THE ENCYCLOPEDIA AMERICANA

In Thirty Volumes

1922
THE ENCYCLOPEDIA AMERICANA CORPORATION
NEW YORK CHICAGO

Vol. 1, A to ANNUALS

Americana

'Myx tfettr

*rtbi\i<

P :Wky/ ii. ,-t 'iwm . *' ^

• ○ s '•. ” V, •' ' •« i′ . *j* •* s '\v • . 7 •' . •’,

-•-'• • '■•;■ •* ;V':\:,‘^V,hV.’.v -j.

: •; • •: ' .

.

/

' .

' * — ~ — i - ^1

Wi—w

SCHOOL OF ATHENS

The fresco of “Philosophy” in the Camera della Segnatura, Vatican Palace, Rome.

Height to arched top 16 feet; width 26 feet 8 inches

This splendid fresco was painted by Raphael in 1511 to represent the “Triumph of Science,” as a companion painting to the Dispute of the Sacrament, representing the “Triumph of Religion.” Philosophy, implying an encyclopedic knowledge of the whole sphere of scientific learning and intellectual culture, is here symbolized. A vast portico is pictured, the arches of which are pierced with statue-filled niches; the facing statues are Apollo and Minerva. The central figures are Plato and Aristotle. Grouped about them are all the philosophers, sages, and elders of antiquity discussing the problem of life. Diogenes is prone on the steps; Aristippus passes him talking to Protagoras; to the left, on the steps, Alcibiades, Xenophon and others are listening to Socrates. Below them are Pythagoras, with his wife Theano, his son Telauges, and his pupil Archytas; Anaxagoras is standing; Heraclitus sits alone; Democritus and Epicurus at the base of the pillar. To the right on the steps are Pyrrho, Arcesilaus and others; below them Archimedes (a portrait of Bramante) teaches geometry, and Ptolemy and Zoroaster stand beside Raphael, II Sodoma, and Perugino. Vasari says the fresco

represents the union of Theology and Philosophy through Astronomy, and points out St. Matthew as Pythagoras. It has also been said to represent Saint Paul preaching at Athens, and in 1560 Giorgio Mantovano engraved it as Saint Paul disputing with the Stoics and Epicureans.

2T13HTA 30 JOOHDS

.smoS ,90 sis'! naoitsY ,BtuJ«n3»3 Bilob BismsO 9 dt ni "vdqoaoliriq** lo ooasil adT

aodoni 8 }99l dt rftbiw ;i99l di qot barioia ot JrigbH

as ",9on9b2 lo dqmuhT" sdt JnoaaiqaT o} II2I ni l9BriqB.fl[-{d batnisq 2 bw oo29ii bibnolqa airiT ".noigifefl to dqmrjnT *sdt gmtn9a9iq9-r ftn9rnBioB3 od) to 9tuqaia 9d) ot gnbRisq noiaBqmoo b bne gninissl odbnsioa to oiodqa alorfw 9dt to 9sb3lwoad oiboqoloyons ns gnrflqmi ˆdqoaoliri4! bsoiaiq sib doidw to asdois arit ,b9Wloiq ai ooittoq Jasv A .bssilodnrja 9i9d ai ,9w}Iuo IsutosIIotni 9 1& aaujgil Istinoo 9riT .BVianiM bns olloqA sib aenJsia gabst sdJ ;asdoin b9lia-9uˆta riJiw YtiupiJnB to aidbte bne ,393Ba ,2i9dqoaoIidq 9dt IIs 9ib modi JuodB boqrroiQ .ollolanA bns oisi 1 ot anidlfii tnid 89 "3Bq auqqbahA ;aq9ia srft no 9noiq ai a9n9goi(I .9ld to msldoiq aril gniaanoaib ,39)bioo3 oi gninaiail 9ia aisriio bns nodqonsX ,a9bsidbiA ,aqota 9rit no .llal 9dt ol jasioaBjoiˆ;aBiˆ.dooA liquq aid bns ,29subI9T noa aid .onsadT sliw aid diiw .aBiogBri}ˆ*! sib ni9dt wobfif .islliq 9riJ to 93Bd aril }b autuoiqa bns antitoomoCI ;9nolB alia auliloeiaH jgmbnsla ai 3fito§BXEnA io JiBitioq e) a9b9midoiA nwril wolsd ;ai9d1o bns auBiia90xA ,orirxˆ<I 9iB aq9ia 9dt no Jdgh sdi oT bns ,srrtobo2 II ,l9sdqs3 9bi39d bnaia i9taBOioS bns ˆnislo}4! bnB .ˆitsmosg asdosst (9tnEmBia riauoidi ˆdqoaoiid*! bns YSOˆsriT lo noinu adt atxiaaaiqai ooaoit 9dJ aˆsa iiBasV .onigtna4! inis3 in989iq9T o) biaa nsed oafs asd JI .asiogBrint4! as wodtJsM .13 Ivo atnioq bns ˆmonoilaA ri":«p gnituqaib Ins*! tai*2 as Ji b97Bign9 onBVOJnBM oigtoiO 0931 ni bnB .ansdiA Jb aniriossiq Ins4!

.arrB®moiq3 bns aoioJ8 adl

1

c

f

I

I

I

1

l

I

I

THE

ENCYCLOPEDIA

W

AMERICANA

JT

hmˆr

Uhnetˆal

Knowledge,

In Thirty Volumes

) * »

1

P

I

I

1

§

f

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK CHICAGO

P

£

I

I

I

I

I

I

&

*■

N

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, EINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 1 8 1922

v<?^!.A6o 4 31 7

I

THE ENCYCLOPEDIA AMERICANA

GEORGE EDWIN RINES, Editor-in-Chief

PARTIAL LIST OF CONTRIBUTORS TO VOLUME I

ALEXIS, JOSEPH, Ph.D.

Professor of Germanic Languages and Literatures, University of Nebraska

ADAM HOMO

AYRES, SAMUEL G., D.B.

Garrett Biblical Institute

AFRICAN METHODIST EPISCOPAL CHURCH

ALLEGORICAL INTERPRETATION

BRETT, GEORGE M.

Department of Political Science, College of City of New York; in charge of the courses in Accounting

ACCOUNTING

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

ADDISON, JOSEPH

BRUSH, EDWARD HALE

AMERICAN SCULPTURE, HISTORICAL SUBJECTS IN

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

AMERICAN EXPANSION POLICY

CARROLL, HENRY K., LL.D.

Author of “Religious Forces of the United States”

ADVENTISTS

CARVER, THOMAS NIXON, Ph.D., LL.D.

Professor of Political Economy, Harvard University

AGRICULTURE IN THE UNITED STATES

AGRICULTURAL PRODUCTION AND DISTRIBUTION IN THE UNITED STATES

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago.

ALTERNATION OF GENERATIONS

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of Cincinnati

AMADIS DE GAULA ANATOL

COFFIN, EDWIN TRISTAM

Formerly Secretary , Albany Chamber of Commerce

ALBANY, N. Y.

CONKLIN, EDWIN GRANT, Ph.D., Sc.D.

Professor of Zoology, Princeton University

ANATOMY, COMPARATIVE

Y

COUMBE, CLEMENT W.

Technical Art Expert

ACANTHUS IN ART

ALTAR

AMULETS

CURRIER, ANDREW F., M.D.

ANAESTHESIA

DAVENPORT, EUGENE, LL.D.

Dean and Director, University of Illinois College of Agriculture

ANIMALS, DOMESTICATED

DEARBORN, GEORGE VAN NESS, M.D., Ph.D.

Professor of Physiology, Tufts College

ANIMALS, MIND IN THE BRUTE

DE LEON, EDWIN W.

Member Insurance Society of New York

ACCIDENT INSURANCE

DICKINSON, THOMAS H., Ph.D.

Associate Professor of English, University of Wis¬ consin; author of "The Contemporary Drama of England "

ALCHEMIST, THE ALL FOR LOVE

DOLE, NATHAN HASKELL, A.B.

Editor of Tolstoi's " Collected Works"

ANATHEMA, ANDREYEV'S ANNA KARENINA

FARROW, EDWARD S., C.E.

Consulting Civil and Military Engineer

AIR COMPRESSOR AIR GUN

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

ALLOYS

ALUMINO-THERMICS

ANEMOMETER

FOSTER, HON. JOHN W., LL.D.*

American Diplomat; Secretary of State in President Harrison's Cabinet

AMERICAN DIPLOMACY

FOWLER, HENRY T., Ph.D.

Professor of Biblical Literature, Brown University

AMOS, BOOK OF

GARNER, JAMES W., Ph.D.

Professor of Political Economy, University ef Illinois

ALIENS

ALLEGIANCE

Contributors to Volume I — Continued

GOMPERS, SAMUEL

President American Federation of Labor

AMERICAN FEDERATION OF LABOR GREELY, A. W., Ph.D.

Major-General United States Army; author of " Handbook of Alaska "

ALASKA

ALASKA, EXPLORATIONS IN

HALE, EDWARD EVERETT, Ph.D.

Professor of English, Union College

AMERICAN LANDSCAPE PAINTING AMERICAN LITERATURE, SYNOPSIS OF

ANCIENT MARINER, THE

HALLER, WILLIAM, Ph.D.

Instructor in English, Columbia University

ALEXANDER'S FEAST

HAMLIN, ALFRED D. F., A.M., L.H.D.

Professor of the History of Architecture, Columbia University

ABORIGINAL ART

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

ADAM BEDE

HARRY, JOSEPH E., Ph.D.

Authorjof " The Greek Tragic Poets," etc.

ˆSCHYLUS

ALCESTIS

INGERSOLL, ERNEST

Naturalist and Author

ANACONDA

ANIMALS, CLASSIFICATION OF

ISAACS, EDITH J. R.

AMBASSADORS, THE

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

AIDA

JELLIFFE, SMITH ELY, M.D., Ph.D.

Adjunct Professor of Diseases of Mind and Nervous System, Post Graduate Hospital and Medical School; Professor of Psychiatry, Fordham Uni¬ versity, New York

ADRENALS

AEROTHERAPEUTICS

ANATOMY

ANIMAL EXPERIMENTATION

KERR, WILLIAM A. R., Ph.D.

Dean of Faculty of Arts and Sciences, University of Alberta

ALBERTA, CANADA

KEYSER, CASSIUS J., Ph.D.

Professor of Mathematics, Columbia University

ALGEBRA, ELEMENTARY ANALYTICAL METRICS

KRAPP, GEORGE P., Ph.D.

Professor of English, Columbia University

ALFRED THE GREAT ANATOMY OF MELANCHOLY, THE

ANGLO-SAXON LANGUAGE AND LITERATURE

LIPPHARD, WILLIAM B.

AMERICAN BAPTIST FOREIGN MIS¬ SION SOCIETY

LIVINGSTON, ARTHUR

Professor of Romance Languages, The Western Uni¬ versity, London, Ontario

AMINTA

McCREA, NELSON GLENN, Ph.D.

Anthon Professor of Latin Language and Litera¬ ture, Columbia University

ADELPHI

ˆTHIOPICA

AGRICOLA, GNˆUS JULIUS, LIFE7 OF

MACDOUGALL, DUNCAN

AMATEUR THEATRICALS

MILLER, CHARLES H., N.A.

AMERICAN ART

MODELL, DAVID A., A.M.

AMPHITEATROV, ALEXANDER VALENTINOVITCH

MOORE, V. ALVA, B.S., M.D.

Director New York State Veterinary College, Cor¬ nell University

ANIMALS, DISEASES OF

MORGAN, FORREST

Secretary Connecticut Historical Society

ADAMS, JOHN ADAMS, JOHN QUINCY AMERICA

AMERICAN PARTY

AMERICAN POLITICAL ISSUES 1788-

1862

NOURSE, EDWARD E., D.D.

Professor of Biblical Theology, Hartford Theological Seminary

ACTS OF THE APOSTLES

PETROVITCH, WOISLAV M., Ph.D.

Chief of Slavonic Division, New York Public Library

ACADEMY OF FINE ARTS, IMPERIAL RUSSIAN

ACADEMY OF SCIENCE, IMPERIAL RUSSIAN

ALBANIA

PILCHER, LEWIS F., Ph.B., LL.B.

State Architect of New York

ARCHITECTURE

Contributors to Volume I — Concluded

PRESBREY, FRANK, A.M.

The Frank Presbrey Company, New York

ADVERTISING

RINES, GEORGE EDWIN

Editor of “The Foundation Library Co-editor of “The Encyclopedia of Latin America;” Managing Editor of “The German Classics;” “The South in the Building of the Nation,” etc.

AMERICAN POLITICAL ISSUES, 1865-

1918

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

AIR

ALCOHOL

SABINE, WALLACE CLEMENT, D.Sc., D.S.

Professor of Physics, Harvard University

ACOUSTICS

SCOTT, WALTER DILL, Ph.D.

Director Bureau of Salesmanship Research, Carnegie Institute of Technology, Pittsburgh

ADVERTISING, THE PSYCHOLOGY OF

SHOREY, PAUL, Ph.D., LL.D.

Head of Greek Department, University of Chicago

ANACREON

SHOWERMAN, GRANT, Ph.D.

Professor of Latin Literature, University of Wis¬ consin

iENEID, THE

SIEBERT, WILBUR H., A.M.

Professor of European History, Ohio State Uni¬ versity

AMERICAN LOYALISTS

SMITH, CHARLES FORSTER, Ph.D., LL.D.

Professor of Greek and Classical Philology, Uni¬ versity of Wisconsin

ANABASIS, THE

SMITH, DAVID EUGENE, Ph.D., LL.D.

Professor of Mathematics, Teachers College, Co¬ lumbia University

ABACUS

ALGEBRA, HISTORY OF THE ELE¬ MENTS OF

SPENCER, CHARLES WORTHEN, Ph.D.

Assistant Professor in History and Politics, Princeton University

AMERICA, DISCOVERY AND COLONI¬ ZATION

STUART, CHARLES LEONARD, B.A.

Editorial Staff of The Americana

ABYSSINIA

AFRICA

THORNE, CHARLES EMBREE

Director Agricultural Experiment Station, Wooster, Ohio

AGRICULTURAL EXPERIMENT STA¬ TIONS

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

ABSOLOM AND ACHITOPEL ADONAIS

ANDREA DEL SARTO

VOGEL, KARL M., M.D., Ph.G.

Assistant Professor of Clinical Pathology, Columbia University

ALCOHOLISM

WARDROP, G. DOUGLAS

Managing Editor “Aerial Age”

AERONAUTICS, HISTORY OF

AEROPLANE

AEROPLANE ENGINES

WELLS, BENJAMIN WILLIS, Ph.D.

Author of “Modern German Literature”, etc.

ADVENTURES OF BARON MUNCH¬ AUSEN, THE

AMIEL’S JOURNAL

WERNICKE, PAUL, Ph.D.

Professor of Mathematics, State College of Kentucky

ANALYSIS SITUS

WEST, ANDREW FLEMING, Ph.D., LL.D., Litt.D.

Dean of the Graduate School, Princeton University

AMERICAN COLLEGE, THE

WHIPPLE, GUY MONTROSE, Ph.D.

Professor of Education, University of Illinois

ADOLESCENCE

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

AESTHETICS

ALGEBRA

ALPHABET

ANIMALS, CHEMICAL SENSE IN

WILCOX, MARRION, A.M., LL.B.

Co-editor “ Encyclopedia of Latin America ”

ADIRONDACKS

ALPS

ANDES

WILLINGHAM, HENRY J., A.M.

President of State Normal School, Florence, Alabama

ALABAMA

WOLFF, SAMUEL L., Ph.D.

Instructor in English, Columbia University

ALICE’S ADVENTURES IN WONDER¬ LAND

WOODWARD, H. E.

Bureau of Chemistry, Washington, D. C.

AGRICULTURAL CHEMISTRY

YERKES, ROBERT M., Ph.D.

Professor of Psychology, University of Minnesota

ANIMAL PSYCHOLOGY

KEY TO PRONUNCIATION.

••

a

far, father

n

Span, h, as in canon (can'yon), pihon (pen'yon)

a

fate, hate

n g

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

a

all, fall

o or 6

not, on

ch

choose, church

6

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. c, as in de ; eu, as in neuf ; and oeu, as in

oi

oil, soil ; also Ger. ca, as in beutel

boeuf, coeur; Ger. d (or oc), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

ii

between u and e, as in Fr. snr,

Ger. Miillcr

i or 1

him, it

i

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

y

(consonantal) yes, young

j

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or rt, as in embon¬

'(prime),

"(secondary) accents, to indicate

point , Jean, temps

syllabic stress

PREFACE TO THE NEW EDITION

TO impartial critics and scholars, no less than to the thousands of its possessors among the general public, the first edition of The Americana commended itself as a useful work of reference. In many ways, both in its emphasis and in its treatments, it was a departure from the beaten track of earlier works, and experience has shown the wisdom of this departure. The characterization of the work in The Encyclopedia of Educa¬ tion: “ Notable for its fullness in articles dealing with technical subjects, as mathematics, engineering, and the trades,” is true, even if it fails to state the whole truth. In History, Political Economy, Religion, Philosophy, Astronomy, Education, Literature, as well as in topics of general interest, the first edition was not surpassed by any contemporary American work.

In view of the tremendous changes that the great world conflict has brought about in every department of human thought and activity, and the vital necessity for a new and up-to-date restatement of the world’s knowl¬ edge, the publishers determined to issue this new edition, and ordered the work planned upon a scale to make it of still greater utility, retaining whatever features the experience of the past had shown to be excellent, and enlarging and improving wherever necessary to meet present conditions. New depart¬ ments and thousands of new articles have therefore been added, and the whole work has been revised and reset and is printed from new plates. The maps have been prepared especially for this Encyclopedia by the Rand McNally Company of Chicago, and are late and accurate. The illustrations have been carefully selected and are far superior and more numerous than in the former edition. We are confident therefore that the new Americana will be recognized as the greatest repository of practical universal knowledge in one set of books that has ever appeared in the English language.

In the new edition, the Editor has endeavored to limit the work to its

legitimate purpose — the presentation of knowledge with faithfulness and

with scholarly impartiality, avoiding the promotion of theories and such discussions and defenses as are entirely foreign to the character and nature of an encyclopedia. Every effort has been made to secure not only accuracy of statement but also fairness and correctness of view.

The “ Americana idea ” is not simply a reference “ book of facts ” — too brief to be of any special value to the intelligent reader; nor yet a series of “ learned and splendid essays,” showing an utter misconception of the idea which justifies the existence of a general work of reference. It is rather an endeavor to present, in an intelligent and informing way, the history and nature of the civilization, institutions, systems, activities and achievements of man¬ kind with sufficient fullness to furnish the general reader a fair and adequate understanding of the development of man and his social life. In dealing with “ the dead past and the living present ” this Encyclopedia does not seek to dogmatize beyond the established facts. It is content to tell what is known so far as we know it, and leave it there. It knows no north or south — no national boundaries; it has no political, governmental, religious, or social proclivities or antipathies; it is neither pro nor anti; it is neither a maker nor an ultimate interpreter of history; it does not preach sermons, or inculcate morals, or prophesy future events; it neither eulogizes good men nor abuses the bad; but seeks to maintain in all things the spirit of fairness, and aims to avoid pedantry and intellectual cocksuredness.

The prime object has been to give a clear, concrete, definite, truthful and up-to-date statement of every subject, without prejudice or bias of any kind; to present in the most intelligent, authoritative, impersonal and impar¬ tial manner the actual facts of knowledge so far as it is humanly possible to do so. True, analysis must be made; opinion must be offered; judgment must be passed; perhaps criticism and even condemnation may occasionally be necessary, but it must all be done in the spirit of true scholarship and high service.

The thousands of contributors are representative of the highest scholar¬ ship and authority in the United States and other countries, and the editorial staff is composed of men and women of wide knowledge and experience, pos¬ sessing special encyclopedia training.

The Editor-in-Chief and his staff of co-workers are solely responsible for the literary development of this work. Appreciative

acknowledgment, however, is due and is here made, to all the friends of this enterprise who have

encouraged its production, and especially to those who by their practical advice and scholarly assistance, as well as by their personal contributions, have rendered invaluable service, among whom may be mentioned:

Professor James E. Creighton, Ph.D.

(Philosophy)

Professor George T. Ladd, D.D., LL.D.

(Philosophy and Japan)

Professor Albert B. Hart, Ph.D., LL.D., Litt.D.

(History and Government)

Professor Eric Doolittle, C.E.

(Astronomy)

Professor Charles L. Dake, Ph.D.

(Geology)

Lewis F. Pilcher, Ph.B., LL.D.

(Architecture)

Professor William Benjamin Smith, Ph.D. (Biblical Literature)

Professor William P. Trent, LL.D., D.C.L.

(English Literature)

George F. Kunz, Ph.D., Sc.D.

(Gems and Precious Stones)

Thomas E. Finegan, Pd.D., LL.D.

(Education)

Professor Cassius J. Keyser, Ph.D.

(Mathematics)

Smith Ely Jelliffe, M.D., Ph.D.

(Medicine)

James A. Sullivan, Ph.D.

(History and Government)

James M. Walsh, M.D., LL.D., Litt.D., Sc.D.

(Medicine and History)

Professor Marion Tucker, Ph.D.

(English Literature)

Professor Thomas N. Carver, Ph.D., LL.D.

(Economics)

William Elliot Griffis, D.D., LL.D.

(China and Japan)

Professor Alfred G. Panaroni, B.S.

(Italian Department)

Professor Jacob W. Hartmann, Ph.D.

(German Literature)

Professor William F. Hauhart, Ph.D.

(German Literature)

Professor Abram S. Isaacs, Ph.D.

(Jewish Topics)

Professor Patrick A. Halpin, Ph.D.

(Catholic Topics)

Charles F. Beach, LL.B.

(French Department)

Professor James M. Callahan, Ph.D.

(Political Science)

Allan D. Risteen, Ph.D.

(Chemistry)

Ernest Ingersoll (Biology)

Professor James W. Garner, Ph.D.

(Political Science)

Norbert Wiener, Ph.D.

(Mathematics)

Paul C. Standley (Botany)

Elmer C. Youngman

(Banking and Finance)

Nelson LI. Darton

(Minerals and Geological Subjects, etc.)

Professor Eugene Davenport, LL.D.

(Cattle and Live Stock)

Professor Richard F. Deimel, B.S., M.A. (Mechanics)

Oscar P. Austin, A.M.,

(Commerce and Trade)

Professor Frederick H. Newell, B.S., D.Eng. (Civil Engineering)

Henry K. Carroll, LL.D.

(Religious Denominations and Statistics)

Marrion Wilcox, A.M., LL.B.

(Latin America)

Professor John Hubert Cornyn, B.A., LL.B. (Latin America)

Samuel G. Ayres, B.D.

(Religious Biography, etc.)

Clement W. Co umbe

(Art Topics)

To give an adequate statement of the civilization of the world to date, even thirty volumes have proved few enough, but it is the hope and belief of the Editor that the new edition of The Americana will prove an efficient aid to the educational and intellectual forces of America, and of especial value at this time to the American public, but to ah who speak or read the English language throughout the world.

.

' 0<-\ ' i*rri d v >rru; ˆvn u- :. rkuf;: ni 1* a J>n n 9 n.rl

,l T |1 ; . y ■ n \ i.

. .

i 'T

ill ir' {

•

.

■

,

A The first letter of every alphabet ex¬ cept the old German or Runic and the Ethiopian : the (<futhark)) of the former places it fourth, the latter makes it thirteenth. As all alphabets ultimately come through the Phoenician (wit¬ ness the name itself), this arrangement is natural. Our own is inherited from the Latin, which was derived from the Greek; and the latter in its alpha confirms its traditional deri¬ vation from the Phoenician where and in Hebrew it is called aleph, Aramaic alph. The name is said to have meant ˆox,® and so strongly

resembles the root-element of eleph¬ ant that there is little doubt the original mean¬ ing of both was the same. Hence formerly the shape of the lower-case a was derived by some from the rough outline of an ox-head with its horns; but in fact, as evidenced by a comparison of the gradual evolution of forms, the small letters in all cases are derived from the capitals, and the Greek capital A (see table under Alphabet) in its original shape was a somewhat more cursive form of the Phoenician aleph which itself was a conven¬ tionalized form of the Egyptian hieratic, and that in turn (the final step backward) was conventionalized from the picture of an ibis in the ancient Egyptian hieroglyphics or ideographs.

The sound of the letter has varied little more than the form — perhaps less — except in modern English, which owing to its composite character has made it a symbol of so many different vowel-sounds as to be well-nigh meaningless. Yet even here most of them have never quite lost connection with the earlier vocal efforts it stood for, and their fluctuations are fixed by the character of the vocal opening. The Phoenician sound repre¬ sented by the letter aleph cannot have cor¬ responded to the Greek alpha or any of its derivatives, as the former alphabet assumed that all syllables began with consonants, and aleph was in some sort consonantal; but the Greeks made it a pure vowel, the so-called “Continental® or broad a as in “ah.® This is the simplest and most fundamental of all vowel-sounds, the earliest uttered by infants, — whence many grotesque theories of its divine origin and the reasons for its position, — since it results from opening the throat and mouth wide and emitting the tone from the larynx, with the least friction or interference possible

from the other organs; and it is still the most general on the Continent of Europe. But even there it has been largely flattened by the French into the short sound as in “at® ; at the end of words in all languages the dropping of the voice tends to slur it toward the sound of u in “but,® which in English it quite attains ; and with us it has become the representative of nine distinct sounds, seven of them each recognizably developed from one of the others, and all from the parent sound, while two are of a different order yet still explicable. The usual arrangement (“fate, fat, far, fall,® etc.) is entirely misleading, as it obliterates this evolution which the following makes clear :

(1) ah, explained above.

(2) all, a closer sound than (1), formed by drawing back the tongue, compressing the sides of the throat, and speaking more toward the

diaphragm. In general utterance this is perhaps the first change from ah. It is almost universal among the Hindu and Persian masses (“ghaut® for ghat, etc.), and was very common in England and America in the 18th century : witness pronunciations like “spaw® for “spa® ; the curious aberrant “vawz® for “vahz® which has more curiously become ac¬ cepted as a sort of social touchstone in a small group ; family names like Raleigh, Decatur Taney, etc., in American pronunciation.

(3) was, what. The same pronounced still deeper in the diaphragm, and cut short instead of prolonged.

(4) oval. This is the “ neutral ® sound, cor¬ responding to “short u® ; used in Western lan¬ guages only in unaccented syllables, and made by lazily opening the organs as little as possible and putting no stress on the expiration of the breath. It is the closest of the vowel-sounds, and the most diaphragmal, and therefore seem¬ ingly the antithesis of C(broad a® ; it has in truth no special relation to that more than to e and o (“silent,® “apron®), but is the common weakened form of all. In Hindu speech it is used stressed, as in the familiar “Juggernaut® (Jaganath), “Buckergunge® (Bakarganj), etc.

(5) bare. A more open sound than (1), formed in precisely the same manner as (2) except by expanding instead of contracting the throat.

(6) at. Identical with (5) except being cut short instead of prolonged ; in fact, its short sound.

(7) ask. Always a different sound from

the others, but not always the same in itself. With the less cultivated speakers it is nearly identical with (5), even with (6). With others, anxious to avoid the flatness and ex¬ aggerating in the opposite direction, it is made identical with (1). With the majority of good speakers it is akin to (1), but shorter and more diaphragmal, and with the organs rather closer together.

(8) any, many. This is not one of the group of a-sounds, but is <(short e.® The change was caused by assimilation of the a-sound to the i-sound of the closing letter.

(9) ate. This, in usual order the first given, considered the typical English a-sound, and actually furnishing the pronunciation of that letter in its alphabetic position, is not merely not an a-sound at all, but not even a simple vowel-sound being nearly ei, sliding quickly from a closer and more diaphragmal ((short e® to a vanishing sound of <(short i.® As in (8), the cause appears to have been originally as¬ similation with a final vowel (the sonant e now so often silent but ˆlengthening® the a before it), and afterwards extended to words where this principle could not act.

A, in general, the first term of any series.

In music, the first note of the scale of A, major minor; and A minor is the relative (or related) minor of (or belonging to) C major; the Continental la. The open second string of the violin sounds it, and the instruments of an orchestra are all tuned to it. As a fixed tone a' (435 vibrations) is the standard by which all instruments are tuned. In theoretical works A denotes the triad of A major and a the triad of A minor. In the score of works requiring more than one performer the letters of the alphabet are used as guides, to help find the places readily in case of repetition.

In logic, the universal affirmative (((all trade is barter®), distinguished from the particular affirmative (“some trade is barter®). See Logic.

In algebra, the first letters of the alphabet, a, b, c, etc., are used to denote known quanti¬ ties, while the last, down to z, denote the un¬ known, — a and x being used first in all cases, the others being added according to need.

In geometry and mechanical diagrams, the capitals A, B, C, etc., are used to mark off points, lines, angles, and figures ; in compli¬ cated diagrams, often supplemented by the small letters and accented, to indicate the closer relations of parts.

As an abbreviation, see Abbreviations.

As an adjective or attributive, shaped like the letter A ; as an A tent.

Consult Petrie, W. M. F., (The Formation of the Alphabet (1912) ; Rippmann, (Sounds of Spoken English > (London 1910); Stuc.ken, (Das Alphabet und die Mundstationen) (1913) ; Sweet, < History of English Sounds > (Oxford 1908) ; Taylor, I., (The Alphabet (London

1883).

A is also the first of the Dominical Letters.

A, word. (1) The form of ((an® used before consonants. (2) Broken-down form of <(on,® or ellipsis of <(for a® (((twice a day®). (3) Old form of <(ah,® as a war-cry (((A Doug¬ las!®).

Al, a-one (colloquially, <(first-class®), the mark for highest-grade wooden vessels in Lloyd's (q.v.) (Register of Shipping.* A re¬

fers to hull, 1 to rigging and equipment. This rank is assigned by Lloyd's surveyors to new ships for a term of years prefixed to the sym¬ bol, as 10A1) dependent on quality of mate¬ rials and mode of building; but to retain it they must be periodically resurveyed, and if fit are granted continuation for one to eight years, marked 10A1 Cont. 5A1, etc. A in red means over-age, but still fit for any voyages which perishable goods can endure ; JE in black, fit for short trips with similar goods. In all cases the 1 is omitted if rigging, etc., are inferior. Iron and steel vessels have a Gothic A preceded by numerals from 100 down, 100A to 90A re¬ surveyed once in four years, 85A and below once in three ; rigging, etc., marked same as on wooden ships. In the German Lloyd's Al and A are the two best grades of wooden ships: Bl, B, CL, and CK, lower ones; iron and steel ships are marked as in the English classifica¬ tion, but with the resurvey term marked under the A.

A a, a (<(water®: a general Indo-European word in various shapes, — Ger. ach or aach in Aachen, Biberach, etc. ; Lat. aqua, pi. aquae, whence O.F. Aigues, Mod.F. Aix, in com¬ pounds; etc.), the name of some forty streams in northern and central Europe : among the chief, a French river rising in dept. Pas-de- Calais, flowing into dept. Nord, and reaching the Strait of Dover at Gravelines ; about 50 miles long, navigable below St. Omer, and connected with Calais and Dunkirk by canals.

Aa, geologically, a Hawaiian term much in use to describe lava flows with rough, cindery surfaces.

AACHEN, a' Hen. See Aix-la-Chapelle.

AAGESEN, Andrew, a'ge-sen, Danish statesman and jurist: b. 1826; d. 1879. In early life he commanded a reserve battalion in the Schleswig war of 1848. He was appointed professor of jurisprudence in his alma mater, the University of Copenhagen in 1855, where he was distinguished by his learning and attractive personality. He was an expert in Roman law, in maritime and commercial legis¬ lation, and

was the chief author of the naviga¬ tion law of 1882. He was elected to the Lands- thing in 1879.

AAHMES or AHMES, a'mess, (c. 1700 b.c.) the author of the hieratic papyrus in the Rhind collection, deciphered by Eisenlohr in 1877, which is the first extant mathematical document from Egypt, or indeed from any¬ where. It contains crude approximations to the area of an isosceles triangle or trapezoid, and the fairly correct value (ˆ)2 for tt. It also contains the first trace of the notion of equa¬ tion.

AAHMES I, the founder of the 18th dynasty in Egypt, c. 1600 b.c., and its final liberator from the Hyksos or Shepherd Kings, Asiatic nomads who had conquered the land a century or two before. Native kings had already recovered it in part; but Aahmes cap¬ tured the last Elyksos fortress, Hatwaret (Awaris), expelled them from Egypt, and fol¬ lowed them into southern Palestine, besieged their army five years in <(Sharuhen® and cap¬ tured it. He then penetrated farther into Palestine, levying tribute on it and on the seaboard. Thus began a long series of Egyp-

tian retaliatory expeditions into West Asia and a long dominance over it. He had an admiral of the same name, whose self-laudatory in¬ scription on his tomb is a most valuable mine of knowledge on the military and naval opera¬ tions of the time. Aahmes-Nefertari was his queen : her mummy-case, one of the most mag¬ nificent ever discovered, is in the museum at Gizeh.

AAHMES II, the Amasis of Herodotus, fifth Pharaoh of the 26th dynasty, c. 570-526 b.c. An officer of Aipries headed a revolt against him, and overthrew and killed him. Though he seems to have risen from the ranks, and to have loved roystering and disliked royal etiquette, he made a capable and judicious sov¬ ereign; saved Egypt from conquest by Nebu¬ chadnezzar (who ravaged it, but retreated), and managed to preserve it from invasion by Cyrus the Great. He was on very friendly terms with the Greeks : lending his influence to promote their commerce and colonization ; assigning them the excellent port of Naucratis, which soon grew into a flourishing city ; con¬ tributing liberally toward the rebuilding of the burned temple at Delphi ; and according to Greek story having cordial relations with sev¬ eral philosophers and princes — Pythagoras, Polycrates, etc. Under the reign of Aahmes Egypt enjoyed much prosperity.

AALBORG, al'bork ((<eel-town®), Den¬ mark, the chief city of N. Jutland; on the south side of the Limfjord (a sea-arm which joins the Cattegat to the North Sea), and on the Danish State Ry., which crosses the fjord by an iron bridge 990 feet long, one of the finest pieces of engineering in the kingdom. An important commercial town as far back as the 11th century (Wallenstein sacked it in 1627, the Swedes in 1644 and 1657). Despite a shallow harbor it has much trade, by means of small vessels, with Scandinavia and Eng¬ land ; and it manufactures liquors, leather, lumber, soap, cement, cotton goods, etc. A bishop's seat, it has a cathedral ; also two old churches, an old castle, a museum, and a well equipped library. Pop. 33,500.

AALESUND. See Alesund.

AALEN, a'len, Germany, town of Wurt- temberg on the Kocher river, 46 miles by rail east of Stuttgart. It is situated in the foot¬ hills of the Swabian Alps, 1,400 feet above sea- level. It was the boyhood home of Christian Schubert, the poet, who is commemorated by a statue. It has large iron works and woolen, linen, ribbon and leather manufactures are car¬ ried on. Aalen was a free imperial city from 1360 until its annexation to Wurttemberg in 1802. Pop. 11,400.

AALI PASHA, Mehemed Emin, a-le' pa¬ sha', me-hem-ed' a-min', a Turkish statesman: b. Constantinople 1815; d. 6 Sept. 1871. Enter¬ ing public life at 15, he was charge d'affaires at London 1838, ambassador to Great Britain 1841-44; chancellor of the divan 1845; thrice minister of foreign affairs in the troublous years 1846-52; grand vizier a short time in 1852 but soon displaced as not in political ac¬ cord with his companions. Recalled as foreign minister during the Crimean war of 1854, in March 1855 he took part in the treaty of the ftfour guarantees®; in July again became

grand vizier, and at the Treaty of Paris in 1856 showed great decision and cleverness in looking after Turkish interests, but without entire success. In November his political tone forced him to resign, but he remained minister without portfolio, and member of the Great Council. After Reshid Pasha's death in 1858 he was again grand vizier, and soon again withdrawn; but in November 1861 he resumed the office of foreign minister. He was presi¬ dent of the convention on Rumanian affairs, Paris 1864, and member of the Black Sea Con¬ ference in London 1871. During the Sultan's absence at the Paris Exposition in 1867 he was regent ; and while the very soul of the reform movement energetically suppressed the Cretan rebellion and the movement for Egyp¬ tian independence. In the full tide of activity he suddenly died, — an excellent man and statesman who strove all

his life, like Midhat Pasha, but with little success, to regenerate and modernize his country.

AAR or A ARE, ar (ˆriver®), the name of several German streams : chiefly, a Swiss river tributary to the Rhine, about 175 miles long, the largest in Switzerland save that and the Rhone. Formed by torrents from the vast and famous Oberaar and Unteraar glaciers of the Bernese Alps in E. Bern, it flows northwest through the valley of Hasli over the Handeck Falls, 200 feet high, expands into Lake Brienz, and past Interlaken into Lake Thun, becomes navigable, passes Bern, turns north and then northeast along the southern slopes of the Jura, past Solothurn and Aarau, and join¬ ing the Liminat, shortly after breaks through the ridge and empties into the Rhine at Waldshut. Chief affluents, the Saane, Zihl, and Enime, the Reuss feeding it from the lake of Lucerne and Zuger See, the Limmat from the lake of Zurich and the Lutschine from the two splendid Grindelwald glaciers. The chief cities on its banks are Bern, Solothurn, Aarau and Interlaken.

AARAU, (((Aar-meadow®), Switzerland, capital of the canton of-Aargau ; right bank of the Aar, 41 miles northeast of Bern, 1,100 feet above sea-level, in a fertile plain just south of the Jura, whose peaks close by are the Wasserfluh (2,850 feet) and Giselahfluh (2,540 feet). It has famous manufactures of cannon, bells, and fine scientific instruments, besides cutlery, leather, silk, and cotton ; and holds eight fairs yearly. There are also historic, scientific, and ethnographic museums, a can¬ tonal library rich in volumes of Swiss history, and a bronze statue of the historian and novel¬ ist Heinrich Zschokke (q.v.), who lived here. Here, December 1797, the old Swiss confeder¬ acy held its last session ; April to September 1798 it was the capital of the Helvetic Republic. Pop. 9,800.

AARDVARK, ard'viirk (Dutch, «earth- pig®), the Cape ant-eater (Orycteropus capen- sis). Also called ground-hog and ant-bear. A South African mammal measuring about five feet from end of tubular snout to tip of long naked tail. It lives in shallow burrows and is of timid, nocturnal habit; it feeds on ants and other insects, licking them up with a long tongue which secretes a sticky saliva. The head is slightly pig-like, with erect ears ; the

stout body is sparsely covered with short stiff hairs ; the limbs are short, with strong claws for digging; the flesh is edible and considered

delicate, though of peculiar flavor. See Ant- eater.

AARDWOLF (Dutch, ˆearth-wolf®), a timid, nocturnal South African carnivore (Pro- teles lalandii), the only representative of the family Protelidcc. It resembles the hyena, to which it is closely related, but has less strength of jaw and teeth. Its fur is coarse; color ashy-gray irregularly striped with black; muzzle, black and nearly naked ; ears, brown outside, gray within. It inhabits burrows, and being unable to kill vertebrates lives upon insects, larvae, and small carrion.

AARESTRUP, Emil, a're-stroop, Danish poet (1800-56). He was born in Copenhagen. He was not duly appreciated until after his death, but is now acknowledged one of the foremost lyric poets of Denmark, ranking next to Christian Winther. His (Collected Poems,) with critical sketch by G. Brandes, was pub¬ lished at Copenhagen in 1877.

AARGAU, ar'gow (((Aar-shire® : Fr. Ar- govie, ar-go-ve), Switzerland, an extreme N. canton between Basel W., Zurich E., Lucerne S., and the Rhine and Baden N. Area 542 square miles ; capital, Aarau. It consists mainly of spurs of the Alps and Jura, nowhere over 3,000 feet above sea-level, with numerous fertile valleys watered by the Aar and its S.E. tributaries, the Limmat (or Linth) and Reuss (see Aar) being chief. The climate is moist and variable, and stock-farming and agricul¬ ture are advanced: fruit, vegetables, and vines abound, but the wines are inferior. Timber is plentiful. Manufactures : cottons, silks, rib¬ bons, linens, hosiery, straw-plait, etc., and im¬ portant machine works. The boat traffic on the Aar and Rhine, and the active land and water transit trade, employ many. It has several picturesque ruined castles. Aargau, part of old Helvetia, then conquered by the Franks (5th century), a Hapsburg fief 1173- 1415, then captured by- the Cantonal League and divided between Bern and Lucerne, was split up and a part made a member of the Helvetic Republic 1798. Its constitution was first fixed by the Congress of Vienna in 1815 ; in 1831 it gained a democratic one, and has ever since been a champion of liberalism. In 1841 it suppressed its eight monasteries, and this led to the formation of the Sonderbund (q.v.), or Secession League, of Catholic cantons in 1847. Legislative power is vested in the Great Council, one member for every 1,100 people, which has to submit laws and decrees to a ref¬ erendum ; executive power in the Small Council of five, chosen by and from the Great one. Aar¬ gau sends 10 members to the National Council. Pop. 236,860, nearly all German. See Switzer¬ land and consult Hierli, J., (Die archaolo- gische Karte des Kantons Aargau) (Aarau 1899) ; Zschokke, E., (Geschichte des Aargaus) (ib* 1903), and (Historische Gesellschaft des Kantons Aargau) (ib., 1898).

AARHUUS, ar'-hoos, Denmark. (1) Dis¬ trict, the east central part of Jutland, divided into Aarhuus and Randers amfs (or baili¬ wicks) ; area, 1,821 square miles; pop. about 325,000, mainly employed in fishing industries. (2) City, the second largest of Denmark, capi¬

tal of Aarhuus amt, on a bay of the Cattegat and the Danish State Ry. ; has a harbor made in 1883-90, with a breakwater and six feet of water, regular steamer lines to Copenhagen and England, and a large trade in grain, cattle, etc. ; and much shipbuilding, iron¬ founding, cotton-spinning, and other manufac¬ tures. It is a bishop's seat since 948, making it one of the oldest cities in Denmark; its cathedral, begun in 1201, is one of the largest and finest church buildings in the kingdom. It has a museum, banks and a stock exchange. Pop. about 62,000.

AARON, ar'un, a prominent but subordi¬ nate figure of the Exodus period in Jewish history, whose importance increases with the distance of the recorder from the early epochs, and with the remodeling of the early histories by the priesthood to support their later pre¬ tensions and their theocratic ideal of Judaism. In the earliest or Elohistic (q.v.) portions of the Hexateuch, he is brother of Miriam (Ex. xv, 20) ; but it is Joshua who is Moses' min¬ ister for religious rites and who keeps guard over the tent of meeting (Ex. xxiii, 11), the young men of Israel offer sacrifice, and Moses alone is the high-priest. Aaron, however, seems to be regarded as ancestor of one set of priests, those at the Hill of Phinehas, and perhaps of those at Bethel. In a later portion it is he who yields to the demand for an idol, and fashions the golden calf — an evident genealogy of Baal-worship, accredited to the ancestor of rival priests. In the Yahvistic portions he is Moses' older brother, but is brought upon the stage only to be ignored : Pharaoh sends for him and Moses to take away the plagues (Ex. vii), but he has no independent power and is merely Moses' agent in performing miracles, bringing on plagues, etc. The supererogatory nature of his func¬ tions makes it probable that his role is intro¬ duced by the priestly redactor, under whose hands he becomes a mighty leader little inferior to Moses : he sometimes receives laws directly from Yahwc (Num. xviii) ; he with Moses numbers the people; the Israelites rebel against him as well as Moses, though, when he criti¬ cises Moses, curiously his inciter Miriam is punished, not himself (Num. xii) ; he and Moses jointly disobey Yahwe's command at Meribah ; and he is punished by having his life close before entering Canaan. This magnify¬ ing connects itself clearly with the post-exilic books, where he is the ancestor of all legiti¬ mate priests, consecrated high-priest by Moses, and alone permitted to enter the Holy of Holies yearly : he represents the tribe of Levi, and even within

it his descendants alone are right¬ ful priests, and interlopers (see Korah) are stricken dead by Yahwe. The pre-exilic prophets know nothing of this claim : Ezekiel traces the origin of the Jerusalem priesthood only to Zadok (q.v.). He belongs to the tribe of Joseph and its struggle to secure admission to the Jerusalem priesthood. Consult Meyer, Ed., (Die Israelitcn und ihre Nachbarstamme) (1906) ; Schmidt, N., (jeramcel and the Negeb * (in the Hibbert Journal 1908) ; Oort (Die AaroniedetP (in Theologisch Tijdschrift

1884).

AARON BEN ASHER, Jewish scholar: lived in Tiberias early in the 10th century. He

completed one of the two existing recensions of the vowels and accents of the Hebrew Bible. His rival Ben Naftali also completed a similar work, but the readings of the former are usually preferred.

AARON BEN ELIJAH, renowned Karaite theologian: b. Cairo, Egypt, 1300; d. Constanti¬ nople 1369. To distinguish him from his father, Aaron ben Joseph, also a famous scholar, he was often called ((Aaron the Younger.® By many he is considered the most logical reasoner of the Karaite school and in the profundity of his learning the equal of Maimonides. In accordance .with the doctrines of the Mutazil- ites, which influenced him early in his career, he emphasized the reason as the medium for sal¬ vation and enunciated a materialistic theory of the universe, though of divine origin. His first work was (Ez ha-Hayyim) ((The Tree of Life), 1346), which was followed by (Gan Eden) ((The Garden of Eden), a Karaite code, 1354); (Keter Torah > ((The Crown of the Law\ a commentary on the Pentateuch, 1362). Most of his life he lived in Nicomedia, in Asia Minor, but later in life took up his residence in Constantinople.

AARON, Hill of, a lofty mountain range of Arabia Petraea, in the district of Sherah or Seir, 15 miles southwest of Shobeck. On its highest pinnacle — called by the Arabs Nebi Haroun — is a small building supposed by the natives to inclose the tomb of Aaron ; and it may be the Mount Hor of Num. xxxiii.

AARSENS, Frans Van, ar'sens, Dutch dip¬ lomat : b. Tfie Hague, 1572; d. 1641. From 26 on he represented the States-General at the court of France for many years, first as agent and then as ambassador ; and

Richelieu ranked him one of the three greatest politicians of his time. He also held embassies to Venice, Germany, and England. The judicial murder of John of Barneveld by Maurice of Orange in 1619 was greatly helped on by Aarsens, who has gained a tardy popular opprobrium for it through Mot¬ ley's life of John.

AASEN, Ivar Andreas, a'sen, e'var iin'dra- as, Norwegian philologist and poet: b. Orsten, 1 Aug. 1813 ; d. 1896. At first a botanist, he turned philologist and student of native dialects from motives of patriotic enthusiasm: his great aim was to construct from their older elements a new national language ((<Landsmaal®), as a substitute for Danish, in pursuance of which end he published several valuable philological works and set going the nationalistic movement called ((maalstroev.® As a poet he produced <Symra,) a collection of lyrics, and ˆrvingenC a drama.

AASVAR, as'-var, Norwegian islands near the Arctic Circle, where the .great Nordland herring are caught in December and January to the extent of sometimes 200,000 tons, and 10,000 men are employed, who live elsewhere the rest of the year.

AASVOGEL, as'f o-gel (ˆcarrion-bird®), the South African vulture, of several different species.

AB, the 11th month of the Hebrews' civil year and the 5th of their ecclesiastical (which begins with Nisan), has 30 days, and answers to the July moon, or part of our July and August. The 9th day was a great fast in

memory of the destruction of the first temple by Nebuchadnezzar, 586 b.c., and the second by Titus, 70 a.d.

ABA or ABU HANIFAH, or HANFA,

ii'ba or a'boo ha-ne'fa, or hiin'fa, surnamed Alnooma : b. in the 80th and d. in the 150th year of the Hegira (701-71) He is the most celebrated doctor of the orthodox Mussulmans, and his sect is the most esteemed of the four which they severally follow.

ABA, a'ba, a mountain in Armenia, part of Mount Taurus, where the rivers Araxes and Euphrates have their rise.

ABABDA, ab ab'da, a wandering tribe of Hamitic Arabs found on the southern border of Egypt east of the Nile from Assuan to the Red Sea and north to Kena-Kosseir. They now number about 30,000, governed by an hereditary chief, but in ancient days were much more

numerous. The more enterprising still carry on their old occupation of caravan guards, and others of trade carriers, and as dealers in herbs, drugs and gums. During the Mahdist wars of 1882-98 many enlisted in the Anglo-Egyptian troops. Under British rule they have advanced considerably and now engage profitably in agricultural and fishing industries. Self-styled (<sons of Jinns,® they are claimed to be descendants of the Troglo¬ dytes and Blemmyes of' classic ages, the Gebadei of Pliny, who inhabited the same region.

ABACO, a'ba-ko (or Lucaya), Great and Little, two Bahama islands 150 miles east of Florida. Great Abaco, the largest of the Baha¬ mas, is about 80 miles long by 20 wide, with a lighthouse at its southeast point, at a natural perforation of the rock known to seamen as (<The Hole-in-the-Wall.® Little Abaco, 28 miles long, lies west of its north point. Area of both, 879 square miles ; pop. 2,400.

ABACUS (Greek a, flan) from the Semitic pns, abq, dust). In mathematics, a term ap¬ plied to several forms of reckoning apparatus, and hence for some centuries to arithmetic itself. The primitive form seems to have been a board covered with fine dust, whence the generic name. Among the Hindus this was a wooden tablet covered with pipe clay, upon which was sprinkled purple sand, the numerals being written with a stylus. (Consult Taylor, in the preface to his translation of the (Lila- wati,} Bombay 1816, p. 6). That this form was used by the ancient Greeks is evident from Iamblichus, who asserts that Pythagoras taught geometry as well as arithmetic upon an abacus. Its use among the Romans of the classical period is also well attested. Another form of the abacus, having many modifications, is a board with beads sliding in grooves or on wires in a frame. Herodotus tells us that this in¬ strument was used by the Egyptians and the Greeks, and we have evidence that the Romans also knew it, although preferring a form de¬ scribed below. It is at present widely used in India and appears in the form of the swan pan in China, the sciroban in Japan, and the tschoty in Russia, the latter being the same as the modern Arabian abacus. In its simplest form, the beads or counters are stored at one end of the frame and the computation is done at the other end by moving the correct number of

beads over against that side of the frame. Usually on a decimal scale, the separate wires represent units, tens, hundreds, etc., progres¬ sively' but a duodecimal scale is also in use, and among the Chinese

there is a separate division horizontally across the frame below which units are counted up to five, and the fives transferred to the upper section where each bead stands for five units. In parts of India where English money is used the wires on the abacus represent pence, shillings, pounds, tens of pounds, hun¬ dreds of pounds, etc., there being 11 beads on the first wire, 19 on the second, and 9 on each one above. It is in this type of the abacus that prayer beads have their origin. The third form is a ruled table, upon which counters are placed, somewhat like checkers on a backgam¬ mon board, a game derived from this type of abacus. This was the favorite form among the Romans, whose numerals were not at all adapted to calculation, and it maintained its position throughout the Middle Ages and until the latter part of the 16th century. The Hindu- Arabic numerals (see Numericals) having then supplanted the Roman, such an aid to calcula¬ tion was thought superfluous in western Europe. The counters used were called ipˆoi by the Greeks, calculi (pebbles, whence cal- culare and our calculate) by the Romans, and in Cicero's time aera because brass discs were used. In mediaeval times they were called projectiles because they were thrown upon the table, whence our expression to <(cast an ac¬ count,® and Shakespeare's <(counter caster.® The early French translated this as gettons, gectoirs, and jetons, whence our obsolete English jettons and the modern French jeton, meaning a medal, and also a counter for games. The Germans translated the late Latin denarii supputarii

transactions of the Asiatic Society of Japan, > Vol. XIV) ; Bayley, in the Journal of the Royal Asiatic Society (N.S., Vol. XV) ; Chasles, in the Comptes rendus, t. 16, 1843, p. 1409; Woepcke, in the Journal asiatique, 6 ser., t. 1. See Finger Notation.

David Eugene Smith,

IJrofessor of Mathematics, Teachers College, Columbia University, New York.

ABACUS. In architecture, the flat stone forming the highest member of a column, next under the architrave and bearing its first weight. In the Tuscan, Doric, and Ionic orders, its four sides are arched inward, with generally a rose in the centre. In Gothic architecture it was variously employed, according to the archi¬ tect's fancy.

ABAD' (((abode®), a suffix meaning town or city, common in Hindu and Persian names : as Allahabad, city of God ; Hyderabad, city of Hyder; Secunderabad, city of Alexander.

ABAD'DON, in the Old Testament and the rabbinical literature, Sheol, the underworld, or the place of the lost in it : in Revelation (ix, 11) the King of the Abyss, Greek Apollyon.

ABADIR, according to Augustine, the chief god of the Carthaginians ; according to Pris- cian, a stone which Saturn swallowed by con¬ trivance of his wife Ops, believing it to be his new-born son Jupiter, and hence worshipped with divine honors.

ABAKANSK', a mountain range in Siberia, extending from the upper Yenisei to the Tom River, parallel to the Altai Mountains. Also a town founded by Peter the Great in 1707, near the Abakan River; now renamed Minusinsk (q.v.).

AB'ALO'NE (Sp., origin unknown). Any one of the several species of Haliotis (ear- shells or sea-ears) found along the California coast. The shell is a spiral so broadly flattened as to make an oval saucer, around the edge of which is a row of holes through which the tentacles pass when extended. The animal lives on rocks near the shore, feeding on seaweed; when frightened it withdraws entirely beneath its shell and clings with surprising force to the rock. The shell is lined with a bright mother- of-pearl much used in arts and crafts. The animal itself is used as food by the Chinese and Japanese; quantities of them are dried and exported from California to the Orient. The name <(abalone® is local, but marine gastropods of the same family are abundant in all seas not too cold, outside the western Atlantic. In the Channel Islands off the coast of France, a species known as ormers, Fr. (oreilles de mer f* is used as food. See Ear-shell.

ABANAH, a-ba'na, or AMANAH (Gr.

Chrysorrhoas, now Barada, ((The cold®), one of the two famous (< rivers of Damascus® men¬ tioned in the Scripture: rising in the heart of the Anti-Lebanon, it flows through a narrow gorge and spreads fan- wise through the Damas¬ cus oasis, irrigating the land and supplying the city, by the canals or ((rivers,® with its clear sparkling water, so greatly superior to the Jordan in beauty that Naaman’s question is quite intelligible.

(calculating pennies) as Rechenpfennigc, the early printed books distinguishing between reckoning on the line (that is, on the ruled table) and with the pen. The Court of the Exchequer (q.v.) derives its name from this form of the abacus, about which the judges of the fiscal court sat. , (Hall, (The Antiquities and Curiosities of the Exchequer, > London 1891; Henderson, (Select Historical Documents

of the Middle Ages,* London 1892, p. 20.) An¬ other form of the abacus, possibly introduced by Gerbert before he became Pope Sylvester II (q.v.), was arranged in columns and employed counters upon which the western Arab forms of the Hindu numerals (see Numerals) were written. The use of the term to designate an instrument of calculation led to its use for arithmetic itself, as in the (Liber abacP of Leonardo Fibonacci of Pisa (q.v.) and in the works of later writers.

Consult Knott, (The Abacus) (in the

ABANCAY, a-ban-ki', Peru, capital of dept. Apurimac, 65 miles west of Cuzco, on the Abancay, an affluent of the upper Apurimac ; in an East-Andean valley, the best sugar dis¬ trict in Peru, with large refineries and silver mines. Pop. about 3,000.

ABANDONMENT, the act of abandon¬ ing, giving up, or relinquishing.

In commerce it is the relinquishment of an interest or claim. Thus, in certain circum¬ stances, a person who has insured property on board a ship may relinquish to the insurers a remnant of it saved from a wreck, as a prelim¬ inary to calling upon them to pay the full amount of the insurance effected.

The principle is also applicable in fire insur¬ ance, and often under stipulations in life poli¬ cies in favor of creditors. The chief object of abandonment being to recover the whole value of the subject of the insurance, it is necessary only where the subject itself, or portions of it, or claims on account of it, survive the peril which caused the loss. At once upon receiving information of a loss the assured must elect whether to abandon, and not delay for the pur¬ pose of speculating on the state of the markets.

The English law is more restricted than the American, by not making the loss over half the value conclusive of the right to abandon, and bv judging the right to abandon by the circum¬ stances at the time of action brought, and not by the facts existing at the time of the abandon¬ ment. By commencing full repairs the right of abandonment is waived. An abandonment may be oral or in writing. When acted upon by another party, the effect of abandonment is to devest all the owner’s rights.

In criminal law abandonment is the inten¬ tional desertion of a dependent by one under a legal duty to maintain him. A parent or guardian of the person of an infant is guilty of a misdemeanor if the child is injured through the act of the guardian, and of murder if death results. The offense is now defined in nearly all States. Consult Bishop Commen¬ taries on Criminal Law) (Boston 1895) ; Wharton, A., (Treatise on Criminal Law5 (San Francisco 1912).

ABANO, Pietro d', a'ba-nd, pea'tro de, known also as Petrus de Apono, one of the most celebrated physicians of the 13th century: b. in the Italian village from which he takes his name, in 1246 or 1250; d. 1316. He visited the East in order to acquire a thorough knowl¬ edge of Greek, and then completed his studies at the University of Paris. Returning to Italy he settled at Padua, where his reputation as a physician became so great that his rivals, envious of his fame, gave out that he was aided in his cures by evil spirits. It was known, too, that he practised astrology, and he was twice summoned before the Inquisition. On the first occasion he was acquitted, and he died before his second trial came to an end. Besides the work, Conciliator Differentiarum Philosopho- rum et Prsecipue Medicorum5 (Mantua 1472), he wrote (De Venenis eorumque Remediis5 (1472), Ceomantia,5 (Quaestiones de Febri- bus,5 and other works.

ABANO BAGNI, a'ba-no bam, Italy, a health resort in the province of Padua, 29 miles from Venice by rail. Already in ancient times its hot sulphur springs were famous among the

Romans as a cure for diseases of the skin, the town being known then as Fons Aponi. Pop.

5,500.

ABAN'TES, an ancient Greek people origi¬ nally from Thrace, who settled in Phocis, and built a town called Abse. Their name implies an ancestor or leader Abas.

ABAR'BANEL. See Abravanel.

AB'ARIM (((the beyonds,® sc. Jordan), the edge of the Moabite plateau overlooking the entire Jordan valley: a range of highlands forming its whole horizon, broken only by the valley mouths of the Yarmuk, the Zerka, and the Jabbok. Its highest elevation is Mount Nebo, whence Moses had his ((Pisgah view® of Palestine (see Pisgah), and whence Jericho is plainly visible. Ancient altars, perhaps Amor- ite, were discovered here in 1881.

AB'ARIS, the Hyperborean (fabled as from the Caucasus or thereabout), a legendary sage first mentioned by Pindar and Herodotus, 5th century b.c., but quite uncertain of date or existence. He had the prophetic gift, and a magic arrow of Apollo on which he rode through the air ; cured by incantations, rid the world of a great plague, etc. The Neo-Plato- nists made him Pythagoras' companion.

ABASCAL, Jose Fernando, a-bas-cal', ho-sa' fer-nan'do, Spanish soldier and states¬ man: b. Oviedo, 1743; d. Madrid, 1821. Enter¬ ing service in 1 762, he rose to brigadier-general in the French Revolutionary wars; in 1796 became viceroy of Cuba and defended Havana against the English fleet ; then was commander in New Galicia, and later viceroy of Peru, where he showed great ability and kindliness, and in recognition of his efforts to reconcile natives and Spanish was created Marques de la Concordia. He defended Buenos Aires from the English, and suppressed revolts in Lima and Cuzco ; but having a turn of ill success was recalled in 1816.

ABASOLO, Mariano, a-ba-so'lo, ma-re- ii'-no, Mexican patriot: b. Dolores, Guanajuato, about 1780; d. Cadiz, 1819. Joining Hidalgo's (q.v.) Mexican revolution in 1810, he rose to major-general, and was noted for humanity to prisoners. After the final rout at Puente de Calderon, 17 Jan. 1811, he fled with his chief; with him was captured by the counter-revolu¬ tionists, tried at Chihuahua, and sentenced to imprisonment in Spain, where he died.

ABATEMENT. In law: (1) A removal or putting down, as of a nuisance. (2) A quashing; a judicial defeat; the rendering abortive by law, as when a writ is overthrown by some fatal exception taken to it in court. A plea designed to effect this result is called a plea in abatement. All dilatory pleas are considered pleas in abatement, in contradistinc¬ tion to pleas in bar, which consider the merits of the claim. (3) Forcible entry of a stranger into an inheritance when the person seized of it dies, and before the heir or devisee can take possession. (4) The termination of an action in a court of law, or the suspension of proceed¬ ings in a suit in equity, in consequence of the occurrence of some event, as for example the death of one of the litigants. In contracts, a reduction made by the creditor in consideration of the prompt payment of a debt due by the debtor. In mercantile law, a deduction from

duties imposed at the custom-house, on account of damages received by goods during importa¬ tion or while in the custom-house.

A misnomer of plaintiff or defendant can be taken advantage of only by plea in abatement.

In heraldry, an abatement was formerly an addition to a coat-of-arms, indicative of dis¬ grace or inferiority ; now it is confined to the bend sinister, marking illegitimate descent.

AB'ATIS, or ABATTIS, in military affairs, a defense made of felled trees. In sudden emergencies, the trees are merely laid length¬ wise beside each other, with the branches pointed outward to prevent the approach of the enemy. When employed for the defense of a pass or entrance, the boughs of the trees are stripped of their leaves and pointed, the trunks are planted in the ground, and the branches interwoven with each other ; and the abatis is laid in a depression in front of a trench, for protection from artillery fire.

AB'ATQS, Egypt, an island in Lake Mceris, famous as the sepulchre of Osiris, and for pro¬ ducing the papyrus of which the ancients made their paper.

ABATTOIR (Fr.), ab-at-war, a slaughter¬ house ; sometimes extended to include a great market of which the abattoir proper is only a part. The nuisance of blood, offal, etc., in crowded settlements, early forced ancient civil¬ ized governments to put the slaughter of the animals under restrictions. Our first definite information on this point is the system under the Roman empire : the slaughter-houses in¬ stead of being scattered about the streets were collected in one quarter, forming the public market, which in Nero's time was one of the most imposing structures in Rome. The system was introduced into Gaul, but the meat supply of Paris was in the hands of a clique of aristo¬ cratic families who balked all attempts at re¬ form ; and though as far back as 1567 Charles IX had issued a decree on the subject, no improvement was made till Napoleon's time, when the nuisance was shocking, — slaughter¬ houses abutted on the principal thoroughfares, herds of footsore and lamenting beasts im¬ peded traffic, the gutters ran with blood, offal poisoned the air, and the Seine was a sewer for it. A commission was appointed to rectify these conditions in 1810, and the five great abattoirs which still exist were formally opened 15 Sept. 1818. They have been the models of the world, and for many years had no rivals; indeed, for symmetry of arrangement they have never been surpassed. But of late the vast American establishments at Chicago, at Kansas City, St. Louis, Mo.,

Brighton, Mass., and other places, have carried speed, economy, and cleanliness to an ideal point, and American inventiveness has built up an incredible number of subsidiary industries and products, so that literally not a hair of an animal's body nor a drop of its blood is wasted: foods, medicines, chemicals, ma¬ nures, building-materials, etc., produced from the refuse of the slaughter-houses are past numbering. The . improved systems of the United States are of recent development and are due to the investigations of the methods followed in abattoirs in preparing meats and canned goods. These investigations revealed unsanitary conditions, and unwholesome and unhealthy practices. On 30 June 1906 Congress

provided for the inspection of all meats destined for interstate or foreign trade and of all establishments engaged in the industry, and appropriated $3,000,000 per annum for the maintenance of this supervision. Federal in¬ spection is now conducted in about 1,000 estab¬ lishments located in 275 cities and towns. It reaches about 60 per cent of the total meat supply of the country, the remaining 40 per cent being under the supervision of State and local officers. In modern abattoirs great skill and speed are attained in the slaughtering and dressing of animals. The cattle are driven up to pens on a killing floor and are stunned by being struck between the eyes with a sledge hammer. The animal is then shackled, placed on the killing bed, and hoisted on a suspended tramway, and bled. It is next moved on to the <(header®, who skins and removes the head. The animal is then lowered and skinned, and passes through a row of butchers, each of whom performs some operation in trimming the dressed carcass. It is then shifted along to the cooling room and its place is at once taken by the next carcass on the run. By means of this specialization and division of labor a constant run is maintained, a force of less than 200 workers kill, dress and trim about 2,000 car¬ casses in a day of 10 hours. During the slaughtering, the carcasses are inspected by Federal meat inspectors, examining with care the viscera for indications of disease, or if animals are emaciated or in any way unsound the carcass is marked ttU. S. Inspected and Condemned® and is turned into fertilizer. For hogs the process is different but the same sub¬ division and specialization of labor obtain ; scalding vats and scraping machinery are added, and the carcasses are examined during the proc¬ ess as in the case of beef carcasses. The largest abattoirs in the United States, and in the world, are located at Chicago, Kansas City, St. Louis, Omaha, and Cincinnati. The Chicago Union Stock Yards is the largest concern of its kind in the world, covering an area of about 500 acres, and having an invested capital of about $70,000,000. About 8,000,000 hogs, 2,500,- 000 cattle, and 6,000,000 sheep are

received and slaughtered annually. (See Meat; Packing Industry.) Consult Macewen, (Food Inspec¬ tion (1910).

ABAUZIT, Firmin, ab-6-ze, fer-man French scholar of Arabian blood and Protes¬ tant parents: b. Lizes, 1679; d. Geneva, 1767. Fie lost his father when only two ; in 1685, on the Revocation, the authorities tried to tutor him for a Catholic, but his mother contrived his flight with an elder brother to the Cevennes, where after two 3ˆears as fugitives they gained Geneva, and the mother escaped from imprison¬ ment and joined them. He early acquired great proficiency in languages, physics, and theology ; traveled to Holland and made ac¬ quaintance with Ba)rle and others, and to Eng¬ land, where Newton admired him greatly, cor¬ rected through him an error in his <(Principia,® and wrote to him, ((You are well worthy to judge between Leibnitz and me.® William III wished him to settle in England, but he pre¬ ferred to return to Geneva: assisted a society there in translating the New Testament into French, _ was offered but refused a chair in the university, but accepted a sinecure librarian-

ship, and died very aged. He was of wonderful versatility and universality, seeming to have made everything a speciality; Rousseau, jealous of every one, yet eulogized him warmly ; and Voltaire asked a flattering stranger who said he had come to see a genius, whether he had seen Abauzit. His heirs, through theological differences, destroyed his papers, so that little remains of his work; he wrote articles, how¬ ever, for Rousseau's dictionary of Music) and other works, and edited with valuable additions Spoil's <History of Geneva. *Collected works, Geneva, 1770; London, 1773. Translations by Dr. Harwood, 1770, 1774. For personal infor¬ mation, consult Senebier's (Histoire Litteraire de Geneve*; Harwood's (Miscellanies) ; Orme's (Bibliotheca Biblica) (1834).

ABAZA, Alexsander Agreievich, a-gra- ya'vich, aba'za, Russian statesman : b. 1821 ; d. Nice, 1895. He was descended from a noble family of Moldavia, completed his education at the University of Petrograd and, in 1839, entered the military service in which he dis¬ tinguished himself in the Caucasus, being wounded several times and being invested with the order of St. Vladimir. However he aban¬ doned the service and joined the educational and humanitarian circles presided over by Grand Duchess Helena Pavlovna. He soon was appointed master of ceremonies at the court of the princess. In 1865

he was elected a member of the council in the Ministry of Finance in which capacity he rendered impor¬ tant service to the financial and economic de¬ partment of his vast country. He retired from public life in 1892 and, until his death, traveled extensively throueh Europe. He was not in favor of the reforms of Alexander II (q.v.), which were passed before he had any substan¬ tial power in his hands to oppose them effec¬ tively. But as Minister of Finance he sud¬ denly changed and became one of the most fervent supporters of the reforms.

ABBA ARIKA, a-re'ka, also known as ((Rab,® a Jewish scholar of Babylonia and the son of a distinguished family. He studied at Sepphoris, then went to Sura where he founded the academy of that name. He was one of the leaders of Jewish thought in Babylonia.

ABBA MARI, ma'ri (correctly Abba Mari ben Moses ben Joseph don Astruc of Lunel), a French Hebrew who achieved fame as leader of the opposition to the growing rationalism of Maimonides, in the Montpellier controversy of 1303-06. He was born at Lunel near Montpellier, but the dates of his birth and death are unknown. His correspondence with Solomon ben Adret, rabbi of Barcelona, pub¬ lished under the title of (Minhat Kenaot — Jealousy Offering,* accentuates the three cardi¬ nal doctrines of orthodox Judaism, and throws much light on the question of the relation of religion to the philosophy of the age.

ABBA (same as papa, etc.), Aramaic form of Hebrew for Mather.® In the New Testa¬ ment, used as an address to God; in the Tal¬ mud, a scholar’s title of honor; also used as part of proper names; and at present the title of Syriac, Coptic, and Ethiopic bishops. See Pope.

ABBADIDES, a-bad'idz, a Mohammedan dynasty founded in Spain in 1023 by Abd-al-

Kasim Mohammed and maintained by his son, Abbad, El Motaddid (1042-68) and his grand¬ son, El Motamid (1068-91), all three men of remarkable personality. They were recognized as the leaders of the Moslems of Arabic or Spanish descent against the Berbers of Gra¬ nada. They have been the subjects of many romances and even to-day they are the heroes of many legendary tales told among the Span¬ ish peasants. After the capture of Toledo by Alphonso VI of Castile in 1085 El Motamid found himself in so desperate a position that he was obliged to call the Almoravides to his assistance. His duplicity soon caused a breach between himself and his allies, in 1091 Seville was captured and El Motamid was made a prisoner by the Spaniards, thus bringing the Abbadides dynasty to an end. In 1095 he died in prison.

ABBADIE, Antoine Thomson and Ar- naud Michel d’, dab-ad-e, an-twan ton-son and ar-no me-shel, French brothers and ex¬ plorers: b. Dublin, Ireland, 3 Jan. 1810: and 24 July 1815; d. 1897 and 1893, respectively. In 1837-48 they explored Abyssinia and Upper Egypt, traveled up the White Nile, visited Dar¬ fur (regarded by the English in these places as French emissaries), and made a remark¬ ably large collection of Ethiopic and Amharic manuscripts. Among other works Antoine pub¬ lished (Geodesy of Part of Upper Ethiopia) (1860-73) and dictionary of the Amarin Lan- guage) (1881); and Arnaud, (Twelve Years in Upper Ethiopia) (1868).

ABBADIE, Jacques, ab-ad-e, zhak, or James, French-English divine: b. Nay, Bern, c. 1654-57; d. London, 1727. A poor boy, edu¬ cated by friends, he took a degree of doctor in theology at Sedan at 17, was minister of a French Protestant church in Berlin some years, then in 1688 accompanied Marshal Schomberg to London for the second English Revolution, and became minister of the French church in the Savoy. He was stronglv attached to Wil¬ liam’s cause, wrote an elaborate defense of it, and a history of the conspiracy of 1696 from materials furnished by the government ; and William made him dean of Killaloe, Ireland. A very able man and eloquent preacher, Abb- adie is best known by his religious treatises in French, several of them translated into other languages: the most important are: (On the Truth of the Christian Religion, * with its sequel (On the Divinity of Jesus Christ, * and (The Art of Self-Knowledge. >

ABBAS (Ibn Abd il Muttalib, 'bn abd il moo-ta'lib), uncle of Mohammed; at first hos¬ tile to him, but ultimately — after the defeat at Bed’r (see Mohammed) — the chief promoter of his religion. He was the founder of the Abbasside (q.v.) caliphate at Bagdad.

ABBAS I, of Persia, ((the Great,® 7th shah of the Sufi dynasty: b. 1557, acceded 1585: d. 27 Jan. 1628. Sent to Khorasan as nominal governor in childhood, at 18 he was pro¬ claimed shah by its nobles, smarting under the oppression of his father Mohammed Khoda-bendeh’s officers ; the father was soon driven from the throne. At this time the Turks had invaded the western Persian provinces, and the Uzbek Tartars occupied and ravaged Khorasan. Abbas first transferred his residence from

Kasbin to Ispahan ; he then by treaty confirmed to the Turks all their

conquests, to gain time for chastising the Uzbeks, whom in 1597 he surprised and routed near Herat, and followed this by the conquest of Ghilan, Mazanderan, much of Tartary, and nearly all Afghanistan. He then declared war against the Turks; and in 1605, with 60,000 men, annihilated their army of nearly double the number at Basra (Bussorah), recovering all the lost provinces, and not only securing complete immunity from Turk¬ ish aggression for the rest of his life, but ex¬ tending his empire beyond the Euphrates. In 1611 he dictated to Achmet I a treaty which gave Persia Shirwan and Kurdistan. In 1618 he routed the united Turkish and Tartar armies near Sultanieh, securing more territory; and on the Turks renewing the war in 1623 he cap¬ tured Bagdad after a year's siege. The same year he took Ormuz from the Portuguese; and when he died his dominions reached from the Tigris to the Indus. His internal administra¬ tion was no less firm and beneficial. He en¬ couraged commerce, built highways, repressed violence, and left the country flourishing as it never has since. He was favorable to foreign¬ ers, and two Englishmen, Sir Anthony and Sir Robert Shirley, had much influence over him. He was like Herod in every respect: a jealous and cruel tyrant to his family, — he slew his eldest son and blinded his other children, — his country alone felt his good side. (See Persia). Consult Markham, C. R., (General Sketch of the History of Persia) (London 1874).

ABBAS, Kuli Khan (Nawab), Persian diplomat: b. 1864. The son of Nawab Jafer Kuli Khan, he was educated in England and became interpreter to the British legation at Teheran in 1885. He was appointed third sec¬ retary in the British diplomatic service in 1901 ; was the Persian special envoy at King Edward's coronation, and on the Shah's visit to England in 1902 ; in 1903 received the order of the C. M. G., and was a member of Viscount Downe's special mission to Persia. In 1908 he became head of the Oriental Chancery of the British Legation at Teheran.

ABBAS-MIRZA, Persian prince and war¬ rior, favorite son of the shah Feth-Ali : b. 1783; d. 1833. He was early convinced of the ad¬ vantages of Western civilization, and with the help of European officers he first of all applied himself to the reform of the army. He led the Persian armies with great bravery, but with little success, in the war with Russia ended by the peace of Gulistan, when Persia lost her remaining Caucasus districts and ceded to Rus¬ sia the sovereignty of the Caspian ; and in that of 1826-28, ended by the peace of Turkmanchai, when she lost most of Persian Armenia. In 1829 he visited St. Petersburg, to ward off punishment for the murder of the Russian ambassador in a riot at Teheran ; and was sent back to Persia loaded with presents. His eldest son acceded to the throne in 1834.

ABBAS PASHA I, viceroy of Egypt, grandson of the famous Mehemet Ali : b. 1813; d. 13 July 1854. Early initiated into public life, in 1841 he took an active part in his grand¬ father's Syrian war; in 1848 the death of his uncle Ibrahim Pasha called him to the vice¬ regal throne at Cairo. During his brief reign he did much to undo the progress made under

Mehemet Ali: he dismissed all Europeans and fought Western ideas energetically. At_ the outbreak of the Crimean war he placed 15,000 men and his fleet at the Sultan's disposal ; but was shortly after found dead, not without sus¬ picion of foul play.

ABBAS PASHA II, Hilmi, hel'me, third Khedive of Egypt: b. 14 July 1874, the eldest son of the Khedive Mehemed Tewfik, better known as Tewfik Pasha, wras educated with his brother at the Theresianum in Vienna. Abbas Hilmi was declared to be officially of age in 1891, and on the death of his father (7 Jan. 1892) was proclaimed Khedive of Egypt in accordance with the Sultan's finnan of 8 June 1873, by which the succession wras to fall from father to son instead of from brother to brother. Despite the British occupation of Egypt since 1882, that country was — at least nominally — under Turkish suzerainty down to December 1914. The activities of Abbas Hilmi as a ruler were limited to following the advice of Lord Cromer, Sir Eldon Gorst, and, later, of Lord Kitchener, successively British Con- suls-General in Egypt. At the outbreak of the European War (1914) the Khedive was in Constantinople, the. guest of the Sultan, and was credited with devoting his energies to plot¬ ting against the British rule in his country. Great Britain declared war on Turkey (5 No¬ vember) in consequence of hostile acts com¬ mitted by Turkish troops. On 18 December the British Foreign Office issued a statement to the effect that in view of the state of war arising out of the action of Turkey, (<Egypt is placed under the protection of His Majesty and will hence¬ forth constitute a Protectorate. The suze¬ rainty of Turkey over Egypt is thus terminated and His Majesty's Government will adopt all measures necessary for the defense of Egypt and the protection of its inhabitants and in¬ terests.® A further announcement next day referred to Abbas Hilmi, ((lately Khedive of Egypt.® who had adhered to the King's enemies, and stated that he had been deposed. The title of Khedive was abolished for that of Sultan and conferred on the eldest living descendant of the family of Mehemet Ali, Prince Hussein Kamel Pasha who died 5 Oct. 1917 and was succeeded by Prince Ahmed Fuad. Consult Cromer, Earl of, (Abbas IP (London 1915).

ABBASSIDES, abas'sidz, The, 750-1517, caliphs at Bagdad and later in

Egypt ; nominal sovereigns of all Islam, but losing Spain at the outset, and never practically obeyed in Africa outside Egypt ; the most famous dynasty of Saracen sovereigns. They took their name from Abbas (q.v.), the uncle of Mohammed. This descent had given the family great influence by a century after the Prophet's death; and Ib¬ rahim, fourth in descent from Abbas, had gained several victories over the Ommiads (q.v.), supported by the province of Khorasan, when the Ommiad caliph Merwan defeated and put him to death in 747. His brother Abu '1-Abbas, whom he had named his heir, as¬ sumed the title of caliph, crushed the Ommiad dynasty in a decisive battle near the Zab (750) and acceded to their position. Its members and relatives were nearly all tolled into one spot and exterminated, earning for Abu '1-Ab¬ bas the nickname of As-Saffah, «the butcher®; but one of them, Abder-Rahman (q.v.),

escaped, and after picturesque adventures set up an independent emirate in Spain, which toward two centuries later took the title of caliphate. On Abu '1-Abbas' death, his suc¬ cessor Al-Mansur removed the seat of royalty to Bagdad, and won successes against Turko¬ mans and Greeks in Asia Minor ; but by this time the warlike impulse had begun to decay, and the love of luxury and its literary and artistic attendants to come to the front. Means were found of evading the strict¬ ness of Mohammedan rules ; and no courts of any age or country were gayer or more splendid than those of the great Harun al-Rashid, Charlemagne's contemporary (786- 809), and Al-Mamun (813-33). The splendor of their palaces, their decorations, their equi¬ pages, and the seemingly exhaustless treasures they possessed, gave them a world-wide celeb¬ rity — especially in contrast with the poverty- stricken barrenness and barbarism of most Christian sovereigns at that period — which is vivid even yet in literature and popular mem¬ ory : Harun is the chief princely figure of the (Arabian Nights, > and Bagdad the centre of all picturesciue and varied enjoyment. Al-Mamun is still more honorably remembered as the patron of arts and literature. What lay under¬ neath this external gorgeousness — the cor¬ ruption, the furies of jealousy and bloodshed, and the barbarous oppression of the many — • is outside a notice like this. But external decay soon began to witness internal rotten¬ ness. The Ashlabites, Edrisites, etc., carved out independent sovereignties in Africa; the Taherites in 820 set up a separate power in Khorasan, even under the great Al-Mamun. The Greeks, under the new life of the Byzan¬ tine empire brought in by Leo the Isaurian (q.v.),

pushed them back in Asia Minor; and Al-Mamun's last years were contemporary with the philosopher, 'soldier, and statesman, the all-accomplished Emperor Theophilus. But the final stroke came from barbarians. The caliph Motassem (833-42), who had fought both Theophilus and the hordes of Turkestan successfully, distrusting his subjects, formed bodyguards out of his Turkish prisoners. They soon became what the Roman praetorians were • — masters of the empire. Motassem's son Motawakkel was assassinated by them in his palace (861) and the succeeding caliphs were their puppets ; and in 936 the caliph Radhi (934-41) was forced to give up the command of the army and other powers to his general and mayor of the palace, Mohammed ben Rayek. The provinces one after another threw off allegiance ; the caliph held only Bag¬ dad and its neighborhood ; and at last Hulagu, prince of the Mongols, fired Bagdad and slew the reigning caliph Motassem in 1258. The Abbassides retained a nominal caliphate in Egypt under the aegis of the Mamelukes, and never gave up the claim or the hope of their old position and seat; but in 1517 the Turkish Sultan Selim I, the conqueror of Egypt, bore the last of them, Motawakkel III, a prisoner to Constantinople, finally allowing him to re¬ turn to. Egypt, where he died a Turkish pen¬ sioner in 1538. Consult Muir's <Caliphate) for the best English account; the monumental treasure-house of information for scholars is Weil's great (Geschichte der Chalifen) (Mann¬ heim and Stuttgart 1846-62). Consult also

Muller, (Der Islam in Morgen- und Abend- land > (1887).

ABBATE, ab-a'te, or ABATI, a-ba'te, Ni- colo, ne'ko-lo, Italian painter, follower of Raphael and Corregio : b. 1512 at Modena, where his earlier works are exhibited; d. 1571 at Fontainebleau — his frescoes in which palace are his best-known productions. His finest piece, however, is regarded as (The Adoration of the Shepherds,* at Bologna, where his later work mostly exists. He has another in the Dresden gallery.

ABBAYE, a military prison near St. Ger¬ main des Pres, Paris, where 164 prisoners were murdered by infuriated republicans led by Mail-lard 2-3 Sept. 1792.

ABBAZIA, a'ba-tse'a, a popular health resort on the Adriatic, nine miles northwest from Fiume. On account of its sheltered situ¬ ation it has an equitable climate, the tempera¬ ture seldom dropping below 50° F. in winter or rising above 77° F. in summer. It is frequented by over 40,000 visitors annually and is a favor¬ ite resort for yachtsmen. One of its most

prominent features is the Carol Promenade, built in 1896 by the King of Rumania. Resi¬ dent population, 3,000.

ABBE, Cleveland, American meteorol¬ ogist: b. New York city, 3 Dec. 1838; d.

Chevy Chase, Md., 28 Oct. 1916. His educa¬ tion was received at the New York Free

Academy, now the College of the City of New York, where he made a record in mathematical and mathematico-physical science. He was graduated in 1857 and then taught mathematics at the Trinity Latin School for a year. Later he studied astronomy under Professor Briin- now at the University of Michigan. A year afterward he removed to Cambridge where he spent four years with Dr. B. A. Gould and did telegraphic longitude work for the United States Coast Survey. During 1865-66 Profes¬ sor Abbe studied at the Observatory of Poul- kova, Russia, then under the direction of the illustrious Otto Struve, and finally, in 1867, he returned to this country and became connected with the National Observatory in Washington. He was immediately appointed Director of the Cincinnati Observatory. Professor Abbe took charge there in May 1868 and immediately became prominent through his offer to the Chamber of Commerce to make daily predic¬ tions of the weather for the benefit of the citizens. From a scientific standpoint this was then unheard of. However, it was soon seen that he had «inside information® on the all- important subject, the weather, and during September 1869 his offer was accepted, and the daily publication of weather bulletins and ˆprobabilities® began.

His weather service met with instant suc¬ cess, and soon his friends had a resolution in¬ troduced into Congress providing for the estab¬ lishment of a national bureau of storm warnings for the benefit of commerce, which bureau was opened in February 1870 with Gen. A. J. Myer, Chief Signal Officer of the Army, in charge. He immediately adopted all Professor Abbe's systems and methods, and in January 1871 invited him to come to Washington as his scientific assistant. A month later Professor Abbe commenced the regular tri-daily issue of ˆprobabilities,® which he kept

lip himself until he could train others to do the work correctly. These forecasts were pub¬ lished all over the country anonymously as

official documents, and earned for Professor Abbe the cognomen of (<01d Prob.® From that time the weather service was extended each year until the United States Weather Bureau came to rank first among such services the world over, and Professor Abbe came to be regarded as the world's foremost meteorolo¬ gist. It was largely due to his initiative that several successful advances were made in the service, such as ocean meteorology, the intro¬ duction of uniform standard time, and a great many other steps were taken. Professor Abbe continued in the Government service even when well past 70 years of age. He continued to edit the Monthly Weather Review and made many other contributions to meteorological science. In addition, he was editor of the Bulletin of the Mount Weather Observatory from 1909, professor of meteorology at Wash¬ ington University from 1886, and lecturer on meteorology at Johns Hopkins University from 1896. He was a member of the National Academy of Sciences and of many other foreign and domestic scientific bodies.

One of Professor Abbe's most noteworthy achievements was his (Report on Standard Time) (1879), which started the agitation that resulted in the establishment of the modern standard hour meridians from Green¬ wich. He was the author of a number of books on meteorological subjects, including (Meteorological Apparatus and Methods > (1887); (Studies for Methods in Storm and Weather Predictions *(1889) ; (Mechanics of the Earth's Atmosphere> (Vol. I, 1891 ; Vol II, 1909) ; (The Altitude of the Aurora) (1896) ; (Physical Basis of Long-Range Fore- casting) (1902) ; (Solar Spots and Terrestrial Temperature,* and (Atmospheric Radiation.*

ABBE, Cleveland, Jr., American geogra¬ pher and geologist, son of Cleveland Abbe: b. Washington,. D. C., 25 March 1872. After being graduated at Harvard University in 1894 he took a post-graduate course at Johns Hopkins University, receiving his degree of Ph.D. in 1898. In 1894, on graduating from Harvard, he was appointed instructor in physi¬ ography at the Corcoran Scientific School of Columbian, now George Washington Uni¬ versity, which position he held until 1897. From 1896 until 1901 he was an assistant in the Maryland Geological Survey and, at various times during this period, taught geology and biology in the Western Maryland College. In 1899 he was appointed acting professor of natural _ sciences in the Winthrop Normal and Industrial College in South Carolina. In 1901 he left this position to follow a two years' special course . in geography at the Imperial University, Vienna. LTpon his return, two years later, he. was appointed aid in the United States Geological Survey and, in 1906, he be¬ came research observer in the Weather Bureau. From 1908 to 1910 he was assistant editor of the Monthly Weather Review,

after which he was appointed assistant librarian of the Weather Bureau.

ABBE, Ernst, German phvsicist : b. Eise¬ nach, 1840; d. Jena, 1905. Studied at Jena and Gottingen ; became assistant at the latter's

observatory, and lecturer before the Frankfort- on-the-Main Physical Society; 1863-70 lecturer at Jena, and 1870 professor there; 1878 director of its observatories; in 1891 he resigned profes¬ sorship. He became distinguished for his work in perfecting optical instruments, especially photograph and microscope lenses, having for a long time been connected with the highly reputed firm of Carl Zeiss in Jena. He in¬ vented the Abbe refractometer. He wrote a work in German on the (Refracting and Dis¬ persing Power of Solid and Fluid Bodies.*

ABBE, Truman, American surgeon, son of Cleveland Abbe and brother of Cleveland Abbe, Jr.: b. Washington, D. C., 1 Nov. 1873. After his graduation from Harvard University, in 1895, he studied medicine at the College of Physicians and Surgeons, at Columbia Univer¬ sity, New York, gaining his degree of M.D. in 1899. After a year's post-graduate course at the University of Berlin he served for two years in several hospitals in New York city. In 1902 he was appointed instructor of physics and physiology at Georgetown University and in the following year surgery was added to his subjects. In 1905 he became instructor in physiology at George Washington University and in 1909 he became also instructor in sur¬ gery at the same institution. From 1906 to 1910 he was chief surgeon of the Garfield Sur¬ gical Dispensary. In 1907 he was awarded a silver medal at the Jamestown Exposition for his researches into the use of radium as applied to medicine. Besides his many articles on radium in medical journals he contributed to Vol. Ill of Wharton and Stiller's (Medical Jurisprudence) (1905), and (with F. H. Bowlby) wrote (Physical Conditions and Treat¬ ment. }

ABBE, ab-a, originally the French name for an abbot, but later used. in the general sense of a priest or clergyman. By a concordat between Pope Leo X and Francis I in 1516, the French king had the right to nominate upward of 200 abbes commendatairc, who drew a third of the revenues of the monasteries without having any duty to perform. They were not necessarily clergy, but were expected to take orders unless exempted by a dispensation. The hope of ob¬ taining one of those sinecures led multitudes of young men, many of them of noble birth, to enter the clerical career, which however seldom went further than taking the inferior orders; and it became customary to call such aspirants abbes, jocularly, Abbes of St. Hope. They formed a

considerable and influential class in society; and an abbe, distinguished by a short violet-colored robe, was often found as chap¬ lain or tutor in noble households, or engaged in literary work. This class of nominal clergy dis¬ appeared at the Revolution. In Italy they are called abbate.

ABBESS, the female superior of some con¬ vents of nuns, corresponding to the abbot over monks. She was elected from the monastery by secret votes, inducted by a bishop's consecra¬ tion, and held office three years or even for life unless deprived for misconduct. The Council of Trent fixed the required age at 40, with eight years of professed membership in the monas¬ tery. She could discipline and even expel the nuns, subject to the bishop; but, being a female, could exercise only certain functions, such as

giving religious counsel and administering the rule, but no spiritual jurisdiction, as ordaining, conferring the veil, or excommunicating.

ABBEVILLE, France, ab-vel ((<abbey-

town,55 of St. Riquier's), capital of Abbeville arrondissement, dept. Somme ; 28 miles north¬ west of Amiens on both banks of the

Somme and an island in it, 12 miles from its mouth and head of navigation (at high tide vessels of 150 to 200 tons can reach it) con¬ nected by canals with Amiens (28 miles dis¬ tant), Lille, Paris, and Belgium; on the North¬ ern Ry. It is an old, narrow-streeted, pictur¬ esque town, with ancient fortifications on

Yauban's system ; has a wonderfully fine

church of the flamboyant order, St. Wolfran's, begun under Louis XII (1462-1515), a very interesting city hall built in 1209, and a library of 1690 now containing 45,000 volumes. It manufactures jewelry, soaps, glassware, and various fabrics, as velvets, cottons, linens, etc. But its chief interest to the foreign world is for the relics and implements of primitive man (the cave-dweller) and the fossils of extinct animals found in its neighborhood. Pop. (1914) 20,373.

ABBEVILLE, S. C., county seat of Abbe¬ ville County ; on the Southern and Seaboard A. L. railways ; 105 miles west of Columbia. It is in a rich cotton-growing region ; is noted for its fine climate, which makes

it a popular resort for Northern invalids, and has a national bank, excellent public schools, several large manu¬ factories connected with the cotton industry, railroad repair shops, flour and feed mills, brick¬ yards, etc. Property valuation over $500,000; bonded debt less than $55,000. Pop. (1910)

4,459; (1920) 4,570.

ABBEVILLE TREATIES. (1) A treaty in 1259 between Louis IX of France (((St. Louis®) and Henry III of England, to settle definitely the territorial rights of the two crowns, Louis fearing that his title to some pos¬ sessions was liable to dispute, and having sought a settlement for many years. It was negotiated at Paris with Simon de Montfort, Earl of Lei¬ cester, and signed by the two kings at Abbeville during Henry's visit to France, 1259-60, but dated back to 20 May 1259. Henry resigned all title to Normandy, Afaine, Anjou, Touraine, and North Saintonge; Louis turned over Perigord, Limousin, South Saintonge, and some districts south of the Loire, to be held by Henry in fief, — a surrender which so enraged the inhabitants that they refused to celebrate Louis' birthday. Henry resigned the titles of Duke of Normandy and Count of Anjou, and agreed to do homage at Paris for those of Duke of Guienne and peer of France. (2) Between Henry VIII and Francis I in 1527, Wolsey representing England.

ABBEY, Edwin Austin, American artist : b. Philadelphia, 3 April 1852; d. London, 1 Aug. 1911; studied at the Pennsylvania Academy of Fine Arts; lived in New York and drew illus¬ trations of a high order for periodicals, also painting water-colors, till 1883, when he re¬ moved to England. His two most individual qualities have been his love for English country life and scenery and for the old English poets and dramatists, both of which have resulted in notable illustrations (as of Shakespeare, Gold¬ smith, etc.) and paintings; and his ability as a colorist, though much of his work has been

done without color. He had also deep intellec¬ tual and spiritual qualities; and all these facul¬ ties and tastes together combine in the famous panels of the (Search for the Holy GraiP on the upper walls of the delivery room at the Boston Public Library He was elected member of the Royal Academy July 1898; was one of the American jurors on paintings in the Paris Exposition of 1900; and was commissioned by Edward VII to paint the coronation scene in Westminster Abbey. He married, in 1890, Miss Alary Mead of New York. Though many years resident in England Abbey never abandoned his American nationality. Consult Radcliffe, (Schools and Masters of Painting) (1898), Aluther, (History of Alodern Painting) (1896).

ABBEY, Henry, poet and journalist: b. Rondout, N. Y., 11 July 1842; d. 1911. He pub¬ lished several collections of pleasing verse : (May Dreams5 (1862); (Ralph, and Others Poems5 (1866) ; (Ballads of Good Deeds5 (1872) ; (Collected Works5 (1885; 3d ed. 1895) ; (Phaethon5 (1901) ; (Poems 5 (1904).

ABBEY, Henry Eugene, American operatic manager: b. Akron, Ohio, 27 June 1846; d. 1896. He was engaged for several years in theatrical, and from 1883 in operatic management, produc¬ ing Italian and German operas with the most distinguished singers of the day. Under his management Aladame Adelina Patti made a tour of the United States in 1889-90.

ABBEY, a monastery or religious commu¬ nity of the highest class, governed by an abbot, assisted generally by a prior, sub-prior, and other subordinate functionaries ; or, in the case of a female community, superintended by an ab¬ bess. A priory differed from an abbey only in being on a smaller scale, and governed by a superior named a prior. Abbeys or monasteries first rose in the East. Among the most famous abbeys on the European continent were those of Clugny, Clairvaux, and Citeaux in France; of St. Gall in Switzerland, and of Fulda in Ger¬ many; in England, those of Westminster, St. Mary's of York, Fountains, Kirkstall, Tintern, Rievaulx, Netley, Paisley, and Arbroath. The English abbeys were wholly abolished by Henry VIII at the Reformation. Abbeys were usually strongly built, with walls which served as a defense against enemies and within which were large buildings in which the occupants carried on the work to which they had been assigned. See Abbot; Monastery.

ABBITIB'BI, a river, a lake, and a former important trading-post of the Hudson Bay Com¬ pany in the Northwest Territories of Canada. The river is the outlet of the lake, about 49° N. lat., and flows into James Bay; the post is on the shore of the lake.

ABBO OF FLEURY, fle-re, French theo¬ logian : b. near Orleans about 945; d. 1004. He studied at Rheims and Paris ; acquiring great repute as a scholar and scientist (of the time). Oswald, Archbishop of York, induced him to teach for two years in the abbey of Ramsey and aid in restoring the monastic system ; on his return to France he became abbot of Fleury and built up a thriving school there; was sent hv Robert II (son of Hugh Capet) on two missions to Rome, 986 and 996, and each time succeeded in warding off a papal interdict. Later, while trying to reform the discipline of

the priory of La Reole, Gascony, he was killed. He wrote lives of the early popes down to Gregory I. Consult Life by his pupil Aimoin, in Latin, (Vita Abbonis abbatis FloriacensisP

ABBOT, Benjamin, American educator: b. New England, about 1762: d. Exeter, N. H., 25 Oct. 1849. He was a graduate of Harvard College, then became head of the Phillips Academy at Exeter, N. H., a position which he held for nearly 50 years, until 1838. Among his pupils were many who later became promi¬ nent figures in American history, notably Daniel Webster, George Bancroft, Edward Everett and Jared Sparks.

ABBOT, Charles, first Baron of Colches¬ ter, speaker of the British House of Commons : b. Abingdon, Berkshire, 14 Oct. 1757 : d. 1829. After finishing his studies at Christ Church he entered government service and, after occupying many positions, finally became Speaker of the House in 1802, retaining this position for 15 years, when he was compelled to resign on account of ill health. He was also one of the trustees of the British Museum. His (Diary and Correspondence > (1861) is of con¬ temporary historical value.

ABBOT, Charles Greely, American astro¬ physicist: b. Wilton, N. H., 31 May 1872. After graduating from the Massachusetts Institute of Technology, in 1894, he was appointed assis¬ tant at the Smithsonian Astrophysical Observa¬ tory. In 1907 he was advanced to the position of acting director, becoming director a few months later. During this period he attracted much attention by his researches in solar radia¬ tion. In collaboration with S. P. Langley he completed and published the mapping of the infra-red solar spectrum, described in Vol. I of the <Annals) of the Astrophysical Labora¬ tory. More recently his studies have been of the total amount and variability of solar radia¬ tion, its absorption in the solar and terrestrial gaseous envelopes and its effects on climatic conditions. He has written numerous articles on the apparatus, methods and results of solar research, but his chief work is *The Sun)

(1911).

ABBOT, Ezra, American Biblical scholar: b. Jackson, Me., 28 April 1819; d. 21 March 1884. He studied at Phillips Exeter Academy, graduated at Bowdoin 1840, and after teaching in Maine and Cambridge, Mass., became in 1856 assistant librarian of Harvard. In 1872 he received a D.D. from Harvard, though a lay¬ man, and thence

till death was professor of New Testament criticism and interpretation in the Cambridge Divinity School. His wide read¬ ing and wonderful verbal memory made him one of the foremost of textual critics and bibli¬ ographers ; his mastery of the Greek New Testament text placed him beside the leading scholars of the world ; and on the American New Testament Revision Committee, 1871-81, he was a chief agent in putting its work on an even level of authority with the English, in minute accuracy of scholarship as well as broad, acute judgment. Indifferent to fame, he gave his best work to collaborations or private assistance mostly unacknowledged and unreal¬ ized except by scholars. His most important individual book was on the (Authorship of the Fourth GospeP (1880), in which he announced

the important discovery of Tatian's (Diates- saronP Of his other critical work, besides the great Revision, his half of the prolegomena to Tischendorf's Greek New Testament (1884-94), his additions to Mitchell's (Critical Handbook of the New Testament (1880), and his revision of Schaff's (Companion to the New Testament } (1883), should be mentioned. As a bibliog¬ rapher, his greatest fame was for the curious and exhaustive catalogue of relevant books he furnished for Alger's (Critical History of a Future Life) (1864), and his notes to Smith's (Bible Dictionary } (Am. ed. 1867-70). He also wrote many papers for periodicals. His mono¬ graphs were collected by J. H. Thayer and published under the title (Critical Essays) (Boston 1888). Consult Barrow (Ezra Abbot > (Boston 1884).

ABBOT, Francis Ellingwood, American religious radical: b. Boston, 1836; d. 1903. He was graduated at Harvard 1859 and Meadville (Pa.) Theological School 1863. A Unitarian minister 1863-68, he started in 1870 The Index, an ultra-radical weekly devoted to religious and philosophical topics ; and wrote Scientific TheisnP (1886), and (The Way Out of Agnosticism) (1890), besides notable maga¬ zine articles.

ABBOT, George, Archbishop of Canter¬ bury: b. Guildford, Surrey, 19 Oct. 1562; d. 5 Aug. 1633. A cloth-worker's son, he studied at Balliol, Oxford, was chosen Master of Uni¬ versity College 1597, and three times was vice- chancellor of Oxford. Dr. Abbot's name was second on the list of eight divines ordered in 1604 to prepare the present (King James) ver¬ sion of the Bible. In 1608 he went to Scotland with the Earl of Dunbar to arrange for a union of the English and Scotch churches. James took a great fancy to him, and, though Abbot had never held a parish, made him bishop of Lichfield and Coventry in 1609, transferred him to the see of London a month later, and less than a year afterward appointed him Arch¬ bishop of Canterbury. Flattery of the king is accredited as the cause of this astonishing

rapidity of preferment ; but once in his seat, at least, Abbot felt no need of such tactics. He opposed the scandalous divorce suit of Lady Frances Howard against the Earl of Essex, though the court favored and carried it. In 1618 he forbade the reading, in the Croydon church where he was, of the king's declaration permitting games and sports on Sunday, which the Puritans (to whom Abbot belonged) re¬ garded as a permit to break the Sabbath, and the order to read it as a command to commit blasphemy. He promoted the marriage between the Princess Elizabeth and the Protestant Elec¬ tor Palatine, and opposed the disastrous Spanish-marriage project of Prince Charles, and thereby won Charles', Laud's, and Buck¬ ingham's hatred. The king, however, remained his friend. In 1622 he accidentally killed a keeper while deer-hunting, and his enemies tried to have him disqualified for the involun¬ tary manslaughter. The king made light of the matter, but had to refer it to a commission, which decided in his favor, and he was formally absolved and reappointed. He attended James in his last sickness, and crowned Charles. The latter, on Abbot's refusing to license a fanatical divine-right sermon, deprived him of his func-

tions and put them in commission ; but, having to summon a parliament shortly after, was afraid of the effect and restored him. From that time he lived in retirement, leaving Laud in complete ascendancy. He wrote many works now forgotten, though one on the prophet Jonah was reprinted in 1845. A geography passed through numerous editions. Consult Gardiner, S. R., (History of England. }

ABBOT, Henry Larcom, American mili¬ tary engineer: b. Beverly, Mass., 13 Aug. 1831; graduated at West Point 1854, and entered the engineer corps. Took part in the survey for a Pacific railroad and of the Mississippi River delta, served through the Civil War as engineer and artillerist, was wounded at Bull Run, and commanded the siege artillery before Richmond, an account of which he published in 1867. He was brevetted brigadier-general U. S. Army and major-general U. S. Volunteers. He long com¬ manded the engineers' garrison at Willett's Point, N. Y., established an engineers' school, worked out the submarine defenses of the United States sea coast, and accomplished much in the improvement of mortar batteries and engineering equipment, etc. ; was a member of the Gun Foundry Board and the Board of Fortifications and Defense, of that for the protection of the Mississippi basin, of that on the proposed canal from Pittsburg to Lake

Erie, and of the technical Committee of the new Panama Canal Company. He drew the plans for the interior harbor at Manitowoc, Wis. He was retired in 1895. He has written be¬ sides (Physics and Hydraulics of the Missis- sippi) (1861) ; (Problems of the Panama Canal in 1905 and 1907.) He is a member of the Committee of the National Academy of Sciences to report on the slides obstructing the Panama Canal, appointed at the request of President Wilson in 1915.

ABBOT, Joseph Hale, American educator: b. Wilton, N. H., 26 Sept. 1802; d .7 April 1873. He was graduated at Bowdoin in 1822, was tutor there 1825-27 ; and professor of mathe¬ matics Phillips Exeter Academy 1827-33 ; then taught a ladies' school in Boston ; subsequently was principal of the Beverly, Mass., high school. He was for some years recording sec¬ retary of the American Academy of Arts and Sciences, and published valuable scientific papers in its transactions, 5 besides writing on pneumatic and hydraulic problems, in which he made ingenious investigations. He was asso¬ ciate editor of Worcester's dictionary of the English Language) (1860).

ABBOT, Samuel, American philanthropist: b. Andover, Mass., 25 Feb. 1732; d. 12 April 1812. He became a wealthy Boston merchant and gave $20,000 in 1807 toward founding An¬ dover Seminaoq with $100,000 more by will.

ABBOT, Willis John, American author and editor, grandson of John S. C. Abbot; b. New Haven, Conn., 16 March 1863. He was graduated from the University of Michigan in 1884. In 1892 he became managing editor of the Chicago Times, holding this position for about a year. From 1896 to 1898 he was on the editorial staff of the New York Journal. His chief works are: (Blne Jackets of '6U; (Blue Jackets of 1812) ; (Battle Fields of 1861 > ; (The

American Merchant Ships and Sailors> (1902); (A Story of Our Navy for Young Americans } (1910) ; (Panama and the Canal in Picture and Prose) (1913).

ABBOT (<(father®), originally the head and ruler of a community of monks ; in the Greek Church hegumenos, Header,® or archimandrite, "ruler of the fold,® though the latter is oftener an abbot-general with hegumenoi under him. Among the Dominicans the head' of a convent was called prceposiius, a ((provost,® or prior; among the Franciscans cast os, ((guardian® ; among the Camaldules major. The name sur¬ vives in the orders derived from the Benedic¬ tines, as the Cistercians, Bernhardines and Trappists. The term (<abbot® originated in the East, and was first applied to any monk noted for piety, but at length

restricted to the superior. The first abbots were laymen like the rest of the monks in general ; the lowest clergy took precedence of them, and for sacraments they had to attend the nearest church : but the ex¬ treme inconvenience or even impossibility of this when the monastery was in a desert or far from a town forced the ordination of the abbots. Abbots could attend councils, and the second Council of Nice, 787, allowed them to ordain monks to the inferior orders; and ultimately nearly all monks were ordained to some grade of the ministry. To this elevation was added that of allowing pluralities of abbacies, originally forbidden, and even in the 6th century allowed only in special cases ; but it increased till early in the 10th century one German prelate had 12 abbeys under him, corresponding to the archimandrites of the East. Thus, and by the increase of numbers and corporate wealth in the great abbeys, the abbots themselves became prelates of vast power. Still another cause developed this, — the exemption of abbeys from control of the bishops. They were originally all subject to episcopal jurisdiction, and in the West generally continued so till the 11th century; this is ex¬ pressly ordered in Justinian's code. The ex¬ actions of the bishops, however, rendered the exemption increasingly frequent; beginning in 456 the practice grew, and was much helped forward by Gregory the Great, who relieved many abbots from episcopal control and made them responsible directly to the Pope. By the 12th century this had become an evil of the first order in ecclesiastical government, the bishop usually having no authority whatever over the chief centres of religious and often secular power in his diocese; and one abbot, of Fulda in Germany, claimed precedence over the Arch¬ bishop of Cologne. Next came an encroach¬ ment on the functions of the bishops : from conferring the tonsure and the office of reader they came to be equally associated with the bishops in consecrations ; and while originally the bishop chose the abbot from the monks of the house, and then the right of election was transferred to the monks, the abbots came sometimes to choose their own successors. This, however, was stopped in some countries by a counter-process ; the popes in Italy and the kings in France assuming to themselves the right of appointment.

Otherwhere the choice was by secret election of and from the monks of the house, unless it furnished no fit candidate, when choice might

be made from another monastery of one well instructed himself and competent to instruct others, of legitimate birth and at least 25 years

old. His election was for life. His power was absolute except as restricted by the canons of the Church. His exaction of deference in the routine of life was royal : all rose and bowed when he entered the church or chapter, his let¬ ters and orders were received kneeling, and no monk could sit in his presence or leave it with¬ out permission. They had immense political power, and were on equal terms of intimacy with the greatest in the realm. Many of the abbots were an honor to their countries, and their schools were seminaries of learning and virtue.

In time the title was improperly conferred on others who had no connection with monastic life, or sometimes even with the Church, — on the principal of a body of parochial clergy or the king's chaplain, and the chief magistrate of Genoa was called ((Abbot of the People.® Lay abbots, so called, originated in temporarily handing over the revenues of an abbey to some noble, or even the king, for a great public exigency, the noble being titular abbot, but enough of the revenues being reserved from se¬ questration to support the house. Once in lay hands they usually remained there, and most of the Frankish and Burgundian sovereigns and chief nobles in the 9th and 10th centuries were titular abbots of great monasteries, whose revenues they applied to their own uses. This often happened from the monastery's volun¬ tarily placing itself under the "commendation® of some noble for protection ; and there were sometimes two lines of abbots, — one lay, taking the major part of the income without service, the other clerical, doing the work. This was mostly reformed during the latter part of the 10th century. The Council of Trent restored to the monasteries the right of electing their abbots. The newly elected abbot is then con¬ firmed by the bishop or in certain cases by the pope.

In convent cathedrals, where the bishop filled the place of the abbot, the superior's duties were performed by a prior. In other convents the prior was the vice-abbot. The superiors of cells, or small monastic establishments depend¬ ent on the larger ones, were also called priors ; they were appointed by the abbott and held office at his pleasure. There were three classes of abbots : mitred abbots, croziered abbots, or those allowed to bear a crozier, and oecumenical abbots, ruling the houses of a province or a country. Abbots hold a rank immediately after bishops. Their mitres must be less costly than those of bishops, and they are assigned a tem¬ porary throne. There are now 17 mitred abbots in the United States, two in Canada, 10 in Eng¬ land, two in Ireland and one in Scotland. Con¬ sult Feazey, H. J., (Monasticism) ; Montalem- bert, (Monks of the WesG (ed. 1896, Vol. I) ; Bingham, Engines5 ; Martene, (Rites of the Ancient Monasteries) ; Gasquet

(Cardinal), (English Monastic Life) (London 1904) ; Taun¬ ton, (English Black Monks of St. Benedict (London 1898).

ABBOT OF JOY, from the French “Abbe de Liesse,® a title conferred upon the head of a fraternity founded in Lille. He presided over the games that took place during the carnival

at Arras and the neighboring communities, popularly known as the “Feast of the Ass.®

ABBOT, The, by Sir Walter Scott. A sequel to (The Monastery, > but dealing with more stirring situations. The time of the action is 1567-68. While the action goes on partly at Avenel Castel, and Halbert Glendinning of (The Monaster}', > as well as his brother Ed¬ ward (now an abbot) figure prominently in the story, the reader finds that he has exchanged the humble events of the little border vale by Melrose for thrilling and romantic adventures at Lochleven Castle on its island in the lake, north of Edinburgh, where Mary Queen of Scots is imprisoned. The chief interest centres around the unfortunate queen. The framework of the tale it is claimed is historically true.

ABBOTSFORD, a fording-place of the Tweed near its confluence with the Yarrow; the name given by Sir Walter Scott to his property there bought in 1811, in memory of its use by the monks of Melrose Abbey, it being at the time known as the Clarty [Filthy] Hole. The site is a low hillside on the southern bank, overlooked by the Selkirks. At first only a villa, now the west wing of the pile, he was seized with the idea of founding a great feudal family of the old Scotch pattern, with this for a baronial seat ; and gradually added other sec¬ tions, copying old Scotch mansions or ruins, or special features of them, making an irregular, rambling, picturesque abode, “a romance in stone and lime.® It remained in Scott’s family for four generations, but has in recent years been leased to Americans. Consult Irving’s <Abbotsford) (London 1850) ; Lockhart’s (Life of Scott) (Edinburgh 1838) ; Scott, Mary (Abbotsford } (New York 1893) ; Smith and Crockett <Abbotsford) (ib., 1905).

ABBOTT, Alexander Crever, American

hygienist : b. Baltimore, Md., 26 Feb. 1860. He was educated at Johns Hopkins University and at the universities of Maryland, Munich, and Berlin. He is a fellow of the College of Physicians in Philadelphia, and a member of numerous scientific societies ; in 1900 was pro¬ fessor of hygiene and director of the labora¬ tory of hygiene in the University of Pennsyl¬ vania. His publications include (The Principles of

Bacteriology > (1892, 1915) ; (The Hygiene of Transmissive Diseases) (1899-1902), and numerous papers on bacteriology and hygiene.

ABBOTT, Austin, American law-writer, son of Jacob: b. Boston, 18 Dec. 1831; d. 1896. He was graduated at the LTniversity of the City of New York in 1851, and entered the practice of law ; collaborated with his brother Benjamin in valuable legal compilations, digests, textbooks, etc. ; was an able law lecturer, and dean of his alma mater's law school 1891-96. He was counsel for Theodore Tilton in the Beecher trial. With his brothers Benjamin and Lyman he wrote two novels, (Cone Cut Cor- ners) (1885) and (Matthew Caraby) (1888).

ABBOTT, Benjamin, American revivalist: b. Long Island 1732; d. Salem, N. J., 14 Aug. 1796. A hatter's and then a farmer's apprentice, somewhat dissipated but a kind husband and father and a church-goer (whence his accounts of the pit from which he was rescued are probably dialectic), he was roused to intense

conviction of sin at 33 by an itinerant Methodist preacher, joined that Church with his children and his Presbyterian wife, and became one of the most remarkable revivalists of the time, producing wonderful conversions of the most hardened, and often sending hearers into con¬ vulsions. In the Revolution the Methodists were suspected of disloyalty, and more than once he was near being mobbed ; but he always preached down his assailants, once turning from their purpose a gang of a hundred soldiers. Serving for 16 years as a local preacher, from 1789 he went on various cir¬ cuits, and in 1793 was made an elder and sent to Maryland. He carried on his duties till death despite much enfeeblement ; and his career has been one of the most stirring themes for exhortation in the Church.

ABBOTT, Benjamin Vaughan, American lawyer, eldest son of Jacob: b. 4 June 1830; d. 1890. He was graduated at the University of the City of New York in 1850, and practised law with his brothers Austin and Lyman. He compiled nearly 100 volumes of legal digests and reports. He drew up in 1865, as secretary of the New York Code Commission, the penal code which is the basis of the present one. In 1870 President Grant appointed him one of three commissioners to revise the United States stat¬ utes, which occupied three years, and com¬ pressed 16 volumes into one large octavo ; thence till 1879 he was occupied on a great revision of the (United States Digest. *Among his lesser works are (*

Judge and Jury) (1880), collected contributions to periodicals ; a Chau¬ tauqua book, <The Traveling Law School ; and (Famous Trials) (1880).

ABBOTT, Charles Conrad, author and naturalist: b. Trenton, N. J., 4 June 1843. He received an academical education, and took the degree of M.D. at the University of Pennsyl¬ vania in 1865. He is corresponding member Boston Society of Natural History; member American Philosophical Society of Philadel¬ phia; Fellow Royal Society of Antiquaries of the North, Copenhagen; Assistant, Peabody Museum of American Archaeology and Eth¬ nology, Cambridge, Mass., 1876-89. Author : (Primitive Industry *(1881) ; (Naturalist Ram¬ bles about Home' (1884) ; (Upland and Mea¬ dow* (1886) ; (Waste-land Wanderings)

(1887) ; (Days Out of Doors) (1889) ; lut¬ ings at Odd Times *(1890) ; decent Rambles* (1892) ; 'Travels in a Tree-top) (1894) ; (The Birds About Us) (1894) ; (Notes of the Night *(1895); <A Colonial Wooing* (novel, 1895); 'Birdland Echoes *(1896) ; 'When the Century was New* (novel, 1897) ; (The Hermit of Not¬ tingham *(novel, 1897) ; (The Freedom of the Fields* (1898) ; 'Clear Skies and Cloudy *(1899) ; (In Nature's Realm* (1900) ; 'Archae- ologia Nova Caesarea *(1907-09) ; 'Ten Years' Diggings in Lenape Land* (1912) ; Various Reports on Indian Stone Implements, in American Naturalist (1872), revised and en¬ larged as 'Stone Age in New Jersey *in Smith¬ sonian Annual Report of 1876 In 1876 he announced the discovery, since confirmed by other archaeologists, of traces of man in the Delaware River valley, dating from the first or "Kansan** ice-age and inferentially the pre¬ glacial period when man is believed to have entered upon the North American continent.

ABBOTT, Edward, American clergyman, son of Jacob: b. Farmington, Me., 15 July 1841 ; d. Boston, Mass., 5 April 1908. He was graduated at the University of the City of New York 1860, and at Andover Theological Semi¬ nary 1862 ; in 1863 was with the United States Sanitary Commission at Washington and in the field. He was ordained Congregational clergy¬ man in 1863, and 1865-69 was pastor of the Pilgrim Church, Cambridge, Mass. ; in 1879 was ordained Episcopal priest and was rector of St. James', Cambridge, till 1906; in 1889 he was elected missionary bishop of Japan, but de¬ clined. He was associate editor of the.Cow- gregationalist 1869-78, and editor of the Literary World 1878-88, and 1895-1903. Among his works are Conversations of Jesus *(1875); Paragraph History of the United States* (1875) ; (Paragraph History of the American Revolution *(1876) ; Cong Look Series,* juvenile (1877-80) ; memorial of his father (1882); and (Phillips Brooks* (1900).

ABBOTT, Edwin Abbott, English theo¬ logian and Shakespearean scholar : b. London, 20 Dec. 1838; graduated at St. John's College, Cambridge ; senior classic and Chancellor's medalist (1861). He was master at King Ed¬ ward's School, Birmingham, 1862-64, and at Clifton College; and head-master of the City of London School, 1865-89, raising it to a fore¬ most rank in England. In the latter year he retired. He has been select preacher at Cam¬ bridge and Oxford. His works include the well-known 'Shakespearian Grammar *(1869, enlarged 1870), still a classic; 'Bacon and Essex* (1877) : 'Philochristus *(1878), and (Onesimus* (1882), two anonymous romances of the first age of the Church; (Francis Bacon *(1885) ; (Anglican Career of Cardinal New¬ man* (1892) ; 'St. Thomas of Canterbury *(1898); (From Letter to Spirit* (1903); (Johannine Vocabulary *(1905) ; (The Son of Man* or Contributions to the Study of the Thoughts of Jesus *(1910) ; (Light on the Gospel* (Eng. ed. 1912: Am. ed. 1913); (The Fourfold Gospel* (1913).

ABBOTT, Emma (Wetherell), American dramatic soprano : b. Chicago, Ill., December 1849; d. Salt Lake City, 5 Jan. 1891. Beginning her musical career in Plymouth Church choir, Brooklyn, N. Y., she studied abroad with Sangiovanni at Milan and with Defied Sedie, Wartel, and James at Paris; then joined Mapleson's troupe, made her debut at Covent Garden, London, toured three years in Great Britain, and returning to the United States joined the Emma Abbott English Opera Com¬ pany. She sang in Martha, *'The Chimes of Normandy,* (Faust, *and other popular operas and was one of the best known singers in America in her day. Consult Lahee, H. C., (Famous Singers of To-day and Yesterday* (Boston 1898).

ABBOTT, Frank Frost, American Latinist: b. Redding, Conn., 27 March 1860; graduated at Yale 1882; Latin tutor at Yale 1885-91; associate professor 1892; 1894, professor of Latin in the University of Chicago ; 1901-02 annual professor of the American school of classical studies in Rome ; becoming associate chairman of the managing committee; 1908, professor of classics in Princeton University; a frequent contributor to classical periodicals

and associate editor of Classical Philology. He has written (A History of Roman Political lnstitutions) (1901) ; (The Toledo Manuscript of the Germania of Tacitus) (1903); (A His¬ tory of Rome) (1906) ; (Society and Politics in Ancient Rome* (1909) ; (The Common People

of Ancient Rome) (1911) ; etc. He is vice-president of the American Philological Association.

ABBOTT, Gorham Dummer, American educator, brother of Jacob and J. S. C. : b. Hallowed, Me., 3 Sept. 1807; d. 31 July 1874. He was graduated at Bowdoin 1826, at Andover 1831. • Ordained a Congregational clergyman, he became a teacher in New York; in 1845 with his brothers he established the Abbott Institute for females in New York city and in 1847 the Spingler Institute, — pioneers in women's higher education ; the latter held a foremost rank in the United States for 30 years, and he left it in 1869 a rich man. He wrote didactic works, as lThe Family at HoraeJ (Nathan W. Dickerman,5 (Pleasure and Profit 5 ; also (Mexico and the United States.5

ABBOTT, Jacob, American juvenile writer and educator: b. Hallowed, Me., 14 Nov. 1803; d. 31 Oct. 1879. He was graduated at Bowdoin 1820, studied at Andover, and was ordained a Congregational minister; professor of mathe¬ matics and natural philosophy at Amherst 1825-29; then established the Mt. Vernon girls' school in Boston, and in 1834 organized and was pastor of the Eliot Church in Roxbury. In 1839 he removed permanently to Farming- ton, Me., and devoted himself to literary work there and in New York, assisting also in female education (see the preceding title), writing extensively for the early Harper's Monthly, of which he was one of the chief bulwarks, traveling widely abroad, and writing the classic juveniles of which the (Rollo Books5 are the best known type, — neither their useful¬ ness, their popularity, nor their charm, has yet vanished. He had an excellent dramatic sense, a healthy balance, a sound business practicality and a true understanding of and sincere sym¬ pathy with children, which makes his didactics charming to rightly constituted children ; no boys and girls were ever less priggish than those in <Rollo,) the conventional burlesques of which merely prove that the authors have not read the books, and even so are a testi¬ mony to their vitality. The chief of his more than 200 volumes are the (Rollo Books) (28 vols.), the (Lucy Books) (6 vols.), the (Jonas Books5 (6 vols.), the (Franconia Stories) (10 vols.), the (Marco Paul Series 5 (6 vols.), the Cray Family) series (12 vols.), the (Juno Books) (6 vols.), the (Rainbow Series5 (5 vols.), and several other series of science and travel for the young; more than 20 of the series of illustrated histories to which his brother J. S. C. contributed, and 8 vols. of American history. He also edited historical text-books and compiled school readers.

ABBOTT, Sir John Joseph Caldwell,

Canadian statesman : b. St. Andrews, Quebec, 12 March 1821 ; d. 1893. Graduated at McGill College, Montreal, he became a lawyer, and was regarded as among the best Canadian authori¬ ties on commercial law, being dean of the Mc¬ Gill College Law Faculty for 10 years. In 1859 he was elected to the Lower House of

Quebec, representing Argenteuil until Confed¬ eration (1867), when he was returned to the Canadian House of Commons. In 1862 he was solicitor-general in the Sandfield-Macdonald- Sicotte Cabinet. In 1887 he joined Sir John A. Macdonald's Cabinet as minister without portfolio, and on Macdonald's death in June 1891 became premier of the Dominion ; but resigned from ill health November 1892.

ABBOTT, John Stephens Cabot, Ameri¬ can author: b. Brunswick, Me., 18 Sept. 1805; d. Fairhaven, Conn., 17 June 1877. He was gradu¬ ated at Bowdoin 1825, and Andover; was ordained Congregational minister 1830, and held pastorates at Worcester, Roxbury, and Nantucket, Mass. He resigned the ministry in 1844 and devoted himself to popular literature. A fertile writer like his brother Jacob, and with an interest in his own matter that gave a certain charm to his style and excited equal interest in uncritical readers, but with too little acumen and too much rhetoric for the solid historical subjects he had a passion for, he issued very many works useful in stimulating public curiosity in history, but of too little weight to endure. The most famous was the (Life of Napoleon5 contributed as a serial to Harper's Magazine, and a great popular suc¬ cess; others were (The French Revolution,5 (Napoleon at St. Helena,5 (The Civil War in America5 (1863-66); <Napoleon III5 (1868); 'Romance of Spanish History5 (1879) ; Fred¬ erick the Great5 (1871), and many volumes of small histories and biographies.

ABBOTT, Lyman, American clergyman and editor, third son of Jacob: b. Roxbury, Mass., 18 Dec. 1835. He was graduated at the University of the City of New York in 1853; studied law, and went into partnership with his brothers Austin and Benjamin in 1856; but feeling more inclined to the ministry studied theology with his uncle John Stephens Cabot, and was ordained in 1860. Till 1865 he was pastor at Terre Haute, Ind. ; 1865-68 secre¬ tary of the Freedmen's Commission, residing in New York, also becoming pastor of the New England Church there; in 1869 resigned his pastorate for journalism and literature. He was successively editor of the <(Literary Record55 department of Harper's Magazine , and at the same time chief editor of the Illustrated Christian Weekly; then associate editor with Henry Ward Beecher of the Christian Union, now the Outlook, of which he became chief editor on Mr. Beecher's death in 1887, succeeding him

also in the Ply¬ mouth Church pulpit, which he resigned in 1899 to devote himself wholly to literary work. Since that time he has devoted himself to the editorship of The Outlook, other occasional contributions to literature, and to preaching in various pulpits during seven or eight months of the year, generally in colleges. He has taken an active part in social and industrial reform and in the religious and theological movements of the time. His earliest works were two novels written in collaboration with his brothers Benjamin and Austin Abbott (see Abbott, Austin) published under the nom-de- plume, composed by the three first syllables of their names, (<Benauly.)5 The following is a list of his published volumes: Commentary on the New Testament. Matthew to Romans5

(1875) ; ‘In Aid of Faith) (1886); Evolution of Christianity) (1892) ; (Plymouth Hymnal) (1893) ; Christianity and Social Problcms) (1896); (The Theology of an Evolutionist* (1897); ‘Life and Letters of PauP (1898); (Life and Literature of the Ancient Hebrews) (1901); ‘The Rights of Man> (1901); ‘The Other Room> (1903); ‘Life of Henry Ward Beecher * (1903) ; ‘The Great Companion *

(1904) ; ‘The Christian Ministry) (1905) ; ‘The Home Builder *(1908); ‘The Temple* (1909); ‘Spirit of Democracy) (1910); ‘America in the Making) (1911) ; ‘Letters to Unknown Friends) (1913) ; ‘Reminiscences) (1915).

ABBOTT, Nathan, American jurist and educator, son of Abiel Abbott: b. Norridge- wock, Me., 11 July 1854. He was graduated from Yale College in 1877, then studied law in Boston University. He became Tappan Profes¬ sor of Law in the University of Michigan. In 1893 he was appointed professor of law in Northwestern University. In 1895 he became professor of law and dean of the Law School at Leland Stanford University. After holding this position for 12 years he became, in 1907, professor of law at Columbia University, New York city. He is recognized as a leading au¬ thority on the English and American law of real property.

ABBOTT, Thomas Kingsmill, Irish edu¬ cator: b. Dublin, 26 March 1829; d. 1913. He was a graduate of Trinity College. In 1867 he was appointed to fill the chair of moral phi¬ losophy at the same institution, which position he held until 1872. From 1875 to 1888 he was professor of biblical Greek and from 1879 until 1900 he was

professor of Hebrew. His w'orks are: a translation of Kant's 'Introduc¬ tion to Logic) (1878), and Kant's 'Ethics *(1909) ; 'Essays) (1892) ; 'The Elements of Logic * (1895) ; 'Commentary on Ephesians and Colossians) (1897) ; 'Elementary Theory of the Tides* (1901) ; 'Catalogue of 1 5th Century Books in the Library of Trinity College)

(1905).

ABBOTT, Wilbur Cortez, American edu¬ cator : b. Kokoma, Ind., 28 Dec. 1869. After graduating from Wabash College in 1892 he took a post-graduate course at Cornell Uni¬ versity, then studied at Oxford, where he re¬ ceived a degree of B.Litt. in 1897. From 1893 to 1895 he was instructor in history at Cor¬ nell. In 1897 he became instructor in history at the University of Michigan. Two years later he was appointed assistant professor of history in Dartmouth College; in 1902 profes¬ sor of history in the University of Kansas, and in 1908 he was appointed professor of history at the Sheffield Scientific School, at Yale Uni¬ versity. He is the author of 'Colonel Blood, Crown Stealer* (1911).

ABBREVIATIONS or "shortenings® are used in writing to save time and space, or it may be to ensure secrecy. They are of two kinds, consisting either in the omission of some letters or words, or in the substitution of some arbitrary sign. In the earliest times, when uncial or lapidary characters were used, abbre¬ viations by omission prevailed, such as we find in the inscriptions on monuments, coins, etc. The ancient copiers of MSS. invented many contractions to facilitate their labor. Greek

MSS. abound in such, and hence often cannot be read without a previous regular study of Greek palaeography. From MSS. thtse contractions were transferred to the printed editions of Greek authors, and have only been wholly disused within the past century ; hence regular lists of them were given in the earlier Greek grammars, because the knowledge of them was absolutely essential to the student. Some of the commoner are still given in some gram¬ mars, as many Greek works are accessible only in editions full of them. Among the Romans the marks of abbreviation, called notes or compendia scribendi , were so numerous that, in a classification by L. Annaeus Seneca, they amount to 5,000. With the Latin lan¬ guage the ancient Roman abbreviations passed to the Middle Ages, appearing first on inscrip¬ tions and coins, then in manuscripts, and, more especially after the 11th century, in charters and other legal documents, and the practice continued in these long after the invention of printing had made it unnecessary in books. The use of them in legal documents was

for¬ bidden by an act of Parliament passed in the reign of George II. In ordinary writing and printing few abbreviations are now employed. The abbreviations by using the initials of words are chiefly confined to titles, dates, and a few phrases: A.M. — Magister Artium, Master of Arts; A.D. — Anno Domini , in the year of our Lord; F.R.G.S. — Fellow of the Royal Geographical Society. In the following list most of the abbreviations that are likely to be met with by modern readers are alpha¬ betically arranged, save chemical elements, for which see table of Atomic Weights. The standard abbreviations used in library cata¬ logues are also given. For Latin abbre¬ viations see Campelli's 'Dizionario di Abbre- viature) (Milan, 1899) ; Dobbs' 'Abbreviations, British and Foreign* (1911).

A.A. — Associate of Arts.

A.A.A. — Amateur Athletic Association (Brit.). A.A.A.S. — American Association for the Ad¬ vancement of Science.

A.A.P.S. — American Association for the Pro¬ motion of Science.

A.A.S. — Academics Americance Socius, Fellow of the American Academy (of Arts and Sci¬ ences) ; American Automobile Association. A.A.S.S. — Americance Antiquariance Societatis Socius, Fellow of the American Antiquarian Society.

A.B. — Artium Baccalaureus, Bachelor of Arts. A.B.C.F.M. — American Board of Commis¬ sioners for Foreign Missions.

Abp. — Archbishop.

Abr. — Abridgement, or Abridged, a/c — • Account.

A.C. — Ante Christum, before the birth of Christ.

Acad. Nat. Sci. — Academy of Natural Sciences. Accel. — accelerando, In music, more quickly. A.D. — Anno Domini, in the year of the Lord. A.D.C. — Aide-de-camp.

Adjt. — Adjutant.

Adjt.-Gen. — ■ Adjutant-General.

Ad lib. — Ad libitum, at pleasure.

Admr. — Administrator.

Admx. — Administratrix.

Ads. — Ad sectam, at the suit [of].

Ad v. — Ad valorem, at (or on) ‘the value.

2Et. — JEtatis, of age ; aged.

ABBREVIATIONS

A.F.B.S. — American and Foreign Bible So¬ ciety.

Agl. Dept. — Agricultural Department (Depart¬ ment of Agriculture.

A.G.S.S. — American Geographical and Statis¬ tical Society.

A.H. — Anno Hegires, in the year of the Hegira f Mohammedan era, reckoning from 622 A.D.)

A.H.M.S. — American Home Missionary So¬ ciety.

A.M. — Ante meridiem, before noon; morning; Anno mundi, in the year of the world; Ar- tium Magister, Master of Arts

Am. Ass. Adv. Sci. — American Association for the Advancement of Science.

Amer. Acad. — American Academy.

A.M.E.Z. — African Methodist Episcopal Zion.

Amt. — Amount.

An. — Anno, in the year.

A.N.A. — Associate of the National Academy.

Anat. — Anatomy.

Ang. Sax. — Anglo-Saxon.

Anon. — Anonymous.

Ant., or Antiq. — Antiquities.

A.O.S.S. — Americance Orientalis Societatis So- cius, Fellow of the American Oriental So¬ ciety.

Apoc. — Apocalypse.

Apocr. — Apocrypha.

App. — Appendix.

Apud — In writings of.

A.R. — Anna Regina, Queen Anne; Anno regni, in the year of the reign.

A.R.A. — Associate of the Royal Academy.

Arch. — Archibald ; Architect ; Architecture.

Archd. — Archdeacon.

Arith. — Arithmetic.

Arm. — Armenian.

A.R.S.A. — Associate of the Royal Scottish Academy.

A.R.S,S — Antiquariorum Regies Societatis So- cius, Fellow of the Royal Society of Anti¬ quaries.

Assist. Sec. — Assistant-Secretary.

A.S.A. — American Statistical Association.

Assn. — • Association.

A.S.S.U. — American Sunday-School Union.

Astrol. — Astrology.

Astron. — Astronomy.

A.T.S. — American Tract Society.

Atty. — Attorney.

Atty.-Gen. — Attorney-General.

A.U.A. — American Unitarian Association.

A.U.C. — Anno urbis conditcc, or ab urbe con- dita, in the year from the building of the city (Rome) b.c. 753.

A. V. — Authorized Version (of the Bible).

Ave. — Avenue.

Avdp. or Avoir. — Avoirdupois.

b. — Born.

B. A. — Bachelor of Arts.

Bal.-*- Balance.

Bapt. — Baptist.

Bart, or Bt. — Baronet.

Bbl. — Barrel.

B.C.— Before Christ; British Columbia.

B.C.L. — Bachelor of Civil Law.

B.D. — Baccalaureus Divinitatis, Bachelor of Divinity.

Bds. — Boards ; Bonds.

Beau. & FI. — Beaumont and Fletcher.

Belg. — Belgian* ; Belgium.

Benj. — Benjamin.

B.esL. — Bachelor of Letters (Fr.).

Bib. — Bible ; Biblical.

Bibliog. — Bibliographical ; Bibliography.

Biog. — Biography ; Biographical.

Bk.— Book.

B.L. — Bachelor of Letters.

B.Litt. — Bachelor of Literature.

B.LL. — Baccalaureus Legum, Bachelor of Laws.

B.M. — Baccalaureus Medicines, Bachelor of Medicine.

B.Mus. — Bachelor of Music.

Bot.— Botany.

Bp. — Bishop.

B.Ph. — Bachelor of Philosophy.

Br. — Brig; British; Brother.

Brig. — Brigade ; Brigadier.

Brig -Gen. — Brigadier-General.

Brit. Mus.— British Museum.

Bro.— Brother.

B.S. or B.Sc. — Bachelor in the Sciences.

Bt— Baronet.

B. V. — Beala Virgo, Blessed Virgin; Bene vale, farewell.

C. — Caput or capitulum, chapter ; Celsius ; Cent ; Centigrade; Cents; Centum , a hundred; Cen¬ tury; Circa or circiter, about; Consul.

C.A.— Chief Accountant ; Commissioner of Accounts.

Cam., Camb. — Cambridge.

Can. — Canon.

Cant. — Canticles.

Cantab. — Cantabrigies, Cantabrigiensis, of Cam¬ bridge. In music cantabile, singing tone.

Cantuar. — Cantuariee, Cantuariensis , of Canter¬ bury.

Cap. — Caput, capitulum, chapter.

Capt. — Captain.

Capt.-Gen. — Captain-General.

Card. — Cardinal.

Cath. — Catherine, Catholic, Cathedral.

C.B. — Cape Breton; Communis Bancus, Com¬ mon Bench ; Companion of the Bath.

C.C. — Caius College; Compte courante, ac¬ count current ; Circuit Court ; County Com¬ missioner ; County Court ; Cubic centimeter.

C.E. — Civil Engineer; Church of England; Christian Endeavor Society.

Celt. — Celtic.

Cent. — Centigrade, a scale of 100° from freez¬ ing to boiling; Central; Centum, a hundred; Century.

Cf. — Confer, compare.

C.G. — Commissary-General ; Consul-General.

C.G.H.— Cape of Good Hope.

Chap. — Chapter.

Ch.J. — Chief Justice.

Chr. — Christ ; Christian ; Christopher.

Chron. — Chronicles.

Cic. — Cicero.

Circ. — Circa, or circiter, about ; Circuit.

Cit. — Citation ; Cited ; Citizen.

Civ. — Civil.

C.J. — Chief Justice.

C.M.G. — Companion of the Order of St. Mich¬ ael and St. George.

Co. — Company ; county.

c/o. — In care of.

Coch., or Cochl. — Cochlear, a spoonful. C. amp. (am plum), a

tablespoonful. C. mag. (magnum), a large spoonful. C. med. (me¬ dium), a dessert-spoonful. C. pan', (par- vum), a small spoonful or teaspoonful.

ABBREVIATIONS

C.O.D. — Cash (or collect) on delivery.

Coll. — College.

Com. — Commerce ; Committee ; Commissioner ; Commodore.

Com. Ver. — Common Version (of the Bible). Con. — Contra, against; in opposition.

Conch. — Conchology.

Confed. — Confederate.

Cong. — Congress.

Congl. — Congregational.

Conj . — Conj unction.

Copt. — Coptic.

Cor. — Corinthians.

Cor. Mem. — Corresponding Member.

Corn. — Cornwall ; Cornish.

Cor. Sec. — Corresponding Secretary.

Coss. — Consnles, Consuls.

Cp. — Compare.

C.P.A. — Certified Public Accountant.

C.P.S. — Cnstos Privati Sigilli, Keeper of the Privy Seal.

Cr.— Credit ; Creditor.

Crim. Con. — Criminal conversation (adultery).

C.S. — Court of Sessions ; Custos Sigilli, Keeper of the Seal.

C.S. A. — Confederate States of America; Con¬ federate States Army.

C.S. I. — Companion of the Order of the Star of India.

C.S.N. — Confederate States Navy.

C. Theod. — Codice Theodosiano, in the Theo- dosian Code.

Cwt. — Hundred weight.

Cyc. — Cyclopedia.

d. — Denarius, penny, pence; Died.

D. C. — Da capo, from the beginning; District of Columbia.

D.C.L. — Doctor of Civil Law.

D.D. — Divinitatis Doctor, Doctor of Divinity.

D.D.S. — Doctor of Dental Surgery.

Dea. — Deacon.

Dec. — December ; Declination.

Dec. of Ind. — Declaration of Independence. Def. — Defendant.

Deg. — Degree ; degrees.

Dem. — Democrat ; Democratic.

Dep. — Deputy.

Deut. — Deuteronomy.

D.F. — Defender of the Faith.

D.G. — Dei gratia, by the grace of God ; Deo gmtias, thanks to God.

Disc. — Discount.

Dist.— District.

D.M. — Doctor of Music.

D.M.D. — Doctor of Medical Dentistry.

D.O. — Doctor of Osteopathy.

Do. — Ditto, the same.

Doc. — Document.

D.O.M. — Deo optimo maxim o, to God, the best, the greatest.

D.O.S. — Doctor of Orthopedic Surgery.

D.P. or D.Ph. — Doctor of Philosophy.

Dpt. — Department.

Dr. — Debtor; Doctor.

D.Sc. — Doctor of Science.

D.T. — Doctor Theologice, Doctor of Theology. D.V. — Deo volente, God willing.

D. V.M. — Doctor of Veterinary Medicine.

Dwt. — Pennyweight.

Dyn. — Dynamics.

E. — East.

Ebor. — Eboracum, York.

Eccl.— Ecclesiastes.

Ecclus. — Ecclesiasticus.

Ed. — Editor ; Edition.

Edin. — Edinburgh.

E.E. — Electrical Engineer.

e. g. — Exempli gratia, for example ; Ex grege, among the rest.

E. I. — East Indies or East India.

E. Lon. — East longitude.

E.M. — Mining Engineer.

Encyc. — Encyclopedia.

Encyc. Amer. — Encyclopedia Americana.

Eng. — Engineering; Engineers; England; Eng¬ lish.

Env. Ext. — Envoy Extraordinary.

Ep. — • Epistle.

Epis. — Episcopal.

Esq. — Esquire.

Et al. — Et alii, and others.

Etc., or &c. — Et cceteri, et ccetcrce, et ccetera, and others ; and so forth.

Et seq. — Et sequentes, et sequentia, and what follows.

Etym. — - Etymological ; Etymology.

E. U. — Etats Unis, United States; Evangelical Union.

Ex. — Example ; Exodus.

Exch. — Exchange.

Exec. — Executive ; Executor.

Execx. — Executrix.

Exon. — Exonia, Exeter; Exonice, Exoniensis, of Exeter.

Ex p. — Ex parte, in behalf of.

F. — Fahrenheit ; Franc; Francs.

Fahr. — Fahrenheit.

F. and A.M. — Free and Accepted Masons.

F.A.S. — Fellow of the Antiquarian Society.

F.B.S. — Fellow of the Botanical Society.

Fcap. or fcp — Foolscap.

F. C.P.S. — Fellow of the Cambridge Philo¬ logical Society.

F.C.S. — Fellow of the Chemical Society.

F.D. — Fidei Defensor, Defender of the Faith. Fee. — Fecit, he did or made it.

Fed. — Federal.

F.E.S. — Fellow of the Entomological Society;

Fellow of the Ethnographical Society.

Ff. — Fecerunt , they did or made it; Folios;

Following; Fortissimo.

F.G.S. — Fellow of the Geological Society. F.H.S. — Fellow of the Horticultural Society. Fid. Def. — Fidei Defensor, Defender of the Faith.

Fig. — Figure.

Fin. — • Finland.

Finn. — Finnish.

Fir. — Firkin.

FI. — Florin ; Florins ; Flourished.

F.L.S. — Fellow of the Linnaean Society. F.-M.— Field-Marshal.

F. o. b. — Free on board.

Fol. — Folio.

For. — Foreign.

F.P.S. — • Fellow of the Philological Society.

Fr. — Fragmentum, fragment; Franc; France;

Francis; Francs; French.

F.R.A.S. — Fellow of the Royal Asiatic So¬ ciety; Fellow of the Royal

Astronomical So¬ ciety.

F.R.C.P. — Fellow of the Royal College of Physicians.

F.RC.S. (E.I. or L.). — Fellow of the Royal College of Surgeons (Edinburgh, Ireland, or London).

F.R.G.S. — Fellow of the Royal Geographical Society.

F.R. Hist. Soc. — Fellow of the Royal His¬ torical Society.

F.R.S. — Fellow of the Royal Society.

F.R.S.E. — Fellow of the Royal Society, Edin¬ burgh.

F.R.S. L. — Fellow of the Royal Society, Lon¬ don.

F.R.S. S. A. — Fellow of the Royal Scottish So¬ ciety of Arts.

F.R.Z.S. — Fellow of the Royal Zoological So¬ ciety.

F.S.A. — Fellow of the Society of Arts, or of Antiquaries.

F.S.A.E. — Fellow of the Society of Antiqua¬ ries, Edinburgh.

F.S.A. Scot. — Fellow of the Society of Anti¬ quaries of Scotland.

F.S.S. — Fellow of the Statistical Society.

Ft. — Foot; feet; Fort.

Fur. — Furlong.

F. Z.S. — Fellow of the Zoological Society.

G. — Guineas.

G.A.R. — Grand Army of the Republic.

G. B. — Great Britain.

G. B. & I. — Great Britain and Ireland.

G.C.B. — Grand Cross of the Bath.

G.C.H. — Grand Cross of Hanover.

G.C.K.P. — Grand Commander of the Knights of St. Patrick.

G.C.L.H. — Grand Cross of the Legion of Honor.

G.C.M.G. — Grand Cross of St. Michael and St. George.

G.C.S.I. — Grand Commander of the Star of India.

Gen. — Genealogy; Genera; General; Genesis; Genus.

GL, or Gloss. — Glossary.

G.L. — Grand Lodge.

G.M. — Grand Master.

G.M.K.P. — Grand Master of the Knights of St. Patrick.

G.M.S.I. — Grand Master of the Star of India.

G.O. — General Order.

Goth. — Gothic.

G.P.O. — General Post-Office.

Gr. — Greek.

G. R. — Georgius Rex, King George.

Gr., Grs. — Grain ; Grains.

G. S. — Grand Secretary; Grand Sentinel; Grand Scribe.

Gtt. — Gutta or guttce, drop ; drops.

H. — Hour.

Hab. — Habakkuk.

Hab. corp. — Habeas corpus, that you have the body.

Hab. fa. poss. — Habere facias possessionem, that you cause to have possession, — a legal writ.

Hab. fa. seis. — Habere facias seisinam, that you cause to have seisin,

— a legal writ.

H.B.M. — His or Her Britannic Majesty.

H.M.S. — His (or Her) Majesty's Ship.

H.C.M. — His or Her Catholic Majesty.

H.E. — • His Excellency, or His Eminence.

Heb. — Hebrew ; Hebrews.

Her. — Heraldry.

H.H. — His or Her Highness; His Holiness (the Pope).

H. I. — Hawaiian Islands.

Hier. — Hierosolyma, Jerusalem.

H.I.H. — His or Her Imperial Highness.

Hind. — -Hindu; Hindustan; Hindustani.

H.J.S. — Hie facet sepultus, here lies buried.

H.L. — House of Lords.

H.M. — His or Her Majesty.

H.M.P. — Hoc monumentum posuit, erected this monument.

H.M.S. — His or Her Majesty's Ship or Service. Hon. — Honorable.

Hort. — Horticulture.

Hos. — Hosea.

H.R. — House of Representatives.

H.R.H. — His or Her Royal Highness.

H.R.I.P. — Hie requiescit in pace, Here rests in peace.

H.S. — Hie situs, Here lies.

H. S.H. — His or Her Serene Highness.

Hypoth. — Hypothesis ; Hypothetical.

I. — Iniperator or Imperatrix, Emperor or

Empress.

Ib., or ibid. — Ibidem, in the same place.

Ich., or Ichth. — Ichthyology.

Icon. Encyc. — Iconographic Encyclopedia.

I. Ch. Th. U. S. — ’I (wove) X (picroe) 0 (eov) v (ioe) 2(lott/p) (Iesous Christos, Tlieou Uios, Soter), Jesus Christ, the Son of God, the Saviour; also written Ixˆe — a fish ; whence the sym¬ bol of a fish for the sacred name.

Id. — Idem, the same.

I.H.S — (CornTpted from Gr. IH2, abbrev. of IH20T2, Jesus). Now read Jesus Hominum Salvator, Jesus the Saviour of Men.

Imp. — Imperative; Imperator, emperor; Im¬ perial.

In. — Inch; inches.

Inc. or Incor. — Incorporated.

Incog. — Incognito, unknown.

I.H.P. — Indicated horse-power.

I.N.D. — In nomine Dei, in the name of God. Inf. — Infra, beneath, or below.

In f. — In fine, at the end.

In lim. — In limine, at the outset.

In loc. — In loco, in the place.

In pr. — In principio, in the beginning.

I.N.R.I. — Jesus Nazarenus, Rex Judceorum, Jesus of Nazareth, King of the Jews.

Inst. — Instant; Institute; Institutes; Institu¬ tion.

In trails. — In transitu, in transit.

Int. Rev. — Internal Revenue.

Ion. — 1 Ionic.

I.O. O.F. — Independent Order of Odd Fellows.

I.O.S.M. — Independent Order of the Sons of Malta.

I.O.U. — I owe you.

Ipecac. — Ipecacuanha.

I. R. — Imperator, Rex.

Ital. — Italic ; Italian.

J. — Justice, or Judge.

J.A. — Judge- Advocate.

J.C. — Jurisconsultus, jurisconsult.

J.C.D. — Juris Civilis Doctor, Doctor of Civil Law.

J.D. — Juris Doctor, Doctor of Law.

J.P. — Justice of the Peace.

J. Prob. — Judge of Probate.

Jtid. — Judicial; Judith.

J. U.D., or J.V.D. — Juris utriusque Doctor, Doctor of both laws (of the Canon and the Civil Law).

Judge-Adv. — Judge-Advocate.

K. — Karat ; Karats ; King.

K.A. — Knight of St. Andrew, in Russia.

Kal. — Kalendce, the Kalends. •

K.B. — ’King’s Bench; Knight of the Bath.

K.B.A. — Knight of St. Bento d’Avis, in Por¬ tugal.

K.B.E. — Knight of the Black Eagle, in Russia.

K.C. — King’s Counsel; Knight of the Crescent, in Turkey.

K.C.B. — Knight Commander of the Bath.

K.C.H. — Knight Commander of Hanover.

K.C.S. — Knight of Charles III of Spain.

K.E. — Knight of the Elephant, in Denmark.

K.F. — ■ Knight of Ferdinand, in Spain.

K.F.M. — • Knight of St. Ferdinand and Merit, in Sicily.

K.G. — • Knight of the Garter.

K.G.C. — Knight of the Golden Circle ; Knight of the Grand Cross.

K.G.C.B. — Knight of the Grand Cross of the Bath.

K.G.F. — Knight of the Golden Fleece, in Spain.

K.G.H. — Knight of the Guelphs of Hanover.

K.G.V. — Knight of Gustavus Vasa, in Sweden.

K.H. — Knight of Hanover.

Kilo., Kilog. — Kilogram.

Kilo., Kilom. — Kilometer.

K.L. — Knights of Labor.

K.L., or Iv.L.A. — Knight of Leopold of Aus¬ tria.

K.L.H. — Knight of the Legion of Honor.

K.M. — Knight of Malta.

K.M.H. — Knight of Merit of Holstein.

K.M.J. — Knight of Maximilian Joseph, in Ba¬ varia.

K.M.T. — Knight of Maria Theresa, in Austria.

K.N.S. — Knight of the North Star, in Sweden.

Knt. or Kt.— Knight.

K.P. — Knight of St. Patrick; Knight of Pythias.

K.R.C. — Knight of the Red Cross.

K.R.E. — Knight of the Red Eagle, in Prussia.

K.S. — Knight of the Sword, in Sweden.

K.S.A. — Knight of St. Anne, in Russia.

K.S.E. — Knight of St. Esprit, in France.

K.S.F. — Knight of St. Fernando, in Spain.

K.S.F.M. — Knight of St. Ferdinand and Mer¬ it, in Naples.

K.S.G. — Knight of St. George, in Russia.

Iv.S.H. — Knight of St. Hubert, in Bavaria.

K.S.J. — Knight of St. Januarius, in Naples.

K.S.L. — Knight of the Sun and Lion, in Persia.

K.S.M. & S.G. — Knight of St. Michael and St. George, in the Ionian Islands.

K.S.P. — - Knight of St. Stanislaus of Poland.

K.S.S. — Knight of the Southern Star, in Bra¬ zil ; Knight of the Sword of Sweden.

K.S.V. — Knight of St. Vladimir, in Russia.

Kt. — Knight.

K.T. — Knight of the Thistle; Knight Templar.

K.t.l. (Gr r. X). — nai ra teitcopeva (kai ta lei- pomena), or 'kovna (loipa), and so forth; and the rest ; same as ˆetc.®

K.T.S. — Knight of the Tower and Sword, in Portugal.

K.W. — Knight of William, in the Netherlands.

K. W.E. — Knight of the White Eagle, in Po¬ land.

L. — Lake ; Liber, book ; Libra, librce, pound, pounds.

L.A.C. — Licentiate of the Apothecaries' Com¬ pany.

Lapp. — Lappish.

Lat. — Latitude.

Lb., or lbs. — Libra or librce, pound or pounds in weight.

L.C. — Loco citato, in the place cited; Lord Chamberlain; Lord Chancellor; Lower Can¬ ada ; Lower case.

Leg. — Legal ; Legate.

Legis. — Legislature.

Lev. — ■ Leviticus.

Lex. — • Lexicon.

L.H.A. — Lord High Admiral.

L.H.C. — Lord High Chancellor.

L.H.D. — ■ Litter arum Humaniorum Doctor,

Doctor of the More Humane Letters.

L.H.T. — Lord High Treasurer.

Lib. — ■ Liber, book.

Lieut.-Col. — • Lieutenant-Colonel.

Lieut.-Gen. — • Lieutenant-General.

Lieut.-Gov. — ■ Lieutenant-Governor.

Linn. — Linnaeus ; Linnaean.

Liq. — Liquid ; Liquidation ; Liquor.

Lit. — ■ Literally ; Literature.

Lith. — Lithuanian.

Litt.B. — Bachelor of Letters.

Litt.D. — • Doctor of Letters.

L.L. — Loco laudato, in the place praised (quot¬ ed) ; Lord Lieutenant.

L.Lat. — Low Latin ; Law Latin.

LL.B. — Legum Baccalaureus, Bachelor of Laws. LL.D. — Legum Doctor, Doctor of Laws.

LL.M. — Legum Magister, Master of Laws.

L.M.S. — London Missionarv Society.

Loc. cit. — Loco citato, in the place cited.

Long. — ■ Longitude.

L.R.C.P. — Licentiate of the Royal College of Physicians.

L.R.C.S. — Licentiate of the Royal College of Surgeons.

L.S. — Locus sigilli, place of the seal.

L.S.A. — Licentiate of the Society of Apothe¬ caries.

L. S.D. — Pounds, shillings, and pence.

LXX. — 'The Septuagint (Version of the Old Testament).

M. — Married; Meridies, noon; Mile; Mille, a thousand; Minute, minutes; Monsieur, mister.

M.A. — • Master of Arts.

M. Am. Soc. C.E. — Member American Society Civil Engineers.

Maj.-Gen. — Major-General

Math. — ■ Mathematics ; Mathematician.

M.B. — Medicince Baccalaureus, Bachelor of Medicine; Musicce Baccalaureus, Bachelor of Music.

M.B.F. et LI. — • Magna Britannia, Francia, et Hibernia, Great Britain, France, and Ireland.

M.C. — Member of Congress ; Master of Cere¬ monies ; Master Commandant.

M.C.E. — Master of Civil Engineering.

Mch. — March.

M.D. — Medicince Doctor, Doctor of Medicine. Mdlle. — Mademoiselle.

Mdse. — Merchandise.

M.E. — Methodist Episcopal ; Military or Me¬ chanical Engineer.

Mech. — • Mechanic ; Mechanical.

M.E.G.H.P. — Most Excellent Grand High Priest.

Mem. — ■ Memento , remember; Memorandum.

M.E.S. — ■ Methodist Episcopal, South.

Metal. — Metallurgy.

Meteor. — Meteorology.

Meth. — Methodist.

Mex. — Mexico, or Mexican.

M.F.A. — Minister of Foreign Affairs; Master of the Fox Hounds (Eng.).

M. Goth. — Moeso-Gothic.

Mic. — • Micah.

M.I.C.E. — Member of the Institution of Civil Engineers.

Mich. — Michael ; Michaelmas.

Mil. — Military.

Min. — Mineralogy ; Mining ; Minute, minutes.

M.L. — Master of Laws.

M.L.A. — Mercantile Library Association ; Member of the Legislative Assembly (S. Africa) .

Mile. — Mademoiselle.

MM. — Messieurs, Gentlemen; (Their) Majes¬ ties.

M.M.E. — Master of Mining Engineering.

Mme. — Madame, Madam.

M.M.S. — Moravian Missionary Society.

M.M.S.S. — Massachusettensis Medicince So- cietatis Socius, Eellow of the Massachusetts Medical Society.

M.N.A.S. — Member of the National Academy of Sciences.

M.P. — 'Member of Parliament; Metropolitan Police ; Methodist Protestant.

M.P.P. — Member of Provincial Parliament. MfP.S. — Member of the Philological Society;

Member of the Pharmaceutical Society. M.R.A.S. — Member of the Royal Asiatic So¬ ciety; Member of the Royal Academy of Sci¬ ence.

M.R.C.C. — •' Member of the Royal College of Chemistry.

M.R.C.P. — Member of the Royal College of Physicians.

M.R.C.S. — Member of the Royal College of Surgeons.

M.R.C.V.S. — Member of the Royal College of Veterinary Surgeons.

M.R.G.S.— Member of the Royal Geographical Society.

M.R.I. — Member of the Royal Institution. M.R.I.A. — Member of the Royal Irish Academy. M.R.S.L.— Member of the Royal Society of Literature.

M.S. — Master of Science; Memories sacrum, sacred to the memory.

M.S. A. — Master of Science in Agriculture. Mus.B. — Musices Baccalaureus, Bachelor of Music.

Mus.D. — Musicce Doctor, Doctor of Music. M.W.G.C.P. — Most

Worthy Grand Chief Pa¬ triarch.

M. W.G.M.— Most Worthy Grand Master; Most Worshipful Grand Master.

M}r th. — Mythology.

N. — Neuter; North; Note; Noun; Number.

N.A. — National Academician; North America;

North American.

N.A.S. — National Academy of Sciences.

Nat. — Natural; National.

Nath. — 'Nathanael, or Nathaniel.

Naut. — Nautical.

Naut. Aim. — Nautical Almanac.

N.B. — New Brunswick; North Britain (i.c. Scotland) ; North British (i.e. Scottish) ; Nota bene, mark well ; take notice.

N.D. — No date; Not dated; North Dakota. Neh. — Nehemiah.

N. e. i. — Non est inventus, he is not found. Nem. con., or nem. diss. — Nemine contradi- cente, or nemine dissentients, no one opposing or dissenting; unanimously.

N. 1. — Non liquet, it does not appear.

N. lat. — North latitude.

N.M. — New measurement; New Mexico.

Nob pros. — Nolle prosequi, unwilling to pro¬ ceed.

Non-com. — Non-commissioned (officer).

Non cul. — Non culpabilis, not guilty.

Non obst. — Non obstante, notwithstanding. Non pros. — Non prosequitur, he does not prose¬ cute.

Non seq. — Non sequitur, it does not follow. Notts*. —

Nottinghamshire.

N.P. — Nisi Prius ; Notary Public.

N.P.D. — North Polar Distance.

N.S. — New Series; New Style (after 1752) ; Novia Scotia.

N.S.J.C. — Noster Salvator Jesus Christus, Our Savious Jesus Christ.

N.S.W. — New South Wales.

Num. — Numbers (Book of).

N.V. — New Version.

N. Z. — New Zealand.

Ob. — Obiit, he or she died.

Obs. — Obsolete ; Observatory ; Observation. Oct., or 8vo. — Octavo.

O. F. — Odd Fellow, or Odd Fellows.

O.G. — - Outside Guardian.

O.H.M.S. — On His or Her Majesty's Service. Olym. — Olympiad.

O.M. — Old Measurement; Order of Merit.

Opt. — Optics.

O.S. — 'Old Series; Old Style; Outside Sentinel.

O. U.A. — Order of United Americans.

Oxon. — Oxonia, Oxford; Oxonice, Oxoniensis ,

of Oxford.

Oz. — Onza, ounce.

P. — Page; Part; Particle; Pondere, by weight. Pal. — Palaeontology.

Pari. — Parliament.

Pathol. — Pathology.

Paym.-Gen. — Paymaster-General.

P.B. — Philosophies Baccalaureus, Bachelor of Philosophy; Primitive Baptist.

P.C. — Patrcs Conscripti, Conscript Fathers, Senators; Postal card; Privy Council; Privy Councilor.

P.C.P. — Past Chief Patriarch.

P.C.S. — Principal Clerk of Sessions.

Pd. — Paid.

P.D. — Philosophies Doctor, Doctor of Phi- losophy.

F'.E. — Protestant Episcopal P.E.I. — Prince Edward Island.

Per. — Persia ; Persian.

Per ann. — Per annum, by the year.

Per cent. — Per centum, by the hundred.

Peri. — Perigee.

Per proc. — Per procurationem, by procuration, or by power of attorney.

Phar. — Pharmacy.

Ph.B. — Philosophies Baccalaureus, Bachelor of Philosophy.

Ph.D. — Philosophies Doctor, Doctor of Phi¬ losophy.

Ph.G. — Graduate in Pharmacy.

Phil — Philadelphia ; Philemon; Philip; Philip- pians ; Philosophical ; Philosophy.

Philem. — Philemon.

Philomath. — Philomathes, a lover of learning Phren. — Phrenology.

P.I. — Phillipine Islands.

Pinx, or pxt. — Pinxit, he (she) painted it.

P.M. — Passed Midshipman; Post meridiem, afternoon, evening; Postmaster; Past Master. P.M.G. — Postmaster-General.

P.O. — Post Office; Province of Ontario.

P. of H. — Patrons of Husbandry.

P.-O.O. — Post-Office order.

PP. — Patrcs, Fathers.

P.P. — Parish priest; Per procurationem, by procuration, or by power of attorney.

P.P.C. — Pour prendre conge, to take leave.

P.Q. — 'Previous Question; Province of Quebec. Pr. — Per, by, or by the.

P.R. — Populus Romanus, the Roman people; Porto Rico.

P.R. A.— President of the Royal Academy. F'.R.C. — Post Roman conditam, from the building of Rome.

Presb. — Presbyterian.

Pro tern. — Pro tempore, for the time being. Prov.— Proverbs ; Province; Provost.

Prox. — Proximo, next (month).

P.R.S. — -President of the Royal Society.

Prus. — Prussia ; Prussian.

Ps. — Psalm, or Psalms.

P.S. — Post scriptum, postscript; Privy Seal. Psych. — Psychic ; Psychical; Psychology.

Pt. — Part ; Pint ; Payment ; Point ; Port.

P.T.O.— Please turn over.

P. W.P. — Past Worthy Patriarch.

Pwt. — Pennyweight ; pennyweights.

Q. — • Quadrigans, farthing ; Quasi, as it were, almost ; Queen ; Query, or question.

Q.B. — Queen's Bench.

Q.C.— Queen's College; Queen's Counsel.

Q. d. — Quasi dicat, as if he should say ; quasi dictum, as if said; quasi dixisset, as if he had said.

Q. e. — Quod est, which is.

Q. e. d.— Quod erat demonstrandum, which was to be proved.

Q. e. f. — Quod erat faciendum, which was to be done.

Q. e. i. — Quod erat inveniendum, which was to be found out.

Q. 1. — Quantum libet, as much as you please. Qm. — Quomodo, how; by what means.

Q.M.G. — Quartermaster-General.

Q. p., or q. pi. — Quantum placet, as much as you please.

Q.S. — Quantum sufficit, as much as may suffice;

Quarter Sessions.

Qt. — Quart.

Qu., or qy. — Quaere, inquire ; query.

Quad.— Quadrant ; Quadrate.

Q. v. — Quod or quern vide, which or whom see ; Quantum vis, as much as you will.

R. — Railroad ; Railway ; Recipe, take ; Regina, Queen ; River.

R.A. — Royal Academician ; Royal Academy ;

Royal Arch ; Royal Artillery.

RC. — Rescriptum, a counterpart.

R.C. — Roman Catholic.

R.C.S.— Royal College of Surgeons.

R.C.P. — Royal College of Physicians.

R.D. — -Rural Dean.

R.E. — Reformed Episcopal ; Royal Engineers. Rec. — Recipe ; Record ; Recorder ; Recording. Reed. — Received.

Rect. — Rector; Receipt.

Ref. — Reformed; Reformation; Reference. Reg. — Regiment; Register; Registrar; Regular. Reg. Prof. — Regius Professor, Royal Professor. Rev. — Reverend; Revelation (Book of); Re¬ view ; Revenue ; Revise.

R.H.S. — Royal Humane Society ; Royal His¬ torical Society.

R.I.P. — Requiescat in pace, Let him (her) rest in peace.

r M. — Royal Marines; Royal Mail.

R.M.S. — Railway Mail Service; Royal Mail Service ; Royal Mail Steamer.

R.N. — • Royal Navy.

R.N.R. — Royal Naval Reserve.

Rom. — • Roman ; Romans.

R.P. — 'Reformed Presbyterian; Regius Profes¬ sor, Royal Professor.

R.S.A. — 'Royal Society of Antiquaries; Royal Scottish Academy.

R.S.V.P. — Repondcz, s’il vous plait, answer, if you please.

Rt. Hon. — Right Honorable.

Rt. Rev. — Right Reverend.

R.T.S. — Religious Tract Society.

Rt. Wpful. — Right Worshipful.

R.U.E. — Right upper entrance.

R.V. — Revised Version.

R.W.D.G.M. — Right .Worshipful Deputy Grand Master.

R.W.G.R.— Right Worthy Grand Representa¬ tive.

R.W.G.S. — Right Worthy Grand Secretary'.

R.W.G.T. — Right Worthy Grand Treasurer; Right Worshipful Grand Templar.

R.W.G.W.— Right Worthy Grand Warden.

R. W.S.GAV. — Right Worshipful Senior Grand Warden.

Rx. — Rupees.

S. — Saint; Scribe; Second; Series; Solidus, a shilling; South; Sun; Sunday.

S.A. — Secundum artem, according to art; South America ; South Australia.

S.A.S. — Societatis Antiquariorum Socius, Fel¬ low of the Society of Antiquaries.

S.C. — Senatus Consultum, a decree of the Sen¬ ate ; Small capitals ; South Carolina ; Staff Corps ; Supreme Court.

Sc. — Scene; Scilicet, namely, to wit; Scruple; Sculp sit, he (or she) engraved it.

Scan. Mag. — Scandalum magnatum, scandal of the great.

Scapa (S.C.A.P.A.) . — -Society for Checking Abuses in Public Advertising.

Sc. B. — Scientice Baccalaureits, Bachelor of Sci¬ ence.

Schol. — Scholium, a note.

Scr. — Scruple.

Scrip. — Scripture.

Sculp. — Sculpsit, he (or she) engraved it

S.D.U.K. — Society for the Diffusion of Use¬ ful Knowledge.

Sec.— Secretary ; Second; Section.

Sec. Leg. — Secretary of Legation ; Secundum legem, according to law.

Sec. Reg. — Secundum regulam, according to rule.

Sem. — Semble, it seems; Seminary.

Seq. — Sequentia, following; Sequitur, it follows.

Serg.-Maj . — Sergeant-Major.

Sess. — Session.

S.-G. — Solicitor-General.

S.H.S. — Societatis Historiae Socius, Fellow of the Historical Society.

S.I.M. — Society for Increase of the Ministry.

S.J. — Society of Jesus; a Jesuit.

S.M. — State Militia; Short Meter; Sergeant- Major; Sons of Malta.

S.M. Lond. Soc. — Societatis Medicce Londo- nensis Socius, Fellow of the London Medical Society.

Soc. Isl. — Society Islands.

Sol. -Gen. — Solicitor-General.

S.P. — Sine prole, without issue.

S.P.A.S. — Socictatis Philosophic <2 Americana ce Socius, Fellow of the American Philosophi¬ cal Society.

S.P.C.A. — Society for the Prevention of Cruelty to Animals.

S.P.C.C. — Society for the Prevention of Cruelty to Children.

S.P.C.K. — Society for the Promotion of Chris¬ tian Knowledge.

S.P.G. — Society for the Propagation of the Gospel.

Sp. gr. — Specific gravity.

S.P.M. — Short particular metre.

S.P.Q.R. — Senatns Populusque Romanns , the Senate and people of Rome.

S.P.R.L. — Society for the Promotion of Re¬ ligion and Learning.

Sq. — Sequens, following; usually et seq., and following (pages) ; Square.

Sqq. — Sequentibus, the following (pages or places).

S.R.I. — Sacrum Romanum Imperium, Holy Roman Empire.

S.R.S. — Societatis Regice Socius, Fellow of the Royal Society.

SS. — Saints; Scilicet, to wit; Semis, half; Ses¬ sions.

5.5. — -Steamship; Sunday-school.

5.5. E. — South-southeast.

S.SAV. — South-southwest.

St. — Saint ; Street.

S.T.B. — Sacrce Theologice Baccalaureus, Bach¬ elor of Sacred Theology.

S.T.D. — Sacrce Theologice Doctor, Doctor of Sacred Theology.

Ster., or Stg. — Sterling.

S.T.P. — Sacrce Theologice Professor, Professor of Sacred Theology.

Su.-Goth. — Suio-Gothic.

Sup. — Superfine; Supplement; Supra, above; Supreme.

Surg. — Surgeon ; Surgery.

Surg.-Gen. — Surgeon-General.

S. V. — Sub voce, under the word or title.

Syn. — Synonym ; Synonymous.

Syr. — Syriac.

Tan. — Tangent.

T. E. — Topographical Engineers.

Tel. — Telegraph or Telephone.

Text. Rec. — Textus Receptus, Received Text.

Thess. — Thessalonians.

Tob. — Tobit.

Tom. — Tome, volume.

Topog.— Topography ; Topographical.

Tr. — Transpose; Translator; Translation; Trustee.

T rans. — T ranslator ; T ranslation ; T ransac-

tions ; Transpose.

Tur. — Turkey.

Typ. — Typical ; Typographer ; Typographical.

U. — Union.

U.B. — United Brethren.

U.C. — Upper Canada; Urbe condita, year of the founding of Rome.

U.J.D. — U triusque Juris Doctor, Doctor of both Laws (Canon and Civil).

U.K. — United Kingdom.

U.K.A. — Ulster King-at-Arms ; United King¬ dom Alliance.

Ult. — ■ Ultimo, last ; of the last month.

U.P. — United Presbyterian.

U.S. — United States.

U.S.A. — United States of America; United States Army.

U.S. M.— United States Mail; United States Marines.

U.S.M.A.— United States Military Academy. U.S.M.C. — United States Marine Corps. U.S.M.H.S. — United States Marine Hospital Service.

U.S.N. — United States Navy.

U.S. N. A.— United States Naval Academy. U.S.S. — United States Senate; United States Ship.

U. s.w. — Und so welter, and so further; same as <(etcA

V. — Versus, against; Versiculo, in such a verse ; Vide, see.

Val. — Valorem ; Value.

V at. — V atican.

V.C. — Victoria Cross; Vice-Chairman; Vice- Chancellor.

V.D.M. — Verbi Dei Minister, Minister of God's word.

V.G. — Vicar-General.

V.g. — Verbi gratia, as for example.

Vid — Vide, see.

Vise. — Viscount.

Viz., or vl. — Videlicet, to wit; namely; that is to say.

Vo. — Verso, left-hand page.

Vols. — Volunteers; Volumes.

V.P. — • Vice-President.

V.R. — Victoria Regina, Queen Victoria.

Vs. — Versus, against; Versiculo, in such a verse.

V. S. — -Veterinary Surgeon.

Vul. — Vulgate.

W. B.M. — Woman's Board of Missions.

W.C.A. — Woman's Christian Association.

W.C.T.U. — Women's Christian Temperance

Union.

W.F. — Wrong font.

W.F.M.S. — Woman's Foreign Missionary So¬ ciety.

W.H.M.A. — Woman's Home Missionary As- ciation.

W.M. — Worshipful Master.

W.M.S. — Wesleyan Missionary Society. W.N.C.T.U. — Woman's National Christian

Temperance Union.

W. S. — -Writer to the Signet.

X. , or Xt. — Christ. (X in this and the follow¬ ing abbreviations is the Greek chi.)

Xmas., or Xm. — Christmas.

Xn., or Xtian. — Christian.

Xnty., or Xty. — Christianity.

Xper., or Xr. — Christopher.

Y. M.C.A. — Young Men's Christian Associa¬ tion.

Y.M.C.U. — Young Men's Christian Union. Y.P.S.C.E. — Young People's Society of Chris¬ tian Endeavor.

Y. W.C.A. — Young Women's Christian Asso¬ ciation.

Zach. — Zachary.

Zech. — Zechariah.

Zeph. — Zephaniah.

ABBREVIATORS, a body of 72 writers

in the Papal Chancery who have charge of sketching and putting in shape papal bulls, briefs, and consistorial decrees, and signing them in the name of the Cardinal Vice-Chan¬ cellor. This body receives its name from the fact of their taking short-hand notes of the decisions to be later expanded. They have existed at least since 1400.

ABC CLUB (a-ba-sa/) : a name adopted by certain republican enthusiasts in Paris, pro¬ fessing to relieve the depressed — abaisses. Their insurrection of 5 June 1832 was sup¬ pressed with bloodshed. The event is de¬ scribed in Victor Hugo's (Les Miserables)

(1862).

«A. B. C. POWERS,® a convenient and popular designation applied to Argentina, Bra¬ zil, and Chile, the three strong nations of South America united to a certain extent by treaty in 1915, after having been, in 1914, associated very conspicuously and honorably as mediators actively concerned in efforts to arrange a peaceful settlement of the quarrel between the administration of the United States and General Huerta of Mexico. The growth of the movement which culminated in the treaty of 1915 is marked by three distinct phases in the course of a decade. Thus, during the early months of 1906 there was frank talk of the imminence of war between Chile and Argentina, but at the same time publicists in Buenos Aires advocateˆ a permanent agree¬ ment which should remove onerous taxes at the Brazilian and Chilean frontiers and justify the reduction of armaments — an idea essen¬ tially right, yet requiring for popular acceptance some authoritative foreign approbation to over¬ come deep-seated, inveterate local prejudices or aversions. Such was the first phase. The en¬ tirely reasonable advocacy of a South American triple entente therefore made little headway until the administration at Washington had en¬ tangled its policies in the complications of hostile Mexican factions. The <(A. B. C.® nations then saw their opportunity to stand out together before the world, side-by-side, in a most distinguished fashion. They proposed mediation four days after the United States had inaugurated hostilities at Vera Cruz. The acceptance of their offer and the proceedings of the Niagara Falls conference gave promi¬ nence to the second phase (see Latin America — Recent History). Then events moved swiftly toward the consummation long desired by leaders of thought in Buenos Aires and advocated, as we have said, for 10 years, more or less. On 25 May 1915 a treaty of peace, valid for

five years, was signed at Buenos Aires by representatives of Argentina, Brazil, and Chile — the first actual treaty between these separatists and therefore jealously competing nations — by the terms of which each was pledged not to make war against either of the others before investigation, etc., of the causes of conflict by an impartial commission. This marks the third, or present, phase.

ABC PROCESS: a name given to a method of purifying sewage by sulphate of alumina, blood, charcoal and clay.

ABD (Arab. ((slave®) ; Abd- Allah, ((Slave of God,® generally romanized as (<Abdullah.® Abdul Hamid, ((Slave of the Praiseworthy,® i. e., God ; Abdul or Abd-el-Aziz, ffSlave of the Beloved.® •

ABD ALLAH IBN AL MUTTALIB,

ban'-al-moot'a-leb, father of Mohammed : b. 554, according to A1 Kalbi. As Mohammed was born in 571 this would make his father only 17 years old at the time. As stated defi¬ nitely in the Koran, Mohammed was an orphan

shortly after his birth. Aside from these bare facts little of any certainty is known of the father of the Prophet.

ABD ALLAH IBN ZUBAIR, ’bn'zoo'ber,

Moslem Caliph : b. 622 : d. 692. He was the son of Zubair, nephew of Mohammed, the Prophet, and the grandson of Abu Bekr. After the death of Husain he had himself proclaimed caliph by the people of Mecca in 681, taking the title of Amir al Muminin. Soon he was attacked by the armies of Yazid and was besieged in Mecca. Yazid’s death, however, in 683, put an end to the siege, and Irak, Arabia and the greater part of Syria recognized Abd Allah as caliph. But presently Abd al Malik renewed the war and again laid siege to Mecca. After a long resistance the city finally fell in 692, and Abd Allah was slain.

ABD AL LATIF, la-tef, Arabian writer and physician: b. Bagdad, 1160; d. while on a pilgrimage to Mecca, 1231. After his early studies, which consisted, after the custom of the time and the people, of memorizing the Koran and other literary works, he went to Damascus, which was then the centre of learning of the Moslem world. While in Egypt Abd al Latif became acquainted with Maimonides, the great Jewish philosopher. At Cairo he became a teacher of medicine, though he also devoted much time to traveling. Abd al Latif is sup¬ posed to have written many works, but of these only his (Account of Egypt } is

preserved. This work was translated into Latin by White (1800), and into French by De Sacy (1810).

ABDALWADIDS, db'dal-wa'didz, a Ber¬ ber dynasty of Tlemcen, sometimes referred to as Banu Zayyan, after the father of the first independent king, whose reign began in 1239. Of the early origin of the family little is known, but there are ample records to prove that the Abdalwadids reigned wisely for more than three centuries over the western part of Al¬ giers, the dynasty terminating in 1554.

ABD EL AZIZ, abd-ool-a'zez', Sultan of Morocco, son of Sultan Mulai Hassan : b. Marakesh, 1880. In 1894 he succeeded his father as Sultan. So progressive was he in his tendencies and so friendly toward Euro¬ peans that he aroused thereby the fanaticism of his people. Taking advantage of this, a prophet, Bu Hamara, precipitated a formidable rebellion in 1902, bringing about the interven¬ tion of France. This was finally followed by the Algeciras Conference, in 1906, by which France and Spain undertook to maintain law and order along the Moroccan Coast, Abd el Aziz agreeing to co-operate with these two European nations. But this promise he found difficulty in keeping on account of his growing unpopularity. The following year Mulai Hafid, elder brother of the Sultan, headed a rebellion of the southern tribes and Abd el Aziz was obliged to remove his capital from Fez to Rabat. In spite of the support of Franceˆ both moral and financial, he was unable to maintain his authority, and in January 1908 the throne was declared vacant by the priesthood of Fez and immediately offered to Mulai Hafid. Realizing that his attempt to regain his author¬ ity by force would prove futile, Abd el Aziz compromised with his brother and retired to private life in Tangier.

ABD EL KADER IBN MOUHI AD DIN, ab'del-ka'der ’bn' moohe ad-den, noted Arab chief : b. near Mascara, 1807 ; d. Damas¬ cus, Egypt, 26 May 1883. He was educated at Ghetna in an institution maintained by the Marabouts. When only eight years of age he went with his father on a pilgrimage to Mecca. In 1827, when 20 years of age, he visited Egypt, where he came in first contact with Europeans. His first entry into the affairs of public life was when Algiers was conquered by the French. On the defeat of the Turks, Abd el Ivader placed himself at the head of the Arab tribes of the province of Oran and declared himself an independent ruler. On 3 Dec. 1833 he fought a bloody battle with the French, in which the French were decidedly beaten. A month later

he again attacked the French under General Desmichels, command¬ ing all the forces of France in Oran, and com¬ pelled him to recognize his authority. The result was that his power increased rapidly and he was proclaimed sultan by all the surround¬ ing tribes and peoples. The truce with the French was only temporary, however, and in 1841 Abd el Kader was completely defeated and driven into Morocco. Here he appealed to the people in the name of Islam and declared a religious war. France then turned her atten¬ tion to Morocco, the operations finally terminat¬ ing in the Battle of Isly, in 1844, after which the Sultan of Morocco repudiated Abd el Kader. The latter attacked the Moors on the night of 11 Dec. 1847, but was heavily defeated and obliged to flee to Algeria, where he was com¬ pelled to surrender to the French. Abd el Kader was now taken a prisoner to France. For five years he was held in France, though allowed an annuity of 100,000 francs. Finally, in 1852, Napoleon III liberated him, whereupon he retired to Brussa, Asia Minor, later remov¬ ing to Damascus. During the massacres in Syria, in 1860, he rendered the Christians such services that Napoleon III awarded him the Grand Cross of the Legion of Honor. In 1865 he visited Europe again and was present at the Baris Exposition in 1867. During his later years he engaged in literary labors, writing a religious work, which was later translated into French (1858) under the title (Rappel a l'intelligent : avis a l'indifferent.*

ABD EL MUMIN ABU MOHAMMED,

abd al moo'men a'boo mo-ham'med, Moorish ruler, founder of the Almohades dynasty : b. Tajira, North Africa, 1094; d. 1163. He was a member of the Kumiya, a Berber tribe. He became a close friend of Ibn Tumart, founder of the Almohades sect, and when that leader died he was chosen as his successor. Announc¬ ing himself as a caliph, he met the Almoravides in battle, put them to flight and then began a campaign of conquest that did not cease until he had subdued the cities of Oran, Tlemcen, Fez, Sale, Ceuta, and finally Morocco. Having established himself firmly in Africa he crossed over into Spain and conquered Cordova in 1148, Almeria in 1151, and Granada in 1154, until the greater portion of Mohammedan Spain was under his control.

ABD-ER-RAHMAN I, abd-er-ra'man, founder of the Moorish emirate (later cali¬ phate) of Cordova (q.v.) : b. Damascus, 731 ; d. 788. He was a grandson of the Ommiad

caliph Hisham, and having fled to Africa es¬ caped the frightful massacre of his family (see Ommiads and Abbassides) by Abu '1-Ab¬ bas ; a hunted fugitive in the desert, but faith¬ fully protected by the

tribesmen, who respected his blood and pitied his misfortunes. Mean¬ while Spain was seething with anarchy; each new' caliph sent a new emir there ; the gov¬ ernor of Africa claimed the right to interfere on the ground that the African governors had captured it ; the native chiefs were unwilling to submit to a constant succession of interlopers with no interest but their own, and at last the situation became so intolerable that the Span¬ ish Arabs determined to choose a ruler with his residence in Spain. They selected the wan¬ dering heir of the overthrown house, and seek¬ ing him out in Africa offered him the place. He landed in Spain 25 Sept. 755, and fixed his royal seat at Cordova. His reign wras one of incessant warfare. Hosein ben-Yahya, the Abbasside emir, driven from Spain, fled to Charlemagne and implored his assistance ; it wjas granted and Hosein was re-enthroned at Saragossa, but while* the Frankish army was returning through the Pyrenees, the Basque mountaineers fell upon the rear-guard and an¬ nihilated it in the pass of Roncesvallcs, with its commander Roland. Saragossa wras taken after two years' siege, Hosein put to death as a rebel, and Spain subdued to the Pyrenees. A formidable rising in 786 was crushed, and Abd-er-Rahman had two years of life to de¬ vote to the arts of peace and the building of his famous mosque at Cordova (now used as a cathedral), wfith its rows of cupolas sup¬ ported by 850 pillars of jasper.

ABD-ER-RAHMAN II, the greatest of the caliphs of Cordova, and the first under whom the emirate assumed the title of cali¬ phate: b. 891, acceded 912; d. 961. Measured by what he found and what he left, he must be counted among the ablest rulers of history. The former w?as a throne to wrhich most of the provincial governors had thrown off allegiance, and the rest rendered such obedience as suited them; a country in a state of permanent anar¬ chy and civil war, perishing of racial, religious, and factional quarrels between Arabs and Moors ; the Fatimite dynasty establishing a great empire in Africa, and looking for a speedy succession to the heritage of Spain ; on the north, the new Christian states rapidly growdng,— Alfonso III had recently moved his capital across the mountains to Leon, and San- cho had founded the kingdom of Navarre, — so that wrhat escaped the Africans would prob¬ ably fall into the hands of the Christians. Abd-er-Rahman first put down the worst in¬ ternal revolt, that of the family of the old brigand Omar ben Plafsun, whose stronghold in the mountains of Andalusia had become a centre for all the renegades, Christians, and rebels of the south. He tied the hands of the Fatimites by subsidizing the native princes who held out agaipst them. The northern danger was the worst. Ordono II in 914 raided the territory of Merida ; and though Merida had thrown off allegiance to Cordova, Abd-er-Rah¬

man wished the more to show them that he was their protector. Collecting and equipping a splendid army, in 918 he gained a great vic¬ tory over the combined forces of Leon and

Navarre, following it up with several cam¬ paigns in which he penetrated to Pamplona, the capital of Navarre. These victories were not final : his fortunes were checkered on the Christian side, and he suffered some defeats. But his suzerainty over Navarre was recog¬ nized, and in 960 a deposed king was reseated on the throne of Leon by Abd-er-Rahman's troops. Internally his success and glory were unqualified. At his death he left a consolidated kingdom, a full treasury in place of an empty one, internal order kept by a vigilant police, flourishing agriculture based on scientific irri¬ gation, prosperous industries, commerce whose customs dues furnished the majority of the revenue, an income of which one-third paid the current expenses and another third was used for building, and the rest kept for a re¬ serve, the best army in Europe, a superb navy which made him lord of the gates of the Medi¬ terranean, and equality in diplomatic rank with the proudest sovereigns of the world.

ABD-ER-RAHMAN, Saracen chieftain who led an army of nearly 90,000 into Gaul, and was defeated and slain near Poitiers (usually known as the battle of Tours) by Charles Martel (q.v.).

ABD-ER-RAHMAN. See also Abd-ur- Rahman.

ABDICATION, in strictness, the renun¬ ciation of any office by the holder before the expiration of its term ; in actual use, applied only to sovereign rulers, de jure or de facto, who resign the crown in their lifetimes. The motives for this are as various as human fate, character, policy, or necessity, or the events of history. It may be compulsory — in which case it is really not abdication but deposition — or voluntary. Compulsion may come from foreign conquest; from foreign commands when the king is a puppet, as with the later Polish kings, or Napoleon's shifting his broth¬ ers from throne to throne; from the commands of de facto controllers of the state within, as with the puppet Roman emperors under the barbarian commanders-in-chief of the army ; or from popular or factional insurrections. If voluntary, it may be from desire to let a con¬ stitutional machine have a fair chance to work alone, as with Sulla and Diocletian ; from sa¬ tiety with royal powrer and weariness of royal burdens, as with Murad II of

Turkey; from physical ailments and discouragement, as with the Emperor Charles V ; from penitence and desire to live a religious life, as with more than one mediaeval prince who furnished real models for Shakespeare's usurper in (As You Like It) ; from weariness of the restraints of royal etiquette, as with Christina of Sweden, — • perhaps also sincere conversion to Catholicism and unwillingness to enforce a Protestant es¬ tablishment; from unwillingness to obey an overlord to the harm of his kingdom, as writh Louis Bonaparte of Holland; from inability to face the results of crushing defeat, as with Charles Albert of Sardinia* from acceding to a higher throne, as wdth Charles of Naples ; from shame at the results of a bad policy, as with William I of the Netherlands; from un¬ willingness to retain a throne against the pop¬ ular will, as with Louis Philippe — for his res¬ ignation was not enforced; or other reasons. Jn monarchies as a whole, the sovereign can

abdicate at will ; in England, only by consent of Parliament — which however, as in the case of James II, can assume an implied abdication which the monarch had no intention of execut¬ ing, the term being a euphemism for deposi¬ tion.

The following is a list of some of the chief historical abdications, with their dates :

Sulla the Dictator .

Diocletian the Emperor .

Benedict IX, Pope .

Stephen II of Hungary .

Ladislas III, Duke of Poland .

Albert the Bear of Brandenburg .

Celestine V, Pope .

John Balliol of Scotland .

Joannes Cantacuzenos, Emperor of the East . .

Richard II of England .

John XXIII, Pope . .

Eric VII of Denmark and XIII of Sweden. . . .

Murad II, Ottoman Emperor .

Charles V, Emperor (Netherlands) .

(Spain, Sicily and the Empire) .

Christina of Sweden .

John Casimir of Poland .

James II of England .

Frederick Augustus of Poland .

Philip V of Spain .

Victor Amadeus II of Sardinia .

Ahmed III, Ottoman Emperor .

Charles of Naples (on accession to throne of

Spain) . . . . . .

Stanislaus II of Poland .

Charles Emanuel IV of Sardinia .

Charles IV of Spain .

Joseph Bonaparte of Naples (transferred to

Spain by Napoleon) .

Gustavus IV of Sweden .

Louis Bonaparte of Holland . .

Napoleon I of France . 4 April 1814 and

Victor Emanuel of Sardinia .

Charles X of France .

Pedro of Brazil .

Miguel of Portugal .

William I of Holland .

Louis Philippe of France .

Louis Charles of Bavaria .

Ferdinand of Austria .

Charles Albert of Sardinia .

Leopold II of Tuscany .

Isabelle II of Spain .

Amadeus I of Spain .

Abd-ul-Aziz, Sultan of Turkey .

Alexander of Bulgaria .

Pedro II of Brazil .

Milan of Serbia .

Emperor Hsuan-Yung of China .

Emperor Nicholas II of Russia .

Emperor William II of Germany .

Emperor Charles of Austria-Hungary .

B.c. 79 A.D. 305 IO48 II3I

1206

II69

13 Dec. 1294

1296 1355 1399 1415 1439

1444 and 1445 25 Oct. 1555

1556

1654

1668

1688

1704

1724

1730

1730

1759 1795

4 June 1802 19 Mar. 1808

6 June 1808 29 Mar. 1809

2 July 1810 22 June 1815 13 Mar. 1821 2 Aug. 1830

7 April 1831 26 May 1834

1 Oct. 1840

24 Feb. 1848

21 Mar. 1848

2 Dec. 1848

22 Mar. 1849 21 July 1859

25 June 1870

11 Feb. 1873 30 May 1S76

7 Sept. 1886 15 Nov. 1889 6 Mar. 1880

12 Feb. 1912 Mar. 1917

9 Nov. 1918 12 Nov. 1918

ABDIEL, ab'di-el (ˆservant of God»), the one loyal seraph in heaven, according to (Paradise Lost,* ((among the faithless, faithful only he,® who withstands Satan when the lat¬ ter is inciting revolt against God for promoting his Son over the heads of the angel peers. Milton took the name from the Jewish cabal- ists.

ABDOMEN, ab-do'men, in human anat¬ omy, that portion of the body bounded above by the diaphragm, below by the pelvis, behind by the lumbar vertebra;, and in front by a thin layer of muscles, the abdominal muscles. This cavity contains the chief organs of digestion and the genito-urinary system. By reason of the movements of the diaphragm it is rhyth¬ mically changing its size, and the move¬ ments of the intestines somewhat modify its internal contour. For purposes of de¬ scription and for localization the abdomen is divided by a tit-tat-toe figure into nine regions ; the upper and lower horizontal lines passing at the lower level of the ribs and the upper bor¬ ders of the pelvis. From above downward

the middle squares are termed the epigastric, the umbilical, and hypogastric ; to the sides of the epigastric regions are the right and left hypochondrium (under the ribs) ; the right and left lumbar flank, the central umbilical re¬ gion, and the right and left iliac regions lie down in the pelvis on either side of the hypo¬ gastric area. The general location of the ab¬ dominal viscera in the various areas is of in¬ terest. The liver lies up under the ribs in the right hypochondrium, stretching over the upper part of the epigastrium into the left hypo¬ chondrium ; the stomach lies mostly in the left hypochondrium and reaches into the epigas¬ trium just below the sternum; the large intes¬ tine starts in the right iliac region, the appen¬ dix being there also, goes up the right lumbar into the lower portion of the right hypochon¬ drium, crosses straight over, dipping slightly into the umbilical region, from the left hypo¬ chondrium it descends into the left iliac re¬ gion and then turns back into the centre and ends at the rectum. The small intestine occu¬ pies most of the umbilical region, extending out into the others. The pancreas lies just behind the lower end of the stomach in the epigastrium. The spleen lies higher up on the left side behind, resting on the 10th and 11th ribs ; the kidneys are Dehind high up, in the hypochondriac lumbar region, just coming below the free borders of the ribs; most pains in the small of the back thought to be kidney pains are pains from constipated bowels ; kidney pains are high up under the ribs behind. The genital organs lie in the hypogastric and right and left iliac re¬ gions, the bladder low in front in the centre, the uterus slightly above in the centre, the ovaries to the right and left in the right and left iliac fossae.

In entomology, the whole body of an in¬ sect behind the thorax. It usually consists of rings or short hollow cylinders, which are united by

a joint or membrane, and in some cases, as in the grub of the chameleon fly, slide upon one another like the tubes of a tele¬ scope. Sometimes it bears a sting or an ovi¬ positor, though in the perfect insect no appen¬ dages are found.

An abdominal ring is one of two oblong tendinous openings or <(rings® existing in either groin, or in the right and left inguinal regions. Through these rings pass the sper¬ matic cord in the one sex, and the circular ligament of the uterus in the other. Consult Taussig, F. J., (Surgical Diseases of Abdo- men> (1910) ; Gray, (Human Anatomy) (1916).

ABDUCTION, the act of abducing or ab¬ ducting; a taking or drawing away, and spe¬ cifically an unlawful taking. In the United States the word abduction is ordinarily applied to the illegal seizure and detention of a female for the purpose of concubinage, prostitution or marriage. The punishment for abduction varies in the different States of the Union. The tendency of American legislation is to extend the scope of the term beyond its com¬ mon law limits. In many States the statutes in express terms look to the punishment and suppression of the vices which are involved in the sexual acts usually contemplated in the unlawful taking or enticing of females. They are variously directed against the taking of a

woman against her will for the purpose of compelling her by force, menace, etc., to marry ; against the taking of a female under a desig¬ nated age, without the consent of her lawful custodian, for the purpose of marriage; against the taking and detaining of any woman against her will, with intent to have carnal knowledge of her, or that another shall have such knowl¬ edge ; against the inveigling or enticing of an unmarried female of previous chaste character into a house of ill fame, assignation or else¬ where, for the purpose of prostitution or sexual intercourse, or against the taking and seduction of a girl under a designated age.

In common and English law this offense is of three kinds: (1) If any person shall ma¬ liciously, either by force or fraud, lead, or take away, or detain, any child under the age of 10 years, with intent to deprive the parents or other persons having the lawful charge of such child, or with intent to steal any article on its person ; or shall receive or harbor such child, knowing the same to have been so stolen or enticed, — every such offender shall be guilty of felony, and shall be liable to penal servitude for not more than seven or less than three years, or imprisoned, with or without hard labor, for any term not more than two years. (2) If the girl is under the age of 16 years, the

offender shall be guilty of misdemeanor, and being convicted thereof shall be liable to suffer such punishment, by fine or imprison¬ ment, or both, as the court shall award. (3) If any person shall, from motives of lucre, take away or detain, against her will, any woman having any interest, present or future, in any real or personal estate, with intent to marry or defile her, or to cause her to be mar¬ ried or defiled by any other person, every such offender, and every person counseling, aiding, or abetting such offender, shall be guilty of felony, and liable to penal servitude for life, or for any time not less than three years, or to be imprisoned, with or without hard labor, for any term not exceeding five years. If the woman first consent to be taken away, and afterward refuse to continue with the offender, and he forcibly detain her; or if she be forc¬ ibly taken away and she afterward consent to her marriage or defilement ; or if she be taken away with her own consent, obtained by fraud or imposition, the offense is the same. But if a man, without fraud, deceit, or violence, mar¬ ries a woman under age, without the consent of her father or guardian, that act is not in¬ dictable at common law.

In logic, abduction is a form of reasoning in which the greater extreme is contained in the medium ; but the medium is not so evidently in the lesser extreme. Example : <(Whatever God has revealed is certainly true; now God has revealed a future retribution; therefore a future retribution is certainly true.® In the use of this kind of reasoning the minor prop¬ osition must be proved to be contained in the major.

ABDUCTOR, a muscle, the office of which is to draw a limb or portion of a limb to which it is attached away from the centre of that limb. Abductor of the thigh, for example, raises the thigh away from the centre of the body.

In law, a person guilty of abduction.

ABD-UL-AKHAD-KHAN, abd-ool-ak- ad'-kan, Amir of Bokhara: b. 1852; d. 4 Jan. 1911. Head of modern state of Bokhara (q.v.) which was founded by the Usbegs in 1 5th cen¬ tury after the power of the Golden Horde had been crushed by Tamerlane. At the instance of Russia he abolished slavery and was con¬ sidered a capable and conscientious ruler. He succeeded his father Muzaffer 12 Nov. 1885, who was the fifth Amir of Bokhara, of the dynasty of Manguts, which dates from end of 18th century. Muzaffer proclaimed a holy war

against Russia, was defeated and forced to sign a treaty ceding what was later the Rus¬ sian district of Syr-Daria, besides paying a large war indemnity and permitting Russian trade. Later another treaty was signed (1873) and the state became a Russian dependency. Abd-ul-Akhad upon his death was succeeded by his son, Sayid Amir Alim, b. 3 Jan. 1880, the present ruler of Bokhara.

ABD-UL-AZIS-HAN, ab'dol-a-zez'-han, 32d Sultan of the Ottoman Turks : b. 9 Feb. 1830; succeeded his brother Abd-ul-Medjid (q.v.), 25 June 1861; d. 4 June 1876. At first he showed himself liberal-minded and open to Western ideas, promising economy and reform. But ere long he began to spend vast sums on his army, the embellishment of his capital, hunting and costly journeys. The most im¬ portant of his political trips wTas in 1863 to Egypt, where he was accompanied by Fuad- Pasha. In 1867, at the time of negotiation about Crete, notwithstanding the misunder¬ standings existing between the Sublime Porte and European powers, Abd-ul-Azis went to Paris where he had a sumptuous reception at the Universal Exposition, and, in July of the same year, spent two weeks in London. His government had great difficulties to contend with in the Cretan insurrection of 1866, the struggle with Rumania and Serbia for full autonomy and finally the outbreak of Moham¬ medan fanaticism. In 1871, after the death of Aali-Pasha, the Sultan strove to have the suc¬ cession settled upon his son, Yussuf-Izedin, in¬ stead of his nephew Murad, according to Turk¬ ish custom. He next tried to set Russia against the other powers and plunged ever into deeper financial difficulties, while his stupid misgov- ernment alienated the provinces and led, in 1875, to risings in Bosnia-Herzegovina, Bul¬ garia and the Pashalik of Belgrade. At last a conspiracy forced him to dismiss his ministers, and next to abdicate the throne, 30 May 1876. Four days later he was found dead. He was succeeded by his nephew Mehmed Murad, who was shortly deposed on the ground of alleged insanity, in favor of Sultan Abd-ul-FIamid, and finally murdered. Consult Millingen (Osman Saifi-Bey) (La Turquie sous le regne d’Abd- ul-Azis* (Brussels 1868) ; ((Sultan Abd-ul- Azis,® in the Unsere Zeit (Vol. I, Leipzig

1877).

ABDUL BAHA, eldest son of Mirza Ali, b. 23 May 1844. He has been, since his father’s death in 1892, the spiritual head of the Bahai movement. He was one of the exiles in Akka, where he shared his father’s trials and tribula¬ tions and, in his later years, the burdens of the spiritual and social direction of the Bahai col¬ ony. From his exile he continued the work of spreading a knowledge of the Bahai doctrine

which, under his able management, attracted wider and deeper interest than it had under either of his predecessors in office. Carefully educated, widely read in almost every line of thought and study, and trained under his father, Abdul Baha brought to the performance of his duties sympathy, conviction, enthusiasm, able executive ability, a broad liberality and a strange Oriental fascination of character, which has made him a power in the religious life of Persia for a quarter of a century. To him in exile came literally streams of people from all over Asia. He communed with them, advised with them, taught them and sent them forth converts, apostles and teachers of the faith. Born of one of the noblest families in Persia, of the faithful of the faithful, he dis¬ regarded race, and religious prejudice, caste and color. To him came millions of letters in a single year from all parts of the world; and he answered them all personally. He kept a staff of interpreters and secretaries. All kinds of problems he handled, as they troubled his visitors or followers, personal, religious, social, political. His fame reached the western world and he was invited to represent Bahaism at the Universal Race Congress held in London in July 1911. This he was not able to do but he forwarded a paper on Spiritual Unity which attracted much attention and, in general, fa¬ vorable criticism. In this paper he took the po¬ sition that only spiritual unity could solve the many race problems now facing the world. Before the end of the year he visited England where he was given a warm welcome. There he made addresses before many churches, clubs, associations and societies, among them being the congregation of Archdeacon Wilber-force, St. John's, Westminister. Even still greater interest was shown in his work and personality in the various other countries of Europe which he visited, more especially by France. One of the most cosmopolitan gath- ings ever met together welcomed him to Paris. He also visited Egypt in December 1911. He reached New York in April 1912 where he delivered many addresses, one of them before the congregation of the Church of the Ascen¬ sion. He visited Chicago, Washington and a score of other cities from coast to coast and spoke to Jew and Gentile, Catholic and New Thought, Mormon and Free Mason. After nearly six months on this side of the Atlantic he returned to England where he spent six weeks and another two months in France. Germany and Austria also entertained him on into the following year, when he returned home to the land of his <(exile.®

Abdul Baha has ever been one of the strong¬ est advocates of the disarmament of nations, which he asserts is the first requisite of inter¬ national peace. This is the natural outcome of his religious dogma of social unity in spiritual thought. <(No man,® he asserts, ((except the madman, plots against an unarmed man ; and no institution, except

the outlaw institution, plots against those institutions devoted to the service of humanity, as, for example, the Sal¬ vation Army, and the Red Cross.® Among the works of Abdul Baha are : (The Mysterious Forces of Civilization,* and (Tablets of Ab¬ dul. } See Mirza Husain Ali Nuri; and Bahaism.

ABD-UL HAMID I, abd-ool-ha-mid', 27th Sultan of Turkey, son of Ahmed III: b._1725; d. 19 April 1789. He succeeded his brother Mustapha III in 1774. He was involved in two wars with Russia, and the treaty of Kut- chuk-Kainardji in 1774 compelled him to relin¬ quish Kabardia, Eni-kale, Kerch, Azov and Kinburn. He was also forced to grant free navigation in the Black Sea, the protectorate of Russia over the provinces of Wallachia and Moldavia, guarantee the partition of Poland and independence of the Crimean Tatars. This Sultan succeeded in quelling the rebellions instigated by several of his pashas and, recog¬ nizing the superiority of the European military system, invited French officers for the pur¬ pose of fortifying the fortresses of his empire. In 1787 a war broke out between Turkey and Russia and the latter's ally Austria which ended in the disaster of the Ottoman fleet at Kim- burn (30 Dec. 1788) and the loss of Ochakov. In the last years of his reign Abd-ul Hamid suffered from mental and physical disorders and died 19 April 1789, just when he was pre¬ paring for a formidable invasion to the north of his empire. He was succeeded by his nephew Selim III. Consult Azim-Tarischi, (History of Abd-ul-Hamid and Selim IIP (Constanti¬ nople 1867).

ABD-UL-HAMID II, 34th Sultan of Tur¬ key: b. 22 Sept. 1842; d. 10 Feb. 1918; 2d son of Abdul-Medjid, reigned from 1876 to 1909, when he was deposed and made a state pris¬ oner for life. His uncle, Abdul-Aziz, a prof¬ ligate debauchee, was dethroned by Midhat Pasha (q.v.) in 1876, and was found shortly after with the veins of his wrists cut open with a pair of scissors. Whether it was a case of suicide or murder has never been decided. Abdul-Hamid's brother Murad V ascended the throne, but was deposed again in a few months' time owing, it was said, to a disordered men¬ tal condition, and Abdul-Hamid reigned in his stead. Up to that time he was known as a debauched weakling, brought up in the luxuri¬ ous atmosphere of the harem. No sooner, however, had he grasped the reins of power, than he proved himself a despotic ruler of the strongest type, and developed into one of the cleverest and most unscrupulous diplomatists of his age. At the time of his accession, the country was

in a deplorable condition. Torn by revolution, corruption and bankruptcy within her borders, Turkey was threatened w'ith war outside by her hereditary enemy, Russia. Even the European powers who had labored and fought to keep the ((Sick Man of Europe® alive, were clamorously demanding the introduction of long-promised and neces¬ sary ref orms.. By a skilful policy of apparent acquiescence in every demand made upon him, the new ruler managed for a time to relieve the external pressure and devoted his immense energy to reorganizing the army and the finances of the state. He speedily crushed the insurrection in Herzegovina and Bosnia; by galvanizing his tottering empire with new life and vigor, he showed an astonished world that the Turk was not so <(sick® as his numerous doctors imagined. A rejuvenated Turkey was the last thing that Russia desired, and Alexan¬ der II lost no time in declaring war. Abdul Hamid accepted the challenge and conducted

the war with remarkable ability. But his en¬ emy was too strong for him, and he committed the fatal error of interfering too much with his generals. The surrender of Osman Pasha at Plevna (q.v.) to the Russians and Rumanians opened a clear passage for the victors to Con¬ stantinople. As before in the Crimean War, Great Britain again came to the rescue. Dis¬ raeli ordered the British Fleet to the Darda¬ nelles and mobilized the fighting forces of the whole British Empire. This unexpected move checked the Russian advance; the Treaty of San Stefano (q.v.) was nullified by the Berlin Congress, and a totally undeserved new lease of life was granted to the worst-ordered state in modern history.

The Treaty of Berlin deprived Turkey of her Balkan principalities : Herzegovina, Bos¬ nia, Kars and Batum, but she was still per¬ mitted to retain her suzerainty over Eastern Rumelia.

The gloom of the Hamidian era settled like a pall over the land of the Osmanli. The con¬ stitution and parliament inaugurated by Midhat were abolished; the control of every depart¬ ment of state was centralized in the hands of the Sultan, and the liberal grand vizier, Mid¬ hat Pasha, was exiled to Arabia and strangled. He was too honest and too democratic to please his imperial master. European jealousy had hindered Russia from wiping out the plague spot of Europe, and Abdul Hamid was clever enough to utilize that jealousy by playing one power off against the other. His one aim was to maintain absolute autocracy at home and to evade the demands of the <(infidels® abroad. The methods he employed in the process were

truly Oriental : espionage, bribery, murder and terrorism. Many powerful persons who disa¬ greed with him were quietly removed and never heard of again. High positions were conferred upon unscrupulous tools or sold to the highest bidder. The governors of provinces were per¬ mitted to squeeze and tyrannize over the unhappy people they were supposed to govern ; whole¬ sale massacres of Christian subjects were en¬ couraged — or at least tolerated. Hordes of savage Kurds exterminated Armenians by the thousand; unspeakable atrocities sent many a thrill of horror throughout the civilized world ; international representations and diplomatic <(Notes® were simply showered upon the hermit Sultan, who smilingly accepted them all and calmly pursued the uneven tenor of his way. Nemesis, however, prepared a belated instru¬ ment of vengeance to compass his downfall — the Young Turk Party. Persecuted, imprisoned and judicially murdered at home, the survivors of the party carried on their propaganda as the <(Committee of Union and Progress® in Paris, Geneva and London, whilst secret agents canvassed among those without whose help nothing could be done — the Turkish army officers. The Albanians, the finest soldiers in that army, went over in a body to the revolu¬ tionary movement. The hour struck on 22 Tilly 1908, when Majors Niazi Bey and Enver Bey raised the flag of military revolt at Resna, in Macedonia, where they were stationed in command of the troops. They proclaimed the Constitution and threatened to march on Con¬ stantinople. Seeing that he could no longer count on the loyalty of his soldiers, Abdul- Hamid became thoroughly alarmed and capitu-

latcd at once. Making a virtue of necessity, he immediately restored the Constitution he had abrogated in 1878. Great rejoicing pre¬ vailed, especially when, on 1 August the Sultan issued a Hatt-i-Humayun assuring to the people those elementary principles of freedom and jus¬ tice they had never before enjoyed. The revived Turkish Parliament opened on 15 Jan. 1909. Kiamil Pasha, the aged grand vizier, referred to the (<wise and prudent policy® of the Sultan (<in putting himself at the head of the revolu¬ tion. a The Government soon resigned, however, owing to internal dissensions. Serious disturb¬ ances broke in the provinces ; in Ardana, Asia Minor, thousands of Armenians and two Ameri¬ can missionaries were massacred. The spirit of Abdul-Hamid inspired his followers to restore the old order of things, and there is no reason to doubt that he instigated the mutiny that broke out (14 April 1909) among the troops

still loyal to him. They seized the Parlia¬ ment House, telegraph offices and bridges of the city. Two members of the Committee were murdered and several others arrested. The minister of justice was killed and the minister of marine wounded. For the moment it seemed that Abdul-Hamid would emerge victorious from the crisis, but the Committee of Union and Progress promptly sent troops to Constan¬ tinople to crush the counter-revolution. On 24 April Gen. Mahmud Shefket Pasha entered the city with a ˆconstitutional® army. Consider¬ able street fighting developed with the (<loyal- ists,® who were easily overcome by the Young Turkey leaders. It was then decided to de¬ pose the Sultan and replace him by his younger brother Mohammed Reshad Effendi, who had for many years been kept in isolation to pre¬ vent the very event which was now to happen. (Se.e Mohammed V). The ringleaders of the counter-revolution were court-martialled and 40 of them hanged in the principal public squares of the city. Abdul-Hamid was ban¬ ished to Salonica with his dogs, birds, car¬ penter's tools, and a few members of his harem. An expert cabinet-maker, he frequently pre¬ sented writing desks of his own make to foreign diplomatists. Many uncomplimentary epithets were applied to him during his dark reign, such as (<The Great Assassin,® (< Abdul the Damned,® and <(The Unspeakable Turk.® Consult Pears (Sir) E., (Abdul Hamid) (in Makers of the Nineteenth Century Series, New York 1917).

ABDULLAHI. See Khalifa, The.

ABD-UL-MEDJID, abd-ool-me-jid', 31st Sultan of the Ottoman Turks, son of Mahmud II; b. 23 April or 6 May 1823; acceded 1 July 1839; d. 25 June 1861. He received the usual enfeebling harem education, his father failing in his efforts to rescue his children from the sys¬ tem. On his accession Turkish affairs were critical. The great viceroy of Egypt, Mehemet Ali, had a second time revolted; 10 days pre¬ viously the Turkish admiral had turned traitor and put the entire fleet in his hands; and three days afterward Mehemet's son Ibrahim, the greatest Moslem soldier of the century, had routed the Turkish army at Nizib, and was marching straight on Constantinople, where the orthodox party, enraged at Mahmud's reforms, had conspired to nlace Mehemet Ali on the throne. But the European powers interfered, and the treaties of 27 Nov. 1840 and July 1841 vou l — 3

confined Mehemet to Egypt again. Abd-ul- Medjid at once set about complying with his father's express instructions and carrying out his reforms: 3 Nov. 1839, he promulgated the ((Hatti-sherif of Gulhane,® placing all his sub¬ jects on full religious and civil equality, and providing for security of life and property to all, with just and equal

taxation, administration of laws, and conscription; February 1856, after the Crimean War, it was supplemented by another to the same purport. But the Mussulman aris¬ tocracy and the educated classes (Ulema) re¬ garded it as an anti-Mussulman revolution to no profit but that of the infidels, and fought it so furiously that it remained practically inopera¬ tive, and rather sharpened the edge of their ill-treatment of the Christians ; and repeated con¬ spiracies were formed against his life, whose members however the kindly Sultan would not put to death. His right hand in reform work was the able and humane Reshid Pasha, a Mussulman educated in France; through him the army was reorganized 1843 — 44 ; a board of education instituted 1846; a university founded, with military, medical, and agricultural colleges ; a hateful capitation tax abolished, slave-trading repressed, and commerce advanced. Nothing can better prove the intrinsic and hopeless rot¬ tenness of the Mussulman system under modern conditions than the fact that these measures were written in water and died almost with their birth; their main fruit was bloody insur¬ rections in various parts of the empire, of which the great Syrian massacres of 1860 (see Syria) were the worst. In 1849 Abd-ul-Medjid honored himself by boldly refusing to surren¬ der Kossuth and the other Hungarian refugees, after the failure of the Hungarian revolution, at the joint demand of Russia and Austria. For the Crimean War, and its antecedents and re¬ sults, see that head. In later life he sank into extravagance and sensuality; but he was essen¬ tially a good-hearted and honorable man, power¬ less against fate. He was succeeded not by one of his seven sons, but by his brother Abd-ul-Aziz, the oldest living member of the house of Othman.

ABD-UR-RAHMAN, abd-oor-ra'man, Sul¬ tan of Fez and Morocco: b. 1778; succeeded his uncle 1823; d. 1859. His first four years of rule wrere occupied in quelling insurrections. Next, Austria refused to pay the tribute for safety against pirates levied by Morocco on European ships in the Mediterranean : the Sul¬ tan wisely adjusted the dispute by relinquishing this blackmail. (See Morocco.) The religious war under Abd-el-Kader against the French in Algeria involved Morocco in its movements : the defeat hy the French in 1844 compelled the Sultan to order Abd-el-Kader to quit the country, which, however, he did not for three years longer. The piratical habits of the Moroccans brought him to the brink of war with more than one European state. He was succeeded by his eldest son, Sidi-Mohammed

(1859-73).

ABD-UR-RAHMAN-KHAN, abd-oor-ra'- man-Han, amir of Afghanistan, son of Afzul (uf'-zool) Khan, nephew of the amir Shere Ali, grandson

of Dost Mohammed: b. Kabul, 1844; d. 3 Oct. 1901. During the civil war of 1864 in Afghanistan (q.v.) between Dost Mohammed's sons, he played a leading part on his father's

side against his uncle, won several battles, — the important victories of Shaikhabad and Khelat-i-Ghilzai were mainly due to his ability, — ■ and for a time his father seemed secure of the amirate ; Abd-ur-Rahman was made gover¬ nor of Balkh, and won great popularity by his moderation and by marrying the daughter of the chief of Badakh-shan. In 1868, however, Shere Ali gained the mastery, and the English government helped to put down further resist¬ ance for order's sake. Yakub-Khan drove out his cousin Abd-ur-Rahman, who after hunted wanderings reached Russian territory, and Gen¬ eral Kaufman allowed him to live at Samarcand with a pension of 25,000 rubles a year. Here he remained till 1879, when Shere Ali's death, and the weakness of Yakub, whom the English had recognized as amir, gave him a chance to return to Balkh, where he was welcomed. The murder of the British Resident at Kabul and Yakub's deposition followed; Abd-ur-Rahman came forward once more, and was acknowledged amir by the principal chiefs and the English government, which gave him a subsidy of £160,- 000 a year, and large gifts of artillery, rifles, ammunition, etc. In 1893 the Indian govern¬ ment turned over to him Kafiristan, in the Hindu-Kush mountains, and he brought its savage tribes under control in 1896. The Eng¬ lish government showed him great honor, as he deserved; and made him G.C.B. and G.C.S.I. He was succeeded by his eldest son, Habibullah- Khan, who had been associated with him in the government for some time.

A BECKET, Thomas. See Becket, Thomas A<

A'BECitETT, Arthur William, English

novelist and dramatist, son of Gilbert Abbott A'Beckett : b. London, 25 Oct. 1844; d. 1909. From 1865 to 1868 he was editor of The Glowworm r after which he edited the Britannia Magazine until 1870. When the Franco-Prussian War broke out he was sent to the theatre of war as special correspondent by the London Standard and Globe. In 1874 he became a member of the editorial staff of Punch, a position which he retained con¬ tinuously until 1902, when he resigned to be¬ come editor of John Bull. Among his works are: (Modern Arabian Nights) (1885) ; (London at the End of a Century) (1900) ; (The A'Bec-

ketts of Punch) (1903) ; (Recollections of a Humorist > (1907).

A'BECKETT, Gilbert Abbott, English humorist: b. London, 9 Jan. 1811; d. Bou¬ logne, 30 Aug. 1856. He began life as a lawyer and later became a police magistrate, but he became famous as a playwright, writing over 60 plays. In collaboration with Mark Lemon he dramatized (The Chimes } and sev¬ eral other works by Dickens. He wa£ the founder of Figaro in London, which was later transformed into Punch, of whose original staff A'Beckett was a member. Among his most important works are: (Comic History of Eng- land) (new ed. 1907) ; (Comic History of Rome) (1852) ; (Comic Blackstone) (1869).

ABEEL, David, American missionary : b. New Brunswick, N. J., 12 June 1804; d. Albany, N. Y., 4 Sept. 1846. He studied at Rutgers College and at the Theological Seminary of the Reformed Dutch Church and in 1827 was ordained to the ministry. For two years he

was pastor of a church at Athens, N. Y., leaving there in 1829 for Canton, China, as a missionary. While in that country and in Java, Singapore, and Siam he did much good work in spreading Christianity. He returned to America in 1845, broken down in health. His published works include: (The Claims of the World to the Gospel,) (Residence in China, } and (The Mis¬ sionary Convention at Jerusalem. y An account of his life has been written by G. R. Williamson.

ABEKEN, a-be'ken, Heinrich, German divine and diplomat : b. Berlin, 8 Aug. 1809 ; d. 1872. He was chaplain to the Prussian embassy in Rome in 1834, and in 1841 visited England to arrange for the establishment of a Protestant bishopric at Jerusalem. He was attached to the Prussian ministry for foreign affairs in 1848, and in 1853 became privy councillor of legation. Associated officially with Bismarck and with King William II during the campaigns of 1866 and 1870-71. (Heinrich Abeken, ein

schlichtes Leben in bewegter zeiD (Berlin 1898) published by his widow, has much his¬ toric value. See Ems Dispatch.

ABEL, second son of Adam and Eve, the first born being Cain. Abel became a shepherd, while Cain became an agriculturalist. At the end of the first season both offered up sacrifice to the Deity, Abel bringing the firstlings of his flock while Cain offered the first fruits of his labor. Abel's offerings were accepted but Cain's ignored, which so aroused the jealousy of the latter that he killed his brother Abel. It is not said in Genesis why Jehovah rejected the sacrifice of Cain and accepted

that of Abel; but the Saviour, in the New Testament, speaks of <(righteous Abel,® from which it is concluded that there dwelt in him a spirit of righteousness, which was absent in his brother. The story is generally regarded as reflecting the ancient belief of the early nomadic tribes that the herd¬ ing of animals is more pleasing to the Deity than the more settled life of the grower of food plants.

ABEL, Carl, German philologist : b. Berlin, 1837 ; d. 26 Nov. 1906. After finishing his studies at the universities of Berlin, Munich and Tubingen, he specialized in European and Oriental languages. He was, at various times, teacher of philosophical and comparative lin¬ guistics at the Humboldt Academy of Science, at Berlin, lecturer at Oxford and linguistic assistant in the German Foreign Office. Among his many works, published in German, French and English, are: (Linguistic Essays) (1880);

(Slavic and Latin, > lectures on comparative lexicography, delivered at Oxford (1883) ; (Russland und die Lage) (1888) ; (Letters on International Relations before and during the War of 1870> (London 1871).

ABEL, John Jacob, American pharmacolo¬ gist and physiological chemist : b. Cleveland, Ohio, 19 May 1857. Fie was graduated at the University of Michigan in 1883, took advanced work in physiology in the Johns Hopkins Uni¬ versity 1883-84, studied chemistry and medi¬ cine at Leipzig, Strassburg, Heidelberg, Vienna, Berne) Wurzburg and Berlin 1884—91, taking the degree of M.D. at Strassburg in 1888. Has devoted himself to the study of chemical com¬ position of animal tissues and fluids and to the toxic and therapeutical action of various sub¬ stances Pnd made numerous discoveries in these

fields. He has held the chair of pharmacology in the Medical School of the Johns Hopkins University at Baltimore, since 1893.

ABEL, Sir Frederick Augustus, English chemist: b. London, 17 July 1827; d. there 6 Sept. 1902. As a specialist in explosives he was consulting chemist in the British War Department, from 1854 until 1888, improving considerably the processes of manufacture of g;un cotton and blasting gelatine. In collabora¬ tion with James Dewar he invented cordite. His most important works are: (Gun Cotton) (1866);

(On Explosive Agents) (1872); ‘Re¬ searches inˆ Explosives > (1875) ; (Electricity

Applied to Explosive Purposes> (1884) ; hand¬ book of Chemistry > (with Colonel Blexam,

1854).

ABEL, Karl Friedrich, German musician and composer: b. Gothen, 1723; d. London, 20 June 1787. He was a pupil of Sebastian Bach and for years a member of the famous Dresden band of the Elector of Saxony, and King of Poland. In 1758 he went to England in a state of great destitution and some years later was appointed chamber musician to Char¬ lotte, the queen of George III. He and John Christian Bach, the son of his old teacher, directed the subscription concerts, known as the Bach-Abel Concerts, from 1765 until 1782. His works include many symphonies, string quartets, trios and piano sonatas.

ABEL, Niels Henrik, Norwegian mathe¬ matician: b. Findoe, 5 Aug. 1802; d. Arendal, 6 April 1829. Having finished his studies in the University of Christiania, in 1825, he spent two years in Paris and Berlin. In 1828 he was appointed instructor at the University and at the military school at Christiania. He demon¬ strated for the first time the impossibility of solving general equations of any degree higher than the fourth by the elementary processes of algebra. He was one of the originators of the theory of functions, an important class of trans¬ cendental functions being known as ((Abelian,® after him. The binominal theorem, proved by Newton and Euler, were more widely general¬ ized by Abel, including the cases of irrational and imaginary exponents. The results of his labors, in two volumes, were published by the Norwegian government (Christiania 1839).

ABELARD, ab-e-lar (Fr. Abelard, ab-a- lar), Pierre, pe-ar, a distinguished philosopher, and lover of Heloise. His real name was Pierre de Palais, the other being a nickname spelled in many other ways, but originally Bajolardus, ('bacon-licker,® from a school joke, which he changed to Habelardus, (<bacon-haver,® as a retort: b. 1079 near Nantes, in the little village of Pallet, the property of his father Berengar; d. Chalon-sur-Saone, 21 April 1142. Full of intellectual enthusiasm, he gave up his patri¬ mony to his younger brothers to devote himself to. a life of study. Those studies were very wide, though the usual inclusion of Greek and Hebrew is an error ; but his chief passion was philosophy, and its great implement, the scho¬ lastic logic, in which he soon became the most eminent master of his

age. Having learned all that Brittany could teach him, he went to Paris, the university of which attracted stu¬ dents from all parts of Europe. Guillaume de Champeaux, a follower of Anselm and an extreme Realist, was the most skilful disputant

of his time, and Abelard, profiting by his in¬ structions, was often victorious over his master in contests of wit and logical acumen. The friendship of Champeaux was soon succeeded by enmity ; and Abelard, who had not yet com¬ pleted his 22d year, removed to Melun, whither he was soon followed by a multitude of young men, attracted from Paris by his great reputa¬ tion. Hostility still pursued him, but he left Melun for Corbeil, nearer the capital, where he was still more admired and persecuted. Soon after he ceased teaching to recruit his strength, and after two years returned to Paris and found that his former teacher had removed to a monastery outside the city.

He again joined issue with him and gained so complete a triumph that he opened in Paris a school of rhetoric, the fame of which soon de¬ prived all the others of their pupils. Shortly afterward he was appointed to his rival's chair in the cathedral school of Notre Dame, where he educated many distinguished scholars, among whom were the future Pope Celestin II, Peter of Lombardy, bishop of Paris, Berenger, bishop of Poictiers, and Arnold of Brescia.

At this time there resided close to Notre Dame, a young lady, by name Heloise, niece to the canon Fulbert, then of the age of 17, and remarkable for her beauty, genius, and varied accomplishments. Abelard became inspired with such violent love for Heloise as to forget his duty, his lectures, and his fame. . Heloise was no less susceptible. Under the pretext of fin¬ ishing her education he obtained Fulbert's per¬ mission to visit her, and finally became a resident in his house. His conduct in abusing the confi¬ dence which had been placed in him opened the eyes of Fulbert. He separated the lovers, but too late. Abelard fled with her to Brittany, where she was delivered of a son, who died early. Abelard now resolved to marry her se¬ cretly. Fulbert gave his consent, the marriage was performed, and in order to keep it secret Heloise remained with her uncle, while Abelard retained his former lodgings and continued his lectures. Abelard, however, carried her off a second time and placed her in the convent of Argenteuil.

Fulbert erroneously believed it was intended to force her to take the veil, and under the in¬ fluence of rage subjected Abelard to mutilation. He became, in consequence, a monk in the abbey of St. Denis, and Heloise took the veil at St. Ar¬ genteuil. After time had

somewhat moderated his grief he resumed teaching. At the Council of Soissons (1121), no defense being permitted him, his ((Essay on the Trinity® was declared heretical, and he was condemned to burn it with his own hands. Continued persecutions obliged him at last to leave the abbey of St. Denis and to retire to a place near Nogent-sur-Seine, where he built a rude hut in which he deter¬ mined to live a hermit's life. Even here, how¬ ever, students flocked to him, and they built him an oratory, which he dedicated to the Holy Ghost and hence called Paraclete. Being subse¬ quently appointed abbot of St. Gildas de Ruys, in Brittany, he invited Heloise and her religious sisterhood, on the dissolution of their monastery at Argenteuil, to reside at the above oratory, and received them there. He lived for some 10 years at St. Gildas. Ultimately, however, he fled from it and lived for a time in other parts of Brittany.

Saint Bernard of Clairvaux, the leading op¬ ponent of the rationalistic school of Abelard, laid his doctrines before the Council ol Sens in 1140, had them condemned by the Pope, and ob¬ tained an order for his imprisonment. Abelard appealed to the Pope, publishing his defense, and went to Rome. Passing through Cluny he vis¬ ited Peter the Venerable, who was abbot there. This humane and enlightened divine effected a reconciliation between him and his enemies, but Abelard resolved to end his days in retirement. The severe penances which he imposed upon himself, together with the grief which never left his heart, gradually consumed his strength, and he died, a pattern of monastic discipline, in 1142, at the abbey of St. Marcel, near Chalons- sur-Saone. Helo'ise begged his body and had him buried in the Paraclete, of which she was at that time the abbess, with the view of repos¬ ing in death by his side. Helo'ise died there 16 May 1164. In 1800 the ashes of both were carried to the Museum of French Monuments at Paris, and in November 1817 were deposited under a chapel within the precincts of the church of Monamy. The small chapel, in the form of a beautiful marble monument, in which the figures of the ill-fated pair are seen reposing side by side, is now one of the most interesting objects in the Parisian cemetery of Pere la Chaise.

Abelard was distinguished as a grammarian, orator, logician, poet, musician, philosopher, theologian, and mathematician. As a philoso¬ pher he founded an eclectic system commonly but erroneously termed Conceptualism, which lay midway between the prevalent Realism,

rep¬ resented in its most advanced form by William of Champeaux, and extreme Nominalism, rep¬ resented in the teaching of his other master, Roscellin, and largely approached the Aristote¬ lian philosophy. In ethics Abelard placed much emphasis on the subjective intention, which he held to determine the moral value as well as the moral character of man's action. Along this line his work is notable, owing to the fact that his successors did little in connection with morals, for they did not regard the rules of human conduct as within the field of philosophic discussion. His love and his misfortunes have secured his name from oblivion; and the man whom his own century admired as a profound dialectician is now celebrated as the martyr of love. Abelard's works were all written in Latin. They were first printed at Paris in 1616, are to be found in Migne, (Patrologia Latina) (Vol. CLXXVIII, Paris 1855). . Other editions of special works are Cuvrages inedits d' Abelard, *edited by Victor Cousin (ib., 1836) ; (Opera* (2 vols., 1849-59) ; (Sic et Non, *edited by E. L. T. Henke and G. L. Lindenkohl (Marburg 1851) ; (Planctu$ Virginum Israel super filiam Jeptse Galaditae,* edited by W. Meyer and W. Brambach (Munich 1886) ; (Tractatus de Unitate et Trinitate, *discovered, edited, and published by R. Stolzle under the title, (Abelards 1121 zu Soissons verurtheilter Trac- tatus, etc. 5 (Freiburg-im-Breisgau 1891) ; (Hym- narius Paraclitensius,* edited by G. M. Dreves (Paris 1891). The letters of Abelard and Helo'ise have been often published in the origi¬ nal and translations. Pope's epistle (Eloisa to Abelard) is founded upon them. There is a complete English translation by J. Berington, with the Latin text, (The History of the Lives

of Abeillard and Helo'ise *(Birmingham 1788), edited by H. Mills (London 1850). Consult also Wight, O. W., (Lives and Letters of Abelard and Flelo'ise* (New York 1861); Morton, H., Wove Letters of Abelard and Helo'ise *(ib., 1901) ; Richardson, A. S., (Abelard and Helo'ise* (ib., 1884). Consult also Compayre, G., (Abe¬ lard and the Origin and Early History of Uni¬ versities *(New York 1893) : Deutsch, S. M., (Abalards Verurtheilung zu Sens, 1141, nach den Quellen kritisch dargestellt* (Berlin 1880) ; id., (Peter Abalard, ein kritischer Theologe des zwolften Jahrhunderts *(Leipsic 1883) ; Haus- rath, A., (Peter Abalard* (ib., 1893) ; Hoyd, IL,

(Abalard und seine Lehre in Verhaltniss zur Kirche und ihrern Dogma *(Ratisbon 1863) ; McCabe, J., (Peter Abelard* (New York 1901) ; Poole, R. L., Ullustrations of the History of Mediaeval Thought *(London 1884) ; Rash- dall, (Universities in the Middle Ages* (Ox¬ ford 1895) ; Remusat, C. de, (La vie de Pierre Abelard *(Paris 1855), the standard biography of Abelard; id., < Abelard,* a drama (Paris 1877) ; Sauerland, H. V., (Abalard und Helo'ise *(Frankfort 1879) ; Thaner, F., (Abalard*

und das canonische Recht (Gratz 1900) ; Tiby, P., (Deux couvens au moyen age, ou l'abbaye de Saint Gildas et le Paraclet au temps d' Abelard et d'Helo'ise* (Paris 1851) ; Vacandard, E.,

(Abelard, sa lutte avec Saint Bernard, sa doc¬ trine, sa methode* (Paris 1881) ; Wilkens, C. A., (Peter Abelard' (Bremen 1851) .

ABELIN, Johann Philipp, a'be-len, Ger¬ man historian: d. about 1637 at Strasburg; was also known as Johann Ludwig Gottfried or Gotofredus under which name he wrote (Thea- trum Europaeum, * a history of the world down to 1619, illustrated with Merian's beautiful cop¬ perplate engravings (21 vols., Frankfort 1633— 1738) ; (Historia Antipodum* (Frankfort 1635) ; and other works.

ABEN ESRA, a'ben ez'ra, or Ibn Esra, properly Abraham ben Meir ibn Esra, Jewish scholar: b. Toledo, Spain, between 1093 and 1097; d. 23 Jan. 1167. While still a young man he traveled extensively and visited Italy, France, England and Egypt, but spent his later life in Rome. He was a profound scholar of the Hebrew, Arabic and Aramaic languages, as well as of mathematics, medicine, astronomy and philosophy, besides being a poet of no mean order. His most important work is his Com¬ mentaries on the Old Testament, *but he also wrote extensively on astrology, some of his treatises on that subject being published in Latin. His Hsaiah* has been translated into English (London 1873), while his Canticles *appear in (Miscellany of Hebrew Literature* (Vol. II, London 1877).

ABENSBERG, a'bens-berk, Germany, town in Bavaria, situated on the Abends, a branch of the Danube, 18 miles southwest of Ratisbon, with a population of 2,300. Its warm mineral springs have made it a health resort to a limited extent. On 20 April 1809 it was the scene of a battle between the French under Napoleon and the Austrians, whereby the former gained such advantages as lead up to their final victory at Eckmithl.

ABEOKUTA, a'be-6-koo'ta. citv in Egba- land, a division of Yoruba, on the Slave Coast, north of Lagos, with which it is connected by rail. The population is estimated at consider-

ably over a quarter of a million. It was founded some time in the third decade of last century by a combination of various local tribes as a mutual protection against the slavers, who raided this region

extensively. The inhabitants are an industrious people, expert in various crafts, especially in building and textiles. A. considerable trade is done between them and European traders, who exchange their goods for the products of the region, of which cotton is the most important.

ABERAVON, ab'er-a'von, Wales, seaport town of Glamorganshire, near the mouth of the Avon on Swansea Bay, 11 miles by rail south¬ east of Swansea. It is the seat of the important metal industry of the vale of Avon with iron, steel, tin-plate, copper melting and engineering works. Pop. 11,000.

ABERCARN, ab'er-karn, England, a town of Monmouthshire, on the Great Western Ry. 10 miles northwest of Newport, with important coal and iron mines and allied manufactures. Pop. 17,000.

ABERCROMBIE, John, ab'er-krum'bi, Scottish physician : b. Aberdeen, 10 Oct. 1780 ; d. 14 Nov. 1844. After graduating from the medical school in Edinburgh University, in 1803, he began a private practice in the city and soon was regarded as one of the leading con¬ sulting physicians of the country. His fame, however, rested mostly on his writings, and especially on his (The Intellectual Powers and the Moral Feelings) (London 1833). Though possessed of no scientific value, his works were immensely popular on account of their readable qualities, their highly religious tone being especially acceptable to the people of his time. The estimation in which he was held by the nation may be judged by the many honors that were bestowed on him, among them being the degree of M.D. from Oxford, the rectorship of Marischal College, the vice-presidency of the Royal Society of Edinburgh and the office of physician in ordinary to the King for Scotland.

ABERCROMBIE, John William, Ameri¬ can educator and congressman : b. Kelly’s Creek, Ala., 17 May 1866. In 1886 he was graduated from Oxford College and, two years later, from the law school of the University of Alabama. He was appointed president of Ash¬ land College after graduating from college and on completing his legal studies he became principal of Cleburne Institute, both Alabama institutions. For twro years, from 1890 until 1892, he was president of Bowdon College, Georgia, after which he was for six years superintendent of schools in Anniston, Ala. For a while, during 1897, he was president of the Southern Female Seminary, now the Annis¬ ton College for Young Ladies, after which he was, for four years, superintendent of educa¬ tion for his native State. In 1902 he became president of the University of Alabama. From 1896 to 1898 he was a member of the State Senate, where he was chairman of the com¬

mittee on education. From 1900 to 1904 he was a director of the National Education Associa¬ tion and from 1905 to 1906 he was president of the Southern Educational Association. In 1912 he was elected to Congress.

ABERCROMBY, David, Scottish philoso¬ pher: d. about 1702. His chief work is entitled

(A Discourse of Wit* (1686). He also wrote many treatises and his work is said to antedate the so-called Scottish School of Philosophy.

ABERCROMBY, or ABERCROMBIE, James, British soldier: b. Glasshaugh, Scot¬ land, 1706; d. 1781. He is especially known as the commander of the 15,000 British troops who attacked Ticonderoga, 8 July 1758, being re¬ pulsed with a loss of 2,000 men. Lie obtained his commission in the British Army as major in 1742 and in 1756 was sent to America, being then a major-general. In September 1758, fol¬ lowing his disastrous defeat at Ticonderoga, he was superceded in command by Sir Jeffery Amherst, whereupon he returned to England, became a member of Parliament and a firm supporter of the King's colonial policy. A full account of his career in America is given in Parkman's (Montcalm and Wolfe) (Boston

1884).

ABERCROMBY, Sir Ralph, distinguished British soldier: b. Menstry, Scotland, October 1734; d. 28 March 1801. He was designed for the bar by his father 'and studied from 1752 to 1755 at the University of Edinburgh and the University of Leipsic. His natural inclination, however, was toward a military career, so in 1758 a cornet's commission was procured for him in the 3rd Dragoon Guards, with which regiment he went to Germany and saw some active service, as well as gained his first ex¬ perience. After peace was concluded he was stationed in Ireland for some years, but in 1767 he married and retired to private life. In 1793 he accompanied the Duke of York to Hol¬ land, in which unfortunate campaign he was one of the few to distinguish themselves. On his return to England he was appointed chief- in-command of an expedition to the West Indies, which he conducted with marked suc¬ cess, capturing Demerara, Granada, Essequibo and Trinidad. Soon after he w'as made com¬ mander-in-chief of the British forces in Ireland, but so obviously was he not in sympathy with the Government's policy of repression in that country that he was transferred to Scotland. In 1799 he was appointed second in command to the Duke of York in the expedition to Hol¬ land, another ignominious campaign, where Abercromby was the only one

to conduct him¬ self with distinction. On his return he was appointed to command the expedition to the Mediterranean. The fleet anchored in Aboukir Bay, 2 March 1801. On the 7th Abercromby reconnoitered the shore in person. The next day a landing was effected in spite of a heavy fire and within a few dajrs the enemy was driven within his lines around Alexandria. On 21 March Menou attempted to surprise the British camp; a terrible battle followed, in which the British forces were completely vic¬ torious, but Abercromby had been mortally w'ounded by a musket ball which caused his death some days later. The gratitude of the nation for his services took the form of a peerage, granted to his widow and afterwards enjoyed by his son, with the title of Baron Abercromby.

ABERDARE, ab'er-dar', Wales, a town of Glamorganshire, at the junction of the rivers Cynon and Dar, and on the Great Western Railway, four miles southwest of Merthyr Tydvil. It is an important coal-mining centre,

with iron and tin-plate works, brickworks and breweries. Pop. 51,000.

ABERDEEN, 4th Earl of (George Ham¬ ilton- Gordon), British statesman and premier: b. Edinburgh, 28 Jan. 1784; succeeded to title in 1801 ; d. London, 14 Dec. 1860. He was educated at Harrow and St. John’s College, Cambridge. Shortly after returning from a Continental and Grecian tour, full of classical enthusiasm, he established the Athenian So¬ ciety; whence Byron’s sneer

“ First in the oat-fed phalanx shall be seen The traveled thane, Athenian Aberdeen.”

He severely criticized Gell in the Edinburgh Review and wrote an introduction to Wilkins’ translation of Vitruvius, published separately in 1822 as (An Inquiry into the Principles of Beauty in Athenian Architecture. > In 1806 he entered Parliament as a Scottish representa¬ tive peer, and was twice re-elected. In 1813 he was sent to Austria to bring it into the coalition against Napoleon, and in 1814 was a signatory . of the Treaty of Prague; he won credit in diplomacy, and the same year was made Viscount Gordon in the British peerage. During 1815-28 he devoted himself to his estates. In 1828 he became chan¬ cellor of the Duchy of Lancaster, and a few months later foreign secretary in Wellington’s Cabinet, and had the satisfaction of seeing

Greek independence recognized. He warmly supported repeal of the Test and Corporation Acts, and Catholic Emancipation. Peel had him in both his Cabinets, 183-4 — 35 as colonial secre¬ tary, 1841-46 as foreign secretary. In 1846, during the struggle which rent the Established Church of Scotland in twain, he brought in a compromise bill which was denounced by both halves ; and after the Disruption in 1843 again attempted conciliatory measures without result. On Peel's death in 1850 he became the leader of the free-trade Conservatives. The Derby administration being unable to stand, Lord Aberdeen in 1853 formed a coalition ministry. In it were such men as Russell, Palmerston and Gladstone. For a time it was very popular; unluckily the Crimean War supervened. Aberdeen's tardiness of action and reluctance to enter on hostilities, the result of a constitu¬ tional aversion to war, irritated the country, which was in one of its periodical anti-Russian frenzies, and bent on fighting. Moreover, the early portion of the war was shockingly mis¬ managed, as those of commercial countries al¬ ways are ; and on the appointment of a commit¬ tee of inquiry, the ministry, which had uni¬ formly resisted the motion, resigned, and Palmerston's succeeded it. This closed Aber¬ deen's public life. His dislike to ˆspirited® foreign policies and interference with other countries, and his sympathy with the Holy Alliance, gave him the name of an enemy to liberty; but the above detail shows its injustice. Consult Gordon (Earl of Aberdeen) (London

1893).

ABERDEEN, John Campbell Hamilton Gordon, 1st Marquis of: b. 3 Aug. 1847. He succeeded his brother as 7th Earl of Aberdeen in 1870; was lord-lieutenant of Ireland, 1886, 1905-15; and governor-general of Canada, 1893-98. He was created a Marquis in 1915. Isabel Maria, Marchioness of Aberdeen, wife

of above, is the youngest daughter of Dudley Coutts Majoribanks, 1st Baron Tweedmouth and a prominent banker. She was b. Inverness-shire, Scotland, 1857. At an early age she became interested in social and political work, has been especially prominent in organizations which have as their object the raising of the status of women, and has held the office of president of the International Council of Women. Her literary works are: (Through Canada with a Kodak) ; (Our Lady of the Sunshine) (1910) ; (Ireland's Crusade against Tuberculosis) (1908).

ABERDEEN, Miss., city and county-seat of Monroe County; on the Tombigbee River, and the Illinois Cent., the St. L. & San F., and the Mobile & O. railroads; 130 miles southeast of Memphis, Tenn. Its chief

trade and manu¬ facture are cotton and cotton products, lumber coming next. There are also oil and grist mills and manufactures of clothing, buttons, barrel- staves, wagon spokes, etc. The waterworks and electric light plant are owned by the city. Pop. (1910) 3,708; (1920) 4,071.

ABERDEEN, S. D., city and county-seat of Brown County, on the Chicago & N. W., Chicago, Milwaukee & St. Paul, the Minn. & St. L., and Great Northern railroads; 280 miles west of Minneapolis, 125 miles north¬ east of Pierre. It is the farming and lumber trade centre of a large section ; manufactures boots and shoes, flour and feed, soap, plows, machinery, chemicals, soft and pressed brick, clothing, candy, and artesian well supplies, etc., and has 10 grain elevators, granite and marble works and creameries. Its factories are sup¬ plied with abundant water power furnished by artesian wells. It has Federal and municipal buildings, a court house, an opera house, five inside parks, national banks, several daily, weekly and monthly periodicals, a system of graded public schools and a State normal and industrial school, a Carnegie library. The value of taxable property is $13,669,100. Aberdeen was settled in 1880, inc. 1882 and was one of the first cities to adopt commission government. Pop. (1910) 10,753; (1920) 14,537.

ABERDEEN, Wash., city in Chehalis County, at the head of Grays Harbor, on the Chehalis River, 50 miles west of Olympia, and on the Northern Pacific, the Chicago, Milwau¬ kee and St. Paul, and other railroads. It is a lumber and dairy centre. The city has logging, lumber and shingle mills, cooperages, shipyards and fish-curing houses. There is steamship communication with the Pacific ports. The waterworks are the property of the city. Pop. (1910), 13,660; (1920) 15,337.

ABERDEEN, Scotland, the chief city and seaport in N. Scotland, fourth largest . in all Scotland; lies in Aberdeenshire, of which it is the county town, between the mouths of the Dee and Don rivers, 130*4 miles northeast of Edinburgh by the N. British Railway, also on the Caledonian N. Scotland Railway. William the Lion gave it a charter in 1179; and its priv¬ ileges were subsequently extended by Robert Bruce. The English burned it in 1336, but it was soon rebuilt ; within the same parliamentary boundary is a small town a mile north near the Don mouth, formerly called Old Aberdeen, the seat of St. Marchar's Cathedral (1357-1527),

now represented by the granite nave, which, as restored since 1869, is used as a parish church. King's College and University, founded by Bishop Elphinstone in Old Aberdeen in 1494, and Marischal College and University founded by the Earl Marischal in New Aberdeen in 1593, were in 1858 united into one institution, The University of Aberdeen (q.v.). With Glasgow University it sends one member to Parliament. Marischal College was rebuilt in 1841 and additions were made in 1895 and 1906. Kings College is a stately fabric, its chapel, dating from 1500, is adorned with exquisite wood-carvings. The university is richly en¬ dowed by the State and private bequests and is a beneficiary of the Carnegie Trust Fund. In the 17th century Aberdeen had become an important place, but it suffered much from both parties in the civil wars. It has a flourishing trade and thriving manufactures ; and having been largely rebuilt of granite and extended since the formation of Union street in 1800, the ((Granite City® now offers a handsome and regular aspect. Among the chief public edifices are the Municipal and County buildings, the post-office, Market Hall, Trades Hall, the Royal Infirmary, the lunatic asylum, the Gram¬ mar school, the art gallery and art school, the music hall, public library, College of Agricul¬ ture and Gordon's College. The last has been much extended as a technical school, the foundationers being no longer resident ; while the infirmary was reconstructed and modern¬ ized to celel3rate the Queen's Jubilee (1887). Of more than 60 places of worship those of most interest are built on the site of the ancient church of St. Nicholas, connected by a granite tower where a fine carillon of 37 bells was placed in 1887, and a Roman Catholic Cathedral built in 1859, with a spire 200 feet high. One may also notice the Market-cross (1686), the Wallace, Gordon Pasha, and three other statues, the Duthie public park of 47 acres, Victoria Park, Union Terrace, and the four bridges spanning the River Dee, one of which is said to date from 1320. It has a fine harbor and docks, good steamship and railway facilities and does a large import and export trade, being the leading port for the White Sea and Baltic trades. The chief exports are woolens, linens, cotton yarns, paper, combs, granite (hewn and polished), cattle, grain, preserved provisions and fish. Aberdeen is one of the most important fish-trawling centres and has the largest granite polishing works in the kingdom, the art of granite polishing having been revived here in 1818 by Alexander McDonald. There are also several large paper works nearby. Shipbuilding was formerly a prosperous industry, the Aberdeen clipper-bow ships being celebrated as fast sailers, but now is greatly contracted. The city sends two mem¬ bers to Parliament and is under the jurisdiction of a council with lord provost, bailies, treasurer and dean of guild. Pop. (1901) 153,503;

(1911) 163,084.

ABERDEEN, University of, Scotland, situated in the city of Aberdeen, and consisting of King's and Marischal Colleges. The former was at one time known as Saint Mary's and was founded in 1494 by William Elphinstone, Bishop of Aberdeen. Marischal College was founded in 1593 by George Keith, Earl Marischal of Scotland. Until 1858 the two institutions were

under separate government, when they were united into the University of Aberdeen by an act of Parliament. The students number from 1.200 to 1,300 and include both sexes. The 1 acuities, five in number, covering arts, law, science, theology and medicine, number fully 30 professors and as many instructors. Endow¬ ments are both state and private, beside which the institution is also a beneficiary of the Car¬ negie Trust Fund. Its library has over 140,000 volumes.

ABERDEEN ACT (Brit.), introduced by the Earl of Aberdeen, and passed in 1845, to enforce the observance of a convention made with Brazil in 1826 to put down the slave trade. The act was repealed in April 1869.

ABERDEENSHIRE, Scotland, the north- easternmost county, on the North Sea, drained by the rivers Don, Ythan and Dee. Aberdeen, the capital, Peterhead and Fraserburgh are the chief towns. Area, 1,971 square miles; pop.,

312,200.

ABERIGH - MACKAY, a-be'ri-mac'ka, George Robert, Anglo-Indian teacher and author: b. 25 July 1848; d. 1881. In 1877 he be¬ came principal of Rajkumar College, Indore, and widely known by his attractive satire on Anglo-Indian society, (Twenty-one Days in India) (London 1878-79).

ABERNETHY, John, Irish dissenting clergyman and pioneer of toleration : b. Coler¬ aine, 19 Oct. 1680; d. 1740. The son of a Non¬ conformist minister, he graduated successively from Glasgow and Edinburgh universities, was licensed to preach before coming of age, urged to take an important charge in Antrim at 21, and two years later was ordained there. The work he did there for many years was of the most remarkable kind, in drafts on body, brain, soul and will ; and he was eminent in all. In 1717 he was invited at once to Dublin and Belfast; the Synod assigned him to Dublin; he refused to leave Antrim and was considered a Church mutineer; a furious quarrel followed,

developing into the fight in the Irish Presby¬ terian Church between ˆsubscribers® and ((non- subscribers® (Abernethy's party), the latter being formally barred out in 1726. The real question at issue was of old orthodoxy versus the liberalizing opinions which he disclaimed holding, but which have of course long since left his position far behind. In 1730 he was nevertheless called to Dublin. The next year came up the question of the Test Act, really involving the whole subject of religious tests in civil life ; and Abernethy took a firm stand against <(all laws that, upon account of mere differences of religious opinion and forms of worship, excluded men of integrity and ability from serving their country,® asserting near a century ahead of his time that a Roman Catholic could be such. His (Tracts) were later col¬ lected, and did good service in the Catholic Emancipation fight of the next century. Abernethy was the bravest of the brave, not only in advocating unpopular truths to his own harm, but in resisting the highest dignitaries in the cause of right. Consult (Diary, > 6 vols. ; Duchal's (Life) ; (FIistory of Irish Presbyterian

Church. >

ABERNETHY, John, English surgeon, grandson of the preceding : b. London, 3 April 1764; d. 20 April 1831. Educated at Wolver-

Hampton grammar school, he was apprenticed at 15 to Sir Charles Blicke, a leading London surgeon, assistant surgeon at St. Bartholomew's Hospital ; he also attended the lectures of Pott, the chief surgeon there, of John Hunter, and the anatomical lectures at London Hospital of Sir William Blizzard, who early employed him as demonstrator. Pott resigning, Blicke took his place, and made Abernethy assistant sur¬ geon in 1787. His lectures, illustrated by apt anecdotes, drew such crowds that a special building was 'erected, now the celebrated St. Bartholomew's School. In 1813 he was ap¬ pointed surgeon to Christ's Hospital, in 1814 professor of anatomy and surgery to the Col¬ lege of Surgeons, and in 1815 full surgeon to St. Bartholomew's, a post which he resigned in 1829. Of his numerous medical works the most important is (Surgical Observations on the Constitutional Origin and Treatment of Local Diseases5 (1806), which, from his frequent references to it, became known as (My Book.5 He was one of the first to prove that topical symptoms should be treated by general reme¬ dies, especially for the stomach and bowels ; and he was a persuasive and influential teacher, though over-dogmatic. He

was the first to in¬ troduce the capital surgical improvement of tying the great arteries in operations for aneu¬ rism, etc. Consult (Works 5 (5 vols., 1820) ; (Memoirs5 by Macilwain (1853), not highly esteemed.

ABERRATION. In physics, (1) that property of a lens or curved mirror in virtue of which it does not form a sharp, flat image devoid of false color fringes. Spherical aberra¬ tion is the geometrical distortion of the image due to the fact that the surface of the lens or mirror is spherical instead of having the theoretically best form. It is easy to grind a spherical surface, and more difficult to grind those of other forms ; hence in the practical manufacture of a high-grade lens the curva¬ tures are carefully calculated, so that spherical surfaces may be used, while the spherical aber¬ ration is still kept within limits that are con¬ sistent with the use of the lens. (See Lens.) Chromatic aberration is the defect in virtue of which the focal length of the lens is not the same for all colors. A lens possessing chro¬ matic aberration gives an image that is blurred with rainbow-like fringes; one that is devoid of chromatic aberration is said to be achromatic (see Light). Mirrors, whether concave or convex, have no chromatic aberration.

(2) The slight displacement of the apparent position of a star or other celestial object, due to the fact that although the velocity of light is very great it is not infinite. In recent years much attention has been paid to aberration phenomena, because the observed amount of the displacement of a star indicates that the ether of space is stationary and that the earth passes through it like a fish through stagnant water ; while direct experiments indicate, on the con¬ trary, that the ether is dragged along with the earth to a considerable extent. See Ether; Relativity, Theory of.

AB'ERT, Herman Joseph, German au¬ thority on music : b. Stuttgart, 25 March 1871. His first musical education was from his father, who was director of the court opera, but later he studied in the Stuttgart conservatory. From 1890 to 1895 he was a student in the University

of Tubingen, where he specialized in classical philology, thereby earning his degree of Ph.D. In 1897 he entered the University of Berlin and for four years there devoted himself to re¬ search work into the history of music. In 1902 he was appointed lecturer of music at the University of Halle, where he was appointed professor in 1909. His works are: (Die Lehre von Ethos in der griechischen Musik5 (1899) : a biography of Schumann in Reimann’s series (Beriihmte Musiker5 (1903) ; (Die Musikan- schauung des Mittelalters und ihre Grundlagen5 (1905) ; (Jommelli als Opernkomponist5 (1908).

ABERT, John James, American military engineer: b. Shepherdstown, Va., 17 Sept. 1788; d. 1863. He was graduated at West Point in 1811, was admitted to the bar; served in the War of 1812, becoming topographical engineer with the rank of major; was made chief and colonel of topographical engineers in 1838, and assisted in developing important canals and other works. His engineering reports are considered standard, and he was a founder of the National Institute of Science, since merged in the Smithsonian. He was retired in 1861 and was an important factor in the develop¬ ment of governmental engineerings in the earlier half of the 19th centuˆ.

ABERYSTWITH, ab'er-ist'with, Wales, a popular seaside resort of Cardiganshire, on Cardigan Bay 50 miles by rail northeast of Swansea. The pier and attractive sea front promenade and the buildings of the University College of Wales on Castle hill near the pic¬ turesque ruins of the 11th century Norman castle are prominent features. Pop. 8,500.

ABEYANCE, meaning expectancy; prob¬ ably derived from the French bayer, to gape after. When real or personal properties are in expectation, or the intendment of the law, they are said to be in abeyance, or not actually pos¬ sessed. The word is often used in the Church of England, a living being known as (<in abey¬ ance55 when it is left vacant owing to the un¬ willingness of the patron to declare himself in favor of any particular applicant for the office.

AB'GAR, Kings of Edessa, northern Meso¬ potamia, chiefly remembered from the 3d century account by Eusebius Pamphilius of one of them, Ouchama — (<the black,55 probably Abgar V, who, suffering from leprosy, wrote a letter to Jesus asking him to come to Mesopo¬ tamia to heal him. Eusebius states that Jesus wrote a letter in reply that he was unable to make the journey, but that after his ascension he would send a disciple. Eusebius says that he both saw and transcribed his account from the original letters at Edessa and that Judas, son of Thaddeus, one of the 70 disciples was sent, a.d. 29. Moses of Chorene further states that Jesus sent his portrait to Abgar. Portraits now exhibited both at Rome and Genoa are claimed to be this original portrait, known as ((The Holy Face of Edessa.55

ABHEDANANDA, Swami, ab'-ha-da'nan- da, Hindu author and lecturer : b. Calcutta, India, 21 Nov. 1866. He was graduated from the University of Calcutta and afterward be¬ came a disciple of Ramakrishna Paramahansa and a member of the Order of Sanyasitis, a very ancient priesthood. He came to the United States in 1897 to lecture on Vedanta phi¬ losophy, organizing and becoming head" of

the Vedanta Society in New York city. He has lectured extensively before educational in¬ stitutions and societies throughout the United States and is considered the best authority on Monistic Vedanta. His chief works are: (Reincarnation) (1899); Spiritual Unfold- ment> (1902); <Philosphy of Work' (1902); (How to be a Yogi' (1902) ; (Divine Heritage of Man' (1903); (Self-Knowledge' (1905); (India and Her People' (1906) ; (Human Af¬ fection and Divine Love' (1911) ; (Great

Saviours of the World' (1911).

ABHORRERS, a term applied in English history by the Petitioners, their opponents, to those tories who expressed abhorrence of the petitions to Charles II in 1679 to reassemble Parliament, and upheld him in his autocratic efforts to control public opinion.

ABI'ATHAR, high priest of the Jews, son of Abimelech who was killed by Saul's com¬ mand because he had assisted David. Abiathar also became one of David's most loyal ad¬ herents and supported him during the rebellion of Absalom. Solomon cast him out of the priesthood when he supported Adonijah and banished him to Anathoth.

A'BIB, first month of the Jewish ecclesias¬ tical year and the seventh of the civil year, the month in which the Passover is celebrated. This month is now called Nisan, a name which was adopted during the Babylonian period of the history of the Jewish people and as such it is now known in the official calendar of the Jewish Church.

ABICH, Wilhelm Herman, German miner¬ alogist and naturalist: b. Berlin, 11 Dec. 1806; .d. Graz, 2 July 1886. After completing a course of study in the natural sciences at the Univer¬ sity of Berlin, he traveled in Italy and Sicily. In 1842 he was appointed to the chair of min¬ eralogy in the university at Dorpat, and in 1853 was elected a member of the Academy of Sci¬ ences in Saint Petersburg, for whom he wrote exhaustive reports of the explorations which he had made in the Caucasus, Russian Ar¬ menia and northern Persia. He also published several books descriptive of the minerals found in the different countries in which he had trav¬ eled, the most important of which are: (Erlau- ternde Abbildungen von geologischen Erschei- nungen, beobachtet am Vesuv und Aetna 1833 und 1834' (1837) ;

(Ueber die Natur und den Zusammenhang der vulkanischen Bildungen' (1841); (Ueber die geologische Natur des ar- menischen Hochlander' (1843) ; Weber die Natronseen auf der Araxesebeni' (1846-49) ; (Vergleichende geologische Grundziige der kaukas- armenischen und nordpersischen Ge- birge' (1858); (Sur la Structure et la Geol¬ ogic du Daghestan' (1862).

ABTGAIL, or ABTGAL, wife of King David, but previously the wife of Nabal. She offered food to David while he was fleeing from Saul, after her husband had refused to do so. When Nabal died, some 10 days later, David took her to wife. During a foray of the Amelikites on Ziklag, Abigail was carried off, but David recovered her. She bore him a son, Chileab, or Daniel. Another Abigail was daughter of Nahash, sister of Zemiah, Joab's mother, wife of Ithro, the Ishmaelite, mother of Amasa. The name is also employed as a general name for waiting maids.

ABIJAH, or ABIAH, also ABIJAM, the

name of nine different persons mentioned in the Old Testament. (1) The second King of Judah, son and successor of Rehoboam. He was presumably a great-grandson of David on his mother's side, for she is described as a daughter of Absalom, though there is some confusion regarding both mother and son in the text. In the books of Kings and Chroni¬ cles she is variously given as Maacah, daugh¬ ter of Abishalom, and Micaiah, daughter of Uriel of Gibeah. It may be noted that Maacah was also the name of Asa's mother. All we can gather is that Abijah reigned three years, that he walked in all the sins of his fathers, and was at war with the King of Israel, Jero¬ boam. (2) The second son of Samuel bore the name of Abijah or Abiah, likewise (3) a young son of Jeroboam I, while another Abi¬ jah was one of the (<heads of fathers' houses" of the sons of Eleazar, eponymist of the 8th course of priests, to which Zacharias, the father of John the Baptist, belonged. In. the lists of priests the name Abijah occurs in Nehemiah x and xii ; in 1 Chron. it applies also to the wife of Hczron, eldest son of Perez; a son of Becher, son of Benjamin; and the mother of Hezekiah, also called Abi.

ABILDGAARD, a/bil-gord, Nikolai Abra¬ ham, Danish painter : b. Copenhagen, 4 Sept. 1744; d. Frederiksdal, 4 June 1809. He studied for some time at the academy in Copen¬ hagen, but in 1772 went to Rome to study un¬ der the masters. After his return he was ap¬ pointed to a professorship at the academy in 1786, and in 1789 was elected a director. The greater number of his paintings were of an historical nature and he had much to do with the founding of the

Danish school of historical painting. A series of 10 pictures in the castle of Christiansborg, which burned in 1794, and scenes from Shakespeare and Ossian were his most important works.

ABILENE, ab'e-len, Ivan., city, county- seat of Dickinson County 163 miles west of Kansas City, on the Smoky Hill River and Union Pacific, Chicago, R. I. & P. and Atchi¬ son, T. & S. F. railroads. For many years it has been one of the great agricultural market cen¬ tres of the State, the focus of a large farm loan business, and the sales-ground and ship¬ ping point for large droves of cattle that are annually brought from Texas. It has also large manufacturing interests, including several flour-mills and creameries, as well as manu¬ factures of iron bridges, carriages, etc.. Min¬ eral water from sand springs four miles dis¬ tant is bottled for export. These springs also supply the water works which are owned by the city. There are four banks, with a com¬ bined capital of $175,000; one high school and three ward schools, many fine private resi¬ dences, a city hall, court house, Government building and Carnegie library. The value of taxable property is $4,718,628. Abilene was settled in 1856, incorporated in 1869, the orig¬ inal charter remaining in force until 1911 when the commission form of government was adopted. Pop. (1910) 4,118; (1920) 4,895.

ABILENE, Tex., city and county-seat of Taylor county 160 miles southwest, of Fort Worth, on the Texas & P., Wichita Valley and Abilene & S. railroads. It is the centre

of a farming, cotton, fruit and stock-raising district and its chief interests lie in its cotton gins, oil, compress and flouring mills and oil refineries. It has three national banks, with deposits amounting to about $3,009,000; four ward schools and one high school, and is the seat of Christian College (Baptist), Simmons College and the State Epileptic Colony. There are seven churches and among other buildings worthy of note are the post-office, Carnegie library and Federal court house. The value of taxable property is $6,000,000. The city is

supplied with natural gas from Moran, Tex., and has electric light and water plants and a good street railway system. A high tension

electric line runs to Merkel, Tex., on the west. The government is the commission form, vested in a mayor and four commissioners. Receipts

and expenses balance at approximately $80,000. Pop. (1910) 9,204; (1920) 10,274.

ABIMELECH, a-bim'e-lek, ((Melech is father,® or Mather is king.® (1) King of

Gerar, who, according to Gen. xx, took Abra¬ ham's wife, Sarah, into his harem, but re¬

stored her, afterward entering into a covenant with Abraham. There are two variations of the same story. (2) The son of Gideon. Af¬ ter his father's death he caused his 70 half- brothers to be slain and was proclaimed king. Three years later he crushed a revolt headed by Gaal, son of Ebed. Abimelech was mor¬ tally wounded by a woman during his attack on Thebez. Judges viii, ix; 2 Samuel xi.

ABINGDON, Ill., city, Knox County, 85 miles northeast of Quincy, on the Chicago, B. & Q. and the Minn. & St. L. railroads. Set¬ tled 1828, incorporated 1857, now acting un¬ der charter of 1859. Among its many indus¬ trial interests, which include wagon-works, saw-mills and manufactories of gloves, shirts and overalls, cement, paving brick, tile and organs, it has the largest animal-trap factory in the world. It is in an agricultural region and possesses some coal mines. Besides its excel¬ lent school system, it is the seat of Hedding College (M. E.) and Abingdon (Christian) College, the latter having been founded in 1855. A mayor and council of five are annually elected. Pop. (1920) 2,721.

ABINGDON, Va., town and county-seat of Washington County, on the Holston River and the Norfolk & W. and the Virginia-Caro- lina railroads, 315 miles southwest of Rich¬ mond and 189 miles west by south of Lynch¬ burg. Settled 1730, incorporated 1788, it has long been noted for its large tobacco and live¬ stock interests, as well as for its valuable de¬ posits of iron, gypsum and salt, much of the salt used in the Southern States during the Civil War having been obtained in this vicinity. Its manufactories include wagon- works and planing-mills, besides cigar, tobacco, pipe, brick and canning factories. It is also the seat of Martha Washington College for girls (Methodist Episcopal, South), the Stonewall Jackson Female Institute (Presbyterian), the Academy of the Visitation and Abingdon Academy for boys. Pop. (1920) 2,532.

ABINGTON, Mass., a post township in Iflymouth County 19 miles north of Plymouth and 19 miles southeast of Boston, on the Plv- mouth Branch of the New York, N. H. & H. Railroad and Old Colony electric. Settled in

1680, incorporated 1712. Its southern portion is now known as Whitman ; its northern por¬ tion as North Abington, and both are important manufacturing centres, the chief industries be¬ ing the making of boots and shoes, shoe find¬ ings, lasts, textile machinery, window shades and dry plates. Strawberry growing is also practised and there are good nurseries. Abing¬ ton has three banks with a combined capital of $3,924,866 ; commodious and well-kept ele¬ mentary and high schools, for which an annual appropriation of $37,200 is made, a good fire department, municipal owned water works and a fine park with an arch to Civil War veterans. The value of taxable property is $3,763,645. The government is by town meeting. In 1915 the treasurer's reports totaled $240,035. The Abolitionist movement was started and encouraged by meetings in Island Grove in this town. Pop. (1910) 5,455; (1920) 5,787. Consult Hobart, B., (History of the Town of AbingtoiP (Boston 1866).

ABIOGENESIS. See Biogenesis.

ABIPONE, a'be-po'na, an Indian tribe, formerly inhabiting the Gran Chaco region of Paraguay, the headwaters of the Rio Grande in Bolivia and the Vermejo in Argentina. They were daring riders and fierce and for¬ midable antagonists of the Spaniards, their weapons being the bow and the lance. In 1780 the tribe numbered about 5,000, but owing to a peculiar custom prevalent among them, whereby all but two children of a family were killed off, as well as to the constant wars with the Spaniards, this whole people has become ex¬ tinct. Consult Dobrizhoffer, (An Account of the Abipones) (London 1822) ; Church,. Aborigines of South America) (London 1912).

ABITIBI, ab'i-tlb'i, Canadian river and lake, the latter being situated in latitude 48° 24' N. at an elevation of 830 feet. Out of the lake flows the river of the same name, north¬ ward to James Bay, in Hudson Bay.

ABJURA'TION, the act of forswearing, abjuring or renouncing upon oath; a denial upon oath ; a renunciation upon oath. Chiefly a law term and used in the following senses :

1. In the United States when an alien wishes to become a citizen he must declare, among other things, that he doth absolutely and en¬ tirely renounce and abjure all allegiance and fidelity which he owes to any foreign sover¬ eign, etc., and especially by name the sover¬ eign, etc., whereof he was before a citizen or subject.

2. An abjuration of the realm. During the Middle Ages the right of sanctuary was con¬ ceded to criminals. A person fleeing to a church or churchyard might permanently es¬ cape trial if, after confessing himself guilty before the coroner, he took an oath abjuring the kingdom: promising to embark, at an as¬ signed port, for a foreign land, and never to return unless by the king's permission. By this, however, he forfeited his goods and chat¬ tels.

3. Special. An abjuration or renunciation of all imagined allegiance to the Jacobite line pf rulers, after the English nation had given its verdict in favor of William and Mary.

The oath of abjuration was fixed by 13 Wm. Ill c. 16. By the 21 & 22 Viet. c. 48,' one form of oath was substituted for the oaths of

allegiance, supremacy and abjuration. For this form another was substituted by the Act 30 & 31 Viet. c. 75, § 5. This has in turn been superseded by the Promissory Oaths Act, 31 & 32 Viet. c. 72.

1. An abjuration, renunciation or retraction of real or imagined heresy or false doctrine. Thus the now abolished 25 Chas. II c. 2, en¬ acted that certain tenets of the Church of Rome were to be solemnly renounced.

ABKHASIA, ab-ka'se-a, or ABASIA, a

district of European Russia, in the government of Kutais, Trans-Caucasia. It extends down the southern slopes of the Caucasus Mountains to the Black Sea. The country is extremely mountainous and heavily timbered, mostly with oak and walnut. The inhabitants, numbering

136.500 in 1917, are mostly Mingrelians and Abkhasians and are engaged mainly in agri¬ culture and stock-rearing, as well as in the cutting of lumber. The district, which is about

2.500 square miles in area, has been successively under the dominion of the ancient Persians, the Georgians and the Turks, the latter estab¬ lishing the religion of Islam among the people. After the Treaty of

Adrianople, in 1829, the Russians began establishing themselves there, but they did not gain full possession until 1864. The chief town is Sukhum Kale.

ABLATIVE CASE, one of a number of ˆcases® comprising a system of modifications which nouns, pronouns and adjectives undergo in many languages, the number of cases being very different in different languages. The further back we go in the history of the Indo-European languages, the richer we find them in these modifications. Sanscrit has eight cases, Latin six and Greek five. The Latin cases, often used in regard to the English language, are: the Nominative, which names the subject; the Genitive, express¬ ing the source whence something proceeds ; the Dative, that to which something is given ; the Accusative, the object toward which an action is directed; the Vocative, the person addressed, or called ; and the Ablative, that from which something is taken, denoted in English by means of the prepositions in, with, by, from, etc.

AB'LEGATE, papal envoy, or special commissioner, representing the papal court at Rome in conveying the hat and the red biretta to a newly appointed cardinal. Upon deliver¬ ing the insignia of office his mission is com¬ pleted. There are two ranks of ablegates : the apostolic and the pontifical, the former out¬ ranking the latter.

ABLUTION, or the ceremonial act of washing to symbolize purification from un¬ cleanness, is a rite which has been observed by many races of people from the early Mosaic days down to our own time. Under the Mo- saical dispensation the act of ablution had four purposes: (1) To cleanse from the taint of an inferior position before initiation into a higher state, as when Aaron and his sons, having been chosen for the priesthood, were washed with water before they were invested with their robes of office; (2) to cleanse in order to fit one for special acts of religious ceremony, as when the priests were required, under the pen¬ alty of death, to wash both their hands and feet before approaching the altar; (3) to

cleanse from defilement contracted by some particular circumstance which prevented one from enjoying the privileges of ordinary life, of which there were no less than 11 species of uncleanness recognized by the law ; and (4) to cleanse or absolve oneself' from the guilt of a particular act, as when, in expiation for an unknown murder, the elders of the village washed their hands over the slaughtered heifer, saying, ((Our hands have not shed this blood, neither have our eyes seen it® (Deut. xxi). This practice was also common both among the Greeks and Romans, and it was undoubtedly in accordance with this

practice that Pilate called for water and washed his hands to signify that he held himself innocent of the blood of Jesus Christ (Matt, xxvii, 24).

Ablution by the priests before the perform¬ ance of sacred ceremonies was common even among the heathen, while the Egyptian priests carried the practice to such an extreme that they shaved their entire bodies every third day and then washed themselves in cold water twice every day and twice each night, that no particle of filth might even rest upon them. Such an act corresponds somewhat to the more simple wadn of the Mohammedans, a ceremonial wash¬ ing which they are compelled to observe five times daily, or immediatelv before their stated prayers, and these do not begin to represent the formal acts of cleansing required by the Moslem law. For example, the ablution for positive defilement required by Moses has its counterpart in the Mohammedan ghual, and yet again, under the Moslem law, the causes of such defilement are specified so minutely that they greatly exceed those of the ancient Jews. So strict was the law upon this point, however, that, when water could not be obtained, it was required that the purification should be made with something that might represent the water. In times of drought, therefore, or on occasions of sickness, the act of purification might be performed by rinsing, or rubbing the hands and face with dry sand. This form of cleans¬ ing was called tayemmum.

The ceremony of ablution at communion was adopted by the early Christian Church, and has been retained both in the Eastern and Roman Catholic churches. In the Roman Catholic Church it has become a liturgical term, denoting the two acts of cleansing per¬ formed during the mass: (1) When wine is poured into the chalice to disengage any par¬ ticles which may be left in the vessel ; and (2) when both wine and water are poured over the priest’s fingers into the chalice. In the Greek Church the word ((ablution)) is applied to a ceremony performed seven days after baptism, when the unction of the chrism is formally washed off from those who have been baptized.

ABNAKI, ab-na'ke, a federation of the Algonquin Indians, including the Passamaquod- dies, the Penobscots, Norridgewocks and other minor tribes, formerly occupying a territory now included in Maine and southern New Brunswick. As a result of King Philip's war they assisted the French colonists against the English, until the latter destroyed their prin¬ cipal town at Norridgewock and killed their missionary, Rasle, in 1724. Thereafter the greater portion of them removed to Saint Francis, Canada. Those who remained be¬ hind made peace terms with the English and

were allowed to retain a smaller portion of their old territory. Their descendants, now numbering only about 1,500, are found in the Malecites on the Saint John River, New Bruns¬ wick, the Passamaquoddies on the bay bearing their name, in Maine, the Penobscots, at Old- town, Me., and the Abnakis at Saint Francis and Becancour, Quebec.

AB'NER, son of Ner and cousin of Saul and commander of the latter's army. When the tribe of Judah recognized David after Saul's death, Abner prevailed upon the other tribes to recognize Saul's son, Ishbaal. Where¬ upon David sent his forces, under the com¬ mand of Joab, into the field. Abner met them at the pool of Gibeon and attempted to terrify Joab's men by a ruse. Pie proposed that 12 champions from each army should en¬ gage in a competitive trial of strength. Ab¬ ner's 12 men were Benjaminites and left- handed, so that they could conceal short swords at their right sides. By this trick the Judaeans were killed. Whereupon the angry soldiers of Joab fell on Abner's men and drove them from the field. Abner fled, but being closely pur¬ sued by Asahel, he turned and slew him. Later Abner quarrelled with Ishbaal and went over to David. But Joab had not forgotten the death of Asahel, his brother, and while Abner was peacefully dining with David he killed him. The murder caused general indignation, but Joab's high position as commander of the army saved him from punishment.

AB'NEY, Sir William de Wiveleslie, English physicist: b. Derby, 24 July 1844; d. Folkestone, 2 Dec. 1920. He was graduated from the military academy at Woolwich in 1861 and entered the Royal Engineers as a lieutenant, reaching the rank of captain within 10 years. From 1893 to 1895 he was president of the Royal Astronomical Society, after which, for two years, he was president of the Physical Society of London. In 1903 he became adviser to the Science and Art Department of the Board of Education. In the same year he be¬ came a member of the Advisory Council for Education to the War Office. His reputation rests largely on his researches in photography and spectroscopy, on which he has written many works, the most important of which are : (Instruction in Photography * (1870) ; treat¬ ise on Photography* (1875) ; (Color Vision, Color Measurement and Mixture) (1893) ; the Pioneers of the Alps) (with C. D. Cun¬ ningham, 1888). In 1900 he was awarded a knighthood.

ABNORMAL PSYCHOLOGY. See

Psychology of the Abnormal.

ABO, a'boo, former capital and the oldest city of Finland, now the chief town of the government of A.bo-Bjorneborg. It is situated on the Aurayoki River and near the Gulf of Bothnia, 128 miles in a westerly direction from Helsingfors. It was founded by the Swedes in 1157 and remained the capital of Finland until 1819. It contains a fine sarcophagus which was erected in 1865 in memory of the Queen, Catharine Monsdotter, who died in 1512. In one of the suburbs is an old spring in which, according to traditions prevalent among the people, the Finns _ were first baptized into Christianity. It is in direct steamship commu¬ nication with Stockholm, Copenhagen and

Petrograd. Its harbor is too shallow to allow shipping of more than 10 feet draught, so large vessels dock at Bornholm, where some 700 ships touch annually. Many Russian warships have been built in the shipyards near the city, the great Crayton works there supplying the Russian fleet with torpedo boats. It has a number of tobacco factories, cotton mills, machine shops, sugar refineries and other industrial plants. The School of Navigation and the School for Deaf-Mutes are notable among its public educa¬ tional institutions, besides which there are a number of gymnasia, a technical institute, a commercial college and a normal training school. In 1910 the population was 49,691, the people being mixed Finns and Swedes, with the Finns predominating. In 1827 a large portion of the city was destroyed by a conflagration, includ¬ ing the University buildings. Since then the University has been removed to Plelsingfors.

ABOLITIONISTS, the extreme section of the anti-slavery party in the United States, who advocated immediate sweeping away by the national government of Southern slavery, without regard to constitutional guarantees, vested interests, or political facts ; this section and its nickname date from about 1835. Grad¬ ual abolition had been the desire of many of the best men even of the South; and till after the War of 1812 there was no prejudice against the freest expression of opinion on the sub¬ ject. But the effects of Whitney’s cotton-gin were now beginning to be felt in making the slave system for the time enormously profit¬ able; and the Missouri Compromise, with the insistence of the South thereafter that States should be admitted only in pairs, one slave and one free, showed that the time of apathy had gone by. The new zeal of the South in up¬ holding, increasing and justifying the system was met by a new intensity of the North in opposing it, though for a long time confined to a small band

of agitators. In 1833 the National Anti-Slavery Society was formed in Philadel¬ phia; in 1831 William Lloyd Garrison had founded the Liberator, a weekly continued till 1866, filled from the first with the fiercest de¬ nunciation not only of the system but of all connected with it ; and a brilliant band of ora¬ tors, philanthropists and growing political forces, — Wendell Phillips, Charles Sumner, Gerrit Smith and women like Lucretia Mott, — kept the public mind on the alert and furnished a monotonous moral to the course of political events which the people might not otherwise have drawn so readily. There were grades even among these ; and the extremists denied the duty of obeying the United States Consti¬ tution, since it contained the clause warranting the Fugitive Slave Law, which was denounced as <(a covenant with death and an agreement with hell.® In practice they violated it system¬ atically by assisting in the escape of runaway slaves, through the machinery known as the ˆUnderground Railroad,® concealing them from pursuit and forwarding them from stage to stage till they reached Canada. But in 1840 the abolitionists divided on the question of the formation of a political anti-slavery party, and the two wings remained active on separate lines Jo the end. It was largely due to the abolitionists that the Civil War, when it came, was regarded by the North chiefly as an anti¬ slavery conflict, and they looked upon the

Emancipation Proclamation as a vindication of this view. See Anti-Slavery Society; Liber¬ ty Party; Slavery; United States — Causes of the Civil War.

ABOMEY, a'bo-ma, French West Africa, city of Dahomey, 70 miles inland, north of the port of Kotonu, with which it was connected by rail in 1905. The town is modern and has a good artesian water supply. Before its occupa¬ tion November 1892 by the French, Abomey was the capital of the native kingdom of Dahomey, a typical African city surrounded by mud walls and protecting ditches, its royal palaces and market square the scene frequently of barbaric festivals attended by human sacrifices. Pop.

16,000.

ABORIGINAL ART. Strictly speaking, the art of the aborigines, that is, of the original inhabitants of any region ; and hence by exten¬ sion, any primitive or savage art unaffected by the contact of a foreign and

superior culture. In this sense the term is used without regard to the question of whether the people prac¬ tising the art are true aborigines or not. The art of the savage tribes of our own time is included under this designation, and is studied carefully for the light it throws on primitive conditions, industries and conceptions. Yet the art of modern savage tribes must be con¬ sidered as representing rather an early-arrested development than a truly primitive culture. The oldest known products of human industry are the flint and bone implements and the paint¬ ings of the prehistoric cave-dwellers of West¬ ern Europe, which in many respects, especially in the fine arts of drawing and painting, far surpass the most advanced works of modern savages. These works date from an antiquity estimated at 25,000 to 30,000 years. While in delineation of animal life they are thus superior to modern savage fine art, they reveal nothing of proficiency in the industrial arts of pottery and weaving or basketry, which are prominent in modern savage art. Indeed, basketry and pottery and the applied arts of carving and stamping constitute the chief artistic activi¬ ties of modern savages. Of these pottery repre¬ sents the more advanced development cultur¬ ally. Primitive metal-working is met with in Africa and in some other regions. The ancient art of Central America, Mexico, Bolivia and Peru is aboriginal only in the sense of belong¬ ing to the most ancient inhabitants of whom we have exact knowledge in those countries ; it exhibits many evidences of a civilization many stages removed from primitive savagery.

The primitive origins of art have been much discussed by anthropologists and philosophers. The earliest human works known, found in caves in the provinces of Dordogne, France, and Santander, Spain, include artistically- shaped flint tools, carved bone handles, pictures engraved on bone, and paintings of animals on cave walls and roofs. But between this vividly realistic prehistoric art of 30 millenniums ago and modern savage art there is a great gulf, in kind as well as time. Modern savage art is almost wholly decorative, seldom realistic. It is so largely f etishistic that some writers derive the primitive artistic instinct wholly from ani¬ mism — the ascribing of animate magic powers to inanimate objects, and to representations of them and of animals. (See Animism). Others

think it is first awakened by the processes of basketry, weaving, string-lashing, etc., which produce certain regularly recurring motives or patterns. Others again find its root in personal adornment by tattooing, smearing with color, etc. Probably all three origins are in a measure correct. The decorative instinct once awakened develops more and more intricate combina¬ tions, and this development continues until arrested by the cultural limitations of the people or

region. Besides these forms of decorative plastic art, certain “savage® cultures have de¬ veloped the art-instinct in other directions, such as primitive forms of poetry and drama, music (songs or chants), and the dance. In all these the idea of rhythmic form predominates over substance or content, and it is rhythmic repeti¬ tion, with or without alternation, that charac¬ terizes also all savage ornament, which is never realistic except, perhaps, in certain Australian rock-pictures and bushmen’s drawings. Savage decoration, especially that of New Zealand and some other Polynesian islands, displays a keen sense of decorative values in space-filling, and infinite patience of execution. See Art ; Deco¬ rative Art.

Bibliography. — Balfour, H., (The Evolu¬ tion of Decorative Arp (London 1893) ; Grosse, (The Beginnings of Art) (New York 1897) ; Haddon, A. C., (Evolution in Arp (London 1895) ; Hamlin, A. D. F., (A History of Orna¬ ment, Ancient and MedievaP (New York 1916) ; Osborn, H. F., (Men of the Old Stone Age *(New York 1915) ; Tylor, E. B., (Primitive Culture* (New York 1889).

Alfred D. F. Hamlin, Professor History of Architecture, Columbia University.

ABORIGINES (Lat. “from the origin® ; the Greek name was autochthonoi) , the earliest inhabitants of a country discoverable by civil¬ ized investigation. Their relation to the animal world as a whole comes under the head of An¬ thropology; to other races, under Ethnology; their culture and conditions, under Archeol¬ ogy; of special countries, under their names, or those of particular tribes. Specifically, in Roman writers, a race traditionally said to have been driven by the Sabines from their first homes in the mountains around Reate (Rieti), invaded Latium, subjugated the native Siculi and occupied the land, along with a tribe of Pelasgi, the two thenceforth taking the name of Latini. If true, these Aborigines would be of Oscan stock and form the non-Pelasgian element in the Romans.

ABORTION, the expulsion of a foetus irom the uterus before it is capable of carrying on its own life. A variety of different terms have been applied to indicate variations in the character of this process ; thus : accidental, when brought about by purely accidental means ; artificial or induced, when caused for medical therapeutic reasons ; criminal, when induced for purely selfish reasons; tubal, when rupture of the Fallopian tube occurs, discharging the foetus into the abdominal cavity, the pregnancy thus being extra-uterine.

The causes for this accident, apart from in¬ duced abortion, may be

due to paternal, ma¬ ternal or foetal defects. The proportion of abortions to full-time pregnancies is about 1 to 7 or 10. Of the paternal causes, alcoholism,

syphilis, old age or physical weakness may he cited. The most frequent causes, however, are of foetal and maternal causes. Death of the foetus is the most frequent foetal cause. The maternal causes may be local or constitutional. Inflammation of the membranes of the uterus, tumors or new growths of the uterus, disease of the ovary, and inflammatory adhesions of the closely associated organs, act as local causes. Alcoholism, starvation, as in times of famine, syphilis, lead poisoning, coal-gas poisoning, acute diseases, as typhoid, pneumonia, and sud¬ den severe shock, are the most common agents acting on the mother that bring about the death of the foetus and its subsequent expul¬ sion. With certain women abortion, or mis¬ carriage, happens very readily.

The symptoms are hemorrhage, discharge of the amniotic fluid and pain. The treatment is always medical. The dangers are mostly those of hemorrhage and infection.

In law, when abortion is produced with a malicious design, it becomes a misdemeanor, and the party causing it may be indicted and pun¬ ished. When, in consequence of the means used to produce abortion, the death of the woman ensues the crime is designated as murder. In all cases of abortion the body of the offense must first be proven. The fact of the pregnancy, the use of the instruments and the administer¬ ing of the drugs must be established beyond a doubt. The evidence of the woman upon whom the abortion was committed is admissible but her dying declarations are not admissible un¬ less homicide is charged. A person who sells a drug or instrument, knowing that it is to be used for the purpose of causing a miscarriage, is guilty of a misdemeanor.

ABORTION IN PLANTS. This term is ap¬ plied to the arrest of development which occa¬ sionally occurs in otherwise normal organs of plants, being sometimes contrasted with degen¬ eracy, where we not only find an arrested development but a perversion of form. Abor¬ tion may take the form of an inordinate abbre¬ viation of the stem or flower-stalk as in the cauliflower, of irregular development of any part of the leaf, which is sometimes reduced to a mere midrib, of great

reduction in the size of some or all of the petals of a flower, of indelfiscence in the anther, of abnormal want of succulence in the fruit, or of many other fail¬ ures of development. Abortion of the sexual organs and sexual cells is probably one of the most common causes for the sterility of many hybrids. Abortion is sometimes due to defective nutrition, sometimes to the intrinsic defect of the organization of the plant. For further information on this subject consult Masters, M. T., (Vegetable Teratology) (London 1869), and Ward, H. N., (Disease in Plants* (London

1901).

ABOU BEN ADHEM AND THE AN¬ GEL, a'boo ben ad'hem, title of a poem of which Leigh. Hunt was the author. The fol¬ lowing line in it is frequently quoted:

“ Write me as one who loves his fellow men.”

ABOUKIR or ABUKIR, a'boo-ker, Egypt, a spacious bay with a small village of the same name, 14 miles northeast by rail of Alexandria. It is noted as the scene of the battle of the Nile, 1-2 Aug. 1798, when Nel¬

son defeated the French fleet; of a battle on its shores 25 July 1799 when Napoleon defeated the Arabs; and of the battle of Alexandria 21 March 1801, when Sir Ralph Abercromby defeated the French.

ABOUT, a'boo, Edmond Frangois, French journalist and novelist: b. Dieuze, 14 Feb. 1828; d. 17 Jan. 1885. In 1851 he was sent to the French school in Athens, Greece, after having completed his studies in Paris. After spending two years in Greece he returned to France. In 1856 he attempted to become an actor, without success. He was especially favored by the court of the Second Empire. After the fall of the Empire he ceased writing fiction and devoted himself to the editorship of Le XIX Siecle. In 1884 he was elected to the Academy, but died before his formal admission. It is generally admitted that had he taken his talents more seriously he could have become a really great writer, but he was by nature flighty and somewhat shallow. Among his many works are: (La Grece contemporaine) (1854); (Le roi des montagnes) (1856) ; (Les manages de Paris) (1856) ; (Trente et quarante) (1858) ; (L’homme a l’oreille cassee *(1861) ; (Le nez du notaire* (1861);

ABRA, a'-bra, a province and a river in the north of Luzon, Philippine Islands. The province contains numerous deposits of placer gold, and

the river gravel is auriferous. Other minerals, such as coal, copper, lead, iron and sulphur, are believed to exist in paying quantities. For its head-hunting tribes, see Igorrote; Philip¬ pines.

ABRABANEL. See Abravanel.

AB'RACADAB'RA, a magic word sup¬ posed to be derived from Abrascas, used as an incantation against inflammation, fevers, or agues, according to the earliest known author- ity Serenus Sammonicus, a Gnostic, and phy¬ sician in the 2d century, to the Emperor Caracalla. In his work ((De Medicina Prae- cepta,** which was admired by the Emperors Geta and Alexander Severus, he prescribes that the word be written in the form of an inverted cone, as shown in the diagram herewith, folded in the form .of a cross, worn on linen as an amulet for nine days, and then before sunrise thrown backward into a stream, flowing east¬ ward. The formula was supposed to make the spirit of the disease gradually loosen its hold upon the patient.

The letters are usually arranged as follows:

ABRACADABRA ABR ACADABR ABRACADAB ABRACADA ABRACAD ABRACA ABRAC ABRA ABR AB A

King, author of ‘ Gnostics and their Remains ’ embodies the idea in the fol¬ lowing easily memorized lines:

“ Thou shalt on paper write the spell divine,

ABRACADABRA called, in many a line :

Each under each in even order place,

But the last letter in each line efface.

As by degrees the elements grow few

Still take away, but fix the residue,

Till at the last one letter stands alone

And the whole dwindles to a tapering cone.

Tie this about the neck with flaxen string:

Mighty the good ’twill to the patient bring.

Its wondrous potency shall guard his head,

And drive disease and death far from his bed.

ABRAHAM or ABRAM, the progenitor of the Hebrews and the Arab Bedouin. After deriving his genealogy through Shem to his father Terah and his brothers Nahor and Ha- ran, the narrative in Gen. xi-xxv proceeds as lollows, — each step in the pilgrimage being bv express direction of Yahwe, to his purpose of founding the Hebrew nation : —

After Haran's death Terah removes with his family from his native Ur of the Chaldees (? Mugheir in southern Babylonia), north to Haran, where he dies. Abram then (at 75) takes his wife Sarai and his nephew Lot, Haran's son, and makes his way north by way of Damascus (stopping to build altars to Yahwe at Shechem and Bethel) to Canaan, where he receives the promise that he shall become the founder of a great nation, and all the families of the earth shall be blessed in him. Being a pastoral nomad, a drouth in Canaan forces him to seek forage in fertile Egypt ; where he passes off Sarai as his sister, in fear that her beauty will lead to his murder to possess her, and she is taken by Pharaoh, who, on discovering the deception, restores her, but orders Abram out of Egypt. Accompanied by Lot, he returns to a former encampment between Bethel and Ai. The clans of the two kinsmen quarrel over the limited pasturage, as usual with nomad tribes, and Abram proposes that each follow his own fortune. Lot, wishing to quit nomad life, chooses the fertile Jordan plain ; Abram pitches his tent among the oak groves of Mamre, close to Hebron, and the previous promise of his posthumous glory is repeated and solemnly covenanted. Lot is captured in a raid of the Babylonian king, with his Syrian and other allies, against his revolted vassals of the Dead Sea and Jordan valleys, including the kings of Sodom and Gomorrah, who are overthrown ; Abram sallies out to his rescue with a band of tribesmen, beats the confederacy and chases them near to Damascus, and not only recovers his nephew but restores the above kings to their thrones, refusing any reward. The property of the childless Abraham is to descend to his trusted servant Eliezer, and Sarai suggests that he avoid this by having a child from a con¬ cubine, a common enough arrangement ; ac¬ cordingly he has Ishmael by Sarai's maid Hagar, at 86. Four years later it is revealed by Yahwe in person to Abraham that he shall have a legitimate son by Sarai, whose name is thenceforth to be Sarah (princess) and his own to be Abraham (father of peoples) ;

the promise is afterward repeated by Yahwe and two angels, wTho visit Abram's tent in human form, the latter going on to destroy Sodom and Gomorrah for their wickedness, and the former staying behind to inform Abram of it. Abram's plea wins a promise of mercy contingent on 10 righteous men being found there, but they are not forthcoming, and only Lot and his family escape. Abram goes to Gerar (Negeb) in southern Palestine, repeats precisely the same performance with the nonagenarian Sarai as before, and the king Abimelech repeats the part of Pharaoh, with the same apologies and re¬ proaches. Isaac is born, Sarah being 90, and Hagar and her boy Ishmael are driven into the desert by Sarah's jealous fears, where Ishmael becomes ancestor of the Bedouin. Isaac is circumcised at eight days old, as a token of Yahwe's covenant with Abraham. Some

time in Isaac's boyhood Abraham is commanded by Yahwe to make a burnt-offering of him, and proceeds to obey, but is spared the sacrifice by Yahwe, who accepts a stray ram instead and blesses him for his faith. Sarah dies in Hebron and is buried in the cave of Machpelah, which Abraham buys of Ephron the Hittite. He later marries Keturah, has six sons by her, dies at 175, and is buried beside Sarah. Isaac has previously married Rebekah. so that the suc¬ cession is assured.

The Jewish stories of Abraham were by no means confined to this account in our canonical book ; they had many others, associating him with Nimrod, etc., which are collected in the Talmud; and the Mohammedans invented or preserved many more. The critical view is that there was a real Abram or Abraham (the tra¬ ditions existing in both forms), with his home at Hebron, probably a considerable man from the number and persistence of the legends about him ; but that this is all wTe know. The names of his brothers and- ancestry are not persons but Arab clans, and their relations and move¬ ments represent what was handed down or believed concerning the North-Arab league that grew into the Hebrew nation, or its original elements. The path of the (and (Early History of the Hebrews, *reverent in tone; Tompkin's (Studies on the Times of Abraham.) Critical commentaries on Genesis are also serviceable. For the rabbin¬ ical legends, the sources — in German — are Beer on the life of Abraham, and Griinbaum on the (Semitic Sagas,* which gives the Mohammedan legends likewise. Consult Commentaries on Genesis by Driver, Gunkel, Dillman, Delitzsch, Holzinger, Strack. Histories of the Hebrews by Stade, Kittel, Guthe, Piepenbring. Also Dhorme, in Revue Biblique (1908) ; Gunkel, (Abraham *in Die Religion in Geschichte und Gegenwart (1908); Proksch, (Das nordhebraische Sagenbuch* (1906) ; Tomkins, (Studies on the Times of Abraham* (London 1878).

ABRAHAM, Ladislas, Polish educator and author: b. Sambor, Galicia, 10 Oct. 1860. He was educated at the universities of Cracow and Berlin; began his career in a solicitor's office in Cracow and in 1886 was appointed lecturer in canon law at the University of Cra¬ cow. Two years later he was appointed pro¬ fessor of canon law in the University of Lem¬ berg, becoming dean of the law faculty in 1895 and rector of the university in 1900. He is director of the Polish scientific expedition of the Academy of Cracow at Rome and mem¬ ber of the Cracow Academy of Science and of

other scientific associations in Austria. He was nominated Austrian crown councillor, knight of the Order of the Iron Crown, and command¬ er of the Papal Order of Saint Gregory. He is a contributor to the (Catholic Encyclo¬ paedia5 and has written numerous treatises and books on canon law and the eccleciastical his¬ tory of Poland and Russia, including Organi¬ zation of the Church in Poland up to the Twelfth Century5 (Lemberg 1893) ; (The Commencement of the Organization of the Roman Church in Russia 5 (ib. 1904), and 'Forms of Engagement and Marriage in Canon Law.5

ABRAHAM A SANCTA CLARA,

a'bra-ham a sank'ta kla'ra, Austrian prior, author and evangelist : b. Kreenheinstetten, 1644; d. Vienna, 1709. He joined the order of barefoot Augustinians in 1662, when he abandoned his real name of Ulrich Megerle. He became the prior of his province, and in 1669 was appointed court preacher at Vienna. Distinguished by exuberant eloquence, in which loftiness and dignity of thought were mingled with grotesque humor, coarse language, puns, slang, and utter fearlessness in attacking the vices of the courtiers and the follies of all classes of society, he attracted crowded con¬ gregations. His self-sacrifice during the plague of 1679 exhibited his qualities as a faithful and devoted priest. He was a prolific author, his didactic novel, (Judas der Erzschelm5 (4 vols., Salzburg, 1686-95), being his best known work. His collected writings were published in 21 volumes (1835-54).

ABRAHAM IBN DAUD (DAVID) HALEVI, ibn' dowd ha'la-ve, Jewish astrono¬ mer, historian and philosopher: b. Toledo, Spain, about 1110; d., according to report a martyr, 1180. He was the first to introduce to Judaism that phase of philosophy which is de¬ rived

from Aristotelian sources, and to his (Emunah Ramah — Sublime Faith,5 Maimon- ides was largely indebted for many valuable suggestions. His chief historical work is ‘Sefer ha-Kababbalah — Book of Tradition,5 translated into Latin by Genebrad (1510).

ABRAHAM, Plains of. See Plains of Abraham.

ABRAHAM THE JEW AND THE MERCHANT THEODORE, a tale which was popular in the Middle Ages, in which figure prominently the miracle-working powers of the Saviour in Constantinople. Theodore, the merchant, being sorely pressed by the need of money, accepts two loans from the Jewish money-lender, Abraham, his only security being the oath he takes before the statue. But diffi¬ culties continue to beset Theodore for some time, and when finally he is able to repay the loans, he finds himself away in a distant country. Unable to find any means of trans¬ mitting the money to Abraham, Theodore casts his money box out into the sea. The currents carry the box to Constantinople where it is recovered by Abraham. When Theodore re¬ turns, however, he denies that he has received it. Theodore prays before the statue in whose presence he took the oath, and the result is that Abraham is converted to Christianity.

ABRAHAMITES. (1) A 9th -century sect pf Syrian deists, denying the divinity of Christ.

(2) In modern use, the Bohemian deists of the later 18th century, who called themselves fol¬ lowers of Huss, but accepted no religious doc¬ trine beyond the unity of God, and nothing of the Bible but the Lord’s Prayer. They avowed this creed in 1782 on Joseph IPs promise of toleration; but as they would join neither Jew¬ ish nor Christian folds, he expelled them from Bohemia the next year and scattered them through Hungary, Transylvania and Slavonia. Many were martyred, others turned Catholic.

ABRAHAMS, Israel, English- Jewish au¬ thor: b. London, 26 Nov. 1858. His early education was in Jews’ College, London, after which he studied in the University of London. After serving for a short period as tutor at Jews’ College, he wras appointed reader in Tal¬ mudic and Rabbinic Literature in Cambridge University. In 1905 he became the president of the Jewish Historical Society of England and he was also the first president of the Union of Jewish Literary Societies. In 1907 he was made honorary president of the Theological Society of the University of Glasgow7. From 1889 to 1908 he was editor of the Jewish Quarterly Review. His published works are: (Aspects of Judaism5 (1895); ‘Jewish Life in the Middle Ages5 (1896) ; (Chapters

on Jewdsh Literature5 (1899); ‘Maimonides5 (1903); festival Studies5 (1905) ; (A Short History of Jewdsh Literature5 (1906) ; ‘Rabbinic Aids to Exe¬ gesis5 (1910); (The Book of Delight and Other Papers5 (1913); (Annotated Hebrew

Prayer Book5 (1914) ; (Jews5 (in Hutchinson’s ‘History of the Nations,5 1915).

ABRAHAM’S BOSOM, an old Hebrew

term, later adopted by the Christians as well, signifying the home of the blessed, symbolized in the art of Byzantium, in which the blessed are pictured as little children being taken into the bosom of Abraham.

ABRAM. See Abraham.

ABRAMS, Albert, American physician: b. San Francisco, Cal., 8 Dec. 1863. After taking his degree of M.D. at Heidelberg Uni¬ versity, in 1882, he continued his post-graduate studies in Vienna, Berlin, London and Paris. In 1893 he was appointed professor of pathol¬ ogy in the Cooper Medical College, in which position he continued for five years. In 1904 he became president of the Emmanuel Poly¬ clinic in San Francisco. He is now president of the American Society for Psycho-Physical Research. Among his important works are : ‘Synopsis of Morbid Renal Secretions5 (1892) ; ‘ Manual of Clinical Diagnosis5 (1894) ; Con¬ sumption — Its Causes and Prevention5 (1895) ; ‘Scattered Leaves from a Physician’s Diary5 (1900); ‘Diseases of the Heart5 (1901); ‘Nervous Breakdown5 (1901) ; ‘Hygiene, in a System of Physiologic Therapeutics5 (1901) ; ‘The Blues5 (1904); ‘Diseases of the Lungs5 (1905); ‘Self-Poisoning; Diagnostic Thera¬ peutics5 (1909); ‘Spinal Therapeutics5 (1909); ‘Spondylotherapy5 (1910).

ABRANTES, a-bran'tesh, Portugal, a town of Santarem district, Estremadura; on the Tagus, and a junction on the Madrid-Lisbon Railway wdth the Guarda-Abrantes line, 70 miles northeast of Lisbon. It is a strategic fortified position, founded about 300 b.c., and named by the Romans, Aurantes. An active

river trade is carried on in olive oil, wine, grain and fruit. Abrantes was occupied by the French, 24 Nov. 1807, Marshal Junot the victor later receiving the title of Duke of Abrantes. Pop. 7,000.

ABRASIVES, or those substances used in grinding or polishing, include (1) mineral sub¬ stances, such as grindstones, millstones and whetstones, which are used by simply shaping up the material found in nature; (2) mineral substances which occur disseminated in the rocks or which must first be freed from im¬ purities and are prepared for use by an initial granulation; (3) artificial abradants. The his¬ tory of abrasives shows that in ancient times the first class was used, the artificial abrasives now so extensively employed being unknown until quite recently.

Grindstones are manufactured from a tough, gritty sandstone, found chiefly in Ohio, though Michigan, Colorado and West Virginia add to the output, and England, Scotland and Bavaria are also producers. The Ohio and Michigan stones are quarried from the Berea grit (q.v.) of Mississippian age. The production of grind¬ stones in the United States in 1915 amounted to $648,479. Millstones and Bulirstones are far less used now than before the introduction of the roller process of making flour, for while the American production in 1880 amounted to $200,- 000 it fell in 1894 to $13,887. Since 1894 it has steadily increased till in 1912 it was $71,414. The 1915 output was valued at $53,480. This is owing to the increased demand for buhr- stones for grinding the coarser cereals, fertiliz¬ ers, cement rock and various minerals. Mill¬ stones are finer grained and more compact than grindstones. They are usually made from sand¬ stone or a quartz conglomerate. The buhrstone (q.v.) from France is the best, but the stones from New York and Virginia meet most of the requirements of the trade. A few are made in Pennsylvania and Ndrth Carolina. There are buhrstone deposits in Vermont, Ohio and Ala¬ bama which have not been worked of late years ; also a newly discovered deposit in Cali¬ fornia of stone equal to the French. The New York stones come from the Shawangunk grit of Silurian age.

Oilstones, Whetstones and Scythestones are to a large extent American products. For nearly a century New Hampshire was the head¬ quarters of the whetstone industry, but Ar¬ kansas has held the lead for some years. Whet¬ stone rock is also found in Vermont, Ohio, Kentucky, Pennsylvania and Indiana. The best oilstones from New Hampshire are inferior to those of Garland County, Ark., in which region there are extensive beds of a remarkably compact, white, Paleozoic quartz rock, called Novaculite. Griswold in 1890 announced that this material is a sedimentary deposit of fine¬ grained quartz and not a chemically precipitated deposit as had been previously supposed. The quarries were largely worked for implements in prehistoric times and since 1840 they have yielded the finest oilstones known. These are sold under the names of “Washita®1 and

“Arkansas® oilstones. The production of oil¬ stones and whetstones in the United States dur¬ ing 1915 amounted to $115,175. The imports, chiefly of razor hones from Belgium and Ger¬ many, and of “Turkey® oilstones from Italy vol. l — 4

and France amounted to $14,247 — about one- third the normal value. Ohio leads in the pro¬ duction of scythestones, New Hampshire, Ver¬ mont and Michigan contributing important shares.

Pumice (q.v.), a spongy lava, or a volcanic ash, is used in scouring powders and soaps. It comes chiefly from the Lipari Islands, but is also produced in Utah and Nebraska. The pro¬ duction of the United States in 1915 was valued at $63,185; the imported pumice at $65,691. Infusorial or diatomaceous earth (Kieselguhr) occurs in beds often miles in extent. It is formed of the siliceous shells of infusoria and diatoms, and is used in scouring soaps and polishing powders. The chief American lo¬ calities are in Maryland, Virginia, New Hamp¬ shire and California. The United States pro¬ duction for 1915 was 4,593 tons, valued at $38,517; but these figures cover not only that used as abrasive, but also a much larger quan¬ tity used by sugar refiners and to insulate boilers, etc. Tripoli is a similar variety of opal, but formed from a siliceous limestone by the leaching out of the calcium carbonate. Its use as an abrasive is as a polishing powder for metals, etc., but it is also extensively manu¬ factured into 'filters, for which it is admirably adapted. Extensive deposits are worked at Seneca, Mo., and in Illinois, but the chief supply is imported from Tripoli. The United States production for 1915 was 30,711 tons, valued at $572,504 — four times the output in 1911. The 1915 importation of tripoli was valued at $27,333. Crystalline quartz, of which 112,575 tons were mined in Connecticut and Pennsylvania in 1915, is used as a wood finisher, in the manufacture of sandpaper, in the sawing of marble, for cleaning castings, etc. Garnet (q.v.) occurs in many of the crystalline rocks, especially in pegmatite and mica schist. Many varieties are recognized b}r the mineralo¬ gist ; but the value of garnet as an abrasive, aside from its great hardness, is dependent not on its composition, but on its structure. If this is distinctly lamellar the material will con¬ tinually present the sharp edges which are so essential to a good abrasive. Garnet which lacks this lamellar structure is of comparatively little efficiency for grinding and smoothing. Garnet is of little value for grinding metals but is of great utility in woodworking. Its low melting point prevents its bonding with refrac¬ tory materials. Garnet-paper is much superior to sandpaper and is extensively used in wood¬ working and finishing the soles and heels of shoes. The most important localities are in New York and New Hampshire. The output for 1915 amounted to 4,301 tons, valued at

$139,584. Corundum (q.v.), being the hardest mineral known, except the diamond, ranks next to it among the natural abrasives. It occurs in enormous quantities in Ontario, which since 1901 has been the leading producer. It was at one time extensively mined in Montana, North Carolina and Georgia which furnished nearly all of the domestic supply, but since 1906 no corundum has been produced in the United States. Small quantities of corundum are pro¬ duced in India which go chiefly to the English market. The chief deposits of corundum are of magmatic segregation origin, having solidified from a fluid state during the crystalli¬ zation of very basic igneous rocks. The value

of any sample of corundum depends largely upon its fracture, the crystals which break smooth being of very 'limited use. Emery (q.v.) is a natural mixture of corundum with magnetite or hematite. It has been largely mined at Chester, Mass., and Peekskill, N. Y., but the Massachusetts mines have not been operated of late years. The chief supply, however, comes from the Island of Naxos, Greece, and from Asia Minor. The material is brought to this country as ballast and owing to the low prices at which it is marketed, the sale for the American mineral is much reduced. The United States production for 1915 was 3,063 tons valued at $31,131 — five times the usual output. The Canadian output of corun¬ dum in 1915 was $37,798 — about one-sixth the usual production. The importation of emery and corundum was valued at $271,649 — about 55 per cent of the average. Diamond (q.v.), owing to its far greater hardness, brings many times the price per carat which any other abrasive brings per pound. The black amor¬ phous ((carbonado® found in Brazil is much harder than the crystallized diamond, but it is almost exclusively used for diamond drills, while the dust of the South African ((bort® is the material commonly employed as an abrasive in the cutting of diamonds and other precious stones. In 1915 the importation was valued at $75,944. A large division of natural grinding material in the form of quartz pebbles may properly be included under abrasives. For¬ merly imported altogether, from Denmark, France, Sweden, Labrador and Newfoundland, the war cut off the supply and led to a develop¬ ment of American deposits, chiefly in Nevada, though in many instances hardened steel balls have been found an effective substitute.

Artificial abrasives belong to two principal groups: (1) The aluminous group, comprising alundum and aloxite ; and (2) the silicon-car¬ bide

group, comprising carborundum and crys- tolon. Alundum is crystalline aluminum oxide and is the most efficient of all abrasives for steel. The possibility of determining the de¬ gree of toughness in the manufacture of this substance leads to a line of special alundum abrasives made purposely for grinding special hardened and toughened steels. Aloxite is of the same general composition as alundum, but with different qualities and adaptations. Its specific use is on malleable iron. Carbide of silicon, called in the United States ((carborun- dum,® is the hardest of all abrasives but lacks the toughness of alundum. It is so hard that carborundum wheels have to be trued up with a diamond ; no other known substance will cut them. Carborundum is the most effective abrasive for cast iron, chilled iron and brass. Crystolon is a very similar carbide, useful especially on copper, zinc, gold, tin and alu¬ minum. Electrite is a still newer abrasive, with a composition between alundum and carborun¬ dum. It is extremely tough, and amorphous in structure, breaking with a sharp fracture, which is durable under heavy work. The pro¬ duction of artificial abrasives in the Unit d States in 1915 amounted to 37,684,000 pounds, valued at $2,248,778. Abrasives are graded by the size of their fragments. After being crushed, the material is sifted through a series of screens, the number of the smallest screen through which the fragments will pass being

given them. For mechanical use abrasives are commonly mixed with a bonding material and formed into wheels. These bonds are of four varieties, — vitrified, silicate, elastic and hard rubber. The first is made of fused clays, and can be produced of varying degrees of hard¬ ness. This bond does not completely envelop the grains of the abrasive, and thus affords a larger clearance than the other bonds. How¬ ever, it is entirely without elasticity. The sili¬ cate bond is of clay fluxed with sodium silicate at a low temperature. It is affected by damp¬ ness and cannot be made into a thin wheel. The elastic bond is made of shellac and other resins. It has a high degree of elasticity and can be formed into very thin wheels. The rubber bond is of vulcanite, also very elastic. By adapting the bond and the abrasive to the work to be done, almost any desired result may be attained. Another thing to be consid¬ ered is the speed at which the wheel is to be run. With the artificial abrasives a piece of work may be done in a fraction of the time required by the best emery. It is common practice for an alundum wheel to deliver 400,- 000,000 cutting strokes per minute, and twice that speed is not unusual. On special work the speed is sometimes equal to 2,000,000,000 cuts per minute. Crushed steel is extensively used in sawing, grinding, rubbing and polish¬ ing granite, marble and other stone. The finer grades of this abrasive, known as

<(steel emery® and (<steel rouge,® are used for working glass. See special articles under the names of the different abrasives for further particulars. Consult Haenig, A., Ornery and the Emery Industry) (London 1912) ; Grits and Grinds (monthly, Worcester Mass.) ; United States Geological Survey, (Mineral Resources of the United States5 (chapter (< Abrasives® annually) ; Ries, H., (Economic Geology5 (4th ed., New York 1916).

ABRAVANEL, a-bra'va-nel, Isaac ben Jehuda, Jewish statesman and Bible commen¬ tator: b. Lisbon, 1437; d. Venice, 1508. He was the son of the Portuguese treasurer, Dom Judah, and came of an old and distinguished family which traces its origin from King David. He became treasurer to King Alfonso V of Portugal ; was banished on the King's death ; retrieved his fortunes in Spain where he gained royal favor ; was ruined again on the decree of expulsion banishing all Jews in 1492; went to Naples where he again achieved high rank; lost all his possessions when the French took the city in 1495; and finally settled in Venice where he negotiated a commercial treaty between Portugal and the Venetian Republic. Flis fame rests on his sound scholarship and exegetic Avritings, illuminated by a clear and keen mind. The chief of these are (Sources of Salvation5 (1496); (Salvation of His Anointed5 (1497); Proclaiming Salvation5 (1498), which at¬ tracted the attention of eminent Christian writers, among them the younger Buxtorf, Bud- deus and Carpzov, who condensed and trans¬ lated them, and introduced them to the world of Christian scholarship.

ABRAX'AS, or ABRAXAX, a word used by the Basilidians, a sect of Christians who ex¬ isted until the 4th century, to designate the many emanations from the Supreme Power. When the word is written in Greek letters, these

letters, computed numerically, have the value of 365, the mystic number so often inscribed on the stones in the Gnostic schools of the Basilidians, indicating the worlds, or spheres, that constituted the Gnostic universe. These stones are cut in various forms and bear a variety of capricious symbols, mostly com¬ posed of human limbs, a fowl's head and a snake's body. . The word itself the Basilidians did not apply to the highest Deity but to the spirits of the world collectively. Gnostic symbols were afterward adopted by all sects

given to magic and alchemy, therefore there is little doubt that most of the abraxas stones in collections were made in the middle ages as talismans. Consult Barzilai's cGli Abraxas* (Trieste 1873) ; King's (The Gnostics and Their Remains * (London 1887) ; Kraus' (Real Encyklopadie der christlichen Altertiimer> (Freiburg 1882-86) ; Dieterich's (Abraxas Studien) (Leipzig 1891) ; Schultz's (Docu- mente der Gnosis) (Jena 1910).

ABRUZZI, Duke of the, Prince Luigi Amadeo Giuseppe Maria Ferdinando Fran¬ cesco, Italian admiral, mountaineer and Arctic explorer: b. Madrid, 29 Jan. 1873. He is the third son of the late Prince Amadeo, Duke of Aosta, and a first cousin of King Victor Em¬ manuel III. His two elder brothers, the Duke of Aosta and the Count of Turin, are generals in the Italian army. He was educated at the naval school at Leghorn and rose in the service by his own merits and industry. Being of daring and adventurous disposition, he found an outlet for his energies first, in 1897, by climbing Mount St. Elias, Alaska, the highest peak in the Rockies, 18,000 feet. On 12 June 1899 he sailed from Christiania on the Stella Polar e in command of a North Pole expedi¬ tion. He spent one winter in Teplitz Bay, Rudolf Land, but on account of serious dam¬ age to his ship he was compelled to return be¬ fore he could accomplish his aims. He had intended to reach the Pole by a series of sledge expeditions, one of which, commanded by one of his officers, Captain Cagni, started on 11 March 1900 from the base, and on 25 April reached 86° 33' 49" N., beating Nansen's pre¬ vious record. They returned in September. The Duke himself was too severely frostbitten to travel the whole distance, yet the result of his expedition was to establish the outlines of the northern coasts of Franz- Josef Land and the non-existence of Petermann Land. In 1906 he conducted an expedition into Equa¬ torial Africa where he succeeded in climbing the highest peak of Mount Ruwenzori, 16,600 feet high, never before, so far as is known, touched by human foot. Three years later he established another record by climbing Mount Austen, in India, to a height of over 24,000 feet. In the Tripolitan war the Duke com¬ manded a squadron operating in the Mediter¬ ranean and Adriatic. In August 1914 he was appointed commander-in-chief of the Italian navy and when, in May 1915, his country en- entered the European YVar, he co-operated with the Allied admirals in maintaining command of the southern waters.

ABRUZZI E MOLISE, a-broot'se a mo'- le-za, department in Central Italy, composed of the provinces of Teramo, Chieti, Aquila and Campobasso, comprising an area of 6,380 square

miles between the Apennines and the Adriatic Sea. The country is

extremely mountainous and includes the higher portions of the Apen¬ nines, the elevation in one portion reaching 9,584 feet above sea level. Cattle and swine form an important part of the produce, but in the smaller valleys nestling in among the mountain forests there are many olive or¬ chards, vineyards and grain fields. Here, too, the silk worm is reared and silk is one of the important products. The population is about

1,500,000.

ABSALOM, third son of King David (2 Sam. xiii-xv, xviii; 1 Chron. iii, 2). He re¬ venged his brother Amnon's outrage of his sister Tamar by killing him, and was banished from his father's court for five years. The grudging readmittance probably left him feel¬ ing insecure ; he cleverly ingratiated himself with the people, and by aid of the shrewd Ahithophel organized a rebellion against his father, which took David unaware and forced him to fly east of the Jordan with a small fol¬ lowing, while Absalom gained possession of Jerusalem and the court. With this enormous de facto advantage he might easily have main¬ tained his seat ; but according to the story, one Hushai, pretending to desert David, ingratiated himself with Absalom, and by cunning and flattery persuaded him to a policy of delay, while Ahithophel urged him to strike quick and hard, the obviously sensible course. David with this breathing-space collected an army; his veteran captain Joab, gray in victories and blood, routed Absalom's forces in ((the wood of Ephraim** ; and on report that Absalom had been caught by his long hair in the branches he was riding under, and refusal of the mes¬ senger to lay hands on the king's son, Joab himself dispatched him with his spear (about 980 b.c.) . David could not have suffered the rebel to live ; but the statement that he held a grudge against Joab for killing him and or¬ dered public mourning for his son has noth¬ ing intrinsically improbable in it. Absalom is represented as a very handsome and charming prince and the chronicler plainly has much sympathy with him.

ABSALON, ab'sa-lon, Danish prelate, statesman and military commander: b. 1128; d. 1201 ; the great historic figure who con¬ tributed most to Denmark's rise as an inde¬ pendent nation. He was educated at the Uni¬ versity of Paris; became bishop of Proskilde in 1158 and chief counsellor to his boyhood friend, King Valdemar I. In 1168 he rooted out piracy in the Baltic and idolatry in Riigen. In 1184 he destroyed the Pomeranian fleet which had attacked Riigen. He had previously been ap¬ pointed archbishop of Lund in 1178.

ABSCESS, a local focus of infection by some bacterium which has

progressed to the point of formation of pus. which is a collection of broken-down blood cells and of the tissue in which the abscess may occur. As a rule the infecting agent is brought to the tissues by the blood or lymph stream. Abscesses may occur in any tissue or organ of the body. The usual micro-organisms of acute abscesses are various streptococci and staphylococci. Chronic or cold abscesses are chiefly tubercu¬ lous in origin. Abscesses are always best

treated surgically. The old-fashioned way of letting an abscess ((come to a head® is more dangerous, time-consuming and usually dis¬ figuring. Dispersing an abscess is a delusion.

ABSCHATZ, ap'shats, Hans Assmann,

Freiherr von, poet: b. Wurbitz, 4 Feb. 1646 ; d. Liegnitz, 22 April 1699. A lyric poet of his day, whose poems were in great part called forth by his indignation at the predatory wars of the French. They are simple and without bombast, and show sincere feeling, pure senti¬ ment and a sturdy, patriotic mind entirely free from class prejudices. His (Poems and Trans¬ lations } (1704) include a German translation of Guarini's (Pastor FidoP Selections from them were edited by W. Muller in 1824.

ABSECON, or ABSECUM, a bay and an

inlet on the coast of New Jersey, northeast of Atlantic City.

ABSCONDING, the going clandestinely or secretly out of the jurisdiction of the courts, or hung concealed, in order to avoid their process. A person who has been in a State only transiently or has come into it with¬ out any intention of settling therein cannot be treated as an absconding debtor (15 Johns. N. Y. 196), nor can one who openly changes his residence (3 Yerg. Tenn. 414). It is not neces¬ sary that the debtor should actually leave the State.

ABSENTEEISM, a term applied to the owners of estates in a country who habitually absent themselves from that country and spend the income of their estates in it in another ; in current use, referring almost wholly to the Irish nobility whose fixed residence is outside of Ireland. Much of the poverty and many of the disturbances in Ireland have been charged directly to it, and the Irish people have protested against it since 1380. While an Irish Parliament existed, there seemed

hope for its gradual dwindling, careers being open for ambitious men in Ireland; but with its abolition the evil is almost incurable. Plungary suffered heavily from the same cause — its aristocracy looking on their native country's language and life as badges of barbarism, priding themselves on being Germans and liv¬ ing in Vienna — till the great national move¬ ment set going by Szechenyi and his com¬ panions early in the 19th century. Despite the defense of the system by some economists and the good theoretical arguments that may be made for it, in practice its economic, social, personal and political mischiefs are obvious. Not only is the absent landowner and property-owner, collecting his rents b}' agents, inaccess¬ ible to complaints, representations, appeals for help in upbuilding local institutions, etc., and unwilling to acknowledge rackrenting he does not personally see to be such (even a generous and kindly agent dares not be as lenient as he would, in fear of his master) ; but he should be the leader of his section, the fountain of careers, furnishing it employment, having his own success depend on its prosperity, and the active defender of its interests and rights and susceptibilities. The estate of an absentee owner, in fact, is essentiallv like a colony in the old conception, — a mine to exploit for out¬ siders who cared nothing for it ; but the colo¬ nists of a distant province have a collective

power much greater than that of the tenants of an absent landlord. Furthermore, it makes social co-operation for general needs almost impossible. The literature on this subject is nearly coincident with that of the Irish ques¬ tion as a whole ; and the debates in Hansard's Parliamentary Reports } abound in its discus¬ sion.

AB'SIMA'RUS, a soldier of fortune who raised, against the Byzantine emperor Leon¬ tius, an army which proclaimed him emperor, a.d. 698. He slit Leontius' ears and nose and threw' him into a convent. He was taken in 705 by Justinian II, who, after having used him as a footstool at the hippodrome, ordered him to be beheaded.

ABSINTFIE, ab'sinth, a drink prepared from alcohol, the active principle of Artemisia absinthium, and other aromatics, notably the volatile oil of anise. Its frequent and pro¬ longed use leads to a diseased condition known as absinthism that is a product of chronic alco¬ holism to which the effects of the volatile oil of Absinthium are added. Other volatile oils probably contribute somewhat to the general result. Absinthism, in the main, is character¬ ized by a greater amount of affection of the brain than is simple alcoholism. The action of the volatile oils is to heighten cerebral ex¬ citement, and absinthe-mania is a frequent re¬ sult of this form of intoxication. On 15 Jan. 1915 its sale was forbidden in France during the duration of the Great

War. See Wormwood.

ABSIT OMEN (Lat. may the omen be absent); God forbid!

ABSOLOM AND ACHITOPHEL. Do-

den's (Absolom and AchitopheV perhaps the greatest verse-satire in English, was the direct outgrowth of political conditions. The Popish Plot of 1678-79, followed by the rebellion of Monmouth, illegitimate son of Charles II, against his father, had disorganized the king¬ dom ; and the Exclusion Bill, which provided that the succession of James, Duke of York, brother to the king, and a Catholic, should be set aside in favor of the King's Protestant suc¬ cessors, was again being fiercely debated in Parliament. The fate of the bill was still in doubt ; Monmouth, though outwardly recon¬ ciled to the King, might again rebel ; Shafts- bury, implacable enemy of James and instiga¬ tor of Monmouth's rebellion, though being tried for high treason, might yet be acquitted and live to do further mischief. Amid such conditions, in 1681, Dryden, as poet laureate, was called upon to defend the throne. He answered with a satire that for brilliant char¬ acterization, cogent political reasoning, and mastery of form, has at least never been sur¬ passed in English. His object was to expose the characters and motives of the King's oppo¬ nents and to exhibit Monmouth as their dupe; and by so doing to kill the Exclusion Bill and confirm James in his succession to the throne. Taking a part of the story of Absolom's re¬ bellion against his father David (2 Samuel, xv-xviii), he ingeniously adapts it to contem¬ porary characters and conditions. The story of (Absolom and AchitooheP is slight and un¬ important, but for this defect the characteriza¬ tion and political reasoning amply atone. The characters are not merely impersonal types, nor, unlike most of Pope's, are they too sharply

individualized. Furthermore, they seemingly are drawn without personal animus ; the satirist has the air of pronouncing judgment like an Olympian. The portraits of Achitophel (Shaftsbury), Zimri (Buckingham), Shemei (Slingsby Bethel), deserve the place that they have for two centuries occupied in the picture gallery of great satire. Scarcely less remark¬ able is the cogent political philosophy of v the poem, which mingles the specious with the pro¬ found. In the mouth of Achitophel, whose reasoning he seems to condemn, the poet puts arguments that are now generally accepted as valid by the greater part

of mankind. It is hard to tell just what Dryden really believed. The verse show's mastery of that heroic couplet which Dryden perfected and which is, all things considered, the best vehicle that English satire has discovered. Each couplet, its sense condensed to the last degree, is at the same time ((a slap in the face and a stride forwards towrard the goal.® With such qualities, added to its timeliness, (Absolom and Achitophel } gained immediate and universal popularity and made literature for the first time in England a power in politics. Although the many re¬ plies which it evoked are long since forgotten, it remains great literature in spite of the fact that its political issues are dead and that the world in general has come around to Achito- phel's point of view. A second part of (Ab- solom and Achitophel > was written by Nahum Tate. To this Dryden contributed only 200 lines (310-509) of satire on the poets Shad- well and Settle, which are in his best vein and which form the only readable portion of the poem.

Marion Tucker,

Professor of English Literature , Polytechnic

Institute of Brooklyn.

ABSOLUTE, opposed to relative; means that the thing is considered in itself and with¬ out reference to other things.

In Logic.- — (1) Absolute or non-connotative, according to Whately, is opposed to attributive or connotative. The former does not take note of an attribute connected with the object, which the latter does. Thus "Rome® and "sky® are absolute terms ; but "Rome, the capital of Italy,® and <(our sky® are attributive or con¬ notative. (Consult Whately <Logic,) bk. ii, ch. v, §§ 1, 2-5). (2) According to J.' S. Mill, it

is incorrect to regard non-connotative and ab¬ solute as synonymous terms. He considers absolute to mean non-relative and to be op¬ posed to relative. It implies that the object is to be considered as a whole, without refer¬ ence to anything of which it is a part or to any other object distinguished from it. Thus "man® is an absolute term, but "father® is not, for father implies the existence of sons and is therefore relative. (J. S. Mill's (Logic,) bk. i, ch. ii).

In Grammar, a case absolute is one consist¬ ing essentially of a substantive and a participle, which form a clause not agreeing with or gov¬ erned by any word in the remainder of the sentence. In Greek the absolute case is the genitive ; in Latin the ablative ; in English it is

considered to be the nominative. In Latin the words sole stante in the expression sole stante terra vertitur (the earth turns round, the sun standing still — that is, while the sun is stand¬ ing still) are in the ablative absolute. In Eng¬

lish, thou leading, in the following familiar quotation —

“ I shall not lag behind, nor err The way, thou leading — ” (Milton)

is in the nominative absolute. So also is I rapt in the line —

“And, I all rapt in this, ‘ Corne out,’ he said.”

— Tennyson’s ‘ Princess,’ Prol. So.

In Law. — (1) Personal rights are divided into absolute and relative — absolute, which pertain to men as individuals ; and relative, which are incident to them as members of so¬ ciety, standing in various relations to each other. The three chief rights of an absolute kind are the right of personal security, the right of personal liberty and the right of pri¬ vate property. (Blackstone’s Commentaries/ bk. i, ch. i). Similarly there are absolute and relative duties. Public sobriety is a relative duty, while sobriety, even when no human eye is looking on, is an absolute duty. (Ibid.). Property in a man’s possession is described under two categories, absolute and qualified property. His chairs, tables, spoons, horses, cows, etc., are his absolute property, while the term “qualified property® is applied to the wild animals on his estate. (2) An absolute decision is one which can at once be enforced. It is opposed to a rule nisi, which cannot be acted on until cause be shown, unless, indeed, the opposite part)' fail to appear. (3) Absolute law : The true and proper law of nature. (4) Absolute warrandice (Scotch conveyancing) : A warranting or assuring against all mankind.

In Physics, absolute is opposed to relative. As this relativity may be of many kinds, various shades of meaning arise ; thus : —

(1) Absolute or real expansion of a liquid, as opposed to its apparent expansion, the ex¬ pansion which would arise when the liquid is heated if the vessel containing it did not itself expand. (2) Absolute gravity is the gravity of a body viewed apart from all modifying in¬ fluences, as, for instance, of the atmosphere. To ascertain its amount, therefore, the body must be weighed in vacuo. (3) Absolute mo¬ tion is the change of place on a body produced by the motion so designated, viewed apart from the modifying influence arising from disturb¬ ing elements of another kind. (4) Absolute force exercised by a centre of force ; strength of a centre. (5) Absolute zero is that

temper¬ ature at which bodies are absolutely devoid of

heat. It is situated at- 273.10 C. Absolute tem-

n

perature is temperature measured in centigrade units from absolute zero. See Thermodynam¬ ics; Zero.

In Astronomy, the absolute equation is the aggregate of the optic and eccentric equations.

In Algebra, (x), the absolute value of x, is x if x is real and positive, — x if x is real and

negative, and + Va2 + b2 if x is a complex number of the form a ~h ib, where a and b arc real.

In Geometry, the absolute is the region of a projective space which becomes the points at infinity when a Euclidean or non-Euclidean space is constructed from the elements of the projective space. In a Euclidean plane, as a locus, the absolute is a line, and as an envelope a pair of points on the line. In a non-Euclidean plane it is a conic.

In Ethics , absolute ethics are those that are based on a fixed standard, independent of time and of society.

In Metaphysics and Theology, the absolute is a being, often identified with God, which is (a) unrelated, (b) immediately presented to our consciousness and (c) all-inclusive. An unrelated being cannot of course be the subject of the cognitive relation, so that if known it must be known in a manner involving no re¬ latedness. This is why the absolute is supposed to be known immediately. This conception of knowledge without relation is one which it is very difficult to maintain consistently, and al¬ most inevitably leads the absolutist (as the adherent of the doctrine of the absolute is known), to one or the other of the many forms of mysticism. It must be supposed that the mind in some way becomes the absolute by vir¬ tue of its act of knowledge. Furthermore, the third property of the absolute, that of being all- inclusive, follows directly from its unrelated¬ ness. However, the desire for a finished philo¬ sophical system which contains an all-inclusive whole is probably one of the chief motives

leading to the selection of an absolutistic stand¬ point. Consult Spinoza's (Ethics, } Bradley's <Logic,) or Bosanquet's for expres¬ sions of the absolutistic standpoint.

Absolute Space and Time are space and time viewed apart from their contents. Absolute rest is rest which possesses some intrinsic cri¬ terion that differentiates it from motion. The absolute position of a body is its position with reference to a set of axes at absolute rest. Ab¬ solute motion and velocity are motion and velocity with reference to a body at absolute rest.

ABSOLUTE, Sir Anthony, a character in (The Rivals, } a comedy by R. B. Sheridan. He is a hot-headed, fiery-tempered, generous old man, always in a towering passion, even while he commends his own mildness of manner. His son, Captain Absolute, is the hero of the play.

ABSOLUTE MONARCHY. See Mon¬

archy.

ABSOLUTE PERMISSIVE BLOCK SYSTEM. See Block Signal System.

ABSOLUTION, in ecclesiastical usage, the freeing from sin or its penalties. In the Cath¬ olic Church absolution has two important and distinctive bearings: (1) Absolution from sin; (2) Absolution from censures. The first is defined as the remission of sin, and can only be given by a duly ordained priest in the Sacra¬ ment of Penance, which requires, on the part of the penitent, a sincere confession of all his sins, contrition and a firm purpose of amend¬ ment. The basis of the doctrine is the authority of the Church and the commission in John xx, 23. In circumstances, where the conditions of the Sacrament of Penance cannot be fulfilled, as in severe illness when the penitent is too weak to speak, or in instant danger of death, conditional absolution may be given on the ground of the moral conviction of the penitent's virtual desire to comply with all the necessary conditions. The Councils of Florence and of Trent defined the form of words to be used: <(I absolve thee from thy sins, etc:* In the Greek or Eastern Church the deprecatory form is used: (<May Christ absolve thee, etc.® Absolu¬

tion from censures merely removes penalties imposed by the Church. It may be given either in the Sacrament of Penance, or in the external form, that is, in the courts of the Church. It is not necessary for the person to be absolved from censures to be present or even living. Absolution for the dead is a short prayer im¬ ploring eternal rest and

the remission of the temporal penalties of sin over a dead body. In the Protestant Churches in general absolution is simply a declarative power of the minister imploring the divine forgiveness. Consult ‘Decrees of Council of Trent) ; Denys de St. Marthe, (Traite de la Confession.)

ABSOLUTISM. A term used in political science to denote that system of government wherein the supreme power is vested in a single authority — individual or collective — unchecked by any constitution or laws. Since absolute power may be exercised under a mon¬ archy, an aristocracy or even a democracy, the term, strictly speaking, does not apply to any particular form of government, though it is usually employed in describing monarchies, as they furnish the most numerous examples of absolutism. United sovereignty is an essential condition of absolutism, since the distribution of the functions of government places that government under restraints. Absolutism char¬ acterized all ancient monarchies and has pre¬ vailed in all Oriental monarchies, down to Japan of a few years ago. When the barbar¬ ians overran western Europe feudalism replaced the absolute monarchy, but the growth of towns and the rise of commercial classes made neces¬ sary a strongly centralized government to pro¬ tect the nation against the feudalistic lords, and the absolute monarch again came into power, uniting in himself the various functions of national life, both political and religious. The Tudors and Stuarts in England, Frederick the Great of Prussia, and Louis XIV of France, with his famous assertion ((L’etat c’est moi® (((I am the State®) are examples of absolute monarchs, though their absolutism was mainly limited to the central government. There are no absolute monarchies in Europe and since 1908, when the government of Turkey was over¬ thrown and a constitution adopted later, the term has not been applicable even to the Otto¬ man Empire’.

The most common method of checking abso¬ lutism is to separate the governmental functions. The legislative functions in most states of western Europe and England are exercised by two chambers ; in the United States the national and state governments share the powers of sovereignty itself, while in each of these govern¬ ments the authority is again divided among the legislative, executive and judicial departments. The written constitution or fundamental law made by the people or their representatives is another method of preventing absolutism, since the fundamental purpose of a written consti¬ tution is not only to lay down a general plan of government but also to regulate the powers and conduct of those who govern. From the standpoint of the citizen or subject no govern¬ ment, whatever its nature or form, can hold absolute sway in the multitudinous

ramifications of human activity, since, being political in char¬ acter, absolutism is subject to the limitations of human nature and is limited by local govern¬ ment, and, in some countries, by common law ;

by international law which restrains sovereign states from acts prejudicial to the interests or injurious to the coexistence of the various states ; and by the church, the religious author¬ ity of which is usually independent of the state. (See Monarchy; Feudal System; Despot). Consult Brougham, H. P., (Political Philosophy * (1842-46) ; Baldwin, S. E., (Modern Political Institutions) (1898) ; Lieber, F., (Civil Liberty) (3d ed,, 1891).

ABSORPTION, in chemistry, absorption is the taking up of a gas by a liquid or by a porous solid ; and in natural philosophy it is the taking up of rays of light and heat by certain bodies through which they are passing. Absorp¬ tion of light is the retention of some rays and the reflection of others when they pass into an imperfectly transparent body. If all were absorbed, the body would be black; if none, it would be white ; but when some rays are absorbed, and others reflected, the body is then of one of the bright and lively colors.

In chemistry the coefficient of absorption of a gas is the volume of the gas reduced to 0° Cent, and 760 m.m. pressure, which is absorbed by the unit of volume of any liquid.

Absorption of heat is the retention and con¬ sequent disappearance of rays of heat in passing into or through a body colder than themselves.

Absorption of the earth is a term used by Kircher and others for the subsidence of tracts of land produced by earthquakes.

In physiology absorption consists of a series of complicated processes by which the neces¬ sary constituents of the body are taken in at certain parts to be distributed to the places of need. The chief substances are water and salts, mainly absorbed in the small intestines ; fats, chiefly taken in the cells of the intestinal mucosa after a complicated series of chemical changes ; carbohydrates chiefly absorbed at vari¬ ous parts of the intestinal canal after conver¬ sion into monosaccharids and proteins which are chiefly taken up by the bloodvessels after pass¬ ing through the epithelial cells of the intestinal mucosa as peptones, proteoses, or amino-acids. Proteids are not absorbed in the stomach. (See Digestion ; Gases, General

Properties of ; Light; Occlusion; Spectroscopy). Consult Bayliss, Principles of General Physiology > ; Starling, (Human Physiology.)

ABSTRACT OF TITLE, a synopsis, or brief statement, of the evidences of ownership of real estate. An abstract should set forth briefly but clearly every deed, will or other- instrument, together with every fact relating in any way to the title, in order to enable the party in interest to form an opinion as to the exact state of the title. The vendor of land, in England, usually furnishes the purchaser with an abstract of title. The vendor is not compelled to furnish an abstract of title in the United States. He usuallv undertakes to give only a marketable title. Plans and sketches of the premises are generally inserted in abstracts of title.

ABSTRACTION. In logic, the formation of a general concept on the basis of individual entities exemplifying the concept, or of con¬ cepts of greater intensity and less extensity. The word is also used to refer to the concept thus formed. For example, when I single out the redness of an apple and recognize it as

a separate quality, I am abstracting from the size, taste, smell, etc., of the apple. While the relation of the abstracted concept to the concept irorn which it is abstracted is altogether a logical one, our tendency to make abstraction is greatly enhanced by our innate psychological tendency to attend to certain striking portions of a sense-datum, while the less impressive aspects of the datum are only vaguely and blurredly noticed. This process of abstraction for the child begins in his noticing differences in familiar objects. Within certain groups some differences are found to be unimportant. These qualities which are found to be of less importance are then abstracted or removed from the complex idea for which the word denoting this group of objects stands. As this process develops it becomes deliberate, and the attention may be directed upon resemblances instead of differences. At this stage the grouping of ob¬ jects according to likenesses results in classi¬ fication. Consult any general work on logic or psychology.

ABSYR'TUS. See Argonauts.

ABT, apt, Franz, German song-writer and conductor: b. Wiesbaden, 22 Dec. 1819; d. 31 March 1885. He studied theology at Leipzig, but abandoned it for music at Mendelssohn's instance. In 1841 he became kapellmeister at the. cn irt theatre at Bernburg; shortly afterward reiin fishing the post for a similar one in Zu¬ rich. where he remained till 1852. He was then cal lea to Brunswick as chief conductor of the orchestra in the royal theatre, and made court kapellmeister in 1855.

In 1872 he came to the United States at the invitation of a number of ch "d societies, and was very favorably re- r ; he conducted at the famous Peace ju i in Boston in that year. In 1881 he reti d to Wiesbaden on a pension. Many of his songs (for example, (When the Swallows Homeward Fly, *(Good Night, Thou Child of My Heart,* (0 Ye Tears,* etc.), have endeared themselves to the heart of the people all over the world.

ABU-BEKR, a'boo-bek'r, his original name being, Abd al Kabah ibn Abi Kuhafah al Atik, also Abd Allah, father-in-law of Mohammed, being the father of the Prophet's wife: b. Mecca, 573; d. 23 Aug. 634. On the death of M hammed, in 632, he was chosen as his suc- c< scr and the first caliph of Islam. He began a g a successful warfare against his enemies rabia, Persia and the Byzantine Emperor E. eclius, but two years later died at the age of Jl and was buried in Medina, near the tomb of Mohammed and Ayesha, the Prophet's wife and his daughter.

ABU-HASSAN, a'-boo-has'an, surnamed ((The Wag, *hero of one of the (Arabian Nights' Tales, entitled (The Sleeper Awak¬ ened.* Unaware he entertains the caliph and later becomes the monarch's friend and trusted adviser.

ABU KLEA (Abuklea Wells), a place in the eastern Sudan, west of the Nile, on the desert route from Korti to Metammeh, 23 miles n< "th northwest of the latter and about 120 udes from Khartum. Here a battle was fought

Jan. 1885 between a British force of 1,500 u der. Gen. Sir Herbert Stewart and 12,000

ffidists, of whom 5,000 actually attacked.

Harrar in the south and southeast, including large portions of Galla and Somali Lands. Addis Abeba, capital of Shoa, was founded in 1892 by King Menelik as the capital of Abys¬ sinia. It consists of villages and suburbs scattered round the palace over an area of three square miles, and has between 50,000 and 60,000 inhabitants.

Topography. — The more marked physical features of the country may be described gen¬ erally as consisting of a vast series of table¬ lands of various and often of great elevations, and of numerous ranges of high and rugged mountains, some of them of very singular forms,

dispersed over the surface in apparently the wildest confusion. From these mountains flow inexhaustible supplies of water, which, pouring down by the deep and tremendous ravines that everywhere intersect them, impart an extraordinary fertility to the plains and valleys below.

The loftiest and most remarkable mountain summits occur in the Simen range in the centre of the northern part of the kingdom, immedi¬ ately west of the Tacazze River. Among the highest of these (so far .as known) is Ras Dashan, calculated at 15,160 feet and capped with perpetual snow. Abba Yared and Biuat are slightly lower. Along the eastern side of the country extends a mountain range or es¬ carpment forming a natural rampart, with a mean elevation of 7,000 or 8,000 feet for some 600 miles. No volcanoes are known to exist at present, but almost everywhere are numerous evidences of past volcanic action. Perhaps the principal river of Abyssinia is the Tacazze, rising in the mountains of Lasta, about lat. 12° N. ; long. 39° 20' E. It runs north and then west, and after leaving the bounds of Abvssinia takes the name of Atbara, and finally joins the Nile. The chief of the other rivers — if not indeed the chief of all — is the Abay or Abai in the centre which, after flowing through Lake Dembea, or Tsana, the largest lake in Abyssinia, runs south and then northwest, and later becomes the Bahr-el-Azrek or Blue Nile, of which it is in fact the upper portion. The Hawash is the principal river flowing east.

Fauna. — The domestic animals consist of horses, cattle, sheep, goats, camels, mules and asses. Mules, camels and asses are the usual beasts of burden, the horses being generally reserved for war and the chase. Vast herds of oxen are met with throughout the country. The wild animals are the lion (rare), elephant, hippopotamus, rhinoceros, crocodile, buffalo, hyena, leopard, boar, antelope, zebra, quagga, giraffe, gazelle and civet. The hippopotamus abounds in .Lake Tsana, and great numbers are killed annually for their flesh and hides. The rhinoceros, like the elephant, inhabits the low, moist grounds, and is numerous in certain dis¬ tricts. Crocodiles are found in various rivers, but the largest and most dreaded are those that inhabit the Tacazze. The buffalo, a compara¬ tively harmless animal in other countries, is here extremely ferocious. Serpents are not numerous but several poisonous species are to be found as well as the boa, which often attains a length of 20 feet. There are many, birds of beautiful plumage; bees are numerous, honey being a general article of food; locusts often lay the land waste, and the tsetse fly is destruc¬ tive to cattle during the rainy season. The

flora is very varied and in the low lands and valleys extremely luxuriant. Cotton, sugar¬ cane, date palm, coffee, vine, bananas and

other fruits would flourish, but are not extensively cultivated. A wild coffee plant runs riot in southern and western Abyssinia, and there are many valuable timber and rubber trees in the forests. Agriculture is the chief industry but is still in a primitive state, the soil belonging theoretically to the imperial government and the idea of landed property being little under¬ stood by the natives. Manufacturing industries are very backward, but cattle, sheep, goats, small hardy horses, donkeys and mules are ex¬ tensively raised. The chief native products are hides, skins, millet, wheat, barley, tobacco and an excellent Mocha coffee known as Hariri coffee.

Productions. — The chief mineral products of Abyssinia are iron, sulphur, coal and salt, but they are as yet undeveloped. Coal beds extend along the whole of the eastern frontier of Shoa, but as a combustible coal is scarcely known in the country. Salt is obtained in various places, especially from a plain on the southeastern border of Tigre. Gold is obtained from alluvial deposits, but not in great quan¬ tity. In some parts of the country iron is abundant and is manufactured into implements. A few hot mineral springs are known and used.

Climate. — 'The climate of Abyssinia is as various as its surface. In the valleys it is delightful, but on the mountains often cold. The light rains commence in April or May, the heavy rains in Tune and continue till September (over a considerable portion of the country at least), during which period they are often so violent as to put a stop to agricultural labor.

Commerce. — The foreign trade is chiefly carried on through Jibuti in French Somaliland and other non-Abyssinian ports on the Red Sea and Gulf of Aden and through Gambela and western Abyssinia to the Sudan; but the exter¬ nal traffic has never been of great importance, as the nature of the country is adverse to an extensive trade, and there are relatively few commodities suited for export; moreover, till recently the natives dared not trust their treas¬ ures out of their secret hoards, and the royal court was the chief buyer. Menclek's firm administration, however, with its better security for life and property, extended Abyssinian trade considerably, the United States and Great Britain being the chief beneficiaries, France, India, Italy and Germany ranking next. In 1913 the value of exports and imports through Jibuti was about $3,684,240, through Gambela and West Abyssinia $638,235 and through Somaliland $308,500. The chief ex¬ ports were hides and skins, coffee, wool, ivory and rhinoceros horns, honey, wax, civet ; the chief imports, cotton goods, in which American fabrics take the lead, firearms, ammunition, pro¬ visions, liquors, railway

material, sugar and petroleum. Trade is greatly hampered by the primitive methods of communication, which is carried on by mules and pack-horses; the dis¬ tance traversed being not above six to eight-miles a day at best. In 1902 a railway 187 miles long, constructed by French capital, was opened between Jibuti and Dire Dawa, 25 miles from Harar; in 1909 a new company was formed to extend the line to Addis Abeba. In 1912 it reached the Hawash River, and was expected

A B 34° c D 36“ E F 38° G H 40° I J 42° K L 44° M

Aim Hamwi

ABYSSINIA

BaRomosa Kebeek

Suaklu

Baromosa Seggeer

'<Slnkarf/ ; /

Arittb

A.bu Egli'

DESERT

I* Tellau-Tellah I. StVTrinkitat

SURROUNDING COUNTRIES

Mt. Shakrib

MT.4r^OWE|-

JES/RA

\ih C« tnrart

Scales.

Statute miles, 101 1 Inch.

El Sulunanioh

Mftfl

BjbrOd.uajQiˆ

MACAQA

Ras Kasar

Kilometre'

Widan

,MT. U0EN\GADE1N

Ruud, Mr Sally & Co.'s New 11' X 14 Map of Abyssinia. k.r». Copyright "by Rand, McNally it Co*

NVossaleat

f; ,-GHENA!

"W.indiM

I

ISkeN.AB >

' rBENI

.Bir Kaberel Shekh

.El It wed

if/} ht Safer

2 M. Allah

Jffs tfcjadi y

ˆlvabo th La.

o Sinhan

MtHACAP;

<ˆ(MER

El Gindi

Fabsan

YyfCiliKEB

Jisan

, Alni'Ar.isL,

Hastai

Difnan 1.

• aksak ^ lKeueek

o Subaja^

9 Nakfa

_0faiiutu‘1j(($ |

Bauluk

Harmeel I.

4 > aratc I,

Karkabul

Banaghtr

Dokk'an-

Gos Rejeb,

iFlllik.

Abu Delete

Waled Hossuna

Korvei i

unguas

EXTAFoosh I

V * ^

Kotama

Keren

f KallCyn

Khartum.

Mtiliiun

- — (L MnssawfC {ˆVrktt\ • ifm-

'A / ˆDela, ˆZabdemt Alg-aden ,'Ambarabj

i Laoateru rak ,

o'Anirc.n /r£

M*rib

OM DU

!mt. haohur

r * (

fSanyi

Jebcl Tkk

nssalal

,Ras Gubobcll

Asobi i<

KamarakI

Aideiessa efussi o"©]

L,0-7iVlaN

Ik Ani!W*

Iekoncltb

fcmlada fta9 Marah

flau/'O/ Bet if LˆLwGias Hanfila

Kami tin D A R ; E N N A R

l > uem ˆ

Damugp

Uodulda

.muL*

Gund <

Beit-el-Fakilv

■pab'ta

\ I G R

S\H l R E H

Abu Iluras

Toraat

Blf Bcinnˆ

Jebel

SoGHAIR

oGabal

Mt. Kabtiya

Zebid

(SfiHsTbP

■Gednref

\ •J„eV?WeM

Mooshi " - I -

' -V: *:"7/Tau° %»;

t / < #"-

Hoklmˆ _r-': I M‘saT'

— I)0t,ban S,1

v\s ˆ Abu Sak ra;

./Metemeh fg a r V-Tt

(Berkiˆ 7

JrAb

‘ Makbl e

Debiˆa Ganatt

TALTAL

ARNISU]

Nabida

ljt',1 i v\ Mai Tsai cl

ABBA.ARˆ,,* --7L . ˆ | .75'MTYBUAHIT

Bcheta B-

IT Chˆi®tt ari .0. f tgf ,ue„'" Ant*®!,

WJ > j£flATf

yyokin:

f.. 0 R

jfLAHETA MTS

bIUuI'

Abu Shoka

l--'r Talha(

GALABAT

dvamisa < 1ˆ

MVlDeberki ˆ

t Buya’ Aoij.aT*-

vN < jebel

ˆHARˆR.

vBdˆ-Moheny K A toip'iigu 1 £

4 f’/W A A G' Sokotnp

Didhav

Vlerdibbaˆ

E KB i aJ1/ fo ,5h /.

' if \»Jenda7y A' P 'v-TAnahf > rELainba A-ufsCtv"- Ebenalj75-Ai

SA-RAGOˆ fil'- If?, ~

ˆ J luk el Arba? j Tsana j

Meharai

.Akulle y

Mcdghul,ˆ FRENCH

v / MT. DEBENE-TC Qbol

boeira

Ferluvna®1*

Harunˆ.

Hinirainu

Bedua

ˆˆmjAmelza

£■'- oV SOMALI

, 1 y i 0,,r.ˆ3

Abtiebad VˆJ I B

AND

NValdffe

Roseres

Donga r1ˆ

i > BOR0JokW zSbti

/K.»-u Samara -p o Sra Mariamˆlˆdˆ-GUNA

Hadele Gubo AUSSA / > Daleh/A”

il WADELA%

oGergera.iy , ˆ ,/F . Venitcha %

'o Daont

r“b31agdala‘

\ Jiff a

r KOLLOl'K '

Kharabaj

GorguY

.Tanta',

.Zella

J < IENAN "

7 Beiiaˆp

p-XAND 7/

y’(iakv.nyy/J Aj,

I;-°L)png < ‘

'LQogtok

AGAgO'

t'olSjMarlftm

'c.bra Ny'ar k o

I'Lim

ˆLixxftdu

ndaEv

i G allay

Dair

Om Ebeiio. IV-'

® Idris

Killeld;

Majetie,- 0 Kokfara

| cBtBt

WardigjM1,

jaKabbba

rˆT.ELLES. '

ioinasl

Fasouder,

Tana'

Bulbar

;o Gabolla

Belletafa

°I > acu-

(FnsKoda)

i.o Dillon ˆWogiddi;

, G or g\i r a (Fadaa i-’ y;SH!EBU-\ _G ALLAS)\o

1 /LAUata'v Heier-

\ ' H„ˆDankaka'

ˆ4ˆ7 . .

10 j ?onta /»■'"

\c

PF,J‘rFYAPy

o\ BreahanV anus \a..„ j\pq '

. 'Angolalas.

/n ' re / JjifdeUflt1 1 Diiw.a/x 1 ˆ

r ' rSa 0 a ta

Birbirsafat

ˆMT. MOGA MEDIfˆ

- ov©arnii ˆ,ˆ/ˆ\jigjiga -Fiatnbiro \ \

tssf 4~, > <•

GahuoU “"nLot.u T a

S-V o ˆ-iMT.ˆAˆA;

”SKumbiUtsbaOv. _ ˆ

i ˆ yˆSv/ Jar raj y J Gi

-7 ˆ M ˆ-4'7'-rHol'°° ■

yti&if t ■ 1 1 feQt

JKomonjug,

:l$g_a

GALL AS

° Babagob

tibassa

Lekemti

°Luftu

ˆHardagaˆ1'

Lagama

ˆNasser G 15 u-i-u B.

‘ ’ °Galan\so Gambela -v

Koma

rˆs°t

J Dumu, DeybaC Cˆ/ianka'

(bur

Milmil

So ' ' v »* . ji

VLagaburo c/

Shala

o Sbeikh Husein Dl-,r°r6i'1ˆ-

V0$g u r a r ' '^“R oko 0 | .

-AT-4 . '\£oroll V R.

J,A> Berbade<r pr w?M)dula° 7-x

Gandabella

Abugasi

PfG'H

ˆKeCho!

TjLa/ifjtthoi

•L.'lShanC-

BodeleN

Sedera ˆ ˆ 'R

cambata! I

i MT?!f

Sheikh Mihamed

:> >■ y4tfib°y0°y

VX- WnbeRAoh'a©

Rawa

Warandab

WORGOMA

Gerlogubio

Mt. KAtfOASH

Bodewenlc

Melile

L.Sltyayai

Ture

MT. .SMITH<V

y;/lf. Chamo]

Godigea0U.

Isbila

Berdale£

Mbliko

Birifai

Bodle

Duierto’

Laket

Stefantej

ˆ%MT. MOGORE

'gaSaˆ#

T. KANJARO'

Higc 0

•TERTALA : MTS.

MT TlRANO 1

Bar m eta wen

rS£tGIDA VOLCANO

fNVoladeyi

Mt. Jibbissa

BUNGOL

VabncSr-

1C0 DJ.ˆ

£ tLrw

%

IT. FEIJJ,S0

A UGANDA f

' /* "i

Uprotectoratˆ

..V B R I i

It. tenfe-

Kuffole

rˆlXi LONGENOOTI

RENDILE

A F R I c

L i v i n Plain

AFRICA PROTECTORATE

MT. KOROLf

iT.'KULOLˆ

Bardera.

MT. MAR3ABIT

.LEKJ8 VOLCANO

Longitude East from Greenwich

ABYSSINIA

to be about 30 miles from Addis Abeba in 1915. There are 1,056 miles of telegraph lines. The bank of Abyssinia, chartered in 1905 with a capital of $2,500,000, mainly provided by the National Bank of Egypt, the governor of which is its president, has its headquarters at Addis Abeba. The current coin of Abyssinia is the Maria Theresa dollar, but in recent years an effort had been made to introduce a new cur¬ rency with the Menelek dollar (worth about 50 cents) as the standard. Saltbars and cartridges are also accepted as currency.

Population. — The native population consists of Semitic Abyssinians, Gallas and Somalis, negroes (in southwest) and Falashas (of Jew¬ ish religion). The non-natives are Indians, Arabs, Greeks, Armenians, and a few Euro¬ peans. Up to 1907 education was solely in the hands of

the clergy. In October of that year compulsory education was decreed for boys over 12, but the edict remained a dead letter. One Abyssinian school with about 100 pupils exists in Addis Abeba. Justice is administered by the provincial governors and petty chiefs with right of appeal to the Emperor. The legal system is supposed to, be based on the Justinian Code.

Government. — The government of Abys¬ sinia is feudal in character. Each of the nine provinces has its governor, supposedly under the authority of the Emperor or Negus, and having their retainers, or professional warriors. There is a vague state council composed of the most important rases, or chiefs, and a ministerial council constituted by Emperor Menelek in 1908. The regular army numbers about 250,000 men, mostly cavalry, and is sup¬ plemented by irregulars and territorial troops in time of war.

History. — Northern Abyssinia corresponds to ancient Ethiopia (see Ethiopia), which is still the official name of the country, Abyssinia being a Portuguese form of the Arabian Habesch, signifying ˆmixture.® Christianity was introduced in the 4th century. In the 6th century the Abyssinians conquered the rich province of Yemen in Arabia and were in con¬ stant communication with the outside world for over 50 years. The Mohammedan conquest of Egypt in the 7th century completely isolated them however, and for centuries afterward the kingdom continued in a distracted state, now torn by internal commotions, and now invaded by external enemies (Mohammedans and Gal¬ las). To protect himself from the former the Emperor of Abyssinia, about the end of the 16th century, applied for assistance to the King of Portugal. The solicited aid was sent, and the empire saved. The Jesuit priests, having now ingratiated themselves with the Emperor and his family, endeavored to induce them to renounce the tenets and rites of the Coptic Church and adopt those of Rome. This attempt, however, was resisted by the ecclesiastics and the peo¬ ple, and finally ended, after a long struggle, in the expulsion of the Roman Catholic priests in 1633. The kingdom gradually fell into a state of anarchy, which about the middle of the 18th century was complete. The Negus received no obedience from the provincial governors, who besides were at feud with one another and severally assumed the royal title.

Abyssinia thus became divided into a num¬ ber of petty independent states and, save for

visits from occasional explorers such as James Bruce in 1769, remained shut off from the world until the 19th century. A

remarkable, but, as it proved, quite futile attempt to resuscitate the unity and power of the ancient kingdom was begun about the middle of the 19th century by King Theodore, who aimed at the restora¬ tion of the ancient kingdom of Ethiopia, with himself for its sovereign. He introduced European artisans, and went to work wisely in many ways, but his cruelty and tyranny counter¬ acted his politic measures. In consequence of a slight, real or fancied, which he had received at the hands of the British government, he threw' Consul Cameron and a number of other British subjects into prison in 1864, and refused to give them up. To effect their release an army of about 16,000 men under Sir Robert Napier was dispatched from Bombay in 1867; it landed at Zulla on the Gulf of Aden in Janu¬ ary 1868, and after marching 400 miles besieged Magdala, Theodore's capital, which 'was taken by storm 13 April. Theodore was found among the slain, the general opinion being that he had fallen by his own hand.

After the withdrawal of the English, fight¬ ing immediately began among the chiefs of the different provinces, the three most powerful, Kassa of Tigre, Gobasie and Menelek, strug¬ gling for the supremacy. This state of matters continued for some time ; but at last the country was divided between Kassa, who secured the northern and larger portion and assumed the name of Johannes, and Menelek, who gained possession of Shoa. In 1872 Johannes made himself supreme ruler, with the title of emperor, or king of kings (Negus Negusti). Taking advantage of the troubles in Abyssinia the Egyptians annexed Massowa and adjoining ter¬ ritory on the Red Sea, and hostilities were repeatedly carried on between them and Jo¬ hannes. In 1885 the Egyptian forces were with¬ drawn, and Italy, with the consent of Great Britain, declared a protectorate over Massowa and the strip of territory along the coast of the Red Sea. In the following year the Italians pushed inward to Saati, a few miles west of Massowa, an action which led to war with Johannes. An Abyssinian force was sent in 1887 to recover Saati ;. but though a small Italian force was cut to pieces at Dogali the Italians maintained their position.

On the death of Johannes in 1889, while fighting against the Mahdists, Menelek, who had concluded an alliance with Italy, known as the treaty of Nchali, raised himself to the imperial throne. The result of this was the strengthening of the Italian hold on the country. The Italians regarded their treaty with Menelek as giving them a protectorate over Abyssinia, and by 1892 the whole of Ethiopia was generally recognized as within the Italian sphere. Proceeding to extend and strengthen their posi¬ tion, the Italians in 1889 occupied Keren, capital of the Gogos country, situated 60 miles west of Massowa, and also fortified Asmara, south¬ west of Massowa. Adowa,

the capital of Tigre, and the centre of opposition to Menelek, was occupied in the following year. The Mahdists were also defeated, and Kassala in the Sudan was occupied by the Italians. Menelek, how¬ ever, later repudiated the Italian protectorate, broke with his former allies, and in 1896 his troops inflicted on them such a defeat at Adowa

as gave a death-blow to their claim of a pro¬ tectorate over all Abyssinia. The treaty of Addis Abeba concluded in that year between Menelek and the Italians practically abrogated the treaty of seven years before, but left Italy in possession of a strip along the Red Sea coast from the French colony of Obok on the south to Ras Kasar on the north, known officially as Eritrea (Erythraea), the frontiers of which were definitely settled in 1908. A British mis¬ sion in 1897 was favorably received by the Emperor, a treaty of commerce was concluded and the boundaries between Abyssinia and the British Somali protectorate were arranged. In 1908 a further agreement with Great Britain regulated the boundary between Abyssinia and the Sudan down to 6° N. lat. Abyssinia also made comprehensive commercial treaties with the United States (1903), Germany and Austria- Hungary (1905), and France (1908). Each of these treaties was to remain in force for a period of 10 years, when it could be terminated at a year's notice. Menelek (b. 1842) died in December 1913 and was succeeded by his grand¬ son Lidj Yasu (b. 1896), who on account of the illness of the Emperor had been virtually ruler, under regents, since 1909.

On 27 Sept. 1916, during the Emperor Lidj Yasu's absence at Harrar, the Metropolitan Abuna Mathaeos released the people and chiefs from their allegiance and deposed the Emperor. In his stead they elected Waizern Zauditu, daughter of the late Emperor Menelek, as Empress of Abyssinia, and designated Degiac Tassari Makonnen as heir to the throne. The deposed monarch, who is a Knight Grand Cross of the Royal Victorian Order (G.C.V.O.), is a son of Menelek' s second daughter. The young emperor had received an excellent European education, and at the age of 14 could speak fluently English, French and German. In May 1909, when 13 years old, Lidj Yasu was mar¬ ried to Princess Romani, a granddaughter of the late Emperor John, who had fought against and defeated Menelek (when King of Shoa) in 1877. Sentimentality or favoritism found no part in Menelek's nature ; the welfare of his country was his first preoccupation, and it was a well-known fact in Abyssinia that he had carefully studied the nature

and character of the youth before he took the step of appointing him as his successor. During the World War, Abyssinian troops were allied with the British in the East African campaign.

Bibliography. — Bruce, <Travels to Discover the Source of the Nile5 (3d ed., Edinburg 1813); Markham, (History of the Abyssinian Expedition5 (London 1869) ; Wylde, (Modern Abyssinia5 (London 1901) ; Skinner, Abys¬ sinia of Today5 (New York 1906), an account of the first American mission ; Duchesne-Four- net, (Mission en Ethiopie5 (Paris 1909) ; Schu- lein, (In Abyssinia, the Land of the Barefooted King5 (London 1914) ; Annaratone, (In Abis- sinia5 (Rome 1914) ; Castro, (Nella Terra dei Negus5 (Milan 1915) ; Bent, J. T., (The Sacred City of the Ethiopians5 (London 1893) ; Rohlfs, (Meine Mission nach Abyssinien5 (Leipzig 1883) ; Vigneras, (Une mission Frangaise en Abyssinie5 (Paris 1897) ; Morie, (Histoire de 1' Ethiopie5 (Paris 1904) ; Welby, (Twixt Sirdar and Menelek5 (London 1901).

Charles Leonard-Stuart, Staff of the Americana.

ABYSSINIAN CHURCH. The Church founded by Frumentius, the first bishop of Ethiopia, about 330 a.d. About 470 a great company of monks established itself in the country, completely changing the doctrines and affairs of the Church, but was a few years later expelled. From 1528 to 1540, the country was overrun by Mohammedans, followed at the end of the 15th century by the Portuguese Jesuit missions, which remained till 1633, when the Abyssinians resumed allegiance to the Church at Alexandria. The metropolitan (called Abuna) or head of the Church is appointed by the patriarch of Alexandria, and is always a foreigner. The Abyssinians are monophysites, generally agreeing with the Copts in ritual and practice. The fasts are long and rigid; confes¬ sion and absolution are strictly enforced and the Sabbath and the Levirate law are generally observed. Graven images, purgatory, extreme unction, crucifixes, etc., are prohibited. The priests must marry, but only once. The liturgy is celebrated on the ark in the King's palace at Christmas, Epiphany, Easter and the Feast of the Cross. The Scriptures are read in Geez, the literary language, which is used for all services. Consult Dowling, (The Ab}rssinian Church5 (London 1909).

ACACIA, a-ka'sha, (Gr. ake, spine, from their spiny stalks), a genus of plants, family Mimosacece. They are trees or shrubs with compound pinnate leaves and small leaflets, — in some species wholly or partially undeveloped, when the petiole or leaf-stalk expands into a blade resembling a leaf, hence called phyllo- dium. Certain species yield gum arabic, gum Senegal and other gums ; some have astringent

barks and pods, used in tanning. Some of the Australian species contain considerable tannin, and hence are exported to a large extent. An Indian species yields an astringent called catechu. Some of the species of tropical America, known as hull-horn Acacias, are inter¬ esting because of their large hollow spines which are penetrated and inhabited by ants.

ACACIUS, a-ka'shius, bishop of Caesarea 340-365 a.d. He founded a curious Christian sect called Acacians, and that may be termed homoiothelites , as they held that the Son was like the Father in will, but not of the same or similar substance; thus differing from the Arians. He induced a synod at Constantinople in 359 to accept the doctrine, whereon St. Jerome said that (<the world groaned and wondered to find itself Arian.55 It was finally condemned, however, and he was banished.

ACACIUS, Saint, bishop of Amida in

Mesopotamia, early in the 5th century. He sold the church plate to redeem 7,000 starving Persian slaves. Vararanes (Bahram), the king, is said to have been so affected by this noble action that he sought an interview with the bishop, which resulted in a peace between that prince and Theodosius II, a.d. 422, and a hun¬ dred years' peace was sworn between Rome and Persia.

ACADEMIC COSTUME. See Costume, Academic.

ACADEMIC DEGREES. Academic de¬ grees, whether earned or honorary, are titles conferred by colleges, universities and pro¬ fessional schools upon persons who, in the opinion of the authorities of these institutions,

have exhibited special proficiency in any branch of knowledge. (See Degree). The difference between earned and honorary degrees is that the former are conferred upon students who have completed a certain prescribed course of study and all other requirements of the insti¬ tution granting such degrees, whereas the lat¬ ter are conferred upon individuals selected, without examination or other requirement, be¬ cause they have attained eminence in some line of endeavor.

There is a woful lack of uniformity in the methods used in granting degrees by the edu¬ cational institutions of the United States.

Academic degrees are not and cannot be pro¬ tected adequately by law. Institutions which claim the right to confer such degrees have in¬ creased so rapidly and their standards vary so widely that the value of a degree is greatly lessened. Some small and new institutions and some unauthorized agencies not only bestow the degrees that are properly honorary, for in¬ sufficient or no reason, but confer other degrees that should be won only after the completion of a definite course of study. There is a ten¬ dency toward uniformity of standards, however, and in 1908 a report was made by a committee of the National Association of State Universi¬ ties ((upon standards for the recognition of American universities and upon standards for the recognition of the A.B. degree and higher degrees. w The Carnegie Foundation (q.v.) is also using its influence to standardize degrees by giving the benefits of its pension fund only to those universities and colleges which adopt and enforce certain requirements for admission and study.

In general the lowest degrees, Bachelor of Arts (B.A. or A.B.) and Bachelor of Sci¬ ence (B.S. or S.B.), are given to students who have completed the non-professional four-year college course. There is considerable diver¬ gence in the significance of degrees even among the older colleges and universities, since the A.B. no longer indicates, as formerly, that the recipient has completed a definite amount of Greek, Latin and mathematics. The elective system and the tendency to replace the classics by modern languages have obliged the institu¬ tions either to change the requirements for the degree or else to substitute a new degree. The second or master's degree — Master of Arts (M.A. or A.M.) and Master of Science (M.S.) — are granted to holders of bachelor's degrees who have completed an additional year of study, although these degrees are often honor¬ ary. The degree of Doctor of Philosophy (Ph.D.) is usually bestowed upon those who have completed at least three years of grad¬ uate work and have prepared a thesis upon some subject approved by the faculty that will show ability to do original work. This degree is no longer given as an honorary degree by any institution of rank.

Among the more usual degrees, besides those above mentioned, conferred by profes¬ sional schools are Bachelor of Laws (LL.B.), Doctor of Medicine (M.D.), Bachelor of Divin¬ ity (B.D.), Civil Engineer (C.E.), Electrical Engineer (E.E.), Mechanical Engineer (M.E.) and Bachelor of Literature in Journalism fB.Litt.). There are numerous other degrees, honorary and otherwise, such as Doctor of Science (Sc.D.), Doctor of Letters (Litt.D.),

Doctor of Laws (LL.D.), Doctor of Divinity (D.D.L Bachelor of Civil

Law (B.C.L.), Bachelor of Letters (B.L. or Litt.B.), Bachelor of Philosophy (B.P., B.Ph. or Ph.B.), Doctor of Medical Dentistry (D.M.D.), Doctor of Veterinary Medicine (D.V.M.), Doctor of Law (J.D., Juris Doctor), Doctor of Civil and Canon Law (J.U.D., Juris U triusque Doctor), Doctor of Letters or Humanities (L.H.D.), Bachelor of Music (Mus.B.), Master of Laws (L.L.M. or M.L., Legum Magister) , Master of Civil Engineering (M.C.E.), Master of Mining Engineering (M.M.E.), Doctor of Music (Mus.D.), Graduate in Pharmacy (Ph.G.), Veterinary Surgeon (V.S.), and others which can be found under the title Abbreviations. The United States Commissioner of Education reports yearly on the degrees granted by insti¬ tutions, and the catalogues of the institutions will give the conditions attaching to the be¬ stowal of degrees. Consult Paul Monroe (ed.), (Cvclopedia of Education* (article (:)

1911).

ACADEMIC LEGION, an insurrec¬ tionary corps of armed students who made themselves conspicuous at Vienna in 1848.

ACADEMICS, a name given to a series of philosophers who taught in the Athenian Academy, the scene of Plato's discourses. They are commonly divided into three sects : (1) The Old Academy, of which Plato was the immediate founder, was represented suc¬ cessively by Speusippus, Xenocrates and Pole- mon. (2) To them succeeded Arcesilaus, the founder of the Middle Academy. Under his hands the Platonic method assumed an almost exclusively polemical character. His main ob¬ ject was to refute the Stoics, who maintained a doctrine of perception identical with that promulgated by Dr. Reid in the 18th century. Socrates is said to have professed that all he knew was that he knew nothing. Arcesilaus denied that he knew even this. Wisdom he made to consist in absolute suspension of as¬ sent; virtue, in the probable estimate of con¬ sequences. He was succeeded by Lacydes, Telecles, Evander and Hegesinus. (3) The New Academy claims Carneades as its founder. His system is a species of mitigated scepticism. He was succeeded by his disciple, Clitomachus. Charmides, the third and last of the new aca¬ demicians, appears to have been little more than a teacher of rhetoric.

ACADEMIE DES BEAUX ARTS, ak-

ad-a-me da bo zar. See Academy of Fine Arts.

ACADEMIES IN AMERICA. In the

United States the term academy is not generally applied, as in Europe, to learned societies. The oldest association of the academic type in the United States originated with Benjamin Franklin, who published (A Proposal for Pro¬ moting Useful Knowledge Among the British Plantations in America *in 1743. This re¬ sulted in the organization the same year of the <f American Philosophical Society Held at Philadelphia for Promoting Useful Knowl¬ edge.** Franklin was its first secretary, and from 1769 until his death in 1790 its president. Its Transactions were first published in 1771, and its Proceedings in 1838. It numbers over 500 members and holds an annual general meeting. The American Academy of Arts and

Sciences was founded at Boston in 1780, and dealing largely with the antiquities and natural history of America, has published several vol¬ umes of Transactions dating from 1785. The Connecticut Academy of Arts and Sciences was founded in 1799. The Academy of Natural

Sciences of Philadelphia was founded in 1818 and is a flourishing institution with a fine museum and library. The New York Academy of Science, originally known as the Lyceum of Natural History, was founded in 1818 and re¬ ceived its present title in 1875. The American Association for the Advancement of Science, first organized in 1840 as the American Associa¬ tion of Geologists, now has a membership of over 8,000. The National Academy of Sciences was chartered by Congress in 1863 to investi¬ gate and report on scientific questions. Origin¬ ally limited to 50 members, the number was extended to 150 in 1907. The most important of the national organizations of academic character is the Smithsonian Institution (q.v.) at Washington. The Washington Academy of Sciences, amalgamating several scientific so¬ cieties of the National capital, was incorporated in 1898. The American Academy of Political and Social Science of Philadelphia, and the Academy of Political Science of New York (Columbia University), are important institu¬ tions. Academies of medicine flourish in New York, Philadelphia (established 1799), Cin¬ cinnati and Cleveland, an academy of science in St. Louis, and in 1898 the American Acad¬ emy of Arts and Letters was founded in New York. The Pennsylvania Academy of Fine Arts, famous for its annual exhibitions, was founded in 1807, and the National Acad¬ emy of Design, in New York, in 1828.

Of scholastic institutions, the earliest was The Academy and College of Philadelphia, founded in 1749 by Benjamin Franklin, char¬ tered in 1753, and in 1779 incorporated as the University of Pennsylvania. Other early schools of this type were the John Phillips academies, established at Andover, Mass., and at Exeter, N. H., and the term is also used in the well-known title of The United States Military Academy at West Point.

The term is also loosely but popularly used to designate places where dancing, riding, fencing, etc., are taught.

In Central and South America among the learned societies of standing are : The Aca¬ demia Mexicana de ciencais y literatura in Mexico City; the Academia de la historia, at Caracas, Venezuela; the Academia nacional de artes y letras, and the Academia de ciencias, medicas, fisicas y naturales, at Havana, Cuba; the Academia nacional de ciencias, Buenos Aires ; the Academia Cearenes, at Ceara, Brazil, and the Academia de medicina, at Rio Janeiro.

ACADEMY. (1) A school; (2) a society of higher learning. In modern days the word is used to designate British and American schools of higher instruction for youths, rank¬ ing with the gymnasia of

Germany, and also national military and naval high schools. The name is also applied to various associations of scholars, scientists, literary men, artists, etc., established and organized for the improvement of science, literature or the arts. The origin of the term is traced to the public pleasure ground and gymnasium in the Ceramicus — tile field, a suburb of Athens, said to have belonged

in the time of the Trojan war to a local hero, a contemporary of Theseus, named Academus, whence the name. Cimon, the son of Miltiades, the proprietor of the land in the 5th century b.c., beautified and planted the grounds with olive and other trees, gave free admission to the public and bequeathed the property to the city at his death. The grounds became a popular resort, where Socrates used to orate, and in its groves Plato taught philosophy. Plato's school became known as the Academia and his followers were called Academists. Subsequently, whenever a Platonist opened a school, he called the institution an academy, and these schools modeled after the original academy, until their abolition by a decree of Justinian, flourished almost continuously for nine centuries. Cicero named his villa near Puteoli (<The Academy, » and there wrote his (Academic Questions,) and other philosophic and moral dialogues, based on the conversation and learned discussions of friends whom he entertained as visiting guests. The principal academies of antiquity were the Old, founded by Plato 428-348 b.c., and continued by Speu- sippus, Xenocrates of Chalcedon, Polemon, Xenocrates and Crantor; the Middle Academy, founded by Arcesilaus 241 b.c., and the New Academy, founded by Carneades 214—129 b.c. Adrian founded an academy at Rome in which all the sciences were taught, but especially jurisprudence. Another academy flourished at Berytus in Phoenicia in which jurists princi¬ pally wrere educated. At Alexandria, Ptolemy Soter, one of the generals and successors of Alexander the Great, founded the Musaeon, or Museum, the first association of this kind mentioned in history. Devoted to the cultiva¬ tion of letters and science, he made valuable collections of books and treasures of art, which became the nucleus of the famous great library of Alexandria, and gathered around him scholars of brilliant attainments. In Babylonia, Palestine and Armenia academies were estab¬ lished, and Arabian caliphs, profiting by and improving upon the institutions of their He¬ brew and Christian subjects, founded similar establishments for the preservation and in¬ crease of learning from Cordoba to Samarkand. At the instigation of David of Alcuin, Charle¬ magne established an academy in his palace in 782, where men of learning were encouraged to assemble. Caesar Bardas founded, at Constan¬ tinople in the 9th century, a state institution for the promotion of

science. Near the end of the 13th and the beginning of the 14th cen¬ turies, institutions of this kind, chiefly devoted to the cultivation of poetry, were established at Florence, Palermo and Toulouse, and vied with the universities as seats of learning, cul¬ ture and intellectual development. Academies of fine arts were established in Florence by Brunetto Latini in 1270, and by Frederick II, at Palermo, in 1300. In 1380 an academy of architecture was established in Milan. One of the most celebrated academies of mediaeval times, still surviving after a diversified history, is the Academie des Jeux Floraux (Academy of Floral Games), inaugurated May 1323 by a guild of troubadours ; it was permanently en¬ dowed in 1500 through the munificence of Clemence Isaure, a wealthy lady of Toulouse; was incorporated by letters patent of Louis XIV in 1694, and reorganized in 1773; the

original name was (College du gai savoir et de la gaie science5 (College of Gay Knowledge and of Gay Science). After the downfall of the Byzantine empire in the 15th century, and the revival of classical culture in Western Europe, academies of a more comprehensive kind were established in Italy. Antonio Bee- cadella founded, at Palermo, in 1433 the Ac- cademia Pontaniana, so named after Pontani- ana, its principal benefactor. Alfonso V founded an academy at Naples in 1440. From 1474 to 1521 the Accademia Platonica, founded by Lorenzo de' Medici, flourished in Florence. Devoted to the study of Plato and Dante, and to the improvement of the Italian language and letters, it numbered Machiavelli, Mirandola and other famous men among its members and became the model for many other similar in¬ stitutions. Assuming peculiar names, and en- downed by wealthy patrons of learning, or by the state, these academies were centres of lit¬ erary activity for those members of the Italian nobility, debarred for partisan reasons from political life. The Lincei flourished at Rome; the Ardenti at Naples; the Insensati at Parma; the Addormentati at Genoa. The academies of the Vagabonds, the Thunderers, the Smok¬ ers, the Dead, the Nocturnals, the Drowsy, the Unstable, the Confused, were to be found in other towns. The Accademia de' Lincei (the lynx-eyed), founded at Rome in 1609 by Prince Federico Cesi, and dissolved at his death in 1632, numbered Galileo among its members. It succeeded the Accademia Secretorum Na¬ turae, established at Naples in 1560 for the study of physical science, which was soon sup¬ pressed by the Church. In 1725 Jakeius pub¬ lished at Leipzig an account of over 600 Italian academies. The most influential and enduring of all was the Accademia della Crusca, i. e., chaff, so called

in allusion to its principal aim, that of winnowing and purifying the national language. It was founded by the poet Graz- zini at Florence in 1582. The dictionary of the Accademia della Crusca, first published in 1612, and subsequently, in augmented form, is considered the standard authority for the Italian language. This academy, incorporated with two older societies, survives as the Royal Florentine Academy. While Italy can thus be regarded as the mother country of modern academies, probably the most celebrated and important of all is the French Academy, found¬ ed in 1635 (see Institute of France, The). An Academia Secretorum Naturae was founded in Madrid in 1652, and the Spanish Royal Academy in 1714. An academy of Portuguese history was established at Lisbon in 1720 by King John V, and a flourishing academy of science, agriculture, arts, commerce and general economy, by Queen Maria in 1779. In Germany the Royal Academy of Sciences and Belles-lettres was established by the Elector Frederick at Berlin in 1700. In Sweden the Royal Academy of Sciences was founded at Stockholm by six scientists, includ¬ ing Linnaeus, in 1739. In Holland the Academia Lugduno-Batava was established at Leyden in 1766. In Belgium the Academie Royale des sciences, des lettres et des beaux-arts was founded at Brussels by Maria Theresa in 1772. ˆ Switzerland an academy of medicine was tv. nded at Geneva in 1715. In Russia The Imperial Academy of Sciences was founded at

St. Petersburg in 1725. In England an acad¬ emy, first suggested as ((Iving James, His Academe, or College of Honor,55 then as ((Tlie British Academy, 55 was finally chartered as the Royal Society (q.v.) in 1662. The term acad¬ emy in Great Britain is now reserved for in¬ stitutions devoted to the cultivation of the fine arts and for schools of higher instruction. In Ireland the Royal Irish Academy was founded at Dublin in 1782. See also Academies in America, and for a record of modern academies consult Kukula, R., and Trubner, K., (Miner¬ va : Jahrbuch der Gelehrten Welt5 (Strass- burg 1914) ; Steeves, H. R., (Learned Societies and English Literary Scholarship in Great Britain and the United States5 (New York

1913).

Charles Leonard-Stuart, Staff of the Americana.

ACADEMY, French. See Institute of France.

ACADEMY, The Royal Spanish. See

Royal Spanish Academy, The.

ACADEMY OF ARTS, The Royal. See

Royal Academy of Arts, The.

ACADEMY OF ARTS AND LETTERS,

an American institution founded in 1898 by the American Social Science Association. At its annual meeting that year the Association elected a select group of American authors and artists, who should constitute a National Institute of Arts and Letters. Membership was to be based on distinguished achievement in art, literature or music. At first the body wras lim¬ ited to a membership of 150, then increased to 250. This body then proceeded to organize an Academy of Arts and Letters, the members of wThich were to be recruited from the general membership of the Institute. The first seven members were elected in 1904: William Dean Howells, Augustus Saint Gaudens, Edmund Clarence Stedman, John La Farge, Samuel Langhorne Clemens (Mark Twain), John Flay and Edward A. MacDowell. These were em¬ powered to elect additional members, each new member being given a vote, until the whole body of 50 had been organized. The living members of the Academy in 1921 were: John Singer Sargent, Daniel Chester French, James Ford Rhodes, William Milligan Sloane, Robert Underwood Johnson,, George Washington Cable, Henry Van Dyke, William Crary Brownell, Basil Lanneau Gildersleeve, Woodrow Wilson, Arthur Twining Hadley, Henry Cabot Lodge, Edwin Howland Blashfield, Thomas Hastings, Brander Matthews, Thomas Nelson Page, Elihu Vedder, George Edward Woodberry, George Whitefield Chadwick, Abbott Henderson Thay¬ er, George deForest Brush, William Rutherford Mead, Bliss Perry, Abbott Lawrence Lowell, Nicholas Murray Butler, Paul Wayland Bart¬ lett, Owen Wister, Herbert Adams, Augustus Thomas, Archer Milton Huntington, Timothy. Cole, Cass Gilbert, William Roscoe Thayer, Robert Grant, Frederick MacMonnies, William Gillette, Paul Elmer More, Barrett Wendell, Gari Melchers, Elihu Root, Brand Whitlock, Hamlin Garland, Paul Shorey, Charles Adams Platt, Maurice Francis Egan, Lorado Taft, Booth Tarkington, Childe Hassam, David Jayne Hill.

ACADEMY OF DESIGN, National.

See National Academy of Design.

ACADEMY OF FINE ARTS, The,

a French institution, originally founded in

1648 at Paris under the name of the Academy of Painting and Sculpture. In 1795 it was joined to the Academy of Architecture and has borne its present name since 1819. It pub¬ lishes memoirs, proceedings and a dictionary of the fine arts. It has 41 members, besides corresponding members, etc.

ACADEMY OF FINE ARTS, Im¬ perial Russian, was first established in

a primitive form by the great Emperor Peter I, who, realizing the civilizing power of such institutions, invited to St. Petersburg notable artists in all branches for the purpose of train¬ ing young Russian aspirants in the arts, or sent abroad those who desired to perfect themselves in painting and sculpture. It was the Empress Catherine II, who, in inaugurat¬ ing the Imperial Russian Academy of Science (q.v.), introduced into that institution the teaching of painting and sculpture from other and more progressive countries. While it was unable to produce at once great masters, it certainly succeeded in propagating the history of fine arts and in supplying a few remarkable reproductions from French, Italian, Spanish and German masters, thus acquainting the Russian public with the aesthetic necessities. Empress Elisabeth Petrovna went a step fur¬ ther by separating the School of Fine Arts from the Academy of Science, which act was amplified by Shuvalov, who submitted to the Empress plans for the establishment at the Moscow University of a Faculty of Fine Arts. However, as the court and the Russian aris¬ tocracy lived at St. Petersburg, it was definitely decided by the Senate (1757) to establish the Academy of Fine Arts (Akadyemiya Hudo- zhestv) in that capital, and a sum of 6,000 roubles was appropriated to that effect. Pro¬ fessors of painting and sculpture were mostly French, but it was the Russian Shevakinski to whom the chair of architecture was first en¬ trusted and who secured permission from the Empress to move from her palace to the Acad¬ emy 100 of the finest paintings, which consti¬ tuted the first picture gallery in that institu¬ tion. But the small appropriation of 6,000 roubles was soon exceeded and the deficit was made un hv Shuvalov from his private purse. Shuvalov directed the Academy most success¬ fully for six years and, after the death of Empress Elisabeth, he retired and for the fol¬ lowing 30 years the Academy was entrusted to the care of Betzki, who secured a constitu¬ tion and a charter of rights and privileges. Under the direction of Ivokorinov the first public exposition of the Academy took place in 1765 to the marvel of the visitors. In 1812 the Academy was placed under the Ministry of Public Education whereby the financial state of the institution was greatly improved. The president of the Academy, A. L. Oleninyi, in order to

check the rising criticism of the ad¬ ministration, published a short history of the Academy embracing the period from 1764 to 1829, which showed a crying inadequacy of the administration and caused the Academy to be transferred to the Ministry of the Imperial Court. Under this new protectorate the Acad¬ emy prospered considerably; the budget was increased, a greater number of students were sent abroad (especially to Rome) and a new

constitution was granted (30 Aug. 1859) where¬ by the program of education was radically changed. The yearly budget was increased to 72,626 roubles and, besides the duty of pre¬ paring and training the students of art, the Academy now began to organize, at regular in¬ tervals, public expositions, and an art museum was also established. The complete course of study in either of the two divisions of the Academy (painting-sculpture and architecture) lasts five years and the number of students in the last decade varied from 500 to 1,000, of which number about 10 per cent were women.

W. M. Petro vitch,

Chief of the Slavonic Division, New York Public Library.

ACADEMY OF FRANCE AT ROME,

an institution for the advanced study of the fine arts in Rome, Italy; founded by Colbert in 1666, during the reign of Louis XIV. It was at first established in the ruined villa Man- cini on the Corso, and in 1803 at the villa Med¬ ici. The young artists, painters, sculptors, architects, engravers and musicians who secure the annual prizes of the Academy of Fine Arts in Paris spend four years there, with an annual pension of 3,500 francs and traveling expenses.

ACADEMY OF INSCRIPTIONS AND BELLES-LETTRES, an institution founded at Paris by Colbert in 1663, under the name of Petite Academie. It was composed originally of four members, chosen by the ministry to belong to the Academie Frangaise. The first members, Chapelain, Charpentier, the Abbe de Bourzers and the Abbe Cassagne, met in a salon of the Louvre or in Colbert's library and devoted themselves to composing the inscrip¬ tions for the monuments erected by Louis XIV and the medals struck in his honor; hence their popular name. They undertook a medallic history of the reign of the King. In 1701 the Academy assumed its definitive form; 40 academicians were named. In 1803 the Academy was reconstituted and became the third class of the Institute. Comparative phi¬ lology, Oriental, Greek and Roman antiquities and epigraphy have received the attention of the

Academy, which has published a series of invaluable records and works.

ACADEMY OF MEDjICINE, a French

institution founded in Paris in 1820 for the purpose of keeping the government informed on all subjects appertaining to the public health. It has sections of medicine, surgery and pharmacy and its publications are highly prized by sanitarians.

ACADEMY OF MORAL AND POLIT¬ ICAL SCIENCE, founded at Paris in 1795, became the second class of the Institute. It was suppressed by Napoleon in 1803 but was re-established by Louis Philippe in 1832 and forms the fifth class of the Institute. It is composed of 30 members, divided into five sec¬ tions with five free academicians, five foreign associates and 30 corresponding members.

ACADEMY OF NATURAL SCIENCES OF PHILADELPPIIA, an institution found¬ ed in 1812. It has one of the best natural- history collections in this country — especially rich in stuffed birds — and a valuable scientific library. It has published (Journals > since 1817, and <Proceedings) since 1841.

ACADEMY OF POLITICAL AND SO¬ CIAL SCIENCE, American. See Amer¬ ican Academy of Political and Social Sci¬ ence.

ACADEMY OF SCIENCES, an institu¬ tion founded at Paris in 1666 by Colbert and approved by Louis XIV in 1699. It published about 130 volumes of memoirs from 1666 to 1793, when it was suppressed. It was re-estab¬ lished in 1816. It has now 66 ordinary and 10 honorary members in 11 sections, with two perpetual secretaries, eight foreign associates and 106 corresponding members. Its prizes include an annual sum of 3,000 francs, given alternately for the best essay on a subject in mathematics and physics ; the Montyon prizes, six in number and valued at 45,000 francs an¬ nually, the Laland prize for astronomy, award¬ ed annually, and several others. The Academy meets annually in December and publishes Memoir es.

ACADEMY OF SCIENCE, Imperial Russian. Animated by a desire to develop Russian science to the degree of complete individuality and independence, the great re¬ former Emperor Peter I united all the most learned men and scientific researchers into one group which he called Akademiya Nauk (i. e., Academy of Sciences), the technical

realization of which was entrusted to his imperial physician, Professor Blumentrost. It was in 1724 that Peter the Great definitely approved the plan of Professor Blumentrost whereby the Academy was constituted in three principal parts : mathe¬ matics, natural sciences, and history with juris¬ prudence. Blumentrost was commissioned to invite to St. Petersburg not only Russian scien¬ tists but also a great number of foreigners which order he executed with the aid of Pro¬ fessor Wolf who had previously maintained an active correspondence with the Emperor. For the maintenance of the Academy Peter appropriated an annual sum of about 25,000 roubles and also presented that institution with his own library and art gallery. But Peter did not live to see the solemn inauguration of the Academy ; that honor fell to the portion of Empress Catharine, which took place on 1 Aug. 1726, notwithstand¬ ing the fact that the constitution of the Academy was granted one year previously and the first assembly of the members met in December 1725. The first president of the Academy was Blumentrost When Peter II came to the throne certain members of the Academy were appointed to direct his education, but when the Emperor went to Moscow together with Blu¬ mentrost the directorship of the Academy was entrusted to the librarian, Schuhmacher, who was a selfish and half-learned man with great power and who soon became most unpopular with the members of the Academy. Many of the most learned members resigned their posts, not being able to endure the interference with their scientific research of a director like Schuh¬ macher. Among the learned members who left St. Petersburg were Professor Eiler and the astronomer de la Cruis, who had spent 22 years in making astronomical researches in Siberia and whom Schuhmacher charged with the theft of Russian state documents; the celebrated author of the history of Siberia, Gerard Fried- rick Miller, and others. During the reign of Anna Iohanovna, Schuhmacher's power in- vol. i—5

creased all the more as he enjoyed the protection of Blumentrost* after whom the presidency was given over to Keiser- ling, who tried to curtail Schuhmacher's power, but presided only a year and was suc¬ ceeded by Korf who was friendly with Schuhmacher. However he improved the finances of the Academy and established in it a department of geography, publishing also in 1739 the first scientific atlas of Russia. In 1740 the presidency was transferred to Brevern who added to the Academy the library and the nu¬ mismatic collection of Volynski. Finally the academicians lost their patience with Schuh¬ macher and presented to the Senate a collective complaint against him. As Elisabeth Petrovna was not fond of the Germans and the investi¬ gations proved beyond doubt Schuhmacher's misdeeds, he

was dismissed and the directorship passed over to Nartov, a favorite of Peter I, who immediately discovered some further un¬ wholesome transactions of Schuhmacher that were threatening the Academy with complete financial ruin. He asked and obtained from the Senate a new appropriation to repair the situa¬ tion. Nevertheless Schuhmacher by some clever, though not honorable, device proved his inno¬ cence, the complaint against him was set aside and he reoccupied his old position. When Lomonosov returned from abroad and the presi¬ dency passed over to Count K. G. Razumovski, the controversy started afresh and Lomonosov's plan to add a University to the Academy was ignored. In 1745 regulations were adopted in accordance with which there were 10 members to be appointed by the state and as many honor¬ ary ones. Soon afterward a fire broke out in the archives of the Academy and Schuhmacher was suspected of being the incendiary. The administrative authority Catharine II granted to the new director of the Academy, Count G. G. Orlov (1766-74), who in turn was succeeded by Domoshnev (1774-82), who in turn was dis¬ missed on account of disorders caused by him. In his stead was appointed Princess E. R. Dash¬ kova (1782-94), a talented writer and follower of Lamonosov. She delivered a number of lectures in the Academy in Russian and trans¬ lated into the native idiom the principal master¬ pieces of foreign literature. It was during her administration that the Academy started publishing (Akedemicheskiya Izvyestiya) (Aca¬ demic Reports), <Noviya yezhemyesyachnyia sochineniya) (New monthly compositions), etc. But she was unable to agree with President Nikolay, who was succeeded by Novosiltzev (1803-10). This president issued new regula¬ tions increasing the number of the staff to 18 members and 20 assistants and establishing sep¬ arate sections for history, statistics, political economy and Oriental languages. After Novo¬ siltzev the office of the presidency was held for 37 years by S. S. Uvarov, who further increased the number of members to 21 and reduced that of assistants to 10. He also furthered research work in the fields of ethnography, history and statistics. After the death of Uvarov the presi¬ dency was given to Bludov (1847-64) who made many important investigations in the field of Russian philology. He was succeeded by the celebrated explorer, Admiral Lilke. The Acad¬ emy of Science consists of three parts: (1) physics and mathematics ; (2) Russian language ;

(3) history, political science and philology. Its annual budget amounts to over 500,000 roubles.

W. M. Petrovitch,

Chief of the Slavonic Division, New York Public Library.

ACADEMY OF SCIENCES, The Na¬ tional. See National Academy of Sciences.

ACADEMY OF SCIENCES, The Royal.

See Royal Academy of Sciences, The

(Danish).

ACADEMY OF SCIENCES, The Royal.

See Royal Academy of Sciences, The

(German).

ACADEMY OF SCIENCES, The Royal.

See Royal Academy of Sciences, The

(Swedish).

ACADIA (Micmac, Aplenty®), the original name of Nova Scotia (q.v.).

ACADIA UNIVERSITY, Canada, at Wolfville, Nova Scotia, was founded in 1838 as Acadia College, its act of incorporation conferring the powers of a university, which were confirmed by an Act of 1891, creating a new corporation under the name, of the “Governors of Acadia University.® They were invested with complete control over Acadia College and also over Horton Academy for boys and the Acadia Seminary for girls. The University grants degrees in theology, and the degrees of bachelor, master and doctor in the several arts, sciences and faculties. The gov¬ ernors are appointed by the Baptist Convention of Nova Scotia, but no religious tests are re¬ quired of the faculty or students. The institu¬ tion is coeducational.

ACADIALITE, a name given to chaba- zite (q.v.) from Nova Scotia (Acadia). Its color is usually salmon to flesh-red.

ACAJUTLA, ak-a-hoot'la, Salvador, Cen¬ tral America ; its second port in importance, exporting coffee and sugar, and the seat of a United States consular agent, 65 miles by rail from San Salvador, the capital. Pop. 12,000.

ACANTHOPTERYGII, a sub-order of teleost fishes, the most comprehensive in the whole class. Its most prominent distinguishing feature is “the presence of non-articulated, more or less pungent, rays in the dorsal and anal fins.® It embraces about 75 families of typical bony fishes, including almost all those taken for sport or food from the sea, except of the cod and herring tribes and a few fresh¬ water forms.

ACANTHUS, the typical genus of the family Acanthacecc, or acanthads, a family of monopetalous exogens, consisting of herbaceous plants or shrubs, found chiefly in the tropics, where they often form a large part of the weedy herbage. Acanthus is a native of many parts of southern Europe. The family is represented in America by a few wild-growing species ; but they are best known as tender garden plants. The best-known species of the genuine acanthus (or brancursines, as they were formerly called by a euphemism for the still older “bear’s- breech®), are A. mollis and A. spinosus. The former has a stem about two feet high, sur¬ rounded in its lower half with large, soft, shin¬ ing, hairy and deeply indented leaves, and cov¬ ered from the middle to the top with large

white flowers tinged with yellow. See Acan¬ thus in Art.

ACANTHUS IN ART. There are several

varieties of the acanthus plant. The two which find expression in art are the acanthus spinosus

Roman Acanthus Scroll.

and acanthus mollis, the former having leaves of sharply pointed indentation, the latter having wider, blunter points. Of all the art motifs

Greek Decorative Acanthus Leaf.

taken from plant life the acanthus has for many centuries been the most prolifically util¬ ized. Its graceful foliation adapts itself, when

Roman Decorative Acanthus Leaf.

slightly conventionalized, to all the decorative arts. In stone (architecture, etc.) it is found in the decorative capital of the columns in the Corinthian Order and in friezes; in metal we find it highly favored by the gold and silver-

smith, the ironworker, the brass trade artisan ; in woodwork the acanthus ornamentation is found universally in furniture and mural deco¬ rations. The ancient Greeks greatly favored this floral motif and the Romans quickly adopted the device in their art. In the East, also, the use of its decorative value was soon appreci¬ ated — in Byzantine it predominates. As in the above plastic arts, so in the graphic, where it is still in very great favor. Most art motifs taken from the flora as well as fauna domain owe some of their appreciation to the fact that they carry with them some reference to symbol¬ ism, but the acanthus has no symbolic value whatever.

The actual acanthus leaf is a perpendicular growth, but in the arts it is subjected to curves and convolutions not conforming to nature. The acanthus motif of the Greeks is the spinosus variety, while that adopted by the Romans was the mollis . Throughout the evolution of the decorative arts the acanthus continues favored by the period styles. We find it taken up, of course, in the Renaissance when it revived the classic forms ; the Romanesque utilized it, as did the Gothic. Its delicate scroll decoration appears in the French art of Louis XIV, XV and XVI, though with specialized conventional formations which, to some extent, render these periods separately recognizable.

ACCAD or AKKAD, Babylonia, a royal city of Shinar which gave its name to northern Babylonia, as distinguished from Sumer or southern Babylonia. It is the Akkad mentioned in Genesis x, 10, identified with Agade the capital of Sargon and of Naram Sin, still flour¬ ishing in the days of Nebuchadnezzar, about 1,100 years b.c. The Kings of Accad were dreaded in Sinai and in Cyprus, 3800 b.c. The exact site of the city is unknown, although it was near Sippara, about 30 miles north of Babylon. It is surmised that it was the oldest quarter of Sippara, on the opposite bank of the Euphrates, identified by British excavations in 1881 wdth the modern Abu Habba. Consult King, H., (A History of Sumer and Akkad* (London 1910).

AC'AROID RESIN, or GUM, a resin which exudes so abundantly from the grass trees (Xanthorrhoca) of Australia as to cover the base of the leaves and the underground portions of the plants, and is also obtained by crushing and sifting or wrashing, as much as 50 or 60 pounds being obtained from one plant. Two kinds, red and yellow, are generally dis¬ tinguished, and are used in varnishes as well as for several other purposes.

AC'ARUS, a genus of insects of the tribe Acaridce order, Arachnida.

They are oviparous, have eight legs, two eyes and two jointed tentacula, and are very prolific. All the species are extremely minute, or even microscopic, as the cheese-mite (Acarus domesticus), and many of them parasitic ; of the latter, the itch-insect (Sarcoptes scabici) is a remarkable example. It is a microscopic animal found under the human skin in the pustules of a well-known cutaneous disease. Many others infect the skin of different animals, such as dogs, hogs and cattle and sometimes in considerable numbers. In some instances they damage cow-hides. (See Mites). Acarus folliculorum is a microscopic parasite of the hair follicles of the skin. It is

the lowest form of mite, and is known also as Demodex folliculorum. See Blackhead.

ACCELERATION, the rate of change of the velocity of a body. If the velocity of the body is constant, its acceleration is said to be zero. If the velocity increases uniformly, so that at the end of every second it is greater than it was at the end of a preceding second by a constant amount, the acceleration is said to be uniform, and the motion is said to be uni¬ formly accelerated. If the velocity is decreas¬ ing, the acceleration is said to be negative. A body falling freely under the influence of grav¬ ity affords the most familiar example of uni¬ form (or constant) acceleration. When the body falls in air or any other medium, the phenomena are complicated by the resistance of the medium ; but when it falls in a vacuum its velocity increases every second by the same constant amount. Thus if the body starts from rest, it will have a velocity of 32.2 feet per second at the end of the first second, 64.4 feet per second at the end of the second second, 96.6 feet per second at the end of the third second and so on. The acceleration produced by gravity is therefore said to be 32.2 feet per second each second ; but this varies somewhat with the latitude and the height above the sea. (See Force of Gravity). The acceleration experienced under given circumstances is pro¬ portional to the force acting upon the body in the direction in which its motion is accelerated. Thus if the foregoing experiment with a falling body were tried upon some other planet, and we found that the velocity of the falling body was increased by 322.0 feet per second every second (instead of 32.2 feet), we should know that the force of gravitation at the surface of that planet is precisely 10 times as great as it is upon the surface of the earth. In physics and theoretical mechanics a force is always measured by the acceleration it produces when exerted upon a unit mass. For a further account of the relation between force, mass and acceler¬ ation, also see Force.

ACCELEROGRAPHS, devices or attach¬ ments for measuring the

succession of pressure developed in a given point of a powder cham¬ ber by the combustion of a charge of powder either enclosed in a vessel or placed in the bore of a gun and acting on the projectile. The first accelerographs were experimented on in 1873 in Paris, for the study of com¬ bustion in a close vessel; afterward, in 1874, on the proving ground of the Nevers foundry for the study of combustion in guns. Since that time various improvements have been successively made in the mode of construc¬ tion and in the manner of employment. The accelerographs thus modified were em¬ ployed in numerous experiments, both at the laboratory of the central depot for powder and saltpetre and at the proving ground of the Sevran-Livry powder works with the double advantage of testing both the ingredients and the powder manufactured for the navy. In these trials they proved convenient for hand¬ ling and also practical, and they furnished some valuable observations on the law of combus¬ tion of powder charges, and on that of the development of the pressure resulting there¬ from both in close vessels and in guns of vari¬ ous calibres. Also by a slight modification of

t>8

the accelerograph, employed for measuring the pressures developed in the firing of guns, this apparatus can be utilized for determining simul¬ taneously the law of the pressure developed in the bore and the law of the recoil of the gun. The accelerographs in question were of the types called slide accelerographs, in which the law of the movement of the piston, subjected to the action of the powder gases, is deducted from the known movement of a style-bearing slide displacing itself in a direction normal to that of the piston. More recently there has been a return to the employment of accelero¬ graphs, in which the movement of the piston is deduced from the tracing of the vibrating fork. Finally, from the commencement of the experiments on accelerographs, trial was made conjointly of apparatus called accelerom¬ eters, based on the same principle, but which indicated at each experiment only one isolated value of the pressure developed by the powder corresponding to an arbitrary subdivision of the duration of combustion of the charge. These, which require the repetition of identical experiments for determining perfectly the law of the development of the pressures produced by the combustion of a charge of powder placed in certain definite conditions, have been applied to the study of the combustion of powder in a closed vessel, as \yell as to the study of the pressure developed in the bore of the guns. But they have been more especially employed in this latter case by

placing them in front of the initial site of the projectile for measuring the pressure existing against the ® sabot® of this latter at the same moment when it attains a definite point of its passage in the bore, be¬ cause one single experiment with this appara¬ tus suffices to show the value sought. Accelero¬ graphs present different arrangements, accord¬ ing as they are intended to be mounted on fixed receptacles for the study of the combustion of powder in a closed vessel, or as it is proposed to mount them on guns ; two principal types have been established, the one denominated weight accelerometers and the other spring accelerometers. Fork accelerometers have also been employed for increasing the precision ob¬ tained.

The Slide-accelerograph used for studying the combustion of powder in a closed vessel is arranged in such a manner as to indicate the law of the movement of a piston, of known section and weight, bedded in a groove cut normally in the sides of the powder chamber and subjected freely, on its base, to the action of the gases produced by the combustion of the charge. The apparatus registers the spaces passed by the piston each instant during the combustion and these passages can be exactly measured by very small and regularly divided intervals of time.

The Slide-accelerograph, employed for study¬ ing the combustion of powder in guns, has the piston lodged in a steel bushing like those that are designed for the apparatus called crushers employed also for estimating the pres¬ sures produced by the combustion of powder. The bushing is screwed into a hole pierced in the sides of the gun normal to the bore, at a point chosen for the purpose, and is terminated on the outside in a threaded head on which is screwed the frame which serves as a guide for the cube designed to receive the table and

as a support for the stylus-bearing slide. The only difference in signalling with the powder- mill apparatus is the arrangement placing the additional weight above the piston, when there is room, in order to increase, as occasion re¬ quires, the duration of the unobstructed stroke of the piston and to prolong it so as to continue the movement during an interval equal to that of the passage of the projectile in the bore. See Ballistics ; Chronograph.

ACCELEROMETER. An apparatus for measuring the velocity imparted by gunpowder. It shows, by direct registry, the law of the movement in the function of time of a piston subjected to the action of powder-gases. An additional weight placed on this piston in such a manner that it may be thrown vertically without obstacle, when this latter is

suddenly stopped, can show, by a single observation, the velocity acquired by the piston up to the end of its stroke. In fact, this weight, thrown freely and preserving the velocity which it had in common with the piston, will be raised to a height, h, given by the relation v2 — 2gh, so that the observation of the height of the vertical stroke h will show the velocity v. If it is ad¬ mitted that the phenomena of the combustion of the powder are reproduced identically in the like conditions, and if a series of detona¬ tions are effected with a constant charge, but varying the stroke each time, it is evident that the observation of the corresponding heights of throw of the additional weight supported by the piston would show the successive velocities acquired by this piston according to the grad¬ ually diminishing paths. We could then deter¬ mine, by this simple process, and without a special chronometric organ, but on condition of repeating the experiments, the law of move¬ ment imparted to the piston. See Accelero¬ graphs.

ACCENT, the stress or emphasis given by the voice to a certain syllable or syllables of a word, or to certain notes in a bar of music; also, the peculiar intonation of one spoken lan¬ guage when compared with another ; further, marks used in printing or writing to show the position of the stress. In a dissyllable there is but one accent, as a-back', but in a polysyllable there may be more than one. One of these, however, is always greater than the rest and is called the primary accent; the others are called secondary.

Two wholly distinct classes of accent are found in Aryan languages, the musical and the expiratory; the former, which is that of some Semitic tongues also, being that of Greek and Sanskrit, the latter that of Latin and Teutonic. Some languages, as French, have no accent, the stress on all syllables being the same, but even here the stopping of the voice gives the final syllable a slight tilt upwards, with the effect of an accent on that syllable. Accent may be free, as in Greek or old Teutonic, — that is, its posi¬ tion in a word may shift in accordance with the nature of the syllables or of the words which follow, — or fixed, as in later Teutonic and English: perhaps the only remnant of the free accent in English is the word (<cannot,® which, though often spelled as two words, is really a compound word with an accent shifting accord¬ ing to emotion. By a change of stress we often indicate the change of an adjective or a noun

into a verb, as fre'quent (adj .) , frequent' (verb) ; pro'ject (noun), project' (verb).

In compound words the accent is commonly on the first ; but when the first element is a prefix, separable or inseparable, it is accented only when the root-word is noun or adjective, the root receiving the accent if it is a verb, — this of course not applying to words borrowed from other languages, for which there is no settled rule, the chance of first usage commonly determining it. The inflections have almost al¬ ways been left unaccented, and this has aided greatly in the sloughing off of the whole in¬ flectional system in modern languages : even where retained to the eye they are often not pronounced at all, as in French.

There is a certain analogy between accent and emphasis, emphasis doing for whole words or clauses of sentences what accent does for single syllables. One result of this has been to develop duplicate words with different mean¬ ings, as of and off, to and too, through and thorough (originally pronounced tho-roo). All modern verse depends on stress-accent (see Metre) ; while that of classical Greek and Latin, as of some Semitic tongues still, rested on quantity or length of syllables, — a system not easy for those reared on stress to comprehend, much less imitate.

Marks of Accents. — In ancient Greek, ac¬ cents marked the rise and fall in pitch of the voice, and were three in number, the acute (a), the grave (a) and the circumflex (a or a). The same marks are now used in French, and the first two in Italian, though they are largely of historical or etymological interest only, and do not always indicate a difference in pronunci¬ ation. A mark similar to the acute accent is sometimes used to signify stress in English words, chiefly in poetry ; and one like the grave is used to mark as a separate syllable letters otherwise not pronounced so, for example, learned, abhorred. Marks sometimes called accents are used in mathematics ; for example, a' --b' (read a prime plus b prime). In geom¬ etry and trigonometry, a circle at the right of a figure indicates degrees, one mark minutes, two marks seconds of a degree, as 13° 4' 5".

In mensuration and engineering, the mark denotes feet, inches and lines, as 4' 6" 10'''.

In Music. — The greater emphasis or inten¬ sity given to certain notes or passages, as distinguished from their length in time and their quality or timbre. It is divided into three classes, — • grammatical, rhythmical and rhetori¬ cal or aesthetic. The grammatical accent is

al¬ most always on the first part of a bar; long measures have usually secondary ones, as have polysyllables in words. Rhythmical accent is the more pronounced character given to certain parts of larger compositions, — phrases, themes, motifs, — to mark off entrances, finales or cli¬ maxes. Rhetorical accent corresponds strictly to the same emphasis in oratory, in accordance with emotion or a desired effect, and is at the will of the performer.

ACCENTOR (ˆsinger-together®), a liter¬ ary name for the American water-thrushes (genus Siurus) and the European warblers, of which the British hedge-sparrow (incorrectly named) is best known.

ACCEPTANCE, an act by which one agrees to be bound by the terms of a bill of

exchange. To render a bill of exchange so valid that, if the drawee fails to liquidate it, the drawer may be charged with costs, the promise of the drawer should be in writing under or upon the back of the bill. An ac¬ ceptance may be made before the bill is drawn, in which case it must be in writing (15 Johns. N. Y. 6). It may be made after it is drawn and before it becomes due, which is the usual course, or after it becomes due (1 H. Blackst. 313), or even after a previous refusal to accept. The proper form for the acceptance of a bill is to write the word (< Accepted® across the bill and sign the acceptor's name, but the drawee's name alone is sufficient or any words of equiva¬ lent force to <(accepted.® Byles on Bills, 147 ; 21 Pick. (Mass.) 307. See Bill; Banks and Banking — Commercial Paper (Article 17).

ACCESS, (1) admission of a husband to intercourse or opportunity of intercourse with his wife. The mere fact that husband and wife live apart creates no presumption of non-access. The issue of the wife, in the absence of direct proof to the contrary, are presumed to be his issue. Except when modified by statute, par¬ ents are not permitted to prove non-access in order to show illegitimacy of the wife's issue, either in civil or criminal actions. (2) Admis¬ sion of an owner of adjoining land to a public road or a public navigable stream. See Access, Right of. (3) Admission of parents to children having a court as guardian.

ACCESS, Right of. The owner of land adjoining a road or public highway is entitled to access to such highway at any point where it comes up to his land. He may also have an action for the removal, by injunction, of any obstruction to such access, as well as an action for damages. It has been expressly held also that an abutting owner has a property right in the use of the street in front of his land as a means of

egress and ingress, and for light and air. (47 N. J. Eq. 421 ; 106 N. Y. 157). If a man buys a lot of land from which there is no access to a public highway, upon application to the proper authorities he may obtain an order for the construction of a road or high¬ way leading from his land to a public highway. See also Right of Way.

ACCESSION is the right to all wdiich a man's own property produces, and the right to that which is united to it by accession either naturally or artificially (2 Kent Comm. 360). If a man builds a house upon his own grounds with the materials of another, or, on the con¬ trary, if a man shall have built a house with his own materials upon the ground of another, in either case the house becomes the property of him to whom the land belongs, for every build¬ ing is an accession to the ground upon which it stands, and the owner of the land, if liable at all, is only liable to the owner of the mate¬ rials for the value of them (2 Kent Comm. 362). The same rule holds where vines, trees, . fruits and vegetables are planted or sown in the ground of another.

ACCESSORY, in law, one who is not the chief actor in an offense or present at its com¬ mission, but still is connected with it in some other way. Accessories may become so before the fact or after the fact. Sir Matthewr Hale defines an accessory before the fact as one who, being absent at the time of the crime committed,

does yet procure, counsel or command another to commit a crime. If the procurer be present when the evil deed is being done, he is not an accessory, but a principal. An accessory after the fact is one who, knowing a felony to have been committed, receives, relieves, comforts or assists the felon. In high treason of a pro¬ nounced character there are no accessories — all are principals. In petit treason, murder and felonies, there may be accessories ; except only in those offenses which, by judgment of law, are sudden and unpremeditated, as manslaugh¬ ter and the like, which, therefore, cannot have any accessories before the fact. So, too, in petit larceny and in all crimes under the degree of felony, there are no accessories either before or after the fact ; but all persons concerned therein, if guilty at all, are principals (Blackst. Comm., bk. iv, ch. iii). Presence and actual participation are necessary to constitute a per¬ son an accessory. The mere fact of presence or failure to interfere to prevent the commis¬ sion of a crime is not, alone, an indictable offense. The person must act in concert with the active party. He must by word or act con¬

tribute to the felonious purpose. Presence need not be actual, it may be constructive. A man may commit a crime through the agency of an innocent person, but the agent cannot be con¬ victed. Where an offense is committed within a State by means of an innocent agent, the em¬ ployer is guilty as a principal, although he did no act in the State where the crime was com¬ mitted, and at the time of the commission of the offense was in another State. (1 N. Y. 173 (s. c. 45 Am. Dec. 468) ; 123 Mass. 430).

AC'CHO. See Acre.

ACCIAIGLI, atch-yi-6'le, Renatus, a Florentine who conquered Athens, Corinth and part of Bceotia; lived in the beginning of the 15th century. He bequeathed Athens to the Venetians; Corinth to Theodosius Palaeologus, who married his eldest daughter ; and Boeotia with Thebes to his natural son Anthony, who also got Athens, but this was retaken in 1455 by Mohammed II.

ACCIDENT, an unforeseen occurrence, particularly if it be of a calamitous character. This is the most common use of the word.

In logic, (d) Whatever does not really con¬ stitute an essential part of a person or thing; as the clothes one wears, the saddle on a horse, etc. (b) The qualities or attributes of a person or thing, as opposed to the substance. Thus bitterness, hardness, etc., are attributes, and not part of the substance in which they inhere.

(c) That which may be absent from anything, leaving its essence still unimpaired. Thus a rose might be white without its ceasing to be a rose, because color in the flowers of that genus is not essential to their character.

Accidents, in logic, are of two kinds, sepa¬ rable and inseparable. If walking be the acci¬ dent of a particular man, it is a separable one, for he would not cease to be that man though he stood still ; while, . on the contrary, if Spaniard is the accident connected with him, it is an inseparable one, since he never can cease to be, ethnologically considered, what he was born (Whately's (Logic, } bk. ii, ch. v, sec. 4).

In grammar, a property attached to a word which nevertheless docs not enter into its essen¬

tial definition. Each species of word has its accidents : thus those of the noun substantive are gender, declension and number. Compari¬ son in an adjective is also an accident.

In law, an event which under the circum¬ stances is unusual and unexpected by the person to whom it happens. It is the happening of an event without the concurrence of the will of the person by whose agency it was caused, or the happening of an event without any human agency. If a house should be burned in conse¬ quence of a fire made for the purpose of cook¬ ing, . or warming the house, this would be an accident of the first kind. If the house should be set on fire by lightning, this would be an accident of the second kind. (1 Fonblanque, Eq. 374, 375 n.). The best test of liability for the consequence of an accident turns upon the fact whether the person causing the accident was guilty of negligence or not. If he was guilty of negligence he would be liable unless the person injured was guilty of contributory negligence.

In heraldry, an additional note or mark on a coat of armor, which may be omitted or re¬ tained without altering its essential character.

ACCIDENT INSURANCE. A policy of accident insurance is a contract providing in¬ demnity for loss of life, limb, sight or time, be¬ cause of bodily injuries, effected solely and independently of all other causes, through ex¬ ternal, violent and accidental means. The full principal sum of the policy is payable in case of death, loss of both hands or both feet, of one hand and one foot, or the sight of both eyes. One-half of the full principal sum is pay¬ able in case of the loss of either hand or foot or the sight of one eye. A fixed sum is payable weekly tor the term of temporary disability, whether total or partial, not exceeding a cer¬ tain definite period, varying from six months to two years, and frequently for the life of the insured. The premium, which is generally es¬ timated on the annual basis, is determined by the business, occupation or profession of the applicant, and is proportioned upon the amount of the principal sum and the weekly indemnity named in the policy. Double amounts, both of the principal sum and of the weekly indemnity, are payable in case of injuries received in or on a moving conveyance, provided for the use of passengers, and propelled by steam, electric or cable power; or for injuries received in or while entering or leaving passenger elevators ; or in burning buildings, or for injuries caused by falling walls ; or from automobile ac¬ cidents on the highway; or caused by a stroke of lightning ; or by the explosion or rupture of a steam boiler ; or by a cyclone or tornado.

The policy also provides for hospital treat¬ ment ; for the payment for medical and surgical fees and for operations; for the payment of optional indemnity, in cases of certain named injuries, in lieu of weekly indemnity; and for annual accumulations of the principal sum and the weekly indemnity until the same amount to 50 per cent in

addition to the original sums: also for emergency indemnity to place the in¬ sured in care of friends or relatives in case of injury away from home.

Accident insurance was first introduced in this country by James Goodwin Batterson of Hartford, Conn., after his return from a trip

to England in 1859, where he learned of acci¬ dent insurance, in the form of tickets, insuring the holder for a specified sum, in case of death or injuries resulting from railway accidents. The first American accident insur¬ ance company was organized in 1863 at Hart¬ ford, and it is said that the first insurance con¬ tract made by the company was a verbal agree¬ ment between the president of the company and a citizen of Hartford, whereby, in consider¬ ation of a premium of two cents, the company agreed to indemnify the insured in the sum of $5,000, in case of accident to the insured while journeying from the post-office to his home in Buckingham street

Growth. — The growth of the business has been phenomenal since that modest beginning, as the following figures will attest: Premiums received from 1873 to 1892, $42,027,207 ; losses paid $18,125,771 ; from 1893 to 1916 premiums received $426,600,679; losses paid $183,804,575.

The above figures cover the operations of the stock insurance companies, of which there were 119 transacting business in 1916 with pre¬ miums written in that year of $43,043,546, and losses paid of $19,159,528, including health insurance in the case of some companies that do not report their accident and health premiums and losses separately. There are in addition, however, a large number of mutual accident insurance associations operating in the United States upon the assessment plan and providing to their members accident and sick¬ ness insurance at a cost much less than could be obtained from stock companies. This busi¬ ness has increased since 1901 from premiums or assessments received of $1,111,232 and claims paid of $715,429 to premiums or assessments of $6,937,175 and claims paid $4,834,479 in 1916, covering the operations of 56 companies.

The number of certificates in force at the close of 1901 was 146,185, while at the end of 1916 this number had increased to 799,761. The total admitted assets increased during the same period from $930,471

to $4,360,666; total liabilities from $84,630 to $2,065,919, and net surplus from $845,841 to $2,296,747.

In a word, accident insurance has assumed a leading place in insurance underwriting of the United States, and the ever-increasing competi¬ tion of new companies and the activities of those now in business has resulted in the con¬ tinued broadening of the policy and the grant¬ ing of additional benefits. At the present time, the modern, up-to-date policy is practically con¬ ditionless and pays indemnity for life, in case of total or partial permanent disability, thereby affording to the unfortunate an annuity that may be his only source of income. Partners in business and officers in corporations take out large policies, payable to the firm or to the cor¬ poration, protecting them against loss in case of the removal by death of a valued member of the organization. In many such ways, accident insurance proves to be not only a benefaction, but actually a conserver of credit.

Edwin W. DeLeon,

Member Insurance Society of New York.

ACCIDENTALISM. The theory that events may happen without any cause whatever. If we accept the old view of the causal rela¬ tion as fundamental and in need of no defini¬ tion, the meaning of accidentalism is clear

enough. If on the other hand, we take the Humain view that cause is mere constant con¬ comitance, and that causal laws merely express one sort of occurrence as a function of another, accidentalism may be interpreted as meaning that this function is many-valued — that two qualitatively identical antecedents may be fol¬ lowed by different consequences — or that it is discontinuous - — that a sufficient degree of simi¬ larity in the antecedents need not imply any similarity in the consequences. Accidentalism in ethical matters is indeterminism. However, many views which are considered as indeter¬ ministic merely hold that the physical ante¬ cedents of a deed are alone insufficient to deter¬ mine the deed, while the physical antecedents together with the character, motives, con¬ science and understanding of the agent are adequate for this purpose. Accidentalism in metaphysics is known as tychism.

ACCIDENTS, Causes and Prevention of Industrial Accidents. — For many years mod¬ ern industry, especially in the United States, has been confronted with the serious problem of preventing injuries, whether avoidable or unavoidable. The avoidable injuries are due to

the carelessness of the victim, the employer or a fellow employee, while unavoidable injuries or accidents constitute the occupational risk. The chief causes of preventable industrial in¬ juries are: (1) Lack of provision of safety in construction; (2) excessive hours of labor; (3) unremitting pressure for large output, resulting in the maintenance of too great speed; (4) inadequate factory inspection; (5) failure to remedy known defects ; (6) insufficient signal systems or methods of warning; (7) ignorance of workers and the failure of employers to instruct and direct them. The first annual re¬ port (1915) of the New York State Workmen's Compensation Commission states that there were not more than 100 cases in a total of 18,930 awards allowed in which the question of intoxication was raised either by the em¬ ployer or insurance carrier ; in not a single case did the commission decide that the injuries were due wholly to intoxication, nor was a single grant disallowed on the ground of intoxication. A Minnesota bulletin assigned 71.6 per cent of industrial accidents to hazards of industry and 5.2 per cent to contributory negligence. The principal causes of accidents were ascribed to (<youth, ignorance of the English language, in¬ competence, carelessness, ranging all the way from momentary inattention or forgetfulness to foolhardy recklessness, personal short-com¬ ings, like deafness, or excitability and absorp¬ tion in the work at hand which make the workman oblivious of approaching danger, fatigue and nerve strain.® A Massachusetts report states that ((dusty trades, industrial poisons, and occupational diseases are responsi¬ ble for an annual loss in the United States of $750,000,000, through needless diseases and dis¬ ablements,® and that poor conditions in many factories, mills and shops have a direct bearing upon the number of accidents. The Ohio report of 1915 ascribes the accidents that were passed upon by the commission to the follow¬ ing causes: Falling and shifting objects, 19,606; machinery, 14,018; hand tools and simple apparatus, 5,231 ; nature of material used or similar working conditions, 4,900; falls, 4,774 ■

carrying, lifting or handling great weights, 1,196; transportation on tracks, 912; transporta¬ tion not on tracks, 699 ; suffocation and asphyxi¬ ation, 139; animals, 457; sunstroke and heat prostration, 107 ; intentional violence of fellow employee, 41 ; intentional violence of persons not employees, 34.

There are no statistics for the country as a whole relating to industries individually, but the mortality tables of the 1910 census give a fair

idea of the accident rate, the statistics covering about 56 per cent of the country's population. Of the males 10 years of age and over, 22,652, grouped in 148 occupations, died through acci¬ dent, while 881 females of the same ages, grouped in 140 occupations, met the same fate. Among the males one death out of every 10 was accidental, while the ratio among the females was one out of 30. Among steam rail¬ way employees there was one death by acci¬ dent to 1.9 deaths by all causes; among manu¬ facturing laborers one to 8.4; among miners and quarrymen one to 2.5 ; among persons en¬ gaged in agricultural pursuits, one to 15.5; among salesmen, one to 18 ; and among lawyers, one to 23 ; while teachers and clergymen ap¬ peared to be most free from fatal accidents, the ratios being one to 31 and one to 30 respec¬ tively. In the Bureau of Labor Statistics Bul¬ letin 157 (1915) F. L. Hoffman estimates the number of fatal industrial accidents in 1913 at 35,000, while there were approximately 700,000 injuries which resulted in disability for more than four weeks. The ratio of fatal injuries per thousand employees ranged from 4.00 for metal mining, 3.50 for coal mining, 3.00 for fisheries, navigation, lumbering, building and street railway employees to .25 for general manufacturing. In coal mines the number of fatal accidents decreased from 2,785 in 1913 to 2,454 in 1914, the most prolific cause of death being the falling of roofs and coal. The death rate per thousand employees for the entire country was 3.22 in 1914 against 3.73 in 1913. Carl M. Hansen of the Workmen's Compen¬ sation Service Bureau places the number of workmen killed annually at 40,000 to 45,000, while the Massachusetts Industrial Accident Board places those killed by accident at 75,000 and the number of those injured annually at

3,000,000.

Legislation and Safety Devices. — Un¬ doubtedly a large proportion of industrial acci¬ dents are preventable, if the employer be com¬ pelled to make the protection of workmen rather than enormous production his first inter¬ est. If accidents constituted a heavy and de¬ terminable cost to the business, the employer would quickly realize that the prevention of accidents was to his economic interest. Safe but slower methods of production may result in reduced profits, but the welfare of the com¬ munity demands that the human waste that is a direct result of the dangerous quicker ways be compensated for by a greater reduction in profits. In the Army and Navy Appropriation bill passed 4 March 1915, Congress inserted a provision prohibiting the employment of the l(speeding tip® system in government plants. The motive for prevention of accidents can never be compelling until a uniform and un- escapable penalty be established for each injury or

death. Many of the States have enacted laws for the prevention of work-accidents and

diseases, and for the collection of reliable in¬ formation concerning their nature and extent. Most of the States and Territories have also passed laws compelling the payment of various sums of money by employers for personal in¬ juries to employees causing death or disability for more than two weeks, arising out of and in course of employment, not due to the em¬ ployee's wilful intention to injure himself or another or to his intoxication. The industries covered, the injuries and persons compensated, and the rates of compensation differ in the various States. Among the laws are the fol¬ lowing, with the dates of enactment and amend¬ ment :

Alaska: 9 April 1915; in effect 28 July 1915.

Arizona: 8 June 1912; in effect 1 Sept. 1912; new act 13 May 1913; in effect 1 Oct. 1913.

California: 8 April 1911; in effect 1 Sept. 1911; new act 13 May 1913; in effect 1 Jan. 1914; amended 1915 Canal Zone: 24 Aug. 1912; executive order 26 Feb. 1913; in effect 1 March 1913 (suspended); new order 20 March 1914; in effect 1 April 1914.

Colorado: 10 April 1915; in effect 1 Aug. 1915. Connecticut: 29 May 1913; in effect 1 Jan. 1914; amended 191S-

Hawaii: 28 April 191S; in effect 1 July 1915.

Illinois: 10 June 1911; in effect 1 May 1912; new act 28 June 1913; in effect 1 July 1913; amended 28 June 1915. Indiana: 8 March 1915; in effect 1 Sept. 1915.

Iowa: 18 April 1913; in effect (a) establishing industrial commission and providing for insurance of employees, 4 July 1913; (b) compensation features 1 July 1914. Kansas: 14 March 1911; in effect 1 Jan. 1912; amended 10 March 1913.

Kentucky: 23 March 1916; in effect 1 Aug. 1916.

Louisiana: 18 June 1914; in effect 1 Jan. 1915.

Maine: 1 April 1915; in effect 1 Jan. 1916.

Maryland: 16 April 1914; in effect 1 Nov. 1914. Massachusetts: 28 July 1911; in effect 1 July 1912; amended

1. 1. iQiS-

Michigan: 20 March 1912; in effect 1 Sept. 1912; amended

1913, 1915.

Minnesota: 24 April 1913; in effect 1 Oct. 1913; amended I9XS-

Montana: 8 March 1915; in effect 1 July 1915.

Nebraska: 21 April 1913; in effect 17 July 1913.

Nevada: 15 March 1913; in effect 1 July 1913; amended I9i5-

New Hampshire: 15 April 1911; in effect 1 Jan. 1912.

New Jersey: 4 April 1911; in effect 1 July 1911; amended

1911, 1912, 1913. 1914. 1915.

New York: 16 Dec. 1913; in effect 1 July 1914; amended

1914, 1915, 1916, 1919.

Ohio: 15 June 1911; in effect 1 Jan. 1912; amended 1913,

1914, 1915-

Oklahoma: 22 March 1915; in effect 1 Sept. 1915.

Oregon: 25 Feb. 1913; in effect 30 June 1914; amended 19x5.
Pennsylvania: 2 June 1915; in effect 1 Jan. 1916.

Porto Rico: 13 April 1916; in effect 1 July 1916.

Rhode Island: 29 April 1912; in effect 1 Oct. 1912; amended

1. 1915-.

Texas: 16 April 1913; in effect 1 Sept. 1913.

Vermipnt: 1 April 1915; in effect 1 July 1915.

Washington: 14 March 1911; in effect 1 Oct. 1911; amended

1913,.1915-

West Virginia: 22 Feb. 1913; in effect 1 Oct. 1913; amended I9I5-

Wisconsin: 3 May 1911; in effect same date; amended 1913, I9.I5-

Wyoming: 27 Feb. 1915; in effect 1 April 1915.

United States: 30 May 1908; in effect 1 Aug. 1908; amended 24 Feb. 1909, 4 March 1911, n March, 27 July and 24 Aug. 19x2. (Does not include private employment). New act 7 Sept. 1916; in effect same date.

Most of the laws are enforced through factory inspection, but in many States this inspection is so lax and inadequate that the laws are practically ineffectual. In 1911 Wis¬ consin created an agency for administrative legislation as to details in safety provisions, resembling the systems in many foreign countries. The law requires the employer to take every reasonable precaution against risk and the industrial commission decides what safety devices the employer shall install in order that his factory may be as nearly free from accidents as possible. The commission is

expected to inform itself of the latest and most improved safety devices and so far as may be practicable to secure their adoption by em¬ ployers. The success of this law induced Massachusetts and New York in 1913 to pro¬ vide for similar tribunals. In 1915 Nevada created an industrial commission for the ad¬ ministration of the Workmen's Compensation Act and provided that one of the commissioners should hold the office of labor commissioner for the enforcement of labor laws. In 1915 New York consolidated the workmen's com¬ pensation commission and the labor department under an industrial commissioner, the act being in accord with laws in Wisconsin, Ohio and a few other States which have created industrial commissions with powers similar to those exer¬ cised by public utility commissions.

Almost all States have enacted laws requir¬ ing dangerous machinery to be fenced about, and that every possible means be adopted to protect employees. In 1915 Connecticut and Massachusetts passed laws requiring first aid rooms or emergency kits in all manufacturing establishments where machinery is used. De¬ tailed provisions regulating heating, lighting and ventilating factories and guarding ma¬ chinery therein were passed in Illinois in 1915, and Missouri in the same year provided for similar regulations in coal and zinc mines.

Many cities too have enacted laws with the same object in view. New York city has passed ordinances to prevent unnecessary and reckless loss of life by compelling employers to furnish proper and safe scaffolding, to be more careful in employing men who work in caissons, to institute proper safeguards in the operation of elevators and to enforce the fire prevention law more strictly. The police forces of the various cities are compelling a more strict observance of the traffic regulations with the result that street accidents are being reduced to a minimum.

The various safety appliances could not be here described ; suffice it to say that their effectiveness is conclusively proved by statistics published in 1913 by the Department of Labor in a report entitled (Accidents and Accident Prevention in the Iron and Steel Industry.* The report covered 155 plants, employing 1 58,- 604 workers, the accident rate for all plants, per thousand, being 1.86 fatal accidents, 2.72 permanent disabilities and 240.6 temporary dis¬ abilities. In those plants where the best sys¬ tems of accident prevention were installed, the accident rate was 167.1 per thousand, while the rate in the most poorly equipped plants was 507.9 per thousand. The United States Steel Corporation annually spends nearly a million dollars to maintain its safety system, but by so doing has reduced its fatal and disability accidents by about 45 per cent, and its less serious accidents by a still greater percentage. Safety engineering has now become an accepted branch of the science of engineering. One of the motives impelling employers to install or increase their safety appliances has been the differential insurance rates put into vogue by those who issue employers' liability policies.

An International Association of Industrial Accident Boards and Commissions has been formed ((to bring into closer relation with one another the various boards and commissions administering compensation laws of the United

States and to effect so far as possible unanimity in the administration of such laws and to encourage and give effect to all measures look¬ ing toward the prevention of accidents and the safeguarding of plants and machinery.® At a convention of the National Safety Council at Philadelphia in October 1915, much time was devoted to the discussion of means for safe¬ guarding machinery; the connection between the consumption of liquor and the number and seriousness of accidents; the necessity of more drastic legislation ; the value of physical ex¬ amination and of other methods of excluding the subnormal and the unfit ; and the financial advantages accruing from the use of safety devices.

Railway Accidents and Legislation Re¬ garding. — The result of the installation and application of safety devices appears nowhere more strikingly than in railway statistics. In 1914 there were a total of 192,662 persons in¬ jured on steam railways and 10,302 killed, while in 1915 the total was 8,621 persons killed and 162,040 injured. This showed a remarkable reduction over any year since 1900, despite the fact that the number of persons carried one mile in 1915 was 106 per cent greater than in 1900 and the number of tons of freight hauled one mile was about 92 per cent greater. On 31 Dec. 1915 the Railway Age Gazette reported that 97,809 miles of railway in the United States were operated under the block signal system, which may account for the increased safety of passengers. Many casualties are due to carelessness of motorists at crossings, though in many cases these are inadequately guarded.

In order to promote safety in railway opera¬ tion many States have railway commissions that investigate and report accidents them¬ selves while other States require the railways to render their own reports. In general these commissions are empowered to inspect railway property and operation (roadway, bridges, tracks, equipment) periodically or at discretion, to recommend and require repairs and improve¬ ments and to report to the governor or the legislature their recommendations and any neg¬ lect of them. They are authorized also to require the proper guards at crossings ; to regulate the heating and lighting and the carry¬ ing of tools in passenger cars; to regulate the speed of trains in cities and near grade cross¬ ings and the transportation of explosives and inflammables ; to regulate the weight and quality of rails and the style of interlocking devices ; to prescribe the number of brakemen and the qualifications and hours of labor of various employees ; to impose penalties upon railway employees who become intoxicated while on duty or for neglect of duty which would endanger life or safety.

A number of Federal safety appliance, acci¬ dent and compensation laws have been passed. The act of 3 March 1901 was superseded by another 6 May 1910 requiring monthly reports of all accidents injuring persons or railway property and authorizing the Interstate Com¬ merce Commission to investigate serious acci¬ dents. On 11 June 1906 an act was passed which was later declared unconstitutional and was superseded by the acts of 22 April 1908 and '5 April 1910. These constitute the Federal Employers' Liability Act and hold common

carriers liable for injury or death resulting in whole or in part from the negligence of any of the officers, agents or employees of such carrier, or by reason of any defect or insuffi¬ ciency due to its negligence, in its cars, en¬ gines, appliances, machinery, track, roadbed, works, boats, wharves or other equipment. Workmen's compensation acts are not appli¬ cable to cases of employees injured while en¬ gaged in interstate commerce traffic and no recovery may be had under them. Other acts are designed to prevent casualties. The orig¬ inal safety appliance act was passed 2 March 1893 but was amended 1 April 1896, 28 June 1902 and 2 March 1903, with the result that now all freight cars must be equipped with automatic couplers and grab-irons, and in each train at least half the cars must be provided with brakes operated from the locomotive. On 6 June 1910 the Interstate Commerce Com¬ mission ordered that on all trains operated with power or train brakes at least 85 per cent of the cars should have their brakes operated from the locomotive. By the act of 14 April 1910, as amended 4 March 1911, the Commis¬ sion is required to regulate hand-holds or grab- irons, hand-brakes, running-boards, sill-steps and ladders on freight cars. Under the joint resolution of 30 June 1906 the Commission is required to investigate the block signal systems and appliances for automatic train control. The railways are required by the act of 30 May 1908 to equip locomotives with ash pans that can be cleaned without an employee going under the locomotive. The use of unsafe boil¬ ers and other appurtenances on locomotives and tenders is forbidden by the act of 17 Feb. 1911 (as amended 4 March 1915) and provision was made for the inspection of boilers and their appurtenances by the railways and by inspectors under the Commission's supervision. The transportation of explosives for a time was regulated by the act of 4 March 1909 which superseded the act of 30 May 1908. On 1 Jan. 1910 the law was again amended and the present regulations which have been the result of occasional amendment went into effect 1 Oct. 1914. There is a <(Bureau for the Safe Transportation of Explosives and Other Dan¬ gerous Articles® which was first instituted in June 1907 and was conducted under the aus¬ pices of the American Railway Association, but which now also works in conjunction with and under the authority of the Interstate Com¬ merce Commission. On 4 March 1907 an act became law providing that, save in cases of great emergency, trainmen must have 10 hours off duty after 16 hours of continuous service, and eight hours off after 16 hours of service in any one day. The wrork of operators, dis¬ patchers and others must be limited to nine hours per day in posts operated continuously, and to 13 hours in

other posts.

Steamship Accidents. — The Federal gov¬ ernment has full and complete jurisdiction over marine transportation and there is a bureau in the Department of Commerce de¬ nominated the Steamboat Inspection Service, whose function it is to supervise steam ves¬ sels for the promotion of safety. The service must inspect structural materials for marine boilers and each year must thoroughly inspect the hulls, machinery, boilers and fire apparatus

of vessels under its jurisdiction. It is em¬ powered to determine the carrying capacity of vessels, and to promulgate laws for the pro¬ vision of life-saving devices. Many laws have been passed by Congress regarding marine transportation, the most important of which have been on the statute books since the early days of steam navigation. An important enact¬ ment is that of 23 July 1912 amending the law of 24 June 1910 requiring wireless equip¬ ment on all vessels, American or foreign, licensed to carry 50 or more persons, navigating the ocean or Great Lakes.

See Physical Economics ; Occupational Diseases ; Labor, Protection to ; Employers' Liability; Workingmen's Insurance; Work¬ ingmen's Compensation; Social Insurance; Accident Insurance; Factories and Factory Inspection ; Railway Safety Devices ; Ma¬ chinery Safety Devices; Mining Safety De¬ vices ; Vital Statistics ; Locomotive Safety Appliances.

Bibliography. — Boyd, James H., (Work- men's Compensation and Industrial Insurance Under Modern Conditions) (Indianapolis

1913) ; Campbell, G. L., industrial Accidents and Their Compensation (Boston 1911) ; Clark, L. D., (The Law of the Employment of Labor' (New York 1911) ; Crum, F. S.,

(Street Traffic Accidents) (in American Sta¬ tistical Association Quarterly, N. S., Vol. XIII, pp. 473-528, Boston 1913) ; Eastman, C., (Work Accidents and the Law' (New York 1911) ; Hard, William, injured in the Course of Duty) (New York 1910) ; Holt, E. E., (Physical Economics) (New York 1912) ; Hansen, Carl M., (Universal Safety Standards' (New York

1914) ; Hoffman, F. L., (Fatal Accidents in Coal Mining and Industrial Labor) (U. S. Bureau of Labor Bulletin 78, pp. 417-65, 1908) ; Law, F. E., and Newell, W., Prevention of Industrial Accidents) (New York 1909) ; Myers, Gustavus, (A Study of the Causes of Industrial

Accidents) (in American Statistical Association Quarterly, N. S., Vol. XIV, pp. 672-94, Boston 1915) ; and the standard acci¬ dent table by I. M. Rubinow in same, pp. 358- 415; Roberts, Maurice G., injuries to Inter¬ state Employees on Railroads1* (Chicago 1915) ; Sherman, P. T., <The Consequences of Acci¬ dents Under Workmen's Compensation Laws' (in University of Pennsylvania Larv Review, Vol. LXIV, pp. 417-48, Philadelphia 1916) ; Seager, H. R., (Social Insurance) (New York 1910) ; Trieber, Jacob, (The National Em¬ ployer's Liability Act' (in American Law Re¬ view, Vol. XLIX, pp. 481-509, St. Louis 1915) ; Tolman, W. H., (Safety: Methods for Pre¬ venting Occupational and Other Accidents and Diseases) JNew York 1913) ; Thornton, W. W., (Treatise on the Federal Employers' Lia¬ bility and Safety Appliance Acts' (Cincinnati 1916) ; Walgren, J. A., (Federal Employers' Liability Act' (Chicago 1916) ; West, Thomas D., Occidents, Their Causes and Remedies' (Greenville 1908) ; Van Schaack, David, Safe¬ guards for the Prevention of Industrial Acci¬ dents' (Hartford 1910) ; articles on ˆIndustrial Safeguards® (in the Weekly Underwriter, New York '1915 and in Science, Vol. XLI, pp. 154 — 57, and Vol. XLII, pp. 238-39, New York

1915) , and the annual reports and bulletins of the various commissions and bureaus.

ACCIP'iTRES (Lat. plural of Accipiter, the common hawk), or RAPTORES. An or¬ der of birds, comprising the birds of prey, — eagles, hawks, owls and vultures. See Birds of Prey.

ACCLAMATION (<(calling to®) : prop¬ erly, expressing any judgment of an assembly or a large part of it by shouting: but in usage restricted entirely to a favorable one. The choice of rulers among most early Aryan tribes or nations was by acclamation : the candidate was presented by a previous understanding — among the Vikings raised on a shield in the presence of the chiefs — and acclaimed by the voices of the assembled multitude. In some cases, as with the Poles even quite late in their history, the agreement was only made when the throng had gathered and there were more than one set of acclaimers, often ending in a pitched battle to decide which party preponder¬ ated. In the minor divisions of modern politi¬ cal life, voting by acclamation is usual; a ballot being called for only when the parties are so evenly balanced that the preponderance is dubi¬ ous, or a small majority has great strength of lungs, or the minority wish to make the major¬ ity

put their position on record, or simply to have the satisfaction of a proved vote. In ecclesiastical councils the vote by acclamation comes first also, the question being put as <(placet ® or anon placet ,® In private matters, acclamation has been used from early times as an expression of good feeling or enthusiasm, as in the customary ((hurrahs,® ((huzzas® and ((tigers,® and the ((hear, hear® of political assem¬ blies, and the responsive shouts and groans of religious revivals or prayer-meetings. The ap¬ plause in theatres, etc., being non-vocal does not etymologically belong to the group, but is usually included as having the same intent. It began with genuine applause, an actor closing the play by some word asking for approval of the company — in the Roman theatre, <(Plaudite ® (<(applaud ye®), or a poet or orator who re¬ cited in public expecting and receiving applause; but the claque, in modern French phrase, was very early organized by rich amateurs, who kept bands of paid applauders not only for their own use but to lend to friends. Nero had 5,000 of these, many of them equites or knights, to chant his praises at the direction of a profes¬ sional music-master ; they were called Augus-tiniani. In the modern French theatre the claque is on a more modest footing and is paid by the management ; the understood reason be¬ ing (curiously) that it keeps up the spirits of the actors when the audience's coldness might depress them beyond the power to play well, and more rationally that it guides and stimu¬ lates the audience itself to genuine applause when it might be simply sluggish and indif¬ ferent. In old times applause was shouted ,at marriages, as ((Io Hymen,® ((Hymensee,® ((Talas- sio® ; in festal or religious processions ; to vic¬ torious commanders in triumphs or ovations, as «Io triumphe® ; and even, contrary to modern feelings of decorum, in churches, the pulpit orator being cheered at good passages.

ACCLIMATIZATION, the gradual al¬ teration which fits a plant or animal to a climate differing from that in which the habits of its species or race have been formed. Ac¬ climatization and naturalization are often mis¬

takenly used as synonymous, but naturalization properly means establishment in a new country, and, if the climates of the two countries chance to be the same, acclimatization is not implied. In the consideration of marine animals and plants acclimatization takes on a slightly dif¬ ferent meaning, since aquatic life is more affected by the various conditions of the sur¬ rounding water than by climate.

In Plants. — Many examples of acclimatiza¬ tion are furnished by cultivated plants, among which the most noteworthy are perhaps the cereals. The original species of most of these has not been discovered,

but in most cases it is supposed to have lived in sub-tropical or warm temperate regions. Some of these cereals now thrive far better or are more productive in cold, northern climates than in warm regions. But in such cases an important influence may to a greater or less extent obliterate or emphasize the apparent period of growth, the productive¬ ness, etc. This is the daily duration of sunlight. During the growing period the sunlight lasts longer as the pole is approached, so that the shorter season is more than compensated for by the increased hours of sunlight. It has been found by experiment that certain varieties of corn brought from the southern States to the northern attained their customary height, but generally failed to ripen seed. The progeny of such plants as did mature seed gradually as¬ sumed the characteristics of northern varieties ; they reduced their height and shortened the time necessary to attain maturity. In a few years they resembled other northern varieties in these two respects. The reverse of this case has also been proved ; northern varieties taken to the south at first reached the height and at¬ tained maturity in the time natural to them in the north, but gradually assumed the character¬ istics of southern varieties — increased height and greater number of days to reach maturity. But even considering the frequent preponder¬ ance of this influence and remembering that the production of seed is usually in opposition to marked development of vegetative parts, there is no doubt that plants, in becoming acclimat¬ ized, are compelled to adjust themselves to many other less prominent influences, such as humidity, temperature, light and wind. The peach is supposed to have come from China by way of Persia, and since early historical times has gradually been fitting itself to more and more northern conditions. It is now found to be a profitabe crop in Michigan and New York, which are several degrees farther north than its supposed place of origin. The influence of cli¬ mate upon cultivated plants is recognized by progressive agriculturists and horticulturists, and each prefers seed grown in a more north¬ erly locality than his own. The effects of the new environment, however, soon become evi¬ dent, and new importations must be made. Seeds grown at high altitudes exhibit the same characteristics as those produced in high lati¬ tudes ; that is, they are hardier and require a shorter period to reach maturity than those grown in low altitudes or. low latitudes.

Among naturally acclimatized plants are many remarkable phenomena. Deciduous plants taken from cool climates to tropical conditions hold their leaves for a much longer period than where they are indigenous, or may even become evergreen like their new associates. Plants im-

ported from warm regions to cooler may lose the power to ripen seeds, but this defect may he compensated by the development of vegeta¬ tive reproductive powers. The reverse case is also true. Southern plants may fail to ripen wood completely, and winter killing may result. In cultivated plants, however, this phenomenon, which is often observed in the peach, may be due to improper methods of cultivation result¬ ing in abnormal wood-development.

In Animals. — The capacity for acclimatiza¬ tion is possessed in very different degrees by different animals, even by different individuals of the same species, and depends much upon general hardihood. Exactly what changes take place during acclimatization is not known ; sometimes the very specific gravity of the ani¬ mal is altered, as when fresh-water fishes be¬ come adapted to the denser water of the ocean ; similarly, the normal temperature of the individual may gradually become altered, as in the case of fishes native to cool water, which chance to work up-stream into hot springs and live there at a temperature which would kill normal individuals of the same species. The animals which are most wide¬ spread over the earth are those which have the greatest adaptability to new climates and new conditions of environment, and the best examples of this adaptability are found among domestic animals (q.v.). About the middle of the 19th century there was much enthusiasm for transplanting animals from one country to another; but the results have so often been harmful rather than beneficial to the recipients of the new forms that the effort to improve on nature in this way has been abandoned. Con¬ spicuous examples are afforded by the sending of the European rabbit to Australia and New Zealand, where it multiplied so excessively in a favorable climate, with abundant food, and through the almost complete lack of enemies, as to become a nuisance and a menace to the pastoral industry. (See Rabbit). The intro¬ duction of the agua toads, and afterward of the mungoos (q.v.) into Jamaica, to subdue the rats that were devouring the sugar-cane, had evil results. The spread of the European house- sparrow in the United States is another pertinent example. Many highly injurious in¬ sects have been accidentally introduced and ac¬ climatized in America from abroad; and the same is true of other countries. On the other hand a few instances like the acclimatization of the silkworm in Europe, of bumblebees in New Zealand, or of ladybirds in California, have been highly beneficial ; while much good has come from stocking new streams with de¬ sirable fishes. Of the several societies founded to

promote such transferences, that of Paris (Societe d'Acclimatation) is most important, but latterly has been inactive.

In Human Beings. — See Hygiene.

Bibliography. — Variations of Animals and Plants Under Domestication, *Darwin; Hsland Life,* Wallace; (Tropical Colonization.*

ACCO, ak'o. See Acre.

ACCOLADE, ak'o-lad' (Fr. ˆembrace,® literally, ((on the neck®), in heraldry, the cere¬ mony by which in mediaeval times one was dubbed a knight. On the question what this was, antiquaries are not agreed. It has been made an embrace around the neck, a kiss or a

slight blow upon the cheek or shoulder. In some cases it was a literal box on the ear, for which later was substituted a gentle tap on the shoulder with the flat of a sword. In confer¬ ring Knighthood the King strikes the kneeling subject lightly on the shoulder with a sword and uses the words ftI bid thee rise, Sir Knight.®

ACCOLTI, Benedetto, ak-ol'te, ben-a-det'o, the Elder, Italian jurist: b. Arezzo, 1415; d. Florence, 1466. Several other members of his family were noted for legal attainments. He became professor of jurisprudence in the Uni¬ versity of Florence, and on the death of the famous Poggio was made chancellor of that republic. With his brother Leonardo he wrote in Latin a three-volume history of the first crusade, not of great value, but interesting as having furnished Tasso the material for (Jerusalem Delivered) : pub. Venice 1452, Italian tr. 1543, French tr. 1620. He also wrote a volume of biographies of his distinguished contemporaries (Parma 1689).

ACCOLTI, Bernardo, Italian poet and

ecclesiastic: b. Florence, before 1466; d. after 1534. He was greatly admired, especially as an improvisatore. Whenever he announced his in¬ tention of reciting his verses the shops were closed and the people flocked in crowds to hear him. He was surrounded by prelates of the first eminence ; a body of Swiss troops accom¬ panied him ; and the court was lighted by torches. Leo X esteemed him highly and made him apostolic secretary, cardinal and papal legate at Ancona. He it was who drew up the papal bull against Luther (1520). Though styled in his own day ((The Only (one) of Arezzo® (L' Unico Aretino), the fame of his works perished with him. Their style is hard, his images forced and his taste marred by affectation. The best known is a comedy, (La Virginia.* His other productions include some lyric

poetry, epigrams, octaves and verses in tersa rim a.

ACCOMMODATION, the process by which the mind is brought into adjustment with its surroundings ; adaptation.

In physiology, the accommodation of the eye is the function by which objects, near or distant, may be seen distinctly. It is accomplished by the relaxing or contracting of the ciliary mus¬ cle. See Eye.

In biology, the process by which an organism becomes adapted to its environment.

In theology, properly, the presentation of a truth not absolutely, but with some modification to suit it either to some other truth or to the person addressed. It is distinguished as formal and material, the former relating to the method of teaching, and the latter to what is taught. The former includes teaching by parables or symbols, by progressive stages graduated to the capacity of the learner, etc. ; more usually, now, the forcing of texts from their obvious mean¬ ing to conform them to theories derived from other sources. The latter, as now commonly used, means the theory that Christ and the writers of Scripture modified or perverted the truth to accommodate it to the limited intelli¬ gence or the prejudices of their times, — the cosmogonies of Genesis, or Jesus' acceptance of demoniac possession as a truth, etc.

In commerce it usually denotes temporary

financial assistance rendered by one merchant or bank to another. Accommodation paper in¬ cludes notes or bills of exchange made, ac¬ cepted or indorsed, without any consideration. While in the hands of the party to whom it is made, or for whose benefit the accommodation is given, such paper is open to the defense of want of consideration, but when received by third parties in the usual course of business it is governed by the same rules as other paper (2 Duer, N. Y. 33; 2 Kent, Comm. 86).

ACCOMPANIMENT, in music, is that part which serves for the support of the prin¬ cipal melody (solo or obligato part). This can be executed either by many instruments, by a few or even by a single one ; we have there¬ fore pieces with an accompaniment for several, or only for a single instrument. The principles on which the effect of

accompaniment rests are so little settled that its composition is perhaps more difficult than even that of the melody. Frequently the same musical thought produces a good or bad effect, according to the character of the accompaniment, without our being able to give a satisfactory reason for the difference. The accompaniment requires of the performer the most scrupulous study, and of the composer the greatest skill and delicacy. As the object of every musical accompaniment is to give effect to the principal part, the accompanist should always aim really to support and by no means to overpower it.

ACCOMPLICE is the term applied to one who is in some way connected with the com¬ mission of a crime, though not as a principal.

In the absence of a statute it is not a rule of law, but a rule of practice only, that a jury should not convict on the uncorroborated testi¬ mony of an accomplice. Ordinarily the judge will advise the jury to acquit unless the testi¬ mony of the accomplice is corroborated as to the circumstances of the offense and the partici¬ pation of the accused. It is provided by the N. Y. Code Crim. Proc., § 399, that a conviction cannot be had upon the testimony of an ac¬ complice unless he be corroborated by such other evidence as tends to connect the defend¬ ant with the commission of the crime. This statute has been adopted in many of the States of the Union.

ACCORAMBONI, Vittoria, ak-o-ram- bo'ne, vit-6're-a, Italian lady famous for her beauty and her wild tragic history : date of birth unknown; d. 22 Dec. 1585. Her contem¬ poraries thought her the most fascinating woman ever in Italy. Paolo Giordano Orsini, Duke of Bracciano, who was believed to have murdered his wife with his own hand, sought hers with her passionate acquiescence ; but her father gave her to Francesco Peretti, nephew of Cardinal Montalto and living in his house. Peretti was assassinated 1581 ; and Vittoria fled to Bracciano; the scandal was great, and Gregory XIII imprisoned her nearly a year in the castle of St. Angelo, but she married the duke as soon as released. Montalto becoming Pope as Sixtus V, the couple took refuge in Venetian territory. After a few months' resi¬ dence at Salo on Lake Garda, the duke died, leaving her almost the whole of his great fortune; but an incensed relative of his, Ludo¬ vico Orsini, had her murdered at Padua, whither she had removed. This recital, valid

on the evidence accessible up to now and ac¬ cepted by Gnoli in his "Life® of her (Florence 1870), leaves Vittoria much on the level of other passionate Italian women of her age ; but the Countess Martinengo-Cesaresco has re¬ cently re-examined the evidence in her

Lom¬ bard Studies, > and thinks her innocent of com¬ plicity in crime. Much literary use has been made of her story, and Webster's play (The White Devil) is based on it.

ACCORD AND SATISFACTION sig¬ nifies a satisfaction agreed upon between the party injured and the party injuring, which when performed is a bar to all actions upon this account. It must be legal. An agreement to stifle a criminal prosecution for a criminal offense such as an assault and imprisonment is void (2 Wils. 241; 5 East, 294).

Where a release is given to one of two joint tort-feasors which recites the receipt from him of a certain sum as full payment, it will operate as a bar to an action against the other tort¬ feasor (136 Mass. 503).

Accord with satisfaction, when completed, has two effects : It is a payment of the debt ; and it is a species of sale of the thing given by the debtor to the creditor in satisfaction ; but it differs from it in this, that it is not valid until the delivery of the article, and there is no war¬ ranty of the thing thus sold, except perhaps the title; for in regard to this it cannot be doubted that if the debtor gave, on an accord and satis¬ faction, the goods of another, there would be no satisfaction. But the intention of the parties is of the utmost consequence (30 Vt. 424).

ACCORDION, a musical instrument in the form of a small box, generally from 8 to 12 inches long by 4 wide, and containing a number of metallic reeds fixed at one extremity, but left to vibrate freely. A small bellows, formed by a folding apparatus which unites the top and bottom of the box, supplies the wind, which, admitted by keys acting on valves, sets the reeds in vibration. In the harmonium (q.v.) and the American cabinet-organ the same prin¬ ciple is also employed. The accordion was introduced into America from Germany about 1828 but the principle had long been known in China, and employed for instruments played by the breath. The concertina, flutina and organ- accordion are improvements.

ACCOUNT, a register of pecuniary trans¬ actions, whether for personal use, to satisfy a contract, in obedience to law, or as a bill of items sent to a customer who buys on credit. A mutual account is one where debtor and creditor items are opposed between two parties. An open account, or account current, in com¬ merce is one in which the balance has not been struck ; in banking, one that may be added to or drawn upon at any time, as opposed to a deposit account, where notice is required for withdraw¬ als. To keep an open account js to keep such a one running on, instead of closing it. A stated account is

one which all parties have expressly or by implication (as by the debtor's retaining ■ it beyond a reasonable time without objection) admitted to be correct. To open an account is to begin pecuniary transactions with a banker or merchant.

In law , an account is a detailed statement of the mutual demands in the nature of debt and credit between parties, arising out of contracts

or some fiduciary relations. An open account is one in which some term of the contract is not settled by the parties, whether the account con¬ sists of one item or many.

In equity, jurisdiction concurrent with courts of law is taken over matters of account on three grounds : Mutual accounts ; dealings so complicated that they cannot be adjusted in a court of law; and the existence of a fiduciary relation between the parties.

ACCOUNTANT, properly any one who keeps accounts, and till lately applied in the United States to all bookkeepers without dis¬ tinction ; more generally now restricted to the head bookkeepers of large houses or corpora¬ tions, with difficult or complex accounts calling for expert ability. Especially an (<expert ac¬ countant or ((public accountant is understood as one not in the employ of any one house, but hiring his services out to such firms or com¬ panies, banks or public institutions, as either find their accounts in disorder or wish a legal verification or a guaranteed statement for the public ; or report on bankrupt estates under legal process. Few large financial institutions neglect to support public confidence by having their books periodically investigated and re¬ ported upon by an accountant unconnected with the concern. This is gradually building up, through many scandals and frauds upon the public, a much higher standard of professional duty among these experts : it is recognized that it is their duty not merely to certify to the correct balancing of the figures submitted to them, but to use reasonable intelligence and honorable purpose on the manner in which those figures were made, and whether they represent facts or gross fictions to deceive outsiders and lure in money to be mishandled. The proper, and in the United States the only, business of an accountant is to examine accounts and make out balance-sheets and statements. In Eng¬ land they assume a still further duty, that of managing estates and legacies.

ACCOUNTING. It is difficult to dis¬ tinguish between bookkeeping and accounting. In attempts to do so bookkeeping is called the art of recording business transactions and ac¬ counting the science. Bookkeeping gives the history of the business in a systematic manner, while accounting classifies, analyzes and then interprets the facts thus recorded and shows the results as losses and gains, leakages, econo¬ mies, changes in value, etc., in such a way as to reveal the progress or retrogression and the limitations and possibilities of the business. The primary object of bookkeeping is to show debts, both those due to the owner and those due by him to others ; the purpose of account¬ ing is to show profits and losses and valuations. Accounting is more than advanced bookkeep¬ ing and an accountant is more than an expert bookkeeper. A person might keep a set of books with perfect accuracy by mechanically observing the rules of debit and credit. The accountant must be able to design the set of books and the system of accounts which will give the desired information with the minimum of effort. He must have such a comprehen¬ sive view of business, both its economic and legal aspects, . that he can not only see the ef¬ fect of all kinds of transactions on the profit and loss statement and balance sheet, but also

recognize and classify all other factors which enter into the determination of the true status of an enterprise. The development and rapid rise of accounting is due to the change from private to corporate form of business organi¬ zation. The enormous growth of manufactur¬ ing, transportation and mining companies, and the investment of their ownership in the hands of many shareholders demands a more ac¬ curate determination of profit and loss and valuation of assets than when such enterprises were owned by small private companies. A proper accounting system is an aid to the creditors of a corporation in determining the value of its securities and shows the stock¬ holders whether they are receiving a just share of its profits. Since the charges for service rendered by the public service com¬ panies are coming more generally under the regulation of legislative authority, it is essen¬ tial to know the exact value of the capital upon which dividends must be paid and the true profit which has been earned in order to fix those charges on an equitable basis. This requires a careful classification of items and a regard for certain factors which bookkeep¬ ing, as formerly known, did not take into con¬ sideration.

Increasing interest in municipal affairs has resulted in the development of accounting sys¬ tems for cities, counties and States with a view to unifying and classifying their revenues and expenditures so as to show true costs and the comparative efficiency

of various depart¬ ments and changing administrations.

Accounting has made prominent the prob¬ lem of distinguishing between a revenue ex¬ penditure and a capital expenditure. If an item is regarded as a revenue expenditure, it is debited to some expense account and decreases profit; if it is considered a capital expenditure, some real account is debited and the assets in¬ creased. For many years the railroads, quite generally, regarded as an expense most im¬ provements in their rolling stock and better¬ ment of their tracks. They charged to operating expenses instead of to construction account the cost of reduction of grades, the re¬ placement of wooden bridges by those of steel, and even the cost of extensions and branches. They claimed that these expenditures for im¬ provements were necessary to hold business against competition and were not simply fac¬ tors to increase business.

The commonly accepted theory of account¬ ing requires that in so far as any expenditure results in an addition of substantial and per¬ manent character which increases the value of the plant, such expenditure shall be considered an increase in assets and debited to construc¬ tion account. This is not always upheld by legal decisions but since 1906 the Interstate Commerce Commission has prescribed, a uni¬ form set of accounts for railroads engaged in interstate commerce which embodies this prin¬ ciple. It is often difficult to determine whether an expenditure should be considered a real ex¬ pense or an increase in capital. Sometimes it partakes of the nature of both and has to be divided, as when an old machine is replaced by a new one of an improved and more ex¬ pensive type.

Accounting recognizes depreciation as a business factor. All machinery used in pro-

duction and even the most fixed assets, as buildings, decrease in value with use, the lapse of time and because of new inventions and im¬ provements. This decrease in value must be considered an expense or cost of production just as much as wages and materials, interest and rent. Consequently, true profits cannot be determined nor the real value of the assets stated until after an allowance has been made for depreciation. In Germany, Austria, France, Switzerland and Belgium, all corporations are required by law to set up a special account to cover depreciation. In England and the United States there is no

general regulation but the Interstate Commerce Commission and the State legislatures compel the railroads and cer¬ tain public service corporations to make such provision. Most large corporations voluntarily do so.

There are various ways of treating depre¬ ciation on the books. Sometimes the particular asset is credited with the amount of its de¬ crease, the balance of the account showing its new value. This is called ((writing down® the asset. Sometimes the asset is carried at its original cost and a valuation account credited with the amount of the depreciation. The two accounts, taken together, show the actual value of the asset. Since some assets are consumed slowly while others are short-lived, the deter¬ mination of the proper allowance for deprecia¬ tion is a difficult problem. Absolute accuracy cannot be attained and even approximate esti¬ mates require considerable expertness. Tables applicable to various kinds of machinery and buildings have been worked out from experi¬ ence.

Fluctuations in the value of fixed assets, as measured by the market price, may be consid¬ ered as due to causes not under the control of the business. They may be favorable or un¬ favorable and are often not at all permanent. Usually no consideration is given to them on the books except as there results a depreciation in the value of goods for sale or in the process of manufacture.

Stocks, bonds and the securities of other concerns bought for investment are carried on the books at their original cost, if this is be¬ low the market quotations, otherwise the mar¬ ket value is substituted. In Austria, the law requires the use of the market value in case of either depreciation or appreciation. In this country it is considered conservative to disre¬ gard appreciation unless the increased value of the asset is actually realized upon by its sale.

Goodwill may be defined as the monetary value placed upon the reputation, connections or advantages possessed by a firm whereby it is able to make unusual profits. In forming consolidations it is often used to represent the difference between the price paid and the in¬ trinsic value of the property acquired. Al¬ though a firm may possess or create advantages by which its profits are increased, it is generally agreed that it is bad practice to set up an ac¬ count for goodwill unless it has been pur¬ chased. As to whether goodwill should be considered a depreciating asset and gradually written off the books is a question of dispute among accountants. On account of its intangi¬ bility it is regarded conservative to do so.

Cost Accounting is one of the latest developed and most difficult and technical

branches of accounting. It is applicable to a manufacturing business rather than to a mer¬ cantile or trading concern. The manufacturer buys raw materials, semi-raw materials, parts already finished, etc., and by means of a prop¬ erly equipped factory and the employment of skilled and unskilled labor, converts these materials into a finished product which he sells. In order to meet competition intelligently and to prepare estimates on work to be performed with accuracy the manufacturer must be able to determine from his records the actual cost of each unit produced during a given period and the cost of goods in process of manufacture at the end of the period. This necessitates the keeping of a class of expenses, known as manu¬ facturing expenses, different from those of a mercantile firm, and the use of many additional ledger accounts.

Three elements enter into the cost of a manufactured article: (1) Raw materials; (2) productive labor; (3) manufacturing ex¬ penses. Manufacturing expenses are also called indirect or overhead expenses and in¬ clude all expenditures outside of those for raw materials and productive labor, such as power, heat, light, factory supplies, taxes, insurance, repairs, depreciation of machinery, etc. Some¬ times a fourth element is included — the sell¬ ing expenses. The first two elements may be called the Prime Cost ; the first three the Fac¬ tory Cost; and all four the Total Cost. But these terms are used to express so many various meanings by the different writers on Cost Ac¬ counting as to render a complete discussion too long for this article.

Two of the several general methods of computing costs are: (1) The Production Or¬ der Method; and (2) the Process Method. In the Production Order Method an account is opened with each job in the cost ledger. Each job is given a number by which it is always known. Every productive laborer reports the amount of time he spends on it. All material required is requisitioned from the stock room by this number. Thus, the account of each job can be easily debited with the cost of direct labor and the cost of material and parts used. This gives the prime cost of the job and leaves the indirect expenses to be apportioned to it.ˆ

The apportionment of the indirect or over¬ head expenses must of necessity be arbitrary. Many schemes have been suggested but it is impossible to find one that is generally agreed to be logically correct or uniformly accurate. Among the various methods used are: (a) The ˆman-rate® method, which divides up the indirect expenses in

proportion to the direct wages paid for the productive labor; (b) the wman-hour® method, in which the division is according to the total number of hours of pro¬ ductive labor; (c) the ((mixed method,® which uses the cost of raw materials plus the cost of productive labor as the basis of division; (d) the ((machine-hour® method; and (e) the units of product method. Having decided upon the most practical method of apportioning the manufacturing expenses, the proper amount is debited to each job and the factory cost of that job determined.

The Process Method of determining costs is used when the lots of material in the process of production follow one another in such a way that one lot cannot be distinguished from

another. Each process is known by a name or number, as milling, rolling, annealing, dipping, etc., or, as operation No. 1, No. 2, No. 3, etc. The amount of time of productive labor spent on each process is reported and its cost debited to the account of that process. The cost of raw materials or finished parts used in each process is also debited to its account. The in¬ direct expenses are apportioned by one of the methods described above to arrive at the total factory cost of the process.

Auditing. — Even if not required by law, it has become the custom for most large business firms to have an audit of their records made by outside accountants employed for the pur¬ pose of carefully examining their books and certifying to their correctness. It is the duty of the auditor to check up all the entries of the bookkeepers and to compare their amounts with all the original documents and papers, such as checks, notes, bills, receipts, etc., and to discover any errors of principle, of omission or fraud. The auditor's report consists of a profit and loss statement and a balance sheet, with necessary comments and suggestions for increase in efficiency and accuracy of record. In preparing the profit and loss statement the auditor endeavors to make certain that it con¬ tains all of the expenses of the period, whether they have been paid or not ; that charges prop¬ erly made against income have not been made against capital ; that all the profits earned are included ; in short, that the statement is a true report of the income and expense of the period. The balance sheet is the statement of the busi¬ ness most often published and the auditor should be able to certify that the assets are not overstated; that proper allowance has

been made for depreciation ; that the liabilities are all included.

The auditor may be called in only at the end of a period to make a (<complete **audit, or he may be employed to make a <(continuous** audit, that is, to check the bookkeeper's work during the period at frequent intervals, so that the statements may be prepared at the end without delay.

Historical. — The practice of accounting was recognized as a profession in Great Britain long before it had attained the highly special¬ ized character it possesses to-day. In 1854 the Society of Accountants in Edinburgh was in¬ corporated by royal charter. Similar societies were established in Glasgow and Aberdeen in 1855 and 1867 and the Institute of Accountants in London in 1870. The New York State So¬ ciety of Certified Public Accountants was the first to be organized in the United States. In 1896 the New York State legislature passed an act authorizing the State University to confer the degree of C.P.A. (Certified Public Ac¬ countant) only on those passing an examina¬ tion. Many other States have followed this lead. The various State and National societies with their official journals and publications pro¬ mote the discussion and solution of new prob¬ lems and methods of practice. During the past few years many colleges and universities, recognizing the importance of accounting and its direct relation to economics, have included its study in their curriculums and greatly de¬ veloped its literature. Specialists have arisen in the field. Cost accountants and efficiency engineers devise ways and means for cheaper

production. System builders organize the ac¬ counting of a firm so as to give most satis¬ factory results. The general expert accountant acts as auditor and <(business physician,** whose advice is sought whenever unusual conditions arise. See Bookkeeping.

Bibliography. — Bennett, R. J., Corporation Accounting) (New York 1917) ; Bentley, H. C., (Science of Accounts- *(ib. 1913) ; Church, A. H., distribution of Expense Burden and Pro¬ duction Factors;* Cole, W. H., Accounts: Their Construction and Interpretation *(New York 1915) ; Day, C. M., Accounting Prac¬ tice* (ib. 1908) ; Dicksee, L. R., depreciation, Reserves and Reserve Funds *(London 1903) ; Eggleston, D. C., (Municipal Accounting*

(New York 1914) ; Esquerre, P. J., Applied Theory of Accounts *(ib. 1914) ; Hatfield, H. R., (Modern Accounting* (ib. 1916) ; Illein, J. J., (Bookkeeping and Accounting* (ib.

1917) ; Lisle, G., Accounting in Theory and Practice *(Edinburgh 1906) ; Montgomery, R. H., Auditing Theory and Practice* (New York 1917) ; Nicholson, J. L., dost Account¬ ing *(ib. 1916) ; Sprague, C. E., (Philosophy of Accounts* (ib. 1908) ; Wildman, J. R., drinciples of Accounting* (ib. 1913).

George M. Brett,

Department of Political Science, College of the

City of New York.

ACCOUNTING, MUNICIPAL. See Mu¬

nicipal Accounting.

ACCOUTREMENTS, ak-kod'ter-mentz, military equipment carried on the person of the soldier or his horse, in particular such as is used to bear his arms and ammunition. In the United States Army the pattern of the infantry equipment was selected by a special board of officers in 1910; that of the cavalry in 1912. Both arms carry extra clothing, a shelter-tent half, a cartridge-belt (suspended from the shoulders), a mess outfit (including bacon- box, condiment-box, knife, fork, spoon, meat- can with cover and cup), a canteen with cover and a first-aid packet. The dismounted troops carry in addition a pack-carrier, slung down the middle of the back, an entrenching tool and a poncho. In the case of the mounted troops these are replaced by a pair of saddle-bags, a saddle-blanket, a set of horse-equipment and a slicker. The infantry entrenching tools are issued as follows: To each squad of 8 men 1 wire cutter (carried by the corporal), 4 short-handled shovels 2 collapsible picks and either an axe or a bolo (a leaf-shaped heavy knife for cutting brush). The bayonet of the infantryman may be carried on his belt, but is now more usually strapped on to the left side of his pack. Those enlisted men and officers who carry pistols carry them in a leather or khaki-colored canvas holster at the right hip and strapped to the leg to prevent swinging. The material of which the pack, bayonet-scab- bard, cartridge-belt, canteen-cover, etc., are made is khaki-colored canvas or webbing and the entrenching tools are painted khaki-color. The me9S- tin, canteen and cup are aluminum. The accompanying diagram exhibits the re¬ spective details of the present issues of infan¬ try and cavalry equipments. The cavalryman is provided with a small box or pouch for re¬ volver-cartridges and a cap-pouch. The sabre- belt, to which all the preceding are attached, consists of a waist-belt, with two rings for the

shoulder-strap and sabre-sling. The usual ac¬ coutrements tor horse-artillery consist general¬ ly ot a pistol and cap-pouch and a sabre-belt, which differs from the cavalry-belt only in the omission of the shoulder-strap.

Field Equipment of Enlisted Men, United States Army, Navy, and Marine Corps.

Enlisted Men Dismounted.

1. Full Equipment.

A. Meat can pouch.

B. Haversack.

C. Bayonet.

D. Entrenching tool.

E. Suspenders.

F. Cartridge pocket, open.

G. Cartridge belt.

H. Roll (contains blanket, shelter-tent, half, extra

clothing) .

I. Canteen.

K. First-aid packet.

Entrenching tools (carried by some men in place of tool marked D).

1. Pick-mattock.

2. Axe.

Tools (carried on belt by men who carry no entrenching tools).

1. Bolo.

2. Wire cutter.

Enlisted Men Mounted. (They wear a cartridge belt with canteen and first-aid packet attached).

1. Saddle and equipment.

A. Slicker.

B. Roll (contains blanket, shelter-tent, half, extra

clothing) .

C. Saddle-bag (contains meat can pouch and extra

articles) .

1. Holster (carried by men equipped with automatic

pistol) .

A. Leg-strap. (To prevent swinging).

Contents of meat can pouch.

1. Bacon box.

2. Condiment box.

3. Bottom of meat can.

4. Top of meat can.

ACCRA, or AK'KRA, British West Africa, capital of the Gold Coast colony since 1876, a fortified seaport town, the starting point of a railway to the northeastern cocoa plantations and connected with South Africa and Europe by telegraphic cable. Since a destructive fire in 1894, Accra has been almost rebuilt, and in 1896 wras raised to the rank of a municipality. The residential section is at Victoriaborg where there is a racecourse, and on the Aquapini hills, vol. l — 6

at Aburi, 26 miles northeast of Accra, are the government sanatarium and botanical gardens. Pop. including about 200 Europeans, 20,000.

ACCRINGTON, England, a manufacturing town and municipal borough in Lancashire, on the Hyndburn, 20 miles north of Manchester and five miles east of Blackburn ; on the Lan¬ cashire & Y. Railway; incorporated 1878. It is well laid out, and has various handsome build¬ ings, including the town-hall, a splendid market hall, technical school and school of art, clubs, etc. The manufacture and printing of cottons, chemical works for their use, and the manu¬ facture of spinning and other machinery, are the chief industries. Coal is wrought exten¬ sively. Pop. about 47,000. Accrington gives name to a parliamentary division of the county; pop. 84,878.

ACCUM, Friedrich, fred'riH, German chemist: b. Biickeburg, 1769; d. Berlin, 1838. Removing to London at 24, eight years later he was made professor of chemistry and min¬ eralogy at the Surrey Institution. He published several textbooks on these sciences, but is re¬ membered mainly for being (with an energetic print-seller, Ackermann) the introducer of gas¬ lighting into England. His Practical Treatise on Gaslight) appeared in 1815. Another valu¬ able service to society was his (Treatise on Adulterations of Food and Culinary Poisons > (1820). As the result of charges against his honesty he returned to Germany, and in 1822 was made professor in the Industrial Institute and Academy of Architecture in Berlin.

ACCUMULATION, in law, the increase of a trust fund by the interest or revenue thereon being added to the principal, for the future benefit of a person or persons. The period of time during which this may be done is limited generally by statute both in England and in the United

States to the life of the settlor only or for 21 years or during the minority of the cestui que trust. The com¬ mon-law rule makes void any disposition of realty for a greater period than a life or lives in being and an additional period of 21 years.

ACCUMULATOR, a device for the stor¬ age of energy, more particularly when the energy is supplied from an intermittent source, or when it is to be withdrawn intermittently or irregularly. The fly-wheel on a steam-engine is a device of this sort, but it is not commonly referred to as an accumulator. The word is practically restricted to the following two senses: (1) A storage-battery; (2) a

hydraiilic apparatus, commonly consisting of a plunger which is fitted to a vertical cylinder and heavily loaded with weights. Water is forced into the cylinder by pumps, with the result that the plunger and its weights are raised, and a considerable quantity of water is thus stored in the cylinder under a high pressure. By the use of such an accumulator it is possible to deliver water for a short time in far greater volume than the pumps feeding the accumulator could deliver it, and yet at the maximum pressure that the pumps are capable of producing. Hydraulic accumulators are used in connection with riveting-machines, cranes and many other heavy tools.

ACCURACY OF FIRE.— The firing for accuracy, whether with artillery or small-arms, involves two entirely separate and distinct con-

ditions : (1) The determination of the personal skill of the individual using the weapon; (2) the determination of the qualities as regards accuracy of the weapon itself. The most com¬ mon way of determining the relative accuracy of guns is to ascertain their mean errors in range and deflection for a given mean range, and compare them. It is not always possible to test the practice of guns under precisely similar circumstances.

It is easier to determine, from the practice of the gun itself, a rectangle with which there would be an equal chance of any shot from the gun striking or not striking; or, if a given number of shots were fired, the number which fall within the area. The accuracies of two guns would be in the inverse order of rectangles for the same range. The relative precision of small-arms is decided by various methods. To determine the centre of impact the piece should be fixed in a frame and be

pointed at the centre of a target stationed at the required dis¬ tance, and fired a certain number of times, and the positions of the shot-holes, measured in vertical and horizontal directions from the lower left-hand corner of the target, are ar¬ ranged in tabular form. The sum of all the vertical distances divided by the number of shots gives the height of the centre of impact above the origin. Similarly the sum of all the horizontal distances divided by the number of shots gives the horizontal distance from the origin to the centre of impact. The co-ordi¬ nates of the centre of impact being known, the point itself is known, and its distance from the centre of the target is called the absolute mean deviation. This is equal to the square-root of the sum of the squares of its vertical and horizontal distances from the centre of the tar¬ get. To obtain the mean deviation it is neces¬ sary to refer each shot-hole to the centre of impact as a new origin of co-ordinates, and this is done by taking the differences between each tabular distance and the distance of the centre of impact and adding them. The sum of all the distances thus obtained in one direc¬ tion divided by the number of shots gives the mean deviation or figure of merit.

The mean horizontal error is found by add¬ ing the horizontal distances by which the balls have missed the centre of the target and di¬ viding this sum by the number of balls ; this quotient indicates how much the average of the balls have missed horizontally the point aimed at. To get the absolute mean error there are two methods. The first is short and. sim¬ ple, and consists in calculating the hypothenuse of a right angle triangle, in which the other two sides are the mean horizontal and mean vertical errors. The second, which should be called the calculation of the mean of the abso¬ lute errors, consists in measuring for each ball its absolute error, a distance from the point aimed at, and to take the mean of these ab¬ solute errors by dividing their sum by the number of balls fired. This method is very long, since to have the absolute error of each ball it is necessary to square two numbers and then extract the square-root of these sums as the distance of the points struck have been measured upon the vertical and horizontal lines passing through the point aimed at. The re¬ sults are not exactly the same; the mean of

the absolute errors will be greater than the ab¬ solute mean error.

The trajectory from the gun to the mean point of impact is called the mean trajectory, and the divergencies of the trajectories of par¬ ticular shots from the mean trajectory have a multitude of independent causes, such as initial angular deviations ; variations of the muzzle velocity; variations of the form and weight of the projectiles; variations in the angular posi¬ tion of the gun when it is

fired, and in its jump; variations in the force and direction of the wind; and variations in the drift due to rotation.

If the actual mean initial velocity is that for which the sights of the gun are graduated; if the range is exactly known and the sights are set accordingly; if the density of the air is standard ; and if there is no wind and no mo¬ tion of gun or target, then the mean point of impact will coincide with the point at which the line of sight is directed. These conditions, however, are never fulfilled, nor is it possible to compensate exactly for their non-fulfillment, and consequently the mean point of impact is never exactly at the centre of the target. To bring it as near as possible to that point is the object of the regulation of gun-fire. See Gun¬ nery.

ACCUSATION, in law, the charging of a person with a crime, or of a minor offense ; the declaration containing the charge of an offense or crime. The term is a broad one, including indictment, presentment, information (qq.v.), and any other form in which the charge of a crime can be made against an individual.

ACCUSATIVE CASE, in Latin,— and thence applied to the corresponding case in Greek and other declensions, — that case of the noun, pronoun, etc., which designates the ob¬ ject to which the action of a verb is imme¬ diately directed. It corresponds with what, although the English noun is nearly without declension, is called in English the objective case. See Declension.

ACELDAMA, a-kel'da-ma, a cemetery in Jerusalem used to bury strangers in. The traditional site is on a small plateau half-way up the southern slope of the valley of Hin- nom, near its junction with the valley of Jehosh- aphat ; and it was certainly used in the 6th century for the burial of Christian pilgrims, and continued in use till the 17th. According to. Matt, xxvii, 7-8, it was bought by the chief priests and elders for a burial-ground with the 30 pieces of silver returned by Judas after the betrayal ; according to Acts i, 19, it was bought by Judas himself with the money, which he did not return, and his bowels burst open in it; according to both, the name means <(the field of blood,® and it was a potter's field. But as the Greek text gives <(Aceldamach ,® which would mean <(field of sleep,® a natural and beautiful term for a burying-ground, and as, according to Jer. xviii, 2 and xix, 2, there was a potter's house in the valley of Hinnom, it appears that the use and name of the place were very old at the time of Christ, and that the meaning <(field of blood® was a misunderstand¬ ing, or a play on the real meaning, and its con¬ nection . with Judas artificial. (History and description by Schick,

1892, quarterly statement of the Palestine Exploration Fund, pp. 283-89).

ACEPH'ALI ((<headless”), in civil history, certain levelers, in the reign of Henry I of England, who acknowledged no head or em¬ peror ; or, according to another explanation, who were too poor to own any property and so have any legal superior.

In Church history: (1) Bishops exempt from the jurisdiction and discipline of a patriarch. (2) Clergy belonging to no diocese. (3) Those who, on occasion of a dispute in the Council of Ephesus, a.d. 431, refused to follow either John of Antioch or Cyril of Alexandria. (4) Those who rejected the decision of the Council of Chalcedon, 451, on the nature of Christ. (5) In the 5th and 6th centuries, a large sec¬ tion of the followers of the Monophysite, Peter Mongus, who cast him off as their leader be¬ cause of his accepting a peaceful formula called the Henoticon. They soon after¬ ward split into three parties, the Anthropomor- phites, the Barsanuphites and the Essianists, who again gave origin to other sects. (6) The Flagellants (q.v.).

ACEPH'ALOCYST' (<(headless cyst®), a growth found in the liver, kidneys and other glandular organs of man and oftentimes those of the lower animals.

ACER, a genus of trees of the family Aceracese, containing about 100 species and abundant in north America and eastern Asia. They are natives of the north-temperate regions. The most widely-known European species are A. campestre and A. pseudo- platanus. See Maple; Whistlewood.

ACERATHERIUM, a-se-ra-the'ri-um, an extinct rhinoceros which inhabited Europe during the Miocene epoch. It had no distinct horn, whence the name (Gr. «- without, repag horn, Gyp animal), but a small boss on the top of the skull indicates a rudimentary horn or callosity. American fossil hornless rhinoc¬ eroses formerly referred to this genus are now distinguished as Caenopus.

ACERBI, Giuseppe, a-cher'-be, ju-sep'-a, Italian traveler and scientist : b. near Mantua, 3 May 1773; d. there August 1846. He studied at Mantua, devoting himself to natural science ; in 1798 journeyed through Scandinavia, Fin¬ land and Lapland, and in 1799 visited the North Cape, the first Italian ever there. On his re¬ turn he stayed some

time in England and pub¬ lished his (Travels } in English, later having them translated into French and German. He rendered great service to Italian literature by starting in 1816 the Biblioteca Italicma, which fought the Accademia della Crusca. Made Austrian consul-general to Egypt in 1826, he contributed valuable articles on Egypt to the Biblioteca, and obtained many Oriental objects of interest to European museums. From 1836 till his death he lived at his native place.

ACERRA, a-cherr'a, Italy (the ancient Acerr.ˆt, admitted to Roman citizenship 332 b.c., plundered and burnt by Hannibal), an episcopal city nine miles northeast of Naples, with which it is connected by railroad, and oppo-site Mount Somrna. It has a cathedral. The inundations of the neighboring Agno for¬ merly made it very unhealthy, but the marshes are now drained. Pop. about 18,000.

ACES'TES, or ˆGES'TUS, in Greek legend, son of Crinisus and Hfgesta, and king of the country near Drepanum, in Sicily. He assisted Priam in the Trojan war, entertained yEneas during his voyage and helped him to bury his father on Mount Eryx. In commem¬ oration of this 2Eneas built a city there and called it Acesta.

ACETAL, as'e-tal. (1) A colorless, pleasant-smelling liquid, formed as a by¬ product in the preparation of aldehyde from alcohol, and occurring naturally in crude alco¬ hol Its formula is CH3.CH (OC2H5)2. It boils at 219° F. under ordinary atmospheric pressure. Its specific gravity is about 0.831, and its critical temperature is 490° F. Acetal mixes in all proportions with alcohol and ether. It is soluble in 18 volumes of water at 80° F., and is more soluble at higher tempera¬ tures. (2) (<Acetal® is also used to signify any one of a group of compounds formed by the combination of one molecule of an aldehyde with two molecules of an alcohol and the elimination of one molecule of water. They are obtained as by-products in the preparation of aldehydes from alcohols, a certain portion of the aldehyde formed combining with the unmodified alcohol.

AC'ETAN'ILIDE (known in the drug trade as antifebrin), a crystalline compound obtained by the action of glacial acetic acid upon aniline (q.v.). Its formula is CbHsNH COCHa. It melts at 237° F., and boils at 563° F. without decomposition. It is readily soluble in alcohol and ether and ■ dissolves in hot water, but is only sparingly soluble in cold water. It is given in medicine as a sedative and febrifuge. Its physiological action is sim¬ ilar to that of antipyrin but its administration is considered to be safer. It is a common in¬ gredient of ((headache powders,® and when taken habitually it is liable- to

cause cardiac symptoms, cyanosis of the mucous membranes, anaema, heart failure and death.

AC'ETATES, compounds of acetic acid with metals or organic radicals. See Acetic Acid.

ACE'TIC ACID, an organic acid belong¬ ing in the fatty series, and resulting from the oxidation of alcohol. It is important on ac¬ count both of its extensive use in the arts, and of its properties as viewed from the standpoint of the theoretical chemist. Its formula is CH3.COOH, or C2H3O.OH. It is a monobasic acid, the hydrogen in the radical CH3 not being replaceable by a metal or another radical. In its dilute state it has been known for centuries as vinegar, and in strong vinegar the charac¬ teristic odor of the acid is quite marked. It is formed naturally in the fluids of many plants, especially trees; in some cases as free acid and in others in combination, usually as acetate of lime or of potassium ; also in many organic acetates, and in the oils of many seeds. It is a constituent also of certain animal fluids, as, for example, milk. It may be obtained by the oxidation, decomposition and destructive dis¬ tillation of many organic bodies. It is pro¬ duced, as in the manufacture of cider vinegar, by the action of the microscopic plant My co¬ derma aceti, better known as ((mother-of-vin- egar,® or <(vinegar plant,® upon weak alcohol In the manufacture of vinegar the alcohol

required for the transformation is present in the cider as the result of a previous alcoholic fer¬ mentation. It has been shown that <(mother-of- vinegar* has no effect upon pure alcohol ; a certain amount of albuminous and mineral mat¬ ter must be present to serve as food for the plant. A very pure form of acetic acid is pre¬ pared by subjecting alcohol to the powerful oxidizing action of spongy platinum hung above it in abundance of air. The platinum absorbs oxygen and alcohol vapor at the same time, and these combine to form acetic acid and water. Acetic acid has also been produced by oxidiz¬ ing alcoholic liquors by blowing ozone into them. The greater part of the acetic acid of commerce is obtained by the destructive distil¬ lation of wood, acetate of lime being a by¬ product in the manufacture of wood-alcohol. (S ee Wood-Alcohol, under Alcohol). The acetate of lime so obtained may be decomposed by the addition of sulphuric acid, when acetic acid is liberated, or it may be treated in any one of a number of other ways for the re¬ covery of the acetic acid. One of the

best methods consists in mixing the commercial acetate of lime with calcium chloride, and con¬ centrating the solution until the compound known as calcium aceto-chloride (CaC2H302 CI.5H2O) crystallizes out. The crystals so formed are then dissolved in water, the solu¬ tion is filtered through animal charcoal, 10 per cent more calcium chloride is added, and the operation is repeated to obtain a new crop of purer crystals. These crystals are finally dis¬ tilled with moderately strong sulphuric acid, when a very pure acetic acid is given off. This is concentrated to the required degree by distill¬ ing.

By heating dry acetate of sodium with an equivalent quantity of concentrated sulphuric acid it is possible to obtain acetic acid in a state free from water. The acid so obtained is a colorless liquid boiling at 244° F., and solidify¬ ing in prismatic or tabular crystals at about 63° F., into an ice-like mass; from this property the anhydrous acid has been called glacial acetic acid.

Acetic acid is uninflammable in its liquid state, but its vapor burns with a fine blue flame, with the production of water and car¬ bonic acid gas. It has a stinging sour taste, and when strong it blisters the skin. It mixes with alcohol and with ether in all proportions and is used as a solvent for resins, essential oils, gelatin, albumen, fibrin and other organic substances, being a useful substitute for alco¬ hol in certain cases on account of its relative cheapness.

The commercial acid is generally very im¬ pure, containing more or less of sulphuric acid and sulphates ; sulphurous acid ; hydrochloric acid and chlorides ; and the salts of copper, lead, zinc, tin and arsenic.

Acetic acid is used in the production of the acetates of lead, copper, aluminum and iron ; in calico printing; in the manufacture of var¬ nishes; and in domestic economy as vinegar. It has also some medicinal use as an outward ap¬ plication. Its extended solvent properties have already been noted.

Lead acetate (or sugar of lead) and copper acetate (or verdigris) are the most important compounds of acetic acid with the heavy metals. Aluminum acetate and the iron acetates are

much used in dyeing. The acetates of lead, potassium and ammonia are also largely used in medicine.

Acetic acid may be formed synthetically by exposing a mixture of one volume of acetylene (q.v.) and two volumes of air to daylight, in the presence of a weak solution of caustic potash. The acetylene is slowly

oxidized, com¬ bining simultaneously with the caustic potash to form acetate of potash, according to the formula

C2H2 +0 + KOH = CH3.COOH

Acetylene Caustic Acetate of

potash potash

From the acetate of potash so formed the acetic acid can readily be obtained. This mode of formation is of no practical value, but it has a theoretical interest.

The relations of acetic acid with the organic radicals are too numerous and complicated to receive general treatment in the present article. The more important ones are noticed elsewhere. See Aldehyde; Alcohol; Ether; Vinegar, etc.

ACETIC ETHER, or ETHYL ACE¬ TATE, a colorless, inflammable liquid having the formula CH3.COO.C2H5, or CJLCh, pre¬ pared by the action of sulphuric acid upon a mixture of alcohol and acetic acid. It has a specific gravity of about 0.91 and a specific heat of 0.48 and boils at 171° F., under the ordinary atmospheric pressure. It mixes read¬ ily with alcohol and with ether and at ordinary temperatures is soluble in about 17 parts of water. See Esters ; Ether.

ACETIN, a substance resembling fat in its constitution, obtained by acting upon glycerin with glacial acetic acid. Acetins are known as monoacetin, diacetin and triacetin, according as the acetic acid has displaced one, two or three of the hydroxyl molecules in the glycerin. The formula of monoacetin is C3H5(OH)2 (OC2H30) ; of diacetin, GHb(OH) (0C2H30)2 ; of triacetin, C3H5(OC2H30)3.

ACE'TO-ACE'TIC ACID, a thick acid liquid, having the formula CHs.CO.CH2.COOH. At 212° F. it splits up into carbon dioxide and acetone. Aceto-acetic ether, or ethyl aceto- acetate, has the peculiar property of reacting either as CH3.CO.CH2.CO.OC2H5 or as CHa.C (OH) : CH.COOC2H5.

AC'ETONE. (1) A limpid, mobile liquid with a taste suggestive of peppermint. For¬ mula, CH3CO.CH3. It occurs in crude wood-alcohol, from which it can be separated by dis¬ tilling over calcium chloride. It is also ob¬ tained by the destructive distillation of acetates, notably those of barium and lead. It occurs in the urine, blood and brain of calcium diabetic patients. Lieben’s test for acetone in the urine is as follows : Distilled urine is made alka¬ line by caustic

potash and a few drops of a solution of iodine and iodide of potassium are added. If acetone is present a yellow precipi¬ tate of iodoform is formed at once; if alcohol be present in the distillate, the same reaction takes place, but more slowly; but with acetone the reaction is immediate. Acetone is very in¬ flammable and burns with a white smokeless flame. It boils at 133° F. at ordinary atmos¬ pheric pressure ; its specific gravity at ordinary temperatures is about 0.800. Acetone is a val¬ uable solvent for scientific and technical pur-

poses. One of its most important uses is the solution of acetylene (q.v.) (2) Any one of

a certain class of carbon compounds in which two alcoholic radicals are united by the group CO. These compounds are now called ketones to distinguish them from the particular member of the group defined in (1), above.

AC'ETONI'TRILE, a colorless liquid with a pleasant ethereal odor and burning with a reddish-bordered flame. It has the formula CzHjN, and is isomeric with methyl cyanide. It is best prepared by distilling a mixture of potassium cyanide and potassium-methyl-sul¬ phate. It boils at 178° F. at ordinary atmos¬ pheric pressure and has a specific gravity of 0.79. It mixes with alcohol and water.

AC'ETYL, the radical of acetic acid, its formula being CH3.CO. Acetic acid may be regarded as the hydrate of this radical, its formula being CH3.COOH. Acetyl chloride, CH3.COCl, is obtained by the action of phos¬ phorus trichloride upon acetic acid. Acetyl chloride evolves hydrochloric acid when it is heated with any substance containing the rad¬ icals hydroxyl, amidogen or imidogen, and is of importance as a test for these substances.

ACETYLENE. See Liquefied and Com¬ pressed Gases.

ACHiEA. See Achaia.

ACHiEI, ak-I'e, ACHAIANS, ak-a-yans, or ACHZEANS, ak-e'ans, the descendants of the mythical Achaeus, son of Xanthus and grand¬ son of Helen; a generic term employed by Homer to designate the whole Hellenic host before Troy, and in poetic use applied to all the Greeks indiscriminately. They appear to have been that branch of the Greeks which inhab¬ ited southeastern Thessaly and northern Pelo¬

ponnesus, and by the Dorian invasion were driven altogether beyond the Corinthian Gulf and cooped into a strip of Peloponnesus along its southern shore, where they were the nu¬ cleus of the later Achaian League. See Achaia.

ACHTEMENIDiE, ak'e-men'i-de, the Greek name of the Persian dynasty (558-330 b.c.) founded by Cyrus the Great, including Cambyses, Darius I and II, Xerxes, Artaxerxes, etc., and ended by Alexander the Great. The family took its name from an ancestor of Cyrus, found in Persian inscriptions as Haxa- manisya, which the Greeks softened to Achae- menes (a-ke'men-ez) .

ACHAIA, ak-a'ya, or ACH2EA, ak-ea, according to Homer, southeastern Thessaly, where was Phthia, the home of Achilles. In later history, a strip of Peloponnesus along the southern shore of the Corinthian Gulf, rising from the coast to wooded hills abounding in beasts of the chase; the uplands were fertile with grapes, olives and other fruits. The nome called Achaia (including Elis) in modern Greece (pop. 255,000), the northwestern part of Morea with capital at Patras, occupies the same location except along the west coast, on the Ionian Sea. When it first appears in authentic history (Herodotus), it is a confederacy of 12 town? — Pellene, 2Egeira, 2Egae, Bura, Helice, yEgium, Rhypes, Patrae, Pharae, Olenus, Dyme and Tritaea — headed by Helice, and keeping much to itself in Greek affairs. Helice was destroyed by an earthquake and swallowed by the waves 373 b. c., and /Egium succeeded

to the hegemony; and at some time unknown Olenus was deserted.

The League took no share in the Pelopon¬ nesian war, but the Macedonian supremacy and the dynastic struggles after Alexander's death broke it up altogether. Some of the remaining 10 towns were held by Macedonian garrisons, some by local tyrants, a state of disunion equally gratifying to Macedonia and intolerable to Greek patriots. In 280, when several kings were dead, Macedonia in confusion, and the great Pyrrhus absent in Italy, Patrae and Dyme, the two westernmost towns, formed an alliance ; Tritaea and Pharae joined them; and the new Achaian League, famous in history, which gave southern central Greece more than a century of order and good government, was begun. The cities probably drove out their garrisons or rulers, as later ones certainly did. Five years afterward .TEgium expelled its garrison and joined the League; Bura was freed and its tyrant slain by its people and their exiled brethren, and joined also; and Iseas, tyrant of Ceryneia, seeing how events were trending, voluntarily surrendered his position with a guaranty of safety, and

annexed the city to the League. Seven towns were now included ; and the other three were recovered and annexed not long after. But all were small and poor; fortunately for the League, as it was thought too insignificant to molest, and grew up peace¬ fully and solidly for some 30 years. The chief name in its early history is Markos of Ceryneia, who helped liberate Bura even before his own city was freed, and seems to have been the Washington of the League. But its first en¬ trance into the role of a great Greek political force began with the expulsion in 249 of the tyrant of Sicyon by Aratus of that city, who induced it to join the League; it not only gained thereby the first city outside the old Achaian confederacy, and became more or less Pan-Greek, but gained Aratus, its second founder, and a statesman and administrator of high or¬ der, though his jealousy of other leaders and his military incompetency injured it deeply. A still greater accession came in 242, when Corinth expelled its Macedonian garrison and joined; and in 234 Lydiadas, tyrant of Megalopolis, the powerful city founded by Epaminondas, volun¬ tarily resigned his place like Iseas and brought in his city, being made commander-in-chief of the League's army the next year. Before the century had begun its last quarter the League included all northern and central Peloponnesus, and many towns elsewhere.

The League was a federal union of abso¬ lutely independent states, each having equal power in the Council, which met twice a year — at first and for a long time in a grove near yEgium, but later, at Philopcemen's motion, in the League cities in rotation. The vote of each city was given as a unit, not by elected dele¬ gates, but by any of its citizens who were present, any one over 30 having a right to be so ; attendance therefore naturally fell to the richer citizens with means and leisure, and the assembly was a rough representative body of the leading men. The union acted as a unit in foreign affairs, and there was a secretary to record the debates and resolutions. The head officer was the strategos, who was ,*ommander- in-chief and civil president at once ; he had under him a hipparchos (cavalry commander)

and nauarchos (admiral), and a board of 10 demiourgoi as assistants in the Council.

The League of course had its internal feuds and discordances of policy;

and the ˆTEtolian League north of the Gulf (only half Greek, and wholly barbarian in instability and lack of pro- Greek feeling), which alternately allied itself with it and ravaged its territory, was a mis¬ chievous rival and enemy. But the League would probably have fully held its own till the Romans came, but for Sparta. Cleomenes II had revolutionized that state, which had shrunk into the narrowest of oligarchies and could not maintain its position ; he had turned it into a socialistic one, and wished to force the League to join him in a great Peloponnesian union, of which Sparta would be master, imposing both its foreign policy and perhaps its internal or¬ ganization on the rest, and which would destroy the internal independence of the League and menace the possessions of every property-holder in it. The League was badly defeated by Cleo¬ menes in the field, and was between hammer and anvil ; for the only power which could save it was Macedonia, its natural foe and old master, and Antigonus Doson refused to give aid unless the citadel of Corinth, the key of Peloponnesus, held by the League, were given up to him. Aratus felt, however, that the suzerainty of Macedonia, now that the League was strong enough to pre¬ vent active tyranny, was a less evil than the mastery of Cleomenes ; and by cunning manage¬ ment he induced the League to pay the price asked for Antigonus' help. Cleomenes was crushed at Sellasia, and his Spartan constitution came to an end, and the League became a de¬ pendency of Macedonia. Yet Aratus' policy was justified by events so far as the League was concerned; it did not suffer from Macedonian tyranny, though the chance of forming a united Greece was at an end. But that was probably as little possible under Cleomenes as under Macedonia.

In point of fact the destroying enemy was not Macedonia but Rome. Under the noble and able Philopoemen of Megalopolis, soldier and statesman of high rank, the League was pros¬ pering and giving the citizens an enviable gov¬ ernment. But a pro-Roman policy prevailed, and Philopoemen left the country. In 198 it allied itself with Rome against Macedonia, and this was always the beginning of the end with the other party to a Roman alliance. There were wars against Sparta, and a struggle between Roman and anti-Roman partisans in the assem¬ bly, with Roman envoys and intriguers to fan the flames. Finally, in 167, the Romans de¬ ported the flower of the Achaian citizens to Italy, many of them being imprisoned, others — as the future historian Polybius (q.v.), then a youth of 18 — kept as hostages but given Roman advantages. The last struggle took place in 146, when Mummius defeated the League at Corinth, and the independence of Greece or any fraction of it was at an end. All southern and central Greece was made a Roman province called Achaia.

The first-hand authority for the League is Polybius, unfortunately extant only in frag¬ ments ; in some parts he is pieced out by Livy, passages of whose work are often obvious translations from Polybius. In English the one great work is E. A. Freeman's (History of

Federal Government,' nearly all devoted to the Achaian League (London 1893).

ACHAIAN, or ACHAEAN, LEAGUE.

See Achaia.

ACHAN, or ACHAR, aH'an, a Biblical character whose story is found in the Book of Joshua, chapter VII. Israel had been for¬ bidden to take captives or spoil at the capture of Jericho. Achan violated the taboo. Dis¬ aster came to Israel. Investigation followed. After he was discovered by lot, Achan con¬ fessed. He and his family were stoned and burned and their property was also burned. The family were destroyed as accessories after the fact. This incident has suggested a phrase often used in literature — (<there is an Achan in the camp,® meaning that some member of the group is not true to his obligations.

ACHAQUA, a-cha'kwa, a South American Indian tribe probably extinct, though a few hundreds, who lived in the upper Orinoco forests in northeastern Colombia, were still existent in 1850. They were utter savages, practising infanticide beyond the second child, polyandry, and tattooing.

ACHARD, Franz Karl, iiH'art, friints karl, German chemist and physicist : b. Berlin, 28 April 1753; d. 1821. He published in 1780 the results of many and careful experiments on the adhesion of bodies. But later he devoted him¬ self to the development of the beet-sugar manu¬ facture, and after six years of laborious endeav¬ or discovered the true method of separating the sugar from the plant. His process was of enormous service to the countries whom the Napoleonic blockade shut off from the West India sugars. He was afterward director of the class of physics in the Academy of Science in Berlin.

ACHARD, Louis Amedee Eugene, ash- ar, loo-e am-a-da e-zhan, French novelist: b. April 1814; d. 25 March 1875. Originally a merchant, he became a contributor to several Paris journals in 1838. After the revolution of 1848 he was active as a royalist political writer ; 1848-72 the Revue des Deux Mondes brought out almost annually a new story from his pen. He depicts pre-eminently conflicts in family life and society. (Parisian Letters,' published in 1838 under the

pseudonym of ˆGrimm," made his reputation. Other works of his are ‘Belle Rose) (1847) ; (The Royal Chase) (1849- 50) ; (Castles in SpaitP (1854) ; (The Shirt of Nessus) (1855) ; (Chains of Iron' (1867) ; (The Viper' (1874).

ACHARNiE, a-kar'ne, a large town of Attica, where the Thirty Tyrants (q.v.) en¬ camped when they marched against Thrasy- bulus ; and where the Lacedaemonians, under their king Archidamus, pitched their tents when they made an irruption into Attica at the begin¬ ning of the Peloponnesian war. Aristophanes, in his comedy (The Acharnians' — where a citizen of the place, sick of war, ravage and the stoppage of trade, makes a treaty of peace with the Lacedaemonians on his own account — represents the inhabitants as charcoal-makers ; and other comic writers stigmatize them as rough and boorish.

ACHATES, a-ka'tez, in the ˆEneid, a friend of Avneas, whose fidelity is depicted as

so exemplary that fid us Achates (the faithful Achates) has become a proverb.

ACHEEN. See Achin.

ACHELOUS, ak-e-lo'us (now Aspropo- tamo, (< White River®), the largest river in Greece, 130 miles long, and not navigable. It rises on the Pindus range, flows south in a boisterous torrent, forming the boundary be¬ tween ZEtolia and Acarnania, and empties into the Ionian Sea opposite Ithaca. In its lower course it is an alluvial stream, winding in great loops through very fertile and marshy plains ; it comes from the mountains heavily laden with fine white mud, which it deposits along its banks and in the sea at its mouth, where it has formed a number of small islands.

In Greek legend, the son of Oceanus and Terra, or Tethys, god of the river. As one of the numerous suitors of Dejanira, daughter of CEneus, Achelous entered the lists against Her¬ cules, and, being inferior, changed himself into a serpent and afterward into an ox. Hercules broke off one of his horns, and Achelous, being defeated, retired into his bed of water. The broken horn was given to the goddess of plenty.

ACHEN, Johann (((Hans))) von, ii'Hen, yo'han ton, or ACKEN, a'ken, German painter: b. Cologne, 1512; d. 1615. He studied at home, and at Venice under Kaspar Rems, and took service with the Bavarian court 1590; later went to Prague at the invitation of Emperor Rudolph II. The Protestant church at Cologne con¬ tains his (Crucifixion,) the cathedral at Bonn his (Entombment, } and among his other works are (Christ Raising the Widow's SonP and (Truth Victorious under Protection of Jus¬ tice. J

ACHENBACH, Andreas, a'Hen-baH, Ger¬ man landscape and marine painter : b. Cassel, 1815; d. 1910. He studied under the eminent Schadow at Diisseldorf, and became one of the leading artists of that school. He painted in Holland, along the Rhine, and in Norway, pro¬ ducing landscapes of rich coloring and intense realism. He was made R.A. in Berlin, and knight of the Legion of Honor in France; and took a first medal in Paris, 1855. Private gal¬ leries in the United States have many of his finest works.

His younger brother Oswald, b. Diisseldorf, 1827; d. 1 Feb. 1905, was also a landscape artist, esteemed of more ideal quality than Andreas; and his pictures of Switzerland, Italy, etc., were largely bought in the United States. Consult icchenbach, C., (Andreas Achenbach in Kunst und Leben) (1912).

ACHENE, ACHENIUM, AKENE, a-ken', etc. (<(not gaping®), a dry, hard, one-sceded fruit in which the wrappings of the seed set closely to it, forming almost a coat; The entire family of Compositce are of this sort: the <(seeds® of borage, the sunflower, thistle, dande¬ lion, etc. Sometimes the)r are grouped on a common receptacle, called an etcurio ; as in the strawberry, where it is fleshy, the achenes be¬ ing the ((pits,® or in the centre of the butter¬ cup, where they form the <(fruit®; sometimes they are inclosed in the fleshy tube of the calyx, as in the rose.

ACHENSEE, a'nen-za, a lake in northern Tyrol, Austria, Sl/2 miles long by 14 mile wide, 20 miles northeast of Innsbruck. Its shores

are of great beauty, and it is a noted summer resort, having many hotels and private villas, while steamers carry passengers to points of interest.

ACHENWALL, Gottfried, a'Hen-val, got'- fred, German statistician: b. Elbing, 20 Oct. 1719; d. Gottingen, 1 May 1772. He studied at Jena, Halle and Leipzig, and became professor of philosophy, and later of law, at Gottingen. In economics he belongs to the school of

(<moderate mercantilists® ; but it is in statistics that he holds a really high place. The work by which he is best known is his Constitutions of the Present Leading European States) (1752). In this he gives a comprehensive view of the con¬ stitutions of the various countries, describes the condition of their agriculture, manfactures and commerce, and frequently supplies statistics in relation to these subjects. German econo¬ mists claim for him the title of (<Father of Sta¬ tistics® ; but English writers dispute this, assert¬ ing that it ignores the prior claims of Petty and other earlier writers on the subject. He gave currency to the term S taat swiss enscliaft (pol¬ itics), which he proposed should mean all the knowledge necessary to statecraft or statesman¬ ship.

ACHERON, ak'e-ron, the ancient name of several rivers in Greece and Italy, all connected by legend with the lower world. The principal was a river of Thesprotia in Epirus, which passes through Lake Acherusia, receives the Cocytus (Vuvo), and flows into the Ionian Sea south of the promontory of Chimerium, at Glycys Limen or Elaea, now Port Fanari. At one part its course lies between mountains rising pre¬ cipitously to the height of 3,000 feet. The name is also given to a river of Elis, a tributary of the Alpheus, and to a small river of Bruttium, in Italy, near Pandosia (location uncertain), near which Alexander of Epirus fell in battle against the Lucanians and Bruttians (326 b.c.). Their legendary celebrity appears to have been originally due to the Acheron in Thesprotia. This country being regarded by the Greeks as the end of the world in the West, they sup¬ posed the entrance to the lower world to be here. As this district became better known, the legendary river was placed elsewhere, and final¬ ly transferred to the lower regions. In Homer, Acheron is represented as a river of Hades. According to later traditions a son of Helios and Gsca or Demeter, who bore this name, was changed into an infernal river as a punishment for giving drink to the Titans during their war with Zeus. The Etruscans are said to have worshipped Acheron. The name of Acheron was ultimately used in a poetic or figurative way to designate the whole of the lower world.

ACHERONTIA ATROPOS. See

Death’s head Moth.

ACHESON, ach'e-son, Edward Goodrich,

American inventor: b. Washington, Pa., 9 March 1856. At 18 he was engaged with a civil engineering corps, opening mines and laying railroads in the vicinity of Reynoldsville, Pa. Upon the termination of

his work in railroad construction he designed a small dynamo, and after meeting many discouragements he secured a position at Edison's establishment at Menlo Park, where his ability speedily attracted the attention of Thomas A. Edison. He was pro-

moted rapidly, given every opportunity for the exercise of his inventive faculty and was sent to Europe as first assistant engineer for the Edison interests at the Paris International Elec¬ trical Exposition. Mr. Acheson declined an ex¬ ecutive position offered him by Mr. Edison in order to pursue individual research and, after a series of unsuccessful inventions, he brought out an anti-inductive telephone wire. In 1886 he removed to Pittsburgh, where he succeeded in interesting capital in his schemes. In the same year Mr. Acheson concerned himself with the synthetic production of rubber, as prelude to the more important field of artificial abrasives which now engaged his attention. While pass¬ ing natural gas into a highly heated furnace containing some clay articles, he found these, after cooling, to be impregnated with carbon and, he believed, rendered harder in conse¬ quence. Experiments with a mixture of clay and coke heated electrically failed to produce the result for which Mr. Acheson was striving, but on the end of the arc carbon carrying the electric current into the mixture he discovered a bright speck. Testing this substance he dis¬ covered that it would not only cut glass as readily as a diamond, but would cut diamonds as well. On 21 Sept. 1891, the Carborundum Company was formed. At first carborundum was so expensive that it could compete only with diamond powder, used for polishing gems, but after extended work the price was reduced, and about 1899 he invented a graphite (Ache- son-graphite), superior to the natural product. The emery wheel manufacturers declared their ability to turn carborundum into wheels, whereupon Mr. Acheson tried the experiment himself, and secured the contract for grinding the joints of the new Westinghouse electric lamp. The valve grinders next found a great time-saver in carborundum, while new vistas were opened up by the utilization of Niagara Falls for the generation of electric power. Mr. Acheson built a new plant there in 1895, con¬ tracting for 1,000 horse power, the largest amount ever used in bulk up to that time. As early as 1895 he had taken out a new patent for the purifying of carbon, the first of a series resulting in the artificial production of graphite.

What is often considered his greatest achievement is the discovery of

graphite lubri¬ cation. Before he finally met with success here his experiments brought him upon other dis¬ coveries of inestimable importance. Making a test of various clays, Mr. Acheson became con¬ vinced that the greater plasticity and strength of the imported article over the home product was the result of a natural addition of organic matter. Experiments along this line showed him that a treatment with a dilute solution of tannin would produce the same results. Al¬ though straw contains no tannin, a liquid ex¬ tracted from it was found to produce a similar effect, and the clay so treated was called by Mr. Acheson <(Egyptianized Clay,® and under that name has taken its place on the market as a most important product.

An important discovery of Mr. Acheson's came as the result of an attempt in 1906 to in¬ crease the abrasive value of carborundum. In¬ stead of a harder, a softer material was dis¬ covered. the ideal lubricating product. A patent of 20 Nov. 1906 secured the perfected process

to the International Graphite Company, which is now marketing a mixture of the new graphite with grease under the name of ((Gredag.® This discovery of the process for making this unctuous graphite led to the great¬ est invention of all, as by applying to it the treatment which produced ((Egyptianized Clay® the discoverer succeeded in rendering the graph¬ ite so fine that it would pass through the finest of filtered papers, while it freely diffuses of itself through oil or water. Graphite in this state of fineness is termed (<Deflocculated.® This graph¬ ite diffused in water is called (<Aquadag.® The advantages of this new lubricant over oil, be¬ sides cheapness, are the elimination of viscosity and consequent loss in power, and impossibility of explosion in air compressors. In order to mix deflocculated graphite with oil a process for separating it from the water at this point had to be devised, and this Mr. Acheson met, with the result that he produced the most efficient lubricant known to man, namely, ((Oildag.®

Besides receiving the Paris and Saint Louis Exposition prizes, the University of Pittsburgh conferred on him the honorary degree of Sc.D. 12 Feb. 1909; the John Scott Medal was given him by the Franklin Institute of Phila¬ delphia, first for the discovery of carborundum (1899) and again for the manufacture of graphite (1901) . In 1907 the American Academy of Arts and Sciences awarded him the Rumford Medals for application of heat in the electric furnace for industrial purposes, and in 1909 the Society of Chemical Industry conferred upon him the Perkin Medal. See Carborundum ; Aquadag; Graphite; Gredag; Oildag.

A CHEVAL POSITION. Military term signifying the position of an army astride a river or other obstacle preventing co-operation of the wings of the army.

ACHILL, ak'il, or EAGLE ISLE, Ire¬ land, the largest island off the coast, included in the western county of Mayo. It is of trian¬ gular shape about 15 miles long from east to west and 12 miles from north to south; area, 57 square miles. The surface is mountainous, rising in peaks to heights of over 2,200 feet ; and the coast line is bold and picturesque. There are several fishing villages, of which Dugort, the principal, has modern hotels to accommodate summer visitors. Pop. 5,000.

ACHILLES, a-kil'ez, one of the heroes of Greek mythology, and in particular the hero of Homer's Iliad. According to the latter he was the son of Peleus, king of the Myrmidons in Phthiotis, a district of Thessaly, and of the Nereid or sea-goddess Thetis, and the grandson of Aiacus; hence often called Peleides and 2Eacides. He was educated from childhood by Phoenix, a friend of his father, who accom¬ panied him to the Trojan war; and Cheiron the Centaur instructed him in the art of healing. Achilles went to this war with the knowledge that he was to perish in it ; his mother having foretold him that he should either live a long and inglorious life, or die young after a glori¬ ous career. He led his troops, the Myrmidons, against Troy in 50 ships. During the first nine years of the war we have no minute detail of his actions ; in the tenth a quarrel broke out be¬ tween him and the general-in-chief, Agamem¬ non, which led him to withdraw entirely from the contest. In consequence the Trojans, who

before scarcely ventured without their walls, now waged battle in the plain with various issue, till they reduced the Greeks to extreme distress. The Greek council of war sent its most influential members to soothe Achilles' anger, and induce him to return to arms, but without effect. Rage and grief caused by the death of his friend Patroclus, slain by Hector, induced Achilles to return to battle. Thetis procured from Hephaestus (Vulcan) a fresh suit of armor for her son, who at the close of a day of slaughter killed Hector and dragged him at his chariot wheels to the camp, but afterward gave the body to Priam, who came in person for it. Achilles then performed the funeral rites of Patroclus, with which the Iliad closes. It contains, however, several anticipative allu¬ sions to the death of Achilles, which is also mentioned in the Odyssey. He was killed in a battle at the Scaean Gate.

Here ends the history of Achilles so far as it is derived from Homer. By later authors a variety of fable is mixed up with it ; some per¬ haps old legend, much certainly outright in¬ vention. To make him immortal, his mother during his infancy concealed him by night in fire, to destroy the mortal parts inherited from * his father, and anointed him by day with am¬ brosia (the story of Demeter and Demophoon). His father discovering him one night in the fire, Thetis fled ; and his father entrusted him to the care of Cheiron, who fed him with the hearts of lions and the marrow of bears, and gave him the education proper to a hero. Ac¬ cording to another story Thetis made him in¬ vulnerable by dipping him in the Styx, but the heel by which she held him was untouched by the water ; accordingly he received his fatal wound in the heel. The story of Siegfried is patterned on this. To prevent his going to Troy, where it was predicted he should perish, Thetis sent him, disguised as a girl, to the court of Lycomedes of Scyros. He was educated with Lycomedes' daughters, one of whom, Deida- meia, became the mother of Pyrrhus or Neop- tolemus by him. Odysseus (Ulysses) went to the court of Lycomedes to discover him and induce him to join the war, in which Calchas had declared his aid indispensable. He suc¬ ceeded bv a stratagem. Presenting himself as a merchant, he offered the daughters of Lyco¬ medes female ornaments and articles of attire for sale, among which he laid a shield and spear. He then raised an alarm of danger, on which the girls fled, and Achilles seized the weapons. He is said to have been killed either by Apollo in the likeness of Paris, or by an arrow of Paris directed by Apollo. According to another account he made love to Polyxena, a daughter of Priam; and, induced. by the prom¬ ise of her hand on condition of his joining the Trojans, went unarmed to the temple of Apollo at Thymbra, and was there assassinated by Paris. Various stories are told of the relations of Achilles with Iphigenia (q.v.), who was brought to the camp at Aulis on pretext of being married to Achilles. In one account Achilles interferes to rescue her from being sacrificed, and sends her to Scythia ; in another he marries her, and she becomes the mother of Pyrrhus. Others say he was united to her in the lower world, where he became a judge; others again say he married Medea in Elysium. Annual sacrifices were offered to Achilles by the

Thessalians at Troas by command of the oracle of Dodona ; at Olympia and other places in Greece sacred honors were likewise paid to him. This has led to the unsafe inference that he was originally an Achaian god; but remem¬ bering the propensity of uncivilized races to deify superior geniuses among them, and such cases as that of Roland, it is much more likely that he was a chief before he was a god. It is

probable that a real Thessalian warrior existed who has been thus idealized, though we do not know his name or real deeds. See Homer; Trojan War.

ACHILLES TATIUS, a-kil'ez ta'shi-us, a Greek writer of romances : b. in Alexandria ; flourished in the 5th century of our era. Suidas says he was a Christian bishop, but this is doubted. He wrote (The Loves of Clitophon and LeucippeH an erotic story in eight books, of pleasing but florid style, and without much regard to unity or consistency of plot; it was modeled on Heliodorus' ˆthiopicaP That the story was very popular in its day is proved by the number of copies of it that are still in MSS., and by the plentiful imitations of it in the Mid¬ dle Ages. An English translation by Anthony Hodges was published in 1638.

ACHILLES TENDON, a tendon, so called because, as fable reports, Thetis, the mother of Achilles, held him by that part when she dipped him in the river Styx to make him invulnerable. It is the strong and powerful tendon of the heel, which is formed by the junction of divers muscles, and which extends from the calf to the heel. When this tendon is unfortunately cut or ruptured, as it may be in consequence of a violent exertion or spasm of the muscles of which it is a continuation, the use of the leg is immediately lost ; and unless the part be afterward successfully united the patient will remain a cripple for life. The indications are to bring the ends of the divided parts together, and to keep them so until they have become firmly united. This tendon is frequently the seat of a synovitis, just above the heel, from excessive exercise.

ACHIMENES, a-kim'e-nez (from the Greek name of an East Indian plant used in magic), a genus of tropical American plants of the family Gesneriacccz, greatly cultivated in greenhouses for the beauty of their red, white and blue flowers, which, if the rhizomes are potted by the first of April, bloom from the last of May till into October or even Noyem- ber. They may also be propagated by cuttings. The species are numerous.

ACHIN, ACHEEN, or ATCHEEN, a-chen' (properly Acheh, Portuguese corruption Achem, Dutch Atjeli or Ajeh), a district at the northwest extremity of Sumatra, till 1873 an in¬ dependent sultanate, now a province of Dutch Indies: area, 20,471 square miles; pop. (1912) 789,664 (but a true census must be impossible). The surface is divided into an eastern and a western half by a mountain chain which tra¬ verses the whole island, rising in the peak of Abong-Abong to 11,000 feet. At the farthest north is the famous Gold Mountain, at the base of which lies the capital. On both sides are numerous stretches of level or

undulating soil, watered by small but deep streams, and admirably adapted for tree-culture, gardening and rice. The flora and fauna agree with those

of Sumatra; pepper-trees and areca-nuts grow there. The natives employ themselves in agri¬ culture, cattle-rearing, trade, fisheries, weaving cloth and working in gold, silver and iron. The chief agricultural industry is the produc¬ tion of rice and pepper, the latter sent from many small western ports. From Pedir and other northern ports large quantities of betel- nut are exported to India, Burmah and China. Achin ponies are also much reputed and ex¬ ported. Minor exports are sulphur, iron, sapan- wood, gutta-percha, dammer, rattans, bamboos, benzoin and camphor, the latter highly valued in China and bringing an enormous price. Silk, once plentiful, has nearly disappeared. Nor is there now much export of the gold that once drew so much trade thither and made it so rich as to astonish foreigners. No place in the East save Japan was so abundantly supplied with it, and it was from far antiquity part of the Golden Chersonese. It exported probably 15,000 to 20,000 ounces a year. The imports are mainly rice (the native supply being insufficient), opium, salt, dried fish, cotton goods, iron and copper wares, firearms, pottery, etc. The people are distinct from the rest of the Sumatrans, who are Malays ; they are taller, handsomer and darker, more active and industrious, and good seamen ; but they are treacherous, blood¬ thirsty and revengeful, immoral and inordi¬ nately addicted to opium. Their ethnological place is not settled ; they are believed to be Malay at root, though probably with some ad¬ mixture from India, and not impossibly an Arab strain. Their speech is said by some to be Polynesian at root, though with much Malay loan element. Their literature is entirely Malay, and comprises poetry, theology and chronicles.

The capital of the province is Kota Radja or Achin, situated at the northwest extremity, on a stream navigable by boats, about 4*4 miles # from its port Oleh-leh, with which, since 1876, it has been connected by a railway. Formerly a large and flourishing city, it was almost en¬ tirely destroyed during the war, but is now beginning to revive. It contains a Dutch garrison.

History. — Civilization was first introduced into Sumatra by Hindu missionaries in the 7th century, and a considerable amount of immigra¬ tion from India followed. In the 13th century it was

converted to Mohammedanism by Arabs — the sultans of Achin claim descent from the first Mohammedan missionary — and the Arabic alphabet displaced the Japanese. Northern Su¬ matra was visited by several European travelers in the Middle Ages, as Marco Polo, Friar Odor- ico and Nicolo Conti; and some of these, as well as Asiatic writers, mention Lambri, a state which milst have corresponded nearly with Achin ; but the first to name it as such is Alvaro Tellez, a captain of the Portuguese Tristan d'Acunha's fleet, in 1506. It was then a de¬ pendency' of Pedir adjoining; but within 20 years it had not only gained independence, but swallowed up all the other states of northern Sumatra. It attained the climax of power under Sultan Iskandar Muda, 1607-36, when it extended from Aru, opposite Malacca, round by the north to Padang on the western coast, a sea¬ board of 1,100 miles; and its supremacy was owned also by the large island of Nyas, and by the continental Malay states of Johor, Pahang,

Quedah and Perak. It is in fact the only Su¬ matran state which has at any time been power¬ ful since the Cape route to the East was dis¬ covered. Its wealth astonished the European visitors and traders ; and its great commercial repute is shown by the fact that it was to Achin port that the first Dutch (1599) and English (1602) commercial ventures were directed. Lancaster, the English commodore, carried let¬ ters from Queen Elizabeth to ((the king of Atcheen,® James I exchanged letters with Is¬ kandar Muda in 1613, and the Achincse sent envoys to the Dutch republic, who were re¬ ceived by Prince Maurice in camp (1602). But native jealousy of foreigners and the latter's rivalry with and destruction of each other's ventures prevented the establishment of per¬ manent factories there. Still, the trade, though spasmodically interrupted, was very important ; foreign merchants of many nations were settled in Achin city port, while other Chinese mer¬ chants came annually and held a great fair through June and July. For 58 years after Iskandar's death the Malay oligarchy of chiefs placed females on the throne; in 1699 the Arab party suppressed this system and set up an Arab ruler, and the state rapidly decayed from inter¬ nal factions. From 1666 on, the Dutch had held possessions around Padang on the western coast, and gradually gained much in old Achin ; in 1811 the British seized this as well as the other Dutch East Indies. In 1816 Java was restored to the Dutch, but the English colonies insisted the more strenuously that English in¬ fluence should be maintained in Achin ; and in 1819 the Calcutta government made a treaty ex¬ cluding all other foreigners from permanent settlements there. In 1824 an exchange was made with the Dutch, of the Sumatran settle¬ ments for others in Asia; the above article was not mentioned, but it was privately understood that it should not be

insisted on if the Dutch would make no war on Achin. In the conven¬ tion at The Hague, 2 Nov. 1871, the Dutch in¬ sisted on the latter stipulation being formally withdrawn, as the Achinese were pirates and chastisement was often needed ; and in 1873 Holland — with plenty of provocation, but grave doubts even at home of its necessity — em¬ barked in the war, which cost it 15,000 lives and about $100,000,000, and ended in 1880 in the real subjugation of the country. Achin city was captured and civil government has been instituted in the coast territory ; but the natives are fierce and have a good country for guerilla warfare, and outbreaks occurred in 1896, 1898 and 1901-04. Many evidences of these wars may be seen in Holland. The authoritative works are all in Dutch; the chief is Snouck-Hurgronje (De Atjehers> (2 vols., Batavia 1893-95). There is also one of Veth, (Atchin) (Leyden 1873). For the geography of Atchin consult Volz (Die Gajolander> (Berlin 1912).

ACHIKUNDA, an African tribe inhabit¬ ing the Lower Shire, Nyasaland, Central Africa. They are quiet and peaceful, with marked tribal characteristics and are engaged chiefly in agri¬ culture, boating and fishing.

ACHISH, ii'kish, King of Gath in Philistia, with whom David takes refuge when out of favor with Saul ; represented as a dull, easy man whom David dupes into believing that he is making war only on the Judahites and their al-

lies, when in fact he is raiding the native tribes, and enriching his stronghold Ziklag with their plunder. His lords are not so blind, however, and make him dismiss David before going to battle at Mount Gilboa. David lived with him four months according to one account, a year and four months according to another.

ACHMET, ak'met, VEFIK PASHA, Turk¬ ish statesman, son of a Greek renegade and a Jewish mother: b. Constantinople, 1818; d. 12 Aug. 1891. In 1834 he accompanied his father to Paris, where he entered the College of Ste. Barbe. Having finished his education in France he returned to Constantinople, where he was given a position in the official translation bureau, of which he soon became the director. He made accurate and detailed knowledge of the Ottoman Empire more easily accessible to Europeans through the publication of his year¬ book, (Salaame, ou Annuaire de l’Empire Otto¬ man,) which first

appeared in 1847. He was later appointed by the Sultan to fulfill many important diplomatic missions abroad and was president of the council and minister of the interior during the Russo-Turkish war in 1877-78. He translated many of the French and German classics into Turkish.

ACHOR, aHor, a valley which forms the northern boundary of Judah (Josh. xv, 7) near Jericho. Its identification is uncertain.

ACHRO'MATISM. Because the several components of a beam of ordinary light are of different ref Tangibilities, it follows that they are not brought to a common focus by a simple convex lens. The violet rays meet at a point nearer the lens than that at which the red rays unite, and the optical image is confused and fringed with prismatic colors.

The difficulty is greatest with lenses of short focus, whence the early practice of constructing telescopes of enormous length. Sir Isaac New¬ ton, misled by a really remarkable series of petty accidents, concluded that this difficulty could not be obviated, and that large refracting telescopes were therefore impracticable. He therefore gave his attention to the development of the reflector.

In 1757, however, John Dollond, a Spital- fields weaver, discovered that different sub¬ stances separate the colors of light, for a given mean refraction, to a different degree. He therefore constructed double lenses of two dif¬ ferent kinds of glass, — crown glass and flint glass. A concave lens of flint glass brings the colors together while not entirely destroying the refraction caused by a convex lens of crown glass. The correction is far from perfect, how¬ ever, and even the best telescope lenses produce a blue halo surrounding the stellar images. This outstanding color may be reduced by combina¬ tions of three or more lenses; but such devices greatly increase the mechanical difficulties of the optician. The present practice is to bring to¬ gether such portions of the light as most power¬ fully affect the eye or the photographic plate, leaving the other tints uncorrected. The intro¬ duction of new kinds of glass, especially the Jena glass, so called, has somewhat improved the chromatic correction of smaller objectives. See Dispersion; Lens; Microscope; Telescope; Light.

ACHSHARUMOV, Nikolei Dmitriyevich,

ach-sha-roo'mof, ne-koUi dme-tre-yev'ich,

Russian novelist and critic : b. Saint Petersburg, 15 Dec. 1819 ; d.

Moscow, 30 Aug. 1893. For a time he held a post in the ministry of war, but came later to devote himself to painting, and particularly to literature. He first attracted at¬ tention by a dramatic sketch, (The Masked Ball, *and became more widely known through his novels, (The Double,* (The Gambler, *(The False Name,* (An Unusual Case, *(The Mandarin, * and (At All Costs) ((Was es auch Kosten mag*). His critical essays include studies of Tolstoi, Turgeniev, Dostoievski and Herbert Spencer.

A CHULA, a-shoo'la (Port.), a dance re¬ sembling the fandango (q.v.).

ACIC'ULITE, a mineral better known as needle-ore (q.v.).

ACID INDUSTRY, The. The manufac¬ ture of chemicals in the United States began with that of sulphuric acid. The indispensable part that this acid plays in all branches of man¬ ufacturing created an insistent demand that could not be met by importation. From those early days onward the manufacture of acids has steadily increased until, at the present, the tonnage of acids made annually in the United States exceeds the tonnage of any other one product, excepting only fertilizers, which in themselves contain enormous quantities of salts made with the aid of acids.

In gathering statistics of the acid industry it is customary to place the making of sulphuric and nitric acids and their mixture (<(mixed acids®) under a separate classification, as the production is so very much greater than of other acids, and their use in general manufac¬ tures is so widespread. The Census Bureau in its report on the acid industry for the calendar year 1914 gives the total value of the acids made for sale in the United States at $30,001,- 364. The amount made and consumed is not valued, but was estimated as worth at least as much more.

Sulphuric Acid. — The number of establish¬ ments making sulphuric acid was 194 — includ¬ ing those plants producing it for consumption in their regular business of making fertilizers and explosives, refining petroleum and the man¬ ufacture of general chemicals. The total pro¬ duction amounted to 4,047,675 tons, of which 2,337,977 tons were made for sale, in value, $15,395,133 — and 1,709,698 tons for consump¬ tion in the factories where produced. In this total all the acid made was reduced to the basis of 50° Baume. It included 1,677,649 tons of 50° acid; 795,489 tons of 60° acid; 828,466 tons of 66° acid; and 77,758 tons of oleum or fuming acid. Of the establishments reported, 34 were in Georgia, 18 in New Jersey and 16 in Pennsylvania — the location being governed obviously by

proximity to deposits of the pyrites needed as raw material. Prelim¬ inary official figures of the Geological Survey place the 1916 output of sulphuric acid in the United States at about 4,500,000 tons of 50° acid and nearly 1,000,000 tons of acids strong¬ er than 66° Baume. The enormous increase over the production of 1914 has nearly all gone into the manufacture of explosives in the United States. The exports of sulphuric acid for 1916 were onlv 30,000 tons.

Nitric Acid. — The manufacture of nitric acid engaged 52 establishments, of which 11

were located in Pennsylvania and 10 in New Jersey. The total output was 78,589 tons, of which 14,685 tons were for sale and 63,904 tons for consumption in the making of other products in the plants where produced. The production sold was valued at $1,591,625.

Mixed Acids. — In 1914 there were 37 estab¬ lishments making the mixture of sulphuric and nitric acids known to the trade as <(mixed acids,® and used so largely in the manufacture of explosives. The total production was 112,124 tons, of which 42,725 tons were for sale, and valued at $2, 204,480, and 69,399 tons for con¬ sumption by the plants making it. The mixed acid industry showed a notable increase since the previous census of 1909, amounting to 49.4 per cent in quantity. The value, however, in¬ creased only 18.5 per cent.

The quantities of the principal raw materials consumed in the manufacture of sulphuric and nitric acids and mixed acids in 1914 were as follows : Sulphur or brimstone, 62,340 tons, cost¬ ing $1,272,745; pyrites, 918,211 tons, costing $3,928,069 ; and nitrate of soda, 59,604 tons, costing $2,772,495. In addition, the fertilizer industry used in making acids : 2,041 tons of sulphur; 613,842 tons of pyrites; and 15,134 tons of nitrate of soda. The explosives indus¬ try used in making acids: 15,832 tons of sul¬ phur; 25,885 tons of pyrites; and 190,960 tons of nitrate of soda. The petroleum industry used in making acids; 2,035 tons of sulphur and 23,669 tons of pyrites.

Of the less important acids separate reports for 1914 were made as follows :

Acetic Acid was made in 13 establishments, the output amounting to 75,303,375 pounds, of which 70,617,637 pounds was for sale and valued at $1,272,294. The remaining 4,685,738 pounds were for

factory consumption. The in¬ crease in output since 1909 was 24.1 per cent, but the value of the product was less than in 1909 by 4.8 per cent. The bulk of the produc¬ tion was in Pennsylvania, with Massachusetts and New Jersey second.

Boric Acid was made in 1914 by five establish¬ ments whose combined production amounted to 8,590,311 pounds of which practically the whole was for sale, and valued at $588,981. The fig¬ ures show an advance of 54.5 per cent in the quantity over the production of 1909, and of 99.1 per cent in value.

Citric Acid was made in three establishments in 1914, the combined output being 2,657,840 pounds, valued at $1,516,336. The production was 26.4 per cent greater than in 1909, and its value was greater by 95.1 per cent.

Hydrofluoric Acid was made in nine estab¬ lishments in 1914, and their' combined output wras 7,209,248 pounds, of which 5,373,657 pounds, valued at $325,540, were for sale; 1,835,591 pounds were for consumption by the maker.

Muriatic or Hydrochloric Acid was made in 1914 by 31 establishments, the total produc¬ tion being 337,167,882 pounds. Of this, 170,- 876,878 pounds were made for sale, and valued at $1,348,805; the remainder of 166,291,004 pounds being consumed by the maker. The figures show a decrease of production from that of 1909 by 15.9 per cent, and a decrease of value by 23.3 per cent.

Oleic Acid was made in 1914 by seven estab¬ lishments. with a total output of 23,187,579 pounds, of which nearly all was for sale, the

value being $1,301,353. The increase of produc¬ tion over 1909 was 33.9 per cent, and the in¬ crease in value 54 per cent.

Phosphoric Acid was made in seven estab¬ lishments in 1914, the output being 12,420,191 pounds valued at $680,239 — only 1.9 per cent greater than in 1909.

Stearic Acid was made in 10 establishments in 1914, the combined production amounting to 14,351,404 pounds, valued at $1,242,492. In ad¬ dition, 608,705 pounds were made and consumed by the maker.

Tannic Acid was made in five establish¬ ments, four of which were located in New York. The total output was 853,830 pounds, valued at

$287,142.

In addition to these separate reports values are given for the production of <(fatty acids® at $206,576, and miscellaneous acids at $1,980,- 816. This latter classification includes — in the order of the value of their respective outputs — tartaric, carbolic, picric, salicylic, lactic, oxalic, hydrofluosilicic, pyrogallic, gallic, sulphurous, Pyroligneous, hypophosphorous, benzoic and arsenic acids.

ACIDASPIS, as'i-das'pis («spine- shield®), a small trilobite widely distributed through Silu¬ rian and Devonian rocks, whose striking char¬ acteristic is the thick setting of the dorsal shield with such numerous and formidable spines that it must have been almost impossible for even much larger enemies to prey on it. The head-shield is entirely different from that of other trilobites, the trilobation being ob¬ scured by extra furrows and longitudinal false furrow's. The thorax has 9 or 10 segments, each with long lateral spines and two shorter median ones ; the small tail-shield in nearly all species also has them; in some a row of slender ones on the sides of the head-shield, and a long one projecting from each posterior angle; and from the middle posterior edge twro long ones, straight or curved, often project up¬ ward and backward. A few species have the eyes placed, like some crabs and lobsters, on the ends of long, slender stalks, commanding a view in all directions.

ACIDIMETRY. See Chemical Analy¬ sts.

ACIDOSIS, a condition of the body due to excess of acid formation or lack of oxidation of the same. It is chiefly seen in the disorder known as diabetes. Acid intoxication results from the direct production of acid substances within the body, or from the administration of acids chiefly inorganic.

The chief acids concerned in acidosis are collectively termed acetone bodies and are : (1) Boxybutyric acid, (2) diacetic acid and (3) acetone. These bodies are formed from carbohydrates, fats or proteids, practically from the fats and proteids however, the amino acids of the latter being the chief sources. The Boxybutyric acid is the starting point of the other two. By oxidation it is converted into aceto-acetic (diacetic) acid and this by losing a molecule of water from its carboxyl group produces acetone. These substances were first found in the urine and later isolated from the blood of patients with acidosis.

The acetone bodies appear normally under conditions of starvation ; even abstention from carbohydrates will cause their presence in the

urine. Under pathological conditions acidosis is found in a number of conditions, such as cyclic vomiting of children, pregnancy with vomiting, eclampsia, marked grades of temper¬ ature, tuberculosis, asthma, atropine, morphine, carbon monoxide poisoning, and chiefly in the disorder known as diabetes (q.v.).

ACIDS. In popular language, acids are substances of a corrosive nature, with a sour taste when diluted sufficiently to lose their cor¬ rosive action on the tongue, capable of turning certain blue vegetable coloring matters, such as litmus, to a red, dissolving metals and forming neutral compounds with alkalies. They are classified generally into two groups : the inor¬ ganic and the organic, referring to their origin in the mineral kingdom, or in the vegetable and animal kingdoms. Inorganic acids are rarely found as such in nature, but usually in combinations. A small quantity of nitric and nitrous acids is often present in the atmosphere after thunderstorms, carbonic acid is found in limited extent and over limited areas and hy¬ drochloric and sulphurous acids are detected in the fumes from some volcanic fissures. On the other hand, organic acids are freely distributed throughout the vegetable world — as in all fruits, and to a less degree in the animal kingdom. In modern chemistry an acid is re¬ garded as a salt of hydrogen in which one or more of the hydrogen atoms are replaceable by metallic atoms or by organic radicals. For ex¬ ample, hydrochloric acid (HC1) brought into contact with sodium hydroxide (NaOH) seizes upon the sodium, and releases the hydrogen atom — forming sodium chloride (NaCl) and water (H20). An acid containing one such atom of replaceable hydrogen is called mono¬ basic ; if it has two such atoms of hydrogen it is called dibasic or bibasic ; if three, tribasic ; and so on. Hydrochloric acid, HC1, is a familiar example of a monobasic acid ; it has only one atom of hydrogen that can be replaced by potas¬ sium (for example), with the formation of the single compound KC1. Sulphuric acid, H2SO4, is a familiar dibasic acid ; with potassium it forms the two compounds HKSCh (hydrogen potassium sulphate), and K2S04 (normal or basic potassium sulphate). Phosphoric acid, H3PO4, is a tribasic acid in which one, two or all three of the hydrogen atoms may be re¬ placed by metals or radicals. In a polybasic acid the hydrogen atoms need not necessarily all be displaced by the same element or radi¬ cals; thus microcosmic salt is a phosphate of hydrogen, sodium and ammonium, with the formula HNa(NH4) P04 + 4H20. Acids may be formed synthetically by uniting hydrogen with non-metallic substances — as with chlorine, to form hydrochloric acid.

When an acid contains oxygen it is com¬ monly named for the substance that is present with the oxygen and hydrogen in the acid. For example, nitric acid is named for nitrogen, and phosphoric acid for phosphorus. It often hap¬ pens that the same element forms more than one acid with oxygen and hydrogen. In these cases it is usual to give the termination -ic to the one in which the oxygen is present in its high¬ est valency, or combining proportion ; and the termination -ous when in its next lower valency. For example, H2SO4 is called sulphuric acid, while H2SO3 is called sulphurous- acid. Hypo — is used as a prefix where the oxygen is in still

lower proportion — as hyposulphurous acid. If the acid contains no oxygen it has the prefix hydro — as hydrochloric acid (HC1). When an acid has an unusually large oxygen com¬ ponent it has the prefix per — as perchloric acid. When an acid has been deprived of all its water component it becomes an acid an¬ hydride. The salts formed by acids ending in -ic have the ending -ate, such as the acid sul¬ phate of potassium, produced by substituting the metal potassium for one of the hydrogen atoms of sulphuric acid, while those formed by acids ending in -ons have the ending -ite, as the sulphite of sodium, and the hypophosphite of calcium. Salts are considered by some chem¬ ists to be acids in which the hydrogen atom has been replaced by the metals. Organic acids are oxides in the second degree of alcohols and aldehydes, combined with a hydrocarbon. They are distinguished by the presence of the car¬ boxyl group — CO2H, in which the hydrogen atom is replaceable by metals, resulting in salts. When the hydrogen is replaced by alkyl radicles esters are formed. The relative strength of various acids is determined by saturating them with a metallic hydroxide. The proportion taken up by each acid is the measure of its relative strength.

ACIPENSERIDiE, a family of fishes in the suborder Chondrostei (by some called Acipenseroidei) , comprising the sturgeons (q-v.).

ACIREALE, a'che-ra-a'la, Italy, an episco¬ pal city of' Sicily7', nine miles northeast of Ca¬ tania, at the mouth of the river Acis which flows from Mount Etna. An important trade is carried on in grain and flax ; there are manu¬ factures of silk, linen and cotton goods, and the thermal springs dating from Roman days, and the surrounding scenery filled with classic tra¬ dition, attract numerous visitors. The grotto of Acis and Galatea/ the cave of Polyphemus and the seven Scoglide' Cyclopi or Faraglioni which the blinded Polyphemus hurled at Ulysses, are shown in the neighborhood. Pop. 35,600.

A'CIS, a character of Greek mythology, a handsome shepherd of Sicily,

son of Pan and the nymph Symaethis. Beloved of Galatea the Nereid, they were surprised by the jealous Cyclops Polyphemus who crushed Acis to death with a rock. Galatea transformed his gushing blood into the river Acis, which has been famous for its cold waters since the time of Ovid. See Acireale.

ACK'ER, Charles Ernest, American in¬ ventor : b. Bourbon, Ind., 12 March 1868. He was graduated from Cornell University in 1888, with baccalaureate honors, then began a private practice as electrical engineer in Chi¬ cago, which he continued until 1893. He is the inventor of the Acker process of manufac¬ turing caustic soda by the electrolysis of molten salt and he was the first in America to manu¬ facture carbon tetrachloride. He has invented many processes pertaining to chemical and electro-chemical manufacturing. He was awarded the Cresson gold medal by the Frank¬ lin Institute, and is a member of many scien¬ tific societies.

ACKERMANN, ak'er-man, Louise Vic- torine Choquet, French poet: b. Paris, 20 Nov. 1813; d. Nice, 2 Aug. 1890. Her principal

work, 'Poesies, premieres poesies, poesies philo- sophiques) (Paris 1874), analyzing and revolt¬ ing against human suffering in powerful but sombre verse, attracted wide attention. Her last work 'Pensees d'une solitaire 1 (Paris 1883) contained a short autobiography.

ACKERMANN, Rudolph, German-English publisher and inventor : b. Schneeberg, Saxony, 20 April 1764; d. London, 30 March 1834. In 1795 he opened a print-shop and art-school in the Strand, London, and developed a lucrative business as publisher of Ackermann's Reposi¬ tory of Arts, Literature, Fashions, etc., a monthly periodical of which 40 volumes, illus¬ trated by Rowlandson and other leading artists, appeared up to 1828. In 1825 he published (For¬ get-me-not,) the originator of the English an¬ nuals; 'The Microcosm of London) (3 vols., 1808-11) ; 'Westminster Abbev- *(2 vols., 1812); 'The Rhine* (1820); 'The World in Miniature) (43 vols., 1821-26) ; etc. He in¬ vented and manufactured waterproof cloth and paper; was one of the first to apply the litho¬ graphic process to illustration ; and was a pioneer in the use of illuminating gas. In philanthropic work he raised nearly $1,000,000 for German relief after the battle of Leipzig.

ACKNOWLEDGMENT, the act of one

who has executed a deed, in going before some competent officer or court and declaring it to be his act and deed. The function of an acknowledgment is twofold: To authorize the deed to be given in evidence without further proof of its execution, and to entitle it to be recorded. The same end may be attained by a subscribing witness going before the officer or court, and making oath to the fact of execu¬ tion, which is certified in the same manner, but in some States this is permitted only in case of the death, absence or refusal of the grantor. The certificate should be in substantially the fol¬ lowing form :

— - , 19 — .

I, - , hereby certify that -

- , whose name is signed to the foregoing

conveyance, and who is known to me, acknowl¬ edged before me on this day that being in¬ formed of the contents of the conveyance, he executed the same voluntarily on the day the same bears date.

Given under my hand this - day of - ,

19—.

In many of the States it is necessary that a married woman be examined separately and apart from her husband touching her voluntary execution of the deed, and the fact of such ex¬ amination must be included in the certificate.

AC'LAND, Lady Christian Henrietta Caroline Fox, commonly called ((Lady Harriet® ; daughter of the first Earl of Ilchester: b. 3 Jan. 1750; d. 21 July 1815. She married Maj. John Dyke Acland, September 1770, accompanied him to America, and shared Burgoyne's campaign of 1777 with him. He being wounded and carried prisoner into the American lines in the second battle of Saratoga, 7 October, she left the Brit¬ ish camp by night in a small rowboat and in a driving storm to rejoin him, with her chaplain and two servants ; was cordially received by Gates and nursed her husband back to health. Acland reciprocated the kindness when on parole in New York, by helping to relieve the sufferings of American prisoners. He died of

a paralytic stroke 2 Dec. 1778; the grati lying story that he was killed in a duel for defending American courage against aspersion being pure invention. Equally untrue is it that she went insane and afterward married Chaplain Brude- nell ; she died Acland's widow. She was a

graceful and elegant woman and is remembered for her charities.

ACLAND, Sir Henry Wentworth Dyke,

English sanitarian: b. 1815; d. 16 Oct. 1900. He was long an expert on cholera and the various forms of plague. He was professor of medicine at Oxford (1857-94), besides serving on various sanitary bodies. He was one of the founders of the Oxford University Museum, and with Ruskin published an account of its objects (1859). He accompanied the Prince of Wales to America in 1860. He was author of numer¬ ous works on medicine and medical education, among them 'Memoir of the Cholera at Ox- ford) (1854). He was created a baronet in

1.

ACLINTC LINE, an imaginary line on the surface of the earth, at every point of which the magnetic dip is zero. It is irregular in shape, and its shape and position vary some¬ what from year to year; but, roughly speaking, it lies close to the equator. See Magnetism, Terrestrial.

AC'MITE, a mineral, in Dana's pyroxene group, crystallizing in the monoclinic system, and having essentially the composition Na20.Fe203.4Si02. Hardness 6 to 6.5; sp. gr. 3.5 ; lustre vitreous, inclining to resinous ; usual color dark blackish-green or reddish-brown. Occurs in slender lustrous prisms in the elseolite-syenites of Norway, Greenland and Arkansas.

ACNE, ak'ne. Among the diseases of the skin there is none which is more annoying than this, particularly because of its frequent loca¬ tion upon and disfigurement of the face and because of its common occurrence in young people of both sexes with whom disfigurements of this character are keenly distressing. It also appears upon the scalp, back, chest and shoulders, and in people of all ages. It may be a serious matter in the aged for it sometimes terminates in cancer.

Specifically it is a disease of the sebaceous glands of the skin, due sometimes to retention of their oily, greasy secretion, to the action of certain drugs like the bromides, or to the in¬ fluence of various kinds of germs which find a lodgment upon the skin. It appears in various forms, as black specks or comedones, as reddened spots, as hardened shot-like points, as elevated conical lumps from a pinhead to a pea in size, as suppurating sores resembling boils, etc. In many instances it terminates in disfiguring scars which gradually become in¬ conspicuous, in stains, or in increase or atrophy of' the skin. When the scalp is involved there is dandruff and loss of hair, on the nose and

cheeks it gives rise to crusts and scales, and on the face of the aged it may take the form of horn-like masses. Wens and similar tumors of the face and scalp are other forms of this disease.

It may result from indigestion, constipation, bad nutrition, bad habits connected with the sexual apparatus and disturbance of the peri¬ pheral nerves. The sebaceous glands which

may be involved in this disease are destroyed, and if they perish in very large numbers the nutrition of the skin to which they have been distributed is of course impaired.

The symptoms are sometimes active and acute and the eruption painful, and at other times the eruption will disappear only to return when provoked by the use of sweets, pastries, fats or other substances which are not easily digested, after an attack of constipation, or after the use of irritating drugs. It is very apt to recur periodically in young women in connection with the function which is peculiar to their sex, especially when there are anatomi¬ cal defects which prevent its normal perform¬ ance. Therefore all persons who have a tend¬ ency to this disease, for some are immune and some are sensitive just as they are to other diseases, must avoid all things which have an irritative action upon the skin, whether drugs or food, or bad habits ; as a rule they must also avoid tea, coffee, alcohol, pork, veal, game, shell-fish, cheese and fats of all kinds, also sweets, nuts, fried and greasy food and hot and imperfectly baked biscuits. The diet must be very simple and nutritious, and include milk, eggs, cereals, fresh vegetables, stale bread or toast, prunes, figs and a minimum of meat and fish. Those foods which have a constipating tendency must be rigidly avoided, and if consti¬ pation exists it must be combatted by the sys¬ tematic and regular use of efficient laxatives, including castor oil, fluid extract of cascara, the salines — Epsom and Rochelle salts, and phosphate of soda, or the saline mineral waters. The old-fashioned sulphur and molasses which was a standard, though disagreeable, household remedy a generation ago need not be despised in the treatment of acne. Exercise is very im¬ portant and it will tend to equalize the blood circulation and direct to the face its proper share of this vital fluid. The sebaceous glands are far more likely to do their work properly when the face and scalp have an adequate supply of freely circulating blood. Bathing is very important, both for preventing and curing this disease, hot baths being preferable. Ap¬

plications of very hot water to the face and scalp will frequently be found both agreeable and serviceable. Solutions of alcohol, boric acid, mercury and formaldehyde are often used in the treatment of acne and the X-ray has been found beneficial when used skillfully and cautiously. The most recent mode of treat¬ ment, which however is not uniformly success¬ ful, consists in the use of autogenous vaccines composed of dead cultures of acne bacilli and staphylococci in a saline solution. A stock vaccine from four to ten million with staphy¬ lococci at intervals of one or two weeks is sometimes used successfully. When the erup¬ tion takes the pustular form, a polyvalent vac¬ cine of cultures of staphylococcus albuf, citreus and aureus may be used. In all cases it is im¬ portant that the general health be kept in the best possible condition and that the habits of life be simple and normal. The disease is not a dangerous one and is seldom painful except when the glands become inflamed, but when once acquired it is seldom gotten rid of easily.

ACCEMETZE, as'e-me'te (the ˆsleepless®), a monastic order of the Greek Catholic Church, who in harmony with the universe and the ceaseless music of the spheres celebrated the

divine service of perpetual adoration to God, day and night, through the whole range of the canonical hours and the calendar year. For this purpose they were divided into choirs which relieved each other at regular intervals. The order was founded on the Euphrates in 400 by Alexander, a courtier exile from Constanti¬ nople. A mother house, the (<Irenaion® or “great monastery® was later founded near Con¬ stantinople, followed by the <(Studium® in the city which from the 5th to the 7th centuries became “through true piety toward God, to zeal ever on the watch, and to a special gift of the Holy Spirit,® a centre of learning as well as devotion, which brought to a culmination the glory of the order. Their influence was con¬ siderable on Christianity, and the splendor of their religious services contributed largely to shape the liturgy of the Church. The order declined after excommunication by Pope John II, owing to Nestorian tendencies.

ACOLYTE, ak'6-lit (a <(follower®). An attendant of the fourth clerical order in the Catholic Church, whose chief duties are to assist the sacred ministers at the Mass and other public services of the Church, to light the candles on the altar, to carry them in procession and during the singing of the Gospel, and to prepare the wine and the water for the sacrifice of the Mass. It is the highest minor order of the Church ranking next to a subdeacon. The office originated about the 3d century. At ordination acolytes receive from the bishop an unlighted candle and an empty cup as symbols of the office. Altar boys

are frequently desig¬ nated as acolytes and perform the duties.

ACOMA, a-ko'ma, N. Mex. (the old Span¬ ish Acuna or Acuco), in Valencia County, 60 miles southwest of Albuquerque and 15 miles southwest of Lagun. It is an Indian pueblo of 830 people, famed especially for its original site, the ((San Francisco 1889) ; F. W. Hodge, <The Enchanted Mesa,* (in National Geographic Magazine, Vol. 8, Washington

1897).

ACONCAGUA, a-kon-ka'gwa (Sp.-Am. pron. ka'wa), Chile. (1) An extinct volcano in the south Andes, on Chilean territory and dividing it from Argentina; one of the highest summits in the western hemisphere, estimated at about 23,000 or sometimes nearly 24,000 feet. (2) A river about 200 miles long rising on the southern slope of the above mountain and emptying into the Pacific 12 miles north of Valparaiso. (3) A central province of Chile, bounded north by Coquimbo, south by Santiago, east by Argentina, southwest by Val¬ paraiso. For route of Trans-Andine Railway, via Uspallata Pass in this province, see South America. The valleys are very fertile, vine¬ yards and orchards are plentiful and in sum¬ mer numerous flocks are pastured on the mountain slopes ; figs, nectarines, peaches, etc., are sent to Santiago and Valparaiso. Copper and some silver and gold are found. Area, 5,486 square miles. Pop. about 130,000. Cap¬ ital, San Felipe.

ACONITE (Aconitum), a genus of hardy herbaceous plants of the natural order Ranun- culacece, long known for their poisonous prop¬ erties. Many of them are of great beauty and several are cultivated, especially the common wolf’s-bane or monk’s-hood (A. napellus), so called from the form of its flowers, character¬ istic of the genus, which are shaped like a helmet or hood. The United States has also several species growing wild. The wild monk’s- hood (A. uncinatum) is common in rich, shady soils along the margins of streams as far west as Wisconsin, its blue flowers being one of the marked features of the summer’s bloom. Trailing wolf’s-bane (A. reclinatum), a white-flowered variety, grows in the southern Alle- ghanies. The winter aconite (Eranthis), with yellow flowers, is common throughout the Rocky Mountain regions extending to the Pacific coast. It is perhaps more closely re¬ lated to the hellebores. These flowers hang clustered

round an upright stalk and make the aconite a very imposing plant. Some powerful medicines are prepared from the leaves and roots of monk's-hood. Applied externally the)' produce numbness of sensory nerves and are used to relieve pain in certain forms of neuralgia and in acute and chronic rheumatism. Given internally they diminish the force and frequency of the heart's action, render breath¬ ing slower and are employed in acute fevers and inflammations. A poisonous dose causes cessation of breathing and of the heart's ac¬ tion. Many of the plants of this genus are poisonous ; common monk's-hood is very viru¬ lent; but the most deadly seems to be the A. ferox, the bish, or bikh, of Nepal. The dif¬ ferent species contain different but related alkaloids. See Aconitine.

ACONITIC ACID (also called equisetic or citridic acid), a tribasic acid having the for¬ mula C3H3 (COOH)s, the calcium salt of which occurs in several plants of the genus Aconitum and in the common Equisetum or horsetail. The acid itself is most easilv prepared by the dry distillation of citric acid. It crystallizes in small four-sided plates which melt and are decomposed at about 406° F.

ACONITINE, a powerful vegetable alka¬ loid found in the tuberous root of Aconitum

napellus and other species of Aconitum. In its chemical structure it is an acetyl-benzoyl-

aconine, C-iFUCOCFhOiNOs j COCH* or' ex~

pressed in simple form, C34H47NO11 (Freund and Beck). However, different formulae are assigned to it by other authorities. It is one of the most deadly poisons and has been known for hundreds of years. Its action as a medi¬ cine was first carefully studied by Stoerck in 1762. When locally applied it produces the constitutional symptoms. Its local use in the form of an ointment is of service in neural¬ gias. Its primary effect is first to stimulate and then to powerfully depress the central nervous system. It thereby slows the heart and dilates the blood-vessels, causing a marked decrease of blood pressure. It is because of this action that it is so widely used in the acute stages of many affections that are accompanied by a rapid heart and a tense, bounding pulse. Aconite has been called the "vegetable lancet® since it dilates the blood-vessels so, bleeding one into one's own veins, as it were. In poison¬ ous doses it causes nausea, vomiting, cold, clammy skin, very slow weak pulse and breath¬ ing and finally paralysis of the heart and res¬ piration and death. Death has taken place in from one to five hours from the root. Doses above three milligrams (1-20 gr.) a

day are dangerous; 1-400 gr. is an average dose. Treatment is symptomatic, special attention be¬ ing paid to the respiration by artificial means, and heart stimulants,— strychnine, etc.

ACONTIUS, in a Greek legend retold by Ovid in his ˆHeroides, *a youth of the island of Cea, who went to Delos to see the sacred rites performed by a crowd of virgins in the temple of Diana, and fell in love with Cydippe, a beautiful virgin. Not daring to ask her in marriage on account of the meanness of his birth, he presented her with an apple on which were inscribed these words : (lI swear by Diana, Acontius shall be my husband.® Cydippe read the words and, feeling herself compelled by the oath she had inadvertently taken, married Acontius. William Morris has used the story in the (Earthly Paradise.*

ACORDAD, a court established at Quere- taro, New Spain (Mexico), for the summary trial of brigands and others. It was sup¬ pressed in 1813.

ACORN, a'korn (from the Gothic akran — <(fruit of the field® —), the saucer-cupped nut or fruit of oak trees. On the Pacific Coast from Mexico to northern California, Indians dry and pound acorns into meal and use it in making bread, and as mush food. In northern Italy and other parts of Europe, acorn meal mixed with grain is also made into black bread which, however, is heavy and indigestible. Acorns dried and ground are also used as a substitute for coffee. Children in many places are fond of eating fresh and sweet acorns. The hogs of the Southern States which feed on acorns with a varied diet of occasional corn are dis¬ tinguished for the agreeably flavored pork, ham and bacon they yield. Beechnuts and acorns as food for pigs is commonly called mast. The word acorn is also used as a nautical term for the cup-like piece of wood which keeps the vane on the mast-head.

ACORN-SHELL, a barnacle of the family Balanidae. See Barnacle.

ACORUS. See Flag, Sweet.

ACOSTA, Gabriel, a-kos-ta, Portuguese philosopher: b. Oporto, 1591; d. April 1640. Of a converted Jewish family, educated a Roman Catholic, his studies led him back to Judaism, and he fled with his mother and brothers to Amsterdam. He again developed heretical opin¬ ions, was taken to task by the synagogue, and excommunicated ; his writings were confis¬ cated and himself fined; and years of

persecu¬ tion by the Jewish authorities and his family drove him to suicide. Gutzkow made him the hero of his novel (Die Sadducaer von Amster¬ dam *(1834), and of his tragedy (Uriel Acos¬ ta* (1846). The work which caused Acosta's excommunication was (Examen Traditionum Pharisaeicarum Collatarum cum Lege Scripta* (1623, in Latin).

ACOSTA, Joaquin, ii-kos'ta, hooa-ken', South American soldier and geographer : b. Guachias, Colombia, 29 Dec. 1799; d. there 1852. He was an officer of engineers in the Colombian army, member of the New Granada Convention 1831, later representative in its Congress. In 1834 he explored the Socorro valley to the Magdalena with the botanist Cespedes, and in 1841 traveled from Antioquia to Aserma to study the various Indian tribes. For a time he was minister from New Granada to Ecuador; was charge d'affaires at Washington 20 July to 8 Nov. 1842; and later secretary of state in New Granada. He published at Paris in 1848 a his¬ tory of the discovery and settlement of New Granada, with a valuable map of his own draw¬ ing, the first made since the independence of Colombia; and in 1849, at Paris, a (Miscellany of New-Granadan Sciences, Literature, Arts, and Industries, * with portraits and map.

ACOSTA, Jose, a-kos'ta, ho-sa', Jesuit and historian: b. Spain, c. 1540; d. rector of Sala¬ manca in 1600. In 1571 he went to Peru, where he spent 15 years, becoming provincial of his order. After two years in Mexico and the West Indies he returned to Spain laden with manuscripts and information, and became a royal favorite. His theological works evinced great learning, but it is by his (Natural and Moral History of the Indies* that he is best known. The complete work was published at Seville in 1590 and proved the most popular and most satisfactory account of the New World up to that time. An English translation appeared at London in 1604, a reprint of which was issued by the Hakluyt Society in 1880.

ACOUCHI, or ACOUCHY. See Agouti.

ACOUMETER, a-koo'meter (((hearing- measurer®), an instrument to determine the acuteness of hearing. It is a small steel bar of uniform pitch, to be struck with a hammer or falling weight with gradations of force.

ACOUSTICS, a-koo'stiks, (from cucoveiv , to hear), is the science of the production, propa¬ gation and audition of sound. The term sound is sometimes by definition restricted to the sen¬ sation involved in hearing, but is never consist¬ ently so used. Both by derivation and by

com¬ mon and best usage it should be applied to those aerial or other vibrations which, were they to reach the • ear, would produce audition. The term being thus used, sound consists of waves

of longitudinal vibration, that is to say of waves of to and fro motion perpendicular to the wave, front. Such motion, propagated through an elastic medium with a finite velocity, results in alternate rarefaction and condensation.

A moment's consideration of any source of sound will show it to be of such a nature as to give either a single impulsive blow' or re¬ peated blows, usually systematically repeated, to the surrounding medium. In the great majority of cases, and those the more interest¬ ing both theoretically and practically, the source of sound consists of an elastic body distorted from its normal shape, and, released, vibrating more or less symmetrically about this normal shape or position. It results from this vibra¬ tory motion that a series of impulses is given to the surrounding medium which are periodic, nearly similar in character, and nearly equally timed. These impulses, propagated through the surrounding medium all with the same velocity, follow each other in the form of a train of waves. The distance from a point in one impulse to the corresponding point in the next impulse is called the wave length of the sound. The frequency of these waves as they strike the ear determines the pitch of the sound ; the character of the wave in respect to form de¬ termines the quality of the sound; while both of these together with the amplitude of vibra¬ tion and the density of the medium determine the loudness or strength of the sensation.

In respect to pitch sounds audible to the human ear range in frequency from about 24 vibrations per second to 40,000 vibrations. Sounds very much higher in pitch are audible to some animals, the cat for example, while for some animals it is probable that the upper limit is not so high, although in regard to the latter point no reliable data have been secured, the interest of the biologists apparently being to extend the range. In regard to the lower limit in other auditors than man no reliable ex¬ periments have been made, and if attempted w'ould be extremely difficult because of the diffi¬ culty of distinguishing the reactions due to the mechanical disturbance from the reaction due to true audition, — a difficulty which indeed affects all such experiments, but wdiich is enhanced in the case of the low^er limit.

The quality of a sound is determined by the w'ave form. A pure

musical tone is due to sim¬ ple harmonic motion, a type of periodic motion best described as the projection on a diameter of uniform circular motion, and most famil¬ iarly illustrated by the motion of the pendulum of a clock. Perfectly pure tones are rare, the nearest approach being that of a tuning fork re¬ enforced by a resonator. Most musical sounds are far from being pure tones. They may, how¬ ever, be regarded as a complex of a number of pure tones, each pure tone being then called a partial tone. Of these partial tones the lowest, which is generally though not always predom¬ inant, is called the first partial, and the other partial tones in order of their pitch are called the second, third, etc.., partials. In many of the more interesting cases such as the tones of the organ pipe, or of a bowed, struck or plucked string, the upper partials are harmonics of the fundamental. The pitch and the relative in¬ tensities of the partial tones determine what is called the quality of the sound, the pitch of the whole being usually rated as that of the lowest

partial. When a sound is incapable of analysis into pure tones it is called a noise. In many, indeed it is safe to say that in most, sounds that are classed as noise there is some trace of a predominant note, and of a definite musical pitch which a trained ear can detect.

The loudness of a sound is capable of be¬ ing variously defined. If by the loudness of a sound is meant physical energy and if the sound is a pure tone then its loudness depends on the amplitude of vibration and the pitch, being pro¬ portional to the square of each, and on the density of the medium, to which it is directly proportional. The loudness of a sound is ordi¬ narily defined, however, by the intensity of the sensation which it is capable of producing. Thus defined loudness is a function not merely of the amplitude of vibration and the density of the medium, but of the pitch and the quality as well, and moreover it is a complicated func¬ tion of each. It is an interesting fact that in man there is a definite sense of loudness which renders it possible to compare, in respect to the intensity of the sensations which they produce, sounds differing in pitch by the whole of the musical scale. Moreover, this sense of loud¬ ness is apparently physiological and not de¬ pendent on familiarity with the “balance® of any musical instrument, and is to a high degree of accuracy the same for different persons, in¬ dependent of age, sex or musical training.

Production of Sound. — The best example of the single impulse as a

source of sound is an explosion in unconfined and therefore non¬ resonant space. The result is an approximately single wave. When, however, the explosion oc¬ curs in a resonant cavity the result is a note of definite pitch determined by the cavity. Or a single explosion and impulsive wave may re¬ sult in a train of waves and therefore a sound of definite pitch, by being reflected from uni¬ formly spaced surfaces, such for example as the pickets of a fence. The next simplest source of sound is a siren, long a laboratory instru¬ ment, more recently made familiar by use in fog signals and steam whistles. The siren con¬ sists of two circular discs, the one fixed, the other pivoted to revolve nearly in contact with it. Both discs are pierced by a circle or by cir¬ cles of holes through which steam or com¬ pressed air escapes as the holes in the two discs come opposite each other.

A straight bar of metal or wood may vibrate either transversely or longitudinally. If dis¬ torted transversely it vibrates to and fro through its normal straight form. The simplest form of this transverse vibration is that in which the bar at points one-quarter the total length from either end remains at rest. These points of rest are called nodes and the inter¬ mediate part of free vibration is called an anti¬ node. When vibrating in this manner the bar emits its fundamental note, the lowest note of which it is capable if entirely free. The next simple mode of vibration is that in which there are three nodes, or points or rest, at points one- sixth the total length from either end and in the middle. In this case the bar emits a note having twice the frequency of the fundamental and in pitch an octave above it. Continuing in this way a series of simple types of motion may be determined. The notes thus produced have twice, three times, four times, etc., the vibration frequency of the fundamental. Any transverse

free vibration of the bar is a combination of these forms, and the sound which it emits is a combination of these notes. In this manner the quality of the sound is determined. If the bar is clamped at oner end the lowest note which it emits is an octave lower than the lowest when entirely free; and the higher tones, instead of being two, three, etc., multiples of the funda¬ mental, skip every other one, being three, five, seven, etc., multiples of the fundamental. Touching the bar at any point tends to pro¬ duce a node at that point and to strengthen the corresponding partial tone, and to diminish the partial tones having antinodes at that point. The exact converse is true in regard to striking the rod. Finally, the frequency of the several notes is proportional inversely to the length, and to the square root of the density, and directly to the square root of the rigidity, other dimen¬ sions being the same in each case.

When the rod is rubbed or stroked so as to vibrate longitudinally, either free or clamped at one end, its fundamental and overtones form the same systems as before, but all are of a different pitch, determined now by the length, density and modulus of elasticity. Thus the longitudinal vibrations of the free rod have as vibration frequencies of its overtones all inte¬ gral multiples of the fundamental. If the same rod is rigidly clamped at one end, its fundamental is an octave lower than the funda¬ mental of the free rod, and the even integral overtones are absent.

A stretched string or wire, so small in diameter in comparison with its length that its rigidity is insignificant in comparison with its tension, vibrates for its fundamental over its whole length with nodes at each end. The first overtone is an octave above this in pitch, the wire vibrating with a node at the centre. The second overtone (third partial) is three times the fundamental in pitch frequency, the wire vibrating with nodes a third of the whole length of the wire from either end. The third overtone (fourth partial) is four times the fundamental in pitch frequency, with nodes at the quarter and middle points. A string set in vibration by any ordinary method vibrates in a more or less complex manner, emitting a sound containing the fundamental and overtones. The overtones present and their relative intensities are determined by whether the string is plucked, struck or bowed, and also by the point of appli¬ cation. The fundamental note emitted by a string is of a vibration frequency equal to the square root of the tension divided by the mass per centimetre of length, divided by twice the length.

If the vibrating elastic solid is in the form of a plate the system of overtones bears a com¬ plicated relationship to the fundamental, no longer being integer multiples in vibration fre¬ quency. The manner in which the plate vi¬ brates may be shown by sprinkling sand on the plate, the latter being horizontal. When the plate vibrates the sand dances away from the parts of the plate in motion and settles in ridges along the nodes. When the plate is square and emitting its lowest tone the nodal lines traced by the sand form a cross reaching from the centres of the sides. By bowing the plate at different points the plate may be made to vi¬ brate in very complicated forms, . the sand figures thus traced often making attractive de-

signs. The production of these various pat¬ terns is much guided by

touching the plate at various points on the edge with the fingers, thus determining the ends of nodal lines. This ex¬ periment was first performed by Chladni, and the sand figures are called after their inventor Chladni's figures. Similar experiments can be carried out on stretched membranes, and one may investigate in this way the vibration of drum heads. The result of such an experiment shows that the quality of sound from a drum depends on the point at which it is struck, and that the upper partials are inharmonics of the fundamental.

Next to the stretched string the most inter¬ esting case of a vibrating body is that of a col¬ umn of air. To a first approximation the prob¬ lem of the vibration of an air column is as simple as that of a stretched string, but in its practical forms and more accurate solution it is by no means so simple. The vibration of a column of air, according to the theory ad¬ vanced by Bernoulli, is identical with the longi¬ tudinal vibration of a straight bar of metal. If the column of air is in a tube open at both ends, the simplest form of vibration and that in which it emits the lowest possible note is such that the air moves to and fro at both ends having a node at the middle. The first overtone, hav¬ ing a vibration frequency twice that of the fundamental, is produced by the column of air vibrating freely at both ends, vibrating freely at the middle, and having nodes at points one- quarter of the total length of the pipe from either end. The second overtone has three times, the third overtone four times, etc., the vibration frequency of the fundamental. If the column of air is closed at one end the low¬ est tone which it can emit is an octave below the lowest tone emitted by the same pipe open at both ends. The overtones in this case are three, five, seven, etc., times the fundamental in frequency. The analogy of this with the bar of metal is obvious. It might be added that according to Bernoulli's theory the note emit¬ ted by the column of air is such that the sound could travel from the open end to the first node during one-quarter of a vibration. This, only approximately true in the case of the column of air, is very strictly true in the case of the metal rod. It follows from this that the pitch of the note emitted by a column of air can be varied either by varying the length of the column, the pitch being inversely pro¬ portional to the length*, or by so exciting the air that it vibrates according to the higher forms with nodes nearer the ends. The appli¬ cation of this to musical instruments is very simple. Take, for example, organ pipes of what are called flue stops as distinguished from reed stops. All such organ pipes are, obviously, open at the end at which they are blown. Ac¬ cording as they are open or closed at the other end they are called open or closed pipes. Open nipes have nodes at their middle when sound¬ ing the

fundamental note, while the closed pipes have their nodes at the closed end. A closed pipe is therefore an octave lower in pitch than an open pipe of the same length, ac¬ curately according to the theory of. Bernoulli, but as a matter of fact only approximately so. In a pipe organ the variation in pitch is accom¬ plished not merely by using open and closed pipes, but principally by using pipes of different

lengths. The pipes not uncommonly vary in length from 32 feet to half an inch. In the military trumpet we have an exceedingly simple instrument whose whole available scale consists in the overtones, the particular note being determined by lip tension and wind pres¬ sure. In the slide trombone the scale is pro¬ duced not merely as in the trumpet, but by varying the length by means of the slide. In the cornet the variation in length is accom¬ plished by means of keys turning valves which throw into the length of the pipe or cut out from it short auxiliary convolutions. In the French horn the scale is played not merely by the means adopted in the cornet, but by means of the hand thrust into the bell or flared end, thus partially closing it and so lowering the pitch. In the flute, clarionet and wood wind- instruments generally the variation in pitch is accomplished by opening and closing ports on the side of the tube.

A little more might be said in regard to stringed instruments. The strings are, in gen¬ eral, so narrow that when vibrating they cut through the air, communicating, practically, no motion to the air and therefore emitting, prac¬ tically, no sound directly. The sound which we hear therefore comes not from the string, but from the sounding boards with which they are always placed in contact. It is thus be¬ cause the sound which we hear comes from the body of the violin and scarcely at all from the strings directly that its quality depends so much more on the instrument than on the strings with which it is stretched.

Propagation of Sound. — When a sound is produced in free air at a distance from all ob¬ stacles it spreads in spherical waves, diminish¬ ing as it spreads over greater and greater sur¬ faces, the intensity of the sound diminishing as the wave increases. The area of a sphere be¬ ing proportional to the square of the radius we have the so-called law of the inverse square of the distance. The velocity of propagation of a sound through a medium is independent of the pitch of the sound or of its loudness and depends only on the nature of the medium — its elasticity and its density. In any medium the velocity of the sound is proportional directly to the square root of the elasticity and in¬ versely to the square root of the density of the medium. Since the waves follow each other with so great rapidity that the air does not

have time to cool during compression, the elasticity here referred to is that of adiabatic compres¬ sion. A table is here given of the velocity of sound in various media :

Carbonic acid gas . 866

Air . 1.092

Hydrogen . 4.190

Water . 4.730

Pine wood . . . . io , 900

Copper . 12,200

Iron . IS. 700

In this table the velocities given are. in feet per second and at 0° C. A variation in tem¬ perature produces a variation in the velocity, particularly in the case of gases. A rise, in temperature results in an increase of velocity, the increase being about .18 per cent, for every degree Centigrade for all gases. This amounts to a little less than two feet per second in the case of air.

When the source of sound is . coming toward the observer, the observer being sta-

tionary, the sound as heard is of a higher pitch than if the source were stationary, for the num¬ ber of waves reaching the observer per second is increased in the ratio of the velocity of sound plus the velocity of the source to the velocity of sound. Similarly when the source is receding from the observer the sound re¬ ceived is of lower pitch. The change is strik¬ ingly observed as a bicycle bell or a clanging street car gong passes close by an observer. In this case the fall in pitch is abrupt and marked. Similar phenomena are produced as the ob¬ server approaches or recedes from a stationary source. This is called Doppler's principle.

When the sound instead of being produced in uniform and stationary air is produced in air moving with various velocities the phenomena are much complicated. These phenomena were first studied with care

in connection with fog signals by Henry, Tyndall, and Stokes. It was an old observation that fog signals plainly audi¬ ble at a very great distance could often not be heard at a little less distance, still nearer were audible again, still nearer inaudible, — that these regions of silence and audibility varied, not merely on different days, but rapidly in the most mysterious and disconcerting manner, so much so as to receive the name of “sound ghosts.® The explanation, for a long time sought in vain, was ultimately given in a sug¬ gestion by Stokes that they were due to a varia¬ bility in the velocity of the wind in different strata of the atmosphere. The result of such an irregularity would be that the spreading sound waves instead of remaining spherical would be distorted very considerably. For ex¬ ample, the waves would be tipped back if the wind were greater at the higher altitude and against the sound. In such case the sound would rise from the water and there would be a region close to the surface over which the fog signal would be inaudible. If, on the other hand, the wind retarded the sound less above than below, or if the wind above favored the sound the wave would be tipped forward and the sound would descend upon the sea and there would be a resulting area of audibility. As the wind at different altitudes varies greatly and changes abruptly we have an entirely ade¬ quate explanation of the phenomena.

If the medium through which the sound is being propagated is not homogeneous another very interesting series of phenomena will occur. Whether the variation in homogeneity results from the variation in composition or a variation in temperature, the effect is the same. A change in either temperature or composition re¬ sults in general in a change in the velocity of the sound. Whenever sound passes from one medium to another or from one region to an¬ other in which the velocity is different the direction of the sound is changed. It is said to be refracted. The law of refraction is a very simple one, — that the ratio of the sines of the angles made by the direction of propagation of the sound in the two media with a normal to the surface separating the media is equal to the ratio of the velocities in the two media. The sound is thus always bent toward the nor¬ mal in passing from a medium in which the velocity is greater to a medium in which it is less. According to this principle the so-called acoustical lenses have been made. This may be done by filling a large but thin walled spher¬

ical balloon with some heavy gas. Such a lens properly placed will focus the sound of the tick¬ ing of a watch so that it can be heard at a dis¬ tance considerably greater than that at which it can ordinarily be heard. When the lens is thus made with heavy gas it is a converging lens ; when made with light gas it is a diverging lens. A curious but unintentional example of the latter occurred in the House of

Parliament when a shaft of warm air, rising through the large ventilator in the middle of the floor, so diverted the sound that a speaker on one side could not be heard clearly by a member imme¬ diately opposite him.

Whenever a sound traveling through one medium comes to another medium in which its velocity is different a certain portion is re¬ flected, the amount reflected depending upon the change in velocity of the sound and upon the angle at which it strikes the surface of separation. This furnishes the explanation of the so-called aerial echoes observed by Tyn¬ dall, and a partial explanation of the rolling of thunder.

When the reflecting surface is a solid wall a very large per cent of the sound is reflected, how much, depends, of course, on the nature of the wall. Under these circumstances there are produced a large number of important phe¬ nomena which are most strikingly interesting in connection with architectural acoustics. Under special but usually accidental conditions very peculiar phenomena arise as is illustrated in the case of whispering galleries. Whispering gal¬ leries are of one or the other of two general types usually illustrated, following the lead of Herschel, by the dome in Saint Paul's Cathe¬ dral, London, and by a much less familiar build¬ ing, the cathedral in Girgenti. In Saint Paul's — Cathedral if a person takes a position at one side of the dome and very close to the wall he can whisper with great ease and distinctness to a person at the opposite side of the dome. This is not the case of focusing sound in the ordinary sense. The sound starting from one point is carried by the curved surface along • great circles on the interior of the almost spher¬ ical dome. The sounds traveling by all these paths meet again at the opposite end of the diameter. As distinguished from this the whis¬ pering gallery in the cathedral at Girgenti is produced by a single, isolated, but focused re¬ flection. A better and more familiar illustra¬ tion of this was until recently to be found in the Hall, of Statues in the Capitol at Washing¬ ton. It is a necessary condition for both types- of whispering galleries that the wall surfaces should be smooth and free from great projec¬ tions. The whispering gallery in the Capitol at Washington has recently been destroyed by replacing the formerly smooth spherical ceiling by a rather deeply coffered ceiling in plaster. The ideal whispering gallery, should one be planned, would be secured by constructing a room a considerable portion of whose wall sur¬ face would be part of an ellipsoid of revolu¬ tion with foci at the points between which the whispering is to occur. Another interesting and somewhat, related phenomenon is that of multi¬ ple reflections. An interesting example of this recently occurred in a private athletic court at Rhmebeck-on-

the-Hudson. In this case the ceiling was a smooth dome so nearly flat that its centre of curvature was at a distance below the

floor equal to the height of the room. Here the echo was repeated very many times and the sound was reflected three times between each repetition of the echo. Such special forms of walls not infrequently occur in auditoriums, often in a subtly concealed manner, and are the occasion of much annoyance. It might be added that it would not be a safe generaliza¬ tion to say that all curved surfaces are bad or that all disturbing surfaces are curved.

In the absence of specially disturbing sur¬ faces the multiple reflection of the sound re¬ sults in a general reverberation, which is from some points of view advantageous and from some harmful. The reverberation results in an increased loudness particularly of sustained tone. On the other hand by the prolongation of each sound it results in more or less confusion. When the room is to be used for musical pur¬ poses, the effect of this reverberation, unless it be carried to too great an extent, is to blend the tones and to give to the performer a sense of support from the auditorium. There is ap¬ parently a nice balance which for the best mu¬ sical effects must be accurately attained in or¬ der to fully satisfy expert musical taste. The reverberation in the room as well as the gen¬ eral loudness and even the loudness at the sev¬ eral points can be calculated when the dimen¬ sions of the room and the absorbing power of its various surfaces are known.

Another feature of architectural acoustics is the phenomenon of interference. Taking first the simplest possible case when a sound from a distant source strikes normally on a plane wall, the reflected waves meeting the following on-coming waves produce by their superposi¬ tion a system of stationary waves parallel to the reflecting surface. The result would be great nodal and antinodal surfaces parallel to the re¬ flecting wall. An observer moving about in such a medium would hear the sound as very loud at the nodal surfaces. When the sound is produced in a confined space, such as a room, it is reflected from wall to wall many times and in many directions before it is ultimately absorbed. The result is an exceedingly com¬ plicated system of stationary waves. Under certain conditions the sound may be so intense at certain points of the room as to be unen¬ durable, while at other points but a few feet distant it is so faint as to be scarcely audible. The distribution of such a system of stationary waves depends on the shape of the room, the material of the walls and the position of the source of sound. It also depends on the pitch of the sounds.

When the conditions of the room are such that a system of stationary waves are so formed that a region of great intensity coincides with the source, the phenomenon of resonance oc¬ curs. That is to say the

emission of that par¬ ticular note will be increased in comparison with other notes of such pitch that their great¬ est nodal intensity in their own interference sys¬ tems does not coincide with the source. This phenomenon is called resonance. Both interfer¬ ence and resonance result in the destruction of chordal balance.

Audition. — The ear is ordinarily divided, in anatomical work, into three parts, the outer, the middle and the inner ear. The drum of the ear separates the outer from the middle ear, the middle ear being an air cavity connected by

the eustachian tube with the nasal cavity. The sound is conducted across the middle ear by a system of three bones which connect the drum with another membrane separating the middle ear from the inner ear. The inner ear is a somewhat complicated cavity in the solid bone of the skull. It consists essentially of three semi-circular canals, and a much longer and larger snailshell-like cavity called the cochlea. This inner ear is separated from the middle ear not merely by the membrane already referred to pressed against and vibrated by the bones, but also by another small membrane. Starting from between these two membranes a diaphragm runs the length of the cochlea. This diaphragm, somewhat intricate in its complete structure, has as an essential part a system of numerous stretched fibres, varying in length and probably also in tension. When the sound is conducted from the outer ear to the inner ear by the three bones in the middle ear, the vibration is communicated to a liquid which fills the inner ear. This liquid in vibrating causes the small fibres of the diaphragm, called the fibres of Corti, to vibrate. As the fibres of Corti are of different lengths and of a different tension, dif¬ ferent regions of the diaphragm respond to dif¬ ferent notes. On this diaphragm terminate the auditory nerves which are stimulated by the vibration of the fibres, and communicate the corresponding sensation to the brain. The vari¬ ation in pitch sensation is due to variation in the stimulated region of the diaphragm. When the sound is not a pure tone the various partial tones excite the corresponding parts of the diaphragm. When two notes are sounded, each with its system of overtones, there are regions of the diaphragm more or less excited simul¬ taneously by the two systems. When the two partials which excite overlapping regions of the diaphragm are not of exactly the same pitch beats occur between them. These beats when slow are not wholly disagreeable, and having a tremulo effect in moderate use are not without musical value. When, however, the beats are more rapid, and this occurs when the over¬ lapping partial tones differ more in pitch, the beats lose their distinct character as such and produce the effect known as discord. If the two partial tones differ still more in pitch the regions

which they excite overlap less and less and the discord diminishes. Following out this line of argument Helmholtz was able to show that when the fundamentals having harmonic upper partials bear to each other simple ratios in their vibration frequency their discord is a minimum, deriving in this way a complete ex¬ planation of the musical scale as used in har¬ monic composition. The scale thus obtained is the true or natural scale. The intervals be¬ tween the successive notes are not equal, but fall into two groups of so-called whole and half tone intervals. The whole tone intervals are not equal among themselves and are not. twice the half tone intervals. Therefore, even after inserting sharps and flats to subdivide the whole tone intervals the resulting chromatic scale is not one of equal interval. While this is the scale which would be employed by instru¬ ments without fixed key-boards, and by the hu¬ man voice accurately trained, it cannot be em¬ ployed in instruments with fixed key-boards if such instruments are to be used in different keys.

For this purpose Bach invented a scale called the equally tempered scale in which all the half tone intervals are made equal. On this scale no key is accurate, but no key is so inaccurate as to result in serious discord. The following table gives the vibration frequency of the eight notes of the middle octave on the natural and on the tempered scale :

	Natural Scale	Tempered Scale
C .	258.7	258.7
D .	291.0	290.3
E .	323.4	325-9
F .	344 9	345 - 3
G .	388.0	3876
A .	43 1. 1	435-0
B .	485.0	488.2
C .	5i7,3	517.3

As the invention of the musical scale long preceded its use in harmonic composition, and during the period preceding the 11th century was used only in melodic composition. — that is for notes sounded in sequence — the simul¬ taneity necessary for harmonic effect was ob¬ tained by the prolongation of one note into the other. Consult Franklin, F. and Macnutt, B., (Light and Sound) (1909) ; Hamilton, (Sound and Its Relation to Music) (Boston 1911) ; Sabine, Architectural Acoustics > (Boston 1906) ; Saeltzer, (Treatise on Acoustics in Con¬ nection with Ventilation (New York 1908).

Wallace Clement Sabine, Professor of Physics, Harvard University.

ACQUAVIVA, Andrea Matteo, an'dra-a mat'a-o ak'wa-ve'va, Duke of Atri and Prince of Teramo, in the kingdom of Naples: b. 1456; d. 1528. He seems to have been the first who conceived the idea of an (Encyclopaedia, J or (Universal Dictionary of Arts and Sciences. > He published a useful work under that title in two folio volumes.

ACQUI, ak'we, northern Italy. (1) A dis¬ trict in the province of Alessandria, on the north side of the Ligurian Apennines. Area, 445 square miles. Productions, corn and fruit. Chestnut-trees furnish the peasantry with an article of common food, and silkworms are reared. (2) Its capital and episcopal city, on the Bormida, 18 miles south southwest of Ales¬ sandria, 37 miles northwest of Genoa. It has commodious hot sulphur baths, and is celebrated for its great antiquity and for the remains of a Roman aqueduct. The hot sulphur baths were known to the Romans, who called the place Aqnce Statiellcc. There is an extensive trade in wine, silk lace and rope. Acqui has a cathedral, a royal college, and is a bishop’s see. It was taken by the Spaniards in 1745; retaken by the Piedmontese; and afterward dismantled by the French. Pop. about 16,000.

ACQUISITION is the act bv which a person procures property in a thing; also the thing the property in which is secured. Original acquisition is that by which a man secures a property in a thing which is not at the time he acquires it, and in its then existing condition, the property of any other individual. It may result from occupancy, accession or intellectual labor.

ACQUITTAL, in law, the judicial setting free or releasing a person from a contract, debt or other obligation ; but the term is more com¬ monly used in criminal law to signify the de¬ liverance from a charge of an offense, either by a verdict of not guilty by a jury, or by simple

operation of law, as in the case of an accessory where the principal is

acquitted. In the United States acquittal may be the result of some technical defect in the proceedings or by the verdict in favor of the accused on the merits of the case. In the first case a second trial of the case may be instituted, but the second case is a bar to any further prosecution of the ac¬ cused for the same offense. This is guaranteed by a constitutional provision that ((no- person shall be twice put in jeopardy for the same offense.®

ACRTEI'NiE, a sub-family of butterflies of the family Nymphalidce, deriving its name from the leading genus Acrcea. There are about 85 species, mostly African. They are of small or moderate size, and have semi-transparent wings, reddish-brown marked with black.

ACRANIA, a primary division of Verte- brata, represented by Amphioxus (q.v.) in which, as the name indicates, there is no skull, while the notochord extends to the anterior end of the snout, in advance of the central nervous system. There is no true brain, the region cor¬ responding to the brain of the genuine verte¬ brates being very imperfectly differentiated. There are only two pairs of cerebral nerves, and the dorsal and ventral spinal nerves do not unite. There is also no trace of limbs. The pharynx is of comparatively immense size, per¬ forated by very numerous gill-slits, and sur¬ rounded by an atrium. The liver is a hollow pouch of the intestine. There is no heart, and the blood is colorless. The numerous nephridia remain distinct and open in to the atrium. There are no paired eyes, only a single median pig¬ ment-spot in the wall of the brain ; there are no ears, though an olfactory pit is present. The reproduction glands are segmentally arranged, but have no ducts.

ACRASIA (Gr. liKpaoia , Intemperance), a beautiful woman, the personification of all that is intemperate and immoderate, portrayed in Spensers < Faerie Queened She lives in a (<Bower of Bliss,® on a floating island, in which there is everything to delight the senses. Her character was suggested by Circe, but prob¬ ably more directly by the Alcina of Ariosto.

ACRE, a'ker, Syria (Biblical Accho, Greek Ptolem.ais, other forms Acco, Akka, Aeon, Accaron; modern French, St. Jean d'Acre), a port some miles north of Mount Carmel, on the Bay of Acre, facing Haifa on the opposite horn. The harbor is one of the best on the coast; even so, it is much choked with sand. Its interest is chiefly in its varied and pictur¬ esque past ; as the chief landing place for inva¬ sion of Syria, it has perhaps suffered more from political revolutions and war ravages than any other place in history. Its name first occurs in a letter of King Burnaburiash of Babylon to Amenhotep IV of Egypt, c. 1400

b.c. Senna¬ cherib of Assyria captured it 701 b.c., and his son Esarhaddon about 675 gave it to the King of Tyre. After the break-up of Alexander's empire, Ptolemy Soter of Egypt took possession of it and renamed it Ptolemais ; it afterward became part of the Seleucid empire of Syria; and later the Romans acquired it and made a colony of it. Under the early empire it was a city of great importance, and remnants of its grandeur in. the shape of fine granite and marble

pillars still exist. In 635 a.d. the Saracens under Khaled and Obeida captured it and Da¬ mascus. They were expelled from it in 1110 by the Crusaders, who made it their principal port and retained it till 1187, when it was re¬ covered by Saladin. Four years later it was retaken by Richard Cceur de Lion and Philip II of France, at the cost of 100,000 lives. They made it a bishopric and gave it to the order of St. John (Fr. St. Jean, from which it took its French title). These held it for just a century, despite continual assaults from the Saracens; and it was a large, rich and powerful city, filled with churches, convents and hospitals. In 1291, when it had become the last Christian strong¬ hold left in Syria, the Saracens retook it after a bloody siege which injured it greatly. From that time it sank rapidly. In 1517 it fell into the hands of the Turks under Selim I; and at the beginning of the 18th century it was a vast scene of ruin, relieved only by a few cottages, a mosque and the houses of French factors. Toward the end of that century the Turks, especially Djezzar, much strengthened and im¬ proved it, and it rose to some importance again. It is best known in modern times for its brave and successful defense in 1799, by means of a body of English soldiers and marines under command of Sir Sydney Smith, against Napo¬ leon, who, after spending 61 days before it, was obliged to retreat. It continued to prosper and was the seat of a considerable trade till 1832, with consuls from all the great states, though crippled by the imposts, monopolies and misgov- ernment with which the Turks blight every place that endures them. On the revolt of Mehemet Ali, the great Viceroy of Egypt, his son Ibrahim besieged it for five months and 21 days in the winter of 1831-32, and before he captured it its public and private buildings were mostly de¬ stroyed. The Egyptians repaired and improved its fortifications; but on 3 Nov. 1840 a three- hours' bombardment by a combined English, Austrian and Turkish fleet reduced it to a ruin. The Turks were again put in possession of it in 1841. See Syria; War, European.

ACRE, a'ker, originally Afield,® "pasture,® "hunting-ground® ; but

later a rough measure of size, somewhat similar in different countries, and supposed to represent what one man could plow in a day. The Italian term giornate (day's work) is significant on this point. In England reckoned as the amount a }'oke of oxen could plow in a day, till the laws of the 13th century and later settled a definite measure. There and in the United States this is. termed the statute acre, old customary acres being still used in Scotland, Ireland and Wales, as well as in several English counties, all different and some of them less than half the statute, while others are more than double. The statute acre is 43,- 560 square feet, or 4,840 square yards, or 160 square rods or perches (from the yard and the rod or pole with which it was measured) ; also divided into 4 roods, though this and perch are mere book-words in the United States at least, as is the square "chain® of 22 yards or 484 square yards, from the surveyor's chain used in measuring it. As commonly measured in feet in the Eastern States the acre is a square meas¬ uring 208 feet 8p2 inches on the side. The fol- . lowing table gives various measures in relation to the English and American acre as the unit.

Germany having adopted the French metrical system, the German morgen are becoming of historical significance merely.

English .

Cheshire .

Westmoreland Lincolnshire . . Cornwall .... Leicestershire .

Scotch .

Irish .

Welsh .

Austria .

Baden .

Belgium .

Denmark .

France .

Hamburg .

Hanover .

Holland .

Naples .

Poland .

Portugal .

Prussia .

Russia .

Sardinia .

Saxony .

Spain .

Sweden .

Switzerland .

Geneva .

Tuscany .

United States ....

Wurtemburg .

Roman, ancient. . . Greek, ancient. . . .

acre .

U

u

u

u

u

u

u

erw .

stang .

joch .

morgen .

hectare (Fr.)

toende .

hectare (ioo ares) arpent (common) , morgen .

U

U

moggia - ’ .

morgen .

geira .

little morgen .

great morgen

deciatina .

giornate .

morgen .

fanegada .

tunneland .

faux .

arpent .

saccata .

acre .

morgen .

jugerum .

plethron .

I .00

2 . 1 1

i . 40

1 25 1. 19 0.48

1 . 27 1 .62 0 . 89 0.67 1 .42 0.89 2.47 5-50 2.47 0.99 2.38 0.64 2 . 10 0.83 0.83 1-43 0.63

1 .40 2 . 70 0.93 1.36 1 .06 1. 13

1 .62

1 . 27

I . 22 I .00

2 . 40 0 . 66 0.23

NUMBER OF PLANTS FOR AN ACRE OF GROUND

Dist. apart

Inches

3 by

3-

4 by

4-

6 by

1.

9 by Feet

9-

1 by

1 .

i* by

i*

2 by

1 .

2 by

1.

2 1 by

2*

3 by

I .

3 by

1.

3 by

3-

3i by

3l

4 by

I .

4 by

1.

4 by

1.

4 by

4-

4l by

4*

5 by

1 .

5 by

1.

5 by

3-

5 by

4-

5 by

5-

52 by

5l

6 by

1.

61 by

61

7 by

7-

8 by

1.

9 by

9-

10 by

IO.

11 by 11 .

12 by 12.

13 by 13.

14 by 14.

15 by 15.

16 by 16. 16I by 165

17 by 17.

18 by 18.

19 by 19.

20 by 20. 25 by 25. 30 by 30. 33 by 33. 40 by 40. 50 by 50. 60 by 60. 66 by 66.

Number of plants

. . 696,960 . . 392,040 . . 174.240 . . 77.440

. . 43.560

. . 19.360

21,780 10,890 6,960 . . 14.520

7 , 260 4.840 3.555 10,890

5.445 3,630 . . 2 ,722

2,151 8,712 4.356

2 , 904 2,178 1,742 1,417 1,210 1,031 881 680 537 435 360 302

257

222

193

170

160

150

134

120

108

69

48

40

27

17

12

IO

ACRE RIVER, a'kra, South America (also called ACQUIRY, a'ke-re), a tributary of the Purus River, Its sources are on the eastern

Andean slopes near lat. 11° S. From the point at which it becomes navigable for small steam¬ ers its course is generally northeast to its con¬ fluence with the Purps ; the latter flows nearly parallel to and north of the Madeira, emptying into the Amazon west of Manaos. Together these rivers give access to an exceedingly valu¬ able rubber forest district, long in dispute be¬ tween Bolivia, Peru and Brazil.

ACRE TERRITORY. See Brazil.

ACRES, a'kerz, Bob, an awkward young country booby of the gentleman class of Eng¬ land, who figures in Sheridan’s comedy of (The Rivals. >

ACRIDINE DYESTUFFS. See Coal

Tar Colors.

ACRISIUS, a-krish'i-us, in Greek mythol¬ ogy, King of Argos. He expelled his twin brother Prcetus (q.v.) from his inheritance and for a time ruled alone in Tiryns and Argos, but was later forced to surrender to his brother the former kingdom. He w as the reputed founder of the Delphic amphictyomy. For the legend concerning the prediction of the oracle that he would die at the hands of his grandson, see Perseus.

AC'ROBAT. See Gymnastics.

ACROCERAUNIUM, ak'ro-se-ra'ne-um, the northwestern promontory of Epirus, with mountains called Acroceraunia ((< thunder- peaks”), which separated the Ionian and Adri¬ atic Seas, and were noted for attracting storms, and hence dreaded by mariners. Its modern name is Chimara or Cape Glossa, or Cape Linguetta.

AC'ROCORIN'THUS, in ancient times the acropolis or citadel of Corinth: a steep rock nearly 1,900 feet high, overhanging the city, and crowned with the remains of Venetian and Turkish fortifications, ruins of mosques and dwelling-houses, and also a barrack with a few soldiers. On its top stood of old a temple of Aphrodite.

ACROLEIN, a colorless liquid which has a very irritating odor. Its chemical formula is C2H3CHO. Acrolein is produced in the incomplete combustion of fats and when glyc¬ erin is distilled with sulphuric acid. When the wick of a candle is left smoldering after the flame has been blown out some acrolein is produced. It is classed with the aldehydes.

AC'ROLITHS (Gr. signifying ((extremities of stone”), statues of which head, hands and feet were of marble, attached to a trunk of wood, covered with drapery, or gilt. The Athene Areia of the Plataeans mentioned by Pausanias is one of the best known acroliths.

AC'ROMEG'ALY (Gr., signifying «cx- tremes enlarged”), a disease first described by Marie in 1886, as a permanent enlargement or overgrowth of the extremities — head, hands and feet, — caused by certain types of tumor, chiefly adenomate, of the hypophysis or pitui¬ tary gland. Both sexes, but a larger percent¬ age of the female, are subject to the disease which has a gradual beginning, usually in the thirties. Giants are mostly cases of acrome¬ galy which are arrested early and which have

sprung from disorder of the pituitary before adolescence. Consult Osier, 1 Modern Medi¬ cine *(Vol. VI, New York 1910) ; Jelliffe and White, (Diseases of the Nervous System* (1917); Cushing, (The Pituitary Body) (1913).

ACROP'OLIS, the high part of any an¬ cient Greek city ; usually an eminence over¬ looking the city and frequently its citadel. Notable among such citadels were the Acropo¬ leis of Argos, of Messene, of Thebes and of Corinth; but pre-eminently the Acropolis of Athens, to which the name is now chiefly ap¬ plied. This veas the original city (as indeed most of the acropoleis date from the times of barbaric insecurity), later the upper city as distinguished from the lower, and w'as built upon a separate spur or butte of Hymettus. The hill rises out of the plain, a mass of rock about 260 feet high, with precipitous sides save for a narrow access at the western end where there was a zigzag road for chariots. The sum¬ mit of this rock forms an uneven plain 500 by 1,150 feet at the maximum breadth and length. Within this area were reared, chiefly in the days of Pericles, remarkable specimens of ar¬ chitectural art. The buildings were grouped around two principal temples, the Parthenon and the Erechtheum. Between these temples stood the statue of Athene Promachos ((<fighter in front"), by Phidias, the helmet and spear of which were the first objects visible from the sea. About these centre-pieces, covering the rocky height and extending down the steep sides, were lesser temples, statues, theatres, fanes and odea (music halls). Among the famous buildings on the sides of the Acropolis were the Dionysiac theatre, the Odeum of Pericles and the Odeum, built by Herodes At- ticus in honor of his wife Regilla. The rav¬ ages of accident and war and Athenian marble- merchants, and in case of the Parthenon (q.v.) its deliberate dismantling by Lord Elgin early in the 19th century, have largely destroyed and despoiled these classic works. Archaeologists have secured many important remains of the Acropolis, which are preserved in the col¬ lections of various European capitals and in the new archaeological museum at Athens.

AC'ROPOLTTA, Georgius, Byzantine his¬ torian and statesman: b. Constantinople 1217; d. 1282. Appointed <(great logothete" or chan¬ cellor in 1244, he was instrumental in effecting a reconciliation between the Latin and Greek churches in 1274. His (Annales,* covering the period from the capture of Constantinople by the Latins in 1204, to its recovery in 1261 by Michael Paleologus, is a valuable contemporary work which, with his other writings, was pub¬ lished in a complete edition in 1903. Consult Heisenberg, A., <Teubner Series) (Vol. II, which contains a full life, with bibliography, Leipzig 1903).

ACROSTIC, a poetical composition, dis¬ posed in such a manner that the initial letters of each line, taken in order, form a person's name or other complete word or words. This kind of poetical trifling was very popular with the French poets from the time of Francis I until Louis XIV. Among other English writers, Sir John Davies, who lived in the 16th century, amused himself in this way. Lie produced 26 pieces called (Hymns to Astrea,* each of them

forming an acrostic upon the words Elisabetha Regina. The following is an example :

E ternal virgin, goddess true,

L et me presume to sing to you.

I ove, e'en great Jove, hath leisure S ometimes to hear the vulgar crew,

A nd heed them oft with pleasure.

B lessed Astrea! I in part E njoy the blessings you impart,

T he peace, the milk and honey,

H umanity and civil art,

A richer dow'r than money.

R ight glad am I that now I live,

E 'en in these days whereto you give G reat happiness and glory;

I f after you I should be born,

N o doubt I should my birthday scorn,

A dmiring your sweet story.

In the Old Testament there are 12 psalms written according to this principle. Of these the 119th Psalm is the most remarkable; it con¬ sists of 22 stanzas, each of which commences with a Hebrew letter and is called by its name. Acrostic verse is no longer cultivated by serious poets, and has in fact been relegated mainly to country

newspapers, except as a jest or social pastime. Edgar Allen Poe, however, wrote some striking acrostics, varying the form with great ingenuity. One example, beginning with the first letter of the first line, the second of the second, and so on, forms a lady's name.

AC'ROTE'RION (((extremity®), in archi¬ tecture, an ornament — statue, palmette, or leaf-decoration — placed on the apex of a pedi¬ ment or one of its lower angles.

ACT. In the drama, one of the parts into which a play is divided, to mark change of time or place, to give a respite to the actors and audience from the strain and physical fatigue of sitting intent on a long play, and to enable actors to change costumes and managers to change scenery. In Greek plays, where there was no scenery and no change of costume, there were no separate acts, — the episodes separated by the lyrical portions being not such either in design or effect, — and the action was continuous from beginning to end and the unities strictly observed. If the principal actors left the stage, the chorus took up the argument and con¬ tributed an integral part of the play; chiefly in the form of comment on the action, but often by supplying necessary information impossible to give in the regular speeches. When it was desired to develop the story further than the single play could conveniently do, another drama, — etymologically the same as act, — car¬ ried it on to another time or place, forming the common Greek trilogies, or groups of three, in which the same characters reappear. The Roman theatre first adopted the division into acts, suspending all stage business in the in¬ tervals. They made the regular number five, and Horace sets this down as a fixed rule of art. On the revival of letters it was almost univer- . sally used by dramatists ; and that it rests on something more than caprice is shown by the fact that Shakespeare, who cared nothing for fixed rules of art and utterly disregarded the unities, never varies this division. For a great drama there is a real reason, though in light comedy it is admost universally dropped at present. The natural division is into three, — introduction, climax and conclusion ; and the central act still fulfils the same function. But for a great action this is apt to hurry matters too fast for a proper development either of

character or interest ; hence the first and the last act are doubled, the approach to the main point and the preparation for the catastrophe being both rendered more gradual. Some critics have laid down exact rules as to the part each act is to sustain in a play ; but these cannot be justified and have never been regarded. It is obvious, however, that each act should form a certain unity, ending with a point of deep but suspended interest, yet should be an integral part of the whole.

Moliere began the three- act comedy ; but even to an impatient genera¬ tion this is too short for a play of power, and four is most preferred. See Drama.

In law. — (1) Anything officially done by the court, as the phrases ((Acts of Court,® <(Acts of Sederunt,® etc. (2) In bankruptcy, an act the commission of which by a debtor renders him liable to be adjudged a bankrupt. (3) In civil law, a writing which states in a legal form that a thing has been said, done or agreed. (4) In evidence, the act of one con¬ spirator performed in pursuance of the common design may be given in evidence against his co¬ conspirators. (5) Acts done, distinguished into acts of God (q. v.), of the law and of men.

In mental philosophy, an operation of the mind supposed to require the putting forth of energy, as distinguished from a state of mind in which the faculties remain passive. In this sense such expressions as the following are used: The act of thinking, the act of judging, the act of resolving, the act of reasoning or of reason ; each of these being viewed as a single operation of the human mind.

In parliaˆnentary Idnguage, an ellipsis for a law enacted by a congress, legislature, parlia¬ ment, etc. A statute, law or edict, consisting of a bill which has been successfully carried through both Houses of Congress or legislature, and received the approval of the executive. See specific title infra, Act of God ; Act of Settle¬ ment; Act of Supremacy; Act of Toleration; Act of Uniformity; Acts of Congress; Acts of Parliament; Acts of Trade; Bills, Course of; Bills, Private.

In theology, the carrying out of an opera¬ tion in a moment, as contradistinguished from the performance of a work requiring a con¬ siderable time for its accomplishment.

In universities, of old, the commencement or taking of degrees ; now disused save as a form at Cambridge, England. The student “keeps the act® by reading a Latin thesis which he must defend against three opponents named by the proctors.

ACT OF GOD, an accident which arises from a cause which operates without inter¬ ference or aid from man. The term is some¬ times used as equivalent to inevitable accident, but incorrectly according to some authorities, although Sir William Jones proposed the use of “inevitable accident® instead of ((act of God.®

ACT OF INDEMNITY, or ACT OF OBLIVION, an English statute of 1660, en¬ titled <(An Act of Free and Generali Pardon, Indempnity

and Oblivion,® by which all poli¬ tical offences committed during the time of the Commonwealth were pardoned, certain of¬ fenders mentioned by name in the act being excepted, particularly those engaged in the trial and execution of Charles I.

ACT OF SETTLEMENT, an act of the

Parliament of England in 1701, vesting the hereditary right to the English throne in So¬ phia, Electress of Hanover, and her Protestant descendants, constituting the source of the sov¬ ereignty of the House of Hanover or Bruns¬ wick, and the present Plouse of Windsor. The act prohibited the king (or queen) from going to war in defense of non-English powers with¬ out the assent of Parliament.

ACT OF SUPREMACY. (1) An act of the Parliament of England, in 1534, by which the king was made the sole and supreme head of the Church of England. (2) A re-enact¬ ment of the above, with changes, in 1559.

ACT OF TOLERATION, usually known as the Toleration Act, an act of the reign of William and Mary, granting _ freedom of re¬ ligious worship, under certain comparatively moderate conditions, to all dissenters from the established Church of England except Roman Catholics and persons denying the Trinity. This act, as confirmed in the reign of Anne, was the basis of various subsequent measures of religious toleration, culminating in the Catholic Relief Act of George IV, and the still more liberal legislation of Victoria.

ACT OF UNIFORMITY. (1) An act of

the Parliament of England (1559) adopting a revised liturgy for the Church of England, entitled (<An Act for the Uniformity of Com¬ mon Prayer and Service in the Church, and Administration of the Sacraments.® (2) An act of Parliament (1662) requiring that the revised Book of Common Prayer and Ordina¬ tion of Ministers, and no other, should be used in all places of public worship and be assented to by clergymen. By this test more than 2,000 non-conforming clergymen were ejected from their churches. It took effect on St. Bartholo¬ mew's Day (24 Aug. 1662), and accordingly is known in English history as the ˆBartholomew Act,® the day of its enforcement being known as ((Black Bartholomew.®

ACT'A DI'URNA («Daily Acts®) ; also called Acta Populi, <(Acts of the People® ; Publica, ((Public Acts® ; Urbana, “Municipal Acts.® Written daily newspapers in ancient Rome, posted up in public to be read or copied, then taken down and filed in the public archives. The news was collected by reporters (actuarii) employed by the state, and con¬ sisted of much the same sort of matter as that contained in modern newspapers; a miscellany of everything that might interest the citizen, from the latest war news, abstracts of the best speeches in the Senate or Forum or the courts, the most important legal decisions or political events, probably even to interviews, down to the most trivial gossip of the town, — not only births, marriages, divorces and deaths, murders, domestic infelicities and accidents, but any un¬ usual omens or prodigies, lusus natures, etc. Petronius in (Trimalchio’s Feast) gives an ad¬ mirable burlesque of it. The letters of Romans to out-of-town friends were regularly furnished with spicy news from the Acta Diurna, which seem to have taken the place of the older (An- nales> or yearly chronicles, too slow for the active later republic and only reporting the more important occurrences, some time after 131 b.c. The usual statement is that Julius Caesar introduced them ; but it hardly seems

probable that the Roman people, once used to even an imperfect form of news-gathering, dis¬ pensed with it altogether for three-quarters of a century and did not think of it again until it was invented for them. It is certain, however, that it was in use in Caesar’s time, for he ordered Antony’s offer of a crown to him on the Lupercalia to be set down in the Acta Diurna. Consult Le Clerc, (Roman News¬ papers > (in French, 1838, entertaining but not cautious in facts) ; Hiibner, (Acta of the Roman Republic > (in Latin, Leipzig 1860).

ACTiE'A, a genus of American plants of the family Ramin culacc ce. A. alba or white cohosh, or baneberry, is found in rocky woods from Georgia northward. A. rubra, red cohosh, or red baneberry, is widely distributed in east¬ ern North America.

AC'TA E'RUDITO'RUM, the first literary journal of Germany. It was started in 1682 by Prof. Otto Mencke of Leipzig, and enjoyed a long existence and great popularity. It was owned by his family till 1754, after which it began to decline in value and in the number of its subscribers ; and the irregularity of its appearance became at length so great that the last volume, for 1776, was published in 1782, exactly a century from the time when the journal was commenced. The whole consists of 117 quarto volumes, including the supple¬ mentary volumes and indices. In this journal Leibnitz first gave to the world his notions respecting the differential calculus.

ACTiE'ON, ak-te'on, in Greek mythology, the son of Aristaeus and Autonoe (a daughter of Cadmus), a great hunter. He was turned into a stag by Artemis (Diana) for looking at her when she was bathing (or, as some say, for boasting that he was superior to her in hunting), and was torn to pieces by his own dogs. This incident is exhibited in various ancient works of art.

AC'TA SANCTO'RUM, or MAR'TY- RUM, the collective title given to several old writings respecting saints and martyrs in the Greek and Roman Catholic Churches, but now- applied especially to one extensive collection begun by the Jesuit Roswevd, and continued by J. Bolland. The work was carried on (1661) by a society of learned Jesuits, who were styled Bollandists, until 1794, when its further prog¬ ress was prevented through the invasion of Holland by the French. In recent times the undertaking has been resumed.

ACTINTA. See Sea-Anemone.

ACTINIA'RIA (Gr. aktis, ray), the sea- anemones. See Anthozoa ; Sea-Anemone.

ACTIN'IUM. A radio-active substance discovered by Debierne in 1900, while working up uranium residues in the Curie laboratory. It has the chemical properties of an element between calcium and lanthanum. All efforts to isolate it from the rare earths, with which it is found in mixture, have failed, and its place of origin in the uranium series has not been discovered. Actinium gives off the same kinds of rays as radium but the emanation diminishes to half its initial vigor in a few seconds. Like radium and polonium, actinium is prepared from pitchblende and belongs to the iron group. Actinium preparations which are some months old emit a, /I and y rays.

The last, however, have a lower penetrating quality than those of radium or thorium. By fractional crystallization of the double nitrate of the rare earths and magnesium nitrate preparations of actinium have been obtained which show 100,000 times the radio-activity of uranium. The spontaneous decomposition of actinium affords a series of six successive products. Actinium preparations are highly radio-active and induce radio-activity in sur¬ rounding objects. As with other radio-active substances the ultimate product of actinium is helium. Actinium salts evolve an inert gas having the molecular

weight of (about) 70. (See Radioactivity). Consult Rutherford, E.,

(Radio-Active Substances and Their Radia- tions) (Cambridge, Eng. 1913).

ACTIN'OGRAPH, a name sometimes given to the actinometer (q.v.), especially when it is arranged so as to give an automatic record of the intensity of the light. The simplest form of this instrument is one in which stand¬ ard photographic plates or films are exposed to the sun's action for short, definite periods.

ACTINOM'ETER, an instrument for measuring the intensity of the chemical action of the sun's rays. For use in photography for the judging of times of exposure, the essential part of the instrument is a strip of sensitive silver paper which is blackened by the sun's rays, the time required to darken the paper to a definite shade being taken as the index to the intensity of the light. Any other chemical action that light rays are capable of performing may be made the basis of an actinometer ; but the indications of instruments in which the fundamental chemical changes are different will not necessarily agree with one another, be¬ cause any given actinometer shows nothing but the intensity of the particular part of the spec¬ trum which performs the chemical change upon which that instrument is based. Sir John Herschel's actinometer was a thermometer whose bulb contained a blue solution of sul¬ phate of copper and ammonia. The expansion of this solution, by absorbing the sun's rays, measured the quantity of chemical rays in the sunshine. Bunsen, Draper and Roscoe selected instruments sensitive to certain selected radia¬ tions, such as cause chemical or other changes. In this case the sun's rays perform molecular work and are measured by the effects. For example, when a chlorine and hydrogen mix¬ ture is converted into hydrochloric acid, the quantity of acid produced in a given period is a measure of the intensity of the rays which produced it. Ferric-oxalate and chloride of iron dissolved in water and exposed to the sun's rays give out carbonic acid gas and the quantity of the latter given off may be used as a basis of measuring the intensity of the rays. A photographic plate exposed for a short period of time receives an impression the intensity of which is determined by a scale of tints or shades, and this intensity of the impression in a given period is made the basis for determining the intensity of the sunshine. When the sensitive element, used as a measur¬ ing medium, absorbs all the radiation of all wave-lengths the instrument is more properly called a pyrheliometer (q.v.).

ACTINOMETRY, in general, the measure¬ ment of either the relative or absolute effect

of solar or other radiation. In particular, it refers to the measurements of only actinic ef¬ fects, i. e., chemical, photographic and similar reactions.

ACTINOMYCO'SIS, a disease due to a vegetable parasite known as the ray fungus, Actinomyces bovis, of the fungus class. This fungus lives its life in grasses and plants and thus infects cattle, in which animals it is com¬ paratively frequent, causing the disease known as <(big jaw,® or Humpy jaw.® These in turn affect man. It is also found in horses, pigs, sheep, deer and llama. The disease has been recognized since 1825 and is often mistaken for cancerous, tuberculosis or syphilitic tumors. Bollinger first accurately described the disease in cattle in 1877. It is found throughout Eu¬ rope and the Americas. The fungus is found in all tumors and abscesses of the disease and is readily detected by the microscope. Cattle are usually affected in the salivary glands, the inferior maxillary bones, the tongue, oesophagus and pharynx. Hogs are generally affected in the udder. Great difference of opinion exists regarding the position of the fungus, but it is generally held that part of its life is spent on a plant host. Grasses with sharp awns appear to be a chief agency for the transfer of the ray fungus to cattle. The general treatment consists in opening, draining and sterilizing the abscesses, wherever accessible, and by admin¬ istering internally potassium iodide. The dis¬ ease pursues a slow, chronic course. Infection in man and cattle most frequently takes place through diseased teeth or abrasions of the mucuous membrane of the mouth. See Para¬ sites.

In man the symptoms are often very ob¬ scure. Some infections of the lungs have appeared to be cases of pulmonary tuberculosis. Pathologically the disease is one of new con¬ nective tissue formation with abscess produc¬ tion. It is a chronic disease, and often is a slow, suppurative affair affecting the tissues about the pharynx and neck. The bones, lungs and intestinal tract may be affected. The diag¬ nosis may be readily made by the microscope. Consult Salmon, D. E., (Investigation Relating to the Treatment of Lumpy- Jaw, or Actinomy¬ cosis in Cattle,* Department of Agriculture Bulletin No. 2 (1893) ; Salmon, D. E., et al., (Special Report on Diseases of Cattle and Cattle-Feeding, * Report of United States De¬ partment of Agriculture for 1904, Bureau of Animal Industry (Washington 1904). For the disease in man consult Osier, (Modern Medi- cine) (New York and Philadelphia 1910).

ACTIN'OPHONE, better known as the radiophone (q.v.).

ACTINOZO'A, or AN'THOZOA, a class of ccelenterates which exist only

in the polyp state, not giving rise to a medusa form. They are represented by the sea-anemone (q.v.) and coral polyps. Their bodies are vase¬ shaped, usually fixed at one end, though most of them are capable of slowly, moving about. They are provided with a digestive sac partially free from the body-cavity opening into it be¬ low and held in place by six or eight mesen¬ teries radiating from the digestive cavity and dividing the perivisceral space into chambers. The mouth is surrounded with a circle of ten¬ tacles which are hollow, communicating directly

with the perivisceral chambers. There is a slightly marked bi-lateral symmetric. To the edges of the mesenteries (usually the free ones) are attached the reproductive glands, both male and female, or of one sex alone; also the <(craspeda,® or mesenterial filaments, which contain a large number of threadcells (q.v.). The body is either entirely fleshy or secretes a calcareous or horny coral-stock, and W'hen the species is social it is connected by a ccenenchyme. In some forms, as sea-pens (q.v.) the entire colony is capable of limited locomotion. There is no well-marked nervous system, but a plexus of fusiform ganglionic cells connected by nerve-fibres in the base of actinians. Reproduction takes places by self¬ division, gemmation, or by eggs, the sexes being separate or united in the same individual ; the young undergoing a blastula and gastrula condition and then becoming fixed.

The Actinozoa are divided into two sub¬ classes, the Zoantharia and the Alcyonaria (qq.v.).

ACTION. In law, the formal demand of one's right from another person, made and in¬ sisted in a court of justice which has jurisdic¬ tion of the person and the subject-matter of litigation. In a quite common sense, action includes all the formal proceedings in a court of justice attendant upon the demand of aright made by one person, or party, of another in such court, including an adjudication upon the right, and its enforcement or denial by the court.

The parties to an action are called plaintiff and defendant, and the former is said to sue or prosecute the latter, hence the word suit instead of action. In some few instances the redress sought by a civil action consists in the recovery of some specific article of property wrongfully and unlawfully taken by the defendant from the plaintiff, but most frequently the object of an action is to obtain compensation

in money for an injury complained of, which compensa¬ tion is technically called damages.

The action is said to terminate properly at judgment.

Civil actions are those actions which have for their object the recovery of private rights, or of damages for their infraction.

Criminal actions are those actions prose¬ cuted in a court of justice, in the name of the government, against one or more persons ac¬ cused of a crime..

Transitory actions are those civil actions the cause of which might have arisen in one place or county as well as another.

Local actions are those civil actions the cause of which could have arisen in some particular place or county only.

Personal actions are those civil actions which are brought for the recovery of personal prop¬ erty, for the enforcement of some contract or to recover damages for the commission of an injury to the person or property.

Real actions are those brought for the re¬ covery of lands, tenements and. hereditaments. Mixed actions are those w'hich partake of the nature of both real and personal actions.

In higher theoretical mechanics the word ˆaction® is used to signify the value of a cer¬ tain integral, whose form may vary according to the character of the problem in hand. In the case of a' single particle the action is the space

integral of the momentum of the particle, or it is double the time integral of its kinetic energy. In a system of such particles the total action is the sum of the auctions of the constituent parti¬ cles. It is probable that the physical principle corresponding to the mathematical expression called <(action® will some day be exhibited to us in a simple form ; but up to the present time no mathematician or physicist has succeed¬ ed in doing this. The importance of <(action® as a mathematical conception may be seen from the following theorem, wrhich has long been known : ((If the sum of the potential and kinetic energies of a system is the same in all its configurations, then, of all the sets of paths by which the parts of the system can be guided by frictionless constraint to pass from one given configuration to another, that one for which the action is least is the natural one, and requires no restraint.® The theorem just stated is

known as Maupertuis' ((principle of least action.® There is also a principle of stationary action, and one of varying action ; but it is impossible to eluci¬ date these without a prohibitive amount of mathematics. The last twˆo principles were formulated by Sir William Rowan Hamilton.

In theoretical mechanics the wrord «ac- tion,® is also used to signify a force acting upon a body, as in the expression ((action and reaction.® See Force; Motion, Law of.

In applied mechanics the mechanism by w'hich some operation is effected in a machine is often called the action of the machine ; thus wre speak of the action of a gun, meaning the mechanism governing the loading and firing of the gun • or of the action of a piano, mean¬ ing the combination of keys, hammers and other parts, by wdiich the player causes the strings of the instrument to vibrate.

Consult Holmes, (The Common Law) ; Pol¬ lock and Maitland, (English Lawr) ; and Sohm,

(Institutes of Roman Law7 > (2d ed., 1901).

ACTIUM, ak'shium, Greece, now Akri, a promontory on the west coast jutting out from the northwest extremity of Acarnania, on the Ionian Sea at the entrance of the Gulf of Arta (old Ambricia), opposite Prevesa and just north of Santa Maura (old Leucadia). Forts Punta and Aktium defend it. It represents one of the greatest of historical landmarks : the naval battle of 2 Sept. 31 b.c., between Octavi- anus (later the Emperor Augustus) and An¬ tony, w'hich decided the mastership of the then civilized world. For the reasons of the en¬ gagement, see Antonius ; it wˆas fought by him, not for victory but for escape, which partly ex¬ plains its half-heartedness and result on his side. Both armies were drawn up on the shore watching it. After waiting four days for a calm they engaged about noon on the fifth. Antony had . some 500 large ships, Octavianus fewer and lighter ones. Antony on his right was. opposed to Agrippa, Octavianus on his to Cselius ; Cleopatra's 60 wrere in the rear sup¬ porting Antony's forces. Antony's vessels were huge hulks, too clumsy for manoeuvring; but on the other hand so impenetrable with iron-bolted timbers and brass plates and spikes that Octa¬ vianus' galleys dared not ram them for fear of shattering themselves, and skirmished rapidly around, hurling missiles and trying to board. It was more like the besieging of forts than a naval battle ; one of Antony's tall structures being often surrounded with three or four of its

nimble foes pouring darts and fire-balls into it, to which it replied from catapults loaded with heavy missiles. At length Agrippa used his superior numbers to attempt a flanking move¬ ment ; Antony's flag-captain drew his wing away from the centre to prevent it; Cleopatra took alarm, and to make sure of escape her squadron broke through the front rank, throw¬ ing it into disorder, and sailed away for Egypt. Antony jumped into a small galley and followed her, leaving his command to its fate; even so it fought on till about 4 p. m., when 300 ships had been taken and many burned, and 5,000 men killed ; it then yielded. The land army surren¬ dered a week later. In commemoration of the triumph Octavianus enlarged the temple of Apollo at Actium, dedicated his trophies there, instituted quinquennial games and built Nicop- olis (C(city of victory®) on the site of his army's camp, near the modern Prevesa. (Plutarch's (Life of Antony } is the only first-hand account in an English translation ; and Dion Cassius, in Greek, is much later and less judicious). See Antonius, Marcus ; Augustus ; Cleopatra.

ACTON, John Emerich Edward Dalberg,

Baron, historian: b. Naples, 10 Jan. 1834; d. Bavaria, 19 June 1902. He was educated under Dr. (afterward Cardinal) Wiseman at Oscott College, England, and at Munich under Ignatius von Dollinger, whose friend and adherent he remained throughout life. He was returned to Parliament for Carlow (1859) and for Bridg¬ north (1865), but was unseated on a scrutiny of the vote; created a peer (Baron Acton of Alden- ham) in 1869 by Gladstone, whose trusted friend and adviser he was. A strong Liberal in poli¬ tics and religion, he founded the Home and Foreign Review (1862-64) in the interest of the liberal Catholic party, and adopted the Home Rule idea before Gladstone himself. At the CEcumenicai Council in Rome (1870) he vigorously opposed the dogma of papal infal¬ libility. From 1895 to 1902 he held the office of regius professor of modern history at Cam¬ bridge University. A scholar of 'wide and vast erudition, his passion for acquiring knowledge seemed to act as a check upon his productive powers. No modern man of such first-rate abilities has left so few literary productions by which posterity may judge of those abilities. Between 1868-90 he gave to the press a few historical essays and anonymous letters ; and in 1895 he published a (Lecture on the Study of History.) In 1882 he planned a comprehen¬ sive history of liberty, but never carried out the design. His university lectures were mod¬ els of narrative, fullness of thought and flaw¬ less exactitude of statement. (The Cambridge Modern History) (Vol. I, 1902) was planned and outlined by him.

ACTON, Sir John Francis Edward, Eng¬ lish adventurer, son of an English physician and a French lady: b. Besangon, France, bapt. 3 June 1737; d. Sicily, 12 Aug. 1811 Entering the Tuscan navy under his uncle’s auspices, he commanded a frigate in the Algerian expedi¬ tion of 1775, performed daring exploits in cov¬ ering its retreat and attracted the notice of Caramanico, favorite of Queen Caroline of Naples; and the Queen, ambitious of playing a large European part, persuaded her brother, the Grand Duke of Tuscany, to lend Acton to her to reorganize her navy. He soon became

her prime favorite, commander-in-chief by both land and sea, and ultimately prime minister, shelving Caramanico on foreign missions. He improved the roads and ports, but excited great discontent by the consequent taxation and the positions given to foreigners. In 1793 he formed the league between Naples, Austria and England against France; in 1798 the French victories forced him to fly with the royal fam¬ ily to Sicily, and the Parthenopean Republic was formed. Five

months later they were back, and he, with a ((Junta of State,® insti¬ tuted a reign of terror, sending many to the prison or the block. In 1804 he was removed at French demand, and in 1806, when the French entered Naples, he was obliged to take refuge in Sicily again, where he died with the ill will of all parties.

ACTON, Thomas Coxon, American finan¬ cier and public official: b. New York, 23 Feb. 1823 ; d. there, 1898. He was a leading banker, and in early years was assistant to the county clerk and deputy register; 1860-69 metropoli¬ tan police commissioner, 1862-69 president of the board. During the draft riots of July 1863 he commanded the entire police force in person for a week, rendering highly valuable service. He was superintendent of the United States Assay Office 1870-82, and assistant treasurer of the United States at New York 1882-86. He was always an active agent in administrative and social reforms in the city; carried through against bitter opposition the creation of a paid fire . department ; and assisted in founding the Society for the Prevention of Cruelty to Ani¬ mals and the Society for the Prevention of Cruelty to Children. He declined a nomination for mayor.

ACTORS' CHURCH ALLIANCE OF AMERICA, an organization whose purpose is to establish a closer relation between the church and the theatre, founded in 1899 by Walter E. Bentley, a clergyman who had once been an actor. It uses its influence against theatrical performances on Sundays and pro¬ vides chaplains of all denominations to care for the spiritual needs of all connected with the dramatic profession. It is affiliated with a sim¬ ilar organization in Great Britain. The total membership is about 5,000 and it has at its cˆll about 1,500 chaplains in 400 American cities.

ACTS, Apocryphal. See Apocrypha.

ACTS OF THE APOSTLES. One of

the books of the New Testament. The title, Acts of the Apostles (simply Acts in the old Codex Sinaiticus), was not bestowed by the author, and does not correspond to the con¬ tents of the work. The book seeks to describe a great historical fact, namely, the growth and expansion of the Christian Church, under the guidance of the spirit of Jesus, from its be¬ ginning in the small group of personal friends and disciples of Jesus (who were all Jews liv¬ ing in or near Jerusalem), until, having pene¬ trated the Gentile world, it finally reached and gained a foothold in the capital of the empire, Rome itself. That this, and not to record the acts or deeds of the apostles, was the purpose of

the work is indicated in i, 8, which forecasts the general plan and contents. The narrative begins with Jesus' last interview with His disci¬ ples before His ascension, and then exhibits the origin and development c- die Christian

community or church, externally, in virtue of the gift of the Spirit at Pentecost and of the preaching and missionary activity of the spirit-filled apostles, especially Peter and John; and internally, in reference to certain details of organization and modes of conduct and wor¬ ship. In its first stages the movement was confined to Jerusalem or its immediate vicinity, was limited to Jews exclusively, and in due time attracted the attention of the Jewish au¬ thorities, who tried in vain to check its progress (i, 1 — vi, 7). A crisis came when Stephen, a Hellenistic Jewish convert, who had defined this as different from and superior to the existing Jewish system, suffered martyrdom, and a violent persecution of the Christians of Jerusalem followed. The resultant scattering of active Christian workers throughout Pales¬ tine only fostered the growth of the new movement, and soon Christian disciples and communities were to be found in all parts of the land (vi, 8 — viii, 39).

As yet, however, the Gospel had been preached to none but Jews. But soon, under the guidance of the Spirit, the movement took on a larger scope, and to the Gentile world the blessings of the new faith were made known. The historian notes three significant facts that were influential in bringing about this great result: (1) The conversion of Saul, the ardent Jewish persecutor, destined to be¬ come the great apostle to the Gentiles (ix, 1-30) ; (2) The revelation to Peter in the case of the Roman centurion Cornelius of Caesarea (ix, 31 — xi, 18) ; (3) the spontaneous preaching of the Gospel to Gentiles at Antioch and its consequences (xi, 19-30). After noting the vain attempt of Herod Agrippa I to check the growth of the Church (Ch. xii), the in¬ terest of the narrative centres on the great Gentile-missionary propaganda, of which the chief exponent and champion was the Apostle Paul. The first section of this (xiii, 1 — xv, 35) tells how Paul and Barnabas, by direc¬ tion of the Holy Spirit, were the first to conduct a mission to the Gentiles on a large scale, and how the seal was set on this work by the apos¬ tolic council at Jerusalem. The remainder of the work is devoted to Paul's subsequent mis¬ sionary activity, first in the East (Asia Minor, Macedonia, Achaia) and then, after his arrest and imprisonment, in Rome itself, though as a prisoner

(xv, 36 — xxviii). The book ends somewhat abruptly.

As <Acts) is the only early account in exist¬ ence of the apostolic period, and is also our one and only source for the historical back¬ ground of Paul's Epistles, and thus enables us to construct an intelligible outline of the great apostle's career, its value is inestimable.

Because of its great importance (Acts) has been subjected to a criticism more severe than has been meted out to any other New Testa¬ ment book with the possible exception of the fourth Gospel.

The traditional view that <Acts) was writ¬ ten by Luke the physician, one of Paul's com¬ panions and fellow-workers, the author of the third Gospel, may be said still to hold its place. No other view has succeeded in gaining any general acceptance. The uniformity of style and vocabulary shows quite conclusively that the book is the work of one hand, and until a more plausible view is set forth the early

church's tradition that it was Luke's hand is to be accepted as true.

The problem of the sources used by the author of (Acts) is of special interest. The narrative, as far as xv, 35, as has been shown above, relates facts that transpired or were well known in the Aramaic-speaking circles of the early Jewish-Christian church. This is especially true of Chs. i-xii. The remainder of the narrative is mainly concerned with Paul's mission to the Gentiles. Recent investigations (such as those by Dr. C. C. Torrey, noted be¬ low) have only made quite probable what had been suggested earlier, namely, that for the material given in i, 1 — xv, 35, Luke depended in the main on written Aramaic sources, which he himself translated quite literally, adding only a comparatively small amount of his own free composition. It must be said, however, that this view needs a thorough testing and sifting before it can be accepted as final.

For the remainder of his narrative (xv, 36 to the end), Luke must have depended partly on the results of his own inquiries of those cognizant with the facts, including the Apostle Paul himself, and partly on his own memory concerning those events with which he was personally acquainted. This personal respon¬ sibility is probably indicated by the author in the use of the first person plural in the so- called ®we» sections (xvi, 10-17, and xx, 5, to the end of the book), sometimes called <(the travel-document.®

Closely related to the problem of the sources is that of the credibility

and accuracy of JActsP Of the credibility of the narrative in its general outline there can be no reason¬ able question. But its accuracy in detail, in many instances, is open to doubt. Such errors as exist may be due in some cases to the source Luke was using; in others, to imperfect or in¬ correct information which he took to be re¬ liable ; in others, to simple omissions of facts which Luke may have known but chose not to mention, and in still others to a failure on Luke's part to grasp the significance of events, or to carelessness in the way he set them down. The differences, e. g., between the story of Paul's conversion, in Ch. ix, and the sub¬ sequent accounts in Chs. xxii and xxvi, may be due to the fact that in Ch. ix Luke has simply transcribed without alteration a written source, while in the later passages he set down Paul's own account as he remembered hearing it given. The discrepancies between Ch. xv and Paul's own account in Gal. ii, 1-10, of his experiences at the council, may be due to Luke's faithful transcription of an Aramaic .source written from a point of view entirely different from that of Paul himself. If the ((we® sections alone cover the events and period of Paul's career with which Luke was personally ac¬ quainted or connected, it is not surprising that Luke may not have been minutely acquainted with the small details of Paul's relations to the churches of Corinth and Ephesus as these are revealed in Paul's letters. But such discrepan¬ cies, which are doubtless to be found in con¬ siderable numbers between ˆcts1* and some parts of Paul's Epistles, are more than offset by the numerous and often reciprocally ex¬ planatory agreements between the two. This is the more significant when we consider that there is no probability that Luke had read

these Epistles when he wrote <Acts.) That Luke always caught Paul's viewpoint and ac¬ curately comprehended the motives and prin¬ ciples that actuated the apostle cannot be as¬ sumed. Paul was admired and loved by many, but thoroughly understood by very few in the early church. Luke's aim was not, however, to give a biography of Paul, but, as has been stated, to write a history of the spread of the Gospel, under the guidance of the Spirit, until it reached Rome, the world-capital. So viewed, the author's work must be pronounced a re¬ markable achievement, one of the greatest books ever written. It is the worthy com¬ panion and sequel to the author's Gospel, in which he set forth (<the things Jesus began both to do and teach® (Acts i, 1).

Bibliography. — Besides the standard com¬ mentaries, e. g., by H. H.

Wendt in the Meyer- Weiss series (in Germail), by R. J. Knowling in the Expositor's Greek Testament, * by J. R. Lumby in the 'Cambridge Bible, *or by J. Ver¬ non Bartlett in 'The New Century Bible,* the most up-to-date discussions will be found in 'The Acts of the Apostles,* by A. Harnack (London 1909) ; 'Introduction to the Litera¬ ture of the New Testament, * by James Mof- fatt (New York 1911), and 'The Composition and Date of the Acts of the Apostles, * by C. C. Torrey (Cambridge 1916).

The following works also may be consulted : Commentaries: Andrews, in 'The Westmin¬ ster New Testament *(New York and London 1908) ; Holtzmann, H. J., 'Hand-Kommentar zum Neuen Testament (Freiburg 1892) ; Gil¬ bert, in 'Bible for Home and School* (New York 1908) ; Lietzmann, 'Handbuch zum Neuen Testament (Tubingen 1908). Introductions: Bacon, in 'New Testament Handbook Series> (New York 1903) ; Von Soden 'Early Christian Literature) (ib., 1906). General Works:

Balmer, 'Die Romfahrt des Apostels Paulus und die Seefahrtskunde im romischen Kaiser- zeitalter) (Bern-Miinchenbuchsee 1905) ; Chase, 'The Historical Credibility of the Acts of the Apostles * (London 1902) ; Clemen, 'Die Apos- telgeschichte) (Giessen 1905) ; Ritschl, 'Die Enstehung der altkatholischen Kirche *(Bonn 1857) ; Ramsay, 'The Church in the Roman Empire before 170 A. DP (New York 1893) ; Weizsacker, 'The Apostolic Age* (Edinburgh 1894) ; 'Date of Acts and the Synoptic Gos- pels) (New York and London 1911).

Edward E. Nourse,

Professor Biblical Theology, Hartford Theo¬ logical Seminary.

ACTS OF CONGRESS. The two

branches of Congress are co-ordinate in legis¬ lative power, the bills passed by either being subject to the absolute veto of the other. The only exclusive power possessed by either House was the provision that all bills for raising rev¬ enue should originate in the House of Repre¬ sentatives, but this power has practically been nullified by the unrestrained freedom of amend¬ ing such bills which the Constitution gives to the Senate. In one case this freedom was ex¬ ercised to the extent of placing 872 amend¬ ments in a single House bill and of eliminating everything but the enacting clause and substi¬ tuting a new bill. Annually many thousands of bills and resolutions are introduced by the Senators and Representatives (during the 61st

Congress nearly 46,000), are then referred to the proper committees for consideration, and if worthy of presentation and action by Con¬ gress are introduced for debate. While the congressional committee system is crude, it performs excellent work in killing off worth¬ less bills. When a bill has been passed by either House it is sent to the other for action ; if passed by that branch the "enrolled® copy, signed by the President of the Senate and the Speaker of the House, is sent to the President. If he sign it or allow it to become a law, it takes, effect at the time designated in the bill, but if he veto it, then it must be passed by a two-thirds vote of those present in both Houses before it can become a law without his signature. If the bill fail to receive the two- thirds vote it is then a nullity and has no effect. (See Bills, Course of; Bills, Pri¬ vate). All acts of Congress for each session are edited, printed and published by authority of Congress, under the discretion of the secre¬ tary of state, in the 'Statutes at Large. > All acts of Congress remaining in force 1 Dec. 1873 were codified in 1874 in the 'Revised Statutes *and from time to time successive vol¬ umes of supplementary acts have been issued. The criminal laws of the United States were codified in 1912. Consult Hart, A. B., 'Actual Government* (New York 1903) ; Reinsch, P. S., 'American Legislatures and Legislative Meth¬ ods *(New York 1907) ; Bryce, James, 'Ameri¬ can Commonwealth* (4th ed., New York 1910) ; Ford, H. J., 'Cost of Our National Govern¬ ment *(New York 1910) ; Hinds, A. C., 'Rules of the House of Representatives* (1909).

ACTS OF HOSTILITY, actions of one nation against another signifying its intention to impose its will by force, not always physical. Acts of hostility may be of a diplomatic, com¬ mercial, civil or military character. An ulti¬ matum delivered by one nation to another, whose terms are so harsh as to be utterly un¬ acceptable, may be termed an act of hostility, in a diplomatic sense. The blockade of a country’s ports against food supplies is an act of hostility in a commercial sense, though not a shot may be fired. A military act of hostility usually involves actual invasion, as the raiding of Columbus, N. M., by the Mexican Villa, though in that case the Mexican Government was not considered responsible for his act.

ACTS OF PARLIAMENT. An act of

Parliament is a resolution or law or declara¬ tion passed by all three branches of the British legislature (the king or queen, lords and com¬ mons) to enforce certain or specified rules of conduct or defining and conferring rights upon persons or withholding them from certain per¬ sons or classes of persons. In acts other than those granting money to the Crown, the enact¬ ing clause reads : "Be it enacted by the King’s

most excellent Majesty, by and .with the advice and consent of the Lords Spiritual and Tem¬ poral and Commons in this present Parliament assembled, and by the authority of the same.® When money is granted to the Crown the en¬ acting clause is prefaced by the words : "Most gracious Sovereign, we, Your Majesty's most dutiful and loyal subjects, the Commons of the United Kingdom of Great Britain and Ireland, in Parliament assembled, towards making good the supply which we have cheerfully granted to

your Majesty in this session of Parliament, have resolved to grant unto your Majesty the sums hereinafter mentioned; and do therefore most humbly beseech your Majesty that it may be enacted,® etc. Thus the collective body of such declarations is the written law or statutes of the realm of the British nation and is the highest legal authority recognized, which can¬ not be amended or repealed without the same authority of Parliament. It binds every sub¬ ject and every alien (with few exceptions) and, if named therein, the sovereign himself. Unless a specific date be set by the act itself, an act of Parliament takes effect immediately on receiving the sovereign's signature. Acts of Parliament are either public or private. A pub¬ lic act is one relating to the whole Empire or a main subdivision (in which case it is called general) or a subordinate part (in which case it is called local). Private acts are those which relate to particular persons and private con¬ cerns. (See Bills, Private). Originally the whole number of acts passed during each ses¬ sion constituted a single statute having a gen¬ eral title and for this reason acts of Parliament are referred to by the year of the sovereign's reign and the chapter of the statutes of that year, e. g., 2 and 3 Richard III, c. 45. Since the passage of the Short Titles Act of 1892 important acts up to that time may be cited by their short titles, either individually or col¬ lectively. Most of the recent acts have borne short titles. See Great Britain — 'Parliament.

ACTS OF TRADE, a series of acts to regulate trade passed by the British Parlia¬ ment between 1660 and 1674. These acts levied heavy duties in England on agricultural prod¬ ucts and salt provisions imported from the col¬ onies. The intent was to protect the British landlord, but the actual result was to force the colonists to seek other markets where they could exchange their produce for manufactured materials and eventually to erect their own manufactories. On non-colonial importations heavy or prohibitory duties were imposed to give protection to colonial products which were admitted into England

under nominal duties. Enumerated goods (such as sugar, tobacco, cot¬ ton, hemp, grain, meats, indigo, ginger, fustic, molasses, South Carolina rice, etc.) were re¬ quired to be shipped to England and heavy duties were levied upon intercolonial trade so as to force the shipment of such articles to England. In order to prevent trade with other countries or their colonies and to encourage the colonial production of articles obtained therein, heavy prohibitory duties were laid on all non-English goods imported into the col¬ onies. The colonies were either greatly re¬ stricted in their production of or prohibited altogether to manufacture woolens, linens, hats, iron and many of its products, since the manu¬ facturers of the mother country greatly feared the competition of the colonists in these ar¬ ticles. Indeed the imposition of a duty on Eng¬ lish manufactures by Massachusetts and a slight discrimination in favor of her ship¬ building industry led the British ship-builders to exclaim that the colonists would soon <(be- able to live without Great Britain ; and their ability, joined to their inclination, [would] be of very ill consequence.® But the colonies were benefited to a degree by the two bounties granted by the government : First, that paid

directly to the colonists to encourage the pro¬ duction of indigo in South Carolina and of naval stores, such as masts, hemp, flax, lumber, pitch and tar; and second, that paid to British manufacturers which reduced the prices to co¬ lonial consumers. Irish linen was allowed to be shipped to the colonists duty free, salt needed for curing fish might be imported from any European port, and drawbacks were al¬ lowed on goods warehoused in England and then shipped to the colonies. The colonists were allowed later to ship grain, lumber, salt provisions, fish, sugar and rum to any port in the world, provided these goods were carried in English or colonial ships, of which the owners and three-fourths of the crews were British subjects.

At first the acts of trade were so unpro¬ ductive of revenue that the funds raised there¬ by in the colonies did not pay the costs of ad¬ ministration, but in 1764 a statute known as the <cSugar Act® was passed containing the provisions of the previous ((Molasses Act,® and an attempt was made to collect the duties which had been placed purely on a revenue basis. This indicated that the home government in¬ tended to convert the acts of trade into rev¬ enue acts, which later was demonstrated by the passage of the Stamp Act (q.v.) and the Townshend Acts. These were among the con¬ tributing causes of the Revolutionary War. See United States — Causes of the Revolution; Great Britain — Navigation Acts; Virginia Conventions of the Revolution; Stamp Act; Declaration of Independence. Consult Beer, G. L., Commercial Policy of England Toward the American Colonies5 (in

Columbia Univer¬ sity (Studies in History, Economics and Public Law,5 Vol. Ill, No. 2, 1893), (British Colonial Policy, 1754-1765' (1907), and (1912) ; Osgood, H. L., (The American Colonies in the 17th Cen¬ tury) (1907) ; Doyle, J. A., (English Colonies in America) (1882-1907) ; Andrews, C. M., Colonial Self-Government5 (1904) ; Howard, G. E., Preliminaries of the Revolution5 (1905); MacDonald, William, (Select Charters5 (con¬ taining text of some of the acts) ; Lord, E. L.,

(Industrial Experiments in the British Colo¬ nies of North America5 (in Johns Hopkins University (Studies in History and Political Science,5 Extra yol. XVII, 1898) ; Bruce, P. A., (The Economic History of Virginia in the 17th Century5 (1896) ; Weeden, W. B., eco¬ nomic and Social History of New England5

(1890).

ACTUALITY, LAW OF, in philosophy, the state of being actual ; reality. <(The ac¬ tuality of these spiritual qualities is thus im¬ prisoned, though their potentiality be not quite destroyed.® — Cheyne.

ACTUARIAL SOCIETY OF AMERI¬ CA, a scientific organization established in April 1889, having for its object the promo¬ tion of actuarial science by such methods as may be found desirable. The membership is composed of those connected with actuarial pur¬ suits. The enrolment is divided into fellows and associates. Candidates for associate must be nominated to the council by at least two fellows of the society, and after their nom¬ ination has been approved are required to pass such preliminary examination as may be pre-

scribed ; a second examination is demanded of candidates for fellowship. An annual meeting is held on the first Thursday after 14 May in each year. Other meetings may be called by the council from time to time and by the presi¬ dent at any time on the written request of 10 fellows. The officers of the society are a presi¬ dent, a first and second vice-president, a secre¬ tary, a treasurer and an editor of the transac¬ tionsˆ President and vice-presidents are not eligible for the same office for more than two consecutive years. The council is composed of the officers, ex-presidents and nine other fel¬ lows, three elected to serve for three years, three for two years and three for one

year. The society publishes (Transactions, > contain¬ ing the proceedings of the meetings, including original papers presented by fellows or asso¬ ciates, discussions on said papers and other matter expressly authorized by the council. In 1911 the total number of fellows was 144; that of associates, 113. Enrolment is not restricted to the United States. International congresses are held from time to time under the auspices of the socictv. The secretary's office is main¬ tained in New York.

ACTUARY, in ancient Rome, a clerk of public bodies who recorded their acta; also one of the public reporters who prepared the daily news of the city as a written newspaper. (See Acta Diurna). In modern times, the mathe¬ matician of an insurance company, who makes the calculations on which its policy plans and prices are based, and applies the doctrine of probabilities to fire, life or accident insurance. Although the material on which he works is theoretically furnished by the experience of his and other cognate companies, and the records of public and private bodies, with the common rules of interest, in fact it needs not only great mathematical capacity but great practical sagac¬ ity to apply them to actual business ; and no actuary of the highest class is a mere mathe¬ matician. In the early days, when experience was still mostly to make, the actuaries were usually the presidents of their companies ; in recent times a safe body of experience has ac¬ cumulated which enables business men to head them, and the actuary's computations and ad¬ vice relate to slighter variations or special plans. In accident companies the actuary needs to be and usually is a man of large practical ac¬ quaintance with different employments, their hazards, the meaning of given employment-names, and those under which the more hazard¬ ous employments are disguised as less so ; in fire insurance equally he must know the char¬ acter of different risks. See Insurance.

ACUNA, Christoval de, a-koon'ya, chns'- to-val, Spanish missionary and South American explorer: b. Burgos 1597; d. 1676. After mis¬ sion work in Chile and in Peru, he became rector of the College of Cuenca. In 1639, as scientist, he accompanied the second expedition of Texeira to explore the Amazon, and wrote his (Nuevo Descubrimiento del Gran Rio de las Amazonas. } The work was published at Madrid in 1641, a French translation in 1682 and an English translation from the French edition in 1698.

ACUNA, Manuel, a-koon'ya, man-oo-el', Mexican poet: b. 1849; committed suicide 1873

from disappointed love, which was the princi¬ pal theme of his poems.

ACUNA DE FIGUEROA, Francisco,

a-koon'yii da fe-ga-roa, fran-thes'ko, Uruguayan poet : b. Montevideo 1791 ; d. there, 6 Oct. 1862. His works are a Spanish- American classic from their metrical perfection, though deficient in warmth. The collection (Poetic Mosaic) comprises every variety of secular and religious poetry, from heroic poems to psalms.

ACUPUNCTURE, an old remedy for the relief of pain, swelling or dropsy. Steel needles about three inches long are used. One or more are inserted by the surgeon to the required depth and are left there from a few minutes to an hour. The result is a great relief from pain and, provided the needles are aseptic, the wounds are entirely harmless. Electric cur¬ rents are sometimes sent into the needles to remove birthmarks, moles, etc., and some needles are made hollow so that a sedative may be administered and pain relieved at once.

ADA, Okla., county-seat of Pontotoc County, about 75 miles southeast of Oklahoma City, on the St. Louis & San Francisco, the Missouri, Kansas & Texas and the Oklahoma Central railways. Its industries include the manufacture of cement and asphalt. Cotton is raised extensively in the vicinity. Here is situated the State Normal School. The citi¬ zens have adopted the commission form of government, and the municipality owns its own waterworks. Pop. 5,000.

ADABAZAR, a/da-ba'zar, Turkey in Asia, town in the Kohja Hi sanjak, an active com¬ mercial centre on a branch of the Anatolian Railway, and on the military road from Con¬ stantinople. It has silk and linen industries, and trades with Constantinople in tobacco, co¬ coons, walnut wood and vegetables. Its annual imports are valued at $400,000 ; its exports at $2,400,000. Pop. 18,000 (Christians, 8,000; Mo¬ hammedans, 10,000).

ADAGIO, a-da'jo, a musical term denot¬ ing a slow movement or measure of time, be¬ tween largo, grave and andante. In more ex¬ tended compositions of instrumental music the second or third movement is generally marked adagio, and serves as a contrast to the rapid and energetic movement of the preceding and following parts of the sonata or symphony. It must be written in a measure of time which will afford scope for a flowing and expressive slow melody with a gracefully varied accom¬ paniment. A clear and expressive execution of an adagio is an infallible test of a per¬ former’s art, as it

demands a pure and beau¬ tiful tone and calls for great variety of tonal color. The diminutive adagietto is no longer used as denoting a tempo slightly more ani¬ mated than adagio, but as a generic title for a short adagio movement.

ADAIR, James, American 18th-century Indian trader and author. He lived 1735-75 among the Indians, mainly the Cherokees and Chickasaws, and in the latter year published a (History of the Indian Tribes,) especially the southeastern ones, containing an admirable first-hand account of their manners and cus¬ toms, and a still more valuable, though unsat¬ isfactory, set of Indian vocabularies. But the

chief object of writing the book was to trace the origin of the Indians to the Lost Tribes of Israel; a curious phantasm (especially as the tribes are known not to have been lost, and the differentiation of stocks must far antedate the Christian era) which has bewitched many enthusiasts since, and was revived and ex¬ pounded by Dr. Elias Boudinot in his (Star of the West) (1816). Adair's views are sum¬ marized in H. H. Bancroft's (Native Races) (Vol. V, p. 91).

ADAIR, John, American general and pub¬ lic officer: b. Chester County, S. C., 1759; d. Harrisburg, Ky., 18 May 1840. He served in the Revolution ; removed to Kentucky 1787 ; in 1791 was major under St. Clair and Wilkin¬ son in the northwestern Indian expeditions, and was defeated by the Miami chief (<Little Tur¬ tle,® near Fort St. Clair. He was a member of the constitutional convention which made Ken¬ tucky a State, 1 June 1792; was State Repre¬ sentative and Speaker, register of the United States Land Office, and 1805-06 United States Senator. He was volunteer aide to General Shelby at the battle of the Thames, 5 Oct. 1813 ; made brigadier-general of State militia No¬ vember 1814, and as such commanded the State troops at New Orleans under Jackson, 8 Jan. 1815. He was governor of Kentucky 1820-24, and United States Representative 1831-33, on the committee on military affairs.

ADAIR, Robin. See Robin Adair.

ADALBERT, or ALDEBERT, a native of France, who preached the gospel in 744 on the banks of the Main. He is remarkable as the first opponent to the introduction of the rites and ordinances of the Western Church into Germany. He rejected the cult of the Saints and

Confession, but distributed his own hair as sacred relics to his followers; was ac¬ cused of heresy by Boniface the apostle of Germany, and condemned by two councils, at Soissons in 744 and at Rome in 745. Finally escaping from prison, he is said to have been murdered by some peasants on the banks of the Fulda.

ADALBERT, SAINT, OF PRAGUE,

the apostle of Prussia proper: b. 939; d. 23 April 997. He was the son of a Bohemian noble¬ man, and his real name was Voitech (((host — comfort®) ; was educated in the cathedral of Magdeburg, and appointed the second bishop of Prague in 983. He labored in vain to convert the Bohemians from paganism, and to introduce among them ordinances of the Church of Rome. Discouraged by the fruitlessness of his pious zeal, he left Prague (988) and lived in convents at Monte Casino and Rome until the Bohemians in 993 recalled him ; but after two years he again left them, disgusted with their barbarous manners. He returned to Rome, and soon fol¬ lowed the Emperor Otho III to Germany; on which journey he baptized, at Grau, St. Stephen, afterward king of Hungary. He proceeded to Gnesen to meet Boleslas, Duke of Poland. Be¬ ing informed that the Bohemians did not wish to see him again, he resolved to convert the pagans of Prussia, but was murdered by a peasant near what is now Fischhausen. His body was brought by Boleslas for its weight in gold, and became famous for its miraculous power. Its influence was greater than that of

the saint himself ; the Bohemians, who had re¬ fused to receive the ordinances of the Church, now suffered them to be introduced into Prague, on the sole condition that these miraculous relic? should be transferred to their city. They were rediscovered in a vault in 1880 and deposited in the cathedral. Consult <Life) by Heger, (Konigsberg 1897) ; Voigt (Berlin 1898).

ADALBERT, «THE GREAT,® arch¬ bishop of Bremen and Hamburg: b. about 1000; d. 17 March 1072; descendant of a Saxon princely house. He received his office in 1043 from the Emperor Henry III whose relation, friend and follower he was. He accompanied Henry to Rome in 1046 and was a distinguished candidate for the papal chair. Pope Leo IX made him his legate in the north of Europe (1050). He superintended the churches of Denmark, Nor¬ way and Sweden, converted the Wends, and as¬ pired to a great northern patriarchate to vie with the Roman Curia. During the minority of Henry IV he usurped, in consort with Hanno, archbishop of Cologne, the guardianship of the young prince and the administration of the em¬ pire, and gained an ascendency over his rival by indulging the

passions of his pupil. After Henry had become of age Adalbert exercised the government without control in his name. His pride and arbitrary administration induced the German princes in 1066 to remove him by force from the court; but after a short contest with the Saxon nobles, who laid waste his terri¬ tory, he recovered his former power in 1069, and held it till his death in Goslar in 1072. His in¬ justice and tyranny were instrumental in pro¬ ducing the confusion and calamities in which the reign of Henry IV was involved.

AD ALIA, a-da'lea, Turkey in Asia, a sea¬ port on the south coast, in the vilayet of Konieh, finely situated on the Gulf of Adalia, from which the houses rise in terraces like an amphi¬ theatre, on a rocky hill and surrounded by fig, orange and mulberry gardens. It lies in a fer¬ tile but hot and unhealthy locality, producing grain, figs, oranges, wine, etc. It has a small but good port, and carries on a considerable trade, exporting grain, timber, cattle, volonia, etc. It was anciently called Attalia, later Satalia. Pop. about 30,000, 7,000 Greeks.

ADAM (<(one made®) and EVE (((living being,® feminine). As the Old Testament al¬ most invariably uses the article before <(adam® (((the adam® = ((the made one® or ((the man®), its use as a personal name is a mere misappre¬ hension, and the implications drawn from it are no part of the text ; nor is there any reason to suppose it was so intended by the writers who used it, or so understood by the Jews. This, however, is a minor point, as the narratives of the creation and fall, etc., have the same bear¬ ing whether the first created beings had names or not ; they remain themselves no less. But those narratives were certainly not understood by their compilers themselves, who merely took them from Babylonian sources (See Creation), as implying literal history — which their dis¬ cordance should render obvious — and the diffi¬ culties involved in it result from being more Biblical than the Bible, as the Yahvistic portions of the later chapters disregard them, and the Yahvish adds to them at will. The accounts

in Genesis are three: (1) The Elohistic (q.v.), in which <(male and female® are created at the same time; that is, the whole race, just as the whole animal race is created at a stroke. The interpretation as (<one couple® is thrown back from the second account. (2) The Yahvistic, in which ((the adam® is made from the dust, and ((the eve® from the adam; and which contains the theological part of the

story — the location in the Garden of Eden, the prohibition of God and its disregard, the expulsion, the birth of Cain and Abel, and the first murder. (3) The genealogical list in chapter v, where the race is derived through Seth, and Cain and Abel are unknown ; and where the first generations of men are demigods with enormous spans of life. The last is not only later than the other two, and corresponding to Greek, Assyrian, etc., pedi¬ grees carrying the race or its first families back to the gods, but it is entirely unconnected with the first two, which have a certain relation as efforts of early man to account for the origin and propagation of life on the earth, which every race has undertaken as soon as it attained self- consciousness. The first, however, is that pure and simple, with no ulterior purpose. The sec¬ ond is quite other, combining the creation story of a single couple, the progenitors of the human race — as with the Greek Deucalion and Pyrrha, etc. — with a deeply moralized account of the origin of moral evil, and the rapine and violence, pain and disease and hardship, which it brought into a world previously free from them. It is this, reflecting the predominant religious tone of the Jewish mind, that has formed the basis first of the Jewish and then of its successor the Christian theology : Adam as the reason for and spring of human sin. This resulted in Paul's conception of two Adams : the fleshly one, whence come sin and death ; and the spiritual one, whence springs salvation.

Most of the later Jews regarded the story as an allegory. Philo, the foremost writer of the Alexandrian school, explains Eve as the sensuous part, Adam as the rational part, of human nature. The serpent attacks the sensuous element, which yields to the temptation of pleas¬ ure and next enslaves the reason. Clement and Origen adapted this interpretation somewhat awkwardly to Christian theology. Augustine ex¬ plained the' story as history, but admitted a spiritual meaning superinduced upon the literal ; and his explanation was adopted by the re¬ formers, and indeed generally by the orthodox within the Catholic and the various Protestant Churches alike. More modern critics, loath to abandon it wholly as legend, have sought to separate a kernel of history from the poetical accretions, and attribute the real value of the story not to its form, but to the underlying thoughts. Martensen describes it as a combina¬ tion of history and sacred symbolism, ((a fig¬ urative presentation of an actual event.® The second narrative may be regarded as embodying the philosophy of the Hebrew mind applied to the everlasting problem of the origin of sin and suffering, a question the solution of which is scarcely nearer us now than it was to the primi¬ tive Hebrews. Hesiod describes man in his primitive state as free from sickness and evil before Prometheus

(q.v.) stole fire from heaven, and Pandora (who corresponds to Eve) brought miseries to the earth. Prometheus gives man the capability of knowledge; his daring theft is

for man the beginning of a fuller and higher life. ˆEschylus regards Prometheus as the rep¬ resentative of humanity led into misery by his self-will until he submits to the higher will of God. This corresponds with the story of Gene¬ sis, save that in the latter the spiritual features are clearer and more distinct. Consult Jere- mias, (Das Alte Testament im Lichte des alten Orients) (1906) ; Schrader, (Die Keilenschrif- ten und das Alte Testament (1902) ; Wiinsche, (Der Mid-rasch Rabba zu Genesisˆ (1882).

ADAM, Alexander, Scottish classical scholar and author: b. Forres, 24 June 1741; d. Edinburgh, 18 Dec. 1809. In 1768 he became rector of the High School, Edinburgh, and among his pupils were Sir Walter Scott, Lord Brougham and Jeffery. Edinburgh University conferred upon him an honorary LL.D. in 1780. His chief work, (Roman Antiquities, } (1791) passed through several editions and was trans¬ lated into German. He also wrote Principles of Latin and English Grammar } (1772) ; CA Summary of Geography and History > (1794) ; and a (Compendious Dictionary of the Latin Tongue) (1805).

ADAM, Graeme Mercer, Canadian author and editor: b. Scotland 1839; d. 1912. He was trained in Blackwood's publishing house, Edin¬ burgh, and, emigrating, became a publisher in Toronto and New York. He later edited several Canadian periodicals, assisted Goldwin Smith on the Bystander, and founded with him the Canadian Monthly (1872). In 1879 he founded the Canadian Educational Monthly. In 1896 he became editor of Self-Culture. He wrote (An Outline History of Canadian Liter- ature) (1886) ; (The Canadian Northwest *(1895) ; and with Ethelwyn Wetherald, the his¬ torical novel (An Algonquin Maiden* ; etc.

ADAM, Juliette, ad-an, zhii-le-et (Mme. Adam, nee Lamber), Parisian journalist and author: b. Verberie, Oise, 4 Oct. 1836. She founded in 1879 the Nouvelle Revue, the organ of the Extreme Republicans, and edited it till her retirement in 1897 ; and her salon was a noted influence in Paris. Her second husband, Edmond Adam (later life senator, d. 1877), was prefect of police in Paris during the Prussian siege, and her first book was (Le siege de Paris, journal d'une Parisienne) (1873). She has written largely (often under the pseudonyms Juliette Lamber and Comte Paul Vasili) on women's rights and various literary and social subjects; novels assailing Christianity for its crucifixion of natural instincts ; (The Hungari¬ an

Fatherland) (1884) ; (General Skobeleff* (1886) ; (Apres l'abandon de la revanche) (1910) ; Umpressions frangaises en Russie)

(1912).

ADAM, ad'am, Lambert Sigisbert, <(Ad- am l'aine — the elder,® French sculptor: b. Nancy 1700; d. Paris 1759. The son of a pro¬ vincial sculptor, he won the Prix de Rome in 1723. His masterpiece, <(The Triumph of Nep¬ tune Stilling the Waves,® is at Versailles. His brother Adam Nicolas Sebastien, f(Adam le jeune — the younger®: b. 1705; d. 1778; also achieved fame as a sculptor. His chief work is the mausoleum of the Queen of Poland, Catherine Opalinska, wife of King Stanislaus, at Nancy. Another brother, Adam, Francois Gaspard Balthasar: b. 1710; d. 1761; was

court sculptor to Frederick the Great at Ber¬ lin, and his works embellish the palaces and gardens of Potsdam and Sans Souci. Consult Lady Dilke, (French Architects and Sculptors of the Nineteenth Century) (London 1900).

ADAM, ad-an, Paul, French author: b. Paris, 7 Dec. 1862 ; d. there, 2 Jan. 1920. His first book, 'Chair molleP a realistic novel, for which he was prosecuted and acquitted, ap¬ peared in 1885. His succeeding works, chiefly of the symbolist school, include (Robes rouges- *(1891) ; 'Le mystere des foules-* (2 vols., 1895), a study of the Boulangist period; (La bataille d'Uhde) (1897) ; (Letters de Malaise) (1897); and four historical novels, (La force) (1898); 'L'enfant d'Austerlitz) (1902); (La ruse) (1903) ; (Au soleil de Juillet > (1903). Other works are 'Basile et Sophia, * a Byzan¬ tine romance (1900) ; 'La ville inconnue)

(1911) ; and a problem novel, (Stephanie) (1913). •

ADAM, Book of, works dealing with Adam and Eve and the story of the Creation. One of the earliest of these, supposed to have been called (The Life of Adam and Eve, *and of Hebrew origin, was published in Greek by Tischendorf in (Apocalypses Apocryphae* (1866) under the misleading title of (Apoca¬ lypses of Moses, *because in the introduction the story is said to be recorded to Moses and later by Ceriani, in his (Monumenta sacra et profana> (1868). Conybeare, in the Jewish Quarterly Review (1895), has presented an English version of this work, translated from an Armenian text. An old Slavic version has been published with a Latin translation by Jagic in 'Denkschriften der Wiener Akademie*

der Wissenshaften) (1893). There is also a Latin 'Vita Adae et Evae, of which the best text is that published by Meyer in 'Abhand- lungen der Bayerischen Akademie der Wissen- shaften) (1878). This work relates the story of the Creation, the Fall, the penitence of Adam and Eve, their restoration to divine favor and their death and burial. Apparently it dates from the 1st century before Christ and was written either in Hebrew or Aramaic. The 'Conflict of Adam and Eve) is obviously of Christian origin. An Ethiopic version, translated from the Arabic, has been pre¬ served. The Ethiopic text has been published by Trumpp in ' Abhandlungen der Miinchener Akademie der Wissenshaften) (1881). Transla¬ tions were published by Dillman : 'Das Christ- liche Adamsbuch des Orients *(1853); Migne's 'Dictionnaire des apocryphes) (1856); Malan's 'Book of Adam and Eve* (1882). There is manuscript copy of the Arabic text in Munich. An earlier version of this work is 'The Treas¬ ure Cave, *published by Sachau, first in Ger¬ man, 'Die Schatzhohle* (1883), then in Syriac (1888). The Arabic text was published by Mrs. Gibson in (Studia Sinaitica) (1901). An¬ other work of Christian origin is in Syriac, (The Testament of Adam, *published by Renan, with a French translation, in Journal Asiatique (1853). Of this work Bezold pub¬ lished Arabic and Ethiopic versions in 'Orientalistische Studien Noldeke gewidmet* (1906 p. 893). Renan proved conclusively that the original version had been written in Greek. Consult Fuchs, in Hennecke's 'Neutestament- liche Apokryphen) (1904); Ginzburg, in the 'Jewish Encyclopaedia,* under the title ((Adam,

Book of**; Schurer, 'Geschichle des jiidischen Volkes* (1901, p. 396).

ADAM BEDE, the first long novel of George Eliot (Mary Ann Evans), was pub¬ lished in 1859. The .action takes place in the English village of Hayslope, where the hero, Adam, a simple workman of sterling worth, pursues his trade of carpentry. Very different from Adam is his brother, Seth, a gentle and loving spirit, whose religious emotions have been strongly engaged by Alethodist revival of the time. Seth is devotedly in love with the leading exponent of the sect in the Hayslope community, Dinah Morris, but she, consecrated to her work of evangelical preaching, refuses to think of him except with sisterly and re¬ ligious affection. Adam loves Hetty Sorrel, a beautiful but vain and shallow country girl, who encourages him but secretly hopes to make a much loftier marriage. When young Arthur Donnithorne, son of the village squire, falls in love with her, both her passion and her am¬ bition are stirred. Arthur, who is kind-hearted but weak-willed, tries to resist his infatuation, but finally yields to it. When Adam discovers them together there is a stormy scene between the two men, and Arthur agrees to tell Hetty that he can never marry her.

Hetty, in her loneliness after Arthur's departure, becomes engaged to Adam, not knowing that she is to be a mother. When at last she realizes her condition she goes to Windsor in search of Arthur. Finding, after a painful journey, that he has gone to Ireland, she wanders miserably to seek Dinah. The scene now changes to Hay¬ slope, where the girl's long absence has aroused anxiety, and the reader learns, with Adam, that she is in prison, . charged with the murder of her child. She is condemned to death, but at the last moment, when, supported by Dinah, she is going to the gallows, her sentence is commuted to transportation, the release from death being brought by Arthur Donnithorne. The subject of Hetty's sin is handled with peculiar delicacy, and her wretched journey is one of the most poignant incidents of fiction. The story ends with the marriage of Adam and Dinah, who have been unconsciously drawn together from the first.

The characters in the story, simple country people as they are, working on the farm or in the shop, are portrayed with unusual distinct¬ ness, and their appeal is direct and powerful. The analysis of Hetty's character is particu¬ larly keen. In the midst of pity for her fate the reader is never allowed to forget the girls' shallowness and selfishness. Finely contrasted with Hetty is Dinah Morris, in her purity and selflessness. But the dominant figure is Adam Bede himself, level-headed and iron-willed, morally uncompromising, finding his best re¬ ligion in work well done. The theme of the inevitable consequences of wrong-doing, which is ever present in George Eliot's novels, is strongly emphasized, and the story as a whole is not to be forgotten.

Bibliography — "George Eliot as Author,® by R. H. Hutton, in 'Some Modern Guides of English Thought * ; "Essays on George Eliot,® by E. Dowden, in (Studies in Literature, * and by W. C. Brownell, in 'Victorian Prose Masters.*

James H. Hanford,

Associate-Professor of English, University of North Carolina.

ADAM FAMILY, British architects, a cele¬ brated 18th-century family consisting of Wil¬ liam and his four sons, William, Robert, James and John: of whom Robert ranks first and James next. The father was born in Fifeshire, Scotland, and his work was done in his native country :

the town hall at Dundee, the library and university at Glasgow, and many other public and private buildings there and in Edin¬ burgh, etc. Robert was born in Edinburgh, studied in Italy, and examined the noble re¬ mains of Dalmatia before settling in London; his work on Diocletian's palace at Spalato was a valuable advertisement to his talents and taste, and all the brothers increased their re¬ pute by publishing engravings of their plans. Under Robert's direction they constructed a great number of buildings in London, — the Adelphi Terrace and the streets around com¬ memorate them specifically. He also did much to remodel the appearance of the city. Robert also built Lansdowne House, Kedleston Hall near Derby and Register House near Edin¬ burgh. A special feature of the brothers' work was their careful attention to harmonious in¬ terior arrangement and decoration.

ADAM DE LA HALE, or HALLE,

ad-aii duh la al, French poet and composer: b. Arras about 1235; d. Naples about 1287; nick¬ named the Hunchback of Arras, although he was not deformed. His satirical extravaganza, <The Play of Adam, or the Play in the Arbor) (1262), constitutes the earliest corned}' in the vulgar tongue; while the pastoral drama, (The Play of Robin and of Marion, y may be looked upon as the earliest specimen of comic opera.

ADAM HOMO, a poem by Frederik Palu- dan-Muller, and his most important work, ap¬ peared during the years 1841-48. It is of par¬ ticular significance in Danish literature, as it marks the end of Romanticism in Denmark. In Oehlenschlaeger's which introduces the period of Romanticism, imagination is given full play; in (Adam Homo) cool reason prevails. Oehlenschlaeger points to Aladdin, the favorite of fortune ; Paludan-Miiller shows us Adam Homo, man as he really is. (The name of the poem suggests that the hero represents the average man, as we find him in every-day life. Human life as it is, contrasted with the ideal, is the theme of the book). For (Adam Homo' is realistic, and presents modern life with all its ugliness and wickedness. With shocking truthfulness the author shows how one may lose sight of ideals and squander a spiritual heritage. Adam is the son of a min¬ ister in Jutland, who over-emphasizes the ma¬ terial things of this world. His mother, a spiritual woman, tries to interest her boy in the higher life. While Adam studies' at Copen¬ hagen, his nobler impulses are kept alive by the loving letters of his mother and by his asso¬ ciation with a pure-minded young woman. Un¬ fortunately Adam succumbs to the temptations of new conditions, and almost without being aware of the fact he gradually loses sight of his ideals, and makes material gain and social recognition the goal of his

efforts. Though he becomes a man of distinction in society, he leads a sordid life, for his enthusiasm for truth, beauty and goodness is gone. Consult V. An¬ dersen, <Paludan-Muller) ; Georg Brandes, (Aesthetiske StudicU (pp. 191-222) ; Georg Brandes, (Danske Digtere) (pp. 251-313) ; P.

Hansen, Hllustreret Dansk Litteratur His- torie) (pp. 295-303) ; Karl Mortensen, cLitter- atur Historie> (pp. 248-261) ; Torvald Strom, (Dansk Literaturhistorie) (pp. 286-291).

Joseph Alexis,

Professor of Germanic Languages and Litera¬ tures, University of Nebraska.

ADAM OF BREMEN, German historian : b. probably in Meissen, Saxony; d. 12 October of an unknown year, probably 1076. He lived at Magdeburg, removed to Bremen in 1067, was made canon of its cathedral and next year prin¬ cipal of the cathedral school. His fame rests on his (History of the Church of Hamburg) (1072-76), an inestimable mediaeval classic, for which he gathered material far and wide ; mak¬ ing a special trip to Denmark to interview King Svend Estridson, whose communications he gives. As an appendix to his last book he gives an account of the Danish, Swedish and Norwegian possessions, containing a passage of the first interest to Americans, as verifying the Saga stories of Vinland : (<He [SvendJ told of still another island found by many in that [At¬ lantic] ocean. It is called Wineland, because grapes grow there spontaneously. ... I have learned through definite information from Danes that unsown crops also grow there in abundance.®

ADAM OF ST. VICTOR, famous mediae¬ val hymnologist : d. in Paris c. 1192; nothing is known of him save his great hymns, the most numerous of any mediaeval writer, and among the foremost in rank. A few have been finely translated by J. M. Neale; a complete (so far as known) edition from the French of Leon Gautier * was published in London (3 vols., (1881). Consult- Duffield, (Latin Hymns) (1888); French, (Sacred Latin Poetry) (1874) ; Julian, dictionary of Hymnology)

(1888).

ADAMANT, a word loosely used to signify a substance of extreme hardness. It is probably derived from the Greek adamas, (<unconquer- able.® Very possibly the name adamant was at one

time applied to a definite substance ; but it has been used to signify corundum, various gems, a hard metal (probably steel) that was used in making armor, the lodestone and va¬ rious other substances. It is now chiefly used in a poetical or rhetorical sense.

ADAMANTINE SPAR, a name some¬ times applied to corundum (q.v.) on account of its hardness ; especially to the dark colored, non-transparent varieties which are used in pulverized form for polishing gems.

ADAMANTOID, a crystalline form be¬ longing to the isometric system, and bounded by 48 similar scalene triangles. It has 6 octa¬ hedral solid angles, at the extremities of the principal axes ; 8 hexahedral solid angles, at the extremities of the trigonal axes ; and 12 tetra¬ hedral solid angles, at the extremities of the digonal axes. Its name is due to the fact that the diamond usually occurs in this crystalline form. (Also, and more commonly, called hex- octahedron).

ADAMAWA, a'da-mii'wa (formerly Fum- iuna), an internally autonomous sultanate of central Africa, between lat. 6° and 11° N., and long. 11° and 17° E. : part of the Sokoto empire in northern Nigeria ; area some 50,000 square

miles. Much of the surface is mountainous, the mountains rising to about 8,000 feet. The prin¬ cipal rivers are the Benue and its tributary the Faro. The eastern part belongs to the district of Kamerun; the western to British North Ni¬ geria. A great part of the country is covered with thick forests, though there are also exten¬ sive and splendid pasture lands and cultivated fields. The native inhabitants are industrious and intelligent, but they have been in a great measure subdued by the Mohammedan Fulahs, who possess innumerable slaves. Slaves and ivory are the chief articles of trade. Pop. about 3,000,000. Chief towns, Yolo the capital, est. 12,000 to 20,000; Banjo, chief ivory mart; and Nganudere.

ADAMI, Friedrich Wilhelm, a-da'me, fred'riH, German author: b. Suhl, 18 Oct. 1816; d. Berlin, 5 Aug. 1893. He wrote stories, plays, etc., a very popular biography of Queen Louise, (The Book of Emperor William5 (1887-90) ; ‘Ein erlicher Mann5 (1850) ; (Der Doppel gauger5 (1870), and contributed regularly to the Kreutzzeitung. His literary style was much admired.

ADAMI, John George, Canadian patholo¬ gist : b. Manchester, England, 1862 ; educated at Owens College there and Christ's College, Cambridge. He studied at Breslau and Paris ; became demonstrator of pathology at Cam¬ bridge in 1887, and fellow of Jesus College in 1891. In 1892 he came to Montreal as profes¬ sor of pathology at McGill University; from 1894 has been head of the pathological depart¬ ment at the Royal Victoria Hospital there ; from 1896 lecturer to the New York Patho¬ logical Society. He has published papers on pathological topics, and is the author of 'The Principles of Pathology5 (1908) ; 'Inflamma¬ tion: Introduction to the Studv of Pathology5

(1910).

ADAMITE (named for M. Adam, a French mineralogist), a mineral, isomorphous with olivenite, and occurring in small orthorhombic crystals that are often grouped in fine granular aggregations. It is an arsenate of zinc, having the formula Zn3As20s.Zn(0H)2, although cop¬ per and cobalt may also be present. Its hard¬ ness is 3.5, and its sp. gr. 4.35. Its color is variable. It occurs at Cap Garonne, near Hyeres, France; and also at Laurium, Greece, and in certain parts of Chile.

ADAMITES. (1) A Christian sect said to have existed in the 2d century : so called be¬ cause both men and women appeared naked in their assemblies, either to imitate Adam in the state of innocence or to prove the control which they possessed over their passions. The tra¬ dition is probably baseless, originating in a name of derision given to the Carpocratians. (See Gnostics). (2) Also called Picards, from the founder of their sect, Picard (per¬ haps also Beghards). He called himself Adam the Son of God, and advocated community of women. They appeared about the year 1421 on an island in the River Lusinicz, where Zisca surprised them, but was not able to destroy the whole sect. In the following year they were widely spread over Bohemia and Moravia, and especially hated by the Hussites (whom they resembled in hatred toward the hierarchy) be¬ cause they rejected transubstantiation, the priesthood and the Supper. They subsequently

formed one sect with the remaining Taborites, who have accordingly been confounded with them. In 1849 a similar sect sprang up in Austria.

ADAMNAN, Saint (der. of Adam), Irish ecclesiastic and author: b. in Donegal, c. 625; d. 703 or 704. He was descended from a cousin of St. Columba and from powerful Irish chieftains. Entering the monastery of Iona, he became abbot in 697 ; but was involved in quar¬ rels with

his monks over Easter and the ton- sure (enforcing the orthodox Roman view against the Irish Church view), which hastened his death. He wrote a most valuable life of St. Columba (q.v.), the founder of Iona, full of historical information about the early Irish- Scotch Church (best edition Reeves', 1857 ; English translation in the 'Historians of Scot¬ land,5 1874, reissued Oxford 1895) ; and a hear¬ say but valuable report of matters in Palestine in his time, the first we have of that land in the early Middle Ages.

ADAMS, Abigail Smith, wife of President John Adams: b. Weymouth, Mass., 23 Nov. 1744; d. 28 Oct. 1818. She was daughter of a Weymouth clergyman, who opposed the match and took for a text "My daughter is grievously tormented with a devil.55 Though lacking strength and regular school education, she became a self-made force of high order in public affairs and one of the best of early American writers; her letters to her husband, collected and published, are not only of great historical and social value, but full of delight¬ ful genial humor and acute comment and judg¬ ment. Her husband's position kept them apart for years; but she joined him in France in 1784, went with him to his life of torment in London, and lived in Washington 1789-1801; thence till death at Braintree, now Quincy.

ADAMS, Alvin, founder of Adams Express Co.: b. Andover, Vt., 16 June 1804; d. 2 Sept. 1877. On 4 May 1840 he started an express business between Boston and New York which developed into the great company above named, formed in 1854 by the consolidation of several rival firms, — including Hamden's, the initiator of the express business, — with Mr. Adams as president. In 1850 he helped to organize the pioneer express service through the California mining camps, which on the consolidation above he sold out. In the Civil War the Adams Ex¬ press Company was of immense help to the government; in 1870 it extended its business to the far West.

ADAMS, Arthur H., Australasian jourtial- Et, novelist and poet: b. Lawrence, New Zea¬ land. 6 June 1872. He was graduated- from Otago University, New Zealand, studied law and became private secretary and literary ad¬ visor to C. J. Williams, the noted Australian theatrical manager. Later he went to China as war correspondent for Australian newspapers during the Boxer trouble ; and he was in Eng¬ land from 1902 to 1905. Among his published works are: 'Maoriland and other Verses5 (1899) ; 'The Nazarene5 (London 1902) ; 'Lon¬ don Streets5 (poems, 1907) ; Tussock Land5 (a novel) ; and stories, poems and articles in nu¬ merous periodicals, magazines and newspapers. In 1906 he became an editor on the Sidney Bul¬ letin.

ADAMS, Benjamin Matthias, American clergyman : b. Stamford, Conn., 1824 ; d. Bethel, Conn., 27 Dec. 1902. He was the son of Gen¬ eral Adams and his mother was a daughter of the noted Rev. John J. Matthias. He was edu¬ cated in a private school in which William Miner, afterward governor of Connecticut, taught. After considerable mental struggle he entered the ministry of the Methodist Episcopal Church and joined the New York Conference in 1848, in which he labored for 17 years. He was then transferred to the New York East Conference. He was a close observer of the habits of birds and nature and lectured on ((Fun in Animals.® He was a member of the general conference of 1884. He was a personal friend of the Warner sisters. A letter which he wrote to Anna Warner contained a passage which led her to compose the widely known hymn, <(One more day's work for Jesus.® His ministry, spent in and around New York and Brooklyn, was noteworthy. *

ADAMS, Brooks, American writer on soci¬ ological themes: b. Quincy, Mass., 24 June 1848. He is a son of Charles Francis Adams (1st), was graduated from Harvard University in 1870 and followed the law for the succeeding year. He is a member of the Massachusetts Historical Society, the Institute of Arts and Letters, etc. In 1900 he published (The Law of Civilization and Decay,) which has been is¬ sued also in French and German, and among his other works are included (The New Em¬ pire' (translated into German and Russian) ;

(Centralization and the Law' (1906) ; (The Theory of Social Revolutions' (1913) ;

(Charles Francis Adams; an American States¬ man,' the last named work being a contribu¬ tion to the proceedings of the Massachusetts Historical Society for December 1911. His literary fame depends chiefly upon (The Emancipation of Massachusetts' (1887), a work intended as a philosophic exposition of a theory of social development.

ADAMS, Charles Francis, American states¬ man, son of President John Quincy Adams: b. in Boston, 18 Aug. 1807 ; d. there 21 Nov. 1886. At the age of two he was taken by his father to Saint Petersburg; in 1815 went with his mother thence to Paris ; the same year his father was made minister to England, and he was placed in an English boarding-school. In 1817 both returned to America; he was placed in the Boston

Latin School, and in 1825 he was graduated at Harvard. His father had just been inaugurated President, and he spent two years in Washington ; then returned to Boston, studied law with Daniel Webster and was called to the bar in 1828, but never practised — engaging in literature and political writing in magazines and pamphlets, and editing John and Abigail Adams' letters (1840-41). He was Representative in the legislature 1841-44, State Senator 1844-46, as a Whig; heading the (<Con- science Whig" wing, he edited the Boston Whig, 1846-48, was chairman of the Free-Soil Convention at Buffalo in 1848, and was nom¬ inated for Vice-President on the ticket with Martin Van Buren. In 1850-56 he edited John Adams' (Works' in 10 volumes. He joined the Republican party on its organization in 1855, and in 1858 was sent to Congress, . and re-elected . in 1860. In 1861 Lincoln sent him to England as minister, as his father and grandfather had

been before him. But even their problems were trivial beside his, when the very existence of the Union perhaps depended on how far the English upper classes could drag the govern¬ ment in evasion of international obligations and covert help to the South. The seizure of Mason and Slidell on the Trent nearly precipi¬ tated war ; the fitting out of cruisers to destroy United States commerce was put a stop to only after the escape of the Alabama (q.v.) in the face of Mr. Adams' representations, and his declaration to Earl Russell, then foreign secre¬ tary, that permitting the Laird rams also to leave Birkenhead was ((war." Napoleon Ill's persistent efforts to seduce the English govern¬ ment into a joint intervention in favor of the% Confederacy had to be checkmated; and the rancorous hostility of one section and the cold¬ ness of the remainder of the best society made it a lonely and trying place, which for seven years he filled with a dignified resolution of im¬ measurable importance to his country. Re¬ turning to America in 1868, he was elected president of Harvard the next year, but de¬ clined; for several years, however, he was pres¬ ident of its board of overseers. In 1871 he was the United States representative on the board of arbitrators at Geneva to settle the Alabama Claims (q.v.) ; in 1872 he nearly ob¬ tained the nomination as Democratic-Indepen¬ dent candidate for the presidency, which Horace Greeley secured. In 1874-77 he edited the (Memoirs of John Quincy Adams' in 12 volumes.

ADAMS, Charles Francis (2d), American publicist, son of above : b. Boston, 27 May 1835 ; d. Washington, D. C., 20 March 1915. He was graduated at Harvard in 1856, and served as a cavalry officer through the Civil War, rising from first lieutenant to colonel, and being brevetted brigadier-general at its close. Shortly becoming noted for

ability in discussion of eco¬ nomic, political and speial questions, he was appointed railroad commissioner of Massachu¬ setts in 1869; wrote (Chapters of Erie' (1871) in collaboration with his brother Henry, a se¬ ries of papers on railroad accidents and on (The State and the Railroads' (1875-76) for the Atlantic Monthly ; (Railroads, their Origin and Problems' (1878) ; (Notes on Railway Ac¬ cidents' (1879), etc.; and 1884—90 was presi¬ dent of the Union Pacific Railroad Company. In 1892 he published (Three Episodes of Massachusetts History,' on the settlement of Boston Bay, the Antinomian controversy and early town and church government, and in 1893 Massachusetts; Its Historians and Its His¬ tory.' In 1895 he was chosen president of the Massachusetts Historical Society, and in 1901 president of the American Historical Associa¬ tion. He also published lives of Richard Henry Dana (1891) and of his father (1900, American Statesmen Series), (Lee at Appo¬ mattox,' etc. (1902), and much miscellaneous work. As chairman of the State Park Com¬ mission, 1893-95, he contributed materially to¬ ward planning out and establishing the great Metropolitan Park System of Massachusetts.

ADAMS, Charles Kendall, American histo¬ rian and educator: b. Derby, Vt., 24 Jan. 1835; d. 26 July 1902. He removed to Iowa in 1855; was graduated at the University of Michigan in 1861 ; became assistant professor there 1863-67, and professor of history 1867-85. He studied

abroad 1867-68; in 1869-70 introduced the Ger¬ man seminary method into the United States by establishing the Historical Seminary in the University of Michigan; and was made dean of its School of Political Science when estab¬ lished. In 1885 he succeeded Andrew D. White as president of Cornell ; resigned 1892, and till 1902 was president of the University of Wis¬ consin. He was chief editor of (Johnson's Uni¬ versal Cyclopaedia,1 1892-95. His most valued work is a (Manual of Historical Literature) (1882) ; he wrote also (Democracy and Mon¬ archy in France) (1872) ; (Christopher Colum-bus) (1892) ; compiled (British Orations1 (1884) ; and wrote much magazine and review matter.

ADAMS, Ephraim Douglass, American educator : b. Decorah, Iowa, 18 Dec. 1865. After graduating from the University of Michigan he took a post-graduate course in the same institu¬ tion, receiving his degree of Ph.D. in 1890. He was immediately appointed special agent in charge

of street railways, for the 11th census. In 1891 he became assistant professor of his¬ tory and sociology at the University of Kansas and in 1899 he was promoted to the chair of European history. In 1902 he was appointed associate professor of history in Leland Stan¬ ford University, becoming full professor four years later. His books are : 'The Control of the Purse of the United States Government1 (1894) ; 'The Influence of Grenville on Pitt's Foreign Policy1 (1904) ; (British Interests and Activities in Texas) (Albert Shaw Lectures, Johns Hopkins University 1910) ; 'Power of Ideals in American History) (Dodge Lectures on Citizenship, Yale University, 1913).

ADAMS, Frank Dawson, geologist: b. Montreal, Canada, 17 Sept. 1859; he was gradu¬ ated at McGill University in 1878; took ad¬ vanced courses at Sheffield Scientific School (Yale), and at Heidelberg, applying himself particularly to lithology and physical geology; in 1889 became lecturer on geology at McGill, in 1893 succeeded Sir William Dawson as Logan professor of geology there; and in 1908 was appointed dean of the faculty of applied science.

ADAMS, Franklin Pierce, American humorist: b. Chicago, 15 Nov. 1881. He was educated at the Armour Institute and the Uni- •versity of Michigan. On graduating, in 1903, he entered newspaper wrork, which he followed for two years, on the Chicago Journal, after which he went to New York and became a member of the staff of the Evening Mail. For this paper he wrote a daily column under the caption (<Always in Good Humor.® His ((Diary of our own Samuel Pepys11 was another daily contribution which attracted popular attention. Besides his prose he has written much humor¬ ous verse. His works in book form are 'Tobogganing on Parnassus) (1911) ; 'In Other Words1 (1912). Collaborated with O. Flenry in writing <Lo) (musical comedy, 1909).

ADAMS, Frederick Upham, American author and inventor: b. Boston, Mass., 10 Dec. 1859. While still a child his parents removed to Elgin, Ill., where he attended the public schools. From 1882 until 1890 he was engaged in the profession of mechanical engineering, and it was during this period that he invented an electric lamppost, which has since been univer¬

sally adopted, and an electric light tower, In 1894 he was appointed chief smoke inspector for Chicago, which position he held for three years. In 1900 he constructed an experimental passenger train for the Baltimore & Ohio Railroad which broke all previous speed records, He was the founder of a periodical entitled The New Time, dealing with social problems and which he edited from 1896 until 1898. Be¬ sides

his works on technical subjects, he has also written several novels. The most import¬ ant of these publications are: ‘Atmospheric Resistance and Its Relation to the Speed of Railway Trains1 (1893) ; ‘President John Smith1 (1896) ; ‘The Kidnapped Millionaires) (1901); ‘John Burt) (1903); ‘How Cities are Governed in Great Britain1 (1904); ‘John Henry Smith1 (1905); ‘The Bottom of the Well1 (1905); ‘The Revolt1 (1907); ‘The Vegetarians1 (a comedy, 1911) ; ‘Ramley1 (a drama, 1911).

ADAMS, George Burton, American histor¬ ical writer: b. Fairfield, Vt., 3 June 1851. He became professor of history at Yale University and beside editing various historical works is the author of ‘Civilization During the Middle Ages,1 ‘The Growth of the French Nation,1 ‘European History,1 Vol. II in Hunt and Poole’s ‘Political History of England,1 ‘The Origin of the Constitution.1

ADAMS, Henry, American historian, son of Charles Francis: b. Boston, 16 Feb. 1838; d. 28 March 1918. He was private secretary to his father during the latter’s English ministry, and assistant professor of history at Harvard 1870— 77, being reputed one of the most stimulating and original instructors as well as brilliant expositors in the country. With several pupils he published in 1876 ‘Essays on Anglo-Saxon Law,1 of which he wrote on ‘Anglo-Saxon Courts of Law.1 In 1871 he collaborated with his brother, Charles Francis, in ‘Chapters of Erie.1 He edited the North American Review, 1875-76. In 1879 he published Albert Gallatin’s writings (3 vols.) ; in 1882 a life of John Ran¬ dolph (American Statesmen Series). But his life-work, and with one exception the foremost historical work of America in matter and style, is his ‘History of the United States from 1801 to 181 71 covering the presidencies of Jefferson and Madison (9 vols.,, 1889-91), in motive it is a defense of his grandfather, John Quincy Adams, for deserting the Federalist party ; in essence, a history of the causes and conduct of the War of 1812. For this task he took up his residence in Washington and spent years ran¬ sacking its archives. He also lived for long periods abroad, examining various European records, and trained himself thoroughly in mili¬ tary and naval science and construction, besides studying historical and economic problems. Besides the works named he is author of ‘Mont Saint Michel and Chartres1 (1904) ; ‘Letter to American Teachers of History1 (1910); Life of George Cabot Lodge1 (1911).

ADAMS, Henry Carter, American econo¬ mist : b : Davenport, Iowa, 31 Dec. 1852. He was graduated from Iowa College; took a post¬ graduate course at Johns Hopkins University, where he became fellow and lecturer. He sub¬ sequently became professor of political econo¬

my in the University of Michigan and later represented the Interstate Commerce Commis-

sion in the standardization of accounting records for the government railways in China. He went to China for that purpose in 1913 and while there assisted in organizing the ministry of communication, statistics and accounts. He returned in March 1916.

ADAMS, Henry Cullen, United States Congressman from Wisconsin: b. Verona, N. Y., 28 Nov. 1850; d. 1906. His parents re¬ moved to Wisconsin while he was still a child. He began life as a farmer, then went into politics and filled various public offices, notably that of dairy and food commissioner, from 1895 to 1902. He was elected to Congress in 1903, where he remained until his death. He was the author of the Adams Act of 1906, under which the State experiment stations receive $720,000 annually for original research in agri¬ culture. He took a prominent part in the Drug and Food Act of 1906 and in the organization of the meat inspection service that followed.

ADAMS, Herbert, American sculptor: b. West Concord, Vt., 28 Jan. 1856. After early studies at the Institute of Technology, Wor¬ cester, Mass., and at the Normal Art School, Boston, he proceeded to Paris, and became a pupil of Antonin Mercier, 1885 to 1890. From 1890-98 he was instructor in the art school of the Pratt Institute, Brooklyn. In 1899 he was elected to the National Academy of Design and in 1906 vice-president. Among his distinctive works are tinted marbles and polychrome busts, notably that of (<St. Agnes,® of ((Primavera® and of ((A Young Lady® in pink marble, in the Metropolitan Museum, New York. His por¬ trait busts of women are remarkably beautiful, among the best examples being that of Miss A. V. Pond (who afterward became his wife), completed in Paris in 1887, and one of Miss Julia Marlowe, the actress. In the Congres¬ sional Library, Washington, are a statue of Professor Charming and two bronze doors, be¬ gun by Olin Warner. A <(Madonna with Angels® in marble, and the Vanderbilt bronze doors are in St. Bartholomew's Church, New York. His other works of importance are the bronze Jon¬ athan Edwards Memorial at Northampton, Mass., bronze statues of Richard Smith, in Philadelphia, and William Ellery Channing, in Boston, and William Cullen Bryant, in New York. Adams' works were exhibited at the Chicago Fair of 1893 and at the Louisiana Purchase Exposition, St. Louis, in 1904, in both of which he received high awards. While mod¬

ern and original, Adams, of all Americans, ap¬ proaches closest to the Early Renaissance, in his refined realism and in his great technical skill in marble cutting. Consult Taft, Lorado, (History of American Sculpture1* (New York

1904).

ADAMS, Herbert Baxter, American his¬ torical student and educator : b. Shutesbury, Mass., 16 April 1850; d. 1901. He was gradu¬ ated at Amherst in 1872 ; took Ph.D. at Heidel¬ berg; and on the opening of Johns Hopkins in 1876 was made fellow in history, 1878 associate in history, 1883 associate professor in history, and in 1891, full professor. In 1901 he resigned on account of ill health, and died shortly after. In 1884 he was a leader in organizing the American Historical Association, and was sec¬ retary till 1900, then becoming first vice-presi¬ dent. He edited the <John Hopkins Studies in

History and Political Science) from the start, also the Contributions to American Educa¬ tional History } published by the United States Bureau of Education. His chief publication is (The Life and Writings of Jared Sparks) (2 vols., 1893). Among his historical monographs are (The College of William and Mary, *(Thomas Jefferson and the University of Vir¬ ginia, > (The Germanic Origin of New England Towns, * and Maryland's Influence in Founding a National Commonwealth.* But his best work was not in writing history, but in training others to write it, and he was a powerful influence in creating the new school of historical research.

ADAMS, John, American statesman, 2d President of the United States : b. Braintree, Mass., of a line of farmers, 19 Oct. 1735; d. 4 July 1826, the year after his son was inau¬ gurated President. Graduated at Harvard, he taught school, and read theology for a Church career; but seeing his unfitness for it studied law and began practice in 1758, soon becoming a leader at the bar and in public life. In 1764 he married his famous wife. All through the germinal years of the Revolution he was one of the foremost patriots, steadily opposing any abandonment or compromise of essential rights ; and in 1766 published essays in the Boston Gazette, reprinted in London 1768, entitled (A Dissertation on Canon and Feudal Law, *really on colonial rights. In 1765 also he was counsel for Boston, with Otis and Gridley, to support the town's memorial against the Stamp Act. In 1766 he was a selectman, or in other words one of the three official rulers of the head of the New England colonies. In 1768 the royal gov¬ ernment offered him the post of advocate- general in the Court of Admiralty, — • in fact a lucrative bribe to desert the opposition ; but he refused it. Yet in 1770, as a matter*

of high professional duty, he took his future in his hands to become counsel (successfully) for the British soldiers on trial for the ((Boston Mas¬ sacre.® Though there was a present uproar of abuse, Mr. Adams was shortly after elected Representative to the General Court by more than three to one. In March 1774 he was con¬ templating writing the (History of the Contest between Britain and America. On 17 June he presided over the meeting at Faneuil Hall to consider the Boston Port Bill, and at the same hour was elected delegate to the first Congress at Philadelphia (1 September), by the Provin¬ cial Assembly held in defiance of the govern¬ ment. Returning home, he was made a member of the Provincial Congress, already organizing resistance to England. Just after Lexington he again journeyed to Philadelphia to the Congress of May 1775; where he did on his own motion, to the disgust of his associates and the reluc¬ tance even of the Southerners, one of the most important and decisive acts of the Revolution, — induced Congress to adopt the forces already gathered in New England as a national army and put George Washington at its head, thereby engaging the Southern colonies irrevocably in the war and securing the one man who could make it a success. In 1776 he was a chief agent in carrying the Declaration of Independence. He remained in Congress till November 1777, serving on the Committee ©n Foreign Relations and as chairman of the Board of War and Ordnance, very useful and laborious, but making

one dreadful mistake ; he was largely re¬ sponsible for the policy of ignoring the just rights and decent dignity of the military com¬ manders, which lost the country some of its best officers and led ultimately to Arnold's treason. His reasons, exactly contrary to his wont, were sound abstract logic, but thorough practical ineptitude.

In December 1777 he was appointed commis¬ sioner to France to succeed Silas Deane. Dr. Franklin and Arthur Lee were there before him ; and though he reformed a very bad state of affairs, he thought it absurd to keep three envoys at one court and induced Congress to abolish his office, returning in 1779. Chosen a delegate to the Massachusetts Constitutional Convention, he was called away from it to be sent again to France. There he remained as Franklin's colleague, detesting and distrusting him and the foreign minister Vergennes, em¬ broiling himself with both, and earning a cor¬ dial return of his warmest dislike from both, till July 1780. He then went to Holland as volunteer minister, and in 1782 was formally recognized as from an

independent nation. Meantime Vergennes intrigued energetically to have him recalled, and did succeed in tying his hands so that but for his contumacious stub¬ bornness half the advantages of independence would have been lost, as Vergennes was em¬ ployed to gain points for France and not for the United States. In the final negotiations for peace he persisted (against his instructions) in making the New England fisheries an ulti¬ matum, and saved them. The wretched state of American affairs under the Confederation made it impossible to do his country any good abroad, and the vindictive feeling of the English made his life a purgatory, so that he was glad to come home in 1788.

In the first presidential election of that year, he was elected Vice-President on the ticket with Washington; and began a feud with Alexander Hamilton, the mighty leader of the Federalist party and a chief organizer of our executive machine, which is accredited with the premature overthrow of that party, and had momentous personal and literary results as well. As official head of the party he thought himself entitled to its real leadership as well ; Hamilton would not and indeed could not surrender his position, for the lesser men looked to him for counsel and policy, and the rivalry never ended till Hamilton's death. In 1796 he was elected President against Jefferson by three electoral votes, one ˆscratch'' vote each in Pennsylvania, Virginia and North Carolina, a virtual defeat as not likely to recur. His term is recognized as one of the ablest and most useful of our administrations; but its personal memoirs arc most painful and scandalous. The members of the Cabinet — nearly all Hamiltonians — laid official secrets before Hamilton and took advice from him to thwart the President. They dis¬ liked Mr. Adams' overbearing ways and ob¬ trusive vanity, — for modesty or a low sense of personal dignity were no parts of his char¬ acter, — considered his policy destructive to the party and injurious to the country, and felt that loyalty to them involved and justified a dis¬ loyalty to him. Finally his best act brought on an explosion. The French Directory had pro¬ voker! a war with this country, which the Ham¬ iltonian section of the Federalist leaders and

much of the rank and file hailed with delight, thinking it a service to the world to cripple France as then ruled; but when it showed signs of a better spirit, Mr. Adams, without consult¬ ing his Cabinet (who he knew would oppose it nearly or quite unanimously), nominated a com¬ mission to frame a treaty with France. He had the constitutional right to do so ; but a storm of fury broke on him from the Hamiltonian leaders as little better than a traitor. He was renominated for President in 1800, but beaten by Jefferson, owing to the loss of New York despite heavy gain in Pennsylvania. The causes were natural and local, and while machine unity might have gained the upper-class

party one more election it was bound soon to be swamped by popular growth ; but as it never won another, each faction laid its death to the other, and American History is hot with the fires of this battle even yet.

His later years were spent at home, where he was always interested in public affairs and sometimes much too free in his comments on them; where he read immensely and wrote somewhat. He heartily approved his son's break with the Federalists (see Adams, John Quincy) on the Embargo (q.v.). He died on the same day as Jefferson, both on the 50th anniversary of the Declaration of Independ¬ ence.

Mr. Adams' greatest usefulness and popular¬ ity sprang from the same cause that produced some of his worst blunders and misfortunes : a generous impulsiveness which made it im¬ possible for him to hold his tongue at the wrong time and place for talking, his vehemence, self-' confidence and impatience of obstruction. He was fervid, combative, opinionated and master¬ ful ; but he had trust, admiration and respect from the majority of his party at the worst of times, and history justifies it. Consult (Works) by his grandson Charles Francis Adams; Parker, T., (Historic Americans) (1910).

Forrest Morgan, Connecticut Historical Society.

ADAMS, John, American educator : b. Con¬ necticut 1772; d. 1863. He was graduated at Yale in 1795, was a school teacher' till 1810, and thence till 1833 principal of Phillips Academy, Andover, Mass., which he developed into repute throughout the country. He was teacher of Oliver Wendell Holmes, who, in the lines be¬ ginning (read at the Phillips Academy centennial in 18*78.

ADAMS, John, Confederate soldier: b. Tennessee 1825: d. 30 Nov. 1864. He was graduated at West Point in 1846; was brevetted first lieutenant for bravery at Santa Cruz de Rosales, 1848; promoted captain of dragoons, 1856; and resigned 1861 to join the Confederate army, in which he rose to the rank of briga¬ dier-general. He was killed at the battle of Franklin, Tenn.

ADAMS, John, the name assumed by Alex¬ ander Smith, one of the mutineers of the Bounty. After intoxication and massacre had killed off all the mutineers but himself, he was shocked into a complete change of heart, and became sincerely pious and of upright life; he was the patriarch of the little native and half- caste group on Pitcairn's Island, taught a school and held worship there. It was nearly

JOHN ADAMS

Second President of the United States

JOHN QUINCY ADAMS

Sixth President of the United States

20 years after the mutiny before his exist¬ ence was known ; and though technically liable to execution for the mutiny the English offi¬ cials felt that his hardships, exile and re¬ pentance had atoned for the crime, and that it would be wrong to remove the head from the little settlement. He was left unmolested and died in 1829. See Bligh, William; Pit¬ cairn's Island.

ADAMS, John Coleman, American clergy¬ man : b. Malden, Mass., 25 Oct. 1849. He was graduated from Tuft's College in 1870 and the Divinity School in 1872, and entered the minis¬ try of the Universalist Church and has since, served several churches of his denomination. He is author of ˆThe Fatherhood of God) (1888) ; (Christian Types of Heroism) (1891) ; (The Leisure of God) (1895) ; (Nature Studies in the Berkshires5 (1899) ; (Life of William Hamilton GibsoiP (1901) ; (Hosea Ballou and the Gospel Renaissance) (1903) ; honor¬ able Youth* (1906) ; (Short Studies in the Larger Faith > (1907).

ADAMS, John Couch, English astronomer: b. in Cornwall, 5 June 1819; d. 21 Jan. 1892. A precocious mathematician, he became senior wrangler at St. John's College, Cambridge, and mathematical tutor there. He discovered in 1845, by calculation of the perturbations of Uranus, that another planet must exist beyond it. and fixed its position within two degrees; but search for it not being made, Leverrier of Paris independently made the same discovery next year, and Galle of Berlin at once found the planet (see Neptune). This mathematical discovery of Neptune is justly regarded as one of the greatest triumphs of science. To com¬ memorate it the University of Cambridge founded in 1848 the Adams prize to be awarded biennially for the best essay in astronomy, pure mathematics or other branch of natural philosophy. In 1851 he became president of the Royal Astronomical Society; 1858N39 pro¬ fessor of mathematics at Aberdeen University; 1859-92 Lowndean professor of astronomy and geometry at Cambridge, and in 1861 di¬ rector of Cambridge Observatory. He was a delegate to the International Prime Meridian Conference at Washington 1884. He

received the Copley medal of the Royal Society in 1848. His papers were edited by his brother, William G. Adams, and R. A. Sampson (2 vols., I, 1896; II, 1901).

ADAMS, John Quincy, American states¬ man, 6th President of the United States, son of John Adams: b. in Braintree, Mass., 11 July- 1767; d. Washington, I). C., 23 Feb. 1848. At 10 he accompanied his father on his first embassy to France, and was placed at school near Paris. He returned with his father in about 18 months; but soon went back with him to Europe, and attended school in Holland and at the University of Leyden. At 15 Francis Dana, his father's secretary of legation, who had been appointed minister to Russia, took him with him as his private secre¬ tary. After 14 months' stay in Russia, where Catherine refused to recognize Mr. Dana, he traveled back alone through Sweden and Den¬ mark to The Hague. Soon after his father's appointment as ambassador at London in 1785, he returned home to. complete his studies, as he believed (<an American education to be

the best for an American career,® a coolly judicious choice for a lad of 18. He was graduated at Harvard in 1788, entered the office of Theophilus Parsons (q.v.), and in 1791 was admitted to the bar. He now began to take an active interest in politics. He wrote a series of letters to the Boston Sentinel under the signature of ((Publicola,® in reply to Paine's (Rights of Man,* and in 1793 defended Wash¬ ington's policy of neutrality under the signature of ((Marcellus.® These letters attracted atten¬ tion, and in 1794 Washington appointed him minister to The Hague. In 1798 he received a commission to negotiate a treaty of commerce with Sweden ; and traveling through Silesia wrote an account of it which was published in London, and later translated into German and French. On Jefferson's accession to the presi¬ dency he was recalled and resumed law practice.

In 1802 he was sent to the State Senate; the next year to the United States Senate in place of Timothy Pickering, leading Hamiltonian. But the Hamilton- Adams feud (see Adams, John) had split the party into rancorously hostile halves, and Mr. Adams was practically ((boycotted® by the dominant section of his own party, as being an Adams, with an in¬ genuity of indecent insult curious to read of ; still worse was it when Pickering was made his colleague by the other faction at the next vacancy. It was good training for the great career of his later life ; he was not the man to conciliate his foes, and soon made the breach irreparable by breaking away from the party policy. Through life any action which strength¬ ened the United States, or increased its dig¬ nity in the eyes of the world, or simply (<showed fight® for any purpose, met with his heartiest approval and warmest

support, even though fathered by his worst enefnies ; and he first supported (with some reservations) Jefferson's Louisiana purchase, — precisely in the line of the former Federalist policy and the nature of the party, but now fought by them as Jeffer¬ son's^ — and in 1807 took a far more radical step. The action of France and Great Britain in plundering American commerce for evading their mutual blockade laws, and of the latter in impressing American citizens under pre¬ tense of their being English runaways, had enraged the country, but it was helpless against both and felt not strong enough at the time to fight either; finally the outrage of the Leopard on the Chesapeake (see the latter name) roused the Republicans to fury, and even man)' of the Federalists. But the leaders of the lat¬ ter sympathized with England's difficulties in the war with Napoleon, would do nothing to embarrass her and even defended the Leop¬ ard's action. Mr. Adams was as hot as any Republican ; he tried to have the Boston Federalists hold a meeting and pledge the government their support in any measures to curb British insolence, and on their refusal attended a Republican meeting and was put on a committee to draft such resolutions. The Federalists were soon compelled by popular feeling to do likewise, and Mr. Adams also drafted resolutions there. At the extra ses¬ sion of Congress in October the Embargo on all American shipping was passed, to see if England could not be starved into better be¬ havior; half ruining New England, most of

whose capital was invested in commerce, and injuring Americans much more than the enemy. Mr. Adams was a member of the committee which reported the bill, and earn¬ estly advocated it, — not because it went as far as he liked, but as preferable to showing no resentment whatever, and all the Federalists would permit. The execrations leveled at his father for the French mission, and the charges of sectional and party treachery, were repeated on the son ; political literature for half a cen¬ tury was glowing with the acrid polemics on the subject, and the prime object of his grand¬ son Henry Adams's (History > is to exculpate him. His term in the Senate was to expire 3 March 1809; in the preceding June the Massa¬ chusetts legislature elected James Lloyd to succeed him, as an insult, which he accepted and at once resigned. Meantime he had been made professor of rhetoric at Harvard and delivered lectures there. The next month he declined a Republican nomination to the House.

On Madison's accession in 1809 he at once appointed Mr. Adams

minister to Russia; the Senate for some months refused to confirm the nomination, but at length yielded, and he passed four and one-half years there. In the peace negotiations with England over the War of 1812, he was a commissioner with Gallatin and Bayard, and again defeated assaults on the American fishing rights like his father. The treaty is usually considered a humiliating fiasco for America; but it is significant that the British press considered it a surrender on their side, and especially reviled Mr. Adams for his share in it. Visiting Paris, he was made com¬ missioner to negotiate the American-English commercial treaty signed 13 July 1815. Mean¬ time he had arrived in England, 26 May, and received the news of his appointment as minis¬ ter to that country. The synchronism of wars, treaties and ministerships between father and son is so curious that in ancient history it would be treated as indubitable confusion of persons.

Eight years after leaving America, Mr. Adams was recalled to it as secretary of state under Monroe, inaugurated March 1817. His greatest achievement was the treaty with Spain ceding Florida to the United States for $5,000,000, to be used in paying American claims against Spain ; and rectifying the boundaries of Louisiana and Mexico. His utter inde¬ pendence of personal against national con¬ siderations is singularly shown in his support of Jackson for invading Spanish Florida and hanging Arbuthnot and Ambrister; he hated and despised Jackson, who surely had vio¬ lated all international law, but had roughly vindicated United States rights and put down dangerous intrigues with savages, and Mr. Adams vigorously defended him. Adams was the author of {he (<Monroe Doctrine,® and though he never dreamed of its later inter¬ pretations would not improbably have sym¬ pathized with them. He also drew up a report on weights and measures which is still a classic, and shows an almost incredible amount of investigation. An ultimately far more im¬ portant question came up over the admission of Missouri as a slave State. The Missouri Compromise (q.v.) had been passed and put before Monroe for signature, but he submitted

to his Cabinet the questions whether Congress had a constitutional right to prohibit slavery in a Territory, and whether the prohibition of slavery <(forever® in the territory north of Mason and Dixon's Line meant while it re¬ mained a Territor}ˆ or thereafter. The Cabinet was unanimous in the affirmative on the first question; Mr. Adams was alone in declaring that <(forever® included statehood also.

In the presidential election of 1824 there was no electoral majority: Andrew Jackson had 99, Mr. Adams 84 (a remarkable vote con¬ sidering his ungracious manner, gift for mak¬ ing enemies and refusal

to do anything to pro¬ mote his election), William H. Crawford 41 and Henry Clay 34. Crawford was put out of the field by a paralytic stroke. As Clay could not be elected, his supporters cast their votes for Adams as preferable to Jackson: the former represented the same public policy as theirs, he was the ablest public official in the country and not personally hostile to Clay, while Jackson was regarded as an ignorant and violent demagogue. Mr. Adams was elected, and made Clay secretary of state, a place to which Clay's talents and position gave him almost a prescriptive claim. The Jack- sonians denounced this as a corrupt bargain to defeat the people's will, and absurdly gave it the name of the unsavory English <(Coalition,® a catchword which was an efficient party weapon for many years. Mr. Adams' admin¬ istration had no dramatic events. Its policy was based on a new division of parties. The Federalists were dead, consequently their op¬ ponents were dead also, and the new division was into National Republicans, afterward Whigs, and Democratic-Republicans, or Demo¬ crats ; the former favoring internal improve¬ ments, a national bank and high tariffs, the latter opposing them. In reality, the division was between the preferences of the capitalist class and the masses ; and the vast overplus . of the latter in the South, now concentrated on Jackson instead of a threefold split (they had given almost none to Adams), carried him in four years later by 178 to 83. Much is always made of the hostility of the northern com¬ mercial classes whose trade the tariff was in¬ tended to cut down, of the southern planters who would lose as consumers while having nothing to protect as producers, and the Jack¬ sonian bribe and threat of <(spoils® ; but by the figures they cost Adams nothing.

Mr. Adams retired, as he supposed, from public life. But in 1831 the constituency of his district around Braintree elected him a member of Congress on the Anti-Masonic ticket (see Anti-Masonry; Morgan, William); and though that party soon died, his immense ability and unique power in Congress kept him there till his death. By a singular fortune, he owes by far his greatest fame to this relatively small position after his crowning office was laid down. Belonging Jo no party, a political Ishmaelite, of the loftiest patriotism and the highest integrity, but scornful of nature and irritable in temper, rousing every demon of hatred in his fellow-members, in constant and envenomed battle with them and more than a match for them all, the (<old man eloquent® was for many years a storm centre of wonder¬ ful picturesqueness. But his repute is not a mere political curio: he had the fortune to

take his place at the very outset of the strug¬ gle of the slave oligarchy to suppress free speech and writing on the slavery question, and crush political liberty to uphold slavery. He fought the attempt unflinchingly year after year by purely legal methods, upholding the right of petition as indefeasible under any government or for any purpose, — he did not hesitate to submit a petition from Virginians praying for his own expulsion as a nuisance, — and consequently a right of slaves or of others in their interest ; and with little sympathy for the anti-slavery cause as such, became by force of circumstances its mightiest champion. He died of a stroke of apoplexy on the floor of the House. Consult (Writings of John Quincy Adams, 5 edited by W. C. Ford (New York

1917).

Forrest Morgan,

Secretary Connecticut Historical Society.

ADAMS, John Quincy (2d), American politician, son of Charles Francis: b. in Boston, 22 S-ept. 1833 ; d. 14 Aug. 1894. He was grad¬ uated at Harvard in 1853, and became a lawyer. A Democrat after the war, he took hopeless candidacies for the governorship to keep the organization together, in 1867 and 1871, and for the vice-presidency in 1872. He also served in the legislature in 1866, 1869 and 1870. In 1877 he was made a member of the corpora¬ tion of Harvard.

ADAMS, Maud Kiskadden, American ac¬ tress : b. Salt Lake City, 11 Nov. 1872. She is the daughter of an actress, who, under the stage name of Adams, was leading woman of a stock company in that city. Her first appear¬ ance was made while a child on a stage in the West ; she then continued to take children's parts till she reached the age of 16 when she left Daniel Frohman's company to take an important role in Hoyt's (A Midnight BellP She later became a member of Charles Froh¬ man's stock company; in 1892 supported John Drew in (The Masked BalP ; and in 1898 scored a marked success as Lady Babbie in J. M. Barrie's (Little Minister^ In 1899 she played Juliet in (Romeo and JulieD ; in the season of 1900-01, won further approval as the Due de Reichstadt in Rostand's (L'Aiglon) ; in 1901-02 took the character of Miss Phoebe in Barrie's (Quality Street" ; in 1903-04 played (The Pretty Sister of Jose *; and in 1905-07 Barrie's (Peter Pan.* She has appeared in such Shakespearean roles as Viola and Rosa¬ lind and assumed the title role in Rostand's (Chanticleer) in 1911. In

1913-14 she starred in Barrie's (Legend of Leonora.) Consult Clapp and Edgett, (Players of the Present, * in the Dunlap Society Publications (New York 1899).

ADAMS, Nehemiah, American Congrega¬ tional clergyman : b. Salem, Mass., 19 Feb. 1806; d. 6 Oct. 1878. He was graduated at Harvard in 1826, and at Andover Theological Seminary in 1829. The same year he settled at Cambridge, but 1834-70 was pastor of the Essex Street Church in Boston, and was widely reputed for his eloquence and learning. He published several polemic works ; a great sensation and much hostile criticism were created by (A South Side View of Slavery, * published in 1854 after a winter in Georgia, in which he lauded slavery as beneficial to the

negroes' religious character. He published also a (Life of John Eliot.*

ADAMS, Samuel, American patriot : b. Boston, 27 Sept. 1722; d. 2 Oct. 1803. He was son of a rich merchant, ship-owner and magis¬ trate, a leader in provincial contests with royal governors, and inventor of the caucus in fact and perhaps unintentionally in name. Edu¬ cated at the Boston Latin School, he was gradu¬ ated at Harvard in 1740. In 1743 he wrote for his master's degree a thesis upholding the lawfulness of resisting supreme magistrates. He became a lawyer; but the profession was under ban with the upper classes, and at his family's wish he entered a leading merchant's counting-house. Shortly afterward his father set him up in business, in which he lost half his capital, losing the other half by a loan never repaid. Then he became partner with his father in a rather unsuccessful brewery. Soon the father lost nearly all his property in a land-bank scheme crushed by an act of Parliament, which extended an English bank¬ ing enactment to the colonies. The hundreds of ruined shareholders denounced this act as an invasion of chartered colonial rights, and it turned the cream of the business leaders of Massachusetts, and their sons and daughters, into potential rebels at a blow. On his father's death in 1748 he carried on the brewery alone, and was nicknamed by his opponents <(Sammy the maltster,® changed to «Sammy the publi¬ can® when he was made tax-collector of Bos¬ ton 1763-65. Meanwhile he had become a great power in town meetings, having strong and sincere democratic feeling and a marvel¬ ous genius for political management and (<cau- cusing.® As collector he was a bad business manager and was sharply assailed ; but his political headship is shown by his being selected in 1764 to draft the town's instructions to its representatives relative to the Stamp Act, — the first public American protest against the parliamentary right of taxation, — and the like instructions the next year. He was himself in the legislature 1765-74, being clerk of

the House and on the leading committees, drawing up the most important state papers of that stormy time, and spokesman as well as prompter of the incessant wrangles with Gov¬ ernors Bernard and Hutchinson. When the Townshend Acts were passed in 1767, he drafted the legislature's petition to the King, the instructions to the Massachusetts agent in England, and the circular letter of February 1768 to the other colonies asking their aid. The latter led directly to the Revolution, George III ordering Bernard to command the legislature to rescind it or be instantly dis¬ solved. The latter refusing by 92 to 17, the King thereon resolved to send troops to overawe the colony. The same year Adams wrote (The True Sentiments of America, *and in 1769 a famous (Appeal to the World.) The morning after the <(Boston Massacre* he was made chairman of a committee to com¬ municate to Governor Hutchinson and his council the town-meeting vote that the two regiments of British soldiers should be re¬ moved to the castle in the harbor. When the governor wished to compromise on one, Adams had the people insist on ((both or none, *and both were removed, thereafter being known in Parliament as the <(Sam Adams regiments.*

In 1772 the order was issued that the judges should thereafter be paid by the Crown, not by the colony, and be removable at the King's pleasure; the Boston town-meeting requested Governor Hutchinson to convene the legis¬ lature on the question, and on his refusal Mr. Adams revived a proposal of Jonathan May- liew's in 1765, to have the towns of Massa¬ chusetts appoint committees of correspondence to consult about the common weal. Eighty towns soon adopted the suggestion, forming an omnipotent revolutionary legislature be¬ yond the reach of government veto or dissolu¬ tion, yet quite within the law. The next spring intercolonial committees of the same sort were formed, — an unorganized government of the united colonies. Meanwhile Mr. Adams had kept the public spirit inflamed and alive to the nature of the crisis by articles under various pseudonyms in the Boston Gazette, arguing the colonists' legal rights and the practical impossi¬ bility of any compromise; thus not only pre¬ paring the public for the crisis and bringing over the waverers, but making the crisis itself more inevitable. The management of the tea- ship matter was in the hands of the com¬ mittees of correspondence of Boston and five adjoining towns, of which Mr. Adams was the active head; and the throwing of the tea into the harbor, 17 Dec. 1773, was unquestion¬ ably supervised or arranged by him. When as a

punishment the. port of Boston was closed and the charter of Massachusetts annulled in April 1774, and the legislature met at Salem under parliamentary order to abase itself and undo its bad work, Mr. Adams locked the door, pocketed the key and carried through the measures for calling a congress at Phila¬ delphia in September; the legislature ad¬ journed sine die while the governor's clerk was hammering at the door with the Writ of dissolution, and British authority was at an end. Mr. Adams' lifework — of assuring the breakdown of a system difficult to work at best, the government of a country by scornful aliens plus the aristocratic native families — was over. Though a useful and upright pub¬ lic servant, he was of secondary importance in presence of large problems of constructive statesmanship; his abilities were parochial, and he does not figure on a national scale. He could manage caucuses and organize jealousies, but hardly frame constitutions. At the Phila¬ delphia Congress he was of course a delegate, and greatly smoothed over sectional distrusts by his shrewdness, tact and geniality. In 1775 he and Hancock were the only patriots ex¬ cepted from amnesty; and it was Gage's at¬ tempt to seize them — under government orders, and with London forecasts that their heads would soon adorn Temple Bar — that brought on the battle of Lexington and opened the Revolutionary war. They escaped by Paul Revere's warning. He led in pushing forward the Declaration of Independence, of which he was one of the signers ; and was active in Congressional work till the close of the Revolution. With much creditable service, his sympathies were always with division of authority; he believed in committees instead of executive heads, and national policy was often affected disastrously by the delays and irresponsibility involved. He was largely in¬ strumental in framing the State Constitution

of 1780. Nationally, he was of course an Anti-Federalist, opposing a strong national government in fear of tyranny ; after long hesitancy over supporting the Constitution of 1787, he did so only on the understanding that amendments constituting a bill of rights should be submitted ; but his voice in favor of ratifi¬ cation by Massachusetts secured it by 187 to 168, and saved it to the nation. He was long on the Executive Council of Massachusetts, lieutenant-governor 1789-94, and governor 1794— 97 (three terms).

ADAMS, Samuel Hopkins, b. Dunkirk,

N. Y., 26 Jan. 1871. He was graduated from Hamilton College in 1891 and spent the next nine years as reporter and special writer on the New York Sun. He was managing editor of McClure's Syndicate 1900-01 ; advertising man¬ ager of McClure, Phillips & Co., 1901-02;

and a member of the staff of McClure's Magazine 1903-05. He contributed a noteworthy expos¬ ure of quack medicines in a series of articles to Collier's Weekly in 1906, which resulted in the correction of many of the abuses described and the closing down of several patent medi¬ cine factories. He has written (The Great American Fraud) (1906) ; (The Mystery) (with Stewart Edward White, 1905) ; (The Flying Death) (1906) ; (Average Jones)

(1911) ; (The Secret of Lonesome Cove) (1913) ; (The Clarion) (1914) ; (Little Miss Grouch > (1915) ; (Our Square and the People in It> (1917).

ADAMS, Suzanne, American soprano singer: b. Cambridge, Mass., 28 Nov. 1873. After studying with Marchesi in Paris she made her debut at the Paris Opera in 1894 as Juliette in Gounod's (Romeo et Juliette. > After three years in Parisian opera she went to Nice. In 1898 she appeared at Covent Gar¬ den, London, and during the season of 1898-99 she appeared at the Metropolitan Opera House in New York. In 1898 she married Leo Stern, the violoncellist, who died in 1904. Her roles include Juliette, Marguerite, Gilda, the Queen in (Les Huguenots, > Queen of the Night in (The Magic Flute, > Mimi and Micaela.

ADAMS, Thomas, English clergyman and author: d. 1655. From 1612 to 1614, he preached at Willington Bedfordshire, where he published (Heaven and Earth Reconciled, > and (The Devil's Banquet.) These were followed by a great number of other works, admired for their diversified brilliance, and by ˆoccasional® ser¬ mons which place him in the front rank of con¬ temporary English preachers. His works are said to have influenced John Bunyan; while he is compared to Jeremy Taylor in brilliance of fancies, to Thomas Fuller in wit, and Southey styles him <(the prose Shakespeare of Puritan theologians.® In 1618 he was attached to Saint Paul's Cathedral and became <(observant chap¬ lain® to Sir Henry Montague, lord chief justice of England. His writings edited by J. Angus and T. Smith were published in J. P. Nichol's (Puritan Divines) (3 vols., London 1862).

ADAMS, Thomas Sewall, American economist and educator: b. Baltimore, Md., 29 Dec. 1873. After graduation from the Balti¬ more City College in 1893, he entered Johns Hopkins University and there obtained his degree of Pli.D. For a year he filled an

appointment as a clerk in the Census Bureau m Washington; he became assistant treasurer oi Porto Rico. In 1901 he was appointed as¬ sociate professor of political economy at the University of Wisconsin, being promoted to a full professorship in 1908. In 1910 he became professor of political economy in Washington University, where he remained a year, then resumed his former position at the University of Wisconsin. In 1911 he became tax commis¬ sioner of Wisconsin. His works include: 'Taxation in Maryland *(1900); 'Labor Prob¬ lems' (in collaboration with Helen L. Sumner 1905) ; 'Mortgage Taxation in Wisconsin and Neighboring States* (1907); 'Outlines of Economics* (with R. T. Ely 1908).

ADAMS, Walter Sydney, American as¬ tronomer: b. Antioch, Turkey, 20 Dec. 1876. He was graduated from Dartmouth College in 1898, and took post-graduate courses in the University of Chicago and at Munich. In 1901 he was appointed assistant in the Yerkes Obser¬ vatory. Three years later he was made assist¬ ant astronomer at the Mt. Wilson Solar Obser¬ vatory. During 1910 and 1911 he was acting director of this observatory. Beside numerous articles on astronomical subjects he has pub¬ lished 'Investigation of the Rotation Period of the Sun by Spectroscopic Methods* (1911).

ADAMS, William, the first Englishman in Japan: b. Kent, c. 1575; d. 10 May 1620. In 1598 he sailed as pilot of five Dutch vessels from the Texel to the East; landing at Kiushiu. The great Shogun Iyeyasu, who shortly before crushed his rivals and ended Japan's feudal anarchy, first imprisoned and then took him into service, employing him in shipbuilding, as informant, etc. Iyeyasu dying in 1616, a reac¬ tion against foreigners set in, and Adams wished to return to England, where he had left a wife and children; but was forbidden, and married a Japanese wife, their descend¬ ants still living in Japan.

ADAMS, William Taylor, American au¬ thor and editor, best known by the pseudonym "Oliver Optic* *: b. Medway, Mass., 30 July 1822; d. 27 March 1897. He taught for many years in the Boston schools. He was a voluminous and highly popular writer of fiction for young readers, his works including over 100 volumes, mainly travel and adventure: 'Young America Abroad, * 'Starry Flag Series,* and others.

ADAMS FAMILY, of Massachusetts. In the varied abilities and conspicuous public im¬ portance of its members, this family confessedly outranks every other in the United States. It has furnished in a single line two Presidents, both of great weight and permanent import¬ ance, and even more interesting as virile and individual characters, provoking admiration or hate, but never indifference ; a

statesman and a diplomat of high order; the author of one of the two first-rate histories yet written in America, matter and style both considered ; a noted financier and business magnate, and prominent author as well ; another keen and vigorous writer; and an able lawyer and local politician who might have attained larger im¬ portance but for belonging to a party in . a hopeless minority in his State. The founder in America was Henry Adams, an Englishman with eight sons, who removed to Braintree,

Mass., in 1636; but the fortunes of the family began when to this tough stock — in the person of John Adams, who died in 1760, a selectman of Braintree and a deacon, and a farmer almost a rich man for the times — was added the energetic, passionate Boylston blood, a strain commemorated in Boylston Street, Boston, and the town of Boylston, Mass. The son of John Adams and Susanna Boylston was President John Adams (q.v.), the real founder of the family greatness and its striking individuality. All its members since have been distinguished by the same general qualities in varying mix¬ ture. They have mostly been vehement, proud, pugnacious and independent, with hot tempers and strong wills; but with high ideals, dramatic devotion to duty and the intense democratic sentiment so often found united with personal aristocracy of feeling. They have been men of affairs first, with large practical ability, but with a deep strain of the man of letters which in this generation has outshone the other faculties ; strong-headed and hard-working students, with powerful memories and fluent gifts of expres¬ sion. But no curio of heredity in all time is stranger than the contrast between the Presi¬ dent father and his President son, John Quincy Adams (q.v.), when it is remembered that to the fiery, combative, bristling Adams-Boylston blood was added an equal strain from the gay, genial, affectionate Abigail Smith (see Adams, Abigail). The son, though of deep inner affections, and even hungering for good will if it would come without his aid, was on the surface incomparably colder, harsher and thornier than his father, with all the socially repellent traits of the race and none of the softer ones. The father could never control his tongue or his temper, and not always his head; the son never lost the bridle of either, and much of his terrible power in, debate came from his ability to make others lose theirs while perfectly keeping his own. The father had plenty of warm friends and allies — at the worst he worked with half a party; the son in the most superb part of his career had no friends, no allies, no party except the group of constituents who kept him in Congress. The father's self-confidence deepened in the son to a solitary and almost contemptuous gladiator- ship against the entire government of the country through long years of hate and peril. The father's irritable

though generous vanity changed in the son to an icy contempt or white- hot scorn of nearly all about him. The father's spasms of acrimonious judgment steadied in the son to a constant rancor always finding new objects. The country has reason to be thankful for his unamiable traits, for each one strength¬ ened his fibre to do the work awaiting him, and only John Quincy Adams could have accom¬ plished the work of John Quincy Adams. His son, Charles Francis Adams, Sr., had the useful and forcible qualities of both without their besetting defects. He was in youth as hotly pugnacious as his grandfather; he was always as self-centred as his father, and as willing to stand alone amid hate and incessant conflict; but he had far more self-control than the former, and far less bristling repellance and contempt of co-operation than the latter. His diplomacy was cast in a spot where he was too much "boycotted" to make the softer side of much avail ; but he roused no useless and costly

hatreds, and ranked the peer in effectiveness of any European diplomat. Of his three sons (see Charles Francis, 2d; Henry; Brooks) it would be invidious to analyze the personal traits. The former, soldier, railroad commis¬ sioner, president of the Union Pacific Railroad, and eminent historical 'scholar and publicist, showed the family traits of courage, independ¬ ence of thought and action, and intellectual en¬ ergy, to the full, and was an active public force. The historian was distinguished during his historical professorship as the most original, independent and stimulating of instructors ; and his history displays not only massive research, enormous power of acquisition in the most widely separated fields, and entire freedom from beaten roads and traditional views, but tempered self-control, the moderation of judg¬ ment bred by thorough knowledge and a per¬ vasive atmosphere of gentlemanly irony. The essayist assailant of the Massachusetts ((the-ocracy,® and student of economic history to saturation, was as eager and passionate as his great-grandfather, and in striking contrast with his brothers in literary style, but none the less a man to reckon with. The late John Quincy 2d would perhaps have filled a larger public field in a less strongly Republican community. It is not likely that this virile stock has lost its energy with the present generation.

This by no means, however, ends the con¬ tributions of the Adams stock to our public life. The patriot, Samuel Adams, the father of American liberty, was own cousin to John Adams the President ; a more dexterous and politic man, and much abler political manager,

but not otherwise cast in as large mold. From different sons or grandsons of the pioneer have descended William Taylor Adams ((<01iver Op¬ tic-0), the well-known juvenile writer; Charles Baker Adams, the naturalist, and Edwin Adams, the actor, the grandfather of the first being the great-grandfather of the second; Herbert Bax¬ ter Adams, the eminent American historical scholar and educator; Alvin Adams, the founder of the Adams Express Company ; William Claf- lin, the Massachusetts merchant and governor, whose mother was an Adams ; and many other strong figures in public life. Consult Adams, A. N., (Genealogical History of Henry Adams, of Braintree, and. His Descendants) (1910).

ADAMS, Mass., town in Berkshire County, containing villages of Adams (formerly South Adams), Maple Grove, Zylonite and Renfrew; the first and chief 16 miles north of Pittsfield, 6 miles south of North Adams, which was set off in 1878; on Pittsfield and North Adams branch of the Boston and Albany division of the New York Central Railroad. It is on Hoosac River, and contains Greylock Mountain, the highest point in Massachusetts. Founded in 1749 as East Hoosuck, it was renamed for Sam¬ uel Adams in 1778. Its manufacturing industries, including paper, fabrics, foundry work, etc. (U. S. Census 1914), are carried on in 35 es¬ tablishments and employ 4,047 persons of whom 3,930 are wage earners, receiving annually $1,-793,000 in wages. The aggregate capital em¬ ployed was $7,119,000. The annual value of the products amounts to $6,530,000. It has a public library and a town board of three selectmen, the government being administered by town meeting. Pop. 14,000.

ADAM'S APPLE, in botany, (1) the name given by Gerard and other old authors to the plantain tree (Musa paradisiaca, from the no¬ tion that its fruit was that sinfully eaten by Adam in Eden. (2) The name given, for the same reason, to a species of Citrus.

In anatomy, a protuberance on the forepart of the throat, due to the thyroid cartilages. The name is supposed to have arisen from the absurd popular notion that a portion of the forbidden fruit, assumed to have been an apple, stuck in Adam's throat when he attempted to swallow it.

ADAM'S BRIDGE, or RA-MA'S BRIDGE, a chain of shoals across the Gulf of Manaar, between Hindustan and the island of Ceylon, in the Ramaana fabled to have been constructed by monkeys.

_ ADAM'S PEAK, one of the highest moun¬ tains in the island of Ceylon, about 45 miles east of Colombo. It is of a conical shape, 7,420

feet high, and can be seen in clear weather from sea 150 miles away. From its solitary position and immense height above the sur¬ rounding country the peak forms a striking and awe-inspiring object and has been for cen¬ turies venerated by the inhabitants. On the top, under a sort of open pagoda, is the sacred footmark, a natural hollow in the rock, artifi¬ cially enlarged, and bearing a rude resemblance to a human foot. Mohammedan tradition makes this the scene of Adam's penitence after his expulsion from Paradise; he stood 1,000 years on one foot weeping for his sin, hence the mark. To the Buddhists, the impression is the Sri-pada, or sacred footmark, left by Bud¬ dha on his departure from Ceylon ; and the Hindus recognize Buddha as an avatar of Vishnu or Siva. Devotees of all creeds here meet and present their offerings (consisting chiefly of rhododendron flowers) to the sacred footprint, finishing their devotions by a draught from the sacred well. The ascent of the moun¬ tain is very steep, and toward the summit is assisted by steps cut and iron chains riveted in the rock, the last 40 feet being accomplished by an iron ladder. The top is an area of 64 feet by 45.

ADAMSON, Patrick, Scottish prelate (real name was spelled Constyne, Constean, Conston, Constant, and Constans ; later changed to Con¬ stantine, then to Adamson) : b. Perth, 15 March 1536; d. 19 Feb. 1592. He took his degree at St. Andrews, and in 1566 went to Paris as tutor. Here he wrote a Latin ode on the birth in June of James VI, and called him (<king of France and England, for which the French court gave him six months' imprisonment. Re¬ leased, he went to Padua, Geneva and Paris, and finally to Bourges, where he lay in hiding for seven months in fear of the rage against Protestants let loose by the massacre of St. Bartholomew (1572), and which cost his host's life. Recalled to Scotland (in 1573), he became a prominent minister, one of the commissioners to settle Church matters, and chaplain to the regent Morton, who in October 1576 made him archbishop of St. Andrews. The tragedy of his life lay in his attempting to be an old-fashioned prelate in the new Scotland which hated prelacy, and to air High-Church pref¬ erences before men who considered them

popery. He began the warfare himself by declaring that he would oppose all attempts to deprive the archbishopric of any of its former power ; the presbytery took up the glove, and never ceased till they had pulled him down. He was assailed first for not having been con¬ secrated to his post ; making his peace some¬ how for this, they again

attacked him for in¬ solence to the presbytery, for opposing its in¬ terests in Parliament, for popery and heresy. The conflict grew so hot that he retired to the castle of St. Andrew's, where he was cured by a <(wise woman® of a disease the doctors could not handle, and the presbytery afterward seized and burnt her for it. In 1583 he went to Eng¬ land as James' ambassador, exciting attention by his eloquence, and being savagely libeled by the Presbyterians for alleged looseness of be¬ havior. Returning next May, he was high in favor with James, and his chief agent or promp¬ ter in severe measures against the Puritans. In December 1585 he published a paper on the <(King's Majesty's Intent in the Late Acts of Parliament,® which was a chief article in his derelictions then, but in 1646, in the heart of the Civil war, was reprinted by the Puritans as on their own side. In 1585 Andrew Melville and other Presbyterian leaders returned after the Raid of Ruthven (q.v.), and that party was gaining the upper hand : Morton had been executed in 1581. In April 1586 Adamson was impeached and excommunicated; the next year the excommunication was removed, but in 1588 he was freshly accused, — among other things, of mutilating and abstracting registries, — and the King, tired of the quarrel or convinced that it was Adamson's fault, transferred the revenues of his see to another party and left him in actual want for himself and family. A small pension was afterward granted him, but he died poor and wretched.

ADAMSON ACT. See Arbitration, In¬ dustrial; Labor Legislation.

ADANA, a'da'na, an ancient town in the southeast of Asia Minor, capital of Adana vilayet, on the Sihun, about 25 miles from its embouchure in the Mediterranean, and about 30 miles from its port Mersina, with which, and with Tarsus about half way between, it is connected by railway. Pop. about 45,000. Of vilayet, 422,400.

ADANSON, a-dan-son, Michel, French naturalist and traveler (of Scottish extrac¬ tion) : b. 7 April 1727; d. 3 Aug. 1806. Al¬ though he gave much time and attention to the study of the sciences, particularly elec¬ tricity, his chief work was in the realm of botany. From 1784 he spent five years in Senegal and collected a large number of plants and animals which he classified and described. His more important works are : * Histoire

Naturelle du Senegal *and (Familles des plantes,* in which he opposed the system of Linnaeus.

ADANSONIA. See Baobab.

ADAPTATION, the power and process of gradual change in an organism to fit it to its environment. See Biology; Evolution.

Life came to be, it is inferred, when the gradually accumulated energy which resulting in physical and chemical forces forced a bet¬ ter medium for its interchange, which science, to-day, symbolizes under the term vitalism. vol. i — 9

This is then a sort of superchemistry which arose out of the need of handling the cosmical energy constantly being delivered to the earth's surface. One of the methods of inter¬ play between the living matter and its environ¬ ment is adaptation. This adaptation is never perfect save in - those forms which become fixed and these are on the decline in struc¬ tural differentiation. They cease to evolve to higher types, for evolution implies new con¬ quests over the environment.

By the terms environment, surroundings, conditions of life, medium or milieu, or monde arnbiant, is meant everything outside of the individual plant or animal, between which and the living matter there is an energy inter¬ change. The nature of the earth's surface, of the soil, of well-watered regions, of deserts, plains or barrens, the physics of the air and sea, are taught in our textbooks of physical geography. Each such area is inhabited by assemblages of living beings adapted well or ill to such or such conditions. We speak of alpine or arctic life, of the flora and fauna of deserts, of mountains, of lowlands, of the great plains, of forests, of the coasts and abysses of the sea. The word ((fauna® means the assemblage of animals inhabiting any area, as the word ((flora® is used for the plants. Now each of these areas, with its peculiar surface features, climate, soil, etc., is charac¬ terized by a set of plants and animals which flourish better there than in adjoining regions, and hence are spoken of as being better adapted.

The most unique cases of adaptation to extreme conditions of life are seen in animals living in the darkness of caves, or in the dark abysses of the sea, or parasitic animals, as the fluke and tapeworm, the root-barnacles (Sac - culina), the fish-louse (Lerncea) and many in¬ sects. In all these forms the body has, as the result of a parasitic life, undergone profound modification, becoming so atrophied in certain respects as to present the utmost contrast to their free-living allies. Adaptation is contin¬ ually correlated with certain given conditions. If the conditions be changed, in time the or¬ ganisms, unless they are modified and changed to what are called new species, become un¬ adapted, unfit for the new environment and unsuccessful in the struggle for existence.

Extinct species are such unfit, unadapted forms. However well adapted they were at the period in which they lived, when the con¬ ditions of existence changed ; when the climate changed from warm to cold, or the reverse; when the soil changed its elevation above the sea, or degree of dryness or humidity ; when one area subsided; and another became ele¬ vated, — certain species or groups of species, unless they migrated, or were plastic enough to undergo modification and become what are called ((new® species or <(new® genera, unable to resist the change, died out, — became ex¬ tinct. The harder parts of these extinct spe¬ cies are found in the rocks and are called ˆfossils.® They are the relics of former worlds, witnesses of the profound changes in physical geography through which the earth has passed.

Extinction has not yet taken place for cer¬ tain forms. A few ancient primitive forms have persisted and are still flourishing. Such

are many of the Protozoa (Saccamina and others), the Lingulella and Lingula, the king- crab (Limulus), the Peripatus and Scolopen- drella, which are probably the ancestral forms of insects ; among the fishes the Australian lung-fish (Ceratodus) , and among lizards the Hatteria of New Zealand. These forms, for various reasons, have withstood the most wide¬ spread and the profoundest geological changes, but they are exceptional. On the other hand a vast number of species which were plastic enough to yield to the changes in their sur¬ roundings and became modified into new spe¬ cies became adapted to new conditions of ex¬ istence. It is undoubtedly the case, then, that certain forms become maladapted and suffer extinction, though all through the ages the plant and animal census by no means became at any time lessened, but rather gradually in¬ creased in extent. Another fact clearly estab¬ lished is that the earlier forms were generalized and the later were specialized, and the former, the ancestors of the present species, had to make way for their more specialized descend¬ ants. Thus the trilobites were succeeded by the king-crabs, the creeping dinosaurs were succeeded by the flying reptiles or pterodactyls, and the highly generalized tailed Amphibia yielded the right of way to the tailless frogs and toads of the present day. Adaptation, then, is the process of modification of organ¬ isms caused by changes in the conditions of life. The most fascinating of all adaptive forms is man, who retains all of the charac¬ ters which have been found most valuable for the utilization of more and more of the energy of the

environment and who through struc¬ tural specialization has fashioned organs of increasing efficiency to utilize these energy re¬ sources. The chief tool of adaptation of man is his use of symbols by means of his brain structures, which have given him increasing power to manage the vast amounts of energy which have been and are being subject to con¬ stant interchange.

ADAR, Jewish month, 12th of the ecclesias¬ tical and 6th of the civil year; representing parts of February and March of ours. The 7th was a fast for the death of Moses, the 9th for the falling-out of Hillel and Shammai. But the important days were the 13th, a fast in com¬ memoration of that of the Jews for their threatened destruction by Haman (see Esther), followed by a feast on the next two days for their escape.

ADARCE, a-dar' se, a salty deposit found on the grasses and sedges growing in wet places in ancient Galatia. It is used somewhat for cleansing the skin in cases of leprosy.

ADDA, ad'da (ancient Addua), a river of northern Italy, descending from the Rhsetian Alps, falls into Lake Como, and leaving this joins the Po after a course of about 170 miles.

ADDAI, ad'ae, is said to have introduced Christianity into the principality of Edessa. The tradition is that he was one of the 70 disciples and was sent there by the Apostle Judas. The story comes from Syrian sources. <The Doctrine of Addai, the Apostle1* (now first edited in a complete form in the original Syriac with an English translation and notes by Phillips, London 1876), contains practi¬ cally all that is known of him. The critics

place the above-mentioned work at about the year 300. Bickell even placed its date in the 1st century. Some authors try to identify him with Thaddeus.

ADDAMS, Jane, American philanthropist: b. Cedarville, Ill., 6 Sept. 1860. She was grad¬ uated at Rockford College in 1881, and after post-graduate studies in Europe and the United States became an active social reformer. She inaugurated in 1889 at Chicago the establish¬ ment known as Hull House, an adaptation of the <(social settlement® plan to Chicago con¬ ditions ; acted as street-cleaning inspector in Chicago, and has lectured on the improvement of the condition of the poor in great cities ; and on social and political reform. She has written (Democracy and Social Ethics) (1902) ; (Newer Ideals of Peace} (1907) ; (The Spirit of Youth and the City

Streets) ; (Twenty Years at Hull House1* (1901) ; (A New Conscience and an Ancient EviP (1911) ; (Long Road of Women's Memory > (1916).

ADDAX, or ADDAS (Lat., of African origin), a North African antelope (Addax nasomaculatus), related to the oryx and sim¬ ilar to it in habits. Its large broad hoofs fit it for traveling over loose shifting sand; it has a long tail, long ears, and spirally-twisted horns three to four feet high. The animal measures about three feet in height at the shoulder; in color it is nearly white, with shading of reddish brown on the head and front of the body. The hoofs are black and there is a black, shaggy marking on the fore¬ head above a white blaze on the nose. It is now becoming very rare in all parts of the Sahara. The Arabs hunt the addax with greyhounds.

ADDER (Anglo-Saxon ncedder, Goth. nadro, Gcr. natter, a snake), a colloquial name for several poisonous snakes, mostly belonging to the family Viperidce, such as the copper¬ head, moccasin, asp, etc.; and also for certain harmless snakes of the family Colubridce, par¬ ticularly the spreading adder (Heterodon platyrhinus), which when angry resembles the poisonous snakes. (See Hognose). In Eng¬ land the name denotes the only venomous snake of Great Britain, — the European viper (Pelias berus). See Copperhead; Death- Adder; Puff-Adder; Viper; etc.

ADDICKS, John Edward, American capi¬ talist: b. Philadelphia, 21 Nov. 1841; d. 7 Aug. 1919. He acquired a large fortune as a gas manufacturer, organizing the Bay State Gas Company of Boston in 1884, and buy¬ ing control of the Brooklyn (N. Y.) Gas Company in 1892. For 11 years he was of national prominence as candidate for the United States senatorship from Delaware, which he did not succeed in obtaining, but till 1906 was able to prevent the election of any rival, leaving both of Delaware's seats vacant. In 1895 his rival was H. A. Du Pont, and among the members of the legislature voting was the former president of the Senate, later governor through the death of Governor Mar¬ vel ; the Democrats and Populists declared his vote illegal, and refused to seat Du Pont. In 1896 the Republican State Convention to elect delegates to the St. Louis National Con¬ vention split and elected two sets, Du Pont and Addicks ; the former was recognized as ftregu-

lar® by the St. Louis Committee on Creden¬ tials, while the other

section called themselves Union Republicans. In 1899 a successor to Senator Gray was balloted for, but no elec¬ tion .followed. In 1900 as in 1896 two sets of delegates went to Philadelphia, and this time the committee seated the Addicks party ; though he was thus recognized as State party chief, the 1901 election for Senator was again a stalemate, and as there were two to elect, the State was left entirely unrepresented in the Senate. In the session of 1903 Addicks nominally withdrew, and the legislature elected two Senators, a Regular for the short term and a Union for the long term. On 12 June 1906 Du Pont was elected. Addicks's fortune was greatly impaired by his political course and was still further diminished by a court order in 1907 which obliged him to pay $890,000 of profits unlawfully drawn from the Bay State company.

ADDING-MACHINE. See Calculating- Machine.

ADDINGTON, Henry, Viscount Sid- mouth, English statesman: b. 30 May 1757 ; d. 15 Feb. 1844; educated at Winchester and Brasenose College, Oxford ; he then studied law and, through the influence of Pitt, entered Parliament (1784) ; was speaker of the House of Commons (1789-1801) ; chancellor of the ex¬ chequer and first lord of the treasury; he put through a bill disqualifying clergymen from sitting in the House of Commons, and later, with Pitt's advice, negotiated (1802) the Peace of Amiens, a cessation of war much needed by England. In 1805 he was raised to the peerage. As home secretary (1812-22), he was strict in his administration of justice and in conservative oversight of the press and public meetings. Partly due to his too great zeal was the <(Manchester massacre.® He resigned in 1824, owing to his disapproving of the recog¬ nition of the independence of Buenos Aires.

ADDIS ABEBA. See Adis Ababa.

ADDISON, Daniel Dulany, American clergyman and author: b. Wheeling, W. Va., 11 March 1863. After graduating from Union College in 1883, he studied at the Episcopal Theological School, Cambridge, Mass., then became assistant rector of Christ Church, Springfield, Mass. In 1889 he was appointed rector of St. Peter's Church, Beverly, Mass., where he remained until 1895. He then be¬ came rector of All Saints Church, Brookline, Mass. He was especially interested in condi¬ tions in Liberia and was made a trustee of the College of Monrovia. In 1904 he was knighted by the government of Liberia for his services. He is the author of : (Lucy Corcoran, Life, Letters and Diary* (1894); (Phillips Brooks) (1894) ; 'Life and Times of Edward Bass) (1897) ; 'All Saints Church, Brookline) (1896) ; (The

Clergy in American Life and Letters) (1900) ; 'The Episcopalians) (1904).

ADDISON, Joseph, English essayist: b. Milston, near Amesbury, in Wiltshire, 1 May 1672; d. Holland House, London, 17 June 1719. Addison was the eldest son of the Rev. Launce- lot Addison, a Royalist clergyman, who, after the Restoration, had been chaplain of the gar¬ risons at Dunkirk and Tangier, and at the time of the birth of Joseph was rector of Milston.

Later (1683) he was made dean of Lichfield. He was a man of character, attainment and considerable literary gift, which found its most interesting expression in devolutions of the Kingdoms of Fez and Morocco, * a historical sketch of lively character. Addison's mother was Jane Gulston, daughter of Dr. Nathaniel Gulston and sister of William Gulston, bishop of Bristol. Addison was brought up in a pleasant country and in a family of admirable manners; his home life is described by Steele as delightful. He went to schools in the neigh¬ borhood and to the Charter House School, where he acquired some knowledge of Greek and a considerable familiarity with Latin liter¬ ature.

In 1687 he entered Queen's College, Ox¬ ford, whence, after two years, he transferred to Magdalen. The change was the result of some excellent Latin verses, Unauguratio Regis Gulielmip in honor of King William, which attracted the admiration of Addison's preceptor and obtained for him a demyship. At Mag¬ dalen he lived a quiet, studious life, and his scholarly reputation is said to have extended itself to London. His academic career is chief¬ ly connected with Magdalen; his M.A. came from that college in 1693; he was made pro¬ bationary Fellow in 1697 and actual Fellow the following year; and a pleasant walk along the Cherwell to-day bears his name.

Addison's first published work was an Ac¬ count of the Greatest English Poets) (1693), chiefly interesting to-day because of the low plane which, following the taste of the times, he accorded to the great Elizabethans. Com¬ plimentary verses to Dryden (q.v.) the same year won for him the favor of the dictator. He next experimented with translation, ren¬ dering the fourth book of the 'Georgies, *two books of Herodotus, and the second book of Ovid's 'Metamorphoses.* This last task, though a distasteful one, had, according to Mr. Courthope, a marked effect on his taste in that it taught him to avoid extravagance of style. By this time he had made a fair name as a writer and had attracted the notice of the min¬ isters, Charles Montague, afterward Lord Halifax, and Somers, who may have induced him to write a

perfunctory (Address to King William *(1695), and who probably persuaded him to enter civil rather than ecclesiastical life. At all events, Halifax and Somers obtained for him, in 1699, a pension of £300 a year for foreign travel. One of Addison's recommen¬ dations for this honor had been his 'Peace of Ryswick,* a Latin poem (1697), and various trifling contributions to the (Musse Anglicanae* (1699). It was a critical year for Addison, in that his career was then determined.

Addison set out, in the. summer of 1699, for France, where he remained a year and a half, chiefly at Blois, studying the language. From December 1700 to December 1701 he was touring in Italy, whence he went to Swit¬ zerland and, in the autumn of 1702, to Vienna. Thence he visited the Protestant cities of Ger¬ many, reaching Holland in the spring of 1703, and,' in the fall, on receipt of news of the death of his father, returning to England. Some time previous to his return he had been deprived of his pension, for the death of King William, in 1702, led to the dismissal of Addi¬ son's patron, Halifax, and Addison was accord-

ingly out of employment. The literary result of his travels was a (Letter from Italy) in verse, and his prose (Remarks on Italy.* The latter is an interesting document in the history of English taste. Italy is interesting to Addi¬ son chiefly as the source of classical poetry, and his pleasure in it is almost wholly literary. His judgments, too, on the taste of the mediae¬ val church builders are made from a narrow classical point of view. During the journey, Addison wrote his (Dialogue on Medals * (1702) and the first four acts of (Cato.)

In 1704, Addison, on the recommendation of Halifax, was asked by Godolphin to write a poem on Marlborough's victory at Blenheim, and accordingly, in that year, produced (The Campaign, *a panegyric narrative in heroic couplets. The poem wras of such aid to the Whig party that Addison at once gained prefer¬ ment and was, in 1706, made under-secretary of state. His political duties did not keep him wholly from literature; in 1705 he helped Steele with (The Tender Husband, * a drama, and on 2 April 1706 himself signally failed with the presentation of his opera (Rosamond,-* though it had some success when printed. On the loss of his political office in 1708, he was al¬ most immediately made secretary to the Lord- Lieutenant of Ireland, Lord Wharton, and the same year sat in Parliament for Malmsbury, a position that he held till his death. From the Irish appointment dated his friendship with Swift

(q.v.). The friendship of the two suf¬ fered some strain when, in 1710, at the fall of the Whig ministry, they found themselves ar¬ rayed on opposite sides in a bitter struggle for ascendency. Addison wrote five numbers of the Whig Examiner (up to 8 October) in opposition to the Examiner of the Tories, of which Swift took charge in November. Most of his offices Addison lost with the change of the ministry, and was free to pursue the course on which his fame rests.

Steele had issued the first number of the Tatler on 12 April 1709. It appeared three times a week and was first issued as a news¬ paper, with different classes of news — politi¬ cal, social, literary, etc., purporting to come from different quarters of London. The paper, however, was not long in losing these distinc¬ tions and soon became chiefly moral. For this change Addison, who entered at the 18th num¬ ber and wrote 42 out of the total 271 numbers, may have been largely responsible. Coming to an end on 2 Jan. 1711, the Tatler was followed, on 1 March of the same year, by the Spectator , which, while modelled on the Tatler, was an improvement on it in all ways. It appeared daily, it was more essay-like in form, it was more varied in subject, more satirical in tone, and it addressed a wider range of readers, particularly women, in the belief that improve¬ ment in manners must begin with them. Since its place, as a form of literature, had been carefully prepared by the rise of the daily press, and, as. an organ of education, by the growing reaction against the dissoluteness of Restoration manners and literature, it had marked success. Its circulation is estimated to have been 10,000 copies toward the close of its career, 6 Dec. 1712 (a continuation, issued thrice a week, came to an end in 1714), and the sale of completed volumes was equally great. Addison contributed 274 papers to 236

by Steele; Addison's are nearly all signed by one of the letters C. L. I. O.

On 13 April 1713, (Cato *was acted. Though wholly different from the prevailing and the traditional English play in that it was built on severely classical and unromantic prin¬ ciples, and though succeeding generations have pronounced it to be a poem of noble sentiments rather than a dramatic play, it had great suc¬ cess and ran for 35 nights, an unprecedented period. This was largely due to the political situation, — the eve of the fall of Tory power and of Whig success, — and Addison was a man of such political eminence that his play was naturally to be regarded as of uncommon im¬ portance. Abroad, the play was well received. It was twice translated into Italian, twice into French and once into Latin, besides being often adapted. Voltaire praised it highly as a ((regu- lar tragedy, and regarded it as much superior to preceding English plays. Two years later*

Addison wrote (The Drummer, which was coldly received at Drury Lane.

In 1714, on the ascendency of the Whig party, Addison was made chief secretary to the Lord-Lieutenant of Ireland, the Duke of Shrewsbury, an office which he held till August 1715. From 23 December of that year till 9 June 1716, he wrote The Freeholder, a semi¬ weekly of 55 numbers altogether, designed to prove to the freemen of England the justice of the Whig cause and the need of the Protest¬ ant succession. In 1716, he was made a com¬ missioner for trade and the colonies. This same year he married Charlotte, Countess Dowager of Warwick, to whom he is said to have been long attached. The marriage has been called unhappy and there is a fairly estab¬ lished tradition to that effect ; in Pope's innuen¬ do he (<married discord with a noble wife.® For the tradition there is, however, no good evidence. By her he had one daughter, Char¬ lotte, who died unmarried, in 1797. His mar¬ riage was coincident with the height of his political career; in 1717 he was made secretary of state, an office which he resigned in March of the following year. His health was failing and he had never been a good public speaker.

The last half decade of his life was some¬ what embittered by two famous literary quar¬ rels. The first, with Pope, in 1715, was due, generally, to the fact that the two were essen¬ tially incompatible, and, in particular, to the fact that Pope felt aggrieved because Addison had praised warmly a rival translation of the (Iliad *by Tickell, and even went so far as to suspect Addison of being the real author. Addison's acquaintance with Pope began with a favorable comment in the Spectator on the (Essay on Criticism,* but thereafter he never spoke of Pope so highly as of the members of fthis little senate.® Addison may have advised Pope against adding to (The Rape of the Lock *the brilliant and charming machinery of the fairies, and Pope is said to have tried to dis¬ suade Addison from presenting (Cato* on the stage, neither pieces of counsel likely to in¬ crease the mutual respect of the two authors. The result was that long after Addison's death Pope published, in his < Epistle to Arbuthnot,* his .famous satire on Addison, already written during the latter's life, and then defended his course by the publication of a somewhat doc¬ tored correspondence.

In 1719, Addison and Steele found them¬ selves on opposite sides of a bill for definitively limiting the number of peers. Steele, though a Whig, opposed the party measure in a pam¬ phlet called the Plebeian

(14 March), and was answered by Addison five days later in the Old II hig. The contest ended in some personalities on Steele's part. Before a reconciliation could take place between the two life-long friends, Addison died of dropsy. He lies buried in Westminster Abbey.

By Addison's contemporaries and biog¬ raphers he is almost always spoken of as a man of fine intellect, lofty character, consider¬ ate and distinguished manners and great per¬ sonal charm. He has been called the chief architect of public opinion in the 18th century. His posthumous fame, of course, rests almost exclusively on his contributions to the Tatler and the Spectator , which contain nearly all that he had to say of permanent value. Their in¬ fluence was directed, socially, to the bettering of contemporary life and manners and the in¬ culcation of virtue, and, intellectually, to the improvement of the taste of his generation ; of the former his mild satires on the affecta¬ tions of his time are perhaps the best example, and, of the latter, there may be taken his some¬ what formal but enlightening examination and criticism of (Paradise LostP In literary his¬ tory he is commonly said to have contributed to the art of novel-writing an unprecedented skill in drawing individual character or per¬ sonality and of thus preparing the way for Richardson (q.v.) and Fielding (q.v.) ; and the proof of this remark lies in his lively sketches of the members of the Spectator Club, particularly Sir Roger de Coverly. As a stylist he has, in his own field of inoffensive social satire and gentle humor, no superior, and the famous phrase of Dr. Johnson that ((Whoever writes to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison, remains largely true. Addison brought English prose to a degree of finish and accessibility that had been wanting before. Even his great predecessor, Dryden (q.v.), one of the most flexible and easy of prose-writers, has not quite that sense of the audience which Addison possessed to so great a degree, and which is the basis of his secret of writing easy, readable prose. Technically, this is Addison's contribution to the art of expression.

Bibliography. — Editions of Addison's works are numerous. Bohn's (British Classics> contains his complete works. (The Spectator *was edited by Morley (1868) and by G. Smith (8 vols., 1898). The famous essays on Addison are Johnson's, in the (Lives of the Poets,) Macaulay's (The Life and Writings of Addi¬ son, } and Thackeray's in the (English Humor¬ ists, * the two last being brilliant rather than sound. The life by W. J. Courthope in the (English Men of Letters Series * (1884) is ex¬ cellent, and is more convenient than the older and longer life by Lucy Aiken (1846). For Addison's place in literature consult Perry, T. S., { English Literature in the 18th Century > (1883), and Beljame, A., (Le*

public et les homines de lettres en Angleterre au XVIII siecle (1881; 2d ed., Paris 1897) ; they are more satisfactory than the criticism in Taine's (History of English Literature* (1863), or

Professor Gosse's (A History of 18th Century Literature, 1660-1780) (1889).

William T. Brewster, Professor of English, Columbia University.

ADDISON'S DISEASE, a disease asso¬ ciated with diminution of the functions of the suprarenal glands, a hypoadrenalemia. It is characterized by general depression of the mobility, as evidenced by pronounced muscular weakness (asthenia), by anaemia, lowered tone of the circulatory apparatus, irritability of the stomach and pigmentation of the skin. This last symptom is the most pronounced and was fully described by Addison in 1855. The dis¬ ease is more common in men and between the twentieth and fortieth years. The heart, muscle also suffers, very markedly, there being frequent attacks of rapid and feeble pulse with vertigo, and fainting, sometimes fatal. Headache is frequent. In the pronounced types there is usually a severe disease of the suprarenal struc¬ tures, most often a tuberculosis, less frequent¬ ly a malignant disease (carcinoma). In mild inflammatory states of the adrenals, recover¬ able hypoadrenalemias may occur. Sudden death is a not infrequent result in acute hem¬ orrhagic disease of the adrenals. A number of irregular forms of suprarenal disease are known, Addison's disease being but one of the more pronounced and terminal states.

The treatment is symptomatic with the pro¬ longed use of the suprarenal gland. See Ad¬ renals.

ADDLED PARLIAMENT, The, a nick¬ name given to James I's second Parliament, of 1614, because it passed no statute and fin¬ ished no business. It did, however, settle a far more important question than any point of administration, namely, that the Commons were to have the power of the purse there¬ after — that is, the rule of the kingdom — unless the Crown crushed them by force. In a word, it proclaimed the revolution, though not consciously. The previous Parliament had been dissolved for not granting supplies until the King had abolished the illegal imposts and regulated the Court of High Commission by statute — that is, given church as well as state into their hands. The elections for 1614 were contested with a passion unknown for genera¬ tions ; the court candidates were overwhelm¬ ingly defeated, and 300 of the victorious ones were new men sent up for the first time, among them John Pym, Thomas Wentworth (afterward Earl of

Strafford) and John Eliot. After a two months' session they became in¬ volved in a quarrel of privilege with the Lords, and the King dissolved the House on that pre¬ text, — really on the point of their refusal of supplies, — and imprisoned four of them.

ADDRESS, The, in British parliamen¬ tary procedure, is the answer to the King's Speech (q.v.) moved in both Houses. In former times it was composed of an answer to each paragraph in the speech, but it now forms a single resolution expressing the thanks of the House to the Sovereign for the speech. The debate on the address occupies the first days of the session, but both Houses show their independence by formally discussing other busi¬ ness before considering the answer to the King's Speech. The mover and seconder of the address are chosen from the younger sup-

porters of the Ministerial party. If any amend¬ ments condemning the policy of the govern¬ ment are moved to the address and carried, the ministry usually resigns.

ADE, George, American journalist and au¬ thor: b. Kentland, Ind., 9 Feb. 1866. He made his mark as a writer of (Stories of the Streets and the Town) in the Chicago News, which showed remarkable variety of motive and lo¬ cal reporters' knowledge. He published (Ar¬ tie, } made up from these, and 1897 the dialect story (Pink Marsh) ; in 1901-02 two sets of (Fables in Slang,) full of pungent wit and in¬ timate knowledge of the less agreeable phases of human character ; in 1903 the satirical comic opera (The Sultan of Sulffi ; a musical com¬ edy, (The County Chairman } ; a comedy of college life, (The College Widow *; a play for William H. Crane called (Father and the Boys.* Still other plays produced have been: (Just Out of College, *(The Fair Co-Ed.,* (The Sho-Gun, *(The Old Town,* (Marse Covington, * (U. S. Minister Bedloe* and

Nettie. * His published books, in addition to those mentioned above include (In Bahel, *(The Girl Proposition,* (People You Know, *ˆKnocking the Neighbors, > (True Bills, > (In Pastures New,* (The Slim Princess) and (Ade's Fables.) Delegate to the Republican National Convention 1908, trustee Purdue University 1909, and member of the National Institute of Arts and Letters.

ADEE, Alvey Augustus, American diplo¬ mat : b. Astoria, N. Y., 27

Nov. 1842, son of a fleet surgeon ; was secretary of legation at Madrid 1870-77, charge d'affaires at different times; in 1878 became chief of the United States diplomatic bureau, 1882 third assistant secretary of state, in 1886 second assistant, which he still remains. He was secretary of state ad interim 17-29 Sept. 1898; and acting secretary during some of the most acute Chinese troubles of 1900.

ADELAER, a'de-lar (Norwegian, signify¬ ing (<The Eagle®), the honor title conferred on Kurt Sivertsen, Norwegian-Danish ad¬ miral: b. Brieg, Norway, 1622; d. Copenhagen, Denmark, 1675. After early service in the Dutch navy, he joined the Venetian navy and rising to the rank of squadron commander, achieved his most brilliant victory at the Dar¬ danelles, 13 May 1654, when he compelled the Turks to surrender. He afterward became commander of the Danish fleet, but died sud¬ denly when about to start on an expedition against Sweden.

ADELAIDE, capital of South Australia on the river Torrens, seven miles by rail southeast of Port Adelaide, on St. Vincent Gulf, and 506 miles northwest of Melbourne. It stands on a large plain, and is walled in on the eastern and southern sides by the Mount Lofty range ; the town proper is enclosed by a wide belt of park lands, laid out in terraces, making it one of the most beautiful cities of Aus¬ tralia. It was first surveyed and staked off by Col. William Light in 1837, and named after the queen of William IV. The Torrens divides the town into North and South Ade¬ laide, the former being occupied chiefly with residences and the latter forming the business portion of the town. Four substantial iron bridges span the Torrens, which has been

formed by a dam into a lake one and one-half miles long. The streets are broad and regu¬ larly laid out, especially in Adelaide proper, to the south of the river, where they cross each other at right angles, and are planted with trees. Among the public buildings are the new Parliament Houses, erected at a cost of about $500,000 ; the government offices, post-office and town hall ; South Australian In¬ stitute, with museum, library and art galleries ; and hospital. There are a number of fine churches, including the Anglican Cathedral of St. Peter. The botanical garden covers more than 40 acres of ground, and many other beau¬ tiful parks and squares embellish the city. The chief manufactures are woolen, leather, iron and earthenware goods, and there are flour mills, mines and metallurgic works ; but the chief importance of Adelaide depends on its being the great emporium for South Aus¬ tralia. The city controls the trade of the large back country and rich mining districts, which have a population of 200,000 within a radius of 10 miles from the town hall. Wool, wine, wheat, flour, copper, silver, lead, ores and concentrates, skins, butter, tallow

and leather are the staple articles of export. The value of total exports in 1913 was $49,048,815; of imports, $36,741,700. Among the educational institutions the most important is the Ade¬ laide University, with a working capital of $894,850, including a conservatory of music, schools of engineering, science and commerce. It was opened in 1876 and has about 1,000 pupils, and 25,000 volumes in its library. Other institutions include a school of mines and in¬ dustries, the largest in Australia; St. Peter's Episcopal College ; St. Barnabas Theological College, opened in 1881, and Prince Alfred (Wesleyan) College. It is the seat of an Anglican and of a Roman Catholic bishop. Adelaide, incorporated in 1840, is the oldest and third largest municipality in Australasia. The government is vested in a mayor elected annually, six aldermen elected for three years, two auditors and two councillors. Adelaide has been very successful in carrying on mu¬ nicipal enterprises. It is required that all the meat furnished to the population of over 200,000 must be slaughtered in the municipal abattoirs. The Municipal Tramway Trust op¬ erates the city and suburban electric lines, and the Municipal Harbor Trust conducts the business of the port. The city also carries on the usual public utilities • — water supply, light¬ ing, etc. Area, including parks, 3,700 acres. Pop. (1917), city proper, 43,438; metropolitan area, 205,443.

Port Adelaide, its haven, dates from 1840. It is the principal port of call for vessels ar¬ riving from Europe ; has a fine harbor, ex¬ tensive quays and railway communication with Melbourne, Sydney and Brisbane. Pop., local gov. area, 24,015.

ADELARD, or ˆTHELHARD, of Bath, English philosopher and mathematician of the 12th century. Little is known of the facts of his life, except that he traveled widely, visiting Greece, Asia Minor and Africa. He wrote (Perdifficilis Quaestiones Naturales> and (De Eodem et Diverso,* a philosophical allegory in which he sought to reconcile the theories of Plato and Aristotle. He also made a Latin translation of Euclid and of several Arabian

mathematical treatises. See Arithmetic, His¬ tory of.

ADELBERT COLLEGE. See Western Reserve University.

AD'ELIELAND', an Antarctic continent discovered 20 Jan. 1840 by Du Mont d'Urville. It consists of a chain of mountains without prominent peaks, with a few shallow bays filled with icebergs, and a number of islands with rounded summits.

AD'ELOCHOR'DA, a group standing at the base of the branch of phylum Chordata , and including certain animals, formerly sup¬ posed to be worms, but now placed in the same group as the vertebrates. The class Adelochorda is represented by Balanoglossus, while with it are provisionally associated two forms of doubtful position, the worm-like Rhabdopleura and Cephalodiscus. The Adelo- cephala are worm-like, but from the fact that the body is in part supported by a structure supposed to be homologous with the notochord of true vertebrates, and that the animal breathes through gill-slits, like those of the lowest vertebrates, it is supposed to be related to some extinct form which gave rise to the vertebrates. It is also itself probably an an¬ cestral persistent form. If we throw out the doubtful forms Rhabdopleura and Cephalodis¬ cus, leaving only Balanoglossus, we have the old group Enteropneusta. A typical example of the Adelochorda is Balanoglossus (q.v.).

ADELPHI, ((The Brothers,® the last and in the truthful portrayal of human nature, perhaps, the best of the six comedies of Terence, had its first performance in 160 b.c. The action turns upon an old yet ever new problem, whether a policy of good-natured indulgence which seeks, though it does not al¬ ways win, mutual confidence between father and son, will lead to better results in the up¬ bringing of young people than one of sternness and insistent preaching of duty. In the sequel neither plan is successful. Both of the young brothers (one of whom has been adopted by his uncle) compromise themselves by love-af¬ fairs. Terence, as his admirers might con¬ jecture in advance, favors the principle of the (<golden mean® in education as in all other things. But while his answer to the problem of this play is no clearer than life itself com¬ monly affords, the advantage on the whole ap¬ pears to lie with the theory that parental au¬ thority, to be effective, must rest upon a friendly understanding and a tactful allowance for the difference in the point of view of youth and age. The general idea is worked out with great skill and abundant humor. The last act, in particular, is conceived in a spirit of drollery that is rare in Terence. The 'Adelphi, *like all of Terence's work, has had a great influ¬ ence upon modern literature. Among the plays that are indebted to it may be mentioned Moliere's 'ficole des maris,* Baron's 'L'Ecole des peres, *

Fagan's (La pupille, *Garrick's 'Guardian,* Cumberland's 'Choleric Man) and Shadwell's (Squire of Alsatia.* Sar- geaunt's translation has been reprinted in the 'Loeb Classical Library) (New York 1912).

Nelson G. McCrea,

Professor of Latin Language and Literature, Columbia University .

ADELPHI, a district in London, England, south of the Strand, close to Charing Cross. It was so named from the architects, four Scottish brothers Adams (Greek adelphoi, brothers). There is also a theatre of that name in the Strand.

ADELPHI COLLEGE, Brooklyn, N. Y., a college for women, non-sectarian, was incor¬ porated by the regents of the University of the State of New York, 24 June 1896. It is intended to be a college of liberal culture. The requirements for admission and graduation are the same as those of the leading Eastern col¬ leges. It is the only institution in Brooklyn in which a woman may obtain the usual bac¬ calaureate degrees. The curriculum is ar¬ ranged semestrally, and eight semesters are required for graduation. The courses in ped¬ agogy are arranged so that the studies prepar¬ atory to the profession of teaching may all be taken as a part of the work offered for the degrees of bachelor of arts and bachelor of science. From the beginning the college has always offered special facilities to students who wish to enter the profession of teaching. It also makes provision in afternoon, evening and Saturday morning classes for teachers in pub¬ lic schools who desire to study for a degree without giving up their positions. Connected with the college are the Normal School for Kindergartners, with a two years' course, or¬ ganized in 1893. The college reported in 1920: Professors and instructors, 22 ; students, 533 ; volumes in the library, 14,000. Adelphi Col¬ lege maintains a coeducational preparatory de¬ partment, known as Adelphi Academy, which has 50 instructors and 760 students. The total value of the property and endowments of the college is $600,000. The total annual income is $118,000.

ADELSBERG, a'dels-berk, Austria, a mar¬ ket town of Carniola, 22 miles by rail north¬ east of Triest. Pop. 4,000. It is a favorite summer resort for tourists attracted there by the celebrated stalactite cavern which, with its four chambers and lateral recesses, was known as early as 1213, but was not rediscovered in modern days until 1816. The length of its underground passages, through part of which flows the river Polk, is over five miles ; in 1890 a connection was discovered with the neighboring Ottokar grotto. About four miles to the north is

the Magdalene grotto, noted for its extraordinary specimens of subterra¬ nean life.

ADELUNG, a'de-lung, Johann Christoph,

German philologist, grammarian, lexicog¬ rapher and librarian : b. Spanketow, Pom¬ erania, 8 Aug. 1732; d. Dresden, 10 Sept. 1806. His services to the standardizing of the Ger¬ man language were of incalculable value. His chief works are: ‘Grammatisch-Kritisches Worterbuch der hochdeutschen Mundart *(1774-86) ; (Ueber den Ursprung der Sprache und den Bau der Worter) (1781) ; ‘Deutsche Sprachlehre fur Schulen) (1781); a periodical Magazin fur die deutsche Sprache (1 782— 84) ; ‘Ueber den deutschen StiP (1785) ; ‘Directorium Diplomaticum* (1802) ; and ‘Mithridates, oder Allgemeine Sprachenkunde) (1806). Adelung was chief librarian of the Electoral Library at Dresden from 1787 until his death.

ADEN, a'den, or a'den, Arabia, peninsula and town belonging to Great Britain, on the southwest coast, 105 miles east of the strait of Bab-el-Mandeb, the entrance to the Red Sea. The peninsula is a mass of volcanic rocks, five miles long from east to west, and rising to 1,776 feet. It is joined to the main¬ land by a narrow, level and sandy isthmus. The town is on the eastern shore of the penin¬ sula, stands in the crater of an extinct volcano and is surrounded by barren, cinder-like rocks. The main crater is known as the Devil’s Punch-bowl. The climate of Aden is nor¬ mally hot and dry with hot, sandy winds at certain seasons. The rainfall during 1916 was four inches, the average 'is three inches. The maximum temperature in 1916 was 101°, in July, and the minimum was 68.2°, in December. Nevertheless the climate is unusually healthy for the tropics. The Romans occupied it in the 1st century a.d. Till the discovery of the Cape route to India (1498) it was the chief mart of Asiatic produce for the Western na¬ tions ; but in 1838 it had sunk to be a village of 600 inhabitants. The increasing import¬ ance of the Red Sea route gave Aden great value as a station for the British to hold ; and in 1839 after a few hours’ contest it fell into their hands. It is of high importance both in a mercantile and naval point of view, especially as a great coaling station ; it has a garrison and strong fortifications. The pop¬ ulation and resources of the place increased rapidly after 1838, and the opening of the Suez Canal in 1869 gave it a great impetus. The affairs of the port are administered by a board known as the Aden Port Trust. The annual

gross revenue of the settlement is about $2,279,417. For purposes of government Aden is included in Bombay Presidency of India and the currency and postage stamps are the same as those used in that country. The rupee ($0.3244J is the currency unit. Whereas Aden of itself produces and con¬ sumes but little, conditions at the port are important, as it is the market through which a large commercial district is best reached. Aden's only industries worthy of mention are the manufacture of salt and of cigarettes. The total sea-borne merchandise trade for the year 1915-16 was valued at $31,804,667 against $27,875,101 in 1914-15. According to the Aden Port Trust returns, imports of merchandise in 1915-16 were valued at $17,010,190, as com¬ pared with $15,200,389 in 1914-15, and of treas¬ ure $1,305,702, against $1,996,230, respectively. Exports of merchandise increased in value from $12,674,712 in 1914-15 to $14,794,477 in 1915-16, but those of treasure declined from $2,601,368 to $1,890,934. Exports to the United States reached a value of $2,427,764, an in¬ crease of approximately 50 per cent over the exports for the preceding year and formed approximately 15 per cent of the total exports. Imports of American goods reached $2,595,600, practically double that for the preceding year. Cotton manufactures, grain and pulse, coffee, hides and skins, tobacco and coal are the .chief articles imported. Exports include principally cotton manufactures, skins, coffee, grain, to¬ bacco, spices, sugar, gums and salt. It is a telegraphic station on the cable between Suez and Bombay, and on the line to Zanzibar and the Cape. To provide for its growing popula¬

tion, a considerable territory on the mainland was acquired and added to the peninsula, the total area (including the island of Perim) being about 80 square miles. Population, about

46,000.

ADENEZ or ADANS LE ROI, ad'na or a'dan-le-rwa, a French troubadour and poet of the 13th century, attached to the courts of Henry III, Duke of Brabant, and of Guy de Dampierre, Count of Flanders. In 1270 he accompanied the crusade which ended disas¬ trously at Tunis with the death of Louis IX, and returned by way of Sicily and Italy. His chief claim to remembrance is Eleomades,* a long roman d' aventures based on Moorish and Spanish traditions, an edition of which in two volumes was published in Brussels (1863-66). His other poems are, (Les enfances Ogier,} (Berte aus granspies) and Veuves de Co- marchisP His writings are distinguished by the purity of their French and by exact de¬ scriptions of places through which he traveled. His romances were edited by A. Scheler and A. van Hasselt

for the Academie Imperiale et Royale of Brussels (1874).

ADENEY, Waltfer Frederic, English cler¬ gyman, educator and author : b. Ealing, Mid¬ dlesex, England, 14 March 1849. He was edu¬ cated at New College and University College, London. For 17 years he was pastor of the Congregational Church, Acton. For two years he was lecturer in biblical and systematic theology at New College, London; 1889-1903 professor of New Testament exegesis and church history. Since 1903 he has been prin¬ cipal of the Lancashire Independent Col¬ lege, Manchester. He has been a voluminous author, contributing nine volumes to the (Pulpit Commentaryˆ two volumes to the Expositor's Bible, > editing the (New Cen¬ tury Bible, } besides several volumes and many articles.

ADENITIS, ad'e-ni'tis, or LYMPH¬ ADENITIS, lim'fad-, inflammation of the lymphatic glands or of the vessels which lead into and bind them together. In either case the inflammation may become acute or chronic. The acute form is usually caused by a wound or a sore on the skin or mucous membrane. The inflammation then extends from the first lesion along the series of lymphatic vessels, causing intense pain in the glands with which these vessels connect. If the original wound or abrasion has been infected, the inflammation is accompanied by the gathering of pus around the glands. Where the . inflamed condition is severe, fever, headache, sickness of the stomach and general prostration may be added to the symptoms. The chronic form of adenitis is usually caused by tuberculosis or syphilis. In such cases the treatment consists in putting the affected part at rest and applying moist, antiseptic dressings and regulating the bowels by means of diet and laxatives. If suppuration follows, the pus must be freed by lancing. When tonic and constitutional treatment fail, surgical removal of the enlarged glands is resorted to.

ADENOIDS, a term applied to an ex¬ cessive growth of spongy tissue lying back of and above the soft palate. The growth may begin in early infancy, and if not removed

may continue until the age of puberty. In the first stages the tissue is soft and apt to bleed easily, but as the victim becomes older it grows fibrous and harder, some¬ times causing an enlargement of the glands. Adenoid tissue is present in all normal children, the disease being merely abnormal growth of this tissue, due to various causes.

Among these may be bad hygienic sur¬ roundings, improper diet, poor ventilation, and often, in large part, it is due to heredity. By filling the air passages adenoid growths render breathing difficult and cause a perma¬ nent expression of the features not unlike that of the feeble-minded. Sometimes the growth of the facial bones may be affected, the teeth being irregular, the upper jaw may become narrowed and the hard palate unduly arched. The mentality of the sufferer is also affected, the mind being sluggish and incapable of con¬ centration. This condition is termed apro- sexia. All the evils due to habitual mouth¬ breathing are also likely to result, such as bronchitis, weak lungs and asthma. Digestive disorder and catarrh of the stomach or of the intestines may also result from the constant swallowing of mucus.

Treatment is usually by means of surgical operation, which should be resorted to as soon as any of the above symptoms appear. The operation is without danger, except to those prone to excessive bleeding, on whom no oper¬ ation should be attempted. Timely removal invariably causes a marked improvement in the child's mentality and physical condition. If, however, treatment is delayed until bone development has set in, absolute cure may be impossible, mouth-breathing having become a confirmed habit.

ADERNO, a'der-no, Italy, town of Sicily, 22 miles northwest of Catania, near Mount Etna. It is famous as the historic Adranon, the site of the ancient Roman temple of Vul¬ can, guarded by a thousand gods, ruins of which are shown, and also of the city walls, founded by Dionysius I, 400 b.c. Here Tim- oleon defeated Hicetas of Syracuse, 344 b.c., and Adranon was the first city captured by the Romans, 263 b.c., in the first Punic war. The Norman castle and the convent of St. Lucia, dating from 1157, with its church columns of black lava and its frescoes representing Adela- sia (granddaughter of Roger I, the founder) taking the veil, rise in the centre of the town. Aderno is a busy market town with an im¬ portant trade in agricultural products. Pop.

30,200.

ADHEMAR DE CHABANNES, a'de- mar de sha'ban', French chronicler: b. Cha- bannes about 988; d. Jerusalem about 1030. He adopted a monastic life and wrote several works of which the most important is (Chron- icon Aquitanicum et FrancicumP or (Historia FrancorumP (3 vols.). The third volume cover¬ ing the period from 814 to 1028, as a valuable historical source, is published in (Monumenta Germanise historica) Band. IV (Hanover and Berlin 1826-92). Other works are

published in Migne, J. P., (Patrologia Latina, } (Tome CXLI, Paris 1844-55). Adhemar died while on a pilgrimage to Jerusalem. Consult Mod¬ ifier F., <Les sources de l'historie de France' (Vol. II, Paris 1902),

ADHESION, in physics , the force which holds together two surfaces brought in con¬ tact; distinguished from cohesion, the mutual attraction exerted by particles of the same body, and from affinity, since the particles ad¬ hering remain unchanged. It is a force ex¬ erted on each other by the molecules of the adhering bodies, and not to be confounded with mere mechanical contact due to pressure. The wetting of solid bodies is an instance.

It usually happens that when a solid and a liquid come in contact, a film of the liquid adheres to the solid too firmly to be detached, showing its adhesion to the solid to be stronger than the cohesion of its particles or the force of gravitation, as it can be removed only by forcible rubbing or evaporation. On the other hand, solutions are supposably cases where the adhesive force of solid and liquid overbalances the cohesive force of the solid, so that it loses its form and adheres particle by particle ; but see Solutions, the true theory of which is keenly debated. The force of adhesion is measured by poising a metal plate on a bal¬ ance, and then finding what additional force is required to detach it from the surface of a liquid which does not wet it (otherwise it would be measuring the cohesive force of the liquid) nor act on it chemically. The phe¬ nomena of capillary attraction depend on adhesion. Solid bodies also adhere to solids ; most smooth surfaces will adhere ; the smooth¬ er the tighter; and two plates of polished glass laid together can hardly be parted without breaking them. If the solids are pressed to¬ gether, it usually increases the adhesive force ; but it depends but little on atmospheric pres¬ sure. Friction is a looser kind of adhesion, which prevents surfaces moving freely on each other, and may result from gravitation or mechanical appliances. Plating, gilding, etc., also depend on adhesion. Soldering, the use of mortar, cementing, gluing, etc., are familiar applications of the principle, intermediary sub¬ stances being employed, whose particles have at once great cohesion among themselves and great adhesion to each of the bodies to be joined. A familiar example is the splitting of a thin sheet of paper by pasting it between two sheets of cloth and pulling them apart after it has dried ; the adhesion of paste to paper and cloth is so great that the paper fibres yield to it. Furthermore, air and other gases adhere to solids ; a favorite children's experiment is to float a dry needle in a basin of water, it resting on a cushion of air; and when ther¬ mometers are filled with mercury it has to be boiled in them to expel the air that adheres to the glass. Every material body,

and every par¬ ticle of such body in however fine division, is surrounded by its own atmosphere of con¬ densed gases, which are an efficient factor in many physical and chemical phenomena ; this property in comminuted bodies is called ad¬ sorption, and in metallic substances is some¬ times so avid that they grow red-hot.

In pathology, adhesion is sometimes applied to the closing of a wound. It occurs when two granulating surfaces are kept in contact that they may fuse and the wound unite by adhe¬ sion. The pleura, pericardium and peritoneum often adhere when inflamed, and in inflamma¬ tions of the vermiformis appendix, pelvic or¬ gans, etc., more or less extensive adhesions

sometimes occur, and special operations may be necessary to allow the free functioning of the organs.

ADRABATIC TRANSFORMATION.

See Thermodynamics.

ADIABENE, a'de-a-be'ne, an ancient king¬ dom, lying between the Tigris and its two trib¬ utaries, the Upper and the Lower Zab. At one time it included all of Assyria proper and the Mesopotamian province of Nisibis and the district of Ecbatana. In 116 a.d. the country was conquered by Trajan, who made it a Roman province under the name of Assyria. Hadrian, however, allowed it to resume its autonomy under Parthian suzerainty. The capital of the kingdom was Arbela.

AD'IAPH'ORISTS, a-di-af or-ists, or AD- IAPHORITES, a party or wing of the Lu¬ theran reformers of Germany, who held that certain things practised by the Roman Catholic Church were indifferent and might be received. In 1548 an ecclesiastical controversy broke out among the reformers. The Emperor Charles V, having issued a paper popularly called the ˆInterim," in which he prescribed what faith and practice the Protestants were to adopt till the Council of Trent should dictate a perma¬ nent form of belief and worship, Maurice, Elector of Saxony, urged Melanchthon and his friends to decide what portions of the docu¬ ment they would accept and follow. Melanch¬ thon considered that to a very large extent the ˆInterim" might be accepted and obeyed. A controversy in consequence arose between the followers of Luther and those of Melanch¬ thon. It was called the adiaphoristic contro¬ versy, and embraced two questions: (1) What

things were indifferent; and (2) whether, with regard to things indifferent, the Emperor could or could not in conscience be obeyed.

ADI-BUDDHA, a-de-bud-ha, from the San¬ skrit, the Primordial Buddha, a conception of Buddha due probably to the influence of Chris¬ tianity. It came into vogue among the North¬ ern Buddhists about the middle of the 10th century. In this conception he is represented as self-existent and omniscient.

ADIGE, a'de-je, a considerable river of North Italy, which has its source, in the Alps of Tyrol, above Brixen; it enters Lombardy by Bolzano and the valley of Trento, flows in a southern direction by Rovereto, parallel to and for the most part about six miles from the lake of Garda, then, turning abruptly toward the east, passes through Verona and Legnano; it afterward enters the great delta between the Brenta and the Po, and, forming several branches, empties its waters into the Adriatic Sea. It is a deep and rapid stream, dividing by its course the old Venetian territories from Lombardy proper. The valley of the Adige has been rendered forever memorable by the wars of Bonaparte and the World War of 1914-18.

ADI-GRANTH, a'de-granth, the Bible of the Sikhs (q.v.), mainly compiled by the guru (spiritual guide) Arjun (1584-1606), fifth successor of the founder Nanak (q.v.). He gathered up the poetical pieces of his four predecessors and fragments from other great teachers like Ramananda, Kabir, Namdev, etc., and added compositions of his own. The tenth and last Sikh guru, Govind (1675-1708), made

additions to it and composed an entirely new Granth, the ((Granth of the Tenth Reign." The language of these is an archaic Punjabi called Gurmukhi (<(from the guru's mouth"). These Granths, with the biographies of gurus and saints, and instructions for ritual and dis¬ cipline, comprise the Sikh sacred books.

ADINOLE, a variety of the mineral albite.

ADIPATE, any salt of adipic acid (q.v.). Thus the compound of adipic acid with sodium is called sodium adipate.

ADIPIC ACID, an organic acid having the formula CcHioCh, and crystallizing in mono¬ clinic liminse which are sparingly soluble in cold water, but freely so in alcohol and ether. It melts at 300° F. and is formed by the action of nitric acid on natural fats.

ADIPITE, a gelatinous mineral substance of the same composition as

chabazite (q.v.).

ADIPOCERE, ad'i-po-ser' (Lat. adeps, fat, + cera, wax), a fatty substance consisting largely of palmitic, stearic and margaric acids, combined to some extent with ammonia. It is sometimes formed by the decompostion of ani¬ mal matter from which air has been excluded. It was first observed by Fourcroy. The most notable example of its occurrence was in the Cimetiere des Innocens at Paris. A large num¬ ber of coffins had been piled together in this cemetery for many years, and in 1786-87, when the coffins were removed, it was found that in many cases the corpses had been changed into shapeless masses of a dingy white color and waxy consistency, only the bones remaining unaltered. Adipocere is not a result of the de¬ composition of albuminous tissue, but is formed from the fats that are present in the body at the time of death, the fatty matter collecting to¬ gether, undergoing further decomposition and finally losing its glycerine and oleic acid. A similar substance, called bog-butter, is occasion¬ ally found in peat bogs in Ireland and Wales. Sometimes spelled adipocire.

ADIPOCERITE, a mineral better known as hatchettite (q.v.).

ADIPOSE TISSUE, animal tissue con¬ sisting of vesicles filled with fat or oil and supported by a network of capillary blood-ves¬ sels. Each drop of fat is confined within a protoplasmic envelope thickened at one part where a flat nucleus is found. Adipose tissue is found in a considerable layer under all skin surfaces, around the nerves and large vessels, and around the kidneys, joints, etc. The vesi¬ cles are round or oval, the tissue is organic and vital; fat is secreted from the blood-ves¬ sels. The fat is unorganized and devoid of vitality. Adipose tissue differs from cellular tissue in that the vesicles are closed so that even when fluid the fat does not escape.

ADIPOSIS DOLOROSA, a special form of endocrinopathy first described by Dercum in 1892, and characterized by enor¬ mous collections of fat in different parts of the body, not in the hands or feet, and associ¬ ated with marked tenderness to pressure over the fatty deposits, neuralgic pains and other signs of interrelated endocrinopathic disturb¬ ance. It is but one of a group of related syn¬ dromes which are related to faulty metabolism of the fatty structures, chiefly of the skin.

ADIRONDACK MOUNTAINS

Various types of lipomatosis belong in the group. The precise mechanisms which bring it about are not yet worked out, but pluriglandu¬ lar defects are probably the chief endocrinosus glands at fault being a combination of the gonads (generative glands) and the thyroid. Opotherapy has occasionally been of service. Consult Jelliffe and White, cDisease of the Nervous SystenP (1917).

ADIRONDACK MOUNTAINS, a group in the northeastern part of New York State, lying between the depressions occupied by Lake Champlain on the east, the St. Lawrence on the northwest and the Mohawk River on the south. The group is sometimes included in the Appalachian system, but physically and geologically the two uplifts are quite inde¬ pendent. The Adirondacks cover an area of more than 12,000 square miles and include within their limits most of the counties of Clinton, Franklin, Essex and Hamilton, and portions of St. Lawrence, Lewis, Herkimer and Warren. They are formed by several folds arranged parallel or en echelon, with a north¬ east-southwest trend, sloping on either side toward the narrow longitudinal valleys that separate the individual ridges. Most of the peaks have a rounded outline due to long-con¬ tinued erosion, although in the northern part, where the highest elevations are found, the peaks are bold and picturesque and have bare rock walls rising several hundred feet in ver¬ tical escarpments. Avalanche Pass, Indian Pass and Wilmington Notch are the most noteworthy of several passes formed by these escarpments. The summit of the group is Mt. Marcy, 5,344 feet above the sea, and there are many prominences exceeding 4,500 feet, in¬ cluding Mt. McIntyre, 5,112; Skylight, 4,920; Whiteface, 4,872; Santanoni, 4,644; and Nipple Top, 4,684 feet. Toward the south and west the elevations become less pronounced and rise but a few hundred feet above the level of the plateau, which stands 1,500 feet or more above the sea. The parallel ranges are interrupted frequently by gaps or passes; some of them, like the Avalanche Pass and Indian Pass, pos¬ sessing beautiful scenic features. Gorges and waterfalls occur along many of the stream valleys, the Ausable Chasm being especially noteworthy.

Rivers and Lakes. — The Adirondacks form the water parting between the Hudson and St. Lawrence, both of which streams receive many important tributaries from this region. Most of the western region drains directly into the St. Lawrence through the Oswegatchie, Grass, Raquette and St. Regis rivers, but a small por¬ tion is drained by the Black River, which flows into Lake Ontario. On the eastern side there are the Saranac and Ausable rivers and many short streams flowing into Lake Champlain. The Hudson River receives the waters of the Sacandaga, Indian and Boreas, and has its source in the interior of the

mountains in the northeastern part of Hamilton County.

The lakes are perhaps the most attractive feature of the Adirondacks ; they are distrib¬ uted over the entire area to the number of many hundreds. The greater proportion lie in the larger valleys, to which they conform more or less closely in outline, being elongated along a northeast-southwest axis. Many, however, are nestled on the higher slopes at an eleva¬

tion of 2,500 feet or more above the sea. Lake Tear of the Clouds on the crest of Mt. Marcy has an altitude of 4,320 feet. Lakes Champlain and George, the largest of the Adirondack lakes, are among the most attractive sheets of water in the United States. Among the smaller lakes much frequented by tourists are Long, Raquette and Blue Mountain in Hamilton County, the Fulton Chain in Hamilton and Herkimer counties, St. Regis and the Saranacs in Franklin County and Lake Placid in Essex County. Most of the lakes are of glacial for¬ mation, the outlets of the old rivers having been obstructed by deposits of glacial material.

Geology and Mineral Resources. — The strata of which the mountains are formed be¬ long to the most ancient geological period, the Pre-Cambrian, consisting for the most part of crystalline formations which were uplifted long before the Appalachian ranges had been de¬ fined. Gneisses, granites and basic igneous rocks predominate, although there are small areas underlaid by limestones and quartzites. One of the most prominent types is a basic feldspar rock called anorthosite, composed al¬ most entirely of the mineral labradorite. It constitutes the highest peaks in Essex County. On the borders these ancient formations are overlaid by early Paleozoic strata of Cambrian, Ordovician and Silurian age, which have been little disturbed from their original horizontal position. The whole region was invaded by the great northern ice-sheet, which eroded and polished the rock surfaces and upon its retreat left a heavy mantle of drift covering all but the highest elevations. Valuable ores and min¬ erals occur at numerous localities. The de¬ posits of iron ores have been of great economic importance, although in recent years the indus¬ try has suffered from competition with the Lake Superior and Pennsylvania ores, which can be extracted at much less expense. The mines of magnetite ore near Port Henry yield a large annual output, which is shipped to dis¬ tant points for smelting. There are also de¬ posits at Lyon Mountain, Lake Sanford and Benson Mines and other localities, which are not exploited at present. One of the richest graphite mines in the United States is located at Hague on Lake George. Garnet for abra¬ sive purposes is mined in large quantities at North River, while

extensive deposits of foli¬ ated talc occur near Gouverneur. Marble, granite and other stones suitable for building and other purposes are the basis of a large quarry industry.

Forests. — Pine, spruce and hard woods are found over extensive areas. Chestnuts are found in the lower and open valleys of the south and spruce is to be had only at an eleva¬ tion of 1,000 feet or more above sea level. The mountains have been denuded of much of the larger timber and the principal lumbering in¬ dustry is based upon the cutting of pulp-wood for paper manufacture. Spruce and poplar are most valuable for this purpose. The wholesale destruction of the forests has induced the State government to purchase extensive tracts with a view to forest-cultivation and to preserve the sources of the principal rivers. See Adiron¬ dack Park.

Game. — The Adirondacks are one of the favorite hunting-grounds of America. Owing to the stringent legal restrictions limiting the

season for killing game, there is an abundance of deer, rabbits, partridge (grouse) and water- fowl. Deer are hunted chiefly by stalking, the use of dogs being prohibited. Black bear and wildcats may be found in many parts of the mountains, but moose and caribou, which for¬ merly were plentiful, have entirely disappeared. Several moose were introduced from other States in 1902 with the hope that they might again roam through the woods in numbers. Brook and lake trout and black bass are found in most of the streams and lakes and furnish excellent sport for the angler.

Resorts. — The climate of the mountains is bracing and healthful ; in the summer season the heat is tempered by cool mountain breezes and by the elevation, and the severe cold of winter is made more endurable by the dry at¬ mosphere. There are many sanitariums for invalids, especially for those afflicted with pul¬ monary diseases. The pleasure-seekers, who visit the mountains in great numbers, find am¬ ple accommodations in the many hotels and camps. The railway lines afford easy access to most parts of the Adirondacks, while by taking advantage of the network of rivers and lakes the most remote regions can be reached without much difficulty. During the summer months steamboats make regular trips for the convenience of travelers on many of the larger lakes. For geology and mineral resources con¬ sult Bulletins of the New York State Museum and Reports of the New York

State Geologist: for forestry, the Reports of the State Forestry Commission ; for botany, Reports of the State Botanist; all published at Albany. See New York (State).

ADIRONDACK PARK, a large district in the heart of the Adirondack region, prin¬ cipally forest land, set apart by the State of New York in 1892 for the conservation of the forest, protection of the watershed of the Hudson and other rivers of the State, for pub¬ lic recreation and for the practical study of forestry. (See Cornell University). It covers Hamilton County and parts of Essex, Franklin, Herkimer, St. Lawrence and Warren counties, and contains many mountains and lakes. It is over 3,000,000 acres in area, about 1,500,000 acres being State lands (which also form part of the Adirondack Preserve) and the rest being owned by lumber companies, as¬ sociations, clubs and individuals. From time to time additions are made to the reservations, as the appropriations are available, and it is hoped that in time the whole region not under culti¬ vation for crops will be under State control, and, while saved for the use of the people, will become a source of revenue to the State from the forestry industries.

ADIS ABABA, ad'des a-ba'ba, Abyssinia, capital of the kingdom and of the province of Shoa, is situated 9,000 feet above sea-level on the southern slope of the Entotto hills. It con¬ sists of groups of villages and suburbs scat¬ tered around the Gebi or royal palace and enclosure placed on a small hill, commanding the whole neighborhood. There is telegraphic communication with Massowah, Harrar, Dire Dawa and the seaport of Jibutil in French Somaliland, whence a railway line to Dire Dawa 187 miles, on the southeast border of Abyssinia, is projected, via Harrar and the

Hawask River, 300 miles to Adis Ababa. Tele¬ phone communication has been established with Harrar and intervening points. At the military camp a mile northeast of the palace are the seven batteries of artillery and mitrail¬ leuses taken at the battle of Adowa, 1 March 1896. Adis Ababa, signifying (<the new flower,® was founded in 1892 by Menelek II after abandoning Entotto, 10 miles to the north. Here on 26 Oct. 1896 the treaty of- peace be¬ tween Italy and Abyssinia was signed. The population ranges from 50,000 to 70,000, about a third being of a floating character.

ADIT (<(approach®), an underground pas¬ sage with but one opening; distinguished from the tunnel proper, which has two. In military use, the burrow by which miners approach a place they wish to sap. In industrial mining, a gently sloping drift, used to drain a mine of the water coming into the workings from the top or sides or

pumped up from below; usually but improperly called a tunnel. When there are two adits at different levels, the lower one is termed the ((deep adit.® The greatest in the United States is the Sutro Tunnel, 2,000 feet deep and 20,000 feet long, made in the palmy days of the Comstock Lode near Virginia City, Nev., to drain the mines along it.

ADITI, ad'e-ti, in the mythology of the Hindu Rig-Vedas, Infinity, endued with life and form, from which are born the Adityas — the source and substratum of the universe ; in later Vedic literature, the mother of the gods of storms (which are represented as life-producing), and of the sun. Aditi is the daughter of Daksha and wife of Kasyapa, and besides being the mother of the 33 gods and of the sun, was also the mother of the Tushitas, Or the 12 Adityas. The latter in the Vedic literature numbered seven and are the gods of the heavenly light, with Varuna at their head. In the Brahmanas and later they numbered 12 with supposed reference to the months of the year.

ADIVE, a local Asiatic name of the corsac (q.v.).

ADJECTIVE. See Grammar.

ADJOINING LANDOWNERS. The

mutual rights, duties and liabilities of adjoin¬ ing landowners are dependent on the general principle which requires one to enjoy his prop¬ erty in such a manner as not to injure that of another; but the application of this principle is to be limited so as not to restrain an owner of property from reasonable and prudent use and enjoyment of it. It is therefore a general rule of law that every owner of land has abso¬ lute dominion over it and may make any reason¬ able use of it he sees fit, and if injuries result to adjoining land by such use it is damnum absque injuria. The test as to whether a par¬ ticular use of the premises is a reasonable one is whether or not it is such a use as, under the circumstances, an ordinary man would make of his premises, taking into consideration the importance of the use to the owner as well as the extent of the damage to be inflicted upon his neighbor, and if he uses ordinary care therein to prevent unnecessary injury to ad¬ joining owners the fact that the use is one which will inevitably produce injury to such adjoining owners does not necessarily make it negligence.

ADJOURNMENT, technical law term, signifying the termination of a

session of court, as distinguished from the suspension of a pending case, which is technically known as a continuance. Adjournment may be for a designated time, as from day to day, or it may be indefinite, in which case it is said to be ((without day.® When the period covers less than a day, it is called a recess. The suspen¬ sion at the close of the day, when the session is to be resumed next morning, does not call for an order of adjournment, the session being deemed continuous.

ADJUDICATION, the term used in Eng¬ lish and American law to denote the final de¬ cision in a proceeding in bankruptcy. The Federal Bankruptcy Act of 1898 defines it as ((a decree that the defendant, in a bankruptcy proceeding, is a bankrupt.® Former adjudica¬ tion is a phrase often used, the rule being that persons shall not relitigate a case which has once been adjudicated between them.

ADJUSTABLE TRIANGLE, a triangle with a 45-degree angle in which the latter can be set to any degree very quickly by shifting the hypothenuse, and held in position firmly by clamping the thumb screw. It is divided into one-half degrees from 0 to 45 on the base of the angle. In drawing roof pitches, arch keys, towers, bay windows, etc., it is very convenient, as the lines can be drawn with absolute correctness ; it is only necessary to measure one pitch, set the angle to it, move the hypothenuse along to every similar line, then turn the angle over, drawing the corre¬ sponding lines on the other side. It is also a great help in hydraulic and railroad engineer¬ ing and drainage work. There is no better or quicker way of transferring angles from one drawing board to another than by means of this adjustable triangle. Parallel and vertical lines can be drawn w7ith the utmost correct¬ ness. When lettering on drawings or trac¬ ings, etc., it is also very useful, as the letters A, K, M, V, W, X and Y are marked on the base of the angle, each giving the desired slope for these letters. The following 11 slopes are indicated on the bases of the triangle: 1:1, 1:1} 4, 1:2, 1:2ˆ2, 1:3, 1:4, 1:5, 1 :6, 1 :8, 1 :12 and 3 :4.

ADJUSTMENT, in insurance, is the deter¬ mining the amount of a loss. No specific form is necessary to an adjustment. It must be in¬ tended and understood by the parties to a policy to be absolute and final, in order to render it binding. It may be made by en¬ dorsement on the policy, by payment of the loss or by the acceptance of an abandonment (4 Burr. 1966; 1 Camp. 134; 22 Pick. (Mass.) 191). If an adjustment is brought about by the fraudulent conduct of one of the parties, it will not bind the other person. (2 Johns. Cas. 233; 3 Camp. 319). If one party is led into a material mistake of fact by fault of the other, the adjustment will not bind him. (2 Johns. (N. Y.) 157; 2 Johns. Cas. 233).

ADJUTANT (“assistant®), in the armies of most civilized powers, a staff officer, the chief assistant to the commander of a regi¬ ment, battalion or squadron, in the drill and discipline of the troops, and their, general man¬ agement off the battlefield, and in such other duties as fall to the commander’s charge. In

the United States army he is appointed by the colonel for four years, has the rank of captain, and is not eligible to reappointment; he is the colonel’s secretary, and is generally so indis¬ pensable that in time of war ambitious men often dreaded the appointment as death to further promotion. The squadron and bat¬ talion adjutants rank as lieutenants, are simi¬ larly appointed for two years, and have the same relation to their chiefs; there are also post, garrison and brigade adjutants. For further details consult the (U. S. Army Regis¬ ter. >

ADJUTANT, a large stork (Leptoptilus argala) found in India and southeastern Asia, and so called by the English on account of its erect, officer-like appearance. Its Hindu name is “argala.® Its height is about five feet, its spread of wings about 14 feet. The back and wings are slate-colored, the bare, flesh-colored head and neck are marked with black, and elsewhere it is white. The beautiful “mari- bou® feathers of commerce are taken from the under side of the wings. A pouch, which probably serves some purpose in connection with the organs of breathing, hangs from the under part of the neck and is capable of great distension. The bill is of great size, and the appetite of the bird is correspondingly large. It is a scavenger, its food being carrion, offal and small live animals, and it runs freely about Indian villages, protected for its useful works. The maribou of Africa is a closely related species.

ADJUTANT-GENERAL, an officer on the staff of the commander-in-chief, his secre¬ tary and principal assistant in issuing orders and supervising their execution, making re¬ ports and keeping registers, etc. ; and having general charge of the drill and discipline of an army. In the United States army there is a department known as the Adjutant-General’s Department, all the officers of which are above the grade of captain, and who have, in addition to the title of adjutant-general, the specific title of brigade or division adjutant when serving as such with a brigade or di¬ vision in the field. The chief of the depart¬ ment has the rank of brigadier-general and the title of (<the adjutant-general.® He is charged under the direction of the secretary of war, and subject to the supervision of the chief of staff in all matters pertaining to the command, discipline, or administration of the existing military establishment, with the duty of recording, authenticating and communicat¬ ing to troops and individuals in the

military service all orders, instructions and regulations issued by the secretary of war through the chief of staff ; of preparing and distributing commissions; of compiling and issuing, the Army Register and the Army List and Direc¬ tory; of preparing the annual returns of the militia to be submitted to Congress ; of man¬ aging the recruiting service ; of collecting mil¬ itary information, and with the custodv of all official and historical records, including all pension, pay, bounty, etc., pertaining to or based on the military or medical histories of former officers or enlisted men. Individual States also have their own adjutant-general, with cognate duties regarding the State militia. In many countries, such as Germany and

Russia, the term has retained its original meaning of an officer on the personal staff, and is the designation of personal aides-de- camp to the sovereign.

AD'LER, Cyrus, American librarian and archaeologist: b. Van Buren, Ark., 13 Sept. 1863. He was graduated at the University of Pennsylvania in 1883, and took the degree of Ph.D. in 1887 at Johns Hopkins University, where for several years he was instructor in Semitic languages. From 1892 to 1905 he was librarian of the Smithsonian Institution ; spe¬ cial commissioner of World's Fair to Turkey, Egypt, Tunis, Algiers and Morocco ; president of the American Jewish Historical Society; president of United Synagogue of America, and members of numerous learned societies, such as the American Oriental Societv, and of Doropsie College for Hebrew Learning since 1908. He is the author of numerous articles on Oriental archaeology, Assyriology, Semitic philology, comparative religion and bib¬ liography; and one of the editors of the Jew¬ ish Encyclopaedia.' He also edited the (Jeffer¬ son Year-Book' (1899-1905), with Allen Ram¬ say; (Told in the Coffee House) (1898) ; (Jews in the Diplomatic Correspondence of the United States. '

ADLER, Felix, American lecturer and scholar: b. Alzey, Germany, 13 Aug. 1851, son of an eminent Jewish rabbi. In 1857 he emi¬ grated to the United States, in which country and at Berlin and Heidelberg he was edu¬ cated. After being for some time professor of Hebrew and Oriental literature at Cornell Uni¬ versity he founded in New York (1876) the Society for Ethical Culture, of which he is lecturer. Similar societies have been estab¬ lished elsewhere in the United States and in other countries. He is an effective writer and speaker. He has

published (Creed and Deed) (1878) ; (The Moral Instruction of Children> (1892); (The Essentials of Spirituality) (1905) ; (The Religion of Duty> (1912) ; (Marriage and Divorce) (1915) ; (The World Crisis and Its Meaning) (1915). In June 1902 he was called to the newly-created pro¬ fessorship of social and political ethics in the department of philosophy in Columbia Uni¬ versity. From 1908 to 1909 he was American exchange professor at the University of Ber¬ lin. He has served for 10 years as chairman of the National Child Labor Committee.

ADLER, Friedrich, German architect: b. Berlin, 15 Oct. 1827; d. Berlin, 15 Sept. 1908. After finishing his studies at the Berlin Archi¬ tectural Academy he traveled extensively. In 1863 he was appointed professor at the Berlin Academy, and from 1877 until he retired, in 1903, he was consulting architect to the Prus¬ sian minister of public works. Among his greater architectural works are the designing of Christ Church and . St. Thomas' at Berlin, St. Paul's at Bromberg and the Church of the Redeemer at Jerusalem. He specialized in the architecture of ancient times and the Mid¬ dle Ages and took a prominent part in the ex¬ cavations at Olympia. Among his published works are: (Mittelalterliche Backsteinbau- werke des preussischen Staats) (1858) ; (Die Baugeschichte von Berlin' (1861) ; (Bau- geschichtliche Forschungen in Deutschland'

(1870); (Das Mausoleum zu Halikarnass' (1900); (Zur Kunstgeschichte' (1906).

ADLER, Georg, German economist : b. Posen, Germany, 28 May 1863 ; d. 1908. He be¬ gan his career as extraordinary professor of sociology at the University of Basel, Switzer¬ land, then became professor of political econ¬ omy at the University of Freiburg, Germany. In 1900 he was appointed professor of political science at Kiel University. His sociological writings tend strongly against the revolution¬ ary programs of the socialist schools. His works are: (Karl Marxsche Kritik' (1886); (Internationaler Arbeiterschutz' (1888) ; (So¬ cial-Reform und Theater' (1891) ; (Staat und Arbeitslosigkeit' (1894) ; (Die Social- Reform im Altertum' (1898) ; (Geschichte des Sozial- ismus und Communismus) (1900) ; (Ueber die Epochen der deutschen Handwerkerpolitik' (1903) ; (Die Bedeutung der Illusionen fur Politik und sociales Leben' (1904) ; (Stirners AnarchisD (1907) ; (Hauptwerke des Sozial- ismus und der Sozialpolitik' (1908).

ADLER, George J., German-American phi¬ lologist : b. Germany 1821; d. 1868. He came to New York 1833; was graduated at the Uni¬ versity of the City of New York 1844, and from 1846-54 was professor

of German there. He published a valuable (German-English Dictionary' (1848, many editions since), still very useful for its careful discrimination of synonyms; (German Grammar' (New York 1868) ; (Wilhelm von Humboldt's Linguistic

Studies' (New York 1868), and translated Fauriel's (History of Provengal Poetry.'

ADLER, Guido, Austrian writer on music : b. Eibenschutz, Moravia, 11 Jan. 1855. After studying in the gymnasium and university in Vienna, he continued his musical studies at the conservatory under Bruckner and Dessoff. In 1881 he was appointed lecturer on the science of music at the University of Vienna and in 1885 he became professor of music at the German University of Prague. In 1898 he returned to the University of Vienna as pro¬ fessor of the history and theory of music. To¬ gether with Chrysander and Spitta, he founded in 1884, the Viertel jalirsschrift filr Musikwis- senshaft, to which he was one of the most im¬ portant contributors, writing on the history and theory of music. At the same time he began the publication (Denkmaler der Ton- kunst in Oesterreich,' published by Artaria in Vienna and by Breitkopf and Hartel in Leip¬ zig and which is subsidized by the Austrian government. Up to 1913, 19 double volumes had appeared, containing works of the old Austrian composers or of such of the great masters who had lived in Austria. Many of the historical introductions are written by Ad¬ ler himself. During the International Exhi¬ bition in Vienna in 1892 Adler acted as chair¬ man of the historical section. The most im¬ portant of his independently published works is (Der Stil in der Musik' (1911).

ADLER, Hermann, Anglo-Jewish leader: b. in Hanover, 29 May 1839; d. London, 18 July 1911. He lived most of his life in Eng¬ land, where he held many positions of high trust connected with his race, having been since 1891 chief rabbi of the British Empire, and active in general benevolence. He was

principal of the Jews' College, London, 1863- 91, and as chief rabbi became its president. Besides sermons, lectures, etc., he wrote (The Jews in England, *(The Chief Rabbis of Eng¬ land^ (Ibn Gabirol, the Poet Philosopher,* etc.

ADLER, Nathan Marcus, German-Jewish leader: b. Hanover 1803; d.

1890. Educated at Gottingen, Erlang&n and Wurzburg, he be¬ came chief rabbi of Oldenburg 1830, of Han¬ over and the provinces 1831 ; and of the British Empire 1845. He was a chief organizer of schools for Jews in England, assisted Sir Moses Montefiore in raising the £20,000 fund for Palestine, was cofounder of the United Synagogue (association of the leading syna¬ gogues), and founder and first president of the Jews' College. He published several vol¬ umes of sermons and a commentary on the Targum.

ADLER, Samuel, German-Jewish rabbi and author : b. Worms, Germany, 3 Dec. 1809 ; d. New York city, 9 June 1891. After studying at the universities of Bonn and Giessen, be was appointed, in 1842, rabbi of the congrega¬ tion in Alzey. In 1857 he came to the United States, being appointed rabbi of the congre¬ gation of Emanu-El of New York city. He was considered a profound scholar of the Talmud. His works include: (Jewish Confer¬ ence Papers1 *(1880); benedictions* (1882); (Kobez al Yad* (collections 1886).

ADLER, Victor, Austrian socialist editor: b. Prague, 24 June 1852. After studying in the University of Vienna he visited England, on whose system of factory inspection he wrote his first book. On his return to Vienna he founded a Social-Democratic weekly pub¬ lication, which the Austrian government sup¬ pressed. He then founded and edited the Ar¬ beit er Zeituncj. He was for a time a member of the Lower Diet and, in 1907, became a member of the Imperial Council. His most imporant publication is (Die Arbeiter Kam- mern und die Arbeiter* (1886).

AD LIBITUM, musical term, which implies that the part so marked may be played ac¬ cording to the taste of the performer and not necessarily in strict time. When there is ap accompaniment to the music so marked it must strictly follow the ad libitum time of the principal performer. Ad libitum also fre¬ quently means that a part for. a particular in¬ strument, or instruments, in instrumental scores or pianoforte arrangements may be either played or entirely left out.. Thus, a song written with 'cello accompaniment <(a.d libitum** may be sung to the piano accompani¬ ment alone or with the 'cello added.

ADMINISTRATION, in general, the management of any business; especially ex¬ ecutive government. In public affairs it refers to the actions of the government in exercising its authority agreeable to the constitution of the nation. The word is applied more com¬ monly to the collective body of governmental officers exercising authority as an executive power. In a narrow sense it is used in Amer¬ ica, in national politics, to designate the Presi¬ dent and his cabinet, in State politics

to desig¬ nate the governor and his executive officers, or in municipal politics the mayor and heads , of departments. Tn England the administration

consists of the Premier and his cabinet, who hold office while their party has a legislative majority in the House of Commons.

In law the management of the personal es¬ tate of anyone dying intestate or without an executor. If the deceased leaves real estate, the estate devolves upon heirs related by blood ; if personal property is left and no ex¬ ecutors named, administrators are appointed. In the United States a surrogate or judge of probate appoints the administrator and grants letters of 'administration. The adminis¬ trator is a trustee within the jurisdiction of a court of equity as well as of a court of pro¬ bate. His duties are to inventory the estate, collect accounts due, pay all debts, and dis¬ tribute the remainder among those entitled to it. In England the power of such appointment was vested in the ecclesiastical courts until 1857, when it was transferred to a court of probate. The personal property of a decedent is appropriated to the payment of his debts so far as required, and until exhausted must first be resorted to by creditors ; but by certain statutes, courts may grant an administrator power to sell, lease or mortgage real estate when the personal estate of the deceased is not sufficient to pay his debts. At common law the real estate of an intestate goes to his heirs ; the personal to his administrator. The fundamental rule is that all just debts shall be paid before any further disposition of the property.

Ancillary Administration. — That which is subordinate to the principal administration, for collecting the assets of foreigners. It is taken out in the country where the assets are locally situate.

Of Estates. — The term is applied broadly to denote the management of an estate by an executor, and also the management of the es¬ tates of minors, lunatics, etc., in those cases where trustees have been appointed by au¬ thority of law to take charge of such estates in place of the legal owners.

Foreign Administration. — That which is exercised by virtue of authority properly con¬ ferred by a foreign power. In England and in the United States the general rule is that letters granted abroad give no authority to sue or to be sued in another jurisdiction, though they may be ground for new prqbate authority. Consequently, when persons are domiciled and die in one country, as A, and have personal property in another, as B, the authority must be had in B, but

exercised ac¬ cording to the laws of A. (Story, Confl. Laws, 23, 447). There is no legal priority between administrators in different States. The prin¬ cipal administrator is to act in the intestate's domicile, and the ancillary is to collect claims and pay debts in the foreign jurisdiction and pay over the surplus to his principal. (2 Mete. (Mass.) 114; 3 Day, 74). But some courts hold that the probate of a will in a foreign state, if duly authenticated, dispenses with the necessity of taking out new letters in their State. So it has been held that possession of property may be taken in a foreign state, but a suit cannot be brought without taking out letters in that State.

Public Administration. — That which the public administrator performs. This happens in many of the States by statute in those cases

where persons die intestate, without leaving anyone who is entitled to apply for letters of administration.

Jurisdiction over administrations is in Eng¬ land lodged in the ecclesiastical courts, and these courts delegate the power of administer¬ ing by letters of administration. In the United States administration is a subject charged upon courts of civil jurisdiction. A perplexing mul¬ tiplicity of statutes defines the powers of such courts in the various States of the Union. The public officer authorized to delegate the trust is called surrogate, judge of probate, registrar of wills, etc. As to surrogate courts and pro¬ ceedings therein in the State of New York, consult the Code of Civil Procedure (Chase’s ed. 1902, ch. 18). The death of the intestate must have taken place or the court will have no jurisdiction. A decree of the court is prima facie evidence of his death and puts the bur¬ den of disproof upon the party pleading in abatement. (26 Barb. 383.) The formalities and requisites in regard to valid appointments, and rules as to notice, defective proceedings, etc., are different in the various States.

Consult Goodnow, Principles of the Ad¬ ministrative Law of the United States } (New York 1905) ; id., Comparative Administrative Law° (New York 1893) ; Fairlie, (The Na¬ tional Administration of the United States *(1905) ; Freund, Cases on Administrative Law* (St. Paul 1911) ; Schouler, <rTreatise on the Law of Executors and Administrators- *(3d ed., Boston 1901); Williams, (Treatise on the Law of Legal Representatives* (London 1899) ; Woerner, (Treatise on the American Law of Administration (2d ed., Boston 1899) ; Woerner and

Wizlizenous, Caw of Decedents' Estates Including Wills) (Boston

1913).

ADMINISTRATIVE DEPARTMENTS,

See United States — The Beginnings of Ex¬ ecutive Departments of the; Executive; Cabinet and Cabinet Government; Appoint¬ ments; Budget System; Commission Gov¬ ernment; and the departments by name.

ADMIRABLE CRICHTON, cre'ton (N. Irish Cri'ton). See Crichton, James.

ADMIRAL (Arabic amir-al or emir-al, Commander of the** — whatever follows it), the highest rank of naval officer; the title of the general officer who commands a fleet or a subdivision of a fleet. As a naval term the word appears to have been used first by the Sicilians and then by the Genoese, from whom it was taken by the French during the cru¬ sades of the 13th century. By the end of that century the word had come into use in Eng¬ land to designate the officer in command of the Cinque Port ships. The French preserved the word without change, as amiral, and in France it was borne as the title of an office by the military, judicial and administrative of¬ ficer known as grand amiral, in England as lord high admiral and in Spain as almirante mayor. In Spanish and Portuguese the word has developed into almirante, supposedly being derived from the Latin admirari, since the ad¬ miral <(is to be admired® for surmounting all dangers and difficulties; both in Spanish and in Elizabethan English the word has been ap¬ plied to the flagship of the commander of a fleet, the Spanish almiranta being the ship of

the second in command and the capitana the ship of the ranking officer. In England the early forms were amyrell, and admyrall, the present form arising from a confusion with the Latin admirabilis. The first English ad¬ miral was William de Leybourne (1286) but he did not command the sea forces, his duties corresponding to those afterward vested in the lord high admiral, viz., the administrative pow¬ ers now delegated to the lords commissioners of the admiralty and the judicial authority now belonging to the high court of admiralty. From 1632-50, from 1685-1702 and from 1708- 1827 the duties of the office were performed by a board of commissioners, while under the Commonwealth a committee of Parliament ad¬ ministered the office. The last lord high ad¬ miral was the Duke of Clarence, afterward William IV. When he resigned in 1828 the office

was put in commission, in accordance with a previous practice. In Spain the title of admiral is an hereditary honor still borne by the descendants of Columbus, the Dukes of Veraqua.

In the modern navy the admirals corre¬ spond to the general officers of the army. In the British navy there are four classes. There is an admiral of the fleet, corresponding tp the field marshal and conferred at the sov¬ ereign's will, but it is little more than an hon¬ orary distinction. The three active ranks are those of admiral, vice-admiral and rear- admiral, ranking respectively with general, lieutenant-general and major-general. In for¬ mer times there were also three subdivisions of each grade known as admirals (or vice- or rear-admirals) of the red, the white and the blue respectively; the color of the flag flown by the admiral (hence called flag-officer) cor¬ responded with his section and all the ensigns and pennants of all ships under his command were of the same hue. This distinction is now abolished. The sea pay of an admiral of the fleet is £6 per day, of an admiral £5, of a vice-admiral £4 and of a rear-admiral £3 ; and an admiral commanding-in-chief is allowed £3 per day additional at home and £4 10s. abroad, as table money. In the British navy the vice- and rear-admiral are also honorary titles, with¬ out the active functions, conferred in compli¬ ment on senior naval officers. The former ex¬ tensive functions of the admiral have been absorbed by the Crown and have been divided among other officials. In Russia the highest rank is that of lieutenant admiral-general. In other foreign navies there are admirals, vice- admirals and rear-admirals, whose duties cor¬ respond, save in minor details, to those of the above officers.

In the United States navy the three ranks of admirals were adopted during the Civil War period, the rank of rear-admiral being es¬ tablished by Congress in 1862 (as was also that of commodore, though this title had pre¬ viously existed as one of courtesy, but without legal sanction) ; the rank of vice-admiral in 1864, when Lincoln was authorized to promote one of the rear-admirals to that position ; and the rank of admiral in 1866, when Congress enacted a law providing an active list of one admiral, one vice-admiral and 10 rear-admirals. Originally these three grades were established for the express purpose of conferring excep¬ tional honors and distinction upon David Glas-

gow Farragut (q.v.) and in order he became the first rear-admiral, first

vice-admiral and first admiral. In 1866, when the rank of ad¬ miral was established and Farragut had as¬ sumed the rank, Rear-Admiral David D. Porter (q.v.) was promoted to vice-admiral, and in 1870, on Farragut's death, he became admiral. Rear-Admiral Stephen C. Rowan then became vice-admiral, but he died in 1890 and Porter in 1891, whereupon both grades were abolished. In 1899 the grade of admiral of the navy was established by Congress and conferred upon George Dewey (q.v.) as a reward for services at Manila Bay. This rank is a grade above admiral and resembles the rank of admiral of the fleet in the British navy. In 1882 Congress reduced the number of rear-admirals to six and the number of commodores to 10, but in 1899 increased the number of rear-admirals to 18, comprising two classes of nine each, and abolished the grade of commodore on the active list. The rank of rear-admiral is also borne by the chiefs of the Navy Department bureaus during their term of office. Originally the admiral, vice-admiral and rear-admiral of the navy corresponded to the general, lieutenant-general and major- general of the .army, and various acts after 1862 confirmed these provisions, but the act of 1899, which abolished the rank of com¬ modore, provided that the senior nine rear- admirals should rank with major-generals and the junior nine rear-admirals with brigadier- generals. The admiral of the navy and ad¬ miral receive $13,500 annually ; senior nine rear-admirals, $8,000; and junior nine rear- admirals, $6,000; while an additional 10 per cent above these amounts is allowed for sea duty or shore duty beyond the continental limits of the United States. A retired officer receives 75 per cent of his active pay. at time of retirement. The flag of the American ad¬ miral, which flies at the main, is rectangular and blue, with four white stars.; that of the vice-admiral, flown at the fore, is similar, but has only three stars; that of a rear-admiral, flown at the mizzen, is similar in shape but has only two stars and usually is blue, but if two or more rear-admirals be together, the senior flies a blue flag and the others red. See United States, Navy of the, and similar articles under the titles of the various nations.

ADMIRAL. (1) In entomology, a nymph- alid butterfly. — any one of several species, as the red admiral (Pyrameis atalanta), and the white admirals of the genus Basilarchia. (2) In conchology, one of the cones (Conus am- miralis) . See Cone-Shell.

ADMIRALTY, The. In Great Britain, the governmental department which manages all matters pertaining to the British navy and the royal marine. The admirality derives its character from the fact that it represents the lord high admiral, whose administrative func¬ tions have been transferred to and vested in a board of commissioners. Among the duties of these commissioners are the maintenance and

expansion of the fleet according to govern¬ mental policy, keeping its roster filled with trained officers and men, and preserving it in the highest possible degree of preparedness and efficiency as regards personnel and material. The board consists of five lords commissioners,

who decide collectively all important matters and who, in theory, are jointly responsible; they are the first lord, the first and second naval lords, the additional naval lord and controller, the junior naval lord and the civil lord who execute the office of lord high admiral, and with them are the parliamentary and financial secretary and the permanent secretary. The first lord, who is always a cabinet minister and who is responsible to the Crown and to Parlia¬ ment for all admiralty business, besides having general direction and supervision, manages the political affairs of the navy, as its representative in Parliament, controls the naval estimates and finances and has charge of appointments, pro¬ motions and removals. The first naval lord is responsible for the commissioning of ships, the personnel of the fleet, its fighting efficiency and employment, its discipline and the appoint¬ ment of inferior officers ; he directs the opera¬ tions of the admiral superintendent of naval reserves in regard to ships' the hydrographer, the director of naval ordinance and the naval intelligence department ; and makes the neces¬ sary preparations to protect trade and the fish¬ eries. The second naval lord has charge of the personnel of the fleet, the manning of the navy, and mobilization, supervises the training estab¬ lishments and colleges, attends to naval edu¬ cation, training and the affairs of the royal marine force, appoints navigating officers and inferior officers and supervises the management of the reserve. The additional naval lord and controller has charge of everything pertaining to the material of the fleet, design, construction, machinery, equipment, dockyards and building establishments, gunnery and armament, main¬ tenance repairs and refits and naval stores. The junior naval lord has control over the transport, medical and victualling services, the regulation of hospitals, the coaling arrange¬ ments of the fleet, of uniforms, prize money, naval savings banks, pensions and the appoint¬ ment of chaplains, naval instructors, medical officers and officers of the accountant branch. Among the duties of the civil lord are the supervision of admiralty buildings and works, construction and labor, contracts and purchases of building stores and land, and the direction of the civil staff of the naval establishments ; Greenwich Hospital is under his authority and the charitable funds, compassionate allowances, etc., are in his charge. The parliamentary and finan¬ cial secretary has charge of the finances

of the department, the navy estimates and general expenditures. The permanent secretary super¬ vises and directs the general office work of the admiralty, of the military, naval and legal branches, the civil branch and the record office. When the prime minister resigns, all the lords of the admiralty do likewise and those who have seats in Parliament are succeeded by others.

ADMIRALTY AND MARITIME JU¬ RISDICTION. The system of law and pro¬ cedure under which maritime transactions are regulated. It derives its name from the fact that it was originally administered in England by the lord high admiral. The modern laws have been adopted from the civil law and from such sea codes as those of Rhodes and Oleron (qq.v.). Article III, § 2 of the Constitution provides that the judicial power of the United

States (<shall extend to all cases of admiralty and maritime jurisdiction" and as is the custom in Europe the United States Supreme Court has declared that by virtue of these words our admiralty courts shall entertain jurisdiction not only over the high seas but also over all public navigable waters, including interior lakes, rivers and canals, and that this jurisdiction is not confined to tide waters. The admiralty juris¬ diction of the Federal courts is fixed by statute and in general covers cases that arise under contracts calling for the performance of cer¬ tain duties or obligations upon navigable waters, such as contracts involving the transportation of passengers or merchandise between different States or foreign ports, cases of salvage, bonds of bottomry or hypothecation of ship and cargo, contracts (express or implied) for sea¬ men's wages, seizures under the laws of im¬ post, navigation or trade, cases of prize or ransom, charter-parties, contracts with material- men, jettisons, maritime contributions and aver¬ ages, policies of marine insurance, contracts for the furnishing of materials for or the making of repairs on foreign vessels, and generally to all assaults and batteries, damages and tres¬ passes taking place on the high seas. Under war conditions the admiralty jurisdiction is extended so as to include the power to deter¬ mine questions of prize. Crimes committed upon the high seas or beyond the jurisdiction of any country come under the jurisdiction of the admiralty courts, but as no crimes save those specified by statute are punishable in the Federal courts, the jurisdiction in this respect does not differ from that regarding other statu¬ tory offenses. A suit is commenced in admiralty by filing a libel, upon which a warrant is issued for the arrest of the

person, or attachment of his property if he cannot be found, or a simple monition to appear ; such proceedings are called actions in personam, that is, actions between individuals for tort or breach of contract. There may be a proceeding in rem, under which a warrant is issued for the arrest of the thing in question ; in other words the proceedings are to determine the rights to or claims against a vessel or other particular subject-matter. In cases of actions in personam, the admiralty courts do not possess exclusive jurisdiction, since under the statutes the parties to such actions still retain their rights of action at common law ; but in cases in rem, admiralty courts exercise exclusive jurisdiction and no other remedy can be sought in any other court. In the latter class of cases the vessel or other subject-matter involved must be brought by seizure or otherwise within the jurisdiction of the court. Since, in the United States, there are no courts whose duties and jurisdiction are confined to admiralty cases the district courts, by statute, have original jurisdiction in general admiralty and maritime cases and ap¬ peal may be made to the circuit court of appeals, but in a few specified cases and in prize cases the appeal is to the Supreme Court. The court usually tries admiralty cases without a jury, but in a few special cases trial by jury is pro¬ vided by statutory provision. State courts have no admiralty jurisdiction. Among the more prominent cases in the Supreme Court are : Waring vs. Clark (1846), 5 How. 441; The Propeller Genesee Chief vs. Fitzhugh (1851), 12 How. 443; The Moses Taylor (1866), 4

Wall. 411; Insurance Co. vs. Dunham (1870); 11 Wall. 1; Leon vs. Galceran (1870), 11 Wall. 185; Ex parte Boyer (1884), 109 U. S. 629; Manchester vs. Massachusetts (1891), 139 U. S. 240. See Commercial Law; Law, Mari¬ time; Insurance, Marine. Consult Benedict, E. C., (The American Admiralty, Its Jurisdic¬ tion and Practice* (4th ed., Albany, N. Y., 1910). The early continental and English authorities are collected in Judge Story's opin¬ ion in the case of De Lovio vs. Boit (1815), 2 Gallison 398, 7 Fed. Cases, No. 3,776. The Laws of Oleron and other early maritime codes and ordinances may be found in Peter's (Admiralty Decisions, * 1792-1807, Vol. I, App., and in the appendix to (Federal Cases,) Vol. XXX.

ADMIRALTY INLET, a narrow body of water connecting Puget Sound with the Strait of Juan de Fuca.

ADMIRALTY ISLAND, a mountainous

island, 90 miles long, off the west coast of Alaska, to the northeast of Sitka; belongs to the United States.

ADMIRALTY ISLANDS, a group of 40 islands, to the northeast of New Guinea; Basco, the largest of them, being 60 miles in length, mountainous, but fruitful. The total area of the islands is 8 78 square miles. They were discovered by Schouten in 1616. Carteret named them in 1767. Some are volcanic; others are coral islands. They abound in cocoanut- trees and are inhabited by a race of tawny, frizzle-headed savages of the Papuan stock, about 800 in number. Together with New Britain and some adjoining groups they were annexed by Germany in 1885. and now form part of the Bismarck Archipelago under Aus¬ tralian mandate.

ADMIRALTY LAW. See Admiralty and Maritime Jurisdiction; Law, Maritime.

ADMISSION. In practice, the act by

which attorneys and counsellors become recog¬ nized as officers of the court and are allowed to practise.

In corporations or companies, the act of a corporation or company by which an individual acquires the right of a member of such cor¬ poration or company. In trading and joint- stock companies no vote of admission is requi¬ site, for any person who owns stock therein, either by original subscription or conveyance, is in general entitled to, and cannot be refused, the rights and privileges of a member. Nothing more can be required of a person demanding a transfer on the books than that he prove to the corporation his right to the stock.

In evidence, a concession or voluntary ac¬ knowledgment made by a party of the exist¬ ence of certain things or conditions, or of the truth of certain statements. The admissions or declarations of a party in respect to the sub¬ ject-matter of an action at law or suit in equity may always be given in evidence against him. As distinguished from confessions, the term is applied to civil transactions, and to matters of fact in criminal cases where there is no crim¬ inal intent. Express or direct admissions are those which are made in direct terms. Inci¬ dental admissions are those made in some other connection or involved in the admission of some other fact. Implied admissions are those

which result from some act or failure to act of the party. To be considered as evidence, admissions may be made by a party to the

record or one identified in interest with him, but not where the party of record is only a nominal party and has no active interest in the action.

ADOBE, a-do'ba (Sp., from adobar, to daub or plaster), colloquially <(dobie® : sun- dried bricks, from any native clays ; especially those made in the arid western and southwest¬ ern regions of the United States, as in the Great Basin, Arizona, New Mexico, etc., by molding the bricks and then turning the sides alternately to the sun day by day for a week or two, stack¬ ing up for use when sufficiently baked. These, however, are the resource only of people in an inferior state of civilization, as the rain soon dissolves them into streams of mud ; hence also they are impossible at all save where rain is very infrequent. The sizes are usually two, 18x9x4 and 16x12x4, the larger ones in the best building used as headers (the greatest length crosswise to the wall) and the others as stretchers (lengthwise). The earliest building material in Assyria and Egypt was adobe, usu¬ ally strengthened with straw, and it is still much used in Japan and China. Adobe soils are clay soils very plastic when wet, but too hard for cultivation when dry ; they are light¬ ened by plowing in sand or sandy loam and are often very fertile.

ADOLESCENCE (Latin, adolescere, to grow up) is the period of life between the ad¬ vent of puberty and maturity. Puberty, or the period when an individual first becomes capable of begetting or of bearing children, occurs approximately in the 12th or 13th year for girls and the 14th year for boys, though in individual cases its advent may he as early as the 10th or as late as the 21st year. These alterations of structure and function in the body which fit it for the processes of reproduc¬ tion are the primary aspect of the period of adolescence on its physical side and the remain¬ ing phenomena, both physical and mental, which make the period so striking and so significant for psychology and education, can be shown to be related more or less directly to this funda¬ mental process of preparing the body for its role in the perpetuation of the race.

Physical Changes.— Thus, on the physical side, measurements of the body and its capaci¬ ties show during adolescence, and particularly in the four or five years from puberty onward, distinct acceleration in the rate of growth, and this acceleration begins earlier and ends earlier in boys than in girls, just as the onset of pu¬ berty itself is earlier in girls. The consequence of this sex difference in the appearance of ado¬ lescence is that for a time, approximately from the age of 12 to the age of W/2, girls are actu¬ ally taller and heavier than boys of the same age, while in other respects, as for example in

strength and in breathing capacity, the girls come near to, though they do not exceed, the capacity of boys during these years. These bodily changes at adolescence are prominent in every aspect of physical development; the bones not only lengthen and thicken but alter their shapes and their structure. The facial expression changes during this period and the shift in the shape of chest and pelvis, particu¬

larly in girls, is marked. There is quite excep¬ tional growth of muscles. There are decided changes in the volume and capacity of the heart. The alteration in the dimensions of the larynx and its vocal cords is responsible for the char¬ acteristic mutation of the voice in boys. The brain, while not increasing appreciably in weight, certainly undergoes rather marked alterations in its connective systems, if we may judge from the corresponding alterations in instinctive ten¬ dencies, impulses, feelings and emotions and the obviously greater maturity of thought.

While all these physical changes are to be noted in adolescent boys and girls, it remains true that there is considerable unevenness in their appearance when we consider the indi¬ vidual rather than the group. It is agreed that one of the characteristics of the period is this increase in variability ; there is more difference between individual and individual during ado¬ lescence than during the first 12 years of life, and this is true of all the aspects of develop¬ ment, both physical and mental.

Mental Characteristics. — On the mental side adolescence is characterized by analogous and equally striking alterations. The central phenomenon is the correlate of the physical changes of puberty, namely, the emergence and rapid development of sex feelings and impulses, in the widest sense of these terms. Thus, con¬ comitant with the ripening of the sex instinct, appear such psychological manifestations as ˆshowing off,* jealously, heightened conscious¬ ness of social relations, deeper and richer appre¬ ciation of beauty in all its forms, a wider range of ambitions and ideals, an enlarged mental horizon, new and more vital appreciation of moral and religious relations, a lessening of home ties with a corresponding augmentation of interest in the world’s life outside the famil¬ iar circles of the earlier years. Mere maturity would account for a portion of these manifes¬ tations, yet psychologists detect the undercur¬ rent of sex in all of them, so that they are to be regarded as primarily due to the irradiation or ˆsublimation® of the sex impulse.

The more direct expressions of the develop¬ ing sex impulses are found in bashfulness, coy¬ ness, ((showing off,® sudden and strong

attrac¬ tions or repulsions for individuals of the op¬ posite sex, new interest in dress and adornment and numerous vague, though emotional, re¬ sponses to sex stimuli of all sorts.

For the best physical and mental develop¬ ment it is of the highest importance that these attitudes toward sex should be ((normal® and wholesome. No one conversant with the facts doubts that boys and girls who are entering the period of adolescence ought to be sufficiently warned and protected as to keep them from vicious sex practices ; it is perhaps less gener¬ ally understood that there is danger of unwhole¬ some mental attitudes toward sex and that there is corresponding need of guidance here. The forces liberated by the stimuli of sex can be diverted or <(sublimated® in such a way as to provide a tremendous incentive toward sound mental development. The cardinal issue of moral training in adolescence is to divert the energies of youth into the best channels of effort, to replace crude and selfish by refined and unselfish interests ; in short, to compass the shift from the natural egoism of childhood to the desired altruism of maturity.

Sex Hygiene. — In this connection much de¬ bate has arisen concerning the instruction of adolescents in sex hygiene. The problem is intricate and difficult. Perhaps the best opin¬ ion of experts would be that information con¬ cerning the elementary facts of sex ought by all means be given to children before the ad¬ vent of puberty and preferably by their par¬ ents ; instruction in childhood is easy because self-consciousness has not developed so far; children are naturally curious about these matters ; their parents are the natural sources from which to seek information; if unin¬ formed by their parents they will almost in¬ evitably pick up from their associates misin¬ formation of an appalling character. In addi¬ tion, adolescent boys and girls ought to know the main facts concerning the physical changes going on in them at puberty, and they ought probably a little later to be given the main facts concerning venereal diseases, though without overstressing the pathological aspects in a lurid way. Instruction in adoles¬ cence, in any event, should not be restricted to the physiology and pathology of sex, but should include talks on the family, on divorce, on the larger social relations of the individual, all so couched as to appeal to the best emotions and stimulate the adolescent to a broad and wholesome attitude toward the participation which is about to be his in the life of his fel- lowmen.

Special Impulses. — Statistics show that adolescence tends to arouse the so-called mi¬ gratory instinct. Running away from home, yearning for adventure, the Wanderlust ap¬ pears to be stronger about the years 17 to 19 than at any other period. In boys, especially, this instinct is often seen clearly at work; no other explanation is adequate for the appar¬ ently motiveless way in which young boys suddenly strike out for themselves and leave perfectly comfortable homes. Closely akin to this is the <(desire for activity® that figures so prominently in causes of withdrawal from school. Many writers feel that a serious at¬ tempt should be made in secondary education to supply in connection with the work of the school opportunities for satisfying this im¬ pulse to explore, to visit new places, to try new things, to be doing ((something different.®

Social Tendencies. — In adolescence all the tendencies that we term ((social® are decidedly intensified. Wanting to be where others are, wanting to be liked by others, wanting to help others, entering seriously into the joys and sorrows of others; — these are all manifested in adolescence much more clearly and con¬ sistently than in childhood. It is obvious that these tendencies, all of which are instinctive attitudes more or less closely correlated with the sex impulse, have in themselves possibili¬ ties both of good or of evil. Parents and teachers must seek to direct these social ten¬ dencies so that good associates are preferred, so that the youth seeks the approbation of the best, so that the .relations formed between the youth and his fellows make for his moral de¬ velopment and not his moral undoing. Nat¬ urally, at this age the appeal to social appro¬ bation is a powerful incentive; the adolescent boy and the adolescent girl will do what will secure the good opinion of their social group when they will be moved by no other motive.

Similarly, the tendency during adolescence to form numerous social organizations — boys' gangs, secret societies, literary societies, musi¬ cal societies, sketch clubs, athletic associations and the like — demands a reasonable amount of judicious supervision on the part of parents and teachers. Without such supervision there is always danger of moral deterioration. Wit¬ ness the very serious problem of the high- school fraternity and sorority, which has grown to such dimensions and assumed such an aspect that secondary school teachers with almost no exception view the movement with alarm and have persuaded the legislatures of several States to forbid fraternity membership to high-school students under penalty of sus¬ pension or expulsion.

Mental Changes. — Religious conversion is essentially an adolescent

phenomenon; the great majority of conversions occur during the ages of 15, 16 and 17. Even when the young man or young girl fails to experience the typical conversion of the evangelical sort, he may be expected to undergo what might be termed a <(secular conversion,® to turn from selfishness to unselfishness, to reconstruct his attitude toward his fellows, to readjust his thinking so as to give due heed to the rights of others as compared with his own desires. In the later years of adolescence many young men and women also pass through a period of doubt, of skepticism, often of a serious sort. It is, of course, to be expected that the broad¬ ening intellectual horizon shall disclose incon¬ sistencies between the newer views of life and the earlier notions of God, heaven, immor¬ tality, the nature of evil, the efficacy of prayer, the possibility of miracles, etc. Whether a different form of instruction in childhood might obviate the necessity of this reconstruc¬ tion may be debated ; in any event, adolescents need and deserve the utmost sympathy from those who are watching over their religious and moral development.

Akin to the growth of religious interests and the widening of social interests is the strik¬ ing increase during adolescence in the range and variety of ideals ; these differ in the two sexes, differ in the poor and the rich, differ with race but in all cases are prone to shift rapidly during the high-school ages. Since ideals form incentives to conduct of the most powerful sort, it is clear that parents and teachers must take definite measures to supply material for their formation, to check the un¬ wholesome or unworthy, to encourage the wholesome and worthy.

In the opinions of some psychologists adolescence is accompanied by impulses which, if unchecked, would carry their possessor ((with almost resistless fury toward a life of crime.® It is true that there is a sudden in¬ crease at this period in the commission of cer¬ tain types of criminal offense, of which lying, stealing and vagabondage are most typical, and that we are prone to believe that all boys must sow their <(wild oats.® Apparently, the men¬ tal turmoil of adolescence brings it about that certain young men and young women, before they have become ((converted,® before they have made the adjustment of self to society and taken on the responsible attitude of the adult, do exhibit for a time <(streaks® of law¬ lessness, or rebellion against authority, but it is

rather too much to declare that adolescents as a group are predisposed toward criminality.

Instruction. — In the schooling of adoles¬ cents there would appear to be almost equally good arguments for and against coeducation. In larger communities with two or more high schools, experience shows that a separation by sex works well on the whole. No one doubts that girls can do as good work as boys. But they may compete with boys at the risk of their health, and they may, by the practice of coinstruction, be led to pursue a curriculum that is less well adapted to their prospective lines of activity. See Co-education.

Bibliography. — Burnham, W. H., (The Study of Adolescence > (Pedag. Seminary, 1891, Vol. 1, No. 2, pp. 174-195); Hall, G. S., (Adolescence *(2 vols., New York 1904) ; (Pedag. Seminary, 1897, Vol. 5, pp. 61-128) ; Slaughter, J. W., (The Adolescent* (London 1911) ; Whipple, G. M., Psychology and Hygiene of Adolescence * (being chap, vii in Principles of Secondary Education,* edited by Paul Monroe. New York).

Guy M. Whipple,

Professor of Education , University of Illinois.

ADOLF OF NASSAU, adolf'. See

Adolphus of Nassau.

ADOLPHUS, or ADOLF, OF NASSAU,

Emperor of Germany: b. about 1250; d. 2 July 1298. He was elected emperor 1 May 1292, and was crowned at Aix-la-Chapelle 25 June in the same year. He owed his election in part to intrigues with the Electors of Cologne and Mainz, who imposed on him the hardest conditions ; but, refusing to fulfil them, he soon saw himself hated and deserted. Urged by want of money, he took £100,000 sterling from Edward I of England to assist him against Philip the Fair of France; but obeyed the Pope's prohibition with alacrity. He thus made himself contemptible to the German princes, and became still more odious by tak¬ ing advantage of the hatred of Albert, Land¬ grave of Thuringia, against his sons, and pur¬ chasing this territory from him. This involved him in a fruitless five-years' war to subjugate his purchase. Disgusted, and urged on by Albert of Austria, the majority of the college of electors cited Adolphus before it; he failing to appear, the throne was declared vacant 23 June 1298, and Albert of Austria was < elected. A war already existed between the rivals, in which Adolphus

seemed superior until he was outmanoeuvred and surrounded at Gallheim, and fell by Albert's own hand.

ADONAI, a-do'nAi, a Hebrew name for the Supreme Being; a plural form of Adon, (<lord,® combined with the pronoun of the first person. In reading the Scriptures aloud, the Jews pronounce ((Adonai® wherever the old name Hhvh® is found in the text; and the name <(Jehovah® has arisen out of the con¬ sonants of <(Jhvh® with the vowel points of Adonai.

ADONAIS, perhaps the most widely read of Shelley's longer poems, is together with Milton's (Lycidas) the most highly wrought and finished of English elegies. Composed on the death of Keats, it has gained further pathos and interest from the fact that, as Mrs. Shelley pointed out, ((it now seems more appli¬ cable to Shelley himself than to the young and gifted poet whom he mourned.® When Keats died in Rome on 23 Feb. 1821, Shelley was moved not only by the early death of a poet whose work he admired, but also by the un¬ founded report that Keats' health had broken down under the savage criticisms of his poetry in the Quarterly Review. This absurd notion accounts for certain passages in the preface to (Adonais *and for the five stanzas (27-29, 37-38) which attack the critics. The poem, which is in 55 Spenserian stanzas, was com¬ posed between the middle of May and the middle of June 1821 ; it was first printed at Pisa by 13 July, and shortly afterward in London. Shelley, whose criticism of his own poems is almost infallible, said that ((<Adonais,* in spite of its mysticism, is the least imper¬ fect of my compositions® ; that it was <(a highly wrought piece of art® ; and that he should be surprised ((if that poem were born to an immortality of oblivion.® But (Adonais) was ignored by the contemporary public; only posterity has placed it among the supreme treasures of English song.

The first portion of (Adonais, *which fol¬ lows the classical tradition in the tone of its lament, is based primarily upon two famous Greek elegies, Bion's (Lament for Adonis* and Moschus' (Lament for Bion, *from which Shelley drew many details but which he actually recreates into an original and modern poem. The latter portion of the poem is wholly original in both imagery and thought, and closes in the manner of Spenser and Mil- ton, with a paean of immortality and the as¬ surance of personal triumph over death. <((Adonais,-* as a work of art, effects this evolution of life out of death, with more un¬ consciousness, greater unity and steadfast tendency, with passion more spontaneous and irresistible, with melody more plaintive, elo¬ quence more sweet and springing, imagination more comprehensive and sublime, than any other English elegy. It is artificial only to those whose minds are not yet familiarized

with the language of imagery, — those to whom the gods of Greece speak an unknown tongue ; it is cold only to those who confound personal grief with that universal sorrow for youthful death which has been the burden of elegy from the first; it is dark with metaphysics only . to those who have not yet caught a single ray from the spirit of Plato® (Woodberry, Cambridge ed. Shelley's Poetical Works). The most elo¬ quent expression of Shelley's philosophy of life and death is found in the latter portion of (Adonais.* Here the poet utters at first a kind of pantheism, but from this, as if un¬ satisfied with so impersonal an immortality, he finally passes into a rapturous assertion of immortality conscious and personal. The con¬ cluding stanzas, attain a majesty and splendor unsurpassed in English lyrical poetry. <Adonais) was edited by Rossetti (Clarendon Press 1891). Consult also Dr. Richard Acker-

mann, (Quellen, Vorbilder, Stoffe zu Shelley's Poetischen WerkeiP (1890) ; and Woodberry's introduction and notes in the Cambridge edition of Shelley. Marion Tucker.

ADONIJAH, the fourth son of King David, by Haggith. His claim to the throne was best after Absalom's death, and the chief commander Joab and the high-priest Abiathar supported him ; but the captain of the body¬ guard Benaiah, the priest Zadok, the prophet Nathan and Solomon's mother Bathsheba, in¬ duced the old King David to make Solomon associate at once. Adonijah fled to the taber¬ nacle for protection ; but after the death of David he was slain by order of Solomon on the pretext that his request for a concubine of David's was a claim to the throne.

ADONIS, a-do'nis, in Greek legend, son of Myrrha, daughter of Cinyras King of Cy¬ prus : born in Arabia. Before the birth of her son she was transformed into the tree which produces the fragrant gum called by her name; this, however, did not hinder his being brought into the world in due season. He grew up a model of manly beauty and was passionately beloved by Aphrodite (Venus), who quitted Olympus to dwell with him. Hunting was his favorite pursuit, until, having gone to the chase against the entreaties of his mistress, he was mortally wounded in the thigh by a wild boar. Venus, coming too late to his rescue, changed his blood into flowers. After death he was said to

stand as high in the favor of Perse¬ phone (Proserpine) as before in that of Aphrodite ; but, the latter being inconsolable, her rival generously consented that Adonis should spend half the year with his celestial, half with his infernal mistress. This is a highly decorated form ; the simpler and older myth seems to have been that Aphrodite and Persephone contested the beautiful child's pos¬ session, and Zeus ordered that he should spend four months with each and four as he chose. The fable has been variously interpreted. The alternate abode of Adonis above and under the earth is typical of the burial of seed, which in due season rises above ground for the propaga¬ tion of its species. How much of the myth was cause and how much result of the famous Greek woman's festival, the Adonia, cannot be said. This represented the union of Adonis and Aphrodite on one day and the sorrow over his death the other, and the women performed the funeral rites over small images of him; also planting quick-growing herbs like fennel and lettuce in shards filled with earth, and throwing them into springs after the burial. It was a worship of the reproductive principle of plants, which after a short life die and are buried and again spring up ; naturally, it was involved with the grossnesses of phallic wor¬ ship, for which all growth-cults tended to be an excuse. The name is Semitic, ad on, <(lord,® — though of course all the local gods were ((adons® of the place, — and the cult was wide¬ spread in the east; in Phoenicia the Adon was termed Thammuz, ((the hidden.® The Greek celebration was often performed by the priestesses of Aphrodite, courtesans ; but Theocritus' charming Idyl XV shows that in his time at least it was perfectly respectable for decent women to attend.

ADONIS, a genus of plants of the family Ranunculacec ?, or crowfoot family. The plants are natives of Europe, and only a single species, A. autumnalis, the ((pheasant's eye® of the flower-garden, is grown commonly in the United States. It is a low leafy annual with scarlet or crimson flowers, darker in the centre. It is said to have been stained with the blood of Adonis.

ADONI-ZEDEK, a-donai tzh-e-dek, King of Jerusalem at the time of the invasion of Canaan by the Israelites under Joshua. He was the head of an alliance of five kings designing to stop the progress of Joshua's invasion. The kings were defeated and took refuge in a cave. By Joshua's order the mouth of the cave was closed and a guard set until the pursuit was over. The kings were then brought out and made to prostrate themselves, when Joshua and his generals placed their feet upon the necks of the kings in token of triumph. The kings were then executed and their bodies hung on trees until evening when the bodies were taken down and put in the cave which was blocked with stone.

one which arose in Spain toward the end of the 8th century. Its leaders were Felix, bishop of Urgel, and Elipand, archbishop of Toledo; they modified the doctrine of Nestorius (see Nestorianism) to the opinion that Christ was the Son of God only in his divine nature, and in his human nature only so by adoption. It was hoped that this doctrine would be more acceptable to the Mohammedans than the ortho¬ dox view, and a means toward their conversion ; and Elipand was a zealous missionary among them. Felix introduced it into Frankish Spain, and Charlemagne called a synod at Regensburg (Ratisbon) in 792 to have him explain and justify it. Instead he renounced it, confirming the renunciation by a solemn oath to Adrian I, to whom the synod sent him ; yet on returning to his diocese he taught it as before. Another synod was held at Frankfort in 794, and the doctrine was formally condemned, neither Felix nor any of his followers attending. After some controversy a commission of clergy was sent to Spain to put down the heresy. Leidrad, arch¬ bishop of Lyons, one of the commission, per¬ suaded Felix to go before a synod at Aix-la- Chapelle in 799 and recant ; which after a week's dispute with the great Alcuin he did, and was prevented from further relapse by being kept under surveillance at Lyons for the rest of his life, to 816. Elipand, at Toledo, maintained his Adoptian views despite their ban by the Church ; but after his death they were abandoned by practically all. Occasional advo¬ cates afterward arose during the Middle Ages, however, and the question has been discussed even in modern times.

ADOPTION, the act of taking a stranger into one's family, as a son or daughter ; or the taking of a person, a society, etc., into more intimate relations than formerly existed with another person or society ; or the taking as one's own, with or without acknowledgment, an opin¬ ion, plan, etc., originating with another ; also the selecting one from several courses open to a person's choice.

In law, both ancient and modern, the act of taking a stranger into one's family constituted the person so adopted one's heir to all intents and purposes. The practice was common among the Greeks and Romans, and is still in use among some modern nations.

A proceeding which so materially affects the succession of property

and the rights of natural heirs is a very important one. It is not recog¬ nized by the common law of England, and exists only in the United States by special statute. Comparatively few of the States have engrafted it upon their systems of jurispru¬ dence. But among many of the Continental nations it has been practised from the remotest antiquity. The effect of adoption was to cast the succession on the adopted in case the adopt¬ ing father died intestate.

The statute in force in the State of Michigan is substantially similar to other statutes in the various States upon the subject. The Michigan statute provides, among other things, that the person or persons so adopting such child shall thereafter stand in the place of a parent or parents to such (<child-in-law,® and be liable to all the duties, and entitled to all of the rights, of parents ; and such child shall thereupon be¬ come an heir-at-law of such persons, the same as if he or she were in fact the child of such person or persons.

Adoption by matrimony is the placing the children of a former marriage on the same footing, with regard to inheritance, etc., as those of the present one.

Adoption by testament is the appointing of a person one's heir on condition of his assuming the name, arms, etc., of his benefactor.

Adoption by hair was performed by cutting off the hair of the person adopted and giving it to the adoptive father.

Adoption by arms was the presentation of arms by a prince to a brave man. These the recipient was expected to use for the protection of his benefactor.

In heraldry, arms of adoption are the heraldic arms received when the last representa¬ tive of an expiring aristocratic family adopts a stranger to assume his armorial bearings and inherit his estates. The recipient may obtain permission from Parliament to take the name of his benefactor, either appended to, or substi¬ tuted for, his own.

In Scripture and theology, the act of ad¬ mitting one into the family of God, or the state of being so admitted. The previous position of the person adopted in this manner was that of a <(servant,® now he is a <(son,® an <(heir of God,® and a <(joint heir with Christ.®

In ecclesiastical language, adoption by bap¬ tism is the act of becoming godfather or god¬ mother to a child about to be baptized. Unlike real adoption, however, this does not constitute the child heir to its spiritual father or mother.

ADORATION, in unspecialized modern usage, a spiritual homage to God ; but originally an act to express obedience and reverence per¬ formed before the images of the gods. Among the Romans it was performed by raising the hand to the mouth, kissing it, and then waving it in the direction of the image ; the devotee had his head covered except before Saturn and Hercules, and after the act turned himself around from left to .right. Sometimes he kissed

the feet or knees of the images. This homage was afterward transferred to the emperors, by bowing or kneeling, laying hold of the imperial robe, and then pressing the hand to the lips. The Oriental methods were of course still more abject, — bending the knee, falling on the face, striking the earth with the forehead and kissing the ground or floor. Alexander borrowed this from the Persians and made it a feature of his court ; the rough Macedonian Cassander burst into a roar of laughter when he saw the Persian grandees performing this kotow (the Chinese term for the same act) before Alexander, who was so enraged that he seized him by his long hair and dashed his head against the wall. But the Greeks considered it impious and degrading, and the best of them would not bend to it; Conon refused it to Artaxerxes, and Callis- thenes to Alexander. The abject degradations which the mediaeval far-Eastern rulers exacted from foreign traders, by submitting to which the Dutch purchased trade privileges, though the English would not, — crawling on the face from the door to the monarch's seat, licking up the dust as they went, till the victim was often unable to speak when he reached it, and could only gasp with his mouth full of dirt, — are well known. Milder forms in modern times, hardly thought degrading even by the sturdiest demo¬ crat, are kneeling and kissing the monarch's hand ; and the similar homages of lovers have never been considered so. The ceremony of kissing the cross embroidered on the Pope's slipper is a like form, said to have been bor¬ rowed from a similar ceremony introduced by the Emperor Diocletian, who greatly extended court ceremonial. The original signification of the word as an act and not an emotion is preserved in the marriage service of the English and Protestant Episcopal Churches, (<with my body 1 thee worship.® In the Roman Catholic Church, also, a distinction is made between latria, the worship due to God alone, and dulia the veneration paid to the Saints, and hyper- dulia, that accorded to the Virgin.

ADOUR, a river of southern France, hav¬ ing its source in the mountain ridge of the Tourmalet, in the department of Hautes-Pyre- nees. Its course is first north, then west, south¬ west and south southwest, passing St. Sever and Dax, to the former of which it is navigable, and falling into the sea a little below Bayonne, flowing

through many exceedingly fertile val¬ leys. Its whole length is estimated at about 200 miles. The current is rapid, and sometimes serious inundations are caused by the melting of the snows on the slopes of the Pyrenees. At the mouth of the river there is a shifting bar.

ADOWA, or ADUA, ad'6-a, Abyssinia, capital of Tigre province; on the left bank of the Hassam, a tributary of the Tacazze, 6,000 feet above the sea, about 10 miles east of Axum. It is the chief commercial depot on the great caravan route from Massowah to Gondar, about 110 miles from the former. Though it still carries on some trade and has manufactures of cotton cloths, iron and brass ware, owing to the Abyssinian civil wars it has greatly declined from its former prosperity and presents a rather miserable appearance. The inhabitants, num¬ bering about 5,000, arc considered the most civilized of the Abyssinians. It was here that

the Italian General Baratieri was defeated by the Negus Menelek, 1 March 1896, when 7,000 men, 250 officers and the whole artillery were lost.

ADRA, a'dra, (the ancient Abdera), sea¬ port of southern Spain, in the province of Almeria, 29 miles west southwest from the town of that name, near the mouth of the Adra, on an eminence facing the Mediterranean. The. inhabitants are employed in agriculture, fishing, distilling brandy and manufacturing lead from the ore produced from the extensive mines in the neighborhood. Pop. about 12,000.

ADRAR', a-drar', Sahara, a district peopled by Berbers, possessing camels, sheep and oxen and cultivating dates, wheat, barley and melons. Chief towns, Wadan, pop. 4,000, and Shingit, which has inexhaustible beds of rock-salt. The region embraces about 30,000 square miles and since 1892 is a part of the French possessions.

ADRASTUS, in Greek legend, King of Argos, son of Talaus and Lysimache. Poly- nices, being banished from Thebes by his brother Eteocles, fled to Argos, where he mar¬ ried Argia, daughter of Adrastus. The King assisted his son-in-law, and marched against Thebes with an army led by seven of his most famous generals. All perished in the war ex¬ cept Adrastus, who, with a few men saved from slaughter, fled to Athens and implored the aid of Theseus against

the Thebans, who opposed the burying of the Argives fallen in battle. Theseus went to his assistance and was victorious. In a later story Adrastus after a long reign died from grief occasioned by the death of his son 2Egialeus. He was wor¬ shipped at Sicyon, Megara and Athens, per¬ haps also at Argos and the Troad. See Argos; Thebes.

ADRENALS, also known as suprarenal glands. Paired structures, which in the human animal are located in the kidney fat just above the kidney. They have no physiological rela¬ tion with that organ. They are a vital neces¬ sity to life and removal of the glands by acci¬ dent, experiment or disease causes almost in¬ stant death. Disorders of the glands are numerous and of enormous importance to the well being of the body since by their internal secretion, the hormone, known as adrenalin, the blood pressure of the body is regulated. They belong to a group of structures, known as the glands of internal secretion, which are a part of the vegetative nervous system of the body, and the action of the hormone is chiefly made effective through the sympathetic fibres of this vegetative nervous system.

The suprarenal glands are made up largely of chromaffine tissue, which like the cells of the sympathetic ganglia is derived from neuroblasts of the central nervous system. The cortex of the suprarenals is made up of entirely different types of cells. Chromaffine cells are found also in the sympathetic para¬ ganglia of the solar plexus, Zuckerkandl's aortic ganglia, the cardiac paraganglia, the coccygeal and cartoid ganglia of Luschka, and the tympanic paraganglia. The tissues them¬ selves are richly supplied with sympathetic nerve fibres.

The chromaffine tissues produce a true in¬ ternal secretion adrenalin, whose chemical

composition is known : ortho-dioxy-phenyl- ethanol-methylamine.

H

I H

C H H H H

/ \ I I I I

HO— C C— C— C— N— C— H

I III L

HO— C C— HOH H H

\ /

C

I

H

Its nearest relative is tyrosin, a well-known product of protein decomposition. The chief action of adrenalin is through the sympathetic nervous fibres increasing their reactive capacity, or sensitizing them as it were. The routine function of the chromaffine tissue is to react to metabolic stimuli largely in response to desire and fear. Their emergency function, as Cannon has termed it, is to provide the necessary over-response to emotional hyperac¬ tivity, i. e., to increased or diminished desire and fear — which, as their correlates love and hate, are the ultimate expressions in the sym¬ bolic sphere of what are instinctively known as useful or harmful agencies to the organism and to the race. This over- or under-response brings about, through widespread vegetative nervous system activities, including those upon other endocrinous glands, the approximately necessary metabolic adjustment. This takes place chiefly through the regulation of the blood volume and of the organic and inorganic constituents of its plasma. Adrenalin itself is present in the plasma in proportions of 1 to 20,000,000. Notwithstanding this extreme dilu¬ tion it acts upon unstriped muscle fibre and on sympathetic receptors. Adrenalin then is a typical product which demonstrates the meta¬ bolic regulation mechanisms of the vegetative nervous system. In addition to this broad function of keeping the sympathetic nerve fibres in adjustment it has certain specific func¬ tions, over- or under-activity of which give rise to a typical hyperadrenalemia and to hypoadrenalemias. The latter syndrome, when well developed, is known as Addison’s disease.

Furthermore, very minute amounts produce results antagonistic to those from large doses. This bears upon the facts known concerning the antagonisms of sympathetic and autonomic impulses. This idea should prove of service in t'e entire range of opotherapy in calling atten¬ tion to the results obtained by large and by small doses.

Hypoadrenalemia. — The most acute form which is present in complete or great loss to the suprarenals is rare. Pende, in (Patologia del’ apparato surrenale) (Milan 1909), has de¬ scribed six types to which he gives the names impromptu death of suprarenal origin,

pseudo- peritoneal type, cholera-like or gastro-intestinal adrenalemia, apoplectiform type, meningoence- phalitic type and myocardial type. In the first form individuals suddenly die without warn¬ ing, without symptoms save perhaps an epilepti¬ form cry or acute dyspnea or angina. Caseous degeneration of the suprarenals has been ob¬ served. The pseudoperitoneal forms resemble an inexplicable attack of acute peritonitis with death. The gastro-intestinal form behaves

like an acute poisoning. The apoplectiform re¬ sembles a cerebral hemorrhage, but autopsy has shown no cerebral defect but suprarenal hemorrhage. The cases are extremely difficult of diagnosis and are rarities. Less severe types may be met with, among which the attacks of vomiting of pregnancy may be considered.

Addison's Disease. — This is a more chronic type due to more or less total involvement. As early as 1855 this disorder was first described by Thomas Addison whose outline practically covered the essential symptomatology. It is a disorder of adult life, 30 to 40 years. Its chief features are a gradually developing asthenia, with arterial hypotension. There is morning nausea or vomiting, lumbar pains, an advancing yellowish pigmentation of the skin and mucous membranes, amyatrophy. depres¬ sion, unwillingness to do anything, with episodic occurrence of myoclonic, tetanoid or epilepti¬ form convulsions with periodic palsies, con- fusional states, delirium, chronic paranoid ideas, coma, death. The chief lesion found is tuberculosis of the medulla of the suprarenal glands. The more complete symptom picture may be consulted in works on general medicine.

Partial Hypoadrenalemias. — These have been termed the abortive or latent types of Addison's disease. The melanoderma is ab¬ sent, but the other symptoms noted are ob¬ served. Constitutional hypoadrenalemic states no doubt are very numerous and show them¬ selves as rare and obscure forms of lowered vascular tonus, cardiac instability, muscular asthenia, visceral and ligamentous ptoses. These are often correlated with a chronic sclerosing adrenal.

Hyperadrenalemia. — Several types are known, the most striking of which are: (a) Genito-adrenal syndrome of pseudoherma¬ phroditism, (b) virilism, (c) precocious macro¬ genitosomia. The fact that these syndromes occur only in women, as well as the pathologi¬ cal data,

point to a simultaneously invoked ovarian disturbance. These are feminine hermaphroditic forms externally with virile secondary male sexual characters. The earli¬ est case reported was by Creechio in 1865, of a woman of 52, taken to be a man. She had a large penis-like clitoris with hypospadias, no scrotum nor testicles, a uterus with two tubes, two ovaries without trace of corpora lutei, and an enlarged and voluminous suprare¬ nal. She had been markedly asthenic, dying in a syncopal attack with vomiting and persistent diarrhoea. Other cases show other combina¬ tions such as amenorrhoea, gynecomastia, adi¬ posity, hypertrophied clitoris, hypertrichosis, masculine voice, muscular activity, nervous and agitated, even overactive. Others only show continued hypertension and secondary arteri¬ osclerosis possibly with glycosuria. Some patients pass through a nervous agitated crisis with all signs of marked hypertension, ap¬ proaching a manic episode.

The virile type are made up of those in¬ tensely masculine females with traces of beards and often with marked homosexual traits.

The third type consists of the <(infant her- cules® anomalies, who at the ages of from four to eleven years develop genital hair, beards, general hypertrichosis and markedly older skeletons. Sometimes the intelligence is precocious, again they are imbeciles.

Therapy.— Polyglandular opotherapy with careful analysis of each type may give relief in certain cases. The indications are slowly crys¬ tallizing but cannot be even summarized here. Consult Jelliffe and White, diseases of the Nervous System* (1917) ; Sergent, (Les Glandes Surrenales) (1917); Pende, (Pato- logia del' apparato surrenale) (1909) ; Falta, (The Ductless Glands) (1915); Gley, (The Internal Secrelions) (1917).

Smith Ely Jelliffe.

ADRETS, Baron des, da'za'dra', Francis de Beaumont: b. Dauphine 1513; d. 1587; a violent French Fluguenot, who distinguished himself by many daring exploits as well as cruelties. From 1562 on he made himself noted for a ferocity matching his opponents, but seemingly from no religious motive. He subsequently became a Catholic, but died as he had lived, in general detestation. At some places he obliged his prisoners to throw them¬ selves from the battlements upon the pikes of his soldiers. Reproaching one for retreating twice from the fatal leap, ˆSir,® replied the man, ((I defy you, with all your bravery, to take it in three.® This keen rejoinder saved his life.

ADRIA, a'dre-a, Italy, in the province of Rovigo, between the Po and Adige, is one of the oldest cities in Europe, having been found¬ ed by the Etruscans. So late as the 12th cen¬ tury a.d. it was a flourishing harbor on the Adriatic Sea, to which it gave name; but by the continual deposition of alluvium on the east coast of Italy it has been gradually sepa¬ rated from the sea, from which it is now 15 miles distant. It still retains several interest¬ ing remains of Etruscan and Roman antiquity, with a fine cathedral. It has a considerable trade in cattle, grain and wine, silk, linen, leather and pottery. Pop. about 18,000.

ADRIA, an abbreviated name of the Adri¬ atic Sea. It is used by Milton in (Paradise Lost.*

ADRIAN, Emperor. See Hadrian.

ADRIAN I, Pope, b. Rome ; succeeded Stephen III in 772; d. 795. Like his predeces¬ sor, he had to struggle against the power of the Longobards, who had invaded the Ex¬ archate and other provinces bestowed by Pepin, King of the Franks, on the Roman see. Adrian applied to Charlemagne for assistance against Desiderius, King of the Longobards, Charlemagne crossed the Alps, defeated De- siderius and overthrew the Longobard king¬ dom in 774; he then went to Rome, where Adrian acknowledged him as King of Italy, and the latter renewed Pepin's grant. Charle¬ magne paid another visit to Adrian at Rome in 787, when his son Pepin was christened by the Pope. In 787 the 7th General Council of the Church was held at Nicaea. Adrian died after a pontificate of nearly 24 years. He was a man of talent and dexterity; he succeeded in gaining and preserving the friendship of the greatest sovereign of his. time and saved Rome from the last barbarian invaders of the West¬ ern Empire. He was the first Pope to change his name on election.

ADRIAN II: b. Rome; succeeded Nicholas I 867 ; d. 872. He had been married and had a daughter bv his wife Stephania, from whop he afterward separated in order to live in

celibacy. During his pontificate Photius, Patriarch of Constantinople, withdrew from the Church of Rome; from which time dates the schism between the Greek and Latin Churches. He was succeeded by John VIII.

ADRIAN III: b. Rome; succeeded Marinus 884 and died the following year.

ADRIAN IV, the only Englishman ever raised to the papacy; succeeded Anastasius IV, 1154; d. 1 Sept. 1159. He was Nicholas Brake- speare, and for some time filled a menial situa¬ tion in the monastery of St. Albans. Being refused the habit in that house, he went to France and became a clerk in the monastery of St. Rufus, of which he was afterward chosen abbot. Eugenius III created him cardi¬ nal in 1146, and in 1148 made him legate to Denmark and Norway, which he converted to Christianity. As Pope he granted to Henry II a bull for the conquest of Ireland. In 1155 he excommunicated the King of Sicily; and about the same time the Emperor Frederick II, meet¬ ing him on a journey, held his stirrup while he mounted his horse. Adrian took the Em¬ peror with him and consecrated him King of the Romans in St. Peter's Church. The next year the King of Sicily submitted and was ab¬ solved. His term was stormy; the Romans, influenced by Arnold of Brescia (whom he put to death), opposed him; his high claims for the papacy opened the long struggle with the Hohenstaufen house ; and he was about to excommunicate Frederick II when he died. He was succeeded by Alexander III.

ADRIAN V, a Genoese, succeeded Inno¬ cent in 1276, and died five weeks after his election. He was succeeded by John XX.

ADRIAN VI, succeeded Leo X 1522; d. 1525. He was born at Utrecht, of an obscure family, advanced himself by his talents to the post of vice-chancellor of the University of Louvain. Ferdinand of Spain gave him the bishopric of Tortosa. After Fedinand's death he was coregent of Spain with Cardinal Xi- menes. He was elected Pope chiefly through the influence of Charles V, whose authority was then spreading over Italy. He was succeeded by Clement VII.

ADRIAN, Mich., city and county-seat of Lenawee County; on the Raisin River, and on the N. Y. C., the Wabash and the Detroit, T. and I. railroads, 33 miles west of Toledo, Ohio, and 60 miles southwest of Detroit It is situ¬ ated in the midst of a prosperous agricultural section and is fast becoming an important manufacturing centre owing to its favorable location and railway advantages. Among the chief industries are wire-fence plants, con¬ densed milk plant, steel and iron casting foundry; and manufactories of cotton knitted underwear, screens for doors and windows, electric bells and horns, pianos, organs, leather, rockers, razor strops, concrete products, steel posts and rural mail boxes, baskets, gloves, mit¬ tens and toothpicks. Tomato preserving and tomato seed growing are also important in¬ dustries with

headquarters at Adrian. The United States Census of 1914 reported 68 manufacturing establishments on a factory basis employing 1,506 persons of whom 1,256 were wage earners, and a combined capital of $5,032,000. The annual value of the pro¬ ducts amounts to $5,442,000. There are five

banks with a combined capital and earn' ings of $737,298 and deposits of $4,805,- 834. The city has a fine system of public schools with 2,500 pupils and is the seat of Adrian College (q.v.) ; St. Joseph's Academy for Girls (Catholic) with 500 pupils; a good business college, and the State Industrial Home for Girls. There are many fine churches, a Y. M. C. A. building, a new post office, a public library with 23,264 volumes. Streets shaded with maple trees and lighted with electricity and handsome private residences make Adrian an attractive home city. It was founded in 1825 by Addison J. Comstock, incorporated as a village in 1828 and chartered as a city in 1853. The government is the commission form with a mayor and two commissioners. The city has a good sewerage system, water works, public steam heating and an electric street car line, and is connected by an interurban line with Toledo. Pop. 12,000.

ADRIAN, Bull of (1156), issued by Pope Adrian IV (q.v.), granting the sovereignty of Ireland to Henry II in return for his under¬ taking to support the papal authority and to pay Peter's Pence. Considerable doubt exists as to its authenticity.

AD VALOREM DUTY, a tax or duty the

amount of which is not fixed, but is calculated at a rate of so much per cent on the value of the article imported.

ADRIAN COLLEGE, Michigan, located at Adrian, county-seat of Lenawee County, a Methodist Protestant coeducational institution, one of the oldest in the United States, organized at Leoni, Mich., in 1852, and in 1859 trans¬ ferred under a new charter to Adrian. The college grounds cover 22 acres with five large collegiate buildings on the campus. The de¬ partments of instruction comprise : College of literature, science and arts ; school of theology ; commercial school; school of domestic science; school of fine arts ; conservatory of music. The college library contains over 10,000 valuable reference works. The conservatory of music is equipped with a superior modern $20,000 four-manual pipe organ. From the time of its organization the college has maintained a repu¬ tation for thorough work as one of the best educational institutions in the country and with its facilities continually improved and kept abreast of the times, presents

advantages for securing thorough scholarship, superior to those of any previous period. Special advantages are offered to the children of Methodist Protestant ministers and to candidates for the Methodist Protestant ministry. The average annual en¬ rolment of students is over 200.

ADRIAN DE CASTELLO (Adriano di Castelo, adre-a'no de kas-telo), Italian car¬ dinal and scholar: b. Corneto, Tuscany, c. 1460; d. 1521. He was educated at Rome; sent by Innocent VIII to England, and to Scotland and reconciled James III to his subjects; after that monarch's death at Sauchieburn he re¬ mained in England, and obtained a prebend and rectory from Henry VII. After Innocent's death in 1492 he returned to Rome and became prothonotary or secretary to Alexander VI (Borgia), and finally cardinal just before Alex¬ ander's death in 1503. The story that Alexander fell a victim to his own attempt to poison Adrian in order to inherit his great fortune is

scouted by recent historians. In 1502, in his absence, Henry VII made him bishop of Here¬ ford, and in 1505 bishop of Bath and Wells. In 1517 he was involved in the plot of Cardinals Petrucci, De Sauli and Riario to poison Leo X, confessed, and was absolved on condition of paying 25,000 ducats, though deprived of his cardinalate and English dignities. He fled from Rome, however, lived in retirement till Leo's death in 1521 (probably in Venice), and died suddenly on his way back to Rome, there being a suspicion that he was murdered by a servant. He is honorably remembered as one of the first who sought to rescue Latin from its mediaeval corruptions and restore it to purity. He wrote a religious treatise (De Vera Philosophy (The True Philosophy, 1507, printed Cologne 1548) ; (De Sermone Latino et Modo Latine LoquendP (The Latin Speech and Mode of Speaking Latin, a scholarly work published at Rome in 1515, and repeatedly since).

ADRIANOPLE (‘^Hadrian's city®), city of Eastern Thrace, the second city of the peninsula, next after Constantinople; 137 miles west north¬ west of Constantinople, connected by rail ; near the western end of the great Thracian coast- plain where it rises to the Rhodope mountains ; at the confluence of the large Martiza (ancient Hebrus) which drains the centre of South Bulgaria, the Tunja from the north, and the Arda from the west, all navigable. This posi¬ tion and the convergence of several trade routes have made it from very old times a place of great

importance. It was an antique Thra¬ cian city, rebuilt by the Emperor Hadrian, seized by the Turks under Amurath (Murad) I in 1361, and the residence of the Sultans thence till the capture of Constantinople in 1453. Since the Russo-Turkish war of 1877-78 and the separation of Bulgaria, it has lost nearly half its population and a large part of its trade. The old wall that once surrounded it, now existent only in a few fragments, has been re¬ placed by a circle of modern forts. It has a palace and two fine bazaars, besides schools and mosques. Pop. about 83,000, half Turks and the remainder Bulgarians, Greeks, Arme¬ nians and Jews.

It has great historic interest as the scene of four events of the first importance. (1) The battle of Adrianople, 9 Aug. 378, a.d., the most tremendous disaster to the Roman arms since Cannae, and incomparably greater in permanent effects. The Goths, whose head chief was Frith gern, — a man of superior genius and honorable character, — were being crowded southward by the great movement of the Huns which culmi¬ nated in Attila's occupancy of all central Europe three generations later, and asked leave to set¬ tle in the lands south of the Danube they had ravaged into semi-desolation. This was granted on condition that they came unarmed and left the children of the leading families in Roman hands as hostages ; but when the Goths com¬ plied, the imperial officers, who were to supply them with food, forced them to pay famine prices for it, and sold or kept many of the girls for concubines. The enraged Goths,, in return, carried fire, sword and plunder far down into Thrace ; driven back for a time, they returned in the spring of 378, reinforced by Huns and Alans, and their vanguard came near Con¬ stantinople. The Emperor Valens was an in¬ competent but ambitious man. Jealous of his

brilliant nephew, Gratian, who had just won a great victory over the Western barbarians, and eager to fight before Gratian could join him and have the credit of a fresh victory, he made a long march on a sultry day and attacked the Goths with his fatigued troops. The Alan and Sarmatian cavalry surrounded and hemmed in the Roman infantry, like Hannibal at Cannae, till they could not use their weapons ; thousands were driven into a marsh ; the Roman army was practically exterminated; Valens was never again seen alive, and the Goths obtained permanent possession of the broad plains south of the Danube. (2) The Treaty of Adrianople, 1829. In the Russo-Turkish war of 1828-29, Diebitsch passed the Balkans, advanced on Con¬ stantinople, and halting at Adrianople made the demands of a conqueror, and the panic-stricken Turks acceded to everything. Russia received the northeast coast of the Black Sea, and all rights over the Caucasus tribes, the district of Akhaltsikh, and the protectorate over

Molda¬ via and Wallachia (now Rumania) ; and Tur¬ key recognized the independence of Greece. (3) The Treaty of San Stefano (q.v.), after fhe capture of Osman's army defending Shipka Pass in the war of 1877-78. (4) During the

war of 1912-13, Adrianople after a siege of five months capitulated and was ceded to the Bulgarians 30 May 1913 by the Treaty of Lon¬ don. The Turks reoccupied the city on 20 July 1913, and the reoccupation was confirmed 29 Sept. 1913, by the Treaty of Constantinople. From 1914, in the European War, Adrianople suffered from the ravages of enemy warplanes. See War, European.

ADRIATIC SEA, a'dri-at'Ik, or GULF OF VENICE (ancient Mare Adriaticum), an arm of the Mediterranean, stretching in a northwestern direction from the Straits of Otranto, between the east coast of the Italian Peninsula, and the west coasts of Dalmatia and Illyria; length, about 480 miles; average breadth, about 100 miles; area, estimated at about 60,000 square miles. Its depth in the north, between Istria and Venice, is only from 12 to 20 fathoms, but increases in proceeding south to 100 fathoms near its centre, and to 500 fathoms between its centre and its en¬ trance. At the straits between Otranto and Valona its depth does not exceed 350 fathoms, but increases very rapidly toward the Ionian Sea. Its opposite shores present a striking contrast, the east being generally bold and rocky, lined with islands and furnished with good harbors, but thinly peopled and com¬ paratively sterile ; while the west are low, shal¬ low, marshy and ill provided with harbors, though generally populous and fertile. The Adriatic is evidently a continuation of the longitudinal valley of the Po, forming a long and narrow trough between the parallel ranges of the Apennines and the mountains of Illyria. The rivers which it receives, particularly the Po, its principal feeder, have produced, and are still producing, great geological changes in its basin by their alluvial deposits. Hence Adria, between the Po and the Adige, which gives the sea its name, though once a flourish¬ ing seaport, is now 15 miles inland. The prin¬ cipal trading ports on the west side are Brindisi, Bari, Ancona and Venice; on the opposite side, Ragusa, Fiume, Pirano, Pola

and Trieste. From July 1915, the Adriatic Sea was the scene of great naval activity between Italy and Austria. See War, European.

ADSORPTION (a variation of the word <(absorption))). The condensation of a gas or vapor upon the surface of a solid. The fact that solid bodies are capable of condensing upon their surfaces air films or gas films of considerable density was probably first forced upon the attention of the physicist by the dif¬ ficulty of obtaining a permanently good vacuum. Thus it was found that a glass globe (for example) might be highly ex¬ hausted, and yet after a time the vacuum would be found to be materially reduced, even when it was apparently impossible that any air should have leaked in from without. It is now known that unless special pains are taken to prevent it, a film of air remains condensed against the surface of the glass, even when the vacuum through the general bulk of the globe is very high; and air molecules from this film are gradually given off until the vacuum becomes much less perfect than it was at first. To prevent this action it is customary to heat the vessel that is being exhausted, as the gas film is largely driven off from the walls of the vessel when they are heated. See Vacuum.

The condensation of gaseous films upon the surfaces of solids is undoubtedly due to the molecular attraction exerted by the solid upon the gas. This molecular attraction is in¬ sensible at distances that are easily measurable, but it may be very great at points sufficiently near to the surface of the solid. The expres¬ sion (<sensible molecular attraction,® which is in use among physicists, is indefinite, and no very precise statement can be made with regard to the limiting distance beyond which the at¬ traction is not sensible; but from the investi¬ gations of Quincke, Plateau, Maxwell, Kelvin and others, we may infer, in a general way, that molecular attraction is not sensible at a greater distance than about 1-200, 000th of an inch. Hence it- is safe to say that this is the maximum thickness that the gas film condensed on a solid surface can have.

Concerning the condition of the gas in the film we can only say that where it is in im¬ mediate contact with the solid it probably has a very great density, this density rapidly falling off as we pass away from the solid. Under ordinary conditions of temperature the air film condensed against a solid cannot actually be in the liquid state, because it is not possible for air to exist in this state at any temperature higher than 220° below zero F. See Critical Point.

It is well known that a solid body appears to weigh less when it has been recently heated, or is still hot, than it does when it has been al¬ lowed to stand for some time in contact with the air at ordinary temperatures. This phenomenon is apparently due, to a consider¬ able extent, to variations in the thickness of the film of air and moisture

that the body con¬ denses upon its surface. In accurate ther¬ mometry (see Thermometer), where the gas thermometer is used at a standard, great pains are taken, in filling the thermometer bulb with gas, to avoid the contamination of the ther¬ mometric gas by moisture condensed upon the surface of the bulb; the bulb being repeatedly

exhausted, heated and refilled, until there is no longer the smallest chance of any appreciable part of the original surface film remaining. The phenomena of adsorption have not yet been fully studied.

ADULLAM, Palestine, a town in the Shephelah or southwestern Judean coast-land; the centre of a Canaanitish clan later fused with Judahite Hebrews, but not till after David's time, when it was still <(outside Judah,® for which reason he and his 400 freebooters took refuge in its "stronghold® (not "cave,® a misreading which has led to many fruitless identifications of site and a familiar English nickname — see below) when outlawed by Saul (1 Sam. xxii). He also dwelt there when at war with the Philistines. Rehoboam fortified it. In Judas Maccabaeus' time it was in "Idumsea,® as he stopped there when he raided that territory.

ADULLAMITES, in English history, the Liberals who left their party in 1866 and joined the Conservatives, to oppose extension of the franchise by Mr. Gladstone and Earl Russell. John Bright in a speech compared them to- the outlaws in the Cave of Adullam ; to which Lord Elcho retorted that the band was hourly increasing, and would deliver the Parliament from the tyranny of Saul (Gladstone) and his armorbearer (Bright). The group was also known as ((The Cave.®

ADULT EDUCATION. See Education,

Adult.

ADULTERATION ((<making other' wise®), in its legal sense the deceiving of buy¬ ers of goods as to their quality by secretly add¬ ing or taking away basic constituents. The element of deception must be present; openly selling any mixture, however poor, is not adul¬ teration legally or morally. In current usage the term is restricted to food products, drugs and dyestuffs. The adulteration of coinage is termed "counterfeiting® (q.v.) that of unsound meat, fish, etc., "doctoring,® a term which, with "sophistication,® is also used for wines and liquors. Adulterated woolen fabrics are collo¬ quially but not always properly known as "shoddy.® The object of adulteration is to gain more profit: with costly wares, either by diluting them with cheaper ones, or by remov¬ ing some valuable element for separate

sale ; with cheap ones, to make them look like or have the flavor of costlier ones; with spoiled or damaged ones, to make them appear sound. Most adulterations are not directly injurious to health, the public being cheated rather than poisoned, and.it is to some extent a copartner in the deception, as the cost of wholly pure articles would greatly curtail buying.- On the other hand, it is often forced into such co¬ partnership by inability to find or know the good when willing to pay for it, and wastes money by paying for a pure article and receiv¬ ing an adulterated one. And as the reduction of the nutritive value of food is itself a great evil; as the extent or harmfulness of adultera¬ tions cannot be known offhand and tends always to grow worse as the maker grows greedier and his character deteriorates from losing his self-respect (itself a great social evil) ; as hon¬ est dealers are not only prejudiced by unfair competition, and suspected of fraud when qualities are poor, but often driven into the

same course in self-defense; and as hasty addi¬ tions of cheap materials are always liable to come from diseased sources and menace public safety, — modern legislation constantly broadens its scope in dealing with this offense alike from a pecuniary, a sanitary and a moral standpoint. Ignorance is not considered a valid excuse to a dealer who sells adulterated wares under the ordinary trade title; the offense is a fraud at common law, and he may be compelled to take back the goods or pay damages.

The history of adulteration would probably be coexistent with that of trade. We know that it was practised by the Greeks and Romans, and the comic dramatists have divert¬ ing references to the (<doctoring® of stale fish. English statutes exist from 1266 with penalties for debasing beer or wine and selling inferior bread or meat, while tea (see below) had later a special statute ; and the law-makers have never ceased struggling with the problem. But the first great general agitation was in 1851, when the London Lancet aroused the public by a special investigation, publishing analyses and names of dealers ; and the first parliamentary commission was appointed. The first general adulteration act was passed in

1.

The chief articles subject to adulteration have been, first of course, the great staples of life, flour and bread, milk, butter and cheese, with

beer, wines, liquors and tobacco, staple in use if not need; relishes and seasonings, as. sugar, honey, preserves, vinegar, pickles, con¬ diments and spices ; oil and lard ; tea, coffee, cocoa and chocolate; confectionery; drugs and dyestuffs. The selection and extent of adultera¬ tions vary indefinitely with place and time ; as cost or popular wealth differs in different, coun¬ tries and epochs, adulterations common in one place or generation are almost unknown in an- other.

Beer. — The objects of its adulteration are three: To give artificial strength to weak beer, to disguise the badness of poor or spoiled beer and to keep it from spoiling. The most com¬ mon adulteration is the substitution of quassia, gentian, aloes or other bitter extract for the bitter principle of hops. Capsicum is added to give pungency and flaxseed and glucose to give the body which should be derived from malt. Carbonic acid gas is forced into imitation beer to give it (<life.® Alum, potash, cream of tar¬ tar and salt, used to make beer keep, are not regarded as deleterious adulterants. Salicylic acid is the preservative most commonly used, and benzoic acid and sulphites perhaps as fre¬ quently. Formaldehyde is also a frequent ad¬ dition. A common practice is to fumigate beer casks with sulphurous acid gas and the beer afterward put into the casks takes up enough of the acid to preserve it. Wild cherries, vari¬ ous herbs and foliages, etc., are employed to improve a poor flavor. 1 hey are cheats but not injurious.

Butter. — A formidable list may be made of butter adulterants at different times and places, — chalk, gypsum, alum and borax, bo- racic and salicylic acids, glucose, flour, etc.; but for practical purposes they may be reduced to water, buttermilk, cheese, salt and oleomar¬ garine (q.v.) as increasers of bulk, with ar- notto, aniline yellow, etc., to improve the color. The latter is hardly adulteration either in bad

intent or bad effect ; the public universally con¬ nects a yellow tint with richness in cream, — quite irrationally, as the milk of many cows gives butter as white as tallow, yet of perfect quality and taste, — and the harmless pigments merely remove incorrect prejudices. The first four others are equally innocuous (save that buttermilk makes it grow rancid more quickly ; it is usually carelessness or incompetence rather than fraud) and are mere diluents. In normal butter, water should not exceed 12 per cent and salt 5 per cent. By adding certain chemicals to butter and churning them together the butter may be made to take up from 25 to 35 per cent of water and 10 per cent of salt. Oleomargarine is not even an inferior product in any respect ; its nutritive value equals that of butter and it keeps better; and the severity of the laws regulating its manufacture and in¬ spection guarantee its quality

beyond that of any other manufactured article. Its use as an adulterant is to be condemned chiefly on the ground of fraud in selling oleomargarine at butter prices. Glucose is sometimes found as an adulteration in butter to the amount of 10 per cent. The chemical preservatives deemed adulterants in butter are borax and boric acid chiefly and rarely formaldehyde and salicylic and sulphurous acids.

Cheese. — English cheeses are practically not adulterated. Fancy foreign cheeses, as the Swiss, etc., often contain coloring matter and potato meal. American cheese is by law per¬ mitted to contain coloring matter and is re¬ quired to contain <(in its water-free substance not less than 50 per cent of milk fat.® How¬ ever, it is not forbidden to sell cheese with less than this proportion of milk fat provided it is sold as ((skimmed cheese,® a provision too commonly ignored. A frequent deception practiced is the substitution of some cheap fat in cheese for the natural butter fat of the milk skimmed before being made into cheese.

Cocoa and Chocolate. — The chief adulter¬ ants are starch and sugar ; but they have also contained wheat and potato flour, sawdust, oils and fats and other things, with iron rust as col¬ oring matter. Ground cocoa shells and ar¬ rowroot are common adulterants. The tests are for theobromine (the characteristic prin¬ ciple of the cacao bean), fat, starch, inorganic matter, etc.

Coffee. — Its usual adulterations are seeds (roasted peas, beans, etc.) or roots (chicory, dandelion, carrots, turnips, parsnips, etc.) with caramel to color their gray tint. All these are mere diluents ; though there are some who actually prefer an admixture of chicory for its flavor though it gives black, bitter and mud¬ dy grounds. It and the roots may be easily detected by putting a little of the sample into a glass of water ; each bit of chicory or other root will be soon the centre of a yellowish- brown cloud which will rapidly spread till the water is all colored. A more serious adultera¬ tion is made by adding <ccoffee pellets,® — imi¬ tation coffee beans made of roasted wheat, peas, and molasses — to bean coffee. These are not discovered by the usual purchaser and when ground disappear in the dust and chaff. Coloring matters are frequently used to make an inferior grade of raw coffee resemble a high-priced grade. There are also chemical tests for both tea and coffee, by determining

the amount of thcine or caffeine, the percentage of matter soluble in water, treatment with hot mineral acids which increase the sugar in cof¬ fee but not in chicory, etc. The microscope, however, is the most effective detector of adul¬ terations in coffee.

Confectionery. — The extreme cheapness of sugar has practically put an end to the adul¬ teration of all but the very poorest grades of candies ; and those mainly with the harmless terra alba, or pipe-clay, and paraffin wax. The term <<sugar,)) however, in this use of it in¬ cludes glucose or corn syrup, permitted by law to be used in food products. A wide range of coal-tar colors are used but in such minute quantities as to be considered harmless.

Distilled Liquors. — Whisky, brandy and rum are often purely factitious, being made from caramel and dilute alcohol and given the characteristic flavors by ethers of various sorts and fusel oil (often left in genuine whisky, etc., from carelessness or grudging the cost of purification, and recognizable by its nauseous smell when a little of it is evaporated in the hand). The more common adulterants are raisin syrup, prune juice and glucose, with creosote, cayenne pepper and <(cognac oil® (made from cocoanuts) for flavoring.

Drugs. — The adulteration in each case is special, with some article looking like the gen¬ uine but inert. This is, of course, potential manslaughter wholesale, as each prescription made from such materials might cost a life. Unfortunately, a large part of the drugs are imported and the fraud is probably committed before they come to this country at all. Many of the adulterations of drugs, however, must be considered accidental ; they consist of dirt upon roots insufficiently cleaned and twigs and stems included with valuable leaves and berries. There are also the more serious deteriorations from age or careless handling, which amount practically to adulteration. Among this latter class are especially articles in which the valued ingredients are essential oils, as in cinnamon, cloves, peppermint leaves, lavender flowers, etc. When not intelligently cared for these articles lose their active principles by evaporation.

In the line of chemicals many of these acci¬ dental adulterations exist and the labelling of such substances ((C.P.® (chemically pure) should never be taken at its face value but proved by rigid tests. At the same time it must be borne in mind that a failure to meet all the requirements of an arbitrary standard is not evidence of adulteration or deterioration. Standards are generally established with but one or two objects primarily in view and a condemned chemical may be entirely suited to another use.

Among intentional adulterations in this class may be mentioned as examples : Alcohol, with wood alcohol ; beeswax, with starch and ceresin artificially colored ; geranium oil, with gingergrass oil ; glycerine, with glucose and cane sugar ; linseed oil, with mineral oils ; lin¬ seed meal, deprived of its natural oil which is ˆrestored® with cheaper oils ; phenacetine, with the cheaper acetanilid ; Seidlitz powders, with Epsom and Glauber's salts ; soaps, with starch, flour, mineral oils and excess of water; tea sweepings (for the manufacture of caffeine), with many sorts of leaves and dirt; turpentine, with kerosene, etc., etc. Many drugs in leaf

and root form have had their active principles removed by distillation or solution and some powdered drugs show an admixture with flax¬ seed meal and variously tinted sawdust.

Dyestuffs. — These are very variously adul¬ terated with cheaper dyes, determinable, if at all, by expert chemical examination.

Flour and Bread. — Flour is not much adul¬ terated in the United States, though it is in Europe, where the masses are poorer. The chief admixture is ground gypsum, or other minerals, which can be detected with the mi¬ croscope ; diluents but harmless. Wheat flour is too often adulterated with corn, rye flour with both corn and low grade wheat and buck¬ wheat flour with all three. The chief illegiti¬ mate additions to bread are alum and sulphate of copper, to whiten it or correct sourness. Alum in baking-powder is not thought objec¬ tionable, the heat of baking converting the mixture into insoluble aluminum phosphate ; and by itself its chief harm is in disguising any sourness of the bread. Copper sulphate is always dangerous. Both are tested by dis¬ solving gelatine, laid for some hours on a sop of bread, in a wood-alcohol tincture of log¬ wood with ammonium carbonate, which turns blue for alum and green for the copper salt.

Honey. — Strained honey, a costly article when pure, is often heavily adulterated with glucose syrup, invert-sugar, cane sugar, gela¬ tine, etc. An educated taste is a better guide •to these than any analysis, as that of native flower-fed honey is beyond counterfeiting; but chemical analysis can detect most of them. Formerly comb honey was regarded as neces¬ sarily pure but modern beekeepers have been able to feed their bees with glucose and cane- sugar syrup which the bees innocently store in the combs as readily as they do pure honey. The charge has been made by English chemists that American combs are often made of par¬ affine ; this is most improbable as the profit would be extremely small ; and a very simple test will decide it. The

microscope will show pollen grains in the real wax and warm sul¬ phuric acid will blacken beeswax but not par¬ affine.

Lard. — Hogs' lard is frequently adulterated w'th stearine, tallow and cottonseed oil ; other vegetable oils such as peanut oil, corn oil and cocoanut oil are more rarely used. The worst adulteration is water, which is successfully incorporated with the lard under pressure and, of course, sold at the price of lard. A common commercial fraud is the selling of low-grade hog fat for <(leaf lard,® the choice layers of fat from certain tissues of the animal.

Milk. — The adulterations of milk are re¬ ducible to five : Diluting, skimming, replacing the skimmed cream with cheaper animal fats, coloring to give it the look of cream and add¬ ing preservatives or correctives to keep it from souring or to sweeten its taste when beginning to turn. Its use as the staff of life for chil¬ dren and invalids makes its purity one of the most exigent demands and its poor quality or innutritiousness a direct or promoting source of widespread disease and death. In some great cities pure milk is not attainable for the masses at any price within the means of ordinary workmen; tie dairy districts within reach of the city by train, during any time it will keep sweet and not churn, cannot supply enough for

all and it is inevitably diluted with water and more or less of it treated with chemicals. This adulteration may be still further in¬ creased by skimming off of the cream to sell separately, heavily reducing its nutritive value Still worse, the water used in dilution is not likely to be free from the bacteria of disease (diphtheria, typhoid and scarlet-fever out¬ breaks have been repeatedly 'traced to this cause, sometimes merely from cooling leaky cans in the tainted water) ; from decaying ani¬ mal or vegetable matter, or from the germs •with which street dirt is laden. (The contam¬ ination from sores on cows kept in unsanitary conditions belongs to another subject). As to the effect of the adulterations : Skim-milk is a cheap and valuable food for blood-making protein, as evinced by the cheese made from it; but it should be sold as such, otherwise in¬ fants and invalids who need the milk fat may be injured. Other fats do not replace the characteristic and valuable qualities of the cream. Of the chemicals used to preserve milk for short periods, formaldehyde (also used for preserving other foods) is most com¬ monly employed. One part of formaldehyde in 10,000 parts of milk will keep the milk sweet for five days. In this proportion

it has not been proved injurious to infants. It is usually added in only half this proportion, preserving the milk for three days. It is urged against its use that it destroys beneficent bacteria in the milk. Borax, salt and carbonate of soda are also used ; neither they nor the arnotto used to give the milk a cream color are harm¬ ful in themselves, but only as disguising the real quality of the milk sold. Benzoic acid and salicylic acid are also found by milk inspectors in some samples. Cane sugar, glucose, starch, gelatine and even chalk are used to bring up diluted milk to a density which will stand the lactometer test. In some instances this has been done by adding condensed skimmed milk and some oil.

The method of testing for dilution is by the lactometer to determine specific gravity, which is lowered by admixture of water; in exact reverse, it detects skimming (which in¬ creases specific gravity by removing the lighter cream) by showing normal specific gravity when looks and taste are inferior. Skimming is also inferred from increase in transparency, as indicated by the lactoscope ; opaque normal milk needs thinning with a certain percentage of water before a dark object or black line drawn on a white surface will show through; uhe less water a given sample needs for this visibility, the less cream it contains. For more precise determination the chemist finds the amount of solids in a sample by evaporating a mixture of milk and newly-heated asbestos and weighing the residue; the amount of fats, by dissolving them out with ether from a measured strip of blotting paper and evaporating. Wa¬ tering may often be detected by testing for nitrates, which milk does not contain and most water does, and contaminated, water practically always. The detection of animal fats used to replace cream is. not easy, though the butyrates have some individual qualities.

Mustard. — This is perhaps the most heavily and universally adulterated article in the mar¬ ket; only a small percentage of it is pure. For one harmless adulteration the public is

responsible, as for butter-color and pickle- green ; that of turmeric or coal-tar color to give it the bright yellow demanded by cus¬ tomers, while real mustard is very dull. But it is usually diluted with starch,— wheat, corn or rice, — millet, rape-seed, flaxseed, old tur¬ nip- or radish-seed, charlock (wild mustard) seed, cayenne pepper, corn-meal, gypsum and wheat-bran. The adulteration is so large in some samples of mustard-paste that salicylic acid is added to keep it from spoiling. For starch, easy tests are iodine, which turns it blue, and its thickening in boiling water; for mineral matter the chemist determines the amount of ash. For the others, though the microscope is useful, the

best remedy is to pay for a known brand, — which indeed is best of all.

Olive Oil. — A large part of the so-called olive oil of the market is cottonseed, peanut or mustard oil or greatly mixed with it ; prob¬ ably the equal in quality and taste of the genu¬ ine (as it is indistinguishable), but a fraud in price through deception. The very finest qual¬ ity of olive oil is rarely adulterated as the taste is easily impaired by even a slight admix¬ ture. Tests: Nitric acid turns olive oil from pale green to dark green within a few minutes. Should the color change to orange or brownish, some other oil is present.

Pickles and Canned Goods. — The public demand for bright green pickles has been gratified by boiling them in copper kettles with vinegar and some alum, the vinegar forming the highly poisonous acetate of copper with the kettle and coloring the pickles green by forming albuminate or leguminate of copper on the surface of the pickles. As only a minute proportion of the copper salt remains in the liquid the determination of its presence is a task for the analytical chemist. The same process is said to be gone through with peas ; and even the copper salts directly added, which would be a basis for a criminal prosecution. The presence of metallic salts from, the can results from the action of certain vegetable substances on the tin coating and upon the iron after the tin is dissolved. These sub¬ stances are not necessarilv acids, as canned pumpkin will show a much larger percentage of tin salts than does canned plums. These salts of tin have not been proved deleterious, and, besides, oxide of tin would make the canned food too nauseous to eat long before it reached even a medicinal proportion, and oxide of lead has not been found in any quan¬ tity. By far the greatest danger in canned foods is that due to carelessness in the canning process, resulting in the development of putre¬ factive ptomaines which have been the cause of many deaths.

Preserves, Jams, Jellies. — Gelatine and glue are often used to help the fruit to jelly (not always an easy thing to assure even by experts) and are often not restricted to the amount needed; the goods are also artificially colored and flavored with so-called <(fruit oils,® chemical analysis being needed to determine the constituents. The demand for cheap jams and jellies brings into the market concoctions of glucose and apple juice artificially flavored and colored to conform to the name, on the labed on the jar. In some instances a little real fruit is scattered through the material. The

deception is self-evident, as every housewife knows the impossibility of making such goods at the price. Zinc oxide has been found in preserves, from its use as cement to make cov¬ ers- of jars airtight. Most of the cheap prod¬ ucts contain the allowable percentage of ben¬ zoate of soda to prevent their decay. To make up for the lack of sweetness in the glucose saccharine is a frequent addition. The apple-pulp from cider-mills is a common basis of cheap jams and this is sometimes given body by the addition of boiled starch, agar-agar or dextrine. If in good ' condition none of these adulterations is injurious to health. The fraud is in the name under which they are sold.

Spices: Nutmeg, Pepper, Cinnamon, Mace, Cloves, Allspice, etc. — Whole spices are gen¬ erally thought safe from adulteration; but they are not, as inferior members of the same species may be substituted for them with im¬ mense loss of quality, exactly as if crab-apples were sold for dessert apples. Thus, wild nut¬ megs are often sold for the cultivated ones and cassia almost always for cinnamon. The method of detection is to know the genuine. For instance, the best nutmegs are about an inch long and shaped like a damson plum, weigh one-seventh to one-fifth of an ounce and exude oil liberally when pricked with a pin ; the wild ones are small and pointed and have less oil and fragrance. The genuine Cey¬ lon cinnamon is a thin small roll, of delicate flavor which lasts long in the mouth, and tears rather than breaks ; the cassia cinnamon is much coarser and thicker, breaks but does not tear, is rather mucilaginous when chewed and has a strong woody flavor. Cloves are adul¬ terated by making them absorb water, of which they will take up a great deal to increase their weight. Another form of adulteration is the removal of a part of the essential oil and the subsequent sale of this exhausted spice at reg¬ ular prices.

The immense adulteration of ground spices makes their convenience a costly purchase. At the outset, sawdust and starch are added even to the best, to absorb the oil which makes them difficult to grind ; and it rarely stops there. Of 12 specimens called Aground cinnamon® ex¬ amined by the New York Board of Health, only three contained any cinnamon whatever and even those were largely mixed with cassia and sawdust ; the others were almost entirely composed of those ingredients, two were saw¬ dust with a very little cassia and one was pure sawdust. Seventy per cent of the allspice, 70 per cent of the pepper, 82 per cent of the cinnamon, 57 per cent of the cassia, 76 per cent of the cloves, and 66 per cent of the ginger, was adulterated. The most universal adultera¬ tions are starch for bulk, mustard for pun¬ gency and turmeric for color. Other substances used are cocoanut

shells, rice, charcoal, sand, ground date and olive stones, buckwheat hulls and the ground shells of walnuts, brazil nuts and almonds and corn meal. Ginger, like cloves, is often exhausted by removing its es¬ sential oil with alcohol or even by soaking in water to procure the <(water extract® used in making ginger ale.. Black pepper demands a special note, as it is the exception rather than the rule to find it pure. A large percentage of the samples examined in the past have con¬ tained no pepper at all. ((Pepper dust® (the

sweepings of warehouses, in trade a regular article of sale as (<P. D.®), mustard husks, ground wheat, corn or rice, capsicum, and even gypsum and sand, have been found in it. Red or cayenne pepper is much purer than black pepper and is mainly adulterated with flour, crackers, rice, turmeric, red ochre and coal-tar dyes. Ground mace often contains cracker dust tinted with Venetian red.

Sugar. — White cane sugar has become so cheap that it does not pay to adulterate it and the old-time adulterants like marble-dust, terra alba, etc., have practically disappeared except in cheap confectionery. Sand was never much used except in Drown sugar (4 per cent has been said to be unavoidable in raw Manila sugars, but any percentage is indictable if the direct addition can be proved) and glucose has taken its place ; equally healthful with cane sugar but, of course, a fraud, as lacking in sweetening power, and a deception.

Tea. — Owing to its cost and the difficulty of judging its quality by the eye or taste, tea has always been an article easily susceptible to adulteration since its introduction into the West; fortunately, more than most products, the price is an index of the quality and it is easy to procure a good article by paying for it. It has the distinction of having had a special law passed to prevent its adulteration, and for the most curious reason imaginable : the Act of 17 Geo. Ill alleges that the admixture of the leaves of sloe, ash, elder and other trees and shrubs with it was working great injury to the local timber and undergrowth. Being a luxury whose cost presses heavily on the very poor, its substitutes within the means of that class have usually none of the characteristic properties, good or bad, of the genuine and are mere flavored warm drinks ; curiously, the poisonous adulteration alleged against it (groundlessly), that of obtaining its green color from copper pans, was against the very costliest brand of all. It has been found, however, that tea is (< faced® with Prussian blue and indigo, soap¬ stone, plumbago and gypsum. But the stuff sold to the poor, besides spent tea-leaves and those of various plants, as above, has been found to contain sheer dirt, sweepings, brick- dust, iron filings, and iron salts, sand, etc., un¬ wholesome and liable to contain disease

germs. Catechu is sometimes added to give increased ˆstringency. Owing to careful inspection very little tea in the American market is adulterated otherwise than by mixing a lower grade tea with a more expensive one and selling the mix¬ ture at the top price. See Tea.

Tobacco. — Color and flavor are often given to inferior grades by artificial means. No leaf is known which will counterfeit the tobacco leaf . outright. Snuff, however, lends itselt readily to debasement by colored powder, and lime and chromate of lead have been found in it.

Vinegar. — The most usual form of adul¬ teration is thinning down with water, then re¬ storing the lost acidity with sulphuric, muriatic, nitric or other cheap mineral acids. The first is easily detected by the considerable precipi¬ tate when barium chloride is added ; the second by a white fiocculent precipitate on adding a few drops of solution of silver nitrate. Nitric acid needs special chemical tests only to be performed by an expert. Imitation vinegars

are made by the acetic fermentation of malt sugar, cane sugar and alcohol, all diluted with water to a degree where the ferment will work, ihese vinegars, of course, derive their acidity from acetic acid. They lack the flavor of ap¬ ple-juice. However, this is sometimes added, together with a proportion of pulp from the cider-mills, to counterfeit the body and taste of pure cider- vinegar.

Wines. — Naturally their chief adulterants are water and alcohol, to increase bulk or strength ; colors and flavors, astringents, etc. — caramel, logwood, glycerine, syrups, etc., — to give artificial qualities resembling wines of re¬ pute ; salicylic acid to prevent souring ; gyp¬ sum to precipitate organic matters that muddy the wine (the latter injurious as likely to turn into acid potassium sulphate) ; sugar in the must, to increase the alcohol, etc. Natural colors like fruit juices and cochineal are harm¬ less ; aniline colors not always. The chemical tests are too special to be detailed in a popular work. It should be said, however, that by far the leading adulteration consists in the wine not being real fermented grape-juice at all; this applies only to foreign wines, the American being generally pure and practically the only pure wines at moderate price on the market. Real wine from foreign vineyards is a costly article and the better grades are pledged years ahead to the great foreign courts, noble houses and private European buyers. Cheap foreign wines should be understood from the outset to

be made either from exhausted grape-skins or raisins treated with alcohol and water (it is not for dessert use that the great majority of the California raisin crop is exported to France) or from pear- juice (much the greater part of the so-called French ˆchampagne® in America being perry).

Bibliography. — Leach, (Food Inspection and Analysis) (1913); Olsen, (Pure Foods; Their Adulteration, Nutritive Value and Cost) (1911) ; Vacher, (Food Inspector's Handbook (1913); Wiley, (Foods and Their Adultera- tions) (1912); Wiley, (1001 Tests of Foods, Beverages and Toilet Accessories) (1914) ; also the United States Chemistry Bureau's Bulletins 41, 80, 100 and 147, and Circulars 25, 63, 113 and 180; and the Animal Industry Bureau's Circular 203.

ADULTERY, unlawful intercourse be¬ tween two married persons not standing to each other in the relation of husband and wife, or between a married person and another unmarried. In the former case it has been called double and in the latter single adultery. Unlawful voluntary sexual intercourse be¬ tween two persons, one of whom at least is married, is the essence of the crime in all cases. In general it is sufficient if either party is married and the crime of the married party will be adultery while that of the unmarried party will be fornication. In the United States there is a wide diversity in the laws relating to this offense. In some States it has been made a crime while in others civil proceedings are allowed substantially similar to those of the English law. Varied punishments, mostly of a very severe character, have in nearly all countries and ages been inflicted on those who have committed this offense. In some cases it has been deemed lawful for a husband or the vol x — 11

woman's father to kill the guilty person if taken in the act. By the law of England the slaughter of the offending parties in such cases is deemed manslaughter of a not very aggra¬ vated sort. In English law the act is punish¬ able only by the censure of the ecclesiastical courts, but when committed by a wife it is regarded as a civil injury and an action for criminal conversation may be brought by the husband against the paramour. Adultery is now considered in England a ground for total divorce.

ADVAITA, a-dwAi'ta, a philosophical school of India, founded by Sankarujurya (or Cankaracarya), who flourished about the mid¬ dle of the 8th century a.d., or earlier. Its prin¬ cipal doctrines are that the human soul is not essentially different from God, but that it is imprisoned in the body from which at death it is released to return to the impersonal God and that the material world is not different from

God. Its adherents are called Advaitava- din, or Confessors of Monism.

AD VALOREM (((according to value®), a term denoting the method by which customs taxes are determined at a percentage of the value of the imported article at its place of ex¬ port on the seller's oath and appraiser's esti¬ mate. Theoretically, this is much fairer than a specific duty (on a unit of measure, as pound, yard, bushel, bale, etc.), since the costlier pay their equal percentage with the cheaper ; but in practice it has serious drawbacks, annoys both sellers and government much, defrauds the latter somewhat and its people a great deal. Values are unstable, the exporter is interested to understate them and the officials are eager to scent fraud, whence much friction and many lawsuits. As to the last item, general tariffs are apt to produce an appearance of moderate average by equating a low duty on grades of slight consumption with a high one on those chiefly used ; a deception impossible on specific duties, which at least must declare themselves. The customs officers much prefer these also. The United States tariffs are of both kinds, some articles having a combination of the two. See Duty.

ADVANCE GUARDS. The principal de¬ tachment insuring security for the command in the field, which covers the head and flanks of a column or army advancing in the direction of the enemy. For a large force the advance guard is necessarily composed of troops of all arms ; its strength being proportioned to that of the main force ; the more or less resistance of an independent character it may be required to make ; and the greater or less extent it may be found necessary to embrace by its advanced posts on the front and flanks to watch and an¬ ticipate every movement of the enemy. The proportion of the advance guard to the main body may vary from a third to a fifth of the total force. In armies of some strength, or large corps d'armee, particularly where the nature of the country requires a wide develop¬ ment of advanced posts, the larger proportion is demanded; as at least one-third or even one- half of its strength will be required for the advanced post service. In a small force of two or three thousand men one-fifth will usually be all that can be well spared for the same

purposes. The purpose in all cases should be to keep the enemy in a state of uncertainty and even to act offensively against him when occasion offers so as to keep him in doubt as to the actual character and numbers of troops before him. In all defective positions the

advance guard and its advanced posts should retire slowly, but circumspectly, so that the main body may have time to take all its de¬ fensive measures. In the offensive the attack of the advance guard should be decided and vigorous ; pressing upon the enemy at every point ; and leaving nothing undone to demoral¬ ize him by the confusion which so often fol¬ lows from an impetuous onset. In all affairs of advance guards great circumspection is to be shown both by the officer in command of the advance guard in throwing forward fresh troops to strengthen a point assailed, as well as on the part of the general-in-chief in sustain¬ ing the advance guard by weakening his main body. These are points that can only be de¬ cided on the spot. The safer rule in all cases is not to weaken the main defense, or main attack, by detaching from it to support a feeble point. If the force engaged under such circumstances does not suffice for its own de¬ fense it is best for it to fall back in time and, taking position with the main body, endeavor, by their combined efforts, to turn the scales of victory in their favor.

Strength. — The strength of an advance guard depends upon: (1) The force it is cov¬ ering. (2) The object for which it is organ¬ ized. If its commander is instructed to engage the enemy whenever found, its strength should be at least one-fourth of the entire command. If, however, he is only to delay the enemy's ad¬ vance to give the main body time to deploy, it should be as small as is consistent with this duty — for a large force, from one-sixth to one-eighth will suffice. (3) On the nature of the country. (4) The character of the enemy. (5) The distance it is required to precede the main body. Its strength should never exceed one-third of the command and rarely be dimin¬ ished below one-sixth. The strength of ad¬ vance guards would usually be as follows :

One battalion of infantry (four companies), one-half to one company;

One regiment of infantry (12 companies), two to three companies ;

One brigade of infantry (36 companies), six to 10 companies.

In an infantry division, approximately the following number of troops would be detailed on advance-guard duty :

From the three brigades of infantry, two regiments ;

From the two regiments of artillery, one battalion ;

From the regiment of cavalry, two bat¬ talions ;

From the one company of engineers, one- half company of engineers.

One of the important duties of the army commander is to determine the strength and composition of his advance guard and he must bear in mind many things in addition to those already mentioned. (1) If the enemy is near the duty will be arduous. (2) That detach¬ ments from the main body may impair its strength at a critical moment. (3) That an ambitious officer, finding himself in command

of a strong force, may unwisely become in¬ volved with a stronger one and thus force his chief to deploy the main body to extricate his advance guard. He must also remember that the defensive powers of small bodies have been increased by improvements in fire-arms.

Duties. — The duties of the vanguard are : (1) To examine thoroughly the ground and remove all obstructions from the road. (2) To gain information of the enemy, especially when the cavalry division is not in advance. (3) To drive back or capture any detachments of the enemy they may find or hold the ground until they can receive reinforcements. As the principal duty of the vanguard is reconnoitering, it should be largely composed of cavalry. The duty of the reserve is to fight and it would naturally be composed of infantry and artil¬ lery.

The remainder of the unit from which the advance guard is taken ought, when convenient, to march at the head of the main body. The place for the commander of the advance guard is with the reserve. In open country the scouts and Hanks should operate at considerable dis¬ tances from the column and connecting files should be placed to insure rapid communica¬ tion.

Cavalry. — Cavalry must lead the vanguard and furnish scouts and flankers when the country permits. It can move with great rapidity, can examine places at a distance and quickly regain its place without delaying the march. It must push forward boldly and keep well in advance. It must furnish the regular patrols and detachments to examine lateral roads. The role of the cavalry is reconnais¬ sance, but as it may meet with obstacles to its progress, such as detachments of the enemy’s infantry, villages, defiles and roads, it must be accompanied by infantry to which these duties must be assigned. The cavalry may ride around a village or small wood and examine the outside, but it should not enter until they have been explored by the infantry. While the infantry is engaged in the examination, cavalry patrols should be sent on the roads beyond on the lookout for the enemy. De¬ files, ravines and rough country generally must be

examined by the infantry. As all kinds of country are apt to be found in a day's march, the advance party and flankers must not be cavalry alone. It is impossible to give a gen¬ eral rule as to the proportions of the various arms.

Artillery. — The mobility and the offensive and defensive powers of modern field artillery have become so great that it is now assigned an important place in the advance guard in country favorable to its movements. As it must come into action early, some pieces are frequently attached to the support and the re¬ mainder of the battery or batteries march with the reserve. A division would have one battery with the advance guard, two pieces to march at the rear of the support and the other pieces behind the first battalion of the reserve. The limber-chests should be filled with ammu¬ nition and the caissons be left in the rear out of the way. It can assist in dislodging the enemy from villages, buildings, woods and bridgeheads.

The battles of the future will generally be preceded by a concentration similar to that of

the German armies, at least for the corps of the first line. There is nothing to prevent placing the corps artillery in the advance guard if the situation is strong and well known. No inconvenience will result, for when this artil¬ lery is called to participate in the combat it will take the trot and leave vacant the interval between the advance guard and the main body for the zone of manoeuvre. In immediate con¬ tact with the enemy the advance guard must form a curtain of exploration with its skir¬ mishers and advanced parties while the main line of resistance must be formed from the reserve. The masses will march in the rear of the advance guard. The disposition will depend upon the ground and the intentions of the chief — the important thing is that the ar¬ tillery find the ground free in its front. The artillery has also a reconnaissance role in con¬ nection with the cavalry for, with its long range, it can assist in searching by its fire places unapproachable to the cavalry.

Infantry. — The role of resistance belongs to the infantry, as it is essentially the fighting- arm in the combination. Its mobility imposes upon it also the duty of assisting the cavalry in reconnaissance work and of covering the artillery. The more artillery in the advance guard the more infantry it must have. In rough country the service of

exploration and the advance guard duty will fall almost en¬ tirely upon the infantry. In the combat with the enemy's advance guard the infantry must advance quickly to protect it from the enemy's infantry fire. We may say that all of the duties, which from the nature of their organization the cavalry and artillery cannot perform, fall to the lot of the infantry. Its role is (<to con¬ quer and to preserve.®

A light bridge train and some engineer troops should also be assigned to the advance guard to bridge streams, destroy obstacles and repair roads for the progress of the main body.

The Commander. — When the enemy is near, the selection of a commander for the advance guard is very important. He must combine boldness, activity and knowledge with good judgment, and be so well disciplined as to subordinate his actions to carrying out the wishes and instructions of the commander-in¬ chief, and avoid bringing on engagements through his own desire for distinction. He is responsible for the proper arrangement of the various parts, and that each faithfully performs its particular function. He must see that in¬ formation obtained as to the strength, position or movements of the enemy is promptly and accurately transmitted to the commander-in¬ chief. Before assuming command of the ad¬ vance guard, he reports to his chief for instruc¬ tions. If they are verbal, he should write them in his notebook and have them verified. He should quickly inspect his command, divide it into the proper parties and give his subordi¬ nate chiefs their general instructions before the march is begun. If attacked, he must do one of three things, viz.: (1) Move forward and drive the enemy from his position. (2) Assume a defensive position and hold it until he can be reinforced from the main body. (3) Or, if outnumbered, retire slowly on the main body, using every device to check the progress of the enemy until the main body can be

formed. See Flank Guards, Rear Guards and Vanguard.

ADVANCED POSTS. Positions taken up by a force in advance of the main body of an army, and in such a situation that they shall be within easy communication of it and of one another. The duties of the advanced posts are the same whether the troops are stationary or in movement. They are: (1) To keep a lookout for the enemy and when in his imme¬ diate presence to take all means accurately to be informed of his strength, position and movements. (2) Should the enemy advance, to hold him in check long enough to give the main body ample time to be prepared for his attack. By a faithful discharge of these duties the whole army can, at all times and under all circumstances, be kept in a state of readiness for action without

subjecting the soldiers to any fatigue beyond the ordinary physical en¬ durance of a well-developed manhood; as but a small portion, comparatively, of the force present is required to watch over the safety of the rest, and can therefore be frequently relieved, so that every one may have time suffi¬ cient for the repose demanded after extraordi¬ nary exertions. The object being to secure the front and flanks of the position occupied by the main body from any attempt either to reconnoitre or attack it, the detachments which form the advanced posts must be so distributed as to embrace all the avenues by which the enemy can approach the position. The system adopted, in most services, to effect this object consists of two or three concentric lines of posts, disposed in a fan-shaped order. The exterior line, which forms the outposts, em¬ braces a wide circumference, and by means of a chain of sentinels, posted in advance, pre¬ vents any one from penetrating to the rear between the posts without being seen. The second line, which is one of grand guards, embraces a narrower circumference than the line of outposts, occupying the more important avenues from the outposts to the' interior, so as to be in a position to support the outposts in caise of necessity, and to receive them if driven in. The interior line consists of several strong detachments, termed pickets, posted upon the main avenues to the position. They serve as supports to the two exterior lines, upon which they rally if forced to retire before the enemy. Besides these dispositions for security, patrols are kept up between the line of posts, to keep the one informed of the state of the other; and also between the outposts and chain of sentinels, to see that the duties of the latter are well performed and to search any ground not brought well under the eyes of the sentinels. The whole, in this way, forms a connected system for observing the enemy and for mutual support in case of attack. The ground taken up by the advanced posts will depend on the capabilities which its natural features offer for defense; on the number and character of the approaches it presents to an enemy for attacking the front or flanks of the position occupied by the main body; and upon the facilities it may afford for communication between the posts.

ADVANCEMENT, in law, is a gift by anticipation from a parent to a child of the whole or a part of what it is supposed such

child would inherit on the death of the parent. An advancement can only be made by a parent to a child (2 Jones 137), or in some States by statute to a grandchild (4 Kent Comm. 419). The effect of an

advancement is to reduce the distributive share of the child by the amount so received, estimating its value at the time of receipt. In some States, however, the child has his option to retain the advance¬ ment and abandon his distributive share.

ADVANCEMENT OF LEARNING, The, by Francis Bacon, 1605, the original title being (Of the Proficience and Advancement of Learning, Divine and Human. } This book, received with great favor by the court and by scholars, was afterward enlarged and published in Latin with the title (De Augmentis Scienti- arumP as the first part of a monumental labor, (The Instauration of the Sciences, *of which the second part was the still famous (Novum Organum,* on which Bacon's fame as a philosopher rests.

ADVENT, the period of some weeks be¬ fore the Nativity, observed in all the apostolic churches as a season of solemnity of emotion and action, marriages and public amusements being interdicted or reprobated; in the Roman Catholic Church also a season of fasting and penance. In the Western Churches — Roman, Lutheran, English and Protestant Episcopal — it is of four weeks, beginning the Sunday next after 26 November, or that nearest St. Andrew's Day (30 November) ; in the Greek Church it is six weeks, beginning 11 November, St. Martin's Day. Our first notice of it is in the 6th century, at the Synod of Lerida (524) ; and two sermons on it in 542 show that it was then in general ob¬ servance. In that century also the Eastern and Western Churches, following the Nestorians, made it the beginning of the ecclesiastical year instead of Easter. Its four Sundays were be¬ lieved to have been introduced into the calendar by Gregory the Great; and to have reference to Christ's fourfold coming early spoken of — in the flesh, at the hour of death to his faithful followers, at the fall of Jerusalem and at the day of judgment. On these grounds the gospels were chosen for the four Sundays. Its ordering was settled in the Western Church by Charle¬ magne's <(Homilarium.®

ADVENT, Second. See Millennium.

ADVENTISTS. Bodies of believers who take their name from their belief as to the second coming of Christ. They came out of the movement begun by William Miller, a Bap¬ tist of New England, who, after a long study of the Scriptures, especially of the prophecies, reached the conclusion that the second coming of Christ would take place in 1843, at which time Christ would personally descend to earth and reign with the saints a thousand years. He based this prediction on the prophecies of the book of Daniel, holding that the periods spoken of as ((2,300 days,® <(the seven times of Gentile

supremacy,® and the ((1,335 days,® were pro¬ phetic periods and, applied chronologically, led to the end of the world in 1843. He also interpreted the Gospels and the Apocalypse as showing that the <(only millennium® to be ex¬ pected (<is the thousand years which are to intervene between the first resurrection and that of the rest of the dead.® He confessed his disappointment at the failure of his pre¬

diction and admitted his error; but insisted that the day of the Lord was at hand. Miller drew many followers from the Baptist, Christian, Methodist and other churches, and the discus¬ sion was attended with considerable excite¬ ment. Lie fixed upon a second date, 22 Oct. 1844, after which many left the movement. Those who remained held a general conference in Albany, in April 1845, and set forth their belief in the personal proximate coming of Christ, without naming any dates, and in the resurrection of the saints at his appearance, the millennium to follow. Small companies of Adventists have since fixed upon various dates, but the body of believers have not supported these predictions.

Societies, or churches, were formed during the progress of the movement, but no very definite organization was at first attempted to bind these societies together. Organization came into use when differences of view began to divide Adventists. The Evangelical Ad¬ ventists may be regarded as the oldest organ¬ ized branch. Adventists baptize by immersion. The six bodies reported in 1916 a total of 1 12,054 church members, 2,794 churches and 1,501 ministers.

1. Evangelical Adventists. — These refused to accept the belief that the soul of the wicked is mortal. They announced the doctrine that the soul is immortal ; that all the dead will be raised, the saints first and the wicked last ; that the saints will participate in the millennial reign of Christ and after judgment enter upon their eternal reward; that the wicked who will rise at the end of the millennium will be sen¬ tenced to everlasting punishment. They also held that the dead are in a conscious state. They had in 1890 two annual conferences and about 1,147 church members. According to the census of 1906 they had decreased to 481 mem¬ bers, with eight ministers and 18 churches. As an organization they are now nearly extinct.

2. Advent Christians. — This branch, which has shown a tendency in recent years to closer organization and to increase, opposed the doc¬ trines enunciated by the Evangelical branch in 1855 as to the conscious state of the dead and the resurrection of the wicked, holding that immortality is conditional and does not

belong to the wicked who will be raised from the dead at the end of the millennium to receive sentence of banishment and annihilation, while those who accept Christ shall rise and receive the reward of eternal life, at his second coming, which they believe is near at hand and is to be personal and visible. They avoid any attempt at fixing a particular day for his coming.

The Advent Christians are congregational in polity; they have district conferences to the number of 50 or more (including six in Canada, England and China) which hold annual ses¬ sions; also a general conference, meeting bienni¬ ally, composed of delegates elected by the dis¬ trict conferences. Its function is to serve as a means of co-operation in carrying on the missionary, educational, publishing and other work of the denomination. In 1916 there were 602 ordained ministers, 30,316 church mem¬ bers and 640 churches. The body is strongest in New England where it originated; but it also has churches in the West and South. Their headquarters are at 160 Warren Street, Boston, Mass.

1. Seventh-Day Adventists. — As early as 1845 a congregation in New Hampshire con¬ nected with the Advent movement began to observe the seventh day as the Sabbath, holding that the fourth commandment was still in force. Those Adventists who adopted this view gave a different interpretation of the prophecy of Daniel that at the end of the 2,300 days the sanctuary should be cleansed. They held that it did not refer to the renewal of the earth, as Miller had contended, but to the Sabbath, as ordered by the fourth principle of the code which was placed in the ark of the covenant, a type of the heavenly sanctuary. As the com¬ pany of Seventh-Day observers grew they established a paper to advocate their views (1849) in Middletown, Conn. In 1885 the head¬ quarters of the denomination were removed to Battle Creek, Mich., and in 1903 to Washing¬ ton, D. C. The Seventh-Day people believe, with most of the other branches, that the second advent of Christ is to be personal, that it is near at hand, that it is to precede the millen¬ nium, at the end of which Christ and his fol¬ lowers will reign on the earth and Satan and all who do his work will be destroyed. Mrs. Ellen White, one of the founders of the de¬ nomination, was credited with divine revela¬ tions as a

prophetess.

The body is thoroughly organized with local, State and union conferences and a general con¬ ference. The latter meets quadrennially, the union conferences, which embrace five or six States, meet biennially and the State and local conferences meet annually. The local churches have the congregational form of government, but the conferences are presbyterial in char¬ acter. There are departments of missions, pub¬ lication, medicine, education, Sabbath school and young people's work which are conducted sys¬ tematically. The foreign mission work is quite extensive, embracing the countries of Europe, also including Iceland, China, Japan, Korea, India and Burma, five centres in Africa, Australia, Canada, Mexico and South America. The edu¬ cational work includes 12 colleges, 23 acade¬ mies, with numerous church and intermediate schools. A sanitarium was established at Battle Creek in 1866; now there are upward of three score institutions of this kind for the (<rational treatment of disease® and inculcation of tem¬ perance and healthful living.

The denomination grows from year to year, reporting, in 1916, 77,724 members in the United States alone, with 2,036 churches and 558 min¬ isters. It embraces all the States, but is strongest in the North Central group and in the Eastern.

1. Church of God. — This is a small body akin to the Seventh-Day branch, from which it sprang, but differs from it chiefly as to the prophecies of Mrs. Ellen White, which it refused to accept. On most other points they agree with the original denomination. The Church of God publishes a paper at Stanberry, Mo., called the Bible Advocate. There are in this branch 800 members, 22 churches and 34 ministers.

2. The Life and Advent Union, organized in 1864, holds that there will be no resurrection of the wicked dead. Eternal life will be given at the second coming to those who are to re¬ ceive it and the millennium is not in the future, but in the past, and was a period of persecution

and suffering for Christians. The Herald of Life, which represents this body, is published at Springfield, Mass. No statistics have been reported since the census of 1906 when there were 509 members, 12 churches and 12 min¬ isters.

1. Churches of God in Christ Jesus, a

small body of ((Age-to-Come Adventists,® or¬ ganized in 1888 in Philadelphia, Pa. They hold that the capital city of the kingdom of God, which Christ will establish at his second com¬ ing, will be in Jerusalem, and the Israelitish nation will then be restored to the favor of God. Hence they are often called (<restoration- ists,® (<restitutionists.® Their organ is The Restitution, published at Plymouth, Ind. They have 2,224 members, 65 churches and 61 min¬ isters.

Bibliography. — Consult for the general his¬ tory of the Adventist Movement, Welcome's (History of the Second Advent Message> (Yarmouth, Me., 1874) ; for the Seventh-Day branch, Loughborough's (Rise and Progress of the Seventh-Day Adventists > (Battle Creek, Mich., 1892) ; for the Church of God, Dug¬ ger's (Points of Difference between the Church of God and the Seventh-Day Adventists) (Stanberry, Mo.), and for the Age-to-Come Adventists, Weethee's (The Coming AgeJ (Chicago, Ill., 1884). Also Carroll's Re¬ ligious Forces of the United States) (rev. ed.,

1912).

Henry K. Carroll.

ADVENTURES OF BARON MUNCH¬ AUSEN, The. Munchausen's Adventures are a by-word among travelers' tales for extravagant, methodical lying. They owe their name and first inspiration to Hieron}ˆmus Kari Friedrich, Baron Miinchhausen (1720-97), of Bodenwerder, near Hanover, Germany, who had served in the Russian cavalry against the Turks (1737-39) and had had an adventurous middle life. He had been living on his German estate since 1760 and was renowned locally as a raconteur. Among his auditors was a Ger¬ man scholar and writer, Rudolph Erich Raspe, who, being in straits in London in 1785, pub¬ lished anonymously some of these stories in a little book of 49 pages, (Baron Munchausen's Narrative of His Marvelous Travels and Cam¬ paigns in Russia.) This with additions not by Raspe reappeared in 1786 as (Gulliver Re¬ vived, the Singular Travels, Campaigns, Voy¬ ages and Sporting Adventures of Baron Mun- nikhousonP A free German translation by the poet G. A. Burger (1786) gave the book international popularity. Raspe had drawn his materials not only from the Baron's talk but from older sources, especially Bebel's facetiae5 (1508) and Lange's Felicias1* (1765). The English edition of 1793, with a sub-title, <(or the Vice of Lying Properly Exposed.® had further additions and such continued to be made by publishers' hacks for many years. The Baron, innocent source of all this, was far from relishing the reputation he had gained for un

veracity by such pranks of a lively fancy as cold so bitter as to freeze music into a posthorn or thaws that would leave the rider after a night's rest to find his horse hanging by the bridle from a steeple. Adolph Ellisen, in a German edition of 1849, says his father found the Baron exceedingly uncommunicative

when he visited him in 1795. The most satisfactory modern English edition of the < Adventures) is by Lawrence and Bullen, with an introduction by T. Seccombe. There are many others, some illustrated by talented ar¬ tists. For the place of the <Adventures) in the history of literary lying consult (Diedeut- schen Liigendichtungen bis auf Miinchhausen) by Karl Miiller-Fraureuth (1881) and Lienhard, F., cMiinchhausens LustspieP (Leipzig 1900).

Benjamin W. Wells, Author of (Modern German Literature 2

ADVERB, a word joined to a verb, an adjective or another adverb, to qualify or mod¬ ify the sense, as adjectives are joined to substantives. An adverb cannot be the subject, copula or the predicate of a proposition. They are divided into adverbs of place and direc¬ tion, of time, of degree, of manner, of doubt, etc., according to their signification. Adverbs admit of comparison to the same degree as adjectives. In English a large class of adverbs is formed from adjectives by the addition of the syllable ly, which is derived from the word like. Phrases that can be represented by a single adverb or that fill the function of an adverb when there is no single equivalent to them are termed adverbial phrases.

ADVERSE POSSESSION, a possession against any other claimant. It is the enjoy¬ ment of land, or such estate as lies in grant, under such circumstances as indicate that such enjoyment has commenced and continued un¬ der an assertion or color of right on the part of the possessor. In a majority of the States of the Union, when such possession has been actual and has been adverse for 20 years, of which the jury are to judge from the circum¬ stances, the law raises a presumption of a grant. This presumption, however, arises only when the use or occupation would otherwise have been unlawful. Such possession, how¬ ever, must be open, notorious, visible, exclu¬ sive and continuous. But possession is not adverse when both parties claim under the same title, as if a man seized of certain land in fee have issue two sons and die seized, and one of the sons enter by abatement

into the land, the statute of limitations will not operate against the other son ; for when the abator en¬ tered into the land of his father, before entry made by his brother, the law intends that he entered claiming as heir to his father, by which title the other son also claims.

ADVERSITY HUME. See Hume, Joseph. ˆ

ADVERTISEMENTS OF ELIZA¬ BETH, orders issued by Parker, archbishop of Canterbury, in 1566, to enforce dignity and uniformity in the conduct of common prayer and the administration of the sacraments ; pre¬ scribing the wearing of the surplice and college cap by the clergy, and of the cope in cathedrals and collegiate churches. They were so entirely in accord with Elizabeth's known views that the archbishop had no doubt of her sanction ; but after a year's waiting and copious corre¬ spondence with her minister Cecil (Burghley), he could not extract an official guaranty and was obliged to assume personal responsibility. Their modern importance springs from the quarrel in the English Church over ritual and

their varying interpretation by the High and Low parties. In the Ridsdale case of 1877, the latter, headed by Lord Selborne, held that they prescribed absolutely the vestments to be worn and were infringed by additions; the former, through James Parker, held them merely a minimum for decency.

ADVERTISING (from French Avertir, ((to notify®). Originally, advertising implied mere publication, a notice for an individual or class, such as legal advertisements. The word, however, is now generally applied to the ad¬ vertisement of merchandise to the public at large, through periodicals, circulars, posters, painted signs, electrical display, etc. In its pres¬ ent sense advertising is a powerful and legiti¬ mate force in the commercial world and in the distribution of commodities, and it has been designated as the literature of persuasion. Its volume in the United States figured in dollars is so great as to place it among the most im¬ portant of the nation's activities.

History of Advertising. — The rudiments of advertising as it is practised to-day for the promotion of commerce can be traced back as far as commerce itself. With the invention of the rudest forms of writing came advertise¬ ments, such as the rewards for runaway slaves. These were written on papyri and well-pre¬ served copies have been exhumed at Thebes. Before writing was developed advertising by means of criers and sign-boards existed. The latter have been used in all ages for the in¬ formation of the illiterate. Shops in ancient

Pompeii had terra-cotta signs, showing a goat to denote a milk-seller's stall, or two men at sword-play to indicate a fencing school. Old tavern signs like the <(Star and Garter® are a mediaeval form of the same species of adver¬ tisement. All shops in London and Paris had such picture-advertisements in the Middle Ages, so that servants unable to read might find them. Until the invention of printing advertis¬ ing was necessarily of this primitive character. But since the 16th century it has steadily kept pace with the increase in periodicals and books. The oldest newspaper advertisement preserved appears in a German newsboolc of 1591, and is a book notice. The first newspaper traceable in France (1612) was partly an advertising me¬ dium. The first English newspaper appeared in 1622 and the first advertisement 30 years later. But before that the puffing of books, plays, cure-alls and quacks by posters, proces¬ sions, etc., was very common. The introduction of tea, coffee and chocolate into England is recorded in old newspaper advertisements (1652-58). Addison's Tatler No. 224 (1710) is devoted entirely to descriptions of advertise¬ ments of that day in the public press and tells of methods of exploiting pills, plasters, cos¬ metics, books, houses for rent and advertising for lost animals and runaway wives. Fifty 3ˆears later (1759) Dr. Johnson thought that ((the trade of advertising is now so near to per¬ fection that it is not easy to propose any improvement. ®_ The first newspaper advertise¬ ment in America appears in the Boston Neivs-Letter, of 1704. Notices of shipping and re¬ wards for slaves were numerous in the New England Weekly Journal (Boston) of 1728, and shortly after this American newspapers be¬ gan to carry miscellaneous trade advertise¬ ments.

In Great Britain advertisements were heavily taxed until 1833, an impost of 3s. 6d. being levied on each one appearing in a newspaper, though it might be but a laborer's advertise¬ ment for work. Upon the abolition of this tax advertising immediately began to grow. To-day Great Britain probably stands next to the United States in the extent of its advertising expenditure. The London and provincial news¬ papers are heavily patronized, while outdoor advertising is more extensive and less sightly than in this country. English magazines, though numerous, have never been developed as adver¬ tising mediums to the extent that the American have. In advertising practice British trades¬ men and manufacturers respect and study American advertising methods, adapting many of our devices to their own needs. In Con¬ tinental Europe advertising finds its chief out¬ let in

the newspapers, which often have tre¬ mendous circulations, and by means of outdoor posters and bulletins. The latter forms of ad¬ vertisement are generally controlled by govern¬ ments on the Continent, and not only yield a revenue to the state, but are regulated as to size, location and display. While France, Ger¬ many, Italy and other countries have numerous weekly and monthly reviews, none of them have ever attained the importance of leading Ameri¬ can magazines as advertising mediums. Great Britain and the continental countries have ex¬ cellent facilities for the transportation of mer¬ chandise parcels through the posts, and it might be thought that on this account some system corresponding to our mail order advertising would have been developed. But mail order advertising is limited abroad, probably because most of the population is in close touch with distributing centres, and also because the mass of the people, not so evenly prosperous as Amer¬ ican farmers, have a smaller purchasing power.

The real development of advertising as a factor in the distribution of commodities may be said to have begun only with the appearance of the steamboat and railroad, the modern pos¬ tal system and the telegraph. Its rapid growth since then, especially in the United States, where the great distances between producer and consumer lessen direct dealing, would seem to indicate that it is a legitimate wheel in dis¬ tributive machinery rather than a form of ag¬ grandized puffery. In this sense, advertising is a modern development. In earlier times it had chiefly a curious interest. A full and entertain¬ ing description of early advertising will be found in Sampson's (History of Advertising from the Earliest Times) (London 1874).

Development of Advertising. — Advertis¬ ing in the modern sense was first sparingly employed by retail merchants in large cities. About 1840 improved postal, facilities in the United States gave opportunity for broadened circulation of periodicals and brought into, be¬ ing the earliest trade, denominational., agricul¬ tural and general publications of national cir¬ culation. These made it profitable to advertise over wide territory. Soon there were firms, chiefly patent nostrum makers, whose chief expenditure was for advertising, and the value of the new force was appreciated by charlatans, quacks and swindlers to such an extent that the public soon learned to distrust advertising. For more than a generation it was not considered reputable by the great majority of legitimate

business houses. The power of advertising as a force in merchandising, however, eventually brought reputable interests into the field. The swindler began to retreat. Among the first classes of manufacturers to

advertise widely were makers of commodities, such as sewing machines, typewriters, baking powders, infant foods, etc., then quite new for the most part. In recent years the charlatan has been practically forced out of American advertising mediums as legitimate business increased in them, and during recent years, with public confidence gained, the growth of both advertising and publications in the United States has been so great that pub¬ lishing and printing now rank seventh in the country's industries, being exceeded only by iron and steel, slaughtering, foundries and machin¬ ery, lumbering, milling and clothing. Where formerly the novelties of commerce were ad¬ vertised, it is now the staples that predominate, such as automobiles and accessories, shoes, flour, cereal foods, clothing, sanitary appliances, etc. The advertising revenue of leading publi¬ cations is to-day so important that the more progressive publishers censor advertising, and investigate a doubtful advertiser before his announcement is inserted. The practice of the publisher making good to readers any loss they may incur through a swindling advertisement is becoming common in this country, and few losses occur. Moreover, the Government has thrown safeguards around advertising, and through the Federal Post-Office Department effectually prevents swindling operations by denying the use of the mails to an advertiser whose methods will not bear investigation. Advertising has had an immense influence upon the lives of the people, for it not only increases the standard of living and health by introduc¬ tion of modern conveniences such as baths and sanitary appliances, heating and lighting appa¬ ratus, the spread of means of culture, the en¬ couragement of travel, etc., but also tends to improve the quality of commodities without a corresponding increase in cost. Competition in advertising takes the form of price rivalry much more rarely than might be presumed. Adver¬ tisers seeking to create national demand for commodities sold under their trade-brands com¬ pete rather in offering excellent staples, assur¬ ing purity and marketing in sanitary packages. Advertising has resulted in the invention and use of dust, germ and air-proof cartons, boxes and containers. Formerly it was a kind of puffery, but at present the widest advertising is characterized by the completeness with which it presents information and the logical reason¬ ing by which it seeks to persuade readers. One of the most notable phases of modern advertis¬ ing has been the liberal use of space in news¬ papers and magazines by large corporations, such as the railroads, manufacturing concerns, political parties and associations., for the pur¬ pose of influencing public opinion, it having been proved that this method of reaching and affecting current thought on questions of the day was quick and dependable. In recent years advertising in the United States has out¬ grown that of every

other nation in volume, and has also been conspicuous for its division into special channels, following the lines of the various periodicals and conditions of de¬ mand for commodities.

Retail Advertising embraces the announce-

ments of merchants, large and small, in their own communities, from the full page in each day's newspapers employed by great department stores to the small announcements once or twice a week of the minor shopkeeper. This form of advertising is really a species of news, prepared daily, and is of such interest to the public that many readers take newspapers for their store advertisements, and the journals which carry most of these have the largest circulations. Merchants also publish store news by means of circulars through the mails, minor local jour¬ nals, programs, bulletins, posters, etc.

General Advertising is the general term de¬ scribing exploitation intended to reach the public nationally or in a group of States. It is found chiefly in magazines and reviews, and in daily newspapers. Street cars, billboards and bulletins are employed as accessories. General advertis¬ ers include large manufacturers of food articles, soaps, musical instruments, clothing, beverages, tobacco, household and office supplies, furniture, plate, jewelry, sanitary appliances, etc., as well as the great insurance, steamship and railroad companies, cities and villages seeking popula¬ tion, banks and trust companies and so forth. This is easily the largest branch of advertising, and the one most influential in distribution. It acts as a stimulus to the local merchant's efforts, and is so wide in scope as to touch every class and interest of the nation, however remote.

Mail Order Advertising is the term ap¬ plied to a form of exploitation peculiarly American. When the newer communities of the West were insufficiently supplied by their local merchants, several intelligent merchants in Chicago, a city advantageously situated for this form of trade, began to advertise commodities to be forwarded direct to consumers by freight and express, receiving orders and remittances through the mails. This was the beginning of <(mail order® advertising. Several of these mer¬ chants have built up businesses with a gross annual income of $50,000,000 or more, selling practically everything in the way of supplies, machinery, food, clothing, etc., direct to the consumer. Thousands of small advertisers

op¬ erate with a few commodities through the mails, and many local merchants conduct mail order departments. Mail order advertising is found in the magazines, the farm and religious press, the newspapers and in a class of cheaply printea periodicals known as <(mail order journals,® having enormous circulations among people on farms and in villages who are not reached by more costly magazines or daily papers. A large volume of mail order advertising is also done through catalogues and printed matter sent through the mails. This branch of trade has had a very large increase in volume since the introduction of the parcels post system.

Agricultural Advertising is a form of pub¬ licity similar to mail order advertising, but which appears chiefly in farm periodicals and exploits machinery, fertilizers, farm animals, stock food, building materials and farm supplies.

Trade Journal Advertising appears in the numerous special publications devoted to manu¬ facturing, retail and wholesale, commerce, finance, medicine and the professions, mining, transportation, etc. Its object is to acquaint local merchants with commodities manufac¬ turers wish to distribute, to inform engineers and superintendents of manufacturing plants

about new machinery, and, generally, to main¬ tain that great organization which produces and handles commodities up to the point where they pass into the consumer's hands.

Advertising Mediums. — In the United States advertising may be divided roughly into four groups, represented by the mediums used : Periodical advertising, outdoor advertising, street-car advertising and mail order adver¬ tising.

Periodical Advertising includes news¬ papers, magazines, reviews, trade, denomina¬ tional and farm publications, periodicals printed in foreign languages, theatre and concert pro¬ grams and other publications, of which there are not less than 23,000 of all kinds. In 1914 the output of printing and publishing in this country was valued at $810,000,000, of which, it is estimated, fully $255,000,000 represented revenue from advertisements in periodicals. Advertising in periodicals exceeds receipts from subscriptions by $90,000,000. The advertising revenue of some of our largest newspapers runs into millions of dollars yearly. Magazines have shown the greatest growth in numbers, circula¬ tion and advertising patronage the past 20 years. It is held to be a safe rule to spend 5 per cent of the selling price of a commodity in adver¬ tising, so that the advertising for a single month

in the 30 leading publications would have to re¬ turn a gross amount exceeding $25,000,000 to be profitable, or nearly $300,000,000 yearly. While the largest newspaper circulations seldom exceed 300,000 copies, daily, the circulation of several monthly magazines is more than 1,000,- 000 copies per issue, and of one weekly more than 2,000,000 copies per issue.

Outdoor Advertising includes posters and placards pasted on billboards and barns, painted signs on barns, fences and walls, as well as specially constructed bulletin boards in large cities, many of which are electrically illumi¬ nated at night, the erection of advertisements about buildings in process of construction, the use of advertising along railroad lines and at populous seaside resorts, etc. As much as $20 per square foot has been paid for the privilege of advertising on a wall in New York city. Electric signs, with advertisements outlined in incandescent lamps, are an. important form of expenditure for outdoor advertising. The larg¬ est advertisement of this sort in the world is a single word on a New York building, with letters 60 feet high, visible to 50,000,000 passen¬ gers on ferries each year. Advertising of this character adds to the attractiveness of a city by its diffusion of light through the main streets at no cost to the public. Billboards and other outdoor advertising are more often charged with abuses and unsightliness than any other form, and in some cities are prohibited in the vicinity of parks by municipal regulation. They have never come under control to the extent common on the Continent, and in comparison with the outdoor advertisements of London are perhaps pleasing. Outdoor advertising is thought to be effective in reaching persons not habitual readers of newspapers, as well as to lay emphasis upon newspaper and magazine advertising by repeating the names of com¬ modities more fully described in the press. It necessarily affords no opportunities for descrip¬ tion of articles, but is confined to repetition of brands and trademarks,

Street Car Advertising is a medium that has become prominent in the United States since the introduction of electric traction and the spread of trolley lines through cities and suburbs. An enormous population is carried in these vehicles — more than 5,000,000,000 cash fares are paid on trolleys yearly, and perhaps two-thirds of these represent an extra ride in the shape of a transfer. It is possible to main¬ tain an advertising card in the 32,000 cars throughout the United States, covering about 400 towns and cities, for $150,000 a year, and in point

of the number of persons who can be reached for a given sum the trolley, elevated and subway lines are said to offer the cheapest form of advertising. Car advertising in New York city, it is claimed, has a national circula¬ tion owing to the fact that 250,000 persons from all over the country are constantly in the metropolis. More matters may be printed on a car card than on 'an outdoor poster, and while there are few instances where large advertisers have attained success through the use of bill¬ boards alone, quite a number have confined their operations to street cars with profit. As a rule, though, advertising aims toward a bal¬ anced effect in magazines, newspapers, cars, bill¬ boards and printed matter.

Mail Advertising. — In 1679 a London hab¬ erdasher gave to each customer who purchased goods to the value of a guinea a printed list of his stock, and this was regarded as a dangerous innovation because, if followed generally, it would result in the investment of too much tradesmen's capital in printed bills. From this humble beginning the use of circulars and cata¬ logues has grown to a point where, at present, in the United States, every second letter carried through the mails is an advertising letter, and for every periodical posted there is mailed a catalogue or brochure. Postage on advertising matter aggregates between $25,000,000 and $30,- 000,000 annually and this perhaps represented only one-tenth the cost of compiling and print¬ ing such advertising. Mail advertising takes many forms, from the leather-bound catalogue of 500 or more pages, to the humble postal card. Every general advertiser has descriptive matter in booklet form which is mailed freely to those who express interest in his magazine or news¬ paper advertising, and in many instances the periodicals are used only to excite such interest, printed matter being relied upon to tell the whole story of such complicated apparatus as an agricultural implement, heating furnace or piano player. Many advertising letters are sent out to lists of persons who may be interested in certain commodities, either printed in imitation of typewriting or actually written on a typing machine. Mail advertising also embraces the distribution at regular postal rates of small periodicals devoted to the interests of a manu¬ facturing or merchandising house. There are hundreds of these personal business organs, some of which have been of sufficient interest to enlarge into standard magazines. Mail ad¬ vertising also includes the distribution of what are known as "advertising novelties, » ingenious * or useful trifles ranging from puzzles to match¬ boxes, and comic cards to desk calendars, all bearing the name of an advertiser. Blotters, calendars, almanacs, reproductions of paintings and many other forms of printed advertising,

upon tin, cardboard, paper, wood, leather, cloth, bark, porcelain, glass and other substances travel through the mails. This is the most costly form of advertising known, in proportion to the number of persons that can be reached for a given expenditure, but as most of this matter is sent to persons thought to be directly interested, it often pays a larger return than advertising distributed promiscuously through periodicals, etc.

Advertising Agencies— Soon after adver¬ tising began to be used nationally instead of lo¬ cally, it was found convenient to put details of correspondence with newspapers, arranging rates, writing the advertisements, seeing that they were properly inserted, etc., into the hands of a new functionary who then sprang up — the Advertising Agent. The first advertising agent to open an office for the reception of advertise¬ ments in this country was Volney B. Palmer. He began business in Philadelphia in 1840, and subsequentlv established offices in Boston and Baltimore as well. Before this, however, the advertising agent was known abroad, for Balzac mentions ((Le Depute d'Arcis') as among the tenants of a Paris rookery in the thirties, "women of the town, still-born insurance com¬ panies, newspapers fated to die young, impos¬ sible railway companies, discount brokers and advertisement agents who lack the publicity they profess to sell — in short, all description of shy or doubtful enterprise.ˆ When national ad¬ vertising was new there existed no newspaper directories. To advertise in a given territory it was necessary to go to an advertising agent who had lists of the newspapers and knew their rates. Agents often purchased several columns of space in a number of newspapers by the year, reselling allotments to advertisers for a price less than the newspaper would charge direct. The advertising agent was thus a broker, and to encourage him in developing ad¬ vertising the newspapers paid him a commission on what he sent in. Then, as demand grew, he became also an adviser to new advertisers, giv¬ ing counsel as to the ways in which a given appropriation should be spent, preparing the text and illustrations and supplementary matter to be used, checking insertions in papers and bills, etc. This detail work is complex, and the advertising agent usually performs it more rea¬ sonably than an advertiser could do himself. From a broker in space, the advertising agent of the present day has become a specialist whose services are valued because he has a wide experience in directing the operations of many advertisers, as well as an equipment for writing and illustrating advertising matter. While the advertising agent is still paid by commissions of 10 to 15 per cent allowed him by publishers of newspapers and magazines, he is in no sense the agent of the publishers, but receives rather a wholesale rate upon advertising

space, ‘which he sells to the advertiser at a retail or gross price. An advertising agent’s interests are so wholly bound up with his advertising client’s that in some instances he receives for his serv¬ ices a salary besides. Advertising agents have been of the utmost importance in the develop¬ ment of advertising, for by active work in lead¬ ing conservative business houses to utilize this modern distributive force, they have built up the revenues of publishers, improved publica¬ tions and driven advertising charlatans from

the field. A few of the largest advertisers maintain departments in their business to pre¬ pare and supervise their own advertising, while publishers of magazines and newspapers also carry on independently the work of converting business houses to advertising.. Despite this, the agent’s function has remained an indispensable one, and with the development of advertising he has entrenched it by specializing. One of the leading New York advertising agencies, for ex¬ ample, has been instrumental in building up the large showing of steamship, railroad and travel advertising now carried in leading magazines, with supplementary advertising of hotels and resorts. Two other agencies are known for their work among advertisers of agricultural implements, another has found its field in the development of textile advertising through mag¬ azine and trade journal advertising, etc.

With the past decade the advertising agent has ceased to be what the name would imply and has really become a professional man whose advice is sought as such by the largest commer¬ cial and financial concerns. The leaders in this new profession have become experts on trade conditions and in the introduction of new goods or the development of trade in well-estab¬ lished lines. The modern well-equipped adver¬ tising agency has attached to it not only compe¬ tent writers of advertisements, artists and pho¬ tographers, but experts in salesmanship who study economic questions and conditions with the greatest thoroughness. This branch of the work has been carried by some of the leading agencies to the point of becoming advisers and lecturers to the regularly employed traveling men of the concerns represented.

Special Advertising Agencies differ from the foregoing general advertising agencies in that they actually represent the publishers of certain newspapers or miscellaneous journals in a given territory, promoting advertising only for those journals and receiving

commissions on all business that comes from such territory. These special agents are found chiefly in New York and Chicago, where a large percentage of advertising originates, and are simply branch offices of publishers outside such cities, who take such means for being represented. In several States associations have been formed among the smaller daily papers who unite in employing a representative who acts as their agent in procuring business.

As advertising has developed in this country it seeks ever new, varied channels, so that while it is possible by a proper selection of mediums to reach practically the whole public, it is also possible, on the other hand, to appeal to a small group of persons interested in some special commodity. No adequate outline of the many forms of advertising could be given in an arti¬ cle of this scope, and readers interested in a fuller presentation of methods, cost, the stories of famous advertisers, etc., are referred to (History of Advertising) (London 1874) ; (Modern Advertising) (New York 1905) ; (The Theory of Advertising) (Boston 1904) ; (Forty Years an Advertising Agent) (New York 1906) ; Principles of the Mail Order Business) (Chicago 1903) ; (The Business of Advertising) (London 1905) ; Balmer, (The Science of Ad¬ vertising) (1909) ; Spies, (The Art of Publicity) (1910) ; Advertising and Progress* (London 1914) ; Advertising: Its Principles and Prac¬

tice) (New York 1915) ; Analytical Advertis¬ ing) (Detroit 1912).

American advertising has a large periodical literature of its own, comprising fully 25 weekly and monthly journals. Many of these are illus¬ trated and assume the dignity in matter and typography of the standard magazine. Among the most notable of these publications are Printers' Ink (weekly, New York) ; Advertis¬ ing and Selling (monthly, New York) ; Mail Order Journal (monthly, Chicago).

Frank Presbrey,

The Frank Presbrey Co., New York.

ADVERTISING, The Psychology of.

It seems quite natural that the first notably successful attempts to apply psychology to the needs of the commercial world should have been made in the field of advertising. The fundamental purpose of the advertiser is to influence human minds. Inasmuch as psychol¬ ogy is simply a systematic study of those same minds, the advertiser, seeking a scientific basis for his work, must find that basis in the science of psychology. But for other reasons than those pertaining to subject

matter prob¬ lems of advertising are peculiarly open to psychological treatment. The executive, the salesman, the labor leader and many others are primarily concerned with influencing human minds, but the conditions of mind with which these men have to deal are all remarkably complex and, in the present stage of science, it is extremely difficult to isolate them for pur¬ poses of exact observation. The problems of advertising, on the other hand, are more simple and consequently more open to exact observa¬ tion.

Perhaps we can gain an idea of what ap¬ plied psychology really is in no better way than by surveying a few of the psychological principles to which the successful advertiser pays heed. It stands without saying that an advertisement, in order to be effective, must gain the attention of those who may purchase a product the merits of which that adver¬ tisement sets forth. So the question becomes : <(To what kinds of things are people most apt to give attention?)) The psychologist says that on the whole people are most apt to pay attention to those things which are novel, either in themselves or because of their un¬ usual setting or presentation. And the phychol- ogist adds further that the comparatively pro¬ longed attention which people give to the best examples of advertising would not be thus prolonged were it not for the fact that those advertisements are interesting and easily com¬ prehended. These few underlying principles of securing and holding the attention of pos¬ sible customers are much easier to cite than to put into practice. As a result a distinct profession of advertising artists and copy-men is growing up in this country. In experi¬ mental psychology these men can find many facts to guide them in making the most of the space at their disposal. The laws of color contrast, the pleasingness _ and displeasingness of certain color combinations and of figures of certain proportions; all these had been ' worked out and more or less organized in the psychological laboratories while advertising was still appearing in its earlier crude forms.

To gain and hold the attention of the pub-

lie is not, however, the final purpose of an advertisement. The advertiser aims so to in¬ fluence the minds of purchasers that when they are in the market for a cake of soap or an automobile they immediately think of his particular brand of soap or his particular make of automobile. In other words, he must get the idea of the article which he is offering associated with the idea of the class of

arti¬ cles to which it belongs. Here again in this need he can find psychological fact to guide him in conducting his campaign. For exam¬ ple, the psychologist has established that the strength of the association between two ideas depends among other things upon the fre¬ quency, vividness and recency of the past as¬ sociation of those same ideas. If, upon think¬ ing of automobiles in general, that idea is fol¬ lowed by the idea of some particular make of automobile, that sequence of ideas may be due to the fact that of all automobiles this one has been brought to my attention most often by advertisements, by the talk of my friends or by seeing the actual article. The sequence may be due equally well to the vividness of a par¬ ticular experience with this machine or to the recency of such an experience. These few principles of association readily explain why experienced advertising men assent to the superiority of the long, persistent campaign. When the advertising man conducts a continu¬ ous campaign he is paying heed to the two laws of frequency and recency. When he enrolls the services of a convincing and clever writer or artist he is paying heed to the law of vivid¬ ness.

Still it is one thing to get the public to think of a particular brand of goods and quite another to get that public to complete the act of buying. Having done his best to influence men's thoughts, the advertiser must know how to turn those thoughts into action. Now, ac¬ cording to one of the most fundamental laws of psychology, any thought of an act tends to result in that act unless it be interfered with by a stronger or a contrary idea. Few laws are more important for the advertiser to keep in mind than this one. Unless he has salesmen to follow up mere educational ad¬ vertising he must put into the public mind not only an idea of his goods but also the idea of purchasing those goods. If his advertisement is to do his selling it must give the public a specific idea of just how and where the pur¬ chase can be made. Moreover, if the goods which the advertiser is offering are expensive or in a line where the public still feels no need, then there are contrary ideas already in the public mind which the advertiser must overcome. Often he will have to make use of argument. To do so effectively he must be familiar with the motives which make one course of action seem more favorable than others. He must take into account the in¬ stincts and emotions of men and the customs, prejudices and sentiments of particular groups. And again he will find the scientific basis for his procedure in psychology.

It should be kept in mind that the above account is but a sketch of some of the out¬ standing applications of psychology to adver¬ tising. Many of the scientific principles out¬ lined were recognized by the advertiser before any serious attempts were made to apply psy¬

chology to his work. But the later knowledge of psychological methods has systematized what in most cases was formerly unorganized tradition. And there is still much to be done. The relative merits of the daily press, the weekly journal, the fiction magazine, the bill¬ board, the street-car display, for particular kinds of advertising; the various motives to which the advertiser of this or that product can appeal with the greatest success ; these and many other problems can and will be solved by this youth among the applied sci¬ ences — the psychology of advertising.

Walter Dill Scott,

Director Bureau of Salesmanship Research, Carnegie Institute of Technology, Pittsburgh.

ADVOCATE, (1) Originally one whose aid was called in or invoked; one who helped in any business matter; (2) in law, at first, one who gave his legal aid in a case, without, however, pleading, this being the function of the patronus; (3) the advocatus fisci, who at¬ tended to the interests of the fiscus, or the emperor's privy purse.

In the old German empire, a person ap¬ pointed by the emperor to do justice. In Ger¬ many and elsewhere juridical advocates were made judges in consequence of their attending when causes were pleaded in the count's court.

In the mediaeval church, one appointed to defend the rights and revenues of a church or monastery. The word advocate, in the sense of a defender of the Church, was ultimately su¬ perseded by that of patron but it still lingers in the term advowson (q.v.).

Constitutional advocates, in Rome, pleaded before the consistory in cases relating to the disposal of benefices which they opposed. Elective advocates were chosen by a bishop, an abbot or a chapter. Feudal advocates were persons assigned lands on condition of their fighting for the1 Church, leading out their vas¬ sals for the purpose. Matricular advocates defended the cathedral churches. Military advocates were appointed to fight for the Church. The Devil's advocate is a Roman ecclesiastic whose office it is to urge whatever objections may exist to the canonization of any proposed saint.

In English law, originally one who pleaded a cause in a civil, but not in a criminal, court ; alone entitled to plead as counsel in ecclesias¬ tical and admiralty courts which are now thrown open to the ordinary bar. Now, in English and American law, one who pleads a cause in

any court. It is not, properly speak¬ ing, a technical word but is used only in a popular sense, while the attorney and barrister (q.v.) have defined special attributes.

ADVOCATUS DIABOLI, di-ab'6-li, or ˆdevil’s advocate,® popularly applied to per¬ sons who accuse maliciously or slander. The term and its significance is derived from the procedure in the Roman Catholic Church, in which, when a sanctified person is to be canon¬ ized, someone is appointed to scrutinize his past life and bring forth all facts mitigating against the proposed honors. This official is termed the ((advocatus diabolic while the of¬ ficial appointed to defend the candidate for honors is termed ((advocatus Dei,® God’s ad¬ vocate.

ADVOWSON, signifying in England the right of presentation to a church or ecclesias¬ tical benefice. Advowsons are either <(append-ant55 or (<in gross.55 Lords of manors were originally the only founders, consequently the only patrons of churches, and so long as a right of patronage exists annexed or appended to the manor it is called an advowson append¬ ant. Such rights are conveyed with the manor. But where the property of the advowson has once been separated from the property of the manor by legal conveyance it is called an ad¬ vowson in gross, or at large, and is annexed to the person of its owner and not to his es¬ tate. Advowsons are further divided into ((pres-entative,55 (<collative55 and (<donative.55 The first is where the patron has the right of pres¬ entation to the bishop and may demand of him to institute his clerk if he find him qualified. The second is where the patron and the bishop are identical persons. The third is when the sovereign, or a subject by his license, founds a church and ordains that it shall be at the sole disposal of the patron, subject to his vis¬ itation only. Blackstone classed advowsons as the first of the incorporeal hereditaments and they still constitute in England an import¬ ant class of property interests.

ADYE, a'di, Sir John Miller, British sol¬ dier, administrator and author: b. 1 Nov. 1819; d. 26 Aug. 1900. He served in India and in Egypt, rising to be general and colonel com¬ mandant of the Royal Artillery, and was gov¬ ernor of Gibraltar from 1883 to 1886. He wrote (The Defense of Cawnpore) (1858) ; (A Review of the Crimean War) (1860) ; <Sitana: A Mountain Campaign on the Borders of Af¬ ghanistan in 1863 } (1867) ; (Recollections of a Military Life5 (1895) ; and Hndian Frontier Policy5 (1897).

((A. E.55 See Russell, George W.

ZEDILES, e'dilz, public functionaries or commissioners of ancient Rome, who, ac- cording to Cicero, undertook the care of the city, the repair and preservation of temples, aqueducts and sewers, street-cleaning, paving and traffic regulations, precautions against fire, dilapidated buildings and dangerous animals, superintendence of baths and taverns, punish¬ ment of gamblers and usurers, inspection of weights and measures and the care of public morals generally. From 494 b.c. there were two (<plebeian aediles55 until 471 b.c., when two ˆAidiles curules 55 were added from the patri¬ cians, chiefly to manage the Roman games. In 44 b.c. Caesar added the two ((TEdiles Ce- rcales 55 to have charge of the public granaries. Consult Abbott, F. F., (Roman Political In¬ stitutions5 (New York 1901).

ZEE'TES. See Argonauts.

ZEGA'DIAN ISLANDS, a group lying off the western extremity of Sicily and consisting of Maritimo, Favignana, Levanso and Le For- miche. Favignana, the largest, is about 14 miles in circuit and has productive tunny and anchov)ˆ fisheries. The group has a popula¬ tion of 6,300. Near these islands the Romans won the naval battle with the Cartha¬ ginians, 741 b.c., which ended the first Punic war.

AEGEAN SEA, e-je' an or i'ga-an, the old name of the gulf between Asia Minor and Greece, now usually called the Grecian Archi¬

pelago (q.v.). During the European War from 1914 it was the scene of much naval ac¬ tivity. See War, European.

ZEGEUS, e'jus. See Theseus.

ZEGINA, a Greek island about 15 miles southwest of Athens, in the Gulf of ZEgina (old Sinus Saronicus) ; area, 32 square miles; pop. about 7,000. It is the triangular top of a partly submerged rocky hill, with deep gorges and ravines, and the eastern half rocky and unproductive ; but the western is a well- cultivated plain which, under the warm air and sea, produce the best Greek almonds, with olives and other fruits, wine and some grain. The non-agricultural inhabitants do a consid¬ erable commerce and navigation from the one port, the capital, zEgina (pop. about 5,000), at the northwest, on the site of the old Greek town, of which considerable remains are left, the ruins of solidly-built walls and harbor moles still attesting its ancient size and im¬ portance. According to the legend, the island was named after the nymph Avgina, brought thither by Zeus. Historically,

its first inhab¬ itants were Achaeans and were expelled by a Dorian colony from Epidaurus, under whom it was one of the foremost commercial cities of Greece, full of hardy, energetic people, born seamen, who covered themselves with glory at Salamis. They were later forced to become a tributary part of the Athenian empire, and in 431 b.c. were expelled altogether. Lysander afterward restored them, but the city's old im¬ portance was gone. On a hill in the northeast are the remains of a splendid temple of Zeus Panhellenius (or, as others maintain, of Athena), many of the columns of which are still standing. Here are found early in the 19th century a number of marble statues which once adorned the east and west fronts of the temple ; they were purchased by the King of Bavaria in 1812, the deficient parts restored by Thorwaldsen, and are now among the chief ornaments of the Glyptothek at Munich.

ZEGINETA, ej'ine'ta, Paulus, a Greek

physician of the 7th century: b. in the island of 2Egina. He wrote (De Re Medica Libri Sep- tem,5 a synopsis of medicine in seven books, the sixth of which, dealing with operative sur¬ gery, is of special historical value. An Eng¬ lish translation by Adams was published in London (1834) and a French edition by Brian in Paris (1855).

ZEGINHARD. See Eginhard.

ZEGIR, a' jir, a Norse god of the sea-storms, who treats the other gods to foaming beer and has a wife Ran caring for those lost at sea. Their nine daughters are sea-waves, with names representing the aspects of the ocean.

ZEGIRITE, a mineral essentially identical with acmite (q.v.). Like it, aegirite is mono¬ clinic and is a silicate of sodium and both fer¬ ric and ferrous iron, the former largely pre¬ dominating. It is a member of the pyroxene group and is regarded by Miers as an alkali diopside. It is distinguished from acmite by its simple, prismatic crystals, usually bluntly terminated, its dark green color and its char¬ acteristic grass green, pale green and brown pleochroism. Its hardness is 6 to 6.5 and specific gravity about 3.53. It occurs in long prismatic crystals chiefly in the elseolite-syenites of Norway cfnd Arkansas.

ZEGIS, e'jis ((<storm®), the shield of Zeus, fashioned by Hephaestus (Vulcan). From a probably mistaken etymology it was often said to

have been the skin of the goat Amalthea, who suckled Zeus and to have had the Gor¬ gon's head in the centre. When Zeus was an¬ gry he waved and shook the aegis, making a sound like a tempest, by which the nations were overawed. It was the symbol of divine protection and became in course of time the exclusive attribute of Zeus and Athene.

ZEGISTHUS, e-jis'thus, son of Thyestes and cousin of Agamemnon ; adopted son of Atreus. He did not accompany the Greeks to Troy, and during Agamemnon's ab¬ sence lived in adultery with his wife Clytem- nestra. He assisted her in murdering her hus¬ band on his return, but was himself put to death seven years later by Orestes, son of Agamemnon. This is the account given by Homer ; the tragic poets make Clytemnestra alone murder Agamemnon, her motive in ZEschylus being her jealousy and wrath at the death of Iphigenia of Cassandra; in Sophocles and Euripides, the latter alone. Later writers also describe yEgisthus as the son of Thyestes by unwitting incest with his daughter Pelopia. See Agamemnon; Atreus.

2EGIUM, e'jium, Greece, modern Vas- titza, though officially restored to its ancient name. See Achaia.

ZEGLE, e'gl', a genus of plants of the nat¬ ural order Aurantiacece. The AEgle mannelos is the tree which produces the bhel fruit. This fruit is most delicious to the taste, being ex¬ quisitely fragrant and nutritious, but laxative. It has been long used in India with great effect as an astringent in cases of diarrhoea and dys¬ entery, when a little unripe.

iEGOSPOT'AMOS, or ˆGOSPOT'-

AMOI (ˆgoat-river®), the Thracian Cher- sonesus (now peninsula of Gallipoli) : a river and town memorable for the battle, or rather surprise, in which the Spartan general Lysan- der annihilated the Athenian fleet, 13 Dec. b.c. 405, and ended the Peloponnesian war by the temporary ruin of Athens. The latter had 180 vessels, with a number of coequal commanders, only one of whom (Conon) had common mili¬ tary sense, and perhaps treachery was at work; while Lysander was an eminent military genius had no one to consult but himself. Having put them off their guard by ostenta¬ tious carelessness and absence for several days, he swooped down upon them one day at din¬ ner-time while their ships were totally unpre¬ pared (despite the warnings of Alcibiades, whose castle was close by and who was fully a match for Lysander and destroyed or cap¬ tured the entire fleet except Conon's small squadron. Athens fell under the

rule of Spar¬ ta, which set up an aristocratic government, the outcome of which is infamous in history as the Thirty Tyrants.

ZEGYPTUS, in Greek legend, son of Be- lus, King of Arabia; conquered the land called Egypt from him. He gave his 50 sons in marriage to the 50 daughters of his brother Danaus, who had established himself in Ar¬ gos and was jealous of his brother, and who obliged all his daughters to murder their hus¬ bands on the night of their nuptials; Hyperm- nestra alone spared her husband, Lynceus.

Even zEgyptus was killed by his niece Polyx- ena. See Danaus ; Egypt.

AEHRENTHAL, a'ren-tal, Baron (after¬ ward Count), Alois Lexa von, Austrian statesman: b. Grosskal, Bohemia, 27 Nov. 1854; d. Vienna, 18 Feb. 1912. Studied law at Prague and Bonn ; entered diplomatic service 1877 ; at¬ tache, Saint Petersburg 1878; chief of cabinet under Count Kalnoky (foreign minister) 1883- 88; councillor of embassy, Saint Petersburg, till 1894; minister to Rumania 1895-99; ambassa¬ dor to Russia 1899-1906. In October 1906 he succeeded Count Goluchowsky as foreign min¬ ister, the latter being forced to retire on ac¬ count of Hungarian hostility. Aehrenthal was believed to be a strong Russophil with Con¬ servative leanings and to have worked for the restoration of the Drei Kaiserbund, or League of Three Emperors, which had dominated Europe between 1870 and 1878. He soon made a new departure in the foreign policy of his country. Whereas Goluchowsky had earned the title of a ((brilliant second® to Germany, the new minister maintained the perfect equality of Austria-Hungary and her independent right to carry on her foreign relations without pre¬ vious consultation and approval by Berlin. In regard to Hungary the dual minister has al¬ ways a difficult role to play, and Aehrenthal wisely profited from the failure of his prede¬ cessor. His first coup was played within a month of taking office, when he granted Bul¬ garia relief from the burden of the <(capitula- tions,® a relic of the old times of Turkish misrule, under which no foreign subject could be arrested or tried without the presence of a consular officer of his own nationality. Nearly all the powers interested had signified their readiness to abolish the capitulations if every other one would consent. Austria, however, had always opposed the change, and it was left for Aehrenthal to render Bulgaria this graceful service, which cost his country nothing and laid the principality under a great obligation. He reversed the 10 years' old policy of playing off the Slav against the non-Slav Balkan states and settled an old quarrel with Serbia by re¬ suming negotiations with that country. In Jan¬ uary 1908 he sprang a surprise upon Europe by his plans for a Novi-Bazar railway, which he said would lay the foundation for further de¬ velopments of Austria in

the Balkans. This proposal was regarded as peculiarly unfortu¬ nate in view of the changes taking place in Turkey, which, it was hoped, gave promise of true progress in the Ottoman Empire. Aehren¬ thal had exerted himself to prevent the Anglo- Russian rapprochement of 190.7, and the railway project was his answer to it, as a blow aimed at Russian predominance in the Balkans. The meeting of King Edward and the Tsar off Reval (July 1908), and the Turkish revolution, gave him his opportunity. A meeting between him and the Russian foreign minister (M. Izvolsky) in September relieved the strain between the two powers for a time, but events followed one another with startling rapidity. Eight days later Prince Ferdinand proclaimed himself Tsar of independent Bulgaria, and in another two days the Emperor Francis Joseph issued a proc¬ lamation that Austro-Hungarian sovereignty was extended to Bosnia and Herzegovina, in other words, the two provinces were annexed. This was a step undoubtedly premeditated ever

since the Berlin Treaty of 1878, by which these provinces were handed over to Austria to ad¬ minister until such time as the Turks should be more competent to govern them. The move was a flagrant violation of that treaty, and Aehrenthal refused to entertain the idea of a conference on the ground that it would seem like <(a tribunal in which Austria-Hungary would be the defendant.® Serbia and Monte¬ negro threatened war, and the situation at last became so dangerous that the acquiescence of Turkey had to be bought by concessions and a sum of $11,000,000. Early in 1909 everything was ready for war on the southeastern fron¬ tier, but Serbia was forced to yield when it became evident that Germany had compelled Russia to withdraw all hope of practical sup¬ port. Aehrenthal had won a victory; but he had planted the seeds of the European war and placed his county more firmly than ever under German tutelage.

.7ELFRIC, al'fric, the Grammarian, An¬ glo-Saxon author and translator ; fl. 1006. In his youth he was taught by a secular priest who could scarcely understand Latin. <(There was no one,® he says, ((who could write or under¬ stand Latin letters until Dunstan and yEthel- wold revived learning.® This may account for his warm interest in education and his industry in translation and compilation. (A Treatise on the Old and New Testaments) (printed 1623) ; the

ˆeptateuchus,* an abridgment and trans¬ lation of the first seven books of the Old Testa¬ ment, with the Book of Job (printed 1699) ; a (Pastoral Letterˆ written for Wulfstan, arch¬ bishop of York (1003-23), in which he makes the archbishop declare that he will not forcibly compel his clergy to chastity, but admonishes them to observe it; a (Latin Grammar and Glossary) (printed by Somner 1659).

TELIA, a Roman gens, whose members included Sejanus, Hadrian and the Antonines, as also the families of Paetus (q.v.), Gallus, etc.

.TELIA CAPITOLINA, the new name given to Jerusalem by Hadrian when he col¬ onized it with Romans after the insurrection of 132-35 a.d. ; he built a temple to Jupiter Capi- tolinus and prefixed the name of his own gens, the 2Elian. The Christian emperors after Con¬ stantine restored the old name.

.7ELIANUS, Claudius, e-li-a'nus, a noted Roman sophist who flourished in the first half of the 2d century : b. Praeneste, Italy. Of his many works, written in Greek, two are extant: (Various Histories, > or narratives, in 14 books, and (Of the Nature of Animals, } anecdotes of animals, — most entertaining and uncritical compilations. The Peasants' Let¬ ters y accredited to him are spurious. Best ed., Hercher, 1858 and 1864.

TELIANUS TACTICUS, a Greek tacti¬ cian and author of the 2d century. His (Tactike Theoria) (written about 106 a.d.) is a valuable historical and bibliographical treatise on Graeco-Macedonian military tactics, based on the best authorities, the chief of which is the lost work of Polybius. The treatise exerted great influence on the Byzantines and Arabs, and was the groundwork of the Spanish, Dutch and other European army organizations of the 16th and 1 7th centuries. Theodore Gaza trans¬ lated it into Latin, and from this a German translation appeared (Cologne 1524) ; it was

translated into French by Machault in (Milices des Grecs et Romains) (Paris 1615) ; into Eng¬ lish by Bingham (London 1616), and by Vis¬ count Dillon (London 1814) ; it reappeared in German with translation, notes and reproduc¬ tions of the original illustrations, edited by Riistow and Koehly in (Griechische Kriegs- schriftsteller) (Leipzig 1855).

.7ELURODON, el-ur-o'-don, a primitive carnivore fossil in the rocks of the Wahsatch and Unita (American) stages of the Pliocene Age; a hyena-dog. It <(was as large as the modern wolf, but had a short, heavy, mastiff¬ like head, and was distinguished from any living

canids by the cat-like construction of the carnassial teeth.® Consult Osborne, H. F., (Age of Mammals* (1910).

.ZEMILIANUS, C. Julius, Emperor of Rome : a Moor who rose from the lowest sta¬ tions ; governor of Pannonia and Mcesia, whose troops killed the Emperor Gallus and gave him the crown. He reigned only four months, when he was killed in his 46th year by his own soldiers, who then offered the crown to Valerian, August 253 a.d.

.3EMILIAN WAY, a Roman state road about 185 miles long, built by the consul Marcus ˆEmilius Lepidus, 187 b.c., primarily as a mili¬ tary road to make easy communication between Rome and her new possessions in Cisalpine Gaul (Lombardy). Beginning at Ariminum (Rimini) on the Adriatic, where the Flaminian way from Rome ended, it traversed Bononia (Bologna), Mutina (Modena) and Parma, crossed the Pa- dus (Po) at Placentia (Piacenza) and ended at Mediolanum (Milan).

iEMILIUS PAULUS, surnamed Mace- donicus, a noble Roman of the ancient family of JEmilii b. 230 b.c. ; d. 160. He conquered Perseus, King of Macedon, and on this occasion obtained a triumph, 168 b.c. During the tri¬ umph two of his sons died. He bore the loss like a fiero and thanked the gods that they had chosen them for victims to avert bad fortune from the Roman people. He was father of the renowned Scipio Africanus the Younger.

iENEAS, in the Iliad, a Trojan prince, son of Anchises and the goddess Venus; second only to his kinsman Hector among the Trojan chiefs. Other stories tell that the care of his infancy was entrusted to a nymph; but at the age of five he was recalled to Troy and placed under the inspection of Alcathoiis, his father's friend and companion. He afterward improved himself in Thessaly under Chiron the Centaur, whose house was frequented by all the young princes and heroes of the age. Soon after his return home he married Creusa, Priam's daughter, by whom he had a son called As- eanius. Virgil, whose object is to connect him (according to Latin tradition of untraceable source) with the origin of Rome, tells his fur¬ ther story as follows in the 2Eneid : In the night of the capture of Troy by the Greeks, Hector warned him in a dream to fly. 2Eneas not¬ withstanding rushed to the fight; but after Priam was slain returned to his home and car¬ ried off his father, his child and his household gods, losing, however, his wife, Creusa, in the confusion. With 20 vessels he sailed for Thrace, where he began to build 2Enos, but terrified by a miracle, abandoned the attempt. Thence he went to Delos to consult the oracle.

Misunderstanding its reply he went to Crete, from which he was driven by a pestilence; thence to the promontory of Actium, and in Epirus found Helenus and Andromache ; thence past Italy and through the Straits of Messina, and circumnavigated Sicily to Cape Drepanum on the western coast, where Anchises died. A tempest drove him on the shore of Africa, where Dido received him kindly in Carthage and wished to detain and marry him. Jupiter, however, mindful of the Fates, sent Mercury to . < Eneas and commanded him to sail for Italy. While the deserted Dido ended her life on the funeral pile, Eneas set sail with his compan¬ ions and was cast by a storm on the shores of Sicily, in the dominions of his Trojan friend Acestes, where the wives of his companions, wearied of a seafaring and homeless life, set fire to the ships. Nevertheless, after building the city Acesta, he sailed for Italy, leaving the women and the sick behind. He found near Cumae, a sibyl his father's ghost had ordered him to seek, who foretold his destiny and aided his descent into the lower world; here he saw his father and had a prophetic vision of the glorious destinies of his race. On his return he embarked again and reached the eastern shore of the river Tiber, in the country of Latinus, King of the Aborigines (q.v.). His daughter Lavinia was destined by an oracle to a stranger, but promised by her mother Amata to Turnus, King of the Rutuli. This occasioned a war, after the termination of which, Turnus having fallen by his hand, Eneas married Lavinia. His son by Lavinia, Eneas Sylvius, was the ancestor of the kings of Alba Longa, and of Romulus and Remus, the founders of the city of Rome. From Ascanius' son lulus the Ro¬ mans derive the Julian family. For the real origin of Rome, see that title.

ENEAS SILVIUS. See Pius II.

ENE'AS TAC'TICUS, a Greek writer on war tactics of the 4th century b.c., by some authorities identified with Eneas of Stympha- lus, Arcadia, a general who fought at Mantinea 362 b.c., as recorded by Xenophon. His several treatises on the art of war, of which the only one in existence deals with the best methods of defense for a fortified city, were epitomized by Cineas, minister of Pyrrhus, King of Epirus, and are mentioned by Polybius and Elianus. Containing anecdotes and illustrations from Thucydides and Xenophon the work, as edited and published by Hercher (Berlin 1870), and with introduction and notes by Hug (Leipzig 1874), has much value and interest. For a chal¬ lenge as to the identification with the Stym- phalian general and for a

bibliography consult Williams, T. H., in American Journal of Philo¬ logy (Vol. XXV, 1904).

ENEID, The. The (Eneid> of Vergil is the epic of imperial Rome, as the Homeric poems are the epic of early Greece, the (Divine Comedy) of mediaeval Italy, and (Paradise Lost) of Puritan England. For two hun¬ dred years before Vergil (70-19 b.c.) there had been current the legend of the found¬ ing of Rome by Eneas, a minor Tro¬ jan hero of the Iliad, son of Venus and Anchises and father of Ascanius or lulus, ancestor of Julius Caesar and Augustus. The <Eneid) gave it final form and sanction, and made it canonical. The first six books of the

poem, after introducing Eneas and his com¬ panions shipwrecked near Sicily and driven to the Carthaginian coast, where they are received at the court of Queen Dido, narrate the hero's escape from burning Troy, his wanderings on sea and shore in search of the divinely ap¬ pointed but unknown goal, his tarrying at Car¬ thage, the passion of the Queen and her fatal despair when divine intervention forces him on, the funeral games in Sicily in honor of Anchises, the visit to the underworld, where the destiny of Rome and the Julian family is made known to him, and his departure from sacred Cumae, near Naples, for the Tiber's mouth, where his landing takes place at the opening of the seventh book. The last six books, the narrative of his troubled alliance with King Latinus of Latium, and of his wars, assisted by the Arcadian King Evander of primitive Rome, with Latian and Etruscan en¬ emies under Turnus and Mezentius, close with the slaying in single combat by Eneas of Turnus, his most persistent and spirited foe, and the clearing of the stage for the beginnings of Roman greatness.

It is immediately apparent — to the shallow reader offensively so — that the (Eneid) is an imitation or adaptation of the Homeric poems; the first six books an Odyssey, with the divine¬ ly guided and divinely hindered hero Eneas reaching Italy after seven years of blind wan¬ derings, as Odysseus reached his Ithacan home in similar wise 10 years after the fall of Troy, and the last six an Iliad of battling, with the Trojan cause victorious in Latium as the Greek cause had been at Troy. This manner of blending, or rather building, a unit out of two Greek originals was so well known in Roman literature that as early as Terence (195 ?— 169) , who practiced it in the field of the drama, con¬ tinuing a tradition at least as old as Nsevius (circa 270-199), it had received the technical designation of ˆcontamination To deny the en¬ tered into the ideals and execution of Spenser, Milton and many others of the long line of modern poets in all European languages, was to Tennyson Eight among the vanished ages; star that gildest yet this phantom shore,® and has held its place through the centuries as a

necessary part in the culture of the Caucasian peoples. Admiration so widely spread and so long continued, and influence bearing such abundant fruit, are possible only with works of power. With its faults freely conceded, the <Eneid) remains one of the world's three or four epic masterpieces.

For reasons both of content and form, com¬ parison of the (Eneid) with the <Iliad) and

the <Odyssey) is inevitable; blit it is also not quite just. There are two kinds of epic. There is the natural or folk epic, a more or less spon¬ taneous and naive growth by oral and popular tradition, such as the (Nibelungenlied,' (Beo¬ wulf^ the (Song of Roland' or the (Cid' ; and there is the artificial or literary epic, the delib¬ erate, though also inspired, creation of a single mind in an age of cultivation and reflection, such as the (Divine Comedy,' Jerusalem De¬ livered,' (Orlando Furioso,' (The Lusiad' or (Paradise Lost.' To the former belong the Homeric poems, though their art is by no means as ((unconscious" as is sometimes supposed ; to the latter class belongs the (TEneid.' Vergil's poem is not merely a more or less dull reflection of the (Iliad' and the (Odyssey.'

In the first place, the (Tineid' is a poem with a purpose. It is not the spontaneous <(singing" of primitive inspiration; it is not, and was not intended to be, the mere telling of an entertain¬ ing tale. The literary epic has usually a con¬ scious purpose — <(to justify the ways of God to men" ((Paradise Lost'), to fashion <(XII Moral Virtues" ((The Faerie Queene') — as well as the less artificial purpose of artistic self-expression. The (Tineid' is a poem with a national, patriotic purpose. The writer of the (Eclogues' and the (Georgies,' who had helped to reawaken the love for field and or¬ chard in a time when the Roman world was fatigued with the disorders and violences of a century and longing for peace and quietude, was prompted by the court, as well as by his own inspiration, to celebrate the greatness, un¬ der divine warrant, of Roman achievement and Roman purpose. The great figure in the (Tineid' is not .Tineas, or Dido, or the Julian ruler, but Rome. Throughout the 12 books — in the councils of the gods, in the Carthage episode, in the hero's converse with the under¬ world, in the endless conflicts and cruelties on the plains of Latium — there is ever felt in the background the idea of the oncoming, di¬ vinely ordered, irresistible greatness of Rome. It was the century in which the phrase

urbs csterna was coming into use and the faith in Roman destiny was ripening.

In the. second place, the sources of the Tineid's inspiration and matter include not only the (Iliad' and the (Odyssey,' but the Cyclic poems and the Homeric Hymns, Apol¬ lonius Rhodius' (Tale of the Argonauts,' and the whole range of Roman historical and poetic literature — Ennius, Naevius, Cato, Varro, Lu¬ cretius. In other words, Vergil was a widely and deeply cultured student and lover of poetry and history, and the (TEneid' is the product of poetic inspiration working upon an exceedingly rich intellectual and spiritual equipment in an age of culminating greatness. In the respect of intellectual preparation Vergil is to be com¬ pared with poets like Dante, Tasso, Milton and Spenser, whose works are so permeated by the classical spirit and so filled with classical ma¬ terial as to remind the reader of a rich mosaic. He is no more the plagiarist that Macrobius, three centuries later, charged him with being, than Milton, using from the full store of the classics and Hebrew literature, was a plagiarist.

In the third place, the (Tineid' is a poem of many and varied interests. The reader must not look to it for the simplicity and sponta¬ neity and speed of primitive story-telling

genius, the qualities that make the natural epic great. As compared with the Homeric poems, it is not easy and fluent reading. It is a com¬ plex of the primitive and the sophisticated, of the heroic and the actual, of the legendary and the real, of the historic and the prophetic, of the Hellenic and the Roman, of age-old religion and the new philosophy, of the archaeological and the modern, of the political and the poetic, of the classic and the romantic. It is filled with the humility of faith, and with gentle personal emotion, but also with national pride, and with the dignified and austere feeling of might con¬ sciously engaged in working the will of heaven. ((To write an enduring epic," says Cruttwell ((History of Roman Literature,' p. 266), <(a poet must not merely recount heroic deeds, but must weave into the recital all the tangled threads which bind together the grave and varied inter¬ ests of civilized man." It is not to be won¬ dered at that criticism has found in the (TEneid' some lack of the evenness, simple directness and bright rapidity of narrative and language, the heroic fire, the bigness of stage, the variety and richness of character, and the dramatic power that characterize Homer. The poet realized the difficulties of his undertaking, and had a despairing sense of his limitations. He would have spent years more on his work had death not cut him off. Yet, uncompleted as it is, it stands beside Milton and Dante as an expression of national life. The (Tineid' is not a Greek but

a Roman poem; just as the trium¬ phal arch, in spite of its Greek column and architrave, is a Roman, not a Greek, structure.

Posterity has rejoiced that Vergil's order for the destruction of the (Tineid' was not obeyed. The poem has its own pronounced ex¬ cellences, some of them unsurpassed, and to call a thing Vergilian is to give it high praise. If any single word will in a measure express the sum of its qualities, it is the word richness. The natural epic is of a texture firm, warm and yielding, with simple pattern in glowing, joyous colors; the literary epic is a brocade of gor¬ geous, mingled hues, with strands of gold and silver inwoven in complicated pattern, so stiff it will stand alone. The (Tineid' is especially rich. It is kept from the exuberance of Italian Renaissance art only by Hellenic restraint. It is rich in allusive content — mythological, his¬ torical, religious, archaeological, literary. It is rich in story. The fortunes of its hero as a whole are no uninteresting narrative, and no tales could be more fascinating than the epi¬ sodes of the fall of Troy, the loves of Tineas and Dido, the descent to Avernus, the adven¬ ture of Nisus and Euryalus. It is rich in re- memberable characters. It may be that not even allowance for the divine constraint under which TEneas labored and for the ancient lack of chivalrous sentiment toward woman, to say nothing of the woman who was Queen of the Carthage one day to threaten Roman existence, can move the modern reader to more than a purely intellectual acceptance of the principal character ; but even Tineas is a thoroughly consistent figure in his steadfast, sad-hearted obedience to the commands of heaven. And as for the Dido he was compelled to leave, in her Vergil has executed one of all time's most truthful portrayals of a dignified, beautiful and passionate woman wrought upon by the ex¬ tremities of love and despair. This one intense

figure goes far to compensate for the lack of vividness and reality in so many of the dra¬ matis personas of the <2Eneid.) It is rich in the mystical and the romantic. For Dante to make the sixth book into the stage of the In¬ ferno was natural; the sixth book is already mediaeval. It is rich in love of nature and sensitiveness to beauty of every kind. No reader forgets the familiarly modern feeling for natural scenes — for the sea tremulous under the light of the moon, for the Tiber swirling to the sea between leafy banks, with wild fowl in the air all about ; or misses the charm of numberless allusions in simile and metaphor to the beauty of Italy, the garden, and her sister

Mediterranean lands. It is rich in pathos. ((Vergilian tenderness,® ((the haunt¬ ing melancholy of Vergil,® ((lachrymse rerum,® have become literary phrases. It is rich in re¬ ligious feeling, in its fond looking back toward the old-fashioned gods of field and grove, farmhouse and fold, and in the yearning note always pathetically sounding when death is en¬ visaged and the life beyond is glimpsed. ((Vergil's poems,® writes F. W. H. Myers, <(lie at the watershed of religions. Filled as they are with Roman rites and Roman tradition, they contain also another element, gentler, holier, till then almost unknown ; a change has passed over them like the change which passes over a Norwegian midnight when the rose of evening becomes silently the rose of dawn.® It is rich in the personality of the poet. The emotional qualities of the <2Eneid) are felt to belong to Vergil himself. It is as if we were in the presence of the tall, dark, delicate, se¬ rious, retiring friend of Florace, the (<soul than whom the earth has brought forth none more fair,® and heard his earnest, melancholy tones, and felt his enthusiasm for poetry and respon¬ siveness to the noble and the beautiful. It is rich above all in the dignity, variety, sonorous¬ ness, adaptability and spiritual suggestiverfess of <(the stateliest measure ever moulded by the lips of man.® In other respects the <2Eneid) may be uneven; in this it is of unfailing ex¬ cellence. ((We shall not find,® says Mackail, <(that the splendour of the poem depends on de¬ tached passages, but far more on the great manner and movement which, interfused with the unique Vergilian tenderness, sustains the whole structure through and through.®

The <2Eneid) may be read in the verse translations of Conington, Bowen, Morris and Dryden; or in the prose of Conington, with es¬ say and notes by Francis G. and Anne C. E. Allinson, or of Fairclough in the Loeb Classical Library, or of Mackail. For appreciation, Sel¬ lar's (VirgiF ; Boissier, (The Country of Horace and VirgiP; Glover, (VirgiP ; Com- paretti, (Vergil in the Middle AgesP

Grant Showerman,

Professor of Latin Literature, University of Wisconsin.

iENESIDE'MUS, e'nes-i-de'mus, Greek philosopher, fl. 80-60 b.c. : b. Cnossus in Crete, removed to Alexandria. He was a leader of the Skeptical school and is famous for the <(Ten Tropes® attributed to him, — arguments to prove the impossibility of absolute knowledge, and reducible in essence to two, that no two things are alike and everything is relative. They are: (1) That each sentient being must

have a different perception and conception of the universe from every other because differ¬ ently constituted; (2) that human beings dif¬ fer; (3) that sense organs differ; (4) that the circumstances of perceptions differ; (5) that objects perceived differ in location and dis¬ tance; (6) that different objects are confound¬ ed; (7) that different combinations make the same sensation seem different; (8) that all knowledge is relative; (9) that degrees of familiarity cause differences in perception; (10) that the intellectual speculations, moral theories, laws, manners and customs, civiliza¬ tions, etc., of all races differ (Locke's argu¬ ment against intuitive ideas).

2ENIANES, e-ni'a-nes, in classic Greek, an Achaean people living on the southern bor¬ der of Thessaly, in the mountains west of Thermopylae; members of the /Etolian League and the Delphic Amphictyony.

/ENON, anon, a place near Salim where John the Baptist baptized (John iii, 23). Its location is now difficult to determine. Euse¬ bius and Jerome place it eight miles south of Scythopolis, now called Beesan. Nearly a mile south are seven springs. A place which is now called Ainun, five miles northeast of Jerusalem in Wady Farah, is thought by Bar¬ clay and Conder to be the right location. Here are a great number of rock-hewn cisterns, and a short distance south are many springs, which may seem to connect it with 2Enon, a place where was ((much water,® or many waters.

AEOLIAN, a musical instrument. See Musical Instruments, Mechanical.

2EOLIAN DEPOSITS. See Eolian De¬ posits.

2EOLIAN HARP, or 2EOLUS' HARP,

is generally a simple box of thin fibrous wood to which are attached a number of fine strings, sometimes as many as 15, stretched on low bridges at each end and carefully tuned so as to be in harmony. Its length is made to cor¬ respond to the size of the window or other aperture in which it is intended to be placed. Its width is about five or six inches, its depth two or three. It must be placed with the strings uppermost, under which is a circular opening in the centre, as in the belly of the guitar. When the wind blows athwart the strings it produces the effect of a choir of music in the air, sweetly mingling all the harmonic notes and swelling or diminishing the sounds according to the strength or weak¬ ness of the blast. A simpler kind of 2Eolian harp has no sounding-board but consists mere¬ ly of a number of strings extended between two boards.

2EOLIANS (<(variegated,® mixed race), an ancient Greek people, perhaps the very earliest Greek stock — a mixture of Hellenes and Pelasgi — before the special races like Ionians and Dorians had differentiated from it ; as their language was not a distinct dialect like those, but is a mixture of elements from all and presents the closest link of any between Greek and Latin. The Homeric language is TEolic. The race extended from northeast to southwest through Greece, from the Pagasaic Gulf through Thessaly or at least Phthiotis, Boeotia, Phocis, Locris and 2Etolia, north of

the Corinthian Gulf, to Elis and Messenia, south of it. The sons of ZEsculapius (q.v.), Philoctetes, Odysseus, Nestor and the O'ilean Ajax, were Bohans; and legend accredits to the same stock Jason, Melampus the healer, who understood the song of birds, Sisyphus, the founder of Corinth, and Athamas, the great King of the Minyse, son-in-law of Cadmus and father of Phrixus and Helle. The Achaeans, if not originally part of the same stock, became blent with them and are classed by the ancients as part of them; and there is no separate Achaean dialect or art. Probably they were one, and the Peloponnesian Achaei were certainly part of them ; and the great emigration commonly called theZEolian was an emigration of Achaean people. It seems prob¬ able that the emigration from the Peloponnesus began before the Dorian invasion, or return of the Heraclidae, as it is often called, which caused so great a revolution in the peninsula. Strabo says the ZEolian settlements in Asia were four generations prior to the Ionian. Their colonies on the Asiatic mainland were widely spread, extending at least from Cyzicus, along the shores of the Hellespont and the ZEgean to the river Caicus and even the Hermus. Many positions in the interior were also occupied by them as well as the fine island of Lesbos, with Tenedos and others of smaller importance. Homer mentions all these parts as possessed by a different people, which would be proof, if any were wanting, that the race of new settlers came after his time. There were 12 cities or states included in the older settlements in that tract of Asia Minor on the ZEgean which was known in Greek geography by the name of ZEolis and formed a part of the subsequent larger division of Mysia. Smyrna, one of them, which early fell into the hands of the Ionians, the neighbors of the ZEolians, still exists nearly on the old spot, with exactly the same name ; thus adding one to the many instances of the durable im¬ pression made by Greek colonies wherever they settled.

ZEOLIPILE, an invention of Hero of Alexandria, often called the first steam engine. It consists of a hollow metal sphere supported by trunnions, through one of which steam is admitted to the interior of the sphere. At op¬ posite points on the sphere short tubes are in¬ serted with their ends bent. The steam es¬ capes through these ends and causes the sphere to revolve. Consult Gerland and Traumuller, (Geschichte der physikalischen Experimentier- kunst) (Leipzig 1899) ; Schmidt, (Heron von Alexandria* (ib., 1899) ; Thurston, R. H.,

ˆGrowth of the Steam Engine* (New York

1878).

ZEOLIS. See ZEolians.

ZEOLUS, in Greek legend: (1) Ruler of the winds; a sort of sub-deity, having his resi¬ dence on a floating island, said to be one of the ZEolian Islands, or by the Latin and later Greek poets one of the Lipari Islands. Here he kept the winds in bags (Vergil says in caves), restraining or letting them loose at the orders of Zeus. In the Odyssey he gives them to Odysseus to take care of for a time. (2) The eponymous ancestor of the ZEolians, located in Thessaly; Hellen was his father and Dorus his brother (eponyms of the Hellenes and

Dorians), and Sisyphus his son, the signifi¬ cance of which is not ascertainable. (1) and (2) may have been originally the same, but if so they arose as independent metaphors or eponyms.

ZEONS (from the Greek, signifying “an age,® “everlasting®), a designation applied to celestial powers and spirits which, according to Gnostic philosophy, proceed from God the all-perfect Hfon, the fountain-head of divinity, existed before time began and distinctively rule the successive eras of the universe, through¬ out eternity. See Gnosticism. Consult Mead,

(Fragments of a Faith Forgotten) (London

1900).

ZEPINUS, e-pi'nus, Franz Maria Ulrich Theodor, German physicist and Prussian edu¬ cator: b. Rostock, Saxony, 13 Dec. 1724 ; d. Dor- pat, 10 Aug. 1802. From 1757 until his retire¬ ment in 1798 to Dorpat, he was professor of physics and member of the imperial academy of sciences in Saint Petersburg (Petrograd). He was a prolific author of various works on the physical sciences, chief of which are : (Tentamen Theorise Electricitatis et Mag- netismP (Saint Petersburg 1759) ; (De

dis- tributione caloris per tellurem* (Saint Peters¬ burg 1761) ; and a treatise on the effects of parallax in the transit of a planet over the sun's disc (1764), which created great interest. He was tutor to Prince Paul, son of the Em¬ press Catherine II, and inspector-general of the imperial normal schools which the Empress un¬ successfully tried to establish throughout the empire.

ZEQUI, e'kw!, an ancient people of Italy, conspicuous in the early wars of Rome. They inhabited the mountain district between the upper valley of the Anio (Teverone) and Lake Fucinus. Their origin is unknown; but they were probably akin to the Volscians, with whom they were in constant alliance. This league after the fall of the monarchy made great headway and captured many towns, their power culminating in the 5th century b.c. At length they were severely defeated by Cincinna- tus in 458, and again by the dictator Postumus Tubertus in 428. They were finally subdued about 304, and soon after were admitted to Roman citizenship, being included in the new tribes Aniensis and Terentina. Henceforth their name disappears from history; but the inhabitants of the upper valleys began to be called ZEquiculi, by which name they are men¬ tioned by Vergil as predatory mountaineers. The name ZEquiculani occurs in Pliny.

ZERARIUM, e-ra'ri-um ("money-place®), the public treasury of ancient Rome ; containing not only the state moneys and accounts, but the legionary standards, the public laws (on brass plates), Senate decrees, and other important papers and registers. It was located in the tem¬ ple of Saturn, on the eastern slope of the Capitoline hill. Besides the general treasury, filled from general taxes and drawn on for regular expenses, there was in the same build¬ ing, a "sacred treasury,® or reserve fund, replenished chiefly by a 5 per cent tax on the value of manumitted slaves, which was never drawn upon except on occasions of ex¬ treme necessity. The Senate controlled the serarium nominally even under the early em¬ perors, who had their separate imperial treasury

called the fiscus; but as the Senate became a mere name, the figment of two treasuries was gradually abolished. Augustus established also a military treasury devoted solely to army ac¬ counts. The later emperors had likewise a pri¬ vate treasury, aside from the general one which they administered for the empire.

AERATED BREAD. See Bread.

AERATED WATERS. See Mineral Waters.

AERATOR, an apparatus used in dairying for aerating milk to remove the animal and barn odors. The usual process is to run the milk in a thin layer over an exposed surface immediately after milking. In most appliances of this kind the animal heat is removed at the same time by having the exposed surface cooled with ice, ice water or cool spring water. Care must be taken that aeration be carried on in a place free from dust in order to lessen the conditions favorable to the growth of micro¬ organisms. The aerator itself, like all dairy appliances, must be so constructed that it may be easily and thoroughly cleaned.

AERENCHYMA, a loose, spongy tissue in plants, especially in water plants. It is sup¬ posed to facilitate aeration. Typically it is composed of radially arranged arms of thin- walled cells inclosing large air spaces.

AERIAL CONVEYER. See Conveyer.

AERIAL NAVIGATION, Legal Aspect

of. The rapid development of aerial naviga¬ tion seems as yet to have produced no actual decisions upon the novel questions of private right and public regulation which sooner or later will be presented for solution. In the absence of express statute or international regulation by treaty, the principles and anal¬ ogies of the common and maritime law must furnish the rule of decision. The right of an aviator to fly over another's land depends upon the true meaning and present application of the ancient maxim, ((Whoever owns the soil owns also to the sky and to the depths.® Lit¬ erally construed and applied, any passage over another's land, at whatever height, is a tres¬ pass and therefore unlawful. On the other hand, the view is taken that this maxim is not to be applied literally, that the owner's rights in the air space above his land are appurtenant to the soil and extend only so far as is neces¬ sary to the enjoyment of the use of the soil without interference and that therefore a mere passage across his land at a sufficient height and without other interference is not an actionable wrong. It is everywhere agreed, however, that if navigation over another's premises is conducted so as to constitute a nuisance, . or to result in actual damage, an action will lie. The conflict of opinion is as to whether the right of action is limited to cases of actual damage and of nuisance. An opinion fast gaining ground is that the landowner cannot be heard to complain of any use of the air spaces above his

land by which no damage to him can result ; that his rights above the height necessary to the full enjoyment of his land free from any interference are too unsubstan¬ tial to be protected by the law (4 Am. T. Int. L. 126, 127).

AERIAL TELEGRAPHY. See Sema¬ phore; Wireless Telegraphy.

AERIAL TORPEDOES, the designation given to explosive missiles which are capable of propelling themselves through the air by self-contained forces. See Torpedoes.

AERIANS, a-e'ri-unz, a religious sect who arose in the 4th century of the Christian Church and present many features of modern religious liberalism in the way they combatted ecclesiastical tradition and the institutionalism professedly derived from the apostolic age. They derive their name from their originator and leader, Aerius, a presbyter of Sebaste, a city of Pontus. Aerius flourished about 355 a.d. He was fired with a spirit of revolt against the condition of the Church as he found it. Although an ascetic of a very stern and rigid character, he was shocked at the extravagant lengths to which some of his fellow Christians carried the practice of fasting, and the claims which they made to merit because of this rigorous self-maceration. Although he found fasting a settled institution of the Church he opposed the practice because of the delusions it seemed to lead to. He was also an opposer of those special festivals of intercession which were held in behalf of the faithful departed. ((Pray for the living, whose needs and suffer¬ ings some of which you may have caused,® he seems to say. To this vigorous and uncompro¬ mising onslaught on the common and ordinary practices of the Church he recalls such earnest and outspoken fathers of the Reformation as Alartin Luther and John Knox. There were a great many people who sympathized and agreed with him, and his sect at one time was very flourishing. The ascendancy of the episcopal order in the Church was a natural aristocratic movement, although Bishop Lightfoot in com¬ mentary on the Philippians does not seem to think that it was sanctioned either by divine command or apostolic precedent. Aerius main¬ tained that the bishop was not superior to the presbyter, that they were of the same order, and that a bishop was merely a chairman elected for convenience sake to preside among equals. He seems also to have been opposed to holding of any such set festivals in the Church as Easter. This sect seems to have sown the earliest seed of modern Presbyterianism.

AERIDES, a-e'ri-dez, the wind flower, one of the Orcliidaceco , of which there are 15 species. The finest species, Aerides adoration,

grows wild in parts of Asia, but in cold and temperate climates is cultivated under glass, though flowering at rare intervals. This genus of plants derives its name from the fact that the species appear to take their principal nourish¬ ment from the air, as they can exist and thrive in their native clime, sending forth blossom after blossom while suspended and far away from any vegetable soil. They bear distichous leaves and their flowers , are big and brilliant, while at the same time possessing a rare frag¬ rance.

AERINITE, a bright blue earthy sub¬ stance found in the Pyrenees. It has no defi¬ nite composition, and its blue color is perhaps of artificial origin.

AERO CLUB OF AMERICA. Club or¬ ganized on 16 Feb. 1910, having for its objects,

as stated in the certificate of incorporation, ((the promotion of a social organization or club composed in whole or in part of persons own¬ ing aeronautic inventions for personal or pri¬ vate use. To advance the development of the science of aeronautics and kindred sciences. To encourage aerial navigation, conferences, expositions, congresses and contests. To maintain a club house or club houses, aerial garages, and accessories, aeronautic or other¬ wise incidental to the purposes or the further¬ ance of any of the powers hereinbefore set forth, and to do every other act or acts inci¬ dental or appurtenant to or connected with the aforesaid purposes, sports or powers, or any part or parts thereof ; provided the same be not inconsistent with the laws under which this corporation is organized. w The Aero Club is the sole representative in the United States of America of the Federation Aeronautique Internationale, and as such, it may grant aero¬ nautical and aviation pilots' certificates to per¬ sons who are over 18 years of age, citizens of . the United States, or citizens of a country not represented in the Federation Aeronautique Internationale.

AERODYNAMICS. That branch of physics which treats of forces, equilibrium and motion in a gas. It is a branch of hydrodynamics (q.v.), but differs from this latter science as applied to liquids in that it concerns itself with a compressible medium. See Airplane; Aero¬ statics; Gas; Sound; Wave; Wind.

AEROKLINOSCOPE, an instrument to indicate differences of

barometric pressure at remote stations. It consists of a vertical axis 30 feet high, turning on a pivot, carrying at the top a horizontal arm, of which the in¬ clination can be varied according to the differ¬ ence of barometric pressure at different sides of the station, the amount of dip being indi¬ cated by a sliding rod held in position by graded notches at the lower part of the axis, each notch corresponding with one millimetre in pressure. It is used in' the weather service and at military stations.

AERONAUTICAL NOMENCLATURE.

The following are the principal terms which have come into use in the development of aeronautics and are new and peculiar to the subject.

Aerofoil, a thin wing-like structure, flat or curved, designed to obtain reaction upon its surfaces from the air through which it moves.

Aeroplane, a form of aircraft heavier than air which has wing surfaces for sustentation, with stabilizing surfaces, rudders for steering, and power plant for propulsion through the air. The landing gear may be suited for either land or water use.

Pusher. — A type of airplane with the propeller or

propellers in rear of the wings.

Tractor. — A type of airplane with the propeller or pro¬ pellers in front of the wings.

Aileron, a movable auxiliary surface used for the control of rolling motion — i. e., rotation about the fore and aft axis.

Air-Speed Metre, an instrument designed to measure the velocity of an aircraft with reference to the air through which it is moving.

Altimetre, an instrument mounted on an aircraft to con¬ tinuously indicate its height above the surface of the earth.

Ballonet, a small balloon within the interior of a balloon or dirigible for the purpose of controlling the ascent or descent, and for maintaining pressure on the outer envelope to prevent deformation. The Ballonet is kept inflated with air at the required pressure, under the control of a blower and valves.

Balloon, a form of aircraft comprising a gas bag and a car, whose sustentation depends on the buoyancy of the contained gas, which is

lighter than air.

Captive. — A balloon restrained from free flight by means of a cable attaching it to the earth.

Kite. — An elongated form of captive balloon, fitted with tail appendages to keep it headed into the wind, and deriving increased lift due to its axis being inclined to the wind.

Bank, to incline an airplane laterally — i. e., to rotate it about the fore and aft axis. Right bank is to incline the airplane with the right wing down.

Barograph, an instrument used to record variations in barometric pressure. In aeronautics the charts on which the records are made are prepared to indicate altitudes directly instead of barometric pressure.

Biplane, a form of airplane in which the main supporting surface is divided into two parts, one above the other.

Body of an Airplane, a structure, usually inclosed, which contains in a stream line housing the power plant, fuel, pas¬ sengers, etc.

Cambre, the convexity or rise of a curve of an aerofoil from its chord, usually expressed as the ratio of the maximum departure of the curve from the chord as a fraction thereof. “ Top Cambre ” refers to the top surface of an aerofoil, and “ Bottom Cambre ” to the bottom surface; “ Mean Cambre ” is the mean of these two.

Capacity,

Lifting. — The maximum flying load of an aircraft.

Carrying. — Excess of the lifting capacity over the dead load of an aircraft, which latter includes structure, power plant, and essential accessories.

Centre, the point in which a set of effects is assumed to be accumulated, producing the same effect as if all were con¬ centrated at this point.

Of buoyancy. — The centre of gravity of the fluid dis¬ placed by the floating body.

Of pressure of an aerofoil. — The point on the chord of an element of an aerofoil, prolonged if necessary, through which at any instant the

line of action of the resultant air force passes.

Of pressure of a body. — The point on the axis of a body prolonged if necessary, through which at any instant the line of action of the resultant air force passes.

Chord,

Of an aerofoil section. — A right line tangent to the under curve of the aerofoil section at the front and rear.

Length. — The length of the chord is the length of the aerofoil section projected on the chord, extended if neces¬ sary.

Controls, a general term applying to the means provided for operating the devices used to control speed, direction of flight and altitude of an aircraft.

Dirigible, a form of balloon, the outer envelope of which is of elongated form, provided with a propelling system, car, rudders and stabilizing surfaces.

Non-rigid. — A dirigible whose form is maintained by the pressure of the contained gas assisted by the car- suspension system.

Rigid. — A dirigible whose form is maintained by a rigid structure contained within the envelope.

Semi-rigid. — A dirigible whose form is maintained by means of its attachment to an exterior girder construction containing the car.

Drag, the total resistance to motion through the air of an aircraft — i. e., the sum of the drift and head resistance.

Drift, the component of the resultant wind pressure on an aerofoil or wing surface parallel to the air stream attack¬ ing the surface.

Elevator, a hinged surface for controlling the longitudinal attitude of an aircraft — i. e., its rotation about the a thwart- ship axis.

Engine, Right or Left Hand, the distinction between a right-hand and a left-hand engine depends on the rotation of the output shaft, whether this shaft rotates in the same direction as the crank or not. A right-hand engine is one in which, when viewed from the output shaft end, the shaft is seen to rotate anti-clockwise.

Fins, small planes on aircraft to promote stability; for example, vertical tail fins, horizontal tail fins, skid fins, etc.

Flight Path, the path of the centre of gra\ity of an air¬ craft with reference to the air.

Gap, the distance between the projections on the vertical axis of the entering edges of an upper and lower wing of a biplane.

Helicopter, a form of aircraft whose support in the air is derived from the vertical thrust of large propellers.

Inclinometre, an instrument for measuring the angle made by any axis of an aircraft with the horizontal

Lift, the component of the force due to the air pressure of an aerofoil, resolved perpendicular to the flight path in a vertical plane.

Monoplane, a form of airplane whose main supporting surface is disposed as a single wing on each side of the body. Nose Dive, a dangerously steep descent, head-on. Ornithopter, a form of aircraft deriving its support and propelling force from flapping wings.

Pitot Tube, a tube with an end open square to the fluid stream; used as a detector of an impact pressure. More usually associated with a concentric tube surrounding it, having perforations normal to the axis for indicating static pressure. The velocity of the fluid can be

determined from the difference between the impact pressure and the static pressure. This instrument is often used to determine the velocity of an aircraft through the air.

Pylon, a marker of a course.

Race of a Propeller, the air stream delivered by the pro¬ peller.

Rudder, a hinged or pivoted surface, usually more or less flat or stream lined, used for the purpose of controlling the altitude. of an aircraft about its vertical axis when in motion.

Skidding, sliding sideways in flight away from the centre of the turn. It is usually caused by insufficient banking in a turn, and is the opposite of side slipping.

Skids, long wooden or metal runners designed to prevent nosing of a land machine when landing or to prevent dropping into holes or ditches in rough ground. Generally designed to function should the wheels collapse or fail to act.

Slip, this term applies to propeller action and is the dif¬ ference between the actual velocity of advance of an air¬ craft and the speed calculated from the known pitch of the propeller and its number of revolutions.

Spread, the maximum distance laterally from tip to tip of an airplane wing.

Stability, the quality of an aircraft in flight which causes it to return to a condition of equilibrium when meeting a dis¬ turbance. (This is sometimes called “Dynamical stability ”).

Directional. — Stability with reference to the vertical axis.

Inherent. — Stability of an aircraft due to the disposition and arrangement of its fixed parts.

Lateral. — Stability with reference to the longitudinal (or fore and aft) axis.

Longitudinal. — Stability with reference to the lateral (or athwartship) axis.

Statoscops, an instrument to detect the existence of a small rate of ascent or descent, principally used in ballooning.

Stay, a wire, rope or the like, used as a tie piece to hold parts together, or to contribute stiffness; for example, the stays of the wing and body trussing.

Strut, a compression member of a truss frame; for in¬ stance, the vertical members of the wing truss of a biplane.

Tail, the rear portion of an aircraft, to which are usually attached rudders, elevators and fins.

Tail Fins, the vertical and horizontal surfaces attached to the tail, used for stabilizing.

Thrust Deduction, due to the influence of the propellers, there is a reduction of pressure under the stern of the vessel which appreciably reduces the total propulsive effect of the propeller. This reduction is termed “ Thrust deduction.”

Triplane, a form of airplane whose main supporting sur¬ faces are divided into three parts, superposed.

Truss, the framing by which the wing loads are transmitted to the body; comprises struts, stays and spars.

Warp, to change the form of the wing by twisting it, usually by changing the inclination of the rear spar relative to the front spar.

Wings, the main supporting surfaces of an airplane.

Wing Loading, the weight carried per unit area of support¬ ing surface.

Wing Rib, a fore and aft member of the wing structure used to support the covering and to give the wing section its form.

Wing Spar, an athwartship member of the wing structure resisting tension and compression.

Yaw, to swing off the course about the vertical axis, owing to gusts or lack of directional stability.

Angle of. — The temporary angular deviation of the fore and aft axis from the course.

AERONAUTIC CHARTS. The rapid progress of aeronautics demands the develop¬ ment of a system of signals and charts which will enable pilots to find their way in the air and indicate convenient landings,

atmospheric conditions, etc. One proposed method involves the construction of special aeronautical charts ; another requires merely the establishment of easily visible signals by which the pilot can find his position on the very accurate ordnance maps which are commonly used as standard maps in France and other European countries. In the French system, the country is divided into 258 districts, each of which extends about 38 miles east and west and 24 miles north and south, and is represented by a numbered sec¬ tion of the map.

According to one proposed system of sig¬ nals, a large rectangle having the proportions of the corresponding map section and in the

correct relative position to the points of the compass will be marked out on the roof of a balloon shed or other building, or on the ground. The rectangle is marked with the number of the section, and the exact position of the locality in the section is indicated by a conspicuous mark. For example, the towns of Beauvais, in section 32, and Nantes, in section

-The roof of one of the military hangars of Camp de Chalons, on which an aeroplane signal is painted.

Beauvais :

3

Nantes

Orleans

A

Mourmelon

48

40

©

50 x

X

X

65

66 x

X

67

80 x

X

— X

X "

X

81

82

•X95

95

97

117, would be indicated as is shown in the drawing. A glance at any one of these signals near which he passes will show the pilot the exact place on the map so that he need not be long lost or go very far astray if the signals are sufficiently numerous. A predetermined course can be followed without carrying a set of maps. It is necessary only to draw on a small card a rough outline of the sections crossed by the coufse and- adjacent thereto to mark each section with its proper number, to mark the positions of the starting and destina¬ tion points and to connect these by a straight line. A diagram for a flight from Orleans to Mourmelon is shown in the drawing. It will be observed that the straight course crosses the northwestern part of section 81. Hence, if the aviator comes to the signal shown in the lower¬ most portion of the drawing, which indicates a point in the southwestern part of section 81, he knows that he has deviated toward the right hand. The map is required only for the pur¬ pose of selecting a good landing place, if the goal is a large town.

If the signals are composed of white lines on a black ground, or conversely, they need not be very large in order to be visible at a considerable distance. A rectangle 12 feet broad and 20 feet long, with lines 20 inches wide and figures 6 feet in height (in actual use at

Mourmelon), is easily seen from a dis¬ tance of one mile and an elevation of 600 feet.

For the* guidance of aviators and aeronauts at night a German inventor has devised a trans¬ lucent red balloon about 8 feet in diameter, containing an electric light of 100 candles or more, and moored by means of an electric cable. These balloons are easily distinguished from other lights, and from stars, and can be seen from a great distance.

AERONAUTICS, History of. There has always been interest by philosophers and scientists in aerial navigation, and the problem was given serious thought by the first physicists of whom history gives account. To those not versed, who consider mechanical flight to have been developed within the past few centuries, it may seem surprising that principles estab¬ lished by Archimedes, a Grecian mathemati¬ cian who lived several centuries before the Christian era, are now followed and are suc¬ cessfully applied in the most modern types. Students of ancient history are familiar with the mythological legend of Daedalus, Grecian sculptor, and Icarus, his companion, who made a flight with wings fashioned by the former, and which, like so many actual flights, ended in disaster. Icarus, feeling over-confident in his own ability, flew too near the sun, the heat of which melted the wax attaching the wings to his body, and precipitated him into the sea, which sea was named the Icarian Sea to com¬ memorate the event.

The first human being whom history records as having actually risked his life in demon¬ strating his theories was Fauste Veranzio, who in 1617 made a descent from a high tower in Venice supported by a primitive parachute con¬ sisting of a square framework covered with canvas. There were no imitators of his methods for many years though there were many suggestions made, most of them fanciful and impracticable. Among these might be mentioned the creation of Francesco De Lana, which was to be sustained by four large hollow metal spheres, from the interior of which all the air was to be exhausted, the theory being that as the spheres were lighter than air they would float in space as does a cork upon water. It seems that even at this early period there was knowledge that air had a definite weight just as any liquid or solid, and that bodies lighter than air would rise as would a chip of wood when released under the surface of the water. These metal spheres of De Lana’s were held in fixed

relation by a framework of wood and a boat or body was provided with oars and sails by which it was to be propelled. While his ideas and theories on the problem were very much the same as those which determine the aerostats, or balloons of the present day, there existed obvious practical difficulties and the proposed airship remained as a rather fancifully designed drawing.

It is interesting to note at this point a form of glider constructed by Karl Friedrich Meer- win, a German architect who lived early in the 18th century, which proves that even at that date considerable was known of the law of resistance. The engineer calculated that an exposed area of 130 feet would be necessary to support a man's weight, or a weight equiv¬ alent to that of an average man, and this is a very good approximation of the truth as will be pointed out later. This inventor suggested that experiments be carried out over water to

prevent serious accidents, which suggestion has been carried out in more recent years by Count Zeppelin over the waters of Lake Con¬ stance and in the experiments of Langley over the Potomac River at Washington, D. C.

Aerostats. — The discovery in 1776 by Cavendish of hydrogen gas and his proof that it was lighter than air represents the beginning of actual aerial navigation. It was natural for philosophers to conclude that if containers of sufficient dimension but little weight were filled with this gas they would rise in the air. Ex¬ periments were made by filling soap bubbles with this gas, which, however, escaped so rapidly little was learned. Then attempts were made to fill bladders and paper bags, but again the gas escaped through the pores almost as fast as it was let into them.

The credit of inventing the aerostatic air¬ ship or balloon is given to the Montgolfier brothers, Stephen and Joseph, who were the sons of a wealthy manufacturer of paper bags. These experimenters, after many trials, made a paper balloon of 700 cubic feet capacity, which was filled with smoke and heated air from a fire fed with wet straw and wool under the open mouth, and which surprised the multitude when it rose to the height of 1,000 feet. This was on 5 June 1783. Not long after this ex¬ periment Faugus de St. Fond started a sub¬ scription to raise the funds necessary to build a balloon, with the principal work of which the scientist, Charles, was interested. Through years of laboratory experience Charles was thoroughly familiar with the properties of hydrogen, and with the fact in his mind that heated air had enabled the Montgolfier brothers to ascend their balloon to a height of 1,000 feet, he concluded that by using a gas lighter than air,

his success would be greater.

But the problem which he had to face was that up to that time no fabric had been made which was thoroughly airtight. Happily, just when he was experimenting with hydrogen, two brothers named Roberts discovered that it was possible to apply a coating of dissolved rubber to silk fabric and thereby secure an airtight covering. This fabric was fashioned into a balloon, and on 20 Aug. 1783, the balloon, made possible by the co-operation of the genius of St. Fond and the Roberts brothers, was filled with hydrogen and liberated. It rose to a very great height, but because of too strong inflation it ruptured and the envelope fell to the ground.

The tests thus commenced were continued by De Rozier, and Count Zambeserri, until in January 1785, Blanchard, a professional balloon¬ ist, accompanied by Dr. Jeffries, an American, drifted across the English Channel from Dover to Calais. To-day a marble column marks the spot on the coast at Calais where this historic landing was made.

The. next important advance in practical ballooning was made by the substitution of coal gas. for hydrogen. This was England's contri¬ bution to an art which previously had not greatly flourished west of the channel. It was a contribution following the natural growth of science, for in 1814 coal gas began generally to be used for lighting in London and several years later for inflating balloons. This valuable advance was made by the famous aeronaut Charles Green. It gave a powerful stimulus to aeronautics by rendering inflation

cheap and convenient. The first aerostat con¬ structed on anything like our present propor¬ tions was the great balloon of Nassau which, on its initial journey, was navigated from Lon¬ don to Weilburg, a distance of nearly 500 miles. This was in 1836. In 1863 a still more elaborate and colossal airship was the Geant. It was made of a double layer of white silk, had a volume of 215,000 cubic feet and a buoy¬ ancy of 4 1/2 tons. The Geant was in turn eclipsed in size by the great balloon of Henri Giffard. This measured 450,000 cubic feet and even to-day ranks as the largest captive bal¬ loon ever constructed. It was a familiar ob¬ ject at the Paris Exposition in 1878.

On 31 July 1901 Professor Bergson of Ger¬ many, accompanied by Dr. Suring, ascended in the balloon Preussen to an altitude of 10,- 800

metres (6.7 miles), which at present con¬ stitutes the world's altitude record. No serious attempt has been made to surpass this altitude record, for though it is easily possible to carry human beings to a greater height than seven miles, the results seem hardly to justify the cost. To ascend very much higher would re¬ quire an enormous and costly balloon and to ensure the comfort of the passengers might re¬ quire an airtight car, or armor, supplied con¬ tinuously with fresh air or oxygen.

In recent years some of the most notable balloon flights include that of M. Goddard, who sailed from Leipzig to Wilna, a distance of 1,032 miles in 24*4 hours. This was in 1897. In 1900 M. Balsan voyaged from Vincennes, France, to Rodom, Russia, a distance of 843 miles in 27 hours and 25 minutes, and De la Vaulx, starting from the same point, landed at Korosticheff, Russia, having traversed 1,193 miles in 35J4 hours. Until 1912 this remained the longest balloon flight on record. A close second to this record was made by Alan R. Hawley in his spherical balloon America , aided by Augustus Post, in the Gordon Bennett In¬ ternational Balloon Race in 1910. Sailing from Saint Louis they drifted 1,172 miles from their starting point and landed in a great for¬ est at Peribonka River, North Lake Chilogoma, Quebec, Canada. In 1912 MM. Dubonnet and Dupont started from La Motte-Breuil, France, in the Condor III and landed at Sokolowska, Russia, having traversed a distance of 1,211 miles. This record was supplanted in the same year by that of MM. Bienaime and Rumpel-mayer in the Picardie. They started from Stuttgart, Germany, and in 48 hours landed near Moscow, Russia, after a trip of 1,36154 miles. Rumpelmayer made a new record on 24 March 1913 by a trip of 1,492 miles from Paris to a point near Kharkoff, Russia.

The recent advances in aerostation, though not radically changing the balloon itself, con¬ tribute much to its use and convenience. Im¬ provements have occurred in the means of inflation and deflation, in devices for making topographical and meteorological observations, as also for transmitting and receiving signals. Hydrogen shipped in steel tubes is now avail¬ able for easy and rapid inflation, the process of obtaining it on a large scale making it prac¬ tically as cheap as illuminating gas.

During an ascension the rise and fall of the vessel may now be instantly noted on the dial of the statoscope, the temperature, pres¬

sure and moisture of the atmosphere may be read on the recording instruments, messages may be sent by telegraph and telephone, either by wire or without, and sky and landscape may be photographed.

Kite Balloon. — The kite balloon is a development of the captive spherical balloon, especially constructed and designed for military purposes and deriving its name from the fact that it performs the service hitherto performed by man-carrying kites. The kite balloon is sausage-shaped, with a series of ballonets at the lower end which are so adjusted that they act as stabilizers, permitting the observer's basket to remain in the air without the disas¬ trous yawing motion which affects the basket suspended from a spherical balloon.

Power Balloons.— It is natural that after the first launching of human passengers in a crude aerostat, many schemes designed to con¬ trol the course of a balloon should be evolved. The investigators of the early days fully knew that if a propelling mechanism could be made to act in conjunction with favorable aerial currents something might be effected. They knew that the wind frequently has different di¬ rections at different levels. They believed that by causing the craft to rise and fall to a suit¬ able stratum, by use of various then known de¬ vices, it could be made to travel in any direction at the will of the pilot.

Several devices for changing the altitude of the balloon were proposed or tried. For in¬ stance, with the Montgolfier, the mere increase or lessening of the fire would cause it to rise or fall. If a gas bag were used it would be sent up or down by dropping out ballast or opening up the valve. Not realizing the enormous power required to propel swift balloons of the very best shape, and in the light of present achievement, the first efforts at a balloon propul¬ sion as viewed to-day could not be seriously re¬ garded by trained engineers, even at the in¬ ception of aeronautics. Historically they call for brief mention. It was in 1784 that Blanch¬ ard made the first real effort to steer a balloon, using a spherical gas balloon, provided with aerial oars and a rudder. An even simpler de¬ vice was that of the two physicists Miolan and Janinet. The balloon was a Montgolfier with a large hole in one side, through which the hot air was to escape with such strong reaction as to drive the bag forward.

In 1784 the Roberts brothers made a melon¬ shaped balloon of silk and inflated with pure hydrogen, suspended from which was a longish car of white wood. This ship was to be rowed through the air by a crew of six by means of silken oars. A seven hours' cruise was made in the vessel, and before coming down the crew managed to have the envelope navigate a curve nearly one kilometer in radius.

While these experimentations were being carried out, even more important experiments were being made by other inventors. In 1784,

in a letter written to Benjamin Franklin, Francis Hopkinson of Philadelphia proposed to build a balloon of spindle shape and to drive it by means of a wheel-like propeller. This proposed craft, the forerunner of the modern screw-driven motor balloon, antedated the screw-driven boat, the submarine and the aero¬ plane. In 1820 Rufus Porter, an American inventor, and later the original founder of the

Scientific American, patented an airship which was decidedly in advance of that day. Its hull was a long, finely tapering symmetrical spindle, suspending a car of similar shape by means of cords, which were vertical at its middle, but more and more slanting toward its ends. Mid¬ way between the hull and car was a large screw propeller, actuated by a steam engine in the car. The inventor, being too poor to develop his airship alone, did little with the patent dur¬ ing his life.

The Dirigible. — Henri Giffard was the in¬ ventor of the first dirigible which was success¬ ful both in design and operation. It was a spindle-shaped bag covered with a net whose cords were drawn down and attached to a horizontal pole, from which the car and motor were suspended, and at the end of which was a triangular sail serving as a rudder. To guard against fire, the furnace of the colce-burning boiler was shielded by wire gauze, and the draft, taken from its top through a downward point¬ ing smokepipe, was ejected below- the car by force of exhaust steam from the engine, thus obviating, as Giffard asserted, all danger from the use of fire near to inflammable gas. The car hung 20 feet below the suspension pole, and carried a three horse-power engine driving a three-blade propeller 11 feet in diameter, and making 110 turns per minute. The motor com¬ plete, including the engine and boiler without supplies, weighed 110 pounds per horse power. The bag measured 143 feet long, 39 feet in diameter and 75,000 cubic feet in volume. Gif¬ fard reports of his first voyage that although he could not sail directly against the strong wind then blowing, he could attain a speed of 6 to 10 feet per second relatively to the air, and he could easily guide the vessel by chang¬ ing the rudder. Captain Charles Renard of the French War Department continued the good work of Giffard. He manifested uncommonly good judgment and excellent scientific method in combining the researches and contrivances of others writh those of his own. As a conse¬ quence he produced the first man-carrying dirigible that ever returned against the wind to its starting point, and the first aerial vessel whose shape and dynamic adjustment even ap¬ proximated the requirements of

steady and swift navigation in a surrounding medium pre¬ senting various conditions of turbulence and calm.

In 1884 Renard, with Captain Krebs, con¬ structed the La France, the success of which stimulated anew the hope of conquering the air. Its hull was 165 feet long, 27.5 feet in greatest diameter and cubed 66,000 feet. It was kept rigid under varying conditions by means of a balloonet filled with air. The car sus¬ pended from the balloon was 108 feet long and 6 to 7 feet across. It carried at its for¬ ward end the propeller, and at its rear a rec¬ tangular rudder, and between them the aero¬ nauts, the batteries and electric motor. The motor weighed 220 pounds and developed nine horse power. The battery, composed of chloro- chromic cells, was the result of researches of Renard.

While Renard was experimenting with elec¬ tric power, a few German inventors were ap¬ plying gas and benzine engines with better promise of practical success. The first of those wa's Hanlein, who in 1872 advanced the

project of driving a well-shaped balloon by means of a gas engine taking its fuel from inside the balloon, and making good the loss by pumping air into the balloonet. In 1879 Bannigarten and Wolfert in Germany built a dirigible equipped with a Daimler benzine motor. The year 1898 witnessed the commence¬ ment of two famous systems of navigation by the lighter than air, one in France, the other in Germany, destined quickly to revolutionize the art and to establish it on a substantial basis. The leading exponents of these two systems were Alberto Santos-Dumont, a rich young Brazilian living in Paris, and Ferdinand von Zeppelin. Both achieved success by applying the gasoline engine to the propulsion of elon¬ gated balloons, but by very different methods.

Santos-Dumont's first dirigible was designed to carry his weight of 110 pounds and a 3ˆ2 horse-power petroleum engine taken from his tricycle and reduced in weight to 66 pounds. The hull was a cylinder of varnished Japanese silk, 82 feet long including its pointed ends, 11 feet in diameter and 6,354 cubic feet in gas capacity. A ballonet, or air pocket, occupied the lower middle of the envelope. The basket for the pilot, engine and two- blade propeller was suspended below the hull. The poise of the vessel was con¬ trolled by shifting weights fore and aft, while the turning right and left was effected by means of a silk rudder stretched over a steel frame. This dirigible demonstrated that it wras possible readily to guide an airship, but upon descent the envelope folded up like a pocket knife. Santos-Dumont continued his pioneer work until he encountered the rivalry of great wealth

employing highly trained en¬ gineering and constructive talent. But he con¬ tinued to do excellent work for the populariz¬ ing of the science. Santos-Dumont's experi¬ ments were continued by Le Baudy, the most notable of whose ships were the Le Bandy, La Patrie, Morning Post and the Ville de Paris. The Zodiac Company, under the com¬ pelling energy of Count de la Vaulx, furthered the work bv the production of the Zodiac I, II, III and IV.

During all of these developments English and American authorities pursued a policy of interested waiting, watching the progress and hoping to benefit by the costly experimenting of the others. In 1909, however, the British government appropriated nearly $400,000 for aeronautics, and the United States House of Representatives, voted $500,000, but promptly reversed its action. Considerable progress was made in England subsequent thereto through the monetary stimulus offered by various Lon¬ don newspapers.

The United States War Department, in 1908, started an aerial squadron by purchasing from. Thomas S. Baldwin for $10,000 a tiny airship of the flexible type. It had a rubberized gray silk cylindrical hull slightly tapering toward the rear and terminating in ogival ends, its length being 96 feet, its major diameter 19j4 feet.

Coincidentally much work was done in Ger¬ many. The work done there by Von Zeppelin really commenced in 1898, when he formed a limited liability company for the purpose of de¬ veloping a new type of dirigible which he had long contemplated. In the summer of 1900 he

brought forth from his floating laboratory on Lake Constance the first of his airships.

Through disaster after disaster and griev¬ ous hardships, Count Zeppelin pushed his work from 1900 to 1910, when he had his first passenger machine ready. The maiden voyage of this first air liner was a marvel to the for¬ tunate few traveling in such celestial style. Great progress was made between 1910 and 1914 and at the outbreak of the European War the Zeppelin was one of the most potential ele¬ ments of Germany's air fleet.

Aeroplane, The. *The art of aero¬ plane flight presents two main groups of fliers. The first comprises the various man-kites, para¬ chutes, gliding*

machines, soaring machines. These may be called passive fliers, because they carry no motive power, but ride passively on the air by the force of gravity or a towline. The second group comprises the bird-like flap¬ wing machines called "orthopters® ; the screw- lift fliers called "helicopters ;* the aeroplanes, also called monoplanes, biplanes, triplanes, ac¬ cording to the number of superposed main lift¬ ing surfaces ; and lastly the gyroplanes, whose sustaining surfaces may turn over and over; like a falling lath, or whirl round and round, like a boomerang. These may all be called dynamic, or power, fliers.

Disregarding the crude essays at human flight, recorded in the early histories and liter¬ ature of many peoples, we may notice first the well-authenticated sketches of Leonardo da Vinci. His fertile mind conceived three dis¬ tinct devices for carrying a man in the air. But he and his successors for nearly four cen¬ turies could do little more than invent. For lack of motive power they could not navigate dynamic fliers, however ingeniously construct¬ ed. Da Vinci's first design provided the oper¬ ator with two wings to be actuated by the power of both arms and legs. His second de¬ sign was a helicopter; an aerial screw 96 feet in diameter was to be turned by a strong and nimble artist who might, by prodigious effort, lift himself for a short time. His third scheme of flight was a framed sail on which a man could ride downward, if not upward.

Mr. Henry Woodhouse, one of the foremost aeronautic authorities, author of the (Textbook of Naval Aeronautics, * and the (Text book of Military Aeronautics, *has summarized the work of pioneer experiments in aeronautics as fol¬ lows : History has a list of some two-score of experimenters who tried to develop power flight, among whom were: Sir George Gay- ley, an English inventor, whose writings (1809- 10) show that he was first to plan dynamic flight on a scientific basis. He planned an aeroplane built with slightly oblique planes, resting on a wheeled chassis, fitted with propel¬ lers, motors and steering devices. _ Samuel Henson, another English inventor, in 1843, patented what was designated as an "aerial steam carriage,** an aeroplane of immense size, which was to be used for passenger carrying. This carriage was never built. Another Eng¬ lish scientist, F. H. Wenham, improved on Henson's idea, and in 1867 developed a multi¬ plane. This model was taken up by another inventor, M. Strongfellow, who reduced the number of planes to three, making a triplane,

♦For a detailed discussion see Aeroplane.

which he fitted with a tail and two propellers. This model was shown at the exhibition of the Aeronautical Society of Great Britain in 1868.

As in the case of previous inventors, nothing in this model indicated that he had any com¬ prehension of the principles of stability or knowledge of the lifting capacity of surfaces, or of the power required for dynamic flight. Strongfellow deserves, however, much credit for building a very light motor, one of sufficient lightness to support a well-designed aeroplane. In 1872, a French inventor, named Alphonse Penaud, constructed a small monoplane. It was only a toy — two flimsy wings, actuated by a twisting rubber, but had fore-and-aft stability, something that most of the creations of the time lacked. Subsequently, in 1875, Penaud took out a patent on a monoplane fitted with two pro¬ pellers, and having controlling devices. But this was not built, principally because it would have required a light motor, and the lightest available at the time weighed over 60 .pounds per horse power, br 20 times the weight of the motors of to-day. Louis Pierre Mouillard, a Frenchman, having observed that large birds in flight, while seeming at rest, could go for¬ ward against the wind without a stroke of the wings, constructed a number of gliders, built on the principle of bird wings, and experi¬ mented with gliding. In 1881, he published a valuable wrork entitled (L'Empire de l'Air,* which inspired many of the latter experiment¬ ers. Subsequently he invented a soaring machine, which he patented in 1892.

Pioneers of Modern Aviation. — These early experimenters laid the foundations of modern aviation. They showed the supporting power of their rigid surfaces, defined the gen¬ eral shape and structure of the aeroplane, and prepared the work for the next generation, which was to perfect these, and find ways and means to make the aeroplane rise from the ground and maintain equilibrium in the air. This new generation came toward the close of the 19th century. These new men, the pioneers of modern aviation, were divided into two schools. The first sought to achieve soaring flight by means of kitelike apparatus, which enabled them to soar in the air against winds, their machines being lifted up and supported by the inertia of the air as kites are. The second sought to develop pow'er flight, that is, to send their kitelike machines through the air at high speed, being tracted or propelled by revolving screws actuated by motor power. The most eminent experimenters in the first schools were Otto Lilienthal, who was the chief ex¬ pounder of gliding flight; P. L. Pilcher, an English follower of Lilienthal ; Octave Chanute, an American follower of Lilienthal, and J. J. Montgomery, an American experimenter. Lilienthal, a German, was the first to make gliding flight a science, and he first defined the value of arched wings, and the amount of pressure to be obtained at various angles of incidence. He met with untimely death while experimenting in 1896. Chanute's experiments

were in the line of Lilienthal, but his great contribution was his early encouragement of the Wrights, although the Wrights did not suc¬ ceed by adopting Chanute's theories.

The leaders of the second school, who ac¬ tually built and tried power-driven aeroplanes,

were Clement Adcr (1890—97); Sir Hiram Stevens Maxim (1890-94) and Samuel Pierpont Langley (1895-1903). Clement Ader was the first to construct an aeroplane large and power¬ ful enough to carry a man, and the French gov¬ ernment considered the craft of immense value and employed him to build some for the army, but as each of the two experiments toppled over at the trial and wrecked, the government refused to further finance the enterprise. While Ader wras making his experiments in France, Sir Hiram Maxim was at work constructing a large multiplane for the English government, which he fitted with two steam engines of 175 horse-power. But like Ader's experiment, it toppled over at the first trial and was badly damaged, and the British government refused further backing. The experience of Samuel Pierpont Langley in America is not unlike the experience of Ader in France and Maxim in England. He was employed by the Board of Ordnance and Fortification of the United States army to construct the ((Aerodrome® of his own invention. Congress appropriated $50,000 for the purpose. Langley's machine was a tandem monoplane, 48 feet from tip to tip and 52 feet from bowsprit to the end of its tail. It was fitted with a 50 horse-power engine and weighed 830 pounds. The trials of his aerodrome, two attempts to launch it, were made on 7 Oct. and 8 Dec. 1903. On both occasions the aerodrome became entangled in the defective launching apparatus, and was thrown headlong in the Potomac River — on which the launching trials were made. Fol¬ lowing the last failure, when the aerodrome was wrecked, the press ridiculed the whole enterprise, and Congress refused to appropriate money for further experiments. The Langley aerodrome, partly reconstructed and fitted with a Curtiss motor and Curtiss controls, flew in

1913-14.

As with the experimenters of the first school, they did not attain practical results. Their machines were usually wrecked at the first trial without giving any clue to the nature or where¬ abouts of the trouble.

Just how much each of these contributed toward the final success it is hard to say. The matter has not yet been de¬ fined, and, possibly, only one man — Orville Wright — is qualified to say. Most of these men made valuable additions to the knowledge of the science, but all of them mixed the practi¬ cable with the impracticable in such a way as to make it risky to adopt their conceptions as to the basis of actual flight, a fraction of error being enough to spoil the unity of truths that must be present, and so to end an experiment in a catastrophe. Wilbur Wright, having made exhaustive tests and dissected the theories and notions of all these pioneers, knew the exact worth of each. He could have made the valua¬ tion, but died before he had done so. In a paper on Lilienthal, which he wrote for Flying a few days before his death, he defined the causes of previous failures, and made a general rule by which all could be judged and their works valued. The realization of power flight was thus left to the 20th century — and to the Wright brothers. In view of the complex problems to be solved, this achievement was stupendous.

Wilbur Wright and his brother, Orville

Wright, two men of remarkable characteristics, sons of the Rev. Milton Wright, were presented in their boyhood, 30 odd years ago, with a toy helicopter, a butterfly-shaped contrivance, con¬ sisting of paper wings fitted with a tin pro¬ peller which, when made to revolve by twisted rubber, caused the toy to shoot forward through the air. That toy fired their imaginations, and they saw it, in magnified form, capable of carry¬ ing a man.

Their attempt to fly large helicopters con¬ structed on the idea of the toy did not bring practical results, and until 1896, they did not give the matter of artificial flights more than passing attention. In the summer of that year, however, the news of the accident and death of Otto Lilienthal, the German champion of gliding flight, stirred them to action, and they set themselves to study aerodynamics and the works of Lilienthal, Mouillard, Chanute, Maxim and Langley, the most prominent experimenters at that time. Their experiments with a glider began in the fall of 1900 at Kitty Hawk, N. C. There, on the barren sand dunes of North Carolina, these two intrepid investigators took all the theories of flight and tried them one by one — only to find, after two years of hard, discouraging work, that they were based more or less on guesswork. Thereupon they cast aside old theories and patiently put the ap¬ paratus through innumerable gliding tests, ever changing, adding, modifying — changing again and again, advancing inch by inch, until they had, at last, developed a glider wonderfully exact, which, when fitted with a light motor, also built by them, made

initial flights on 17 Dec. 1903, of from 12 to 59 seconds' duration. This, then, was the birth of the aeroplane, the flimsy, iconoclastic thing which seems to evade Newton's laws, eliminates frontiers and prom¬ ises to expand civilization as much as have the steamship, the railway and electricity.

The Wrights' Success Created New In¬ terest. — The Wrights did not make their achievements public at the time ; in fact, until 1908, they flew only in private. But the report of their wonderful achievement, nevertheless, went far and wide, and stimulated those who had given up experimenting and inspired others to take up experiments. Octave Chanute, in 1902, went to France and related the early suc¬ cesses of the Wrights with their glider, and described the general shape of the Wright machine. The result of this trip was that half a dozen enthusiasts, including Louis Bleriot, Capt. Louis Ferber, Ernest Archdeacon, and later the Voisin brothers and Albert Santos- Dumont took up the work, thus founding the mighty French school which has increased so greatly and done so much since. The. first of this school to succeed was Santos-Dumont, the Brazilian aeronaut sportsman. He constructed a machine of original design, and in 1906 made short sustained flights of from 50 to 700 feet in straight line, which created a world-wide sensation at the time. Meantime others of the French school graduated and won honors. The Voisin brothers turned constructors and teachers, and with their co-operation Leon Delagrange, Henry Farman, Louis Bleriot and other prosecuted practical experiments and succeeded in getting their creations to leave the ground for modest flights. At this juncture,

in the summer of 1908, the Wrights started out to give public demonstrations, and their methods supplied and suggested to the French experi¬ menters the means to modify and improve their aeroplanes, particularly the means of balancing them, which had, until then, been a perplexing problem. Some months before this some American enthusiasts had combined under the auspices of Mr. Alexander Graham Bell, the inventor of the telephone, and Mrs. Bell, and organized the Aerial Experiment Association. Glenn H. Curtiss, one of the experimenters, developed a suitable type of aeroplane, and in

1908- 09 became proficient in piloting it, and founded a school which did much in the fol¬ lowing years to popularize and develop avia¬ tion in America. Consult Zahm, A. F., (Aerial Navigation. }

The progress in aerial locomotion from

1909- 14 was very rapid in Europe — • especially in France and Germany — but slow in Amer¬ ica on account of lack of the governmental stimulus which prevailed in Europe. But even in America the progress between 1909 and 1914 was important, especially in the field of marine flying, in which field America is likely to retain its supremacy. The great stimulus to aviation throughout the world came with the outbreak of the European War. The work of aircraft in the war has been of supreme importance. The co-operation of aeroplanes with artillery has proved extraordinarily effec¬ tive. Of purely fighting aeroplanes, when the war began there were none — after two years there are machines weighing 10 tons, carrying a ton of ammunition, rapid-firing machine-guns and heavy guns — literally aerial cannon.

Large airships in the war have proved dis¬ appointing when compared with the aeroplane, because they are in a cruder state of develop¬ ment. They have almost the size of a battle¬ ship, offering a large target, without the bat¬ tleship's armor or guns. The seaplane has had many achievements to its credit in the naval operations and the types which will be equipped with aerial torpedoes will constitute a real dynamic force in the future. The development of aerial locomotion during 1914—16 has ex¬ ceeded the expectations of the most sanguine enthusiast — no man can prophesy what the next decade will produce. See Aeroplane Distance and Speed Records; Aeroplane Al¬ titude Records; Aeronautical Nomencla¬ ture.

G. Douglas Wardrop, Managing Editor Aerial Age.

AERONAUTICS, Military. See Mili¬ tary Aeronautics.

AEROPLANE (from the Greek aer, air; pianos, wandering), a term now commonly used to define a "heavier than air® flying ma¬ chine equipped with fixed aerofoils or main supporting surfaces and driven by suitable mo¬ tive power.

Principle. — Everyone nowadays is familiar with the appearance of an aeroplane, but many there are, nevertheless, who do not know what, scientifically speaking, an aeroplane is. They see the machine on the ground ; they observe someone giving frantic tugs at something that

moves in jerks: they hear a roar, which they know must come from an engine; they per¬

ceive that, in starting, the machine runs for a while along the ground before rising gently into the air; but still they do not know why ihe aeroplane flies.

It has something to do with the wings, of course, but how? That is the question at which the average lay mind stops short, not for ability to understand the problem, but gen¬ erally for lack of some appropriate explana¬ tion that will bring what is fundamentally a very simple phenomenon out of its proper sphere of aeronautical science into the realm of everyday things that are comprehended by common sense.

There is an elusive aspect of the general view, and only one, that is apt to hide itself from the uninitiated unless brought prominent¬ ly into the full light of the mind in the very first instance and that is the significance of a simple scientific expression much used in avia¬ tion, namely, (<relative motion.® If the man in the street saw an aeroplane apparently stand¬ ing still in the air it would not occur to him to think that the machine must be flying through the wind at its full speed and that its relative motion in the air is quite unaffected by its motion relatively to the ground on which he is standing. Yet the same man knows very well that if he starts running on a calm day he will feel a slight breeze in his face, which is solely the result of his own relative motion through the air. He is also aware that if he puts his head out of an express railway car he will encounter half a gale of wind notwith¬ standing that the leaves of the trees may show not so much as a tremor. If, instead of put¬ ting his head out of the window, he were to take a sheet of stiff cardboard and put that outside he would have a still more practical demonstration of the force of the relative wind which supports the aeroplane in its flight. If the train is moving fast the card¬ board will exhibit a violent tendency to flap upwards and downwards with the least variation from its truly edge-on horizontal position. It is at this point that the embryo scientist begins to think really hard. His mind perceives an unsuspected fact that he senses to be of great importance. He has observed that by slightly raising the front edge of the piece of cardboard so that it is at a slight angle to its line of motion, instead, of being truly edge-on, an extremely strong lift¬ ing force acts on the cardboard, although its resistance to the air is but little more than it was when the cardboard was edge-on. So pronounced is the preponderating value of the lifting effort over the resistance at very small angles that anyone making this experiment would at once conclude that if he wished the wind to support a weight he would certainly arrange some sort of a surface

beneath it, like a table, but tilted so as to have only a slight angle of inclination to the line of its flight through the air.

An aeroplane has its table-like supporting surfaces so arranged as to get the best lifting effect for the least effort, having regard, of course, for the conditions under which the machine is designed to fly. It is clear, merely from a glance at a number of aeroplanes, that they are not all exactly alike in this respect, but it will be noticed that they all have one point in common which is that the surface

instead of being Hat is cambered or slightly bellied like the sail of a yacht. This is an important analogy because a yacht is one of those commonplace objects that are so familiar that the man on the shore never stops to ask himself whether or not he understands how it sails. It will be the same with the aeroplane in a few years' time, which is why it is worth while troubling to appreciate an explanation now in order that one really may be informed as to the essential facts by the time aviation, in common with so many other interesting things, becomes veiled under the ever-spread¬ ing pall of public indifference. The sail of a yacht is an aeroplane in principle but its use differs materially from the purpose of the wing of an aeroplane. When the wind blows obliquely on the sail of a yacht the pressure that it exerts is mostly directly toward cap¬ sizing the boat, but owing to the set and cam¬ ber of the sail the force is also directed slight¬ ly forward toward the bows and the amount of this component is sufficient to propel the boat. If a real wind were to blow obliquely from beneath on the wing surface of an aero¬ plane the same propelling effect would be pro¬ duced and the main force that tends to capsize the yacht would be turned to the useful pur¬ pose of supporting the weight of the machine, which would continue to fly without using its engine so long as the conditions remained ap¬ propriate.

At this point let us become familiar with the idea of power in connection with flying. When the wind blows it often possesses enor¬ mous power and when it blows suitably against a windmill or the sail of a yacht or the wing of a bird, it may transfer some of its energy into mechanical movement as grinding, sail¬ ing, and flying, respectively, in the three in¬ stances cited.

When the air itself does not move, or does not move in a suitable way to enable the transformation of its energy into soaring flight, the

power necessary to the continuance of flying must be supplied by the object which flies. The bird flaps its wings, the aeroplane starts its engine. There may be little resem¬ blance between the action of a bird's wing and that of the propeller which is driven by the engine of an aeroplane. Scientifically, there is a close analogy between them. One of na¬ ture's masterpieces is the perfect articulation of the joints of an anatomy that permits such smooth-acting to-and-fro movement as is manifested by the legs of an animal when walking and of a bird's wing when in flapping flight. Reciprocating motion is anathema to engineering, but the engineer finds a great compensation in the principle of rotation, and wherever it is possible to do so the mechanism of mechanical power is confined to the con¬ tinuously revolving shaft. Thus, on an aero¬ plane, you find an engine which generates the power, a revolving shaft, which transmits the power, and a propeller on the shaft, which transforms the power into thrust or traction, and so pushes or pulls the engine as a whole through the air.

Power is essential to flight, but when the engine stops in mid-air the aeroplane does not fall to the ground, nor is the pilot in any need of a balloon. The aeroplane itself, when properly designed and flown, possesses an in¬

herent quality that is better than any artifice, and without which flying by aeroplane would be quite out of the question.

The principles of aeroplane propulsion and sustentation are shown graphically- in Fig. 1. The case considered is that of a biplane. A single large propeller serves to pull the machine in the direction of flight and the air immediately ahead of the machine, being displaced by the action of the propeller, flows backward hori¬ zontally at high velocity and presses against the under surface of the aerofoil.

The following tables, giving the air resist¬ ance and corresponding horse-power and the air pressure at different velocities, will be found of value in calculations pertaining to the de¬ signing of any class of aircraft:

Table I. — Air Resistance and Horse-power

Feet per Horse-power Miles per hour second per sq. foot

10 . 14.7 0.013

15 . 22 0.044

20 . 24.6 0.105

25 . 36.7 0.205

30 . 44 0.354

40 . 58.7 0.84

50 . 73.3 1.64

60 . 87.9 2.83

80 . H7.3 6.72

100 . 146.6 13.12

120 . 161.3 16.98

Table II. — Air Pressure Per Square Foot

Feet per Pressure

Miles per hour second per sq. foct

10 . 14.67 .492

25 . 36.6 3.075

50 . 73.3 12.3

70 . 102.7 24.103

100 . 146.6 49.2

120 . 161.3 63.3

The eftect of varying areas and forms of planes is marked, and with planes of different form but of the same area results are obtained which are so different as to be the cause of comment. There is no question that the form of the wing of the bird gives proportions which can be followed in the aeroplane with good results. This means that the best results will be obtained with a plane which is wide when viewed from the front and short when seen from the side. The exact proportions have never been definitely determined, and vary in all of the successful creations, but it was de¬ termined by Professor Langley that a plane with a wide advancing edge was the most efficient, not only by calculation, but by actual experiments. His tests were made

with various forms and areas of planes, and for illustration it will be said that a plane with an advancing edge or width of six inches and a length of 18 inches, when moving at a horizontal velocity of 65.61 feet per second, or at the rate of 45 miles per hour, as shown in Fig. 2, A fell vertically four feet in seven-tenths of a second. On the other hand a plane with an advancing

AEROPLANES

1 Twin-motor biplane 2 Fuselage and seating arrangement of a two-seater aeroplane 3 Twin-motor hydroplane

AEROPLANES

1 Twin-propeller, two-seater and single-seater biplanes 2 Thomas military tractor

3 Hoisting aeroplane on board a destroyer

AEROPLANES

1

Copyright by Underwood & Underwood, N. Y.

1 Caproni Italian Triplane. Flies 90 miles an hour; carries 9 machine guns and 25 passengers

2 Curtiss Biplane, for use by the United States on the French front

AEROPLANES

1 Sikorsky Aerobus

2 The Geest-German Monoplane

3 Curtiss Triplane

4 Burgess Military Pusher

5 High Speed Scout Machine

6 Morane Monoplane

7 Wiegandt's 3-seater Monoplane

8 The German Fritz Biplane

edge of 18 inches and a length of six inches, obviously having the same supporting area as the other, and moving at the same velocity, fell lour, feet vertically in two seconds, demon¬ strating that the sustaining power of the form shown in B was about three times as great as that of the form with the narrow advancing edge.

edge. Two of the most important accessory features of the supporting planes are the ele¬ vator and the rudder. Since the aeroplane sails in, instead of on, the aerial sea, it must be equipped with two sorts of rudder, one for steering to the right and left in the ordinary way, and another for steering up and down. The latter we now call an elevator in order to

Constructional Features. — Like birds, aeroplanes possess bodies, wings and tails ; they also have undercarriages that serve the purpose of legs when alighting. The class of machine that most closely approximates to the bird type is the typical monoplane ; biplanes often have no resemblance whatever, in ap¬ pearance, to nature's best flyers. The technical difference between a monoplane and a biplane, however, is merely that a monoplane, in com¬ mon with the bird, possesses only one pair of wings, while the biplane is provided with two main supporting surfaces, one situated above the other.

There is apt to be considerable confusion about the use of the term ((length® when ap¬ plied to aeroplanes, owing to the fact that wings fly through the air broadside:on. It is natural, when speaking of the wings alone, to refer to their longest dimension as their length, as one would do when speaking of any other object; but, when the machine is in flight, one might equally remark how short is the length of the wings compared with that of the machine as a wrhole, meaning thereby the measurement of the wing from its leading edge to its trailing edge. For this reason it has be¬ come customary to apply the terms ((span® and ffchord® in this connection, and having an ob¬ vious derivation they justify their existence as technical words and are deserving of general use. One speaks of the span of a bridge and chord of the arc of a circle; both expressions have an analogous significance in reference to the aeroplane.

Thus, the wings, which are the supporting members of the machine, form a kind of bridge that spans the air in order to hold aloft the weight ; the wings themselves, as has already been mentioned, are

cambered so that a string stretched between the leading edge and the trailing edge would occupy the position of the chord to the arc that is formed by the wing surface. This arc, by way, is not circular, but is of such contour as is found best by experiment on models that are tested in an experimental wind tunnel. The highest point of the curvature of any wing section is always nearer the front edge than it is to the trailing

avoid confusion of terms ; actually it is merely a pivoted plane just like a rudder, but arranged horizontally instead of vertically. In a mono¬ plane, the rudder and the elevator form part of the tail of the machine. The term (<tail® applies to a group of organs of which the two just mentioned are hinged and movable to per¬ form the directional functions under the pilot's control. A third plane horizontally arranged like the elevator, but rigidly fixed, is commonly added in order to confer some degree of natural <(longitudinal stability® in flight. In those aeroplanes that have long boat-like bodies ex¬ tending the full length of the machine, this fixed tail plane is often a mere fin-like excres¬ cence. On other types, however, the rigid por¬ tion of the tail is a much larger affair; in either case, it commonly carries the elevator as an extension in the form of a hinged flap. Instead of flapping its wings, to do which would in¬ volve constructional difficulties, the machine carries a propeller. This is usually a two-bladed unit built of timber, and it usually measures about eight feet or more in diameter. Owing to its high speed of rotation, which commonly is between 1,000 and 1,300 revolutions per minute, the propeller is invisible in some of the machines that are photographed in flight. It is common practice to put the propeller in front and to mount it upon the engine crank¬ shaft. A general study of the designs of the machines makes it very clear that the forward position — or <(tractor® screw as the propeller in front is often called — is structurally con¬ venient. Monoplanes were from the first designed with long girder-like bodies, which necessitates a single air screw being placed either in front of the wings or behind the tail. When this form of body became more common on biplanes the tractor screw accompanied it. There exists a wide difference of expert opinion regarding the most effective plane area. Some of the most efficient aerofoils (consult Loening, (Military Aeroplanes*) have been developed by the Frenchman Eiffel. Experi¬ ments at the Royal Aircraft. Factory in Eng¬ land have also been productive of some inter¬ esting wing surfaces and more recently tests made for the Signal Corps of the United States

army at the Massachusetts Institute of Tech¬ nology have developed some interesting facts concerning aerofoils. It is well recognized, however, that the matter of plane area is largely governed by the factor of velocity, and that slow speed machines require larger aero¬ foils than those operating at higher velocities Since slow speed is not a desirable qualification of aircraft in general, and tends to influence the angle of incidence, thus increasing the air resistance and requiring the employment of ex¬ cessively high driving power, the general con¬ structive effort is being directed to the pro¬ duction of high speed machines having small aerofoils and powerful engines, the velocities commonly attained ranging from 65 to 150 miles an hour, with a speed of 180 miles an hour an easy probability in the near future.

The solution of the problem of control naturally follows the successful accomplish¬ ment of aeroplane sustentation, and in the successful execution of. the acts of balancing, banking, and steering, depends the success of the machine as a practical commercial craft. In the design and construction of air craft there are 10 essentials to be borne in mind: (1) An aeroplane must have sufficient com¬ bined speed and plane area to raise its intended load, together with its own weight. (2) The greater the speed the less the plane area, and the less the necessary angle of that plane for the same effect. (3) To counteract the resist¬ ance set up by means of gaining momentum while on the ground, which is additional to the resistance the machine will have when once clear : a. extra power is required, or b. extra plane surface to meet the power we have, c. a better effect for the power we have, d. an outside agency that will assist. Extra power means more weight, extra plane means more resistance, better effect for the power we have means improvement in the engine or means of propulsion, an outside agency means a fixed starting point. (4) The planes must always be sufficient to permit of a safe landing. (5) Their exact shape depends upon the type of machine constructed, the means employed for obtaining lateral and longitudinal balance and stability, and varies so greatly that no particular rule can be laid down. (6) The planes should be constructed of materials as strong as the end in view permits, and should in themselves create as little useless resistance as possible. (7) The general arrangement should be as simple as the design allows. (8) The control should be simple and easy of manipulation. (9) The balance should be automatic. (10) Al¬ though it is difficult to obtain, a means of keeping afloat until a safe landing is made without engine power perfects the aeroplane.

Before starting to build any machine, either full size or model, the

following points require to be known by the constructor : First, the weight of the complete machine; second, the area of supporting surfaces necessary; third, the amount of power required ; fourth, dimen¬ sions; fifth, size and speed of propeller, and lastly, methods of control. Weight forms the basis of designing. It may seem somewhat difficult to assume the weight of an object, before knowing its dimensions, but it is not difficult to build an object of such dimensions that it will not exceed a certain weight.

Equilibrium. — In flight, the weight of the

aeroplane is supported by the reaction between the wings and the relative wind created by their motion through the air. So long as the proper relative motion continues, the wings perform their function of maintaining an upward pres¬ sure, but it depends on a variety of circum¬ stances whether that pressure continues to be applied exactly in the correct way. At this point it will be necessary to explain two technical terms: the centre of gravity (C.G.), and the centre of pressure (C.P.). The centre of gravity is the point where the weight of the machine seems to be concentrated, and the centre of pressure is the point at which the lift of the wings seems to be focused. Any object that is supported exactly at its centre of gravity is always balanced in any position in which it . may be set. When it is not supported, it tends to fall into such a position as will bring the point of support vertically in line with the centre of gravity. Like ships, aeroplanes are potentially liable to pitching, rolling and yawing, and it is essential from the beginning to recognize that some of these acts may at times be essential to the guidance of the machine from one point to another through space. If, for example,' an aeroplane were in¬ capable of being made to swerve at will, it could not be steered ; on the other hand, a tendency to make erratic changes of direction of its own accord would be described as direc¬ tional instability. It is important to bear in mind that the air does not provide a fixed platform. When an aeroplane is canted, so that one wing is lower than the other, the C.G. of the machine has not necessarily been disturbed. There is a very ingenious side-show, often to be found at large exhibitions, that may assist the imagination in grasping the breadth of the subject. It consists of a flexible track that ceaselessly undulates in supposed pres¬ entation of the waves of the sea. The raft¬ like trolley serves as a very good object-lesson in two forms of stability. The machines in question are stable in the ordinary sense to the degree of absolute security, for they cannot conceivably capsize. On the other hand the instability of their direction makes it almost impossible to guide them three or four yards without running into either side of the barrier. When an aeroplane is canted, the forces brought into play correspond

with those that make the trolley run into the barrier, and their effect is equally to tend to make the aeroplane slip down sideways through the air. In the broader use of the term, what ordinarilv is called longitudinal stability has to do with the pre¬ vention and cure of pitching; lateral stability — similarly related to rolling, and directional stability to yawing from the course.

Lateral Balance. — When an aeroplane is seen advancing from directly in front, the up¬ ward pressure or lift of its wings may always be assumed to be acting in a direction per¬ pendicular to the spars. The downward force of the weight acts always vertically toward the earth. If, therefore, the wings are canted, their pressure is no longer precisely in line with the weight, and there is, necessarily, a sideways component tending to make the machine swerve off its former course. On the assumption that the machine ascends into the air with its wings level, it is necessary to account for the disturbance of the balance by

HYDROPLANES

„ 2 Naval hydroplane — twin-propeller, model k

3 Sport type flying craft

1 Curtiss Transatlantic type flying boat

HYDROPLANES

MARINE FLYING

1 Thomas-Morse SH = 4 Navy Hydro-airplane 3 Sport Type Flying Craft 5 Burgess Navy Tractor

CRAFT — SPORT TYPE

2 Model “ America ” Type 4 Sport Type Flying Craft 6 Verville Type Flying Boat

AEROPLANE

19i

the introduction of some extraneous force. This, however, is readily supplied by supposing that the machine is struck by a gust. A gust, for present purposes, is assumed to be a sud¬ den veering or backing of the relative wind. It is not necessary that the machine should be

possessed of vertical fin surfaces, against which the oblique wind may strike, in order to account for the tendency of a gust to cant an aeroplane. The characteristics of wing-forms as ordinarily employed suffice in themselves to explain the occurrence, for if a gust is a sudden veering of the wind, it is equivalent to a sudden spinning of the wings about their vertical axis, as a propeller might spin on a vertical shaft. Under such conditions there is an obvious tendency for one wing to lift more than the other, and so to upset the balance. Lateral balance in the modern machines is secured by various methods. First, warping, which means that the relation of the wing surfaces to the relative wind are changed by the pulling of wires for a temporary period to aid in the control of balance. Secondly, machines of the biplane type are constructed with their upper wing in advance, slightlyˆ, of the lower wing, which enables the pilot to manoeuvre the machine very effectively in gusty weather. (Consult Berri- man, <Aviation)). Thirdly, dihedral forma¬ tion of wings has been introduced with much success. That is, wings which rise from a point at which they meet (exactly above the body of the machine) to their outward surface.

Steering. — There is perhaps no object of a technical nature so universally familiar by name, appearance and purpose as the rudder. Everyone knows that the rudder is to steer the craft to which it is attached. The direct effect of a rudder relates to the control of movements about the vertical axis of the craft. Such movements may conveniently and appropriately be referred to under the general term “yaw.® It is the tendency of the craft to yaw on its own vertical pivot that the rudder is used either to check or to initiate. When steering a straight course, the rudder is used to counter¬ act disturbances that otherwise might give rise to yawing. In an aeroplane, which has no appreciable extent of vertical surface in the vicinity of the C.G., a slight yaw will of itself present equivalent to the side of a ship against which the air can react. But when an aero¬ plane with positive wing tips is caused to yaw, one tip is thereby accelerated while the other is retarded, and so a bank is established which in turn tilts the direction of the air pressure on the wing. It is this tilting of the air pressure by canting the wings that provides the steering force in the case of an aeroplane.

Types of Aeroplanes. — The different types of aeroplanes are distinguished according to their number of supporting plane surfaces. The “monoplane® with one plane surface; the “biplane® with two super-posed plane surfaces; the “triplane® with three supporting surfaces; and the “multiplane® with any number of sup¬ porting surfaces in advance of three.

Monoplane. — For a considerable period in the history of practical aeronautics the mono¬ plane held the pre-eminent position, in that period when France was in the forefront, and when she developed a corps of sportsmen who were eminent throughout the world. This was due to the excessive speed which could be

acquired with this type of machine. The assets of the monoplane are, briefly, lightness, speed, both in climbing and racing. Its disadvantages, inability to carry a load, the proficiency which it demands of the pilot, the extensive smooth landing grounds necessary.

Biplane. — The most common of modern machines, because of its adaptability to all con¬ ditions of aerial navigation. The types vary greatly (consult Fage, Aeroplane*) from the machine with narrow advancing plane edge for speed, to the machine with a wing spread of 157 feet, equipped with multiple motors, for load carrying and long distance reconnaissance.

Triplane. — This type has been developed to extend further the load carrying capacity of the biplane. It will undoubtedly represent in the period immediately succeeding the war the vehicle that will be entered first upon the aerial carrying commercial ventures.

Hydroaeroplane. — A hydroaeroplane has been described as an air-borne craft capable of floating on water. Such a machine must be made sufficiently strong to resist the severe buffet¬ ing of a rough sea, although its flying capacity is affected by any undue weight and head resistance. Single and double floats are used. The floats should not be too far apart, other¬ wise the lifting of one float out of the water due to excessive rolling causes the machine to suddenly swing round ; and, moreover, the un¬ balanced forces called into action by the reduc¬ tion of the resistance of the rising float, and the increase of resistance of the falling float, are greatly assisted by the leverage between the two floats. On the other hand when the two floats are close together, the behavior approxi¬ mates that of a single float machine. The water resistance of the floats appears to be practically independent of their distance apart. To prevent the float driving into the water when the machine alights, and also to keep the nose of the float well out of the water when the machine is at rest on the water, it is desir¬ able that the centre of buoyancy of the float, when the longitudinal axis of the machine is horizontal, should be well forward of the position of the centre of gravity of the machine. The total buoyancy of the floats should be almost equal to twice the weight of the fully loaded machine. While the float is rising from the water the free access of air to the bottom of the step should not be hindered. The tend¬ ency to

hop — -a characteristic of most floats when running along the surface of the water at high speeds and small buoyancy — is due to the inherent instability of a machine partly supported on a small area. Any tendency to dip the nose of the float under water may be minimized by a low position of the line of propeller thrust.

Flying Boat. — The flying boat had its in¬ ception in America, where Glenn H. Curtiss was the first to design this type of craft. It is an ordinary aeroplane in wing structure, either biplane or triplane, but with a boat¬ shaped hull for landing on, and subsequently, if necessary, navigating the water. See Aero¬ plane Distance and Speed Records ; Aeroplane Altitude Records; Aeronautical Nomen¬ clature. Consult Woodhouse, (Naval Aero¬ nautics^

G. Douglas Wardrop, Managing Editor Aerial Age.

AEROPLANE ALTITUDE RECORDS.

As speed and duration of flight progressed according to the advances in engine and body design, so, too, the altitudes at¬ tained kept pace with the growth of en¬ gine power and of superior design in the planes. It was early realized that the greater the height attained the greater must be the power of the engine to raise the plane in the atmosphere which becomes ever rarer as the plane ascends. In 1909 the record altitude for the aeroplane stood at 1,473 feet ; this was raised to 10,499 feet in the following year. In 1912 Garros ascended 19,032 feet at Tunis, Africa, but this record height was surpassed by Perreyon, who, on 14 March 1913, reached a height of 19,650 feet in a Bleriot monoplane. In the closing days of the same year G. Legag-neux made the record ascent of the year by attaining a height of 20,090 feet. On 27 June 1914 the Austrian, H. Bier, with one passenger, ascended 20,260 feet. In the same year Garaix took four passengers up to a height of 10,000 feet; six passengers, 5,730 feet; and nine pas¬ sengers to a height of 5,220 feet. On 25 April 1914 the Russian pilot, .Sykorsky, took 15 pas¬ sengers to a height of 980 feet in a Sykorsky biplane. On 27 Feb. 1920, Maj. R. W. Schroeder, U. S. A., in a LePere biplane rose to a height of 36,020 feet. However, he was offi¬ cially credited with a height of but 33,113 feet.

AEROPLANE DISTANCE AND SPEED RECORDS. The aeroplane devel¬ oped increased speed in successive years as a result of improved

construction and design and especially of improvements in engine-building. A speed of 61 miles per hour was the greatest reached up to 1910, when this speed was at¬ tained in a Bleriot monoplane. This record wras surpassed the following year when Weymann attained a speed of 78.7 miles per hour in a Nieuport monoplane. A speed of 100 miles per hour, the goal for years of designers and engineers, was reached and passed in 1912, when Vedrines, in a Deperdussin machine, made the record speed of 107.4 miles per hour over a distance of 124 miles. This record was not to remain long unsurpassed for in 1913 Maurice Prevost made new records for all dis¬ tances from 10 to 200 kilometers (6.2 to 124 miles), when, at the Bennett cup competition at Rheims, he traversed the 200-kilometer course (124 miles) in 59 minutes 45 3/5 sec¬ onds, making an average speed of 126.5 miles per hour. This speed was made in a Deper¬ dussin monoplane with a 160 horse-power Gnome motor.

In 1914 M. Garaix, in a Schmitt biplane, piloted four passengers a distance of 26.58 miles at the rate of 67.28 miles per hour ; five passengers 12.5 miles at the rate of 67.28 miles, and six passengers a distance of 31 miles at the rate of 66.85 miles per hour.

In 1913 Deroye, in a Bleriot monoplane, made a non-stop flight of 486.87 miles, and in April 1914 Garaix, with six passengers, covered a distance of 68.3 miles without alighting.

The European War completely paralyzed competitive aviation, aeroplanes being com¬ mandeered for military purposes and aviators pressed into army service, and there were no records accepted by the International Aviation Federation during 1915, 1916 or 1917. Several

important flights were made, however, of which the following are the most noteworthy : On 20 June 1916 Lieut. A. Marechal of the French army flew 812 miles, starting from Nancy, France, and alighting at Chlom, Poland. On 3 November of the same year Victor Carl- strom flew from Erie, Pa., to New York city (515 miles) in 4 hours 11 minutes, and on the 19th of the same month Miss Ruth Law set out from Chicago on a flight to New York, reach¬ ing Hornell, N. Y., 590 miles from Chicago, in 5 hours 45 minutes ; on the following day she completed the remaining 294 miles of the journey in 3 hours 10 minutes and 35 seconds. On 11 Dec. 1917 Miss Katharine Stinson estab¬ lished a new record by flying from San Diego to San Francisco, a distance of 610 miles, in 9 hours and 10 minutes. In 1919 Lieutenant Reid, U. S. N., flew from Trepassey, Newfoundland, to Horta, Azores, a distance of 1,240 miles.

AEROPLANE ENGINES. There are three prime requisites for a good aeroplane en¬ gine — reliability, small weight per horse-power and low fuel and oil consumption. Since these requirements are more or less conflicting, a compromise is necessary and the 4esigner is confronted by the delicate question: Which of these is the most important? German design¬ ers, with their customary thoroughness, have produced more reliable, but, generally speak¬ ing, heavier engines than those of England and France. For military work this has proved a weak point, because the lighter, and hence faster, aeroplanes can easily secure positions of advantage over their enemies, which usually makes it possible to bring them down. For non-military service, however, except racing, reliability is unquestionably the fundamental requirement. The balance between weight and

Thomas Aeromotor, Model 8, equipped with a self-starter.

fuel economy will be fixed by the particular service required, for the matter of importance is not the engine weight only, but the total weight of the engine and fuel. This is easily appreciated when one realizes that . the fuel required for a flight of six or seven hours weighs as much as the engine itself. For short flights during which but little fuel is used, an exceptionally light engine is desirable, for the poor economy usually characteristic of such an engine is not very important. How¬ ever as the length of flight increases, economy becomes more and more important. Other requisites which must not be overlooked, though they are by no means as important as those just mentioned, are compactness, ac¬ cessibility, freedom from vibration, flexibility,

silence and reasonable cost. Little need be said in regard to these as they are almost self- evident to any engineer.

Ihe reliability of an engine is the final proof of the skill of its designer in mastering every little detail. This is particularly true of an aeroplane engine because its service is so much more severe than that of an automobile engine that any weakness will show itself much sooner. Since weight is of such great import¬ ance, every member of an engine will probably be designed so as to be stressed to the maxi¬ mum safe limit. For this reason any cast metal should be avoided as far as possible be¬ cause of its uncertain strength. In nine en¬ gines a certain cast member will be strong enough, yet in the tenth some

imperfection in the casting may cause a failure at a critical moment. Forged or rolled steel is one of the most dependable materials known to-day and as it is also the lightest for a given strength, it is ideal for aeroplane engines. Consequently

it is standard practice in a large percentage of the successful aeroplane power plants to-day. Since the greatest strength of steel is utilized when the stress acting upon it is one of tension it is advisable to design the engine so that parts which sustain the greatest strains shall meet with purely tcnsional stresses as far as possible. Lubrication is another factor on which the re¬ liability of an engine is dependent and is re¬ ceiving more and more attention from design¬ ers. It is probably the one point on which the success or failure of a heavily-worked engine hinges more than anything else. One of the improvements in lubricating systems which is gaining favor at present is that of cooling the oil after it has been used once and before using it a second time. The reason for this is that oil apparently deteriorates upon pro¬ longed exposure to heat, causing a falling off of the power of an engine because of inferior Vol. i — 13

lubrication. An aeroplane engine must, of course, be as economical as possible of both fuel and oil. Fuel economy implies a high compression, since efficiency rises with the compression ratio; and careful workmanship is an essential, so as to eliminate any unneces¬ sary friction.

For any particular type of engine there are three places to look for a possibility of im¬ proved efficiency — the carburetor, ' gas pas¬ sages and ignition system. These are facts well known to automobile engineers and have been the cause of much research. For very high engine speeds it has been proved that the number and location of the spark plugs has an appreciable effect upon efficiency. When two- point ignition is used, failure of one of the plugs must be guarded against because it will not cause missing and therefore may not be detected. Since two-point ignition requires a smaller angle of advance than the single point, the failure of one plug will cause late ignition in its cylinder with its resultant heating and lowered efficiency.

At present the magneto reigns supreme for the ignition of aeroplane engines, but it may be replaced by some battery systems because of the increasing necessity for an electric gen¬ erator for wireless outfits, searchlights, stabil¬ izers, etc.

It almost goes without saying that any un¬ necessary weight on an aeroplane engine must be eliminated and the greater use of aluminum

and the higher grades of steel will play an im¬ portant part in having decreased weight go hand in hand with all round efficiency.

G. Douglas Wardrop, Managing Editor Aerial Age.

AEROSTATICS, a branch of science treating of the equilibrium and pressure of air and other gases, and of the methods of meas¬ uring it by the barometer and other instru¬ ments. The expansive force or pressure of at¬ mospheric air varies with time and place. In a medium condition of the atmosphere, and near the sea-level, barometrical observations give the pressure or weight equal to that of a column of mercury 30 inches high, or of a column of water about 34 feet high. This makes the mean pressure of the atmosphere nearly 15 pounds on every square inch. Aero¬ statics also investigate the phenomenon of the high compression of gases ; in other words, the relations between the elasticity and the density or volume of a gas. According to the law of Mariotte, the expansive force of one and the same body of gas is proportional to its density; or, which is the same thing, the expansive force of a body of gas under different degrees of compression varies inversely as the space which it occupies. See Gas; Pneumatics; Thermo¬ dynamics.

AEROTHERAPEUTICS. This literal¬ ly means the treatment of disease by air and is usually limited to the supposed value of air in certain chest diseases, notably of tuber¬ culosis, and the use of compressed air for special chest conditions.

This is a difficult subject to treat since there is so much popular tradition and medi¬ cal superstition regarding the "alue of air in the treatment of chest conditions. The gen¬ eral attitude that regards open-air treatment

of tuberculosis as of prime importance stands in marked contrast to the position taken by the few that the air per se has little or noth¬ ing to do with the matter. In fact the open- air treatment of tuberculosis is a vastly much more organized program than its name would imply. Under the general idea of ((open-air® is included exercise, freedom from work, ex¬ tra feeding, psychotherapy, humidity, skin stimulation, etc., etc. The air itself in real¬ ity plays an insignificant part in the therapy. The reason for this is plain. It is well known that the sole stimulus in air is the oxygen contained within it. It is also an

axiom of physics that the composition of the air so far as its gases are concerned is constant the world over at the sea-level and under average conditions. There is no more oxygen in one air than another and no less unless in a her¬ metically sealed space specially treated by physi¬ cal procedures. Hence oxygen transfer in the lung is constant under the same barometric pres¬ sures and temperatures. Rarified air in high places contains differing proportions of oxy¬ gen but here the problem is not so much one of the oxygen as of the barometric pressure and the relationships of the tension of oxy¬ gen in the tissues and the external atmos¬ phere and carbon dioxide tensions in the tis¬ sues. Special problems arise here which are in need of special forms of consideration, which cannot be discussed here. Here oxy¬ gen want develops a special type of illness — ((mountain sickness.®

Water and air (oxygen) are among the most constant things in the environment. They rarely ever change in their gross com¬ position, hence they have built up invariable interactions between the body and the environ¬ ment. The real work of supplying the proper amount of oxygen takes place within the lung tissues and is not dependent upon the exter¬ nal oxygen supply which is always ample and constant under the ordinary conditions of life.

Hence it can be seen that although the physiology of respiration is extremely com¬ plex, there is, properly speaking, no real prob¬ lem of air treatment in the ordinary sense, and the (<open-air® treatment of tuberculosis is a misnomer. The largest factor is an elab¬ orate psychotherapy. The oxygen itself plays the least role in the therapy. Popular miscon¬ ceptions regarding air in buildings, in theatres, in subways, etc., etc., are abundant. When the laity speaks of ((bad air,® it really means foul-smelling, humidity, heat and other things. The air, so far as its oxygen and the respira¬ tory needs are concerned, is not ((bad.® It is constant all over the world — in the garret or in the cellar, rooms with windows open or windows shut — the oxygen never varies. The aesthetic wishes of individuals vary and make them prefer sleeping porches or inside rooms and thus the psyche is affected. The actual respiratory needs are equal everywhere under similar atmospheric pressures and simi¬ lar temperatures. Consult Bayliss, (General Physiology } ; Henderson, (Fitness of the En¬ vironment. y

Smith Ely Jelliffe.

AEROTROPISM, the sensitiveness of cer¬ tain plant organs which enables them to orient

themselves from certain gases dissolved in the medium in which they are grown. Various roots also possess this property. See Chemo-

TROPISM.

AERSCHOT, a town of Belgium, 26 miles southeast of Antwerp and 20 miles northeast of Brussels. Situated on the river Demer, it is a junction of railroad and steam¬ tramway lines running to Louvain (q.v.), Herenthals, Tirlemont and Haecht. Its mod¬ ern importance was derived from its cloth manufacture and railway works. The town contains an old Gothic church with fine choir- stalls of the 1 5th century and an altar piece by the Flemish painter, Gaspar de Craeyer (1582-1669). At the beginning of August 1914 Aerschot boasted a prosperous popula¬ tion of about 8,000 souls ; these were doomed to a tragic fate in the early stage of the European War. With the possible exception of Termonde, Aerschot seems to have suf¬ fered more than any other place in the Flem¬ ish-speaking part of the country. A fierce ac¬ tion was fought round Aerschot on 19 Aug. 1914. German infantry, supported by ma¬ chine-guns and artillery, opened the attack, and the Belgians, although outnumbered, made a desperate resistance. The troops on both sides fought like demons and the fight soon developed into a veritable butchery. The Belgians in the front held their ground tena¬ ciously for two hours and retreated on Louvain, the main army retiring upon Ant¬ werp. The Germans entered Aerschot early in the morning of 19 August. Throughout the day the soldiers looted the town, broke store windows and ransacked them. ((A shot was fired about 7 o'clock in the evening, by which time many of the soldiers were drunk. The Germans were not of one mind as to the direction from which the shot proceeded. . . . No one was hit by the shot, but thereafter German soldiers began to fire in various directions at the people® (Bryce committee). It was also said that a German officer had been killed at the burgomaster's house. The Ger¬ man version stated that the 15-year-old son of the burgomaster had killed the officer — a Colonel Stenger. On the following day a number of civilians were shot, together with the burgomaster, his brother and the boy. In the report preseyted by the Belgian Royal Commission to President Wilson at Washing¬ ton it was stated that ((the Germans took every man who was inside of Aerschot; they led them, 50 at a time, some distance from the town, grouped them in lines of four men, and, making them run ahead of them, shot them and killed them afterward with their bayonets. More than 40 men were found thus massacred.® About 150 inhabitants of Aerschot were sup¬ posed to have been killed. For three days the invaders pillaged the houses and set fire to them. Much of the portable property was sent into Germany (13th Belgian report). <(I know there were 91 shot at Aerschot and

that there, under pain of death, their fellow citizens were compelled to dig their graves® (Cardinal Mercier). Immediately after the battle of Malines (q.v.), which resulted in the evacuation by the Ger¬ mans of the district of Malines, Sempst, Hofstade and Eppeghem (25 Aug. 1914), a long series of excesses were committed either

just before or during the retreat. At Aerschot and the other villages from which the Germans had not been driven, the effect of the battle was to cause a recrudescence of outrage and pillage. Large numbers of civilians, men, women and children, were herded into the church. The priest of Gelrode, a village near Aerschot, was brought here, made to stand for some hours with his hands above his head, and finally shot by five soldiers. Some of the prisoners were actually kept in the church until the arrival of the Belgian army on 11 September, when they were released. Others were marched to Louvain, and with others from the surrounding districts were taken to Germany.

In May 1915 the German government pub¬ lished a White Book under the title of (<Offenses against International Law in the Conduct of the War by the Belgians.® It contained the results of an official inquiry into the Belgian allegations, and gave the evidence of numerous witnesses — German officers. In the section relating to Aerschot Captain Karge relates that he observed regular volleys from 8 or 10 rifles from a particular house; that he broke into it and set fire to it. No civilians are suggested to have been found by any of the soldiers who went upstairs to assist in the destruction; the house appears to have been empty. The captain stated : ((Thereupon, I pushed into the house with the others, and using a fairly large quantity of turpentine . . . succeeded in a very short time in setting the house on fire. . . . When I left the

burning house, several civilians, including a young priest had been arrested from the adjoining houses. ... I then put the col¬ umns on the march out of the town, took command of all prisoners, among whom I set free the women, boys and girls. I was com¬ manded by a staff officer to shoot the prison¬ ers. Then I made some of my gendarmes ar¬ range the columns and keep them in motion out of the town, while others escorted the prisoners and took them out of the town. Here, at the exit, a house was burning, and by the light of it I had the culprits — 88 in number, after I had separated out three crip¬ ples — shot.® No mention is made of any in¬ vestigation or trial. See

Andenne; Louvain.

AESCHINES, es'ki-nez, the greatest of Greek orators except his rival Demosthenes : b. Attica, 389 b.c. ; d. Samos, 314 b.c. That he rose to immense influence and high station by his unaided genius, despite family poverty, would be considered his best title to honor in democratized modern states; it was charged against him as a foul disgrace in Athens. The further <(campaign® accusations of Demos¬ thenes — that his father was a schoolmaster's freedman and his mother a public dancer and courtesan, and that he changed the family name to a more genteel form — are valuable only as examples of what passed then for fatal ob¬ stacles to public trust and private honor, and the last-named reads curiously in a modern at¬ mosphere. That his father was a poor school¬ master, and that he worked in the school to help, is probable ; more than probable also are his boasts of good blood despite it, as several of the brothers became leading citizens, one of them being on the board of 10 strategoi which conducted military and foreign affairs. He

may have been, as alleged, a professional gym¬ nast ; unpaid athletes were too reverently worshipped there to make paid ones seem un¬ natural. He certainly served a long term of military duty (probably not all at once), and with distinction ; for he was in the battles of Mantinea (362) and Tamynse (349), and for bravery in the latter was deputed to carry home the news and accorded a crown. Meantime he had become a magistrate's clerk; a petty actor; finally secretary to the important political lead¬ ers Aristophon and Eubulus, who helped him twice to an election as government secretary. He was now 40 and had not (<found himself® ; but with the chance of addressing the public his true talent soon became manifest. He quickly acquired an eminent mastery of legal and political knowledge, and became a singu¬ larly graceful and effective speaker, with re¬ markable finish, harmony and variety of ora¬ torical effect. In 348 he was sent to the Pelo¬ ponnesus to organize a union of the Greeks against Philip of Macedon, but failed entirely, and doubtless became convinced at that time that any such scheme was permanently imprac¬ ticable. The next year he went as one of the embassy to negotiate peace with Philip, and on their report (which Grote pronounces <(a tissue of impudent and monstrous falsehoods,® not necessarily of their own invention, but accept¬ ance of Philip's word), the Peace of Philo- crates (another envoy) was concluded in 346. Philip grew more and more powerful, and Demosthenes more and more urgent for oppo¬ sition to his plans, which, however plausible — a Graeco-Macedonian union against the barba¬ rians and the East — could in practice only be carried out, as they at last were, by absorbing Greece in Macedonia. 2Eschines as

steadily supported the Macedonian alliance, and doubt¬ less as honestly, from conviction that for dis¬ united Greece the only choice was between league and conquest — which also was true. In 345 Demosthenes charged him with treason and bribery. He was acquitted without difficulty. Three years later the charge was renewed in Demosthenes' great speech (<On the False Em¬ bassy® ; 2Eschines rebutted it with success in his speech of the same title. He helped on the Macedonian cause all through the reign of Philip and the early part of Alexander's, ac¬ cused by the opposing party of being a hired emissary of Macedonia, and returning as much and presumably as just abuse as he received. That the public made the necessary discount is proved by the fact that he lost no credit with them. At last he assumed the aggressive with . disastrous results. One Ctesiphon having pro¬ posed a golden crown for Demosthenes in recognition of his services to the common¬ wealth, yEschines impeached him for propos¬ ing an illegal act, and made his greatest speech, (<Against Ctesiphon,® an indictment of Demos¬ thenes' entire public life. Demosthenes replied with his greatest, <(On the Crown® ; so crush¬ ing that though the pro-Macedonian party was in the ascendant 2Eschines could not obtain the one-fifth minority of votes legally necessary to save him from atimia, or dishonor, and a fine of 1,000 drachmas. He left Athens at once without paying it, and thereafter taught rhetoric or schools of oratory in foreign parts ; some say Ionia and Caria, and finally Rhodes after Alexander's death. He died at Samos,

aged 75. Three of his orations are extant — against Timarchus' charge of bribery after his second embassy to Philip, one on that embassy and the one against Ctesiphon. There is a story that he read the latter to his pupils at Rhodes, and on their professing to be astonished that despite its brilliancy he should have been de¬ feated, replied, (<You would not be if you had heard Demosthenes.® A variant is that he read Demosthenes' speech as a model of rhetoric, and on their expressing admiration, replied, <(If you had heard him roll it out himself !® The originals are in countless editions. Con¬ sult for text and best comment Jebb's ((Attic Orators® (London 1876-430). Translations are also plentiful.

AESCHINES, Greek philosopher of the 5th century b.c., and a friend of Socrates. Of humble parentage and at first unfortunate in business, he

achieved success as a teacher of philosophy in Athens, and as an orator and stylist of high rank. He was the author of several (Orationˆ <Epistles) and of three Socratic dialogues: (Virtue, whether it can be taughD ; (Riches, whether they are good) ;

(Death, whether it is to be feared.) Consult Gomperz, T., (Greek Thinkers) (translated by G. C. Berry, Vol. Ill, p. 342, London 1903).

AESCHYLUS, the founder of tragedy: b. Eleusis, Attica, 525 b.c. ; d. 456 b.c. His father, Euphorion, was a nobleman. One of his brothers distinguished himself in the Persian war. At 25 the poet brought out his first play. Fifteen years later he won his first prize. But ZEschylus was not only a poet ; he was also a soldier, for he fought at Marathon (490 b.c.) and at Salamis (480). No patriot felt more keenly than he the impulse of that mighty na¬ tional movement of Greece against Persia. In a contest with Simonides he failed to win the prize for an elegy to be inscribed over the fallen heroes. About 476 he went to Syracuse, where Hiero had gathered about him the most famous poets. Shortly before the death of Hiero he contended with Sophocles for the tragic prize and lost. It is likely that he thought his failure was due to politics or to partisan¬ ship. Later he was successful; but there was still a gulf between him and a large part of the Athenian public. His last and greatest work, the ˆresteia,* received the first prize. Though acquitted of the charge of having revealed the Eleusinian mysteries, he withdrew from Athens. He died at Gela, Sicily, in 456. The Athenians erected a statue in his honor. In the epitaph, written by himself, he speaks only of his valor in the Persian war.

Theoretically Sophocles was the greatest Greek dramatist, but ZEschylus was a genius of a higher type; the magnificence of his imagery and the sublimity of his conceptions are unsurpassed, if equalled, by any poet. He was also a genius of great resource and an artist of consummate conscience. Theologian, as well as artist, ZEschylus sought to interpret the old myths, to find in them a doctrine on human destiny. He was the first poet to iden¬ tify tragic action with a moral and religious question. There had been much skepticism in Greece; but the Persian war had brought a reaction, reviving the national religion. The poet's Zeus is the supreme ruler of the uni¬ verse. But Fate is above Zeus. Necessity gov¬

erns all. Every violation of the law of righteousness is followed by punishment. The sinner thrives for a season, but the penalty is at last exacted. Even Zeus cannot avert what the Fates have ordained. The Ruler governs by and through Justice. This idea dominates all the tragedies of ZEsclrylus. To the Erinyes (Furies) is entrusted the moral

government of the world ; they execute the eternal immutable law, punishing every atrocious crime. ZEschylus says nothing about the joys of the just in the next world, but he has a clear idea of retribution. ZEschylus was thoroughly famil¬ iar with the stage ; he superintended the per¬ formance himself ; and he was excessively busy in improving the appliances of the theatre. But in his plays there are no carefully laid plots, no intricate weaving of incidents, no fine meshes of intrigue. His dramas, like his characters, are drawn only in large outline, with simplicity and manly straightforwardness. Lyric move¬ ment, epic interest and gnomic wisdom are first combined in ZEschylus. His choral songs rise to the loftiest height. But in the episodes there are no surprises, no complications, no sudden reversals of situation. There is one idea and a uniform development. Whole per¬ sonages are presented to the view of the audi¬ ence. There is no unfolding of character. The poet sometimes touches upon the tenderness and delicacy of the gentler sex, but he does not dwell on these traits and study them in detail. His heroes move in an ideal sphere ; they are ethical types, majestic, terrible. The tragedies of ZEschylus were written in trilogies • — groups of three plays with a single main theme. A grotesque satyr drama followed each trilogy. The number of characters never transcends seven. Two actors played the roles for his earlier tragedies. Sophocles introduced a third actor. The ZEschylean characters leave a last¬ ing impression on the mind ; they are not ef¬ feminate creatures, but <(sturdy men that breathe of the spear and the lance and white- crested helmets, of casques and greaves and courage, doughty as the tough-hided seven-fold shield of Ajax® (Aristophanes, 177, Job xxxiii, 15). In the splendor of his figures and in his powerful metaphors we see <(visions vast as those of Ezekiel, yet conveyed withal in rich and radiant Greek.® The mighty line of ZEschylus gave unrivaled dignity to the narrative. When profuse, he is exceedingly difficult. His obscurity is due chiefly to luxu¬ riant metaphors and to a pleonasm of imagery. The ancient rhetoricians called his style lofty, stately, dignified, archaic, magnificent. When the poet is simple he combines majesty and power with beauty in a style that surpasses the polished perfection of Sophocles and the

brisk dialogue and facile narrative of Euripides. Small wonder that Ben Jonson exclaimed:

“ Call forth thundering Eschylus,”

or that Browning speaks of

“The thunder phrase of the Athenian grown Up out of the memories of Marathon.”

zEschylus was an exemplar of the austere style. Dionysius of Halicarnassus classes him with Pindar and Thucydides. Dio Chrysostomus praises him for his high-toned spirit, for his archaic coloring and for his boldness of thought and expression. There is no base cun¬ ning, no garrulity, no littleness in 2Eschylus. Though redundant at times, he surpasses all Greek poets in a certain Shakespearean con¬ centration of phrase. The great number of reminiscences from Homer and the plasticity of his descriptions show how much he was in¬ fluenced by the epic style. <(The scraps from Homer’s banquet, 55 as he characterized his tragedies, included form as well as substance. Of all the tragic poets he is the one most steeped in Homer. His rhythms are finished and full of power and expression. Of the 70 tragedies attributed to him by his biographer only seven have come down to us. The ‘Per- sians) was produced seven years after the battle of Salamis (472), the (Prometheus Bound5 in 470, the ‘Seven Against Thebes5 in 468, and the <Oresteia) (consisting of the ‘Agamemnon,5 ‘Choephori,5 and ‘Eumenides5 in 458. The date of the ‘Suppliants5 is uncer¬ tain. Many scholars consider it one of his lat¬ est works. I am inclined to place it about 489. See Oresteia, the; Prometheus Bound.

J. E. Harry.

ZESCHYNITE, es'ki-nit, the mineral for which Dana’s ZEschynite group was named. It is essentially a niobate, titanate and thorate of the cerium metals, containing also iron and calcium in small amounts. It occurs in black, prismatic, vertically striated crystals belonging to the orthohombic system. Its hardness is about 5.5, and its specific gravity about 5. It is rare, and occurs in the Ural Mountains, in Norway and in Silesia. It was named by Berzelius from a Greek word meaning “shame,55 in allusion to the “shameful55 inability of chemistry, at the time of its discovery, to sepa¬ rate titanic acid and zirconia (two of its con¬ stituents).

ˆSCULA'PIUS (Greek Asclepios), the god of medicine among the ancient Greeks and Romans. In Homer he is merely a man, the god of medicine being Paeeon ; the deification was probably founded on the Homeric story, and at any rate was subsequent. The notion that he was originally a god of light or the un¬ derworld, “reduced55 to the tradition of a hu¬ man being, inverts all historic processes and the

nature of early thought. In Homer he has two sons, Machaon and Podalirius, famous as heroes and physicians ; they are called Asclepiadse, a name retained by their descendants or at least a priestly physician-caste. His daughters, Hygeia (health), Panacea (all-healer), Iaso (healer), etc., are later inventions, abstractions of relevant ideas. The later myths vary; some call him son of Apollo and Arsinoe, some of Apollo and Coronis, daughter of Phlegyas. In Hesiod the nymph was faithless, and with her bridegroom Ischys (one of the Lapithse) was

slain by the gods (the raven who brought the news being changed from black to white as a punishment) ; but Apollo rescued his unborn son from the mother's body on the funeral pile, and put him under charge of Chiron, where he grew to excel his master, able not only to prevent death but to raise the dead. At Pluto's complaint Zeus slew him with a thun¬ derbolt, and after his death he received divine honors. The supposition that his worship originated in the Peneus Valley in Thessaly is perhaps due to the Homeric tradition being our earliest record ; but if he was originally a healer wonderful to rude barbarians, it is likely enough that the tradition was Thessalian. Any¬ way, Tricca there was an old focus of his cult; but it flourished also to the south, perhaps car¬ ried there by the Thessalians forced southward by invaders. It had noted seats in Phocis, Bceotia, and especially in the Peloponnesus, where Thelpusa in Arcadia was one familiar seat ; but by far the greatest was Epidaurus, south of Corinth. Here was a temple in a grove, where the sick had to spend a night, and the proper remedies were revealed to the priests in a dream, and the cured made sacrifice to zEsculapius, commonly a cock. The sleep was of course a mere part of the priests' mystifi¬ cation ; but from their accumulated experience and their register of cases they must have be¬ come really expert physicians for the times. From thence the worship spread all over Greece and the islands and to Rome — nearly 200 tem¬ ples in all ; there were celebrated ones at Cos, Cnidus and Pergamus; the cult was introduced into Athens as late as 420 b.c., and to Rome 293 b.c., in consequence of a plague. Consult Walton, 'The Cult of Asklepios5 (New York 1894) ; Wilamowitz-Mollendorff, 'Isyllus von Epidauros5 (Berlin 1886).

ZESCULIN, es'cu-lin, a bitter principle found in the bark of the horse-chestnut tree (ZEsculus hippocastanum) , especially in the spring, before the buds open. It crystallizes in small prisms having the formula C15H16O9.2H2O. ZEsculin melts at 400° F. It dissolves sparingly in cold water, but easily in boiling water, the solution coagulating upon cooling. It is soluble in glacial acetic acid and in 24 parts of boiling alcohol. ZEsculin is of special interest to the physicist on account of the notable bluish fluor¬ escence (q.v.) exhibited by its

solution in water. The word is also spelled aesculine, esculin and esculine.

ZESOP, the fabulist. As early as the mid- 5th century b.c. at least, fables were circulating in Athens attributed to a certain ZEsopus, and held in such esteem that the city erected to him a statue by the great sculptor Lysippus; Aris¬ tophanes makes one of his characters learn the fables, Socrates versified such as he could re¬ member and Plato speaks of them with ap¬ proval ; Herodotus, born c. 484 b.c., specifically tells us, as referring to a story too familiar to repeat, that when the Delphians offered com¬ pensation for his murder to the rightful claim¬ ant, it was claimed and received by one Iadmon, grandson of another Iadmon, a Samian and owner of Rhodopis the courtesan, who lived un¬ der Amasis, King of Egypt (c. 570-526 b.c.), and was redeemed by Charaxus, the brother of Sappho. That all this mass of detail concern¬ ing persons living less than a century before his

time, with easily verifiable dates, and about one whose fate was notorious, was in fact told of a myth and abstraction, and that there never was an AEsop, is exaggerating skepticism into ab¬ surdity; and the later accretion of fables and confusion of persons is irrelevant. Plutarch (late 1st century a.d.) fills out the story from lost authors, possibly with authentic traditions, perhaps mixed with real myth-making : that he was captured young and brought a slave to Athens, and after several changes of owner¬ ship enfranchised by Iadmon (which is incon¬ sistent with Herodotus) ; that during Pisistra- tus' usurpation he visited Athens and composed the fable of <(King Log and King Stork55 for the edification of the citizens ; that, going to the Lydian court, he became Croesus' favorite, was sent by him as envoy to Delphi to distribute money to the people (about 564 b.c.), and, re¬ fusing to do so on account of a quarrel among them, was thrown from a cliff by them. This at least coheres with Herodotus. The stories of his being an ugly blackamoor, and others be¬ yond the above, are derived from a worthless life of him published (but not written) by Maximus Planudes (q.v.), a 14th-century monk, in which he is apparently confounded with the mythical Oriental sage Lokman. As to the fables, it is probable that AEsop did not write them down, but merely told them to audiences ; and it is perfectly certain that the ones we have under his name are not his (though they may incorporate the same incidents), but sub¬ stantially a collection made from oral memories by Demetrius Phalereus of Athens about 320 b.c. ; turned into Latin by Phsedrus of the 1st century a.d., with additions of his own much in¬

ferior in every way; versified by Babrius, a Greek poet of perhaps the late 1st century; and variously translated and re-edited since. The usual popular <(AEsop55 is Pheedrus. The origin of the fables is largely Oriental; but they are much superior to any Oriental prototypes in pith and conciseness. It is often said also that they are part of the stock of beast-apologues common to the entire Indo-European races ; but this is true only in the sense that animals have been made to talk in all old folk-lore. The special qualities of (< AEsop55 — the immense com¬ pression of idea almost to ((indecent exposure, 55 in Sydney Smith's phrase, the sweep of gen¬ eralization, the acute analysis of typical human characteristics — make it unique ; and it quite probably inherits these traits from the genius of the real AEsop, a Greek of the mighty age of Greece. See Fables of AEsop, and consult Jacobs' (Introduction to the Fables of AEsop5 (New York 1896) ; Keidel, (The Editio Prin- ceps of the Greek AEsop5 (in American Journal of Philology, XXIV, 304-317, 1903).

AESOPUS, Greek historian, author of the history of Alexander the Great, translated into Latin by Julius Valerius, discovered in 1816.

AESOPUS, Clodius, Roman actor of the 1st century b.c., a contemporary of Roscius. When acting he entered into his part to such a degree as sometimes to be seized with a per¬ fect ecstasy. Plutarch mentions a report con¬ cerning him while representing Atreus, that, deliberating how he should revenge himself on Thyestes, he was so transported beyond him¬ self that he smote one of the servants who was crossing the stage and killed him on the spot. He was a dramatic tutor of Cicero, and be¬

friended him in exile. His last appearance wras at the dedication of Pompey's Theatre in 55 b.c. ; his voice thereafter failed. His folly in spending money on expensive dishes made him as conspicuous as his dramatic talents. He is said, at one entertainment, to have had a dish filled with singing and speaking birds, which cost $4,000. His son AEsop inherited his father's worst traits; it was he who drank the $40,000 pearl dissolved in vinegar, to be noted as having drunk the most expensive known beverage.

AESTHETICS (from Greek alaOdveadai , (<to perceive55), is the science of beauty and art.* It can be treated from the scientific standpoint, in which the actual qualities of the different va¬ rieties of beauty and art are investigated em¬ pirically, or from the historical standpoint, by the exposition of the views which have been held as to the nature of art and beauty in their chronological sequence and under their author¬ ship, or from the systematic standpoint, by the

independent investigation of the philosophical question of the nature of art and beauty. The scientific standpoint is too technical and too in¬ tricate to be susceptible of treatment within the narrow confines of an encyclopedia article, so that we shall approach the question entirely from the other two avenues.

AEsthetics receives its first scientific treat¬ ment in the work of Plato (q.v., 428-348 b.c.). In accordance with the views of his master Socrates (q.v.), Plato identifies the good, the beautiful and the true. All these are regarded as being ultimately one ideal entity, the Idea of the Good. This is incarnated with increas¬ ing perfection in corporeal beauty, in the beauty of noble souls, in the virtues, and in the sciences, until at last we meet it unalloyed and pure. The beautiful as we find it in concrete beautiful objects is for. Plato an imperfect ex¬ emplification, that is a copy, of the Idea of the Good. As it is the nature of art to copy and imitate, a wrork of art is still further re¬ moved from the Idea of the Good than the ob¬ ject of which it is a copy, and hence possesses less beauty. Accordingly the greatest care is necessary to prevent art from being a hindrance rather than a help in the search for beauty, and in the ideal state it will be under strict super¬ vision in order that the deterioration conse¬ quent on its remoteness from the Idea of the Good may not turn it into a source of positive evil.

In so far as he exhibits a certain parallelism between the beautiful and the good, Plato, and indeed all the other Greek philosophers with him, is unquestionably right. Beauty and Vir¬ tue are both normative concepts — that is, they both establish a chain of values running from the lowest to the highest. Furthermore, both the beautiful and the good seem to have a claim on our action: we refrain from at least as many deeds because they are in bad taste as because they are evil. Still, there are so many cases where the two standards appear to con¬ flict that their absolute identity is doubtful. It is a familiar experience to find an artist a hope¬ less reprobate, or a thoroughly good man aii utter Philistine. This would be quite impos-

*The word is also used by Kant in its etymological sense, as the science of sense-perception.

sible if goodness and beauty were completely identical.

In Aristotle (q.v., 384—322 b.c.) we find the first germ of a distinction between ethics and aesthetics, for he says that whereas beauty may be found in the unchanging, only actions are good. It will readily be seen that this is not a very sharp distinction, and Aristotle does not go on to develop its implications. In the spirit of his master Plato, he gives as the essential marks of beauty order, symmetry, and limita¬ tion. He makes the important statement, which has served as a basis of the theories of many later aestheticians, that the pleasure induced by beauty is disinterested.

Aristotle's theory of beauty, in so far as we possess it, is extremely undeveloped, and ac¬ cordingly we find no use made of it in his book on art, the <Poetics.) Here he follows Plato in considering the essence of art to be imita¬ tion. The motive of this imitation is the uni¬ versal desire for knowledge, so that the value of the knowledge imparted determines that of the work of art. Therefore a work of art per¬ forms its function properly when it gives us the most valuable knowledge of things — the knowledge of their inner essence. This re¬ quires idealization and generalization, so that the true art portrays types, not individuals — laws, not facts. Thus while for Plato art is essentially inferior to nature, for Aristotle it may and should be superior to nature.

Aristotle assigns to music — and implicitly also to the other arts — four functions. These are (1) that of serving as an amusement; (2) that of moral education; (3) that of constitut¬ ing an enjoyable exercise; (4) that of ((purifi- cationA The first and the third of these four values are obviously only the passive and the active phases of a single one. As for the em¬ phasis which Aristotle puts on the moral pur¬ pose in art, it is to be remembered that beauty and morality are for him essentially one and the same thing, so that this moral purpose un¬ doubtedly stands not only for what we should ordinarily know by that name, but also for the intrinsic beauty of the work. The <(purifica- tion® which art is supposed to produce is an emotional one. If we accept Zeller's interpre¬ tation of this point, Aristotle means that music and the tragedy furnish a safe outlet for our more violent emotions by turning them from the individual and particular to the general and universal, owing precisely to that typical reference which we have seen to be character¬ istic of art in the Aristotelian system.

The next great figure in aesthetics is the Neo-Platonist Plotinus (q.v., 204-269 a.d.). Like all the Greek philosophers, in fact, he too maintains that the beautiful is intimately re¬ lated to the good, but this relationship receives less emphasis in his system than in those of Plato and Aristotle. Plotinus is a mystic, and he considers that all

things are emanations from the One, which he also knows as the Good. In so far as these emanations are per¬ ceptible to our external senses, we experience them as beauty. As Bosanquet interprets this view, it means that all that symbolizes in sensu¬ ous form laws eternally active ranks as beau¬ tiful. This symbolization need not involve any symmetry or order or proportion in the sym¬ bol — indeed the One itself has no parts, and can consequently share in none of these quali¬

ties. Whereas on the Aristotelian view only that which possesses structure can be beautiful, Plotinus holds that nothing can partake of beauty whose parts are not beautiful in them¬ selves.

Plotinus is the last of the ancient thinkers to have added anything really new to the theory of aesthetics. With the rise of Chris¬ tianity and the barbarian incursions from the north and east, art and the theories of art to which it gives rise enter on a period of retro¬ gression. Save as a tool of religion art is dormant until the wonderful centuries that foretoken the Renaissance. As a consequence, although we do find treatments of aesthetic problems from the time of St. Augustine to that of St. Thomas, these have been singularly arid and without fruit in modern aesthetic theory. It is remarkable, however, that the Renaissance itself, fertile in artistic interest and artistic production as perhaps no other time has been, should have left so small a con¬ tribution to the aesthetics of to-day, and that it is to the pedantic, dry Enlightenment that we must look for the rebirth of the theory of beauty and art.

As in all the philosophical theories of the Enlightenment, we find a sharp contrast be¬ tween the empiricistic, Baconian, ((tough- minded^ tendency of the British speculators and the ^tender-minded^ rationalism of the Continent. The Continental tradition in aes¬ thetics begins with Baumgarten (1714—62), a follower of Leibniz (q.v., 1645-1716). Leibniz believed that our experience of what is appar¬ ently matter is really the result of a confused perception of an aggregate of entities he calls monads, which are essentially spiritual or mental in nature. Accordingly Baumgarten considers that the property of these monads which is known to our intellect as the perfection of the ideas which they possess and the consequent correctness or truth of these is perceived after the confused method of our senses as beauty. It will be seen that this view of Baum¬ garten belongs to that utter pedantry which characterizes the decadence of the Leibnizian tradition, yet it is the first sign of the renas¬ cence of a philosophical aesthetics.

Not many years after Baumgarten we find the question of the norms and branches of art treated by Winckelmann and by Lessing (q.v., 1729-81). Winckelmann's interest is primarily in those arts that appeal to the sense of vision, while Lessing, on the other hand, approaches aesthetics from the standpoint of the poet. Winckelmann has a formal view of the nature of beauty not unlike that maintained by the British artist Hogarth, but he does not make beauty the sole end of artistic endeavor, for he finds that beauty and expressiveness are not perfectly compatible. Lessing follows Winckel¬ mann in applying the word ˆart® primarily to the plastic arts, so that poetry is for him some¬ thing quite outside the scope of art. Conse¬ quently he is able to maintain that the ugly has its place in poetry, but not in art. Lessing fol¬ lows Aristotle closely, even pedantically, in his views on the drama and on the relative func¬ tions of the several arts.

In Britain at about this time Home (Lord Kaimes) (1696-1782) develops an asthetical theory on the lines laid down by Shaftesbury and Hutcheson. This view is verbally hedon-

istic, making the test of beauty a certain sense of immediate satisfaction, yet in essence it is not hedonistic at all, for this satisfaction is said to be not only quantitatively but qualitatively distinct from the satisfaction of the useful or the merely agreeable. This view in effect amounts to the postulation of a peculiar aes¬ thetic feeling. Like the Greeks, the members of this school of British thought maintain that the norms of ethics and aesthetics are closely related, but it is the ethical norm which they subordinate to the aesthetic one, for they find the basis of morality in the beauty of good deeds. Edmund Burke develops this empiri- cistic vein in aesthetics further, and derives the feeling for the sublime from the instinct for self-preservation, that for the beautiful from the social impulse. The technical side of artis¬ tic theory is investigated by Hogarth (q.v.), who places great emphasis on the beauty of form or design.

As in metaphysics and in ethics, so also in aesthetics it is the great genius of Kant (q.v., 1724-1804), which unites the twin streams of British and of Continental thought into a single mighty current. He combines the apriorism of Baumgarten with the empiricism of Home. Like Home, he finds the criterion of the beau¬ tiful in some kind of pleasure which it excites, but he does not consider this pleasure as a mere feeling. Beauty, he maintains, is that which universally and

necessarily arouses dis¬ interested satisfaction by its own form. Or again, he states that whatever pleases univer¬ sally and without a concept is beautiful. Beauty then is determined by the pleasure it excites in us, but this pleasure must not apply to the sensory qualities of the object, but rather to their mere arrangement, and must be universally and necessarily determined by this arrangement. The nature of the arrangement in question is indicated by Kant when he says that a thing is beautiful when it corresponds to the nature of the cognitive faculty, or when it brings harmony among human faculties. Kant denies that an absolute a priori treatment of the various types of beauty is possible, but he nevertheless attempts what practically amounts to this. One of his most important contributions to aesthetics is that of making the way for a true appreciation of the sublime. He finds that the sublime is that which by its quantitative or qualitative mightiness shocks us and fills us with pain at our own smallness, but then fills us with a feeling of the exaltation of the greatness of our moral nature, which is mightier and loftier than all the splendors of the outer world.

While Kant emphasizes the formal side of the beautiful to the exclusion of the material, the poet Schiller (q.v., 1759-1805) finds the na¬ ture of the artistic activity in a mediation be¬ tween the matter-impulse and the form-impulse, between desire and reason. Art, then, consists of a sort of balancing or play of all the mental faculties. This suggestion was adopted by Spencer (q.v., 1820-1903), who attributes to this play the function of preventing the higher faculties from disuse and the atrophy conse¬ quent thereon. The fact that the higher we go in the scale of life the less completely do the bare necessities of life consume the energies of the individual furnishes both the need and the opportunity for a progressive increase in the

attention given to play and to aesthetic appre¬ ciation.

In the great schools of idealistic philosophy which immediately follow Kant aesthetics plays a large part. According to Hegel (q.v., 1 770—1831). art is a synthesis of theoretical and prac¬ tical action, or subject and object, of cognition and action, of conscious and unconscious ac¬ tivity,' of freedom and necessity, of genius and deliberation. Beauty is the shining of the Ab¬ solute (cf. the One of Plotinus) through the veil of sense-experience. It is through this in¬ tervention of a sensuous medium that beauty differs from truth. The further developments of the Hegelian aesthetics are essentially Platonic.

That arch-pessimist Schopenhauer (q.v., 1788-1860) finds in beauty

his respite from the toil and trouble of the world. Beauty is for him the expression of an Idea. Everything is in some measure beautiful. When we con¬ template the beautiful we lose our individ¬ uality and will, and in so far our dependence on the World-Will. The appreciation of art gives us a partial attainment of the Buddhist Nirvana. The disappearance of will from con¬ sciousness takes place on the contemplation of the sublime by an active effort on our part ; while when we devote our attention to the beautiful, will merely vanishes of itself.

In Herbart (q.v., 1776-1841) we find a cer¬ tain affinity both to British subjectivism and to Kant. Beauty, he considers, arouses an in¬ voluntary and disinterested judgment of ap¬ proval. We transfer this predicate of the judg¬ ment to the object and call it beauty. This ca¬ pacity of judgment, or taste, differs from de¬ sire in that it can judge that which is present as well as that which is absent. The essential character of the beautiful is its form.

In Britain the early and middle part of the last century received relatively little influence from Kant. Dugald Stewart (1753-1828) and Bain (q.v., 1818-1903) develop a view which shares in all the hedonism of Home and Burke. Bain follows Alison and Jeffrey in attributing to association an important place in the genesis of the sense of beauty. Although in all these writers there is much that is relevant to the modern discussion, this is so bound up with a false and unwieldy psychology that it is hard to isolate.

It is not worth while to arrange the writers of the middle and latter thirds of the last cen¬ tury historically. In England we have that great, paradoxical, sincere genius Ruskin (q.v., 1819-1900). <(Art for art's sake® is a doctrine essentially repugnant to him. According to him, the three functions of art are to enforce the religious sentiments of mankind, to perfect their ethical state, and to do them material serv¬ ice. It will be seen that his opinion agrees closely with the practice of that period which furnished so much of his inspiration, the Mid¬ dle Ages, for then art, like philosophy, was ancilla Theologies.

In Taine (q.v., 1828-93) as in Spencer, the biological, anthropological consideration comes strongly to the front. Art is largely a matter of environment, and there can be, for example, no talk of the Flemish type of art as bad art, or of the Italian type as good art. The func¬ tion of art is to make predominant the essential character of the object it depicts. A Dutch

landscape is excellent in so far as it truly con¬ veys to us the misty, foggy air, the rich, marshy fields, the careful husbandry of the Rhine delta.

By Tolstoy (q.v., 1828-1910) art is regarded as a means, not an end, and in this he agrees with Ruskin. Art is a human activity aiming at the transmission of emotion, and is not the pursuit of beauty. Art should not be the ex¬ clusive property of one class or one race, and should avoid such subjects as sexual love, patriotism, or religious devotion. Its true func¬ tion is ethical.

According to Bosanquet (q.v.), the beauti¬ ful is ((that which has characteristic or indi¬ vidual expressiveness for sense-perception or imagination, subject to the conditions of gen¬ eral or abstract expressiveness in the same medium.® Bosanquet finds beauty in charged¬ ness with associated ideas. Here the voice is Hegel's but the hand is Bain's. Beauty is to be judged, not by individual human feeling, but by the tendency of human feeling. ((Beauty® usually means such beauty as is recorded in art — i. e., by those who perceive best.

According to Bergson (q.v.), art exhibits the intention of life, as opposed to science, which presents its analysis. Art is the sphere of intuition, science that of reason. As Berg¬ son considers the knowledge gained by intui¬ tion as deeper and truer than that gained by reason, he assigns a higher place to art in his philosophy than to science. He names sym¬ pathy as one of the cardinal marks of art.

Bergson's antithesis between art and science is foreign to the philosophy of Santa¬ yana, who regards art as plastic instinct which is conscious of its aims. The instinct which constitutes art in Bergson's philosophy need not possess this consciousness. For Santayana art is reason propagating itself. This attitude is not unlike that of Benedetto Croce (q.v.). Croce holds that art is essen¬ tially lyrical, and consists in a representation of the feelings. He denies to art all ulterior metaphysical purpose. It should exhibit feel¬ ings and not deliberately construct them.

Let us now leave the historical for the sys¬ tematic part of the discussion. We find that the two cardinal problems of aesthetics are that of the nature of beauty and that of the nature of art. Although art does not always deal with what is prima facie beautiful, it would seem difficult to deny that any proper object of art, no matter how great its

apparent ugliness, will be beautiful when approached from the stand¬ point of the artist or the appreciative observer. Although, then, it is easy to formulate para¬ doxes that appear to point in the opposite direction, we are justified in defining art as that human activity which has as its end the production of the beautiful. This definition does not tacitly introduce the (<Art for art's sake® which Tolstoy combats, for it leaves en¬ tirely open the question of the independence of beauty from morality, and furthermore does not declare that the attainment of beauty is an end which justifies action. If we admit the validity of this definition, we have left of the two problems of aesthetics but one — that of the nature of beauty.

The most important question which, as we have seen, has historically presented itself as to the nature of beauty is that of its source. This question is completely analogous to that of

realism or idealism in epistemology; is beauty something intrinsic in what is perceived, which is only disclosed through the act of per¬ ception and not at all altered thereby, or does beauty consist in a relation between the beauti¬ ful object and the subject who is aware of it or the act of perception by which it is brought to consciousness? Those who hold views of the first type, such as Plato, Aristotle, Plotinus, Hegel or Bosanquet are called objective aestheti- cians, while their opponents, including among others Home, Shaftesbury, Burke and in a limited sense Kant, are said to be subjective aestheticians.

The dispute between subjectivists and ob- jectivists in aesthetics has been full of much confusion. The subjectivists have been ac¬ cused of degrading their science by making the validity of the aesthetic judgment dependent on the mere passing whim of any self-appointed critic. Without in the least prejudicing the answer to the main question at issue, it may be pointed out that to say that a view is degraded or ignoble is not to say that it is false, and furthermore that a property of an object which is dependent on its relation to a percipient is not necessarily mutable at the will of the per¬ cipient. An aesthetic judgment w'hich is de¬ pendent, let us say, on my feeling of admiration for a certain statue, is no more under my con¬ trol for that reason than if it were solely de¬ pendent on the physical shape of the statue. As far as my will is concerned, my sentiment of admiration is as immutable a datum as the statue itself. The subjectivist, then, may have canons of taste quite as binding as those of the objectivist, but these canons involve a double reference — a reference not only to the object but to the subject.

Furthermore, a subjective aesthetics need not necessarily identify

beauty with pleasantness. The old psychological hedonism which made all the keys of human interest strike one of the twin strings of pleasure and pain is no longer upheld by any respectable authority. It is quite possible that the seat of the dispute between the claims of sensual pleasure and of beauty is within us, and that they are equally parts of our nature. Therefore it is no answer to the subjectivist in aesthetics to say that the beauty of an object is introspectively other than the pleasure it may induce in us, and is often in¬ compatible therewith.

It is through this method of introspection or self-examination, however, that the true nature of the beautiful is to be discovered, and the question of' its internality or externality to be solved. Does recognition of the beautiful enter the mind after the manner of our perception of a quality in an external object — as we per¬ ceive that a tree is green and leafy or bare and brown — or after the manner of an awareness of our own emotions, such as anger, satisfac¬ tion, contrition, etc. ? This is the attitude which should be kept in the mind of the reader throughout the following discussion.

Now, it is a familiar experience that one may be blind to beauty with much more readiness than to an ordinary sensory impression. Words¬ worth's Peter Bell found that

" A primrose by a river's brim,

A yellow primrose was to him,

And it was nothing more."

It is obvious that the essential thing which Peter Bell lacked was not sensory acuity. He probably saw as much of the color, form, etc., of the primrose as the poet himself. What was wanting in him was a certain emotional re¬ sponse to the color and form. Furthermore, once this emotional response is present, machine shops or traveling cranes may be beautiful, as is shown by the work of Mr. Pennell, or city slums or barren deserts or in fact anything whatever. It is difficult to avoid the conclusion that in the emotion excited by any object and only in that emotion does its beauty lie.

If we accept this view, we shall be subjectiv¬ ists, and indeed the trend of the age is in this direction. There are still, however, many di¬

verging types of subjectivism possible. One might say with Kant that though the seat of beauty is in the impression made by an object on the subject, this impression is bound by fixed a priori laws. Yet the very diversity of the beautiful and the fact that nothing appears ugly to him who considers it in the proper light, seem to exclude this view from being a real solution of the problem. But even if we admit that the connection between the beautiful object and the emotion it excites is a de facto one and not a priori, we have not yet pinned our aesthetics down to a single theory. Many maintain that beauty consists in the ex¬ citation of some peculiar aesthetic emotion. If we accept the James-Lange theory of the emotions — which has been seriously questioned of late — and maintain that an emotion is indi¬ viduated only through the physiological re¬ sponse which characterizes it, it will be very difficult to attribute a separate existence to the aesthetic emotions. We react to different works of art in very different ways ; one excites awe, another pity ; we laugh at the comedy and weep at the tragedy, we exhibit the physical symp¬ toms of admiration for this work and those of the enjoyment of that. It is impossible for a single physiological reaction to be found that is compatible at once with those of awe, pity, laugh¬ ter, tears, pleasure, admiration, which is not also found in our reactions to things not beautiful. Even apart from the James-Lange theory, the multifariousness of the aesthetic emotions seems to contradict their possession of any common element. It seems, then, that the aesthetic senti¬ ments are qualitatively identical with those of non-esthetic character. Whatever distinction may subsist between them must be sought else¬ where than in their quality. Perhaps the dis¬ tinction is to be found here ; many of our emotions, such as desire, fear, hatred, satisfac¬ tion, etc., have a certain polarity about them — they are either emotions of approval or of disapproval. These emotions do not always agree in their direction at different times, or even at one and the same time, we may fear what we desire, or even hate it. Nevertheless, owing to the de facto uniformity of our nature, certain types of things will attract us in the long run and in general, and others repel us, even though these rules may be broken in a large number of particular instances. That is, we possess what may be known as a taste, which changes very slowly, if at all. Further¬ more, we are able to recognize whether or not a thing will satisfy our taste, regardless of the conflicting promptings of our immediate emotions or of the presence or absence of the

thing in question. Now, there are two ways in which we may apply our taste to an object or process ; we may consider in its environment in the causal chain, or by a more or less volun¬ tary act we may blot

out its actual associates, and look at it in complete isolation. The first is the method of the moral agent, while the second is that of the artist. Here wre see why art and morality may differ in their promptings, and also why the artistic attitude has been called disinterested by Kant and so many other writers. If the whole world were summed up in one picture or one symphony, the artist would necessarily be a good man, but it is not, and the very disregard for the loose ends of causality which bind his activities to the rest of the world which makes the artist a genius is likely to interfere with his being completely good. Or to put it otherwise, the artist may have many masterpieces, but the good man only one — his life.

On this theory of art it is easy to account for both the mutability and the fixity of aesthetic taste. Taste with a capital T is formed from the aggregate of individual tastes bv much the same process by which these take their origin from the single emotions of those to whom they belong. Taste is that part of personal tastes which is based on what is biologically and culturally common to mankind. Consequently it changes just as rapidly and just as slowly as mankind itself. Of course, in addition to this general human taste, every group of persons has. its group taste. There are always certain individuals, whose tastes have been more highly developed in the intricacy of their objects and the uniformity of their norms than those of the common run of humanit}ˆ. These persons indi¬ cate the direction which the general human taste will assume with the increase of artistic and cultural education, and accordingly the group-taste of this community is Good Taste. With Bosanquet we may make this Good Taste the. practical norm of aesthetics.

The norm of aesthetics, then, is to be found in the direction in which evolution and education are leading the judgments of mankind. It is because of the de facto permanency of the trends of education and evolution and of human nature itself that art is a social matter — that the works of one man can be appreciated by others — and not because of any a priori character of the beautiful and of art.

Bibliography.— Aristotle, (Poetics) ; Ar¬ nold, Matthew, (Essays on Criticism } (London 1865, 1875, 1888, 1895) ; Baumgarten, (AEsthetica) (Frankfurt 1750-58) ; Bergson, Henri, (Le rire} (Paris 1900; tr. as (Laughter) 1911) ; Bosanquet, Bernard, (Three Lectures on AEsthetic) (London 1915) ; (A History of ˆEsthetic *(ib. 1910) ; Croce, Benedetto, <Estetica) (Milan 1902; tr. London 1907) ; Fechner, Gustav Theo¬ dor, (Zur experimentalen Hfsthetik) (Leipzig 1871) ; Gaultier, Paul, (The Meaning of Art' (London 1913); Goethe, Johann Wolfgang, . < Essays on Art> (tr. Boston 1845) ; Griveau, Maurice, Wes elements du*

beau) (Paris 1893) ; Hazlitt, William, (Essays on the Fine Arts) (London 1873); Hegel, George 'Wilhelm Friedrich, intro¬ duction to (Philosophy of Fine Art> (tr. by. B. Bosanquet, London (1886); Hogarth, William, (The Analysis of Beauty (London 1753) ; Home, Henry, (The Elements of Criti-

cism) (Edinburgh 1762-66) ; Kant, Immanuel ‘Kritik der Urtheilskraft’ ’(‘Critique of Judgment,’ tr. by J. H. Bernard, London 1892) ; Lee, Vernon, ‘Belcaro’ (London 1883) ; Less¬ ing, G. E., (Laocoon) (Berlin 1766) ; Lipps, Theodor, (Grundlegung der /Esthetic’ (Leip¬ zig (1903) ; Morris, William, ‘The Decorative Arts) (London 1878) ; Munsterberg, Hugo, Psychology and Life) (Boston 1899) ; Parker, Henry, ‘The Nature of the Fine Arts) (Lon¬ don 1885) ; Plato, (Republic,’ etc. (tr. by N. Jowett, Oxford 1871); Plotinus, ‘Enneads;’ Reynolds, Sir Joshua, ‘Seven Discourses on Arts) (London 1769-76) ; Ruskin, John, <Works) (Orpington 1871-83) ; Santayana, George, ‘The Sense of Beauty) (New York 1896) ; Schelling, Friedrich Wilhelm Joseph von, Philosophic der Kunst) (tr. by A. John¬ son, London 1845) ; Schiller, Johann Christoph Friedrich, ‘Essays, /Esthetical and Philosophi¬ cal, Newly Translated’ (London 1846) ; Schlegel, August Wilhelm, ‘Vorlesungen fiber schone Litteratur und Kunst) (Heilbronn 1884) ; Schopenhauer, Arthur, Pie Welt als Wille und Vorstellung) (tr. as ‘The World as Will and Idea) by R. B. Haldane, London 1883) ; Spencer, Herbert, Principles of Psy- chology) (London 1855) ; Taine, Hippolyte Adolphe, Philosophic de l’art’ (tr. by J. Durand, London 1865) ; Tolstoi, Leo, ‘What is Art?) (in ‘Works,’ tr. by Leo Wiener, Vol. XIX, Boston 1904).

Norbert Wiener, Editorial Staff of The Americana.

/ESTIVAL, es'teyal, or ESTIVAL, plants whose principal functions, especially the bloom¬ ing of the flower, occur in summer, are called aestival. Prairie plants are nearly all of this class.

AETA, a'a-ta. See Negritos.

/ETHEL, ath'el, prefix in Anglo-Saxon name. See Ethel.

/ETHELBOLD. See Ethelbold.

/ETHELHARD. See Adelard.

/ETHELING. See Atheling.

/ETHER. See Ether.

/ETHIOPICA, “Tales of Ethiopia,® a Greek romance in 10 books in which is told the story of the love, adventures and final union of Chariclea, an Ethiopian princess, and Thea- genes, a Thessalian Greek. I he author is a certain Heliodorus of Emesa in Syria, who lived in the latter part of the 3d century a.d., and not, as was until recently believed, Helio¬ dorus, bishop of Trikka in Thessaly. The development of the tale, which is on the whole the best of the extant Greek romances, is ex¬ tremely complicated, often, though Tasso thought otherwise, unreasonably so. For the author not only adopted the technique of the epic and disclosed subsequently through the speeches of his characters the events which had brought about the situation at the opening of Book I, but he also allows these characters, as they successively appear, to relate their own previous adventures. The tale thus abounds in episodes, amid which the thread of the main story is temporarily lost. There are, besides, countless incidental discussions of mat¬ ters connected with geography, natural science war, literature, etc., etc. It may fairly be said

that about one-quarter of the ‘/Ethiopica’ is either irrelevant to the story or impedes its progress. The interest naturally depends al¬ most wholly upon the plot and the fantastic adventures in strange lands ; there is but little character-drawing. The author displays, how¬ ever, a remarkable power of pictorial descrip¬ tion, especially in those scenes which mark some important turn in the action. Of these probably the most striking is the brilliant scene in Book VII in which the lovers meet again under the walls of Memphis. The ‘/Ethiopica’ exerted no inconsiderable influence upon the fiction of the Renaissance. Tasso greatly ad¬ mired the structure of the story and drew from it material for his ‘Jerusalem Delivered/ In England, Sidney is heavily indebted to it in his ‘Arcadia’ and Greene shows its influ¬ ence in his ‘Menaphon’ and ‘Pandosto.’ Shakespeare in ‘The Winter’s Tale’ took over from ‘Pandosto’ some of Greene’s borrowings from Heliodorus. The ‘/Ethiopica’ was first translated into English in 1577 by Underdowne from the Latin rendering of Warschewiczki and his version has been reprinted in ‘Tudor Trans¬ lations’ (Vol. V, London 1895). A translation from the original Greek is that of Rev. R. Smith (London 1901). Consult also Chassang ‘Histoire du roman dans l’antiquite grecque et latine’ (Paris 1862) ; Rohde, ‘Der griechische Roman’ (Leipzig 1900) ; Oeftering, ‘Heliodor und seine Bedeutung fiir die Litteratur’ (Ber¬ lin 1901); Wolff, ‘Greek Romances in Eliza¬ bethan Prose Fiction’ (New York 1912).

Nelson G. McCrea,

Anthon Professor of the Latin Language and Literature, Columbia University.

/ETHIOPXS, a Greek epic poem in five books, written by Arctinus of Miletus, one of the earliest poets of Greece and a contributor to the epic cycle. He flourished about 744 b.c. The '/Ethiopis' was so named from the /Ethi- opean Memnon, who, after the demise of Hec¬ tor, became the ally of the Trojans. The poem takes up the narrative of the Trojan War from the close of the 'Iliad.' It begins with the famous deeds and death of the Ama¬ zon Queen, Pentheseleia, and ends with the death of Achilles and the dispute over his arms between Ajax and Odysseus. Consult Allen, T. W., in Classical Quarterly (pp. 82 et seq., April 1908) ; Lang, 'Homer and the Epic' (1893) ; Kinkel, 'Epicorum Grsecorum Fragmenta' (1877).

/ETPIIOPS MARTIAL, an old pharma¬ ceutical name for black oxide of iron.

ZETHIQPS MINERAL, a name some¬ times given to the artificial black sulphide of mercury.

/ETHQGEN, a compound better known as nitride of boron. See Nitrides.

ZETHRIOSCOPE, eth'ri-o-skcVp, a form of differential thermometer devised by Sir Tohn Leslie. Both bulbs of the thermometer are enclosed in a concave mirror, one of them being in its focus. The instrument is so sensi¬ tive that when directed toward the sky it is affected by a passing cloud. It is not much used at the present time.

AETIUS, a-e'shius, the last great Roman general and savior of western Europe from

being Hun : b. Durostorum on the Danube (now Silistria), c. 390 a.d. ; murdered toward the end of 454. He was son of a distinguished com¬ mander Gaudentius (probably barbarian) ; in military service while a boy, and given to Alaric as a hostage after Pollentia in 403, remaining three years ; later a hostage to the Huns ; and gaining close intimacy with both races, of mixed results. After Honorius' death he supported the secretary Joannes against the Empress-regent Placidia, and

brought an army of 60,000 Huns to his aid; but, Joannes having just been de¬ feated and slain, the Huns were bribed to go home, and Aetius was made Count of Italy and commander of the army, and became the chief adviser and prop of Placidia and her children. His main rival was Boniface, Count of Africa, at Carthage ; and the accepted story is that by a base double intrigue he drove him into revolt and calling the Vandals from Spain into Africa; that on discovering the fraud Boni¬ face fought in Italy first a slight battle and then a duel with Aetius, was mortally wounded, and in dying counseled his wife to marry no one but his rival. It is very suspicious ; but any way the Vandals overran North Africa; Boniface was killed ; Aetius in 432 had to flee to the Huns, came back the next year with an army of them, was reinstated, and for the next 17 years was the ruling spirit in the Western Empire, battling in Gaul with Visigoths, Bur¬ gundians and Franks, upholding by combined soldiership and policy the declining state, with a vigor and genius which made him the one great man of the Roman world in foreign eyes. In 450 the great Hunnish invasion under Attila (q.v.) came rolling down into Gaul with a volume it seemed impossible to stay, and the success of which might have blighted western Europe as their kinsmen the Turks have blighted the eastern portion. Aetius by his di¬ plomatic skill and knowledge of how to play on the barbarians induced Theodoric the Visigoth to league with him, followed Attila into the Seine valley, and on 20 Sept. 451 checked his progress in the mighty battle of Chalons (q.v.) ; the empire's last victory, and one of the world's turning-points. Attila's death not long after broke up the Hunnish coalition and delivered the empire from it; but it was also Aetius' death sentence, and with his the empire's. Va- lentinian III, Placidia's son, hated Aetius' power and had only submitted to it from fear of Attila; and, feeling now secure, seized the occasion of a visit of Aetius to Rome, to arrange the marriage of his son with Valen- tinian's daughter, and stabbed him with his own hand. The sack of Rome by the Vandals shortly followed ; and 22 years after Aetius' murder the last of a succession of puppet emperors was pulled down by the barbarian Odoacer.

AETIUS, a Roman theologian of the 4th century .surnamed ((the Atheist® : d. Constanti¬ nople 367. He wras founder of the Anomcean- Arian sect, named after him the Aetians, who held that the Homousian doctrine of the be¬ gotten son as God is self-contradictory, since the nature of God is eternal and unbegotten. He was banished from Alexandria by Constan¬ tins in 356, but was called to Constantinople by Julian in 361 and made a bishop.

AETIUS, a-e'shi-us, a Greek physician of the 6th century: b. Amida,

Mesopotamia. He

became court physician at Byzantium and was author of a voluminous work on medicine in 16 books, based on Oribasius, Galenos and other sources. A complete Latin translation by Cornarius was published (Basel 1542). Con¬ sult Zernos, (Aetii sermo sextidecimus et ulti- mus } (1901).

ZETNA. See Etna.

ZETOLIA, e-to'lia, ancient Greece, a dis¬ trict lying along the north shore of the Gulf of Corinth and having Epirus and Thessaly north, Acarnania west, separated by the Ache- loiis and Locris and Doris east, separated by the Daphnus. The only other river of any size was the Evenus. Between it and the Acheloiis lies a marshy but fertile plain separated by the Aracynthus range on the north from a similar plain, of which two large communicating lakes — Trichonis (Apokuro) and Hyria (Zygos) — take up a great part. The rest of the country is crossed in all directions by rugged mountains, covered with forests and intersected by ravines. The plains produced plenty of corn and fine pasture and the AZtolian horses were famous, while the mountain slopes gave excellent wine and oil ; but for some reason the tribes never till late in Greek history entered into the fel¬ lowship of Greek civilization and then but imperfectly. They were wild, backward, an¬ archic and untamable ; a race of robbers and pirates and the best recruiting-ground in Greece for mercenary soldiers. In the Heroic age, when most other Greeks were like them, and Odysseus' grandfather won distinction as an accomplished klepht, they were conspicuous ; and ZEtolia was the scene of the Calydonian boar hunt. (See Meleager). When they reap¬ pear in Thucydides' pages on the Peloponnesian war, they are a congeries of unfederated inde¬ pendent tribes, living by plunder and the chase, with few and poor towns — Thermon, Calydon and Pleuron the chief — and taking to the mountains when hard pressed. They had a sort of union like the Iroquois League, for common action against a common enemy, but no corporate accountability and nobody to make a treaty with. After Alexander's death Anti¬ pater and Craterus invaded the country ; and this, with the great new wealth their general trade of soldiering was bringing in and conse¬ quent increase of civilized interests, forced them to strengthen the bond into the ZEtolian League, first mentioned in 314 b.c., but of im¬ mense weight in later times and chief rival to the Achaian League and Macedonia. Unlike the former, it was a league of tribes, not towns. But like that, it was a democracy nominally, every freeman over 30 having a vote if he could come to the capital and cast it, but an aristoc¬ racy or timocracy in practice, only the

wealthier being able. There was a Great Council, or Pansetolicon, which met yearly at Thermon, elected all magistrates afresh and enacted gen¬ eral laws and voted on foreign policy; a smaller body of Apocletse, who were in fact a cabinet, who prepared all questions to put before the Great Council and seemed to have been perma¬ nent ; a chief magistrate, the strategos (gen¬ eral), who was not only military commander but president of the assembly, put such ques¬ tions as he chose (Speaker), was elected annu¬ ally and was not allowed a vote on the question of peace or war; a liippcirchos or cavalry com-

mander; and a chief secretary. After the ex¬ pulsion of the 'Gauls from Greece in 279, in which the League did good service, it expanded enormously ; not like the Achaian League be¬ cause of the advantages of its membership, but from the exceeding disadvantages of its hos¬ tility — for it never lost its piratical character wholly to its latest day. It took in Locris, Phocis and Boeotia, Acarnania, southern Thes¬ saly and Epirus, many cities in the Pelopon¬ nesus, Thrace and Asia Minor and the island of Cephallenia ; it controlled the oracle at Delphi and the Amphictyonic Council. But its wanton invasion of Messenia (southwest Peloponne¬ sus) in 220 brought the Achaian League and Macedonia both against it ; Philip V invaded ZEtolia in 218, sacked Thermon with its vast accumulated national treasures and burnt the sacred* buildings ; and the next year they made peace. In 211 they again provoked a war with Macedonia and again Thermon was captured, peace being made in 205. In 200 they joined Rome against Macedonia and helped to win the battle of Cynoscephalae, which crushed Philip; but they were so disgusted with Flamininus' settlement of the country without giving them the advantages they expected, that in 192 they made the fatal error of allying themselves with Antiochus of Syria against the Romans. An- tiochus was crushed in 189 and the independ¬ ence of the League came to an end. In 167 the pro-Roman party murdered 550 of the patriot leaders, and the League was dissolved and ZEtolia made a Roman province.

AFANASIEV, Aleksander Nikolaievich,

Russian folklorist and antiquarian : b. Bogu- char, government of Voronezh, 11 July 1826; d. 23 Sept. 1871. He received his education

in the gymnasium of Voronezh and at the Uni¬ versity of Moscow, where he studied law. At his graduation in 1848 he entered the civil service and took a position in the record-office of the ministry of foreign affairs (1849) and in 1856 became head of the department. He was dismissed in 1862 on the charges of being involved in political affairs. His writings touch upon all sides of Russian-Slavonic tradition. His love for antiquities and mythology shows the indirect influence of Buslayev, who was becoming prominent during Afanasiev's stu¬ dent days. He was more directly influenced by Kavellin and Solovyev whose literary direction he reproduced in his historical treatises, (State Organization under Peter I,5 Concerning Patrimonial and Country Estates5 (both pub¬ lished in the Archives of Hist, and Juridical Studies). While ye't a student he contributed to Sovremennik (1849-52), Otechestvenmiiya Zapiski (1850-60) and several other publica¬ tions. His most important articles of those days are (Ancestor-House Demon) (publ. in the Arch, of Hist.-Judicial Studies cone. Russia, ed. by Kalachev) ; (Sorcerer and Witch5 (publ. in the almanac <Kometa,5 ed. by Schepkin, and as a separate edition, Moscow 1851) ; (Zoomor- phic Gods of the Slavs5 (in Otechestvenmiiya Zapiski Nos. 1-3, 1852). From 1858—59 he edited the Bibliographicheskiya Zapiski. His most important works besides ' those mentioned are:

(Russian Journalism5 (in Otechestvenmiiya Zapiski 1855; separate edition, Moscow 1859. It is a valuable monograph of century litera¬ ture dealing with journalism for the period of

1769-74) ; (Russian Popular Legends 5 (1860) ; (Russian Folk-Tales > (1860), which is the first scientifically treated collection of Russian fairy tales. In 1866 appeared his (Poetical Concep¬ tion of Nature of the Slavs,5 which is the first attempt at a scientific and systematic study of Slavonic mythology. This work shows the influence of Grimm, Kuhn, Schwarz and Max Muller. The general criticism of his work is lack of originality.

AFANASIEV, Aleksander Stepanovich

(Afanasyev-Chuzhbinin), Russian novelist and ethnographer: b. Poltava, 1817; d. St. Petersburg, 6 Sept. 1875. Graduating from a gymnasium in 1836, he entered military sendee but left it with disappointment and the rank of lieutenant (1843). In 1847 he took a civil service position in the office of the governor of Voronezh. Two years later he gave it up and devoted himself entirely to literary work. His first poem (The Ring> appeared in 1848 under the pseudonym "Chuzhbinin.® In 1856 the government sent him, together with a few

other writers, to study the life of the people on Russian sea-coasts. He chose the region of the Dnieper and expounded the result of his studies in his work (Journey in Southern Russia) (Saint Petersburg 1861) which is a good description of Ukranian life. He wrote a great deal and contributed almost to all Russian periodicals. Not counting his poems, news¬ paper articles and correspondence, his produc¬ tions amount to 60 works. He founded in 1864 the newspaper Saint Petersbnrgski Listok. In the seventies he edited Magazin inostran- noi literatnrui (Journal of Foreign Literature) and the paper Novosti (1875). He had also been editing minor periodicals for a period of a few months each. During the last years of his life he was inspector of the museum of Saint Petersburg. His most valuable contribu¬ tions are his ethnographical works. Besides the work named above, he started a dictionary of the Ukranian Dialect.) He wrote several very successful Ukranian poems ((Tell me the truth, my good Cossack5). His Russian poetry is much inferior. Of his novels those are best which describe military and provincial life. They are written in an interesting style and contain good character sketches of Russian officers. Some of his works besides those men¬ tioned are: (Recollections about T. G. Shev- chenko) (Saint Petersburg 1861) ; (Fanya) (ib., 1872) ; (Petrograd Gamblers5 (ib. 1872).

AFFECTION, in psychology, is a mental element co-ordinate with “sensation.® See Feeling.

AFFIDAVIT, a statement reduced to writ¬ ing, and sworn or affirmed to before some officer who has authority to administer an oath. An affidavit should refer to the cause in which it is made. The common-law rule is that it must contain the title of the cause. The place where the affidavit is taken must be stated, to show that it is taken within the officer’s juris¬ diction. The affiant must sign the affidavit at the end. It is necessary that the officer signing the jurat should append his official title.

An affidavit should also describe the affiant sufficiently to show that he is entitled to offer it, for instance that he is a party, or agent or attorney of a party to the proceeding. This

matter must be stated, not by way of recital or as a mere description,

but as an allegation in the affidavit.

Affidavit of Defense. — A statement made in proper form that the defendant has a good ground of defense to the plaintiff's action upon the merits.

Affidavit to Hold to Bail. — An affidavit which is required in many cases before a per¬ son can be arrested.

AFFILIATION, is a species of adoption which exists in some portions of France and in other European states. The person affiliated succeeds equally with other heirs to the prop¬ erty acquired by the deceased to whom he had been affiliated, but not to that which he in¬ herited. See Adoption. As to orders of affiliation in bastardy proceedings, see Bastard.

AFFINE TRANSFORMATION, a-flnf, in geometry, a transformation by means of which every point in a plane receives a dis¬ placement whose direction is parallel to a given fixed straight line called the axis of affinity, and whose magnitude is proportional to the distance of the given point from that axis. The affine transformation is projective; that is, it transforms every straight line into a straight line.

AFFINITY. In law, the connection exist¬ ing in consequence of marriage between each of the married persons and the kindred of the other. By the marriage one party thereto holds by affinity the same relation to the kindred of the other that the latter holds by consanguinity ; and no rule is known to us under which the relation by affinity is lost on a dissolution of the marriage more than that by blood is lost by the death of those through whom it is derived.

Affinity is distinguished from consanguinity, which denotes relationship by blood. The de¬ grees of affinity are computed in the same way as those of consanguinity.

In Chemistry. — The tendency manifested by certain substances to unite with one another so as to produce new combinations, chemically different from the primitive ones. The word was originally applied in this sense in the belief that some obscure and undiscovered <(affinity® or relationship existed between the combining substances ; but it now appears probable that the contrary is more nearly true, and that the tendency toward combination is strongest, gen¬ erally speaking, between bodies that are quite dissimilar; though it is impossible to lay down any fixed rule of this simple kind. The modern theory of chemical affinity is too elaborate to be treated adequately

under a single heading. See Chemical Affinity ; Dissociation ; Elec¬ trolysis ; Equilibrium, Chemical; Molecular Theory; Solution.

AFFIRMATION, the act of affirming, in the sense of solemnly declaring in a court of law that certain testimony about to be given is true. Also, the statement made. First the Quakers and Moravians, who objected on con¬ scientious grounds to take oaths, were allowed to make solemn affirmations instead ; now everyone objecting to take an oath has the same privilege; but, as is just, false affirmations, no less than false oaths, are liable to the penalties of perjury.

AFFRE, Denis Auguste, afr\ de-ne o-gust, French ecclesiastic: b. 27 Sept. 1793; d. 27 June 1848. Because of his prudent and mild charac¬ ter he was made archbishop of Paris by Louis Philippe's government in 1840. Though not yielding blind submission to all its measures, he abstained from offensive opposition; and when a republic was proclaimed in 1848 he kept aloof from political strife, but displayed earnest zeal for the public welfare. During the June insur¬ rection he climbed on a barricade in the Place de la Bastile, carrying a green bough in his hand as messenger of peace ; but he had scarcely uttered a few words when the firing recommenced, and he fell mortally wounded, to die next day. He wrote several theological works and one on Egyptian hieroglyphics.

AFGHANISTAN, af-gan'i-stan, Asia, lit. ftThe country of the Afghans® is the term which, in the present day, designates those regions governed by the Amir of Kabul. The name ((Afghan)) is supposed to signify ((noisy or tumultuous.® It is very ancient in its origin and has gradually been assumed by the subjects of the Amir. During the Afghan conquest of India they were known as Pathans and Ro- hillas, terms which are still used in India to denote people of Afghan origin.

Topography. — Afghanistan, as it now ex¬ ists, embraces the country between the River Oxus and the Indus, and consists of ranges of snow-covered mountains, deep ravines and valle}rs. Many of the valleys are well watered and very fertile. The surface on the northeast is covered with the lofty ranges of the Hindu Kush which reach 20,000 feet above the level of the sea. The total length of this range of mountains is estimated at 365 miles. The do¬ minions of the Amir as now defined by various boundary commissions lie on the northwest frontier of India, and are bounded on the north by Turkistan, on the west by Persia, on the south by Baluchistan and on the east by Cashmere and British India. It has an area of about 250,000 square miles and a mixed popula¬ tion estimated at 6,000,000. The rivers are very numerous. Among them are the Oxus, or Amu-daria, which

separates Afghanistan from Russian territory; the Murghab, which rises in the Afghan hills and flows through the city of Merv ; the Helmund watering the valleys of Afghan Turkistan; the Hari Rud, which waters the valley of Plerat and runs a course of 245 miles to the Seistan Lake; the Kabul River, which flows from the city of Kabul and enters the Indus at Attok; the Kuram and the Gomal rivers, which enter the Indus in British terri- tovy; the Lora which flows through the Peshin valley and is 200 miles in length. The only lake of importance is the Ab-i-Stada on the. Ghilzai plateau about 65 miles from Ghazni. It stands at a height of 7,000 feet. It is about 44 miles in circuit and very shallow.

Provinces and Cities. — Afghanistan is divided into five provinces — Kabul, Herat, Kandahar, with chief cities of the same name, Afghan-Turkistan and Badakshan ; and two territories — Kafiristan and Wakhan. The province of Kabul is bounded on the northwest by Koh-i-Baba, on the north by the Hindu Kush, on the northeast by the Pangsher River and on the east by Jagdalik. It is very moun¬ tainous, but it also has large sections of rich

arable land. A very large portion of the popu¬ lation live in tents during the summer months. Herat extends from near the sources of the Hari Rud River on the east to the Persian frontier on the west. The Herat valley is most fertile, and it has been estimated that it is capable of supplying an army of 150,000 men. Kandahar is a most important province of the country. It extends over a wide area from Ghazni to the Persian frontier, and includes that part of Seistan which belongs to the Amir. Afghan-Turkistan was formerly the ancient province of Balkh but has now assumed its present condition through the treaty arrange¬ ments with Russia and Great Britain. The province of Badakshan lies to the extreme east of the kingdom and is bounded on the north¬ east by the River Oxus and on the south by the Hindu Kush. It consists of lofty moun¬ tain ranges and deep rugged valleys in which there is but little agricultural development. In the winter the climate is severe and the moun¬ tain passes are blocked by snow. Wakhan con¬ sists of two valleys watered by the Panja River. It is too elevated and sterile for tillage. Its lowest hamlet is 8,000 feet above the level of the sea.

Lines of Communication. — From India to Afghanistan there are four well-known lines of communication. The first is from the rail¬ way

terminus at Peshawar through the Khybar Pass. The second from Tliul through Bannu over the Paiwar and Shutturgardan passes to Kabul. The third through the Gullair Sur- wandi and Sargo passes to Ghazni. The fourth from the railway terminus at Quetta to Kan¬ dahar via the Bolan Pass.

There are four distinct lines by which Rus¬ sia can move on to Herat: First from the Cas¬ pian by the Mashat route; second from Chi-kishliar by the Bendessan Pass and across the desert to Merve ; third from Tashkend via Gherjuit: fourth by Balkh direct to Herat. The distance from Peshawrar to Kabul is 191 miles in 20 stages varying from 8 to 12 miles. From Kandahar to Herat is 365 miles. From Herat to Balkh 370 miles. From Kabul to the Oxus by Balkh 424 miles.

Climate. — As might be expected in a country having the physical conditions of Afghanistan there is the greatest variety of climate. In some parts, especially north of Kabul, the winter is rigorous. In the city of Kabul the snow lies for two or three months and the people seldom leave their houses. At Jalabad the climate is similar to that of the plains of India and the heat is intense in sum¬ mer. Throughout Kandahar the summer heat rises to a very high temperature, but at Herat, although much lower than Kandahar, the cli¬ mate in summer is more temperate and in winter much milder. The salubrity and charm of some localities is much praised by the people, although they have by no means that immunity from disease which the dry climate of the country and the fine physical condition of the people might lead us to suppose. Fevers arc common, stone is frequent, ajid eye diseases prevail.

Natural Productions. — Afghanistan is sup¬ posed to be rich in minerals. Small quantities of gold have been taken from the streams flow¬ ing from the Hindu Kush. There were at one

time famous silver mines in Badakshan. The ruby mines which lie some feet above the Oxus River have a world-wide reputation, but the deposits have not been worked regularly. There are rich lead mines in Herat. Coal has been found near Ghazni. Silicate of zinc comes from the Kaki country. Sulphur abounds in Herat on the confines of Seistan. Sal-am¬ moniac is found in Seistan. Gypsum exists in large quantities in Kandahar. Nitre abounds in almost every part of the land.

Vegetable Productions. — On the Alpine ranges of the country there is a magnificent growth of forest trees — cedars, pines, hazels and walnuts ; and growing under the shade of these trees are rich varieties of honeysuckle, currant, gooseberry, hawthorn and rhododen¬ dron.

The wild rose is found in all parts of the land and is an important export. Lemons and wild vines are in abundance. In cultivated dis¬ tricts the chief trees are mulberry, willow, pop¬ lar and ash. An important product is gum resin which grows abundantly in Kandahar and Herat. In the highlands of Kabul edible rhu¬ barb is a local luxury. Walnuts grow wild and are exported with the pistachio nut to both India and Russia.

Agriculture. — In most parts of Afghanistan there are, as in India, two harvests. One of them is called the ˆBaharakˆ or spring crop, which is sown at the end of autumn and reaped in summer. It consists of wheat, barley and a variety of lentils. The other harvest is called ˆPaizah,® and is sown at the end of the spring and reaped in autumn. It consists of millet, maize, beets, turnips, etc. The staple food of the country is wheat, but rice is largely imported from Peshawar. The growth of melons, especially of the <(sarda melon, }) is an important cultivation as they are exported to Peshawar. Sugarcane is grown in the plains, and cotton in the warmer sections of the country. Tobacco is very widely cultivated and exported to Rus¬ sia and India. The fruit crops are abundant. Every kind of European fruit — pears, apples, peaches, oranges and grapes are produced in many varieties and of excellent quality. Mul¬ berries are reduced to flour, and when prepared in cakes form the staple food of many districts. Grapes are cultivated to a very high degree. They are placed in boxes protected with cotton wool and exported in large quantities to India. The vineyards and peach gardens at Kandahar and Herat are very productive.

Industrial Products and Trade. — Silk is produced in Kabul, Kandahar and Herat, and although it is largely consumed in domestic manufactures the best qualities are exported to Bombay. Excellent carpets, soft, brilliant and durable in color, are made in Herat and are very often sold in America as (<Persian carpets. They are woven by the Nomads of the desert, and by the girls and women while the men are tending their flocks on the hills. Of recent years the Amir has given great atten¬ tion to the manufacture of all kinds of articles, and English artisans have been brought into the country for promoting various industries. The chief exports of the country are wool, horses, silk, fruit, madder and asafoetida. Under the fostering care of the Amir the ex¬ ports of Afghanistan are very rapidly on the increase.

Animals. — Bears, jackals, hogs, monkeys, leopards, wolves, hyenas, wild dogs and cats are among the wild animals of Afghanistan. The wild ass is found in the southwest part of the country. During the breeding season Afghanistan appears to be the retreat of a variety of birds. Camels are frequently em¬ ployed, although they cannot travel in rainy weather or through snow. The two-humped Bactrian camel of historic lineage is still seen. Horses are a staple export to India, especially the ((Yabu,® a stout heavy-shouldered pony about 14 hands high. The breed has been much improved as they are used for the cavalry of the Afghan army. The cows are the humped variety of the east and the dairy produce is an important feature in Afghan diet, especially the pressed and dried curd called ((krut.® There are two varieties of Afghan sheep both having the fat tail. One bears a white fleece and the other a russet or black one. The ex¬ port of wool is very largely cultivated. Goats are also valuable on account of their hair which is used in the manufacture of shawls. Dog breeding is cultivated by the Afghan nobles as they are used in the sports of the field, especially for turning up quail and partridge for the hawk, hawking being a popular sport among both the nobles of Persia and Af¬ ghanistan.

The People . — The origin of the Afghans is involved in obscurity and has given rise to various opinions. Some have supposed that thev are descended from the soldiers of Alex¬ ander the Great whom he left in these countries. Others affirm that the Copts of Egypt or the Chaldseans and even the Armenians were their ancestors. The Afghans themselves maintain that they are of Jewish origin descended from Afghana who was in lineal descent from Abra¬ ham and Hagar by their son Ishmail. Some Afghan authors affirm that Afghana was the grandson of King Saul. Some writers state that they are descended from Jewish prisoners sent into the mountain by Nebuchadnezzar. It is related that when Nadir Shah marching to India arrived at Peshawar, the chief of the Yusufzai tribe presented him with a Hebrew Bible. There is no trace of Israelitish origin in the Afghan language (see Language and Literature) , but there is not a single Afghan, from the Amir on the throne to the tiller of the soil, who does not believe that he is one of the ((Beni Israil.® Of the Afghans proper there are numerous clans, somewhat similar to the clans of the highlands of Scotland. Of these the most important are the Durranies, originally called Abdalis, who received the name from their famous clansman the poet king, Ahmad Shah. The Barakzais are a powerful tribe represented by the present reigning dynasty. The Gilzais were supreme in power at the beginning of the 18th century and are still a powerful clan, occupying the high plateau of Kandahar. The Yusufzais inhabit a

district called Yusufzai in Pashawar valley. The Kizil- bashes are Persianized Afghans who came into the country in the time of Nadir Shah. The Hazaras, living in a district of that name, came from the east with the army of Ghenjiz Khan. They have Mongolian features, and speak a Persian dialect. The Hinkis are people of Hindu descent. They are the merchants and

bankers of the country and being idolaters they pay a poll tax, according to Muhammadan law, and are denied many privileges. In religion the Afghans are of the Sunni sect of Isjam, and in jurisprudence belong to the Hanafi school of interpretation. The Kizilbashes are of the Shiah sect of Moslems. The people of Ka- firistan are idolaters who are being rapidly con¬ verted to Islam.

As a race the Afghans are exceedingly at¬ tractive to the western traveler. They are handsome and athletic. They have fair com¬ plexions with aquiline features and long flowing beards. The women are exceedingly fair and handsome, and more intellectual than the aver¬ age woman of the East. In cities they are rigidly secluded, but in outlying districts they are free to roam and are often employed in the field.

The Afghan, familiar with bloodshed from his boyhood, makes a valiant soldier, and there are many Afghans who have attained to high positions in the Anglo-Indian army. <(The avenger of blood® is an institution among the Afghans and it is a point of honor for the next of kin to avenge a murder. With the Afghans hospitality is the very salt of life, and the ordinary salutations of the people bear this character. When passing along a road the mounted chieftain salutes the weary traveler with ((may you never be tired,® to which the man on foot responds (<may you ever be pros¬ perous.® On approaching the village <(Hujrah,® or guest house, the traveler is received by the host with the welcome of ((may you ever come,® to which the guest replies <(may you ever re¬ main master of this house.® When the guest departs he is escorted to the village boundary and is sent on his way with the salutation (<may God protect you.®

The Afghans of to-day believe that their nation has a great future in harmony with the noble traditions of the past and they believe that they will again become a great and power¬ ful nation. They are shut in by Russia on the one side and by Great Britain on the other, and in consequence of the British conquest of Baluchistan and Sind they have been deprived of a seaport. But they hope against hope and consequently avoid committing themselves to either Russia or Great Britain, and pose as the enemies of Persia.

Language and Literature. — The national language of the Afghans is Pashto, or Pakhto, Pushto, or Pukhto, Pushtu, or Pukhtu, the pro¬ nunciation varying in different tribes. It is an Aryan or Hindu-Persian language, written in the Arabic character, with three letters pe¬ culiar to Pushto. It is only of late years that the language has been expressed in writing with a system of phonetic spelling. Specimens of Aighan prose and poetry are found in the ((Kalid-i-Afghani,® a work compiled for the use of students in 1872. As the Afghans claim an Israelitish origin Oriental scholars have thought that there were traces of Hebrew in certain Afghan words, but these words, without ex¬ ception, have been brought into the language through the religious terminology of Islam.

Pushto is the spoken language of the people in the Trans-Indus territories of British India, including Peshawar, also in the province of Kandahar, and among the hills between the

provinces of Kabul and Kandahar and British India. Persian is the language of the educated classes.

The earliest English grammar of Pushto was compiled by Prof. Bernard Dorn of the Imperial Russian University of Kharhov in 1829. There are Pushto grammars by Captain Vaughan, Maj. H. G. Raverty, Dr. Henry Walter Bellew and Dr. Trumpp; Pushto dic¬ tionaries by Dorn, Raverty and Bellew.

There must be a very large number of Pushto manuscripts in existence stored away in the moscpies of the country, where native cali-graphists employ their time in copying them. Peshawar has been the literary centre of the Afghan language. The earliest work discov¬ ered in Pushto is a history of the conquest of Swat by Shaikh Mali Yusuf zai, a.d. 1413. There is also a history of Bunair by Khawjah Khan. In the reign of Akbar, 1600, Bayazid Ansari, known as Pir Roshan, the <(enlightened saint,® wrote several works in Pushto. There are also several books, chiefly religious, by his contemporary Akhund Darweza. In Hughes' textbook there is a selection from the Tarikh-i-Murassa, the (<gem-studded history® by Afzal Khan Khattak, who was a voluminous writer. His grandfather, Khushhal Khan, chief of the Khattaks, translated about a hundred works from Persian into Pushto, and he is also the author of a ((Diwan® of poetry of very high merit. He died in 1691 and is buried at Isuri, near Attock. Ahmad Shah, the

founder of the present Afghan monarchy, was a poet of some reputation. The popular poet of the Afghans, whose ®Diwan® is read wherever the Afghan language is spoken, is Abdur Rahman, who re¬ sided near Peshawar at the beginning of the 18th century and whose grave is to be seen at Hazarkhana, two miles from Peshawar.

(Sj K JiV _? ˆ

L-k v- *jIt*- j, <_P J-1'

A STANZA FROM DIWAN-I-ABDUR RAHMAN.

The Christian scriptures have been trans¬ lated into Pushto by William Carey, the Baptist missionaiy, 1825, Isidor Lowenthal, an Ameri¬ can Presbyterian missionary 1862, and in 1886 by a committee of missionaries working under the supervision of the late Thomas Valpy, French bishop of Lahore 1886;

Government and Administration. — When Amir Abdur Rahman ascended the throne in 1880 the greatest confusion prevailed in every department of political, civil and military ad¬ ministration, while the supremacy of the Amir at Kabul was scarcely recognized by the chief¬ tains of the various tribes. But with states¬ manlike ability, supported as he was by the British government, he succeeded in establish¬ ing a permanent government. It consists of a board of treasury, a board of trade, a bureau of justice, a department of police, a public works department, a postal system and a department of education. The government is conducted by a supreme council known as the “durbar.® This

VOL. l — 14

council has three sections. First the (<Durbar-i- Shai,® or such members of the reigning family as are invited by the Amir. Second, the “Khawanin,® or assembly of Maliks and chief¬ tains. Third, the ((Ulima® or representatives of the Mullahs or Moslem priesthood. The Amir is seldom absent from the council, and its assembling depends entirely on his pleasure. The Amir’s cabinet consists of the lord of the seal, the commander-in-chief, the lord treas¬ urer, the postmaster-general and the chief secretaries of departments. The laws are those established by the Moslem religion, the ((Pukh- tanwali,® or peculiar customs of the Afghan people, and the supreme will of the Amir. Amir Abdur Rahman gave his closest attention to revenue and in order to establish the currency of the country he opened a mint in Kabul. The annual revenue is unknown but it probably amounts to a sum equal to

$5,000,000 which includes the subsidy received from the government of India. According to the old system the Afghan army was composed entirely of tribesmen collected by their Maliks who were supposed to hold their land on condition of military service. At the present time the regular army is estimated at 150,000 men, con¬ sisting of a royal bodyguard of four regiments of infantry and three regiments of cavalry, a regular army of 80 regiments of infantry, 40 regiments of cavalry and 100 batteries of artillery. The police force consists of 30,000 men, and the tribal auxiliaries are about 30,000. When placed on a war footing it is thought that the Amir could put in the field at least a half million men, because every Afghan is by birth and education a soldier, a man of war from his youth.

History. — For many centuries this country was the centre of history. First, as the seat of powerful Buddhist kingdoms, and then as the highway of Moslem conquest. In the time of Darius Hystaspes, b.c. 515, these regions em¬ braced the Achemenian Satrapies, and among them a district known as Paktyes, which must have been on the right bank of the River Indus now known as the district of Yusufzai, and the Peshawar valley. This is undoubtedly the origin of Pukhtun which is the oldest name of the country of the Afghans, and is still retained in the designation of their language.

Alexander the Great marched to Herat, the ancient Artacoana, the capital of Aria, and pro¬ ceeded to Zarangae on the banks of the Hel- mand. He then advanced to ((a country among the snows in a barren land® which seems to have been the mountain regions of Kabul and Ghazni. After retiring to the foot of the Caucasus for the winter he advanced to Bac- tria, the modern Balkh, and proceeded to Kabul, from whence he marched down the left bank of the Kabul River and crossed the Indus probably at Hund near Attock.

The Ariana mentioned by Strabo, about the beginning of the Christian era, must have occu¬ pied the limits of the present Afghanistan. In 310 b.c. an Indian king named Chandragupta ruled the province of Kabul. In 250 b.c. there was an independent Greek dynasty in Bactria (Balkh). The ancient coins, and the old Bud¬ dhist ruins show evidences of this, and when the old ruins at Balkh have been excavated very interesting historical facts will be made known

regarding this Greek kingdom in Central Asia. At present we know but

little regarding it.

Demetrius, b.c. 190, reigned in Arachosia after being expelled from Bactria. Eucratides, 181 b.c., reigned in the mountain region. Under Heliocles, 147 b.c., the Parthians extended their conquests through the country into India. In 126 b.c. Meander invaded India. The Chinese accounts of the time when Bactria was over¬ run by Scythian invaders are supposed to be very extensive although they have not yet been translated into western languages. Chinese his¬ torians say there was a nation called Yuchi settled in the Oxus valley in 126 b.c. In the travels of the Chinese pilgrim Hwen Tsang in the 7th century we have accounts of the country now known as Afghanistan. In 630 a.d. he says there were both Indian and Turk rulers in the Kabul valley.

The first attempts of the Moslem conqueror to bring these regions to the faith of the Prophet of Arabia were unsuccessful. It was not until 977 a.d. that Subuktigin the Turk con¬ quered the country and established his capital at Ghazni and founded what is known as the Ghaznevi dynasty. His son was the famous Mahmud of Ghazni who in 1001 invaded India, and in course of time established Afghan rule both at Lahore and Delhi. He is credited with having made 12 expeditions to India. His tomb is still to be seen at Ghazni. The Ghaznevi dynasty was succeeded by that of Ghor or Ghur which transferred the capital of the em¬ pire to Herat. Muhammad Ghori ruled Af¬ ghanistan in the 12th century and made Delhi the capital of his kingdom. About 1220 Genghiz Khan, the great Mogul ruler of the Tartars, marched through Afghanistan and displaced the Ghor dynasty. In 1398 Timur made himself master of Central Asia, and crossing the Indus plundered the Panjab as far as Delhi.

Baber, who was sixth in descent of Timur, captured the city of Kabul in 1504, and made it the capital of his empire. He was eventually killed and his body was carried from Agra and interred in Kabul where his tomb is still to be seen. His son Humayun was defeated and driven out of India in 1540, but in 1555 he again mounted the throne at Delhi, and at his death was succeeded by Akbar, the greatest of the Mogul emperors of India. The Afghans gave Akbar much trouble. When the power of the court of Delhi was weakened, Kandahar with a large part of Afghanistan fell under the power of the Shah of Persia. Nadir Shah wras pro¬ claimed King of Persia in 1736. He seized the city of Kabul as one of the main gates of India, and then leading his army through the Khybar Pass entered the Peshawar valley and there defeated the imperial forces. Ahmed Khan, a general of the Saddozia clan, seized the treasury at Kandahar, and was crowned King of the Duranis about 1747. With Ahmed Shah commences the history of

Afghanistan as an independent nation. Pie reigned 26 years and was succeeded by his son Timur, who in 1773 removed the seat of government from Kandahar to Kabul. He reigned 20 years, and died in 1793 leaving three sons. The youngest son, Shah Shujah, eventually ascended the throne and made Peshawar his capital. In 1800 the Tsar of Russia and Napoleon Bonaparte concocted a scheme for the invasion of India,

and consequently 'the British government sent Mr. Monstuart Elphinstone as ambassador to Shah Shujah at Peshawar and concluded a treaty in 1809.

The Baralczai tribe, under the leadership of Fateh Khan, deposed Shah Shujah, who fled from Peshawar to seek protection at Lahore, where the Sikh ruler Runjit Singh extracted from him the famous koh-i-nur diamond, which eventually became the property of the English sovereign. In 1826 Dost Muhammad became Amir of Afghanistan, founding the present dy¬ nasty of Afghan rulers. Dost Muhammad ob¬ tained supreme power, and establishing himself as Amir, entered into negotiations with Russia. This led to the invasion of Afghanistan by a large British force in 1838 and the establish¬ ment of Shah Shujah as king. Dost Muham¬ mad was sent to India a prisoner of the British government. In November 1841 Sir Alexander Burns and his suite were assassinated and a few days later Sir William MacNaghten shared the same fate. In January 1842 the British army retreated to India and was completely anni¬ hilated, with the exception of Dr. Bryden, who was brought in half dead to Jalalabad on 13 Jan. 1842, the sale survivor of an army of 5,000 men and 12,000 camp followers. In April two British forces were sent to avenge the massacre, a column under General Pol¬ lock by way of the Khybar Pass and another column under General Nott by way of the Bolan Pass. The British evacuated Afghanis¬ tan in October 1842 leaving Shah Shujah ruler of the country. Shah Shujah was assassinated, and the British having released Dost Muham¬ mad from prison, he was restored to the throne. During the mutiny of the native army in In¬ dia in 1857 Amir Dost Muhammad proved a valuable ally to the British. The British gov¬ ernment engaged in war with Persia in behalf of the ruler of Afghanistan and eventually re¬ stored the province of Herat to Afghan rule.

Dost Muhammad died June 1863 and was succeeded by his son Shir Ali. Consequent on the nomination of Shir Ali, who was not the eldest son of the deceased Amir, a rebellion broke out and for a time Afzal Khan and Azim Khan, the elder sons of the Dost, reigned conjointly as Amirs. Eventually Shir Ali be¬ came firmly established on the Afghan

throne and in March 1869 visited Lord Mayo, viceroy of India, at Umballa.

Amir Shir Ali Khan being suspected of in¬ trigues with Russia a British force command¬ ed by Gen. Donald Stewart invaded Af¬ ghanistan in 1878. On the death of Shir Ali February 1879 he was succeeded by his eldest son, Yakub Khan. A treaty with Amir Yakub Khan and the British government was signed at Gandamak by Colonel Cavagnari represent¬ ing the English government and the Amir in May 1879. By this treaty an extension of the British frontier was secured and the residence of a British envoy in the city of Kabul was sanctioned. In accordance with this treaty Sir Louis Cavagnari proceeded to Kabul accom¬ panied by his secretary, Mr. Jenkins, Dr. Am¬ brose Kelly and Lieutenant Hamilton. On 4 September the troops of the Amir demanded payment and attacked the British embassy, killing Cavagnari and his three companions.

As a result of this outrage a third Afghan

war began on 6 Sept. 1879 and an expedition under the command of General Roberts marched to Kabul arriving 28 September. The murderers of the four Britishers were executed and Amir Yakub Khan was deported to India. Afghanistan for a few months was under British military rule, but in July 1880 Abdur Rahman Khan, the eldest son of Afzal Khan, who was the eldest son of Amir Dost Muhammad Khan, was recognized as Amir at a durbar in which the British government was represented by Sir Lepel Griffin. On 27 July 1880 occurred the ((disaster** of Maiwand when the British force under the command of Gen¬ eral Burrows was totally defeated by Sardar Ayub Khan, a brother of the late Amir Shir Ali. General Roberts made his celebrated march for the relief of Kandahar, leaving Ka¬ bul 8 Aug. 1880 and arriving at Kandahar 31 August, he totally defeated Ayub Khan on 1 September. On 30 Sept. 1881 the British evacuated Kandahar and Amir Abdur Rah¬ man took possession of the province. In 1883 the Amir was granted a subsidy of 12 lakhs of rupees. In 1885 Amir Abdur Rahman at¬ tended a conference with Lord Dufferin, vice¬ roy of India, at Rawalpindi, and received the British decoration of G. C. M. G. Numer¬ ous boundary commissions were held during the years 1887 and 1888 in which the frontiers both on British territory and also those of the Russians were clearly defined. A final agree¬ ment was reached by negotiations carried on by Sir Mortimer Durand in

Kabul 1893 and the subsidy granted to the Amir was in¬ creased by six lakhs of rupees. In 1894 the Amir was invited to England by Queen Vic¬ toria, but being unable to leave his country, he sent his second son, Sadar Nasr Ullah Khan. On 1 Oct. 1901 the Amir died and was suc¬ ceeded by his eldest son, Habib Ullah Khan, who, in a treaty with the British, assumed the position of the independent sovereign of Af¬ ghanistan. In January 1907 Amir Habib Ullah visited Calcutta to meet Lord Minto, the viceroy of India. He was assassinated 20 Feb. 1919 and was succeeded by his son, Amanullah Khan, Inayat Ullah Khan, the eldest son of Habib Ullah Khan agreeing to the succession 1 March 1919.

Bibliography. — Bellew, H. W., Afghanis¬ tan and the Afghans • *(London 1879) and (The Races of Afghanistan* (London 1880) ; Curzon, G. N., (The Pamirs and the Source of the Oxus *(London 1889) ; Daly, K., (Eight Years Among the Afghans * (London 1905) ; Martin, F. A., (Under the Absolute Emir) (New York 1907) ; Pennele, P. L., Among the Wild Tribes of the Afghan Frontier* (Lon¬ don 1911) ; Roberts, Lord, (Forty-nine Years in India *(London 1897) ; Tate, (The Kingdom of Afghanistan* (Bombay 1911).

Henri F. Klein.

AFIUN-KARA-HISSAR, a'fe-oon'ka-ra'- his-sar, Turkey in Asia, cityˆ of Anatolia, 180 miles northeast of Smyrna by rail ; also con¬ necting with Konieh, Angora and Constanti¬ nople. At the junction of several caravan routes, it carries on an extensive Oriental and European trade in general merchandise. It has manufactures of saddlery, carpets, felts and arms, and opium is largely produced in the neighborhood. Pop. 20,000.

A FORTIORI , an argument derived from what is stronger; an argument more potent than that which has just before been employed. When in Euclid it is reasoned, that much more than is the angle B D C greater than the angle B C D, the use of the words much more implies that the a, fortiori argument is used.

AFRANCESADOS, the partisans of Na¬ poleon in Spain and the Spanish colonies.

AFRICA, second in size of the six con¬ tinents, with a continental area of 11,262,000 square miles and islands of 239,000 more, has the Mediterranean north, the Atlantic west, the Red Sea and Indian Ocean east, the Antarctic Ocean south; and lies nearly due south of Europe and southwest of Asia. It extends from lat. 37ˆ 20' N. to 34° 51' S., and

long. 17° 32' W. to 51° 28' E., being nearly equal in length and breadth from its extreme points; from Cape Blanco in Tunis to Cape Agulhas in Cape Colony is nearly 5,000 miles; from Cape Verde in Senegal to Cape Guardafui in Somali¬ land about 4,600. The northern section, how¬ ever, has an average breadth nearly double that of the southern, owing to the great northern projection of the upper part, the western coast taking a sudden inward turn and facing south for nearly 20 degrees of longitude, forming the Gulf of Guinea.

General Topography. — From its junction with Asia at the Isthmus of Suez, the north coast runs west by a little north to the Strait of Gibraltar, its nearest approach to Europe, whose Mediterranean shore it faces, and whence for many centuries it derived its principal civili¬ zation. The chief identation is that forming the Gulfs of Cabes and Sidra. From the Isthmus south the coast runs somewhat south¬ east, parallel to Arabia, separated by the long narrow expanse of the Red Sea ; further south it projects well to the east, overlapping the south coast of Arabia and again running nearly parallel to it, the two forming the Strait of Bab-el-Mandeb and the Gulf of Aden. From the terminus of this projection at Cape Guarda¬ fui, the coast trends southwest with slight un¬ dulations to the south extremity of the conti¬ nent. About midway, separated from the main¬ land by the Mozambique Channel, 250 miles wide, lies the great island of Madagascar. Save those named, Africa has no great indenta¬ tions, and the coast line is very small relatively to its size ; about 16,000 miles, a fifth less than that of Europe absolutely, and between one-fourth and one-fifth as great relatively. The southern extremity presents to the Southern Ocean a coast line of nearly 400 miles exclud¬ ing indentations, compendiously known as <(the Cape,** first doubled by Bartholomew Diaz and Vasco da Gama. Its principal indentations are Algoa Bay and False Bay. The islands belong¬ ing to Africa are not numerous, and except Madagascar none of them large. In the Atlan¬ tic Ocean there are Madeira, the Canaries, the Cape Verde Islands, the Bissagos, the islands off the coast of Guinea, Fernando Po, St. Thomas, Annobon, etc., Ascension Island, St. Helena and Tristan d'Acunha; in the Indian Ocean, Sokotra, Zanzibar, Seychelles, Amirante, Comoro Isles, Madagascar, Mauritius, Reunion, with their dependencies ; and some small islands in the Southern Ocean.

Northern Africa. — The interior of Africa forms two great divisions

nearly corresponding with the external diversity of form already in¬ dicated. The northern section has its greatest extension from east to west, the southern from north to south. The northern division lies for the most part above the 6th degree, of north latitude, extending from the Atlantic on the west to the Somali coast and the Red Sea on the east. Its principal feature is the Sahara or Great desert, which is inclosed on the north by the elevated plateau of Barbary and that of Barca, on the east by the Nile valley, on the west by the Atlantic Ocean and on the south by the Niger and the countries of the Sudan. The north coast region (plateau of Barbary) is traversed by the Atlas system and its continu¬ ations, rising to the height of 13,000 feet or even more. Exclusive of the mountains it has an elevation of from 1,500 to 3,000 feet. From Barca, where the former level prevails, it de¬ scends gradually toward Egypt. The character of the desert, though sufficiently inhospitable, is much less uniformly monotonous than till recent researches it was commonly reputed to be. Instead of an undeviating sandy plain irregularly interspersed with speck-like oases it contains elevated plateaux and even mountains with more or less permanent streams, and habit¬ able valleys which lose themselves in the vast low-lying tracts of sand with which the more elevated regions alternate. The desert itself is furrowed with wadis (dry river-beds) radiating in all directions ; while under the sand collec¬ tions of water have been found, which by means of artesian wells have been turned to account by the French in their dependency, Algeria. A considerable nomadic population is thinly scat¬ tered over the habitable parts of the desert, and in the morfe favored regions there are settled communities. (See Sahara). To the south of the Sahara, and separating it from the plateau of southern Africa, a belt of pas¬ toral or steppe country extends across Africa. This region has received the general name of the Sudan and includes the countries on the Niger, around Lake Tchad, and east to the elevated region of Abyssinia.

Southern Africa. — From Lake Tchad the country begins to rise till below the 10th degree of north latitude, where the edge of the ele¬ vated plateau of high or southern Africa be¬ gins. This division of the continent is, as far as known, completely surrounded, at a distance of 50 to 300 miles from the coast (which is usually low but rising inland), by what look like ranges of mountains varying in breadth and height; but which are really the escarpment of a tableland, or series of tablelands, of con¬ siderable elevation and great diversity of sur¬ face and direction, having hollows filled with great lakes rivaling those of America in extent, and terraces over which the rivers break them¬ selves in falls and rapids. The southern di¬ vision has, like the northern, a desert region - — the Kalahari desert — but it is of small

extent compared to the Sahara. In some respects it resembles the Sahara, but possesses more vege¬ tation. The mountains which inclose the south tableland are mostly much higher on the east than on the west, and the slope of the land and the flow of the principal rivers, with the excep¬ tion of the Zambezi, is from east to west. The east edge of the plateau reaches its highest ele¬

vation and greatest extent in the mountainous country of Abyssinia, with heights of 10,000 to 14,000 or 16,000 feet. From this the system ex¬ tends north in detached ranges or occasional elevations between the valley of the Nile and the Red Sea, with gradually diminishing height to the very delta of the Nile. The east edge of the Abyssinian plateau presents a steep un¬ broken line of 7,000 feet in height for several hundred miles. This line of elevation extends south toward Lakes Rudolf and Stefanie and thence in a narrow belt and at a lower average level to the northeast of the. Victoria Nyanza; it then proceeds in a south direction to Ivilima- Njaro, beyond which the plateau merges into the Pare Mountains in the neighborhood of the Pangani River. Immediately to the south of Lake Rudolfr, Mount Nyiro rises to a height of 10,000 feet ; Mount Elgon, to the northeast of Victoria Nyanza, 14,100 feet; Mount Kenia, 18,370 feet; Kilima-Njaro, 19,300 feet; Mount Meru, to the west of Kilima-Njaro, 14,000 feet The general level of the plateau between Mount Kenia and the lake is from 5,000 to 7,000 feet. To the west of Victoria Nyanza, between Lakes Albert and Albert Edward, Mount Ruwenzori rises to a height of 16,600 feet, and the active volcanic Kirunga Mountains, south of Lake Albert Edward, to 13,000 feet. All these moun¬ tains are volcanic in origin, and between Kilima- Njaro and the lake signs of volcanic activity are still visible. The central plateau reaches its greatest average height, over 4,000 feet, in the region embracing the Lakes Victoria, Tanganyika and Nyassa; it forms a broad belt reaching close to the east coast and in an equally broad belt extends from Lake Nyassa to the west coast. Above this are numerous detached heights, like the Rubeho Mountains, west of Zanzibar, the Livingstone Mountains around the north of Lake Nyassa, and the Mlanje heights south of that lake, Mount Mlanje being 9,680 feet. South of the Zambezi occur the Mashona and Matoppo highlands, ris¬ ing in places to from 5,000 to 7,000 feet. Im¬ mediately to the south of the Middle Limpopo a series of mountains begins which, under vari¬ ous names — Zoutpansberg, Libombo, Drakens¬ berg, Compassberg, Schneeberg, etc. — extends along the east and south coast and north to some distance beyond Cape Town. In Natal these rise to 10,000 and 12,000 feet, and in Cape Colony to 7,000 and 8,000 feet ; the interior pla¬ teau averaging about 4,000 feet, but falling to a lower level in the Kalahari desert.

Between the Orange River and the Kunene, and the lat¬ ter river anl the Kongo, the escarpment con¬ tinues, rising in places to 6,000 and 8,000 feet. The general level lowers considerably as the Kongo is reached. The low coast region ex¬ tends some distance into the interior along this part of the west coast, the descent from the in¬ terior plateau giving rise to the cataracts which so seriously interrupt navigation on the lower Kongo. On both sides of the middle Kongo extends a considerable area which sinks from the generally high level of the interior to an average of only about 1,000 feet. From the Kongo and Kameruns the general level of the coast plateau is broken by the Crystal and other mountains rising to 3,000 and 4,000 feet, cul¬ minating in the Kameruns Peak, a volcanic mountain rising to 13,000 feet. On the south of the Benue, in the Atlantika group, and be-

tween the Benue and the Niger, we find a broken mountain group with heights of from 6,000 to 10,000 feet ; while in the interior north of the Gulf of Guinea there is a broad plateau, beginning at various distances from the coast, extending across the upper Niger, and rising to 2,000 and 3,000 feet with irregular ranges ris¬ ing at places to from 5,000 to 7,000 feet. The Kong Mountains, in the region where the Niger has its sources, as a range do not exist. As the middle Niger is approached the general level lowers to that of the Sahara, while north the low coast region extends far into the interior till the Atlas is reached.

Rivers. — The Nile is the only great river of Africa which flows to the Mediterranean. It is now known to receive its waters primarily from the country drained by the great lakes, the Vic¬ toria Nyanza, the Albert Nyanza and the Albert Edward Nyanza, and especially from the Vic¬ toria Nyanza, which itself receives numerous streams. The Victoria Nile connects the Vic¬ toria and the Albert Nyanza; and on leaving the latter the river flows in a winding course, of which the direction is almost due north, without further lake expansion, to the Mediter¬ ranean. In descending from the lake elevations (of the Victoria 3,900, of the Albert Edward 3,200 feet, the latter connected by the Semliki River with the Albert 2,300 feet) it makes, both between the lakes and in its subsequent course, numerous falls. Those in upper Egypt are known as the Cataracts. Between lat. 5° and 10° north, under the name of Bahr-el-Jebel, it receives numerous tributaries, mostly from the country to the south and west; the principal on the left bank being the Bahr-el-Ghazal, on the right the

Sobat. After this it takes the name of the White Nile, and receives through the Bahr-el-Azrek and Atbara, or Blue Nile and Black River, the drainage of Abyssinia. The Atbara brings the mud which forms so precious a deposit in Egypt. After this the Nile flows for 1,200 miles to the sea without receiving a tributary. Altogether it drains an area of more than 1,600,000 square miles. The Indian Ocean receives numerous African rivers, most of which are short, being the drainage merely of the external slopes of the escarpment of the interior plateau. Among the most considerable rivers on this coast are the Jub, which is formed by several streams rising in the border slopes near Abyssinia, is navigable with difficul¬ ty to Bardera, and enters the ocean at the equa¬ tor; the Webi Shebeli, formed by streams rising on the southeast slopes of Abyssinia, and losing itself in the sands on the coast near the mouth of the Jub; the Tana from Mount Kenia dis¬ charging at Witu ; the Sabaki south of the Tana; the Rovuma, which flows from the moun¬ tains east of Lake Nyassa; the Beira; and the Limpopo or Crocodile, which enters the ocean north of Delagoa Bay. The only great riyer flowing from a distant point of the interior which breaks the mountain barrier of the east is the Zambezi, which has its embouchure be¬ tween the Beira and Rovuma. It is the fourth in size of the continent. It drains a large part of the great tract of pastoral country south, of the equatorial region. Several streams coming from the 'swampy plateau on the borders of Lunda and the Garenganze country unite ˆ to form the Zambezi, the principal being the Llba trom the southwest edge of the Garenganze

country. In its middle course it is joined by the Kafue and Loangwe from the north and the Shire from Lake Nyassa, and by the Chobe and some smaller streams from the south. Below the Chobe are the Victoria Falls, one of the greatest cataracts in the world; from which the river flows in a semi-circular course to the ocean, breaking through the Lupata Mountains, and discharging by several mouths, the most navigable of which is the Chinde. The river is navigable by vessels of some size to the Karoa- bassa Rapids beyond the Shire, but above that only by boats and canoes. The drainage area of the Zambezi is 550,000 square miles.

Of the Atlantic rivers, the Senegal, Gambia and Niger have their origin in the mountains near the coast of Senegambia. The Senegal flows in a northerly and westerly direction, its volume varying much according to the season. In the rainy season it is navigable for 500 to 700 miles, in the dry season for about a fourth of that distance. The Gambia takes a winding course to the west, and is navigable for about 400 miles, nearly its whole extent. The great¬ est of these rivers, the Niger, rising in the inner slope of the same mountains, flows northeast to

Timbuktu, whence it turns first east and after¬ ward southeast, receiving the Sokoto, to its junction with the Benue, which comes from the mountains south of Lake Tchad. The upper part of the Niger is called the Joliba, and is flanked by several great swampy lakes; it after¬ ward acquires the name of Quorra or Kawarra. In the northern part of its course it touches on the great desert. It is navigable for light ves¬ sels above Timbuktu. Between the Sokoto and the Benue it is interrupted by shoals and rocks to below Boussa. From the junction it flows due south to the ocean, where it forms a wide alluvial delta and enters by a number of mouths, the most distant of which are 200 miles apart. The main channel is called the Nun. The drain¬ age area of the Niger is 810,000 square miles. The Kongo, the second in extent of basin and the greatest in volume of the African rivers, flows from different slopes of the same water¬ sheds as the Zambezi. Its identification with the Lualaba, the great stream discovered by Livingstone in the centre of the continent, was established by Stanley in 1876-77, this enterpris¬ ing traveler having descended the river to the Atlantic from a point in the interior west of Tanganyika. The Lukuga, the outlet of Lake Tanganyika, discovered by Cameron, is a tribu¬ tary of the Lualaba. The Chambeze, which rises in the mountains between Lakes Nyassa and Tanganyika, is the remotest source of the Kongo system. It falls into Lake Bangweolo, from which it issues under the name Luapula and flows north to Lake Mweru; from the north side of this lake issues the Lualaba, which passes through a magnificent series of lake-like expansions and receives numerous tributaries. Below Stanley Falls it receives the Lomami, and above Stanley Pool the Kwa, which is formed by the junction of the Kasai-Sankuru system with the Lukuallu or Kwango. Other tributaries come from the south and in the north it is fed by the Ubangi, which, under the name of the Welle-Makua, comes from the water-parting between the Nile and Kongo sys¬ tems. The total length of the Kongo is about 3,000 miles, and its drainage area 1,450,000 square miles. Unlike most of the African

rivers, the mouth of the Kongo forms an es¬ tuary. It is estimated to pour into the ocean a larger body of water than the Mississippi. The Kwanza rises in the Mossamba Mountains and curves northwest to the ocean. Like most African rivers, its upper course is interrupted by cataracts, and its mouth closed by a bar. The Kunene rises on the opposite side of the same watershed and flows southwest to the At¬ lantic. From it south to the Orange River fol¬ lows a dry belt, through

which no considerable river flows to the sea. The Orange, though it rises near the east coast, and flows nearly across the south part of the continent, passes for the greater part of its course through a desert region, receiving no tributaries, and is a shallow stream. Its headwaters, the Vaal and the Nu Gariep, rise on opposite slopes of the Draken- berg Mountains and flow to their junction round opposite sides of the Orange River Colony. The Great Fish River, which drains Great Namaqualand, enters the Orange River near the termination of its course.

The rivers which reach the ocean do not ac¬ count for the whole drainage of Africa. There are two great and numerous smaller tracts from which no large river reaches the sea. The two great areas of internal drainage correspond with the two great deserts. That of the north desert is estimated at 4,000,000 square miles. As already indicated, it is furrowed with water¬ courses in every direction, which lose them¬ selves in the sand. The Bahr-el-Ghazal, which is usually dry, but intermittently flows out of Lake Tchad, terminates in a salt lagoon on the border of the desert to the north of the lake. In the south the Zuga or Botletle, which forms the outlet of Lake Ngami, in the Kalahari desert, loses itself in salt lagoons at greater or less distance, according to the supply of water. A region of inland drainage, with salt lagoons, also exists between the Victoria Nyanza and the coast range of mountains. In the low coast land east of Abyssinia the Hawash River loses itself in the sands before reaching the sea ; and the Webi, as already stated, which flows south from the Somali Peninsula to near the equator, likewise terminates in a salt lagoon on the border of the ocean. The Omo flows into the north end of Lake Rudolf.

Lakes. — 'The only lake of considerable ex¬ tent north of lat. 5° N. is Lake Tchad, an enormous flooded swamp subject to great varia¬ tions of level and area (10,000-20,000 square miles), which until 1911-12 seemed to be drying up but since then has slowly increased in size. Lake Tsana in Central Abyssinia, the salt Lake Asal in the east and Lakes Dembel and Abayo in Gallaland, are comparatively small. Between 5° N. and 15° S. is a series of lakes forming one of the most striking features of the continent. Almost in a line, beginning in the south, are Lakes Nyassa, Tanganyika, Lifu, Albert Edward, Albert, all lying in more or less elongated rifts or gorges. The series is continued by Lakes Rudolf (salt) and Stefanie in the northeast, and, according to some authori¬ ties, by the ancient lake now the Red Sea and by the Dead Sea in Palestine. The great Vic¬ toria Nyanza, c. 32,167 square miles, the largest fresh water lake in the world after Lake Superior, which touches the equator on the north, is of a different type, as are

Lake Bang- weolo (another flooded swamp) on the south

of Tanganyika and Lake Mweru in the north of Bangweolo. Lake Rikwa or Leopold, be¬ tween Nyassa and Tanganyike, is partly of the rift type, while Lake Ngami in the Kalahari region is a swamp which sometimes dries up. Lake Leopold II and Lake Malumba are at¬ tached to the lower Kongo. Lake Dilolo is in the swampy region forming part of the water¬ shed between the Kongo and the Zambezi. There are numerous salt lagoons in the north¬ ern portion of the Sahara.

Climate. — The climate of Africa is mainly influenced by the fact that, except the countries on the north and south coasts, it lies almost entirely within the tropics. The equator, as al¬ ready observed, cuts it nearly through the mid¬ dle, so that it belongs in latitudinal, though un¬ equally in longitudinal extension, to the north and south tropics. It is the only continent which extends unbroken from the north to the south tropics and is consequently the hottest of all. The two sections north and south of the equator have, as has already been observed, in some respects a very considerable resemblance in their general features, the chief modifying circumstances being the greater elevation and the smaller longitudinal extension of the southern division, which, by bringing it more within the influences of the ocean, tends to modify its climate.

In the belt immediately under the equator, both north and south, vegetation is intense and rain abundant. For about 10 degrees north and south we find true tropical forests, mainly to the west of the great lakes, on the middle and upper Kongo and its affluents and along a belt of the west coast in the Niger region. To the east of the great lakes, where the rainfall is not so abundant, are considerable areas of poor steppe and scrub country, and generally over the tropical region the trees are scattered and the country more park-like than forestal. Ani¬ mal life, from herds of elephants to innumer¬ able swarms of insects, abounds in these luxuri¬ ant regions. To the north and south of the equatorial belt, as the rainfall diminishes, the forest region is succeeded by open pastoral and agricultural country. This pastoral belt ex¬ tends, in the north, across the Sudan, from Senegambia to Abyssinia; on the south from Angola and Benguela to the Zambezi. This is followed by the rainless regions of the Sahara on the north and the Kalahari desert on the south, extending beyond the tropics and border¬ ing on the agricultural and pastoral countries of the north and south coasts, which lie entirely in the temperate zone.

The winds and rains in Africa are chiefly produced by the successive exposure of the various intertropical belts to the vertical rays of the

sun. The south winds on the west coast and the monsoons of the Indian Ocean exercise the principal modifying influence. From March to September the southwest monsoon blows from Africa to Asia, and during the remaining months the northeast monsoon blows toward the African coast. The indraught of air charged with moisture, at the seasons when the sun is overhead, produces the rainy seasons within the tropics, and as the incessant rarefaction of the air by heat continually draws in fresh. supplies, the rainfall is on the whole abundant, varying from 50 to 100 inches in the region between 10° N. and the Tropic of Capricorn. In a patch

AFRICAN ART

1 Horn Comb

2 Battle Axe

3 Woman's Girdle

4 Club and Dagger

5 Head Ornament 6-7 Fetich Figures

8 Woman's Sandal

9 Woman's Head-Dress 10 Basketry

on the Gulf of Guinea the rainfall exceeds 350 inches, though in Somaliland there are almost rainless patches. Near the tropics, to which the sun comes only once a year, there is only a sin¬ gle rainy season, while in the central part of the zone, which the sun traverses twice in his pas¬ sage between the tropics, there are two distinct rainy seasons, a greater and a less, according as the wind is in a direction which brings more or less moisture, except in some places in the in¬ terior, where the two rainy seasons are so pro¬ tracted as to blend into one, lasting, as in the Manyuema country, from September to July, or in some other parts even longer. The rainy season usually begins soon after the sun has reached his zenith, but on the east coast the monsoon charged with the moisture of the Indian Ocean brings it earlier. In the deserts, as already observed, there is hardly any rain; and this applies also to Egypt, which but for the Nile would be no better than the Sahara. The chief cause of the rainlessness of the des¬

erts is the direction of the winds, which causes the chief moisture-bearing currents to pass, be¬ fore reaching them, over hot and thirsty re¬ gions which deprive them of their moisture; and especially the mountain screens which in¬ tercept the moisture of the winds both from northeast and southwest. Another cause is the want of elevated regions to attract the moisture actually contained in the atmosphere, as in the higher regions of the desert periodical rains do occur. The high mountains of the east plateau and the intervening tropical regions deprive the northeast monsoon of all its moisture be¬ fore it reaches the Kalahari desert. Hence the apparently anomalous circumstance that the greatest heat is found after the equatorial re¬ gion is passed. The rapid radiation of heat in the desert causes a very great fall of tempera¬ ture after the sun is down, so that sometimes frosts are generated, and this in some measure supplies the want of rain by condensing the moisture in dew. In the desert, too, scorching winds are generated full of fine particles of sand, those of the north afflicting Egypt and the countries on the Mediterranean coast and those on the west coast known as the harmat- tan. The average summer temperature in the Sahara is 97 degrees or more ; the hottest part is in Nubia, where the Arabs say the soil is like a fire and the wind like a flame. The coasts of tropical Africa, especially the west coast, where colonial settlements have been formed, have been found to have a deadly climate for foreigners.

Geology and Minerals. — The geology of Africa is little known. Very ancient crystal¬ line rocks are found rising into mountain ranges and sometimes spread over large areas. Most of the rocks that overlie them belong to the older formations, so that the continent as a whole is supposed to be of very ancient date. The sands which cover so large an area are be¬ lieved to be mainly of aeolian origin, and not to have been formed by the action of water. The porous clay found so abundantly in West Africa is of comparatively recent date. The region around Tanganyika is of Jurassic origin. Around the great lakes are abundant evidences of enormous volcanic activity at no very remote date; and, as already mentioned, active volcanoes are not unknown. Tanganyika, according to

recent views, may at one period have been con¬ nected with the sea. Salt is abundant, though often scarce from want of communication and working organization. Gold is found in abun¬ dance in southern Africa from the Transvaal region to the Zambezi, and a number of very productive mines opened up industries in the Transvaal and Mashonaland. Diamonds have been found in large numbers, and in apparently inexhaustible supply, on the Vaal River and its tributaries, in Cape Colony and Orange River Colony. In the southern central

district, par¬ ticularly the country of Katanga, iron and cop¬ per are found, and are worked in some dis¬ tricts in the countries bordering on the Lualaba. Copper is also found in Loanda, iron in Angola, and lead, tin, iron and copper in Great Nama- qualand; iron, copper and coal are found in Natal and Cape Colony.

Vegetation. — The centre of Africa pos¬ sesses, as already mentioned, an exuberant tropical vegetation. In the equatorial districts dense forests are found with trees of enormous size and luxuriant climbing plants. The open pastoral belt at the extremities of the tropics is distinguished by a rich and varied flora. A special characteristic of the vegetation of the southern extremity of Africa is the remarkable variety, size and beauty of the heaths, some of which grow to 12 or 15 feet and form minia¬ ture forests. Cycadacese and bulbous and or¬ chidaceous plants, aloes and other succulent plants also abound. The baobab or monkey- bread tree, first discovered by Adanson in Sen¬ egal, is found from the Sudan to Lake Ngami. Acercias, Euphorbias and palms of one variety or another are diffused over almost every part of Africa. The date palm is the special char¬ acteristic of the desert, to which it is peculiarly adapted, and there it forms the principal means of subsistence. It is also cultivated as a garden plant in the northern coast regions. This dis¬ trict as well as Egypt has an ancient celebrity for its fertility in grain. Wheat and maize are cultivated, fruit trees also abound, and groves of oranges and olives relieve the landscape. The castor oil plant, the fig tree, the dwarf palm and the lotus, formerly an important ar¬ ticle of food, are here characteristic forms. The common oak, the cork oak and the pine form the staple, and the cypress, myrtle, ar¬ butus and fragrant tree heaths the ornaments of the woods. The pastoral tropical belt pre¬ sents a different order of vegetation. Besides the baobab, the cabbage palm, the oil palm, the wax palm, the shea butter tree, the cotton tree, the African oak and the mangrove here pre¬ vail; rice and maize are cultivated; the prin¬ cipal fruits are the banana, pawpaw, custard apple, lemon, orange and tamarind. Many val¬ uable timber trees and India-rubber plants are found in various forms, as trees and as climb¬ ing plants, in abundance both in east and west tropical Africa. The prevalent plants of this district are also found in the fertile parts of Nubia. To the northeast of this region frankin¬ cense, myrrh, cinnamon and cassia abound. The coffee plant is a native of the southern Abys¬ sinian region, and also of western tropical Africa, where it forms thick woods. This plant is supposed to have been transported from Africa to Arabia. Abyssinia, though coffee and spices are native products, possesses generally,

from its elevation, the vegetation of a tem¬ perate region. The swamps of the tropical re¬ gion abound with papyrus. The cassava, yam, pigeon-pea and ground-nut are cultivated as bread plants.

Animals. — The fauna of Africa is extensive and varied, and numerous species of mammals are peculiar to the continent. According to a scientific view of tHe geographical distribution of animals, the northwest of Africa belongs to the Mediterranean sub-region, while the rest of the continent forms the Ethiopian region. Af¬ rica possesses numerous species of the order Quadrumana (apes and monkeys), all of which are peculiar to it. They abound especially in the tropics. The most remarkable are the chim¬ panzee and the gorilla. The lion is the typical carnivore of Africa. Latterly he has been driven from the coast settlements to the interior, where he still reigns king of the forest. There are three varieties, the Barbary, Senegal and Cape lions. The leopard and panther rank next to the lion among the carnivora. Hyenas of more than one species and jackals are found all over Africa. Elephants in large herds abound in the forests of the tropical regions, and their tusks form a leading article of commerce. These are larger and heavier than those of Asiatic ele¬ phants. The elephant is not a domestic animal in Africa as it is in Asia. The rhinoceros is found, like the elephant, in middle and southern Africa. Hippopotami abound in many of the large rivers and the lakes. The zebra and quagga were numerous in central and southern Africa, but the latter is said to be now en¬ tirely extinct. Of antelopes, the most numerous and characteristic of the ruminating animals of Africa, at least 50 species are considered pecu¬ liar to this continent, of which 23 used to occur in Cape Colony. The giraffe is found in the interior and is exclusively an African animal. Several species of wild buffaloes roam in the interior, and the Asiatic buffalo has been nat¬ uralized in the north. The camel, common in the north as a beast of burden, has no doubt been introduced from Asia. The horse and the ass are highly developed in the Barbary States. The cattle of Abyssinia and Bornu have horns of im¬ mense size but extremely light. In Barbary and the Cape of Good Hope the sheep are broad¬ tailed; in Egypt and Nubia they are long-legged and short-tailed. Goats are in some parts more numerous than sheep, especially in the Sudan and in Abyssinia. Dogs are numerous, but cats rare, in Egypt and Barbary. The former in the northern towns serve as scavengers. Bears and foxes are found only in the north. The im¬ mense herds of game which formerly abounded in many parts of Africa were diminishing so rapidly that in 1900 measures for their protec¬ tion were laid down by an international conven¬ tion, and game reserves have been established in British

Africa, Somaliland and elsewhere. The birds of northern Africa are almost iden¬ tical with those of the south of Europe and the Asiatic ˆcountries bordering on the Medi¬ terranean. In the rest of Africa they show more resemblance to those of Australasia. Many of the African birds are famed for the brilliancy of their plumage, such as the sun-birds, bee-eaters, rollers, plantain-eaters, par¬ rots and kingfishers. The ostrich is found nearly all over Africa, but especially in the desert. A remarkable bird of southern Africa

is the secretary-bird or serpent-eater, which renders great service to the inhabitants by kill¬ ing serpents. Another peculiar bird of South Africa is the little honey-guide (q.v.), which points out the nests of bees. The whale-headed stork, remarkable for its enormous beak, may also be mentioned. Owls, falcons, eagles and vultures are numerous. Water-fowl are abun¬ dant on the lakes and rivers, and there are many species of quails and partridges. One species of gallinaceous bird, the guinea-fowl, has been domesticated in other countries. Reptiles, owing to the dryness of the climate, are comparatively few. The largest is the crocodile, which abounds in the great rivers and tropical lakes. There are several species of venomous serpents, including the horned viper and the African cobra. The chameleon is common. The rivers and coasts abound with fish of numerous spe¬ cies, and some of them of the most brilliant coloring. Insects are numerous. Among the more troublesome species are the locust, tsetse and white ant.

Inhabitants, Civilization, etc. — There is

a marked distinction between the races in the north and east of the great desert and those in central Sudan and the rest of Africa and the south. The main elements of the population of north Africa, including Egypt and Abyssinia, are Hamitic and Semitic, but in the north the Hamite Berbers are mingled with peoples of the same race as those of prehistoric southern Eu¬ rope and other types of various origins, and in the east and southeast with peoples of the negro type. The Semitic Arabs are found all over the northern region, and even in the western Sahara and central Sudan, and far down the east coast as traders. The Somalis and Gallas are mainly Hamitic. In central Sudan and the whole of the country between the desert and the Gulf of Guinea the population is pure negro — people of the black, flat- or broad-nosed, thick-lipped type, with narrow heads, woolly hair, high cheek¬ bones and prognathous jaws. Scattered among them are peoples of a probably Hamitic stock. Nearly the whole of the narrow southern section of Africa is inhabited by what are known as the Bantu races, of which the Zulu or Kaffir may be taken as the type. The languages of

the Bantu peoples are all of the same structure, even though the physical type vary, some resembling the true negro and others having prominent noses and comparatively thin lips. The Bush¬ men of southern Africa are of a different type from the Bantu, probably the remains of an abo¬ riginal population, while the Hottentots are ap¬ parently a mixture of Bushmen and Kaffirs. Scattered over central Africa, mainly in the for¬ est regions, are pygmy tribes, who are generally supposed to be the remains of an aboriginal population. The bulk of the inhabitants of Madagascar are of Malay affinities. The total population is estimated at about 140,000,000.

As regards religion, a great proportion of the inhabitants are heathens of the lowest type. Mohammedanism possesses a large number of adherents in northern Africa and is rapidly spreading in the Sudan. Christianity prevails chiefly among the Copts of Egypt, the Abyssinians and the natives of Madagascar, the lat¬ ter having been converted in recent times. Else¬ where the labors of the missionaries have been attended with promising success. It is estimated that about 1 2/5 per cent of the popu-

MARIBOU STORK (Leptoplilus crumenifer) AFRICAN JABIROU (Mycteria senegalensis)

lation are Roman Catholics and 1 9/10 per cent Protestants. Over a great part of the conti- n.erT notwithstanding European colonization, civilization is at a low ebb, and in the Kongo region cannibalism is still preva¬ lent. Slavery is still practised in many parts and polygamy is widespread. Yet in various regions the natives who have not come in contact with a higher civilization show con¬ siderable skill in agriculture and various me¬ chanical arts, as in weaving and metal-working. Among articles exported from Africa are gold and diamonds, palm oil, ivory, wool, ostrich feathers, esparto, cotton, caoutchouc, etc. See paragraph Commercial Conditions at end of this article.

Languages. — The languages spoken on the continent may be divided into two great classes, those native to Africa and those brought in from outside; the former including the three great divisions of Negroid, Hottentot-Bushman and Hamitic, the latter Aryan, Malay and Se¬ mitic; and the latter again into the pure lan¬ guages or patois of recent immigrants or trad¬ ers and those which have become naturalized by time and change into virtually native tongues

themselves.

The first division of the extra-African tongues comprises: (1) Pure English in South Africa and Liberia, pure French in Algeria and the scattered trading settlements elsewhere. (2) Four “creole® dialects: the Mediterranean ((lingua franca® or trade jargon; the English creole or West African Kru-English; the Cape Verde Islands Portuguese creole; and the Boer and Hottentot Dutch creole. The last three are European in stock, but with much African phonic, inflectional and syntactical mixture and influence. The second division includes the Malay or Malagasy of Madagascar and the Semitic tongues of the northeast. These last are (a) Pure Arabic (the Latin of Africa, the uni¬ versal language of social intercourse and trade wherever Mohammedanism prevails), including the Egyptian, Sudani, Maghreb and Muscat dia¬ lects ; (b) mixed, as the Abyssinian dialects, derived from the ancient Geez (q.v.), Tigre and Tigrina, Amharic (originally of southern Abys¬ sinia, but now the chief tongue of the country), Harari of the Galla country, Gurague, etc. All these were brought in by Semitic invaders.

The native African stocks are classed in English books mainly according to the system adopted from Friedrich Muller by R. N. Cust in his (Modern Languages of Africa) '; later Ger¬ man Africanists prefer that of Lepsius, the chief difference being on the relations of Bantu and Negro or Nigritic.

1. Negroid. This has three main divisions: (a) Bantu, a pure language. This immense group occupies, with enclaves of Hottentot- Bushman and Pygmy, the whole vast triangle from the Kamerun west and Zanzibar east down to the Cape, or pretty much all Africa south of the equator. All its components (for which see Bantu) have one grammar though different vocabularies ; the greatest and perhaps purest representatives of it are the Zulus or Kaffirs and their neighbors the Se-chuana. (b) Ni¬ gritic, Negro or Sudan-Negro, between the Sa¬ hara and the equator. Ethnologically, the races speaking this group of tongues are the purest types of the Negro stock; but linguistically, they are only classed together from the utter

impossibility of grouping them with any others, though Lepsius thinks them degenerated Bantu, — a conclusion scouted by others, the affinities being very faint. They are many and to all appearance totally unrelated, so diverse and pe¬ culiar are the idioms ; some, however, think they show marked characteristics in common. They doubtless represent the oldest races on the con¬ tinent, wandering in small

hostile bands and changing their dialects almost from generation to generation, like all such petty camps with unfixed traditions and no general intercourse ; and may well have scores or hundreds of “languages® among them with no traceable connection, (c) The Nuba-Fulah or Ful; some¬ times called the Nilotic, from its main seat in the Nile valley from Nubia to the Albert Nyanza, and with isolated tribes farther out, as the Barea and Kunama on the northern border of Abyssinia, and the Masai and Oigob southwest. Others dispute the inclusion of the Fulah, con¬ sidering it a tongue by itself ; perhaps a mon¬ grel, more likely a family as above, which has picked up some Hamitic words. The Dinka, Bari and Shilluk are its chief families along the Nile, the Lur or Shuli and Madi being the last to the south ; west of the valley it shades into the Nigritic chaos.

1. The Hottentot-Bushman. This is the lan¬ guage of the dwarf tribes, and its relations to others or itself are vigorously debated. Muller thought it represented two ethnological and lin¬ guistic divisions. Lepsius thinks it one, Bantu in race and Hamitic in language ; but his con¬ clusions are not accepted. Besides the main stock in southern Africa, this group includes the Pygmy dialects in central Africa; it is denied that they have kept their original languages, but this is true of many others, and the ethnological and linguistic problems have no necessary rela¬ tion.

2. Hamitic. This includes (a) the Libyan or Berber dialects spoken across North Africa from the Canaries to Egypt — probably changed scores of times from top to bottom; (b) the ancient Egyptian, with the four dialects of its descendant Coptic (extinct save as the ritual language of the Coptic Church) ; (c) the non-Semitic or Kushite Abyssinian dialects (for¬ merly called Punic, sometimes Ethiopic, which was more generally applied to Geez) ; as Bi- shari (see Bisharin), the ancient Bedja, be¬ tween Egypt and Abyssinia; Danakil (q.v.) or Dankali, native name Afar, between Abyssinia, Massowa and Obok; Somali and Galla, in their countries; Agau (through Abyssinia, the users believed to be its aborigines, with dialects as Chamir, Quara, etc.) ; Saho, between Abyssinia and Adulis Bay; Kaffa, Kullo, etc., in the high¬ lands south of Abyssinia. The Fulah group (see above) and the Haussas in Sokoto have some Hamitic admixture. These Hamite tribes are much mixed, geographically or more in¬ timately, with Semitic and Negro tribes or ele¬ ments.

“Equatorial® is a name given in 1889 by Muller to a group of Negro tribes south of Darfur, of which he wished to make a new family; the

Nyam-Nyam and Monbuttu were the chief. All are of a lighter color than the typical Negro, and their languages are more distinctive still. As above said, it is probable that many such groups can be segregated on the best of grounds.

Systems of Writing. — Africa has four liv¬ ing systems (not counting the fossil Coptic or the European used by those races) and has had four now represented only by inscriptions or papyri. The latter are: (1) Ancient Egyp¬ tian, passing from hieroglyphics (a mixture of ideograms and syllables) through the cursive hieratic to the more cursive demotic, the or¬ dinary script of business life. A few of the demotic characters are preserved in the ritual Coptic. (2) Ancient Phoenician, the ancestor of all Western alphabets. (3) Ancient Ethiopian, used for the native tongue around Napata and Meroe. It was cursive and borrowed, but it is not known from whence, nor what language it represents. (4) Ancient Libyan or Numidian, borrowed from southern Arabia and read from the bottom up. There are many inscriptions in it in Algeria and Tunis, some of which have been deciphered ; the first was the celebrated bilingual inscription of Takka. The living sys¬ tems are practically those of the Hamites and Semites, the others being mostly below the grade of civilization which uses such things ; and both the former use Semitic systems. The four are:

1. The only one developed in a Negro tribe, and with one exception the only one actually in¬ vented and popularly used within historic times : that of the Vei, on the west coast near Cape Mountain, devised about 1834 by Doalu Bukere, a native with a rough knowledge of European printing. It was not an alphabetic system, but a syllabary, with complicated characters like hieroglyphics. It was later used for Moham¬ medan missionary work, but has been sup¬ planted by the European system, the Christian missionaries refusing to employ it.

2. That of the Touaregs or Saharan Ber¬ bers, called tifinaghen. It seems to be a de¬ scendant of the ancient Libyan, to which it is similar in reading from the bottom up.

3. The Arabic, used by all who wish to write the great language of Mohammedan Africa, the general medium of social and busi¬ ness communication. It is also widely used to write other African languages: by the Berbers and Suahelis for Libyan; by

the people of Shoa for Amharic and those of Harar for Harari ; by the Malavs of Madagascar and by the Kaffirs.

4. The Amharic, used largely in and around Abyssinia ; it is an extension and modification of the ancient Geez or Ethiopic, which there¬ fore we have not classed as dead, any more than the Greek and Roman alphabets can be so called. It is written from left to right like the Euro¬ pean languages, the other Semitic systems being the reverse ; and the vowels are indicated by modifications of the consonants or marks added to them, making it a semi-syllabic rather than pure alphabetic system. It was borrowed from southern Arabia, and can be traced back to the 4th century on the monuments at Axum, the ancient capital of Abyssinia.

History of Discovery. — Although in Egypt and along the Mediterranean coast (see Car¬ thage and Egypt) Africa was the seat of re¬ mote and comparatively high states of civiliza¬ tion, up to the middle of the 19th century the whole of central Africa was a blank; it is now at least as well known as South America. The civilized nations of the ancient world approached Africa from the Mediterranean and the Red Sea; there is reason to believe that till the in¬ troduction of the camel in the 7th century a.d.

the desert was an insuperable barrier between the Mediterranean countries and central Sudan.

The name Africa is mythologically associated with Afer, a son of the Libyan Hercules; but this is only an eponym. It is certainly Phoe¬ nician, and probably meant “nomadic,® a term applied by the Carthaginians to the tribes around. It was the name given by the Romans at first only to a small district of Africa in the immedi¬ ate neighborhood of Carthage, and nearly corre¬ sponding with the Roman province formed on the destruction of Carthage. The Greeks called Africa Libya, and the Romans often used the same name. The first African exploring expe¬ dition on record is that mentioned by Herodotus as having been sent by Pharaoh Necho about the end of the 7th century b.c. to circumnavigate the continent. The navigators, who were Phoe¬ nicians, were absent three years, and according to report they accomplished their object. The story has been the subject of much controversy, and was for long generally discredited, but re¬ cent authorities of weight have pronounced in its favor. The next important voyage recorded is that of Hanno, a Carthaginian, down the west coast, probably 50 or 100 years later. He passed a river with crocodiles and river-horses, and probably reached the coast of Upper

Guinea. Herodotus also mentions some young men of the tribe of the Nasamones (living near the Gulf of Sidra) crossing the desert in a westerly direc¬ tion, and coming to a great river where they saw crocodiles and black men, but it is doubtful if this could have been the Niger. There is no evidence that the Egyptians knew the Nile be¬ yond the site of Khartum, though they may have sent ships as far as the coast of Somaliland by the Red Sea. Nero sent an expedition up the Nile which seems to have penetrated up the White Nile ; and remains of Roman origin have been found some distance into the Sahara. From the navigators and traders that frequented the east coast of Africa, Ptolemy may nave learned that the Nile issued from two great lakes about the equator. Mohammedanism was car¬ ried into North Africa in the 7th century and very rapidly spread to the Atlantic. By the 10th century the Arabs had crossed the desert, and between this and the 14th century Arab travelers visited central Sudan, the Niger and other regions, and till comparatively recently they were the great authorities on much of central Africa.

The first impulse to a more complete ex¬ ploration of Africa was given by the Portuguese prince known as Henry the Navigator, who in the early part of the 15th century sent out a series of expeditions along the west coast. These were continued after his death, so that in 1486 Bartolomeu Diaz doubled the Cape and in 1497 Vasco de Gama sailed up the east coast as far as Mombasa, and thence to India. Thus for the first time the main outline of the African coast was laid down. Settlements were planted on the east and west coasts by Portuguese, French, English, Dutch and Brandenburgers, but there is no authentic information that any European penetrated into the interior. Maps of the 16th to the 18th century were covered with lakes and rivers, but these were swept away as unauthentic by D'Anville in the middle of the 18th century, and the interior left a blank. An association for the exploration of inner Africa was formed in London in 1788. Additions were

AFRICA

Copyright by Underwood & Underwood, N. Y. Copyright by Underwood A Underwood,

1 Street in Cape Town 2 The " Lion's Head," part of Table Mountain, Cape Town

AFRICA

Copyright by Underwood & Underwood, N. Y.

1 Cecil Rhodes Monument, Table Mountain, near Cape Town, South Africa

2 Cape Town Breakwater and Harbor

made to geography under its auspices by Mungo Park, Hornemann, Burckhardt and others.

Modern African exploration may be said to begin with James Bruce, who penetrated through Abyssinia and Sennar to the headwaters of the Blue Nile (1770-72). He was followed by Mungo Park, who reached the upper course of the Niger or Joliba, and whose efforts to ex¬ plore the river to its mouth cost him his life (1795-1805). Dr. Lacerda, a Portuguese, about the same time reached the capital of Cazembe, west of Lake Bangweolo, where he died. Hornemann, who traveled for the same society as Park, perished in the desert after sending home accounts of Bornu and the neighboring states. In 1802-06 two Portuguese traders .crossed the continent from Angola, through Cazembe's dominions, to the Portuguese posses¬ sions on the Zambezi.

In 1816 Captain Tuckey, in command of a British expedition, sailed up the Kongo, which he took to be the mouth of the Niger, for 280 miles. About the same time Major Peddie, and after his death Captain Campbell, led a party up the Senegal through the Fula or Fel- latah territory, returning to Kakundy on the Nunez. In 1817 Mr. Bowditch explored the country of the Ashantis. In 1818 a French traveler, Gaspard Theodore Mollien, discovered the sources of the Senegal, Gambia and Rio Grande. In 1819 Ritchie and Lyon traveled from Tripoli to Murzuk, and in 1821 Major Laing made some important journeys in the Mandingo district of western Africa. In 1822-24 extensive explorations were made in northern and western Africa by Major Denham, Captain Clapperton and Dr. Oudney, the last of whom died on the way. The travelers proceeded from Tripoli by Murzuk to Lake Tchad. While Denham examined the south and west coasts of the lake, Clapperton proceeded west through Bornu to Sokoto, the capital of the Fellahtah country, on the Sokoto, an affluent of the Niger. Impressed with the importance of establishing political and commercial intercourse with this district, Clapperton organized another expedi¬ tion for the purpose of reaching Sokoto from the west coast. Setting out from Badagry, on the east of Cape Coast Castle, 7

Dec. 1825, and passing through the kingdom of Yoruba he reached the Niger at Bussa. Here he crossed the river and traversed the kingdom of Nupe to Kano, capital of the Haussa country, which he had previously visited, and from thence pro¬ ceeded to Sokoto, in the neighborhood of which, after a short residence, he died. His servant, Richard Lander, returned to Kano and at¬ tempted to proceed south through the kingdom of Zegzeg, but was compelled by the natives to return to Darroro, from which he reached the coast.

W. Allen, a naval officer, about this time accompanied a mercantile expedition up the Niger, which he surveyed for a certain distance, and in another expedition in 1848 the same officer revised and corrected his survey. Major Laing in 1826 crossed the desert from Tripoli to Timbuktu, but he was killed on his return and his papers lost. Rene Caillie, after living for some years on the Senegal coast learning the language and initiating himself into the re¬ ligion and manners of the Arabs, made in 1827— 28 a journey to Timbuktu, and thence through the great desert to Morocco. Richard Lander,

accompanied by his brother, leaving Badagry for -Bussa in March 1830, ascended the river Niger to Yauri, and descending from thence reached the mouth called the Nun in November. In 1832 he traced other mouths of the river up to the main stream ; and the identity of the great river which passes under various names in dif¬ ferent parts of its course was thus established.

In the south, Livingstone, who was stationed as a missionary at Kolobeng in 1849, passed

through the desert of Kalahari, reached the

Zuga or Botletle, and after a circuitous route discovered its source in Lake N garni. In 1851 he went north again, proceeding from the Zuga in a more easterly direction. In lat. 17° 25'

south, and between long. 24° 30' and 26° 50'

east, he came upon numerous rivers flowing north, which were reported to be affluents of a larger river, the Zambezi.

In 1848 and 1849 Krapf and Rebmann, mis¬ sionaries stationed near Mombasa, saw the Kilima-Njaro and the Ivenia Mountains. In 1851 Francis Galton, starting from Walfisch Bay, made an extensive survey of the Damara and Ovampo countries, in which he found high pastoral and agricultural table-lands. An ex¬ pedition under the patronage of the British government started from Tripoli in 1850 to visit the Sahara

and the regions around Lake Tchad. Richardson, the originator of the expedition, was joined by two Germans, Drs. Overweg and Barth. In crossing the desert from Murzuk to Ghat they found some interesting sculptures. From Ghat to Air they found the country wholly desert and uninhabited. On reaching Lake Tchad Richardson went to Kuka, capital of Bornu, Barth to Kano, Overweg to the native states of Mariadi and Guber. Barth and Overweg met again at Kuka in April 1851, but in the meantinme Richardson had died. Over¬ weg explored the lake and Barth proceeded on another journey south to Massena, in the king¬ dom of Bagirmi. On his return the death of Overweg left him to prosecute the enterprise alone. He proceeded to Timbuktu via Kano, and after collecting much information about the Niger and its tributaries, over a great part of the course of which he traveled on his return to Kuka, he reached Tripoli in August 1855. Dr. Vogel, who was sent to join Barth, was put to death at Wadai and his papers were lost.

Dr. Livingstone began another journey from Kolobeng on 15 Jan. 1853. After staying a month at Linyante, capital of the Makololo, he proceeded down the Chobe to Sesheke, and thence ascended the Leambye (Zambezi) to the junction of the Liba. After returning to Lin¬ yante, and taking with him a party of Makololo, he again set out 11 Nov. 1853, reached the Liba 27 December and proceeded to Lake Dilolo, where he found the watershed of the streams which flow north and south (feeders of the Kongo or the Zambezi) at a level of 4,000 feet above the sea. On his return journey he was confirmed in the belief that an elevated plateau here crosses the country and forms the water¬ shed of the whole continent. Fie next crossed the Cassabi River, and on 4 April he reached the banks of the Kuango, both these rivers being affluents of the Kongo. Crossing the Kuanga, he reached Loanda on 31 May. On 20 Septem¬ ber he set out on his return journey, and fol¬ lowing pretty nearly the route by which he had gone, arrived at Linyante. Starting from this

place on 3 Nov. 1855, he reached the Zambezi, and proceeding down the river, and visiting its falls, called by him the Victoria Falls, arrived at Kilimane at its mouth on 20 Mav 1856, and sailed for England. Thus was accomplished by Dr. Livingstone the remarkable feat of crossing the entire continent from sea to sea — the first time, so far as is known, that this was done by any European. In 1858 Livingstone returned to resume his exploration of the Zambezi re¬ gions. Entering

the Kongoni mouth of the river in May, he ascended its tributary, the Shire, to Murchison Cataracts, visited Lake Shirwa and Lake Nyassa, traveled on or near the Zambezi to Victoria Falls, established the identity of the Leambye and the Zambezi, sailed up the Shire to Lake Nyassa, also sailed 156 miles up the Rovuma River, and returned to England in 1864.

Between 1856 and 1865 Paul du Chaillu trav¬ eled extensively on the west coast, in the neigh¬ borhood of the river Ogowe (or Ogobai). In 1861-62 Maj. (afterward Sir) R. F. Burton also traveled on the west coast. He ascended the Kamerun Mountains and confirmed some of the observations of Du Chaillu. A French ex¬ pedition visited the delta of the Ogowe in 1864. After that the river basin was very fully explored, the principal expeditions being those of Walker, 1866, 1873 ; Lieutenant Aymes, 1867-68; the Frenchmen Compiegne and Marche, 1872-74; Dr. O. Lenz, 1876; and another French expedition under Savorgnan de Brazza, 1876, who took possession of a large stretch of terri¬ tory for France. This territory now forms part of French Kongo, which had been tra¬ versed bv various Frenchmen, including Brazza, Mizon, Le Maistre, Monteil and others.

In 1866 Livingstone entered on his last great series of explorations, the main object of which was to settle the position of the watersheds in the interior of the continent south of the equator, and to discover the source of the Nile. Landing at the mouth of the Rovuma he pro¬ ceeded southwest round the south end of Lake Nyassa, and then traveling north reached the south end of Lake Tanganyika (discovered by Speke and Burton in 1858). He afterward vis¬ ited Lakes Mweru and Bangweolo in the basin of the Chambeze, the name given to a headwater of the Kongo. In 1869 he reached Ujiji, on the Tanganyika, and crossed the lake, making ex¬ tensive journeys in the Manyuema country, and reached the Lualaba or upper Kongo, but could not explore it for want of boats. Henry M. Stanley, who had been specially sent by the proprietor of the New York Herald to search for Livingstone, met him at Ujiji on his return from the Manyuema country, relieved his neces¬ sities and examined along with him the northern end of Lake Tanganyika. Livingstone after¬ ward started on a fresh journey (in 1872) to determine the course of the Lualaba, intending to travel round the south side of Lake Bang¬ weolo; but after suffering much from illness he died on the shore of this lake on 1 May 1873.

In 1872 the Royal Geographical Society or¬ ganized two expeditions to go in search of Liv¬ ingstone. The one, under Lieutenant Grandy, sailed some distance up the Kongo ; the other, under Lieutenant

Cameron, started from Zan¬ zibar for Tanganyika. On ascertaining the death of Livingstone he proceeded to Lake Tanganyika, where he secured Livingstone's

map and sent it to Zanzibar. He ascertained the height of the lake ; found an outlet, the Lukuga, on the west side ; traversed the Man¬ yuema country; reached Nyangwe, Living¬ stone's farthest point on the Luabala ; pro¬ ceeded south up the east side of the valley of Lomane to Kilemba in the Urua country; and reached Benguela, on the Atlantic coast, 4 Nov. 1875. The identity of the Kongo and Lualaba was at last settled by Stanley, who, between October 1876 and August 1877, descended from Nyangwe on the latter river to the mouth of the former. After helping to establish the Kongo Free State (1879-85) Stanley pro¬ ceeded in 1887 with an expedition to relieve Emin Pasha, Gordon's lieutenant, who, after the fall of Khartum, had retreated into the , interior. Following the Kongo and its tribu¬ tary the Aruwimi, Stanley hewed his way through a vast forest, arrived at the Albert Nyanza, met Emin there, returned for his rear¬ guard and stores, and at last brought Emin and his followers to Bagamoyo, on the east coast, in 1889. He also discovered Lake Albert Ed¬ ward and the lofty mountain of Ruwenzori, on the Semliki, between that lake and Lake Albert. The Portuguese Major Serpa Pinto journeyed from Benguela to Natal in 1878-79; the Germans Wissmann and Pogge crossed from St. Paul de Loanda to Zanzibar in 1881— 82; in 1879-80 (after the death of his leader, Keith Johnston), Joseph Thomson crossed from the east coast by the north of Lake Nyassa to the east of Tanganyika and back to Zanzibar; again in 1883-84 he explored the Masai country between the coast and Lake Victoria; Capello and Ivens went from Angola to Mozambique by way of Bangweolo in

1884-85.

One of the most interesting problems con¬ nected with African geography was the trac¬ ing of the source of the Nile. Among the first of the famous explorers in this direction was James Bruce, who, in 1770, reached the source of the Blue Nile or Bahr-el-Azrek and imagined himself to have solved the great problem. But the real source of the Nile re¬ mained long unknown, the great lakes con¬ nected with its origin being hardly dreamed of till comparatively recent times. In 1858 Bur¬ ton and Speke, crossing from Zanzibar, dis¬ covered Lake Tanganyika, and the same year Speke also reached the Victoria Nyanza, but did not ascertain that it gave rise to the Nile. Speke and Grant in 1862 reached the place where the Nile leaves the lake and followed part of its course to Karuma Falls. At Gon- dokoro they met Sir Samuel Baker, who pro¬ ceeded to investigate the

unexplored part, but did not fully succeed in his object. Baker in 1871 — 73 returned to the scene of his explora¬ tions as the commander of an Egyptian force and took possession of the country in the name of the Khedive, but added little to his previous geographical discoveries. He was succeeded in his command by Colonel Gordon, one of whose officers, Colonel Long, more fully traced the Nile between Karuma Falls and the Vic¬ toria Lake ; while another, M. Gessi, first ac¬ tually traced the Nile up to its outflow from the Albert Nyanza (1876).

Since 1883 the exploration of Africa has been carried out by a multitude of explorers. In the north the French have pushed south

from Algeria and French explorers, prominent among whom was Marchand during 1896-98, crossed the continent from Loanga, in French Kongo, to Fashoda on the Nile, and Foureau, who, in 1900, crossed the Sahara from Algeria to Lake Tchad, have added greatly to our knowledge of the Sahara. Dr. Junker devoted several years to exploring the country between the basin of the Nile and the Kongo. Mr. Stanley, in his great journey across Africa in 1876, added largely to our knowledge of Lake Victoria and of Uganda, the country between Victoria and Lake Albert. After 1890 the work of the various international commissions, which traced the frontiers of the protectorates of the various European powers, added great¬ ly to the topographical knowledge of Africa. Since the British occupation of Uganda, Colonel Lugard and many other officers have mapped the country between the coast and the lakes, Uganda itself and the country to the west. Italian and British explorers have added to our knowledge of Abyssinia and of the desert between the Nile and the Red Sea. Lakes Rudolf and Stefanie have been discov¬ ered and explored by Count Teleki and Lieu¬ tenant Von Hohnel from the south, while James, Donaldson Smith, Cavendish, Robecchi, Bottego and others have explored Somaliland and ascertained that the Omo flows into Lake Rudolf. Gregory has investigated Mount Kenia; Meyer has ascended Kilima-Njaro ; Baumann and other German explorers have visited the region to the west and south of that mountain, round by the south of Lake Vic¬ toria and on to Lake Albert Edward. In 1894 Count Gotzen crossed from east to west, dis¬ covered Lake Kivu to the south of Lake Albert Edward and a lofty active volcano near its shores, coming out by the Kongo. Many other Germans have been busy in German East Af¬ rica, while in British Central Africa Johnston, Sharpe, Joseph Thomson and others have filled in many" blanks, and

British naval officers have charted Lake Nyassa.

The unique distinction of being the first white man to traverse Africa from south to north on foot fell to the lot of an undergradu¬ ate of Cambridge University, Ewart Scott Grogan, who, in February 1898, started from Cape Town with one white companion and a few servants and 18 months later reached Cairo, having traveled the greater part of the distance with only the servants, as his white friend left him before the journey was half done. Mr. Grogan brought back a mass of ethnological information, having carefully in¬ vestigated and described the various tribes with which he came in contact and cleared up a number of disputed geographical points. Consult (From Cape to Cairo* (London 1900).

Several German explorers also traversed and mapped Damaraland and Namaqua- land; Lugard explored the Uganda region; Gibbons and others traversed the Barotse country. The officials of the Kongo Free State laid open the courses of the numerous rivers that feed the main stream; Hinde found the Lukuga flowing into the Lualaba ; Grenfell and others established the connection of the Ubangi or Mobangi tributary on the north with the Makua-Welle higher up, which had been explored by Junker and others. Under the auspices of the Royal Niger Company,

Joseph Thomson and others further explored the Niger; while the Benue and its tributaries and the German sphere in the south were actively explored by British, French and Ger¬ man travelers.

All these three nationalities, moreover, were busy in the vast area between the Guinea coast and the great bend of the Niger. Prom¬ inent among them was Binger, who contributed more than any single individual to our knowl¬ edge of this region. The French occupation of Timbuktu led to the navigation and ex¬ ploration of the upper and middle river by gunboats; while a French expedition followed the river from Timbuktu to its mouth. Mon • teil crossed from Senegal to Lake Tchad and traversed the desert to Tripoli, and the Lake Tchad region was further explored by Lenfant and Loeffler (1902-04) and Alexander and Gosling (1904—05). French expeditions crossed from the Kongo to the Nile and all the river systems are now mapped in their main features. It may indeed be said that the pioneer exploration of Africa has been com¬ pleted, and by 1910 good economic maps existed of all the colonies. What remains to be done is the filling up of the meshes between the vast network of explorers' routes, and this is a task which cannot be completed for many years.

International and Diplomatic Relations. — Early in the history of the United States American shipping trade in the Mediterranean suffered in common with the rest of commer¬ cial navigation from the piracies of the Bar¬ bary States. In 1784 Congress sought to safe¬ guard American commerce by the negotiation of treaties. In 1787, Thomas Barclay signed a favorable treaty with the Emperor of Mo¬ rocco for a period of 50 years, giving the United States the most-favored nation privi¬ leges, with consular representation. The treaty of 1797 with Tunis, like that of Morocco, was also favorable, and, with modifications in 1827, remained effective after the French occupation in 1881.

The treaties negotiated with Algiers in 1795 and with Tripoli in 1796 proved unreliable and expensive. Failing in their obligations, the American naval blockade of Tripoli in 1805, and of Algiers in 1815, led to new treaties of peace and friendship. By compulsion and an expenditure of nearly $3,000,000 the United States gained the commercial freedom of the Barbary shores for the world. See Barbary Powers, U. S. Treaties and Wars with the.

While the slave trade early in the 19th cen¬ tury was a subject of international discussion, and its suppression was advocated in the Treaty of Ghent in 1814, it was not until 1842 that the United States joined with Great Britain in a patrol of the west coast of Africa, which ended with the abolition of slavery in America in 1863.

In 1886 the Sultan of Zanzibar confirmed the extra-territorial rights granted Americans under a treaty made with the Sultan of Muscat in 1833, which lasted until the British occupa¬ tion and the Anglo-American convention of

1.

In 1903 a most-favored nation commercial treaty was effected by the United States' repre¬ sentative with Abyssinia.

The United States had shared in the most- favored nation treaty arranged in relation to

Moroccan affairs by the Madrid conference of 1880, and at the Algeciras conference in 1906, precipitated by German intervention, its repre¬ sentatives signed the treaty <(\vithout assuming obligation or

responsibility for its enforce¬ ment,® the Senate ratifying <(without purpose to depart from the traditional American for¬ eign policy.® See American Diplomacy; Treaties ; United States — Diplomacy of the.

Modem History — International Inter¬ vention and Colonization. — Before 1875 the only European powers with considerable interest in Africa were Great Britain, France and Portugal, the first being pre¬ dominant. After the Franco-Prussian war (1870-71) the unified German nation desired to build up a colonial empire, France also sought compensation for her loss of European prestige by colonial expansion, while Italy, recently be¬ come a united kingdom, likewise desired colonies. South America being protected by the Monroe Doctrine, Africa was the only field open to these conflicting ambitions. Great Britain and Portugal, seeing their influence threatened, determined to guard and if possible extend their possessions. Matters were brought to a head by Leopold II, King of Belgium, who con¬ ceived the project of forming a great state in the recently discovered Kongo territory in cen¬ tral Africa. On his initiative the International African Association® was founded in 1876, with headquarters at Brussels, ostensibly to place the exploration and commercial development of Africa on an international footing. This Asso¬ ciation® finally resulted in the Berlin Confer¬ ence of 1884, b}' which the Kongo Free State was established under the sovereignty of the Belgian King, and the general spheres of influ¬ ence of the other Great Powers were defined. Meantime Germany had established a footing in East Africa and Italy on the Red Sea, France had secured her conquest of Algeria and established a protectorate over Tunisia, and Great Britain had consolidated her influence in South Africa. The possessions of the powers were added to and the boundaries more or less definitely fixed in subsequent agreements, the most important of which are those of 1 July 1890 between Germany and England; of 5 Aug. 1890 between France and England; of 11 Tune 1891 between Portugal and England; of 24 March and 15 April 1891 between England and Italy, and of 15 March 1894 between France and Germany. As a result of the Fashoda incident in 1898, England secured control of the Upper Nile valley; by the Boer war (1899—1902) she gained possession of the South Af¬ rican Republic and Orange River Free State, which in 1910 were united with Natal and Cape of Good Hope Colony undgr the name of Union of South Africa, while by the conventions of 1899 and 1904 she strengthened her already dominant position in Egypt. The latter, how¬ ever, remained nominally under Turkish con¬ trol until 18 Dec. 1914, when a British protec¬ torate was declared. Belgium annexed the Kongo Free State in 1907-08; Italy annexed Tripoli 1911-12, and France declared a

protec¬ torate over Morocco 1912. In 1915 territory under British control in Africa included: North and South Nigeria and protectorate, Gold Coast and protectorate, Sierra Leone and protec¬ torate, Gambia and protectorate in West Africa; Mauritius and dependencies; Seychelles Islands,

Somaliland, East African protectorate, Uganda protectorate, the islands of Zanzibar and Pemba in East Africa; Nyasaland, Union of South Africa, Rhodesia, Swaziland, Basutoland and Bechuanaland in South Africa ; Egypt and Anglo-Egyptian Sudan ; the islands of Ascencion and Saint Helena; in all an area of 3,514,- 271 square miles, with a population of 52,311,544. Territory under French control included: Al¬ geria and Algerian Sahara, Tunisia, Morocco, French Kongo, Madagascar, Mayotte and the Comoro Islands, Reunion Island, French Soma¬ liland and French West Africa in which are comprised Senegal, French Guinea, Ivory Coast, Dahomey, Upper Senegal and Niger Terri¬ tories and Mauretania ; in all an area of 4,403,- 401 square miles (including Morocco), with a population of 30,681,243. Territory under Ger¬ man control before the European war included : Togo, Kamerun, German Southwest Africa, German East Africa; in all an area of 931,460 square miles, with a population of 14,890,000. German Southwest Africa was conquered by Great Britain 1915, Togo in 1914, Kamerun 1915. Territory under Portuguese control in¬ cluded: Cape Verde Islands (1912), Guinea, Principe and Saint Thomas Islands, Angola, Mozambique; in all an area of 793,980 square miles, with a population of 8,245,032. Territory under Italian control included: Eritrea, Italian Somaliland, Tripoli and Cyrenaica; in all an area of 591,230 square miles, with a population of 1,378,176. Territory under Spanish control included : Rio de Oro and Adrar, Spanish Guinea and islands of Fernando Po, Annabon, Corisco, Great Elobey and Little Elobey; in all an area of 84,814 square miles and a popula¬ tion of 235,844. The Belgian Kongo has an area of 909,654 square miles, with a population of 15,000,000. Liberia (area 40,000 square miles, population 1,500,000-2,100,000) being under the supervision of the United States as regards finances, military organization, etc., Abyssinia (area 350,000 square miles, population about 8,000,000) is the only independent nation re¬ maining in Africa. For further details see sep¬ arate countries mentioned.

Commercial Conditions. — Necessarily in so large an area with so many tribes and peo¬ ples who keep no accounts of their transactions, a considerable amount of commerce must pass without being recorded in any way, yet the annual commerce of Africa, of which statistics are available, amounts to over $1,440,000,000. The principal imports were distributed as fol¬ lows : Into British territory (1913-14), $441,-

516,990; French territory (1913), $174,250,765; Portuguese territory (1913), $74,000,000; Ger¬ man territory (1912), $30,000,000; into the Kongo Free State (1912), $11,000,000; and in¬ to Italian territory (1912), $10,500,000. They consist largely of manufactured goods, espe¬ cially cotton goods. Of the exports a large share, especially those from the south, is gold and diamonds ; in the tropical region ivory, rubber, palm nuts and gums and in the north a fair share of the exports are products of agriculture, cotton, coffee, cacao, spices, dates, etc. Exports from British Africa amounted (1914) to over $489,000,000; from French Af¬ rica (1913) to $128,000,000; from Portuguese Africa to $42,000,000; from German Africa (1912) to $25,000,000; from Belgian Kongo (1912) to $12,000,000.

)

Copyright by Rand McNally &• Company

20*

20'

40°

CO°

40

■p, •&*

=\e

• •

/ ;

vO.

PINEAPPLES

“T

Lisbor

Sl

4

X

Sardinia^

disi

20

<» Pont* De .Azores (Port.)

J

VC*'

•

'Strait of Gibraltar C. StaRtE)"

ADEI(lA IS. MEKI _ e _

<.,(PoRT.'f* ^yniDEs^sKiN

M 75 7 ^

] / }Jl E-tD-7-r - *?t

PMnppevllley^^^^j^)

^#,LV

1

JNIS

A, (Port. Vi y"atbygs^SKINj ^

ncr • .00° nt MAO Rpcco /‘WM^sv NS \ fT

/ rVf / w-eia \y

NARY Is. /*^S~ - "~~0 ' //'S CtR

TES !

/ FEZZAN J

L - 'j CAMgis

U(~«^S A Hi A R A

- I A ! .

L A c?BiAra

, WOOL Sfh. _.

lLGERIA

PO LI

SPONGE

Tri

FEATHERS

*// # ') j TV / /£ I

l ?'? 7f PrSwu. _ Tropic of Cancer

/ //? / S/ilr

' ^»;oro\ n a a

TRIPOLITAN!^

DATES

*Ain Salah

- iv " \

f /WA^1

(JSTRICT

FEATHERS

_ GUA?S O

'Sjafr-. O

Timbuktu/ OSTRICH

y vfrK. U feathers

t RU£iii}Vvttlf^SETiEGAl£AMELS

_ rjceJf I 1 o a / r

».A^

Bathurst 4

jSAMAKO wW

l/cffs;

anjA671^...

A ... j.! _ V,VO?»“

/(j&ndo

\

OAST

'f

Equa

V

ˆ 13000 ft.

'zuiteeto)/?/! *

th5rn ‘7T ~4 A* K

oNCEy KAMEE'

0STRI C/Abeshr

Vffh&et

W A D A

'0RY

o

rv

; BLACK

v*. \ ;<?

: ˆ

v/>

cY

WOOL 1

I '•

LIBYAN

eˆy p

OASES OF K UFKA ifesuan

SUE> CANAU W

ˆSuez x

\<$>

tO

'V

N” U~7Bf'T~A VS \ \~~~~'

yj- - \ > iˆlecca

'ZJP

//Xadi Haifa 7\

I

t

Port

<p<lai

. _ 'Vakil

CAMELS \ Berber

WiANGLO-EGY]

_ .X +\

r RUBBER 0myTm™K

7 SUDAN «2(!V ˆPˆ-Lxv

f DARFUR 7}' Vv jNG“ndarl'S<ˆ

IVORY Vˆ-1L7 f • flSi'M. somali j

40

20

, ».A/yp :

"A /

‘Tr

\

\

EEUNl

(ABYSSlil

\D

GOLD

7° Old Calˆr7?ˆ.UEArA TottAaf,0(ˆi

/ffY ˆ ;

GULF OF ˆPAKˆTr.ˆ O /;7

Princes l.o (aifiiA-i JblLM-

St.ˆHOMASˆQ70 ˆLlBREVIULEli

UEs

(Port.) Annobon I.* (Span)

GUINEA

m

■sY&tm WF

\V, ■

\ StUnldy 'Pool

a/1

Fashoda •// ri

I T Adis Abebaˆ

V \ CA\jL£yy.G0Lnf \

•a' 1 v ˆ

'™ IVC.

britIi sY

ˆUGANDA/ E A S ’

.ETA S T

JIBUTI]

fX

Had

(erb£RA

\BR.

SOMALJ

LAND

-M

&

/ 1

,0°

'Mad >

ty6000 / ˆ

ˆAscension 2.

v

\

. _ 'RAZZAVILU

LoaUgO? / sArLcopoldville KADiynfA(/j ˆOMA) PALM ,

7Vrfv‘1i"i l .

AmbrizˆA LUboiLy .f2, :

tabacaˆ-4

Loan da i

.., \ ; l\0RY ■ /

) :PA/.\w A£//

iT'RyWER 'l I

1 \A N G O L A -| ■'•. N \ 1 .ˆethviu COF .

\

x

20

St. Helena. , (Br.) x

3enguelaˆ

Mossamedes

GERI

Tropic of Capricorn

Swakbpipundl

'X. WALFISll

- ○ ■(BR)-

v n[f German

G \CX 1° SRUj'jl.

REALS',

■*M A F R I

'-'S?

■gtlf - * v at Jm

IS \i U,s7-ˆM/r.i

JOBBER

-njarg' onibasa

’kk'lT&F'

Agˆfs-SALAM

\

/ I ...

w

AMIRAiTE Is < W)Cf

j (Be.) ‘ -

/. < o

Hi,

•ULLjt

r

9

~ l Ji.*

\ COMORO Is.,ˆ,V jVL

yl jsflOAR Ao9Af pVˆ'e?0

i Y"areˆ

a/ M '

pfoZAMW

WEB

»Ckinde Lv

jgfra

RAFF IP

CM& LL { CTVLD

/

_ _ .jrˆ/c/T xzsjE:. n-t/eitft

0„™ˆrTOfcHu.lNfeg7\S, J . ♦/*

’ _ \ T kala hari ˆ - -• 7

dS) 1 LL

VAX

IbUj

Inhambane

ˆ O Bour;

AFRICA

(Commercial)

Scale

200

BOO

1000

Statute Miles to one inch. Principal Products Navigable Portions of Rivers Most important Railroads

1

Most important Steamship Lined _

Railroads projected

Angra Pequena } NX POPf An

(CVS

'° REUZ»- (Fb) y

•••Johann

lENQO MARQUES

C. Ste.

- ■ — ‘

d Orange H

\ doCOPlfER

\ X. I

°o ^ r i Vts.

X

l

\l

Cape Toia)&

^V^PiETERMARITZBURG

i.--

\

C. 0»

G°'

,0®

^ f^2afaeth

7

\

Longitude West F) from Greenwich

. Longitude East from 20° Greenwich

40

40

bO

Cofarirht fv Rand McNally Er Comlanv

Railroad development in Africa has been rapid in the past few years and seems but the beginning of a great system which must con¬ tribute to the rapid development, civilization and enlightenment of the (tDark Continent." Already the proposed (<Cape to Cairo" railroad runs north from Cape Colony to Elizabeth- ville in Katanga, Belgian Kongo, about 2,300 miles, and south from Cairo to Sennar in the Anglo-Egyptian Sudan with branches to Port Sudan on the Red Sea and to El Obeid, the capital of Ivordofan. At the north numerous lines skirt the Mediterranean coast, especially in the French territory of Algeria and in Tunis, aggregating about 3,134 miles; while the Egyptian railroads are, including those of the Sudan, 3,779 miles in length. Those of the Union of South Africa are 8,833 miles and of Rhodesia 2,481 miles in length, and those of Portuguese East Africa are another 1,000 miles in length. In British West Africa there are about 1,500 miles open; in the Belgian Kon¬ go about 1,000 miles, while in German Africa, before the European war, there were over 1,700 miles in operation. The Great Lakes Railway in the Belgian Kongo (total length 165 miles) was completed in 1915 and links the Upper Kongo with the German railway from Ujiji to Dar-es-Salaam on the Indian Ocean. The Upper and Middle Niger are con¬ nected at three points with the Atlantic Ocean.

Including all of the railroads now con¬ structed or under actual construction, the total length of African railways is about 22,900 miles. A large proportion of the railways thus far constructed are owned by the several colonies or states which they traverse, about 279 miles of that of Egypt and nearly all of the Union of South Africa and Rhodesia sys¬ tems belonging to the state.

That the gold and diamond mines of South Africa have been and are still wonderfully profitable is beyond question. The Kimberley diamond mines, about 600 miles from Cape Town, now supply 98 per cent of the diamonds of commerce, though their existence was un¬ known prior to 1867 and the mines have thus been in operation scarcely 50 years. It is es¬ timated that over $900,000,000 worth of dia¬ monds have been produced in South Africa up to the end of 1913, the output in that year alone having been valued at over $56,500,000, and this enormous production would have been greatly increased but for the fact that the own¬ ers of the various mines there

formed an agreement to limit the output so as not. to greatly exceed the world's annual consumption.

Equally wonderful and promising are the great Witwatersrand gold fields of South Africa, better known as the Johannesburg mines. Gold was discovered there in 1883 and in 1884 the value of the gold product was about $50,000. It increased with startling rapidity, the product of 1888 being about $5,- 000.000; that of 1890, $10,000,000; 1892, over $20,000,000; 1895, over $40,000,000; and 1897 and 1898, about $55,000,000. In 1914 the gold output from the Union of South Africa was valued at over $178,300,000 and that of Rhode¬ sia at over $17,900,000, and it seems probable that South Africa will for many years con¬ tinue to be, as it is now, the largest gold-pro¬ ducing field of the world. Agriculture and farming have also made considerable progress

in many parts of Africa, white immigration has steadily increased, as has the trade between the colonies and their mother countries. Plans for industrial training of the natives have been devised by the colonial governments, and the slave-trade, which has been a canker in the growth of Africa since the end of the 17th century, though still prevalent in many parts, has been checked to a certain degree by the extension of European control and improved economic conditions.

Bibliography. — General Works : Bryce, J., (Impressions of South Africa) (London 1897) ; Fallex and Mairey, (L'Afrique au debut du XXe siecle) (Paris 1906) ; Herbertson, F. D. and A. J., (Descriptive Geographies from Original Sources: Africa' (London 1902); Keane, A. FL, (Africa) (in Stanford's Com¬ pendium ' London 1904-07) ; Lucas, C. P., his¬ torical Geography of British Colonies) (Vols. Ill & IV, Oxford 1894, 1904) ; Reclus, E.,

(Universal Geography, Africa' (London 1890- 95) ; Sievers-Hahn, (Afrika eine allgemeine Landeskunde) (Leipzig 1901). Archaeology and Ethnology: Deniker, J., (Races of Man) (London 1900) ; Frobenius, L., hr sprung der Afrikanischen, Kulturen) (Berlin 1898) ; Keane, A. H., (Ethnology' (Cambridge 1896) ; South African Native Races Committee, Na¬ tives of South Africa: Their Economic and Social Condition' (London 1901) ; Spencer and Duncan, (Descriptive Sociology: African Races ' (London 1875) ; Stowe and Theal, (The Native Races of South Africa' (London

1905) . Flora and Fauna: Baum, FL, (Ku- nene-Zambesi Expedition' (Berlin 1903) ; Buxton, E. N., Two African Trips' (London 1902) ; Dugmore, A. R., hes fauves d'Afrique' (Paris 1910) ; Hiern, W. P.,

Catalogue of African Plants collected by Dr. Friedrich Wel- wich in 1853-61' (London 1896-1901) ; Oliver Thisellton-Dyer, (Flora of Tropical Africa' (London 1888-1906) ; Oschatz, K., (Anord- nung der. Vegetation in Africa' (Erlangen

1900) ; Schillings, G., cWith Flashlight and Rifle in Equatorial East Africa' (London

1906) ; ib., (In Wildest Africa' (London 1907) ; Selous, F. C., (African Nature Notes and Reminiscences' (London 1908) ; Sim, (The Ferns of South Africa' (Cape Town 1892). Geology, Physical Geography and Climate: Bartholomew, J. G., (Physical Atlas' (London

1901) ; Knox, A., (Notes on the Geology of the Continent of Africa' (London 1906; includes a bibliography) ; Lyons, H. G., (Physiography of the River Nile and Its Basin' (Cairo 1906). History and Politics : Bartholomew, J. G., (Literary and Historical Atlas of Africa and Australasia' (London 1913) ; Claridge, W. W., history of the Gold Coast and Ashanti' (London 1915) ; Goodrich, J. K., (Africa of To-day' (Chicago 1912) ; Graham, A., Toman Africa' (London 1902) ; Johnston, H. H., history of the Colonization of Africa by Alien Races' (2d ed., Cambridge 1905) ; Kel- tie, J. S., (Partition of Africa' (London 1895) ; Morel, E. D., (Nigeria, Its Peoples and Its Problems' (London 1912) ; Petit, E., (Les Colonies Franchises' (Paris 1902-04) ; San¬ derson, E., (Great Britain in Modern Africa' (London 1907) ; Theal, E. M., history and Ethnography of Africa South of the Zambesi — to 1795' (London 1907-10); Wack, H. W., (The Story of the Congo' (New York 1905).

Languages: Blcck, W. H., Comparative Grammar of South African Languages *(Lon¬ don 1862-69) ; Cust, R. N., (Sketch of the Modern Languages of Africa-* (London 1883) ; Torrend, J., Comparative Grammar of South African Bantu Languages- *(London 1891). Travel and Discovery: Alexander. B., (From the Niger to the Nile* (London 1907) ; Barnes, J., (Through Central Africa from Coast to Coast *(New York 1915) ; Brown, R., (The Story of Africa and Its Explorers) (London 1892-95) ; Burton, R. F., (First Footsteps in East Africa) (London 1856) ; Davis, R. H., Che Congo and the Coasts of Africa) (New York 1907) ; Forbes, E. A., Che Land of the White Helmet* (New York 1910) ; Foureau, F., (D'Algerie au Congo par le Tchad *(Paris 1902) ; Livingstone, D., (Missionary Travels and Researches in South Africa* (London 1857) ; and

Cast Journals of Livingstone in Central Africa *(ed. by Waller, London 1874) ; Letcher, O., Che Bonds of Africa, Impres¬ sions of Travel and Sport* (London 1913) ; McCutcheon, J. T., (In Africa *(Indianapolis 1910) ; Melland and Cholmely, Chrough the Heart of Africa* (London 1912) ; Powell, A., Che Last Frontier *(New York 1912) ; Roosevelt, T., (African Game Trails* (New York 1910) ; Schomburgk, H., (Wild und Wilde im Herzen Afrikas *(Berlin 1910) ; Stanley, H. M., Chrough the Dark Continent* (London 1878) ; ib., (In Darkest Africa* (Lon¬ don 1890). See also accounts of explorers mentioned.

Charles Leonard-Stuart, Editorial Staff of The Americana.

AFRICA, Colonization and Intervention

in. — It is difficult to summarize the origin and development of the larger recent colonial ex¬ pansion movements of European nations seek¬ ing territory and economic concessions in Af¬ rica, the efforts to secure strategic positions, the persistent work in the conquest of natural obstacles, the penetration of the wilds to stop slave-hunting and the slave trade and to es¬ tablish peace and security, the enterprises and blunderings which furnish lessons of state¬ craft, and the evolution of adjustments in ad¬ ministration based on scientific study of peo¬ ples and conditions. These movements form¬ ing a part of world politics chiefly relate to the founding of the Kongo Independent State and its transition to the Belgian Kongo, Ger¬ man colonization in Southwest Africa, British and German East Africa (and Uganda), French colonial expansion in West Africa (and the Sudan and Sahara), Nigerian enterprise, South African expansion and union, and the reoccupation of northern Africa (Algeria, Tunisia, Morocco, Tripolitania, Egypt and the Sudan). They represent various phases of a vast world movement which none of the great European Powers had seriously considered in 1870 when their African possessions were still confined to seaport towns and adjacent terri¬ tory — which were regarded as mere trade centres and not as bases for colonial expansion. Although French colonial enterprises in Africa began in 1636 and were extended and consolidated between 1854 and 1865, France really did not conceive dreams of a great Mediterranean-Kongo colonial empire until the early eighties wrhen the Senegal colonists reached the Niger. She evolved a more pro¬

gressive policy after the acquisition of Tunis. England, with the spirit of conservatism, and wfithout any preconceived policy of expansion, was led to extension of territory by unexpected developments. In 1884, although forced by circumstances of 1882 to interfere in Egypt, she was still undecided on a policy of colonial expansion until forced

to act by new condi¬ tions. Under Gladstone's leadership she wTould never have consented to turn Egypt into a British protectorate. Until 1884, she had been in no haste to enter upon a race for territory in West Africa, but, under pressure of French and German activities, she realized the neces¬ sity of formulating a definite policy of expan¬ sion there, and in June 1885 to protect British interests on the Niger she proclaimed a Brit¬ ish protectorate over the region — the begin¬ ning of a policy which by 1914 resulted in the amalgamation of all Nigeria into a single united protectorate. Her period of indecision and uncertainty was not fully ended until about 1885 after the fall of the Gladstone ministry. Although Germany wras under strong pressure after 1878 to enter the field of international politics, Bismarck postponed action until he had firmly secured the position of Germany in Europe through a tariff program and by the formation of the triple alliance of 1882. Alarmed at conditions resulting from the in¬ dustrial revolution and increase of population at home, and partly influenced by the delay of the British government to establish a protec¬ torate over Atlantic coast territory (north of Cape Colony) in which German missions had been established, Bismarck in 1884 determined upon colonization. In 1884, he sent a war ship to take possession of territory in South¬ west Africa in which England promptly recog¬ nized German rights ; and in 1885 he officially proclaimed in East Africa a German protec¬ torate which, through the influence of England, was recognized by the Sultan of Zanzibar. Aroused by the entrance of Germany into Southwest Africa and the expansion of the Boers westward, England took under her pro¬ tection Basutoland in 1884 and Bechuanaland in 1885 — the latter in order to keep the way open to the north of the native districts of Matabeleland and Mashonaland whose possi¬ bilities attracted the attention of Cecil Rhodes (and John Hays Hammond) bv 1888. The later attempt (after 1890) of Germany to se¬ cure the Uganda region by treaties with the natives was frustrated by the prompt action of the British East African Company which, from 1890 to 1892, obtained a control which made permanent the British protectorate in East Africa and won the key to the Nile. By the new treaties (after 1895) the British gov¬ ernment secured the Nile as the frontier of Uganda and proceeded to safeguard her in¬ terests in that region by a railroad which was begun in 1895 and which reached Lake Vic¬ toria at the close of 1901.

In South Africa also, forced by new fac¬ tors which changed completely the situation, the British government after 1884 adopted a policy of forward movement. After the cir¬ cumstances by which England wras led to in¬ tervene in Egypt in 1882, and to undertake the reorganization of the Egyptian govern¬ ment after 1883, the

British scheme of Euro¬ pean extra-legal advisers acting with a gov-

ernment of native Egyptian officials worked admirably, securing a slow but steady progress of reform and affording the people every chance to learn the elements of national self- government. The Gladstone government was justly criticized for failing properly to support General Gordon with force sufficient to conduct an orderly and successful retreat in 1S84. The tragedy of 1884 temporarily shattered the confidence of the Egyptians in the integrity and ability of the British gov¬ ernment and multiplied the dangers and dif¬ ficulties of the later reoccupation of the Sudan — an event which was finally accomplished by Kitchener in 1898. Considering the prospec¬ tive economic benefits of European colonies in Africa, the possessions controlled by France and England are the most fertile and promis¬ ing; those of Spain and Italy are of question¬ able value; while some parts of those con¬ trolled by Germany and Belgium and Portu¬ gal are promising. Although, as a financial proposition, Algeria does not pay, its future possibilities are excellent ; and its position is assured since the definite and final settlement of . the frontier question in 1911 by the acqui¬ sition of Morocco to which France is now ap¬ plying the general principles of her Tunisian system of administration. Although Italy, adopting French methods in the preservation of local customs, has made a good beginning in orderly government in Turkish-ridden Tripoli, she will find a long and painful process neces¬ sary to secure a self-supporting and prosper¬ ous colony. British East Africa promises soon to become self-sustaining. The three German protectorates, recently lost in the World War, have never been satisfactory, although the most constant irritation which existed between set¬ tlers and natives wˆs greatly lessened in 1907 under the leadership of Dcrnberg who in¬ augurated more scientific methods of govern¬ ment. In the German East African protec¬ torate, on which the German government has spent large sums, no remarkable progress has been achieved either in colonization or in de¬ velopment of the region.

James M. Callahan,

Professor of Political Science , University of West Virginia.

AFRICAINE, L' (Die Afrikanerin), an opera in five acts by Jacob Meyerbeer (1791— 1864) ; text by E. Scribe ; first performed at Paris

28 April 1865 and in New York 1 Dec. 1865. The plot revolves around Vasco da Gama, the famous Portuguese navigator (b. 1469), who is betrothed to Donna Inez, daugh¬ ter of Admiral Diego. While da Gama is away with Diaz on a voyage of discovery by way of the Cape, a rumor reaches Lisbon that he has been shipwrecked and lost at sea. Her father insists that Donna Inez shall marry Don Pedro, a councillor of the king. In the first scene, which is laid in Lisbon, the council of state is sitting when da Gama suddenly appears before them and describes his adventures as the sole survivor from the wreck. He produces maps to show that other undiscovered lands lie beyond Africa. On his way home he had picked up a man and a woman of some unknown race who refuse to give the name of their country. For his temerity in assuming, the existence of countries not mentioned in Holy Writ, da Voi t — 15

Gama is thrown into prison, together with the two mysterious natives, Nelusco and Selika. For having rescued her from a slave ship, Selika has fallen in love with da Gama. Her passion is not returned. Her companion, Nelusco, is jealous and attempts to stab da Gama in the cell while asleep, but Selika frus¬ trates his design by awakening da Gama in time. She finally points out her country on the map, for which the navigator vows eternal gratitude. Then Inez enters the cell and an¬ nounces that da Gama is free; she has pur¬ chased his liberty by marrying Don Pedro, having been told that da Gama was enamored of the dusky queen, Selika. Denying infidelity on his part, da Gama immediately makes Inez a present of the two slaves. Don Pedro had meanwhile gained possession of da Gama's maps and plans and been commissioned by the government to undertake the voyage of dis¬ covery. He decides to take the two natives with him. The third act plays on board of Don Pedro's vessel in the Indian Ocean. He is accompanied by his wife, Inez, and the native, Nelusco, is steering the ship — a some¬ what broad stretch of imagination. Don Pedro is warned by his friend Don Alvar, also a member of the council, that Nelusco means treason, but the warning is unheeded, although two ships of the expedition were already lost. On board of a small sailing ship Vasco da Gama is following them. He overtakes them and, fearing only for the safety of Inez, he adds his warning to that of Don Alvar. But Don Pedro orders him to be shot ; Inez pleads for his life; suddenly a storm breaks out and the vessel strikes upon a rock .close to a cannibal island — Madagascar. A horde of savages overwhelm the ship and rescue their queen, Selika, whose influence alone saves the Christians from being massacred. In the fourth act Selika is restored to her position as queen. Her priests clamor for the white men's blood as a sacrifice to the gods ; the white women are to inhale the deadly

manzanillo-tree. Desiring to save Vasco from death, Selika proclaims that he is her husband, and Nelusco is prevailed on to vouch for the statement. The marriage rites are about to be performed. Believing Inez to be already dead, da Gama is soon reconciled and once again swears eternal fidelity to Selika. But, hearing the voice of Inez, who is being led to death, he turns pale and betrays that he still loves her. In the final scene Selika determines that Inez shall die. In an interview, however, her jealousy fades away, and she orders that Inez and Vasco be placed on a ship to return home. As the departing vessel sinks on the horizon Selika herself inhales the deadly perfume of the manzanillo-tree and dies. An invisible chorus consoles her with the assurance that all are equal in love's eternal realms.

AFRICAN INTERNATIONAL ASSO¬ CIATION. King Leopold of Belgium called a conference of geographers and explorers at Brussels in 1876 to consider the development of Africa. This was the first definite step in the modern partition of the continent. King Leopold summoned representatives of Great Britain, Austria-Hungary, France, Belgium, Germany, Italy and Russia <(to deliberate on the best methods to be adopted for the

exploration and civilization of Africa and the opening up of the interior of the continent to commerce and industry.® After deliberations lasting three days the conference formed the "International African Association,® with its headquarters at Brussels ; committees were to be established in the various countries repre¬ sented and the central idea was apparently to place the entire matter of the exploration and development of Africa on an international footing. The greed of the different nations, awakened by the commercial prospects of the Kongo, led to various disputes, and at length it was decided by consent of all the Great Powers, including the United States, to adjust the several, difficulties at an international con¬ ference in Berlin. This conference opened 17 Nov. 1884 and closed its session 26 Feb. 1885. Prince Bismarck presided at its deliberations. Fifteen countries were represented. It was declared that the regions forming the basin of the Kongo River and tributaries shall be neu¬ tral territory, free trade shall exist there, na¬ tionals of any country may undertake trans¬ portation therein, the powers exercising sov¬ ereign rights in adjacent territory shall not exercise any monopoly of trade and all shall bind themselves to suppress slavery. The cen¬ tral association became gradually more and more

Belgian in character, while the territory in question at last developed into the Kongo Free State under the personal sovereignty of King Leopold. See Africa; Belgian Kongo; Stanley, H. M.

AFRICAN METHODIST EPISCOPAL CHURCH, The. Work among the negroes was begun by the Methodist Episcopal Church at an early date. Bishop Asbury was much interested in the race and often preached to them. “Black Harry,® a noted colored preach¬ er, often accompanied Bishops Asbury and Coke and preached to white congregations as well as congregations composed almost entirely of black men. For a considerable number of years the two races worshipped together, but gradually they separated. As early as 1787 a society was organized among the negroes in Philadelphia as the result of ill-treatment re¬ ceived. The formation of the society was op¬ posed by the whites. In 1793 Richard Allen erected a church on his own lot and at his own expense. This brought the church into con¬ troversy with the authorities. The whole in¬ volved story is given in the historical preface to (The Doctrines and Discipline of the A. M. E. Church, } the last edition of which appeared in 1916. Dr. Benjamin Rush, the noted physi¬ cian, sympathized with them and helped them. Bishop William White, bishop of the Protestant Episcopal Church, was appealed to and or¬ dained Rev. Absolom Jones, one of their num¬ ber, to be their pastor. However, when the new meetinghouse was completed it was dedi¬ cated by Bishop Asbury and was named Bethel. The subsequent history of the church was one of persecution and litigation. The members of Bethel were victorious in the suit brought against them.

A similar time of trial and persecution was experienced by the colored people of Baltimore and other places. The feeling produced made a division necessary. In 1816 a general con¬ vention was called to meet in April in the city

of Philadelphia. Seventeen delegates respond¬ ed to the call, representing congregations in Philadelphia, Baltimore, Attleborough, Pa., and Salem, N. J. At this convention it was resolved: “That the people of Philadelphia, Baltimore and all other places who should unite with them, should become one body un¬ der the name and style of the African Meth¬ odist Episcopal Church.® Articles of incorpor¬ ation were not filed until May 1900. The trus¬ tees are 12 and consist of four bishops, four ministers and four laymen. Rev. Richard Al¬ len, who 17 years previously had been ordained deacon by Bishop Asbury, was elected bishop and served in that capacity until his death, 26 March 1831. He was not, however, the first choice of the convention. Rev. Daniel Coker was first elected, but resigned the next day. On 11

April 1816 Mr. Allen was ordained bishop by Rev. Absolom Jones, mentioned above. The convention adopted the Book of Dis¬ cipline of the Methodist Episcopal Church, re¬ jecting, however, the articles relating to the office of presiding eldership. Later they adopted this officer in their polity and he re¬ mains as one of their executives to this day. They also used the hymnal of the Methodist Episcopal Church until 1826, when they pre¬ pared one* of their own.

At the time of the convention about 3,000 members were numbered as belonging to the various churches represented. The growth of the new church was very rapid. The church spread south and southwest in its growth. As early as 1822 there was a strong church of 3,000 members in Charleston, S. C. It was suppressed by the authorities as dangerous to the community interests. Probably some of the leaders had been too outspoken to please the white authorities and at that time it was the only church organization in the South not under white leadership. After the Civil War ceased the membership of the denomination greatly increased. As early as 1866 there were 10 annual conferences, 185 pastors, 206 churches and 50,000 members. There are now, according to the latest statistics available, 81 conferences, including a conference in Ber¬ muda, one in Nova Scotia, one in Ontario, seven in Africa, one in the West Indies and one in South America; 5,000 preachers, 6,000 churches and over 650,000 members.

In 1856 the members of the African Meth¬ odist Episcopal Church residing in Canada formed the British Methodist Episcopal Church and elected Willis Nazrey, then bishop of the A. M. E. Church, as their bishop. In 1884 the church was reunited and the British M. E. Church ceased to exist except in a very small minority.

The General Conference is the supreme governing body and, as in other Methodist bodies, it has only legislative power for the church. It is composed of all the bishops, General Conference officers, college and uni¬ versity presidents and deans of theological schools, two ministerial and two lay delegates from each annual conference. If a conference has more than 60 members it is entitled to an additional ministerial delegate for each 30 members or fraction of the same exceeding 15. The Annual Conference is composed of all the traveling elders, deacons and licentiates and

all the local elders and local deacons and two laymen from each

district in the bounds of the Conference. Members of other conferences visiting the session of the conference have the right to speak in debate but cannot vote.

The District Conference is composed of all traveling ministers, local preachers and one steward from each quarterly conference in a presiding elder's district. The District Con¬ ference does considerable work done by the Annual Conferences in other churches, such as the preliminary examination of candidates for admission to the ministry.

The Quarterly Conference is the governing body of the local church. The women of the church have a large share in the local govern¬ ment. There are not only stewards but stew¬ ardesses as well. From three to nine belong to each local Quarterly Conference. The church also makes use of the services of deaconesses. The bishops, however, are spe¬ cifically prohibited from ordaining women to the ministry.

The present Board of Bishops consists of 16 members, 15 of whom are in active service. The church is divided into 15 episcopal dis¬ tricts over each of which a bishop presides for a period of four or more years, as the Gen¬ eral Conference shall direct. The limit of service of presiding elder or pastor is five years.

The educational work of the church in¬ cludes 20 institutions of which 10 are of col¬ legiate grade, two are normal schools and one an industrial school. For the training of their ministry they have two theological sem¬ inaries : Payne Theological Seminary, located at Wilberforce, Ohio, and connected with Wilberforce University; and Turner Theologi¬ cal Seminary, connected with Morris Brown College, Atlanta, Ga.

The Missionary Society was organized by the General Conference of 1844 and includes both foreign and home missions in its work. Previous to that date, however, the church had conducted mission work in Hayti, sending Scipio Beans as missionary in 1827. In 1830 mission work was begun in Santo Domingo. In 1820 missions were established in Sierra Leone by Rev. Daniel Coker. In 1878 work was begun in Liberia and in 1889 in the Trans¬ vaal. In 1908 and 1912 Bishop Heard was sent to Africa as resident bishop. In 1912 Bishop Johnston was resident bishop of South Africa. In 1916 Bishop Ross succeeded Bishop Heard, while Bishop Beckett succeeded Bishop Johnston. The headquarters of the Mission¬ ary Society is located in New York.

Bibliography. — Jenifer, John T., (The First Decade of African

Methodism in Arkan¬ sas and Indian Territory, ' Jenifer's Life and Historic Notes,' (Centennial Retrospect History of the African Methodist Episcopal Church' (Nashville 1916) ; Payne, D. A., (Semi-Centen¬ ary of African Methodism,' (Recollections of Seventy Years,' (History of the African Meth¬ odist Episcopal Church' (Nashville 1891) ; Tan¬ ner, B. T., (An Apologv for African Metho¬ dism' (Baltimore 1867) ; id., (Historv and Government for African Methodist Church¬ men' (Philadelphia 1884).

Samuel G. Ayres.

AFRICAN SLAVE TRADE. See Ne¬

gro, The.

AFRICAN WAR, The, in Roman history, Caesar's campaign against the Pompeians who after Pharsalia kept up the war in Africa, and were crushed at Thapsus, 46 b.c. The history of it printed as Caesar's is not his, and the author is unknown.

AFRICANUS, Sextus Julius, Christian historian of the 3d century: b. in Libya, traveled in Asia Minor, and from 195 to 240 lived at Emmaus near Jerusalem. No copy exists of his (History of the World' in five books from the Creation to a.d. 211, a period which he computed at 5,723 years, but it is known by considerable extracts made by Euse¬ bius for his (Chronicon,' and by Syncellus and Cedrenis. A letter to Origen on the book of Susanna and Origen's reply exist. Consult Geizler, H., (Sextus Julius Africanus und die Byzant. Chronographˆ' (2 vols., Leipzig

1880-85).

AFRIDIS, af-re'dez, a tribe of Afghans or Pathans on the northwest Indian border near the Khyber Pass, who after many years of the customary border raids were dignified into al¬ most a great power by the ill-advised policy of the Indian government in sending out an im¬ posing army against them in place of the usual small punitive expeditions. The tribe sent their women into the English camp to be cared for and protected, fought for some months in their mountains till the planting season was come, then submitted and promised an indemnity, hav¬ ing enjoyed the highest glory and felicity their natures could appreciate.

AFRIKANDER («Taal» Dutch for Af¬ rican), a native South African; commonly used for the Dutch stock alone.

AFRIKANDER BOND, or BUND, bunt,

an association of white natives of South Africa to make native influence paramount there and ultimately secure its independence ; formed in 1879, but thus named in 1880. The Cape Col¬ ony wing supported Cecil Rhodes till after the Jameson Raid in 1895, which it considered as fostered by him with objects exactly contrary to its own. It carried the elections in 1898, and while advising Kruger to grant concessions to the Outlanders for safety's sake, its sympathies were hostile to them ; in the ensuing war it was a heavy handicap to the English, seeming likely at one time to add Cape Colony to the revolt; indeed, it held a convention, 6 Dec. 1900, at Worcester, C. C., condemning the war and Eng¬ lish policy, insisting on the recognition of the South African Republic, and censuring the pol¬ icy of the high commissioner. The success of the British and the annexation of the territory to the empire of Great Britain brought about a dissolution of the organization.

AFTER-DAMP, the gaseous product formed by an explosion of fire-damp (q.v.) in a coal mine. It consists largely of nitrogen from the air, and carbon dioxide formed by the explosive combustion of the hydrocarbon gas given off by the coal. It seldom contains sufficient free oxygen to support respiration. Hence its danger to the miners.

AFTERGLOW, a display of brilliant colors in the western sky after sunset. The colors are usually various shades of red, al-

though yellows and grays are sometimes visible. Afterglows follow volcanic eruptions of ex¬ plosive character and are generally ascribed to the presence of minute dust particles in the air. The eruption of Krakatoa in 1883 was ac¬ companied by most gorgeous afterglows which were observed throughout the world and per¬ sisted for several years. Similar effects were seen over a much smaller area after the out¬ bursts of Mont Pelee and La Soufriere in May 1902. The name foreglow is given to such dis¬ plays in the eastern sky before sunrise.

AFTER-IMAGE, AFTER-SENSATION and AFTER-PERCEPT are the terms used to denote the direct after-effects of the stimu¬ lation of a sense organ. These after-effects occur in almost all of the sense departments. A brief stimulation of the sense organ gives a primary sensation, then a pause of a fraction of a second, followed by a

secondary sensa¬ tion of the same quality as the primary sensa¬ tion. After-images of touch follow after brief contact. They do not appear under ordinary circumstances, but may be observed if special conditions are produced ; for example, a gentle tap of a point of a needle will be followed by a pause, then an after-sensation which differs from the primary sensation in that it seems to be produced from within the body, not from without. The effects of a temperature stimu¬ lus may persist for a time in the same quality as the primary sensation. After-taste and after-smell have been observed, but have not been studied. Auditory after-sensations, anal¬ ogous to after-sensations of touch, are very weak and of brief duration.

After-images of vision are stronger and more permanent, consequently have been given much more attention by experimentalists. It has been found that after the retina has been stimulated by light for one second, or less, the primary image disappears quickly; an interval of less than two seconds is then followed by a posi¬ tive after-image, that is, an after-image of the same quality as the primary image.

A stimulus of longer duration is followed immediately by the positive after-image, and this image may itself be followed by a negative after-image, that is, an image which differs very much in brightness from the primary image, or is of a different color. With some observers a brief stimulus is followced imme¬ diately by a negative after-image, which fades away quickly to be followed after an interval by a more permanent positive after-image. Sev¬ eral images may succeed each other immedi¬ ately or be separated by an interval of time. A stimulus of still greater duration is followed directly by a negative after-image. In such cases the after-image is usually of a color that is complementary' to the color of the primary image, especially if observed with closed eyes or if projected upon — that is, seen while look¬ ing at — a gray background. The duration of the after-image varies with the intensity, dura¬ tion and area of the stimulus. The results of experiments, under conditions such that the in¬ tensity of the light does not vary, have not as yet shown that any one color has more power to produce after-images than any other color. The greater the angular distance of the portion of the retina stimulated, from the fovea, the Jess distinct and the less durable is the after¬ image. There seems to be no after-image at

an angular distance of 45 degrees or more from the fovea. The explanation for this fact may be physiological, or psychological, or both ; that is, it may be due to the fact that the periphery of the retina is more easily fatigued than the fovea, or it may be due to lack of ability to attend to those portions of the retina which are not

customarily attended to. When an ob¬ ject occupies the attention, the eye is so directed toward it that the image falls over the fovea ; the mind docs not ordinarily attend to images that are not over or very near the fovea.

A blow on the head may cause the after¬ image to become less intense or to cease en¬ tirely. Electrical stimulation of the eye and optic nerve will change the character of the after-image and shorten the time of its dura¬ tion. General fatigue will shorten the dura¬ tion of the after-image; for example, it has been found that an after-image lasts about 30 per cent longer in the morning than in the even¬ ing. The distraction of attention in any man¬ ner has its effect on the course of the after¬ image ; when the attention is directed wholly upon the after-image the duration is one-third longer than when the attention is not concen¬ trated upon it.

If one eye only be stimulated, .an after¬ image may appear in the unstimulated eye. Four hypotheses have been offered to explain this transfer of the image from one eye to the other: (1) The appearance is a phenomenon of binocular contrast. When one eye is stimu¬ lated by a bright colored light, and the other eye is stimulated by a very little gray light or is protected from all light, the contrasted color may be seen in the unstimulated eye during the time of stimulation, and this may leave an after-image in that eye. (2) A second hypoth¬ esis is that the eyes are accustomed to func¬ tion together, and whatever affects one retina affects the other also. This may be considered as a modified form of the first hypothesis. (3) Another hypothesis is that the after-image has its seat in the centres in the brain, not in the end organ or retina, and that it may be seen in whichever eye is open. This hypothesis seems to be overthrown by the fact that an electrical stimulation of the optic nerve pro¬ duces a sensation like that produced by a flash of light, but no after-image follows. Another fact difficult for this hypothesis to explain is that if one eye be stimulated the after-image appears in the other eye only in case that eye be well darkened. (4) A fourth hypothesis is that the transfer of the after-image is not real but only apparent. In support of this hypothe¬ sis it has been found that when <(that portion of the right eye which corresponds to the blind spot of the left eye was stimulated® (Franz), there was an apparent transfer of the image to the left eye; also if the unstimulated eye be disturbed or interfered with during the course of the after-image no change in the image may be observed, . whereas if the stimulated eye be interfered with the image disappears. Consult Fechner. (Elemente dcr Psvcho-physik) ; Franz, S. I., (After-Images) (Monograph Supplement, Vol. HI. No. 2, 1899, Psych. Rev.) ; Titchener, E. B., (Ueber binocular Wirkungen monocular ReizeJ See

Eye; Vision.

AGABUS, a'-ga-buz, a prophet residing in Jerusalem in the time of Paul and said by tradition to be one of the 70 disciples of Jesus

LIZARD (Agcima colonorum) BEETLE {Ateuchus sacer HORNED VIPER {Cerastes cornusus

. I

• 1

■Hi *

I HHB Hj ■ H . . - t$X'> ’ Mm 'M

.

Christ. He predicted a famine in the year A.D. 43, which occurred in the next year (Acts xi, 27, 28) but was probably confined to Judea. According to Josephus many poor Jews were relived by the Queen of Adiabene, who pur¬ chased corn in Egypt for them. Later Agabus predicted to Paul that he should suffer if he went to Jerusalem (Acts xxi, 10-12). The Greek Church holds that later Agabus suffered martyrdom, and observes his festival on 8 March.

AGADES, a'ga-dez, Africa, a town near the middle of the Sahara, capital of the oasis kingdom of Air or Asben ; at one time a seat of great traffic, probably containing 60,000 in¬ habitants. It has a population of about 6,000.

AGADIR, a-ga-der', an Atlantic seaport of Morocco, northwestern Africa, 375 miles from Tangier and 64 miles from Mogador, in lat. 30° 27' N. and long. 9° 36' W. It is famous simply because its name has been so prominently associated with the Franco-German crisis of 1911. In the summer of that year, while France was establishing a protectorate in Morocco against the wishes of the inhabit¬ ants, the German warship Panther was sud¬ denly sent to Agadir. The most powerful of the Moroccan chiefs were entertained aboard and were promised German support in resisting French control. For a time war seemed im¬ minent between France and Germany, both na¬ tions mobilizing troops on their frontiers. After some delay an accord was

published on 3 November in which Germany recognized the right of France to establish a protectorate in Morocco, and France ceded to Germany about 250,000 square kilometers of land in the French Kongo, bordering the German colony of Kam- erun, and other commercial and economic pro¬ visions were added. Both nations engaged to obtain the adhesion to this accord of the other nations who were signatories of the Algeciras act. At the waterfront there is a miserable hamlet of fishermen called Fonti ; the town it¬ self, built on the crest of a hill about 660 feet in height and a short distance away, is sur¬ rounded by walls with Saracenic towers. It was an outpost of Moroccan Islam : a closed port — closed, that is, to general commerce. Pop. about 1,000. Consult : Albin, P., (Le “Coup® d’Agadir : origines et developpement de la crise de 191P (Paris 1912) ; also (Agadir et la strategic navale) (Rev. de Paris, 18th year, Vol. VI, pp. 809-822).

AGAG, a-gag, (1) in Jewish history, a king of the Amalekites saved by Saul out of the slaughter of his people, and hewn in pieces by Samuel before Yahwe’s altar; evidently a sur¬ vival of human sacrifice. (2) A character in Dryden’s (Absalom and Achitophelp represent¬ ing Sir Edmund Berry Godfrey, the London magistrate found murdered shortly after taking Titus Oates’ deposition concerning the imagi¬ nary “Popish Plot.®

AGALACTIA, a deficiency, either of quality or quantity, in the secretion of milk after delivery. It may be due to a number of causes, as poor diet, hemorrhage, or exhausting diseases such as syphilis, or phthisis, or even by emotional disturbances. A good diet with plenty of milk and cream will often increase the secretion of milk. Malt liquors (porter,

stout) are helpful in small quantities. Drugs are of no value. Agalactia is contagious in sheep and goats. It is accompanied when acute by a high fever and has a mortality of 15 per cent. It is very frequent in Italy, France and Spain.

AGALMATOLITE, ag-al-mat'6-llt (from the Greek words agalma, image, and lithos, stone), a soft, massive stone, grayish or green¬ ish in general hue, and often yellow, brown and red, or streaked with those colors. It is soft enough to be cut with a knife and it takes a good polish. The Chinese use it for carving images, notably small pagodas and grotesque figures of animals and men ; ingenious advan¬ tage often being taken of its varied colors for the production of odd effects. The hardness of the Chinese variety is mostly from 2.0 to 2.5, and its specific gravity about 2.8. It is not a definite mineral, some specimens being silicious pinite, while others are referable to

pyrophyl- lite and steatite.

AGAMA (Caribbean name), a genus of lizards, typical of the large and important fam¬ ily Agamidcc, which is distributed over all Af¬ rica (except Madagascar), Arabia, Asia south of the Caucasus and Himalayan Mountains, the Malayan Islands and Australia. None are found in the New World. They are closely re¬ lated to the iguanas, and are characterized by acrodont dentition (that is, the teeth surmount ridges of the jaw), a broad and short tongue, and the absence of bony tubercles (osteoderms) in the skin, but large and numerous spines are often present. They may have brilliant colors, but many are dull, desert-inhabiting species. Some have parachutes, as the flying dragon, and others defensive appendages, as the frilled lizard. Prominent examples are the dragons, bloodsuckers, false chameleons, frilled lizards, spiny-tailed desert lizards, dabs, molochs and related forms elsewhere described under their own names. The family contains about 200 species arranged in about 30 genera, and is most numerous in the region from India to Australia.

AGAMEMNON, in the Iliad, is the Greek “great king® or “king of kings,® the overlord of Greece both north and south of the Gulf of Corinth ; the royal seat is at Mycenae in the Peloponnesus. He is represented as a rather weak man, presiding over a turbulent assembly of practically independent feudal chiefs, who will not openly defy him because he is conse¬ crated to his position by Zeus, but who are entirely independent as regards their individual districts, though bound to follow him to war when ordered. His character is of course pure¬ ly the invention of the poet, and its relation to that of Achilles and other chiefs is curiously like that of Charlemagne to Roland and the peers in the chansons; the dashing noble being the real hero, and the monarch slurred as rather petty, unjust and capricious, king by grace rather than special merit. But the posi¬ tion is not fictitious. Archaeology has proved that Mycenae was really the seat of a wealthy and powerful monarchy, probably about 1500 b.c. and somewhat after, as well as that sev¬ eral Troys flourished and perished; and these proofs that the basis of the story was tradi¬ tional and not mvthical naturally tempt the sanguine to hope for further points of truth,

which research tends steadily to justify. As to the character of the monarchy, later theorists take the reverse view from the earlier. Grote

held that the account in Homer showed the germ of a developing constitutionalism, the criticising commons who were becoming a thorn in the monarch's flesh being satirized and caricatured in Thersites, and the king only an Aryan chief elected by his equals ; Mahaffy thinks it the decay of a monarchy of the Orien¬ tal type, the feudal anarchy indicating break¬ down instead of growth. In the legend he is the son of Atreus (q.v.), and brother of Mene- laus, King of Sparta, whose wrong in the se¬ duction and carrying away of his wife Helen by Paris, son of Priam, King of Troy, he avenges by a levy of all the Greeks to make war on Troy, when its King, Priam, will not give up Paris or make him give up Helen. (See Helen; Iliad; Troy). The sacrifice of his daughter Iphigenia (q.v.), to secure a passage from Aulis, is a later fiction and recalls Jeph- thah and his daughter curiously. His quarrel with Achilles is the theme of the Iliad. When Troy was sacked he received Priam's proph¬ etess-daughter Cassandra (q.v.) among his share of the spoils. Returning home after 10 years' absence, he was murdered by his cousin 2Egisthus, son of Thyestes (see Atreus), aided by Agamemnon's wife Clytemnestra (q.v.) with whom he had been living in adultery for a short time previously; and his son Orestes on growing up avenges him by killing his mother, his sister Electra abetting. In Homer the mo¬ tive for Agamemnon's murder is simply that of any adulterous pair in ridding themselves of an inconvenient husband ; in 2Eschylus' (Agamemnon, > Clytemnestra slays him with her own hand, professedly in revenge for his sac¬ rifice of Iphigenia, obviously sharpened by jealousy of Cassandra, and throwing the ulti¬ mate responsibility on Nemesis, who is pursu¬ ing the house of Atreus.

AGAMENTICUS, Mount, a noted land¬ mark in York County, Me., near which one of the earliest settlements in this territory was made in 1631. It is a few miles back from the shore and rises to the height of 673 feet.

AGAMIDJE, a large family of lizards, in¬ cluding about 200 species, all dwelling in the warmer parts of the Old World. They are of moderate size, active, with well-developed limbs, are of both terrestrial and arboreal habits and mostly insectivorous. The tongue of all is broad and short; the skin often spiny and changeable in color. In this family are many common and familiar lizards of the Mediterranean region as well as of the East, including the flying dragon, the moloch, the frilled lizard of Australia and others else¬ where described by name.

AGAMOGENESIS. See Parthenogene¬ sis.

AGANA, ag-an'ya, the principal town of Guam, the largest of the Ladrone Islands, 1,500 miles east of Luzon, Philippines, and 1,300 miles south of Yokohama. The Ladrone, or Marianne, group belonged to Spain ; but, as a result of the war between the United States and Spain in 1898, the former took possession of the island of Guam, and in 1899 established a naval station and seat of administration at Agana, with Capt. Richard P. Leary, U.S.N., as

first governor. The town contains the usual public buildings of a military station, and a college.

AGANIPPE, -nip'e, a fountain on Mount Helicon, in Greece, sacred to the Muses, which had the property of inspiring with poetic fire whoever drank of it.

AGAPE, ag'a-pe (Gr. agape , love), in eccle¬ siastical history, the love-feast or feast of charity, in use among the primitive Christians, when a liberal contribution was made by the rich to feed the poor. During the first three centuries love-feasts were held in the churches without scandal, but in after-times the heathen began to tax them, with impurity and they were condemned at the Council of Carthage in 397. Some modern sects, as the Wesleyans, Sande- manians, Moravians, etc., have attempted to revive this feast.

AGAPEMONE, ag-a-pem'o-ne (lit. <(the abode of love®), the name of a singular con¬ ventual establishment which was founded at Spaxton, near Bridgewater, Somersetshire, in 1859, the originator of it being a certain Henr}ˆ James Prince, at one time a clergyman of the Church of England, who called himself the Witness of the First Resurrection. The life spent by the inmates appeared to be a sort of religious epicureanism. Some of the pro¬ ceedings of the inmates of the ((Abode of Love® resulted in applications to the courts of law, where parties formerly members of the society having returned to the world sought to regain their rights from Prince and his followers, such cases naturally causing some scandal ; but the sect has been scarcely heard of for some years.

AG'APPIITE, a name given to the tur- quois (q.v.) by Fischer in 1806, in compliment to the naturalist Agaphi. It is no longer in general use.

AGAR-AGAR, a'gar-a'gar, also known as Bengal isinglass. A dried seaweed or vege¬ table gum obtained from Singapore. It is al¬ most completely soluble in water, dissolving to a tasteless and odorless mass. It is much used as a culture medium in bacteriology.

AGARTC (Agancus), a genus of fungi, characterized by having a fleshy cap or pileus and a number of radiating plates or gills on which are produced the naked spores. The ma¬ jority of this species are furnished with stems, but some are attached to the objects on which they. grow by their pileus. Over a thousand species are known, and- are arranged in five sections according as the color of their spores is white, pink, brown, purple or black. Many of the species are edible, like the common mushroom (A. campestris) , and supply a deli¬ cious article of food, while others are dele¬ terious and even poisonous. See Fungi; Mushrooms.

AGARICIC ACID, ag-ar-is'ik, a substance

having the formula C16H30O5, Which is. obtained from certain species of mushrooms by extrac¬ tion with ether or strong alcohol. It is also soluble in hot glacial acetic acid and oil of turpentine. It crystallizes in flat, four-sided plates, and also in prisms, according to the sol¬ vent from which it is deposited, and melts at about 290° F. It dissolves in boiling water, but crystallizes out again upon cooling. A

IP*

• - . -v. -..:; .. /.-

iyMSSwV;- SSffiifiHKSSR

■NMI

..

W

HH

■ '

'

mmmmm

m

wmm

$%%&&$

MpaMp

.v.V :-i.ˆV4".‘;":

m- '&% -■;%■■ ■

mm

tfwm

f&SJ

W&mws&m.

v-’ ¥r

§$

fe'3 1

?&s$

'V-'V.

ˆV'"';*V'*

:*!5&££

LOUIS AGASSIZ

similar substance, known as agaricin, is ob¬ tained from the fly-agaric by extraction with alcohol, and Jahns states that it is identical with agaricic acid. Several salts of agaricic acid are known. See Agaric Resin.

AGARIC MINERAL, ag'a-rik, or a-gar'ik. (1) A soft, white variety of calcite, breaking easily in the fingers and occurring in caverns and in the clefts of rocks in regions where the ground water contains much lime. (2) A va¬ riety of silicate of magnesium found in Tus¬ cany and also known as mountain-milk or rock- milk. Bricks made from it wifi float in water hence it is supposed that this is the material from which the ancients made their floating bricks.

AGARIC RESIN, a red resinous sub¬ stance obtained from certain mushrooms, to¬ gether with agaricic acid (q.v.) by extraction with

alcohol or ether. It melts at 194° F. It is insoluble in water but dissolves in absolute alcohol, ether, wood alcohol, chloroform and alkalies.

AGASSIZ, Alexander, ag'as-si, American scientist, son of Louis: b. Neuchatel, Switzer¬ land, 17 Dec. 1835; d. 27 March 1910._ Taken to America in 1848 he was educated at Harvard College. In 1859-60 he made biological studies along the coast of California and Mexico with the United States coast survey. Later he be¬ came wealthy through investment in coal and copper mines, to which he was led by scientific knowledge and experience. On his father's death he was appointed curator of the Museum of Comparative Zoology at Harvard, but re¬ signed in 1885 on account of ill health. In 1896 he was made an officer of the Legion of Honor. He belonged to many scientific asso¬ ciations, did much important work in marine dredging and the zoology of the deep sea, as well as on other subjects. His most important publications are (North American AcalephaA (1865); (Marine Animals of Massachusetts

Bay5 (with Elizabeth Agassiz, 1871) ; Revi¬ sion of the Echini) (1872) ; (North American Starfishes) (1877) ; and Report on the Echini of the Challenger Expedition (1881).

AGASSIZ, Louis, American naturalist : b. 28 May 1807 at Motier, Canton Fribourg, Switzerland; d. 14 Dec. 1873. From childhood he showed a strong bent toward zoology and, after a preparatory training at Lausanne, studied medicine and natural history at Zurich, Heidel¬ berg and Munich, taking a degree in philosophy at Heidelberg and graduating in medicine at Munich, 1830. After this he went to Paris and worked under Cuvier until 1832, when he was called to Neuchatel as professor of natural history, and remained there until 1846, when invited to give a series of lectures in the Lowell Institute course at Boston. The suc¬ cess of these lectures and his desire to study the natural history and geology of America de¬ termined his permanent removal to the United States ; in 1848 he was given the chair of nat¬ ural history in the Lawrence Scientific School of Harvard University. With the interval of three years (1851-54) as professor in the med¬ ical college at Charleston, S. C., he continued his connection with Harvard until his death. His enthusiasm, eloquence and clearness of thought made him a pre-eminent teacher, but

in his later years he was relieved from the regular duties of the school.

His first great work, Recherches sur les poissons fossiles) (5 vols., 311 plates, 1833-42) was accomplished during his professorship at

Neuchatel. This was followed by (Fossil Fishes of the Old Red Sandstone of the British Isles,5 written after making several visits to England, and by the (Nomenclatoris Zoologici Index5 (Soliduri, 1842-46), which, revised and brought up to date by Scuddcr, was reissued in 1882 as Bulletin No. 19 of the United States National Museum. During this same period he had stud¬ ied both living and fossil echinoderms and had spent many summers in observing glacial action. The most eminent European biologists, botan¬ ists and geologists were among his friends, and he came to America with the hope not only of advancing science by his own researches, but of waking a deeper interest than American students had yet shown in the natural sciences. His first wife had died in Europe; he remar¬ ried in America and became so engrossed with the work he had undertaken as to refuse the most flattering offers of positions in Europe. In constant demand and traveling widely as a lecturer as long as his health permitted, he was nevertheless constantly forwarding his original work. In 1848 he made a geological and bio¬ logical survey of the northern and eastern shores of Lake Superior; in 1850-51 he studied the coral reefs of Florida; later he visited Brazil and the coasts of California.

His zeal was untiring, even after his health failed; besides working through all his later life on his great series, Contributions to the Natural History of the United States, 5 which he had planned on so large a scale that the four quarto volumes completed were but a beginning, he directed constant efforts toward the estab¬ lishment of the Museum of Comparative Zoology at Harvard, giving more attention to it than to any other of his later interests. The plans for it were perfected in 1858, and through his influence the original endowment was sup¬ plemented by generous appropriations ; he gave his own valuable collections to it, and his time and money as well ; before his death the oppor¬ tunities which he had created there had at¬ tracted a group of young men who were to be¬ come the foremost American biologists. The founding of a summer school where zoology could be studied out of doors was another of his projects, and this he accomplished on the island of Penikese, Buzzard's Bay, in 1873, just before his death.

Among his more important American pub¬ lications are: (Methods of Study in Natural History, 5 (Geological Sketches,5 (The Struc¬ ture of Animal Life,5 (A Journey to Brazil) and (An Essay in Classification 5 (the first vol¬ ume of his unfinished Contributions5) . The amount and scope of his work, together with his great gift of awakening _ interest in the natural sciences and advancing new views without rousing the opposition of the dogmatic, gave him rank as the most

influential of Amer¬ ican naturalists, although many of his opinions and theories have been superseded by the Dar¬ winian idea of evolution, which he opposed. He was buried in Mount Auburn Cemetery, where his monument is a boulder from the Aar glacier in Switzerland. Consult Rife and Cor¬ respondence of Agassiz5 (Boston 1886).

AGASSIZ, Mount, a remarkable extinct volcano situated in Arizona about 70 miles northeast of- Prescott. It has an altitude of more than 10,000 feet above the sea, and be¬ longs to the ranges of the Rocky Mountains. As a place of resort it has numerous attrac¬ tions — grand scenery, elevation and proximity to the Colorado Canon.

AGASSIZ ASSOCIATION, an organiza¬ tion for the promotion of nature study among youth. The society was established in 1875, and in 1902 had a membership of more than 12,000. The headquarters, at Pittsfield, Mass., until 1910, are at Sound Beach, Conn. The official publication is The Guide to Nature, and the badge is a Swiss cross. Consult Guyot, (Memoir of L. Agassiz5 (Princeton 1883).

AGATE, a variety of chalcedony, or cryp¬ to-crystalline quartz, distinguished by its banded or clouded appearance or by the pres¬ ence of visible impurities. (<Achates55 was the Greek name of a river in Sicily near which, ac¬ cording to Pliny, agates were first found; but the name was earlier used by Theophrastus in his treatise (On Stones,5 published about 315 B.C., while agate is mentioned in Exodus xxviii, 17 as one of the precious stones in the breast¬ plate of the high priest. Its. history, therefore, extends over a period of at least 3,400 years.

The method of formation of banded agates has been carefully studied by numerous in¬ vestigators. M. F. Heddle (consult Nature, Vol. 29, p. 419) assumes the existence of a cavity in a trap rock which is lined during its solidification with a thin layer of green cela- donite or delessite. The rock subsequently rots, and its feldspar is decomposed by water con¬ taining carbonic acid, which thus becomes highly charged with silica. This is transfused into the cavity, coagulates and is deposited on its walls. The banded structure is due to the intermittent deposition of successive layers of silica from the highly siliceous solution. It was long supposed that after the earlier layers were deposited fresh supplies of the solution passed inward through a hole called the (<inlet of infil¬ tration.55 This canal is often

distinctly seen in agates, but the weight of evidence now seems to favor the hypothesis that the external solu¬ tion supplies the silica by osmosis (q.v.). The internal solution becomes less dense as it is re¬ lieved of silica by its deposition on the walls of the cavity, and it is then replaced by the denser external solution which passes through the layers of agate already formed. If the condi¬ tions remain unchanged the process continues until the entire cavity is filled, but agates are not infrequently found with a cavity in the centre, or with crystallized quartz (often ame¬ thystine) lining the interior. Such distinctly crystallized portions may be succeeded by fur¬ ther deposits of the cryptocrystalline chalce¬ dony. The successive layers often differ much in density, hardness, color and transparency. Sir D. Brewster has shown that some of the layers are so exceedingly thin that it would take 55,760 to measure an inch. (Philosophical Magazine (3) XXII, p. 213). These layers are deposited all around the cavities, following all of their irregularities. The beauty of agates is thus greatly enhanced by extreme delicacy of their banding. Sometimes these bands concen¬ trically encircle a dark spot, forming a ((buH's

eye agate,55 or again they parallel a cavity with sharp angles, as in the ((fortification agate.'5 Other agates show horizontal layers, suggesting the query as to whether the silica had settled upon the floor of the cavity from a solution at rest. Such agates are known as onyx (q.v.), or if the colors are red and white, as sardonyx (q.v.). In clouded agates there is no distinct banded structure, but the colors shade grad ually from one into another.

The natural colors of agates vary greatly, being usually gray or either red or brown. The colors are due to the presence of organic im¬ purities or to the oxides of iron, manganese or titanium. Nearly all the agates now offered for sale are, however, artificially colored. The success of the process is due to the varying de¬ grees of porosity of the different layers of agate, some of which readily absorb the fluid in which the stones are immersed, while others are impervious to it. The black and white agates are prepared by soaking the stones for several days in a warm syrup of honey and water, then immersing them in sulphuric acid, which carbonizes the honey absorbed by cer¬ tain of the layers, making them dark brown or black. The red or carnelian agates are pro¬ duced by a process of <(burning.55 A grayish stone is heated in an oven for several weeks, at first gently, then it is moistened with sul¬ phuric acid and the temperature is gradually raised to redness. Blue or <(sapphire55 agates are produced by steeping the stones first in a solution of a ferric salt and then in potassium ferrocyanide, thus depositing Prussian blue in the more

porous layers. A green agate is se¬ cured by the aid of chromic acid or a nickel salt, while hydrochloric acid yields a yellow agate. The red and the black are much the most popular.

For over four centuries the headquarters of the agate industry has been in the valley be¬ tween Idar and Oberstein, some 40 miles from Bingen on the Rhine. There are probably 150 agate mills working an average of three to five stones each in this little valley. These are chiefly operated by water-wheels 10 to 18 feet in diameter, abundant power being secured from the rapid mountain streams of the neigh¬ borhood. The millstones are of red sandstone, each about five feet in diameter, and rotate in a vertical plane, making about three revolutions per second. The workmen lie stretched in an almost horizontal position upon a low wooden grinding stool fitted to the chest and abdomen, leaving the limbs free. The hands are engaged in holding and grinding the agate, while the feet are firmly pressed against short stakes screwed into the floor, the reaction enabling the grinder to press the agate with much force against the moving millstone. During the process the agates glow most beautifully with a bright red phosphorescence. After having been ground the agates are polished with tripoli on cylinders of wood or a metal disc. Consult Popular Science Review, New Series, Vol. I. p. 23.

Moss-agate or (<Mocha-stone55 is a variety of chalcedony through which are scattered black or brown masses, more or less resembling moss. These impurities are usually one of the man¬ ganese oxides. In the Chinese moss-agate they appear as thin matted filaments of a green color, which are often artificially colored.

i

1.

AGATES

1, 4, 5. Carnelian Agate or Sard Agate 3. Onyx Agate

1.

Moss Agate

Bull's Eye Agate

Beautiful dendrites are sometimes found in chalcedony. The name dendritic-agate or tree- agate is given to these highly prized forms. Moss-agates abound at many localities in the United States, especially in Wyoming.

In the “melaphyre® of the hills around Idar, agates of considerable beauty are found. For¬ merly they were extensively quarried there, but since 1827 the lapidaries of Idar have secured their supplies largely from Uruguay and Brazil, which countries have long furnished nearly the entire commercial supply, though Scotch agates are marketed to some extent. Small banded agates of much beauty abound on the shores of Lake. Superior ; large and fine specimens occur plentifully in western Texas. Agates abound in many other regions, while very many localities yield choice agates sparingly. Most of the pol¬ ished agate specimens and novelties of the tour¬ ist resorts, though often purporting to be of local origin, come from Brazil or Uruguay and are polished in Germany.

Agate is used in making burnishers and agate mortars and pestles and, owing to its hardness, for the knife edges of balances. It is worked up as a decorative stone into vases, dishes, ash trays, paper weights, paper cutters, etc., and is mounted as a semi-precious stone in a great variety of objects, such as jewel boxes, glove or shoe buttoners, watch charms, letter openers and scarf pins. Every boy is familiar with agate marbles, but the cheaper grades of these are only glass. From the earliest times the black and white banded agates (see Onyx) and the red and white (see Sardonyx) have been used for seal rings and for carving cameos. The ancients also regarded agate as a charm against the intoxication of love. Consult Ruskin, (On Banded and Brecciated Concre¬ tions } (in Geological Magazine , 1867 to 1870) ; (Ethics of Dust, 5 p. 190; (The Vale of Idar,* by S. Weisse (in Blackwood’s Magazine, Vol. cxlviii, pp. 75 and 208').

George Letch worth English.

AGATE-SHELL, or AGATE-SNAIL, a

land-snail of the carnivorous genus Acliatina of the family Helicidce. They are abundant in tropical Africa; the largest of all land-snails are found among them, and many species have brightly colored shells.

AGATHA, Saint, a lady of Palermo, mar¬ tyred by Quintilian, the pro-counsul of Sicily, in the persecution of Decius, because she would not perform idolatrous worship or submit to his impure desires, c. 251 a.d.

AGATHARCHIDES, ag-a-thar'ki-dez, or AGATHARCIDES, ag-a-thar'si-dez, a Greek writer on geography: b. at Cnidos in Asia Minor; lived 250 b.c. and wrote numerous works; among them, one on the Erythraean Sea, of which some extracts have been pre¬ served. He is the earliest extant writer who attributes the annual rise of the Nile to the periodical rains in the upper regions of that river.

AGATHARCHUS, ag-a-thar'kiiz, Greek painter : b. Samos, about 430 b.c. He worked at Athens between 455 and 415 b.c. He is re¬ garded as the first scene-painter, having painted a scene for a tragedy of 2Eschylus. His art was important because of the development of perspective. He is said to have written a treatise on this subject.

AGATHIAS, a-ga/thi-as, Greek poet and historian, about 536-81. He collected a ˆCycle® of contemporary poems, in which were a few of his own compositions. We have still 101 of his (Epigrams * and the whole of his (History * of the years 553-58.

AGATHO, ag-ath'o, Saint, Pope of Rome from 678 to 681, surnamed ((Thaumatur- gus — • the Wonderworker,® from the many miracles he wrought. He was born in Sicily and was over 100 years old when he was elected Pope. He was instrumental in arranging the 6th Ecumenical Council held at Constantinople in 680 which practically ended the Monothelite heresy. His feast-day is cele¬ brated by both the Greek and Roman churches. He died at Rome 10 Jan. 681.

AGATHOCLES, ag-ath'o-klez, Syracusan of low extraction, who became ruler of a great part of Sicily. He was remarkable for beauty, strength and capacity for enduring labor. In the outset of life he belonged to a band of robbers ; afterward he served as a private soldier, rose to the greatest honors and made himself master of Syracuse. He con¬ quered the greater part of Sicily, 317 b.c. Be¬ ing defeated at Himera by the Carthaginians, he carried the war into Africa, where for four years he extended his conquests over his enemy. He afterward passed into Italy and made him¬ self master of Crotona. In his 72d year he was poisoned by his grandson Archagathus, 289 b.c., after a reign of 28 years of great pros¬ perity mingled with the deepest adversity. His son-in-law, Pyrrhus, King of Epirus, inherited his influence in Sicily and southern Italy.

AGATHON, ag'a-thon, Greek tragic poet (448-402 b.c.) . He was a close friend of Eurip¬ ides and of Plato; and the famous Symposi¬ um* of Plato immortalizes the banquet given on the occasion of Agathon’s dramatic triumph, 416 b.c.

AGAVE, ag-a've, daughter of Cadmus and Hermione, married Echion, by whom she had Pentheus, who was torn to pieces by the Bac¬ chanals. She is said to have killed her husband while celebrating the orgies of Bacchus. She received divine honors after death.

AGAVE, a genus of remarkable and beau¬ tiful plants, of the family Amaryllidacece, hav¬ ing a tubular perianth with 6-partite limb and triangular many-seeded capsule. They resemble aloes in their growth and general appearance, and the best-known species, Agave americana, is sometimes known as the American aloe. This is a large plant, the leaves of which are thick, fleshy and spiny-toothed at the edge, and the stem branched and of great height. The flowers have the tube of the corolla nar¬ rowed in the middle, the stamens longer than the corolla and the style longer than the stamens. This magnificent native of North America, probably of Mexico, is by no means an uncommon plant in gardens, but is seldom seen there in flower. There is indeed a notion, but an erroneous one, that the American aloe does not bloom until it is 100 years old. The fact is that the time of flowering depends al¬ most wholly on the rapidity of its growth. In hot countries it will flower in a few years, but in colder climates, the growth being slower, it is necessarily longer in arriving at maturity.

The stem, which bears the blossoms, rises from the centre of the leaves and when the plant is in a vigorous state it frequently ex¬ ceeds the height of 20 feet. Branches issue from every side and in such a manner as to form a kind of pyramid, composed of greenish- yellow flowers, which stand erect and are seen in thick clusters at every joint. When in full llower its appearance is extremely splendid; and if the season be favorable, and the plant be sheltered from the cold in autumn, a succession of blossoms will sometimes be produced for nearly three months. In the warmer parts of Europe the American aloe is cultivated as an object of considerable utility. They are fre¬ quently set out in rows as fences for inclosures, particularly in Spain, Portugal and Italy. In some parts the leaves are employed for scour¬ ing pewter, kitchen utensils and floors. The juice of these leaves is made into cakes, which are used for washing and will make lather with salt water as well as with fresh. The sap of certain species when fermented yields a bever¬ age resembling cider, called by the Mexicans pulque. By distillation it yields two intoxicat¬ ing beverages very widely used in Mexico — mescal and tequila. The leaves are used for feeding cattle; the fibres of the leaves (called pita, sisal hemp or henequen)

are formed into thread, cord and ropes. The leaves also, roasted, wrere formerly used for food by the Indians.

AGE, any period of time attributed to something as the whole, or part, of its duration ; as the age of man, the several ages of the world, the Golden Age.

In law, the time of competence to do cer¬ tain acts. In the male sex 14 is the age when partial discretion is supposed to be reached, while 21 is the period of full age. Under seven no boy can be capitally punished; from seven to 14 it is doubtful if he can; at 14 he may. At 12 a girl can contract a binding marriage ; at 21 she is of full age. In mediaeval times, when a girl reached seven, by feudal custom or law a lord might distrain his tenants for aid to marry, or, rather, betroth her ; at nine she was dowable; at 12 she could confirm consent to marriage which she had previously given ; at 14 she could take the management of her lands into her own hands ; at 16 she ceased, as is still the law in England, to be under the control of her guardian; and at 21 she might alienate lands and tenements belonging to her in her own right. At common law the age of discretion for female infants was 12 and the age of consent to unlawful carnal intercourse was 10, but by recent legislation the age of consent has been raised in the United States to 14, 15, 16 and, in several States, to 18 years. For the modern law of infancy consult Schou- ler, (Treatise on the Domestic Relations > (Bos¬ ton 1870). In the United States at 25 years of age a man may be a representative in Congress ; at 30 a Senator and at 35 he may be chosen President. The age of serving in the militia is from 18 to 45 inclusive.

In England no one can be chosen a member of Parliament under 21 years of age, nor be ordained a priest under the age of 24, nor made a bishop until he has become 30 years of age. The age of serving in the militia is from 16 to 45 years. The sovereignty of the realm is as¬

sumed at 18; though the law recognizes no mi¬ nority in the heir to the throne.

In French law, a person must have attained the age of 40 to be a member of the legislative body ; 25 to be a judge of a tribunal de premiere instance; 27 to be its president, or to be judge or clerk of a corn* royale ; 25 to be a justice of the peace; 30 to be judge of a tribunal of com¬ merce, and 35 to be its president ; 25 to be a notary public; 30 to be a juror. At 21 both males and females are capable of performing all the acts of civil life.

In Archaeology. — The Danish and Swedish antiquaries and naturalists, MM. Nilson, Steen- strup, Forchamber, Thomsen, Worsaae and others, have divided the period during which man has existed on the earth into three — the Age of Stone, the Age of Bronze and the Age of Iron. During the first mentioned of these he is supposed to have had only stone for weapons, etc. Sir John Lubbock divides this into two — the palaeolithic, or older, and the neolithic, or newer, stone period. At the commencement of the age of bronze that composite metal became known and began to be manufactured into weapons and other instruments ; wrhile, when the age of iron came in, bronze began gradually to be superseded by iron. Consult Lyell's An¬ tiquity of Man *and Lubbock's Prehistoric Times.*

In Physiology. — If the word age be used to denote one of the stages of human life, then physiology clearly distinguishes six of these, viz., the periods of infancy, of childhood, of boyhood or girlhood, of adolescence, of man¬ hood or womanhood and of old age. The pe¬ riod of infancy terminates at two, when the first dentition is completed; that of childhood at seven or eight, when the second dentition is finished; that of boyhood or girlhood at the commencement of puberty, in temperate cli¬ mates from the 14th to the 16th year in the male and from the 12th to the 14th in the fe¬ male; that of adolescence extends to the 24th year in the male and the 20th in the female; that of manhood or womanhood stretches on till the advent of old age, which comes sooner or later, according to the original strength of the constitution in each individual case and the habits which have been acquired during life. The precise time of human existence similarly varies. See Longevity.

In Geology. — Age, as used by geologists, represents a subdivision of time variously evaluated. It has been used as the equivalent of Era (q.v.), but as now generally under¬ stood constitutes a subdivision of an epoch.

Ages of the World. — We find the ages of the world mentioned by the earliest of the Greek poets. Hesiod speaks of five distinct ages: (1) The Golden or Saturnian Age, when Saturr. ruled the earth. The people were free from the restraint of laws; they had neither ships nor weapons, wars nor soldiers; the fer¬ tile fields needed no cultivation, and perpetual spring blessed the earth. (2) The Silver Age, which he describes as licentious and wicked. (3) The Brazen Age, violent, savage and war¬ like. (4) The Heroic Age, which seemed an approximation to a better state of things. (5) The Iron Age, when justice and honor had left the earth. The poet supposed this to be the age in which he himself lived. The idea of ages of the world is

interwoven with the

religious sentiments of various nations. We find examples of it in the thousand years of the Millenarians and in the four yugas or ages of the Hindus. The first or Krita Yuga, a kind of Golden Age, lasted, according to their tradition, 4,000 divine years, each equal to 360 solar years, and adding its fore and after ˆtwilight,® 1,728,000 solar years in all; men then lived 400 years and were all giants ; then the god Brahma was born. In the second period, the Treta Yuga, which lasted 3,000 divine and 1,296,000 solar years in all, men lived only 300 years and vice began to creep into the world. During the third age or Dwapara Yuga, which lasted. 2,000 divine and 864,000 solar years, men lived only 200 years owing to the increase of vice. The last age, the Kali Yuga, that in which we now live, is to last for 1,000 divine or 432,000 solar years and the life of man is sunk to one-fourth of its original duration.

Age of Animals. — The duration of life in animals is generally between seven and eight times the period which elapses from birth till they become adult ; but this rule, besides being vague and indefinite, is quite useless in practice, because it affords no scale of gradation which would enable us to ascertain the precise age of individuals, the only inquiry of real importance or of practical application to the interests of so¬ ciety. More certain and scientific principles are derived from observing the growth and decay of the teeth. See Cattle; Horse.

AGEN, a-zhan, one of the oldest towns in France, capital of the department of Lot-et- Garonne, on the Garonne, 74 miles southeast of Bordeaux. A fine stone bridge of 11 arches spans the river here, and the aqueduct bridge of the Canal Lateral is another striking struc¬ ture. The town has. been an episcopal see with a cathedral since the reign of Clovis, prior to which it was a Roman station. It commands an extensive agricultural trade, owing to its position between Bordeaux and Toulouse.

AGENCY, in its widest sense includes ev¬ ery relation in which one person acts for or represents another by his authority. In the more restricted sense in which the term is used in the law of principal and agent, agency may be defined as the relation which results where one person, called the principal, authorizes an¬ other, called the agent, to

act for him, with more or less discretionary power, in business dealings with third persons. It is a representa¬ tive relation, its fundamental maxim being, Qui facit per aliutn facit per se. The agent represents, acts for, and derives his authority from another, his principal; he is an attorney standing in the place of his employer. It is also a fiduciary relation which is one of trust and confidence. See Agent.

AGENT, in law, one person who acts for another, called the principal. If a person acts as agent without authority, the subsequent rati¬ fication of the act will make it binding on the principal just as if he had originally directed it. When an agent acts within the scope of his employment he may bind his principal, and the principal is liable for any fraudulent acts or wrong-doings of the agent so acting. If the agent, having power to bind his principal, does so expressly, he is not liable; but if he exceeds his authority he becomes personally responsible.

The agent is bound to obey the instructions of the principal, and if, in violating them, he binds his principal to a third person, he is personally liable to make compensation. He cannot deal in his principal's affairs to his own profit. The right on the part of an agent to act is called his authority or power. The authority or power must in some instances be exercised in the name of the principal, and the act done is for his benefit alone. As a general rule, an agent cannot delegate his authority without special authority from his principal, consequently an agent cannot create a subagent without special permission. Any person may act as agent whom the principal wishes to appoint. So broad is this rule that married women and infants, who are incapable of acting in their own behalf, may act as agents, for the ap¬ pointment takes away the legal insufficiency and permits them to bind their principals when they could not bind themselves. The mode of appointment depends upon the nature of the agency. By a rule of law the evidence of appointment must be of as high a nature as the thing to be done. Thus, to execute a writing under seal, the appointment must be under seal. When the authority or power is coupled with an interest, or when it is given for a valuable consideration, or when .it is a part of a security, then, unless there is a special agreement that it shall be revocable, it cannot be revoked. Death, insanity, bankruptcy, the extinction of the subject-matter of the agency or the execution of the trust will usually .terminate the agency unless the au¬ thority is coupled with an interest. Upon the law of agency is based to a large degree the law of partnership.

AGENTS-GENERAL, representatives in London of the self-governing

British colonies.

AGE OF CHIVALRY, The, or THE LEGENDS OF KING ARTHUR, by

Thomas Bulfinch, was published in 1858. More than 20 years after an enlarged edition appeared • under the editorship of Edward Everett Hale. In Part I the legends of King Arthur and his knights are considered. Part II deals with the Mabinogion, or ancient prose tales of the Welsh; Part III with the knights of English history, King Richard, Robin Hood and the Black Prince. From the time of its first pub¬ lication the popularity of the book has been great. No more sympathetic and fitting intro¬ duction could be found to the legends of chivalry.

AGE OF FABLE, The, or THE BEAU¬ TIES OF MYTHOLOGY, by Thomas Bul¬ finch, was published in 1855, and republished in 1882 under the editorship of Edward Everett Hale. It has become a standard work upon mythology, by reason of its full and extensive treatment of the Greek and Roman myths.

AGE OF REASON, The, by Thomas Paine, was first published in a complete edition 25 Oct. 1795. In 1793 the first part appeared, but no copy bearing that date can be found. Part I consists of an inquiry into the bases of Christianity, its theology, its miracles, its claims of revelation. The process is destructive and revolutionary. In Part II the author makes critical examination of the Old and New Testa¬ ment, to support the conclusions and inferences

of Part I. Yet the work is not wholly nega¬ tive. “The Word of God is the creation we behold. ®

AGERATUM, a-ger'a-tum, a genus of plants of the family Astcracec p (belonging to the Eupatorium tribe of the order), chiefly natives of the warmer parts of America. One species, A. houstonianum, is an annual plant of flower borders and has densely clustered heads of lavender-blue flowers. Several others are also grown in gardens, some of them with pur¬ ple, white or pale blue flowers.

AGESANDER, a Greek sculptor of the Rhodian school, who with Polydorus and Athenodorus, 42-21 b.c., are mentioned by Pliny as authors of the famous Laocoon group, dis¬ covered near the baths of Titus in 1506, and now in the Vatican at Rome.

AGESILAUS, King of Sparta: b. 442 b.c., and elevated to the throne after the death of his brother Agis II, in 398. Called by the Ionians to their assistance against Artaxerxes, he commenced his glorious career by defeating the Persians and defending Sparta against the united attack of Thebes, Corinth, etc. In a subsequent war with Thebes he had to contend against Pelopidas and Epaminondas, the great¬ est generals of those times. His prudence, however, saved Sparta without the hazard of a battle. He delivered it anew at the age of 80 years, though it was actually in the hands of Epaminondas. In the spring of 361 he crossed over to Egypt with a body of Lacedaemonian mercenaries, and there, after displaying much of his former ability, he died while preparing for his voyage home, in the winter of 361-360. Though small and insignificant in person he was a noble prince and almost adored by his soldiers.

AGGLOM'ERATE, in geology, a name ap¬ plied to a rock consisting of angular fragments of other rocks, united or bound together by a matrix of similar materials but of finer texture.

• The rock is of volcanic origin, but the frag¬ ments may be either volcanic or sedimentary, having been ejected from some volcano.

AGGLU'TINATE LANGUAGES, lan¬ guages in which the modifying suffixes are as it were glued on to the root, both it and the suf¬ fixes retaining a kind of distinctive independ¬ ence and individuality, as in the Turkish and other Turanian tongues. Consult Max Muller's (Lectures on the Science of Language.*

AGGLU'TINA'TION. See Immunity.

AGGRADATION. See Gradation.

AGGREGATION, States of, an expres¬ sion sometimes used to signify, collectively, the various physical states in which matter can exist. For' ordinary purposes it is suffi¬ cient to distinguish two fundamentally differ¬ ent states of aggregation, the solid and fluid; fluids being further subdivided into liquids and gases. A solid body may be defined as one that is capable of resisting a considerable shear¬ ing-stress. It is important to note, however, that a true solid does not yield continuously to a small deforming force ; it resists deformation, and its resistance increases as the deformation increases. A fluid, on the contrary, is a body having almost no shearing-strength and offer¬ ing very little resistance to forces that tend to change its shape. A fluid yields continuously

to a deforming force, and a force that will de¬ form it at all will deform it indefinitely, so long as it is allowed to act. Considering the subdivision of fluids into gases and liquids, it may be said that a gas is a fluid that presses continuously and in every direction on the walls of the vessel containing it, and which follows them indefinitely if they retreat. A gas, if left to itself, tends to expand infinitely in every direction. A liquid may be defined as a fluid which does not follow the walls of the contain¬ ing vessel if they retreat, and which has no tendency to sudden and indefinite expansion when freed from all restraint.

These distinctions between the various states of aggregation in which matter occurs are to a certain extent arbitrary, elastic, indefinite and inexact. For example, certain kinds of pitch resist the action of deforming forces that are applied for a short time only, and are brittle enough to fracture, like glass, under the influ¬ ence of a sudden stress ; yet they yield slowly but continuously to very small deforming forces, when those forces act for a long time. A body of this sort, strictly speaking, is neither a solid nor a liquid, and to include it in a gen¬ eral classification we should have to have a “semi-solid** division. The distinction between liquids and gases is even more artificial than that between solids and liquids ; for a liquid may be made to pass into its vapor in such a manner that it is impossible to state at what moment it ceases to be a liquid. Thus, if water is heated under a sufficiently great pressure up to 700° F., and is then allowed to expand by a sufficient amount at this temperature and is finally cooled at constant volume, we shall find, at the end of this operation, that it has been entirely transformed into steam, although we cannot say at what stage the transformation took place. See Critical Point; Equilibrium, Chemical; Molecular Theory; Thermody¬ namics ; Matter.

AGHA KHAN, title of the spiritual head of the Indian Ismailites or Khodjas, a Mohammedan sect. The office is vested in a very ancient and sacred family said to be descended from Mohammed’s daughter, Fati- mah; but more directly from Hasan Sabbah, founder of the Ismailiah dynasty in Persia (d. 1124). This weird but mighty personage became chief of the dreaded Assassins (q.v.), well known by the Crusaders and completely exterminated by the Tartar King Halaku of Persia in 1256. The present holder of the title is the third in succession. A remarkable feature of the three Agha Khans is their absolute and whole-hearted devotion to Great Britain. Agha Khan I, Hasan Ali Shah, b. Persia 1800; d. Bombay, 12 April 1881, was governor-general of the province of Kerman under the Shah Fateh Ali. He fled from Persia in 1840 after an attempt to gain the throne, at

which his family aimed, and settled in Bomba}'. Here he held a royal court' for 30 years. He assisted the British with his private cavalry in the Afghan War, 1842, and later rendered numerous valuable services to the British government, which granted him a pension. A recognized “king without a coun¬ try, ** he exercised absolute control over his followers, Collected a large annual tribute, and became a keen sportsman, with a special fond¬ ness for horse racing. Agha Khan II, Agha

Ali Shah, son of the preceding, reigned only four years ; he continued in his father’s policy, received a knighthood from Queen Victoria, and was made a member of the Bombay legis¬ lative council. He died in 1885 and was suc¬ ceeded by his son : Agha Sultan, Sir Muham¬ mad Shah, K.C.I.E., G.C.S.I., LL.D., Agha Khan III, b. 1875. He holds spiritual sway over some 60,000,000 followers in India, central Asia, east Africa, Morocco and China. At the outbreak of the European \Var he was visiting his adherents in Zanzibar ; he not only exhorted all his people to place their personal services and resources unreservedly at the disposal of the British government, but himself volunteered to accompany the Indian Expeditionary Force as a private in any infantry regiment, since he had not had any military training to justify a commission. When Turkey entered the war he issued a powerful manifesto to Moslems throughout the empire strongly condemning her action. At the risk of his life, he visited Egypt in the critical period immediately fol¬ lowing Turkey’s adhesion to the Central Powers, and assisted in bringing about the readjustment which followed the deposition of Abbas Hilmi II (q.v.). During 1911-13 he was instrumental in soothing the grave dis¬ quietude of Indian Moslem sentiment in respect of the Turco-Italian and the two Balkan wars, urging upon his coreligionists the imperative duty of resignation to the inevitable waning of the Turkish power in Europe and of acquies¬ cence in British policy. An enthusiastic sup¬ porter of the Allies against Germany, he upheld their cause in public speeches and writings. In April 1916 King George, Em¬ peror of India, granted to His Highness the Agha Khan a salute of 11 guns and the rank and status of a first class chief of the Bom¬ bay Presidency for life. This very exceptional honor is the more noteworthy as his authority is entirely spiritual and there is no state in India where he holds sway as ruler. In 1902 he was the guest of the British nation at the coronation of the King. In 1901 the Kaiser conferred on him the First Class Prussian Order of the Royal Crown.

AGINCOURT, aj'in-kort, or AZIN- COURT, a-zhan-koor, France, a village, depart¬ ment of Pas-de-Calais, famous for a battle fought there 25 Oct. 1415. Henry V, King of England, eager to conquer France, landed at Harfleur, took the place by storm and wished to march through Picardy to Calais, in order to fix his winter quarters in its neighborhood. With a powerful force the Dauphin advanced against him. Henry V, retreated to the Somme. The French followed to harass his retreat and to defend the passage from Abbeville to Saint Quentin, which he gained only through the in¬ attention of the enemy. The English, however, being destitute of everything and reduced by sickness, Henry asked for peace on disadvan¬ tageous terms. The French refused his pro¬ posals and succeeded in throwing themselves between Calais and the English. These latter consisted of 2,000 men-at-arms and 12,000 archers, and were arranged in order of battle between two hills, with the archers on the wings. Stakes, of which every man carried one, were fixed in front of them. , The French, commanded by the Constable d'Albret, num¬

bered 50,000 troops, of whom 8,000 were men- at-arms; but other estimates make the French strength much greater. They arranged them¬ selves in two divisions, with the men-at-arms, of whom 2,000 were mounted, in front. The English first put themselves in motion. The French horse instantly hastened to meet them, but were received with such a shower of arrows by the archers that they fell back on the first division and threw it into confusion. The light¬ armed English archers seized their clubs and battle-axes and broke through the ranks of the French knights, who could hardly move on ac¬ count of their heavy coats of mail and the closeness of their array. The English horse rushed to assist the archers; the first French division retreated ; the second could not sus¬ tain the charge of the victors; and the whole French army was soon entirely routed. The victorious army, in the pursuit of the flying enemy, took 14,000 prisoners in addition to those previously captured; 10,000 Frenchmen lay dead on the battlefield. Among them was the Constable of France, with six dukes and princes. Five princes, among whom were the Dukes of Orleans and Bourbon, were taken prisoners. The English lost 1.600 men killed; among them the Duke of York, Henry's uncle, whom the Duke d'Alengon slew at his side while pressing toward the King. D'Alengon had dashed the crown from Henry's head and lifted his hand for a more effectual blow, when the King's attendants surrounded him and he fell covered with wounds.

AGIRA, a-je' ra, Italy, a town of Sicily, 35 miles west of Catania. It stands over 2,000 feet above sea-level and is four and one-half miles from its railway station to the south of the town. In the neighborhood

are fine marble quarries which yield its chief industry. It is famous as the site of ancient Agyrion, ruled by Sicel tyrants, notably Agyris who became the leading ruler of central Sicily, and an ally of Dionysius I when they overthrew the Cartha¬ ginian invasion 392 b.c. Hercules visited Agira according to Diodorus Siculus the historian who was born here, and Timoleon 339 b.c. expelled the last tyrant, and erected several fine build¬ ings. Pop. 22,500.

AGIS, a' j is, the name of four Spartan kings. Agis I, son of Eurysthenes, founder of the family Agidse, and reputed conqueror of Helos. Agis II, son of Archidamus II, and reigned either in 427 or 426 b.c. to 400 or 399 b.c. He was active in the Peloponnesian war; invaded Attica several times and conquered the Atheni¬ ans at Mantinea in 418 b.c. Agis III, son of Archidamus III, reigned in 338-331 b.c. He en¬ deavored to overthrow the Macedonian power in Europe, but was routed and killed in a battle with Antipater in 331 b.c. The most important of the four kings was Agis IV, who succeeded to the throne in 244 b.c., and reigned four years. He attempted a reform of the abuses which had crept into the state — his plan comprehending a redistribution of the land, a division of wealth and the canceling of all debts. Op¬ posed by his colleague, Leonidas, advantage was taken of his absence in an expedition against the / Etolians to depose him. Agis at first took sanctuary in a temple, but he was entrapped and hurriedly executed by his rivals.

AGLIARDI, a-lyar'de, Antonio, Catholic cardinal and diplomat: b. Cologno (Bergamo), Italy, 4 Sept. 1832. After service in Canada as bishop’s chaplain, on his return to Rome in 1884, he was appointed secretary of the Propa¬ ganda, created archbishop of Caesarea in Palestine, and proceeded to India to investigate conditions. In 1887 he returned to India as apostolic delegate to settle the Goa controversy with Portugal. He was appointed papal nuncio to Munich in 1889 and to Vienna in 1892. In 1896 he was recalled at the request of the Hungarian government for being involved in the disputes which had arisen with the church authorities. The same year he was created cardinal-archbishop of Ferrara, and in 1903 vice-chancellor of the Catholic Church.

AGLIPAY, Gregorio, archbishop and head of the Independent Catholic Church of the Philippines : b. about 1864. An Ilocano by birth, he was educated in a Roman Catholic semi¬ nary and ordained in Manila

about 1890. He was trusted by his superiors and rapidly ad¬ vanced. At the time of the insurrection he was excommunicated by the church authorities for some irregularity in church order. He then cast his lot with the insurrecto movement, and Aguinaldo made him vicar-general. On 4 April 1899 he <(came in)} and took the oath of allegiance. In October 1902 he with others formed the Independent Catholic Church of the Philippines. The movement spread rapidly. One million five hundred thousand soon joined it. He recommends the reading of the Bible by his people. Consult H. C. Stuntz, (The Philippines and the Far East.)

AGLOSSA, a-glos'sa (Gr. o, priv. ; glossa, tongue), a group of the order Anura (toads and frogs) containing only two living families, the South American Pip idee and the African Xenopidce, and characterized by the lack of any tongue and the union of the eustachian tubes into one opening far back in the palate. The pipa toads and South African plathandlers are typical examples. The group is interesting for its antiquity and primitive relationships.

AGNADELLO, an-ya-del'lo, North Italy, a village 10 miles east of Lodi, near which Louis XII of France completely defeated the Vene¬ tians, on 14 May 1509, and the Duke of Ven- dome gained a victory over Prince Eugene in

1.

AGNANO, an-ya'no, till 1780, small lake, three miles west of Naples, about 60 feet in depth, and without visible outlet. As it was supposed to cause malaria it has been drained. The surrounding country is volcanic and moun¬ tainous. On the right lies the Grotta del Cane, where the carbonic acid is dense enough to kill dogs, and on the left are found the sulphurous vapor baths of San Germano, which are valua- able for gout and blood disorders.

AGNES, Saint, a saint who, according to the received account, because she steadfastly refused to marry the son of the prefect of Rome and adhered to her religion in spite of repeated temptations and threats, suffered martyrdom during the persecution of the Christians in the reign of the Emperor Diocle¬ tian, 303 a.d. She was first led to the stake, but as the flames did not injure her she was

beheaded. Her festival is celebrated on 21 January. Domenichino painted a picture repre¬ senting her at the moment of her execution.

AGNESI, a-nya'se, Maria Gaetana, a learned Italian lady: b. Milan

1718; d. 1799. In her 9th year she was able to speak Latin, in her 11th, Greek; she then studied the Oriental lan¬ guages, and next geometry and philosophy, mathematics having latterly engaged her chief attention. She was appointed, in 1750, profes¬ sor of mathematics in the University of Bologna, ultimately taking the veil. Her sister, Maria Theresa, composed several cantatas and three operas.

AGNES OF SORRENTO, a romance by Harriet Beecher Stowe. The scene is laid in central Italy during the papacy of Alexander VI (1492-1503). Agnes is the daughter of a Roman prince who deserts a girl of humble parentage and then secretly marries. The young mother dies of grief, and Elsie, the grand¬ mother, takes Agnes to Sorrento, where she lives by selling oranges in the streets. Her beauty and her purity attract to her many lovers, worthy and unworthy, and involve her in many romantic and dramatic incidents.

AGNEW, Cornelius Rea, American phy¬ sician: b. New York, 8 Aug. 1830; d. 8 April 1888. Professor of diseases of the eye and ear in New York College of Physicians and Sur¬ geons. He was a graduate of Columbia Col¬ lege, and later studied in Europe ; was surgeon-general of the State of New York at the be¬ ginning of the Civil War, when he became medical director of the New York State Volun¬ teer Hospital. As member of the United States Sanitary Commission he contributed largely to its success. In 1868 he founded the Brooklyn Eye and Ear Hospital. He was interested in the public schools of New York; became founder of the Columbia College School of Mines, and in 1874 one of the trustees of the college. His writings are chiefly monographs on diseases of the eye and ear.

AGNEW, David Hayes, American sur¬ geon and medical writer: b. 24 Nov. 1818; d. 22 March 1892 : for many years professor of surgery at the University of Pennsylvania. He was also the operator in several important cases, notably that of President Garfield. He published Practical Anatomy) (1867); (Anat- omy and Its Relation to Medicine and Surgery,) Principles and Practice of Surgery) (1878); etc.

AGNO, ag'no, important river in the north¬ west part of Luzon, Philippine Islands. It is about 90 miles in length, describing a circuitous course, parallel with a range of coast moun¬ tains, and emptying into Lingayen Gulf. The town of Lingayen is at the mouth of the river, which is accessible by railway from Manila.

AGNOSTICISM (Gr. (<unknowing))), a school of thought which holds that man can know nothing of ultimate realities, or whether they exist; since, his only means of knowledge being through comparison of

phenomena, the absolute* could only be cognized by his senses on assuming phenomenal traits, and would then be grasped as a phenomenon and not as abso¬ lute, the knowledge of which is therefore a con¬ tradiction in terms. We cannot know any¬ thing outside our own mental processes and the

existence of other minds; in popular phrase, we cannot get behind the looking-glass. This does not, however, deny the absolute any more than ahirm it; and most agnostics (as Clifford, one of the greatest) consider the diversity of phenomena as probably indicating a diversity in their causes. The agnostic position involves refusal to accept “evidences” of the origins of the universe, of unseen powers, of a future life, or in general the metaphysical bases of religion,ˆ save as more or less probable infer¬ ences. The current idea that it involves re¬ jection of these beliefs, however, is entirely wrong; the agnostic does not admit that either the affirmative or the negative of them can be a subject of knowledge, and regards the atheist as less intellectually respectable than the dev¬ otee. In point of fact, Professor Huxley, the in¬ ventor of the term, thought the existence of beings higher than man rather probable than otherwise, and the government of the universe by a “divine syndicate” of great spiritual es¬ sences quite logical. The theory is practically that of the Pyrrhonist or Skeptical school of Greek philosophers. See Epistomology ; Hux¬ ley, Thomas Henry; Spencer, Herbert. Con¬ sult Stephen, Sir Leslie, (An Agnostic’s Apology ’ (New York 1903) ; Ward, James, ‘Naturalism and Agnosticism’ (London 1899) ; Ormond, A. T., foundations of Knowledge ’ (New York 1901) ; Hyslop, J. H., (Problems of Philosophy 5 (New York 1905).

AGONY COLUMN,' a jocular name given to the column in newspapers set aside for ad¬ vertisements of missing or runaway persons, lost property, help appeals, etc. Some of these are often couched in agonizing terms.

AG'ORAC'RITUS, Greek sculptor: b. Paros in the 5th century; the favorite pupil of Phidias. His chief work, by some attributed to his master, was the colossal statue of Nemesis at Rhamnus, the head of which is in the British Museum and fragments of the pedestal reliefs in the Athens Museum.

AGNUS DEI. See Sacramentals.

AGORAPHOBIA, a type of phobia in which the patient experiences great anxiety and distress when in open spaces, such as an empty theatre, a very large room, an open square, etc. It is but one symptom found among a number of related neurotic signs in many neuroses and phychoneuroses. It is found, however, in its most striking form in that psychoneurotic group known as the Compulsion Neurosis (q.v.).

AGOSTA, a-go'sta, or AUGUSTA, a sea¬ port on the southeast coast of Sicily, in the province of Syracuse. It was a place of some importance before the earthquake of 1693, which buried a third of the inhabitants in its ruins, and at the same time ignited the powder magazine, and blew up the citadel. It was off this port that De Ruyter, the famous Dutch admiral, in command of the united Dutch and Spanish fleet, 22 April 1676, was defeated by the French under Duquesne, and received his death wound. Pop. about 16,400.

AGOULT, a/goo, Marie Catherine Sophie de Flavigny, Comtesse d', French author: b. Frankfort-on-Main, 31 Dec. 1805; d. Paris, 5 March 1876; best known under her pseudonym <(Daniel Stern." In 1827 she married Comte Charles d'Agoult, but separated from him to

live with Franz Liszt who was the father of her three children ; a son who died young, and two daughters Blandine, who became Mme. Emile Ollivier. and Cosima who married Hans yon Biilow and later Richard Wagner. She is the "Arabella" in the 'Lettres d'un voyageur) of "George Sand" with whom she frequently associated during her European travels. Under the royal regime of Louis Philippe, she was as¬ sociated with the literary and artistic side of Parisian life; after the revolution of 1848 with its political life. Her best known work is '-Esquisses morales et politiques> (1849) ; other works include (Lettres republicaines) (1848), on the government of Louis Philippe; 'His- toire de la Revolution de 1848) (3 vols., 1850- 53) : the novels (1841), and 'Nelida' (1845) describing her rupture with Liszt; 'Jeanne d'ArcR a national drama (1857); and 'Mes Souvenirs, 1806-1833) (1877). Consult Rochelaure, S., 'Une amitie romanesque: George Sand et Mme. d'Agoult' (Paris 1895).

AGOUTI, a-goo'te, AGOUTY or AGUTI,

South American and West Indian rabbit-like rodents of the Dasyprocta family and genus Caviida. They are nocturnal woodland prowl¬ ers feeding on nuts, fruits and roots and fre¬ quenting sugar cane and banana plantations, where with grunting enjoyment they frequently do considerable damage. Squirrel-like in shape, from 15 to 20 inches long, wdth slender limbs, five front and three hind toes, and short

nails, they hide in the day in the hollows of trees and in burrows among the roots. There are a dozen species of w hich the West Indian variety, black and brownish with yellow hind quarters, and Azara's «acuchi" of Guiana, are the best knowm. In Brazil and southward to Patagonia, the (<pampas hare," "cavy" or "agouti" is hunted as game.

AGRA, a gra, India, a city in the North¬ west Provinces, on the right bank of the Jum¬ na, 841 miles by rail from Calcutta. It is a well-built and handsome town and has various interesting structures, among which are the imperial palace, a mass of buildings erected by several emperors; the Moti Masjid or Pearl Mosque (both within the old and extensive fort) ; the mosque called the Jama Masjid (a cenotaph of white marble) ; and above all, the Taj Mahal, a mausoleum of the 17th century, built by the Emperor Shah Jehan to his favorite queen, of white marble, adorned throughout with exquisite mosaics. There are several Protestant and Roman Catholic churches, a government college and three other colleges or high schools, besides a medical college. Agra has a trade in grain, sugar, etc., and some manufactures, including beautiful inlaid mo¬ saics. It was founded in 1566 by the Emperor Akbar, and was a residence of the succeeding emperors for over a century. Pop. 185,500.

AGRAM, a'gram, Jugo-Slovakia, capital of the province of Croatia-Slavonia, between the banks of the Save and the foothills of the Agram Mountains rising in the background to 3,400 feet, 188 miles by rail south of Vienna. Of Roman origin, Agram was made the see of a bishop in 1094. It was ravaged by the Mongol-Tartars in 1242, but after their ex¬ pulsion it w'as rebuilt and created a royal free city. It was made the capital of Croatia- Slavonia in 1867 and is an important Slavic

national centre. Earthquakes in 1880 and in 1901 did considerable damage. Divided into the Kapitel-Stadt or Bishop's town, and the upper and lower towns, the city has numerous fine buildings, including the archiepiscopal cathedral of the 15th century, the governor's palace, the Academy of Sciences, the Franz- Josef University and the national theatre. Street railways connect the different districts. An active trade is carried on in wine, grain, silk, porcelain, etc., and there are thriving manufactures of cannons, ammunitions, carpets, tobacco, leather, linen, etc., besides important state railroad works. Pop. 80,000.

AGRAPHA, ag'rafa, signifying ((unwrit- ten,® sayings not recorded in the New Testa¬ ment, but found in the MSS. of early Christian writers, and ascribed to Jesus. J. G. Korner first used the term in 1776, but its general adoption dates from 1889, when Alfred Resch used <Agrapha) for the title of his work on the < Sayings) in Gebhardt and Harnack's (Texte und UntersuchungenC Among early debated examples of the sayings are : (<That which is weak shall be saved by that which is strong®; <(Wrath destroyeth even wise men®; <(A man is unapproved if he be untempted® ; and ((Jesus on whom be peace, has said: The world is merely a bridge; you are to pass over it, and not to build your dwellings upon it,® this last found inscribed in Arabic on the gateway of a mosque at Fatehpur Sikri, by Rev. Alexander Duff, missionary to India, 1829 to 1849. The most important of the sayings are those found in 1897 and 1903 by Grenfell and Hunt at Bahnasa, ancient (Oxyrh3mcus) in Egypt, all beginning (< Jesus saith.® Among these are: (<Jesus saith, Except you fast to the world, you shall in no wise find the Kingdom of God®; <(Jesus saith, I stood in the midst of the world, and in the flesh was I seen of them, and I found all men drunken and none found I athirst among them, and my soul grieved over the sons of men, because they are blind in their heart, and see not® ; (< Jesus saith, Wherever there are two they are not without God, and wherever there is one alone, I say I am with him. Raise the stone, and there thou shalt find me ; cleave the wood and there am I.® Besides Resch's work consult also Grenfell, B. P., and Hunt, A. S., (Logia Jesu: Sayings of Our Lord from an Early Greek Papyrus) (London 1897) ; (New Sayings of Jesus and Fragment of a Lost Gos¬ pel from Oxyrhyncus> (London 1904) ; Pick, B., ˆaralipomena : Remains of Gospels and Sayings of Christ > (Chicago 1908).

AGRARIAN LAWS, enactments framed at different times by the Romans to regulate the public domain. In the first epoch of the growth of Rome, before the city had extended beyond the Palatine Hill, the whole soil of the state was undivided public property, and from the state, consisting exclusively of citizens, every citizen received a share for his private use. In principle all the land was therefore undivided public property, and the citizen could only acquire possession as tenant at will of the state. In course of time, however, the descend¬ ants of the original founders, or the patricians, transformed these primitive concessions into an absolute right called in the Roman law de jure quiritio. During the entire existence of the

republic the principle was recognized that all lands and personal property acquired by con¬ quest were acquired for the state, and could only become the property of individuals through the cession to

them of the rights of the state. As conquest increased the public property, and the class of plebeians was formed, the Roman government gave them an interest in the public domain as private property on condition of their paying a tribute and undertaking other public services. The patricians, however, al¬ ways preserved their ancient right of receiving in possession and using portions of the public property on paying to the public treasury a tithe of its product. From the earliest period of Roman histor}' lands thus held could pass as an inheritance to children, and were even sold under this uncertain tenure, while the state always reserved the power to resume posses¬ sion. Spurius Cassius, a patrician, on becom¬ ing consul in the early period of the republic, caused a law to be enacted that some portion of the public lands, long before conquered, but occupied by the Roman nobles, shall be sur¬ rendered to the state and assigned to the needy citizens. The law remained a dead letter be¬ cause of the resistance of the patricians, who not only prevented any new divisions of the public lands, but by violence or usury acquired those of the plebeians. The keeping of large flocks of cattle practically ruined the common pasture lands, and in fact excluded the small farmers from them. This caused the publica¬ tion, in 367 b.c., of the Licinian law, so called from Licinius Stoto, its originator. For a brief period this law was put in force, after which it was neglected for nearly 200 years, when it was renewed by Tiberius Gracchus with some additions and modifications in favor of the patricians. The attempt to execute these laws caused the death of the two Gracchi (133 and 121 b.c.) . Not one of the Agrarian laws was ever executed, and it is said by the ablest writers that they had none of that leveling and confiscatory character which has been so often attributed to them. It is believed by able writers that none of the laws aimed at the equal division of real estate owned by indi¬ viduals in their own absolute right, or intended any limitation upon the ownership of land. The most prominent advocates of the Agrarian laws, Cassius, Licinius and the Gracchi, all belonged to the class which would have been injured by their operation had they led to an undue inter¬ ference with the right of private property.

AGRARIAN PARTY, a political organi¬ zation in Germany, representing the interests of the landlords (in political life). The first steps toward the formation of the party were taken by an assembly called together at Breslau, in May 1869, by M. A. Niendorf (d. 1878), and Eisner von Gronow, but the theory on which the party was based had already been formu¬ lated by Johann Karl Rodbertus. The organ of the party was Die Deutsche Landeszeitung, edited by Niendorf. In February 1876 a con¬ stitutional assembly of agrarian reformers was opened, and adopted the official name of (<Steuer und

Wirtschaftreformer.® Their pro¬ gram was especially devoted to the abolition of taxes on land, buildings and trades. At first especial emphasis was laid on free trade, but this object fell more and more into the back-

ground after 1879. Since that date they have sought to limit the importation of food stuffs, and have opposed several commercial treaties supported by the government ; they also opposed Emperor William's project for a canal sys¬ tem, and were very hostile to his navy policy. As the Agrarians dominate the Conservatives in the Reichstag they have frequently obtained important concessions in commercial matters and forced the government to turn to the Radicals for support for its measures.

AGRAVIADOS. The Catalan insurgents in 1825 called themselves by this name, or men with a grievance.

AGREDA, a-gra'da, Maria (Coronel) de,

Spanish abbess and author: b. 2 April 1602; d. 24 May 1665. Extremely devotional from an early age, she entered a convent at Greda when 17 years old, under the name of Sor (Sister) Maria de Jesus, and eight years later was appointed abbess. Her prominence is due to her posthumously published writings, chief of which is (La mistica ciudad de Dios, historia divina de la Virgen, Madre de Dios,* (The mystic city of God, the divine history of the Virgin, Mother of God), printed in Madrid in 1670. When translated in French and pub¬ lished at Marseilles in 1697, it created an inter¬ national controversy which lasted over half a century. Her lengthy correspondence with Philip IV from 1642 to 1655 was printed in Madrid in 1885, and is distinguished by its excellent style and valuable illustrations of con¬ temporary Spanish life.

AGREEMENT, a mutual bargain, con¬ tract or covenant. Agreements may be either express or implied. Express agreements are those openly stated and avowed by the parties at the time of. their making. Implied agree¬ ments are those which the law supposes the parties to have made although the terms were not openly expressed. There must be an agree¬ ment by the parties, a definite offer made by one party and accepted by the other, and they must assent to the same thing in the

same sense. The assent must be mutual and obliga¬ tory and there must be a request on one side and an assent on the other. The assent must be broad enough to cover the whole proposition. It must be exactly equal to its extent and pro¬ vision, and it must not qualify them by any new matter, and even a slight qualification destroys the assent. The agreement must be based upon a sufficient consideration (q.v.), and as against third persons this consideration must be good or valuable. It need not be ade¬ quate provided it has some real value. If the consideration is impossible, or illegal either in whole or in part, the agreement will be void. The agreement may be to do anything permitted by the law, as to sell and buy real estate or per¬ sonal property. The evidence of the sale of real estate, however, must be by deed, and sealed. In many instances agreements in re¬ gard to personal property must be reduced to writing.

A hire-purchase agreement is a contract, usually in writing, by which one agrees to hire or purchase goods on instalments, the title to the same remaining in the lender or vendor until the last instalment has been paid, and in case of default in any payment or breach of any part of the contract by the hirer or vendee,

the prior payments are forfeited to the lender or vendor. It is virtually a conditional sale, and has become of increasing importance dur¬ ing recent years. See Contracts ; Sale.

AGREEMENT OF THE PEOPLE, The,

a document proclaimed by the Council of the Army, 15 Jan. 1649, a fortnight before the exe¬ cution of Charles I of England. It is based on the Heads of the Proposals offered by the Army, 1 Aug. 1647, except that no reference is made to royalty. It is, in fact, the rough draft of a constitution for a republic. It provided that the existing Parliament was to be dissolved before 1 April 1649, after which a ˆrepresentative assembly,® composed of not more than 400 members, was to be elected by the people every two years on the first Thurs¬ day in May. The franchise was conferred on all who were (<assessed ordinarily toward the relief of the poor,® over 21 years of age, and housekeepers ˆdwelling within the division for which the election is held.® There was also to be a (<Council of State® for the management of public affairs. Christianity was adopted as the religion (<recommended as the public confes¬ sion,® but <(Papists® were excluded. To the assembly was given <(the supreme trust in order to the preservation and government of the whole,® but six points were reserved from its

legislative action. Except for the constitutions of the Connecticut and New Haven colonies this is the first record of a republican constitu¬ tion. But as its promulgators, the Levelers, were defeated by Cromwell, it was never put into effect. A full text of this remarkable document may be found in Gardiner's Consti¬ tutional Documents) (Oxford 1889).

AGRICOLA, Gnaeus Julius, lived from a.d. 37 to 93, and was a Roman general and governor in Britain, the greater part of which he brought under the dominion of Rome. His life (which extended through the reigns of the nine emperors from Caligula to Domitian) has been excellently written by his son-in-law, Tacitus, who holds him up as an example of virtue. Agricola was born at Forum Julii (now Frejus in Provence), and was the son of Julius Graecinus, a senator put to death under Caligula. He served his first campaign in Britain in 60, and after serving in Asia Minor and again in Britain, and governing Aquitania a praetor for three years, he was raised to the consulship in 77, and the next year went to Britain as governor. Agricola was the twelfth Roman general who had been in Britain, but was the only one who effectually subdued it ; partly by his consummate military skill, partly by his policy in reconciling the Britons to the Roman yoke and by teaching them the arts and luxuries of civilization. In his fourth cam¬ paign he built a chain of forts between the Forth and Clyde to help to keep in check the peoples to the north of this. His seventh and last campaign (a.d. 84) was marked by the total defeat of the Caledonians under Calgacus, at some place called by Tacitus Mons Grampius or Graupius. In this campaign his fleet sailed northward from the coast of Fife round Britain to the Trutulensian harbor (supposed to be Sandwich), thus for the first time proving that the country was an island. His death was either caused or hastened by the minions of the jealous tyrant Domitian.

AGRICOLA, Gnaeus Julius, Life of. The

story of Agricola's life is told by his son-in-law, the historian Tacitus, in what is, perhaps, the most artistic biography that has come down to us from ancient times. It was avowedly writ¬ ten to do honor to its subject, and is in no sense a critical estimate of his character and achievements. The state had fallen on evil days. Was it possible for men to be great even under bad rulers? The question has often arisen in the history of the world, and has been variously answered by

honest men. Tacitus was himself convinced that political martyrdom is inexpedient unless the resultant gain to one's country is beyond doubt. "Conformity and moderation,® he holds (Agr. 42) "if combined with diligence and energy, attain those same heights of glory to which very many have climbed by perilous paths, gaining fame, with¬ out any benefit to their country, by an ostenta¬ tious death.® It is in this spirit that he describes the career of an upright and highly efficient public servant who knew when it was prudent to' avoid futile opposition to the inevitable, and who did his duty unobtrusively under a tyrant in the hope of the accession presently of a better ruler. The style in which this memoir is written represents an early stage of that unique manner which is associated with the name of Tacitus. There is already a tendency to compress the thought, sometimes to the point of obscurity, a preference for short independ¬ ent sentences rather than the intricately bal¬ anced period, a readiness to modify almost any accepted rule of prose structure, and a remark¬ able mastery of pointed phrase. A very famous specimen of this last power occurs in the speech of the Caledonian chieftain, Cal- gacus, before the battle at the Grampian Mount: "To robbery, murder, pillage, they (i. e., the Romans) give the false name of empire, and when they make a solitude, they call it peace.® The (Agricola) has been often translated. One admirable rendering is by W. H. Fyfe (Oxford 1908). For an illuminating discus¬ sion of the ideas of Tacitus consult Gaston Boissier, (Tacitus and Other Roman Studies) (New York 1906).

Nelson G. McCrea,

Anthon Professor of the Latin Language and Literature, Columbia University.

AGRICOLA, Georg, German scholar by

the name of Georg Bauer, better know'n under its Latin version : b. Glauchau, Saxony, 24 March 1494; d. Chemnitz, Saxony, 21 Nov. 1555. He began his studies in the University of Leipzig in 1514, from which he graduated in 1517 with the degree of B.A. During the next two years he was first vice-principal, then prin¬ cipal, of the Municipal School at Zwickau. In 1524 he began a two years' study of medicine, philosophy and natural sciences at various uni¬ versities in Italy. In 1527 he was appointed town physician at Joachimstal, Bohemia. Three years later he resigned this position to travel. After another three years of wandering he ac¬ cepted the position of city physician at Chem¬ nitz, where he remained until his death. Soon after he began writing and publishing the books which made him famous. Of these the most noteworthy is (De Re Metallica,* consisting

of 12 volumes, covering mining, metallurgy and ge¬ ology, was completed in 1550 and went to press

three years later. Originally written in Latin, it was later translated into German, Italian and English, the latter version being published in 1912, in the Mining Magazine of London. This work was for 180 years the standard guide of all metallurgists, until the publication of Schluter's work in 1738. It is the first work of this nature based on actual research and ex¬ perimental work, instead of the imaginative speculations of the alchemists. In 1546 ap¬ peared (De Natura Fossilium.) which ranks almost as high as (De Re Metallica.) This work comprised 10 volumes on mineralogy and is the first attempt at systematic classification. (De Ortu et Causis Subterraneorum) appeared in 1546 and includes five volumes on geology. In 1530 he published <Bermannus,) his first work on mining. Aside from these, his chief works, he wrote copiously on the same and kindred subjects. In 1546 Agricola, at the request of Duke Maurice, entered public life in a diplomatic and advisory capacity. Though a Catholic himself, he was elected a Burgher by the Protestant electors of Chemnitz, and in the same year was appointed Burghermeister. During the Schmalkaldic war, he was sent on various missions to Emperor Charles, King Ferdinand of Austria and other potentates.

AGRICOLA, Johann, German reformer : b. 1492; d. 1566. He was one of the most active among those who propagated the doctrines of Luther. He studied at Wittenberg and Leip¬ zig; was afterward rector and preacher in Eisleben, his native city, and in 1526, at the Diet of Spires, was chaplain of the Elector John of Saxony. He subsequently became chaplain to Count Albert of Mansfield, and took a part in the delivery of the Confession of Augsburg, and in the signing of the articles of Schmalkalden. When professor at Witten¬ berg, whither he went in 1537, he stirred up the Antinomian controversy with Luther and Melanchthon. He afterward lived at Berlin, where he died after a life of controversy. Be¬ sides his theological works he composed a work explaining the common German proverbs. Its patriotic spirit, strict morality and pithy style place it among the first German prose composi¬ tions of the time, by the side of Luther's trans¬ lations of the Bible.

AGRICOLA, Martin, German composer and writer: b. Soran, Silesia, 1486; d. 1556. After 1524 and until his death he was musical director of the Protestant school at Magdeburg. He wrote much on musical subjects. His (Musica Instrumentalˆ is invaluable as a source of information in regard to old instru¬ ments. It contains many illustrations and ex¬ planations of the mechanism and instructions for

playing each instrument. It was reprinted by Eitner as volume XX of the publication of the Gesellscliaft filr Musikf or s chung. He also wrote (Rudimenta Musicae) (1529).

AGRICOLA, Rudolphus, the foremost scholar of the “New Learning,® in Ger¬ many : b. 23 Aug. 1443, near Groningen, in Friesland; d. 28 Oct. 1485. His real name, Roelof Huysmann (husbandman), he Latin¬ ized into Agricola; and from his native place he was also called Frisius, or Rudolf of Gron¬ ingen. From Groningen he passed to Louvain, then to Paris and then to Italy, where, during the years 1473-80, he attended the lectures of

the most celebrated men of his age, and where he entered into a close friendship with Dalberg, afterward bishop of Worms. On his return home he endeavored, in connection with several of his former codisciples and friends, to pro¬ mote a taste for literature and eloquence. Several cities of Holland vainly strove with each other to obtain his presence, but not even the brilliant overtures made to him by the Emperor Maximilian, to whose court he had • repaired in connection with affairs of the town of Groningen, could induce him to renounce his independence. At length yielding (1483) to the solicitations of Dalberg, he established himself in the Palatinate, where he sojourned alter¬ nately at Heidelberg and Worms, dividing his time between private studies and public lectures, and enjoying high popularity. He distinguished himself also as a musician -and painter. With Dalberg he revisited Italy (1484), and shortly after his return died at Heidelberg'. Most of his works were collected by Alard of Amster¬ dam (2 vols., Cologne 1539).

AGRICOLITE, a mineral having the same composition as eulytite, but crystallizing in the monoclinic system. It also occurs in globular forms, with a radiated structure, and the crys¬ tals, when they occur, are indistinct. The species needs further examination.

AGRICULTURAL ANT, a remarkable species of ant (Myrmica molefaciens) that cul¬ tivates fields of grass around its hill, allowing only one kind of grass (Aristida) to grow in a field ; it harvests the seeds and stores them away as food. The fields may be as large as 15 feet across; roads are laid out from the hill to the outer margin of the plantation, so that the crop may not be trampled, and any weeds which appear among the grass blades are at once cut off. These

colonies are often found in large grain fields, which they injure in pro¬ portion to their numbers.

AGRICULTURAL ASSOCIATION, the

voluntary association of farmers with the ob¬ ject of promoting a knowledge of the science of agriculture. The first instance on record of such an organization is that of the Society of Improvers in the Knowledge of Agriculture, founded in 1 723 by a group of Scottish agri¬ culturalists. It continued its activities for over 20 years and has left behind its ˆSelect Trans¬ actionsˆ published in 1743. In 1777 the ((Bath and West of England Society® was established, followed by the ((Highland Society® in 1784. The later organization exists to this day as the (<Highland and Agricultural Society of Scot¬ land,® carrying on much the same work as the United States Department of Agriculture. In England the same functions in the development of agriculture were performed by <(The Royal Agricultural Society,® founded in 1838. Its present membership is considerably over 10,000 and at its annual agricultural fairs it distributes as much as $50,000 in prizes. It maintains an experimental station at Woburn and a veteri¬ nary college at Camden Town, London. Another organization is the Agricultural Or¬ ganization Society, Ltd., founded in 1901 to organize agricultural co-operative societies in England and Wales. It has affiliated with it about 400 societies and its membership includes over 20,000 individuals. In Ireland a society of the same name and the same purposes has been

very active of recent years, under the guidance of Sir Horace Plunkett, who by some has been termed the father of modern Irish agriculture.

In the United States the activity of the De¬ partment of Agriculture has made the extensive organization of such societies needless, but in 1785, before there was any thought of the government taking over such work, a society for the promotion of agriculture was founded in Philadelphia. In the same year another so¬ ciety of the same nature was organized in South Carolina. Then followed other societies in Kennebec, Me. (1787), New York city (1791) and the Massachusetts Society for the Promotion of Agriculture (1792). By 1809 these societies attempted the beginnings of a national federation, whose work should be of nation-wide scope, in the Columbian Agricul¬ tural Society, with headquarters in Washington, D. C. The holding of agricultural shows or county fairs had its origin in Washington, in the efforts of Elkanah Watson, of Massachu¬ setts. Such exhibitions are now held all over the country by nearly 3,000 organizations, rang¬ ing from international to local scope in their characters. In many of

the States agricultural societies have developed to large proportions. Other societies have for their purpose the or¬ ganization of co-operative buying and selling among farmers. But in 1913 the Department of Agriculture assumed a function approaching this very much in character — the rural organi¬ zation service to assist farmers in forming or¬ ganizations for the betterment of agricultural and country life.

AGRICULTURAL CHEMISTRY. Ag¬ ricultural chemistry deals with the chemical composition of plants and of animals and of their foods, and with the chemical changes involved in the life processes. It therefore includes the chemistry of air, water, soil, manures, fertilizers, insecticides, fungicides, plants, animals and metabolism or the chemical changes taking place in living things. Some of the problems of agricultural chemistry do not lie strictly in the field of chemistry but border on other branches of science such as physics, geology and physiology.

Composition of Plants. — The number of definite chemical compounds occurring in plants is very large, and excluding water which may constitute from 75 to 90 per cent of the weight of the plant, most of them can be classified under one of the following heads :

Inorganic salts.

(carbohydrates, fats and waxes.

essential oils, terpenes and resins, organic acids.

proteins and amino acids. Organic compounds amides.

CONTAINING NITROGEN. alkaloids.

chlorophyl and coloring matter.

Carbohydrates, including cellulose, starch and sugars, or fats or proteins make up most of the dry matter of plants. Except for cer¬ tain terpenes which contain only carbon and hydrogen the organic compounds all contain carbon, hydrogen and oxygen, and some also contain nitrogen. Sulphur occurs mainly in one of the amino acids which are the constituents of proteins. Phosphorus occurs in conjugated proteins and also as inorganic and organic

phosphates. Potassium and calcium are present as salts of inorganic and of organic acids. Iron, magnesium and manganese occur in or¬ ganic combination, magnesium being present in the green pigment chlorophyl. Sodium, chlorine and silicon are also found in most plants, but they do not seem to be essential to plant life.

The Air. — The growth of plants is greatly influenced by temperature and rainfall, both of which arp controlled by the atmosphere. The nitrogen of the air is one of the elements essential for plant and animal life, but it can be utilized only when it is in combination with other elements. Except for a small amount which is combined with oxygen during lightning discharges and brought to the earth by the rain, and that which is now artificially fixed by chemical processes and added to the soil in commercial fertilizers, all nitrogen that is used by plants has been fixed or combined with other elements by micro-organisms which are present in fertile soils and especially in the nodules on the roots of leguminous plants, or by certain very low forms of plant life. The nitrogen is then taken from the soil by the roots of the plant in the form of nitrates. The oxygen of the air oxidizes organic matter in the life processes to furnish energy and also oxidizes waste matter during decomposition. The main products of complete oxidation are carbon dioxide and water. The source of all the carbon in organic compounds in plants is, with few exceptions, the carbon dioxide of the air. In the presence of chlorophyl, the green pigment of plants, and under the influence of light, carbon dioxide and water are converted into organic compounds which occur in plants. During this process a volume of oxygen equal to the volume of the carbon dioxide is returned to the aid.

The Soil. — Plants obtain from the soil, in addition to nitrogen which comes originally from the air, water and inorganic salts con¬ taining phosphorus, sulphur, potassium, calcium, magnesium, iron and manganese. Soil is formed by the disintegration of the rocks which make up the earth's crust, mostly by the me¬ chanical and chemical action of water and air, and the elements necessary for plant food are made available by chemical decomposition of the mineral compounds of which the rocks are composed. The soil then consists of decom¬ posed rocks, mainly in the form of sand, clay and limestone with small amounts of unchanged minerals and of the salts necessary for the growth of plants. In addition to these, an important constituent of fertile soil is humus, which is decaying organic matter, either of plant or animal origin. Humus benefits the soil both on account of its physical and its chemical properties. It contains the elements required by plants, which are made available for plant food during decomposition, and it is able to retain ammonia and some other bases,

thus preventing their loss from the soil by leaching. It has a lower density, a higher specific heat and a greater capacity for holding water than the other constituents of soil, thus making a moist warm soil in which the air can circulate. These conditions are most satis¬ factory not only for the growth of plants but also for the action of nitrifying bacteria which oxidize different forms of nitrogen into nitrates which can be utilized by plants. When the air

is excluded from the soil either because the soil is too compact or because it is not well drained, the conditions are more favorable for the action of denitrifying bacteria which reduce nitrogen compounds to free nitrogen which is then lost as a plant food. An important prop¬ erty of fertile soils is the ability to retain plant food by forming insoluble compounds which are not washed out by water but which are soluble in the plant juices. In addition to the retention of ammonia by humus, which is men- • tioned above, phosphates, potash and ammonia are retained by clay, the phosphates in com¬ bination with oxides of iron and aluminum, the bases in combination with complex silicates.

Manures. — Soils gradually become poorer in plant food as crops are removed every year. If the crops removed are fed to farm animals and the manure returned to the land the soil may be maintained in a fertile condition. The manure from an adult animal not giving milk contains practically all the nitrogen, potassium, phosphorus and calcium that was present in the food, but growing animals and those giving milk use a certain amount of these elements, so the amount in the manure is generally about 80 per cent of that in the food. On a farm where milk is the only product sold and where some feed is bought for the animals the manure will return to the soil all that the crops take from it, providing the manure is used in such a way that nothing is lost from it by fermenta¬ tion or leaching. In addition to returning plant food to the soil manure furnishes humus and so greatly improves the physical condition of most soils. This beneficial effect is lasting, so that the soil remains fertile for several years after the application of manure.

The condition of a soil is improved by green manure as well as by farm manure, especially when the latter is not obtainable. It has been known for ages that the growth of leguminous crops such as red clover is to a great extent equivalent to the application of nitrogen fer¬ tilizers for the growth of cereals, and in 1886 Hellriegel and Wilfarth demonstrated that this was due to the fact that micro-organisms in the nodules on the roots of leguminous plants assimilate free nitrogen from the air and make it available for plant food. Growing and plow¬

ing in leguminous crops therefore not only returns to the soil the plant food used by the crop but it also increases the supply of com¬ bined nitrogen in the soil.

Commercial Fertilizers. — When crops are continually taken from the soil and plant food is not returned in manure, it is necessary to supply the necessary elements in commercial fertilizers. These are used mainly to supply nitrogen, phosphorus, potash and lime, as the other elements are required in such small amounts that most soils have a sufficient supply. The principal nitrogen fertilizers are either organic matter such as dried blood, meat waste, fish scrap, tankage, sewage sludge and cotton¬ seed meal, or inorganic compounds including ammonium sulphate recovered from coal gas, nitrates from the natural deposits in Chile, and artificially fixed nitrogen in the form of cal¬ cium nitrate, ammonium sulphate and calcium cyanimide. Nitrogen is assimilated by plants in the form of nitrates, so the nitrate salts are most readily available for plant growth, but in fertile soils there are bacteria to ammonify

organic nitrogen and to nitrify ammonia. Some kinds of organic matter such as leather and wool waste decompose very slowly and so the nitrogen is not readily available.

The phosphate fertilizers are phosphate rock, bones, superphosphate and basic slag. The first two are insoluble, consisting mostly of tricalcium phosphate, and it was Liebig who in 1840 first suggested making a more soluble product by treatment with sulphuric acid to make superphosphates which consist of monocalcium phosphate and calcium sulphate. In the last few years some phosphate rock has been treated in the electric furnace to get a soluble concen¬ trated product which may be used either in combination with ammonia, potash or lime. Basic slag contains the phosphorus removed from iron by limestone in the blast furnaces.

Except for tobacco stems and wood ashes, most potash fertilizers have been salts from the Stassfurt mines in Germany. Since 1914, when the supply from Germany was cut off, many attempts have been made to obtain potash sup¬ plies in the United States. Two methods of ob¬ taining amounts at a reasonable cost appear to be successful. The first is the recovery of potassium salts from the kelp of the Pacific Ocean by processes in which other by-products are also recovered. The

second is the recov¬ ery of potash from feldspar and clay in con¬ nection with the cement industry by the use of the Cottrel process for precipitation from the flue dust. By this method a large amount of potash which has previously gone to waste is now recovered at a slight cost.

Applications of lime are often of benefit on soils which are not deficient in calcium, on account of the effect on the physical condition of the soil and the chemical action on the soil constituents. Lime floculates clay and so im¬ proves the drainage of a heavy soil, it liber¬ ates potash from feldspar, makes certain phos¬ phates more available for plants and aids bac¬ terial nitrification by neutralizing acidity and maintaining a neutral or slightly alkaline con¬ dition. Lime is applied either as quick lime, slaked lime or finely ground limestone.

Crops. — The different fertilizers have dif¬ ferent effects on the growth of plants and dif¬ ferent crops require different amounts of the plant foods, so commercial fertilizers should not be used indiscriminately. Analyses of plants show' how much of each of the necessary plant foods is removed by any crop and this gives an indication of how much fertilizer should be added to the land to keep the soil from becoming deficient in any element. Ni¬ trogen generally tends to delay maturity by causing more growth. Maturity is also delayed by a lack of phosphorus wdiich is especially needed for the growth of the seeds. While potash tends to delay the maturity of grains it hastens the maturity of root crops.. While the use of fertilizers may materially increase the yield the composition of the mature crop is influenced very little by the amount or kind of fertilizer used.

On account of the fact that different crops use different amounts of the several plant foods and so deprive the soil of different elements, a plan of crop rotation exhausts the soil less rapidly than growing a single crop continuously on the same land and allows the soil to be en¬ riched occasionally by the growth of a legu¬

minous crops. Some plants have short roots which take their food from the surface soil, while others have long roots which bring up their food from the deep soil and when the crop is harvested and the root decays it en¬ riches the top soil by a certain amount of potas¬ sium, phosphorus and nitrogen.

That the climate influences the composition of crops more than other factors has been shown by several experiments. Among them is

LeClerc's experiment with wheat in which it was found that the same wheat planted in different parts of the country gave crops with very different amounts of protein and starch, w'hile wheat from different parts of the country when planted in one place gave crops which were approximately alike and quite different from the seed from which they were planted. With regard to the effect of rainfall on the composition of wheat it was found that an abundant water supply produces a large starchy grain, while a dry climate produces smaller grains with a larger proportion of protein. Wiley's experiments with sugar beets showed a considerable variation in the composition of crops grown in different parts of the country from the same seed, a larger yield of sugar being obtained in the northern part of the country. In experiments with sweet corn Wiley found that the climate has less influence on the composition of the crop than the amount and distribution of the rainfall. From such chemical studies it is possible to find out in what part of the country to grow certain crops with the best results and also to select for de¬ velopment the varieties that will produce more of a given desirable constituent, either protein, fat or carbohydrate. It is evident that for the improvement of crops by selection it is neces¬ sary that the experiments be carried on in the climate in which the crop is to be grown.

Insecticides and Fungicides. — Plants have many insect enemies and it is often necessary to use poisons to kill them. These poisons must not be such as to harm the plant and must not be used in a way to make it poison¬ ous as a food for the higher animals. The poisons used for spraying on leaves which in¬ sects eat are mainly insoluble arsenic com¬ pounds such as Paris green and lead arsenate. Among the sprays that poison by contact are lime sulphur and tobacco extract or nicotine solution. For destroying insects in stored grains poisonous gases are frequently used, such as hydrocyanic acid and carbon disulphide. Copper salts are commonly used for destroying fungi and the most generally used fungicide is Bordeaux mixture which is made from copper sulphate and lime.

Animals. — The animal body contains be¬ sides from 50 to 70 per cent of water, inorganic salts and organic matter which is mainly pro¬ tein and fat. The inorganic salts include phos¬ phates and chlorides of calcium, sodium, potas¬ sium and magnesium in the skeleton and body fluids. The organic matter includes compounds containing carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, iron and iodine. Small amounts of fluorin and silicon are also found but it is not known that these are essential to animal life. The organic matter required by animals comes directly or indirectly from plants which have synthesized their organic compounds from the inorganic matter

in the

air and soil. The organic matter required for growth and repair of tissues is protein, and the energy required for keeping the animal warm and for performing the functions of the organs and muscles is obtained by oxidation of organic compounds, mainly fat and carbo¬ hydrate. Protein in excess of that required for building new tissue or replacing waste tissue is also used as a source of energy, but protein foods are a more expensive source of energy than fat or carbohydrate, and they are generally used in a diet only in amounts neces¬ sary for tissue-building. Any excess of food over that required for growth and for energy is stored as fat. Not only must a diet contain protein, fat, and carbohydrates enough to fur¬ nish the necessary energy, but it must have a sufficient variety and amount of inorganic salts, and there are also certain other organic com¬ pounds, known as accessories or vitamines, which are present in small amounts in food from plant and animal sources and without which animals either do not grow or they de¬ velop certain diseases such as polyneuritis or scurvy, which are therefore known as deficiency diseases.

Energy requirements of animals have been carefully investigated by three methods : First, by determining the balance between the intake of energy in the food and the output in the excrement; second, by observing the amount of oxygen consumed during respiration and the amount of carbon dioxide exhaled; third, by direct measurement of the heat given off by the body in a calorimeter. The three meth¬ ods are combined in experiments made with the respiration calorimeter devised by Atwater. By these means feeding standards have been established, especially by Armsby, for different animals under different conditions such as growing, working, fattening and giving milk.

Besides the importance of the required amount of different food substances it is now known that the quality of the protein has some effect on its availability for animal use. Work by Osborn has shown that some proteins do not furnish nitrogen in a form that can be used by growing or adult animals. Analyses of these proteins show them to be deficient in certain ones of the amino acids of which pro¬ teins are composed.

Carbon and Nitrogen Cycles. — The study of agricultural chemistry

shows interesting cycles for carbon and nitrogen. Carbon is taken from the air as carbon dioxide by plants and synthesized into organic compounds which are then used by animals and returned to the air by oxidation during respiration or decom¬ position. Some carbon is returned to the air by plants by oxidation during respiration or decomposition or combustion, and there are other branches to the cycle, but in the main it may be represented as air — plant — animal — air — plant — -animal, etc.

In the same way combined nitrogen as ni¬ trates is taken from the soil by plants and synthesized into organic compounds which are then used by animals and returned to the soil in manure or the dead body. Here also some of the nitrogen is returned to the soil by de¬ caying plants, but the main cycle is soil — plant — animal — soil — plant — animal, etc.

Dairy Chemistry. — Dairying is an import¬ ant agricultural industry not only commer¬

cially but also because dairy farming tends to keep the soil fertile by returning to it all the plant food taken from it except for the small amount used in producing the milk. Chemical investigations have been directed to the com¬ position and character of milk from different cattle and under different conditions, to the chemical changes taking place during souring and curdling, to the processes of making but¬ ter and cheese and to the effect of pasteuriza¬ tion on the composition of milk.

Organizations. — Every State in the country now has an agricultural college or an agricul¬ tural station where experiments in agricultural chemistry are carried on, and the United States Department of Agriculture is investigating many of the problems in this field. The As¬ sociation of Official Agricultural Chemists, organized in 1880, is composed of the Federal and State officials who are enforcing the laws regarding foods, drugs, feeding stuffs, fertili¬ zers, insecticides and fungicides, and those who are carrying on investigations along these lines under the Federal or State governments. The main work of this association is the im¬ provement of the methods of analysis of agri¬ cultural products and it meets annually to re¬ port the results of collaborative work carried out on these methods. Its analytical methods are official in many of the Federal and State laws. The proceedings of the meetings and the methods of analysis are published in the Journal of the Association of Official Agri¬ cultural Chemists.

Bibliography. — Chamberlain, J. C., Or¬ ganic Agricultural

Chemistry) (1916); Fraps, G. S., Principles of Agricultural Chemistry) (1913) ; Hall, A. D., (The Book of the Roth- amsted Experiments) (1905) ; Hart, E. B., and Tottingham, W. E., (General Agricultural

Chemistry) (1910); Hilgard, E. W., <Soils) (1906); Ingle, Herbert, (A Manual of Agri¬ cultural Chemistry *(1913) ; Kahlenberg, Louis, and Hart, E. B., (Chemistry and Its Relations to Daily Life) (1913); Robertson, F. D., Practical Agricultural Chemistry* (1907); Snyder, Harry, (The Chemistry of Plant and Animal Life* (1913); Stoddart, C. W., (The Chemistry of Agriculture for Students and Farmers) (1915) ; Wiley, H. W., Principles and Practices of Agricultural Analyses) (1906-14) ; Journal of the Association of Official Agricultural Chemists ; Journal of Agricultural Research; Bulletins of United States Depart¬ ment of Agriculture and of State Experiment Stations.

H. E. Woodward,

Bureau of Chemistry, Department of Agricul¬ ture, Washington, D. C.

AGRICULTURAL COLLEGES. As a

result of National and State co-operation, which enables the ordinary farmer to profit from the experiments of widely separated individuals in¬ terested in scientific farming, the United States stands foremost in the matter of agricultural development. As far back as 1862 Congress passed the first of a series of acts whereby ex¬ tensive grants of national lands were mad" and converted into trust funds for the support of at least one agricultural college in each State, the grants being contingent upon a certain per¬ centage of assistance by the States. The De¬ partment of Agriculture renders the greatest

service imaginable to the country ; but its facili¬ ties are greatly improved by the co-operation of the different State agricultural institutions, while the farmers of each section can rely upon their special State colleges to supplement the work of the national institution.

The Massachusetts Agricultural College is one of the foremost representatives of the typ¬ ical institution devoted to practical agricultural education, and its work and studies are devoted chiefly to the training of students in modern scientific farming. The work is conducted in the class-room, on an experimental farm and in co-operation with farmers' organizations. The institution is located on a farm of 400 acres at Amherst, and its buildings, land and equipment are valued at $1,530,465. Its annual income from the State and United

States for extension work and its experiment station alone amounts to $100,000. There are buildings for nearly every imaginable specialty pertaining to agri¬ culture — a chemical laboratory, botanical lab¬ oratory, plant-house, creamery and dairy lab¬ oratory, veterinary buildings, barns, museum, library, and entomological laboratory and in¬ sectary.

Instruction is given by a corps of 60 profes¬ sors and assistants in chemistry, botany, agri¬ culture, horticulture, zoology, veterinary science, mathematics, civil engineering and similar studies and in extension work. Practical work on the farm is a part of the course, and the stu¬ dents cultivate the whole farm, experimental orchard and nursery. There are 100 acres de¬ voted to orchards, vineyards and the cultivation of small fruits; 150 acres under cultivation with field crops and nearly as many more allot¬ ted to grass and hay for the cattle which are kept on the farm. Considerably over 1,000 men have been educated at the Massachusetts Agri¬ cultural College. A recent census of them showed that nearly 400 are to-day engaged in agricultural pursuits ; more than a score are instructors in other similar institutions ; and others have drifted into a variety of callings. The effect of the college on the agriculture of the country must prove of immeasurable value if a similar proportion of its graduates adopt farm¬ ing for their life's work, and perform their labors in a scientific manner, as they were taught to do at the institution. During 1915 a new building, costing $210,000, was dedicated.

The State agricultural and mechanical col¬ leges which have sprung up in most of the leading agricultural States of the East and West, and in many parts of the South, in recent years, have in view the training of young men for scientific and practical agriculture, and also for mechanical and manufacturing arts and sci¬ ences. They are endowed by the State and the Federal Government (see Department of Agri¬ culture) and also by private individuals. They are for the most part under the control of the State Board of Agriculture, the governor and other State officers; but the president and fac¬ ulty of each institution practically have all the liberty tjiey demand in carrying out the work according to well-defined policies. Some of these State agricultural colleges are remarkably well equipped and endowed for the work they have in hand. Thus, the Iowa State College of Agriculture has 15 buildings, which have been erected by the State at a total cost of $500,000. There are nearly 1,000 acres of land attached

to the institution. A corps of 250 professors and instructors and over 1,700 students are en¬ gaged in study and work. All kinds of crops raised in Iowa are cultivated on the farm, and cattle, horses and

poultry are kept by the stu¬ dents. Experiments are constantly being car¬ ried on by the professors and students in agriculture, horticulture, chemistry and general farming, and the results of these experiments are published in bulletins and papers for the benefit of the world.

The Pennsylvania State College, called the Agricultural College of Pennsylvania, is even broader in its educational aims than the Iowa college. Almost all studies from agriculture, chemistry, physics, engineering, mining and mathematics up to philosophy, general literature and languages are taught there. In recent years this college has steadily broadened as a high- grade technical, scientific and classical institu¬ tion. Nevertheless agriculture, in all its wide fields of application, is one of the chief studies emphasized at the college. A correspondence course has in late years been organized for the purpose of instructing students on farms who cannot attend the college, but who wish to avail themselves of the researches and facts obtained at it. Forestry is one of the most useful branches of work carried on at this college ; and it not only trains young men to appreciate the value of cultivating orchards and woods, but also turns out practical foresters, capable of taking charge of large forests and converting them into profitable possessions, without de¬ stroying and denuding them of trees.

The Michigan State Agricultural College is another institution which, for more than 45 years, has endeavored to help the farmers in their struggle to wrest from the soil a fair compensation for their labors. The original idea of this college was to perfect in their studies all graduates of the common schools who wished to possess a complete practical and theo¬ retic knowledge of the arts and sciences which bore directly upon agricultural and kindred pur¬ suits. Economic zoology, meteorology, physics, veterinary science, entomology, bacteriology, chemistry, geology, and agriculture and horticul¬ ture are a few of the studies pursued. Post¬ graduates can pursue advanced studies in the sciences, and in the library of 38,000 volumes they can find nearly all the literature of value pertaining to their particular studies. There is a fine arboretum, a botanic garden, a grass- garden and a weed-garden, where 100 or more noxious weeds are grown to show their destruc¬ tive possibilities to the students. There are some 1,400 students at the college, and more than half of them take the full agricultural course.

The South has a good institution of this class in the Mississippi Agricultural and Me¬ chanical College, with a faculty of some 60 members and a student membership of nearly 800. The college is

under the management of a board of trustees, with the governor of the State an ex officio member. The students who attend this college are paid eight cents per hour for their work in the fields or orchards, which enables them to pay for a part of their living while studying.

The Kansas State College, with its 300 acres of land, buildings valued at $965,000 and a fac¬ ulty of 190 professors and assistants, has

become an important factor in the middle West in developing the agricultural possibilities. Agri¬ culture, engineering and general and household economics are taught to the students. There is a dairy, blacksmith-shop, foundry, machine- shop, printing-office, and woodwork and paint¬ ing shop connected with the college, where practical work can be followed by the students.

With agriculture as our leading industry, many of the large universities have in recent years established an agricultural course and experimental farms for work in the regular col¬ lege course. When this subject is mentioned, one turns instinctively toward Cornell Univer¬ sity, with its admirable agricultural and forestry departments ; toward the Ohio State University, with its buildings and equipments aggregating nearly $5,000,000 and with an income of $1,250,- 000; or toward the University of Wisconsin or the University of California. These typical uni¬ versities, which have given agriculture and hor¬ ticulture a prominent place in their curriculums, send forth annually hundreds of students to teach practical farming to new communities which may still labor under the disadvantage of old methods and ideas of agricultural produc¬ tion. The Ohio State University at Columbus has over 2,500 students and a corps of 250 pro¬ fessors and assistants; but it aims to give a scientific and classical education to both young men and women. It is divided into six colleges, with one devoted to agriculture and domestic science and another to veterinary science. Stu¬ dents pursuing other studies can take courses in these departments, and there are also oppor¬ tunities for graduate studies in the science of agriculture. There is a well-stocked farm con¬ nected with the university, a dairy department and a large laboratory for student work.

At the end of 1914 there were 69 State agri¬ cultural colleges, some of them being conducted in connection with the State universities. Their total endowments amounted to $60,000,000 ; the value of their

farms amounted to $24,000,000 and their buildings to $51,800,000. Toward their maintenance the Federal Government was contributing $3,592,198 (see States Relations Service in article Department of Agriculture) and the States were contributing $17,997,765. The rest of their incomes, mostly from tuition fees, amounted to $13,301,000. The total num¬ ber of students enrolled amounted to 115,054. During the four years from 1910 to the begin¬ ning of 1915 the increases in their equipment, faculties, student bodies, etc., have amounted to 67 per cent. During the year 1915 progress was especially notable ; the State legislature of Cali¬ fornia appropriated large sums for additions to the group of agricultural buildings at the State University, Nebraska gave $100,000 for similar purposes and Cornell University completed a new Soils Building which cost $100,000.

AGRICULTURAL CREDIT ASSOCIA¬ TIONS. See Co-operative Banking; Fed¬ eral Farm Loan Act; Land Credit.

AGRICULTURAL EDUCATION. See

Education, Agricultltral.

AGRICULTURAL EXPERIMENT STATION. An institution for scientific re¬ search in agriculture. The modern agricultural experiment station owes its origin chiefly to the work of Boussingault and Liebig, born re¬ spectively in 1802 and 1803, although the earlier

work of Sir Humphrey Davy, De Saussure and others had prepared the way for that of these great chemists. During the third decade of the century Boussingault established and for a few years maintained a chemical laboratory on his farm, and there began the combination of field experiment with laboratory investigation which characterizes the experiment station of to-day.

In 1837 a young Englishman, .John Bennett Lawes (q.v.), began making experiments in the use of bone superphosphate on his ancestral estate at Rothamsted, near St. Albans, Hert¬ fordshire, about 25 miles northeast from Lon¬ don. The success of these experiments led him to engage in the manufacture of super¬ phosphate and also stimulated a desire for fur¬ ther investigation, and after some years of pre¬ liminary work, in 1843 he associated with him¬ self Dr. Joseph Henry Gilbert, a young chemist and a recent pupil of Liebig, and the two entered upon a systematic line of research which has been continued without material change of original plan until the present day. For more than half a century these two men worked together ; both received the well-earned honor of knighthood, and before his

death, which oc¬ curred in 1900, Sir John Lawes made provision for the permanent continuance of the work, under what is now known as the ((Lawes Agri¬ cultural Trust.)}

The feature of the work of Lawes and Gil¬ bert which distinguished it from anything that had previously been undertaken, except the work of. Boussingault, was the combination of systematic and long continued field and feeding- experiments with parallel investigations con¬ ducted in the chemical laboratory, in which the principal agricultural plants adapted to the English climate were grown both continuously on the same land and in various rotations, the composition of the crops and of the soils upon which they were grown being determined from time to time, and in which large numbers of animals have been fed over long periods and under such conditions that it was possible to determine the chemical elements consumed in the food and the proportion of each utilized by the animal. Extensive detours have also been made into other fields of chemical research, especially that of the assimilation of nitrogen by plants. For many years several general assistants have been employed, including chem¬ ists, botanists, computers and other help. The entire expense of this work has been met by the originator, except that a chemical labora¬ tory was presented to him some years ago in recognition of the value of his work.

In 1851 a small company of Saxon farmers, organized as the Agricultural Society of Leip¬ zig, incited by the revelations of Liebig and Boussingault (q.v.), who were then in the full zenith of their work, employed a young chemist, Emil von Wolff, and started him in the experi¬ mental study of agricultural problems, especially those related to the feeding of animals. In a few yrears the government was induced to assume the cost of this work, and thus was established at Moeckern, near Leipzig, *the first public agricultural experiment station in the world.

In the United States attempts at experimental research in agriculture were undertaken at the Agricultural High School, afterward State College, of Pennsylvania; at the Michigan Agri-

cultural College and at the Maryland Agricul¬ tural College, all established between 1854 and 1858, and later several of the institutions organ¬ ized under the National Agricultural College Act of

2 July 1862 undertook some investiga¬ tions of this character.

The first regularly organized agricultural experiment station in America was established at W esleyan University, Middletown, Conn., in 1875, under the directorship of Dr. W. O. Atwater, a young chemist who had become enthused with the idea while studying in Ger¬ many. For the inauguration of this work private initiative was necessary; Mr. Orange Judd, then editor and proprietor of the Ameri¬ can Agriculturist , contributed $1,000 on con¬ dition that the State should appropriate $2,800 for the support of the station for two years. This offer was accepted and work was begun

• in October of that year. In 1877 at the expira¬ tion of this period the State assumed the entire support of the station, and it was removed to New Haven.

Similar stations were established by North Carolina in 1877; by New Jersey in 1880; by New York and Ohio in 1882 ; and by Massachu¬ setts in 1883. During this period also several of the agricultural colleges organized their research work on a more definite basis, and by 1887 there were 17 stations in operation in 14 States.

In 1883 a bill was introduced in the House of Representatives of the National Congress by C. C. Carpenter, of Iowa, providing for the establishment of experiment stations in con¬ nection with the colleges of agriculture, but it was not voted upon. In the next Congress Mr. Cullen, of Illinois, introduced a bill pro¬ viding for a grant of $15,000 annually to each State and Territory for this purpose. This bill was re-introduced in the following Congress by William H. Hatch, of Missouri, and after

- being so amended as to authorize States, in which experiment stations independent of the agricultural colleges had been previously estab¬ lished, to use the grant in support of such independent stations — a proviso applying to the five stations above mentioned — the bill became a law on 2 March 1887.

Under this law experiment stations have been established in every State and Territory in the United States, 60 such stations being enumer¬ ated in 1914 — the fund being divided between two stations each in Connecticut and New York; while additional stations have been es¬ tablished under State or Territorial support in Alabama, Louisiana, Missouri, New Jersey, Pennsylvania and Virginia, and in several of the States substations or test farms have been established under State support, but as adjuncts to the regular stations. In addition

to these the National Government has established sta¬ tions in Alaska, Hawaii, Porto Rico and Guam.

In 1914 the stations organized under the Hatch Act of 1887 and the Adams Act of 1906 (see below) had a total income of $5,054,687.96, of which $1,426,166.99 was received from the National Government, the remainder, $3,628,- 520.97, coming from State appropriations, fees, sales of produce and other sources. The sta¬ tions employed 1,852 persons in the work of administration and research, and published 1,330 reports and bulletins, which were sent to over 1,000,000 addresses.

The following are among the principal sub¬ jects under investigation by the American sta¬ tions: (1) The soil: its physics, .chemistry and biology; including tillage, drainage, irrigation and the maintenance of fertility by crop rota¬ tion and the use of manures and fertilizers. (2) The plant: its physiology, chemistry, nutri¬ tion and pathology; the introduction of new varieties ; improvement in productiveness by selection and breeding; the control of fungous and bacterial diseases and injurious insects; the various phases of forestry. (3) Animals: the special adaptations of the various breeds ; the chemistry of animal foods and the econom¬ ics of feeding; dairying and its manifold prob¬ lems ; the control of animal diseases.

In addition to the work above outlined,, several States have laid upon the stations cer¬ tain lines of police work, such as the inspection of fertilizers, seeds, drugs, foods and animal feeding stuffs for the prevention of adultera¬ tion; that of live stock to prevent communica¬ tion of animal diseases, and that of orchards and nurseries for the control of insect pests and fungous diseases ; but such work is not scientific research; it frequently interferes ma¬ terially with the conduct of such research, and is more properly an executive function of the State government. In some States it is so recognized.

Under the provisions of the Hatch Act the stations are governed under the laws of their respective States, the National Government exercising no control except to make sure, through annual financial reports from the sta¬ tions and through personal visits by officers of the Office of Experiment Stations of the De¬ partment of Agriculture, that the money appro¬ priated by Congress is being expended for the purpose designated in the national law.

The stations, in connection with the colleges of agriculture, have organized an Association of American Agricultural Colleges and Experi¬ ment Stations, which meets annually at some point in the

United States for the discussion of matters pertaining to their work, and the Office of Experiment Stations publishes a monthly journal, the Experiment Station Record, in which notices or summaries are given, not only of the publications of the American stations, but also of the scientific agricultural publica¬ tions of the world.

While this work has been thus extending in the United States it has also spread over most of the civilized world, 728 such institutions being enumerated in other countries in a bul¬ letin of the Office of Experiment Stations, pub¬ lished in 1904. The only countries in which experiment stations were not found in that year were Greece, China, Turkey, Russia, Afghanis¬ tan, Beluchistan, Mexico, Central America, Bo¬ livia, Colombia, Ecuador, Patagonia, Peru, Uru¬ guay and Venezuela. As was natural, there has been a decrease in the kind of activity, which has characterized the European stations in nor¬ mal times. The information available has been drawn on to a hitherto unprecedented degree. The forces of many of the stations have been drawn for the war and considerably depleted.

The European stations as a rule are con¬ fined to single lines of investigation, and very often to inspection work merely, whereas the. American station generally embraces- several co-ordinate departments, each with a chief and

one or more assistants and helpers, all working under the general supervision of a single director. Man}' of the European stations would be classed as substations in America. Another point of difference is that elsewhere the sta¬ tions are very generally limited to laboratory work, whereas in America, England and the English colonies the laboratories are generally used as adjuncts to field investigation.

The rapid extension of this work through¬ out the world and the large and constantly increasing sums of money devoted to it are sufficient evidence that it has obtained and holds the confidence of the people ; but this position has been attained rather through the gradual substitution by the stations' investigations of demonstrated facts for the theories which had previously held sway in agriculture than by epoch-making discoveries, although a few of these also are to be placed to the credit of these institutions.

It was the Rothamsted Station which dem¬ onstrated that leguminous

plants do not absorb and fix the free nitrogen of the air through their foliage, a demonstration which cleared the way for the solution of a mystery which had puzzled the student of plant growth for many years, and Dr. S. M. Babcock, of the Wisconsin Station, perfected a method of determining the fat in milk, which has been adopted throughout the world, and for which a medal was voted to him by the legislature of his State; but it is the patient, plodding work, by which a body of exact knowledge in agriculture is being slowly accumulated, which has been the chief factor in winning confidence and support.

On 15 Feb. 1906 a bill, introduced by H. C. Adams of Wisconsin, passed the House of Representatives by a unanimous vote, increas¬ ing the national allotment to the experiment stations by $5,000 for each State for 1906, this amount to be increased by $2,000 annually until the total should reach $15,000. This bill became a law 16 March and the experiment stations re¬ ceive $720,000 annually under it in addition to the same amount appropriated under the Hatch Act.

Charles E. Thorne,

Director Agricultural Experiment Station, Wooster , Ohio.

AGRICULTURAL IMPLEMENT IN¬ DUSTRY, The. One of the largest classified industries of the country, including the estab¬ lishments whose products of greatest value are machines or implements designed for use in agriculture. Such implements fall naturally into four groups: (1) Implements of cultivation; (2) seeders and planters; (3) harvesting im¬ plements; (4) seed separators. The first group includes plows, harrows and cultivators ; the second, seeders, drills, planters and listers ; the third, mowers and reapers, harvesters and hay rakes, hay tedders, hay forks, hay stackers, etc. ; the fourth, threshers, fanning mills, corn husk- ers and corn shellers. Besides the production of new machinery there is a very large output of parts for replacement or repair of worn-out mechanisms, amounting to some $60,000,000 annually.

The special census of manufactures made for the year 1914 shows that in that year there were 772 establishments engaged wholly or partly in the making of agricultural imple¬ ments. Their combined product amounted to

3,318,176 implements of cultivation; 634,929 seeders and planters; 1,076,769 harvesting im¬ plements; and 140,803 seed separators. Their aggregate value was $160,120,632, which, as compared with the value in 1909 — $149,318,544 — shows an increase of 12.6 per

cent in the five years. These totals include a value of $60,211,- 327 for parts and miscellaneous implements and $1,460,590 received for repairs.

The industry, as might be expected, is widely distributed over the country, every farming community constituting a centre of demand. Of the 772 establishments engaged in the industry in 1914, 86 were located in Illinois, 67 in Ohio, 61 in Wisconsin, 58 in New York, 49 in Penn¬ sylvania, 45 in California, 42 in Indiana, 40 each in Iowa and Michigan, 35 in Minnesota, 27 in Missouri, 25 in Tennessee, 22 each in North Carolina and Virginia, 18 in Georgia, 14 in Ver¬ mont, 12 in Kansas, 11 in Maine, 10 each in Alabama and New Jersey, 7 each in Kentucky, Massachusetts, Nebraska and Washington, 6 each in Connecticut and Mississippi, 5 in Texas, 4 in Colorado, 3 each in Arkansas, Florida, Maryland, New Hampshire, Oregon, South Carolina and South Dakota, 2 each in Idaho, Oklahoma and West Virginia, and 1 each in Louisiana and Montana.

There is some concentration of the industry, however, the first five states named doing fully 75 per cent of the entire business. Agricultural implements constitute one of the most important classes of export from the United States. The value of such machinery exported before the European war ranged from $30,000,000 to $40,000,000 annually. For the fiscal year end¬ ing 30 June 1915 the value exported dropped to about $10,000,000. See Farm Machinery.

AGRICULTURAL LAND BANKS.

See Federal Farm Loan Act; Land Credit.

AGRICULTURAL LEGISLATION. United States. — The history of agricultural legislation in the United States dates back to 1862 when Congress granted to the several States 30,000 acres of land for each senator and representative in Congress with which to endow at least one agricultural college. In the same year the United States Department of Agriculture was established by law of 15 May. The first State to pay serious attention to agriculture as a scientific subject worthy of serious study on the part of the government was Connecticut which established the first agricultural experimental station at the Shef¬ field Scientific School in 1877 ; and it was not until 11 years later that the United States Department of Agriculture was created by law an executive department (21 May 1888) and the Secretary of Agriculture made a member of the Cabinet. In 1891 the Weather Bureau was transferred from the Department of War to that of Agriculture; and in 1905 the National Forest Reserves Department

was handed - over from the Department of the Interior to that of Agriculture, which, from this time on, con¬ tinued to gain control of every part of the government activities related in any way to agriculture. Thus strengthened, it soon began to show its power for good. Chiefly through its instrumentality the Meat Inspection Law of 1906 was passed, and the National Pure Food Law, after a long and bitter struggle, finally became a fact. Control was also secured over

interstate transportation. The sum of $150,000 was secured from Congress, in 1907, to fight the Texas cattle fever in the South, and the moth pest in the Eastern States. The tendency of the Federal laws passed from this time on, in the interest of the development of agricul¬ ture, was to give more and more power and resources to the Department of Agriculture and to place in its hands the control of prod¬ ucts intended for interstate shipment. The Appropriation Act of 1908 provided large sums for the continuance of the agricultural work already in hand and its rapid extension through more efficient administration. The care and extension of the national forests, the enforce¬ ment of pure food and drug inspection and the campaign against the extension of all kinds of cattle diseases were specifically aided by this act. _ The amplification of the activities of the National Weather Bureau and the more ex¬ tended study of tuberculosis in cattle were also to receive much more serious attention than heretofore. In all these advances of the Federal legislature ar.d the Department of Agriculture the various State governments followed, at first hesitatingly, then with in¬ terest, and finally with enthusiasm.

This national propaganda work dates from the reorganization of the Department of Agri¬ culture in 1901 when it was put upon a more scientific basis and each of its various depart¬ ments regulated and their functions defined by iaw, which added four new bureaus, namely, (1) Plant Industry; (2) Soils; (3) Chemistry; (4) Forestry. During the following year the effect of this reorganization was seen in the appropriation of $3,862,420 (in addition to the $720,000 previously granted for State aid) for the agricultural work in hand. By the close of 1909 laws had been passed in every State of the Union and in all the Territories includ¬ ing Hawaii, Guam, Alaska and Porto Rico, for the establishment of experimental agricultural stations maintained or supported in part by Federal funds. The Adams Act raised the level of the experimental work of American agricultural stations and induced the State legislatures to undertake more practical

opera¬ tions. A Federal law passed in 1910 regulated the manufacture, sale and interstate trans¬ portation of adulterated or misbranded insec¬ ticides and fungicides; and it was at once adopted by 15 States. In 1911 the sum of $2,000,000 was appropriated until July 1915 for the purchase of lands located at the head¬ waters of navigable streams, and their mainte¬ nance as national forests ; and stringent meas¬ ures were provided for the control of foods, feeding stuffs, fertilizers, seeds and other agri¬ cultural interests.

In 1912 agriculture received unusual con¬ sideration from Congress. Numerous bills, though not then passed, were introduced and, with others already presented, warmly dis¬ cussed. Among those actually adopted were, (1) an act providing for plant quarantine, (2) making it necessary to secure a permit from the Secretary of Agriculture before importing nursery stock. The law also required a certifi¬ cate of inspection from the proper authorities of the exporting country. Interstate movement of nursery stock was required to be reported to the Secretary of Agriculture. This require¬ ment might also be exacted, when considered

necessary, of imported fruits, vegetables and seeds. The Secretary of Agriculture was em¬ powered to stop importations from, and to quarantine against shipments from, any State or section thereof in the interest of protection against any new pest. The administration of this work, which had already assumed large proportions, was entrusted to a Federal horti¬ cultural board composed of officials of the Federal Department of Agriculture, while the inspection was left in the hands of the State authorities. In 1913 agriculture continued to receive also very special attention from Con¬ gress, the chief interest centring in bills to improve the economic status of the farmer, to regulate markets, to provide increased facilities for agricultural credit and co-operative drain¬ age, irrigation and general farm improvement. Steps were taken to better and increase the dissemination of agricultural information; and the police duties of the Federal Department of Agriculture were extended to include the pro¬ tection of migratory and insectivorous game birds and the inspection of viruses and serums for the treatment of animal diseases.

The Smith-Lever Agricultural Extension Act, which had been before Congress for several years, was finally passed in 1914. It provides for extra-mural instruction and recog¬ nizes the agricultural colleges as the proper agencies in which such work should centre ; and it is specially intended to aid in diffusing among the people of the United States infor¬ mation on agriculture, home economics and the practical application of both ; and to give in¬ struction and practical

demonstration in these subjects to non-college students, through field demonstration, publications and otherwise. The act carries a permanent appropriation of $480,000 per annum ($10,000 for each State) ; and, in addition to this, $600,000 for the second fiscal year of operation, and there¬ after an increase each year of $500,000 for seven years, reaching finally $4,580,000 as a permanent annual appropriation. The addi¬ tional appropriations are to be allotted annually by the Secretary of Agriculture to the several States in proportion of the State rural population to that of the whole rural population of the country, conditional upon the provision by each State of an equal sum; thus making, when the act finally ma¬ tures, $8,680,000 annually.

The United States Cotton Futures Act was also passed in 1914 to minimize spec¬ ulative manipulation of the cotton market, This activity of the Federal government in promoting the welfare of agricultural inter¬ ests was reflected in the activities of most of the States of the Union, for the provision of better rural credit facilities. Though no State agricultural bills became law in 1914, the good work done in the State legislatures was seen in the following year in the constant stream of State agricultural legislation and in the closer co-operation of farming interests throughout the country. In 1915 the interest in providing, by law, better rural credit facil¬ ities continued ; and the Federal appropria¬ tion for the study of marketing problems was increased to $238,000 annually. Congress prescribed a standard barrel for fruit, vege¬ tables and other dry commodities handled in

interstate commerce. This barrel must con¬ tain 7,056 cubic inches.

The Federal Farm Loan Act (q.v.), which had long been before Congress, in one form or another, finally became law in 1916. It created a Federal Farm Loan Board control¬ ling a system of national and land banks em¬ powered to make long-time loans on favor¬ able terms on farm mortgages. See Farm Loan Associations.

State Legislation in the United States. —

The years 1908 and 1909 were prolific in legis¬ lation for the control and improvement of agri¬ culture. Florida, South Dakota, Tennessee, Mississippi, Texas, Utah, Vermont, Wyoming and several other States made legal provisions for the protection of various phases of agri¬

culture, including the inspection of live stock, butter, cheese and other farm products, nursery stock brought into the country, sanitary condi¬ tions in rural districts, conservation of natural resources, protection against insect and other diseases in plant life, regulation of the sale of agricultural seed and the supervision of nurser¬ ies. Florida provided, by legislative act, for the teaching of elementary agriculture in the public schools of the State; Mississippi established a County Department of Agriculture to furnish information to agriculturists and develop the agricultural resources of the State ; and pro¬ vided agricultural high schools and inspection by the State entomologists. Louisiana pro¬ vided for experimental agricultural stations in the great rice belt of the southwestern part of the State, for scientific investigation into rice growing. It also fixed a standard for cotton classification. Vermont created a State Board of Agriculture and Forestry; Texas, agricul¬ tural experiment stations and training in agri¬ culture, in certain schools ; Kansas, a Dairy Commission with power to enforce the sale of only pure butter, cheese, ice cream and dairy products in general ; Porto Rico, a completely new program of agricultural education. Massa¬ chusetts authorized the establishment and main¬ tenance of schools of instruction throughout the State, in gardening, fruit growing, floricul¬ ture, poultry keeping, animal husbandry and other branches of agriculture and horticulture, with the approval of the State Board of Educa¬ tion ; and provision was also made for the pro¬ tection and encouragement of forestry. South Carolina passed an act to encourage the joint action of “Consolidated Schools® doing prac¬ tical class-room and field work in agriculture; and provided that when trustees of three or more approved schools raise $750 for agricul¬ tural instruction the districts shall be entitled to a like sum from the State, the total amount to be used to pay the salary of a qualified teacher of agriculture for the joint use of the several district boards, the county board of education and the State superintendent of schools, for three years. The year 1910 saw particular at¬ tention paid to the use of serums and other measures in various States of the Union owing to the ravages of hog cholera and the conse¬ quent heavy financial loss, more especially in Kentucky and Virginia. More stringent laws were also passed in these two and other States for the inspection and testing of cattle sus¬ pected of being diseased and for the destruction of those affected from contagious animal dis¬ eases. In Maryland stringent regulations were

made for the sale of tuberculin, mallein and vaccine; and New York passed a new act for the care and keeping of cows. Virginia au¬ thorized the creation of commissioners for the drainage and reclamation of marsh lands, and established agricultural instruction in

high schools. Ohio also made provision for having county commissioners drain and reclaim her marsh lands for agricultural purposes. Missis¬ sippi created county agricultural high schools, affirming the act already mentioned, which was held to be unconstitutional because it provided specifically for pupils of white blood only. Kentucky made a very radical move when it provided that farmers might legally agree to abstain from growing any kind of crop for any given period or season and to combine or pool crops of certain commodities and thus obtain for them a higher price. In 1911 new and vastly improved food laws were adopted in Florida, Idaho, Maine, Montana, Texas and Wyoming, leaving at that date only Arkansas, Missis¬ sippi and West Virginia without effective food laws. Manv States regulated cold storage products ; Maine provided for the inspection of canned goods; and Florida the inspection of fruit, a move which was followed by Idaho, Illinois, Missouri, Nevada, New Hampshire, New Jersey, Ohio and Utah. Pennsylvania authorized the construction of 300 State roads, and California provided $18,000,000 for the same purpose. Alabama, Colorado, Connecti¬ cut, Delaware, Illinois, Kansas, Missouri, Okla¬ homa, Washington, West Virginia and Wiscon¬ sin also enacted important good-roads legisla¬ tion, more especially in the interests of the rural communities. Bills were passed in 16 States to aid in the reclamation of swamp lands ; others to amend the then existing irrigation laws were enacted in most of the dry-land States or States having arid districts.

Many States provided means of fighting tree diseases and established bee insecticide and fungicide and ways of combatting insect pests. The distribution of hog cholera serum was regulated by law and stallion registration was provided for in many States. Ohio made agri¬ culture obligatory in all the State non-city schools; Kansas prescribed a knowledge of agriculture for all State teachers ; Idaho and North Carolina instituted systems of rural agri¬ cultural high schools ; Massachusetts. Maine and North Dakota extended additional State aid to schools giving agricultural instruction. New York appointed a State advisory board to pro¬ mote agricultural education and the advance¬ ment and improvement of country life. In 1912 Arizona and New Mexico provided new irriga¬ tion codes; New York passed a law to en¬ courage the preservation of forests, and authorized counties, towns and villages to ac¬ quire and operate forests.

The year 1913 saw a decided movement on the part of many of the States to encourage market co-operation and to improve rural credit. Long-time loans were authorized in Vermont from municipalities to farmers for drainage projects. Michigan provided for the inspection and testing of sugar-beets at the factories, and numerous States

regulated weights and meas¬ ures and fruit containers, and provided for the employment of farm experts for advisory and demonstrative work throughout the counties. Irrigation and drainage received serious atten-

tion in many States. In New Hampshire, Washington and Montana new agricultural de¬ partments were established. Co-operative efforts distinguished the legislative acts of 1914. New York authorized a system of land banks, con¬ sisting of local savings and loan associations with a central State bank in New York city, with power to issue shares to locals. Colorado provided $1,000,000 school fund for long-time farm loans at 6 per cent. Virginia facilitated the formation of co-operative associations, while Massachusetts very greatly improved its credit law of 1909. Again drainage received serious encouragement from many State legis¬ latures and milk laws were generally made more stringent.

Much recent agricultural legislation has taken place in the various States of the Union, but nearly all of it has been improvement, ex¬ tension or definition of that already mentioned or described in this article.

LEGISLATION IN FOREIGN COUNTRIES.

Germany. — The German government early recognized the importance of agricultural edu¬ cation properly directed and encouraged by the state, and Germany was among the first nations of the world to establish agricultural colleges and experimental agricultural stations ; and to carry on intense farming along scientific lines, her only serious competitors in this latter work being Belgium and Holland. Extensive investi¬ gations were made, in Germany, by legislative act, into crop rotation ; and laws were passed providing for detailed study of diseases inci¬ dental to plant and animal life. The broad and scientific work done in this field inspired the governments of other countries to greater effort along these and other lines of agricul¬ tural endeavor. The works of the German scientists, in the form of translations., were scattered broadcast over the entire scientific world by the agricultural societies, bureaus and agencies of the various governments and thus helped vastly the work of furthering the in¬ terests of agriculture.

France. — After several years of very effect¬ ive work, all the French government agencies engaged in the promotion of agricultural in¬ terests in the country were unified in 1911, in one Department of Agriculture, with bureaus of General Administration, Agricultural In¬ struction and Service, Waters and Forests, Breeding, Inspection, Agricultural Credit, and other co-operative agencies ; and also a depart¬ ment for the protection of horticultural interests from insect pests and plant diseases. In 1912 the pure food laws were revised and extended to cover practically all the interests of the country. The system of national agricultural education was reorganized and made vastly more efficient; and commissions were ordered to study and combat plant and animal parasites and to classify useful and injurious birds. The following year the Ministry of Agriculture, was reorganized along thoroughly modern lines; and its Advisory Superior Council of Agricul¬ tural Education authorized the expenditure of 12,000,000 francs for agricultural loans. Laws were also passed to encourage reforestation and the conservation of mountain lands.

Great Britain. — Closely following Germany and France, Great Britain saw the importance of legislative help to agriculture, and her in¬

fluence had begun to be felt in the colonies and at home. The relation of the Board of Agricul¬ ture and Fisheries to that of Education had been clearly defined with reference to the pro¬ motion of agricultural interests ; and, in 1909, provision was made for (<aiding and developing agricultural and rural industries by promoting scientific research, instruction and experiments in the methods and practices of agriculture.® In the same year the Development and Road Improvement Funds Act gave much prominence to the aiding and development of agricultural and rural industries by encouraging research, agricultural education and experiment, the or¬ ganization of co-operative enterprises and the extension of the provision of small holdings. The improvement of rural transportation, the development of forestry through teaching and experimentation, the afforestation of lands, reclamation and drainage were all provided for; and horse breeding was subsidized. In the fol¬ lowing years, among much active legislative attention to agriculture, special care was given to the registration and sale of fertilizers, feed stuffs and other agricultural commodities, and the inspection of seeds and nursery plants of all kinds. A Commissioner of Agriculture was appointed for Wales in 1912. Numerous re¬ strictive and directive measures relative to agri¬ culture were put into force, owing to the war, for the period of its duration.

Cuba. The budget estimate for 1910 pro¬ vided $112,200 for the

maintenance of six agri¬ cultural schools authorized for the several provinces by the Agricultural Act of 12 July 1909, since which time the island government has had a very active and efficient Department of Agriculture.

Brazil. — In 1909 Brazil organized, under the Federal government, a Bureau of Agricultural Inspection, which was empowered to make a special study of agricultural conditions, collect and disseminate useful information among farmers and to promote crop introduction and production. This bureau is also, by law, re¬ quired to compile agricultural statistics (till then completely lacking in Brazil), to make crop estimates and to inspect agricultural schcils and experiment stations. The sum of $300,000 was also authorized to be used in the northern Brazilian states for the introduction of irriga¬ tion and dry farming. A later law makes pro¬ vision for opening up remote agricultural re¬ gions by rail and public highways ; and it also provides for irrigation plants, reservoirs, arti¬ ficial wells, river dikes and drainage in certain coast lands, in order to make them suitable for agriculture. Both the Federal and States' legis¬ latures were active in the promotion of laws favorable to the betterment of agriculture throughout Brazil from 1909 to 1918.

Canada. — Ontario, Quebec and the Mari¬ time Provinces early had each its department for looking after agriculture ; and the Dominion government has long had a very active and efficient Department of Agriculture. Most of the eastern provinces, notably Ontario, have had agricultural schools in active and efficient operation for years ; and much good work has been done in spreading abroad scientific methods in farming and in the organization of rural interests and the protection of the same. The central and western provinces have fol¬ lowed the lead of the eastern and they threaten

soon to surpass them in the extent and breadth of their legislative aids to agriculture. In 1909 Alberta provided for a Department of Agricul¬ ture in the Provincial University at Strathcona; and, in connection with it, demonstration farm¬ ing <(in those sections of the province not coming within the immediate scope of the work of the college itself.® All the provinces fol¬ lowed in the steps of the Dominion govern¬ ment, providing special agricultural legislation. New Brunswick, by legislative act of 1913, es¬ tablished a system of agricultural schools; and British Columbia arranged to make long-time

loans to agricultural associations.

In 1909 President Roosevelt invited Can¬ ada, Newfoundland and Mexico to a North American Conservation Conference at Wash¬ ington. The invitation was accepted by the Dominion government and resulted in the creation by Parliament through the law of 19 May 1909 of a Commission of Conservation ; and by an Order-in-Council (3 September) 32 members of the Commission were appointed, the ex officio members being the Ministers of the Interior, of Agriculture and of Mines, and the member of each provincial government of Canada charged with the administration of the natural resources of the provinces. At least one of the members of the Commission from each province must be a member of the fac¬ ulty of a university in the province. The Com¬ mission has to collect, assimilate and digest exact information and to make it of practical benefit for the country, and to advise the gov¬ ernment upon questions relative to the admin¬ istration and conservation of natural resources with a view to their effective and economic use. The Commission set for itself two broad aims : <(the taking of an inventory of Canada's natural resources, the molding of public opin¬ ion and the advising of administrative authori¬ ties with regard to the more intelligent man¬ agement of the same.® To this end the Com¬ mission formed itself into seven committees dealing respectively with Lands, Forests, Wa¬ ters and Water Powers, Minerals, Fisheries, Game and Fur-bearing Animals, Public Health and Press and Co-operating Associations ; and field investigations were ordered to be under¬ taken by these committees and a staff of tech¬ nical experts respecting various natural re¬ sources. The committee on lands set itself to study and improve farming methods throughout the Dominion ; and constructive measures were undertaken in 1912 to supple¬ ment the survey work done up to that date. In each agricultural district ˆillustration farms® were conducted at the government ex¬ pense to demonstrate practically the benefits to be derived from scientific agriculture.

Latin America. — Practically all the coun¬ tries of Latin America had, in 1918, depart¬ ments of agriculture, commissions or other bodies dedicated especially to the promotion, each of the agricultural interests of its own national territory; and all had one or more agricultural schools with experimental agricul¬ tural stations established by legislative act and maintained by public funds, state or Federal, or both. Most of the Latin American countries extend both State and Federal aid and en¬ couragement to agriculture and offer super¬ vision and inspection covered by protective laws.

Mexico. — In 1909 the Mexican Federal Agri¬ cultural Commission,

by direction of Congress, completely reorganized the agricultural interests of the republic and created a General Bureau of Agriculture with five departments ; and pro¬ vided for the establishment of national cham¬ bers of agriculture in various states, of which 11 were opened that same year. All public land was also withdrawn from sale in order to divert it to special agricultural uses con¬ templated by the Federal government. Since then the Carranza government has made pro¬ vision for the subdivision of large estates in widely different parts of the country, into small holdings, with a view to encouraging the great body of Indians and mestizos composing the laboring and peon class of the republic, to be¬ come independent homestead holders and agri¬ culturists. These small tracts of land are offered at exceptionally low prices and favorable conditions of payment. Provision has also been made for the further extension of agricultural teaching and more attention is being paid yearly to the broadening and making practical of the National Agricultural College, near Mexico City. An attempt has also been made to teach agriculture more extensively in the public schools. Uncultivated lands, of which there are still vast tracts in Mexico, have been taxed with a view to forcing their cultivation. Export duties have, in some cases, been put upon cattle to prevent their going out of the country in regions where, owing to the ravages of the revolution, there are not cattle enough. Legis¬ lative enactments have also been made to en¬ courage .the settlement of agricultural colonies in various parts of the republic.

John H. Cornyn, Staff of the Americana.

AGRICULTURAL MACHINERY. See

Farm Machinery.

AGRICULTURAL PRODUCTION AND DISTRIBUTION IN THE UNITED STATES. The vast majority of American farmers are engaged ip growing the great staple crops such as corn, wheat, cotton, oats, barley, potatoes, hay and tobacco, besides such products of animal industry as milk, beef, mut¬ ton and wool. The problem of distributing these products has not been left to the farmer. They are produced on a scale large enough to tempt dealers of various kinds and classes to enter the field and take them off the farmer’s hands or organize a distributing system. Ordi¬ narily the farmer’s responsibility ceases as soon as these products leave the farm, though some¬ times he does his own shipping, that is, he ships to one of the large markets or distributing cen¬ tres and sells to a large dealer. In either case he sells to a well-organized market and throws his products into a distributing system whose grooves are worn smooth by the quantities

which flow through them.

The high development of the long-distance freight service of the American railroads, and the comparative neglect of the local freight service, has tended toward a rather extreme ter¬ ritorial division of labor in the growing of the great staple crops. With long distance freight so efficient and so cheap as it is here, proximity to a market is no great advantage and is usually not sufficient to overcome even a slight physical

disadvantage in the production of these crops. Lhere is, therefore, a tendency for each crop to be grown in marketable quantities in those sec¬ tions where the soil, climate and other condi¬ tions are best suited to it, rather than in those sections which are nearest the centres of con¬ sumption. Therefore, we have what may be called belts of production such as the cotton belt, the corn belt, the wheat belt, etc. To at¬ tempt to grow wheat, for example, in Massa¬ chusetts would prove uneconomical. Although the wheat grower in this State would be very close to a vast consuming population, he would save comparatively little in freight rates in com¬ petition with the wheat grower of the far West. The latter, having such a marked advantage in the quality of his land, can easily pay the slight difference in freight rates and still drive his Eastern competitor out of the market. Even some of the more bulky and perishable products show the same tendency. Apples from the far West are regularly marketed in large quantities in the Eastern cities in competition with apples that are grown in the immediate neighborhood. Here again the advantages of a favorable cli¬ mate and virgin soil seem to be sufficient to overcome the difference in freight rates.

Some of these producing belts or crop areas are fairly well defined and easily described; others are not. About 90 per cent of the orange crop of southern California is produced in a strip 10 miles wide and 60 miles long, lying at the foot of the Sierras. The cotton belt is a strip beginning in North Carolina and extend¬ ing southwestward and westward to central Texas, lying in its eastern extremity midway between the mountains and the sea, widening as it approaches the Mississippi River and extend¬ ing westward until it reaches the arid belt where lack of moisture prevents its further spread. Small areas devoted to Egyptian cotton grown under irrigation are found in the far West, par¬ ticularly in the Salt River valley of Arizona. The wheat belt

is divided into two parts, the northern and the southern. In the northern belt where spring wheat predominates, though winter wheat is gaining ground, we find its greatest concentration in the valley of the Red River of the North. The southern belt, where winter wheat predominates, is noticeable in southern Indiana and Illinois, north central Missouri, but finds its greatest concentration in west central Kansas and Nebraskaˆ along the border between what is conventionally called the humid and the arid belts. Another large producing area not included in either of these belts is found in eastern Washington. The corn belt is more difficult to describe for the reason that corn is grown in practically every county in the United States. That which is known as the corn belt, however, is the terri- torv in which corn is the leading money crop and where it is grown on the largest percentage of the total acreage under cultivation. The belt thus defined is first noticeable in western Ohio. It extends through north central Indi¬ ana and Illinois, covering the whole State of Iowa and northern Missouri, widening as it approaches the Missouri River and extending beyond that river to the borders of what is known as the humid belt, — that is, approximate¬ ly to the hundredth meridian of longitude. It reaches its greatest density, however, in north central Illinois, particularly in a remarkable

strip of prairie extending from the Wabash to the Illinois River. Its next greatest area of concentration is along the Missouri River from about the latitude of Sioux City, Iowa, on the north to St. Joseph, Mo., on the south. It is not customary to speak of an oats belt, probably for the reason that oats is nowhere grown as the principal crop, but it is largely grown in the corn belt in rotation with corn. Thus it happens that the area of largest oats production is identical with that of the largest corn production, with the same centres of con¬ centration. There is nothing that could be called a potato belt, though there are several detached areas of large production, notably the eastern half of Aroostook County, Me., west¬ ern New York, central Wisconsin and a small area in Minnesota just north of the twin cities. The greatest centre of apple production in the country is western New York. The Ozark region of northwestern Arkansas and south¬ western Missouri is another area of concentra¬ tion, as are also several valleys in southern Washington, northern Oregon and western Colorado.

The corn crop of the country exceeds in value any other crop, and in most years any two other crops. It so much exceeds the de¬ mand for it for purposes of direct consumption that the greater part of it has had to be sold in more concentrated form. Various corn products have recently been manufactured, large quantities of it have been used for the purpose of manufacturing alcoholic drinks ; but by far the largest

part of it has been used for the production of meat. It therefore happens that the areas of pork production are almost identical with the corn belt. The fact that the corn belt lay contiguous to the great ranges of the arid West built up a great cattle-feeding industry, especially in the Missouri River val¬ ley. It would not be quite accurate to say that the corn belt is therefore the centre of beef production because much beef is produced out¬ side the corn belt ; but the centre of high-class beef production or the centre of the business of fattening beef is in the corn belt.

A small but rapidly increasing minority of American farmers are engaged in growing agri¬ cultural specialties for which there is no well- organized market or distributing system. These products are too numerous to be catalogued, but they include most perishable fruits and vegetables and fancy products of various kinds, including fancy horses and breeding stocks. These products cannot be thrown on to the market as can the large staple products for the reason that there is no well-organized distrib¬ uting system ready to handle them. Therefore the grower of such products must give a great deal of attention to their marketing and dis¬ tribution. In some respects this is a more diffi¬ cult if not a more important problem than that of growing them. The following figures show the totals in millions of bushels of the different crops harvested in 1916: Winter wheat, 685; spring wheat, 206; maize, 2,673; oats, 1,141 ; bar¬ ley, 195; rye, 43; buckwheat, 17; potatoes, 406; hemp, 16 ; apples, 253 ; peaches, 54 ; hay, 70,000,- 000 tons; and tobacco, 1,035,000,000 pounds.

A glance at the railroad map of the United States shows that the main lines run east and west instead of north and south. This is only an indication of a much larger economic fact,

namely that the territorial division of labor is between East and West rather than between North and South. There is a natural and per¬ manent division of labor between different cli¬ matic zones. This gives rise to transportation lines running north and south. The division of labor and exchange of products between East and West are due in part to difference of soil and other physical conditions, but mainly to the fact that the East is older and the West young¬ er. The older communities develop the highly technical industries first, leaving to the younger communities the task of producing raw mate¬ rials and the cruder products. In short, the division of labor and exchange of

products be¬ tween East and West are mainly between the manufacturing and commercial regions on the one hand and the agricultural, mining and lum¬ bering regions on the other.

This fact, in so far as it affects agriculture, derives considerable significance from its bear¬ ing upon the problem of distributing farm products. It means that the bulk of our agricul¬ tural produce is grown at vast distances from the centres of consumption. Another fact which points in the same direction is that our rail¬ roads have given great attention to long dis¬ tance freight and almost none to local freight. These may be said to be the dominating facts in the organization of our agricultural markets. The amount of produce which is grown within hauling distance of the consumer is so small as to be negligible. Accordingly very little account is taken of it and very few provisions have been made for handling it. Dealers of all kinds have planned their business primarily with a view to handling produce from a distance shipped in by rail, and only secondarily, if at all, with a view to handling produce which is hauled to town by farmers nearby. Nor have many cities made provision for an open market where local pro¬ ducers might sell directly to consumers.

From the standpoint of the city consumer this situation has certain advantages as well as disadvantages. It relieves him of depend¬ ence upon local producers, giving him a choice among large numbers of producers scattered over wide areas. Again, it lengthens the sea¬ son over which a perishable fruit or vegetable may be consumed. But it tends to discourage the local producer who might otherwise sup¬ ply a very superior, because fresher, product in its proper season. Lacking adequate ma¬ chinery for handling and distributing his product, he is often at a positive disadvantage in competition with a more distant producer who sends his product through a well-organized system with well-worn channels.

The predominance of this system of long¬ distance marketing has necessitated certain changes both in method and machinery. When the farmer could haul his produce to town and show it to the consumer, marketing was sim¬ ple and its methods could be crude without great loss of efficiency. The method was that which is known as selling on inspection. It becomes, however, a very expensive and labori¬ ous process when producer and consumer are widely separated. It requires a chain of mid¬ dlemen, each of whom must make a profit. Selling by sample is an improvement upon selling on inspection because it is less expen¬ sive and laborious ; but it is possible only where there is confidence in the seller, that is,

confidence that the whole quantity offered for sale will be like the sample submitted for in¬ spection. This is a case where confidence makes economy possible. A still more econom¬ ical method, but a method which requires still more confidence, is that which is known as selling on grade. If the product is properly graded the name of the grade takes the place of a sample so that it is not even necessary to submit a sample for inspection. This requires confidence not only in the honesty of the seller but also in the scientific accuracy of the one who does the grading.

The nearer to his farm the process of grad¬ ing can take place the better it will be for the farmer. Except in the case of the very large farmer who sells on a scale large enough to make an impression on the market, selling oa grade is an impossibility for the farmer. The small farmer operating alone cannot establish confidential relations with large numbers of dealers nor can he gain such a reputation on the market as to secure the general acceptance of his grades. A large group of farmers, however, acting co-operatively, may achieve this result. Every great co-operative selling organization among farmers which has achieved notable success owes its success to its system of grading as much as to any other single fac¬ tor. Not every farm product can be graded accurately enough to permit of its being sold by grade. Selling by sample or on inspection is then the only method. In these cases it is sometimes possible to sell rapidly, economically and on a large scale by the auction method. Horses, for example, are not easily graded. So far as the writer knows they are never sold on grade. Selling by sample is obviously impossible. The auction method seems to have demonstrated its superiority over other methods in every large horse market where horses have to be sold at wholesale and in large numbers. The same method is being tried in a large number of other cases includ¬ ing such diverse products as cheese, apples, fish, oranges, besides all sorts of vegetables.

The commission merchant is a peculiar and more or less temporary development growing out of the necessity of selling products on a distant but badly organized market. To him the producer consigns his product to be sold for whatever it will bring, the commission merchant (deducting a fixed commission on the price received and returning the balance to the producer. Under this method the producer assumes all the risk and the commission mer¬ chant none. Besides, this method invites abuses because the producer has very few and very inadequate checks upon the commission merchant. This presents temptations which human nature is not always strong enough to withstand. In a disorganized and uncertain market the distant producer frequently has no other recourse than to consign to a

commission merchant. As soon, however, as the market becomes organized and the demand fairly cal¬ culable the commission merchant gives place to the jobber who buys from the producer and sells again, thus assuming the risk and relieving the producer of it. During the tran¬ sition stage, however, many houses practice both methods, becoming jobbers when the market is firm and prices advancing and commission merchants when the market is unstable or

prices falling, thus playing the time-honored game ol ((heads I win, tails you loseA

1 he parcels-post and express companies are beginning to serve as agencies through which the producer may sell directly to distant consumers. The success of this method is obviously limited to those products which can be accurately graded and put up in standard¬ ized packages, in short, to those articles which can be sold on grade rather than by sample or on inspection. There is no reason, however, why there should not be a great increase in the use of these agencies in this restricted field. Moreover, this is an expanding field. Fhe tendency is more and more toward grad¬ ing and standardizing all products which are capable of being graded and standardized. Be¬ fore much can be done in this direction it will be necessary for the government, either State or Federal, to define grades more fully and accurately. To define a grade is merely to establish a standard of cpiality. This is com¬ ing to be quite as important as to establish standards of quantity as is already done when the government defines weights and measures.

There is another large fact which must be remembered in any discussion of the problem of getting agricultural products from pro¬ ducer to consumer — that is, three-fourths of all the telephones in the world are in the United States and Canada. This means that American housewives, more than any others, have formed the habit of ordering goods by telephone. It is not likely that this habit will decline. It is more likely* to grow. If it does, it means that direct selling by the farmer to the consumer is possible only with¬ in a very limited field. The store which can always be reached by telephone and which can make a prompt delivery will have an advan¬ tage in getting the trade of the telephone-using housewife.

This paper may be summarized as follows : (1) From the standpoint of distribution two classes of products are grown in the United States,

first, the great staple crops for which there is a well-organized market and which sell at a quotable price; second, agricultural special¬ ties for which there is no well-organized mar¬ ket and which do not sell at a quotable price. The latter class presents the difficult problem in distribution. (2) There are two distinct problems in the marketing and distribution of farm products, especially the minor crops and agricultural specialties. The first is that of distributing the products where they are grown within a wagon-haul of the con¬ sumer. The second is where the products are grown at such a distance from the con¬ sumer that the producer cannot accompany them to market. Of these, the latter is much the larger problem in the United States. (3) There are three distinct methods of selling products: First, selling on inspection; second, selling by sample ; and third, selling on grade. Of these three methods the last is the most efficient where the product can be satisfactorily graded ; but the conditions are more exa.cting, requiring confidence not only in the honesty of the seller but also in his skill and accuracy as a grader. (4) There are four characteristic agencies through which the producer who is distant from the market may sell his products. The first and crudest is the commission mer-

chant, the second is the auction house, the third is the jobber and the fourth is the par¬ cel-post and the express service. Of these the last is the most direct but it requires confidence as between buyer and seller, besides an effi¬ cient and accurate system of grades and standards.

Thomas N. Carver,

Professor of Political Economy, Harvard University.

AGRICULTURAL SYNDICATES, dif¬ fering from agricultural associations in that they take on more the character of co-opera¬ tive societies and act as commission mer¬ chants for their members in the sale of their produce. It is estimated that they now num¬ ber 5,000 in Europe with a membership of 800,000 individuals. Their most complete de¬ velopment has been reached in France among the vineyardists. Their funds are usually de¬ rived from a commission charged their mem¬ bers on _ the business transacted for them, whether in selling their produce or buying fer¬ tilizers, farming machinery or seeds. They are also sometimes active in politics in promot¬ ing the farming interests. In some countries their influence has been potent enough to ob¬ tain subsidies from the government.

AGRICULTURAL TRACTORS. See

Tractors,

AGRICULTURE IN THE UNITED STATES. Land and Labor. — The tvro fac¬ tors which, more than any others, have given character to American agriculture are : First, an abundance of land .and, sec¬ ond, a scarcity of labor. These two fac¬ tors almost necessarily belong together be¬ cause land is abundant whenever and wherever there is not enough labor to cultivate it thor¬ oughly, and labor is scarce whenever and wher¬ ever there is more land than can be thoroughly cultivated. The necessary and logical result of this combination of . abundant land and scarce labor is extensive as opposed to inten¬ sive farming. Extensive farming consists in using a small quantity of labor on a large quantity of land, wffiereas intensive farming consists in using a large quantity of labor on a small quantity of land. As extensive farm¬ ing is the logical system in a country where land is abundant and labor scarce, so intensive farming is the logical system in an over-popu¬ lated country where labor is abundant and land scarce.

Not only wras the character of our agricul¬ ture largely determined by this combination of scarce labor and abundant land, but many of our political and social institutions, and much of our political and social history as well. It gave rise, for example, to the institution of slavery which wras primarily an agricultural institution, together with all that grew* out of that institution. Scarce labor and abundant land mean necessarily dear labor and cheap land. This is a situation extremely favorable to those farmers who expect to work with their own hands. Cheap and abundant land means free opportunity for self-employment on the part of the agricultural laborer, whereas scarce and dear land means limited opportunity for self-employment, most of those who work the land being compelled to wrork for others. Scarce and dear labor means necessarily a

liberal income for the self-employed laborer. On the other hand, this is a situation which is very unfavorable to the proprietary farmer who does not expect to work with his own hands but has to depend upon the labor of others to cultivate his lands. The cheapness of land reduces his income from that source and the scarcity and dearness of labor makes it difficult for him to secure the necessary help.

In Virginia and the other southern colonies this difficulty was

increased by the exceedingly liberal land policy. In Virginia, for example, there were three methods by which an indi¬ vidual might acquire title to land:* One was to buy a share of the stock of the London Com¬ pany, to which the land had been granted by the British Crown. These shares were called <(Bills of Adventure® and the holder of each share, besides participating in the profits of the company, was entitled to receive without fur¬ ther cost 100 acres of land. The second method was by meritorious service. Ministers of religion, physicians and other public serv¬ ants, including those who had performed val¬ uable manual labor, were sometimes granted tracts of land as rewards of merit. The third method, which was really the one generally used, was known as <(head right.® Under this right anyone who transported to the colony any person, including himself, at his own ex¬ pense, could secure, without further expense, 50 acres of land for every person so transport¬ ed. Later on this method became so laxly ad¬ ministered that any free person could secure land under it without much regard to the original requirements.

This liberal policy made it extremely dif¬ ficult for any large landowner to keep suffi¬ cient help to cultivate his land. No man was willing to work for wages when he could, practically without money and without price, secure a tract of land and become a land- owner himself. The difficulty was first met by the system of indentured servants. An in¬ dentured servant was simply a person who was too poor to pay for his own transportation to the colony. In order to get there he would agree to work for a term of years for some¬ one who would advance the money. After his term of service had expired he became a free man and could become a landowner on the same easy terms as anyone else. This gave the large landowner an opportunity to keep a laborer for a short term of years but his labor supply had to be constantly renewed. Under these conditions African slavery seemed to furnish a solution of the problem which confronted the large landowner. It was the ruin of the small white farmer who worked his own land and who thereafter had to sell the products of his own labor in competition with that of slave labor. If they had been awake to the situation they would at once have prevented the establishment of slavery or, later, have abolished it, since they vastly outnumbered the large landowmers who alone found slavery profitable.

The conditions in New England were more favorable to a continuation of free labor for several reasons. In the first place the soil and climate were less favorable to the production

♦Consult Bruce, H. A., ‘The Economic History of Vir¬ ginia’; also Carver, T. N. , 1 Principles of Rural Economics’, (p. 67).

of great staple crops such as tobacco and cot¬ ton. Consequently there was less farming for profit and more farming for a living. In the second place there were fewer large land¬ holders who needed an abundant supply of cheap labor. In the third place the land policy was a little less liberal. That is to say, there were more restrictions and obstacles in the way of land owmership. Land was less fre¬ quently granted directly to individuals but gen¬ erally to companies or groups of individuals, who founded towns. The individual settlers generally received their grants from these companies or towns. Some of the earlier towns were settled as church communities. The formation of a town amounted practically to the organization of a church congregation and then settling as a congregation upon a tract of land and calling it a town. Weeden, in his (Social and Economic History of New England,) says that <(It wras the admirable economic land tenure which shaped the early towns ; without this, even their religious and political systems might not have established their distinctive system of living.® The re¬ strictions upon land ownership made it a little less easy for the landless man to become a landowmer and the harshness of the climate, the sterility of the soil and the difficulty oi reducing it to cultivation made landownership a little less desirable in New England than it was in the South. Consequently it was, on the one hand, easier to keep a supply of labor for those who needed it, and, on the other, there was less demand on the part of landowners for a large supply of cheap labor in New Eng¬ land. Therefore, slavery never appealed to the New" Englanders as an economic necessity as it had to the wealthy landowners of Vir¬ ginia. Nevertheless there wrere, in limited numbers, both indentured servants and negro slaves in New England. But neither class ever figured prominently as factors of agri¬ cultural production, being kept rather as domestic servants by wealthy townsmen.

Labor-saving Devices. — Another character¬ istic of American agriculture wffiich grew out of the original factors of scarce labor and abundant land w'as the large use of labor-sav¬ ing devices and, until recently, the general ab¬ sence of land-saving devices. This wras a logi¬ cal and natural result. Labor being scarce and hard to get it was necessarv to economize it. Agricultural machinery in America was con¬ sequently designed almost exclusively wuth a view to enabling a given amount of labor to cultivate a larger area of land rather than to enable a larger population to subsist on a given area. Neither the reaper, the mow'er, the twine-binder, the thresher, the corn planter, the grain drill, the cultivator, the corn-husker nor any other characteristic American farm machine is calculated to increase materially the product per acre. They are designed to increase the

product per man by enabling each man to cultivate more acres. In the use of labor-saving devices American farmers have shown . themselves to be the most scientific and progressive farmers in the world. In the use of land-saving devices they have not kept up with some of the older and more thickly populated countries, as shown by the fact that our product per acre is noticeably lower than theirs. However, our product per man is

T"”-

AGRICULTURAL MACHINERY

Photograph from Underwood & Underwood, N. Y.

f ■ * •:

1 Avery 40-80 H. P. Tractor and 36 x 60 Yellow-Fellow Grain Separator threshing

2 Avery 8-16 H. P. Tractor sawing wood

3 Side view of new Avery Motor Corn Planter

AGRICULTURAL MACHINERY

Copyright by Underwood & Underwood, N. Y.

1 National Farm Tractor Demonstration at Fremont, Neb. This tractor is pulling the discs and harrowing the ground

at the same operation °

2 The Gile Tractor and Plow at work

noticeably higher which, from the economic standpoint, is of the utmost importance. It is generally true the world over that intensive cultivation and a large product per acre are found in conjunction with the poverty of the agricultural workers. This is a necessary re¬ sult of a small product per man.

During the period of slavery labor-saving devices were not much used in the South, mainly for the reason that slave labor was so cheap that it was not necessary to economize it. In another sense, slaves took the

place of machinery.

However* further expansions of our agri¬ cultural area must come slowly in the future as compared with the rapid expansion of the past. Then it was merely a matter of moving westward and settling upon land that was easily tillable. Hereafter it must depend upon the progress of discovery — the discovery of meth¬ ods of using lands hitherto considered unfit for cultivation. Vast areas of dry land west of the one hundred and second meridian and considerable areas of the South, especially in the coastal plain, may yet be reduced to profit¬ able cultivation, besides smaller areas here and there which may yet be irrigated. Up to the present time the progress of discovery

in these fields has not been rapid. A great

many experiments and failures must be re¬ corded before many successes can be achieved. If the expansion of our tillable area continues

to be retarded and if, at the same time, the

number of our farmers should increase, a change must come in our methods if we would maintain a large product per man. Instead of merely increasing our acreage in proportion as the number of farmers increases, we must hereafter increase the product per acre, other¬ wise the product per man must decline.

Native Crops. — - Another outstanding fact regarding American agriculture is the extent to which it is a continuation of that of the aborigines. Our most important crop is maize, Indian corn or, as it is universally called in this country, corn. It exceeds in value that of any other two field crops combined. - The first European settlers found it growing here under cultivation by the Indians and they learned from the Indians how to grow it. The potato is another product native to the American continent. Next to wheat and rice, these are the two most important of the world's food products. Tobacco was, until it was super¬ seded by cotton about 1803, the principal money crop of the South and it was, like corn and the potato, a product of native agriculture.

The earliest colonists, both in the North and the South, found that the hog flourished in the woods, feeding on the mast and the roots. According^, the raising of hogs was one of the first branches of animal husbandry to be developed. Corn proved to be admirably adapted to the fattening of hogs. With the development of the great prairie States

of the Mississippi valley, which now form what is known as the corn belt, hog-raising increased rapidly and pork-packing became one of the leading industries of the cities of that region. From about 1830 to 1863 Cincinnati was the greatest centre of pork-packing. In the latter year it was surpassed by Chicago, which has held first place ever since.

The raising of cattle has always been, since

the earliest settlements, a frontier industry. Before the soil was broken by the plow the natural grasses furnished cheap and abundant pasturage. Accordingly, the cattle ranges, since the first settlement of Jamestown, ex¬ tended just west of the line of permanent set¬ tlement. They moved through the Southern States in advance of tobacco and cotton until they reached Texas. There the rangers from the United States came into competition with those from Mexico, producing complications which afterward led to the Mexican war.

Immediately after the Civil War the wide ranges of Texas having become overstocked, there begun a vast migration of cattle from the southern to the northern ranges. The route, known as the (<01d Cattle Trail,)} was merely a strip of land of indefinite width fringing the western settlements. After the building of the transcontinental railways the points at which the trail crossed these railroads became great shipping points from which cattle were sent to the great markets and packing towns of the corn belt.

Wheat, like beef, has been primarily a frontier crop. Both these products are most economicallv produced by extensive rather than intensive methods; that is, by the use of little labor on much land. Accordingly, under what is known as the territorial division of labor, those sections where labor is relatively abun¬ dant and land relatively scarce are given over to the crops which can be cultivated economi¬ cally by intensive methods, while those which require extensive methods, migrate to those sections where land is relatively more abundant and labor relatively scarcer. The wheat belt, in accordance with this law, has gradually mi¬ grated westward, first through western New York and Pennsylvania, later through Ohio. Indiana and Illinois. Here it split, the spring wheat belt moving northwestward through Wisconsin, Minnesota and the Dakotas, while the winter wheat belt moved southwestward through Iowa, Missouri, Nebraska and finally into Kansas.

A clearer idea of our present agricultural situation can be gained through a brief survey of our agricultural history. This history is

divisible into five main periods. The first is the same as our colonial period and may be called the period of trial and adaptation. The second is that comprised between the dates 1789 and 1830 and may be called the period of the conquest of the forest. The third is the period from 1830 to 1860 and may be called the period of the conquest of the prairies. The fourth is the period from 1860 to 1888 and may be called the period of the settlement of the Far West. The fifth is the period from 1888 to the present time and may be called the period of reorganization.

The Period of Trial and Adaptation. — The colonial period was necessarily a period of experiment and adjustment; of trial and adap¬ tation. The settlers faced conditions of which they had had no previous experience and they had to acquire their own experience through bitter trials and disappointments. The sum¬ mers were hotter and the winters far colder than anything with which they were familiar. The plant and animal life also differed from that of the Old World. What crops to grow and how to grow them was consequently an

unsolved problem for the first settlers except in so far as the practices of the Indians gave them a clue.

Jamestown, for example, is in the same lat¬ itude as the northern coast of Africa. The first English explorers had visited the coast of Virginia in summer when the heat was more intense than in England. A natural in¬ ference was that the new country would be adapted to a semi-tropical agriculture. The fig and the olive were tried and there were numerous experiments in silk culture. These were soon given up in favor of stock-raising and the growing of corn and tobacco. In New England, besides cattle and hogs, most of the English grains and garden fruits and vegetables were tried out. In the middle col¬ onies wheat was grown successfully and ex¬ ported to the West Indies. So successful were the colonists in this work of trial and rejection that the main features of our present agricul¬ ture were all fixed. Until our present Federal Department of Agriculture began sending its plant explorers to the ends of the earth in search of new crops, not a single new crop was introduced into this country since the colonial period except sorghum and alfalfa.

The Period of Conquest of the Forest. — Before the War of

Independence some of the Colonial population had spilled over the Alleghanies into the great interior basin. The movement westward on a large scale began soon afterward. The various col¬ onies ceded to the Federal government their claims to the western lands. The government then began a land policy which encouraged set¬ tlement. This policy began as a financial pol¬ icy and ended, through a series of transitions, as a social policy. That is to say, the govern¬ ment began selling the public land as a means of filling the treasury and of paying off the Revolutionary War debt. It ended by giving the land in small farms, without money and without price, to landless men who would actually live upon and cultivate it.

The first general ordinance for the sale of the national domain was passed in 1785. Among other things it provided for the rec¬ tangular system of surveying, which has been followed ever since. Until 1800 the land was sold only in large tracts, 640 acres being the smallest unit. During the next 20 years (1801— 20) the smallest unit was 160 acres and the lowest price was $2 per acre. From 1821 to 1840 the lowest price was $1.25 per acre and 40 acres was the smallest unit. In 1841 was passed the first general pre-emption act. This withdrew public lands from sale to the general public, reserving them for sale to actual set¬ tlers. These were allowed to purchased limited areas, upon which they had actually settled, at the uniform price of $1.25 per acre. The final stage of the transition was reached in the Homestead Acts of 1862 and 1864. Under these acts the actual settler who lived on his land and cultivated it for a period of years was given a tract not exceeding 160 acres without money and without price. There have been several supplementary acts, such as the Timber Culture Act, the Desert Land Act, all designed to make it easy for the landless man to become a proprietor.

The beginnings of this public land policy form by far the most important phase of our

national history during the period we are now studying. With it began the real history of the Great West. Getting the people on to the land, bringing the land under subjection, laying the foundations of a future civilization, are the most fundamental and far-reaching enter¬ prises of any government.

In 1793 the saw gin for separating the seed from the cotton was invented. This followed a remarkable series of inventions for the manu¬ facture of cotton cloth which had created a great demand for cotton. The cotton gin en¬ abled the Southern States to supply that de¬ mand and greatly stimulated the growing of cotton. Cotton

therefore soon rose to first place among the products of the South, super¬ seding tobacco as the main crop. An unfortu¬ nate result was to give a new lease of life to slavery, which was beginning to be unpopular even in the South.

The beginnings of an improved live stock industry were made during this period. The famous sire of American trotting horses, ˆMessenger,® was imported from England in 1788. The great (<Justin Morgan,® the sire of the Morgan breed, was foaled about the same time, probably in 1789. George Washington began the breeding of mules of a superior quality, having received two fine jacks as presents from Lafayette and the King of Spain. Several importations of cattle for breeding purposes, particularly of the Shorthorn and Hereford breeds, were made about this time. Merino sheep in considerable numbers were imported from Spain. There had been restric¬ tions upon their exportation from their native country, but during the disturbances growing out of the Napoleonic wars, particularly the Peninsular war, these restrictions were ineffec¬ tive. Many bands of sheep were broken up and sold and American buyers were not slow to take advantage of these opportunities. There were said to be 5,000 Merinos in the United States by 1809. The growing of hogs in the Ohio valley became a leading industry. In 1805 fat cattle began to be driven across the Alleghanies to the Eastern markets.

The movement for the organization of agri¬ cultural societies began during this period. Societies for agricultural improvement were organized in South Carolina in 1784, in Pennsyl¬ vania in 1785, in New York in 1791, in Masssa- chusetts in 1792. An exhibition of agricultural products was held in Georgetown, D. C., in 1810 and another in Pittsfield, Mass., in the same year. In 1816 a somewhat larger one was held in Brighton, Mass. These were the fore¬ runners of the State and county agricultural fairs which have since played a very important part in our agricultural development.

Period of the Conquest of the Prairies. — The third period, which we have called the period of the conquest of the prairies, might well have been called the period of transforma¬ tion. The period between 1830 and 1860 wit¬ nessed, on American soil, a transformation of farming methods such as no previous period of 30 years had even witnessed. It was the period of the introduction of farm machinery driven by horse power. At the beginning of this period practically every farm operation except plowing, harrowing and the drawing of carts was performed with human muscles. By the end of this period, corn was planted and

cultivated, wheat and t>ther small grains were drilled, harvested and threshed, hay was mown and lifted into the mow or on to the stack by horse power — that is, on the more progressive farms.

The first factor in this transformation, aside from the native ingenuity of the American farmer, was the opening up of the great prairies of the West. At the beginning of this period the vanguard of the great army of settlers was just emerging from the great forest which extended continuously from the Atlantic coast to the western end of Lake Erie and the \ abash River in the middle streak, and to the Mississippi and beyond on the north and on the south. These prairies, though regarded as of doubtful value by the first settlers, soon proved themselves to be more fertile than the timber lands previously settled. Besides they were smooth and comparatively level and free from stones and other obstructions. They were therefore well adapted to the use of horse- drawn machinery. This fact, together with their seemingly boundless expanse, offered a challenge to the inventor which he was not slow to accept. The reaper, the mower, the thresher, the corn planter and the cultivator followed one another in quick succession.

Another important factor in bringing about this transformation was the coming of the rail¬ road. In 1830 there were no railroads in the United States. In 1860 there were 30,000 miles in operation and they had penetrated every State east of the Missouri River. They brought the markets of the world near to the Western fields and furnished an outlet to all that could be produced by means of the new farm ma¬ chines. Through the repeal of the English corn law's, English markets were opened to American farm products in 1849. New England factory towns were growing at the same time, so that the factory populations of both Old and New England began to be fed with food grown in our great West.

The joint result of all these changes was an agricultural revolution, not only in this coun¬ try, but in Europe as well. A flood of agricul¬ tural products began to pour into the Eastern markets and later into the European markets. The Eastern farmers and the European farmers began to feel the pressure of the new competi¬ tion. On the more broken and stony farms of New England the farmers were unable to stand the pressure and public attention began to be called to the abandoned farms. This pressure, which began during the period we

are now studying, continued and increased during the next period.

The Period of the Settlement of the Far West. — The period from 1860 to 1888 begins with the use of horse-drawn machinery well established. Many improvements w'erc made, particularly in reaping and threshing machinery, during this period. The Marsh harvester, the wire binder and the twine binder followed in quick succession. The roller process of manu¬ facturing flour made it possible to manufacture excellent flour out of Northern spring wheat, a thing which had previously been considered impossible. This, together with the improved harvesting and threshing machinery, made it possible to cultivate the vast _ prairies of the Northwest, making Minneapolis the centre of the flour manufacturing industry. The building

of the transcontinental railway lines, most of them projected in advance of settlement through subsidies of government land, still fur¬ ther hastened the settlement of the far West. More important, possibly, than any of these were the homestead laws of 1862 and 1864, al¬ ready referred to, which gave the land free of charge to actual settlers. The tide of settle¬ ment literally swept across the prairies during the seventies, the eighties and the early nineties, all but exterminating the buffalo and crowding the Indians into reservations where they could be protected against the competition of the white man. The settlers were mainly people from the Eastern and middle Western States, but their numbers were greatly increased by the immigrants from northern Europe who began coming to the United States in unprecedented numbers after the close of the Civil War. Dur¬ ing the decade from 1860 to 1870 there arrived more than 2,000,000 immigrants, nearly 3,000,000 during the decade from 1870 to 1880, and 5,250,000 from 1880 to 1890. During the decade from 1870 to 1880 more than 297,000 square miles were added to the cultivated area of the United States. This is a territory equal to that of Great Britain and France combined.*

One result of this rapid expansion of our agricultural area was the disorganization of agriculture in the older States and in Europe. Wheat began to be exported in enormous quan¬ tities, and its price, in consequence, fell to unremunerative levels. While this, and a sim¬ ilar fall in the price of other products, tended to discourage the farmers of the older sections, it did not deter the western settler from the work of extending the agricultural frontier far¬ ther and farther west. Many of the settlers, in fact, had no intention of remaining in the farming business, planning rather to get a piece of government land, hold it for a few years and then sell it at a price which would remunerate them for the time spent. Crops w*ere grown and sold, meanwhile, in order

to live until a buyer wdth a satisfactory price arrived. They lived literally by mining the soil and selling it, rather than by farming. Against this kind of competition the recent buyers of farms found it hard to strive. The result was a vast amount of agricultural discontent. Shameless dema¬ gogues flourished and fattened on this discon¬ tent, telling the farmers that it wˆas the fault of the monetary system, or that it wras due to some other more or less occult force rather than to the over-supply of agricultural products. The seventies, the eighties and the early nine¬ ties witnessed several political movements among the farmers of the South and the West, none of which, however, succeeded in seriously modifying the financial system.

The complete reorganization of the cotton¬ growing industry constitutes the most violent agricultural change of this period. In 1860 the bulk of the cotton crop was grown by slave labor. After the Civil War cotton prices were soaring because of the cotton famine during the war. It sold for 43 cents a pound in 1865 and for 30 cents in 1866. Under the stimulus of these prices many planters undertook to grow cotton on a large scale with hired negro help and with borrowed capital. The price fell rapidly and brought bankruptcy to many of the

♦Bogart, 1 Economic History of the United States,' p.267.

planters. But both the landowners and the negroes had to live, and to live mainly on cot¬ ton. It was therefore necessary that some workable system should be devised. This was found in the one still in vogue throughout the greater part of the cotton belt, at least in the eastern half of it. The land is worked by negro tenant-farmers who cultivate small tracts on shares. Thus both landowner and laborer share in the risk and the danger of complete bankruptcy is avoided.

The Period of Reorganization. — The year 1888 is chosen as the beginning of the fifth period in our agricultural history, not because any profound change was noticeable on that date, but because there began about that time a series of changes which are destined to pro¬ duce, — which have, in fact, already begun to produce, — profound agricultural changes. Con¬ gress had, in the preceding year, passed the famous Hatch Act, or the Experiment Station Act, as it is sometimes called. Agricultural ex¬ perimentation began at once on an enlarged scale. This led to a more comprehensive and systematic application of the principles of ex¬ perimental science to agriculture

than had ever been undertaken before.

Another large fact is that through the rapid occupation of the public lands the available free lands in the humid belt were nearing exhaus¬ tion. The old pioneering period in American agriculture was therefore drawing to a close and a new period was opening, wherein the farms must first be created by considerable outlay of labor and capital before profitable farming can begin. During the old period waste land was merely land which lay to the west. It was only necessary for the settlers to move to it in order to bring it within the cul¬ tivated area. From now on waste land is land which goes to waste not because of geometrical distance, but because of bad physical, chemical or political conditions. Bad physical conditions may be described as (1) too wet; (2) too dry; (3) too stony; (4) too sandy. The cure for the first is drainage ; for the second, irrigation ; for the third, the clearing of the stones; for the fourth, the supplying of humus through the plowing under of manure and green crops. Bad chemical conditions may be described as (1) too much acid, and (2) too much alkali. The cure for the first is lime. The second is a complicated problem too difficult for discussion within the limits of this article.* Bad political conditions may be described as (1) bad taxa¬ tion; (2) undesirable social surroundings; (3) poor educational facilities ; (4) poor sanitation. The cures are obvious.

The point to remember is that it is no longer possible for the landless man who can acquire a team, a wagon, plow, harrow and a few other implements, to begin farming on free public land. The drainage of wet land, the irrigation of dry land, the clearing of stony land, the 'supplying of humus to sandy land are laborious and expensive processes. These opportunities are consequently open only to men with some capital, either of their own or advanced to them on easy terms by others. The same may be said of land which is either too sour or too alkaline. Land which is going to waste through bad political or social conditions is more abun¬

- Consult Hilgaid on ‘Soils.’

dant than is commonly supposed. A detailed description here would provoke resentment and do no good.

In the early settlement of the continent, when serious difficulties had to be overcome, experience showed that the colony system rather than the system of individual settlement was the practicable method. The system of in¬ dividual settlement flourished under the easy conditions found in the Mississippi valley. Now that we are again face to face

with diffi¬ cult conditions, the lesson of history shows that we must again return to the colony method. In the field of irrigation the Mormons and the Greely colony of Colorado have furnished us with excellent examples.*

The tendency, which has almost become a habit, of well-to-do farmers to leave the farms and retire to the towns, is primarily a result of bad social conditions in the open country. These call peculiarly for the colony idea as a corrective. Though the physical difficulties in the way of the new pioneering call for united or community effort, such as can only be found where the colony idea prevails, these do not point so unerringly toward the colony system as do the social difficulties. Where families of unlike ideals, customs and traditions are thrown together, higgledy-piggledy, in the same neighborhood through the method of individ¬ ual settlement, it is difficult to secure effective community action. Such a settlement may suc¬ ceed in overcoming the physical difficulties where they are as easy as they were in the middle-western prairies, but it can never suc¬ ceed where they are as great as they are in most of the lands which remain to be subju¬ gated, and it is utterly incapable of handling the social difficulties which are found in very many of our rural communities.

Unity of sentiment and feeling, or like- mindedness, which is the condition of all ef¬ fective community work, may grow out of a feeling of common and pressing necessity, as in the case of the early pioneers in time, of phys¬ ical danger ; it may be based upon a common kinship, nationality or language, as in the case of some Scandinavian communities of our Northwest, or it may be based upon a common religion, as in the case of the early New Eng¬ land towns, many Pennsylvania German com¬ munities, a few Quaker communities, a few Scotch Presbyterian neighborhoods, and espe¬ cially the Mormon settlements of the Far West. A combination of all these unifying factors gives the best results. The agricultural states¬ men of the future must build our agricultural civilization on community action. Effective community action must have some unifying sen¬ timent to give it body and consistency. There¬ fore the problem of agricultural statesmanship is to discover or create these unifying senti¬ ments.

In almost every agricultural region there is one crop which, under the conditions of soil, climate and markets, is more profitable than any other, such as cotton in the South, corn in the Middle West and wheat in the Northwest and in the Middle Southwest. In the early development of every such region there is a tendency toward what is called the <(one crop

♦Consult Katharine Coman, ‘The Economic Beginnings of the Far West.'

system, w under which all the labor of the farmer is concentrated on his most profitable crop. Later on there is, in every progressive community, a tendency toward diversification. The reason for the change is not that one crop has ceased to be more profitable than any other. There are two reasons which combine to force the change. The first is the necessity of econo¬ mizing the soil, and the other is that of econo¬ mizing the labor time of the farmer. Growing one crop continuously on the same soil tends not only to exhaust those elements in plant food which are required by the crop in ques¬ tion, but to multiply the enemies and parasites which prey upon or injure it. A change of crops not only gives the soil a rest, but inter¬ feres more or less with the development of the enemies of each crop. The crops which are introduced into the rotation need to be chosen very carefully in order to give the soil the max¬ imum rest and also in order to afford the most effective check upon the enemies of the major crop.

Quite as important, however, is the necessity of economizing the labor time of the farmer and his labor force. No crop requires equal time and attention at all seasons of the year. When the major crop requires all the time of the labor force it would be uneconomical to turn aside to work on a less profitable crop. But if the farmer grows as much of the major crop as he can handle when it demands the most attention, he will have time to spare at other seasons of the year. This time will or¬ dinarily be wasted unless he has other crops which require his time then. If minor crops can be found which do not demand attention when the major crop is requiring it, but can be handled at other times and seasons, the farmer can obviously make a more economical use of his labor force by growing some of these minor crops.

Neither of these reasons in favor of rota¬ tion are very strong in a new and undeveloped farming community. In the first place the soil is usually so rich as not to require immediate conservation. In fact, the pioneer farmer was usually in great need of other forms of capi¬ tal, while possessing a superabundance of soil fertility. From his point of view it was not unbusinesslike to reduce his over-supply of one form if by so doing he could increase those forms which he lacked. Therefore he would be inclined to grow only his most profitable money crop. In

the second place, on a pioneer farm there are so many other things to do be¬ sides growing crops that the farmer need never spend an idle day from the beginning to the end of the year. Fencing, draining, erecting buildings, clearing stones, stumps and other obstructions and a multitude of other improve¬ ments have to be made. Under such circum¬ stances it is natural and economical that he should grow only his most important money crop, and spend his time during the slack sea¬ sons making these necessary improvements.

In case, however, as in some portions of the South, the labor force is not inclined toward steady and continuous work the year round, the tendency to stick to the principal money crop rather than to rotate and diversify per¬ sists long after the pioneering period has been passed. Seasons of strenuous work followed bv periods of idleness seem to be preferred by

the negro farmer. This is one of the chief obstacles to the proper diversification of crops in the South. There is probably no other crop which the cotton farmer could grow which is so profitable as cotton. Therefore, if diver¬ sification meant less cotton, it would probably reduce his income. But if he will equip him¬ self with first-rate teams and tools he can grow more cotton than he can possibly pick. There is a tendency, therefore, to work with inferior teams and tools — with one mule per man, for example, instead of with two, three or four, because one man can usually grow as much cotton with one mule as he can pick. The way for the cotton farmer to increase his income is to cultivate more land, growing as much cot¬ ton as he can pick, and some other crops be¬ sides, provided he can find crops which can be handled when cotton does not demand the full time of his labor force. In order to do this each hand should work at least two mules, though four would be better if the land is fairly smooth and free from obstructions. This habit of working with large teams and tools has had a great deal to do with the prosperity of the farmers of the upper Mississippi valley. It is also one of the factors in the increasing tendency toward rotation and diversification.

The principal crop areas of the country must be defined in terms of the principal money crops rather than in terms of the subsidiary crops. The cotton belt, the corn belt and the spring and fall wheat belts are fairly well defined, provided we observe the above defini¬ tion. There is, for example, scarcely an agri¬ cultural county in the United States in which corn is not grown, but it is grown as the prin¬ cipal money crop in what is known as the corn belt. Wheat is widely grown, but only in re¬ stricted areas as the principal crop. Potatoes are grown as the principal money crop in small areas scattered here and there, such

as Aroos¬ took County, Maine, parts of western New York, of Michigan, Wisconsin, Minnesota, Montana and Colorado; barley in parts of Wisconsin and California ; buckwheat in a few counties in Pennsylvania and New York; hops in a few counties in New York and Wash¬ ington ; tobacco in many and widely scattered areas from Louisiana to Vermont, particularly in the Connecticut valley, southern Ohio, east¬ ern Pennsylvania, southern Wisconsin and the border States between the cotton belt and the corn belt.

Turning from field crops to farm animals, we find the hog in greatest numbers in the corn belt, cattle are widely scattered, dairy cattle being found in greatest numbers in the thickly populated States of the east, and beef cattle in the corn States and the contiguous grazing States to the west. Horses are raised in greatest numbers in the corn States, though Kentucky, Tennessee and Texas raise consid¬ erable numbers. Sheep are diminishing in numbers, but are grown in considerable num¬ bers in Ohio, Michigan, Wyoming and the Pacific Coast States.

If one were to describe American agricul¬ ture in terms of the size of the business unit, one would say that the characteristic farm is middle-sized farm, or the one-family farm. That is, it is a farm of such size as can be worked by the labor force of one family, with an occasional hired man. when equipped with

the best teams and tools that are to be had. It differs from the small peasant farm of Europe

— La petite culture — in that it includes a larger area, and because of the larger area makes use of larger teams and tools. The tendency toward this type of farming is grow¬ ing, as shown by the fact that the large farms

— those of above 1,000 acres — are diminish¬ ing in number and area, and that the small farms also — those under 100 acres — are di¬ minishing in number. In other words, the ten¬ dency is toward the farm of from 160 to 320 acres. From the standpoint of production, this middle-sized, or one-family farm is the most efficient unit yet discovered in this country. From the trading point of view it is less effi¬ cient than the larger unit. In other words, where the farmer's success depends primarily upon his efficiency in production, the

middle- sized farm will beat all others in competition. But where the farmer's success depends pri¬ marily upon his efficiency in bargaining, that is, in buying and selling, the large farm has the advantage. In the growing of staple products, for which there is always a well-organized market where they always sell at a quotable price, the farmer's success wTill depend more upon his skill as a producer than upon his skill as a bargainer. But in the growing of special¬ ties, which do not sell at a quotable price and for which there is no organized market, the farmer's success will depend more upon his success in selling than upon his success in pro¬ ducing. This is the field where the large farm has the advantage. In the other field, which is much the larger, the middle-sized farmer more than holds his own in competition with the big farmer.

Bibliography. — Arnold, B. W., industry in Virginia from 1860-1894) (Baltimore 1897) ; Bailey, Liberty Hyde, (Cyclopedia of Ameri¬ can Agriculture' (New York 1910-11) ; Ben¬ ton, C, (A Statistical View of the Number of Sheep in the Several Towns and Counties of Various States> (Cambridge, Mass., 1837) ; Blodgett, James Harvey, (Relation of Popula¬ tion to Food Products in the United States) (Washington 1903) ; Bogart, E. L., (Economic History of the United States,' chaps, i, v, ix, xvii, xviii, xxi (New York 1908) ; Bruce, Philip A., (Economic History of Virginia in the Seventeenth Century,? Vol. I, chaps, iv-vii (New York 1896) ; Buck, Solon Justus, (The Granger Movement-* (Cambridge, Mass., 1913) ; Caird, Sir James, (Prairie Farming in America) (New York 1859) ; Carver, Thomas Nixon, Principles of Rural Economics ' (Boston 1911), (Selected Readings in Rural Economics' (Boston 1916) ; Chilcot, E. C., Pry Land Farm¬ ing in the Great Plains Area' (Yearbook of the Department of Agriculture, p. 451, 1907) ;

Coleman, Henry, Agriculture in the United States' (New York 1841); Coman, Katharine, (Economic Beginnings of the Far West' (New York 1912) ; Coulter, T. L., (Agricultural De¬ velopment in the United States, 1900-10' (Quar¬ terly Journal of Economics, November 1912) ; Dahlinger, Charles William, (The New Agra¬ rianism' (New York 1913) ; Emerick, G. F., Agricultural Discontent' (Political Science Quarterly, Vol. IX, p. 436) ; Flint, Charles H., Progress in Agriculture, 1780-1860,' (Eighty Years' Progress of the United States,' (New York and Chicago 1864) ; Hammond, M. B.,

(The Cotton Industry' (Publication American Economic Association, New Series, Vol. I, No. 1) ; Hart, A. B., (The Disposition of our Pub¬ lic Lands' (Quarterly Journal Economics, Vol. I, pp. 169, 251) ; Holmes, George K., Pauses affecting Farm Values' (Yearbook of the

De¬ partment of Agriculture, p. 511, 1905) ; Levas- seur, Emile, P'agriculture aux Etats-Unis' (Paris 1894) ; Mead, Elwood, (Irrigation Institutions' (New York 1903), (The Rela¬ tion of Irrigation to Dry Farming' (Year¬ book of the Department of Agriculture, p. 423, 1905), (Report of Irrigation Investiga¬ tion in California' (Washington 1901) ; Newell, F. H., (Irrigation in the United

States' (New York 1902), (The Reclamation of the West' (Washington 1903) ; Nimmo, Joseph, (Report in Regard to the Range and Ranch Cattle Business of the United States' (Washington 1885) ; Nourse, Edwin G., Agri¬ cultural Economics' (Chicago 1916) ; Olm- stead, Frederick Law, A Journey Through the Back Country' (New York 1860), A Journey in the Seaboard Slave States' (New York 1856), A Journey Through Texas' (New York 1857, (Journeys and Explorations in the Cot¬ ton Kingdom' (London 1861) ; Pierson, C. W., Pise and Fall of the Granger Movement' (Popular Science Monthly, December 1887) ; Report of the United States Industrial Com¬ mission, Vol. XI; Sato, S., ˆHistory of the Land Question in the United States' (Baltimore 1886) ; Stevenson, George M., Political His¬ tory of Public Lands, 1840-1862' (Cambridge, Mass., 1914) ; Taylor, Henry C., Agricultural Economics' (New York and London 1911) ; Turner, F. J., (The First Official Frontier of Massachusetts Bay' (Cambridge, Mass., 1914) ; Geographical Influences in American History' (New York 1914) ; (Outline Studies in the His¬ tory of the Northwest' (Chicago 1888) ; (The Rise of the New West' (New York 1906) ; Walker, C. S., (Is There a District Agricultural Problem?' (Publication American Economic Association, p. 56. 1897) ; Weeden, William B., Pconomic and Social History of New Eng¬ land, 1620-1789' (Vol. I, pp. 53-89, Vol. II, pp. 492-507, Boston 1890) ; Wellington, R. G., (The Political and Sectional Influence of the Public Lands, 1828-1842' (Cambridge, Mass., 1914).

Thomas N. Carver, Harvard University.

AGRICULTURE, Department of, an ex¬ ecutive department of the United States, whose head is a member of the Cabinet with the title secretary of agriculture. It was formed early in 1S89 under President Cleveland, the first sec¬ retary being Norman J. Colman of Missouri; he was succeeded in the same year, under Pres¬ ident Harrison, by Jeremiah M. Rusk, of Wis¬ consin; in 1893 President Cleveland in his sec¬ ond term appointed J. Sterling Morton, of Ne¬ braska; in 1897 President McKinley appointed James Wilson, of Iowa, who was succeeded in 1913 by David F. Houston, of Missouri, the present incumbent (1916). Its germ was a dis¬ tribution of seeds to farmers by the Commis¬ sioner of Patents in 1836, enlarged by Con¬ gress in

1839 to include the prosecution of ag¬ ricultural investigations and collection of agri¬ cultural statistics ; in 1854 a special appropria¬ tion was made and an entomologist employed ; in 1855 a chemist and botanist were added and

a propagating garden begun. In 1862 the Agri¬ cultural Bureau was established separate from the Patent Office, and President Lincoln ap¬ pointed Isaac Newton, of Pennsylvania, Com¬ missioner of Agriculture; the last commissioner was Mr. Colman, the first secretary. The De¬ partment's quarters in Washington arc in a large park near the Washington Monument. Its functions are expressed by statute as : ((To acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate and distribute among the people new and valuable seeds and plantsˆ ; but scientific and administrative duties have been heaped upon it till it has become not only an enormous workshop and museum of every class of scientific research relating to plant and ani¬ mal life and that of agricultural animals, but an establishment of practical services in trade and commerce, quarantine, statistics, tree¬ planting, road-making, irrigation, insecticides and almost everything that can affect the inter¬ ests of those engaged in raising and marketing all articles that grow from the ground or living things that feed on them. Even the Weather Bureau was transferred to it, in 1891, from the War Department.

Its cost, is over $20,000,000 a year, of which about $2,200,000 goes to extension work. The detailed statement below will give a full con¬ spectus of its activities.

Organization and Functions.

Office of the Secretary. — Supervision of pub¬ lic business relating to the agricultural industry and management of department subdivisions ; advisory supervision over government agricul¬ tural experiment stations ; control of quaran¬ tine stations for imported cattle and of inter¬ state cattle quarantine, including inspection of cattle ships; also carrying into effect the inter¬ state game laws and those on importation of noxious animals, with authority to control that of other animals.

The Weather Bureau. — Records daily exist¬ ing atmospheric conditions and formulates therefrom — for distribution — forecasts of probable weather during the succeeding 48 hours. It maintains a central office in Wash¬ ington, and 197 subordinate stations in the United States and West Indies, whose work is supplemented by the services of 4,500 voluntary observers. It also receives daily telegraphic reports of observations in Canada, Mexico, the Azores and the western coast of Europe.

The Bureau of Animal Industry. — Investi¬ gates the nature and prevention of communi¬ cable diseases dangerous to live stock, and takes measures for their extirpation ; inspects live stock and their food products in interstate and foreign commerce, also the transport ves¬ sels for exported and quarantine stations for imported animals ; disseminates information on our dairy interests and their foreign markets; and reports on our animal industries and means of improving them.

The Bureau of Chemistry. — Studies the chemical problems of agriculture; soils, fer¬ tilizers and irrigation _ waters ; agricultural products and industries ; insecticides and fungi¬ cides ; foods of man and beast; raw materials, products and processes of agricultural-chemical

industries ; chemical relations which modify the results of environment — as soil, latitude, altitude and meteorological conditions — on agricultural products ; inspects food products imported or for export ; and examines quality of materials used in road construction. The chemical problems of other departments are turned over to it. It has under its charge the inspection of foods and drugs, as authorized bv the Pure Food Act.

The Bureau of Plant Industry. — Studies plant life in relation to agriculture, including vegetable, pathological and physiological, bo¬ tanical, pomological, grass and forage plant in¬ vestigations and experiments ; has charge of experimental gardens and grounds, the Arling¬ ton experimental farm, Congressional seed dis¬ tribution, seed and plant introduction and tea- culture experiments.

Forest Service. — Prepares and executes plans for conservative lumbering of wood¬ lands, public or private; investigates trees and methods for planting, and gives practical assist¬ ance to tree-planters ; studies commercially val¬ uable trees for their special uses in forestry, and the relations between forests and fire, grazing, lumbering, stream flow and irrigation ; maintains a photographic laboratory and col¬

lection and a library. On 1 July 1915 it had under its administration 162,773,280 acres of national forest land.

The Bureau of Soils. — Studies physical and chemical properties of soils, and materials and methods of artificial fertilization, with their in¬ fluence on the original soils ; classifies and maps soils in agricultural districts to show the dis¬ tribution of soil types for adaptability to cer¬ tain crops and their management ; investigates alkali problems and their relations to irrigation and seepage waters ; reclamation of abandoned lands ; studies tobacco soils and methods of cul¬ tivation and curing, introduction of improved varieties and methods of exporting tobacco. The total area covered by detailed soil surveys in the United States from 1899, when the work was begun, to 30 June 1915 amounts to 369,928 square miles.

The Bureau of Crop Estimates. — Collects and digests statistics of agricultural production; area annually sown to each of the leading crops, their condition on the first day of each month, the quantitative results at close of the crop year, and estimated farm value 1 Decem¬ ber. Supplementarily it collects periodical in¬ formation on minor crops of importance, meadows and pastures, and the principal for¬ eign crops. The stock of corn, wheat and oats on United States farms at certain regular fixed dates is estimated, with the proportion shipped out of the county where grown ; the number and value, by species, of animals on United States farms at the beginning of each year, and the annual losses from disease and ex¬ posure ; also the annual clip of wool and aver¬ age weight of fleeces, by States and Territories. It computes the world's production of the chief crops, by countries, and prices of principal ag¬ ricultural products in various United States markets.

The Division of Publications. — This is the publishing house of the Department. It has general charge and assignment of expenditures under the appropriation for printing and dis¬ tributing agricultural documents, preparation

and distribution of the ˆear-Bookp (Farmers' Bulletins, > and other bulletins, reports and cir¬ culars; supervises the Department's printing and binding in the government printing office ; prepares the drawings for illustrations, and prepares and distributes official information and advance notices to agricultural writers. During 1915 the Division

issued 913 new bulletins, pamphlets, circulars, reports and documents of all kinds, the printed copies aggregating 26,-

496,661.

The Bureau of Entomology. — Studies the entire field of insect life in its relation to hu¬ manity; primarily, insects injurious directly to man, to agriculture and horticulture, and to stored products; the geographic distribution of such insects, and their relations to climate. It conducts field and laboratory experiments with different classes of remedies, and reports there¬ on. It also studies beneficial insects • — both those which are the source of industries, like the honey-bee, the silkworm and the fig-fertiliz¬ ing insect and those indirectly beneficial by preying on injurious ones. It makes large col¬ lections of insects and of insecticidal machin¬ ery and chemicals.

The Bureau of Biological Survey. — Studies the geographic distribution of animals and plants, and maps the natural life zones of the country; also investigates the economic rela¬ tions of birds and mammals, recommends meas¬ ures for the preservation of beneficial and the destruction of injurious species, and carries into effect the Federal laws concerning the im¬ portation of wild birds and other wild animals, and the interstate game laws.

The Office of Public Road and Rural Engi¬ neering — Investigates the United States system of road management and the best methods of road-making and maintenance ; experiments on best methods of road-building and analyzes chemical and physical qualities of road mate¬ rials ; co-operates with agricultural colleges, experiment stations and local authorities in building short sections of road as object les¬ sons, and conducts investigations into proper methods of irrigation and drainage.

The Division of Accounts and Disburse¬ ments. — Audits and pays all accounts and ad¬ justs claims against the Department; decides questions involving the expenditure of public funds ; prepares advertisements, schedules and contracts for annual supplies, leases, agree¬ ments, letters of authority and all letters to the Treasury Department and Department of Justice; issues requisitions for the purchase of supplies and requests for transportation ; pre¬ pares the annual estimates of appropriations, etc.

The Library. — The librarian purchases books and periodicals, supervises their arrangement and cataloguing, and has charge of the prepa¬ ration of catalogues, indexes, bibliographies, etc.

Federal Horticultural Board. — Established to administrate the Plant 'Quarantine Act of 20 Aug. 1912, regulating the entry of foreign nursery stock and other plant products into the United States and providing for domestic and foreign quarantines on account of plant diseases and insect pests.

Office of Markets and Rural Organisation. — Enforces an act of 18 Aug. 1914 which taxes the privilege of dealing on exchanges, boards

of trade and similar places in contracts of sale of cotton for future delivery, whose object is to curb speculation. The office also makes a study of co-operative organizations among farmers with the object of extending such or¬ ganization more widely and it requires and spreads information regarding improved methods in the marketing and distribution of farm products.

States Relations Service. — A department which was formally established by Secretary Houston on 1 July 1915, in accordance with the provisions of the Smith-Lever Agricul¬ tural Extension Act of 8 May 1914, providing for a wide extension of the co-operative activities carried on with the various State colleges on a permanent basis. The Smith-Lever act appropriates money as follows: The sum of $10,000 of Federal funds is granted to each of the 48 States. In addition to the $480,000, the act appropriates for 1915-16 $600,000 additional, which will be increased an¬ nually by $500,000 until 1923, when the annual government appropriation will be $4,580,000. The additional appropriation is divided among the States in the same proportion that the rural population of each State bears in relation to the rural population of the country as a whole. Each State, on its part, must grant a sum of money toward the funds equal in amount to the Federal grant. The money from the States will bring the joint extension work funds up to $1,680,000 in 1916. In addition to all these pro¬ visions, however, the Department of Agricul¬ ture will, during 1916, spend from its own ap¬ propriations $1,025,000 for farmers' co-operative demonstration work and other field instruction in special subjects.

The new States Relations Service will in¬ clude within its jurisdiction the former Office of Experiment Stations, which superintends the work of the experiment stations and sends its agents all over the world in search of useful plant life that may be introduced into the United States. Since the Service was estab¬ lished all the States have assented to the pro¬ visions of the Smith-Lever act. A single agri¬ cultural college in each State has been desig¬ nated as the beneficiary of this act. In several where the college is not coeducational a co¬ operative

arrangement for work in home eco¬ nomics has been made with the State college for women. All the State agricultural colleges receiving the benefits of the States Relations Service have entered into co-operative relations with the Department of Agriculture, and in 46 States these institutions and the Department are conducting all their extension wrork in agri¬ culture and home economics under the terms of a general ((memorandum of understanding, which is used as a basis for a great variety of co-operative project agreements.

One of the chief works which is being un¬ dertaken is the establishment of the ˆcounty agent® system. The county agent is an agri¬ cultural expert who acts as the joint- repre- sentative. of the local community, the State through its agricultural college and the Federal Government through the Department of Agri¬ culture. The functions of the county agent arc various ; he advises the individual farmers in their work, instructing them in all modern and scientific methods of planting or stock raising, assists them in the buying of their supplies on

a co-operative basis and advises them in the marketing of their products. His business is, in fact, to do all in his power to further the interests of his local community as an agricul¬ tural centre. Already 1,200 counties have es¬ tablished such county agent headquarters. An¬ other line of extension work which will be greatly stimulated by the States Relations Serv¬ ice is the organization of agricultural clubs among school children, in connection with the work of the elementary schools. The same is true of the demonstrations in domestic eco¬ nomics, which will now be extended to the col¬ leges which number girls among their students.

The following figures will give an idea of the relative attention that is being paid to the various fields of this work. Of a total of $4,782,270 the following sums will be spent on : Administration, $391,652; publications, $107,- 980 ; county agents, $2,497,426 ; home demon¬ stration, $542,732 ; movable schools, $218,000 ; school children's clubs, $236,917. It will be seen that the largest item, over one-half of the total, is county agent work. The rest of the appropriation will be spent in minor sums on pig, poultry and live-stock associations.

John H. Cornyn, Editorial Staff of The Americana.

AGRIGENTUM, ag -ri-jen'tum, a town in Sicily, of which this was the Roman name, the Greek name having been Agragas and the mod¬ ern Italian name being Girgenti. It is thought to have been founded by Dorian colonists about 582 b.c. Its situation on the southern shore of the island was peculiarly strong and impos¬ ing, standing as it did on a bare and precipitous rock about 1,000 feet above the level of the sea. During the Greek period Agragas rose to a position of great wealth and importance and was adorned with splendid temples and public buildings. Among Sicilian towns it was second only to Syracuse. In 406 b.c. the city received a blow from which its dignity and power never recovered, in its capture by the Carthaginians. Under the Roman dominion we do not hear much of the town, which, however, seems to have been always prosperous, having mines as well as the most fertile territory. The town is celebrated in Greek history as the birthplace of the famous philosopher Empedocles, and the celebrated and almost legendary tyrant Phalaris was ruler there — in what capacity is not clearly recorded. In the history of fine arts Agragas was famous as the centre of a school of sculp¬ ture and refined architecture. We still have vestiges of this in the extraordinary group of temples, that dedicated to Hera Lacinia; that called ((Temple of Concord,® a remarkably well- preserved monument of the Doric style ; that called <(Temple of Hercules,® much ruined; and, finally, the gigantic Temple of Zeus, a building wholly unique in Grecian art as hav¬ ing columns engaged in the walls of the cellar and a great interior evidently treated as a pub¬ lic hall.

AGRIMONY (Agrimonia), a genus of plants belonging to the family Rosacece, distin¬ guished from the other genera of the same tribe (Rosece) by having but two carpels enclosed in the deep tube of the calyx, from 7 to 20 stamens and small notched petals. A. eupatoria, or com¬ mon agrimony, is an erect, hairy, herbaceous plant, native of Europe. Several species are. widely distributed in eastern North America.

AGRIPPA VON NETTESHEIM, Hein¬ rich Cornelius, a versatile German diplomat, historian, philosopher and author: b. Cologne, 14 Sept. 1486; d. Grenoble, 18 Feb. 1535. He led a remarkably diversified life in France, Italy'-, Switzerland and the Netherlands, and wrote among other works: (De Occulta Philo¬ sophy (1510) which describes and defends magic; (De Nobilitate et Prsecellentia Fcminei Sexus, *dedicated to Margaret of Burgundy (1532); and (De Incertitudine et Vanitatc Sdentiarum et Artium, atque Excellentia Verbi Dei Declamatio) (1527), a satire on sciences and on the pretensions of scientists. Consult Morley, H., Wife of H. C. Agrippa,* (London 1856) ; Prost, A., ˆCorneille Agrippe, sa vie et ses oeuvres) (Paris 1881).

AGRIPPA I and II. See Herod Agrippa I ; Herod Agrippa II.

AGROPYRON, a genus of grasses includ¬ ing about 50 species, mostly perennials. The best known are A. repens , couch grass or twitch grass ; A. caninum, bearded wheat- grass ; A. divergens, wire bunch grass; A. pseudo-repens, western couch grass, and A. tenerum, slender wheat grass. A, repens is in some districts considered a pest to agricul¬ ture. It is extremely hard to eradicate. It is considered a good hay grass in western United States. The species are common in America, Europe and Australia. A. repens is considered a good binder grass for railroad embankments and places liable to washouts and its roots are used in medicine, having aperient properties.

AGTELEK, og'te-lek, or AGGTELEK,

Hungary, a village in the county of Gomor, 40 miles southwest of Kaschau, on the road from Budapest to Dobsina. Pop. 500. It is a famous tourist resort on account of the neighboring Baradla (((steaming place®) stalactite cavern, which with its remarkable chamber, passages and subterranean stream extends underground for over five miles.

AGUADILLA, a'gwa-de'lya, Porto Rico, capital of a municipality on the western coast, near the northern extremity, 20 miles by rail from Mayaguez. The town, founded in 1775, is well built on a spacious bay forming an excellent trading outlet for the sugar, tobacco, coffee, cocoanuts, etc., of a fertile agricultural district. Pop. of municipality 21,500; of town

6,200.

AGUADO, a-gwa'do, Alejandro Maria, Marquis de las Marismas del Guadalquivir,

Spanish financier and millionaire : b. Seville, 29 June 1784; d. Gijon, 14 April 1842. Of Jewish parentage, he early became a soldier, fighting in the war for Spanish independence. Exiled, he went to Paris in 1S15 and in colonial trade and banking with Cuba and Mexico ac¬ quired great wealth. From 1823 to 1831 he negotiated four loans which saved Spain from bankruptcy. For these services he was en¬ nobled by Ferdinand VII. He acquired large estates in France and became a naturalized citizen in 1828. He left a fortune of over $12,000,000 (60,000,000 francs), and a collec¬ tion of splendid pictures which were acquired by the French government.

AGUAS CALIENTES, a'gwas ka'le-en'ta0

Mexico, capital of the state of the name, on the line of the Mexican Central Railroad, 860

miles south of El Paso, Tex., 364 miles north of the City of Mexico and 415 miles northwest of Tampico, on the Gulf of Mexico. Elevation 6,106 feet above the sea.. It is especially noted for its hot springs (the name Aguas Calientes signifies hot waters), which have been highly prized ever since their discovery. Here are located the principal shops and one of the divi¬ sion headquarters of the Mexican Central Rail¬ road, the result of which has been the establish¬ ment of a considerable colony of Americans. Here, also, is located one of the greatest silver- copper smelting plants in the world, employing a great number of men and adding materially to the business prosperity of the community. In the city and its immediate vicinity are several woolen factories, a flouring mill, a starch factory and other important manufactur¬ ing enterprises. Perhaps the most notable special industry, and for which the place has become really famous in domestic circles, is the making of drawnwork table cloths, napkins, doilies, handkerchiefs dress trimmings and ac¬ cessories of every description, in which a con¬ siderable part of the female population is employed. Imposing church edifices and beauti¬ ful parks or plazas greet the eye on every side. The cause of education, — both primary and advanced, — has long received great atten¬ tion in Aguas Calientes. The educational insti¬ tutions are most creditable, not only in numbers and capacity but in the thoroughness and pro¬ gressiveness of the professors and teachers by whom they are conducted. The local financial institution — the Bank of Aguas Clientes, — has a capital of $600,000. The National Bank and the Bank of London and Mexico maintain branches here, and there is an agency of the Bank of Zacatecas. The library of the Institute of Sciences contain over 4,000 volumes. As a place of residence the city has long been a prime favorite.

AGUE. See Malaria.

AGUESSEAU, a'ge-so, Henri Francois d\

chancellor of France: b. 1668; d. 1751. Accord¬ ing to Voltaire, he was one of the most learned of Frenchmen and his long and honorable career is distinguished chiefly by his defense of the Gallican Church and the rights of the people, in opposition to the imposition of the

"Unigenitus® papal bull, favored by Louis XIV and his councilors. He also ranks high as a reformer of French jurisprudence. A complete edition of his works, edited by Pardessus, J. M., was published in 16 volumes (Paris 1818-20). Consult Butler, C., (Memoir of the Life of H. F. d'AguesseaiP (London 1830).

AGUILAR y CORREA, a'ge-lar, Antonio, Marques de la Vega de Armijo, Spanish statesman: b. Madrid, Spain, 30 June 1824; d. 1909. He studied law in the universities of Seville and Madrid, then became prominent in ' the politics of the Union Liberal party. His first office was that of governor of Madrid and during his term of office he distinguished him¬ self by his severity against vice. He next be¬ came minister of public works, then minister of the interior. On the downfall of his politi¬ cal party, 22 Tune 1866, he assisted in the prepa¬ rations for the revolution, which was success¬ ful. In 1873 he was sent as the representative of Spain to France. After the restoration he recognized Alfonso XII. In 1883 he passed

over to the opposition and the following year was elected "ConcejaP* for Madrid. On the death of the King, Alfonso XII, his party returned to power and he was elected deputy for Madrid and Lucena. In 1889 he became minister of state, but a year later his party fell from power. Late in 1892, under the presidency of Sagasta, he was again made minister of state which position he resigned a few months later in order to be elected president of the congress, a position he held until March 1895, when Sagasta fell from power. In 1898 he was elected president of the congress of deputies. Aguilar was a member of the Royal Academy of Moral Sciences and Politics and the R.oyal Academy of History, and was for a time director of both.

AGUILAR, Grace, Anglo-Hebrew author: b. London, 2 June 1816; d. Frankfort-on-Main, 16 Sept. 1847. 'The Spirit of Judaism > (1842) ; (The Jewish Faith* (1846) and 'Home Influ- ence) (1846), of which over 30 editions were issued, are her chief wˆorks. (The Vale of Cedars, (1850) ; (1850) and (The Days of Bruce> (1852), edited by her mother, appeared after her death.

AGUILAR DE LA FRONTERA, a'ge-lar

dah la fron-ta'ra Spain, city of Cordova province, Andalusia, on the river Cabra, 26 miles by rail southeast of Cordova. A former fortified town on the Moorish frontier, it has an interesting history. Its modern importance is derived from its olives and white Montilla wine and the thriving agri¬ cultural and manufacturing trade carried on. Pop. 13,000.

AGUILAS, a'ge-las, Spain, seaport town of Murcia province on the Mediterranean, the terminus of the Huercal-Overa Railway, 38 miles southwest of Cartagena. It is the com¬ mercial outlet for the iron, minerals and agri¬ cultural produce of the region, and imports large quantities of coal. Pop. 16,000.

AGUILERA, Ventura Ruiz, a-ge-la'ra, ventoo'ra roo'eth, lyric poet, <(the Spanish Beranger® : b. Salamanca, 2 Nov. 1829; d. Mad¬ rid, 1 July 1881. After a medical course at home he became a Madrid journalist (1843) and an important official under Liberal govern¬ ments ; later a director of the Madrid Archaeo¬ logical Museum. His bold incisive editorials endeavored to instil fervid national patriotism into the masses, an aim also of his poems like National Echoes) and 'Satires. > His 'Elegies^ (1862) w-ere masterpieces translated into nearly all European languages. He wrote also 'The Book of the Fatherland > (1869) ; (A Christmas Legend) (1872); (The Modern Arcadia } ; col¬ lections of novelettes, etc.

AGUILLON, da'gi-lyon', Frangois d\ Bel¬ gian Jesuit, philosopher and mathematician: b. 1566; d. 1617. He became rector of the Jesuit College at Antwerp and wras the author of an important work on optics, containing the earli¬ est description of stereographic principles, pub¬ lished in 6 volumes (Antwerp 1613).

AGUINALDO, a'ge-nal-do, Emilio, leader of the insurgents in the Philippine insurrection of 1896, and their chief in the Spanish- Ameri¬ can war of 1898 : b. Imus 1870 of Chinese and Tagalog parentage. His father was a planter and he received his early education at the

College of St. Jean de Lateran and the Uni¬ versity of St. Tomas in Manila. Later he be¬ came the protege of a Jesuit priest, and was for a time a student in the medical department of the Pontifical University of Manila. In 1888 he had some conflict with the authorities and went to Hongkong, there becoming inter¬ ested in military affairs and acquiring a knowl¬ edge of warfare. He quickly learned some¬ thing of the English, French and Chinese lan¬ guages, together with various native tongues, achieved a reputation for intelligence, ability', shrewdness and diplomacy and had a personal magnetism which gave him great influence among his countrymen. On the outbreak of the rebellion against Spanish authority in 1896 Aguinaldo became a commanding figure with the insurgents. Pie was at the head of the

diplomatic party, which succeeded in making terms with the Spanish government, the latter paying a large sum to induce the Philippine leaders to lay down their arms. Aguinaldo quarreled with his associates in Hongkong over the division of this monev and went to Singapore, where he came in contact with the United States consul shortly before the break¬ ing out of the war between the United States and Spain. On the representations of the con¬ sul Commodore Dewey telegraphed to have Aguinaldo sent to him and the insurgent leader arrived at Cavite shortly after the battle of Manila Bay. Aguinaldo was given opportunity to organize the Filipinos against the Spanish authority ; but no promises were made to him and the insurgents were never officially recog¬ nized by the Americans. Friction early arose and the Americans protested against the cruel treatment of Spanish prisoners bv the Filipinos. The strain became serious at the capture of Manila, the insurgents claiming the right to sack the city, which the Americans denied. On 12 June 1898 Aguinaldo organized a so-called Pfilipino republic, with himself as president, but very soon proclaimed himself dictator. He protested against the Spanish-American treaty of peace, which ceded the Philippine Islands to the United States, and claimed the independ¬ ence of the islands. Organizing an extensive conspiracy among the native population of Manila, he ordered the complete massacre of the Americans, together with the entire European population of the city, while yet at peace with them. The plot wras discovered in time and failed. The intention of Aguinaldo to oppose by force the American occupation had been growing increasingly evident and on the evening of 4 Feb. 1899 his forces attacked the American lines in the suburbs of Manila. The news of this overt action caused the prompt ratification of the Spanish-American treaty by the United States Senate. Aguinaldo made a determined resistance to the Americans and the rainy sea¬ son soon prevented the latter from following up their uniform successes in the open field; but early in 1900 organized insurrection, which was chiefly confined to the Tagalog nationality, was broken up, Aguinaldo driven into hiding and his correspondence, order books, etc., cap¬ tured by General Funston, who captured Agui¬ naldo himself at Palawan, Luzon, 23 March 1901. On 2 April he took the oath of alle¬ giance. Consult Wildman, Aguinaldo5 (Boston 1901); (Aguinaldo et les Philippins) (Paris

1900).

AGULHAS, a-gool'yas, Cape, the most southern point of Africa, lies about 100 miles cast southeast of the Cape of Good Hope, in lat. 34° 49' S. ; long. 20° 0' 40" E. rl he point is very dangerous for ships; fogs are frequent, the currents are uncertain and there are many rocks to

seaward.

AGUR, a-goor', the name of an unknown Hebrew sage mentioned only in Proverbs xxx, 1. There he is called the son of Jakeh. Much discussion has arisen concerning the name. Jerome and many Jewish rabbis of his time held the name to be a pseudonym used symbol¬ ically. Agur is not mentioned as the author but as the collector of the book of Proverbs. It is thought by some that he was one of Hezc-kiah's men. Another theory is that he was the son of the Queen of Massa, whose kingdom was located near the head of the eastern branch of the Red Sea.

AGUTI. See Agouti.

AHAB, King of Israel 875-853 (?) b.c., son and successor of Omri (1 Kings xvi-xxii). He found his kingdom in extreme peril; whole districts in the north had been swallowed up by the growing Syrian kingdom with capital at Damascus, which menaced its very life; and Moab and Edom were possessions only to be held down by force, with Syria constantly incit¬ ing them to revolt. He proved a prince of great energy and ability ; twice he drove back Ben- hadad of Damascus and he held down Moab with a strong hand, crushing a wholesale insur¬ rection, as proved by the inscription on the Moabite Stone (q.v.) ; he made the kingdom of Judah an ally and perhaps a vassal, and gained at least the neutrality and perhaps some of the resources of the kingdom of Tyre by marry¬ ing the Princess Jezebel. Unfortunately this involved letting her establish the worship of the Tyrian Baal, called Mclkart, and made the extremists of the Yahwe priesthood his irrecon¬ cilable enemies and defamers. Yet he was no deserter of Yahwe, but merely a cool politician, who felt that his first duty to his country and even to its national religion was to save it from absorption in Syria, which would end Israel and the Yahwe cult at once; and 400 priests of Yahwe prophesied before him previous to his last campaign. His entire internal policy has been blackened by the affair of Naboth's vine¬ yard, and Jezebel is a name of execration. Certainly the judicial murder was a great crime, but it shows at least that even an Oriental monarch 2,750 years ago could not expropriate an obstinate holder by sheer violence; defiance of royal orders was not as safe to let go for a precedent then as now and more than one king has had his hand forced by his queen. Nor in fact did these things prejudice the larger in¬ terests of his reign. In 854 we find him strange¬ ly allied with his old enemy Ben-hadad against Shalmaneser (q.v.) of Assyria, though one would suppose he would gladly have seen Ben- hadad crushed, and Assyria was no immediate danger; possibly he was menaced from other quarters and dared not refuse. At

any rate, Shalmaneser inflicted a crushing defeat on the allies at Kargar near the Orontes in 854 and Ahab recovered liberty of action if he had lost it ; for the next year he engaged in a new campaign against Ben-hadad, in alliance with Jehoshaphat, King of Judah, and was killed in

battle. The Biblical narrative is taken from two opposed sources ; one embodying the pop¬ ular tradition of Ahab as a brave, capable and popular king, the other the priestly view of him as a bad man and monarch. His contest with Elijah (1 Kings xvii-xix) is a picturesque rendering of the latter.

AHASUERUS, a-haz'u-e'rus, Scripture history, a king of Persia, the husband of Esther, to whom the Scriptures ascribe a singular de¬ liverance of the Jews from extirpation, which they commemorate to this day by an annual feast, that of Purim, preceded by what is called the fast of Esther. Different opinions have been entertained as to which of the kings of Persia mentioned in other historical books may be the Ahasuerus of the Bible. He is probablv the same as Xerxes. Ahasuerus is also a Scripture name for Cambyses, the son of Cyrus (Ezra iv, 6) and for Astyages, King of the Medes (Dan. ix, 1). The word Ahasuerus is merely the Latin form of the He¬ brew Ashashverosh and is believed by some to be a transcription of the Persian Khshayarsha (((venerable king®) and this name may be reasonably supposed to have been originally aii appellative, so that its application by for¬ eigners, like the Jews, to different royal person¬ ages is explained.

AHAVA, a-ha-va, the name of a stream and a district or town in Babylonia, mentioned in the book of Ezra. The river was probably one of the canals of the Euphrates near the city of Babylon. On its banks Ezra assembled his company and camped for three days be¬ fore returning to Jerusalem. The site and the river still remain unidentified although many conjectures have been made. In the apocry¬ phal book of First Esdras the name is given as Theras.

AHAZ, the 12th King of Judah, succeeded his father Jotham, 742 b.c. Forsaking his fa¬ ther's religion, he gave himself up so completely to idolatry that he is said to have caused his own son to pass through the fire to Moloch, and plundered the temple to obtain presents for Tiglath-pileser, King of Assyria, whose assist¬ ance he desired to obtain. His powerful ally freed him from his most formidable foes by invading Syria, taking Damascus, killing Rezin, the King, transporting the inhabitants of Kir, thus putting an end to the Syrian kingdom of Damascus, and by stripping Israel of the whole country east of the

Jordan.

AHAZIAH, two kings referred to in the Bible. The first was the son and heir of Ahab, and the 8th King of Israel, from 851 to 849 b.c. On assuming power the Moabites refused to pay tribute, but before he could march against them he fell from a window of his palace and was badly injured. He sent messengers to the god Baal Zebub of Ekron to consult him in regard to his injuries, but the messengers were met by Elijah, the Prophet of Yahwe, who sent them back with the information that the King would die. He was succeeded on the throne by his brother Joram. The second Ahaziah referred to was the son of Jehoram and of Arab's daughter, Athaliah, the 6th King of Judah. In 2 Chron. xxi, 17 he is called Jehoahaz and in 2 Chron. xxii, 6 Azariah, which is an error of transcription, as indicated by the Greek version. With his uncle, Jehoram,

he served in the latter's campaign against Hazacl, King of Syria. Later he was slain by Jehu, after having been on the throne only a year.

AHIKAR, a-he-kar, the vizier of Sennach¬ erib. The story of Ahikar has recently been published. Scholars claim for it a greater an¬ tiquity than that of the Book of Tobit or the Book of Daniel. Both seemed to have bor¬ rowed from it. Ahikar being childless, adopted a boy named Nadan and treated him as his own son. He was not worthy of the care lav¬ ished upon him. He forged treasonable letters in Ahikar's name, thus procuring Ahikar's condemnation to death. The executioner spared him but imprisoned him. In time he was restored to royal favor and Nadan delivered to him for punishment. The text of the story is in a volume issued from the Cambridge University Press (1898). In condensed form the reader is referred to the American Journal of Semitics (Vol. 16).

AHITH'OPHEL, privy counselor to King David, native of Giloh, in Judaea and supposed to be the grandfather of Bathsheba. He was implicitly trusted by David and Absalom and joined the latter when he revolted. It was he who advised Absalom to take possession of David's throne and concubines. In despair be¬ cause Absalom took other advice than his, he went home and hanged himself.

AHMADABAD, a/ma-da-bad', chief town in the district of the same name, in the presi¬ dency of Bombay, India. It is situated on the banks of the river Sabarmutti, 309 miles north of Bombay. It was founded in 1412 by Ahmed Shah. In 1818 it came under British rule. It has always been the centre of the skilled handi¬ crafts, being famous for the manufacture of silk fabrics, objects of the goldsmith's art and

pottery. It is now also the centre of a big trade in cotton, indigo and opium. The Jumna Masjid, a magnificent mosque, shoots its two lofty minarets above the centre of the city. Here too is the mosque of Sujaat Khan and the modern Jain temple of Seth Hathi Sinh. The city walls, once a very complete system of fortifications and later fallen into ruins, were restored in 1834. Ahmadabad has now a mod¬ ern system of water works installed and con¬ tains quite a number of educational institutions, the most important of which is the Rat Guza College. The population is estimated at a little over 216,000.

AHMED FUAD, 2d Sultan of Egypt: b. 1868. He is the youngest son of the Khedive Ismail Pasha, and succeeded his brother Hus¬ sein Kamel (q.v.) on the death of the latter in October 1917. He received most of his edu¬ cation in Italy and is regarded as a broad¬ minded and progressive ruler. Always noted for his consistently friendly attitude toward the British connection, he is expected to pur¬ sue the same steadfast and loyal policy as his predecessor. He is strongly interested in all matters of national importance, particularly education and agriculture. He is the eighth descendant of Muhammad Ali, the founder of the dynasty, and has two brothers and three sisters living.

AHMED MIRZA, ah'med mir'za, Shah of Persia: b. Tabriz, 20 Tan. 1898. He is the son of Mohammed Ali, whom he succeeded on the

Persian throne when the latter was deposed, 16 July 1909. Although not the eldest son, his father nominated him heir-apparent because the mother of his eldest son was not of the Jadjar, or royal, house.

AHMED, Prince, hero of one of the Ara¬ bian Nights tales. The fairy Pari-banou gives him a tent large enough to shelter an army, yet so fine in texture that it could be folded up and hidden in one's pocket. She also presented him with the apple of Samarcand, which in¬ sured its possessor perennial good health.

AHMEDNAGGAR, a'med-nug'ur, an im¬ portant town in British India, presidency of Bombay, 122 miles east of Bombay, on a branch of the Great Indian Peninsular Railroad. It was founded in 1494 by Ahmad Nizam Shah. During the reign of his son, Boorhan Nizam Shah, it reached a high degree of prosperity, but the political anarchy following his death brought about its decay. In 1797 it fell into the

hands of the Mahrattas, but in 1803 was taken by General Wellesley. The town has increased in size and prospered since coming into British possession. It is noted for the curious defense works that have been laid about it, walls consisting of prickly pear hedges 20 feet high, so full of sap that no fire can burn them and so thick that it is impossible to force a way through. Some fine pieces of na¬ tive architecture still attest the past glories of the town. It has a modern water supply, brought in by means of aqueducts. The popu¬ lation is about 43,000.

AHMED SHAH, ah'med sha, 1st Ameer of Afghanistan: b. 1724; d. 1773. He was a chief of the Abdali tribe, but later extended his sway over the other chieftains by taking ad¬ vantage of their feuds. He thus liberated them from the dominion of Persia and founded the Douranee dynasty. He became noted for his wealth, among which was included the famous Kohinoor diamond. In 1748 he cap¬ tured Lahore and Kashmir and in 1756 de¬ feated the Great Mogul and sacked Delhi.

AHMED TEWFIK PASHA, Turkish diplomat and statesman : b. 1843. Having served in the army some years he was sent to Athens as minister in 1882, to Berlin as am¬ bassador in 1884, then became minister of for¬ eign affairs in 1895, holding this office until 1899. Under the Young Turk regime he was again minister of foreign affairs, becoming grand vizier for a short time in 1909.

AHRENS, Carl, Canadian landscape painter: b. Winfield, Ont., 15 Feb. 1866. A Norseman by descent, he studied art under William Chase, Edwin Ellwell and George Inness of New York. One of his pictures, (The Day is Done,5 received much favorable notice at an exhibition of the Ontario Society of Artists in 1890; another, (The Fisherman's Child, > was given the place of honor in the biennial exhibition of the Royal Canadian Academy in 1893; and still another, (Ripe Corn Time,5 was purchased by the Ontario govern¬ ment to hang in the Parliament buildings, Toronto 1896. Afterward he attracted the at¬ tention of Elbert Hubbard, who was greatly impressed by his originality in atmospheric ef¬ fects, and persuaded him to throw in his lot with the Roycroft Community at East Aurora, N. Y. ; separating from them he spent three

years painting the ruins of the old Spanish missions in southern California. He returned to Canada in 1907. His distinguishing traits are his feeling for color and his handling of the problems of light and air. His composition is always simple and effective ; there is, however, no real resemblance to any other than himself ; his style is an amalgam absolutely his own. In addition to the works mentioned

above the fol¬ lowing are well known: (Cradled in the Net,5 (The House in the Clearing,5 (Gleam on the Woodlands, 5 (The Woodcutters,5 (The Glow in the Woodland,5 (Passing Showers5 and (The Coming Storm.5 He is also a writer of short stories for the periodical press.

AHRENS, a'rens, Franz Heinrich Ludolf,

German classical philologist: b. 1809; d. 1881. For 30 years, from 1849 to 1879, he was director of the Lyceum at Hanover, and became known as an authority on the scientific study of Greek dialects. His principal work, an important standard treatise, is (De Gnccre Linguae Dia- lectis5 (1839-43; new ed. by Meister, 1882-89).

AHRIMAN, a'ri-man, the devil of the ancient Zoroasterian religion. He is the head spirit of all the sources of evil. Under him are hordes of other evil spirits, but next to him come the six arch-demons, chief of whom is Aeshma.

AHUACHAPAN, a'oo-atch'a-pan, a de¬ partment of the Republic of El Salvador. It is divided into two districts, the first of which includes the departmental capital (pop. 15,000), also called Ahuachapan, together with Apaneca, Ataco, Jujutla, Guaimango, San Pedro Pustla and Tacuba (in all 48,840 inhabitants), and the second district embraces Atiquizaya, San Lo¬ renzo, Turin and Refugio (all told 15,168 in¬ habitants). It is bounded on the north and northwest by Guatemala, on the east by the de¬ partments of Santa Ana and Sonsonate, and on the south and southwest by the Pacific Ocean. The climate is considered healthful, the agri¬ cultural products are uncommonly varied, and in commerce and industry this department takes the leading position in the republic. Total pop. 64,008. See Salvador, El.

AIBONITO, a'bon-eto, Porto Rico, capital of a municipality of the Guayama electoral dis¬ trict, 25 miles northeast of Ponce. Coffee and tobacco are cultivated in the neighborhood, and the town, located over 2,000 feet above sea- level in a cool and healthful situation, is the seat of an acclimatizing station and sana* torium for visitors. Pop. of municipality, 8,600; of town, 2,100.

AICARD, a'kar', Jean Francois Victor,

French author: b. Toulon, 4 Feb. 1843. Many of his works are extremely popular and he is especially noted for his finished style. He was elected member of the French Academy in 1909. Among his later works are (Poemes de Pro¬ vence5 (1874) ; (La chanson de l'enfant5

(crowned by the Academy 1876) ; (Miette et Nore5 (1880) ; (Lamartine5 (1883) ; (Jesus5 (1896-1912); (Tata5 (1901-10); (L'ame d'un enfant5 (1903). His plays include (Legende du coeur5 (1903) ; (Benjamine5 (1906) ; (L'illustre Maurin5 (1908) ; (Maurin des Maures5 (1908) ; (Hollande; Algere5 (1913).

AIDA, grand opera in four acts by Guiseppe Verdi (libretto by Camille du Locle and

Antonio Ghislanzoni), first produced at Cairo, Egypt, on 24 Dec. 1871. Verdi was in his 59th year at the time, but, as the event showed, not yet in the full maturity of his powers. He was still later to astound the musical world with (Otello) and (Falstaff) — the latter a unique exhibit of the ultimate flowering of genius. Aida typifies Italian opera at its best. Never has there been a richer or more breathless outpouring of melody that carries the listener on its very crest from beginning to end. Written to order and for an honorarium of six figures, the work defies tradition in its spontaneity and torrential vigor. The libretto, founded upon a motif of ancient Egyptian his¬ tory, affords full scope for brilliant pageantry, contrasted scenic effects and emotional in¬ tensity. Rhadames, the warrior hero, betray¬ ing his country for love of the captive Ethiopian princess, Aida, Amneris, daughter of the King, whose love for Rhadames is unrequited, Amonasro, the enemy King, energized by un¬ dying hate of his successful adversary, and Ramfis, the vengeful high-priest, are all operatic characters in the finest sense. The music individualizes them in a masterly way. Local color is used sparingly, but the composer's richly flowering fancy endues the pages with glowdng, sensuous colors, admirably contrasted with impressionistic mood-painting, as in the famous Nile scene, with its pale moon-tinted flute introduction. Verdi's orchestra becomes a far more expressive instrument than ever before. It rarely dominates the voices, but the accompaniment is never stereotyped and it always adds dramatic point to the scene. There are many instances, too, of matchless skill in the handling and the language is eloquent throughout. Among the finest numbers in the opera — selection is difficult — may be men¬ tioned the opening tenor romance, Celeste Aida, the pompous but brilliant finale of the second act, full of varied contrasts, brought to an in¬ tensely dramatic close, the judgment scene with its solemn pauses and the final love duo, O terra addio, blending with the overhead strains of the sacred dance of the priestesses and Amneris' final wail.

With all the remarkable development of music in the last four decades, Aida has re¬ mained as fresh and as vivid as when it was first produced. Its influence on modern Italian opera is unmistakable, its pages a constant source of inspiration to Verdi's successors.

Lewis M. Isaacs.

AIDE-DE-CAMP. An officer who may be regarded as a kind of superior confidential attendant upon a general in active service. He carries all orders from the general in command to the commanding officers of the various arms and divisions on the field of battle ; these he is to deliver in the plainest terms, so as to be dis¬ tinctly understood ; and when so understood, the orders are to be as implicitly obeyed as if the general himself were present and speaking. Wherever possible such orders must be deliv¬ ered in writing. As an example of the import¬ ance of this matter may be adduced the bril¬ liant but disastrous light-cavalry charge of the British at Balaklava in 1854. An aide-de- camp also acts as secretary to the general and assists him in his correspondence when he has not specifically a military secretary. He aids

likewise in dispensing the courtesies of the gen¬ eral's house or tent. Aides-de-camp vary in number according to the rank of the general officer. In the United States a lieutenant-gen¬ eral is allowed to have two aides (lieutenant- colonels) and a military secretary; a major-general, three aides (either captains or lieuten¬ ants) ; and a brigadier-general two aides (lieu¬ tenants). Before an officer below the rank of major can receive such appointment he must have served at least two of the six preceding years with his troop, battery or company. The appointment is for four years and may not be exceeded. In the British service, before an officer can be appointed as aide-de-camp, he must have been two years with his regiment and must pass an examination.

AIDIN, i-den, Turkey in Asia, capital of a sanjak of the same name, in the vilayet of Smyrna, on the classic river Meander, 70 miles by rail southeast of Smyrna. It is noted for the beauty of its situation, its tree-shaded streets, its churches, synagogues and mosques, the ruins of the ancient Tralles or Guzel- Hissar and for its interesting history. A large transit trade is carried on in cotton, figs, dates, raisins and important candy and leather manu¬ factures. Pop. 35,000.

AIGRETTE, a'gret, a French word, used to denote the down, or plume, that is attached to many vegetable seeds, as the thistle or the dandelion. It is also used in reference to the feathery tufts found on

the heads of some birds, as the heron and the egret, whence the term came also to cover a tuft of feathers employed as an ornament in a woman's head¬ dress. More specifically it means such an orna¬ ment of egret plumage, the long, slender white feathers that spring from the back of the egret during the breeding season and for which these birds have been much hunted. As the feathers cannot be procured without killing the bird, thus causing the death of the nestlings, the result has been that it has become more and more rare and now threatens to become extinct. To protect the birds their feathers are pro¬ hibited from importation into the United States.

AIGUES-MORTES, eg'mort, France, town in the department of Card, 25 miles by rail southwest of Nimes. Isolated amid the salt marshes of the Rhone delta, three miles from the Mediterranean with which it commu¬ nicates by a canal, it is remarkable for the fine mediaeval fortifications, crenellated walls, bas¬ tions and towrers surrounding the town. These were begun by St. Louis IX who sailed from here in 1248 and again in 1270 for the seventh, and the eight crusade in which he lost his life. The fortifications were completed under Philip III. Trade is carried on in oranges, fruits, wine and coal and the manufacture of soda; fishing and the entertainment of tourists are the chief industries. Pop. 4,000.

AIGUILLON, da'gwe'yon', Armand de Vignerot Duplessis Richelieu, Due d', French statesman: b. 1720; d. 1782. In 1754 he became governor of Brittany. His administration of the province was so bad that he brought upon himself the condemnation of the Parliament of Rennes. But his friendship with Madame du Barry, the mistress of Louis XV, not only saved him from punishment but was the influence

which caused his appointment as minister of ioreign affairs, in 1771. But so incompetent was he that even the complacent monarch could no longer tolerate him, and after serving in office three years he was removed.

AIGUILLON, Marie de Vignerot, Duch- esse d': b. 1604; d. 17 April 1675. In 1620 she was married to the Marquis de Combalet, and after his death in action in 1622 she de¬ voted her time and fortune to works of piety and charity. Her interest was aroused in the Jesuit

mission to Canada bjf Father Le Jeune's 'Relation* of 1635, and in 1639 she founded the Hotel Dieu at Quebec, entrusting it to Augustinian nuns from Dieppe.

AIGUN, Convention of (1858), between Russia and China, by which the former obtained all the territory eastward of the Ussuri River to the Japan Sea, and fixed her southern boundary at the frontier of Korea.

AIHUN, i'hun, or AIGUN, China, town of northern Manchuria, of historical importance, owing to the Aihun treaty effected here by Count Muraviev in May 1858, by which the left bank of the Amur was ceded to Russia. An active transit trade is carried on in grain, flour, mustard, tobacco and oil. Pop. 20,000. See Aigun, Convention of.

AIKEN, Charles Francis, American edu¬ cator : b. Boston, Mass., 8 April 1863. He was educated at Harvard University, St. John's Theological Seminary, Brighton, Mass., and the Catholic University, Washington, D. C. In 1884-86 he was teacher of the classical lan¬ guages in Hcathcote School, Buffalo, N. Y., from 1892 to 1895 was engaged in parish work, studied abroad for the next two years, and in 1897 was appointed instructor, in 1900 assistant professor, in 19.06 ordinary professor of apologetics at the Catholic University, Wash¬ ington. He was dean of the faculty of theology in 1909, 1911 and since 1913. In the latter year he lectured at the Catholic Summer School, Cliff Haven, N. Y. He is a member of the Advisory Council of the Simplified Spelling Board, is a contributor to the Catholic Univer¬ sity Bulletin , the American Ecclesiastical Re¬ view, the American Catholic Quarterly Reviezv and has published (The Dhamma of Gotama the Buddha and the Gospel of Jesus Christ } (Boston 1900; French trans., Paris 1903).

AIKEN, William, American congressman: b. Charleston, S. C., 1806; d. Flat Rock, N. C., / Sept. 1887. In 1825 he was graduated from the College of South Carolina. Having been elected, in 1838, to the State legislature he served his term and was then, in 1844, elected governor of South Carolina. In 1851 he was sent to Congress as democratic representative, where he remained for six years and was short only one vote from becoming Speaker of the House of Representatives. He opposed seces¬ sion, and after the end of his term he retired from politics, until 1866, when he was again elected to Congress but was not admitted to a seat. Aiken, S. C., is named for him.

AIKEN, S. C., city and county-seat of Aiken County, on the Southern Railroad, 17 miles northeast of Augusta, Ga., and 120 miles northwest

of Charleston. It is one of the most picturesque and attractive towns in the United

States, being located at an elevation of 600 feet above the sea, in the midst of numerous pine forests. The dryness of the atmosphere and the comparative mildness of the climate have combined to make Aiken the most noted health resort in the South. The town is the centre of a large and important agricultural district and does a thriving cotton trade. There are also artificial stone works, planing and lumber mills. There is located here the Aiken Insti¬ tute ; St. Angela's Academy for white students ; the Schofield Normal and Industrial School and the Robertson Training School for colored youth, and several private schools and academies for both sexes. Many Northern families of wealth and culture have winter homes here. Aiken was first incorporated in 1835, and is governed by charter, secured in 1890 and re¬ vised in 1897, which provides for a mayor elected every two years, and a city council com¬ posed of the mayor and six aldermen. The town officials are elected annually at town meet¬ ings. The water supply and sewerage system are controlled by the town. There are two national banks here, numerous large hotels, a number of manufactories and several news¬ papers. Pop. (1920) 4,103.

AIKIN, JOHN, English physician and miscellaneous writer: b. 1747; d. 1822. He at¬ tained considerable popularity by (Evenings at Home) (6 vols. 1792-95), instructive reading for the family circle which were translated into almost every European language, and which he issued in collaboration with his sister Mrs. A. L. Barbauld. His (General Biography) (10

vols., 1799-1815), was another important work. His daughter, Aiken, Lucy, b. 1781 ; d. 1864, was the author of court memoirs of (Queen ElizabetlP (1818) ; (James P (1822) ; (Charles P (1833), which had considerable vogue. She also wrote Worimer,* a novel (1814), and a (Life of AddisoiP (1843).

AIKINITE. See Needle Ore.

AIKINS, Sir James (Albert Manning), Canadian lawyer and administrator : b. Grahamsville, Peel County, Ontario, 10 Dec. 1851. He was educated at Upper Canada Col¬ lege and Toronto University, where he was graduated in 1875. He was called to the Ontario bar in 1878, and settled in Winnipeg in 1879. He represented Brandon in the

Con¬ servative interest in the House of Commons 1911-15, and resigned to lead his party in the provincial elections for Manitoba, in which they suffered defeat. In 1916 he was appointed lieutenant-governor of Manitoba. He was knighted in 1914, and was president of the Canadian Bar Association, 1914-15.

AILANTHUS, a genus of trees of the family Simarubacece, including eight or nine species of central and southern Asia and north¬ ern Australia. The trees have large deciduous pinnate leaves and small greenish flowers in large panicles, followed by flat-winged fruits. A. glandulosd, the Tree of Heaven, the best known species, is common in cultivation in the United States and in some places has run wild. It is better able to endure smoke and dust than most trees and has few enemies. The trees are short-lived and are somewhat objectionable be¬ cause of their malodorous flowers, the pollen of which is said to cause catarrhal troubles.

AILLY, a'ye,' Pierre d' (((Petrus de Allaco11), French cardinal and philosopher sur- named <(the eagle of France and the indefati¬ gable hammer of heretics® : b. at Compiegne 1350; d. at Avignon 1420. Distinguished as a preacher and philosophical disputant, he led an active and diversified life mainly devoted to the promotion of church unity and the healing of the papal schism. He was made cardinal by John XXIII and was appointed papal legate to Germany. He was a prolific author and among his writings are (Concordantia Astronomiae cum Theologia) ; and (Imago Mundi1 ; the lat¬ ter of American significance as in it he writes of the possibility of reaching the Indies by sail¬ ing west, citing as authorities Aristotle, Pliny and Seneca. Columbus' personal copy of d'Ailly's (Imago Mundi1 now in the Columbine library at Seville has numerous marginal notes in the navigator's own handwriting, and Las Casas in his (Historia de las Indias) (Vol. I, xi, 89) states that of all "modern writers d'Ailly exercised the greatest influence on the realization of the plans of Columbus.®

AILSA CRAIG, al'sa krag, Scotland, a remarkable rock islet, at the mouth of the Firth of the Clyde, off the west coast of Ayrshire. Scarcely two miles in circumference, it rises precipitously to a height of 1,114 feet. On the northern side is a columnar basalt cave. The rock is the chief source of supply for "curling11 stones, which are popularly called <(Ailsa Craigs® or "Ailsas.® The rock is immortalized in liter-

ture, notably in Keats' fine sonnet (1818).

AIMARD, a'mar', Gustave, French- Ameri¬ can novelist: b. 1818; d. 1883. His real name was Olivier Gloux and he became known as the "French Fenimore Cooper.® After a voyage to America as a cabin-boy he spent an early ad¬ venturous life for 10 years among Indians in Arkansas and Mexico. He afterward traveled as a soldier of fortune in Turkey, the Caucasus and Spain, served as an officer of the Garde Mobile in the Paris revolution of 1848, and as commander of the ((1864); La foret vierge1 (1870); and (Les sajTpeurs blancs) (1873).

AIN, an' administrative department of the French government, on the French and Italian frontiers. In the south and west the country is marshy, but in the north are the Jura Moun¬ tains, much frequented by foreign tourists. The soil produces bituminous limestone. The area is about 2,250 square miles and the population 342,482. The chief town is Bourg.

AINGER, an'jer, Alfred, English clergy¬ man and author: b. London, 9 Feb. 1837; d. 8 Feb. 1904. In 1887 he was appointed a canon in Bristol Cathedral; in 1894 he became master of the Temple, London ; chaplain-in-ordinary to Queen Victoria in 1896; and to King Edward VII in 1901. He was distinguished by an at¬ tractive personality, by wit and humor; and be¬ came well known as an authority on Charles Lamb, Crabbe and Thomas Hood. His chief works are Loems of Thomas Hood1 (with

biographical introduction, 1897) ; (The Life and Works of Charles Lamb1 (12 vols., 1899- 1900) ; Crabbe1 (1903) ; (The Gospel and Human Life1 (1904) ; (Lectures and Essays1 (2 vols., 1905).

AINMULLER, m'mool'er, Maximilian Emmanuel, German artist, founder of the modern school of stained glass painting: b. Munich, 14 Feb. 1807 ; d. 9 Dec. 1870. After studies in architecture and decoration, he be¬ came designer in the royal porcelain manu¬ factory at Nymphenburg and later inspector and head of the royal manufactory of stained glass at Munich. Among his master works are the windows representing St. Peter and St. Paul in the Vatican at Rome; windows in the cathedrals of Cologne, Glasgow, St. Peter's College, Cambridge, St. George's Chapel, Wind¬ sor, St. Paul's Cathedral and Westminster Abbey, London.

AINO, fno, or AINU, sometimes called the (<hairy Ainus,® people of northern and eastern Yezo, on the Island of Saghalien and the southern Kuriles, numbering in all about 18,000. They are supposed to

be the descend- ents of the original inhabitants of the Japanese archipelago. They differ very much in ap¬ pearance from the present inhabitants of Japan, especially in the heavy beards of the men. Their language resembles the Japanese in structure, but differs radically in vocabulary. Authorities differ widely in their theories re¬ garding the origin of the Ainu, one of them being that they were a small branch of the Caucasian, or white, race, which was driven out into the archipelago by the Mongols. Con¬ sult Batchelor, (The Ainu and Their Folk Lore' (London 1901) ; Chamberlain in the Journal of Race Development for 1912-13.

AINSWORTH, anz'wiirth, Fred Crayton,

American soldier: b. Woodstock, Vt., 11 Sept. 1852. He was appointed first lieutenant and assistant surgeon, U.S.A., in 1874; major and surgeon 1891 ; colonel and chief of Record and Pension Office in 1892, where he devised and introduced many important improvements in the business methods of the War Department and the army and completed the compilation and publication of the ˆOfficial Records of the Union and Confederate Armies.1 In 1899 he received the rank of brigadier-general. In 1904 he became the military secretary of the army with the rank of major-general, and in 1907 the adjutant-general of the army with the same rank. In 1912 he was retired from active service, at his own request, after more than 37 years' service.

AINSWORTH, William Harrison, Eng¬ lish novelist: b. 4 Feb. 1805; d. 3 Jan. 1882. He was the son of a Manchester solicitor. He wrote Lockwood1 (1834) ; (Jack Sheppard' (1839); and about 40 other novels, including (Guy Fawkes,1 (Tower of London,1 (Windsor Castle,1 Lancashire Witches,1 (Flitch of Bacon,1 etc.

AINTAB, in-tab, Turkey in Asia, town in the villayet of Aleppo, on the southern foothills o f Mount Taurus and on the right bank of the river Sajur; 70 miles northeast of Aleppo. Its strong mediaeval castle Hamtab is the seat of an important military station. There is an active trade in the tobacco, grain and fruits of the region, and in the local manufactures of

cotton goods, striped cloths and pekmez con¬ serve made from grapes; also in ((Hittite)) antiquities from ancient Doliche, the site of the cult

of Baal, to the northwest. Aintab is the seat of American, Anglican and Franciscan missions. Pop. 45,000.

AINU. See Aino.

AIR, the gaseous substance that envelops the earth and forms its atmosphere. (See At¬ mosphere). It consists almost entirely of the gases oxygen and nitrogen, which are merely mixed and not chemically combined ; but in addition it contains many other substances in small amounts, among which are water-vapor, carbon dioxide, nitric acid, ammonia, ozone, argon, neon and organic matter, as well as dust, germs and other solid particles held in suspen¬ sion. In certain localities other components may occur. Near the sea, for example, salt can always be detected in it, and over the land it contains sulphates in small amounts. The quantity of water-vapor present in air varies greatly with time and place, and in all analyses and statements of its composition the water- vapor is supposed to have been removed first. The quantity of carbon dioxide is subject to considerable variation also. It is very constant in the open country, where it constitutes about 0.043 per cent (by weight) of the air; in cities the percentage is higher, rising to 0.07 and occasionally to 0.10. In crowded rooms, espe¬ cially where artificial lights are burning, the quantity of carbon dioxide present may be even greater than this. In country air the percentage of carbon dioxide is subject to a diurnal change amounting to about one-eighth of its total amount, more being present at night than in the daytime. This is undoubtedly due to the fact that plants absorb the gas by day and exhale it during the night. The proportion of nitrogen and oxygen in air is subject to variation also, though within much narrower limits. In gen¬ eral, 100 volumes of air contain about 21 vol¬ umes of oxygen and 79 of nitrogen. Regnault analyzed air collected in different parts of the world, and found that the volume-percentage of oxygen in the air of Europe varied from 20.903 to 21.0 per cent. The average of 17 samples collected from over the Arctic seas gave 20.91 per cent. Regnault was of the opinion that sea air contains slightly less oxygen than land air ; but Lewry considered that no distinct difference could be proved except in the tropics, where sea air exhibited a slight diurnal variation. Argon constitutes about 1 per cent of air, and neon about 0.001 per cent. The nitric acid present in the air is so small in amount that it can be detected only in rainwater, by which it is dis¬ solved and brought down. It is very likely formed partly by the direct combination of oxygen and nitrogen under the influence of electric discharges, and partly by the action of ozone upon ammonia. The quantity present is greatest in summer and least in winter. The ammonia of the air occurs partly as carbonate and partly as nitrate. Its

amount is exceedingly variable, ranging from 0.1 to 135.0 parts (cal¬ culated as carbonate) in 1,000,000 parts of air, the average amount being perhaps 6. The amount present decreases during a heavy rain, but within a few hours it returns to the normal amount again. No ozone can be detected in city air, and air over marshes and in malarial

regions contains very little of it. Normal country air contains not more than one volume of this gas to 700,000 of air. It is more abun¬ dant in summer than in winter, and is most noticeable during thunderstorms and heavy winds. In the laboratory ozone is produced by the action of electric discharges upon oxygen, and it is probably produced in the air in the same way. Hydrogen peroxide has been de¬ tected in the air, and some authorities consider that it may be present in greater abundance than ozone, and that it may sometimes be mis¬ taken for ozone. (For further information on the composition of the air, see Angus Smith's (Air and Rain}). According to Regnault, one cubic centimetre of air that has been freed from water-vapor, carbon dioxide, and am¬ monia, weighs 0.0012932 gramme when the air is at the temperature 0° C., and under a barometric pressure of 760 millimetres of mer¬ cury at Paris (lat. 48° 50' N.), and at a height of 60 metres above the sea. In English equiva¬ lents this means that at ordinary atmospheric pressure and at the temperature of melting ice (32° F.) a cubic foot of air weighs 0.080681 pound ; (<ordinary atmospheric pressure,® signi¬ fying the pressure that would be exerted by a weight of 14.7 pounds, resting upon a base one inch square at sea level in the latitude of Wash¬ ington. When a mass of air, originally at at¬ mospheric pressure and at the freezing-point (32° F.), is heated to the boiling-point (212° F.) without changing its volume, its pressure becomes 1.36728 atmospheres according to Bal¬ four Steward, or 1.36706 according to Wiebe and Bottcher. The average of these is 1.36717, which agrees well with the value 1.36719 as given independently by Morley and Miller. The older estimates of Regnault and Magnus are probably too small. The specific heat of air (the pressure being kept constant) is 0.2375 according to Regnault, and 0.2389 according to Wiedemann. The specific heat (the volume being kept constant) is 0.1715 according to Joly's direct measurement with the steam calori¬ meter. Air cannot be liquefied by any pres¬ sure whatever so long as its temperature is higher than about 220° F. below zero (-140°C.) ; but if it be first cooled to a temperature slightly below this it condenses to a liquid upon the application of a pressure of 39 atmospheres. (See Critical Point). If it be cooled to a temperature materially lower than 220° F. below zero, it can be liquefied by a correspond¬ ingly smaller pressure. Liquid air is opalescent at first, probably from particles of solid carbon dioxide

held in suspension. These can be sepa¬ rated by filtration, or they will rise to the surface in a short time, leaving the clear, transparent air beneath. When liquid air is ex¬ posed in a glass vessel it absorbs heat rapidly from surrounding objects, and boils actively until it has entirely evaporated. The nitrogen that it contains evaporates faster than the * oxygen, however, and the liquid remaining in the vessel becomes increasingly rich in oxygen until toward the last it consists almost entirely of that gas. Liquid air may be frozen to a clear, transparent solid by surrounding it with liquid oxygen and then forcing the evaporation by means of an air-pump. Liquid air is of great interest to the physicist for many reasons; but its importance in the arts has been grossly ex-

aggeratcd. In particular, the process that is put forth from time to time, to utilize liquid air for running a motor that shall condense more liquid air than it consumes, is impossible of realiza¬ tion, because although such an action would not necessarily imply perptual motion it would violate the second law of thermodynamics. (See Thermodynamics). If liquid air is confined and allowed to become warm through the ab¬ sorption of heat from its surroundings its expansion gradually generates an enormous pressure. This fact, together with the safety with which liquid air can be handled, has led to its use to a limited degree for blasting in tunnels and mines, where the presence of the irrespirable products of combustion of ordi¬ nary explosives is objectionable; but even this application has been discontinued, owing to certain grave and apparently insuperable prac¬ tical difficulties that were encountered. See Liquid Air.

The scientific study of the air has been much stimulated in recent years by the estab¬ lishment of the Hodgkins Fund. In October 1891 Mr. Thomas George Hodgkins of Se- tauket, N. Y., made a donation to the Smith¬ sonian Institution, the income from a part of which was to be devoted to the ˆincrease and diffusion of more exact knowledge in regard to the nature and properties of atmospheric air in connection with the welfare of man.® The first prize of $10,000 from this fund was awarded on 6 Aug. 1895 to Lord Rayleigh of London, and Prof. William Ramsay of University Col¬ lege, London, for their discovery of the pre¬ viously unknown element argon in the atmos¬ phere. (See Argon). A prize of $1,000 was also awarded at the same time to Dr. Henry de Varigny of Paris, for his (L'Air et la Vie) (((Air and Life®), which was considered to be the best treatise upon atmospheric air, its

prop¬ erties and relationships. Further information concerning the Hodgkins Fund may be had from the Smithsonian Institution, Washington, D. C. For information concerning dust and germs, consult Tyndall's (Fragments of Science, 5 and Dr. T. Mitchell Prudden's ˆDust and Its Dangers. >

Dephlogisticated Air, in the old chemistry,

was air that had been deprived of phlogiston (q.v.) ; in modern terminology it is called oxy¬ gen. Fixed air was Dr. Black's name for carbon dioxide, suggested by the fact that cer¬ tain alkaline substances can ((fix® this gas, or combine vith it to produce a solid substance.

The word <(air® also occurs as an element in a host of compound words. The significance of many of these is evident, but some few call for special mention and they will be found below in their respective order. See Aero¬ dynamics; Aerostatics; Aeronautics; Atmos¬ phere; Barometer.

Allan D. Risteen.

AIR, in music (in Italian, aria), means a continuous melody in which some lyric subject * or passion is expressed. The lyric melody of a single voice, accompanied by instruments, is its proper form of composition. The word also designates the entire composition in such ex¬ pressions as ((national air,® (<operatic air,® etc. In the 16th and 17th centuries the word was used in England to denote a lively, cheerful strain. It is fast becoming obsolete as a

technical term synonymous with aria. Many of the Italian airs of the present, together with too great a proportion of the popular music of the day, are destitute of meaning and character. The songwriters of Germany strive to con¬ struct their airs in direct conformity to the meaning of the words. Air is also the name often given to the upper or most prominent part in a concerted piece, and is thus equivalent to treble, soprano, etc. Arietta signifies a short, less elaborate air than aria , and is designed to express a more simple and transient emotion.

AIR, a-er', or ASBEN, French West Africa, an oasis of the desert of Sahara, called by Dr. Barth <(the Switzerland of the desert and the frontierland of negrodom.® In the north, inhabited by the savage and treacherous Tuaregs, the mountain group of Gunge rises 5,000 feet above the level of the sea. On the south a desert plateau, rising 2,000 feet, the home of giraffes, ostriches, and wild oxen, di¬ vides Air from

the Sudan. Palm nuts, dates, figs, millet, senna and indigo are the chief products ; camels, zebra, asses, cattle and goats are raised. The salt caravan trade to southern regions, and pilgrim caravans traveling to Mecca, are the means of commercial inter¬ course, yielding in tribute much of the revenue of the reigning suzerain sultan whose capital is at Agades (pop. 50,000), and of his emir who governs at Tintellust (pop. 60,000). Asben is the native designation of the region, which under the name of Air, was first described by Leo Africanus in 1526.

AIR-BATH, an apparatus designed for drying substances by exposing them to air of any desired temperature.

AIR BEDS AND CUSHIONS, often used by the sick and invalids, are composed of india- rubber, or of cloth made air-tight by a solu¬ tion of india-rubber, and when required for use filled with air, which thus supplies the place of the usual stuffing materials. They tend to prevent bedsores from continuous lying in one position. They are also cheap and easily trans¬ ported, as the bed or cushion when not in use can be packed in small compass to be again inflated with air when wanted.

AIR-BLADDER. See Fish.

AIR-BLAST, a stream of air, issuing from a nozzle or other aperture under pressure. Such blasts are used for throwing sand or other abrasive material against a body that is to be eroded or polished; for forcing the fires of forges or furnaces, and for burning out the impurities in pig iron in the manufacture of Bessemer steel; for removing dust from grind¬ ing-machines and saws ; for cleansing woven fabrics and for multitudes of other purposes.

AIR-BLAST TRANSFORMER. This

transformer is particularly well adapted to all installations where the use of oil is not permis¬ sible, or where, on account of the size of the units, self-cooling is impracticable and the cost of water required by water-cooled transformers is prohibitive. Their high efficiency at all loads, low fire risk, economy of floor space and other desirable features have resulted in a large and increasing demand for this apparatus for those installations in the foundry and arsenal in which large amounts of power must be con¬ tinuously handled.

Electric transmission lines for moderate dis¬ tances are usually operated at the following potentials: 2,200, 6,600, 11,000, 16,500, 22,000

and 33,000 volts. The standard lines of air- blast transformers are designed for these voltages and on account of the drop in potential on the transmission lines, taps are brought out from the high tension winding at such points that the transformers can be operated on poten¬ tials approximately 3J/3, 62/$ and 10 per cent lower than their normal voltage. This arrange¬ ment of taps on the high tension winding per¬ mits the use of duplicate transformers at either end of transmission lines and at intermediate points, which is of great advantage in many cases, particularly on large systems.

Air-blast transformers are cooled by a forced blast of air delivered by a blower. One blower usually supplies all of the transformers in any particular station; but it is strongly recom¬ mended that a duplicate blower equipment be added. This arrangement permits one unit to be held in reserve. The transformers are gen¬ erally placed above an air-chamber in which a pressure is maintained slightly above that of the surrounding air, and the blower may deliver air directly into this chamber, or, if it is more convenient, the blower can be located at a dis¬ tance from the transformers, feeding into a conduit which leads to the air-chamber.

AIR-BOX, a flue or other form of conduit conveying air to or from a furnace or into a mine for ventilation.

AIR BRAKE. A brake operated through the medium of compressed air, and extensively applied to railroad trains and street railway

engineer and inventor, Mr. George Westing- house. It consisted of a steam-driven, direct- acting air compressor (see Fig. 1), carried on the locomotive, which forced compressed air into a reservoir. This reservoir was connected through a three-way valve, in the engine cab, to the rear of the locomotive tender where it terminated in a flexible hose with a coupling. Throughout the length of every car a pipe was extended, with a similar hose and coupling at each end. To combine a number of cars and a locomotive into a train the respective couplings were united, making the brake pipe continuous throughout the train. The brake pipe at the rear of the train was closed by a cock. On each car, the brake pipe communicated with one face of its respective brake cylinder piston. On the other face were located brake rods and levers holding the brake shoes almost up against the treads of the car wheels. Normally the three-way valve connected the brake pipe to the

atmosphere. To apply the brakes, the engineer turned the three-way valve to a posi¬ tion which cut off the brake pipe from the at¬ mosphere and permitted compressed air to flow into it from the reservoir (now known as the main reservoir) on the locomotive. This air, thereupon, forced the brake cylinder pistons on each car outward, actuating the brake rods and levers, and thereby forcing the shoes against the treads of the car wheels.

Whenever the desired pressure was developed in the brake pipe, the engineer turned the three- way valve into a position (lap position) which cut off the main reservoir from the brake pipe as well as continuing to hold the communica-

Fig. 1

cars. Originally this brake was devised merely as a safety device, but is now considered in¬ valuable as a dividend-earning asset also. This latter consideration is based on the principle, that the better the brake, the higher the sched¬ uled speed; consequently, the more frequently the car or train can traverse a given road so that fewer cars need be purchased and less labor employed. The air brake permits high sched¬ uled speed because of the short emergency stopping distance made possible from high velocities and because a train or car may be run at high speed within a short distance of the stopping point, which is a highly important feature where stops are frequent. The first type of this appliance, designated as the straight-air, or non-automatic., brake, was in¬ vented in 1869 by the well-known American

tion between the brake pipe and atmosphere closed. In order to release the brakes, the three-way valve was moved into a position which cut off the main reservoir from the brake pipe and, at the same time, vented the latter to the atmosphere. This operation removed the pressure from the faces of the brake cylinder pistons and permitted the brake cylinder release springs to pull the shoes from the treads of the wheels, through the medium of the rods and levers.

This brake, while being far superior to any vehicle brake heretofore invented, required im¬ provements in the following respects: (1) The brake pipe pressure, being higher on the front than on the rear cars during the period the brake pipe pressure was being built up. caused the rear cars to run violently into the head

cars and produced a rough stop. (2) The stop with a long train was prolonged through a considerably greater distance than with a single car because of the time necessary to transmit the required air through the long brake pipe to the respective brake cylinders. (3) For a long train, an impracticably large size main reservoir was required to fill all brake cylinders to standard maximum pressure without the as¬ sistance of the compressor. (4) In case a train broke in two, or a hose burst, the brake would be lost. This would be especially danger¬ ous on grades.

In order to improve these conditions, Mr. Westinghouse invented the automatic brake in 1872 (see Fig. 2). With this scheme, air was

through a valve which reduced its pressure, was admitted by the brake valve into the brake pipe. The air then passing to the outer face of each triple valve piston held each in its innermost position, where this air was able to flow by the piston through a groove into a storage reservoir (auxiliary reservoir), charging it until the pres¬ sure on the two faces of the triple valve piston became balanced. In this innermost position of the triple valve piston, a slide valve, controlled by the piston, locally connected its respective brake cylinder to the atmosphere. To retard partially, or stop a train under ordinary con¬ ditions, the brake valve was moved into (<serv- ice® position whereby the main reservoir air supply was cut oft" from the brake pipe and the

Fig. 2

stored in a reservoir on each car at a time when a brake was not required. When a brake appli¬ cation was desired the stored air, being at the spot ready for use, was caused to flow from the reservoir on each car to its respective brake cylinder. In order to apply the brakes with this arrangement, it became necessary to employ a device for controlling the flow of this stored air, known as a plain triple valve, on each car. This device had to be operated just the reverse of the straight air brake, viz., to release the brakes, air was put into the brake pipe, and to apply them, the brake pipe air was vented to the atmosphere. This scheme had the adde-d advantage of operating on the <(closed circuit® principle, in that, whenever a train broke in two, or a hose ruptured, the resultant reduction in brake pipe pressure caused the brakes to apply automatically. Experience with the air brake to this time indicated that two rates of applying the brakes were desirable for train control : — one, a comparatively slow rate (service

rate) for ordinary use, through which the train would be stopped as quickly as con¬ sistent with the comfort to passengers and free¬ dom from damage to lading and equipment; the other, a rapid rate (emergency rate) through which the train would be stopped at a rate as great as conditions would permit, to be used only when a short, quick stop became necessary. To utilize these new functions, the engineer's three-way valve was developed into a form designated as a brake valve. With this automatic system, as with the straight air system, compressed air was forced into the main reservoir by a compressor. Normally, however, when the train was running free over the road, the compressed air, after passing

air in the latter vented to the atmpsphere. The rate of reduction in brake pipe pressure, while slow, was nevertheless faster than air could flow from the storage reservoir through the groove past the triple valve piston back into the brake pipe. Consequently, a differential pres¬ sure, thus developed in the triple valve piston, forced it outward to a position where its ac¬ companying slide valve cut off the brake cylinder from the atmosphere and connected the brake cylinder to the auxiliary reservoir in such a manner that the pressure in the auxiliary reser¬ voir dropped at the same rate as the pressure in the adjacent section of the brake pipe.

Whenever it was desired to stop the brake application from developing to its fullest possible magnitude, the engineer, by placing the brake valve in ((lap® position, interrupted the reduction in brake pipe pressure. The auxiliary reser¬ voir pressure, having been reducing up to this time at the same rate as that of the brake pipe, immediately dropped slightly below the now constant brake pipe pressure, whereupon the triple valve pistons were forced slightly inward, thereby resulting in cutting off further flow of air from the auxiliary reservoirs into the brake cylinders. In releasing the brake, the brake valve was moved into <(release® position where air at full main reservoir pressure was permitted to expand into the brake pipe through a large opening, in order to transmit a quick impulse through the brake pipe. The triple valve pistons were thereby forced to their innermost positions whereupon the auxil¬ iary reservoirs were recharged and the brake cylinder air exhausted, as previously explained. After a short period elapsed, the engineer placed the brake valve in ˆrunning® position to prevent

the system from charging to a pressure higher than permitted by the reducing valve, which is operative in “running” position and is used to govern the maximum pressure carried in the brake pipe. To produce an emergency brake application, the operator moved the brake valve

pipe air to flow to one outlet (the brake valve port) at the extreme end of the brake pipe, and furnishing, in addition, a local outlet on each car, the time to apply all the brakes throughout the train was materially reduced. This decreased the length and improved the

Fig- 3

into “emergency” position where the brake pipe air was vented to the atmosphere through a large opening. The resultant sudden reduction in brake pipe pressure caused the auxiliary reservoir air to force the triple valve pistons and slide valves into their outermost positions where auxiliary reservoir air was admitted into the brake cylinders rapidly. This operation produced a short, quick stop. While the auto¬ matic brake with the plain triple valve made the air brake safe, and the stops quicker and shorter than with the straight air brake, yet as train lengths and weights increased, the stops

smoothness of the emergency stop. In other respects, the quick action automatic triple valve was similar to the plain triple valve. From the time of this invention, train speeds and weights were gradually increased and the train stops accordingly began to lengthen once more. It was known that this increase could be offset for emergency application by raising the brake pipe pressure, because this, in turn, would cause an increase in brake cylinder emergency pres¬ sure. The greater retarding force thus de¬ veloped would not have been objectionable at high speeds on account of the coefficient of

again began to become rough and longer, par¬ ticularly with emergency applications.

This condition led Mr. Westinghouse to in¬ vent the quick action triple valve (Fig. 3) in 1887, which, in assuming “emergency” position, locally reduced the brake pipe pressure. By thus avoiding the necessity for all the brake

friction between the shoe and the wheel being low, but as the velocity of the train decreased the accompanying increase in the coefficient of friction would have caused the wheels to slide. Mr. Westinghouse overcame this difficulty in 1894 by inventing the high-speed reducing valve (Fig. 4), which was connected direct to the

brake cylinder. This valve permitted the use of high brake cylinder emergency pressure, which it gradually reduced throughout the stop to compensate for the increase in the coeffi¬ cient of friction between the shoe and the wheel. The high-speed reducing valve did not operate for brake cylinder pressures supposed to be developed for service brake applications. Up to, and shortly after, 1900 substantially the same type of equipment was employed for all different classes of steam and electric railway service ; but about this time the characteristics of these different classes became so distinctive that it became necessary to develop specific types of air brake appliances for each.

portation during the years mentioned. These inventions are described in sequence of their development as follows :

Locomotive Brake Equipment. — In the earlier days of railroading, no brakes were in¬ stalled on the locomotive; then straight air brakes were applied to the engine ; next straight air brakes to both engine and tender ; and finally, as all the braking force possible had to be developed within a safe limit of wheel sliding, quick action instead of plain brakes were placed on the tender. The necessity of braking the engine as part of the train, under some conditions, and independently, as in switching, grade work, etc., under other con-

H-G AUTOMATIC BRAKE VALVE

RELEASE POSITION

S-6 INDEPENDENT BRAKE VALVE RUNNINC POSITION

GOVERNOR

00U8LE PRESSURE FEEO VALVE

TO TENDER CYL

APPLICATION CYLINDER >IPE DISTRIBUTING VALVE RELEASE PIPE CYLINOER PIPE

BRAKE PIPE

Fig. 5

A classification of air brake equipment with reference to service requirements resulted as follows: (1) Locomotive brake equipment; (2) Passenger brake equipment; (3) Freight brake equipment; (4) Electric traction brake equipment. In each of the above classifica¬ tions quite a number of epoch-making inven¬ tions were brought out between the years 1900 and 1918 by Mr. Walter V. Turner, an eminent American engineer and inventor, which form the basis of rapid developments and improve¬ ments in the art, thereby not only advancing the status of the air brake, but contributing jargely to the marked progress in railroad trans-

ditions, and of avoiding the difficulties ex¬ perienced from variations in braking ratio, due to non-uniformity of piston travel and loss of brake cylinder air through leakage from the locomotive brake cylinder (which unfortunately o'ften had to be located near the hot boiler) re¬ sulted in the development of the No. 6-ET equipment (Fig. 5) during the period from 1903 to 190S, which overcame all these objections.

Freight Brake Equipment. — When freight trains were composed of less than 50 cars, the automatic quick action type of triple valve in¬ vented in 1887 fully met the braking require¬ ments. With the later practice of operating

r

ˆ0 and 80 cars per train, however, it was found l hat, during a service brake application, the brake pipe pressure reduced so slowly toward the rear of the train that the auxiliary reservoir air would leak past some of the triple valve pistons without actuating them and would thus cause a brake failure; that, during a release and recharging operation, the auxiliary reservoirs on the front cars would absorb so much of the air delivered to the brake pipe that the small quantity which reached the rear end of the train would leak past some of the triple valve pistons without forcing them to <(release® position so that ˆstuck® brakes would result ; and further, that, if the rear brakes did release, it would be so long after the front ones did so, that in the case of a slow-down, produced by an appli¬ cation and release of the brakes, the front cars

all the auxiliary reservoirs throughout the train were ensured ; and by automatically restricting the release passage at the head end of the

train in order to compensate for the time interval required to start the release of the rear brakes, so that all the brakes tended to release uni¬ formly. To maintain the speed of a given train constant on a given grade requires a certain braking force for every pound weight of the train. This exact braking force cannot be ob¬ tained by merely making one brake application, for two reasons : — First, because it would be almost impossible to reduce the brake pipe pressure the exact amount required ; and second, if this were possible, the brake cylinder pressure obtained would soon be lost due to leakage, etc. _ Consequently, the method employed in practice to secure the proper train control was

LOAD CVUHDCR

zvyzzzWj

TAW/V6 VAi vc .

A*s > uAnr RCSCRVOR

AJ1H/A&Y mˆ Rescxvan

ff** Kt r > oc

r .

CuRr *era* OCR '%ˆta m e op cYUNtof*

Fig. 6

would violently run out from the rear. During the period from 1903 to 1905, there was also developed the ((K® triple valve, which elim¬ inated the objections developed by the increas¬ ingly severe freight brake requirements. The ((K® differed from the former type of quick action triple valve by quickly and positively transmitting a service brake pipe reduction by locally reducing the brake pipe pressure in its adjacent section of the brake pipe at a moder¬ ate service rate as soon as it assumed ((service® position ; by automatically restricting the com¬ munication between the brake pipe and auxiliary reservoir on the front cars during the release and recharging period and thereby enabling far more air to be transmitted toward the rear of the train than heretofore, so thus the releasing of the rear brakes and a uniform recharge of

to make a brake application to reduce the train speed; to release the brake cylinder air on each car through a restricted <(retaining

valve® port (until the retaining valve cut off the exhaust after the brake cylinder air had reduced to a predetermined pressure), while the brake system, in the meantime, was being recharged and the train speed increased ; to make another brake application followed by a release ; and to continue to repeat this cycle as long as the train was on the grade. Such operation neces¬ sitated that the train be sufficiently short • to enable the brake system to be recharged in time to obtain another effective brake application before the train speed developed to an uncon¬ trollable degree; and that the maximum speed reached through the braking cycle be suffi¬ ciently slow to ensure that the train could be

stopped at any time. Furthermore, the braking force available on the loaded cars alone was inadequate to control the train speed on some grades of ordinary steepness, so that the prac¬ tice of distributing empty cars throughout the train had to be resorted to, in order to secure the greater force per pound weight provided by the empty cars. As a result, trains on grades were short, only partially loaded and operated at slow speeds. Consequently, in various sec¬ tions, grades restricted, and in fact limited, the traffic. To obviate this condition, the freight empty and load brake was devised, which provides substantially the same per cent retarding force for a loaded as an empty car and requires less air to produce a given brak¬ ing force (the train considered, at least, partially loaded) than heretofore. This invention, there¬ fore, made train stops smooth and greatly im¬ proved grade traffic by permitting higher speeds, longer trains and loading to car capacity. The recent introduction of heavy high capacity freight cars in service (weighing 70,000 pounds empty and 315,000 pounds loaded) required so much air per car, even with the empty and load brakes, that another type of an empty and load brake (Fig. 6) still more economical in air consumption and especially adaptable to these cars was developed.

Passenger Brake Equipment. — About the year 1900, a speed of 60 miles per hour with long heavy passenger .trains became common. For this condition the brakes then in service were inadequate to ensure the safety required. The energy to be dissipated was also so great that high shoe temperatures were developed which caused the shoes to soften as the stop continued, so that under these new conditions the coefficient of friction between the shoe and the wheel remained constant throughout the en¬ tire stop. This fact made the invention of

the (<IA triple valve possible. In addition to the auxiliary reservoir the (<IA triple valve employs a large storage reservoir, known as the supple¬ mentary. The air in the supplementary reser¬ voir is not used for service applications; but during emergency applications it equalizes with the air in the auxiliary reservoir and the brake cylinder. The high brake cylinder emergency pressure thus realized, and the maintenance of the full brake cylinder pressure throughout the stop (possible because the coefficient of friction between the shoe and the wheel remains con¬ stant), greatly shortened the emergency stop and hence made it safe to run the train at high speeds. The (<IA triple valve has four other important advantages, namely, quick re¬ charge of the auxiliary reservoir after a service application, through the undisturbed air in the supplementary reservoir restoring the pressure in the auxiliary reservoir as fast as the pressure rises in its adjacent section of the brake pipe (up to the pressure at which the supplementary and auxiliary reservoirs equalize, which is very close to the maximum brake pipe pressure carried) ; uniform and quick release, after a service brake application, possible because the air initially delivered into the brake pipe after the brake application need only expand through the brake pipe on account of being relieved by the supplementary reservoir of the first stages of recharging the auxiliary reservoir; gradua¬ tion of release secured by the supplementary

reservoir charging the auxiliary reservoir to a slightly higher pressure than that in the brake pipe, when the recharging of the latter is cut off at the brake valve, so that the higher auxiliary reservoir pressure moves the triple valve pistons outward sufficient to cause the exhaust of brake cylinder air to be cut off; and a provision for each valve to reduce the pres¬ sure in its adjacent section of the brake pipe at a moderate service rate after the respective triple valve piston and slide valve have as¬ sumed service position.

With triple valves, including the <(IA type, up to this time, however, the following condi¬ tions prevailed: (1) Since the brake pipe pres¬ sure reduces during a service brake application at a faster rate than it is restored during a recharging period, less air may leak past the triple valve piston for a given change in brake pipe pressure in the former case than in the latter. This action, combined with a greater frictional resistance of the triple valve piston and slide valve in service than in release posi¬ tion as sometimes existed, occasionally pre¬ vented a triple valve piston and slide valve, which assumed ˆservice” position upon a slight reduction in brake pipe pressure, from being returned to its release position. Thus a stuck brake resulted. (2) The device which normally tended to maintain the brake pipe pressure (feed valve)

when in bad condition, permitted the brake pipe pressure to fluctuate through a range of several pounds. In some cases this fluctuation caused a brake application, which thereupon could not be released, as explained above. (3) The brake cylinder pressure de¬ veloped from any application gradually reduced, due to the brake cylinder air changing in tem¬ perature and leaking past the brake cylinder piston to the atmosphere. (4) The pressure intended for any brake pipe reduction depended on the brake cylinder volume which in turn de¬ pended on a certain fixed predetermined travel of the brake cylinder piston. With poor designs and lack of maintenance of brake rigging, this piston travel varied on the different cars, so that different brake cylinder pressures were obtained on various cars throughout the train for the same brake pipe reduction. This con¬ dition often produced rough stops. In addition even the ((IA type of triple valve, while repre¬ senting the highest development in the air brake art up to this time, still afforded possibilities of improvements in the following respects : (1) If the ((IA triple valve were used on the same train with triple valves which did not have the graduated release feature (that is, triple valves which did not have supplementary reser¬ voirs to recharge the auxiliary reservoirs to a slightly higher pressure than the brake pipe, when the latter was cut off at the brake valve, so that the higher auxiliary reservoir pressure could force the triple valve piston outward, thereby cutting off the brake cylinder exhaust) a rough stop would be produced when an at¬ tempt was made to apply the brakes fully at the beginning of a stop and then to ((graduate ofP the brake cylinder pressure. The stop would be rough because the triple valves, with¬ out the graduated release feature, would release their car brakes at once due to the immediate and entire exhaust of the brake cylinder air and thus permit their respective cars to lunge

forward, while the other triple valves would release their brakes by steps, and thus tend to hold their cars back. If the supplementary reservoirs were cut off to eliminate the gradu¬ ated release feature, then their respective triple valves would lose their quick recharge feature and high emergency brake cylinder pressure secured through these reservoirs; (2) The “L® was the first triple valve to develop a higher brake cylinder pressure for emergency than for service brake applications. This higher pres¬ sure was secured from air in the supplemen¬ tary reservoir being introduced into the auxil¬ iary reservoir, and the brake cylinder through the operation of a piston valve actuated by the supplementary reservoir exposed one piston

valve face forcing the piston valve in the direction of the brake cylinder pressure on the opposite piston valve face. Due to this arrange¬ ment, the differential pressure after a full service brake application was insufficient to actuate it, even if the triple valve piston as¬ sumed “emergency® position. In other words,

the other valve functions; the emergency func¬ tion was made independent of the service so that an emergency could be made after a service brake application ; the depiction of brake pipe pressure to a predetermined low degree pro¬ duced an emergency brake application; and a shorter, quicker emergency stop was secured by quicker transmission of the brake pipe re¬ duction, quicker delivery of air to the brake cylinders and high brake cylinder pressure. To obtain what may be termed “ideal® train con¬ trol in a practical way with methods that are fundamentally safe and sound, the “UCE® Universal valve with electrical appliances was perfected in 1912 (Fig. 7). This valve possesses substantially all the features of the “PC® equip¬ ment, previously mentioned, except the obtain¬ ing of brake cylinder pressure irrespective of piston travel and maintaining it against leakage (provision is made for the addition of these features, when desired) with the addition of the following: Simultaneous application of every brake throughout the train, electri-

Small EMERGENCE / RESERVOIR

AUXILIARY BRAKE LARGE EMERGENCY -SERVICE R£8ERV0IR--ˆPIPE \ RESERVOIR _ RESERVOIR

BRAKE

CYLINOER

QUICK ACTION

closing chamberˆ

OU'CK ACTION CHAMBER

GRADUATED release car IN O'RECT RELEASE POSITION

■?rrr777?rif//<

QRa0uatE0 RELEASE CAP in GRaOuateo RELEASE ' POSITION

ouick C

ACTION /• EXHAUST

EMERGENCY

maGnET

RElEaSE

MAGNET,

SERVICE

MaGnET

maGnET CUT.I BOTH SERVU EMERGENCY MAG'

BRAKE CYlinOCR-

EXNAU8T

Fig. 7

an emergency brake application could not be developed after a service brake application had well started, even though the necessity for a quick, short stop arose after the service brake application had begun; (3) If the brake pipe pressure gradually depleted to a low degree it would be impossible to obtain an effective brake; (4) a shorter, quicker emergency slop was desirable. The above-enumerated desirable improvements were incorporated in the “PC® equipment with the No. 3-E control valve, which was brought out in 1909. This device automatically developed a greater slide valve resistance for an application than for a release of the brakes so that whenever a brake was applied it could surely be released ; the auxiliary reservoir air equalized into a constant volume chamber, connected to a piston, instead of into a brake cylinder whereby this piston per¬ mitted the same pressure to be developed in the brake cylinder from main reservoir air irre¬ spective of brake cylinder leakage or piston travel; graduated release was separated from

cally initiated by the brake valve, resulting in a smooth and quick stop, smooth because each car is braked at the same instant, and quick because the time of transmission of the brake application is eliminated; a more power¬ ful brake than heretofore possible without the danger of rough stops on account of all cars being retarded simultaneously; ability to re¬ charge the brake system v'hile the brakes are held applied by closing the exhausts writh a magnet valve;

same degree of flexibility of brake control as possible with the straight air brake on even a single car realized by electrical appliances on each car; elimination of the possi¬ bility of the valve assuming emergency posi¬ tion when not intended by making the service and emergency valve mechanisms separate and distinct; simultaneous application of all brakes throughout the train in case of a break-in-two or rupture of the brake pipe obtained by a pneumatic switch on each car, which, when energized by electrical actuation, causes each valve throughout the train to assume emergency

position ; and the ability to secure a relatively small rise of brake cylinder pressure per pound of brake pipe reduction when a reapplication is made before the brake cylinder air from previous applications has been entirely ex¬ hausted by automatically placing only a portion of the auxiliary reservoir under the control of the equalizing piston during this period ; ability to cut out any features without interfering with others; ability of assembling valve so as to give the equivalent of any past standard valve ; and ability to make one size of valve suitable for all sizes of equipment by using removable choke plugs to govern the flow of air instead of permanent restriction in the valve structure.

Electric Traction Equipment. — When all electric traction cars were operated singly, straight air brakes were used almost exclusively in this service. After two cars were employed as a unit, ˆstraight air® became dangerous be¬ cause, whenever the cars broke apart, no brak¬ ing force could be maintained due to the brake cylinders being connected direct to atmosphere through the open straight air pipe. As a conse¬ quence in 1905 there was developed the semi¬ automatic equipment with the <(A® emergency valve. With this device straight air applica¬ tions were secured as heretofore, but the straight air connection was made through

only the straight air pipe to be filled from the brake valve while the brake cylinders were charged by a reservoir located on its respective car, and controlled by a valve actuated through the medium of the air in the straight air pipe. This arrangement overcame to a considerable extent the serial time difference in the appli¬ cation of the various car brakes. It also de¬ veloped the proper brake cylinder pressure irre¬ spective of the brake cylinder piston travel and maintained this pressure against brake cylinder leakage. A late development of this

particular type of equipment was of electro-pneumatic, semi-automatic character, having as its main new feature the electrical control of straight air, with provision for a brake application in case any portion of the electrical equipment failed. A special phase of this type of equipment, recently developed, is the one-man car, or safety control equipment (Fig. 9). With this equip¬ ment the entire control of the car can be effi¬ ciently handled by one man. The opening and closing of the doors, as well as the folding and unfolding of the door steps, is controlled from the brake valve. The incapacitation or negli¬ gence of the operator, or breakage of any of the pipes at either end of the car, will cut off the power, make an emergency brake applica¬ tion, sand the rails and unlock the car doors.

W 18 6ftAKC valve

(0*t A AT'Vt)

M-t8 BAaVE VALVE (non OAtAAr.vf)

TO HOS- CONNECTIONS

straight AIR APPLICATION ANO release pipe

EMERGENCY I

TO HOSE CONNECTIONS

Fig. 8

the emergency slide valve. The emergency brake application was obtained by reducing the pressure in the ˆemergency® pipe, thus enabling the main reservoir pressure to force the emergency slide valve piston outward, which thereby cut off the straight air pipe from the atmosphere and thereupon connected the main reservoir direct to the brake cylinder. The accidental separation of cars produced a similar brake operation.

When more than two cars began to be oper¬ ated as a unit, the serial time difference re¬ quired to develop the braking force on the different cars was objectionable. The <(D® type of emergency valve (Fig. 8) was therefore provided in 1906 to meet this new condition. This valve possessed substantially the same emergency feature as the <(A® type of emergency valve; but for service application required

Another phase of the electric traction-road de¬ velopment consisted in the use of purely auto¬ matic devices as in steam-road service. Some

roads which operated a number of cars as a unit at times ran the individual cars separately. To obtain flexibility of brake control realized with straight air in single cars and also to operate the head car of the train separately, when desired, a combined straight air and auto¬ matic system was developed in 1906. A recent development for electric traction service is the universal type of valve with an exhaust cut-off valve. This valve possesses all the features previously outlined for the universal valve for steam-road service and. in addition, permits the simultaneous delivery of air, for service appli¬ cations direct from the reservoirs to their respective brake cylinders and simultaneous ex¬ haust of brake cylinder air direct to the atmos-

phcre without the actuation of the piston which ordinarily controls this service brake applica¬ tion and release. Any failure of electrical equipment produces a brake application. This latest device is a safe, highly flexible, instan¬ taneously responsive brake. Another important development in the electric traction field is the variable load brake with the universal type of valve. With this equipment the weight of the passengers automatically adjusts the cylinder pressure obtainable for emergency, and per pound brake pipe reduction for service brake application so that the same emergency and service stopping distances are realized for a given speed irrespective of the load carried. Many other inventions used with these equip-

Thcy arc connected with the respiratory sys¬ tem, and are situated in the cavity of the thorax and abdomen, and sometimes extend into the bones. They are most fully developed in birds of powerful and rapid flight, such as the albatross.

AIR-CHAMBER, a reservoir in a hy¬ draulic apparatus, in free communication with the water. The chamber or reservoir is filled with air, which by its elasticity diminishes the shocks that would otherwise be produced by sudden changes in the speed of flow of the water, and also equalizes the flow. When the pressure in the pipes is momentarily greater than the normal pressure, water enters the air-

ments have been developed. One of particular note is the type <(J)J electro-pneumatic governor for electrically-driven air compressors, — the first satisfactory electro-pneumatic governor ever developed for

electric compressor control. Consult development in Air Brakes for Rail- roads) ; (The Air Brake as Related to Progress in Locomotion ; (The Vital Relation of Train Control to the Value of Steam and Electric Railway Properties) ; (The Development of the Electro-Pneumatic Brake* ; (Brake Perform¬

ance on Modern Steam Railroad Passenger Trains* ; also various other publications issued by the Westinghouse Air Brake Company, Pittsburgh, Pa.

Westinghouse Air Brake Company.

AIR-CELLS, cavities in the cellular tissue of the stems and leaves of plants which contain air only, the juices of the plants being con¬ tained in separate vessels. They are largest and most numerous in aquatic plants, as in the V allisneria spiralis and the Victoria regia, the gigantic leaves of which latter are buoyed up on the surface of the water by their means. There are also air-cells in the bodies of birds.

chamber and compresses the air it contains ; and when the pressure is momentarily less than the normal, the reverse action takes place, and the elasticity of the air forces water back into the pipes.

AIR-COCK, a cock placed upon a water- or steam-pipe (notably upon a steam radiator) to allow of the escape of air from the piping.

AIR COMPRESSOR, a device used for compressing air, or, in other words, which makes the same weight of air occupy a less volume or a greater weight occupy the same volume. Any device which reduces the volume of air with a pressure increase is an air com¬ pressor. When released from the containing reservoir the air tends to resume its volume and this tendency is utilized by making the air perform mechanical work as it expands. Al¬ though compressed air has been used for work¬ ing engines in confined situations, it is not at all likely that it will ever come into extensive use, owing to the great waste of power attend¬ ing it. This waste arises from two causes: (1) The friction due to forcing the compressed air along a great length of pipe, and (2) the

loss from the dissipation of the great heat which results from its compression. The greater the original compression of the air the higher its temperature will rise; and as this caloric, which cannot be

kept from escaping, is practically a part of the bulk of the air, it fol¬ lows that the loss of power from this cause will increase with the pressure or tension of

steam engines there is always a small quantity of water in the cylinders and slide-valves, aris¬ ing from the condensation of a portion of the steam, and this suffices to lubricate the piston and valves. It is well known that when steam is superheated so highly as to prevent a slight condensation in the cylinder and slide-valves, they are very rapidly destroyed. Air rises in

O

z

G

cS

E

tn

<D

Q.

O

o

v-

<

c

• H

Q

I

i-i

o

<D

C/3

c6

X

Oh

I

<D

<V

u

X

H

u

O

O

&

H

OJ

u

be

oJ

G

O

*05

4-»

C/3

the air. Even were it possible to prevent the escape of the heat by covering the vessels and pipes with some non-conducting substance, it would not be practicable to use the hot air in the same way as steam is used, because the lubricating material necessary to keep the pis¬ ton and slide-valves from ˆtearing® would be decomposed bv tin high temperature. In

temperature when very much compressed, and we cannot use it until its temperature falls ; and as this involves a great waste of power, it follows that where economy is of great conse¬ quence, air cannot be used as a mode of trans¬ mitting mechanical power. Indeed, no fluid can be economically used for transmitting power for any considerable distance.

AIR COMPRESSOR

In its early history compressed air as a motive power for vehicles was not successful due to the fact that the storage tanks in use would admit of only small pressures. With its continued use and the development of stor¬ age tanks permitting the air to be compressed to an initial pressure of about 5,000 pounds per square inch it has made that class of motive power available for trucks used in manufactur¬ ing plants and for other vehicles designed to carry heavy weights for short distances. The extensive plants necessary for compressing the air and the fact that the storage tanks must be refilled frequently, as well as the inconvenience of transporting a large number of charged cylinders, make it impracticable as a motive power for vehicles used for commercial or military purposes.

The air compressor consists essentially of a cylinder in which atmospheric air is compressed by a piston, the power for driving which may be derived from a steam engine, water-wheel or electric motor. The air cylinder is generally double-acting and is provided with inlet and discharge valves in each cylinder head. The usual types of compressors are straight-line and duplex. Direct-connected compressors are driven by direct-current induction or synchron¬ ous motors, the rotors of which are of large diameter to produce a proper relation between the peripheral and rotative speeds.

The work performed by a compressor is, broadly speaking, that of increasing the pres¬ sure of air (or other gas) by reducing its volume

or compressing it into a smaller space. Usually the lower or initial pressure is the <(atmospheric pressure® at the point of location of the compressor, while the higher or terminal pressure is fixed by the requirements of the particular case, and may be anywhere from 10 to 30 pounds (gauge pressure) per square inch as in blowing engine practice, up to 80 to 125 pounds per square inch for rock drills, pneu¬ matic tools, etc., and up to 1,500 to 2,000 pounds per square inch, or even higher, for special pur¬ poses. Atmospheric pressure (or zero gauge pressure) equals 14.7 pounds absolute pressure per square inch at sea-level (equivalent to 30 inches barometer) and becomes less as the altitude above sea-level increases, the decrease being approximately one-half pound, or one inch in mercury column, for each 1,000 feet in¬ crease in altitude. As the work of compression depends upon the initial and terminal absolute pressures (absolute pressure being equivalent to gauge pressure plus atmospheric pressure) the altitude at which the compressor is to work is of great importance and must always be taken into consideration.

When air is compressed into a smaller volume, if the temperature remains constant, the pressure increases directly in proportion to the decrease in volume ; that is, if the volume is reduced one-half the pressure will be doubled ; if reduced to one-third the pressure will be trebled, and so on for any decrease in volume. There is, however, another and most important factor in the problem which must be considered in all cases, particularly where high pressures are concerned, viz., the increase in temperature and consequent increase in volume due to the heat developed during compression. When air is compressed, part of the work done during compression is converted into heat, which must

be taken up by the air compressed, the result being to very materially raise its temperature and increase its volume, thus adding largely to the work required to be done.

The single stage compressor consists primarily of an air-cylinder, in which the air drawn from the atmosphere is compressed, a steam cylinder, located above the air-cylinder, the two being connected by a suitable centre piece, steam and air pistons mounted on a com¬ mon piston rod, and a valve motion controlling steam admission and exhaust. The compressor is double acting, steam being admitted alter¬ nately on either side of the steam piston which, being directly connected with the air piston, causes both to move up and down. On the upward stroke of the air piston the air above

Air Reheater.

it is compressed and discharged into the main reservoir, while the space below is filled with air drawn from the atmosphere. On the down¬ ward stroke this operation is reversed. The steam exhaust is piped to the smokestack or to the exhaust cavity of the saddle.

The great increase in compressor capacity called for in modern service has resulted in a much more careful consideration of the matter of steam consumption than formerly, and as a result the Westinghouse 8ˆ2-inch cross com¬ pound compressor was developed for the specific purpose of combining maximum capacity and highest efficiency, by compounding both the steam supplied and the air compressed to the extent that, while this compressor has a capacity over three times greater than the well-known

9pAinch single stage compressor, the steam con¬ sumption per 100 cubic feet of air compressed is but one-third.

While it is advantageous to keep the air as cool as possible during compression, heating it is an advantage, as soon as it leaves the re¬ ceiver, for the reason that by this heating its volume or its pressure is increased. So im¬ portant is this advantage, theoretically, that de¬ vices called reheaters are frequently employed to heat the air just before it passes to the motor or tool which it operates. Reheaters are made in many forms, the usual one being a kind of stove or oven through which the air passes by means of a spiral pipe or some other arrange¬ ment which allows it to be quickly heated.

The air reheater shown in the sectional drawing consists of a series of hollow annular rings bound together by four tie rods, the upper and lower rings having flanged openings projecting through the shell for pipe connec¬ tions. These rings are surrounded by a sheet steel shell, the space between being filled with asbestos packing, which prevents loss of heat by radiation. Air enters at the bottom ring and leaves at the top, the openings connecting the rings being so arranged that the air is forced to travel through the heater in a circuitous passage. These heaters should be placed as near as possible to the ■work and the outlet pipe should be of large diameter, short and care¬ fully covered, to prevent losses by radiation. See Air-Pump; Compressed Air; Condenser.

Edward S. Farrow, Consulting Military and Ciz'il Engineer.

AIRCRAFT ENGINE. See Internal Combustion Engine.

AIR-CYLINDER. A pneumatic buffer used to absorb the recoil of large guns. For 10-inch guns, one cylinder is used; for 15-inch guns, two. They are placed between the chassis-rails, to which they are firmly secured by diagonal braces. A piston traversing the cylinder is attached to the rear transom of the top carriage. When the gun recoils the piston- head is drawn backwards in the cylinder, and the recoil is absorbed by the compression of the air behind it. Small holes in the piston-head allow the air to slowly escape while the gun is brought to rest. The hydraulic buffer, largely used above, operates in the same man-

Weekly Journal 1832-35, and the Dumfriesshire and Galloivay Herald (Dumfries) 1835—64. He published (Religious Characteristics, *prose es¬ says (1827) ; 'The Captive of Fez,* narrative poem (1830) ; a character story, (The Old Bachelor in the Scottish Village) (1845), very popular at the time ; etc.

AIRDRIE, Scotland, a municipal and par¬ liamentary burgh in Lanarkshire, 11 miles east of Glasgow. It depends chiefly on the col¬ lieries and iron-works in its vicinity, but has also a large cotton-mill and factory, several ex¬ tensive foundries and machine-shops, tube-works and a number of hand-loom weavers. Pop. about 25,000.

AIR-DRILL, a rock drill or other form of drill actuated by compressed air.

AIREDALE DOG. See Terrier.

AIR-ENGINE, an engine in which air is the working body. Such an engine may be operated by air previously raised to a high pres¬ sure by a compressor, as in the storage and transmission of power by compressed air; or it may derive its power directly from the burn¬ ing of fuel. In the latter case it is often called a hot-air engine. For the elementary theory of the hot-air engine, see Thermodynamics.

AIRE-SUR-LA-LYS, ar-siir-la-le, a town of France, department of Pas-de-Calais, 10 miles southeast of Saint Omer. It stands at the junction of the Lys with the Laquette, on a low marshy site, but is well built, and possesses several beautiful fountains, a handsome Gothic church and barracks for 6,000 men. Its trade is chiefly in linens, fustians, hats, thread, starch, soap, Dutch tiles, osier work and grain.

AIR-GAS, an inflammable gas produced by charging air with the vapors of naphtha, gas¬ oline or some similar volatile hydrocarbon.

AIR-GATE, in foundry work, an opening left in the mold for the escape of air and other gases as the molten metal enters.

AIR-GUN. An instrument resembling a musket, used to discharge bullets or darts by the force of compressed air instead of gun¬ powder. Various forms of construction have been adopted. The most usual plan is to insert a condensing syringe in the stock of the gun.

ner, water being used instead of the air. See Pneumatic Buffer.

AIRD, ard, Thomas, Scottish poet who has won praise from high critics, but little popular acceptance : b. Roxburghshire 1802 ; d. 25 April 1876. He studied in the University of Edin¬ burgh, and formed a lifelong intimacy with Carlyle; contributed to (Blackwood's,) and won the warm good will of Wilson; edited the

The piston of this syringe is worked by an ap¬ paratus which passes through to the exterior of the gun, and this working causes a small body of air to be condensed into a chamber. The chamber has a valve opening into the barrel just behind the place where the bullet is lodged. The gun is loaded from the muzzle, as ordinary muskets or fowling-pieces. The trigger opens the valve ; the highly compressed air rushes

forth and propels the bullet. By a certain management of the trigger, two or three bullets, successively and separately introduced, can be fired off — if firing it can be called — by one mass of condensed air. Another form of air- gun contains several bullets in a receptacle or channel under the barrel ; by the movement of a cock or lever one of these bullets can readily be shifted into the barrel; and thus several suc¬ cessive discharges can be made after one load¬ ing — on a principle somewhat analogous to that of the revolving pistol. Some varieties of air-gun have the condensing syringe detached, by which means a more powerful condensation of air may be produced. This done, the air- chamber is replaced in its proper position be¬ hind the bullet in the barrel. Those air-guns which present the external, appearance of stout walking-sticks, and are hence called air-canes, have a chamber within the handle for contain¬ ing condensed air, which can be unscrewed and subjected to the action of the condensing syringe. One inventor has devised a form of air-gun with two barrels — one of small bore for the reception of the bullets, and another of larger bore for the reservoir of condensed air; the condensing syringe being within the stock of the gun. An attempt has more recently been made to combine the action of elastic springs with that of compressed air in an air-gun; springs of gutta-percha, or of vulcanized india-rubber, are employed in substitution of or in co-operation with a condensing syringe. No form of air-gun hitherto made has had powTer enough to propel a bullet to any con¬ siderable distance, and therefore the instrument is scarcely available in war. The air-gun was known in France over two centuries ago; but the ancients had some kind of apparatus, by which air was made to act upon the shorter arm of a lever, while the larger arm impelled a bullet.

AIR-HOLE, or BLOW-HOLE, a fault in a casing, due to the presence of a bubble of air or other gas.

AIR-LOCK, an air-tight chamber used in tunneling, when the tunnel has to be kept filled with compressed air to prevent the en¬ trance of water. The air-lock communicates with the-tunnel by one door, and with the out¬ side air by another. It serves the double pur¬ pose of permitting the workmen to enter and leave the tunnel without undue loss of air, and of partially mitigating the physiological effects of a too sudden transition from the high pres¬ sure in the tunnel to ldwer

pressure outside.

AIRPLANE ENGINE. See Aeroplane Engine; Internal Combustion Engine.

AIR-PLANT, more properly epiphyte, a plant growing upon the trunk or top of another plant (the host), but not anatomically connected with it. Air-plants derive their nutriment chiefly from the air and rain, commonly by means of aerial roots. Parasitic plants, on the other hand, are directly connected with the plant upon which they grow and extract their food from the host. Air-plants are most com¬ mon in moist tropical forests, often completely covering the trunks and branches of trees. They belong chiefly to the ferns, mosses, brome-liads, orchids and aroids, and are mostly her¬ baceous, but sometimes shrubs are epiphytic upon tropical trees. In the United States air-plants are found chiefly in Florida, but one, VOL. i — 19

Spanish moss (Dendropogon usneoides) , is common throughout the Southeastern States.

AIR-PUMP. A machine by means of which air or other gas, water or other liquids may be removed from an enclosed space. The essential part is a hollow cylinder, in which an air-tight piston is made to move up and down by a rod. From the bottom of the cylinder a connecting tube leads to the space which is to be exhausted, which is usually formed by plac¬ ing a bell-glass, called the receiver, with edges ground smooth and smeared with lard, on a flat, smooth plate or table. When the piston is at the bottom of the barrel, and is then drawn up, it lifts out the air from the barrel, and a portion of the air under the receiver, by its own expansive force, passes through the con¬ necting tube and occupies the space below the piston, which would otherwise be a vacuum. The air in the receiver and barrel is thus rare¬ fied. The piston is now forced down, and the effect of this is to close a valve placed at the mouth of the connecting tube and opening in¬ ward into the barrel. The air in the barrel is thus cut off from returning into the receiver, and, as it becomes condensed, forces up a valve in the piston, which opens outward, and thus escapes into the atmosphere. When the piston reaches the bottom and begins to ascend again, this valve closes ; and the same process is re¬ peated as at the first ascent. Each stroke thus diminishes the quantity of air in the receiver; but from the nature of the process it is evident that the exhaustioh can never be complete. Even theoretically there must always be a por¬ tion left, though that portion may be rendered less than any assignable quantity; and prac¬ tically the process is limited by the elastic force of the remaining air being no longer sufficient to

open the valves. The degree of rarefaction is indicated by a gauge on the principle of the barometer. By means of the partial vacuum formed by the air-pump a great many inter¬ esting experiments can be performed, illustrat¬ ing the effects of atmospheric pressure and other mechanical properties of gases. The air- pump was invented by Otto Guericke, in 1654; and though many improvements and varieties of structure have been since devised, the prin¬ ciple of all is the same. Two barrels are gen¬ erally used, so as to double the effect of one stroke. In some air-pumps, stop-cocks turned by the hand take the place of valves, and in others the entrance of the connecting tube into the cylinder is so contrived that the valve through the piston is not required. The air- pump used in connection with the densimeter is of the ordinary construction.

The use of compressed air for pumping water, oil or other liquids from wells, vats and tanks, is now general. The simplicity and ease of maintenance attending its use make it far superior to any other means of conveying liquids. In deep wells particularly, great economy is found in the use of air as compared with the old time deep- well pump. No valves, no reciprocating rods and plungers, and no wasteful steam cylinder at the top to operate them are required. The air may be compressed at any convenient point, such as an existing power house, and yet do pumping at an isolated or distant place; several separate wells, if neces¬ sary, being pumped from one central station.

Westinghouse compressors have been found

well adapted to this class of work and are largely employed for furnishing the compressed air to raise or convey liquids in breweries, tan¬ neries, oil wells, dairies, hospitals, chemical laboratories, acid plants and especially all kinds of water wells.

The Latta-Martin displacement pump is an efficient and reliable device designed to pump water by air pressure. Extremely simple in construction, it requires no packing nor lubrica¬ tion, has no dead centre, no pistons, no plungers, will not freeze in the severest weather, and is entirely automatic. It will pump from any dis¬ tance, to any elevation, in any quantity, hand¬ ling muddy or gritty water without injury. In the general design of the apparatus, the two cylindrical chambers are connected at the top by an automatic air-valve mechanism and at the bottom by suitable piping and check valves.

The air pressure entering at the top is delivered alternately to the respective chambers, discharg¬ ing the water contained therein through the check valves and discharge pipe. As a chamber is emptied of water, the remaining air is ex¬ hausted through a port in the upper valve gear, while water simultaneously replaces it through the check valves below. This simple operation is repeated alternately upon each side of the pump and is entirely automatic. The pump may be placed at any point of water supply — in a dug well or in a river — and can be oper¬ ated and controlled by the engineer even though situated several miles from the source of power. A modified form of these displacement pumps can be used in driven wells *having casings six inches or more in diameter. This form is particularly valuable for cases where the water level in the well falls a considerable amount, either during the pumping operation, or at different times of the year, as the action of the pump is not affected by the position of the water level. See Air-Compressor; Condenser; Compressed Air; Power; Power, Transmis¬ sion of.

AIRSHIP. See Aeronautics, History of; Aeroplane; Dirigible; Military Aeronautics.

AIR-THERMOMETER, a thermometer in which temperature is measured by determin¬ ing the change of volume of a mass of air that is kept at constant pressure, or the change of pressure of a mass that is kept at constant vol¬ ume. See Thermometry.

AIR-TRAP, in steam and hydraulic engi¬ neering, a place where air can accumulate in a line of piping; as at the highest point of a line of water pipe. Air-cocks are placed at these points to permit of the removal of the accu¬ mulated air. Also called air-bond.

AIRY, ar'i, Sir George Biddell, English astronomer-royal: b. Alnwick, 27 July 1801; d. 2 Jan. 1892, in Greenwich. He was graduated at Trinity College in 1823. In 1826 he was ap¬ pointed Lucasian professor of mathematics at Cambridge, a chair once held by Newton, and he was the first actual director of the Cam¬ bridge Observatory, holding in connection with this post the Plumian professorship of astron¬ omy. In 1835 he succeeded Pond as director of the Greenwich Observatory, and retained this office till 1881, when he retired on a pen¬ sion. He initiated at Greenwich the plan of immediately and completely reducing observa¬ tions ; introduced the regular observation of

magnetic phenomena, and of sun-spots by photography; invented new instruments for lunar observations; and arranged the British

observations in all parts of the world of the transit of Venus in 1874. His chief works are Mathematical Tracts) (1826); (Ipswich Lectures on Astronomy) (1849) ; (Undulatory Theory of Optics) (1866) ; (Treatise of Sound) (1869) ; and (Treatise on Magnetism > (1870).

AISLE, IP, in architecture, one of the lateral and usually lower divisions of a building which is divided lengthwise, as by rows of columns or piers, so that the roof is supported while still the interior is one large hall broken only by the uprights. The basilicas of the Romans were b.uilt in that way, as had been the small interiors of many Grecian temples ; and when the first Christian churches were built in Italy and in the East, this ˆbasilican® form rivaled the round or polygonal plan and the plan of the Greek cross in popularity. At a later time Christian churches were nearly always built with aisles and a higher central part called usually the nave. Most churches have an aisle on either side of the nave, and are called “three- aisled® churches, but there are a few with five, and the famous Cathedral of Antwerp in Bel¬ gium has seven aisles, being almost alone in this respect. It is a mistake to count an outer row of chapels as another aisle.

By extension the term covers such a long and narrow compartment of a building as is found in one of the great mosques of Cairo, Cordova and Damascus. These buildings have generally flat roofs intended always to be of masonry, and that structure is carried by a great number of parallel rows of columns. The resulting “aisles® are, of course, of the same height. In the mosque of Cordova there are 17 such aisles left open, besides two outer ones which are largely enclosed for chapels ; all the aisles opening by doors or windows upon a large court.

AISNE, an', France, a northeastern frontier department which takes its name from the river Aisne, a tributary of the Oise. Area, 2,866 square miles; pop. 530,300. The surface is level; the soil fertile; drained and watered by the rivers Ourcq, Marne, Oise and Aisne, names celebrated in the great European War for the battles that raged on their banks. To¬ gether with several canals, these rivers carry a considerable traffic. Owing to numerous small lakes and stretches of forest the climate is cold and humid, though well adapted to agriculture and pasturage. The principal crops are cereals, but hemp, flax, potatoes and oil¬ seeds are also largely cultivated. Cotton and other textiles are manufactured at Saint Quen¬ tin, and at Saint Gobain the plate-glass works have been in operation since 1665. Laon, Soissons, Saint Quentin, Chateau-Thierry and Vervins are the chief arrondissement towns, with Laon as capital of the department. See War, European.

AISNE, an, a river in northern France, with a total length of 280 miles. A tributary of the Oise, the Aisne rises in the Argonne Forest, flows north and then west, joining the Oise above Compiegne (on the left bank) after passing Vouziers, Rethel and Soissons, tak¬ ing in on the way its affluents the Aire and Vesle, on the latter of which stands Rheims.

AISSE

AITON

291

It flows through the departments of Marne, Ardennes, Aisne and Oise. From Mouron for about 170 miles the river is used for floating lumber ; from Chateau-Porcien it is navigable for 75 miles, and from Neufchatel, about 15 miles below that point, there is considerable traffic. A lateral canal runs from Vouziers to Conde — above Soissons. The Canal des Ardennes (62 miles long) begins at Conde, below which the Aisne is canalized and con¬ nected with the Meuse. The lateral canal of the Aisne is connected with that of the Marne at Conde-sur-Marne by a 36-mile canal. On its north side the Aisne has a line of steep ridges, the scarp of a great plateau, at an average of a mile or more from the stream. The height of the scarp varies from some 200 feet, where the uplands begin on the west above Compiegne from the Forest of the Eagle, to more than 450 feet 30 miles east in the high bluffs of Craonne. Beyond this latter place the Aisne takes a wide sweep to the northeast toward its source, and the banks fall to the lower level characteristic of the shallow dales of Champagne. From Compiegne to Craonne the section is everywhere of the same type, with occasional deeper ravines. For the most part the lower slopes are steep and clothed with grass. The plateau stretches back for some miles, till at La Fere and Laon it breaks down into the plains of northeastern France. It was the crest of this plateau that the German armies had chosen — at an average of two miles from the river bank — on which to make a stand after they had been hurled back on the Marne (q.v.) in September 1914. The position was well chosen, for it was one of enormous strength, extending from a point on the heights of the Meuse north of Verdun westward across the Argonne and the plain of Champagne to Rheims, where it turned north¬ west along the Forts de la Pompelle, Nogent l'Abesse, Berru and Brimont, and across the Aisne near its confluence with the Suippe to Craonne, whence it ran westward along the heights of the Aisne to the Forest of the Eagle, north of Compiegne. During their advance to the Marne the Germans had left parties of sappers behind to entrench the Aisne position — in

case of necessity. How that necessity actually arose from the historic battle of the Marne is told elsewhere (See War, European). That battle began 6 Sept. 1914; on 8 September General von Kluck's army was in full retreat and on the . 9th von Buelow's army followed. On the 10th the battle was over and the British and French became the pursuers. On the 12th the Ger¬ mans were in position on the Aisne, and on the 13th the Allies began the passage of the river. The first phase of the battle of the Aisne closed on 18 Sept. 1914, and from that day began the remarkable trench warfare that became so prominent a feature of the great war.

AISSE', a'e-sa, or HAIDEE, Made¬ moiselle, French-Circassian author: b. Cir¬ cassia 1694: d. Paris 1733. The daughter of a Circassian chief, captured at four years of age in a Turkish raid, she was bought in the slave market at Constantinople by Count de Ferriol, French ambassador. He sent her to Paris to be educated, where, later, introduced by the Count's sister-in-law to the Regent's receptions, she was greatly admired for her beauty and her wit.

Count de Ferriol took advantage of her inno¬ cence, but she repulsed the French Regent's ad¬ vances, and made a love match distinguished by great affection and fidelity, with Chevalier d'Aydie, a Knight of Malta, by whom she had a daughter. Her latter years were marked by sincere devotion and piety. Her (Letters, 5 pub¬ lished with annotations by Voltaire (1787), con¬ tain interesting pictures of court life of the period and anecdotes of contemporary person¬ ages, notably Madame du Deffand and Madame de Tencin. They also reveal the great charm of the author's personality. She is the original of the Haidee in Dumas' (Count of Monte Cristo,5 and has been the subject of at least three plays. The best editions of her <Letters) are those of M. Ravenel, with introduction by Sainte-Beuve (1846), and by Eugene Asse (1873). Consult Courteault, (LIne idylle au XVIIIe siecle ; Mademoiselle Aisse et le Chevalier d'Aydie5 (Magon 1900) ; and Gosse, E., (French Profiles5 (London 1905).

AITKEN, at'ken, Robert Grant, American astronomer: b. Jackson, Cal., 31 Dec. 1864. In 1887 he was graduated at Williams College, then became instructor of mathematics at Livermore College, in California. In 1891 he was appointed professor of mathematics and astronomy at the University of the Pacific and four years later he became astronomer at the Lick Observatory. In 1898 he was a member of the expedition sent by the Lick Observatory to the Flint Islands to observe an eclipse. He has discovered over 2,400 double stars, for which the Academy of Sciences of France awarded him the Lalande prize in 1906. From 1897 to 1908 he edited the publications of the

Astronomical Society of the Pacific, besides which he has contributed many articles to German and American journals on astronomical subjects.

AITKIN, Robert, American printer and publisher: b. Dalkeith, Scotland, 1734; d. Phila¬ delphia, July 1802. Emigrated to America, 1769; settled in Philadelphia as a bookseller, becoming later a bookbinder and publisher as well. He published the Pennsylvania Magazine (1775-76), and printed numerous documents and state papers for the Continental Congress, among them the journals of Congress5 from 5 Sept. 1774 to 1 Jan. 1776 (Phila. 1777-80). At his own expense he published in 1782 the first English Bible printed in America. This is now the rarest of all early Bibles printed in America, not more than 25 copies being known to exist. In 1777 Aitkin was imprisoned for his attachment to the cause of independence. His daughter, Jane Aitkin, was one of the first business women of America. After her father's death in 1802, she carried on his busi¬ ness as printei and publisher. Among other books she published in 1808, in four volumes, the translation of the Septuagint made by Charles Thompson, secretary of Congress.

AITON, a'ton', William, Scottish botanist: b. Hamilton, Scotland, 1731 ; d. Kew Palace 1793. In 1759 he was appointed director of the botanical garden at Kew, and in 1789 pub¬ lished the work by which he is remembered, (Hortus Kewensis5 (3 vols.), in which, under the Linnean system of arrangement, 5,600 species are described, indicating their origin, mode of culture and date of introduction in

England. His assistants in this monumental work were Dr. Solander and Mr. Jonas Dry- ander, two cultured Swedes.

AITZEMA, at-zem'a, Lieuwe (Leo) Van,

Dutch official and historian: b. 1600; d. 1669. An expert in politics and political science, he was resident-agent of the Hanseatic League at The Hague for 30 years, and author of the most valuable work on the eventful epoch of Dutch history covering the years 1621 to 1668, entitled (Zaaken van Staat en Oorlog in Ende omtrcnt de Vereenigde Nederlanden* (14 vols., 1657-71 ; 7 vols., 1685-99, continuing the history to 1697).

AIVALI, ai-va'li, or KIDONIA, ki-do-ni'a (the ancient Heracleia) , a

town of Asiatic Tur¬ key, on the western promontory of the Gulf of Adramyti, 66 miles northwest of Smyrna. In the beginning of the present century it was a place of considerable note, but in June 1821, during a contest between the Greeks and Turks, it was set on fire by the latter and reduced to ashes. It has again revived, however, and possesses a population of about 35,000. The olive is extensively cultivated in the district, and much oil and soap manufactured.

AIVAZOVSKII, Ivan Konstantinovitch,

Russian painter: b. Feodociya 1817; d. 1900. From his earliest years he showed a remark¬ able talent for painting. Koch, the architect of his native town, discovered his gift and also gave him a few private lessons in perspective and architectural designing. Thanks to the influence of Koch and some other friends Aivazovskii succeeded in entering (1833) the Academy of Fine Arts where he learned the art of aquarelles from Philippe Tonneur. His first work, which attracted general attention, was the (Study of Air above the Sea) (1835) for which he was awarded a silver medal. Henceforth Aivazovskii pursued exclusively this field of painting and, in order to acquire adequate impressions of light on the nature of the sea, he sailed extensively over the Gulf of Finland and the Black Sea. His extraordinary memory helped him to retain and reproduce with great vigor and fullness the most singular moments at sea, hence there is a complete absence of monotony or repetition in his works. He traveled extensively through Italy, France, Germany and England where his fame as a sea painter was already well established by his remarkable paintings made in Rome: Neapoli¬ tan Night, * <Storm) and (Chais. *The (Boat of the Tcherkessian Pirates,* (Stillness on the Mediterranean *and (Island of Capri* won prizes at the Exposition of Paris (1843) and gained him the title of academician. In 1857 at the Exposition of Paris, he was awarded the order of the Legion d'Honneur for his remark¬ able (The Four Wealths of Russia. *Of his later paintings the best known are: (Universal Deluge-* ; (The Moment of the Creation of the World* (1864) ; (The Chain of Caucasian For- ests) (1871). At the Exposition in Florence the Academy of Fine Arts there asked him to paint his own portrait for the gallery in the Palazzo Pitti where are kept portraits of the most celebrated painters of the Renaissance. At the time of the Russo-Turkish war 1877 Aivazovskii painted a new series of episodes and in 1880 there was held an exposition of his works illustrating different episodes from the

life of Columbus. On 20 Sept. 1887 Aivazov¬ skii celebrated his 50th jubilee on which oc¬ casion he presented the Saint Petersburg Academy of Fine Arts with (Pushkin on the Sea-Shore* painted in co-

operation with L. E. Ryspyny.

AIX, aks, France, town and capital of an arrondissement, department of Bouches-du- Rhone, 17 miles by rail north of Marseilles. Its interest is chiefly historical. It was the (Aquae Sextiae* — Baths of Sextius — founded 123 b.c. by the Roman consul Sextius Calvinus around the thermal sulphurous springs. In the Middle Ages it was the capital of Provence and became a great seat of learning, renowned for its faculties of law and theology. Both baths and university under modern develop¬ ment continue their usefulness ; and fine his¬ torical and modern buildings attract the atten¬ tion, notably the cathedral dating from the 11th century, and the archiepiscopal palace. Pop 20,000; including suburbs, 30,000.

AIX-LA-CHAPELLE, ass, or ax-la-sha-

pel' (German, Aachen ; Latin, Civitas Aquensis, Aquisgranum) , capital of a district of the same name in the Prussian province of the Rhine, 38 miles west by south of Cologne; pop. 156,150. It is a well-built town, pleasantly situated in a fine vale watered by the Wurm, and surrounded by the Venn Hills. It was formerly surrounded by ramparts, but these have been converted into pleasant promenades. The town-house (built in 1353 on the ruins of Charlemagne's palace) contains the coronation room with portraits of the German emperors, half-size portraits of Napoleon and the Empress Josephine, painted by David, and many relics of old German art. The nave of the cathedral, erected by Charle¬ magne as a palace chapel between 796 and 804, was rebuilt on the old model by Otho III in 983, after having been almost destroyed by the Normans. It consists of an octagon, sur¬ rounded by a 16-sided gallery, and terminating in a cupola. The Gothic choir was begun in 1353 and finished in 1413; it is of prodigious height (114 feet) and lightness, and the large windows are filled with stained glass. Besides the tomb of Charlemagne, the cathedral con¬ tains many relics, the most sacred of which — such as the robes worn by the Virgin at the Nativity, the swaddling-cloths of the infant Jesus, the scarf He wore at the crucifixion, etc. — are shown only once in seven years, and at¬ tract many thousands of pilgrims from all countries. As the chief station of the Belgo- Rhenish Railway, which connects it with Ant¬ werp, Ostend and Cologne, Aix-la-Chapelle affords an extensive mart to the commerce of Prussia; it is also a grain market for Belgium, and the seat of commercial and other courts. Electric street railroads connect with handsome suburbs and neighboring towns. Aix-la-Cha- pelle was eminent as a manufacturing city, especially of cloth and needles, as early as the 12th century; and its prosperity in this respect still continues. Its woolen cloths are

highly esteemed on the continent of Europe and are also exported to America, China, etc. All trading countries, including the United States, have consulates in the city. It is estimated that over 30 per cent of the inhabitants are em¬ ployed in the manufactures of the city. Al¬ though Aix-la-Chapelle is an extensive seat of

manufactures and has considerable commercial relations, it derives its celebrity chiefly from its historical associations, and a considerable por¬ tion of its importance and prosperity from the influx of visitors to its baths. There are in all eight mineral springs here, six of them warm. The most famous is the Imperial Spring or Kaiserquelle, which has a temperature of 143° F., and the vapor of which, when confined, deposits sulphur. For the accommodation of strangers there are a number of bathing-houses. The rooms for bathing are excellently fitted up, with baths from 4 to 5 feet deep, built in mas¬ sive stone and in the old Roman style. About a half mile north of the city is the Louisberg or Lousberg, rising nearly 300 feet higher than the city. It is a favorite summer evening resort of the citizens.

Aix-la-Chapelle was known to the Romans as early as the time of Caesar, and is mentioned by Pliny under the name of Vetera. It was, after 768, the favorite residence of Charle¬ magne, who made it the capital of all his do¬ minions north of the Alps and spared no expense in beautifying it. Here he died in 814, and in the cathedral his tomb is marked by a large flat slab with the inscription Carolo Magno. During the Middle Ages it was a free imperial city, and its citizens throughout the empire were exempt from feudal service, from attachment of their goods and persons and from all tolls and taxes. Thirty-seven German emperors and 11 empresses have been crowned in this city, and the imperial insignia were preserved here till 1795, when they were carried to Vienna, and are now in the imperial treas¬ ury. By the peace of Luneville (9 Feb. 1801), which separated the left bank of the Rhine from Germany, the city was transferred to France, in whose possession it remained till 1814, when it was restored to Prussia. It was a busy base for military operations during the Franco-Prussian War 1870-71, and during the European War of 1914-18 was also an import¬ ant aerial station.

AIX-LA-CHAPELLE, Congress of, an

important congress held in October and No¬ vember 1818. By this

congress the army of the allies, consisting of 150,000 British, Russian, Austrian, Prussian and other troops, which, 'since the second peace at Paris, had remained in France to watch over its tranquillity, was withdrawn after France had paid the contri¬ bution imposed at the peace of 1815. Thus the Congress of Aix-la-Chapelle restored inde¬ pendence to France, and readmitted her as one of the Great Powers to the councils of Europe.

AIX-LA-CHAPELLE, Treaties of Peace Concluded at. The first, 2 May 1668, put an end to the war carried on against Spain by Louis XIV in 1667, after the death of his father-in-law, Philip IV, in support of his claims to a great part of the Spanish Netherlands, which he urged in the name of his queen, the Infanta Maria Theresa, pleading the jus devolu¬ tion is prevailing among private persons in Brabant and Namur. The second peace of Aix- la-Chapelle, 18 Oct. 1748, terminated the Aus¬ trian War of Succession in which the parties were at first Louis XV of France and the Em¬ press Maria Theresa and, in the sequel, Spain on the one side and Great Britain, Maria Ther¬

esa and Charles Emmanuel, King of Sardinia, on the other.

AIX-LES-BAINS, -la'ban', France, town in the Savoie department near Lake Bourget; 848 feet above sea-level ; 18 miles by rail north of Marseilles. It is a fashionable watering place visited annually by thousands for the hot sulphurous springs, used internally and for bathing ever since the establishment there in Roman days of the (Aquae Gratianae — the Baths of GratianP Resident pop. 5,000.

AJACCIO, a-ya'cho, or AJAZZO, a-yat'zd, France, capital of the department and island of Corsica, on its southwest coast, on a tongue of land projecting into the Gulf of Ajac¬ cio. It is sheltered by mountains from the north and east winds ; and the town and bay are defended by a citadel. The entrance into the harbor is rendered unsafe by projecting rocks. Ajaccio is the birthplace of Napoleon; the house in which he was born is still in a state of good preservation and has become the property of the nation. It is the handsomest city of Corsica and the seat of a bishop. It contains a cathe¬ dral, a communal college, a public library, a botanical garden, etc. In the commercial world it is famous for its coral and sardine fisheries, and it has also a trade in wine, grain, olive-oil and fruits. During the European War its im¬ portance was increased as a naval base for the allied fleets operating in Mediterranean waters.

AJALON, aj'a-lon, said to be the modern Yalo, a village 14 miles west-northwest of Jeru¬ salem, was the town rendered memorable by

Joshua's victory over the five Canaanitish kings, and still more so by the extraordinary circum¬ stance of the miraculously lengthened day.

AJAX (Greek, Aids), the name of two of the Grecian chiefs who fought against Troy, distinguished as Ajax Oileus and Ajax Tela-monius. The former, the son of Oileus and Etiopas, a Locrian, was called the Less. When the Greeks had entered Troy, Cassandra fled to the temple of Pallas, whence she was forced and dragged along, bound as a captive. Some accounts add that he violated the prophetess in the temple of the goddess. Ulysses accused him of this crime, when he exculpated himself with an oath. But the anger of the goddess at last overtook him and he perished in the waves of the sea. The other Ajax was the son of Telamon, from Salamis, and a grandson of Hfacus. He understood not how to speak, but how to act. After the death of Achilles, when his arms, which Ajax claimed on account of his courage and relationship, were awarded to Ulys¬ ses, he was filled with rage, and, driven to frenzy, threAV himself on his sword, after having slaughtered the sheep of the Greek army, which he fancied were his enemies.

AJMERE, aj-mer', India, capital of the district and province of Ajmere-Merwara, on the Rajputana Railway, 275 miles south of Delhi. Ajmere was founded 145 a.d., and the ancient section is rich in historical interest. The modern city is well laid out with broad streets, fine stores and handsome residences. It is the seat of the Mayo Rajkumar College established in 1875 for the sons of native nobles. Pop. of city, 86,500. Area of province, 2,700 square miles ; pop. of province, 501,500.

AKABAH, a'ka-ba, Arabia, town of his¬ toric and strategic interest at the head of the Gulf of Akabah, identified with the Gneco- Roman yElana and the scriptural Elath, whence Solomon's fleet sailed for Ophir. A branch line joining Akabah to the Mecca Railway from Beirut was begun in 1906. The Gulf of Aka¬ bah, the yElanitic Gulf of the ancients, is the eastern of the two inlets into which the Red Sea divides at its northern end. It is from 12 to 17 miles wide and extends for about 100 miles in a northeasterly direction, bounding the mountainous peninsula of Sinai on the east.

AKBAR, ak'ber, the Great, properly Je- lal ed Din Mohammed, most noted of the Great Moguls, Emperor of Hindustan : b. Amerkote, 14

Oct. 1542; d. Agra 1605. His father, Humayun, was driven from the throne by usurpers and fled to Persia. It was during this flight that Akbar was born. After an exile of 12 years the father returned and suc¬ ceeded in recovering his throne, but died within the year. Akbar succeeded him at the age of 14 and at first the administration was placed in the hands of a regent, but in 1560 he asserted his strong personality and took the reins of power into his own hands. At this time the territory under the rule of Delhi was limited to a few provinces. Within 12 years Akbar had con¬ quered and consolidated under his administra¬ tion the whole of Hindustan north of the Deccan. But although great in war, he was even more able as an administrator, being unexcelled, or even unequaled, by any of his predecessors or successors. He threaded his dominions with roads, established a uniform system of weights and measures and organized a vigorous civil police system. His powerful influence rested more on his strong sense of justice than on the military power with which he had first subdued his enemies. For the proper levying of taxes, the lands were accurately surveyed and a careful census of the population taken. He forbade child marriages, encouraged widows to remarry and attempted to put an end to the hideous practice of suttee, whereby wives were burned on the funeral pyres of their husbands. Although a Mohammedan by faith, he was won¬ derfully tolerant of other forms of belief and even invited Christian missionaries into the country. Schools were established for Hindus as well as for Mohammedans and numbers of Hindu works were translated from the Sanscrit into Persian. Abu-1 Fazl (q.v.), his able vizier, has left detailed records of the entire administration of his reign in a work which has been translated into English by Gladwin under the title Hnstitutes of Akbar' (3 vols., Calcutta 1786 and London 1800). He was suc¬ ceeded by his son Selim, also known as Jehan- gir, in 1605. Consult Malleson, (Akbar ' (Rulers of India series, Oxford 1891-1901) ; Garbe, (Kaiser Abkar von Indien) (1909); Modi, (Parsees at the Court of Akbar 5 (1903).

AKED, a'ked, Charles Frederick, Anglo- American clergyman: b. Nottingham, England, 27 Aug. 1864. He began his career as auc¬ tioneer to the sheriff of Derbyshire, but later entered as a student in the Midland Baptist College. He first attracted attention in Liver¬ pool as a speaker and his congregation there became one of the largest in England. He was one of the most violent opponents of the Boer

War, and one of the founders of the Passive Resistance League. He was also prominent in the movement in opposition to the Education Act of 1902. In 1907, through the influence of John D. Rockefeller, he received a call to the pastorate of the Fifth Avenue Baptist Church,

New York. In 1911 he went to San Francisco, where he became pastor of the First Congrega¬ tional Church. In 1919 he became pastor of the First Congregational Church of Kansas City, Mo. In 1913 he became a citizen of the United States. Among his published writings are (The Courage of the Coward) (1905) ; (A Ministry of Reconciliation ' (1907) ; (Mercies New Every Morning) (1907) ; (Wells and Palm Trces) (1908) ; (01d Events and Modern Meanings' (1908) ; (The Lord's Prayer; Its Meaning and Message for To-day' (1910).

AKEE (Blighia sapida) , fruit tree of the family Sapindaccce. It is a native of tropical Africa, reaches a height of 25 feet or more, with numerous branches. Its leaves resemble those of the ash. The fruit is about the size of a goose's egg, contains three seeds and has a grateful flavor. With sugar and cinnamon it is used as a remedy for diarrhoea. The dis¬ tilled water of the flowers is sometimes used as a cosmetic. Sometimes by cramping the roots in pots the akee produces fruit in hot¬ houses.

AKENSIDE, Mark, English physician- poet: b. 9 Nov. 1721; d. 23 June 1770. He achieved literary fame at the age of 23 with his poem Pleasures of the Imagination' (3 vols., London .1744), didactic verse based largely on Addison's essays on the imagination and on Lord Shaftesbury's writings. Among his minor verse are (Ode on the Winter Sol¬ stice' and (Hymn to the Naiads.' Consult Buckle, C., (Life, Writings and Genius of Akenside' (London 1832).

AKERS, Peter, American clergyman and educator : b. Campbell County, Va., 1 Sept. 1790; d. Jacksonville, Ill., 21 Feb. 1886. He re¬ ceived his education in the common schools and pursued a classical course in higher insti¬ tutions of learning in Virginia and North Caro¬ lina. In 1817 he was admitted to the bar and formed a partnership with Maj. W. P. Fleming of Kentucky. In 1822 he entered the minis¬ try of the Methodist Episcopal Church. He served many years as presiding elder. In 1827 and 1831 he was financial agent of Augusta College.ˆ In 1833-34, 1852-57 he was president of McKendree College. Lebanon, Ill. He was a delegate to six General Conferences of his church.

AKHALTSIKH, a/kal-tsek', chief town of a district in the government of Tiflis, the former capital of Turkish Armenia from 1579 to 1828, 70 miles by rail east of Batum. The river Kura divides the old town and fortress on the left bank from the new town on the right. Coal and lignite are mined, firearms, small weapons, silver filigree work are manufactured, arid a thriving trade in these and in the silk, grain, honey and wax of the neighborhood is carried on with Black Sea

ports. Pop. 15,000.

AK-HISSAR, ak’hls-sar', Turkey in Asia, a town in the vilayet of Smyrna, 50 miles by rail northeast of Smyrna. It is the biblical f<Thyatira,” one of the (<seven churches of Asia,” a Macedonian colony founded by Seleu-

cus about 290 b.c., and later an important Ro¬ man station on the highway from Pergamum to Laodicea. The modern town carries on a busy export trade in locally-grown cotton, wool, silk cocoons, grains and cereals, and has a high reputation for its scarlet dyes. Pop. 20,000.

AKHMIM, ak-mem', or EKHMIM, Egypt, town on the right bank of the Nile, almost opposite the Suhag station on the Cairo and As¬ suan Railway, 68 miles by river south of Assiut. Its archaeological interest is great. It was the ancient Egyptian Apu or Khen-min, the Coptic Shmin, known to the Greeks through Herod¬ otus, Strabo and other travelers, as Chemmis or Panopolis, the seat of the pagan worship of the ithyphallic Min (Pan) as <(the strong Horns. ® Christian monasteries were early founded here and the pagan temples destroyed. Modern Akhmin is a busy trading centre in cotton and linen goods, and in Coptic and Egyptian antiquities. Pop. 24,000.

AKHTYRKA, ak-tir'ka, Russia, town in the Kharkov government, on the Vorskla River, 82 miles by rail northwest of Kharkov. Its miraculous ikon of the Virgin in the beautiful cathedral built in 1753, and the annual May fair, attract numerous pilgrims and visitors. A busy agricultural trade is carried on and woolens are manufactured. Pop. 26,000.

AKIBA BEN JUDAH, a-ke'ba ben joda, a Jewish rabbi who was executed during the reign of Hadrian, about 133, because it is said he taught the Jewish law when it was forbidden to be taught. He was a great scholar in Jewish law and a Mishnah bears his name. Pie de¬ fended the Song of Solomon and interpreted it allegorically. He was an allegorist in his method of interpretation, finding a meaning in even the letters of the law. Aquila, who trans¬ lated the Old Testament into Greek, is said to have been a pupil of Akiba. The school of

which he was head exerted a wide influence.

•

AKKA, ak'ka, a tribe of dwarfs inhabit¬ ing the Belgian Kongo. The first to report their existence was the Franco- American ex¬ plorer and writer, Paul du Chaillu, but because his books were written in a simple style, which made them popular with young people, his ac¬ counts were not accepted by the scientific world, being regarded as fiction. Later the Akka were discovered by Schweinfurth, who corroborated du Chaillu in every detail. In height these peculiar people average four feet and six inches, and though their features are distinctly negroid they are of a dark yellow complexion. They are extremely retiring by nature, do not mix with the neighboring tribes though often they will seek the protection of the tall negroes. They hunt their game with poisoned arrows, their favorite prey being the python. Their main diet, however, is composed of nuts and berries.

AKKAD, ak'kad. See Accad.

AKKERMAN, ak'ker-man', Rumania, fron¬ tier town of Bessarabia, on the right bank of Dniester estuary, 12 miles from the Black Sea. The harbor has been made navigable for large steamers and an export trade is carried on with Odessa 60 miles distant, in wine, fruits, fish, salt, wool and tallow. The town is noted for its beautiful gardens and vineyards. It dates from the Genoese colony Mauro Castro,

founded on the site of Tyras, an ancient Mile¬ sian colony. In disputes with the Turks it was repeatedly taken and returned by Russia until its final annexation in 1881. After the World War it was ceded to Rumania. Pop. 34,000.

AKMOLINSK, ak'mo-lyensk, Asiatic Rus¬ sia, a province organized 2 Nov. 1868 from the Kirghiz Steppe in Central Asia. The Trans-Siberian Railway runs along its northern border and the province extends southward to the Chu River. Akmolinsk, the former capital, a city of 12,000 inhabitants, is an important trading centre for the caravan trade with Bok¬ hara and Tashkend. Omsk (q.v.) founded in 1862, the most important city, is since 1882 the capital of the province. Coal, iron, copper and gold are mined and among the chief industries are horse-breeding, cattle- and sheep-raising, fishing, hunting and the cultivation of grain, flax and tobacco. The stationary population live mostly in the northern and central hilly section. The Khirgiz nomads who constitute about half the population wander and encamp over the southern regions. Area of province 218,480 square miles; pop.

1,060,000.

AKRON, Ohio, city and county-seat of Summit County, situated in a range of hills overlooking the Big and Little Cuyahoga Rivers, 35 miles southeast of Cleveland and 130 miles northeast of Columbus. Akron is entered by the Baltimore & Ohio, Pennsylvania, Erie, Akron, Canton & Youngstown, and Northern Ohio railroads. The town was settled about 1818 but its growth dates from the construction of the Ohio Canal in 1825, here mounting to the watershed between Lake Erie and the Ohio River by a series of 21 locks, the surplus water used in lockage furnished by a system of reser¬ voirs on the Summit level supplying the power for large flouring mills then located here. Akron was incorporated as a village in 1836 and as a city in 1865. Situated in a location advantageous for diversified industries at the northern edge of the grain belt and on the southern border of the dairy section of the State, with beds of fireclay and coal fields close by, Akron has developed the largest cereal mills in the country, the most extensive clay-product plants, has taken the lead in books, fishing-tackle, matches and agricultural implements, and is the largest rubber-manu¬ facturing centre in the world. Besides im¬ mense quantities of rubber clothing, hose, surgical and other goods, 20 companies have a daily capacity of 40,000 automobile tires and an increasing output of aviation and aeronautical material. The aggregate capitalization of its 164 industries is $175,000,000; combined value of annual sales (1915) $156,177,993. Akron is governed by a mayor, council, board of public service, board of public safety, board of edu¬ cation and subordinate officers. The school system alone involves the annual expenditure of $350,000 in salaries, and is of a high and efficient grade. The University of Akron, a free city institution, dates from 1913 and was previously known as Buchtel College (Lffiivcr- salist) (q.v.), founded by John R. Buchtel, the cornerstone of which was laid by Horace Greeley in 1872. Akron has fine public insti¬ tutions and residential buildings, large depart¬ ment stores, a completely motorized fire de¬ partment, a municipal water system completed

(1915) at a cost of $4,580,000; a municipal gar¬ bage and sewage plant which cost $550,000, 17 parks covering 219 acres, four public play¬ grounds, and a Svhite way® system of lighting three miles long. It is the centre of a lake dis¬ trict famous for its scenic attractions, including Portage Path, an Indian trail between the Cuyahoga and Tuscarawas rivers, which formed part of the western boundary of the

United States in 1785. Akron was once the home of John Brown, where the councils of his associates in the abolition cause were held. It was also the residence of Sidney Edgerton, first chief justice of Idaho Territory and first territorial governor of Montana. Pop. (1915) 100,079, an increase of 45 per cent in five years from (1910) 69,067. Pop. of Greater Akron, including suburbs (1920) 208,435. Consult

Lane, S. A., (Fiftv Years and Over of Akron and Summit County) (Akron 1892) ; (Akron — The City of Opportunity' (Akron Chamber of Commerce 1916).

AKSAKOV, ak-sa'kof, Ivan Sergeye¬ vich, Russian writer and leader of the Pan- slavist movement: b. government of Ufa, 26 Sept. 1823 ; d. 8 Feb. 1886. Having graduated from his law studies in Saint Petersburg in 1842, he entered the Moscow division of the Senate. In 1848 he entered the service of the ministry of the interior. Four years later he became ed¬ itor of Sbornik in Moscow, which was soon suppressed. During the Crimean war he served in Bessarabia in command of the Ser- pukhoff detachment of the Moscow troops. After the war he founded a weekly journal called Den, which he edited for four years, after which he founded and edited a daily paper called Moskva. This latter paper was suppressed three times by the government with¬ in two years. He was one of the leaders of the movement toward the union of all the Slavic peoples into one great empire and he had not a little influence in precipitating the Russo-Turkish war of 1877, which resulted in the liberation of Rumania and Bulgaria. From 1880 until his death he published the weekly Rus in the interests of Panslavism.

AKSAKOV, Sergei Timofeyevich, Rus¬ sian writer: b. in the government of Ufa, 20 Sept. 1791 ; d. Moscow, 30 April 1859. On grad¬ uating from the University of Kazan he entered the legislative commission in Saint Peters¬ burg in 1807, where he served for five years. Already at the age of 15 he began to write and was for the rest of his life ever busy pro¬ ducing literature. His works are Observa¬ tions on Angling' (1847) ; { Memoirs of a

Huntsman in the Government of Orenburg' (1852); (Tales and Memories of a Huntsman' (1855); (The Family Chronicle' (1856); (Bogrov's Childhood' (1858).

AKSAKOV, Konstantin Sergeievich, Rus¬ sian historian and publicist: b. 1817; d. 1860. He grew up in the village of his birth but when his parents moved in 1826 to Moscow he came suddenly, as a nine-year-old boy, into the midst of the high life of • Russian society. From his earliest childhood he manifested a strong love for everything Russian

and par¬ ticularly for things of Old Russia. He was able to read at four years of age and by the time he was 12 years old he had already read

the entire classical literature. His education was completed at home with the aid of some of the most able preceptors, as also by the professors of Moscow University where he studied comparative literature. Having finished his studies at the University in 1835, he dedi¬ cated himself entirely to literature : at first in the field of criticism and poetry and later, of history. In 1847 he defended successfully his doctorate thesis, (Lomonosov in the History of the Russian Literature and Language,' In 1850 Aksakov wrote for the National Theatre of Moscow a historic patriotic drama, liber¬ ation of Moscow in 1612,' which was sup¬ pressed the next day by the authorities be¬ cause of his claims that Moscow was freed by the peasantry and not by the nobility. Some of his publications ((The Wealthy Prince Vladimir,' etc.) were not only censured, but even caused their author's arrest. His his¬ toric comedies (Prince Lipovitzki' (1856) in which he glorifies the national Russian genius triumphing over the (<venomous" Western civ¬ ilization, and (01eg at the Gates of Constanti¬ nople' do not show a powerful playwright, but may be considered as valuable historic studies with weak dialogue. His efforts in the field of Russian philology were crowned with more success as he proved the evil to the Russian idiom caused by the inroads of foreign lan¬ guages. In his treatise (On the Fundamental Principles of Russian History' (1861) Aksa¬ kov distinctly separates the people from the government and asserts that between them ex¬ ists a permanent chasm bridged by mutual con¬ cessions.

AK-SHEHR, ak-she'h'r (((white city"), Turkey in Asia, a city of the Konieh vilayet, on the north slope of the Sultan-Dagh, five miles south of Lake Ak-Shehr and 100 miles by rail northwest of Konieh. It abounds in historical interest. Mentioned in the martyr¬ dom of Polycarp and in the correspondence of Cicero ; it is the Philomelium of Strabo ; the burial place of Nur-eddin Khoja; here in 1190 Frederick I, the German Emperor, fought a battle with the Seljuks; and here in 1403 the Sultan Bajazet I died while a prisoner in the fortified camp of Tamerlane. The modern city manufactures carpets of repute and is an im¬ portant trading-centre between Constantinople and Syria. Pop. 15,000.

AKSU, ak-soo' (Svhite water") China, a town of East Turkestan, on the Aksu River and the southern slope of the Tien-shan Moun¬ tains, about 250 miles northeast of Kashgar. It is a great caravan-centre for Chinese, Rus¬ sian, West Turkestan, Kashmir and Indian traders and

its industrious and hospitable in¬ habitants manufacture unglazed (<bias" cotton cloth, ornamented saddlery of deerskin, jewels and jasper ornaments. Copper, iron and lead deposits nearby are mined by Chinese convicts. Aksu was the former capital of the Khans of Kashgar and Yarkand. In 1867 the Khan of Kashgar regained it, only to lose it again to the Chinese in 1877. It was almost destroyed by an earthquake in 1716 and in 1800 was flooded by a freshet in which 3,000 lives were lost. Pop. 25,000.

AKTIAN DEPOSITS. See Continental Shelf.

AKYAB, ak-yab', India, seaport town of Burma, capital of the district of Akyab and of the province of Arakan, 190 miles southeast of Calcutta on the eastern coast of Akyab Island, at the confluence of the Kuladan, Myu and Lemyu rivers. A former fishing village, it has become a flourishing town since its se¬ lection in 1826 as a port and the capital of the province. The chief exports are rice and oil. Pop. 40,000.

AL, or EL, the Arabic definite article ; also means (<of the®: al abdu — the slave; abdu '1 malik = slave of the king. In Arabic the fol¬ lowing consonants are called ((sun letters® : Te, the dal, dzal, re, ze, sin, shin, sad, dad ta, tsa, nun. When a noun or a name beginning with one of these letters follows the article, the / is then dropped and the sun letter is doubled, e. g., Noor-el-deen (light of the faith), becomes Nooreddeen; koh-el-noor (mountain of light), is pronounced koh-en-noor. Simi¬ larly, Abdu el Rahman (slave of the merciful) is pronounced ((Abdurrahman ;® el shems (the sun), esh-shems.

ALABAMA. A Gulf State of the United States, the ninth in order of admission to the Union. It is bounded on the north by Tennes¬ see, south by Florida and the Gulf of Mexico, east by Georgia, west by Mississippi. Its ex¬ treme length is about 336 miles from north to south ; its greatest breadth 200 miles ; its area 51,998 square miles, of which 719 square miles is water. The population (official census, 1920) was 2,348,174, of which 58 per cent are white. In 1910, Alabama ranked as the 18th State of the Union in population and the 27th in area. It is divided into 67 counties. The capital is Montgomery.

Topography. — The State lies partly in the Gulf Coastal Plain and partly in the Appa¬ lachian Highland which extends in the United States from Maine to middle Alabama. A southward bending arc

drawn from the north¬ west corner of the State to Columbus, Ga., divides it into two distinct regions, the north¬ eastern, the southern extremity of the Appa¬ lachian, a mountainous section ; the south¬ western, belonging to the Gulf Coastal Plain. The mountain portion contains all the features of the Appalachian system. (1) A Piedmont region in the east, called the Ashland Plateau. (2) Ajacent to the Piedmont, a number of parallel mountain ridges, with valleys between, extending from northeast to southwest, which gradually reduce in elevation to the southern plain. (3) On the west a hilly region, the southern end of the Cumberland Plateau.

The average elevation of the State is ap¬ proximately 600 feet. In the north and east the surface is generally above this level ; in the south and west, below it. The greatest elevation is 2,500 feet, found in the sharp crested Talladega ridges composed of granite, slate and marble. These represent the extreme southern end of the Blue Ridge of the Appalachians. The great Tennessee River enters Alabama at the northeast corner from the State of Ten¬ nessee between two parallel ridges. At Gunters- ville it turns abruptly to the northwest and flows through the valley which it has made across the Cumberland Plateau and emerges from the State at its northwest corner.

The coast line of the State is about 120

miles in length including both shores of Mobile Bay, an inlet 36 miles long and from 8 to 18 miles in width with a channel 30 feet deep in course of construction. The smaller bays are Perido, Grand and Bon Secours.

Hydrography. — There are three major and two minor drainage basins in the State :

Major. — (1) The Mobile; (2) the Ten¬ nessee; (3) the Chattahoochee.

Minor. — (1) The Conecuh, forming the Es¬ cambia of Florida; (2) the Choctawhatchee.

The Mobile system drains the greater part of the State. Mobile River, 44 miles long, is formed from the Alabama and the Tombigbee, both crooked alluvial streams. The Alabama is navigable 320 miles to the junction of its two chief tributaries, the Coosa and the Tallapoosa. The Coosa, since the completion of several great locks by the Federal government, is navigable to Rome, Ga., and its falls are the source of immense water power. The Cahaba, another tributary of the Alabama, enters it from the north and flows through important coal fields.

The Tombigbee, 500 miles in length, has its remoter sources in Mississippi. Its chief tribu¬ tary in Alabama is the Black Warrior, 300 miles long, rising on the divide near the great bend in the Tennessee River. This tributary flows through the greatest coal measures of Alabama, and has been made navigable by a series of locks and dams built by the Federal govern¬ ment.

The Tennessee, chief affluent of the Ohio, is navigable from its mouth to Knoxville, Tenri., about 700 miles, 300 of which lie in Alabama. Navigation on this was originally interrupted by mussel shoals, but now a canal with nine locks is in operation, extending 28 miles between Decatur and Riverton. The power available at the foot of the shoals in this mighty stream is second only to that of Niagara.

The Chattahoochee, flowing between Georgia and Alabama, is navigable to the <(Fall-line® where the stream leaves the Piedmont and enters the Coastal Plain, a distance of about 200 miles. •

The Conecuh and Choctawatchee are shal¬ low streams of the Coastal Plain, used for float¬ ing rafts of logs to the Gulf. Alabama is classed as one of the four great river States of the United States. Its streams furnish steam navigation for nearly 3,000 miles.

Climate. — Lying between parallels 31-35, the State has a range of climate from temperate in the northern mountainous portion, to semi-tropical in the low-lying counties of the south¬ ern part bordering the Gulf. The annual mean temperature for the entire State is 63° ; average rainfall, 52 inches. Throughout the State there is an average of six months with¬ out frost. All the climate conditions favor the growth of cotton, corn, peanuts and other leguminous plants.

Geology. — All the Appalachian formations are found here in three divisions: (1) A north¬ west section showing subcarboniferous lime¬ stone masses and coal measures, with strata practically horizontal. (2) A northeast sec¬ tion having metamorphic and calcareous rocks, — Silurian quartzites, marbles, granites and gneisses, the strata often broken into masses of

clay interlaminated with quartz seams ; the Coosa and Cahaba coal fields showing strata of sandstones, conglomerates, shales and coal beds. (3) A southern section, part of the Gulf Coastal Plain, having drift beds over Creta¬ ceous and Tertiary rocks. The angle between

the Alabama and Tombigbee rivers is rich in fossil remains of the Tertiary Age. Consult Geologic Map published by Geological Survey of Ala¬ bama.

Soils. — The soils are (1) residual, and (2) sedimentary. The residual soils, being derived from underlying rocks, vary from clay to sand, according to the substratum. The Coosa and Tennessee valleys underlaid with limestone are overlaid with fertile red clay, while the adjacent highlands are covered with sandy soil varying in color. The Coastal Plain is composed of many overlapping strata of sedimentary ma¬ terial, limestone, sandstone, clay, each outcrop¬ ping stratum being overlaid with its appropriate soil. Overlying the western and southern part of the State is the remnant of a mantle of sand, gravel and loam in the form of gravelly hills of moderate fertility, but chiefly forested. Be¬ tween the northern mountainous region and the southern plain lies an inner lowland extend¬ ing across the State from east to west. This shallow trough, about 25 miles in width, has been eroded out of the belt of chalky limestone of the Cretaceous deposits, the rock of which has weathered into a dark soil of great depth and fertility. This lowland is the famous Black Belt, having a soil of enduring quality. Most of the rivers of the lowlands have made flood plains of rich alluvial soil.

Fisheries. — Oyster-dredging is the chief branch of the fishing industry, an average an¬ nual yield being 535,000 pounds valued at $168,- 500. Red snappers, catfish, mullet and shrimp also furnish profitable yields. The average annual value of the total product of the Ala¬ bama fisheries amounts to $387,000.

Minerals and Mining. — The mineral wealth of the State is enormous, practically all of it lying in (1) and (2) of the geologic regions. The advantage of vast coal, iron, limestone and dolomite (magnesian limestone) deposits tying close together has within the past 20 years raised the State from an almost purely agricultural section to one of the chief manufacturing districts of the Union with its centre at Birmingham. It is said that iron products can be manufactured more cheaply there than anywhere else because of the prox¬ imity of coal, iron and fluxing material. The mineral wealth of Alabama lies chiefly in her rich deposits of coal and iron ore. The former brings her two-thirds of her annual income from mines and quarries, and the latter about one-fourth. Beyond the first value of these raw materials, however, they form the bases of two thriving industries — the manufacture of pig- iron and of coke — through both of which the State takes high rank among the mineral-work¬ ing States in the Union. In 1916 Alabama produced 5,976,018 tons of iron ore, which,

though it amounted to only about 8 per cent of the total yield of the whole country, placed the State in third place among the iron ore pro¬ ducers — following Minnesota and Michigan — and the yield was five times as much as that of Wisconsin, the fourth in rank in that industry. The incompleteness of the returns for 1916 of

the mineral industries of Alabama at this writ¬ ing (October 1917) makes it necessary to revert to the record of 1915 for a unified statement. In 1915, then, the production of raw mineral substances in the State reached a total value of $29,457,407. This was distributed as follows:

Coal . $19,066,043

Iron ore . 6,798,266

Clay pioducts . 1,193,022

Cement . 891,183

Marble and other stone . 719,452

Lime . . . 250, 227

Sand and gravel . 242,336

Graphite . 204,572

Miscellaneous . 92,306

Some of these items, as the clay products, cement and lime, are advanced by treatment beyond the raw stage ; the stone is more or less dressed before being placed on the market; and the graphite is milled. But it is the custom of the Geological Survey to enumerate such pro¬ ductions among the mineral products of the several States and this practice is followed here. A very considerable secondary value, arising from the conversion of coal into coke, and of iron ore into pig iron should be noted, as inseparably connected with the mineral out¬ put of the State. In 1915 the pig iron pro¬ duced was valued at $23,757,124; and the coke production was valued at $8,505,555.

Coal. — The great Appalachian coal region which includes the world-famous mining sec¬ tion of Pennsylvania and Ohio, trends south-westward through eastern Kentucky and Ten¬ nessee, having its southerly terminus in a broad area in the northern half of Alabama.

The coal formations in this State underlie about 8,400 square miles distributed in four dis¬ tinct measures : the Warrior, the Cahaba, the Coosa and the Plateau. The first named in¬ cludes all of Walker County and most of Jef¬ ferson, Tuscaloosa and Fayette counties, with parts of Blount, Culman, Winston and Marion counties. This great area embraces about 4,000 square miles and supplies over 80 per cent of all the coal mined in the State. The Cahaba measures underlie parts of Saint Clair, Jeffer¬ son, Shelby and Bibb counties, and supply more than 18 per cent of the State's total output. The other two measures though they are known to contain immense quantities of coal, have but few mines and together supply less than 2 per cent of the coal mined in the State. Nearly half of the entire output is mined in Jefferson County, nearly one-fourth in Walker County and about one-eighth in Bibb County. About 35 per cent of the product is mined by ma¬ chines, 31 per cent by hand and 33 per cent is blasted off the solid. The coal production of Alabama in 1915 was 14,927,937 tons, valued at the mines at $19,066,043. The highest output was in 1910 when 16,111,462 tons were mined. In 1870 the output was 13,200 tons. Of the coal output of 1915, 49 per cent was consumed in the State, 34 per cent by railroads, 14 per cent was shipped to other States and 3 per - cent was shipped to tidewater. The amount con¬ sumed by the railroads was 5,072,435 tons ; 4,695,938 tons were made into coke ; 2,389,397 tons were consumed in industrial plants; 1,592,932 tons were used for domestic and local purposes; 535,340 tons were used at the mines; 109,160 tons in the manufacture of gas; and 480,258 tons were shipped to tide¬ water as bunker coal. From 1840, when records

ALABAMA.

Estimated population, 2,395,270

COUNTIES

Pop.

Pop.

20,038

Autauga . .

. E 5

32,414 Houston .

H 8

18,178

Baldwin .

. I 3

32,918 Jackson .

A 6

32,728

Barbour .

.G 8

226,476 Jefferson .

.C 5

22,791

Bibb .

E 4

17,487 Lamar .

.C 2

21,456

Blount .

30,936 Lauderdale .

A 3

30,196

Bullock .

21,984 Lawrence .

A 4

29,030

Butler .

.G 5

32,867 Lee .

E 8

39,115

Calhoun .

.C 7

26,880 Limestone .

A 4

36,056

Chambers .

.E 8

31,894 Lowndes .

F 5

20,226

Cherokee .

. B 7

26,049 Macon .

F 7

23,187

Chilton . . .

.E 5

47,041 Madison .

A 5

18,483

Choctaw .

. G 2

39,923 Marengo .

.F 3

30,987

Clarke .

G 3

17.495 Marion .

B 3

21.006

Clay .

. D 7

28,553 Marshall .

B 6

13,385

Cleburne .

.C 7

80,854 Mobile .

. I 2

26,119

Coffee .

.H 6

27,155 Monroe .

H 4

24,802

Colbert .

A 3

82.178 Montgomery .

F 6

21,433

Conecuh .

.H 4

33.781 Morgan .

B 5

16,634

Coosa .

. E 6

31,222 Perry .

E 4

32,124

Covington .

H 6

25,055 Pickens . . .

D 2

23,313

Crenshaw . . .

. G 6

30.815 Pike .

G 7

28,321

Cullman .

. B 5

24,659 Randolph .

D 8

21,608

Dale .

. H 7

25.937 Russell .

F 8

53,401

Dallas .

. F 4

20,715 St. Clair .

.C 6

28,261

Dekalb .

B 7

26,949 Shelby .

D 5

28,245

Elmore .

.E 6

28.699 Sumter .

E 2

18,889

Escambia .

. H 4

37,921 Talladega .

D 6

39,109

Etowah .

. B 6

31,034 Tallapoosa .

E 7

16,248

Fayette .

C 3

47,559 Tuscaloosa .

D 3

19,369

Franklin .

. B 3

37,013 Walker .

.C 4

26,230

Geneva .

. H 7

14,454 Washington .

H 2

22,717

Greene .

. E 2

33,810 Wilcox .

. G 4

27,883

Hale .

.E 3

12,855 Winston .

. B 4

20,943

Henry .

. G 8

Incorporated Cities

Towns, and Villages

1,141

Abbeville .

. G 8

478 Courtland . .

.A 4

649

Adamsville .

.C 5

650 Cuba .

F 2

4 313

Alabama City . . . .

.B 7

2,130 Cullman .

. B 5

1,544

Albertville .

.B 6

1,193 Dadeville . .

. E 7

1,710

Alexander City . .

.E 7

1 27 Daviston .

D 7

640

Aliceville .

. D 2

382 Dayton .

F 3

1,071

Altoona .

. B 6

194 Deatsville .

.E 6

2,480

Andalusia .

.11 5

4,228 Decatur .

.A 4

14,112

Anniston .

.C 7

279 Deer Creek, Walker C 4

431

Ariton .

.G 7

2,417 Demopolis .

F 3

479

Ashford .

. H 8

916 Dora .

.C 4

1,062

Ashland .

D 7

7,016 Dothan .

H 7

278

Ashville .

.C 6

288 Dozier .

H 6

1,715

Athens .

.A 4

315 Eclectic .

.E 6

1,060

Atmore .

. H 3

- 165 Eden .

.C 6

2,513

Attalla .

.B 6

393 Edwardsville .

.C 8

1,408

Auburn .

.F 7

1,079 Elba .

H 6

671

Austinville, Morgan

188 Elkmont .

A 4

B 5

8,000 Ensley .

.C 5

313

Autaugaville .

.F 5

2 322 Enterprise .

H 7

3,600

Avondale .

. D 5

374 Epes .

.E 2

307

Banks .

.G 7

94 Estaboga, Talladega

143

Batesville .

.F 8

D 6

749

Bay Minette .

1 3

4,259 Eufaula .

.G 8

214

Bear Creek .

B 3

1,001 Eutaw .

.E 3

345

Beatrice . . . .

.G 4

1,582 Evergreen .

H 5

201

Bellwood .

.H 7

590 Fairhope .

. J 3

372

Berry Station . . .

.O 3

237 Fairview, Morgan

. B 5

16,556

Bessemer .

D 5

335 Falkville .

B 5

256

Billingsley .

.E 5

352 Faunsdale .

F 3

181,762 Birmingham. . . .

. D 5

636 Fayette .

C 3

485

Black .

.H 7

398 Fitzpatrick. .

. F 7

3,500

Blocton .

. D 4

197 Flint .

. B 4

287

Blountsville .

. B 5

539 Flomaton .

.H 4

11?

Blue Springs . . . .

.G 7

2,439 Florala .

.H 6

1,010

Boaz .

.B 6

6,689 Florence .

A 3

350

Bolling .

.G 5

893 Fort Deposit .

F 5

803

Brantley .

.G 6

1,317 Fort Payne .

. B 7

2,185

Brewton .

.H 4

257 Fruithurst .

.C 7

2.125

Bridgeport .

.A 7

518 Fulton .

. G 3

1,502

Brighton, Jefferson

125 Furman .

G 5

C 5

14,642 Gadsden .

,C 7

623

Brookside .

.C 5

532 Gainesville .

.E 2

815

Brundidge .

.G 7

145 Gastonburg, Wilcox

754

Calera .

. D 5

G 4

648

Camden .

G 4

204 Gaylesville, Cherokee

896

Camp Hill .

. E 7

B 7

403

Capital Heights,

969 Geneva .

H 7

Montgomery . . .

.F 6

999 Georgiana .

G 5

1,627

Carbon Hill ....

.C 3

4,214 Girard .

. F 8

426

Cardiff .

.C 5

336 Glenwood .

.G 6

444

Carrollton .

. D 3

740 Goodwater .

. D 7

, 225

Castleberry .

H 4

707 Gordo .

D 3

730

Centerville .

.E 4

293 Gordon .

. H 8

269

Cherokee .

A 2

347 Goshen .

.G 6

449

Childersburg . . . .

. D 6

428 Graysville, Jefferson

935

Citronelle .

. H 2

C 5

1,123

Clanton .

. E 5

2,048 Greensboro .

.E 3

1,130

Clayton .

. G 7

3,377 Greenville .

G 5

580

Clio .

G 7

356 Guin .

.C 3

685

Coal City .

.C 6

1,145 Guntersville .

. B 6

503

Coffee Springs . . .

. H 7

750 Gurley .

.A 6

673

Collinsville .

. B 7

286 Hackleburg .

B 3

1,122

Columbia .

. H 8

1,111 Haleysville .

. B 3

1,079

Columbiana .

. D 6

422 Hamilton .

. B 3

1,747

Cordova .

.C 4

464 Hanceville .

. B 5

352

Cottonwood,

300 Hardaway .

. F 7

Houston .

H 8

1,159 Hartford .

H 7

INCORPORATED CITIES, ETC— Continued

Pop. Pop.

1 .374

Hartsell .

. B 5

541

Pinckard .

. . . H 7

1 ,090

Headland ....

.H 8

627

Pine Apple. . . .

. . G 5

839

Heflin .

.C 7

470

Pine Hill .

...G4

202

Hillsboro .

.A 4

358

Pinkney .

...,C6

344

Hobson, Calhoun .

.C 7

599

Pollard .

. . . H 4

688

H ollins .

D 6

3,600

Pratt City ....

. . . C 5

234

Hollywood .

.A 6

2,222

Prattville .

. . . . F 5

7,611

Huntsville .

A 5

483

Ragland .

. . .C 6

764

Hurtsboro .

F 8

472

Red Bay .

. . .B 2

982

Ironaton .

. D 7

317

Red Level . . . .

...H5

572

Irondale .

. D 5

550

Reform .

. . D 3

1 .379

Jackson

H 3

85

Renfroe .

. . . D 6

2,231

Jacksonville .

.C 7

331

Repton .

. . H 4

2,509

Jasper .

.C 4

760

River Falls. . . .

H 5

413

Jerhison .

E 5

277

Riverside .

. ..C6

104

Jenifer . .

,C 7

2,034

Roanoke .

. . D 8

1,979

Jonesboro .

. D 4

349

Rock Mills .

. . . ,D 8

442

Jones Mill .

H 3

210

Round Mountain . . B 7

167

Joppa .

. B 5

2,046

Russellville . . .

. . . B 3

261

Kennedy .

.C 3

230

Rutledge .

. . G 6

340

Kinsey . ....

. H 8

1,350

Samson .

. . .H 6

1,632

Lafayette .

. E 8

491

Sandusky, Jefferson

3,820

Lanett .

. E 8

C 5

314

Langston .

. B 6

742

Sanford .

. . . H 6

810

Leeds .

.C 5

1,019

Scottsboro .

. . .A 7

540

Leighton .

.A 4

312

Seale .

. . . .F 8

600

Linden .

F 3

120

Searight .

. . .H 5

1,053

Lineville .

. D 7

133

Seddon .

. . . .C 6

877

Livingston .

.E 2

15,626

Selma .

. . . .F 4

483

Louisville .

. G 7

4,865

Sheffield .

...A3

1,384

Luverne .

. G 6

896

Slocomb .

. . .H 7

184

McWilliams .

G 4

422

Smith Hill, Bibb. .D 4

426

Madison .

A 5

350

Springville ....

. . . ,C 6

1,834

Marion .

. E 4

574

Stevenson .

... A 7

539

Midland City . . .

. H 8

619

Sulligent .

. . . .C 2

464

Midway .

F 8

1 ,456

Sylacauga .

. . D 6

529

Millport .

.C 2

5,854

Talladega .

. . . . D 6

58,221

Mobile .

.12

1,347

Tallassee .

. . . .F 6

616

Monroeville .

. H 4

309

Thomaston . .

. . . .F 3

923

Montevallo .

. D 5

1,181

Thomasville . . .

. . . . G 3

43,285

Montgomery .

F 6

263

Thompson ....

. . . .F 7

137

Mooresville,

426

Thorsby .

...E5

Limestone. . . .

A 4

344

Town Creek. . .

. ... A 4

299

Morris, Jefferson .

. .C 5

235

Townley .

. . . .C 4

354

Moulton .

. B 4

198

Trinity .

. . . .A 4

253

Moundville .

.E 3

4,961

Troy .

. G 7

130

Muscadine . .

,C 8

10,488

Tuscaloosa ....

. . . .D 3

392

Nauvoo .

.C 4

3,324

Tuscumbia . . . .

...A3

515

Newbern .

E 3

2,803

Tuskegee .

. . . .F 7

328

New Brockton .

. H 7

4,055

Union Springs

. . . ,F 7

6,118

New Decatur . . . .

A 4

1,836

Uniontown . . . .

. ,E 4

301

New Hope .

A 6

423

Vernon .

C 2

524

Newton .

. H 7

79

Vienna .

. .D 2

522

Newville .

.H 8

995

Vincent .

. . . D 6

500

Northport .

. D 3

426

Wadley . .

. . . .D 7

512

Notasulga .

.E 7

204

Walnut Grove,

1,065

Oakman .

.C 4

Etowah .

.. . . B 6

609

Oneonta .

.C 5

660

Warrior .

. . . .C 5

4,734

Opelika .

. E 8

435

Waterloo ....

...,A2

863

Opp .

.H 6

256

Webb .

...H8

255

Orrville .

.F 4

435

Wedowee . . . .

. . . .D 8

1,090

Oxford .

. .C 7

892

West Blocton,

Bibb

2,229

Ozark .

.G 7

D 4

534

Paint Rock .

A 6

1,103

Wetumpka . . . .

...,E6

106

Pansey .

. H 8

187

Whatley .

...,G3

530

Pell City .

.C 6

249

Whiteoak Springs .G 8

4,555

Phoenix .

. F 8

933

Wilsonville. . .

. . . D 5

214

Pickensville .

D 2

419

Winfield .

. . . .C 3

2,226

Piedmont .

. .C 7

710

Y ork .

...F2

ol the coal production of the State were first made, and including the 1915 output. Alabama has mined a grand total of 285,475,717 tons of coal — all bituminous. It is known that there are deposits of lignite in the southern part of the State, but no definite survey has yet been made of them.

Coke. — In the production of coke Alabama has ranked second among the coke-producing States for several years. In 1915 the coke in¬ dustry consumed 4,695,938 tons of coal, valued at $1.48 per ton, and produced 3,071,811 tons of coke valued at $2.78 per ton. The yield of coke was 65.4 per cent of the coal consumed and the value of coal per ton of coke, $2.26. Of the whole coke production, 2,869,268 tons were of furnace quality and 172,991 tons of foundry quality. The entire product was valued at_ $8,545,555. At the close of 1915 there were 8,568 beehive ovens and 750 by-product ovens in the State, but during the year only 2,506 beehive ovens and 732 by-product ovens had been active. Of the by-product ovens, 450 are of the Ivoppers type and 300 of the Semet- Solvay type. No reports are available as to the by-products recovered, but it is known that some toluol was produced.

Iron Ore. — The output of iron ore in Alabama in 1915 was 4,374,309 tons of hematite or red ore and 935,045 tons of limonite or brown ore. In the early days of iron-making in the State only the brown ore was used and the furnaces reduced it with charcoal. Later it was discovered that the red ore could be made into good iron at a considerably lower cost, using coke for fuel. The limonites, however, con¬ tinue to be regarded as the best ores in Ala¬ bama and bring a higher price. ' They make a tougher iron than the red ore and are fre¬ quently used with the red ore to improve the quality of the product. The limonite deposits are very numerous and widely distributed over the State, and in some localities are very ex¬ tensive. The most important occurrences are those overlying the Knox dolomites, the VVeis- ner quartzite, the Lauderdale chert and the La¬ fayette strata. The brown ore in 1915 brought at the mines $1.68 per ton when the red ore was selling at $1.25 per ton.

All the hematite ore mined in Alabama comes from the Clinton or Red Mountain formation. It is found on both sides of the anticlinal valleys which lie between the coal fields. In spots, owing to faults, the red ore ridges are missing on the western side of the valleys, although in some places and from the same cause the ridges are duplicated on the

eastern side. The moderate dips are generally on the eastern side and it is in these locations that nearly all the active mines are found. The hematite seams are exposed in outcrop along a distance of about 50 miles, but for the greater part of this distance they are not rich enough for profitable working. The most important development in the State has been along the easterly side of East Red Mountain, Jefferson County, in the stretch of about 15 miles be¬ tween the cities of Birmingham and Bessemer. Here there is an almost continuous string of active mines. A new mine, opened in 1915 in Shades Valley, gives promise of being the largest producer in the State. That rank is now held by the Red Mountain mine (a group), which also holds third rank among the iron

mines of the United States, with the record for 1915 of 2,138,015 tons of ore, only 170,000 tons behind the leading mine in the country — the Mahoning, of Minnesota. The iron ore of the new mine at Shades Valley analyzes as follows: Metallic iron, 39.5 per cent ; calcium carbonate, 24.20 per cent; silica, 9.94 per cent; alumina, 3.34 per cent ; magnesium carbonate, 0.78 per cent; phosphorus, 0.32 per cent; metallic man¬ ganese, 0.20 per cent.

Pig Iron. — In 1915 there were 27 blast furnaces in o_peration in Alabama and they pro¬ duced 2,049,453 tons, about 7 per cent of the 29,- 916,213 tons which was produced by the whole United States. With this output Alabama took fourth place among the iron-producing States, following Pennsylvania, Ohio and Illinois. The average value for the year was $10.24 per ton. In the latter part of the year the price began to rise and in the early part of 1916 reached $13. Later the price of Southern foundry No. 2 at Birmingham rose to $22 per ton. A general advance in the price of ore followed the rise in iron and the tendency was still upward at the close of 1916.

Clay and Clay Products. — In 1915 there were mined in Alabama 31,520 tons of fire clay, and 250 tons of other clay, which were sold as such in the market. The remainder of the clay mined was manufactured into brick and tile and pottery, and no records were kept as to its amount. The clay products made during the year were valued at $1,193,022, of which $1,177,725 was the value of the brick and tile produced and $15,297 of the pottery. The brick industry centred in Jefferson County, where 68 per cent of the State's entire output was made. A total of 70,681,000 common brick, 29,018,000 vitrified brick, and fire brick to the value of $145,535 was made by 65 operators; and 13 other firms made the red earthenware and the stoneware which constituted the pottery output.

Cement. — Large supplies of the limestone, chalk, clay and shale required for the manu¬ facture of Portland cement exist throughout the State. With coal and labor cheap, the cement industry flourishes. In northern Ala¬ bama the limestone used by the cement makers is the hard Trenton limestone, with shale from the Clinton formation or from the coal meas¬ ures. In central Alabama the soft Cretaceous limestone is used, with the residual clays which overlie it. In southern Alabama the Saint Ste¬ phen's limestone is combined with clays from the Grand Gulf formation. In 1915 the cement output of the State was 1,114,386 barrels, valued at $891,183. In North Birmingham is located the principal Puzzolan cement works in the United States ; there are but two other such plants in the country. Furnace slag is used in the manufacture of this cement.

Stone. — Alabama has for many years had a thriving industry in stone, principally in lime¬ stone. Some very fine building stone of this material has been quarried at Rockwood, in Franklin County. It has proved very durable under weather and wear, and has found an ever-widening market outside of the State. Alabama produces also some notable marbles, both crys¬ talline and non-crystalline. The former, known as statuary marble, occurs as a belt 50 miles long, crossing Coosa and Talladega counties. In quality it compares favorably with the best Vermont marble and many public buildings

have been faced with it. In Shelby County there are deposits of variegated marble, red, pink, black, and white, and at Pratts Ferry on the Cahaba River, in Bibb County, there is another deposit of varicolored marble, ranging from gray through pink, red and brown. A very handsome black marble is also found near An¬ niston, and at Piedmont in Calhoun County. The total stone production in 1915 was valued at $719,452; of this, $375,000 represented marble. The total includes the value, $289,167, of 523,- 066 tons of limestone flux, mined for use at the furnaces. Lime was burned in 14 plants in 1915, with a combined output of 60,332 tons, valued at $250,227. Three of the plants pro¬ duced hydrated lime.

Sand and Gravel. — In 1915 Alabama mined 169,663 tons of molding sand, 157,581 tons of building sand, 6,942 tons of engine sand and 7,294 tons of other sands, and 547,656 tons of gravel. A high grade of glass sand is found in Jefferson and Etowah counties, but no de¬ velopment has yet been made. The value of the sand and gravel

production in 1915 was

$242,336.

Graphite. — • Alabama produces annually about half the crystalline or <(flake® graphite mined in the United States, and this production is 47 per cent of all the graphite of all kinds which is mined in the country. The mineral is found in a schist in the form of lenses in a series of metamorphic rocks traversing parts of Clay, Coosa and Chilton counties in the Piedmont region. The average graphite con¬ tent of this schist is 3 to 4 per cent, but the re¬ covery in milling is rarely more than 2 per cent of the tonnage of ore handled. The in¬ dustry centres about Ashland, in Clay County, with one or two establishments near Good- water, in Coosa County, and one near Moun¬ tain Creek, in Chilton County. In 1915 only four mines were in operation producing 3,474,- 800 pounds, valued at $204,572. Three more mines began operations during the year and in 1916 the output of the seven mines was 5,226,940 pounds, valued at .$492,407. Two more companies began production in the early part of 1917 and 23 other companies have made preparations to begin mining before the year is out. This marked activity is due to the scarcity of Ceylon graphite in the market be¬ cause of the shortage in shipping facilities and the high ocean freights. The price of the Cey¬ lon graphite doubled and the demand for do¬ mestic graphite became insistent. The larger part of the crystalline graphite produced in the country, and imported, is used by crucible makers, whose business has increased enor¬ mously through the manufacture of munitions.

Miscellaneous. — The mineral productions of Alabama which are of minor importance when ranked according to the value of their annual output are gold and silver, mica, mill¬ stones, mineral paints (natural), silica, mineral waters, fuller's earth, bauxite, barytes, natural gas and petroleum. In 1915 the value of their combined output was $92,306. There are known to be auriferous lodes in Turkey Heaven Mountain, but they are not being de¬ veloped. Some new prospecting was done during the year and a new placer was discovered and worked near Heflin. The year's output of gold was $5,243 ; and of silver. $6. Mica was mined in Randolph, Cleburne, Clay and Talla¬

poosa counties. The total output amounted to 3,750 pounds of sheet mica and two tons of scrap. It was all consumed locally. Three natural gas wells in Fayette County and two in Walker County supplied a total of 441 cus¬ tomers. Small quantities of petroleum have been found at several localities in the State, the latest and most promising being the

new well at Cordova, in Walker County. Oil was struck in this well in December 1916, and it has the record of being the first well in the State to yield enough oil to be measured in barrels. At Hamilton, in Marion County, and at Atwood, in Franklin County, oil-saturated sands have been found and small quantities of oil secured. The strike at Cordova has revived interest in oil exploration in that part of the State. There is one mine near Rock Run, Cherokee County, producing bauxite ; one mine in Calhoun County producing barytes; one quarry at Dutton, in Jackson County, producing millstones; and one mine producing ochre, in Clarke County. There are 14 mineral springs in the State producing medicinal waters. The 1915 output reached 86,499 gallons, valued at $8,912.

Forest Products. — Beech, hickory, white oak, yellow, long leaf pine, walnut, ash and elm cover the State in sufficient quantity to be a factor of prime commercial importance. The products from this source include firewood, ma¬ terial for fences, logs, railroad ties, telegraph, telephone and power-conduit poles, materials for barrels, bark and naval stores. The total value of these reaches annually to about $6,500,000, of which about $4,000,000 worth is consumed on the farms and the remainder sold off the lands.

Agriculture. — • Alabama is pre-eminently an agricultural * State with a wide range of soils admirably adapted to cultivation. The number of farms in 1910 was 262,901, an increase of 17.8 per cent over 1900 when 223,220 farms were reported. The farm area in 1910 was 20,732,312 acres, of which 9,693,581 acres were improved land. The average acreage per farm was 78.9 in 1910 against 92.7 in 1900. The value of all farm property was $370,138,429, including land, buildings and live stock. The average value of land per acre was $10.46 in 1910 against $4.84 in 1900, an increase of 116.1 per cent for the decade. These values have greatly increased (1917) but no statistics are available.

In Alabama, as in other southern States, there is a great tendency to lease farms to ten¬ ants or on shares. Of the 262,901 farms in the State in 1910, 158,326 were operated by tenants and 104,575 by the owners. The leasing con¬ tracts vary considerably; of the total number in 1910, 83,300 were cash tenants, 2,428 share- cash tenants, and 67,352 were shareholders.

Another matter of great interest in con¬ nection with farming in Alabama is the rela¬ tive amount of land held or leased by whites and negroes. Of the total farm acreage of 20,732,312 acres reported in 1910, 15,640,877 acres were owned or operated by whites, and

5,019,435 by colored farmers. The acreage owned or operated by white farmers decreased during the decade 1900—10 by 324,383 acres, while that owned or operated by negroes in¬ creased during the same period by 299,268 acres. By far the great majority of negro farmers are tenants. In 1910 colored owners held 1,466,719 acres, while 3,607,234 acres were

held by colored tenants. Of 103,929 farms owned in 1910, 74,504 were free of incumbrance while 27,457 were under mortgage and the status of 1,908 was unknown. In 1900 80.8 per cent of the farms were free of mortgage while in 1910 only 73.1 per cent were free. Two-fifths of the entire farm area of the State is in farms of from 20 to 49 acres; one-fifth are from 50 to 99 acres, and about one-eighth from 100 to 174 acres. Of the farmers in Alabama in 1910, 152,458, or 58 per cent, were white and 110,443 were non-white, of which number all but 56 were negroes. In 1915 the area under cotton was 3,219,000 acres ; the yield was 525,000 bales of cotton valued at $48,956,000. In 1911 Alabama produced 1,716,- 534 bales of cotton. Due to ravages of the boll weevil cotton is greatly reduced since 1914. Velvet beans and peanuts are replacing its acre¬ age. In 1917 velvet beans were planted on 2,334,000 acres, and peanuts on more than 900,- 000 acres. The chief crops are maize, 46,- 688,000 bushels in 1916; wheat, 1,045,000 bushels ; oats, 10,500,000 bushels; potatoes, 1,800,000 bushels. Other important crops are hay, 362,- 000 tons in 1916, and vegetables, peanuts to the value of about $1,500,000 annually; sweet potatoes and yams to the value of $3,500,000; cottonseed valued at $12,000,000 annually; orchard fruits valued at $1,800,000; bush fruits valued at $175,000; tobacco, 60,000 pounds in 1916. Sugar cane is largely grown and manu¬ factured into syrup. In January 1917 the live stock comprised 150,000 horses, 278,000 mules, 405,000 milch cows, 534,000 other cat¬ tle, 121,000 sheep and 1,850,000 swine. In 1910 the total value of live stock, includ¬ ing domestic animals, poultry and bees, was $65,595,000. Strong efforts have been made in recent years to diversify the State's agriculture more, and not without suc¬ cess ; but the system of renting farms by mer¬ chants to small occupiers, largely negroes, who are supplied with necessaries by the merchant on a crop mortgage, makes it difficult to ef¬ fect the change, as the cotton is a less experi¬ mental crop than new ones, and the merchant wishes to sell the occupier other products him¬ self. The partial exhaustion of even the fer¬ tile cotton land, however, by continuous plant¬ ing for many years, has awakened much anxiety for

the agricultural future; and the planting of cow-pease, alfalfa, etc., to enrich the soil and feed greater quantities of stock has shown a considerable advance.

Manufactures. — According to the special census of manufactures made by the Federal government for 1914, the figures show that although the number of manufacturing estab¬ lishments in the State had decreased by 156 since the preceding census (for 1909), the number of the wage-earners had increased in the five years by 6,569; the amount paid in wages had increased by $6,613,000; the capital invested in the State's industries had increased by $54,325,000; and the value of the yearly production of manufactured articles had in¬ creased by $32,836,000. Incidentally it may be mentioned that the horsepower employed in the manufacturing industries in the same five- year period had increased by 87,925. The num¬ ber of establishments engaged in manufactur¬ ing in the State in 1914 was 3,242; the num¬

ber of persons employed was 88,931, of whom 78,717 were wage-earners who received an ag¬ gregate of $33,897,000 in wages in the year, an average of $430 each. The combined capi¬ tal invested amounted to $227,505,432 and the value of the year's output was $178,797,633 ; of this, $71,386,000 was the value added by the processes of manufacture. The total horse¬ power employed aggregated 445,762, of which 375,114 was steam and turbine energy, 98,189 electric and 9,621 power from water wheels and water motors.

The principal industries, arranged in the order of the value of their output in 1914, were as follows :

Cotton goods, 57 establishments, employing 13,697 hands, $25,623,000; lumber and timber, 1,335 establishments, 21,646 hands, $21,333,000; iron and steel blast furnaces, 15 establish¬ ments, 3,547 hands, $20,066,000; cottonseed oil and cake, 84 establishments, 2,028 hands, $14,- 982,000; railway car and repair shops, 22, with 7,908 hands, $12,522,000; fertilizers, 80 estab¬ lishments, 1,416 hands, $10,870,000; coke, 18 establishments, 2,209 hands, $1 0,353,000 ; iron pipe, 20 establishments, 3,696 hands, $6,754,- 000; foundry and machine shops, 79 establish¬ ments, 1,866 hands, $4,033,000; printing and publishing, 278 establishments, 1,286 hands, $3,993,000; planing mills, 76, with 886 hands, $2,772,000; flour and grist mills, 73, with 125 hands, $2,179,000; mineral- and soda-water bot¬ tlers, 161 establishments, 520 hands, $2,162,000; bread and bakery products, 87 establishments, 651 hands, $2,056,000; turpentine and resin, 160 establishments, 3,411 hands, $2,047,000; brick and tile, 51

establishments, 1,599 hands, $1,622,000; ice manufacture, 55 establishments, 478 hands, $1,201,000; illuminating and heat¬ ing gas, 14 establishments, 214 hands, $1,125,000. No other industries reached the million mark in their combined output for the year.

The chief manufacturing centre was Bir¬ mingham, where 10,863 wage-earners found employment. No other city in the State ap¬ proached this figure, Mobile ranking next with

2,604.

Of the total number of wage-earners in the State 69,849 were males over 16 years of age and 5,735 were females over 16 years. The number of persons under 16 years engaged in the manufacturing industries of the State was 3,133 — about 4 per cent. Of the whole num¬ ber of workers, 36,131 had a 60-hour week; 12,797 worked from 60 hours to 72 hours a week; 9,804 worked 54 hours a week; 6,765 worked 48 hours a week; 4,777 worked from 54 to 60 hours a week; 3,507 had a 72-hour week; and 3,372 worked more than 72 hours a week.

Transportation. — The great streams of the State, never closed by ice, afford fully 1,500 miles regular steam navigation, besides smaller boats in reaches ; and improvements under way will increase this. The Mobile . River and its two great constituents are navigable to Mont¬ gomery on the Alabama, 320 miles from the Mobile (the Coosa has also small steamers on it), and to Columbus, Miss., on the Tombigbee, 300 miles. The Chattahoochee is navigable to Columbus, Ga., about 300 miles. Navi¬ gation on the Tennessee was hampered by the Mussel Shoals near its western end

in the State, but a canal 23 miles long cut around the shoals has obviated this difficulty, it is navigable to Chattanooga, Tenn., and for small craft as far as Knoxville. The Mobile Basin and Tennessee River Association was organized in 1907 to work for the improve¬ ment of Alabama waterways and in 1910 the United States government began extensive improvements in the Alabama and Coosa Riv¬ ers to Wetumpka and also in the Warrior and Tombigbee.

Alabama was a leader in the pioneer period of railroad building. As early as 1830 the legislature chartered a two-mile line from Tus-cumbia to the Tennessee River and in 1832 another road was

chartered which extended to Decatur from Tuscumbia. On both roads were iron bars laid on wooden stringers and the cars were drawn by mules. The stockholders wrere the cotton planters of the locality who found an ample supply of labor in the plantation ne¬ groes. A prosperous commerce developed on the navigable rivers at an early period and in 1858-59 Mobile had become the third exporting port in the United States ((Statistical Ab¬ stractˆ United States Treasury, Washington

1886).

The railroad mileage increased from 127 miles in 1850 to 6,325 miles in 1916, exclusive of over 300 miles of electric street railroads. The great railroad centre of the State is Birmingham, through which passes nearly every trunk line in the South. The Louisville & Nashville Railroad had an early and potent in¬ fluence in making available the landlocked min¬ eral resources of the State and the Southern Railroad has been equally active and beneficent in promoting agriculture. The harbor of Mo¬ bile, the chief commercial outlet of Alabama and neighboring States, has been greatly im¬ proved ; the harbor channel is being deepened to 30 feet, making it possible for seagoing ships to be loaded at their wharves. The port is avail¬ able for the entire commerce of the State, either by rail or river.

Commerce. — The imports at Mobile arrive mostly from Mexico and comprise tropical fruits, chiefly bananas and sisal grass. Total in 1911 was $4,031,737. Raw cotton, the prin¬ cipal export, averages annually over $12,050,000; timber, lumber, etc., $6,800,000 ; cereals and flour, $2,950,000; lard, $1,800,000; besides cattle, mules, swine and sheep, flax-seed and oil, tobacco, sugar, hops, fruits and nuts. Total export 1911 equaled $30,151,561.

Banks and Finance. — There are in the State 93 national banks with resources of $60,746,000; 205 State banks with resources of $32,189,445; 41 loan and trust companies with resources of $22,5.34,555; and 11 savings banks with resources of $1,572,282. The capital of the national banks aggregates $9,700,000, and they have annual deposits totaling $35,935,708. In 1915 there were seven banks in Birmingham with deposits of $24,147,379; five banks at Mo¬ bile with deposits of $1 1,724,786 ; seven banks at Montgomery with deposits of $6,031,383; and five banks at Selma with deposits of $3,763,- 169. The State now has an officer, the bank examiner, charged with stated and frequent examinations of private banks. Some of the more lately constructed bank buildings are equal in magnificence of appointments to the best in

the United States. Alabama, according to the council of the Corporation of Foreign Bond¬ holders, has a defaulted debt estimated at $30,- 000,000, but the State denies any liability for such estimated indebtedness, having legally ad¬ justed all claims. Unauthorized charges for which no warrants were issued make up the amount claimed. The bonded debt in 1915 amounted to $9,057,000; the assessed value of real property was $389,741,082; of personal property, $236,417,740 ; total assessed value, $626,150,822. The revenue is derived mostly from taxes on property of all kinds and partly from occupation taxes. The assessment is made at 60 per cent of the cash value for State and county purposes by the county assessors on the sworn statements of the taxpayers. The receipts in 1914—15 (year ended 30 Sept. 1915) amounted, with the previous year's balance of $180,196, to $6,874,734; disbursements amounted to $7,830,045, leaving a deficit of $955,311.

The present State Constitution limits the power of the legislature to levy in any one year a greater rate than 6ˆ2 mills on the dollar State taxes. No county may levy a tax ex¬ ceeding one-half of 1 per cent by State as¬ sessment, except for old debts and school pur¬ poses. Incorporated cities are subject to same limitation of powrer of taxation that applies to counties. The State can contract no new debt except that the governor may borrow $300,- 000. The governor has authority under the State Constitution to extend the present bond¬ ed debt of the State. The State bonds of all classes are now'- above par. Of the State taxes, 30 cents on $100 is applied to the maintenance of the public schools and 25 cents is applied to general purposes, including pensions to in¬ digent Confederate soldiers and widows of Confederate soldiers, salaries, etc. The State revenue is derived as follows: Tax on prop¬ erty and polls, 60 per cent ; licenses, 23 per cent; proceeds of convict labor, 18 per cent. About 50 per cent of the disbursements is ap¬ plied to schools and charitable institutions ; 16 per cent to pensions ; 10 per cent to penal in¬ stitutions ; about 6 per cent to interest on the bonded debt, and the remainder for miscel¬ laneous subjects, including salaries of chiefs and employees of the State, the judiciary, the National Guard, etc.

Education. — There is a State superin¬ tendent of education, an elective office, the term of which is four years. He has general supervision of the public schools and teachers. The public school fund is derived from a State tax of three mills on the $100 assessable values, interest upon the sixteenth section fund and from appropriations by the State legislature together with certain smaller amounts fixed and provided by the legislature. Each county is authorized by a vote of its qualified electors to levy a county school

tax of not more than four mills, 40 cents on each $100 of . taxable

values. The incorporated towns and cities share in all State taxes and in all county taxes. Each of them is also permitted to levy a municipal school tax of not more than three mills, 30 cents on each $100 of taxable

values. The total expenditures for the year ending 30 Sept. 1917 from the above sources and including small incidental fees collected amounted to nearly $5,000,000. Each of

ALABAMA

STATE CAPITOL AT MONTGOMERY

ALABAMA

i

ft** °%t

itH

■

tti . <**-

*#4i

JT

?|8>

Loading Cotton Bales on Alabama River Boat

3 Tallassee Falls

? .Selling Cotton in Court Square, Montgomery, Ala. Electric Power Source

ALABAMA

303

the 67 counties may establish and maintain under the management of the State high school commission a county high school of standard grade to which an additional, annual appropriation of $3,000 is

provided by the State. All but about half a dozen counties have availed themselves of this privilege. Ten agri¬ cultural high schools, one for each congres¬ sional district, are also maintained under State management. Each receives a State appropria¬ tion of $5,000 annually. Teachers' institutes are conducted in all the counties each year, under institute conductors appointed by the State superintendent of education. The term of compulsory attendance is 80 days annually, including all children 8 to 15 years, unless they have completed the common school course of seven grades. The State appropriates funds for the Alabama Industrial School for white boys and the Alabama Reform School for juvenile negroes. It aids the Alabama Home of Refuge for white girls and supports the Alabama School for Deaf and Blind. Six normal schools for the training of white teachers are supported and controlled by the State, as well as one normal school for negro teachers. The Alabama Girls' Technical Insti¬ tute, the Polytechnic Institute (coeducational) and the State University (coeducational) are controlled and managed each by a separate board. Tuskegee Institute for the education and training of negroes, coeducational, is the most extensive educational plant in the State and the largest in the world for negroes. It was founded and developed by the late Booker T. Washington. The State makes an annual ap¬ propriation to this school but exercises no con¬ trol over its policies and management. A majority of its trustees are non-residents of Alabama. The Agricultural and Mechanical College for negroes is supported jointly by State appropriation and national funds. The governing board is self-perpetuating and local. All these State-supported institutions are in a satisfactory condition and are meeting the growing needs of the Commonwealth. In addi¬ tion to the State schools and colleges there are many flourishing institutions under private or denominational control. Among them should be mentioned the following, either wholly or partly of college grade: Alabama Presbyterian College, Presbyterian (male) ; Alabama Synodi¬ cal College, Presbyterian (female) ; Athens Female College, Methodist ; Birmingham Col¬ lege, Methodist (male) ; Howard College, Bap¬ tist (male) ; Judson College, Baptist (female) ; Loulie Compton Seminary, private (female) ; Marion Institute, private (male) ; Marion Fe¬ male Seminary, Presbyterian ; Saint Bernard College, Catholic (male) ; Southern University, Methodist (male) ; Spring Hill College, Cath¬ olic (male) ; Talladega College (colored), Con¬ gregational ; Woman's College of Alabama, Methodist (female).

Religion. — The Protestant churches, not¬ ably the Baptists and Methodists, are in the ascendency in Alabama as throughout all the South. The other religious bodies in order of numerical strength are

Roman Catholics, Pres¬ byterians, Christians or Disciples, and Episco¬ palians.

Charity. — The hospitals, orphanages, homes for the aged and other benevolent institutions, including asylums for the deaf, dumb, blind

and insane, number 48. The charitable institu¬ tions include insane hospitals at Tuscaloosa and Mount Vernon, the Confederate Soldiers' Home at Mountain Creek, the Industrial School at East Lake, School for the Deaf and Blind at Lineville and a school for the negro deaf and blind. Rules for the support of the poor are made by county commissioners. Within certain degrees, relatives are liable for the support of the poor. For infirm and necessi¬ tous Confederate veterans the following an¬ nual pensions are allowed according to rating: First-class, $100; second-class, $80; third-class, $64. On 1 Jan. 1910, the number of paupers in almshouses was 739, being 34.6 per 100,000 of population.

Penal. — Although the harsh conditions formerly governing the convict system have been greatly modified, prisoners are still hired out to contractors. Since 1907 special pro¬ vision is made for dealing with juvenile of¬ fenders and in 1911 a State prison inspector was appointed. There is a State cotton mill and cotton farms where women and boy con¬ victs are employed, a penitentiary, a reforma¬ tory for wayward women, a reform school for juvenile negro offenders and 20 prisons where State convicts are kept. On 1 Jan. 1910 there were 3,687 prisoners in penal institutions, be¬ ing 172.4 per 100,000 of the population.

Population, Chief Towns. — From 127,901 in 1820 the population had increased to 996,992 in 1870, to 1,828,697 in 1900, and to 2,138,093 in 1910, the increase being 16.9 per cent in the last decade, or 41.7 inhabitants per square mile as against 35.7 in 1900. Alabama ranks 18th in pop¬ ulation among the States. In 1910 the popula¬ tion comprised 625,891 white males, 602,941 white females, 447,794 colored males, 460,488 colored females, 454 Indian males, 455 Indian females and 70 male Asiatics. The foreign- born included 3,599 Germans, 2,348 English, 1,167 Irish, 1,120 Scotch. The capital, Mont¬ gomery, has a population of (1915 est.) 42,530; other large cities are: Birmingham, 174,108; Mobile, 56,336; Selma, 13,640; Anniston, 12,794; Bessemer, 10,864, and Gadsden, 10,557. There wrere 22 cities with a population in excess of 4,000 in 1910. The population in 1920 was

2,348,174.

Constitution. — The Territory of Alabama was organized in 1817 by act of Congress. Population from the Southern Atlantic States from Maryland dowmvard flocked there rapidly. By authority of act of Congress 45 deputies from 23 counties assembled in convention at Huntsville in July 1819, and framed the State Constitution that was accepted and the State wˆas admitted to the Union 14 Dec. 1819. The census of 1820 gave the population, not includ¬ ing any Indians, 127,901. The next census showed 142 per cent increase, of wLich 18 per cent was slaves and 124 white. No white wage ' class appeared. Increase of population not Indians fell from 1830 to 1840 to 90 per cent but slaves increased by immigration and nat¬ ural rule to 115 per cent. The first State Con¬ stitution, that of 1819, was made by cotton planters, university men fresh from their for¬ est-opened plantations. It was an aristocratic democracy. The general assembly contained the kernel. The lower branch was elected every year ; the higher once in three years. It met every year. The governor was chosen at

the polls every two years. The general as¬ sembly elected all courts of record for life. The deputies to the constitutional convention were mostly South Carolinians, North Caro¬ linians, Virginians or Georgians. The Consti¬ tution, with certain amendments, endured until by convention an ordinance of secession from the United States made expedient a new Con¬ stitution in 1861. The scheme of government was not changed. The original right of eman¬ cipation of slaves by individual masters was forbidden. The third State Constitution was framed in 1865 within six months of the col¬ lapse of the Southern Confederacy. The Pres¬ ident of the United States ordered the con¬ vention. The Constitution thus framed re¬ voked the ordinance of secession and emanci¬ pated slaves within the borders of the State except for crime convicted. This Constitution went into effect two months prior to the 13th article of amendment of the Federal Consti¬ tution emancipating slaves. The electoral vote was given to white males but by special pro¬ vision it secured to negroes the civil rights pos¬ sessed by white women and minors. This third Constitution was set aside by the act of Con¬ gress in 1867. By that act the army took con¬ trol of the Southern States, Alabama becoming part of (<Military District No. 3,® Maj.-Gen. John Pope commanding. General Pope ordered an election to be held during several days in October for the selection of delegates to a constitutional convention. Under this act of Congress the free men were eligible voters. The fourth State Constitution was made under military authority by

outsiders, mainly chosen by followers left from the army of occupation, a few citizens and illiterate negroes. In 1875 by State election a fifth Constitution was made. The object was to curtail the power of taxa¬ tion hitherto held by the general assembly. The military constitution of 1867 had been in force from 1868 to 1875. Under the Constitu¬ tion of 1875 a debt commission of three made readjustment of the State debt contracted under the military constitution. The debt of about $30,000,000 was reduced to $9,057,000. The debt commission reported that assessable values of the State, which in 1860 exceeded $700,000,000, had been reduced by 1875 to some¬ thing in excess of $100,000,000. The electorate created by the military constitution was not disturbed by that of 1875. Under that the State government was administered for 33 years. Toward the close of the last century State elections had become impracticable. The belt of white counties were upon the verge of insurrection. The negroes, uneducated, were politically dominant in the black belt, and their votes either purchasable or suppressed at option of partisans. The sixth and last State Constitution was framed by convention in 1901, and ratified at the polls after severe opposition from white leaders and the solid negro senti¬ ment. The only registration list is of date 1908. That presents white electors, 250,381 ; negro electors, 3,742 ((Official and Statistical Register,* State Dept. Archives and History, 1915, p. 363). The Constitution of 1901 prac¬ tically eliminates negro suffrage through sev¬ eral of its provisions, such as that requiring an applicant for registration prior to 20 Dec. 1902, to be the descendant of one who took part in the early wars of the nation, the Spanish war

or as a member of the Confederacy. Another orovision requires that the applicant be able to read and write in English and be physically able to work.

Alabama (1917) has had six State Consti¬ tutions, each of conventional product and each the vital essence of the community life at the time. The State was one of the groups in the period, 1812-21, when Congress introduced the sanction of that body to membership in the Union. Vermont, the first new State, that is the 14th State, but in both branches two years before she had established any State Consti¬ tution at all, Kentucky came next into Con¬ gress by authority of Virginia only. In 1796, the third new State, Tennessee, offered a State Constitution to Congress but in the House it was decided the application should have gone to the Supreme Court only. There the matter was abandoned. Ohio was the fourth, 1802. The State Constitution presented to Congress was referred in the Senate to a special com¬ mittee that never reported.* The Supreme Court is

elected for six years. The State is represented in the Senate of the United States by two senators elected by the people and in the House of Representatives by 10 representatives elected each by the people in a prescribed district. The militia is known as the ((National Guard,® composed of the three arms of service, infantry, artillery and cavalry, with special corps. There were (1916) about 4,400 enlisted men and officers in camp, well dis¬ ciplined and equipped. The functions of execu¬ tive character in the State are, the convict bureau, controlling the penitentiary, under the governor; the department of archives and his¬ tory, under a director, the governor, ex officio president of the board of trustees, composed of one in each Congress district ; State tax com¬ mission of three ; State board of health ; State department of fish and game ; State inspector of prisons and cotton mills, three persons; State banking department, seven persons ; State highway commission; State geological survey; State board of examiners of public accounts; State coal mine inspector and his associates ; State live-stock and sanitary board; State board of Confederate pensions; State board of me¬ diation and arbitration and various other com¬ missions intended to promote the public weal.

Of those enumerated the Alabama public service commission ranks first in importance. It is made up of three citizens elected by the people. It controls railroads, telephone serv¬ ice, telegraphs, etc., and regulates their rates and charges. It has general supervision of firms, corporations and persons engaged in business. Except in the interregnum of mili¬ tary authority, 1867-74, all senators in Con¬ gress have been Democrats of the Jacksonian school. Senator Gabriel Moore, Democrat, 1832, having offended the Jackson sentiment, was requested by the legislature, in vain, to resign. In 1840 the legislature abolished, the congressional district for a general election in order to eliminate two Whigs from Whig districts. In 1844 the Democratic State Con¬ vention recommended Van Buren for Presi¬ dent against Calhoun. For Alabama political history preparatory to the founding of the Southern Confederacy, consult Du Bose's (Life and Times of Yancey.)

♦Annals of Congress, Vol. Ill, p. 50 et seq.

A complete list of governors follows :

TERRITORIAL GOVERNOR

William W. Bibb . 1817-19

STATE GOVERNORS

W. W. Bibb . Democrat . 1819-20

Thomas Bibb . “ 1820-21

Israel Pickens . “ 1821-25

John Murphy . “ 1825-29

Gabriel Moore . “ 1829-31

Samuel B. Moore . “ . 1831-

John Gayle . “ 1831-35

Clement C. Clay . “ 1835-37

Hugh McVay . “ . 1837-

Arthur P. Bagby . “ 1837-41

Benjamin Fitzpatrick . “ 1841-45

Joshua L. Martin. . . . . “ . . 1845-47

Reuben Chapman . “ 1847-49

Henry W. Collier . “ 1849-53

John A. Winston . “ 1853-57

Andrew B. Moore. . . . “ 1857-61

John G. Shorter . “ 1861-63

Thomas H. Watts . “ 1863-65

Lewis E. Parsons . . Provisional. 1865-

Robert M. Patton . Republican . 1865-67

Wager Swayne . (Military Governor) 1867-68

William H. Smith . Republican . 1868-70

Robert B. Lindsay . Democrat . 1870-72

David P. Lewis . Republican. 1872-74

George S. Houston . Democrat . 1874-78

Rufus W. Cobb . “ 1878-82

Edward O’Neal. . . . “ 1882-86

Thomas Seay . . . “ 1886-90

Thomas G. Jones . “ . . . 1890-94

William C. Oates . “ 1894-96

Joseph F. Johnston . “ 1896-1900

William J. Samford . . . . . “ . . ; . . . . ; 1900-01

William D. Jelks . “ 1901-07

Braxton B. Comer . “ 1907-11

Emmett O’Neal . “ 1911-15

Charles Henderson . * 1915-19

Thomas E. Kilby . * 1919-23

Alabamians with national and world-wide reputation won in the succeeding generations under the various political constitutions are : William R. King, senator, Ambassador to France, Vice-President of the United States; Josiah C. Nott, M.D., author of voluminous, illustrated works on ((Type of Mankind® ; James Marion Sims, M.D., surgeon ; William Lowndes Yancey, political orator and leader; Mrs. Augusta Evans Wilson, novelist; John Pelham, a youthful soldier; John Tyler Mor¬ gan, senator of the United States.

History. — In 1519, the Spanish governor of Jamaica sent Pineda to explore the gulf coast of Florida. Pineda soon reached a fine body of water, supposedly Mobile Bay, which he called Espiritu Santo. He ascended the broad stream emptying into it for six leagues and saw many houses and natives on the banks. Nine years later, Panfilo de Narvaez, a Spaniard, set out westward from Florida on an exploring expedition. He skirted along the coast, but soon drifted out to sea and he and all but three of his men were lost. In 1539, Ferdinand de Soto,

governor of Cuba landed in Florida with a thousand men equipped for fighting their way into the unknown West. The Indians who met De Soto were an interest¬ ing type of the Americail aborigines, and were more numerous than our historians report them in the later time of the white settlements. The men were fairly intelligent, possessed splendid physical forms, were athletic, brave and re¬ sourceful. The women were smaller, with marked personal beauty in individuals. These Indians maintained tribal customs that amounted to a form of civil government. They lived in rude log houses and built bins in which to store pumpkins, corn, and dried beef from the forest. They covered their bodies with gar¬ ments of dressed skins and woven fabrics of

bark and grass. At Mauvila, an Indian vil¬ lage near the junction of the Tombigbee and Alabama rivers, De Soto won a hard-fought battle with the Indian chief, Tuscaloosa. After this, De Soto made his way westward to the Mississippi River, and Alabama was undis¬ turbed by the white men for 160 years.

After LaSalle's exploration of the Missis¬ sippi River, Alabama was included in French Louisiana. In 1702, a young French-Canadian, Jean Baptiste La Moyne, Sieur de Bienville, founded Mobile. To checkmate the British from South Carolina who sought to monopo¬ lize the Indian trade, he built Fort Toulouse near the place where the Tallapoosa and Coosa join; and to protect the colony against the Chickasaws, he built Fort Tombecbe where the Great Southern Railroad now crosses the Tom¬ bigbee. The French colony did not succeed. The settlers sickened in their effort to cultivate the soil; so 15 years after Bienville came, the home government chartered the West India Company to settle Louisiana with a vague idea of its boundaries. During 1721, three slave ships brought negroes to Mobile, and African slavery began in Alabama. The colony now took on a new face. Whites, who had been reduced to their last extremity because of labor in the hot climate, now began to trade in timber, tar and turpentine, and to produce from the soil plenteous crops of corn. Cotton was success¬ fully grown, and many decades before Whitney's invention, a crude machine was put in use near Mobile which served to separate the cotton seed from the lint.

Early in the 18th century, the English had planted trading posts north of Mobile, and when the French posts east of the Mississippi were ceded to England, that part of Alabama north of 32° 28" was added to the Illinois country, and that part south of the line was added to west Florida. Many English and Scotch settled here, and these remained loyal during the Revolution. Spain seized the province of west Florida

in 1789. On account of her treaty with England, the United States laid claim to all territory down to 31°. Spain, however, held all south of 32° 28" until 1798. The land lying between 32° 28" on the north, 31° on the south, the Chattahoochee River on the east, and the Mississippi River on the west, was organized into Mississippi Territory in 1798. In 1804, land claimed by Georgia and South Carolina, extending to 35°, was added to Mississippi Territory. The Mobile district was taken from Spain in 1812. In 1817, Mississippi Territory was divided. The western half be¬ came the State of Mississippi, and the eastern half the Territory of Alabama. On 14 Dec. 1819 Alabama became a State.

At the outbreak of the War of 1812, the chief Tecumseh and his brother, the Prophet, came south to inflame the tribes of Alabama against the whites ; and Colonel Nichols came from London to Pensacola with ample freight of arms and ammunition to distribute among the tribes of Alabama as allies of the British army. On 30 Aug. 1813, Chief William Weatherford, one-fourth Indian, three-fourths Scotch, led the Creek warriors to the massacre of Fort Mims. In a few hours, most of the 540 white occupants of this place, men, women and children, were butchered indiscriminately. Only

a few made good their escape. General An¬ drew Jackson, a fierce avenger, hastened to the field, and on 27 March 1814, he attacked the Creeks in their fortified position on the Talla¬ poosa, 20 miles north of Montgomery, and al¬ most annihilated the tribe. Near the battle¬ field on the site of old Fort Toulouse, he built Fort Jackson, assembled the warriors, prophets and deputies of the Creeks and made a treaty with them by which they surrendered most of the tribal lands in Alabama and Missis¬ sippi. The British War Office now conceived a plan for operation in the extreme South. Major Lawrence, of the regulars, was placed at Fort Bowyer at the entrance of Mobile Bay with 160 men. The English assailed the fort with perseverance, but were defeated and re¬ treated with loss.

The total white population of Alabama at the beginning of the decade of 1860 was 526,- 431. The slave population was 435,080. There were 52 counties. In each of the 15 great cotton plantation counties which formed the Black Belt there were from 10,000 to 25,760 slaves, an average of 16,808 slaves and an average of 9,363 white population.

The most influential men of the State came from the Black Belt, Mobile and the Tennessee Valley.

Alabama wras one of the earliest Southern States to engage in the secession movement, and Montgomery was the first capital of the Confederacy. The Ordinance of Secession was passed 11 Jan. 1861, by a vote of 61 to 39. The division of the vote on the adoption of the Ordinance of Secession was not be¬ tween a disunion and a union party. The two parties in this convention were the Im¬ mediate Secessionists, led by William L. Yancy, and Co-operationists, who believed in the right of secession but hoped in some way through the co-operation of the Southern States to pro¬ tect their rights without secession. These Co-operationists were led by William R. Smith. When the State seceded, Governor Moore or¬ dered the seizure of Forts Morgan and Gaines which guarded Mobile harbor. The senators and representatives from Alabama resigned their seats in Congress on 21 Jan. 1861. On the 4 February the government of the Con¬ federacy was organized at Montgomery by delegates from the seceding States. Selma was made a leading Confederate arsenal and ship¬ ping yard. The Tennessee Valley was occupied by Union forces early in 1862; the fleet in Mobile was destroyed and the forts were re¬ taken by Farragut in 1864; and the whole State was reoccupied April 1865.

A provisional government was established by President Andrew Johnson by the appoint¬ ment of Lewis E. Parsons, a native of New York, who had long resided in Alabama, to be governor. Governor Parsons ordered an elec¬ tion by the full body of electors, except the several classes not yet pardoned by the Presi¬ dent, of delegates to assemble at the Capitol at Montgomery, September 1865. This conven¬ tion made a new State Constitution revoking the Ordinance of Secession, abolishing slavery and providing for the equality of the freed men in the rights of person and property; but restricted the electorate to the white males eligible. The State government set up by the new Constitution was recognized by the Presi¬ dent as soon as the legislature had ratified the

13th Amendment, and went into effect Decem¬ ber following. The general assembly of Ala¬ bama, however, refused to ratify the 14th Amendment. Thereupon, the senators and rep¬ resentatives from Alabama to Congress were denied seats by that body, and by the Acts of March, 1867, the State government was abol¬ ished and military rule restored. Under mili¬ tary supervision, the Constitution of 1868 was made by carpet-baggers, scallawags and negroes and a civil government was set up. The- Con¬ stitution of 1868 remained in force until 1875. The State was bankrupted by the carpet-bagger regime,

and there was great disorder in the attempt to bring the government once more into the hands of the better classes. But these conditions have long since passed away, and the reorganizing of the public debt in 1876 made industrial progress possible. The re¬ markable industrial changes in the mineral region of Alabama since 1870 have greatly affected the life of the State. To the agricul¬ tural life of early days has been added the city life of a mining, manufacturing and com¬ mercial people. Great attention has been given to road building. The steel and cotton indus¬ tries, lumbering and mining have developed enormously and agriculture is now improving rapidly.

During the Spanish- American War, Ala¬ bama furnished two white regiments and one negro regiment. President McKinley overcame what was left of sectional ill-feeling by ap¬ pointing Joseph Wheeler, a representative in Congress from Alabama and an ex-Confeder- ate general, major-general of volunteers, and giving him command of all the cavalry at the battle of Santiago de Cuba. In the last dec¬ ade the burning question in Alabama has been prohibition. After wravering between local option and State-wide prohibition, the State adopted State-wide prohibition in 1915. The State has always been Democratic, except dur¬ ing the carpet-bagger regime.

The construction of the Panama Canal has greatly enhanced the importance of Mobile as a port. Since the United States' declaration of war against Germany, Mobile has been selected as a centre of important naval con¬ struction work. The Tennessee valley in the extreme northern part of the State is one of most prosperous sections of Alabama. In 1915, the United States government appropriated $20,-000,000 for the purpose of manufacturing nitrate. An experimental nitrate plant has been located at Sheffield, and a permanent plant is being constructed near South Florence, at Mussel Shoals post office, established February 1918. In addition, a great dam across the Tennessee River at Florence for the purpose of developing the enormous pow7er of the Mussel Shoals is to be built by the government. So great will be the power developed that Florence, Sheffield, and Tuscumbia will be¬ come important industrial centres.

Bibliography. — Abele, C. A., Statistics of the Mineral Production of Alabama for 19KP ; Brewer, W., (Alabama: Her History, Re¬

sources, War Record and Public Men) ; Brown, W. G., School History of Alabama) ; Clarke, (History of Education in Alabama, 1702-1889 > (Washington 1889) ; Dubose, J. W., (Life and Times of Yancey^ ; Fleming, W. L., (Civil War and Reconstruction in Alabama* ; Hamilton, P.

J., (Colonial Mobile *; Hillyard, (The New South > (Baltimore 1887); Owen, T. M (ed.) transactions of the Alabama Historical Society* (4 vols.) ; Petrie, George, (ed.) (Studies in Southern and Alabama History *; Pickett, (History of Alabama.* Consult also Publications of Alabama Geological Survey- University ; Bulletins of State Department of Agriculture (Auburn) ; Census Reports 1910 (General and Special Census Bureau, Wash¬ ington, D. C.) ; Preliminary Survey of the Forests of Alabama (Bureau of Forestry, Washington, D. C.) ; Fish and Game Laws of Alabama (Department of Game and Fish, Montgomery) ; Official and Statistical Register- Director of Archives (Montgomery) ; Book¬ lets Issued by Industrial Departments of all Railroads operating in Alabama; Special Pub¬ lications issued bv Commercial Clubs of the larger cities of Alabama.

Henry J. Willingham, President State Normal School, Florence, Ala.

ALABAMA CITY, Ala., town in Etowah County, 56 miles north of Birmingham on the Louisville and Nashville, the Alabama Great Southern, the Nashville, Chattanooga and Saint Louis and the Southern railroads. Large steel works and a cotton mill form the industrial resources. Coal is mined and intensive agricul¬ ture is carried on in the vicinity. Pop. 5,432.

ALABAMA CLAIMS. See International Claims and Disputes.

ALABAMA POLYTECHNIC INSTI¬ TUTE, at first known as the Alabama State Agricultural and Mechanical College. This institution is a college at Auburn, Ala., organ¬ ized in 1872, under the Federal Land Grant Act of 1862. The value of its grounds, buildings and general equipment is estimated to be about $476,000. It has a campus and forum of 304 acres. The library contains 25,000 volumes, and the students number more than 800 in the various courses.

ALABAMA RIVER. An important river of the State of Alabama. Formed by the union of the Tallapoosa and Coosa rivers, about 10 miles direct northeast of Montgomery, it winds with a navigable course of 320 miles first west to Selma, then south, until about 50 miles above Mobile, it joins with the Tombigbee to form the Mobile River. On its banks are valuable timber, some of the largest southern cotton plantations and the towns of Montgomery, Sel¬ ma, Cahawba and Claiborne, which carry on an active river transit trade.

ALABAN'DITE, an iron-black, subme- tallic mineral. It is usually granular-massive, while its rare isometric crystals exhibit very perfect cubical cleavage. The black color of a fresh surface tarnishes to a dark brown, while its streak is green. Its hardness is 3.5 to 4 and specific gravity about 4.0. Alabandite is a manganese monosulphide MnS, and contains 63.1 per cent of manganese. Some of its most important localities are in Austria-Hun¬ gary, Peru and Mexico. It also occurs in Sum¬ mit County, Cal., and at Tombstone, Ariz.

ALABASTER, a name applied to two sub¬ stances, the one a stalagmitic or stalactitic car¬ bonate of lime, the other a kind of gypsum or sulphate of lime. The first is often called Ori¬

ental alabaster, and is that which is mentioned in the New Testament. It occurs in caves in limestone regions and is a translucent stone of yellowish milky color or of a deeper tinge of yellow and sometimes marked with lighter and darker streaks like an onyx. It is found in the cave of Antiparos, the Baumann’s cave in the Hartz and is now worked

in the province of Oran in Algeria. The gypseous alabaster has a fine granular texture and is usually of a pure white color. It is softer than the other alabaster, indeed so soft that it may be scooped out with the nails ; while the other kind cannot be so treated. It is found in many parts of Europe; in great abundance and of peculiarly excellent quality in Tuscany and Piedmont in Italy, also in England. It is extensively carved into statuettes and vases and often sold as <(Floren- tine marble. ** Many museums contain ancient vases and similar articles of alabaster, for which the Romans often employed this material.

ALACOQUE, a'la'kok', Marguerite Marie

Ufihe Blessed**), a French nun: b. 1647; d. 1690 ; to whom, according to Catholic faith, was revealed through visions of Christ, the commands to confirm devotion to the Sacred Heart of Jesus. Private devotions had long existed and an office and festival had previously been instituted by Father Jean Eudes (1601-80). Her treatise, (La devotion au coeur de Jesus,* describing her visions and transcribed by Father de la Colombiere of the Jesuit monastery at Paray-le-Monial, was published at Lyons in 1684. Thereafter the observance spread with great rapidity, but not until 1856 was the feast under the rite of double major extended to the universal Church by Pope Pius IX, who had previously beatified her memory in 1846.

ALADDIN, or THE WONDERFUL LAMP, one of the stories in (The Arabian Nights' Entertainments.* Aladdin, the son of a poor widow, comes into possession of a magic ring and lamp, and thus becomes the master of the powerful jinns who are the slaves of the lamp and ring. Through their powers he amasses great wealth and becomes sultan.

ALAGOAS, a'la-go'ash, Brazil, a maritime province, deriving its name from various inter¬ communicating lakes for which it is noted ; capital Maceio. It is bounded on the north and west by the province of Pernambuco, on the south by that of Sergipe del Rey and on the east by the Atlantic; area, 11,640 square miles. This province has several lakes, none of them of great extent, frequented by a great variety of birds ; and in the west several ridges of hills, none of them of great elevation, but generally well wooded, and inhabited by abun¬ dance of game, ounces, macaws, etc. From the extent of surface covered by lakes and by forests the climate of Alagoas is on the whole moist. The plains near the sea are generally sandy and not very fertile; but inland the soil is good, producing besides tobacco, cotton and sugar, which are exported to Bahia and Per¬ nambuco, rice, cocoanuts, mangoes, oranges, jack-fruit and abundance of fine timber used for ship-building in the above-named ports and in Maceio. The forests furnish excellent

building and dye woods and much ipecacuanha. Limestone, granite and various kinds of clay abound in the province. Pop. 790,000.

ALAIS, a'la, France, town of the depart¬ ment of Gard, situated in a fertile plain on the right bank of the Garden at the base of the Cevennes Mountains, 23 miles by rail north¬ west of Nimes. Alais is a very flourishing community, owing much of its prosperity to the abundance of mineral wealth of the district surrounding it which produces coal, iron, lead, zinc and manganese. Blast furnaces, mines and factories of various kinds give employ¬ ment to large numbers of men, and Gard may therefore be justly styled the Black Country of France. There is also an extensive trade in silk, glass, bricks and tiles. There are in Alais monuments to Florian the novelist, and to Pas- terer, who became famous after his studies of the silk worm disease then prevalent in Alais. The town sided with the Protestants in the re¬ ligious wars of the 17th century and Louis XIII in person, accompanied by Cardinal de Richelieu, besieged it and, having captured it in 1629, demolished its walls. Three years later the Baron of Alais having taken part in the re¬ bellion of Montmorency, the castle was de¬ stroyed. Protestantism still prevails to a con¬ siderable extent. Consult (Memoires et comptes- rendus de la Societe Scientifique et Litteraire d' Alais. > Pop. 1901, 24,940; 1911, 29,831.

ALAIS, Peace of, a treaty which closed the Huguenot wars in France. It was signed 28 June 1629, immediately after the capture of Alais by the royal forces, La Rochelle having fallen as a result of Richelieu's policy the year before. In accordance with its terms the for¬ tifications of the Protestant towns were razed and Catholic worship re- established in them, but amnesty and freedom of conscience were granted to the rebels.

ALAJUELA, al-a-wha'la, city of the state of Costa Rica, Central America, 23 miles west northwest of Cartago, and a little on the west¬ ern side of the watershed between the Atlantic and the Pacific. It is connected with Cartago by rail and carries on a considerable trade in cattle, coffee, sugar and bananas. Pop. 6,300.

ALAMAN, a-la-man', Lucas, Mexican his¬ torian and statesman: b. 18 Oct. 1792; d. 2 June 1853. He was educated in Spain 1814-20, and served as minister of foreign affairs, 1823-25, 1830, 1837, 1853. He introduced European machinery; founded a museum of antiquities and

natural history, and was an active official encourager of industry and agriculture, but re¬ actionary in religion and politics. His works are dissertations on the History of the Mex¬ ican Republic from the Conquest to Its Inde¬ pendence* (3 vols., Mexico 1814 49), an in¬ troduction to his (History of Mexico, * 1808-30 (5 vols., Mexico 1849-52), of scholarly impar¬ tiality in the main, filled with documentary proofs, but with a tendency to belittle the ac¬ tions of those not of pure Spanish blood.

ALAMANCE CREEK, N. C., Battle of, 16 May 1771, sometimes termed the first battle of the American Revolution. Official corrup¬ tion and burdensome taxation in North Caro¬ lina roused public resentment so that the col¬ onists banded themselves into ˆRegulators® to reform conditions. The rough element resorted to riot and violence, whereupon the assembly passed the Johnson bill (better known as the Bloody Act), which made rioting treason. Governor William Tryon (q.v.) collected 1,200

militia and on 16 May 1771, at Alamance Creek, near Hillsboro, encountered and de¬ feated about 2,000 Regulators (of whom only about 1,000 were armed), inflicting a loss stated at from 9 to 200, while his own loss was about 60 or 70. Twelve Regulators were tried for treason and condemned, but only six were executed. The others submitted and ultimately nearly 6,500 took an oath of allegiance to the royal government. Consult J. S. Bassett's article in (Report of the American Historical Association * for 1894, pp. 141-212; Fitch, Wil¬ liam E., Tome Neglected History of North Carolina) ; (North Carolina Colonial Records) (Vols. VII-IX) ; . Haywood, Marshall de L., (Governor Tryon and His Administration *; Stockard, (History of Alamance*; Husband, Harmon, { Affairs of North Carolina) ; <The South in the Building of- the Nation* (Vol. I, pp. 452-456).

ALAMANNI, a'la-man'ne, or ALE- MANNI, a confederacy of several German tribes which, at the commencement of the 3d century after Christ, lived near the Roman territory, and came then and subsequently into conflict with the imperial troops. Caracalla first fought with them in 211, but did not con¬ quer them ; Severus was likewise unsuccessful. About 250 they began to cross the Rhine west¬ ward, and in 255 they overran Gaul along with the Franks. In 259 a body of them was de¬ feated in Italy at Milan, and in the following year they were driven out of Gaul by Postu- mus. But the Alemanni did not desist from their incursions, notwithstanding the numerous defeats they suffered at the hands of the Roman troops. In the 4th century they crossed the Rhine and ravaged Gaul, but were severely de¬ feated by the Emperor Julian and driven back, Subsequently they

occupied a considerable ter¬ ritory on both sides of the Rhine; but at last Clovis broke their power in 496 and deprived them of a large portion of their possessions. Part of their territory was latterly formed into a duchy called Alemannia or Swabia, this name being derived from Suevi or Swabians, the name which they gave themselves. It is from the Alemanni that the French have derived their names for Germans and Germany in gen¬ eral, namely, Allemands and Allemagne, though strictly speaking only the modern Swabians and northern Swiss are the proper descendants of that ancient race.

ALAMANNI, Luigi, Italian poet : b. Flor¬ ence 1495; d. 1556. His father was zealously devoted to the party of the Medici, and he him¬ self stood in high favor with the Cardinal Giulio, who governed in the name of Pope Leo X ; but conceiving himself to have been injured he joined a conspiracy formed against the life of the cardinal. The plan was discovered; Ala- manni fled to Venice; and when the cardinal ascended the papal chair, under the name of Clement VII, he took refuge in France. But the misfortunes which befell this Pope giving Florence an opportunity to become free, Ala- manni returned thither in 1527. His country sent him on an embassy to Genoa. Here he became the friend of Andrea Doria with whose fleet he went to Spain. Charles V soon after sailed in the same fleet from Spain to Italy to arrange the affairs of Florence and subject it to the Medici. After this new revolution, Ala-

manni, now proscribed by the Duke Alessandro, went to France (1530) where the favors of Francis I retained him. Here he composed the greater part of his works. The King esteemed him so highly that after the peace of Crespy in 1544 he sent him as ambassador to the Emperor Charles V. Alamanni discharged his office with great skill. He was held in like estimation by Henry II, who also employed him in several negotiations. He followed the court and was with it at Amboise, where he died in 1556. His principal works are (Opere Toscane,* (La ColtivazioneC (Girone il CorteseC etc. The English poet Wyatt imitated some of his satiri¬ cal work. The writings of Alamanni are rec¬ ommended by ease, perspicuity and purity of style, but often want strength and poetic eleva¬ tion.

ALAMEDA, a-la-ma'da, Cal., a coexten¬ sive city and township in Alameda County, on San Francisco Bay and the Southern Pacific, Santa Fe and the Western railroads, 11 miles east southeast of San

Francisco. It is the seat of the College of Notre Dame (Roman Cath¬ olic) ; a popular summer resort, and the place of residence of many San Francisco business men. It has numerous banks, electric lighting and street railways, large borax works, exten¬ sive potteries, oil refineries, ship-building yards, engine, motor, pump, moving picture and aero¬ plane manufacturing plants. According to the United States census 1914, there were in that year 53 manufacturing establishments of fac¬ tory grade, employing 1,267 persons, of whom 1,092 were wage earners receiving an aggregate of $1,029,000 in wages. The total capital em¬ ployed was $3,737,000, and the value of the output was $2,794,000, of which $1,789,000 was the value added by manufacture. The com¬ mission form, of government was adopted in 1913. Alameda grew from a population of 100 in 1854 to 23,383 in 1910; (1920) 28,806.

ALAMINOS, a-la-me'nos, Antonio de, Spanish pilot : b. in Palos, Spain, about the end of the 15th century. He is said to have been with Columbus in 1499, and was the principal pilot for the expeditions of Cordova, Ponce de Leon and others in the early part of the 16th century. The earliest map of North America is supposed to have been prepared by Alaminos.

ALAMO, a'la-mo, The, San Antonio, Tex.; a Franciscan mission house built about 1722 and called San Antonio de Valerio; after 1793 used on occasion as a fort and renamed Fort Alamo. It consisted of an oblong plaza some 2p2 acres in area, enclosed by walls 8 feet high and 33 inches thick, a church, a hospital building, a convent and a walled convent yard about 100 feet square. It has enduring celebrity as the scene of the battle and massacre of 6 March 1836, in the war for Texan independence. The fort was held by about 140 men under William B. Travis, and on 23 February was invested by a considerable Mexican army (probably about 4,000) under Santa Anna, who at once began a bombardment scarcely intermitted for the next 10 days. The little garrison, compelled to man the defenses day and night, and too few to relieve each other, sent desperate appeals to their outside comrades for help; but to break through the dense Mexican forces was so diffi¬ cult that the only reinforcement received was 32 men on the 1st of March. At last a breach

was made in the walls, and shortly after day¬ light on the 6th a general assault was ordered. Twice the storming party were repulsed with heavy loss of lives; the third time they gained the parapet and entered the enclosure. No sur¬ render was offered, and the result showed that the Texans knew their foe too well to expect quarter; worn with fatigue and privation, they fought to a finish, till only five

were left. These were taken prisoners, and the savage Santa Anna had them slaughtered on the spot. Three women, two white children and a negro boy were the sole survivors of about 180 inmates. Santa Anna stated the Mexican loss at 70 killed and 300 wounded, but it is believed to have been much greater. The news of the heroic fight, wThe Thermopylae of America, nerved the Texans in all their future efforts, and their slogan was <(Remember the Alamo P Santa Anna himself was defeated and captured at San Jacinto a few weeks later. Consult Corners, (San Antonio de Bexar) (1890) ; Wil¬ liams, (Sam Houston and the Wffir of Inde- pendence) (1893) ; Ford, J. L., (Origin and Fall of the Alamo y (1896).

ALAMOSA, Col., city and county-seat of Conejos County, 110 miles south of Pueblo, on the Rio Grande, and on the Denver and Rio Grande Railroad. It has a Carnegie library and an opera house. Its industrial establishments comprise a flouring mill and railroad repair shops. The surrounding region is a prosperous agricultural and stock raising section, in the products of which the city has a large trade. The city owns the waterworks and sewage system. Pop. 3,013.

ALAND ISLANDS, a'lan, a group of about 80 islands and islets between the Gulf of Bothnia and the Baltic Sea, and near the mouth of the Gulf of Finland; area, 468 square miles. The principal islands are Aland, which is the largest and gives name to the group; Lemland, Lumparland, Ekeroe, Fogloe, Ivumlinge, Braen- doe, Vordoe and Hannoe. Aland, distant about 30 miles from the Swedish coast, is 25 miles long and about 22 broad. In this island is a harbor capable of containing a very great fleet. The chief towns are Aland and Castelholm. The islands are now included in the Republic of Finland. When the European War broke out in 1914 the islands were not fortified. Their strategic importance was be¬ yond question, as properly fortified, they form virtually an impassible barrier between the Baltic and the Gulf of Bothnia and provide a naval base commanding the entrance to the Gulf of Finland. According to the North Sea Baltic Treaty of 1908 they were not to be forti¬ fied or used for military or naval purposes. Through the intermediary of Great Britain and France, apprehensions of the Swedish govern¬ ment were removed, Russia readily giving definite assurances that any defenses would be purely for war emergencies, and that any such military works would be removed at the con¬ clusion of peace. Pop. about 19,000.

ALANI, or ALANS, one of the warlike tribes which migrated from Asia westward at the time of the decline of the Roman empire. They are first met with in the region east of Mount Caucasus, where Pompey

fought with them. From this centre they spread over the south of modern Russia to the confines of the

Roman empire. They were engaged in war with Rome in the time of Hadrian, but were defeated by Arrian, the general of that Em¬ peror. Marcus Aurelius had much difficulty in keeping them out of the empire, and Tacitus concluded a treaty with them (275 a.d.). About a century later those on the banks of the lower Danube were conquered by the Huns, after which most of them joined the ravaging expe¬ ditions of that people. They accompanied Rhadagais on his march into Italy, and after his defeat they settled first on the Rhine, after¬ ward (about 411) in modern Portugal. Being there completely defeated by the Visigoths, they joined the Vandals, among whom they have become lost to history.

ALANUS AB INSULIS, a-la'nus ab in'su-lis, or ALAIN DE LILLE, a-lan de lei, a French scholastic philosopher: b. 1114; d. 1203. Of his voluminous theological writings the best known is the treatise on ((The Articles of the Faith.® His poem, <(Anti-Claudinus, or On the Duties of a Good and Perfect Man,® is one of the most celebrated poetic composi¬ tions of the Middle Ages.

ALARCON, Pedro Antonio de, Spanish novelist, poet and politician : b. Gaudix, 10 March 1833; d. 19 July 1891. His critical con¬ tributions to papers, political and literary, his description of the Moroccan campaign, but es¬ pecially his novels and short stories, are among the best of their kind and present a picture of modern Spanish society as true to life as it is variegated. His clever essay, ‘The Poet’s Christmas, > went through over 100 editions. An imposing number of his stories appeared under the collective titles ‘Love and Friend¬ ship, > ‘National Tales,) ‘Improbable StoriesP Among them ‘The Three-Cornered HaD and ‘The ScandaP deserve special mention. See El Sombrero de tres Picos (The Three-Cor¬ nered Hat).

ALARCON Y MENDOZA, a-lar-kon e man-do'-tha, Don Juan Ruiz de, Spanish dram¬ atist: b. Tabasco, Mexico, about 1588 or 1590; d. 4 Aug. 1639. Little is known about his early life, but he went to Spain in 1600 and became royal attorney in Seville. From 1608 to 1611 he was in Mexico ; then he took up his residence in Madrid, where he was appointed reporter of the royal council of the Indies, about 1628. Ele¬ vated sentiment, harmony of verse and cor¬ rectness of language

distinguish his works, the principal of which are ‘The Weaver of Se¬ govia) ; ‘Suspicious Truth, *the model for Cor¬ neille’s ‘Liar-* ; ‘Walls Have Ears) ; ‘The Proof of Promises- *; ‘The Anti-Christ.* A complete edition of his works was published by Hartzen- busch in Madrid 1866.

ALARIC I, King of the Visigoths : b. about the middle of the 4th century; d. 410, and is first mentioned in history in 394 a.d., when Theodosius the Great gave him the command of his Gothic auxiliaries. The dissensions be¬ tween Arcadius and Honorius, the sons of Theodosius, inspired Alaric with the intention of attacking the Roman empire. In 396 he ravaged Greece, from which he was driven by the Roman general Stilicho, but made a mas- terlv retreat to Illyria, of which Arcadius, frightened at his successes, appointed him gov¬ ernor. In 400 he invaded Italy, but was de¬

feated by Stilicho at Pollentia (403), and in¬ duced to transfer his services from Arcadius to Honorius on condition of receiving 4,000 pounds of gold. Honorius having failed to fulfil this condition, Alaric made a second in¬ vasion of Italy, during which he besieged Rome thrice. The first time (408) the city was saved by paying a heavy ransom; the second (409) it capitulated, and Honorius was deposed, but shortly afterward restored. His sanction of a treacherous attack on the forces of Alaric brought about the third siege, and the city was taken, 24 Aug. 410, and sacked for six days. He quitted Rome with the intention of reducing Sicily and Africa, but died at Cosenza.

ALARIC II, King of the Visigoths from 484 to 507 a.d. At the beginning of his reign the dominions of the Visigoths were at their greatest extent, embracing three-fourths of the modern Spain and all western Gaul to the south of the Loire. His unwarlike character induced Clovis, King of the Franks, to invade the king¬ dom of the Visigoths. In a battle near Poic- tiers (507) Alaric was slain and his army com¬ pletely defeated. The ‘Breviarium Alaricia- num,’ a code of laws derived exclusively from Roman sources, was compiled by a body of Roman jurists at the command of this King Alaric.

ALA-SHEHR, a-la-shar', ancient Philadel¬ phia, a town in Turkey in Asia, 76 miles east of Smyrna, famous as the seat of one of the first Christian churches, and still having a vast number of interesting remains of antiquity, consisting of fragments of beautiful columns, sarcophagi, fountains, etc. It is a place of some importance, carrying on a thriving trade, chiefly with Smyrna, to which runs a railway. Pop.

20,000.

ALASKA. The greatest of the Territo¬ ries of the United States in area and in pros¬ pective resources. It practically is divided into three distinctive regions — the main territory, the panhandle or southeastern Alaska, and the Aleutian Archipelago. The main territory in¬ cludes all that part of the continent of North America to the west of the 141st meridian of west longitude ; its other boundaries are the Arctic Ocean to the north, Bering Sea to the west and the Pacific Ocean to the south. The panhandle of southeastern Alaska comprises a narrow fringe of continental coast — with the outlying and adjacent islands — extending from Portland Canal north to Mount St. Elias. The Aleutian Archipelago consists of all the islands westward from the Alaskan Peninsula to in¬ clude A ttu, off the Asiatic coast. Under Amer¬ ican jurisdiction also are the islands of Bering Sea — the Pribilofs, Saint Lawrence and others near the Alaskan mainland. The geographical extension of Alaska is very great, from 51° N. in the Aleutian Archipelago to about 72° N. latitude at Point Barrow, and from 130° W. longitude, in Portland Canal, westward to Attu Island in 173° E. longitude.

Physiography. — Since Alaska, with its area of about 590,000 square miles, is one- third greater in size than the Atlantic States from Maine to Florida, its detailed geographic description would involve much space. Sitkan Alaska, the land of tourists, is a narrow region intersected by long, deep fiords, which are dom-

ALASKA.

Estimated population, 64,834

TOWNS

Pop. Pop.

318

Afognak .

. F 6

245

Klukwan .

151

Anvlk .

. D 4

438

Kodlah .

...,F6

446

Barrow .

. A 5

231

Koserefsky. . .

337

Cape Prince of Wales

168

Loring .

. . .F 12

C 2

602

Metlakatla ....

. . .F 12

185

Chena .

. D 7

2,600

Nome .

566

Chlgnik .

230

Nulato .

....

Chomly .

74

Nushagak. . . .

144

Circle .

. C 8

58 5

Petersburg ....

. . .F 12

1,152

Cordova .

243

Point Hope. . .

289

Council .

. C 3

119

Rampart .

... .C 7

, .

Dolomi .

. . . .G 12

6

Sand Point . .

. . . .G 3

1,722

Douglas .

.... F 11

173

Seldovia .

. . . .E 6

261

Dyea .

. . . . E 11

534

Seward .

. . . .E 6

178

Eagle .

. C 9

118

Shakan .

98

Ellamar .

1,039

Sitka .

321

Fort Yukon .

. C 8

872

Skagway .

...Ell

3,541

Fairbanks . . .

. C 7

415

St. Michael . . .

. . D 3

221

Gambell .

137

Sumdum .

158

Golovin . . . .

. 0 4

130

Sunrise .

. . . . E 7

445

Haines .

233

Susitna .

462

Hoonah .

. F 11

398

Tanana .

. . . ,C 6

200

Howkan .

... .G 12

1,222

Treadwell . . . .

. . F 12

1,644

Juneau .

. E 1 2

2

Udakta .

232

Kake .

247

Unalakleet . . .

549

Karluk .

281

Unalaska .

. . . .G 1

129

Kasaan .

108

Unga .

. . . .G 3

250

Kenai .

. E 6

810

Valdez .

. . . .E 7

1,613

Ketchikan. . .

... .F 12

743

Wrangell .

. . .F 12

351

Killisnoo . . . .

271

Yakutat .

241

Klawock ....

. F 12

Ai.* •>' JL”

Atka

Tanaga

(jSareloi 1.0

ocean

Chandif

Noala k

ChaBtlljaT

Settles

**#•... . •-

*doel

.jBerginSET"

_>• ^WVv.

iBurgcss^wWt'

■ U n,.p»

Auckland R.

1 ' Forf [lairilin :(N:/r' T — \ 7 . Deaav

; . -

Stswt

E4'J

7~)f>oxat>° o> yc oFo« _

lOBTO&

Pt. r, Sr

yfjnch uvtftna

Glacier/

r'Aˆ Mt/K-

pc'j

Denipseyˆ

«$jmBko \

V_ˆ"\

Iditˆrod ˆ 3

A”dre afj

fMt.. For.aKerkT,'

win... ˆ >

Vrnsˆurifea

! M ontanˆi

PBJP* ' 1

tpoinjiif

'vjeanjut

(' i rdwOOd

iU09an

KKN/ViJiiu,?ˆ

iV-fii Rdoi'l /Vfa

ICHINUliOOK

TiatgClp

iNTAGUE 1.

C. Sucklintf r> *

C.Cleare

button Ilotirˆ

Kachemak Be 3 Seldovlagi Augustine I. W*

Goodnetvs V<"J Portage B«!T

C. Veirce

BAGR»®1St

, ˆ=lliHEK» Is. -il/Oj

C. Douglas e&

V,/.34SHUYAK *■

'*kz Strait 0ˆ5/ sTonki Cape

§Cwˆ“ˆL

ˆAjtoirnak } L-' '>y Kodiak urll"'W Chiniak Bay QT (iff C. G re v i lie Narrow Capo A(J Ugak Bay

ˆSiikalidak Strait

SlTK A LIDA R I.

Naknelc

Lake

i !',\aN jTKulagvii] /'•' \i.

r

C. Providence

i)aj, BaVˆ'

ˆF°ss, ctptTve,l>4

k . a JUINITY Is.

ˆSEMIDI JS.

ALASKA

Statute Miles, 132 = 1 Inch.

100 _ 200 _

AY,r"n" ua„

ytc.

Oˆ'k.vak

Rand McNally's New 11 i 14 Map of Alaska. Copyright by Rand McNally & Co.

Longitude West from Greenwich.

igsy?

<i\Jk

5 5/iT 4n“v?4*

Vfhm '

i\V l

1 85"

iwv« #1 ˆ

\Jyˆ

ALASKA

311

inated by lofty, glacier-covered mountains ris¬ ing precipitously hundreds, and in places thou¬ sands, of feet from the sea. Its densely wooded, irregular land surfaces are very rarely level. Southwestern

Alaska, from the Alaskan Penin¬ sula eastward to the Saint Elias region, has coasts of the fiord type, which are rather more open through the great waterways of Cook In¬ let, Prince William Sound and Yakutat Bay. These mountainous coasts are, however, broken by the Copper River and the debouching streams at the head of Cook Inlet. This well- wooded country of surpassing beauty from Yakutat Bay to Cook Inlet thence shades west¬ ward to the desolate Alaskan Peninsula, a tree¬ less, volcanic, upturned region, where lakes are interspersed. Southeastward of this region are the fertile islands of Afognak and Kodiak. The Aleutian Archipelago stretches from the Peninsula a thousand miles westward toward Kamchatka in the form of some 70 treeless volcanic islands, of which less than a third are inhabited. The best known are the Fox group (Uminak and Unalaska), the Nearer (Attu), Rat (Seven Peaks), and Andreanafski (Atka) groups. Isolated in the middle of the Bering Sea are the Pribilofs, the wonderful breeding grounds of the fur-seal. The Bering Sea dis¬ trict from Bristol Bay north is a barren coast, usually a treeless and tundra country. The Seward Peninsula, about 20,000 square miles in area, rises from low, sandy coasts to flat- topped uplands, rarely above 2,000 feet. The Arctic coast is low, sandy, shoal-bounded and practically uninhabited, though the forest-clad hills of the interior are roamed over by Eskimo hunters. The Yukon watershed, about 200,000 square miles in area, comprises far the greater part of the habitable regions of the Territory. In its bow-shaped course of 1,500 miles from the Canadian frontier to Bering Sea the Yukon receives three large and navigable affluents — - the Porcupine, Tanana and Koyukuk. The Yukon watershed is separated from the Arctic slope by low (Endicott) mountain ranges, and from the Gulf of Alaska by lofty, snow-clad ranges — the Alaskan chain, the Saint Elias, Wrangell and McKinley groups- — which rise from 9,000 to 19,000 feet. Extensive areas in the Yukon and other valleys are tundra — flat, undrained lands covered with a dense, rank growth of mosses, sedges and shrubs. Apart from the Bering Sea coast the Yukon Basin has extensive forest growths in its valleys, prin¬ cipally alders, birches, cottonwood, hemlock, poplar and spruce. •

Mountains. — Some 200 miles inland and nearly parallel with the Arctic shores is the Endicott range, low mountains from 1,000 to 1,800 feet in elevation. The Coast Range, north of Cross Sound, consists of the Fair- weather and Saint Elias groups — more pic¬ turesque than any other part of Alaska — over which lies the most extended glacier of Amer¬ ica. Twelve of its peaks exceed 10,000 feet in height, while Mounts Saint Elias and Logan rise respectively to 18,024 and 19,540 feet above the sea. The Wrangell group, to the east

of Cop¬ per River, is an irregular uplift of volcanic for¬ mation, which has an area of 5,000 square miles. Eight of its summits rise above 10,000 feet, Mount Blackburn reaching 16,140 feet. The Alaskan Range, the southern boundary of the Yukon Basin, extends in an unbroken chain

about 200 miles from the Canadian border to the Alaskan Peninsula. Its crest line exceeds an average of 8,000 feet, with four peaks above 10,000, among which is Mount McKinley with an elevation of 20,464 feet — the highest peak of America. South of this range are the less important Chugach Mountains. Finally the Aleu¬ tian volcanic range forms the backbone of the Alaskan Peninsula. Among these peaks, and the continuation of the range through the Aleutian Isles, are the active volcanoes of Alaska, perhaps the most remarkable group in the world, Akutan, Bogoslof, Grewingk, Kat- mai, Korovin, Pavlof, Redoubt, Shishaldin, etc. The eruption of Katmai in 1912 is the most violent volcanic outburst known in the history of the Alaskan mainland. On the Aleutian Chain the existence of 48 volcanic craters on 25 islands indicates the frequency and violence of such disturbances in past ages.

Glaciers. — The most extensive remnants of the ice-age in North America are those found in Alaska. Along the coast from Portland Canal north and west to the Alaskan Penin¬ sula, the mountains facing the ocean are cov¬ ered with perpetual snow, from which project huge glaciers, increasing in size and in fre¬ quency as one goes north. Though the least extensive of the glacial formations, the tourist-visited glaciers of southeastern Alaska are the most widely known. Noteworthy among them are the numerous ice-streams of Sumdum Bay and Taku Inlet, the 40 or more dead glaciers of Lynn Canal and the enormous accumulations in Glacier Bay, where the Muir glacier has a face of about three miles in width and 300 feet in height. Much vaster, however, are the neves which cover the coastal mountains from Glacier Bay northwestward to Kenai Penin¬ sula, as on these shores are to be seen nine- tenths of the permanent ice-fields of America. Of the 31 live glaciers (those which reach the sea) no less than 25 are in these regions — three in the Saint Elias group, 11 in Prince William Sound, and 11 in the Fairweather region. Prince William Sound is especially notable for its ice phenomena, since in Harri- man and College fiords there are 11 live ice- rivers, the largest being Columbia glacier with a front about four miles wide, and 300 feet or more high. The greatest ice mass, however, is the Malaspina glacier, which rests on the south¬ ern flank of Mount Saint Elias as a seaward* flowing ice-mass of some 1,200 square miles in area. Separated from the ocean for a score of miles by a forested moraine about five miles wide, it finally reaches the open sea at Icy Cape.

There must be at least 400 glaciers in Alaska, as more than 250 have been visited, definitely located and considered important enough to be named.

Climate. — Owing to its great range of lati¬ tude, from 54° 30' to 72° N., it is difficult to briefly describe the various climates of this vast territory. From Portland Canal north¬ westward to the Alaska Peninsula the coast type prevails ; much cloudiness, heavy rainfall and equable temperature through warm winters and cold summers; of which Sitka and Valdez are representative. Their coldest and warmest months of average temperature and yearly rainfall (including melted snow) are as fol¬ lows: Sitka. February, 33°, August, 57°. rain¬ fall 112 inches; Valdez, January, 20°, July 51°,

rainfall 73 inches. The Bering Sea coast, little affected by the ocean temperatures, has smaller rainfall and increased range of temperature, as shown by Saint Michael, February, 2°, July, 54°, rainfall 15 inches. The interior regions have a continental type of climate, with very cold winters, warm summers and also light rainfall. The following are typical: Copper Center, January, 14°, July, 55°, rainfall 9.3 inches; Ft. Gibbon, January, 18°, July 59° rainfall, 12 inches. The climatic conditions of the Aleutian archipelago are of the insular type, as determined at Unalaska, February, 20°, July, 50°, rainfall 109 inches. Point Barrow is typical of the entire Arctic coast, with its polar climate modified by the adjacent sea, January, 21°, July, 39°, rainfall 6.6 inches. It may be added that the heaviest rainfalls occur along the southern coasts during October, in the interior during July, on the Arctic coast during August and in the Aleutian Isles during January.

Fauna and Flora. — The species of animals, birds, fishes, etc., are varied and numerous. The Harriman expedition collected along the coast more than 1,000 species of insects. More than 150 kinds of plants are known and nearly 50 different fishes and over 200 habitant birds. Osgood records 171 species of birds from the Yukon River region alone. At sea the more important species are the fur-seal, sea-otter, hair seal, walrus and whale. On land are found five kinds of bear and six of foxes. Other animals of economic value are the beaver, cari¬ bou, ermine, goat, hare, lynx, martin, mink, moose, otter, reindeer, sheep, squirrel, wolf and wolverine.

Commerce. — The entire volume of traffic shipments in and out of

Alaska for the fiscal year ending 30 June 1916, amounted to $97,- 646,430, including copper, gold and silver. The shipments increased enormously in value for the fiscal year ending 30 June 1917, the aggre¬ gate being $121,265,947. Articles to the value of a million dollars or more were shipped into the Territory as follows: Breadstuffs, $1,303,- 218; cotton manufactures, $1,530,197; explo¬ sives, $1,278,026; machinery, $3,932,189; other iron and steel, $6,209,2 27 ; meat and dairy products, $3,493,876; oils, $1,385,186; tin man¬ ufactures, $3,894,165; wood and manufac- • tures, $1,822,549. The comparative shipments out of Alaska for the years 1916 and 1917 of the more valuable articles were : Furs and fur-skins, 1916, $588,035; 1917, $711,550; fish, $19,629,431, and $23,833,662; copper, $26,- 488,288 and $33,098,190; gold ores, etc., do¬ mestic $16, 195,635 and $15,409,529. The salmon industry has increased greatly from shipments of $17,590,317 in 1915 to $21,195,612 in 1917, and will be very materially increased for the fiscal year 1917-18. The most phenomenal growth has been in the shipments of copper, ore, etc., wrhich has risen in value from $5,182,- 004 in 1915 to $26,488,288 in 1916 and $33,098,- 190 in 1917. The increase in pounds has been from 35,994,812 to 117,338,937, and finally 120,- 670,352 pounds in 1917.

Commercial Development. Fur-Seals. — Three products have in turn dominated the commercial interests of Alaska — furs, fish and gold. Copper now forges to the front, while coal looms up in the near future. The develop¬ ment of these industries will be separately

considered. In the minds of the multitude Alaska was for many years associated only with the furs of the otary or eared-seal. The breeding grounds of these mammals are almost exclusively confined to the Pribilofs — four isolated, barren islets in the middle of Bering Sea, of some 65 square miles in area, equi¬ distant 200 miles from the Aleutian Isles, the Alaskan mainland and the Nome region. Set apart as a reserve by Congress in 1868, the Pribilofs wˆere leased from 1870 to 1890 to the Alaska Commercial Company, with authority to kill 100,000 seals each year. From 1870 to 1889 inclusive the company took 197,273 pelts, valued at $29,473,050. The maximum produc¬ tivity, including seals killed outside of the Prib¬ ilofs, was in the twro years, 1888 and 1889, when 272,568 pelts were taken, valued at $4,333,809. In 1890 the concession passed to the Northern Commercial Company with the right to take 40,000 pelts annually. As early as 1885 pelagic or open-sea sealing by various nations in the waters adjacent to the Pribilofs, seriously affected the fishery. Thousands of seals, many wfith babes, were slaughtered out¬ side of the Pribilof reserve. The annual means of 136,000 pelts taken

(1888-89) fell to less than 29,000 for the five years ending 1908. The Paris convention for the correction of the evil proved to be of little value. In 1911, the governments of Great Britain, Japan, Russia and the United States agreed to a convention which promises to restore the seal herd to large proportions. Until 1926 pelagic sealing is pro¬ hibited in the seas of Bering, Japan, Kam¬ chatka, Okhotsk and to the north of the 30th parallel of latitude in the Pacific Ocean. Aborigines living on the coasts of these regions are permitted to take native-fashion such seals as are needful for local uses. Under the con¬ vention the products obtained by sealing on the islands are to be equitably divided between the countries named, and during close seasons an indemnity must be paid by the United States to Great Britain and Japan. By the Act of 24 Aug. 1912, Congress established a close season for five years, with a proviso that resi¬ dent natives may kill such seals as are neces¬ sary for food, clothing and boat-making. Under such conditions the product of fur-seals cannot average much over $200,000 annually. In round numbers the aquatic furs of Alaska from 1868 to 1915 inclusive have a value of $65,000,000, the fur-seal products amounting to about $51,000,000. The beneficial effects of the closed season at the Pribilofs are already ap¬ parent. The seals were enumerated at the rookeries with the following results : 1912,

215,738; 1913, 268,305; 1914, 294,687; 1915, 363,-

872; and 1916, 417,281. With the same rate of increase the seal herds should number about 550,000 when the open season begins in 1918.

Land Furs.— In comparison with the sea furs those obtained from land mammals are of minor importance, though considerable in value. The values of land furs by decades are as follows: 1871-80, $1,596,494; 1881-90,

$2,360,115; 1891-1900, $2,335,862; and 1901-10, $2,381,925. The aggregate values to include 915 amount to $11,518,188. The enormous slaughter of land animals threatened at one time the destruction of the industry, as in 1899 the product was only $45,725. Under restric¬ tions as to close seasons, prime skin's, use of

ALASKA

1 Castle Cape

2 Town of Douglas

Copyright by Underwood & Underwood, N. Y.

3 Gold Cliff Mine, Valdez Bay

poison, etc., the trade has . very much improved and the maximum year of products was 1914, $632,063. The furs taken in 1914 were as fol¬ lows : Ermine, 6,873 ; red fox, 14,967 ; white fox, 6,530 ; lynx, 6,930 ; marten, 6,497 ; mink, 65,623 ; muskrat, 101,202; and land otter, 1,008. In October 1915 the United States sold at auction 513 blue-fox skins at an average of $114.45, an advance of $72 over the last sale. Selected lots ran from $245 to $273 per pelt. The white fox pelts averaged $24.-55. The value remained materially unchanged in 1916 and 1917. A novel industry was introduced about 1894, the breeding of foxes. Thirty or more uninhabited islands, principally situated from Prince William Sound westward to the Fox Islands, have been leased by the United States to the breeders. Few of these enterprises have resulted in returns adequate for the labor and capital therein involved.

Fisheries. — -With the marked decrease in the fur products — Trom $3,054,414 in 1888 to $2, 121,611 in 1891 — the fishery industries rose during the same period from $1,447,478 to $2,856,742 annually, thuS(making it temporarily of primary importance in Alaskan trade. To include 1916 the product of Alaskan fisheries aggregates in round figures, $260,000,000. Of this amount $20,000,000 came from cod, whale, halibut, etc., in contradistinction to the far more productive of all branches — the salmon industry. From 1868 to 1880 the average out¬ put of all fisheries was about $170,000. The following decade saw the product quintupled, the income from 1881-90 averaging $850,000 annually — almost half the value of the furs — of which nine-tenths were derived from the salmon. The subsequent growth in the salmon industry has been constant and astonishing. The average annual values in periods of five years are as follows: 1891-95, $2,100,000; 1896-

1900, $3,400,000; 1901-05, $6,700,000; 1906-10,

$11,000,000; and 1911-15, $16,900,000. Except for one year (1913) the increase has been un¬ interrupted from 1905 to 1915. The year of maximum productivity for this period was 1914, $19,474,393, followed closely by 1915 with values of $19,053,905. The output is again steadily increasing, the values for 1916 for canned salmon alone being $23,269,429, with the probability that this sum will be very

largely increased in 1917. Although temporarily sur¬ passed by the gold output, the salmon is now the most valuable single product of Alaska, and affects industrially the maximum number of persons. The plants are elaborate, including at least 100 canneries, and five hatcheries. The entire fisheries give employment to about 22,000 persons, of whom some 4,000 are natives. The entire investments exceed $37,000,000, of which the salmon industry alone amounts to

$35,000,000.

Mineral Resources. Gold. — In 1880 Alaska began gold mining, but the yearly product was not considered of importance until it passed the million-dollar mark for 1892. The development is clearly shown by the average annual output for decades: 1881-90, $462,000; 1891-1900, $2,821,000; 1901-10, $14,572,000, and for the five years ending with 1915, $16,418,485. The total products to include 1915 aggregate $260,858,943, divided by districts as follows : Pacific Coast belt, $76,259,295 ; Copper River and Cook Inlet region, $6,613,783; Yukon Basin,

$106,423,169; Seward Peninsula and North¬ western Alaska, $71,562,700. The mining oper¬ ations of 1916 added to these figures a value of $11,140,000 in placer gold and $5,912,736 from the lode mines, a total value for the year of

$17,052,736.

Of the total yield of gold in Alaska, 72 per cent is obtained from placers, 27.6 per cent from lode-mines, and 0.4 per cent from copper ores. Juneau is the most important of the lode-mining centres, although some lode-mines are in operation at Fairbanks, and in the Kus- kokwim and Nome districts. In the season of 1916, 42 dredges were operating in the streams of Alaska, 37 of these being in the waters of the Seward Peninsula. These great machines recovered 94 per cent of the entire value won from Alaska's gold placers, the output of the small workings reaching little above $600,000. The Territory of Alaska, as regards its mining interests, is classified as follows: (1) The Pacific Coast Belt includes all mines in southeastern Alaska — Ketchikan, Wrangell, Jun,eau and Berner Bay regions. Far greatest in productivity are the .quartz mines of Juneau, where the famous Treadwell lode mines on Douglas Island, the largest gold mines in the world, with their plant of concen¬ trators, stamps, workshops, etc., have produced nine-tenths of the gold of the Pacific belt. The yield of its three largest mines in 1905 exceeded $2,000,000, and in 1908 was $3,000,000, and in 1916 attained an output of $4,500,000. Second in

importance are the quartz mines on the mainland near Juneau. In 1916 there were 13 lode mines producing ore, and the output was $5,912,736, an almost uninterrupted yearly increase from 1897. The average of the past five years exceeds $5,500,000 annually. (2) The Copper River district has averaged an output of $300,000, which has increased for the past five years to $450,000, with its maximum of $605,390 in 1915. (3) The Yukon Basin has produced a

larger amount of gold than any other Alaskan district. Of surpassing importance were the placer diggings of the Tanana watershed, where the Fairbanks yield of $350,000 in 1904 rose to $3,750,000 in 1905, and then gradually to $9,200,000 in 1908. The maximum for the Yukon Basin was $11,580,000 in 1909, since which time, despite the discovery of new placers in the basins of the Innoko and upper Kuskokwim, the production has fallen very gradually to $7,367,776 in 1915, of which more than $300,000 came from lode-mines. (4) The Seward Peninsula is better known to the public as the Nome region. This district sprang into fame when the unimportant output of $75,000 in 1898 rose to $2,800,000 in 1899. The yearly out¬ put reached a maximum of $7*500,000 in 1906; after that it decreased steadily to $2,535,000 in 1913, but is again tending upward, the product of 1915 being $2,920,000. The gold production from 1901 to 1907 amounted to $37,000,000, the Nome district yielding about $28,000,000. Thirty-six deep mines were operated in 1915 in the Nome district, where the total gold prod¬ uct was about $1,500,000, while some $700,000 came from the Council district. (5) Among smaller isolated districts the most promising for future increases with their outputs in 1915 are: Tolovana, 50 miles northwest of Fair¬ banks, $60,000; Kuskokwim, $110,000; Chisana, $135,000; Inoko, $190,000; Koyukuk, $300,000;

Hot Springs, $550,000, and Iditarcd, more than $2,000,000. These are placer mines, in which some steam dredges are at work.

Silver. — The silver production of Alaska in 1916 amounted to 1,379,261 ounces, valued at $907,554. About nine-tenths of this was se¬ cured incidentally in the mining of copper, the amount being not far from 1,200,000 ounces. The remainder was gained in the mining of gold. An undeveloped source of silver in Alaska exists in the extensive deposits of ar¬ gentiferous galena, which up to 1916 were still lying idle. Since 1880, including the out¬ put of 1916, Alaska has

yielded a grand total of 6,302,459 ounces of silver, valued at $3,729,465.

Copper. — While gold has for 20 years shown the largest value among the mineral products of Alaska, it bids fair to be surpassed in im¬ portance by copper in the immediate future. For a few years prior to 1905 copper was profit¬ ably mined, to the value of about $200,000 an¬ nually, in the Ketchikan district on Prince. of Wales Island. The number of working mines reached 10 in 1906 with an output of $920,000. Later rich veins were discovered on the ad¬ jacent Kasaan Peninsula, where more than 30 mines were opened. Very rich deposits of sul¬ phides and of native copper were discovered, scattered over the country from the Saint Elias region to Cook Inlet. Rich and easily worked veins were found on the eastern shores, and adjacent islands, of Prince William Sound. The richest and most productive deposits are those in the watershed of the Chitina, on the southern flank of the Wrangell Mountains, where there are several mines and scores of prospective drifts. These deposits were so extensive and valuable that the Copper River and Northwestern Railway, 197 miles long, was built to transport the ores of the Bonanza copper mines from the northeastern terminus at Kennicott. In connection with the Bonanza, Jumbo and Mother Lode mines there have been installed tramways, concentrators, etc., for handling the immense quantities of ore pro¬ duced. The production of 1914 was great, but it was quadrupled in 1915, in which year the product was 40 per cent of the grand total mined in Alaska from the beginning. From 13 mines there were obtained 86,509,312 pounds, valued at $15,139,129, besides by-products of $600,000. In 1916, 18 copper mines were op¬ erated in Alaska, yielding a total of 119,600,000 pounds. Nine of these mines were in the Ketchikan district, six on Prince William Sound and three in the Chitina belt. The greater part of the output, however, came from three large mines — two in the Copper River country, and one on Prince William Sound. The lack of transportation facilities is a serious obstacle to the development of many mining properties known to contain ex¬ tensive and valuable deposits. Since 1903, the grand total of copper mined in Alaska, in¬ clusive of the output of 1916, amounted to 339,513,375 pounds, valued at $68,839,581.

Other Metals. — Of other metals, Alaska yields small supplies, with prospects of great increases when the transportation facilities are extended to reach the mining areas. The most important output in point of size is of lead. In 1916 the lead production amounted to 820 tons, making the total yield of lead up to the close of 1916, 2,080 tons. The larger proportion of

this output has been gained from gold ores, principally from the lode mines in the Juneau mainland belt, which carry considerable galena. Galena-bearing lodes are found also in the Ketchikan and Wrangell districts in south¬ eastern Alaska; in the Fairbanks district; m the Fish River basin of Seward Peninsula; in the Broad Pass region ; in the Mentasta Pass region; in the Koyukuk district; and in many other more remote localities, where distance from transportation lines renders them un¬ available for the present.

Antimony has been mined in Alaska only since 1915. In that year 833 tons of stibnite, carrying about 57 per cent of antimony, was sent into the market. In 1916 the output was 1,458 tons. Most of this ore came from the six mines of the Fairbanks district. Two newly opened mines in the Nome country added a small production. The most important lode is located in the Ketchikan district, and de¬ velopment was begun in 1916. Other localities, accessible to transportation the year round, are lodes on Prince William Sound, on Kenai Peninsula and in the Nizina district.

Tin has been mined in the York district of the Seward Peninsula since 1902, and, later, in the Hot Springs district. The total amount re¬ covered, including the 139 tons gained in 1916, has been 767 tons. Most of this has been ob¬ tained incidentally by dredges operating for gold in the stream beds. Two lode mines are in operation in the York district, with a small annual output. There are a number of known tin-bearing placers in York district, and stream tin is widely distributed throughout the Hot Springs district, but few miners make any at¬ tempt to save it. The York tin mining is car¬ ried on only through the summer season, and the Hot Springs placers can be worked only about three months.

Tungsten, in its ore scheelite, has been for a considerable period recognized in the gold placers of Fairbanks, Iditarod and Nome. In 1915 a scheelite-bearing lode was opened near Fairbanks, and in 1916 others were located and opened in that vicinity and also near Nome. Some of the dredges in the' Nome and Iditarod districts separate the scheelite from their con¬ centrates. Both wolframite and scheelite are found in some of the gold placers of the York district, and wolframite has also been found in some of the gold placers of the Yukon-Tanana region. In 1916 theˆ total output of tungsten ore in Alaska was 47 tons.

Platinum began to attract the attention of the Alaskan placer miners in 1916, and 10 or 12 ounces were recovered, most of it in the newly developed Koyuk district, in the south¬ eastern part of Seward

Peninsula and in the Slate Creek placers in the upper Copper River Basin. Platinum has also been reported as in considerable quantity in the gold-bearing gravels of the Kahiltna River, and in the beach placers of Lituya Bay and of Red River, Kodiak Island.

Quicksilver occurs as cinnabar in lodes in the lower Kuskokwin region, and in nearby localities in the Yukon Basin. The extent of the deposits has not yet (1917) been defined.

Nickel and cobalt have been found in a cop¬ per-bearing lode near Pinta Cove, on the west side of Chichagof Island, in the Sitka district, there are deposits of molybdenite at several

points in southeastern Alaska, and in the Wil¬ low Creek district, but no attempt to develop them had been made up to the close of 1916. A bismuth-bearing vein occurs on Charley Creek in the Nome district, and this metal is also found in connection with gold at two points in the Tanana valley. No output was reported for 1916.

Coal. — Coal occurs in Alaska in many widely separated sections, and in many grades, ranging from a fair quality of anthracite to lignite. Much the larger part of the coal area is so remote from transportation lines as to be available only for local uses. The only area at present accessible is the Matanuska field, yield¬ ing high grade steam and coking coals, and low grade bituminous coal. This field is reached by the Matanuska Branch of the government railroad. The Bering River field, yielding high grade steam and smithing coal, and per¬ haps coking coal, with some anthracite, can be made accessible by the completion of the rail¬ road now under construction, and its extension into the central and western parts of this field, where the best coal is found. The Cook Inlet field lies practically at tidewater, but yields only lignite.

Notwithstanding the extensive areas of its coal-fields, the amount mined in Alaska has been insignificant, amounting to less than 50,000 tons. The withdrawal of coal-lands from public entry in 1907 ended all mining, but legislation in 1914 provided for utilization of the coal. Over 1,200 square miles of area have been determined by survey to be coal-fields, while there are good reasons for the belief that 11,400 other square miles are underlaid by coal-bearing rocks. About 58 per cent of the known fields are of lignite, while 7 per cent are high-grade

coal — there being 26 square miles of anthracite, 7 of semi-anthracite and 50 of semi-bituminous. No considerable area of high-grade coal has been found outside of the fields in the basins of the Bering and the Matanuska Rivers. By far the greater amount is in the Bering River field — 22 square miles of anthracite and 28 square miles of semi-anthra¬ cite and semi-bituminous. The coals vary from 84 per cent of fixed carbon in the anthracite to 74 per cent in the semi-bituminous. Workable Bering beds are known from 3 to 25 feet in thickness. In the Matanuska field of 46 square miles the seams vary from 5 to 30 feet in thick¬ ness. The estimates for these two fields indi¬ cate the presence of at least 3,554,000,000 tons of high-grade coal, which estimates will doubt¬ less be largely increased when detailed surveys are made. Bituminous coal exists in large quantities in the Alaska Peninsula. Through¬ out the Yukon Basin coal is widely distributed, the principal fields being the Nulato (the best coal), the Washington (upper Yukon), and the very' extensive Nenana lignite coals, where 66 square miles are covered by veins from 500 to 1,800 feet in thickness at many points. Three fields are known on the Arctic coast — Cape Lis- burne, W/'ainwright Inlet and the Colville Basin.

Under the Act of 16 July 1914, the Alaskan coal lands were opened for public use. The act empowers the President to reserve for govern¬ mental purposes coal-bearing lands not exceed¬ ing 5,120 acres in the Bering River Basin, 7,680 acres in the Matanuska field and one-half of the other coal-fields. Unreserved coal lands

are to be divided into blocks of 40 acres, and no combined blocks exceeding 2,560 acres in the aggregate shall pass under any one control, the leases to run for 50 years only. Limita¬ tions are imposed on aliens, corporations, rail¬ roads and other common carriers. Royalties of not less than two cents per ton are to be levied, while annual rentals rising from 25 cents per acre for the first year to $1 in the sixth and succeeding years are provided for. The royal¬ ties and rentals are to form funds for the con¬ struction of railways and for other public utilities in Alaska. Leases must contain pro¬ visions for an eight-hour day as well as other welfare restrictions in favor of the miners. For strictly local or for domestic use permits may be granted covering the mining for 10 years, without royalties, of areas not exceeding 10 acres. No less than 47,742 tons of coal were imported by Alaskans during the fiscal year 1917, which indicates the inadequacy of the coa] law of 1914. See Coal Lands.

Agriculture. — The United States has fos¬ tered agricultural interests through four experi¬ mental stations: Sitka, nursery, etc.; Kodiak, dairy, etc. ; Rampart, grain ; and Fairbanks, farm demonstration.

Despite much effort agri¬ culture is only successful near large settlements and to a moderate degree. The growing sea¬ son of six months on the southern islands drops to four in the interior valleys. The most im¬ portant products are vegetables on favored grounds in the valleys of the Susitna, Koyukuk, Copper R.iver, and especially the Tanana. The reduced importations of vegetables, despite large increase of population, indicates the in¬ creasing volumes of these products. The values of all vegetable shipments into Alaska aggre¬ gated $700,000 in 1906, but was only $522,000 in 1915; imported hav fell from 16,044 tons in 1913 to 8,780 in 1917.

Manufactures. — Apart from the canneries the manufacturing establishments of Alaska are few. The census of 1910 reported the fol¬ lowing additional: 22 with 178 persons en¬ gaged in lumber products ; 16 with 89 persons in printing and 68 with 290 persons in miscel¬ laneous work.

Forests. — The forestal resources have been conserved by congressional legislation. Origin¬ ally about 40 per cent of the Territory' was wooded, .of which the coastal woodlands are now protected. The Chugach forest, over 800 square miles in area, includes most of the valu¬ able timber in the neighborhood of Prince W il¬ liam Sound and on the adjacent island of Afognak. Some considerable areas in this forest have spruce and hemlock ranging from 20,000 to 50,000 feet per acre. The Tongass forest, with an area of 100 square miles, brings under national control the timber of the Sitkan Archipelago and the adjoining mainland. The timber is heavier and more valuable than else¬ where. It consists of Sitka spruce, western hemlock, western red cedar and yellow cypress. The exportation of timber from the Territory is forbidden. Wood for domestic purposes is free to all living on or near the national for¬ ests, as is the timber needed by prospectors while developing their claims. Nearly 40,000,000 feet of timber were sold from the national for¬ ests in 1915, which returned a net income of $7,265. While the woodlands of the interior are inferior in quality, consisting mainly of

small cottonwood, birch and spruce, yet they are of great economic importance in the mining districts where they are indispensable for the easy working of the frozen placers, which are thawed for exploitation. See Forestry in the United States.

Game. — Alaska is the only part of the United States where large game is yet to be found in quantities. Under the provisions of the act of 11 May 1908, game has been con¬ served through close seasons, hunting and shipping licenses, and the system of licensed guides. During the breeding seasons the law protects caribou, deer, goats, bears, sheep, sea- lions, walrus and game birds. Hunting is free to residents, but non-residents must obtain licenses from the Secretary of Agriculture, ranging from $50 to $150. While game can be killed for necessary food it cannot be shipped out of the Territory. Licensed hunters are per¬ mitted to kill not more than one walrus or sea- lion, two moose, three bears, caribou, deer or sheep, and not more than 25 birds on any single day. Special permits are granted for scientific purposes.

Reindeer. — As far as the natives are con¬ cerned, reindeer-raising is the most important of the Alaskan industries. It has gradually transformed large numbers of natives from wandering hunters into domesticated stock herders. In general the reindeer herds are scattered through the tundras of the coast regions of Bering Sea, of the valleys of the lower Yukon and Kuskokwim, along the Arctic coast from Kotzebue Sound to Point Barrow, and on a few of the outlying islands. The deer are widely and systematically distributed to the natives under definite regulations, which foster the spirit of personal ownership and in¬ culcate skilled methods of herding. Young natives, trained as herders by an apprenticeship of four years, ultimately receive from 24 to 29 deer as the nucleus of a personal herd. On 30 June 1914, there were 57,872 reindeer, herded at 65 separate points. Of these no less than 37,828 deer were owned by 980 natives, whose income for the year amounted to $77,934, ex¬ clusive of domestic uses. The missions and the Lapp settlers owned 15,931 head. In 1916, the herd had increased to 82,151, and by 1918 will undoubtedly exceed 100,000. Female deer can be sold only to natives and within the Territory. Male deer can be slaughtered, when over four years old, not ex¬ ceeding 2 per cent of any herd. Experiments have been made and plans are in progress for the exploitation of reindeer meat commercially, and it is thought that shipments will soon attain such proportions as to be a factor in the meat supply of the entire Pacific coast.

Reservations. — Many reservations have been made "by the United States in the interests of conservation and for public utilities. The army, the navy, the fishery and the lighthouse bureaus have thus been insured proper facili¬ ties for administration, free from unauthorized invasion. Among reservations elsewhere men¬ tioned are the Chugach and Tongass forests, the Pribilof fur-seal islands and nine for native

villages. Others of importance are a sea-otter reserve on Afognak Island, a reindeer station on Saint Lawrence Island a moose reserve on Fire Island. A general and very extended reservation is that of the Aleutian Archipelago,

for the development of fisheries, the propaga¬ tion of reindeer and for the protection of birds and fur-bearing animals. Special bird-reserva¬ tions are the Bering Sea, the islands of Bogoslof, Chamisso, Forrester, Hazy, Saint Lazaria, Tu- zedni and the great delta of the Yukon, the last named being a favorite breeding region for ducks and geese. The fox-farming islands are not reservations, although leased for exclusive use.

Transportation. — In summer transporta¬ tion in the interior of Alaska is largely by boats on the great rivers. The principal streams are the Yukon, with its important tributaries, the Porcupine, Koyukuk and especially the Tanana, Copper, Kuskokwim, Susitna, Yentna and Kobuk. They are all navigable for steamboats from 100 miles upward. The Yukon, 1,865 miles in length, is the fifth river in size of North America. The Tanana, besides 750 miles of navigable waters, has tributaries also navigable — the Chena, Kantishna, Tolovana and Volk- mar. For the interior regions, Fort Gibbon, at the mouth of the Tanana, may be called the centre of river transportation. From that point boats ply to and from Dawson, from the end of May to 1 October; Fairbanks from the middle of May to 1 November; Saint Michael from the middle of June to 1 October. Oc¬ casional boats navigate the Koyukuk and the Kuskokwim. Skagway and the Prince William Sound country are reached weekly by steamer from Seattle throughout the year, and Nome from early June to October. The railroads (see Railroads) are almost entirely operated in connection with mines. Land travel has been greatly facilitated by the labors of the Army Roads Commission. Under its adminis¬ tration there have been built to 30 June 1916, 3,759 miles of wagon roads, sled roads, pack- trails and winter trails. A stage route is operated throughout the year from Valdez to Fairbanks, about 375 miles; stages from Chitina on the Copper River Railroad con¬ nect with this route at Copper City. From Fairbanks there are sled roads (for winter travel) to Ft. Gibbon and Circle on the Yukon. Pack-trails extend westward from Gibbon to Nome and eastward to the Canadian border. They also reach northward within the Arctic circle to Candle on Kotzebue Sound, Coldfoot on the Koyukuk, Ft. Yukon on the Yukon and Barrow on the Arctic Ocean.

Railroads. — Practically all the railways of Alaska have been constructed as adjuncts to mining enterprises. They aggregate 466

miles in length, as follows: White Pass and Yukon, from Skagway, 20.5 miles; Yakutat Southern, between Minto and Situk bays, 9 ; Tanana Val¬ ley, from Fairbanks, 46; Council City, from Solomon, 32.5 ; Golovin Bay, from Council City, 5; Seward Peninsula, from Nome, 86; Copper River and Northwestern, from Cordova to Kennicott, 195; Alaskan Northern, from Seward, 72 miles. Conditions of taxation, mining, etc., were such that from 1913 to 1915 only 261 miles of these roads were operated. The necessity of additional railroads for the development of the Territory was so evident that Congress authorized such a system at pub¬ lic cost. Public Act 69, 12 March 1914, em¬ powered the President to locate, construct and operate railroads in Alaska, at a cost not to

exceed $35,000,000. After surveys and studies by a commission, the President approved of what is known as the Susitna route, a line from Seward, Kenai Peninsula, to Fairbanks, on the Tanana River, about 471 miles in length, with a branch line of 38 miles to the Matanuska coal fields. The route is from Seward to the head of Turnagain Arm to Knik Arm, up the drain¬ age valley of the Susitna and Chulitna rivers, over Broad Pass, and down the valley of the Nenana River to the Tanana valley. In order to develop as early as possible the Matanuska coal fields, work wras begun on Knik Arm, where a town site was surveyed and settlement made. It is known as Anchorage, is connected with the main line by a branch of five miles, and will be the shipping point save for four months in the winter when Knik Arm is usually frozen. During the remainder of the year freight and passengers will necessarily be handled to and from Seward, with which the Matanuska section will soon be connected by rail. During 1914 about 70 miles of the Alaskan Northern Railway were rebuilt, and about 30 miles of the Matanuska section graded and bridged. The terminal station, Chickaloon, of the Matanuska coal field is now connected by rail with Seward. Construction has so far progressed that there are now being operated about 75 miles of new line, 65 miles of which is located north of Anchorage. Some of the heaviest work on the line is found between Anchorage and Kern Creek, on account of it being necessary to bench in the line on pre¬ cipitous cliffs in that locality. It is estimated that the 500 miles of line from Seward to Fair¬ banks can be built for $27,000,000, exclusive of the $1,150,000 paid for the Alaskan Northern. Passenger service has been fixed temporarily at 12.5 cents per mile, while the freight rate for 35 miles operated is 1.25 cents per pound. Tim¬ ber for construction purposes will be

taken free from the Chugach forest, while local needs will be met from the timber reservation made by executive order, five miles wide on each side of the railway route from Turnagain Arm to Chickaloon and to Fairbanks.

Telegraphs and Telephones. — Ninety per cent of the towns and mining camps of Alaska, even to Kotzebue Sound, can be reached readily from any part of the world. The Signal Corps of the Army constructed, and now operates, a system of more than 4,000 miles of cable, wireless and land lines, which connects Seattle, via Sitka and Valdez, with Nome to the ex¬ treme northwest, Circle City to the central north, and along the immediate southern coast to Skagway. These lines are open to com¬ mercial use, and transact a business of such volume that the tariffs approach $225,000 annually. Private companies operate a tele¬ phone system, which from the centre at Nome reach Candle and other stations on Seward Peninsula. Similarly the mining camps of the Fairbanks district are connected with Fair¬ banks. The United States Navy operates radio stations at Cordova, Dutch Harbor, Saint George, Saint Paul Island and Sitka.

Education. — The whites and the natives are educated separately, the former at local and the latter at Federal expense. In 1915 schools for the white children were maintained in 14 incorporated towns and in 31 other settlements, with a force of 105 teachers and 2,503 children.

Under acts of Congress the education of the Eskimo and Indians is conducted under the direction of the Secretary of the Interior, the expenses of the system being met by con¬ gressional appropriations. In 1915 such appro¬ priation amounted to $200,000, from which were maintained 71 schools with 106 teachers. There were 3,666 pupils enrolled, while the average at¬ tendance wras 1,991. The instruction is along thoroughly practical lines, and covers the moral, physical and mental training of both adults and children. Elementary English subjects, domestic science, industrial handicrafts, personal hygiene and village sanitation are the principal subjects. Nearly three-fourths of the native children be¬ tween 10 and 14 years of age can read and write English. The teachers are debarred from trade. Besides their school work they aid in the reindeer service, and actively engage in the care of the sick and distressed, distributing food and clothing to the absolutely destitute and affording hospital care. In the special hospitals at Kanakanak, Kotzebue and Nulato is employed part of the force of doctors and nurses. Contract hospital service is also had through hospitals at Candle, Juneau, Nome, Seattle and Valdez.

Missions. — The Presbyterians began mis¬ sionary work in 1877, and

though the establish¬ ment of independent churches in the larger towns has materially modified the needs, they yet maintain three missions, as well as the hospital at Haines and the training school at Sitka. The Baptists, Congregationalists, Friends, Lutherans, Moravians and Methodists have contributed largely to religious training in Alaska. The Catholics have labored assidu¬ ously and successfully, especially in the Yukon Valley at Nulato and Holy. Cross; the latter is a station monumental for its success in agri¬ culture, stock-raising and industrial training. The Greek Church has gone its own way with the natives near their stations. Although the Episcopalians entered the field late they have pursued their work to a greater extent than any other denomination. About $50,000 are spent annually on their 24 missions, and four hospitals, those at Fairbanks, Iditarod, Ketchi¬ kan and Valdez.

Natives. — The Indian population of Alaska has fallen from 29,536 in 1900 to 25,331 in 1910, and was estimated to be about 24,000 in 1915. As far as their racial distribution was deter¬ mined in 1910 they were divided as follows: Aleuts, 1,491; Athabascans, 3,916; Eskimo, 12,652; Haidas, 530; Tlingits, 4,458; and Tsimshians, 729. The Aleuts occupy the Aleu¬ tian Archipelago, where they barely maintain life by fishing. The few Haidas live in the Ketchikan region, being offshoots from the tribe on Queen Charlotte Islands. The Tsimshians, generally known as the Metlakat- lans, are for the most part living in com¬ munity on the reservation of Annette Island, granted them by Congress ; they are industrious, temperate and thriving. The Tlingits are the natives living principally in the Sitkan Archi¬ pelago, and along the coast northward to the Saint Elias region. Known to tourists through their totems and other customs, they have gradually abandoned old ways, many being em¬ ployed in mines, fishing, etc. Living in the interior of the country, in the valleys of the Copper, Kuskokwim, Tanana and Yukon, the

Athabascans are rapidly disappearing. Both game and fish are scarce, and regular labor in mines and agriculture is confined as a rule to Indians under mission control. The Eskimo are a coastal people, whose habitat extends from the Canadian border of the Arctic shore westward to Cape Barrow, thence south and easterly along Bering Sea and the Alaskan Peninsula to Cook Inlet. Only about one-fifth live on the shores of the Polar Sea. About two-fifths occupy permanently the hunting and fishing grounds between Bristol Bay and Nor¬ ton Sound,

where game is abundant in some form summer and winter. The education and care of the natives are treated under the head of Education and Missions. Their conditions have materially improved during the past few years, as far as selected communities are con¬ cerned. The United States has set apart certain reservations, thus freeing them from obtrusive and demoralizing surroundings : Annette Island, Saint Lawrence Island, Hydaburg, Klawock, Klukwan, Port Gravina, Long Bay, Ft. Yukon, and on Kobuk River. The Territorial legisla¬ ture has enacted laws granting citizenship, and authorizing separate self-governing towns to Indians under certain restrictions. Co-opera¬ tive stores have been conducted with success by natives at Hydaburg, Atka, Klawock and Saint Lawrence Island, and are being organized else¬ where. Efforts, so far unavailing, have been made to induce Congress to bring about the betterment of the 5,000 Eskimo in the Yukon delta through the abolition of the liquor traffic and the development of industrial training. In 1915-16, however, an appropriation of $25,000 w'as made by Congress for the relief of natives, supplementary to the funds used in education.

Government. — Alaskan government is that of a modified territorial form. Appointed by the President, the governor has strictly limited powers. The territorial legislature, consisting of eight senators and 16 representatives, meets biennally in Juneau, the capital. Its acts are subject to veto by the governor, and only have the force of law when approved by Congress. The course of justice, administered through four district courts, is slow and expensive. The courts are supplemented by commissioners whose powers are restricted to cases involving values of not more than $1,000, and to crimes whose punishment does not exceed imprison¬ ment for one year. The fisheries, forests, fur- seal, game and largely the natives are under Federal control, so that local administration is complicated, uncertain and not always efficient.

Population. — According to the census of 1910 the population then numbered 63,700, of whom about 36,000 were white. According to the 1920 census the population of Alaska was 54,899. The incorporated towns and their population were: Fairbanks, 3,541; Nome, 1,200; Douglas, 2,500; Juneau, 5,000; Cor¬ dova, 1,500; Skagway, 872; Valdez, 1,200; Wrangell, 743; Petersburg, 1,200; Seward, 1,100 ; Haines, 445; Tanana, 398; Eagle, 178 and Chitena, 400. The new railway town of An¬ chorage, founded at the head of Cook Inlet in 1915, is estimated to have a population of 2,500. The largest native villages are : Metlakatla, 602 ; Chignik, 566 ; Karluk, 549 ; Sitka, 500 ; Kodiak, 438 ; Saint Michael, 415 ; Ft. Yukon, 331 ; Unalaklik, 247; Koserefsky, 231; Nulato, 230.

History under Russia. — The discovery of

Alaska was due to the enterprise of Peter the Great, who a few days only before his death drew up a program for the exploration of the seas to the eastward of Kamchatka. It was not until 1741 that Bering and his lieutenant Chiri- koff reached the Alaskan mainland, at Cape Saint Elias and near Cross Sound. The wealth of furs brought back by the survivors of the expedition stimulated the activities of the Russian fur-hunters, who soon made extensive discoveries along the Aleutian Chain and de¬ veloped a thriving trade. From 1790 Alaska was controlled and exploited by trading mo¬ nopolies, principally by the Russian American Company -which had exclusive rights from 1800 to 1862. The company was required to settle the country, develop its resources, propagate the faith and to extend Russian influence in North America. Operating under the nominal control of the Imperial Department of Com¬ merce, the chief director of the company in his remote realm of Alaska exercised despotic and often cruel sway. The natives were practically serfs, and though timid and inoffensive, were at times driven by horrid cruelties to rebellion. The most prominent of the chief directors were the brutal Baranoff (1799-1819) and the reformer Baron Wrangell (1831-36). About 20 trading posts were established by the com¬ pany, the most important being Kodiak, Sitka, Saint Michael, Unalaska, Atka and Kurile. Seven missionary districts were organized, and a few schools opened, mostly by priests. Dis¬ putes arose as to the boundaries of Alaska, which were settled by conventions with Great Britain and the United States. In 1824 by convention with the United States, the southern boundary, which Russia had claimed to be the parallel of 51° north latitude, was fixed defi¬ nitely at 54° 40' N. In 1862 trade monopoly came to an end, and in 1864 the Territory came under its first imperial governor, Prince Mak- sutoff. Under a treaty, confirmed by the United States Senate 28 May 1867, Alaska was pur¬ chased from Russia for the sum of $7,200,000, and the country was formally occupied by the United States on 18 Oct. 1867.

American History. — Although the treaty of cession guaranteed to the civilized inhabit¬ ants of Alaska equal civil rights with American citizens, this provision was not granted, even qualifiedly, for 17 years. The army was re¬ sponsible for Alaskan affairs from 1867 to 1877, without having legal standing or needful power. Then the officials of the treasury ruled for seven years, equally beyond the law and without means of control. An act of Congress 17 May 1884, gave a shadow of government to Alaska. It extended to the Territory the laws of Oregon, authorized a governor, formed dis¬ trict courts and a land district, granted mining rights, prohibited liquor, established schools

and placed restraint on Indians. In 1899 penal codes were enacted, and in 1900 an inadequate civil government was provided, with legislation as to courts, schools, coal lands, missions, Indians, the insane, etc. Homesteads could not be legally acquired until 3903. With the dis¬ covery of extensive gold placers Alaska finally assumed such an economic importance as led to boundary disputes with Canada, which were adjusted by an international commission in 1903. In 1906 Alaska was granted the right of representation in Congress through a delegate.

and by the act of 24 Aug. 1912, the Territory was accorded a measure of home government by the creation of a territorial legislature. Al¬ though so long neglected in the way of gov¬ ernmental administration, Alaska has been free from murders and other serious crimes to an extent unsurpassed by any other part of the United States.

Bibliography. — Dali, (Alaska and Its Re¬ sources } (Boston 1870) ; Bancroft, ‘History of Alaska5 (San Francisco 1886) ; Harriman, (Alaska Expedition 5 (10 vols., New York

1901-15) ; Elliott, (Our Arctic Province) (New York 1886) ; Greely, (Handbook of Alaska5 (New York 1914). Government publications as follows: Interior Department, ‘Annual Report of Governor from 18865 ; Geological Survey, Annual Reports from 1889, especially (Mining Industry5 by Brooks, as also Brooks’ Geog¬ raphy and Geology5 (1906), his ‘Railway Routes5 (1912), and Annual Reports Commis¬ sioner of Education from 1895; Department of Agriculture, Annual Reports of Experiment Stations from 1907 ; Department of Commerce, Annual Reports ‘Salmon Fisheries5 from 1896; Special government reports, ‘Narratives of Ex¬ plorations in Alaska5 (Washington 1900) ; Re¬ port of the Alaska Railroad Commission (Washington 1913) ; Osgood, et al., ‘Fur Seals of the Pribilof Islands in 19145 (Washington

1916).

Major-Gen. A. W. Greely, Author of ‘ Handbook of Alaska .5

ALASKA BOUNDARY. See Boundaries of the United States.

ALASKA, Explorations in. Under Rus¬ sia. — In carrying to completion the project of Peter the Great for explorations to the east

of Kamchatka, Vitus Bering discovered Alaska in 1741, when he visited the Saint Elias region, while his lieutenant Chirikoff landed at Cross Sound. Incited by reports of fur wealth, enter¬ prising Russian hunters, between 1743 and 1762, discovered and visited the chain of Aleutian isles and the peninsula adjoining. In pursuit of the Northwest Passage, James Cook in 1778 fol¬ lowed the greater part of the coasts from the Sitkan Archipelago northward to Icy Cape, Arctic Ocean. Taking possession of the country, the Russian- American Company, 1790 to 1860, established trading posts at many points, — the principal stations being Kodiak, Saint Michaels, Sitka and Unalaska. From these centres desultory and infrequent efforts were made to explore the adjacent regions. The principal journeys were as follows: 1791, Becheref on the Alaska Peninsula; 1796, Shultz, Lituya Bay and Lynn Canal ; 1803, Bazanoff, the delta regions of Copper River ; to carry out the orders of the company to explore the country to the north of Cook Inlet, in 1818, Korsakof crossed overland from the Inlet to Bristol Bay, and thence by ship to the Kuskokwim Bay, and two years later Kolmakoff visited the valley of the lower Kuskokwim River. Ascents up the Yukon River were made by Glasunof, 1835, to Anvik; by Malakoff, 1838, to Nulato; by Zagoskin, 1843, to Novikakat; while in 1863 Lulceen was the first to make the long journey to Ft. Yukon and return. Along the coasts, Vancouver surveyed in 1794 Cook Inlet and

the shores thence southward to Chatham Strait ; Kotzebue discovered and explored Kot¬ zebue Sound in 1816; while Beechey in search of the Northwest Passage reached, through Elson Point, Barrow by boat. From the Hud¬ son Bay Territory, in 1847, came a factor, Mur¬ ray, who descended the Porcupine River and near its mouth established and built the trading post Ft. Yukon. In 1826 Franklin explored the Arctic Coast from the Mackenzie River west¬ ward to Return Reef, Alaska. In a renewal of the journey in 1837 Thomas Simpson filled in the unknown coast between Return Reef and Point Barrow. Between 1863 and 1865 the Kennicott party, constructing the Western Union telegraph line, surveyed the country overland from Norton Sound to the mouth of the Koyukuk River, and thence along the north bank of the Yukon as far as Ft. Yukon. When Alaska was transferred to the United States in 1867, the mainland was an unknown country except narrow fringes along the coasts, and the immediate banks of the Yukon River.

American Explorations. — The explorations from 1869 to 1898, made entirely by officers of the army, are recorded in ‘Compilation of Narratives of Explorations in Alaska5 (Senate Report 1023, 56th Cong., 1st Sess.). In 1869 Captain Raymond, corps of engineers, made

a reconnaissance of the Yukon River from its mouth to Ft. Yukon. His astronomical obser¬ vations disclosed the fact that the Hudson Bay station at that point was in American territory, and its removal was enforced. Opening weather stations at Saint Paul, Pribilofs and at Saint Michael, the signal corps began research work, which was eventually carried on at 29 stations, until Congress forbade continuance. The most important of the labors of the corps was the maintenance of an international polar station at Point Barrow, 1881-83. Its com¬ mander, Lieut. P. Ray, supplemented his scientific work by field explorations, during which he discovered Meade River and the adjacent Endicott Mountains. In 1883 Lieut. F. Schwatka explored the country between Chilkoot Inlet and Ft. Selkirk, B. C. The most important and extensive of any reconnais¬ sance is that of Lieut. H. T. Allen in 1885. Starting from the coast at the mouth of the Copper River, with Corporal Fickett, signal corps, he ascended the Copper Valley, crossed the mountains, descended the Tanana to its mouth, and following the Yukon to the mouth of the Koyukuk ascended that valley overland to the junction of the Kanuti, and then by boat reached the mouth of John River. The journey was one of great danger and privations. Allen's discoveries added some 240,000 square miles of territory hitherto unknown, although under the control of Russia and the United States for a century. The maps of these three rivers were recognized as authoritative for 12 years, when they were revised by the geological survey. The gold discoveries of 1898 stimu¬ lated activity in exploration. In 1898-99, Aber¬ crombie explored the country from Prince Wil¬ liam Sound to Copper Valley for a military road. Glenn's expedition of 1898 extended from Cook Inlet toward the Tanana Basin, and that of 1899 around Cook Inlet. Burnell and Mitchell, signal corps, explored the regions of

the upper Copper and upper Tanana for telegraph routes in 1902-03. The explorations of the basins of the Noatak and Kobuk Rivers have been made by the navy, the revenue marine and the geological survey. These un¬ known tributaries of Kotzebue Sound were first explored by Lieut. G. M. Stoney, U.S.N., who from 1883 to 1886 made extended voyages up these rivers, supplemented by land trips in ad¬ jacent regions. Lieutenant Cantwell, revenue marine, further explored in 1884 and 1885 the Kobuk, reaching Walker Lake. Engineer Mc-Lenegan, revenue service, first visited the Noatak, traversing an extended part of the valley in 1885. Systematic surveys were made by W. C. Mendenhall, geological survey, who explored the country from

Ft. Hamlin, on the Yukon, to Kotzebue Sound, traveling in 1901 via the Dali, Kanuti, Kovukuk, Alatna and Kobuk rivers. (Ft. Hamlin to Kotzebue Sound> (Survey Prof. Paper 10.) The latest explora¬ tions, under P. S. Smith, geological survey, in 1910 and 1911, appear in Survey Bulletin 536, (The Noatak-Kobuk Region. } By far the most important explorations from an economic stand¬ point are those made by the United States Geological Survey, whose labors have con¬ tributed enormously to the material develop¬ ment and prosperity of Alaska. Working pri¬ marily in the interests of mining, the survey covered, from 1898 to 1915, 202,391 square miles of area, divided as follows : Detailed sur¬ veys, 3,731 miles; exploratory, 51,680 miles; and reconnaissance, 146,980 miles ; thus including in its work one-third of the Territory. The geological surveys aggregated 177,963 square miles. The National Geographic Society's ex¬ pedition of 1917 under the direction of Dr. Robert F. Griggs, explored the Mount Katmai region, called by the Indians ((the valley of ten thousand smokes, w and reported the Katmai crater the largest in the world, nine miles in circumference, and 3,600 feet deep. The region has over a thousand active volcanic vents within an area of 100 square miles, and is declared by Dr. Griggs to be one of the wonders of the world.

Bibliography. — Among the many valuable publications of the survey the following cover the more important phases of exploration : Brooks, (Geography of Alaska) (Prof. Paper 45) ; (In Northern Alaska Across the Rocky Mountains> (Prof. Paper 20) ; Brooks, (Mount McKinley Region *(Prof. Paper 70) ; (The Koyukuk-Chandalar Region* (Bull. 532) ; Brooks, (Railway Routes to Fairbanks) (Bull. 520). Major-Gen. A. W. Greely.

ALASKAN BOUNDARY COMMIS¬ SION, a mixed tribunal which met in London, England, 3 Sept. 1903 to arbitrate on the con¬ tentions of the Canadian government with re¬ gard to the boundary line between Alaska and Canada, from Mount Saint Elias to the Port¬ land Canal. The commission consisted of three Americans and three Britons, the American commissioners being Secretary Root, Senators Lodge and Turner, while the British commis¬ sioners were Lord Alverstone (formerly Sir Richard Webster), English, Sir Louis Jette and Mr. A. B. Aylesworth, Canadians. Ex- Secretary Foster was counsel for the American

side and Mr. Clifford Sifton for the British side.

In May 1898 the United States and Great Britain agreed to appoint an Anglo-American Joint High Commission to consider and put on a satisfactory basis the regulations of the North Atlantic fisheries,

commercial reciprocity, the Bering Sea fishery question and other disputes which disturbed relations between the United States and Canada. When the questions for the deliberation of this commission were fixed, no mention was made by Great Britain of any di¬ vergence of opinion regarding the Alaskan boundary, — but on 1 Aug. 1898 the British government informed the United States that a difference of views existed as to the provisions of the treaty of 1825, which defined the Anglo- Russian boundary. On 23 August Great Britain submitted its claims, enumerated below. It was proposed to arbitrate the matter, but the High Joint Commission could not agree. The United States rejected a European umpire for American territory and the Canadians would not agree to an American judge. The final compromise was the above-mentioned tribunal.

Previous to the discovery of gold in the Yukon region there was no dispute, or occasion for dispute, as to the course of the boundary line defined by the Anglo-Russian treaty of 1825. For 73 years it had been tacitly recog¬ nized by all nations, including Great Britain. The history of that treaty is interesting. The government of the Tsar had from time to time by ukase asserted exclusive jurisdiction over the coast lands and the waters of Alaska, to prevent any encroachment by the British Hud¬ son's Bay Company upon the monopoly of the Russian-American Fur Company which had established its stations and carried on its trade in the islands and along the coast of Alaska extending northward from the Portland Canal. Disputes arose, and in the attempt to settle them the negotiations were begun which led to the signing of the treaty of 1825. The purpose of Russia in that negotiation was altogether to shut out Great Britain from the coast and the waters in which the Russian company was carrying on its business. The attempt of Great Britain was to secure a foothold upon the coast with the obvious purpose of getting an oppor¬ tunity for the Hudson's Bay Company to estab¬ lish its stations there, which was the very thing Russia sought to prevent.

The negotiations- lasted from 1822 to 1825, Count Nesselrode and M. de Poletica conduct¬ ing the Russian case, and Sir Charles Bagot first and Lord Stratford de Redcliffe finally, the British case. At that time Great Britain feared that the United States would insist upon retaining possession of the whole Oregon terri¬ tory up to the Russian line at the historic parallel of 50° 40'. This would have shut off Canada from the Pacific coast entirely, and the British, therefore, made strenuous efforts to get an outlet through the Russian coast strip, making various propositions, one after the other which the Russians rejected, stubbornly adher¬ ing to their original proposition, which in the end prevailed.

The British first asked to have the boundary line drawn straight down the 141st meridian to the sea at Mount Saint Elias, thus depriving Russia of the entire ((panhandle** of Alaska, and

causihg her even to relinquish Sitka, the colonial capital. This was peremptorily re¬ jected by Russia without serious consideration. The British next proposed Christian Sound, Chatham Strait and Lynn Canal as the bound¬ ary, leaving Baranoff Island to Russia, but giv¬ ing to the British Juneau, Admiralty Island,, and everything to the south and east thereof. This was also rejected. Then Clarence Strait and the Stikine River were proposed, leaving Prince of Wales Island to Russia, but giving to Great Britain the islands of Wrangell and Revilla-Gigedo. This also the Russians re¬ jected. Finally the British commissioners con¬ ceded to Russia the whole strip down to 54° 40', but sought as a last resort to have the coast line drawn straight across such arms of the sea as Glacier Bay and Lynn Canal, from head¬ land to headland, so as to give the British ac¬ cess to tidewater. This, too, the Russians, in¬ exorably refused to grant, and in the end they won on this point as on all the others. From first to last the constant and inflexible Russian contention was for Russian possession of an unbroken strip of coast from Mount Saint Elias to Portland Canal, and in the treaty of 1825 that contention was explicitly upheld and confirmed.

That Russian title was transferred to the United States in 1867, and from that time to the present the United States has stood for precisely what Russia stood for in 1822-25.

In 1898, however, as already stated, follow¬ ing the discovery in 1896. of the rich gold de¬ posits in the Klondike district, the Canadian government set up a claim based upon a new understanding of the Anglo-Russian treaty. The main contention, which, by the way, never had any cordial support from qualified experts in Great Britain, was whether the line of de- markation between the southeastern end of Alaska and the British northwest possessions cut through the inlets and estuaries of the Pacific or went around them, leaving all these waterways in American territory and prevent¬ ing Great Britain from access to the sea. The British contended that the boundary line, which was defined by treaty as running parallel with the sinuosities of the coast at a distance of 30 marine miles inland, except where parallel mountain ranges were nearer, when it was to follow these ranges, was to be construed as running parallel to the coast of the Pacific and not

parallel to the shores of the inlets of that sea, thus constituting a political rather than a physical coast line. If the British contention had been granted, Dyea and Skagway, two im¬ portant ports on the Lynn Canal, and the prominent places of export and import for the Yukon and Klondike gold fields, would be in Canadian territory. So would the Porcupine gold fields.

On account of the apparent clearness of the terms of the Anglo-Russian treaty in 1825 it may seem difficult to imagine how any interpre¬ tation different from that argued for by the United States could have been put forth. The original treaty, however, was in French, and dispute arose as to the precise translation of ˆcrete,® meaning crest, Uisiere,® meaning strip, and ˆcote,® usually translated as coast.

The treaty also laid down the boundary on supposed topographical conditions which did not

exist. When the treaty was drawn up the fram¬ ers relied upon some of the maps of Captain Vancouver, and from observations in the small section of British Columbia which he explored it seemed apparent that the whole coast was bordered by a range of mountains which ran parallel to and at a distance of from 25 to 30 miles from the sea.

As a matter of fact there is a jumble of mountains in various places along the coast, but in no case is there a well-defined watershed. The ˆcrests® mentioned in the treaty were even more difficult to decide upon, and with the dif¬ ference of opinion as to whether the coast line as intended in the treaty ran through the inlets or around them there were grounds for dis¬ putes, for the settlement of which an inter¬ national tribunal became necessary.

The treaty between the United States and Great Britain, of which the appointment of the Alaska tribunal was the consequence, therefore decided that the following questions should be decided upon :

1. What is intended as the point of com¬ mencement of the line?

2. What channel is the Portland Channel?

3. What course should the line take from the point of commencement to the entrance to Portland Channel?

4. To what point on the 56th parallel is the line to be drawn from

the head of the Portland Channel, and what course should it follow be- between these points?

5. In extending the line of demarkation northward from said point on the parallel of the 56th degree of north latitude, following the crest of the mountains situated parallel to the coast until its intersection with the 141st degree of longitude west of Greenwich, subject to the condition that if such line should anywhere ex¬ ceed the distance of 10 marine leagues from the ocean then the boundary between the British and the Russian Territory should be formed by a line parallel to the sinuosities of the coast and distant therefrom not more than 10 marine leagues, was it the intention and meaning of said convention of 1825 that there should re¬ main in the exclusive possession of Russia a continuous fringe or strip of coast on the main¬ land, not exceeding 10 marine leagues in width, separating the British possessions from the bays, ports, inlets, havens and water of the ocean, and extending from the said point on the 56th degree of latitude north to a point where such line of demarkation should intersect the 141st degree of longitude west of the merid¬ ian of Greenwich?

6. If the foregoing question should be an¬ swered in the negative, and in the event of the summit of such mountains proving to be in places more than 10 marine leagues from the coast, should the width of the Uisiere® which was to belong to Russia be measured (1) from the mainland coast of the ocean, strictly so-called, along a line perpendicular thereto, or (2) was it the intention and meaning of the said convention that where the mainland coast is indented by deep inlets, forming part of the territorial waters of Russia, the width of the lisiere was to be measured (a) from the line of the general direction of the mainland coast, or

(b) from the line separating the waters of the ocean from the territorial waters of Russia, or

(c) from the heads of the aforesaid inlets?

1. What, if any exist, are the mountains re¬ ferred to as situated parallel to the coast, which mountains, when within 10 marine

leagues from the coast are declared to form the eastern boundary?

The United States made no actual claim. She reiterated her right to territory which she proved had been recognized as hers by Great Britain and by various official acts of Canada. Various maps were produced to show that Rus¬ sia had been entitled to the disputed territory and that after the purchase of Alaska that same territory was mapped and charted as belonging to the United States.

Among the maps put in evidence was the British Admiralty Chart No. 787, corrected to April 1898, in which the boundary line follows the sinuosities of the actual sea-coast, and de¬ prives Canada of the inlets which cut into the continent. It was proved also that post offices have been maintained on various points of the disputed strip; that custom-houses have been established there and have collected duties, and that government and mission schools, particu¬ larly at the head of the Lynn Canal, have been maintained for nearly 20 years. The fact that the possession of the territory by Russians and later by Americans had not been disputed from 1825 until 1898 was also put forth by the United States in support of her claim.

The British contention rested primarily on the claim that it would have been impossible to trace at a distance of 30 miles the intricate con¬ volutions of the line forming the edge of the salt water, and that therefore a general coast line, including many of the islands and disre¬ garding many of the inlets, was the intention of the framers of the Anglo-Russian treaty. If the 30-mile limit were applied to such a coast, the boundary line would, of course, cut across all the deeper inlets, giving the British im¬ mediate access to the interior.

The British also submitted an argument plac¬ ing a new interpretation of that clause of the treaty which provides that where the boundary line follows the mountain ranges, the crests of these mountain peaks shall mark the precise line of demarkation. It was demonstrated in the rush to the Klondike that there was no general line of mountains anywhere near the coast, but a number of peaks and small mountains were scattered disconnectedly close along the coast.

The British claim that the boundary line should follow the crests of these isolated peaks, had it been allowed, would have deprived the United States of a great portion of their 30- mile Uisiere.® The British cited the action of American surveyors in 1893 in support of their interpretation of <(coast.®

Dr. T. C. Mendenhall, superintendent of the United States Coast and Geodetic Survey, in that year directed his subordinates to carry their operations inland ((30 nautical miles from the coast of the mainland in a direction at right angles to its general trend.® In regard to the mountains it was contended that a gap does not discontinue the general line of the range.

The official report of the tribunal was signed and issued on 20 Oct. 1903. The signatories were Lord Alverstone, the British commis¬ sioner, and the three American commissioners, who constituted a majority of the tribunal, the Canadian commissioners refusing to sign.

All the American claims were granted with

the exception of those in regard to qudstions 2 and 3, in which the British contentions were upheld. The original treaty specified that the line should run from the southernmost point of Prince of Wales Island (Cape Muzon) to Port¬ land Channel. The course of this line, accord¬ ing to the United States, is due east about 70 miles.

The British locate it a little north of east about 66 miles to what they call Portland Chan¬ nel, and what the Americans call Pearse Chan¬ nel. The American claim is made on the map of Captain Vancouver, who first scientifically investigated the territory, and the British claim was made upon the text of Captain Vancouver's book, which differed slightly from the map.

A substantiation of the American contention would have given to the United States Pearse and Sitklan islands, which command the en¬ trance to Fort Simpson, to which point Canada proposes to build a new transcontinental rail¬ way.

The decision in regard to Portland Channel or Canal gave Canada Pearse and Wales islands, while the United States obtained Sitklan and Kunnughunnut islands and the broad southern portion of the channel. Three opinions were also delivered to Messrs. J. W. Foster and Clifford Sifton, the agents respect¬ ively of the United States and Canada, one by the United States commissioners discussing the Portland Canal claims ; another by Lord Alver¬ stone on the general issue, and a third by the Canadians protesting in the most emphatic lan¬ guage against all the American claims. The chief interest in the decision lay in the conclu¬ sions upon the fifth or main question of Lord Alverstone, who by his impartial and high- minded course refuted the assumption on which was based the principal objection to the former treaty, that not even on the bench could a British subject be found who would not

persist in upholding the supposed interests of his country, no matter how cogent might be the appeals to his sense of justice or of equity.

The following is an abstract of Lord Alver- stone's conclusions :

(<Jhe broad, undisputed facts are that the parties < were engaged in making an agreement respecting the archipelago and islands off the coast and some strip of land upon the coast it¬ self. The western limit of these islands extends in some places about 100 miles from the coast and the channels or passages between the isl¬ ands and between the islands and the coast are narrow waters, their widths varying from a few hundred yards to 13 miles.

((In ordinary parlance no one would call the waters of any of these channels or inlets the ocean. I agree with you as presented on behalf of Great Britain that no one coming from the interior and reaching any of these channels, particularly the head of Lynn Canal or Taku Inlet, would describe himself as being upon the ocean, but on the other hand, it is quite clear that the treaty does regard some of these chan¬ nels as the ocean. This consideration, however, is not sufficient to solve the question. It still leaves open the interpretation of the word coast, to which the mountains were to be par¬ allel. ...

(<There is, so far as I know, no recognized rule of international law which would by im¬ plication give a recognized meaning to the word

coast as applied to such sinuosities and such waters different from the coast itself. As I have said more than once, the locus in quo to which the treaty was referring precludes the possibility of construing the word coast in any particular article in any special way if it does not refer to the coast line of the continent. I think the words upon the border of the con¬ tinent comprised within the limits of the Rus¬ sian possessions in Article V rather confirm the view that Russia was to get a strip all along the continent, but I do not think that much reliance can be placed upon this because of the provision regarding the rivers and streams in Article VI.

((Turning from the language of the treaty to the record of the negotiations, I have been un¬ able to find any passage supporting the view that Great Britain was directly or indirectly putting forward a claim to the shores or ports at the head of inlets. This is not remarkable inasmuch as no one at that time had any idea that they

would become of any importance. . . . The language of both the British and Russian representatives in reporting the con¬ clusion of the treaty to their respective govern¬ ments is in accordance with the view I have suggested ... I have little doubt- that if shortly after making the treaty in 1825 Great Britain and Russia had proceeded to draw the boundary provided by the treaty, the difficulties and in certain events the impossibilities of drawing the boundary in strict accordance with the treaty would have been evident.

<(I can, therefore, understand and appreciate the contention of Great Britain that under ex¬ isting circumstances difficulties in delineating the boundaries described must arise in one view and might arise in any view. But these conten¬ tions, strong as they are in favor of a just and equitable modification of the treaty, do not, in my opinion, enable one to put a different con¬ struction upon the treaty. I think the parties knew and understood what they were bargain¬ ing about and expressed the terms of their bar¬ gain in terms to which effect can be given. The fact that when, 75 years later, the representa¬ tives of the two nations attempted to draw the • boundary in accordance with the treaty they were unable to agree as to its meaning does not entitle me to put a different construction upon it.

<(In the view I take of the terms of the treaty itself it is unnecessary to discuss the sub¬ sequent action. Had the terms of the treaty led me to a different conclusion and entitled me to adopt the view prescribed by Great Britain, I should have felt great difficulty in holding that anything done or omitted to have been done, by or on behalf of Great Britain, prevented her from insisting upon a strict interpretation of the treaty, nor do I think the representations of the map-makers that the boundary was as¬ sumed to run around the heads of the inlets could have been properly urged by the United States as sufficient reason for depriving Great Britain of any rights she had under the treaty had they existed.®

ALASKA RAILROAD, The. See

Alaska — Railroads ; Alaska Railroad Act.

ALASKA RAILROAD ACT, approved April 1915, for the building of the Susitna or

Seward route, extending from Seward on Resurrection Bay to Fairbanks, 471 miles inland on the Tanana River. It includes the existing Alaska Northern Railroad, purchased for $1,150,000, running from Seward through the Kenai Peninsula almost to Knik on the

Matanuska River, a distance of about 100 miles. A side line is projected from Matanuska Junc¬ tion to the Matanuska coal region, perhaps the most valuable field of high-grade coal in Alaska. The estimated cost of construction of the line from Seward to Fairbanks including the 38-mile Matanuska branch, was $26,800,000. The road eventually will probably be extended to the Yukon, tapping the great interior valleys with their vast agricultural resources.

ALASKA TREATY. See Alaskan

Boundary Commission.

ALASSIO, a-las'se-o, small seaport and summer resort in the province of Genoa, Italy, situated on the Gulf of Genoa, about 48 miles southwest of the city of Genoa. Pop. 6,000.

ALAS'TOR, in Greek mythology, a sur¬ name given to Zeus as the avenger ; also the name of an avenging demon who follows the sinner and drives him to fresh crime. In the Middle Ages the name was given to a house- demon, the skeleton in the cupboard.

ALATAU, a'la-tou', a range of mountains in central Asia, forming the boundary between Mongolia and Turkestan.

ALATYR, a-la-tir' Russia, a town in the government Simbirsk, at the confluence of the Alatyr with the Sura, with a considerable trade. Pop. about 15,000.

ALAUDA, a genus of insessorial birds, which includes the larks. See Lark.

ALAUX, al-6', Jean, called ((Le Romain,® a French painter: b. Bordeaux 1786; d. 3 March 1864. He was a pupil of Vincent and Guerin; in 1815 took the Prix de Rome with the painting of (Briseis Finding the Body of Patroclus in the Tent of Achilles. } He executed many por¬ traits and other works. His historical paintings in the Museum of Versailles are famous: (Battle of VillaviciosaC (Valenciennes Taken by Assault by Louis XIV, } (States-General of Paris under Philippe de Valois, > (Assembly of Notables at Rouen under Henry IV, } (States- General of Paris under Louis XIII > and the (Reading of the Will of Louis XIV. } He spent nine years in painting the 86 pictures which dec¬ orate the hall of the States-General of Paris. He was director of the Academy of France from 1847 to 1850, and in 1851 became a mem¬ ber of the Academy. His brother, Jean Paul Alaux, called ((Le Gentil,® born in 1788, was director of the School of Design at Bordeaux.

ALAVA, Spain, a hilly province in the north; one of the three Basque provinces; area, 1,175 square miles; covered by branches of the Pyrenees, the mountains being clothed with oak, chestnut and other timber, and the valleys yield¬ ing grain, vegetables and abundance of fruits. There are iron and copper mines, and inex¬ haustible salt springs. Capital, Vittoria. Pop. about 98,000.

ALB (from Lat. albus, white), a clerical vestment worn by priests while officiating in the

more solemn functions of divine service. It is a long robe of white linen reaching to the feet, bound round the waist by a cincture and fitting more closely to the body than the surplice.

ALBA, the name of several towns in an¬ cient Italy, the most celebrated of which was Alba Longa, a considerable city of Latium, ac¬ cording to tradition built by Ascanius, the son of 2Eneas, 300 years before the foundation of Rome. It was at one time the most powerful city of Latium and the head of a league of the Latin cities, but fell during the reign of Tullus Hostilius when the town was destroyed and the inhabitants removed to Rome. It was long be¬ lieved that the modern Albano occupies the site of Alba Longa, but Cluver disproved this in 1624. It is probable that its site was on the western side of the Lacus Albanus, where the modern Castel Gandolfo stands, immediately to the north of which a prehistoric necropolis was discovered in 1817, buried under volcanic ashes and containing burial urns shaped like round huts. Alba Pompeia (modern Alba), an episcopal city in the province of Cuneo, on the Tanaro, 30 miles southeast of Turin. It con¬ tains rare collections of ancient coins, manu¬ scripts. household utensils, etc. The district produces grain, cattle, wine, silk, cheese and truffles. Pop. (1911) 14,176. Another Alba, called Alba Fucentia or Fucentis, was near the Lacus Fucinus. The cyclopean walls of the old town are still to be seen in excellent preserva¬ tion. Consult Promis, C., (L'Antichita di Alba Fucense) (Rome 1836).

ALBA, Duke of. See Alva.

ALBACETE, al'ba-tha'ta, Spain, town and capital of the province of the same name, on the highway and railway between Madrid and Cartagena. It lies in a fertile but treeless plain. Albacete, from its

position, is a place of considerable business; and carries on trade, both direct and transit, with Murcia, Alicante, Valencia and Madrid, exporting grain, saffron and cattle ; and importing codfish, sardines, rice, sugar, wine, iron, cloths, etc. A good deal of cutlery is made here. Pop. 25,000.

ALBA LONGA. See Alba.

ALBAN, al'ban, Saint, protomartyr of Britain, 303. A native of Hertfordshire, he was tortured and executed at Verulamium by command of the prefect, Asclepiodotus. When tranquillity was restored a chapel was erected over his grave; in 795 Offa; King of the Mer¬ cians, founded a large monastery upon the spot and Pope Adrian IV (1154-59) directed that he should hold the first place among the abbots of England. His festival is celebrated by the Roman Catholic Church on 22 June, and by the Anglican Church on 17 June.

ALBANEL, ol'ban-eT, Charles, Jesuit: b. Auvergne 1616; d. Sault Ste. Marie 1696. He entered the order in 1633, arrived in Canada in 1649, and accompanied the first French expedi¬ tion from Quebec to Hudson Bay 1671-72, de¬ signed to take possession of that region in name of the French King. In 1674 he revisited the bay, was taken prisoner by the English, sent back to Europe, and on his release re¬ turned to mission work in Canada.

ALBANI, al'ba-ni, a powerful family of Rome, which has supplied the Roman Catholic Church with several cardinals. Two of them

are well known as patrons of the fine arts:

(1) Albani, Alessandro, b. 1692; d. 1779; he was a great virtuoso and possessed a collection of drawings and engravings which at his death was purchased by George III for 14,000 crowns.

(2) Albani, Giovanni Francesco, nephew of the former, b. 1720; d. 1803; a great friend of the Jesuits, and in every respect liberal and en¬ lightened. His palace was plundered by the French in 1798, when he made his escape to Naples stripped of all his possessions.

ALBANI, Emma (stage name of Marie Louise Cecilia Emma Lajeunesse), Canadian dramatic soprano : b. Chambly, near Montreal, Canada, 1 Nov. 1852; d. After studying with Lamperti, at Milan, she made her debut at Mes¬ sina (1870), in (La Sonnambula,* under the name of Albani, in compliment to Albany, N. Y., where her public career began at the age of 12. In 1878 she married Ernest Gye of the Covent Garden Theatre. She sang in opera in London, Berlin, Paris,

Saint Petersburg and in the prin¬ cipal cities of the United States. Among her principal roles wˆere Elsa in (Lohengrin,) Eliza¬ beth in ˆannhauserC Senta in (The Flying Dutchman, > Marguerite, Mignon, Lucia, Isolde and Ophelia. Madame Albani has sung also in oratorio. Consult her memoirs, (Forty Years of Song) (London 1911) and Edwards, H. S., (The Prima Donna) (ib., 1888).

ALBANI, Francesco, a famous painter: b. Bologna 1578; d. 1660. He entered the school of Dionysius Calvaert, a Flemish painter, who had a great reputation in Bologna. Albani was one of his most distinguished scholars, but quitted him for Ludovico Carracci, under whose instruction he made rapid progress. He labored here several years in connection with Domeni- chino, to whom he was closely attached by friendship and love of art; and some resem¬ blance is perceptible in their manner of coloring. But in invention he surpasses his friend, and indeed all his rivals of the school of Calvaert. His female forms Mengs places above those of all other painters. Among the best known of his compositions are the Sleeping Venus, *c Di¬ ana in the Bath,* (Danae Reclining, *(Galatea on the Sea,* (Europa on the Bull.* Scriptural subjects he has less frequently selected, but when he has, the paintings are principally dis¬ tinguished for the beauty of the heads of the angels. He had a prosperous school in Rome and Bologna. The scholars of Guido, with whom he vied, accused him of effeminacy and weakness of style, and maintained that he knew not how to give any dignity to male figures. He has been called the Anacreon of painters.

ALBANIA, al'ba'm-a. The geographical region known as Albania before the Balkan war (1912-13) was made up of the Turkish prov¬ inces of Scutari (the ancient Illyrium) and Yanina (the ancient Epirus), and parts of the Ottoman vilayets of Kossovo and Monastir. It lies in the western part of the Balkan Penin¬ sula and was bordered on the west by the Adriatic, on the northwest by Montenegro, on the north and northeast by Serbia, on the east by Macedonia and on the south by Greece. The southern part of Albania is of a volcanic char¬ acter and earthquakes are very frequent, al¬ though not very intense. Since the independ¬ ence of Albania was proclaimed in November 1912 its frontiers have been ill-defined and

constantly changing. The eastern natural boundary is a mountain range, which attains in its highest peak an altitude of 8,858 feet. West¬ ward of this range lie parallel chains enclosing long, elevated

valleys sinking to level strips along the coast, which, while fertile and well watered, are very unhealthy and swampy. The highlands advance to the sea, forming steep, rocky coasts. One promontory, the Glossa (an¬ cient Acroceraunia), projecting in Cape Lin- guetta far into the sea, reaches a height of 6,642 feet. The most important lakes are Skadar (Scutari), lying for the most part in Montenegro, Ochrida and Janina. The prin¬ cipal rivers are the Boyana, Drin, Shkumbi, Mac (Matli), Voyussa and Devol. The cli¬ mate in the highland is healthful but subject to violent changes and excessive cold in winter. The sea-coast is malarial in parts and exposed to the violent bora or north winds. The principal ports are Drac (Duraz- zo) and Sindjin (S. Giovanni di Medua). The estimated probable area of the country is between 10,500 and 11,500 square miles, and the population between 800,000 and 850,000 souls.

Industries. — The Albanians, especially in north, have never been an agricultural people, and although the soil, apart from some chalky regions, is fertile, great tracks remain unculti¬ vated. In the cultivated areas the methods used are exceedingly primitive, and agricultural and industrial development is further hindered by lack of transportation, there being no railways, few roads and few bridges. In the north little is cultivated but maize ; the mountain terraces are used as pastures for horses, cattle and sheep. In the south the slopes of the lower valleys are covered with olives, fruit and mul¬ berry trees, intermixed with patches of vines and maize, while the densely wooded mountain ridges furnish valuable supplies of timber. The plateau of Janina yields abundance of grain; and in the valleys opening to the south the finer fruits are produced, along with maize and wheat. In 1902 the chief exports were wool, hides, olives, fish, fruit and maize. Durazzo, Valona and Scutari are the chief towns. In¬ dustries are primitive and include fishing, ex¬ traction of sea-salt, gold and silk embroideries and filigree work. Tobacco is produced in abundance and is of excellent quality. The mountains are thought to be rich in minerals, especially copper and coal, but mining is prac¬ tically unknown.

The People. — The inhabitants (called by the Turks ˆArnauts,® by the Serbians <(Arba- nassi® and by themselves <(shkipetar);>) are the descendants of the ancient Pelasgs and are di¬ vided into two main groups : the Ghegs, who live in the north, and the Tosks, who live in the south. They have an hereditary aristocracy and a kind of feudal system. The Ghegs are divided into tribes, the principal of which are the Malissori and Minidits. They are half- civilized mountaineers; frank to a friend, vin¬ dictive to an enemy. They arc constantly under arms, live in perpetual anarchy, every tribe be¬ ing at war with its

neighbor, and manage their affairs according to their own peculiar customs and code of honor, so called ˆbessa.® They are haughty, simple and brave and have always been excellent soldiers. The Tosks are more civilized and have hitherto been under the

guidance of a system of beys or chiefs and acknowledged the Ottoman code of law. But in reality their tribes (ˆfisses®) have self- created an administration of a somewhat aris¬ tocratic-republican character with a ˆvoyvodaˆ (duke) as chief leader in war and peace who is at the same time the head of a council of chosen senators. At the beginning of the 15th century the Tosks had a legislator called Dukashin. Their ancestors, the Pelasgs, were at first sub¬ jugated by the ancient Hellenes and later by the Romans. About two-thirds of the Albanians are Moslems ; the northern Christians are mostly Roman Catholic, the southern Orthodox Greek. There are a few Roman Catholic and Orthodox schools, but education may scarcely be said to exist as yet. The free schools, which were founded by a Serbian scholar and celebrated writer, Dositey Obradovic, in the beginning of the 18th century, died out as soon as their founder left the country.

History. — The Albanians are among the oldest peoples in Europe. Their country formed part of the Roman provinces of Illyria and Epirus, and after the dismemberment of the Roman Empire it became part of the Byzantine Empire. In 640 a.d. northern Albania was in¬ vaded by the Serbians, with whom they adopted later (1288) the Christian faith, and in the 9th century southern Albania was conquered by the Bulgarians. The Normans, Venetians and Byzantines disputed the territory with them, but until the 14th century the Albanians re¬ mained the greater part of the time nominally under Serbian rule, never, however, losing in any high degree their nationality. Upper Al¬ bania and part of southern Albania were ruled by the Montenegrin princely family of Balsa or Balsici of Provengal origin. In 1360, after the death of the Serbian Emperor Dusan the Mighty, they regained complete independence under native chiefs until 1431, when the Turks captured Yanina. The Albanians, united for the first time under their great leader George Kasriot, or Skanderbeg (1404-67), successfully resisted in 1443 the Turkish invasion, but on the death of Skanderbeg (1467) the principal¬ ity he had founded was taken over by the Venetians, and after the fall of Scutari in 1478 the Albanians passed nominally under Turkish rule. They still preserved intact their racial and national characteristics and maintained a large degree of independence augmented by their conversion to Mohammedanism in the 16th and 17th centuries. This was a cause of further estrangement from their neighbors, the Bul¬ garians, Greeks and Serbs, who remained Christians, and their

aloofness was encouraged and utilized by the Turks, who in the second half of the 18th century through the pashas of the notorious Bushatli family succeeded in ac¬ quiring from the Sublime Porte the right of succession in northern Albania and Ivara-Mah- mud Pasha made himself an absolute satrap after several battles which he won from the Turks. But in 1796 he perished in a battle against the Montenegrins. In the 18th and early 19th century Albania regained for a brief period her independence under Ali Pasha of Janina (1740-1822). Mustafa Pasha made (1831) a decisive effort to shake off Turkish dominion but was utterly defeated bv the Grand Vizier Reshid at Skadar and surrendered. After that disaster Albania came definitely under the

Ottoman sovereignty but the liberty-loving Albanians rose in rebellion against their op¬ pressors in 1833, 1836 and 1842. The Albanians in the south followed the example of their northern brothers and rebelled in 1843 and 1847, but were mercilessly suppressed and crushed by Omer Pasha. Among other rebel¬ lions that took place in Albania mention must be made of that of 1872 when the Meredits joined hands with the Montenegrins and re¬ sisted stubbornly Dervish Pasha. Stimulated by the Turkish revolution of 1908 and the des¬ potism of the Young Turks the powerful Ma- lissori contributed to bring about the Balkan war (q.v.) of 1912. The Balkan allies wished to divide Albania among themselves, but were opposed by Austria-Hungary and Italy. At Va- lona 28 Nov. 1912 Albania was declared inde¬ pendent, a provisional government was set up under Ismail Kemal Bey and on 20 Dec. 1912 the London Ambassadorial Conference of the Great Powers acknowledged the autonomy of Albania, and later approximately defined the frontiers and appointed Prince William of Wied sovereign (in Albanian ˆM'pret,ˆ a cor¬ ruption of Imperator) of the new country, to be supported by an International Commission of Control of six members. The Prince ar¬ rived in Durazzo 7 March 1914, but after the outbreak of the European war fled from the country with most of the members of the com¬ mission. An attempt made by Essad Pasha to set up a military form of government failed (5 Oct. 1914) and Albania fell into a state of anarchy. On 25 Dec. 1914 the Italians captured Valona. During the Great War the Austrians overran Albania.. On 3 June 1917 the commander of the Italian forces proclaimed it an independ¬ ent country and set up a provisional govern¬ ment at Durazzo. The Albanian population is computed at 1,700,000, of which number 250,- 000 live in Greece, 100,000 in

southern Italy, while many thousands live in Asia Minor.

Language. — Authorities are not in com¬ plete accord over the origin of the Albanian language. By some it is thought to be the speech of the ancient Pelasgs, but Gustav Meyer and most of the later philologists believe it to be one of the eight chief Indo-Germanic groups, representing the ancient Illyrian; it is found not only in Albania, but in southern Italy and Sicily. The former notion that its affinities were prevailing Greek was derived from the number of Greek loan-words in its southern branch, the Toskish, the northern and the more primitive being called Gegish ; the affiliation of the whole is rather to Slavic than any other. While retaining its grammatical structure, its vocabulary has been largely transformed by borrowing from its neighbors; Latin most, then Greek, Serbian and Turkish. The many suffixes of Latin origin, the simple and compound verbs made in accordance with Latin models, the formation of plurals by inflexion, etc., are the best proof that the Albanian language has been affected most by Latin influence. It has al¬ most no literature, except folk songs, fables and tales. The Gegish use the Roman alphabet, the Toskish the Greek, with some changes, there being no common written alphabet. Apart from a few writings of the Roman Catholic propa¬ ganda (Varibabba with his Wife of the Virgin Mary}) mention should be made of de Rada's

attempt to collect Albanian national poetry and rhapsodies (19th century). In the most recent times Koustauban Kristoforidhis has written a grammar of the Albanian languages and en¬ deavored to translate the Old and New Testa¬ ments.

Bibliography. — Consult the bibliography compiled by Manek, Pekmezi and Stotz (Vienna 1909) ; also Legrand et Guys, (Bibliographic Albanaise du XV siecle a l'annee 1900) (Paris 1912) ; Durham, (High Albania) (London 1909); id., (The Struggle for Scutari ' *(Lon¬ don 1914) ; Grothe, (Durch Albanien und Mon- tenegro) (Munich 1913) ; Gopcevic, Was Fiir- stentum Albanien, seine Vergangenheit, ethno- graphische Verhaltnisse, politische Lage und Aussicht fur die Zukunft* (Berlin 1914) ; Pea¬ cock, (Albania, the Foundling State of Europe-' (London 1914) ; Gibert, Wes pays d'Albanie et leur histoire) (Paris 1914) ; Wace and Thomp¬ son, (The Nomads of the Balkans) (London 1914). Language. — Miklosich, (Albanesische Forschungen *(Vienna 1870-71) ; Meyer, (A1- banesische Studien* (Vienna 1883-96) ; id., (Albanesische Grammatik) (Leipzig 1888) ; Jokl, (Studien zur Albanesischen Etymologie und Wortbildung *(Vienna 1911) ; Weigand, (Albanesische Grammatik in Sudgegischen Dia- lekt) (Leipzig 1913) ; Lambertz, Max and Pek¬ mezi, Wehr-und Lesebuch des Albanesischen ;*

(Vienna 1914) ; Blanchus, Wictionarium Lat- ino-EpiroticunP (Rome 1635) ; Lecce, (Osser- vazioni grammatical! nella lingua albanese (Rome 1716) ; Rossi, (Vocabolario italiano-epi- rotico) (Rome 1866) ; id., (Vocabolario della lingua epirotica-italiana) (Rome 1875) ; Kahn, (Albanesische Sunken *(Jena 1854) ; Dozon, (Manuel de la langue tchipe ou albanaise* (Paris 1879); Kristaforidhis, (GfjagfiariKJj rr/q oLkfiaTiKTjq yAuccrjq' (Constantinople 1882).

Revised by Woislav M. Petrovitch, Chief Slavonic Division, New York Public Library.

ALBANS, St. See St. Albans.

ALBANY, al'ba-ni, Louisa Maria Caroline, or Aloysia, Countess of, a princess of the Stol- berg-Gedern family: b. 1753; d. 29 Jan. 1824. She married in 1772 the English pretender, Charles Edward Stuart, after which event she bore the above title. Her marriage was un¬ fruitful and unhappy. To escape from the bar¬ barity of her husband she retired in 1780 to a cloister and afterward to the house of her brother-in-law at Rome where she met the poet, Alfieri, to whom, soon after the death of her husband, she was privately married. Alfieri attributed to her his poetic inspiration. (See Alfieri). She died at Florence, her usual place of residence, in her 72d year. Her ashes and those of Alfieri now repose under a com¬ mon monument in the church of Santa Croce at Florence.

ALBANY, Ga., city and county-seat of Dougherty County, on the Albany & North Seaboard Air Line, Central Ga. and Plant Sys¬ tem railroads, at the head of navigation on the Flint River, about 175 miles west from Savan¬ nah. The city has large manufacturing inter¬ ests in lumber, cotton, bricks, etc., and is the centre of one of the most productive agricul¬ tural regions in the State. It is governed by a mayor and a council and maintains municipal

gas and e'ectric lighting plants and waterworks. Pop. (1910) 8,190; (1920) 11,555.

ALBANY, Mo., city and county-seat of Gentry County, on the Chicago, B. & Q. Rail¬ way, about 82 miles northeast from Kansas City. The Central Christian College and the Northwest Missouri College are situated there. The city, first settled in 1845, is governed by a mayor and council. Pop. 2,000.

ALBANY, N. Y., State capital and seat of Albany County, on the right (west) bank of the Hudson, 143 miles north of New York, 200 miles west of Boston, 297 miles east of Buffalo. Besides its political importance as the capital, . its commercial and manufacturing status is high. For many years the start¬ ing point of all the enormous eastern travel and traffic to the West, over the Erie Canal (q.v.), connecting it with the Great Lakes at Lake Erie, and now virtually the terminus of the new State Barge Canal System, it is an im¬ portant port and the intersecting point of the great western as well as northern rail and water routes. With New York and the ocean it is connected by the imperial Hudson, of which it is the head of navigation for large steamers (smaller ones going on to Troy, six miles above). The Barge Canal is a great commer¬ cial advantage and will soon be more so ; while the Champlain-Barge Canal gives access not only to western Vermont, but to the Saint Law¬ rence and the heart of Canada, with the foreign business centring at Montreal. It joins the western and northern traffic of the New York Central Railroad system (the Adirondack re¬ gion, Vermont and Canada) and that of the Delaware & Hudson Railroad with the western traffic of central New England over the Boston & Albany branch of the New York Central road, the Fitchburg branch of the Boston & Maine Railroad and the Rutland Railroad.

Trade and Manufacturing.— The through freight lines now leave little transshipment to be done at Albany, but the city still re¬ mains an important passenger centre, and is the second largest express and the third largest mail transfer point in the United States. Commerce and industries are conservative and it retains much of both given it by its position in earlier times as a distributing point and terminal. In particular, the great Canadian and Adirondack forests to the north have made it an immense lumber port. Its manufactures are of wide and well-known importance, the greatest being iron goods, — foundries and stove works, — wood and brass ; combined wood and metal, as carriages and wagons ; brick, shirts, collars and cuffs, clothing and knit goods, shoes, flour, tobacco and cigars; and brewery products, billiard balls, dominoes, checkers and embossed blocks. The United States census (1914) reported 477 manufactur¬ ing establishments of factory grade, employ¬ ing 11,405 persons, of whom 9,399 were wage- earners receiving a total of $5,652,000 in wages. The capital employed aggregated $26,683,000 and the value of the output $25,289,000; the value added by manufacture being $13,864,000. In addition there are also the extensive car and locomotive shops of the New York Central Railroad.

Finances. — The assessed valuation of real property in 1917 was

$104,701,690 and the net

public debt in 1910 was $2, 458, 644-. 08. The an¬ nual and municipal outlay is about $2,283,000, of which $492,286 was for schools, $244,885 for police and .$250,610 for the fire department. There were four discount banks and trust com¬ panies with aggregate capital of $3,000,000, and seven savings banks with a surplus (at market value) of $4,621,941, and amount of deposits of $83,973,602. Tax rate (1919) per $100 was $3.10 (includes State, county and city taxes).

Interior. — The city has a river frontage of little over four miles and extends west about nine miles, from a narrow alluvial strip often flooded in the spring, over a steep rise to a sandy tableland 150 to 200 feet above tidewater, divided into four elevations and their corre¬ sponding valleys. It has 97.5 miles of streets, paved with granite, asphalt and brick; gas and electric light plants ; and about 42 miles of electric street railways within its limits, several suburban lines running to towns at a distance, centring in Albany: these lines reach Troy, Cohoes, Saratoga, Glens Falls, Lake George and Warrensburgh in the north, a distance of 71 miles; Sand Lake in the northeast, a distance of 15 miles ; Sche¬ nectady, Amsterdam, Johnstown and Glovers- ville in the west, a distance of 50 miles, and Hudson in the south, a distance of 38 miles. The river is crossed by two railroad and foot bridges and one wagon bridge to Rensselaer (formerly Greenbush). The wTater supply is partly taken by gravity from an artificial lake five miles west, and partly pumped from the river, with a public filtration system. This plant covers 20 acres of ground, has eight filter-beds and filters l5,OOO,O0O gallons of water daily. The parks, 11 in number, contain 402 acres; the largest is Washington Park of 90 acres with a lake 1,700 feet lorfg. This park contains the celebrated ˆBurns® statue by Charles Cal- verly, and the bronze and rock fountain <(Moses at the Rock of Horeb,® by J. Massey Rhind, and the Soldiers' and Sailors' Monument. The three cemeteries cover 440 acres. President Arthur's tomb is in the handsome Rural cem¬ etery of 280 acres, situated four miles north of the city.

Buildings. — The great show building of Albany is the magnificent capitol, begun in 1871 and continued by several different archi¬ tects at a total outlay to date of some $29,- 000,000. The lack of unity in plan makes itself perceptible both in looks and cost, millions have been spent in alterations and reconstructions, and some of the mechanical work and material have been poor. It is of Maine granite, in the Renaissance style ; is 300 x 400 feet and covers more than three acres ; it occupies a most sightly position on the hillside facing the

river, and including part of the site of the old capitol built in 1806. Besides its rooms for the legis¬ lative bodies and officials and the court of ap¬ peals, it contains many interesting relics of the Revolution and Civil War. The grand western staircase in the western end of the building is said to be the finest staircase in the world. Fire nearly destroyed the building in 1911.

The State House and the City Hall face the capitol ; the former of white marble and the latter of red sandstone with grand campaniles and Romanesque doorways. The custom-house and post-office are in the government building at the foot of State street. Among other

buildings are the County courthouse ; the State armories ; the old Schuyler Mansion, once used as an orphan asylum, but dedicated in 1917 as an historical monument ; the Albany Institute and Historical and Art Society, containing many archives of Albany history; the Hotel Ten Eyck; the Delaware and Hudson building; and the new High School. In 1893 the second Van Rensselaer manor-house, built 1765, was removed to the Williams College campus, of Williamstown, Mass.

Religion, Education, Etc. — Albany is the seat of both Roman Catholic and Protestant Episcopal bishoprics, and has 74 churches. Very notable are the cathedrals of the Immacu¬ late Conception (R. C.) and All Saints (P. E.). Saint Peter's Church (P. E.) is reputed one of the finest specimens of the French Gothic type of architecture in the United States. The Madison Avenue and First Reformed churches were organized in 1642, incorporated in 1720 and continued as one church until 1799, when separate edifices were built ; these two churches continued under one government un¬ til 1815.

The State Education Building is exceed¬ ingly attractive, four stories and basement. The materials used on the front and ends are for the most part white marble, terra cotta and dark granite. The building contains offices for the Board of Regents and Department of Education, the State Library, with an attractive reading room, and a stock room capable of ac¬ commodating 2,000,000 volumes, the State Li¬ brary School, and the State Museum, which contains the State collections in geol¬ ogy, mineralogy, paleontology, archaeology, botany and zoology. There is also a large audi¬ torium in the building. Several large and at¬ tractive mural paintings adorn the walls.

The public school property is valued at nearly $2,000,000. Other institutions of learn¬ ing are the law and medical departments of the Union University at Schenectady (origin¬ ally independent academies of 1851 and 1839), Albany Academy, the State College for Teach¬ ers, Saint Agnes School, the Albany Female Academy and the Convent of the Sacred Heart; also the Dudley Observatory and the Bender Llygienic Laboratory. Albany has a fine city hospital built in 1899 on the pavilion plan and covering 16 acres with 150,000 feet of floor space ; the Homcepathic and Saint Peter's hos¬ pitals; the Albany penitentiary, dating from 1848 — from three to four hundred prisoners a year are confined in this institution.

Government. — Biennial mayor ; city coun¬ cil, the president elected at large, the aldermen by wards ; and boards constituted as follows :

(1) Finance, comptroller, treasurer and a board of estimate composed of the mayor, comp¬ troller, corporation counsel, president of the common council, city engineer and treasurer ;

(2) Public Works, commissioner who appoints superintendents of waterworks and parks; city engineer ; a board of contract and supply ;

(3) Public Safety, commissioner who appoints chiefs of police and fire departments with their subordinates and a health officer with assist¬ ants; (4) Public Instruction, three commis¬ sioners of education, term six years, who ap¬ point superintendent of schools and teachers ; (5) Assessment and Taxation, four assessors, two elected every two years for a term of four

years ; (6) Charities and Correction, commis¬ sioner who appoints overseer of the poor and assistants; (7) Judiciary, one police court justice who holds office six years and three city court justices; (8) Law, corporation counsel, assistant and subordinates. Of these officials, the comptroller, treasurer, assessors and police and city court justices are elected. All others are appointed by the mayor.

Population. — (1800) 5,289, (1820) 12,630,

1840) 33,721, (1860) 62,367, (1880) 90,758, 1890) 94,923, (1900) 94,151, (1910) 100,253, (1920) 113,344.

Flistory. — Albany, as an old frontier town and strategic post against the French settle¬ ments in the 18th century wars, is of much historic interest. Next to Jamestown, Va., and Saint Augustine, Fla., it was the oldest settle¬ ment in the Union; if the 13 colonies only are included, and Jamestown thrown out as de¬ serted since 1676, it may perhaps

be called the oldest with a continuous life, though its actual settlement as a residence is later than Ply¬ mouth. (For early discovery, see America; Hudson; Verassano). About 1540 a French trading-post was set up there for a time. In 1614 the Dutch, following Hudson's lead, es¬ tablished a factory on Castle Island, called Fort Nassau, in 1617 removed to the mainland and called Beverw3ˆck. The first settlers were 18 Walloon families (Huguenot refugees from Belgium — Peter Minuit, the first director- general of New Amsterdam, was a Walloon), and Fort Orange (Latinized Aurania) was built the same year near the present capitol. In 1626 a war with the Mohawks forced the temporary abandonment of the village. In 1629 Killian Van Rensselaer, having obtained from the Dutch government a large land-grant near by, colonized it with Dutch settlers and rented the land to them as patroon. (See Anti-Rent War; Patroon). This, as always, ended in a chronic dispute over the extent of his legal rights and jurisdiction, which was not settled till after the ownership of the Dutch settlements was transferred by the English conquest to the Duke of York and Albany (later James II) after whom Fort Orange was renamed. In 1686 it received a city charter (its bi-centennial was celebrated in 1886) from Gov. Thomas Dongan; its first mayor (appoint¬ ed by the governor, though the council was elected) was Peter Schuyler. The English settlers rapidly increased, but Albany was long a Dutch city. In the French and Indian wars it was a stockaded rendezvous, arsenal and hospital, the refuge of the border. In 1754 it was the meeting-place of the first Provincial Congress, which formed ((a plan of a proposed union of the several colonies. 5) (See Albany Congress). In 1777 it was Burgovne's objec¬ tive point, where he was to meet the expedi¬ tions up the river and from Canada. After being for many years the occasional .seat of State government, it became the permanent capital in 1797, the centennial of which it cele¬ brated 6 Jan. 1897. Its rapid growth began with the. opening of the Erie Canal in 1825, making it the terminal for western business. Within 35 years it had increased five-fold. In 1848 the city was partially destroyed by fire.

Bibliography.— Weise, A. J.t (The History of the City of Albany 5 (Albany 1884) ; Mun- sell, J., (The Annals of Albany5 (10 vols., Al-

ALBANY, N. Y.

tifffTVnmii tv nr ii

rnr 1 1 nun 1 II III li

r-in i nun i u ill ii

; 11,1 Ml I H I II III II

i ii in h

i",,. '1 1,1 1 ii. i ii in ii

,ˆr ..

■-J. I'M

1 Albany from the River 3 New York Telephone Company Building

(Fellowcrafts Photo. Copyright, 1917)

2 State Street from the Plaza 4 Delaware & Hudson and Albany Journal Buildings

bany 1850-59) ; and Collections on the City of Albany * (4 vols., Albany 1865-71) ; Howell, G. R., and Tenney, J., (Bi-centennial History of Albany •* ; (History of the County of Al¬ bany N. Y. from 1609-1886) (bound with a (History of the County of Schenectady), New York 1886) ; Reynolds, C., (Albany Chronicles } (Albany 1906) ; and a sketch in Powell, L. P.,

(Historical Towns of the Middle States1* (New York 1899). Edwin Tristram Coffin, Formerly Secretary Albany Chamber of Com¬ merce.

ALBANY, Ore., city and county-seat of Linn County, on the Southern Pacific and the Corvallis & E. railroads, and the Willamette River, about 25 miles south by west from Sa¬ lem. The city has good water-power from the Willamette River, and has large manufac¬ turing interests. It ships both grain and flour. Pop. (1920) 4,840.

ALBANY, West Australia, in Plantagenet County, on King George's Sound. It has one of the finest harbors in Australia and is a port of call for the steamers of the Peninsular & Oriental Company. It is a consular station of the United States. Pop. about 3,600.

ALBANY CONGRESS, an assembly of representatives of the seven northern British- American colonies (Massachusetts, Newˆ Hampshire, Connecticut, Rhode Island, New York, Pennsylvania and Maryland), called together in 1754 by the British government to consult in regard to the threatening French war. It met 19 June, and two plans were

pro¬ posed: (1) A league with the Five Nations, which was carried out; (2) a proposal offered by Franklin for a political union. In this a common president was proposed, and a great council representing the different colonies. The president was to be appointed by the Crown ; to be also commander-in-chief, to com¬ mission all civil officers and appoint all military ones and have a veto on the council. The council was to consist of three-year members, two to seven from each colony; not to be ad¬ journed or dissolved or kept over six weeks in session against its will ; it could lay taxes, maintain troops, build forts, nominate civil officers, manage Indian affairs and authorize new settlements ; and its acts were to be valid unless vetoed within three years by the Crown. This plan was rejected by the British Crown because it gave too much power to the colonies and by the colonies because it gave too much power to the Crown. The significance of this congress lies in the fact that it stimulated the union of the colonies which was afterward accomplished.

ALBANY REGENCY, in American politi¬ cal history, the nickname of a powerful group of Democratic leaders in New York State, who controlled the party machinery there and acted together for influence in State and na¬ tional affairs about 1820 to 1854. The name was given because the members of the Regency either lived near the capital or held offices which made the city their headquarters. Its origin and essence as an aristocracy of <(bosses® la}ˆ in the system of frequent elections among a democracy, which puts nominations into the hands of professionals who will be paid in some shape, creating a permanent standing army of political managers.

The Regency was the unofficial staff of this army and was larger than in other States from the imperial field which New York offered for great careers ; but it could not have perpetuated its power but for the means of rewarding friends and punishing enemies given it by the (<spoils system® (a name derived from the say¬ ing of one of its members, William L. Marcy, in 1833, that <(to the victors belong the spoils®). While personally upright, and strong oppo¬ nents of corruption, they held firmly to this, the very spring of corruption : the giving or taking away of offices, the use of public contracts for printing or other work or supplies, etc. That this was its cement is shown by the fact that after the bitter factional split of 1848 (see Barnburners) had given the other party this patronage to use against it, the Regency was reduced in a few years to unorganized indi¬ viduals. The members of course kept themselves in high or profitable positions according to their capacities or preferences; several alter¬ nating between State and national preferment, but never neglecting the former basis even in the latter service. The earliest and greatest

leader was Martin Van Buren, State attorney- general, United States senator 1821-28, resign¬ ing to become governor of New York, Jack¬ son's secretary of state, Vice-President, Presi¬ dent. Others were William L. Marcy, State comptroller, judge of the New York supreme court, United States senator 1831, resigning 1833 to become governor of New York, Polk's secretary of war, Pierce's secretary of state ; Silas Wright, congressman, State comptroller, United States senator 1833-44 (succeeding Marcy), resigning 1844 to become governor of New York; John A. Dix, State secretary of state, United States senator 1845 — 49, Buchan¬ an's secretary of the treasury, again governor of New York 1872-74; Benjamin F. Butler, Van Buren's attorney-general and acting sec¬ retary of war; while others held only State offices, — Azariah C. Flagg, State secretary of state and afterward twice comptroller ; Edwin Croswell, State printer, editor of the Albany Argus, leading Democratic organ; Benjamin Ivnower, State treasurer ; and others held no offices, — Dean Richmond, Roger Skinner, Peter Cagger, Samuel A. Talcott, etc. Afterward Samuel J. Tilden, Daniel Manning and others of high stamp, by sagacity of central manage¬ ment, preserved in a manner the traditions of the older group, though they never had its patronage to use for discipline.

ALBATROSS (corrupted from Portug. alcatroz, the cormorant; from Ar. al, the; qadus, bucket, on account of its pouch), a large, almost exclusively pelagic bird of the family Diomedeidce, a feature of the lonely southern oceans. They are rarely seen on the north At¬ lantic, but frequent nearly all other seas, and are never seen ashore except on the barren Antarctic islands where they breed. They have great powers of flight and follow ships for long distances to pick up offal. Their appetites are rapacious, their natural diet consisting of any fishes, mollusks or other animal matter which they find at the surface of the water ; they do not dive. Sailors are fond of them and have a strong superstition against killing them. Like their allies, the petrels, the albatrosses have three fully-webbed toes, while the hind toe

is either entirely wanting or represented by a claw. The bill of an albatross is four inches or more long, very thick and finished by a power¬ ful hook at the tip. The nostrils open from round horizontal tubes placed one on each side of the bill, but at its base, instead of together on top as with the petrel. The wings are ex¬ tremely long and pointed, the tail short and somewhat rounded. The feathers of the body form so thick a coat as to withstand both yvater and severe,

long-continued cold ; owing to the extreme length of the wing the number of flight feathers on it is greater than on the wing of any other bird. The single large white egg of the albatross is usually hatched on the bare earth. Two rather small species of albatross, the short-tailed (Diomedea albatrus) and the black-footed (Diomedea nigripes), occur on the western coasts of North America; these are about three feet long and seven feet across the wings. The sooty albatross (Phcebelria fuli- ginosa), of much the same size, belongs broadly to the Pacific Ocean. There are from seven to nine other species, of which the largest is the wandering albatross (Diomedea exulans) of the southern oceans. It is four or five feet long and 10 to 12 feet from tip to tip of wings. Its color is white, with black bars across the wing coverts and across part of the back. This is probably the best known species in the family.

AL-BATTA'NI (Mohammed ibn Jabir ibn Sinan), Arab astronomer and mathematician: b. 850; d. 929. He began his astronomical ob¬ servations at Rakka in 878 and continued them for over 40 years. In pure mathematics he also made important investigations. He used the sine of an angle instead of the chord of double the angle, computed a table of cotangents and formulated several propositions in spherical trig¬ onometry. Plato of Tivoli translated his astronomical works under the title (Mahometis Albatenii de Motu StellarumP This work made him known to Europeans. This work was edited by C. A. Nallino in Arabic and Latin and pub¬ lished at Milan (1899). Al-Battani corrected numerous errors of astronomers ; he gave the length of the tropical year as 365 days, 5 hours, 46 minutes, 24 seconds; too short by 2 minutes, 26 seconds, and he stated the obliquity of the ecliptic as 23° 35' instead of 23° 51' 20".

ALBAY, al-bl, Philippine Islands, province in the southeast of Luzon, and the richest hemp¬ growing district on the island ; area, 997 square miles; pop. 241,000. It has yielded as much as 40,000 tons of hemp in a season. The province contains a picturesque volcano, Mayon, which has had several destructive eruptions, the last in 1888. In January 1900 Brig.-Gen. William A. Kobbe, United States Volunteers, was appointed military governor of the province and Catan- duanes Island, with temporary authority over Samar and Leyte Islands for the purpose of controlling the hemp-growing country and occu¬ pying and opening to trade the various hemp ports. The principal towns in the province are Albay (the capital, pop. 42,000), Tivi, Malinao, Tobaco, Malilipot, Bagacay, Libog, Legaspi, Manito, Libon, Polangui, Ligao, Oas, Guinoba- tan, Cagsaua and Camalig. Vicol is almost the exclusive language of the province. The indus¬ tries are hemp-growing (annual value $4,750,- 217), shipbuilding, gold, silver;

coal and iron mining.

ALBEMARLE, The, a Confederate ram, which for a long time did great damage among Union shipping, but was finally destroyed by W. B. Cushing (q.v.), who was entrusted at different times with various difficult feats of the sort. Cushing, while the Albemarle was at moorings in the harbor of Plymouth, N. C., on the night of 27 Oct. 1864 entered the harbor and succeeded in blowing up the vessel by means of a torpedo. The Albemarle was rendered com¬ pletely useless, and Cushing obtained lieutenant- commander's rank and the thanks of Congress for his execution of the exploit.

ALBEMARLE SOUND, a shallow and narrow body of water on the coast of North Carolina, separated from the Atlantic Ocean by low sand islands. The greatest depth is about 18 feet, but it is generally so shallow as to be unnavigable except where it has been dredged. The water is generally fresh and' is not affected bv the tides. It extends directly west from the ocean about 60 miles. It is the outlet of many of the streams of northeastern North Carolina, chief of which are the Roanoke and Chowan.

ALBERONI, aI'ba-ro*'ne, Giulio, cardinal

and minister of the King of Spain : b. Firenznola, Parma, 1664; d. Rome 1752. He soon gained the favor of powerful patrons, especially the Duke of Vendome, whom he accompanied to Paris and then to Spain, the Duke being ap¬ pointed generalissimo of the armies of Philip V. Having made himself a favorite of the Spanish King, he rose to be prime minister, became a cardinal, was all-powerful in Spain after the year 1715 and endeavored to restore it to its ancient splendor. He reformed abuses, created a naval force, organized the Spanish army on the model of the French and rendered the king¬ dom of Spain more powerful than it had been since the time of Philip II.

ALBERS, Petrus Henricus, German eccle¬ siastical historian : b. Cranenburg, Cleves, Ger¬ many, 13 April 1856. He was educated at the gymnasium of Gemert, North Brabant; emi¬ grated with his family to Holland in 1870 and entered the Society of Jesus in 1880. After completing his studies in the Jesuit scholasti- cates he took a course in church history at Innsbruck under Ludwig Pastor. In 1896 he became professor of church history at the Jesuit college of Maastricht. He is a member of the Historical Society of Utrecht, the Leyden Literary Society and of the administrative board of the Historical and Archaeological So¬ ciety of the Province of Limburg. He has pub¬ lished:- (Het Herstel der Hierarchie in de Nederlanden) (2 vols.,

Nijmegen 1904) ; (Hand- boek der Algemeene Kcrkgeschiedenis) (2 vols., ib., 1905-07), translated into French, Latin, Spanish, Italian and English; (Levensgeschie- denis van Pater Roothaan. *He was a col¬ laborator in (Vivat's Enc)xlopedie) ; (Neder- landsch Biographisch Woordenboek* ; (Het Jaarboekje van Alberdingk ThijnP ; and (Ar- chief voor de Geschiedenis van het Aartsbisdom Utrecht* ; and for many years has been a con¬ tributor to the Studien.

ALBERT, Prince (Albert-Francts-Au- gustus-Charles-Emmanuel), Prince of Saxe- Coburg-Gotha and Prince Consort of England, second son of Ernest I, Duke of Saxe-Coburg, was born at the Rosenau, a castle near Coburg,

on 26 Aug. 1819. In 1837 he entered the Uni¬ versity of Bonn, where he devoted himself to the studies of political and natural science, his¬ tory, philosophy, etc., as well as to those of music and painting. On leaving the university he made a tour through the chief cities of Italy with Baron Stockmar. On 10 Feb. 1840 he married his cousin, Queen Victoria of England. An allowance of £30,000 a year was settled upon the Prince, who was naturalized by act of Par¬ liament, received the title of Royal Highness by patent, was made a field-marshal, a Knight of the Garter, of the Bath, etc. Other honors were subsequently bestowed upon him, the chief of which was the title of Prince Consort (1857). He always took a deep and active interest in the welfare of the people in general. His serv¬ ices to the cause of science and art were very important ; he presided over the commission ap¬ pointed in 1841 to consider the best means of rebuilding the houses of Parliament and the great exhibition of 1851 owed much of its suc¬ cess to his activity, knowledge and judgment. He died of typhoid fever on 14 Dec. 1861, after a short illness. A collection of his speeches and addresses was published in 1862. A biography of the Prince by Sir Theodore Martin has been published in five volumes (London 1875-80).

ALBERT I, King of the Belgians : Albert Leopold Clement Marie Meinrad, Duke of Sax¬ ony, Prince of Saxe-Coburg and Gotha, second son of Prince Philip Baldwin, Count of Flan¬ ders, and Princess Marie of Hohenzollern : b. Brussels, 8 April 1875; married 2 Oct. 1900 to Elizabeth, Duchess of (in) Bavaria, daugh¬ ter of the late Duke Karl Theodor, the phy¬ sician and oculist. They have three children : (1) Prince Leopold, Duke of Brabant, b. 3 Nov. 1901 ; (2) Prince Charles, Count of Flanders, b. 10 Oct. 1903; (3) Princess Marie Jose, b. 4 Aug.

1906.

King Albert succeeded his uncle, Leopold II (d. 17 Dec. 1909) and was crowned on 23 Dec. 1909. The condition of Belgium at that time was far from promising. Leopold II had gone to his grave ((unwept, unhonour'd and un¬ sung.® His profligate vices, ambitions and auto¬ cratic magnificence, his domestic tyranny and private scandals had aroused almost universal indignation, nowhere stronger than in his own country. In addition, the Kongo atrocities per¬ petrated in his name and with his knowledge had lowered the repute of Belgium. Flence the new King inherited sentiments of distrust, enmity and anger at home and abroad, besides a country saddled with enormous expenditures. A barrier of estrangement and contempt had grown up between King and people ; it was the task of Albert I to break down that barrier and replace it by a bond of democratic sym¬ pathy and confidence. Like his uncle, he is a man of great stature and masterful will ; but there the resemblance ends. Before he had been two weeks on the throne his people re¬ alized that something essential had been changed in Belgium ; that the <(commonplace virtues® so constantly disregarded by the late King — love of children, of family and country, honesty and simplicity — had been restored, as it were by magic, into the scheme of national life. One of the King's actions was to allow — or rather, invite — Princess Louise, Leopold's eldest daughter, to return to Belgium, whence her

father's wrath had expelled her. He also au¬ thorized Leopold's youngest daughter, Princess Clementine, to marry Prince Victor Napoleon — a love romance which her father had sternly opposed. King Albert quickly gave proof of his genuine interest in the welfare of the people, in their labor and their pleasures ; in the sym¬ pathetic encouragement he extended to art, lit¬ erature, science and industry — all subjects treated with contemptuous indifference by his predecessor. He reduced the royal court cere¬ monials and etiquette to their lowest expres¬ sion ; with his consort he moved among his people with an easy, unpretentious friendliness, qualified by a natural modesty almost akin to bashfulness. He abolished Leopold's custom of driving through the streets surrounded by loaded rifles and pistols. The success of his endeavors to win public confidence was not, however, the result of mere tactful good nature, but of deep understanding, systematic study and first-hand knowledge. He had been trained in sociology and economics by his father; as heir presumptive for 18 years (since the death of his elder brother in 1891) he strove to learn facts for himself regarding the life and labor of the people. With this object he worked in the mines, drove railway engines and generally mixed with the working classes in all their

activities. In the guise of a newspaper reporter he had visited the principal ports and shipyards of Europe, and in 1898 traveled in the United States, where he made a study of our railroad methods with the assistance of the late James J. Hill. Some months before his accession he returned from an extensive tour through the Belgian Kongo and plainly opened his mind on the necessity for reforms to his royal uncle, who, it is said, never spoke to him again.

On his accession King Albert ordered the release of 2,500 prisoners detained for minor offenses. He attended the funeral of King Edward in London (May 1910) and a week later with the Queen was in Berlin and Pots¬ dam, receiving expressions of the good-will of the German people and their ruler. As the Kaiser was indisposed at the time, the Imperial Crown Prince acted as host. In the official speeches peculiar stress was laid on the com¬ mercial relations between the two countries and the absence of any desire on the part of Germany to annex Belgium. On 25 Oct. 1910 the German Emperor and Empress and their daughter visited Brussels. At the state banquet that night the Emperor, replying to the King's French speech, spoke in German — which few of those present understood — and said, in con¬ clusion, <(. . . that your Majesty's reign may spread happiness and prosperity in your Royal House and among your people, is the wish which arises from the deepest depth of my heart, and with which I cry. Long live the King and Queen of the Belgians. Hurrah !®

Long before he was called to the throne, King Albert had resolved to remedy a serious defect in the equipment of his country : Belgium had a great overseas trade and the second port in Europe, namely, Antwerp ; but its merchandise was carried in foreign ships, mainly English and German, not only a source of commercial weakness, but also a political menace. The Ger¬ mans were gradually acquiring a predominant influence in Antwerp, capturing the chamber of commerce, the marine insurance business, the

control of the banks, possession of the naviga¬ tion companies, ship-broking, etc., etc. To alter this he had decided on a Belgian mercantile marine and during the first year of his reign a shipping scheme was put forward, by which a new service to South America and one to the Kongo were established with a capital of $2,000,- 000, of wThich

$800,000 was supplied by the Woermann Line of Hamburg and the British Elder-Dempster Company. In 1911 two new steamer services were started to Brazil — from Ghent to Rio Grande do Sul and from Antwerp to Brazilian and River Plate ports. Despite labor troubles, election riots and political strife, King Albert and his government introduced a number of useful reforms, including free and compulsory education, equal rights for the Flemish and French languages, and a scheme for the reorganization of the army.

The great world conflict turned the eyes of the world upon the little kingdom and its mon¬ arch ; the tragedy of Belgium became the cen¬ tral star in a lurid constellation of tragedies. In a few days Albert I was a king without a country. Only four and a half years earlier he had uttered these words in Brussels : (<Bel- gium is mistress of her destiny. . . . Belgium is rich and happy. . . A Perhaps the first vision of coming disaster was conveyed to King Al¬ bert as early as November 1913, by no less a person than the German Emperor himself, in an interview at which von Moltke, chief of the General Staff, was also present. The report of that interview first saw the light in the French Yellow Book published in December 1914 (see War, European — Diplomatic History). Thus the year before the war King Albert knew that the storm would ere long burst over his country, for von Moltke had prophesied to him the ˆirresistible enthusiasm with which the whole German people will be carried away when that day comes.® Though he had no passion for military glory, though all his hopes centred in the commercial and industrial de¬ velopment of his country, King Albert unhesi¬ tatingly rejected the German demand for a free passage through Belgium and mustered his forces to resist invasion. He had studied the art of war with the same thoroughness that he gave to all his tasks ; his own military train¬ ing began at the age of 17. Unfortunately, the army reorganization was barely half completed when the challenge came. German troops were already on Belgian soil when he made a ((su- preme appeal® for the diplomatic intervention of Great Britain. At 7 o'clock the same night the British ambassador in Berlin presented the ultimatum. The heroism of the Belgians and their King was not in vain; their spirited re¬ sistance held the avalanche long enough to enable the French and British to complete their mobilization and preparations for the victory of the Marne. After the fall of Antwerp the Belgian government withdrew to Le Flavre, France (13 Oct. 1914). During the war Albert shared all the dangers of the field with his heroic army, defending the remnant of his king¬ dom, a corner of West Flanders. See War, European.

ALBERT, First Duke of Prussia, and the last Grand Master of the Teutonic Order, son of Frederick, Margrave of Ansbach and Bai- reuth,

and grandson of Albert Achilles, Elector of Brandenburg: b. 17 May 1490; d. 20 March

1. Fie was educated under the care of Arch¬ bishop Hermann of Cologne. He accompanied Maximilian I in his expedition against Venice. In 1511 he was chosen by the Teutonic Knights grand master of their order. Being the son of Sophia, the sister of Sigismund, King of Poland, and descended from one of the most powerful German families, the Knights hoped by his means to be freed from the feudal superiority of Poland and placed under the protection of the empire. Being recognized by Poland he proceeded to Konigsberg and assumed the gov¬ ernment in 1512. He refused the oath of allegiance to Poland, which the previous grand master had evaded, and prepared for resistance. In 1520, after protracted negotiations, Sigis¬ mund attempted to enforce submission by an invasion of the territories of the order, but the contest was without decisive result and in the following year a truce of four years was agreed to at Thorn. Albert appeared before the Im¬ perial Diet at Nuremberg as a German prince of the empire to solicit the aid of the other princes in his struggle against the Poles. He failed in this object and soon after espoused the cause of the Reformation. In order to preserve his possessions from becoming a prey to Poland, he, at Luther's advice, had himself proclaimed secular Duke of Prussia and placed himself under the sovereignty of Sigismund. He earnestly sought to promote the welfare of his duchy, established the ducal library, founded the University of Konigsberg in 1544 and gathered about his person many literary men. In 1527 he married Dorothea, daughter of Fred¬ erick, King of Denmark. The latter years of his reign were troubled with many intrigues, foreign and domestic; in 1532 he was put under the ban of the empire, but succeeded in trans¬ mitting his succession to his son. Consult Lohmeyer, (Herzog Albrecht von Preussen) (Dantzic 1890) and Tschakert, (Herzog Al¬ brecht von Preussen) (Halle' 1894) .

ALBERT I, Margrave of Brandenburg, surnamed the Bear, from his heraldic emblem, was the son of Otto the Rich, Count of Ballen- stadt; d. 1170. As Marquis of Lusatia he served the Emperor Lothaire' with credit in his war with Bohemia. The Diet afterward withdrew Lusatia from him, but the Emperor for further services conferred on him in 1134 the mar- gravate of Brandenburg. In 1136-37 he made incursions into the territory of the Wends, who disturbed his government, and checked their disorders. In 1138 the Emperor Conrad con¬ ferred on him the duchy of Saxony, of which he had deprived Henry the Proud.

This led to a war with Henry, in which Albert was deprived of Brandenburg, but was restored by an armis¬ tice negotiated by the ecclesiastical electors. On the death of Henry (1139) he reassumed the title of Duke of Saxony. A combination was then formed against him, which, in spite of the favor of the Emperor, reduced him to ex¬ tremities. Peace was concluded in 1142. Albert resigned Saxony and Brandenburg was raised to an immediate fief of the empire. He acquired at the same time by inheritance from Przibislas, a Vandal king who had taken his name in bap¬ tism, the country between the Elbe and the Oder. He made his new possessions a fief of the empire and in order the better to guard them removed his residence to Brandenburg.

In 1148 lie led an expedition into Pomerania and in the following year induced the duke of that country to embrace Christianity. In 1150 he was raised to the electoral dignity. In 1157 he made a third expedition against the Wends, conquered their country and colonized it with agriculturists from Germany, Holland and Zea¬ land. In 1164 he went on a crusade to the Holy Land. Another war broke out between him and Henry, Duke of Saxony, which was termi¬ nated to the advantage of the latter in 1168 by the mediation of the Emperor Frederick I. In 1169 Albert reniitted his estates to his son. The origin of Berlin, Koln, Aachen on the Elbe and other towns is attributed to the colonies founded by him. Consult Heinemann, (Albrecht der Bar* (Darmstadt 1864).

ALBERT I, Duke of Austria, and after¬ ward Emperor of Germany: b. 1248; d. 1 May 1308; son of Rudolph of Hapsburg, who had a short time before his death attempted to place the crown on the head of his son. But the electors, tired of his power and emboldened by his age and infirmities, refused his request and indefinitely postponed the election of a King of the Romans (the title of the desig¬ nated successor of the Emperor). After the death of Rudolph, Albert, who inherited only the military qualities of his father, saw his hereditary possessions, Austria and Styria, rise up in rebellion against him. He quelled by force this revolt which his avarice and sever¬ ity had excited; but success increased his pre¬ sumption. He wished to succeed Rudolph in all his dignities, and without waiting for the decision of the Diet seized the insignia of the empire. This act of

violence induced the elec¬ tors to choose Adolphus of Nassau Emperor. The disturbances which had broken out against him in Switzerland, and a disease which de¬ prived him of an eye, made him more humble. He delivered up the insignia and took the oath of allegiance to the new Emperor. Adol¬ phus, after a reign of six years, lost the regard of all the princes of the empire, and Albert was elected to succeed him. A battle ensued near Gellheim, in which Adolphus fell by the hand of his adversary. The last barrier had fallen between Albert and the supreme power, but he was conscious of having now an opportunity of displaying his magnanimity. He voluntarily resigned the crown conferred on him by the last election, and as he had an¬ ticipated was re-elected. His coronation took place at Aix-la-Chapelle in August 1298, and he held his first Diet at Nuremberg with the utmost splendor.

But a new storm was gathering over him. The Pope, Boniface VIII, denied the right of the electors to deprive Adolphus of the impe¬ rial dignity and bestow it upon one who had caused the death of the legitimate sovereign. He accordingly summoned Albert before him to ask pardon and submit to such penance as he should dictate ; he forbade the princes to acknowledge him and released them from their oath of allegiance. The archbishop of Mainz from a friend became the enemy of Albert and joined the party of the Pope. On the other hand, Albert formed an alliance with Philip le Bel of France, secured the neutrality of Sax¬ ony and Brandenburg, and by a sudden irrup¬ tion into the electorate of Mainz forced the

archbishop not only to renounce his alliance with the Pope, but to form one with him for the five ensuing years. In April 1301 Boni¬ face forbade all submission to Albert until he would go to Rome and repair his crimes. The next year Albert entered into negotiations with the Pope, in which he again showed the duplicity of his character. He broke his al¬ liance with Philip, acknowledged that the West¬ ern Empire was a grant from the Popes to the emperors, that the electors derived their right of choosing from the see of Rome and prom¬ ised to defend with arms the rights of the Pope whenever he should demand it, against any one. As a reward Boniface excommuni¬ cated Philip, proclaimed him to have forfeited his crown and gave the kingdom of France to Albert. Philip in revenge annoyed and per¬ secuted the Pope.

Albert was engaged in unsuccessful wars with Holland, Zealand, Friesland, Hungary, Bohemia and Thuringia. While preparing to revenge a defeat which he had suffered in Thuringia he received the news of the revolt of the Swiss and saw himself obliged to direct his

forces thither. The revolt of Unterwalden, Schwyz and Uri had broken out 1 Jan. 1308. Albert had not only foreseen this consequence of his oppression but desired it, in order to have a pretense for subjugating Switzerland entirely to himself. A new act of injustice, however, put an end to his ambition and life. Suabia was the inheritance of John, the son of his younger brother Rudolph. John had repeatedly asserted his right to it, but in vain. When Albert set out for Switzerland John re¬ newed his demand, which was contemptuously rejected by Albert. John, in revenge, con¬ spired with his governor, Walter of Eschen-bach, and three friends against the life of Al¬ bert. The conspirators took advantage of the moment when the Emperor, on his way to Rheinfelden, was separated from his train by the river Reuss, and assassinated him.

ALBERT, Peter Paul, German archivist : b. Steinbach, Baden, 29 Jan. 1862. He was ed¬ ucated at the universities of Freiburg, Wurz¬ burg and Munich. In 1899-93 he was assistant archivist of the Grand-Ducal General Public Archives in Karlsruhe and in 1897 became archivist at Freiburg-im-Breisgau. He is a member of the Baden Historical Commission and has published: (Matthias Doring) (1889); (Geschichte der Stadt RadolfzelP (1896) ; (Steinbach b. Mudan) (1899) ; (Baden Zwischen Neckar und Main *(1901); (Die Geschicht- schreibung der Stadt Freiburg* (1912); (Schloss Burgheim am Rhein *(1904) ; (Die Schiller von Herdern* (1905) ; (Die Oden- waldbahn Mosbach-Mudan *(1906) ; (Die Schneeburg ob Ebringen* (1909); (Der Meis- tcr E. S.* (1910). He is editor of the Frei- burger Munsterblatter and the Freiburger Zeitschrift fiir Geschichte — Altertums-und V olkskunde.

ALBERT. See Ancre.

ALBERT COAL. See Albertite.

ALBERT LEA, Minn., county-seat of Free¬ born County, on the Chicago, M. & St. P., the Burlington, C. R. & N. and the Minneapolis & St. L. railroads, about 100 miles south of St. Paul and 10 miles north of the boundary of Iowa. The presence of many lakes and ar-

tesian wells of chalybeate waters make the city and neighborhood a popular summer re¬ sort. It is the market town for a large agri¬ cultural and dairy region, is noted for its State creamery and has considerable manu¬ facturing interests. It is the seat of a Pres¬

byterian college for women and a Lutheran Academy. Pop. (1910) 6,192; (1920) 8,056.

ALBERTA, al-bur'ta, Canada, a north¬ western province. A part of the present area of the province was in 1882 given territorial status and called Alberta in honor of H. R. H. Princess Louise Caroline Alberta, daughter of ueen Victoria and wife of the Marquis of orne, 9th Duke of Argyle, at that time Gover¬ nor-General of Canada. The country was sparsely settled, what white population there was being chiefly in the south and engaged in ranching. For upwards of 15 years little change took place, but subsequent to 1896 a vigorous immigration policy was instituted and settlers flowed in. By the autonomy acts of 1905 the old territories stretching from the western boundary of Manitoba to the Rockies were erected into the two provinces of Sas¬ katchewan and Alberta. The boundaries given to the latter were the 49th parallel — the Unit¬ ed States frontier — to the south, the 60th parallel, to the north, the 4th meridian to the east and British Columbia to the west. This vast area of 253,540 square miles is 750 miles from north to south and at its broadest part 400 miles from east to west. Though some¬ what smaller than Texas, Alberta is more than twice the size of Great Britain and Ire¬ land and considerably more extensive than France or Germany.

Physical Features. — Alberta is a vast plateau ranging from 1,000 to 3,500 feet above sea-level. The land lies higher in the south and falls «way toward the north. The coun¬ try is well watered, both the great Mackenzie and Saskatchewan river systems taking their rise within the province. The Saskatchewan system, with its north and south branches, drains Alberta approximately from the Ed¬ monton district to the American boundary, while the northern half of the province is watered by the various rivers which ultimately combine to make up the Mackenzie. The chief streams flowing into the south branch of the Saskatchewan are the Belly, Old Man, Saint Mary's, Bow and Red Deer, while into the north branch debouch the Clearwater, the Bat¬ tle, the Sturgeon, the Vermilion and other smaller streams. The northern section of the province is drained by three great waterways, the Athabasca, Peace and Hay, which, united on issuing from Great Slave Lake, become the Mackenzie. Lakes also abound, especially in the northerly part of the province. Among the more important of these may be men¬ tioned Gull, Buffalo, Wabamun, Saint Anne, La Biche, Claire and Lesser Slave Lake. Some of these are considerable bodies of water. Claire and Lesser Slave cover respectively 405 and 480 square miles and Lake La Biche has an area of over 100 square miles. Most of these lakes teem with fish — the whitefish of the northern lakes being much esteemed as an article of diet. Mention should be made of two

small lakes that enjoy a world-wide repu¬ tation for beauty — Lake Louise in the Bow

Pass through the Rockies and Lake Malignc in the Yellow head Pass. While the southern part of the province is characterized by vast treeless prairies, the central section has been aptly described as a park-like country, prairie and wooded districts being intermingled. As one goes farther north, prairie again becomes predominant.

Climate. — Alberta has a continental climate, warm in summer and cold in winter. In the former season the thermometer frequently registers 90° during the daytime, but the nights are always cool. The distribution of heat varies little as regards latitude. At Fort Ver¬ milion (lat. 58° 29') the mean summer tempera¬ ture is 61°; at Dunvegan (lat. 55° 56') 60°; at Edmonton (lat. 53° 33') 61°; at Calgary (lat. 51° 2') and Cardston (lat. 49° 12') 59°. This equality of heat seems the more extraordinary when it is remembered that Fort Vermilion and Cardston with two degrees difference in mean summer temperature are in a northerly and southerly direction roughly 700 miles apart. It may be pointed out in this connection that owing to its northerly latitude the summer days are very long in Alberta. These are ac¬ companied with a correspondingly large amount of sunshine, which facilitates the rapid growth of field crops and vegetation of all kinds. At midsummer there are 18 hours of sunshine. In winter the weather is cold, but as the at¬ mosphere, owing to the altitude, is dry, low temperatures are easily supported. In southern Alberta the winters are much modified by the warm chinook winds wrhich, crossing the moun¬ tains from the Pacific, bring in their train periods of extremely mild and genial wreather. Alberta is a region of light rainfall. The sub¬ joined table indicates the average precipitation in the various months :

January,

1.03

May,

3.85

September,

.80

February,

1.03

June,

3.06

October,

1.24

March,

.92

July,

5.23

November,

1 74

April,

2.05

August,

1.73

December,

1.03

Though the foregoing figures yield only 23.71 inches for the year, it will be noted that of this total 13.87 inches or 58 per cent comes during the growing season and the crops are thus amply supplied w'ith necessary moisture when it is most needed. In the southern por¬ tion of the province snow falls during the win¬ ter but soon disappears ; in the more northerly section the snowfall varies in depth from six to 18 inches and remains on the ground from the beginning of December till the end of March.

Soil. — The soil of Alberta consists, gen¬ erally speaking, of a marly clay subsoil over¬ laid writh a black or chocolate-colored mould. The latter, the product of ages of decayed vegetable matter, varies from six inches to several feet in depth. The combination results in a soil capable of storing moisture and at the same time of extraordinary fertility.

Industries. — The chief industry is agricul¬ ture. The immense crops returned by the virgin land of Alberta have too often caused the farmer to devote himself exclusively to grain growing and to neglect stock. With the establishment, however, of extensive packing plants and resultant steady markets, increased interest is being taken in mixed farming, for which Alberta is admirably fitted. The area under crop and the production of cereals are

Saline Spring •

Graham Landing

Point

providence'*— —

^\T\

Lake^laire

fjackflsh

Lake

Vermilion

lurrALa

HEAO^;

'Chfpeicr/an

Lake

Saline

Buffalo Lake '

Battle

Moore

Otter Lake

A

'•^TgSut MUfin*

'Manifou Lake\ t>

Loon

Lake

Island Lake

IVoufS

•'Lakes

LeoartUur (g ,

Cadotte

'"jLake

KiOf?1;

,Ck«d

Trout

|ciieecha!I1

.JO/Peacc River v/fc Laud lug

\Varp«f

[Quisle?

H'aMfkato y. Lakes

Lake

WMteJlsh Lake

'Springˆ

Sand!/ Lakeˆ/OO1 Pel loan Lakeˆl

Pelican Mtˆj}

Camelii

.Roxani

Spirit RiycrSS-’ Esher/

Woking?ˆ* Braeburus’-S W aha ter/

T able Mt.

/ / Martin Mt-

Canoe

Marble

Afartm

Island - Lake

'Delian

irmouti

'Prairie

Rsmith ' 6 Jr Hondo 1/ Chisholm

fourpeon/LaAra

Tro«r r) _ r nke

fa. B. Co.

Athabaska j La tiding

rficland

JjFlatbusU

\o

J Igilsyth /

- - Fawcett

V\i > .v «

/). VV2 r .

Union rvale '

< = 3

1 Saddle 1

OnlonS,

| Lalte 4*

Lake)

LovetT

.?7v

&Vii» U ■o®1*'

＜qp„„..»le qNJ J

’ 6 J

ˆCncruaV Salvador

Lae* 1

SW*W

Clmrirater

Mnhood \ Lake

ROCKY'

Lake

Harm/tt

I K inbasket Lake

Sounding

WUNTA1N&:

l«b«ker

.Little

SKerlorJ

Harpy at

PARK

X＞e Winluo]

ˆGrindj

Upper . (Arrow'

Trout\

Lake

.Lomond'VySX

\ °,c /

Vt ravers V

\Euchant

/AtureC) Cayley' {ekisko~N

Winiiermclˆ V fan Lake ■

Fairmont Sprinj v Columbia La/ct

rmstroQg.

t ˆSua-vp VˆGn

Okanagan

•ICaslo

Wootefioj

• kookuiiulu/c

/X Slocan.

I f'*ijLak'/

JSyY'J

Lower Killarney Y ˆirrouyi

Kimberly tV y cliffeˆ

Cranbrook 1 jiil Locol

W asa V Yl'ort Si SVu'V'

"Pilot 1

Lake

fg}X&

,bten»y van** , Spass

Penticton*

.Vy« Pa J»°

Pokoirki

.V.CTCorbˆ V/Fernia' A/o Mines' /Morrissey '.Valdo \ IDorr V \? \ T \Gateway

Ttrdigri*

W alrdner mXVo sfcal Juktˆ V>b- mlc-f JalfwjM A . 0,‘ Cailhno\

'/Aldridge EUt| \Ryaa ■ — . ˆ

Pri nettopˆˆorf \H It o\ j s.l jBedleyVj

.Bradshaw '

olnnaoat

FaltS

S. K-wtenayˆ*ˆ

ˆ Land i nˆ_rn uyˆ ard ˆCrest< J

to

.«rern<

Tahk

I)A° 3

1 10

120

v Longituae vveav trom ureeuwicu. \ > * ’v i ■?

1 N'ORTHWEST

i — < - *1* - *1* — -*rˆr"* i a .

■v >

BUtc ho

Scale.

Statute Miles 67 = 1 Inch

Copyright by Rand McNally & Co.

Hag Lake

pit*1!. ;

y/«or .

,• i • '

Horse Jig Lake

Canim

1 20

Longitude West from Greenwich

ALBERTA

ALBERTA

annually rapidly increasing. In 1900 the acre¬ age of spring and autumn wheat was 30,361 and the product 583,806 bushels; in 1905 the acreage was 107,527 and the product 2,306,524 bushels; in 1910 the acreage was 592,960 and the product 7,904,520 bushels; in 1915 the acre¬ age was 1,669,076 and the product 60,088,689 bushels. In 1900 the oat crop amounted to 2,625.581 bushels ; in 1905 the return was 9,514,- 180 bushels; in 1910 the yield rose to 12,158,- 530 bushels and in 1915 with an acreage of 1,570,596 sown to oats the harvest totalled 90,582,694 bushels, averaging 57.66 bushels to the acre. The acreage of barley in 1915 was 374,062, and from this area 12,761,187 bushels were garnered. Flax in 1915 amounted to 569,762 bushels, the land under crop being 41,243 acres. In 1915 there were in the province 183,974 milch cows and 660,000 other cattle. Dairy farming is rapidly on the increase and excellent markets, both domestic and export, have been developed for dairy products. The

production of butter for the year ending Octo¬ ber 1915 was 7,200,000 pounds, an increase of 2,000,000 pounds over the previous year. Much attention has been paid to the breeding of horses and with the introduction of such stand¬ ard strains as the Clydesdale, Percheron, Hack¬ ney, Shire, Suffolk and Belgian the standard of horseflesh has reached a high pitch. In 1915 there were 544,772 horses in Alberta. The growing of sheep, both for slaughter and for the wool crop, has proved profitable. The num¬ ber of sheep in 1915 in Alberta was 238,579. The raising of swine has also in recent years yielded handsome returns. Extensive packing plants affording steady markets are in opera¬ tion in Edmonton and Calgary.

As has been said, the bulk of the precipi¬ tation in Alberta comes at the growing time and provides ample moisture to mature the crops. This remark applies to by far the greater part of the province, but there is a dry area in the southern section — particularly the region lying between the cities of Medicine Hat and Calgary and Lethbridge. The situ¬ ation in regard to this section is, not that there is always inadequate rainfall, but that the rain¬ fall cannot confidently be depended upon and recourse has been had to irrigation schemes as a species of insurance so that the farmer may be always sure of his crop. The most ambitious irrigation project is that of the Cana¬ dian Pacific Railway, which when complete will supply water to a block of land of 3,000,000 acres adjacent to the company's right-of-way.

While Alberta is obviously not distinctly a lumber country, still the forest resources are very considerable. The chief merchantable tim¬ ber is spruce, of which heavy stands are found here and there, especially in the northerly part of the province. The forest reserves of Al¬ berta cover 26,112 square miles. Of this vast area, nearly 13,000,000 acres lie along the east¬ ern slope of the Rocky Mountains and extend in a northwesterly direction some 450 miles from the international boundary. Under the inspiration of the Forestry Branch and the Do¬ minion Commission of Conservation, intelligent measures are being enacted for the conservation of provincial forests. In 1912 the lumber cut was approximately 50,000,000 feet. Of this 90 per cent was spruce. The remainder was made

up of small quantities of pine, poplar, Douglas fir and tamarack.

Minerals. — Alberta is known to contain large deposits of minerals. Indications of pe¬ troleum have been found at many far-scattered points. Hitherto, however, only one region — that to the south of Calgary — has actually produced oil. Natural gas is found in large quantities in the Medicine Hat-Bow Island dis¬ trict and is piped into

the city of Calgary. At Pelican rapids on the Athabasca River natural gas exists but owing to there being no settle¬ ments of any size it has not yet been utilized.

A new gas field has recently been discovered at Viking on the Grand Trunk Pacific Railway east of Edmonton. Several wells have been successfully sunk and it is expected that Ed¬ monton will shortly be supplied with natural gas from this field. At McMurray on the Atha¬ basca River are immense deposits of tar sands. The commercial value of these, whether for the paving of roads or for highly valuable ex¬ tractive matter which may be wrested from them by chemical processes, is a question un¬ dergoing investigation in the laboratory. Other minerals are known to exist but owing to lack of transportation or other difficulties have not yet been developed. It remains to speak of • coal, the one mineral industry whose exploita¬ tion has already assumed substantial and per¬ manent form. Very wide areas of the province are underlaid with coal. Anthracite is mined near Banff. Extensive deposits of bituminous coal, an excellent steam and coking coal, are found in the Crowsnest Pass as well as in the Palliser, Costigan and Bighorn fields. The commonest coal is lignite, and of this inex¬ haustible quantities occur. According to the report of D. B. Dowling submitted to the Geo¬ logical Survey in 1909, coal underlies nearly 17,000 square miles of territory and the total quantity is estimated at upward of 90,000,000,- 000 tons. The production of coal is steadily increasing. Two hundred and eighty thousand tons were mined in 1901, while in 1914 the number of collieries operating was 264 and the production of coal had risen to 3,821,739 tons.

Transportation. — Three transcontinental railway lines traverse Alberta from east to wrest. The pioneer line, the Canadian Pacific, crosses the province in the southerly section. The main line running through Medicine Hat and Calgary ascends the valley of the Bow and threads the Kicking Horse Pass on its way to the Pacific coast. Leaving the main line at Medicine Hat, the Canadian Pacific Company also operates a line connecting Medicine Hat with Lethbridge, and crossing the mountains by way of the Crowsnest Pass, proceeds to¬ ward tidewater. Besides these through lines the company has constructed a complex system of branch lines. The chief of these are the line running north and south and connecting Edmonton with Calgary and that running east from Edmonton and giving the latter city direct touch with Winnipeg. The Canadian Pacific continues steadily its policy of expansion and during the decennial period, 1905-15, this com¬ pany's mileage in Alberta increased from 1,060 to 1,909. In 1906 a rival railway, the Canadian . Northern, appeared on the scene, laying down that year 17S miles of steel. In 1909 and the following years,

encouraged by liberal finan-

cial support from the provincial legislature, the Canadian Northern carried out an ambi¬ tious program of construction. In 1915 the company's mileage in Alberta had risen to 1,247. In this same year the Canadian Northern Rail¬ way transcontinental line following the valley of the North Saskatchewan, and connecting Edmonton via the Yellowhead Pass with Van¬ couver, was also put into operation. In 1908 the Grand Trunk Pacific, in course of construc¬ tion as a transcontinental, began to build in Alberta. With assistance from both the Do¬ minion and provincial governments, this com¬ pany's system steadily grew. In 1914 the main line connecting Winnipeg, Edmonton and Prince Rupert, was opened to traffic. At the close of 1915 the Grand Trunk Pacific Com¬ pany was operating 707 miles of railway in the province. Apart, however, from the line run¬ ning north from Edmonton some 90 miles to Athabasca, the northerly half of the province — a hinterland known to be rich in resources and into which settlers were pouring — was with¬ out railway communication. In 1912, as a re¬ sult of contracts entered into between the pro¬ vincial government and a group of capitalists, construction was commenced on the Edmonton, Dunvegan and British Columbia Railway run- * ning in a northwesterly direction from Edmon¬ ton to the Peace River Valley. This line is now in operation to Peace River, there coming in touch with the vast system of northern nav¬ igable waterways. Under the name of the Al¬ berta and Great Waterways, this group is also engaged in the building of a line in a north¬ easterly direction from Edmonton to McMur- ray on the Athabasca River. At this point great mineral resources will be made available and connection given also via the Athabasca River with navigable streams and lakes lead¬ ing to the Mackenzie and thence to the Polar seas. The total mileage of railways in the province of Alberta at the close of 1915 was 4,423 miles — showing an average annual in¬ crease for the decennial period of 332.3 miles.

Population. — The population of the prov¬ ince has in late years shown rapid growth. Ac¬ cording to the Dominion census of 1901 it to¬ talled 73,022. In 1911 official figures gave a return of 374,663. The population according to census of 1916 is 496,525. In recent years heavy immigration has taken place, especially from the British Isles and the United States. Settlers in considerable num¬ bers have also come into the province from Germany, Austria-Hungary and the

Scandina¬ vian countries. The census of 1911 shows the chief religions to be represented as follows : 66,351 Presbyterians, 62,193 Roman Catholics, 61,844 Methodists, 55,628 Anglicans, 43,311 Lutherans, 19,491 Baptists, 18,149 Greek Church, 2,628 Congregationalists, 1,524 Mennonites, 1,207 Jews. Numerous minor varieties of re¬ ligious faith are also represented.

Education. — Education is by law free and compulsory. Owing, however, to difficulties arising from rapid settlement and imperfect transportation, it has proved neither always wise nor always possible rigidly to enforce compulsory attendance at school. Any section of the province may be erected into a school district provided (1) it does not exceed four miles in length or breadth; (2) it contains four persons liable to assessment and eight children

between the ages of 5 and 16. The number of schools down to the close of the year 1914 was 2,027 and the number of children enrolled 89,- 910. All schools are subjected to regular in¬ spection by government officials and the annual examinations in the upper grades are conducted directly by the provincial department of educa¬ tion. The school system is supported by direct taxation and by grants in aid made by the pro¬ vincial government. By the terms of the British North America Act, a certain percentage of the Crown lands was set apart for the endow¬ ment of public education. In Alberta, sections 11 and 29 in every township are designated for this purpose. The mon-ey accruing from the sale of these lands is held by the Dominion government in trust for Alberta and the in¬ come paid to the province for the support of the school system. For the training of teachers two normal schools have been established — one at Calgary and one at Camrose. Instruc¬ tion in manual arts, domestic science and vo¬ cational training generally is provided for in the Institute of Technologv and Manual Arts in Calgary. In 1908 the University of Al¬ berta was founded. This is a state institution and occupies a site of 258 acres fronting the Saskatchewan in the city of Edmonton. It is well equipped with buildings and laboratories. There are in operation faculties of arts and sciences, applied science, medicine, law and agriculture, and schools of pharmacy, account¬ ancy and dentistry. The enrolment of students in 1915-16 was 418. Nowhere perhaps in Amer¬ ica has professional education been brought so completely under direct and central public con¬ trol as in Alberta. This has been accomplished by making the University of Alberta on behalf of the province responsible for the conduct of the licensing examinations of practically all the professional societies.

History and Government. — The history of Alberta may be

summarized in a word or two. It has consisted largely in the efforts of the government to keep pace in the provision of educational and transportation facilities with the tide of settlement pouring into a new coun¬ try. Schools, roads, bridges, necessary public buildings, the encouragement of methods of farming suited to the province, the organiza¬ tion of the country generally — in the record of these efforts consists the history of Alberta since the province came into being. The gov¬ ernmental system of Alberta resembles that of most of the Canadian provinces. Representing the Crown there is a lieutenant-governor ap¬ pointed from Ottawa, a single popular cham¬ ber, known as the legislative assembly, of 55 members elected on a suffrage equally shared by men and women. Executive power lies in the hands of a cabinet of seven members, who must hold seats in the legislature and are re¬ sponsible to it. 1 he Liberal party has been in power since the Autonomy Act of 1905. The first premier was the Hon. A. C. Rutherford, who as the result of a political crisis was suc¬ ceeded in 1910 by the Hon. A. L. Sifton.

Chief Cities and Towns. — Edmonton, the provincial capital and seat of the provincial university, is picturesquely situated on both banks of the North Saskatchewan. The city has handsome public buildings, is a very im¬ portant railway centre and has a population of 53.846. Calgary is a substantial and prosperous

ALBERTA, CANADA

■' 1 ■ •. :

CASCADE MOUNTAIN AND BANFF VILLAGE

manufacturing and commercial city located at the confluence of the Bow and Elbow rivers and commanding a beautiful view of the Rocky Mountains. The population is 56,514. Leth¬ bridge, population 9,436, and Medicine Hat, population 9,272, are busy industrial com¬ munities. Other important towns are Red Deer, Wetaskiwin, Lacombe, Macleod, Cam- rose, Stettler, Olds, Cardston, Vegreville, Ver¬ milion and Peace River.

William A. R. Kerr,

Dean of the Faculty of Arts and Sciences, The

University of Alberta.

ALBERTI, al-ber'te, Leone Battista degli, Italian architect, painter, poet, musician and philosopher: b. Venice, 18 Feb. 1404; d. Rome, April 1472. Excelling in physical and social accomplishments, a man of most attractive per¬ sonality, master of almost all the arts, he ranked equally high as dramatist, poet, philos¬ opher, and was one of the best of contem¬ porary organists. While his essays on painting and sculpture are greatly admired, his most im¬ portant work is (De Re Aedificatoria) (1485), which was freely translated into other lan¬ guages. He was architect to Pope Nicholas V. and designed many fine edifices in different cities, notably the Church of Sant' Andrea at Mantua, and the fine church of San Francesco at Rimini. Consult Manzini, M., (Vita di Al¬ berti } (Florence 1882).

ALBERTINELLI, al-ber'te-nel'le, Mari- otto, Italian artist: b. Florence, 1474; d. there 1515. He was fellow-pupil, friend and partner of Fra Bartolommeo until the latter's retire¬ ment into a monastery. His pictures, ranking among the finest of the Renaissance period, in¬ clude (The Visitation of the Virgin (1503), his masterpiece in the Ufffzzi Palace; a (Holy Family, > in the Pitti Gallery, and an (Annun¬ ciation } (1510), in the Florence Academy.

ALBERTITE, or ALBERT COAL, a

pitchlike mineral of brilliant jet black color first discovered by Henry W. Eskildon and other mining engineers in Albert County, New Brunswick. Like the district, it was named after Albert, Prince Consort to Queen Victoria. Albertite is found in the lower carboniferous group, consisting of red sandstones, green marls and beds of fossiliferous limestones ac¬ companied by gypsum. It is not a true coal and is very much lighter in weight per bulk, compared with ordinary coal. It ignites freely from a match and burns like a candle, leaving a fine, almost impalpable ash. It analyzes as free carbon, 82.67 ; hydrogen, 9.14; oxygen and nitrogen, 8.19. Albertite has sold at $45 per ton, and is used for enriching gas, in the prep¬ aration of fine varnishes, etc.

ALBERTUS MAGNUS, Count of Boll- stadt, German scholastic philosopher : b. Lan- ingen, Suabia, 1206; d. Paris, 25 Nov. 1280. He was educated principally at Padua, where he was instructed in the writings of Aristotle. In 1223 he joined the Dominican order and stud¬ ied theology in the houses of the order at Bo¬ logna and elsewhere. He was appointed lec¬ turer at Cologne, and later taught at Regens¬ burg, Freiburg, Hildcrheim and Strassburg. Thomas Aquinas was his pupil at Cologne. He went to Paris in 1245, received the degree of

doctor and taught there with great success. He Vol. I — 22

was appointed German Provincial of the Do¬ minicans in 1254 and fulfilled the duties of the office with great care and efficiency, instituting many reforms in the monasteries and defend¬ ing the mendicant orders against the attacks of the University of Paris. At this period he also answered the errors of Averroes, the Arabian philosopher. In 1260 he was appointed bishop of Regensburg by Pope Alexander IV, but re¬ signed this office in 1263. He spent the re¬ mainder of his life in preaching throughout Bavaria and adjoining districts; in 1270 he preached the 8th Crusade in Austria. He at¬ tended the council of Lyons in 1274, and soon after at Paris publicly defended the orthodoxy of his former pupil, Thomas Aquinas. His great literary activity is attested by his works (published in 21 folio volumes by Pierre Jam¬ my, Lyons 1651, and reproduced by the Abbe Borgnet, 36 vols., Paris 1890). He was the most widely read and most learned man of his time. He was the greatest student of Aris¬ totle up to his time. His chemical and me¬ chanical knowledge was remarkable in his age and brought upon him the imputation of sor¬ cery. His best known works are (Summa de Creaturis) and (Summa Theologise. *Consult Sighart, J., (Albertus Magnus, sein Leben und seine WissenschafD (Regensburg 1857; Eng¬ lish trans. by Dixon, London 1876), and Erd- man, J. E.,* (History of Philosophy) (Vol. I, London 1890).

ALBI, al'be, France, city, capital of the de¬ partment of Tarn, 48 miles by rail northeast of Toulouse, built on a height rising nearly 600 feet above the river Tarn. The fortress cathe¬ dral church of Saint Cecilia, dating from 1277 to 1512 and the 14th century fortress palace of the archbishop, are the most notable buildings. Albi as the home of the Albigensian Cathari of the 13th century suffered severely during the re¬ ligious wars. A large agricultural trade is carried on and there are extensive manufac¬ tures of brick. Pop. 25,000.

ALBIA, Iowa, city and county-seat of Mon¬ roe County, 65 miles southeast of Des Moines, on the Chicago, Burlington and Quincy, the Wabash, the Minneapolis and Saint Louis, and other railroads. Considerable quantities of coal are mined in Monroe County and the city has a large trade in this commodity and also in the grain, livestock and other agricultural prod¬ ucts of the district. Its industrial establish¬ ments consist of a telephone factory, metal works and a packing plant. Pop. 5,342.

ALBICORE, or ALBACORE. See Tun¬ ny.

ALBIGENSES, al'be-gen-sez, a religious sect, coming first into prominence in the 12th century, and taking its name from Albi, their principal stronghold. What their doctrines were has not been determined, as no formal statement of them was ever drawn up. It ap¬ pears that the Albigenses held beliefs similar to those of the Patarins in Italy, the Bulgarians in France and other similar sects. They styled themselves Cathari the Pure and traced their doctrines to the Manichean sect known as Paulicians, that settled in Bulgaria, whence their tenets spread to France.

They taught the doctrine of the Manicheans, that there are two opposing creative principles,

one good, the other evil ; the invisible word proceeding from the former, the body and all material things from the latter. ((Their teach¬ ers assumed a great simplicity of manners, dress and mode of life. They inveighed against the vices and worldliness of the clergy, and there was sufficient truth in their censures to dispose their hearers to believe what they ad¬ vanced and reject what they decried. They also rejected the Old Testament, said that in¬ fant baptism was useless, and denied marriage to the <perfect) as they called their more aus¬ tere members. 55 (Addis and Arnold's Cath¬ olic Dictionary5) .

On the other hand the license permitted to the imperfect gave rise to so much fanaticism and grave social and moral disorders as to threaten the destruction of Christian civiliza¬ tion in the heart of France. They had increased very much toward the close of the 12th century in the south of France, about Toulouse and Albi, and in Raymond, Count of Toulouse, they found a patron and protector. Innocent III, after trying in vain to reform the abuses prevalent among them, was so incensed by the assassination of the papal legate, Peter of Cas- telnau, in 1208, that he proclaimed a crusade against them, and was supported by the King of France.

An army was accordingly collected, large numbers of those composing it being mere mer¬ cenaries and adventurers brought together by the hope of plunder rather than by zeal for the Catholic faith. The chief leader was Simon de Montfort, father of the well-known Earl of Leicester. Raymond's territories were ravaged, and in 1209 the crusaders took Beziers by storm and put a number of the inhabitants

to the sword. Simon de Montfort was equally severe toward other places in the territory of Ray¬ mond and his allies, of whom Roger, nephew of Raymond, died in a prison and Peter I, King of Aragon, in battle. The lands taken were presented as a reward for his services to Simon de Montfort, who, however, was killed at the siege of Toulouse in 1218. When Inno¬ cent III heard of the cruelties of the invading armies he recalled his legate Milo for his weak¬ ness in not restraining Simon and restored to Raymond the captured territory. Soon after, however, Raymond once more espoused the cause of the Albigenses. He died in 1222, un¬ der excommunication, and his son, Raymond VII, was obliged to defend his inheritance against the legates and Louis VIII of France, who fell in 1226 in a campaign against the, Al¬ bigenses. After thousands had fallen on both sides a peace was made in 1229 by the terms of which Raymond was released from the penalties in consideration of a large tribute. He ceded Narbonne, with several estates, to Louis IX, and made his son-in-law, a brother of Louis, heir of his other lands.

ALBINISM, a condition in which there is a congenital absence of pigment in the hair, eye and skin. Animals so affected are albinos. Albinism is also present in the flowers of many if not all plants, white flowers occurring among those of other color on the same plant. Albinos have been known among all races and all peo¬ ples, hence neither climate nor race are its causative factors. Rare in many races, it oc¬ curs frequently in others, as for instance in

the Zuni and other tribes of Arizona. The most widely accepted theory is that the condition is due to an arrest of development of the pig¬ ment layers in the embryo. Affections of the eye are the most important disagreeable feat¬ ures for albinos.

ALBINUS (Weiss), Bernhardt Siegfried,

German physician, one of the greatest anato¬ mists of his time: b. Frankfort-on-the-Oder, 24 Feb. 1697 ; d. Leyden, 7 Sept. 1770. Besides editing the works of Harvey he published (De Ossibus Corporis Humani5 (1726) ; (Historia Musculorum Hominis5 (1734) ; and (Tabul3e Sceleti et Musculorum Corporis Huinani5 (Leyden 1747), illustrated with costly plates prepared under his own supervision. From 1718 he was professor of anatomy, and from 1745 professor of medicine at the University of Ley dan.

ALBION, the earliest name by which the island of Great Britain was known, employed by Aristotle, and in poetry still used for Great Britain. The Greeks and Romans probably re¬ ceived the name from

the Gauls, in whose lan¬ guage it would mean mountain-land or white- land, from the Celtic alp, alb, said to mean high or white (whence also Alps), the latter name being given to it in reference to the chalky cliffs on the coasts.

ALBION, Mich., city in Calhoun County, situated on Kalamazoo River, the Lake Shore and Michigan Southern and the Michigan Cen¬ tral railways, 28 miles south of Lansing. There are manufactures of farm tools, malleable iron, automobile cushion springs, automobile hubs, wire screens. Over 2,000 men are em¬ ployed in the iron-working industries. It has two banks, with a combined capital of $100,000; six churches and good schools. Albion Col¬ lege (q.v.) is located here. Albion is governed by commission-manager form of government. Four commissioners, elected one a year for four-year terms, hire a city manager. First settled in 1831, became a borough in 1855, in¬ corporated in 1885. Pop. (1920) 8,354.

ALBION, N. Y., the county-seat of Orleans County, on the New York Central and Buffalo, Lockport and Rochester railroads, and the Erie Canal, about 51 miles northeast of Buf¬ falo and 31 miles west of Rochester. It has two national banks with a combined capital of $1,731,619, one high school and four public schools, public parks, a free library, several churches and five newspapers. The House of Refuge for Women is located here, and among other places of interest are the court house, surrogate and county clerk building, Pullman Meniorial Church and Mount Albion Cemetery. It is a prosperous fruit and agricultural com¬ munity and has important agricultural indus¬ tries, three canning factories and large stone quarries. Cement, building blocks, etc., are also manufactured. The value of taxable prop¬ erty is $4,030,050. The city is lighted by elec¬ tricity. The affairs of the community are ad¬ ministered by a mayor, elected triennially, and board of trustees. Albion was first settled in 1812, incorporated 1828. Pop. 4.683.

ALBION, New. See New Albion.

ALBION COLLEGE, a coeducational in¬ stitution in Albion, Mich., established as a sem¬ inary under the auspices of the Methodist Epis-

copal Church in 1835, organized* as a college in 1861. Professors and

instructors in 1914, 26; students, 516; volumes in the library, 21,000; grounds and buildings valued at $250,000 ; en¬ dowment fund, $355,000; productive funds, $405,000; income, $61,644. It has beside the college department a business department, pre¬ paratory department and schools of music and painting.

ALBITE, an important member of the feldspar group of minerals. It stands at one end of the albite-anorthite series of triclinic feldspars (see Feldspar Group). It is a sodium- aluminum silicate, Na A1 Si308, and is often called <(soda feldspar.® It has perfect basal cleavage and also cleaves easily parallel to the brachypinacoid. It is brittle, breaking with an uneven to conchoidal fracture. Its hardness is 6 to 6.5, and specific gravity about 2.63. Its usual color is white, whence its name (from ((albus,)) white), but it is occasionally gray or tinted with blue, green or red. The variety peristerite shows a delicate blue iridescence, similar to the <(change of colors® of moonstone, which is also sometimes a variety of albite. Cleavelandite is a common lamellar variety, named in 'honor of the eminent mineralogist, Dr. P. Cleaveland, who died in 1858. Albite crystals present a great variety of forms, some of the simpler of which are quite similar to those of the monoclinic orthoclase, with which albite is often associated in parallel growths and intergrowths such as perthite. Twinning is even more common in albite than in ortho¬ clase, and their analogy is shown by the occur¬ rence of Carlsbad, Baveno and Manebach twins. Several other laws of twinning are, however, followed by albite, notably those known as the (<albite law® and the (<pericline law.® Both of these types are very common and often mani¬ fest themselves by the poly synthetic twinning lamellae which are so characteristic of the pla- gioclase feldspars. Albite often occurs in tabu¬ lar crystals and embedded masses in which this twinning is revealed by striations on the basal plane. Probably the most striking occurrence of albite is at Amelia, Va., this locality pro¬ ducing large groups of tabular crystals, each over a foot in length. It usually occurs in granite or gneiss, and less frequently in the crystalline schists. It is found but rarely in volcanic rocks and in limestones. Many of the most highly prized gem minerals, such as topaz, beryl and tourmaline occur in albitic granite, while albite is often a guide mineral to colum- bite, allanite and other rarer minerals. It is also an essential constituent of dioryte. There are many noteworthy localities in Switzerland, the Tyrol, Cornwall and elsewhere in Europe, while it abounds throughout the Atlantic Coast States, and is found in especially attractive specimens on amazonstone in Colorado.

ALBO, al'bd, Joseph, a Spanish-Hebrew theologian and preacher: b. about 1380; d. 1444. His celebrated work HkkarinP (Principles*),

published 1485, is described by Tanzer as ((a ■well-conceived contribution to the apologetics of Judaism®; it reduces the basic principles of Judaism to three: The existence of God, reve¬ lation, divine retribution, and is a standard popular treatise, which has been of great im¬ portance in shaping Jewish t-hought and con¬ firming Jewish religious faith. An English

translation appears in the Hebrew Review, Yds. I— III. Consult Back, S., (Joseph Albo > (Breslau 1869) ; Tanzer, (Die Religions-philo- sophie des Joseph Albo) (Pressburg 1896).

ALBOIN, al'boin, King of the Lombards, conqueror of Italy : d. about 573 ; succeeded his father in Pannonia in 565; allied himself with Narses against the Ostrogoths; with the Avers against the Gepidae, whose King, Cunimond, he defeated and slew, 567 ; invaded Italy, which he overran as far as the Tiber, and after a three-years' siege took Parra which he made the Lombard capital in 572. He had married as his second wife his prisoner, Princess Rosa¬ mond, daughter of Cunimond. At a feast in Verona he compelled her to drink out of her father's skull which he had transformed into a goblet trophy. In revenge she persuaded her paramour, Helmichis, to assassinate Alboin. Rosamond fled with Helmichis to Ravenna where, flattered by the attentions of the ex¬ arch Longinus, she administered poison to Hel¬ michis. He, discovering her treachery, com¬ pelled her to drink a similar fatal draught, and they died together. Alboin is one of the prom¬ inent figures in early German literature.

ALB ONI, al-bo'ne, Marietta, Italian con¬ tralto: b. 1823; d. 1894. At the age of 15 she made her c1 'but at Bologna as Orsini in (Lu- crezia Borgia, * and thereafter until her final appearances in opera in Paris and in Munich in 1872, was an artist of international reputa¬ tion, ranking next to Malibran as the finest contralto of the period. Her range, of the most beautiful, true, equal and sonorous quality, ex¬ tended over a compass of two and a half oc¬ taves from F in the bass to C in alt of the soprano. Her favorite parts were in the operas of her teacher and coach, Rossini, (Gazza Ladra,P (La Donna del Lago,} tSemiramide) and PenerentolaP She appeared in the United States on a professional tour in 1852, and for over a year sang in opera, oratorio and con¬ cert in the principal cities. She married Count Pepoli, who died in 1866. In 1877 she married M. Zieger, a French officer.

ALBOV, Mikhail Nilov, Russian man of letters : b. Saint Petersburg 1851. From his earliest childhood he showed a manifest love for reading, especially of foreign masterpieces.

(Robinson Crusoe, *(David Copperfield) and (The Dead Souls) left on him the deepest im¬ pression. While still in the second grade in gymnasium he wrote two minor humoristic stories wEich were soon followed by a number of novelettes with Spanish and Italian heroes. Imitating Dumas' (Comte de Monte-Christo,* he wrote a novel entitled (The English Sailor) and at the age of 13 wrote a story in the form of a diary, (The Memoirs of an Underground Lodger, *wrhich the Peterburski Listok accepted and published. Intoxicated by that success Al¬ bov abandoned school altogether and dedicated all his efforts to the literary field. It wras then that his first novel, of considerable importance, (On the Newr Road* (1866), appeared and at¬ tracted general attention. A few years later (1873) he re-entered the gymnasium, finished his course, matriculated at the university and was graduated from the Faculty of Law in 1879. He took a post in the civil service only to resign a few months later. Besides the above works he wrote in rapid succession (The

Wretches of Petrograd, *(The Dog that Ran Away, } (In the Rear of an Army,-* (Thc End of an Unknown Street, > (A Chapter from an Unfinished Novell * Transport, } (A Terrible Word, > (The Garden of BabeP and many others. His earlier novels show the powerful influence which Dostoyevski exercised over the young author and are distinguished by a sombre character, a youthful subjectivism and a singular autoanalysis. But in his later works (especially in (The End of an Unknown Street*), the dark colors disappear and a warm sincerity and a bright poetry are apparent throughout. However, he has not succeeded in developing into a true artist owing to his strong inclination toward a self-created psychiatry and rough naturalism. Consult Skabich, Ustoriya Nov. Lit. 5 ; Arsenyed, K. K., (Krit. Eyudy no Russk. Liter.*

ALBRECHTSBERGER, al'brekts-berk'er, Johann Georg, Austrian organist, composer and theorist: b. 1736; d. 1809. Of the lead¬ ing masters of counterpoint, among his famous pupils were Moscheles, Weigl, Sey fried, Hum¬ mel and notably Beethoven, whose vagaries, however, misled his teacher to declare (that young man would never turn out anything in good style. * Albrechtsberger was appointed or¬ ganist to the court of Vienna in 1772 and ka¬ pellmeister of Saint Stephen's Cathedral in 1792. His fame rests less on his numerous compositions than on his valuable theoretical works: (Kurzgefasste Methode, den General- bass zu erlernen> (1792) ; (Grundliche Anwei- sung zur Composition *(1818), republished in (Generalbasschule,* edited by I. von Seyfried (3 vols., Vienna 1826) ; English translation

by V. Novello (London 1855).

ALBRET, al'bra', Jeanne d’, Queen of Na¬ varre, daughter of Henry II of Navarre and Margaret of Valois (sister of Francis I of France), was the mother of Henry IV of France and a zealous supporter of the reformed religion, which she established in her kingdom. She was b. in 1528; d. 1572. She married An¬ toine de Bourbon in 1548, succeeded her father on the throne of Navarre and Bearn in 1555, reigned in conjunction with her husband till his death in 1562, and afterward alone.

ALBUFERA, al'boo-fa'ra, a lake about nine miles square near Valencia, Spain, sup¬ posed to have been excavated by the Moors. It is separated from the sea by a strip of land. The revenues from the fisheries of the lake be¬ longed at one time to the Duke of Wellington.

ALBULA, al'bu-la, Swiss river in the Can¬ ton Grisons, an affluent of the Rhine, 29 miles in length, in which distance it falls over 4,500 feet.

ALBULA PASS, at the head of the Albula Valley, about 7,600 feet above the sea. In this pass is the most direct road from the valley of the Inn to the valley of the Hinter-Rhein. A railroad now runs through it.

ALBUM, among the Romans, a board or tablet on which official notices, such as the praetor’s edicts, lists of the members of public bodies, etc., were written, and which was put up in some public place to be seen by all. It was so called either because it was of a white material (albus , white) or a material whitened, or because the writing on it was in white. Al¬

bum is a name, now generally given to a blank book for the reception of pieces of poetry, au¬ tographs, engravings, photographs, etc.

ALBUMAZAR, al'boo-ma-zer, or ABOU- MASCHAR, Djafar Ibn-Mohammed, Arab astronomer: b. Balkh 805; d. Wasid 885. He lived in Bagdad and wrote over 50 books, some of which have been translated in Latin. In (De Magnis Conjunctionibus) (Augsburg 1489) the theory is advanced that the world was created when the seven planets were in con¬ junction in the first degree of Aries, and the prediction is made that it will come to an end when the same conjunction occurs in the last degree of Pisces. His other notable works are : (Flores Astrologici *(Augsburg 1488), and Untroductorium in Astronomiain* (Venice

1506).

ALBUMEN, or ALBUMIN (Latin from albus, white), a substance, or rather group of substances, so named from the Latin for the white of an egg, which is one of its most abun¬ dant known forms. The albumins enter largely into the composition of the animal fluids and solids, are coagulable by heat at and above 160° and are soluble in water and dilute salt solu¬ tions. The albumins are present in *the serum of the blood, the vitreous and crystalline hu¬ mors of the eye, the fluid of dropsy, the sub¬ stance called coagulable lymph, in nutritive matters, the juice of flesh, etc. The blood con- tains about 7 per cent of albumen. The albu¬ mins belong to the class of simple proteins, which are nitrogenous organic substances, widely distributed in nature. They consist largely of amino acids united by their carboxyl or amino groups. These simple proteins are divided into about seven groups, albumins, globulins, glutelins, prolamines, albuminoids, lustones and protamines. (See Proteins). Consult Matthews, (Physiological Chemistry.*

ALBUMINOID. See Proteids.

ALBUMINURIA, a condition character¬ ized by the presence of albumen in the urine, indicating some disturbance of the kidney func¬ tion, mild or severe. Thus there may be a functional or physiological albuminuria, follow¬ ing excessive exercise, such as bicycling; fe¬ brile albuminuria as a result of fever, being especially common in malaria, pneumonia, diphtheria and typhoid ; hsemic albuminuria ac¬ companying blood diseases, lukaemia, anaemia ; toxic albuminuria from poisoning by lead and mercury, syphilis, etc. The presence of an al¬ buminuria always calls for a determination of its causation. See Kidneys.

ALBUNOL, al'boon-yol, Spain, town in the province of Granada, near the Mediter¬ ranean, on which it has a harbor, some 35 miles to the south of the city of Granada. Pop.

18,000.

ALBUQUERQUE, Affonso d\ al'bo-kark'e, (lthe Great,** viceroy of the Indies: b. near Lis¬ bon 1453; d. Goa, 16 Dec. 1515. The Portu¬ guese had discovered and subjugated a great part of the western coast of Africa and were beginning to extend their dominion over the seas and the people of India. Albuquerque, being appointed viceroy of these new posses¬ sions, with a fleet and some troops landed on the Malabar coast in 1503; conquered Goa, which he made the seat of the Portuguese gov-

ernment and the centre of its Asiatic com¬ merce; and afterward Ceylon, the Sunda Isles, the Peninsula of Malacca, and the island of Ormuz at the entrance of the Persian Gulf. When the King of Persia sent for the tribute which the princes of this island had formerly rendered to him, Albuquerque presented bullets and swords to the ambassador, saying: (<This is the coin in which Portugal pays her tribute.® He made the Portuguese name profoundly re¬ spected among the princes and people of the East ; and many of them, especially the Kings of Siam and Pegu, sought his alliance and pro¬ tection. He maintained strict military discip¬ line, was active, far-seeing, wise, humane and equitable, respected and feared by his neigh¬ bors while beloved by his subjects. His virtues made such an impression on the Indian peoples that long after his death they resorted to his grave to implore his protection against the mis-government of his successors. Yet he did not escape the envy of courtiers and the suspicions of his King, who appointed Soarez, a personal enemy of Albuquerque, to supersede him as viceroy. This news reached him just as he was leaving Ormuz, and gave a severe shock to his shattered health and he died a few days later.

ALBUQUERQUE, al'bu-kur'ke, N. M., largest city of the State and count3ˆ-seat of Bernalillo County ; situated on the Rio Grande and the Atchinson, Texas and Santa Fe and the Santa Fe and New Mexico Central rail¬ roads, 56 miles in a direct line southwest of Santa Fe. It has an elevation of 4,930 feet above sea-level ; is an ancient and interesting settlement, divided into the Old and New towns and is the seat of the University of New Mex¬ ico and of a government school for Indians, the latter founded in 1881, the former organ¬ ized in 1889. Under the Spanish regime, Fran¬ cisco Cuervo y Valdez became governor of New Mexico 10 March 1705, and he established in 1706 a town or <(villa® to which he gave the name Alburquerque (now Albuquerque) in honor of the viceroy of New Spain, the Duke of Alburquerque (not to be confused with the Portuguese Alfonso d'Albuquerque) . The church of S. Felipe, which was built almost immediately afterward, has never been entirely destroyed, and therefore the present edifice in the ((01d Town® may still claim to be its con¬ tinuation (consult Prince, (Spanish Mission Churches of New Mexico, 1 Cedar Rapids 1915). The city is renowned as a health resort, the winter climate being exceptionally good, and six large sanatoriums have been located here. Noteworthy features are the Federal building and the Harvey Indian Museum with its large and truly representative

collection of Indian baskets and blankets. The Isleta Indian pueblo is about 13 miles distant, toward the south. The last census showed that 16.3 per cent of the total value of New Mexico's products must be credited to Albuquerque. The varied indus¬ tries range from mining (gold, copper, lead, zinc) to fruit-growing and truck- farming. We mention also the extensive lumber interests, railroad shops, woolen mill, Indian trading company, foundries and machine shops, flour mills and tie-preserving plant. The United States census of 1914 reported 55 manufactur¬ ing establishments of factory grade employing 1,008 persons, of whom 847 were wage earners,

receiving a total of $654,000 in wages. The capital employed aggregated $1,593,000, and the output was valued at $1,914,000; of this, $1,020,- 000 was added by manufacture. These figures snow an increase of 48.6 per cent over those of 1909. Pop. (1910) 11,020; (1920) 15,157.

ALBURNUM, the soft white substance which, in trees, is found between the liber or inner bark and the wood and, in progress of time acquiring solidity, becomes itself the wood. A new layer of wood, or rather of alburnum, is added annually to the tree in every part just under the bark.

ALB UR Y, Australia, town of Goulburn County, New South Wales, at the head of navi¬ gation of the Murray River, 1,800 miles from its mouth, and by rail 386 miles from Sydney and 200 miles from Melbourne. Albury was reached by explorers in 1824 and was created a municipality in 1859. It is a sheep-raising and farming centre, noted for its manufactures of wine, which with wool, cereals, tobacco and grapes are its staples of commerce. Pop. 6,300.

ALCiEUS, al'kai-us', Greek warrior-poet and lyricist: b. Mitylcne, Lesbos, in the 7th cen¬ tury b.c. From 606 b.c. he was active in the war between the Athenians and Mitylenians, and in the factions of his native city, which led to his exile for a considerable period. Con¬ temporary with Sappho he was the author of numerous martial and patriotic hymns, love lyrics, bacchanalian songs, epigrams and other poems, originally collected in 10 books. They are said to have exhibited the 2Eolian lyric in highest perfection, but fragments only exist; one of the latest discovered with some frag¬ ments of Sappho is mentioned in the (Classical Review1 (May 1902). The Alcaic metres, ad¬ mired and imitated by Horace, and in modern days by Tennyson and others, are claimed to have originated with him. Consult Bergk, T., (Poetae Lvrici Graeci1 (Leipzig 1882) ; Farnell, L. R., (Greek Lyric Poets1 (London 1891) ; Smyth, T., (Greek Melic Poets1 (New York

1900) ; Easby-Smith, J., (The Songs of Al¬ caeus1 (Washington 1901).

ALCALA, al'ka-la', name of seven cities in Spain, but by far the most important in Spanish history is Alcala de Henares, province of Toledo. Cardinal Ximenes began the first building of the University of Alcala in 1500. Francis I, in 1517, declared that the cardinal had done for Spain what it had taken many kings to do for France. It was in Alcala that the famous Complutensian Polyglot Bible was brought forth.

ALCAMENES, al'ka-me'nez, Greek sculp¬ tor of the 5th century b.c., pupil and co-worker with Phidias at Athens on the Parthenon. His masterpiece, now lost, was the (Aphrodite in the Garden,1 at Athens, presumably repro¬ duced in the well-known statues of <(Venus Genetrix.®

ALCAMO, arka-m< >, Italy, a town of Sicily, province of Trapani, 25 miles direct southwest and 52 miles by rail, from Palermo. A Saracenic town dating from the existing castle built 828; it has several interesting mediaeval buildings, and in the neighborhood are the ruins of ancient Segesta. Mount Bonifato on the south, 2,700 feet high, affords splendid views of Castellamare Bay. Quarries of jxllow marble

are worked in the neighborhood and a con¬ siderable agricultural trade is carried on. Pop.

35,000.

ALCANTARA, al-kan'ta-ra, Spain, forti¬ fied town of Estremadura, on the left bank of the Tagus, near the Portuguese frontier, noted for the Roman bridge built by Trajan in 105 a.d. Of uncemented stone, 616 feet long and 190 feet high, with six arches, it was partly blown up by the British in 1809 during the Peninsular war, and also suffered in the Civil war of 1836. A ferry was used until the bridge was restored in 1860. Here in 1215, when Alcantara had been recovered from the Moors, was organized for defense the celebrated order of monk-soldiers, the Knights of Alcantara. Pop. 3,700.

ALCANTARA, Brazil, seaport town at the entrance to S. Marcos Bay, 17 miles northwest of Maranhao. A coasting trade is carried on in salt, cotton, rice, coffee, hides and sugar. Pop. 10,000.

ALCAZAR DE SAN JUAN, al-ka'thar da san hwan', Spain, town and important junc¬ tion of the Madrid-Albacete and Madrid- Manzanares railroads, province of Ciudad Real, 48 miles northeast of Ciudad Real. In the neighborhood are large iron mines, deposits of salt and alkali, and an important trade is car¬ ried on in local manufacture of soap, daggers, gunpowder, chocolate and wines. The Roman Alee dating from the 2d century around Alcazar is much of the country described by Cervantes in his immortal (Adventures of Don Quixote. > Pop. 14,000.

ALCESTIS (438 b.c.), the earliest extant play of Euripides, is one of the most touching dramas that have come down to us from an¬ tiquity; some of the scenes, in the opinion of Racine, are incomparable. Alcestis, the daughter of King Pelias of Iolcus, married the Thessalian, Admetus, King of Pherae, for whom she offered herself as a willing substitute when Thanatos (death) came to claim her husband. Admetus tried all his friends in turn, but

- ○ ■ “ found no one, who loved as much.

No-: father, nor the aged mother’s self

That bore him; no, not any, save his wife,

Willing to die instead of him.”

— Browning, * Balaustions’ Adventure ’

When Alcestis dies, Admetus gives himself up wholly to his sorrow and remains inconsolable, until Heracles brings her back from the tomb and restores her to her husband. The theme has also been treated in modern literatures. (Wie- land, (Gliick’s Opera, } Handel’s <Admeto)). [Consult Ellinger, (Alceste in der modernen Litteratur) Halle 1885]. The supernatural side of the story is barely touched upon by Eurip¬ ides. The beauty of the play consists in the portrayal of the emotions ; the tenderness and piety of Alcestis, her firmness of soul, the sor¬ row of her husband, a sincere and affectionate though mediocre man, the naive egoism of his father, Pheres, the touching farewells of the servants — all are portrayed with truth and skill. Alcestis has hardly a peer for virtue and true beauty of soul ; in the poet’s galaxy of noble women — Nacaria, Evadne, Iphigenia, Praxithea — she stands pre-eminent. The chorus possesses greater unity and strength than in any other Euripidean drama, with the

possible exception of the (Bacchae> ; it forms an integral part of the play. The comic ele¬ ment in the c Alcestis } is more pronounced than

in any other Greek tragedy, primarily, perhaps, because the play was intended as an after-piece to a trilogy. In the saddest part of the drama the spectators behold the garrulous Heracles, sage as a philosopher, giving advice of doubtful morality to a servant in such a comical manner that even those who have been most affected by the touching scenes which they have just wit¬ nessed cannot refrain from smiling. This feature is an innovation of Euripides, who fre¬ quently makes use of comic elements in the most tragic situations.

Joseph E. Harry.

ALCHEMIST, The. In the crowning composition of that second period of Jonson's comedy which began about 1605, we have, in Coleridge's judgment, one of the three perfect plots of all literature, revolving around characters whose very extravagances broaden our knowledge of human nature. The first of modern critics, Jonson subjected every¬ thing, his own work and that of his fellows, as well as the life of his times to the censure of a <(pitiless method.® This critical faculty in Jonson explains both the rigors of his technical codes and the note of conscious didacticism with which his work is sharpened. As an artist Jonson reprehended those who come in ((ro- bustiously,® those who <(seek to do more than enough,® who <(utter all they can, however un¬ fitly.® In observing his ideal of ˆelection and mean® he clings to the unities of time, place and action.

Jonson's moral passions are the outgrowths of his rugged honesty of temper. His gallery of humors varies as it goes back to one of two sides of dishonesty and pretense, the com¬ manding side which preys upon the weaknesses of its fellows ; the weaker side of gulls and sycophants. Of the two it is not difficult to see for which Jonson has the greater sympathy. The dignity of Subtle's pretensions demands and secures a dignified going-out ; and Face comes off scot-free because he has wit. Only the gulls are punished without pity. The per¬ sonages of such a play as (The Alchemist* have a double value. Subtle and Dol Common, Abel Drugger, Kastrill, Ananias and Tribulation Wholesome, are figures of London streets ; but they are mental abstractions as well. In com¬ bining the pressure of personality with ab¬ stract qualities no writer is Jonson's equal.

Subtle, the Alchemist, belongs to an ancient order of cheaters that had been attacked by Chaucer as well as by Lyly. Alchemy as a science was no more believed in by London than were ghosts. To Jonson it meant the preten¬ sions of learning, cozening the avaricious and fools. Subtle is the magnificent cheater. Face belongs to a very old family of sycophants in the history of comedy. Sir Epicure Mammon is a

burlesque Jew of Malta brought under the sway of the cheater and revelling in the poetry of avarice. Dapper and Abel Drugger, Kastrill and the men of the church, are figures from contemporary life. The two in the play who are neither cheaters nor cheated are appro¬ priately enough Surly and Lovewit. Like Shakespeare's women Jonson's women were written for men actors. He had none of

Shakespeare's witching power for putting womanhood over through the disguise. Dol Common, perhaps on account of her jovial mas¬ culinity, is a real character.

In its main features (The Alchemist *is in¬ debted to (The Mostellaria,* or (The Haunted House> of Plautus. First acted in 1610 the play was printed in 1612, and four years later, in the folio edition of his works, Jonson pro¬ tects himself against the charge of imitating a charge which in fact Drvden brought against the play 60 years later. 'The part of Dol Common was played by Cooke; and Robert Armin, the famous actor of clowns, played Abel Drugger. The play has had a long and honorable stage history. Revived after the Restoration Pepys rated it far beyond Shakes¬ peare. In the 18th century Garrick plaj'ed both Drugger and Face. The play was acted as farce at Drury Lane as lately as 1787. On account of the tender sensibilities of later times it is not now accounted suitable for the stage. Editions : Gifford, W. (9 vols., 1816) ; Cun¬ ningham, F. (9 vols., 1871-75) ; Mermaid Series, ed. Nicholson, B. (3 vols., 1893-94) ; Every¬ man's Library,* (Vols. 489, 490) ; Rys, E.,

< Masterpieces of English drama *(1912). Con¬ sult Ward, A. W., (A History of English Dramatic Literature) (1899); Swinburne, A. C., (A Study of Ben Jonson) (1889) ; Symonds, J. A., (Ben Jonson* (1886).

Thomas H. Dickinson, Author cThe Contemporary Drama of Eng¬ land .*

ALCHEMY, or ALCHYMY, the art which in former times occupied the place of and paved the way for the modern science of chemistry (as astrology did for astronomy), but whose aims were not scientific, being confined solely to the discovery of the means of indefinitely pro¬ longing human life, and of transmuting the baser metals into gold and silver. Probably the ancient nations, in their first attempts to melt metals, observing that the composition of differ¬ ent metals

produced masses of a color unlike either — for instance, that a mixture like gold resulted from the melting together of copper and zinc — arrived at the conclusion that one metal could be changed into another. At an early period the desire of gold and silver grew strong as luxury increased, and men indulged the hope of obtaining these rarer metals from the more common. At the same time the love of life led to the idea of finding a remedy against all diseases, a means of lessening the infirmities of age, of renewing youth and re¬ pelling death. The hope of realizing these ideas prompted the efforts of several men, who taught their doctrines through mystical images and symbols. To transmute metals they thought it necessary to find a substitute wdiich, containing the original principle of all matter, should pos¬ sess the power of dissolving all into its ele-. ments. This general solvent or menstruum universale, which at the same time was to possess the power of removing all the seeds of disease out of the human body and renewing life, was called the philosopher's stone, lapis philosophorum, and its pretended possessors adepts. The more obscure the ideas which the alchemists themselves had of the appearances occurring in their experiments, the more they endeavored to express themselves in symbolical

language. Afterward they retained this phrase¬ ology to conceal their secrets from the uniniti¬ ated. In Egypt Hermes Trismegistus was said to have left behind him many books of chemi¬ cal, magical and alchemical learning. These, however, are of a later date. (See Hermes Trismegistus). After • him chemistry and alchemy received the name of the hermetic art. It is certain that the ancient Egyptians pos¬ sessed considerable chemical and metallurgical knowledge, although the origin of alchemy can¬ not with certainty be attributed to them. Sev¬ eral Grecians became acquainted with the writ¬ ings of tire Egyptians, and initiated in their chemical knowledge. The fondness for magic, and for alchemy more particularly, spread after¬ ward among the Romans also. When true science was persecuted under the Roman tyrants, superstition and false philosophy flour¬ ished the more. The prodigality of the Romans excited the desire for gold, and led them to pur¬ sue the art which promised it instantaneously and abundantly. Caligula made experiments with a view of obtaining gold from orpiment. On the other hand, Diocletian ordered all books to be burned that taught to manufacture gold and silver bv alchemy. At that time many books on alchemy were written, and falsely in¬ scribed with the names of renowned men of antiquity. Thus a number of writings were ascribed to Democritus, and more to Hermes, which were written by Egyptian monks and hermits, and which, as the Tabula Smaragdina, taught in allegories, with mystical and symboli¬

cal figures the way to discover the philosopher's stone. At a later period chemistry and alchemy were cultivated among the Arabians. In the 8th century the first chemist, commonly said to be Geber, flourished among them, in whose works rules are given for preparing quicksilver and other metals. In the Middle Ages the monks devoted themselves to alchemy, although they were afterward prohibited from studying it by the popes. But there was one even among these, John XXII, who was fond of alchemy. Raymond Lully, or Lullius, was one of the most famous alchemists in the 13th and 14th cen¬ turies. A story is told of him that during his stay in London he changed for King Edward I a mass of 50,000 pounds of quicksilver into gold, of which the first rose-nobles were coined. The study of alchemy was prohibited at Venice in 1488. Paracelsus, who was highly celebrated about 1525, belongs to the renowned alchemists, as do Roger Bacon, Basilius Valentinus and many others. When, however, more rational principles of chemistry and philosophy began to be diffused and to shed light on chemical phenomena, the rage for alchemy gradually de¬ creased, though many persons, including some nobles, still remained devoted to it. Alchemy has, however, afforded some service to chem¬ istry, and even to medicine. Chemistry was first carefully studied by the alchemists, to whose labor and patience we are indebted for several useful discoveries, for example, various preparations of quicksilver, kermes, etc.

It is still impossible to assert anything with certainty about the transmutation of metals. Modern chemistry, indeed, places metals in the class of elements, and denies the possibility of changing an inferior metal into gold. Most of the accounts of such transmutation rest on

fraud or delusion, although some of them are accompanied with circumstances and testimony which render them probable. By means of the galvanic battery even the alkalies have been discovered to have a metallic base. The pos¬ sibility of obtaining metal from other sub¬ stances which contain the ingredients compos¬ ing it, and of changing one metal into another, or rather of refining it, must therefore be left undecided. Nor are all alchemists to be con¬ sidered impostors. Many have labored, under the conviction of the possibility of obtaining their object, with indefatigable patience and purity of heart (which is earnestly recom¬ mended by sound alchemists as the principal requisite for the success of their labors). De¬ signing men, however, have often used alchemy as a mask for their covetousness, and as a

means of defrauding silly people of their money. Many persons even in our days, desti¬ tute of sound chemical knowledge, have been led by old books on alchemy, which they did not understand, into long, expensive and fruit¬ less labors. Hitherto chemistry has not suc¬ ceeded in unfolding the principles by which metals are formed, the laws of their production, their growth and refinement, and in aiding or imitating this process of nature ; consequently the labor of the alchemist is but a groping in the dark.

ALCIATI, al-cha'te, Andrea, Italian jurist and poet : b. Milan, 8 May 1492 ;• d. Pavia, 12 Jan. 1550. For many years an advocate in Mi¬ lan, he treated the objects of legal science to keen criticism, and was founder of the so-called ˆelegant® school of law. He also wrote several antiquarian and historical essays, but his most popular work was the <Emblems) (Milan 1522), epigrammatic poems on his contemporaries' vir¬ tues and vices. Of the numerous editions of this work several are chiefly sought on account of their wood-engravings. Editions of his (Complete Works) in Latin (4 vols., Basle 1546-49) ; (6 vols., Lyons 1560-61) ; (4 vols., Frankfort 1617). Consult C. Mignault's (Life of AlciatP (Milan 1584).

ALCIBIADES, al'si-bi'a'dez, son of Clein- ias, an Athenian of high family: b. Athens 450 b.c. ; d. 404 b.c. His father, who died a few years after his birth, had greatly distinguished himself in the Persian wars, and had taken a prominent part in the expulsion of the Peisis- tratidae. Alcibiades was a relation of Pericles, who was his joint guardian along with Ari- phron. He was remarkable in youth for the beauty of his person, the dissoluteness of his manners, the determination of his character and the greatness of his abilities. He came under the influence of Socrates, who tried to lead him into the paths of virtue ; but though their friendship was strengthened by mutual obligations, each having saved the other in bat¬ tle, the passions of Alcibiades were too strong for advice, and little permanent effect was pro¬ duced on his character. He acquired great popularity by his liberality in providing for the amusements of the people, and although guilty of many violent, extravagant and audacious acts, he had, after the death of Cleon, a politi¬ cal ascendency which left him no rival but Nicias. Both at first cultivated alliance with Sparta, to which Alcibiades had a hereditary partiality, but the Spartans trusting more to

Nicias, he was offended, and induced the Athe¬ nians to break with Sparta and ally themselves with Argos, Elis and Mantinea (in the Pelopon¬ nesian war). In 419 he was chosen strategos, and led a small army into the Peloponnesus with which some important operations

were effected. In 415 he advocated the Sicilian war, and was chosen one of the leaders of the ex¬ pedition appointed to conduct it; but before it sailed he was charged with profaning and di¬ vulging the Eleusinian mysteries, and mutilat¬ ing the busts of Plermes which were set up in public all through Athens. He was permitted to take his place in the expedition, but was re¬ called before his plans could be accomplished. He made his escape and went to Sparta, where he was well received. He divulged the plans of the Athenians, and assisted the Spartans to defeat them. Sentence of death and confisca¬ tion was pronounced against him at Athens, and he was cursed by the ˆministers of religion. He induced the Athenian dependencies of Athens to revolt, and made alliance with Tissaphernes, a Persian satrap. Soon after he abandoned Sparta and took refuge with the Persian, in¬ gratiating himself by his affectation of Persian manners as he had previously done at Sparta by a similar affectation of Spartan simplicity. He now began to intrigue for his return to Athens, offering to bring Tissaphernes over to the Athenian alliance. His intrigue led to the es¬ tablishment of an oligarchy (the Four Hun¬ dred), but they did not recall him. The fleet, however, which was stationed at Samos de¬ clared in favor of a democracy and recalled him. The revolution was effected at Athens without the return of the armament, and the banishment of Alcibiades was canceled. He remained abroad, however, for some years in command of the Athenian forces, gained sev¬ eral victories, and took Chalcedon and Byzan¬ tium. In 407 b.c he returned to Athens, where all proceedings against him were canceled, but in 406, the fleet which he commanded having suffered a severe defeat, he was deprived of his command. He retired to the Thracian Cher- sonesus, where he made war with mercenaries on the Thracian tribes. On the establishment of the Thirty at Athens a decree of banishment was passed against him. He took refuge with Pharnabazus, a Persian satrap, and was about to proceed to the court of Persia when he was assassinated, probably through private revenge.

ALCINOUS, al-sin'6-us, said to have been king of the Prseacians, in the island now called Corfu. See Ulysses.

ALCIPHRON, al'si-fron, Greek rhetori¬ cian who flourished in the 2d century of the Christian era and attained celebrity through his series of more than a hundred imaginary letters purporting to be written by the very dregs of the Athenian population, including courtesans and petty rogues. Their importance in literature is due almost wholly to the insight they afford into the social conditions and man¬ ners and morals of the day. The letters from the courtesans (hetairai) are based upon inci¬ dents in Menander's lost plays, and the new Attic comedy was likewise drawn upon for material.

ALCIPHRON, or THE MINUTE PHI¬ LOSOPHER. See Berkeley, Bishop George.

ALCIRA, al-the'ra, Spain, a well-built and strongly-fortified town in the ((garden)} province of Valencia, on an island encircled by two arms of the river Jucar, some 25 miles from Valencia. It was founded by the Carthaginians. Pop.

22,000.

ALCM2EON, alk-me'on, a son of Amphia- raus and Eriphyle, was one of the heroes who took part in the successful expedition of the Epigoni against Thebes. He was charged by his father to put his mother to death in revenge for her having urged her husband to take part in an expedition in which his foresight showed him he should perish. She had been gained over to urge this fatal course by a gift from Polynices of the fatal necklace of Harmonia. The matricide brought upon Alcmseon madness and the horror of being haunted by the Furies, but at Psophis he was purified by Phegeus, whose daughter he married, giving her the fatal present. But the land became barren in conse¬ quence of his presence, and he fled to the mouth of the river Achelous, the god of which gave him his daughter Callirrhoe in marriage. His new wife longed for the fatal necklace, and sent her husband to Psophis to procure it under the pretense of dedicating it at Delhi ; but Phegeus, learning for whom it was really intended, caused his sons to murder the ill-fated Alcmseon.

ALCMAN, alk'man, one of the earliest and greatest of Greek lyric

poets, belonging to the 7th century b.c. He is supposed to have been a native of Sardis, in Lydia, and to have been taken as a slave to Sparta and was made teacher of the state choruses. Only small fragments of his odes remain. He used the broad, homely Doric dialect. His poems were love ditties, hymns, paeans, processional chants, etc. He was regarded as the founder of erotic poetry, and the bucolic poets considered him their predecessor. He was read widely even in the 2d century a.d., but his dialect was then considered harsh. Consult Bergk, (Poetae Lyrici GraecP (4th ed., Leipzig 1882) ; Smyth, H. W., (Greek Melic Poets > (New York 1900) ; and a fragment discovered in 1896 and published in (Oxyrhynchus Papyri > (Vol. I, No. 8).

ALCMENE, or ALKMENE, alk-me'ne, in Greek mythology, the daughter of Anaxo and Electryon, King of Mycenae. She became the mother of Hercules through Zeus, who took the form of her husband Amphitryon. Finally Zeus bade Hermes guide her to the Islands of the Blest, where she was happily united with Rha- damanthus.

ALCO, a small variety of dog, with a small head and large pendulous ears, found wild in Mexico and Peru, and also domesti¬ cated.

ALCOBAQA, al'koˆba'sa, Portugal, a small town in Estremadura, 50 miles north of Lisbon, at the junction of the Alcoa and Baga ; is cele¬ brated for a magnificent Cistercian monastery, the richest in the kingdom. It was founded m 1148 by Don Alphonso I. The buildings in¬ clude an early Gothic church, containing the tombs of some of the Portuguese kings, and a valuable library. Parts of the buildings are used for barracks. Pop. 1,600.

ALCOCK, ol'kok, Sir Rutherford, diplo¬ mat: b. Ealing, 1809; d. London, 2 Nov. 1897. Educated as a physician, he served as surgeon with British troops in Spain and Portugal 1832-36; and was appointed consul at Fuchow 1844. On the way his services were requisi¬ tioned at Amoy, where, with Sir Harry Parkes, he succeeded in convincing the Chinese officials that treaty agreements were to be respected and kept. Transferred to Shanghai he showed courage and determination by proclaiming that English ships would pay no duties, and that 1,400 grain junks then waiting to sail would not be allowed to go until the murderers of some missionaries were seized and punished. Though only one British sloop of war was in the harbor at the time, his bold attitude suc¬ ceeded. He was appointed ‘first consul-general in Japan 1858, and created K.C.B. 1862. As minister at Peking (1865) he conducted many difficult negotiations with tact and success. Retiring in 1871, he devoted himself to medical charities, promotion of geographical studies and the furtherance of a knowledge of Japanese

art. Works: (Medical History and Statistics of the British Legion in Spain > (1838) ;

Japanese Grammar) (1861); Capital of the Tycoon) (1863) ; (Art and Art Industries in Japan* (1878).

ALCOFORADO, al'ko-fo'rad-o, Marianna, Portuguese nun and author: b. Beja 1640; d. 1723. She was betrayed and deserted by Noel Bouton, afterward Marquis de Chamilly and Marshal of France, who was in Portugal from 1665 to 1667, serving under Count Schomberg in the reorganization of the Portuguese army. Her five letters written to him between Decem¬ ber 1667 and June 1668 have earned her an im¬ perishable position in literature, owing to the poignancy of their self-analysis, their uncon¬ scious self-abandonment and the revelation through passionate spirituality of a pure, single- hearted, tender and hopeless affection. As human documents, spontaneous expressions of love, faith, hope and despair, the ((record of a nature tortured into a cry of anguish, they possess that quality of immortal dignity, melan¬ choly and charm, which never fails to arouse sympathy and interest. As (The Letters of a Portuguese Nun,* they were published anony¬ mously in Paris, in 1669, by Comte de Guiller- agues, director of the Gazette de France, and while Chamilly was known as the recipient, it was not until 1810 that the much discussed identity of the author was revealed. Consult Prestage, E., (The Letters of a Portuguese Nun) (Marianna Alcoforado) (3d ed., London

1903).

ALCOFRIBAS NASIER, al'ko'fre'ba na'sya, pseudonym sometimes used by Rabelais (q.v.).

ALCOHOL. Origin of the word some¬ what obscure. According to most authorities it is from the Arabic al-koh'l, koh'l being the finely-powdered black sulphide of antimony used in the East for painting the eyebrows. First used to signify this powder, it afterward stood for any fine powder obtained by trituration or sublimation ; then for any essence or spirit, and lastly for the liquid to which it is now applied. In the latter part of the 16th century spirit dried over powdered carbonate of potash was called spiritiis alcolisatus; but Kopp suggests

that this is a corruption of spiritus alcalisatus, signifying spirit that has been treated with alkali, and that alcolized (or alcoholized) spirit was

then shortened to alcohol.

1. Ethyl Alcohol. — Unless otherwise quali¬ fied, ˆalcohol® is understood to mean the liquid known to the chemist as (<ethyl alcohol,® and to the trade as (<grain alcohol,® or ((spirits of wine.-* It is colorless and inflammable, burning with a flame that is intensely hot but almost non-luminous. Most of the alcohol used in the arts is produced by the fermentation of sugars or starches. A thin paste is made from mo¬ lasses, finely ground corn or potatoes or other natural products containing sugars or starches, and a small quantity of malt or other agent con¬ taining diastase (q.v.) is added. The mixture is then allowed to stand until the diastase has transformed the starch into dextrose (glucose). Taking the chemical formula of starch as (GHioChU for the sake of illustration, we may have either of the following reactions as the primary effect of the diastase :

(CoHxoOOa + H20 — (GH3o03)2 + GH320a Starch Water Dextrin Dextrose (CeHicAOs + 2H20 1= C12H220u + GHiaOo Starch Water Maltose Dextrose

Neither dextrin nor maltose is directly ferment¬ able, but each slowly becomes further trans¬ formed into dextrose, as appears from the following equations :

(C6H1095)2 + 2H20 = 2GHuO«

Dextrin Water Dextrose CiaHaOu + H20 — 2GHmO.

Maltose Water Dextrose

The reduction to dextrose (glucose) being now complete, yeast is added, and the temperature is maintained at from 72° to 85° F. Under the influence of the yeast-plant (Saccharomyces cereitisie or T orula cerevis'uz) the dextrose then undergoes fermentation, alcohol and car¬ bon-dioxide being the chief products, according to the equation :

GHiaO. = 2GHeO + 2C02 Dextrose Alcohol Carbon-

dioxide

A certain amount of nitrogenous and mineral matter must be present, in addition to the starch and sugar, in order to furnish food for the yeast-plant. The next step in the process is to distil off the alcohol from the fermented product. This is usually done in a still heated by steam. One or more redistillations may be necessary in order to obtain

the alcohol in a satisfactory state of purity and strength. The product of the original fermentation is weak in alcohol, but the subsequent distillations effect a great concentration, since alcohol is far more volatile than water and therefore passes off first. The British Pharmacopoeia requires recti¬ fied spirits (produced as described above) to have a specific gravity of 0.838, which is equiv¬ alent to 84 per cent of alcohol by weight. The United States Pharmacopoeia fixes the specific gravity at 0.820, which corresponds to 91 per cent of alcohol by weight. It is possible to ob¬ tain this latter degree of concentration by ordinary distillation ; but it is not possible to free the alcohol entirely from water without distilling it with potassium-carbonate, quick¬ lime, calcium-chloride or some similar sub¬

stance possessing sufficient affinity for water to prevent the water from passing over. The best way to eliminate the last traces of water is to digest strong alcohol with quicklime for two hours at about 100° F., and then distil, rejecting the first and last portions of the distillate. The product is then subjected to the same treatment a second time, after which it will probably be free from water. Alcohol thus deprived of the last trace of water is termed ˆabsolute® or <(anhydrous® alcohol. Its chemical formula is GH-..OH, and its specific gravity is 0.80625 at 32° F., and 0.79367 at 59° F. Absolute alcohol boils at 173.1° F., when the barometer stands at 29.92 inches (760 mm.). It freezes at about 200° below zero F., first becoming very viscid. Its low freezing-point has led to its use as a thermometric fluid for the measurement of low- temperatures. Its specific heat is variously estimated, but is in the vicinity of 0.61. Abso¬ lute alcohol has a powerful affinity for water, and it is therefore used as an astringent, and (for certain purposes) as an antiseptic. When exposed to the air it quickly absorbs a sensible amount of aqueous vapor, and ceases to be <(absolute.® According to the experiments of Atwater, the human body is capable of oxidiz¬ ing about two ounces of it per day, since this amount can be administered without any evi¬ dence of alcohol appearing in the excreta. Alcohol mixes with water in all proportions, and is extensively used as a solvent for sub¬ stances that do not dissolve in water : notably for organic substances and for alkaloids and drugs. When absolute alcohol is mixed with water the volume of the mixture is consider¬ ably less than the sum of the volumes of the constituents. The specific gravity of such a mixture therefore cannot be deduced by any simple formula ; but it has been found by direct experiment, and tabulated, for all possible mix¬ tures and temperatures. The strength of a given mixture of alcohol and water ' may be found by observing the specific gravity of the mixture at a definite temperature by means of a hydrometer (q.v.) and then

referring to the tables. The greatest contraction of volume observed upon mixing absolute alcohol and water occurs when 49.8 volumes of water are mixed with 53.9 volumes of absolute alcohol, both liquids being at 32° F. The volume of the mixture is then 100, instead of 103.7, as it would be if there were no contraction. Men- deleeff points out that this particular mixture corresponds to a possible compound having the formula GH60.3H20 ; but it has not been con¬ clusively proved that such compound exists. An alcohol containing 49.3 per cent (by weight) of absolute alcohol is known in the arts and for excise purposes as <(proof spirit.® This term was originally intended to denote alcohol just strong enough to ignite gunpowder when burned upon it; but it was defined by law in the reign of George III of England to be spirit ((such as shall, at the temperature of 51° F., weigh exactly twelve-thirteenth parts of an equal amount of distilled water® (Watts). At 60° F. proof spirit has a specific gravity of 0.920. A mixture stronger or weaker than this is said to be (respectiveˆ) overproof or under¬ proof. Distilled liquors, such as whisky, brandy and gin, contain from 40 to 50 per cent of absolute alcohol, wines from 7 to 20, ale and

porter from 5 to 7, and beer from 2 to 10. Alcohol coagulates albumen, and, partly for this reason and partly because of its action in arresting the development of micro-organisms, it prevents the putrefaction of dead animal matter. The alkali metals attack absolute alcohol rapidly with the formation of com¬ pounds variously known as alcoholates, alco- hates and alcoates, but more definitely and correctly as ((ethylates.® Thus alcohol may be regarded as water in which one atom of hy¬ drogen has been replaced by a molecule of the organic radical ethyl, C2H3, and, water being H-O-H, the formula for alcohol may be written (C2H5)-0-H. An alkali metal, when it com¬ bines with alcohol, merely replaces the H at the right of this formula ; and sodium ethylate (for example) is therefore ((UfD-O-Na, or simply CkHsONa. The commonest test for alcohol in small quantities consists in warming the suspected liquid (or its distillate) with caustic potash and iodine. If alcohol is present iodoform comes down after a time as a pre¬ cipitate. In England the use of alcohol in the arts is permitted without the payment of an excise tax, provided the alcohol contains 10 per cent of methyl alcohol (wood spirit). Alco¬ hol so treated is known as ((methylated spirit,® it is unfit for drinking and the methyl alcohol that it contains cannot be readily removed. Alcohol can be prepared directly from its ele¬ ments as follows: Acetylene (q.v.),

C2IT2, will combine directly with hydrogen to form olefiant gas, C2H4; concentrated sulphuric acid will absorb olefiant gas with the formation of hydrogen-ethyl-sulphate, C2H5.HSO4; and if the product so obtained is diluted with water and boiled, alcohol is formed in accordance with the equation :

C2H5.HSO4 + H2O = H2SO4 + C2H5.OH.

This process is of considerable theoretic inter¬ est, and is said to be in commercial use in Rus¬ sia. Until carbide of calcium (from which acetylene is prepared) can be had more cheaply, however, it can hardly be successfully used in the United States. (See Denatured Alcohol).

1. Wood Alcohol, or Methyl Alcohol. — A colorless, inflammable liquid, strongly resem¬ bling ethyl alcohol in its general properties. It burns with a flame resembling that of grain alcohol, but with sensibly less evolution of heat. It is far cheaper than pure grain alcohol, be¬ cause there is no excise tax upon it; in many uses it may be substituted for grain qlcohol with success, its solvent powers being very sim¬ ilar. It cannot be used internally, however, as it is of a poisonous nature, and has a peculiar selective action upon the optic nerve, in which it often induces a condition of permanent atrophy with consequent total blindness. Methyl alcohol is obtained by the dry distillation of wood. The process, as carried out in New York State, is substantially as follows : Hard¬ wood is cut into cordwood size and allowed to season thoroughly, two-year-old wood being dry enough to yield excellent results. Beech, maple and birch are most commonly used, birch being the poorest of the three, because it yields a larger proportion of objectionable tarry matter. The seasoned wood is placed in retorts of cast iron or sheet steel, which are cylindrical in general shape, and large enough to hold rather more than half a cord each. A slow fire is

then built under the retorts, its intensity being gradually increased as the distillation pro¬ gresses, and regulated so that at the end of from 12 to 18 hours nothing remains in the retort but charcoal. The distillate is passed through a condenser, by which a portion is condensed into a watery fluid, while another and very considerable portion passes through in the form of a permanent, non-condensable gas. The non-condensable part consists largely of marsh gas, hydrogen, carbon-dioxide and carbon-monoxide, together with smaller amounts of acetylene and numerous other substances. No attempt is made to utilize this portion of the product except as fuel. The portion

that condenses consists largely of acetic acid and methyl alcohol, together with acetate of methyl and acetone, and a considerable quantity of tarry matter. The condensed distillate is passed into settling-tanks, where it is allowed to re¬ main until the greater part of the tarry matter has subsided. The lighter part is then drawn off and saturated with slaked lime to fix the acetic acid. A second distillation expels the methyl alcohol, which is recovered by means of a condenser and shipped to the refiners in iron tanks, being known to the trade in this form as <(wood spirit.® The acetate of lime remaining behind is then recovered by evapora¬ tion and spread out upon a heated floor to dry.

Acetate of lime, as it comes from the alcohol manufacturer, is brown in color, from the tarry impurities that it contains. It is used in the manufacture of acetic acid and the -various ace¬ tates (notably those of iron and aluminum) that are used in dyeing and in printing upon cloth. The impure methyl alcohol, or ((wood spirit,® that is shipped from the factory to the refiner, usually contains 80 per cent of alcohol and 20 per cent of water. The yield of spirit of this strength varies greatly, according to the skill and care exercised by the manufacturer ; but in the best plants it may be taken at from eight to nine gallons per cord of good wood. Crude wood spirit contains considerable ernpy-rcumatic matter as well as acetone, acetate of methyl and acetate of ammonia. Pure methyl alcohol may be prepared by saturating the crude spirit with fused calcium chloride (CaCl2) and heating in a water-bath. Methyl alcohol com¬ bines with calcium chloride under these condi¬ tions, forming a compound which can be readily purified, and from which the alcohol can again be recovered by distilling with water. A final distillation over quicklime will give the alcohol in its anhydrous or ˆabsolute® state. Pure methyl alcohol, free from water, has a specific gravity at 32° F. of 0.8101. Its chemical for¬ mula is CHa.OH ; it is the hydrate of the organic radical ((methyl® (CH3), being analogous in this respect to ethyl alcohol, which is the hydrate of the organic radical <(ethyl® (C2H5). It boils at about 151° F. under ordinaiy atmospheric pressure.

1. Alcohol. — In organic chemistry, a mem¬ ber of a numerous class of compounds consist¬ ing of carbon, hydrogen, and oxygen, and de¬ rived from hydrocarbons containing an even number of hydrogen atoms by the substitution of one or more hydroxyl molecules (HO) for an equal number of hydrogen atoms. The alcohols, as thus defined, include the two sub¬ stances described above, and also many others (such as glycerin) whose properties at first

sight appear to be radically different from those of either ethyl or methyl alcohol. Alcohols are classified as monohydric, dihydric, trihydric, tetrahydric, pentahydric and hexahydric, ac¬ cording as they contain one, two, three, four, five or six molecules of hydroxyl (OH). Thus ethyl alcohol, (AH;, OH, is monohydric, while glycerin, C3H5. (OH)3, is trihydric. In the present article only the monohydric alcohols will be considered. These are divisible into five general series as follows: (a) Those hav¬ ing the general formula CnH2n-K.OH; they are derived from the paraffins, CnH2n + 2, by the substitution of one molecule of OH for one atom of hydrogen and are known as the Matty alcohols.® (b) Those having the formula CnH2n — i.OH. Allyl alcohol is the most familiar member of this series. Its formula is (AH.-, .OH. (c) Those having the general formula CnH2n — 3. OH. No familiar example can be given. (d) Those having the general formula CnH2n — j.OH. This series is derived from the aromatic series of hydrocarbons, just as the first series given above is derived from the paraffins. Thus, when hydrogen peroxide. H202, acts upon benzene, CeHs, we have C6H6 + H202— H20 + CcH5.OH, the last expres¬ sion in this equation being the formula of phenyl alcohol, or (as it is more familiarly known) carbolic acid. (e) Those having the general formula CnH2n — j.OH. Cholesterin be¬ longs to this series. It will be evident that the complete discussion of even the monohydric alcohols would be impossible in the present place ; hence in what follows attention will be confined to the fatty or paraffin series of mono¬ hydric alcohols, having the general formula CnHan + x.OH. No less than 17 distinct mem¬ bers of this series are known, the first five, when they are arranged in order according to the number of carbon atoms they contain, being :

Methyl alcohol, CHa.OH.

Ethyl alcohol, (AHs.OH.

Propyl alcohol, C3H7.OH.

Butyl alcohol, C4H9.OH.

Amyl alcohol, GHn.OH.

The first two members of this series do not admit of any isomeric modifications ; but the third member admits of one such modification and the following members admit of more than one. For example,

propane has the formula CH3.CH3.CH3, and an alcohol may be formed by substituting OH for any one of the H atoms in this formula. If a hydrogen atom at the end of the formula be replaced in this way, we shall obtain the same result whether the substitution be made at the right-hand end or the left ; that much is evident from the symmetry of the formula. But if one of the hydrogen atoms in the central CH2 be so replaced the alcohol thus formed may differ from the one previously ob¬ tained by an end substitution ; and in fact ex¬ periment shows that two different alcohols do actually exist, both having the same formula C3H7OH. These are distinguished as ((pri- mary® and ˆsecondary® respectively. In gen¬ eral, an alcohol is called ((primary® if the carbon atom to which the OH is attached is itself attached to only one other carbon atom ; it is ˆsecondary® if the carbon atom to which the OH is attached is itself attached to two other carbon atoms ; and it is ((tertiary® if this car¬

bon atom is attached to three other carbon atoms. If it is admitted that the quantivalence of carbon is never greater than four, it follows that no carbon atom can be attached to more than three other carbon atoms ; hence every alcohol in the class under consideration must be either primary, secondary or tertiary. The various radicals with which hydroxyl (OH) is combined in the alcohols are collectively called alkyls. Thus CH3 (methyl), C2H5 (ethyl) and C3H7 (propyl) are all <(alkyls,® and an alcohol may be briefly described as the hydrate of an alkyl. Other alkyl compounds are also known. For example, hydrochloric, hydrobromic, hy- driodic or hydrofluoric acid, when allowed to act upon an alkyl hydrate, yields the chloride, bromide, iodide or fluoride of that alkyl. Thus : CH3.OH + HCl = CH3.C1 + H20 ; and C3H7.0H + HI = C»Ht.I + H20. CH3.C1 is <(methyl chloride® and C3H7.I is (<prop3d iodide,® The oxides of alkyls are called ((simple ethers.® (See Ether). For example, (C2H5)2.0 is eth)d oxide (or ether), often erroneouslv called (sul- phuric ether® from the fact that sulphuric acid is used in preparing it. By the action of vari¬ ous acids upon alkyl hydrates (or alcohols), salts of these alkyls, entirely analogous to the metallic salts, are obtained. Thus acetic acid and ethyl alcohol react according to the equa¬ tion :

GH5.OH + CH3.COpH = CH8.COO (C2H5) + H20.

Ethyl Acetic Ethyl Water

hydrate acid acetate

This reaction is entirely analogous to the fol¬ lowing familiar one relating to potassium :

k.oh + ch3.cooh = ch3.cook + h2o.

See Esters.

Allan D. Risteen.

ALCOHOL ENGINE. Sec Internal

Combustion Engine.

ALCOHOLISM, a term applied to the symptoms produced by poisoning with ethyl alcohol (see Alcohol). Alcoholism may be acute, subacute or chronic, and in order to understand its phases a brief review of the more important features of the physiological action of alcohol is necessary. Locally alcohol is an irritant, and induces congestion and in¬ creased cellular activity. There appears to be some foundation for the popular view that taken before a meal alcohol increases the wish to eat, for although in any marked quantity it greatly reduces or altogether inhibits the action of the digestive ferments it is probable that the in¬ creased amount of gastric juice secreted under the influence of small amounts more than makes up for this effect. Some authorities maintain that while the alcohol remains in the stomach digestion is retarded, but that after absorption of the alcohol the process advances more rapidly than would otherwise have been the case. The most important effect of the administration of alcohol is manifested through the nervous sys¬ tem. There is no doubt that physiologically alcohol is always a poison. Its psychological effects, however, need special attention. Experi¬ ments show that tasks like the addition of columns of figures or reading series of discon¬ nected. syllables are performed less rapidly and more inaccurately when the person had taken moderate amounts of alcohol, though he usually feels increased self-confidence and is convinced

that the actually inferior work he is doing is especially good. It is in this way that alcohol often aids the after-dinner speaker, who by moderate amounts of wine is relieved of diffi¬ dence or embarrassment and is enabled to speak with a fluency apparently rarely at his command under ordinary conditions. It is probable that the capacity for muscular work also is only apparently augmented by alcohol, the slight in¬ crease in efficiency at the start being neutral¬ ized by the earlier onset of fatigue. According to modern observers alcohol has but little direct effect on the circulation, though there is

some change in the distribution of the blood through dilatation of the peripheral vessels. Respira¬ tion is little if at all affected. The question of whether or not alcohol is a food has elicited much controversy, but the experiments of At¬ water, Neumann and others show beyond doubt that a certain amount of alcohol can be com¬ pletely burnt in the. body and serve as a source of heat and energy. In this way a saving of other food stuffs is effected, and in this sense alcohol is undoubtedly a food. The view up¬ held by some of the older authors that alcohol has the power of lessening the oxidation of the tissues is, however, unfounded. The modern tendency is to regard alcohol not as a physio¬ logical stimulant but as a universal depressant. From the above it might be inferred that alco¬ hol does not possess the traditional value as¬ cribed to it in medicine, and to some extent this is true. On the other hand, there are many legitimate indications for its use that cannot be met by other drugs and few thoughtful clinicians would be willing to do without its aid. Alcohol is often used in popular medicine without a correct conception of its action. Con¬ trary to general belief it does not raise the bodily temperature, but actually causes it to fall on account of the increased radiation of heat from the surface of the body accompanying the dilatation of the blood vessels of the skin. Con¬ sequently alcoholic drinks should not be taken before exposure with the idea of avoiding fatigue or chilling, though there is no objection to its use when the exposure is over and the individual has returned home wet or chilled through.

Acute alcoholic poisoning follows the tak¬ ing of very large quantities of strong spirits in a short time, and is not often seen. The patient promptly becomes comatose, the face is con¬ gested or purplish, there is complete muscular relaxation, weak heart action and collapse, end¬ ing in death through paralysis of the heart or of respiration or both, unless medical aid is given.

Subacute alcoholism is the ordinary type of drunkenness or ˆintoxication® and pro¬ duces different manifestations in different in¬ dividuals. The first effect of moderate amounts of alcohol is to cause exhilaration, garrulity, in¬ distinctness and incoherency of speech, blunt¬ ing of the sense of touch, and loss of muscular control so that the patient is unsteady on his feet and staggers when he walks. Dizziness and disturbances of sight and hearing may also appear, and finally a deep lethargy and stupor supervene. On awaking, nausea, vomiting, headache and mental depression remind the sufferer of his debauch. In some individuals the stage of hilarity does not appear and quar¬ relsomeness and moroseness are manifested

from the start. The insensibility of alcoholic intoxication to some

extent resembles that at¬ tending certain grave disorders like apoplexy, epileptic coma, fracture of the skull or opium poisoning, and mistakes in diagnosis on per¬ sons found unconscious in the street are un¬ fortunately not infrequent. The true state of affairs is often extremely difficult to recog¬ nize, and it is always wiser to treat doubtful cases as if the more serious trouble existed. The fact that the breath smells of liquor is of little value, as bystanders may have sought to aid a victim of other conditions in this wa}ˆ or a man who has indulged in alcohol may also be suffering from some of the difficulties men¬ tioned. Some persons instead of becoming stuporous pass into a condition of wild excite¬ ment and uncontrollable fury termed alcoholic mania, during which the most revolting crimes may be committed. In others convulsive seiz¬ ures, or alcoholic epilepsy, may succeed the first stage. Dipsomania is a form of mental disturbance in which the patient is subject to attacks of irresistible craving for liquor, though in the intervals he may be quite rational and alcoholic beverages may even be repugnant to him. It is most frequently a manifestation of a compulsive neurosis, or a mild manic-de¬ pression psychosis. Delirium tremens is a state of nervous unrest sometimes following a pro¬ tracted debauch, sometimes appearing in steady, but not necessarily excessive, drinkers, usually as the result of some physical or mental shock. There are distaste for food, intense restless¬ ness, terrifying hallucinations and illusions and obstinate insomnia. The treatment of acute alcoholism comprises, first, elimination of the poison by washing out the stomach, purging, rectal irrigation with salt solution, and the Turkish bath; and secondly, the substitution of other stimulants such as ammonia, strychnine, caffeine, etc., until nourishment can be retained and strength returns. In delirium tremens the two great indications are to produce sleep and nourish the patient, problems that often tax the ingenuity of the physician to the utmost.

Chronic alcoholism is the result of long continued immoderate indulgence in alcoholic liquors and is a serious cause of disease. It is always due to mental causes. Nearly all the organs of the body are affected and exhibit a new growth of connective tissue. The blood vessels show the lesions of arterio-sclerosis, the heart is affected in a variety of ways, com¬ monly becoming fatty and weak, the kidneys develop nephritis, the liver cirrhosis, and the stomach is the seat of a chronic catarrhal condi¬ tion giving rise to nausea, vomiting and dis¬ taste for food. There are congestive and catarrhal changes in the respiratory apparatus ; the bodily strength is decreased and there is a tendency to obesity. There is also marked in¬ volvement of the nervous system leading to complete mental and moral deterioration

with loss of will power, loss of memory and inca¬ pacity for the responsibilities of life. Chronic alcoholics have lessened power of resistance to infectious diseases and readily break down under the stress of any mental or physical strain. The treatment of chronic alcoholism requires isolation of the patient, preferably in an institution. Some authorities advise im¬ mediate withdrawal of all alcohol, others recom¬ mend a more gradual process of ((tapering off.®

Which method is preferable depends on the in¬ dividual case. Hypodermic injections of nitrate of strychnine form the basis of some of the courses of treatment. The use of atropine, phvsostigmine, pilocarpine, as drugs which con¬ trol the disturbance of balance in the vegeta¬ tive nervous system, which is characteristic in chronic alcoholic states, is advisable. (See Crime; Pauperism; Temperance). Consult Cushny, (A Textbook of Pharmacology and Therapeutics *; Jelliffe, S. E., (The Mentality of the Alcoholic* (New York Medical Jour¬ nal, May 1917) ; Jelliffe and White, dis¬ eases of the Nervous System *(1917); (Modern Treatment of Nervous and Mental Diseases) (1913) ; Kelynack, T. N., (The Drink Problem1* (New York 1907) ; Phelps, E. B., (The Mortality of AlcohoP (ib., 1911). Consult also (Economic Aspects of the Liquor Problem *(Boston 1899) ; ((The Relations of the Liquor Traffic to Pauperism, Crime and Insanity,® in (Twenty-sixth Annual Report of the Massachusetts Bureau of Labor Statistics* (Boston 1895) and ((Economic Aspects of the Liquor Problem,* *in (Twelfth Annual Report of the United States Department of Labor* (Washington 1898).

Karl M. Vogel, M.D.

ALCOHOLOMETRY, the process of esti¬ mating the amount of percentage of alcohol in spirits. Several methods are employed for this purpose, but the commonest consists in deter¬ mining the specific gravity of the spirit. Every mixture of alcohol and water has a specific gravity of its own depending on the tempera¬ ture and on the relative composition of the mixture. As liquors contains substances other than alcohol and water they must be carefully distilled before a test can be made. When the specific gravities of various mixtures have been determined, the composition of a sample is readily determined by finding its specific gravity and observing the temperature.

ALCORAN, al'koˆ-ran or al'ko-ran. See Koran.

ALCORN, al'kern, James Lusk, American statesman: b. near Golconda, Ill., 4 Nov. 1816; d. 30 Dec. 1894. He was educated at Cumber¬ land College ; five years deputy sheriff of Liv¬ ingston County, Ky. ; member of the legislature 1843 ; in 1844 removed to Mississippi and began law practice and was in the Mississippi legis¬ lature 1846-65. He was a Scott presidential elector in 1852, declined a Whig nomination for governor 1857, and the same year was defeated for Congress by L. Q. C. Lamar. He founded the levee system in the State. In 1861 he was in the Secession Convention, and was elected brigadier-general, but Jefferson Davis refused his commission from political grudge. In 1865 he was elected United States senator, but not allowed to take his scat. In 1869 he was elected governor (Republican), but resigned on election to the United States Senate, where he served 1871-77. He was independent candidate for governor in 1873, but was defeated.

ALCOTT, al'kut, Amos Bronson, Ameri¬ can philosopher and educator : b. Wolcott, Conn., 29 Nov. 1799; d. 4 March 1888. In 1823 he set up an infant school, teaching it by con¬ versation ; and it gained much local fame. In 1828 he removed to Boston, and till 1836 con¬

ducted a school of the same sort, exciting wide attention by his genius for teaching, his revolu¬ tionary methods, and his exaggerated respect for the infant mind. His system was dis¬ favored by most people, and in 1836 he removed to Concord, Mass., thenceforth expounding re¬ form views on all human subjects, society and theology, diet and education, politics, morals and metaphysics. Lie became an admired pub¬ lic lecturer in the great days of the lecture plat¬ form. In 1842 he visited England, where a Pestalozzian school near London had been named Alcott House. He returned with two English friends, one of which, Charles Lane, bought an estate in the town of Harvard, Mass., for a communistic settlement, and the others joined him; but it failed. Mr. Alcott lived in Boston for a while, but finally returned to Con¬ cord, where he spent the remainder of his life as a ((peripatetic philosopher, *as justly said: giving talks in different tow-ns and cities on all human subjects when invited — first at random, but latterly formal, with printed topics and regular places and periods. The conversation was nominally open, and questions in order ; but it was soon found better to let it be a mono¬ logue by Mr. Alcott, who was put out by inter¬ ruptions and could not argue. The company lost nothing; for though entirely unsystematic, and having no set philosophv which could have been developed into a school, he was fertile in ideas of deep spiritual insight and noble loftiness, and many leaders of thought, as Emerson, ac¬ knowledged*

him as a source of some of their best inspirations. In this characteristic of in¬ tellectual scrappiness, yet great molding in¬ fluence, he may be compared with Coleridge and St. Simon. He was a leader among the Transcendentalists ; and that he was an ardent Abolitionist goes without saying. His grounds in Concord represented his independence of mind and whimsicality; they were fenced by himself with gnarled pine boughs of endless diversity of form, apparently picked up as he walked. He contributed (Orphic Sayings to the Dial, of Boston (1839-42), and published many scattered papers ; (Tablets (1868); Con¬ cord Days, *recollections of that place (1872); ˆTable Talk* (1877) ; (Sonnets and Canzonets*

(1877).

ALCOTT, Louisa May, American novelist,

daughter of A. B. Alcott : b. Germantown, Pa., 29 Nov. 1832; d. Boston, Mass., 6 March 1888, two days after her father. She was two years old when her parents moved to Boston ; eight when they went to Concord. Her father was her chief teacher, on the system of his famous infant schools ; as the latter developed no other geniuses, probably nature was responsible for hers. Thoreau also taught her for a time. She had always creative facility and sense of liter¬ ary form, and began writing in early youth ; at first for pleasure, then at 16 for periodicals to help support the struggling family, whose main¬ stay she continued all her life, her father's su¬ periorities not being of the money-making or¬ der. But for many years afterward she groped for her true field, starting with sensational stories of no permanent merit. For 10 years she was a school-teacher. In 1862 she went to Washington as a war hospital nurse and wrote letters thence to her mother and sisters; on her return in 1863 she recast these into a volume

entitled ˆHospital Sketches, *as the easiest available literary capital, not suspecting that she had found her kingdom. In these was first re¬ vealed her peculiar power of sketching common¬ place people and scenes in all their common¬ placeness, yet by the play of genial humor and rare selective art making them as charming as the best creations of the fancy. The success of these stimulated the publication of < Little Women* (written 1867, after return from a year's European trip for impaired health, pub¬ lished 1868), which sold 60,000 copies the first year, and which

still remains one of the best copyrights in American literature. It raised her at once and justly to one of the front places in American authorship, and remains the one work of hers the world would much regret losing. In formal art it has no merits; there is no struc¬ ture and no climax, merely detached scenes of an uneventful life ; little delicacy of touch, though there are passages of much tenderness and pathos; but the healthy sense and stereo¬ scopic lifelikeness make it rather an addition to people's actual experiences than their memories of fiction ; and the girls, despite the blunt por¬ trayal of surface faults and even over-harsh lack of idealization, are loved like sisters by millions. It is the world-photograph of the New England home and the American girl. This was her great opportunity; her own fam¬ ily and friends to <(compose** and adorn, with scant need for imagination, of which she had little, or plot, in which she was very deficient. After this, 'with the necessity of inventing a set story, and her personal life mostly wrought into her previous work, her limitations were strongly apparent: (An Old-Fashioned Girl (1869),

(Little Men *(1871) and a series of later ju¬ veniles, though only less popular with the young than (Little Women,* add nothing to her real reputation. They are also deformed by two unwholesome qualities : one derived from her father, — representing grown people mainly as vexatious interferences with children's enjoy¬ ment and the latter as quite capable of teaching wisdom to their elders ; the other a proof how much feminine craving lay underneath her spinster life, — making love-sentiment a ' sauce to everything from the kindergarten up, and the world one vast scene of (<philandering. **But these pot-boilers had a higher motive and result than most money-earning, for they enabled her father to live his serene life. She adopted at different times a son of her sister, Mrs. John Pratt (((Meg**) and the orphaned daughter of her artist sister, Mme. Nieriken (((Amy**) ; and kept house for them and her father in vigorous New England fashion, caring for the latter like a baby. Fatigue and excitement during his last hours laid her low with a fatal brain fever. Besides the books above mentioned she pub¬ lished (Flower Fables or Fairy Tales* (1855) ;

(Moods *(1864, revised 1881) ; a series, (Aunt Jo's Scrap Bag* (1871-82) ; (Work, a Story of Experience *(1873) ; (Eight Cousins*

(1874) ; (Rose in Bloom *(1876) ; (Silver Pitchers* (1876); (Under the Lilacs *(1878); (Jack and Jill* (1880) ; (Proverb Stories *(1882) ; (Spinning-Wheel Stories* (1884) ;

(Lulu's Library* (1885).

ALCOTT, May (Mme. Ernest Nieriken), American artist, daughter of A. B. Alcott : b. Concord, Mass., 1840; d. 1879. She studied at

the Boston School of Design, and under Krug, Rimrner, Hunt, Vautier, Johnston and Muller. Thenceforward she lived variously in Boston, London and Paris; after marriage chiefly in the last. She did good work in still-life paint¬ ing, both oil and water-color, and copied Turner so ably that Ruskin had some of the work adopted for models at the South Kensington schools. She published (Concord Sketches, *with a preface by her sister (1869) ; (Art Study¬ ing Abroad* (1879).

ALCOY, al-ko'e, Spain, a town in Valencia, 24 miles north by west of Alicante, near the source of the Alcoy, in a hollow encircled by hills. There is a Roman bridge over the river and the town has a very picturesque appearance. Its chief manufacture is paper and it is famed for the peladillas or sugar-plums of Alcoy. Pop. 34,000.

ALCUIN, al'kwin, or FLACCUS AL- BINUS, an Englishman, renowned in his age for learning; the confidant, instructor and ad¬ viser of Charlemagne. He was born probably in York in 735 and was educated under the care of Archbishop Egbert, and his successor 2Elbert, with whom he went to the continent, and who afterward gave him the management of the school at York. Having gone to Rome to bring home the pallium (see Pallium) for Eanbert, the successor of 2Elbert, Charlemagne became acquainted with him in Parma on his return ; invited him, in 782, to his court and made use of his services in his endeavors to civilize his subjects. In the royal academy he was called Flaccus Albinus. To secure the benefit of his instructions Charlemagne established at his court a school, called Scltola Palatina, or the Palace School, and intrusted him with the su¬ perintendence of several monasteries, in which Alenin exerted himself to diffuse a knowledge of the sciences. Most of the schools in France were either founded or improved by him ; thus he founded the school in the abbey of Saint Martin of Tours, in 796, after the plan of the school in York. He himself instructed a large number of scholars in this school, who after¬ ward spread the light of learning through the empire of the Franks. Alcuin took his leave of the court in 801 and retired to the abbey of Saint Martin of Tours, but kept up a constant corre¬ spondence with Charles to the time of his death in 804. He left, besides many theological writ¬ ings, several elementary works in the branches of philosophy, rhetoric and philology; also poemsˆ and a large number of letters, the style of which, however, is not pleasing and plainly betrays the uncultivated character of the age ; nevertheless he is acknowledged as the most learned and polished man of his time. He un¬ derstood Latin, Greek and Hebrew. The best

edition of his works is that published at Ratis- bon (1777, 2 vols.). Consult Lorenz's (Life of Alcuin* (translated into English, London 1837).

AL'CYONA'RIA (from Gk. alkyon[e]ion, bastard-sponge), a sub-class of coral polyps (Anthozoa) , including fan-corals, <(dead men's fingers,** organ-corals, the red coral used for beads and ornaments and others. Eight tenta¬ cles around the mouth and the eight cells into which the bodv is divided are the characteristic elements of this group. See Coral; Gorgonia.

ALCYONE, the brighest star of the Pleiades (q.v.). Also see Kingfisher.

ALDAN, a river of eastern Siberia, a trib¬ utary of the Lena, 1,200 miles in length, navi¬ gable for 600 miles. The Aldan Mountains run along parallel to it on the left for 400 miles.

ALDANA, Ramon, alda-na, ra-mon', Mexi¬ can poet : b. 1832 ; d. 1882. Besides four dramas, among which are (Honor and Happi- ness) and (Nobility of Heart, } he produced lyric poems and sonnets and contributed articles to journals.

ALDBOROUGH, ald'bur'o, or locally a'bro, or ALDEBURGH, a small seaport and watering-place of Suffolk, 29 miles northeast of Ipswich by rail. It was disfranchised in 1832; but in 1885 it received a new municipal charter. It has a quaint, half-timbered moot hall; and in the church is a bust of the poet Crabbe, who described the place in his poem (The Boroughˆ It has a two-mile promenade, golf links and lobster and herring fisheries. Pop. 2,400.

ALDEB'ARAN, a star of the first magni¬ tude, forming the eye of the constellation Taurus or the Bull, the brightest of the five stars known to the Greeks as the Hyades. Spectrum analysis has shown it to contain anti¬ mony, bismuth, iron, mercury, hydrogen, so¬ dium, calcium, etc.

ALDEGREVER, al'de-gra'ver, or ALDE- GRAF, Heinrich, German artist : b. Pader- born, Westphalia, 1502; d. Soest before 1561; the most important artist of Westphalia during the 16th century and one of the great names in German art. The story of his life can only be gathered from fragmentary allusions which tell us that he was the son of Hermann Aldegrever (the family name was really Trippenmeker,

which the artist used in signing some of his works), that he became a citizen of Soest, where be was highly esteemed and where he died. The last date known on any work by him was 1555. Aldegrever was eminent as goldsmith, painter and engraver. In the first capacity he had such patrons as Duke Wilhelm of Cleve, and like most artists of his day, worked at various re¬ lated branches of the craft (glass, small sculp¬ ture, etc.). His paintings are not numerous but of a very high standard. The (Portrait of a Young ManJ now in the Liechtenstein Gallery in Vienna, perhaps his masterpiece in this art, or the (Young Man with the Pink *in the Na¬ tional Gallery of London, shows the German school at almost its best level ; the scrupulous exactitude of observation and of workmanship being informed by a spirit of human apprecia¬ tion and a real sensitiveness to design. Other paintings of high quality by the master are (The Resurrection * at Prague and a (Portrait of a Man* at Berlin. Aldegrever's greatest im¬ portance is as an engraver, the number of works attributed to him in this medium being 289 (Bartsch). There is a good collection in the British Museum. One of his earliest plates is a free copy after Diirer, and the influence of the master persists for some time and is most fruitful of good. (<The greatest of all the (Little Masters),)) says W. B. Scott, ((Aldegre- ver is the most worthy successor to Albert Diirer.® His inventive power never fails and

shows itself alike in purely ornamental designs, in landscape and in figure work, like the (Wed- ding Guests) or the (Melanchthon.* Alde¬ grever was apparently much stirred by the Ref¬ ormation, and the gravity of its thought is translated by the severe and yet most vital treatment which he accords to lines and masses, to the human face and figure. Consult (Die Nurnberger Kleinmeister) (Leipzig 1911).

ALDEHYDE (((dehydrogenated alcohol,® or alcohol which has been deprived of a portion of its hydrogen), a substance intermediate in composition between a primary alcohol and the corresponding acid. When an alcohol (q.v.) containing the molecular group CH-.OH is acted upon by oxidizing agents, it loses two atoms of hydrogen from this group and becomes trans¬ formed into a substance which no longer con¬ tains the hydroxyl group (OH), and which is known as the ((aldehyde® of the alcohol from which it was produced. In the laboratory al¬ dehyde is formed by the oxidation of alcohol by air in the presence of platinum black or by manganese dioxide and sulphuric acid, and sub¬ sequent rectifying with calcium chloride. It may also be prepared by passing alcohol through an iron tube heated to 1,350° F. For commer¬ cial use it is collected from the first vapors which come over in the rectification of alcohol which has previously been filtered through char¬ coal. The largest yields are obtained from po¬

tato alcohol and from alcohol made from the juice of the sugar beet. The aldehjˆde is sep¬ arated from the alcohol in a special still con¬ trived for the purpose. If the formula of the original alcohol is R.CH2.OH, that of the cor¬ responding aldehyde is R.CO.H. Aldehydes combine with bisulphites (or acid sulphites), producing compounds that are usually soluble in water, but insoluble in a solution of a bi¬ sulphite. Hence if a solution containing an al¬ dehyde is shaken with a saturated solution of a bisulphite (such as HNaS03), the aldehyde is all thrown down in the form of an insoluble compound, from which the aldehyde itself may afterward be liberated by treatment with dilute sulphuric acid and distillation by steam. Alde¬ hydes are easily oxidized into their correspond¬ ing acids and on account of their affinity for oxygen they act as powerful reducing agents. An aldehyde may also be reconverted into the alcohol from which it was obtained, by the action of sodium amalgam. About 50 aldehydes are known, nearly all of which are volatile liquids.

The general relation of the aldehydes to their corresponding alcohols and acids may be illus¬ trated by the following examples: The formula of methyl alcohol is CH3.OH or H.CH2.OH. In the presence of platinum black, air oxidizes methyl alcohol in accordance with the following equation :

H.CH2.OH + O = H20 + H.CO.H.

H.CO.H (or CH2O) is ((formic aldehyde® or ˆformaldehyde.® This rapidly absorbs oxygen and undergoes the change

H.CO.H + 0 = H.COOH.

Formaldehyde Formic acid

Again, if ethyl alcohol (C2H5.OH or CH3.CH2.OH) is treated in the same manner (or better, if it is oxidized with a mixture of

potassium bichromate and sulphuric acid), we have

CH3.CH?.OH + O = CHa.CO.H + H.O.

Ethyl alcohol Acetic aldehyde

If allowed to absorb oxygen, acetic aldehyde then undergoes the

further transformation

CH3.CO.H + O = CHa.COOH.

Acetic aldehyde Acetic acid.

Acetic Aldehyde or Acetaldehyde. — When not qualified in any way the term aldehyde is understood to mean acetic aldehyde, the sub¬ stance whose formation from ethyl alcohol has just been described. It is found among the products of the dry distillation of sugar, in wines during the ageing process, in crude wood alcohol and in crude petroleum. Aldehyde (in this sense) is a colorless liquid with a suffo¬ cating smell, miscible in all proportions with water, alcohol and ether, boiling at 70° F. and having a specific gravity of 0.800 at 32° F. It is highly inflammable and burns with an almost non-lumitious flame. It is capable of existing in several polymeric states, each having the same chemical composition as aldehyde, but differing from it in appearance and behavior. Thus al¬ though aldehyde may be preserved for a long time if kept in contact with excess of acid, in its pure state it soon deposits a solid substance in needle-like crystals known as metaldehyde, which sublimes at 240° F. without decomposi¬ tion, and is reconverted into aldehyde when confined and heated to 260° F. By treatment with sulphuric or hydrochloric acid, aldehyde may be converted into a liquid known as par¬ aldehyde, a colorless liquid which boils at 255° F., has a vapor density indicating the formula 3(C2H40) and crystallizes in large transparent prisms at about 50° F.

Aldehyde is used for silvering mirrors and other objects, 011 account of the property that it possesses (in common with other aldehydes) of throwing down a deposit of bright metallic silver when heated with a concentrated am- moniacal solution of silver nitrate containing a little caustic soda..

ALDEN, al'den, Bradford R., American soldier: b. Meadville, Pa., 1800; d. Newpcjrt, R. I., 10 Sept. 1870. Graduating at West Point 1831, he was instructor there 1833— 40 after some camp and garrison life; then for nearly two years aide to Winfield Scott; after three years more of garrison duty was commandant at West Point 1845-52. Sent to the far West for service in the Puget Sound Indian troubles, in 1853 he organized and led an expedition against the Rogue River Indians of southwest Oregon; and in the fierce battle at Jacksonville 24 Au¬ gust, was permanently disabled and forced to retire from the army. Pie was a man of cul¬ ture and fine literary tastes.

ALDEN, Henry Mills, American author: b. Mt. Tabor, Vt., 11 Nov.

1836; d. 7 Oct. 1919. He was graduated in 1857 at Williams Col¬ lege, in the class with James A. Garfield and Horace E. Scudder; in 1860 at Andover Theo¬ logical Seminary and received license to preach, but was never ordained. He settled in New York in 1861 ; was managing editor of Har¬ per's Weekly 1863-69 and was editor of Harper's Magazine after 1869. His earliest interests were classical, especially in regard to ancient thought, religion and literature; in the

winter of 1863-64 he delivered 12 lectures at the Lowell Institute, Boston, on (The Structure of Paganism 5 ; his earliest writings published were two papers on the (Eleusinian Mysteries,5 in the Atlantic Monthly; and his classical scholarship is recognized as of a high type. In his editorial work he endeavored to combine fresh intellectual outlook and the presentation of the latest results of scholarship with sound ethics and an elevating social tone ; also to make the magazine American in the best sense and to bring forward new writers. He collaborated with A. H. Guernsey in (Harper's Pictorial His¬ tory of the Great Rebellion5 (1862-65) ; and published (The Ancient Ladv of Sorrow) (poem, 1872); (God in His World5 (1890, anonymous), a (Study of Death5 (1895), widely read and admired, and (Magazine Writing and the New Literature5 (1908).

ALDEN, (Mrs.) Isabella McDonald

((<Pansy55), American juvenile writer: b. Roch¬ ester, N. Y., 3 Nov. 1841. She was educated at Ovid and Auburn, N. Y., and while she has written fiction for adults and (The Prince of Peace,5 a life of Christ, her chief note is as the author of the (Pansy Books,5 Sunday- school juvenile novels, about 60 volumes in all; and as editor of the juvenile periodical Pansy (1873-96). She has since been on the staff of the Christian Endeavor World of Boston and the Herald and Presbyter of Cincinnati.

ALDEN, James, American naval officer: b. Portland, Me., 31 March 1810; d. San Fran¬ cisco, Cal., 6 Feb. 1877. Becoming midshipman 1828, he accompanied the Wilkes expedition around the world 1838-42; commissioned lieu¬ tenant 1841, he served through • the Mexican war in all the leading seaboard engagements. The Puget Sound Indian troubles called him thither 1855-56 for active duty. The Civil War found him in command of the steamer South Carolina, and he was sent to the Gulf and had a fight at Galveston, Tex. ; later, in command of the sloop-of-war Richmond, he was at the pas¬ sage of Forts Jackson and Saint Philip and the capture of New Orleans and Port Hudson. He became captain 1863 and commanded the Brook¬

lyn in the battle of Mobile Bay (August 1864) and the assaults on Fort Fisher; commodore 1866, and given charge of the Mare Island (Cal.) navy yard 1868; in 1869 made chief of the bureau of navigation, and in 1871 promoted to rear-admiral and assigned to command- of the European squadron. He was retired 1873.

ALDEN, John, of the Plymouth colony : b. England 1599; d. Duxbury, Mass., 12 Sept. 1687. His name is familiarized by Longfellow's poem (The Courtship of Miles Standish.5 He was originally a cooper of Southampton, was employed in making repairs on the Mayflower and came over in her with the Pilgrim Fathers. By some accounts he was the first to step ashore at Plymouth. He married Priscilla Mullens: the tradition is (as used by Long¬ fellow) that he had previously pleaded the cause of Miles Standish. He was for over 50 years a colonial magistrate and highly esteemed for probity, sagacity and resolution. All the distinguished Aldens of the United States arc his descendants.

ALDEN, William Livingston, American humorous writer and journalist: b. Williams-

town, Mass., 9 Oct. 1837 ; d. Buffalo, N. Y., 14 Jan. 1908. He introduced canoeing into the United States. He was for a time United States consul-general at Rome. He wrote ‘Domestic Explosives1 (1877) ; ‘Shooting Stars1 (1878); (The Canoe and the Flying Proa1 (1878) ; (Moral Pirates1 (1880) ; (The Comic Liar1 (1881) ; (Cruise of the Ghost' (1882); (Life of Christopher Columbus1 (1882); (A New Robinson Crusoe1 (1888); ‘Drewitt’s Dream1 (1902), etc. From 1900 he was London correspondent of the New York Times.

ALDENHOVEN, a town of Prussia, Rhine province; 12 miles northeast of Aix-la- Chapelle. Here the French, in 1793, under Du- mouriez, were defeated by 50,000 Austrians un¬ der Prince Josias of Coburg, and were pre¬ vented from making their contemplated inva¬ sion of Plolland.

ALDER, al'der, the common name for a genus of plants (Alnus), of the family Betu- laccce. In the eastern United States several species are very common shrubs branching freely from the roots and forming dense-clumps along the banks of streams and in other wet places. On the west coast trees often attain a height of from 40 to 60 feet in favorable loca¬ tions. It is found in temperate and cold regions. The

wood of some species is very durable in the water, and therefore well adapted to mill-work, sluices, piles of bridges, etc. The bark and shoots are used for dye, and the branches for the charcoal employed in making gunpowder. The names black, red and white alder are often popularly applied to plants of other orders.

ALDER-FLY, a fly of the dipteran fam¬ ily Sialidtz (q.v.).

ALDERMAN, al'der-man, Edwin Ander¬ son, American educator : b. Wilmington, N. C., 15 May 1861. He was educated at the Univer¬ sity of North Carolina; was superintendent of the public schools of Goldsboro, N. C., 1884— 87; assistant State superintendent of North Carolina, 1889-92; professor of English and history at the State Normal College, 1892-93; professor of education, University of North Carolina, 1893-96 ; president of University of North Carolina, 1896-1900; of Tulane Univer¬ sity, 1900-04; of the University of Virginia since 1904; LL.D. the University of the South, Tulane University, Johns Hopkins University, Columbia University, Yale University, Llniver- sity of North Carolina, Williams College, Dart¬ mouth College and Harvard University ; member of General Education Board and vice-president National Education Association, 1903; member of Virginia State Geological Commission ; mem¬ ber of Rockefeller Sanitary Commission ; member of Virginia State Educational Commission ; mem¬ ber of council of American Association for In¬ ternational Conciliation ; member of Board of Visitors of United States Military Academy, West Point, 1893; member of executive coun¬ cil of American Civic Alliance ; member of Maryland and Louisiana Historical societies ; member of American Academy of Social Sciences; member of Century Club, New York city, 1912 ; director Southern Railway. Author : 'A Brief History of North Carolina,1 (Life of William Hooper,1 (Life of Jabez Lamar Mon¬

roe Curry,1 Obligations and Opportunities of Citizenship,1 'Southern Idealism,1 (The Spirit of the South,1 Sectionalism and Nationality,1 'The Growing South1 and editor-in-chief of 'Library of Southern Literature.1

ALDERMAN, a title pertaining to an of¬ fice in the municipal corporations of Great Britain and the United States. In the United States the powers and duties of aldermen differ in the various States and cities. As a rule they are elected by popular vote and constitute the source of municipal legislation.

ALDERMAN LIZARD, or CHUCK- WALLA, nicknames in California for a fat¬ bodied lizard (q.v.).

ALDERNEY (French Aurigny), an island belonging to Great Britain, on the coast of Nor¬ mandy, 10 miles due west of Cape La Hague and 60 from the nearest point of England, the most northerly of the Channel Islands. It is about 4 miles long and 1 broad, having an area of fully 3 square miles. The coast is bold and rocky, the cliffs in many places rising from 100 to 200 feet in height. In the interior the soil is fertile producing excellent crops of corn and potatoes. About a third of the island is occu¬ pied by grass lands ; and the Alderney cows are famous for the richness of their milk. The climate is mild and healthy. The town of Saint Anne is situated in a beautiful valley near the centre of the island. A judge, with six “ju¬ rats,11 chosen by the people for life, and 12 “douzaniers,11 representatives of the people, form a kind of local legislature; but the judge and jurats alone decide upon any measure, the douzaniers having only a deliberative voice. The French language still continues to prevail among the inhabitants, but all understand and many speak English. Alderney is well forti¬ fied. At Braye there is an extensive granite breakwater, built by the British government to help form a naval station and haven of refuge. The project was a failure. Alderney, Guernsey, Jersey and Sark are the only parts of the duchy of Normandy that have remained under the government of England since 1456. The Race of Alderney is a name given to the strait running between the coast of France and this island. Six miles northwest from Alderney are the Casquets, a cluster of rocks, on the largest of which is a lighthouse and a fog-bell. Pop.

(1911) 2,561.

ALDERSHOT, al'der-shot, Camp at, a

permanent camp for the army in England, com¬ menced in 1854 by the purchase on the part of government of an extensive tract of moorland known by the name of Aldershot Heath, lying on the confines of Surrey, Hampshire and Berkshire. The object was to accustom the officers and soldiers to act in brigades and di¬ visions, and to familiarize them with the opera¬ tions of a campaign by accustoming them to camp life, and exercising them in all the evolu¬ tions which they might be required to perform when brought into actual contact with the enemy. The Basingstoke Canal divides the camp into a North and a South Camp (other¬ wise knowm respectively as Marlborough and Stanhope Lines). The accommodation pro¬ vided for the army consisted at first of wooden huts of the simplest construction; but these have been superseded by brick buildings, and

altogether the money expended on the camp has amounted to upward of $20,000,000. Until 1899 the Aldershot garrison consisted of troops available for service with the first army corps. It was later used by volunteers and militia for their annual training, and after the outbreak of the European War in 1914 vast numbers of raw conscripts were trained there before leaving for the battle fronts in Belgium, France and Macedonia. A town has sprung up in the neigh¬ borhood of the camp immediately beyond the government ground, on the edge of which the camp is established. The town of Aldershot is in Hampshire, to the south of the barracks. It contains several churches, hotels, numerous shops, and offers accommodation of various kinds, good and bad, to the soldiers ; thus there are schools, newspapers, missions, literary in¬ stitutes, music-halls, public-houses, etc. There is a fine equestrian statue of the Duke of Wellington. Pop. (1911) 35,175.

ALDHELM, an Anglo-Saxon scholar and prelate, bishop of Sherborne: b. 640 (?); d. 709. He was a great fosterer of learning and builder of churches, and has left Latin writings on theological subjects.

ALDINE, al'din, Editions, the books printed by Aldus Mauritius and his family in Venice (1490-1597). They comprise the first editions of Greek and Roman classics ; others contain corrected texts of modern classic writ¬ ers, as of Petrarch, Dante or Boccaccio, care¬ fully collated with the MSS. All of them are distinguished for the remarkable correctness of the typography ; the Greek works, however, be¬ ing in this respect somewhat inferior to the Latin and Italian. The editions published by Aldo Manuzio (1450-1515), the father, form an epoch in the annals of printing, as they con¬ tributed in no ordinary measure to the perfect¬ ing of types. No one had ever before used such beautiful Greek types, of which he got nine different kinds made, and of Latin as many as 14. It is to him, or rather to the engraver, Francesco of Bologna, that we owe the types called by the Italians Corsivi, and known to us as italics, which he used for the first time in the octavo edition of ancient and modern classics, commencing with Virgil (1501). Ma- nuzio's impressions on parchment are exceed¬ ingly beautiful ; he was the first printer who introduced the custom of taking some impres¬ sions on finer or stronger paper than the rest of the edition — the first example of this being afforded in the (Epistoke Graecae5 (1499). From 1515 to 1533 the business was carried on by his father and brothers-in-law, Andrea Torresano of Asola, and his two sons — the three Asolani. Paolo Manuzio (1512-74), Aldo's son, possessed an enthusiasm for Latin classics equal to that of his father for Greek; and he was succeeded by his son, the younger Aldo

(1547-97). The printing establishment founded by Aldo con¬ tinued in active operation for 100 years, and during this time printed 908 different works. The distinguishing mark is an anchor, entwined by a dolphin, with the motto either of aFestina lente 5) or of <(Sudavit et alsit A The demand which arose for editions from this office, and especially for the earlier ones, induced the printers of Lyons and Florence, about 1502, to begin the system of issuing counterfeit Aldines. The Aldo-mania has considerably diminished in

later times. Among the Aldine works which have now become very rare may be mentioned the (Horae Beatae Mariae Virginis) of 1497, the 'Virgil 5 of 1501, and the (Rhetores Graeci,5 not to mention all the editions, dated and un¬ dated, from 1490 to 1497 which are now ex¬ tremely rare. Consult Renouard's (Annales de rimprimerie des Aides5 (1834), and Didot's (Alde Manuce5 (1873).

ALDINI, al-de'ne, Giovanni, Italian phys¬ icist: b. Bologna, 10 April 1762; d. Milan, 17 Jan. 1834. A nephew of the famous Galvani and an accomplished linguist, he became widely known by his writings in Italian, English and French on the practical applications of galvan¬ ism, illumination, tides, fire prevention, etc. From 1734 to 1819 he was professor of physics at Bologna, was created Councillor of State and Knight of the Iron Crown by the Emperor of Austria and was founder of the school of nat¬ ural science for working men at Bologna, which he endowed.

ALDOBRANDI'NI, the name of a Floren¬ tine family, latterly of princely rank (now ex¬ tinct), which produced one Pope (Clement VIII) and several cardinals, archbishops, bishops and men of learning.

ALDOBRANDINI, al'do-bran-de'ne, Mar¬ riage, an ancient fresco painting belonging probably to the time of Augustus, discov¬ ered in 1606 and acquired by Cardinal Aldo- brandini, nephew of Clement VIII, now in the Vatican. It represents a marriage scene in which 10 persons are portrayed, and is consid¬ ered one of the most precious relics of ancient art.

ALDRED, or EALDRED, Anglo-Saxon prelate, bishop of Worcester and archbishop of York: b. 1000 (?) ; d. 1069. He improved the discipline of the Church and built several ec¬ clesiastical edifices. On the death of Edward the Confessor he is said to have crowned Har¬ old. Having submitted to the Conqueror, whose esteem he enjoyed and whose power he made subservient to the views of the Church, he also crowned him as well as Matilda.

ALDRICH, al'drich, Nelson Wilmarth,

American legislator : b. Foster, R. I., 6 Nov. 1841 ; d. 16 April 1915: A farmer's lad, with only district-school education, he was clerk in a store from about 12 to 16; but, naturally studi¬ ous and with a strong taste for mathematics, en¬ tered the East Greenwich Academy in 1857, and after graduation took a position in a large whole¬ sale house in Providence, where he soon became a partner. In 1862 he was for nine months on garrison duty near Washington. In 1869 he was elected to the Providence common council, where he became a leader as expert in finance and busi¬ ness, and a dexterous manager without compro¬ mise of right, and was its president 1871-73. In 1875 he was elected to the legislature, and in 1876 was speaker of its house. In 1878 he was sent to Congress, taking his seat in 1879 (42d Congress) ; re-elected for the term 1881— 83, he resigned in 1881. having been elected to the United States Senate on 4 October to succeed Gen. A. E. Burnside, and was re¬ elected in 1886, 1892, 1898 and 1904, practically without opposition in his party. In 1909 he successfully promoted the passage of the Payne-Aldrich tariff bill, passed by Congress

and signed by the President in 1910. His term as senator expired 3 March 1911; but he de¬ clined to stand for re-election and was suc¬ ceeded by Henry F. Levintritt. During more than 20 years he has been known as one of the chief Republican leaders, an authority on finance and political economy, and a champion of protection ; rarely taking part in debate, but powerful in legislative work, a member of committees on civil service and finance and chairman of the committee on rules for the 55th Congress. In 1911 Aldrich put forward a plan intended to increase the effectiveness of resources through their control by reserve as¬ sociations, a scheme received with suspicion by the general public, though not unfavorably re¬ garded by experts.

ALDRICH, Thomas Bailey, American au¬ thor: b. Portsmouth, N. H., 11 Nov. 1836; d. Boston, Mass., 19 March 1907. He prepared for Harvard, but his father's death (1852) pre¬ vented a college career. Held editorial posi¬ tions on the New York Evening Mirror and N. P. Willis' Home Journal till 1865. Edited Every Saturday, Boston, 1865-74, and The At¬ lantic Monthly, 1881-90. In prose and verse he held himself to the highest ideals of literary art and workmanship. He

wrote: doth of Gold) (1874); (Lyrics and Sonnets> (1880); (Friar Jerome's Beautiful Book) (1881) ; bal¬ lad of Baby BelP (1856) ; (Windham Towers1* (1890) ; (Unguarded Gates and Other Poems> (1895) ; (Mercedes, a Drama) (1883) ; (Story of a Bad Boy5 (1870) ; (Marjorie Daw and Other People) (1873) ; (Two Bites at a Cherry, and Other Tales) (1893) ; (A Sea Turn) (1902) ; dower and Thorn5 ; (Prudence Pal- fry5 ; (The Queen of Sheba5 ; (The Stillwater Tragedy5; (The Sisters' Tragedy5; (Judith and Holofernes5 ; (Ponkapog Papers5 (1903); (Judith of Bethulia,5 a tragedy in four acts (1905) ; etc. See Story of a Bad Boy, The.

ALDRIDGE, Ira Frederick, American negro tragedian: b. (?); d. Lodz, Poland, 7 Aug. 1867. The discrepancies about his birth and training are monstrous and indicate inven¬ tion on one side. One is that he was a mu¬ latto, born near Baltimore about 1810, who picked up German from immigrants, became Edmond Kean's servant, and developed stage talent under him in England, returned and made a theatrical failure in Baltimore 1830-31, then went back to England and became famous. The other is that he was son of a full-blooded negro pastor in New York city (Greene Street Chapel), an immigrant Senegal chieftain con¬ verted and educated, who sent his son to Glas¬ gow University to study for the same profes¬ sion, despite a passion for the stage justified by successful amateur performances; but the boy (at this point the stories coincide) dropped theology and made his debut at the Royal Theatre as Othello. He took at once, and Kean made him Othello to his Iago in Belfast. He played Shakespearean roles in London till 1852, regarded as an excellent interpreter in all, but most liked in color-parts, such as Othello, Aaron in (Titus Andronicus,5 Rolla, Zanga, etc. He then played in Brussels and Germany 1852- 55 ; the King of Sweden invited him to Stock¬ holm in 1857. The Continent ranked him one of the foremost actors of the age, and the greatest sovereigns, with cities like Bern, show¬

ered honors and decorations on him and made him member of all sorts of learned societies. He married an Englishwoman. He was on his way to an engagement in Saint Petersburg when he died.

ALDROVANDI, al'dro-van'de, Ulisse, Italian naturalist: b. Bologna, 11 Sept. 1522; d. 10 May 1605. He aroused interest in the nat¬ ural sciences at a time when they had been long neglected, wrote profusely on natural his¬ tory subjects, established the Botanical Garden of Bologna and, through his legacy to the Sen¬ ate of Bologna of his collections, left behind him the germ of the great Bologna Museum. A short account of his life, together with a descriptive list of his published writings and manuscripts, may be found in (Notizie degli

Scrittori Bolognesi5 (Vol. I, Bologna 1781). He was the first to collect an herbarium, in the modern sense of the word. He traveled widely, collecting plants and animals, and preparing himself to write a great work on the animal life of the world. Of this work four volumes on ornithology and one on mollusks were is¬ sued before his death, and 10 others, prepared by him from his material, were brought out afterward by his pupils and friends. Many of his manuscripts and drawings were preserved unpublished in the library of Bologna.

ALE and BEER, well known and exten¬ sively used fermented liquors, the best of which is prepared from barley after it has undergone the process termed malting. Beer is a more general term than ale, being often used for any kind of fermented malt liquor, including por¬ ter, though it is also used in a more special signification. <(The numerous varieties of malt liquors met with in commerce may be resolved into three great classes — ale, beer, porter. Ale, as the term is generally understood, is a pale liquor brewed from lightly-dried malt, and abounding more or less in unfermented sac¬ charine matter, dextrines, proteins, phosphates and the bitter and fragrant principles of the hop. Beer is a fine, strong, well-fermented liquor, darker, less saccharine and less alcoholic than ordinary ale. Porter is a dark-brown col¬ ored liquor, originally brewed from high-dried malt, but now generally made from pale malt, with a sufficient quantity of patent or roasted malt to impart the necessary color and flavor. Stout, brown stout, etc., are mere varieties of porter, differing from that liquor only in their superior strength and quality. East India ale, bitter ale, etc., of the great brewers, are bever¬ ages which combine the pale color and fragrant bitter of ale (the latter usually in undue ex¬ cess) with the (dryness5 and maturity of beer. In London porter is called beer, and indeed in all parts of the kingdom the prevailing bever¬ age of this kind consumed by the masses, of whatever class, commonly goes by the name of beer. The three great classes of malt liquor above referred to are, independent of mere dif¬ ferences of strength, excellence and commercial value, practically subdivided into an almost in¬ finite number of varieties. Every county, every town and almost every brewer is distinguished by the production of a different flavored beer, readily perceived and highly appreciated by their respective votaries55 (Cyclopaedia of Practical Receipts5). These differences depend chiefly on the quality of the materials and the

varying proportions in which they are em¬ ployed, the temperature of

the water used for mashing, the length of time the mash is boiled, the temperature at which fermentation is ef¬ fected and the extent to which it is allowed to proceed. The color of the beer depends on the color of the malt and the length of time occu¬ pied by the boiling. The pale ale is made from malt dried at relatively low temperatures; the deep-yellow ale, from a mixture of pale, yel¬ low and brown malt ; and the dark-brown beer from malt that has been highly dried in the kiln and partly roasted, mixed with the paler sorts. Of all countries, Germany has been celebrated as a beer-drinking country from the earliest times. Many different kinds of beer are made there, among the most important being the Bavarian summer or lager (that is, store) beer, and winter beer, the Bavarian bock beer, Berlin white beer, wheat lager beer, Broyhan beer (Hanover), Merseburg brown beer/ etc.

The manufacture of ale or beer is of very high antiquity. Herodotus ascribes the inven¬ tion of brewing to Isis, and tells us that the Egyptians drank a liquor which they called ziitlios, fermented from barley. Ale or beer was never used to a great extent in Greece or Italy, partly owing, no doubt, to the abundance of wine in these countries. Xenophon, in his (Anabasis, mentions it as being used among the inhabitants of Armenia, and the Gauls were also acquainted with it in early times. Ale or beer was in common use in Germany in the time of Tacitus. ((A11 the nations,® says Pliny, (<who inhabit the west of Europe have a liquor with which they intoxicate themselves, made of corn and water (fruge madida). The manner of making this liquor is somewhat different in Gaul, Spain and other countries, and it is called by many various names; but its nature and properties are everywhere the same. The peo¬ ple of Spain, in particular, brew this liquor so well that it will keep good for a long time. So exquisite is the ingenuity of mankind in grati¬ fying their vicious appetites that they have thus invented a method to make water itself intox¬ icate.® Our Teutonic ancestors would of course bring with them from the Continent their na¬ tional beverage, and accordingly we find ale mentioned in English history in very early times. It is mentioned in the laws of Ilia, King of Wessex (680), and ale-booths were regu¬ lated by law in 728. It was customary in the reigns of the Norman princes to regulate the price of ale, and a statute passed in 1272 en¬ acted that a brewer should be allowed to sell two gallons of ale for a penny in cities, and three or four gallons for the same price in the country. The use of hops in the manufacture of ale and beer seems to have been a German invention, and the name beer appears to have come from Germany to England with this practice (1524) after wThich (<beer® and ((ale® were used respectively for the hopped and the unhopped liquor. In 1552 hop

plantations had begun to be formed in England. Ale-houses were first licensed in 1621, and in Charles II's reign duties amounting to 2s. 6 d. a barrel on strong, and to 6 d. on small ale or beer, were imposed for the first time (1660). From that time up to 1830, when it was entirely repealed, though the malt-tax remained, the duty on the barrel of strong beer varied, being in 1804 as

high as 10j. Up to 1823 beer was classed into strong beer and small beer, the former being beer of the value of 16j\ and upward the bar¬ rel, the latter beer below this value. See also Brewing.

ALEARDI, ii'la-ar'de, Gaetano Aleardo,

Italian poet and patriot: b. Verona, 4 Nov. 1812; d. there 17 July 1878. He was a pupil of Manzoni and early imbibed republican prin¬ ciples. He entered the legal profession, but having circulated some satirical couplets, was expelled from Venice by the Austrian govern¬ ment and took refuge in Paris. On his return to Italy his patriotic verses aroused his com¬ patriots against Austrian domination. For his activity in the insurrection in Venetia in 1848 he was imprisoned at Josephstad, Bohemia, and did not regain his liberty until 1859, when he was at once elected deputy from Brescia. Later he became senator. He lived to see the realiza¬ tion of his life-long dream, of his own contin¬ ued efforts, a united Italy. As a poet he has always been popular in Italy, his verses having awakened the youth of Italy to strive for the regeneration and unity of their country. Of his works the following are best known: (I1 Matrimonio) (1841) ; (Arnalda di Rocca> (1842) ; (I1 monte Circello) (1844) ; (Prime Storie* (1846) ; (Une ora della mia giovinazza) (1858) ; (Poesie volante) (1862) ; (Canti patriP (1862). His works have been issued in one volume, <Canti) (6th ed., Florence 1882). Plis <Epistolario) (correspondence) was edited by G. Trezza (Verona 1879). Con-suit Bar- bera, G., (Memorie di un editore5 (Milan 1883) and Bersezio, V., (I1 regno di Vittorio Eman- uele IP (3 vols., Turin 1881).

ALECSANDRI, a'lek-san'dre, or ALEX¬ ANDRA Vasile (Basil), Rumanian song-writer and patriot: b. Bacau, 21 July 1821 ; d. Mircesti, 26 Aug. 1890. His publication of (Poesii popu- lare ale RomaniloP (1853), drew attention to the great charm and lyric quality of Rumanian folk songs and ensured cordial appreciation of his own verse, (Les doines) (1853) ; (Doine si lacrimioare) (1863; <Pastele) (1867); (Le- gende) (1871) ; and ˆpereP a complete edition of his works to date (9 vols., 1873-76). He also wrote the dramas (Despot Voda) (1880); (Fintina BlandusieP (1884); and ˆvidiiP (1885). A revolutionist and exile in early life, in 1859-60 he was Rumanian

minis¬ ter for foreign affairs ; in 1879 was elected to the upper chamber and in 1885 became Ru¬ manian minister at Paris.

ALEKSANDRA FEODOROVNA, Em¬ press of Russia, consort of Emperor Nicholas I : b. 1 July 1798; d. 19 Oct. 1860. She was a daughter of King Frederick William III of Prussia and Queen Louise Charlotte Wilhel- mine. Aleksandra Feodorovna's childhood belonged to the period of Prussia's down¬ fall caused by Napoleon. After the defeat at Jena the Prussian royal family was constrained to move from one town to another and it was only after the Peace of Tilsit that it settled in Memel. On 15 Dec. 1809 the solemn entry of the royal fam¬ ily into Berlin was celebrated by great masses of people. On that occasion the Queen of Prussia taught her daughter how to share the calamities and joys of the people. When in 1814 Grand Duke Pavpovich came to Berlin

with his armies he was presented to Princess Charlotte and fell in love with her at first sight. The fair princess had confessed in a letter to her brother William her own love for the Russian grand duke and, after a long court¬ ship she came to Saint Petersburg in 1817. The engagement took place on 25 June and the mar¬ riage on 1 July of that year. She had conceived a warm love for everything Russian, especially the language, history, folk-lore customs, etc. Professor Zhukovski had helped her consid¬ erably in her study of the language in which she showed remarkable progress. Until the ascent to the throne of Nicholas I her life flowed peacefully in the midst of her home: educating her children, cultivating music and singing, and exchanging a vast correspondence with her numerous friends. But afterward the circle of her activities became considerably broader In 1836 all the institutions founded by Empress Marie Feodorovna passed over to her care; she personally studied, superintended, in¬ creased and improved their scope. Some of them she reorganized radically. All the most important transactions, conducted by the state secretaries Villamov and Hoffman, had to be previously sanctioned by the wise Empress. In her later life she directed her attention to the education of young women and expended more than two-thirds of her enormous income on charities. Making a wholesome use of her immeasurable influence over her imperial con¬ sort, Aleksandra Feodorovna often softened the outbursts of his temper and unusual roughness which characterized the epoch after 1848. Her trips abroad were crowned by enormous diplomatic successes. She left in her

adopted country an imperishable memory of a good-hearted, noble and modest woman. Consult Daragan, (Vaspominaniya Kamer-Pazha) (Russkaya Starina 1875) ; A. T. von Grimm, Aleksandra Theodorovna, Kaiserin von Russland > (2 vols., Leipzig 1866).

ALEMAN, Mateo, a-la-man, Ma-te-o, Spanish novelist: b. Seville, September 1547; d. Mexico, about 1615. He was graduated at Se¬ ville in 1565 and in 1572 received an appointment to the royal treasury. He remained in this rela¬ tion for 20 years and quitted it as poor as when he entered it. About 1609 it appears that he was established as a printer in Mexico. He wrote a poetical life of Saint Anthony of Padua in 1604 and (Ortografhia Castellana) (Mexico 1609) ; (Sucesos de D. Frai Garcia Gera, arzo- bispo de Mejico) (1613) ; (Oracion Funebre,* of the same archbishop (1613). His great work is (Guzman de Alfarache) (1599), a novel with a rogue for the hero. It shows a wide knowl¬ edge of human nature. The hero exhibits all the resources of a consummate rascal in the various characters he assumes. The work at¬ tained great popularity and was translated into French and Italian. For the text of

(Seville 1907; the first discourse is devoted to Aleman). See Guzman De Alamanni.

ALEMANNI. See Alamanni.

ALEMBERT, dVlan-ber, Jean le Rond d',

French mathematician and philosopher : b. Paris, 16 Nov. 1717; d. there 29 Oct. 1783. The illegitimate child of Chevalier Destouches-Can- on and the celebrated Madame de Tencin, sister of the archibishop of Lyons, he was abandoned in infancy near the church of Saint Jean de Rond, a fact from which his Christian name was derived. After he had attained eminence his father recognized him and gave him a pension. While still very young he displayed such pre¬ cocity of talent that he was placed in the Col¬ lege Mazarin, where he became deeply inter¬ ested in mathematics and philosophy and, in fact, while he attempted to study both medicine and law, his inability to turn his mind to either of these professions determined him to become a mathematician. In 1740 he was admitted to membership in the Academy of Sciences and a year later he published his celebrated (Treatise on Dynamics. > Other scientific work followed rapidly, and in 1750 he became asso¬ ciated with Diderot in the publication of the (Encyclopedia, > for which he wrote the intro¬ duction, the article on mathematics and man)' of the biographies. In 1754 he became a mem¬ ber of the French Academy, and in 1772, hav¬ ing declined

several pressing invitations to be¬ come royal tutor at the court of Russia, he was elected perpetual secretary of the academy. His (Elements of Philosophy,) in which he fol¬ lowed the principles of Locke to their ultimate conclusion, both in skepticism and materialism, had appeared in 1759. Two editions of his works have been published: Paris 1805, 18 vols., and Paris 1821, 5 vols.

ALEMTEJO, a'len-ta'zhii, Portugal, a southern province, extending eastward from the Atlantic Ocean to Spain, and bounded north by Beira, south by Algarve. Area, 9,431 square miles. The chief physiographical features are : the rivers Guadiana, Tagus and Sadao ; the Algarvian Mountains on the south, 4,000 feet high; the hot, dry and barren plains of the south and west and the fertile, grazing and well-cultivated agricultural region on the east. Alemtejo is the largest, but the least populated, province of Portugal. The chief towns, giving their names to administrative districts, are Evora (the capital), Portalegue and Beja. Three lines of railway give intercommunication with Spain. Pop. 480,000.

ALENCAR, a'lan-kar', Jose Martiniano de,

Brazilian jurist and novelist: b. Ceara, 1 May 1829; d. Rio de Janeiro, 12 Dec. 1877. Although prominent in his profession he is best known as a writer of fiction, his most popular works be¬ ing (0 SertanejoP (Iracema) and (0 Guarany,* all of which are stories of local Indian and colonial life.

ALENQON, a'l afi-son', France, city, capital of the department of Orne, on the Sarthe, 115 miles by rail southwest of Paris. Anciently celebrated for manufactures of point d'Alenqon lace and diamonds, these are now comparatively unimportant, replaced by manufactures of woolens, linens, embroidery, straw hats, leather and vehicles. An important trade is also car¬ ried on in Norman horses, grain and granite

of the neighborhood. A clean well-built town, notable buildings are the circular corn market, the cloth market, the 15th century cathedral and the three remaining towers of the ancient castle of the royal dukes d'Alenqon, restored and used as the city hall. Pop. 17,500.

ALENIO, a'la'-ne'o. Giulio, Italian Jesuit missionary and author: b. Brescia 1582; d. Fu-chow 1644. From 1614, he led a remark¬ ably

active life in China during 30 years, adopt¬ ing the native dress and customs, preaching the Gospel in the provinces of Kans-si and Fo-Kien and building several churches. He wrote numerous works in Chinese, notably a (Life of Christ* which was published (8 vols., Pekin 1635-37) and has often been reprinted (3 vols., 1887) and (The True Origin of All Things, * a cosmography of 10,000 titles which refuted the principal errors of Chinese belief (6 vols., Hangkow 1623). He was also distinguished as a mathematician and is author of (Resultat de ˆobservation sur l'eclipse de la lune du 8 Novembre, 1612, faite a Macao) and published in the (Memoires de l'Academie des Sciences * (Vol. VII, p. 706).

ALEPPO, city of Syria, capital of Aleppo vilayet, traversed by the Kuwek River, about 80 miles east of the Mediterranean and 70 miles west of the Euphrates, 60 miles east of Antioch. A branch line connects with the Beirut-Damascus line south to Rayak. Aleppo is a city of great historic interest and of Arab tradition dating back to the days of Abraham. The older portion of the city still surrounded by ruins of a Saracenic wall three miles in circuit is thoroughly Oriental in type with extensive bazaars, khans and numerous mosques. The European and Christian colony live in the new Azzizieh quarters outside and the Jews in the Bahsita quarter. On a hill to the northwest stands the citadel, and along each side of the river beautiful gardens extend for several miles. Aleppo for centuries was the centre of the great caravan trade between Bagdad and Damascus, and still carries on an important export and import trade in Oriental and European merchandise. It is the commercial metropolis of northern Syria, with manufac¬ tures of silks, carpets, woolens, cotton goods, leather, etc., and is the residence of consular agents of leading countries and the seat of European and American Catholic and Protestant missions, of Greek and Armenian patriarchs and of a Maronite bishop. Area of vilayet of Aleppo, 33,436 square miles; pop. 996,000; pop. of city of Aleppo, 150,000.

ALERT. See Essex and Alert.

ALESIA, a-la'shi-a, France, a hill of the Cote d'Or, now Mont Auxois, rising above the village of Alise Ste-Reine, six miles south of Montbard, famous for the strongly fortified Gallic encampment, where Vercingetorix made his last stand against Caesar and was defeated, thus ending the conquest of Gaul. The place became a considerable city under the Romans, but was destroyed by the Normans in 864. The site has been the subject of considerable archaeo¬ logical controversy, discussion and excavation. A colossal statue of Vercingetorix, erected by Napoleon III, stands on Mont Auxois. Con¬ sult Caesar, J., (Dc

Bello Gallico) (Vol. VTI) ;

Rossignol, M., (Alise, etude sur line campagne de Jules Cesar* (Paris 1856).

ALESSANDRIA, a'les-san'dre-a, Italy, fortified city and capital of Alessandria prov¬ ince, Piedmont, on the Tanaro River, 46 miles southeast of Turin. A junction of the principal railway lines of eastern Italy, it has great strategic and commercial importance, manu¬ facturing textiles, clothing, hats, candles, etc., and carrying on a brisk trade in agricultural products. Notable buildings are: the old castle, the cathedral rebuilt in the beginning of the 19th century, the Academy of Sciences and Arts, founded 1562, and the ro}M palace. The citadel and extensive military barracks are on the opposite bank of the river at the confluence of the Bormida and are connected by a bridge. Alessandria was founded in 1168 by the Lom¬ bard League to resist German invasion, was besieged in 1657, 1707 and 1800 by the French and in 1815 had its fortifications destroyed by the Austrians. Since reconstructed, Alessan¬ dria, now is, after Verona the strongest forti¬ fied city of Italy. Area of province, 1,985 square miles; pop. 850,000. Pop. of city, 72,000.

ALESSANDRIA, Armistice of, the armis¬ tice under which the Austrian general, Melas, retired after the celebrated battle of Marengo, 16 June 1800. By this act General Melas abandoned to Napoleon every fortification in northern Italy west of the Mincio, a result which, according to the opinions of the his¬ torians, was a more serious blow to the Aus¬ trian cause than an unconditional surrender would have been.

ALESSANDRO STRADELLA, a ro¬ mantic opera in three acts by Friedrich von Flotow (1812-83). It contains some beauti¬ ful melodies of a soothing charm all their own, while the plot is extremely simple, with¬ out any attempt at sensationalism. It was composed in Paris in 1844. The hero, Stra- della, is a famous Venetian singer, in love with Leonore. Her uncle and guardian, a wealthy citizen named Bassi, watches closely over her, for he wants to marry her himself. But Stradella carries her off and they are married in a village near Rome. Bassi sends a bandit, Malvolio, to discover their whereabouts. At the door of the villa where the lovers reside, Malvolio meets another villain, his friend Barbarino, on the same errand as himself. Together they decide to kill Stradella and ab¬ duct his wife. Disguised as pilgrims they are welcomed in the Stradella home, where they are so charmed with the behavior and singing abilities of their host that they abandon their intention. Bassi next offers them such a high price that

they promise to stab Stradella at his next performance. While lurking for their victim. Stradella so touchingly sings a hymn of the Holy Virgin's mercy to sinners that the would-be murderers throw away their daggers, fall on their knees, and join in the refrain. By the same means, Stradella finally con¬ ciliates also his wife's uncle, and they all become friends.

ALESUND, a'le-sun, a town on the western coast of Norway, rebuilt and modernized after a disastrous fire in 1904 destroyed the old town. Its chief industry is codfishing. Pop. about

14.000.

ALETIA. See Cotton Insect Pests.

ALEURITES, a-lu ritz, a genus of trees of the family Euphorbiacecu, consisting of four species, natives of eastern Asia and the islands of the Pacific. All the species are cultivated in tropical countries for the oils obtained from the seeds These oils (kekuna, bankul, tung or wood oil) are similar to linseed oil, but are superior to it in some respects. They are used largely in the manufacture of paints, soaps, etc. The trees have been extensively introduced into the southern United States with the hope of establishing a wood oil industry in this country.

ALEUPONE, a-lu'pon, a substance rich in nitrogen, found in the cells of seeds. In the legumes it is found imbedded in the grains of starch, but in grains it constitutes the inner nodule. It is sometimes called gluten (q.v.).

ALEUTIAN, a-lu'shan, Islands, a chain of about 80 small islands belonging to Alaska Ter- titory, separating the sea of Kamchatka from the northern part of the Pacific Ocean and extending nearly 1,600 miles from east to west between longitude 172° E. and 163° W. ; total area, 6,391 square miles. Pop. about 3,000. They are of volcanic formation, and in a num¬ ber of them there are volcanoes still in activity. Their general appearance is dismal and barren, yet grassy valleys capable of supporting cattle throughout the year are met with, and potatoes, turnips and other vegetables are successfully cultivated. They afford also an abundance of valuable fur and of fish. The natives belong to the same stock with those of Kamchatka. They are a strong, hardy race, capable of endur¬ ing extremes of heat and cold. They are nom¬ inally Christianized, and are connected with the Greek Church

of Russia. See Alaska.

ALEWIFE (possibly from aloofe, its Indian name), a small anadromous fish (Pomo - lobus pseudoharcngus) found abundantly along the east coast of the United States, except at the extreme north and south. Somewhat earlier in the spring than its relatives it goes up the rivers in multitudes to spawn. It has made its way into some of the inland lakes in western New York where it is landlocked (var. lacustris) . It exists in great abundance in Lake Ontario where it is not uncommon to find immense schools floating dead on the surface and alongshore. The eggs, which are voided in vast quantities, sink to the bottom and stick to rocks, etc. It is closely allied to both the her¬ ring and the shad, but it most resembles the shad in shape and color, though it is only from 8 to 10 inches long. It is less esteemed for its quality than the shad, but is of great import¬ ance as a food fish, and is taken by millions annually. This fish is called “gaspereau® in Saint Lawrence Bay, and “branch-herring, }) “ellwife® and “sawbelly® locally elsewhere; but the “alewife® of Bermuda is an entirely dif¬ ferent fish, the round pompano. Several vari¬ eties of the alewife are of very inferior food quality but are captured and used as fertilizer.

ALEXANDER, a name of various ancient writers, philosophers, etc. (1) Alexander of ZEgae : a peripatetic philosopher of the 1st cen¬ tury a.d. ; tutor of Nero. (2) Alexander the 2Etolian ; a Greek poet who lived at Alexan¬ dria about 285-247 b.c., reckoned as one of the seven poets constituting the tragic pleiad. (3)

Alexander of Aphrodisias, surnamed “Exe- getes® ; lived about 200 a.d. ; a learned com¬ mentator on the works of Aristotle. (4) Al¬ exander Cornelius, surnamed Polyhistor, of the 1st century b.c. He was made prisoner dur¬ ing the war of Sulla in Greece and sold as a slave to Cornelius Lentulus, who took him to Rome, made him the teacher of his children and restored him to freedom. The surname Polyhistor was given him on account of his prodigious learning. The most important of his voluminous works was one in 42 books, con¬ taining historical and geographical accounts of nearly all the countries in the ancient world. (5) A Greek rhetorician and poet, surnamed Lychnus ; lived about 30 b.c., wrote astronom¬ ical and geographical poems. (6) Alexan¬ der Numenius; a Greek rhetorician and teacher of elocution, of the 2d century a.d., two of whose works are historically known. (7) Alexander the Paphlagonian ; a celebrated im¬ postor who lived about the beginning of the 2d century a.d., obtained a great influence with the people as an oracle ; pretended to be /Esculapius reappeared. Lucian chiefly has made him known to us. (8) A Greek rhetori¬ cian of the 2d century a.d., surnamed Pelopla- ton, who

vanquished Herodes Atticus in a rhe¬ torical contest. (9) Alexander Philalethes; a physician of the 1st century b.c., who suc¬ ceeded Zeuxis as president of the famous He- rophilean school of medicine. (10) Saint Al¬ exander (d. 326 a.d.) ; the Patriarch of Al¬ exandria from 312 a.d.; an opponent of Arius ; member of the Council of Nice (325 a.d.) ; commemorated in the calendar 26 February. (11) Alexander of Tralles; an eminent physi¬ cian of Lydia, of the 6th century a.d. ; author of two extant Greek works.

ALEXANDER, the name of eight Popes.

1. Alexander I, bishop of Rome about 109 a.d., recorded on the list of Popes by all the chronicles except Optatus Milevitanus. He confirmed, some say introduced, the rite of using unleavened bread for the Eucharist, of blessing water with salt, and certain rubrics in the mass. He died a martyr's death.

2. Alexander II, Anselmo Baggio, a native of Milan ; he lived for some time at the court of Henry III, and in 1056 or 1057 became bishop of Lucca. In 1059 he became papal legate at Milan, and 1 Oct. 1061, through the zeal of Hildebrand, he was raised to the papal throne, consequently the imperial party elected Bishop Cadaloiis of Parma, a rival Pope, as Honorius II. Alexander wras driven by him in 1062 from the vicinity of Rome. He then with¬ drew to Lucca, and on the decision of the contest by Bishop Burchard of Halberstadt he was sent by the German court to Italy and rec¬ ognized as Pope. At the Council of Mantua in 1604, with the assistance of Anno of Cologne, he got possession of Rome against his rival. His reign, under the influence of Hildebrand, carried out the reform of the churches and' their emancipation from secular control. When Henry IV wished a divorce from his wife Ber¬ tha, Alexander, through his legate, Cardinal Pietros Damiana, decided against him and sum¬ moned the King to Rome to answer for his crimes, but shortly after he died, 21 April 1073.

3. Alexander III (d. 1181), Rolando

Ranuci; Pope, 1159-81. His career is histori-

callv important because of his vigorous pros¬ ecution, in opposition to Frederick Barbarossa, of the policies begun by Hildebrand. Three anti-

Popes Victor IV, Pascal III and Calix- tus 111 had been confirmed in succession by the Emperor. Alexander succeeded, and after the decisive victory at Legnano compelled Fred¬ erick's submission. The papal struggle was carried on in England by Thomas a Becket, ending in a victory for Alexander. William the Lion, of Scotland, was excommunicated for opposing him. Important decrees were issued by Alexander III, safeguarding ecclesiastical powers and privileges

1. Alexander IV, Pope 1254-61 ; a man of great gifts, which, however, were of little avail in his unfortunate times. His administration is signalized by attempts to unite the Greek and Roman Churches, and the establishment of the Inquisition in France (1255). He was the nephew of Gregory IX. In his battle writh Manfred of Sicily, he suffered bitter humilia¬ tions and, deserted by his bishops, was obliged to escape from Rome. He died in Viterbo in

2.

3. Alexander V, Pietro Philargi, of Can- dia. He was for some time professor in Paris, and in 1402 was made archbishop of Milan, and in 1404 cardinal. In 1409 after the deposition of the rival Popes, Gregory XII and Ben¬ edict XIII, he was elected Pope by the cardinals at the Council of Pisa, but was recognized by only a part of Christendom. He forbade the teaching of Wyclif in Bohemia and prohibited Huss from preaching even in private chapels. He died at the age of 70, and it was supposed by some, though without foundation, that he was poisoned by his successor, Balthasar Cossa (Pope John XXIII).

4. Alexander VI, Roderick Llangol, was born at Cativa in the diocese of Valencia, in Spain, 1 Jan. 1431. He assumed the name Bor¬ gia when his uncle of that name became Pope as Calixtus III. After studying law he entered the papal court and was advanced rapidly, be¬ coming commendatory archbishop of Valencia, cardinal deacon and vice-chancellor of the Church in Rome. Appointed cardinal-bishop of Albano in 1476, he was ordained priest in that year. By the unanimous consent of the cardinal electors he was crowned Pope 11 Aug. 1492. His administration was a remarkable one. He cleared Rome of the bandits who had infested the city; held court every Wednesday; estab¬ lished the Congregation of the Index for the censorship of books ; repressed the insolence and rapacity of the Roman nobility ; put a stop to the falsification of ecclesiastical docu¬ ments; drew up measures for the reformation of ecclesiastical

discipline; co-operated with European rulers in their projects against the inroads of the Saracens; effected peace be¬ tween the kings of Spain and Portugal by re¬ partitioning between them their discoveries in the New World; provided missionaries for preaching the gospel in newly explored coun¬ tries; approved and confirmed several religious congregations; restored discipline in the Church in Flanders ; suppressed magic in Germany and Bohemia ; popularized the custom introduced by Calixtus III of saying the Angelus at midday ; encouraged arts, particularly painting and literature; put an end to the famines which had

so often visited Rome; and issued many noted bulls, letters and other papal documents, which alone show that he was a man of extraordi¬ nary genius and power. He is charged by his¬ torians like Guicciardini and Burchard, and more modern writers who follow them, of licentiousness before his ordination to the priesthood, of simony, nepotism and cruelty as Pope. It is difficult to reconcile all the crimes attributed to him with his high qualities and distinguished deeds. Of late years the tendency of moderate historians is to exonerate him from many extreme charges, to extenuate the faults of his youth and cast doubt on the serious accusations brought against him as Pope.

1. Alexander VII, Fabio Chigi, of Siena, was, during the treaties of peace at Munster and Osnabriick, papal nuncio in Germany. He was chosen Pope 7 April 1665, through the influence of France. In 1161, in spite of the protests of the Jansenists, he confirmed the condemnation of the five Jansenist dogmas which had been condemned by his predecessor, Innocent X. Later he fell into controversy with Louis XIV. During his rule Rome was beautified in many directions, especially by the colonnade before Saint Peter's. He was himself a poet and friend of the arts and sciences. A collection of his poems appeared in 1656.

2. Alexander VIII (1610-91), Pietro Ot- toboni, of Venice ; Pope 1689-91 ; assisted Italy in wars against the Turks. Through the pur¬ chase of the library of Queen Christina of Sweden he enriched the Vatican with 1,900 precious manuscripts. The collection is known as the Ottobonian Library. Consult Cam¬ bridge, (Modern History* (Vol. I) ; Hefele, (History of the Councils) ; Parsons, (Studies in Church History) ; Pastor, (History of the Popes. *

ALEXANDER I, Emperor of Russia, son of Grand Duke Paul Petrovitch and Grand Duchess Maria Feodorovna, nee Princess of Wurtemberg: b.

23 Dec. 1777; ascended the throne 24 March 1801 ; d. 1 Dec. 1825. Em¬ press Catharine the Great took care of his education, which was conducted according to the best standard prevailing in Europe by a Swiss pedagogue, La Harpe, in co-operation with Professor Kraft and others. But La Harpe was soon dismissed because of his en¬ lightened ideas of the age and his sympathy with the French revolutionists. Immediately upon the assassination of his father Paul I, of which crime it is alleged Alexander had a guilty knowledge, he ascended the throne and succeeded in restoring (15 June 1801) peace with Great Britain, and later (8 Oct. 1801) concluded conventions with France and Spain. During the reign of terror and insecurity of Paul I, Alexander conceived the idea of fram¬ ing and giving to Russia a constitution with the national representation in the government, which was remarkable in a sovereign of his day and country, but which he, however, abandoned in the later years of his rule, adopting his pred¬ ecessors' policy of repression and accepting the views of the notorious Prince Metternich. The following four years of his rule Alexander spent almost exclusively for the improvement of the internal affairs of which the most im¬ portant are the two ukases, signed on 14 April 1801, whereby he diminished taxes, liberated

debtors, emancipated priests and deacons, abolished corporal punishments, paved the way for complete abolition of serfdom, etc. His co-operators in his reforms were the Anglo¬ phile Count Kotchubey, Prince Czartoryski, who was noted for his sympathy for the Poles, Count Strogonov, the great French admirer, and other able men of the empire. By his ukase of 8 Sept. 1802, he established definitely the duties and authorities of the senate and estab¬ lished the ministries of war, navy, foreign af¬ fairs, interior affairs, justice, finance, commerce and public education. In 1803 he established in Saint Petersburg the Academy of Science and in the following year the universities of Kazan and Kharkov. But the period of peace was soon to be disturbed. The incessant dis¬ sensions between France and Great Britain made it necessary for Russia to effect a rap¬ prochement with England, Austria and Switzer¬ land in the beginning of 1805 for the purpose of resisting the encroachments of France on the territories of independent states. The de¬ feat of the Austrian army in the battle of Ulm forced Russia to send Austria help under the leadership of General Kutuzov. Alexander was personally at the head of the Russian army in the battle of Austerlitz (2 Dec. 1805), when the combined armies of Russia and Austria were defeated by Napoleon. Alexander

was compelled to retreat to his dominions together with the remains of his routed army. Further results of that memorable battle were: the ever-growing hostility of Prussia toward Rus¬ sia and the treaty of alliance, offensive and defensive, concluded 27 Dec. 1805, at Schoen-brunn, between Austria and Russia. In the succeeding campaign the Russians were again beaten at Eylau (8 Feb. 1807), and Friedland (14 June), the result of which was an inter¬ view a few days after the battle, on a raft anchored in the Nicmen, between Alexander and Napoleon, which led to the treaty of peace signed at Tilsit. This treaty was confirmed by the convention of Erfurt (12 Oct. 1808) where¬ by Napoleon consented to the annexation of Wallachia and Moldavia to the Russian empire. The Russian Emperor now for a time identified himself with the Napoleonic schemes. The seizure of the Danish fleet by the British brought about a declaration of war by Russia against Great Britain and Sweden, and Alex¬ ander invaded Finland and conquered that long-coveted duchy. Alexander spent some time in Finland in order to establish personally good relations with the Finns, and to win their confidence; while in Saint Petersburg a separate Finnish committee was formed and a secretary of state for foreign affairs ap¬ pointed. Less successful was the campaign carried on by Alexander against the Turks (1809-12) who now demanded the restora¬ tion to the Ottoman empire of the provinces of Wallachia and Moldavia. The war was ended bv the Peace of Bucharest (1812). The French alliance, however, he found to be too oppressive, and his having separated himself from Napoleon led to the French invasion of 1812 in which the Russian armies were utterly defeated in the battle of Borodino. On 15 Sept. 1812, Napoleon made a triumphant entry into Moscow, which he found in flames. But seven days later, forced by famine, deprivation and by the lessening morale

of his armies, Napoleon decided to leave Mos¬ cow, and his great retreat was converted into a rout by the brilliant victories of the Russian General Miloradovitch at Vyasma, of the Cos¬ sack hetman Platov at Vopa and of General Kutuzov at Krasnoe. The successful outcome of the campaign against Napoleon animated Alexander to further efforts to establish a permanent peace in Europe and, despite the advice of his pious friends, Chancellor Shish- kov, General Kutuzov and Count Rumyantzev, who were unanimous against further wars, he was firmly resolved to cross the frontier (13 Jan. 1813) with his powerful army and to in¬ vade Prussia, and in August 1813 made an offensive and defensive alliance with that government. However, the Russian armies headed by General Withenstein, suffered, to¬ gether with their Prussian allies, crushing de¬ feats in the battles of Liitzen and Bautzen (2 and 21 May respectively). The following year

Austria joined hands with Russia and Prussia against Napoleon and, after numerous battles with alternative success, Paris fell into the hands of the Triple Alliance on 1 April 1814, and the campaign ended by the Treaty of Paris (1 June 1814). By the Treaty of Vienna, which was concluded 10 July 1815, Alexander secured for his empire a part of the duchy of Warsaw, the grand duchy of Poznan, and introduced into the part of Poland apportioned to Russia a liberal constitution. When the deposed Na¬ poleon again landed in France, the Russian army moved rapidly from Poland to the banks of the Rhine and Alexander went from Vienna to Heidelberg. Napoleon's rule of the Hundred Days was ended, however, by his defeat at Waterloo and the French Bourbon dynasty was restored in the person of Louis XVIII. Alex¬ ander, moved by the desire of establishing a lasting peace in Europe, composed and signed, together with his Prussian and Austrian allies, a treaty of peace (26 Sept. 1815) known as the Holy- Alliance (q.v.). The remaining part of his reign was chiefly taken up in measures of internal reform including the gradual aboli¬ tion of serfdom and the promotion of educa¬ tion, religion, agriculture, commerce, navigation and manufactures.

Embittered and disappointed in liberalism and political altruism he turned even more toward religious fanaticism. The last years of his life Alexander spent either in traveling through the remotest parts of his empire or in complete seclusion in the Tsarskoe Selo. When in the year 1821 a Russian agent provoc¬ ateur, Alexander Ipsilanti, started an insur¬ rection in Greece against the Turks, Tsar Al¬ exander formally protested and endeavored to reassure the Sublime Porte of the innocence of official Russia, but the Sultan would not believe in the sincerity of his action and a wholesale massacre of Christians in Constantinople took place, which forced the Russian ambassador, Baron Stroganov, to leave that capital in a hurry. The war, which for a time seemed imminent, was averted by Alexander's astute diplomacy only to break out shortly after his death. Alexander died at Taganroga where he had accompanied his consort, Empress Eliza¬ beth Aleksyeevna, for the improvement of her health.

Bibliography.— Bogdanovich, M., Hstoriya Imperatora Aleksandra Ivo) Saint Petersburg

1869-71) ; Bychkov, I. A., (Aleksandr I i yevo priblizhenie do epohi Speranskovo) (Ruskaya Starina, Saint Petersburg 1903, Vol. 113, p. 5)

; Empaytaz, H. L., (Notice respecting Alexander, Emperor of Russia) (Aberdeen 1855) ; Lloyd, H. E., (Alexander I, Emperor of Russia; or, a sketch of his life and of the most important events of his reign) (London 1826) ; Martens, F. F., (Alexandr I i Napoleon I, — Poslednie gody ikh druzhbi i soyuza* (Vesnik Evropy, Feb.-April, St. Petersburg 1905) ; Marezhkov- ski, D. S., (Aleksandr Pervy) (Saint Petersburg 1913) ; Id., (Alexander I, Historischer Roman' (Munich 1913) ; Schiemann, T., (Kaiser Alex¬ ander und die Grossfiirstin Ekaterina Pav- lona' (Zeitschift filr osteuropaische Ge- schichte, Bd. I, pp. 540-556, Berlin 1911) ; Solovyev, S., (Imperator Aleksandr P (Saint Petersburg 1877).

W. M. Petrovitch.

ALEXANDER II, Emperor of Russia, eldest son of Emperor Nicholas Pavlovitch and Grand Duchess Alexandra Theodorovna : b. 29 April 1818 ; d. Saint Petersburg, 13 March 1881. After having received a careful education, under the conduct of Professors Merder and Zhukov- ski, which covered especially natural sciences, statistics, law and modern languages (French, English, German and Polish), he applied his attention to practical military subjects. In order to acquaint himself with governmental machinery and affairs, Alexander, while still a youth of 17 years, was frequently present at the sessions of the Senate and the Holy Synod. His theoretical education was completed by ex¬ tensive travels through Russia and Europe, of which he visited every country with the ex¬ ception of France and Spain. On 16 April 1841 he wedded Princess of Darmstadt, who is known as Maria Alexandrovna, by whom he had eight children : Alexander, Nicholas, Vladi¬ mir, Aleksey, Marie, Serge and Paul. Alex¬ ander succeeded his father Nicholas I in 1855, before the Crimean War, which he conducted to a satisfactory close, considering the number of his enemies, on 31 March 1856, at the confer¬ ence of Paris, by virtue of which the Black Sea was proclaimed neutral and Russia lost a part of Bessarabia. The new emperor immediately after the war set about effecting important re¬ forms in the empire, among the first being the improvement of finances and state budget, judiciary system, city and country police and the system of popular education. The judiciary reform found expression in the publication of the (< Judiciary ukases® in 1864 by virtue of which the judicial authority was severed from the executive, administrative and legislative powers, the positions of judges became life- permanent; court of cassation, juries and nota¬ ries public were also instituted. In the sphere of interior administration one of the most im¬ portant is the reform combining city police with district police, in which latter a considerably larger power of administration was vested. But the greatest of all the reforms

carried out by him was the emancipation of the serfs (about 23,000,000 people) by the ukase of 2 March 1861. This met with an unbounded enthusiasm of the people and was considered as a new epoch in the Russian history. His reforms in Russian Poland introduced by the imperial ukase of 26 March 1861 were also of a very

liberal character, but they were not well re¬ ceived by the Poles, who, in 1863, protested against them by several armed insurrections. The rebellions were, however, speedily quelled and the rebels severely punished by the notorious Berg and Governor-General Mura¬ viev. Tsar Alexander also effected important reforms in the military affairs of his empire. Thus in the very beginning of his rule he sup¬ pressed military settlements, reduced the length of service from 25 to 15 years, discontinued the humiliating corporal punishment and directed attention to the improvement of the education of the army officers, for which purpose a number of military academies were established. Al¬ though Alexander's rule might be considered comparatively a peaceful one, it was marked by several important wars. Soon after the Crimean War (1859) he had to quell the insur¬ rection of the Caucasians, against whom he sent General Prince Baryatinski. The imperial armies, after having won several important bat¬ tles (at Voden, etc.), surrounded the rebels and forced their chieftain, Shamil, to surrender in September 1859. Thus the eastern Caucasus was freed and occupied and the western fell into the hands of Alexander's armies five years later, when Grand Duke Michael Nikolayvitch was appointed governor of that region. In the course of that same year the Polish insurrection and the occupation of Turkestan took place. In the Far East, too, Alexander II effected im¬ portant and advantageous changes without hav¬ ing recourse to arms. But the most important event of Alexander's rule is undoubtedly the Russo-Turkish War (1877-78), for it was by that successful campaign that Russia announced to the world her 'Panslavistic aims and her readiness to protect the smaller Slavonic nations against foreign rule. It came as a protestation on the part of the Russian people against the refusal of the Sublime Porte to introduce re¬ forms in the Christian regions of European Turkey which had been promised by the Otto¬ man government and signed, in the form of a protocol by the six Great Powers in London, 25 March 1877. Simultaneously with the Rus¬ sian declaration of war on Turkey the Serbians and Montenegrins and even the Rumanians made invasions of European Turkey for the purpose of freeing their Christian co-nationalists inhabiting Macedonia, the Sandjak of Novi Bazaar and Dobrudja, respectively. Russian armies, under the supreme command of Grand Duke Michael Nikolayvitch, joined by the Serbian

and Montenegrin insurgents, utterly de¬ feated the Turks; they were stopped only at the gates of Constantinople, not by the Turkish re¬ sistance but by British intervention and the Sultan's request for peace. The conditions of peace were agreed upon temporarily at the conference of San Stefano but were definitely settled by the Treaty of Berlin, 1878. By virtue of that treaty, which sensibly modified that of San Stefano, greatly to the disadvantage of Serbia, Bulgaria was recognized as a vassal, but fully autonomous principality, with the right of electing her own prince and maintain¬ ing her own army, while eastern Rumelia was placed under the suzerainty of the Sultan but with complete administrative autonomy. Serbia, Montenegro and Rumania were also proclaimed and recognized as independent states. With the

exception of the Delta in the Danube the whole of Bessarabia, lost to Russia in 1856, was now restored to Alexander's empire.

While the first years of Alexander's rule passed in a wholesome internal peace, the period following (from 1851) was greatly dis¬ turbed by the revolutionary element, in the empire, which exacted from the government a national-constitutional form of administration. This movement at first was conducted by the so-called ˆintelligentzia® (or educated classes) by means of circulars and pamphlets, but when the peasantry and craftsmen joined the college students it assumed rapidly terroristic pace and measures. Toward the end of Alexander's reign several attempts on his life were made by Nihilists, and at last he was assassinated by an explosive missile thrown at him in a street in Saint Petersburg. On the spot of his murder a magnificent church (((Voskressenie,® i. e., (< Resurrection®) has been built, and many Rus¬ sian cities have erected monuments to the memory of the <(Tsar Liberator.® The Bul¬ garians, too, have erected in front of their princely palace in Sofia a splendid monument to Alexander.

Bibliography. — Appleton, N., (Russian Life and Society as Seen in 1866-67) (Boston 1904) ; Ashevski, S., cReformy imperatora Aleksandra ID (Sovremenyi Mir, Petrograd 1917) ; Dzhanshiev, G. A., (Epokha Velikikh Reform) (Moscow 1900) ; Kogan, (Konchina imperatora Aleksandra II) (Istoricheski Viestnik, Saint

Petersburg 1913) ; Lavrova N. W., (Imperator Aleksandr II i dieti' (Istoricheski Viestnik, Petrograd 1915) ; Pfeil and Klein-Ellgrith, (Das

Ende Kaiser Alexanders IP (Berlin 19.13) ; Roux, F. C., Alexandre II, Gortchakoff ct Napoleon IIP (Paris 191-3) ; Vasili, P., be¬ hind the Veil at the Russian Court) (London

1914).

W. M. Petrovitch.

ALEXANDER III, Emperor of Russia, second son of Emperor Alexander II and Em¬ press Maria: b. 10 March 1845; ascended the throne 13 March 1881 at the age of 36; d. Livadia, 1 Nov. 1894. He married Princess Dagmar, the daughter of King Christian IX of Denmark, who changed her name, at the moment of adopting Orthodox faith, to Maria Feodorovna. Alexander's education was ex¬ ceedingly careful and austere, which potentiated his innate love for stern order and strict adher¬ ence to everything Russian even to the purity of the Russian language. He was more in favor of French civilization than the German culture and became a powerful Slavophile. At the time of the Russo-Turkish War (1877-78) he had a brilliant opportunity to put in practice his military education, for he participated in that campaign as the commander of the Rust- chuk division, in which capacity he rendered splendid services by his shrewd tactics. After his father's violent death, he secluded himself for some time in his palace at Gatchina. For that same reason his coronation was postponed till 1883 and was celebrated with an extraordi¬ nary magnificence and with great national festivities. Through the fall of Merv, the sub¬ jugation of the Turkomans in central Asia was completed. In 1885 hostilities with Great Britain with regard to the defining of the frontier between the Russian territories and Afghanistan for a time seemed imminent, but

Alexander succeeded in annexing to his empire a considerable stretch of land on which a rail¬ way was constructed, uniting the centre of the Russian possession in central Asia with the Caspian Sea. In European affairs he broke away from the Triple Alliance between Russia, Germany and Austria and directed his attention to France whose friendship he wished to culti¬ vate. He was aggrieved by the new Bulgarian spirit of ingratitude for the liberation of their country bˆ his father Alexander II ; but he finally crushed Stambulov and his band. With regard to home affairs Alexander III announced at the very time of his accession to the throne that he had no intention of limiting or reduc¬ ing the autocratic power exercised by his pred¬ ecessors ; on the contrary he suppressed even the liberties which were granted by his father and his grandfather and he maintained that Nihilism and Anarchism in Russia could not be changed by democratic and

parliamentary institutions but by austere principles of Ortho¬ doxy, nationalism and, if need be, autocracy. As he believed in uniformity of customs, lan¬ guage and religion throughout his vast empire he imposed, sometimes in a cruel manner, the Russian language on his Polish, Finnish and German subjects and caused many blood}' perse¬ cutions of the Jew's. If one could not call him an absolute autocrat, one is safe in characteriz¬ ing his rule as an iron imperialism, for he sought, more than any of his predecessors, for centralization of imperial administration which he strove to place almost wTholly under his con¬ trol. He made strong efforts to prevent mal¬ versation by officials, hitherto corruptible to an incredible degree, and stern economies were practised. The liberties granted by his ancestors to the Baltic provinces and Finland were also curtailed. Despite the most rigid police sur¬ veillance several Nihilist attempts were made on his life. That unfortunate Tsar was forced, throughout his reign, to keep himself practically a prisoner in his palace. Consult Andrews,

(Historical Development of Modern Europe) (Vol. II, New York 1898) ; Flourens, E., Alex¬ andre III, sa vie, son ceuvre) (Paris 1894) ; Lothrop, A. S., (The Court of Alexander IIP (Philadelphia 1910) ; Lowe, C., Alexander III of Russia* (New York 1895) ; Samson-Him-melstierna, (Russland unter Alexander III mit Riickblicken auf die jiingste VergangenheiP (Leipzig 1891); Scignobos, Political History of Modern Europe) (New York 1900).

W. M. Petrovitch.

ALEXANDER I, King of Scotland, fourth son of Malcolm Canmore; b. about 1078, in 1107 succeeded his brother, Edgar, only, however, to that part of the kingdom north of the firths of Forth and Clyde ; d. Stirling 1224. He mar¬ ried Sibylla, a natural daughter of Henry I of England, and his reign was comparatively un¬ troubledˆ though about 1115 he had to quell an insurrection of the northern clans. He founded the abbeys of Scone and Inchcolm and initiated a diocesan episcopate ; while his determined re¬ sistance to the claims of York and Canterbury to supremacy over the see of Saint Andrews did much to secure the independence, not only of the Scottish Church, but of Scotland itself.

ALEXANDER II, King of Scotland: b. Haddington 1198; d. 1249. He succeeded his father, William the Lion, in 1214. He early dis¬ played that wisdom and strength of character

ALEXANDER

in virtue of which he holds so high a place in history among Scottish kings. His entering into a league with the English barons against King John drew down upon him and his king¬ dom the papal excommunication ; but two years later the ban was removed and the liberties of the Scottish Church were even confirmed. On Henry Ill's accession to the English throne Alexander brought the feuds of the two nations to a temporary close by a treaty of peace (1217), in accordance with which he married Henry's eldest sister, the Princess Joan (1221). The alliance, thus established was broken after her death without issue (1238) and the second marriage of Alexander with the daughter of a noble of France. In 1244 Henry marched against Scotland to compel Alexander's homage, but a peace was concluded without an appeal to arms. In 1249, while engaged in an expedi¬ tion to wrest the Hebrides from Norway, Alexander died of fever on Kerrera, near Oban.

ALEXANDER III, King of Scotland: b. 1241 ; succeeded his father, Alexander II, 1249; d. 12 March 1286. In 1251 he married the Prin¬ cess Margaret (1240-75), eldest daughter of Henry III of England. Very shortly after he had come of age his energies were summoned to defend his kingdom against the formidable invasion of Haco, King of Norway (1263), whose utter rout at Largs secured to Alex¬ ander the allegiance both of the Hebrides and the Isle of Man. The alliance between Scotland and Norway was strengthened in 1282 by King Eric's marriage to Alexander's only daughter, Margaret (1261-83) ; the untimely death of their infant daughter, Margaret, commonly des¬ ignated the Maid of Norway, on her way to take possession of her throne, was the occasion of many calamities to Scotland. During the concluding years of Alexander's reign the king¬ dom enjoyed a peace and prosperity which it did not taste again for many generations. His only surviving son died without issue in 1284; and next year Alexander contracted a second marriage with Joleta, daughter of the Comte de Dreux.

ALEXANDER I (Obrenovitch), King of Serbia, second son of King Milan and Queen Nathalie: b. 14 Aug. 1876; d. 10 June 1903. He received his education chiefly in Serbia where he mingled with a band of young officers of no very high culture. Even from his early boy¬ hood those officers poisoned Alexander's mind with distrust in the political friends who sur¬ rounded him after the abdication of his father in 1889. From that time to 1893, as Alexander was under age, the executive power of the state was vested in a regency of three statesmen. But in April of that year Alexander, then only in his 17th

year, by a cleverly prearranged coup d'etat, proclaimed himself of age, ousted the regents, dismissed their government and took the executive power into his own hands. His act met with unbounded approval from the leaders of the then mighty Radical party and Alexander forthwith appointed a Radical ministry presided over by Mr. Pashitch. The Radicals, in their turn, were estranged when their king, by another coup d'etat, abolished the liberal constitution granted by his father in 1889 and restored that of 1869 which was not only conservative but even somewhat autocratic in character. During the summer of 1900, when

King Milan was in Austria endeavoring to secure for his son the hand of a German prin¬ cess, Alexander, to the amazement of all his friends, married his former mistress, Mme. Draga Mashin, the widow of a civil engineer and former lady-in-waiting to Queen Nathalie. Even Milan refused to condone this action, for Mme. Mashin was a woman much older than Alexander and of so impossible a reputation that the possibility, had it existed, of her bear¬ ing an heir to the throne could not but be revolting to the Serbian people. Under Draga's influence Alexander initiated a rule of almost Ncronian tyranny. The Radical party was terrorized by one coup d'etat after another; the vulgar Queen offered incessant insults to the highest dignitaries of the state and court officers, she roused the whole country to a white heat of excitement by a simulated accouche¬ ment, and when the myth was exploded and the friendship of the Russian Tsar lost, she began to intrigue to secure the succession for her own brother, Lieutenant Nikodiye, a man as objectionable and arrogant as the Queen herself. Thus blunders and outrages followed each other under the most impossible couple that ever occupied a throne. King Alexander, in order to veil his ill deeds before the eyes of the people, granted a comparatively liberal con¬ stitution (April 1901) only to suspend it by another coup d'etat (March 1903). This aroused the indignation not only of the members of the National Assembly (Skupshtina) and the Senate, but also, and especially, of the army officers. The end of Alexander and Draga came, however, on the night of 10 June 1903; a group of malcontent officers entered the pal¬ ace and murdered the King. On this occasion Draga was also mortally wounded as revolver shots were exchanged in the complete darkness which reigned in the palace on account of the electric wires having been cut by the friends of the King. Draga's brother, the prime min¬ ister, the minister of war and Alexander's aide- de-camp were also assassinated. The next day the army proclaimed Prince Peter Karageorge- vitch, son of Alexander Karageorgevitch and grandson of Kara-George Petrovitch, King of Serbia, which election was confirmed five days later by the National

Assembly.

ALEXANDER I, P rince of Bulgaria, ne Prince of Battenberg: b. 17 April 1857; d. 26 Nov. 1893. He received his military education in the cadet-corps in Dresden and was ap¬ pointed second lieutenant in the 24th dragoon regiment Later he served with the Russian Uhlans, in whose ranks he fought against the Turks in the Russo-Turkish War of 1877-78. On 10 May 1879, thanks to his influence in Germany, Austria and even of his Russian friends, he was elected by the Bulgarian So- branje of Trnovo, hereditary Prince of Bul¬ garia, immediately after which event he visited the most important courts of Europe and, on 17 July 1879, he was presented to his suzerain, Sultan Abdul-Hamid II, from whom he ob¬ tained the imperial firman granting him the principality of Bulgaria. Soon after his ascen¬ sion to the throne he initiated an anti-Russian policy, ignoring the deeds of Emperor Alex¬ ander II, called by the Bulgarians the <(Tsar Liberator, which, naturally, alienated Russian friendship for Bulgaria. In 1885 King Milan

of Serbia declared war on Bulgaria in order to prevent the annexation of East Rumelia to that principality, which ended by the Treaty of Bucharest 1886 but which, although favor¬ able for Bulgaria, did not in any measure im¬ prove Alexander's impossible position. How¬ ever, the unfriendly attitude of Alexander toward Russia caused in Bulgaria a popular movement and on 3 Sept. 1886 his palace in Sofia was attacked and he was kidnapped and taken to the Russian town Reni. Afterward he was released and taken back to Sofia through the indignation of his powerful party. Having lost Russian protectorate he found it absolutely indispensable to abdicate (7 Sept. 1886) and to leave Bulgaria and to join the Austrian army in the capacity of a colonel of the dragoons. He was buried in the church of St. George at Sofia. Consult Koch, A. (Alexander's chap¬ lain), (Mitteilungen aus dem Leben und der Regierung des Fiirsten Alexander von Bul- garien) (Darmstadt 1887; Draudor, Prince Alexander of Battenberg (1884) Macdonald, (Czar Ferdinand and His People) (New York 1913) ; Sobolef, (Der erste Fiirst von Bul- garien) (Leipzig 1886).

ALEXANDER, Abraham, American agi¬ tator: b. North Carolina 1718; d. 1786. His place in history is due to the fact that he was chairman of the convention which on 31 May 1775 passed the resolutions generally known as the <(Mecklenburg Declaration of Independ¬

ence® (q.v.).

ALEXANDER, Archibald, American

clergyman : b. Virginia, 17 April 1772; d. Princeton, N. J., 22 Oct. 1851. He studied theology and performed itinerant missionary work in various parts of Virginia; became president of Hampton-Sidney College in 1796 and pastor of a Presbyterian church in Phila¬ delphia in 1807. On the establishment of Prince¬ ton Theological Seminary in 1812 he was ap¬ pointed its first professor, a position which he held till his death. Among other works he published: (Outlines of the Evidences of Chris¬ tianity, } (Treatise on the Canon of the Scrip- tures) (1826); (History of the Patriarchs) (1833) ; and <History of the Israelitish Na- tion) (1852) ; his (Moral Science1* was post¬ humous.

ALEXANDER, Barton Stone, American soldier: b. Kentucky 1819; d. San Francisco, Cal., 15 Dec. 1878. He was graduated from West Point 1842 and became lieutenant in the engineer corps ; as such he superintended the building of Minot's Ledge lighthouse off Boston Harbor, the marine hospital at Chelsea, north of Boston, and the military asylum at Wash¬ ington, besides repairs on fortifications. He assisted in constructing the defenses of Wash¬ ington in the Civil War, took part in the first campaign about Manassas and was brevetted major for conduct at Bull Run; and remaining with the Army of the Potomac was brevetted lieutenant-colonel for conduct at the siege of Yorktown in 1862. In 1864 he was consulting engineer on Sheridan's staff and in March 1865 was brevetted brigadier-general for services in the war. The next two years he was in charge of the construction of the public works in Maine and in 1867 became senior engineer with rank of lieutenant-colonel. Thence till death

he was a member of the Pacific board of engi¬ neers for fortification.

ALEXANDER, Cecil Frances (Hum¬ phrey), Irish poet: b. County Wicklow 1818; d. 12 Oct. 1895. She was very active in re¬ ligious and charitable works. She is best known as a writer of hymns and religious poems. Among the most noted are the hymns (The Roseate Hue of Early Dawn *and (All Things Bright and Beautiful.* Her most famous poem is (The Burial of Moses.*

ALEXANDER, Edward Porter, American

military engineer : b. Washington, Ga., 26 May 1835 ; d. Savannah, Ga., 28 April 1910. Gradu¬ ating from West Point 1857, he was made second lieutenant in the engineer corps ; re¬ signed 1861 and entering

the Confederate army served there till the surrender at Appomattox, April 1865, at first as chief of ordnance and chief signal officer in the army of Northern Virginia, then as brigadier-general and chief of artillery in Longstreet's corps, taking part in the Wilderness and Spottsylvania and the siege of Petersburg. From 1866 to 1870 he was professor of mathematics and engineering in the University of South Carolina; thence (1871-92) manager and president of some of the foremost Southern railroads. He was a government director of the Union Pacific Rail¬ road (1885-87), a member of the boards on navigation of the Columbia River and on the Chesapeake-Delaware Ship Canal (1892-94) and in 1891 engineer arbitrator of the boundary survey between Nicaragua and Costa Rica.

ALEXANDER, James, American colonial lawyer and patriot: b. Scotland about 1690; d. New York, 2 April 1756. He was an engineer officer in Scotland ; compelled to leave Great Britain for taking part in the Old Pretender's Rebellion of 1715, he came to Perth Amboy, was its first official recorder in 1718 and was shortly after appointed surveyor-general of New York and New Jersey. Studying law, he rose to dis¬ tinction at the bar. He engaged in political debate in the press ; was temporarily disbarred for serving as counsel to a printer accused of sedition, but was reinstated two years later; held many important public offices, including those of attorney-general and of secretary to the province of New York; acquired a large fortune and was a zealous upholder of colonial liberties. He died from the fatigues of a journey from New York to Albany undertaken to oppose a ministerial project threatening colonial rights. With Franklin and others he founded the American Philosophical Society. His son was the famous (<Lord Stirling** of the Revolution.

ALEXANDER, James Waddell, Ameri¬ can clergyman, son of Archibald Alexander: b. near Gordonsville, Va., 13 July 1804; d. 31 July 1859. He studied in Philadelphia, then was graduated at Princeton and from its theo¬ logical seminary. He held a pastorate at Char¬ lotte Court House, Va. (1825-28) and the First Presbyterian Church in Trenton, N. J. (1828- 30). Resigning from ill health, he became ed¬ itor of the Philadelphia Presbyterian. He was professor of rhetoric and belles-lettres in Princeton (1833-44); pastor of the Duane Street Church, New York (1844-49) ; professor of ecclesiastical history and church government

in Princeton Seminary (1849-51); from 1851 till death pastor of his old Duane Street Church, reorganized as the Fifth Avenue. He wrote much for religious and other periodicals and for the Tract Society, and over 30 volumes for the American Sunday-School Union. He pub¬ lished also volumes of sermons: lThe Ameri¬ can Mechanic and Workingman) (2 vols., 1847) ; c Plain Words to a Young Communi¬ cant* (1854) ; a biography of his father (1854) ; (Discourses on Christian Faith and Practice) (1858); ˆThoughts on Preaching) (1864); etc.

ALEXANDER, John Henry, American scientist: b. Annapolis, Md., 26 June 1812; d. 2 March 1867. Graduating from St. John's Col¬ lege, Annapolis, 1826, he studied law, then engineering; and a plan for the survey of Maryland he put before its legislature gained him the appointment of topographical engineer of the State, which he held till 1841, preparing annual reports which did much to enlist capital in developing its coal and iron fields. He pub¬ lished a two-part (History of the Metallurgy of Iron) (1840-42). tie was also associated in Hassler and Bache’s coast survey. He made great efforts to establish a uniform standard of weights and measures in the United States, and published in 1850 a c Universal Dictionary of Weights and Measures, Ancient and Mod¬ ern. * In 1857 the United Stales government sent him to England as a delegate to the British commission on international coinage and his appointment to the directorship of the Phila¬ delphia mint was only prevented by his death. He served on many commissions and published very valuable reports, papers in the American Journal of Scioice and Arts, etc. He was also at different times professor of physics in St. James’ College, Maryland, the University of Maryland and the University of Pennsylvania. He also wrote volumes of religious verse, an unpublished' c Dictionary of English Surnames, * etc., and edited scientific works.

ALEXANDER, John White, American artist: b. Aliegneny cny, Fa., 7 Oct. 1856; d. 1 June 1915. For three years he was con¬ nected with the Harpers and then was three years abroad, studying at the National Academy of Fine Arts, Munich, and with Duveneck in Venice and Florence. Upon his return to the United States he was active as a magazine illustrator. Attention was first attracted to his paintings by his exhibit in the salon of the Champ de Mars in 1893. He received the gold medal of the Philadelphia Academy of Fine Arts in 1897, and gold medals at the Paris Exposition of 1900 and the Pan-American Exposition, Buffalo, in 1901. In 1902 he was elected an academician of the National Acad¬ emy. He is represented in the Luxembourg and many American and European collections ; and by six lunettes depicting (The History of the Book) in the east hall of the

Congressional Library, Washington.

ALEXANDER, Joseph Addison, Ameri¬ can Biblical scholar, son of Archibald Alex¬ ander: b. Philadelphia, Pa., 24 April 1809; d. 28 Jan. 1860. He was graduated first in the Princeton class of 1826 and with R. B. Patton founded Edgehill Seminary there. He was ad¬ junct professor of ancient languages at Prince¬ ton, 1830-33, then spent some years abroad in linguistic studies; from 1838 till death was

professor at Princeton Seminary, 1838-50 of Oriental and Biblical literature, 1851-60 of church history and government, 1859-60 of New Testament history and Biblical Greek. He was ranked among the foremost of American bibli- ologists, an Orientalist of high order and a linguist of eminent variety and soundness. His exegetical works include commentaries on Isaiah (1846, 1847, 1851), the Psalms (3 vols., 1850), Acts (1857), Mark (1858), all indebted to German sources. His sermons were col¬ lected in two volumes, 1860.

ALEXANDER, Mrs., pseudonym of Annie Hector (q.v.).

ALEXANDER NEVSKY, nyef'ske, Saint, Russian hero: b. Vladimir 1220; d. 1263. Of noble birth and lord paramount of the Russian nobility, he is renowned for his victory in 1240 over the Swedes, Danes and Knights of the Teutonic order, on the Neva, where Petrograd now stands, when Russia was still suffering from the terrible effects of the Tartar invasion. For this victory he received his surname of ˆNevsky.® In 1238 Russia had become vassal to the Tartars. By submission to the con¬ querors, Alexander used his best endeavors to prevent a recurrence of the invasion while the country was recuperating and died when on a third return journey from the Tartar capital, where he had succeeded in winning substantial concessions. His exploits are preserved in na¬ tional songs, the Russian Church canonized him and Peter the Great in 1723 built a magnificent monastery to his memory on the spot where the battle of the Neva was won, transferred his remains there from Vladimir in 1724 and created the order of Knights of St. Alexander Nevski in 1725.

ALEXANDER OF APH'RODIS'IAS,

Greek philosopher, surnamed ((the Expositor® : lived about 200 a.d. As head of the Lyceum at Athens, he became a distinguished exponent of the doctrines of Aristotle and author of commentaries on his works, which, translated into Latin, were adopted by the ((Alexandrist® philosophic school of the Renaissance and are still useful in the interpretation of Aristotle. His own original works include (On the

SouP and (On FateP The latter, in which he con¬ troverts the doctrine of necessity, was pub¬ lished by Orelli at Zurich in 1824.

ALEXANDER pF HALES, English phi¬ losopher and theologian : b. Hales, Gloucester¬ shire ; d. Paris 1245. One of the greatest of the schoolmen, he was among the first to study Aristotle from the point of view of the Arabic commentators. His chief work was <The Sum of Theology) (1475).

ALEXANDER OF RUMANIA, Hospo- dar of Rumania: b. Husch, 20 March 1820; d. Heidelberg, 15 May 1873. On 29 Jan. 1859 he was chosen hospodar at Jassy and on 17 February at Bucharest, with title Alexander John I. By abolishing serfdom and dividing landed properties he benefited the peasantˆ, but his efforts toward centralization caused dis¬ content and on 22 Feb. 1866 he was compelled to abdicate.

ALEXANDER, Samuel, English educator and philosopher: b. Sydney, N. S. W., 6 Jan. 1859. He was educated at the University of

Melbourne and at Balliol College, Oxford. From 1882 to 1893 he was fellow of Lincoln College. He is professor of philosophy at the Victoria University of Manchester since 1893. He was chosen fellow of the British Academy in 1913, was president of the Aristotelian So¬ ciety 1908-11 and in 1915 was appointed Gifford Lecturer for 1916-18 at the University of Glas¬ gow. He has published (Moral Order and Progress> (1889) ; <Locke) (1908) and various papers on philosophical subjects in Mind, the British Journal of Psychology, the Proceedings of the Aristotelian Society and other journals.

ALEXANDER SEVE'RUS, Roman em¬ peror (in full, Marcus Aurelius Alexander Severus) : b. Ace (the modern Acre), Phoe¬ nicia, 205 a.d. ; d. 235. He was the son of Genesius Marcianus and of Julia Mammsea, niece to the Emperor Severus. He was ad¬ mirably educated by his mother, and was adopted and made Caesar by his cousin Helio- gabalus, then but a few years older than him¬ self, at the prudent instigation of their common grandmother, Msesa. That contemptible Em¬ peror, however, soon grew jealous of his cousin and would have destroyed him but for the interference of the praetorian guards, who soon after put Heliogabalus himself to death and raised Alexander to the imperial dignity in his 17th year, 11 March 222. Alexander

adopted the noble model of Trajan and the Antonines, and the mode in which he administered the affairs of the empire, and otherwise occupied himself in poetry, philosophy and literature is eloquently described by Gibbon. On the whole, he governed ably both in peace and war ; but whatever he might owe to the good education given him by his mother, he allowed her a degree of influence in the government which threw a cloud over the latter part of his reign. He however finally became convinced that in this matter he had allowed his filial reverence to mislead him and is said to have reproached his mother with his dying breath as the cause of the disaster which had befallen them both. Alexander behaved with great magnanimity in one of the frequent insurrections of the prae¬ torian guards; but, either from fear or neces¬ sity, he allowed many of their seditious muti¬ nies to pass unpunished, though in one of them they murdered their prefect, the learned lawyer Ulpian, and in another compelled Dion Cassius, the historian, then consul, to retire to Bithynia. At length, after having defeated, in 232, the Persians under Artaxerxes, who wished to drive the Romans from Asia, and undertaking an expedition into Gaul to repress an incursion of the Germans, he was murdered with his mother in an insurrection of his Gallic troops, headed by the brutal and gigantic Thracian, Maximin, who took advantage of their discon¬ tent at the Emperor's attempts to restore dis¬ cipline. Alexander was favorable to Christian¬ ity, following the predilections of his mother, Julia Mammsea, and he is said to have placed the statue of Jesus Christ in his private temple with those of Orpheus and Apollonius of Tyana.

ALEXANDER THE GREAT, the 3d

King of Macedon bearing the name which he made so famous : b. Pella 356 b.c. ; d. Babylon 323 b.c. His mother was Olympias, an Epirote princess, who traced her descent from Achilles.

There is little reason to doubt that his father was Philip of Macedon, though the latter was not confident about his paternity and though there is no evidence of any feelings between the two such as are expected to exist between father and son. On the contrary, Philip seems to have resented the imperial qualities of his son, which he was clever enough to see and appreciate ; and Alexander showed a precocious envy of his father's neglected opportunities of conquest, a feeling which the sagacious biog¬ rapher Plutarch has noted and welt on. No open rupture took place till Philip repudiated Olympias to wed a Macedonian lady (Cleo¬ patra according to Plutarch and others, but Eurydice according to Arrian). During the nuptial feasting Philip made at Alexander with his sword, while the son jeered at his father's

drunken fury and unsteady gait. In the assas¬ sination of Philip in 336 the repudiated and banished Olympias certainly had a hand, and we cannot be sure that Alexander was not an accomplice.

The memorable year in which Alexander first appeared on the stage of universal history was 339 b.c. At the age of 16 the regency of Greece was entrusted to him by Philip when he set out on an expedition against Byzantium ; and in that capacity it fell to his lot to lead his first army against an Illyrian rising, to found his first Alexandria in the upper valley of the Strymon and to receive a deputation of envoys from the King of Persia, — a fit beginning for the miracle of precocity who was afterward to destroy Thebes at 21, to conquer Babylon at 25 and to die master of the world at 33. In the year after his appointment to the regency Alex¬ ander showed eminent military capacity at the battle of Chaeronea (338) and, on the murder of Philip, ascended the throne in 336, before he had reached his 20th year.

The brilliant natural gifts of Alexander had been developed under the tutelage of Aristotle. His personal beauty, with its ardent expressive¬ ness and flashing eyes, was very remarkable, and he was pre-eminent in horsemanship and all athletic accomplishments. A habit (or per¬ haps some peculiar muscular conformation of the neck) which gave his head a tilt toward the left shoulder imparted to him an air of hauteur, which gave a note of eminent distinc¬ tion to manners of charming grace and affabil¬ ity. He was of an extremely trusting disposi¬ tion. His position in ascending the throne was a difficult one. He had enemies on every side. The Illyrians and Thracians were always watch¬ ing an opportunity to attack Macedon, and indeed most of the Grecian states were ready, if possible, to throw off the Macedonian yoke. Persia regarded the growth of Macedon with suspicion, and finally his own Macedonian sub¬ jects were far from being united in approval of the career of conquest on which Philip and Alexander had both resolved to embark.

His reign began with an act of cruelty such as was destined subsequently to become almost a matter of course on every change of rulers; his uncle and his half-brother were put to death and the little daughter of Cleopatra, Philip's widow, was butchered in the arms of her mother. In the autumn of 336 Alexander marched into Greece and was confirmed in the chief command against Persia by the Amphic-tyones at Thermopylae. In 335 he advanced to

the Haemus range (the Balkans) and showed great ability in his campaign against the Thra¬ cians, crossing the Danube — apparently out of mere bravado — in the face of the enemy with¬ out losing a single man. He had no real friends among the Greek states. The Thebans, hearing a false report of his death, became overt en¬ emies, proclaimed their independence and slew some Macedonian officers. Alexander appeared in Bceotia with amazing dispatch and tookThebes by storm on the third day of the siege. This was the occasion on which, in the words of Milton,

The great Emathian conqueror bade spare

The house ot Pindar."

Leaving Antipater to govern in Europe, he crossed over into Asia in the spring of 334 with 30,000 foot and 5,000 horse. The Persian empire, the conquest of which he undertook, was at least 50 times as large as his own and numbered about 20 times as many inhabitants. It extended from the Hellespont to the Punjab, from Lake Aral to the cataracts of the Nile. But it was a vast congeries of subject provinces having no internal bond and no principle of cohesion but the will of the king. For 80 years it had been tending to dissolution in its west¬ ern provinces, which were the most exposed to danger. As stages in this process may be men¬ tioned the revolt of Egypt under Amyrtaeus in 410 and that of the Cypriote Evagoras, which was not put down till 383 ; the numerous re¬ volts of satraps, of Greek cities and of semi-Greek tyrants during the first half of the 5th century and the attack on Persia made by Tachos, King of Egypt, in 361. It has been well remarked by Adolf Holm that the position of the Persian empire when attacked by Alex¬ ander had some resemblance to that of the Roman empire when overrun by the Germans. Both empires held together merely by the law of inertia ; in both their strength lay not in their native elements, but in mercenaries taken from the very peoples, the Germans and the Greeks, who threatened respectively the safety of the two empires. Alexander proposed to himself nothing short of complete dispossession of Darius in favor of himself as captain-general of Hellas and the establishment of his own Panhellenic empire in the room of the Persian. He was not led from point to point by this or that strategical reason. His business was not to leave Asia till every satrapy in the Persian empire acknowledged his sway. Even the burn¬ ing of the Persian capital Persepolis was prob¬ ably no act of drunken folly, as which it has often been described, but rather a signal and emphatic assertion of mastery and ownership, as of one who should say, (<The Persian empire is mine, to throw it into the fire if I please.® Alexander had no intention of remaining King of Macedon. His design

was to be the Greek emperor of Europe and Asia, and this position in effect he assumed on the death of Darius. With this view throughout his whole career in Asia he sought as much as possible to fuse and commingle his Asiatic and European sub¬ jects, very much as England did in India. This was the project to which he was giving all his efforts at the time of his death.

The first hostile army he encountered was on the Granicus River (an affluent of the Sea of Marmora). He crossed the Granicus, just VoL. I - 24

as he afterward crossed the Pinarus at IssusJ in full view of the enemy, hurled himself with all his force on their . centre and completely broke it up. It was not his way to refrain from the pass in quart till he had first hit in tierce. His victories sometimes remind us of the oft-quoted C'est magnifique, mais ce West pas la guerre. He won by an impetuous dash a victory which a subtler strategy might have failed to achieve, just as his sword-cut at Gor- dium made away with the knot which his fin¬ gers could not undo. The victory at Granicus was attended with unprecedented results ; Sar¬ dis, Miletus, Ephesus, Halicarnassus submitted one after another, and he established in them democracies of the Greek type. In November 333, Darius, eager to meet the invader, hastened to the sea-coast near Issus (at the head of the Gulf of Iskanderoon). The tactics pursued at the Granicus had here again a successful issue. Darius fled, leaving his family and his treasures in the hands of the conqueror. The mother, wife, two daughters, and son of Darius were treated with a clemency which foreshadowed the ages of chivalry. An Asiatic conqueror would have put the males to death, probably with torture, and would have sent the females to his harem. Captive Greek generals he also spared and liberated. He took possession of Damascus, a city which even then could boast of a hoary antiquity, and secured all the towns along the Mediterranean Sea. His plan now was to occupy Egypt, and this was made easy by the capture of Tyre on 20 Aug. 332, after a siege of seven months. During the siege a message came from Darius offering Alexander 10,000 talents, the hand of his daughter in mar¬ riage, and Asia as far as the Euphrates, if he would make peace. <(I would accept it if I were Alexander,® said his general, Parmenio. <(So would I,® replied Alexander, ((if I were Parmenio.® Gaza fell in November 332, and Alexander, taking possession of Egypt, sacri¬ ficed to Apis and the Egyptian gods in Memphis and held musical and athletic competitions after the Greek fashion in Tyre. Thus he concili¬ ated the affections of his subjects. Politically he organized Egypt as a province in a way which, as Arrian remarks, foreshadowed the Roman system, giving the civil administration first to two, and then to a

single governor, while the troops were placed under several separate commanders. It was now that Alex¬ ander founded the celebrated Alexandria — destined in two generations to be the first city in the Levant — and marched through the Libyan desert to consult the oracle of Jupiter Ammon, whose son he claimed to be.

Meantime Darius was collecting an army in Assyria; but before the decisive battle of Ar- bela he made overtures of peace to Alexander, whose answer was, ((I, Alexander, hold all thy treasure and all thy land to be mine,® — a verbal cutting of the Gordian knot. The Per¬ sian force encountered by the Greeks at Gau- gamela, near the ancient Nineveh, and about 50 miles from Arbela (which strangely has giv¬ en its name to the battle ever since), is said to have numbered 1,000,000 infantry, 40,000 caval¬ ry, 200 scythed chariots and 15 elephants. Alexander had only 40,000 foot and 7,000 horse, but he won a decisive victory on 1 Oct. 331. The Macedonians aimed at the faces of their adversaries, as the Caesarians afterward did at

Pharsalus. Babylon and Susa opened their gates to the conqueror, who then entered Per- sepolis, the capital of the province of Persis, seized its immense treasures and burned its palace and citadel to the ground.

In the spring of 330, Alexander proceeded to Media in pursuit of Darius. That weak monarch was being carried about by Bessus, satrap of Bactria, who, on hearing of the ap¬ proach of Alexander, inflicted a mortal wound on Darius and fled, leaving him to die. Darius died before Alexander came up with him (July 330). The conqueror sent his body to Per- sepolis to be interred with royal honors. Af¬ ter taking possession of Hyrcania and Bactriana he was meditating still more gigantic plans, when he learned in the autumn of 330 that Philotas, the son of Parmenio, though cog¬ nizant of a conspiracy against his life, had not reported it. He put both Philotas and Par¬ menio to death. The execution of the former has been condemned, but is on the whole de¬ fensible; the murder of the latter is an inex¬ cusable act of brutal tyranny. About the end of 330 or the beginning of 329 he crossed the great range of the Caucasus (not the modern Caucasus, but the Hindu Kush), by a pass at an altitude of 13,200 feet — a march com¬ parable with that of Hannibal over the Alps. He reached the city of Bactra (Balkh), and made his way north as far as the Jaxartes or Tanais, where he founded a city, probably the modern Khojend.

He remained in these regions till the summer of 327, spending the winter in Nautaca, on the right bank of the Oxus. Here occurred the murder of Clitus, and Alexander's marriage with Roxana, daughter of Oxyartes, a satrap of Sogdiana. She had a son named after his father in 323. After the death of Alexander she compassed the destruction of his other wife, the daughter of Darius, and was killed with her son in 311 by Cassander. The murder of Clitus has been regarded as a great blot on the career of Alexander. But the circumstances in which he was placed greatly extenuate the act. The East believed in the divinity of Alex¬ ander, and such a belief was almost an essen¬ tial condition of the permanence of his empire. When one of his own officers openly denied and ridiculed the Emperor's pretensions at a state banquet he seriously imperiled the Hellenic raj. The empire of Alexander was never subject to a second single emperor. The destinies of the West awaited the struggle between Rome and Carthage. But his vast empire nowhere save in India reverted to the pre-Alexandrine type.

Alexander now formed the idea of conquering India. He passed the Indus in 327, and formed an alliance with Taxiles, under whose guidance he reached the Hydaspes (modern Jhelum). This river he

crossed after a severe struggle with Porus, in whom he met an opponent very superior to the Persian satraps who had hitherto confronted him or rather retreated before him. He then moved farther east and crossed the Acesines (Chenab) and the Hyraotes (Ravi), and reached the Hyphasis (Beas), which now joins the last river of the Punjab, the Sutlej, but which then flowed in a different channel. He never reached the Sutlej itself. The mur¬ murs of his army compelled him to return. The fine instrument which he had fashioned

so dexterously broke in his hand. He re¬ crossed the Acesines to the Hydaspes, where he completed the cities of Nicsea and Bucephala (named after his famous horse Bucephalus), which he had already begun. He had only seen the fringe of India — the Punjab. The won¬ drous country of Brahma and Buddha never felt the sway of Alexander. He was obliged to content himself with writing his name large across the histories of Hellenic, Semitic, Egyp¬ tian and Iranian civilization. Alexander's name does not appear in Sanskrit literature.

When he had reached the Hydaspes he built a fleet, in which he sent part of his army down the river, while the rest proceeded along the banks. The city of the Malli, where Alexander was wounded, is probably Multan ; Puttala is perhaps Haidarabad. The march of 500 miles through the hideous desert of Gedrosia (Ba¬ luchistan), and the voyage of Nearchus, have given much material to romancers and rhetori¬ cians. At Carmania he was joined by Craterus, who had marched through the Bolan Pass to Kandahar, and by Nearchus, whose voyage, then thought so marvelous a feat, is no more than the short steam run from Karachi to Bunder Abbas. From Carmania he went to Pasargadae, and thence to Susa, where he de¬ voted himself with great energy to the task of uniting as far as possible the Macedonian and Persian nations. Alexander married two Per¬ sian princesses, and he gave rewards to those of his staff who followed his example in con¬ tracting Persian alliances. He sent home to Macedonia, with a present of a talent each, about 10,000 Macedonians who by age or wounds were incapacitated for service. These veterans were led by Craterus, who was sent to succeed Antipater as governor of Europe. Antipater seems to have fallen into disfavor, though in 330 he had done service in defeating Agis, the Spartan king who threatened Megalopolis. It was of this exploit that Alexander contemp¬ tuously observed, <(So there has been a battle of the mice in Arcadia, while we have been conquering Asia.®

In 323 Alexander arrived at Babylon, where he found numberless envoys from nations near and far, come to pay their homage to the young conqueror. He was engaged in very extensive plans for the

future, including the conquest of Arabia and the reorganization of the army, when he fell ill of a fever, shortlv after the death of his beloved Hephaestion, which had deeply affected him. He died in 323, after a reign of 12 years and 8 months. The day be¬ fore a rumor had gone abroad that the great general was dead, and that his friends were con¬ cealing the truth. The dying King caused his army to defile past his bed, and feebly waved them a last farewell. Alexander was a great administrator, a second Pericles in his devotion to work, an Alcibiades in his distinguished presence, a Phocion in his simplicity of char¬ acter. He possessed eminent qualities as a statesman as well as a military leader. It is unfortunate that he did not live to carry out his plans for trade development. The Romans enjoyed the fruit of his victories, and his con¬ quests made possible the spread of Christianity in the East.

Bibliography.— Droysen, <Geschishte Alex¬ anders des GrosseiP (Gotha 1898) ; Grote, (His-

tory of Greece) (New York 1853-56); Holm, (Griechische Geschichte) (Vol. Ill, Berlin 1893) ; Mahaffy, J. P., (Story of Alexander's Empire *(1886) ; id., (Progress of Hellenism in Alexander's Empire* (1905) ; Wheeler, B. I., (Life of Alexander the Great> (New York

1900).

ALEXANDER, Sir William, Earl of Stir¬ ling, poet and statesman: b. 1567; d. London 1640. Tutor to Prince Henry, son of James I; knighted 1609 ; held various high offices under the Crown and in 1621 received the famous and stupendous grant of land embracing what is now Canada and the best portion of the New England States, and given almost absolute authority in its government, a grant that roused bitter envy among his contemporaries. At the coronation of Charles I (1633) Alexander be¬ came Earl of Stirling. His last years were embittered by great pecuniary reverses and he died insolvent. In strength of character, in¬ tegrity and many-sidedness he was the greatest Scotchman of his time ; took a conspicuous place as scholar, courtier, colonizer and poet. As a poet he belongs to the type of Fulk Gre- ville and Lord Brooke ; his tragedies are la¬ bored; but some minor pieces like the <Aurora) are elegant and musical. Milton read his works and Addison praised them highly. The earliest editions of them are eagerly sought after. Chief among them are (Tragedie of

Darius) (1603) ; A Paraenesis to the Prince) (1604).

ALEXANDER, William, American gen¬ eral in the Revolutionary War, known as <(Lord Stirling®: b. New York 1726; d. Albany, 15 Jan. 1783. He entered the service as a colonel of militia, was taken prisoner at the battle of Long Island, where he commanded a brigade, and served through the New Jersey campaigns with Washington. His claim to the title and estates of Stirling was disallowed by the English House of Lords in 1761 and on his return to America he took an active part in the troubles leading up to the Revolution. He was a member of the first board of governors of King's College, now Columbia University.

"ALEXANDER ARCHIPELAGO, or ALEXANDER ISLANDS, a group of islands on the west coast of North America, extending from 54° 40' N. to 58° 25' N. ; belong to Alaska Territory. The principal islands are Baranoff and Prince of Wales.

ALEXANDER COLUMN, in Petrograd, erected in 1832 in honor of Alexander I (1777— 1825). The total height is 154J4 feet. The polished shaft of red granite, 84 feet high and 14 feet in diameter, is the greatest modern monolith.

ALEXANDER LAND, an area in the Antarctic Ocean, discovered by Bellinghausen in 1821. It is in lat. 68°, long. 70° to 75°.

ALEXANDER, Romance of, a romance of the Middle Ages, based on a fabulous ac¬ count of Alexander's invasion of Asia, written by Callisthenes. In some form it makes a part of all the literatures of Europe and western Asia.

ALEXANDERS, a name applied to Smyrnium olusastrum, of the family Apiacece. The plant is a native of Europe and was for¬

merly cultivated for its leaf-stalks, which may be blanched like celery. It is now rare in culti¬ vation because of its inferiority to celery.

ALEXANDER'S FEAST. Dryden, in his Alexander's Feast or the Power of Music, * an (Ode in Honour of St. Cecilia's Day *(1697), wrote in the form of Cowley's irregu¬ lar ode, but in place of the broken-winded rhythms of the ((Pindarick® made use of his own firm verse-music. Ten years before he had written on the same model (A Song for St. Cecilia's Day* in which he had expressed the idea that the eternal harmony of the universe was to be perceived in the varying effects of music on human emotions, and in the rhythms of his poem attempted to suggest the appealing qualities of various musical instruments. In Alexander's

Feast > he carried the same idea farther, employing now a legend connected with Alexander the Great. This story he tells in such a way as to show how the musician and poet can at will ring the changes upon his hear¬ er's feelings, Alexander being now softened, exalted or infuriated according to the turns of harmony brought to bear upon him by Timo- theus. The success of the poem is largely in the skill with which the verse is varied to suit Dry- den's purpose, but also in its effective imagery and narrative power. The author's great com¬ mand of phrase is also evident throughout, as one may see in the closing lines of the first and last stanzas. Alexander's Feast* had a note¬ worthy effect upon later lyric poetry, particu¬ larly upon the odes of Gray.

William Haller.

ALEXANDRA Caroline Marie Charlotte Louise Julie, Dowager Queen of England, daughter of Christian IX, King of Denmark : b. Copenhagen, 1 Dec. 1844. On 10 March 1863 she was married to Albert Edward, Prince of Wales; she has had three sons, two of whom have since died, and three daughters. She made several visits to Denmark and a visit to Russia at the time of the death of Alexander III. She took an active part in very many benevolent enterprises and became very popuT lar in England. When Albert Edward suc¬ ceeded to the throne in 1901 as Edward VII she became Queen of England and reigned with him until his death, 6 May 1910. In 1913 she celebrated the fiftieth anniversary of her wed¬ ding and of her arrival in England. She has borne a noble part in the various humanitarian activities incident to the great European War. Consult Tooley, S. A., c Queen Alexandra) (London 1902).

ALEXANDRETTA (the ancient Alex¬ andria ad Issum), a small seaport in Syria, on the southeast coast of the Gulf of Iskande- roon. It is the natural port of Aleppo and northern Syria, and the residence of a United States vice-consul. The port is a fine bay, run¬ ning southeast from the Gulf. The annual im¬ ports, about $10,000,000, are chiefly grain, rice and salt; the exports, about $6,500,000, are galls, silk, cotton and dips or beshmet (a preparation from grapes, used by the natives as food). In 1915, in the European War, the railway station, wharf and warlike stores were destroyed by British forces. Pop. about 9,000.

ALEXANDRIA (Iskanderieh of the Turks), an ancient city and chief seaport in

ALEXANDRIA

Egypt, about 14 miles west of the Canopic mouth of the Nile, on the ridge of land be¬ tween the sea and the bed of the old Lake Ma- reotis, 129 miles by rail northwest of Cairo. Ancient Alexandria was founded by, and named in honor of, Alexander the Great, in 332 b.c., on the site of a village called Rhakotis or Ra- coudah. Its plan was sketched by the architect Dinocrates. It stood nearly on the site of the present town, though the configuration of the land has altered considerably since then. It at¬ tained its greatest prosperity in the days of the Ptolemies, who made it their capital. Under the Romans it became the capital of Egypt, and even when captured by Amru, general of the Caliph Omar (a.d. 641) it contained (<4,000 pal¬ aces, 4,000 baths, 400 theatres or places of amusement, 12,000 shops for the sale of veg¬ etables, and 40,000 tributary Jews® (Gibbon). The city was regularly built and traversed by two principal streets, each 200 feet wide. It consisted of three quarters, that of the Jews,, the Rakotis, or the people's quarter, and Brucheion, or the quarter of the palace. In the 1st century b.c. it had about 500,000 inhab¬ itants. One-fourth of the area upon which it was built was covered with temples, palaces and public buildings, the most conspicuous be¬ ing the famous lighthouse, one of the seven wonders of the world, upon the little island of Pharos, which was connected with the city by a mole, called the Heptastadion, nearly a mile long; the splendid temple of Jupiter Serapis; the Librarjq at that time the richest in the world (see Alexandrian Library) ; the Mu¬ seum, a kind of academy in which learned men of every description were entertained at the ex¬ pense of the state ; an immense hippodrome; the temple of Poseidon, and the Caesareum, beside which stood the two obelisks known as Cleo¬ patra's Needles, one of which was taken to Lon¬ don in 1878; the other to Central Park, New York, in 1881. The largest well-preserved mon¬ ument of antiquity in modern Alexandria is the so-called Pompcy's Pillar, a red granite column 88 feet high (including pedestal), on the site of the Serapeum, thought to have been erected in the 4th century either in honor of the Em¬ peror Diocletian or to commemorate the de¬ struction of the Serapeum.

Alexandria was one of the chief granaries of Rome, and apart from its commercial im¬ portance was a great centre of learning. On the introduction of Christianity in the 1st century it became the seat of Christian erudition and the orthodox faith, and was frequently torn by bloody religious dissensions. After the Mo¬ hammedan conquest (7th century) its import¬ ance rapidly declined. In the 19th century un¬ der the vigorous rule of Mehemet Ali, it recov¬ ered a large degree of prosperity, and is to-day one of the most important commercial ports

on the Mediterranean. It was bombarded by the British 11 July 1882. See Egypt.

The • Mohammedan quarter of the present city is chiefly built on the mole, which has been increased by alluvial deposits till it has become a broad neck of land between the two harbors. The European quarter is on the mainland south of the east harbor. It swarms with cafes, shops and theatres, and is lighted with electricity. The finest residences and official buildings surround the Mohammed Ali square. Alexandria has two

harbors; the east harbor (Great Harbor of Antiquity) is now accessible only to fish¬ ing boats. The west harbor is divided into an outer harbor, about 1,700 acres in area, pro¬ tected by a breakwater of solid masonry about two miles long, and an inner harbor 464 acres in area, average depth 28 feet, also protected by a mole 1,000 yards long. It is entered and cleared annually by over 2,000 steamers. In 1912 ex¬ ports, chiefly cotton, grain, cottonseed, rice, sugar, beans, etc., amounted to $168,951,280; im¬ ports to $110,785,145. The city acquired a mod¬ ern drainage system in 1905 and a new water supply in 1906. The population in 1907 was 332,246; in 1914 it was estimated at 400,000, of whom 60,000 were Europeans, mostly Greeks and Italians. There is railway communication with Cairo and Suez; the Mahmoudieh Canal, made by Mehemet Ali, connects Alexandria with Cairo and the Nile.

ALEXANDRIA, Canada, town in Glen¬ garry County, Ontario, half way between Mon¬ treal and Ottawa on the Grand Trunk Railway. It has carriage and cabinet works, and foun¬ dries. Pop. 2,323.

ALEXANDRIA, lnd., a city in Madison County, 50 miles northeast of Indianapolis, on the Cleveland, C, C. & St. L., Michigan div., and Lake Erie and YV. railroads, and Union Traction Company of Indiana. It is in a natural gas region, but the supply has failed of recent years and industrial prosperity has suffered. There are import¬ ant glass and lamp chimney factories, pre¬ serving plants, and manufactures of paper, rockwood products, mirrors, wire-fence, road- drags, steel wheels, etc. ; almost all factories are situated outside the city limits, which makes the value of taxable property only $1,226,000. There are two banks, four public schools, one of which is a high school, a Carnegie library, several city buildings, municipal water and lighting plants ; churches, and daily, tri-weekly and weekly newspapers. It was settled in 1834, and is governed by a mayor, elected for four years, a council of five members, clerk and treasurer. The annual income for running ex¬ penses is about $30,000; expenses in 1915 about

$27,000. Pop. (1920) 4,172.

ALEXANDRIA, La., city and parish seat of Rapides Parish, 193 miles northwest of New Orleans, and on the T. & P., St. L., Iron Mt. and So. (2 divisions), M. L. & T. S. S. Co. (Son. Pas.), Rock Ls., L. & Ark., Alex. & W. and the Louisiana Railway & Navigation Com¬ pany. It is in the midst of fine alluvial lands, devoted chiefly to truck, cane and cotton grow¬ ing. Strawberries and other fruits are raised across the river. The main industries of the city are truck and general farming, cottonseed oil mills, pine and hardw-ood mills, hoop and barrel and silo factories, wroodvrorking plants, etc. There are four large banking institutions, three investment companies, two savings banks and two building and loan associations. The value of taxable property is $25,000,000. Alex¬ andria has four large public schools, equipped with the latest facilities, with 3,000 pupils, pri¬ vate and denominational schools and a convent of the Sisters of Mercy. It has a number of miles of asphalt street paving. Among the public buildings are the city hall, court house, opera house, high schools, public library, ho-

tels and office buildings and insane asylum. There are 30 miles of good gravel roads in every direction. Alexandria was once a trad¬ ing post of the French and Spanish and was incorporated in 1819. In 1864 it was almost entirely destroyed by fire. Its present pros¬ perity began when the Texas and Pacific Rail¬ road was extended here in 1882. It has the commission form of government and the street railways and electric light and water works are owned by the municipality. The city's receipts in 1914— 1 5 were $295,011; expenses, $250,912. Pop. (1920) 17,510.

ALEXANDRIA, Minn., city and county- seat of Douglas County, 130 miles northwest of Minneapolis, on the Great Northern and the Minneapolis, St. Paul and Sault Ste. Marie rail¬ roads. It is located in a stock raising and wheat district and has manufactories of flour, furniture, boats, launches, sleighs, cutlery, stoves, wagons and beer. There is a large re¬ frigerating plant located here. The city has considerable reputation as a summer resort. The electric lighting plant and water works are the property of the municipality. Pop. 3,200.

ALEXANDRIA, Va., city and port of entry of Alexandria County, situated on the Potomac River, the Pennsylvania, the Southern, the

Atlantic Coast Line, the Baltimore and Ohio, the Seaboard Air Line and the Chesa¬ peake and Ohio, and trolley line connecting with Washington, D. C., and Mount Vernon; six miles south of Washington. The river here expands to the width of a mile and gives the city an excellent harbor that will accommo¬ date the largest vessels. The city is an import¬ ant trade centre, and is noted for its educa¬ tional institutions, which include Washington High School, Potomac, Mt. Vernon and St. Mary's academies, and nearby the Theological Seminary and High School of the Diocese of Virginia (Protestant Episcopal). The city's manufactures include glass, fertilizers, pumps, silks and thread, and there are also machine shops and breweries. The United States census of 1914 recorded 49 establishments of factory grade employing 1,716 persons, of whom 1,503 were wage earners, receiving $857,000 in wages. The capital engaged amounted to $4,573,000, and the output was valued at $3,660,000 ; of this $1,701,000 was added by manufacture. There are four national banks, public school property valued at $35,000, and daily and weekly period¬ icals. Among the objects of special interest are the public library, the Confederate monument entitled <(Appomattox,ˆ the Marshall House, and Old Christ Church, of which Washington was one of the first vestrymen, and which con¬ tains his pew and that of General Lee. Gen¬ eral Braddock made his headquarters at Alex¬ andria (originally called Belhaven) in 1755. During the Civil War it was the capital of that part of Virginia which adhered to the Union; and in 1861 Colonel Ellsworth, an officer in Major-General McDowell's army, was shot after tearing down a Confederate flag which floated from the Marshall House. Alexandria was first incorporated in 1749. It is governed, under a charter of 1879 revised in 1895, by a mayor and bicameral city council, which elects the minor officers ; the more important ones such as the treasurer, auditor, etc., being elected by the people. Pop. (1920) 18,060.

ALEXANDRIA BAY, N. Y., a village in Jefferson County on the Rome, W. & O. Rail¬ road about 70 miles northeast of Oswego. It is a prominent resort ot the Thousand Islands. Pop. (1920) 1,649.

ALEXANDRIAN AGE, or SCHOOL,

the school or period of Greek literature and learning that existed at Alexandria in Egypt during the 300 years that the rule of the Ptole¬ mies lasted (323-30 b.c.), and continued under the Roman supremacy. Ptolemy Soter founded the famous library of Alexandria (q.v.) and his son, Philadelphus, established a kind of acad¬ emy of sciences and arts. Many scholars and men of genius were thus attracted to Alex¬ andria, and a period of literary activity set in which made Alexandria

for long the focus and centre of Greek culture and intellectual effort. It must be admitted, however, that originality was not a characteristic of the Alexandrian age, which was stronger in criticism, grammar and science than in pure literature. Among the grammarians and critics were Zenodotus, Era¬ tosthenes, Aristophanes, Aristarchus and Zoilus, proverbial as a captious critic. Their merit is to have collected, edited and preserved the ex¬ isting monuments of Greek literature. To the poets belong Apollonius, Lycophron, Aratus, Nicander, Euphorion, Callimachus, Theocritus, Philetas, etc. Among those who pursued math¬ ematics, physics and astronomy was Euclid, the father of scientific geometry; Archimedes, great in physics and mechanics ; Apollonius of Perga, whose work on conic sections still exists; Nicomachus, the first scientific arith¬ metician, and (under the Romans) the as¬ tronomer and geographer Ptolemy. Alexan¬ dria also was distinguished in philosophical speculation, and it was here that the New Pla¬ tonic school was established at the close of the 2d century after Christ by Ammonius of Al¬ exandria (about 193 a.d.) , whose disciples were Plotinus and Origen. Being for the most part Orientals, formed by the study of Greek learn¬ ing, the writings of the New Platonists are strikingly characterized — for example, those of Ammonius Saccas, Plotinus, Iamblicus Porphy- rius — by a mixture of Asiatic and European elements. The principal Gnostic systems also had their origin in Alexandria.

ALEXANDRIAN LIBRARY, a remark¬ able collection of books, the largest of the an¬ cient world, was founded by the first Ptolemy and fostered by his son. It quickly grew and, already in the time of the first Ptolemy, De¬ metrius Phalereus had 50,000 volumes or rolls under his care. During its most flourishing period, under the direction of Zenodotus, Aris¬ tarchus of Byzantium, Callimachus, Apollonius Rhodius and others, it is said to have contained 490,000, or, according to another authority, in¬ cluding all duplicates, as many as 700,000 vol¬ umes. The greater part of this library, which embraced the collected literature of Rome, Greece, India and Egypt, was contained in the famous museum, in the quarter of Alexandria called the Brucheion. During the siege of Al¬ exandria by Julius Caesar this part of the library was destroyed by fire ; but it was after¬ ward replaced by the collection of Pergamos, which was presented to Cleopatra by Mark Antony. The other part of the library was

kept in the Serapeum, the temple of Jupiter Serapis, where it

remained till the time of Theodosius the Great. When this emperor permitted all the heathen temples in the Roman empire to be destroyed, the magnificent temple of Jupiter Serapis was not spared. A mob of fanatic Christians, led on by the Archbishop Theophilus, stormed and destroyed the temple, together, it is most likely, with the greater part of its literary treasures, in 391 a.d. It was at this time that the destruction of the library was begun, and not at the taking of Alexandria by the Arabs under the Caliph Omar, in 641. There are strong reasons for believing that no library then existed there. Consult Petit-Radel, (Recherches sur les Bibliotheques Anciennes et Modernes' (1819) ; Ritschl, (Die Alexandrin- ische Bibliothek) (1838) ; Weniger, (Das Alex- andrinische Museum* (1875).

ALEXANDRIAN VERSION, or CO¬ DEX ALEXANDRINUS (Codex A.), a Greek manuscript of the Bible, now in the British Museum, of great importance in Biblical criticism. It is on parchment, with uncial let¬ ters, without breathings and accents or spaces between the words. It was written probably in the middle of the 5th century and contains, in four volumes, small folio, the whole Greek Bible, two letters of Bishop Clement of Rome to the Corinthians, the genuine epistle and a fragment of the second, the spurious one, and eight psalms of Solomon, so-called. The first three volumes contain the translation of the Old Testament; the fourth, the New Testa¬ ment. A large part of the Gospel of St. Mat¬ thew and of the Second Epistle to the Corin¬ thians, as well as a portion of the Gospel of St. John, are wanting. The patriarch of Constan¬ tinople, Cyrillus Lucaris, who in 1628 sent this manuscript as a present to Charles I, said he had received it from Egypt; and it is evident from other circumstances that it was written there. But it cannot be decided with certainty whether it came from Alexandria (whence its name). It is said, however, to have belonged to the patriarch of Alexandria at the end of the 11th century. John Ernest Grabe followed it in his edition of the Septuagint (Oxford 1707- 20, 4 vols. folio). Dr. Woide published the New Testament (London, folio, 1786), with types cast for the purpose, page for page and line for line, as in the manuscript itself. A somewhat more accurate text of the New Tes¬ tament in ordinary Greek type (with the lacunae supplied) was published by R. H. Cowper in 1860. Henry Hervey Baber edited a facsimile edition of the Old Testament (London 1816-28, 3 vols., folio). In 1864 the complete text, along with three other of the oldest texts of the Bible, was published at Oxford, the work being arranged in parallel columns. An autotype fac¬ simile of the whole codex in four volumes was published by the British Museum in 1879-83. The text of this manuscript is of most import¬ ance in the criticism of the Epistles of the New Testament; in the Gospels the text is not so good.

ALEXANDRINE, al'eg-zan'drin, the name of a verse, which consists of six feet (or of 6l/2 with female rhymes), equal to 12 syllables, the pause being in correct Alexandrines always on the 6th syllable ; for example, the second of

the following verses (from Pope's Essay on Criticism) :

"A needless Alexandrine ends the song That, like a wounded snake, drags its slow length along."

The only complete English poem of literary im¬ portance written in this measure is Drayton's 'Tolyolbion.* The concluding line of the Spen¬ serian stanza is an Alexandrine. The French in their epics and dramas are confined to this verse, which for this reason is called by them the Heroic. The Alexandrine derives its name from an old French poem belonging to the middle of the 12th or the beginning of the 13th century, the subject of which is Alexander the Great, and in which this verse was first made use of.

ALEXANDRISTS. In the period of the Renaissance there came to be a vigorous con¬ troversy between the adherents of different traditions of Aristotelianism. The chief schools of the Aristotelians were the Thomists, or fol¬ lowers of Thomas Aquinas, the Averroists, or followers of Averroes, and the Alexandrists, or followers of Alexander of Aphrodisias (about 200 a.d.) . The chief point at issue among these three schools was that of the existence and na¬ ture of immortality. The Thomists, of course, as the advocates of the orthodox doctrine of the Catholic faith, held that the intellect re¬ tained its individuality after death. Alexander and his followers, on the other hand, believed that the intellect was double in nature, con¬ taining a passive, formless, mortal part, con¬ nected with the lower psychical functions and acting as a tabula rasa in its reception of the active intellect which, though immortal, was not regarded by Alexander as individual. In¬ deed, he identified this active intellect with the Deity. Averroes really held practically the same view as Alexander, but differed in his terminology, for what Alexander called the passive intellect was regarded by Averroes as a mere non-intellectual disposition, while what Averroes called the passive intellect is the re¬ sult of the particularization of the active in¬ tellect by contact with the specific dispositions of the minds of different individuals. Averroes did not identify active intellect with the Deity, but with an emanation of the Deity; however, he attributed to it immortality. Similar as were the views of Alexander and Averroes, in the Renaissance the followers of Alexander put their chief emphasis on the mortality of the passive reason, the Averroists on the non¬ individual immortality of the

active reason, so that a violent antagonism developed between the two schools which soon attached itself to many other points. The chief Averroists were Nicoletto Vernias (P-1499) , Alexander Achillini of Bologna (P-1518) , Augustino Nifo (1473- 1546), Zimara (P-1532). The chief Alexan¬ drists were Ermolao Barbaro (1454-93), Pietro Pomponazzi (1462-1524), Gasparo Con- tarini (P-1542), Simon Porta (P-1555), Scal- iger (1484—1558). The chief Thomist was Francis Suarez of Granada (1548-1617).

ALEXANDRITE, a varietv of the mineral chrysoberyl (q.v.). It occurs in twin crystals (trillings) and is chiefly remarkable for the fact that while by daylight its color is a dark emerald to grayish-green, it assumes a beauti-

ful columbine-red color by artificial light. Be¬ cause of this property and owing to its rarity and great hardness (8.5), it is highly prized as a gem. Its name, given in honor of Alexander II of Russia, seems singularly appropriate when it is recalled that the gem is said to have been first discovered in the emerald mines of Tako- waja, Siberia, on the very day on which the then heir apparent attained his majority, and further that the green and red colors of alex¬ andrite are the national colors of Russia. The finest alexandrites still come from Siberia, but good gems are occasionally found in Ceylon.

ALEXANDROPOL, Armenia (Gumri), a former Russian military town and fortress in the trans-Caucasian government of Erivan, situated on a bare plateau near the highway from Erivan to Kars. There is accommoda¬ tion in the military quarters for a force of 10,- 000 men. The town has several churches and caravansaries, and there are extensive silk manufactories. Pop. 49,000.

ALEXEI MIKHAILOVITCH, 2d Rus¬ sian tsar of the line of Romanof : b. 1629; d. 1676. He succeeded to the throne in 1645 on the death of his father, Michael Feodorovitch. The first years of his reign were marked by various disturbances due in great part to his youth and inexperience. By 1655 he had re¬ stored peace at home and began to look abroad for realms to conquer. He conducted two cam¬ paigns against Poland (1654-56 and 1660-67), captured Smolensk, overran Lithuania and seized several provinces. He also took part of the Ukraine, and waged a war against Sweden in 1657-58. He greatly extended Russian in¬ fluence in the East, sent several raiding parties

of Cossacks into Asia and made an attack on China. At home he introduced important modi¬ fications of the legal code, had translations made of numerous scientific works, military works, etc., and also instituted some ecclesiasti¬ cal reforms. His private character appears to have been above reproach. By his second wife, Natalia Naryshkin, he was the father of Peter the Great.

ALEXEI PETROVITCH, the eldest son of the Tsar Peter the Great and Eudoxia Lapuchin : b. Moscow 1690; d. St. Peters¬ burg 7 July 1718. He opposed the innova¬ tions introduced by his father, who on this account determined to disinherit him. Alexei renounced the crown, and when Peter set out on • his second journey he made his escape in 1717 to Vienna, where he sought the protection of his brother-in-law, the German Emperor, and thence to Naples, under the pretext of going to his father, who had sent for him. At the command of Peter he returned; but the enraged Tsar, regarding his flight as an act of treason, disinherited him by a ukase of 2 Feb. 1718; and when he dis¬ covered that Alexei was paving the way to succeed to the crown he not only caused all the participators of his project to be punished cap¬ itally or otherwise, but had his son also con¬ demned to death, and the sentence read to him, as pronounced unanimously by 144 judges. Al¬ though he was soon afterward pardoned, the fright and anxiety which he had experienced affected him so much that he died in the course of four days. It is supposed by some that he was poisoned, The Tsar, to avoid scandal, or¬

dered the proceedings at the trial to be pub¬ lished. He left a daughter and a son, after¬ ward the Emperor Peter II. Consult Bain, (The First Romanovs) (London 1905).

ALEXEIEFF, Michael Vassilivitch,

a-lexa'yief, Russian general : b. Tver about 1848. "Educated at the Classical Gymnasium in his native town, he passed to the Moscow Mili¬ tary Academy and was attached to a Kazan regiment in 1876, attaining the rank of captain in 1885. Ambition led him, about 1879, to enter the Academ}' of the General Staff, where he assiduously studied till 1890. During the next eight years he was employed in the administra¬ tive routine of army work, and in 1898 became professor of military science at the Staff Acad¬ emy. When the Russo-Japanese war broke out in 1904 Alexeieff was appointed quartermaster- general of the 3d Manchurian army. In the battle of Mukden he commanded a brigade of infantry and a body of Cossacks. He defended the position at Tsinkhechen with 16 battalions and 20 guns against the fierce onslaughts of the Japanese for several days. From 1908 to 1912 he

was chief of staff of the military district of Kiev. At the outbreak of the European War he was in command of the 13th Army Corps at Smolensk. Alexeieff had literally risen from the ranks by sheer merit; the offspring of a poor family — his father was a humble sergeant — he had no influence behind him beyond his laboriously acquired reputation for tremendous energy, capacity for hard work and an iron determination. In the great struggle to which Russia was committed in 1914 he showed his ability not only by his general grasp in matters of statecraft as well as strategy, but also by the immutable calm and simplicity which never forsook him during the severest ordeals of re¬ sponsibility. Alexeieff first became chief of staff in General Ivanoff's southern army group; then commander of the Army of the Bukovina ; he next succeeded General Ruzsky as com¬ mander-in-chief of the northwestern group, where he had control of nine out of 12 of the Russian armies and was directly concerned in carrying out the invasion of Galicia and afterward the retreat from Warsaw. In the northwestern command his difficulties were ag¬ gravated by his inability, for technical reasons, to assume the offensive — a fact of which the German staff were fully aware. Whilst the enemy could safely undertake active operations at any point that might be chosen, it was the task of Alexeieff to anticipate and counter these movements. Scarcely had the Galician crisis passed than he was summoned as chief of staff to the Generalissimo, the Grand Duke Nicholas, who retired as viceroy of the Caucasus in Sep¬ tember 1915, when the Tsar formally took com¬ mand of the Russian armies, immediately ap¬ pointing Alexeieff chief of the general staff — virtually supreme commander under a shadowy superior. With the downfall of Tsarism in the revolution of 1917 he was appointed com¬ mander-in-chief, which post he resigned in Tune 1917 to become military adviser to the provisional government. He was succeeded by General Brusiloff (q.v.). Subsequently Alexeieff again became chief of the general staff under Premier Kerensky, but resigned again in Sep¬ tember 1917 owing to disagreement, it is said, over the dismissal of officers implicated in the

abortive Korniloff counter revolution. See War, European.

ALEXIA. See Aphasia.

ALEXIAD, a life of the Emperor Alexius Comnenus (q. v.) by the Princess Anna Com¬ nena, his daughter. This work, which is one of the most important authorities for the history of the closing years of

the 11th century, is writ¬ ten in modern Greek and divided into 15 books. It gives a vivid picture of the First Crusade.

ALEXIAN BROTHERS. See Cellites.

ALEXIS, Greek comic poet, a native of Thurii, in Magna Grsecia, afterward an Athe¬ nian citizen : b. about 394 b.c., and is known to have lived as late at least as 288 b.c. He was the uncle and instructor of Menander, and is said to have written 245 plays.

ALEXIS NICOLAIEVITCH, Grand Duke, ex-heir apparent (Tsarevitch) to the Russian throne: b. 30 Tuly (N.S. 12 Aug.) 1904; d. Ekaterinburg, 19 July 1917. The birth of a son of the Tsar caused great rejoicing in Russia; the imperial couple had four daughters, and there seemed reason to apprehend that the throne would not descend in the direct line of succes¬ sion. The young heir proved to be of a bright, active and intelligent disposition, thoroughly Rus¬ sian in all his tastes. In common with several of his near relations, however, he had a serious organic affliction consisting of a tendency to internal hemorrhage which might be brought about by any slight accident. This tendency is hereditary in the Romanoff family, and in this case has been the source of grave concern. Until the birth of Alexis, the younger brother of Nicholas II, the Grand Duke Michael (b. 1878), was heir apparent to the throne. It was then decided that, in the event of the Tsar's death before the young child at¬ tained his majority, the Grand Duke should act as regent for him in conjunction with the dowager Empress. This formal arrangement, however, was canceled some years ago when he contracted a morganatic marriage with a divorcee. He thereafter lived abroad and dis¬ appeared from public view until the outbreak of the European War, when he returned to Russia and served in the army. After the deposition of the Tsar in March 1917 he was appointed regent — an arrangement that lasted but a short while.

In October 1912 a sensation was caused by a rumor that the young heir — then eight years old — had been the victim of a bomb outrage, while another story ran that he had been mutilated by. his nurse. All that could be gathered of a definite nature was the fact that he was in a critical condition of health. An official statement issued on 3 November an¬ nounced that the child had injured himself by jumping into a boat, which had induced hemorrhage and would require a long period of recuperation. The question of succession rose again. The Grand Duke Michael having been eliminated, an heir-designate was appointed in the Grand Duke Dmitri (b. 1891), son of the Tsar's uncle, the Grand Duke Paul. The child recovered in due course, and assisted

his father in distributing decorations among the troops at Tsarskoe Selo in December 1914. In the fall of 1915 he accompanied the Tsar to the front and for a time shared the military life

at the imperial headquarters. Dressed in a little Cossack uniform, he joined his father in lours of inspection and made himself a great favorite with the soldiers. When the Russian revolution became an accomplished fact in March 1917, M. Alexander Gutchkoff and a deputy were commissioned to go to General Ruzsky's headquarters and inform the Tsar that he had ceased to reign. Realizing the hopelessness of his situation, the dethroned monarch asked the delegates, (<What do you want me to do?® He was told that he must abdicate in favor of his son under the regency of the Grand Duke Michael. The Tsar replied, (<I cannot part with my boy ; I shall hand the throne to my brother. Have you a piece of paper?® A manifesto was drafted on the spot; the Emperor of all the Russias for the last time appended his signature as a monarch, lay¬ ing down the supreme power and renouncing all rights of succession on behalf of his son. The document was signed at Pskoff on 15 March 1917. The boy was sick at the time. He sub¬ sequently accompanied his parents into exile and with his father, mother and sisters was executed by the Bolsheviki.

ALEXIS, Wilibald, pseudonym of Wilhelm

Haring (q.v.).

ALEXIUS (Comnenus), Emperor of Con¬ stantinople: b. 1048; d. 15 Aug. 1118. He was the third son of John Comnenus, the Emperor Isaac's brother. Naturally clever, he was care¬ fully educated under the direction of his moth¬ er; and at the age of 14 took part in an en¬ gagement with some European adventurers commanded by a Scot called Russel de Balliol, of whom the youthful warrior afterward be¬ came an intimate friend. After several suc¬ cessive emperors had tasted for a brief season the (<bitter sweets® of a nominal supremacy over a country torn by anarchy, Alexius, with the aid of the army, was proclaimed emperor, seized on Constantinople, which he permitted his soldiers to pillage, and shut up the nominal ruler in a monastery (1081). The empire was then in a deplorable state. The Turks were profiting by these intestine dissensions to seize upon the Asiatic provinces while Robert Guis- card and his Normans were menacing the west, and fierce swarms from beyond the Danube threatened the nearer provinces. However, Alexius did not despair; he sent supplies of money to his ally Henry IV of Germany to en¬ able him to attack Rome, the Pope (Gregory VII) being a firm friend of the Norman lead¬

er. His Holiness had to flee, and Guiscard hastened to his aid, leaving in Greece his son Bohemond, who gained two victories over Alex¬ ius; but famine and disease weakened the Nor¬ man army, which Robert could not rejoin, as he was detained in Italy by a revolt of his vassals. In 1084 he returned to the charge, and after gaming, some advantages he suddenly, died of an epidemic ; although some ascribe his death to poison administered by one of Alexius' secret agents. In consequence of this event the Nor¬ mans abandoned all their conquests, and Alex¬ ius turned his attention to the Turks and Scythians, whom, after an arduous struggle, he completely defeated. Scarcely was this accom¬ plished when, in 1096, the bands of the First Crusade arrived at Constantinople demanding aid, rudely menacing him in his own palace,

and finally compelling him to join them. The alliance did not last long; a war broke out be¬ tween the Emperor and the Crusaders, which ended in the defeat of the latter. The rest of Alexius' life was employed in consolidating his connuests and restoring orderly government in his states, which were much disturbed by here¬ sies. He died at 70, after a reign of 37 years. He extended his empire; and for its defense he left to his successors a well-disciplined army, which he had wholly created himself. His¬ torians differ respecting his conduct and abili¬ ties; his daughter Anna wrote his life (the Alexiad).

ALEYRODIDJE, a family of plant-lice.

See White Fly.

ALFALFA, also called Lucerne (q.v.) (Medicago sativa), is a herbaceous plant be¬ longing to the family Fabacecc. The leaves are pinnate-trifoliate; its flowers small, gener¬ ally purple in color, dense in spikes. The plant is a native of Asia, but has been cultivated in Europe since before the time of Christ. The Spaniards introduced it into South America, but it did not reach North America until some time between 1850 and 1860, when it was intro¬ duced into California. Since then it has become the most extensively cultivated forage crop in the United States. Its adaptability to varying conditions of soil and climate gives it an exten¬ sive range, extending from the arid lands of the West, where irrigation is required, to the richer soils of the East, and from sea-level to heights of over 7,000 feet. It will not flourish in extremely damp or clayey soils. Its roots strike to great

depths, so that it withstands droughts better than most of the forage plants. It is cut when coming into bloom, and yields from three to 12 tons of hay to each acre. In some regions it is cut every month in the year. It is particularly valuable as a green manure, as it takes nitrogen from the air, and its deep¬ growing roots draw from the lower soils large quantities of lime, phosphoric acid, potash and other minerals useful as crop foods. Alfalfa is relished by cattle whether green, as hay, or as ensilage, but to secure the best results it should be fed with root crops and grain, which add the ingredients needed for a well-balanced ration. Alfalfa is subiect to two fungus dis¬ eases, one on the leaf and another on the root, either of which, if not checked, will spread and ultimately ruin the field. It is also attacked by certain insects. The Fanners' Bulletins issued by the United States Department of Agriculture and the bulletins of the various State agricultural experiment stations give full information on the culture of the plant and the treatment of its diseases.

The importance of the alfalfa industry in the United States is indicated by the fact that the area devoted to alfalfa in 1909 was approxi¬ mately 4,638,662 acres. In the same year ap¬ proximately 15,829,680 pounds of seed were harvested and about 11,800,000 tons of hay pro¬ duced . Consult Westgate, J. M, (Alfalfa, > Farmers' Bulletin 339, U. S. Department of Agriculture (1915); Westgate, J. M., McKee, R. and Evans, M. W., (Alfalfa Seed Produc¬ tion,) Farmers' Bulletin 495, U. S. Department of Agriculture (1915); Fortier, S., Urrigation of Alfalfa, } Farmers' Bulletin 373, U. S. De¬ partment of Agriculture (1915). For alfalfa

diseases and enemies consult Kalmbach, E. R , (Birds in Relation to the Alfalfa Weevil,) U. S. Department of Agriculture Bulletin No. 107 ; also Farmers' Bulletins Nos. 636, 637, 649 and

1.

ALFALFA MEAL, a meal made by grind¬ ing alfalfa hay. The meal is either put on the market just as it is ground or is mixed with other concentrates, such as molasses, bran and corn chop. The advantages of alfalfa meal lie in the fact that it is usually fed with less waste than the hay; the hay used for the meal is generally of better quality and has a higher percentage of protein than the ordinary ha)L There is also considerable advantage to be de¬ rived from the reduction of freight charges. It is also a convenient form for special purposes, such as city trade and where the product has to be shipped to a distance. Alfalfa meal is an excellent feed for poultry.

ALFARABI, an eminent Arabian philoso¬ pher of the 10th century. He was a native of Farab, in Asia Minor, his proper name being Abu Nasr Mohammed ben Mohammed ben Tarkhan ; d. Damascus 950. His works con¬ sist of treatises on different parts of the Aristo¬ telian philosophv. He excelled in music and philology as well as in philosophy; and one of his most famous works is a kind of encyclo¬ paedia, in which he gives a brief account and definition of all branches of science and art. The manuscript of this is in the Escurial. His works were printed in Paris in 1638.

ALFIERI, Vittorio, Italian tragic poet : b. Asti, Piedmont, 17 Jan. 1749, of parents, as he tells us in his (Autobiography^ ((noble, well-to- do and honest" ; d. Florence, 18 Oct. 1803. The (Vita di Vittorio Alfieri da Asti scritta da esso) (<(Life of Vittorio Alfieri written by himself") furnishes the material for any sketch of his life and is in itself a remarkable work, not infrequently mentioned with the like notable autobiographies of Cellini and Goldoni. Alfieri divides his biography into four parts, character¬ izing each of them summarily and aptly: Infancy (nine years of vegetation) ; Childhood (eight years of non-education) ; Youth (10 years of travel and dissipation) ; Manhood (30 and more years of composition, transla¬ tion and study). His parents were Antonio Alfieri and Monica Maillard de Tournon, of Savoy origin as the surnames indicate. In early infancy Alfieri lost his father and was entrusted to the care of an uncle, but lived with his mother, who in the following years was twice married. In 1758, when nine years of age, following the period of ((vegetation," Alfieri entered the Academy of Turin, where his ((non-education," consisting largely of routine and the pursuit of an unprofitable cur¬ riculum duly impressed him with the worth¬ lessness of much that passes for academic cul¬ ture. It was here, however, that he made his first poetical effort, a sonnet imitated from the verse of the only poets with whom he was acquainted, having, moreover, read them fur¬ tively, Ariosto and Metastasio. In 1763, when Alfieri was 14 years old, his uncle died, be¬ queathing him property and leaving him in control of his father's large fortune and estate. He could now satisfy some of his longings, one of which, his love of horses, amounted to a passion, ((the third passion of his soul." After

his eight years of "non-education" in the Turin Academy, in 1766 he served for a short period as a standard-bearer in the regiment at Asti and then entered upon his period of youth, or ((10 years of travels and

dissipation.” His first travels (1766-68) were through Italy, France, England and Holland. He appears to have become dissatisfied with Paris, con¬ tracting a dislike for France and its people which became accentuated later on and to which he gave vent in his 'Misogallo' ("Anti- Gallican”). It was in Holland that he had one of his serious love affairs with a married lady. He next traveled (1769-71) through Germany, Denmark, Switzerland, Belgium, Russia, Prus¬ sia, Plolland and England. He was obliged to leave England on account of another love affair with a married lady, attended with seri¬ ous consequences. He resumed his travels (1771-72) through Holland, France, Spain and Portugal, making the acquaintance in the latter country of the Abbe Tommaso de Caluso, whose friendship he retained through¬ out his life. Upon his return to Turin he led an idle life (1772-74) given up largely to temporal pleasures and to a third infatuation. It was during this period that in order to beguile the weariness of his lady-love, who was ill, he sketched a scene of a tragedy which later on was developed into a five-act play, his first, 'Cleopatra,' and which, per¬ fected, was performed in the Carignano Thea¬ tre in 1775. The tragedy was favorably re¬ ceived and gave Alfieri, now in his 27th year, his life’s desire, which he immediately under¬ took to carry out, to become a tragic poet. To accomplish his end he must needs make over his entire education; so he set to work with all of his extraordinary will and passion¬ ate effort. He had been used to the French language for literary purposes and wrote his two next tragedies, 'Filippo' and 'Polinice,' in French prose. Upon trying to turn them into Italian he found his knowledge of the Tuscan idiom was far from adequate. He resolved to forget his French and to steep his brain in the best Italian models. For this purpose he went to Florence, thinking in and speaking and writing continually the Floren¬ tine idiom. In order to become entirely un¬ trammelled he donated to his sister, the Countess Cumiana, almost his entire property, reserving simply enough upon which to live at his ease. It was in 1777 while in Florence that his last and most celebrated love affair, which lasted throughout the remainder of his life, materialized, a love which he calls <(a worthy love,” his attachment to the Countess of Albany, a daughter of Gustavus Adolphus, Prince of Stolberg-Geldem, and the wife of Prince Charles Edward Stuart, the Pretender to the English throne. With her Alfieri lived after her separation from Charles, and made his home with her in various places. There is no proof that they were ever married. To the inspiration of the Countess of Albany the 14 tragedies published between 1777 and 1783 are largely due: 'Filippo IP; (Polinice) ; 'An- tigone) ; 'Agamennone' ; (Virginia) ; 'Oreste' ; 'La Congiura dei PazzP ; 'Don Garcia'; 'Maria Stuarda ; Rosamunda* ; 'Ottavia) ; 'Ti- moleone) ; 'Merope) ; 'SauP ; and a little later, during

his stay in Paris, 'Agide' ; (Sofonisba) ; <Mirra); 'Abele) ; 'Bruto primo)

and 'Bruto secondoP An English translation, by Charles Lloyd, of the tragedies appeared in London, 1815 and 1821. The French Revolu¬ tion of 1792 brought disaster to both the Coun¬ tess and Alfieri, the former losing her pension of 60,000 francs bestowed upon the wife of Charles Edward by the French government, and the latter nearly all his worldly goods, comprising the greater part of the com¬ plete editions of his tragedies published by Didot. This unfortunate occurrence served to augment his hatred of everything French. The last years of Alfieri were spent quietly in Florence, engaged in literary work. At the age of 48, he began the study of Greek in order to read Homer in the original, as Petrarch and Boccaccio had already done before him. Com¬ forted and encouraged by the Countess, he worked hard to the very end of his life, shortened by overexertion.

By nature ardent, generous, impulsive, loyal to his friends, Alfieri was well fitted to write tragedies. His secretary Polidori, speaking of his temperament, described Alfieri "as proud as the Satan of Milton and as irascible as the Achilles of Homer." His tragedies coming at a time of literary decadence in Italy were by contrast all the more effective, and undoubtedly greatly stimulated his successors, Foscolo, Monti, Pellico, and others. The impulse that, as a poet and a patriot, Alfieri gave to Italy of the 18th century is analagous to what Dante did for his country in the 13th. The beautiful monument by Canova in the church of Santa Croce, Florence, between the tomb of Machia- velli and that of Michelangelo, representing Italy in the form of a woman weeping and lamenting the death of the Poet, was erected by the Countess to the memory of Alfieri.

The tragedies of Alfieri, although taken al¬ most entirely from classical subjects, as their titles indicate, nevertheless are treated by the poet in a manner that is his own, devoid of ornamentation to the point of being, both in language and form, almost stiff and barren, yet the nobility of the sentiment and their lofty ideals have made their author the first tragic poet of Italy. His fame may well rest upon the Tragedies, among which 'SauP is gener¬ ally considered the masterpiece, and upon his 'Vita' ("Autobiography"), a work of excep¬ tional interest for its frankness and personal charm. A good edition of the <Vita) is that edited with notes by Emilio Bertana (Naples 1910). A translation of the 'Vita,' with an essay by W. D. Howells, was issued in Boston, 1877. The best edition of the tragedies is the Pisa edition (22 vols., 1805-15), supple¬ mented by the works published in Florence by the Countess and the Abbe Caluso (in 13 vol¬ umes — 8

vo ; but not printed in London, as the title-page states).

Among the many works of minor import¬ ance are, in prose, 'Del principe e delle lettered blaming the patronage given by princes to men of letters; 'La virtu sconosciuta,' a dialogue on the citizen's ideal; (I giornalP ; 'Le lettere' ; in poetry, Commedie politiche : 'L'uno,' 'I pochi,' 'I troppi,' 'L'antidoto'

("Political Comedies : The One, The Few, The loo Many, The Antidote"), suggesting rem¬ edies for abuses in governments; Commedie sociali : 'La finestrina' ; 'II Divorzio' ("So¬ cial Comedies; The Little Widow; Di-

vorce"). The desire to instruct in these com¬ edies is too apparent, nullifying appreciably their small literary value; 'II Misogallo) OtAnti-Gallican®) in which, in poetry and prose commentary, he vents his violent hatred of France; Sonnets; Epigrams; 'L'Etruria lib- erata,> a poem on the assassination of Alexan¬ der I, Duke of Florence; a panegyric of Tra¬ jan; 16 satires; five odes on American Inde¬ pendence and many translations from the Lat¬ in and Greek classics. Consult his 'Auto¬ biography^ translated by Lester (New York 1845) ; Centofanti, 'Tragedie e Vita d'AlfierP (Florence 1842) ; Copping, 'Alfieri and Gol¬ doni: Their Lives and Adventures* (London 1857) ; Cognetti and Antonini, 'Vittorio Alfieri) (Turin 1898) ; Holland, 'Builders of Modern Italy) (New York 1908) ; Howells, 'Life of and Essays on Alfieri) (Boston

1877).

James Geddes, Jr.,

Professor of Romance Languages, Boston Uni¬ versity.

ALFONSINE TABLES. See Alfonso X.

ALFONSO, the name of a number of Por¬ tuguese and Spanish kings.

ALFONSO I, the Conqueror, first King of Portugal, son of Henry of Burgundy, the Con¬ queror, and first Count of Portugal: b. 1110; fought successfully against the Spaniards and the Moors ; named himself King of Portugal, and was recognized as such by the Pope ; d.

1.

ALFONSO I, King of Naples and Sicily. See Alfonso V. (of Aragon).

ALFONSO V, King of Aragon: b. 1385; d. 1458. He was the son of Ferdinand I of Ara¬ gon, the throne of which he ascended in 1416, ruling also over Sicily and the island of Sar¬ dinia. Queen Joanna of Naples had promised to make him her heir, but at her death in 1435 had left her domains to Rene of Anjou. Al¬ fonso now proceeded to take possession of Naples by force, which he succeeded in doing •in 1442 and reigned till his death in 1458. He was an enlightened patron of literary men, by whom, in the latter part of his reign, his court was thronged.

ALFONSO V, the African, King of Por¬ tugal, succeeded his father, Edward I, 1438. Conquered Tangiers ; d. 1481. During his reign Prince Henry the Navigator continued the im¬ portant voyages of discovery already begun by the Portuguese. Under him was drawn up an important code of laws.

ALFONSO X, King of Castile and Leon, surnamed the Astronomer, the Philosopher or the Wise : b. 1226 ; succeeded to the throne 1252 ; d. 1284. Being grandson of Philip of Hohen- staufen, son of Frederick Barbarossa, he en¬ deavored to have himself elected Emperor of Germany, and in 1257 succeeded in dividing the election with Richard, Earl of Cornwall. On Richard's death in 1272 he again unsuccessfully contested the imperial crown. Meantime his throne was endangered by conspiracies of the nobles and the attacks of the Moors. The Moors he conquered, but his domestic troubles were less easily overcome, and he was finally dethroned by his son Sancho, and died two years after, 1284. Alfonso was the most learn¬ ed prince of his age. Under his direction or

superintendence were drawn up a celebrated code of laws, valuable astronomical tables which go under his name (Alfonsine Tables), the first general history of Spain in the Castilian tongue, and a Spanish translation of the Bible.

ALFONSO XII, King of Spain. He was the only son of Queen Isabella II and her cousin, Francis of Assisi: b. 1857; d. 1885. He left Spain with his mother when she was driven from the throne by the revolution of 1868 and till 1874 resided partly in France, partly in Austria. In the latter year he studied for a time at the English military college, Sandhurst, being then known as Prince of the Astu¬ rias. His mother had given up her claims to the throne in 1870 in his favor and in 1874 Alfonso came forward himself as claimant and in the end of the year

was proclaimed by Gen. Martinez Campos as king. He now passed over into Spain and was enthusiastically re¬ ceived, most of the Spaniards being by this time tired of the republican government, which had failed to put down the Carlist party. Al¬ fonso was successful in bringing the Carlist struggle to an end (1876), and henceforth he reigned with little disturbance. He married first his cousin, Maria de las Mercedes, daugh¬ ter of the Duke de Montpensier; second, Maria Christina, Archduchess of Austria, whom he left a widow with two daughters, a son (Al¬ fonso XIII) being born posthumously.

ALFONSO XIII, King of Spain, son of Alfonso XII and Maria Christina, daughter of Karl Ferdinand, Archduke of Austria: b. after his father's death, 17 May 1886, succeeding by his birth, being a male, his eldest sister. His mother was made queen regent during his minority. On 17 May 1902 the young King for¬ mally acceded to the throne and took the oath prescribed by the Constitution, the Queen Re¬ gent having taken official leave of the ministry on the 12th. The United States was represented at the ceremony by special envoy. Alfonso married 31 May 1906 Princess Ena of Batten- burg, daughter of the late Prince Henry of Battenburg and Princess Beatrice (daughter of the late Queen Victoria). An attempt was made by anarchists to assassinate the King and Queen on their wedding day by throwing a bomb at the royal carriage. Among those arrested in connection with the plot was the celebrated educator, Francisco Ferrer (q.v.), whose execution caused much bitter feeling against the young monarch. He has, however, regained his popularity with the nation and has shown himself to be on the whole a liberal- minded ruler and a supporter of the anti-cleri¬ cal party. The King has a civil list, fixed by the Cortes (1886), of 7,000,000 pesetas or

$1,400,000.

ALFORD, al'ferd, Henry, an English poet and miscellaneous writer, philologist, critic, artist and preacher: b. London, 7 Oct. 1810; d. Canterbury, 12 Jan. 1871. He became dean of Canterbury in 1856. An accomplished man, his literary work attracted attention in several de¬ partments. Besides sermons and university lectures he wrote 'The School of the Heart, and Other Poems) (1835), his most popular volume of verse; 'The Queen's English' (1866). He was best known by his celebrated edition of the Greek New Testament (1844-52) which, incorporating the results of German Bib-

lical scholarship, formed a landmark in New Testament study in England and America. He was the first editor of the Contemporary Review.

ALFRED THE GREAT, King of the West-Saxons: b. 848, at Wantage in Berkshire. He was the youngest son of PEthelwulf, suc¬ ceeding to the throne in 871, after the three short reigns of his brothers PEthelbald, PEthel- bert and PEthelred. The day of his death was 28 October, the year is doubtful, 900 of 901 the weight of the evidence favoring the earlier date. Of the early years of Alfred little is known. The indications are that he was a favorite son. For at the age of five he was sent to Rome by his father, where Pope Leo ((hallowed Alfred as King and took him as his bishop's son® (Asser, <Chronicle)) . The allu¬ sion to Alfred as (<bishop's son® refers to his confirmation, the Pope standing as his sponsor according to a not unusual practice of the times. The allusion to his hallowing as king is less clear; since his three older brothers were still alive, it probably refers to some titular dignity conferred upon him. Two years later PEthel- wulf himself went to Rome and Alfred accom¬ panied him. The story of Alfred's learning to read falls in the period before the second pil¬ grimage to Rome. It is found in Asser, who states that Alfred (<remained illiterate® (illitera - ins permansit) to his 12th year or more, al¬ though he knew many Saxon poems by heart. By ˆilliterate® Asser undoubtedly means ignor¬ ant of Latin. Alfred could certainly read Anglo- Saxon before his 12th year, and the mother who, according to the story, promised a book of Anglo-Saxon poems to that one of her sons who first learned to read it to her, was without question Alfred's own mother, Osburh. It was not until after his accession that Alfred acquired a knowledge of Latin. Asser states that at Alfred's marriage festivities, in 868, he was attacked by a grievous illness which af¬ flicted him for 20 years or longe'r. This story has obviously been exaggerated for hagiological purposes, although it probably has some foun¬ dation in the fact that Alfred was never in robust health.

Alfred first appears in public life in the year 866, as the assistant of his brother PEthel- red in repelling the attacks of the Danes. In the midst of these Danish wars Alfred suc¬ ceeded to the throne, nine general engagements being fought in this year. Alfred's own wars with the Danes centre in two great campaigns. As result of the first the Danes, in 878, prom¬ ised to leave Wessex and their King, Guthrun, received Christian baptism. It was in this cam¬ paign that Alfred retreated to PEthelney in the fens of Somerset. Later tradition has added many unauthentic details to this episode, no¬ tably the story of the cakes

and that of Alfred's playing as a disguised harper in the camp of the Danes. After 14 years of comparative peace the Danes returned to the attack. In the meantime, however, Alfred had strengthened his army and his defenses. At one brilliant engagement after another the Danes were de¬ feated, and in 897 they fled into East Anglia and Northumbria and over sea into France. For the remaining years of Alfred's life, Wessex was at peace. The (Chronicle } says, in record¬ ing Alfred's death, that he was king over all the English people except that part which was

under the power of the Danes. But practically all England north of the Thames was in the Danelagh, and Alfred's authority extended only over Wessex and a part of Mercia. In saving Wessex, however, Alfred had saved England for the English people; for it was from Wes¬ sex as a centre that his successors began the task of reconquering England from the Danes.

In his years of peace Alfred was engaged in strengthening and organizing his army, in sys¬ tematizing the government of the country and in laying those plans for advancing the intellec¬ tual interest of his people which made him so much more than merely the soldier. Unable to find teachers in England, Alfred brought schol¬ ars from abroad, and with their aid planned to have translated into English all those Latin books which he thought it most needful that his people should know. Alfred himself bore the greater part of this burden. His first transla¬ tion was one of Pope Gregory's (Pastoral CareP made about 894. This was followed by the 'Universal History *of Orosius, and Bede's (Ecclesiastical Plistory,* though there is some question whether or not this latter work pro¬ ceeded directly from the hand of Alfred. These were followed by his interesting version of Boethius' (Consolation of Philosophy. *His last work was a translation and adaptation of writings of Augustine and Gregory. Other un¬ dertakings undoubtedly due to Alfred's influ¬ ence are a translation of Gregory's 'Dialogues* (the preface of which was written by Alfred), the (Anglo-Saxon Chronicle) (see English Chronicles), and a translation of the Psalter. Popular tradition has ascribed a number of other works to A.lfred which belong to much later periods. Asser refers to Alfred's hand¬ book, * a commonplace book or anthology, but this work is no longer extant. Historians agree in placing a high estimate on the charac¬ ter and achievements of Alfred. Freeman ((Norman Conquest,* I, 49) calls him (<the most perfect character in history®; Ranke ((Weltgeschichte,) VI, II, 46) declares him to be "one of the greatest figures in the history of the world.® It should be borne in mind, how¬ ever, that it is not the magnitude of Alfred's military achievements, nor the extent of the country which he governed, that

lift him into the ranks of the world's great men, but the beauty and moral grandeur of his character. In him were combined the virtues of the scholar and the patriot, the efficiency of the man of affairs with the wisdom of the philosopher and the piety of the true Christian. His character, public and private, is without a stain, and his whole life was one of enlightened and mag¬ nanimous service to his country.

Bibliography. — The primary sources of in¬ formation concerning Alfred are Asser's (Life' of King Alfred) (ed. W. H. Stevenson, Oxford 1904) ; the Chronicle5 (ed. Earle and Plum¬ mer, Oxford 1892-99) ; and the translations from Gregory, Bede and Boethius, texts of which are contained in Grein-Wiilker, 'Biblio- thek der angelsachsischen ProsaP Numerous modern lives of Alfred have been written, the best being that by Plummer (Oxford 1902).

George P. Krapp,

Professor of English , Columbia University.

ALFRED, or ALUREDUS, OF BEVER¬ LEY, chronicler: flourished 1143. His 'Nine Books of Annals or History of the British

Kingdoms to 1129) is largely devoted to the fabulous history of Britain. It is of no use to the historical student, as it adds nothing to what is found m earlier authorities. The best manuscript of the work is among 'the Hengwet MSS., and has never been printed. Hearn printed an inferior Bodleian MS. in 1716.

ALFRED, N. Y., a village in Allegany County, on the Erie Railroad, 12 miles from Hornell and 341 miles west of New York city. It is noted as being the seat of Alfred Univer¬ sity, a coeducational (non-sectarian) institu¬ tion, organized in. 1836 as a school, incorpo¬ rated as a university in 1857. Professors and instructors in 1915, 42; students, 336; volumes in the library, 28,822; graduates, 1,063; produc¬ tive funds, $412,000; total income, $100,000. There is a fine new Carnegie library valued at $30,000 and a university bank. Alfred is also the seat of the New York State School of Ag¬ riculture; New York State School of Ceramics, the Alfred Theological Seminary and Alfred University. The value of taxable property is $214,262. Pop. (1920) 598.

ALGiE, al'je, a term popularly restricted to marine cryptogamous plants or seaweeds, but which may be generally defined as

comprehend¬ ing all aquatic flowerless plants, whether grow¬ ing in fresh or salt water, belonging to the group Thallophytes. The only absolute dis¬ tinction between the Algae and the remaining Thallophytes or Fungi is that the former con¬ tain chlorophyll, while the latter do not. The higher forms have stems bearing leaf-like ex¬ pansions, and they are often attached to rocks by roots. A stem is most frequently absent. The plants are nourished through their whole surface by the medium in which they live. They vary in size from the microscopic diatoms to forms whose stems resemble those of forest trees and whose fronds rival the leaves of the palm. They are entirelv composed of cellular tissue and many are edible and nutritious, as carrageen or Irish moss, dulse, etc. Kelp, iodine and bromide are products of various species. They are beginning to be used in the United States in the production of commercial fertilizers. Four groups are commonly dis¬ tinguished: The blue-green algae (Cyanophy - cece), green algae (Chlorophycece) , brown algae (Phceophycecc) and red algae (Rhodophycece) .

ALGARDI, al-gar'de, Alessandro, one of the chief Italian sculptors of the 17th century: b. 1602 ; d. 1654. He lived and worked chiefly at Rome ; executed the tomb of Leo XI in St. Peter's, and a marble relief with life-size fig¬ ures over the altar of St. Leo there.

ALGAROTTI, Francesco, al'ga-rot'te, fran-ches'ku, Count, Italian author: b. Venice, 12 Dec. 1712; d. Pisa, 3 March 1764. His (Plurality of Worlds } (1733), a popular exposition for ladies of Newton's philosophy, es¬ tablished his fame. Till 1739 he lived much in France and became intimate with Voltaire. The study of French literature and contact with its leading representatives exercised a marked in¬ fluence on his style. His contemporaries greatly respected his art judgments and his (Essays on the Fine Arts,} in Italian (Germ. tr. 1760), show keen discernment. Frederick the Great held him in high regard, created him count, and ordered a monument built to his memory

in Pisa. The best edition of his works is in 17 volumes, Venice, 1791-94.

ALGAROVILLA, arga-roˆvel'ya the seed-pods of one or two South American trees (genus Prosopis) , valuable as containing much tannin.

ALGARVE, or FARO, Portugal, a mari¬ time province extending across the southern coast of the kingdom, bounded north by the province of Alemtejo, east by the Spanish province of Huelva, south and west by the Atlantic Ocean. It has a mountainous surface, with some fertile

tracts, in which excellent oil, wine, figs and almonds are produced, and a coast indented with good bays and harbors. Its tunny and sardine fisheries are productive. Faro (pop. 12.000) is its capital. Area, 1,937 square miles. Pop. 274,156.

aALGAZZALI, al'ga-za'le, or ALGHAZ- ZALI, Abu Hamed Mohammed, Arabian phi¬ losopher, Persian by birth: b. Tits in Khorasan in 1058 or 1059; d 1111. He first taught the¬ ology at Bagdad but left his chair and traveled in Syria, and lived for some time in Damascus, after which he returned to Persia and resumed teaching. The details of his life given by biog¬ raphers are numerous but contradictory. He was one of the most prolific of the Arabian au¬ thors. One of his writings, called the (De¬ struction of the Philosophers, > was answered by Averroes in a book entitled the destruction of the Destruction. • *He also wrote several moral treatises.* Algazzali, as a disciple of the Sufis, was an opponent of the prevailing Aris¬ totelian philosophy of the day and predisposed to the mystical dogmas of emanation, to which, after a keen and critical study of philosophy, he entirely resigned himself. Consult Dugat's distoire des Philosophies et des Theologiens Musulmans> (Paris 1878).

ALGEBRA, Definitions and Fundamental Concepts. The word "algebra® is occasionally used with the same meaning as "mathematical discipline,® in the sense of a body of mathe¬ matical entities which obey a given set of laws or formulae. Accordingly we speak of the algebra of logic, the algebra of quaternions, the algebra of relations, the algebra of groups and so on indefinitely. The word is often used to cover those systems only whose formal struc¬ ture is of a certain type. In this article we shall consider algebra in a still narrower sense — in fact in that sense in which the term is used in the high-school books of our child¬ hood. That is, we shall consider the special algebra of ordinary complex numbers and the various simpler algebras of real numbers, of rational numbers and of integers, through which we pass in reaching the algebra of ordinary complex numbers.

Mathematics has been defined by Benjamin Pierce as that science which draws necessary conclusions. Logic, however, is not only a science which draws necessary conclusions, but is in fact the science of the method in which necessary conclusions may be drawn. The rela¬ tion between logic and mathematics is thus peculiarly intimate and in fact the present view of the matter is that deductive logic is simply that part of mathematics which possesses the least limited hypotheses. We shall therefore search for the basis of algebra among such

logical entities as classes, properties, relations, etc., and shall see how the entire complicated fabric of algebra can be woven from these simple threads.

Assemblages. — We wish to exhibit how the algebra which is familiar to the schoolboy has its roots in the much simpler algorithm which will be found treated in extenso under the heads Logic, Symbolic and Assemblages, Gen¬ eral Theory of. Here it is sufficient for us to call attention to one or two of the simpler as¬ pects of this important theory. Though many difficult and fascinating paradoxes have been found underlying this simple assumption, we shall take it for granted that the things which enter into our daily life — c(Shoes and ships and sealing-wax and cabbages and kings® — can be arranged in assemblages or classes in such a manner that a class is uniquely determined by the specification of all its members. These classes we shall represent by small Greek char¬ acters, and their members by small Roman letters.

Simple Properties of Assemblages. — One of the most obvious of these is that of contain¬ ing members. Strange to say, this is not com¬ mon to all assemblages. It is conspicuously absent in the assemblage of round squares, the assemblage of purple cows, etc. Another para¬ dox about assemblages is that an assemblage of one member is a different thing from that mem¬ ber. The ink-bottle now in front of me may be the only one of its sort, but it is not the sort of ink-bottle of which it is the sole repre¬ sentative. In the symbolism which we shall use, the assemblage of all purple cows shall be represented by the symbol A, and if x is my hffi-bottle, and is the only one of its sort, the assemblage of all the ink-bottles of the sort shall be called f x. This is the symbolism of A. N. Whitehead and Bertrand Russell, the most recent writers on this subject as a whole.

Every two classes determine several new classes. If a stands for lawyers and d for congressmen, there are classes determined by a and P, one of which is made up of all the lawyers in Congress, the other of those who either sit in Congress or practice the law, or possibly carry on both pursuits. The first class we shall indicate by aw/3, the second byaw/3. It is clear that this use of n and u can be ex¬ tended to any two classes whatsoever.

Similarity. — In a properly equipped army, every private has at least

one gun issued to him. Let us suppose that work at the arsenals has ceased, and that every gun has been issued to some private. It is clear that the class of guns and that of privates will stand in a peculiarly intimate mutual relation — that of one — one correspondence or similarity. We may express the same fact by the statement that there are as many guns as soldiers. Ob¬ serve that this identity in number is defined prior to and independently of number itself.

Cardinal Number. — The cardinal number, then, of an assemblage a is something that is common to all the assemblages similar to at or as we shall say, since classes are more amenable to mathematical treatment than properties, the class of all assemblages similar to a. We shall represent cardinal numbers by the letters p, v, o, 7r, p , and the cardinal number of the as¬ semblage a by the symbol Nc'a. It may be

shown that our ordinary 0 is d/\,and that 1 is N c' L'x, or the class of all the classes l' x.

Finite and Infinite Cardinals. — • It is not universally true that the whole is greater than any of its parts. A picture one inch square may be enlarged to be two inches square. Each point of the two-inch picture, if the en¬ largement be accurate, represents uniquely a point of the one-inch picture, and vice versa, yet the one-inch picture can be laid down on one of the corners of the two-inch picture. Obviously, therefore, there are as many points in one of the four quarters of a picture or a square plane area as in the entire picture or

area. Again, there is a first, a second . an

w-th odd number, so that it is possible by con¬ tinuing this process incjefinitely to assign every odd number to an integer and every integer to an odd number, yet the odd numbers form only a part of the integers. Here are instances of assemblages no greater than their own parts. Inspection will show that no aggregate con¬ taining a number of terms which can be ex¬ pressed in the Arabic system of numeration can be of this type, for such aggregates are al¬ ways reduced in number of terms when some are removed. The precise nature of these as¬ semblages which can be enumerated by one of the ordinary numerals of the Arabic system will be discussed in a later paragraph. Here we call attention to the fact that it has not been demonstrated that all assemblages are either similar to one of their own parts or finite in the ordinary, every-day sense of having one of the natural numbers as their cardinal number. All apparent proofs of this depend on Zermelo's axiom (see Assemblages, General Theory of). However, no assemblages such as we should ordinarily call finite are similar to

their own proper parts, so that assemblages of the latter sort and their cardinal numbers are properly called infinite.

Greater and Less Among Cardinal Num¬ bers. — A is said to be greater than p if A is the cardinal number of some class a which contains a part /3 of which p is the cardinal number, and if the converse relation does not hold. It is clearly impossible for ˆ to be greater than p and for p to be simultaneously greater than L That of any two cardinals one is the greater has not yet been demonstrated in general, though its proof for the natural num¬ bers is easy. Thus while the natural numbers form a series, the infinites may constitute a tree or an anastomosing network. Here again Zermelo's axiom underlies all the earlier work on the subject.

Addition. — Consider the two numbers a and p. Let ˆ be the cardinal number of the assemblage a and p that of P. Suppose that a and P have no member in common : that is, that an P is A. It can then be shown that the cardinal number of aup is independent of the particular value of a and of P chosen. Ex¬ pressed in terms of ˆ and p, Nc' (a pp) is written A + p, and is called the sum of X and p. As cabbages and kings are the same as kings and cabbages — as a u P is identically j Qua — it follows that A + p ~ p + A, Gr in other words that the operation of addition, when per¬ formed on any two cardinal numbers, finite or infinite, is commutative. In a similar way it may be shown that % + (p + v) — (A -f p) + v, or that addition is always associative.

The Natural Numbers. — The "natural numbers® or "numbers that can be expressed in the Arabic notation® have already been men¬ tioned. The best definition of these has been given by A. N. Whitehead and B. Russell, to the effect that the natural numbers are those which are amenable to the method of mathe¬ matical induction. That is, the natural num¬ bers are those which possess every property which 1 possesses, which, when it is possessed by ˆ will also belong to +1, where + and 1 are used in the senses already defined. In other words, the validity of the method of mathematical induction as applied to the natural numbers rests neither on an axiom nor on a theorem, but on the definition of the natural numbers.

Multiplication. — Given two assemblages a and A we can derive from them the assem¬ blage of all the ordered pairs of entities the first

member of which is an « while the second is / $. For example, given a class of Christian names and a class of surnames, we can con¬ struct therefrom a class of all complete names of two parts, such that the Chris¬ tian name is to be found among the given Christian names, while the surname is to be found among the given surnames. It is clearly in harmony with our normal use of terms to say that if there are P Christian names and v surnames in the two sets respectively, there are p X v complete names in the derived set. We shall generalize this and make it our definition of multiplication : p X v, the product of l *1 and v, is the number of couples formed by first selecting a term from a class of P members and then selecting a term taken from a class of v members. On the basis of the definition alone, the associative and commutative laws may be shown to hold of multiplication among any numbers, finite or infinite. Furthermore, the distributive law for multiplication with respect to addition — the law that p X 0 + 77) = (fj. x v) + O X* ■) — is easy of universal proof in the algebra we have established.

Involution. — In ordinary algebra we find

that there are /A ways of forming classes by

picking out one term from each of v mutually exclusive assemblages of P terms each. As this process may be applied to all assemblages whether finite or infinite, we make it the basis for our definition of involution. The ordinary

laws of involution — that + 77 = {xv X p17 ,

that pv x 77 = (pv)7T . and that (p X v) 77

= // 77 x v77 — follow readily for all the num¬ bers in our algebra.

Extension of the Number-Concept. — If

we limit our discussion to what we have called the natural numbers, the system which we have obtained has identically the same algorithm as the algebra of our high-school days, in so far as we limit its application to the positive in¬ tegers and 0. This system is called Number- Theory (see Numbers, Theory of). Now, number-theory is famous alike for the dif¬ ficulty and the lack of generality of its methods and for its very slight practical value, so that a more regular and a more useful algebra becomes a desideratum. We want to be able to solve the equations x+5=3, 2x—7, x2~2 — 0, and x2Jr2 — 0, all of which lack a

solution of the algebra so far at our disposal. Be it noticed, the mere fact that these equations are insoluble within the present system does not permit us to assign to them arbitrary solu¬ tions; there is no more justification for saying that .r + 5 — 3 “must have® a solution than there would be for saying that there “must be® an even prime greater than two. The absence of a solution to a problem is never a sufficient ex¬ cuse for building that solution out of whole cloth. Our search for a more complete algebra must consequently take the form of a hunt for systems that actually do obey more universal laws than those of the signless integers, rather than that of filling out the system of the sign¬ less integers by the haphazard introduction of heterogeneous material.

Integers with Sign. — Here the problem is that of finding a system in which such equa¬ tions as .r + 3 = 2 are soluble. When we have once defined addition, the definition of subtrac¬ tion follows without any further ado : p — v is defined as that number which when added to v gives p *p + v and p — v may be regarded as the results of performing on p the opera¬ tions of adding or subtracting v. Let us call these operations + v and — v, respec¬ tively. We shall define the sum of two operations of this sort as the operation consisting in their consecutive application. The word “sum® will here have a significance different from that which it possesses with reference to p and v. Its use, however, is natural, for the adding of numerical “steps® is closely analogous to the process whereby we add, say, two linear steps or lengths by the re¬ peated application of a yardstick. Furthermore, when only entities of the form p are con¬ sidered, the formal properties of the new sum¬ mation will be the same as those of the old, When operations of the form — p are admitted, our new additions will have all the properties we are accustomed to associate with addition among integers with sign, among which are the properties of associativity and commutativity. Similarly, if we define p) (+* 0 and (- P) (-v) as + (p X v), and (+ p) v)

(- p) (+v) as ~ (P y. v), we shall find that the multiplication so defined will have the same properties intrinsically and with re¬ spect to addition that we should naturally expect multiplication to possess in the uni¬ verse of integers with sign. Among these are the “laws® of associativity, com¬ mutativity and distributivity. Consequently, putting all things together, there is no rea¬ son why we should not call our + p’ s and — p’s positive and negative integers, respec¬ tively, provided v :£ 0. In this system, we shall find that every equation of the form x-\~a — b will be satisfied by some value of x. It is note¬ worthy that the system of integers for which this is true does not contain any of the integers of previous paragraphs, so that a positive in¬ teger turns out to differ from the corresponding signless or absolute integer.1

- This definition holds for all the uses of subtraction. Likewise, x -f- y is that number which multiplied by y gives x

1 It is the custom of mathematicians to call severa 1 things by a single name, if only they have analogous formal prop¬ erties, so that we shall meet with entities called absolute

integers among fractions, real numbers, and even among complex numbers.

Fractions or Rational Numbers. — Equa¬ tions such as 3 x — 2 are rendered soluble in a way quite analogous to the procedure of the last paragraph. Let m and n be any two posi-

tive of negative integers. We shall define —

Tl

as the relation which subsists between any two integers p and q if mq — np. We shall define

Vi + P as m ± J}P and m.p_ as We

n q nq n q n. q

in /ti

shall say that — > — if n, q, and mq — np are n q

positive. When this has been done, it is demonstrable that the formal laws of associa¬ tivity, commutativity and distributivitv hold in the proper manner for addition and multiplica¬ tion, that every equation of the form ax = b has a solution when the entities concerned are

m

expressions such as ~ , or as they are called,

n

fractions or rational numbers , and that the relation > determines an order among the fractions such that (a) we never have x > x ; (b) if x > y and y > z, then x > z ; (c) if x and y are two distinct fractions,

either x > y or y > x. This latter set of facts is expressed by the statement that the fractions arranged in order of magnitude form a series. Be it noticed that though the fraction x may be taken to represent the integer x and is usually expressed by the symbol x, it is altogether dis¬ tinct from that integer.

Real Numbers. — The system just developed is very rich in numbers. In fact, it can be proved that no matter how near any two frac¬ tions are to one another, there is a fraction lying between them in magnitude. Neverthe¬ less, the series of fractions is everywhere full of gaps which prevent some of the very simplest equations from having solutions within it. For example, it can be shown that x2 = 2 has no fractional or rational solution. If it had such a solution, it would necessarily be of the form m

— . m and n can be so chosen as to have no

rl'

factor other than ± 1 in common. Therefore, we can so choose m and n that at least one of them will be odd, if any values whatever exist

for m and n. Now, by hypothesis, (-^j =2, or

m2 — 2 n2, and m is consequently even. If m is even, it is of the form 2k. We thus get 4k2 — 2n2, or n2 — 2k2, whereby n is shown to be even, so that our previous hypothesis is con¬ tradicted.

Though 2 has no rational square root, there are numbers whose squares exceed 2 by as little as we please, and numbers whose squares fall short of 2 by as little as we please. The ap¬ proximate values we obtain in extracting the square root of 2 constitute a family of num¬ bers which exemplifies this property : 2 — l2 = 1 , 2 — 1 A2 = .04, 2 — 1 .41 2 = .01 19, 2 — 1 .4142 =

.009,064 and so on indefinitely, while 22 — 2 = 2, 1.52— 2 = 25, 1.42 — *2 = .0168, 1.415* — 2 = .002,625, and so ad infinitum. That is, the proc¬ ess which we call extracting the square root of 2 consists in finding sequences of pairs of num¬ bers whose squares bracket 2 by intervals which decrease beyond any assignable degree of minuteness. To put it crudely, we mark the

place where the square root of 2 ought to be by a definite dividing-line in the scale of rationals between those whose squares fall short of 2 and those whose squares exceed 2.

These dividing-lines between the numbers that are larger than a given standard and those that are not have been termed by Dedekind cuts. Some of these cuts are immediately bounded above or below by a rational number, as for instance the cut which separates all numbers less than 3 from 3 and greater num¬ bers. Others, such as the cut discussed in the last paragraph, have not this property.

By considering only those cuts which do not immediately follow a rational number, we obtain one cut and one only corresponding to each rational number, and a cut, to put it crudely, where a number ought to be, but isn't. For instance, if we take our cuts as a larger system of numbers, we shall find that there will be a cut which we might call the square root of 2. If we define the sum of the two cuts Ci and C2 as the cut which divides all the sums of fractions on the lowTer side of Ci with frac¬ tions on the lower side of C2 from all other fractions, and if we define CiC2 as the cut dividing all products of fractions on the side of Ci more remote from O with fractions on the side of Ci more remote from 0 from all other fractions, we shall be able to prove both that all the convenient .laws of addition and multi¬ plication are satisfied and also that there will be no lacunae in our system such as that which prevented x2 = 2 from being soluble in the universe of rational numbers. If we define the order of magnitude of our cuts in the natural manner, making one cut precede another if the second cut contains on its lower side fractions larger than any on the lower side of the first, we shall not only find that this order is a series, and a series between any two of whose members there lies a third, but also that every cut in this series is bounded on one side or the other by one of the terms of the series. These properties go to make up what is known to mathematicians as continuity * and the ordinary properties which we have learned to attribute to the number system of real algebra are those that belong to continuous series. Therefore, taking all these considerations to¬ gether, we can define the real numbers of ordinary algebra as the cuts which we have just discussed.

Complex Numbers. — Even in the system of real numbers we meet with equations that have no solution. While x2 — 2 = 0 has real roots, x1 2 = 0 is satisfied by no real value of x. However, there is a system easily obtained from that of the real numbers in which this equation and many like it are soluble. Let us consider a system made up of ordered pairs of real numbers, such as (a, b). Let us define (a,b) + (c,d) as (a + c, b+d) and (a,b) .(c,d) as (ac-bd , ad~Cbc). It will be found that the usual laws of commutativity, associativity and distributivity for addition and multiplication will be fulfilled in this system, and that the ordeded pairs of the form (a, O) will have the same formal properties among themselves as the real numbers a.

Further-

- In Cantor's definition of continuity, an additional con¬ dition appears, which is also satisfied by the series of cuts in question.

more the equation (0,V2).(0,V2) = (-2,0) is valid, so that the analogue of — 2 will have a square root in this system, and x2 + 2 = = 0 will be soluble, but it is still further demonstrable that if we define xn as x.x.x...x, every equation of

' -V

n. times

the form a0xn + aix«— * -f- a2xn~ 2 -f a3xn— 3 +

. + dn-ix + an = 0 will have solution in

the algebra of number-couples. The couple (a > b) is usually written a + ib, and the theorem just discussed, to the effect that every equation of the form given (called an algebraic equa¬ tion) has a solution in the algebra of complex numbers is known as the Fundamental Theo¬ rem of Algebra. It is due to Gauss.

It has long been established that there is no algebra which includes complex algebra in the way in which complex algebra includes real algebra wherein the operations of addition and multiplication continue to obey their familiar laws. Complex algebra, then, cannot be ex¬ tended, and owing to the fundamental theorem of algebra it need not be extended, so that it is the algebra par excellence for the mathema¬ tician.

For a further discussion of the real and complex number-systems see the articles on Real Variable, Theory of the, and Complex \ ariable, Theory of the, respectively.

Exponents. — In the last paragraph we have defined xn in the case' where n is an integer. This obeys all the laws laid down in the para¬ graph on involution. These laws require that if any use of fractional exponents is to conform

(m\ n

x / must equal xnA It may be demonstrated that so long as we confine our¬ selves to positive values of the roots of positive

m

numbers, if x n be defined as the nth root of xm, all the laws of exponents will be obeyed. It can likewise be shown that the definition

of x~n as ~n will yield consistent results.

These are accordingly the definitions of frac¬ tional exponents actually used. When other than positive roots of positive quantities are considered, the matter is not quite so simple. If n is not rational, xn is defined as the limit of xm where m is a variable that approaches n through rational values.

The Method of Postulates. — The method whereby we have derived algebra from the entities and truths of logic is not the only one that has been applied in establishing this subject on a logical foundation. The method of postu¬ lates which has been employed so effectively by Veblen and Huntington in many branches of mathematics has been used by Huntington for the study of algebra. This method consists In reducing the theorems of algebra to the consequences of a few simple formal laws such as the laws of associativity and of com¬ mutativity for addition and multiplication and the law of the distributivity of multiplication with respect to addition and others of the same sort. When this is done, algebra is considered not as the study of a set of specifically numerical entities but as the study of any entities you please that obey its postulates.

1 V is defined as m-i-n. n

Rational, real, and complex algebra each receive a complete and self-contained treatment ac¬ cording to this method. See Postulates, Theory of.

Bibliography. — The most thorough work on this subject is the (Principia Mathematica) of A. N. Whitehead and B. A. W. Russell (Cam¬ bridge 1910-13). Whitehead's Hntroduction to Mathematics5 (in the Home University Library series) is the best popular book. Consult also Huntington, E. V., <A Complete Set of Postu¬ lates for the Theory of Absolute Continuous Magnitude5 (Trans. Am. Mat. Soc., 1902), (Complete sets of Postulates for the Theory of the Real Numbers5 (ibid. 1904), and (The Continuum5 (Cambridge, Mass.,

1917).

Norbert Wiener.

Editorial Staff of The Americana.

ALGEBRA, Elementary.* 1 Terms, Ex¬ pressions, Factors, etc. — In Algebra numbers, real or complex, are commonly called quantities. Any lawful combination, however compli¬ cate, of number symbols represents a num¬ ber or quantity, and is named algebraic ex-

_a

pression, as 5, 3a, V7 (a\ — V~xT) — — Lt- The

v ' x — z yw

parts of an algebraic expression that are con¬ nected by the sign + or — are called terms. Two or more terms enclosed in parentheses ()

or brackets [] or braces j j or written under a

vinculum - are treated as a whole ; thus,

2— (4 +6) =2— 10, 3 X 7—5—3 X2, x— [y— • { z—

(x— y— z) }] = x— [y— •{ z— (x— y+z)]—x— [y— { z

— -x-|-y — zl] =x — [y-fx — y] *= = x — x=0. An ex¬ pression of more than one term is a polyno¬ mial or multinomial. Expressions of one, two, three terms are respectively monomial, bino¬ mial, trinomial; thus, a~(b — c) is binomial, though its equivalent, a~ b c, is trinomial.

In the indicated product of two or more symbols, as 4 abx, any partial product is the coefficient of the complementary product. Thus 4 and abx are coefficients of each other, as are a and Abx, or x and Aab. An expression is integral with respect to given symbols if it may be expressed as a sum of products of positive integral powers of these sym¬ bols with one another and with coefficients which do not contain them. An expression is fractional with respect to given symbols if it is the quotient of two expressions which are integral in the symbols, but is not integral itself. An expression is called rational if it is fractional or integral, but ir¬ rational otherwise. An expression may be in¬ tegral in some symbols and fractional in oth-

• i.1, r (x2 -y2)w— 4 i • * •

ers, as in the case of - - — - which is in-

7 —X

tegral in x and y, but fractional in w and z.

Similarly #Ly2 - Fz2 is rational in y, but ir¬ rational in x and z. Any expression, in case it is rational and integral as to some sym¬ bol, as x, is said to be of degree n

iFor definitions of x + y, x — y, xy, x-r-y, xm , see article on ALGEBRA, DEFINITIONS AND FUNDAMENTAL

l

CONCEPTS, —is defined as m-i-n, WV n as n m, and

_ 2 _

V n as V n .

in that symbol if its greatest exponent

in any term is n ; thus a2xi + bafx3 — 4x a" + 1 is

of degree 5 in x, of degree 6 in a, and of degree

1 in b. An expression rational and integral in

two or more symbols is said to be of degree s

in those symbols (together) if s is the largest

sum of the exponents of those symbols in any

term; thus a2b3c — 5 a3b4c2 — 7b2c' is of degree

9 in a , b, c (together). In general, each of two

or more expressions is called a factor of their

1 8

product. In this general sense, a 3 and a- are

a® b

factors of a2, and so, too, are — and — . In a

b a

more restricted sense, the factors of an expres¬ sion rational and integral as to some letter must themselves be rational and integral as to that letter; thus some factors of a2b — a3b are a, a ', b, ab, a2b, 1 — a, for division by any of these yields a quotient rational and integral as to a and b. In such cases, factors of lowest degree n any symbol are called simple factors (in that svmbol). A factor of tw'o or more expressions is called a common factor of them. The common factor of highest degree is called the highest common factor (H.C.F .) ; thus the H.C.F. of a3b 2 and a2b3 is a2b2 ; of a2 — b2 and ac + be, it is a + b. Every expression is a multiple of its factors. A multiple of two or more expressions is called a common multiple of them; it is their lowest common multiple (L.C.M .) if it is the common multiple of lowest degree ; thus, the L.C.M. of ab2c * and a3bc3 is a26V; of (x-a) (x- 6) 2 (x — c)3 and (x-a)4(x — b) (x — c) it is (x - a) 4 (x— b) 2 (x- c)9. It is readily proved that the product of two expressions is equal to that of their H.C.F. and L.C.M. If £ is any algebraic expression, then E2 , £*,..., En are respectively the second, third, . . . , nth powers of E, and E is the square, cube, . . ., nth root respectively of E2, E 3, . . . , En. In par¬ ticular, E2 and E3 are the square and the cube

of E. Thus ax' is the square root of a2x*, ~

b

is the cube root of a'b—', xb — yi is the square root of (xl — yi)*, or x + y — 2x%yl.

Ratio, Proportion, Variation. — The frac¬

tion - is the ratio of a to b, often written a:b, b

of which a is antecedent and b is consequent.

if a — — and b — —, then a:b — — • A ratio is y w yz

commensurable or incommensurable according as it is or is not a rational number; thus, 2:5 is commensurable, but E2:l, ratio of diagonal to side of square, is incommensurable. Plainly, ra¬ tio theory is fraction theory. It is easily proved

that if b d j unless b + d-tf + . . . = 0.

then

a T c -f- c + . . . ®

b -f- d + / + . . . b'

If 7- = --, a , b, c, and d, b d

taken in order, are in proportion, often written a:b::c:d, or a:b = c:d, a and d being the ex¬ tremes and b and c the means. In such case ad = bc, and conversely. If a :b — b :c, i.e., if l)-~ac, b is a mean proportional to a and c, and c is a third proportional to a and b. If aibˆc.d, then a -F b:b = sc -{- d\d, a — b\b = c - d:d, whence a + b:a — b = c-{-d:c — d\ i.e., a, b, c, d are in pro¬ portion by composition, by division, and by both. A quantity x varies directly as y, symbolically

x oc y, if the ratio of every two values of x is equal to the ratio of the corresponding y values. If x oc 1 :y, x varies inversely as y. If y oc yz, x varies as y and z jointly. Examples : if jr is distance traveled and y is rate, x oc y; if x is volume of given mass of gas (at constant temperature) and y is pressure on it, x oc 1 :y (Boyle's Lawr) ; if .„r is the area of triangle and y and z are base and altitude, x oc yz. If x oc y, x~cy, where c is some constant; if x oc 1 :y, x = c:y; if x oc yz, x — cyz, if x oc y and oc 1: 2, x = cy:z ; if x_oc y and y oc z, x oc z, x + y oc z,

x — y ex z, Vxy oc z; if x oc y and z oc w, xz cc yw; if x oc y, xk cx yk, k any exponent; if x cx y when 2 is constant, and x cc z when y is constant, then x a yz when y and z both vary. It is seen that variation is a kind of generalized doctrine of proportion.

The Notion and Notation of Function. —

A quantity which may take different values is a variable. Two variables so related that to a value of either there corresponds one or more values of the other are called functions of each other (see Infinitesimal Calculus)-. Any alge¬ braic expression is a function of the symbols it in¬ volves, and conversely; for example, 2;r2 + 3 is a function of x, as x is of 2.r2 + 3. A function of a symbol as x is often denoted by the symbol f(x) or F (x) or (x) or the like and read /-function of x, and so on. If f(x) —2x2 — 4, then /(0) = — 4, /(— 1) = — 2, f(a) = 2a2-A, etc. The function symbol has reference to the form of the function, and in the same argument or discussion the same symbol may not be used for two different functions. Of great

importance are the integral (entire) polynomials, of which the general form for a single variable x is fn (x) = a0xw + aix«- 1 + a-ixn~ 2 + ... + an - ix + a».

The coefficients a0, Oi . , an are regarded as

arbitrary constants. Accordingly /i (x) = a0x + ai, said to be linear or of first degree ; ft (x)~aoxi + 01x4-02, the general quadratic expression or expression of second degree; ft — a0x3 + ... + a«, the general cubic, f\ (x) EE c0x4 + . . . o4 the general biquadratic, etc. The general expres¬ sions become particular or special on assigning specific (numerical) values to the (literal) co¬ efficients. In any fn (x) any value may be given to x, the corresponding value of/«(x) is then determined. The inverse problem of deter¬ mining all values of x for which fn (x) shall have a prescribed value is far more difficult. A value of x for which fn (x) is zero is said to cause fn (x) to vanish. To every expression fn (x) corresponds an equation, fn (x) = 0, of 1st, 2d,..., nth. degree, according as n = l, 2,.. , n. The equation imposes a condition on x, restrict¬ ing its variability, allowing it only such values as make fn (x) vanish. (The variable in an equation is called the unknown quantity). Any such value is a root of the equation. The equation fn (x) = 0 has n and only n roots (see Theory of Equations). To solve an equation is to find its roots. A linear equation a0x + a 1 = 0

has one root, and it may always be found a o

by adding — ai to both members aox + oa and o and then dividing the sums by ao. The re¬ sult of the addition is the equation a< >x = — ai. Obviously any term may be trans¬ posed from either member of an equation to the other if at the same time the sign of the

term be reversed. Presently we shall see how to solve quadratic cubic and biquadratic equations.

Factor and Remainder Theorems. — Ob¬ viously fn (x) may contain a factor of the form x — a; e.g., x — 2 is a factor of x2 — 4. If fn(x) has x — a for factor, then fn (x)ˆ(x-a)Q. where Q is the quotient of fn (x) divided by x — a. Hence under the supposition fn(x) vanishes when a is put for x. The converse is the factor theorem : If fn(x) vanishes on re¬ placing the variable x by a number a, then x — a is a factor of fn (x). Proof: divide fn (x) by x — a until the remainder R does not

contain x. Then fn (x) = (x - a)Q -f R; put a for x, then fn (a) = (0 - 0) Q + R, but fn (a) = 0 ; hence R =0; hence fn (x)=(x-a)Q. At the same time the remainder theorem is proved : Division of fn (x) by x — a yields fn (a) for remainder. By the factor theorem it is seen that xn — an is divisible by x — a, for on putting a for x, xn — an = an — an~ 0. Put a for x in xn + an ; the result is not zero ; hence x — a is not a factor of xn + an. If n is odd, x + a is a factor of xv+an for (— a)w+a«= 0 for n odd.

The Quadratic Equation. — The general quadratic equation a.r2 + bx + c — 0 can be solved as follows : the roots of an equation are not altered by adding a constant to both members or by multiplying both by a constant. Dividing both members by a, then adding b2 IP

- — t. — -t-t to the left member, we obtain 4 a2 4 a2

(x+iY~ (r^) =0; factoring' i

If the product of two or more integral factors is zero, one of them must be zero and the equation is satisfied if any one of them is zero. Hence the roots of the quadratic are the. roots of the linear equations obtained by equating to zero the foregoing factors. The roots rx and r2 are :

n = — (~b + VlP-A ac)> r°-=4~ (~b~ Vb2 - 4 ac)- 2 a 2.a

Thus it is seen that every quadratic equation has two and but two roots. Their sum

r, + r2= - — and their product n r2 = — , a special a a

case (see Equations, Theory of) of the law connecting the roots and coefficients in the general equation /» (x) = 0. If the coefficients are real, the roots are both imaginary when and only when the discriminant IP — 4ac<0, or nega¬ tive. If b 2 — Aac = 0 the roots are equal; if b2 — Aac is a perfect square, they are rational.

The Cubic Equation, Cube Roots of Unity. — Let „r3 = 1 , then A'3— 1=0; factoring left member, (x — 1) (x2 + ^ + 1) = 0. Hence the cube roots of unity are 1, \ 1 + * - 3),

w, = i (- 1 — V — 3). wi and cj4 are imaginary (complex) ; up = u2t up = ulf up — — L Writing

u for uh the cube roots of 1 are 1, ut u2.

3 _ 1 _

Any number a has three cube roots, I a, u Va,

3 _

oj2 Va; thus the cube roots of 8 are 2, u 2 and u22. The general cubic may be written

xs + ax2 + bx -f c = 0. On putting y - - for

3

x, the cubic becomes

y+(b-f) y + (c-E.

b 2 a3

3 ~~27

)=°.

or y3+/>y+<7=0 lacking the second term and called the reduced cubic. It is sufficient to solve the reduced cubic, for the roots of the

original are then found by the relation x~y — — .

Let y=z — ^ , then zejrqz3 —

32

quadratic in z3, yielding j3= -

P 3

27

S

2

-4-

1. This is

where

3 _ 3

uy , 0)2 V

From the fact that z has six values, it must not be inferred that y has six; for the two

values 2i3 and zf of z3 are such that ziZ»=—£-,

hence the six ˆ-values, Zi, z2, uzlf u2z2, uz2, u2zlf yield but three y-values, corresponding to the

relations zxz2 = uzuu2z2 — u2zx . uz2 = - i*. For ex¬

ample, yi = zi — —z»- -£-=& + 22. If

3zi 322

*» = yj— | + VQ, then z2 = y~Q,

and the y-values are :

yi= yj--ˆ + vq + yj~~2 ~ ˆ

y* = w y/~ˆ+ + u2 yj~"2 ~ ˆ

y» = «2 yJ--2 + VQ + yJ~-% ~ VO-

It can be readily shown for real p and q that one of the y's is real and the other two are conjugate imaginaries if Q be +, that all are real and two are equal if Q = 0, and that all are real and dis¬ tinct if Q is — . The last case is called irre¬ ducible because the root formula, involving imaginaries, is practically valueless. In this case the roots may be found by help of the trigonometric functions (see Trigonometry) as follows: Let Q— — ˆsin2#, — \q=r cos 0, then r = [/ — p* : 27, cos 6 = - \q: [/ — p? : 27. The value of v may be found by trigonometric table. Hence

3 _ 8 _ _

/ — \ q+ VQ — r cos 0+ ir sin 0

= | cos £ (0+ 2k*) 4- i sin £ (0+ 2kˆ) j

and

V - \q - V~Q

= { cos | (6+ 2 kx) - i sin ˆ (d+ 2kn)f

k — 0, or 1. The y formulae then give

3 _

y = 2 'Z r cos £ (6+ 2kx)t

The Biquadratic, or Quartic. — In general form this is x--*px3--qx2Jrrx--s=0. The equiv¬ alent reduced quartic, x*-\~ax2Jrbx--c= 0, is found

by replacing x by x

To solve the reduced

quartic, let x — u~-yfrz, then xi-2x3(u2~Vy2--zi)

= 8 uyzx--{u2--y2--z2)2 — 4(wy-f- y2z2-- (z2u2)— 0; if this be identical with the reduced quartic, a= — 2(«2+y2+£2), b=—8uyz, c=(u2--y2Jt~z2)2 — 4(u2y2Jry2z24-z2u2) . Owing to relations be¬ tween the roots and coefficients of any equation (see Equations, Theory of), the roots of the

auxiliary cubic ts~\~ — t 2 + a ˆ c

16

t _ A=o are ii\

1 64

y2, Denoting them by l, m, n, we have

± V l — ± V n, apparently eight values

of x, but really only four because the product uyz — — b: 8. If b is positive the values of x

are - V l-\/m-'\/n,-\/ l +V w+V V l —

Vw + Vw, Vˆ + Vw — V«;ifˆis negative, they are the negatives of the former.

Historical and Critical Note. — As seen, the general equations of 4th and lower degrees are soluble by means of radicals or root extrac¬ tion. It was naturally but incorrectly supposed that the same means would prove available in case of the general quintic and equations of higher degree, and one of the great problems of the 18th century was to solve the quintic in a manner analogous to that employed above for the quartic, cubic and quadratic. In 1770 Lagrange proved that the method was not adequate for that purpose, as it gave for auxil¬ iary equation an essentially general one of sixth degree. By Abel, Wantzel and Galois (see Equations, Galois' Theory Of.) it was shown to be impossible to solve by radicals any general equation of degree above 4. Subse¬ quently Hermite proved that the roots of the general quintic are expressible in terms of elliptic functions. The quadratic, cubic and quartic are solvable by other methods than those given above, but all are essentially the same. The solution of the general quadratic was known to the Arabs in the 9th century. The solution of xZJr px~ \~q= 0 was discovered by Scipio Ferreo in the beginning of the 16th century. It was rediscovered a few years later by Tartaglia. The solution given above is known as Cardan's, but it is known that Cardan learned it from Tartaglia. Ferrari, a pupil of Cardan's, solved the quartic. The solution, given by Bombelli in his algebra (1579), is some¬ times attributed to him. Descartes gave a different solution in 1637. The solution pre¬ sented above is Euler's, having been found by him in 1770.

Higher Equations. — Although the general equations of the 5th and higher degrees are not solvable by radicals, many particular equations of such degrees are thus solvable ; e.g., x 8 — 1 = 0 breaks up into two quartics, x 4 — 1 = 0, ,U + 1 = = 0. In works on the theory of equations (see Equations, Theory of) various methods, chief of which is Horner's, are given whereby the commensurable roots of any equation having numerical coefficients can be found and the in¬ commensurable roots can be found to any re¬ quired degree of approximation.

Simultaneous Equations. — The general linear equation in two variables or unknowns, as x and y, is ax~-by—c. Solved for one of the variables, say x, in terms of the other, the equa¬ tion becomes x = — — It is seen that x and y

a

are functions of each other : to any value of either corresponds a value of the other. Any two wrresponding values constitute a pair satisfy¬

ing the equation. There are infinitely many such pairs satisfying a given equation of the kind in question, as many pairs as there are numbers. Obviously there are hosts of pairs not satisfying a given equation. All the pairs satisfying a given equation constitute a system of pairs. Two equations aiX T* biy — Ci, a2x + b2y — Ci are different unless a\ : a2 — bi : b2 — Ci\ c2. Have the two systems determined by two dif¬ ferent equations any pairs in the common? The answer is, one pair. It can be found as fol¬ lows : Multiplying the former equation by b2, the latter by- bi, adding and solving for x, x — (b2Ci — biC2) : (aib2 — a2bi) ; analogously, y~

(a2Ci~ Cia2) : (aib2~ a2bi) . This and only this pair of values of x and y satisfies both equa¬ tions. In combining the equations, x and y were regarded as the same in both. Two or more equations in two or more unknowns are called simultaneous when the unknowns are treated as representing the same numbers in all the equations. In the foregoing solution the ˆ-equation was found by eliminating y between the given equations. The elimination was ac¬ complished by addition. It might have been done otherwise, as by comparison, i.e., solving each equation for y and equating the .y-values so obtained, or by substitution, i.e., solving one of the equations for y and substituting the y- value so found for y in the other equation. In any of these ways or by combinations of them one may find a triplet of values satisfying three arbitrary equations in three unknowns, x, y, z : eliminate, say z, between two of them and then between the remaining one and one of the others ; so result two equations in x and y, to be handled as above. The method is obviously extensible to the case of n equations in n unknowns. In general, n linear equations in n unknowns are sat¬ isfied simultaneously by but a single set of values, but in special cases by no set or by more than one set. The latter happens only when the coefficients satisfy some special condition or conditions. Under certain conditions n or more equations in n — 1 un¬ knowns may be satisfied by the same set of value. Thus ax -\~ b — 0 and cx + d = 0 have the same root when and only when be — ad — 0 ; (hx + bxy + Ci = 0, a2x + b2y + c2 = 0, a3x + b3y + c3 = 0, are simultaneously satisfied or are consistent when and only when aib2c3 + a2b3Ci + a3biC%— a3b2cr~ a2bic3~ ad)3ci = 0. For the ex¬ pression of such conditions, and the solution of sets of linear equations, by means of deter¬ minants, see the article Determinants and works therein cited.

Simultaneous equations involving the un¬ knowns to degrees higher than the first may sometimes be solved. Consider, for example, the pair of equations : ax + by + c =0, dx2 + ey2-\~ fxy + gx + hy + k = 0 ; from the former y ~~ (c + ax) : a; substituting that y-value for y in the second given equation, a quadratic in x is found ; this

gives two ˆ-values ; substituting these in the given linear equation, the two corresponding values of y are found. The corresponding values must be properly paired ; thus the equations 3x -f 4y — 5 = 0 and 2.r2 — xy + y2 — 22 = Ogive x = 3 and — 109:53, y = — 1 and 148:53; the proper pairing is x — 3, y = ~ 1, and x — ~ 109:53, y = 148:53; the equations are not satisfied by x — 3, y= 148:53, for example. Once more, the two quadratics x2 + 3xy = 28,

xv + 4y2 —8 give, on division (member by member) and clearing of fractions, 2 (x3 +

3xy) =■ 7 (xy + 4y2) ; whence x — 4y or — 7y :2. For x — 4y, the second given equation furnishes 4y2 + 4y2= 8 and y — 1 or — 1, whence x — 4 or ~ _4; using x —~7y:2 in like manner, one finds y=f + 4 or — 4 and x~— 14 or 14; in all four pairs of values corresponding thus: x — 4, y =1 ; x — ~4, y =— 1 ; x—14, y = — 4 ; „r = — 14, y = 4. In general, an equation of rath degree and one of nth degree in two unknowns are both satis¬ fied by ran pairs of numbers. The solution of such a pair involves, in general, the solution of an equation of degree raw.

Permutations and Combinations. — Any arrangement (in a row) of r things (regarded as belonging to a set of n things) is called a (straight) permutation of the n things r at a time. Two permutations are the same when and only when they consist of the same things in the same order. The number of different (possible) permutations of n things r at a time is often denoted byn-Pr. To find this num¬ ber, think of any one of then Pr- i permutations of n things r — 1 at a time. There remain n~ r+1 things. Put one of these after the things of the given permutation. There so re¬ sults a permutation of the n things r at a time. It readily follows that

nPr—nPr — i . (w — r+ i), nPr—i — nPr—2.(n — r+2), . , nPi — nP. (n — i), vP\=n. Multiply¬ ing these equations member by member, it is found that nPr — n (n — 1) . . . (n — r + 1). If r=n, n P n—n\, where n ! (or |j0 means 1X2X3 X...Xw and is read factorial n. It can be readily proved that the number P of permuta¬ tions of n things (a, b, c ,...) n at a time, p of the things being a s, q of them b's, ..., is

P— - . If the order in a permutation of

p! qt...

n things r at a time be disregarded, the result is a combination of n things r at a time. Two combinations are the same if they consist of the same elements. A common symbol for the number of combinations of n things r at a time is nCr. By permuting the r things of a com¬ bination in every way, r ! permutations arise. It follows that nCr.r! — nPr, whence nCr = nPr:rl Since, on taking r things from n things, there remain n~r things, it is seen that nCr = nCn—r.

Arithmetical Progression. — An A.P. is a series of numbers such that the difference be¬ tween any two adjacent terms is the same as that between any other two adjacent terms. The general A.P. is: a, a + d, aJr2d,..., a + n — i d. Th theory involves five elements: the common difference, d) the first term, a ; the last, /; the number of terms, n ; and the sum of the terms, s. Given any three of the elements, the remaining two can be found. Since tCz = 10, there are but 20 problems to solve, giving rise to as many formulae. The formula for l in terms of a, d and n obviously is / = o+ n — id. To find 5 in terms of a, l and n, let s — a. + (a + d) + (a -f- 2d) 4- ... + (/ 2d)

- (l — d) + l; then 5 = /+(/ — d) + (l— 2d) + ... + (a - 2d) + (a - d) + a; adding, 25 — n (a +1),

tt ' # .

whence s =—(a+l). The remaining 18 for¬

mulae, completely exhausting the subject, are: / - ■ , 25

l = — \d + V 2ds+ (a — %d)2\ l = ~ — a;

i _ s , (w l)d j ■ j\ l -f- a

L — — — _i- ; 5 = \n (2 a + n- id) ; 5 = - -

n 2 2

/2 _ a2 _ _

- — —7 — ; 5 = \n {21 - n - id); a = l — n — id\

2a

a — — - (n- 1)d; a = \d ± V (l + hd)2 - 2 ds;

a = — — l; d = (/ — a) h- (n — 1); d = 2(s — an) n

-7- n(n— 1); d = (l2 — a*) 4- (25 -l — a); d = 2 (nl — s) ~r- n (n —

1); n = 1 + (/ — a) -f- d; n — (d — 2a ± V (2 a — d)2 + 8ds) -=- 2d; n = 2s ■+■ (a + l); n —

(21 + d ± V (21 + dp — 8 ds) -f- 2d.

Geometric Progression. — A G.P. is a series of numbers such thafthe ratio of any one to the next is equal to the ratio of any other one to its next. Accordingly, the general form of a G.P. is: a, ar, ar2,. . . , arn~1. Again, there are five elements to be considered : the first term, a; the last, /; the ratio, r ; the number of terms, n; and the sum of the terms, s. In terms of any three of the five elements, either of the remaining elements can be expressed. Accordingly the theory of the G.P. involves the solution of but 20 problems. Most im¬ portant of these are the problems, to express l in terms of a, r and n, and to express 5 in terms of a, r and n. It is plain that l, or the nth term, is l=arn~'. To find s, let s = a + ar+ . . . +arn~2 + arn — 1 ; thence rs = ar + ar2 + . . . + arn ~~ 1 + am ; substracting, and dividing by 1 — x, it is found

that 5 = — — — — = ~ — - . The remaining 18 1 — r 1 - r

formulae are easily obtained. If r be nu¬ merically less than 1, the G.P. is said to be a decreasing G.P.) otherwise, not. In case of a decreasing G.P ., it is possible to sum the series to infinity, a phrase requiring explanation. An endless series, ax, a2, . . . , is said to be infinite, i.G.f to contain an infinite number of terms. A series that has an end, a last term, is finite. Let sn denote the sum of the first n terms of an infinite series. If the series be such that there is a finite number L from which, by taking n large enough, sn may be made to differ by less than any prescribed amount and to which sn , as n continues to increase, approaches nearer and nearer in value, then L is named limit of Sn as n increases endlessly, the series is said to be convergent (see Series) and L is called the sum (to infinity) of the series. Observe that here the word sum is used in a new sense, viz., as limit of a sum (in old sense). Now consider the infinite G.P., a, ar, aP, . . . , am—1, am, ... The sum s of the first n terms, by the forego¬ ing formula for s, is : Sn =— - 9P!L. If the

1 — r 1 —r

G.P. is a decreasing one, r<i numerically, m ap¬ proaches zero as limit as n increases without

bound, and hence sn has — — for limit, the G.P.

1 — r

is a convergent scries, and its sum to infinity is

5= —a~. For example, the sum of the infinite 1 — r

series, i,

1

IS 5 = - - = 2.

1 -h

Harmonical Progression. — An H.P. is a series of numbers such that the series of their reciprocals is an A.P, Hence the typical H.P. is

1

1

1

1

of the form - -, - — , . . . , - 7

a a *4” d a +2d d + \ ti — — 1)d

It is obvious that every problem involving an

H.P. is convertible into a problem involving an

A.P. If a and b be any two numbers, their

arithmetic mean is a number c such that the

series a, c, b is an A.P. Hence c—a = b—c,

whence c ={a--b) ; i.e., the arithmetic mean of

two numbers is half their sum. The geometric

mean of a and b is a number c such that the

series a , c, b is a G.P. Hence — = —, whence

a c

c — V ab ; i.e., the geometric mean of two num¬ bers is the square root of their product. The harmonic mean of a and b is c, where c is such

that the series a, c, b is an H.P. Hence — , — , 4

a c b

is an A.P. Hence — — — — 4 — — * whence

c a b c

2dJy

c = - — — - . Denote by A, G and H respectively a T o

the arithmetic, the geometric and the harmonic means of a and b. Then A = \ (a--b), ab,

H — — — it is readily seen that H — G2\A, a -f- b

whence G = 'V AH ; i.e., the geometric mean of two numbers is the geometric mean of their arithmetic and their harmonic means.

The Binomial Theorem or Expansion. — If a and b are any numbers and n is any positive integer,

(o-f b)n = anJrnan~ 1 b T VlIAl — 11 an~ 2bˆ-- . . .

1 ■ 2

. «(«-D (» — 2) ■. (w-H-D orJ„_, +

T 1 -2 -3 ■ ... r

- nabn - 1 -f- bn,

an expansion containing m + i terms. For proof of the relationship see article Mathematical Induction. It can be proved by algebraic means, most readily by Maclaurin's formula (see Calculus), that, if a is numerically greater than b and n is any real number, the same expansion as that above given is valid, i.e., (a--b)n = an --nan — 1 b-- . . . , which, however, contains an infinite number of terms, except in the case where n is a positive integer. The equation is called the binomial theorem. It was discovered by Sir Isaac Newton, but its

correct¬ ness was not proved by him. One of the sim¬ plest of its countless applications is its appli¬ cation to the problem of finding correct to any required degree of approximation any real root of any real number. For example, sup¬ pose it is desired to know the real cube root of 25 correct to five decimal places. We may proceed as follows :

V25 = (25)1 = (27-2)$ = (33 — 2) $ = (33)1

- i(33)~' (2) - \ (33)- *2* - A(33)"§ 23 . . . —

= 3— — - : — - — - _ = 2.92402.

3 • 32 9 • 35 8 1 - 38

The Number e and the Series for ex. —

If w be numerically greater than 1, the fore¬ going theorem yields the equations

This equation is valid for every value of n numerically greater than 1. The limits ap¬ proached by its members as n increases be¬ yond every finite value are equal, and it may be shown to result from this that

1 + 1+i+I +

2! 3!

■■■)

X V*

= x+x+r+v+-

The series on the right is convergent for everv finite value of x; in fact, for any given value of x, the series after a certain number of terms converges more rapidly than any decreasing G.P. The series on the left is a special case of that on the right, viz., x—. The limit of the sum of the first n terms of the series on the left, i.e., its sum (to infinity) is denoted by e\ accordingly the equation may be written :

ex— l+#+ ' The meaning is that the

number e raised to a power indicated by a given value of x is the sum to infinity of the series

for that value of x. Since e = 1 + 1 + 4 +4+ •• .

L. . yj .

its approximate value can be readily calculated. That value, correct to 10 decimal places, is e — 2.7182818284. The number e, one of the most important of all numbers, is incommen¬ surable, i.e., not exactly expressible as a rational fraction, and it is transcendental, i.e., not a root of an equation axn ~\~bxn—i + . . . =0 where the coefficients a, b, . . . are integers (see General Theory of Assemblages).

Logarithms.— Let a be any positive number greater than 1. If ax—N, x is named loga¬ rithm of N to the base a; symbolically, x — logo N or, if the base is supposed known, simply x = log N. If a be fixed, x and N will vary each with the other, each is a function of the other. Since a0 — 1, log 1—0 no matter what the base. But in general the logarithm of a given number will vary with the base ; thus, since 2 — 16, 42= 16, log216 — 4, log416=2. The general connection can be .readily found thus : let ax=N and bv=N, then lo gaN=x and log/,Ar

= y; also ax = by,

y_

a~bx

3, log bN

iogta= i=1_

whence log6N=logaA/'.log6a . Calling a the old and b the new base, it is seen that the logarithm of a given number to a new base is equal to the product of the logarithm of the number to the old base and the logarithm of the new base to the old base. Let ax = N, av — M, then ax+v — NM ; hence the logarithm of a product is the sum of the logarithms of the factors. Again, (ax)k*= ; whence it is seen that

the logarithm of the &th power of a number is k times the logarithm of the number. Once more,

dx

— —ax y; that is, the logarithm of a fraction is

equal to that of the numerator minus that of the denominator.

Logarithms to the base 10 are called common logarithms or Briggsian loga¬ rithms after Briggs, who introduced them in 1615. These are used in practical computation, but in theoretical work logarithms are referred to the number e, the Napierian base, so called after Napier (1550-1617), the inventor of log¬ arithms.

Let N be any number and n any positive in¬ teger. Then log io (N • 10») = logic N+n logio 10 = n -f logio iV; and logio (iV-r- 10«) = logio iV- a logio 10 = — w-f logio iV. Now multiplication or division by a power of 10 has only the effect of moving the decimal point, while the logarithm of the

product, as just seen, is equal to that of the

multiplicant (or dividend) increased (or de¬ creased) by an integer. Accordingly, if two

numbers differ only in the position of the

decimal point, their logarithms differ only in respect to the integral part (called the char¬ acteristic), the fractional part (called the man¬ tissa) being the same in both. In that fact re¬ sides the chief practical advantage of the Briggs¬ ian system. For example, if log]02.23 = .3483, it follows that logio22.3— 1.3483; and logio.00223 — logio (2.23 H- 10s) = — 3 + .3483, or 3.3483, as negative characteristics are often written. It is easy to see that the characteristic of a loga¬ rithm is + » if the number has n+1 figures before the decimal point, and is — n if the number is a pure decimal in which the point is followed by n — 1 zeros. Thus, log1023506.054 = 4 + a pure decimal, and logio0008953 “ — -4 + a pure decimal.

Logarithmic Series, Calculation of Log¬ arithms. It may be shown by the methods of the differential calculus that if x< l,log<?(l -f

xz

X3 -y* ^

-by y -r y —

the

logarithmic series. Similarly, log? (1 — x)

r2 r3 r4

*v A rT-'l 1 M •

— — x — - — - — — - _ — ... lhe logarithmic

series converges slowly for all but small values of x. It is on that account ill adapted to the com¬ putation of Napierian logarithms. A series bet¬ ter adapted to such calculation is, however, read¬ ily obtained as follows: From the last two scries

it follows that log* «2 (x + j + y + . . .^ •

Put x* = m > so that — — — — ; then

m--n 1— x n

m — n m--n

' m — n i \in--nj

/m — n\ \m--nJ

a rapidly converging series that may be used for the calculation of logarithms as follows. For m = 2 and n = 1, we get logc2 = 0 + 2 j f-f 5(i)3_E • (• whence loge2 = .693147 (correct to six decimal places). For m — 3 and n—2, the series gives log,3 = log,2 + 2j + () + . • • I — 1 • 098612. Tak¬ ing m = 5 and n — 3, it is found that log(5 — 1.609438. Then loge4 = 2 loge2, loge6 = loge2 -floge3, loge8 = 3 log < > 2, andsoon. In particular loge10 = loge2 + loge5 = 2. 302585. Since logwiV— (logeiV) (logc10), it is seen that the common logarithm of any number may be found from the Na¬

pierian longarithm of that number by multi¬ plying the latter logarithm by 2.302585. This last is called the modulus of common loga¬ rithms. It is obviously possible to calculate logarithms that shall be correct to any pre¬ scribed number of decimal places. Logarithms correct to 3 or 4 places are sufficiently accu¬ rate for all ordinary computations, though tables correct to 5, 6, 7 and even 10 or more places are often employed. By means of any such table can be found the logarithm of any given number and conversely. The number corresponding to a given logarithm is often called the antilogarithm. The advantage of loga¬ rithmic over ordinary computation is easily seen. Thus to find the product of two or more numbers, it suffices to add their logarithms and then to take the antilogarithm of the sum. To extract any root, say the 7th, of any number, it suffices to divide the logarithm of the number by 7 and to take the antilogarithm of the quo¬ tient. To find the quotient of two numbers, it suffices to subtract

the logarithm of the di¬ visor from that of the dividend and to take the antilogarithm of the difference. The cologa¬ rithm of a number is the logarithm of the re¬ ciprocal; thus, colog n = log 1 “log — — log n

n

= 0 — log n ; hence to subtract a logarithm is equivalent to adding the corresponding colog¬ arithm.

Undetermined Coefficients. — Reference

was made above to this subject, of which some account will now be given. Let f(x)= =a0xn --a\Xn — i -fa2xw — 2+ . . . -fa« — i x--an, a rational in¬ tegral function of degree n\nx. It can be proved and is here assumed that any such function vanishes for some value of the variable. If f(ri)= 0, then, by the factor theorem, fix) = (x — ri)f'(x), where fix) =a0xn — 1 -f . . . If /'(r2)— 0, then f'(x)=(x — where

f" (x) —qnxn~ 2-f . . . t and hence / (x) — (x — n) (x — r2)/"(x). By the argument here exemplified it is proved that fix) may be put in the form / (x)=ao(x — ri) (x — rf) . . . (x — rn). Each of the n numbers n, r2, ... , m causes fix) to vanish ; hence the n numbers are roots of the equation f(x) —0. It can be easily seen that the equa¬ tion fix) — 0 cannot have more than n differ¬ ent roots unless its coefficients are each zero ; that is, fix) cannot vanish for more than n different values of x unless Oo=ai= . . ,=an~ 0. For if f(rn+ 1) = 0, then a0(rn+i— ri)(rn+i — rf) . . . (r«-f i — rM)=0, but by hypothesis no ( ) = 0, hence a0 = 0, and / (x) = a\Xn~ i -f . . . As the latter is to vanish for more than n — 1 values of x, Oi = 0. In like manner it would follow that a2 = 0, ..., an= 0. But if the coefficients are each zero, f(x) vanishes for every x, so that if f(x) vanishes for more than n values of x, it vanishes for all a'T. Now suppose that a0xn -f aixM— 1 -f ... -fan is to be equal to ftoxˆ-f bixn~ i-f . . . -f bnior all values of x, then the function (a0— b0)xn -f (ai — bi)xn~ !+ . . .-f(an —bn) must vanish for every value of x, and, conse¬ quently, a0 — b„, ai = bi, . . . , an =* bn. Hence two rational integral functions of degree n in x are equal for all values of x, i.e., are identical, when and only when the coefficients of like powers of x are equal. This proposition enables us to solve many problems involving the determination of undetermined coefficients. For example, sup¬ pose it required to find the sum of the squares of the first n integers. Assume the identity

l2 + 22 + . . . + (« — 1)2 + n2~a--bn--cn2--dn*-- enA + .'..,. --q nkt where the coefficients a, b, . . . q are to be determined. Replacing n by n + 1 , we obtain l2 + 22 + . . . + w2 + (rc + l)2 = a + &(w + l) + c(w + l)2 + < f(n + l)3 + + w + l)4 + . • • By subtracting corre¬ sponding members of the identities, there results the identity w2 + 2a + 1 — b--2cn--c--3dn2Jt-3dn + d + 4ew3 + 6e»2 + 4e« + e-- . . . As this relation is. to be valid for every value of n, coefficients of like powers of n must be equal. Hence e~0, j— 0, . . ., 1 — 3 d, 2—3d--2c, l—b + c + d; hence c— d~. Accordingly, i2 + 22 + . . . + (n— l)2 4 -«2 = a + £w + |fr2 + |&3, true for every value of n, hence for n~ 1, and hence a = 0. Therefore l2 + 22 + w2 — \n(n--) (2w + l).

Part-fractions.— The so-called principle of undetermined coefficients has frequent applica¬ tion in the solution of the problem, to decom¬ pose a given fraction into part-fractions (com¬ monly called partial fractions) whose sum shall be the given fraction. Any fraction whose terms are rational integral functions of x may be thus decomposed. The method of procedure may be made sufficiently clear by a few ex¬ amples. It will be observed that the problem is in a sense the inverse of the problem of summing fractions.

2 5

For example, the sum of — > — - x ,

x 3(1— x)

and

• 1

is

x + 4

or

x + 4

3(2 + x)

o 9 , — /, , s- The inverse

2x—x2—x3 x(l — x) (2 + x)

problem is: given the latter fraction, to find its components. It is plain that the only frac¬ tions whose denominators are linear and whose sum is a fraction of the proper denominator

a

and a linear numerator are — , - —

x 1 —x

x+4 a . b

, and

2+x

c

Hence we assume: „ . , , ,

2x— x2 — x3 x 1 — x 2+x

whence x+4=a(l — x) (2+x) +6x(2+x) +cx(l — x), which is to be valid for all values of x. Expand¬ ing the right-hand member and equating corre¬ sponding coefficients on right and left, we obtain : 4=2a, 1 — — a --2b + c, 0 = — a --b — c\ whence a — 2, b = %, e = — f ; and the component frac-

2 5 -1

- b 3 , tions are seen to be

x 3 (1 — x) ’ 3 (2+x)’ 4x2 + 3x-

For

-1

another example, we may take F= . ...

(x— l)2(x + 2)

A little reflection suffices to show that the as¬ p x-1 (x-l)2+x+2)

Then 4x2 + 3x— l=a(x — l)2+6 (x— 1) (x+2) +c (x + 2); equating coefficients and solving the resulting equations, it is found that a= 1, b = 3, c = 2. In case a factor of the given denominator

is repeated k times, as in - - — ~ - the

mx + nk(px + q)

to be made is: given fraction £2 ak i b

assumption

< 7i .

mx--n (wx + »)2 If F is of the form

(mx + «)^ (px + q)'

N ’

then assume F— ax--b

- •

(tnx2 + nx + /)*

(wx2 + Mx + /)^(^x + 5)s(gx + A)’ ax-j-b . ax~\~b ,

«x2 + Hx + i (mx2 + «x + /)2

- • etc., as before. If N is of

degree equal to or higher than that of the given denominator, F is converted by division into an integral function + a fraction the degree of whose denominator exceeds that of its numera¬ tor. The latter fraction is then decomposed by the methods above indicated.

Indeterminate (Undetermined, Evanescent, Illusory) Forms.— In case of a fraction, < p(x) =

it may happen that both terms vanish for some value of x, as x — a, yielding the form which,

as division by zero is meaningless, is itself with¬ out meaning and is commonly called indetermi¬ nate. In such case we are free (logically) to give the form a meaning, any meaning or value wffiatever. But while all meanings (values) are allowable, not all are expedient. For ex-

ample, -1 - — has a definite value for every

x — a

.r-value except x — a. For this value the frac¬ tion takes the form-^-. To this we might assign

the value of 5 or — 3, or any other. But such a choice would be motiveless. On the other hand,

- ○ ^jr + o for all values of x except a;

x — a

for this critical value a, the right member takes a definite value, 2a, which is accordingly sug¬ gested as the value to be naturally assigned to the indeterminate form in this case. The de¬ cisive motive for this choice lies yet deeper : it is that as x varies through a sequence of values, say a + j, a + i, a + &, . . ., having a as limit, the corresponding sequence of fraction-values, 2a + + 2a + i, 2o + &,..., approaches 2 a as limit. Accordingly, if <P(x) assumes the form

— for x = a, the

0

value assigned to

(a) is the

limit value which the sequence of fraction-val¬ ues approaches as x approaches a through any sequence x-values for each of which <p (x*) has a definite value. The fraction <P(x) may be such that as x approaches a, f(x) approaches a definite value other than zero and that F (x)

approaches zero. Such a fraction is - - ^ .

x — a

In such case the fraction-value obviously be¬ comes larger and larger, surpassing ever}' pre¬ scribed number, a fact commonly expressed by saying that as x approaches a, <p (x) approaches positive or negative infinity (ooor — oo) accord¬ ing as the numbers in the fraction sequence are positive or negative. If, as x approaches a, both f(x) and F (x) approach °o , then, for x=a, 0(x) assumes the indeterminate form — .

But it may be made to take the form-^-, since

/(x) = F (x) = (1 -5- F (x))-f- (1 +/ (*)). Other indeterminate forms also reducible to the form

are O.oo , oe, 0, x» - oo , co 0 00 . For further

treatment see Calculus.

The boundary of what is or should be called elementary algebra is ill defined alike in theory and in practice, and besides the topics dealt with in this article other subjects are briefly treated in some of the elementary textbooks. Of such additional subjects, the more important as chance or probability , the complex variable, and theory of numbers, series, and others, are

subjects of special articles in this work. Rela- tiyely meagre, merely introductory, textbooks of algebra are sometimes quite absurdly de¬ scribed in their titles as ˆcomplete,® and others that might be called advanced are improperly characterized as fthigher.® The better usage has appropriated the term higher algebra to the doctrine of invariants and covariants (q.v.).

Bibliography. — Textbooks of elementary algebra, good, bad and indifferent, are very numerous. The most scientific work on the subject is that of Weber and Wellstein : (Ele- mentare Algebra and Analysis./ The most comprehensive elementary English textbook is Chrystal's <Algebra) (2 vols.).

Cassius J. Keyser,

Professor of Mathematics, Columbia Univer¬ sity.

ALGEBRA, History of the Elements of.

Taking the definition of algebra as given in the article under that title (q.v.), the history of the subject goes back to the earl)'- Egyptians. In a certain hieratic papyrus now in the British Museum, copied by one Ahmes (Aahmesu , the moon-born), about 1700 b.c., from a work writ¬ ten some centuries earlier, several traces of al¬ gebra appear. There are symbols for addition, subtraction and equality, and 11 examples of linear equations with one unknown quantity are given. The unknown quantity is called hail, or heap, the first example involving an equation being <(Heap, its seventh, its whole, it makes

• • oc

nineteen® that is, — + x

7

IQ.

A number of

applied problems are also given, and Ahmes shows some familiarity with arithmetic and geometric progression. Such was the stagna¬ tion of the later Egyptians, however, that al¬ gebra never advanced beyond this point, on the banks of the Nile, at least until Greek influence established the famous school of Alexandria.

The Greek mind turned to the science of form rather than to that of number (see Geom¬ etry, History of the Elements of), and con¬ sequently but few evidences of algebra are found in Greece during the golden age of phi¬ losophy. Whenever a need for algebra is met it is always for the solution of some geometric problem, and whenever a solution is effected it is usually by some device involving geometry. One of the earliest evidences of an algebraic symbolism is seen in a problem of Aristotle's, in which he represents quantities by means of letters, letting A stand for the moving force, B for that by which it is moved, r for the dis¬ tance, A for the time, and so on. About the same time Hippocrates (q.v.) called for the square of a number dvva/ug- (power), from which the Latins derived the name potentia, which appears in our language as power. Euclid (q.v.), c. 300 b.c., proved geometrically certain fundamental laws of algebra, such as a (b + c) = ab + ac, (a + b)2ˆ a2+ 2 ab+b2, (a — b)2=a2 — 2ab + b2, and (a + b) (a — b) — a2 — b2. The equation of the second degree was also known to the Greeks, and they were able to solve the general case by the aid of proportion. Archimedes (q.v.) is even said to have solved one case of the cubic, and he un¬ doubtedly knew a considerable amount about series.

It was not however, until the time of Diophantus (q.v.), c. 300 a.d., that Greek alge¬

bra attained any standing as a separate science. This great mathematical genius improved the symbolism, divorced the subject from geometry, and created the ancient science of indeterminate equations, a science called in his honor wDio- phantine Analysis.®

For reasons above suggested, algebra flour¬ ished more naturally in

the Orient than in Greece. The first Hindu algebraist of any im¬ portance was Aryabhata, who was born at Pa- taliputra, on the Upper Ganges, in 476 a.d. Part of his ((Aryabhatiya)) is devoted to al¬ gebra, and covers the fundamental operations, rules for square and cube roots, progressions, permutations, equations of the first and second degrees with one unknown quantity, and some treatment of indeterminate equations. Aryab¬ hata differs from Diophantus in that he con¬ siders algebra from a broader standpoint, treating it rather as a theory of elementary functions than as the science of a particular form of the equation.

The next great algebraist in the East was A1 Khowarazmi (q.v.), c. 800 a.d., so called from his birthplace, Kharazm, the territory of the modern Khiva. With him algebra takes a still different meaning. It is no longer the theory of indeterminate equations of Diophan¬ tus, nor is it chiefly the theory of elementary functions of Aryabhata, but it becomes pri¬ marily the general theory of equations. Indeed, the title of his work (ilm al-jabr wa' 1 muqa- balah,} means the science of redintegration and equation, a title from which only the words al- jabr have survived, giving the accidental name of algebra to the subject. A1 Khowarazmi solved three types of the quadratic, in modern symbolism x2Jrax—b, x2 — ax — b, x2 + b — ax, thus showing his inability to generalize, a failing with ah writers before the 17th century.

It was two centuries before another writer of prominence appeared. About 1010 a.d., A1 Karchi, like A1 Khowarazmi of the Bagdad school, wrote a treatise in which he shows fa¬ miliarity with the works of his predecessors rather than great genius himself. Like many of the older writers, he gives attention to those rules for approximating roots, so necessary be¬ fore the time of decimal fractions. Stated in modern symbolism his rule for square root is

V u = TC-f - , where w is in the neighborhood of

2w + 1

Va; that is, V 10t = 3 + -f* / = whence V 10

6 + 1

was often used for x . He also gives the rule

V a--b ± ⁄4ab = Va — V G and a rule iorln3.

In the 12th century two Oriental writers of prominence appear, Omar

Khayyam (q.v.), the Persian, who died in 1123, and Bhaskara, the Hindu, who was born in 1114. Omar solved one case of the cubic, and was the first to treat equations above the second degree in a syste¬ matic manner. The binomial theorem with positive integral exponents was also known to him. His algebra, published in Paris, both in Arabic and in French, made Omar known in the West as an algebraist some time before FitzGerald made him celebrated as a poet.

Bhaskara wrote on both arithmetic and alge¬ bra, and his work has long been known in Europe through Colebrook's English transla-

tion. Among the features of his algebra is the

statement that — = oo, and the solution of the o

quadratic by the reduction of ax 2 + bx -p c = 0 to the form (2ax + b)* — — 4 ac + b2, a device known in England as the Hindu Method.

The rise of modern elementary algebra took place in Italy in the 16th century. It was at this time that the cubic was solved by Tartaglia (q.v.), the publication being made by Cardan (q.v.) in his Ars Magna in 1545. The solution of the quartic soon followed, after which the quintic occupied the attention of algebraists until its solution was proved to be impossible by the operations of elementary algebra, in the 19th century. A common name for algebra at this time was ((L'arte maggiore® (the greater art, whence the Latin title of Cardan's treatise), arithmetic being called by contrast (<L'arte mc- nore® (the lesser art). The unknown quantity was called, in Latin, res, whence the Italian translation cosa (thing). On this account the science was called the Coss in the early Ger¬ man schools, and the name ((Cossic Art® was not uncommon among the English writers of about 1600. The mere processes and solutions of elementary algebra were fairly perfected by the close of the 16th century, and little besides the symbolism was needed to make the sub¬ ject what it is to-day.

The title of Father of Modern Elementary Algebra is frequently given to Victa (q.v.). He was the first to devise a systematic and fairly satisfactory scheme of literal notation, using vowels for the unknown quantities and con¬ sonants for the knowns. For example, he used A where we use x, Aq (A quadratics) for our x2, Ac for xs, Aqq for x *, and so on. He also recognized that a letter may represent both a positive and a negative number, and both an integer and a fraction, a generalization not rec¬ ognized by his predecessors, and one that was perfected later by Descartes. Vieta was also the first to recognize the advantage of making the second member zero in considering an equa¬ tion. His work greatly influenced the English algebra as set forth by Harriot (q.v.), who ac¬ knowledged his indebtedness to him. Mention should also be made of the work of Clavius, who did much to meet the demand for a usable textbook at this period.

The final touch was put upon the elementary science by Descartes (q.v.), who suggested and used our modern literal notation, and who per¬ fected the generalizations begun by Vieta. His introduction of the graphic treatment of equa¬ tions not only revolutionized mathematics in general, but materially assisted in the under¬ standing of the elements.

Since Descartes's time there have been certain improvements in the

symbolism of ele¬ mentary algebra, the theory of approximate solutions of numerical higher equations has been created, chiefly through the efforts of Newton, Euler and Horner (qq.v.), the bi¬ nomial theorem has been generalized for nega¬ tive and fractional exponents, principally by the labors of Newton, the theory and the sym¬ bolism of determinants (q.v.) have been de¬ veloped, the various number systems met in algebra (notably the complex number system) have been placed upon a scientific basis, and in general the foundation theories of the science have been greatly strengthened.

Bibliography. — Eisenlohr, (Ein mathema- tisches Handbuch der alten EgypteU (Leipzig 1877) ; Heath, <Diophantos) (Cambridge 1885) ; Matthiessen, (Grundziige der antiken und mod- ernen Algebra der litteralen Gleichungen' (Leipzig 1878) ; Cantor, (Geschichte der Mathematiks) (Leipzig 1880-98, various edi¬ tions) ; Cajori, F., (History of Mathematics'* (New York 1893).

David Eugene Smith,

Professor of Mathematics, Teachers College, Columbia University, New York.

ALGECIRAS, al'ja-se'ras, or al'ha-the'ras, a seaport of Spain, on the west side of the Bay of Algeciras and on the left bank of the Miel, the mouth of which forms the harbor. Lying only six miles west of Gibraltar (easily reached by ferry, etc.), it has become a winter resort, much appreciated by British and Ameri¬ can visitors, as well as by wealthy Spaniards, on account of delightful gardens, bathing- beach, etc. From this town large quantities of cork are exported; also grain, leather, stone, charcoal, etc. History deals first with the much older town, vestiges of which lie to the south¬ west beyond the river and railway. Old Alge¬ ciras, then, was founded by the Moors in 713, two years after their first invasion of the pen¬ insula; and the original form of the name is Moorish (al-Gezira al-Khadra, signifying ((green island®). Taken from the Moors by Alfonso XI in 1344, the old town was recap¬ tured by Mohammed V of Granada 24 years afterward and almost entirely destroyed. In the comparatively modern town (colonized by the Spaniards who left Gibraltar in 1704) the Casa Consistorial was the scene of the Morocco conference, 17 Jan.-7 April 1906. See Morocco, History.

ALGER, Cyrus, an American inventor: b. West Bridgewater, Mass., 11 Nov. 1781; d. Boston, 4 Feb. 1856. He learned the iron foun¬ dry business, and in 1809 established himself in South Boston, where he soon made himself widely known by the excellence of the ord¬ nance

he manufactured. He supplied the United States government with a large quan¬ tity of cannon balls during the War of 1812; produced the first gun ever rifled in America, as well as the first perfect bronze cannon; and supervised the casting of a mortar which was the largest gun of cast-iron that had then been made in the United States. Subsequently he made improvements in the construction of time fuses for bomb-shells and grenades; patented a method of making cast-iron chilled rolls; and was the original designer of the cylinder stove.

ALGER, Horatio, an American writer of juvenile books: b. Revere, Mass., 13 Jan. 1834; d. Natick, Mass., 18 July 1899. He was grad¬ uated at Harvard in 1852, settled in New York in 1866 and became interested in the condition of self-supporting boys, described in his series of more than 50 books, including (Ragged Dick,) (Tattered TomP (Luck and Pluck, }

which became very popular. Other works: (Nothing to Do: A Tilt at Our Best Society, > a poem (1857) ; (Helen Ford,* a novel (1860) ; a . series of juvenile biographies of Webster, Lincoln, Garfield, etc.; and (The Young Sales¬ man J (1896),

ALGER, Russell Alexander, an Ameri¬ can merchant, capitalist and politician : b. La¬ fayette, Ohio, 27 Feb. 1836; d. Washington, D. C., 24 Jan. 1907. He served in the Civil War, rising from a captaincy to the rank of brevet major-general of volunteers. He was gover¬ nor of Michigan from 1885 to 1887 ; a candi¬ date for the Republican presidential nomination in 1888; commander-in-chief of the Grand Army of the Republic (1889-90); and became Secretary of War in President McKinley's Cab¬ inet in 1897. Almost from the beginning of the Spanish-American War of 1898, he was the ob¬ ject of much public censure for alleged short¬ comings in the various bureaus in his depart¬ ment, and this pressure became so strong and widespread that he resigned his office in 1899 after an investigation committee had exoner¬ ated him. From 27 Sept. 1902 till his death he was senator from Michigan. In 1901 he pub¬ lished (The Spanish-American War.*

ALGER, William Rounseville, Unitarian clergyman : b. Freetown, Mass., 30 Dec. 1822; d. Boston, Mass., 7 Feb. 1905. He was grad¬ uated at the Harvard Theological School 1847; filled pastorates in Roxbury, Mass. ; Boston, New York, Denver, Chicago, Portland, Me. Works: (Poetry of the Orient *(1856) ; Criti¬ cal History of the Doctrine*

of a Future Life) (1861) ; (Genius of Solitude) (1861) ; friend¬ ships of Women (1867); fife of Edwin Forrest *(2 vols., 1878) ; (Symbolic History of the Cross* (1881).

ALGERIA, a French colony in north Africa, situated between lat. 30° and 37° N. and long. 2° 10' W. and 8° 50' E., having on the north the Mediterranean, on the east Tunis, on the west Morocco and on the south (where the boundary is ill-defined) the Desert of Sahara; area 184,474 square miles, or including the Al¬ gerian Sahara, 343,500. The country has been organized in two great divisions: Northern Al¬ geria, consisting of the three departments — Algiers, Oran and Constantine, containing 17 arrondissements and 269 communes, 74 of which are mixed; and Southern Algeria, consisting of the four territories of Ain Sefra, Ghardaia, Touggout and the Saharan Oases, organized under decree of 14 Aug. 1905. They con¬ tain five mixed and seven native communes. The coast line is about 550 miles in length, steep and rocky, and though the indenta¬ tions are numerous the harbors are much exposed to the north wind. The country is traversed by the Atlas Mountains, two chains of which — the Great Atlas, border¬ ing on the Sahara, and the Little, or Maritime, Atlas between it and the sea — run parallel to the coast, the former attaining in Mount Shelia, its loftiest peak, a height of 7,611 feet. The intervals are filled with lower ranges, and numerous traverse ranges connect the prin¬ cipal ones and run from them to the coast, forming elevated table lands and enclosed val¬ leys. The rivers are numerous, but many of them are mere torrents rising in the mountains near the coast. The Shelif is much the largest. Some of the rivers are largely used for irrigation, and artesian wells have been sunk in some places ‘for the same purpose. There are, both on the coast and in the interior, extensive salt lakes or marshes (shotts) which dry up to a great extent in sum¬

mer. The country bordering on the coast, called the Tell, is generally hilly, with fertile valleys; in some places a fiat and fertile plain extends between the hills and the sea. In the east there are shotts that sink below the sea- level, and into these it has been proposed to in¬ troduce the waters of the Mediterranean. The climate varies considerably according to eleva¬ tion and local peculiarities. There are three seasons; winter from November to February, spring from March to June and summer from July to October. Rain falls plentifully from December to March. The summer is very hot and dry and the sirocco, or hot desert wind, often blows. In many parts of the coast the temperature is moderate and the climate so healthy that Algeria is now a winter resort for invalids. Agriculture is carried on chiefly in fcthe small but fertile area near the coast, known as the Tell, mainly

owned by the Europeans, and artificially irrigated.

Products. — The chief products are wheat, barley and oats, tobacco, cotton, wine, silk and dates. Early - vegetables, especially potatoes, asparagus and peas, are exported to France and England. A fibre called alfa, a variety of Esparto, which grows wild on the high plateaus, is exported in large quantities. The forest area is estimated at 6,559,490 acres, belonging prin¬ cipally to the state and the communes. Much of it is brushwood, but in the Tell Atlas grow various sorts of pines and oaks, ash, cedar, myrtle, pistachio nut and the cork-oak, cover¬ ing 645,000 acres and furnishing large quanti¬ ties of cork for exporting. Portions of the area are also leased for tillage and for pastur¬ age for cattle, sheep, horses and pigs intro¬ duced by the French. Wild animals are not nu¬ merous, the lion and ostrich having been ex¬ terminated, but hyenas and jackals, a species of ape and occasionally camels are to be found. Algeria possesses valuable minerals, including iron, copper, lead, sulphur, zinc, antimony, mar¬ ble (white and red), phosphate, petroleum and mercury.

Trade. — The trade of Algeria has greatly increased under French rule, France, Spain, England and Germany being the countries with which it is principally carried on, and three- fourths of the whole being with France. In 1909 the exports amounted to $64,845,000, the imports to $90,950,000; in 1913 exports had in¬ creased to $102,100,000 and imports to $133,500,- 000. The exports, besides those mentioned above, are wine, olive oil, raw hides, wood, wool, tobacco, oranges and other fruits, etc. ; the im¬ ports are manufactured goods, cottons, woolens, machinery, clothing, coal, coffee, etc. French money, weights and measures are generally used. The chief towns are Algiers, Oran, Con¬ stantine, Bone, Philippeville and Tlemcen.

Industries. — The wine business constitutes the largest industry in Algeria, the yield in 1913 being 163,476,236 gallons. The production of olive oil is also important as well as the culti¬ vation of oranges, dates and other fruits, silk, tobacco, flax and cotton. Alfa and the dwarf palm are largely worked in the plains. The number of the population engaged in agricul¬ ture in 1909 was 322,520, of whom 213,756 were Europeans. The chief crops are wheat, barley and oats. The northern portion of Algeria is better adapted to grazing and forestry. There are extensive fisheries, $1,028,050 worth of fish

having been caught in 1912. In 1913, 96 mines were being worked, there were 2,793 miles of railway and 8,977 miles of telegraph line. In 1914, 3,741 vessels entered and 4,595 vessels cleared at Algerian ports. National roads have a length of 1,826 miles.

Population. — The two principal races in¬ habiting Algeria are Arabs and Berbers. The former are mostly nomads, dwelling in tents and wandering from place to place, though a large number of them are settled in the Tell, where they carry on agriculture and have formed numerous villages. The Berbers, of whom the Kabyles are a part, are the original inhabitants of the territory and still form a con¬ siderable part of the population. They speak the Berber language, but use the Arabic char¬ acters in writing. The inhabitants of the towns, are largely so-called Moors, and the Jews form a small but influential part of the population. Various other races also exist. Except the Jews all the native races are Mohammedans. There are now a considerable number of French and other colonists, provision being made for granting them concessions of land on certain conditions. In 1906 there were 449,420 colonists of French origin in Algeria, 117,475 Spaniards, 33,153 Italians, 17,849 other foreign¬ ers and 64,645 naturalized Jews. The total pop¬ ulation in 1911, including military forces, was 5,563,828, of whom 795,522 were Europeans and 4,768,306 natives. In 1914 the number of troops was estimated at 63,827.

Government. — Algeria is governed by a governor-general, who is assisted by a consul¬ tative council and the superior council, com¬ posed of elected members and high officials. There are also three financial delegations who vote upon the budget. The three departments of Algiers, Constantine and Oran each send two deputies and one senator to the French Chambers, which alone have the right of legis¬ lating for Algeria. Since 1901 the budget has been distinct from that of France, but the ex¬ penses of the departments of War and Marine and guarantees of interest on railways are still borne by the mother country. In 1914 the budget estimate for northern Algeria was : Rev¬ enue, 171,364,550 francs ($34,272,910) ; expendi¬ ture, 171,325,658 francs ($34,265,131) ; for southern territories: Revenue, 5,060,52 2 francs ($1,012,104) ; expenditure, 5,029,423 francs ($1,-

005,884).

Justice. — Justice is administered by 16 courts of first instance, justices of the peace, commercial courts and a court of appeals. There are special tribunals for the natives.

History. — Down to the time of the Turkish dominion Algeria was

historically inseparable from Tunisia and Morocco. Under the Romans it was included in the provinces of Numidia and East Mauritania and enjoyed great pros¬ perity until the Vandal conquest in 440 a.d. Oriental civilization was introduced upon the conquest by the Arabs in the 7th and 8th centuries. After the expul¬ sion of the Moors from Spain they es¬ tablished themselves in Algeria, and dur¬ ing the struggle which ensued between the aid of the Turkish corsair Horuk, known as Barbarossa, who declared himself Sultan of Algiers. His brother Khair-ed-Din, also known as Barbarossa, placed the country un¬

der the suzernaity of the Turkish Sultan, which was, however, later shaken off. A piratical state was established (see Barbary and Bar¬ bary Powers), and the Barbary corsairs, or Algerian pirates, as they were called, became the terror of the Christian nations, who 14 times besieged Algiers in vain, and some of whom were finally reduced to paying tribute to protect their commerce. A check to the depre¬ dations of the pirates was administered by a United States squadron under Decatur in 1815, but they did not finally cease until the conquest of Algeria by the French, begun in 1830, to avenge an insult to the French consul. Algiers was captured by Marshal Bourmont 5 July 1830 and after several years of warfare the bases were laid down of the political and ad¬ ministrative organization of the French posses¬ sions, consisting of six coast towns. The city of Constantine was captured in 1837, but resist¬ ance to the French had already been organized by the Emir Abd-el-Kader, and was waged with varying success until December 1847, when the Emir surrendered to General Lamoriciere at Sidi-Brahim. The French conquest was then assured, although Great Kabylia was not sub¬ dued until 10 years later, when the French pos¬ sessions were extended to the Sahara desert. Frequent insurrections had to be quelled later, the most serious being in 1870-71. French oc¬ cupation of the Algerian Sahara started in 1890, and was accomplished in 1901 by the oc¬ cupation of the Tuat and Tidikelt oases. Under the third republic Algeria has developed rap¬ idly, politically and industrially. The civil ter¬ ritory has been greatly increased at the expense of the military; railroads and excellent roads have been built, schools have multiplied. In 1913 there were 22 schools for secondary in¬ struction, with 6,686 pupils; 1,268 primary and infant schools, including 226 Mussulman schools, with 145,933 pupils ; 4 normal schools for men teachers, with 110 students; 6 normal schools for women teachers, with 218 students; higher Mussulman schools are established at Algiers, Tlemcen and Constantine, and an in¬ stitution for higher instruction at Algiers. In 1912 Tunisia, Algeria and Morocco were again united under French

dominion.

Bibliography. — Bibliography compiled by Playfair (London 1888) ; ib., (The Scourge of Christendom5 (London 1884) ; Leroy-Beaulieu, (L'Algerie at la Tunisie) (2d ed., Paris 1897) ; Wilkin, (Among the Berbers of Algeria5 (Lon¬ don 1900) ; Bernard, (La Penetration Sahari- enne5 (Algiers 1906) ; Laurie, (French Con¬ quest of Algeria5 (London 1909) ; Devereux,

{ Aspects of Algeria: Historical, Political, Colo¬ nial5 (London 1912) ; Stanford, (About Al¬ geria5 (New York 1913) ; Stott, (The Real Al¬ geria5 (London 1914). Guide Books. — (Cook's Practical Guide to Algiers, Algeria and Tu¬ nisia5 (London 1904); (Guide Joanne: Algerie et Tunisie5 (Paris 1909).

ALGERINE WAR. See Barbary Powers, U. S. Treaties and Wars with the.

ALGHERO, al-ga'ro-, or ALGHERI, Sar¬ dinia, a fortified town and seaport on the west side of the island in the province of Sassari, and 17 miles* southwest of the town of that name. The port is not good, but seven miles west of it is Porto Conte, the best harbor in the island. The town is the seat of a bishop and

possesses a handsome cathedral. The inhabi¬ tants are mainly employed in wine-growing and coral-fishing, and calcium mines are op¬ erated. Pop. 12,000.

ALGIERS, iil-jerz (French, Alger), Al¬ geria, a city and seaport on the Mediterranean, capital of the French colony of Algeria, situ¬ ated on the west side of the Bay of Algiers. It stands on the slope of a hill facing the sea, from which its array of white houses, rising in the form of an amphitheatre, presents an im¬ posing appearance. The old town, which is the higher, has an Oriental aspect. Its crowning point is the Casbah, or ancient fortress of the deys, about 500 feet above the sea. Its streets are narrow, crooked and dirty. The houses are strong, prison-like edifices, with iron-grated slits for windows, looking into central quadrangles entered by a low doorway. The modern town, which occupies the lower slope and spreads along the shore, is handsomely built, with broad streets adorned with arcades and having elegant squares. It contains the government buildings, the barracks, the commercial warehouses, the residences of the governor-general

and the gov¬ ernment officials, and the superior courts of justice. The Ylace du Gouvernement and the Place Bresson here are the two chief squares of the city. The fine Boulevard de la Republique runs along the sea-front, overlooking the bay and harbor. Algiers was the Icosium colony of the ancient Roman empire and has a varied his¬ tory. It is the seat of an archbishop, and has a cathedral and a number of churches (includ¬ ing an English church) and mosques. There are schools of law, medicine, science and letters, and a lyceum ; also a library and museum. It is defended by sea-batteries and other works, and is an important naval station, prominent as a base for Mediterranean operations during the European War. The French at great expense improved the port and provided docks. Pop.

172,400.

ALGOA BAY, al-go'a, Africa, a bay on the southeast coast of Cape Colony, about 420 miles east of the Cape of Good Hope. At its entrance, formed by Cape Woody on the north¬ east and Cape Recife on the southwest, it has a width of 33 miles. Its shelter is very valu¬ able, as there is no other refuge for ships dur¬ ing the northwest gales. The usual anchorage is off Port Elizabeth, at the mouth of the Baakens, where there is now a large and in¬ creasing trade.

ALGOL, al'gol, a star in the constellation Persus (head of Medusa), remarkable as a va¬ riable star, changing in brightness from the second to the fourth magnitude.

ALGOMA, a district of Canada, on the north side of Lake Superior, forming the north¬ west portion of Ontario, rich in silver, copper, iron, etc.

ALGONA, Iowa, city and county-seat of Kossuth County, on the Iowa Cent., Chicago & N. W., and Chicago, M. & St. P. railways, about 123 miles north by west of Des Moines, on a branch of the Des Moines River. The city has four banks, handsome public buildings and flourishing manufactures of foundry and ma¬ chine-shop products, wooden-ware, bricks and tiles. Pop. (1920) 3,721.

ALGONKIAN SYSTEM, the name given in the United States to a great series of rocks that succeeds the basal system of the Archean and is overlaid by the strata of the Paleozoic systems. In the Lake Superior region, the sys¬ tem is divided into Lower, Middle and Upper Huronian, and Keweenawan. The rocks of the Algonkian are developed on an enormous scale around the upper Great Lakes, where they comprise limestones, sandstones, quartzites, shales, slates and

schists, all more or less dis¬ turbed and bearing evidence of having been subjected to metamorphism. They also include dikes and beds of igneous rocks. They contain the famous iron ore bodies of the Marquette, Mesabi and other ranges, the Michigan copper deposits, the copper and nickle of Sudbury, and much of the rich silver ore of the Cobalt dis¬ trict. Algonkian rocks are also known at many points in the Rocky Mountains, and sediments believed to be of equivalent age are known in Europe and other continents. The period was marked by extensive volcanism, particularly in the Keweenawan epoch, when lava flow after lava flow succeeded one another, to enormous thicknesses. At least two periods of folding also took place, one of them of mountain-making magnitude. The presence of striated bowlders in conglomerates of Lower Huronian age in Canada has led many to believe that glaciation occurred during the early Algonkian. A few fossil remains have been found in rocks of very late Algonkian age, but little is known as to the life conditions during the period.

ALGONQUIAN, or ALGONKIAN, STOCK, a North American group once com¬ prising 40 or more separate languages, and embracing a larger area than any other on the continent, stretching in a solid block from Lab¬ rador to the Rockies and from Hudson Bay to Pamlico Sound and the Cumberland River at least, except the enclaves of Iroquois in and around New York State, and of Beothukan in Newfoundland. Outlying tribes were the Shaw¬ nee or Shawano to the south ; and to the west the Cheyenne and Arapahoe, which clove their way through the heart of the Sioux across the Missouri and into the Black Hills region, and later to Colorado and Wyoming, their advance westward being checked by the Shoshone group. They numbered' several hundred tribes, or ˆvillages,® entirely independent ; many, in which several such villages were grouped together ; and several confederacies of tribes united in a loose bond for mutual aggression or defense, though never with any real central government. The chief confederacies were the Abnaki or Abenaki of Maine and New Brunswick; the Pennacook of New Hampshire and the ad¬ jacent parts of Maine and Massachusetts; the Powhatan of Virginia and Maryland; the Illinois or Illini of that region and adjacent Wisconsin, Iowa and Missouri; the Siksika (Blackfeet, etc.) of northern Montana and adjacent Canada; the Cheyenne and Arapahoe, already mentioned; and the Sac and Fox, first at the mouth of the Ottawa, then in northern Wisconsin. (See each title). Of the individual tribes, the most important remaining were the Micmac, Amalecite, Massachusetts, Wampa- noag, Narraganset, Nipmuc, Pequot, Mohegan, Mohican, Metoac and Wappinger on the North Atlantic coast ; Munsi, Leni-Lenape or Dela-

ware, Shawano, Nanticoke, Conoy, Mattamus- keet, on the South Atlantic coast; Nascapi, Montagnais, Algonquin, Ottawa, Muskegon, Cree, Ojibwa, Misisaga, Miami, Piankishaw, Kickapoo, Pottawotomi, Menomini, in the in¬ terior; and Atsina in the West. Tradition places the original home of all these tribes on the North Atlantic coast.

From their being the first to come in contact with the English settlers in Canada, New Eng¬ land, New York, New Jersey and Virginia, and the history of English settlement for two cen¬ turies being a steady record of fierce conflict with and bloody reprisals from and on them, more is known of their minor names and those of their great chiefs — Powhatan, Opechancan- ough, Philip, Pontiac, Tecumseh, Black Hawk, etc. — than of any others except the Iroquois, and their languages are better studied.

Constant wars with the English, French and Dutch colonists depleted their numbers. Filled at first with the idea of freeing the soil from the whites, they afterward degenerated into mere mercenaries, fighting on either side for revenge or gain. After the War of 1812, in which they took the side of the British, the United States government resolved to send them as far west as possible. After 1840 few of them remained east of the Mississippi. In Canada they were not removed from their homes, but were limited as to territory. War and disease have thinned their number until only about 43,000 remain in the United States, and 38,000 in Canada; there are a few hundred refugees in Mexico. (See Indians). Consult Michelson, Truman ˆClassification of Algon- quian Tribes® in (Twenty-eighth Annual Re¬ port of the Bureau of American Ethnology.

ALGONQUIN (properly ALGOMEKIN,

<(othersiders®), a once powerful Indian tribe along the Ottawa River and Lake Nipissing, Canada. Decimated by the Iroquois, some of them with other Indian waifs took refuge along the Upper Lakes and assumed the name of Ottawas (q.v.), bringing forth the greatest Indian of history, the mighty Pontiac (q.v.) ; others kept their name and were protected by the French in mission villages. It was French missionaries who discovered almost at their first coming that the Algonquin language was a type common to what is now called the Algon- quian stock. The chief body of the remaining tribe numbers nearly 1,000, in villages of Que¬ bec and Ontario ; about 250 more are confed¬ erated

with the Iroquois at Gibson, Ont., and Lake of Two Mountains, Que.

ALHAMA, al-a'ma, Spain, a town on the Motril, 25 miles southwest of the town of Granada. This place is celebrated for its warm medicinal (sulphur) baths and drinking-waters, and also for its romantic situation between craggy mountains. The principal bath was a Moorish edifice, the smaller was circular in form and probably a Roman erection. The town was thrown completely into ruins by an earth¬ quake shock in 1884. Washington Irving, in his Chronicle of Granda,* gives a spirited account of the taking of Alhama, <(the key of Granada,® from the Moors, by Rodrigo Ponce de Leon, Marquis of Cadiz, in February 1482.

ALHAMBRA (Kelat-al-hamrah , the red castle), the citadel of Granada when that city was one of the principal seats of the empire of

the Moors in Spain. The wall which sur¬ rounded it still stands flanked by many towers, and has a circuit of two and one-fourth miles. Within it were included several important buildings, besides dwelling-houses; but the building to which the celebrity of the site is due is the Alcazar, or royal palace of the kings of Granada, seated on the northern brow of a lofty eminence which commands a full view of the city of Granada, and, beyond it, of a charming country, bounded in the distance by a line of hills. It is a place equally interesting to the artist, the antiquarian and the historian. The erection of the greater part of the present building seems to have occupied almost the whole of the first half of the 14th century. It consists mainly of two oblong rectangular courts, the one (which was seriously damaged, if not ruined, by fire in Sep¬ tember 1890), called the court of the Fish-pond or of the Myrtles, 138 by 74 feet, and terminat¬ ing at its northern end in an apartment 35 feet square, richly ornamented; the other, called the Court of the Lions, 115 by 66 feet, and so named from the white marble fountain in the centre supported by 12 lions. An exact repetition of this court, on two>thirds of the scale of the original, was made by Mr. Owen Jones in the Crystal Palace. It is surrounded by an arcade, with small pavilions at each end, consisting of 128 columns supporting arches of the most delicate and elaborate finish, still very perfect and retaining much of their original beauty. From the character of many of the arches in various portions of the palace they are most appropriately called stalactitic. They are formed on a peculiar system with plaster bricks of various forms in a manner universally adopted in the buildings of the Moors. The construction of the arches is remarkable for its simplicity. Over the columns, which are of white marble, and which were probably gilded, are brick piers carrying rough brick arches ; above these tiles are placed diagonally,

forming diamond-shaped pen work, running through the thickness of the walls, and a brest-summer of timber supporting the weight above. To these rough arches are attached the various enrichments, and against the tiles are placed the perforated plaster ornaments which give a singularly light appearance to the arches, and create beautiful effects from the rays of light cast through the openings on the wall behind them. Consult Calvert, (Granada and The Al¬ hambra* (1900).

ALHAMBRA, Cal., city in Los Angeles County, 10 miles east of Los Angeles, on the Santa Fe, Southern Pacific and other railroads. It is a residential city with few industries. Here are located the Agnes Hill-Runkle School of Music and the San Gabriel Church, founded by the Franciscans in 1771. A religious play, similar in many respects to the Passion Play at Oberammergau, is regularly produced here. Pop. (1920) 9,096.

ALHAMBRA, Order of the, a Catholic

social society or fraternity organized in Brooklyn, N. Y., in 1905. None but practical Catholics are admitted to membership, and to this end only third degree Knights of Colum¬ bus, in good standing in that order, were made eligible. The purposes of the order are the promotion of such social and intellectual inter-

ALHAMBRA, SPAIN

r ' V-

awsR

p*fwSr3

w

1 Angle in the Hall of Justice 2 Corner in the Hall of the Abencerrags

ALHAMBRA

Copyrighted by Underwood & Uuderwood, N. Y.

2 Court of Myrtles, Alhambra

1 The Alhambra at Granada, Spain

course among its members as shall be desirable and proper and the establishment of a fund for the preservation of American Catholic his¬ torical places. The governing body of the order is the Supreme Divan, composed of the six original incorporators, the supreme officers, and the grand commander and one representa¬ tive from each caravan, as the subordinate bodies are called. The Supreme Divan meets biennially in different cities, for the election of a supreme commander, vice-supreme com¬ mander, supreme scribe, supreme chamberlain, supreme captain of the bodyguard, etc. Cara¬ vans must hold at least four meetings a year in their local alcazar. The emblem of the order is the red tower of Castile surmounting the Crescent of the Saracen, typifying the triumph of Christianity over Mohammedanism. The order now has caravans in Brooklyn, N. Y. ; Can¬ ton, Ohio ; Boston, Mass. ; Wilkes Barre, Pa. ; Augusta, Ga. ; Middletown, Conn.; Newark, N. J.; Jersey City, N. J. ; Chicago, Ill.; Cincinnati, Ohio; New York, N. Y. ; Washington, D. C. ; Albany, N. Y. ; New Haven, Conn.; Stamford, Conn.; Baltimore, Md. ; Toledo, Ohio; San Francisco, Cal.; Elmira, N. Y. ; Butte, Mont.; Portland, Ore. ; Empire, Panama Canal Zone and Milwaukee, Wis.

ALHAMBRA, The, by Washington Irving (1832. Revised, enlarged, and rearranged, 1852). This Spanish Sketch-Book grew out of the experiences and studies of Irving while an actual resident in the old royal palace of the Moors at Granada. Many of the 40 sketches have their foundation only in the author’s fancy, but others are veritable history.

ALI, a'le, cousin and son-in-law of Mo¬ hammed, the first of his converts, and the bravest and most faithful of his adherents; b. 602; d. 661. He married Fatima, the daughter of the prophet, but after the death of Moham¬ med (632) his claims to the caliphate were set aside in favor successively of Abu-Bekr, Omar and Othman. On the assassination of Othman, in 656 a.d., he became caliph, and after a series of struggles with his opponents, including Aye- sha, widow of Mohammed, finally lost his life by assassination at Kufa. A Mohammedan schism arose after his death, and has produced two sects. One sect, called the Shiites, put Ali on a level with Mohammed, and do not ac¬ knowledge the three caliphs who preceded Ali. They are regarded as heretics by the other sect, called Sunnites. The Maxims and Hymns of Ali are yet extant. See Caliph.

ALI, pasha of Yanina, commonly styled Ali Pasha, a bold and able, but ferocious and utterly unscrupulous, Albanian : b. 1741, son of an

Albanian chief who was deprived of his ter¬ ritories by rapacious neighbors. By his enter¬ prise and success and entire want of scruple he got possession of more than his father had lost, making himself master of a large part of Al¬ bania, including Yanina, which the Porte sanc¬ tioned his holding, with the title of pasha. As a ruler he displayed excellent qualities, putting an end to brigandage and anarchy, making roads, and encouraging commerce. He_ ex¬ tended his sway by subduing the brave Suliotes of Epirus, whom he conquered in 1803 after a three years' war. Aiming at independent sover¬ eignty, he intrigued alternately with England, France and Russia. Latterly he was almost

independent of the Porte, which at length de¬ termined to put an end to his power ; and in 1820 Sultan Mahmoud pronounced his deposi¬ tion. Ali resisted several pashas who were sent to carry out this decision, only surrendering at last in 1822 on receiving assurances that life and property should be granted him. Faith was not kept with him, however; he was killed and his head cut off and conveyed to Constantinople, while his treasures were seized by the Porte.

ALI BABA, the principal figure in the famous (Arabian Nights' Entertainments) tale of (Ali Baba and the Forty Thieves.-* He over¬ hears the thieves opening the door of their cavern by the use of the magic words (<Open sesame. ® He does the same in their absence and appropriates as much of their wealth as he can carry. Cassim, his brother, enters the cave later, but having forgotten the magic word is presently found by the robbers and killed. They make an attempt to slay Ali Baba, but are defeated by the slave Morgiana, who pours boil¬ ing oil in the jars in which the robbers are hidden.

ALI BEY, Egyptian ruler : b. in the Cau¬ casus in 1728, was taken to Cairo and sold as a slave, but having entered the force of the Mamelukes and attained the first dignity among them, he succeeded in making himself virtually governor of Egypt. He now refused the cus¬ tomary tribute to the Porte and coined money in his own name. In 1769 he took advantage of a war in which the Porte was then engaged with Russia, to endeavor to add Syria and Palestine to his Egyptian dominion, and in this he had almost succeeded when the defection of his own adopted son Mohammed Bey drove him from Egypt. Joining his ally Sheikh Daher in Syria, he still pursued his plans of conquest with remarkable success, till in 1773 he was induced to make the attempt to recover Egypt with insufficient means. In a battle near Cairo his army was completely defeated and he himself taken prisoner, dying a few days afterward either of his wounds or by poison.

ALI FERROUGH BEY, a'le-fer'ro-ba', Turkish diplomatist: b. Constantinople 1865. After serving as secretary of embassy at Paris, London and Bucharest, as well as councillor of embassy at St. Petersburg, he was promoted to the post of minister-plenipotentiary and envoy- extraordinary to the United States. Besides histories of Arabia and Turkey he has pub¬ lished (Public and Private International LawP In 1901 he was recalled from his post at Wash¬ ington.

ALIAGA, a'le-a'ga, Philippines, town of Luzon, province of Nueva Ec.ija, 70 miles north¬ west of Manila. Situated in a fertile valley between the Pampanga Chico and the Pam- panga Grande rivers ; the inhabitants engage in the cultivation of rice, tobacco, sugar cane and corn. Pop. 12,000.

ALIAS, in law, a term used to indicate the names under which a person who attempts to conceal his true name is ascertained to have passed during the successive stages of his career. An alias writ is a writ issued where one of the same kind has been issued before in the same cause.

ALIBI, in law, a plea that the person ac¬ cused of having committed a crime was else-

where at the time when the breach of the law occurred. If he substantiate this, he is said to prove an alibi. In Scotland the defendant must give "notice of a special defense of alibi, stating where he was 'when the crime was com¬ mitted. In England and the United States this notice is not required. If the accused can make it appear that at the time when the crime charged is alleged to have been committed (it. being of a nature to require his personal pres¬ ence) he was in another place, his innocence will be established, because of the obvious im¬ possibility of the same person being in two places at once. This species of defense is con¬ stantly resorted to in trials for crime. One of the principal rules in the application of this species of evidence is that the time relied on, and in which the value of the evidence mainly consists, must correspond closely with the time at or during which the offense is proved to have been committed. If, time having been fixed to a particular day, hour and minute, the person accused can show that at that exact time he was in another place, his innocence is at once made apparent.

ALICANTE, Spain, a seaport and capital of the province of Alicante ; the ancient Lucen- tum. It is situated at the foot of a cliff 850 feet high, crowned by the fort of Santa Bar¬ bara. It has one of the best harbors on the Mediterranean and carries on a considerable trade, exporting wine, fruit, esparto grass, etc. It was bombarded in 1873 by two vessels sent out by Cartagena insurgents. Professor Free¬ man, the English historian, died here in 1892. An American consul has been stationed at Ali¬ cante for some years. Pop. 52,000.

ALICATA, a-le-ka'ta, or LICATA, le- ka'ta, Sicily, the most important commercial town on the south coast, at the mouth of the Salso, 24 miles east southeast of Girgenti, with a considerable trade in sulphur, grain, wine, oil, nuts, almonds and soda. It occupies the site of the town which the tyrant Phintias of Acrogas erected and named after himself when Gela was destroyed in 280. Pop. 16,000.

ALICE'S ADVENTURES IN WON¬ DERLAND (published 1865), by Charles Lut- widge Dodgson ((<Lewis Carroll®) grew out of a story which the author told the three little daughters of Dean Liddell — one of them the original Alice — while boating on the Thames near Oxford. Its success led him to write 'Through the Looking Glass and What Alice Found There* (1871). Both are dream tales of exquisite nonsense. The earlier is the looser and more desultory, matching the incoherence of dreams and the inconsequential narrative processes of a child's mind; it is generally thought to be preferred by children. The later story has a definite structure, following the moves of a chess-problem ; it reiterates, how¬ ever lightly, that

"We are such stuff As dreams are made on;"

and it employs frequently the motif of topsy¬ turvydom, — everything in Looking Glass Land being, of course, the reverse of ordinary ex¬ perience. Though 'Wonderland, *like 'The Looking Glass,* appeals strongly to adults as well as to children, yet 'The Looking Glass,) by reason of the traits just noted, is to the mature mind more openly suggestive of philos¬

ophy and satire. In the Red Queen's topsy- turvey remark, <(Now here, you see, it takes all the running you can do to keep in the same place,® children see only admirable fooling, while their elders perceive, besides, a keen para¬ dox upon the hustling society of to-day.

In the range of this double appeal there is little to choose between the books. 'Wonder¬ land *excels, perhaps, in invention of person¬ ages and*

incidents — the Duchess, the Cheshire Cat, the Mock-Turtle, the Mad Tea-Party, the Lobster Quadrille, and the Trial — the last often cited as an anticipation of the Dreyfus affair. 'The Looking Glass) probably excels in the richer and more sustained nonsense of its verses — 'Jabberwocky, 'The Walrus and the Carpenter, *(I Sent a Message to the Fish,* and (Haddock's Eyes) ; but it can match its White Knight and Humpty-Dumpty against any of the characters in 'Wonderland. *Both books abound in parody; the present generation may need a reminder that Father William first be¬ longed to Southey, and that Wordsworth's Leech Gatherer is the original of the Old Man on the Gate. Both books abound in puns and verbal quips; the curriculum of Reeling and Writhing, Laughing and Grief, Drawling, Stretching, and Fainting in Coils, and the re¬ vised proverb ((Take care of the sense, and the sounds will take care of themselves® ('Wonderland*) are household words; while human speech in general is the richer by galumphing , frumious, frabjous, uffish, chortle, and the other "portmanteau words® of (The Looking Glass.)

Though each volume thus has its excellences, the two merge in memory into a single 'Alice. *The illustrations by John Tenniel have made the (<hard words® and the strange creatures real ; no artist ever shared more fully with an author the labor and the success of creation. <Alice) has been dramatized and has been translated into French and German — 'Jabber¬ wocky* into Latin elegiacs as well. Growing out of the author's delight in telling stories to children, 'Alice *has remained to delight all the young in heart, has placed the "sense of nonsense® second only to the sense of humor and has added permanently to the gaiety of nations. Consult Collingwood, Stuart Dodgson, 'Life and Letters of Lewis Carroll* (London and New York 1889).

Samuel L. Wolff,

Instructor in English (Extension Teaching) , Columbia University.

ALIEN. See Aliens.

ALIEN AND SEDITION ACTS, in

American political history, four acts passed by the Federalist party in Congress in the summer of 1798, under John Adams, which were the immediate cause of the first nullification pro¬ ceedings in the South (see Kentucky Resolu¬ tions; Nullification; Virginia Resolu¬ tions) and one of the causes which alienated enough votes from the Federalists - to drive them out of power sooner than was inevitable. (For the genesis of the alien acts see also American Party). The embittered exiles who flocked here from 1790 on were doubly ob¬ noxious to the

Federalists ; both as scurrilously offensive journalists, oftentimes, and as hostile to all attempts to punish France for her wanton aggressions on American commerce. In 1797

the House was Republican, the Senate Federal¬ ist ; the latter attempted to pass measures for defense against France, which the former steadily voted down. At length, in 1798, the publication of the <(X. Y. Z.® correspondence, showing the rottenness of the French Directory, shamed the defenders of France and incensed the moderates into supporting the Federalists, who, having now a majority in both houses, first enacted three laws concerning aliens; (1) 18 June, making the residence before nat¬ uralization 14 years instead of five and the under penalties, and entry on such register the only proof admitted on applying for natural- term after declaration of intentions five instead of three ; alien enemies not to be allowed nat¬ uralization ; registration of all aliens on arrival, ization. (2) 25 June, empowering the Presi¬ dent for two years to order out of the county any aliens he thought dangerous or engaged in conspiracies. (3) 6 July, legalizing the appre¬ hension or deportation of all resident aliens when war was declared against the United States. These acts were denounced by the Republicans on three grounds, two of State rights and one general, as invading the consti¬ tutional rights of the States to permit such immigration as they chose up to 1808 (really intended to apply only to slaves) ; that it as¬ sumed national powers over persons under the jurisdiction of their States; and that it violated the right of trial by jury. It was on these points that Jefferson and Madison drew up the Kentucky and Virginia legislative resolutions, the former of which, on its repetition in 1799, named nullification as the proper remedy. Second, on 26 June, Lloyd of Maryland intro¬ duced a bill (1) declaring France an enemy of the United States and any one who should uphold her or give her aid or comfort guilty of high treason; (2) defining treason; (3) impos¬ ing $5,000 fine and six months' to five years' imprisonment on any one conspiring to oppose or impede United States measures, intimidate United States officers, stir up insurrection, etc. ; (4) imposing a fine of not over $2,000 and im¬ prisonment for not over two years for any ut¬ terance or writing tending to justify France or to defame United States officials as hostile to popular liberties, etc. It passed the Senate by a heavy majority; the House made important changes in it and passed the altered bill by a scratch. These changes were: (1) Canceling the first two sections altogether; (2) substi¬ tuting for the fourth, the publishing or printing

any false, scandalous or malicious writings to bring the government, Congress or President into contempt or disrepute, excite popular hos¬ tility to them, incite resistance to United States laws or encourage hostile designs against the United States, etc. To these, which gave Fed¬ eral judges power to make any opposition to the ruling party a felony, Bayard of Delaware got two clauses added which drew their teeth : the first making the truth a good defense and juries the judges of the fact; the second re¬ stricting the term of operation to 4 March 1801 — that is, till a new administration came in, so that it should expire with the Federalists if they went out and the Republicans thus lose the eclat of repealing it. It would naturally be supposed that the Alien Acts, which affected only a few foreigners and no internal liberties, and which as a fact remained entirely un¬

enforced, would have caused little commotion in the Republican party; and that the Sedition Act, which struck at all liberty of free speech or publication, and was contrary to the very basis of free government, and under which at least six prosecutions and most scandalous per¬ formances of one Federal judge took place, would have provoked almost a civil war. The facts are an instructive historical lesson against transferring the ideas of one age to another. The Republicans disliked the use of prosecu¬ tions under the Sedition Act as a party weapon and resented Judge Chase's partisan decisions; but it was only as directed against themselves, not as against civil liberty, that they reprobated it, — neither party had attained to that ideal, — and their chief rhetoric and defiance was di¬ rected against the harmless acts which tried to prevent their supporting France. It was in crystallizing the spirit of State resistance to national power that the acts have their main importance.

ALIEN PRIORIES, the name given to cells or houses erected on the lands belonging to various great religious houses on the Con¬ tinent before the Conquest. Certain people were appointed to livings on these lands. Schools were maintained at the priories which grew to be important factors in the mediaeval system of elementary education. They were finally suppressed in 1415 by Henry V, when 146 alien priories disappeared. The King had intended to use this property as an endowment of a college at Oxford, but his death prevented this ; and Henry VI gave some of the property to Eton, Windsor and King's College, Cam¬ bridge. The bulk of the lands was appropriat¬ ed for private use. Consult Tanner, <Notitia) (1744) and (Some Account of the Alien Pri- ories5 (1786), which contains a list of lands devoted to educational uses.

ALIENATION OF ESTATES , com¬ prises any method whereby estates

are volun¬ tarily resigned by one and accepted by another, whether that be effected by sale, gift, marriage settlement, devise or other transmission of property by the mutual consent of the parties. 2 Bl. Com., § 287; 55 N. J. L. 417. The term alienation is particularly applied to absolute conveyances of real property. 1 N. Y. 290, 294. Alienations by deed may be by conveyances at common law ; wrhich are either original or pri¬ mary, being those by means of which the benefit or estate is created or first arises ; or derivative or secondary conveyances, being those by which the benefit or estate originally created is en¬ larged, restrained, transferred or extinguished: or they may be by conveyances under the statute of uses. The original conveyances are the following: Feoffment, gift, grant, lease, ex¬ change, partition. The derivative is release, confirmation, surrender, assignment, defeasance. Those deriving their force from the statute of uses are covenants to stand seized to uses, bar¬ gain and sale, lease and release, deeds to lead or declare the uses of other more direct convey¬ ances, deeds or revocation of uses. 2 Bl. Com. ch. 20; 2 Washb. Real Prop. 600.

ALIENIST. See Psychiatry.

ALIENS, al'yenz. An alien is any person to whom the rights of citizenship have not been granted by the State in which he resides or so-

journs. Though subject to the jurisdiction of the State, and in a sense clothed with its na¬ tional character, if domiciled therein, aliens are not, in a political sense, members of the State. A distinction is made between domiciled aliens or those who have established a residence or a house of trade in the State and temporary so¬ journers. Again a distinction is made between alien friends and alien enemies, the latter of whom are subjects of a hostile state. In time of war alien enemies are placed under special restrictions and disabilities to which other aliens are not subject. Thus they are fre¬ quently denied the privilege of bringing actions in the courts; sometimes their houses of trade are placed under sequestration ; during the Eu¬ ropean War of 1914-17 they were in several belligerent countries interned in concentration camps and sometimes they are even expelled in a body as the Italians were from Turkey dur¬ ing the Turco-Italian War of 1911-12, and as

the Japanese were from Manchuria during the Russo-Japanese War in 1904.

Although politically members of a foreign state aliens are nevertheless subject to the lo¬ cal jurisdiction; they are held to owe the State in which they reside a local and temporary al¬ legiance and of course they are bound to obey the laws equally with citizens. It has even been held that they may be prosecuted for treason against the State in which they are domiciled (Carlisle v. The United States, 16 Wall. 147). They are not only bound to obey the local laws, but they may be required to share in the public burdens equally with citi¬ zens. It has been held in the United States that they may be called on to aid in the local defense, although they are not liable to con¬ scription in the regular army. But during the Civil War all aliens who had declared their in¬ tention of becoming citizens of the United States, and who had exercised any political franchise were declared to be subject to the terms of the Draft Act, unless they left the country within 65 days. Being subject to cer¬ tain obligations and duties aliens are equally entitled to certain rights and privileges, the most important of which is the right to pro¬ tection in their persons and property. Most countries, in fact, make no distinction between aliens and citizens so far as the enjoyment of civil rights is concerned ; bpt everywhere they are subject to disabilities in respect to political privileges. They are generally excluded from the privilege of voting and holding office, al¬ though in a number of American States they may vote and probably also hold office, if they have declared their intention of becoming citi¬ zens. See Nationality.

By an act of Congress of 2 March 1907, they are entitled to a passport, valid for six months, and carrying with it the right of pro¬ tection by the United States government pro¬ vided they have declared their intention of be¬ coming citizens and have resided in the United States for a period of three years.

If they sustain injuries in consequence of riot, mob violence or insurrection they are in the same position as citizens, but the prin¬ ciple now seems established that if they have suffered injuries from attacks on account of their nationality the United States govern¬ ment is under an obligation to indemnify them

or their families, especiallv if the local authori¬ ties were remiss in affording them protection. It is true that the United States government has uniformly denied such liability, but in most instances it has in fact paid an indemnity in such cases.

Under the common law, aliens were once subject to many civil as well as political disa¬ bilities, but most of their civil disabilities have been removed by legislation. Thus at com¬ mon law an alien could not take real property by descent, although he might acquire it by pur¬ chase or gift, but this disability was removed in England by an act of Parliament in 1870 and it has been removed by act of the legisla¬ ture in most of the American States. In most of them, an alien may now acquire, own and convey land equally wjth citizens, though in a few States the common-law disability still re¬ mains. Some States make a distinction be¬ tween resident and non-resident aliens, allow¬ ing the former, but excluding the latter, from owning real property; others make a similar distinction between aliens who have declared their intention of becoming citizens and those who have not. In the Territories, the District of Columbia and other places subject to the jurisdiction of the United States the ownership of lands is regulated by act of Congress, and Congress has enacted that no alien or foreign corporation shall be allowed to own or hold land in the District of Columbia, and that no alien who has not declared his intention to be¬ come a citizen of the United States may own land in any of the Territories unless the right has been granted by treaty.

Where treaties have been concluded with for¬ eign countries, allowing their citizens or sub¬ jects to hold land in the United States the Su¬ preme Court has uniformly held that the treaty right is paramount to any State law to the con¬ trary, notwithstanding the general right of the States, under their reserved powers, to regulate the ownership and disposition of property with¬ in their limit (Chirac v. Chirac, 2 Wheat. 249). There is, however, doubt as to how far the States may go in forbidding the employ¬ ment of alien labor when their legislation con¬ flicts with a treaty between the United States and the country of which the alien affected is a subject. But it has recently been held by the Court of Appeals of New York that a statute of New York forbidding the employment of aliens on the public works of the State was contrary to a treaty between the United States and Italy, providing that Italian subjects re¬ siding in the United States should enjoy the same rights and privileges as citizens of the United States, and was, therefore, null and void so far as it affected Italian laborers. The case is now (1917) before the Supreme Court of the United States for final determination. Pennsylvania, Massachusetts, New J-ersey, Arizona, Wyoming, Idaho and California have similar laws on their statute books. The ques¬ tion whether a State may prohibit or restrict the employment of aliens in private as well as public wˆork was definitely disposed of by the Supreme Court of the United States in 1915. The legislature of Arizona had passed an act forbidding the

employment in any work, pub¬ lic or private, of more than 20 per cent of alien labor. The governments of Great Britain and Italy protested that the statute was in con-

travention of treaties with the United States and the Supreme Court so held and declared the statute null and void.

The sovereign right of every government to prohibit or restrict the admission of aliens to its territory, so far as it is not contrary to treaty stipulations, is well established. As is well known, the United States has exercised the power of total exclusion in the case of the Chinese and of various classes on the ground of the public safety, health or morals, and has imposed severe and numerous restric¬ tions upon the coming of aliens generally. See Immigration.

Flowing from the same right of sovereignty is the right of expulsion in the interest of self¬ protection. In earlier times this right was re¬ sorted to much more commonly than now. Ex¬ cept in times of war, when even then it is rarely exercised, the power of expulsion is only resorted to in the case of dangerous or otherwise highly objectionable individuals. In any case it should not be exercised in an arbi¬ trary manner without good cause, otherwise the government of which the victim is a sub¬ ject may justly prefer a claim for violation of what is generally admitted to be a well-settled right of aliens under international law. The individual expelled should be informed of the charge against him, and be given an opportu¬ nity to answer, and if he is a domiciled alien he should be given a reasonable time to dispose of his property or wind up his business before leaving. In Europe and Latin America expul¬ sion is generally an administrative act, but in the United States the President has no such power, except as commander-in-chief of the army and during war. In time of peace he could probably exercise such power only in pur¬ suance of an act of Congress. Between 1798 and 1800, when the Alien and Sedition Acts were in force, the President possessed such power, but there was a strong popular opposi¬ tion to the law, and they were speedily repealed after having been in existence two years. See also Allegiance; Citizenship in the United States; Immigration; Nationality; Natur¬ alization and Naturalization Laws; Suf¬ frage.

Bibliography. — The authorities cited at the end of the article on Citizenship in the United States.

James W. Garner,

Professor of Political Science, University of Illinois.

ALIENS IN WARTIME. The treatment of enemy aliens in different countries at war is a problem which has to be handled firmly, each country deciding the question for itself, and being guided by self-interest, and also by enemy behavior. In ancient times, enemy aliens were killed ; civilization brought detention, arrest and even toleration of well-behaved enemies. The method of dealing with a hostile alien population in a nation, when a state of war exists, is essentially a military question, to be settled by military authorities. Wholesale interment is objectionable, ' costly, and diverts necessary guards from the military service. The most satisfactory solution is wholesale and immediate repatriation. The objections are the difficulty of transportation and the repatriation of males of military age. The

former can be solved, and the addition of a battalion of men of military age is not a great advantage, and would be compensated by the release of guards. At the beginning of the European War in 1914, the problem for Great Britian and German differed, because there were only 5,300 British subjects detained in Germany, while there were 27,200 Germans of military age in Great Britain alone, besides the great number of German aliens in the overseas possessions. No satisfactory basis of exchange was discovered. After the severing of diplo¬ matic relations with Germany in 1917, a bill was introduced into- the United States Congress 25 July 1917, to return aliens of draft age to their home countries.

ALIGARH, a'le'gar, or ALIGHUR, In¬ dia, a town in the northwest provinces, capi¬ tal of the executive district of the same name, 53 miles north of Agra. Aligarh was merely a fortress, the town being Koil, distant about two miles and connected with Aligarh by a beautiful avenue. It was formerly of import¬ ance and was one of Dowlet Rao Sindia’s prin¬ cipal depots for military stores. The fort was taken in 1803 by Lord Lake, Sindia’s com¬ mander, Perron (a Frenchman) having pre¬ viously surrendered, and the whole district was then added to the British possessions. Since that time the fort has been much improved, and the town renamed Aligarh has become the station of a civil and judicial establishment and a prosperous industrial and trading centre. Pop.

64,800.

ALIMENT. See Food; Nutrition.

ALIMENTARY TRACT, or GASTRO¬ INTESTINAL TRACT, is the whole digest¬ ive tract in animals concerned in the processes of digestion and nutrition. It is in man a highly developed and differentiated tube or canal from 25 to 30 feet in length extending from the mouth to its posterior end, the anus. The mouth opens into the pharynx and this in turn into the esophagus, a muscular tube leading into the stomach. This is a dilated and pouchlike portion of the canal. From the stomach the tube is narrowed into the small intestine, which occupies from 22 to 25 feet in length and is divided into three parts histologically distinguished from each other. These di¬ visions are the duodenum, jejunum and il¬ eum. The ileum opens at its termination into a blind sac, the cecum, which extends down some two or three inches from the juncture and from the posterior left surface of which the appendix vermiformis is given off. The ascending colon, the first division of the large intestine, begins here and passes up the right side of the abdomen, crosses over under the liver high up in the abdomen, about at the level of the umbilicus, constituting the transverse colon. This turns at the left into the descend¬ ing colon which passes down in front of the left posterior abdominal wall, continues into the iliac colon which in turn extends to the pelvic colon. This forms a loop in the true pelvis and at its distal end it turns sharply downward to form the rectum which bends with a forward concavity and ends in a dilata¬ tion which terminates in the anal canal, the final termination of the alimentary tract. This

is about an inch in length and is guarded at its external opening by two circular muscles known as the sphincters.

The number of accessory glands and organs that empty their secretions into the alimentary tract is very great. The most important are the salivary glands in the mouth, the secretory glands of the stomach, the liver and pancreas, the secretions of which enter by a common duct just below the stomach, and the secretory glands of the intestines.

The structure of the different portions of the tube is similar, but variations in function produce some modifications in the muscular coats. In general there is a layer of mucous membrane on the interior of the canal ; this is surrounded by a supporting framework of con¬ nective tissue, and is further strengthened by a varying amount of unstriped muscular tissue. For details of structure see Intestine; Stom¬

ach. For the more complicated chemical proc¬ esses of digestion, the work of the alimentary tract, see Digestion; Metabolism; Nutrition.

ALIMONY, in law, the allowance awarded out of her husband's estate, to which a wife is entitled on separation or divorce. Jurisdiction in this matter in England rested with the ec¬ clesiastical court until 1857, when it was con¬ ferred upon a court of divorce. In the United States it is vested in the courts of equity. Alimony may be granted by the court during litigation, in which case it is known as pendente lite (during the suit) ; or at the conclusion of the suit, when it is called permanent. The former enables the wife to pursue the litigation, whether proceedings have been brought by or against her. The amount granted lies within the discretion of the court and depends upon a variety of considerations, and is governed by no fixed rules. The ability of the husband to pay is of most importance in determining the amount, and in estimating his ability his entire income will be taken into consideration, wheth¬ er derived from his property or his personal exertions. So far as any general rule can be drawn from the decisions and practice of the courts, the proportion of the joint income to be awarded for permanent alimony is said to range from one-half to one-third, while in case of alimony pending suit it is not usual to allow more than one-fifth, and usually a smaller pro¬ portion will be allowed out of a large estate than out of a small one. Permanent alimony is a periodical allowance awarded to the wife if the termination of the suit is favorable to her. By a writ of ne exeat (let him not depart) the court can prevent the husband from leaving the State without leaving sufficient security for pay¬ ment. The writ of ne exeat has been expressly abolished in many of the States of the Union, but its place has been filled in almost every instance by a similar procedure. In New York a system of arrest and bail has been substituted for the writ. If the husband should remove to another State the wife can enforce her claim in the Federal courts. See Marriage and Divorce.

ALIN, a'lin, Oscar Josef, Swedish his¬ torian and statesman: b. Falun, 22 Dec. 1846; d. Upsala, 31 Dec. 1900. In 1882 he was ap¬ pointed professor of political economy at Up¬ sala University and later rector. In 1888 he became a leading member in the first chamber of the Riksdag. His fame rests on his histori¬

cal works, chief of which are (Bidrag till svenska radets historia under medeltiden) (Upsala 1872); <Sveriges Historia, 151 1—1611 ' (Stockholm 1884-87) ; (Den svensk-norsk Unio¬ men } (Stockholm 1889-91).

ALISMACEiE, the water-plantain family. Sagittaria (arrowhead). See Arrowhead; Water Plantain.

ALIZARIN (from alizari, the commercial name of madder in the East), a substance hav¬ ing the formula CUHeCh. (OH) 2, formerly ob¬ tained from the root of the madder (Rubia tinctoria), but now artificially produced from coal-tar and the refuse from the distillation of crude petroleum. It is used as a dye, for pro¬ ducing the color known as (<turkey red.® Aliza¬ rin is of interest to the chemist not only on account of its industrial importance, but also because it was the first vegetable coloring mat¬ ter to be produced artificially; and the year 1868, in which its synthesis was effected by W. H. Perkin, therefore marks the beginning of a new era in industrial chemistry. In the manufac¬ ture of alizarin, anthracene (CwHio) is first pre¬ pared from coal-tar, and by oxidation (which it readily undergoes under the influence of potassium bichromate or other oxidizing agent) is transformed into anthraquinone, ChHsCL. The next step is to sulphonate the substance so formed. Anthraquinone is remarkably stable toward sulphuric acid, but combination can be effected by strongly heating a mixture of the two, and a solution of mono- and disulphonic acids of anthraquinone is the result. The excess of sulphuric acid is then removed, and the sul- phonic acids are heated with caustic potash to about 350° F. The mass gradually darkens till it becomes almost black, at which stage it dis¬ solves in water with the formation of a rich purple solution, from which alizarin can be pre¬ cipitated in abundance by the addition of sul¬ phuric acid. A similar process was also devised by Perkin, in which the first step is the forma¬ tion of dichloranthracene, CwHsCb, by treating anthracene with chlorine. Subsequent treat¬ ment of this body with sulphuric acid gives anthraquinone disulphonic acid, CwHeCh (HS03)2. This is fused with potash, as de¬ scribed above, and the alizarin precipitated with sulphuric acid as before. Anthrapurpurin is formed, simultaneously with alizarin, in the processes given above. Its behavior as a dye is similar to that of alizarin, but it gives a brighter red. Pure alizarin, as obtained by sublimation, crystallizes in yellowish-red crystals, only slightly soluble in alcohol or water, but readily dissolving in alkalis. Chemically, alizarin is. known as dioxyanthraquinone.

ALKAHEST, The, or THE HOUSE OF CLAES ((La Recherche de VAbsolu — The Search for the Absolute), is a striking novel by Honore de Balzac. The central character, Bal¬ thazar Claes, is a wealthy chemist, the dream of whose life is to solve the mystery of matter. Gradually the quest becomes a fixed idea, for which money, family, health, sanity, are sacri¬ ficed, and Claes dies heart-broken and

defeated. As foils to him stand his devoted wife and his eldest daughter Marguerite, noble women, the latter one of the finest creations of Balzac's genius. They sympathize sorrowfully yet ten¬ derly with his ideal, and bear with true heroism the misery to which his mad course subjects

them. The story belongs to that series of the Human Comedy known as ((Philosophical Studies," and appeared in 1834.

ALKALI (from the Arabic, al, "the," and qaliy, "ashes"), a term originally used for the soluble part of "pot-ashes," but since extended to include the hydrate or oxide of any of the metals lithium, sodium, potassium, caesium and rubidium, or of the radical ammonium. The alkalis possess strongly basic properties, and (with the exception of ammonia) rapidly ab¬ sorb carbon dioxide from the air, when moist, passing into the form of carbonates. They are all soluble in water, and nearly all of their com¬ pounds are also soluble. The real nature of the alkalis was first conclusively proved by Sir Humphrey Davy when in 1807 he decomposed potash and soda by means of the electric cur¬ rent. Alkalis in concentrated solution exert a powerfully corrosive action on the skin, and even in very dilute solution they alter the color of certain vegetable infusions very markedly. This property is utilized for detecting free al¬ kalis in solutions under examination, strips of bibulous paper impregnated with red infusion of litmus being moistened with the fluid to be tested. An exceedingly small amount of free alkali will transform the red color to a blue. The alkali metals are all monovalent. The early chemist distinguished another class of substances, somewhat resembling the alkalis, as the "alkaline earths." These include the oxides of calcium, strontium and barium. The al¬ kaline earths are basic in nature, and differ from the alkalis chiefly in being less soluble. Magnesium is sometimes included among the alkaline earths, but it falls more naturally into the zinc group. See Soils.

ALKALIMETRY, that branch of chemis¬ try which treats of the quantitative estimation of alkalis present in a given solution. See Analysis, Chemical.

ALKALOIDS, organic bases, forming defi¬ nite salts with acids and resembling in some respects the metals of the alkalis, hence the name. A number of basic nitrogenous com¬ pounds of marked physiological

action and somewhat analogous in their chemical composi¬ tion. It has been proposed to limit the word alkaloid to the group of basic nitrogenous prin¬ ciples found in plants, the somewhat similar bodies found in animals being termed ptomaines (q.v.) and leucomaines (q.v.). (See Animal Alkaloids). Some even class as alkaloids a series of feebly basic compounds prepared syn¬ thetically from the anilines, antipyrine, etc. We shall here consider only, such alkaloids as are basic nitrogenous principles, products of the metabolism of plants.

Distribution. — Alkaloids are widely distrib¬ uted throughout the plant kingdom ; many plants contain them, and some plants contain a large number; opium, Papaver somniferuni , for in¬ stance, contains a dozen or more alkaloids. The Cinchona family also contains many. In such cases, however, the alkaloids are, as a rule, very closely related in their chemical structure. Cer¬ tain plant families contain many, others a few or none. Most of the alkaloids are found in the Dicotyledons, a few only are found in the Monocotyledons, Colchicum, and perhaps some of the Liliacece. The fungus Amanita muscaria contains the deadly alkaloid muscarine (q.v.).

The Papavcracecc, S olanacecB and Ranuncu- lacecc are particularly rich in alkaloids. The Leguminosece, Rubiacece, and U mbclhfercc con¬ tain many, while the large families of the Com¬ posites and Labiatecc contain very few. For the most part similar alkaloids are found in re¬ lated plants, yet a few widely separated plants contain similar alkaloids, berberin being an example. As to their location in the plants themselves, alkaloids are found mostly in the fruit and seeds ; many are found in the barks, and some in the roots. They are formed for the most part in the actively growing portions of the plant and are probably katabolic products of the plant metabolism. They are usually found in solutions combined with some plant acid in the cell sap, sometimes dissolved in oils or mucilage, and in many instances are stored up in secretory passages in the plant. As to the role that the alkaloids play in the plant economy it is difficult to state positively. They do not seem to be utilized by the plant as a source of energy and in some instances are even poisonous to the plant itself. One of the services they perform for the plant is to aid it in the struggle for existence by being poison¬ ous to animals. The large quantities found in seeds is evidence of the support of this view.

For the most part alkaloids are solid, non¬ volatile, crystalline bodies, a few being liquid and volatile, such as arecoline, nicotine, coniine, spartein. The former contain carbon, hydro¬ gen, nitrogen and oxygen. The three latter liquid alkaloids contain no oxygen and have a marked odor; the solid alkaloids possess no odor. With few exceptions

the alkaloids are insoluble (or soluble with great difficulty) in water.

Chemically the alkaloids are divisible into five provisional groups, although it was at one time held that only those bodies belonging to the Pyridine group should be considered as alka¬ loids. These groups as classed by Briihl are (1) the Pyrrolidine group — containing an alka¬ loid from the coca leaf, hygrine ; (2) the Pyri¬ dine group, which contains a large number, pilo¬ carpine, pilocarpidine, arecoline, arecaine, coniine, conydrine, piperine, nicotine, atropine, hyoscamine, cocaine, pelletereine, sparteine, cys- tisine and others; (3) Quinoline group — con¬ taining cinchonine, quinine, cinchonidine, strych¬ nine, brucine, curarine, and others; (4) Ison group — containing the opium alkaloids, mor¬ phine, papaverine, narcotine, codeine, thebaine, hydrocotarnine, hydrastine, cannabine, berber- ine, corydaline; (5) alkaloids of undetermined relationship, a few only being of other than chemical interest, ergotinine, colchicine, vera- trine, cevadine, jervine, rubijervine, aspidos- permine, yohimbine, anhalonine, lupinine, gel- semine, aconitine, pseudoaconitine, japaconitine, delphinine, emetine, etc. However, many alka¬ loids, the structure of which is well known, such as caffeine, theobromine, muscarine, etc., do not fit into this scheme.

The internal chemical construction of all the alkaloids is extremely complex; for many it is unknown. Most are tertiary bases ; a few are similar to the secondary amines in structure. Ammonia bases are also present in many. Many alkaloids acted on by strong alkalis are broken up into two components, a basic body and a nitrogen free, usually aromatic acid. Most of the alkaloids react similarly to oxidiz-

ing agents; nitric acid, chromic acid, potassium ferrocyanide and potassium permanganate are the most active. The last makes an efficient chemical antidote for many of them. A few alkaloids have been made synthetically. In the making, however, a related base has been neces¬ sary.

Physiologically the alkaloids are for the most part very active. Some have very little action, berberine, for example, while aconitine is one of the most toxic of substances. Nearly all of them have a marked affinity for nerve struc¬ tures, on which a few have markedly poisonous action : some of them attacking the sensory nervous elements more particularly (aconitine, cocaine) ; others exerting their

greatest activity on the motor nervous structures, sometimes in the muscle plates (coniine, curarine) causing paralysis ; others in the motor cells in the anterior horn of the spinal cord (strychnine). Still others exert their influence on the nerve cells of the brain (morphine, hyoscyamine).

History. — The history of the discovery of the alkaloids is about 100 years old. Derosne of Paris first isolated from opium in 1803 a salt «of opium,® as he termed it. This was a mixture of morphine and narcotine, and in 1806 Serturner, a pharmacist of Hanover, first defi¬ nitely discovered morphine. It was not until 1817, however, that the discovery was noticed. Following this in rapid succession different alkaloids were isolated — narcotine and emetine, in 1817, veratrine and strychnine, in 1818, bru¬ cine and piperine, in 1819, caffeine, cinchonine and quinine, in 1820, and by 1835 at least 30 alkaloids were known. At the present time there are more than 200 known, and new ones are being discovered rapidly; detailed study of more important alkaloids will be found under their respective heads. See Animal Alkaloids ; Plants ; Poisons ; and separate articles on the more important alkaloids under their special names.

Bibliography. — Untroduzione alio Studio degli Alcaloidi, *Icilio Guareschi ; translated into German as (Die Alkaloide,* by Kuntz Krause, is one of the most important of modern works. Also (La Constitution chimique des alcaloides vegetaux, by Ame Pictet (2d ed. 1897) ; (Die Pflanzen-Alkaloide/ by J. W. Brfihl (1900). For studies of their location in plants, consult Rusby & Jelliffe, (Morphology and Histology of Plants > (1899, with bibliogra¬ phy)- Consult also Frankel, (Arzneimittel Syn- these) ; Schmidt, (Ueber die Erforschung der Konstitution und die Versuche zur Synthese wichtiger Pflanzenalkaloide) (Stuttgart 1900) ; id., (Die Alkaloidchemie in den Jahren 1900-04) (ib., 1904) ; id., (Die Alkaloidchemie in den Jahren 1904-07) (ib., 1911) ; id., (Die Alkaloid¬ chemie in den Jahren 1907 —1 P (ib., 1911), and Stewart, (Recent Advances in Organic Chem- istry) (London and New York 1908).

ALKANET, al-ka'net, (1) a genus of plants of the family Boraginaceae, cultivated sometimes for their flowers. The evergreen alkanet (Anchusa sempervirens) is a native of Europe, is cultivated for its blue flowers and its pleasant verdure in winter. Other species are common as flower borders. A. tinctoria is grown in the Levant and the south of France. It is cultivated for its resinous red coloring matter. (2) A red coloring matter obtained

from the roots of the orchanet herb (Anchusa tinctoria). It is chiefly

used to impart a red color to cosmetics, varnishes, etc. Benzine is used to extract it from the roots, the benzine is then evaporated, leaving a thick paste soluble in alcohol, ether and other organic liquids, but insoluble in water. The chemical formula for purified alkanet is about CisHnCh.

AL-KHOWARAZMI, al-koo'wa-rez'me, Arabian mathematician of the 9th century. He was the librarian of Al-Mamun at Bagdad, and also worked in the Bagdad Observatory, where he carried on his astronomical and mathemati¬ cal researches. Among his writings is a geo¬ graphical treatise, (Rasm Al-Ardˆ giving the latitude and longitude of all places mentioned. He also wrote several mathematical treatises, including one on Hindu arithmetic, and (A1 Jabr wa'l MuqabalahP discussing the quadratic equation and other algebraic problems; both of these were later translated into Latin, the latter giving algebra its name. See Algebra, History of the Elements of, and Arithmetic, History of.

ALKMAAR, alk-mar', Netherlands, a town in the province of North Holland; on the North Holland Canal and 20 miles north north¬ west of Amsterdam. It is regularly built ; pub¬ lic walks cover the site of its former ramparts, and its finest public buildings are the 15th-cen¬ tury church of St. Lawrence and a richly deco¬ rated Gothic lownhouse. It has manufactures of salt, sail-cloth, etc., and an extensive trade in cattle, corn, butter and cheese. Among in¬ teresting events in its history are its successful defense against the Duke of Alva in 1573, and the invention of damask-weaving by a citizen, Paschier Lammertyn, in 1595. To the west stood the castle of the counts of Egmont. Pop.

21,500.

ALKORAN. See Koran.

ALKYL, the radicals of the alcohols (for example, methyl, CH3; ethyl, C2H5; and propyl, C3H7) are collectively called alkyls. (See Al¬ cohol). A compound of an alkyl with a halo¬ gen is called an alkylogen ; and the metallic alcoholates are frequently called alkoxids, since they may be regarded as double oxides of a metal and an alcohol radical.

«ALL FOOLS® ARGUMENT, in British political controversy : Those who are in favor of tariff reform sometimes argue that nearly every other country in the world has adopted protection, and then wind up with the question, <(Are they all fools?®

Lost. Dryden had been an innovator when in 1664 he asked that C(the excellence and dignity of rhyme® be added to serious drama. He was an innovator again when he finally ((disincum- bered himself from rhyme® with the ingenious words <(I admire the pattern of elaborate writ¬ ing, but — I love Shakespeare.® Nothing at the time could serve Dryden's purpose so well as to adapt the full free structure of Shakes¬ peare's (Anthony and Cleopatra) to the regular measures demanded by Restoration taste. For his day there was nothing particularly irrever¬ ent or original in this. Dryden himself had some years before adapted (The Tempest,) and many others had been adapted by other men.

Such an undertaking was to be judged purely by the results. Judging by these standards it must be confessed that (A11 For Love) was a success. In reducing Shakespeare's 40 scenes to five acts Dryden lost the epic sweep of the original. He lost as well the impression of the tragic pair at their moment of greatness and passion. The retrospective method gives a tone of plaintiveness to the whole composition. For the last two acts the author seems hard put to it to eke out the action and does so by developing a motive of jealousy below the level of the rest of the piece. But for his own day at any rate Dryden makes up for these faults by the expertness of his handling. Ten years are compressed in one final day, which happens to be the birthday of the protagonist. The characters are fit mouthpieces for dignified speech adorned with some high ornament. (A11 for Love) was produced at the Theatre Royal in 1678 and in the same year was published with a preface by the author. According to Genest it was played some 15 times during the 18th century, the part of Cleopatra being taken by Nance Oldfield, Peg Woffington, and Mrs. Sid- dons. It is last mentioned at Bath in 1818. Sir Leslie Stephen is at one with other critics in considering it Dryden's finest play. Editions : Scott-Saintsbury (8 vols., 1882) ; Saintsbury (ed. (Mermaid SeriesO ; Noyes, G. R. (1910) ; Strunk (ed. (Belles Lettres) Series, 1911). Consult Dryden's (Essay on Heroic Plays) (Scott-Saintsbury, Vol. IV) ; Sherwood, M., (Dryden's Dramatic Theory and Practice* (

Thomas H. Dickinson, Author cThe Contemporary Drama of Eng¬ land?

ALL HALLOWS. See All Saints' Day

ALL HALLOWS COLLEGE, Drumcon- dra, Dublin, Ireland. The foreign missionary college of r\W Hallows, as its name implies, was instituted for the exclusive object of edu¬ cating priests for the foreign missions, for the purpose of supplying with missionary priests those parts of the world where the Gospel had never been preached. The missionaries, how¬ ever, going forth from its halls, were to have as a primary claim on their attention the spirit¬ ual needs, to speak in native parlance, of the <(Irish of the dispersion,** who, owing chiefly to the effects of bad laws, had begun at that pe¬ riod to emigrate in large numbers from Ire¬ land. All Hallows was founded in the year 1842 by the Rev. John Hand, a native of the diocese of Meath, Ireland, then a young man, but a few years previously ordained at May- nooth. It was formally opened on All Saints' Day of that year with only one student, a very small beginning indeed, but it increased in numbers and resources till it is now probably one of the greatest foreign missionary colleges in the world. It is at present, and has been for some time past, in charge of the Vincentian Fathers, and was never in a more flourishing condition. It shelters within its walls some 300 students, all destined for the foreign missions. It is pleasantly situated at Drumcondra, one of the suburbs of the metropolis, on a demesne of rich land, obtained for it through the efforts

of Daniel O'Connell, at that time lord mayor of Dublin. A large number of Catholic priests in the United States received their philosophical and theological training at All Hallows.

ALL IS TRUE, a play attributed to Shakes¬ peare. The burning of the Globe Theatre (29 March 1613) while the piece was being played destroyed the manuscript. Parts of the drama were incorporated into the play of (Henry

VIII. >

ALL SAINTS' BAY, or BAHIA DE TODOS OS SANTOS, a bay on the coast of the state of Bahia, Brazil, in lat. 13° S. and long. 39° W., forming an excellent natural harbor 37 miles long and 27 miles broad. It contains several islands, the largest of which, Itapasica, is 18 miles long and from 3 to 5 miles broad. On its east side stands the port of Bahia.

ALL SAINTS' DAY, a festival instituted by Pope Boniface IV, early in the 7th century, on the occasion of his transforming the Roman heathen Pantheon (the present Rotunda, or Santa Maria de' Martiri)

into a Christian temple or church and consecrating it to the Virgin Mary and all the martyrs. It was first made a feast of obligation by Gregory IV in 835. It is kept by the Roman Catholic church and by churches in communion with the Church of England on 1 November, and by the Greek Church on the Sunday after Whitsunday. It is designed, as its name implies, to honor all de¬ parted saints and was formerly called All¬ hallows. In many American churches a custom has grown up of making the Sunday nearest 1 November the occasion of a service in memory of those who have died during the year. A chapel in St. Peter's in honor of all the saints was consecrated by Gregory III in 731, on 1 November, and from this local cus¬ tom was derived the universal commemoration afterward enjoined on the entire Church.

ALL SORTS AND CONDITIONS OF MEN, a novel by Sir Walter Besant. The famous People's Palace of East London had its origin in this story; and because of it Be¬ sant was knighted. The story concerns chiefly two characters — the very wealthy orphan, An¬ gela Messenger, and Harry Goslett, ward of Lord Joscelyn. Miss Messenger, after grad¬ uating with honors at Newnham, resolves to examine into the condition of the people of Stepney Green, in the Whitechapel region, where she owns great possessions. To indicate to the working women of East London a way of escape from the meanness, misery and pov¬ erty of their lives, she sets up among them a co-operative dressmaking establishment, she herself living with her work-girls. Her good¬ ness and wealth bring happiness to many. The book ends with the opening of the People's Palace and with the heroine's marriage to Harry Goslett.

ALL SOULS' COLLEGE, Oxford, was founded in 1437 by Henry Chichele, archbishop of. Canterbury, for a warden, 40 fellows, two chaplains and clerks. It was designed as a chantry where prayers might be offered for the souls of all Christians, especially those who fell in the war for the crown of France, and also as a society of fellows free from the care

of undergraduate students. Many of its mem¬ bers have been noted in history and law. There are now 50 fellows and two Chichele profes¬ sorships. Fellows are chosen for their attain¬ ments in law and history. Blackstone, Glad¬ stone, Jeremy Taylor, Sheldon, Heber, Salis¬ bury and Curzon have been enrolled there. The Codrington

Library of 70,000 volumes is one of the finest law libraries in England. The pres¬ ent arrangement of fellowships was fixed by statutes which came into operation in 1882.

ALL SOULS' DAY,, the day on which the Catholic Church commemorates all the faithful deceased. It was first enjoined in 998 by Odile, Abbot of Cluny, on the monastic order of which he was the head, and soon afterward came to be adopted by the Church generally. It is observed on 2 November. Among the early Christians the names of the deceased were entered on the diptychs, or lists, used at the altar, from which the cleric read the names of those for whom he was required to pray. In the 6th century the Benedictines commemo¬ rated their departed brethren at Whitsuntide, and in Spain the commemoration took place on the octave of Pentecost.

ALL'S WELL THAT ENDS WELL is

one of Shakespeare's best comedies, and one of the plays in w'hich he has kept closest to the original from which he derived his plot and yet has given the freest rein to his creative fancy. In the first volume of William Paynter's (Pal¬ ace of Pleasure/ a collection of short stories in the assembling of which the author has laid under contribution ancient and modern story¬ tellers, is the short tale (Giletta of Narbona/ borrowed bodily from Boccaccio's (Decam¬ eron/ somewhat to the disfigurement of the story itself, for Paynter was anything but a master of English prose. This tale Shakes¬ peare took for the basis of 4 All's Well that Ends Well/ which was probably written be¬ tween 1590 and 1600.' It w?as included in the folio edition of 1623; but it is supposed, how¬ ever, to have originally appeared under the title of (Love's Labor Won/ as a companion piece to (Love's Labor Lost) ; for a Shakes¬ peare play under this title is listed by Meres in 1598, with accompanying description that fits only (All's Well That Ends Well/ To its meagre incidents Shakespeare added others that give the plot a more dramatic cast ; and he created additional characters that lend it greater vivacity and interest. Some of these characters are altogether the work of his own imagination, wrhile others wrere developed from suggestions in the original story. For the Countess Rousillon, the Clown Lavatch, Parol- lcs, the braggart and coward, Lord Lafeu, talkative but clear-headed, Shakespeare is in no w:ay indebted to Paynter; and these are natu¬ rally the best characters in the play, with the one exception of the heroine, Helena. They stand apart from the others as special crea¬ tions ; are active, convincing, pleasing and life-like.

The outline of the plot of (All's Well that Ends WelP is more like

Boccaccio than Shakes¬ peare. Helena, a young gentlewoman of great beauty, intelligence and wit, wffio is protected by the Countess Rousillon, mother of Bertram, Count of Rousillon, hero of the play, is deeply in love with Bertram, wffio, as a w-ard of the

King, is summoned to the court of France, where his mother and Helena follow him. Helena cures the King of a supposedly incur¬ able malady by means of a receipt of her dead father, a famous physician. The King offers her the hand of any of his young unmarried courtiers ; and she chooses Bertram, who mar¬ ries her at his sovereign's command but promptly disowns her after the marriage, tell¬ ing her that he will never see her again until she secures possession of a ring he wears and has a child by him. Helena leaves his home, disguises herself as a young Florentine .girl and is invited by her husband to his room, where she gets possession of the ring and complies with the requirements laid down by Bertram, who, finally realizing her cleverness and beauty, falls in love with her; and so (All's Well that Ends Well/

This comedy, though well constructed, ex¬ cellently written and filled with well-drawn personae, is seldom presented in modern times on account of the objectionable character of the main incidents of the plot. It is, in fact, superior to some other Shakespeare plays which are not infrequently seen upon the boards. It is rich in comedy and characteriza¬ tion and sparkles with wit and humor not inferior to Shakespeare's best; the dialogue is sprightly; the invention and plot excellent and the interest well sustained. The philosophical, sick old King, the amiable, good-hearted count¬ ess, the clever heroine, the strong-headed young hero, whose chief asset is his ability to fight ; the comic knave Parolles ; old Lord Lafeu, jovial yet scoffing, and Lavatch, the clown, with his ever-ready wit, together form a galaxy of star characters sufficient for several modern comedies. And they are presented to us framed with a bewildering richness of fine rhetorical passages.

ALLACTITE, a mineral found in Swreden, and crystallizing in small monoclinic prisms or tablets having the composition 7MnO.As2O3.4H2O. Its hardness is 4.5 and its specific gravity about 3.84. It exhibits double refraction to a marked degree, and varies in color from red to green, according to the direction from wffiich it is viewed. This property has given it its name, ((allactite,8 being derived from a Greek wˆord meaning ((to change.8 The variability in color is due to the varying absorption of the ordinary and extraordinary rays of the incident light. See Physical Crystallography.

ALLAH, in Arabic, the name of God, a word compounded of the article al, and the word Elah, which signifies <(the Adored8 and (<the Adorable,8 and synonymous with the sin¬ gular of the Hebrew word Elokim. Allah akbar (God is great) is a Mohammedan war-cry.

ALLAHABAD, aHa-ha-bad' (from Allah, God; abad, abode; the <(abode of God8), India, an ancient city, capital of a division and district of the same name, as well as of the whole of the northwest provinces, 72 miles west of Benares. The native town consists largely of mud houses. Its English suburb of Canning- town has much more of a European aspect. Among the remarkable buildings of Allahabad are a large triangular fort, occupying a point of land formed by the junction of the Ganges and Jumna; the Jumna Musjid, or great mosque; the mausoleum of Khosru ; All Saints' Church;

the Roman Catholic cathedral; the Muir Cen¬ tral College, founded in 1874, the chief educa¬ tional establishment of the northwest provinces ; the Mayo Memorial and town hall. Allahabad is one of the chief resorts of Hindu pilgrims, who come partly to visit a sacred cave under the Chali Saturn temple (whence it is said there is a subterranean passage to Benares), but chiefly to have their sins washed away by bathing in the waters of the sacred rivers of Ganges and Jumna at their junction, where believers see a third river, the Saraswati (which is in reality lost in the sands at a distance of 400 miles from Allahabad), mingle its current with those of the other two. A great fair held on 14 December is much attended by pilgrims. There are few manufactures. Allahabad forms a junction in the railway system between Ben¬ gal and Central India, and its trade is rapidly increasing. In the mutiny of 1857 it was the scene of a serious outbreak and massacre. Pop. 171,700. The division of Allahabad contains the districts of Cawnpur, Futtehpur, Hamirpur, Banda, Jhansi, Jalaun, Lalitpur and Allahabad. The agriculture of the division is greatly pro¬ moted by a canal 310 miles long, connecting the Ganges and the Jumna. About five-sixths of the surface is under cultivation, the principal crops being rice, pulse, wheat, tobacco, etc.

ALLAMANDA, a genus of shrubs of the family Apocyncicccz , consisting of a dozen spe¬ cies, natives of Brazil and Central America. Most of the species are climbing; they have entire, bright green, whorled leaves and large, terminal, yellow or purple flowers. Because of their showy flowers they are much culti¬ vated in the United States

and elsewhere, in the North in hothouses and in the South out of doors. The leaves of certain species have been used in medicine as a cathartic.

ALLAN, Sir Hugh, founder of the Allan Line of steamships: b. Scotland, 29 Sept. 1810; d. Edinburgh, 8 Dec. 1882. A clerk with limited education, he emigrated to Canada in 1824, was clerk in Montreal stores, became captain in the rebellion of 1837 and in 1838 'succeeded his late employer as a partner in the shipping and ship-building business. In 1853 his firm began building iron screw steamships and their first vessel, the Canadian, made its first voyage in 1855, two more being used as transports in the Crimean War. The Allan Line, after many disasters, gained a permanent footing and has been a large element in developing Canadian prosperity. Sir Hugh was one of the projectors of the Canadian Pacific Railway and prominent in the political investigations to which it led He was a director in banking, telegraph, gold mining and other large business enterprises, and was knighted in 1871.

ALLAN, Maud, American danseuse : b. Toronto. At four years of age she removed to San Francisco, where her father became a naturalized American citjzen. She took a scholarship at the Cogswell Polytechnic College, San Francisco; commenced studying the piano at the age of five, and made her first appearance as a pianist at 12. Soon afterward she went to Europe to continue her studies; spent five years at the Berlin Royal Academy High School of Music and took the highest diploma for piano-playing. Later, she abandoned her intention of becoming a professional musician,

deciding to become a dancer instead, her idea being to represent music by dancing. After much fresh study, she made her first appearance as a dancer before an invited audience at the Conservatory of Music. Vienna, in 1902 ; she was highly complimented by the press. Her first public appearance took place at the Theatre Moliere, Brussels, and she subsequently per¬ formed at Berlin, Buda Pesth, Hamburg and Paris, .at all of which places she aroused much enthusiasm. In 1908 she achieved a splendid success in London in (The Vision of Salome, } and had the honor of dancing before Edward VII and Queen Alexandra. Subsequently she appeared successfully in New York. Consult her autobiography.

ALLAN, Sir William, Scottish artist : b. 1782: d. 1850. He was a fellow student with Wilkie in Edinburgh, afterward a student of the Royal Academy, London ; then went to St. Petersburg and remained for 10 years in the Russian dominions. In 1814 he returned to Scotland and

publicly exhibited his pictures, one of which (Circassian Captives)) made his rep¬ utation. He now turned his attention to histori¬ cal painting and produced scenes from Scottish history and battle scenes ; among them two pic¬ tures of the battle of Waterloo, one from the British, the other from the French position, and delineating the actual scene and the inci¬ dents therein taking place at the moment chosen for the representation. One of these Waterloo pictures was purchased by the Duke of Welling¬ ton. He traveled extensively, visiting Italy, Greece, Asia Minor, Spain and Barbary. In 1835 he became R.A., in 1838 president of the Scottish Academy; in 1842 he was knighted.

ALLANITE, a mineral, isomorphous with epidote, and containing rare metals of the Ce¬ rium and Yttrium groups. It is variable in composition, but is essentially a silicate of these metals, combined with aluminum, iron and cal¬ cium. It occurs in Norway and Finland and in the United States in Massachusetts, Connect¬ icut, New York, New Jersey, Pennsylvania, Virginia and North Carolina; also in Canada. It was named for Thomas Allan, of Edinburgh, who described it in 1808. (Also called orthitc).

ALLANTOIN, a-lan'to-in, a substance found in the allantoic fluid of the cow, in the urine of sucking calves, in the leaf buds of the maple and in the bark of the horse-chestnut tree. It is readily soluble in alcohol and crys¬ tallizes in monoclinic prisms having the formula C4H6N4O3. It may be formed by treating uric acid with boiling water and PbCh. Compounds of allantoin with several of the metals are known.

ALLANTOIS, a structure appearing dur¬ ing the early development of vertebrate animals — reptiles, birds and mammalia. It is largely made up of blood-vessels and, especially in birds, attains a large size. It forms the inner lining to the shell, and may thus be viewed as the surface by means of which the respiration of the embryo is carried on. In mammalia the allantois is not so largely developed as in birds and it enters largely into the formation of the placenta.

ALLARD, Marie Jules Paul, French church historian : b. Rouen, 15 Sept. 1841 ; d. Senne- ville-sur-Mer, 4 Dec. 1916. He was educated at

the Institut Join-Lambert, near Rouen; was substitute judge, Rouen, 1872-83 and from 1903 to 1915 was editor of Revue des questions

historiques. He took part in the International Catholic Scientific Congress of 1888 and 1891 at Paris and that of 1894 in Brussels. He pub¬ lished : (Les esclaves chretiens depuis les pre¬ miers temps de l'Bglise jusqu' a la fin de la domination romaine en Occident (1876) ; (L'art chretien sous les empereurs paiens) (1879) ; (Esclaves serfs et mainmortables) (1884) ; (Histoire des persecutions de l'figlise) (5 vols., 1885-90); (Paul Lamache) (1893); (Le Christianisme et l'Empire romain) (1897) ; (Saint Basile) (1898) ; (Julien l'Apostat) (3 vols., 1900) ; (Dix lemons sur le martyre) (1905) ;

(Saint Sidoine Apollinaire) (1910) ; (Les orig- ines du servage en France) (1913). He was a contributor to Cabrol's (Dictionnaire d'arche- ologie chretienne et de liturgie) ; d' Ales' (Dic- tionnaire d'Apologetique) and (The Catholic Encyclopaedia. >

ALLEGAN, Mich., a town and county-seat of Allegan County, 33 miles south of Grand Rapids. It is situated on the Kalamazoo River and on the Cincinnati N., Lake Shore & M. S., and the Pere M. railways. It is in the midst of a fertile region, and a large dam on the river a few miles above the village affords valuable water power. Among its industries are mills of various kinds, carriage works, furniture factories, etc. It contains a Carnegie public library, two banks, court house, city hall and public schools. First settled in 1835. The town water works are owned and operated by the municipality. Pop. 3,419.

ALLEGANY, N. Y., village of Cattaraugus County, 70 miles southeast of Buffalo, on the Allegheny River, and on the Erie and Pennsyl¬ vania railroads. It has important oil interests, contains a canning factory, several cheese fac¬ tories and sawmills. Saint Elizabeth's Acad¬ emy for Girls is located here, also the Catholic college and seminary of Saint Bonaventure, founded in 1859. The village was incorporated in 1905. Pop. 1,300.

ALLEGATION is the assertion, declara¬ tion or statement by a party of what he can prove. Under the reformed method of proce¬ dure adopted in nearly if not all of the States of the Union, the general rule that the allega¬ tions in the pleadings and the proof must'corre- spond has been greatly relaxed. Under our present system a failure to prove an immaterial averment cannot in general be a material vari¬ ance at the trial and will be disregarded. If the substance of the issue be proved it is sufficient. If a contract, for instance, agree in substance and legal effect with that stated in the com¬ plaint, .the variance will be disregarded.

ALLEGHANY MOUNTAINS or ALLE¬ GHANY PLATEAU, a name

sometimes used to designate the entire Appalachian Mountain

system, but more properly applied to the western range of this system in Pennsylvania, Mary¬ land, Virginia and West Virginia. They begin near the New York and Pennsylvania border — the Catskills forming a northern outlier — and extend in a southwesterly direction into West Virginia, where the line of elevations is con¬ tinued by other ranges across Tennessee. In the northern part the mountains have an ele¬

vation of about 2,000 feet (over 4,000 feet in the Catskills), but they gradually increase in alti¬ tude southward until in Virginia they rise to 4,500 feet above the sea. Throughout their ex¬ tent they present a remarkably even crest-line with few gaps and isolated peaks. On the east¬ ern side the Alleghany Front or Alleghany escarpment is an abrupt slope overlooking the Great Valley, a depression from 50 to 100 miles wide, lying between the ((Front):> and the Blue Ridge. On the west, the plateau has a gentler bounding slope. The range forms the water- parting between the streams draining into the Atlantic Ocean and the Gulf of Mexico. The former receives the drainage from the eastern slope principally through the Delaware, Poto¬ mac and James rivers, while the Ohio River collects most of the waters on the western side. Except at the eastern edge, where the rocks partake of the folding of the Appalachian Mountains proper, the sediments are nearly horizontal and the region is rather a deeply dissected plateau than a true mountain range. Limestone, sandstones and conglomerates are the predominant formations and range from the Cambrian to the Carboniferous systems. Immense coal-seams occur in the higher part of the series. See Appalachians.

ALLEGHENY, Pa. See Pittsburgh, Pa.

ALLEGHENY COLLEGE, a coeduca¬ tional (Methodist Episcopal) institution in Meadville, Pa.; organized 1815 as a Presby¬ terian college and transferred in 1833 to the Methodist Church under an agreement that it should be conducted on a non-sectarian basis. It early acquired the support of a number of prominent men, including John Adams, Thomas Jefferson, James Winthrop and William Bentley, the two latter making it the gift of their libra¬ ries. Bently Hall and Ford Memorial Chapel are among the finest buildings. The chief emphasis is placed on non-technical cultural subjects but there are also courses in the arts and sciences. In 1914 there were: Instructors, 22; students, 418; volumes in the library, 31,000; grounds and buildings valued at $850,000 ; pro¬ ductive funds, $648,750; income, $117,346; grad¬ uates, 1,911.

ALLEGHENY RIVER, a river of Penn¬ sylvania and New York; a headstream of the Ohio. It rises in Potter County, Pa., and joins the Monongahela at Pittsburg. Among its tributaries are French Creek and Clarion and Kiskiminitas rivers. Its length is 400 miles and it is navigable for about 150 miles above Pitts¬ burgh.

ALLEGIANCE. Allegiance is the obliga¬ tion of obedience or service which one person owes to another or to the state. During the feudal age those who held lands of a feudal lord owed him allegiance ; to-day, however, the allegiance of the individual is only to the state or its symbolic head, the king. The obligation is reciprocal, that is, it is due in return for the protection which the state of which he is a citi¬ zen, or subject, is bound to afford him. The laws of most states require an oath of alle¬ giance, as a condition of admission to citizen¬ ship; many exact a similar oath of persons en¬ rolled in the. military and naval forces, and some require it of persons appointed or elected to a civil office. In times of civil war an oath of

allegiance is usually required of insurgents as a condition of amnesty or of the restoration of their civil status. Violation of the oath of allegiance is severely punished, usually with the penalties of treason.

Ordinarily allegiance is an obligation of citizens only, but in the United States it is held that aliens enjoying as they do the protec¬ tion of the laws owe the country a local and temporary allegiance which continues during their residence and for violation of which they are liable to prosecution for treason equally with citizens (Carlisle v. The United States, 16 Wall. 147).

The doctrine of the English common law was that of indefeasible allegiance, which was also the theory of the Roman law, exuere patri-am nemo potest, according to which the individ¬ ual could not of his own motion throw off his allegiance and take up another. <(Once an English subject, always an English subject,® unless with the consent of the sovereign, was the theory stated in an aphorism. The early ju¬ rists and commentators in the United States also inclined to this view and some secretaries of state followed this opinion. James Buchanan, secretary of state in 1845, however, asserted it to be an unqualified right of the citizen to change his allegiance at will, and in 1868 Con¬ gress passed a law affirming this view. This act declared it to be an inherent right of all people to expatriate themselves whenever they

wished and to assume a new allegiance. Two years later the British Parliament by statute formally abandoned the doctrine of indelible allegiance and declared that any British sub¬ ject not under disability and voluntarily natural¬ ized in a foreign state should cease to be a British subject. The great majority of other states likewise have abandoned the doctrine of indelible allegiance and allowed their citizens or subject to voluntarily expatriate themselves, although some of them attach restrictions to the exercise of the right. Only Russia and Turkey hold to the old rule and refuse to recog¬ nize the legality of the naturalization of their subjects by foreign states, unless the consent of the sovereign has been previously obtained. See also Citizenship and Naturalization.

James W. Garner.

ALLEGORICAL INTERPRETATION, or ALLEGORISM, a method used in the in¬ terpretation of the Scriptures. The method in brief is to take a plain statement and attach to it a symbolical meaning. Allegory has always been largely used. The Greek writers made use of it, especially Plato, Homer and Hera¬ clitus. Sometimes the sacred writers them¬ selves made use of it, thus explaining or clari¬ fying a fact by means of a symbol or an alle¬ gory. The Old Testament contains many allegories. Nathan, in his rebukeˆ of David, uses the allegory of the poor man's pet lamb to enforce his lesson. The allegory of the vine in the 80th psalm is another example. The finest of them all is the allegory of old age contained in the last chapter of the book of Ecclesiastes. Early Jewish writers in the In- tertestamental period interpreted the Old Testa¬ ment after this manner. The Jewish group of scholars in Alexandria under the leadership of Philo adopted this method to the exclusion of

all others. This led of course to an abuse of the method and the production of interpreta¬ tions as ridiculous as they were silly. The apocryphal 'Book of Wisdom } contains some instances. This method was in vogue in the days of Jesus Christ, and he frequently used it. The allegories of the sower, the vine and the branches, and the door are fine examples. Paul uses it several times in his Epistles. In Galatians iv, 21, he uses Hagar and Sarah, Isaac and Ishmael in an allegorical sense. The writer of the Epistle to the Hebrews shows the influence of the same method.

In post-apostolic times the method contin¬ ued. It was made use of by Clement of Alex¬ andria. Its chief exponent, however, was Origen, the great allegoriser of all time. Pos¬ sessed of a poetical temperament and a vivid imagination, he utilized every possible occasion for

making an allegory. He largely influenced succeeding commentators. The method contin¬ ued to be popular through the Middle Ages. Early English divines made use of it. Finally the method seemed to concentrate about the interpretation of the Old Testament types seeming to prefigure facts in the New. In 1682 Benjamin Keach published a large folio volume in which he explained the types alle¬ gorically. Since then many have followed in his footsteps, including Samuel Mather of New England (1705). As late as 1847 Patrick Fair- bairn published his 'Typology of the Scrip- ture} in two volumes. It has since appeared in many subsequent editions. It is the latest book of any note on the subject. The his¬ torical method which aims scientifically to get at the exact facts has now entirely superseded the allegorical.

By the allegorical method "history is not treated as an allegory, but converted into alle¬ gory,® which is not scientific nor in accord with modern methods of treating the Scrip¬ tures. No scholar of any note in our time places much dependence upon it. Consult Far¬ rar, F. W., 'The History of Interpretation) (1885); Gilbert, G. H., 'Interpretation of the Bible* (1908) ; and the article "Allegory® in Hastings' 'Dictionary of the Bible.)

Samuel G. Ayres, Garrett Biblical Institute.

ALLEGORY (from Greek alio, something else, and agoreuein, to speak), a figurative representation, in which the signs (words or forms) signify something besides their literal or direct meaning, each meaning being com¬ plete in itself. In rhetoric, allegory is often but a continued simile. Parables and fables are a species of allegory; for example, the beautiful parable in one of the tales in the 'Arabian Nights, *in which the three religions, the Mohammedan, Jewish and Christian, are compared to three similar rings, bequeathed to three brothers by their father. Sometimes whole works are allegorical, as 'Reynard the Fox,* Spenser's 'Faerie Queene,* and Bunvan's 'Pilgrim's Progress. * When an allegory is thus continued through long works it is indis¬ pensable to its success that not only the alle¬ gorical meaning should be appropriate, but that the story should have an interest of its own in the direct meaning apart from the al¬ legorical signification. There was a time when every poem was taken as an allegory ; even

such works as those of Ariosto and Tasso were tortured from their true

meaning and made to pass for allegorical pictures. No poet has made use of allegory in a more powerful and truly poetical manner than the great Dante. Alle¬ gory is often made use of in painting and sculpture as well as in literature.

ALLEGRI, al-la'gre, Gregorio, Italian composer and a singer in the papal chapel, con¬ sidered one of the most excellent composers of his time: b. Rome about 1580 (according to others 1590) ; d. there 1652. His (Miserere> has particularly distinguished him. It is even now regularly sung during Passion Week in the Sistine Chapel at Rome. Its subject is the 57th psalm (which in the Latin version begins with the word Miserere) and is composed for two choruses in five- and four-part harmony. This composition was once esteemed so holy that whoever ventured to transcribe it was liable to excommunication. In 1770 Mozart, then only 14 years of age, disregarded this pro¬ hibition, and after two hearings made a correct copy of the original.

ALLEGRO, al-la'gro, an Italian word sig¬ nifying gay, and used in music to express a more or less quick rate of movement. The de¬ grees of quickness are indicated by additional qualifying words or by derivatives of the word allegro. Thus allegretto or poco allegro means rather lively; allegro moderato, comniodo, giasto, moderately quick ; allegro maestoso , quick but with dignity; allegro assai and al¬ legro molto, very quick; allegro con brio or con fuoco, with fire and energy; allegrissimo, with the utmost rapidity. Pin allegro is a di¬ rection to play or sing a little quicker. Presto indicates a still quicker rate than allegro, but there is usually also this difference between the presto and allegro movements, that the former demands nothing more than rapid execution, while the latter requires to be performed with expression as well as quickness. The first movement of a symphony and other similar compositions is called the allegro. See Music.

ALLEINE, Richard, English theologian: b. Ditcheat, Somerset, 1611; d. Frome Sehvood, 22 Dec. 1681. He was educated at Oxford, en¬ tered the ministry and was for a time his father's assistant in the ministry. From 1641 to 1662 he was rector of Batcombe in Somer¬ set. The passage of the Act of Uniformity caused him to be ejected and afterward he preached wherever he could. He wrote (Vin- diciae Pietatis) in 1663, the license for which was at first refused by the King's printer, Roger Norton, who on reading it brought back the sheets from the royal kitchen, whither he had sent them for kindling, and issued the work from his own shop. For this Norton was compelled to seek pardon on his knees at the council table.

ALLEMONTITE, a tin-white, metallic mineral regarded as a native

alloy of arsenic and antimony, SbAs3. It usually occurs in fine-granular or mammillary forms. Its hard¬ ness is 3.5 and specific gravity about 6.20. It is found at Allemont in France, also in Bohemia and Germany.

ALLEN, Alexander Viets Griswold, Pro¬ testant theologian : b. Otis, Mass., 4 May 1841 ; d. Boston, Mass., 1 July 1908. He was grad¬

uated from Kenyon College, Ohio, 1862, An¬ dover Theological Seminary, 1865; rector St. John's Episcopal Church, Lawrence, Mass., 1865-67 ; professor of church history, Episcopal Theological School, Cambridge, 1867-1908. He wrote: Continuity of Christian Thought > (1884); (Life of Jonathan Edwards *(1889) ; (Religious Progress* (1893); Christian Insti- tutions) (1897) ; (Life and Letters of Phillips Brooks* (1900).

ALLEN, Alfred, American author and play¬ wright : b. Alfred, N. Y., 8 April 1866. He was graduated from Alfred University, studied at the Johns Hopkins and Columbia universi¬ ties and the American Academy of Dramatic Arts in which last he is now a professor. His plays include (Jack the Giant Killer, *(A Bur¬ glar Honeymoon,* ^Playmates *and dead of the House * ; all of which have been produced on the stage. His novels are: Che Heart of Don Vega,* (Judge Lynch,) Che Cup of Vic¬ tory } (with Richard Hovey).

ALLEN, Charles Grant Blairfindie. See

Allen, Grant.

ALLEN, Charles Herbert, American diplo¬ matist and banker: b. Lowell, Mass., 15 April 1848. He was graduated at Amherst 1869; was associated with his father in the lumber busi¬ ness in Lowell; served in both branches of the State legislature, and in Congress in 1885-89 ; was defeated as Republican candidate for gov¬ ernor of Massachusetts, 1891 ; and succeeded Theodore Roosevelt as assistant secretary' of the navy in May 1898. On th'e passage by Con¬ gress of the Porto Rico tariff and civil gov¬ ernment bill, in April 1900, the President ap¬ pointed him the first civil governor of Porto Rico; he resigned July 1901. He retired from public life in 1902 and became associated with banking and allied interests in New Pork. In 1913 he was elected president of the American Sugar Refining Company.

ALLEN, Ebenezer, American soldier: b. Northampton, Mass., 17 Oct. 1743; d. 26 March 1806. He emigrated to Vermont in 1771 and was made a lieutenant in Col. Seth Warner's regiment of (<Green

Mountain Boys.® In 1776 he was a delegate to the conventions in the New Hampshire grants, and in 1777 to those which declared the State independent and framed its Constitution. In Jul\r of that year he was made captain in Herrick's battalion of ((Rangers** and took an active part in the battle of Bennington ; in September he captured Mount Defiance ; and he took 50 prisoners among the troops retreating from Ticonderoga. He afterward became major and continued to win distinction during the war. He lived at Burlington in his later years.

ALLEN, Edward Patrick, Roman Catholic prelate: b. Lowell, Mass., 17 March 1853. He began early to fit himself for the priesthood and in June 1878 was graduated from Mount Saint Mary's College, Emmittsburg, Md. He was ordained priest in 1881 and in 1884 be¬ came president of his college. In January 1897 his Holiness Leo XIII appointed him bishop c. f Mobile, and on the 16 May following he was consecrated in the Baltimore Cathedral by Cardinal Gibbons. In May of the same year he was installed in his own cathedral, being the 5th bishop of Mobile to hold that office.

Under his care the diocese has prospered greatly and new churches, hospitals, schools and parishes testify to the bishop's diligence. The Catholic population of the diocese in 1897 was 17,000, and in 1913 it had risen to 42,500.

ALLEN, Elisha Hunt, American legislator and diplomat: b. New Salem, Mass., 28 Jan. 1804; d. 1 Jan. 1883. Graduating at Williams College 1823 he became a lawyer at Brattle- boro, Vt., but soon removed to Bangor, Me., and was a member of the Maine legislature 1834—41 and speaker in 1838. He was elected representative to Congress in 1841. Removing to Boston in 1847, he was elected to the Massa¬ chusetts legislature in 1849. Appointed consul at Honolulu in 1852, he held that post till 1850, and thence till 1876 was chancellor, minister of finance and chief justice of the Hawaiian kingdom. Several times during that period and from 1876 onward he was its minister to the United States and died in Washington, dean of the diplomatic corps.

ALLEN, Elizabeth Akers (Chase), Ameri¬ can poet: b. Strong, Me., 9 Oct. 1832; d. 1911. She was married in 1860 to Paul Akers, the sculptor, who died in 1861 ; and in 1865 to E. M. Allen of New York. Her first volume, 'Forest Buds, } appeared under the pen name of Florence Percy (1855). Other works of hers are: (The Silver Bridge and

Other Poems) (1866); a volume of (Poems) (1866), which contains (Rock Me to Sleep, Mother J (her authorship of this popular ballad, once disputed, is proved in the New York Times, 21 May 1867) ; (The High Top Sweeting and Other Poems) (1891) ; 'The Sunset Song)

(1902).

ALLEN, Ethan, American soldier: b. Litchfield, Conn., 10 Jan. 1737; d. Burlington, Vt., 13 Feb. 1789. About 1769 he removed to Bennington, Vt. The Vermont territory had been given by the Crown to both New Hamp¬ shire and New York under conflicting grants; and when the dispute was settled (1764) in favor of New York, Governor Wentworth of New Hampshire had already granted 128 townships and continued to grant others up to the Revolution. New York at once proceeded to regrant the same territory, but the indig¬ nant settlers drove out the surveyors, applying •the "beech seal® (fresh-cut rods) to enforce their withdrawal. The English government or¬ dered the status quo to be respected by New York, and further disorders averted by grant¬ ing only ungranted lands; the New York au¬ thorities continued to send surveyors, their grantees persisted in attempting to take pos¬ session of their lands, and the New Hamp¬ shire grantees continued to eject both deputy sheriffs and claimants by armed force and to chastise them besides. Allen at once took part in the dispute and soon became a leader : an athletic and adventurous giant, he was now in his element. In 1770 he was appointed agent for the settlers at Albany, where they were to plead their rights ; the decision went against them, and a fresh attempt being made to en¬ force New York rights, the settlers raised a regiment for defense, called "Green Mountain Boys,® of which Allen was made colonel. Tryon of New York, historically more renowned for vanity and bad temper than ability or suc¬

cess, proclaimed him an outlaw and offered £150 for his capture; but under Allen, Seth Warner and other able partisan chiefs, the settlers held New York at bay. Allen in 1774 answered publications in defense of the New York claims by a tract defending the Vermont¬ ers, reprinted in 1779. When the Revolution broke out Congress ordered Arnold to raise troops and seize the British fortresses on the New York border; but the Vermonters fore¬ stalled them by collecting a force of "Green Mountain Boys® at Castleton, Vt., under Allen's command, which on 10 May 1775 captured Ti- condcroga and its garrison without a combat, and shortly after Crown Point and Skenes- borough (Whitehall), giving them a mass of stores and the command of Lake Champlain. This action moved Congress to grant them the same pay as Continental soldiers, and to recom¬ mend the New York Assembly to employ them in the army under their own officers. Allen and Warner

journeyed thither and asked ad¬ mittance to thv. session ; and after some grumb¬ ling over receiving proclaimed felons, a heavy majority voted to admit Allen, and later to raise a regiment of “Green Mountain Boys.® Allen wrote a letter of thanks and proposed an invasion of Canada, which was rejected. He then joined Schuyler’s army as a volunteer, was sent on secret missions to Canada, meet¬ ing on the last one Col. John Brown, who agreed to join him in an invasion of Canada. Fort Chambly was captured; but Brown left Allen in the lurch at the attack on Montreal, and Allen was taken prisoner 25 September and sent to England. He was chained and treated with great severity, but after some months was sent to Halifax, N. S., and ex¬ changed 6 May 1778. Oil returning to Ver¬ mont he was appointed commander of the mi¬ litia and Congress made him lieutenant-colonel in the regular army. The old land-grant feud still raged, and in the attempted British in¬ trigue (1780-83) to have Vermont annex itself to Canada as a protection against -New York, Allen paralyzed British military action by pro¬ fession to consider a bribe for favorable ac¬ tion ; later he was charged with treason, but the charge was not sustained. He settled in Bennington and finally in Burlington, where he died. He was a member of the legislature, and after the war was a delegate to Congress, where he worked for the admission of Vermont as a State, which it had been by self-proclama¬ tion since 1777. It was not till 1789, however, that New York waived its claims, and Allen did not live to see the result. He wrote the story of' his captivity (1779) ; ‘Vindication of the Opposition of Vermont to the Govern¬ ment of New York’ (1779); and ‘Reason the Only Oracle of Man) (1784), being a deist of the Paine stripe. Consult Sparks’ ‘Life* (Bos¬ ton 1834) ; and Henry Hall’s ‘Ethan Allen) (New York 1892).

ALLEN, Frederick De Forest, classical scholar : b. Oberlin, Ohio, 1844 ; d. Cambridge, Mass., 4 Aug. 1897. He was graduated at Oberlin College 1863, and studied at Leipzig. From 1866 to 1880 he held professorships in the universities of Tennessee, Cincinnati and Yale. In 1880 he accepted the chair of classical philology at Harvard, holding it until his death. He published an edition of Euripides’ ‘ Medea *

(1876), (Remnants of Early Latin* (1880), a revision of Hadley’s (Greek Grammar) (1884), and (Greek Versification in Inscriptions) (1880) ; besides contributing many papers to classical journals and editing numerous classics.

ALLEN, Fred Hovey, American author and Congregational clergyman : b. Lyme, N. H., 1 Oct. 1845. He was graduated at Hartford Theological Seminary while completing a uni¬ versity course and studied art abroad. Later he became pastor at Boston and Abington, Mass., and editor of the Suffolk County Jour¬ nal, Boston, and a lecturer on art. He has published: (Modern German Masters *(1885); (Recent German Art) (1885) ; (Great Cathe¬ drals of the World* (1886) ; (Popular History of the Reformation) (1887) ; and edited numer¬ ous costly art works. He brought to America the first successful photogravure process, made the first photogravure plates in America and the first book from American made plates. The making of books illustrated by American made plates printed in America was first accom¬ plished by an American since all the imported workmen signally failed to produce either plates or printing.

ALLEN, Grant (Charles Grant Blair- findie Allen), essayist, novelist, naturalist: b. Kingston, Canada, 24 Feb. 1848; d. London, 28 Oct. 1899. He was graduated at Oxford in 1871, and for a time was professor of logic and philosophy in Jamaica, but spent the greater part of his life in England. Widely known as a scientist in several departments, he aimed to popularize science, and his brilliant style con¬ tributed greatly to his success in this respect. His score or so of novels and works of light fiction attained great popularity, but though entertaining they have only an ephemeral value. His outspoken agnosticism is reflected in many of his writings. In science his chief titles are : (Physiological Esthetics *(1877) ; (The Color Sense) (1879) ; (Evolutionist at Large* (1881) ; (Flowers and Their Pedigrees * (1883) ;

(Charles Darwin *(1885) ; (Force and Energy* (1888) ; (Story of the Plants) (4895) ; Evolu¬ tion of the Idea of God' (1897). In fiction the following were most widely read: (This Mortal CoiP (1888) ; (The Great Taboo * (1890) ; (The Dutchess of Powysland) (1892) ; (The Woman Who Did) (1896) ; (The British Barbarians) (1895) ; (Under Sealed Orders >

(1895).

ALLEN, Henry, American religious en¬ thusiast: b. Newport, R. I., 14 June 1748; d. Northampton, N. H., 2 Feb. 1784. He settled in Nova Scotia, where he founded the sect known as <(Allenites.® He made numerous con¬ verts but the sect dwindled after his death. He asserted that Adam and Eve before the fall had not corporeal bodies ; that there will be no resurrection of the body; that men are not bound to follow the ordinances of the Gospel; that the Bible is to be interpreted wholly in a mystic or spiritual sense. He was an eloquent

preacher and published some sermons and hymns.

ALLEN, Henry Watkins, American soldier and public officer: b. Prince Edward County, Va„ 29 April 1820; d. 22 April 1866. He re¬ moved in early youth to Missouri, where he was sent to Marion College ; he subsequently became a teacher A Grand Gulf, Miss., studied

law and entered practice there. He raised a company for Houston's Texas war against Mexico; and after the war was over resumed practice and was sent to the legislature in 1846. Settling in Baton Rouge, he was elected to the Louisiana legislature in 1853. In 1859 he went to Italy, to share her struggle for independence against Austria ; but arriving after it was over, made a tour of Europe, which he described in (Travels of a Sugar Planter.* He was elected to the legislature in his absence. He was one of the Southern Whigs who joined the Demo¬ crats after the party break-up caused by the Kansas-Nebraska bill. At the opening of the war he was commissioned by the Confederacy lieutenant-colonel ; later colonel and military governor at Jackson. He was wounded at Shiloh; constructed fortifications at Vicksburg; was disabled at Baton Rouge; made brigadier- general September 1864; and shortly after elected governor of Louisiana. He was a vigorous and efficient magistrate, with almost dictatorial powers. After the war he migrated to Mexico and started the (English) Mexico Times in the City of Mexico, where he died.

ALLEN, Horace Newton, American min¬ ister: b. Delaware, Ohio, 23 April 1858. He was graduated at Ohio Wesleyan University, and after a medical course went to China as Presbyterian missionary. Going to Korea in 1884 he was in Seoul at the time of the coup d'etat of that year and saved the life of a prince related to the Queen ; he was thereupon made court physician and allowed to establish a hospital under government orders. He came to Washington in 1887 with the first Korean legation, and returned in 1890 as United States secretary of legation. He won great confidence for sagacity and acquaintance with Korea and in 1897 was made United States minister there. He has written: (Korean Tales) (1889);

(Chronological Index of Foreign Relations of Korea from Beginning of Christian Era to 20th Century *(1900, supplemental 1903); (Korea: Fact and Fancy* (Seoul 1904) ; transactions of the Foreign Society of Korea* ; things Korean) (Seoul 1908).

ALLEN, Horatio, American engineer: b. Schenectady, N. Y., 1802; d. 1889. Graduating at Columbia University in 1823, in 1826 he was resident engineer on the summit level of the Delaware & Hudson

Canal and was sent to Eng¬ land in 1828 to buy locomotives for its proposed railway. In 1829 he made the first locomotive trip in America at Honesdale, Pa., with the (Stourbridge Lion.* He was chief engineer, 1829-34, of the South Carolina Railway, then the longest line in the world; and in 183£M-2 was chief assistant engineer of the Croton Aque¬ duct. He was chief engineer and afterward president of the Erie Railway, consulting en¬ gineer of the Panama Railway and the Brook¬ lyn bridge ; president of the American Society of Civil Engineers 1872-73. He invented the swivel car-truck.

ALLEN, Ira, younger brother of Ethan (q.v.) and a ((Green Mountain Boy®: b. Corn¬ wall, Conn., 21 April 1751; d. 7 Jan. 1814. He went to Vermont in 1772 and was an active sup¬ porter of Ethan in the (<beech seal® proceedings. He was a member of the Vermont legislature 1 776—77 and of the Vermont Constitutional Con¬ vention 1778; was its first secretary of state,

then its treasurer and surveyor-general. He was in the battle of Bennington, 1777. In 1780-81 he was a Vermont commissioner to Congress to contest the New York land claim. In 1789 he aided in organizing the University of Vermont; and in 1792 was a delegate to the convention that ratified the United States Constitution after Vermont's admission as a State. In 1795, as senior major-general of militia, he went to France and bought arms to be sold to the State; but in returning was captured by an English cruiser, taken to England and charged with supplying the Irish rebels with arms, and only won his suit after eight years. Imprisoned in h ranee in 1798 he returned to the United States in 1801. He wrote (The Natural and Political History of Vermont5 (London 1798) ; State¬ ments Appended to the Olive Branch) (1807).

ALLEN, James Lane, American novelist ; b. near Lexington, Ky., 1849. He was educated at Transylvania University in his native State and was successively an instructor in Kentucky University and Bethany College, West Virginia. In 1886 he removed to New York city and has since devoted himself entirely to literary pur¬ suits. In his short stories and novels he has usually employed a Kentucky background, and his finished literary style, though somewhat too highly elaborated for the taste of the average reader, has been much admired by the fnore critical. His prose is characterized by a mark¬ edly poetic cast, and his realism is of that profounder kind which concerns itself with

es¬ sential truths rather than with photographic fidelity to local types. His published books com¬ prise (Flute and Violin) (1891) ; (The Blue Grass Region and Other Sketches) (1892) ; (John Gray, a Novel5 (1893) ; (A Kentucky CardinaP (1894) ; ‘Aftermath5 (1895) ; (A Summer in Arcady) (1896) ; (The Choir In- visible) (1897) ; ‘The Reign of Law) (1900) ; ‘The Mettle of the Pasture5 (1903) ; ‘The Bride of the Mistletoe) (1909) ; ‘The Doctor’s Christmas Eve> (1911) ; ‘The Heroine in Bronze) (1912) ; (The Last Christmas) (1913) ; ‘The Land of Youth) (1915); (The Cathedral Singer) (1916); ‘The Kentucky Warbler) (1917). See Flute and Violin.

ALLEN, Joel Asaph, American naturalist : b. Springfield, Mass., 19 July 1838. He studied under Agassiz at Harvard ; took part in scien¬ tific expeditions to Brazil, the Rocky Mountains and Florida 1865-69; was chief of the scientific party accompanying the Northern Pacific Rail¬ road survey 1873, and curator of vertebrate zo¬ ology in the American Museum of Natural His¬ tory, New York, since 1885. He is author of ‘Monographs of North American Rodentia> (with E. Cones, 1877) ; ‘History of North American Pinnipedia> (1880) ; editor of Bul¬ letin of Nuttall Ornithological Club (1876-83), s.nd of its successor, The Auk (1884-1901) ; Bulletin and Memoirs of the American Museum of Natural History (1889-1905). He has writ¬ ten also ‘Mammals of Patagonia5 (1905) and (Ontogenetic and Other Variations in Musk- Oxen) (1913).

ALLEN, Sir John Campbell, Canadian jurist: b. Kingslear, N. B., October 1817; d. Fredericton, N. B., 27 Sept. 1898. He was member of the New Brunswick house of as¬ sembly 1856-65 ; solicitor-general 1856—57 , speaker 1863-65 ; attorney-general 1865. He

opposed confederation. Pie was chief justice of the Supreme Court of New Brunswick 1875— 96, and was knighted in 1889. His ‘Law Re- ports) (6 vols.) and rules of the Supreme Court and acts of assembly relating to the prac¬ tice of the courts are ranked highly.

ALLEN, John Romilly, English civil engi¬ neer and archaeologist: b. London, 9 June 1847; d. 5 July 1907. Educated at Rugby and King’s College, London, he became resident engineer on Baron de Reuter’s Persian railways and on the construction of docks at Leith and at Bos¬ ton, Lincolnshire ; was lecturer on archaeology at Edinburgh University. His books are ‘Design and Construction of Dock Walls> (1876) ; (Early Christian Symbolism in Great Britain (1887) ; (Monumental History of the Early British Church5 (1889) ; ‘Early Christian Monuments of Scotland5 (1903) ; (Celtic Art in Pagan and Christian Times5 (1904).

ALLEN, Joseph Henry, Unitarian clergy¬ man and author: b. Northborough, Mass., 21 Aug. 1821; d. Cambridge, Mass., 20 March 1898. He was graduated at Harvard 1840 and at its divinity school 1843 and filled pastorates at Northborough, Roxbury, Mass., Washington, D. C., Bangor, Me., and other places till 1878. For 12 years he was editor of the Christian Examiner. He was also lecturer on ecclesiasti¬ cal history at Harvard 1878-82, editor of the Unitarian Review 1887-98 and a prolific writer on religious and philosophical subjects. His chief works are: 'Ten Discourses on Ortho¬ doxy5 (1849) ; 'Hebrew Men and Times5 (1861) ; (Christian History in Its Three Great Periods5 (3 vols., 1880-82) ; 'Positive Religion5 (1892) ; (Unitarianism Since the Reformation5 (1894) ; translations of Renan's (Anti-Christ,5 (Origins of Christianity,5 and cHistory of the People of Israel.5 A Latin grammar and other schoolbooks, prepared in collaboration with Prof. J. B. Greenough, were extensively used.

ALLEN, Karl Ferdinand, Danish historian : b. Copenhagen, 23 April 1811; d. there, 27 Dec. 1871. He became professor of history and northern archaeology at the University of Co¬ penhagen in 1862. His principal works are (Handbook of the History of the Fatherland5 (1840), very democratic in tone, and (History of the Three Northern Kingdoms5 (1864-72).

ALLEN, Richard, preacher: b. 1760; d. Philadelphia, 26 March 1831. He organized the first church for colored people in the United States and was elected first bishop of the Afri¬ can Methodist Episcopal Church, 1816.

ALLEN, Robert, American soldier : b. Ohio about 181.5 ; d. Geneva, Switzerland, 1886. Graduating at West Point in 1836, he was second lieutenant in the Seminole war, assistant quartermaster in the Mexican war, brevetted major for conduct at Cerro Gordo and was in the battles that led to the capture of the City of Mexico. Appointed chief quar¬ termaster of the Pacific division, he was trans¬ ferred to Missouri at the outbreak of the Civil War, with headquarters in St. Louis, in charge of supplies and transportation for armies in the Mississippi Valley. He was made colonel in 1862, brigadier-general of volunteers 1863, brevet brigadier-general in the regular army 1864, brevet major-general 1865. From Novem¬ ber 1863 to 1866 he was chief quartermaster

of the Mississippi Valley with headquarters at Louisville, outfitted Sherman's march across country to Chattanooga and the Kentucky, Virginia and North Carolina expeditions. After serving a second time as chief quartermaster of the Pacific division he was retired in 1878.

ALLEN, Thomas, American landscape and animal painter : b. St. Louis, 19 Oct. 1849. He studied at Washington University, graduated at Royal Academy of Diisseldorf and studied in France three years. Has frequently ex¬ hibited at the Paris salons and was a judge of awards at the Worlds' Fair, Chicago 1893. He was chairman of the International Jury, of Awards at the Louisiana Purchase Exposition 1904, president of the International Jury at St. Louis in 1909 and in 1910 he became chairman of the Art Commission of the city of Boston.

ALLEN, Viola, American actress : b. Ala¬ bama, 27 Oct. 1867. She made her debut at the age of 15 at Madison Square Theatre, N. Y., in (Esmeralda.5 She has played leading classi¬ cal, Shakespearean and comedy roles. Be¬ tween 1893-1900 she created and played parts in (Sowing the Wind,5 (The Masqueraders,5 (Under the Red Robe,5 and starred in Hall Caine's Christian,5 F. M. Crawford's (In the Palace of the King,5 Hall Caine's (The Eternal City5 (1902), Shakespearean roles (1903-05). Among her best known Shakespearean roles are (Cymberline5 (1906) ; ˆTwelfth Night,5 (A Winter's Tale,5 (As You Like It.5 Consult Strang, L. C., (Famous Actresses of the Day in America5 (Boston 1899).

ALLEN, William, Cardinal, English ec¬ clesiastic: b. Lancashire 1532; d. at Rome, 16 Oct. 1594. He studied at Oxford and was Fellow of Oriel College but owing to the perse¬ cution of Catholics under Queen Elizabeth he left England, and in 1568 he founded an Eng¬ lish College at Douay, where aspirants to the priesthood might obtain the instruction denied to them at home. During the first five years of its existence, this college trained and sent back to England over 100 priests. Another of his claims to the gratitude of English-speaking Catholics is that while professor at Douay, in collaboration with Gregory Martins and Rich¬ ard Bristow, he translated the Bible from the Latin Vulgate into English. This translation is known as the Douay Bible and is the one generally used by Catholics in England and America. Fie published 10 volumes, chief among which is (Certain Brief Reasons Con¬ cerning Catholic Faith5 (1564).

ALLEN, William, American preacher and miscellaneous writer : b. Pittsfield, Mass., 2 Jan. 1784; d. Northampton, Mass., 16 July 1868. He became president of Dartmouth Uni¬ versity in 1817, and was president of Bowdoin College 1820-39. Of numerous works, both in

prose and verse, the best known is (American Biographical and Historical Dictionary5 (3d ed. 1857).

ALLEN, William, American public official : b. Edenton, N. C., 1806; d. 11 July 1879. He studied law at Chillicothe, Ohio, was admitted to the bar at 21, and in three years had become noted as a coming leader. In 1832 he was elected (Democratic) member of Congress by one vote, the youngest member of the 22d Con¬ gress. Fie was a leading champion of his party;

took an active part in the 1836 canvass for Van Buren, and was given the United States sena- torship by the Democrats at the earliest age of any senator before or since. He was re-elected in 1843, and in 1848 was tendered the nomina¬ tion for the Presidency by the supporters of both Cass and Van Buren, but refused from loyalty to Cass. After the expiration of his term Mr. Allen took no further part in public life for nearly a quarter of a century, till 1873 when he was elected governor of Ohio ; again nominated in 1875 as a ((rag- money)5 champion, he was defeated by Rutherford B. Hayes. His stentorian voice gave him the congressional nickname of the <(Ohio Gong55 ; and he is cred¬ ited with the famous slogan of the campaign of 1844 on the question of the northwestern boundary, <(Fifty-four forty or fight.55

ALLEN, William Francis, historian and es¬ sayist; b. Northborough, Mass., 5 Sept. 1830; d. 9 Dec. 1889. He was graduated at Harvard in 1851 ; studied at Berlin, Gottingen and Rome, 1854-56; was professor of Latin and history in the University of Wisconsin 1867-89 and is noted as a scholar of wide and varied attain¬ ments, equally strong in the linguistic, histori¬ cal and archaeological sides of his subjects. A list of his writings covers 30 12mo pages. Three of especial interest may be found in the Transactions of the American Philological As¬ sociation for the years given: (The Battle of Mons Graupius5 (1880) ; (Lex Curiata de Im- perio5 (1888); (The Monetary Crisis in Rome a.d. 33 5 (1887).

ALLEN, William Henry, American naval officer: b. Providence, R. I., 1784; d. 1813. Fie entered the navy in 1800 and served in some of the greatest naval battles in American history. For bravery displayed on the Chesapeake and United States he was made commander of the brig Argus in June 1813. He did great damage to English commerce in the Irish Channel, cap¬ turing in a month 27 ships. In a few days the Argus was taken by the English brig Pelican. In the battle Allen was shot, died soon after¬ ward and was buried with military honors in Plymouth, England.

ALLEN, Zachariah, American inventor : b. Providence, R. I., 15 Sept. 1795; d. 17 March 1882. He was graduated at Brown University in 1813, and was admitted to the bar in 1815, but soon turned his attention to manufacturing. He traveled in Europe 1825, to study manu¬ facturing methods, and on his return published the Practical Tourist.5 He invented in 1821 the first hot-air furnace for household use; in 1833 the automatic cut-off valve for steam en¬ gines ; and later an improved tire engine, ex¬ tension rollers and a storage system for water¬ power. He first suggested the system of mutual mill insurance, and drafted laws to regulate the sale of explosive oils. He was the first to compute the motive power of Niagara. He was a member from 1822 and president from 1880 of the Rhode Island Historical Society. He published (The Science of Mechanics5 (1829) ; (Philosophy of the Mechanics of

Nature5 (1851); (Solar Light and Heat, the Source and Supply5 (1879); etc.

ALLEN-A-DALE, the friend and con¬ fidant of Robin Hood in the Robin Hood bal¬ lads.

ALLENBY, Sir Edmund Henry Hynman,

K.C.B., English soldier: b. 23 April 1861. He entered the Inniskilling Dragoons and served with the Bechuanaland Expedition in 1884-85 and in Zululand in 1888. He served with great distinction throughout the whole South African War 1899-1902 in command of cavalry opera¬ tions : commanded the 5th Royal Irish Lancers 1902-05, and the 4th Cavalry Bri¬ gade from 1905 to 1910. From 1910 till 1914 he was inspector of cavalry. He accompanied the first British Expeditionary Force to France in the European War and commanded the cavalry division in the great retreat from Mons. He was specially mentioned by Sir John French for his skilful handling of the troops. He was promoted to lieutenant-general in January 1916; fought at the battle of the Somme; was promoted to general in June 1917 and transferred to Mesopotamia to co-operate with General Maude (q.v.). On 11 Dec. 1917 he took Jerusalem from the Turks, and on 21 beb. 1918 he also captured Jericho. See War, European ; Mesopotamia Campaign.

ALLENITES. See Allen, Henry.

ALLENSTEIN, al'len-stin', Germany, town of East Prussia, on the river Alle, 30 miles from the Russian frontier and 100 miles by rail northeast of Thorn. It is a fortified garrison town, and has manufactures of iron, machinery, stoves, matches, barrels, etc., and an active trade in grain and lumber. An im¬ portant railway junction, an airship station, it was the headquarters of the 20th German Army Corps when, in the first invasion in August 1914, it was occupied by the Russians, who, however, were compelled to retire a few days later. Pop. 33,000.

ALLENTOWN, Pa., city and county-seat of Lehigh County, on the Lehigh Valley, Cen¬ tral of New Jersey, Philadelphia and Reading and the Perkiomen railways and the Lehigh Canal, 92 miles west of New York city, 55 miles north of Philadelphia and 98 miles east of Harrisburg. The commercial and industrial metropolis of the Lehigh Valley, covering an area of six square miles, Allentown is well built on a plateau sloping toward the con¬ fluence of the Lehigh, Little Lehigh and Jordan rivers, and is the centre of three great trolley systems, touching every important city, town and village within- a radius of 36 miles, and extending in a two-hour connection to Phila¬ delphia. The power plants, car barns and machine shops of one transit company alone represent an investment of over $1,350,000. Nearly 600 diversified industries find a home in Allentown, including iron, silk,

furniture, shoes, cigars, hosiery, dyeing, automobile, wire, cement blocks, brick, clothing, lumber, automo¬ bile fire engines, etc. According to the special census of manufactures for the year 1914, there were 297 establishments of factory grade, employing 15,072 persons, of whom 13,685 were wage earners, receiving a total of $6,501,000 in wages. The aggregate of capital employed amounted to $26,716,000, and the value of the output was $33,918,000; of this, the value added by manufacture was $13,- 213,000. These figures show an increase of 29 per cent since 1909. Besides the local indus¬ tries, Allentown is commercially interested in the 18 cement companies with 34 mills in the

Lehigh district employing 12,000 men. They average an annual output of 25,000,000 barrels or about one-third of the total product of the United States. Within a 30-minute trolley ride is the $50,000,000 plant of the Bethlehem Steel Company, employing among its 12,000 men, from 1,000 to 1,200 skilled mechanics from Allentown. Allentown ranks second only to Paterson in the United States for the manu¬ facture of silks. Here is held annually with a four-day attendance of 200,000, the “Great Al¬ lentown Fair,® the greatest county fair in the United States. The large court house, fine hos¬ pital, free public library, many of the handsome churches, hotels, elegant banking institutions, spacious prison, and other public buildings, are of hewn limestone. The numerous educational buildings, 22 public schools, one open-air school, five colleges, include Muhlenberg College, a Lutheran institution founded in 1867, and the Allentown College for Women. Allentown maintains parks, well-equipped play grounds, an abundant pure spring water supply, pumped direct from the spring to the home with a daily flow of 12,000,000 gallons ; a street main supply of steam heat; an unlimited supply of electric power for manufacturing purposes and for its brilliantly illuminated streets, mer¬ cantile establishments, and homes; and a motorized fire department. A concrete bridge which cost $500,000 connects a rapidly growing section. By legislative enactment effective 1 Dec. 1913, the city is governed by a commission council of five members, including the mayor. The city's annual income averages $750,000.

Allentown was founded in 1762 by William Allen, Esq., Chief Justice of the Province of Pennsylvania, father-in-law of Governor John Penn, and a great friend of the Penn family from whom he derived his grants of land, and named Allentown in honor of its founder. Here, during the Revolution, the Liberty Bell, the bells now in Christ Church, and St. Peter’s, Philadelphia, were concealed by the Ameri¬ cans; and

here, in 1799, John Fries (q.v.), of “Fries Rebellion® notoriety, fomented the Ger¬ man opposition to the “window tax.® First inhabited by 13 German families and by the influence of the neighboring towns cut off for several years from the different post routes, it remained unprogressive until, in 1811, by the division of Northampton County, it became the seat of justice of Lehigh County, and by the act of the legislature passed 18 March 1811, was incorporated as Northampton borough with a population of about 800. With its advance to the rank of a county-seat, the town improved rapidly, and its accessibility to deposits of lime¬ stone, iron ore, anthracite coal, slate, zinc, cement, etc., added to its increasing importance in trade and wealth. An inadequate water sup¬ ply, one of its chief drawbacks, was removed in 1828 by the organization of a municipal water-works plant. In 1838 the original name of the town was restored, and in 1867 it re¬ ceived a special charter. Pop. (1910) 51,913; (1920) 73,502. Consult Roberts, C. H., and others, (History of Lehigh County) (3 vols., Allentown 1914).

ALLEPPI, a-lep'e, or ALLAPALAY,

a-lap'a-la, India, seaport town of Travancore State, Madras, 32 miles south of Cochin. Its fine harbor facilitates a large export trade in

coffee, cocoanuts, pepper, cardamoms, and local manufacturers of coir matting. Pop. 25,000.

ALLERTON, Isaac, one of the ˆPilgrim Fathers® : b. England about 1583; d. New Haven, Conn., 1659. He was one of the most influential members of the Plymouth Colony, but on account of some disagreement with his associates he removed to New Amsterdam in 1631, and later to New Haven. Mary Allerton, his daughter, was the latest survivor of the original Mayflower company.

ALLIACEOUS PLANTS. See Allium.

ALLIANCE, Neb., city and county-seat of Box Butte County, 350 miles northwest of Lincoln, on the Chicago, Burlington and Quincy Railroad. Stock-raising and butter-curing are its chief industries. The electric lighting plant and waterworks are the property of the munici¬ pality. Pop. 4,000.

ALLIANCE, Ohio, a city of Stark County, 56 miles southeast of Cleveland, an important railroad centre for the Lake Shore and Michi¬ gan Southern, Pittsburg, Fort Wayne and Chicago, Alliance, Niles and Ashtabula, Cleveland and Pittsburg railways and three interurban lines. Located in a fertile grain¬ growing region on the Mahoning River 1,000 feet above the sea and 500 feet above the level of Lake Erie, close to coal mines and an un¬ limited supply of natural gas, Alliance's lead¬ ing industries are electric overhead cranes, heavy machinery, structural iron, boilers, brass, bronze and copper goods, steel foundries, over¬ alls, flour mills, cash registers, agricultural im¬ plements, pipe organs, rubber goods, auto tires auto jacks, electric furnaces, hollow tile, cattle feed, butter and cheese. The United States census of 1914 recorded 52 manufacturing es¬ tablishments ot factory grade, employing 2,806 persons, of whom 2,333 were wage earners re¬ ceiving $1,617,000 in wages. The aggregate capital engaged was $8,665,000, and the output was valued at $7,175,000; of this, $3,519,000 was added by manufacture. These figures show an increase of 17 per cent since 1909. It has an annual bank clearing averaging $26,700,000 and an annual payroll of $8,000,000. Among its public buildings are the city hall, Mount Union College, Carnegie library, the Y. M. C. A. in¬ stitution and numerous church edifices, includ¬ ing those of German, Greek Catholic and Ru¬ manian faiths. The city is administered by a mayor elected biennially, seven councilmen, a director of public safety and a director of pub¬ lic service. The annual reccpits average $491,- 600; expenditures, $405,000. The city owns its water-works plant. Alliance dates from a set¬ tlement of 1838 named Freedom; it was re¬ named Alliance in 1851, was incorporated as a village in 1854 and received a city charter in 1888. Pop. (1910) 15,083; (1916) 22,600.

ALLIANCE ISRAELITE UNIVER- SELLE. See Jews and Judaism — Alliance Israelite Universelle.

ALLIANCE OF THE REFORMED CHURCHES HOLDING THE PRESBY¬ TERIAN SYSTEM, a voluntary organization popularly styled the Presbyterian Alliance, formed in London in 1875. Its councils have much moral significance but possess no legisla¬ tive authority. Rather more than 90 Presby¬ terian bodies are represented in the alliance,

with some 25,000,000 adherents in all parts of the world. The first general council of the al¬ liance met in Edinburgh in 1877 ; and subse¬ quently Philadelphia, 1880: Belfast, 1884; Lon¬ don, 1888; Toronto, 1892; Glasgow, 1896; YVashington, 1899; Liverpool, 1904. Between councils business is entrusted to an executive commission.

ALLIANCE, TRIPLE. See Triple Alli¬ ance.

ALLIANCES, in international relations, are coalitions or leagues entered into between rulers or states for the purpose of combined action of a political or military nature. An alliance may be defensive or offensive, or both, in giving circumstances stipulated for in a treaty. A treaty is the contract signed by the representatives of the states which are parties to the alliance, and defines the conditions under which the contracting powers are pledged to defend each other against an attack in war, or of jointly attacking another state. Nominally, only independent or ˆsovereign® states have the power to contract alliances ; yet there have been several cases where states under suzerainty have concluded alliances without consent of the suzerain. A neutralized state, i.e., a state such as Belgium, the existence of which is guar¬ anteed by other states, can contract alliances only for the purpose of defense ; an offensive alliance would involve a breach of its neutrality. Alliances may be permanent or temporary; in the latter case they expire with the period of time for which they were formed, and are either renewed or “denounced® (canceled). It is a generally recognized rule of international law — in theory, at least — that immoral obligations cannot be the object of an international treaty; hence offensive alliances are regarded as valid only when their object is not immoral. Yet what may appear immoral to the outsider may be quite otherwise to those directly involved. An interesting example of this kind is fur¬ nished by the Balkan League (q.v.). Aggres¬ sive in intent (and therefore “immoral®), the League made war upon Turkey in order to liberate their respective co-religionists and co¬ nationals from political oppression, a perfectly “moral® undertaking. The most important con¬ ditions of an alliance are those which refer to mutual support in the event of war, which may consist either of military or of naval assistance, or of both. Where financial assistance only is involved, such a pact is termed a treaty of subsidy, not an alliance. Any agreement in¬ volving physical — as apart from “moral®— support, or the permitting of the passage of troops or of warships through territorial waters, constitutes an alliance. Thus, strictly speaking, the passage of the Goeben and Breslau through the Dardanelles early in the war ipso- facto constituted an alliance between Turkey and the Central Powers as the vessels were not interned according to international law. The term casus foederis signifies the oc¬ currence of the event provided for by treaty which makes it imperative for one or more of the contracting parties to render the assistance promised under the terms of the alliance exist¬ ing between them. In a defensive alliance the casus foederis arises immediately war is declared against one of the allies.

Unless the casus foederis is precisely defined in the treaty of

alliance, different interpretations and contro¬ versy may arise. Under the terms of the Triple Alliance, for instance, Italy was pledged to support Austria if that country were at¬ tacked. Austria, however, made war on Serbia, which the Italian government regarded as an aggressive, and not defensive, act, and there¬ fore claimed that the casus foederis did not arise.

Separate articles are devoted to Dual Alliance, Holy Alliance, Quadruple Alli¬ ance, Treaties and Triple Alliance (all of which see). An alliance (known as the Dual) was started in 1893 between France and Russia and definitely established in 1897. In 1903 was initiated the so-called “Entente Cordiale® between France and Great Britain, which became definite in 1905 after the Anglo- French Convention of 1904, by which were settled all the outstanding disputes between the two countries referring to Egypt, Morocco, and the Newfoundland Fisheries. The Anglo- Russian Agreement of 1907 similarly settled disputes between those two countries, and the Entente developed into the Triple Entente of Great Britain, France and Russia. Just after Germany had declared war on Russia in 1914, Sir Edward (now Viscount) Grey informed the House of Commons (3 August) that ((The Triple Entente was not an alliance; it was a diplomatic group. . . . Up till yesterday no

promise of anything more than diplomatic sup¬ port was given. . . . We are not parties

to the Franco-Russian Alliance. We do not even know the terms of it.® After the Morocco crisis in 1911 Sir Edward Grey had written to the French Ambassador (22 Nov. 1912) to the following effect : ((. . . I agree that, if

either government had grave reason to expect an unprovoked attack by a third Power or something which threatened the general peace, it should immediately discuss with the other whether both governments should act together to prevent aggression and to preserve peace, and, if so, what measures they would be pre¬ pared to take in common.®

The Anglo- Japanese Alliance dates from 1902 ; it was renewed in 1905 and revised in 1911. The objects aimed at in the treaty are the maintenance of peace in eastern Asia and India; the preservation of

the independence and integrity of China with the <(open door® ; and the maintenance of the territorial rights and the defense of the special interests of the contracting powers in the Far East. It is also provided that if by reason of unprovoked _ at¬ tack or aggressive action, wherever arising, on the part of any other power or powers, either party should be involved in war in de¬ fense of its territorial rights or special inter¬ ests, the other party will at once come to the assistance of its ally, and will conduct the war in common, and make peace in mutual agree¬ ment with it. This agreement was modified in 1911, mainly by the addition of a new article providing that (<should either party conclude a treaty of general arbitration with a third Power, it is agreed that nothing in this agree¬ ment shall entail upon such party an obligation to go to war with the Power with whom such treaty of arbitration is in force.® The proviso as to arbitration had in view the Anglo- American unlimited Arbitration Treaty signed

in 1911, but not ratified by the Senate (see below.)

The Anglo-Portuguese Alliance has a re¬ markable history. On 23 Feb. 1916 Portugal seized 36 German and Austrian merchant ships interned in her ports. Germany declared war o 10 March 1916. The Portuguese Minister in Washington, Viscomde de Alte, stated that his country's entrance into the war was in fulfilment of a treaty obligation entered into between England and Portugal on 16 June 1373, of 543 years ago. The friendly relations which Henry II of England (d. 1189) had established with the princes of the Iberian Peninsula made the few dealings between the early Portuguese monarchs and the English court of a generally amicable nature. The treaty in question was concluded between Edward III and Ferdinand of Portugal, and provided that Portugal should join England (there was no ((Great Britain® then), in warfare when called upon to do so. A commercial treaty was concluded with Eng¬ land in 1645 and renewed in 1652. These treaties had never been broken through the centuries. Again, in 1898, treaties were pub¬ lished in which neither party will help another nation in attacking the other party, and in case of war or invasion both powers agreed to assist each other when required.

In September 1914 was concluded the Anglo- American Treaty by which the contracting powers agree that w a 1 1 disputes between them, of every nature whatsoever, other than dis¬ putes the settlement of which is provided for and in fact achieved under existing agreements, .j . . shall, when diplomatic methods of ad¬

justment have failed, be referred for investi¬ gation and report to a Permanent International Commission . . . and they agree not to

declare war or begin hostilities during such investigation and before the report is sub¬ mitted.®

In September 1914 the Allied Powers, Great Britain, France and Russia, signed a declara¬ tion that they would not conclude peace sep¬ arately, and that no one of the Allies would demand conditions of peace without the pre¬ vious agreement of each of the other Allies. Japan and Italy subsequently gave their full and complete adherence to this treaty of alliance (November 1915).

ALLIBONE, Samuel Austin, American bibliographer and librarian : b. Philadelphia, 17 April 1816; d. Lucerne, Switzerland, 2 Sept. 1889. For a time he engaged in mercantile pursuits ; was book-editor of the American Sunday-School Union, 1867-73 and 1877-79; and in 1879 was appointed librarian of the Lenox Library, New York. He is best known by his (Critical Dictionary of English Literature and British and American Authors1 (3 vols., 1854—71), a monumental work that cost him 20 years of labor. It contains notices of 46,499 authors, with extracts from reviews of their works, and 40 classified indexes of subjects. It is an indispensable reference work for libraries and students. A supplement containing over 37,000 authors, by John Foster Kirk, appeared in two volumes, 1891. Others of Allibone's works are (Poetical Quotations from Chaucer to Tennyson1 (1873), containing 13,600 pas¬ sages from 550 authors ; (Prose Quotations from Socrates to Macaulay1 (1876), with indexes to the 8,810 quotations, and containing the

names of 544 authors and 571 subjects; Ex¬ planatory Questions on the Gospels and the Acts (1869) ; (An Alphabetical Index to the New Testament (1868) ; indexes to Edward Everett's Orations and Speeches) (1859) ; (Great Authors of All Ages: Selections \ (1880). New editions of the (Prose Quota- tions) and the (Poetical Quotations) appeared in 1893 and 1891 respectively.

ALLICE, or ALLIS (Fr. alose} from Lat. alausa), the larger European shad (Alosa vul¬ garis), about 20 inches long. There is but one other shad in Europe, the twaite. In the Rhine valleys both are called mdifisch. See Shad; Twaite.

ALLIED WAR COMMISSIONS TO THE UNITED STATES. Beginning in April 1917, a succession of conferences took place in the United States, the main objects of which were to co-ordinate the efforts of the Entente Allies and of the United States and to discuss the conduct of

the war in Europe. The chief commissioners entrusted by their re¬ spective governments with such important du¬ ties were men of high distinction and ability; the conferences at Washington were supple¬ mented by visits to many other cities ; every¬ where the commissioners were received with cordial demonstrations of enthusiasm; during the long voyages and land journeys no serious mishap occurred ; and, finally, the results at¬ tained were pronounced both satisfactory in their immediate effect and of far-reaching importance for the future.

The first commissions to reach the United States were those from Great Britain and France. The British mission was composed of the Rt. Hon. Arthur James Balfour, foreign minister; Sir Eric Drummond; Ian Malcom, member of Parliament; C. F. Dormer and G. Butler, personal staff ; Rear-Admiral Sir Dudley R. S. de Chair; Fleet Paymaster Vincent Law- fort; Major-General Bridges ; Capt. H. H. Spen¬ der-Clay and Lord Cunliffe, governor of the Bank of England. In addition to the foregoing, James H. Thomas and Charles W. Bowerman, members of the House of Commons, were selected by Premier Lloyd-George to explain in detail the measures taken in Great Britain to solidify the labor resources. The personnel of the French mission was announced 18 April as follows: M. Viviani (Rene Viviani), former premier and minister of justice; Marshal Joffre ; Vice-Admiral Chocheprat ; Marquis de Cham- brun, member of the Chamber of Deputies. Attached to the French mission were: M. Si¬ mon, inspector of finances ; M. Hovelacque, in¬ spector-general of public instruction. Members of Marshal Joffre's staff were: Lieutenant- Colonel Fabry, Lieutenant-Colonel Remond, Commandant Requin, Lieutenant de Tessan and Major Dreyfus. The British commissioners left England 11 April on a fast cruiser; arrived at Halifax 20 April ; at the Canadian town of McAdams were welcomed by the American reception committee, headed by Assistant Sec¬ retary of State Long, Rear-Admiral Fletcher and Major-General Wood ; and on 22 April arrived in Washington. The French mission crossed on a steamship of the French Line which was convoyed across the Atlantic. The safe arrival of the commissioners was an¬ nounced 24 April. A permanent technical

French commission to the United States which arrived in Washington 16 May had as its chief Capt. Andre Tardieu, French deputy and publi¬ cist, and its membership included several of the most eminent scholars of France. Six members of the Italian war commission reached New York 9 May, the other members arriving later in the month. The Italian envoys were: Prince Ferdinand of Savoy (Prince of Udine, cousin of King Victor Emmanuel) ; Senator Guglielmo Marconi inventor of wireless telegraphy; Mar¬ quis Luigi Borsarelli di Rio

Freddo, 'under sec¬ retary of foreign affairs ; Deputy Ciufelli, mem¬ ber of the Council of State and former min¬ ister of public instruction; Deputy Nitti, former minister of agriculture; Enrico Arlotta, finan¬ cier and minister of maritime and railway trans¬ portation in the Italian cabinet ; General Guglie- motti, representing the army ; Commander Vannutelli, representing the navy ; Aloise Bra- gadoni, of the transportation department ; Cavalier G. Pardo, of the department of in¬ dustry and commerce ; and Cavalier G. Pietra, of the agricultural department. The departure of the French envoys was kept secret. They sailed from New York 15 May on the same steamer which brought them over; were con¬ voyed by a French warship and reached Brest 23 May. The British envoys, after six weeks of conferences, crossed into Canada 25 May ; and on 11 June Lord Northcliffe arrived in the United States, having been appointed as Mr. Balfour's successor in the American phase of war measures initiated by the British mission. On 16 June the Belgian war commission ar¬ rived. Its members were : Baron Moncheur, formerly Belgian minister to Washington ; Maj.-Gen. Mathieu G. A. Leclerq ; Count Louis D'Ursel; Maj. Leon Osterrieth, formerly mili¬ tary attache of the Belgian legation at Petro- grad; and Hector Carlier, a bank expert of international reputation. When greeting this mission, 18 June, President Wilson expressed America's <(solemn determination that on the inevitable day of victory Belgium shall be restored to the place she has so richly won among the self-respecting and respected nations of the earth. ® On 19 June the Russian mission reached Washington. The members of this special embassy, in the order of their rank, were : Ambassador Boris A. Bakhmetieff ; Lieutenant-General Roop, representative of the Russian army; Professor Lomonosoff, member of the Council of Engineers and representative of the ministry ; Professor Borodine, represen¬ tative of the ministry of agriculture; M. No- vitzky, representative of the ministry of fi¬ nance; M. Soukine, first secretary of legation, ministry of foreign affairs; Captain Dubassoff of the guard, aide-de-camp; and Captain Chutt Less than one month afterward the Japanese commission reached the Pacific coast of the United States. The chief envoy was Viscount Kikujiro Ishii, formerly the foreign minister of the Japanese empire. Other members of the commission were : Vice-Admiral Isam Take- shita, formerly naval attache of the Japanese embassy at Washington; Maj.-Gen. Shoichi Sugano; Matsuzo Nagai, secretary to the for¬ eign department; Capt. Shokyo Ando; Maj. Seiji Tamakawa and Tadanao Imai, the sec¬ retary. Viscount Ishii's first formal and com¬ prehensive statement concluded with the words :

<(Lct us see together with a clearer vision the pitfalls dug by a cunning enemy in our path; let us [the United States and Japan] together fix our eyes upon the star of principle which shall lead us together most surely to a participation in the triumph of the right, to a certain victory in the greatest and, let us hope, the last great war in human history. And when that victory shall have been won, let us together help in the upbuilding of a new world, which shall rise, fair and strong and beautiful, from the ashes of the old.® With the arrival of the Japanese commission in Washington, 22 August, and its subsequent visits to New York and other cities of the eastern seaboard, the series of conferences which we are recording reached the point at which initial gains in the international arrangements for co-ordination of the efforts of the principal Entente Allies may be noted. The measures actually adopted or tentatively decided upon included : The grant¬ ing of huge loans to the Allies; the sending of troops of the United States (in the first in¬ stance a division of regulars, with a regiment of marines and nine regiments of engineers, under command of Major-General Pershing) for service in France; adherence to and full co¬ operation with the British blockade system; the expediting of the American ship-building pro¬ gram, and the turning over of seized German ships to France, Italy and Russia; the provision made for a system of joint food-control with the Allies ; the diplomatic arrangements for the granting to the Allies of preferential treatment in commerce and for harmonious action in many specified matters of international im¬ portance, including ultimately policies and de¬ velopments relating to the Pacific as well as to the Atlantic. During the summer and autumn of 1917 the United States also received visits from commissions representing the neutral na¬ tions, Norway, Switzerland, Holland, as well as those representing belligerent nations identi¬ fied with the cause of the Entente Allies, rather as participants than as leaders. In January 1918 the Serbian commission visited Washing¬ ton and other cities, and was well received.

ALLIER, al-le-a, France, a central depart¬ ment intersected by the river Allier and partly bounded by the Loire ; surface diversified by off-sets of the Cevennes and other ranges, rising in the south to over 4,000 feet and in general richly wooded. It has extensive beds of coal as well as other minerals, which are actively worked, there being several nourishing centres of mining and manufacturing enterprise; min¬ eral waters at Vichy, Bourbon, L'Archambault, etc. Large numbers of sheep and cattle are bred. Area, 2,822 miles. Capital, Moulins. Pop. 500,000.

ALLIER, a river of France, tributary of the Loire, rising in the department of Lozere and flowing northward about 200 miles through

Lozere, Upper Loire, Puy de Dome and Allier.

/

ALLIGATOR, the name of a genus of crocodilian reptiles derived form a corruption of the Spanish el lagarto, ((lizard,® from the Latin lacertus, a lizard. Alligators differ from crocodiles mainly in having relatively short and broad snouts and by the circumstance that as a rule the first and fourth tooth on each side of the lower jaw enter into pits in the

upper jaw, whereas those of crocodiles slide outside of the jaw and are visible. The cay¬ mans of South America maj' be included in the general term. These reptiles arc confined mainly to the rivers of the New World, in which they typically represent the crocodiles of the eastern hemisphere, but there is one species in China (Alligator sinensis) first made known in 1879, and resembling the South American species. The best-known species are the alli¬ gator of the Southern States (Alligator mis- sissippiensis) ; the cayman of Surinam and Guiana (A. palpebrosus) , and the spectacled alligator (A. sclerops), found in Brazil. In the water a full-grown alligator is a formidable animal, on account of its great size and strength. These reptiles swim with wonderful celerity, impelled by their long, laterally-compressed and powerful tails. On land their motions arc pro¬ portionally slow and embarrassed, owing to their weight, the shortness of their legs and generally unwieldy proportions. It grows to the length of 15 or possibly 20 feet, and is covered above by a dense armor of horny scales.

Under the throat of this animal are two openings or pores, the excretory ducts from glands which pour out a strong, musky fluid, giving the alligator a peculiarly unpleasant smell. In the spring of the year, when the males are under the excitement of the sexual propensity, they frequently utter a loud roar, which, from its harshness and reverberation, resembles distant thunder, especially where numbers are at the same time engaged. At this period frequent and terrible battles take place between the males, which terminate in the discomfiture and retreat of one of the parties. The females make their nests in a curious man¬ ner, on the banks of rivers or lagoons, generally in the marshes, along which, at a short distance from the water, the nests are arranged some¬ what like an encampment. They are obtuse cones four feet high and about four feet in diameter at the

base, built of mud and grass. A floor of such mortar is first spread upon the ground, on which a layer of eggs, having hard shells and larger than those of a common hen, are deposited. Upon these another layer of mortar, seven or eight inches in thickness, is spread, and then another bed of eggs ; and this is repeated nearly to the top. From 100 to 200 eggs may be found in one nest. It is not ascertained whether each female watches her own nest exclusively or attends to more than her own brood. It is unquestionable, however, that the females keep near the nests and take the young under their vigilant care as soon as they are hatched, defending them with great perseverance and courage. The young may be seen following the mother through the water like a brood of chickens following a hen. When basking in the sun on shore, the young are heard whining and yelping about the mother, not un¬ like young puppies. In situations where alli¬ gators are not exposed to much disturbance the sites of the nests appear to be very much fre¬ quented, as the grass and reeds are beaten down for several acres around. The young, when first hatched, are very feeble and helpless, and are devoured by birds of prey, soft-shelled turtles, etc., as well as by the male alligators, until they grow old enough to defend themselves. As the eggs are also eagerly sought bv vultures and

other animals the race would speedily become extinct but for the great fecundity of the females.

The alligator is generally considered as dis¬ posed to retire from man, but this is only where they are frequently disturbed. In situations where they are seldom or never interrupted they have shown a ferocity and perseverance of the most alarming character in attacking individ¬ uals in boats, rearing their heads from the water and snapping their jaws in a threatening man¬ ner. At present alligators, though still numer¬ ous in the remoter parts of Florida and Louisiana, are no longer regarded as very dan¬ gerous. Their numbers annually decrease and at no distant period they must be nearly, if not quite, exterminated. In the winter the alligators spend a great part of their time in deep holes, which they make in the marshy banks of rivers, etc. They feed on fishes, rep¬ tiles, small quadrupeds (dogs if they can get them) or carrion, and though very voracious are capable of existing a long time without food. Compare Crocodile; and see Cayman; Jacare.

ALLIGATOR-APPLE. See Custard- Apple.

ALLIGATOR-FISH, one of the Agonida ?, a family of fish whose slender bodies are armored by large bony plates. One species 12 inches long (Podothecus acipenserinus) is found on the northern Pacific coast.

ALLIGATOR-GAR, the immense greenish colored gar (Litholepis tristcechus) found in the Southern States and southward through North America, and sometimes measuring 10 feet. See Gar.

ALLIGATOR-LIZARD, any member of the genus Sceloporus, which, although iguanid, has n*iany small species without the typical iguanid characteristics. They abound in Mexico and the southwestern United States, and one species (Sceloporus undulatus) is the familiar ((fence lizard® of the colder States. Though often inconspicuously colored on the back ex¬ cept for black crosslines, the throat and in¬ ferior surfaces are generally striking in color, and frequently there are light lines along the sides. They are often ignorantly called poison¬ ous, but all are harmless.

ALLIGATOR-PEAR, or AVOCADO,

a tree, Persea gratissima, of the family Laura- ccce, indigenous to subtropical and tropical America and widely cultivated in warm coun¬ tries for its more or less pear-shaped, purple- or green-skinned fruits, each of which contains a single seed embedded in a yellowish-green edible marrow-like pulp. Wherever it grows the alligator-pear is highly prized as a salad and is usually served with pepper, salt and vinegar, or with wine and spice, but natives of temperate climates usually have to acquire a taste for it. It is rich in oil, which may be used in soap-making and in lighting. The seeds yield a black dye. Seedlings are easily raised and begin to bear in about five years if planted in good soil in warm places, but they are usually improved by budding from selected stock. Except in southern Florida and south¬ ern California the avocado-pear does not pro¬ duce palatable fruit in the United States. The

American market, therefore, which is limited to the larger cities, has been mainly supplied from Hawaii, Mexico and the West Indies. In recent years many trees have been planted in Florida and southern California, which have yielded a superior quality of fruit which is con¬ stantly finding a wider market. The fruit is sometimes called midshipman’s butter and aguacate.

ALLIGATOR-TERRAPIN, -TORTOISE, or -TURTLE, the snapping-turtle; more partic¬ ularly, a very large species (Macrochelys lacer- tina)

which is eaten and esteemed as a delicacy in the lower valley of the Mississippi. It some¬ times weighs 50 pounds.

ALLINGHAM, William, Irish poet; b. Ballyshannon, Ireland, 19 March 1824; d. Hampstead, 18 Nov. 1889. From 1846 to his retirement in 1870 he held various posts in the Irish customs service. He was sub-editor of Fraser s Magazine, 1870-74, when he succeeded James Anthony Froude as editor, and con¬ ducted it with ability until 1879. At its best Allingham's poetry is excellent, being simple, clear and graceful, and whether pathetic, sportive or descriptive is always characterized by delicate artistic expression. His best work is in the volume called (Day and Night Songs' (1854). ˆLaurence Bloomfield in Ireland) (1864), a long poem which has been called <(the epic of Irish philanthropic landlordism,® has a wealth of fine description, but was not a public success. Other volumes are (Poems) (1850), (The Ballad Book' (1864), (Songs, Ballads and Stories' (1877), (Collected Poeti¬ cal Works' (6 vols., 1888-93).

ALLISON, William Boyd, American legis¬ lator : b. Perry, Ohio, 2 March 1829; d. 4 Aug. 1908. A farmer's son, he received his education at Allegheny College, Pennsylvania, and at Western Reserve College, Ohio. He practised law in his native State till 1857, when he re¬ moved to Dubuque, Iowa. A Republican and trusted local leader, he was sent as a delegate to the Republican national convention in Chicago in 1860, which nominated Lincoln. In the early part of the Civil War he served on the governor's staff, and was actively engaged in raising troops for the Union army. In 1863 he was elected to Congress and served by suc¬ cessive re-elections till 1869; on 4 March 1873 he was elected to the United States Senate, and was five times re-elected, in 1878, 1884, 1890, 1896 and 1904, his many years of service mak¬ ing him one of the oldest as he has always been one of the most influential leaders. He has served on many important committees ; and as chairman of the finance committee in 1878 •was the chief author of the bill that committee reported for the purchase of silver bullion, known as the Bland- Allison Act (see Bland Silver Bill), a compromise from the free-coin- age bill of Congressman Bland. He was re¬ peatedly a strong candidate in Republican na¬ tional conventions for the Presidency; and was offered the secretaryship of the treasury by both Garfield and Harrison. In 1892 he was a representative of the United States at the Brus¬ sels Monetary Conference.

ALLITERATION, the succession or fre¬ quent occurrence of words beginning with the same consonant. In the older Scandinavian,

German and Anglo-Saxon poetry it served in¬ stead of rhyme. It is found in early English poetry with the same function. As thus used it had a certain regularity of accent and em¬ phasis. In (Piers Plowman) the line is con¬ structed with two hemistichs, the former with two words beginning with the alliterative letter, and the latter with one, thus :

“Her robe was full rich with red scarlet engreyned.”

The poetry of widely separated nations ex¬ hibits this device, it being found both in India and in Finland. It still remains in Icelandic poetry. Early in the 17th century English writers ran to great extravagance in the use of alliteration, both in prose and poetry. It is said that preachers from their pulpits addressed their hearers as <(chickens of the church'* and (<sweet swallows of salvation.® No other device of composition so easily lends itself to fanciful conceits or ingenious trifling. The ease with which devices may be marshaled would hardly tend to make the ordinary reader appreciative of Churchill’s description of him¬ self as one

“Who often, but without success, had prayed For apt alliteration’s artful aid.”

But the couplet itself is a striking proof of its own truth, for it shows that the poet did not know what alliteration is : it must be of con¬ sonants, not vowels, and even so his a’ s are alike only to the eye, not the ear. All good poets have used it to lend musical beauty or emphasis to their verse, though it can be over¬ used or misused. Following are a few from the chief American poets :

“And the spark struck out by that steed in his ./light Kindled the land into ./lame with its heat.”

Longfellow.

“It carves the 5ow of beauty there,

And the ripples in rhymes the oar forsake.”

Emerson.

“Of wailing winds, and naked woods.”

Bryant.

"And /?ark! /zow cleat bold chanticleer,

Warmed with the new wine of the year.”

Lowell.

“Stole with soft steps the shining stairway through.”

Holmes.

"What a /ale of /error now their /urbulency /ells!”

Poe'

"Across the mournful marbles play.”

Whittier

ALLIUM, a genus of about 300 perennial, rarely biennial, bulbous herbs of the family Liliacece, mainly indigenous to the colder parts of the northern hemisphere. The leaves are generally long and narrow, often, however, cylindrical and hollow ; the flowers in umbels, often with bulblets among them. Many of the species are economically important ; for in¬ stance, Allium ccpa, the onion; Allium sativum, garlic; Allium porrum, leek; Allium ascaloni- cum, shallot; Allium schccnoprasum, chives; Allium scorodoprasum, rocambole, each of which is treated separately under its common name. Several uncultivated members of the genus are also used as food in countries where they grow wild. Allium vine ale, wild onion or wild garlic, a European species introduced into the United States, is a troublesome weed, es¬ pecially in New England pastures, since it im¬ parts a strong flavor of garlic to the milk of cows feeding upon it. (See Garlic). Many species are natives of the United States, but none of them have been cultivated for food;

some, however, are planted for ornament. Per¬ haps the most common eastern species are Allium cernuum , Allium canadense and Allium tricoccum, the last generally known as the wild leek, a broad-leaved species which grows in moist woods, from Maine to North Carolina and westward to Wisconsin. Some of the hardy species are grown for ornament in gar¬ dens; for example, Allium moly and Allium roseum, from Europe; Allium victorialis, from Siberia; Allium acuminatum, from the Western States. Others, especially Allium neapolitanum, a tender European species, are often grown in

greenhouses.

ALLMERS, Hermann Ludwig, al-merss, her'man lut'vik, German poet and author : b. Rechtenfleth, 11 Feb. 1821; d. 1902. His (Idle Days in Rome *(1869; 9th ed. 1896) was widely read. Others are: (Captain Bose* (1882); (Fromm und Frei *(1889), a volume of re¬ ligious poems; (From an Old and Young Past Time* (1895); Collected Works *(6 vols., Oldenburg 1891-95). Consult Brautigram, L., (Der Marschendichter Hermann Aimers*

(1891).

ALLMOUTH, a fish. See Goosefish.

ALLOA, al'loa, a river port of Scotland, on the north side of the Forth, five miles from Stirling, in the county of Clackmannan. It is irregularly built, but contains some good streets and buildings, including the parish church, the county court house, the town hall and the public baths. It carries on several manufac¬ tures, chief of which are ale, whisky, woolen yarn and bottles. There are some large col¬ lieries in the neighborhood. Alloa has an ex¬ cellent harbor, from which it exports coal, ale and fire-brick, and imports timber, hemp, oak- bark, grain, etc. The river is here crossed by a viaduct of the North British Railway. There is an ancient tower in the vicinity, once the residence of the Erskine family. Pop. 17,200.

ALLOBROGES, the name of a people who lived in ancient Gallia Narbonensis and occu¬ pied the country below the Lake of Geneva and the Rhone, now included in Savoy and the French province of Dauphine. They long struggled for their independence against the Romans, but were finally subjugated by Fabius Maximus.

ALLOCUTION, an address, a term partic¬ ularly applied to certain addresses made by the Pope to the cardinals.

ALLODIUM (((without vassalage**). Ap¬ plied to lands, allodium, or allodial tenure, sig¬ nifies an estate held by absolute ownership, without regarding any superior to whom any duty is due on account thereof. The title to land in the United States is essentially allodial, and every tenant in fee simple has an absolute and unqualified dominion over it ; still, in tech¬ nical language, his estate is said to be in fee, a term implying a feudal relation, although such a relation has ceased to exist in any form, while in many of the States of the Union the lands have been declared to be allodial.

ALLOGAMY, the transfer of the pollen of one flower to the pistil of another. When the pollinated flower is on the same plant the process

is knoAvn as geitonogamy, and when on a different plant it is known as xenogamy.

Allogamy is the opposite of autogamy, or self- pollination. See Pollination.

ALLON, Henry, English Congregational clergyman: b. Welton, 13 Oct. 1818; d. London, 16 April 1892. He was educated at Chestnut College. From 1844 until his death he was minister of Union Chapel, Islington. He was chairman of the Congregational Union 1864 and 1881. He compiled a hymnbook widely used in his denomination. He also compiled anthem books. He was the author of (The Life of Rev. James Sherman) (London 1863). He edited the British Quarterly Review, 1865— 87. His life has been written by his successor, W. H. Harwood.

ALLOPATHY. See Therapeutics.

ALLOPHANE, al'6-fan; from the Greek alios, ˆother,® and phanos, ˆappearing,® in allu¬ sion to its change of appearance before the blowpipe, a native silicate of aluminum, having the formula Al2Si05 + 5H20, and occurring in thin, amorphous, brittle incrustations, with a hardness of 3. and a specific gravity of about 1.87. It is found in a great variety of colors, due to the presence of other minerals. In the United States it occurs in Massachusetts, Con¬ necticut, Pennsylvania and Tennessee.

ALLORI, al-16're, a family of artists who flourished during the 16th century in Florence. The best of them was Angelo (or Agnolo) di Cosimo Allori (b. Monticelli, near Florence, about 1502; d. 1572).. Like his nephew Ales¬ sandro (b. Florence 1535; d. 1607), he was surnamed Bronzino, and both are more often spoken of by this name than by that of their family. The third Allori to attain eminence as a painter was the son of Alessandro — Cristo- fano (1577-1621), who is also, though less fre¬ quently, referred to as Bronzino. Angelo studied mainly under Raffaelino del Garbo and Jacopo Carrucci (Pontormo). The latter, greatly attached to his pupil, associated him in the work of painting some of his most im¬ portant decorations, notably the ceiling of the Medicean chapel of San Lorenzo, which Bron¬ zino completed after Pontormo's death. A friendship with Vasari, biographer of the Italian painters, was one of the factors on Bronzino's coming under the influence of Michelangelo. He does not succumb to it to the extent

that his nephew Alessandro did — the latter must be classed as one of .Michel¬ angelo's imitators. Angelo, with all his classi¬ cal study, preserved a racy force of observation that gives to his famous portraits of the Medici family, like the famous (Cosimo U in the Pitti Gallery, Florence, or better yet, those of the Panciaticchi family, their living appearance and their dignity. The fineness of his draughts¬ manship — an example being the (Venus) of the National Gallery, London — one of the high points of the later Florentine school, is stiffened and hardened by his nephew and pupil Ales¬ sandro, who marks the beginning of the rapid decline of Florentine painting. In the hands of Cristofano it is little better than academic and sentimental. The (J ndith , in the Pitti Palace is the finest and best known work by Cristo¬ fano.

ALLOSAU'RUS, an extinct carnivorous dinosaur of gigantic size, inhabiting North America during the Jurassic Period. It was one of the largest of flesh-eating animals, ex¬

ceeding 30 feet in length, and comparable with an elephant in bulk. The animal was a biped with long hind legs, small fore legs not reach¬ ing the ground and long massive tail. The jaws are three feet long, with pointed, sharp- edged teeth, and the toes armed with large sharp claws, those of the fore foot being espe¬ cially powerful. The hind feet somewhat re¬ semble those of birds. Fossil skeletons of herbivorous dinosaurs frequently show deep scratches and scorings on the softer edges of the bone, and broken-off teeth of Allosaurus are very often found associated with them, showing that this animal preyed on the car¬ casses of his huge herbivorous contemporaries ; it was well adapted also by its teeth and claws to attack them when alive, and was probably their especial foe. See Dinosaur.

ALLOTROPY, a-lot'rd-pi, or ALLOT¬ ROPISM (from the Greek alios, ˆanother,® and tropos, "manner®), the property exhibited by certain substances of existing in two or more different states distinguished from each other by different properties. The most familiar case of allotropy is afforded by carbon, which exists in a number of allotropic modifications, of which charcoal, graphite and the diamond are familiar examples. Allotropy is not ex¬ hibited by the metals to any marked degree (see, however, Silver). Sulphur exhibits many allotropic forms, of which the following are the best known: (1) It occurs in rhombic crys¬ tals, having a specific gravity of 2.07, melting at 235° F., and soluble in carbon disulphide; (2) in monoclinic crystals, having a specific gravity of 1.96, melting at 243° F., and soluble in car¬ bon disulphide; (3) in an amorphous plastic state, insoluble in carbon disulphide ; (4) im¬ mediately above its melting

point it is thin, clear and amber-colored; (5) at about 400° F. it be¬ comes thick and dark; and (6) at about 650° F. it is again thin, but remains dark.

Ozone is a familiar allotropic form of oxygen, produced when the silent electric dis¬ charge is allowed to act upon oxygen. It is known that the molecule of oxygen contains two atoms, and that the molecule of ozone con¬ tains three atoms. This suggests that allotropy, in all cases, may be due to a similar change in the number of atoms present in a molecule ; but so little is known of the ultimate structure of solids and liquids that speculation of this sort is of no great value.

Most of the non-metallic elements have allotropic modifications, and remarkable cases of allotropy are observed among chemical com¬ pounds. In the case of a compound, two states of a substance having the same chemical com¬ position are said to be isomeric when their con¬ stituents are combined by different modes of atomic linkage ; and they are said to be allo¬ tropic when the kind of atomic linkage is the same in both cases. See Isomerism.

ALLOUEZ, a-16-a', Claude, French Jesuit missionary and explorer: b. France 1620; d. near the St. John's River, in the present State of Indiana, 1689. He is called <(the founder of Catholicity in the West.® He preceded and was a coworker of Marquette. For 32 years he labored among the Indians. He preached to 20 different tribes and is said to have bap¬ tized 10,000 neophytes. He traveled over a wider territory than any of the missionaries of his day and reached the western end of Lake Superior.

At times he had to prevent the Indians I rom adoring him as a god ; at others, they were about to sacrifice him to their Mani- tou. Consult Parkman, (La Salle. >

ALLOWAY, a parish of Scotland, now in¬ cluded in Ayr parish. Here Burns was born in 1759, and the (<auld haunted kirk® near his birthplace was the scene of the dance of witches in (Tam o' ShanterP

ALLOXAN, a-lok'san, a substance pro¬ duced by the action of dilute nitric acid upon uric acid, and having the formula C4H2N2O4. It is freely soluble in water and crystallizes in the trimetric system when a saturated solution is allowed to cool, and in monoclinic prisms when

deposited by evaporation from a warm solution. It is converted into alloxantin (C8H4N4O7) by the action of SnCl2 and other reducing agents, and into alloxanic acid (C4H4N2O5) by the ac¬ tion of the fixed alkalis. Ammonia combines with it to form murexid, a substance that was used about the middle of the 19th century for dyeing silk and wool purple and red, but which was soon displaced by the aniline colors.

ALLOYS. In the commercial sense of the term an alloy is a combination of two or more metals which have been melted together. In a scientific sense, however, the term has a restricted meaning. It signifies a chemical com¬ bination analogous to the common solution of a chemical salt in water; only, in the case of two metals in alloy, each is to be regarded as dissolved in the other. As an illustration of the conditions existing in an alloy let us con¬ sider a solution of common salt in water. In 100 parts of water at 65° F. common salt may be dissolved in any proportions from one part (or less) up to 26.4 parts — at which point the solution is said to be ˆsaturated.® In every possible proportion between those limits the solution is entirely homogeneous. If more salt be added, it does not dissolve but remains in the solution as a mere mixture of salt with a solution of salt. In the case of a two-metal or binary alloy the two metals may be desig¬ nated as A and B. The metal having the high¬ est melting point is fused first, and the other is then added. Suppose B to be added to A in this manner. Up to a certain saturation point B dissolves freely in A. Beyond that point, if still more of B is added, a new com¬ bination will be found present in the alloy, namely, a solution of A in B. The alloy at that point is a mixture of the two solutions in varying proportions, depending upon the amount of B which has been added beyond the saturation point. With a still further ad¬ dition of B a larger proportion of the solution A-in-B prevails in the alloy, and, continuing the process, the solution B-in-A disappears from the alloy, and it becomes a homogeneous solution of A in B.

These considerations relate to alloys in a molten state, at the temperature of the melting point of the most refractory constituent. As the temperature falls toward the point where the alloy becomes solid, several changes may be noted as taking place in its constitution, depend¬ ing upon the proportions and conditions of solution of both A and B. The alloy A-in-B may separate out, generally in a crystalline form, or the alloy B-in-A may separate out. The condition of the mass is then one analo¬

gous to curdled milk. That combination of the two metals which has the lowest melting point is the last to solidify as the cooling continues,

and this is called the eutectic of that alloy. But, in the process of cooling, other changes may have taken place. In the solution B-in-A B may have crystallized out if it was close to its saturation point, and a similar action may have occurred as to A-in-B. Further complexities arise from the fact that when an alloy has become solid it has not always become stable. With the lapse of time changes are continually taking place either toward greater stability on the one hand, or toward dissolution on the other. Some alloys give evidence of these changes within a brief period. Others show them only after several years. Much has been learned about the constitution of alloys with the microscope, but this form of research has been limited in practice to the temperatures which normally prevail. Attempts to use the microscope on hot alloys have so far proved unsuccessful. For microscopic work the face of a thin slice of the alloy is very carefully and gently polished, and it is then delicately etched with an appropriate acid which serves to reveal many of the details of internal con¬ stitution. (See Metaliography). Although it has not been adequately determined whether the fusion and admixture of different metals takes place in some relation to their atomic proportions, or else in some other defi¬ nite ratio, yet the composition of natural alloys such as dore or electrum, which consists of variable proportions of gold and silver, as well the fact that, as a rule, alloys more readily melt than either of their constituent metals, are cir¬ cumstances that have given rise to a wide¬ spread conviction or belief that nature really does combine them by some law which is as yet undiscovered. Among the many alloys whose density is less than the average density of their constituent metals may be mentioned gold with either silver, copper, iridium, nickel, iron or lead; silver with copper; and iron with antimony, bismuth or lead. Among those whose density is greater than the mean of their constituents is gold with antimony, bismuth, cobalt or zinc.

Another fact, and one of practical im¬ portance to the manufacturer, is that an alloy, when remelted, even if composed of only two metals, will not exhibit the same characteristics as at first. A malleable alloy may become brittle, a ductile alloy unworkable, etc. This metamorphism is even more marked when the remelted alloy is composed of several metals. The ordinary remedy employed for this defect is to add more raw metal ; but this has to be done with great care as to proportions, which can only be ascertained by experiment. Skill in the remelting of scrap often constitutes a valuable trade secret, such as for a long period was the case with German silver, tombac, Jem- mapes brass and other then popular alloys.

Fusion of metals to make an alloy is not the only method to produce

such a result. Another method much in use, especially in the fine arts, is the electrolytic method. The metals to be combined are placed in the form of water solutions in the electrolyte and the current plates then in alloy upon the ob¬ jects attached to the cathode. In this way jewelers produce the <(red gold,® (<green gold®

and <(gold® of other intermediate tints in al¬ loys of gold, silver and copper from an elec¬ trolytic bath. Other means of producing al¬ loys are by pressure upon the mixed powders of the metals, or by the intimate mixtures of their vapors, but these are employed only in laboratory investigations. Gold and quick¬ silver will coalesce and form a natural alloy or amalgam at ordinary temperatures the moment they touch each other, a fact of the highest importance in gold mining. Discovery of this circumstance and its employment as the ˆamalgamation process® is commonly credited to a Spanish miner named Bartolomeo Medina of the 16th century (1557). In point of fact, it was known to the Arabs, Romans and Greeks, indeed is of the highest antiquity. It was commonly employed as a means of recov¬ ering gold from auriferous gravel or sand by the Arabian miners and metallurgists of the Middle Ages ; the source whence both the Span¬ iards and Portuguese got it. There exist un¬ questionable evidences of its employment in Spain and Portugal centuries before Medina's time. These evidences are brought together in a (History of the Precious Metals* (New York 1904, p. 134). Medina's claim was in fact a claim on behalf of the Fuggers, who farmed and monopolized the Almaden quicksilver mines of Spain, and thus held the American gold and silver mines in subjection. The process which may have been discovered by Medina is the <(patio process,® a complicated metallurgy, in which the amalgamation of gold and quick¬ silver plays but a subordinate part.

To Make a Metallic Alloy. — The first con¬ sideration is the temperature at which the metals will melt in the furnace. This is as follows for various metals, in degrees Centi¬ grade: Mercury (quicksilver), — 39.4; phos¬ phorus, 44; sulphur, 114.5; tin, 231.68; bismuth, 268.3 ; tellurium, 282 ; cadmium, 320 ; lead, 330 to 335 ; zinc, 419 ; arsenic, 450 ; antimony, 629.5 ; magnesium, 632.7 ; aluminum, 654.5 ; silver, 960.5; gold, 1061.7; copper, 1080.5; silicon, 1100 to 1300; nickel, 1400 to 1450; iron, 1550 to 1600; platinum, 1775, and manganese, 1800 to 1900. Ordinarily when the melting points of the con¬ stituents of the proposed alloy are nearly equal, the

alloy is made by fusing first the metal which has the higher melting point and adding the other to the molten mass. When the melt¬ ing points are widely apart a difficulty may be encountered in the vaporizing of one of the constituent metals at the fusing point of the other. In this, case it becomes necessary to form preliminary alloys which are afterward combined. As an illustration, German silver may be instanced. This is an alloy of nickel, copper and zinc. The nickel melts at 1450°, at which temperature zinc would turn to vapor. So an alloy of nickel and copper is first made and then a brass of copper and zinc. The copper-nickel alloy has a much lower melting point than pure nickel and the brass has a higher melting point than zinc. The two pre¬ liminary alloys are then fused together with¬ out the loss of the zinc. Oxidation during the fusing process is a serious obstacle in pro¬ ducing some alloys. This may be obviated by the use of a flux, like borax ; or by metallic deoxidizers, like powdered aluminum, which not only reduce the oxides but increase the fluidity of the mass and therefore the intimacy

of the mixture. Great care is needed also in the pouring (casting) of the alloy at just the right temperature. If the heat be too great the structure will be coarse-grained; if the degree is too low the less fusible constituents are liable to crystallize out and the ingot be un¬ sound and crack under working. The rate at which the cooling after pouring is permitted to take place is also of prime importance. Slow cooling produces a weak alloy of coarse structure ; quick cooling yields a strong alloy of fine-grained structure but inclined to be brittle. The molds employed must be of ma¬ terial suited to the prospective alloy. They * are usually of iron, brass, iron and sand, sand and clay, or plaster of Paris. Most alloys are subjected to after-treatment with heat and cold, as in annealing, chilling, tempering, etc., and by mechanical processes, as hammering, rolling, etc. A remarkable circumstance con¬ cerning alloys is that a very small proportion of another element will often entirely alter the character of a metallic composition. One part of carbon in 2000 of iron will convert it into steel ; the same minute proportion of tellurium in bismuth converts it into a finely crystalline metal ; one part of phosphorus in copper will make it hot-short ; while the same almost negli¬ gible proportion of bismuth will destroy its usefulness for many purposes for which, when rid of this intrusion, it is eminently fitted.

The supreme importance of the alloys in the arts is apparent when it is considered that very little of the vast quantities of metal used in civilized life is the pure metal. Steel is an alloy of pure iron and carbon, and other metals are added in alloy to produce the higher grades of steel — -chrome steel, manganese steel, nickel steel,

tungsten steel, vanadium steel, etc. ; cast iron is an alloy of pure iron with carbon, sulphur and phosphorus ; commercial tin is an alloy of pure tin and lead ; commer¬ cial gold and silver are alloys of these precious metals with others to add the required hard¬ ness to withstand wear ; the brasses are alloys of copper and zinc; the bronzes are alloys of copper and tin, with other metals added; etc. Although many of these alloys have been long known, yet newer and often valuable com¬ binations of the same metals are daily discovered, which are better adapted than the older ones for the new uses which practical engineering and processes demand.

A beautiful and useful alloy of gold 78 and aluminum 22, carrying a rich purple shade, is now employed in the manufacture of jewelry, which formerly consisted of a gold, silver and copper combination. An alloy of silver 25 and aluminum 75 furnishes a metal adapted for the manufacture of fine instruments, electrical ap¬ paratus, dentists' tools, etc. It makes delicate castings and takes on a fine polish. The com¬ binations with copper are more important.

Aluminum Bronze is a combination of cop¬ per 89 or 90, with aluminum 11 or 10 per cent. Although hard, it can be readily soldered. It can be rolled into thin sheets, worked with the hammer and stamped into form. Its color re¬ sembles that of American gold coin, and it is susceptible of high polish. With copper 95 and aluminum 5 the combination resembles pure gold very closely.

Boron Bronze. — Into a fused admixture of fluorspar and vitrified boric anhydride,

aluminum is introduced, when reduction takes place and this result when combined with a copper admixture in the proportions of the pre¬ pared aluminum 5 to 10 and copper 95 to 90 per cent renders an alloy denser, more durable and less brittle than aluminum bronze ; and fur¬ nishes more uniform and delicate castings. The aluminum-copper alloys with 90 to 93 aluminum and 10 to 7 copper yield a metal of great ten¬ sile strength, largely employed in the manu¬ facture of automobile and aeroplane parts.

Aluminum Brass is an alloy with an elastic limit up to nearly 15 tons to the square inch, the aluminum imparting to the brass greater fluidity in casting and additional tensile strength. For these reasons it

is extensively used for electrical purposes. A small propor¬ tion of aluminum with cast iron, wrought iron or steel has resulted in alloys of commercial value. From 1 to 2 per cent aluminum to cast¬ ings of iron will cause the metal to flow more leisurely and take on a closer grain. In steel castings the proportion of aluminum commonly used is. minute, about l/50th to l/30th of 1 per cent, although for certain steel castings this has been advantageously increased to 1 and even 2 per cent of aluminum. The latter adds tensile strength and homegeneity to the alloy, gives it a smoother surface and lessens its liability to oxidation. An alloy of aluminum 70 and zinc 30 has been found useful in casting frames for sewing machines and like small manufactures. A combination of aluminum 80, zinc 15, tin 2, copper 2, and each of man¬ ganese and iron is an alloy in which the alu¬ minum is hardened and the product becomes applicable to many useful manufactures.

Aluminum Zinc, composed of zinc 90 to 95 and aluminum 10 to 5, is used in the galvan¬ izing bath and treated the same way as pure zinc, except that no sal-ammoniac is used for clearing out the oxide, the aluminum being sufficiently effective.

Anti-Friction Alloys. — This name is given to those alloys which are sufficiently plastic under the pressures to which they are sub¬ jected in bearings to mold themselves to the shape of the shaft which they support and still hard enough to stay in place. This property of fitting to the shaft is of course approxi¬ mate, for in fact the shaft and its bearings are always separated by a thin film of oil. These anti-friction metals are generally alloys of tin with tin-antimony and tin-copper; or they may be of lead compounded with tin- antimony or of lead and tin so compounded. The first of these anti-friction alloys was the famous Babbitt metal, now almost wholly superseded by more effective combinations. See Anti-Friction Metals.

Coinage Alloys. — The coinage of gold and silver dollars and multiples or fractions thereof, as first authorized by the act of Congress passed 2 April 1792, provided that the gold dollar should contain 27 grains of gold 916J4 fine. The amount of fine gold in the dollar was there¬ fore 24ˆ4 grains. The silver dollar was ordered to contain 416 grains of silver, 892.4 fine, or 371.24 grains of fine silver. By the act of 28 June 1834 the gold dollar was reduced to the weight of 25.8 grains, 900 fine, or 23.22 grains fine gold. No change was made in either the weight or alloy of the silver dollar. By the act of 18 Jan, 1837 the alloy, but not the fine

contents, of the silver dollar was changed. It was thenceforth to

contain 412*4 grains of silver, 900 fine, or 371ˆ4 grains of fine silver; practically the same contents of fine silver as before. No further change was made in the gold dollar. The alloy of both gold and silver coins has always been of copper, although a minute quantity of silver has at times been introduced into the gold coin alloy, rather to improve the color of the coins, than from any design to increase their bullion value. By the act of 21 Feb. 1853 important reductions were made in the weight and fineness and therefore in the alloy of the subsidiary coins; a subject that belongs less to alloys than to coins. The current five-cent coins, or ˆnickels,® are an alloy of 75 per cent copper and 25 per cent nickel. The ((copper cent® is an alloy of copper, 95 per cent and zinc and tin, 5 per cent.

Heusler Alloys, the group of ferromag¬ netic manganese alloys, named after F. Heus¬ ler, who discovered them in 1898. In addition to manganese or manganese-copper, these al¬ loys contain one or more of the elements aluminum, antimony, arsenic, bismuth, boron, and tin. The aluminum-manganese-copper al¬ loys show the largest degree of ferromagnet¬ ism, about one-third that of the purest soft iron. The ternary tin-manganese bronzes also exhibit marked ferromagnetism. Manganese- tin is magnetic and remains so when copper is added. Manganese-copper is non-magnetic, but becomes magnetic when tin is added. Re¬ search has determined in the case of the aluminum-manganese bronzes that the chemi¬ cal compound carrying the magnetism is ex¬ pressed by the formula Alx(Mn,Cu)3x. This seems to establish the fact that ferromagnet¬ ism is a molecular phenomenon due to a con¬ dition of definite chemical combination. See Ferromagnetism.

Pyrophoric Alloys. — The alloys distin¬ guished by the title ((pyrophoric® have the pe¬ culiarity of emitting hot sparks when rasped off with a coarse file. They consist of the cerium group of rare earth metals in alloy with iron, nickel, manganese or cobalt. They exhibit the same property in a less degree with cadmium, zinc, tin and lead. The common form of pyrophoric alloy used in automatic gas lighters contains 35 per cent of iron and 65 per cent of the cerium metals. These al¬ loys may, however, range in constitution from 10 per cent iron to 65 per cent iron. The py¬ rophoric property of these alloys is utilized in gunnery, the, alloy being set into the shell of the projectile. The friction due to the rapid¬ ity of passage through the air is sufficient to ignite the alloy, thus marking the flight of the projectile by a trail of sparks.

See also Aluminum; Amalgam; Brass; Bronze; Fusible Metals; Steel; and para¬ graphs on Alloys under the titles of the dif¬ ferent metals.

Bibliography. — Buchanan, J. F., Practi¬ cal Alloying) (Cleveland, Ohio, 1910) ; Field, S., Principles of Electro-Deposition > (London 1911) ; Gulliver, G. H., (Metallic Alloys:

Their Structure and Constitution (London 1913) ; Hiorns, A. H., (Mixed Metals *(New York 1912) ; Johnstone, S. J., Pare Earth In¬ dustry > (London 1915) ; Law, E. F., (Alloys and Their Industrial Applications* (London 1909) ; Roberts- Austen, Sir W. C, (IntroduG-

tion to the Study of Metallurgy 5 (London 1910) ; Rosenhain, W., (Metallurgy5 (New

York 1914) ; Ruer, R., (The Elements of Metallurgy (New York 1909). A very com¬ plete bibliography of recent investigations as to Alloys up to 1 Jan. 1917 may be consulted in Metallurgical and Chemical Engineering fVol. XVI, pp. 273-279).

Richard Ferris,

Editorial Staff of The Americana.

ALLSPICE, or PIMENTA, is the dried berry of a West Indian tree (Amornis pimenta) which grows to the height of 20 feet and up¬ ward and has somewhat oval leaves about four inches long, of a deep shining green color, and numerous branches of white flowers, each with four small petals. In the whole vegetable creation there is scarcely any tree more beauti¬ ful or more fragrant than a young pimenta- tree about the month of July. Branched on all sides, richly clad with deep green leaves, which are relieved by an exuberance of white and richly aromatic flowers, it attracts the notice of all who approach it. About the month of Sep¬ tember, and not long after the blossoms have fallen, the berries are in a fit state to be gath¬ ered. At this time, though not. quite ripe, they are full grown and about the size of pepper¬ corns. They are gathered by hand. The ber¬ ries are spread in the sun to be dried, an oper¬ ation that requires great care, from the neces¬ sity of keeping them entirely free from mois¬ ture. By the drying they lose their green color and become a reddish brown ; the process is known to be complete by their change of color and by the rattling of the seeds within the berries. They are then packed into bags or hogsheads for the market. When the berries are quite ripe they are of a dark purple color and filled with a sweet pulp. Pimenta is thought to resemble in flavor a mixture of cin¬ namon, nutmegs and

cloves, whence it has ob¬ tained the name allspice. For its use in medi¬ cine see Condiments.

ALLSTON, Washington, American painter and author: b. Waccamaw, S. C., 5 Nov. 1779; d. Cambridge, Mass., 9 July 1843. In early boyhood he moved to Newport, where he at¬ tended school. He was graduated from Har¬ vard in 1800, and in the following year went abroad, where he became a student of the Royal Academy. Three years later he -went to Rome and there studied the works of the old masters. He passed four years at Rome, the companion of Thorwaldsen, Coleridge, Van- derlyn and Washington Irving, and acquired the lofty tone of the old school, gaining a repu¬ tation as a colorist. Returning to the United States in 1809, he married a sister of Dr. Wil¬ liam Ellery Channing. From 1811 to 1818 he resided in England and during these years pro¬ duced some of his best pictures. Of these (The Dead Man Revived) gained a prize of 200 guineas from the British Institute; and his (Uriel in the Sun5 and (Jacob's Feast> were also produced about this time. Failing in health, he returned to Boston in 1818 and finally moved to Cambridge, where he lived in com¬ parative seclusion until his death. He was a man of fine sensibility, scholarly tastes, an ex¬ cellent conversationalist and a writer of dis¬ tinct charm. His best known works in Amer¬ ica are: (Jeremiah,5 (The Witch of Endor,5

(Miriam, 5 (Rosalie,) (Madonna, 5 (Spanish

Girl,5 (Belshazzar's Feast.) His best known portraits are those of Benjamin West (Boston Atheneum), Coleridge (National Portrait Gal¬ lery, London) and one of himself. His works show a high imaginative power and because of his ability as a colorist he earned the title (The American Titian. 5 But he is not so highly esteemed now as he was by his contem¬ poraries. His conceptions, though grand, arc not always treated with artistic justice. His literary achievements are (The Sylphs of the Seasons,5 a poem delivered before the Phi Beta Kappa society in 1809 at Cambridge and subsequently published in London (1813) ; a novel, (Monaldi,5 a romance of Italian life (1841) ; (The Paint King5 and (The Two Painters5 (London) ; and a volume of lec¬ tures on Art and Poems5 (1850). Consult Ware, (Lectures on the Works and Genius of Washington Allston) (Boston 1852) ; and Sweester, (Artist Biographies5 (Boston 1879) ; also Flagg, J. B., (Life and Letters of Wash¬ ington Allston5 (New York 1892).

ALLUVIAL CONES AND FANS, de¬ posits of sand, gravel and clay built up by streams kt points where the gradient decreases and the carrying power of the water is les¬ sened. Everywhere that rivers

emerge from mountains onto plains, such deposits are com¬ mon. If built of coarse material they have steep slopes and are called cones; if of finer material the slopes are gentle and the deposits are known as fans. The latter are often many miles in extent. Where numerous fans coalesce into one fringing deposit at the foot of a moun¬ tain range, it is termed a piedmont alluvial plain or a mountain apron.

ALLUVIAL TERRACES. See Terraces.

ALLUVION, the legal designation of land gained from the water by gradual changes in the shore line. In English law the form of the word generally used is alluvion, and in Scotch law alluvio. In both of these the enactment is, that if an <(eyott,55 or little island, arise in a river midway between the two banks, it be¬ longs in common to the proprietors on the op¬ posite banks; but if it arise nearer one side it then belongs to the proprietor whose lands it there adjoins. If a sudden inundation cut off part of a proprietor's land, or transfer the materials to that of another, he shall be recom¬ pensed by obtaining what the river has depos¬ ited in another place; but if the process be a gradual one there is no redress. In the United States the proprietor of the bank increased by alluvion may lawfully claim the addition, this being regarded as the equivalent for the loss he may sustain from the encroachment of the water upon his land. Sea-weed which is thrown upon a beach, as partaking of the nature of alluvion, belongs to the owner of the beach. 2 Johns. N. Y. 322. But sea-weed below low-water mark on the bed of a navigable river belongs to the public. 9 Conn. 38. (See Ac¬ cretion ; Avulsion). Consult Angell, (Treatise on the Law of Watercourses5 (Boston 1877) ; and Gould, (Treatise on the Law of Waters5 (Chicago 1900).

ALLUVIUM, a word formerly applied to the gravel, mud, sand, etc., deposited by water subsequently to the Noachian deluge. It was op¬ posed to diluvium, supposed to be laid down

by the deluge itself, or, in the opinion of others, by some great wave or series of waves orig¬ inated by the sudden upheaval of large tracts of land or some other potent causes, different from the comparatively tranquil action of water which goes on day by day. Now allu¬ vium is especially employed to designate the transported matter laid down by fresh water during the Pleistocene and Recent periods. 1 hus it indicates partly a process of mechanical operation and partly a date or

period. It should not be forgotten that the former has gone on through all bygone geological ages and has not been confined to any one time. Many of the hardest and most compact rocks were once loosely cohering debris laid down by water. The most typical example of allu¬ vium may be _ seen in the deltas of the Nile, Ganges, Mississippi and many other rivers. Some rivers have alluviums of different ages on the slopes dowrn into their valleys. The more modern of these belong to the Recent period, as do the organic or other remains which they contain, while the older (as those of the Somme, Thames, Ouse, etc.), which are of Pleistocene age, enclose more or less rudely chipped flint implements, with the remains of mammals either locally or everywhere extinct. Though in many cases it is possible clearly to separate alluviums of different ages, yet the tendency of each new one is to tear up, redis¬ tribute and confound all its predecessors. Vol¬ canic alluvium is sand, ashes, etc., which, after being emitted from a volcano, come under the action of water and are by it redeposited, as was the case with the materials which entered and filled the interior of houses at Pompeii. Marine alluvium is alluvium produced by in¬ undations of the sea, such as those which have from time to time overflowed the eastern coast of India. See Delta ; River ; Soil.

ALLWARD, Walter Seymour, Canadian sculptor: b. Toronto, Ont., 18 *Nov. 1875. He was educated at Dufferin School, Toronto, served five years in an architect's office, at 19 turned his attention to sculpture, in the way of producing figure-work for architectural pur¬ poses. This he continued for only a short time, when he received his first commission for the figure of Peace for the Northwest Rebel¬ lion monument in Queen's Park, Toronto. Fol¬ lowing this he executed busts of Lord Tenny¬ son, Sir Charles Tupper, Sir Wilfrid Laurier and other prominent persons, mostly for the art gallery of the Toronto Provincial Museum. Important works from his hand are the statue of General Simcoe and that of Sir Oliver Mowat, both in Queen's Park, Toronto; the Nicholas Flood Davin monument in Ottawa, and the South African monument, the latter being among the finest in British America. Re¬ cent works are the J. Sandfield MacDonald statue in Toronto, 1908; the Baldwin and La- fontaine memorial on Parliament Hill, Ottawa, and the Alexander Graham Bell memorial at Brantford, Ont.

ALLYL, in chemistry, the radical CH2:CH. CH2, or GH5. (The isomeric radical CHs.CH : CH is called propenyl). Allyl forms many compounds, of which the most important is perhaps allyl alcohol, CsHs.OH, which is pro¬ duced when glycerine js distilled with oxalic acid.

ALMA, Mich., city in Gratiot County, 38 miles west of Saginaw, on Pine River, and Ann Arbor and Pere Marquette railways; founded

1854; incorporated 1872, and received its city charter in 1905. It manufactures flour, lum¬ ber, beet sugar, auto trucks, hay and paper presses, gas engines, furnaces, cement blocks and asphalt mastic ; has water works and elec¬ tric lighting. It contains Alma College (q.v.), Alma Sanitarium, widely reputed, and the Michigan Masonic Home. It has one-year mayoralty and a council of eight. Pop. (1910)

2,757; (1920) 7,542.

ALMA, a river in the 'Crimea, rising at the foot of the Tchadir Dagh and flowing west into the Bay of Kalamita, about half way be¬ tween Eupatoria and Sebastopol. It is about 46 miles long and is renowned for the scenic beauty of its banks. On the steep banks of the stream, through the channel of which the British troops waded amid a shower of bullets, a brilliant victory was won 20 Sept. 1854, by the allied armies of England, France and Turkey, led by Lord Raglan and Marshal St. Arnaud, over the Russian army commanded by Prince Menschikoff. After a stubborn contest lasting five hours the Russians retreated in disorder, leaving 17 per cent of their 33,000 effectives on the field. The allies numbered about 62,000. It was the first battle of the Crimean war.

ALMA COLLEGE, co-educational insti¬ tution founded at Alma, Mich., in 1887. It is under the control of the Presbyterian Church, maintains a college department, an academy, and schools of music and art, and extension courses. The degrees conferred are those of A.B., Ph.B. and B.Sc. In 1917 the institution had a faculty of 21 members and a student en¬ rolment of 213. The library contained 26.437 volumes ; the endowment amounts to about $400,000, and the campus of 36 acres, together with the buildings, are valued at $190,000.

ALMA MATER, a term familiarly applied by those who have attended a university to the particular university they have attended. The adjective almus in Latin means cherishing, fos¬ tering, dear.

ALMACK'S, al'maks, the name formerly given to certain assembly-rooms in King Street, St. James's, London, derived from Almack, a tavern-keeper, by whom they were built, and whose real name is said to have been M'Call, and transformed into Almack by reversing the syllables. The premises are now known as (<Willis's Rooms.® First opened 20 Feb. 1765, they soon became famous for the extreme ex¬ clusiveness displayed by the lady patronesses in regard to the admission of applicants for tickets. These fair arbiters composed a board of six, which held its sittings every Monday evening during the London season, and issued those fiats which were supposed to affect

so conclusively the claims of the received or re¬ jected applicant, as the case might be, to occupy the upper circles in the fashionable world. To have (lanced at Almack's became almost pro¬ verbial as indicative of. exalted social position. The name was also given to a gambling club established by the same Almack in 1763, to which such men as Charles James Fox, Wil¬ liam Pitt and Gibbon belonged. It is now known as Brooks's club. Consult Timbs, (Clubs and Club Life in London) (London

1873), and Walford, 'Greater London* (ib.,

1884).

ALMADA, al-ma'da, Portugal, a town in the province of Estremadura on the left bank of the estuary of the Tagus, opposite Lisbon. It is built upon a height, in a well-cultivated country, and has long been celebrated for its figs and the neighboring gold mine of Adissa. It has a strong castle on a rock, several depots for wine and a mineral spring. Pop. 8,000.

ALMADEN, al'ma-dan, Cal., town in Santa Clara County, noted for its mines of mercury and its mineral springs. It was named after the Spanish town mentioned below on account of its four quicksilver mines, the New Alma- den, Providence, Enriquita and Guadelupe. Large quantities of mercury have been distilled from the ore (cinnabar), and the existence of this deposit has been of immense benefit to the Pacific States. Pop. 3,000.

ALMADEN, or ALMADEN DEL AZO- GUE, -del a-tho'ga (mine of quicksilver), a town in Spain 50 miles southwest of the town of Ciudad-Real in the province of the same name. It is widely known for its rich quick¬ silver mines, which have been worked for cen¬ turies, and in which some 4,000 miners are em¬ ployed. Since 1645 the mines have been the property of the Crown. The town contains a ruined castle of the Moorish period and a school of mines. Pop. 3,500.

ALMAGEST, al'ma-jest. The usual appel¬ lation of the 'Syntaxis *of Ptolemy, derived from an Arabic term signifying "the greatest.* * This celebrated work was written about the middle of the 2d century of our era and com¬ prises an exposition of the ancient system of astronomy so elaborate and thorough as to have made it a standard for 13 centuries. It contains the most ancient known catalogue of the stars,

with observations of the motion of the planets and determinations of their periods. Several editions, one in Greek and others in Latin, appeared in Europe between 1500 and 1700. The most recent accessible edition is that of the Abbe Halma, which is in Greek and French (2 vols., Paris 1814—15).

ALMAGRO, al-ma'gro, Diego, one of the companions of Pizarro in the conquest of Peru, was a foundling, and the exact date of his birth is not known; d. 1538. He engaged with Pizarro and Fernando de Lugue in the long and arduous expedition in which they made the discovery of Peru (1524-27), took part in the conquest of the country and the treacherous murder of Atahualpa (1533), and after fre¬ quent disputes with Pizarro about their re¬ spective shares in their conquests he led an ex¬ pedition against Chile, of which he was ap¬ pointed governor. Having failed to conquer his new province he returned to find Cuzco in possession of the Indians, who had expelled Pizarro. He reconquered it and made himself governor, but, Pizarro returning, a struggle took place between the two parties in which Almagro was finally overcome, taken prisoner, strangled and afterward beheaded. He was avenged by his son, who raised an insurrection in which Pizarro was assassinated in 1541. The younger Almagro was put to death in 1542 by De Castro, the new viceroy of Peru. Almagro showed himself, like most of the Spaniards en¬

gaged in the conquest of the New World, capable of enduring great privations with heroic constancy, and of effecting wonderful achievements by undaunted _ valor, but cruel, rapacious and unscrupulous in success.

ALMAGRO, Spain, town in the province of Ciudad-Real, 12 miles from the city of Ciudad-Real, in the midst of an elevated plain. Its streets are wide and well paved and there is a large open public square. Lace is made here to a considerable extent, as well as soap, brandy and coarse pottery. It is best known as the centre of the Valdepenas red wine dis¬ trict. Pop. 8,300.

ALMALEE, al-ma'le, Asiatic Turkey, town on the river Myra, 25 miles from its mouth and 50 miles west southwest of Adalia. It is beau¬ tifully situated in a kind of natural amphi¬ theatre enclosed by lofty mountains. It has thriving manufactures and a considerable trade. Pop. 12,000.

AL-MAMUN, ma-mon', a caliph of the Abasside dynasty, son of Harun al-Rashid: b. 7 86; d. 833. Under him Bagdad became a great centre of art and science.

ALMANAC, a table or calendar, in which are set down the revolutions of the seasons, the rising and setting of the sun, the phases of the moon, the most remarkable conjunctions, positions and phenomena of the heavenly bodies, for every month and day of the year; also the several fasts and feasts to be observed in the Church and state, etc. The history of the almanac, and even the etymology of the word, are involved in considerable obscurity. It is generally derived from the Arabic article al and the verb manach, to count. The modern almanac answers to the fasti of the ancient. Romans. Almanacs became generally used in Europe within a short time after the invention of printing; and they were very early remark¬ able, as some are now in England, for the mix¬ ture of truth and falsehood which they con¬ tained. In 1579 their effects in France were found so mischievous, from the pretended proph¬ ecies which they published, that an edict was promulgated by Henry III forbidding any pre¬ dictions to be inserted in them relating to civil affairs, whether those of the state or of private persons. No such law was ever enacted in England. It is singular that the earliest English almanacs were printed in Holland on small folio sheets ; and these have occasionally been preserved from having been pasted within the covers of old books. In the reign of James I letters patent were granted to the two universi¬ ties and the Stationers' Company for an exclu¬ sive right of printing almanacs. These, in 1775, were declared to be illegal. During the civil wars of Charles I and thence onward, English almanacs were conspicuous for the unblushing boldness of their astrological predictions and their determined perpetuation of popular er¬ rors. The Stationers' Company, who had man¬ aged to retain a monopoly notwithstanding the invalidity of the letters patent in their favor, were guided merely by commercial principles in supplying the market, and accordingly adapted their almanacs to the taste of the public, which, on one occasion, when the trial was actually made, refused to purchase them without the predictions. Gradually, however, a better taste began to prevail, and in 1828 the Society for

the Diffusion of Useful Knowledge had the merit of taking the lead in the production of an unexceptionable almanac in Great Britain. The example thus set has been almost universally adopted. Almanacs, from their periodical char¬ acter and the frequency with which they are referred to, are now more and more used as vehicles for conveying statistical information. Regiomontanus was the first person in Europe who prepared almanacs in their present form, without the predictions,

which were in all probability introduced into Europe from the Persians. Once they were almost entirely filled with subjects of a religious character. At an¬ other time they oversowed with astrological calculations and predictions. In the time of Napoleon an almanac was published in France in which, to every day, an achievement of the Em¬ peror, or something else relating to him, was added. Almanacs in the petty principalities of Germany exhibit the endless genealogical tables of the princes. Some almanacs in mod¬ ern Greek, printed at Xˆenice, where formerly all books in this language were published, are quite full of astrological superstition and mat¬ ters relating to the Greek Church. A modern Persian almanac contains a list of fortunate days for certain purposes ; as, for example, to buy, to sell, to take medicine, to marry, etc. ; and predictions of events, as earthquakes, storms, political affairs, etc. One of the most curious almanacs is an Italian one exhibiting Italian vivacity in a striking manner. To the entry 30 July is added, Sudano ancora le ossa! (Even the bones sweat) ; to 11 August, Oh! che noia! (Oh! how distressing !) ; to 12 July Cascano le braccia (The arms fall) ; to 2 Jan¬ uary, Stivali e ombrcllo! (Leggings and um¬ brellas!) In Germany, almanack is the name given to annuals like those which used to ap¬ pear in England and the United States under the names of ‘Souvenir,’ < Forget-me-not, ’ etc. In France a work once appeared annually en¬ titled (Almanach des Gourmands,’ which was conducted with much spirit and is in high re¬ pute among epicures. Some of the almanacs that are regularly published every year are ex¬ tremely useful and are indeed almost indis¬ pensable to men engaged in official, mercantile, literary or professional business. Such in Great Britain are (01iver & Boyd’s Edinburgh Almanac,) (Thom’s Official Directory’ and the (British Almanac, 5 with its (Companion.) ‘Whitaker’s Almanac’ is also known as a very comprehensive and valuable compendium. The (Almanach de Gotha,’ which has appeared at Gotha since 1764, contains in small bulk a won¬ derful quantity of information regarding the reigning families and governments, the finances, commerce, population, etc., of the different states throughout the world. It is published both in a French and in a German edition. (The Nautical Almanac’ is an important work pub¬ lished annually by the British government, two or three years in advance, in which is con¬ tained much useful astronomical matter, more especially the distances of the moon from the sun, and from certain fixed stars, for every three hours of mean time, adapted to the me¬ ridian of the Royal Observatory, Greenwich. By comparing these with the distances care¬ fully observed at sea the mariner may with comparative ease infer his longitude with suffi¬ cient accuracy in case he has no chronometer

for keeping Greenwich time. This almanac wras commenced in 1767 by Dr. Maskelyne, astronomer royal. The French (Connaissance des Temps' is published with the same views as the English (Nautical Almanac' and nearly on the same plan. It commenced in 1679. Of a similar character is the (Astronomisches Jahrbueh,' published at Berlin. The Amer¬ ican Ephemeris and Nautical Almanac' is is¬ sued annually since 1855 by the United States government.

The first American almanac was that of William Pierce of Cambridge, published in 1639. The most famous of American almanacs was 'Poor Richard's,' published in Philadel¬ phia by Benjamin Franklin under the pseudo¬ nym of C(Richard Saunders." This almanac was probably imitated from that of Thomas, of Dedham, Mass., which was kept for a good many years and contains many pleasant and witty verses, jests and sayings. The informa¬ tion printed in these almanacs seems to have ' been the only means of carrying newrs to the more distant parts of the country. 'The Amer¬ ican Almanac' appeared between 1830-61, and a second publication under the same name was edited for several years by Ainsworth R. Spof- ford. Several of the largest newspapers in the United States now issue almanacs which are marvels o+ condensed information. See Cal¬ endar.

ALMANDITE, or ALMANDINE, a va¬ riety of the garnet (q.v.).

ALMANSA, al-man'sa, Spain, a manufac¬ turing and farming town of southeastern Spain (Murcia), near which was fought (25 April 1707) a decisive battle in the War of the Span¬ ish Succession, when the French, under the Duke of Berwick, defeated the Anglo-Spanish army under the Earl of Galway. Pop. 12,000.

ALMANZUR, al'man-soor, or ALMAN- SUR, a caliph of the Abasside dynasty, reign¬ ing 754-75. He was cruel and treacherous and a persecutor of the Christians, but a patron of learning.

ALMA-TADEMA, al'ma tad'e-ma, Sir Lawrence, O.M., R.A., Anglo-Dutch painter: b. West Friesland, Holland, 8 Jan. 1836; d. Wiesbaden, Germany, 25 June 1912. He was educated at the Antwerp Academy of Fine Arts under Wappers and Baron Leys and ob¬ tained a medal at the Paris Salon of 1864 and another at the Paris Exposition of 1867. He went to England to live in 1870, exhibiting at the Royal Academy that same year (Un Ama¬ teur Romain' and (Un Jonglier,' which at¬ tracted immediate attention. Becoming a naturalized Englishman, he adopted the double name Alma-Tadema (having been christened Laurenz Alma). He became an associate of the Royal Academy in 1876, and R.A. in 1879; was knighted in 1898 and raised to the Order

of Merit in 1905. His especial field was the portrayal of Greek and Roman life, and all his work is marked by the most careful attention to archaeological details. His execution is scholarly, his coloring accurate and his artistic feeling rarely at fault, but while his canvasses attract the eye and delight the intellect they seldom touch the heart. Among his more noted pictures (he painted about 500), may be men-, tioned — 'Clotilda at the Tomb of Her Grand¬ children' (1858) ; (The Education of the Chil-

dren of Clovis5 (1861) ; (The Roses of Helio- gabalus5 (1888); (A Reading from Homer5; (The Four Seasons5 ; (The Vintage Festival5 ; (Caracalla and Geta.5 Sir Lawrence was twice married, and left two daughters, one a writer, the other a successful artist.

ALMA-TADEMA, (Miss) Laurence, Eng¬ lish novelist : b. in England. She is the second daughter of the late Sir L. Alma-Tadema (q.v.) and has published: (Love's Martyr5; (The Wings of Icarus5 ; (The Crucifix5 ; (Realms of Unknown Kings *; <rrhe Fate Spin¬ ner* (1900) ; (The Unseen Helmsman *(1901) ; (Songs of Womanhood* (1903) ; (Four Plays *(1905); (Tales from My Garden* (1906).

ALMAZOV, Boris Nikolayevich, bo-res'

al-ma-zof, Russian poet and humorist: b. Vyaz¬ ma 1827 ; d. Moscow, 3 April 1876. He was educated in the first gymnasium of Moscow and in a private boarding:school. In 1848 he entered the law-school of the University of Moscow but left it without graduating. He began his literary activities in 1851. In that year appeared in Moskvityanin his clever criticism of current journalism under the pseudonym of <(Erast Blagonravov.55 When Moskvityanin was discontinued he began con¬ tributing original poems and translations to (Biblioteka dlya chteniya ,5 cRusski Vyiestnik" and cUtro.y His poems are written in a smooth and easy style and are characterized by beauty of expression and rhythm. They are, however, devoid of content and, therefore, brought the author no glory. He became, however, well known in the sixties through his humoristic poems and clever parodies published in satiri¬ cal journals, particularly in Rasvlechcniye. His satire is not very biting but his criticism is striking. The more serious works of Al¬ mazov are his (Critical Articles about Pushkin5 (Utro 1858) ; the translation, (Lay of Roland5 (Moskvityanin 1869) ; the novel, (Katenka *(Moskvityanin 1875) ; (Poems5 (1879) ; (Works 5 (3 vols., 1892), with*

his portrait and biography. His better known comical poems are (Funeral of the Russian Language and Scientific and Literary Masquerade.5 Their humor, however, lacks seriousness. He some¬ times used the pseudonym (Adamantov.5

ALMEIDA, al'ma-ida, Portugal, town in the province of Beira, on the Spanish frontier, and on the river Coa. It was at one time one of the chief strongholds of Portugal. In 1762 it was taken by the Spaniards, who later sur¬ rendered it. A great part of the fortifications were destroyed by the French under Brenier in their retreat from Portugal in 1811. The fortifications were soon restored by the English. Almeida is famous also for its sulphur waters. Pop. about 2,500.

ALMENDRALEJO, al'men-dra'ya-ho,

Spain, town of Badajoz province, 28 miles by rail southeast of Badajoz. Since 1875 and the introduction of the railroad and improved facilities of transport, the trade in locally manufactured brandy and wines, and in the grain and fruit of the surrounding districts, has attained great importance. The town is well built ; its most notable edifice is the palace of the marquesses of Monsalud, and their mu¬ seum of locally discovered Roman antiquities. Pop. 12,500.

ALMERIA, al'ma-re'a, Spain, seaport city, capital of Almeria province, on the Mediter¬ ranean, 104 miles east of Malaga. At the mouth of a river at the head of a gulf, both bearing the same name, Almeria has one of the best harbors in Spain, and is the terminus of a railroad from Madrid. A large export trade is carried on in white grapes, fruit, esparto grass, iron and lead; coal and lum¬ ber are the chief imports; and macaroni, sugar and white lead are manufactured. Of anti¬ quarian interest is the old Moorish castle rising above the city, and the fortress-like cathedral dating from 1524. Almeria was an ancient Phoenician settlement, the Roman Unci and Magnus Portus, a prosperous Moorish seaport, and also a notorious nest of pirates. Railroad, pier and docking facilities have created its modern importance. Area of province, 3,360 square miles; pop. 359,000. Pop. of city, 47,500.

ALMODOVAR DEL CAMPO, al'mo-do - var del kam'po, Spain, town of Ciudad-Real province, 20 miles by rail southwest of Ciudad- Real. A fortified Moorish town of the Middle Ages. It derives its modern importance from the neighboring Puertollano coal mines, and the sheep-grazing crown lands of the Sierra de Alcudia, which rise above the town. Pop.

14,000.

ALMOHADES, al'mo-hadz, from the Arabic (<A1-Muwahhadis5* — the Unitarians — the Spanish name given to the 12th century Moorish dynasty which ruled northwestern Africa and Spain. Their origin is traced to Abu Abdillah Mohammed ben Tumart, a de¬ formed youth of humble parentage, a Masmuda Berber from the Atlas, who, as a traveling dev¬ otee beggar, obtained instructions in Cordova, Cairo, Bagdad, and made the pilgrimage to Mecca. On his return to Morocco he became known by the boldness of his preaching and by the austerity of his life. In Abd-el-Mumim el Kumi, another Berber, he found a disciple, whose mind he filled with a belief that he was reserved to inaugurate a purified Mohammedan creed. Preaching the coming of the great Mahdi (director) who was to establish the reign of universal justice and peace, Abd-el- Mumin one day remarked <(You yourself are the great Mahdi,55 swore allegiance to him with 50 other listeners, and was followed soon after by 70 others. Preaching the unity of God, they retired to the mountains. Their number soon increased to 20,000 and a victory over th • King's brother established the power of the Almohades. By 1147 they had conquered Mo¬ rocco. In the meantime Abu Abdillah had died and been succeeded by Abd-el-Mumin. He and his successors Yusuf, Yacub-ibn-Yusuf, Mohammed Abu- Abdallah, overthrowing the Almoravidian Moorish dynasty established themselves in Portugal and Spain, until 12 June 1212, they were defeated by the Christians in the battle of Navas de Tolosa, leaving it is said 170,000 dead on the field. Soon after, disorganized by internal dissensions, the power of the Almohades in Spain had disappeared by 1257 and in Africa by 1269.

ALMOND, al'mund, the tree and nut of Amygdalns communis of the family Amygdal- acea, supposedly a native of the Mediterranean region and of southwestern Asia, but so long in cultivation that its origin is a

matter of conjecture. In habit of growth the ˆtree, which reaches a height of 20 or 30 feet, is like the peach, with which some _ botanists have mistakenly surmised that it was formerly identical. The hard, inedible pulp of its fruit (a drupe) splits at maturity and exposes the pit or ((almond® of commerce. Varieties of almonds are classed as bitter or sweet. The former, little grown outside the Mediterranean region, furnish prus¬ sic acid and oil of bitter almonds used in per-

fumery and culinary preparations; the latter, grown extensively in California and southern Europe and in similar climates, furnish one of the most agreeable of nut fruits. The sweet almonds are divided into hard- and soft-shelled varieties, the former little grown, the latter ex¬ tensively. Some specially thin-shelled sorts are known as paper-shells. The kernels, particu¬ larly of sweet almonds, are rich in a mild fixed oil which is expressed for medicinal and other purposes, but the nuts are chiefly used for des¬ sert, either directly or in some prepared form, such as confectionery.

The almond succeeds best upon light, thor¬ oughly drained soil so situated that early frosts, which destroy the fertility of the blossoms, need not be feared. The trees, which are generally propagated by budding the desired varieties upon bitter almond seedlings, are set about 25 feet apart, different varieties that blossom simultaneously being planted in each other's proximity to ensure cross-pollination, self¬ sterility being characteristic of many varieties. If trees are properly trained during their first three or four years they demand little severe pruning aftenvard. Cultivation does not differ materially from that of other tree-fruits. In California the nuts are harvested from August to October, dried for several days, and if dis¬ colored, as is often the case where the air is very humid, they are lightly sprayed with water and then treated with sulphur fumes to bleach the shells somewhat. Nuts that are too badly discolored to respond to this treatment are cracked by machinery and the kernels sold largely to confectioners. Because frost and self-sterility have been often overlooked, al¬ mond-growing in California has been remark¬ able for failures ; many orchards have been cut down for firewood. But when and where con¬ ditions are favorable the crop is a profitable one. In 1897, 218 carloads were shipped from California; in 1912 the production was 3,000 tons. • Attention has been drawn to parts of Arizona and New Mexico as probably adapted to the almond, and some orchards have been planted. About $1,000,000 worth of almonds are imported annually. The almond is some¬ times attacked by a fungus which appears first as a yellow rust on the leaves. This often leaves the tree bare of foliage as early as 15 July. Spraying is the only remedy. See Fungicides.

As an ornamental tree the almond, like the peach, is often planted even in localities unfavor¬ able to fruit-production. But its relative, the dwarf almond (Amygdalus nana), a native of southern Russia, is hardy and is recommended as an ornamental shrub by nurserymen for northern climates.

ALMONRY SCHOOLS, institutions for boys which began to be

attached to monasteries

VOL. i — 2d

in the 14th century. The almoner was the dis¬ penser of charity generally, but there is no record of education in connection with the of¬ fice until 1880 when the archdeacon of Dur¬ ham gave a manor to the almoner of Cathe¬ dral Monastery to supply food and lodging for three boys from the grammar school. At the beginning of the 14th century a movement for the training of choristers in connection with the more elaborate worship of the Virgin Mary grew up and special provision was made at the monastery for their housing and education. The boys were kept as charity students. They acted as page boys and choristers and were taught and managed, by secular clerks as mas¬ ters. At Canterbury in 1320 a body of choris¬ ters was first inaugurated by royal grant to pray for the soul of Edward I. Saint Albans Abbey founded in 1339 an ((Order of living for the poor scholars in almonry,® making the term of education five years. Westminster opened its school with two boys in 1355, which continued under a special master in 1540. The school was revived when the abbey became a cathedral in 1540, with 40 boys. Durham, Saint Mary’s, Coventry and other abbeys also kept such schools. Altogether about 2,000 boys were thus provided with free board and education in England. Saint Paul’s is the only secular church in which an almonry school exists, which began in the 14th century. Many of the pupils passed on to colleges and universities.

ALMONTE, al-mon'ta, Canada, situated in Lanark County, Ont., on the Mississippi River 30 miles wrest of Ottawa and on the Canadian Pacific Railway. Its industries include woolens, tweeds and hosiery, stoves and agricultural im¬ plements, etc. Pop. (1911) 2,452.

ALMORAVIDES, al-mo'ra-vidz, from the Arabic ((al-Murabathin — the devoted,® wdience (<Marabouts — the hermits,® an 11th century Moslem dynasty of northwest Africa and Spain. It originated with Abdallah ibn Yasim, who preached Mohammedanism among the Arabian tribes of northern Morocco, and died in battle a.d. 1058. Abubekr ibn Omar suc¬ ceeded him, but after some minor victories w7as ousted by his lieutenant Yusuf ibn Tashfyn, who founded the city and empire of Morocco. Yusuf was invited to Spain by the Moorish Prince of Seville to aid him against the Christians and defeated them in a desperate battle on the plains of Zalaca in 1086. Yusuf returned to Morocco, but the following year came back to Spain, defeated the Moorish kings in detail and proclaimed as his successor his son Ali ben Yusuf, who ruled until 1143. Five years later

the Almoravian dynasty was overthrown by the Almohades (q.v.).

ALMQVIST, alm'kvist, Karl Jonas Lud¬ vig, Swedish poet and author : b. Stockholm 1793; d. Bremen, 26 Sept. 1866. He achieved literary fame in 1832 by a group of romances, the leaders of Swedish literature, entitled (The Book of the Thorn-Rose.) (Araminta May, *(The Mill at Skallnora, and (Grimstahama's Set¬ tlement* are his best tales; notable novels are (The Palace, > < It's All Right, * (The Lords of Ekolsundp ˆmarina, *(Gabrielle Mimanso* and (Amelia Hillner.* His waitings are dis¬ tinguished by brilliancy of style and great dramatic power. His life was of the most un-

stable character. Implicated in a case of forgery and murder by poisoning in 1851, he disappeared for 15 years. It is now known that he came to America and settled in St. Louis, where he earned a scanty living, return¬ ing to Bremen in 1866, where he lived until his death, under the assumed name of C. Wester- mann. Translations of his works are very popular in Germany.

ALNWICK. an'ik, England, town, capital of Northumberland County, on the Alne, 30 miles by rail north of Newcastle. Its chief feature is the ancient Norman castle on a hill above the river northwest of the town, the resi¬ dence since 1309 of the Percys, dukes of North¬ umberland. It covers five acres of ground and was restored in 1830 at an outlay of $1,000,000. It is one of the finest types of old baror*al castles in England. Alnwick from earliest times was a border stronghold against Scottish incursions; and here in 1093 Malcolm III of Scotland was slain and his army routed ; and in 1174 William the Lion was defeated at the head of a large army and made prisoner. Pop.

7,000.

ALOE, a genus of succulent-leaved plants of the family Liliaceoe, natives chiefly of Africa. The numerous species range in height from a few inches to 25 feet or more. Some are valued for their fibre, which is used for cord-, net- and fabric-making; others for the medicinal qualities ascribed to them. Chief among the latter are several arborescent species, Aloe succotrina, A. spicata, A. pur- purascens, and A. arborescens, from which Cape aloes is mainly derived, and Aloe vera , a Mediterranean species frequently cultivated in the West Indies, which yields Barbadoes or hepatic aloes. Aloe perryi furnishes

Zanzibar or Socotrina aloes, also a transparent pigment valued in miniature-painting and a rich violet dye.

ALOES, the inspissated juice of the leaves of a number of species of Aloe, a genus of the lily family of over 100 species, widely distributed in warm arid regions. The leaves are long, thick and succulent, and the juice that yields aloes is thin and flows readily from the cut leaf. This is then thickened (inspissated) by natural or by artificial drying and there re¬ sults a yellow to brownish to blackish, or green¬ ish, mass of a tarry, waxy or glassy consistency. The aloes that is used in the United States is either Barbadoes aloes, from Aloe vera, or Socotrina aloes, from Aloe Perryi. As a medi¬ cine aloes has been used for centuries. It is a powerful cathartic, acting particularly on the large intestine, its active principle being termed aloin. Its action is extremely variable, and in large doses it has been known to induce abor¬ tion. See Cathartics.

ALOES WOOD (sometimes called also eagle wood, calambac, paradise wood or agal- lochum), the inner part of Aquildria malac- censis and A. agallo churn, trees of the family Thymelacacece, natives of the tropical parts of Asia, and supposed to be the aloes or lignaloes of the Bible. They are large, spreading trees. Aloes wood contains a dark-colored, fragrant, resinous substance, and is much prized in the East as a medicine and for the pleasant odor it diffuses in burning.

ALOGI, a sect of heretics in the 2d century. They are said to have been founded by Theodotus of Byzantium, a leather dresser, and were rivals and opponents of the Montanists. Epiphanius declares that they denied that Jesus Christ was the Logos, and thus gave them their name. They also denied the continuance of the gifts of the Holy Spirit. They rejected the Gospel of John and the Apocalypse which they ascribed to Cerinthus the Gnostic. Further they rejected the Millenarianism and prophet- ism of the Montanists.

ALOIDZE, or ALOADZE, in Greek legend, the giant twin sons of Neptune and the wife of Aloeus. They were named Otus and Ephialtes and at the age of nine measured 27 cubits in height and nine cubits in breadth. They chained the god Mars in a bronze cask and kept him there 13 months. By piling Pelion upon Ossa they sought to reach heaven and war on the Olympian gods and would have suc¬ ceeded before their beards had grown, but were destroyed by Apollo.

ALOPECIA, a partial or complete loss of hair in large quantities. This is due to a num¬ ber of causes and frequently leads to baldness (q.v.). Alopecia is of two main kinds: primary or secondary. In primary

alopecia there may be (1) a congenital lack of hair (this is rare) ; (2) senile alopecia, due to the advent of old age; (3) premature baldness, this may be a natural product, or it may be the result of a chronic seborrhea, or dandruff (q.v.).

ALORA, a'16-ra, Spain, town and health resort, Malaga province, on the river Guadal- horce, 18 miles by rail northwest of Malaga. It is frequented for its medicinal sulphurous springs, and has manufactures of spirituous liquors and a considerable trade in the fertile valley products, corn, sugar-cane, dates, etc. Pop. 11,000.

ALOST, a'lost, Flemish Aalst, alst, Bel¬ gium, an old historic town of East Flanders, on the river Dendre, about half-way between Brussels and Ghent. It was formerly the capital of the county of Aalst, which passed in 1056 into the possession of the counts of Flanders under the name of Keizer- Vlaanderen. The Dendre divides the town into two unequal pjirts. Pop. (1912) 35,130. Over a thousand years ago Alost became a walled town ; a grandson of William the Conqueror was killed under its walls in 1128. The main object of attraction is the fine old Gothic church of Saint Martin's which was commenced toward the end of the 15th century and was intended to be a copy of the cathedral at Amiens. The scheme was apparently too ambitious for the available resources, for not only in the tower missing, but the nave was built only half its proposed length. The edifice contains a re¬ markable painting by Rubens, (<Saint Roch interceding for the Plague-stricken,® which is said to have been painted in eight days to the order of the town about 1625-30. The first printing press in Belgium was set up in Alost, the birthplace of Thierry Maertens, one of the claimants to the honor of inventing the art of printing. Maertens appears to have worked under Gutenburg at Mayence, and returned to Alost in 1475. Until recent years the people of Alost used to keep up the ancient practice of sword-dancing, almost identical with that

in vogue in Scotland. Tradition ascribes the dance to have come down from the Nervii; increased industrial activity in Alost led to its falling into disuse. Due to the great trade in hops and various manufacturing industries, no town in Belgium had made greater progress during the past 30 years than Alost.

The European War brought dire tragedy upon the town. On 11 Sept. 1914 an engage¬ ment was fought there between the German

invaders and Belgian troops. Civilians were taken- prisoners ; their money was confiscated; a number were shot or bayoneted, and others were driven in front of the German troops as a screen against the Belgian army. The Bel¬ gian left advanced from Termonde and Lierre and recaptured Alost 26 Sept. 1914. “During their retreat the Germans fired 12 houses . . . and three civilians were shot dead in the street ... a heap of nine dead civilians were lying in the Rue de FArgent® (Bryce Report). The Germans bombarded and captured Alost again on 29-30 September, and wreaked terrible vengeance on the unfortunate citizens for the repulse they had suffered at the hands of Belgian soldiers. See Bryce Committee, Re¬ port of.

ALOYSIUS GONZAGA, Saint: b. Lom¬ bardy 1568. At the age of 17 he transferred his inheritance and right of succession to his brother Rudolph and immediately set out for Rome. Here he entered the novitiate of the Society of Jesus, and shortly after began his studies in the Roman College. While nursing the victims of a contagion then ravaging the city he contracted the disease and died in his 25th year. His brief career was characterized by such extraordinary virtue that he was canon¬ ized a saint by Pope Benedict XIII in 1726, and is now recognized by the Catholic Church as the Patron of Young Students. His feast day is celebrated 21 June.

ALP-ARSLAN, alp'ar-slan (“strong lion®), the greatest ruler of the Seljuk Turks: b. Turkestan 1028; d. Berzern 1072. He suc¬ ceeded his uncle Togrul 1063, consolidated his realm into one kingdom and then proceeded to a career of conquest interrupted only by his death. He conquered central Asia to the Oxus ; and invading Armenia and Georgia, in August 1071, he overthrew and captured the Emperor Romanus IV (Diogenes) in a bloody battle near Malaskerd, between Van and Erzerum, and only released him on payment of a vast ransom. He was assassinated while invading Turkestan and was buried at Merv.

ALPACA, or PACO (Ar. al, the; Peruv. paca), a semi-domesticated animal (Lama pacos), native to the Andes and valued for its wool. It is a cameloid mammal, closely allied to three others of the same region, the vicuna, the llama and the guanaco ; but it much resem¬ bles a sheep, except in the length and erect carriage of its head. The natural growth of its thick woolly hair would be about two feet, but it is clipped, the annual growth being about eight inches. In color the wool varies from pale yellowish brown or gray to black ; its fibre is straighter than that of sheep wool, and very fine, glossy and elastic. The animal is now seldom seen in an entirely wild state. See Llama.

ALPENA, Mich., city and the county-seat of Alpena County, 110 miles north of Bay City; on the west side of Lake Huron, at the head of Thunder Bay, on the Detroit and Mackinaw Railway. It is divided in two by Thunder Bay River, from which water power is procured from three dams, facilitating extensive manu¬ factures of paper from wood-pulp and of cement from limestone and clay. Further es¬ tablishments include large tanneries, large ex¬ tract works (hemlock) for export trade, found¬ ries and machine shops, saw-mills, shingle- mills, veneer-mills a woolen-mill, flour-mills, large sash and blind factories, large excelsior- mills, quarries, stave and heading factories, municipal electric lighting and water plants and a government fish hatchery. The United States census of 1914 recorded 54 manufacturing es¬ tablishments of factory grade, employing 1,636 persons, of whom 1,494 are wage earners, re¬ ceiving a total of $895,000. The capital en¬ gaged aggregated $4,712,000, and the output was valued at $4, 102,000 ; of this, $1,804,000 was added by manufacture. The harbor facili¬ ties are excellent. Alpena is governed on the commission-manager plan, under the recent en¬ abling act of the State Legislature. Alpena was settled in 1835 and incorporated 1871. Pop.

(1920) 11,101.

ALPES-MARITIMES, alp ma're'tem', France, southeastern department on the Mediterranean and Italian border, noted for its picturesque scenery and fine climate. The celebrated health resorts, Nice (the capital), Grasse, Cannes and Mentone are in this de¬ partment. Area, 1,482 square miles; pop.

356,500.

ALPHA and OMEGA, the first and last letters of the Greek alphabet, used widely in ecclesiastical literature as a term signifying “completeness.® Jesus Christ is designated the “Alpha and Omega,® three times in Revelations i, 8; xxi, 6; xxii, 13. Aleph and Tau, the first and last letters of the Hebrew alphabet, are similarly used and Isaiah xliv, 6 repre¬ sents God saying “I am the first and I am the last,® as an expression of eternal and universal omnipotence.

ALPHABET (from alpha and beta, the first two letters of the Greek alphabet), the ordinary series of the letters or syllables (in syllabic alphabets) of a language. For an ac¬ count of what is known or conjectured of the origin of alphabetic and other systems of writ¬ ing, see Writing. • The English alphabet, like the most of those of modern Europe, is derived directly from the Latin, but owes its ultimate origin to the Phoenician, which gave birth also to the ancient Greek, the

Etruscan, the Gothic, etc. According to tradition the Phoenician Cadmus introduced writing into Greece, the let¬ ters first used being the same as the Phoenician, but afterward undergoing changes both in sound and form. It would appear that the Phoenicians borrowed their alphabet from the hieratic alphabet of Egypt, whence also the He¬ brews may have obtained theirs during their long stay in that country, though it is more probable that like the Aramaeans they were content to receive it at second-hand from the Phoenicians. The Egyptian origin of the Phoenician alphabet, however, has not been definitely established, and some hold to the

SOUTH SEMITIC

ALPHABETS ARAMAEAN ALPHABETS HELLENIC ALPHABETS

• /-s

6

<D

✓ —

ctf

H

0)

H

d

<

CO

d

<

tn

d

<

to

✓—N

• H

Ih

bfl

03

£

Alphabet of Asoka. (3d century b. c.

Modern Amharic

Inscriptions at Safa (1st century a. d.

i

Modern Arabic

!

1

j Inscriptions at Sina

(5th century a. d

Modem Syriac

Modern Hebrew

Inscriptions at Jeru

(1st century B. c.

Aramaic.

(7th century b. c

Moabite Stone.

(9th century b. c

Greek Inscriptions i

(9th centurj' b. c

Eastern Greek.

(c. 460 b. c.)

Eubcean Greek.

g

’4- >

o3

Roman Uncials.

(5th-6th centurie

Irish Half-Uncials.

(7th-8th centurie

Caroline Minuscule

(9th century A. D

Greek Uncials.

(5th-6th centurie

Greek Cursive.

(7th century A. D

Greek Minuscule. (Modern)

6

o

m

H

X

,1

1

6.f

1

K

ry

%

- a

A

A

A

A

cc

cl

X

a

tX

\

□

A

0

J

D

urn

3

i

.a

B

B

h

B

l

b

&

LL

M

s

Tf

A

n

T

T

\

\

;

;

X

7

“i

f

c

C

C

c

C

r

T

r,r

r

“C

1 =

1

►

a

1

9

&

n

*7

A

A

A

D

D

d

d

d

A

s

A

f

If

A

T

ar

d.i

Cl

n

n

A

3

E

E

e-

p-

e

e

(r

£

L

V

k

5

o

i

r

F

F

F

f

Y

0

N

j

!

1

T

Z

i

X

I

[9

r

S’]

«3К»

Z

3

i?

Lu

M

W

z

A

M

n

TT

H

N

B

H

H

H

i?

h

tl

H

h

H

TT

0

Tn

Hi

la

6

4

£2

[S]

©

0

0

0

8-

e.-fr

T

i

?

6

F

l

a

•

1

1

1

J

1

i

1

l

L

f

＜?

i

n

3

-L

y

3

'3

1

■y

1

P

K

K

K

X

K

K

T

S

A

1

J

i

u

L

6

1

A

l'

L

£

l

t

A

J-

A

A

y

S

0

D

3

• I

7

7

A

A

A

CD

IB

TH

LC

M

i

*1

\

3J

J

t

J

J

1

U

*1

yt/

/V

N

N

I

TL

KS

1

ru

Y

M

ST ’ "

rl

A

A

-0

S

»

■h

5

X

X

0T

X

X

I

3

F

4

a

A

c

M

S

V

y

0

0

0

0

0

0

0

0

0

O

O

0

0

Tf

£

b

£

0

O

3

0

0

1

7

1

r

r

P

p

y >

P

rr

CD

ir,ar

n

IT

E61

1

'v— A'

P

J

£

X

h

3"

d>

4>

• •

J

/0

JD

P

T

<?

T

9

a

C|

q

L

►

J

t

§

*7

7

W

p

p

R

fl

r

p

e

/°

i3

jt

£

£

•

0 0

■

F

Jkr

V

V

vv

A\

£

5

5

f

r

c

c

7T

A

t

X

h

L

n

J]

/>

X

T

T

T

T

T

z

z

i

T,7

nr

r

Y

V

V

1L

VL

u

Y

u

U

;

|

4 >

w

4?

♦

9

t

X

V

i

X

t

X

X"

T

T

•

t

; /

J

n

GO

03

uu

vV

opinion that Crete rather than Egypt is the original home of onr alphabet.

The Hebrew alphabet now employed is not the original one, but has an Ara¬ maic origin, having been adopted some time after the Captivity. The Hebrew alphabet proper, as we find it on ancient coins, is evi¬ dently the same as that of the Phoenician in¬ scriptions. The names of the letters in Phoeni¬ cian and Hebrew must have been almost the same, for the Greek names, which, with the letters, were borrowed from the former, differ little from the Hebrew. By means of the names we may trace the process through which the Egyptian characters were transformed into letters by the Phoenicians. Some Egyptian character would, by its form, recall the idea of a house, as for example, in the Phoenician or Hebrew betJi. This character would subse¬ quently come to be used wherever the articula¬ tion b occurred, whether in the beginning, mid¬ dle or end of a word. Its form might be after¬ ward simplified, or even completely modified, but the name would remain, as beth still con¬ tinues the Hebrew name for b, and beta the Greek. Our letter m, in Hebrew called mim, water, has still a considerable resemblance to the zigzag wavy line chosen to represent water, as in the zodiacal symbol for Aquarius. The letter o, of which the Hebrew name means eye, was originally intended to represent that organ.

The Semitic alphabets are written from right to left. The earliest Greek inscriptions, at Thera, are written in a character much like Phoenician, either from right to left, or from left to right, or boustrophedon, with the lines alternating in direction. The Greek alphabet did not definitely assume its final form until comparatively late. It is the Ionian (see accom¬ panying plate (Eastern Greek) in the form which it assumed at Halicarnassus) which gave rise to the modern Greek “capitals, }> while the alphabets of Italy, such as Latin, Etruscan, etc., were offshoots from an Eubcean stock.

The later Greek alphabet furnished elements for the Coptic, the Gothic and the old Slavic alphabets. The Latin characters are now em¬ ployed by many nations, such as the Italian, the French, the Spanish, the Portuguese, the Eng¬ lish, the Dutch, the German, the Hungarian, the Polish, etc., each having introduced such modi¬ fications or additions as are necessary to express •the sound of the language peculiar to it. The Greek alphabet has only 17 letters, taken directly

from the Phoenician, though the Phoenician al¬ phabet had 22 letters. These were the five vowels, a, e, l , o, v, (a , e, i, o, u, as in French) and the 11 consonants, ft , 7, d, /c, A, g, v, rr , p, cr, r, (b,g , d , k, l, m, n, p, r, s, t) . According to one tradition, Palamedes, a contemporary of the Trojan war, invented k (x) and the three aspirates 0y , z, (th, ph, ch guttural). To Simonides was attrib¬ uted the invention of the double consonants C and ip (ds or z, and ps) and the two long vowels V and « (e and o) , which completed the Greek alphabet of 24 letters as still used. Be¬ sides these, there were anciently the digamma , a character corresponding pretty nearly to v, which afterward slipped out of the Greek alphabet ; and the character ' representing, an aspirate at th*3 beginning of words. The origi¬ nal Latin alphabet, as it is found in the oldest inscriptions, consisted of 21 letters ; namely, the vowels a, e , i, o and u (v), and the con-*

sonants b, c, d, f, z, h, k, l, mr n, p, q, r, s, t, x. Z slipped out at an early period, and g took its place. To these we might also add the char¬ acters ce and ce , representing the Greek diph¬ thongs oi and at. The letters i and u, it must be remarked, had a double force, that of a vowel and that of a consonant. In the latter case they were, after the introduction of print¬ ing, changed frequently into j and v. The i consonant, as in inventus (youth), had a sound resembling that of y in English or j in Ger¬ man; u, consonant, as in uespa (vespa), a wasp, had a sound much like the English w — wespa. (At least this opinion appears best supported by the evidence). No genuine Latin word con¬ tains either y or z, these being used in foreign (chiefly Greek) words adopted into the lan¬ guage ; and k is found in classical Latin only in Kalendce. Our modern lower-case letters and script represent adaptations of the Caro- lingian minuscule of the 9th century, which itself was descended from the uncials or book- hands of still earlier periods. The most im¬ portant of these were the Roman uncial, which is essentially made up of rounded capital forms, and the Irish semi-uncial, which shows traces of influence by an antecedent cursive script or running hand. The modern Greek minuscule is likewise the result of the interaction of uncial and cursive forms.

While the alphabets of the west of Eu¬ rope are derived from the Latin, the Rus¬ sian and other Slavonic alphabets of the east come from the Greek. The modern Rus¬ sian, consisting of 35 letters, is a modification and simplification of the ancient Cyrillic alpha¬ bet, invented by Cyril in the 9th century in order to translate the Gospels into the language of the Slavs of Bulgaria and Moravia. It was formed of Greek letters, together with some that had been differentiated from Greek liga¬ tures. The Anglo-Saxon alphabet (see Anglo- Saxon) had two letters for the two sounds of th, which appear to have come from

the Greek through the Moeso-Gothic, and which were un¬ fortunately not retained in later English. It wanted the letters j, k, q, v, z, but it had the sound ce. The German alphabet consists of the same letters as our own, the common German characters being mere modifications of the Roman, but the sounds of some of them are different. Anciently certain characters called Runic (q.v.) were made use of in Germany and Scandinavia, to which some would attribute an origin independent of the Greek and Latin alphabets, although it is pretty well established that both Greek and Latin played a part in their origin. Among Asiatic alphabets the Arabian, which, like Hebrew, is of Aramaic or¬ igin, has played a part exactly analogous to that of the Latin in Europe, the conquests of Mohammedanism having imposed it on the Persian, an Aryan language; the Turkish, a Tatar language; the Hindustani, also an Aryan language ; and even the Malay. It con¬ sists of 28 letters, and appears to derive its origin from the Sinaitic alphabet, employed during the first centuries of the Christian era, and found in inscriptions in the Sinaitic penin¬ sula, at Petra, in the Hauran, etc. Other alpha¬ bets of Aramaic origin are used for Syriac, Mongolian and Manchu. Beside these alpha¬ bets of North Semitic origin there is a group

of alphabets indigenous to southern Arabia. A specimen which appears to be of this stock, though it comes from Safa, near Damascus, is shown in the accompanying table. Though the relation of these forms to those of Phoenicia is unquestioned, the precise nature of this re¬ lation is unknown. The alphabets or sylla¬ baries of Abyssinia are South Semitic in char¬ acter, as is shown by the Amharic alphabet pictured. It has also been maintained by Biihle, and vigorously denied by other writers, that the alphabet used in the edicts of the great Indian monarch, Asoka (255-223 b.c.), is of South Semitic origin. The Nagari alphabet, used in writing Sanskrit, comes from this stock. This alphabet is one of the most remarkable alphabets of the world. As now used it has 14 characters for the vowels and diphthongs, and 33 for the consonants, besides two other symbols. The vowel a short is to be understood after every consonant, unless ex¬ cluded by another vowel immediately attached to the consonant. (See Sanskrit; also arti¬ cles on the various Indian languages). Our alphabet is by no means a perfect instrument for what it has to perform, but is both defec¬ tive and redundant. It is estimated that there are 42 sounds in the language, and only 26 letters to represent them. A, to begin with, has to do duty for many different sounds, as in far, fat, fail and fame; o

has three sounds, as not, note and move; e has a long sound and a short, as in mete and met. C is a useless letter altogether, since it has always either the sound of s or of k. Others of the consonants encroach upon one another's prov¬ inces ; g, for example, sounds sometimes like j, as in digest; f sounds v in of; s sometimes usurps the sound of z, as in raisin, sometimes that of zh or sh, as in pleasure. See articles on the various languages mentioned and on the several letters of the alphabet, and Hiero¬ glyphics; Palaeography; Phonetics; Writing. Consult Berger, P., (Histoire de l'ecriture dans l'antiquite5 (Paris 1891) ; Clodd, E., (The Story of the Alphabet (1900); Evans, A. J., (Scripta Minoa) (Vol. I, 1909) ; Faulmann, Hllustrierte Geschichte der Schrift5 (1880) ; Kirchoff, A., (Studien zur Geschichte des grie-chischen Alphabets) (4th ed., 1887) Larfeld, W., (Handbuch der griechischen Epigraphik5 (1902-07) ; Lidzbarski, article in Jewish En¬ cyclopedia, and (Nordsemitische Epigraphik5 (1898) ; Reinach, S., (Traite d epigraphie grccque) (1885) ; Roberts, E. S., (Introduction to Greek Epigraphy5 (1887-1905) ; Steffens, (Lateinische Palaeographie — Tafeln5 (1903) ; Taylor, I., (The Alphabet5 (London 1883) ; Thompson, E. M., (Handbook of Greek and Latin Palaeography5 (3d ed., 1906).

Norbert Wiener.

AL-PHASI, al-fa'zi, or RIPH, Isaac,

Hebrew rabbi: b. Fez, 1013; d. Lucena, 1103. As a codifier, simplifying Talmudic teachings and freeing them from controversial detail, Al-Phasi's digest (Halakhoth5 or ˆecisipns5 was the basis of the codes of Maimonides and Quaro. Exiled at 75 years of age Al-Phasi, the <(man of Fez55 as he was called, settled in Lucena, Spain, where his pupil and successor as rabbi, Joseph ibn Magash, became the teacher of the celebrated Maimonides.

ALPHEUS, Greece, the modern Ruphia, river of Peloponnesus, which rises near Asca in southern Arcadia, and flows through Elis and the Olympian plain to the Ionian Sea. It is the classic river famous for the myth of the love of Alpheus for Arethusa. Arethusa bathing in the river is said to have escaped from the enamored river-god through the in¬ tervention of Diana who transformed her into a fountain, transporting her to Ortygia, modern Sicily. But Alpheus, pursuing through a sub¬ terranean course emerged in Sicily, and was happily united to the Arethusian fountain.

ALPHONSINE TABLES. See Alfonso X.

ALPHONSUS A SANCTA, Maria,

Spanish historian and bishop of Burgos : b. 1396; d. 1456. Celebrated for his learning, his most important work is a history of Spain from the earliest times to 1456, entitled (Rerum Hispanorum Romanorum imperatorum, sum- morum pontificum, nec non regum Francorum anacephaleosis5 (Granada 1545).

ALPHONSUS DEI LIGUORI, Saint: b. Naples of noble parents at the end of the 1 7th century; d. 1787. At the age of 16 he took his degree of Doctor in Civil and Canon Law in the University of Naples and immedi¬ ately entered the legal profession. This he soon abandoned in order to become a priest and to dedicate his life to the service of the poor in the villages of southern Italy. To assist him in these labors of teaching the poor peasants, he founded the Congregation of the Holy Re¬ deemer, whose members are commonly known to-day in the United States as <(Redemptorists.55 He was made bishop of St. Agatha by Cle¬ ment XIII. After 25 years of fruitful labor in this field, he returned to his monastery at Nocera, where he died. His virtues and learn¬ ing have made him one of the best known saints in the Catholic Church. He was canon¬ ized in 1839 by Gregory XVI, and in 1871 was proclaimed by Pius IX a Doctor of the Uni¬ versal Church. His writings deal chiefly with moral theology in theory and practice. His feast is celebrated on 2 August. The first authoritative work on St. Alphonsus was written by one of his scholars, P. Tannoiaand, and is entitled (Vita et Instituto del Vener- abile Servo di Dio5 (3 vols., Naples 1802). In French, an exhaustive work in four volumes by Cardinal Villecourt, (Vie et institut de Saint Alphonse de Ligouri5 (1863) ; in English, vid. Butler's (Lives of the Saints5 and (Life5 by Bishop Mullock.

ALPINE CLUBS, organizations for the exploration and study of mountains. The original club is the famous Alpine Club of Eng¬ land, organized in 1858, which publishes the Alpine Journal. The first American Alpine Club was organized in 1873. There are in the United States the <(Mazamas55 and Sierra clubs on the Pacific coast, and the Appalachian Club on the Atlantic. See Mountain Climbing.

ALPINE PLANTS, plants indigenous to high altitudes. The most striking features common to them all are adaptations to rigorous climate such as the dwarfing of the stems of trees and shrubs, but not of roots or flowers, which may even be increased in size over those of similar plants grown in milder places;

ALPINI

gnarled and crooked habit; horizontal or creep¬ ing rather than upright growth (the height of the taller species indicating the approximate depth of snow) ; and the development of structures that tend to check evaporation. Of these last a thickened epidermis, as in conifers, and epidermal hairs, as in edelweiss, are the most striking.

ALPINI, al-pe'ne, Prospero, Italian bota¬ nist and physician: b. Marostica 1553; d. Padua 1617. During the management of date plantations in Egypt, he discovered the sexual difference of plants and the fertilization of female flowers from the male, which Linnaeus adopted as the foundation of his system, also naming the genus Alpmia of the order Zingiberaceae in his honor. Alpini's (De Medicina EgyptiorunP (Venice 1591) contains the first description of the coffee plant known in Europe. (De Plantis 2Egypti liber) (Venice 1592) is his most important work.

ALPS, the most remarkable and interesting system of mountains in Europe. It covers a great part of northern Italy, several depart¬ ments of France, nearly the whole of Switzer¬ land and a large part of Austria, while its ramifications in Italy and Germany, and ex¬ tending far toward the southeast, connect it with nearly all the mountain systems of Europe. The name is derived from the Celtic alb, which by some is made to signify white, by others height. In the immediate neighbor¬ hood of the mountains alp has a peculiar mean¬ ing, and signifies one of the high pastures for which the Alps are distinguished. This great congeries of mountains may be said to be in¬ cluded between lat. 44° and 48° N. ; and long. 5° and 18° E. The culminating peak of the whole system is Mont Blanc, 15,781 feet high, though the true centre is St. Gothard, or rather the mountains between the sources of the Rhone and the Inn, and the Swiss cantons Valais, Bern Uri and Grisons on the north; and cantons Tessin and Lombardy and Sardinia on the south. It is a curious fact that its great central mass is nearly equidistant from the pole and from the equator. From its slopes flow, either directly or by affluents, the great rivers of central Europe, the Danube, Rhine, Rhone and Po. Round the northern frontier of Italy the Alps form a remarkable barrier, shutting it off at all points from the mainland of Europe, so that, except in the valley of the Adige, where a remarkable break occurs in the chain, or at the opposite extremity at Nice, it can only be approached from France, Germany or Switzer¬ land through high and difficult passes. Ac¬ cordingly nearly all the great passes of the Alps are connected with roads from the

north¬ ern kingdoms into Italy. In this connection see Italy : History and Modern Development ; 1, Physical Geography; Mountains.

As usual with mountain systems of great altitude, the highest peaks of the Alps are reached by a gradual ascent through a succes¬ sion of outer ranges and elevated intermediate valleys. The total width of the system is there¬ fore always great and can hardly anywhere be measured with precision, opinion varying as to the points at which the outer limits should be fixed. Toward the east, however, the system, while it diminishes in height, becomes more widely extended, some of the transverse valleys

extending to 150 miles, while that of the Drave reaches 200. From Bellinzona, in the canton of Tessin, to Altdorf, in that of Uri, the dis¬ tance is 50 miles. The outer range is called by the Italians Pre-alpi, by the Germans Voralpen. The main chain of the Alps, which commonly determines the watershed of the countries through which it passes, contains some of the highest peaks; but at several points there are extensive ramifications of the system proceeding at various angles from the main chain, and more or less connected with it, and which some¬ times exceed in mass and altitude the cor¬ responding parts of the principal chain. Such are the Alps of Dauphine and Savoy, and the Bernese Alps. The principal valleys of the Alps run mostly in a direction nearly parallel with the principal ranges, and therefore east and west. The transverse valleys are commonly shorter. In the section called the Lepontine Alps, however, long ranges run north and south, forming valleys transverse to the divid¬ ing line of. the waters, and terminating in the great Italian lakes. The slopes toward the south are more precipitous than toward the north, and as most of the collateral ranges lie to the north of the main chain the great valleys are mostly to be found in the intervals between them. The transverse valleys of the Alps frequently lead up through a narrow gorge to a depression in the main ridge between two adjacent peaks. These are the passes or cols, which are found by tracing a stream which descends from the mountains up to its source. The col is usually found to receive the drainage of the neighbor¬ ing peaks, and when it is of sufficient extent a small lake is generally formed, from which a Stream flows down on each side. When the one stream has been traced up to its source the passage across the mountains is completed by following the course of the other. The prin¬ cipal passes, now well known, are more than 50 in number ; but there are many others more difficult and dangerous which have never had more than a local reputation.

The common divisions of the Alps have been taken from the Romans, whose acquaintance with the Alps as the northern boundary of Italy

was considerable, yet their classification, being formed mostly for practical purposes, was far from complete. Several modern divisions have been added. The Romans were acquainted with many of the best passes, to which from their altitude they gave the name of Mons. Before noticing these divisions a glance may be taken at the general direction of the main chain. The most convenient starting-point is on the Medi¬ terranean coast, near Nice. Eastward the chain proceeds along the coast till it forms a junction with the Apennines, which may be con¬ sidered as one extremity of thie system. In the opposite direction it proceeds northwest, and af¬ terward north on the boundaries of France and Italy to Mont Blanc; it then turns northeast and runs generally in this direction to the Gross Glockner, in central Tyrol, between the Drave and the Salza, where it divides into two branches, the more northerly of which proceeds northeast toward Vienna. The southern chain subdivides again, one branch running in a southerly direction, connects itself with the mountains of Dalmatia, and by a southeasterly continuation with the Balkans and the moun¬ tains of Greece ; the middle branch proceeds

toward the Drave and Danube. With these con¬ tinuations, which lose themselves insensibly in other ranges, the Alps may be considered to terminate.

The Maritime Alps. — The first great divi- fvision of the Alps extends from their junction with the Apennines to Monte Viso, a distance of about 100 miles. This mountain is the most prominent object from the basin of the Po, wherever the Alps are visible. The division of the Alps from the Apennines has been vari¬ ously fixed at Col di Tende and Col d'Altare, near Savona. The northern limit of the Mari¬ time Alps is to the south of Monte Viso. The culminating-points are the Aiguille de Cham- beyron, 11,155 feet, and the Grand Rioburent, 11,142 feet. The principal pass is the Col di Tende (6,158 feet), which was made practicable for carriages by Napoleon. It leads from Nice to Turin. The road is dreary, but commands a view of the Alps from Col dTseran to Monte Viso. There are carriage roads over the Col di San Bernardo and Col di Nava. Numerous tributaries of the Po and the Durance with the Var and other lesser rivers rise in the Maritime Alps.

The Cottian Alps. — Anciently named after a chief of the district, and extending from Monte Viso to Mont Cenis, these consist of numerous mountain masses irregularly grouped, the main line running

northeast, and the prin¬ cipal ramifications to the west of it. The length is about 60 miles. Modern geographers dis¬ tinguish, as a separate group divided from the main chain by the valley of the Durance, the so-called Dauphinese or Dauphine Alps. These contain loftier peaks than the* main chain. Principal peaks of the Cottian Alps : Monte Viso, 12,605 feet ; Chardonnet 12,373 ; Ciama- rella, 12,081 ; of the Dauphines Alps : Pic des Lcrins, 13,462; La Meije, 13,081; Pelvoux, 12,973. There is a carriage road by Mont Genevre (6,102 feet) between the valleys of the Durance and the Dora Ripaira, and by the Col de Sestrieres (6,335 feet) from Cesanne to Pignerolo. The road by the former, Cesanne to Briangon, was constructed by order of Na¬ poleon. The difficult pass of Col de la Roue, Bardonneche to Modane, is that supposed to have been traversed by Caesar in order to attack the Helvetians. The Durance and the Dora Ripaira rise in the Cottian Alps.

The Graian Alps. — From Mont Cenis this group extends to Mont Blanc (50 miles) and has extensive ramifications in Savoie and Pied¬ mont. The principal peaks are, in the main chain, Aiguille de la Sassiere, 12,326 feet; in the Piedmontese group, Grand Paradis, 13,300; in the Savoie group, Grande Casse, 12,780. Mont Cenis (6,765 feet), the most frequented of all the Alpine passes, was crossed by Pepin to attack the Lombards. A carriage road over it was constructed by Napoleon in 1803-10, lead¬ ing from the valley of the Arc to Turin, and uniting with the road from Mont Genevre at Susa. A railway now passes through the mountain by a tunnel nearly eight miles long (See Cenis). The pass of Little St. Bernard (7,192 feet) lies between the valleys of the Isere and Aosta. It was made practicable for cars by Augustus, but is now only available for mules. It appears to have been the road taken by Hannibal, The Col de Bonhomme (8,195 feet) communicates with the Col de la Seigne

(8,327 feet) in the Pennine Alps. They lead by a mule path from Contamines to Cour- mayeur. The Stura, and Orca, and the Arc and Isere, rise in the Graian Alps.

The Pennine Alps (Celtic, pen or ben, a hill) is the loftiest range of the whole system, having Mont Blanc at one extremity and Monte Rosa at the other (60 miles). Here also begin the most extensive ramifications of the system, some of the collateral ranges rivaling or ex¬ ceeding in mass and altitude the main chain. The Alps of Haute Savoie form a northwestern continuation of this range. The northern bound¬ ary of the Pennine Alps is the Valais, or upper valley of the Rhone. On the opposite side of this valley, and nearly parallel with the main chain, runs the great range of the Bernese Alps. Here . the grandest

panoramas of Alpine scenery are exhibited. The great peaks of the two vast ranges are only about 20 miles apart, and be¬ tween them run transverse ranges presenting innumerable secondary heights. From the Mat¬ terhorn (Mont Cervin), between Mont Corn- bin and Monte Rosa, a series of great heights, including the Weisshorn and the Gabelhorn, run to the north. The main range contains Mont Blanc, Monte Rosa and Mont Cervin, three of the highest peaks in Europe. On the west the Bernese Alps are connected with the Jura range. The principal heights of the Pen¬ nine Alps are Mont Blanc, 15,781 feet; Monte Rosa, 15,217; Mischabelhorner (Dom), 14,935; Lyskamm, 14,889; Weisshorn, 14,804; Matter¬ horn, 14,780. In the Bernese Alps are the Fin- steraarhorn, 14,026; Aletschhorn, 13,803; Jung¬ frau, 13,671. There are bridle passes, the Col de la Seigne, already mentioned, and the Col de Ferret (8,320), on each side of Mont Blanc. The pass of Great St. Bernard is celebrated for its hospice (See Bernard, Great St.). It was crossed by Napoleon in 1800, but it is not prac¬ ticable for carriages. There are several passes, as the Col du Cervin, the Schwarzthor and the Col du Lys, from 10,000 to 14,000 feet in height. The most easterly pass is the Simplon, 6,595 feet, from Brieg to Domo d'Ossola. It has a carriage road made by Napoleon. This is about 36 miles long and 25 feet wide through¬ out, and is carried over steep precipices and through six galleries hewn in the rock. The Grande Galerie is 683 feet long. A double rail¬ way tunnel, the longest and lowest tunnel through the Alps (12% miles long and 2,313 feet above sea-level), has been driven through the Simplon. Numerous tributaries of the Rhone rise in the valley between the mountains, and on the Italian side the Dora Baltea, Sesia and other rivers.

'Ihe Lepontine Alps form the continuation

of the main chain on the south side of the great valley or depression stretching from Martigny in the Valais to Coire in the Grisons, the western portion of which forms the basin of the Rhone, the eastern that of the Vor- derrhein. From this chain branch the northern and eastern extensions of the Swiss Alps be¬ yond the Bernese range, the eastern boundary of which is fixed at the defile of the Devil's Bridge, near Andermatt, crossed by the Reuss. The Lepontine range extends to the Spliigen pass. The line of watershed is generally parallel to the valley of the Vorderrhein ; but here, as already noticed, some of the principal ranges run transversely to it, terminating in the great

ALPS

Copyright by Underwood & Underwood, N. V.

1 The Matterhorn, Switzerland 3 Mount Pilatus, Switzerland

2 The Jungfrau, Switzerland 4 Avalanches in the Swiss Alps

valleys in which lie the lakes Maggiore, Como, etc., led by numerous tributaries from this and the following division of the Alps. This divi¬ sion forms the great water-parting of the whole system. Within a radius of a few miles from the St. Gothard Pass rise the Rhone, the Aar, the Reuss, the Vorderrhein, the Ticino, the 1 occia and the Maggia. The principal pass is the St. Gothard (6,936 feet), over which pass is a carriage road from Bcllinzona to Altdorf. 1 hrough this mountain mass a railway tunnel more than nine miles long was opened in 1882. The Gries Pass (8,050 feet) conducts from (tbcrgestelen to Formazza. The Bernardin Pass (6,769 feet), constructed by the Swiss government, leads from Coire to Bellinzona. i he road from Coire to the Spliigen leads, by wav of the Spliigen Pass (6,945 feet), to Lake Como. . 'Phis route commands the finest views oi Swiss scenery in the Orisons. Previous to the construction of the present road by the Austrian government in 1823 it was difficult and dangerous. Marshal MacDonald, who crossed it in 1800, lost a large number of men bv avalanches at a gorge in the passage of the Cardinello, which the new road avoids. The carriage road over the Furka Pass from Ober- gestelen to Andermatt, completed in 1867, af¬ fords a fine view of the Schreckhorn and Fin- steraarhorn. The peaks here are of less eleva¬ tion. The highest, Monte Leone, is 11,696 feet; the Piz Valrhein is 11,148 feet, and several are above 10,000. Of the northern ranges Todi is 11,887; Bifertenstock, 11,237; Scheerhorn, 11,132, and there are many above 10,000.

The Rhaetian Alps extend from the Spliigen to Dreiherrnspitz on the borders of . Salzburg and Tyrol. The Engadine, or valley of the Inn, divides them into tw’o portions. The chain is also broken by the valley of the Adige. To the south, separated by the valley of the Adda, are the Lombard Alps, while the more northerly continuations embrace the Tyrolese and Bavarian Alps. In the main range are the Piz Bernina, 13,294 feet; Piz Roseg, 12,936; Ortelerspitze, 12,814; in the Lombard Alps, Monte Adamello, 11,832; Presanella, 11,688; and Care Alto, 11,352. The other ranges are inferior in height. Good roads now* become more numerous. The Malloya Pass (5,942 feet) leads from Chiavenna, by the valley of the Inn, to Innsbruck, and communicates with the road over the Julier Pass (7,503 feet) to Coire. The Pass of

Glurns (4,400 feet), from the valley of the Inn to the Adige, is the lowest pass over the main chain. It joins the road to Milan by the Valtelline, the highest part of which is 9,174 feet. This is a carriage road constructed by the Austrian government for communication with their Lombard dominions. The Brenner Pass (4,588 feet) leads from Verona to Innsbruck. The Brenner is crossed by a railway. The northern ranges are inter¬ sected by the Septima, Julier, Albula and other passes. The Adda, Oglio, Adige, Hinterrhein, Inn and other rivers, rise in this part of the chain.

Noric Alps. — The main chain of the Alps here divides into different sections as already mentioned. The northern part of the chain ex¬ tending to Vienna was anciently called the Noric Alps, wffiile the southern continuations were knowm as the Carnian and Julian Alps, the names Venetian, Dalmatian; and Pannonic Alps

being also in use. The culminating peak of the northern range is the Gross Glockncr, 12,405 feet. Farther east the heights are of much less elevation. In Carinthia and Styria two parallel branches called the Styrian Alps enclose the up¬ per valley of the Mur. In this group is the Hafnereck, 10,044 feet. In south Tyrol and Venetia several peaks rise above 10,000 feet. The Carnic Alps run from the frontiers of Tyrol and Venetia to the frontier of Carinthia They are separated from the northern range by the Gailthal. The height of the southeastern continuations of the Alps rapidly diminishes, and they lose themselves in ranges having noth¬ ing in common with the great mountain masses which distinguish the centre of the system. Mount Terglou, near the northwestern extrem¬ ity of the Julian Alps, has a height of 9,371 feet. The name Dinaric Alps is given to a continuation from Mount Klek through Croatia and along the borders of Dalmatia and. Her¬ zegovina.

There are various points of vantage from which extensive views of Alpine scenery are commanded at the expense of a moderate amount of climbing. The Rigi, which can now be ascended by railway, is one of these. There are hotels at the top, 5,905 feet above the level of the sea, and 4,468 above the Lake of Lucerne. A favorite Rigi spectacle is that of the sun rise over the Bernese Alps. The Faulhorn (8,799 feet), southeast of Lake Brienz, com¬ mands a near view of the same range. The Becca di Nona (8,415 feet), south of Aosta, gives, according to some authorities, the finest panoramic view to be obtained from any sum¬ mit of the Alps. From the Gorner Grat (to which there is now' a railway from Zermatt), and various points in the valley of Chamonix, particularly the Montanvert, with its outlook upon the Mer de Glace, view's of various inter¬ est are obtained. The most accessible Alpine

glaciers are those of Aletsch, Chamonix and Zermatt.

Climate. — In the lowrer valleys the mean temperature ranges from 50° to 60°. Half-way up the Alps it averages about 32° — a height which, in the snow'y regions, wffiere snow always lies, the average does not attain. The exhila¬ rating and invigorating nature of the climate in the upper regions of the Alps during sum¬ mer has been acknowdedged by all who have visited these romantic scenes. The freshness of the breeze as it comes from the snowy peaks, tempered by the rays of a southern sun, en¬ ables the traveler, without weariness, to per¬ form distances on foot that at home he w'ould have shrunk from attempting. Notwithstand¬ ing, however, the invigorating nature of the climate, the inhabitants of the higher valleys are often afflicted with goitre and cretinism.

Botany and Zoology. — In respect to vege¬ tation the Alps have been divided into six zones. The limits of these depend not on absolute height, but on height modified by ex¬ posure and local circumstances. The lowest is the olive zone. This tree flourishes better on sheltered slopes of the mountains than on the plains of northern Italy. The vine, which bears a greater winter cold, distinguishes the second zone. On slopes exposed to the sun it flourishes to a considerable height. The third is the mountainous zone or region. Cereals and de¬ ciduous trees form the distinguishing features

of its vegetation. The mean temperature about equals that of Great Britain, but the extremes are greater. The fourth region is the sub-Alpine or coniferous. Here are vast forests of pines of various species, which have in many places been inconsiderately cut down, the result being that the valleys have been deprived of shelter and denuded of soil. Most of the Al¬ pine villages are in the two last regions. On the northern slopes pine forests extend to 6,000, and on the southern slopes to 7,000 feet above the level of the sea. This is also the region of the lower or permanent pastures where the flocks are fed in winter. The fifth is the pas¬ ture region, the term alp being used in the local sense of high pasture grounds. It extends from the uppermost limit of trees to the region of perpetual snow. The landscape is adorned with numerous shrubs; rhododendrons, junipers, bil¬ berries and dwarf willows being among the dis¬ tinctive forms of vegetation. The sixth is the region of perpetual snow. The line of snow appears from a distance to be continuous at a limit which varies, according to seasons

and localities, from 8,000 to 9,500 feet, but on ap¬ proaching this apparently continuous line it is found to be broken up and crossed by patches of brilliant vegetation, the limit of which ap¬ pears to be imposed by want of soil rather than severity of climate. Few flowering plants ex¬ tend above 10,000 feet, but they have been found as high as 12,000 feet. At this great elevation two species of quadrupeds may be seen, the bouquetin or wild goat, and the chamois, which delight in heights inaccessible to man. The bouquetin, which has become very rare, scales the most elevated peaks, while the chamois is generally found rather lower, but is never seen in the plains. In summer the high mountain pastures are covered with large flocks of cattle, sheep and goats, which in winter are removed to a lower and warmef level. The marmot and white or Alpine hare inhabit both the snowy and the woody regions. Lower down are found the mole, the wildcat, the fox, the lynx, the bear and the wolf ; but the last two are now extremely rare. The vulture, eagle and other birds of prey frequent the rugged Alpine rocks, and ((the snowy ptarmigan® seeks food and shel¬ ter among the diminutive plants that border upon the snow-line. Other kinds of game, in¬ cluding the grouse, woodcock and partridge, may be found from the upper limit of the woods to the more level and habitable parts below. Several kinds of water-fowl frequent the higher lakes, where excellent trout and other fish are found ; but those lakes situated at the greatest elevation are, from their low temperature, entirely destitute of fish.

Geology and Minerals. — The geological structure of the Alps forms the subject of, or is incidentally discussed in, many books of great distinction, some of which we include among the works mentioned in the bibliog¬ raphy below. In general three zones can be distinguished, a central, in which crystalline rocks prevail, and two exterior zones, in which sedimentary rocks predominate. The rocks of the central zone consist of granitic gneiss of various forms, seldom pure granite, gneiss, hornblende, mica slate and other slates and :chists. In the western Alps there are also considerable elevations in the central zone that belong to the Jurassic (Oolite) and Cretaceous

formations. From the disposition of the beds, which are broken, tilted and distorted on a gigantic scale, the Alps appear to have been formed by a succession of disruptions and ele¬ vations extending over a very protracted period. The large beds of calcareous rock which overlie the older rocks both to the east and west appear to have been ruptured and rolled back by the upheaval of the central mass. Mining is not carried on to an extent proportionate to the magnitude of the mountain range. Iron and lead, however, are found in considerable abun¬ dance, and the Bleiberg (lead mountain) mine, in Carinthia,

furnishes the purest lead in Europe. Rock-salt is abundant toward the north of the chain, and the salt works of Bex in Canton de Vaud, of Hall in Tyrol, of Hallein and of Berchtesgaden in the vicinity of- Salz¬ burg, are of note. Mercury exists chiefly in the east part; the richness of the mine of Idria, northwest of Trieste, is well known. Besides those principal products, gold, silver, copper, zinc and coal are mined to some extent.

Bibliography. — Ball, J., (Hints and Notes for Travellers in the Alps) (ed. 1899) ; Ber¬ trand, M., (Etudes dans les Alpes frangaises) (in Bull. Soc. Geol. Fr., ser. 3, Vol. XXII, 1894) ; Chodat and Pampanini, (Sur 1ft Distribu¬ tion des Plantes des Alpes Austro-Orientales) (in the Globe , organe de la Soc. de Geographic de Geneve, Tome XLI, 1902) ; Climbers' Guides Series, edited by Sir Martin Conway and W. A. B. Coolidge (10 vols., 1890-1904) ; Conway, M., (The Alps *(1904) ; Coolidge, W. A. B., Hosias Simler et les Origines de l'Alpinisme jusqu'en 1600) (1904) and, with H. Duhamel and F. Perrin, (Guide du Haut Dauphine* (English trans. 1905) ; Diener, C., (Bau und Bild der Ostalpen und des Karstgebietes *(in Ban und Bild Oesterreichs, Vienna and Leipzig 1903) ; Fatio, V., (Faune des vertebres de la Suisse) (5 vols., 1869-1904) ; Forder- reuther, M., (Die Allgauer Alpen) (1906) ; Jerosch, (Geschichte und Herkunft der schwei- zerischan Alpenflora* (1903) ; <Livret-guide geologique dans le Jura et les Alpes de la Suisse *(Paris and Lausanne 1894) ; Rey, G., HI Monte Cervino* (1904) ; Rothpletz, A., (Ein geologischer Querschnitt durch die Ost-Alpen *(Stuttgart 1894) ; Schroter, (Das Pflanzenleben der Alpen* (Zurich 1908) ; Suess, E., (Das Antlitz dur Erde* (English trans., Oxford 1904) ; Willis, B., (Report on an Investigation of the Geological Structure of the Alps) (Washington 1912).

Marrion Wilcox.

ALSACE-LORRAINE, al-sas-16-ran' (Ger¬ man, Elsass-Lothringen) , the former German Reichsland or imperial domain from 1871 to 1918, bounded west by France, east by Baden and south by Switzerland. Its length from north to south is 123 miles; its breadth varies from 22 to 105 miles; and its area is 5,580 square miles, of which 1,353 belong to Upper Alsace (in the south), 1,844 to Lower Alsace (north¬ east) and 2,383 to Lorraine (northwest). Pop. (1910) 1,874,014, of which 1,428,343 are Roman Catholics, and more than 80 per cent speak German — mainly the vernacular Alsatian, a dialect of Alemannian. The most populous districts in their order are Lower Alsace, Lor¬ raine and Upper Alsace. The French-speaking population is mainly in the larger towns and

in Lorraine. The Rhine flows 115 miles north by east, along all the eastern border, and re¬ ceives, below Strassburg,. the Ill from Alsace, 127 miles long. Other rivers are the Moselle, flowing through Lorraine past Metz, and its affluent, the Saar. Along the Rhine is a strip of level country, 9 to 17 miles broad and de¬ clining from 800 to 450 feet above sea-level. Westward of this rise the 'Vosges Mountains, culminating at a height of 4,677 feet; while Lorraine, rather hilly than mountainous, rarely attains 1,300 feet. About 48.5 per cent of the entire area is arable, 11.6 meadow and pasture and 30.8 under wood. Alsace-Lorraine pro¬ duces much wine, grain and tobacco; it is rich in mines, iron and coal; and manufactures iron, cotton, wool, silks, chemicals, glass and paper. It contains the important cities of Strassburg (pop. 1905, 167,678) ; Metz (pop. 1910, 68,598) ; Colmar (pop. 1910, 43,808). As a French prov¬ ince, Alsace was divided into the departments of HauDRhin and Bas-Rhin. Lorraine fell into the departments of Meuse, Moselle, Meurthe and Vosges. Under German rule the territory was governed by a Statthalter repre¬ senting the imperial government. He resided at Strassburg and was assisted by a ministry of five departments and a council of state.

From the 10th century Alsace-Lorraine formed part of the German empire till a part of it was ceded to France at the Peace of West¬ phalia (1648), and by the Peace of Ryswick (1697) the cession of the whole was ratified. "Gefnmn never ceased to be the chief language of the people, and all newspapers were, during the whole period of the French possession, printed in both languages. In 1871, after the Franco-Prussian War, Alsace and German Lor¬ raine were, by the Treaty of Frankfort, incor¬ porated in the new German empire. The great mass of the population was strongly against the change, and 160,000 elected to be French, though only 50,000 went into actual exile, refusing to become German subjects. Since the era of the Revolution, Alsace in sentiment was wholly French. To France she gave the bravest of her sons — Kellerman, Kleber and many another hero. Strassburg first heard the <Marseillaise) ; and MM. Erckmann-Chatrian, Lorrainers both, have faithfully represented their country¬ men's love of La Patrie in the days of the second as of the first Napoleon. Of late it was claimed by the Germans that the situation had slowly but steadily changed in favor of Ger¬ many and the then existing firm but fair admin¬ istration. The irritating passport system, a special grievance not in force elsewhere in Ger¬ many, was withdrawn in 1873. On 9 May 1902, Emperor William directed that a bill be laid before the Federal Council abolishing para¬ graph 10 in the imperial constitution, which im¬ posed practically a dictatorship

on the reich- sland of Alsace-Lorraine. In December 1913, however, occurred the ˆZabern® incident, in which as a result of an assault committed by an officer on a civilian cripple violent anti- Prussian riots broke out. Bitter feeling had not subsided when the war broke out. By the terms of the armistice of 11 Nov. 1918 the Ger¬ man government was obligated to immediate evacuation of Alsace-Lorraine, and by the de¬ finitive treaty of peace signed 28 June 1919 the territory reverted to France. See France: Political Divisions; Lorraine. Consult

rHazen, C. D.,j (Alsace-Lorraine under German Rule) (New York 1917); Jordan, D. S., (A1- ' sace-Lorraine) (1916).

ALSBERG, alz'berg, Carl Lucas, Ameri¬ can chemist, son of Meinhand Alsberg, one of the founders of the New York Chemical So¬ ciety, now the American Chemical Society: b. New York City, 2 April 1877. In 1900 he was graduated from the medical college in Columbia University. For the three years following he studied physiology, pharmacology and chem¬ istry in Germany, studying under Hofmeister and Emil Fischer. In 1902 he became head of the department of biochemistry in the Harvard Medical School. In 1908 he was appointed chemical biologist in charge of the Poisonous Plants laboratory in the Bureau of Plant Indus¬ try, at Washington. In 1912 he was nominated by President Taft to succeed Harvey W. Wiley as chief of the Bureau of Chemistry in the Department of Agriculture.

ALSEN, al'zen, Germany, island of the Schleswig-Holstein province, in the Baltic, separated from the mainland by Alsen Sound at its narrowest point, 400 yards wide. For¬ merly a part of Denmark, Alsen was taken by the Prussians, 29 June 1864, and with a portion of the mainland joined by a drawbridge con¬ stitutes the district of Sonderburg. Sonder- burg, the chief town, is strongly fortified and has a good harbor. Alsen is nearly 20 miles long with an extreme breadth of 12 miles. Area, 125 square miles; pop. 25,000.

ALSOP, al'sop, Richard, American poet: b. Middletown, Conn., 23 Jan. 1761; d. Flatbush,

L. I., 20 Aug. 1815. He studied at Yale, but did not complete his course. He formed the literary group known as the ((Hartford Wits,® which includes Benjamin Trumbull, Lemuel Hopkins and Theodore Dwight. Alsop was largely responsible for the Echo (1791-95), a series of travesties and burlesques on current fads and literature (pub. in

book form 1807). He wrote (Monody on the Death of Wash¬ ington (1800) ; -the (Enchanted Lake of the Fairy Morgana * (1808).

. ALSTED, al'stet, Johann Heinrich, Ger¬ man encyclopedist and theologian: b. 1588; d. 1638. His (Cursus Philosophici Encyclopedia*

(2 vols., fob, Herborn 1630), the most im¬ portant complete work of its kind that had appeared, contains an interesting, and probably the earliest, article on the use and abuse of tobacco. (Tractatus de Mille Annis *(1627) prophesied the beginning of the millenium in 1694. He also published (Thesaurus Chrono¬ logize* and (Triumphus Bibliorum Sacrorum,* attempting to prove that the Scripture? con¬ tain the principles of all arts and sciences. Alsted was professor of philosophy and theology at Herborn and later at Weissenberg.

ALSTON, Theodosia Burr. See Burr, Theodosia.

ALSTROMER, al'stre-mer, Jonas, Swed¬ ish benefactor: b. 1685; d. 1761. Of humble parentage, he went to England as clerk for a Stockholm merchant, later engaged in shipbrok¬ ing business independently, amassed a fortune, returned to Sweden in 1724, established woolen and other factories, introduced improved breeds of sheep, the culture of dye plants and pota¬ toes and contributed to the formation of the

Levant and East India companies. He was ennobled and a statue to him was erected on the Stockholm exchange. His son, Alstromer, Clas (Claude) : b. 1736; d. 1796; author of a work on the breeding of fine-wooled sheep, was also a distinguished botanist, a pupil and friend of Linnaeus, who named after him the Alstromer or Inca Lily. This remarkable Peruvian plant Alstromer discovered at Cadiz and sent to Linnaeus along with other speci¬ mens collected during his botanizing rambles over Europe.

ALTAI, al'tl, MOUNTAINS, a moun¬ tain range of central Asia, extending from the desert of Gobi in a northwesterly direction along the boundary of Mongolia and Sungaria. After passing the Russian frontier it gradually falls off in altitude and merges into the steppes. The rivers of this region are mostly head waters of the Obi and Irtysh. The mountain scenery is generally grand and interesting. The highest summit is Baluka, about 17,500 feet above the sea. The area covered by snow and glaciers is large. The mountains have a severe climate,

but agriculture is carried on to some extent in the larger valleys. The inhabitants are chiefly Russians and Kalmuks.

ALTAIC LANGUAGES, a family of languages occupying a portion of northern and eastern Europe, and nearly the whole of north¬ ern and central Asia, together with some other regions, and divided into five branches, the Ugrian or Finno-Hungarian, Samoyedic, Turkic, Mongolic and Tungusic. Also called Ural-Altaic and Turanian.

ALTAMURA, al'ta-mooTa, Italy, city of Bari province, at the foot of the Apennines, 60 miles by rail northwest of Tarentum. Two annual fairs are largely attended and consider¬ able trade is carried on in regional products, oil, wine, olives, grain and cattle. It is a bishop's see with a fine Romanesque 13th cen¬ tury cathedral and interesting archaeological remains. Pop. 26,000.

ALTAR. From the Latin alt a ara, a raised space. An elevation of any kind (earth, grass, stones, etc.) was used by the primitive races as a sacrificial spot. With the commencement of culture altar construction came into being, built of brick, stone, marble, etc. A separate altar was dedicated to each god of the Greeks, Romans and Eastern pagans. Very soon they developed into works of art according, in quality, with the best craftsmanship the period afforded, and proof of the sentiment of sacri¬ fice felt. The ram's skull (cegicrane) or ox skull (bucrane) — signs of animal sacrifice — adorned the altar corners of the ancient Greeks and Romans, while wreaths and garlands of fruits and flowers draped the sides. These altars were erected (in the more primitive times) outdoors (on streets, squares, in meadows, near springs, on tops of mountains, etc.). Later came the altars dedicated to the household (lares and penates) within the walls of the habitations. With the advancement of art came structures of monumental form with architectural members — the plinth, capital, moldings, and even steps (degrees). These were altars devoted to burnt sacrifices. They are known as Pagan altars.

Early altars of the Jews were also erected

for burnt sacrifice and were also in the open air (often on the tops of mountains), until the raising of Solomon's Temple, when an incense altar was erected within the Temple, the altar for burnt sacrifice being in the front court yard, open to the sky.

Christian Altars. — While the consecrated bread and wine (Flesh and Blood) are sym¬ bolic of Christ's sacrifice, the Christian altar is dedicated to the memory of the Last Supper and not to sacrificial

ceremonies. Thus the primitive Church used some form of portable table which alone through the presence on its surface of the Host became sanctified. And on the withdrawal of the sacramental service the table was taken to pieces and stowed away while the Eucharist was kept devoutly screened and protected. Veritable sanctified altars of stone or wood, etc., took the place of ordinary tables for the display of the Eucharist about the 4th century, when they were built as fixed structures of stone or wood, in 'the early basil¬ icas. In 517 a canon enforced the use of stone for the altar. These altars became consecrated by the presence of the body or relics of a martyr which were placed under the altar. The altar was placed immediately in front of the apsis (see Basilica) of the basilica (always in the eastern end), where the bishops and clergy sat in a semicircle. The construction of these early stone altars consisted of a slab sup¬ ported by pillars. In the open space beneath the slab reposed the body or relics of the saints enclosed in shrines. To protect the relics from dust or irreverence these curtains subsequently suggested ornamenting the altar front with an embroidered hanging, called antependium or frontal (Pugin). These antependia developed into elaborate ornamentation in precious metals, adorned with enamels and jewels; others were of delicately carved wood, painted, gilt, often embellished with crystals. Extant examples of altars of the 5th, 6th and 7th centuries are those of St. Victor in Marseilles Museum, of St. Nazaire and of St. Celsus at Ravenna, of Auriol in Provence, etc.

Up to the 9th century the altar was sanctified by the body or relic reposing beneath the altar and nothing was permitted on the altar. Even the Eucharist was suspended above the altar. From the 5th century the altar was covered with a dome (ciborium) supported by four columns and enclosed with hangings supported on rods. Attached to a chain or cord from the centre of the dome hung the pyxide holding the consecrated Host, often found in the form of a dove of gold or silver. With the 9th century the relics of the saints became exposed on the altar, enclosed within a shrine. Soon the relics were followed by the Book of the Four Evangels, but images were not admitted on the altar till the 9th century. The candle¬ sticks still posed on the floor alongside the altar.

The Romanesque and Gothic periods used the massive table form of the 4th century with its slab of stone (Regensburg has an altar of this style) ; usually a ciborium covers these altars. Silver plastic decoration (usually from the hands of a goldsmith) soon began to be displayed in altar decoration. Perhaps most noted of the period is that of the Collegiate Church at Klosterneuenburg (Austria) by

ALTARS

1 High-Altar in St. Peter’s, Rome 2

3 High-Altar in Notre-Dame, Treves

High-Altar and Ciborium in the church of St. John Lateran, Rome

High-Altar in the Cathedral, Miinchen-Gladbach, Rhenish Prussia

ALTARS

High Altar, Roman Catholic Cathedral, St. Louis, Mo,

ALTAR

445

Nicolas dc Verdun (1181) representing scenes from the Old and New Testament. From the 11th and 12th centuries' the massive altars are relieved by architectural outside work — small detached columns Supporting arches (effigies often in the openings) broken into trefoil and quarterfoil, tracings, mullions, etc. Gables and crockets, of course, appear. Gothic altars are frequently of carved wood, painted and gilded. Wing altars were a common form, having plastic internal ornament and painted decora¬ tion outside ((The Last Judgment in the Church of our Lady at Danzig; the high altar in the monastery church at Blaubeuren ; the (Coronation of Mary} in the Minster of Brei- fach and the Bruggemann altar in the Schles¬ wig Cathedral). In the 14th century an open¬ work gallery often replaces the pillars. _

In Italy, in the Renaissance, a baldachino (ciborium) supported by four columns was in vogue, but in France this structure fell into disuse and the pyxide is then suspended from the extremity of a shaft ending in the form of a bishop’s crook placed behind the altar. Be¬ hind the altar is placed a ˆtabernacle” (shrine) for the reliquaries. From the 13th century, in order better to display the reliquaries, chasses, etc., during fetes, the retable was formed back of the altar. And the cabinet (ˆtaber¬ nacleˆ) to hold the relics was placed on the retable. Then (14th century) swinging painted pictures (triptychs) were placed beneath con¬ structed in different compartments to be opened at will. It was in the Renaissance that the great altar picture originated as a chief unit. With the early Renaissance period altars be¬ came veritable works of art. On them the greatest artists, sculptors and goldsmiths de¬ voted their utmost talents accentuated by re¬ ligious zeal.

With the growth in complexity of church edifices and their increasing separate devo¬ tional sections, other altars were installed in the additional divisions, the main altar becom¬ ing known as the high-altar, others being termed side-altars.

Portable Altars. — Termed by contempo¬ raries variously altaria viatica, portatilia, ges- tatoria, as differentiated from the fixed or monumental church altar, these were less cum¬ bersome pieces of priestly furniture. They consisted, as a rule, of a rectangular slab of valuable stone, as marble, agate, porphyry, onyx, amethyst, etc., enclosed in a frame of gold or gilt copper. Decorations consisted of precious stones, enamel or niello work. A wooden table usually formed the back, also richly embellished. The relic, sanctifying the altar* was enclosed in a cavity in the centre or in the corners. Beda (8th century) tells of them being used on missionary journeys; the Crusaders carried them on their campaigns in the 12th century. Some portable altars took the form of triptychs, having swinging panels that could be opened or closed at will. These consisted of ivory, precious stones or paintings. When larger relics were to be carried the altar took the form of a shrine (chasse), usually of sarcophagus shape resting on the claws of animals. Of existing examples we might mention a Romanesque portable altar in the Church of the Virgin at Treves — the travel¬

ing altar of St. Willibrod. One is in the treas¬ ury of the cathedral at Bamberg, one in the cathedral at Paderborn, two in the chapter¬ house of Melk, several in the Cologne archie- piscopal museum, in the royal treasury cham¬ ber at Hanover, several in the new museum, Berlin. A small Gothic wing-altar is in the sacristy at Kirchlinde, Westphalia, another (14th century) in the Admont Collegiate Church, in Steyermark ; another (of 1497) in the Nuremberg Germanic Museum. The Mor¬ gan collection contains a fine Gothic (14th cen¬ tury) folding altar of gold, decorated with jewels and enamel.

Altar Furniture. — The consecrated altar of the early Christian days was enshrined. Cur¬ tains hanged from the architraves of the ciborium, or from rods between the four pil¬ lars of the baldacchino of the Renaissance, to hide the altar on all four sides (the Eastern Church developed solid walls of the iconosta¬ sis). In the Middle Ages the veil in front of the altar disappeared (except in Lent), but the idea of enshrining persisted, for the frontal hid the altar and the cloth covered its top ; the dorsals closed the rear from view, and the riddels, hanging from rods at the sides, hid either end. The reredos more solidly replaced the dorsal curtain. And ail persist to this day.

In primitive times altars were covered with rich tissue or precious stuff, over which one linen cloth was laid during the time of cele¬ bration. This served also as a corporal and was called a pall. Subsequently the corporal was a distinct linen cloth set apart specially for the purpose. The cloths used in covering the altars were designated pallce (pallium altaris) down to a late period. Three linen cloths cover the altar, the uppermost being the largest and reaching to the floor. The upper linen cloth was termed the fair-linen. In the Greek Church pieces of cloth (called Evangelists) were (and are still) placed at the four corners of the altar. Over these four pieces was spread a linen cloth (Karaoapua) because it is the figure of the white winding-sheet in which Joseph of Arimathea swathed the body of the dead Saviour. Over this cloth was placed an¬ other thinner one, which represented the Glory of the Son of God seated on the altar as on a throne. Over these four pieces of cloth and these two linen coverings was a corporal, which represented the figure ot the death and the resurrection of Jesus Christ.

Altar coverings (since the Middle Ages) in the Roman Catholic Church are : White for Christmas, the ordaining of bishops, etc. ; from 24 December till 13 January; green from 13 January to Septuagesima and in Trinity period; red for Easter and for Apostles' and Martyrs' feasts; black on Good Friday; violet on Ad¬ vent and fast days.

The altar now carries : Crucifix, lights (burning wax candles) first in memory of the Last Slipper held at night, but since for fes¬ tivals, weddings, baptisms, etc. ; flowers. See also Chalice, Cruet, Ostensorium, Paten, Pax.

Noted Altars. — Justinian (6th century) pre¬ sented a magnificent altar to the Church of St. Sophie at Constantinople encrusted with pre¬ cious stones and enamels. That at St. Peter's at Rome is no less splendid. The altar in the

basilica of St. Ambrose at Milan by Wolvinius (835) is coated with silver plates of repousse work. The oldest extant altar is that found at Auriol (5th century), near Marseilles. The earliest altar with carved antependium is in the church at Cividale (8th century). In St. Mark's Venice, is the famous reredos, (<pala d'oro55 (10th century) ; it was originally an antepen¬ dium. In Cluny Museum is the golden ante¬ pendium presented to Basle cathedral by Em¬ peror Henri Deux. A

similar arcaded panel, but of carved wood, is in the Episcopal Museum of the Minister in Westphalia (12th century). The ciborium altar of St. Apollinari in Classe, near Ravenna, is of the 9th century. The best ciborium example of early Gothic is in the Church of Our Lady in Halberstadt ; Ratisbonne and Vienna have two in their cathe¬ drals ; Italy has a number of mediaeval cibo¬ rium altars. A magnificent altar by Andrea Ognabene, made for the Cathedral of Pistoja (1316), is of silver work. A silver antependium (14th century) is in the Museum of St. Maria del Fiore dedicated to St. John, Baptist. A silver altar is in the baptistry of St. John, Florence, by Leonardo and other artists (14th and 15th centuries).

Bibliography. — Arendt, K., (Sammlung ausgefuhrte Altare5 (Luxemburg 1866) ; Au- gusti, <Denkwiirdigkeiten) (Vol. XII, Leipzig 1831) ; Baumgarten, Fritz, (Der freiburger Hochaltar5 (Strassburg 1904) ; Bowerman, Helen Cox, (Roman Sacrificial Altars5 (Lan¬ caster, Pa., 1913) ; Coleman, Caryl, (Christian Altars and Their Accessories) (in Architectural Record, Vols. IV and V) ; Corblet, ˆistoirede l,Eucharistie) (Paris 1888) ; Curtius, Ernst, (Die Altare von Olympia5 (in Kon. Preuss. Akad. der Wissenscli, Berlin 1882) ; Dearmer, Percy, (Fifty Pictures of Gothic Altars5 (in Alcuin Club collections, London 1910) ; En- lart, (Archeologie franchise5 (Paris 1902) ; Fairbank, F. R., (Portable Altars5 (in Journ. Brit. Archceol. Assoc., London 1897) ; Hartel, August, (Altare und Kanzeln5 (Berlin 1910) ; Heideloff, Karl Alexander von, (Der christ- licher Altar5 (Nuremberg 1838) ; Laib and Schwarz, (Studien ueber die Geschichte des christlichen Altars5 (Stuttgart 1857) ; Miinzen- berger and Beissel, (Zur Kenntniss und Wiirdigung der mittelalterliche Altare Deutsch- lands5 (Frankfort-on-the-Main 1890-1901 ; Reusens, (Archeologie chretienne5 (Paris 1890) ; Roosval, Johnny, (Schnitzaltare in schwedischen Kirchen und Museen by Sculptor Jans Bormann5 (Strassburg 1903) ; Schmidt, (Der christliche Altar und sein Schmuck5 (Regensburg 1871) ; Schreiber, Ellis, (The Christian Altar5 (in American Catholic Quar¬ terly Review, Philadelphia 1906) ; Sydow,, Echart von, (Die Entwickelungs des figuralen Schmucks der christlichen Altar5 (in Zur Kunstgeschichtc des Auslandes, Strassburg 1912) ; Tosi and Becchio, (Altars, Tabernacles and Sepulchral Monuments of the 14th and 15th Centuries Existing at Rome5 (Lagny 1843) ; Wright, John, Tome notable Altars in the Church of England and the American Episco¬ pal Church5 (New York 1908) ; Voegelen, M., (Studien zum Hochaltar von Blaubeuren5 (in Monats Heften fur Kunstzuissenschaften, Leip¬ zig 1914).

Clement W. Coumbe.

ALTAR LEAGUE, The Family. A world¬ wide company of people who have made a covenant to maintain a family altar in their home. Covenant cards are furnished free on request, and to all who enroll by signing the covenant a wall-card certificate of member¬ ship is sent without cost. It is estimated that more than 60,000 new family altars have been established and 250,000 lives are being touched and influenced every day in the home because of the league. The headquarters are at 508 Lakeside Building, Chicago.

ALTA VERAPAZ, al'ta va'ra-paz, one of the departments of the republic of Guatemala, Central America, lying in the region between the southern boundary of Mexico and Guate¬ mala City. Its chief town, Coban (q.v.), is 4,047 feet above sea-level and has between 25,000 and 30,000 inhabitants. Pop. of depart¬ ment (1916) 97,400.

ALTDORF, alt'dorf, Switzerland, town, capital of Uri canton, on the Reuss near its junction with the Schachen, two miles east of Lake Lucerne. The town's distinction is due to the legend of William Tell and the shooting of the apple from his son's head in the market place. A bronze statue erected in 1895, and a theatre opened in 1899 where Schiller's play of the Swiss patriot is produced annually, commemorate the feat. In the neighborhood are the Capuchin monastery built in 1581, the ancient castle of Attinghausen with its museum of antiquities, the Schachenthal and Burglen village where Tell was born and drowned, try¬ ing to save a child who had fallen into the Schachen torrent. Pop. 4,000.

ALTDORFER, alt'dor-fer, Albrecht, al'-

breHt, German artist : b. shortly before 1480, probably in Ratisbon (Regensburg) ; d. there 13 Feb. 1538. One of the <(Little Masters55 of German art (so called because of the size of some of their works, not because of their qual¬ ity). His father is supposed to have been the painter Ulrich Altdorfer. Besides his engrav¬ ing, which contributes most to the artist's fame to-day, Altdorfer was renowned in his own time as an architect and painter, many of his works in the latter medium having come down to us and ensuring him a distinguished place in the German school. From 1526 until his death he was a member of the ((Inner Council55 of Ratisbon and held the position of municipal architect. His paintings are to be seen in the museums and private collections of Berlin, where we find, at the Royal Museum, that admirable work — (The Family of Satyrs.5 Other important examples of his art in the Ber¬ lin Museum are (Repose on the Flight into Egypt,5 < Beggary Sitting on the Train of Pride5 and a (Nativity.5 Others are at Frank¬ furt, Augsburg, Cassel, London, a

most im¬ portant work being the great altar piece of the Church of Saint Florian an der Donau. His largest picture — by some considered his masterpiece — is (Alexander at the Battle of Arbela5 in the Munich Gallery. This work so captivated Napoleon that it was carried off to Paris and only restored in 1815. A title some¬ times bestowed on Altdorfer, <(The father of Landscape Painting,55 comes to him through the affection for nature which appears so

strongly in such works as (The Mountain Landscape, *at Munich or the (Susanna at the Bath* in the same gallery. It is most strongly evinced, however, in his engraving. In this art he appears as perhaps the only one of the German masters who engraved his own wood¬ blocks, Diirer and the others leaving that proc¬ ess to skilled workmen. There iˆ an open question as to whether Altdorfer was a pupil of Diirer's but there is no doubt of the great Niirnberger's influence on the younger man. The number of his copper-engravings is gen¬ erally placed at 109 (including etchings), his woodcuts at 65 — among the latter the (Madonna of Ratisbon *should be cited. But it is the etchings such as the (St. Jerome, * (Samson and Delilah) and the (Venus) which stand the highest in Altdorfer's work, and in them we get to the full the flavor of his art — precise in its mastery of the material but with a genuinely' Romantic tendency in the thought about the pine trees, the rocks and the ruins amongst which he grouped his figures from the sacred history. Albrecht's brother Erhard Altdorfer (or Altdorffer), active between 1512 and 1561, was also an architect, painter and engraver, attaining distinction in all three branches. Consult Voss, (Meister der Graphik,* (Leipzig 1910).

ALTENA, al.ta'na, Germany, a town of Westphalia, Prussia, on the Lenne, 18 miles southwest of Arnsberg, capital of the district. It has long established manufactures of iron, steel, copper, brass and nickel goods, especially of altar vessels. In the vicinity is the ancient castle of the counts of La Marck, related on the female side to the Hohenzollerns. Pop.

15,000.

ALTENBURG, al'ten-burk Germany, town, capital of Saxe-Altenburg, on the river Pleisse, 24 miles by rail south of Leipzig. Alten- burg manufactures cigars, gloves, brushes, hats and haberdashery and has an important book trade and traffic in grain, horses and cat¬ tle. An historic castle with its fine picture gallery, a cathedral, public library,

museum of antiquities, etc., are among the principal build¬ ings. Altenburg was for some time an im¬ perial city and was almost destroyed by the Hussites in 1430. In 1455 the young Saxon princes Albert and Ernest were abducted from the castle. Pop. 40,000.

ALTENSTEIN, al'ten-stln, Germany, a mountain castle in Saxe-Meiningen, on the southern slope of the Thuringian forest, near the Liebenstein tourist resort, 12 miles south¬ east of Eisenach. Once the summer residence of the reigning dukes has great historic and scenic interest. Here in the 8th century re¬ sided Boniface, the English apostle to the Ger¬ mans, and here in 1521 Luther was secreted from his enemies by Elector Frederick the Wise. In 1799 a cave which is entered through a subterranean gallery, was discovered in the castle park over 600 feet long; through its whole extent flows a rapid stream sufficiently deep to bear barges and turn a mill at the place where it issues from the earth.

ALTERATION, such a change in a writ¬ ten instrument or property interest as, if

effective, would result in a different instrument or interest from the original. The alteration of a written instrument is effected by any material change in its language or character, such as adding terms, erasing or interlining or removing a seal from a deed. The law distin¬ guishes in cases according as the alteration is made by a party or by a stranger. See Con¬ tract; Deed; Negotiable Instrument.

ALTERATIVE, a remedy that acts slowly and in an unknown manner, probably by pro¬ moting metabolism. Alteratives are admin¬ istered in small doses, and for a considerable length of time. Mercury is a powerful altera¬ tive, and has been proved very effective in cases of syphilis. Arsenic and its compounds are employed in certain skin diseases. Cod liver oil is employed in diseases associated with malnutrition, including tuberculosis and rickets.

ALTERNATE, in American politics, a delegate chosen to act in the place of the regu¬ lar delegate to a convention during the latter's absence. At all political conventions since 1840 alternates in increasing numbers have been selected to attend when their principals did not get to the convention at all, or to take the latters' places during a temporary absence. Since 1884 in all conventions of the Republican party an alternate for every delegate has been chosen. Alternates arc usually seated in a separate part of the convention hall ; and when a regular delegate withdraws, his alternate has a right to the seat of his principal and to act in his stead. Recent rulings by

convention chairmen hold that, on roll call, if a member answer ((present but not voting,)} he is con¬ structively absent and the chairman may call on the alternate to vote in his stead.

In American political law the general prin¬ ciple is that a person elected to office must him¬ self discharge the duties of that office. There can be no written proxies either for legislators or executive officials. In some States a lieu¬ tenant-governor may act as governor whenever the governor is absent from the State and some city charters permit a mayor to designate an acting mayor from among certain officials when he expects to be absent. In New York city the president of the board of Aldermen becomes automatically acting mayor when the mayor is absent from the city. Concerning the judiciary, there exists a certain latitude in as¬ signment of justices, by which a justice may hold court outside his own district. This ap¬ plies to both Federal and State courts. See Convention; Parliamentary Law.

ALTERNATING CURRENT. See Elec¬ trical Terms.

ALTERNATION OF GENERATIONS.

The term, alternation of generations, is applied to the alternation of sexual and asexual indi¬ viduals in the life history of a plant ; e. g., in the fern, a small sexual plant, called the prothal¬ lium, which most people never see, bears the eggs and the sperms. A sperm fertilizes an egg, which then develops into the familiar fern plant. The fern plant produces spores, which in turn develop into prothallia, so that the fern plant produces the prothallium and the pro¬ thallium produces the fern plant, the two phases, or generations alternating regularly.

ALTERNATION OF GENERATIONS

Alternation of generations, in a form most easily understood, is seen in the true ferns. The principal features of the life history of a common fern will make the subject clear

Fig. 1, — A, prothallium of fern; B, fern plant.

(Fig. 2). A spore from the fern plant, falling on moist ground or rotten wood, germinates and develops into the prothallium, a thin, flat, prostrate body, which seldom reaches more than a quarter of an inch in length or more than one-thirty-sec.ond of an inch in thickness. It is green and therefore independent (Fig. 2, A). Upon the under side of the prothallium the eggs and sperms are developed, the eggs being

developed singly in organs called archegonia, while the sperms are developed in considerable numbers in organs called antheridia. A vertical section of a portion of a prothallium showing an archegonium containing one egg and an antheridium containing several sperms is shown in Fig. 2, B. Since the prothallium produces eggs and sperms, which are commonly called gametes, it has been named the gcimctophyte (q. v.). The sperm escapes from the antherid¬ ium, enters the archegonium and unites with the egg. This egg, thus fertilized, is the first cell of the fern plant which ultimately pro¬ duces spores and is therefore called the sporo- pliyte. After fertilization, the egg divides rapidly, forming a more or less spherical mass of cells (Fig. 2, C) . It then breaks out from the archegonium and becomes erect (Fig. 2, D) . The first leaves are small and simple, but the little plant develops roots and larger leaves, while the prothallium disintegrates and soon disappears completely, so that the sporophyte, now fully independent, is the only phase re¬ maining. As the leaves approach maturity, sori, or <(fruit dots,ˆ easily visible to the naked eye, appear upon the under surface (Fig. 2, E, f). A vertical section of a sorus is shown in Fig. 2, F. In this case, the sorus is covered by an umbrella-like indusium, underneath which are the essential structures, the sporangia. Within the sporangium, the shift from the sporophyte generation to the gametophvte gen¬ eration takes place. As the sporangium ap¬ proaches maturity, spore mother cells are formed (Fig. 2, G) each of which by two characteristic divisions called the reduction divisions gives rise to four spores (Fig. 2 H). The spore is the first cell of the gametophyte generation. Upon germination, it develops into

the prothallium. Thus the fertilized egg, pro¬ duced by the prothallium, develops into the fern plant and the spore produced by the fern plant develops into the prothallium. This regular alternation of prothallium and fern plant illustrates alternation of generations in its most easily understood form. The nuclei, during division, show a feature of great im¬ portance; the nuclei of the sporophyte have twice as many chromosomes as those of the gametophyte (See Cell and Chromosomes). The number of chromosomes is doubled when the sperm and the egg nuclei fuse at fertiliza¬ tion, and during the two divisions by which four spores are formed from a spore mother cell in the sporangium, the number of chromosomes is reduced one-half, so that the gametophyte num¬ ber is restored. This <(x>:> and <(2x)) condition of chromosomes is characteristic of the two gen¬ erations in all plants which have reached the level of sexuality.

Fig. 2. — The principal features in the life history of a fern. A, young prothallium (gametophyte) developing from the spore, s; B, vertical

section of the tip of older pro¬ thallium showing an archegonium with one egg (shaded), and an antheridium showing eight of the numerous sperms; C, later stage showing the young sporophyte (shaded) developing from the fertilized egg; D, the pro¬ thallium, or gametophyte, p, with young sporeling (sporophyte) sg; r, root; E, leaflet of mature plant bear¬ ing numerous fruit dots or sori, f; F , section of single sorus showing numerous sporangia, sp, under the um¬ brella-like indusium, i; G, section of young sporangium showing five of the sixteen spore mother cells, m; H, later stage showing spores, s, developed from the spore mother cells.

Alternation of generations is just as defi¬ nitely present in plants above and below the

ferns, but it is not so easily recognized, because the gametophyte, in the higher plants, becomes parasitic upon the sporophyte, while in the mosses and liverworts the sporophyte is para¬ sitic upon the gametophyte, not yet having at¬ tained the independent condition illustrated by the ferns.

In the higher plants, as the gametophyte be¬ came dependent upon the sporophyte and even became included within the tissues of the sporo¬ phyte, it became more and more reduced until it lost all resemblance to an independent gameto¬ phyte and is recognizable as such only by the evidence of comparative morphology. A com¬ plete series of forms illustrating the gradual reduction of the gametophyte would require pages of description and illustration, but a pine and a sunflower will indicate the general trend of the reduction. The pine tree and the sun¬ flower plant are sporophytes. The pine (also the fir, spruce, hemlock, etc.) bears two kinds

Fig. 3. — Some important features in the life history of the pine. A, part of a longitudinal section of a male cone showing one sporangium and part of another, contain¬ ing pollen grains, p; B, part of a longitudinal section of a young female cone showing a reduced leaf, /, bearing a large scale, sc, which bears a sporangium, o, contain¬ ing a megaspore, f; p, pollen grains; C, longitudinal section of sporangium (ovule) at a later stage; p, pollen grains; t, pollen tube containing two sperms, s; f, female gametophyte showing two of the eggs, e.

of cones, a rather small one producing an abundance of pollen and a

comparatively large one producing seeds. The small cone, called the male cone or the staminate cone, consists of an axis with a large number of very small and much modified leaves, each bearing on its under surface two sporangia which are equiv¬ alents of the sporangia of the ferns. The sporangium contains several spore mother cells, each of which produces four spores, called microspores or pollen grains. The microspore is the first cell of the male gametophyte. The larger cone, called the female or ovulate cone, consists of an

axis bearing much reduced leaves, in the axil of each of which is a “scale® with two sporangia or ovules. Within the sporangium one spore mother cell appears and divides into four spores, called megaspores, three of which disintegrate while the other germinates within the tissue of the sporangium, forming a pro- vol. l — 29

thallium or female gametophyte, consisting of a mass of rather uniform cells, and later pro¬ ducing four or five eggs. The megaspore is the first cell of the female gametophyte. The pollen grain is carried by the wind to the female cone where it falls upon the sporangium and germinates, forming a pollen tube which grows down through the tissue of the sporan¬ gium until it reaches the egg. Two sperms are formed within the pollen tube and one of these enters the egg and fertilizes it. As in the fern the fertilized egg is the first cell of the sporo¬ phyte generation. The egg divides rapidly and becomes differentiated into root and stem re¬ gions, while the tissues of the sporangium and surrounding structures become hardened into a seed coat. The seed then falls out from the cone and develops into the pine tree. In com¬ paring this life history with that of the fern, it will be noted that in the fern there is only one kind of sporangium producing one kind of spore which gives rise to a gametophyte bearing eggs and sperms, while in the pine there are two kinds of sporangia, one producing spores which give rise to male gametophytes and the other producing spores which give rise to the female gametophytes. Plants with only one kind of spores are homos porous. Those with two kinds of spores are hetcrosporous. This con¬ dition is derived from the homosporous and is found in all seed plants and in some ferns and lycopods.

In the sunflower the reduction of the gametophyte is still more extreme. The sun¬ flower is composed of hundreds of very small flowers, each of which has five stamens and one ovary. The stamen bears four sporangia, each containing hundreds of microspores or pollen grains. The ovary contains one sporan¬ gium within which one spore mother cell pro¬ duces four megaspores, one of which germi¬ nates, while the others abort. The prothallium formed by the

germination of this spore is entirely included within the sporangium and is completely dependent. It is called the embryo- sac and contains only eight nuclei, which at first lie free in the sac. Later, three of these in the narrower end of the sac become sep¬ arated by walls. These three are called antip¬ odal cells and, usually, they have no function. Two of the nuclei, called polar nuclei , fuse and form a large nucleus called the endosperm nucleus. The other three form a group at the opposite end of the sac from the antipodals and constitute the egg apparatus. They become organized as more or less definite cells, but are surrounded only by a delicate pellicle. One of the three is the egg; the other two are called synergids, because they are supposed to assist in fertilization. The pollen grain is carried to the tip of the ovary by insects and there pro¬ duces a long pollen tube containing two sperm nuclei. One of these nuclei fuses with the endosperm nucleus which then divides and pro¬ duces a tissue called the endosperm, constituting the principal bulk of corn, cereals and other seeds. The other sperm nucleus fuses with the egg, which, as in the other cases already con¬ sidered, is the first cell of the sporophyte gen¬ eration. From the fertilized egg a new sun¬ flower plant is produced. The gametophyte generation consists of two separate plants, the male and the female. The male, composed of

the pollen grain and its tube, and the female, consisting of the embryo-sac, alternate with the sporophyte generation, the sunflower plant, which begins with the fertilized egg. Some features of the life history of the sunflower are shown in Fig. 4.

Fig. 4. — A , transverse section of anther with four sporangia, each containing spores (pollen grains); B, sectional view of sporangium (ovule) containing the embryo-sac (g); antipodal cells (a); endosperm nucleus (e); synergids(s) ; egg (o) ; C, upper end of embryo-sac at time of fertiliza¬ tion; t, pollen tube which has discharged its sperms; r, remains of synergids; o, egg; one sperm s1 is fusing with the nucleus of egg and the other sperm, 52, is fusing with the endosperm nucleus, e.

Below the ferns, in the mosses and liver¬ worts, the gametophyte and sporophyte genera¬ tions alternate just as regularly, the fertilized egg being the first cell of the sporophyte and the spore produced by the sporophyte being the first cell of the gametophyte; but the sporo¬ phyte never becomes free from the gametophyte and, consequently,

the existence of two genera¬ tions is not so evident as in the ferns. The spore produces a branching filament called the protonema, upon which buds appear and de¬ velop into the familiar leafy moss plants. Upon the leafy plant, often at the top, antheridia and archegonia appear, containing respectively the sperms and eggs. The whole structure from the spore up to this point constitutes the gametophyte. A sperm fertilizes an egg which then develops into a stalk bearing a sporangium, called a capsule, within which spore mother cells appear, each giving rise to four spores, the spore being the first cell of a new gameto¬ phyte generation. The sporophyte begins with the fertilized egg and ends with the spore mother cell.

It will be noted that the two generations are more nearly equal than in the fern.

In the liverworts, the life history is essen¬ tially the same, but the protonema is incon¬ spicuous or entirely lacking. The sporophyte is not so highly developed as in the moss, and, in the lower liverworts, the sporophyte is en¬ tirely included within the gametophyte. But here again the sporophyte begins with the fer¬ tilized egg and the gametophyte begins with the spore.

In plants below the liverworts, i. e., in the algae and fungi, alternation of generations is easily recognized in many cases. In forms which have not reached the level of sexuality there is no alternation, but with the origin of sex, i. e., with the fusion of gametes, the sporo- nhyte had its beginning. In many of these simple plants reduction of chromosomes occurs immediately after the fusion of gametes with¬ out the formation of any spores, no recog¬ nizable body being built up which could be called a sporophyte. As the interval between the fusion of gametes and the reduction ’of chromosomes became more prolonged, a recog¬ nizable body was formed, which in some cases looked like the gametophyte and in some cases looked different. When this body produces spore mother cells, each of which gives rise to four spores, practically all botanists admit that there is an alternation of generations. It must be admitted that the term sporophyte is a misnomer in those simple forms which do not produce spores, but the fundamental fea¬ ture is this, that the fusion of gametes initiates a generation — long or short — which comes to a close with the reduction of chromosomes. Consequently, we should insist that the two generations are marked by the number of chro¬ mosomes, the sporophyte having twice as many as the gametophyte.

The sporophyte, at its beginning, is small and, in many cases, dependent upon the gameto¬ phyte ; but higher in the scale it

becomes in¬ dependent and is the generation which we recog¬ nize as the plant. On the other hand the gametophvte in the early forms is the domi¬ nant generation which, higher in the scale, be¬ comes dependent, and then more and more reduced until it can be seen only with the aid of the miscroscope. Here it is the sporophyte which we recognize as the plant. This evolu¬ tion of the sporophyte and reduction of the

gametophyte are among the most interesting phenomena of plants.

We believe that in animals, as well as in plants, there are two alternating generations, characterized by the number of chromosomes, but this belief is shared by only a few botanists

and, as far as we know, practically all zoologists oppose it.

Bibliography.— Bower, F. O., (The Origin of a Land Flora) (Botanical Gazette, Vol. XXXIX, 1905, p. 137) ; Chamberlain, Charles J., (Alternation of Generations in Animals from a Botanical Standpoint ; Lang, W. H., (On Apogamy and the Development of Sporangia upon Fern Prothallia> (Philosophical Transac¬ tions, Royal Society of London, Vol. CXC, 1898, p. 187).

Charles J. Chamberlain, Professor of Morphology and Cytology, Uni¬ versity of Chicago.

ALTGELD, alt'geld, John Peter, American politician : b. Germany, Dec. 1847 ; d. 12 March 1902. Brought to Mansfield, Ohio, in infancy, he received a public-school education ; served in the Civil War as a private in the Union army, 1864-65 ; taught school in Missouri ; be¬ came a lawyer there and county attorney of Andrew County in 1874. Removing to Chicago in 1875 he became prominent in the Democratic party. An unsuccessful candidate for Congress in 1884, he was judge of the Chicago Superior Court 1886-91. Elected governor in 1892, one of his first official acts was to pardon three anarchists, imprisoned since 1887 (two for life and one for 15 years) for complicity in the bomb-throwing which killed seven policemen in Chicago, 4 May 1886 (See Anarchism; Haymarket Massacre). It should be said that many leading United States citizens had pe¬ titioned for their release on the ground of in¬ sufficient evidence, an assumption which Judge Gary (q.v.) has vigorously repelled. Altgeld was governor till 1897. He was a prominent champion of free silver and an active supporter of Bryan

for the Presidency in 1896 and 1900, and was defeated as independent candidate for mayor, 1899. He was an able speaker, an ef¬ ficient advocate of prison reform, and appears to have been moved chiefly by sympathy with the working class. He wrote: (Our Penal Ma¬ chinery and Its Victims, > (Live Questions,) etc.

ALTHEA. See Hollyhock; Marsh Mallow.

ALTHORP, Lord. See Spencer.

ALTHUSIUS, Johannes, German philoso¬ pher: b. 1557; d. 1638. He was for many years professor of ethics and law at Herborn. He wrote the first treatise on politics ever produced in Germany. His system claimed that social life was based on a contract express or implied between men ; he was thus the forerunner of Rousseau. He claimed that all rights proceed from the people and was quite outspoken against any usurpation of those rights. He in¬ cluded workingmen's unions or combinations among monopolies requiring regulation. He wrote (Politicia Methodice Digesta) (Herborn 1603) ; (Jurisprudentˆ Romanse LibrP (ib., 1588) ; (Dicaeologicse Libri tres Totum et Uni- versum Jus, quo Utimur, Methodice Complec- tantes) (ib., 1617). Consult Gierke, Otto, (Jo¬ hannes Althusius> (Breslau 1880).

ALTIMETRY, the art of ascertaining alti¬ tudes geometrically by means of a quadrant, sextant, or theodolite. The instrument so used is then known as an altimeter.

ALTISCOPE, an instrument consisting of an arrangement of mirrors in a vertical frame¬ work, by means of which a person is enabled to overlook an object (a parapet, for instance) intervening between himself and whatever he desires to see, the picture of the latter being reflected from a higher to a lower mirror, where it is seen by the observer.

ALTITUDE, in mathematics, denotes the perpendicular height of the vertex of any plane or solid body above the line or plane of its base ; thus the altitude of a triangle is meas¬ ured by a perpendicular let fall from any one of its angles upon the base, or upon the base produced ; therefore the same triangle may have different altitudes, accordingly as we as¬ sume one side or another for its base. Again, the altitude of a cone or pyramid, whether right or oblique, is measured by a perpendicu¬ lar let fall from the vertex to the plane of its base. Similar remarks apply to other solids. In astronomy altitudes are measured or esti¬ mated by the angles subtended between the ob¬ ject and the plane of the horizon; and this al¬ titude may be either true or

apparent. The apparent altitude is that which is obtained im¬ mediately from observation; and the true alti¬ tude that which results from correcting the ap¬ parent altitude, by making allowance for parallax, refraction, etc. The altitude of a ter¬ restrial object is the height of its vertex above some horizontal plane assumed as a base.

ALTITUDE AND AZIMUTH INSTRU¬ MENT. Altitude, in astronomy, is the height of a heavenly body above the horizon, and is measured, not by linear distance, but by the angle which a line drawn from the eye to the heavenly body makes with the horizontal line, or by the arc of a vertical circle intercepted be¬ tween the body and the horizon. The azimuth of a heavenly body is the angle measured along the horizon between the north or south point and the point where a circle, passing through the zenith and the body, cuts the horizon. An altitude and azimuth instrument consists es¬ sentially of a vertical circle with its telescope so arranged as to be capable of being turned round horizontally to any point of the com¬ pass. It thus differs from a transit instru¬ ment, which is fixed in the meridian. To take an altitude the telescope is directed toward the body to be observed, and the angle which it makes with the horizon is read off the gradu¬ ated circle. The altitude thus observed must receive various corrections — the chief being for parallax and refraction — in order to get the true altitude. The azimuth — derived from an Arabic word signifying (<a quarter of the heavens,® — is usually measured westward from the point most remote from the elevated pole, beginning at 0° and returning to it at 36°. Thus, in northern latitudes, where the north pole is elevated, the azimuth is measured from the south point, so that the east point, for in¬ stance, has an azimuth of 270°.

ALTON, al'ton, Ill., city in Madison County, on the Mississippi River and on the Chicago & Alton, Cleveland, Cin., C. & St. L., C., B. & Q., C., P. & St. L., Illinois Terminal and Missouri & Illinois Bridge & Belt railroads, about seven miles above the mouth of the Missouri River and 25 miles north of St. Louis. Alton was settled early in the century, but was not in-

corporated as a city until 1837. The city, built upon a high limestone bluff, has very pic¬ turesque surroundings. Seat of Shurtleff Col¬ lege, Monticello Seminary and Western Mili¬ tary Academy. Has 14 public and three paro¬ chial schools. Churches of all denominations. Alton has considerable river trade and is a dis¬ tributing point for farm

products. Large man¬ ufacturing district producing bottles, pig lead, strawboard, castings, tools, cartridges, stokers, mine cars, brick, sewer pipe, oil products, powder, flour, meat products, stone and sand. Annual value of manufactured products, $40,- 000,000. The city is governed by a mayor and common council, elected every two years by the people. There are two national and three sav¬ ings banks and two daily newspapers. In 1837 Elijah P. Lovejoy, the abolitionist, was mur¬ dered here. _ A monument to his memory was erected in 1897. Pop. (1920) 24,682; including suburbs, 30,000.

ALTON LOCKE, a story by Charles Kingsley, published in 1850. It was his first novel, and displayed the author's broad sym¬ pathy for the condition of the English work¬ ing classes. It excited immediate attention, and was an important factor in arousing the upper classes to a realization of their respon¬ sibilities toward the less fortunate. The altru¬ ism of Locke and his friends, Crossthwaite, Mackaye, Lady Ellerton and Eleanor, forms an admirable and inspiring feature of the book.

ALTONA, al'to-na, Germany, a town in the Prussian province of Schleswig-Holstein, on the Elbe, immediately west of Hamburg. It has spacious squares and streets, which are em¬ bellished by several monuments, notably the memorials of the wars of 1864 and 1870. There are fine municipal and judicial buildings, a theatre, a gymnasium, technical schools, a school of navigation and a hospital. It has manufactures of tobacco and cigars, of ma¬ chinery, woolens, cottons and chemicals. There are also extensive breweries, tanneries and soap and oil works. It has an extensive maritime trade, but its neighbor, Hamburg, is easily its commercial superior. Pop. 168,301.

ALTOONA, al-too'na, Pa., city in Blair County, on the Pennsylvania Railroad, 118 miles east of Pittsburg. It has an elevation of 1,182 feet above the sea; situated in the midst of a most picturesque mountain region, at the eastern base of the Alleghany Mountains. For many years Altoona has been regarded as the most typical of American railroad towns, for here are located the immense machine shops of the Pennsylvania Railroad, the largest railroad shops in the world, where over 17,000 workmen are engaged in manufacturing and repairing lo¬ comotives, passenger coaches and freight cars. The normal output from the shops is five en¬ gines a week. There are also silk mills, planing mills, a bar iron plant, brick and tile works and other important manufactories of machin¬ ery, agricultural implements, etc. According to 1917 estimate of manufactures there were in that year 70 establishments of factory grade employing 19,165 persons, of whom 16,971 were wage earners, receiving a total of $20,301,165 in

wages and salaries. Altoona is centrally situ¬ ated in a bituminous coal region and is also the business centre of a considerable agricultural region. The city has an excellent school sys¬

tem, a fine high school and many private schools. Among its 52 churches are many handsome buildings. It has three banks and three trust companies with a combined capital of over $1,000,000; a public library building and several hospitals. The famous Horseshoe Bend, on the line of the Pennsylvania Railroad, is located near the city, and Lakemont Park is a well-known pleasure ground in Logan town¬ ship. The city owns the water-works plant, which was acquired in 1872 at a cost of $680,- 000, and upon which $97,000 is expended an¬ nually. The city's expenses aggregate $565,000 yearly, of which amount about $280,000 is ex¬ pended for schools, $50,000 for the police de¬ partment and $20,000 for municipal lighting. The city was founded in 1850 by the Pennsyl¬ vania Railroad Company. It was first incor¬ porated as a borough in 1854, and chartered as a city in 1868. The commission form of govern¬ ment was adopted in 1914. During the great railroad strike of 1877 Altoona was the centre of the disturbed section and troops were ordered out to protect railroad property here. It is a growing, thriving city. There are three daily and numerous weekly newspapers. Pop.

(1910) 52,127; (1920) 60,331.

ALTOONA, or ALLATOONA PASS, a

mountain pass in northern Georgia, the scene of a sharp engagement between the Federal troops under General Corse and the Confed¬ erates commanded by General French, on 5 Oct. 1864. The losses on each side were about equal.

ALTO-RELIEVO, al'to-re-lya'vo (Ital. ((high relief˜), the term applied to sculpture that projects from the plane to which it is at¬ tached to the extent of more than one-half the outline of the principal figures.

ALTRICES, birds that are hatched from the egg before they have acquired feathers or the ability to care for themselves. Hence they must remain in a nest and be protected and fed by the parents. This division, also called Nidicolce, includes all birds except those known as game-birds and seafowl.

ALTRINCHAM, al'tring-am, or AL- TRINGHAM (and so pronounced), England, a town in Cheshire, eight miles southwest of Manchester. Many residences are occupied by those whose business is in

Manchester, who are attracted by the healthful climate and the vicin¬ ity of Bowdon Downs and Dunham Massey Woods. Market gardening is carried on, large quantities of fruit and flowers being grown for sale in Manchester. Cabinet-making is also practised, and there are saw-mills, iron foun¬ dries and manufactures of cotton, yarn and worsted. Pop. 16,831.

ALTRUISM, a term in psychology and ethics to denote disposition and con¬ duct directed toward the well-being of others. It is contrasted with egoism, or self-seeking disposition and conduct. It is essential to al¬ truism, as well as to egoism, that the good of others, or of self, should be consciously and in¬ tentionally pursued. Actions and dispositions which are instinctive, such as maternal instinct, are not, properly speaking, altruistic, nor arc the opposite egoistic. It is only when the con¬ sciousness of self is sufficiently developed in the child to give rise to a contrast between self

and the ((other® {alter), that the conscious pur¬ suit of the interest of one of them is possible. This is covered by psychologists by saying that real altruism and egoism are always <(reflec- tive.® Altruism is also applied to the type of ethical theory which bases morality upon gen¬ erous or altruistic disposition or conduct (in the sense defined above).

ALTSHELER, alt'sha-ler, Joseph Alex¬ ander, American author : b. ri hree Springs, Ky., 29 April 1862; d. 5 June 1919. He stud¬ ied at Vanderbilt University and was con¬ nected with the Louisville Courier- J ournal and the New York World. His numerous nov¬ els are chiefly on American historical subjects and among them are (The Sun of Saratoga } (1897); (A Soldier of Manhattan) (1897); (The Last RebeP (1899) ; (In Hostile Red' *(1900) ; (In Circling Camps* (1900) ; (My Captive* (1902) ; (The Wilderness Road) (1901) ; (The Candidate) (1905) ; (The Forest of Swords * (1915) ; (The Hosts of the Air) (1915) ; (The Guns of Europe * (1915).

ALTUS, Okla., city and county-seat of Jackson County, 145 miles southwest of Oklahoma, on the Saint Louis and San Fran¬ cisco, the Kansas City, Mexico and Orient and other railroads. It contains flour, oil and alfalfa mills. Stock raising and truck farming are important industries of the surrounding district. The city owns the electric plant and the waterworks. Pop. 5,200.

ALTWASSER, alt'vas-er, Germany, town in Silesia, 43 miles southwest of Breslau. It has factories for glass, porcelain, machinery, cotton-spinning, iron foundries and coal mines. Pop. (1910) 12,144.

ALUM, in chemistry, a general name for a large class of substances, which may be defined as double sulphates or selenates, in which one of the bases is aluminum, chromium, manga¬ nese, iron, indium or gallium, and the other is sodium, potassium, rubidium, caesium, am¬ monium, silver or thallium. The alums all crystallize in cubes or octahedra, with 24 mole¬ cules of water, and are all isomorphous, so that when in solution together they cannot be sepa¬ rated by crystallization. In naming them alu¬ minum is understood to be one of the metals present unless the contrary is expressly indi¬ cated. Thus ((potash alum® is the alum whose formula is A12(SO.i)3 4* K2SO4 4" 24H20. If aluminum is not present, the metal that re¬ places it is stated; thus ((iron-sodium alum® is the alum whose formula is FeRSChUT- Na-SOi + 24H20. When selenium replaces the sulphur in one or both of its positions, the alum is most clearly identified by giving its formula. In addition to the true alums a class of substances known as (<pseudo-alums® ex¬ ists. These also crystallize with 24 molecules of water, but they are not isomorphous with the true alums. Mn2(S04)s + MgSCh + 24H20 is an example of this class.

All the alums are soluble in water, and it is probable that all are resolved, at least partially, into their constituents, by solution. It is known that in certain cases (in silver alum, for ex¬ ample) the separation is absolute. All of the alums give an acid reaction when in solution, all have an astringent taste and all lose their water of crystallization when heated.

The alum of commerce is assumed to be potash alum, the formula of which has been al¬ ready given. Ammonia alum — (NHOSChAb 03(S03)324H20 — is sometimes substituted, however, owing to the cheapness of sulphate of ammonia, which is now obtained as a by¬ product in the manufacture of illuminating gas. Sodium alum is probably not substituted for potash alum to any great extent.

The alums are largely used in the arts, es¬ pecially in dyeing and tanning, and in the puri¬ fication of water. Potassium alum is also used with borax in waterproofing cloth and with lime in preserving timber; in the size used in paper making; and as a soap precipitant in the manufacture of glycerine. Bread made from flour containing a small amount of alum is said to be very white, and partly for this rea¬ son and partly on account of the cheapness of the substance, ammonia alum has been largely used in the manufacture of baking-powders.

This practice has been condemned and pro¬ nounced detrimental to health, however, by nearly all the authorities who have written on the subject.

Commercial alum is made from alum stone (see Alunite), from alum shale, or from bauxite and cryolite, generally by roasting. It is also made in greater purity by mixing solu¬ tions of the sulphates of alumina and potassa and allowing the alum to crystallize out. In making ammonia alum, sulphate of ammonia is substituted for the potassium sulphate (see Alunite). Some alums occur native. (See Mendozite; Tschermigite.) The United State census of 1914 reported 19 establish¬ ments making alums, with a total output of 313,712,000 pounds, valued at $3,467,969, an in¬ crease over 1909 of 37,418,000 pounds, and $445,614. Of the 19 establishments, 5 were located in Pennsylvania, 3 each in Illinois, Mas¬ sachusetts and New York, 2 in Michigan and 1 each in California, Connecticut and New Jersey. The output comprised 142,438,000 pounds reported as aluminum sulphate, valued at $1,277,836; 23,338,000 pounds of alum cake, valued at $251,186; 42,562,000 pounds of con¬ centrated alum, valued at $450,730; 22,629,000 pounds of burnt alum, valued at $364,656 ; 12,- 765,000 pounds of potash alum, valued at $219,- 968; 13,995,000 pounds of soda alum, valued at $254,477, and 55,985,000 pounds of other alums, designated as porous alum, excelsior alum, pearl alum, ammonium alum and chloride of alumina, valued at $649,116.

Alum Poisoning. — This poisoning may be acute or chronic, the latter being much more common. In the acute variety, often the result of accidental drinking of a gargling solution, the symptoms are nausea, vomiting, purging, cold clammy skin, small thready pulse, thirst, muscular tremor, followed by a rise in tempera¬ ture in those that have recovered. The treat¬ ment pursued in the case of alum poisoning is to wash out the stomach and use the white of eggs as a chemical antidote.

Alum being so widely employed as a pre¬ servative, as a means of clarifying water and as an adulterant in baking-powders, the ques¬ tion of chronic alum poisoning becomes of great importance. The symptoms that have been most frequently observed in such poison¬ ing are disturbances of digestion and consti¬ pation. The question as to its harmful action

on the kidneys is not yet decided, but it would seem to be harmful rather than the reverse.

ALUMBAGH, a domain in India formerly belonging to one of the princes of Oudh, about four miles south of Lucknow, near the road to Cawnpore. It comprised a beautiful palace, a mosque, a temple and other buildings sur¬ rounded by a garden, all in the centre of a magnificent park enclosed by a lofty wall with turrets at each angle. On the outbreak of the Indian mutiny this place was occupied by the revolted Sepoys and converted into a fort. On 23 Sept. 1857 it was captured by the British, then on their way to relieve Lucknow. Leav¬ ing a garrison of 300 European troops, to¬ gether with the sick and wounded and about 4,000 native camp-followers, the main body, under Outram, Havelock and Neil, pushed on to Lucknow. These generals were unable to send reinforcements, but at the end of Novem¬ ber the place was relieved by Sir Colin Camp¬ bell. The latter left Sir James Outram, with a force of 3,500 men, to hold the Alumbagh, a task which he successfully accomplished, though repeatedly attacked by overwhelming numbers of the rebels. In March 1858 the garrison was finally relieved. At the foot of a tree within the grounds Sir Henry Havelock was buried.

ALUMINA (AI2O3), the only oxide of the metal aluminum. As found native, crystallized, it is only second to the diamond in hardness. The transparent varieties are the sapphire and ruby, the opaque are corundum and emery, only the corundum being pure. In combination with silica it is one of the most widely distributed of substances, ranking in this respect next to oxygen and silicon. It enters in large quantity into the composition of granites, traps, slates, schists, clays, loams and other rocks. The hy¬ drated oxide, AI2O3H2O, occurs as disapore, and with ferric oxide as bauxite. Various aluminates occur in certain gems, as in spinel and chrysoberyl. Alumina may be obtained by adding a solution of ammonium hydrate to purify alum dissolved in 20 parts of water, thoroughly washing the very gelatinous precip¬ itate formed, and then drying it carefully. It may also be prepared by igniting powdered al¬ uminum in air or oxygen. Alumina is a white powder, without taste or smell, and infusible except in the oxyhydrogen flame It is the basis of porcelain, pottery, bricks and crucibles ; and it has a strong affinity for oil and coloring matter, which causes it to be employed in the state of clays as a cleansing powder, and in a state of purity in the preparation of the colors called lakes, in dyeing and calico-printing. It combines with the acids, and forms numerous salts, the most important of which are the sul¬ phate (see Alum) and the acetate. The latter salt is formed by digesting strong acetic acid (vinegar) with the newly precipitated earth; but for

the use of the manufacturer, by decompos¬ ing alum with acetate of lead (sugar of lead), or more economically with acetate of lime, a gallon of which, of the specific gravity, 1.050, is employed for every 2Y\ pounds of alum. The sulphate of calcium formed falls to the bottom, and the acetate of aluminum remains in solu¬ tion with an excess of alum, which is neces¬ sary to prevent its decomposition. It is of ex¬ tensive use in calico-printing and dyeing, as a

mordant, and is employed in the place of alum, to which it is generally preferred.

ALUMINITE, a mineral having the com¬ position of a hydrous aluminum sulphate, AI2O3. S03.9HaO, occurring in white reniform con¬ cretions in beds of clay in Germany, England and other European countries. It is opaque, of earthy lustre and fracture, and is sift and light.

ALUMINO-THERMICS, a term designed to embrace the processes of reduction of metals by taking advantage of the intense affinity for earthy lustre and fracture, and is soft and light, temperatures.

The principal industrial applications of these processes are: (1) The welding of iron and steel in place as in the uniting of railroad rails, and in repairing broken shafting and the like ; (2) the production of pure metals and alloys free from carbon, nitrogen and other common impurities; (3) in foundry practice for re¬ viving or increasing the temperature of molten iron or steel in the ladle before pouring; (4) in the manufacture of small castings and repairing flaws in large ones; (5) in surface softening of hardened steel to permit tooling or boring and the cutting of large openings.

In the welding process the aluminum is re¬ duced to a powder or granulated and mixed with a metallic oxide, in most cases the oxide of iron. This mixture has been given the com¬ mercial name ˆthermit.®

The chemical reaction, which consists in oxidizing the finely divided aluminum, is started by producing the high temperature necessary at only one point in the thermit. • This is ac¬ complished by a priming powder composed preferably of metallic magnesium and barium peroxide. The primer is ignited by a fiercely burning storm match or by touching it with a red-hot iron rod. The reaction then spreads spontaneously and with great rapidity and with considerable violence. In a few seconds the entire mass is a white-hot fluid at a temperature estimated to be about 5400° F.

In the crucible after the reaction there are two layers. The bottom one is pure metal of equal weight to, but occupying only one-third of the space of, the top layer, which is now oxide of aluminum, so-called corundum.

The most commonly employed of the weld¬ ing processes is the one by which a continuous rail — a desideratum in modern trolley-road construction — is simply, cheaply and effectively obtained. The marked advantage enjoyed by this system is the freedom from bulky equip¬ ment; a crucible, a mold box and, in instances where a complete butt weld of the head of the rail is desired, a rail-clamp is all that is re¬ quired. All these materials, including the neces¬ sary quantity of thermit, can easily be moved on a hand truck. Each weld, according to the section, requires from 15 to 20 pounds of ther¬ mit, and the metal welded around the joint will only weigh, therefore, from 8 to 10 pounds.

The thermit reaction takes place in a- crucible which rests on a simple iron stand that can be attached to the rails or rail-clamps where such are used. The crucible consists of a sheet-iron mantle lined with magnesia or corundum slag, which is tamped round a sheet-iron conus sus¬ pended in its middle. The bottom is formed by a hard magnesia stone provided with a re¬ placeable outlet which will stand 9 or 10 runs.

The life of the crucible itself is about 25 reactions. The crucible is plugged by two as¬ bestos washers covered by a metal disk over the outflow or thimble. In the latter is sus¬ pended a piece of iron wire, the lower end of which projects below the base of the crucible. This is driven up by a blow and so ((taps)) the crucible. The heat of the thermic reaction might in spite of the asbestos washers burst through the plugging material. To prevent this the metal disk is further covered by a layer of magnesia sand.

The mold is made according to a special design for each section. Its two parts, one on each side, exactly fit and firmly enclose the rail. It must be dry and porous. On a large scale molds are made by manufacturers of refractory earthenware or by railway lines, according to their requirements, in their own shops, by tamping an ordinary mixture of loam and sand in equal parts into a sheet-iron case placed over the model. This sand mold must be dried during a

couple of hours at a tem¬ perature of about 212° F. Before placing the mold round the joint, the rail ends are cleaned of dirt and rust with a wire brush and warmed with a gasoline torch. In case the tops of the rails are to be butt-welded the sections must be filed. The thermit is then poured into the crucible from bags containing the necessary amount for each section. After the charge in the crucible has been ignited in the usual way the reaction takes its course and the crucible is tapped to allow the liquid steel to flow into the mold. The great heat of the liquid thermit steel literally melts and amalgamates the ends of the rails projecting into the molds, making them as one, so that when cool it leaves a continuous rail. The joint is stronger than an equal section of the rail, from the fact that a shoe or collar of metal is cast around the rail at the joint.

It has been found that there are no changes in the composition or temper of the steel in the rail and it is left just as it was, except that the ends are melted together up to, and generally a little above the bottom of the tread of the rail, and that a slight longitudinal expan¬ sion has taken place.

The so-called third rail is also welded by this means.

Steel girders for construction work can, of course, be welded in the same way as rails. Practically the same process is used in butt¬ welding pipe up to six inches diameter. In making marine and other large repairs thermit welding has proved invaluable, the mold being made and the work done in place, without re¬ moval to a foundry. In this way the broken crank shafts or rudder and stern posts of great steamships have been welded in a few hours.

Among the pure metals produced by the alumino-genetic reaction may be mentioned in the first instance chromium free of carbon. It is used in the manufacture of particular quali¬ ties of chromium steel with a limited percentage of carbon, and nowadays hardly any high-speed tool steel is made without it. Pure manganese also produced by this process finds employment in copper and nickel manufacture, and, further¬ more, in the production of particular sorts of manganese steel of great strength and great elasticity with 12 to 14 per cent manganese,

used particularly for bolts of machinery ex¬ posed to great strains. Pure molybdenum and ferro-vanadium have also lately been put on the market. Ferro-titanium has been in use with a number of steel works for quite a considerable time, to deoxidize the steel and remove nitrogen. It also gathers sulphur and phosphorus, and imparts density,

toughness and strength. In addition to the pure metals several of their alloys are produced in exceptionally pure form by the alumino-thermic processes.

In foundry practice the thermit is plunged to the bottom of the molten metal in the pour¬ ing ladle or thrown upon the surface of metal in the riser. In making small castings required quickly the thermit is ignited in a flat-bottom crucible and in 30 seconds can be poured into the mold. Where more than 10 pounds of thermit is used it is necessary to add 10 per cent of clean steel punchings or rivets to the thermit to modify the intensity of the reaction. A further addition of 1 per cent of metallic manganese and 1 per cent of nickel thermit will improve the quality of the casting. In the replacing of parts broken off the desired form is modeled on to the work with yellow wax and the molding loam packed around it. The wax melts away when the work is heated preparatory to the pouring of the thermit steel.

In the use of thermit for locally softening armor plate and other hardened steel the powder is heaped within a confining ring and ignited. The heat generated is sufficient to affect the metal to a depth of two inches. From 30 to 40 pounds of thermit are required to the square foot.

Analyses of thermit steel show an average of carbon, .05 to .1 per cent; manganese, .08 to .1 per cent; silicon, .09 to .2 per cent; sul¬ phur, .03 to .04 per cent ; phosphorus, .04 to .05 per cent.; aluminum, .07 to .18 per cent.

The quarterly magazine Reactions is de¬ voted to the alumino-thermic industry. Con¬ siderable work of this kind has already been done in Germany.

ALUMINUM, or ALUMINIUM, the most abundant of all metallic elements in the earth's crust, and ranking third among all the known elementary substances, following the non-metals oxygen and silicon. It is a large constituent of all common rocks, excepting only the sedi¬ mentary rocks — the sandstones and limestones — and forms about 15 per cent of the solid substance of the world. Aluminum is never found native, but in the form of oxide, fluoride, phosphate, silicate, sulphate, etc. Its most im¬ portant ore, and that from which the whole commercial supply is produced, is known as bauxite (q.v.). This mineral is a hydrated silicate of aluminum, containing when pure, 74 per cent of alumina — 39 per cent of the metal. As it comes from the mines, bauxite is a mix¬ ture, containing not more than 50 to 60 per cent of alumina. For several years the State of Arkansas has produced

more than 80 per cent of the bauxite mined in the United States, the remainder being supplied by Alabama, Georgia and Tennessee. The Tennessee prod¬ uct, however, being of especially high grade, is used in the manufacture of the chemical salts of aluminum, and very little, if any, reaches the furnaces which produce the metallic aluminum.

Practically all the metal produced in the United States is obtained by the Hall process. Alumina is first prepared by the Bayer process. Bauxite, very finely ground, is digested with caustic soda under steam pressure of 70 to 80 pounds, sodium aluminate being formed. This solution is filtered, diluted and run into tanks where it is agitated with freshly precipitated alumina. About 70‘ per cent of the alumina present is thrown down. This is washed free of sodium and the moisture evaporated. When dry, it is charged into an iron tank lined with carbon, containing a fused bath of cryolite, with some other admixtures, such as fluorite of sodium and fluorite of calcium, or similar ingredients, the nature of which is guarded as a trade secret. Above the vat are suspended a series of carbon anodes which may be lowered into the bath. The alumina being stirred into the fused cryolite, the anodes are lowered and the current turned on. The alumina is de¬ composed and the metallic aluminum collects in the bottom of the bath and is drawn off from time to time. The bath remains unaltered, and as the dissolved alumina is exhausted, more is stirred in, and the operation continues as long as the current is provided. The most scrupu¬ lous care is taken that the materials used shall be free from silica and sodium. The first reduces resistance to corrosion, and the second produces a yellowish coating particularly ob¬ jectionable in aluminum cooking utensils. Plants for the economical production of alu¬ minum have to be very large. The metal can¬ not be produced cheaply on a small scale.

Characteristics and Properties. — As found in the market, aluminum varies from 98 per cent to 99.75 per cent pure, the impurities being chiefly iron, silicon, copper and sometimes sodium. It is grayish white in color with a bluish cast, quite distinct from silver, nickel and tin. It has a satiny lustre and is practically unaffected by pure air, though in regions where the atmosphere is permeated with mixed gases from factory chimneys, sheet aluminum soon becomes perforated and eventually falls to powder. Owing to its great affirmity for oxygen, aluminum is almost instantly covered with a very thin pellicle of oxide which acts as a protection to the metal beneath. In hardness it closely

resembles silver, and this may be considerably increased by working. In elas¬ ticity it compares with copper as three to four. Its thermal conductivity is very high, exceeded only by copper, and being double that of tin and three times that of iron. Its electrical conductivity is 61 per cent that of copper, so that wire to carry an equal charge must be 64 per cent larger in sectional area ; that is, 28 per cent greater in diameter. Aluminum is sonorous to a high degree, and this quality is improved by the addition of a little silver or German silver. Aluminum is extremely ductile, and may be drawn into wire 1/250 of an inch in diameter, which has about half the strength of copper wire of the same size. In malleabil¬ ity, aluminum ranks next to gold. It may be rolled into sheets 17/10,000 of an inch in thick¬ ness, and these may be hammered into foil 1/10,000 of an inch in thickness. Its tensile strength is ordinarily from 6.5 to 15.5 tons per square inch, with a top limit for selected specimens of 29 tons. Weight for weight it

has a tensile strength equal to that of 80,000 pound steel. Thus the weight of steel in an eight-inch girder would make a 15-inch girder of aluminum, which would carry 80 per cent more than the steel. Aluminum is non-magnetic and therefore exceedingly useful in much elec¬ trical work. Like lead, aluminum has the property of extrudability, and when warm may be pressed into a mold of any shape through a small opening. If the mold is of polished steel the aluminum will have a surface as per¬ fect as if machined. By virtue of this quality it may be pressed into continuous bars and tubing of any length, and into engineering shapes of great strength, fancy moldings, cor¬ nices, etc. This property is also possessed by some of its hard alloys. Its atomic weight is 27; its atomic volume, 10.1 ; its specific gravity is 2.56, which is increased by rolling to 2.67 ; its specific heat ranges from 0.2120 to 0.2185. Its melting point is 1215° F. In fusing it expands about 5 per cent and its specific gravity falls to 2.54. Above 1300° F. the metal Unirns® ; that is, it unites very rapidly with the oxygen of the air.

Aluminum is not affected by organic acids, and resists well cold sulphuric and nitric acids, but dissolves speedily in hydrochloric acid. The alkalis readily decompose it. As compared with other metals, for a given gauge of plate, one ton of aluminum is equal in area to 2.7 tons of tin, 2.88 tons of iron, 3.33 tons of copper and 4.22 tons of lead. One pound of sheet aluminum of any thickness will cover 3V5 times the area covered by a sheet of brass of the same thickness. Compared with copper, aluminum sheets are 25 to 50 per cent cheaper ior the same area, 66 per cent lighter and in many cases much more durable.

Alloys. — xAduminum forms alloys readily with all the common metals except lead. The alloys which have been found more or less useful have been combinations of aluminum with copper, chromium, tungsten, titanium, molybdenum, zinc, bismuth, nickel, cadmium, magnesium, manganese, tin or antimony, — all of these alloys being distinctly harder than -pure aluminum. A small percentage of man¬ ganese adds ductility to these alloys without reducing their strength. The copper-aluminum alloys, containing 10 to 11 per cent of aluminum, are known as aluminum-bronze. These alloys are not corroded by sea water, making them of special value for marine fittings. (Sec Bronze). When aluminum is alloyed "with 7 to 10 per cent of copper, a tough metal results ; it is especially useful in automobile parts and other construction forms which are subjected to sud¬ den and severe shocks. The zinc-aluminum alloys yield a metal eminently adapted for forging, being tough and flowing well under dies. _ Some of the zinc-aluminum alloys are but little heavier than

pure aluminum, are as rigid as bronze, and machine as readily as brass. They are very extensively used in making mo¬ tor casings for automobiles and aircraft. With iron, aluminum combines in all proportions, but the alloys of most value are those with very small percentages of aluminum. This is true especially of steel, to which the usual addition of aluminum is from two ounces to 12 ounces per ton. In this quantity the alu¬ minum is essentially a deoxidizer, and while

increasing the steel in tensile strength, its chief effect is to produce smoother and more homo¬ geneous ingots. With cast iron the addition of aluminum is from one to two pounds per ton, lessening the tendency to chill, causing it to flow smoothly and giving it a closer grain. In wrought iron, aluminum increases the tensile strength 30 per cent and renders the iron more fluid at 2200° F. than at 3500° without it. With 2 to 10 per cent of magnesium, aluminum forms an alloy lighter even than its normal weight. This alloy goes by the name of mag- nalium and is equal in strength and workabil¬ ity to good brass. With 1 to 15 per cent of tin a series of strong and rigid alloys is produced, suitable for heavy castings. Aluminum-tungs¬ ten and aluminum-nickel make good rolling metal for sheet forms. Alloys of aluminum with 3 to 4 per cent of copper or with 2 to 5 per cent of nickel are also very largely used for rolling into sheets. All brass is improved by the addition of small percentages of alumi¬ num, a 2-per cent addition doubling its tenacity. Aluminum has the effect generally of lowering the melting point of the alloy. Added to gold in the proportion of 1 per cent, the resulting alloy is known as <(green goldA Five per cent of aluminum will quench the color of the gold, yi.elding a white metal. With silicon aluminum combines in all proportions, but these alloys are brittle and are not permanent. With plati¬ num and cadmium it forms fusible metals (q.v.). An alloy consisting of 96 parts alumi¬ num, three parts copper and one part of mag¬ nesium is known commercially as ˆduralumin.® It has been used extensively in making shells, helmets, grenades and camp equipment during the European War.

Welding and Plating. — The great difficulty of soldering aluminum has been overcome by the process of autogenous welding and thus the making of tanks and vessels of the largest sizes has become practicable. In this welding process the sheets of aluminum are lapped, and a pure aluminum wire laid between, with a flux, generally a mixture of fluorides of the alkalis. The heat used may be the oxy-

hydrogen flame, the oxy-acetylene torch or even the air-acetv- lene flame. Aluminum is successfully plated with other metals by first plating it with zinc upon which the other metals are then deposited in an electrolytic bath.

Uses. — The uses of aluminum are almost without number. More than 250 articles are made from the pure metal and nearly as many more from its alloys, and the list is continually being extended. Among them are aeroplane parts, automobile parts and bodies, . blades for fans, buttons, camp equipment, chains, cooking utensils, dental plates, foil for wrapping food products and confectionery, gas and oil stoves, hair and hat pins, horseshoes, frames for mirrors and pictures, penholders, army pon¬ toons, optical goods, scientific instruments, stoves and stove pipe, telephone fixtures, tele¬ scope tubes, trunks and traveling cases and vacuum cleaners. In the arts aluminum has replaced other metals, notably in the brewing industry. The great fermentation vats are now made of aluminum instead of copper, as the former has no deleterious effect upon the growth of yeast, as has the former. In varnish making also, the use of aluminum kettles affords a paler varnish from the same gums,

or a varnish of the same color from darker gums. The resistance of aluminum to stearic and oleic acids makes it of the greatest value in soap making. In sugar refineries the copper piping is now lined with aluminum instead of tin as formerly. In iron and steel founding powdered aluminum is used to keep up the heat of molten metal, which it does by uniting with the oxides with great energy. This prop¬ erty of powdered aluminum is the basis of the action of thermit. (See Alumino-thermics) . The powdered metal is used also in the manu¬ facture of the explosive ˆammonal.® Mixed with ammonium nitrate in varying proportions it forms a series of safe explosives which can¬ not be fired without a detonator, but range in power from common black powder to nitro¬ glycerine. These explosives are of particular value in mining, as the resulting gases are entirely harmless, being nitrogen, oxygen and steam. Powdered aluminum is used extensively in the painters' trade as a foundation for bronze powders, in which it excels all other metals. In electrical transmission cables it has found a new utility, the cables being drawn on a ste_l core, which renders them strong enough to stand the weight of long suspensions as well as the force of the wind and the weight of ice storms.

History. — While the fact that argillaceous earth concealed a new metal had been known for some years, the first production of metal¬ lic aluminum was not accomplished until 1824, when Oersted succeeded in making it by heat¬ ing aluminum chloride with

potassium amalgam. In 1827 Wohler obtained it by a closely similar method. In 1854 Bunsen and Deville indepen¬ dently produced metallic aluminum by the elec¬ trolytic process. The credit of pursuing the problem of a successful commercial process belongs to Deville, who persistently worked, first at Javel, then at Nanterre and finally at Salindres, with the double chloride of aluminum and sodium as his source. When cryolite was discovered, Messrs. Dick and Smith, at the sug¬ gestion of Dr. Percy, made successful use of that mineral as a source of metallic aluminum. Deville accepted the improvement, but finding the metal from cryolite quite impure, he re¬ turned to his former crude material, adding the cryolite to his own mixture, however. De- ville's process furnished the metal at a cost of $5 a pound until 1887, when several inven¬ tions in other fields were applied to the com¬ mercial production of aluminum. Since that time the price has steadily dropped until it has reached its present normal of about 18 to 20 cents a pound. The war has had its effect upon aluminum as well as upon all other metals, but with the return of settled conditions lower prices will again prevail.

Production. — The French periodical L'Echo des Mines estimates the potential production of aluminum by the world's existing plants as follows :

United States and Canada . 75,000 tons

France . . . 20,000 "

Switzerland . 20,000 "

United Kingdom . 12,000 "

Norway . 16,000 "

Italy . 7 , 000 "

Total . 150, 000 tons

The production of aluminum in the United States in 1916 amounted to 123,708,000 pounds.

In addition to this output of metal, there were produced 153,860 tons of aluminum sulphate, 27,257 tons of alum and 30,708 tons of alumi¬

num abrasives. (See Abrasives). In 1885 the commercial production of aluminum was 283 pounds. From that year to the present, includ¬ ing the 1916 output, the total production of metallic aluminum in the United States has been 680,380,500 pounds.

ALUM-ROOT, the name given in the United States to two plants on account of the remarkable astringency of their roots: (1) Geranium maculatum, or spotted cranesbill, is a native of North America from Canada to North Carolina; it has an angular, downy

stem, 3-5-parted leaves with deeply toothed lobes, obovate ' entire petals, the filaments scarcely ciliated at the base; the color of the flowers is a pale lilac. It is employed success¬ fully as a remedy in dysentery among children ; the tincture is recommended in cases of ulcer¬ ated sore throat, soreness of the gums, etc. The plant contains large proportions of gallic acid and tannin. (2) Heuchera americana family (Saxifragacece) is a hairy plant with rough scapes and leaves, the latter being on long petioles, 5-7-lobed, toothed ; the calyx is 5-cleft, petals undivided, five stamens; the styles are remarkably long. It contains tannin and is used in preparing a wash for wounds, ulcers, etc.

ALUM-SHALE, a slaty rock of different degrees of hardness ; color grayish, bluish or iron-black; often possessed of a glossy or shining lustre. It is chiefly composed of clay (silicate of alumina), with variable proportions of sulphide of iron (iron pyrites), lime, bitu¬ men and magnesia. It is found abundantly, and from it is obtained the largest part of the alum of commerce.

ALUNITE, al'u-nit, a native subsulphate of aluminum and potassium, having the for¬ mula K(A10)3(S04)2 + 3H20, and occurring both massive and in rhombohedral crystals resembling cubes. It is white with a vitreous lustre, with a hardness varying from 3.5 to 4, and a specific gravity of about 2.6. It has been found, in the United States, in California and Colorado. According to Dana it was first called ˆaluminilite,® a name afterward abbre¬ viated to the present form. Alum may be ob¬ tained from it by repeated roasting and lixivia-

tion. (Also called alum-stone and alum-rock).

ALUNNO, Niccolo (real name Nicolo di Liberatore), an Italian painter of the 1 5th century, the founder of the Umbrian School: b. Foligno about 1430; d. 1502.

ALUNOGEN, a-lu'no-jen, a native hydrous sulphate of aluminum,

having the formula Al2 (S04)3_M8H20. It occurs massive, as an in¬ crustation in mines and quarries, and also in delicate fibrous forms. Its hardness varies from 1.5 to 2, and its specific gravity is about 1.7. It occurs in large quantities in Jackson County, N. C., and near Silver City, N. M. ; and it is found in many other parts of the United States in small amounts.

ALUREDUS, an English historian: b. about 1100. See Alfred of Beverley.

ALVA, al'va, or ALBA, Ferdinand Al¬ varez de Toledo, Duke of, Spanish statesman and general: b. 1508; d. Thomar, 12 Jan. 1582.

He was educated by his grandfather, Frederick of Toledo, who instructed him in military and political science. He commanded under Charles V in Hungary, and was present at the siege of Tunis and in the expedition against Algiers. His cautious character and his inclination for politics at first led men to believe that he had but little military talent ; and his pride being touched at the low estimation in which he was held, his genius was roused to the performance of exploits deserving remembrance. He won in 1547 the battle of Miihlberg against John Frederick, Elector of Saxony, and in 1555 was commissioned to attack the French in Italy, and Pope Paul IV, the irreconcilable enemy of the Emperor. When Charles V resigned the gov¬ ernment to his son, Philip II, Alva received the supreme command of the army and conquered the states of the Church and frustrated the ef¬ forts of the French. Philip, however, com¬ pelled him to contract an honorable peace with the Pope, whom Alva wished to humble. He appeared in 1559 at the French court in order to marry Elizabeth, the daughter of Henry II, by proxy, for his sovereign ; she had been at first destined for the crown prince, Don Carlos. About this time the Netherlands revolted, and Alva was entrusted with a considerable army and unlimited power to reduce the rebellious provinces. Scarcely had Alva reached Flan¬ ders at the end of August 1567, when he es¬ tablished the Council of Blood, at the head of which stood his confidant, Juan de Vargas. This tribunal condemned, without discrimina¬ tion, all those whose opinions were suspected and whose riches excited their avarice. The present and absent, the living and the dead, were subjected to trial and their property con¬ fiscated. The cruelty of Alva was increased by the defeat of his lieutenant, the Duke of Arem- berg, and he caused the Counts of Egmont and Hoorn to be executed. He afterward defeated the Count of Nassau on the plains of Gem- mingen. Soon after the Prince of Orange ad¬ vanced with a powerful army, but was forced to withdraw to Germany. The Duke stained his reputation as a general by new

cruelties, his executioners shedding more blood than his sol¬ diers. The Pope presented him with a conse¬ crated hat and sword, a distinction previously conferred only on princes. Holland and Zea¬ land, however, still resisted his arms. A fleet fitted out at his command was annihilated, and he was everywhere met with insuperable cour¬ age. This, and perhaps the fear of losing the favor of the King, induced him to request his recall. Philip willingly granted it, as he per¬ ceived that the resistance of the Netherlands was rendered more obstinate by these cruelties, and was desirous of trying milder measures. In December 1573 Alva proclaimed an amnesty, resigned the command of the troops to Louis de Requesens, and left the land in which he had executed 18,000 men, as he himself boasted, and kindled a war that burned for 68 years, cost Spain $800,000,000, its finest troops and seven of its richest provinces in the Low Coun¬ tries. Alva led an army into Portugal, gained two battles in three weeks, drove out Don An¬ tonio, and reduced all Portugal, in 1581, to sub¬ jection to his sovereign. He made himself master of the treasures of the capital and per¬ mitted his soldiers to plunder the suburbs and surrounding country with their usual rapacity

and cruelty. It is said of him that during 60 years of warfare he never lost a battle and was never taken by surprise.

ALVA, Okla., city and county-seat of Woods County, 150 miles northwest of Okla¬ homa City, the capital of the State, on the Canadian River, and on the Atchison, Topeka and Santa Fe and the Chicago, Rock Island and Pacific railroads. It contains flour mills, broom factories and dairy establishments,, and has important interests in the agricultural products of the district, which produces wheat, corn, oats and alfalfa. It contains a hospital, city hall, court-house, library, opera house, two modern school buildings and the Northwestern State Normal School. The waterworks are the property of the city. Pop. 3,688.

ALVARADO, ai'va-ra'dcr, Pedro de, a Spanish soldier of fortune, the companion and lieutenant of Cortez: b. Badajoz about 1499; d. 1541. He was of good family, his father being a knight of the order of St. James. In 1518 he accompanied Grijalva in a small expedition sent by Velasquez, governor of Cuba, to ex¬ plore the American coast. A considerable amount of the precious metals was obtained by barter, and Alvarado was despatched to Cuba with this treasure and with a

report of the regions which had been explored. When Cortez was called away to meet Narvaez, who had been sent by Velasquez with a superior force fo supersede him in command, he left the capital and his royal captive, Montezuma, in Alvarado's charge, and in 1523 was sent with a considerable force to reduce the tribes of In¬ dians in the direction of Guatemala. Having beaten off all opponents he founded a city now called Guatemala la Vieja, and established a port on the Pacific, which he called Puerto de la Posesion. Embarking for Spain, he was received with great honor by the Emperor, Charles V, who, in acknowledgment of his services, made him governor of Guatemala. He shortly returned to America with a numerous band of knights and kinsmen, and Guatemala speedily became a prosperous city. An at¬ tempt which he subsequently made on Quito, but which he was induced to relinquish, was resented by Pizarro as an intrusion within the boundaries of his command, and he embarked a second time for Spain to vindicate his con¬ duct to the Emperor.

ALVARADO, Tomas Antonio, Ecuadorean clergyman : b. Cuenca, Ecuador, 18 Sept. 1860. He was educated at the Christian Brothers Col¬ lege and the Ecclesiastical Seminary of his native city. While still a student he was ap¬ pointed superior of the seminary and pro¬ fessor of grammar, literature, French and Latin. He was ordained to the priesthood in 1886 and soon after was named dean of the faculty of philosophy at the University of Azuay. In 1898 he was exiled for a time by the government because of his opposition to the law ((E1 PatronatoA He has held official, posi¬ tions as municipal councillor and commissary of the Fiscal Revenue Commission. He was twice elected deputy to the National Congress, but each time declined to serve. He is the au¬ thor of (Estetica literariaP 'Ortologia fran- cesa) and (Versificacion francesaP which are used as textbooks in several schools ; also of a number of poems, religious and secular. He is

a frequent contributor to various ecclesiastical periodicals.

ALVAREZ, al-va'rath, Don Jose, Spanish sculptor: b. Priego 1768; d. 1827. In 1799 Charles IV gave him a pension of 12,000 reals to enable him to study in Paris and Rome. In Paris he executed a statue of Ganymede, which at once placed him in the front rank of the sculptors of his time. Another successful work was a group representing Antilochus and Mem- non, which secured for the artist the appoint¬ ment of court sculptor.

ALVARY, al -va're, Max, German singer : b. Diisseldorf 1858; d. 1898. Gifted with a fine tenor voice and handsome presence he speedily made a reputation in Germany in the leading roles in Wagnerian

opera, and from

1885 onward appeared also in America and England. His performances as Tristan and Siegfried aroused great enthusiasm.

ALVENSLEBEN, al'vens-la'ben, Constan¬ tin Von, German army officer: b. Eichenbarle- ben, Saxony, 26 Aug. 1809 ; d. Berlin, 28 March 1892. He distinguished himself in the campaign against Austria in 1866 and in 1870 as com¬ mander of the 3d army corps he contributed greatly to the success of the German arms be¬ fore Metz by his resolute leading, energy and determination.

ALVERSTONE, Sir Richard Everard Webster, 1st viscount A.; British lord chief justice: b. 22 Dec. J842; d. 15 Dec. 1915. He was educated at King's College, Charterhouse and Trinity College, Cambridge. In 1868 he was called to the bar and became Q. C. 10 years after. He was appointed Attorney-Gen¬ eral in the Conservative government in June 1885. He was elected for Launceston in the following month, and later sat for the Isle of Wight, which he continued to represent until his elevation to the House of Lords. Except under the brief Gladstone administration of

1886 and the Gladstone-Rosebery administra¬ tions of 1892-95, Sir Richard Webster was Attorney-General from 1885 to 1900. In 1893 he represented Great Britain in the Bering Sea arbitration, and five years later he dis¬ charged the same function in the matter of the boundary between British Guiana and Venezuela. In 1900 he succeeded Sir Nathan¬ iel Lindley as master of the rolls, at the same time being raised to the peerage as Baron Al- verstone. In October of the same year he was elevated to the office of lord chief justice upon the death of Lord Russell of Killowen. In 1903 Lord Alverstone presided over the Alaska boundary tribunal, and his decisions favoring American claims, particularly with regard to the mountain boundary, were severely criti¬ cized in Canada, and to a lesser degree in England. He resigned the office of lord chief justice in 1913 and was succeeded by Sir Rufus Isaac (now Lord Reading). He published (Recollections of Bar and Bench) (1914).

ALVEY, Richard Henry, American jurist: b. 1826; d. 14 Sept. 1906. He was admitted to the bar in 1849 ; was a member of the Mary¬ land State Constitutional Convention ; chief judge of the fourth judicial circuit, and a judge of the Maryland Court of Appeals (1867-83) and chief justice (1883-93) ; became chief justice of the Court of Appeals of the District

of Columbia in 1893, and one of the Venezuela boundary commissioners in 1896.

ALVORD, Benjamin, American soldier: b. Rutland, Vt., 8 Aug. 1813; d. 17 Oct. 1884. Received a military education at West Point and after serving in the second Seminole War and in the Mexican War also, was paymaster of the department of Oregon, 1854-62. He was brigadier-general of volunteers, 1862-65, retiring from the service in 1881 with the rank of brigadier-general. He published: cTan- gencies of Circles and of Spheres) (1855) ; and (The Interpretation of Imaginary Roots in Questions of Maxima and Minima) (1860).

ALVORD, Henry Elijah, American sol¬ dier: b. Greenfield, Mass., 11 March 1844; d. 1904. He entered the army in 1862 and had risen to the rank of major in 1865. He was a cavalry captain in the regular army 1866-72, and chief engineer on General Sheridan's staff 1868-69. From 1886 to 1888 he was professor of agriculture in the Massachusetts Agricultural College, and was president of the Maryland Agricultural College 1888-92. He was for many years prominent as an authority on agricul¬ tural questions.

ALWAR, ul'wur, India, town and capital of the Rajput state of same name, situated at the base of a rocky range of quartz and slate, 80 miles south southwest of Delhi. The Rajah's palace is of cubical form and has its walls pierced with numerous small windows and is decorated with rude and glaring paintings ; a pavilion of white marble, built by the late Rao Rajah, near a very deep tank which he had executed, displays no small degree of taste; and there are several Hindu temples in a style imitated from Mohammedan structures. A fort, crowning the lofty mountain which over¬ hangs the town, is highly ornamented and serves the Rajah both as a summer palace and as an asylum in times of danger. Modern buildings include the Lady Dufferin hospital for women, a high school for young noblemen, and Catholic and Presbyterian churches. Pop.

41,500.

ALYTES, a'll -tez, the midwife toad, first discovered by P. Demours in 1741, on the bor¬ der of a small pond in the Jardin des Plantes, in the very act of parturition which has ren¬ dered it famous. Alytcs obstetricans is of spe¬ cial interest as the first known example of

paternal solicitude in Batrachians, and although many no less wonderful cases have since been revealed to us, it remains the only one among European forms.

ALZOG, al'tsog, Johann Baptist, German theologian: b. Ohlan, Silesia, 29 Tune 1808; d. 1 March 1878. He studied at Breslau and Bonn and was ordained priest at Cologne in 1834. He was professor of church history at Posen 1835- 44 and at Freiburg from 1844 until his death. With Dollinger he was instrumental in con¬ voking the famous Munich assembly of Cath¬ olic scholars in 1863. He also took part in the preparatory work of the Vatican council. His fame rests mainly on his (Manual of Univer¬ sal Church History, } which is generally ac¬ cepted as the best exposition of Catholic views.

AMADIS DE GAULA, the most famous romance of chivalry in prose, was printed in

its earliest extant edition at Saragossa in 1508. Its author was Garci Rodriguez or Ordonez de Montalvo, governor of Medina del Campo in Old Castile, whose avowed purpose was to draw from ((the ancient originals,® which have since perished, a story that might inspire Span¬ ish youth with a desire to emulate the noble deeds of knighthood. Montalvo, in expanding what seems to have been a Portuguese model from three books to four, and in adding a fifth, started upon its career the fiction destined to unfold in more continuations than any other known to literary history. It is presumed that the writer of the Portuguese original was Joao de Lobeira, a member of the poetical circle of King Denis of Portugal in the late 13th cen¬ tury. Like others of his coterie, Lobeira was subject to French influence and acquainted with legends of the prowess of the knights of King Arthur and Charlemagne ; but his (Amadis } is distinguished from romances of the Arthurian and Carlovingian cycles by be¬ ing wholly fictitious, founded neither upon tra¬ dition nor upon history. Another Lobeira of the 14th century (Vasco, q.v.) has been credited with the authorship of the Portuguese (Ama- dis, *since its ascription to him by a chronicler of the 15th century. His claim, however, is now no longer accepted by scholars, who at most will concede to him a later manuscript version rumored to have been lost in the Lis¬ bon earthquake. In any case, Wpiadis* achieved its renown, not in the Portuguese of either Lobeira, but in the Spanish of Mon¬ talvo, who probably had Castilian as well as Portuguese versions upon which to draw. If the origin of it is (<the best of all books of this kind that have ever been written.® It is also, according to Prof. F. M. Warren, <(our first modern novel.® The time of the story is ((not long after the Passion of our Lord® ; its scenes are laid in a mythical Great

Britain and an im¬ aginary Firm Island. Gaula signifies Wales; Amadis of Gaul is a prince of Wales born of a secret amour, reared as a knight, and serving devotedly the fair English princess Oriana. For her sake he contends against monsters and en¬ chantments, defends her father's kingdom from an oppressor, and opposes the Roman emperor as rival. He wins a victory over the emperor, whose suit is favored by the lady's father, but, in his hour of triumph, consents to spare the latter, and at last is formally united to Oriana in marriage. High ideals mark the work — pride, honor, valor, love, loyalty to the king, and religion. It contains nothing of the ex¬ travagant code of faith and honor which grew up in the Spanish decadence, and exhibits com¬ paratively little of the absurdity so character¬ istic of its fantastic continuations. Of such continuations the first was Montalvo's <(Fifth Book® entitled (The Deeds of Esplandian,* its hero the son of Amadis and Oriana: Most others followed the fortunes of some one of Esplandian's descendants, professing to be but additional books of the original { Amadis. y That original may be read in Robert Southey's abridgment of its Elizabethan translation by Anthony Munday. The English reader should also consult Prof. F. M. Warren's 4 His¬ tory of the Novel Previous to the Seventeenth

Century* (1894). The best Spanish treatment of (Amadis) is to be found in Marcelino Menendez y Pelayo's (Origenes de la novela)

(1905).

Frank W. Chandler,

Professor of English and Comparative Litera¬ ture, University of Cincinnati.

AMADO DE CONTRERAS, Ramon Ruiz, Spanish clergyman and writer on educa¬ tion : b. Castello d' Ampurias, Catalonia, Spain, 14 Jan. 1861. He received his education at the University of Barcelona; practised law from 1881 to 1884, when he entered the Society of Jesus. He was ordained to the priesthood in 1896 and in the same year was appointed teacher of humanities, Latin and Greek at the Vernela Scholasticate. He spent several years in literary work in the interests of education and in traveling in Germany, England and South America. In these travels he made a special study of the educational systems of Germany, England, Argentina, Uruguay and Chile. In

1906-10 he was associate editor of Racon y Fe, and in 1910 became the founder of the review La Educacion Hispano-Americana. He is one of the founders of the Academia Universitaria Catolica. de Madrid and for a time was professor of higher pedagogy. He has published several works on education, in¬ cluding: (La Educacion moral, *(La Educa¬ cion intelectual,* cLa Education religiosa, *(Historia de la educacion y la Pedagogia,* (Educacion femenina, *(Educacion civica,* (Didactica 6 el Arte de ensenar, *(Compendio de Plistoria de Espana,* (La Iglesia y la lib-ertad de ensenanza, *(La Historia de los Papas,* translated from the German of Lud¬ wig Pastor. He was a contributor to the (Catholic Encyclopedia* and of numerous articles on education to Racon y Fe.

AMADOR, a'ma-dor, Manuel, the 1st

President of the Republic of Panama: b. 1841; d. 1909. He was for many years minister of France in Panama. He was soldier, statesman, scholar and diplomat and was largely instru¬ mental in establishing the new republic of Panama (q.v.) Lie adopted the practice of medicine in early life and became eminent in his profession. He sided with the revolutionist party against Colombia, which achieved the independence of Panama. Elected President of the new republic, 17 Feb. 1904, he was inaugu¬ rated to hold office four years and at the ex¬ piration of his term declined renomination. Since then the principal fortification of the Pacific end of the Panama Canal has been named in his honor, Fort Amador.

AMADOU, am'a-doo, a sof-t leathery sub¬ stance obtained from certain fungi, chiefly Polyporus fomentarius and P. igniarius, which are parasitic upon the trunks of trees. It is prepared chiefly in Germany _ by slicing the fungus and soaking the slices in a solution of saltpeter. It is used for tinder and in surgery as a moxa or styptic. It is also known as Ger¬ man tinder and punk.

AMAL, the name of the noblest family among the Ostrogoths, and that from which nearly all their kings were chosen.

AMALEKITES, an ancient tribe. in the southeast of Palestine, frequently mentioned in the Old Testament as enemies of the Israelites.

The name is celebrated in Arabian tradition, but the statements in regard to them are con¬ flicting and confused and almost worthless from a historical point of view. They appear as a branch of the Edomites (Genesis xxxvi, 12), Amalek being represented as the son of Eliphaz, who was himself the son of Esau by Timina, a Horite woman.

When the Israelites journeyed from Egypt to Canaan the Amale- kites are said to have harassed them and be¬ cause of this hostility it was divinely ordered that their memory should be blotted out (Deut. xxv, 17-19). A victory by them over Israel is mentioned (Num. xix, 45) and a defeat at Raphidin (Ex. xvii, 8-16). The statements, however, are obscure and the situation is fur¬ ther complicated by the account of Joshua's victory over the Amalekites in the Sinaitic peninsula. According to 1 Sam. xv, Saul re¬ ceived a divine command to destroy the tribe because of its enmity to Israel, and David con¬ quered a marauding band of these ancient ene¬ mies of his people. The spirit of hostility is shown also in Balaam's prophecy ((Amalek, first of nations, his latter end (will be) destruction **(Num. xxiv, 20). Even in the Psalms (lxxxiii, 7) Amalek is cited as the traditional enemy of Israel ; later in the Book of Esther Hainan, the arch-enemy of Israel, is termed <(the Aga- gite,** emphasizing his descent from Agag, King of the hated race, and is opposed to Mordecai the Bengamite. Consult Grimme, (Mohammed *(1904); Meyer, Eduard, (Die Israeliten und ihre Nachbarstamme* (1906) ; Noldeke, (Ueber die Amalekiter *(Gottingen 1864), and Schmidt (Afessages of the 'Poets* (1911).

AMALFI, a-mal'fe, Italy, town and archi- episcopal see of Campania, in the province of Salerno. It lies 12 miles southwest from the town of Salerno, at the mouth of a deep ra¬ vine, in the centre of splendid coast scenery, and is in consequence much frequented by tourists. It contains a splendid cathedral of the 11th century and a Capuchin monastery (now used as a hotel) with fine cloisters. In the 9th century it had a considerable trade with the East and was then an independent republic, with a population of some 70,000. In 1343 a large part of the town was destroyed by an in¬ undation and its harbor is now of little import¬ ance. Its industries, too, have declined, and the paper manufacture has lost ground since 1861. Pop. (1911) 6,681.

AMALGAM, an alloy in which mercury is an important constituent. Silver and gold amalgams occur in nature to a limited extent, but most of the amalgams are of artificial origin. Four general methods of forming them may be noted: (1) By direct contact of mer¬ cury with "the metal to be amalgamated. Amal¬ gams of antimony, arsenic, bismuth, cadmium, gold, lead, magnesium, potassium, silver, sodium, tellurium, thorium, tin and zinc may be obtained in this way. The different elements mentioned combine with the mercury with va¬ rying manifestations of affinity, the amalgama¬ tion of sodium being attended with the pro¬ duction of heat and light, while in the case of zinc it is often necessary to bring the zinc and mercury together in the presence of dilute acid before they will combine evenly and smoothly.

(2) By immersing the metal to be amalgamated in a solution of a salt of mercury. Copper,

gold, platinum and silver can be amalgamated in this way. (3) By reversing the process last described and bringing mercury in contact with a salt of the metal whose amalgam is desired. The mercury, in certain cases, will partially re¬ place the metal in solution, the portion so re¬ placed combining with the mercury with the production of the desired amalgam. A val¬ uable modification of this method consists in substituting for the metallic mercury an amal¬ gam of zinc or of sodium, the zinc or sodium changing places with the metal in solution. Amalgams of bismuth, calcium, chromium, iridium, iron, magnesium, manganese, osmium, palladium and strontium may be prepared by the use of sodium amalgam. (4) By electrol¬ ysis, the metal whose amalgam is desired be¬ ing used as the cathode in a solution of a mer¬ curial salt. (The cathode may also be metallic mercury, and the electrolyte a salt of the metal whose amalgam is desired). This process is in commercial use for the production of sodium hydrate, a solution of sodium chloride (com¬ mon salt) being electrolyzed with a mercury cathode. The cathode absorbs the sodium with the formation of sodium amalgam, which is subsequently decomposed, by contact with water. In practice the process is continuous, a part of the mercury cathode being exposed to the electrolytic bath, while another part is si¬ multaneously exposed to the action of the water.

In the formation of amalgams there is usu¬ ally but little thermal effect. In the case of sodium and potassium, however, a very con¬ siderable amount of heat is evolved ; and in the formation of amalgams of bismuth, lead and tin, heat is absorbed.

There is considerable evidence in favor of the view that many amalgams contain definite compounds of mercury and the other con¬ stituent metals. Thus when certain amalgams are heated (say) to the boiling point of sul¬ phur, the excess of mercury present appears to be volatilized, so as to leave a body behind that has a definite chemical composition. In this way Sonza obtained amalgams having the ap¬ parent composition ArnHg, Agi3 Hg, Cu 16 Hg, Na3Hg, and K2Hg, the last-mentioned being silvery in appearance and crystalline in struc¬ ture. But it is said that all these amalgams, as well as many others, continue to lose mercury slowly when the temperature is maintained high; and this fact, while not disproving the existence of a definite

compound of mercury and the metal, lessens its probability. Amal¬ gams having the composition CuHg, AgHg, FeHg, Zn2Hg, Pb2Hg and PtHg2 have also been prepared by expelling the excess of mer¬ cury from amalgams richer in that metal by exposure to a pressure of 70 tons to the square inch. One of the most interesting amalgams from the standpoint of chemical theory is the amalgam of the hypothetical radical <(ammo- nium,® which is described under Ammonia.

The affinity of mercury for gold is put to practical use in mining for the recovery of small particles of gold from auriferous gravel or crushed quartz. The details of the process vary somewThat according to the nature of the material from which the gold is to be ex¬ tracted ; but in general it may be said that the pulverized gold-bearing quartz or gravel is washed, in a finely divided state, over a plate

of amalgamated copper, to which the gold par¬ ticles adhere. From time to time the gold amalgam is scraped from the copper plate and more mercury is added. The presence of sul¬ phur (from pyrites) seriously interferes with this process, by causing the formation of a sulphide of mercury which destroys the effi¬ ciency of the amalgamated plate. The mercury is then said, in miners' parlance, to become ((sick.® To prevent this the ore, if originally rich in pyrites, is roasted to expel the sulphur before being submitted to amalgamation. See Gold.

Mirrors are silvered by amalgams. One of the simplest of those so used is composed of one part of tin to three of mercury. A supe¬ rior amalgam for this purpose contains two parts of bismuth, one part each of lead and tin and four parts of mercury. In dentistry the <(silver filling® used for closing the cavities in teeth is an amalgam. Its composition varies somewhat, but a preparation containing two parts of mercury and one part of pulverized zinc gives excellent results. It hardens quickly and expands slightly in solidifying, thus filling the cavity tightly. Amalgams of copper, silver, lead and tin have a volume smaller than the sum of the volumes of their constituents. See Battery.

AMALTEO, a-mal'ta-o, Pomponio, Italian painter: b. San Vito 1505; d. there 1584. He was a pupil and son-in-law of Pordenone, whose style he closely imitated. His works con¬ sist chiefly of frescoes and altar-pieces and many of them have suffered greatly from the ravages of time.

AMANA, am'a-na, Iowa, town in Iowa County, 28 Miles west of Iowa City, the site of a German communistic religious colony founded in 1885. It includes the seven villages of Amana, the oldest and largest;

East Amana; Middle Amana; High Amana; West Amana; South Amana and Homestead. The society is governed by a president and a board of 13 directors, and each village is controlled by seven or more elders appointed by the board of direc¬ tors. Family life is kept up, but in every vil¬ lage are from four to 16 ˆkitchen-houses® where meals are prepared and served. The community owns and operates woolen, flour and saw mills, dye shops, machine shops and other industrial establishments, and agriculture is ex¬ tensively followed. The inhabitants dress plainly and in sober colors. The community is primarily a religious organization, and the sect itself dates its founding from Eberhard Gruber, in Wurtemberg, in 1714. By its members it is known as ((The Community of True Inspira¬ tion.® The total value of their property com¬ prising 26,000 acres of land is valued at $1,800,000. Pop. 1,729.

AMANITA, a genus of fungi related to the genus Agaricus, to which the common mush¬ room belongs, and for which two of its poison¬ ous members (see below) are sometimes mis¬ takenly eaten. A. muse aria, the fly mushroom, so called from its use as a decoction in milk for killing flies, is commonest in the birch, beech and pine woods of Europe and America. It has a variously colored cap — white, yellow, orange, red, etc. — usually warted above and sometimes four or more inches in diameter; white or occasionally yellow gills, and a long

white stem with bulbous base. Though univer¬ sally considered poisonous it is said to be used by certain Old World peoples to produce a kind of intoxication. A. phalloides , death-cup, deadly agaric, deadly amanita, is commonly found in woods, especially in damp weather, from early summer until mid-autumn. It is usually white, sometimes light yellow or gray¬ ish ; its cap is seldom as large as four inches in diameter ; its gills white ; its stem hollow and slender above, solid and bulbous at the base, which is surrounded by a cup which has sug¬ gested one of its common names. With reason¬ able caution on the part of the collector none of these species should be mistaken for the common mushroom, because all three grow singly in woods and have white gills and white spores ; whereas the mushroom grows in clumps in pastures and upon lawns, occasionally in grassy open woods. Its gills are pink in young specimens and darker in old ones ; its spores dark-colored, and it has no cup at the base of the stem.

AMANITIN, a strongly basic ptomaine (or perhaps leucomaine) occurring in the poisonous fungus Amanita muscaria (Agaricus muscarius) , or fly agaric. Amanitin is not poison¬ ous, but is converted by oxidation into mus- carin (q.v.), to which the deadly effects of the fly agaric are due. Amanitin is believed to be identical with cholin, neurin and sincalin. See Neurine.

AMANUENSIS, a Latin word, derived from the phrase servus a mann, slave of the hand, a secretary, one who writes, from dicta¬ tion or otherwise, on behalf of another.

AMAPALA, a-ma'pa-la, Honduras, a sea¬ port on the north shore of the island of Tigre, in the bay of Fonseca. It has an excellent harbor and carries on an important exporting trade in silver, coffee, indigo, timber, hides and fish. It was founded in 1838. Pop. 4,000.

AMARA. See Kut-el-Amara.

AMARA SIN'HA, Sanskrit grammarian: lived about 375 a.d. Of his personal history hardly anything is known. Amara seems to have been a Buddhist ; and a tradition asserts that his works, with one exception, were de¬ stroyed during the persecution by the Orthodox Brahmins in the 5th century. The exception is the celebrated (Amara-Kosha) (Treasury of Amara), a vocabulary of Sanskrit roots, in three books, and hence sometimes called (Tri- kanda) or the tripartite. J It contains 10,000 words, and is arranged, like other works of its class, in metre, to aid the memory. An edition of the entire work, with English notes and index, appeared in 1808. The Sanskrit text was printed at Calcutta in 1831.

AMARANTHUS, the typical genus of herbaceous plants of the family Amaranthaceco. This family consists of apetalous plants chiefly inhabiting tropical countries, and remarkable for the white or reddish scales of which their flowers are composed. In some species the flowers preserve their appearance after they are plucked and dried, and on this account poets make the plant an emblem of immortality. The name is from the. Greek, meaning ((not withering,® and was originally Amarantus. The family contains about 500 species, some of which, as love-lies-bleeding, prince’s feather

and cockscomb are common garden plants. In the wild state they are mostly troublesome and unsightly weeds, of which the tumbleweed and pigweed are well-known American examples. Some of the foreign plants are cultivated as pot herbs, and others for their medicinal prop¬ erties. Their chief commercial value is as decorative plants, for

which purpose immense quantities are used in the southern parts of Europe, where they are employed to ornament the churches when fresh-grown blooms are not procurable. The seeds of some species were formerly used by the American Indians for food.

AMARAPURA, um'a-ra-poo'ra, Burma, formerly the capital of the Burmese kingdom, now a suburb of Mandalay. The town was founded in 1783, increased rapidly in size and population, and in 1810 was estimated to con¬ tain 170,000 inhabitants. In that year it was destroyed by fire, and this disaster caused a decline in the prosperity of the place. It was finally abandoned as a capital in 1860. The remains of the former palace of the Burmese monarchs still survive. It has a station on the Rangoon-Mandalay Railway. Pop. about 10,000.

AMARI, a-ma're, Michele, Italian oriental¬ ist and patriot: b. Palermo 1806; d. Florence 1889. He imbibed liberal principles at an early age, and was an active sympathizer in the vari¬ ous revolutions in Sicily. He came under the suspicion of the authorities and escaped to Paris, where he took an interest in Arabic studies. His translations and editions of Orien¬ tal texts, as well as his historical essays, made him a reputation. In 1844 he began his great work, (La Storia dei Musulmani in Sicilia,) but the revolution of 1848 plunged him into politics once more. On the expulsion of the Bourbons from Sicily he held various public offices. He soon after returned to Paris and resumed his Arabic studies. In 1859 he was appointed pro¬ fessor of Arabic at Pisa and afterward at Florence. He was the pioneer of Arabic studies in modern Italy, and he still remains the stand¬ ard authority on the Mussulman domination of Sicily.

AMARILLO, Tex., city in Potter County, on the Atchison, Topeka and Santa Fe, the Chicago, Rock Island and Gulf, the Fort Worth and Denver City, the Pecos and Northern Texas and the Southern Kansas and Texas railroads ; 32 miles southwest of Panhandle. The city' is the centre of a flourishing agricul¬ tural and stock-raising section, and has made a rapid growth. Its manufactures are con¬ ducted by 36 establishments (U. S. census 1914) employing 429 persons, of whom 311 were wage earners receiving $255,000 in wages. The capi¬ tal engaged was $1,094,000, and the total out¬ put was valued at $986,000; of this, $477,000 was the value added by manufacture. Pop.

(1900), 1,440; (1910), 9,957; (1920) 15,494.

AMARNA LETTERS a collection of sev¬ eral hundred cuneiform clay tablets discovered in 1887 at Tel-el-Amarna, a village on the Nile in

middle Egypt, on the site, of a city built by Amenophis IV. They comprise the correspond¬ ence of the Egyptian court about 1400 b.c., and with but three exceptions are in the Babylonian language. Some of them were written by Amenophis III and Amenophis IV and other royal personages contemporary with these, but

the majority are by Egyptian officials and allies in Syria. Their discovery has thrown much light not only on the history of Egypt itself, but upon the condition of the Holy Land prior to the Hebrew invasion. An English transla¬ tion of the letters, by Metcalfe, with the title cThe Tel-el-Amarna Letters, > appeared in 1896.

AM'ARYL'LIDA'CE-ZE, a family of mono- cotyledonous plants, generally bulbous, some¬ times fibrous-rooted. Their characteristics are a highly-colored flower, six stamens and an inferior three-celled ovary. They are natives chiefly of Africa; but species are found in the warmer parts of Europe, in America and trop¬ ical Asia, and a few in Australia. To this family belong the snowdrop, the snowflake, the daffodil, the belladonna-lily, the so-called Guernsey lily (probably a native of Japan), the Brunsvigias, the bloodflowers (Hcemanthus) of the cape of Good Hope, different species of Narcissus, Amaryllis, Galanthus, Crinum, Agave, Atamasco lily, star-grass, spider lily, etc. The agave and sisal (q.v.) are of consid¬ erable commercial value, but the family as a whole is chiefly ornamental.

AMARYLLIS, a genus of bulbous plants of the family Amaryllidaccce. The principal species is A. belladonna, the Belladonna lily, of southern Africa, much cultivated for its hand¬ some reddish flowers. The name Amaryllis, however, is most commonly applied by gar¬ deners to species of the nearly related genus Hippeastrum. This consists of 60 or 70 species, natives of tropical America. Many of them are widely cultivated as pot plants because of their large and showy flowers which range in color from white to deep red. This group of plants has been greatly improved, particularly in the size and color of the flowers, by hybridization.

AMARYLLIS, the name of a shepherdess in the Theocritean (Idyls) and the Virgilian (Eclogues y ; also of a character in Spenser’s (Colin Clout’s Come Home Again) ; of the shepherdess in love with Perigot, in Fletcher’s pastoral (The Faithful Shepherdess) ; and of a character in Buckingham’s comedy (The Re¬ hearsal.)

AMASA (more correctly AMMISHAI), the nephew of David, King of Israel. He was commander-in-chief of Absalom's rebel army, and after its defeat received from David a promise of the same post in his own army in place of Joab. On the renewal of the revolt under Sheba, Amasa was assigned the task of collecting the men of Judah; as he did not appear- when due (perhaps knowing too much about the disturbance), Abishai was sent in his place, and Joab's company took part without commission. Amasa met them at Gibeon, and under pretense of a salute Joab stabbed his cousin and rival (2 Sam. xx, 9).

AMASIA, a-ma-se-a, Asiatic Turkey, a city in the province of Anatolia, 335 miles east of Constantinople, famed as the ancient capital of Pontus and as the birthplace of the historian Strabo. Picturesquely situated in a deep valley, it is built almost entirely of stone and contains a massive citadel and a notably fine mosque. Silk is made here, and salt, wine, wheat and cotton are also exported. Pop. about 30,000.

AMASIS I, Egyptian king, the first mon¬ arch of the 18th dynasty. His rule lasted for some 20 years following 1600 b.c. He expelled the Shepherd Kings from Egypt and laid Pales¬ tine and Phoenicia under tribute.

AMASIS II, Egyptian king: b. 570; d. 526 b.c. He cultivated friendly relations with the Greeks, and established Greek commerce at Naucratis. Pythagoras and Solon are said to have visited him. He greatly enriched Mem¬ phis.

AMATEUR. Up to the middle of the 19th century this now ever-recurring word was used exclusively to define those who for the love of the arts, and not for the profit to be derived from the exercise of them, painted, or engraved, or sang. In such of the recreations and sports as were then in vogue and which some men engaged in for pleasure and others for pay, the phrase used to distinguish the two classes varied. If a man of means rode a horse in a race or a steeplechase for the pure love of equestrianism, while others rode for fees, the one was called a <(gentleman rider,® and the rest were <(jockeys.® So again in cricket, those who participated in matches were designated by two titles : ˆgentlemen,® denot¬ ing those who participated con amove, and <(players,® those who played for pay. It was always easy to recognize one from the other, for in the list of published names one class was always designated ((Mi\,® as ,((Mr. Somer¬ ville,® while the ((players® would lack that pre¬ fix and appear as <(Thomas Sadler.®

Golf of that period was more democratic; neither the word amateur nor any other dis- tinguishment had appeared ; cobbler and prince played together, and for stakes too, without a thought of one or the other losing caste. James II, King of England, while still Duke of York, chose an Edinburgh shoemaker as his golfing partner to play two Scotch peers for a goodly stake of money which he and the cob¬ bler won. The Prince did the honorable thing by giving up his half of the stake to the shoe¬ maker, with which and his own share the latter bought a house in the Cripplegate of the city.

The ancient exemption of golf from the dis¬ tinction between amateur and professional per¬ sists even to this day; according to the rules formulated by the United States Golf Associa¬ tion, amateurs may play in contests against pro¬ fessionals, even for a prize, provided only the prize is not cash.

Football at that period was largely in abey¬ ance, except among schoolboys, and the need of definitions had not arisen.

The word amateur in sports first appears in connection with rowing. Up to the year 1835 such rowing contests as had taken place had been on the one hand confined to watermen, who at that time had to serve apprenticeships and could not ply their trade without; and on the other hand to inter-collegiate and inter¬ university crews. Neither class needed defini¬ tions. But at that time an open regatta was organized at Henley, in which it would have been manifestlv unjust to allow watermen and others who had had a lifetime's experience and of hardened training to enter and compete against those for whom the regatta was really intended, that is, those who loved aquatic sport for its own sake and followed it only as a

recreation at seasonable times. Hence rules were formulated and have ever since been in operation which distinguished the professional from the amateur and precluded the possibility of the one contesting against the other. So strong is this feeling still in rowing at Henley that in 1902 a further restriction was made against the entry of any crew that had within a month from its entry been trained by a pro¬ fessional.

When track athletics, about 1850, first crys¬ tallized by the impulse given it by colleges and clubs, similar conditions existed. The only

representative of this form of recreation at that time was the old and hardened trotter- around-the-track, sometimes for the gate money derived from it, sometimes for the benefit of the betting men. Ostensibly it would have been unfair to handicap young collegians by permitting their intermingling, even if for eth¬ ical reasons it had not been desirable. Rules were here again formulated which had the ef¬ fect of barring the professional and defining the amateur. The rule of the Amateur Ath¬ letic Association of Great Britain may be quoted as expressing the then prevalent feeling :

“ An amateur is one who has never competed for a money prize or staked bet, or with or against a professional for any prize, or who has never taught, pursued or assisted in the practice of athletic exercises as a means of earning a livelihood.”

Football added another temptation on ac¬ count of its possibilities in city centres of at¬ tracting large numbers and much gate money. Here, too, the barrier was raised, in both the association and the Rugby games, along lines which America has followed. But the United States authorities in all recreations have gone a great deal farther in the strictness of their definition of the word amateur, and in safe¬ guarding against persons who receive any por¬ tion of their traveling or hotel expenses : a notable example of this occurred in 1902, when the National Golf Association precluded from the amateur ranks any player who participated in the generosity of railroad companies or hotel proprietors.

A more recent illustration of this tendency in the world of American athletics was the case of James Thorpe, the Indian student from Carlisle, who won the all-round championship in the international Olympic Games at Stock¬ holm in 1912. Some months later a statement was published in some obscure paper that the young Indian had been a paid member of a baseball team in North Carolina some two or three years previously. Thorpe frankly ad¬ mitted ” this to be the truth, whereupon the American Olympic Committee and the Amateur Athletic Union repudiated Thorpe as an Amer¬ ican amateur athlete, contending that he had no right to the honors he had won. Thorpe re¬ turned his trophies and has since become a pro¬ fessional baseball player.

It would seem an easy thing, from the fore¬ going facts, to be able to formulate a phrase which should generically and yet accurately de¬ scribe an amateur, but it is not, as the story of the endless definitions adopted and aban¬ doned, or amended, though made by experts, attests.

The spirit is the old spirit ((for the love of the art or game and not for personal gain” ;

even if a present literal definition were at¬ tempted, it might be rendered obsolete by new legislation in a short time. Those who are purposing to enter any particular recreative contest in which the status of the amateur is material must consult the last rules of the or¬ ganization governing it.

AMATEUR THEATRICALS. Amateur theatricals have had a long and distinguished history. In the beginnings of art, in the primi¬ tive history of humanity, all artists were neces¬ sarily amateurs. The renowned tragedians and comedians of Athens were amateurs. Ama¬ teurs created the mystery and morality plays of mediaeval times and ushered in the modern theatre of Shakespeare and Moliere, Racine and Calderon. The marvelously popular Roman farces, the Atellanae, which augmented the theatre with types that exist to this day, came from the country players of Atella (see Atellanas). Recent researches suggest that amateurs founded the famous Commedia Dell’ Arte of Italy (see Harlequinade). In late years amateurs, true to their lineage, labored to bring forth the Theatre Libre of Paris, the Irish Literary Theatre of Dublin, the Art Theatre of Moscow, and many others in Eu¬ rope similar to these world-approved experi¬ ments. In New York a group of young artists called the Washington Square Players, with little or no professional experience, have per¬ formed with noteworthy success a number of excellent one-act plays that would most prob¬ ably have remained outside the commercial theatres. Maeterlinck, Tchekoff and Bracco were among their authors ; but the two most pronounced successes were bv local writers. These facts present but surface evidence of the stir going on in and around the theatres all the world over; and often enough, in places that never before had known of a theatre. A new age, quite unparalleled in history, has be¬ gun for amateur theatricals. Never before have so many sides of the art received equal attention and sustained so many possibilities ; never before have so many accomplished vir¬ tuosi in every country in the world concerned themselves with the theory and practice of the theatre. The actor for the moment has been displaced from his old strategic position, and the regisseur, with all the reins of all the arts in hand, wields the sway. Books on the drama and the theatre are issued by the million. Lit¬ erary and debating societies find in the drama the dominant topic. Drama clubs flourish evenwvhere. The Drama League of America has given a powerful impetus to thousands of these clubs and societies. This organization,

with headquarters in Chicago and New York, and with producing or non-producing centres in nearly every State, and in Toronto and Ot¬ tawa, makes the publication and distribution of dramatic material of all kinds (plays, bul¬ letins of current plays, sectional play lists, book lists, a quarterly Review, a monthly bulletin, etc.), the maintenance of inquiry bureaus and the booking of lecture courses, the chief means for educating the public. The institution is unique in history, and is the literary centre of the major part of amateur dramatic per¬ formance and discussion in the United States.

It would seem that to-day even the most conservative bodies, hitherto strongly opposed to it from various standpoints, have undergone

a complete change of front with regard to the theatre. In the energetic realization by so many educationists of the breadth and depth of the dramatic instinct, and of ways and means of profitably utilizing this love of play¬ making and play-going, both within the school and beyond, we see other signs of the renais¬ sance of amateur dramatics. The colleges and universities have awakened to the need of en¬ couraging a broader theatre than the higher institutes of learning have yet known (see College Dramatics). In many elementary schools in Europe and the United States, his¬ tory, geography and language are being taught through the dramatic method ; and in nearly all schools it is becoming the custom to early in¬ stil a feeling for literature and the higher morality by the aid of selected drama. Pro¬ ducing societies — some of them bringing pro¬ nounced individuality to the work, with the shrewdest skill and artistic wit — have sprung up everywhere. And, despite the almost in¬ evitable crudeness in some directions, and not a little audacity, valuable contributions are be¬ ing made to the future of the professional theatre. Artists of many phases outside the direct lines of the theatre are practising the technique of the theatre as an adjunct to their own, and as an impetus to development. Social, civic and rural officials are doing likewise. The Neighborhood Theatre of Grand Street on the east side of New York city, founded and financed by the Misses Lewisohn, introduced mechanical features new to the American stage, and has struck an individual note. The Provincetown Players, founded by writers and printers of Washington Square district of New York, have been accorded highest praise by professional critics in reviews of the sea¬ son's work. The Hull House Players, under the enthusiasm of Miss Addams, prompt to note the power that lay in the cultivation of the

dramatic instinct, received much attention from the whole continent, widened the scope of the Settlement, and were recently enabled to take a trip to Europe on the proceeds of spe¬ cial performances. The Little Theatre of Chi¬ cago, sustained by a wealthy social set, and famous for its simple staging; Mrs. Gale's Toy Theatre of Boston (which introduced a scenic artist of rare gift to the professional stage) ; the Forest Lake Players under Mr. and Mrs. Aldis; the Wisconsin Players (who have given a season in New York) ; the Carnegie School of Applied Design in Pittsburgh, directed by Prof. T. Ward Stevens (himself an artist and dramat¬ ist), the experimental theatres of Phila¬ delphia and Milwaukee, have all been distin¬ guished by the striking taste and originality of their productions. ((The Bohemian Jinks® of the Bohemian Club of San Francisco (some¬ what more serious performances than the title would imply), played among the redwood pines, have slowly evolved since the seventies, and are characteristic of open-air experiments conducted by men of distinguished parts to whom the theatre is an avocation. The com¬ munity theatres, including festivals and page¬ ants, rural theatres and children's theatres, are all signs of the times and are treated at length under special headings.

Not the least important side to amateur acting is the opportunity it gives the aspirant

for receiving the basis of his art education. It also enables him to try his wings preparatory to undergoing the severer discipline of the pro¬ fessional stage, under directors with firm pre¬ conceptions in regard to parts. And the actor is jealous of his individuality. It is the glory of the actor, both professional and amateur, that he is the medium for re-creating, in the most vivid and popular art form, the spirit of all literature as expressed by dramatists dur¬ ing all ages. And it is his fortune, that in the space of a few years, since the beginning of the 19th century, the market has become stocked with a choice of excellent plays of all kinds, excepting the poetic.

The labors of the actor are in themselves a liberal education. First, _ the pursuit of such graces as elocution, gesticulation, deportment, music, dancing, fencing, with the best possible teachers; then practice, practice and again practice. Given earnestness, the capacity for taking pains, the student will not be discour¬ aged if nature has not endowed him with all the gifts for all the arts within the art. No artist ever lived who possessed all the advan¬ tages appointed to fit out the youthful paragon who abides in most handbooks to amateur theatricals — and nowhere else. For those who live in the big cities, schools like Madame Al¬ berti's, the American Academy of Dramatic Art, in New

York, and institutions of the credit of the School of Expression, Cincinnati, offer sound training in technique. But the young actor, warding off the danger of becom¬ ing merely mechanical that haunts every artist, must break away from all teachers and familiar counsellors to experiment with all manner of parts — preferably before the responsive audi¬ ences to be met in social and recreative cen¬ tres. Then, as a necessity of his existence, he should cultivate the observation of the world around for all that is characteristic. A knowl¬ edge of physiognomy will be of incalculable help in the study of human character; and no better beginning could be made in this direction than with one of the works of Dr. Katharine Black¬ ford, the industrial employment adviser, co¬ author of (The Man, the Job, the Boss. *The works of Lavater, illustrated with excellent line drawings for make-up; Darwin's Expres¬ sion of the Emotions in Man and Animals, > and Mantegazza's (Physiognomy and Expres¬ sion, 5 all advance this study. George Henry Lewes' (On Actors and the Art of Acting, * and the monographs by Denis Diderot, the great encyclopedist, and by Talma, the tragedian, are the profoundest of all the many works on the psychology of acting. The reprints of various papers written by famous actors and published by the Columbia University Dramatic Museum are interesting and instructive material. For views of the methods employed in training the students of the Paris Conservatoire consult J. R. Solly's (Acting and the Art of Speech at the Paris Conservatoire) (London 1891), and Austin Fryer's (Guide to the Stage* (Lon¬ don 1905). It should be remembered that the actor is at one and the same time the composer of a musical score (that has no notation) and its interpreter, as well as a living, moving sculp¬ tor, fitting into a kaleidoscopic group of other such sculptors and musicians — trumpeters of literature, be it good or bad. Only by a regard for these facts can histrionic development pro-

ceed. For literary aids to technical excellence, and for notes on all property and other re¬ quirements, the selected bibliography below should be closely read. But the student of theatre art cannot too clearly become ac¬ quainted with the fact that the intricacies and niceties (of <(making-up" for example) can never be acquired from any book.

Plays for Amateurs. — ((The Agency for Unpublished Plays,® Concord avenue, Cam¬ bridge, Mass., has many new American plays in MS. ; Baker, W. H., & Co., Boston, Mass., circulate lists of plays of all publishers, many of these plays being royalty-free; Browne, H. B., (

Short Plays from Dickens, for the use of amateur and school dramatic societies> (London 1908) ; Clapp, J. M., Elays for Ama¬ teurs } (Chicago 1915. A Drama League pub¬ lication contains detailed descriptions of 197 plays ; all but 59 being one-act. The notes on choosing a play and the hints on production are excellent) ; Denison, T. S., (Descriptive Catalogue of Amateur and Standard Plays) (Chicago) ; Dick, John, (List of 1,000 Stand¬ ard Plays) (Reynold's Newspaper Company, London. Valuable for a choice of royalty- free plays. Includes adaptations of the novels of Dickens, Scott, Charles Reade, Hugo and many other standard novelists, though it may be necessary to readapt much of the old- fashioned dialogue. All at two cents each) ; Dickinson, T. H., (Chief Contemporary Dra- matists) (New York 1915, 21 complete plays in one volume) ; Dramatic Index (Boston; inval¬ uable though not yet well known, published quarterly from 1909) ; Dutton's (Everyman Li¬ brary' includes many volumes of translations of foreign plays, royalty-free (New York) ; Filippi, Rosina, (Sixpenny Series of Adapta¬ tions of the Novels of Jane Austin' (London 1901, by the famous London actress and ama¬ teur coach) ; French, Samuel, (The World's Best Plays) (New York 1916, edited by Mr. Barrett H. Clark of the Drama League, with notes and suggestions for staging; about 50 titles, many new) ; (Guide and Index to Plays for Amateurs' (New York) ; McFadden, E. A., and Davis, L. E., (A Selected List of Plays for Amateurs' (350 titles, with descriptive details, appendices of outdoor plays and of Old Eng¬ lish and standard plays, Cincinnati 1908) ; Matthews, Brander, (The Chief European Dramatists) (21 plays from the drama of

Greece, Rome, Spain, France, Italy, Germany, Denmark and Norway, from 500 b.c. to 1879 a.d. ; selected and edited with notes, biographies and bibliographies, Boston 1916) ; Moses, M. J., (A Collection of American Plays) (New York 1916, one of the latest volumes in the Every¬ man Library) series) ; (Sixpenny Carpet Plays' (London, edited by Lucian Oldershaw,. some¬ time secretary of the Oxford University Dramatic Society) ; Pierce, J. A., (The Master¬ pieces of Modern Drama ; English, American and Foreign: abridged in narrative, with a critical essay by Prof. Brander Matthews ' (2 vols., New York 1916) ; (Washington Square Plays' (New York 1916) ; Short plays and monologues for amateurs (a bibliography; Carnegie Library Monthly Bulletin, Pittsburgh 1908) ; (Actable One-Act Plays' (by the offi¬ cials of the Chicago Public Library, March 1916) ; Elays of Thirteen Countries' (by the officials of the New York Public Library, 1915.

These two lists are more literary than dramatic in their bias). The play brokers publish lists of the latest plays; consult the (Ncw York

Dramatic Mirror Date Book' and the Drama League Elays for Amateurs' for a list of play brokers. Translations of the best foreign plays are to be found in the important drama¬ tic reviews, The Drama Quarterly, The Dramatist and Poet Lore.

Copyright. — The copyright laws of the United States are somewhat stricter and nar¬ rower than similar laws in Europe ; for no per¬ formance of a copyright play may be given without permission, even where the perform¬ ances are free to the public. It should be ob¬ served that until we have a uniform copyright law all British plays may be publicly performed without a permit, even in the United Kingdom, if there be no charge for public admission. Needless to say, if any British play be duly copyrighted in the United States, the domestic law applies. The title page, or the page that immediately follows, will have one of the three necessary imprints of copyright if the work be copyrighted in form. Should there be any doubt in regard to registration, reference may be made to the catalogue of all such copyrighted works on file at the public libraries ; or, the question may be directly put to the Register of Copyrights, Washington, D. C., who will gladly extend the required information. Any in¬ fringement of copyright by performers may lead to damages.

Bibliography. — Angus, J. K., (Amateur

Acting) (London 1913) ; (Amateur's Hand¬ book : A Guide to Home Theatricals' (New York 1910) ; Auvergne, Jean d', (The Moscow Art Theatre' (in Fortnightly Revieiv, London 1914) ; (The Art of Making-up, as taught with other things at the American Academy of Dramatic Art' (in Werne/s Magazine, New York 1899) ; Beegle, M. P., and Crawford, J., (Community Drama and Pageantry' (New Haven 1916. Contains the best selected lists of advanced literature on every branch of the theatrical art) ; Browne, Van Dyke, (Secrets of Scene-painting and Stage Effects' (New York; old-fashioned; useful still; illustrated with diagrams). Gordon Craig's (On the Art of the Theatre' and (Towards a New Theatre,' will act as good foils to the above. So also will two recent American volumes (The Theatre of To-day,' by H. K. Moder- well (New York 1914), and (The New Move¬ ment in the Theatre,' by Sheldon Cheney (New York 1915). (The Stage Year Book' pub¬ lished each January in London is excellent. Consult all the numbers from 1908. Bullivant, C. H.,' (The Drawing Room Entertainer' (Lon¬ don 1904) ; Campbell, H., (Voice, Speech and Gesture' (London 1904) ; Diderot, Denis, (De la poesie dramatique' (in CEavres completes, edited by J. Assizat, Vol. VII) ; Filippi, Rosina, (Hints to Speakers and Players' (London 1911; unconventional; very useful and inspir¬ ing) ; Fitzgerald, Percy, (The Art of Acting' (London 1892;

standard work) ; Gregory, Lady Augusta, (Our Irish Theatre' (New York 1913) ; Hornblow, A., draining for the Stage' (New York 1916) ; Howard, H. H., (The Toy Theatre of Boston' (in The Drama Quarterly, Chicago 1914) ; (How I Make Up,' by a well-known actor (in Royal Magazine, Vol. V, London 1901) ; Hunt, E. R.

(The Play of To-Day y (New York 1913) ; Mackay, Constance D'Arcy, Costume and Scenery for Amateurs ; a practical working handbook *(New York 1915' best work of the kind for amateurs ; contains numerous costume, scene and property plates, drawn conventionally as a basis for experimentation, with directions for procuring and making all requirements, in accord with the new stage art) ; Mackaye, Percy, (The Playhouse and the Play* (New York 1909) ; Morton, Cavendish, (The Art of Theatrical Make-up *(London ; the one book on the subject of any art value; splendidly illustrated) ; Neil, C. L., (Amateur Theatrical (London 1904) ; Taylor, Emerson, ˆPractical Stage Directions for Amateurs) (New York 1916 conventional compilation) ; Thalasso, A., (Le Theatre Libre, 1887-96* (Paris 1906) ; Young, James, (Making-up* (New York 1905). Periodicals. — The Drama Quarterly (Chicago) ; The Dramatic Index (Boston) ; The Dramatic Mirror (New York) ; The Dramatist (Easton, Pa.) ; Poet Lore (Boston). See Community Theatres; Children's Theatres; College Dramatics; Costume; Drama; Scene-Paint¬ ing; Stage and Theatre.

Duncan MacDougall.

AMATI, a-ma'te, an Italian family of Cre¬ mona, celebrated for their skill in making violins. Andrea Amati (b. about 1520; d. 1570) was the earliest member to follow the art, but few of his instruments remain. His younger brother, Nicola, made basses. Andrea's sons, Antonio (b. about 1555) and Geronimo (b. 1556; d. 1630), worked after their father's manner, but Geronimo's son Nicolo (b. 3 Dec. 1596; d. 12 Aug. 1684) excelled all others of his family, and in his hands the art of the Cre- monese school reached its perfection. His most famous pupils were Antonio Stradivarius and Guarnari. The line ended with his son Geronimo, whose violins were of inferior quality.

AMATITLAN, a-ma'te-tlan, or SAN JUAN DE AMATITLAN, a Central Amer¬ ican town in the republic of Guatemala, 12 miles southwest of Guatemala City. In its vicinity are found hot springs and salt and alum wells. It stands on the shores of Lake Amatitlan, and the department of

which it is the capital bears the same name. The chief industries of the people of this region are the gathering of cochineal, the preparation of salt and raw silk and the cultivation of fruits. The town was severely damaged by earthquakes in 1902. Its population is given as 12.000. The entire department has about 38,000 inhabitants. See Guatemala.

AM'AURO'SIS, a disease of the retina or its nervous connections, resulting in partial or complete blindness. It usually begins with con¬ fused vision ; there may then be the appearance of a black spot in the centre of an object looked at, and graded dimness of sight develops. See Amblyopia.

AMAURY I, a'mo're, King of Jerusalem: b. 1135; d. 11 July 1173. He was the son of Baldwin II, and reigned from 1168 to 1173, in succession to his brother, Baldwin III.

AMAURY II, sometimes known as AMAU¬ RY DE LUSIGNAN, titular King of Jerusa¬ lem : b. 1144; d. Acre 1205. He was King of

Cyprus 1194-1205, succeeding his better known brother, Guy de Lusignan.

AMAXICHI, a'maks-e'ke, or LEVKAS, Greek town, the capital of Santa Maura, or Leucadia, one of the Ionian Islands. A Greek archbishop resides here. It is on the east coast of the island and possesses a small harbor. Pop. 6,000.

AMAZI'AH, King of Judah about 797-779

b.c. ; son of Joash. He punished his father's murderers and reconquered the Edomites ; but according to 2 Kings xiv was so puffed up by his victory over these Bedouin that he chal¬ lenged Joash, King of Israel, an incomparably more powerful, civilized foe, to a war. Joash retorted with stinging contempt, wishing to avoid the contest, but Amaziah insisted, and Joash routed his army and captured him, stormed and sacked Jerusalem, destroyed a part of the wall, and carried away to his capital of Samaria hostages, and a large amount of spoil, including gold and silver treasure and temple utensils. Amaziah, after his release and 15 years further of reign, was killed by con¬ spirators at Lachish (2 Kings xiv, 19).

AMAZON, the chief river of South Amer¬ ica and the greatest in all the world. Its source is found in the Peruvian Andes, its headwaters, the Marahon and Ucayale rivers, uniting in about long. 74° W. From long. 70° its course is wholly in Brazil, and its entire course from the source of the Ucayle to its mouth is about 3,400 miles, its width

increasing from over a mile at the Peruvian frontier to 150 miles. The Amazon receives the waters of about 200 tributaries, 100 of which are navi¬ gable, and 17 of them 1,000 to 2,300 miles in length. From the north it receives the San¬ tiago, Morona, Pastaza, Tigre, Napo, Putu¬ mayo, Japura, Rio Negro (a branch of which, the Cassiquiare, strangely enough connects it with the Orinoco), Uatama, Trombetas, etc.; from the south the Pluallaga, Ucayale, Yavari, Jutahy, Jurua, Teffe, Coary, Purus, Madeira, Tapajos, Xingu, etc. The depth varies much. From the sea to the mouth of the Rio Negro, about 750 miles in a straight line, the depth is nowhere less than 30 fathoms ; higher up it varies from 10 to 12, and up to the junction of the Ucayale there is depth sufficient for large vessels. The rapidity of the stream is considerable, especially during the rainy season (January to June), when it is subject to great floods. It is on the average two and three-fourths miles per hour. In some places it is four, or even more, and in others as low as one mile. The river is perceptibly affected by the tides up as far as the town of Obidos, 400 miles from its mouth. The phenomenon of the bore , or as it is called on the Amazon the pororoca, occurs at the mouth of the river at spring tides on a grand scale. The waters of the ocean rush into the river in the form of huge waves 10 to 15 feet in perpendicular height, three or four of which follow each other with irresistible force. The waters of the Amazon swarm with alligators, turtles and a great variety of fish, of which Agassiz in 1866- 67 discovered 1,163 species. The country through which it flows is covered with im¬ mense and impenetrable forests, and in regions at a distance from the larger water-courses the scarcity of mammalia bears silent testimony to

the triumph of vegetation and the subordina¬ tion of the animal kingdom. The area drained by the Amazon and its tributaries is estimated at 2,600,000 square miles. This region produces an immense variety of vegetable substances, in¬ cluding a great many drugs, dyewoods and valuable timber trees. The products it might be made to yield by cultivation are almost in¬ numerable, among the chief being cotton, sugar, indigo, coffee, cocoa and tobacco. The Ama¬ zonian water system affords some 16,000 miles of river suitable for navigation. Steamers be¬ gan to ply on the river in 1853, but years passed before its navigation was opened up to all nations. Para is the chief seat of the trade on the river, and Manaos, situated about 1,000 miles up, is also a place of commercial im¬ portance. About 40 river, coasting, and ocean steamers now ply regularly between Para and

Manaos every month, a number of them being British.

Mr. Lange (see Bibliography) describes the pororoca, saying that in certain places (<the wave travels fast, — it has traveled a measured statute mile in 90 seconds, or at the rate of about 45 miles an hour.® Ex-President Roosevelt (see Bibliography) , describing <(the mightiest river in the world, the Amazon,® says : ((It runs from west to east, from the

sunset to the sunrise, from the Andes to the

Atlantic. The main stream flows almost along the equator. This gigantic equatorial river basin is filled with an immense forest, the largest in the world, with which no other

forests can be compared save those of Western Africa and Malaysia. We were within the

southern boundary of this great equatorial forest, on a river which was not merely un¬ known but unguessed at, no geographer hav¬ ing ever suspected its existence. This river flowed northward toward the equator, but whither it would go, whether it would turn one way or another, the length of its course, where it would come out, the character of the stream itself, and the character of the dwellers along its banks — all these things were yet to be dis¬ covered.® Again, on pp. 333 and 334, we read : ((We finally entered the wonderful Amazon itself, the mighty river which contains one- tenth of all the running water of the globe. It was miles across, where we entered it; and indeed we could not tell whether the farther bank, which we saw, was that of the mainland or an island. We went up it until about mid¬ night, then steamed up the Rio Negro for a short distance, and at one in the morning reached Manaos. Manaos is a remarkable city. It is only three degrees south of the equator. Sixty years ago it was a nameless little collec¬ tion of hovels, tenanted by a few Indians and a few of the poorest class of Brazilian peasants. Now it is a big, handsome modern city, with opera-house, tramways, good hotels, fine square and public buildings and attractive private houses. The brilliant coloring and odd archi¬ tecture give the place a very foreign and at¬ tractive flavor. Its rapid growth to prosperity was due to the rubber-trade. This is now far less remunerative than formerly. It will un¬ doubtedly in some degree recover ; and in any event the development of the immensely rich and fertile Amazonian Valley is sure to go on, and it will be immensely quickened when closer

connections are made with the Brazilian high¬ land country lying

south of it.®

The mouth of the Amazon was discovered by Yanez Pinzon in 1500, but the stream was not navigated by any European till 1540, when Francis Orellana descended it. Explorations of the river or portions of it were undertaken in later times by La Conda- mine (1743-44), Humboldt (1799), Prince Ad¬ albert of Prussia (1842), Herndon (1850), Lal- lemant (1858), Bates (1861), Marcoy (1866), Agassiz (1866-67) and others; and of its tribu¬ taries by Hartte, Chandless, Abendroth, etc. See also in the following list of books the names of other distinguished travelers.

Bibliography. — Acuna, C. de, (A Relation of the Great River Amazons1* (In (Voyages and Discoveries in South America,' London 1698) ; Bates, H. W., (The Naturalist on the River Amazons' (London 1875) ; Enock, C. R., (The Andes and the Amazon' (London 1907) ; Herndon, W. L., and Gibbon, L., (Exploration of the Valley of the Amazon' (Washington 1853) ; Humboldt, A., (Personal Narrative of Travels to the Equinoctial Regions of America' (London 1853) ; Lange, A., (In the Amazon Tungle' (New York 1912), and (The Lower Amazon' (New York 1914) ; Mozans, H. J. (pseud for Zahm, J. A.), (Along the Andes and Down the Amazon' (New York and Lon¬ don 1911) ; Orton, J., (The Andes and the Amazon' (New York 1870) ; Roosevelt, T., (Through the Brazilian Wilderness' (New York 1914) ; Spruce, R., (Notes of a Botanist on the Amazon and Andes' (ed. and condensed by A. R. Wallace, London 1908) ; Wallace, A. R., (A Narrative of Travels on the Amazon and Rio Negro' (London 1853) ; Whiffen, T. W., (The North-west Amazons' (London 1915) ; Woodroffe, J. F., (The Upper Reaches of the Amazon' (London 1914). See articles Brazil and South America.

AMAZONAS, a'ma-zo'nas, Brazil, the largest of all the Brazilian States and the farthest north : bounded north by British Guiana and Venezuela; east by the State of Para; south by Bolivia and the State of Matto Grosso ; west by Colombia and Peru. Its area is 732,439 square miles, or nearly three and a half times that of France, and except for moun¬ tain ranges on the Venezuelan border it is an alluvial plain. Its capital is Manaos. Pop. of the State 387,000. The name Amazonas is also borne by a territory of Venezuela and a department of Peru (q.v.).

AMAZONAS, Peru, a department in the montana portion of the republic, has an esti¬ mated area of 13,940 square miles. It is bounded on the north by Ecuador, on the northeast and east by Loreto, on the south by La Libertad and on the west by Cajamarca. In this depart¬ ment we find mountains of the central Cor¬ dillera

intersected by the deep valleys of the Maranon and its tributaries. A singular fact in regard to these tributaries is that two of them, flowing in opposite directions, bear the same familiar name, Santiago. The depart¬ mental capital is Chachapoyas, seat of a bishop¬ ric, and the industrial centre of a department which is still in large measure covered by virgin forests. The products, beside the rubber, coca, etc. — the usual products of the forest — are cacao, coffee, sugar, cotton, tobacco (in those

deep valleys), and, in mining sections, rock salt and gold. The inhabitants numbered, in 1916, about 53,000.

AMAZONAS, Venezuela, a territory of the republic, bounded on the north and east by the State of Bolivar, on the south by Brazil and on the west by Colombia. It is divided into two main parts by the Orinoco River, and the western part includes great llanos which ex¬ tend to the neighboring .republic of Colombia. There are navigable rivers, such as the Orinoco, the Meta, the Ventuario, the Guaviare, the Vichada and the Iriuda. The chief products are rubber, copaiba, sarsaparilla and wild cacao. Pop. (est.) 46,000, divided as follows: 12,000 Indian converts, 33,000 savages, 200 natives of other States of the republic and 700 foreigners. The capital is San Fernando de Atabapo. See Venezuela.

AMAZONS, in Greek legends a nation of female warriors. They were fabled to have cut off their right breasts in order not to inter¬ fere with their use of the bow, and variously to have expelled men from their country or kept them in subjection for the continuance of the race. The earliest traditions locate them in Asia Minor and relate their appearance at the siege of Troy under their Queen, Penthesilea.

AMAZONSTONE, a beautiful green or blue feldspar. It is a variety of the mineral mi- crocline and occurs in magnificent crystals in granite near Pike's Peak, Col. Inferior crystals occur in New Jersey, the Ural Moun¬ tains and many other localities. Large quan¬ tities of green, cleavable amazonstone have been c* tained at Amelia, Va., and have been \yorked up as semi-precious and decorative stones.

AMBALA, or UMBALLA, the name of a district of Northern India and its capital. The latter was the scene of a treaty between the governor-general of India, Lord Mayo, and the Emir Shere Ali of Afghanistan in

1869. The town contains several important churches, a dispensary, hospital and a leper asylum. Pop.

80,000.

AMBALENIA, Columbia, city in the de¬ partment of Tolima, on the Magdalena River, 50 miles west of Bogota. It is the trade centre of a rich agricultural region, exporting large quantities of excellent tobacco. Pop. 8,500.

AMBARI, am-ba're, HEMP. See Hibis¬ cus.

AMBARV'ALIA, Roman festival in

honor of Ceres, which was observed in May. The blessing of the goddess was then besought on the wished-for harvest.

AMBASSADOR (from the mediaeval Latin Ambasciator, an agent), diplomatic officer of the highest rank, the representative of one na¬ tion at the court of another. In this capacity he is expected to support the interests and dig¬ nity of his own state. Ambassadors are ordi¬ nary when they reside permanently at a foreign court, or extraordinary when sent on a special occasion. When ambassadors-extraordinary are vested with full powders, as of concluding peace, making treaties and the like, they are called plenipotentiaries. Ambassadors are often loose¬ ly styled ministers. Envoys are ministers em¬ ployed on special occasions, and are of less dig¬ nity than ambassadors. Until 1893 the United

States had been represented at foreign courts by persons with the rank of ministers-resident, accredited in the care of the great powers as envoys-extraordinary and ministers-plenipoten- tiary. In that year, however, an act of Con¬ gress was passed allowing the President to accredit ambassadors as United States represen¬ tatives at several of the more important Euro¬ pean courts. When acknowledged as such, am¬ bassadors are exempted absolutely from all allegiance and from all responsibility to the laws of the country to which accredited. Should they be so regardless of their duty, however, and of the object of their privilege, as to in¬ sult or openly to attack the laws of the govern¬ ment, their functions may be suspended by a refusal to treat with them, or application can be made to their own sovereign for their recall ; or they may be dismissed and required to de¬ part within a reasonable time. An ambassador is considered as if he were out of the territory of the foreign power, by fiction of law, and it is an implied agreement among nations that the ambassador, while he resides in the

foreign state, shall be considered as a member of his own country, and the government has exclusive cognizance of his conduct and control of his person. Ambassadors' children born abroad are held not to be aliens (7 Coke, 18 a). The persons of ambassadors and their domestic serv¬ ants are exempt from arrest on civil process (3 Burr. 401, 1731).

AMBASSADORS, The. (The Ambassa- dors> is often spoken of as enjoying the doubt¬ ful distinction of being the most talked about and least read novel in the English language. It holds first place in the affection of most people with whom the love of Henry James is a literary cult ; it is the author's own favorite among his works. He calls it <(quite the best (all round) of all my productions.® Yet, in spite of the fact that it was published in 1903, 25 years after (Daisy Miller) and (The Por¬ trait of a Lady> had created an audience for their author's work, half of the first edition remained on the publisher's shelves for years. It requires something more than the fact that (The Ambassadors) is written in James' <(later manner® and is full of subleties of character, situation and expression to account for these extremes of admiration and neglect, and that something is undoubtedly the age of the hero. Middle age has never been popular in fiction, and (The Ambassadors, > through Lambert Strether — probably the finest character James ever created — is the mirror of New England middle age beside the youth of Paris. The essence of the story, according to Henry James' preface to the New York edition (the best an¬ alysis of the work), is contained in the words of Strether to the friend of the New England boy whom he has been sent to save from the clutches of Paris and whom he finds ((diso- bligingly and bewilderingly not lost.® . ((Livc all you can ; it's a mistake not to. It doesn't so much matter what you do in particular so long as you have your life. If you haven't had that, what have you had?®

Edith J. R. Isaacs.

AMBATO, Ecuador, town on the slope of Chimborazo, 70 miles south of Quito. It has a flourishing trade in grain, sugar -and cochineal. Pop. 12,000.

AMBER, one of the most important and valuable of the fossil resins. It is one of the oxygenated hydrocarbons and its mineralogical name, succinite, emphasizes one of its distin¬ guishing characteristics, namely, the presence of from 5 to 8 per cent of succinic acid. Its com¬

position is represented by the formula CmHmO*. It occurs in irregular masses, usually of small size but sometimes weighing up to 15 or . 18 pounds. It has a yellow color, resinous lustre and conchoidal fracture. Its hardness is 2 to 2.5 and specific gravity 1.05 to 1.1. Along the shores of the Baltic Sea, especially in East Prussia, mining for amber has been carried on for two centuries. In this region shafts are sunk through a superficial stratum of marl and sand, a bed of lignite with light sands and gray clays, and finally a layer of green-sand, 50 to 60 feet thick. All of these strata contain amber, but in the lower portion of the green-sand there is a stratum four to five feet thick of (<blue earth® in which amber nodules occur so abun¬ dantly that 50 or 60 square rods yield several thousand pounds. This ((blue earth® stratum extends out under the sea and there the amber is freed and cast upon the shores by the waves, especially after the autumnal storms. Small quantities are found in Great Britain, on the coasts of Sicily and the Adriatic, in various parts of Europe, in Siberia, Greenland and in the United States.

Pliny declared amber to be ((an exudation from trees of the pine family,® a conjecture that proves to be correct. The fact that it was at one time fluid or nearly so is established by its occasional inclusion of insects ; and its antiquity is also established by the fact that most of the species of insects so included are now extinct.

Amber becomes strongly electrified when rubbed, and the power that it then possesses, of attracting light bodies to itself, was proba¬ bly considered by the ancients to be the out¬ ward sign of the mysterious virtues that they attributed to. the mineral. It was greatly es¬ teemed for ornaments and charms, and Pliny says that among women ((it had been so highly valued as an object of luxury that a very di¬ minutive human effigy, made of amber, had been known to sell at a higher price than living men, even in stout and vigorous health.® He also says that a necklace of amber beads was con¬ sidered to protect the wearer from secret poisons, and to be efficacious as a counter-charm against sorceries and witchcraft. In the time of Nero an expedition sent from Rome to the Prussian amber-beds returned with 13,000 pounds of the precious substance.

In modern times amber is chiefly used for the manufacture of mouthpieces for tobacco pipes and for the preparation of a kind of var¬ nish. The attractive power exhibited by amber when rubbed was the first electrical phenome¬ non observed by man, and the word <(electricity® was derived from electrum, the Greek name for amber.

AMBER, India, a ruined city, the ancient capital of Jaipur. Its

picturesque situation at the mouth of a rocky mountain gorge, in which nestles a lovely lake, has attracted the admira¬ tion of all travelers. It is now only remark¬ able for its architecture. The chief building is the Diwan-i-Khas built by Mirza Raja, the

columns of which were covered with stucco to hide their magnificence from the commissioners of Jehangir, who had ordered it destroyed be¬ cause it surpassed the marvels of his imperial city of Agra. It is only by knocking off some of the plaster that one can get a glimpse of the sculptures, which are as perfect as on the day they were carved.

AMBER-FISH, any one of a genus of fishes (SerioYa) related to the pilot-fishes, many species of which are found along our coasts, the most of which are known by other names. The great amber-fish, or amber-jack, is a food- fish of some importance in the Gulf of Mexico and the West Indies, reaching a weight of 100 pounds. Others in that region are more com¬ monly known as madregals ; and a species of the Pacific Coast is the highly-prized yellow- tail (q.v.). The name refers to the prevailing color.

AMBER GODS, The, a story by Harriet Prescott Spofford, published 1863. It is char¬ acterized by superb depth and richness of color, like a painting by Titian. An amber amulet or rosary possessing mysterious influences gives the title to the story.

AMBER INSECTS. The great majority of the fossil insects of the Oligocene (Tertiary) period have been obtained from the amber of the Baltic shores of Prussia, upon which they had rested in life, stuck fast and then been overflowed. The most fragile and delicate flies, moths and many other insects, besides spiders, mites, centipedes and Crustacea, are preserved in this gum or resin, which wTas evi¬ dently formed in the same manner as gum copal, also a late tertiary or quaternary gum.

AMBERG, the ancient Bavarian capital of the upper Palatinate, situated on both sides of the Vils, in the midst of numerous iron¬ works. It is well built, and on the site of its former wralls are shaded walks. Glass, iron wares, stoneware, tobacco, beer, vinegar and arms of good quality are manufactured here. The principal buildings are a Gothic church of the 15th century, the royal palace, the town- house and the Old Jesuits' College, and it pos¬ sesses a gymnasium and a large library. At Amberg the Archduke Charles defeated the French general, Jourdan, on 24 Aug. 1796. Pop. 25,000.

AMBERGRIS, a gum-like substance of great value in the making of

perfumes, ob¬ tained from the intestinal canal of the sperm whale, or found floating in pieces of various sizes on the surface of the sea. It is a product of cetacean digestion, and often contains the beaks of cuttle-fish, a fact which conclusively proves the place of its origin, until recently much in doubt. When first extracted from the alimentary canal it has the feeling and con¬ sistency of thick grease, and chemically seems to be of the nature of cholesterin, but after exposure to the air hardens and acquires its characteristic sweet earthy odor.' Some odd stories were told by the old writers to account for its origin, of which the least absurd was that it was the excrement of the whale. It was held by the ancients to be of great value in certain diseases, but is now used entirely in connection with perfumery, and is worth about $20 a pound. The name is also given to a bar-

ren island on the coast of Yucatan, on account of the quantities of ambergris gathered along its shores.

AMBIDEXTERITY, the ability to use the right or left hand with equal freedom and skill in all types of manipulation. The causes of the condition of right-handedness, i.e., the tendency to use the right hand only for finer manipulations, are probably to be found in inherited nervous structures which in turn seem to be related very closely to the inherited circulatory organs. Exercise may have some effect in fixing this relation and exaggerating the degree of one-sided development, but it is generally agreed that the inherited structures are of first importance.

AMBIGUITY, in law, the uncertainty of meaning of words, clauses or other parts of a written instrument. The rule of evidence pre¬ venting the admission of hearsay evidence has the important exception that it may be admitted to explain an ambiguity in a written instru¬ ment. See Contract; Evidence; Will; and consult the works referred to under these sub¬ jects.

AMBITIOUS WOMAN, An, a novel by Edgar Fawcett (1883). It is a keen yet sympathetic analysis of an American female type whose dominant trait is social ambition. Claire Twining is reared in the ugly poverty of a Brooklyn suburb, but is clever and capable, with strong aspirations for the luxuries of life. Through the good offices of a schoolmate she gains a social foothold. If Claire's transforma¬ tion seems a little sudden, there is genuine strength in the story and much

truthful obser¬ vation of city life in New York.

AMBLER, James Markham Marshall,

surgeon and Arctic explorer : b. Virginia, 30 Dec. 1848; d. in the Lena Delta, Siberia, 31 Oct. 1881. Educated at Washington and Lee Uni¬ versity and the Medical College of the Univer¬ sity of Maryland, he practised medicine in Baltimore 1870-74; entered the navy as assistant surgeon 1874; and was selected as volunteer for that post to the Jeannette Arctic expedition under George W. De Long, 1879. When their vessel sank, 13 Tune 1881, he accompanied his chief along the Lena and was alive at the date of the last entry in De Long's journal, 30 Oct. 1881, but probably died the following dav. His remains were discovered bv Chief Engi¬ neer Melville, 23 March 1882. Upon his body were found memoranda on (Ice Formed by Sea Water > and (Remarks on Snow Crystals, > pub¬ lished in De Long's <Journal) (Boston 1883).

AMBLER, Pa., borough in Montgomery County, , 15 miles northwest of Philadelphia, on the Philadelphia and Reading Railroad. The Methodist Episcopal church here is famed for its stained-glass windows. Fort Washington and the home of Gen. George Meade are of historic interest. The borough contains a chemical factory, also asbestos, shingle, slate and sheet metal works. It is a favorite sum¬ mer resort for residents of Philadelohia. It has large agricultural interests. Pop. (1920) 3,094.

AMBLESIDE, England, town in the Eng¬ lish lake district, Westmoreland, the home of Harriet Martineau, and near which Words¬ worth and Dr. Arnold resided. The chief in¬

dustry is the manufacture of coarse woolen goods. Pop. about 2,500.

AMBLETEUSE, an'bl'-tez, French village on the English Channel six miles north of Boulogne, noted as the landing-place of James II on his flight from England 1689. In 1805 Napoleon erected a monument here to the Grand Army. Pop. about 700.

AMBLYDACTYLA. See Amblypoda.

AMBLYGONITE, am-blig'6*-nit (from the Greek amblygonios, ˆobtuse-angled,®) a min¬ eral crystallizing in the triclinic system, and having the chemical formula AlPCh.LiF. The lithium is often partially replaced by sodium, and the fluorin by hydroxyl (OH). Its hard¬ ness is 6 and its specific gravity about 3.05. It is translucent and white, or more or less tinged with various colors. It occurs in certain locali¬ ties

in Saxony, Norway, France and Peru; and in the United States it has been found in Maine and Connecticut. It is a valuable lithia ore.

AM'BLYO'PIA, defective, weak or blunted vision, a word now widely employed instead of the term amaurosis, meaning blindness (q.v.), since the modern methods of examination of the retina have made known the more exact character of the affections of this part of the eye. Defective, weak or blunted vision due to disorder of the retina usually may be attributed to the following main causes': (1) Certain poisons, notably alcohol, wood alcohol in particular, tobacco, lead and uraemic poisoning of Bright's disease; (2) certain functional or reflex disturbances, as in hysteria; (3) changes in and about the optic nerve, as pressure of in¬ flammations, or of tumors, leading to optic neuritis; (4) cerebral changes, such as hemor¬ rhages, tumor of the brain, localized injury of the brain, usually leading to localized types of amblyopia (hemianopsia) ; (5) defective cere¬ bral development, causing congenital amblyopia.

AM'BLYOP'SIDTE, a family of fresh¬ water fishes closely allied to the cyprinodonts and remarkable for living altogether in caves, except one species found in the ditches of the rice-fields of South Carolina. Among many peculiarities may be noted the facts that the vent is at the throat instead of in the usual position behind the ventral fin, and that all of the under-ground species are blind. See Cave¬ dwelling Animals.

AMBLYPO'DA, an extinct order of hoofed mammals found in the Eocene forma¬ tions of North America and Europe. They are distinguished by a primitive pattern of teeth and short post-like feet resembling those of elephants. The chief types are Pantolambda, Coryphodon and Uintatherium (qq.v.).

AMBLYS'TOMA, a genus representing a

subfamily (Amblystomatince) of salamanders of North and Central America and northern Asia. The parasphenoid bone is toothless. A common American species is the spotted sala¬ mander (A. tigrinum) whose young in certain Mexican lakes never reach the adult condition, and are known as <(axolotls.® See Axolotl; Salamander.

AMBO, a reading-desk or pulpit, which in early churches was placed in the choir. The epistle and gospel were read from the ambo, and sermons sometimes preached from it. It had two ascents — one from the east and the

other from the west. In many churches there were two ambos, one on each side of the choir, from one of which the gospel was read, and from the other the epistle. The earliest are at Ravenna in the cathedral and the Church of Saint Apollinare, and are of carved marble (See Pulpit), ihe name ambo was also given to an eagle-shaped reading-desk, now usually termed a lectern.

AMBOCEPTORS, also called immune bodies, are protective substances which develop in the body following injection of cells of dif¬ ferent kinds. Nearly all animal cells and plant cells are capable of producing amboceptors. The amboceptors are of great value in aiding the body to recover from an infection. The problem is discussed more fully in the article on Immunity (q.v.).

AMBOISE, am'bwaz, Aimeric d\ a famous French admiral, brother of Georges d'Amboise (q.v.) ; d. 1512. He became in 1503 Grand Master of the Knights of Saint John in Rhodes, and gained a great victory over the Sultan of Egypt in 1510.

AMBOISE, Bussi d\ See Bussi.

AMBOISE, Georges d', French cardinal and minister of state : b. Chaumont-sur-Loire 1460; d. 1510. He became successively bishop of Montauban and archbishop of Narbonne and of Rouen, and in 1498 Louis XII made him Prime Minister. He failed in his attempt to secure the papacy, but his policv toward France was wise and statesmanlike. He reformed the Church, remitted the people's burdens and con¬ scientiously labored to promote the public happiness.

AMBOISE, France, a town in the depart¬ ment of Indre-et-Loire, on the Loire, 15 miles by rail east of Tours. It lies in a rich vine¬ yard district and has been called <(the Garden of France.® The town is memorable as the scene of the conspiracy of the Huguenots against the Guises (1560). It contains a beautiful chateau dating from the time of the Renaissance. Pop. about 4,600.

AMBOYNA, or AMBOINA, the most im¬ portant of the Molucca Islands, being the seat of their government and the centre of the com¬ merce in nutmegs and cloves ; greatest length, 33 miles; greatest breadth, 10 miles; area, about 260 square miles. It is composed of two un¬ equal peninsulas united by an isthmus about a mile broad, the larger known as Hitu, the smaller as Leitimor. Its general aspect is at¬

tractive and its climate salubrious. It is cov¬ ered almost throughout with forests, affording a great variety of beautiful wood for inlaying and ornamental work. Sugar and coffee are cultivated. The surface is generally rugged and hilly, sometimes rising into mountains of granite. The soil in the valleys and along the shores is very fertile, but a iarge portion re¬ mains uncultivated. In 1605 Amboyna was taken by the Dutch from the Portuguese, and shortly afterward some English factories were erected there ; but in 1623, the Dutch seized the English fort, tortured frightfully Captain Towerson and nine others to obtain a confes¬ sion of conspiracy and put them to death — a performance notorious as ((The Massacre of Amboyna.® Pop. 30,000. Amboyna is also the name of one of the residencies into which the

Molucca Islands are divided, including Buru, Caram, Aru Islands, the Bandas and others. Pop. 95,000.

AMBOYNA, capital of the Dutch residency in the Moluccas, situated on the northwest shore of the peninsula of Leitimor and defended by Fort Victoria. The houses/built in Dutch fashion, are generally of one story, owing to the frequency of earthquakes, one of great severity occurring in January 1898. It con¬ tains a governor's palace, town-house, two Protestant churches, several mosques, an orphan hospital, a theatre and a large covered market-place. The streets are wide, and are planted on each side with rows of fruit-trees. Pop. about 10,000.

AMBRIDGE, Pa., borough in Beaver County, 16 miles northwest of Pittsburg, on the Ohio River and on the Pennsylvania Rail¬ road. Bridge building, molding of metals and the manufacture of tubes are the chief local industries. The water works are municipally owned. Pop. (1910) 5,205; (1920) 12,730.

AMBRIZ, am-brej', seaport, capital of a district of the same name in the Portuguese colony of Angola, West Africa. Originally the capital of Quibanza it was taken by the Por¬ tuguese, who in 1855 built a fort, a custom¬ house and a church which formed the nucleus of the present town. It has a number of fac¬ tories and a trade in india-rubber, coffee and palm oil. Pop. about 3.000.

AMBROS, am'bros, August Wilhelm,

Austrian writer on music: b. 17 Nov. 1816 in Mauth, Bohemia; d. Vienna 28 June 1876. He was trained for the civil sendee and served in it with distinction ; but his tastes led him elsewhere, and he rose to eminence as the author of (The Limits of Music and Poetry, > besides numerous essays and studies connected with art. His masterpiece,

(The History of Music} (1862-68) a work which cost him many years of labor, was carried only to the fourth volume. A fifth, completing the work, was added by Langhaus.

AMBROSE, Saint, Latin father of the Church : b. 333, or, according to other accounts, 334, probably at Treves (the ancient Augusta Trevirorum), where his father resided as pre- torian prefect of Gallia Narbonensis; d. Milan, 4 April 397. It is told that a swarm of bees covered the eyes of the boy while slumbering in the court of his father's castle, and the nurse was astonished to perceive the bees going in and out of his mouth without doing him any injury. His father, possibly recalling a similar wonder, mentioned of Plato, prophesied future greatness for his son. Ambrose studied law at Rome under Anicius Probus and Symmachtis, and then went to Milan and began to plead causes while yet a youth. His pleadings were so eloquent and skillful that in a short time Pro¬ bus, the prefect of Italy, chose him a member of his council; and in 369, with the approval of the Emperor Valentinian, appointed him gov¬ ernor of the provinces of Liguria and Ttmilia (North Italy). In 374 he was called to the bishopric of Milan by the unanimous voices of Arians and Catholics. Ambrose long refused to accept this dignity, but in vain. He fled by night, and thought himself on the way to Pavia, but unexpectedly found himself again before

the gates of Milan. At length he yielded, re¬ ceived baptism, for he had hitherto been only a catechumen, and eight days after was conse¬ crated a priest. The 7th of December is still celebrated by the Church on this account. On his elevation to the bishopric he bestowed all his wealth on the Church and among the poor, resolving to live as simply as possible, and at the same time to exercise his functions as an ecclesiastical ruler with firmness and vigor. He was employed by the court to negotiate with Maximus, then threatening Italy, whose advance he succeeded for a time in arresting (383). Four years later he was sent on a like mission, but his conduct on this occasion so offended Maximus that he had to return to Milan, hav¬ ing accomplished nothing. In his struggles against the Arian heresy he was opposed by Justina, mother of Valentinian II, and for a time by the young Emperor himself, together with the courtiers and the Gothic troops. Backed by the people of Milan, however, he felt strong enough to deny the Arians the use of a single church in the city, although Justina, in her son's name, demanded that two should be given up. He

was commanded to quit the city, but this he refused to do, being still supported by the people. About this time Ambrose, in¬ structed by a dream, searched for and found the relics of two martyrs, Gervasius and Protasius. The people crowded to see these bones, and, according to Ambrose himself, the eyes of the blind were opened and devils were cast out by touching them. Although the court derided these miracles they were accepted by the people, and the triumph of orthodoxy was secured. He had also to oppose paganism. In 390, after the massacre at Thessalonica, he re¬ fused the Emperor Theodosius entrance into the church of Milan for a period of eight months, only restoring him after a public penance. (See Theodosius). The later years of his life were devoted to the more immediate care of his see. His writings (the best edition is by the Bene¬ dictines, 2 vols. folio, 1686-90), "bear marks of haste, and show his theological knowledge to have extended little beyond an acquaintance with the works of the Greek fathers, from whom, especially Origen, he borrowed consider¬ ably. The ((Ambrosian Chant® or <(Te Deum Laudamus® has been ascribed to him, but was written a century later. He may be considered the father of the hymnology of the Latin Church. He is the patron saint of Milan, which observed his 15th centenary in 1897.

AMBRO'SIA, in the Greek mythology, a balsamic juice which formed the food of the gods and preserved their immortality. It was used also as an ointment. Mortals permitted to partake of ambrosia received an increase of beauty, strength, and swiftness, becoming in some measure assimilated to the gods.

AMBROSIA BEETLE. See Wood-boring Beetles.

AMBROSIAN CHANT. See Gregorian Chant.

AMBROSIAN LIBRARY, public library in Milan ; founded by the Cardinal Archbishop Federigo Borromeo, a relation of Saint Charles Borromeo, and opened in 1609. It now con¬ tains over 175,000 printed books and 8,400 MSS.

AMBROSINI, Bartolomeo, Italian natu¬ ralist: b. Bologna, 1588; d. there, 1657. He was a pupil of Aldrovandi, several of whose works he published, and whom he succeeded eventually as director of the university botanical garden He studied at the university, and became suc¬ cessively professor of philosophy, of botany and of medicine; and during the plague of 1630 in Bologna he worked assiduously for the relief of the sufferers.

AMBULANCE, a term generally applied in England and America to the

wagon or other vehicle in which the wounded in battle, or those who have sustained injuries in civil life, are conveyed to hospital. More strictly, in military parlance, the term imparts a hospital establish¬ ment moving with an army in the field, to pro¬ vide for the collection, treatment and care of the wounded on the battlefield, and of the sick, until they can be removed to hospitals of a more stationary character. An ambulance or¬ ganization, differing in minor details, now pre¬ vails in all civilized armies.

AMBULANCE COMPANIES. In the

United States a limited number of field hos¬ pitals and ambulance companies are main¬ tained in time of peace to provide trained or¬ ganizations for duty with the troops when they are on field service and to afford a means for training officers and men of the sanitary service in the work of the sanitary field or¬ ganizations. In the training of these organi¬ zations special attention is given to those elements of field work for instruction in which only limited facilities are afforded at posts, such as the practical use of the articles of field equipment, lines of aid, equitation, care of animals and the use of the pack-sad¬ dle. The personnel of these organizations in time of peace comprise two classes: (a) A permanent cadre, consisting of such number of non-commissioned officers and. men as are deemed necessary to maintain continuity of policy and method in instruction; (b) tem¬ porary personnel attached to these organiza¬ tions for purposes of instruction. On field service with a mobilized division the field hospitals and the ambulance companies operate under their two respective directors whose relation to them is similar to that of a major of the line to his battalion. The senior officer of two or more field hospitals or ambulance companies conducts the course of instruction as though they were a single organization and assigns the instructors from the permanent personnel of the organizations as he deems best. In other respects, however, the several organizations retain their autonomy as sepa¬ rate and distinct administrative and tactical units, each under the command of its own senior medical officer. The discipline and in¬ terior economy of these organizations con¬ form so far as practicable to those of a com¬ pany of infantry. The program of instruction for these organizations, the sequence of the subjects, the manner in which the same are taught, the details thereof to be taken up and the time to be given to each are prescribed by the War Department.

The personnel of an ambulance company at war strength are ordinarily distributed as follows: (a) With the dressing station, in¬ cluding the litter-bearers — four officers, one

sergeant first class, six sergeants, one acting cook, 40 privates first class and privates, all of the medical department; (b) with the wheeled transportation — one officer, one ser¬ geant first class, one sergeant, one acting cook, 28 privates first class and privates (one as farrier, one as saddler, two as musicians, 12 as ambulance-drivers and 12 as ambulance orderlies), all of the medical department; also one sergeant (blacksmith) and three pri¬ vates (drivers) of the quartermaster corps. The function of the ambulance company is to collect the sick and wounded, to afford them temporary care and treatment and to transport them to the next sanitary unit in the rear. In camp it operates the ambulance service be¬ tween the camp infirmaries and the field or other hospitals. On the march ambulances are distributed among the marching troops, usually one to each regiment, for the purpose of sup¬ plying transportation to those who become un¬ able to march.

In combat the ambulance company operates in two parts. The first establishes and oper¬ ates a dressing station and collects the wounded thereat, the second operates the wheeled transportation in evacuating the wounded. The dressing station party, includ¬ ing the litter-bearers with its equipment on pack-mules, moves forward in rear of the troops ready to establish the dressing station. The location of the dressing stations and the number to be established is determined by the division surgeon acting under the instructions of the division commander. The director of ambulance companies supervises their open¬ ing, giving the necessary orders therefor to the commanders of the ambulance companies. The site selected for a dressing station should have the following advantages: (1) Protec¬ tion from rifle fire, (2) protection from direct artillery fire, (3) accessibility for wheeled transportation, and (4) a supply of water. Effective shelter from fire is the chief desider¬ atum. A site inaccessible to ambulances on account of exposure to fire need not invari¬ ably be condemned, for the greater part of the work of the ambulances is done after the close of the battle or after nightfall. The sta¬ tion is pushed as far to the front as

possible to reduce to the minimum the

distance over which the wounded must be

carried on litters. In some cases in

which the establishment of the dressing sta¬ tion is delayed, or in which the troops are about to move forward, it may be possible to locate the dressing station at the aid station, thus practically eliminating one station. Un¬ der these circumstances the dressing station assumes the work of the aid station and the personnel of the two co-operate until the aid station moves forward. The requirement that the sanitary personnel with the combatant organizations keep in touch with those organi¬ zations may make it necessary for them to leave the wounded where they fall, pausing only to administer such aid as may be abso¬ lutely essential. Cases thus left are collected and cared for by the dressing station party as it advances. As soon as the dressing station is open its bearers under the direction of a medical officer proceed to the front as far as the enemy's fire permits. Ordinarily they are divided into as many sections as there are aid

stations, each under a non-commissioned offi¬ cer, and one section proceeds toward each aid station. They direct wounded who are able to walk to the station for slightly wounded. They transport other wounded from the aid station to the dressing station. When prac¬ ticable they also assist the regimental medical personnel in the care and removal of wounded from points in advance. Meanwhile the com¬ manding officer of the company with the dressing station personnel proceeds to put the dressing station in condition to receive pa¬ tients. When possible for wheeled transporta¬ tion to reach the dressing station a message is sent to the officer in charge of the ambu¬ lance train directing him to report at the sta¬ tion with the ambulances.

The work of the dressing station is car¬ ried on under the following departments : Dispensary, kitchen, receiving and forward¬ ing, slightly wounded and seriously wounded. All wounded pass through the receiving and forwarding department. Those whose in¬ juries are not sufficient to incapacitate them for the present performance of their military duties are directed, after receiving the neces¬ sary treatment, to return to their units and the fact that such directions have been given them is noted upon their diagnosis tags. Other slightly wounded, able to walk, are, after like treatment, immediately directed to the rear in command of their highest-ranking officer or soldier. Generally they are sent to the station for slightly wounded. At the dressing station only such operations are per¬ formed as may be immediately required to save life or to render the patients fit for fur¬ ther transportation. The rules to be followed generally are that no operative or other in¬ terference should be attempted under condi¬ tions unfavorable for asepsis or antisepsis and also that no wounded for whom trans¬ portation is available should be delayed at the

dressing station. Conditions in these respects vary widely in different battles.

The ambulances and wagons remain far¬ ther to the rear than the dressing station (usually in proximity to some unit or station through which communication with division headquarters may be maintained) until it is practicable to determine a line of evacuation for the wounded. As soon as the dressing station is established and the location of the field hospital is determined a safe route for the ambulance service between these two es¬ tablishments is sought and when found the ambulances advance to begin the removal of wounded from the dressing station. The wagons of the ambulance company, earning a reserve of dressings, remain at a field hos¬ pital whence the supplies are sent forward by ambulances returning to the dressing station. Ambulances must reach the station as early as possible even at the risk of losses. ' Ordi¬ narily ambulances carry wounded only from the dressing station to the nearest field hos¬ pital, immediately returning to the former. During the daytime when a battle is still in progress it is rarely possible for ambulances or other wheeled vehicles to advance farther to the front than the dressing station. Op¬ portunity to have them do so will sometimes occur at night, and on the conclusion of an engagement they should always be used as far

as may be at all points on the battlefield. Should it be impossible to evacuate the wounded at a dressing station before it is closed or moved, by reason of retreat or other¬ wise, the commanding officer of the ambu¬ lance company leaves with the wounded ac¬ cording to their number and condition suffi¬ cient medical personnel and supplies to pro¬ vide for their immediate necessities, and ad¬ vances or withdraws with the division the remainder of the personnel and equipment.

AMBULANCE CORPS. The modern army corps has become so large and is so likely to break up into parts operating separately that its ambulance service does not give the best results when kept together as a homo¬ geneous whole. European experience shows that not the corps but the division should be the unit of ambulance organization. The name of ambulance corps is too well consecrated by usage to permit of any alteration in form or general meaning, but it is admissible to change the composition of the body it designates.

Organization. — The ambulance corps should be made up of independent units, each one corresponding to a division of the army corps and operating with it. The unit thus assigned to a division is the ((Ambulance® of the French; the <(Sanitats detachment® of the Germans ; the ((Sanitatscolonne® of the Aus¬ trians ; and the ((Bearer Company® of the Eng¬ lish. The name of Ambulance Brigade, which is proposed for it, seems to be the most appro¬ priate for the United States army.

The ambulance corps, thus reorganized, is under the general direction of the medical director. It consists of as many ambulance brigades as there are divisions in the army corps, and an additional one, known as the Headquarters Ambulance Brigade, or the corps troops (cavalry, artillery, engineers, etc.), and the reinforcement of any divisional brigade in need of assistance. Our hypothetical corps of three divisions would, therefore, consist of four ambulance brigades fully manned and equipped for independent action.

What should be the strength of the medical personnel (bearers and nurses) of an ambulance brigade? Our rule assigns 1.5 per cent of the command to the ambulance corps, therefore, if we have a division 12,000 strong, the ambulance brigade will get a detail of 180 men. From this number must be deducted the quota to the Headquarters Brigade, say, 24 men. Of the remaining 156, 36 will do duty as ambulance orderlies. We have now left only 120 men, a number which represents the exact rate of 1 per cent of the strength of the division. These 120 men are divided into stretcher-bearers and nurses — 96 of the former and 24 of the latter. The 96 bearers will man 24 stretchers, or at the rate of two stretchers per 1,000 combatants. These two, added to the four stretchers manned by the regimental bearers, give us six stretchers for each full regiment, independently of the help which in case of need could be obtained from the Headquarters Brigade.

The composition of an ambulance brigade is complex. Its total personnel, for a division of 12,000 men, would be about as follows : One surgeon in charge ; five surgeons ; one captain ; one first lieutenant ; one second lieutenant ; one sergeant-major; eight sergeants; eight hospital

stewards; 24 hospital attendants (nurses and cooks); two buglers; 36 ambulance drivers; 36 ambulance orderlies (nine of whom to be mounted corporals); 10 wagon drivers; 96 stretcher-bearers; four mechanics (blacksmith, wheelwright, saddler and farrier). Total, 234.

The materiel consists of 36 ambulances, two medicine wagons, six service wagons for tent¬ age, baggage and supplies and two water-carts. Personnel and materiel are so organized as to admit of being split in halves, each capable of separate action.

The ambulance orderlies follow the ambu¬ lances, or ride on the rear step, and are re¬ sponsible for the safety and comfort of the patients in transit to the depot and the field hospitals. Each of the nine orderly corporals, besides his own ambulance, will also exercise supervision over three others — the four ambu¬ lances thus under his authority constituting an ambulance section. The 24 stretchers will be divided into six sections of four stretchers, each section being in charge of a sergeant designated chief of section. The Headquarters Brigade need not be so large as the others. It is made up of 24 men from each of the infantry divi¬ sions ; therefore, in our hypothetical corps, will have only 72 bearers and attendants.

The three lines of the field services are the regimental help-stations, the ambulance brigade depot and the field hospitals.

Help Stations. — On the battle-field nothing ca be done for the wounded, while under fire, but to lift them upon stretchers and carry them off speedily to the help-station. Here they are rapidly examined and given such im¬ mediate attention as may be required to secure their safe transport to the ambulance depot.

The modern formation of infantry advanc¬ ing against an enemy may be practically de¬ scribed as consisting of three lines: Firing line, line of support, regimental reserves, with an interval of 300 yards between them. The line of support, placed 300 yards behind the skir¬ mishing or firing line, is supposed by tacticians to be comparatively safe from the fire aimed at the. first line, while the regimental reserves are entirely safe from bullets. The help-station should not therefore be further than just in rear of the reserves. This will place it about 600 yards behind the firing line. In certain cases, where good shelter is available, and the reserves can get nearer to the front, the station, of course, follows them.

The German and French regiment of in¬ fantry, made up of three battalions, is 3,000 men strong; one help-station for each is provided, and considered sufficient. Our formation cor¬ responding in number to the above regiment is the brigade, which seldom would exceed but often fall short of 3,000 men. Such brigade in battle array would only cover a front of from 300 to 500 yards, and, therefore, obviously needs but one station. To have three or more stations 100 or 200

yards apart would be a waste of means and detrimental to the wounded.

A medicine wagon containing the supplies of the help-station and carrying the regimental stretchers should follow each brigade to the field, and advance to the station or as near it as possible.

Ambulance Depot. — The depot of the ambulance brigade constitutes the second line

of help. It is the centre and rallying point of the brigade. Here, as a battle becomes im¬ pending, all the ambulances which follow the regiments on the march rejoin the brigade train. If no suitable building can be found, the grounds are cleared by the attendants and hospital tents pitched ; the necessary medicines and appliances are drawn from the wagons and held in readiness.

The stretcher-bearers are divided into as many platoons as there are help-stations ; each platoon, under command of a lieutenant or the senior chief of section, marches toward its assigned station, followed by a picket of am¬ bulances ; these are driven as near the station as possible; as soon as halted, the bearers re¬ move the stretchers and with them proceed to the front, or else first carry off the wounded collected at the help-station. The patients brought to the depot are carefully but rapidly examined, and assorted according to their in¬ juries; one surgeon applies simple dressings, a second attends to serious wounds, a third, with assistants, performs urgent operations.

At what distance in the rear should the ambulance depot be established? We have seen that at 600 yards behind the firing line one was practically safe from bullets; at the distance of about a mile, rather less than more, we shall not only be beyond the range of musketry fire but also beyond the aim of artillery projectiles, and there seems the proper place for the depot. Whatever danger there may be at this distance is reduced to a minimum by a judicious selection of the spot.

Field Hospitals. — The field hospitals form the third line of help. They should be at an absolutely safe distance from the scene of con¬ flict — that is, two or three miles behind the ambulance depot — and have a free outlet toward the line of evacuation. There should be three provided for a division, and all com¬ pletely equipped. Each

accommodates 200 patients and is divided in two equal sections. See Field Sanitary Service.

AMELAN'CHIER, a genus of shrubs or small trees of the family Rosacecs, natives of Europe, Asia and America. The species, which are closely related, have alternate, simple, de¬ ciduous leaves, numerous racemes of showy white flowers appearing in early spring often before the leaves, and, in summer, edible spheri¬ cal or oblong red or dark purple berries with more or less bloom. They are commonly known under the names Juneberry, shad-bush and service-berry, and some species are culti¬ vated for their edible fruit or for ornament. They are hardy, succeed upon many soils and in many climates and are readily propagated by seeds or suckers.

AMELIE-LES-BAINS. See Arles.

AMEN, a word of Hebrew origin now generally used in all the languages of Christen¬ dom, having the sense of firmly, or surely, certainly, truly. The most common use is at the end of a prayer or creed where it has the sense of <(So I believe.® This usage was very early. In the Apostolical Constitutions the word was used for a response. Jerome men¬ tions its use in his time. J. Massie in his ex¬ cellent article in Hastings' dictionary of the Bible) finds four distinct uses of the word: (1) For the <(purpose of adopting as one's own

what has been said,® often <(doubling the word for emphasis.® (2) <(It is used in confirmation of one's own prayers, thanksgivings, benedic¬ tions or doxologies.® (3) ((It is used once at the close of an affirmation of one's own to con¬ firm it solemnly in faith.® (Rev. i, 7) Christ uses it as a word of introduction. (4) The Amen is used ftas a name or description of Christ and of God.® Another usage occurs in several passages in the Old Testament. When the priest or administrator of an oath has administered the oath, all bystanders who say amen thus bind themselves by the oath as surely as if they had said it. (Numbers v, 22; Deuteronomy xxvii, 15, 17 are samples.)

AMENDE HONORABLE. In the old

armies of France, this expression signified an apology for some injury done to another, or satisfaction given for an offense committed against the rules of honor or military etiquette, and was also applied to an infamous kind of punishment inflicted upon traitors, parricides or sacrilegious persons, in the following man¬ ner: The offender being delivered into the hands of the hangman — his shirt stripped off, a rope put about his neck and a taper in his hand — was led into the

court, where he begged pardon of God, the court, and his country. Sometimes the punishment ended there ; but often it was only a prelude to death or banish¬ ment to the galleys.

AMENDMENT, in law, the correction of any mistake discovered in a writ or process. At common law, amendments, in the absence of any statutory provision on the subject, are in all cases in the discretion of the court for the furtherance of justice. The power of amend¬ ment is regarded as incidental to the exercise of all judicial power. Amendments are very liberally allowed in all formal and most substan¬ tial matters under statutes in modern practice. They are allowed either without costs to the party amending, or upon such terms or condi¬ tions as the court may see proper to impose. In legislative proceedings, a clause, sentence or paragraph proposed to be substituted for an¬ other, or to be inserted in a bill before Con¬ gress, and which, if carried, actually becomes part of the bill itself. As a rule amendments do not overthrow the principle of a bill. The Senate of the United States may amend money- bills passed by the House of Representatives, but cannot originate such bills. The Constitu¬ tion of the United States contains a provision for its amendment (U. S. Const. Art. 5). See Constitutional Law ; Parliamentary Law.

AMENDMENTS, Constitutional. See

Initiative; Referendum; Convention, Con¬ stitutional.

AMENHOTEP, a-men-hoˆtap, or AMEN- OPHIS, the name of four Pharaohs of the 18th dynasty. Amenophis I reigned for 10 years about 1570 b.c. After his death he received divine honors and was made patron of the necropolis of Thebes. Elis mummy was dis¬ covered at Dair-el-Bahri and now lies in the Gizeh museum. Amenophis II reigned for about 25 years about 1450 b.c., carried on sev¬ eral wars and maintained the integrity of the territory inherited from his father. Ameno¬ phis III was the son of Thothmes IV and reigned for 35 years about 1410 b.c. He lost a great portion of his Asiatic territory, attained

renown for the erection of public temples, es¬ pecially the great temple of Thebes, of which two colossi remain. The great tomb of the parents of his wife Teye was discovered in

1.

The most important of these rulers was Amenhotep IV, later called Ikhnaton. He was the son of Amenhotep III and Queen Teye Early in life he became interested in the theol¬ ogy of the priests. As the result of his con¬ templation he gained the idea of ((A single con¬ trolling intelligence, behind and above all sentient beings including the gods.® This in¬ telligence enforced his designs by his <(word.® This teaching anticipated the doctrine of the Logos of Philo and others. This god was supreme above all and after a time was called Aton. The priesthood of Amon, the former national god, would have supplanted him if they could but the priests of the other gods at that time supported him. He became high- priest of all the priesthoods of Egypt. He next planned to completely abolish the worship of the other cults, and thus became the arch¬ heretic of his time. He had the names of the gods erased from all monuments. Finally he left Thebes and founded a new city, Akhetaton, ((Horizon of Aton,® which was built on the site of Tell El-Amarna. He raised Merire, one of his favorites, to the high-priesthood. After a few years his empire was overrun by the Hittites and the Asiatic part was lost en¬ tirely. He had no son to succeed him, but was succeeded by Tutenkhaton, his son-in-law. He died about 1358 b.c. after a reign of 17 years. He came to be known in succeeding years among his people as the <(criminal of Akheton.® He was buried in a tomb, which he had prepared for himself and family, in a lonely valley some miles east of the city. In 1888 in a small room in Akheton were found the archives of his foreign office and many of its documents pub¬ lished under the title of (The Tell El-Amarna Letters.)

AMENT, William Scott, American mis¬ sionary:, b. Owosso, Mich., 1851; d. 1909. He was educated at Oberlin, and studied thology at Union and at Andover Theological semi¬ naries. The. American Board of Foreign Mis¬ sions sent him as missionary to China. In 1900 he was one of the 800 foreigners, who with 3,000 native Christians were besieged in the Boxer revolt at Peking. When the siege was raised, Ament and his companions together with 500 native Christians took possession of the palace of a Mongolian prince. He took an active part in reinstalling the native Christians and in the readjustment of things generally after the revolt. He was severely criticised in the Ameri¬ can press because of his course, and some journals went so far as to brand him as morally guilty of looting. The charges fell through, however. Consult his life by H. D. Porter (New York 1911).

A'MENTIF'ERiE, a name wdiich has been used to include in one class several natural orders of plants which bear their flowers in catkins (amenta). They are trees and shrubs chiefly of temperate climates, and include many common trees, such as willows and pop¬ lars, oak,

beech and chestnut, walnut and bog myrtle.

AMERICA: a brief account of the deriva¬ tion and meaning of the word. The name Amalric (in Old High German Amalrich or Amelrich; Gothic Amala-reiks or -reikis; variants Am-el, Am-ul and Am-il-rih, -rich or ric) originated among the Goths in northern and central Europe; was adopted by other nations of the Teutonic stock before the great migra¬ tion of those kindred peoples ; and was carried into all west European countries — even to England and the Mediterranean coasts — by the Northern conquerors between the 5th and 12th centuries. The famous East Gothic dynasty of the Amala received its name, accord¬ ing to tradition, from a national hero whose mighty labors had earned for him the title Amal, which, as we shall presently explain, was a purely democratic term, connoting personal character and achievement, without the slightest implication of social rank.

From the dynastic name, the Goths as a race, or, more narrowly, the East Goths, were famil¬ iarly called Die Amelungen ; the Amal king in the 4th century ruled from the Baltic to the Black Sea; at the beginning of the 6th century a king of the West Goths in Spain and France, a grandson of Theodorich the Great, w7as called Amalarich. The word of democratic meaning thus spread through a few lands w7as destined to live, in the centuries that followed, united inseparably with the other short w7ord which appears in the name of the West-Gothic king.

The signification of the compound is of ex¬ traordinary interest. Its second member appears in Old English (for example, in the Anglo-Saxon epic of Beowulf) as ric, meaning power¬ ful, or when a substantive, control, domain or empire — the modern German Reich. Ac¬ cording to von Humboldt ((Examen Critique, J Vol. IV) and Professor von der Hagen, the fundamental meaning of the first member (its root, am, often occurring in the dialects of Iceland and Scandinavia in the forms arna, arnbl, etc.) is labor, endurance of great toil. Accepting this view, w-e find that the title of the Gothic national hero, Amal, expressed popular appreciation of <(the man of great or laborious enterprises.® Simply that. In order to show that Amal, wrhen uniting with the aristo¬ cratic monosyllable, retained its original value, so characteristic of the people w7ho used it every day; that, at least, they never thought it meant (<the mighty,® as some authorities have asserted recently; we need only point to the facts that they prefix it to ric, which itself signified <(mighty,® and that folk stories served to remind them constantly of the primitive meaning of the first member. Amalric, then, was the name which compacted the old ideal of heroism and leadership common to all Germanic tribes,

the ideal that stands out most clearly in the character of Beowulf — the Amal of Sweden, Denmark and Saxon England. *The compound plainly meant what the north Euro¬ pean hero-stories described : The man who ruled because he labored for the benefit of all. In France this name was softened to Amaury. Thus, a certain theologian who was born in the 12th century at Bene, near Chartres, is called indifferently Almaric of Bene or Amaury of Chartres. England, in the 13th century, could show no more commanding figure than Simon of Montf ort-/' Amaury, Earl of Leicester, to

whom King Henry once said, ((If I fear the thunder, I fear you, Sir Earl, mote than all the thunder in the world.® A Norman Amalric was that Earl Simon, creator of a new force, and a democratic one, too, in English politics. ((It was,® says the historian Green, (<the writ issued by Earl Simon that first summoned the merchant and trader to sit beside the knight of the shire, the baron, and the bishop in the parliament of the realm.® In Italy, after the Gothic invasion, the Northern name suffered comparatively slight euphonic changes, which can be easily traced. As borne by a bishop of Como in 865 it became Amelrico or Amelrigo. But the juxtaposition of the two consonants l and r presented a difficulty in prononciation which the Italians avoided : they changed Ir, first, to double r, and then to a single r. Still, 600 years after Bishop Amelrigo died, the Floren¬ tine merchant, explorer and author usually re¬ tained the double r in his own signature, writ¬ ing (< Amerrigo Vespucci,® and, by the way, accenting his Gothic name on the penultimate (Amerigo, not Amerigo). In Spain the name must have been rare, since it was often used alone to designate the Florentine during his residence in that country. There was, ap¬ parently, no other Amerigo or Amerrigo in the Spanish public service early in the 16th century. We must again look toward the North for the scene of the next important change, and among the men of a Northern race for its author.

Martin Waldseemiiller, a young German geographer at Saint Die, in theVosgian Moun¬ tains, whose imagination had been stirred by reading Amerigo's account of voyages to the New World, bestowed the name America upon the continental regions brought to light by the Florentine. It is not enough to say, with Mr. John Boyd Thacher ((Columbus, } Vol. Ill; compare also his interesting Continent of America)) , that Waldseemiiller <(suggested® this designation. As editor of the Latin work, the (Cosmographiae Introductio* (5 May

1507), he stated most distinctly, with emphatic reiteration, his reasons for this name-giving; placed con¬ spicuously in the margin the perfect geographi¬ cal name, America, and at the end of the volume put Vespucci's narrative. Further, on a large map of the world, separately published, he drew that fourth part of the earth which was the < Introduction > novel feature — marking it firmly, (< America.® It is impossible to adopt the suggestion of Professor von der Hagan, that Waldseemiiller was distinctly conscious of giv¬ ing the new continent a name of Germanic origin. <(Quia Americus invenit,® says the (In¬ troduction <(Americi terra sive America nuncu- pare licet.® But the case stands otherwise when we ask why Europeans generally caught up the word. Its association with so many men be¬ fore Vespucci certainly commended it to North¬ ern taste.

Marrion Wilcox.

Author of (History of War with Spain / etc.

AMERICA, the second in size of the iso¬ lated land masses of the globe ; containing about three-tenths of the total land surface and per¬ haps half the cultivable area, but less than one- tenth the population. The name was originally used only for central Brazil, and was applied in honor of the Italian, Amerigo Vespucci

(q.v.), who claimed that he discovered it. (See America : a brief account of the derivation and meaning of the word). It was first em¬ ployed for the entire known Western world by Mercator in 1541, and is usually but not prop¬ erly understood to include Greenland, which is physically a part of Europe.

The extreme points marking the limits of this vast continent are: North, the point of Boothia Felix, in the Strait of Bellot, lat. 71° 55' N., long. 94° 34' W. (in Alaska Point Bar- row, lat. 71° 23' 31" N., long. 156° 21' 40" W.) ; South, Cape Froward, lat. 53° 53' 45" S., long. 71° 18' 30" W., or, if the archipelago of Tierra del Fuego is included. Cape Horn, lat. 55° 59' S., long. 67° 16' W. ; West, Cape Prince of Wales, lat. 65° 33' N., long. 167° 59' W. ; and East, the Point de Guia, lat. 7° 26' S., long. 34° 47' W. Its total area is not far from 16,000,000 square miles, without Greenland or the polar archipelago.

Topography. — Nominally one ((continent,® it is really two if not three sections, geologically independent. The northern, from the Arctic Ocean to the Isthmus of Tehuantepec in Mexico on the west (where the last slopes of the Anahuac plateau of the Rocky Mountains sink to the plain, and the Guatemalan Highlands are not in sight), and

Florida on the east, is con¬ nected with the southern by two great parallel ridges. One called Central America, is con¬ tinuous, joining South America at the west side, and dwindling to 28 miles across at the Isthmus of Panama ; the other, partly submerged, consisting of Haiti, Porto Rico and the Lesser Antilles, joining at the eastern side; the two united transversely by Cuba and Jamaica and the projection of Yucatan, and enclosing the Caribbean Sea, 1,500 miles from end to end. The continental mass, 8,700 miles from Alaska on the northwest and Boothia Felix on the northeast to the south end of Patagonia, is prolonged to a total of some 9,600, nearly four- fifths the distance from pole to pole, by a vast archipelago of Arctic islands up from Hudson Bay (ending suddenly like a drift line about 125° W. long., and at Grant Land about 83° N. lat.), and by another at the south called Tierra del Fuego, on the Antarctic Ocean. But as with the eastern continent, some force has massed the land chiefly at the north : two-thirds of the continent is north of the equator ; the extreme point of the continuous northern islands reaches to a few hundred miles from the pole, the last of the southern is 2,350 miles from it; Alaska is 1,100 from the north pole, Argentina is 3,400 from the south. The same causes make it form part of a nearly solid ring on the Arctic Ocean, the northwest projection of Alaska being separated from the northeast of Kamchatka by only 40 miles of strait, and the continent being connected with Europe by a series of islands one to two hundred miles apart ; while the immense though widely un¬ equal gulfs of the Pacific west and the Atlantic east separate the habitable portions.

The axial dimensions of the continent are not very dissimilar to those of the eastern. Its length is about the same as the breadth of the other from China to England, its greatest breadth about the depth of the other from the Arctic to the Indian Ocean ; but its relative slenderness gives it less than half the area. It

is in fact an immense peninsula slightly severed from the main mass, with the shape and the southerly direction of the majority of penin¬ sulas. From nine to ten thousand miles long, it is little over 3,000 across its main north and south lines, from Labrador to British Colum¬ bia, or from Peru to Brazil; about 2,100 from Savannah to San Diego, a few hundred across Mexico, 1,725 at the Tropic of Capricorn just above Rio Janeiro, 750 from Buenos Ayres to Valparaiso, and so on southward. The Atlantic Ocean is relatively small and of regular breadth from Laborador and Brazil to England and Liberia, compared

with the immense abyss of the Pacific and its sweeping arch from the Bering Sea to Australia and Chile; from Newfoundland to Ireland is but 1,900 miles, from Cape Saint Roque in Brazil to Cape Palmas in Liberia but 1,700; while from San Francisco to Yokohama is 5,500, from Quito to Singapore (almost exact antipodes) 12,500, and from Valpariso to Sydney 8,000. Strangely enough the continents fit to¬ gether somewhat as would the blocks of a dis¬ sected map. The great eastern projection of North America is toward the Bay of Biscay, that of South America toward the Gulf of Guinea, the great western projection of Africa toward the Gulf of Mexico and the Caribbean Sea. The same closure (about 45°) which would bring Newfoundland against Brittany and Labrador against the British Isles, would make the Kongo empty against the Brazilian coast and the West Indies surround Senegambia. In physical char¬ acter also the northern and southern portions of each are akin: northeastern North America has the broken island-fringed peninsular coasts and the gigantic inlets and inland seas of Europe, while South America has the solid coast-wall and the absence of lakes character¬ istic of western Africa. Not to mention the great polar archipelago or Hudson's Bay, and allowing the archipelago at the south end of Chili to set off against the Alexander Archi¬ pelago along the south Alaskan coast, there is no parallel in South America to oceanic bodies like the Gulf of Mexico, or lesser ones like the Gulf of Saint Lawrence northeast to Puget Sound northwest, or the Gulf of California southwest; or the mass of sheltered bays and sounds along the east¬ ern coast to the Great Lakes; to islands like those around the mouth of the Saint Law¬ rence or Vancouver's, or- peninsulas like Nova Scotia, Florida and Lower California. It must be said, however, that there are strong physical differences between South America and Africa: the chief mountain ranges of the former being on the west, of the latter on the east; the African rivers are less copious, and mostly have cataracts above their mouths, proving recency of origin. It has been argued, not without some show of reason, that these structural re¬ semblances are more than accidents, but scientists are far from agreeing as to the cause, and a discussion of the high-sprung theories that have been advanced to account for them would be out of place here.

Apart from this, the structural characteris¬ tics of the northern and southern continents have striking similarities, largely nullified for human use by the difference in location already mentioned. Each is a rather slender triangle with the vertex to the south. Each is joined to the next northern portion of the globe by a

northwestern peninsula, the trend of the whole as far south as Bolivia being regularly south¬ east from Bering Strait, just as that of the

Asiatic coast to the Philippines is southwest ; so that the north Pacific is a semicircular gulf. Each has to the north an immense archipelago and a vast island-ringed inland sea. Each has a framework of mountain and plain correspond¬ ent in general, though with some important differences. In each, according to the law that the largest continental mountain chain is on the side of the largest ocean, there is a western range of immense height and mass, hundreds of miles broad and split into parallel sections sometimes connected by transverse spurs, stretching its entire length ; quite recent in origin, and the volcanic action which raised it still energetic in parts. The Andes in South America thus correspond to the Rockies in North America; but the current idea that they form part of one continuous system is erro¬ neous, — the Andes end in Venezuela, and the Rockies are of different genesis. Each con¬ tinent has on the east a much shorter chain, much older and therefore much lower, from the erosion through geologic ages, and its volcanic fires long since spent ; and as the highest points are worn down earliest, each is now rather a broad plateau with some elevations than a mountain wall. The Alleghany-Appalachian system in the United States corresponds to the Brazilian chain, which has no one distinctive title. Each continent has also a lateral range beginning in the north centre, turning first south and then east till it ends somewhat north of the eastern vertical chain, and cut in its course by the chief river running northeastward; and in each it is much the oldest part of the con¬ tinent. Tim Laurentian chain in North Amer¬ ica, crossed by the Saguenay, is a trivial counterpart to the great lateral ranges of Vene¬ zuela and the Guianas, crossed by the mightier Orinoco.

Hydrography. — In each continent the two main ranges are connected by an almost unin¬ terrupted plain many hundreds of miles broad, sloping southward to the ocean, and drained by three immense hydrographic systems with slight and sometimes non-existent divides : one running east and emptying just north of the eastern vertical range, the Great Lakes and the Saint Lawrence in the north corresponding in posi¬ tion to the oceanic Amazon in the south; the second running south and discharging a little south of the same range, which thus forms one side of a huge triangle of which the rivers form the other two — the Mississippi and Missouri in North America comparable to the Parana and Paraguay which form the La Plata in South America;. a third running northeast and discharging into the northern ocean — the Saskatchewan, with the Red River of the North and Lakes Winnipeg and Manitoba, correspond¬ ing to the Orinoco. Besides these, each has a river following the eastern side of a spur from the main range up to the northern ocean, the Mackenzie in the Arctic

regions and the Mag¬ dalena in Colombia, though the former is the drainage of a great Arctic plain while the latter is confined between two ridges. With regard to the watersheds, those of North America lie within a few miles of each other in Minnesota; the headwaters of the Illinois in the Mississippi Basin lien within a half mile of the Chicago in

the Saint Lawrence system, and the two have now been connected; the Amazon and Plata sys¬ tems are only three miles apart, and those of the Amazon and Orinoco are actually connected by the so-called ˆriver® Cassiquiare, a deep and broad natural channel about 150 miles long, running either way according to conditions of flooding seasons.

These, however, by no means exhaust the large drainage systems of North America, though in South America the closeness of the western chain to the ocean throws the whole burden on the east. The Pacific slope of the north is drained in the semi-Arctic regions by the immense Yukon, one of the great rivers of the globe. On the eastern side the great mass of the Arctic moors sends its drainage through a network of small streams, and lakes like Great Bear, Great Slave and Athabasca lakes, by the Mackenzie to the northern ocean, the Great Fish. River taking the east Arctic waters. Farther south the Pacific drainage is by the Fraser into Puget Sound, and by the Columbia into the Pacific. The smaller Sacramento drains central California. The Great Basin be¬ tween two arms of the Rockies sends its scanty and precarious rainfall into the Gulf of Cali¬ fornia by the Colorado. East of the range in the south the Rio Grande has a long course and forms the boundary between the United States and Mexico ; but, despite its impressive name, is not of great volume. Between this and the Mississippi system several considerable streams dram the Texas region; the Colorado, Brazos, Sabine, etc. East of the Appalachian system a number of fair-sized and beautiful rivers flow to the Atlantic — the Saint John’s, Penobscot and Kennebec, the Connecticut, Hudson, Delaware and Susquehanna, the Potomac, James, Cape Fear, Savannah, etc. In South America the large rivers of the eastern slope are the Sao Francisco and the Paranahyba of northern Brazil ; but between this range and the Amazon system a great plain is drained by the huge Tocantins, which, though emptying only at the mouth of the Amazon, is really a part of its basin.

The drainage systems of America have no parallel on the globe. The Amazon discharges more water into the sea than the eight largest rivers of Asia together, and the Mississippi more than all the streams of Europe large and small. The navigable waters of the Saint Law¬ rence, Mississippi, Amazon, Orinoco and Plata systems together amount to over 100,000 miles in length. The five Great Lakes of America alone — excluding large bodies like Winnipeg, Manitoba, Champlain, Nicaraugua, Titicaca, etc., and the polar lakes — make up an area of 89,000 square miles, or considerably more than England and Scotland together.

Another physical similarity between the two continents might be found in the relations of the Gulf of Mexico to the northern continent and the great Argentine plain to the southern ; both lie in the same position with regard to the eastern and western mountain chains, though the one is submerged.

But the differences are also great. The main drainage system of the central plain in North America is to the south, by the Missis¬ sippi ; that in South America is to the east, by the Amazon ; while the Great Lakes are a great drainage system for the surrounding VOL. l — 3i

regions, the melting snows of which supply them through deep rock fissures. They are hollows in the oldest rock elevation of the continent, with the ground sloping away from them in every direction not far from their shores ; not a single considerable stream flows into them, nor even into the Saint Lawrence west of Montreal. The most vital difference structurally is due to the position of the west¬ ern chain. In North America the chief height is on the eastern flank a thousand miles from the Pacific, the gradually lessening slopes leav¬ ing space for an empire along that ocean, and their drainage forming great rivers. In the southern continent it hugs the ocean so closely that not a stream of any size flows into the sea, and the cultivable area is but a petty strip on the coast. More than half the whole western side of South America is occupied by one state, some 1,500 miles long by 50 or 60 wide, which even so finds none too much terri¬ tory with its slender width and partly barren soil. The northern continent has also an im¬ mense advantage in the character of its coast line : what with its archipelagoes, sounds and river-mouths in the north, and the sheltered in¬ dentations farther south, it is well fitted for commerce, while the whole South American coast has very few good harbors above Pata¬ gonia. The greatest differences in the civil¬ ized destiny of the two continents, howeyer, are due to the northward massing of the land heretofore mentioned. All the United States and southern Canada lie in the temperate re¬ gions; the largest and most fertile part

of South America lies in the tropics. The narrow southern part of North America lies in the warm semi-tropic ocean ; that of South America in the south-polar sea. A quarter of all North America is a worthless polar waste, but per¬ haps as large a space of South America is an uninhabited and pestilential tropic jungle; and the improvements in food production and means of warmth which push back the reign of the one are perhaps balanced by the hygienic in¬ ventions and commercial uses tending to re¬ claim the other. Certainly the northern part has much more arable land and much less miasmatic or enervating climate than the other, nothing whatever that compares with the pestilential coasts and inland swamps of the southern. The Mississippi Valley, the largest continuous body of agricultural land on the earth, is not only of immensely greater value than the grassy steppes of the temperate south¬ ern plain of South America, but the prairies of the north, which correspond in position to the Amazonian forests in the south, are a still more striking contrast. Commercially the north is equally favored in comparison. From the nearness of the continent to Europe rela¬ tively to Asia, and from the structure of the continent throwing the mass of population and production east of the great mountain chain, the chief commercial relations of America must always be with the western side of the other continent. But North America is di¬ rectly opposite Europe, the commercial head of the world ; while South America's eastern neighbor is barbaric Africa, and most of its harbors are either along the miasmatic north¬ ern and northeastern coast, unfit for great cities, or the semi-polar shores of Patagonia.

For general works on American geography and topography consult the New Universal Geography, > translated by Keane and Raven- stein from Elisee Reclus' French work (1890- 94) ; Dawson's North America, Canada and Newfoundland) (1897ˆ ; Keane's (Central and South America) (1901) ; Shaler's Nature and Man in America) (1891) ; Wright's (Ice Age in North America> (1889); Powell's Physio¬ graphic Regions of the United States) in Na¬ tional Geographic Monographs) (Vol. I, 1895).

Physiographical Conditions. — The great western chain of both continents, which would seem to be the chief formative base of both, is in fact very much the newest section in each case, though each is of independent origin, as shown by the energy of still remaining vol¬ canic action in both ; while the uplift of the eastern side has so long

ceased that erosion has worn them down many thousands of feet, trenching immense valleys, and building up vast plains to the west by their detritus.

The Archean portion of North America, the first in order of appearance above the water, is the northeastern part: the elevation in which the Great Lakes and Hudson Bay are hollows, the Laurentian system of Canada, the Adiron- dacks of northern New York, and a southern tongue east of the Blue Ridge. The line of forces thenceforth acted steadily to the west¬ ward, the surface formations regularly grow¬ ing more recent in that direction. This por¬ tion is not merely the oldest of the western continent, but among the oldest on the globe, the <(New World® being new only from the standpoint of European history, not of geology or ethnology. This and the polar archipelagoes are composed of Pre-Cambrian or Palaeozoic rocks of extreme antiquity. The highlands of Labrador and those extending north and west are mainly granite and other archaic rocks. To the west stretches the vast plateau called by Suess the “Canadian buckler® and known to American geologists as the <(Canadian Shield.® By erosion this has been almost denuded of its upper Paleozoic strata, and the whole of Hudson Bay excavated to a slight depth on the surface of its eastern section.ˆ The eastern part of the Appalachian system is mostly Silurian and older rocks; its western plateau and most of the Mississippi Valley are Carboniferous; while as we go westward we encounter in suc¬ cession Cretaceous and Tertiary formations.

The Rocky Mountain system shows the greatest activity of volcanic forces at its ends, in Alaska and Mexico. In the old portions of the United States and Canada there are no active volcanoes; and the strength of eruptive force, greatest in the Aleutian Islands, stead¬ ily diminishes eastward and southward, oc¬ casional eruptions occurring on the southwest¬ ern coast, while Mount Wrangell is semi-erup¬ tive only. Within the present boundaries of the United States, exclusive of Alaska, the only volcanic activity within historic times has been that manifested by Lassens Peak, California, during the years since 1914. In Mexico, Popo- catapetl and others indicate the beginning of the equatorial belt of volcanic forces exhibited in Central America and the Antilles. But all the Cordilleran system is relatively of recent eleva¬ tion, though old enough for heavy erosions to have taken place, exposing strata of every age as they were tilted up, creating some valleys and

filling up others. In the region from California to Puget Sound the surface over many thousand square miles is lava, the valley of the Snake and Columbia for long distances being cut through lava beds,

and fields of black scoriae forming a peculiar feature in the northern Pacific States and Pacific Canada. To the south of the Appalachian system, along the Atlantic and the Gulf, the flooring is Cretaceous and Tertiary, therefore of recent uplift.

Modifying the erosive action on these primi¬ tive elevations there has operated a vast ice cap, the so-called Laurentian glacier, which at an un¬ certain but relatively recent period, ending probably from 50,000 to 100,000 years ago, covered all North America from the polar regions down to Philadelphia and the Ohio and as far west as the Missouri, leveling hills and hollows, creating soils, excavating lake beds, changing the courses of streams and the outlets of gigantic lakes, cutting out and blocking up fiords and harbors, and de¬ positing enormous masses of rock and gravel moraines. To this, among other things, is due the creation of New York harbor and Niagara Falls, and the turning of the Great Lakes through the rocky Saint Lawrence valley instead of the Mohawk and Hudson. This ice cap has by no means wholly disappeared yet : the immense glaciers on the northwest coast and in the Rocky Mountain heights, some of them hundreds of square miles in extent, are remnants of the one great glacier of ancient times which still covers almost entirely the turtle-back conformation of Greenland.

In South America the eastern highlands are also of enormous antiquity, as shown by their archaic composition, with a sandstone cap not since submerged, their horizontal layers, deep erosions and detritus plains indicating no up¬ lift since the earliest times. The Andes (q.v.) are quite recent, and full of volcanoes still or but recently active, but they are not all of a sin¬ gle age, however, and show successive uplifts. The plains between have Tertiary bases under their alluvial surface.

South America too has had its glacial periods, spreading from the south-polar regions and producing the same effects as in its north¬ ern neighbor. The great heights of the Andes keeps them still existent up to and beyond the equator.

The Cordilleran System. — The two great axial chains which form the western base of the double continent, though (as said) of in¬ dependent origin, have strong similarities and a like relation to the remainder of the surface, and may conveniently be treated together. For their detailed composition and characteristics, see Andes and Rocky Mountains. It should be noted that these are not mere dividing walls, but vast formative elements of the continental masses, and themselves of continental volume. With their foothills and spurs they

amount in South America to at least 1,000,000 square miles in area, and in North America to some 2,500,000, or toward a third of the entire surface. They include almost every possible character of soil and climate and natural product, and suitability for every employment, — agriculture, manufac¬ tures or mining. They make climates of their own, so that no inference can be drawn from that on one side to that on the other, and the

two may have the difference of five degrees of latitude or 5,000 miles of distance: one side may be a sponge, the other a rainless desert, one a glacier, the other a garden. They make the difference between Puget Sound and Labra¬ dor, and on the other hand between the Mexican plateau and the Nicaraguan plains, between Peru and Caracas. They enclose fertile proy- inces and deserts of rock and sand each large enough for an empire, and have great lakes and considerable rivers entirely their own.

As the development is better studied from the south, we shall begin with South America, whose cordilleras descend by steep short ter¬ races to the seashore, or to a narrow belt of level land immediately adjoining it, form regu¬ lar chains, display the loftiest masses of all America and send out only short branches to the eastern plains; whereas the North American cordilleras lean, in the west, on elevated pla¬ teaus, so as to favor a large development of rivers, are less vertical in their structure and less high and send to the east more extensive ramifications. The name of particular groups of the Andes are taken from the countries to which they more especially appertain ; thus, pro¬ ceeding from south to north, we have the cordil¬ leras of Chile, Bolivia, Peru, Ecuador and Co¬ lombia. This, as a whole, is the highest moun¬ tain mass on the globe, and except the Hima¬ layas has the highest peaks. Beginning among the rock islands of the Fuegian archipelago, it runs through Patagonia as a low single range with summits of perhaps 8,000 feet ; rises swiftly through Chile, growing at once higher and more multiplied, with summits of 12,000 to 18,000 feet, till it culminates in the stupendous nevado of Aconcagua, from 23,000 to 24,000 feet high, the loftiest elevation on the western hemisphere. Beyond this it divides into two enormous paral¬ lel arms with a high plateau between, and lower ranges to the east in Argentina increasing its complexity. Thence to the Isthmus it is not a ridge, but a rock continent 200 or 300 miles wide, with a great number of peaks from 19,000 to 21,000 and even 22,000 feet high,

and the very <(passes):> over them 15,000 or 16,000 feet above the sea, terrific and nearly impassable gorges above the highest summits in Europe. Sometimes it contains three or four parallel ranges, with two and even three immense till¬ able valleys on the same base. It attains its greatest breadth at about lat. 18° S., in central Bolivia, where it is some 300 miles wide, with three main ranges ; and at this point, in the northern part of the province of Tacna, it and the correspondent coast curve northwest as far as 5°, its course in this direction being exactly coincident with the limits of Peru. On these plateaus was situated the empire of the Incas. Just northeast of the turn it holds the great Lake Titicaca, some 1,800 miles in area, on a high plateau 12,645 feet above the sea, the sur¬ face of the lake itself being nearly 12,500 feet above sea-level. This part is called the Royal Cordillera and contains several peaks above 20,000 feet. At the Gulf of Guayaquil it again turns north, with a gradual trend east to about lat. 4° N., when it curves north and west to meet the Isthmus, forming a large but nameless gulf. Near the equator, in Ecuador, are a number of very lofty volcanic summits, the two highest and most famous of which are Chim¬

borazo, 20,498 feet, and Cotopaxi, 19,613 feet. Thence to the Caribbean the height decreases, and in Colombia it divides into three, two running north and the third extending well into Venezuela, the true end of the Andean system.

Central America is hardly a part of either great system. The Isthmus is a low plateau, succeeded by highlands rather than mountains in Costa Rica ; then comes the depression near¬ ly filled by Lake Nicaragua, where the elevation sinks to less than 100 feet above the sea. The mountains begin in northern Nicaragua and occupy the entire breadth of Honduras, Guate¬ mala and Salvador from ocean to ocean; but they are not of great height and consist of several detached ranges with active or extinct volcanic peaks. These sink to a broad plain at the Isthmus of Tehuantepec, forming the dividing line between the mass of North American and South American organic species ; though zoologically the central plateau is a northern tongue thrust into two lines of tropic territory along the Gulf and Pacific coast.

The Rocky Mountain system, or northern Cordillera, begins with the plateau of Anahuac on which the City of Mexico is situated, the seat of the original culture overthrown by Cor¬ tes.- It is from 4,000 to 7,000 feet high, and is flanked by mountain ranges and isolated vol¬ canic peaks, active or quiescent, the highest summits in Mexico. Orizaba, the loftiest, is 18,250 feet high ; but the most remarkable and imposing is Popocatapetl, rising 17,520 feet from the floor of the

valley, the highest peak of the world in practical isolation, its whole height visible from sea-level. At this point the main ridge of the Rockies (the Mexican section is known also as the Sierra Madre, which prop¬ erly is the name of the northeastern spur) sud¬ denly turns far eastward from the Pacific, and for the remaining 3,500 miles of its course keeps hundreds of miles from it, so that the broad western slope is drained by very large rivers, as the Columbia and Fraser, and in the extreme north the mighty Yukon. But it throws out lesser arms to the west nearly to the ocean. Between the main range and the great Sierra Nevada arm is enclosed the desert Great Basin of Utah and Nevada and northern Arizona and New Mexico: a waste of alkaline earth and* naked rocks, of river courses dry except in the infrequent rains, and roaring torrents then for a few hours or minutes ; of the great canons, gulleys cut sometimes a mile deep into the solid rock by the swift sand-laden currents. It is drained to the Gulf of California by the only real stream of water of any size in the whole region, the Colorado. The Sierra Nevada has for its crowning summit Mount Whitney, in California, 14,898 feet high. Still farther west it throws out the Coast Range, running through California, Oregon and Washington up to Puget Sound. The Sierra Nevada is continued, both structurally and through more recent independent volcanic action, by the Cascade Range of Oregon, Washington and British Columbia, with Mount Shasta, 14,510 feet, in the south, and Mount Rainier or Tacoma, 14,526 feet, in Washington. Puget Sound is a submerged trough and the Valley of California a lowland lying between the Coast ranges and

the Sierra Nevada-Cascade ranges. The system as a whole, across from California and Oregon to Colorado and Wyoming, is 1,000 miles wide, with a number of north-and-south. ranges rising from a plateau from 5,000 to 10,000 feet high, and with a large number of peaks between 14,000 and 15,000 feet high. The main range in Colorado has for its chief divisions the Front, Sangre de Cristo, Park, Saguache and San Juan ranges; Long's and Pike’s Peaks, Blanca Peak, Mounts Lincoln and Harvard and Uncompahgre Peak are the best known of the summits.

The system follows the coast around nearly to Asia, rising in peaks all along the Aleutian Islands, the chief being the noble Shishaldin, 8,000 feet high; and north of Yakutat Bay, a great landmark, where the coast turns west and the greatest glaciers begin, the place where the

temperate zone properly gives place to the semi- Arctic — a branch continues straight on, runs far north to the Yukon watershed, then turns west again and rejoins the other in southwest Alaska. In the course of the latter it throws up mighty peaks, the monarchs of the northern continent, including Mount Saint Elias, 18,024 feet, and Mount Wrangell, a great isolated semi-active volcano, 17,524 feet; the altitude rising as it goes west, it culminates in Mount McKinley, 20,464 feet, the highest elevation in North America.

The Eastern Mountains and the Plains. —

In North America the backbone and nucleus of the continent is locally known as the Alleghany system in the northern half of the United States and the Appalachian in the southern ; but for scientific purposes the latter name is commonly extended to the whole. It extends from Gaspe peninsula, between the lower Saint Lawrence and Chaleur Bay, below Quebec, through the United States to north Alabama and north Georgia, where the mountains sink dowTn to the great coastal plain which girdles the United States from 50 to 100 miles back from the shore. Between the mountain and plain is a foothill region usually known as the Piedmont region. The mountains are a plateau from 50 to 200 miles wide and averaging 1,500 to 3,000 feet high, but with peaks rising to 6,294 feet in Mount Washington (New Hampshire) and 6,707 feet in Mount Mitchell (North Carolina).

. The range has many local names for the differ¬ ent divisions, as the White and Green, the Adirondacks, the Taconic, Hoosac and Catskill, the Alleghany, the Blue Ridge and South Moun¬ tain, the Black and Smoky, etc.

On the west they slope through rolling up¬ lands to the most peculiar feature of the North American surface, entirely unlike any other part of the globe, the prairies (called savannahs in English books, but never in American speech) : a block of undulating plains of enormous ex¬ tent in the centre of the Mississippi basin, com¬ posed mainly of dark, rich loam from a foot to several feet deep Qver a bottom of clay, and of such composition that natural tree-growth is largely absent even where rainfall is plentiful, though grass and other crops grow abund¬ antly. Often this will be as level as a floor for scores of miles together, and the eye sweeps uninterruptedly over a grassy ocean to the horizon. On the west of this extend to the Rockies lands often as flat as the prairies, but

lacking their individual trait and called plains instead. The same features are repeated in northwest Canada from Manitoba to the

Rockies. Locally they are known as the <(Great Plains.®

In South America the eastern chain is simi¬ larly formed of several parallel ranges follow¬ ing the Brazilian coast, on a wide plateau, a reduced copy of it running through the Guianas. The whole centre is an immense plain sloping sharply up to the Andes ; but in place of the vast- treekss flats of the northern continent there is the most enormous forest of the world, two and a half millions of square miles in ex¬ tent. North of this, however, are considerable plains along the Orinoco called llanos. Below' the range the country is a great grassy steppe, rather ill-watered, called pampas, and extending through Argentina and Patagonia.

Geology and Mineral Resources. — North America. — The North American continent may rather easily be divided into a few great geo¬ logical units, the general features of which are simply and briefly stated below. These divi¬ sions may be termed the Canadian Shield, the Coastal Plain, the Eastern Highland, the Cen¬ tral Lowland and the Western Highland.

Canadian Shield. — The nucleus of the con¬ tinent consists of a great U-shaped area en¬ closing Hudson Bay, and extending in the Lake Superior region southward a short distance into the United States. It also sends a long arm southward into the Piedmont region, along the east border of the Appalachian Highland. This large area consists almost wholly of highly folded Pre-Cambrian (q.v.) (Archean (q.v.) and Algonkian (q.v.)) rocks, granites, schists, quartzites, marbles, etc., of great age ; and it was by the erosion of this mass, largely, that the sediments were derived to build up the other portions of our continent. Particularly in Canada, this area contains extremely valuable deposits of gold (Porcupine District), silver and cobalt (Cobalt District), and copper and nickel (Ludbury District). In Michigan it also contains famous mines of metallic copper; and in Michigan, Wisconsin and Minnesota are great iron ranges, among which the Marquette and Mesaba are the best known. The eastern part of this large region is known as the Laurentian Highland. The area as a whole is not mountainous, and consists of a rather low, dissected peneplain (q.v.), the aver¬ age elevation of which is about 1,000 to 1,500 feet. It has been glaciated in comparatively recent times, and contains vast areas of swamps . and thousands of lakes. Geologically the region is known as the ˆCanadian,® or (<Pre-Cambrian Shield.®

C oastal Plain. — On the eastern and south¬ ern sides of North America, from the vicinity of New York southward, is a low flat plain which sweeps around the southern end of the Appalachian Mountains,

and from the Gulf of Mexico merges gradually northward into the great interior plain. It is known as the Coastal Plain. Geologically it is extremely young, con¬ sisting wholly of Cretaceous (q.v.) and Tertiary (q.v.) rocks, mostly soft, unconsolidated clays, sands and marls. At a time geologically recent, this area was under the sea, and these beds were laid down as a result of the erosion of older parts of the continent. The region is so new

and so low that it has undergone little erosion, and is consequently very flat and monotonous in topography. Portions of it are rich agri¬ culturally, where the soil is not too sandy. Owing to the unconsolidated condition of the rocks, building stone is less abundant than else¬ where. Aside from petroleum products and salt, both of which occur in quantity in the Louisi¬ ana and Texas portions of the area, the Coastal Plain is singularly poor in mineral wealth.

Eastern Highland. — This highland, extend¬ ing from New England southwest to Alabama, has a base of Pre-Cambrian rocks, among which granites, gneisses and schists are dominant. Upon these rests an intensely folded complex of shales, limestones and sandstones, embrac¬ ing rocks belonging to every period of the Paleozoic Era. Throughout the Paleozoic, this area was almost continuously beneath the sea, finally emerging at the close of the Era, when it was folded into a marked mountain range. Erosion has one or more times almost com¬ pletely leveled away the range, and still further uplifts without folding have allowed the streams to cut away the soft layers of rock, leaving the upturned edges of the harder layers as long parallel mountains typical of Appalachian topography. To the west this folded region grades into a high plateau of flat-lying rocks chiefly of Carboniferous Age, known as the Allegheny (north) and Cumberland (south) plateaus. The chief mineral wealth of the region lies in its coal, of which the area of Pennsylvania anthracite is the most famous field. Slate, marble and granite are especially important products in the New England portion. The intensely folded area yields little oil and gas, but the flatter plateaus to the west contain the important Appalachian petroleum field.

Great Central Lowland. — With the excep¬ tion of a few minor uplifts, such as the Onichi- tas, the Ozarks, the Black Hills, and others of lesser note, this region is a vast interior region, lying south of the Canadian Shield, and en¬ closed between the Eastern and Western

high¬ lands, sending a narrow arm to the Arctic be¬ tween the Western Highland and the Canadian Shield. The area is one of flat-lying rocks. East of the Missouri River, these are almost wholly Paleozoic, the Carboniferous being the most wide-spread surface formations. From the ' Missouri River westward, Cretaceous and Tertiary rocks constitute most of the surface. It was during late Carboniferous times that most of this area permanently became land, al¬ though its western portion was again tempo¬ rarily under the sea during the Cretaceous period. Topographically the region varies from almost dead level plains to sharp hilly regions, ranging from a few hundred to 5,000 feet above sea-level. The northern part has been glaciated, and swamps and lakes are abundant. As a whole the region comprises the great agricultural portion of the continent. It is the richest in coal and petroleum of any section of the country. It has very valuable lead and zinc deposits, beds of salt, quarries of building stone and other minerals of lesser value.

The Western Highland. — This portion of the continent is more complicated in structure and history than the areas thus far considered. It may be said to consist of a great range of mountains, the Rockies proper, on the east, to

the west of which lies a broad plateau region, and beyond this the Pacific border ranges, them¬ selves complex in structure and history. These sections will be taken up each in a separate brief discussion.

The Rocky Mountains, contrary to rather hazy prevalent conceptions, lie nearly a thou¬ sand miles from the Pacific Ocean, at least in the United States. They contain rocks of every age from Pre-Cambrian to Quaternary folded into ranges, rather generally trending north and south. Their final emergence from be¬ neath the sea, and the folding which gave them their present structure, came at the close of the Cretaceous period. During the Tertiary they were the site of much igneous activity, and since their folding they have been greatly modi¬ fied by powerful erosion, several minor uplifts and very recently by glaciation. Unlike the Appalachian region, there are minor areas be¬ tween the numerous ranges, in which the rocks are flat-lying, or nearly so.

The Inter-Mountain plateau, while it con¬ tains some areas of intense folding, is more largely -one of nearly flat-lying rocks, greatly modified by faulting. The rocks are of all ages from Pre-Cambrian to Tertiary.

The southern and higher portion of this large region is generally

known as the Colorado plateau. Paleozoic rocks are exposed at a few points, but the surface formations are largely Jurassic and Cretaceous in age. The rocks are nearly flat, as a wEole, and the structure is dominated by a few very large faults. Above the plateau surface, which average 5,000-7,000 feet in height, rise several groups of volcanic mountains, among which the San Francisco Peaks and the Henry Mountains are best known. The area is deeply trenched by magnifi- cient canons, among which the Grand Canon is easily the foremost.

To the north and west of the Colorado plateau is that portion of the Inter-Mountain plateau most commonly called the Great Basin. This region stands notably lower than the Colo¬ rado plateau and is much more intensely faulted. Paleozoic formations and Tertiary lavas and lake beds are wide-spread surface rocks. The general floor of this region ranges from a few hundred to 5,000 feet above sea- level, and above this are many north and south mountain ranges carved out of fault blocks. Between these ranges are extremely flat desert floors, some of them beds of extinct salt lakes.

Still farther north this complicated basin structure has been buried beneath thousands of feet of Tertiary lavas, forming the great Columbia Lava plateau, many thousands of square miles in extent. This has more recently been trenched by the Snake and Columbia rivers, which have cut canons from 2,000 to 4,000 feet in depth.

The Pacific Border ranges are made up of the Sierra Nevadas and Cascades on the east, and the Coast ranges on the west, wdth the Valley of California, the Willamette Valley and Puget Sound as lowlands separating the two systems.

The Sierra Nevada Range consists largely of Triassic and Jurassic slates, cut by great masses of granite. The range was folded near the close of the Jurassic period, since which time it has been modified by subsequent uplifts,

faulting, and very extensive erosion, with recent glaciation. To the north it passes with some¬ what similar structure, under great piles of lava that constitute the numerous volcanic cones of that range, dating from Tertiary time.

The Coast ranges consist of intensely folded and faulted rocks varying

in age, but probably dominantly Tertiary. Their structural history has been extremely complex. One in¬ tense period of folding came near the middle of the Miocene. There have been later uplifts, accompanied by some folding and much faulting the latter process going on even to the present time, as witnessed by the great fault responsible for the San Francisco earthquake.

The Western Highland Region, as a whole, has been one of intense igneous activity dating at least from the Jurassic, and perhaps earlier time, to the recent activity of Lassen's Peak, in California since 1894. This igneous activity is probably the one fact most largely responsible for the great metallic wealth of the region, gold, silver, copper, lead, zinc and many other minerals occurring in very rich deposits in many widely separated localities. Coal of Cretaceous and Tertiary age is also an important economic produce, and petroleum occurs in enormous quantities in California, and in lesser amounts in other localities.

Smith America. — The mineral belt of South America centres upon the great continental backbone of the Andes, following along the entire western coast. Other small areas add their tribute, notably the coastal uplift of south¬ eastern Brazil, known as the great Brazilian Plateau. The territory available for profitable exploration and development is, broadly speak¬ ing, boundless. Somewhere within the region may be found every mineral having commercial value, scattered far and wide from the. mother lodes by the grindings of glaciers and other erosive agencies, for South America exceeds any other part of the world in the abundance of its mineral wealth. After the advent of the Spaniards in the 16th century, Bolivia rivalled Mexico in the billions of dollars of silver taken from its mines, while a few of its mines yielded billions of dollars of gold. Hundreds of mil¬ lions of dollars of gold were also extracted from the soil of Peru, Colombia, Brazil and the Guianas. At the present day, with her treasures practically untouched, South America holds several world records in the mineral market. The entire supply of the world's bismuth comes from Bolivia ; by far the largest supply of thorium is furnished by the monazite sands of Brazil ; the unparalleled nitrate deposits of Chile supply practically all of the world's con¬ sumption of nitric acid, and practically all of its consumption of iodine. Colombia is the only considerable source of platinum outside of Russia ; the tin production of Bolivia stands second on the world's tally sheets ; Colombia supplies the world's demands for fine emeralds ; Brazil is second only to south Africa in the production of diamonds, and for many years was first; the asphalt lakes of Trinidad and Bermudez supply the world. Coal exists in large quantities all through the Andes region. In many localities wide seams are exposed to view for long distances along the slopes and in the

sides of ravines, millions upon millions of tons being in sight. Some of these coal veins come down almost to tide water — as at

Paracas and near Trujillo, Peru. Good coal is found also along the coast of Ecuador; in southern Chile coal is mined extensively at Lota and Coronel, . at the former place the mines running out under the sea for more than half a mile; deposits also exist in the Acon¬ cagua region near Rio Blanco. In Colombia coal exists in many widely separated localities; good bituminous coal in the interior and lignite beds near the coast; in Venezuela there is coal of fair quality. Indifferent development of this primal commodity, however, is the cause of the retardation from which the mineral industries of South America suffer. The only consider¬ able active oil production in South America is in the Lobitos fields of Peru. In Bolivia, how¬ ever, there is an immense oil belt 150 miles long, which continues over the national bound¬ ary into Argentina to Comodoro Rivadaira. At Santander, Colombia, there is an oil area 100 miles in length and 60 miles in width, and petroleum has been found in the upper Mag¬ dalena district. A large field also exists in V enezuela near the city of Maracaibo.

Iron exists in enormous quantities and of unrivalled quality through all South America awaiting development. In the Brazilian plateau are billions of tons of ore, carrying up to 50 per cent of the metal, but coal and transporta¬ tion are lacking for its successful utilization. Great iron deposits, notably at Tofo, are found in Chile. Other important deposits also exist in Colombia and Peru. Four-fifths of the world's supply of vanadium is produced by a single mine in Peru, to the extent of 3.000 tons annually. Bolivia, Argentina and Brazil furnish about one-tenth of the total production of tungsten, while the great sulphur mine at Tinguirirca, Chile, holds another record as con¬ taining the richest sulphur deposits known.

Consult reports, bulletins and monographs of the United States Geological Survey; reports of the Canada Geological and Natural History Survey; Suess (Das Antlitz der Erde) (The Face of the Earth, Prague 1883-88), and, more particularly, the excellent version entitled (La Face de la Terre,* translated and annotated by Emm. de Margerie (Paris 1911); Pirsson and Schuchert, (A Text-Book of Geology) (New York 1915) ; Felix and Lank, (Geologie und Palaontologie der Republik Mexico > (Leipzig

1890) ; Steinmann, (Sketch of Geology of South America* (in American Naturalist, Vol. XXV,

1891) ; Mill, ‘International Geography*; Rus¬ sell, I. C.t ‘North America. *

Climatic Conditions. — In a continent prac¬ tically spanning the entire space from pole to pole, every variety of climate may be inferred; and with every elevation from sea- line to everlasting ice even in the tropics, each latitude is sure to contain as endless va¬ rieties in itself. In both North America and Asia the western side is both warmer and of more even temperature than the eastern, ow¬ ing to ocean currents generated in the tropics and flowing eastward, the Gulf Stream through the Atlantic, the Kuro Shiwo through the Pa¬ cific. The Rockies, however, give a peculiar character to western North America, to be mentioned later, and even in interior Alaska the isotherms rise — the parallel of Dawson City in the Klondike is that of the north end of Hudson Bay and far into south Greenland. The eastern side of both continents has about

the same climatic belts : China corresponds fairly to the United States, and Peking has a climate not unlike Boston. But if we com¬ pare eastern North America with Europe, and to a less extent South America with the East, the leading trait is its greater cold in every zone from, just below Great Bear Lake; Pet- rograd and Christiania are on a level with the southern tip of Greenland. Sitka has much the same parallel as Aberdeen ; Copenhagen and Moscow, Glasgow and Edinburgh, corre¬ spond with central Labrador, northern James Bay and some distance north of Lake Winni¬ peg. All the British Isles, all the Netherlands and the greater part of Germany, are north of the city of Winnipeg, which itself is about on the parallel of Paris ; Saint Paul and Ottawa correspond to Bordeaux, Turin and Bucharest, centres of wine and roses; Boston and Chicago to Rome, New York to Naples; Philadelphia is south of Madrid and Constantinople ; Wash¬ ington corresponds to Lisbon and Corfu, Saint Louis to Athens.' The thirtieth parallel is about that of New Orleans and the Isthmus of Suez; the twentieth passes through the heart of Mexico, also just below Calcutta and Mecca, and through the Sudan and Sahara ; the tenth through Venezuela, also through Guinea and just above Ceylon. The equator touches Quito and the mouth of the Amazon, and also divides Sumatra and Borneo anfl Lake Victoria Nyan- za; the Amazon and the Kongo traversing about the same zones. Even allowing for the elevation of the Mexican plateau, the tempera¬ tures of India and of the deserts of Arabia and Africa cannot be paralleled even on our tropi¬ cal coasts.

The difference is due to environ¬ ing conditions and internal structure combined. Above the European mass is a partially thawed sea ; above that limit in America lie many hun¬ dred miles of ice-clad land masses, while to the northeast is the continental mass of ice- capped Greenland, piercing deep into the east¬ ern side the polar inlet of Hudson Bay. But a partial cause is the mountain framework which in Europe lies mainly east and west and in America north and south. In the latter, there¬ fore, what is practically one long plain stretches from the Arctic Ocean to the Gulf of Mexico, the polar winds finding no obstruc¬ tion as they sweep southward. There is not a spot in North America east of the Rockies abso¬ lutely secure from intense frosts; and there are no definite north-and-south climatic belts, the only sharp divisions being those east and west of the Rockies. In Europe and west Asia, on the contrary, where the mountains cut off the polar winds, the climate will often vary from north-temperate to semi-tropic within a score of miles. This isolation of different parts, giving the most varied lives and habits time to grow into deep-set racial distinctions, has produced by their varied strains and inter¬ action the splendid civilization of the Western world ; while the two great plains which fill the centre of each continent, linked by a fer¬ tile and temperate plateau, in itself the most tempting of all, gave no opportunity for differ¬ entiation, and the undiversified monotony of a single racial stock and culture was one of the influences which kept progress at a spot reached by European races thousands of years before.

Rainfall and Natural Sections.— The habitability of a land outside of Arctic regions

depends first upon its water supply and sec¬ ondly upon its disposition. The prevailing winds which supply the rainfall of all countries by the ocean vapors they carry blow nearly east and west, the easterly called specifically “trades,® the westerly “anti-trades.® The eastern con¬ tinent has its greatest length in this direction and a great mountain wall on the cast ; hence much of central Asia lying beyond the reach oi vapors remains a permanent desert. America, from its narrowness and its sides being toward these winds, is much more easily supplied. The Great Lakes add to the rainfall in their region; the Gulf of Mexico, as will be demonstrated, turns the whole east centre from a potential desert to a garden ; and the only entire deserts are between two arms of the western range in the northern part and some portion of the strip along the western coast of the southern.

In the polar regions the cold and physical conformation make the

water supply of little avail. Northern Alaska and northern Canada are flat, spongy moors but half reclaimed from the ocean, with permanently frozen subsoil, thawing slightly in the brief, intense summer (sometimes of 120°), and developing a few mosses, grasses and weeds, with dwarfed shrubs and clouds of mosquitoes. (See Alaska) . But the distance southward to which Arctic conditions extend is far greater on the eastern coast than the western, owing to the effect of the Rocky Mountain wall in breaking the force of the polar winds, and of the warm ocean vapors ; the latter also make the temperature far more equable. The midwinter Arctic tem¬ perature of 50° and below has no representative on the western coast. The Labrador coast, latitude for latitude, is 20° colder than the Alaskan in mean annual temperature, about 20° against 40° even in the extreme northwest; and its mean midwinter temperature 30° colder, — 25° against 5°. Even from the interior to the western coast the isotherms rise astonishingly ; that of north Virginia at lat. 40° N. is that of British Columbia at 50°. On the other hand, the range of temperatures is much greater on the east, the temperature rising pretty steadily as we go southward, to 80° mean annual on the Mexican Gulf coast, a range of 60° from semi-Arctic to semi-tropic, while in the corre¬ sponding part of southern California it is only 70°, a range of 30°. The midwinter range is over 100° on the east coast, not above 50° on the west ; the midsummer is 40° in the east, not over 20° on the whole coast from southern California to Bering Sea. Much greater ex¬ tremes still are found in the Cordilleran region, where the mean annual embraces a scale of 60°, and the mean midsummer runs from 40° to 95° in southern Arizona and northern Mexico, while the thermometer rises to 120° at times, as at Fort Yuma and similar places.

From about lat. 52° N. to perhaps 44° in the interior and east, the climate, though not quite fatal to civilized energies, is very severe, with winters of seven or eight months and summers at best but short and not always calculable, though rising to 100° and over in waves; with sudden intense “northers® and “blizzards® of intense cold with fine dry snow sometimes par¬ alyzing business activities for days. The dry atmosphere, however, makes it less trying than the damper though somewhat warmer eastern weather; it has developed great cities and popu-

lous States in the United States and flourish¬ ing communities in Canada above 50° ; and the industrial and intellectual future of the

region is as promising as that of any part of the con¬ tinent There is not much difference between the central and eastern parts in this respect, Duluth and Quebec, Saint Paul and Ottawa, corresponding closely in parallels and nearly in climate. Northwestern Canada and the northern central States of the United States form the great cattle and wheat district of North Amer¬ ica; and this on both sides of the Rockies is the chief timber section. South of this is the great "temperate® section, shading into the semi-tropic by imperceptible degrees, but which in the United States may be roughly divided by the basin . of the Ohio. The northern por¬ tion has summers and winters of the same gen¬ eral character as the former, but less intense at either extreme, neither hot waves nor cold waves usually lasting long; the weather damper than in the farther north. It is the chief region of Indian corn and apples, hay and potatoes, etc. The southern half shows the beginnings of tropic elements in the seasons, which are not so much winter and summer as wet and dry; in the luxuriance of vegetation and characteris¬ tically tropic varieties ; in the less bracing at¬ mosphere and in the bottom lands its languor¬ ous oppressiveness ; in the domestic architecture, where the obvious desire is to escape heat rather . than to ward ojff cold ; and in the productions, such as cotton and tobacco, rice and sugar, sweet potatoes, and oranges in the far south.

The Pacific slope, however, is an exception to this, its climate resembling the western coast of Europe much more than the eastern of its own. All the isothermal lines curve sharply northward west of the mountains. From Puget Sound to San Diego there is no extreme range of climate, no such division into quasi-Arctic and quasi-tropic as on the eastern slope ; though the northern part from its heavy rains is the greatest timber region of the continent north, and the southern a great country of vineyards, almond orchards and other south-temperate products. California reaches from about the parallel of Boston to that of north Georgia and Mississippi, but has neither the raw, harsh New England climate nor the heavy southern atmosphere, and southern California is a noted warm sanatorium. The high arid plateau of north Mexico experiences extreme alternations of temperature, from 95° to 40° ; but on the coasts and below the great Anahuac table-land the region becomes semi-tropic. Sugar-cane, cotton and coffee now ascend to the lower mountain regions, and in their place, at sea- level, appear pineapples, bananas, etc. Central America from its narrowness and low elevation has an island climate, tropic and pestilential on the shores and along the streams, moderate and healthful on the higher ground in the interior. This and the Antilles are the region of sugar, indigo, cochineal, ginger, vanilla, capsicum, etc. South America, lying

on both sides of the equator, has in the central and eastern parts a much less range of climate than North America, the greatest in a single section being found in Argentina, where it is some 30° ; over the whole continent the mean annual temperature ranges from 80° to 40°, the 'midwinter (our midsummer) from 80° to 35°, and the mid¬

summer from 85° to 50° ; north Argentina, the Cordilleran section, having, as before, the great¬ est alternations. The southern west Andean slopes are cooled and equalized by the west winds from the ocean ; the northern parts are a tropic desert; but on the different levels of the range are found every climate of the earth from tropic to arctic. The tropic productions and characteristics south of the equator, except as deflected by local conditions, are much like those north of it. The zone reaching south as far as lat. 40° S. has a mean temperature of 71° in the warmest and 53° in the coldest month. There the palm still thrives on the lower basin of the La Plata beside the mulberry and indigo ; the pampas and the west coasts of Chile are characterized by beautiful araucarias (the pine of the southern hemisphere), by beeches and oaks, the potato and the arrowroot. The plants in cultivation are a curious blending of the vegetation of the northern and southern United States : wines, olives, oranges, hemp, flax, to¬ bacco, wheat, Indian corn and barley. The southern limit of the periodical rains reaches as far as lat. 48° S., when the mean temperature of 59° in the warmest and 39° in the coldest month still favors the growth of cereals, and on sheltered spots of the west coast the growth even of the vine and tfye finer fruits. The zone reaching to the southern extremity of America shows comparatively little difference between the warmest and coldest month, the mean tem¬ perature of the one being 41° and of the other 25° ; but the low degree of summer warmth pro¬ duces a marked change in the form of vegeta¬ tion which now presents only a few trees, as the beech and birch, and an extraordinary abun¬ dance of mosses and ferns. As in passing from the equator to the pole the region of the veg¬ etable world gradually declines, so in climbing from the tropical shores to the ice-covered mountain summits three different climates have been distinguished by the names of tierra caliente, templada and fria (hot, temperate, frigid). Of these the templada extends over those healthy and beautiful regions where a kind of perptual spring prevails, and green pastures and noble forest trees are found united with the fantastical and gigantic forms of the tropics.

The question of rainfall is difficult to group systematically with that of climate. The mass of the northern continent is in the region of the anti-trades or prevailing westerly winds. The Japanese Black Current, the Gulf Stream of the Pacific, running northeast and striking the

polar currents and the cold shores, ice¬ bound for many hundreds of miles, sends up a great steam of fog which is blown against the wall of the Rockies and sent back by them upon their western slope in a rainfall from 50 inches up to 100 or even more, that makes the northern coast from southern Alaska to northern Califor¬ nia one gigantic forest of immense timber. The rainfall on Puget Sound is from 75 to over 100 inches in winter and the annual average on the Pacific coast of Alaska is 90 inches. In the southern part, along southern and Lower Cali¬ fornia, the Cordilleran region above the Gulf and west Mexico, the same- winds blow; but the land is too warm to cool and precipitate the vapors to the same extent; and such pre¬ cipitation as there is takes place mostly on the

crests of the coast ranges, the Cordilleran re¬ gion being mostly semi-desert or wholly so. In the summer the coast ranges are too warm to retain all the moisture of the vapors, which therefore give a little at these seasons, 10 to 20 inches in all, to the interior regions.

The Mississippi Valley is saved from be¬ coming the most tremendous desert on earth, a second Sahara, by the Gulf of Mexico and the western wall combined. If it had to rely on the Pacific winds it would be utterly rainless ; but these westerly winds in the Gulf region set up whirls of cyclonic disturbance which make an easterly eddy, carrying saturated currents in that direction ; and these, striking against the Rockies, are turned northeastward through the central and eastern valley, giving it abun¬ dant water. This eastward set, however, leaves the western valley only the edge of its course ; the far western, as in western Kansas and Nebraska, being rainless for considerable periods and scantily supplied at best. The rainfall ranges from 60 inches on the coast to 30 around the Great Lakes. The same cyclonic move¬ ment makes the same easterly eddy in the Atlantic, and the Atlantic coast receives its 40 to 50 inches a year from that source.

Central America is in the region of the trades or easterly winds and is so narrow that its climate is that of a semi-tropic island. In this region the rainfall is enormous, creating heavy tropic vegetation and increasing to 200 inches at Panama and the northwestern shores of South America, short rivers like the Atrato carrying almost a continental volume of water. All tropical South America is within the trade- wind belt, its moist warm climate creating the enormous forests of the Amazon basin, the oceanic volume of that <(river® (rather a

huge set of parallel drainage channels in one vast swamp) and its tributaries, and the lesser but still mighty Orinoco. On the western slope of the Andes this portion receives no vapor and is a desert down to north Chile. But in central and south Chile and Argentina the anti-trades begin once more, and North American condi¬ tions are repeated: the westerly winds giving to that coast a mild, equable temperature and heavy rainfall, while the Andes bar nearly all the moisture from the east, and the great southern plains or pampas are a relatively arid steppe.

Taking the continent as a whole, the rainy zone is disproportionately extended in America ; and as it stretches over all the zones, the vege¬ tation is remarkably diversified, from the lowly moss of the north to the lordly banana of the tropics. The giant chain of the Andes every¬ where rises above the snow-line. From the sterile Peruvian coast, burned by tropical heats, one can look up to summits covered with per¬ petual snow and ice; and one may climb from the gigantic equatorial vegetation of Quito to heights where onlv the condor testifies to the existence of organic life as he wings his flight over snow-fields and glaciers. In Peru the culture of cereals is carried on at the height of 12,000, and near Quito at 9,000 feet.

The north and south of America have the same length of day; but in the seasons which depend not merely on astronomical but on a variety of local causes, the analogy does not hold and very remarkable discrepancies appear. Thus, for example, the east coast of Brazil has

the rainy season from March to September, while Peru, lying under the very same latitude, has it from November to March. Within the tropics the transition from the rainy to the dry season takes place almost instantaneously; but in receding from the tropics on either side the change of seasons becomes more and more gradual till at last, in the polar zones, nature, bound in icy chains, affords for living existence only a short awakening out of a long winter sleep.

Consult publications of the United States Weather Bureau, the Canadian Meteorological Office and the Mexican Weather Service; Greely's (American Weather > (1888).

Flora. — The sections of cultivation have been dealt with already, and we shall consider here only the indigenous features. From north to south the general succession is as follows :

The surface-thawed Arctic tundra bears only reindeer-moss, blossoming weeds in its brief hot summer, and dwarf willows. From about the Arctic Circle to the southern coast of Alaska, James Bay and the North Sackatche- wan, we find shrubby plants, most of them yielding berries ; then the universal wood-of- all-work, the famed <(Alaska spruce,® with clumps of birch and alder: these at first sparsely, then forests of conifers, — larger spruces, pine, hemlock and fir. This coniferous growth extends in enormous volume down the cool, wet Pacific slope to central California; the giant redwoods and sugar-pines, etc., and the huge sequoia, the largest and oldest plant on the earth, being famous everywhere. East¬ ern Canada is forested with

similar coniferous species ; so is the United States through Michi¬ gan, Wisconsin and west to Minnesota, to southern Missouri and northwestern Arkansas, and to northeastern Texas and the Indian Ter¬ ritory. The central United States has predom¬ inant deciduous (hardwood) trees, such as the oak of many varieties, the beech, maple, elm, chestnut, black walnut, hickory, ironwood, pepperage, red mulberry, etc. In the southern States the yellow pine holds foremost place. The characteristic forms of the Southern States are the magnolia, palmetto, tulip-tree, plant-tree, pecan, etc., with the cypress everywhere in the swamps. The Cordilleran woods are chiefly conifers on the mountains ; on the plains and in the valleys are the yucca, cactus, etc., whose dense, thorny growth is termed chaparral. The wild picturesqueness and even grotesqueness of the cactus forms is noted; and it furnishes food for animals that would otherwise starve on the arid steppes. The north Mexican plateau has little wood except on the mountains. South¬ ward vegetation blends with the tropical forms, and in Central America and the Antilles the most valuable trees are the mahogany and box¬ wood, and of vegetable products vanilla and ginger.

In South America there is no Arctic region ; but the great differences in altitudes and the water supply give it a wide range of native production. The immense rainfall and steady tropic heat of the north shore along the Carib¬ bean and in the Magdalena Valley create a pro¬ fuse tropical flora on the lowlands, changing to palms, bamboos, tree-ferns, etc., on the higher levels, and coniferous trees on the mountains. Along the Orinoco the llanos, plains with im¬ mensely tall grasses and great single trees, take

the place of forests. The vast selvas or swamp forests of the Amazon occupy the heart of the continent. These colossal tropic jungles, often formed into an almost impenetrable web by multitudes of creeping and climbing plants, con¬ tain an almost unexploited variety of magnifi¬ cent trees with the most beautiful ornamental woods, — as rosewood, cocabola, etc., — products like india-rubber, brazilwood for dyeing, cin¬ chona for medicine, etc. Dense forests of cinchona overshadow the mountain terraces of Quito. South of the selvas are the forests of Mat- to Grosso, the great Brazilian province east of Bolivia; south of this again, and of the Bolivian Cordillera, is the Gran Chaco, or ((great round¬ up,® from the Paraguay to the Andes, — a region of three to five hundred thousand square miles, largely plains,

but with heavy forests including the wax-palm, and with tree-like thistles on the lower plains. Now begin the pampas of the lower La Plata, which are fine grassy plains in the northern part, but in south Argentina and Patagonia become semi-arid steppes. The west¬ ern strip has already been dealt with.

Consult Gray's (Synoptical Flora of North America } (1886-97); Heller's (Catalogue of

North American Plants North of Mexico* (1900; Sargent's (Silva of North America> (1890-91) ; Britton and Brown's (Illustrated Flora of the Northern United States, Canada and the British Possessions * (1896-98) ; Berg's (Physiognomy of Tropical Vegetation in South America) (1894) ; Rusby's Enumeration of Plants Collected in South America> (in Torrey Botanical Club Bulletin , Vols. XV, XX, XXII, XXV, XXVII).

Fauna. — The distribution of animal life in America proves by itself what was probable on geologic and physiographic grounds, that the proper division between the two continents is not at the Isthmus of Panama, but at either Nicaragua or Tehuantepec, and that the junc¬ tion was relatively late. Zoologically considered South America includes also not only Central America and the Antilles, but the Mexican plains and coasts east, west and south of the plateau of Anahuac. The faunae of the two continents have almost no common feature. Furthermore, the North American species are in many respects closely allied to the North Asiatic, while the South American mammalia and birds have but slight affinities to those of any other section of the world, and those of the most general kind, fully four-fifths of its species, being unknown outside its own limits. North America, with this proviso, in Sclater's and Wallace's classification, is Palaearctic. in the Arctic regions and for some distance south of the northern ocean and west of Hudson Bay, and Nearctic through the rest of its bulk; while South America, thus extended, is Neotropic. Some authorities, however, from the close affinities of the first two, group them together into one as Holarctic or Triarctic.

In North America, for instance, the fur animals are not very different from the Siberian kinds; the reindeer, moose (called elk in Europe) and bighorn are closely akin to Asiatic congeners; the bison belongs to the buffalo fam¬ ily; the cat family is represented by the panther and wildcat; the wolf family by various classes of wolves and probably by the Eskimo dog; the bear family by several distinct sorts. The white goat has close foreign relatives ; so have

the beaver, marmot, rabbit, squirrel and most of the other rodentia, the weasels, insectivora, bats and others. The birds, reptiles and am¬ phibia are nearly all identical in family with Old World groups and often in species. The fresh-water fish and mollusks of the cold re¬ gions of both are generally akin and sometimes the same, though in the great rivers of the southern half many new forms have developed, the river mollusks being much more numerous and specialized in the United States than in any other part of the world. But there are very notable individual forms. The North American ((great cat,® variously called panther, catamount, cougar, puma, mountain lion, American lion, etc., has long been specialized in this region; the musk-ox and the skunk are our own, as are the pronghorn and the gopher. And there are still more striking absences where all analogy would lead us to expect strong repre¬ sentation. The horse, camel and rhinoceros originated in North America as late as Tertiary times, but have entirely disappeared. There is but one marsupial, the opossum, no antelopes, and but one genus of native swine (in Texas and Arkansas).

South America shows a new world. Out of 10 orders of mammalia with 33 families which it contains, 13 families are confined exclusively to it. All its families in two orders, the Pri¬ mates (monkeys) and Edentates (armadillos, sloths and ant-eaters), are its own, and five of its nine families of rodents; while of the Chiroptcra (bats), one family, the Phyllostomi- dee, which includes the vampire bats or blood¬ suckers, is peculiar to it. Its deficiencies are equally notable, though less so in some respects than of the northern continent, as it lacks none which originated there. The horse family group is represented only by the tapir, the ruminants only by the llama and the bears only by the Andean bear of Chile and Peru. There are no Ungulates but a small deer and one genus of swine, no members of the weasel or civet fam¬ ilies and only two small genera of insectivores. The birds, instead of having a wider range as might be thought, are still more individual : 23 families, including hundreds of genera, are exclusively South American, while only three out of its 118 genera of humming-birds, one of its 43 genera of tanagers, eight of its 70 genera of tyrant flycatchers, one of its 14 genera of macaws, four of its 13 genera of pigeons, one of its 12 genera of Cracidce (curassows, etc.), two of its 11 .species of goatsuckers, etc., have any habitat beyond itself. Of its wading and swimming birds, 18 of its 24 genera are peculiar to it. The reptiles are much less specialized, only four out of 60 genera being entirely indi¬ vidual, and those of lizards ; the species, how¬ ever, are more peculia. than this would indicate, the boas and scytales being distinctively South American, and the iguana practically so, though known somewhat north of this region. The

waters naturally are much less specialized. Of the amphibians only three out of 16 genera are local. The fishes have four families and 17 genera, of which one family with its one genus, and a genus of another, are peculiar to the South American, the resemblances being mainly to the African families. The sirenoids repre¬ sent extremely ancient forms. The insects are also not so different in form as might be antici¬ pated. But this view understates the specific

variations, for South America is a zoological land apart.

Consult 'The Standard Natural History) (Boston 1885) ; Wallace's (The Geographic Distribution of Animals) (1876) ; Merriam's 'Geographic Distribution of Life in America5 (in Proceedings of the American Biological Society , Vol. VIII). For special portions, Cope's 'Crocodiles, Lizards and Snakes of North America) (in United States National Museum Report 1898) ; Apgar's 'Birds of the United States> (1898) ; Beebe's (Our Search for a Wilderness) (1910) ; Edwards' Butter¬ flies of North America5 (1868-88) ; Goode's 'American Fishes) (1888) ; Zahm's 'Through South America's Southland5 (1916).

Political Divisions. — 'The independent States of both North and South America are all republican in government, though it was only in 1889 that Brazil became a republic. The con¬ tinent is politically divided as follows :

Independent Republics. North A merica — • Capitals.

U. S. Proper . Washington. . . .

Alaska . . . Sitka .

Hawaii . Honolulu .

Porto Rico . San Juan .

Canal Zone .

Virgin Islands .

Sq. m. Pop. 1915

3,026,789 100,264,485 68,000

590,884 6,449 3,435 474 142

232,856 1,118,016 75 , 000 32 , 000

Total .

. 3,

624,173

101,790,353

Mexico .

. Mexico .

767,097

16,000,000

Central American States —

Guatemala .

. Guatemala city.

48,290

2,119,165

600,000

Honduras .

.Tegucigalpa.. . .

46,250

Salvador .

. San Salvador. . .

7,325

1,700,000

Nicaragua .

. Managua .

49,200

600,000

Costa Rica .

. San Jos6 .

23,000

411,000

Panama .

. Panama .

32,380

450,005

Central America

— Totals .

206,445

5,880,170

Cuba .

. Havana .

44,164

2,383,000

Haiti .

. Port au Prince .

10,200

2,000,000

Dominican Rep. . .

.Santo Domingo.

19,325

700,000

South America

Colombia .

Venezuela .

Ecuador .

Peru . .

Bolivia .

Chili .

Argentine Republic,

Uruguay .

Paraguay .

Brazil .

Bogotd .

Caracas .

Quito .

Lima .

La Paz .

Santiago .

Buenos Ayres . . Montevideo. . . .

Asunci6n .

Rio de Janeiro.

438,436 393,976 116,000 680,000 560,000 292,419 153,418 72,210 121,973 3,292,000

1

5,500,000 3,000,000 1,500,000 4,500,000 2,300,000 4,000, 000 9,000,000 1,300,000 800,000 24,300,000

South American Republics —

Totals . 7,120,432 56,200,000

European Dependencies.

British — Capitals. Sq.m. Pop. 1915

Dom. of Canada. . .

Ottawa .

3,603,910

7,206,643

Newfoundland .

Saint Johns. . . .

42,734

243,576

Labrador (dept. Newfoundland)....

120,000

3,998

Bermudas .

. Hamilton .

19

19,935

British Honduras . .

Belize .

8,598

40,458

Bahamas .

Nassau .

4,404

57,241

Barbadoes .

Bridgetown ....

166

173,359

Jamaica with

Turk's, Caicos,

etc .

Kingston .

4,424

864,864

Windward Islands. .

Saint George's..

528

167,809

Leeward Islands . . .

Saint John's . . .

715

127,193

Trinidad .

Port of Spain . .

1,750

312,803

Tobago .

Scarborough . . .

114

21,400

British Guiana .

Georgetown. . . .

89,480

304, 149

Falkland Islands . . .

Stanley .

6,500

3,223

British — Totals . 3 , 883 , 342

French — * -

St. Pierre . Saint Pierre. . . .

Miquelon . Saint Pierre

Guadeloupe, etc . . . Basse-Terre. . . .

Martinique . Fort de France.

French Guiana .... Cayenne .

10

83

687

380

34,060

9,546,651

5,700

550

212,430

185,385

49,009

French — Totals

35,220 453,074

European Dependencies Danish —

Greenland (colonial portions of) . . .

Danish — Totals .

Dutch —

Curasao (Totals, in¬ cluding all the other Dutch West India islands) ... .Willemstad. .. . 436 54,469

Dutch Guiana . Paramaribo.... 49,845 86,233

Dutch — Totals . 50,281 140,702

The foregoing table shows, for America as a whole, though with the omissions mentioned at the beginning of this article, an area of 15,807,404 square miles; the number of inhabi¬ tants in 1916 appears as 186,106,036. It must be understood that these figures are, from the very nature of the subject, approximations only, and that the utmost care and diligence cannot pro¬ duce at present (when great regions of both North and South America remain still unsur¬ veyed, and in part still unexplored) figures of areas, etc., which should be called "exact.55 Most earnest efforts have been made, however, to reduce the margin of error and to secure as nearly as possible essential accuracy.

Forrest Morgan,

Connecticut Historical Society.

AMERICA, CENTRAL. See Central America.

AMERICA, Discovery and Colonization

of. The effective discovery of America was a gradual process, made possible by the first west¬ ward voyage of Columbus across the Atlantic and developed by attempts to determine the relation of the lands thus encountered to the Asiatic continent. The body of legends con¬ cerning European or Asiatic contact with Amer¬ ica prior to the 1 5th century bears witness only to a vague impression of or conjecture at the existence of land in the western part of the Atlantic Ocean, which led to nothing effective in the way of confirmation of such conjecture or occupation of the territory. The contact by the Norse colony in Greenland in the 11th century with the shores, probably of New Eng¬ land, which the Northmen knew by the name of Vinland, led to nothing more than occasional resort to certain of its facilities such as timber, and cannot be regarded as a discovery in any complete sense. Nothing can detract from the unique distinction of the expedition of Colum¬ bus in 1492. The cosmography of his time was in error as to the size of the earth and conse¬ quently underestimated the distance interven¬ ing between the western limit of Europe and the eastern shores of Asia. But this error could in the nature of things only be brought to light by an actual test by a westward voyage across the Sea of Darkness. This test it is the sufficient glory of Columbus to have furnished and its importance for cosmography cannot be overestimated. Nevertheless, in its relation to America alone, discovery in the complete sense was rather made possible, than achieved by Columbus.

It was under the auspices of the Atlantic States of Europe that development of the re¬ sults of this voyage was carried on, and of these Atlantic States, Spain and Portugal at first took the leading part. At the time of Columbus' great voyage, Portugal had nearly completed the development of the possibilities

— Continued

Sq. m. Pop. 1915

46,740 13,500

of an eastward maritime route to the Oriental trade regions, the goal of maritime endeavor. The, Spanish patronage of Columbus naturally led the Spanish Crown to claim for the west¬ ward approach to the Indies, thus made possible under its auspices, the same advantages which papal action had secured for Portugal in con¬ nection with the eastward route. By a papal bull of 25 Sept. 1493, superseding those on the subject previously issued, enterprise upon the ocean was declared open to both Spain and Portugal, with the understanding that Spain should refrain from infringement upon the Portuguese monopoly of the African coast by using only the westward approach to the Indies. By the Convention of Tordesillas, 7 June 1494, the line 370 leagues west of the Cape Verde Islands was set by the two nations themselves as a division between their respective areas of maritime activity.

Spanish voyages between 1493 and 1502 now skirted most of the island and continental shores of the Caribbean Sea and the Gulf of Mexico, without, however making much prog¬ ress in elucidating the connection between these regions and the Asiatic continent, with which they were still somehow supposed to be connected. In the meantime, by the Cabral voyage to Brazil in 1500 and those of the Cor- tereals to Labrador and Newfoundland in 1 500— 02, Portugal found an interest in westward voyages, for she claimed that not only Brazil, but also the regions in the vicinity of the fish¬ ing grounds in the north, were east of the line of demarkation. The expeditions of Vespucius, Coelho and Jaques, 1501-03, not merely sat¬ isfied Portuguese curiosity as to the extent of their possessions accessible by the westward voyage, by establishing the southwestern trend of the Brazilian coast, but, what was very much more important, by establishing the continuance of this land mass to a point as far south as the latitude of the southernmost point of Africa, practically ensured the conviction that here was a New World. This was a land mass, insular or peninsular in its connection with Asia on the north, of such extent as practically to constitute a part of the world co-ordinate with Europe, Africa and Asia. It was to the New World, as thus conceived, that the name America, perhaps a little more than half seriously, was proposed by friends of Amerigo Vespucci in 1507, to be applied, and the name thus applied was but very gradually extended, as the truth became known, to the whole double continent. Spain’s great efforts in exploring voyages, as dis¬ tinguished from land expeditions into the interior, were now concentrated upon the search for a strait through, or a passage to the south of the lands revealed by the voyages since 1492. This was in response to the epoch-making voy¬ age of da Gama in 1497. More accurate ac¬ quaintance with the extent of the Asiatic

continent developed by Portuguese activities in the Far East subsequent to the voyage of da Gama was a favorable condition for such attempts as the Spaniards were making, and the voyage of Magalhaes in the service of Spain in 1519-22 to the south of the New World re¬ vealed the extent of the waters lying between it and the Asiatic continent. This was a funda¬ mental fact, knowledge of which was in large outline logically sufficient to establish the sepa¬ rate continental character of the territory

brought to knowledge since 1492. Appreciation of this significance of Magalhaes' voyage was slow in developing, however, and it was not until after exploring conquests of the western shores of the continent from bases on the eastern shore, like the conquests of Mexico and Peru by Cortez and Pizarro in 1519-21 and 1 531—33, Almagro's and Valdivia's Chilean expeditions in 1535—40, and expeditions like those of Cortez and Alarcon and Coronado to Lower California and up the Colorado River in 1526—40, that the outline of the continent on its western shore was traced out as far as southern California. The coast north of this region was reached and effectively made known only by a succession of voyages covering a considerable space of time and headed by rep¬ resentatives of different nations. Most promi¬ nent in this enterprise were the expeditions of Drake in 1577-80, which probably reached the northern California coast ; Bering, the Russian, in the strait bearing his name and on the Alaskan coast, in 1741, and Vancouver on the coast of what is now British Columbia in 1792. The eastern shore of the continent — unless we include the voyage of Gomez from Labra¬ dor to Florida in 1525, which was not followed up — was outlined by Spain only as far north as Chesapeake Bay, the remainder being the scene of French and English activity after the Spanish power was becoming embarrassed in Europe.

After the voyage of Magalhaes in 1522, Spanish interest in the New World concerned itself rather with the task of exploring the interior of the regions whose boundaries Spanish voyages had skirted, than with further extension of the lines of inclusion. The glitter¬ ing success of Cortez in Mexico in 1519-21 was responsible for many attempts in imitation of such an achievement, and in the course of these attempts much knowledge was attained of the conditions in the interior of the continent. Pizarro's conquest of Peru led on to the exploration and attempted conquest of Chile and to the crossing of the Andes and the descent of the Amazon by Orellana in 1541. The La Plata system was explored by Sebastian Cabot and Diego Garcia in 1527-30. In the northern continent, Florida had been discov¬ ered by Ponce de Leon in 1512 and proved a part of the continent by Pineda, who also made acquaintance with the Mississippi in 1519. In the course of the

wandering of such parties as those led by de Leon, Narvaez, Cabeza de Vaca and Coronado from 1512 to the middle of the century, much of the interior was seen as far north as the Missouri and Ohio systems, but only the extreme southeast and southwest por¬ tions, that is, California and Florida, saw any attempt by Spain to occupy the territory thus wandered over. The task of administering and exploiting what she already had was sufficient to absorb what energy could be spared from European occupations.

France and England, in the meantime, were becoming less and less inclined to respect the claims of Spain in any" direction not backed up by present physical force, and more and more inclined to take up a line of aggression in mari¬ time endeavor, not only for the sake of weak¬ ening the general position of Spain, but also because of the stirrings of individual enterprise within their own populations. It was only

under these circumstances that England began to make use of the claim based upon the Cabot voyages of 1497-98. Conditions inclining the government to a policy of respect for the claim of either Spain or the Pope were now wholly changed, and as against any right to territory west of the line of Tordesillas, England pur¬ sued the policy that occupation must, within a reasonable time, be added to discovery to con¬ stitute a valid title to territory in the New World. According to this criterion, the achieve¬ ments of England and France in the 16th cen¬ tury can only be regarded as preliminary or preparatory in character. In each case internal strife at home and the exigencies of the Euro¬ pean situation prevented the achievements of discovery and incipient settlement from being followed up. Nevertheless they served to re¬ veal in an effective way that portion of the continent in which conditions for transplanta¬ tion of European institutions and life were most favorable. The stretch of shore left unoccupied was comparatively small and the great work of France was extensive, and rapidly spread over the interior accessible by water- routes from the shore. While England's great work was the permanent and slow-expanding settlement of the strip between the coast and the mountain-barrier of the Alleghanies.

In 1524 Verrazano, a Florentine in the service of France, coasted from North Carolina to Newfoundland, and in 1534-41 the first French attempt at settlement was made under Cartier and Roberval, and

though it was not at this time maintained, the foundation was thus laid for the French claim to the territory of the Saint Lawrence system. Attempts to invade the undoubted sphere of Portugal by Ville- gagnon in Brazil in 1555, and of Spain by Ribaut and Laudonniere in Florida and South Carolina in 1562, were promptly suppressed. So that when, at the beginning of the 17th century, Frenchmen were in a position to take up transatlantic activity once more, the Saint Lawrence Basin naturally became the scene of their endeavors. From Port Royal in Nova Scotia in 1603, headquarters were shifted in 1607 to Quebec, and once established at one end of the great interior waterway system, and headed off from southward expansion by the hostility of the Iroquois, the line of least resistance led naturally to the interior by the west. These circumstances, coupled with the character of the emigrating population, account for the most signal achievement of the French in the New World — exploration of the con¬ tinental interior. This went on coincidently with the process of colonization and thereby a fundamental characteristic of New France on the mainland was illustrated — the attempt by the government to nourish a true colony in eastern Canada, while the adventurous popula¬ tion, missionary and fur-trader overran the surface of the great interior. Trails were made by Nicollet in 1634 as far as the Illinois country by the Lakes and the Fox River route, by Radisson and Groseilliers in 1658-59 as far as Lake Superior and the Hudson's Bay region, by Toliet and Marquette in 1673 to the Mississippi. And by 1682 La Salle had opened up the con¬ nection between the Gulf of Mexico at the Mississippi's mouth and the Gulf of Saint Lawrence. By 1699 a French settlement was

planted in Louisiana and in 1718 New Orleans was founded.

With England, the order of proceedings was different. Exploration of new regions was a preliminary to their filling up with settlers and bursts of exploring activity occurred in the in¬ tervals of the great stages in the process of colonization. The Cabot voyages gave her the basis of the claim to the continental shore to the north of Florida, but her first ex¬ ploring activities were in connection with the search for the northwest passage to the Orient by such commanders as Davis and Forbisher in 1576-78 and with the attempt to occupy New¬ foundland by Gilbert in 1579. With the career of Raleigh, the English maritime enterprise takes definite beginning in the colonizing line with the attempt at Roanoke in 1585, and from then till well into the 18th century English exploring activity was mainly concerned with the coast between Florida and Newfoundland, the basis of her colonies on the main. This was as characteristic of the English career in the New World as the French method of rapid and extensive spread from an

undeveloped base. In the course of occupation of the coast, the English found themselves preceded in the strategic regions of the Hudson and Delaware valleys by the Dutch, and falling back on the principle of prior discovery alone, which, as against Spain, she had disregarded, made con¬ quest of the New Netherlands settlement in 1664, as an invasion of the right to the whole, claimed by virtue of the Cabot voyages. British interest in the interior awoke in the 18th cen¬ tury, and, mostly under colonial leaders/British hinterland was extended to a hostile contact with the French claims to the interior based on discovery and exploration of the Saint Law¬ rence system. This being settled by the elim¬ ination of New France from the continent in 1763, English exploring activity found its scene, after the separation of the seaboard colonies with their westward extensions to the Mississippi, in the extreme northern part of the continent, with the territory of the Hudson's Bay Company as the base. Here in the later years of the 18th century the early expedition of Verendrye to the Canadian Rockies by the Saskatchewan in 1741 through the interior of the Canadian Northwest was followed up by Hearne in 1770 and Alexander Mackenzie in 1789.

The areas of the New World within which the colonizing activities of the European At¬ lantic States were carried on conformed in a general way to the scenes of their earliest contact and activity. Portuguese colonization in the New World was limited to Brazil, the only portion of the continent within the limits marked out by the line of Tordesillas. Spanish activity radiated from the Caribbean archi¬ pelago in all directions and included the greater part of habitable South America, Central America and the southern portion of the North American continent. Frenfch colonies were to be found among the West Indies, but the greatest extent of French settlement was in the neighborhood of the Saint Lawrence sys¬ tem, while the English, late comers as they were, occupied strategic points among the islands and stretched along the continental shore from Florida to the Kennebec.

In the list of participators in the work of

colonizing the New World there must be added to the European Atlantic States already mentioned as conspicuous in discovery and exploration, Holland and Sweden. But the brevity of the duration of these attempts hardly entitles them to a place of equal significance with the other four as colonizers in America. The Swedish colony

founded in 1637 on the banks of the Delaware was regarded by the Dutch as an intrusion on their rights and fell victim to Dutch conquest in 1655. The Dutch enterprise on the Hudson and Delaware was in turn held by the English as equally an intrusion on English North America and the Dutch were dispossessed in 1664 by the same means as they had themselves employed upon the Swedes. During their development of New Netherlands the Dutch were not successful in planting the colony firmly on an agricultural basis, the fur trade proving attractively profitable. A system of colonial government in too close dependence upon a clumsily working confederate govern¬ ment at home and a system of local govern¬ ment which repressed individual initiative re¬ tarded the development of the colony. A few islands in the West Indies and a small stretch of the northeastern coast of the South Ameri¬ can continent still remained — and do yet — as Dutch colonies in the New World.

Portugal began her American colonization in 1531 in Brazil, but was unable to give it the requisite attention until the 18th century. In the meantime the comparative freedom from restraint enjoyed by the colonizing population had exercised a developing effect, and, putting in practice lessons in regard to the exploitation of a tropical colony learned elsewhere, Portu¬ gal developed a colonial establishment stable enough to afford a refuge for the House of Braganza during the period of Napoleonic oc¬ cupation of the Iberian peninsula. In 1821, the Brazilians with the concurrence of their re¬ gent, himself of the royal house of Portugal, proclaimed their independence from the Crown of Portugal, and this independence was subse¬ quently ratified by treaty.

The Spaniards began colonizing with the second voyage of Columbus and the islands of the Caribbean, particularly Haiti and Cuba, be¬ came the scenes of an exploitation of the super¬ ficial riches of the tropics which served as bases for exploring conquests to the territory of the mainland. The policy of Spain toward her wide domain in the New World, as worked out in the 16th century, not in abstract theory, but in combination of theory with practice, was but little more illiberal, but considerably less intelligent than that of other states. But the climate of the part of the New World falling to them was not conducive to the steady, stren¬ uous persistence necessary for the building lip of permanent wealth-producing communities. Nor were the original characteristics of the colonizing population calculated to make suc¬ cess in such a career likely. The natives were not able to offer 'stubborn resistance to the rapidly moving enterprises of the conquista- dores. A certain tendency to amalgamate with the natives — a tendency which weakened the stronger without strengthening the

weaker race — did not prevent the evasion of the laws in¬ tended to protect the natives from the rapacity of their conquerors and to keep the two oppo¬ nents of the official class in balance against

each other. The too rapid early successes in the realm of military conquest and the easily won response to the search for the precious metals still further unfitted the Spaniard for what modern colonizing peoples are finding the most difficult of tasks — the intelligent exploi¬ tation of the possible economic resources of a tropical region where the available labor supply is for various reasons inefficient according to European standards. Nevertheless, though the Spanish dominance over such a great part of the New World could not guarantee prosperity to this empire, it ivas rather the shock given by the Napoleonic attack on the mother country and its consequences on Spanish internal war¬ fare than the inherent strength of the separate divisions of Spanish-America, that accounts for the revolt of the greater part of this empire in the first three decades of the 19th century. And at the same time that political separation was taking place, Spain in Europe stood in such need of political help from England that a commercial invasion of Latin-American mar¬ kets could not be prevented. With this once accomplished and the Napoleonic danger passed, the influence of England was publicly and privately used to obstruct all attempts from Spain to reunite the scattered fragments of the once mighty power in America. The sluggish development, to call it by no worse a name, which characterized what remained to Spain of dominion in America between the Latin-American revolts and the wresting of Cuba and Porto Rico bv the intervention of the United States in 1898 illustrates the degree of effectiveness of Spanish colonial policy ac¬ cording to modern economic standards.

French colonization in America received much attention from the home government and the French temperatment was one adapted to success in dealing with the natives, and in amal¬ gamation with them in preserving the elements of strength. But on the other hand the over-zealous and intemperately exercised interfer¬ ence from home frequently nullified all the good that the lavish furnishing of assistance in materials and in military protection did to the fortunes of the colony. The climate was as ex¬ cessive in its rigor as that of New Spain was in the opposite direction. The hostilty of the Iroquois, fiercest of all the native tribes, ob¬ structed expansion to a more favorable clime and made extensive use of a vast forest domain for the fur-trade a more easy and attractive program than the jog-trot business of intensive agriculture and the development of permanent communities on the frontier for which latter task lack of the habits of

initiative in self-gov¬ ernment unfitted the colonizing population. The only colonizing material in the French people capable of developing such traits — the Hugue¬ nots — was peremptorily excluded from New France. So that when the English expansion had at length come into collision with the bor¬ ders of the French forest preserve in the in¬ terior, New France on the continent was capable, by reason of the feudal and military force pervading its population, of effective re¬ sistance against the superior numbers of the English settlements co-operating but clumsily with each other. As between the French and British empires as world-units, however, there was soon no question of superiority, and France was definitively excluded from the con-

tinent as the result of the Seven Years' War (q.v.). The French possessions in the West Indies, acquired in various ways during the 17th century, remain to her, and make of her to that extent an American power.

The colonizing* work of England in America belongs to the colonial period of United States history (q.v.). In broad outline, her policy to¬ ward her American domain was one which, whether with design or not, allowed wide scope for individual and local initiative. The English population afforded good colonizing material. The Indians gave no such serious trouble as did the Iroquois in the case of the French in the early stages of their colonizing. Defense against European attacks upon the colonies was effective. As builders of settlements in the New World, the English were eminently suc¬ cessful. In devising, or at any rate, applying a system of political connection between the home government and the colonies, the English reached an unfortunate place in their internal political development coincidently with a criti¬ cal stage in the relations of colonies and mother country. The strain at that time and under those circumstances brought upon colonial loyalty proved too great and by the separation of the 13 Atlantic seaboard colonies, Great Brit¬ ain's power in the New World was cut down to control of certain important West India islands and the area so recently wrested from France. Under the new spirit of the British Empire which appeared in the 19th century, these pos¬ sessions have been so developed and bound in sentiment to the interests of the mother coun¬ try that Great Britain stands second only to the United States as an American power.

Consult Winsor, (Narrative and Critical History > ; Fiske, (Discovery

of America) ; Payne, Cambridge Modern History *(Vol. I) ; Morris, (The History of Colonization) ; Roscher, (The Spanish Colonial Si'stem.* Charles Worth en Spencer, Assistant Professor of History, Princeton

U niversity.

AMERICA, American song, written in 1832 by Samuel Francis Smith, D.D.

My country! ’tis of thee,

Sweet land of liberty,

Of thee I sing.

Land where my fathers died!

Land of the Pilgrims’ pride!

From every mountain side,

Let freedom ring!

My native country, thee —

Land of the noble free —

Thy name I love;

I love thy rocks and rills,

Thy woods and templed hills,

My heart with rapture thrills Like that above.

Let music swell the breeze,

And ring from all the trees,

Sweet freedcyn’s song;

Let mortal tongues awake;

Let all that breathe partake;

Let rocks their silence break —

The sound prolong.

Our father's God! to Thee,

Author of liberty,

To Thee we sing;

Long may our land be bright With freedom's holy light;

Protect us by Thy might,

Great God, our King!

The circumstances connected with the writ¬ ing of this famous hymn are best gathered

from a letter written by the author, the Rev. Samuel Francis Smith, to Mr. J. H. Johnston of Brooklyn, who had asked concerning the occasion which induced the author to write it. The letter follows :

Newton Centre, Mass., June 5, 1887. Mr. J. H. Johnston •'

Dear Sir : The hymn <(America® was not written with reference to any special occasion. A friend (Air. Lowell Mason) put into my hands a quantity of music books in the German language early in the year 1832 — because, as he said, I could read them and he couldn't — - with the request that I would translate any of the hymns and songs which struck my fancy, or, neglecting the German words, write hymus or songs of my own, adapted to the tunes, so that he could use the music. On a dismal day in February, turning over the leaves of one of these music books, I fell in with the tune, which pleased me — and, observing at a glance that the words were patriotic, without at¬ tempting to imitate them, or even to read them throughout, I was moved at once to write a song adapted to the music — and ((America® is the result. I had no thought of writing a na¬ tional hymn, and was surprised when it came to be widely used. I gave it to Mr. Mason soon after it was written, and have since learned that he greatly admired it. It was first used publicly at a Sabbath school celebra¬ tion of independence in Park Street Church, Boston, on the 4th of July, 1832.

Respectfully yours,

S. F. Smith.

See also National Hymns.

AMERICA, the name of the schooner yacht winning the international yacht race of 1851. The prize obtained, a silver tankard, has since been known as the <(America's Cup.® See Yachts and Yachting.

AMERICA, Prehistoric. See Archeol¬ ogy, American.

AMERICA, South. See Latin America;

South America. •

AMERICAN ACADEMY OF ARTS AND SCIENCES, an organization founded at Boston in 1780. John Adams, afterward President of the United States, was its chief promoter. Its purpose was to ((cultivate every art and science which may tend to advance the interest, dignity, honor and happiness of a free, independent and virtuous people.® It pub¬ lished for many years scientific memories as well as its proceedings. It has a scientific li¬ brary of upward of 25,000 volumes.

AMERICAN ACADEMY OF MEDI¬ CINE, The. Organized in 1876 by a few physicians at Philadelphia. While at first the main qualification seems to have been a liberal education, the scope soon broadened to include an interest in the sociologic problems connected with medicine. The academy works through conferences at its annual meetings and oc¬ casional special conferences. Its publications are The Journal of Sociologic Medicine and reprints or groups of papers on some certain subject. It has about 600 members, most of whom are Fellows (physicians) ; there are also associate members (those not of the medical profession), and a few honorary members.

AMERICAN ACADEMY OF POLITI¬ CAL AND SOCIAL SCIENCE, The. The

Academy was organized 14 Dec. 1889 to provide a national forum for the discussion of political and social questions. The Academy does not take sides upon controverted questions, but seeks to secure and present reliable informa¬ tion to assist the public in forming an intelli¬ gent and accurate opinion. It publishes annu¬ ally six issues of (The Annals, } each dealing with an important current social or political problem. These volumes contain serious dis¬ cussions, not doctrinaire expressions of opinion. Five scientific sessions are held each year, dur¬ ing the winter months, and an annual meeting in April, extending over two days and includ¬ ing six sessions. The

membership fee is $5 per year; life membership fee $100. Members not only receive the volumes of (The Annals y but also have the privilege of attending all the sessions of the Academy, and the further privi¬ lege of applying to the editorial council for in¬ formation upon current political and social questions.

AMERICAN ALLSPICE. See Caly-

CANTHUS.

AMERICAN ALOE. See Agave.

AMERICAN ANTHROPOLOGY. See

Anthropology, American.

AMERICAN ANTIQUARIAN SO¬ CIETY, an association organized in 1812 at Worcester, Mass. The object of the society is the study and preservation of the antiquities of America, and the advancement of art and science throughout the world. Its library in¬ cludes over 100,000 volumes, including a large number of the rarest Americana, very complete files of American newspapers and a rich collec¬ tion of manuscripts. Its Transactions have been published since 1820 and the Proceedings semi-annually since 1849. It maintains an im¬ portant museum of antiquities, gathered in all parts of North, South and Central America. A new library for the society was completed and occupied in 1910. The society maintains a fund aggregating over $100,000 for the sup¬ port of various departments of its work.

AMERICAN ANTI-SLAVERY SO¬ CIETY, The. See Anti-Slavery Society, the American.

AMERICAN ART. The art history of America presents interesting conditions of re¬ ceptivity as well as original productivity ; in¬ deed, artistic taste, it may be claimed, was pri¬ marily transplanted or transfused into the bud¬ ding art of ((The Fair New World.® True to the traditions of historical repetition, the ideals of ancient Greece inspired an Italian renais¬ sance; French, German and English art respec¬ tively, being viewed moreover at their best periods, give evidence of having been begotten through aesthetic assimilation and fruitful ap¬ preciation of the masterpieces of Angelo, Titian, Tintoretto, Rembrandt, Rubens, Ver¬ onese and Velasquez. The early American school not only emulates these treasured quali¬ ties of the old masters, as far as accessible in painting and sculpture of originals or in replicas, but experienced a healthful art evolu¬ tion, normally stimulated by the contemporary works of Gainsborough, Reynolds,

Lawrence and others at the close of the 18th century. It

appears in accord with the artistic spirit of international reciprocity, that America provided the British Royal Academy with its second president in the personality of Benjamin West.

Although it would be intensely interesting to explore the field of Pan-American art, re¬ vealing Aztec and other aboriginal archaeologi¬ cal relics, we are limited to the consideration of the subject coincidental with modern art and civilization. Th'e works of Washington Alls- ton, Gilbert, Stuart, West, Copley, Trumbull, Vanderlyn, Jarvis, Peele, Cole, Harding, and, at a later period, of Morse, Eliot, Mount and many others, afford invaluable examples of rare intrinsic value, with chronological evi¬ dences of the early development, impeded by all sorts of obstacles, of inborn genius and unmistakable tendencies of the progressive element even in the province of fine art.

American Classics. — A representative col¬ lection of the famous works by the American painters mentioned, had it been secured, would certainly to-day constitute a rare gallery of aesthetic <(Americana® that well might be pre¬ served for all time — i(con amore ® — (ipro patria et gloria ® ; enkindling American art patriotism in line with that shown for the army and navy, agriculture and commercialism. It is too late, however, to secure the marvelous masterpiece by Allston, (The Legend of the Bloody Hand,* it having unfortunately been destroyed by fire, and many other gems of renown are now lost sight of through lack of proper preserva¬ tion and of popular appreciation. -Vander- lyn's (Ariadneˆ however, has fared better in company with invaluable portraits painted by these gifted men and now in posses¬ sion of the New York Historical Society.

(Marius Sitting Among the Ruins of Car¬ thage, } a work that secured Vanderlyn, in re¬ ward for its merits, a first-class gold medal at the Paris Exposition, was a product of this period. The most important epochs of Ameri¬ can history have been represented by native artistic talent. The sailing and landing of Columbus, the exploits of De Soto, the subju¬ gation of savage life to that of civilization, colonial and Indian warfare, the declaration of national independence, revolutionary battles, Washington crossing the Delaware, and like famous subjects for painting and sculpture, that manifestly should be preserved by governmen¬ tal direction. Although so long and disastrously belated, these facts and conditions logically sug¬ gest the formation of a national gallery of American art. The landscapes of Thomas Cole upheld, as did those of Turner, the traditions of Claude Lorraine ; still in the spirit of a pioneer he proclaimed the grandeur of

the primeval American forest in paintings direct from nature. His {The Course of Empire,* now in possession of the New York Historical Society, a work that has never, we believe, been repro¬ duced in any form, presents in four grand paintings the sway of civilization from savage life to an Arcadian period ; then onward to the consummation of earthly power and magnifi¬ cence ; followed by the decadence occasioned by war of the elements, and that instigated by <(man's inhumanity to man®; finally, the literal scene of monumental destruction and sublimely solemn desolation. Before dismissing attention called to this early period influenced, as stated, by foreign methods of technical expression,

native American genius found little public ap¬ preciation ; still it faithfully progressed.

Science vs. Art. — Again about this time matter-of-fact utilitarianism appeared to dispel the ideal artist's poetic hopes, while every en¬ couragement followed the success of practical scientific talent. Washington Irving essayed to be a painter, but concluded to devote his life to literature and the power of the pen. Robert Fulton, who began his career as a skillful land¬ scape and portrait painter, attracting the friendship of Benjamin Franklin, who encour¬ aged his studies abroad, and gave him letters to Benjamin West and others, returned to his native land to find that scientific conditions were required rather than a demand for the credentials of culture in works of fine art. The result was steamboat navigation. Another triumph for science may be recorded. Frank¬ lin himself had captured lightning from the skies ; still it remained for the imagination and artistic skill of the professional painter, Samuel Finlay Breese Morse, the first president of the National Academy of Design, to subjugate the marvelous electric element that joins as neigh¬ bors all mankind.

<(The Hudson-River School.® — Neverthe¬ less, the fine arts flourished ; even modern travelers' tales of the wonderful scenery of two great continents stimulated artists and the lov¬ ers of art. ((The Heart of the Andes,® ((Ni- agara,® ((The Arctic Region,® (<The Rocky Mountains,® ((The Catskills,® ((Lake Cham¬ plain,® <(Lake George® and the <(Hudson River,® all were delineated. Along with this demand for great subjects, often commensurate in quantity as to size of canvas with Ruskin's mathematical maxim, that the greatest work of art is the one presenting the greatest number of great ideas,

there still prevailed in marked instances the glorious traditions of full-habited oil-painting to be found in the aesthetics of familiar environment of earth, air and water, as embodied in artistic values and soulful quali¬ ties — creations in harmony with Michel, Ruy- sael, Constable and the masters of Barbazon and Fontainebleau. Again, while scientific in¬ fluences appear in the works of Durand, Church, Casalear and Kensett, they asserted a truly American artistic individuality; they copied directly from nature. They thought of no school nor technique, but carefully imitated what they saw. All these men with one excep¬ tion had been practical engravers, laying down the burin and the needle-point to take up the pencil and the brush. Their respective bio¬ graphical and aesthetical records in American art will be enduring; yet there comes the re¬ flection that had their professional training been more liberal and adequate they would have attained to higher things. The importance of masterly academic training cannot be overesti¬ mated ; as a means to an end, however great, education is the only acknowledged guide for the individual artist and for the community even in matters of taste. Nothing is more creditable to a civilized people than its creden¬ tials of culture. The formation of a fine art association in New York was at the beginning of the past century an occasion of vast import¬ ance to the commonwealth. The first action was taken in 1802 by a few prominent citizens, and six years later a charter was obtained with the name of The American Academy of Arts. vol. l — 32

The first officers under this charter were Robert Livingston, president; John Trumbull, vice- president; DeWitt Clinton, Dr. David Hosack, John R. Murray, William Cutting, and Charles Wilkes, directors. A school was equipped with casts brought from Paris by Mr. Livingston, and exhibitions of paintings and statuary were held for a time in an unused riding school in Greenwich Street near the Battery. Public interest in this movement was soon transferred to grand panorama schemes conducted by Van- derlyn at the <(Rotunda,® and by others with similar enterprises.

The National Academy of Design. — It was

not until the year 1826 that the artists them¬ selves, with Morse as president, founded the National Academy of Design in the earnest interests of American art, with educational purposes and exhibitional facilities ; its in¬ fluence increasing until the present day. Its membership consists of 100 academicians and an equal number of associate members, includ¬ ing the most distinguished painters and sculp¬ tors of America. Its list of fellowship for life likewise includes the most prominent public- spirited patrons of American art.

Established for many years in the Academy building, taste¬ fully modeled after the Palais Ducal of Venice and forming an attractive urban landmark, lack of accommodations for its growing schools and crowding commercial surroundings re¬ quired a move to more suitable quarters. Un¬ like the Royal Academy of London, with its plethoric treasury, and similar institutions sit¬ uated in other European art centres, the academy is without governmental endowment and may well enlist American art patriotism in the cause of aesthetic culture in fostering the fine arts of painting, sculpture and architecture. Other societies of American artists, water color societies and architectural leagues make annual exhibitions in New York; while art institutes throughout the United States in various cities attest the extent and importance of American art. We, as Americans, are an artistic people, cosmopolitan and composite, uniting the genius of all nations. The aesthetic field of general American artistic taste and industry has been strenuously productive. The ornamental, or¬ derly and decorative work in clay, on china, glass, wood and stone as a tasteful and profit¬ able divertissement, begins with the training of the kindergarten. Black and white illustration and etching has been awarded first-class medals at home and abroad. The beautiful and refined exemplified in aguarelle and oil-painting; in por¬ traiture, genre and pastoral ; in sculpture and architecture'; and finally the grand and sublime of high art all confirm the achievements of American art and artists. In advancing these three divisions — the ornamental, the beautiful and the sublime — as a guide, we approach the philosophical consideration of the subject of fine arts.

Art and Science Differentiated. — What is, and what is not, fine art? Shakespeare's injunc¬ tion <(to hold, as it were, the mirror up to nature® is the best artistic advice ever given. Bacon in his essay is not so direct. He asks which is the greater trifler, one who would make a personage by geometrical proportions (perhaps by the fabled Greek cabala) or an¬ other who would select the best parts of divers faces to make one excellent (a veritable com-

posite picture) ? He concludes at last that a painter may make a better face than ever was, but he must do it by a kind of felicity, as a musician who makes an excellent air in music, not by rule. If ever there was an artist, he was Shakespeare — if ever there lived a scientist, Lord Bacon was, perhaps, the most eminent, and in their respective views and definitions we find the differentiation between

science and art. In any given work in so far as it may be me¬ chanically constructed is presented a scientific product ; and in so far as reproductive processes may exhaustively duplicate it, it falls short of the possibilities of fine art. An etching by a master may be an autographic art creation ; but when it is possible through photography, photo¬ gravure or chromo-lithography to so perfectly duplicate a painting that the reproduction pre¬ sents all the merits of the original it may be relegated to science rather than be accepted as genuine fine art. True consummate mechanism must ever go hand in hand with fine art ; still a great work of art presents the maximum of art to the minimum of mechanism. A paint¬ ing portraying living objects with a sharp con¬ tour, such as may delight the photographer, without the suggestive quality of stereoscopic relief, does not hold the mirror up to nature, and the work may be classed with scientific achievements even if accredited to the consum¬ mate mechanism of a Messonnier. Indeed re¬ productive processes have served a great pur¬ pose in defining the line of demarcation between science and are. Affectations have been swept away by a revelation of their superficiality; while the possibilities of inimitable fine oil- painting, a medium and technique that, of all ever employed, has the fewest possible limita¬ tions, have been enhanced as seen in the works of the American artists already mentioned ; and in those of a growing group of American ideal¬ ists, colorists and tonalists.

Pre-Raphaelitism. — Various have been the fashions or <(isms):> that have dominated Amer¬ ican art at different periods of its history. Pre- raphaelitism as advocated by Ruskin was one of the earliest imported. Being appointed the legal executor of his hero-client, as well as being an enthusiastic admirer of his work, Ruskin claimed for Turner not only the grander qualities, but a command of detail that rivaled the ancients, although the artist, we are told, frankly declined the compliment. Turner was unquestionably the greatest modern master of decorative and scenic effect in pictorial com¬ binations representing earth, air and water, being, indeed, entitled to the apotheosis of synthesis; still diligent search in the archives of the Royal Academy and National Gallery fails to reveal the qualities attributed to him by the author mentioned. Ruskin's enthusiasm proved contagious throughout the art circles of Eng¬ land and America; solicitous friends as well as the most influential art writers pleaded with the tyro to emulate not the work of Michelangelo, Titian or Raphael himself, but to follow in the footsteps of Perugino and Raphael's father or grandfather. This verily seemed like unto the dotage of imbecility in the light of Raphael's glorious art that had evolved the immaculate Sistine Madonna. He was brave, indeed, in

the field of American art of that day, who could resist the popular and professional pressure of this pseudo-aesthetic movement. No vestige of

it remains, and no wonder it was followed by impressionism — as a free and joyous transition from mechanical restrictions in art.

True Impressionism. — This was the ar¬ tistic attempt to present the maximum of soul¬ fulness conveyed to the world by finest art ; employing the minimum of materiality and mechanism as seen in the rendition through mental vision of the fleeting sunset or twilight — such as may only be materialized on the mor¬ row ; the epitomization perhaps of a day's outing under the open skies or flying clouds, or in the sublime thunder-storm ; in fact, the entire realm of imagination is unfolded by artistic impres¬ sion. Such was the accepted province of gen¬ uine impressionism originally as associated with the artistic convictions and poetic spirit of Corot, Monet, Monticelli, William Hunt, Will¬ iam Page, George Fuller and many others. Impressionism naturally evolves symbolism and idealism, but in too many instances has deterio¬ rated into affectation and mysticism. Premedi¬ tated and assumed mysticism is the dernier-res- sort of mediocre painters and sculptors, as well as of the minor poets. It may not be mistaken for sublime spirituality. Dante, Shakespeare and Milton, treating even divine themes, never nebulized their ideas in mysticism ; the same may be said of Bryant and Longfellow; while Poe, temperamentally, a mystic solitudinarian, in the field of poetic art presented the apotheo¬ sis of spirituality.

Ideal Naturalism.— The crowning glory in the art of any civilized country is that of naturalism. In the truest sense it utilizes even scientific (<disjecta membra,® as enumerated, and subjugates the same to the entirety of art — the comprehensive structural organic presentation of material nature, suggesting the qualities of size, form, weight, color and perspective values ; chiaroscuro, and, above all, the ultimatum of expression and tone. These enduring qualities characterize the art of Inness, Martin, Wyant, Hunt and Page, and the growing group of American tonalists of the naturalistic school. A great advantage exists in American art from its cosmopolitan resources. In Paris one sees nothing but French art; in Munich, the German school ; in London, English art, while the art institutions of America contain specimens of masterpieces from every source, notably the collection of the Metropolitan Museum of Art, and art institutes of Brooklyn, Boston, Chicago, Philadelphia and Pittsburgh, as well as collections in all our large cities. While every art centre of Christendom seems to be provided with an American colony of artists and students, expatriation is no longer a neces¬ sity in order to obtain an education in fine art.

Expert Supervision. — The Department of Commerce established by the general govern¬ ment is a step in the right direction of national affairs, and may make clear the way for the proposed Department of Art and Industries. It has been repeatedly advocated and constant evi¬ dences of its requirement as an absolute neces¬ sity have been presented to the government and to the people ; still it is being detrimentally delayed. The appropriations for national and international expositions have repeatedly been used in a manner giving anything but satisfac¬ tion. Commissions and contracts for statuary, monuments and architecture that should receive the supervision of expert art judgment are left

to provisional committees of statesmen, who frankly admit their inability to judge in the affairs of fine art. The experiences resulting from the careless management of international expositions, certainly teach that no such enter¬ prises should be thrust upon the community through flattering prospectuses, promises of profit, etc., until matured and definite plans and specifications shall have been officially inspected, approved or rejected by the projected national department of art and industries; this would also provide a valuable bureau of information in art affairs, enabling legislator and citizen to act or vote intelligently in regard to any appro¬ priation, commission or tariff. The practical utility and public good to be derived from such a department may be demonstrated in many in¬ stances. A member of Congress having been appointed upon a committee assigned the duty of supervising the ground immediately sur¬ rounding the House of Representatives was as¬ tonished to find that millions of dollars had been expended upon the same ; each new com¬ mittee annually appointed having exercised its taste and judgment on the important matter. It was concluded that the advice of an expert landscape architect be secured, and this being done, the expenditure was practically ended. Again the enormous expense of indiscriminate illustration of congressional and department literature or printed matter has, to-day, caused anxiety and criticism. So in relation to all official cases requiring expert art supervision, eclectic sense and aesthetic taste should be at the service of the government. The plan in¬ volves no untried innovation; the French nation has it Minister des Beaux Arts, who is a mem¬ ber of the Cabinet of the republic of France, leading the world in art affairs, taste and fashion. The establishment of municipal art commissions is a step in the right direction. The task of correcting the contour of metro¬ politan

architecture seems, indeed, herculean ; individual buildings of great beauty are ad¬ joined by the most heterogeneous structures; a three-story house appears between one of eight and a skyscraper of twenty. In no capital of Europe would such incongruities be permitted, and every possible facility should be afforded our municipal art commissions to correct this chaotic condition. Victor Hugo said ((the beau¬ tiful is as useful as the useful, more so, per¬ haps.® European municipal politics profit by the practical application of this fact; great cathedrals, public statuary and fountains, pic¬ ture galleries and museums attract multitudes of tourists, thereby financially as well as aesthet¬ ically benefiting communities that keep in the vanguard of culture and civilization. See American Sculpture, Historical Subjects in ; Architecture, American ; Painting, Ameri¬ can; Sculpture in the United States. Con¬ sul Wright, Willard H., (The New Movement in North America) (New York 1916).

Charles H. Miller, N. A.

AMERICAN ASIATIC ASSOCIATION,

an organization in the United States founded in 1898. Its purpose is to foster and safe¬ guard the trade and commercial interests of the United States and others associated there¬ with in Japan, Korea, the Philippines and else¬ where in Asia and Oceania; and to disseminate information and cultivate interest in the life

and politics of the East. It publishes a monthly magazine called Asia. Membership, 300. It has auxiliary societies at Shanghai, Yokohama and Kobe.

AMERICAN AS OFFICIAL DESIGNA¬ TION. In June 1904 an order was issued by Secretary of State Hay that on all new record- books, seals, etc., used by representatives of the United States in foreign countries there should appear the words <(American Embassy,® (< Amer¬ ican Legation,® etc., in place of ((Embassy of the United States,® ((Legation of the United States,® etc., previously employed. The usage thus ap¬ plied to all diplomatic establishments and con¬ sular officers had been followed by Secretary Hay when ambassador to England, his position being that all countries composed of ((United States,® for example, Mexico, Brazil, Colombia, etc., were described by the geographical, not the political, name of the country.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, a society originally known as the Association of Amer¬ ican Geologists, founded at Philadelphia in 1840. In 1842 it added Naturalists to its

name and was known by this title until 1847, when the present organization was formed. During the past 50 years the names of practically all the leaders of American science have been on the register of the association, and the 52 volumes of its Proceedings contain many of the most important contributions to scientific literature published in this country. It is organized in 11 sections, each of which holds its own conven¬ tion at the annual meeting of the association during the summer. The sections embrace the following departments of science: A, mathe¬ matics and astronomy; B, physics; C, chem¬ istry; D, mechanical science and engineering; E, geology and geography; F, zoology; G, botany; H, anthropology and psychology; I, social and economic science ; K, physiology and experimental medicine ; and L, education. The association also serves as a centre for the meet¬ ing of a number of important special scientific societies which have become connected with it. It publishes annually a volume of Proceedings, and in 1901 became associated with the journal Science, making it the semi-official organ of the society. The association numbers over 10,000 members. Its roll of <(Fellows® has included such well-known scientific men as Newcomb, Barker, Brush, Young, Lesley, Morse, Langley, Goodale, Prescott, A. Hall, Harkness, Gibbs, Gill, Putnam and Minot.

AMERICAN ASSOCIATION FOR LA¬ BOR LEGISLATION. This is a scientific society, organized in 1906 to serve as the Amer¬ ican section of the international association of the same name, to promote uniformity of labor legislation in the United States, and to encour¬ age the study of labor conditions with a view to promoting desirable laws. Prominent among the Association's achievements are the Federal law abolishing poisonous phosphorus in the match industry, and statutes in several States for the prevention of lead poisoning and com¬ pressed air illness, the reporting of occupational diseases and industrial accidents, and the estab- ishment of one day's rest in seven. The organ¬ ization has also been active in promoting public employment offices and adequate workmen's

compensation laws, and was instrumental in initiating the American movement for health insurance. The American Labor Legislation Review is the official publication.

AMERICAN ASTRONOMICAL SOCI¬ ETY, The. This society was founded in 1899 with an original membership of 113. The mem¬

bership is onw about 300, and includes well- nigh all of the active astronomers of America, and many prominent foreign astronomers. The purpose of the society is to promote the ad¬ vancement of astronomy in general and to further co-operation among members in the solution of the extensive problems of the science. The society holds annual meetings for conferences and for the presentation of current scientific work. It has issued two volumes of its publications, which are largely made up of proceedings of the various meetings.

AMERICAN BANKERS ASSOCIA¬ TIONS. See Banks and Banking — Bankers Associations in the United States (Article

22).

AMERICAN BAPTIST FOREIGN MISSION SOCIETY. Among the five young men whose sailing to foreign lands in 1812 constituted the founding of the foreign mis¬ sion enterprise of American Christianity was Adoniram Judson. On the long voyage to India his study of the New Testament led to a change of conviction regarding baptism and accordingly he offered his services as a mis¬ sionary to American Baptists. His challenge in 1814 called into existence (<The General Missionary Convention of the Baptist Denomi¬ nation in the United States of America for Foreign Missions.ˆ In 1846 the name of this organization was changed to <(American Bap¬ tist Missionary Union, » and in 1910 the present name of ((American Baptist Foreign Mission Societyˆ was adopted. Since 1826 the head¬ quarters of the Society have been in Boston, Mass., and in 1905 the offices were removed to the new Ford building where they now occupy the entire eighth floor. The by-laws of the Society state that the purpose of the organization is to diffuse the knowledge of the religion of Jesus Christ by means of missions throughout the world. The passing of a hun¬ dred years brings on many changes. In the days of Judson the Baptists of America were of little influence, few in numbers and poor in financial resources. To-day they constitute a great denomination, a mighty power in the religious life of America. Their foreign mis¬ sionary society has come to be one of the largest and most influential in the realm of Protestantism. A hundred years ago only $1,059 represented the financial expenditures for Baptist foreign missions, whereas during the past five years the receipts in support of this work have exceeded $1,000,000 an¬ nually. The work of the Society covers a vast expanse of territory in the non-Christian world. Ten mission fields are maintained — Japan, the Philippines, east China, west China, south China, Burma, Assam, Bengal-Orissa, south India and Belgian Kongo. In addition, by a co-operative arrangement, the Society since 1835 has been assisting the Baptist cause in Europe, and separate missions are

main¬ tained in eight European countries. The mis¬ sionaries supported by the Society to-day num¬

ber 688 (including those of the Woman's Society), and these are assisted by 6,673 native workers. In Europe 2,480 workers were in service in 1914, but what effect the war has had upon their number has not yet been de¬ termined. In the 10 missions of the non-Christian wrorld there are 127 regularly main¬ tained stations with missionaries in residence and 3,237 out-stations or preaching places. In non-Christian lands to-day 183,505 church members are enrolled in 1,732 regularly organ¬ ized Baptist churches, of vrhich 1,027, or 59 per cent, are self-supporting. It is a note¬ worthy fact, and one productive of deep grati¬ fication, that among the Karen people in Burma the percentage of self-supporting Bap¬ tist churches is greater than in any State of the Northern Baptist Convention. In 1916 the mis¬ sionaries on all fields baptized 12,355 converts, and the total number of baptisms since the work first began has exceeded 625,000.

The service of the medical missionary is of value in that it visualizes the Great Physician, and at the same time opens the door to the evangelist wdth his healing gospel for the diseases of the soul. Fifty-one missionary physicians, assisted by 133 native nurses and other helpers, give their full time to this im¬ portant work. Sixty-nine dispensaries consti¬ tute the equipment for their service. More than 83,000 patients received medical and surgi¬ cal treatment during 1917, and plans are being made for a great advance in this phase of the Society's work. The educational work is con¬ ducted in six colleges, 35 theological seminaries and training schools, and 2,608 schools of all grades, with a total enrolment of over 85,000 pupils. More than 89,000 pupils receive re¬ ligious instruction in 2,301 Sunday schools. The missionaries have translated the Bible, in whole or in part, into over 30 dialects and languages. Three printing and publication plants are connected with the Society, wdiere bibles, periodicals, hymnbooks, textbooks and other literature are printed. The administra¬ tion of this great enterprise is placed in the hands of a board of managers of 27 members, nine of whom are appointed each year at a Northern Baptist Convention. The plans and policies of the Board are carried out under the direction of the executive officers. At the present writing these are six in number. In the Foreign Department, which is charged with the responsibility for the wrork on the field, there are twro foreign secretaries and an asso¬ ciate secretary.

In the Home Department for the presenta¬ tion of the wrork to churches and the securing of funds there is a home secretary and an

assistant secretary and treasurer.

William B. Lipphard, Assistant Secretary.

AMERICAN BAR ASSOCIATION, The. This association was formed, on the initiative of the Connecticut State Bar Asso¬ ciation, which appointed, in January 1878, a committee of three for that purpose. The com¬ mittee prepared a call for a meeting of a selected list of lawyers from the different States on 21 Aug. 1878 to consider the expediency of such a step. This was signed by 14 of the leaders of the American bar. At that meeting there was an attendance of 72, coming from 20

States. A constitution was adopted, additional members elected, and a complete organization effected. The scheme thus adopted has been substantially followed ever since by the asso¬ ciation, which meets annually, at different places, and publishes an annual volume report¬ ing its doings, as well as a quarterly periodical called the American Bar Association Journal, one number of which is mainly devoted to com¬ parative law and recent legislation in foreign countries. The Association has had a large in¬ fluence throughout the country in advancing the standards of legal education, promoting sound legislation and securing uniformity in State statutes regulating matters of general concern, such as commercial paper, sales, warehousing, etc. To its efforts the creation of the United States Circuit Court of Appeals was largely due. The membership is now over 10,000, em¬ bracing every American State and Territory. Consult historical sketch by Jacob Weartt in the New Jersey Law Journal (1904, pp. 292, 336).

AMERICAN BIBLE SOCIETY, The,

organized in New York in 1816, to encourage the wider circulation of the Bible. In 1841 an act of incorporation was obtained with privi¬ leges which have since been enlarged. In 1852 the Bible House was built, occupying the whole of the ground bounded by Third and Fourth avenues, Astor Place and Ninth Street. It is one of the oldest office buildings in NewT York. The government of the Society is entrusted to a board of managers, consisting of 36 laymen, one-fourth of whom retire from office each year, but are re-eligible. Laymen who were constituted directors for life before 1 June 1877, and ministers who are life members are authorized to attend the meetings of the

board, with power to speak and vote. Its constant aim has been to secure the adequate translation of the Holy Scriptures into all the languages of the earth and to distribute these translations as widely as possible, and especially to reach the destitute of all classes and conditions. Four times it has undertaken to canvass the whole country for this purpose. These canvasses were begun in 1829, 1856, 1866 and in 1882. During the fourth resupply, beginning in 1882, more than 6,300,000 families were visited by its col¬ porteurs, and 473,806 families were supplied with the Scriptures, and in addition nearly 300,000 individuals. In 1912 it issued Scriptures for use in the United States in 83 languages besides English. During the last 30 years its foreign circulation has steadily increased, rising from 250,000 copies in 1876 to over 2,000,000 copies in 1915. It has, by large grants both of money and books, aided missionary labors of the various Christian churches having missions in foreign lands to prosecute Bible translation and distribution. It has now 12 regular foreign agencies under its own direction, each under the supervision of an ordained minister of the gospel. During the last 30 years its foreign circulation has reached a total of 18,000,000 volumes. It has about 500 persons under its direction in the home field, and 810 in foreign lands. In addition to the printing done in the United States in 1915, it had Scriptures printed for its use at Shanghai, and other cities in China, at Yokohama, at Constantinople, at Beyrout and at Bangkok. Translations have been begun, and in part published, in several of the many languages spoken in the Philippine

Islands. For the last year of record, which was its one hundredth year, ending 31 Dec. 1915, the society issued 7,204,497 volumes and for the 100 years 117,130,711 volumes. These Scriptures were in 164 languages, which include the languages of at least nine North American Indian tribes. The increase of Bible reading in China is most notable, the society's circula¬ tion reaching 2,225,000 volumes in the year 1915. Some large bequests have been made during the last decade, especially one from the late John S. Kennedy of $850,000. The endowment fund of the Society was added to by Mrs. Russell Sage, who gave $500,000, the society raising $500,000. The income of the society is how¬ ever very inadequate to its great world needs. Its annual budget calls for an expenditure of over $800,000. The offices are at the Bible House (see Bible Society). Consult Dwight, (The Centennial History of the Society) (New York 1916).

AMERICAN BOARD OF COMMIS¬ SIONERS FOR FOREIGN MISSIONS, The. This is the oldest foreign missionary society in America, having been organized in 1810. Its voting members are the members of the Congregational National Council with 150 additional, selected at

large. The board has 650 Americans working in its 19 missions located in Japan, China, India, Turkey, Austria, Spain, Africa, Mexico, the Philippines and Micronesia. In addition the board supports 5,000 native workers, including teachers, preachers, nurses, doctors, Bible men and women selected from its converts in these various fields.

One-third of the work of the American board has been in European and Asiatic Turkey, this field having been assigned to the board as its exclusive territory. The work of the board consists in translation of the Bible and other books into the languages of foreign peoples, the establishment of churches, schools, colleges, hospitals and industrial plants in its various fields of work. Three of the most important colleges in Turkey to-day, Robert, Constanti¬ nople and Syrian Protestant, although now in¬ dependent, are the product of American Board work.

The annual income of the board for the support of all this work is $1,100,000. This sum comes from the contributions of the churches, chiefly Congregational, from legacies and from the income of permanent funds. The churches which have been founded on the mission fields have been contributing a little more than $300,000 annually toward the enterprise.

The actual management of the business of the board is entrusted to the Prudential Com¬ mittee centring in Boston, the board's head¬ quarters, and consists of 12 men about evenly divided between laymen and ministers. This committee meets on Tuesday afternoon to con¬ sider the important business of the board which business, as a rule, has previously been carefully digested by its subcommittees. Much time of the Prudential Committee is taken up with con¬ sidering applications for service in the foreign fields by young men and women from our American colleges. A conference is held the first of June each year for instruction of these new recruits. About 60 men and women are sent out to the fields each year. After seven years of service on the field these missionaries

are allowed to come home and spend a year on furlough at the expense of the board. The board issues monthly The Missionary Herald, an illustrated missionary magazine which is the oldest in America and probably the oldest in the world. Affiliated with the American Board are three women's boards with headquarters in

Boston, Chicago and San Francisco. These boards of women support all the unmarried women missionaries, and raise about $300,000 annually for that purpose. Of the entire mis¬ sionary force one-third are men and two-thirds are women.

AMERICAN BUREAU OF SHIPPING,

a maritime association established in New York in 1867, for the purpose of collecting and dis¬ seminating information upon subjects of marine or commercial interest, of encouraging and ad¬ vancing worthy and well-qualified commanders and other officers of vessels in the American merchant service, and of promoting the security of life and property on the seas.

AMERICAN CATHOLIC HISTOR¬ ICAL SOCIETY, an organization founded in 1884 for the purpose of collecting and publish¬ ing research ;.nd information concerning the history and activities of the Catholic Church, and stimulating by lectures, etc., interest in Catholic affairs. It publishes (Records) and supports a library and museum devoted to its purposes at Philadelphia. Membership, 612.

AMERICAN CHEMICAL SOCIETY, The. This society was founded in April 1876, its object being <(the advancement of chemistry and the promotion of chemical research.® The society publishes three journals : Journal of the American Chemical Society, founded in 1878; Chemical Abstracts, founded in 1907, and Jour¬ nal of Industrial and Engineering Chemistry, founded in 1909. The membership of the society on 1 July 1916 was 8,100 and it is grow¬ ing rapidly. The society is organized into eight divisions and 49 local sections, each having its own officers and governing bodies. The society meets semi-annually. The policy of organiz¬ ing the members into divisions has been inaugurated, and eight enthusiastic divisions have been formed as follows : Division of Industrial Chemists and Chemical Engineers, Division of Physical and Inorganic Chem¬ istry, Division of Fertilizer Chemistry, Di¬ vision of Agricultural and Food Chemistry, Division of Organic Chemistry, Division of Pharmaceutical Chemistry, Division of Biologi¬ cal Chemistry and Division of Water, Sewage and Sanitation. The society affords especial facilities for chemists interested in a particular branch of the science to organize themselves into a representative body within its ranks. Forty-nine local sections, situated in various parts of the country, hold frequent meetings. The American Chemical Society is the largest chemical society in the world, having some 3,000 more members than its nearest rival — the Verein Deutscher Chemiker. Office of the secretary, Washington, D. C.

AMERICAN CITIES, Government of.

See Cities, American, Government of.

AMERICAN CIVIC ASSOCIATION, The, a voluntary organization formed 10 June 1904 by the consolidation of the American League for Civic Improvement and the Amer¬

ican Park and Outdoor Art Association, its objects being ((the cultivation of higher ideals of civic life and beauty in America, the pro¬ motion of city, town and neighborhood im¬ provements, the preservation and development of landscape, and the advancement of outdoor art.® The organization of a national associa¬ tion to act as an agency of inspiration to Amer¬ ican towns and cities for improvement, and to serve as a clearing house of information in all such activities, was a natural development fol¬ lowing the effective improvement activities that had for years been conducted by local effort, notably at Stockbridge and Newton Centre, Mass., and in other localities. The first efforts of such a local movement were generally of a home and neighborhood character. Unattrac¬ tive and dirty backyards were transformed into little bowers of beauty and cleanliness. From these initial steps there had developed, largely through the nation-wide propaganda of the association, the larger movements that apply to communities at large, such as the creation and maintenance of city park areas, boule¬ vards, playgrounds for children and recrea¬ tional areas for adults. Involved in these gen¬ eral improvements have been specialized efforts for the beautifying of water-fronts, for the elimination of unnecessary smoke and unsightly billboards. The culmination of all these activi¬ ties has developed within the past 10 years in a systematic propaganda by the association for the adoption of comprehensive city plans, en¬ listing the advice and counsel of professional landscape architects and opening the way for an orderly and systematic development of cities and towns. During 1916, as an extension of the idea embraced in city planning, there has been developed a movement in the association for country planning, which proposes to direct a similar effort for the beautification and im¬ provement of the rural districts. In extension of its general purposes for the preservation and development of landscape the association has been the leader in two great movements for the preservation of scenery, namely, in behalf of the Falls of Niagara — to prevent their spoliation by commercial interests — and sec¬ ond, for the extension of the American National Park system. The association originated a pro¬ posal to have created by Congress a National Park Service, which in 1916 appeared likely of realization. The park service as contemplated will be in the Department of the Interior and have

jurisdiction over the 14 existing national parks and the 31 national monuments hereto¬ fore in the Department of the Interior and the Department of Agriculture. Since the con¬ solidation effected in Saint Louis, the American Civic Association has held 10 annual conven¬ tions. Its membership consists of life members, sustaining members, annual members, councilor members and affiliated members. The work of the association is conducted from its general offices through committee and department heads as follows: City Planning, National Parks, State and County Parks, Country Planning, the Billboard Nuisance, the Smoke Nuisance, the Noise Nuisance, Schools as Community Cen¬ tres, and the Press. Active propaganda is car¬ ried on by means of department leaflets, clipping sheets and correspondence. The prin¬ cipal offices of the association are at Washing¬ ton, D. C.

AMERICAN CLIMATOLOGICAL AS¬ SOCIATION, a medical organization founded in New York city in 1884 “for the study of Climatology, Hydrology, and Diseases of the Circulatory and Respiratory Organs.® Candi¬ dates for membership must have contributed something to the literature of the subjects before election, this insuring a select member¬ ship, which the roll shows to be very gen¬ erally distributed among the medical profes¬ sion throughout the United States, with dis¬ tinguished honorary and corresponding mem¬ bers in England, Canada, Mexico, South America, South Africa and Australia and other parts of the world. Annual meetings have been held since the foundation, at which papers con¬ fined strictly to the objects mentioned in the constitution of the organization are read and discussed and afterward published in the Trans¬ actions of the association ; 20 volumes have already appeared, and copies are sent annually to the principal libraries throughout the world. The title of some recent 'contributions showing the value and wide scope of this association are : (The Advantages of Southern California in the Treatment of Tuberculosis5 ; (The Climate and Waters of Hot Springs, Va.) ; Something of the Geography of Croupous Pneumonia) ; ˆRe¬ cent American Contributions to the Methods of Prevention and Treatment of Pulmonary Tu¬ berculosis 5 ; (Climatology as a Study in the Medical Schools5 ; (The Climate of Santa Bar¬ bara, California5 ; (The Climatology of Mus- koka, Ontario, Canada5 ; (The Climates and Diseases of Central America and Panama. 5 The head offices are in Philadelphia ; the organ¬ ization must not be confounded with a similar important and cofriendly society, “The Na¬ tional Association

for the Study and Prevention of Tuberculosis,55 with headquarters in New York city. * The membership in 1916 was 136.

AMERICAN COLLEGE, The. Its Place and Importance. — The American college has no exact counterpart in the educational system of any other country, although its elements are derived from European systems, and in partic¬ ular from Great Britain. And while it is true that the primary form of organization in our earliest colleges, such as Harvard, Yale and Princeton, was inherited from the English Uni¬ versity of Cambridge, still it was subjected to modification at the very beginning, to adapt the college to its community, and afterward it was progressively modified to assure close sym¬ pathy with the character of the growing Ameri¬ can nation. The result is an institution with derived elements of composition and in less degree of form, which has developed for itself an organization notably different from the old-world schools.

So the college, from the nature of its devel¬ opment, holds the central place in the historic growth of American higher education. It re¬ mains to-day the one repository and shelter of liberal education as distinguished from technical or commercial training, the only available foun¬ dation for the erection of universities containing faculties devoted to the maintenance of pure learning, and the only institution which can furnish the preparation which is always desired, even though it is not yet generally exacted, by professional schools. Singularly enough, the relation of directive influence sustained to-day

by our colleges to the university problem is not unlike the relation held in the Middle Ages by the inferior faculty of arts at the University of Paris to the affairs of the university as a whole. In both cases the college, or faculty of arts, appears as the preliminary instructor in the essentials of liberal education; this ear¬ lier education is recognized as the proper requi¬ site for later study in the professional faculties ; and in both cases the inferior faculty contains the germ of the higher university faculty of pure learning, the faculty of arts, sciences and philosophy. The reason for this similarity is that the American college in this respect per¬ petuates and develops a fundamental tradition of liberal learning, which found its way from Paris through Oxford to Cambridge and then from Cambridge to our shores. The parallel of our college history with the Old-World history holds good in other important respects. Still, in order to understand the precise nature and unique influence of the college in American edu¬ cation, it is not necessary to trace the story of its development, for in its various forms of present organization it reveals the normal type which has been evolved, survivals of past stages of development, instances of variation

and even of degeneration from the type, and interesting present experiments which foreshadow the future.

The Old-fashioned College. — The three commonly accepted divisions of education into primary, secondary and higher stages, while fully recognized in America, are not followed rigorously in organization. Primary education is more clearly separable from secondary than secondary from the higher or university stage. The chief cause for this partial blending of the secondary and higher stages is the college. However illogical and indefensible such a mix¬ ture may appear, the historical outworking of this partial blending has been compelled by the exigencies of our history and has been fruitful in good results.

The American college, then, as contrasted with European schools, is a composite thing — partly secondary and partly higher in its organ¬ ization. It consists regularly of a four-year course of study leading to the bachelor's degree. Up to the close of the Civil War (1861-65) it was mainly an institution of secondary educa¬ tion, with some anticipations of university stud¬ ies toward the end of the course, which, how¬ ever, were usually taught as rounding out the course of disciplinary education, rather than as subjects of free investigation. The average age of graduation was about 20. The maximum course of preparation in secondary schools was four years. In the better schools they studied Latin and Greek grammar, four books of Caesar, six books of Virgil's 2Eneid, six orations of Cicero, three books of Xenophon's Anabasis and two of Homer's Iliad, together with arithmetic, plane geometry (not always complete) and alge¬ bra to, or at most through, quadratic equations, This the stronger colleges required for en¬ trance; but many weaker ones were compelled to teach some of these preparatory studies in the first two years of the college course. With few and unimportant exceptions the four-year course consisted of prescribed studies, including Eng¬ lish literature and rhetoric, Latin, Greek, mathe¬ matics, natural philosophy, chemistry, the ele-

merits of deductive logic, moral philosophy and political economy, and often a little psychology and metaphysics. Perhaps some ancient or gen¬ eral history was added. French and German were sometimes scantily taught. At graduation the student received the degree of bachelor of arts, and then entered some professional school, or went into business or into teaching in the primary or secondary schools.

The College of To-day. — At the present time things are very different. The old four-year course, consisting entirely of a single set of prescribed studies leading to the one degree of bachelor of arts, has grown and branched in many ways. The better preparation now given in thousands of schools has enabled col¬ leges to ask for somewhat higher entrance requirements and to exact them. The age of entrance has increased. In some quarters the increasing age of the students has raised the question of shortening the course to three years or allowing the last year to be occupied with professional studies in order that young men may not be kept back too long from entering upon their professional studies. A generation ago a young man graduated at 20 without diffi¬ culty and after two or three years in studying law or medicine he began to earn his living at 22 or 23. But to-day a college student is 22 years old at graduation and if he studies law or medicine he must wait until he is 25 or 26 to begin earning his living. Accordingly boys are now passing in considerable numbers directly from secondary schools, which do not really complete their secondary education, to the professional schools. The problem is an economic one, and it is affecting college courses of study. One solution, to shorten the course to three years, was advanced by President Eliot of Harvard. But this proposal has not met with general favor. Another proposal is to keep the four-year course and allow profes¬ sional studies in the last year, thus enabling the student to save one year in the professional school. This experiment is being tried at Co¬ lumbia and elsewhere. A third proposal is to keep the college course free from professional studies, but to give opportunities in the last year or the last two years to pursue liberal courses clearly underlying professional training, thus saving a year of professional study. This is the trend of recent experiments in Yale and Princeton. The one common consideration in favor of all these proposals is that a year is saved. Against the three-year course, it is argued that there is no need to abolish the four-year course in order to save a year. Against the admission of strictly professional studies it is argued that work done in a pro¬ fessional school ought not to count toward two degrees representing two radically different things. Against the proposal to allow the liberal studies which most closely underlie the pro¬ fessions, it is argued that this is a half-way measure, after all.

Alterations in the Course. — The four-year course, however, no longer leads solely to the degree of bachelor of arts, and this old degree has itself been modified. With the founding of schools of science, aiming to give a modern form of liberal education based mainly on the physical and natural sciences, the degree of bachelor of science came into use. Then inter¬

mediate courses were constituted, resting on Latin, the modern languages, history, philoso¬ phy, mathematics and science, and thus the degree of bachelor of letters or bachelor of philosophy came into use. Sometimes the va¬ rious courses in engineering were made foui-year undergraduate course with their degrees virtually rated as bachelor's degrees. Still other degrees of lesser importance came into vogue here and there to mark the completion of a four-year college course. The dispersing pres¬ sure of the newer studies and the practical demands of American life proved too strong to be held in form or to be kept out by the barriers of the old course of purely liberal studies with its single and definite degree, and new degrees were added to represent the at¬ tempted organization of newer tendencies. Com¬ pared with the old course such courses lack definiteness of structure. They aimed to real¬ ize new and imperfectly understood conceptions of education, and were composed of studies whose inner content was changing rapidly, or else were ˆhalf-and-half® forms of education, difficult to arrange in a system that promised stability, as in the case of studies leading to the bachelor of letters or bachelor of philoso¬ phy. A graver source of trouble was the ad¬ mission of various engineering and other tech¬ nical studies as parallel undergraduate courses. This tended to confuse in the minds of stu¬ dents the radical distinction between liberal and utilitarian ideals in education, and by the attrac¬ tiveness of the ftbread-and-butter® courses, to diminish the strength of the liberal studies. When in addition it is remembered that the newer courses, whether liberal, semi-liberal or technical, exacted less from preparatory schools in actual quantity of school work necessary for entrance into college, it will be seen that the level of preparation for college was really lowered.

The present drift of opinion in colleges which offer more than one bachelor's degree is more eassuring than it was some 20 years ago. There is a noticeable and growing tendency to draw a sharper line between liberal and tech¬ nical education and to retain undergraduate college education in liberal studies as the best foundation for technical studies, thus elevat¬ ing the latter to a professional dignity com¬ parable with law, medicine, and divinity. The more this conception prevails the more will college courses in engineering be converted into graduate, or at least partially graduate, courses. Independent schools of technology may continue to offer their courses to young students of college age, but where such schools have been associated as parts of colleges or universities the tendency to a clearer separation of technical from liberal studies seems likely to prevail.

Another hopeful tendency gradually gather¬ ing strength is to give the

various bachelor's degrees more definite significance by making them stand for distinct types of liberal or semi-liberal education. First comes the aca¬ demic course, attempting a general liberal edu¬ cation, consisting of classical and modern literatures, mathematics and science, with his¬ torical, political and philosophical studies, and leading to the bachelor of arts degree. The second aims to represent a strictly modern cul-

ture predominantly scientific in character, and culminating in the degree of bachelor of science. In this course the technical aspects of the sciences taught tended to create a demand for strictly technological instruction. So schools of science do little save produce experts in the various mechanical and chemical arts and in¬ dustries. Conscious of this difficulty, many schools of science have been giving larger place in the curriculum to some of the more available humanistic studies, especially French, German and English. Economics, modern history and even the elements of philosophy have found place. Some improvement has also been effected by increasing the entrance requirements in quantity of school work. But the course still suffers from an inner antagonism between technical and liberal impulses, and until it set¬ tles into a strictly technical form, or else comes to represent a strictly modern liberal culture, its stability cannot be regarded as assured. In the independent scientific schools, unassociated with colleges, it seems probable the course will keep or assume a highly technical form. But wherever it exists side by side with other bachelor's courses as a proposed representative of some form of liberal education, it will almost inevitably tend toward the ideal of a modern culture mainly scientific. The process, however, promises to be slow and difficult. There is not only a financial risk, but a serious theoretical difficulty in realizing this form of liberal education. The antagonism between the technical and liberal impulses in the course seems very difficult to eliminate completely. The utilitarian instinct of the time militates against devotion to the intellectual value of modern studies and tends more and more toward technical standards.

The third type of liberal college education is the intermediate course labeled with the degree of bachelor of letters or bachelor of philosophy. It differs from the other courses mainly in its treatment of the classical languages. To placate the practical spirit it drops Greek, but retains Latin both as an aid to general culture and as a help in

learning the modern languages. Although indeterminate and intermediate, it serves a valuable end by providing many stu¬ dents, who do not care for the classical lan¬ guages in their entirety, with a sufficiently lib¬ eral form of education to be of great service. Judged from the standpoint of the historical bachelor of arts course, it is a less general but still valuable culture. Judged from the standpoint of the bachelor of science course, it appears to escape the unhappy conflict between the technical and liberal impulses.

Some colleges, following the example of Harvard under President Eliot, dealt with the bachelor degree very differently. The mean¬ ing of the degree was radicallv altered, so as to represent the free selections made by the stu¬ dents themselves out of the range of liberal studies. In such a plan it no longer stands for the completion of a definite curriculum com¬ posed of a few clearly related central studies constituting a positive type. What it does stand for is not easy to define, because of the varia¬ tion of practice in different colleges and the wide diversity of selection on the part of the student. In the undergraduate college con¬ nected with the Johns Hopkins University at Baltimore choice is regulated by prescribing

moderately elastic groups of cognate studies, the student being required to say which group he will choose. In Harvard College the stu¬ dent has been allowed to choose what he pre¬ fers, subject to such limitations as the priority of elementary to advanced courses in any sub¬ ject, and the coincidence in time of various courses. But the so-called ((free-elective sys- tetrF inaugurated by President Eliot has been definitely abandoned by Harvard and a system requiring concentration in one leading division of studies, with some work in each of the three other leading divisions, has been introduced.

Other Phases of Change. — To what ex¬ tent the undergraduate collegian has become a university student is the real question around which a controversy of vital importance is raging.

The profound change indicated by external symptoms has-been in progress since the Civil War, and is still working along toward its con¬ summation. The difficult thing in analyzing this change is not merely to understand the change from a uniform to a multiform mode of life and organization, but to understand that what is changing is the old-fashioned Ameri¬ can college. But even the old-fashioned col¬ leges, while aiming to follow out a single course of study ending in a single degree of single meaning, did not succeed in exhibiting such close individual resemblance to each other as is to be found among the lycees of France, the public schools of England or the gymnasia of

Germany. Many colleges really served as pre¬ paratory schools for larger and stronger col¬ leges, and many so-called universities did not attain and in fact do not yet attain to the real though less pretentious dignity of the better colleges. For the sake of simplicity then we discard from our consideration all except the better colleges which, when taken together, exhibit the dominant tendency.

How, then, have these better colleges changed? Speaking generally, they have changed in a way which reflects the diversified progress of the country, and yet they have had an important influence in leading and or¬ ganizing the national progress. Then, too, the change is not merely a change of form, but of spirit. In the older days scarcely any col¬ lege had as many as 400 or 500 students, and the range of studies was limited. The faculty of the college exercised a strong paternal enxiety and oversight on behalf of the morals and re¬ ligion as well as over the studies of the stu¬ dents. The authority of the president was al¬ most patriarchal in character. Not highly de¬ veloped insight into the problems of education but plain common sense in governing students was the condition of a successful presidency. The range of studies has increased. With the strengthening of preparatory courses, the school preparation of students has improved, and at the same time their average age at entrance has risen. The number of professors has multi¬ plied. The old-fashioned college professor, the man of moderate general scholarship and of austere yet kindly interest in the personal wel¬ fare of those he taught, still remains ; but at his side has appeared the newer type of Ameri¬ can college professor, the man of high special learning in some one subject or branch, who considers it his primary duty to investigate, his next duty to teach and his least duty to

exercise a personal care for the individual stu¬ dents. Perhaps the old type will be replaced by the new. Such a result, however, would not be an unmixed gain, and our finest college professors to-day endeavor to combine high special attainments as scholars with deep inter¬ est in the personal well-being of their students. The authority of the faculty is still sufficient, but is exercised differently. Student self-gov¬ ernment is the order of the day, and the more this prevails the less is exercise of faculty au¬ thority found to be necessary. The presidents of our larger colleges, and even of many of the smaller, are becoming more and more ad¬ ministrative officers and less and less teachers. It is no doubt something of a loss that the students should not have the

intimate personal acquaintance with the president enjoyed by stu¬ dents a generation ago, but mere numbers fre¬ quently make this impossible. . Out-of-door sports have also entered to modify and improve the spirit of our academic life. They have de¬ veloped their own evils, but at the same time have done wonders for the physical health of the students, the diminution of student disorders and the fostering of an intense esprit de corps. In the reaction from the asceticism of early college life there is little doubt athletics have gone too far. But the abuses of college athletics can be corrected, and are to some ex¬ tent self-correcting.

Nearly all our colleges are avowedly or im¬ pliedly Christian. A respectable minority of them are Roman Catholic. The large majority are under Protestant influences, which are sel¬ dom denominational. The student is expected to attend certain religious exercises, such as morning prayers ; but often all such attendance is voluntary. The religious life of the under¬ graduates finds its expression in various socie¬ ties, which endeavor to promote the Christian fellowship and life of their members. While moral and religious convictions are freer and sometimes laxer than of old, the Christian life in our colleges is real and pervasive.

As a rule the student is so absorbed by the scholastic, athletic and miscellaneous activities of his college that he sees little outside social life. This is particularly true in colleges which enjoy academic seclusion amid rural surround¬ ings, for here more than anywhere else is to be seen the natural unperturbed outworking of the undergraduate spirit.

Development of Elective Courses. — The

non-scholastic aspects of our present college life are important in that they give tone to the whole picture, but they do not account for the great transformation which has been wrought for that transformation is distinctly scholastic. It is caused by the increase of students, their better preparation and their greater age. The studies which made up the curriculum leading to the old bachelor of arts degree are now being completed before the end, sometimes by the middle of the college course. There is to¬ day no reason why a young man of 20 should not know as much as his father knew at 20. But at 20 his father had graduated with the bachelor of arts degree, whereas at 20 the son is only half way through his college course. As this fact forced itself upon the older and stronger colleges, experiments were made in granting a limited amount of elective freedom to students in the latter part of their course ;

first in the senior year and then in the junior year, until in some instances the whole four- year course became elective. In some colleges a student may obtain the bachelor of arts de¬ gree without studying any science, or he may omit his classics, or he may know nothing of philosophy. To-dav the problem of the rela¬ tion of prescribed to elective studies is a ques¬ tion of constant interest and perpetual readjust¬ ment. The solutions offered are many.

The first proposal, which has now scarcely an advocate, is plainly an impossible one. It is to insist on the old-fashioned four-year pre¬ scribed course. But the old-fashioned course cannot be restored, because it no longer suits our age. Young men will not go to college and remain there until the age of 22 years without some opportunity to exercise freedom of choice in their studies.

The second proposal is to constitute the undergraduate course entirely, or almost en¬ tirely, of elective studies. It is argued that when a young man is 18 years of age, he is old enough to choose his liberal studies, and that his own choice will be better for him in¬ dividually than any prescription the wisest col¬ lege faculty may make. The advocates of this view admit its dangers. They see the perils of incoherency and discontinuity in the choice of studies. They see that many students are in¬ fluenced, not by the intrinsic value of the studies, but by their liking for this or that instructor, or the companionship of certain students, or for the easiness of certain crowded courses. Yet they argue that the college stu¬ dent must be free at some time, that his sense of responsibility will be developed the sooner he is compelled to choose for himself, and that he will have the stimulating and sobering consciousness that what he does is his own act and not the prescription of others for him. Those who oppose this view argue that the academic freedom here proposed belongs to university rather than to college students ; that the American freshman is not a university stu¬ dent in the sense in which that term has been commonly understood in the educated world, because of his much shorter preparatory train¬ ing, and his mental immaturity as compared with the English and Continental student. If, therefore, he is to be as well educated as they are, some of his time in college, the first two years should be spent in rounding out and en¬ larging his properly secondary education before entering upon that elective freedom which has a place, and a large place, in our present under¬ graduate courses.

A third proposal is a conservative modifica¬ tion of the one just mentioned. It is to pre¬ scribe groups of cognate studies with the ob¬ ject of concentrating attention on related sub¬ jects in that field which

the student may prefer. The advantage claimed for this mode is that it allows the student to choose the field of study he likes, and then safeguards him against in¬ coherency by requiring him to pursue a group of well-related courses in that field. The advo¬ cates of wider freedom object to this as fet¬ tering spontaneity of choice, as not recogniz¬ ing the fact that there are many students for whom it is advantageous to choose a study here and there at will, as a piece of side work outside the chosen field of their activity. The objection to this plan of restricted groups and

also to the plan of practically unrestricted freedom is that it offers temptations to pre¬ mature specialization at the expense of broad intellectual training.

Still another proposal remains to be consid¬ ered. Its followers urge that the best type of liberal education is to be found in the historic academic course, which has been the centre and strength of American college life. They concede that other bachelor's courses may give a valuable education to many, provided these courses are consistently organized. They hold that it is possible to ascertain with sufficient exactness just what studies ought to be pre¬ scribed as integral parts of these courses, and that the preliminary training given in these prescribed studies develops maturity in the young sudent and enables him to choose intel¬ ligently his later elective studies. At the present time, in their view, it is not wise to in¬ troduce elective studies until about the middle of the college course. These studies should be organized and related in a ' system, and con¬ nected with the underlying system of prescribed studies. The principle of freedom should be introduced gradually, not suddenly, and should lead to complete freedom as soon as it is clear the student is able to use it well. A form of this view which finds a good deal of support is that elective studies should be introduced first of all in the form of extensions of subjects already studied by the student, in order that he may make his first experiment of choice in an area where he is most familiar. According to this view the second stage of elective studies should be the introduction of large general courses in leading subjects, accompanied by special courses for students of exceptional ability in special directions, and finally leading to as high a degree of specialization as the resources of the college will allow.

Modes of Instruction. — Instruction is still mainly conducted by

recitation and lecture, the recitation finding its chief place in the earlier and the lecture in the later part of the course. For purposes of recitation the classes are di¬ vided into sections of 25 or 30 students, and the exercise is usually based on a definitely allotted portion of some standard textbook. Much has been done to improve the character of this exercise. The correction of mistakes, the. attempt to lead the student to discover the cause of his mistakes, and the • endeavor to teach the entire class through the performance of each individual, are the aim of the more skill¬ ful instructors. The professors most skilled in the art of conducting recitations, rather than those who depend wholly on lectures, leave the most abiding impression. While instruction by recitation continues with effectiveness in the latter part of the course, especially with smaller groups of students, yet instruction by lecture is the rule. The lecturer may have to face a class which enrolls as many students as the whole college contained a generation ago. He de¬ livers his lecture, while those before him take notes, or as they listen read a printed syllabus prepared for the use of the class, and add such jottings as may seem desirable. In many lec¬ ture courses the recitation is employed as an effective auxiliary. The ˆperceptorial® mode of counsel and supervision, in vogue at Prince¬ ton since 1905, has been valuable in meeting the difficulties of individual students, taken in small

groups. Other forms of instruction find place. In all except elementary courses in science the laboratory plays a most important part, and even in lectures in introductory courses in phys¬ ics, chemistry or biology full experimental illus¬ tration is the rule. The library serves as a sort of laboratory for the humanistic studies. Students are encouraged to learn the use of the college library as auxiliary to the regular exer¬ cises of the curriculum. Certain books are ap¬ pointed as collateral reading, and the written examination at the end of the term often takes account of this outside reading. That pro¬ longed reading, which gives such wide and assuring acquaintance with the important liter¬ ature of any subject, is as yet unattempted in a really adequate degree.

The academic year is divided into two (sometimes three) terms. At the end of each term the student is required to pass a fairly rigorous set of written examinations. Oral ex¬ aminations have largely disappeared. Very rarely a high record of attainment in recitations during the term entitles a student to exemption from examination. In awarding honors the old academic college confined itself almost entirely to general honors. Honors for general emi¬ nence still remains in most colleges. The rank list of the class at graduation either arranges the students in ordinal position (in which case the first honor-man still appears) or

else di¬ vides the class into a series of groups ar¬ ranged in order of general scholarly merit. In such cases the old first honor-man is one of the select a few who constitute the highest group in the class. But special honors in particular studies, while not unknown in the past, are really a development of our time. Undoubt¬ edly they have tended to increase the interest of abler students in their favorite studies. A student trying for special honors is, of course, specializing in some sense, though he is not ordinarily pursuing original research. He is rather enlarging and deepening his acquaint¬ ance with some one important subject, such ˆs history or mathematics.

Student Life. — At 18 the typical student of the older eastern college has completed a four- year course in some secondary school. He finds near at hand either the college entrance board's examination or a local entrance ex¬ amination conducted by a representative of this intended college. The days and exact hours of examination and the examination papers are the same as for the examination held at the college. His answers are sent on to be marked and estimated. In a week or two he receives notice of his admission to the freshman class.

Having passed his entrance examinations, he is now entitled to secure rooms in one of the dormitories, or else to find quarters outside the college campus in town. In the following au¬ tumn his name is enrolled in the matriculation book and his student career begins. His new¬ ness and strangeness naturally pick him out for notice on the part of the older students, es¬ pecially those of the sophomore class. But these annoyances soon cease unless he be vain or ((very fresh. » The daily round of college exercises demands his attention, and in the classroom he begins to pass through a process of attrition more beneficent in its spirit. Under the steady measuring gaze of the instructor, and the unuttered but very real judgment of

his classmates who sit about him, he begins to measure himself and to be measured by college standards. He is learning something not down in the books, and what he is thus discovering is well pictured in the words of Professor Hibben : ((There is a fair field to all and no favor. Wealth does not make for a man nor the lack of it against him. The students live their lives upon one social level. There is a deep-seated intolerance of all snobbishness and pretension. The dictum of the 'varsity field, (No grand¬ stand playing !) obtains in all quarters of the undergraduate life. It signifies no cant in re¬ ligion ; no pedantry in

scholarship ; no affecta¬ tion in manners; no pretense in friendship. This is the first and enduring lesson which the freshman must learn. He learns and he for¬ gets many other lessons, but this must be held in lively remembrance until it has become a second nature.® His college £pmradeship con¬ tinues and constitutes his social world.

In addition to this ever-present gregarious comradeship which environs and inspires him, our entering freshman finds the deeper intima¬ cies of close individual friendship. As a mat¬ ter of course he has some one most intimate friend, generally his room-mate or <(chum.® Side by side they mingle with their fellows. They stand together and, it may be, they fall together, and then rise together. And thus the class is paired off, and yet not to the lessening of the deep class fellowship. Plere indeed is a form of communism, temporary and local, but most intense. They freely use things in com¬ mon, not excepting the property of the college. They are welcome to enter each other's rooms at pleasure and use their friends' tobacco and stationery, or to borrow such articles of furni¬ ture and bric-a-brac as will brighten their own rooms for some special occasion. Money, how¬ ever, stands on a different basis from other valuables. It is freely loaned for an indefinite time, but is strictly repaid. A student who lends his fellow money at interest cannot live in a college community.

Our student, unless he is an unusual re¬ cluse, takes some part in athletics. If he is not able to win a place on the football team or baseball nine or crew, which represents his alma mater in intercollegiate contests, he is very likely to be found playing ball in some organization improvised for the day, or trying his hand at tennis or golf.

He has still other interests outside the cur¬ riculum. He may be a member of the volun¬ tary religious society of the students. Perhaps he gets a place on the glee club or dramatic club. He may become one of the editors of the daily college paper or of the monthly literary magazine. Perhaps he is manager or assistant business manager for one or another under¬ graduate organization. Then there are the whist clubs and time-consuming chess clubs. There are also circles for outside reading and discussion springing up around the course of study, as well as the societies which train in speaking and debating. Perhaps he may win the distinction of representing his college in an intercollegiate debate, and success in intercol¬ legiate debating is highly coveted. The con¬ testants are greatly honored, for debating and athletics form the principal bond of union be¬ tween the different colleges and give to their participants intercollegiate distinction.

Until the student passes out of freshman year, he is not always free to choose what kind of clothes he will wear. In some colleges freshmen are not allowed to wear the colors, except on rare occasions. But as soon as he becomes a sophomore he is free to do as he likes. Then he and his classmates suddenly appear wearing various hats, picturesque and often grotesque in appearance, and revel par¬ ticularly in golfing suits. Toward the close of the course their daily dress becomes more con¬ ventional, though the universal interest in ath¬ letics continues to affect the student mode to the end. He has other amusements besides athletics, and these again are found in the stu¬ dent circle. His briarwood pipe goes with him almost everywhere. In the evening, when the wrork of the scholastic day is done, he sits with his comrades at an unconventional <(smoker,® or else they may gather round the table of some college restaurant. At such evening sessions the different phases of student politics are discussed again and again. Col¬ lege songs are sung, the air being carried in that sonorous baritone wrhich is the dominant sound in all our student music. Tales and jests fill out the hour. At the end the college cheer is given as the men start strolling home¬ ward, singing as they go. Arrived on the cam¬ pus they disperse, and their good-night calls echo from the doors and windows of the differ¬ ent dormitories. And so the day ends where it began ; within that closed circle where every student lives in <(shouting distance® of the others.

Our former freshman is getting on bravely toward the end of his course. The closing months of senior year pass swiftly. His class procession is preparing to march out into the world, and there take its place as a higher order of freshmen in the long file of the classes of alumni advancing with their thinning ranks toward middle manhood and beyond, — and when commencement is over his undergraduate life is ended.

What has he acquired in the four years? At least some insight into the terms and common¬ places of liberal learning and some discipline in the central categories of knowledge, some moral training acquired in the punctual performance of perhaps unwelcome daily duty and some rev¬ erence for things intellectual and spiritual. He is not only a- very different man from what he was when he entered, but very different from what he could have become had he not entered. He is wiser socially. He is becoming cosmopolitan. Awkwardness, personal eccen¬ tricity, conceit, diffidence and all that is callow or forward or perverse have been taken from him, so far as the ceaseless attrition of his fel¬ low-students and professors has touched him. He has been unconsciously developed into the genuine collegian. He is still frank and un¬ conventional. But he has become more tolerant, better balanced, more cultivated and more open-minded, and thus better able to direct himself and others. It is little wonder his student affiliations last. As he goes out to take his place among the thousands of his fellow alumni it is natural that his and their filial de¬ votion to their academic mother should last through life. No matter what university he may subsequently attend, here or abroad, his college allegiance remains unshaken. It is this

which explains the active interest shown by our alumni. In the best sense they advertise their college to the public, and it is to their exertions the recent rapid advancement of many of our colleges is largely due.

Organization and Administration. — The form of government is simple. A college corporation, legally considered, consists of a body of men who have obtained the charter and who hold and administer the property. Where a particular State has established a college or even a university, which regularly includes a college, the members of the cor¬ poration are commonly styled regents, and are appointed by the State to hold office for a limited term of years. But most colleges have been established as private corporations. In this case the title is vested in a board of trus¬ tees, sometimes composed of members who hold office for life, or else composed of these asso¬ ciated with others who are elected for a term of years. Boards of trustees holding office for life usually constitute a- close corporation, electing their own successors as vacancies occur. The two chief functions of such governing bod¬ ies, whether known as regents or trustees or by any other name, are to

safeguard the intent of the charter and to manage the property. They give stability to our college system. To carry out the main purpose for which the charter was obtained they create a faculty of professors and instructors and entrust the general headship to a president. The president and professors usu¬ ally hold office for life. In many places provi¬ sion is made for the retirement of professors on pensions as they grow old. This is usually done with help from the Carnegie Foundation. In¬ structors and sometimes assistant professors are appointed for a limited time, such appointments being subject to renewal or promotion. In the larger colleges the president is assisted in his administrative work by one or more deans. By immemorial tradition the president and faculty are charged with the conduct of the entire in¬ struction and discipline. They have the power to admit and dismiss students. The conferring of degrees belongs to the corporation, but this power is almost invariably exercised according to recommendations made by the faculty. Honorary degrees, however, are commonly given by the trustees or regents on their own initiative.

In State colleges the income is derived from taxation ; in others from endowments, often supplemented by annual subscriptions for spe¬ cial purposes. But the private colleges are cut off from dependence on the State, and have to rely on private gifts. This stream of private liberality flows almost unceasingly. The fact that many colleges are integral parts of real or so-called universities makes it difficult to say how much the specifically collegiate endow¬ ments and incomes amount to. But a few sig¬ nificant facts may be mentioned. No college president, unless he is at the same time the president of a university, receives as high a sal¬ ary as $10,000 annually. He is more likely to receive $5,000 or $6,000. While $2,000 is con¬ sidered a fair professor's salary in small col¬ leges, $3,000 is a usual salary in the larger col¬ leges, while few professors receive more than

$4,000.

The expenses of individual students vary greatly. In some places there is no charge for

tuition ; in others they must pay as much as $100 or $150 or more. In little country colleges the total cost for a year often falls within $300; in the larger old eastern colleges, drawing pa¬ tronage from all parts of the land, the student who must pay all his bills and receives no aid in the form of a scholarship can hardly get along with less than $600 or $700, exclusive of his expenses in the summer vacation. The average expenses in some of the oldest colleges, according to tables prepared by successive senior classes, is higher than this, running up

to $800 or $900, or even more. But these institu¬ tions afford the student of limited means mul¬ tiplied opportunities for self-help. Moreover many colleges possess scholarships which are open to able students who need temporary pe¬ cuniary help. The young American of narrow means, if he be of fair ability and industry, can almost always manage to find his way through college.

The College Is American. — The college

lies very close to the people. Distinctions of caste may manifest themselves occasionally, and yet the college is stoutly and we believe per¬ manently democratic. Its relation to the better side of our national life has been profoundly intimate from the beginning. The graduates of Harvard and Yale in New England, of Princeton and Columbia in the Middle States, and of the College of William and Mary in Virginia contributed powerfully to the forma¬ tion of our republic. Edmund Burke attributed the <(intractable spirit® of the Americans to (<their education,® and by this he meant the col¬ lege education. ((The colleges,® wrote President Stiles, of Yale, shortly after the Revolution, (<have been of signal advantage in the present day. When Great Britain withdrew all her wis¬ dom from America this revolution found above 2,000 in New England only, who had been edu¬ cated in the colonies, intermingling with the people and communicating knowledge among them.® John Adams of Harvard delighted to find in President Witherspoon of Princeton <(as high a son of liberty as any in America.® Hampden-Sidney College in Virginia, founded about the time of the Revolution, incorporated in its charter the following clause : (<In order to preserve in the minds of the students that sacred love and attachment which they should ever bear to the principles of the ever-glorious Revolution, the greatest care and caution shall be used in selecting such professors and mas¬ ters, to the end that no person shall be so elected unless the uniform tenor of his conduct mani¬ fest to the world his sincere affection for the liberty and independence of the United States of America.® And from that day to this the collegiate spirit and the national spirit have been at one. Rightly, indeed, did our apprecia¬ tive French visitor, Baron Pierre de Coubertin, perceive that the place to find ((the true Ameri¬ cans® is in our college halls; iCles vrais Ameri- cains, la base de la nation , I'espoir de I'avenir .® Scarcely one in a hundred of our white male youths of college age has gone to college. But this scanty contingent has furnished one-half of all the Presidents of the United States, most of the justices of the Supreme Court, not far from one half of the Cabinet and of the na¬ tional Senate, and almost a third of the House of Representatives. It has furnished a great contingent to the professions and almost the

entire personnel of the best faculties of law, medicine and divinity. It is increasingly rep¬ resented in business and engineering and the leading newspapers and reviews. No other single class of equal numbers has been so potent in our national life. See American Univer¬ sity; College, Entrance Requirements.

Andrew Fleming West, Dean of the Graduate School, Princeton University.

AMERICAN COLLEGE IN ROME,

Italy. This pontifical college, the legal title of which is ((The American College of the Roman Catholic Church of the United States, Rome, Italy,® was founded 8 Dec. 1859 by Pope Pius IX for the purpose of training young men for the Catholic priesthood in the United States of America. A tablet in the building commemo¬ rates the visit of Pius IX on 29 Jan. 1860. By a pontifical decree it was placed under the di¬ rection of the Congregation of the Propaganda, the students being obliged to attend the courses of lectures given at the University of the Prop¬ aganda. The regular course embraces two years of philosophy and four years of theology, while preparatory classes are held for students who have not completed the college course in their own country. The American College opened with 12 students, three of whom afterward became achbishops : Michael Corri¬ gan, of New York; Patrick Riordan, of San Francisco; and Robert Seton, titular of Heliopolis. Ruben Parsons, the historian, was also one of the original 12. The college has trained many distinguished churchmen dur¬ ing its existence of 58 years. It is administered under the control of a board of four arch¬ bishops, those of New York, Boston, Philadel¬ phia and Baltimore; the officials immediately in charge are the rector, vice-rector and spirit¬ ual director. Thanks to the solicited interven¬ tion of President Chester A. Arthur in 1884 the college was saved from confiscation by the Italian government by virtue of statutes of 1866 and 1867 applying to the property of religious bodies.

AMERICAN COMMERCE. See Com¬ merce.

AMERICAN COMMONWEALTH, The,

an important study of American political, social and economic conditions by James Bryce, the em¬ inent historian of (The Holy Roman Empire, > Part I treats of the Federal government. Part II

considers the State governments (including rural and city governments), their departments, constitutions, merits and defects. Part III is devoted to the political machinery and the party sjˆstem. Part IV discusses public opinion, — its nature and tendencies. Part V gives concrete illustrations of the matters in the foregoing chapters. Part VI is concerned with non-politi¬ cal institutions. The work is lucidly written and as easy for the laity to comprehend as for those familiar with the practical workings of our government. The chapters dealing with the professional and social sides of American life, and especially those devoted to the Ameri¬ can universities, have been enthusiastically re¬ ceived by Americans.

AMERICAN CONFLICT, The, an ac¬ count of the American Civil War and its causes, by Horace Greeley. It is a great magazine of

materials for the political history of the United States with regard to slavery.

AMERICAN COUSIN, Our, a well-

known play by the English dramatist, Tom Tay¬ lor (1858). It was very popular in the sixties, and it was while present at its representation in Ford's Theatre in Washington that Presi¬ dent Lincoln was assassinated.

AMERICAN DIALECT SOCIETY.

The need of an American dictionary like the English Dialect Dictionary, to record peculiar¬ ities of local American speech, led to the for¬ mation at Harvard University, under the auspices of James Russell Lowell and Francis James Child, in 1889, of the American Dialect Society. Since 1890 the society has issued annually (now semi-annually) a periodical, Dialect Notes, containing word lists and short articles which have dealt with some 20,000 terms. This may be found in the libraries of most large cities and colleges. The members, chiefly teachers in universities and colleges, meet annually in December in conjunction with the Modern Language Association of America, and read and discuss papers. In addition to the speech of districts, the phraseology of oc¬ cupations, as whaling, mining, and cowboy lingo, are considered; and the influence of foreign languages receives some attention.

AMERICAN DIPLOMACY. It may be

justly claimed that the United States, in its brief existence as a nation, has exercised a greater influence in the same period in molding

international law than any other nation ; and it has done much to raise the standard of diplo¬ matic practice. From the beginning it has stood as the champion of a freer commerce, of respect for neutral and private property in war and of the most elevated ideas of national rights and justice.

When the United States entered the famiR of nations, there existed a marked contrast be¬ tween the state of law which controlled the rights and intercourse of nations and that which enforced the rights and duties of the individual inhabitants of the respective nations. The civil law, which was in force in most of the countries of continental Europe and their colonies, was the accepted product of the ripened experience of many centuries of Roman jurisprudence. The common law which prevailed in England and its colonies had been brought into an estab¬ lished system through the careful study and practical application of successive generations of renowned jurists. But the law of nations was then in its infancy. Only one century had passed since Grotius, who has been styled the father of international law, had compiled his treatise on the lights of War and Peace) ; and Vattel had but recently published his (Law of Nations, > and the principles he enumerated were far from being an accepted code. Inter¬ national law was still in a formative state when the United States began its career. The latter had scarcely entered upon its organized life when the wars consequent upon the French Revolution forced it to consider its rights and duties as a neutral power. It soon learned that there were no established principles which warring nations respected. In referring to its early history, a Secretary of State in 1853 said to the British Minister of Foreign Affairs:

<(From the breaking out of the wars of the French Revolution to the year 1812, the. United States knew the law of nations only as the victim of its systematic violation by the great maritime powers of - Europe.®

The first effort on its part toward the main¬ tenance of international rules of conduct was in President Washington's neutrality proclama¬ tion of 1793, which, within less than a genera¬ tion, brought about a complete change on this important subject. The proclamation was a simple announcement of the neutral attitude of the government, and a warning to American citizens to observe it. But the significance of the act was in the strict impartiality of its enforcement, and the resulting

legislation of Congress, which became a model for all other nations.

The power of the President to issue such a proclamation based solely upon the principles of international law, without any domestic leg¬ islation respecting offenses against neutrality, was seriously questioned, and in 1794 an act was passed defining what were offenses against neu¬ trality and affixing penalties therefor. During the revolt of the Spanish- American colonies so much trouble was occasioned thereby to the United States authorities that the law was care¬ fully revised in 1818, and it has since practically remained unaltered. Hall, one of the latest English authorities on international law, says : <(The policy of the United States in 1793 con¬ stitutes an epoch in the development of the usages of neutrality. ... It represented by far the most advanced existing opinions as to what the obligations [of neutrality] were. ... In the main it is -identical with the standard of conduct which is now adopted by the com¬ munity of nations.®

The American colonies, in assuming their independence, established a diplomatic service similar to that of the European countries and it has continued to be so maintained. But the question has often been raised in and out of Congress whether, in the existing conditions of the world, the system is necessary and its util¬ ity justifies its expense. With many in the country the diplomatic service is regarded as a purely ornamental branch of the government and its maintenance a useless expenditure of public money. But whenever the question has been made the subject of inquiry by Congress, the various Presidents and Secretaries' of State have given their opinions in favor of the utility and necessity of the service, and Congress has continued to authorize it ; and it has come to be accepted as a permanent branch of the gov¬ ernment.

While the United States has adopted the European system of a diplomatic and consular service, in one important particular the general practice of other nations has not been followed. The service is not made a life career, and no examination or previous experience is required for admission to the posts of minister or am¬ bassador. Appointments are made of persons usually from civil life, and without any pre¬ vious diplomatic experience. The two sys¬ tems have their advantages. It does not necessarily follow that because a young man can pass a successful examination he is destined to make an able minister or ambassador. . The British and other gov¬ ernments have frequently found it necessary

to appoint to the highest posts in the diplomatic service persons from other branches of the administration or from civil life. On the other

hand, the system followed by the United States exposes the government to mistakes and some¬ times to mortification and ridicule because of the inexperience or inaptness of its representa¬ tives. But appointments to the higher posts are generally of persons who have served and gained distinction in legislative bodies or in the professions, and although not experienced in the arts of diplomacy, they are usually able to cope with their colleagues on all subjects where great principles are involved. There is a grow¬ ing sentiment, however, in the country in favor of at least placing the appointments as secre¬ taries of legation and to the consular service upon a permanent basis. Under rules estab¬ lished by executive order no person is now admitted to the places of secretary of lega¬ tion or in the consular service without first successfully passing a civil service examination, and promotions from the lower to the higher grades are based upon merit. This action has tended to give stability to these branches of the service.

Up to recent years the highest grade in the diplomatic service of the United States has been that of minister plenipotentiary, but these rep¬ resentatives sometimes -complained that they were often humiliated and their usefulness sometimes impaired by the lower positions to which they were assigned in the diplomatic corps. The remedy suggested was to raise the rank to that of ambassador. Secretary Marcy declined to make the recommendation to Con¬ gress in 1856. A similar position was taken by Secretary Frelinghuysen in 1884, who said it would be an injustice to the ministers to give them higher rank without increasing their sal¬ aries, and that Congress would not vote the allowance commensurate with the mode of life of an ambassador. Later Secretary Bayard claimed that serious inconveniences would arise from introducing ((into our simple social democ¬ racy ... an extraordinarily foreign privileged class.® . . . *

Notwithstanding these objections, in 1893 Congress authorized the appointments of am¬ bassadors to countries whose governments would reciprocate in such grade, and ambassa¬ dors are now sent by the United States to London, Paris, Berlin, Petrograd, Vienna, Rome and Mexico. Soon after the reception of ambassadors in Washington the question was raised whether they should have precedence over the Vice-President, but it has been decided against them. The ((inconveniences® anticipated by Secretary Bayard have been experienced on more than one occasion, but the innovation seems to be permanently established.

The fiction of international law that ambas¬ sadors represent the person of their sovereign in a greater degree than ministers was

created at an epoch when there was a recognized dis¬ tinction between empires and monarchies, and between these two grades and republics. All distinction between sovereign nations has been abolished and they now stand on an equality, but the ambassadorial pre-eminence is still rec¬ ognized, even in the American democracies.

The diplomatic dress or uniform of an American representative, although an apparently trivial matter, has occasioned considerable dis-

cussion and a varied action on the part of the government. In the early years of its history the diplomatic representative was left without any instruction upon the subject, but when the commissioners to negotiate peace with Great Britain in 1814 went to Europe a simple uni¬ form was adopted, and by a circular of the Department of State in 1817 this uniform was prescribed for the diplomatic representatives at foreign courts. This order continued in force, with some modification during the administra¬ tion of President Jackson, up to the advent of Secretary Marcy, who prided himself on his republican simplicity. In 1853 he issued a circular which became famous in diplomatic annals, in which the representatives of the United States were advised to appear on public occasions (<in the simple dress of an American citizen® unless such costume was objected to by the court to which the representative was accredited. The circular was much criticized, but its spirit was practically approved by Con¬ gress in the passage of an act in 1867 prohibiting officials in the diplomatic service from wearing any uniform or official costume not previously authorized by Congress. As by law only officers who have served in the army or navy are authorized to wear a uniform in the diplomatic service, the great body of the corps come under this prohibition.

From the time of Dr. Franklin, the first minister to France, American diplomatic repre¬ sentatives have sought to be distinguished by entire frankness and straightforward conduct. This is indicated in the instruction to John Jay when he was sent abroad on an important mis¬ sion by President Washington. The Secretary of State wrote: <(It is the President's wish that the characteristics of an American minister should be marked on the one hand by a firmness against improper compliances, and on the other by sincerity, candor, and prudence, and by a horror of finesse and chicanery.®

Much is said in disparagement of the Amer¬ ican diplomatic representatives abroad, and it is not to be disguised that under the system of appointments some unfit and uncultured persons have been found in the service who have reflected little credit on the country. But their discreditable acts have been outdone by the misconduct of the representatives of foreign governments accredited to Washington. This misconduct has embraced flagrant violations of international law and practice, intermeddling with domestic politics, and official and social improprieties of various kinds. Within the first century after the organization of the govern¬ ment, a list was created of foreign diplomats dismissed by the government of the United States, or recalled in disgrace, which embraces three British ministers, two French, two Span¬ ish, one Russian and one Austrian minister. No such record of dishonor can be compiled against American representatives as that made at the seat of government of the United States by the representatives of the most polished nations of the Old World.

The War of 1812, undertaken by the United States against Great Britain, was pre-eminently a struggle on the part of the former to main¬ tain and enforce correct principles of inter¬ national law. It involved the claim by Great Britain of the right of visitation of neutral

vessels and the impressment of such of their crews as the visiting party saw fit ; the doctrine that free ships make free goods, or the exemp¬ tion of innocent neutral commerce from seizure in time of war; and the paper blockades which were sought to be enforced by the warring powers. None of these questions were settled by the terms of the treaty of peace between the United States and Great Britain. But the con¬ tention of the United States as to all of them has come to be accepted by all the nations of the world and by none of them more heartily than by Great Britain. The right of visitation and search of vessels was a frequent subject of negotiations, but while the British government relaxed the enforcement of its alleged right after the war, its claim was not finally aban¬ doned until 1858, when it formally accepted the contention of the United States. A strange incident in connection with this question oc¬ curred soon after that date. During the Civil War the commander of a United States naval vessel arrested a British mail steamer, the Trent, on the high sea, visited her with an armed force and carried away as prisoners two Confederate diplomatic agents en route to Europe. In the United States the naval com¬ mander was hailed as a hero, but in England the act was regarded as an insult to the British flag and a just cause of war. A hostile conflict was avoided by the prompt surrender of the Confederate agents and a disavowal -of the act, as in direct contradiction to the attitude of the

government consistently maintained from its foundation of the immunity of the vessel carry¬ ing the American flag.

The claim of the right of impressment (q.v.) was connected with the subject of naturalization and expatriation, which has been the occasion of much diplomatic correspondence and contro¬ versy on the part of the United States with European powers. From the beginning of its existence the former has encouraged immigra¬ tion ; liberal laws for the naturalization of for¬ eigners have been passed ; and the right of expatriation has been maintained. In this branch of international law this attitude has had a marked effect upon the practice of na¬ tions. One of the chief causes of the War pf 1812, it has been seen, was because of the impressment of seamen, naturalized citizens of British birth, taken from American'vessels. The old common-law doctrine was that no British subject could denationalize himself and that he owed perpetual allegiance to the Crown; but the persistent claim of the United States was finally recognized by Parliament in the Nat¬ uralization Act of 1870. The doctrine of ex¬ patriation is now generally accepted by the nations and the United States has succeeded in having it embodied in many of its treaties.

The subject of free ships was given much prominence through the armed neutrality dur¬ ing the Revolutionary War, was one of the unsettled issues of the War of 1812 and was finally recognized as a principle to be incorpo¬ rated into the international code by the great Powers of Europe, as embodied in the Declara¬ tion at Paris of 1856. This declaration consisted of four rules, which were, briefly stated, (1) the abolition of privateering; (2) the exemption from seizure of an enemy's goods under a neutral flag, (3) a like exemption of neutral

goods under an enemy's flag ; and (4) that a blockade, in order to be valid, must be effective. All of these but the first had been long advo¬ cated by the United States, and even the first had been incorporated in its treaty with Prussia of 1785. The latter was plainly in the interest of nations having a strong navy. Nevertheless, the United States was ready to accept them all as rules for the government of nations, but Secretary Marcy proposed to the great Powers that they go one step further and declare that private property of belligerents at sea be ex¬ empt from capture. As private property of belligerents on land has been exempted by the rules of war, there would seem to be no suffi¬ cient reason why the same treatment should not be applied to like

property at sea. President McKinley instructed the American representa¬ tives at The Hague Conference of 1899 to advocate it, but they were not successful. Presi¬ dent Roosevelt continued to urge upon the na¬ tions this advanced measure to mitigate the ravages of war, but it has not yet been inserted in the international code.

The fourth rule of the Paris Declaration was, in effect, a formal recognition of one of the principles contended for in the War of 1812, that there can be no blockade by mere procla¬ mation. Its application bore heavily upon the United States during the Civil War, but it consistently observed the principle by making its blockade of the Southern ports effective. An effort has been made of late years to establish wrhat is known as a specific blockade, by which one or more states seek to bring constraint upon another state by closing its ports without a declaration of war. In the case of the block¬ ade of Crete by the great Powers of Europe in 1897, the United States declined to concede the right as applicable to its commerce ; and when a similar attempt was made in 1902 of a pacific blockade of Venezuelan ports by Great Britain, Germany, and Italy, the objection of the United States to its interference with American vessels led to the abandonment of the project and to the establishment of a real war blockade.

The subject of neutrality assumed an im¬ portant phase during the War of the Rebel¬ lion, and the duties and responsibilities of a neutral state were the occasion of a heated controversy with the British government. Al¬ though the latter had incorporated in its laws the substantial provisions of the United States statutes of 1818, it dissented from the position asserted by the United States as to its duties in the practical application of its acts of Parlia¬ ment and the recognized principles of interna¬ tional law. The construction of Confederate cruisers in British ports and the aid afforded them in such ports was held to be a failure on the part of that government to discharge its duties as a neutral power, and for these acts the United States made grave complaint and filed a large claim for pecuniary damages. After much discussion the matter was sub. mitted to the arbitration of a tribunal, which met at Geneva (see Geneva Convention). In the treaty providing for the arbitration there were inserted three rules as to neutrality which were to govern the arbitrators in their decision. These rules were based upon the American statute and mainly followed the contention _ of the United States. The result was a decision in favor of the latter, with a large award in

damages. The two governments had agreed in the treaty that they

would submit the rules to the other maritime powers for their acceptance, but this was never done, chiefly because of the extreme construction placed upon some of their clauses in the opinions of the neutral arbi¬ trators. The general concensus of publicists is that these rules are a correct statement of ex¬ isting international law.

The great European War has brought into discussion the various phases of the duties and privileges of neutrals, the freedom of the areas, the effect and requirements of a block¬ ade, the attack on merchant ships by vessels of war and the changes in the modern methods of warfare. This discussion and the spirit of retaliation on the part of the belligerents, which has led to a disregard of heretofore recognized rules of international law, will make necessary a re-examination of these questions on the re-establishment of peace.

One of the conspicuous features of the rela¬ tions of the United States with foreign nations is its readiness to accept arbitration for the settlement of questions that do not prove sus¬ ceptible of adjustment by diplomatic methods. It has been one of the foremost of the nations in advocating this method of arranging inter¬ national complications, and in preserving peace by means of treaties of arbitration. The first treaty negotiated after the organization of the government under the Constitution — the Jay Treaty (q.v.) of 1794 — was made with Great Britain to avert war which was then immi¬ nent. It contained provisions for the adjust¬ ment of three of the most irritating of the questions in controversy by a reference to arbi¬ tration, and three separate commissions were created for that purpose. The year following, the second treaty negotiated by the new gov¬ ernment, that with Spain of 1795, also con¬ tained a provision for arbitration. The country was not so fortunate in its second controversy with Great Britain. The questions at issue were of such grave character that it did not seem possible at that day to settle them by any other method than a resort to war ; but by the treaty of peace of 1814 four boards of arbitra¬ tion were created to settle boundary questions. These all related to the frontier with Canada, which ever since the independence had been a source of almost constant discussion, often of angry controversy, and more than once had brought the countries to the brink of war. But in every instance when the usual method of diplomacy failed, arbitration has been resorted to with success.

During the two generations which followed the War of 1812 all questions of controversy with foreign powers, with one exception, have been settled by peaceful methods. In that period the United States created many courts and commissions of. arbitration. The most of these have been with Great Britain, but more than 20 of them have

been with other nations of Europe and America. The controversy growing out of the manner in which the British government enforced the neutrality laws during the Civil War for a time threatened the peace¬ ful relations of the two countries. When the offer of the United States to adjust the ques¬ tion by arbitration was made, the British gov¬ ernment in the first instance assumed the posi¬ tion that its national honor was involved, and

that that could not be submitted to arbitration. But better counsels prevailed, and the Tribunal of Geneva was created to adjust the contro¬ versy. It was the most important arbitration in which the United States ever engaged, and was one of the most august and imposing ever held in the world. It involved questions of supreme importance and pecuniary claims of great mag¬ nitude ; but its special significance was in the spectacle of two great nations being able to compose weighty matters, which had awakened the passions of their people to a high state of bitterness, by an appeal to reason and the arbit¬ rament of friendly powers in place of war.

Next in importance for the United States to the Geneva arbitration was that relating to the protection of fur seals in Bering Sea, held in Paris in 1893. The decision of the tribunal was against the contention of the United States, and as a result it had to pay about half a million of dollars in damages and sustained a heavy loss in its annual income from the seal islands. Disappointment was felt over the result, but the mature judgment of the country is that it was a wiser settlement of the questions at issue than to push them to the extreme of war.

One feature of the many arbitrations in which the country has engaged is worthy of special notice. A spirit of equity and fair dealing has always marked the conduct of the government in cases where any suspicion of fraud or exaggerated damages has attached to arbitral decisions. The commissions with Ven¬ ezuela, Haiti, Mexico and other countries might be cited in illustration. They show that, though the government is sometimes misled by designing claimants or by the unwise action of its diplomatic agents, it has not hesitated when fully possessed of the facts to undo any in¬ juries inflicted upon friendly powers by means of international commissions, and that fraud, once exposed, cannot reap the benefit of its iniquity under the cover of the finality of an award.

The Alaska Boundary Tribunal of 1903 is an instance of the settlement of a question not possible of adjustment by diplomacy and not deemed appropriate for reference to arbitra¬ tion. A court was constituted, composed of three members from each country, and they were empowered to judicially settle the ques¬ tions submitted to them. The danger feared was that there would be an equal division of the court, but in this case the matter was settled by an award rendered by a majority of the members which has been accepted by both governments.

This brief review shows that in its short career the United States has had an important part in molding the code of international law. The chief actors in the work done by this country have been the Secretaries of State and its diplomatic representatives abroad. But they have had worthy coadjutors in giving this code shape and permanence. The exposition of the law of nations, as set forth in the decisions of the Supreme Court of the United States, has had a great influence in molding that law, and its opinions are recognized as of the high¬ est authority by foreign publicists. Among authors in this department of law none carry greater weight throughout the world than Story, Kent, Wheaton, Halleck, Woolsey, Wharton and other American writers. When

the services are recalled of these diplomatic, judicial and scholastic representatives of the United States, it is just to say that no body of men in any country have done more to improve and enlarge the principles of international law, or have exercised a more salutary influence on the affairs of the globe. See Arbitration, In¬ ternational ; Diplomacy ; International Law ; Monroe Doctrine; United States — the Di¬ plomacy of.

John W. Foster.

AMERICAN DIPLOMATIC RELA¬ TIONS. For the diplomatic relations of the United States with other countries see the articles on the diplomatic relations with the various nations under their respective titles, Africa; Austria-Hungary ; Canada; China; Cuba; Great Britain; France; Germany; Italy; Japan; Russia; Spain, etc.

AMERICAN ECONOMIC ASSOCIA¬ TION, The. This association was organized in 1885 at Saratoga, N. Y. The purpose of the association is: (1) The encouragement of economic research, especially the historical and statistical study of the actual conditions of industrial life; (2) the issue of publications on economic subjects; (3) the encouragement of freedom of economic discussion. It has at present a membership of

2,500, composed of persons interested in the study of political economics or the economic phases of political and social questions. It has published many volumes consisting of papers on economic ques¬ tions, and the association also issues a quar¬ terly publication, The American Economic Re¬ view. The association holds an annual meeting, when papers are presented on economic ques¬ tions, which are afterward published in the Proceedings of the Association and furnished free to all members.

AMERICAN ELECTRO-THERAPEU¬ TIC ASSOCIATION, a society formed in 1890 for the promotion of knowledge in what¬ ever relates to the application of electricity in medicine and surgery. Membership 280.

AMERICAN EMBARGO. See Embargo.

AMERICAN ENTOMOLOGICAL SO¬ CIETY, an association for the investigation of the character and habits of insects, founded at Philadelphia in 1859, incorporated in 1862, and known until 1867 as the Entomological Society of Philadelphia. The results of its investiga¬ tions are published in its Proceedings and Transactions, beginning in 1861, and also in the Entomological News, the latter issued monthly with the co-operation of the entomological sec¬ tion of the Academy of Natural Sciences of Philadelphia. It owns a valuable entomological collection and library. Membership 140. Office of the Secretary, Philadelphia, Pa.

AMERICAN EXPANSION POLICY.

r\ here is no more significant movement in modern history than that of the migrating pro¬ cession which, receiving its start from European conditions and breakine barrier after barrier, swept across the American continent within the last century and finally established Ameri¬ can influence and enterprise in the Pacific and at the portals of the awakening Orient. The feverish, restless, ceaseless westward move¬ ment from the tidewaters of the Atlantic coast, slow at first, but gradually gaining momentum

and force, furnishing new opportunities to interest and awaken delinquents, creating new necessities to stimulate inventive genius, add¬ ing territory after territory to the American Union, and extending American commerce and beneficent influence to distant

lands and peoples, is the great central fact of American history. Expansion, non-parasitic, vigorous and attractive, developing by affinity, contend¬ ing against both restriction and secession, has been America's greatest feat. Expansion of national territory, which in earlier American history was a steady policy, has, with few exceptions, arisen from natural forces or some vital issue — from the necessity of meeting internal or foreign difficulties or from political and economic questions — and probably was in¬ evitable. Although the opposition to slavery was an obstacle to expansion, the Southern de¬ sire to extend this institution was an important factor in all the acquisitions and the demands for expansion from 1820 to 1860. In the dec¬ ade before 1860 annexation was urged by the combined arguments of "manifest destiny® and "international nuisance.® Jealousy or fear in regard to the plans of some European power exerted no inconsiderable influence in determin¬ ing the policy to incorporate Louisiana, Florida, Texas, California, Oregon, Alaska and other territories. On this ground the acquisition of Cuba and Yucatan was also urged. Although some acquisitions have been made by war, the greater part have been obtained under the de¬ sire to prevent war. The American policy, with few exceptions, has been to negotiate directly with the governments exercising authority over the territory desired, but in many instances diplomacy contributed principally to justify and confirm expansions already made by the people. The processes of annexation were mainly the fruit, not of artificial intrigue and machination, but of the natural economic and social development of people chiefly engaged in the great human occupation of making a quiet living by agriculture. Each acquisition excited both domestic and foreign opposition and also pessimistic prophecies ; but time has proved that extension to the Gulf and to the remote Pacific added strength to the Union. In the dark days of the Revolution there was a buoyant American spirit urging that the Union should include Canada. British West India Is¬ lands and even Florida; but American expan¬ sion began with Clark's invasion of the North¬ west, which aided American diplomacy to secure the extension of the western boundary to the Mississippi in the treaty of 1783. The Constitution of 1787 did not expressly provide for annexation of territory but its makers fore¬ saw annexation. In 1791, Jefferson, the great American expansionist, who had already favored exploration westward to the Pacific, acting as Secretary of State under Washington, opened negotiations for the acquisition of Florida and New Orleans from Spain. Tn 1803, as a re¬ sult of the western struggle for the mouth of the Mississippi, driven by necessity and acci¬ dent. before he knew exactly what he was do¬ ing, he began the American policy of peaceful expansion by the purchase of a vast empire, setting American bounds to the Rockies,

bring¬ ing doubtful titles to Florida, Texas and Oregon, and making further expansion neces¬ sary and a great united nation possible. Al¬

ready (in 1801) he had looked forward to the time when (<American multiplication shall ex¬ pand itself and cover the whole northern, if not the southern, continent.® In this he probably expressed an idea similar to that ad¬ vocated by William Thornton in favor of extending the republican system over all North and South America and the adjacent islands, under 13 distinct sections but united by one central government on the Isthmus of Panama. Later, in 1816, T. L. Halsey, writing to Monroe from Buenos Aires, indicated that it was the American policy, “that the whole continent of America should be united, at least in commercial relations.®

Jefferson’s example was followed long after his authority ceased. The imagination of the pioneer soon passed the limits of the treaty, but with loyalty to the United States, to struggle for disputed regions or for regions clearly foreign. Madison, from apparent necessity, took temporary control of the Gulf shores from the Mississippi to the Mobile and, in the War of 1812, planned expeditions for the conquest of Canada. Monroe, for the same reason, seized Amelia Island and Galveston, finally extended the American domains to the Florida straits, and said that the acquisition of Cuba might become necessary to the internal tran¬ quillity and prosperity of the United States. By 1820, the national road and the steamboat were beginning the large influence which they later had in the development of the West and the Americans were preparing to make settle¬ ments on the far-away Columbia. Monroe, in 1822, discouraged the wishes of Guatemalans and Cubans for annexation. Jefferson, although opposed to annexation that would require the construction of a navy to defend it, favored the annexation of Cuba. John Quincy Adams, who in 1820 suggested the occupation of terri¬ tory in the South seas and foresaw American destiny in the West Indies (especially in Cuba and Porto Rico), later announced that he was inclined to seek no acquisition of non-con-tiguous territory. His efforts in 1825 to purchase Texas which had been given up in 1819 were followed by the premature Frcdonian republic of 1826 which foreshadowed the later struggle for Texan independence. Jackson con¬ tinued the negotiations for the purchase of Texas, and also wished to acquire territory that would include the Bay of San Francisco on the Pacific, but he expressed no desire for insular possessions. In his administration, the natural course of events was preparing for expansion along the Gulf toward the Rio Grande ; and in 1837-38 citizens along the north¬ ern frontier were ready to aid the movement for Canadian independence as a step toward annexation. In 1843, Oregon through an organization for the

protection against wolves established a provisional government in prepa¬ ration for American occupation. In 1844, American consuls in California were planning for American occupation to prevent supposed European designs for annexation. In 1845, after the annexation of Texas, the opportunity to meet American needs on the Pacific was fur¬ nished by the Texan boundary dispute, which enabled Polk to acquire a vast territory abutting on the Pacific, and thereby to lay the founda¬ tions for making the Lffiited States a great railway nation and an arbiter in the affairs of

the Pacific. American extension to California, increasing American interest in the Pacific and resulting in negotiations for isthmian transit routes across Mexico and Central America, stimulated agitation and negotiations for terri¬ tory or protectorates both in the Pacific and in the Caribbean-Gulf region. In the twelve-year period of pro-slavery land hunger which fol¬ lowed, there were plans for acquisitions in Central America and Mexico. Many prominent men advocated the acquisition of isthmian and insular possessions, urging that the United States should hold the gate to the Pacific and the key which controlled it. They opposed the Clayton-Bulwer treaty because it restricted the right of occupying territory which might become necessary for the security of communications. Cuba, especially, standing warden to the Gulf of Mexico, having the institution of slavery which the South wished to see continued, and a system of commercial restrictions and arbi¬ trary government which many others desired to see ended, became an object of anxious solicitude to a large party in the United States. Polk's <(profoundly confidential® negotiations for the purchase of Cuba failed, and Fillmore considered that its incorporation would be perilous, but plans for its acquisition continued to be urged. Young America, intoxicated with the progress of a hundred years, and suffering from flights of oratory, joined hands with the slavery extensionists to preach from the text of ((manifest destiny.® Every addition to the territory of the American Union had given homes to European destitution and extended representative government, and it was now boldly proclaimed by Southern leaders that the American nation was not to be circumscribed by narrow isthmuses and gulf streams. The feature which characterized the foreign policy of Pierce, and especially that of Buchanan, was the aim to achieve the long-desired result of securing control in the Gulf of Mexico and the Americanization of the region thereabouts. In 1856 Senator Bell of Tennessee said the Monroe Doctrine had become a doctrine of

progressive absorption, annexation and con¬ quest of Spanish America. The Pierce admin¬ istration contemplated the annexation of Hawaii and Alaska, opened negotiations for the purchase of Cuba, and, while Walker was fili¬ bustering in lower California, sent Gadsden to secure a large slice across Mexico from the Gulf to the ocean, but secured only the Mexican territory along the Gila River. In 1856, after a riot at Panama, the Pierce ad¬ ministration, in order to protect the transporta¬ tion of persons and property on the isthmus, unsuccessfully attempted to obtain (by treaty) from New Granada a belt of land 20 miles wide from ocean to ocean and certain islands in the harbors at each terminal for naval stations. Seward said it was hard to conceive how the United States much longer could avoid the expansion which had not only brought the Antilles under American surveillance, but also had brought the United States to confront the islands and coasts of Asia. The need of coaling stations in the Pacific, and of an inter- oceanic canal, had been urged, especially since the rapid growth of California. Commodore Perry and the American Minister to China recommended the establishment of colonies in the Pacific at the gates of China and Japan.

When Buchanan stepped into the shoes of Pierce he announced expansion to be the future policy of the country. He continued to press the necessity of purchasing Cuba ; suggested intervention in helpless, bleeding Mexico, where he hoped to secure additional territory or to establish a protectorate ; recommended the oc¬ cupation of Sonora and Chihuahua ; proposed to send land and naval forces to Central America in order to protect the transit route; threatened the Fiji Islands, and was favorably disposed to the annexation of Alaska.

The Civil War, inaugurating changes of policy and resulting in the abolition of slavery, ended the agitation for the extension of do¬ minion over tropical peoples disturbed by dis¬ sension and strife, although the difficulties of the blockade of Confederate ports emphasized the need of harbors in the West Indies. The Lincoln administration found little time for a policy of acquisition, although it contemplated acquisition of tropical territory for the coloni¬ zation of free negroes, and, in order to prevent lower California from falling into the hands of the Confederates, was willing to buy or take it as a pledge for a loan to Mexico to meet foreign obligations which endangered foreign intervention. While warning Spain against intervention in Spanish America, and assuring her that her rights in Cuba and Porto Rico were respected by the United States, Secretary Seward significantly added that Cuba must not be used as a base against the American Union. Later in the war (1864), when Spain feared American designs on Samana, he said the United States already

had enough terri¬ tory. At the close of the war, when Maximilian slept and the Fenians blustered, the American government, in spite of various predictions and certain tendencies, showed no disposition to interfere with the operation of natural forces by embarking upon a policy of conquest. En¬ couraged by friendly inviting conditions in the Red River region and in British Columbia and instigated by the desire to compel England to pay large damages for injuries resulting from Confederate cruisers built in English waters, many favored annexation of British America; but the American govern¬ ment under President Grant refused to adopt the ((flag-withdrawal® policy. The pur¬ chase of non-contiguous distant Alaska, how¬ ever, was regarded, not only as a friendly part of a general policy to extinguish European colonial connection in America, but especially as a step toward the annexation of Canada and other territory. In the same year a represen¬ tative of the American navy formally took possession of the Midway Islands in the Pacific. The public mind was at the time too much ab¬ sorbed in domestic questions to consider addi¬ tional annexations. A treaty of 1867 for the purchase of the Danish West Indies was never ratified by the American Senate ; and another of 1869-70 for the purchase of San Domingo, partly with a view to the solution of the race problem, failed of ratification in the Senate. During the Cuban insurrection of 1868-78 the American government in order to secure peace was ready to guarantee a payment by the Cubans to Spain for their independence, but several times disclaimed any desire for the island.

In 1873, when events in Hawaii threatened to precipitate the consideration of the expedi¬ ency of its annexation, Secretary Fish, while reflecting upon the possible necessity of future expansion into midocean, said the acquisition of territory beyond the sea met the opposition of discreet and influential leaders and could not be adopted without grave deliberation. In 1874, after considering the question of assuming control of the Samoan Islands as a protectorate, he doubted whether their position and import¬ ance (<would be sufficient to satisfy the people that the annexation of the islands to the United States is essential to our safety and prosperity® and did not see the expediency of originating a measure ((adverse to the usual tradition of the government.® Evarts in 1877 refused to accept a protectorate over islands so far distant. Blaine in 1881 and Frelinghuysen in 1883 said that the American policy tended to avoid pos¬ sessions disconnected with this continent — but they felt that the destiny of Hawaii like that of Cuba was an American question. Both Blaine and Bayard,

influenced by the absorp¬ tion of Pacific islands by European powers and the decline of native races, recognized the necessity of maintaining the rights to which the United States had become entitled in the few unappropriated islands which were under inde¬ pendent and autonomous native governments. In 1885 Bayard informed Germany that the recorded disinclinations of the United States to accept the voluntary offers of other powers to place themselves under American sovereignty and protection showed that the American gov¬ ernment had no idea of acquiring control of the Carolines, but in 1886 he added that the United States had an equal right with Germany to assert a claim of possession to Pacific islands. The inevitable incorporation of Hawaii was only delayed by the refusal of Cleveland to accept the results of the revolution of 1893. The tendency to favor the acquisition of distant islands for protection of American interests was shown by the annexation of Hawaii as a naval base by joint resolution in 1898, and was increased as an inevitable consequence of the dismemberment of Spanish dominions by the War of 1898. At the close of the war, the American government, desiring to avoid occa¬ sion for future collisions with Spain, and to secure naval and cable stations and provide for commercial interests, demanded and ob¬ tained Porto Rico, Guam and the Philippine Islands, and secured the independence of Cuba which became practically an American pro¬ tectorate.

The recent acquisitions in the Pacific are the logical development of the old-time policy of steady expansion of American interests in the Pacific and the Far East, although by the acquisition of the Philippines the government has taken a larger step than heretofore.

As the result of the change to steam power for war vessels, the United States still needs coaling stations in the southern oceans and in various parts of Asia, Africa and Europe.

The successful object-lesson of American regeneration in Porto Rico and of American responsibilities in Cuba and Panama — and more recently in San Domingo, Nicaragua and Haiti — may result in additional acquisi¬ tions in the West Indies; but American policy in the entire Caribbean region is to guide the

weaker states and not to extinguish their nationality.

The acquisition of the Danish West Indies in 1917 was largely the result of earlier negotia¬ tions begun to prevent danger of transfer to Germany, which has for years been devising a means to secure coaling stations and harbors in the Caribbean, and in 1902 influenced the

Danish Landsthing to reject an American- Danish treaty for the projected purchase of the islands.

In 1912-14 conditions in Mexico furnished another of the traditional opportunities for American expansion, and a bill for the annexa¬ tion of northern Mexico was introduced. In March 1914, intervention was urged to prevent German intervention ; but other methods for pacification were adopted. President Wilson asserted that the United States will never again seek one foot of territory by conquest.

James M. Callahan.

Professor of History and Political Science, West Virginia University.

AMERICAN FARM IMPLEMENTS.

See Farm Machinery.

AMERICAN FEDERATION OF CATHOLIC SOCIETIES, The. Founded in Cincinnati, Ohio, 10 Dec. 1901. The Federa¬ tion is an organization of Catholics in the United States for the purpose of advancing their civil, social and religious interests. It is not a political organization, and does not con¬ trol the political affiliation of its members ; it asks no favors or privileges, but openly pro¬ claims what is just and fair. It aims at the creation of sound public opinion on all impor¬ tant topics of the day; it stands for the Chris¬ tian life of the nation itself ; for the proper observance of Sunday; for the Christian edu¬ cation of youth ; for the stamping out of immorality; for the sanctity and perpetuity of Christian marriage; for the safeguarding of the Christian home. It asserts the necessity of Christian principles in social and public life, in the state, in business, in all financial and industrial relations. It combats all errors which are in opposition to Christianity and threaten to undermine the very foundation of human society. It is willing to co-operate with all loyal citizens and with all civil and social energies which work for truth and virtue. It exposes falsehood and injustice, whether in misrepresentation of history, doctrine or prin¬ ciples of morality. The aims of the Federation, therefore, are both religious and patriotic. Its membership is composed of the leading Catholic national organizations, of county and State federations, Catholic institutions and indi¬ vidual societies and parishes, with an approxi¬ mate membership of 3,000,000. The organiza¬ tion has the endorsement of the American Hierarchy and of the Pope. The advisory board is headed by Cardinal Gibbons, Cardinal Farley and Cardinal O'Connell.

AMERICAN FEDERATION OF LA¬ BOR, a federation of trade-unions

of the United States, Canada, Porto Rico and Pan¬ ama, in which the rights of constituent units are preserved intact. As in the Federal gov¬ ernment, all powers not expressly granted in the written constitution are reserved to the subordinate bodies, but still further, as in the Articles of Confederation, it has not power of

compulsion (except to suspend or expel a union) and any union can override its decision as far as its own action goes. To this is due its steady growth and harmony. What every union fears most of all is being controlled in matters pertaining to its own trade by persons outside that trade.

The Federation originated in 1881. Its pred¬ ecessors had been the National Labor Union (1866-72), which ended its career by entering politics and nominating a candidate (David Davis) for the Presidency, and a number of sectional orders, of which the Knights of Labor was the chief (1869). The latter were gener¬ ally hostile to trades-unions, holding them based on ((false and selfish principles of temporary advantage, to the sacrifice of the general in¬ terests® of labor, and the Knights attempted to break down trade barriers in workmen's action by organizing local assemblies of miscellaneous laborers. This antagonized those who believed that only members of a given craft, trade or industry had a right or the proper knowledge to direct its action ; and on 2 Aug. 1881, repre¬ sentatives from trade-unions, the Amalgamated Labor Union (a split from the Knights of Labor) and the Knights of Industry, both secret orders, held a conference at Terre Haute, Ind., ostensibly to establish a national labor congress, but in reality (as stated) to form a new order to supplant the Knights of Labor. This was defeated, and the conference issued a call for a convention at Pittsburg in Novem¬ ber, where the Federation of Organized Trades and Labor Unions of the United States and Canada was constituted. On 8 Dec. 1886, this fused with a separate trade-union conference and changed its name to the American Federa¬ tion of Labor; and in 1889 acknowledged the continuity of existence by dating the proceed¬ ings to 1881. Its membership is of local unions central unions of cities, State federation, national and international trade-unions. As a local union may thus belong to three different superior bodies, with a possible conflict of juris¬ dictions, the Federation takes charge of these mutual relations. It recognized the national and international unions as having supreme jurisdiction, but it approves and urges State and central bodies as helpers in gaining

com¬ mon objects.

These objects, as stated in its constitution, are: (1) <(The encouragement and formation of local trades and labor unions, and the closer federation and combination of such bodies, to secure legislation in the interest of the working masses.® (2) ((The establishment of national and international trade-unions, based upon a strict recognition of the autonomy of each trade,® etc. (3) ((An American Federation of all national and international trade-unions, to aid and assist each other,® and <(the sale of union-label goods, and to secure national legis¬ lation in the interest of the working people, and influence public opinion by peaceful and legal methods in favor of organized labor.® (4) ((To aid and encourage the labor press of America.®

Its executive organization at first was a sec¬ retary and legislative committee, and it an¬ nounced that it would have no salaried officials ; but for efficient working it has been compelled to modify this rule. It has a salaried president and secretary, a treasurer and eight vice-presi¬

dents, who together form the executive council, which meets quarterly. The president for many years has been Samuel Gompers (q.v.)

The funds are derived from a per capita tax in 1918 of 10J/2 cents per year from each mem¬ ber of an affiliated trade-union, 15 cents per month from each member of a directly affil¬ iated local union, and $10 each from central unions and State federations. Until 1887 it could not grant money in aid of strikes; but in that year a revised constitution gave the executive council the right to call on the unions for financial aid to such strikes as it approved. This voluntary aid was insufficient, and in 1889 another amendment permitted it to levy a com¬ pulsory tax of one cent a week on each mem¬ ber of an affiliated union, for not over 10 weeks in any year, in aid of strikes or lockouts.

The policy of the Federation is fixed in open conventions held in a different city each year. For years these conventions were held in No¬ vember. The 1917 convention changed the time to the second Monday of June. The affiliated organizations are entitled to but one delegate until their membership reaches 4,000, two delegates up to 8,000, three delegates up to 16,000, four delegates up to 32,000, five delegates up to 64,000 and so on. But delegates from organizations, either national, international or local unions, are en¬ titled to cast one

vote for every 100 members they represent. Thus the number of delegates is kept within such limits so that the conven¬ tions shall be really legislative bodies, and yet the spirit and purpose of democracy is main¬ tained so that the delegates have voting power in proportion to the numerical strength of their respective constituencies.

The American Federation of Labor confines its membership to wage workers, men and women, skilled and unskilled, not admitting even farmers who are employers of labor on their farms. The Federation realized that the organization of each trade in its particular union and the affiliation of all unions in a com¬ prehensive federation was sure to strengthen each and bring advantage to all. The Knights of Labor confounded all distinctions and po¬ tentially overruled each trade by the vote of outsiders. By recognizing the common-sense principle that each interest can manage its own affairs best, the Federation has grown, till, for the year ending 30 Sent. 1917, it has in affilia¬ tion national and international unions, 111; State federations, 45; central unions, 762; local unions, 26,761 ; five departments and 441 local department councils. The total membership of unions for September 1917, 2,37 1,434. It does not contain all the trade-unions, a few are still remaining outside, as the great railroad federa¬ tion of four unions; but it contains the United Mine Workers of America (its largest body), the International Typographical Union of North America, the Brotherhood of Carpenters and Joiners, the Cigar Makers' International Union, etc.

Its activity in securing favorable and defeat¬ ing unfavorable legislation for laborers has been very - great and very successful. These are too many to detail ; but it may be said that its first convention of 1881 demanded a national eight-hour day for government employees and exclusion of Chinese and contract laborers; and all these have been enacted into law. It also

secured the establishment by law of Labor Day. Since then it has steadily favored shorter hours, non-employment of children, better sanitary conditions, regulation of convict employment, abolition of (<governmcnt by injunction,® etc.

The American Federation of Labor during the first part of its history followed the political policy of recommending to the members of its affiliated organizations the independent use of the ballot. This policy

was pursued until 1906 when the Federation inaugurated an active non-partisan political policy of rewarding their friends and voting against their enemies. It was felt necessary to make this change of policy because of the urgent need of remedial legis¬ lation. Abuse of the injunctive process and the perversion of the Sherman Anti-trust Law to apply to associations of wage-earners organ¬ ized not for profit constituted such a menace to the activities and the very existence of the organizations of workers that the enactment of laws, regulating and limiting the issuance of injunctions and specifically taking associations of wage-earners from under the provisions of trust legislation, was imperative.

In 1906, the American Federation of Labor drew up its famous ˆLabor's Bill of Griev¬ ances,® which enumerated laws demanded by labor for the protection of the rights and in¬ terests and welfare of the working people. This political movement was given impetus by legal proceedings instituted against organized wage-earners. The two cases which were en¬ dorsed by the American Federation of Labor as test cases were the so-called Hatters' case and the ˆContempt® proceedings against Presi¬ dent Gompers, Vice-President John Mitchell and Secretary Frank Morrison of the American Federation of Labor. Under these contempt proceedings they were twice sentenced to 12, 9 and 6 months' imprisonment, respectively, but the United States Supreme Court reversed the decision of the lower courts in both cases. In the course of the Hatters' case, the Supreme Court of the United States decided that sections 1, 3 and 7 applied to associations of wage-earners. The contempt cases grew out of injunctions issued against the officers of the American Federation of La¬ bor, forbidding them their constitutional rights of free speech and free press. These two cases were considered flagrant violations of the rights of citizens of a free government and demonstrated the imperative necessity for se¬ curing the remedial legislation which labor demanded.

The organized labor movement began a cam¬ paign to secure the nomination and election of representatives, regardless of party, who pledged themselves to the enactment of labor's legisla¬ tive demands. As a result of this political pol¬ icy, there came into existence in Congress what is known as the Labor Group, members of which hold trade-union cards and are affiliated with labor organizations. This group has gradually increased in size until in the 65th Congress there are now belonging to it one senator and 16 members of the House of Representatives. As a result of this political activity, labor's fundamental demands have been enacted into law. In the labor provisions of the Clayton Anti-trust Act, which became a law 15 Oct. 1914, section 6 of this act contains the most

important legislative statement ever enacted into law, namely, (<the labor power of a human being is not a commodity or article of com¬ merce.® According to this declaration, associa¬ tions of wage-earners cannot be classified as trusts and cannot be interpreted as coming under the provisions of trust legislation. Sec¬ tion 20 of the Clayton Anti-trust Act provides for the limitation and regulation of the issuance of writs of injunctions to conform to labor's demands. Another great humanitarian law that has been secured as a result of this po¬ litical policy is the Seaman's Act, which brings freedom to a group of America's workers that could be imprisoned for failure to perform specific services.

In 1884, the American Federation of Labor succeeded in securing the enactment of a law establishing the Federal Bureau of Labor. Af¬ ter continued effort in 1913, a law was enacted which created the Federal Department of La¬ bor, with a secretary at its head, who is a mem¬ ber of the President's Cabinet. There was appointed, as the first Secretary of Labor, William B. Wilson, a member of the United Mine Workers of America and former secre¬ tary of that organization. This enables the workers of America to have representation in the councils of state at the time when plans and policies are in a formative state. Another law provided for the establishment of the Children's Bureau.

In addition, many other humanitarian laws have been secured, such as the amended and im¬ proved eight-hour law for employees on govern¬ ment work, Workingmen's Compensation Act and many others too numerous to mention, but which have made possible better conditions of work, greater safety for life and health of the workers of America. However the funda¬ mental policy of the American Federation of Labor has been that the economic power of the workers is fundamental, that power is derived from the creative labor power of the workers who render service in industry and commerce and that all other power is derived from their economic power. The economic demand which the trade-union movement holds to be funda¬ mental is the shorter workday or the present demand for the eight-hour day. The shorter workday protects workers from physical ex¬ haustion and gives them opportunities for rest, for improvement of their own abilities and for social contact with their fellows. The shorter workday makes of the workers different human beings. It is ahvays accompanied by higher wrages for the worker who, as a result of the shorter workday, is a better and more pro¬ ductive worker than the one who labors long hours.

The trade-union movement has held that personal relations in private industries must be determined by the wage-earners themselves

through their economic organizations. A dis¬ tinction is observed between employees in pri¬ vate industry and employees in the government. The American Federation of Labor holds that the economic organizations are the instru¬ mentalities through which workers in private industries must work out their salvation but that industrial relations for government em¬ ployees must, of course, be regulated to some extent through legislation. However, even the

problem of securing the welfare of workers in government employment depends upon the power of the economic organizations of the workers — not only those in government em¬ ployment but those of the whole country.

The American labor movement has consist¬ ently stood for internationalism and peace be¬ tween nations. It has opposed militarism in all its phases. The Seattle Convention of the American Federation of Labor approved a proposition for a Naval Holiday during which period of time all nations should cease con¬ structing war vessels. Although working for peace and hoping for peace, the Federation understood fully the meaning and the oppor¬ tunities of the European War. The Federa¬ tion realized that ideals of international peace had not been property supported by provisions for constructive agencies. This problem was considered at several conventions held in 1914 in Philadelphia, and a resolution was adopted providing for the holding of a labor peace con¬ ference at the same time and place that the world peace congress should be held after the war. The labor organizations of all countries were urged to approve this idea and to make provisions for sending representatives. This plan was reaffirmed by the San Francisco 1915 Convention. The Baltimore 1916 Convention adopted an additional provision that the or¬ ganized labor movements of all countries should urge upon their governments the jus¬ tice of appointing workers among their na¬ tional delegations of plenipotentiaries which would constitute the peace congress. This proposal, together with the proposed labor conference, was again reaffirmed by the Buf¬ falo 1917 Convention of the American Feder¬ ation of Labor.

The American Federation of Labor was closely in touch with those directing and con¬ cerned in the European War and understood that in the last analysis the war was labor's war and the fighting elements in the war were soldiers, sailors and workers. Thus, the es¬ sential

thing for winning the war was to or¬ ganize production. Workers performed an essential part in production and therefore de¬ manded that they have a voice in determining conditions under which production shall be carried on.

As the war progressed and it became evi¬ dent that institutions of democracy and free¬ dom the world over were involved and that therefore the United States could not avoid becoming an active member of the Allies fighting against militarism and despotism, rep¬ resentatives of the organized labor movement of this country met in Washington on 12 March 1917 and adopted a declaration entitled, <(American Labor's Position in Peace and in War A That declaration clearly sets forth the duties and responsibilities of workers to a free republic, and made clear the loyalty of labor and its determination to render service to the republic in the time of peril. It also set forth the conditions under which labor could render service and at the same time maintaining the principles of freedom for all. Workers, as representatives of labor, have been appointed to several important governmental committees and agencies dealing with war problems. The president of the American Federation of La¬

bor, Samuel Gompers, was appointed by Presi¬ dent Wilson as a member of the Advisory Commission to the Council of National De¬ fense.

In order to facilitate war production and avert situations that might interfere with con¬ tinuous work, representatives of the organized labor movement have entered into working agreements with the government to secure this end. The most important of these agreements were the agreement between the Seamen's organization and the Shipping Board ; agree¬ ment between Samuel Gompers and Newton D. Baker, Secretary of War, providing for the union scale and hours in cantonment construc¬ tion. This agreement was later approved for construction work in the Navy Department and extended to include repairs and the build¬ ing of warehouses. An agreement was entered into between representatives of labor organi¬ zations concerned and the Ship Building Emer¬ gency Fleet Construction Corporation covering the construction of ships. The International Longshoremen's Association entered into an agreement with the Shipping Board under which all disputes involving their members should be settled by a labor adjustment board, and which also provided for union hours and wages. The United Leather Workers' Inter¬ national Union entered into an agreement covering war production with various em¬ ployers and the War Department.

The organized labor movement aims to ex¬ tend the number and the application of agree¬ ments covering war work in order that there may be established agencies for dealing with industrial difficulties as they arise, and thus prevent industrial struggle. It has also main¬ tained the democratic principle that the work¬ ers ought to be represented on all war boards and agencies that deal with matters concerning the life and the work of wage earners.

The Federation has taken an important part in international affairs and has steadfastly opposed international conferences of working men in which there were to be representatives of labor movements of enemy countries. How¬ ever, it has advocated the holding of a world labor congress at the close of the war at the same time and place where the international peace congress shall be held.

The President of the United States ac¬ cepted an invitation to address the Buffalo (1917) Convention of the Federation. His address to that convention may be found in the printed Proceedings, and also in the American Federationist for January 1918.

The Convention adopted the following declaration as Labor's peace program :

1. The combination of the free peoples of the world in a covenant for genuine and practical co-operation to secure justice and therefore peace in relations between nations.

2. Governments derive their just power from the consent of the governed.

3. No political or economic restrictions meant to benefit some nations and to cripple or embarrass others. •

4. No indemnities or reprisals based upon vindictive purposes or deliberate desire to injure, but to right manifest wrongs.

. 5. Recognition of the rights of small nations and of the principle, "No people must be forced under sovereignty under which it does not wish to live."

1. No territorial changes or adjustment of power except in furtherance of the welfare of the peoples affected and in furtherance of world peace.

In addition to these basic principles, which are based upon declarations of our President of these United States,

there should be incorporated in the treaty that shall con¬ stitute the guide of nations in the new period and conditions into which we enter at the close of the war the following declarations fundamental to the best interests of all nations and of vital importance to wage-earners:

1. No article or commodity shall be shipped or delivered in international commerce in the production of which children under the age of 16 have been employed or permitted to work.

2. It shall be declared that the basic workday in industry and commerce shall not exceed eight hours.

3. Involuntary servitude shall not exist except as a punish¬ ment for crime whereof the party shall have been duly convicted.

4. Establishment of trial by jury.

The American Federation of Labor in 1887 published an official journal called the Union Advocate. In 1894 it began the publication of a monthly magazine, The American Fedcra- tibnist. In 1911 the Federation began issuing a weekly news letter, for the purpose of assisting the labor press throughout the country. A number of official pamphlets and publications can be had from headquarters. Consult Aid- rich, (American Federation of Labor) (Vol. Ill of (Economic Studies > 1898) ; Gompers, (The Labor Movement and Others1 *; McGuire, (The American Federation of Labor* ; and annual reports of the Federation.

Samuel Gompers,

President American Federation of Labor.

AMERICAN FLAG. See Flag, the American.

AMERICAN FLAG ASSOCIATION.

See Flag Association, the American.

AMERICAN FOLK-LORE SOCIETY,

an association founded in 1888 for the study of folk-lore in general and in particular for the collection and publication of the folk-lore of North America. It has helped largely to lift folk-lore studies out of the mere antiquarian stage and to make them a valuable auxiliary in

anthropological and ethnological investiga¬ tions. Branches have been established in Cam¬ bridge, Boston, Missouri and Texas, and flourishing folk-lore societies are in existence in Kentucky, North and South Carolina and Vir¬ ginia. There is also a large membership-at-large. The permanent secretary is Dr. C. Pea¬ body, Harvard University, Cambridge, Mass. It publishes quarterly The Journal of American Folk-lore.

AMERICAN FORESTRY ASSOCIA¬ TION, an organization formed in 1882 and incorporated in 1897, devoted to the conservation of private, State and national forests and to public education in the knowledge of trees, their care and development. It is a voluntary or¬ ganization for the inculcation and spread of a forest policy on a scale adequate for our economic needs and any person is eligible for membership. It is independent and has no offi¬ cial connection. The membership which ex¬ tends to every civilized country is about 13,000. The publication of the association is called the American Forestry Magazine.

AMERICAN FORK, Utah, city of Utah County, 30 miles south of Salt Lake City, on the Denver and Rio Grande, the San Pedro, Los Angeles and Salt Lake railroads. Pop.

2,797.

AMERICAN FURNITURE. See Fur¬ niture, Colonial; Furniture Industry in America.

AMERICAN GEOGRAPHICAL SO¬ CIETY. See Geographical Society, The American.

AMERICAN GOVERNMENT. See De¬ mocracy ; Democratic Party ; Federal Gov¬ ernment; Government; Local Government; State; State Governments; Income Tax; Cities, American, Government of; Commis¬ sion Form of Government; Political Par¬ ties; Republican Party; Town and Town¬ ship Government; and the various historical articles under United States. See also Ameri¬ can Diplomacy ; Arbitration ; Diplomatic Relations with Austria-Hungary, China, France, Germany, Great Britain, Italy, Japan, Mexico, North America, Russia, South America (treated under those various countries); Free Trade; International Law; Neutrality; Protection; etc., etc.

AMERICAN HISTORICAL ASSOCIA¬ TION. A national organization of persons interested in history and in the promotion of historical work and studies. It was founded at Saratoga, N. Y., in 1884, by a group of

repre¬ sentative scholars, and in 1889 was incorporated by act of Congress, its national character being emphasized by fixing its principal office in Washington and by providing for the govern¬ mental publication of its annual reports. Its present membership of 3,000 is drawn from every State of the Union, from Canada and South America, and from 13 other foreign countries. The meetings are held annually in December in cities so situated as best to ac¬ commodate in turn the members in different parts of the country. The society has exerted wide influence in directing and stimulating his¬ torical research, and its publications and mono¬ graphs have covered a broad field of historical study. Important committees of the society are the Historical Manuscripts Commission and the Public Archives Commission ; the former is concerned in the preparation of valuable manu¬ scripts for publication and the latter in the preservation of the public records of the various States and smaller political divisions. The so¬ ciety publishes an annual report, usually in two volumes, and appoints a board of editors for the American Historical Review, published quarterly. The society has published five vol¬ umes of (Papers, *about 40 volumes of Annual Reports, a series of prize essays, two volumes on (The Study of History in Schools1* and a series of reprints of (Original Narratives of American History1* in 20 volumes. Membership is obtained through election by the executive council, upon nomination by a member, or by direct application.

AMERICAN INDIANS. See Indians, American.

AMERICAN INSTITUTE OF ARCHI¬ TECTS, a society organized in 1857. It has 39 chapters, 314 fellow's, 809 members, 36 cor¬ responding and 88 honorary members. It has its office in Washington.

AMERICAN INSTITUTE OF THE CITY OF NEW YORK, an organization founded in 1828 for the promotion, by exhibi¬ tions and fairs, of agricultural, commercial, manufacturing and artistic interests throughout the Union. It is now divided into five sections : The Farmers' Club, the Henry Electrical So-

ciety, the Horticultural Section, the Photo¬ graphic Section and the Polytechnic Section. It has a scientific library of 15,000 volumes.

AMERICAN INSTITUTE OF ELEC¬ TRICAL ENGINEERS. This is the national organization representing the electrical en¬ gineering

profession. It was founded in 1884. Its objects are the advancement of the theory and practice of electrical engineering, and of the allied arts and sciences, the maintenance of a high professional standing among its mem¬ bers and the development of the individual engineer. The institute has contributed largely toward the remarkable progress that has taken place in the electrical field during the last three decades, and has been an important factor in advancing the interests of its members and of the entire engineering profession. The mem¬ bership on 1 May 1916 was 8,212. The annual dues are: Associates, $10; members, $15; fel¬ lows, $20. Entrance fees, $5, $15 and $20, re¬ spectively. All branches of electrical engineer¬ ing are represented in the membership. Meet¬ ings for the presentation and discussion of technical papers and other matters of interest to electrical engineers are held in New York by the parent society from October to May, and also by the 86 branch organizations located in the principal electrical centres of the country. An annual convention and additional special conventions, as authorized by the board of directors, are held in different parts of the country. The principal publications of the institute are the monthly Proceedings and the annual Transactions. The policy of co-opera¬ tion with other engineering societies in matters of mutual interest is encouraged by means of joint meetings and otherwise as opportunities develop. Upon invitation, the institute has appointed representatives and committees from time to time to co-operate with various branches of the Federal government, and its representatives have appeared at hearings be¬ fore congressional and other legislative bodies on subjects involving the interests of the engineering profession. Briefly, the institute provides opportunity for and encourages com¬ radeship, the interchange of ideas, the presen¬ tation, discussion and publication of papers, the formulation of standards and codes, the advance of ideals, the cultivation of the spirit of co-operation, and the inspiration which gives vision and incentive for new efforts and greater achievements. Executive offices and library, 33 W. 39th Street, New York.

AMERICAN INSTITUTE OF HOMCE- OPATHY, a society organized in 1844, the oldest national medical organization in the United States. Membership about 2,000.

AMERICAN INSTITUTE OF IN¬ STRUCTION, the oldest educational associa¬ tion in the United States, organized in 1830 at Boston. Its purpose was (<the diffusion of use¬ ful knowledge in regard to education.® It has held annual meetings at each of which prob¬ lems of vital interest were proposed. New England supplies the largest proportion of members. Its proceedings include practically all of the names of well-known educators in the country; among them Ralph

Waldo Emer¬ son, William E. Channing, Samuel Howe, Lowell Mason, Henry Ward Beecher, Julia Ward Howe, etc. Some very important con¬

tributions to American education were first presented as lectures to this institution. Con¬ sult Barnard, Henry, (American Institute of Instruction } (in American Journal of Educa¬ tion 1856, Vol. II, pp. 19-32, 241-55) ; Smith, ((Founders of the Institute® (in Proceedings of American Institute of Instruction, } 1867, pp. 213-18) ; Winship, A. E., American Institute of Instruction (in id., 1906, pp. 457-63).

AMERICAN INSTITUTE OF MINING

ENGINEERS, an association of American mining engineers, organized in 1871 and incor¬ porated in 1905. Its membership in 1916 was

5,785.

AMERICAN IPECAC. See Gillenia.

AMERICAN-IRISH HISTORICAL SO¬ CIETY, founded in Boston, Mass., 20 Jan. 1897, to make better known the Irish chapter in American history. The organization draws no creed lines and is non-political. It has pub¬ lished a number of books and pamphlets along its chosen line of work. The society is national in its scope, and has members throughout the country. The organization holds its annual gathering in New York city, and publishes yearly a bound volume called the UournaP Gf the society. The membership is about 1,000. In addition to the national officers, there is a vice- president for each State.

AMERICANISMS, in language, are words or phrases peculiar to the English speech of the United States or of British America. They may be: (1) Forms originating in America; or (2) forms that have emigrated from Britain and that have continued in use here while they are obsolete there; or (3) that have undergone here an essential change of signification. Ex¬ amples of words originating here or at least first introduced here into the vocabulary of the English language are Buncombe, Caucus, Ger¬ rymander; of words here in current use but now antiquated in England we have Fall (the season), Wilt (verb), Whittle; and of words with changed signification we have Corn (maize), Partridge (quail or ruffed grouse), Store (in England shop). These three proc¬ esses of new word coinage, or survival of meanings in one province of the language which in another province have become obso¬ lete, and of essential change of signification, are inherent in all languages, and can be traced in a comparison of two

counties as clearly as in two countries. Americanism expresses the character of English speech in America : it does not imply any inferiority of American English to British English; nor is American English subject to correction by the laws that British English prescribes for itself : American¬ ism and Briticism in speech are mutually on an equal footing; unlike Gallicisms, Germanisms or even Scotticisms, Americanisms are not aliens in English, but natives. Among the Americanisms to be noted in what follows are many words or phrases which belong to the vocabulary and phraseology of slang, and are universally regarded as vulgarisms and sole¬ cisms and vicious growths of the vernacular speech of America; as such they are (< Ameri¬ canisms,® but they are no more part of legiti¬ mate American speech than is costermongers' English part of the English language of the home country.

AMERICANISMS

523

In the front rank of Americanisms must be classed those which are most racy of the soil and that could not have been evolved in any social or physical environment other than was and is presented in this new world. The first settlers had to clear the boundless forest which covered the land, and constantly to guard their lives and their possessions against the forays of the savages : they went always armed to their day's work. Such words and phrases as Going on the war path, Digging up the hatchet, Bury¬ ing the hatchet, Scalping, Tomahawking, recall the hero-tales of American pioneering; and from the same period come Shanty, Blazing out, Clearing, Backwoods (in Canada, The Bush®). They Took to the woods® or To the timber® for refuge at the approach of the redskins in overwhelming force. In the sparsely peopled settlements the necessity for neighborly help in gathering in the harvest or in erecting a log cabin or in providing comforts for the winter led to the custom of the Raising-bee or Build¬ ing-bee, the Quilting-bee, the Husking-bee : the origin of the word Bee in this sense is un¬ known ; the custom itself survives in rural dis¬ tricts, and a few years ago a new sort of Bee — the Spelling-bee had great vogue ; and that was followed by the Definition-bee ; these <(bees® met with much popular favor in England. Log¬ rolling is another example of co-operation among backwoodsmen, when neighbors associ¬ ate to collect each other's logs for the winter fires. Logrolling came early into use as a term of the art of practical politics to signify the co¬ operation of members of a legislative body to promote one another's schemes. Literary Log¬ rolling is when authors combine to create a market for each other's productions by mutual

puffery. Salt springs to which the big game used to resort were Salt Licks ; the spaces be¬ tween stretches of water over which the pio¬ neers had to carry their canoes were Portages. As settlers began to seek homes in the West on government lands, the distribution of the public domain became a business of vast proportions and ((a Land-Office business® became a superla¬ tive term of comparison. A Section of land is a square mile or 640 acres ; a very usual subdivi¬ sion is the Quarter section, 160 acres. In the nearer West, as in the East, bodies of land were Farms; in the farther West, Ranches; in the South, Plantations. The verb to Deed is a pure Americanism : the phrase ((To convey by deed® was too slow. A settler who acquired land from the government ((blazed out® his grant by cut¬ ting with his axe marks on the bark of trees : the word is from the French blazon, a term of heraldry. A Lot of ground is any distinct portion of land, and in towns and cities is a piece of ground with a definite frontage, usually 25 feet. The use of the word Tot® in the sense of a parcel of land seems to have originated with the Puritans in Massachusetts : for this they had scriptural authority, Joshua xv. To go Across lots is to take the shortest route; but to make a Bee line toward a place is to haste to it in a straight line. Immigrant is an Americanism, and it is the accurately fit word to signify one who comes to a country as a settler. Tenderfoot, a most expressive Amer¬ ican slang word to designate the newcomer into a newly opened gold or silver mining district, is current coin no less in Australia than in the Rocky Mountains. In California, in the early

days, many words came into use and have since remained in general circulation, for example, Placer, Prospecting, Diggings, Pay Dirt, Gulch. Bonanza is of later introduction. Crevasse is a breach in the embankment of a river; the word is of French origin in the province of Louisiana and specially denotes the effect of a flood of the Mississippi River. Of like origin is the word used to designate the embankment of the Mississippi, Levee. The word is also used to designate a river front of towns situate on other rivers in the Mississippi Valley which are naturally confined within their own banks. In English usage Levee is accented on the first syllable, but in the United States the accent falls usually on the last. Incidentally it may be remarked of another American usage of the word Levee to signify an evening reception of visitors by the President of the United States, The President's Levee,® that it is a rank sole¬ cism, and means in effect a morning reception in the evening. Freshet, in obsolete English usage, means a stream of fresh water: in the sense of an inundation it is an Americanism. Blizzard, signifying a violent, blinding storm of wind, snow and sleet, is a word of unascer¬ tained origin. Prairie is as distinctly American as

Veldt is South African or as Tundra is Rus¬ sian and Siberian.

In the vocabulary of politics, besides Log¬ rolling, already mentioned, we have Gerryman¬ der, to make an unfair distinction of electoral districts for party ends : this American political trick is called by the English political philos¬ opher Jerrymandering; and one of the English dictionaries gives as an alternative spelling Jer¬ rymander, while in Gerrymander it makes the g soft : thus pronounced, the word Gerrymander is a Briticism. What for the British is a politi¬ cal canvass is for us a Campaign, and a Cam¬ paign is conducted to a considerable extent in accordance with the tactics and strategy of real war. The successful party is the Victor, and to him, under the ancient laws of war, belongs the spoil. Speaking from the Stump, Taking the stump, were originally literal expressions of fact. Buncome, or Bunkum, seems to be au¬ thentically derived from the name of a county of North Carolina, whose representative in Congress, when begged not to weary the House with his orator}', replied that though he was addressing the House he intended his speech for the good people of Buncombe. The deriva¬ tion of the word Caucus from Calkers is plaus¬ ible. In 1770 the calkers and ropemakers of Boston held frequent meetings to denounce the British government and its local agents, and those meetings were called by the Tories Calk¬ ers' meetings. The Caucus, a preliminary meeting held for the purpose of selecting a candidate for office, or, in case of a legislative body, to decide upon the policy to be supported by members of a party in the open sessions, is an American invention ; of late it has been in¬ troduced in England. Spread-Eagle oratory has its name from the extravagant style of stump orators and Independence Day spouters when they glorify the Bird of Freedom. High¬ falutin, a word that cannot be traced to its original source, denotes turgid, bombastic ora¬ tory. To Enthuse is unquestionably an Ameri¬ canism, and it is base coin formed from the word enthusiasm, which, whether in Greek or English, has no corresponding active tran-

sitive verb form. Of party names and nicknames may be mentioned Whig and Tory, of the pre-Revolutionary era, Federal and Republican of the period after independ¬ ence, then Whig again, and instead of Re¬ publican either Democratic Republican or simply Democrat, with the nickname (about 1835) Locofoco (given first to a body of radi¬ cals who, in Tammany Hall, New York, after a meeting was officially dissolved and the lights put out, produced locofoco matches, rekindled

the lights and continued the meeting : the loco¬ foco match, or locofoco cigar was introduced in 1834, the word meaning ˆsubstitute for fire® — in loco foci. It was a cigar with friction- match attached). Other party names and nick¬ names are Republican, Silver-grays, Copper¬ head, Carpet-baggers, Lily Whites. The man in any political organization who possesses or is believed to possess authority to dictate the party's policies is the Boss. The word is the Dutch baas and is the usual designation of an employer or overseer of workmen. A few years ago political terrorism in the South, de¬ signed to bar to negroes access to the polls, was known as Bulldozing, a word which cannot be traced to its origin with certainty, and which is no longer in use. Roorback is a false and in¬ jurious report set afloat in the crisis of a politi¬ cal campaign, usually a very short time be¬ fore the canvass is closed, so that it may have damaging effect before contradiction or refutation can be made. The phrase (<a good enough Morgan till after election® recalls an incident in the history of New York politics. William Morgan, author of a book purporting to reveal secrets of Freemasonry, was kid¬ napped, and the anti-Masonry party charged the Freemasons with having murdered him. To counteract this charge, which was credited largely by public opinion, the Masonic society, or rather its friends in the Whig and Demo¬ cratic parties, spread reports of the finding of the missing man ; whether true or false, these reports furnished <(a good enough Morgan till after election.®

Right, as equivalent to very, is by some writers classed among Americanisms ; but that is an error, though undoubtedly the word is more commonly used in that way here than among the English. In the style Right Rev¬ erend, Right Worshipful, etc., Right has the meaning of very; in Tyndale's Bible occur such phrases as Right sorry, Right humble, and in writers of the 14th century the same usage is to be seen. But Right here, Right now, Right away, Right off are Americanisms and are not found in the colloquial speech of Britain. In British English of these latter days Sickness is hardly used save in the sense of nausea; but the best British authors do not countenance that restriction of meaning. In the United States, outside the circles in which the time o' day is given from London, the words Sick and Sick¬ ness have the same signification they have had in the general language at least from the 14th century, when mind-sick, mind-sickness, were current phrases; and in the King James version of the Bible sick and sickness have the same purport which they have in the American ver¬ nacular. Ugly, in the sense of cross-grained, ill-natured, is an Americanism, though English usage has the nearly parallel phrase, an ugly customer. An American can ride, in a coach ;

but an Englishman, if he is to ride at all, must go on horseback or be

borne on the back of some other animal. British restriction of the meaning of Ride is inconsistent with the usage of the translators of the Bible, who make Joseph, for example, and Jehonadab ride in chariots. The garment which Americans style Vest is better styled by the English Waistcoat. Peart, pronounced, and often written, Peert, meaning lively, brisk, sprightly, without any suggestion of sauciness or ((freshness,® is gone out of use, at least of literary use, in England ; it is an Americanism, but its habitat, so to speak, is restricted. A special use of Peart is to signify the improved tone of one who is recovering from a sickness.

The place of business at retail which in England is a Shop is in the United States a Store. Of late a tendency has appeared toward adoption of the British usage of these terms. In regions unaffected by this tendency Shop is still what it was 50 years ago in this country, a work-place, and a Store is a place wrhere goods are kept in store for sale. But even while Shop and Store retained their cisatlantic mean¬ ings, there were numerous phrases current which are inconsistent wdth the American mean¬ ings of Store and Shop, for example, Shop¬ worn, Smelling of the shop, Shop-boy, Shop¬ ping, Shopkeeper, Shoplifter, etc. The grocer's store or shop is here called a Grocery, not so in England ; there Grocery signifies only the wares sold by a grocer. Unquestionably Amer¬ ican is the use of the wrord Drummer in the sense of one who solicits or touts for custom. The phrase, He struck oil, will probably sur¬ vive after all the oil wells have gone hopelessly dry.

What we call Baggage is by the British called luggage, though the reason of the differ¬ ence can hardly be that we travel with less im¬ pedimenta than they. The development of our railway systems has brought many new words into the vernacular, but none more expressive than the verb Telescope.

The conversational speech of Americans at one time seemed to be seriously threatened with invasion by a host of spurious, illegitimate word-coinages, especially of verbs made out of nouns, as to Advantage, to Ambition, and of pompous verbs made out of nouns ending mostly in - ation , as Orate, Donate; but that danger was happily averted. The use of Transpire in the sense of happen, occur, is of American origin, but the use quickly spread to England; the solecism wras promptly branded by scholars, but it still lives and flourishes. Balance, in the sense of remainder, is another Americanism which has attained a currency wEich it does not deserve. Mad, in the sense of angry, is an Americanism of the baser sort. To Wilt, on the other hand, a <(provincialism® in England, but in America a word in

universal use, is one of the valuable contributions of the American province of the English language to the mother tongue's general store. The proverbial Whittling of the Yankee keeps alive an ancient native English word for knife.

Among notable or curious phrases current in the United States may be mentioned Flying off the handle, — losing self-control through pas¬ sion : one is then like the axe-head wdiich has quit the haft. To Get religion, or even to Take religion, is a phrase constructed on the pattern

of "to take a cold" or (<to take the measles." To be Posted plainly had its origin in the counting-room.

Bibliography. — Bartlett, J. R., dictionary of Americanisms) (4th ed., Philadelphia 1877) ; Brown, C. S., and Primer, S., (Studies of Southern Dialects) (in the Publications of the Modern Language Association) ; Clapin, (New Dictionary of Americanisms) (New York 1902) ; Crane, W. W., (The American Lan¬ guage' (in Putnam's Magazine, Vol. XVI) ; 'Dialect Notes) (published by the American Dialect Society since 1889) ; Elwyn, A. L., (Glossary of Supposed x\mericanisms' (New York 1858) ; Emerson, (Dialect of Ithaca' (1891) ; Farmer, (Americanisms, Old and New) (London 1889) ; Giggs, G., dictionary of the Chinook JargoiP (Washington 1863) ; Harris, (Uncle Remus, His Songs and His Sayings ' (New York 1880) ; Higginson, T. W., Amer¬ ican Flash Language in 1798) (in Science, May 1885) ; Southwestern Slang) (in Overland Monthly, August 1869) ; Leland, (A Dictionary of Slang, Jargon and Cant) (London 1887) ; id., dans Breitmann's Ballads) (Philadelphia 1870) ; Lounsbury, T. R., (The English Lan¬ guage in America' (in International Review, Vol. VIII) ; Lowell, J. R., Introduction to the (Biglow Papers' (Cambridge 1848) ; Matthews, Brander, (Briticisms and Americanisms' (in Harper's Magazine, July 1891); Norton, Po¬ litical Americanisms' (New York 1891) ; Peck, (What is Good English?' (New York 1899) ; Pickering, (Vocabulary of Words and Phrases Supposed to be Peculiar to America' (Boston 1816) ; Reeves, H., (Our Provincialisms' (in Lippincott's Magazine, Vol. Ill) ; Scheie de Vere, (Americanisms' (New York 1872) ; Smith, C. F., (On Southernisms' (in transac¬ tions of the American Philological Association,' 1883) ; Tucker, G. M., American English' (in North American Review, Vol. CXXXVI) ; White, R. G., Americanisms' (in Atlantic Monthly, Vols. XLI-XLV), and Witherspoon, J., essay in The

Druid (Vol. IV, Philadelphia

1801).

AMERICANISTS (from Americanist es), all those who devote themselves to the study of (1) the native races of America — their origin, distribution, history, physical characteris¬ tics, languages, inventions, customs and re¬ ligions; (2) the history of the early contact between America and the Old World. The name was probably first given to the members of the French Societe Americaine de France, and later to students of any nationality who are interested in the archaeology, ethnology and early history of the two Americas. Since 1875 such students have met at irregular intervals in an association known as the Congres Inter¬ national des Americanistes. This congress grew out of the Societe Americaine de France, which was formed in 1857 by several French students who had become interested in the pre-Colum¬ bian civilizations of South America and Mexico; after this society had flourished for 18 years its members decided to invite Americanists of for¬ eign countries to a congress. The first inter¬ national meeting was held in 1875 at Nancy, France, where statutes were adopted and plans laid for the continuance of the organization. Since then 10 other meetings have been held in various European cities and two in America

(City of Mexico, 1895, and New York city, 1902). At first the intention was to hold bi¬ ennial sessions, but after a few years it was decided to meet at irregular intervals, the coun¬ cil of each congress determining the time and place of the next session. The meetings have a polyglot character, as speakers may use either French, German, Italian, Spanish or English. The addresses may be either written or oral and are limited to 20 minutes in length. All papers presented may, with the approval of the committee, be issued in the printed Proceed¬ ings' which are usually in French (Congres In¬ ternational des Americanistes, Comte-Rendu'), and published in two volumes for each meeting. In addition to the papers the reports contain lists of the members enrolled and minutes of the business transacted at each session. Any one interested in the subjects discussed may become a member of any congress by a sub¬ scription ($3, American money, or an equiv¬ alent in the currency of the country where the congress meets), which entitles him not only to take part in the sessions but to receive the reports of the congress and all other publica¬ tions issued by it. The subjects considered at each meeting range through meteorology, geol¬ ogy, archaeology and ethnology to comparative philology, the history of the pre-Columbian arts and religions, the early discoverers of America and its early relations to European nations. Representatives from

almost every nation, even from China and Japan, are found on the lists, which have included as members (not neces¬ sarily as attendants) many of the most eminent archaeologists, ethnologists and anthropologists in Europe, England and America. For a full account of the 13th congress, held at the Ameri¬ can Museum of Natural History in New York city 20-25 Oct. 1902, see Science, New Series, Vol. XVI, p. 884. Previous meetings are re¬ ported in Nature, Vol. XIV, p. 355 ; Popular Science Monthly, Vol. XXXIV, p. 686, and Vol. XXXVIII, p. 685. The 19th International Congress of Americanists was held in 1915-16 at Washington in conjunction with the Anthro¬ pology section of the 2d Pan-American Scien¬ tific Congress.

AMERICAN JEWISH HISTORICAL SOCIETY. This society was founded at a meeting held in the city of New York 7 June 1892. Its purpose is to collect, preserve and publish material having reference to the settle¬ ment and history of the Jews on the American continent, and to promote the study of Jewish history in general, preferably so far as the same is related to American Jewish history or con¬ nected with the causes of emigration from various parts of the world to this continent. In fulfillment of these objects the society main¬ tains a library and museum in the building of the Jewish Theological Seminary of America in the city of New York and has issued a series of volumes known as Publications,' 25 issues of which have already appeared, and an index volume of the first 20. The researches of the society, which have covered South America, Mexico, parts of Europe and Asia and the whole of the United States, as embodied in the papers and material comprising these Pub¬ lications,' indicate the presence of Jews on this continent since 1494 and their participation in the upbuilding of the colonies and the later

American nation since 1655. The society had, on 1 July 1916, a total membership of 383 persons. Its first president was Hon. Oscar S. Straus, with Dr. Cyrus Adler as the first cor¬ responding secretary. When, in 1899, Mr. Straus went to Turkey as United States. am¬ bassador he declined a re-election as president and Dr. Adler succeeded him. The latter has been chosen in that office annually since this date. The corresponding secretaries of the so¬ ciety, since Dr. Adler's election as president, have been Dr. Herbert Friedenwald, Max J. Kohler and Albert M. Friedenberg. The last- named who is the present incumbent was first chosen in 1910.

AMERICAN LABOR. See American Federation of Labor; Labor Legislation; Labor Movement, American ; Labor Union.

AMERICAN LAKES, Neutrality of the.

During the War of 1812 each party struggled to secure control of the lakes. In the negotia¬ tions for peace the British demanded military control of these waters to prevent the expense of rival armaments. This proposition of a one-sided disarmament was not accepted ; but after the treaty of peace was concluded, the American government decided that mutual dis¬ armament was the only assurance against col¬ lision which might result from various sources of misunderstanding, and early in 1816 sug¬ gested through John Quincy Adams to Lord Castlereagh at London that some such measure should be accepted by both governments to avert the threatened evil of rival naval forces upon the Lakes. After debates in Parliament, Lord Castlereagh instructed Mr. Bagot, the British Minister at Washington, (<to take ad referendum any such proposal.® In August 1816, Secretary Monroe submitted to Bagot the precise project providing for limitation of the force on the Lakes to one vessel on Lake Champlain, one on Lake Ontario and two on the upper lakes, each of 100 tons burden and with one 18-pound cannon. This force was to be restricted in its duty to the protection of the revenue laws, the transportation of troops and goods, and such other services as world not interfere with the armed vessels of the other party. Early in 1817, Castlereagh ac¬ ceded to the proposition and later in the year the agreement was completed by the exchange of notes between Mr. Bagot and Acting Secre¬ tary Rush. By the agreement all naval vessels except the four allowed were forthwith dis¬ mantled and no other vessels of war were built or armed upon the Lakes. The arrange¬ ment doubtless contributed to the century of peace along a boundary of 4,000 miles, the longest international boundary in the world. Consult Callahan, J. M., (Neutrality of the American Lakes *(1898) ; Foster, J. W., (The*

Agreement of 1817 (Ex. Doc. 1892).

J. M. Callahan.

AMERICAN LANDSCAPE PAINTING.

Landscape has always been a characteristic and distinctive element in American painting. Just as there is something especial in American writ¬ ing on nature in the work of Thoreau, Bur¬ roughs, Muir, so there is something especial in the American painting of nature. In the early days the natural scenery of America was of great interest to visitors from abroad and tQ many Americans who looked beyond practical

matters. American scenery was magnificent and vast, — sublime. The unending forests, the inland seas, the great rivers with their many waterfalls, and somewhat later the extending prairies and the enormous mountains, these were by all held to be characteristic of America. In the early days there was iittle painting of any sort. By the end of the 18th century at¬ tempts were made to render the remarkable things in American nature ; there are not a few engravings of American scenery, mostly by Europeans, but some by Americans, of whom Jacob Hoffman is the only one remembered. With the new century there came a number of other renderings, topographical drawings, en¬ gravings of gentlemen's country-seats (William and Thomas Birch), illustrations in the few magazines (Portfolio), landscape backgrounds in books on natural history (Wilson, but par¬ ticularly Audubon), collections of landscape engravings or aquatints. Such things show a widely developed taste, which, however, found no adequate expression until Thomas Cole came to New York in 1825. Earlier were W. G. Wall and W. Bennett, Thomas Doughty and Alvan Fisher. The first two painted American scenes which were often engraved and became popular. The last two had each a definite char¬ acter, Doughty for his refined, painter's view of nature, Fisher as one who could paint a romantic story. Thomas Cole was the first to become generally recognized, the first to pre¬ sent the view of romantic America that had long had its place in the general mind. He felt deeply the grandeur of the American scene, particularly in its wilder and fiercer aspects. He was not satisfied, however, with presenting these things as truthfully as he could, but sought to express the ideal conceptions that arose in his mind ((The Course of Empire, *(The Voyage of Life*) in landscape form. A. B. Durand held more strictly to the land¬ scape ideal and also to a closer method. His work aimed first at a truthful representation of nature. He preferred quieter scenes and the more restful phases of nature. Cole and Du¬ rand are often

thought of as the leaders of the landscape painters of their time, who are loosely grouped as the Hudson River School. Of these some — Kensett, Casilear and Whit- redge were more like Durand in their apprecia¬ tion of a more intimate conception of nature even on a large scale. Others, like Cole, sought to render vast and grandiose aspects. Cole had confined himself chiefly to the Hudson and Lake George, the Catskills and the White Mountains, and so did many who followed him as Sandford R. Gifford. Bierstadt Hill and Moran, however, came later and with the ex¬ pansion of the country sought the greater scenery of the West, while F. E. Church not only painted the national wonder of Niagara, but ranged south to the Andes and north to the Arctic Circle, as well as abroad. These men and many others gave a view of romantic America which had long filled the public mind. George Inness, our greatest landscape painter, took a different view. With a much greater power of painting than his predecessors he sought to render the deep impressions made upon him by nature and to present the beauty of light and color which he everywhere per¬ ceived. In this view he has been followed by

AMERICAN LANDSCAPE PAINTING

. . , 'V; : ip

1 Autumn Oaks. By George Inness

2 Conway Peak. By Thomas Cole

most of our later painters — the most note¬ worthy being Wyant, Tryon, Homer Martin, and, chiefly in marines, Winslow Homer. They have sought to render, not so much the striking forms of crag and torrent, as the myriad phases of sunlight and shadow, color and relations of form. In the last half century too the influence of foreign methods of painting is far more important than in earlier days. The earlier landscape painters picked up their painting largely by themselves or learned of each other ; they often went abroad but generally when they had definitely formed their style and confided in their own way of doing things. In after years the growing cosmopolitan char¬ acter of all art has led to all sorts of influences. George Inness arrived by himself at many of the ideas embodied in the work of the great French landscape school of the middle of the century. Many others however learned much directly of the Barbizon

school, of Dusseldorf or Munich, or more recently of the revolu¬ tionary technique represented in the public mind by the work of Monet. The older land-, scape was apt to present the striking phases of nature much as they might be seen by anyone who cared for them, and in much the same way (though more skilfully) as they might be ren¬ dered by anyone who had a gift for painting. The later landscape gives much more distinctly the painter's especial way of seeing nature and it is expressed more definitely in the painter's way. One cannot enumerate all those worthy of mention : Alexander Harrison is best known for his marines, R. A. Blakelock for a personal romanticism, Walter Palmer largely for his feeling for snow effects. J. F. Murphy and Bruce Crane impress one mostly for their "tonal® quality. Theodore Robinson, Childe Hassam, John H. Twachtman are the best rep¬ resentatives of the influence of Monet. Edward W. Redfield, Elmer W. Schofield and Gardiner Symons have in common that they see nature with a largeness of view and a truth of render¬ ing that is uncommon. There will be found among the painters of the present century even those who care for the wider aspects of nature that seemed so romantic to the America of earlier years.

Bibliography. — Isham, S., (The History of American Painting) (1905) ; Caffin, Charles H.,

< American Masters of Painting) (1902). For a view of American landscape as it appears to the general historian of art, consult Muther, R.,

(History of ArtP For a view of the earlier landscape a little nearer its own point of view, consult Sheldon, G. W., (American Painters* (1879) ; Benjamin, G. W., (Art in America)

(1880).

Edward Everett Hale, Professor of English , Union College .

AMERICAN LEGION, The, a patriotic, non-partisan, non-political, non-military organi¬ zation of veterans of the World War, incorpo¬ rated by Act of Congress of 16 Sept. 1919. Eligible are any soldier, sailor or marine who served honorably between 6 April 1917 and 11 Nov. 1918, and all women enlisted or commis¬ sioned in either branch of the service during the same period. The first annual convention of the Legion was held at Minneapolis 8-14 Nov. 1919, at which its formal organization was completed and a constitution adopted. The na¬

tional Legion is organized into State depart¬ ments and posts. The

Legion is governed by a national commander, five national vice-com¬ manders, national adjutant and State depart¬ ment and post chairmen. The annual convention and the executive committee form its legislative body. National headquarters are in Indianapolis. Its purpose is “To uphold and defend the Constitution of the Lffiited States ; to maintain law and order; to foster and perpetuate 100 per cent Americanism ; to preserve our memories and incidents in the Great War; to inculcate a sense of individual obligation to the community, state and nation ; to safeguard and transmit to posterity the principles of justice, freedom, and democracy; to consecrate and sanctify our com¬ radeship by our devotion to mutual helpfulness.®

AMERICAN LEGISLATIVE ASSO¬ CIATION. The American Association for Labor Legislation is organized to investigate conditions underlying labor legislation and to collect and disseminate information leading to the enactment and efficient enforcement of laws for the promotion of the comfort, health and safety of the employees. In 1910 the associa¬ tion called the first American Conference on Industrial Diseases, the second in 1912. In 1912 it called a meeting for the discussion of the prevention of industrial accidents, in 1913 it called the first Social Insurance Conference and in 1914 it called the first National Con¬ ference on unemployment.

AMERICAN LIBRARY ASSOCIA¬ TION. A national association “to promote the welfare of libraries in America.® It aims (1) by organization and force of numbers to effect needed reforms and improvements, most of which could not be brought about by individ¬ ual effort; (2) by co-operation to lessen labor and expense of library administration; (3) by discussion and comparison to utilize the com¬ bined knowledge and experience of the pro¬ fession in perfecting plans and methods, and in solving difficulties; and (4) by meetings and correspondence to promote acquaintance and esprit de corps. The association was organized in 1876 and incorporated in 1879. The present membership is about 3,300. Annual meetings are held. Executive offices in charge of a salaried secretary are maintained in Chicago in the Public Library building. This is the centre for the association’s activities which may be roughly grouped as follows: (1) Editing and publishing the official Bulletin, issued bi-monthly, through which the membership is kept informed of the plans and work of the association and its committees. One number is entirely devoted to the (Proceedings * of the annual meeting and another to the (Handbookˆ containing lists of officers, committees, mem¬ bers, etc. (2) Editing and publishing the (A. L. A. Booklist,* a monthly guide to the selection and purchase of the best of the current books. (3) Publishing and sale of all publications of the association, some 250 publications

on library economy and bibliography having been issued in the past 30 years. (4) Correspond¬ ence on all phases of library work, the execu¬ tive office acting, so far as it is able, as a clearing house of library information. (5) Co¬ operation with the association committees, library commissions, State library associations and library clubs and other national educational

and civic associations. (6) Promoting better library architecture by collecting and loaning plans of library buildings. (7) Promoting gen¬ eral publicity of the aims and activities of the association and library work at large. Affili¬ ated with the American Library Association are four national associations of kindred purpose : National Association of State Libraries, League of Library Commissions, American Association of Law Libraries and Special Libraries Asso¬ ciation. The National Education Association has a library department closefy connected though not officially affiliated with the American Library Association. Committees, standing and special, include those on bookbuying, book¬ binding, public documents, library administra¬ tion, library training, co-operation with other national associations, libraries in hospitals and charitable and penal institutions, work for the blind, international relations and Federal and State relations. Consult (Papers and Proceed¬ ings of the American Library Association) (1876-date, published annually); Green, S. S., (Public Library Movement in the United States) (1913).

AMERICAN LITERATURE. A hun¬ dred years ago and for half a century after¬ ward, every assembly of students in this coun¬ try was entertained by discussions on a (<Pos- sible Literature® of America, — how soon there would be an American literature wras a favorite question, grief or complaint that there was not an American literature came in if the speaker or writer were of cynical vein. The introspection which was thus developed among people who were born for something better than introspec¬ tion had its good results. Every printed word, one may say, was collected, which showed that between 1602 and the 19th century any man or woman had written anything in America. Such a collection as Samuel Kettell's specimens of American Poetry* shows the eagerness with which critics who were forecasting a glorious future for our literature were willing to pre¬ serve all the crystals from the past and eager to persuade us that they were jewels. The truth seems to be that for the 1 7th and 18th centuries there was no class of men or women who would now be

called (<literary people.® At the same time, the new settlers and the men and women of half a dozen generations which followed said what they had to say, and gen¬ erally said it well. For they did not think much about the way of saying it, they did not talk much about it, they had no professional critics. There were among them those who (<harked back® to English models. After the establishment of newspapers (see Newspa¬ pers), which runs back to the year 1704, the sad necessity of journalism compelled the press to create every week a given number of square inches of what is called <(matter.® Thus there appeared in the three cities a few of those writers who have to write as much when they have nothing to say as when they eagerly pro¬ claim something not known to the world before.

It was not until 1555 that in the printed books of England the first fruits of the dis¬ covery of America appeared. Richard Eden then published his translation of Peter Martyr's (Decades,* and he adds to them some new nar¬ ratives of voyages not described in the original.

An English translation of Ribaut's (Florida 5 was printed in 1563. In 1576 the first edition of Sir Humphrey Gilbert's plea for a northwest passage appeared, and an account of Frobish¬ er's voyages was published in 1578. In 1582 we touch solid ground as we come upon the name of Hakluyt. The island of Roanoke has the honor of furnishing the first original American work to English literature. The four letters of Ralph Lane, who was the first commander of Raleigh's first colony, are the oldest American writings now extant of any Englishman and were perhaps the first ever written. They were written 12 Aug. 1585 from what he calls Porte Ferdynando. One of them was to the famous Sir Philip Sidney. They were printed in 1860 for the first time in the transactions of the American Antiquarian Society.* The English archives have now been thoroughly searched and have probably yielded up all that can be found in them of intercourse with America in this mythical century. There are two or three narratives of the adventures of sailors who straggled from Mexico, where the Spaniards had made them prisoners, to the fisheries of the northeast, where they were relieved by the fish¬ ermen. The earliest of these is dated in the year 1582. In the collections of Hakluyt and Purchas will be found other narratives of a similar character which struggled into print in one way or another. Professor Tyler in his admirable survey of the subject sees the first note of the birth of American literature in the ode of Michael Drayton, published in 1607, the year always assigned as the birthday of the nation, the year of the birth of Virginia, the year of John Smith and Powhatan and Pocahontas.

The history and criticism which belong to this subject have been admirably handled by the Messrs. Duyckinck, by Professor Tyler's his¬ tory of American Literature from Colonial Times, * by Mr. Kettell, who has been named, and by Prof. Charles F. Richardson's Amer¬ ican Literature) (1607-1885). It must be

enough here to say that Capt. John Smith in his various accounts of Virginia and of his voyages on the coast created a real interest in that ((brave new world which hath such people in it.® Dr. Tyler refers also to George Percy, William Strachey, Alexander Whitaker, John Pory and George Sandys. The original edi¬ tions of the publications of these men are now among the most interesting nuggets of the book collectors. The Hakluyt Society has re¬ published many of them and has proved its value to the students of our early history. There is one interesting tract of Strachey's which would answer one pathetic question. Hy says, <(Before I have done I will tell you the story of the lost colony.® But in nothing that has been found of Strachey's is that historv told.

That school of historians whose habit is to draw a. blue pencil, as the trade says, across everything entertaining in history is fond of stamping John Smith as a liar wherever he goes outside Sandy Hook or Lincolnshire or the Strand. It is the fashion of to-day to throw the story of Pocahontas overboard and even Dr. Tyler, who is sympathetic, calls it the ((fable of Pocahontas.® But this is to be said, when 100 men trained like cockneys, embarked on an unknown sea, explored an unknown bay, tried

the adventure of an unknown river, talked in an unknown language with a savage chief who has never heard of such people before, the in¬ cidents of such acts when written by them will not be exactly like those of a London counting- room or of a college lecture-room. The Hun¬ garian gentlemen, I believe, find Smith's account of Hungary and its Turkish wrars intelligible and reliable. Smith's surveys of Massachusetts Bay are entirely intelligible and show an ac¬ curate acquaintance with the region which he describes. Now, it is hardly fair wdien you can verify an old author's personal narrative in nine cases out of ten, to say in the tenth case that he is a liar, simply because you have no material for verification, on the one hand, or contradiction on the other. Close after the little series of Virginian writers came the series of the Massachusetts historians. They also have

been most carefully edited; and it is now only by a fortunate accident that a student of to-day is able to add any anecdote new to other students regarding the first generation of New England. The journal of William Bradford, one of the first governors of the Plymouth Colony, has a story which is dramatic. With a fortunate prescience of the value of every word which related to the Plymouth emigration. William Bradford wrote the (History of Plymouth Plantation.) His sons and indeed all the people of the old colony knew of the exceeding worth of this volume. It was used by Morton, Prince and Hutchinson and the others of our earlier historians. A great part of it was copied and from the copy thus made it was consulted by our historians till the year 1855. In that year a quotation from it, which was not in our copies, appeared in Bishop Wil- berforce's history of the English Church. On inquiry it proved that this gentleman had con¬ sulted the original wrhich was in the library of the bishop of London in Fulham Palace. He immediately gave permission that the whole should be copied on the request of Mr. Charles Deane. Subsequently, as a result of the efforts of Senator Hoar, the various authorities in England gave back the precious manuscript to the State of Massachusetts, and it is now one of the treasures most sacredly preserved in the State House in Boston. As Dr. Tyler calls Drayton's ode the beginning of American liter¬ ature, the Massachusetts people may well call William Bradford's chronicle the beginning of the literature of New England. It should not be forgotten, however, that the letters contain¬ ing the accounts of Gosnold's unsuccessful colony in 1602 were written before the time when Bradford began to write his history.

When the larger colony of Massachusetts Bay was formed the general court of that colony, according to a very early record, directs that paper books shall be furnished for preserving all journals by the first settlers. Fortunately for their successors, Gov. John Winthrop in the midst of all his other cares used his manuscript books, and his notes made almost daily are now cited as Winthrop's his¬ tory of New England. } They cover the period from 29 March 1630, when he sailed from England, to 11 Nov. 1648. It is a convenient aid to memory that Winthrop's death followed close on the execution of Charles the First. Sadly enough all the other blank books thus furnished seem to have served other purposes vol. l — 34

from that for which they were intended. They were, perhaps, used for sermons now forgotten, or possibly for cartridges so soon as cartridges were invented. Such materials for the early history as have been preserved have generally been printed by the care of historical societies or similar agencies. There is a charm about them such as belongs to all fresh narrative where the writers are thinking of the

thing done and not of the methods of expressing it. This charm which hangs around Columbus' betters- *; Sir Thomas More's (Utopia) ; De¬ foe's (Robinson Crusoe-* ; Swift's (Gulliver's Travels, } is the same charm which is to be found in Purchas and Plakluyt and the early narratives of those who wrote by the light of a pine knot with pens made from a bird's wing. In such simple utterances we are to look for the first handiwork of American literature.

The first graduates of Harvard College made a class of nine young men, six of whom sought their fortunes in Europe. The year of their Commencement was 1642, and the theses are preserved in which, according to the custom of their time, they offered to defend 54 proposi¬ tions against all comers. It has been observed by modern critics that all these propositions are now known to be false. This is a somewhat cynical statement with regard to them. But when one learns that these young gentlemen were prepared to prove that Hebrew is the mother of languages, one looks with caution upon their courageous statements on other points with regard to the heavens or the earth, the sea or the skies. Four of the number be¬ came clergymen. The name most distinguished in history is that of Sir George Downing, who did not distinguish himself for the courage of his convictions.

As early as 1639 the government of the colony had cared for its future education by the establishment at Cambridge of a printing plant. This was done almost simultaneously with the establishment of Harvard College by the same authority. And it was a good omen that the first publication accredited to the new printing house was the (Freeman's Oath,* as ordered by the general court, to be taken by those who were chosen into the company. Uni¬ versal suffrage was not yet dreamed of even by Sir Thomas More. The first book from the press which can be called a book was the (Bay Psalm Book,ˆ the work of Thomas Welde, John Eliot and Richard Mather.

John Eliot already looking forward to his work among the Indians was making his first studies of the language of the people for whom he cared. The modern students speak of this language as the Natick dialect of the Algonquin tongue. Eliot's work was of the first import¬ ance, and before he died the publications in that language alone of books printed either in our Cambridge or in London makes a depart¬ ment in literature of more than 30 volumes. These books were printed to be used in wig¬ wams and log cabins. The copies which strayed into libraries were but few and those Indian books of that century which remain are among the rarest treasures of the collectors. Of Eliot's (Nev/ Testament in the first edition there are but 14 copies. Of

the second revised edition, published more elegantly, there are 39 copies. The work that Eliot gave in translating the Bible into the Algonquin tongue has been

spoken of more than once as work thrown away. But to say this is absurd. Eliot proved himself to be one of the first philologists of any period of literature. His analysis of the Indian language is to this moment a guide to those who choose to study it. With the progress of discovery it has proved that the Algonquin language, of which the Massachusetts language was a dialect, was the language of more than half the Indians of our part of the continent. To this hour it is spoken by the Catawbas who are living in North Carolina, the Pamunkeys who are living in Virginia, by the Delawares who have been carried from Delaware Bay to Kansas, by the Micmacs, Penobscots and other Indians of Maine and of the northeast, and even by the Arapahoes in the west. Northward and westward it is spoken as far as the tribes of the great Ojibwa family, far beyond Lake Superior, and often near to the Arctic Ocean. Of 300,000 Indians, more or less, now in the territory of the United States, more than half would have been understood in conversation by Massasoit and Philip. An admirable bibliog¬ raphy of Algonquin literature has been pre¬ pared by James Constantine Pilling. It is pub¬ lished by the United States Bureau of Ethnol¬ ogy. The work of the devoted Moravian min¬ isters in Pennsylvania in the same lines belongs rather to the next century.

Among the early settlers of Massachusetts was Anne Bradstreet, a girl of 18. She was the daughter of Thomas Dudley, who became the second governor of Massachusetts. She was the person called the (<Tenth Muse® by Cotton Mather. Her poems, many of which were written before she came to America, are an interesting and curious memorial of the better educated colonists. She lived for most of her life at Andover in Middlesex County in Mas¬ sachusetts Bay. The most diligent search in her poems shows hardly any reference to the outward aspect of the country in which she lived. Her flowers and her birds belong to the flora and fauna of England and not of Middle¬ sex County. Between 1642 and 1700 Increase Mather and Cotton Mather are the names most often referred to as we look back on our literary history. Of Increase Mather we have in print 85 publications, mostly separate sermons. Of Cotton Mather the collection is much larger, the number of titles being 382. The modern fashion is to speak of the Mathers with a sneer as bigots and to dismiss them from the lofty

consideration of our time. But whoever re¬ members the duties to which they had to put their hands is disposed to regard them more favorably. There was but little subdivision of work for the men who had been educated to be the leaders of their country. And certainly some allowance is to be made for ignorance of the laws of electricity when the teacher whom you are judging has to study his electricity as Cotton Mather did while he encourages soldiers for warfare, while he checks the smallpox by inoculation, while he is writing the history of the past and is caring for the poverty of to-day. any value to the world, he owed it to Cotton Mather's son, that if he himself had been of any value to the world, he owed it to Cotton Mather's (Essays to do GoodP It is rather hard to throw Cotton Mather overboard either as a quack or a fanatic when such a man as Franklin was willing to write for him such an

epitaph. It is fortunate for this generation that at a comparatively early period of his life Mather brought together in his (Magnalia) his¬ torical papers which he had already written, some of which had been printed. The date of the first edition of the (Magnalia) is 1702, but the work belongs almost entirely to the 17th century. Cotton Mather was himself born in the year 1663, so that a good deal of his record of the history of the first settlement is put on paper at second hand. Occasionally an unfor¬ tunate error here has puzzled his readers. For instance, before the discovery of the original Bradford manuscript, we owed to Mather the statement that the Pilgrim Fathers came from Ansterfield in the county of Yorkshire. This proved to be the misprint of the London printer for Austerfield. It was only on the discovery of this error by the late William Hunter that the American pilgrimages to Scrooby and Aus¬ terfield began. A good deal of injustice has been done Mather from what is in itself a com¬ parative trifle, that his great book has not yet been edited by any competent editor. Even the detail that there is no decent index to it has greatly diminished its usefulness to historians in this generation. They ought to remember that he was but 39 years old when it was printed, and the corrections to his work which a man makes between 39 years of age and 60 nowhere appear in it. The reader is referred to the articles Mather, Increase; Mather, Cotton, and Mather, Samuel, which in their place state what these men did for the growing colony during the period when it ceased to be a trading company and became really an inde¬ pendent State.

Thomas Hutchinson, a governor of Massa¬ chusetts, was a man of letters. And if he had not been the unfortunate governor whose dis¬ loyalty to the State gained for him the hatred of those around him, he would have been re¬ membered with gratitude as such. He was an

•enthusiast about the history of the Pilgrims and of the fathers of Massachusetts. The first volume of his (History of Massachusetts > was published in Boston in 1764, and the second volume in 1767. Alas, he was not equal to the duties of a great crisis, he deserted his country¬ men, and by his country was branded as a traitor. But for this he would be named to-day as the first in the series of distinguished Amer¬ ican historians.

The assiduous and successful attention which has been paid to the century of colonization has very naturally given to New England readers a better history of what passed in the 17th cen¬ tury than we have of the first half of the 18th century. During that time the people of the LTnited States were involved in war with France. This meant for them a frontier war in which every savage was commissioned by French or Jesuit authorities to descend upon the borders of the English settlers. Excepting the stories of frontier warfare, there was not much to write history about. There are a few exceptions but in general the crown governors sent over by William and Mary, Queen Anne or by the first Georges were but a poor set. They initiated nothing and were wHl pleased if they could avoid a quarrel with the colonial assemblies. The one distinguished royal gov¬ ernor is William Shirley, who filled so well the duties almost unexpected of a commander-in-

chief of North America. So it happens that in reviewing the literature of the country we have no longer such unaffected and simple narrative. But we find ourselves more in. the walks of religious speculation and of theology. In the front of the writers on such subjects is Jona¬ than Edwards, who challenged the attention of the learned in the English-speaking world by studies and results which have become famous. In the penury of frontier villages, and living day by day in what seems very petty surround¬ ings, this distinguished man elaborated his studies on the divine counsels and placed his poor limits on the infinite in methods and lan¬ guage which will survive all other American literature of the first half of the century. It is inevitable perhaps that in the midst of such discussions of the idea there shall appear on the other side of the horizon discussions of the fact, or of those realities which men can see with the eyes and hear with their ears. And in our case, Benjamin Franklin was born into the world in the year 1706. Before he was a man he was well advanced in those studies of the English language which gave him after¬ ward his power to express himself to men. Long before he was a statesman and

diplo¬ matist, he was conducting his experiments on electricity, and when he drew the lightning from the skies, he attracted the attention of all the learned world of his time. When we speak of the American authors of those 50 years the fame of Edwards and Franklin overshadows all the rest. With the discussions attendant on the American Revolution, a new school of authorship began. It now seems clear enough that the more thoughtful leaders of English opinion were from the very beginning amused, not to say delighted, with the simple dignity with which such men as the Adamses, Franklin, Dickinson and the great Virginia statesmen conducted the discussions, whether of matters of trade, of taxation or of government.

<(History, my Lord,® said Lord Chatham, in his famous address to the House of Lords, ((has been my favorite study. ... I must avow that in all my reading, and I have read Thu¬ cydides and have studied and admired the master states of the world, for solidity of rea¬ son, force of sagacity and wisdom of conclusion, no nation or body of men can stand in prefer¬ ence to the General Congress at Philadelphia. The histories of Greece and Rome give us noth¬ ing equal to it.®

To this moment, indeed, no careful student of constitutional law or of the foundations of states can go forward in any intelligent inquiry without reading with care the work of the American statesmen of that time.

It is interesting to observe that at the same time, perhaps from the same cause, the theo¬ logical literature of America becomes less and less interesting. The mind and heart and soul and strength of the educated men of America was steadily drifting into an interest in the present relations between God and man and the present sway of the eternal law, much more important to men and women, and among the rest, of men of letters, than theological explana¬ tions of the secrets of the universe. The student of to-day finds it worth while to read the publications of Thomas Mayhew, of Boston, of Dr. Witherspoon, of Princeton, of Dr. Samuel Johnson, of New York. But this is not

because he cares so much for what is called theology in its narrow definition, but because these men enter as champions of the people into that larger theology of men who really believe that they themselves and all men may be par¬ takers of the divine nature.

Franklin with his genuine instinct for ((To- gether® did not live long in Philadelphia with¬ out bringing together one and another club of men of inquiring disposition. One of these clubs still exists in the American Philosophical Society. Another founded the fire department

of Philadelphia. And, indeed, most of the activities which had given that city distinction, even before 1775, may be traced to such origins. Franklin's own newspaper, the Evening Post, may be spoken of as really a literary journal. Poor Richard's Almanac was not only an index of time and weather, but it was in its way a philosophical treatise. It was soon trans¬ lated into French. Le Bonhomme Richard was kqown in French hamlets which knew nothing of the tea tax or the stamp tax. So soon as peace was declared such institutions as the American Academy of Arts and Sciences, as the Massachusetts Historical Society, as Tam¬ many in New York, which was originally a scientific and philanthropic institution, came into being. The governors of the colleges took new courage ; and commencements and the cele¬ brations which accompanied them gave good occasions for such appeals or lamentations with regard to an American literature, or the want of it, as gave a healthy stimulus to the literary life of the new nation.

A curious illustration of the increasing con¬ fidence in home and the literature of home, as years went by, would be found in the series of college addresses of which the first were pub¬ lished at Cambridge in 1796. The Phi Beta Kappa Society, founded in 1776 at William and Mary College in Virginia, soon outgrew its first limitations ; and its annual exercises at Cam¬ bridge and New Haven were attended by grad¬ uate members who liked to renew their college memories. Branches of it were founded in Brown College in Providence, in Dartmouth College in New Hampshire, and as years passed on, in other similar institutions. The early addresses by scholarly men in these societies were almost uniformly exhortation that the people of America might pay more attention to scholarship and literature. Meanwhile, and under such incentives, there grew up of course, in one centre or another, small coteries of . literary men and literary women. With an amusing regard to tradition such men seemed to have felt that there could be no literature without an epic or two on which it should be built. Timothy Dwight's Wonquest of Canaan, } Joel Barlow's <Columbiad,) which are all but forgotten, and several others which are for¬ gotten, were the results, almost of a sense of duty in this regard. No one can suppose that either of these men was inspired by any divine inflatus of the poet. As you read the dreary lines you feel that the writer thought that there must be an epic and that because there must be he would write it, with the same feeling that a column of soldiers storms a redoubt. By the side of such men, however, there came men and women who loved to clothe great thoughts with charming or fitting dress.

It is interesting to see that almost all of the

early books which we should now class as ˆefforts® in literature were published by sub¬ scription. And there is something pathetic in the memoirs of the earlier literary men where they describe their personal visits from place to place as they solicited subscriptions to pay for the printing of their books. President Dwight himself visited the camp of Washing¬ ton in 1775 and obtained the subscription of Washington and the other distinguished men around him for the publication of the (Conquest of Canaan.) The reader must remember that the practical introduction of stereotyping in England or America is as late as the beginning of the 19th century. It was necessary, there¬ fore, to test the market in some way when a book was first printed, so that the printer or publisher or author might know how many copies should be printed. It must be remem¬ bered, also, that the printers had no capital which would enable them to keep in type the cumbrous pages of a book which passed the size of a pamphlet. Paine's (Common Sense,* in 1776, was probably the first book which attained at once a circulation in the least approaching the large editions of to-day. The trade, as the book-selling community still likes to call itself, now begins putting out as a feeler a small edi¬ tion printed from stereotypes. In our day in a vault in the side of a mountain, or perhaps in a vault under a sidewalk we preserve such plates from which a book has been printed, and ac¬ cording as the demand may prove, new editions can be issued at a comparatively small expense. But up to the year 1813 there was no such resource.

The pecuniary poverty of the printers of the end of the 18th and the beginning of the 19th century caused many American authors to go to England for the printing of their production. Barlow's <Columbiad) was printed in England. Irving's books appeared first in London. In¬ deed, Irving's wide reputation may be said to have been English before it was American. And he spent much of his early life in Europe, perhaps from the feeling that for a man of letters Europe was a home while America was a wilderness. James Fenimore Cooper made Europe his home for many years, feeling appar¬ ently that he could not find society of his own kind in his own land. The same is true of other American writers as far down as the thirties of the 19th century. That was the worse for the infant literature of the nation. Writers watched painfully for the expressions of English criticism, and one line from a Grub • street critic was sweeter to them and worth more than any words from their own country¬ men. It is indeed impossible to overstate the effect which was eventually produced by the

<(Ainerican system,® as it was called, in the discussions of tariff legislation which followed the short war with England. From the moment when the American printer could send out to the world books as well printed as the printers of England, one may trace new strength in American authorship. The International Copy¬ right Law of 1891 compels the publishers of all books which claim American copyright to print them in America. In a truly celebrated article in the Edinburgh Review of 1820, of which no other line is remembered, Sydney Smith said : (<Who reads an American book? Who looks upon an American picture?® The men who

painted American pictures were very mad, as their vernacular would say; and the men and women who wrote American books were equally mad. The writers had a better chance to ex¬ press their anger than the painters. The sneer implied w:as the more cutting because for most purposes of literature it was true. Possibly it had some share in the growth, almost from that moment, of a literature which can fairly be called American. The worst of it was, per¬ haps, that Sydney Smith was an advance guard of the Liberals of England. He could not be called the product of an (leffete civiliza¬ tion,® and his words could not be ascribed to Tory jealousy. American readers had known how to prize him and they read his articles if they did not read their own. But really an American author had little right to complain so long as Mr. Cooper called a woman a female simply because Walter Scott did, so long as our writers knew more of robin-red-breasts and bulfinches than they knew of bluejays or mock¬ ing birds, so long as their best actors came from England as every play upon their stage was English, and so long as their scholarly men read the Edinburgh Review and the London Quarterly and the New Monthly Magazine as they read no American journal. The American college boy knew much more of the loves and hates of literary men in England, one might almost say, than the English boy of the same time did. The English reviews and magazines passed from hand to hand in the American reading-rooms while their American rivals died a slow death due to the incompetency of most of the writers. But as the 19th century ad¬ vanced the tide turned. Dr. Holmes in a happy phrase, quoted as often as Sydney Smith's which has been cited, fixes Emerson's first Phi Beta Kappa address as ftour intellectual declaration of independence.® I heard the address in 1837, and half a century afterward I heard his second Phi Beta address. Whoever will compare the two will see what Dr. Holmes means. To the thoughtful reader now it seems impossible that Emerson's first address should have seemed extravagant or in any way, indeed, out of the common to the men of that time. But it did seem so then.

It is true that ever since the century began such addresses on Commencement days or on other literary occasions have still given four- fifth of the time to pathetic appeals to young men to create an American literature. The orators, generally clergymen or lawyers, did not understand that such books as Lewis and Clark's journals were American literature, that Pitkin's statistics was a book of American liter¬ ature, that Flint's ˆMississippi *or Pike's Ad¬ ventures* were vigorous bits of proper national literature, that the Constitution of the United States or John Adams' proposals for the State Constitutions were American literature, as much as the Waverley Novels belong to Scotch litera¬ ture, or Petrarch's (Sonnets* to Italian litera¬ ture. But by the middle of the 19th century, people had found out that literature is not a thing by itself to be worshipped and loved like some lonely classical statue in some separate shrine in a gallery, but that literature is simply the expression of what is. In the matter of American literature it proved that Americans had to state for the world the foundation prin¬ ciples of government. They had to describe

for the world physical features of a continent of which the larger world knew nothing. And even the language in which they spoke would bear marks of the climate, the soil and the history of that continent. So soon as we throw aside the follies of talking about literature as literature and of worshipping it as a separate idol, so soon American literature can be spoken of as a thing in any sort distinct from the litera¬ ture of the feudal system or other literature of the ancient world.

To review in the very briefest way the literary advance of the nation from the era of independence we have to look first at the speeches and letters and pamphlets of the statesmen ; and next at the reports of the ex¬ plorers. There are individual poems and a few sporadic books in prose which linger in the remembrance of antiquaries — Philip Frenau's Revolution poems, one or two sermons, per¬ haps may be classed among such memorials. To speak in a broader sense the first work of Irving stands as the first work in the large calendar of our modern literature. His amus¬ ing studies of early New York were known then, but the (Sketch Book) as it was pub¬ lished in London in the years between 1820 and 1822 at once obtained a wide reputation, both in London and in America. Irving showed from the first that he could handle American subjects with a pen as light and a fancy as

charming as gave life to <Bracebridge HalP or his other English studies. In 1825, when Navarrete first published in Madrid the original documents of Columbus' voyage, Alexander H. Everett, who was then our minister in Spain, called Irving's attention to these invaluable memoirs and suggested his work on the life of Columbus. Irving went at once to Madrid and was attached to the American legation there while he studied the subject which is so closely identified with his name. And afterward, when the Spanish people received him as our minister there he enjoyed his well-deserved fame. Here was an American who could meet English writers on their own terms. Irving was master as well as they of whatever is meant by style or method in literature, whatever secret of the guild there is.

In our time there is no longer a patron who shall endow a book as an emperor might endow an opera house at his capital. For a time or a nation without patrons, you must have such patronage of the public in advance as Dr. Dwight sought for with his subscription book; or, as it has • proved, in 150 years, you must have magazines. This means, if one speaks to the Philistines, that you cannot have large wholesale business, no, and you cannot have manufactures unless there be retail business. Dr. Johnson and Oliver Goldsmith had found this out when they worked for Cave and the Gentleman's Magazine. One and another ad¬ venturer tried the magazine experiment in Bos¬ ton or Philadelphia or New York. But alas, the printers of the magazines were almost as poor as the authors were. The people of the country also were very poor in other affairs. As late as 1834 Dr. Holmes wrote for the New England Magazine the first papers of the Au¬ tocrat of the Breakfast Table.) But the New England Magazine , even with such contributors, died for want of readers. The new series of the Autocrat, in 1857, begins with the words,

<(As I was saying when jmu interrupted me,9 which referred to the death of the first series a quarter century before. Still, the names of those old magazines are interesting gravestones which show the roadway for a struggling na¬ tional literature. The Harvard Register of 1807 is one of the earliest. The Lyceum follows the Collegian, Harvardiana, and now almost every university gives this excellent field for the tour¬ nament of squires and even of pages who look forward to golden spurs of knighthood. A few lines of the Harvard Lyceum of 1810 may be worth copying. They are from a clever parody of Barlow's <Columbiad) and describe an early steamboat. They are among the boy amusements of Edward Everett.

So where high Hudson belts his hundred hills,

Winds his wide wave, and York's broad basin fills;

With engine force the fluid fields to plough,

The mighty Steam-boat points his sailless prow.

Needs from the winds no gales, the sea no tides,

Whirls the wheel oar, and o'er the river rides.

Lo with what art the nice machinery turns,

With what fierce force the pitchy pine pole burns.

See the black Boiler, in whose darksome womb,

The prison'd water vapours into fume:

The hollow Cylinder, whose shining side

Cramps the crook'd Chain, and turns the densing tide:

Etc., etc., etc.

Of those of the magazines proper which were manfully and loyally sustained for many years is the Knickerbocker which was published in New York monthly for several years. Most of the authors who won distinction in the litera¬ ture of the century made their maiden contribu¬ tions to its pages. In Boston a beginning, which proved to be a foundation, was made in the issue of the Monthly Anthology, of which the first number was printed in 1809. It was the work of a literary club, and it is very creditable to the literary life of the day. Some original translations from the minor poems of the great German poets slipped in. And by this time, America had found out the resources of the German colleges. George Bancroft, Frederick Hedge, Edward Everett, Henry F. Quitman, George Ticknor studied in the German colleges. The success of the Anthology and perhaps a certain jealousy of the literary tyranny of the London Quarterly and the Edinburgh Review led William Tudor, with the spirited young fel¬ lows who wrote for the Anthology, to announce the North American Review of which the first number was published in 1815. It may be said of the North American Review that a desire to imitate the English quarterlies weakened it for perhaps a quarter of a century. But its tone was always dignified and on really national questions it was American. In the earlier numbers of the Review it admitted poetry and some short articles which did not pretend to be criticism of books. The

successive editors of the Review were William Tudor, Edward Tyrrel Channing, Edward Everett, Jared Sparks, John G. Palfrey, Francis Bowen, An¬ drew Preston Peabody, Alexander Everett, and James Russell Lowell. A few years after the Civil War it was removed from Boston to New York under the direction and charge of Allen Thorndike Rice. In Philadelphia what was called the American Quarterly Review was published under similar auspices.

Meanwhile what had attracted attention at once to a very great extent was the success of Cooper's novels. The later novels of Scott

were still engaging the attention of readers when Cooper's earlier stories were published. He had left Yale College without a degree, dis¬ gusted with something or other as youngsters are apt to be in colleges, and had joined the United States navy. This, as it proved, wras fortunate for the literature of America. After the short war with England, he was stationed on Lake Ontario, which was at that time in the wilderness. At his father's home he had al¬ ready made acquaintance with the wrecks of the Six Nation Indians. At Oswego he fell in somehow with the last of the Mohicans. His study of a real forest and his studies of the forecastle of American ships are both genuinely national, and although he could not resist the spell of the ((great enchanter,® and imitated Sir Walter Scott whenever he got a chance, the early Cooper novels have the great charm of being interesting. To this hour the school boy reads them as his grandfather read them and regards them among his best friends. In Cooper's later novels there may be seen a tinge of ill temper because he fancied that he had not been esteemed fairly by his own countrymen. But the early novels have established them¬ selves in a well-assured place in the literature of his country. Few people remember them, but it is said that the German novels on Ameri¬ can subjects by Sealsfield were the inducement for a time of the great German emigration which began as soon as these spirited books began to be printed. His German name was Karl Postel.

Meanwhile the leaders of the nation had found out that a republic stands or falls accord¬ ing to the education of its people. It is impos¬ sible to estimate the change produced by the early determination of the more civilized States to improve the education of every child born in their borders. At the beginning of the century you might say that there was nobody to buy books, even if angels or archangels had de¬

scended from heaven to write them. But even in the middle of the century an army of readers, men and women, had been created. It began to be evident that a good book in the English lan¬ guage had more readers in America than it had in England. It began to appear that the reputa¬ tions of English writers depended quite as much upon the American -readers as upon those of the British Islands. Scott, Byron, Wordsworth, Coleridge and Southey had more readers on this side of the ocean than on their own. The same was true later of Macaulay's (History* and of other books of permanent value. Disraeli said as early as 1845 that America was the pres¬ ent posterity for the Englishman, — that an Eng¬ lish author knew what posterity would think of him by learning what the American of to-day thought of him. The creation of such a body of readers led to the growth of a genuine Amer¬ ican demand for what could be called an Amer¬ ican literature. A school of history grew up first in which Irving had led the way in which the great historical addresses of Webster and the Everetts and other orators were an essential part. The subserviency to English critics di¬ minished as more and more scholars came from France and Germany. It wTould be fair to say that Bancroft, Prescott and Motley, as histo¬ rians, Emerson as a philosopher, , Longfellow, Lowell, Holmes and Whittier as poets made a distinct American school after the year 1830

when Bancroft announced his plan for his his¬ tory, or more definitely perhaps in 1833. So far as this was a New England school it was some¬ what affected by the literature of the Continent of Europe, but this effect has been overstated. Emerson was not at all indebted to Germany in his work. Longfellow's poems are distinctly American when they are not translations. Lowell won his English reputation by the ad¬ mirably national characteristics of the (Biglow Papers.) Still a distinct ripple on the tide of literary advance may be found in all the sea¬ board States when in the twenties of the last century the Holy Alliance exiled from Germany Lieber, Follen, Beck and some other young students who had displeased Mettcrnich.

What is familiarly called the Lyceum Sys¬ tem introduced an element of value constantly increasing in the higher education. It ought to be remembered that the Lyceum introduced Ralph Waldo Emerson to the people of America in a much shorter time perhaps than any pub¬ lished writing would have done without its as¬ sistance. Where the trustees and faculties of colleges would have refused to invite Air. Emer¬ son to speak, the students of college societies would gladly send him an invitation. Once heard he was of course sure to be remembered. Not to speak of other lecturers who were in¬ structing all the northern States, arousing curiosity as to subjects on which they

hardly touched, Ralph Waldo Emerson when he took up the work of a prophet unlimited by the re¬ strictions of the priesthood led the way in a revelation which has affected all the literature of his time, whether in America or in England. In the smaller New England circle, Alargaret Fuller, afterward the Countess Ossoli, by <(con-versations® and published essays called the at¬ tention of many young people to the wider realms of thought and especially to the more modern movements of philosophy and litera¬ ture.

With the existence of a sufficient body of readers large circulations became possible for magazines. The first which succeeded pecuni¬ arily were those which told the most stories, and it was on the basis of story telling that the Southern Literary Magazine, Graham's Maga¬ zine, the Godey's Ladies' Book and the Bos¬ ton Miscellany of Literature and Fashion came into being, and by their success with the public created the literary magazine of to-day. When a Boston publisher could say in 1841, ((We sell 1,000 copies every month to the Lowell fac¬ tory girls,® the word was spoken .which showed that a sufficient supply of readers is necessary in the creation of a literature, and will in its time bring into being a sufficient number of writers. The Knickerbocker , the New Eng¬ land Magazine and the Port-Folio had failed to enlist anything like the public support which waited on all decent magazine work after the public schools had created their army of readers. One and another ineffectual effort was made to turn away the current of the English magazines and to introduce an American circulation in its stead. It is interesting to see that the early numbers of Harper were written almost wholly by English writers and large editions of Fraser's Magazine, of the Dublin University Magazine and of Blackwood still made up the popular reading of the reading-rooms. But in 1857 the Atlantic Monthly was created with

LONGr|ULOWK

whitt i E r/^)

EM EPSON

LOW £ L L

AMERICAN AUTHORS

1 Washington Irving

4 William H. Prescott

2 Francis Parkman

3 Nathaniel Hawthorne 5 J.Fenimore Cooper

such writers as Bancroft, Prescott, Motley, Holmes, Lowell and Longfellow among its very earliest contributors, and one may say, on its working staff. Lowell was an office editor of the Atlantic. Putnam's Maga¬ zine, in New York, sprang full armed into existence. It introduced itself by an article which awakened curiosity, and perhaps one may say national pride, on the question, <(Have we a Bourbon among us?® From that day to this magazine literature has held an important part in the work of the better literary men of America.

The short story had been invented in Eng¬ land. The serial story, as Dickens and Thack¬ eray had shown, gave admirable opportunities for feeling the public pulse. It is amusing to¬ day to read that the publishers of the Anti¬ slavery Standard doubted whether they should pay James Lowell $400 a year for his contribu¬ tions to that journal, contributions among which are some of the best poems which he ever wrote. This is only one among the many illustrations which peep out from the books of biography as to what Dr. Johnson or Goldsmith would have called the patronage of the readers of maga¬ zines and their editors. The encouragement to authors was little but it was enough. In the year 1849-50 the people who read anti-slavery newspapers began to talk of the serial issues in which the story of (Uncle Tom’s Cabin > was going forward in a newspaper called The Na¬ tional Era. The Southern writers on the Civil War ascribe to that book the complete change in American politics and in the questions which led to the war which belongs to the middle of the century. In 1851 the story was published in book form and at once became known not simply in America but in England and in all the litera¬ ture of the civilized world by means of transla¬ tions. Its circulation in England, for instance, was the first circulation of a book on what was called popular prices. . One edition of it ap¬ peared. in a newspaper issue at the cost of one penny a copy. Mrs. Stowe’s supremacy as a writer of fiction established itself at once, and from that moment to this American literature can make the boast that it has furnished the book of which more copies have been printed than any other book which originated in the English language. It is a little curious that its only

possible rival, if one. considers simply the number of copies printed, is (Robinson Crusoe.* Mrs. Stowe's story is that of a fugitive slave; Defoe's story is that of a shipwrecked slave trader.

After the Civil War the men and women of America learned that for the criticism or for the education which belonged to this nation, they must study their own country. In truth the society of America is American society, the laws of America are American laws. Its prospects and hopes are those of a democracy. . As the strata of its rocks and the growth of its trees are different from those of England, so are the foundations of the state and the customs of its administration. It is impossible here to consider in the least detail the methods of different writers who have won the love and admiration of their countrymen in the years which have followed.

The central observation is that as soon as America furnished readers enough a proper

American literature followed the demand. As soon as the system of the country made possible first-rate printing offices in rivalry with the best printing houses in England, the American de¬ mand for American books could be answered at home. In naming Cooper and Irving we have named the two writers distinctly American whose published work was first everywhere known. Other authors printed their books which were forgotten. There was perhaps something ludicrous in the effort to create aboriginal en¬ thusiasms which did not exist. For instance, any early copy of the North American Review will show the standing advertisement on the cover that the publishers had a <(supply of the Wamoyden *kept constantly on hand.® The was a poem on a supposed hero or heroine of Algonquin origin named the (<Yamoyden.® But the publishers spoke of the volume as a commission house might speak of so many bushels of wheat or barley. Books or essays of purely American type struggled into existence and some of them are still remem¬ bered. Edgar Allan Poe was born in the year 1809 and died in the year 1849. Warren Bur¬ ton's (District School,* Mrs. Gilman's (New England Housekeeper, * some of James K. Paulding's sketches and essays were distinctly American. Mrs. Sedgwick and Miss Sedgwick wrote admirable and unaffected books. Ed¬ ward Everett and Alexander H. Everett with all the advantages of early European training were thoroughly American in their orations and in the work which they did in the North American Review. That publication it¬ self while it imitated aspects of the English quarterlies always carried an American chip on the shoulder and defied all foreign travelers or foreign critics who did not find perfection in everything American. A story of pure Amer¬ ican life, most instructive to the student of that

older time, is Sylvester Judd's story of Mar¬ garet, a Tale of the Real and Ideal, Blight and Bloom.) Judd was a poet, but this prose novel has proved his best work.

The exquisite genius of Nathaniel Haw¬ thorne would have worked its way through any difficulties. In his own nation his favorite earlier subjects, drawn so largely from the tra¬ ditions of the. early centuries, undoubtedly had their share in introducing him to the great body of readers. So soon as he traveled abroad, he showed that he could handle any traditions and was at home in any atmosphere. As in all work of men of genius his temperament and, as he says, the traditions of his life, governed to a certain extent his choice of subject. But al¬ ways it is Hawthorne who is the master and fascinates the reader; and there is no other Hawthorne. In other instances perhaps a cer¬ tain charm is given in English circles to the naivete of what one may call the frontier habit of the American writer. Walt Whitman had an affection of expressing a disgust, which he did not really feel, with all the conventionalities and institutions which did not smell of the pine knot or of kerosine. He is said to be better known in England than in America. This is somewhat as it has happened with an American preacher like Moody and others who could be named, who has won attention even by the accent of his voice. After he had won attention abroad he needed nothing more. We may say again that

this is no place to enter into an analysis or other discussion of the work of different American authors and of their hold upon the national life. When one remembers that no prose writer of our country is more likely to be generally read three centuries hence than the despatches of Ulysses Simpson Grant, he hesi¬ tates before he shall say who are the literary men. Give time enough and Washington be¬ comes a literary man, and Judge Marshall. But this may be said, that of the heroes in the New York Hall of Fame, Thomas Jefferson, James Kent, Joseph Story, Asa Gray, Jonathan Edwards, William Ellery Channing, Horace Mann, Henry Ward Beecher, Ralph Waldo Emerson, Nathaniel Hawthorne, Henry Wads¬ worth Longfellow and Washington Irving, would not have been named among the most distinguished Americans except for their work with the pen. Franklin might be numbered as a naturalist, Washington or Grant as soldiers; but the 12 who have been named won their place simply as authors. And every one who is in any way familiar with their work under¬ stands that this work is distinctly American. You could not mistake it.

If you read 25 pages from any of these authors, you would know that he was brought up under the institutions of a republic and that the width of horizon, may one say, comes in as a part of the atmos¬ phere to which in the omnipotence of God the American is accustomed. In naming those to whom the country owes the growth of its liter¬ ary taste, the charm of great travelers and great historians should be added to the great statesmen. But the list as far as it goes is not useless, for it shows what is the current of average feeling of the people of America The people of America is sovereign of America and as everywhere the sovereign is the fountain of honor. We could choose no better instance of the encouragement given by the people to the author of first-rate genius and ability than is found in the literary career of John Fiske. Fiske owed none of his success to official posi¬ tion. No distinguished review called attention to the way a young man needed encouragement, but simply Fiske had a great deal to say and he said it. And by the time he said it there was a nation of people who had been educated to appreciate and enjoy what he said. He used to say that even in his young life he was look¬ ing forward to history as the study which he was to pursue through his life. The oppor¬ tunity came for the gratification of this passion. He seized upon the opportunity, and the American people recognized the hand of a master. But Fiske was not to be shut up within any narrow range of study or of authorship. He had his own views of life and duty, of ethics and of destiny, and he wrote them down. He said what he wanted to say in a form which won the sympathy of all thoughtful people, and there were enough readers trained to careful thought to welcome the gifts which in such service he made to the nation. Perhaps in speaking of this instance we are speaking simply of the step forward which the con¬ science and heart of the whole nation made in obedience to the word of Ralph Waldo Emer¬ son, who gained a welcome in all quarters, — in the miner's cabin or in the sanctum of kiln- dried seminaries. It has been said that of the

early volumes of Emerson's (Essays y millions of copies might be found to-day in the hands of the most ignorant or the most learned men and millions of men who never heard his name are living under the inspiration of his prophe¬ cies. It is said by the English critics that Long¬ fellow's poems are better known by the people of England than are Lord Tennyson's. Per¬ haps this is true.

It has also been curiously true that more than one English reputation has been first made in America. Carlyle's first books were well known here before the critics of England honored them with their approval. The Eng¬ lish writers whined a good deal so long as they had no protection at American law for their copyrights. This nation was

creating a reading class at an expense such as monarchs never dreamed of, such as England has never thought of, and it was the fashion to chide Americans because at the outset they did not throw open the market thus created to the writers of a nation where there was not one reader for a hundred in America. The Inter¬ national Copyright Act has remedied this griev¬ ance. But it has not proved that either the English or American author has gained readers by any of the accidents of publication. The rule holds which Abraham Lincoln laid dowm so well that the people who like that sort of thing will read that sort of thing. But so far as statistics of the trade in books go, it is evi¬ dent that the rank and file of American readers are interested in American subjects treated by writers who feel the American impulse and were early baptized in the ways of democracy. For the work of individual writers see the fol¬ lowing article and the separate biographies in this Encyclopedia.

Edward Everett Hale.

AMERICAN LITERATURE, Synopsis

of. The first great American poem was (Thanatopsis) by William Cullen Bryant (1794— 1878). There had been rough ballads and songs on the one hand, and literary odes and epics — by John Trumbull (1750-1831), Timothy Dwight (1752-1817), Joel Barlow (1755-1812), and others — while there were snatches of real poetry in the work of Philip Freneau (1752-1832). But the first American poet to make a deep impression on people abroad as well as at home was Bryant. With all his interest in the picturesque and romantic in all ages and in all countries, he was gen¬ erally most himself in his pictures of American life and in his expression of American condi¬ tions. Besides Bryant, and about his time were * a number of other men of letters in New York whose poetry pleased their time, but who are remembered now by the tradition of perhaps a single poem. Such are John Howard Payne (1792-1852) the author of (Home, Sweet Home) whose real work in life was in the drama, Samuel Woodworth (1785-1842) the author of (01d Oaken BuckeD and George P. Morris (1802-64), whose (Woodsman, Spare that Tree) is remembered if not often read. James Rodman Drake (1795-1820) and Fitz-Green Halleck (1790-1867) wrote together and separately poems which delighted their contemporaries. At the same time appeared the poetry of Edgar Allan Poe (1809-49). Poe wrote all sorts of things — poetry, stories,

critical and other articles — for the magazines, some good and some bad, often under the spur of necessity. But among his poems ma}' be found a few which have that peculiar and in¬ dividual lyric quality that belongs especially to the poet, and not to any particular nation or time. With less pure poetic genius, perhaps, but more sense of the beauty and romance that charms people, and more of an easy gift of verse, Henry Wadsworth Longfellow (1807— 82) began his long career with renderings of the poetry of other peoples. He was a college professor, widely read in the literatures of other nations, and his earliest poetry not unnaturally was the rendering of what had charmed and interested him in his read¬ ing. But he, as well as the rest, was im¬ pressed by the romance of American life; in¬ deed, his very first poem is on a subject from American history. And in (Evangeline, }

(Hiawatha,5 the (Courtship of Miles Standish5 as well as in many shorter pieces he fixed in beautiful forms, figures and legends from the American past. American though he was Longfellow saw American life largely through the glasses of traditional literature. A more direct impression of American, or more exactly of New England life, was that of John Green- leaf Whittier (1807-92). Though he knew English literature wrell yet his poetry does much to give, a true idea of New' England country life as it appears to a real country nature of a most delicate and refined type. Nearer still, however, to the ordinary average American life (or at least aiming to be) was Walt Whitman (1819-92), who used every effort to give his work the character of free uncontrolled democrac}7. His poetry is of a wholly uncon¬ ventional form and his view of life is equally direct, free and unrestrained. To many readers, especially abroad, he is the most representative American possible. James Rus¬ sell Lowell (1819-91) is better remembered as an essayist, a scholar and a critic than as a poet, yet his (Biglow Papers5 have not only the qualities of the best poetry but a naturally homely character that is as rare of its kind as anything in literature. Oliver Wendell Holmes (1809-94) w7as best known in his especial field of light and humorous verse, in which vein he had few equals and no superior, al¬ though he also wrote essays and fiction. Other New England poets of those years should be noted, although their works have not survived : Mrs. Lydia PI. Sigourney (1791-1865), James Gates Percival (1795-1856), Jones Very (1813- 80), Samuel Longfellow (1819-92) are but a few of the many gifted and cultivated spirits of that generation of New Englanders. There were fewer poets in the rest of the country, but Bayard Taylor (1825-78), who wrote much beside poetry, and John G. Saxe (1816— 87), should be mentioned, while Henry Timrod (1829-67) and Paul Hamilton Hayne

(1830-86) wrote much that showed poetic feeling and appreciation of the beauty of nature, although it appears to have lacked the preservative quality of true genius.

Poetry has been mentioned first in this sketch because it came first to general public notice, but the first great American man of letters to be recognized as such at home and abroad was Washington Irving (1783-1859), who wrote almost everything except poetry.

He had to a marked degree the essayist's gift of sympathetic and humorous observation joined to a power of easy expression which had been refined by an affectionate study of the English masters. Pie had not only a de¬ light in the romance of Europe but a pleasure in things American, and he pleased not only America but Europe by his appreciation of both. He wrote fiction and history as well as what would be more definitely called essays, but whatever he wrote was delightful to his own day because of the quality that he was able to give it. As the New Englanders of his day tended to poetry so the New Yorkers, or the (<Knickerbocker School55 as it was called after Irving's famous fiction, are best remem¬ bered by their essays. James Kirke Paulding (1778-1860), Gulian C. Verplanck (1786-1870), N. P. Willis (1806-67) are more properly to be called men of letters than anything else though they wrote stories and poems. Three who came a little after them are more note¬ worthy: Donald G. Mitchell (1822-1908), who under the name of ((Ik Marvell55 wrote the (Reveries of a Bachelor,5 George William Cur¬ tis (1824—1900), who although he wrote and did much else for which he became justly dis¬ tinguished, never surpassed the charm of his early meditations on (Prue and I,5 and Charles Dudley Warner (1829-1900) whose homely and somewhat humorous books of reflection and travel were a good deal read. It is not right to speak of Ralph Waldo Emerson (1803-82) specifically as a great essayist nor can he be mentioned especially as a great poet or a great philosopher. Philosophy he of course had, and poetry, and he expressed himself in lectures that easily took the form of essays. But his true position is something outside of philosophy ' or literature; he has been an immense spiritual influence ; in America touching alike the culti¬ vated and those with hardly a touch of educa¬ tion, influencing those deeply read in the philosophies of the world and those whose experience came from daily life alone. He himself once said that he was the voice of New England speaking as it had to speak, by which he meant that he expressed the higher ideals of American life. Whether we think of him as man of letters or philosopher, as essayist or critic, we shall have to recognize that no other American has been so active a factor in arousing and stimulating the higher life of the people. One especial form of his influence is

especially characteristic of Ameri¬ can literature, that which has colored the view of certain writers on nature. These gained a great inspiration from Emerson which they strengthened by keen power of observation. Of these the chief is Henry David Thoreau (181 7— 62) a man of great originality, but more of a philosopher than naturalist. John Burroughs (1837—) is more of an observer and a natu¬ ralist, but of an equally suggestive and vital spirit. John Muir (1838-1914) may also be mentioned here though much of his work ap¬ pears to have been merely private record for his own satisfaction. It may stretch the ordi¬ nary idea of literature to include the name of John James Audubon (1780-1851). His chief work was with the pencil, but his journals are full of his own brilliant and poetic person¬ ality, and also, it should be added, give a view

of America and its people and its natural re¬ sources that can be gained in no other way.

There had always been American historians, unless we draw our definition of history very closely, from the days of John Smith (1579 — 1631) and John Winthrop (1588-1649). In the first half of the 19th century, history still lacked some of the limits that have grown about it and was as often found in the historical ora¬ tions of Daniel Webster (1782-1852), of Edward Everett (1794-1865), or in the pic¬ turesque narratives of Washington Irving as in the more regularly historical work of Jeremy Belknap (1744-98) or Jared Sparks (1789-1866) or the other scholarly students of history or biography. With George Bancroft (1800- 91), however, a more definite historical tradi¬ tion began, to be distinguished by an equal and devoted care for original sources and literary style. William H. Prescott (1796-1859), John Lothrop Motley (1814-77) and Francis Park- man (1823-93), form a very remarkable group of historians. The great orators of our earlier days were chiefly statesmen, — the names of Daniel Webster (1782-1852), Henry Clay (1777-1852), John C. Calhoun (1794-1856) and Edward Everett (1794-1865) coming at once to mind, although the last named was noted also in other forms of public life. Among the great orators of a later generation, however, the most distinguished have, as a rule, not been in political life; Wendell Phillips (1811-84), Henry Ward Beecher (1813-84) and Phillips Brooks (1835-93) will probably be better re¬ membered as orators than Charles' Sumner (1811-78), Stephen A. Douglas (1813-61) or Chauncey M. Depew (1834—) . It is in this place that we should mention the great name of

Abraham Lincoln (1809-65). No part of the energy of his remarkable mind and char¬ acter was ever given to the production of anything that he conceived as literature. Yet his powers of thought were so intensely right, his power of expression had been so nourished by the best English written, and both were used with so single an eye to the real needs of the occasion and so certain an understanding of what the need demanded, that what he said or wrote had a quality that could not be gained by literary care. His (<Gettysburg Address,® therefore, not only makes an immense impres¬ sion even now, but it was influential in chang¬ ing the style of oratory of the nation. We ought to mention a number of writers as char¬ acteristically American as any other writers. From an early day there had been those who presented a humorous view of the situation in a peculiarly quaint manner. The names of Jack Downing (1811-52) and the Widow Bedott (1792-1852), even of Artemas Ward (1834-67) and Josh Billings (1818-85) are now all that will be remembered of their volu¬ minous works. But the work of Samuel Clemens (1835-1910) known throughout the world as <(Mark Twain® had some of more enduring qualities which make real literature as well as the humoorus qualities that endeared him to people in general. Later writers whose gift is chiefly that of humorous interpretation of life are Peter F. Dunne (1867, widely known as ((Mr. Dooley®), and George Ade (1866-).

The most striking thing in American fiction has been its presentation of American life. Even the stories of Brockden Brown

(1771-1810), our first novel writer of real ability, beside the extravagant horrors and mysteries of their time, have a certain actuality that make them still worth reading. Of the stories of Irving, Paulding and others the best are generally those which present the old Dutch life of the Hudson River. James Fenimore Cooper (1789-1851) was and is still best known for his stories and characters of the American wilderness. John P. Kennedy (1795-1870) and W. G. Simms (1806-70) are still interesting for their pictures of Southern life. It is one of the remarkable things about Poe that his work has little of the particular character of his country; his best stories of horror or mystery are still well known, es¬ pecially those in which he anticipated the de¬ tective story of the present day. Fitz James O'Brien (1828-62) wrote some excellent stories in which an idea of fantastic imagination is presented in very realistic form. Such too are the stories of Edward E. Hale (1822-1909) whose (Man Without a Country) gained belief by its realism and appealed to all by its imaginative passion.

There were many romantic story-writers (and some not especially

national) in the gen¬ eration before the war of whom the best re¬ membered are J. H. Neal (1793-1876), Her¬ man Melville (1819-91), Theodore Winthrop (1828-61) and Harriet Prescott (1835—) . Har¬ riet Beecher Stowe's (1811-96) (Uncle Tom's Cabin ; belongs even more to history than to literature, but this book as well as (01d Town Folks) owes its interest to being a close picture of life. Something of this strain will be found in Nathaniel Hawthorne (1804-64). His earlier tales of realistic observation as well as of poetic imagination, of historic life and char¬ acter as well as of delightful fancy, were not at once popular, but his great novels, though by no means realistic, are thoroughly American. In the years after the war came the slow growth of the fiction that wTas consciously realistic, both in short story and novel, of that fiction which takes for its subject the every¬ day life around us and finds its chief interest in the study of character and the observation of life. Here were William Dean Howells (1837-) and Henry James (1843-1916), who began to write stories about this time, and who came to general acceptance as our representa¬ tive novelists 15 or 20 years later. Each was a master of the short story as well as the novel and each wrote also for the stage and for criticism. James took for his chief subject the American abroad, while Howells found his chief interest in the great mass of average Americans in their own country. Their ex¬ ample led others to turn their attention more particularly to an especial study of American life as it developed particularly in particular places. By 1880 the novel especially devoted to local color was a definite form. Sarah Orne Jewett (1849-1909) and Rose Terry Cooke (1827-92) in New England, and Edward Eggleston (1837-1902), Mark Twain (1835- 1910) and Bret Harte (1839-1902) in the great Central States, the Southwest, and the Far West, were noteworthy names out of many. At this time George W. Cable's (1844-) <The Gran- dissimes) and other stories of Creole life in the South, and Miss Mary N. Murfree's (1850-) stories of the Tennessee Mountains, published

under the name of Charles Egbert Craddock, aroused the attention and interest of writers and readers alike. Mary Wilkins wrote of New England, Harold Frederic (1856-98) of life in the Mohawk Valley, F. H. Smith (1838— 1915) of New York city, T. N. Page (1853-), J. C. Harris (1845-1909), James Lane Allen (1849-) of the South, Owen Wister (I860-) in (The Virginian> of the Far West, Alice French (1850—) (as ((Octave Thanet®) and Hamlin Garland (I860-) of the Middle West. F. Marion Crawford (1854-1909) was one of the few

who at this time held to what would be called the romantic ideal, but he remained popular through waves of realism. Frank Stockton (1834-1902) also stood on one side of the. general movement by his remarkable gift of whimsical invention and delightful humor. In the nineties arose a delight in stories of American history. F. J. Stimson (1855-) was one of the first to revive an old form, but he was immediately followed by P. L. Ford (1865-1902), Weir Mitchell (1829-1914), Winston Churchill (1871—) , Mary Johnston (1870—) and many others of ability. The end of the century was a noteworthy seedtime for fiction ; all sorts of new paths were struck out; novels of adventure, Rex Beach (1877-), or of mystery, Anna Katherine Greene (1846-) became popular; novels of the great transactions of commerce, H. K. Webster (1875-), of the great outdoors, S. E. White (1873—) , of all sorts of exotic life, of anything which would arouse and stimulate the imagina¬ tion. The best representative of this kind of fiction was Jack London (1876-1916), who to a love of wild adventure joined an active spirit of social reform; O. Henry (1862-1910), whose stories rise from the emotions and feelings to be found in unexpected corners of the life of our great cities, is another characteristic writer. Among all these insistent passions for wide horizons and stimulating motives the repre¬ sentative of the careful study of actual life as we see it all about us is Mrs. Edith Wharton (1862-). Such, too, is the work of the chief novelists of the present moment with the ad¬ dition often of some study or interest in cur¬ rent social problems. The work of Willa S. Gather (1875—) , Dorothy Canfield (1879-), Ellen Glasgow (1874 —) , Henry S. Harrison (1880-), Robert Herrick (1868-), Mary Watts C 1868—) , Theodore Dreiser (1871-), which is the best fiction of the last few years, is the general sort.

In the poetry of the generation immediately after the Civil War we have a group of poets of less ability than the earlier New Englanders. Edmund Clarence Stedman (1833-1908), Thomas Bailey Aldrich (1836-1907), R. H. Stoddard (1827-1907), and later Richard Wat¬ son Gilder (1844-1909), were poets, of a com¬ mercial society growing in a material way be¬ yond people's belief of conception. Such a world allows a man to pause for a while at a fine thought or a fine deed, but rarely gives the leisure and experience so generally neces¬ sary for the development and experience of genius. Bret Harte should also be mentioned for his earlier poetry, though his reputation rests chiefly on his stories of California in the days of the goldminers. Two other western poets were Joaquin Miller (1841-1913), whose (Songs of the Sierras > gave him a great reputa¬

tion, and Edward Rowland Sill (1841-87), who though he lived in California had the refined literary expression of older civilizations.

Sid¬ ney Lanier (1842-81) was a Southerner and some of his most beautiful poetry is inspired by Southern scenes. In later years the most noteworthy poets were James Whitcomb Riley (1853-1915) with poems full of Hoosier life, Eugene Field (1850-95), whose best poems are inspired curiously enough by literature or by children, William Vaughan Moody (1869- 1910), a man more of broad and general poetic character than any of his time, and George Cabot Lodge (1873-1910), who died before his truly poetic insight had developed to its full power. The last 10 years have seen a greater interest in poetry both by reader and writer than has existed for half a century. Of the number who must still be called minor poets two are the most noteworthy: Edgar Arling¬ ton Robinson (1869-) , whose great insight is for character and satire and for a close reality of language, and Edgar Lee Masters (1869-), whose c Spoon River Anthology J by its poetic realism has gained a wider audience than any other recent poetry. The others are generally noteworthy for an effort at breadth of experi¬ ence and freedom in poetic form. Of the latter the best known names are Vachel Lindsey (1879-), Edwin Markham (1852-), Amy Lowell (1874—) , Robert Frost (1875-), Ezra Pound (1885—) , James Oppenhein (1882-), Louis Un- termyer (1885-) and Harriet Monroe (I860-). Of those who more commonly keep to the older, more traditional forms the chief are G. E. Woodberry (1885-), Percy Mackaye (1875-), Herman Hagedorn (1882-), Fanny S. Davis, Witter Bynner (1881—) and Sarah Teasdale

(1884-).

Edward Everett Hale, Professor of English, Union College.

AMERICAN LOYALISTS. The American

colonies were all infested with internal enemies during the Revolution. This hostile element, while averse to the oppressive measures of the British government, was still more averse to independence. Its guiding principle was loyalty to the Crown : hence the name ˆLoyalists,® which has found general acceptance among his¬ torians of the present day.

In the New England States the Loyalist party was relatively weak, and its numbers were considerably lessened by the flights of many of its zealous and persecuted members in the early days of the war. The proximity of the Canadian posts north of Lake Champlain and along the Saint Lawrence, which were used for military purposes by the English at the be¬ ginning of the Revolution, enabled numbers of fugitive Loyalists to find protection and volunteer for service in

ˆprovincial® regiments. These regiments were gradually filled by send¬ ing recruiting officers into the enemy's country, and were employed on marauding and rescue expeditions. No less than 10 corps, several of which reached a maximum of 500 or 600 men, were thus maintained in the Canadian Division during the Revolution. While a proportion of these refugees came from the New England States, many others had found their way from northern New York. Often they were followed by their wives and children, who were brought in by the recruiting agents, or were conveyed

under flags of truce over the waters of Lake Champlain. Burgoyne's expedition in 1777 was joined by hundreds of Loyalists, who sooner or later escaped into Canada. In 1780 Sir John Johnson delivered 150 from the Mohawk Val¬ ley, and a little later Majors Carleton and Houghton brought in scores of families from south of Lake George.

From Maine, New Hampshire and Massa¬ chusetts other Loyalists early began to sail for Nova Scotia and for England. This movement overseas was given a marked impetus by the battle of Lexington. In July 1775, Judge Cur- wen of Salem, Mass., arrived in London, where he found <(an army of New Englanders® al¬ ready there, ˆlamenting their own and their country's unhappy fate.® And yet, at the end of January 1776, over 2,000 adherents of the Crown remained with the British army in Bos¬ ton, nearly one-fourth of whom were refugees <(from the country.® About 1,100 of these sailed for Halifax at the evacuation in the following March, including doubtless several Tory regi¬ ments raised in Boston under Howe's orders.

When the British army left Halifax for Staten Island in June 1776, it was accom¬ panied by many of the refugees from Bos¬ ton and by two companies of the Neve York Volunteers but recently sent to the Nova Scotian capital. The arrival of Dunmore's fleet a month later brought in another large accession of Loyalists, together with many negroes, this time from Norfolk, Va. From this time on to the end of the Revolution New York city and the neighboring islands received increasing numbers of fugitives from all the other colonies, as well as the region south of Albany. The pervading lovalism of the prov¬ ince, of western Connecticut and of New Jersey made possible the formation of not less than 20 corps of Loyalists in and about New York during the years 1776 to 1781, inclusive. These corps ranged in numbers from 29 to 1,100 men, and probably totaled 15,000. The

loyal militia of New York numbered 8,500 more. After General Howe gained possession of Long Island in August 1776, hundreds of Loyalists from both Connecticut and Rhode Island found refuge there, forming a settlement on Eaton's Neck and perhaps at other places.

The occupation of Newport, R. I., by a part of the King's forces in December, called out loyalist addresses from the Quakers of that province, and from many of the inhabitants of Newport, Portsmouth, Middletown and James¬ town. In June 1778, two provincial regiments arrived at Newport from Kingsbridge, N. Y., and soon a body of 112 loyal New Englanders was enlisted, while small groups of Tories from Freetown and elsewhere came in for protection. When the British and provincial troops evacu¬ ated Rhode Island in October 1779, about 40 families departed with them, leaving other Tories behind. Those departing were posted in Saint George's Manor on the south side of Long Island, but most of them were taken prisoners soon after by a party of revolutionists.

The movement of Howe and his army to Philadelphia in 1777 caused the local patriots to flee from that city, thus turning it into a Loyal¬ ist centre to which numerous Tories resorted from the surrounding region. It also stimu¬ lated the formation of six Loyalist regiments in southeastern Pennsylvania and one in south¬

ern New Jersey, beside enlistments in other provincial corps which had accompanied Howe. Clinton, the successor of Howe, assumed command in Philadelphia in May 1778, and promptly decided to evacuate the place. With his troops marched the Loyalist regiments of the neighborhood, and over 3,000 other ad¬ herents of the Crown boarded the British fleet in the Delaware to be transported to New York.

The seat of war now shifted to the South. In November 1778, Colonel Campbell sailed from Sandy Hook for Savannah with a force including four Loyalist regiments. As a large part of the people of Georgia was friendly to the British cause many men joined Campbell's standard after his capture of the post at Savannah. Sunbury was taken with the aid of 400 Carolina King's Rangers under Col. Thomas Browne, as was also Augusta, Colonel Boyd and 800 Loyalists of South Carolina co¬ operating. Thirty miles above Augusta 300 Tories under Col. Daniel McGirth were active. The posts established in western Georgia were garrisoned by Loyalists, and there was scarcely a skirmish or battle that was not participated in by Loyalist troops. The burden of the defense of Savannah against the Americans and French in September 1779, fell chiefly on the Tory contingent, including the Georgia

militia, but part of this Tory force consisted of men from New York and New Jersey, and part of those from the Carolinas. Tarleton's British Legion (over 1,000 men), Ferguson's Corps (140 men), and the New York Volunteers (350 men) helped to take Charleston, S. C., in May 1780. Only two Loyalist regiments seem to have been organ¬ ized in Georgia. Some Tories fled from this province early in the war.

In contrast with Georgia the Carolinas fur¬ nished nine corps of Loyalists, several being of good size. Most of the nine were embodied under the orders of Cornwallis, who had suc¬ ceeded to the command of the British forces in the South. The outlying posts in South Carolina were principally garrisoned by these troops, which had many encounters with the patriots, and at Camden in August 1780, out¬ numbered the British regulars by several hun¬ dred and played an important part in defeat¬ ing Gates, <(the hero of Saratoga.® A few days later Tarleton with the British Legion and the corps of Light Infantry destroyed the last organized patriot force in South Carolina. Preliminary to his advance into North Carolina, Cornwallis sent messengers thither to rouse the ((friends of government,® and despatched Ferguson with 1,200 men, five-sixths of whom were Loyalists, to the western border of the province to gather recruits and harass the Americans. But Ferguson's operations also brought out a force of sturdy pioneers that turned the tide of war against the British at King's Mountain. Much the same story was repeated at the Cowpens in January 1781, where Tarleton was defeated. With Cornwallis near the Virginia border, Greene and the Americans swept the Loyalists from every stronghold in South Carolina. Thus, only Charleston was left to serve as an asylum for the hunted Tories of the province.

Meantime, General Arnold had been attempt¬ ing to make a diversion in Virginia with an English force, including the American Legion

and the Queen's Rangers, two Loyalist regi¬ ments from New York. These and other such troops were used in carrying on raids into the interior, but without gaining many recruits. The irreconcilable royalists among the Virgin¬ ians had left the country for England, New York and elsewhere during 1775 and 1776. The recovery of the lower States by the British, and the Tory ˆand Indian raids from Detroit in 1779 and 1780, served, however, to revive loyal- ism in western Virginia, western Pennsylvania and in Maryland. Certain Tory leaders of the frontier claimed to have raised 1,300 Mary¬ land Royal

Retaliators up to June 1781, but nothing was accomplished because several of the promoters of this force were arrested and executed. Col. John Connolly, who was in command of the Loyalists of Virginia and North Carolina on the peninsula between the James River and Chesapeake Bay, had been counted on to co-operate with the Marylanders. But in September 1781, he was captured and sent to Philadelphia, and in the following month the surrender of Cornwallis occurred, four Loyalist corps being included (747 men). The King's vessel Bonetta sailed for New York filled with Tories. Thousands of Loyalists with their negroes now left the Southern States for Jamaica, the Bahamas, and Great Britain. When Savannah and Charleston were evacuated in July and December 1782, other thousands sailed with the troops. Up to May 1783, the popula¬ tion of East Florida was increased by about 13,000 whites and blacks. Jamaica gained ap¬ proximately 5,900 white immigrants and 7,500 negroes from the Floridas, which were ceded to Spain, and from Savannah and Charleston. The increase in the Bahamas amounted to nearly 6,000, of which more than a quarter came from New York in 1783.

West Florida had been partly settled early in the war by Loyalist refugees from Georgia and the Carolinas. Several troops of these fugitives were mustered there, and were as¬ sisted by a large body of associated men of the Natchez District and some of the neighboring Indian tribes in repelling the expedition of Captain Willing from Pittsburg. These local troops, reinforced by a thousand men from New York, including the Maryland and Penn¬ sylvania Loyalists, also resisted the Spaniards from Louisiana, but without avail. On the surrender of West Florida in May 1781 the Natchez associators fled, some to Savannah, some to the Cumberland settlements in Ten¬ nessee, while some were caught and carried down to New Orleans.

The British posts along the Great Lakes, including Carleton Island, Oswego, and Fort Niagara, attracted Loyalists from the back country in large numbers. A little colony of refugees sprang up on Carleton Island; many Loyalists were registered at Oswego while pass¬ ing' into Ontario to settle; and in the fall of 1775 Fort Niagara became the rendezvous of those coming in to join Butler's Rangers, a corps that comprised eight full companies in 1779. Brant and the Six Nation Indians also operated from this centre. Sullivan's raid up the Genesee River increased the number of savages at the post to more than 5,000. A Loyalist settlement was begun on the Canadian side of the Niagara River in 1780, which spread round the shores of the entire Niagara Penin¬

sula and beyond by 1791. Both banks of the Grand River were

colonized by the Mohawks and representatives of other tribes. At the west end of Lake Erie, Detroit was the head¬ quarters of Tory refugees and the Wyandot and other Indian tribes. Here Lieutenant- Governor Hamilton embodied the Detroit Vol¬ unteers, who gained leadership when Capt. Alexander McKee, Simon Girty, Matthew Elliott and several other Tory conspirators came in from Fort Pitt in the spring of 1778. Hamilton had been sending raiding parties to the upper Ohio and promising land bounties to those who would join in the King's defense. These measures seem to have led the Loyalists of the frontier to associate for the purpose of aiding the British cause. However, numbers of the plotters were apprehended, and others were suspected, including the officers in the Indian Department at Fort Pitt, namely, McKee and Girty, and Elliott who was an Indian trader. At length, in March 1778, they fled to Detroit, where they were given employment in the In¬ dian Department. Girty now became the in¬ stigator of war parties, which harried the frontier and gathered in adherents of the Crown. When peace returned the colonization of the region east of the Detroit River began. The King's ships brought in without charge dis¬ banded Loyalists, and others had only to cross the river, as at Niagara. Within a few years three townships on the lake front, four on the river Thames, and extensive tracts along the Detroit and Saint Clair rivers were settled by willing exiles from the neighboring republic. See also Loyalists in Canada.

Wilbur H. Siebert,

Professor of European History, Ohio State University.

AMERICAN LYCEUM ASSOCIA¬ TION, an organization founded in 1831 for the purpose of (1) securing better legislative provision for schools; (2) to improve the qualifications of teachers; (3) to secure closer relationship between the common schools and the colleges; (4) to improve the methods of instruction and school discipline; (5) to in¬ troduce the natural sciences into the course of study; (6) to provide schools with books, ap¬ paratus and teaching appliances; and (7) to arouse an interest in the education of girls and women. Annual meetings were held, at which important reforms were advanced. The pro¬ ceedings of the Association — to 'except the first — appeared in the American Annals of Education; and the American Monthly Maga¬ zine.

AMERICAN MANUFACTURES. See

Manufactures, American.

' AMERICAN MATHEMATICAL SO¬ CIETY, an association established in 1888 as a local organization in New York, and reorgan¬ ized in 1894 under its present name, to en¬ courage an active interest in mathematical science. Admission fee, $5; annual fee, $5. Membership 700. Members meet at Columbia University, New York city; meetings are also held in Chicago and other cities. The society publishes two journals, the Bulletin and Trans¬ actions.

AMERICAN MEDICAL ASSOCIA¬ TION, The. On 5 May 1846, a National Med-

ical Convention of delegates from ˆmedical societies and colleges in the whole union® con¬ vened in New York city. A second meeting was held in Philadelphia the following year and on 5 May 1847 this body resolved itself into The American Medical Association. The an¬ nual sessions of this organization are attended by delegates representing the several constit¬ uent State associations who assemble as the House of Delegates, transact the business and frame the policies of the organization; the ses¬ sions are also attended by those members of the organization who qualify as Fellows and meet as the Scientific Assembly for the dis¬ cussion of scientific subjects. This Scientific Assembly includes an opening general meeting at which the president-elect is installed as presi¬ dent and delivers his presidential address ; and 15 sections, in which are presented scientific papers on subjects related to the branch of medicine to the study of which the particular section is assigned. The following are the sections of the association : Practice of med¬ icine ; surgery, general and abdominal ; obstet¬ rics, gynecology and abdominal surgery; oph¬ thalmology ; laryngology, otology and rhinol- ogy; diseases of children; pharmacology and therapeutics; pathology and physiology; stoma¬ tology ; nervous and mental diseases ; dermatol¬ ogy 5 preventive medicine and public health ; genito-urinary diseases; orthopedic surgery; and gastro-enterology and proctology. The constitution states: C(The object of this Associa¬ tion shall be to promote the science and art of medicine. Contributing to this end, the Asso¬ ciation shall endeavor to unite into one com¬ pact organization the medical profession of the United States for the purpose of fostering the growth and the diffusion of medical knowledge, of promoting friendly intercourse among American physicians, of safeguarding the ma¬ terial interests of the medical profession, of elevating the standard of medical education, of securing the enactment and enforcement of just medical laws, of

enlightening and directing pub¬ lic opinion in regard to the broad problems of hygiene, and of representing to the world the practical accomplishment of scientific medicine.®

AMERICAN MERCHANT MARINE.

See Merchant Marine in the United States.

AMERICAN MICROSCOPICAL SO¬ CIETY, an association organized in 1878 for the purpose of promoting microscopical studies by granting aid to members from invested funds and by publication. It has a membership of 350 and $4,000 in research funds.

AMERICAN MILITIA. See Militia.

AMERICAN MINES AND MINING.

See Mines and Mining; Mining Engineering; Mining Law.

AMERICAN MUSEUM OF NATURAL HISTORY, New York city, situated in Man¬ hattan Park, occupies a palatial building ex¬ tending along the whole front of the north side of 77th Street, between Central Park West and Columbus Avenue. The institution was incor¬ porated under a charter of 6 April 1869, and is administered by a board of trustees, under a constitution revised and amended to 5 Feb. 1912. The foundation stone of the building was laid 2 June 1874. The Peary and other meteorites, the anthropological and ethnological collections

made by the Morris K. Jesup expedition to the North Pacific regions, totem poles of the Ilaida Indians, masks and dishes from British Colum¬ bia, carvings from Vancouver Island, basketry and utensils of the Chilcoten and Kakima In¬ dians, articles and models illustrating the life of the Eskimos of North America, the Shoshone Indians, the Gros Venties, attract the attention as the visitor enters on the ground floor and ap¬ proaches the free lecture hall, with a seating accommodation for 1,500, which occupies a separate building at the extreme north of the museum. The Jesup collection of woods; archaeological remains of New York; the Hyde collection from the ancient pueblos, cliff-houses and burial-caves of the Southwest ; the collec¬ tion of reproductions and casts of the ancient monoliths, bas-reliefs of Mexico and Central America presented by the Duke of Lonbat, as well as other rare specimens, all illustrate the pre-Columbian life of the continent. Animals, singly and in groups, masterpieces of the taxi¬ dermist's art, conspicuous among which are the cases of moose, bison, and musk-ox, are un¬ doubtedly the finest in the world. Of particular excellence also is the collection of birds,

especially the bird-rock group and the water- cusel group, and the butterflies and insects. Of great value is the collection of minerals, in¬ cluding the Tiffany exhibit from the Paris exhibition of 1889 purchased and presented by J. Pierpont Morgan ; collections of meteorites and geological specimens, including the collec¬ tion of the late Prof. J. Hall ; and specimens of vertebrate palaeontology, Cretaceous fish ; an ichthyosaurus with young, showing it to have been viviparous; and hundreds of other speci¬ mens of bygone ages, priceless to palaeontolo¬ gists. On the top floor are the mounted skele¬ tons of antediluvian monsters, the brontosaurus, giant sloth, mammoth, etc., the collection of shells, a laboratory for photography and a li¬ brary containing over 55,000 volumes on natural history, accessible to members and students, in¬ cluding that of the Lyceum of Natural History founded in 1817 and incorporated in 1818, since 1876 known as the New York Academy of Sciences affiliated to the Museum.

AMERICAN MYTHOLOGY. Ameri¬ can is here used with the signification of the United States. The myths to be dealt with and the social systems built up about them are much wider-reaching than the territory in¬ cluded within the American Union. They extend as far north as Hudson Bay, spread¬ ing over Ontario and the Canadian Maritime Provinces; while from Alaska they form an almost integral link with the beliefs, myths and institutions of the Eskimos, thus em¬ bracing all the Arctic lands of America. On the south some of the myths of the United States reach far into Mexico. Where neces¬ sary, therefore, these myths shall be followed to their habitat beyond the borders of the United States, provided in so doing their dominant characteristics may be the better presented. This article deals neither with the history of American mythology nor with the various systems of its interpretation, since these are still in an evolutionary stage ; their literature is voluminous and an account of it is readily accessible. Moreover, this litera¬ ture is largely personal while the object of the

present article is to present a condensed yet comprehensive view of the mythologies of the aborigines of the United States and the re¬ lation of these mythologies to the institutions, primitive beliefs, social evolution and peculiar modes of these peoples.

The study of American Indian mythology takes us into a condition of society different in almost every respect from our own. Here the laws

of nature are unknown; and the In¬ dian attributes life not only to everything that moves but to all the inanimate things of na¬ ture, the plants, earth, rocks, stones and wa¬ ter. To him the Sun in his daily journey was a very regal personage, possessed of great power and surrounded by other powerful spir¬ its, warriors, faithful servants and followers ; while the Moon was the sovereign lady of the night. The Sun and the Moon and the Stars were relatives and ruled the heavens, a region sometimes above, sometimes below that of the Thunder Spirits. The Four (or six) Winds were the Cloud-pushers and they ruled the Four Quarters of the earth. They sent the Spring, the Summer and the Winter, heat and cold, and they were generally the benefactors of mankind. To the Indian mind it was self- evident that the rivers, streams, lakes, oceans, plants and mountains had life, for were they not continually manifesting their activity in some way or other? And as the hills were the children of the mountains they must also necessarily be living beings. The Indian mind was ever awake to the voices of these sentient beings, the creation of his own' imagination and want of knowledge. For him they whispered, spoke, whistled, chanted, they moved rest¬ lessly, they crept, they ran, they leapt, they jumped, they rushed with the force of a hun¬ dred armies and their roar drowned the mightest shout of the biggest war party. And they fought and struggled among them¬ selves with greater fierceness, with mightier intensity and with more fearful weapons than the cunning of the wisest Indian tribes had been able to devise. Necessarily they could not do all this unless they were endowed with life. This life was essentially the same as that of the Indian for he knew of no other and could picture no other. He accounted for the extraordinary power of the various phases of nature by picturing them as pos¬ sessed of great magic (medicine). These magic powers he extended alike to animate and inanimate objects; for as they were a thing apart from the being possessing them, and were in themselves supernatural beings, it was just as easy for them to reside in a dead stump as in a live tree, in a sleeping hill as in a heaving volcano, in a placid lake as in a roaring cataract. These unseen powers were constantly at war with one another and with mankind; and they had to be fought like the other enemies of the human race or placated when possible. The natural way to fight them was with their own weapons, incantations, charms and the whole paraphernalia desig¬ nated by the Indian as ˆmedicineT So about this idea of a universal, actual life throughout all nature sprang a vast mass of myths, tradi¬ tions, folk-stories, ritual and ceremony which constitute a very important part of the mythol¬ ogies of the races of the American continents. The priests or medicine men were the inter¬

preters of the religious and philosophical knowledge of the tribes. They were also, for the most part, the depositories of the super¬ natural agencies to be used in the struggle which man was constantly waging against the supernatural powers by which he was sur¬ rounded. Hence the religious ideas of the Indian races are always associated with their philosophy, their attempts to account for the origin of the universe and all that is con¬ tained therein, together with the various forms of animate and inanimate nature, the peculiar habits, shapes, markings and characteristics of fishes, reptiles, birds, other animals, men and the imaginary creatures who peopled the wa¬ ter, the air and the earth with the regions round about its outer edge, below it and within it. The Indian accounted, by means of a heterogeneous mass of myths and stories, for the position, form, color and shape of mountains, hills and valleys, of forest- covered lands and barren wastes, of smooth, water-washed . seacoast and wild, wind-swept, desert sand-dunes. Everywhere he has writ¬ ten his peculiar mode of thought and his primitive culture upon his institutions, his myths and his stories. But to understand these we have to be able to place ourselves in his position and to see through his eyes that curiously-real world of fancy that populated his universe.

Metamorphosis. — The belief in the power of certain enchanters to take upon themselves at will the forms of animals, fishes, birds, flowers, plants, sticks, stones and other ob¬ jects was general throughout the American continents. Sometimes it was not an indi¬ vidual but a whole tribe that possessed this power. Animals could also metamorphose themselves. The Supernatural People who are sometimes identified with the souls of the dead and sometimes looked upon simply as strange non-human beings are, in Indian myths, fond of assuming the forms of animals. Thus Wakiash, the Kwakiutl hero, on his long journey in search of knowledge to im¬ part to his tribesmen, came to the village of the Supernatural People just as they were holding a great animal dance. He inadver¬ tently restored them to their human form and gained a great store of information from them. This belief in metamorphosis fits in with that of the Indian doctrine of the uni¬ versal wisdom of all created things, their re¬ lationship to man and their close communion with him. It is quite common among the In¬ dians of the United States and Canada and it is one of the most familiar features of their myths and stories. Even in much more cul¬ tured Mexico and Yucatan the people firmly believed that the priests could change them¬ selves into dogs, pigs, tigers and other beasts. Any one encountering them in this form was almost sure to meet with sudden death. Women giving birth to misshapen children were thought to have been bewitched before childbirth by one or

more of these sorcerers. Even the dead are believed by various Ameri¬ can tribes to have the power of assuming many forms by means of their great sorcerer knowledge, thus making themselves doubly powerful, fearful and dangerous. This be¬ lief was carried even further. The sorcerer could not only change himself into innumer-

able shapes, but he could visit the land of the dead and marry the dead; and spirits from the land of the dead were universally believed to have carried off young women and made them their wives and to have had children by them. The Sun, the Moon, the Evening Star, the Wind Gods and the Thunder Spirits fre¬ quently visited this earth and made love to earthly women and begot children earthly in form but possessed of the wonderful powers and attributes of their divine parents. Hia¬ watha's grandmother fell from the moon, and his mother, born upon earth, was be¬ trayed by the handsome West Wind. Though born upon earth, Hiawatha inherited all the powers and attributes of his divine parents. From his mother he received the arts of heal¬ ing and of producing growth, and through his father he had all the active qualities inherent in the winds and was the messenger bringing supernatural knowledge to his people.

As the inherent power of animals, men and spirits was essentially the same in all cases, everything done by a power greater than man's was accomplished by means of magic. Even the greatest of the gods and the most terrible and powerful of spirits from the Land of the Supernatural People were no excep¬ tion to this rule. Hence they could be and frequently were overcome by magic greater than theirs. The powerful magicians of the earth went to the land of the dead and even to the home of the gods and overcame the most powerful of the spirits of the Super¬ natural Lands. When the spirits of the clouds and the air withheld the rain the most re¬ nowned medicine men of the tribe with their strongest ˆmedicine® were called upon to over¬ come them and to force them to comply with the wishes and supply the necessities of man. Frequently the whole tribe was summoned to take part in these incantations on the principle that each member of the tribe possessing his own special aiding spirit, the whole combined ought to be more effective and powerful by adding it to the knowledge and dread formulae of the priests. This cojoint power of the tribe is very important when it is remembered that upon it depend, in the Indian imagina¬ tion, their enjoyment of rain in season, har¬ vests, good and bad weather, sunlight, heat and cold,

sickness and health, life and death, and even the rising and setting of the sun and the moon and the regular coming and go¬ ing of the seasons. Upon the placation of the non-human spirits or the contravention of their magic evilly directed depends also the fertility of the human race, and hence its pres¬ ervation. So young girls about to be married and sterile women resorted to magic to assure that fertility for which they longed. These generally took the form of prayers and power¬ ful incantations and offerings to the Moon Goddess, the greatest of the divinities of growth.

Province of the Myth. — Story-telling was common among most of the American Indians. This is a general characteristic of savage and barbarous races. It is the evidence of their social and intellectual progress. Before the popularization of education man perpetuated his acquired knowledge in the form of stories, whether in prose or verse. The whole body of these stories contained his philosophy of

life, his customs, his traditions, his history and his explanations of all the phenomena of nature. At the time of the discovery of Amer¬ ica the races of the New World were some of them in the stages of savagery and others in the advanced stages of barbarism. So a wide stretch of the highway to civilization separates the lowest of the American races from the highest. Yet they are all distin¬ guished by certain racial characteristics whose ear-marks are constantly in evidence in their social and religious systems, in their presenta¬ tion of scientific truths and in the general aspect of their very numerous myths and folk¬ tales. Even in Mexico, Central America and the west coast of South America, where sev¬ eral races had attained to a comparatively high degree of culture and become acquainted with many of the elementary principles of science, the masses of the people still dis¬ played, at the time of the conquest, an all- reaching, unreasoning credulity. The origin of the world, the creation of the human race and the lower animals, the vegetable and in¬ animate kingdoms, the sun, the moon and the other planets and their movements ; the pecu¬ liar markings and characteristics of animals, the typical customs and institutions of men, language, medicine, social and religious insti¬ tutions, all knowledge in short, are explained by the American Indians by means of myths and stories. To these we must go if we would read aright the past and the present of the Indian. There and there only have we the privilege of examining his philosophy and studying his scientific knowledge, his religious beliefs, his social polity, his code of morality and his general attitude toward the mysteri¬ ous world in which he lived and struggled. They teach us that the tribe of the stars, of which the sun was the father and the moon was the mother, ruled the upper heavens ; that the Thunder

Spirits, in various forms, peopled the lower air and the tops of the highest mountains, while the four great winds ruled the four parts of the earth. On the earth itself the various spirits of growth and germi¬ nation carried on their beneficent work for all sentient beings, while within the earth were confined, by magic, other mysterious be¬ ings, which assumed varying forms and attri¬ butes with different tribes. The Indian myths show us the relation of all of these beings to one another, to man and to the great magic found everywhere throughout the universe. They introduce us to the imprisoned spirits in mountains, trees, plants, stones and rocks ; to the powerful beings who guarded the fire and the water and they show us how primitive man overcame them and secured the elements he lacked in his progress toward a higher life. To the Indian imagination all these regions and beings were terribly real. There are evi¬ dences in plenty that a tendency to combine, assimilate and rationalize all Indian knowledge and beliefs, according to the method of reason¬ ing of savage and barbaric man, has been at work for many centuries. The myths and customs, political, social, economic and reli¬ gious, overlap, mingle and apparently contradict one another. They exercise their influences in various ways and through distinct mediums. The tribal story-teller, the slave, the hostage, intermarriage between tribes, the union of

%

clans for defense or other purposes, the blend¬ ing of races through conquest or the peaceful absorption of one tribe by another, all aided in the mixing of myths and folk tales and the blending of customs and beliefs ; so that, in the study of the myths of the American conti¬ nents, we arc confronted with a tangle of threads of myth, legand, story, custom, reli¬ gious beliefs and practical supersitions. Yet amid this tangle the parent myth is often dis- cernable. The cycle of stories relating to Nanabozho, the great culture hero of the Al- gonquins, is one of these. This myth, with slight variations, is or was the common prop¬ erty of the many tribes and sub-tribes of the Algonquin race, and similar myths are to be found in neighboring tribes.

Superstitions in regard to Animals. — Most of the Indian races of the North American continent had a peculiar superstitious fear of animals, which they believed exercised a strong influence over their lives, their well¬ being and their ill-being. There were a num¬ ber of ways in

which this animal power might be contravened. Incantations and prayers, charms and other shamanic medicines were often effective and a piece of the animal feared carried about the person was generally strong medicine in warding off the threatened danger. This belief, which was not peculiarly Ameri¬ can, survives among white people in the cus¬ tom of carrying a rabbit's foot or similar charms against ill luck. And we talk about working a rabbit's foot on some one. Among certain of the Algonquin tribes the rabbit's foot was looked upon as very strong medicine. The Indian hunter carried a rabbit's foot in his hunting bag and with it parts of the ani¬ mals he expected to hunt. This he believed was an effective way of preventing the spirits of the animals he killed from troubling him or doing him harm. This Indian dread of animals is well illustrated in an Algonquin myth, which is found in various forms among other Indian tribes. As man became more and more powerful through the knowdedge he had acquired and the weapons he had invented or secured, his power over the animal creation became more and more dominant. For this reason he was greatly hated by them. At last he slaughtered so many of them that, fearing extinction, they called a meeting of all their kind, with a view to devising some means to curtail man's power over them. Among the animals there were as great or greater medicine men than among men ; and they finally decided to visit upon the human race all the plagues known to their combined enchantments. Each animal medicine man was called upon to do his worst in this direction. The deer agreed to visit man with rheumatism, lumbago and all like muscular diseases ; the reptiles offered to trouble him wdth fearful dreams ; the poisonous animals agreed to pes¬ ter him with their stings and bites ; the birds contracted to affect him with lung troubles, coughs and colds ; while the insects agreed to inject into his system all sorts of malarial fevers. Thus came disease into the world. As this myth was ever present in the mind of the Indian hunter he was scrupulously exact in the observance of the means offered him to avoid such evil effects as were likely to come to him from the enmity of the animals he VOL. i — 35

killed in the chase. Many Indians would not kill the animal represented by the totem of their clan, while others were in the habit c begging the pardon of the animals they were about to slay, explaining to them, at the same time, that the killing was done only as an act of necessity. It was the firm belief of the Algonquins and other tribes that the deer had the power of visiting his slayer with lumbago, rheumatism and other similar diseases. This belief was no doubt largely influenced by the disease myth already related. The Crees and other Rocky Mountain tribes held the same belief with respect to the

bear; and they also begged his pardon and addressed him as broth¬ er before killing him. Western tribes and the Plains Indians believed that certain of the bird tribe had the power of bringing trouble upon mankind ; and numerous myths deal with the means used to divert the danger. Some of these gradually became elaborate ceremo¬ nials.

How a Knowledge of Medicine Came to Man. — It is good to have the chipmunk near the home because he has always been the friend of man and brings good luck with him. He rode wdth Hiawatha on the bow of his self-moving, wonder-made canoe, and the In¬ dian prophet called him his (<very good friend.® The Indian will never kill a chipmunk because, after man had been visited with a plague of diseases by the animal council, the chipmunk alone among all the animal creation was sorry for him ; so he went among the trees and plants, told them what had happened, represented vividly the wretched plight of his good friend man and obtained their help to fight the new plagues. The pines, the balsams and the spruces gave their gums and balsams, the slip¬ pery elm its bark, the sassafras its roots, the mandrake its apples, the wintergreen its ber¬ ries and the catnip and bonset their teas to cure colds. Ginger, gentian, sarsaparilla, pep¬ permint and all the medicinal plants each helped in his own way; and the little chip¬ munk or ground squirrel it was who brought all these remedies to suffering mankind. So it is quite natural that he should take a quite peculiar and proprietary interest in the human race; and it is only reasonable that humanity should remember its debt to him.

Fetishes. — The fear of the secret power of animals exhibited by the American Indian ; his belief in their superhuman attributes and his conviction that these powers can, under proper control, be used to his own advantages, are embodied in the use of amulets or fetishes, which are thought to be the seat of magical power, actually or symbolically. The eagle, the most powerful member of the feathered tribe known to the Indian, was supposed, un¬ der certain conditions, to possess magical powders. He was the representative of the Great Thunder Bird to the Plains people ; and as such was held in great respect. His feathers constituted the badge of honor most highly esteemed by the Indian chief over a wide ex¬ tent of United States and Canadian territory. It is quite natural, therefore, that his talons, the symbols of his power, should constitute powerful fetishes ; and as such they were carried by many a brave on his war expedi¬ tions. The fetish, which nearly always con¬ sisted of some object, could be transferred,

bought or sold. It therefore formed an article of some considerable importance in Indian commerce. According to a Zuni myth, in the early days, the animals of prey were possessed of great strength and cunning; and as they were at eternal enmity with the human race ic was in great danger of disappearing from the earth. So the Two Gods struck many ani¬ mals with lightning from their magic shields and turned them into stones. They allowed them to preserve, in their new condition, all their former qualities, attributes, powers and virtues in a quiescent state, without the power to exercise them for harm to man; but they were permitted to use these powers for his benefit when they felt so disposed. This is why a fetish of one of these transformed animals is often very efficient in bringing luck to the possessor. This luck, however, depends upon the will of the spirit enclosed within the fetish itself, whose attitude can only be learned by experiment. So the Indians were constantly experimenting with fetishes; and those which were found not to be well dis¬ posed to help their possessors were discarded, sold, traded or exchanged for others. This fate happened to tribal as well as personal fetishes ; for one of the most precious posses¬ sions of the tribe or clan was its traditional fetishes, handed down for generations and having attached to them wonderful myths and stories of their origin, history and magical powers together with many folk-tales of the help they had brought, from time to time, when their aid was urgently needed and solic¬ ited. Thus it will readily be inferred that a fetish which was not disposed to help one per¬ son or tribe might be all powerful when in the possession of another; since it was only a question of willingness on its part.

A great number of stock fetishes like the eagle's talons, the feet of the rabbit, the paw of the bear, the teeth of the tiger and the most symbolical parts of other fierce animals were suggestive of the natural and super¬ natural qualities of the animals to which they belonged. Among many tribes the rabbit fe¬ tish was even more feared than those of the fiercest of animals; for he obtained his repu¬ tation as a necromancer on account of his be¬ ing the totem of the culture god Nanabozho, one of the greatest of magicians known to Indian mythology. The survival of the rabbit superstition is still strong among the Indians of the Plains and of the wooded countries to the north and east. Half-breeds of the Cana¬ dian Northwest and the negroes of the South of the United States alike have assimilated the Indian faith in the efficacy of the rabbit's foot. It was and still is an Indian belief that the fetish, in return for the good done its possessor, demanded special deference and attentions in the shape of prayers, incantations and sacrificial offerings, which were duly given it. Great festivals were

often held by the tribes in honor of the tribal fetishes. Many of the so-called ornaments of the American Indians were primarily fetishes. It is there¬ fore very difficult to draw the line which separates the fetish from the ornament. The many legends of talismanic jewels so implic¬ itly believed in during the Middle Ages and even in more recent times, among all classes and races in Europe, show that the fetish, in

becoming purely ornamental, still retained, in the minds of many, in particular cases, its traditional powers. The tribal fetish, like the oyraon, guiding spirit of the Iroquois, might be, and frequently was, revealed in a dream or vision or in some miraculous way; and often the Indian youth, when performing the fasting customary before entering upon the duties of manhood, had one or more powerful fetishes revealed to him. Sometimes he was favored with one or more of these which had the ability and the will to help the whole tribe. In such cases the youth was sure to become a medicine man of note; which did not pre¬ vent him also becoming a great warrior. In this way some of the fetishes contained in the medicine bags of the medicine men were obtained. While the objects in the medicine bags were symbolical of ritualistic ideas, many of them, if not all, are supposed to have been fetish in origin and powers.

A fetish may be a stone, a rock, a piece of wood, an arrow-head, a feather, in fact anything. It may have real power residing within itself as in the case of a rock or stone; it may derive its power from being a part of a well-known whole, as the feather of the eagle; or it may have a power derived from its symbolism, as the foot of the rabbit, the totem of a divinity. The fetish associations may make a hero of one of the most stupid of ani¬ mals, as in the case of the rabbit just cited; around which have been woven countless stories, in which the totem of Nanabozho is generally the hero and the conqueror on ac¬ count of his natural shrewdness, his cunning and his miraculous powers. Trophies obtained from slain enemies often proved most effective fetishes ; and it is very probable that the scalp taken by the American Indian from his fallen foe was primarily looked upon as a fetish, since numerous superhuman Indian characters could be wounded only in the crown of the head; or, in other cases, like Sampson, their strength resided in their hair. This myth was as widely spread in America as in Europe and Asia.

Ceremonies. — The many Indian ceremonies observed throughout the American continents until quite recently covered a very wide field of relationships of society, of the individuals to society as a whole and to one another. They referred to birth, childhood, manhood, mar¬ riage, death and every important movement of life. The ceremonies,

however, are naturally largely taken up with the food supply, war and the preservation of the tribe and the individual from the dangers that threatened them from the magic power of ill-disposed magicians. This latter include the means taken to assure mankind against disease, always caused by the wiles of the enchanter who send evil spirits into. the human body. Among the more cul¬ tured tribes elaborate ceremonies are made use of to pay due deference to the most revered or feared of their divinities. The ceremonies of the American Indian are ritualistic and the order of the ritual must be implicitly followed to assure results. Ceremonies consist of two classes — secret and public. In the 'former only the initiated can take part while in the latter the whole tribe may, in most cases, participate. The secret ceremony is nearly always prepara¬ tory to the public ceremony. In it are pre-

pared all the paraphernalia to be used in public by priest and layman, such as dresses, masks and other distinctive markings, upon which is placed the stamp of sacredness belonging to all things and ceremonies connected with the Sacred Tepee. Ceremonial smoking, prayers and sacrifices form a part of the secret cere¬ monial. An altar almost always occupies a prominent position in the place of ceremonies and on it are laid symbolical representations of the chief tribal gods, of the Spirits of the Four Winds (or six) and the Four Quarters of the World governed by them, of vegetation, thunder, lightning, the rainbow and other per¬ sonifications of the more prominent phases of nature. Possessions of priests, traditional and tribal songs, music and dancing accompanied by rattles, drums and whistles, costumes of special ceremonial significance, tattooing and body painting form part of the ceremonial of a tribal festival. Each distinct ceremonial per¬ formance has its own ritual, costume, dances and symbolical representations. The more cul¬ tured the Indian tribe or nation the more numer¬ ous and complex the ceremonies. The Peru¬ vians,, the Aztecs, the Mayas and other cul¬ tured races of Mexico, Central and South America and the Pueblo Indians had a net¬ work of ceremonies which covered from a fourth to a half of the year; and symbolized almost every conceivable activity of life. They began even before the child was ushered into the world and continued after the indi¬ vidual was dead and buried. The Hopi Indians still have 13 great ceremonies each of nine days' duration, all of which are performed with a very elaborate obligatory ceremonial ; and, in addition to these, they have others which cover only one day. As their land is dry the rain god plays a very prominent part in all their ceremonies. In ceremonial

significance, vari¬ ety, richness of detail and strictness of rit¬ ualistic observance these tribal festivals of the Hopi Indians are equalled on the American continents only by those of the civilized na¬ tions of Mexico, Central America and Peru at the time of the conquest. The ceremonies of the American races vary widely between the broad extremes of extended symbolism just instanced and the almost purely medical dances of some of the more primitive of the tribes. Among other tribes, as the Kwakiutl, the ceremonies are almost altogether priestly functions, as they were in Mexico and Central America.

The Sun-Dance is a ceremony in use among all the Plains Indians, some of whom observe it as an annual event in the tribal life, while among others it is resorted to only on some special occasion. It lasts from one to 8 or 10 days and is generally held about the time of the summer solstice. The first days of the ceremony are devoted to the rites of the sacred (secret) tepee and the others to public ceremonies in which all the members of the tribe take part, in varying capacities according to their rank, age and relationship to the tribal traditions and ceremonies. The sacred tepee rites commemorate and repre¬ sent the acts originally performed by their inventor on the Sacred Mountain. The Sun Dance of the Plains Indians had its origin in days of famine now long past. An Indian with his wife went into a mountain, where he

fasted, prayed and met a great medicine man- itou . from whom he learned the sacred cere¬ monies of the Sun Dance. Returning to his tribe he performed these ceremonies and the famine ceased, for the buffalo came in vast herds covering all the plains. At the time of the holding of the Sun Dance the rank of the chiefs was renewed, the young chiefs were singled out for their bravery and publically commended, and the dead were remembered. Often, too, it was a season for renewing tribal friendships. The ceremonies included a ven¬ eration of the Four Earth Quarters; special honor was paid to the Sun as the Great Mystery and the (<Very Great Medicine Man Above.® He was represented by symbolical characters painted upon the centre pole of the tepee. In the dance ceremonies four old men represented the four wind gods of the four quarters of the world ; while all the dancers wore wreaths symbolical of the Sun, the Moon, the Morning Star and the Four Wind Gods. Whistles were frequently used to symbolize life (the wind in its active mood), and the call of the Thunder Bird from out the clouds driven by the winds, the Cloud Pushers. The whole dance ceremony formed a great aboriginal dramatic representation, a far-reaching and wide-influencing myth de¬ veloped under the influence of the priestly class to keep vividly alive the tribal traditions em¬ bodied in the acts of the several days of

the dance.

The Thunder Bird, which was symbolically represented in the ceremonies of the Sun Dance, is a personification of the thunder and the lightning. The myths relating to it cover a vast, extent of territory stretching from the Atlantic to the Pacific. Sometimes the myth presents one great bird, sometimes several, in the latter case all of different colors. In gen¬ eral the Thunder Bird was the helper of man, and in this respect he may be classed with the culture heroes ; for to him the culture gods of the Pacific were beholden, on several notable occasions, for the things which they taught mankind. Wakiash, the great hero god of the Kwakiutl, made his memorable journey down the Pacific coast countries on the back of the Great Thunder Bird whom he met in the mountains after a long fast, prayers and other observances preparatory to becoming a med¬ icine man ; and it was with the aid of this same supernatural agent that he was enabled to bring back with him the first totem pole and house known in the land of the Kwakiutl. See also Folk-tales and Myths of the American Indians.

Bibliography. — Bancroft, H. H., (Native Races) ; Barratt, Joseph, <The Indians of New England and the North-reastern Provinces) (Middleton 1851) ; Beach, W. W., (The Indian Miscellany5 (Albany 1877) ; Bell, A. W., (On the Native Races of New Mexico5 (London 1869) ; Boas, Franz, (Songs and Dances of the Kwakiutl 5 (Boston 1888) ; (The Mythology of the Bella Coola Indians5 (New York 1898) ; Brinton, D. G., (Myths of the New World) ; Cushing, F. H., (Zuni Creation Myths5 (Wash¬ ington 1896) ; Dixon. R. B., (Maidu Myths5 (New York 1902) ; Dorsey, G. A., (Arapaho Sun Dance5 (Chicago 1903) ; Emerson, E. R., Hndian Myths5 (Boston 1844) ; Hale, Horatio, Hroquois Book of Rites5 (Philadelphia 1883) ;

Leland, C. G., (Algonquin Legands of New England) (Boston and New York 1885) ; Mathews, W., (Navaho Legends) (Boston and New York 1897) ; Mooney, James, (Myths of the Cherokee) (Washington 1900) ; School¬ craft, H. R., (Algic Reseaches) (New York 1839) ; Simms, S. C., (Traditions of the Crows) (Chicago 1903) ; (Stevenson, M. C., (The Zuni Indians) (Washington 1904).

John Hubert Cornyn, National University of Mexico.

AMERICAN NATIONAL PARTY. See

American Party.

AMERICAN NATIONAL RED CROSS.

See Red Cross Societies.

AMERICAN NEWSPAPERS. See

Newspapers, American.

AMERICAN NOTES, a work by Charles

Dickens, published in 1842 and embodying his impressions of the United States.

AMERICAN NUMISMATIC AND ARCHAEOLOGICAL SOCIETY, an asso¬ ciation organized 1858, incorporated 1865. Its objects are the collection and preservation of coins and medals, the investigation of matters connected therewith, and the popularization of the science of numismatology; also the collec¬ tion, examination and elucidation of the an¬ tiquities of this and other countries. Member¬ ship about 300. See Numismatics.

AMERICAN ORNITHOLOGISTS UNION, an association organized in 1883 for the advancement of its members in the science of ornithology. Membership, 825. It issues a quarterly magazine, The Auk. See Orni¬ thology.

AMERICAN PAINTING. See Ameri¬ can Landscape Painting; Painting, Ameri¬ can.

AMERICAN PARTY, the name of three separate political organizations in the United States.

1. The only one of great importance, usually styled ˆKnow-Nothings.® The genesis of this party lay deep in the nature of American set¬ tlement and history. The Constitution crystal¬ lized political parties definitely into Federalists and Anti-Federalists : the one upholding firm government on the general European model, with the local aristocracies in the ascendant ; the other desiring the least possible govern¬ ment of any sort, and no upper-class ascend¬ ancy. Immigrants who had left Europe because of too free indulgence in freedom of speech, thought and action, allied themselves with the Anti-Federalists,

which led the incensed Fed¬ eralists, on gaining power in 1795, to raise the term for naturalization from two to five years, and in 1798 to 14 years, besides passing the Alien and Sedition Laws (q.v.). The Republi¬ cans, coming into power with Jefferson in 1801, in 1802 repealed the obnoxious acts and restored the term to five, swelling their ranks for years with a relay of acrid foreign democrats. Six members of the Congress which declared the War of 1812 against Great Britain were mem¬ bers of the Society of United Irishmen; and the Federalist Hartford Convention of 1814 brought forward a provision against aliens hold¬ ing office. Quiescent for many years, the move¬ ment revived (1835) in New York city, where

a compact and clannish foreign body of immi¬ grants, avid of office and openly allying them¬ selves as foreigners against the natives, was accumulating; one procession bore a transpa¬ rency lettered <(Americans shan't rule us.® The religious question wras also then, as since, a formidable factor in the trouble. In 1843 the Democrats carried the city by a close vote, and distributed the majority of the offices to foreigners, with the result that in the November election for state senator an (<American Re¬ publican® candidate polled nearly a fourth of the vote, and the next spring a <(Native Ameri¬ can® candidate defeated the Democrat by 4,000, and the regular Whig party nearly vanished in the city. The excitement spread to New Jersey and Philadelphia; riots between natives and foreigners cost some lives and much property, including two Catholic churches. The Whigs voted with the Native party to secure its vote for Clay; but finding that its resulted in Native local officials and Democratic presidential ma¬ jorities, drew off, and by 1847 the Native party had pretty much disappeared. Clay in 1844 had six Native American electoral votes, four from New York and two from Pennsylvania; and for some years the Middle States cast small votes for the party.

A new birth came to it about 1852. The Fugitive Slave Law of 1850 had largely dis¬ solved and recombined both Whig and Demo¬ cratic parties, and those of the former who wanted the status quo on slavery without public agitation cast about for a new issue to keep their organization together. The Native Ameri¬ can issue was temptingly at hand, and indeed had never ceased to be a sore in the Whig mind. The tremendous flood of foreign immigration set going in part by the Irish famine of 1847, in part by the revolutionary movements of 1848-50 on the Continent, had kept a steady stream of reinforcements pouring into the Democratic party which almost swamped the Whigs and made it quite impossible to win elections except by fusions that sacrificed all political principle or consistency; they felt it a genuine wrong to the

native or long-resident classes, and there was nothing in the use to which the other party put their victories to make them feel otherwise. They now de¬ veloped a secret oath-bound society whose real name was <(Sons of 76, or Order of the Star- Spangled Banner® ; but its name or precise object (of course they knew its general aim) was not revealed to members till the Hodges,® which they instituted in imitation of the Masons, had raised them to the higher degrees. Hence their stock answer to questions concern¬ ing it was <(I don't know,® which became the popular motto of the order and gave them the nickname of <(Know-Nothings.® The evils it <(viewed with alarm® were the increasing power of the Roman Catholic Church, the vast sudden flood of immigration which was taking the control of the United States out of the hands of its citizens, and the greed of foreigners for office which greatly multiplied the danger from their actual number. Its motto, or at least the essence of its principles, was ((Americans must rule America,® — doubtless with a reminiscence of the foreign motto before mentioned ; and the countersign at its lodges was an order said to have been issued by Washington at some un-

specified occasion, "Put none but Americans on guard to-night.® It acted in politics, not by put¬ ting up separate tickets, which would have kept tally on it and given the other parties a clear target and open victory, but by endorsing select¬ ed candidates of the others in secret convention of delegates from lodges, at which every member must vote or be expelled. This could not be known till election, and hence made havoc of all political calculations and left the workers beating the air. The Kansas-Nebraska Bill, which extinguished the Whig and created the present Republican party, and made the slavery issue one of life or death, drove into the Know- Nothing party a vast number of the moderate section not yet ready to oppose the South; it now took or was given the name of the Amer¬ ican party, and came into the open field. In 1854 it carried Massachusetts and Delaware and polled over 120,000 votes in New York State. Thus far it had been almost wholly a Northern party; but in 1855 it made deep inroads in the South as well, where foreigners were few and the issue was locally innocuous. In that year ii elected the governors and legislatures of New Hampshire, Massachusetts, Rhode Island, Con¬ necticut, New York, Kentucky and California , the controller and legislature of Maryland and the land commissioner of Texas; and narrowly missed carrying the legislature of the latter, and those of Virginia, Georgia, Alabama, Mis¬ sissippi and Louisiana. But even at this time, when it

was sweeping all before it, and the con¬ servatives of both parties were crowding into it panic-stricken to avoid the real issues hurry¬ ing the country to the precipice, keen observers saw its hollow ephemerality : Horace Greeley of the New York Tribune said that “it contained about as much of the elements of permanence as an anti-cholera or an anti-potato-rot society.® With 1856 it came into the national field, and for slavery tried to substitute terrific visions of a revival of the terrors of the Inquisition ; de¬ nounced Archbishop Bedini, the papal nuncio, as an emissary of diabolic designs; and forced public discussions in which all the misdeeds of the mediaeval Christian Church before and after 1520 were recounted. February 1856 a national nominating convention was held at Philadelphia; and its outcome, to the disgust of the majority, turned on slavery after all. A secret “grand council® held a session 19-21 February to draft a platform; and after three days of' violent contention reported as part of it this curious “straddle,® in later political slang: That all public offices should be given to native-born citizens, and the term before naturalization be 21 years; that “all laws® (that is, the Fugitive Slave Law) should be enforced till repealed or declared unconstitutional ; that Pierce’s administration be reprobated for re¬ pealing the Missouri Compromise ; and that State councils be recommended to drop their “degrees® and substitute a pledge of honor from members,— that is, that it cease to be a secret terror to other parties and be one itself. But this meant death, as did its absurd attempt to gain Northern votes by opposing the Kansas- Nebraska Bill, and Southern votes by upholding the Fugitive Slave Law. In the open conven¬ tion of 22 February, 50 Northern delegates of¬ fered a resolution that the secret grand council could not bind the convention by a platform; and on its rejection withdrew. The convention

then nominated Millard Fillmore of New York for President, and Andrew Jackson Donelson of Tennessee for Vice-President; and the Whig national convention later adopted the nomina¬ tions, but made no reference to the platform. In the spring of 1856 the party still increased its power, there being only local issues at stake ; New Hampshire and Rhode Island elected “American® governors, making eight of the 32 States in their hands. But the presidential election showed what a phantom the party was : Fillmore gained the electoral vote of but one State, Maryland, with eight electors ; the popu¬ lar vote was 874,534 out of a total of 4,053,967 ; and in New Hampshire it sank from 32,119 for governor in spring to 422 in face of the real issue. It elected 15 or 20 Congressmen, car¬ ried Rhode Island and Maryland State elections in 1857, and in the Senate of December had five members. In the Congress of 1859 it had become a Border State

party, with one Senator from Kentucky and one from Maryland, and 23 Congressmen, — three from Maryland, five from Kentucky, seven from Tennessee, one from Virginia, four from North Carolina, two from Georgia and one from Louisiana. In the campaign of 1860 its members largely made up the Constitutional Union (Bell-Everett) party, which tried to avert the war. The party was by no means without its use : it brought forward many strong leaders who did good service in the real parties when the issues had shown themselves inevitable.

1. A party directly adverse to the first in being founded on opposition to secret societies : organized by the National Christian Association at the adjournment of its convention at Oberlin, Ohio, in 1872. Organization was completed and the name adopted at a convention in Syracuse, N. Y., in 1874. At Pittsburg, 9 June 1875, a platform was adopted demanding recognition of the Sabbath, introduction of the Bible into public schools, prohibition of the sale of liquors, withdrawal of the charters of secret societies and prohibition of their oaths, inter¬ national arbitration, restriction of land monopo¬ lies, resumption of specie payments, justice to the Indians and direct popular vote for Presi¬ dent and Vice-President. James B. Walker of Illinois was nominated for President. In 1880 it again made nominations ; in 1884 S. C. Pome¬ roy was nominated but withdrew in favor of John P. St. John, the Prohibition candidate.

2. A party organized at a convention in Philadelphia, 16-17 Sept. 1887. Its platform de¬ manded a 14-years' residence for naturalization ; exclusion of anarchists, socialists and other dangerous characters ; free schools ; the build¬ ing of a strong navy and coast fortifications, and internal improvements ; prohibition of alien proprietorship ; permanent separation of church and State; and enforcement of the Monroe Doctrine.

Forrest Morgan, Connecticut Historical Society.

AMERICAN PATRIOTIC SOCIETIES.

See Patriotic Societies.

AMERICAN PEACE AND ARBITRA¬ TION LEAGUE. The corporate purposes of this organization favor universal peace by con¬ ciliation and arbitration through a permanent international court, arbitration treaties between

all nations, and adequate armament for national security.

AMERICAN PEACE SOCIETY. This

society was organized in New York city 8 May 1828, and was formed by the merging of many State and local societies, the oldest of which, The New York, dated back in 1815. Located in Boston from 1837 to 1911, headquarters were removed to Washington, D. C., 1 May 1911.

AMERICAN PHILOLOGICAL ASSO¬ CIATION, a society inaugurated by William D. Whitney, of Yale, at Poughkeepsie 1869 as an outgrowth of the Oriental Society, Classical Section. Its object is the <(advancement and diffusion of philological knowledge® ; it pub¬ lishes an annual volume of transactions *and also (Proceedings,* detailing its meetings and giving titles of papers ' presented. It has a membership of some 718.

AMERICAN PHILOSOPHICAL SO¬ CIETY, The, is the oldest scientific society in America. Benjamin Franklin, in his Auto¬ biography^ states that in the year 1727 <(I united the majority of well-informed persons of my acquaintance into a club which we called the Junto, the object of which was to improve our understandings.® As the population of the colonies grew, Franklin saw the need of another society of larger scope and usefulness than the Junto; therefore, in 1743, he issued a circular, entitled (A proposal for promoting useful knowledge among the British plantations in America,* in which he urged ((that one society be formed of virtuosi or ingenious men resid¬ ing in the several colonies, to be called The American Philosophical Society, who are to maintain a constant correspondence. That Philadelphia, being the city nearest the centre of the colonies, communicating with all of them northward and southward by post, and with all the islands by sea, and having the ad¬ vantage of a good, growing library, be the cen¬ tre of the Society.®

The proposition was favorably received, and in the following spring Dr. Franklin wrote to Gov. Cadwallader Colden, of New York, that the Society <(is actually formed and had had several meetings to mutual satisfaction.® He gave a list of the members, and added that Hhere are a number of others in Virginia, Maryland, Carolina, and the New England colonies who we expect to join us as soon as they are acquainted that the Society has begun to form itself,®

In January 1769 .this Society united with the Junto, which had in the meantime changed its name to ((The American Society held at Philadelphia for promoting Useful Knowledge,® and the united societies took the fused name of the American Philosophical Society held at Philadelphia for Promoting Useful Knowledge,® and elected Benjamin Franklin its first president, and he held this office by successive annual re-elections until his death in 1790.

The Society at once entered upon arrange¬ ments to carry out a notable scientific under¬ taking of great magnitude for those days, namely, to make observations of the expected transit of Venus in the following June — a rare phenomenon which had not occurred for 130 years and would not recur for 105 years. It erected three temporary observatories and

appointed a committee, of which David Ritten- house was the head, to have charge of the ob¬ servations. On the day of the eclipse the weather in northern Europe was cloudy, but in the neighborhood of Philadelphia it was per¬ fectly clear, and a high European authority has said that (<the first approximately accurate results in the measurements of the spheres were given to the world, not by the schooled and salaried astronomers who watched from the magnificent Royal observatories of Eu¬ rope, but by unpaid amateurs and devo¬ tees to science in the youthful province of Pennsylvania.® The results of these observa¬ tions were printed in the first volume of the Society's transaction,* published in 1771. The publication of the quarto < Transactions * still continues, and in addition the society publishes (Proceedings * in octavo form.

Franklin was succeeded in the presidency by David Rittenhouse, the eminent astronomer, who held the office for five and a half years, until his death in 1796, and he in turn was succeeded by Thomas Jefferson, who held the office until 1815, including the eight years of his incumbency of the Presidency of the United States. the tran¬ quil pursuits of science,® he wrote, were his <(supreme delight,® and the most exciting polit¬ ical duties could never withdraw him from them. Jefferson was succeeded in the presi¬ dency by Dr. Caspar Wistar, the eminent an¬ atomist, and subsequent incumbents were Dr. Robert Patterson, Chief Justice Tilghman, Peters S. Du Ponceau, Robert M. Patterson, Dr. Nathaniel Chapman, Dr. Franklin Bache, Prof. Alexander Dallas Bache, Judge Kane, Dr. George B. Wood, Frederick Fraley, Edgar F. Smith and Dr. William W. Keen.

The membership of the Society since its foundation has included names distinguished in science on both continents. The number of

members who may be elected in any one year is limited to 15 residents of the United States and three foreign residents. The election of members is held during the general meeting in April of each year. The ordinary meetings of the Society are held on the first Friday of each month, from October to May, inclusive. The Society possesses a library of over 65,000 vol¬ umes, which is specially rich in the files of the publications of the learned societies of the world, and is housed in a fire-proof building erected on Independence Square in the city of Philadelphia, on land granted to it by the State of Pennsylvania in 1785.

I. Minis Hays,

Secretary American Philosophical Society.

AMERICAN PLATE. See Silverware.

AMERICAN POLITICAL ISSUES,

1788-1852. By this term is here meant the issues which swayed the voters in the Presi¬ dential elections, and in the Congressional elec¬ tions of the Presidential years. These elections were the ((round-up® or register of the accumu¬ lated drift during the four years previous, and formed one of the influences deciding the drift during the next four. They fall into five periods: 1788-1800, 1804-12, '1816-20, 1824-40, 1844-52. In the first, the Federalists are in power; the controlling issues are those of strong v. weak government, and of deference to the educated classes v. the vox popnli. In the second, the Federalists are the opposition,

fling away the excuse for their existence, and after a casual sectional revival are extinguished. In the third, there are no issues and no party, properly speaking; the candidate is accepted by inertia from the old line of leaders, and the administration is able to grant the chief wishes of both the old sections. In the fourth, the former Federalist elements recombine under new names, with the basis of a strong pending and nationalizing government, replacing the dead issue of a strong executive one. In the fifth, the slavery question is the central issue.

1. — The division over candidates has usually and naturally coincided with the di¬ vision over policies; but in the first election, of 1788, it was not so. There was but one pos¬ sible

candidate, Washington; he represented all parties. He had seen the Revolution nearly aborted first, and the Confederation nearly wrecked afterward, by the weakness of the central government ; this confirmed his natural bias as a ˆnationalizing® Federalist, anxious above all things for a government which could keep order, pay its debts, and secure respect from other nations. On the other hand, as a Southern farmer, he commanded the confidence of that section, which distrusted the Northern commercial interests ; and as Washington, he was the idol of the masses everywhere. Furthermore, the very basis of the election had cut the ground from under the chief opposition party. The overshadowing issue, almost the only one, of the Confederation, — which had no president nor regular elections, but only scat¬ tering ˆby-elections® of Congressmen, — was whether it should be replaced by a stronger government; the adoption of the Constitution had settled that, and the Anti-Federalists were shut down to voting for the personnel to ad¬ minister a system they disliked and dreaded. Besides this, all their ablest sympathizers were Federalists for the time being, not from love of a strong government but experience of too weak a one; so that ((Federalist® for election purposes meant not so much a party as almost every one in the country of capacity, experi¬ ence, or business or intellectual standing.

2. — Again Washington was the unan¬ imous candidate. The same men substantially were sent to Congress; indeed, there were few Anti-Federalists to send who would not dis¬ credit and weaken the cause. But the Anti- Federalist voters had the less hesitation, be¬ cause their natural leaders had now begun to split away and lay the foundations of the Democratic-Republican party. Jefferson was the first to take a stand against the Federalist policy, in the matter of the Bank ; shortly rein¬ forced by Madison and Edward Randolph.

3. — Washington, who could have held the office for life, refused it further. There was now a contest over policies represented by candidates . identified with them, and each representing a section as well: John Adams stood for the Northern commercial States, with most to lose from conflicting local imposi¬ tions on commerce, or foreign depredations and restrictions which a weak government could not repel; Jefferson, the lifelong cham¬ pion of the extreme democratic principle, — the least government, the cheapest, and the most unshowy, possible, — stood for the mass of farmers, largely in the South and West,

who simply wished to be let alone and have no

taxes, and thought commerce of no benefit or concern to them. The latter also formed a part of the rapidly growing mass who resented the Federalist claim that political office needed any superior ability or training, and were eager to pass it around in rotation. Quite as strong as either was the sympathy of the masses for the French Revolution, which the Federalists detested. The latter won, but only by grace of two Southern electors and in reality by a single vote; they lost save for these the entire South beyond Maryland, and all but one elec¬ toral vote of Pennsylvania as well. In a word, the party had represented a temporary national necessity which was ceasing to be imperative, and a minority business interest; and as the former vanished, it was shrinking to the basis of the latter.

1. — For the personal feuds which rent the Federalists in twain, see Adams, John, and Hamilton, Alexander; but the influence of these in defeating the party is always overrated. If Hamilton had loved Adams like a brother, and all Adams' Cabinet had been loyal and united, the general result of the election would not have been different; unless we are to sup¬ pose that New York Federalists voted for Jef¬ ferson because their chiefs hated each other, or that the party's recent policy had gained it votes since 1796, which is notoriously the re¬ verse of truth. It had not only angered the Democrats, but displeased many of its own moderates, by the Alien Law for deporting all foreigners politically disagreeable to it, and the Sedition Law to shut the mouths of its oppo¬ nents (see Alien and Sedition Laws) ; the Hamilton wing had tried to force through a war with France to strengthen its domestic policy; the growing popular sentiment now was to make the United States a political island, severed from all relations with the rest of the world which would cause us difficulties. The election was decided for Jefferson by the re¬ versal of New York's 12 electoral votes: local feuds had something to do with it, Burr's politi¬ cal ((bossship® much ; but beyond all, the growth of the country was away from Federalism, and at best the party had not one electoral vote to lose without being displaced.

2. — Had the relations of the parties re¬ mained the same a£ in 1800, there is still no rea¬ son to think there would have been any return to a Federalist administration. From 1789 to 1797 their program had been not merely the best, but the only one as a whole possessing either utility, dignity or even safety; yet the disintegrating forces were so strong, and the squalor of the

Confederation so thoroughly for¬ gotten, that the party barely escaped expulsion in the very prime of its usefulness. Even in the next four years, its errors were trivial compared with its services, especially in creating the navy; yet it was beaten — not very heavily, but with incidents proving that its lost sections would not come back to it. But so far from the issues remaining the same, the Federalist representa¬ tives, with that egregious blindness to the sources of popular strength which is never seen except in (<practical politicians,® committed the amazing folly of attempting to tie their oppo¬ nents' hands by borrowing all their discarded doctrines. The Democrats in power had at once become converts to a strong government and a liberal construction of the Constitution ;

the Federalists, instead of outdoing them and claiming support as the originators of the policy, adopted the strict-construction theories and the decentralizing policy of their oppo¬ nents. The Democrats having appropriated the Federalists' strength, the latter revenged themselves by appropriating their enemies' weakness. This was especially glaring in the case of the Louisiana Purchase, an extreme Federalist measure, and by far the greatest title of Jefferson to the name of statesman: it is quite incredible that the Federalists should have opposed this, even as partisans, or as pos¬ sessing the rudiments of political common- sense. Their astute policy received its fitting reward; in 1800 Jefferson had won by 73 to 65; in 1804 he received 162 to 14.

1. — The Democrats, having had full powder to put in force their cherished theories of insularity and independence of international ties, at once proceeded to make a reductio ad absurdum of them, and hang them like a sack of stones about their town necks. Jefferson was placed between the upper millstone of the English right of search and impressment, ending in the bloody outrage of the Leopard on the Chesapeake (q.v.), and the nether of his own resolve not to fight, the disbelief of all parties alike in our ability to fight a naval war with England, and the determination of the North, which possessed most of the fighting resources, not to use them against England. He solved the problem by the Embargo (q.v.), which saved the need of fighting by sacrificing the commerce he did not value, and the prosperity of a section he was quite resigned to see un-prosperous. The moribund Federalist party gained a galvanic life

from this, which for the time looked like a real one : in 1804 it had car¬ ried only Connecticut and Delaware and part of Maryland; in 1808 it carried all New Eng¬ land but Vermont (the one State which had no commerce to lose), three votes from North Carolina and Delaware, and the two Mary¬ landers as before, — 47 in all.

2. — The same causes which had operated during the previous four years had continued with ever-growing efficacy during this four. The feeling against England among the Demo¬ crats, the feeling among the Federalists that England wTas fighting the world's battle against Napoleon and must not be crippled, ever grew in intensity; the misery and hate in New Eng¬ land with its hamstrung commerce kept pace with either; a generation of youths was grow¬ ing up who never saw the Revolution, — The War of 1812 was officially determined by four Southerners between 26 and 29 ; and the con¬ quest of Canada, instead of a naval war where it was universally believed our entire fleet would be at once seized and impressed into the British navy, had struck the war party as a happy resource. The political campaign of 1812 was made on the issue of war or a repeal of the Non-Intercourse Act. Madison was given a second term on the express condition of his approving the war ; he detested it as strongly as Jefferson, but as the majority had its teeth set, felt that he might as well head it as any¬ one else. He secured it by 189 to 89; the Federalists by a fusion had carried, besides their old States, New York and New Jersey and more of Maryland. A new era seemed com¬ ing for the Federalists; but it was an illusion.

They had no party principles, and not even a party candidate except a borrowed one (George Clinton) ; and their entire basis of life now was on an issue by its nature temporary.

1816-20. — The close of the War of 1812 ex¬ tinguished the old issues. The mostly inglori¬ ous land war had been forgotten in the blaze of New Orleans; we had proved that our navy not only could fight the queen of the world on equal terms, but would never again be wantonly defied; the people were full of satis¬ faction at coming out so well, and of anger at the Federalists, whose chief section had carried opposition to the point of discussing secession. Federalism was in many minds tainted with treason. Furthermore, the New England capi¬ tal driven out of commerce by the embargo and the war had begun to re-embark in manu¬ facturing, wished for a protective tariff, and could only have it from the governing element, which was

hopelessly Democratic. Rhode Is¬ land, the first to establish mills, was the first of the Southern tier to break away from its old allegiance. Massachusetts, Connecticut and Delaware, by small majorities, clung to the ancient faith; but in 1816 the Democrats car¬ ried 16 States with 183 votes, including the rest of New England. The government had bid for these votes by a United States Bank and a light protective tariff ; and in 1820, the «Era of Good Feeling,® or rather of <(No Is¬ sues,® Monroe was elected unanimously save for the vote of one elector, disgusted with the business <(rings® growing up around the administration.

1. — The administration still further car¬ ried out Federalist ideas by a great system of internal improvements and by strengthening the tariff. In a word, while nominally Democratic-Republican, its policy had become so Federal¬ ized as to have a stronger hold on its new allies than on its old constituents, and the issue in 1824 was whether that policy should be sus¬ tained or reversed. John Quincy Adams and Henry Clay represented the former, in different sections; Andrew Jackson the reaction to old- fashioned Democracy, with strict construction, economy and no intermeddling with business development ; William H. Crawford the regular Democratic <(machine,® with no ulterior purpose but office. Thus divided, no candidate had a majority. Jackson had the most; Adams was elected by the House of Representatives, still so far dominated by educated politics as to con¬ sider Jackson an ignorant and pestilent dema¬ gogue ; he made Clay — who had the lowest vote of the four, but was the Southern leader most in accord with his policy and the most of a statesman — Secretary of State. This <(Coalition® (q.v.. No. 2) was denounced by the enraged Jacksonites as a corrupt bargain, and the House election as defeating the people's will ; but there is no reason for assuming, as is currently done, that the anger gained Jackson any electoral votes.

2. — The Democratic reaction had gained strength and the Jackson enthusiasm swept all the factions into his fold, by virtue of the State conventions which had now assumed the office of nominating. On that side the issue was much more Jackson than any definite party pro¬ gram ; but Jackson as representing the hatred of the masses, especially the Southern and Western masses, for the ((money power,® for all

activities of government beyond keeping itself alive, for tariffs and government subventions, and for all claim of superiority in the educated class and all political initiative except by spon¬ taneous popular movements. In short, Jackson was the agent of a Democratic revolution, which supported him with a swarm of new men and approved his policy of turning out the trained officials neck and heels. Adams held his vote well; the stock reasons for his defeat — his ungraciousness, his refusal to employ patron¬ age, his revival of charges against the New England Federalists — are absurd in face of the fact that he had but one vote less than in 1824 and of Jackson's enormous plurality. No can¬ didate representing trained statesmanship, cul¬ ture and a liberal government policy, could have won this election.

1832.— The Democratic tide swept on over¬ whelmingly. Jackson's unprecedented use of the veto power to defeat internal-improvement schemes voted for by members of his own party only bound the majority more tightly to him; his war against South Carolina for attempted nullification cost him her votes, but brought him reinforcements from the nationalist sec¬ tion ; his hostility to the Bank of the United States was a prominent issue in the canvass, and was that of his constituents. Nothing better proves the senselessness of accounting for great political results by personal factions or squab¬ bles than the fact that Adams in 1824 and 1828 had more electoral votes than all Jackson's op¬ ponents together in 1832.

1. — The issues of this year were the carrying on of Jackson's policy, though its great objects had been accomplished, — the deposits had been placed in State ((pet banks® instead of the United States Bank, — and his dictation of his own successor. To oppose this dictation, one party sprung up with the ardent Jacksonian Hugh L. White as nominee, another as a Georgia State Rights faction, — though Jackson had championed the Georgia rights in the mat¬ ter at issue (see Cherokee Case) ; Jackson's influence, however, was powerful enough to nominate Van Buren as the ˆregular® candi¬ date and he was elected by a much reduced vote from lackson's.

2. — Few men have had a worse legacy than Van Buren received in the Presidency; and. few have made a better use of it. Almost his entire term was occupied by the panic of 1837 and the three years of hard times which succeeded it; caused entirely by Jackson's "monkeying® with the currency of which he knew nothing. The State banks which replaced the United States Bank as depositaries and were used as Democratic political

machinery, instead of managing the funds with discretion as the old bank had done, issued masses of notes till a tremendous inflation of the cur¬ rency had created a vast land speculation ; then he suddenly withdrew recognition of the paper currency and brought the whole structure down with a crash. Van Buren was a politician, but he was a sound statesman and financier and an honorable public man ; he would have no more meddling by the government with the banking business for which he was unfit, even to extri¬ cate his own administration from a scrape; and after three years' struggle he established the Sub-Treasury system, to the lasting benefit of the country. But with the customary popu¬

lar perspicacity, he was made the scapegoat for calamities which he had not caused and whose renewal he had prevented. Furthermore, the Whigs outbid the Democrats in avowed sub¬ mission to the <(popular mandate,® their candi¬ date Harrison promising to disuse the veto ; they outdid them in the (<popular hero® line by turning a useful but not very brilliant Indian battle into a second Marathon, or rather repeat¬ ing the name without discussing the details ; capoed their swarms of mythical anecdotes of Jackson's homespun habits and unpretentious heroism by an equal number about Harrison, models of his hypothetical "log cabin® and: bibulous reproduction of his "hard cider® daj's; they made bargains and absorbed both the; Southern free-lance opposition parties; and by all this and their campaign ((noise, numbers and nonsense,® carried all but three old States and1 four small new ones, 234 to 60 — a majority which suggests that possibly the noise and non¬ sense were not needed nor efficacious, and a quieter campaign of sensible argument might equally have won, with a real leader like Clay and no ruinous bargains.

1. — Harrison had barely survived his in¬ auguration ; and the usual policy of "placating® the strongest part of the opposition by giving them the Vice-Presidency (Tyler) had pro¬ duced its usual and deserved fruit of turning the administration over for the whole four years to the Nullification party, except so far as the Whigs tied its hands. This under Clay's leadership they did, consolidating the party by steady war on Tyler, and heartening themselves at last to do what they had not before and did but once again — put forth a platform. It was a very compact and well-expressed one, excel¬ lent from the Whig or present Republican standpoint ; but it was displaced as an issue by far more exigent and pungent practical ones. The tariff of 1842, which was almost weeded of protectionist features by the joint efforts of Tyler and the Democrats, was made one of the

arguments; but the decisive one was Texas. For years the great object of the Calhoun wing of the Democrats had been to annex Texas; partly to increase slave territory and balance Northern growth, partly with the immediate aim of disrupting the Whig party by forcing it to take a position which would drive away either the Northern or the Southern wing. Tyler,, deprived of Whig support, again drew near to the Calhoun party to which he had formerly belonged; in 1844 Calhoun was made Secretary of State ; and with this administration backing, the Calhoun party obtained control of the Dem¬ ocratic national convention, committed it to Texas annexation and gave the nomination to the Southerner Polk instead of the Northerner Van Buren. Clay was asked to declare himself on this point ; he wrote an evasive letter which cost him the support of the political abolition¬ ists (see Liberty Party), who nominated a ticket of their own with disastrous results to both. The three tickets were those of Polk, Clay and Birney; the first on the issues of protection, distribution of land sales, cutting down Presidential power _ and dodging all phases of the slavery question ; the second on the Preoccupation of Oregon and the re¬ annexation of Texas®; the third on immediate abolition of slavery. The last-named cast onlv 62,300 votes; but enough of those were in New

York and Michigan to turn the former's 35 and the latter's 6 electoral votes from Clay to Polk, electing the latter, bringing in Texas and bring¬ ing on the Mexican War.

1. — The Mexican War had been the dom¬ inant issue for a couple of years before, and the Democrats had striven to make it destruct¬ ive to the Whigs by forcing them into ob¬ noxious declarations of principle ; but the latter voted supplies for it and evaded abstract pro¬ nouncements as to its righteousness. The Wil- mot Proviso (q.v.) was a heavier blow, for the Southerners looked on it as a. primary touch¬ stone of sectional loyalty, which stood above party loyalty. The one salvation was a popular moderate candidate who could be accepted by the voters to whom the Democrats were simply impossible; and such a one was found in Gen. Zachary Taylor. A Louisiana slaveholder, no Southerner could suppose he would sign a bill endangering his own property ; known to dislike the veto, he could be trusted by the North to obey the verdict of Congress if

it passed the Proviso; a popular hero, he commanded the great unreflecting brute vote which supposes military and civil functions somehow related. He was elected by reason of a split in the New York Democracy, the country being about evenly divided; that he was elected at all, how¬ ever, is remarkable proof of the terror of the conservative masses at having the slavery fire¬ brand thrown into politics. It was this vote which elected the Whigs Clay and Taylor (the former really elected so far as the Democratic competitor went), and the Democrats Pierce and Buchanan, each in the hope of suppressing the question altogether.

2. — Taylor died in 16 months and the Vice-President, Fillmore, completed the term; but all through the four years each of the two parties of unlimited slavery extension and slavery restriction was drawing its ranks to¬ gether and forming into the parties soon to con¬ test the final mastery. In place of Whig and Democrat, it was increasingly North and South. Unfortunately, the South was willing to fight and the North as yet was not; and the so-called Compromise of 1850, like most compromises, was practically all on one side, the Northern Whigs letting the measure go by default. They did not like it, but the South insisted and they had much more confidence in placating their own constituents for adhering to it than the South for not doing so; once passed, therefore, they proclaimed it a sacred and irrepealable decision, as being a ˆcompromise,® and the Fugitive Slave part as being a sacred obligation to uphold. As always, the <(reopcning of agita¬ tion® was executed by the Southern wing; before the Presidential nominations were made, they had determined to force the Whigs to an absolute declaration of party policy, a touch¬ stone of legitimate membership. First at the Whig caucus of 20 April, then at the Baltimore national convention of 16 June, they insisted on the party recognizing the Compromise as a finality; in the platform, the last article, of great length and minuteness, made the Fugitive Slave Law, by name, a part of the organic con¬ stitution of the party. This was death, and the Southern Whigs must have so intended it. General Scott, as a military hero, was made the candidate. The Southern Whigs, instead of voting for him on account of the Fugitive

Slave plank, largely voted against him because the anti-slavery men in the convention, for no assignable reason, had voted for him, and he was said to be partial to Seward; the Northern Whigs largely voted against the platform and the Whigs carried only four States,

Massachu¬ setts, Vermont, Kentucky and Tennessee, and less than a third of the next Congress even nominally, a third even of that being Southern¬ ers who soon became Democrats. The Whig party was no more; <(died of an attempt to swallow the Fugitive Slave Law® was the epitaph proposed for it.

Forrest Morgan, Connecticut Historical Society.

AMERICAN POLITICAL ISSUES, 1865-1920. Reconstruction. — The predomi¬ nating question that presented itself for settle¬ ment in the years immediately succeeding the Civil War was Reconstruction, or the conditions under which the seceded States should be re¬ admitted into the Union. Reconstruction was not officially complete until 1870, when Georgia, the last State to be restored to the Union, was readmitted; scarcely any other question was considered during the administration of Presi¬ dent Johnson. But although, technically, the Southern States were restored to self-govern¬ ment, and the two administrations of General Grant saw vigorous military force employed to control the complexities of an anomalous situa¬ tion, it was not until the middle of President Hayes' administration, or 13 years after the war closed, that an end was finally put to Federal interference in the local concerns of the Southern States. See United States — Reconstruction in the.

Rise of New Parties. — During the first ad¬ ministration of President Grant steps were taken toward the reform of the civil service, March 1871. It was about this time that the Prohibitionists first put a national ticket in the field, and this period was noted also for the appearance of organized labor in the arena of national politics by the formation of a Labor- Reform party. A Liberal Republican party was also formed, and the decadence of old issues and use of new ones was graphically indicated by the fact that there were five party tickets in the field in the election of 1872. The formation of this Liberal Republican party, which chose Horace Greeley as its standard bearer, should receive further notice, for it dominated political formations and alignments, down to 1892. It took with it many of the great abolition leaders of the old Republican party — men like Sumner and Phillips who claimed that the old party no longer stood for the principles from which it had gained its strength and life. These men were the prede¬ cessors of the later Independents and Mug¬ wumps. These recalcitrants were met halfway by the Democratic party, that made haste to drop the old Doughface and Copperhead issues and catch-words, and nominated their bitterest foe because he seemed to impersonate the Re¬ publican revolt. The immediate result was defeat, but it led to the Tilden victory (or near¬ victory, according to

the point of view) in 1876 and the election of Cleveland in 1884, and defi¬ nitely committed the Democratic party to an attitude that faced the future instead of the past.

The “ Grangers ” and the Money Ques¬ tion. — The seething process was still going on, for from 1872 the genesis of at least two new issues appeared ; one was the (<Granger® move¬ ment, which, though primarily organized to pro¬ mote co-operative buying and selling and secur¬ ing laws favorable to the farming classes, be¬ came the seed, which flowered later, of at¬ tempts, not always well advised, to curb rail¬ roads and trusts and prevent discrimination in rates and prices. Another great issue to assume large importance at this time was that of na¬ tional finances. Occasioned by the terrible panic of 1873, and by a supposed public demand that gold should be used only to pay the interest on the national debt, a ˆGreenback® party was organized in 1874 which took part in the three following national elections, and, under the name of the Greenback-Labor party, polled more than a million votes in the congressional elections of 1878; and in that year silver was made legal tender and given limited coinage. But in 1874 President Grant vetoed the <(In- flation Bill® which would have added $44,000,000 to the currency; and on 7 Jan. 1879, in Presi¬ dent Hayes’ administration, specie payments were resumed after a suspension of 17 years, and greenbacks have ever since been payable in gold on demand.

The Civil Service. — The assassination of President Garfield led to a radical reform in the civil service. The vicious system taken over by Jackson from that of New York — classic in Marcy’s sentence, <(To the victors belong the spoils,® had become so deeply rooted that perhaps nothing less than the martyrdom of a President could have effected a change in public policy at this period. But on 1 Jan. 1883, the (<Pendleton Bill® provided a constitu¬ tional, practical and effective measure for the remedy of the abuse known as the <(spoils sys¬ tem.® Many States have enacted laws along the same lines, and the classified lists of those subject to civil service examinations have been increased by the executive orders of successive Presidents, until, on 30 June 1915, of 476,363 officers and employees of the Federal civil serv¬ ice 292,296 held positions subject to competitive examinations under civil service rules ; and the practice of levying assessments for partisan purposes has long since been discountenanced by law.

Anti-Chinese Legislation. — Anti-Chinese feeling on the Pacific coast made it necessary in 1876 for both great parties to insert anti- Chinese planks in their platforms. A bill to restrict Chinese immigration was passed in 1879, but was vetoed by President Hayes be¬ cause it violated the Treaty of 1868. In 1880 a new treaty was negotiated with China, under which the United States was to regulate, but not to prohibit absolutely the entrance of Chi¬ nese. The limitation was to apply to Chinese laborers only. An act of 1882 suspended the immigration of Chinese laborers for 10 years. This act was amended in 1888 to prohibit the return of Chinamen once here who went back to China. A treaty pending with China at this time was denied ratification by the latter be¬ cause of the amendment. In 1892 the Act of 1882 expired and a new law was passed con¬ tinuing the exclusion for a further period of 10 years. In 1902 an act was passed con¬ tinuing existing legislation until further en¬

actment should be made and extending the exclusion laws to the island possessions and forbidding the migration to the mainland or to other island groups of Chinese domiciled in one group. See Chinese Immigration.

Railroad and Commerce Regulation. — ■ It was during President Cleveland's first ad¬ ministration, 1887, that the first great measure looking to the regulation of railroad and com¬ mercial interests was passed — the Interstate Commerce Act (see Commerce, Interstate) ; this was amended in 1893 by the Elkins Act, which omitted the penalty of imprisonment. The original act was amended in a drastic way in 1910, the Elkins Act being left in force. The amendment is known as the Mann-Elkins Amendment to the Act to Regulate Commerce. It contains 24 sections, which specify the com¬ panies and organizations subject to the Act, and forbidding discrimination, rebates and preferences of all kinds. For a summary of its provisions see Railways — Government Regulation of. An Interstate Commerce Court was established in 1910 to hear appeals from decisions of the Interstate Commerce Commission. See Interstate Commerce Com¬ mission; United States Commerce Court; Trusts.

Formation of Other Parties.— It was at

about this time, which seems to have been one of great political initiative, that (1888) two new Labor parties appeared, Union Labor and United Labor; and in the next presidential elec¬ tion (1892) the Socialist Labor party and People's party or <(Populists® were born. The Populists demanded the free and unlimited coinage of silver; national ownership of all public means of communication and trans¬

portation ; a graduated income tax ; popular election of United States Senators; and, it is interesting to note, the adoption of the initia¬ tive and referendum (q.v.). Many of these measures have since been brought into promi¬ nence by the Socialists or have been adopted into the platforms of one or both of the greater parties. The Populists were also pioneers in denouncing the imperialistic policy of the gov¬ ernment in 1900. In 1892 they polled over a mil¬ lion votes and in the two following elections fused with the Democrats (See Imperial¬ ism). To indicate still further the political restlessness of this period we may recall the fact in 1896 there were seven parties in the field and, in 1900, eight. The Socialists had now divided, or increased, into two parties, of which the new one wˆas to prove the strong¬ er. In the election of 1900 it polled nearly three times as many votes as the Socialist- Labor party; by 1908 it had 30 times as many votes. In 1912 it was again 30 times greater than the older party, but in 1916 it received almost 50 times as many votes, although it' polled only 59 per cent of its 1912 vote and the Socialist Labor party only 32 per cent.

The Tariff. — This question was brought to the front during Arthur's administration in 1882. The clamor against the exorbitant rates had been so vociferous that the President ap¬ pointed a commission to report on conditions. The commission, manifestly partisan in its per¬ sonnel, was expected to <(stand pat® and report against lowering the tariff ; but they astounded the country by recommending a 20 per cent re¬ duction through the entire list. Congress,

however, calmly ordered an increase of 10 per cent and there the subject rested, if the country didn't, until the famous (<Tariff Message® of President Cleveland in 1887. The burden of this message was that the existing tariff was the cause of burdensome taxation which could be relieved only by a reduction of the duties on raw materials, especially wool.

The resulting Mills Bill failed to pass the Republican Senate but, in 1890, under Presi¬ dent Harrison, the McKinley Act was passed which raised, instead of lowered, the duties on most articles. In 1894, under President Cleveland's second administration, the Wilson Bill became law, its principal feature being free admission of wool. In 1897, under Presi¬ dent McKinley, came the Dingley Act ; the duty was again imposed on wool and other rates were advanced. In 1909, under

President Taft, the Payne- Aldrich Tariff Act was passed with no general lowering of the tariff wall. A tariff board was created not only to secure in¬ formation on the maximum and minimum pro¬ visions of successive tariff bills .but upon the relative costs of production at home and abroad.

The Payne- Aldrich Tariff of 1909, which was so irregular and unscientific that President Taft had hesitated to sign it, although he afterward held it to be ((the best tariff that the country had ever known,® was also as¬ sailed by President Wilson. Four other bills for tariff reform passed by Democrats and Progressives had been vetoed by President Taft. These now paved the way for the Underwood Tariff Act which became law 3 Oct. 1913, and fixed a high rate on luxuries and a low revenue rate on the necessities of life. The results were unfortunate ; duties were so lowered that the customs receipts fell off $26,000,000 in the following year. Further depression was caused by the outbreak of the European War in 1914 which upset all cal¬ culations. On the revival of business in 1915— 16, while the Republican party stood firm for a protective tariff, less was heard about a general revision, and more about certain changes of detail. A Tariff Commission was created by the General Revenue Act of 1916, to consist of six members. It is the duty of the Commission to investigate the administra¬ tive, fiscal and industrial effects of the tariff laws. The free-sugar clause of the Under¬ wood Tariff Act was repealed in 1916.

In conjunction with President Taft's tariff policy, an attempt was made in 1911 to crown previous reciprocity arrangements, with differ¬ ent countries by a Canadian Reciprocity Agree¬ ment. This was designed to secure admission into the United States of Canadian agricultural products in return for the repeal of Canadian duties, such as wheat and other grains, fresh fruits and vegetables, dairy products, fish, eggs, poultry, cattle, sheep and other live animals, on American cotton-seed, fruit, etc., with re¬ duced rates on agricultural implements and other manufactured articles. This bill was passed by Congress but rejected by the Cana¬ dians in a special election.

The previous reciprocity agreements re¬ ferred to were: First, one with Canada in 1854, which lasted for 12 years. Its provisions as regards Canada were almost identical with those of 1911, except that manufactured arti¬ cles were not included — only raw materials

which both countries produced. It is curious that the objections to it in England and Can¬ ada were almost exactly identical to those heard later, viz. : The fear that the United States was attempting to weaken

the bonds between England and Canada with a view to annexation of the latter to her neighbor on the south. In 1875 a reciprocity treaty was made with Hawaii, admitting Hawaiian sugar, duty free, in return for a long list of manu¬ factured articles. This treaty remained in force until the annexation of Hawaii in 1898. Under the terms of the McKinley Bill in 1890 reciprocity treaties were made with Germany, Austria and several South American countries, but these were repealed by the Wilson Bill in 1894. See United States — Reciprocity; United States — History of the Tariff.

Foreign Relations.— It is necessary to go back to the administration of President Harri¬ son to note the first real growth of public interest in the foreign relations of the United States, both commercially and diplomatically. The meeting of the Pan-American Congress (q.v.) in Washington in 1889, for which the far-seeing statesmanship of James G. Blaine must receive most of the credit, did much to prepare the way for commercial reciprocity and for a more liberal attitude toward the

outside world. This event marked the first entrance of the United States into world

politics since 1815. Before that its keenest

interest had been in foreign affairs, as

became a satellite of its mother; since then the outside world was almost forgotten except when certain portions of it were menaced as in the Civil War. It was in 1889 that we strode into the world arena once more but un¬ der widely different auspices ; for there fol¬ lowed the Expansion Period, the creditable part borne by the United States in the Boxer troubles in China, the ˆOpen-Door® policy of Secretary Hay, the successful offices of Presi¬ dent Roosevelt in establishing peace between Japan and Russia and other notable evidences that the United States had at last taken her place as a <(world power.® See United States — Territorial Expansion; United States - — Commercial Development.

Anti-Trust Legislation. — The Sherman Anti-Trust Act of 1890 had led to a number of secret agreements between interested parties which sought to evade the provisions of the act, while still dominating the various markets. When Colonel Roosevelt became President, he resolutely instituted an investi¬ gation of these evils, and in 1903 the Attorney- General was instructed to bring suit to dis¬ solve the recently-formed Northern Securities Company, as a combination in

restraint of trade with interests which would permit the control of the nation's railways passing into the hands of three or four persons. In 1904 the combination was declared illegal by the Supreme Court. The Railway Rate Regula¬ tion Act of 1906 made concessions to the railroads, but President Roosevelt's attitude antagonized large banking, corporation and other commercial interests. Under President Taft, regulation of railways and corporations was not favorably looked upon, and this with further leniency toward moneyed interests, led to the formation of the Progressive Republi¬ can party, which joined with the Democrats,

when opportunity offered, to promote legisla¬ tion favorable to their views. This movement created opposition, led by ex-President Roose¬ velt, to President Taft's re-election. The re¬ sult was a Democratic party victory with the election of Woodrow Wilson by a minority vote — '2,500,000 less than the com¬ bined votes of his Republican opponents. President Wilson was not in sympathy with consolidated business interests, which he described as ftso great that it is almost an open question whether the government of the United States can dominate them or not,® and he proposed that Congress should pass new laws curbing monopoly. In 1914, the Ray¬ burn Bill, an anti-stock watering measure, was introduced and passed the House, but was stopped in the Senate as it was discovered that the financial condition of railroads made it inadvisable to press further legislation. The Federal Trade Commission Bill and the Clay¬ ton Anti-Trust Act, however, became law; the first to deal with corporations not engaged in transportation but carrying on interstate busi¬ ness or with a foreign country; the second to meet difficulties that had arisen through efforts of corporations to create monopolies by in¬ direct dealing, such as offering their products at special low prices until their competitors were driven out of business.

Income Tax. — -When in 1895 the Supreme Court set aside the Income Tax Law of the previous year, on the ground that it was a direct tax, and therefore must be apportioned among the States according to population, an amendment to the Federal Constitution seemed the only remedy. On recommendation of President Taft, both Houses of Congress, with almost no opposition, submitted such an amendment to the States in 1909, allowing an income tax without proportional distribution. It was ratified by the necessary 36 States — to which six others were promptly added — and became a part of the

Constitution, 25 Feb.

1.

Senatorial Election by Popular Vote. —

During the first decade of the 20th century there was constant agitation for an amend¬ ment providing that senators should be elected by popular vote. Such an amend¬ ment was submitted 15 May 1912 and it went through with such rapidity that it was put in force 31 May 1913. From that time all va¬ cancies as they occurred were filled by pop¬ ular election. By 4 March 1919, this amend¬ ment had its full effect, every senator there¬ after being chosen by direct popular vote.

Liquor Legislation.— From the beginning of the century the liquor question became an issue of national importance. The outbreak of the European war brought the movement to a head. A resolution was introduced in Congress proposing . a prohibition amend¬ ment to the Constitution of the United States. In December 1917 this resolution passed both houses of Congress by the necessary two- thirds majority and was submitted to the States for ratification. In 1919 this amendment had been ratified by 45 States. On 29 Jan. 1919, the Acting Secretary of State, F. L. Polk, pro¬ claimed the Prohibition Amendment to have been ratified by the requisite number of States

on 16 January and declared that, in accordance with the wording of the amendment, it would become effective after 12 months from that date, or on 16 Jan. 1920. Meanwhile, a War-Time Prohibition Act was passed by Congress 21 Nov. 1918, to become effective 1 July 1919. A Pro¬ hibition Enforcement Act, better known as the Volstead Act, was enacted into law over the President's veto on 28 Oct. 1919. It combined provisions for the enforcement of the War- Time Prohibition Act and of prohibition under the Eighteenth (ˆProhibition®) Amendment. Under it all liquors of over one-half of 1 per cent alcoholic content are declared intoxicating and hence prohibited for beverage purposes. Enforcement is placed in the hands of the Com¬ missioner of Internal Revenue, but also, in ac¬ cordance with the terms of the amendment, it rests upon State and local officials. In 1920-21 several States, including New York (April 1921) and New Jersey (March 1921) passed Concur¬ rent Enforcement acts.

Versailles Treaty and the League of Na¬ tions. — 'The idea of a league to promote peace suggested by Tsar Alexander I. at Vienna in 1815 engaged the thought of many students of statecraft throughout the

19th century. The Hague Tribunal established in the closing years of the century had not aroused great confidence and its utter helplessness to prevent war was demonstrated in 1914. When the Allied repre¬ sentatives met at Paris in January 1919, Presi¬ dent Wilson encountered considerable difficulty in having the Covenant of the League of Nations included in the Peace Treaty. When the treaty terms were made public and pre¬ sented to the signatory powers for ratification most of the states of Europe received the Treaty and the League Covenant with equanimity. To the United States, however, the situation seemed otherwise. The opponents of the Treaty and League held that its acceptance in¬ volved an abdication of sovereignty and a re¬ pudiation of the Monroe Doctrine and of the policy of the United States in external affairs for over a century. On 10 July 1919 President Wilson laid the Treaty before the Senate. Bitter debate ensued for many months and on 19 Nov. 1919 the Treaty was rejected bv the Senate. It was reintroduced at the regular session on 10 Feb. 1920. Substantially the same reservations were adopted and a new one advo¬ cating self-determination for Ireland. When the final vote was reached on 19 March 1920 the Treaty again failed of ratification. In the presidential campaign of 1920, the League of Nations was a prominent issue and in a high quarter the election was called a ((solemn referendum.® The tremendous popular success of the Republican ticket on 2 November tended to show that America was as yet unprepared to enter into entangling alliances and was deter¬ mined to pursue her ancient policy of ((splendid isolation.® See War, European — The Peace T vccitxcs.

Woman Suffrage.— See Woman Suffrage.

George Edwin Rines.

AMERICAN PRINTING TRADE. See

Printing Trade, American.

AMERICAN PROTECTIVE ASSOCIA¬ TION, or (<A. P. A.,® a secret order organized throughout the United States and Canada. Its

chief doctrine, as announced in its declaration of principle, is that (<subjection to and support of any ecclesiastical power not created and controlled by American citizens, and which claims equal, if not greater, sovereignty than the government of the United States of

Ameri¬ ca, is irreconcilable with American citizenship® ; and it accordingly opposes ((the holding of of¬ fices in national, State, or municipal govern¬ ment by any subject or supporter of such ec¬ clesiastical power.® Another of its purposes is to prevent all public encouragement and sup¬ port of sectarian schools. It does not consti¬ tute a separate political party, but seeks to con¬ trol existing parties and to elect friendly and defeat objectionable candidates by the c6n-certed action of citizens affiliated with all par¬ ties, much after the style of the American or <(Know-Nothing® party. The order was found¬ ed 13 March 1887 and once claimed a member¬ ship of over 2,000,000.

AMERICAN PSYCHOLOGICAL AS¬ SOCIATION, a society founded in 1892 for the advancement of psychology as a science. Persons are eligible to membership who are engaged in this work. Membership, 227. Of¬ fice of secretary, Smith College, Northampton, Mass.

AMERICAN PUBLISHING. See Pub¬ lishing, American.

AMERICAN QUARRYING. See Quar¬ rying.

AMERICAN RAILROADS. See Amer¬ ican Street Railways; Railway Systems in the United States.

AMERICAN REPUBLICS, Bureau of.

See Pan-American Union.

AMERICAN REVOLUTION. See

United States — American Revolution.

AMERICAN RIVER, in north-central California, is formed by the union of its northern and southern forks near the western boundary of the county of El Dorado, whence it flows southwest between the counties of Placer and Sacramento and falls into Sac¬ ramento River near the city of Sacramento. For about six miles it has been rendered navi¬ gable for small steamers. The north fork, con¬ sidered by some as the true American River, rises among the hills at the base of the Sierra Nevada, flows west-southwest, forming the boundaries between Placer and El Dorado counties for 100 miles, and unites with the south fork 30 miles above the city of Sacramento. The south fork flows from Bonpland Lake through El Dorado County and forms part of the division between the counties of Sacra¬ mento and El Dorado.

AMERICAN-SCANDINAVIAN FOUN¬ DATION, The. The foundation

was in¬ corporated in 1911 under the laws of New York with the object of cultivating closer in¬ tellectual relations between the Scandinavian countries and America and strengthening the friendly bonds between American-Scandina- vians. It was endowed by the late Niels Poul- son, president of the Hecla. Iron Works in Brooklyn, himself of Danish birth. The income from one-half million dollars is administered by a self-perpetuating board of 15 trustees. The Foundation maintains an office with a salaried

secretary and staff and an organization of associates numbering upward of 4,000. It awards annually six fellowships to Scandina¬ vians for study in the United States and a number of scholarships to Americans for research work in Scandinavia. It publishes regularly two series of books, (The Scandina¬ vian Classics) and {The Scandinavian Mono¬ graphsˆ and a bimonthly illustrated magazine, The American-S candinavian Review. Address, 25 West 45th Street, New York.

AMERICAN SCENIC AND HISTORIC PRESERVATION SOCIETY. A national organization of men and women incorporated by the legislature of the State of New York in 1895. Its aims are the protection of natural scenery, the preservation of historic landmarks and the improvement of cities. In pursuance of these objects it is empowered to receive by purchase, gift or otherwise, and to hold in fee or trust, real or personal property necessary thereto ; and it is required to make to the legis¬ lature an annual report of its affairs. Among its activities since its foundation have been the following: The purchase of the New York State Park at Stony Point, and of Washington's headquarters in New York city, the creation of a State reservation at Watkins Glen, laws for the protection of Niagara Falls, acquiring the site of Major Andre's execution; and it has charge of Fort Brewerton, and Philipse Manor Hall.

AMERICAN SCHOOLS OF LAW. See

Law, American Schools of.

AMERICAN SCULPTURE, Historical Subjects in. American art in the Colonial and Revolutionary periods was confined chiefly to portrait painting. At the beginning of the 19th century there was to all practical purposes no such thing as an art of sculpture in the United States. Mural painting, as a branch of art adapted especially for depicting historical subjects, was still farther away in the future. The country was not ready for the development of art along the lines of history and com¬ memoration of historical characters. It was not until

the latter half of the 19th century that there began to be real activity on such lines.

At first, when statues or busts of pioneers and patriots began to be in demand for public institutions or places, notably the national cap- itol at Washington, it was customary to go abroad to find some artist, possibly a French¬ man or Englishman, capable of doing the work. And when there began to be Americans of real talent who devoted themselves to sculpture they at first were chiefly absorbed in producing gods and goddesses of Greece and Rome, more or less poor imitations of those of classic times, rather than in creating things having to do with their own country and its annals and customs. It is chiefly in the past 25 or 30 years that American sculptors have found their main in¬ spiration in national subjects and have devoted themselves so largely to themes associated more or less directly with American history.

A great influence upon this phase of Ameri¬ can art has been exercised by the wars of the nation, chiefly the Revolution and the Civil War, while the recent centenary of the War of 1812 and the close of a century of peace with Great Britain witnessed the dedication of a strikinglv large number of works of art having to do with

AMERICAN SCULPTURE

1 George Rogers Clark (By Elsie Ward)

3 Gen. Alexander Maccomb (By A. A. Weinman)

2 Sieur de La Salle (By L. A. Gudebrod) 4 Pere Marquette (By Cyrus E. Dallin)

_ : _ a.

AMERICAN SCULPTURE

1 John Paul Jones Hoisting the American Flag on the Ranker. (Sculptural Relief by Niehaus)

2 Francis Scott Key Monument, Baltimore. By Niehaus

3 Lafayette and His Servitor, Prospect Park, Brooklyn, N. Y. By Daniel C. French

AMERICAN SCULPTURE

1 The Buffalo Dance. By John H. Borglum . . _

2 Louisiana Purchase Treaty Group. By Karl Bitter. (Marbois, Livingston and Monroe signing Treaty)

3 Statue of Thomas Jefferson. By Karl Bitter. (University of Virginia)

this commemoration and furnishing proof of the good effect of such celebrations and the incidents recalled upon contemporary art.

Another influence which should be noted is that of the great international expositions of the last quarter century. Most of them had some historical motives which have been ex¬ pressed in the architectural schemes and in the decorative features, and the latter, while usually temporary, have exerted a powerful and far- reaching force, affecting public taste in many ways and often leading to more permanent decorations of similar type in connection with public places and institutions. Hence there has been, partly as a result of the influence emanating from these expositions, a marked in¬ crease in the application of the art of the sculptor to the embellishment of buildings like capitols, court-houses, libraries and even busi¬ ness structures of a semi-public character. There have arisen within this period the Con¬ gressional Library at Washington, one of the most interesting and educational buildings in the world, in its artistic features, so largely associated with historical characters or sub¬ jects; the Pennsylvania State capitol at Harris¬ burg, with its sculptures by George Grey Bar¬ nard, historic or symbolic of national types ; the Court-house at Baltimore, with its many excellent decorations ; the Appellate Court Building in New York, with its sculptures typ¬ ical of law and government; the New York Custom House, with its fagade figures by Daniel Chester French and others; the State capitols of Wisconsin and Iowa, with their splendid adornments typical of the spirit of the West; the Jefferson Memorial Building at Saint Louis, an outcome of the Louisiana Purchase Exposition, with its imposing group by the late Karl Bitter showing Marbois, Liv¬ ingston and Monroe signing the Louisiana Purchase Treaty; and the statue, also by Bit¬ ter, of Thomas Jefferson, during whose ad¬ ministration this momentous purchase was negotiated ; and the Cleveland Court-house, with its historical sculpture, including Chief Justice Marshall by Herbert Adams.

The artistic merits of the creations of later years in this field are evident from a compari¬ son between them and earlier efforts of similar type. When the Virginia assembly wished to have a statue of Washington erected at the State capitol there was apparently no Ameri¬ can sculptor equal to the task, and Jean An¬ toine Houdon (q.v.), the French sculptor, was engaged to model one. He came to this courjtry in 1785 for the purpose, and the statue, the original of which is now in the capitol at Richmond, was dedicated in 1788. Another French sculptor, David d' Angers, executed the first statue which was made of Jefferson. By 1832, when the centenary of the birth of Wash¬ ington was observed, Horatio Greenough, Thomas Crawford and Henry Kirke Brown were coming upon the scene. Greenough was then but 27 and studying in Florence, Italy, but Congress commissioned him to execute a statue of Washington, stipulating that it should not be equestrian and that the countenance should correspond to that of the Houdon Washington. Greenough devoted the greater part of eidit years to his commission and re¬ ceived $20,000 for his work, quite a sum in those days. The statue, which is of Carrara marble,

was brought from Italy in a special ship. It represents the First President in bare legs and a Roman toga, which has slipped from his shoulders, lifting a finger of warning and advice to the nation. It is in the nature of a charac¬ terization of him as an Olymoian Zeus. It was recently removed from the square in front of the capitol to the Smithsonian Institution. There has been much controversy over this figure and no little ridicule has been cast upon it. Considering the time and circumstances it was no doubt a work of merit but does not, in spite of the classic atmosphere with which it is supposed to be invested, give us that impres- sion of dignity and intellectual force in the Father of his Country which we associate, for instance, with John Q. A. Ward's fine figure of the same statesman in front of the Sub-Treas¬ ury in Wall Street, New York, or the splendid equestrian statue by Daniel Chester French in Paris, France, or Henry Kirke Brown's eques¬ trian statue in Union Square, New York. The latter may be classed among the earlier ex¬ amples of American historical sculpture, but holds its own in spite of the onward march of artistic standards. Another historical work, also by Brown, is the spirited statue of Gen. Winfield Scott in Scott Circle, Washington, D. C. Launt Thompson was another of the early American sculptors who did meritorious historical work. His statue of General Scott at the Soldiers' Home, Washington, is an ex¬ ample. Thomas Ball was another. His eques¬ trian statue of Washington is in Boston Com¬ mon. Clark Mills executed equestrian statues of Andrew Jackson and George Washington which are famous. The national capital has the original of his Jackson and New Orleans a

replica.

The historical work of the earliest Ameri¬ can sculptors consisted almost entirely of sculpture in the round — statues and busts. The idea of portraying historical subjects in reliefs, upon the bases of monuments, or upon panels in doors or upon the walls of buildings, though familiar abroad, was a later development in American art. Perhaps one of the first ex¬ amples of it was the work of Thomas Craw¬ ford. Crawford was one of the pioneers of American sculpture and famous for his statu¬ ary in ideal subjects. But he did much of the earlier sculpture of the national capitol illus¬ trating American history and was the sculptor of the bronze doors opening from the Senate portico of the capitol. Its eight panels illus¬ trate such subjects as the ((Death of Warren at Bunker Hill,® “Washington’s Rebuke of Gen¬ eral Charles Lee at Monmouth,® ((Hamilton’s Gallantry at Yorktown,® “Washington’s Recep¬ tion at Trenton® and his first inauguration. Crawford designed the House portico doors and Rinehard modeled them. Hiram Powers’ groups in the Senate portico are a notable feature of the decorations of the capitol and illustrate “American Development and the De¬ cadence of the Indian Race.®

Statuary Hall at the capitol is notable for its historical associations, containing reminders in its gallery of portrait sculptures, by many artists, and some more or less crude and archaic, of the men and women who from the very beginnings of the nation have been the makers of its history. In the decorations of the Congressional Library history and allegory

arc so intimately mingled that it is hard to draw the line between them. The wealth of adornment runs the gamut of archaeology, his¬ tory, mythology, allegory, poetry, music, the drama and the arts, but in the statues and busts, the bas-reliefs and medallions, mosaic work, etc., one finds a multitude of records in art of the men and women who founded the nation or guided it upon its destiny.

Revolutionary characters and episodes have been most fruitful in recent years in inspira¬ tion to the sculptors. This is owing to many causes but not a little to the work of the patri¬ otic societies, which have been untiring in their study of the period and zealous in efforts to keep green the memory of American warriors and statesmen. Numerous tablets commemo¬ rating Revolutionary incidents have

been dedi¬ cated, some containing sculptural reliefs more or less elaborate, and some statues of Revolu¬ tionary characters are traceable to such influ¬ ences, an example being the figure of Nathan Hale, the Patriot Spy, by Frederic Mac- Monnies, in City Hall Park, New. York, dedi¬ cated in 1893, erected by the Society of Sons of the Revolution in the State of New York. This figure, which is superb as a work of art, is scarcely so truthful a portrayal of Hale, how¬ ever, as are the statues of him executed recently bv William Ordway Partridge and Bela L. Pratt, which are the result of very careful historical study. One of Mr. Partridge's Hale figures stands in a park in Saint Paul, Minn., and is the gift of the local Nathan Hale Chap¬ ter of the Daughters of the American Revolu¬ tion. Another is in Washington, D. C. Mr. Pratt's work is on the Yale campus at New Haven, Conn., opposite the room Hale occupied as a student at Yale, and was placed there in

1.

On the Columbia University campus, New York, is Partridge's statue of Hale's friend and fellow officer in the Revolutionary army, Alex¬ ander Hamilton, which was recently dedicated. Within the same period, through the efforts of the Sons of the Revolution and Daughters of the American Revolution, one of Long Island's Revolutionary heroes, Gen. Nathaniel Wood- hull, president of the Provincial Congress of New York, who was fatally and brutally as¬ saulted by the British near Jamaica, L. I., because he would not say <(God save the King,® has received sculptural honors, including a fine bronze tablet by Albert Weinert picturing the incident of the attack upon him by the enemy. A movement is in progress at this writing to erect a statue and monument to the principal hero of the battle of Long Island, Gen. Lord Alexander Stirling. The deeds of his com¬ mand, a militia regiment of Marylanders, are commemorated in a monument in Prospect Park, Brooklyn, but there is as yet no adequate memorial to Stirling though it was largely be¬ cause of his gallantry in engagements of this battle that the American army was saved from complete destruction and Washington was en¬ abled to make his masterly retreat afterward to New York.

Lafayette, too, has been honored by the ded¬ ication of a monument to him at the Ninth Street entrance to Prospect Park, Brooklyn, in May 1917, on which occasion Joffre, Marshal of France and hero of the battle of the Marne, was the guest of honor. A citizen of Brooklyn,

the late Henry Marteau, left $35,000 for this purpose and the commission for the execution of the work was awarded to Daniel

Chester French, who completed the model on Lafayette's birthday, 6 Sept. 1916. Many regard it as one of the finest things that have come from Mr. French's studio. The monument symbolizes Franco-American unity, past, present and to come. It embraces a number of features, the central one of which is a bronze tablet upon which in bold relief the sculptor has portrayed Lafayette standing by his horse which is held by an aide. Lafayette wears the uniform of a general of the Continental Army. His drawn sword is in his right hand and his left reposes upon his hip. On each side are accessories re¬ lating to the hero's career which round out the composition as a whole.

To the Revolutionary period belong also Mr. French's <(The Minute Man,® at Concord; the group at Princeton, N. J., by MacMonnies, commemorating the turning of the tide of the Revolution in the battle of Princeton, won by the Americans ; C. A. Heber's portrait statue of Franklin, at Princeton; the equestrian statue of Gen. Anthony Wayne at Valley Forge, Pa., by H. K. Bush-Brown, and H. K. Brown's equestrian of Gen. Nathaniel Greene at Wash¬ ington, while to this and the period imme¬ diately succeeding belong Miss Helen Farns¬ worth Mears' portrait bust in Milwaukee of the soldier and pioneer, Gen. George Rogers Clark, a notable example of historical sculp¬ ture by an American woman and a gift of the Society of Children of the Revolution.

The placing of tablets or other forms of memorial marking the scenes of Revolutionary incidents has occurred chiefly, of course, in the vicinity of such battlegrounds and in some cases restoration of the redoubts and fortifi¬ cations where famous episodes of war trans¬ pired has been attempted and tablets, often of considerable artistic merit, have been erected. A case worthy of mention is the restoration of Fort Ticonderoga which has been done at great . expense and with high regard for the artistic character of the historical markers.

The monuments and other works of the nature of sculpture occasioned by the cen¬ tenary of the War of 1812 were wholly or in part the outcome of celebrations like the Oliver Hazard Perry Centennial in Ohio, Pennsyl¬ vania and New York in 1913, the ((Star Span¬ gled Banner® Centennial at Baltimore in 1914, the centenary of the battles of Plattsburg and Lake Champlain in the same year, the pageant at New Orleans in 1915 in honor of Andrew Jackson's great victory over the British a hun¬ dred years before, and the commemoration at the Jefferson Memorial, Saint Louis, in Feb¬ ruary 1915, of the centenary of the ratification of the Treaty of Ghent. As a result of or in connection with such incidents we have the splendid memorial at Put-in-Bay, Ohio, in honor of the heroes of the battle of Lake Erie and the

bronze statue of Perry himself ; the Perry monument at Buffalo by Charles H. Niehaus; the .statue of Gen. Alexander Ma¬ comb at Detroit by A. A. Weinmann; the bas- relief in honor of the heroes and pioneers of the 1812 period at the Jefferson Memorial, Saint Louis, by R. P. Bringhurst and Mary E. DeGarmo; the Malmette monument at New Orleans and the Francis Scott Key Memorial

at Baltimore, designed by Niehaus, and but recently finished.

The Hudson-Fulton celebration in New York State in 1909 and the Champlain Ter¬ centenary in New York State and Vermont in about the same period furnished occasion for some records in art of characters and events commemorated, including a monument to Champlain with sculpture by C. A. Heber.

The Mexican War provided the motives for comparatively few notable works of sculp¬ ture aside from statues of generals like Win¬ field Scott who belong also to other periods of history. Among works of recent date as¬ sociated with the history of this war is a relief at the National Museum, Washington, by Isi¬ dore Konti, picturing the incident of Kit Car- son, the scout, and Edward F. Beale, after¬ ward a general, hailing Commodore Stockton's flagship at the conclusion of their adventurous trip through the desert and the Mexican lines to bring news of re-enforcements to the be¬ leaguered Americans. Kit Carson has also been pictured in a group by Augustus Luke- man and F. G. R. Roth showing the scout mounted and in picturesque pose and costume. It is at Trinidad, Col.

The Civil War has occasioned more histori¬ cal and commemorative art projects than any other event in the nation's history, not even excepting the Revolution. Some of these achievements are crude, or at least archaic, as viewed from the art standpoint, yet are the out¬ come of a national impulse in which patriotic sentiments were mingled with artistic ambition. And while there may be a degree of monotony in the long list of statues of heroes of that period, there are not a few which rise above the mediocre in conception and execution and form noble and enduring achievements, — land¬ marks by which the progress of the nation in its aesthetic development may be noted. This is particularly true of the equestrian statues, which are often instinct with life and action. The finest example, no doubt, is the statue of Gen. William Tecumseh Sherman by the late Augustus Saint Gaudens

at the Fifth Avenue entrance to Central Park,- New York, which many regard as the noblest product of his re¬ markable genius. On the other hand, while the patriotic instinct has found its most frequent expression in this connection in the erection of statues of individual soldiers like Grant and Sherman and Lee and Sheridan and naval officers like Farragut, some of these memorials have taken the form of groups and reliefs in which a greater range has been afforded the artist's imagination. An instance in which there is dramatic character in superlative de¬ gree is the artillery group done recently by Henry M. Shrady for the splendid Grant monu¬ ment at Washington, D. C. Mr. Shrady's equestrian statue of Grant for the same memo¬ rial should also be mentioned. Herman A. MacNeil's Soldiers and Sailors' Memorial at Albany, N. Y., is an instance of a composition in which a very poetic scheme has been carried out and which conforms remarkably to artistic requirements. A man of the extraordinary genius of Saint Gaudens was very naturally called upon frequently during that period of his career falling from 10 to 30 years after the Civil War for the performance of tasks asso¬ ciated with it, and beside his Sherman monu-

ment special mention should be made of an¬ other of his great works occasioned by it, the Shaw Monument on Boston Common, one of the most famous and meritorious of all Ameri¬ can achievements of the kind, and his statue of Admiral Farragut, Madison Square, New York, with its sculptured pedestal. Reference may also be made in speaking briefly of the best known of such works to MacMonnies' equestrian statue of Gen. George B. McClellan, Gutzon Borglum's equestrian figure of Gen. Philip H. Sheridan, both at Washington, and the equestrian statue by Niehaus of Gen. Nathan B. Forrest at Memphis, Tenn., all of which stand out as especially fine examples of such work.

It is the heroes of the army who for obvious reasons furnish the subject for eques¬ trian groups, but the navy, too, has been pro¬ ductive of characters and episodes suitable for the themes of the sculptor. In its very in¬ fancy the American Navy produced a John Paul Jones, and one of the most significant and striking episbdes of recent years was the finding of his body and the movement resulting in its being brought from France and placed within a splendid memorial erected for the purpose at the Naval Academy at Annapolis, Md., and containing reliefs by Miss Evelyn B. Longman signalizing his achievements. The movement was stimulated by romances and plays appearing just before this in which he figured as hero. There is further commemora¬ tion of his gallantry in the reliefs by Niehaus for the

monument at the entrance to Potomac Park, Washington.

That it is not always possible or desirable to classify a work of art having historical asso¬ ciations with one period alone of the nation's history is illustrated in the case of some of these well-known figures of the Revolutionary and pioneer periods and that of 1812. Gen.

' Winfield Scott, for instance, whose picturesque personality is perpetuated by so many sculptural works, was perhaps most conspicuous as a mil¬ itary chieftain during the Mexican War, but he began his career with very gallant exploits in the War of 1812 which have been commemo¬ rated in art and survived to participate in the defense of the nation at the outbreak of the Civil War. He is seen on horseback, in a statue by F. E. Elwell, on the battlefield of Gettysburg.

Nor have the heroes of the Confederacy been forgotten, or the women who made sac¬ rifices for the <(Lost Cause.® Recently there was dedicated at Raleigh, N. C., a group . by Augustus Lukeman in honor of the ((Women of the Confederacy,® while Gen. John B. Gor¬ don is commemorated in an equestrian statue at Atlanta by Solon H. Borglum. Jefferson Davis, President of the Confederacy, is por¬ trayed by Edward Valentine in an emotional role, pleading for his cause, one hand out¬ stretched in gesture and the other resting upon the open book of history. The figure is half encircled by a colonnade and. may be seen at Richmond, Va. Here, too, is a fine bronze equestrial figure of Gen. J. E. B. Stuart, the Confederate cavalry leader, the work of Fred¬ erick Moynihan. The gallant military leader of the Confederacy, Gen. Robert E. Lee, be¬ came president, after laying down his arms, of Washington and Lee University at Lexington,

Va., and here he is memorialized in a meri¬ torious recumbent statue by Valentine, while there is also on the field of Gettysburg a memorial of him, and at Richmond, Va., in the Capitol Square there stands an equestrian figure surmounting a massive pedestal, the sculptor being Mercie. Lee's remains rest in a vault under the statue of him at Washington and Lee University.

Wendell Phillips, the great Abolitionist leader, is the subject of a recent work by French, forming a fine example of the art of this distinguished American sculptor, while one of the best known and justly famous of J. Q. A. Ward's achievements was his statue of the

eloquent Abolitionist preacher, Henry Ward Beecher, in front of Brooklyn's Borough Hall. In another statue of Beecher in Brooklyn, placed not long since in the arcade between Plymouth Church and the Arbuckle Memorial Building, and the work of Gutzon Borglum, his character is further interpreted in an inter¬ esting way. It emphasizes his services as prophet-reformer and the slave girls at his side recall the scenes when he sold slaves in Plym¬ outh Church at auction to obtain their freedom and aroused national protest against slavery. The work represents him at the height of a splendid maturity, possessing both the vigor of youth and the dignity of middle age.

Nor should the sculpture signalizing the services of the man who fought so forcefully with his pen for the cause of the Union, Horace Greeley, be forgotten. A seated figure in bronze was long in front of the office of his newspaper, the New York Tribune, and was recently removed a short distance away, while at Chappaqua, N. Y., where he had a farm, a fine standing figure by Partridge was not long since dedicated through the efforts of the Greeley Memorial Association.

The Spanish War gave us the Dewey Arch . on Fifth Avenue, New York, with its emblem¬ atic sculpture by many of the leading men in that branch of art in the United States, and though it was but a temporary achievement, it pointed the way to others more permanent. Later French and Andrew O'Connor collabo¬ rated in the strong figure at Indianapolis of General Lawton, who fell in the Philippines.

After the assassination and death of Presi¬ dent McKinley at the Pan-American Exposition in 1901 the nation was moved as by one im¬ pulse to do honor to his memory through some of the forms of art. There resulted the noble McKinley Monument -at Buffalo, with its lions by A. Phimister Proctor at the four corners, the imposing mausoleum at Canton, Ohio, with its statue and accessory sculpture by Niehaus, the Columbus, Ohio, Memorial by H. A. Mac- Neil, that in Fairmount Park, Philadelphia, by C. A. Lopez and Isidore Konti, and many others, while at Niles, Ohio, the birthplace of McKinley, there has just been erected (1917) a most unique patriotic shrine and museum, wherein McKinley relics may find a safe and available place of custody in an archi¬ tectural and sculptural setting noble in concep¬ tion and appropriate in details of execution. The architects of the memorial are McKim, Mead and White and the sculptor J. Massey Rhind, New York. The building itself is of Georgia marble and in the centre is a court of honor supported by 28 monolothic columns. In

front of this court is a statute of the dead President, and the colonnade contains busts of members of his cabinet and others associated with

his administration, while in the relic rooms, library and auditorium are works of art forming tributes to the heroism of those who participated in the Civil and Spanish-American wars. It is described as “not simply a monu¬ ment, not simply a memorial building, but both and more.®

Memorial buildings bearing the name of Lincoln are now in progress of creation or have recently been dedicated, and the sculpture in which his features are preserved is plentiful throughout the land, the works by Saint Gau- dens, Gutzon Borglum, Niehaus and MacNeil being of special merit; and that by George Grey Barnard, having been a subject recently of much controversy, both highly praised and severely criticized.

In recent years the most important work of an historical nature, whether in painting or sculpture, has been done upon commission in the decoration of public buildings like some of those mentioned. Thus, instead of isolated works there result mural paintings in logical series, in panels or other architectural features of the edifice, or reliefs and tablets or sculpture in the round, all having an artistic and histori¬ cal relation, often portraying episodes in the development of nation or commonwealth, like the work of Miss Violet Oakley and George Grey Barnard for the Pennsylvania State cap- itol. Often it is difficult to draw lines between work that is mainly decorative and that which is primarily historical. In general historical art has a decorative motive. This is especially true in the case of exposition sculpture, of which much that was worthy of preservation has been done. This applies to such achieve¬ ments as Solon Borglum’s picturesque figure of “The American Pioneer® for the recent Panama-Pacific Exposition at San Francisco; to Cyrus E. Dallin’s splendid Indian types in sculpture, some originally executed for exposi¬ tion adornment; to Albert Weinert’s “Primi- tive Man® and MacNeil’s <(Adventurous Bow¬ man,® at the San Francisco Exposition, and works there by Calder and Aitken, and others. At several of the expositions notable attention has been given in the decorative sculpture to the portrayal of the American Indian and such work has much historical value. H. K. Bush- Brown’s superb model of the ((Buffalo Hunt,® representing an Indian on horseback attacking a buffalo, was accorded the place of honor at the Jamestown Exposition. Dallin, whose fame rests largely on his depiction of Indian sub¬ jects, has contributed much work of the kind to expositions and this has resulted in com¬ missions for permanent groups like his “The Appeal to the Great Spirit® in Boston, and “The Signal of Peace,® Chicago. Edwin Wil¬ lard Deming is also a valuable contributor to such records of the Red Man, and though his art has been applied mainly in the direction of painting, it includes some interesting Indian

sculpture. Some of the most striking of Mac- Neil's early successes were his <(The Sun Vow,® (<The Last Act of the Moqui Snake Dance® and "Welcoming the White Man,® a group for the city park of Portland, Ore., commemorating the arrival of the white men of the Lewis and Clark expedition on the shores of the Pacific.

There are Indian figures also in Mr. MacNeil's reliefs for the Marquette Building, Chicago, showing scenes in the life of the hero-priest, Father Marquette. Frederic Remington's cow¬ boy types are graphic portrayals of a pictur¬ esque period now vanishing, like that of the Indian, one of them being his <(Cow Boy" in Philadelphia, while cowboys, Indians and pio¬ neers have been the themes inspiring Solon Borglum's most original work, work that is typically American. In all such art there is historical as well as decorative motive and the influence that flows from it is educational and patriotic, even though it is imparted without the conscious effort of the beholder and the artis¬ tic emotion seems to be the predominating one. See Sculpture in the United States.

Edward Hale Brush.

AMERICAN SHIPBUILDING. See

Shipbuilding, American.

AMERICAN SILKWORM. See Silk¬ worm.

AMERICAN SOCIAL SCIENCE ASSO¬ CIATION. See Social Science Association, American.

AMERICAN SOCIETY OF CIVIL EN¬ GINEERS, an association organized 5 Nov. 1852, in the city of New York, its object being the professional improvement of its members, the encouragement of social intercourse among men of practical science, the advancement of engineering in its several branches, and of architecture, and the establishment of a central point of reference and union for its members. Among the means to be employed for attaining these ends are periodical meetings for the reading of professional papers and the discus¬ sion of scientific subjects, the foundation of a library, the collection of maps, drawings and models, and the publication of such parts of the proceedings as may be deemed expedient.

The early life of the society was a struggle for existence and it was not until 1867 that the organization had a permanent headquarters and began its work in earnest. The first publication was the address of President James P. Kirk¬ wood, delivered 4 Dec. 1867, and printed in Vol. I of (Transactions) bearing date of 1872. The first annual convention was held in New York 16 June 1869, 55 members being present. The second and third conventions were also held in New York, but the fourth was held in Chicago and the annual conventions are now held at widely separated points. In 1869 the membership of the society was 160; the mem¬ bership in 1916 was about 8,000. The society has a splendid library of over 85,000 volumes, thoroughly classified and indexed and which is kept up to date by new additions. A monthly publication of Proceedings is issued in which are printed the professional papers in advance of their presentation at the semi-monthly meet¬ ings. These papers with all the discussion to which they give rise, are subsequently printed in transactions, > two and sometimes three volumes of which are issued annually. The society owns its house at 220 West 57th Street and has no debt.

The organization is in no sense a local one, and it has 15 local associations of its members, located in the larger cities of the United States. Its membership is made up of practitioners en¬

gaged in all branches of civil engineering, t)ie broadest interpretation of that term being used. From the beginning, admission to its privileges has been dependent solely upon professional experience and personal character.

That the society is beneficial to the profes¬ sion is evidenced by the eagerness with which membership in it is sought. The reasons for this are apparent, inasmuch as among its objects are to assist the young engineer professionally during the earlier years of his career, and, when he has proved himself worthy, to stamp him as one qualified to direct <(the great sources of power in nature for the use and convenience of man." That its influence is far-reaching is shown bv the fact that it has members in 51 of the 54 subdivisions of the United States, as well as in 46 foreign countries. This foreign membership constitutes 9l/2 per cent of the total list.

AMERICAN SOCIETY OF MECHAN¬ ICAL ENGINEERS, a professional organi¬ zation composed of engineers practising prin¬ cipally in the department of generation, dis¬ tribution and utilization of mechanical power and the processes of manufacture by mechani¬ cal processes. It is one of four organizations of engineers, national in its character and with a considerable foreign membership also, which exists for the

purpose of the reading and dis¬ cussion and publication of papers on engineer¬ ing subjects and for the advancement of the profession of engineering in any direction within its scope.

The society was formed in 1880 by a group of persons in and near New York city, who recognized that the existing societies of mining and civil engineers did not naturally and in¬ stinctively offer a scope for the developing strength of mechanical engineering in the United States. Its first meeting was held in New York city in the autumn of 1880. Since that two meetings have been held each year; the annual meeting in the city of New York and other meetings in various cities of the Union; meetings have fallen in Boston, Provi¬ dence, Philadelphia, Altoona, Buffalo, Pitts¬ burgh, Cleveland, Minneapolis, New Orleans, Indianapolis, Nashville, Richmond, Saint Louis, Chicago, Washington and San Francisco. These meetings last three or four days and are al¬ ways made the occasion of visits to important engineering enterprises in the city which is en¬ tertaining the society. Usually from 15 to 20 papers are read and discussed at each of these meetings and the papers with their discussions are issued to all members in the form of an annual volume, averaging a thousand pages and copiously illustrated. These volumes which are designated transactions* are an accumulation of most valuable professional literature, results of tests and experiments, researches into new fields and are filled with recorded data of observation. The society was incorporated as a national organization under the laws of New York State in 1881 and has maintained its ex¬ ecutive offices in New York city. For seven or eight years its headquarters were in office buildings in the business district, but in 1889 the movement was started of having its library of professional literature open in the evenings and for this purpose the society rented quarters in the Mott Memorial Library Building, Madi-

son Avenue near 27th Street. The success of the evening opening of its library warranted the step which was taken in 1890 of purchasing the property which had been altered by the New York Academy of Medicine for this purpose and which included not only a library space and equipment, but a convenient auditorium of small size for the holding of meetings. The society later became a participant in the pro¬ vision of a wealthy engineer and donor whereby three of these national societies are accom¬ modated in a special building designed specifi¬ cally for the needs of organizations of this class at 29 West 39th Street.

In addition to the publication of an annual volume the society issues a monthly periodical called The Journal of the society, which con¬ tains current professional literature of a high order and full abstracts of similar material from foreign societies and journals. It also con¬ ducts a free public reference library of engi¬ neering. This library is particularly rich in the current contributions to other scientific and en¬ gineering societies both in English and in other languages and in periodical literature published through the journals of technical journalism, both at home and abroad. This class of litera¬ ture is of special significance in lines in which progress is as rapid as in the industrial depart¬ ments of engineering. The library contains (1917) over 60,000 books and 10,000 pamphlets. It has also a valuable collection by bequest of antiquities in engineering and scientific matters, and obtains by exchange the scientific publica¬ tions of the United States government and corresponds with the important technical soci¬ eties of Europe and the continent. The cozy auditorium and the library exhibit much ma¬ terial in portraits, busts and memorials of en¬ gineering achievement. It is specially rich in drawings and other documents belonging to the work and history of Robert Fulton and early steam navigation.

The society has also discharged a valuable function by the service of professional commit¬ tees on special subjects. These professional committees have mainly been concerned with the work of formulating the best procedure in various lines, with a view of having such pro¬ cedure a species of standard whereby uniform¬ ity might be secured. Committees of the society have reported on uniform methods for conducting tests of boilers, on uniform meth¬ ods of conducting tests of engines, on uniform standards in structural material, and have prose¬ cuted research on the fire-resisting properties of material, advisable methods for conducting tests of strength, and similar problems. These reports are made by the best experts connected with the society, and while the society officially never adopts their recommendation by legis¬ lative action, these recommendations carry great weight by reason of the sources from which they come. The society is governed by a coun¬ cil, consisting of a president, six vice-presidents, nine managers, a secretary and a treasurer. A recent achievement in this field has been a code of accepted practice in design and opera¬ tion of steam-boilers ; and another has been a standardization of proportions of flanges for joints in pipe. It has been active in the. move¬ ment to conserve the natural industrial re¬ sources of the country.

AMERICAN STATE GOVERNMENT.

See State Government, American.

AMERICAN STREET RAILWAYS.

The idea of the street railway grew out of the steam railroad agitation when the first steam railroad was built in the United States in 1829. This idea rapidly materialized and the first street railway was built in New York city in 1832, the tracks being laid on the Bowery and Fourth Avenue from Prince Street to Harlem, the rail consisting of strips of flat-iron laid on granite blocks. This railway was put into operation in June 1833, the first cars running from Prince Street to Murray Hill. The cars resembled the stage coach then in use and were mounted on flanged wheels. This road being a financial failure, it was not until 1836 that the next street railway was built in Boston. After this time street railways were built in all large American cities and between 1860 and 1880 the horse railway had become an estab¬ lished institution. As cities grew and dis¬ tances within their limits became longer there was created a need of a motive power to propel the cars faster than horses could draw them. In some cases steam locomotives were used in the suburbs of large cities, but this was con¬ sidered objectionable on account of the noise, dirt and danger.

Numerous systems of propulsion were pro¬ posed and large expenditures were made in tests and trials. The first practicable method found was that of drawing the cars by an end¬ less wire cable and this method was first used in San Francisco in 1873 with much satisfac¬ tion where it was well suited for roads with heavy traffic and steep grades. This system was used in nearly all the large cities during the next 15 years, but as the cost was over $100,000 a mile, only the largest cities could make it profitable. It was soon conceded, however, that the cable system was not the ideal one for moving cars as there were certain mechanical difficulties in its operation which were extremely burdensome, and experiments were continued with other systems between 1880 and 1890, mainly with electric motors. The names of Edison, Field and Thomson are identified with this work. The first electric line in the United States was an exhibit run by Van Depoele at the Chicago Industrial Ex¬ position in 1882-83. In 1884 Henry in Kansas City, Mo., and Bentley and Knight in Cleveland, Ohio, constructed and operated electric lines. The first street railway to be entirely equipped with electric cars and successfully and con¬ tinuously operated was a road 12 miles long in Richmond, Va., built in 1888 by Frank J. Sprague, called the ˆfather® of the electric street railway. As soon as this road demon¬ strated that the electric motor could propel street cars reliably and economically, horse roads all over the United States were changed to electric roads, and many new roads

and extensions were built into the suburbs of the great cities.

The. electric railway, a distinctly American institution, was soon introduced all over the world. In the United States in 1912 there were 41,065 miles of electric railway track, covering an investment of $4,596,563,292, employing 282,461 persons and daily transporting about 33,250,000 people. Besides the 76,162 cars de-

voted to the transportation of passengers, there were 7,794 express and freight cars, mail cars, parlor cars, and even funeral cars on the street railways of American cities. Interurban elec¬ tric railways have been built in the outskirts of the large cities and between towns on a large scale and there are now very few towns of more than 5,000 inhabitants which are not connected with their neighbors by means of an electric railway. The total car mileage in 1912 was 1 ,921 ,620,074, operated by 3,665,051 horse¬ power of which 471,307 horse-power was pro¬ duced by water-power and the remainder most¬ ly by steam. Of the total track mileage, 38,958 miles were operated by overhead trolley; 1,395 miles by third rail; 352 miles (in New York city and Washington) by conduit trolley; 65 miles by storage battery; 76 miles by steam; 58 miles by horses ; and 56 miles by cable. Of the whole mileage, 40,532 were on the surface ; 420 miles were elevated; and 113 miles were in subway and tunnel. The gross income for the years 1912 was $585,930,517; the operating ex¬ penses were $332,896,346; and the net income was $61,910,753.

In 1915 approximately 1,044 miles were add¬ ed to the electric-railway mileage of the United States, as compared with 946 in 1914. Of the total added in 1915, 596 miles repre¬ sented new electric-railway track built, and 448 miles electrified steam mileage. According to the Electric Railzvay Journal the total electric¬ railway mileage of the United States in 1916 was approximately 46,454 miles ; and the elec¬ tric-railway companies operated 99,405 cars and locomotives. There were 1,027 companies operating the total mileage of 46,454, with 98,893 cars and 512 electric locomotives. Com¬ plete data of electric-railway earnings are not currently available, the latest detailed and com¬ plete statistics being those of 1912 as furnished above.

Many problems in electricity have arisen in the development of the street railway, the latest of which is the question of the alternat¬ ing

current. It is readily seen that an alter¬ nating current system of electric traction which would permit the use of a high transmission line potential and avoid the transformation to direct current by means of the rotary converter would. give an impetus to the electrical solution of transportation problems greater even than that which followed the introduction of the rotary converter. The direct current, because of its limitation as to voltage, is inadequate as a system for the distributing of power over a wide area. The alternating current system, permitting a change of potential by means of the simple and efficient static transformer, has already successfully met the requirements of transmission and distribution of electric power. The necessity of using direct current for the operation of cars has, however, greatly re¬ stricted its application to general railway serv¬ ice, involving, as it does, the introduction of the rotary converter with its auxiliary appa¬ ratus, increasing the cost both of installation and operation and reducing the commercial efficiency of the system as a whole. However, the direct current was in use in 1916 on nearly all city lines and on a large proportion of the interurban lines. The city lines are operated at 500 or 600 volts and the suburban lines at from 1,200 to 1,500 volts. It is claimed for

the alternating current system that it saves 20 per cent in power required. The cars, how¬ ever, are more expensive and this tends to off¬ set the cheaper equipment required in alter¬ nating sub-stations.

Catenary line construction is ’intended for high tension trolley roads, operated at poten¬ tials up to 6,000 volts or more. It is especially designed for use in conjunction with single phase alternating current railway equipment and marks one step further in the movement to secure a greater degree of economy and efficiency in the operation of electric trolley lines. The employment of high tension cur¬ rents for traction purposes necessitates the use of an improved trolley equipment possessing an efficiency and a reliability of a high order. The speed attained upon interurban lines makes it difficult to obtain satisfactory service with a trolley wire which dips between sup¬ ports and sags and sways with every impulse. Increased precautions against accidents and faulty construction are also necessary because of the increased- liability of damage from any diversion of the line current from its proper channel. Study of the traffic reports of many roads has shown that the passenger traffic to be expected on street railways in the United States ranges from 70 rides (fares) per capita per year in cities of 15,000 population, to 240 fares per capita in cities of 1,000,000 popula¬ tion. The intermediate figures are : 120 fares per capita in cities of 50,000 population; 150 fares to each of 100,000 population ; 180 fares to each of 200,000 population; 210 fares to

each of 300,000 population ; 220 to each of 500,000 population.

In late years there has been a rapidly in¬ creasing demand for a controlling system ap¬ plicable to trains of motor cars as well as to cars operated singly. This demand has been met by the development of the unit switch system of multiple control, which consists of a skillful combination of electro-magnetic and pneumatic devices, each applied to those oper¬ ations in which experience has shown it to be most effective. The construction is noticeable for the liberal design of its working parts and contacts and the great margin of power avail¬ able for their operation ; while the general de¬ sign and simplicity of operation insures great reliability of service and low cost of mainte¬ nance. See Railways, Street.

For extended discussion of technical and operating problems, consult Bureau of the Cen¬ sus Bulletin 124; Austin's (Single Phase Elec¬ tric Railways } (1915) ; Harding's Electric

Railway Engineering) (1916) ; Norris's Elec¬ tric Railways* (1913) ; Smith's Electric Traction) (1905).

AMERICAN SUGAR REFINING COM¬ PANY, The, an organization which, since 1900, holds a dominant position in the sugar industry. It was formed by the consolidation of the Havemeyer and other interests into one group. It operates five large refineries in the United States, at Chalmette, La., Brooklyn, N._Y., Jersey City, N. J., Boston, Mass., and Philadelphia, Pa. The first three of these are the largest plants of their kind in the world. The real estate and plants, including refineries, warehouses, cooperage, railroads, tank cars, wharves and stables, with their machinery and

equipment and timber and other lands owned in fee or through ownership of the entire cap¬ ital stock of constituent companies, are valued at $47,246,442. The total assets of the company on 31 Dec. 1916 aggregated $129,979,775 ; the capital stock on the same date consisted of $45,000,000 preferred and $45,000,000 common. In 1916 the profit from its operations totalled $9,756,379, the interest on loans and deposits $792,990, the income from investments reached $2,905,737, and the total dividends declared during the year amounted to $6,299,9 72.

AMERICAN SUNDAY - SCHOOL UNION, a religious association having

for its object the organization and support of Sunday- schools in needy neighborhoods, or those where religious sentiment is too divided to sustain denominational ones ; the publication and cir¬ culation of moral and religious publications and the dissemination of useful information. It is not a union of churches but of Christians of various denominations, requiring no common creed but a belief in the essential truths of Christianity held in common by all evangelical denominations and a desire to save souls and ((teach the truths that Christ taught as plainly as He taught them.® The members of the society may be either clergymen or laymen, every citizen of the United States who con¬ tributes $3 annually and is approved by the board being eligible, but its affairs are directed by a board of officers and 36 man¬ gers, all of whom must be laymen. The managers are elected by the members and the former annually elect the officers. There are also four standing committees appointed by the board, namely, publication, missions, finance and executive. During 90 years of work it has had for presidents, — Alexander Henry, John McLean, John A. Brown, Robert L. Kennedy, William Strong and Morris K. Jesup and the present president, Martin L. Finckel. Its head¬ quarters are at Philadelphia, where it first came into being. Its germ was the First-Day Society, founded in 1791, whose managers peti¬ tioned for free schools in Pennsylvania; this led to the formation of the Philadelphia Sunday and Adult School Union in 1817 which later united with similar societies and changed its name to the present title in 1824. The second year of its existence the Union printed an aver¬ age of 90,000 pages per day besides periodicals and over 600,000 Scripture tickets; since then its progress in every field of endeavor has been very rapid. It introduced the first selected uniform lessons — for which graded instruction was later provided — and the sys¬ tem known as «Union Questions.® It trained innumerable teachers and maintained mis¬ sionaries to organize schools throughout the West and South, particularly in the Mississippi Valley, and later in foreign lands. To supply literature to these schools which became the nuclei of thousands of churches, it created the first juvenile literature of a moral and religious type ; stimulating the use of music in Sunday schools ; organized a $12,000 American Mission¬ ary campaign; founded the- first weekly Sunday School Teacher's Journal; proposed the first National Sunday School Convention in Amer¬ ica; issued the first $10 libraries of 100 volumes for Sunday schools and distributed millions of dollars worth of literature including

Bibles and Testaments. In the last 25 years (1890-1915) the society has organized 43,509 new schools, having 169,016 teachers and 1,503,- 975 pupils besides reorganizing or reviving 9,000 other

schools. Its missionaries have in¬ creased forty-fold. By 1897 all debts had been paid and the society placed on a firm financial basis. Its income-bearing funds and property now amount to about $2,000,000. It expends $225,000 annually in missionary work. Publica¬ tions are furnished at cost but several thousand dollars worth of free literature is annually distributed in homes, hospitals, reformatories, etc. Consult Encyclopaedia of Sunday Schools' (New York 1915).

AMERICAN SYCAMORE. See Plane.

AMERICAN TEXTILE INDUSTRY.

See Textile Industry, American.

AMERICAN TRACT SOCIETY, The.

This society was organized in New York city on 11 May 1825. Its work is interdenomina¬ tional and international in scope, and is com¬ mended by all evangelical denominations. The design of its founders was to estab¬ lish a central society for the whole Union, inviting the co-operation of Christians of all the Protestant churches, and of other tract associations as auxiliaries, in publishing and circulating whatever would best diffuse a knowledge of Christ as the Redeemer and promote the interests of true religion and sound morality. The society has published the Gospel message in 178 languages, dialects and characters. It has carried on an important work among the foreign-speaking people in the United States, and its missionary colporteurs are distributing Christian literature in 33 lan¬ guages among the immigrants, and making a house-to-house visitation among the spiritually destitute, both in the cities and rural districts, leaving all kinds of Christian literature in the home. During the past 75 years the society's colporteurs have made 18,612,843 family visits, in the course of which they have distributed 17,382,454 volumes. The total number of titles of distinct publications, aside from periodicals, that have been issued from the society's home office is 9,136. The grand total of its publica¬ tions, including tracts, books and periodicals, issued from the home office during the past 91 years, is 794,639,700 copies. In Spanish and Portuguese the society has issued 14,748,588 copies of volumes, tracts and periodicals, in¬ cluding 126,000 Spanish hymnals. For Latin- America 14,748,588 copies of volumes, tracts and periodicals have been issued, amounting in value to $633,545. For publishing Christian literature in foreign lands the society has for¬ warded cash appropriations to the amount of $799,456.39, and has granted electrotypes to the value of $61,177.96, making a total expenditure of $860,634.35, by means of which many mil¬ lion copies

of books and tracts have been pub¬ lished at mission stations abroad. During 1915 the society gave away Christian literature to the value of $16,684.99. The grand total value of its gratuitous distribution is $2,634,505.89, which is the equivalent of 5,269,010,000 tract pages. Grants of its publications are given to missionaries, army and navy chaplains, pastors and Christian workers of every description. The society publishes four periodicals, The American Messenger, an illustrated religious

monthly; 7 he Amerikanischer Botschafter, a German paper for the home; Apples of Gold, an illustrated weekly for the Sunday school, and Manzanas de Oro, an illustrated Spanish weekly for the Spanish-speaking Sunday schools.

AMERICAN UNIVERSITY, The. A

post-graduate institution, located at Washing¬ ton, D. C., incorporated under the government of the District of Columbia in 1891, and later with enlarged charter from Congress of the United States; founder and first chancellor, Bishop John Fletcher Hurst; opened in 1914 by President Woodrow Wilson; campus of 93 acres at intersection of Massachusetts and Ne¬ braska avenues. Total assets, $3,000,000. Li¬ brary of 25,000 volumes. Awarded its first fel¬ lowship in 1915 and conferred its first degrees in 1916. Conducts courses leading to the mas¬ ter's and doctor's degrees, gives fellowships for research at other institutions and presents university extension lectures to the public.

AMERICAN WAR COMMISSION TO RUSSIA. On 1 May 1917 it was announced that Elihu Root had been appointed head of the war commission from the United States to Russia; and a fortnight later the commission left Washington, carrying greetings to the new democratic government of Russia and author¬ ized to pledge aid from the United States, not only in the prosecution of the war against the Central Powers, but also in the rehabilitation of Russia. With Mr. Root were: John R. . Mott, S. Reading Bertron, Cyrus H. McCor¬ mick, James Duncan and Charles Edward Rus¬ sell, envoys extraordinary; Maj.-Gen. Hugh L. Scott, chief of staff of the army, military representative of the President; Rear-Admiral James H. Glennon, naval representative of the President; Col. R. E. L. Michie, aide to the chief of staff; Col. William V. Judson, military at¬ tache to the diplomatic mission ; Lieut.-Col. T. Bently Mott, military aide to the ambassador

extraordinary ; Surgeon Holton C. Curl, United States Navy; Lieut. Alva D. Barnhard, United States Navy, aide to Admiral Glennon; James McKenna, disbursing officer of the mission, and a number of clerks, etc. The commissioners traveled overland to the Pacific coast, and there boarded a fast warship for the voyage. On 13 June the commission arrived in Petro- grad, where it was greeted by a large delega¬ tion of Russians and Americans. The American ambassador, David R. Francis, issued a state¬ ment explaining the aims of the mission, which have been given above. On 15 June Mr. Root, addressing the Council of Ministers, expressed the desire of the people of the United States to defend and preserve democracy. M. Tere- schtenko, Minister of Foreign Affairs, respond¬ ing in behalf of the council, expressed the cor¬ dial attitude of the Russian government toward the United States, and said that the Russian people considered the war inevitable and would continue to do their part. On 23 June, in Mos¬ cow, Mr. Root addressed six important organi¬ zations ; and in company with the Foreign Min¬ ister he subsequently visited staff headquarters at Mohilev, where he was welcomed by the commander-in-chief, General Brusiloff, Major- General Scott and aides, escorted by officers of the Russian staff, visited Kiev and the south¬

western front. The members of the commis¬ sion in general received favorable impressions of the new Russia; their elucidation of Ameri¬ can purposes and their authoritative promises of co-operation proved to be of great service in nullifying the effects of German intrigue; and their diplomatic efforts received valuable support from the activities of the American Railroad Commission, which had arrived at Vladivostok about the beginning of June, to assure and to provide indispensable aid to Rus¬ sia in the construction of railways and the supply of materials. Preparations to fulfil such engagements on a vast scale were already far advanced in the United States, when the commission made its report and its appeals for public approval of the new Russia at Washing¬ ton and New York in August. The commis¬ sion's leader then said: ((We took to the Rus¬ sians a message of faith and democracy. We return to repeat it.®

AMERICAN WATER-COLOR SOCIE¬ TY. See Water-Color Society, American.

AMERICAN WHIGS. See Whigs.

AMERICAN WOOD-PRESERVERS' ASSOCIATION. Organized at the World's Fair at Saint Louis in October 1904. Incorpo¬ rated in Illinois on 7 March 1911, as the Wood- Preservers' Association. Title changed 6 March 1912 to the American Wood-Preservers' Asso¬ ciation. The

objects of the association are to promote the knowledge of the materials, meth¬ ods and principles involved in the economic design, location, construction, maintenance and operation of wood-preserving works ; the standardization of specifications for wood pre¬ servatives and for their introduction into the material to be preserved and the maintenance of high standards of business ethics in the wood-preserving industry. The association holds meetings annually for the presentation and discussion of reports of the experiences and investigations of its members and others, and publishes its (Annual Proceedings* and a quarterly magazine, XV ood-Preserving. The membership, numbering 287 on 1 June 1916, consists of corporate, associate, probate and honorary members. The revenue is obtained from the initiation fees and dues of members, and the management is in the hands of the ex¬ ecutive committee, which comprises the presi¬ dent, two vice-presidents, secretary-treasurer and seven other members. On 1 Jan. 1916 there were 102 plants in this country preserv¬ ing wood with creosote, zinc chloride and other chemicals for the purpose of protecting it against decay and thereby aiding in the con¬ servation of our forest resources.

AMERICA'S CUP. See Yachts and Yachting.

AMERICUS, Ga., town and county-seat of Sumner County, on the Georgia & A. and Cen¬ tral of Ga. railroads, about 75 miles southwest of Macon. It was settled in 1832, and is gov¬ erned under a charter granted in 1889. There is a mayor and council of six. It is the busi¬ ness centre for a large cane and cotton region and has also several manufacturing industries. Pop. (1920) 9,010.

AMERIGHI, a'ma-re'gi Michelangelo.

See Caravaggio.

AMERIGO VESPUCCI, a'ma-re'go ves-

poot'che. See Vespucci.

AMERIND, a word suggested by Maj. J. W. Powell to describe the American Indians as distinguished from other Indians.

AMERLING, a'mer-ling, Friedrich, Aus¬ trian painter : b. Vienna 1803 ; d. there in 1887. He studied painting in Vienna, and also in Lon¬

don, Paris and Munich, and spent some years in Italy. Upon his return to Austria he was selected to paint a portrait of the Emperor Franz I, and from that time ranked as the most prominent portrait painter of that coun¬ try. His portraits number about 1,000, and are distinguished by brilliant coloring, but some¬ times fail of definiteness of characteriza¬ tion. Consult Bodenstein, (Hundert Jahre Kunstgeschichte Wiens) (1888) ; and Frankl, (Life> (1889).

AMERSFOORT, a'merz-fort, Holland, town in the province of Utrecht, and 12 miles northeast of the town of Utrecht. By the Eem, on which it stands, it has a navigable communi¬ cation with the Zuyder Zee. It manufactures woolen goods, tobacco, glass and silk-yarn, and carries on an extensive trade in grain. The Roman Catholic church of Saint Mary, built in the 14th century, has a Gothic tower 308 feet high, considered to be one of the finest in Eu¬ rope. There is a college of the Jansenists in the city, it being one of the chief centres of this sect, which does not now exist outside of Hol¬ land. The Grand Pensionary of Holland, Jan von Oldenbarneveldt, commonly called Barne- veldt, was born here. Pop. 24,000.

AMERY, Leopold Charles Maurice Sten-

nett, English journalist and politician: b. Go- rakhpore, India, 22 Nov. 1873. Educated at Har¬ row and Balliol College, Oxford, he secured several “Firsts® and the Ousley scholarship in Turkish, as well as a fellowship for history at All Souls’ College, Oxford. In 1896-97 he was private secretary to Mr. Leonard (now Lord) Courtney, and in the latter year set out on an extensive tour through southeastern Europe, contributing articles to English newspapers, which led to his joining the editorial staff of The Times in 1899. He was sent to south Af¬ rica shortly before the Boer war broke out, met President Kruger and the Boer leaders, and actually received permission from General Joubert to accompany the Boer army. Mr. Amery spent the first week of the war in the Boer camp at Sandspruit, when he was in¬ formed that his life was not safe. He pro¬ ceeded to Cape Town and organized the staff of war correspondents of The Times — some 20 men attached to the various British columns. On his return he undertook the editorship of The Times’ ‘History of the War in South Af¬ rica > (7 vols., London 1900-09), meanwhile

writing regularly on military, economic and im¬ perial questions in the columns of that paper. His book, ‘The Problem of the Army* (1903) was largely responsible for the subsequent re¬ organization of the War Office. He became a barrister in 1902, but never practised. In 1903 he followed Chamberlain in the great tariff re¬ form struggle, in

which he opposed Britain's Free Trade policy in the press and on the plat¬ form, his 'Fundamental Fallacies of Free

Trade) (1906) being regarded as one of the best contributions to the controversy. After four unsuccessful attempts to enter Parlia¬ ment — in 1906, 1908, January 1910 and Decem¬ ber 1910 — he was returned unopposed for South Birmingham as a Unionist in 1911. Though short of stature and slim in build, he delights in neck-breaking adventures, having climbed in the Alps, the Balkans, the Rockies and the Drakensberg Mountains. He traversed the Fraser River for 300 miles in a boat (1909) and in 1910 accompanied the late Lord Grey, then governor-general of Canada, on a 400 miles' canoe expedition. Shortly after the out¬ break of the European War Amery received a commission with the rank of captain and at¬ tached to the staff in France as interpreter. In 1915 he was sent on a special mission to the Balkans, appointed general-staff officer in 1916, and assistant secretary to the War Cabinet in 1917. Mrs. Amery is a Canadian lady, sister of Lieut. -Col. Sir Hamar Greenwood, Member of Parliament.

AMES, Adelbert, American soldier : b. Rockland, Me., 31 Oct. 1835. Graduating at West Point in 1861 he was assigned to the ar¬ tillery and served through the Civil War with distinction ; was wounded at Bull Run and bre- vetted for gallantry there; took part in nearly all the battles of the Peninsular campaign, in Fredericksburg, Chancellorsville, Antietam, Gettysburg and before Petersburg; was bre- vetted colonel, was brevetted major-general of volunteers for conduct at the capture of Fort Fisher and major-general in the regular army for general conduct in the war. From 1868 to 1876 he was in the thick of the "carpet-bag® troubles ; upheld by United States troops, the negro vote and recent immigrants, and bitterly fought by the mass of the white inhabitants. Mississippi was among the last of the revolted States to accept Reconstruction or the War Amendments as fixed facts and the preponder¬ ant negro population made the race problem more acute there than anywhere else in the South. The elements at Ames' disposal were unfit to base even a decent civilized structure upon, and the State soon went into anarchy tempered by local vigilance committees. In 1873 he was elected governor of Mississippi. His governorship was charged with sacrificing the civilized interests of the State to the blacks, and on 7 December there was a sanguinary race riot at Vicksburg, followed by others throughout the State. Ames sent to Washington for more troops to maintain order, the white party countered with fresh charges, a congres¬ sional investigating committee was appointed, and for two years the State had — like several Southern States through this period — a formal government perfectly powerless, and a real government

consisting of the rough consensus of interest among the larger white landowners. The legislature which met in January 1874 im¬ peached Ames and all his executive officers ; the State administration was paralyzed ; the national administration tired of upholding im¬ possible local governments ; and Ames finally agreed to resign if the impeachment were with¬ drawn. He at once removed to New York; later to Lowell, Mass. In the Spanish-Ameri- can War he was a brigadier-general of volun¬ teers.

AMES, Charles Gordon, American Uni¬ tarian clergyman, editor and lecturer : b. Dor¬ chester, Mass., 3 Oct. 1828; d. 15 April 1912. He was graduated at the Geauga Seminary, Ohio, and ordained in 1849 as a Free Baptist, but later became a Unitarian and succeeded James Freeman Clarke as pastor of the Church of the Disciples, Boston. He was editor of the Minnesota Republican, the first Republican paper in the Northwest, in 1854, and the Chris¬ tian Register of Boston, 1877-80. He wrote (George Eliot's Two Marriages) (1886) ; (As Natural as Life> (1894) ; <Poems) (1898) ;

(Sermons of Sunrise *(1901) ; (Five Points of Faith* (1903) ; etc. He was always deeply in¬ terested in social and philanthropic questions.

AMES, Edward Raymond, American clergyman : b. near Amesville, Adams county, Ohio, 20 May 1806; d. Baltimore, Md., 25 April 1879. He was educated at Ohio University, Athens, Ohio, but left at the end of his junior year and became the first principal of Lebanon Seminary, afterward McKendree College. In 1830 he joined the Illinois Conference of the Methodist Episcopal Church ; 1840-44 he was one of the three corresponding secretaries of the Missionary Society. In 1852 he was elected bishop. During the Civil War he, with Bishop Simpson, often aided President Lincoln by their counsel. The War Department gave into his care many unoccupied churches of the M. E. Church South. This was done as a war measure.

AMES, Fisher, American orator and states¬ man : b. Dedham, Mass., 9 April 1758; d. there, 4 July 1808. His father died when he was six. A precocious scholar, he was graduated from Harvard at 16; taught school some years to support his impoverished family, cultivating himself by wide reading and profound study of the classics and the Scriptures ; studied law, and began practice in Dedham in 1781. He made a reputation as "Brutus® and "Camillus** in the Boston papers,

was sent to the legisla¬ ture in 1788, won laurels, and was elected to the convention to ratify the Federal Constitu¬ tion. His speech there on biennial elections gave him fresh repute as one of our foremost orators. In December he was elected (Fed¬ eralist) Representative to Congress, and re¬ elected through Washington's administration to 1797; he was chosen to pronounce the con¬ gressional address to Washington on his re¬ tirement; and on 28 April 1796 delivered his masterpiece of eloquence and effectiveness, on the appropriation to carry Jay's treaty of 1794 into effect — so impressive that the other party protested against taking a vote until after an adjournment, because the House was too ex¬ cited to decide rationally. Retiring from pub¬ lic life on account of feeble health, he spent his later years mainly on his Dedham farm, though writing -papers in 1798 to urge the Fed¬ eralists to resist French aggressions, which was pouring oil on a conflagration (see Adams, John ; Alien and Sedition Laws, and the names of the various political parties of the time), serving for a time on the State council, and delivering a eulogy on Washington before the legislature. He declined the presidency of Harvard in 1804. He was an orator by inspira¬ tion, studying his subject and taking notes to expand on the moment, and full of flashing epi¬

grams and pregnant laconics. A large public school in Dedham Centre commemorates his name. Consult (Works and Life) (1 vol., 1809;

2 vols., 1854, by his son Seth) ; selected speeches, 1 vol., 1871, by his grandson.

AMES, Sir Herbert Brown, Canadian leg¬ islator: b. Montreal, 23 June 1863, of American parents. He was graduated B.A. at Amherst College, Massachusetts, in 1885. An alderman of Montreal 1898-1906, and chairman of the municipal board of health 1900-04, he has rep- *resented the Saint Antoine division of Montreal in the House of Commons in the Conservative interest since 1904, and since 1911 has been chairman of the House's standing committee on banking and commerce. He is honorary sec¬ retary of the Canadian Patriotic Fund and was knighted in 1915. He is a close student of economic and social conditions, and is the au¬ thor of (The Machine in Honest Hands* (1894) ; (The City Below the HilP (1897) ; (The City Problem* (1901), etc.

AMES, Joseph, painter: b. Roxbury, N. H., 1816; d. New York, 30 Oct. 1872. Though wholly self-taught he early began portrait¬ painting, opened a studio in Boston, and had success enough to obtain means to go to Rome and study. While there he painted a fine portrait of Pius IX. He was elected member of the National Academy of Design, 1870, and soon had more orders than he could fill. Some of his best known

portraits are those of Ris- tori, Prescott, Emerson, Rachel and President Felton of Harvard. (Maud Muller* and (The Death of Webster) are his best known ideal paintings.

AMES, Joseph Sweetman, American physi¬ cist : b. Manchester, Vt., 3 July 1864. He was graduated at Johns Hopkins University in 1886 and is professor of physics there. He is author of ˆTheory of Physics) (1897); (Manual of Experiments in Physics *(1898) ; (Free Expan¬ sion of Gases* (1898) ; (Induction of Electric Currents *(2 vols., 1900) ; editor Scientific Memoir Series,* (Fraunhofer's Papers* ; as¬ sistant editor Astro-Physical Journal; American Journal of Science.

AMES, Nathan P., American manufac¬ turer: b. 1803; d. 23 April 1847. In 1829 he established cutlery works at Chicopee Falls, Mass., which attained a national reputation, their swords especially being largely bought by the United States. In 1834 he removed the works to Cabotville (Chicopee), where he lived and died ; and incorporated with others the Ames Manufacturing Company, which in 1836 added a bell and bronze cannon foundry that had equal fame and furnished the larger part of the government's brass cannon in the Civil War, as well as the bronze statues of De Witt Clinton in Greenwood Cemetery, Brooklyn, N. Y., of George Washington in Union Square, New York, and of Benjamin Franklin in School Street, Boston. The works supplied the British government just before the Crimean War with machines for making mus¬ kets.

AMES, Oakes, American manufacturer and promoter: b. Easton, Mass., 10 Jan. 1804; d. 8 May 1873. The son of a blacksmith who had become a manufacturer of highly reputed picks and shovels, he trained himself in his father's

works, and with his brother joined the firm as Oliver Ames & Sons. The opening up of Cali¬ fornia in 1848 and Australia in 1851 by the gold discoveries created an immense demand for their goods in mining, settlement and railroad building, which raised the firm to the front rank in business and wealth ; and in the Civil War they had great contracts for shovels, swords, etc. Mr. Ames was in the Massachu¬ setts executive council 1861, and Congressman 1862 till death. In 1864 the failure of attempts to carry through the nationally exigent Pacific Railroad led President Lincoln's government to call on Mr. Ames to undertake it. He risked financial ruin if it failed, investing

$1,000,000 and making his whole fortune responsible for the rest ; it could not be expected that he should forego a corresponding profit if it succeeded. The work was finally accomplished by organiz¬ ing a construction company (see Credit Mo- bilier of America), which paid itself largely in stock and bonds of the Union Pacific, practi¬ cally making the two companies one, and enabling the former to charge the latter its own prices for work and supplies, the government paying the bills. Credit Mobilier stock became enormously valuable, and the directors were charged with cheating the government and us¬ ing the stock to buy congressional support for the fraud. Mr. Ames' anomalous position as Congressman, director in both companies, con¬ tractor for immense supplies to the railroad, and the ablest manager of the whole enterprise, caused the chief fury of the assault to fall on him; and in the tremendous public scandal and investigation which followed he was censured by the 42d Congress and died shortly after. His son Oliver (q.v.), however, induced the Massachusetts legislature to re-examine the case, and on 10 May 1883 (the 14th anniversary of the completion of the railroad) it passed a resolution exonerating Mr. Ames. The Union Pacific Railroad erected a monument to his memory at Sherman, Wyo., the crest of the road, 8,550 feet above the sea.

AMES, Oliver, American manufacturer, brother of Oakes above: b. Plymouth, Mass., 5 Nov. 1807; d. 9 March 1877. His brother's partner, he was a sharer in all his business en¬ terprises ; president pro tempore of the Union Pacific Railroad 1866-68, formal president 1868- 71 ; a director in the Credit Mobilier. After his brother's death he became head of the manu¬ facturing firm. He was a member of the State senate, 1852 and 1857.

AMES, Oliver, American manuf cturer, son of Oakes above: b. North Easton, Mass., 1831 ; d. 1895. He was trained in his father's works, and as his heir spent several years in paying off the obligations of millions of dol¬ lars incurred by the Union Pacific Railroad and other undertakings. Entering public life avowedly to vindicate his father's memory, he was lieutenant-governor of Massachusetts 1882-86; in 1883 obtained the vindicatory reso¬ lution he sought; and 1886-88 was governor.

AMES, Samuel, American jurist: b. Provi¬ dence, R. I., 6 Sept. 1806; d. there, 20 Dec. 1865. Was graduated at Brown, 1823; studied law with Judge Gould at Litchfield, Conn. He served for many years in the Rhode Island State assembly, being speaker 1844—45. He was elected chief justice of the State Supreme Court

1856, but resigned in 1865 on account of ill- health. In 1839 he

married Mary Throop Dorr, daughter of Thomas W. Dorr, leader of the rebellion in 1842. Author and editor of (Angell and Ames on Corporations, > and Vols. IV-VII of the (Rhode Island Reports.*

AMES, Iowa, city of Story County, on the Chicago & N. W. Railway, and on the Lin¬ coln Highway, 38 miles north of Des Moines. Settled in 1864 and named after Oakes Ames, one of the railway pioneers of the region, it was incorporated in 1869. The city maintains electric lighting plant and water works, a Car¬ negie library, and has manufactures of pen¬ nants and banners. Its chief claim to distinc¬ tion is the munificently equipped Iowa State College of Agriculture and Mechanic Arts. Pop. (1920) 6,270.

AMESBURY, Mass., town in Essex County, situated on the Merrimac River and on the Boston & Maine Railroad, 27 miles north of Salem. It has manufactories of automobiles and automobile fittings, carriages, motor boats, boots and shoes, hardware, etc. The United States census of 1914 showed 59 establishments of factoryˆ grade, employing 1,628 persons, of whom 1,451 were wage earners receiving an¬ nually $1,009,000 in wages. The capital em¬ ployed totalled $2,604,000, and the value of the output was $3,554,000; of this, $1,746,000 was added by manufacture. The town was origi¬ nally a part of Salisbury, but was set off in 1654 as New Salisbury. It was incorporated in 1666, and a year later received its present name. Amesbury was long the home of the poet Whittier, who died here in 1892. Pop.

(1920) 10,036.

AMETABOLA, those insects in which de¬ velopment is direct, there being no metamor¬ phosis.

AMETHYST (from the Greek amethystos, Hiot intoxicated”). In mineralogy (1) a violet or purple variety of crystallized quartz, the color being probably due to traces of manganese or iron. It is esteemed as a gem, and was worn by the Greeks in the belief that it lessened the intoxicating effects of alcoholic drinks upon its possessor. It is widely distributed, but speci¬ mens pure enough in color to be used as gems are not common. The finest amethysts come from Brazil, India, Siberia, Pennsylvania and North Carolina. (2) The precious (or Orien¬ tal) amethyst is a crystalline oxide of alumi¬ num, violet in color from the presence of traces of some other metallic oxide, and very brilliant and beautiful. Mineralogically the Oriental amethyst is a variety of corundum (q.v.).

AMHARA, am-ha'ra, a district of Abys¬ sinia, lying between the

Tacazze and the Blue Nile, but of which the limits are not well de¬ fined. The Amharic language, next to the Ara¬ bic the most widely used of all the Semitic languages, has gradually gained ground in southern and central Abyssinia, and has become the court language. It has a literature of its own, including a version of the Scriptures.

AMHERST, Jeffery, Baron, British soldier remembered for his American services : b. Kent, England, 29 Jan. 1717; d. 3 Aug. 1797. He was a duke's page, by his favor entering the army as ensign at 14, and became General Lord Ligo- nier's aide; served through the war of the Aus-

trian Succession, 1741-48, and was at Dettingen (1743), Fontenoy (1745) and Roncoux (1746) ; in the Seven Years' War beginning 1756 he was at the French victory of Hastenbeck, 1757. He had become noted as a brilliant soldier and ranked as lieutenant-colonel; in 1758 Pitt selected him to co-operate with Prideaux in con¬ quering Canada from the French, made him major-general, and gave him command of the expedition against Louisburg, which he speed¬ ily reduced, 27 .Tilly. In the following Septem¬ ber he superseded Abercromby as commander- in-chief of the English forces in America and captured Crown Point and Ticonderoga the fol¬ lowing year. On 8 Sept. 1760 he captured Mon¬ treal and ended the French dominion in Canada. For this he was made governor-general of the British possessions in America, thanked by Par¬ liament, and made a Knight of the Bath. But in face of Pontiac's conspiracy (1762) he failed, as other English commanders had so often be¬ fore, from insisting on conducting Indian like European warfare, and despising the Ameri¬ can militia and American experience. But as American trivialities like Pontiac's war were un¬ known or unregarded in England, Amherst on his return in 1763 was received with immense enthusiasm as the conqueror of Canada ; and as he was also a favorite of George III, and ac¬ tively supported the policy of coercing the colo¬ nies through the years before the Revolution, his honors did not cease. He was titular gov¬ ernor of Virginia 1763-68, without going there, governor of Guernsey from 1770 on, privy coun¬ cilor, 1772 on, 1772-82 and 1783-93 commander- in-chief of the British army, and was made a field marshal on resigning his command. In 1776 he was raised to the peerage. In 1780 he took an active and most humane part in sup¬ pressing the London ((no popery® riots.

AMHERST, Burma, a town and district in the Tenasserim division, about 30 miles south of Moulmein. It was founded by the British in 1826, and named after the governor-general of India of that day; but in 1827 the head¬ quarters were transferred to Moulmein. Am¬ herst has been eclipsed by the latter city, and is now merely a bathing-place for Moulmein. The district forms a narrow strip of land be¬ tween the Indian Ocean and the mountains which separate it from the independent king¬ dom of Siam. It has an area of 7,062 square miles and a population of about 300,000; it consists partly of fertile valleys and partly of a rich alluvial tract. The highways of the Salween and the Gyaing rivers bring down in¬ exhaustible supplies of rice to Moulmein, the chief town of the district. There is a very heavy rainfall approaching 150 inches in the year, but the temperature is uniform (at about 80° F.) throughout the year.

AMHERST, Canada, port of entry and cap¬ ital of Cumberland County, Nova Scotia, situ¬ ated on an arm of Cumberland Bay, an exten¬ sion of Chignecto Bay, the extreme northeast¬ ern arm of the Bay of Fundy; on the Inter¬ colonial Railway. 138 miles north by west of Halifax, Nova Scotia, and about midway be¬ tween that city and Saint John, New Bruns¬ wick. It was formerly called Fort Lawrence. Amherst is the centre of a rich agricultural and lumbering district; has factories, iron- foundries, tanneries and ship-building estab¬

lishments ; and has an especially large trade in lumber and ship-building. Some of the richest coal mines in the province are near here, and grindstones and gypsum are quarried in the vicinity. Pop. (1911), 8,973.

AMHERST, Mass., a town in Hampshire County, on the Boston & Maine and the Central Vermont railroads, 23 miles northeast of Spring- field. It has manufactories of paper, straw and palm-leaf hats and leather, and is best known as the seat of Amherst College (q.v.), the State Agricultural College and the State Experiment Station. Pop. (1920) 5,503.

AMHERST COLLEGE, one of the best known institutions of learning in the United States, is situated in. Amherst, Hampshire County, Mass. The cornerstone of the present South College, the first of the college buildings, was laid on 9 Aug. 1820, and upon this occasion an address was delivered by Noah Webster. Exercises of dedication and inaugu¬ ration were held on 18 Sept. 1821, and on the following day, with a president, two professors and 47 students, the work of the col¬ lege was begun. The first president was the Rev. Zephaniah Swift Moore, D.D., who had resigned the presidency of Williams College in order to

come to Amherst, and who brought with him 15 students from Williamstown. After two adverse votes in the legislature the college finally secured a charter from the com¬ monwealth, the date of its approval being 21 Feb. 1825. A number of students in the inter¬ vening classes, being compelled to graduate without a degree, received their degrees from Union College, on suitable certificates from Amherst. Of the charter just mentioned a few words are all that the present sketch per¬ mits, or that are pertinent to present condi¬ tions. As to the board of trustees, it «pro- vided, . . . that the number of members

(including the president of said college for the time being, who shall ex officio be one of said corporation) shall never be greater than seven¬ teen® ; and as to keeping that number good, it was in the same section (<provided, further, that as vacancies shall occur in said board, they shall be so filled that the said board shall as soon as may be, and forever after, consist of seven clergymen and ten laymen.® The first five vacancies that occurred in the board were filled by vote of the legislature ; but when, 50 years after the founding of the college, the number of alumni had become sufficient to war¬ rant it, the alumni were empowered to choose five members of the board, electing one each year as their terms of service expired. Regard¬ ing instructors and students, it was enacted, (<That no instructor in said college shall ever be required by the trustees to profess any par¬ ticular religious opinions as a test of office; and no student shall be refused admission tc or denied any of the privileges, honors or de grees of said college on account of the religidus opinions he may entertain.® By an act approved 4 Feb. 1916, that part of the act of 1825 which required that the board of trustees should con¬ sist of seven clergymen and ten laymen was repealed. Amherst College is a college of liberal arts and sciences and does not under¬ take to provide a technical training. The course of study, normally requiring four years, and leading to the degree of bachelor of arts, is

partly prescribed and partly elective. The re¬ quirements for admission are based upon the subjects usually studied during a four years' course in the best high schools. In order to secure a degree a student must complete 40 semester courses which shall include one year of English, one year of mathematics, one year of history or philosophy, two years of Greek or two years of Latin, two years of science in the group, biology, chemistry, physics, and he must have a

reading knowledge of either Ger¬ man or a Romance language (French, Italian or Spanish). In addition to the 40 courses, work is required in public speaking and in physical education. On the other hand, the fact that many courses are elective allows a student to follow to some extent his own incli¬ nations ; in fact it is possible for a student to so shape his college course that after gradu¬ ation he may secure an engineering degree from a technical school by two years of additional study. The college also offers to holders of the bachelor's degree a year's course of study lead¬ ing to the degree of master of arts. For many years the college offered a course leading to the degree of bachelor of science. The require¬ ments for this degree placed less emphasis upon the classical languages and more upon the sciences than do those of the course leading to the degree of bachelor of arts. No candidates have been accepted in this course, however, since those who entered college in 1913. The catalogue for the academic year 1920-21 shows a student enrolment of 503, and a faculty of 46 actively engaged in teaching. Since the college was founded about 9,000 students have been enrolled, and of this number about 5,000 are living. The buildings and equipment are valued at approximately $1,200,000 and include, besides recitation halls, laboratories, dormi¬ tories, etc., an infirmary, a gymnasium, two large athletic fields and a skating rink. The college has also many valuable collections. Among these are the Adams collection of shells, a part of Audubon's celebrated collection of birds, the Woods collection of minerals, the Shepard collection of meteorites, the famous Hitchcock ichnological collection, an anthropo¬ logical collection and an unusually complete and interesting collection of Indian relics. The total funds of the college amount to over $2,800,000, of which the income of more than $420,000 is available annually for fellowships, scholarships and prizes. The corporate name of the institution is (<The Trustees of Amherst College.®

AMHERSTBURG, Canada, a town in Essex County, Ontario, on the Michigan Central Railway, 16 miles from Sandwich. It is situ¬ ated on the Detroit River, and among its indus¬ tries are an automobile factory and a knitting factory. Valuable limestone quarries and a soda ash plant are in the neighborhood. Pop.

(1911), 2,560.

AMIANTHUS, a-me-anth'uz («undefiled»), a name applied to the finer kinds of asbestos in consequence, it is said, of the mineral being unaffected by fire. Some of the finest ami¬ anthus, with long, silky, flexible fibres, occurs in the district of the Tarentaise in Savoy.

AMICE, am'Ts, or AMICT (Lat. amictus, girt around), a vestment worn by priests in the

Roman Catholic Church during the celebration of mass. After the general adoption of the cravat had rendered the amice unnecessary as a neckcloth, it was retained for the significance which it had acquired as an emblem of the cloth wherewith the Saviour was blindfolded by the Jews the night before his crucifixion.

AMICI, a-me'che, Giovanni Batista, an

Italian savant: b. in Modena 1786; d. 1864. He studied natural history at Bologna, and mathematics at Modena. He became professor of mathematics at the College of Panaro, and for some time general inspector of education in Modena, where in 1831 the Grand Duke of Tuscany appointed him director of the Florence observatory, as successor of the celebrated comet-discoverer, Luigi Pons. This office he held until his death, publishing every year the result of his astronomical observations, at the same time contributing important papers on natural history to the Memorie della Societa Italiana. Science is especially indebted to him for his improvement of the telescope, of several microscopes, and of the camera lucida, invented by Hooke and Wollaston. He seems to have from his earliest life devoted much attention to optical instruments, and before he was 20 he made a telescope of a mixture composed by himself. In 1827 he made dioptric microscopes, which are sold with his name attached, and, not¬ withstanding the improved microscopes of Oberhauser, are still in great favor. He was assisted in his labors by his son, Vincenzo Amici, who was professor of mathematics at the University of Pisa.

AMICIS, a-me'ches, Edmondo de, Italy's foremost descriptive writer: b. Oneglia, of Gen¬ oese parentage, 21 Oct. 1846; d. Bordighera, 11 March 1908. Educated at Coni and Turin, he attended the Modena military school ; entered service 1863 as sub-lieutenant, acted against the Sicilian brigands and served through the Aus- tro-Prussian War of 1866. He remained in the army till the occupation of Rome in 1870; but his literary vocation was plain. In 1867 he took charge of a Florentine paper, L' Italia Militare. In 1868 his first volume, (Military Sketches, 5 short stories of the phases of a soldier's life, had sweeping success and marked him as the coming Italian litterateur; and in 1871 he' settled at Turin and devoted himself to authorship. His next work was (Recollections' (of 1870-71), dedicated to the youth of Italy; a fresh collec¬ tion of stories followed. But a craving for travel turned him into the path which has given him his greatest fame : the foreign world at least knows him mainly by the brilliant, glow¬ ing volumes

describing the countries of Europe and other continents he visited, their national characteristics and habits, and, most of all, the springs of their life and thought. They are enthusiastic, sympathetic, optimistic, full of sensuous delight in beauty, rich in color and vivid in clearness of portrayal; but they exhibit too a marvelously keen analytic power as well as acute photographic sensitiveness to impres¬ sions and marvelous literary skill in translating them into language. The greatest of these per¬ haps 16 <Holland) (1874), a singularly fine analysis of the essence of Dutch life and the sources of Dutch art in that life; others are <Spain) (1873), (Recollections of London)

(1874), <Morocco) (1876), (Recollections of

Paris) (1878), Constantinople *(1878). He published also in these times cLiterary Por¬ traits* (1881), sympathetic studies of Daudet, Zola, Dumas, Jr., Augier, Coquelin and Deroulede ; (The Friends, *on friendship in general (1882) ; historical novelettes, a collec¬ tion in part old, entitled (The Gate of Italy* (1884) ; (On the Ocean *(1889). Later, educa¬ tional and social problems deeply occupied his mind: his (Cuore* (Hearts; Englished as (The Heart of a Schoolboy*), a juvenile in which a pupil tells the events of a school year day by day, has sold nearly 200,000 copies in Italy; a novel for adults on similar lines is (The Work¬ men's Mistress* (1895) ; followed the same year by cThe Romance of a Master *(1895), which has a strong socialistic bent. He avows him¬ self that he thinks Socialism the only available spring of a vital Italian literature now. His latest works are: Everybody's Wagon* (1899), (Memories *(1899), (Hope and Glory* (1900), and (Records of Infancy and School* (1901). See Cuore.

amicus cu;rije, in law, a person who

acts in a suit to instruct the court as to facts or as to law. Usually a person so acting is an attorney-at-law, and he may inform the court either on matters of fact or on points of law of which the court is doubtful. He has much less control over an action than an attorney of record, but in some jurisdictions he may move to quash an indictment or set a proceeding aside.

AMIDE (am'id; from ammonia, + ide), in chemistry, a general name for a class of bodies which may be regarded as derived from am¬ monia, NH3, by replacing one or more of the hydrogen atoms in that

substance by an equal number of monovalent acid radicals. Thus formic acid, H.CO.OH, may be regarded as a hydrate of the acid radical HCO ; and the compound HCO.NH2, which is known as <(formamide, **and is obtained by the action of ethyl formate upon ammonia, may be regarded as derived from ammonia by the substitution of the radical HCO for one of the hydrogen atoms in NH3. Similarly, acetic acid, CH3.CO. OH, may be regarded as a hydrate of the radi¬ cal ((acetyl** (C2H30) ; and acetamide, which has the formula C2H3O.NH2, and is produced by the action of ethyl acetate upon ammonia, may be regarded as derived from ammonia by the substitution of the radical '"acetyl** for one of the hydrogen atoms in the ammonia.

Taking the general formula of a normal fatty acid as X.CO.OH, where X represents an alcohol radical (see Alcohol), an amide may be formed by substituting the monovalent acid radical, XCO, for one of the hydrogen atoms in NH3. The resulting substance, XCO.NH2, is called the ((primary amide **of the acid radi¬ cal XCO. By the further substitution of XCO for one of the atoms of hydrogen remaining in the primary amide, a "secondary amide** of the same acid radical is obtained, having the formula (XCO)2.NH. It is evident^ that a ((tertiary amide,** having the formula (XCO)3N, is also possible.

For some purposes it is convenient to regard the primary amide, XCO.NH2 of the monobasic acid X.CO.OH, from the opposite point of view; namely, as derived from the acid by the

substitution of the radical NH3 for the hy¬ droxyl group OH. Obviously the result is the same in either case; but this latter view makes the deportment of dibasic acid radicals easier to describe. Thus in the dibasic acid Y (CO. OH)2 (where Y is a divalent radical), the first result of the substitution of NH2 for OH is the formation of the body Y (CO. OH). (CO. NH2), which is both an acid and an amide — an amide because it is obtained by the substitu¬ tion of NH2 for OH, and an acid because it still contains one molecule of hydrogen that is replaceable by a monovalent metal or radical (namely, the molecule of H in the OH). Bodies of this type are called ((amic acids.**

If the molecule of OH remaining in an amic acid is replaced by a further substitution of NH2, the resulting substance, Y(CO.NH2)2, is called a ((di-amide,** and may be regarded as formed from two molecules of ammonia by the substitution of the divalent acid radical Y(CO)2 for one-third of the total hydrogen present in those molecules.

The chemistry of the amides is very in¬ volved. They are mostly solid

bodies, neutral to litmus, but capable of forming compounds with acids. The amides may be formed in sev¬ eral ways: (1) By the action of ammonia on ethers; (2) by the action of ammonia on acid chlorides; (3) by the dehydration of ammo¬ nium salts; (4) by the action of ammonia on anhydrides; (5) from nitriles and cold concen¬ trated hydrochloric acid ; (6) by heating acids with ammonium sulphocyanide for several days. The most familiar example of the class is the primary amide of acetyl or <(acetamide.** This substance, which is usually obtained by the dry distillation of acetate of ammonium at temperatures exceeding 375° F., has the for¬ mula C2H3O.NH2, as noted above, and forms hexagonal crystals. It melts at about 180° F., boils at about 432°, and is quite soluble in water. Diacetamide, (C2H30)2.NH, and triacetamide, (C2H30)3.N, are also known. See Amine; Imide; Nitrile.

AMIDO-ACIDS, substances derived from organic acids by the substitution of an NH2 group for one or more of the hydrogen atoms in direct connection with a carbon atom. They often form intermediary products in the metabolism of proteids. In the process of digestion notably, the proteids (albumens) un¬ dergo a gradual series of transformations whereby the complex proteid molecule is broken down into simpler and simpler com¬ pounds, until at the end of the process car¬ bonic anhydride, water, urea, uric acid, am¬ monia, etc., are the results. While these end products of metabolism are well known, the intermediary products are the object of much inquiry. In the intestinal canal, under the pro¬ longed action of the pancreatic juice ferments, simpler nitrogenous principles are found, leu¬ cine, tyrosine, aspartic acids — these belong to the general group of the amido-acids. Schutz- enberger has described amido-acids of the (1) leucine class, CnH2n+1N02 — such as alanine, propalinine, butalanine ; (2) of the acrylic series, CnH2n-iN20; (3) amido-acids of the gluco- protein class, sweet in taste, with the general formula CnHunNuCh; (4) amido-acids such as tyrosine, tyroleucine and glutaminic acid. Con-

suit Shafer, (Text-book of Physiology > (Vol. I, p. 30).

AMIEL, a'myel', Henri Frederic, Swiss essayist, philosophical critic and poet : b. in Geneva, 27 Sept. 1821; d. there, 11 March 1881; was for five years a student in German univer¬ sities, and on his return home became pro¬ fessor of philosophy in the Geneva Academy. He is author of several works on the history of literature, as (The Literary Movement in Romanish Switzerland) (1849) ; (Study on

Mme. de StaeP (1878) ; and of several poems, among them (Millet Grains *(1854). But his fame rests principally on the <Journal,) which appeared after the author's death, and trans¬ lated into English by Mrs. Humphrey Ward. This journal is a complete revelation of a cast of mind expressing great passion and full of original power and spiritual yearning. It is fascinating and subtle rather than stimulating or strong, and is esteemed more for its beauty of form then for any definite teaching it con¬ tains. Consult Arnold, Matthew, (Essays in Criticism) ; Bourget, (Nouveaux essais de psy¬ chology contemporaine* (Paris 1885) ; Vadier, (Life of AmieP (ib. 1885). See Amiei/s Journal.

AMIEL'S JOURNAL INTIME. Henri

Frederic Amiel, though for more than 30 years professor in the Academy of Geneva, is remembered almost solely for his (Journal In¬ time/ to which he confided thoughts and im¬ pressions, chiefly psychological, that he could not find the will to publish during his life. He bequeathed it, a manuscript of 1,700 pages, to Genevese friends that they might publish from it whatever seemed (<to possess interest as thought or value as experience.® A first vol¬ ume appeared in 1883 with a notable introduc¬ tion by Edmond Scherer. A second and last followed in 1884. Both have been exception¬ ally well translated, with a thoughtful intro¬ duction, by Mrs. Humphrey Ward. The jour¬ nal } made an immediate and deep, though not wide, impression as being, in the words of Renan, <(the perfect mirror of a modern mind of the best type, matured by the best modern culture, and also a striking picture of the suf¬ ferings which beset the sterility of genius.® The morbid introspection that numbed action in Amiel, as in Shakespeare's (Hamlet, } seems to have been intensified by the conditions attend¬ ing the recognition of his talent that he gained on

his return to his native Geneva after six years' philosophical study, chiefly in Germany. A* democratic revolution had displaced in the city the old governing artistocracy in which was comprised nearly all its culture. To this new government he owed his professorship, an appointment which involved an almost complete social isolation of which the psychic effect is constantly reflected in the (Journalˆ Beauty of expression, psychological insight, untiring in¬ tellectual interest, and above all a power of re¬ vealing most poignantly an experience of spiritual uncertainty, in Scherer's words, <(a will which wished to will but was powerless to furnish itself the motives for willing,® which other over-refined and meditative minds feel to be akin to their own, assure the (Journal) a high place in the literature of confession. There is a <Life of AmieP by B. Vadier. Consult

Arnold, Matthew, (Essays in Criticism, *and Bourget, (Nouveaux essais de psychologie contemporaine.*

Benjamin W. Wells, Author (Modern French Literature .*

AMIENS, a'myan', an old French city, once the capital of Picardy, and now of the department of Somme, on the many-channeled navigable Somme, 81 miles north of Paris by rail. Its fortifications have been turned into charming boulevards, but it still retains its old citadel. The Cathedral of Notre Dame is a masterpiece of Gothic architecture. Begun in 1220, it is 470 feet long, and has a spire (1529) 426 feet high; but its special feature is the lofti¬ ness of the nave, 141 feet. In his little work called (The Bible of Amiens,* Ruskin says this church well deserves the name given it by Viollet-le-Duc, ((the Parthenon of Gothic archi¬ tecture,® and affirms that its style is <(Gothic, pure, authoritative, and unaccusable.® Other noteworthy buildings are the Hotel de Ville (1600-1760), in which the Peace of Amiens was signed; the large museum (1864), in Re¬ naissance style ; and the public library, founded in 1791. Amiens has considerable manufac¬ tures of velvet, silk, woolen and cotton goods, ribbons and carpets. Peter the Hermit and Du- cange were natives, and there are statues to both of them. The (<Mise of Amiens,® was the award pronounced by Louis IX of France, in 1264, on the controversy between Henry III of England and his people as to the (<Provisions of Oxford.® The Peace of Amiens (27 March 1802) was a treaty intended to settle the dis¬ puted points between England, France, Spain and Holland. By it England retained possession of Ceylon and Trinidad and an open port at the Cape of Good Hope; the republic of the Ionian Islands was recognized ; Malta was restored to the Knights of Saint John; Spain and Holland regained their colonies, with the exception of Trinidad and Ceylon; the French were to quit Rome and Naples; and Turkey

was restored to its integrity. In the Franco-Prussian War, on 27 Nov. 1870, General Manteuffel inflicted, near Amiens, a signal defeat on a French army 30,- 000 strong, and three days later the citadel sur¬ rendered. During the European War, with its defenses strengthened, it was important as a garrison railway and supply depot for the al¬ lied armies. Pop. about 92,000.

AMINA, the sleep-walking heroine of Bellini's opera (La Sonnambula.*

AMINE (am'in; from ammonia -\~ine), a general name for a compound derived from ammonia by substituting one or more of its hydrogen atoms with an equivalent number of metallic atoms or basic organic radicals (Com¬ pare Amide). The reactions of the amines de¬ pend upon the class to which the substituted alkyl belongs — whether (1) all aliphatic; (2) part aliphatic and part aromatic — with the ni¬ trogen ring attached to the aliphatic residue (as benzylamine) ; (3) part aromatic and part aliphatic with the nitrogen attached to a carbon atom of the benzene ring (as methylaniline) ; and (4) pure aromatic amines (as aniline, diphenylamine, etc.). Group (1) is known as the aliphatic amines; (2) as the aromatic amines; (3) and (4) as the aromatic amino- compounds. As in the case of the amides,

a given monovalent radical can form three compounds of this sort according as it replaces one, two or three of the hydrogen atoms of the original ammonia. For example, the monovalent basic radical <(ethyl,® C2H5, forms primary ethyl amine (or <(ethylamine®) GHr,.NH2, when it replaces one atom of H in NH3; secondary ethyl amine (or ((diethyla- mine®), (C2H5)2.NH, when it replaces two atoms of H; and tertiary ethyl amine (or (<triethylamine®), (C2H5)3.N, when it replaces all three of the hydrogen atoms in the ammonia. The base by which the hydrogen in the am¬ monia is replaced need not be organic. Po¬ tassium, for example, may replace an atom of it, with the formation of potassium monamine (or ((potassamine®), K.NH2. A derivative of ammonia, in which one atom of the typical hydrogen is replaced by a monovalent acid rad¬ ical, and another by a monovalent basic radical or by a monad metal, may be considered to be either an amine or an amide. Thus CH3.C2H30. NH, in which one atom of the hydrogen has been replaced by the basic radical <(methyl® (CH3), and another by the acid radical <(acetyl® (C2H30), may be described as a modified methylamine, or as a modified acetamide. The amines are found in nature chiefly in the

vege¬ table alkaloids. They occur also in the blood of some animals and generally among the de¬ composition products of both animal and vege¬ table organisms and also in decomposed min¬ erals which have their origin in organic matter.

There are several methods by which amines may be prepared: (1) By the action of am¬ monia or its alkyl derivatives on substitution products of the hydrocarbons; (2) by the re¬ duction of nitrogen-containing substances; (3) by the action of bromine and potash on the amides; (4) by the action of alkalies on alkyl isocyanates; (5) by hydrolysis of the alkyl esters of thiocarbamines and isocyanides with concentrated acids ; (6) from compounds which certain substances form with alkyl halides; (7) by distillation of amino-acids with baryta. In addition, aliphatic primary and secondary amines may be obtained by the action of potash on the p-nitroso derivatives of secondary and tertiary aromatic amino-compounds, and ter¬ tiary amines may be secured by heating primary and secondary bases with an excess of potas¬ sium alkyl sulphate. Secondary and tertiary aromatic amino-compounds (dimethylaniline, etc.) are prepared on a large scale by heating the primary amines under pressure with al¬ cohol and hydrochloric or sulphuric acid, at a temperature of from 360° to 400° F.

When ammonia is added to a cold solution of a salt of an amine, the amine is expelled from its combination and precipitated.

The amines of the aliphatic series are gen¬ erally inflammable gases, or volatile liquids with a low boiling point and a density about 75 per cent that of water. They have a fishy odor, are decidedly alkaline, and are freely soluble in water. Some of the highest members of this class are odorless solids, becoming car¬ bonates upon exposure to moist air. The aro¬ matic amines (benzylamine, etc.) are com¬ paratively few; they resemble generally the aliphatic amines, but are not so strongly basic.

The most important amines, in the arts, are methylamine, and aniline (q.v.).

AMINTA. The uncontested pre-eminence of the it is apparent that he intended to evade this criticism in the typically pedantic fashion of the Renaissance: Aminta is of divine descent, and Silvia, his lover and future bride, is a nymph of Diana. In a world of divinities even the aesthetic shepherds of the pastoral are ˆprobable® as well as possible. If we hold that this evasion is as futile as the objection itself, it is nevertheless clear that Tasso’s poetic in¬ stinct served him better than

his logic. The reality that fails to return through the divinity of his characters does arise from the atmos¬ phere of humorous fancy into which the whole invention is thrown. A playfully mechanical plot — with two. resurrections and a bloodless combat — continued in its lighter effects by character drawings humanly conventional (the philosophical spinster and the vanquished Diana), compensates by its gentle mirth for the absurdities inherent in the nature of the Arca¬ dian world. It is only in the realm of fancy that the impossible becomes probable and neces¬ sary. And when this has been conceded, Tasso is free with all sincerity to yield his spirit to the voluptuous melancholy, the suppressed joys, the mellow anguish of sensuous passions experi¬ enced in an imagination aspiring to the ideal. This idealized sensuousness of the <Aminta,) sustained by imagery free from crudeness but brilliantly visualized, enriched by suggestions of sadness and unsatisfied yearnings, pricking the intellect with paradox and metaphor and the memory with a wealth of erudite allusion, gave new direction to Italian Petrarchism gen¬ erally and to the moods of pastoral poetry in particular. In the (Aminta, *as well as in the Jerusalem Delivered,* the Marinists of the 1 7th century found the principal authority for their <(lasciviousness.® It was the delight of the precieux salons of Paris under Louis XIII and Louis XIV. Twenty-eight French trans¬ lations have been made of this work. Of a dozen English renderings the first, by Abraham Faunce, appeared in 1591, and the best, by Leigh Hunt, in 1820. The ˆmintaˆwas com¬ posed as an entertainment for Giambattista Pigna, Prime Minister of Duke Alfonso of Ferrara, and produced for the first time at Belvedere-on-the-Po, Pigna's country estate, 31 July 1571.

Arthur Livingston,

Western University.

AMIOT, a/myd', Jean Joseph Marie,

French missionary: b. Toulon, February 1718; d. Peking, 9 Oct. 1793. He entered the Society of Jesus in 1737 and was sent in 1750 as a missionary to China. He soon won the confidence of the Emperor Kien-lung and spent the remainder of his life at Pekin. Amiot was eminently fitted to make good use of the advantages which his situation afforded, and his works did more than had ever been done before to make known to the Western World the thought and life of the Far East. His (Dictionaire tatare-manchou-

frangais) (1789) was a work of great value, the language having been previously quite un¬ known in Europe. His other writings are to be found chiefly in the (Memoires concernant l'histoire, les sciences et les arts des Chinois) (15 vols., 1776-91) ; the (Vie de Confucius, > the 12th volume of that .collection, is complete and accurate.

AMIRANTE, am'i-rant, ISLANDS, a group of small islands in the Indian Ocean, ly¬ ing southwest of the Seychelles. They wrere taken possession of by Great Britain in 1814 and form a dependency of Mauritius. They produce cocoanuts, and turtle and fish are abundant. About six are inhabited.

AMIS ET AMILES, a'me' za a'mel', a chanson of the Middle Ages, dating from about the beginning of the 13th century. The work consists of 3,500 lines, in which are narrated the adventures of two friends.

AMISTAD, a'me'stad', CASE, in United States history, one of the landmarks of the slavery question. The Spanish government, by decree of December 1817, forbade the importa¬ tion of slaves from Africa into its dominions after 30 Dec. 1820, on penalty of confiscation of the slave-ship and immediate freeing of the negroes. The trade nevertheless went on under transparent disguises. In the spring of 1839 the slave-hunters in Africa made a large cap¬ ture of Sierra Leone natives, including their chief, Cinque, and sent them to Havana ; where two months afterward two Cuban planters, Pedro Ruiz and Jose Montez, bought 38 youths and men, three girls and a boy, and shipped them on 27 June for Guanaja, Puerto Principe, on the schooner L'Amistad, under passport from the governor of Cuba obtained by falsely alleging that they were domestic slaves. Cinque organized a plan for revolt, and when four days out they rose, killed the captain and one of the crew, wounded two others in the contest, and forced the remaining whites to surrender; but they did them no violence, and set all on shore except the two planters, whom they man¬ aged to make understand that they must steer for Africa. These gradually changed course in the nights and fogs, and brought the vessel north off Culloden Point (near Montauk), at the east end of Long Island, where on 26 August she was noted as ˆsuspicious® by Lieu¬ tenant Gedney of the coast survey, on the brig Washington. He sent a boat to her, and one of the planters declared himself the owner of the negroes and claimed United States protection. Some of them had gone on land in a boat; Gedney seized them as under New York State jurisdiction, and the vessel as a ((prize rescued from pirates,®

and brought them to New Lon¬ don, Conn. The negroes were committed for murder on the high seas, to be tried at the Circuit Court of 17 September at Hartford, and meantime lodged in New Haven jail. The planters claimed them as slaves, appealed to the Spanish minister, Calderon, and he de¬ manded their surrender of the United States district attorney for Connecticut. The latter wrote to the Secretary of State (Forsyth of Georgia) asking if the negroes under treaty with Spain might not be surrendered before the court sat ; the Secretary transmitted the question to the President (Van Buren), but warned the district attorney to take care that

no court whatever put the vessel, cargo or slaves beyond the control of the Federal executive. Meantime the anti-slavery interest had bestirred itself and secured funds, able counsel and an interpreter of African; and the Circuit Court (Judge Thompson) decided on the 23d that the killing of the captain of the L'Amistad, being an incident of the slave trade, was not a crime against the law of nations. The negroes were remanded to jail till the Dis¬ trict Court in November should decide whether they were free or slave. The next day the United States Attorney-General, Felix Grundy of Tennessee, was ordered to prepare an official opinion on the Spanish minister's request and the claim of Gedney et al. for prize money. He replied in November that ship, cargo and negroes should be surrendered according to article 9 of the treaty of 27 Oct. 1795, as the United States under international law had no power to investigate the truth of facts stated in Spanish official papers, — in other words, whether the governor's passport was obtained by fraud, and the negroes were free according to the Spanish law already cited ; though hardly one could speak a word of European and none much more, and the planters were obviously perjured in swearing ignorance of their being recently imported. But this article any way related only to vessels and goods rescued on the high seas from pirates; and under this interpretation the negroes were at once the pirates and the cargo, and had com¬ mitted piracy in seizing themselves from their owners. The Spanish minister protested that no United States court had any jurisdiction. The administration, not daring to take the case out of its courts, went as far as it could by ordering the district attorney to act as legal adviser to the planters and file another indict¬ ment for them with new pleadings ; sent a ves¬ sel to lie off New Haven in order to carry the negroes back to Cuba as soon as the District Court pronounced them slaves, as was taken for granted (this was the first trial for violating the slave-trade laws that had taken place ex¬ cept in slave States, where of course no con¬ victions were ever found), and to do it in¬ stantly unless an appeal were interposed, which wTas (<not to

be taken for granted® ; ordered that Gedney and his associate Meade accom¬ pany it to give evidence in court ; and that these directions be kept secret. But the anti¬ slavery counsel had no difficulty in showing that kidnapping foreigners wras not only not protected by United States or even Spanish

law, but was directly contrary to both (the anti-slavery doctrine outside the courts was that the kidnapped had a natural right to kill their captors if they could, and a legal right to hold ship and cargo as prize in such case, and the United States had no right to interfere) ; and the court pronounced them free, and

ordered them delivered to the United States executive to be sent back to Africa. The

plaintiffs at once appealed to the Supreme

Court, and the administration continued its partnership in a private suit. The case of the negroes was argued in February and March 1841 by John Quincy Adams, who had previ¬ ously introduced resolutions into the House di¬ recting the President to report to Congress the authority by which Africans charged with no crime were held in custody; Roger Sherman

Baldwin, the district attorney, admitted in open court that they were newly from Africa when bought: and on 9 March the court (Taney, C. J.) pronounced them illegally held as slaves and liable to no punishment for their acts.

1 he case roused the fiercest excitement in both the free and slave sections of the country. In 1844 the astounding bill was reported by the chairman of the House committee on foreign affairs to pay Ruiz and Montex $70,000 com¬ pensation ; but it was laid on the table and never reappeared. This ends the “case,® but a word may be added on the negroes. They were removed to Farmington, Conn., well cared for and instructed in the rudiments of educa¬ tion by a competent professor. Cinque kept them under stern discipline ; they were excel¬ lently behaved and much liked ; and some of them, being unusually quick of intelligence, were exhibited for proficiency in New Eng¬ land towns. About the end of November they were sent back to Africa with some mis¬ sionaries, and a mission was afterward estab¬ lished in the district.

AMITE, La., town and parish-seat of Tangipahoa Parish, 65 miles northwest of New Orleans, on the Tangipahoa River and the Illinois Central Railroad. It is located in a thriving agricultural region and has a good trade in corn, cotton, fruit and vegetables. Irrigation is an important factor in crop raising. The town was destroyed by a cyclone in 1908, but was reconstructed within a few months. Top. 2,200.

AMITOSIS. See Mitosis.

AMITYVILLE, N. Y, village of Suffolk County, on the Long Island Railroad, 30 miles east of New York city. It contains a sani¬ tarium, an infirmary, an academy, club houses and several churches. Located on Great South Bay it is a popular summer resort, with ample bathing, boating and fishing facilities. It is also a residential place for New York business men. Pop. (1920) 3,265.

AMLWCH, am'luk, a seaport town in north Wales, on the north coast of the island of Anglesey, and 14 miles northeast from Holyhead. The harbor is partly cut out of the solid rock. There are copper mines near the town, and mining is said to have been carried on here by the Romans. Pop. 5,000.

AMMAN, Jobst, am'man, Swiss painter and engraver: b. Zurich 1539; d. Nurnberg 1591. Little of his personal history survives. It is supposed that before leaving Switzerland, he studied under some glass painter of that country, for stained glass is almost all that constitutes Amman's claim to be considered as a painter. His main work is in his engraving, which consists of no less than 540 pieces. It obtained for him a notable measure of success in Nurnberg, where he settled in 1560. He handled etching and wood-engraving with great skill, and has left a considerable body of work in his pen drawings. While not free from the mannerism that came in with his period, a sufficient measure of the excellence of his pred¬ ecessors remains to make his work worthy of study. His aquarelles and wash drawings are also important. (The Entrance of Emperor Maximilian II into Nurnberg* contains 450 figures. Of the greatest importance are his

drawings for wood cuts, through which he exercised the widest influence of any artist of his time. He drew directly on the wood, and sometimes even cut the engravings himself. Among his etchings may be mentioned the por¬ traits of Admiral de Coligny, of Martin Luther and of Hans Sachs, the (Four Seasons, *(The Twelve Months,* and religious works. The museum of Basel has the only well-authenti¬

cated painting by Amman, also a collection of designs for stained glasses executed in 1557. Consult Amman, (Geschichte der Familie Amman von Ziirich) (Zurich 1904) and Andre- sen, (Der deutsche Peintre-Graveur) (Leipzig

1864-66).

AMMAN, Johann Conrad, Swiss physi¬ cian: b. Schaff hausen 1669; d. Warmoud about 1730. After graduating at Basel in 1687 he be¬ gan to practise at Amsterdam, where he gained a great reputation. He was one of the earliest writers on the instruction of the deaf and dumb, and first called attention to his method in his (Surdus loquens) (1692). His process consisted principally in exciting the attention of his pupils to the motions of his lips and larynx while he spoke, and then inducing them to imitate these movements, till he brought them to repeat distinctly letters, syllables and words.

AMMANATI, am'ma-na-'te, Bartolomeo,

Florentine architect and sculptor : b. Florence 1511; d. 1592. He studied under Bandinelli and Jacopo Sansovino, and closely imitated the style of Michelangelo. He was more distin¬ guished in architecture than in sculpture. He designed many buildings in Rome, Lucca and Florence, an addition to the Pitti Palace in the last-named city being one of his most celebrated works. He was also employed in 1569 to build the beautiful bridge over the Arno, known as Ponte della Trinita — one of his celebrated works. The three arches are elliptic, and though very light and elegant have resisted the fury of the river, which has swept away several other bridges at different times. Another of his most important works was the fountain for the Piazza della Signoria.

AMMEN, Daniel, American naval officer: b. Brown County, Ohio, 15 May 1820; d. 11 July 1898. He entered the United States navy 7 July 1836 as midshipman. He was in the Wilkes exploring expedition 1838 —42, in the East India squadron, and on the coast survey; on the ex¬ pedition to the Paraguay River 1853-54. He commanded the Seneca at the capture of Port Royal, 7 Nov. 1861; promoted to commander 21 Feb. 1863 ; in charge of the Patapsco at the as¬ sault on Fort Macallister, 3 March 1863, and on Fort Sumter, 7 April ; commanded the Mohican in the attacks on Fort Fisher, December 1864 and January 1865. He was commissioned cap¬ tain 1866, was chief of the bureau of yards and docks 1869-71, and of the bureau of navigation till 11 Dec. 1877, when he was made rear-ad¬ miral on the retired list. He designed the Ammen life raft and the ram Katahdin. He wrote:

(The American Inter-Oceanic Ship Canal Question * (1880) ; (The Atlantic Coast *(1883); (Country Homes and Their Improve¬ ment; (The Old Navy and the New* (1891).

AMMERGAU, am'mer-gou, a district or qau on the river Ammer in upper Bavaria. The inhabitants are occupied in making figures of

saints, crucifixes, toys, etc., of wood, ivory and glass, from which a considerable trade arises, having its centre in the villages of Ober and Unter Ammergau. The former village is famous on account of the Passion Play (q.v.).

AMMETER. See Galvanometer.

AMMIANUS, Marcellinus, the last Roman

historian of importance : b. Antioch about 325 a.d. ; d. Rome about 398. He entered the army at an early age and served in several cam¬ paigns. Eventually he settled in Rome, where, at an advanced age, he wrote (in Latin) a his¬ tory of the Roman Empire from the accession of Nerva to the death of Valens (96-378), thus forming a continuation of the work of Tacitus. This history was originally in 31 books; of these the first 13 are lost, the 18 which remain cover the period from 353 to 378. It is ex¬ tremely valuable, being a clear, comprehensive and impartial account of events by a contem¬ porary of soldierly honesty, independent judg¬ ment and wide reading. In his description of the Empire — the exhaustion produced by ex¬ cessive taxation, the financial ruin of the mid¬ dle classes, the progressive decline in the morale of the army — we find the explanation of its fall before the Goths 20 years after his death.

AMMON, an Egyptian deity, whose wor¬ ship spread all over Egypt and other parts of north Africa, and many parts of Greece. The Egyptian hieroglyphic monuments call him Amun, the Greeks identified him with their supreme god Zeus, while the Romans regarded him as the representative of Jupiter. His wor¬ ship centred in the Egyptian Thebes, which the Greeks therefore called Diospolis or the City of Zeus. He is represented as a ram, as a human being with a ram's head, or simply with the horns of a ram. His most celebrated temple was in the oasis of Siwah in the Libyan desert.

AMMON, Otto, German anthropologist and editor : b. Karlsruhe 1842.

He was educated as a civil engineer and was engaged in that pro¬ fession from 1863 to 1868. From 1868 to about 1883 he was a publisher and editor. In 1883 he engaged in literary work and made several in¬ vestigations in anthropology and sociology. He is the discoverer of <(Ammon's law,® that the Teutonic race has everywhere manifested a tendency toward city life. He demonstrated this law by a series of measurements of physi¬ cal characteristics among army conscripts. His investigations have shown radical differences in the form of the head in city and country and even between the upper and lower classes in the larger cities. He has written: (Die natiirliche Auslese beim MenscheiL (Jena 1893) ; (Die Gesellschaftsordnung und ihre naturlichen Grundlagen) (3d ed., Jena 1900) ; (Zur Anthropologie des Badenes) (ib. 1899) ; (Die Korpergrosse der Wehrpflichtigen in Ba¬ den, 1840-64ˆ (Karlsruhe 1899) ; (Anthropoli- gische Untersuchungen der Wehrpflichtigen in Baden) (1890) ; and (<Die Geschichte einer

Idee® (in Rundschau, Berlin 1896) ; (<Der Abanderungsspielraum® (in Natur-Wissens- chaftliche W o chens chrift, Berlin 1896) ; <(Die Menschenrassen in Europa® (in Rundschau, Berlin 1896).

AMMONIA (supposed to be so called be¬ cause originally prepared from the dung of camels near the temple of Ammon, in Egypt), a gaseous compound of hydrogen and nitrogen, having the formula NH3. It may be formed in small quantities by the direct combination of its elements under the influence of the silent electric discharge; but in the arts it is com¬ monly prepared by the decomposition of nitrog¬ enous matter. Formerly it was manufactured in large quantities by the destructive distillation of horns, hoofs and hides, and from this fact it was known as ((spirits of hartshorn.® It is now chiefly obtained as a by-product in the manufacture of coal-gas. Coal suitable for the manufacture of gas contains nitrogen, often to the extent of 2 per cent of its weight ; and in the distillation of such coal the nitrogen com¬ bines with a portion of the hydrogen that is also present, and is driven off in the form of ammonia ; or more often it combines with the sulphur present and is obtained in the form of a sulphate. Salts of ammonia also occur in nature, sometimes in considerable quantities. In Tuscany ammonia sulphate is obtained as a by-product in the manufacture of boric acid. See Boussingaultite ; Larderellitf. ; Mascag-

NTTE.

Ammonia (NH3) is a colorless gas at ordi¬ nary temperatures and pressures, but at 60° F. it condenses into a colorless and expansible liquid upon the application of a pressure of about seven atmospheres.

At the freezing point of water a pressure of 4.4 atmospheres suffices to liquefy it ; and at about 29° below zero, F., it condenses into a liquid at ordinary atmos¬ pheric pressure. Ammonia thus liquefied by pressure is much used, in the arts, for the pro¬ duction of low temperatures and the manufac¬ ture of artificial ice. (See Refrigeration). It freezes at about 103° below zero, F., into a white crystalline solid. • Liquid NHS dissolves the alkali metals without chemical changes, forming blue solutions.

Ammonia gas is very soluble in water at or¬ dinary temperatures, the solution constituting the so-called “ammonia® or “aqua ammonia® that is familiar in every household. At 32° F. and at ordinary atmospheric pressure water will absorb 1,148 times its own volume of NH3; and at 68° F. it will absorb 740 times its own volume.

Both ammonia gas and its solution in water possess strongly alkaline properties, turning red litmus paper blue and combining with acids to produce definite salts. The solution of am¬ monia gas in water is attended by a consider¬ able development of heat, and it is usual to consider that a definite compound of ammonia and water is formed. The formula of this compound may be written NH3.H20, but many considerations suggest that NH».OH is a better and more logical form. NHi is here con¬ sidered to be a radical, analogous in its chemi¬ cal deportment to the familiar alkali metals sodium and potassium. According to this view ordinary “aqua ammonia® would be regarded as a solution of the hydrate of the radical NH4; and for many years past chemists have ad¬ mitted the existence of such a radical, which they have called (<ammonium.® Upon adding hydrochloric acid to a solution of ammonia gas, a compound known as <(sal ammoniac® is obtained, which is used largely in electric bat-

teries that are intended for open circuit work. The reaction by which this substance is formed may be written NHa + HClˆNHa.HCl ; or if the existence of a definite hydrate in the ((aqua ammonia® is admitted, we may write the reac¬ tion NH4.0H + HCl = NH4.Cl-rH20, in which case the reaction is in all respects analogous to that by which potassium chlorid (for example) is formed when hydrochloric acid acts upon potassium hydrate: K0H + HC1 = KC1 + H20. All the other salts that are formed by the com¬ bination of ammonia with acids can be simi¬ larly expressed by admitting the existence of the radical NH4 and treating it, in the formulas, as though it were a metal of the alkali

group. All the <(ammonium® compounds are isomor- phous with the corresponding potassium com¬ pounds.

Aqua ammonia, or <(caustic ammonia® (as it is sometimes called), is used for many purposes in the arts, notably in the production of soda by the ammonia process (see Sodium), and in dyeing and calico-printing. Large quantities of the sulphate are used in fertilizers and in the manufacture of ammonia alum (see Alum). The chloride of ammonium is used (as above noted) in certain common forms of electric batteries, and also in soldering, in dyeing, and in many minor ways. The carbonate is largely used in the manufacture of baking powders and for scouring wool.

Ammonia is expelled from all of its com¬ pounds by quicklime, and the usual test for ammoniacal compounds consists in heating the substance to be examined, tpgether with caustic lime or caustic soda or potash. If ammonia is present in any considerable amount it is liberated by this treatment and may be recog¬ nized by smell or by its action on litmus paper. Nearly all of the compounds of ammonia are batteries, and also in soldering, in dyeing, and the double platinic chloride being the chief ex¬ ceptions.

Ammonia forms the starting point for an extraordinarily long list of compounds, many of which are exceedingly complicated. See Amide; Amine.

AMMONIACUM is a gum resin derived from the stems of Dorema ammoniacum, a forest plant of Persia. Other species of Dorema yield similar products.

The plant has an abundant supply of milky juice which exudes spontaneously and hardens in various-shaped masses. Fine tears, varying in size from two- to five mm. up to the size of a hazel-nut, are obtained from insect-punctured wounds, while the so-called ammoniacum amygdaloides is obtained from the root of the plant.

Ammoniacum consists of a mixture of vary¬ ing proportions of ethereal oils, 1 to 2 per cent, resins, gums, 65 to 70 per cent ; and pectin-like bodies. Ash 20 per cent. A certain amount of water is always found in the commercial prod¬ uct. The ethereal oils are found in small quantities only, generally less than 10 per cent. It is soluble in carbon disulphide. The resin is to be distinguished from other resins in that its alcoholic solution gives a red reaction when added to a bromide of sodium solution, 30 gr. NaOH in Aq. Br. 20 gr. Aq. 1 liter. Umbellif- eron would seem to be absent.

AMMONITES, am'mon-Itz, or <(children of Ammon.® In the cuneiform inscriptions' their land is called Bit-Amman, as if Amman were a personal name ; but Genesis says Ben-ammi, and Ammi was perhaps a local god. Their land was in the eastern part of the district now called Belka, on the northeast of the Dead Sea next the desert ; its capital Rabbah or Rabbath- Ammon. Their real history begins with Saul, though Jephthah the freebooter is said to have delivered Israel from them, and one tradi¬ tion represents Balaam as an Ammonite — but this is thought a later excuse for excluding them from the Jewish body. They were in a state of chronic border warfare with the Hebrews, their close kinsmen, and speaking a closely related dialect. Nahash, King of Am¬ mon, besieges Jabesh-Gilead (1 Sam. xi), and offers terms for its capitulation on condition of putting out the chief men's right eyes, — but Saul wins a crushing victory over the besiegers. David as Saul's enemy is well treated by Nahash; but when he takes Saul's place the old feelings are resumed. Hanun, the son and successor of Nahash, treats David's messengers of congratulation with gross contumely (2 Sam. x) ; David wins a victory over them and the Syrian allies they have called in, and exacts a frightful vengeance from them, putting his captives to the torture quite in the Assyrian fashion, and leaving us to infer that there was little to choose in savagery. They probably re¬ covered their independence after Solomon's death. Later they were subjugated by the Assyrians, as the inscriptions of several kings evince. Under Jeroboam II they make incur¬ sions into Gilead and are blamed for in¬ humanity. After the Israelitish deportation of 734 they occupied the land of Gad ; under Jehoiakim they are incorporated into Judah; under Zedekiah they are allied with him against Assyria, but seem to have drawn out in time for safety, and Israelitish fugitives find refuge with their King, Baalis. Later they intermarried with the Jews, and there, was a village of them in Benjamin; Judas Maccabaeus defeated them; but they were gradually absorbed by invading Arab tribes. Their great local god was Milcom.

AMMONITES, am'd-nftez, the general name for the fossil cephalopod mollusks of the order Ammonoidea, given originally because of a fancied resemblance of the coiled specimens first known to a ram's horn, the symbol of Jupiter Ammon. Subsequently it served as a generic name for a group, but this has been abandoned in the light of later information. The Ammonoidea are one of the two orders of chambered tetrabranchiate cephalopods, the other being the Nautiloidea (see Nautilus). Their remains are found fossil in marine Palaezoic rocks from the Devonian to the close of the Mesozoic Age. More than 5,000 species have been described, grouped into about 100 families, and these into nine sub-orders in two divisions, (1)

Intrasiphonata and (2) Extra¬ sip honata. The first group contains a single primitive (Devonian) sub-order having the siphuncle dorsally situated ; the second contains all the remainder, which agree in having the siphuncle ventral. The classification is based upon the complexly lobed pattern of the sutures, or lines of union between the septa or partition walls of the chambers and the outer wall of the

shell (See Cephalopoda). The shells of am¬ monites were typically coiled in a single plane and ran in size from an inch or two in diameter to two or more feet; but this varied greatly, even to partial or entire straightness. The sur¬ face of the shell, too, was in many cases smooth and polished or slightly ridged, while in others it was roughly ringed or covered with cross- lines, spikes and tubercles, in handsome variety. Some shells were so compressed as to have the proportions of a watch ; while others were almost globose.

As Hyatt states, ammonoids experienced a progressive evolution from the early Devonian until the upper Juras, when the group reached its summit of importance and was represented in great numbers and variety in all parts of the world : that is, when it attained the summit of its evolution in complexity of structure, form and ornament. Ammonoids exist in great abundance in the rocks of this period in the western United States, especially those of the irregular group called Ceratites, which suc¬ ceeded the Palaeozoic Goniatites, and other primitive forms. The Jurassic ammonoids show a mixture of retrogression with some progressive features. “Part of their losses are regained by the evolution of the vast number of forms and modifications during this period, but there are numerous localized signs of retro¬ gression, due perhaps to unfavorable surround¬ ings.® Indications of this kind occur sporad¬ ically throughout the Jurassic time and become general in the Cretaceous period. Many of the later forms were openly or grotesquely coiled, or coiled only when young, becoming nearly or quite straight when they grow older, as in Ptychoceras, Turriteles, Scaphites, etc. These degraded “old-age® types were evidently due to the waning forces of life or to disease, because similar though much less marked uncoiling of shells, due to unfavorable condition of the water, have been observed in the fresh-water Planorbis of Steinheim, Germany, and else¬ where. (See Evolution; Senescence). Hyatt thus infers that there was in the European seas, at least, a widespread unfavorable change in their physical surroundings, “similar to but more extensive than that which

ajfectcd Euro¬ pean forms during the Lower Oolite,® and to this influence he ascribes the uncoiling of the shells of Spiroceras and its allies. At the close of the Cretaceous period the ammonoids en¬ tirely disappeared. We thus see in the vast and more or less complete and continuous series of these beautiful shells, in which the imper¬ fections of the geological record are less marked than in other groups, the process of rise, cul¬ mination, decline, and death of a type, present¬ ing also beautiful illustrations of the biogenetic law (q.v.). The type begins with infantile and larval forms, then evolves youthful, mature, and finally old age forms, which present in their simple and closely coiled shells a return to the original simplicity of the infancy and childhood of the type.

Concerning the animals which made the shells, nothing is known except by inference. The growth of the shell begins with the forma¬ tion of the primitive conically-shaped shell called “protoconch,® and then the secondary shell begins to grow and becomes coiled up in one plane. Like the nautilus the mollusk lived in the outer chamber of its shell, from which

it periodically advanced. The aperture of this outer chamber was closed when the animal withdrew into it, either by a single horny plate (anaptychus) or by a pair of calcareous plates (aptychus). The very earliest appear to have been swimmers, like the nautiloids ; but the great bulk of the ammonites undoubtedly lived gregariously alongshore, where they crawled about, carrying or partly dragging their shells, and searching for the animal food upon which they subsisted. The learned Zittell points out that their shells were proportionately less bulky than those of the nautiloids, and correspond¬ ingly less buoyant ; and the probability is that they swam little and were rarely active. There is reason to believe that in the case of some species the eggs were retained within the shel¬ ter of the living-chamber until they hatched, and that the young remained there until some¬ what grown. See Goniatites.

Bibliography. — Cook, (Cambridge Natural History. Mollusks) (1895); Zittell-Eastman, (Text-book of Paleontology, *Vol. I (1900); Hyatt, (Genesis of the Arietide* (Memoirs Mus. Comp. Zool., Vol. XVII, 18 89) ; <Phylog- eny of an - Acquired Characteristic (Proc. Amer. Philos. Society, Vol. XXXII, No. 143, 1894) ; Wurtenberger, (Studien fiber die Stam- mesgcschichte der Ammoniten) (Leipzig 1880), and numerous other papers ; also articles by D’Orbigny, Neumayr, Pumpelly, Quenstedt, Sandberger, Suess, Waagen, White, Whiteaves, Wright and Zittel.

AMMONIUS SACCAS, a Greek philoso¬ pher who lived about 175-250 a.d. Originally a porter in Alexandria, he derived his epithet from the carrying of sacks of corn. The son of Christian parents, he abandoned their faith for the polytheistic philosophy of Greece ; this is denied, however, by Eusebius and Jerome. His teaching was historically a transition stage be¬ tween Platonism and Neo-Platonism and he may be regarded as the founder of the latter school. Among his disciples were Plotinus, Longinus, Origen the Christian, Origen the Neo-Platonist, Herennius, Antoninus, Theo¬ dosius, etc. He wrote nothing but his tenets were propagated by his pupils, especially by Origen, Herennius and Plotinus.

AMMONOIDEA, an order of tetrabran- chiate cephalopods. It contains more than 5,000 species, all of which are extinct and found in a fossil state in marine rocks of the Devonian, Carboniferous and Mesozoic ages in all parts of the world. It is akin to the.Nautiloidea and was a crawler instead of a swimmer. Its especial interest consists in that it furnishes the best illustrations of evolution, the laws of growth and decline, of ontogeny and pylogeny. See Ammonites; Cephalopoda:

AMMONOOSUC, the name of two small rivers in New Hampshire which rise in Coos County and .flow in a southwest direction, emptying into the Connecticut River. The lower Ammonoosuc is about 100 miles long and the upper 75 miles long.

AMMOPHILA, a genus of grasses, com¬ mon on sandy beaches of Europe and eastern North America, coarse perennials with running root-stocks. They are valuable as sand-binders, and are often planted on sand dunes to ore- vent drifting.

AMMONITES

ˆ Mj

*4

Wi

-ax *i

X*£h- Jagg

jt *

’ ‘ '1 A

Ml

vV

1 2 Ammonites cordatus 3, 4 Ammonites Coupei 5, 6 Ammonites ooulentus 7 Ammonites mammillaris 8 Ammonites cavernosus 9 Ammonites rotula 10 Ammonites Humphryi

■

'

.

AMMUNITION. Ammunition is prepared at the various arsenals and by numerous pri¬ vate manufacturing companies. Bags of serge, in enormous number, are cut out and made, and filled to form the cartridges for large ordnance. Bags or tubes of paper are made and filled to constitute blank cartridges for small-arms ; while the ball-cartridges are enclosed in thin copper cylinders. The tubes and combustibles for war-rockets and fuses are also manufac¬ tured. The cartridges for small-arms (rifles, muskets, carbines and pistols) are made in millions; since it is on those that the main of¬ fensive operations of an army depend. It has been calculated that an army of 60,000 men, comprising a fair average of infantry, cavalry, artillery and engineers, ought to be provided with no less than 18,000,000 ball-cartridges for small-arms, for six months' operations. These would require 1,000 ammunition-wagons and ,3,600 horses to convey them all at once. It is, therefore, deemed better that, under any such circumstances, there should be established entrepots for supplying the troops from time to time. The wagons constructed for this kind of service will carry 20,000 rounds of small-arm ammunition each ; the cartridges are packed in boxes, and the wagons are drawn by four horses each. Several wagons are organized into an ˆequipment,® under the charge of a de¬ tachment of artillery, and there are several such equipments for an army of the magnitude above mentioned — one for each division of in¬ fantry, a small portion for the cavalry, and the rest in reserve. It has been laid down that an army of 60,000 men ought to have 2,680,000 cart¬ ridges with them, besides those in reserve ; and that the conveyance of such a quantity, with a few forges and stores, would require 150 am¬ munition wagons, 830 men and 704 horses. The equipment would return to the entrepot for a new

supply when needed. In the Peninsular War, and at Waterloo, the English used two- horse carts, carrying about 10,000 rounds of small-arm ammunition each ; but a superior kind of wagon has been since introduced. In the field, an infantry soldier usually carries about 60 rounds, put in compartments in his pouch.

The packing-boxes for field-ammunition are made of well-seasoned stuff (generally white pine), 1.25 inch thick, dovetailed with the tenon on the ends. The top of the box is fastened with six 2-inch screws. The box has two handles of lˆ-inch rope, attached to brackets at the ends. The boxes are painted on the out¬ side different colors to indicate the contents of the box. Those containing shot are painted olive; shells, black; spherical case-shot, red; and canisters, a light drab. The kind of ammuni¬ tion is marked on each end in large white letters. The place and date of fabrication are marked on the inside of the cover. The boxes are packed as follows :

For Smooth-bore Guns. Shot, spherical case and canisters, fixed. — Laid in two tiers across the box, the shot or canisters alternating with the cartridges at each side. The shot or canisters of the upper tier rest on those of the lower and not on the cartridges. Canisters are packed in the same manner, omitting the strips of wood in the bottom of the box.

For 12 -PDR. Mountain-howitzer. Shells and cast-shot, fixed.— Placed upright, the balls

down, resting on strips of wood as for the other howitzer. Canisters are packed in the same manner, resting on the bottom of the box.

For Rigged Guns. Shells and Case-shot. — Placed upright, the balls down, resting on strips of wood as for the howitzer. The iron part of the balls rests against strips of wood 4 inches wide and .25 inch thick, nailed to the side and ends of the box at the bottom, and , similar strips placed between the row of the balls to prevent the soft metal cups from bear¬ ing against the box or against each other and being bruised; the cartridges are placed on top of the projectiles. Canisters are packed in the same manner as the case-shot, omitting the strips of wood on the bottom of the box. In all the boxes the small stories are placed in the vacant spaces on top of the ammunition. A layer of tow is placed in the bottom of each box, and the whole contents are well packed in tow, filling the box so as to be pressed down by the cover. About three pounds of tow are required for a box.

Ammunition is supplied to troops in cam¬ paign in the following

manner : It is shipped from arsenals to ammunition depots at the base of operations; it is then carried by the line of communications to the advance supply depot and there delivered to the ammunition trains. The combat trains are replenished from the ammunition trains, though in exceptional cases issues from a supply depot may be made direct to combat trains. From the latter am¬ munition is delivered to the troops. At the beginning of a general engagement two wagon companies for each division engaged (includ¬ ing the cavalry division) are loaded — one with small arms and the other with artillery am¬ munition — and held in readiness at the advance supply depot.

Ammunition Trains. — The ammunition train of a full division is normally loaded as follows: (a) For small arms (three wagon companies, 81 wagons), 77 wagons, each with 25 boxes (1,200 rounds per box) of rifle and 1 box (2,000 rounds) of revolver ammunition, and 1 wagon with 300 boxes of revolver am¬ munition. (b) For artillery (2 wagon com¬ panies, 54 wagons), 51 wagons, each with 25 boxes (4 pounds per box), and 1 wagon with artillery stores. If available, caissons instead of wagons may be used for carrying artillery ammunition. Each caisson carries 106 rounds, or 48 caissons would carry about the same as 51 wagons. During combat the ammunition train takes station as ordered. It is generally in a protected position, near good roads if possible, where the empty battalion ammunition wagons or caissons can be replenished. It may be advisable to divide the train and assign the parts to different positions in rear of the. line.

A brigade commander may select a rendezvous station for the empty battalion ammunition wagons of his command and request that wagons from the ammunition train be sent to that place to refill battalion wagons. The po¬ sition of an ammunition train, or detached part thereof, is marked by a red flag during the day, and by a red lantern at night.

Combat Trains. — The small-arms ammuni¬ tion wagon (2 for each infantry battalion and 1 ‘for each squadron) in addition to intrenching tools, etc., is usually loaded as follows : In¬ fantry, 22 boxes of rifle ammunition; cavalry.

20 boxes of rifle and 4 revolver ammunition. Ammunition in the

artillery combat trains is carried in caissons. Battalion commanders are charged with keeping their ammunition wagons properly filled and equipped.

As as rule, combat trains march immediately in rear of the battalion unit to which assigned, though when combat is not probable they may . be assembled in rear of their respective regi¬ ments, or sent to join the trains.

Infantry. — The distribution of small-arms ammunition allows 330 rounds per rifle, with a reserve for machine guns, etc. Engineers or signal troops requiring ammunition draw from the nearest ammunition wagons. Cavalry and other men armed with both rifle and re¬ volver carry in the belt 90 rounds of rifle and 20 rounds of revolver ammunition.

In campaign all officers and non-commis¬ sioned officers endeavor to keep the belts of their men filled with ammunition. Not only must advantage be taken of every opportunity to replenish the supply, but prospective expend¬ itures must be anticipated by issuing ammuni¬ tion in advance. As troops go into combat two bandoliers from the combat train are issued to each man, unless otherwise ordered. If addi¬ tional ammunition is needed during the combat, the lead mules of battalion ammunition wagons may be converted into pack mules and ammuni¬ tion delivered to the firing line in that manner. If this is impracticable, small squads of men under non-commissioned officers may be de¬ tailed to carry ammunition to special parts of the firing line, or reinforcements may be given extra ammunition for that purpose. If available the division pack train is used to carry ammunition to ground impracticable for wagons, or wherever it may be urgently needed.

Every lull in the fight must be utilized to renew the supply, and to equalize the same in each company. The contents of the belts of the dead and wounded are distributed whenever practicable, though the latter must not be left wholly without means of self-defense. In no case are men sent to the rear for ammunition, if it can be obtained in any other manner. When ammunition is running low, officers caution the men to reserve a few rounds each for emer¬ gencies. The morning following an engage- ent should find the firing line and all ammuni¬ tion wagons replenished.

Artillery. — When the battery goes into action each piece is supplied from its own caisson. With the firing battery are two addi¬ tional caissons from which the gun caissons are replenished. This

replenishment is ordinarily effected by the cannoneers during lulls in the action. The ammunition in the gun limbers is kept intact as a last reserve, and whenever used is replaced as soon as practicable. The emer¬ gency ammunition on the guns is used only in extreme cases, and must be immediately re¬ placed. Cassions from the reserve (combat train) replace empty caissons of the firing battery. Empty caissons are either refilled from the limbers of the reserve caissons or sent to the ammunition train to be refilled. If neces¬ sary, wagons or caissons from the ammunition train may be sent direct to the firing battery. Horse batteries in a cavalry action draw am¬ munition, when necessary, from the limber's; the ammunition so used should be replaced as soon as practicable.

Cavalry. — Ammunition Train. — The ammu¬ nition train of a cavalry division is normally loaded as follows: (a) For small-arms (2 wagon companies, 54 wagons) — 52 wagons, each with 20 boxes of rifle and 4 boxes of revolver ammunition, (b) For artillery (1 wagon company, 27 wagons) — 25 wagons, each with 25 boxes, and 1 wagon with 12 boxes and artillery stores. Rations, forage and the neces¬ sary intrenching tools are also carried, but the loads are kept as light as possible. The ammu¬ nition for a cavalry division is carried, distrib¬ uted and replaced substantially as in the case of infantry, the cavalryman carrying 90 rounds of rifle and 20 rounds of revolver ammunition in the belt, and, when combat is imminent, 60 rounds of rifle and 20 of revolver ammunition in the saddle bags. Combat trains of cavalry acting independently generally march with the horse artillery, if any; otherwise in rear of their squadrons or regiments or with the ammu¬ nition train. As cavalry in campaign is liable to be separated from its combat and ammuni¬ tion trains, it is authorized, in such emergencies, to draw from the most available ammunition wagons or source of supply. The use of pack animals is often necessary.

Ammunition Supply for a Field Army. — To replace ammunition used in combat an amount not less than that carried by the mobile forces should be kept at or near the advance supply depot, and an additional amount approxi¬ mately equal to all ammunition in advance of the base should be available at the base of operations or other depots. This distribution, in rounds, is shown in the foregoing table. See Cartridges ; Explosives ; Shrapnel.

AMMUNITION SERVICE. This resem¬ bles the service of supply (q.v.), but differs in that no ammunition can be replenished by foraging. The ammunition service is organ¬ ized by the field artillery, and its commander is directly under the commander of the latter.

Ammunition on the man and on the caissons of the firing batteries is replaced by that carried in organization combat trains, which are ordinarily refilled from the divisional ammu¬ nition train, though they may be refilled from the line of communications. Economy and a continuous supply of ammunition must be ob¬ tained by the concerted efforts of all. The normal course of ammunition is from the rail¬ head in the line of communications by the ammunition column to the refilling point, where the zone of active operations commences. From there it is transported to the distributing points by the ammunition train, which may be sub¬ divided into two companies or battalions acting tandem, the one refilling from the other. From the distributing points it is brought to the separate organizations by their own combat trains. The whole- organization continually advances as far as possible, bringing the dis¬ tributing and refilling points to the front, and shortening the hauls of the combat -and am¬ munition trains. Any part of the route indi¬ cated may be eliminated if circumstances per¬ mit : for instance, the refilling-point may be at the rail-head. In the present war, there is a tendency to replace the various units of the ammunition service, up to the heavier guns themselves and to the distributing points for infantry and some of the lighter guns, by narrow-gauge railways.

AMMUNITION TRAINS. See Ammuni¬ tion.

AMNESIA, am-ne'zhi~a. See Aphasia.

AMNESTY, an act of oblivion passed after an exciting political period. Express amnesty is one granted in direct terms. Implied amnesty is one which results when a treaty of peace is made between contending parties. Amnesty and pardon are very different. Amnesty is an act of the sovereign power, the object of which is to efface and to cause to be forgotten a crime or misdemeanor. A pardon is an act of the same authority which exempts the individual on whom it is bestowed from the punishment which the law inflicts for the crime he has committed. 7 Pet. (U. S.) 160. Amnesty is the abolition and forgetfulness of the offense ; pardon is forgiveness. A pardon is given to one who is certainly guilty or has been con¬ victed ; amnesty, to those who may have been so.

AMNESTY PROCLAMATION. An act

passed 25 Dec. 1868, granting amnesty to. all who were guilty of treason against the United States or adhered to their enemies during the Civil War. This included domiciled aliens. But the proclamation did not entitle one whose property had been sold under the Confiscation Act of 1862 to reclaim the proceeds after they had been paid into the treasury of the United States.

AMNION. See Embryology.

AMCEBA, or PROTEUS ANIMAL¬

CULE, a protozoan classified as one of the rhizopods, which is present almost every¬ where in fresh water, and sometimes in moist earth, and is commonly taken as the type of the unicellular animals. It

is a mere drop of animated jelly (protoplasm,

q.v.), hardly visible to the unaided eye, which under the microscope is seen to be divisible into an inner granular mass (endosarc) and an outer clearer part or envelope (ectosarc) ; but there is no essential difference in substance be¬ tween them. Imbedded in the interior granules is a large spherical globule, the nucleus, con¬ sisting of a clear chromatic substance contain¬ ing minute granules of chromatin. A contrac¬ tile vacuole lies in the ectosarc, and manifests more or less regular and rhythmical expansions and contractions ; this seems to serve the pur¬ pose of an excretory organ. The amoeba con¬ tinually throws out irregular threads and ex¬ tensions (pseudopods), so that its shape is more often like that of a drop of any thick liquid which has fallen and spattered, than of a globule; this shape is changing incessantly as the creature slowly creeps about. Whenever it touches any edible particle of organic material it slowlv enfolds it, and the particle sinks into the body, where it is gradually dissolved, its nutritive material is digested and assimilated, furnishing food and fuel to the protoplasm, and the innutritious parts are finally gathered into the vacuole, whence they are squeezed out and discarded.

Amoeba reproduces itself by a simple proc¬ ess of division. A constriction takes place at a point where the nucleus will be divided, and goes on until the animal becomes dumbbell¬ shaped. Finally the two parts separate, and each becomes a distinct and perfect whole., each with its half of the original nucleus, which at

once becomes, in each case, a whole nucleus. After a time these individuals in turn undergo a similar division and so on. It may there¬ fore be said that amoeba never ceases to exist — never dies ; but

simply multiplies indefinitely by repeated divisions.

Certain forms of Amoeba , notably A. coli, are the cause of a distinct kind of dysentery now termed amoebic dysentery. This is a dis¬ ease mostly of the tropics, but is also found endemic in the United States. Occasionally the parasite may infect the liver, causing an abscess in that organ. The disease is difficult to treat.

AMON-RE, a-mon-ra (originally Re and later Amon Re), the national god of Egypt during the greater part of its history. His worship was a form of sun-worship. The in¬ signia of the god was the <(solar disc encircled by the poisonous uraeus serpent.ˆ In the 12th dynasty, to strengthen the hold of Thebes on the country, the local Theban divinity Amon was transformed into the sun-god Amon-Re. His worship extended beyond the confines of Egypt. Thebes .was the centre of the worship and for a time his high-priests were the rulers of Egypt. His consert was Mut, the mother of the gods.

AMONTONS, a'mon-ton', Guillaume,

French experimental philosopher: b. Paris, 31 Aug. 1663; d. there, 11 Oct. 1705. He devoted himself particularly to the improvement of in¬ struments employed in physical experiments. In 1687 he presented to the Academy of Sciences an hygrometer of his own invention, and in 1695 he published his only book (Re¬ marques et experiences physiques sur la con¬ struction d'une nouvelle clepsydre, sur les barometres, les thermometres et les hygrome- tres. In 1699 he published some investigations on friction, and in 1702-03 two noteworthy pa¬ pers on thermometry. He experimented with an air-thermometer, in which the temperature was defined by measurement of the length of a column of mercury ; and he pointed out that the extreme cold of such a thermometer would be that, which reduced the ˆspring® of the air to nothing, thus being the first to recognize that the use of air as a thermometric sub¬ stance led to the inference of the existence of a zero of temperature. In 1704 he noted that barometers are affected by heat as well as by the weight of the atmosphere, and in the fol¬ lowing year he described barometers without mercury, for use at sea.

AMOR, the god of love among the Romans, equivalent to the Greek Eros. He had no place in the national religion of the Romans, who derived all their knowledge of him from the Greeks. According to the later mythology Amor is the son of Venus and Mars, the most beautiful of all the gods; a winged boy with bow and arrows, sometimes represented blind¬ folded. His arrows inflict the wounds of

love, and his power is formidable to gods and men. He is not always a playful child in the arms of his mother, but appears sometimes in the bloom of youth, for example, as the lover of Psyche. He is brother of Hymen, the god of marriage, whom he troubles much by his thoughtlessness. According to the earlier my¬ thology he is the oldest of all the gods, and ex¬ isted before any created being. In English the

god of love is less frequently called Amor than Cupid ; yet with the ancients cupido denoted, properly, only the animal desire.

AMORGOS, a-mor'gos, an island in the Grecian Archipelago, one of the eastern Cy¬ clades, 22 miles long, five miles broad; area, 106 square miles ; has a town of the same name, with a castle and a large harbor. Pop. 5,000.

AMORITES. Though made a separate tribe in the varied and rhetorical lists of the peoples in Canaan ousted by the Israelites, the name is used by Amos in the 8th century as a general term for the primitive inhabitants of Canaan, with attribution of gigantic size and power, as most old nations do with their special aboriginal predecessors. Some critics think, however, that ((Canaanite55 is used for the peace¬ ful settlers of the plains, and ˆAmorite® for the warlike tribes on the hills to the north. At any rate, the latter term is always used when hostile tribes arc meant. Moses' foes include Sihon and Og, the Amorite kings, and Joshua deals with 12 kings of the Amorites west of the Jordan. The Amarna letters show that the coast as far north at least as Sidon was called Kinahi (Canaan), and perhaps the Amorites were the people of the interior; but the usages, may be due to the writers coming from different sections.

AMORPHISM, a term used in chemistry

and mineralogy to denote the absence of regu¬ lar or crystalline structure in a body.

AMORTIZATION, (1) the act of satis¬ fying, liquidating or reducing, as a debt, usually by a sinking fund. The term has a wider application and is more commonly used recently in this sense than formerly. It is often applied to securities in figuring their in¬ vestment value. For instance, if a security is bought at a premium or at a discount, a part of the premium is charged off or a part of the discount is credited so as to bring the value of the security to par at maturity. In each case

the transfer is made from investment to income or the reverse. Another common ap¬ plication of the term in this sense is to invest¬ ments having a life of limited duration, as mines. Dividends on such investments are treated not only as interest on capital but also as the return of capital itself. As an illustra¬ tion, if securities in a mine are purchased and such securities yield an annual dividend of 12 per cent, 6 per cent may be treated as income and 6 per cent as return of capital. If the 6 per cent treated as return of capital is again invested at 4 per cent interest, a simple mathe¬ matical calculation will determine the number of years required for the return of the invest¬ ment originally made. The term is also often applied to the paying off of a mortgage by in¬ stalments or by a sinking fund.

(2) The sum applied to satisfying, liquidat¬ ing or reducing, as a debt.

(3) The alienation of lands to a corpora¬ tion having perpetual succession ; the convey¬ ance of lands in mortmain. Formerly this was applied to ecclesiastical corporations only, but later it was applied to any corporation which by its nature could be perpetual. Alienation of lands to corporations is governed by statute in

Great Britain and in some States in this country.

AMORY, Blanche, a shallow, selfish, worldly girl in Thackeray's novel (Pendennis.'

AMORY, Robert, physician: b. Boston, 3 May 1842; d. 1910. He was graduated at Har¬ vard 1863, M.D. 1866, and studied in Paris and Dublin. He was lecturer at Harvard on the physiological action of drugs 1869 ; then pro¬ fessor of physiology at Bowdoin Medical Col¬ lege till 1874. Auther of (Bromides of Potas¬ sium and Ammonium5 (1872) ; (Action of

Nitrous Oxide5 (1870) ; and important papers on (Chloral Hydrates,5 ˆathologica1 Action of Prussic Acid5 and (Photography of the Spectrum5 ; the volume on (Poisons 5 in Wharton & Stille's (Medical Jurisprudence5 ; and (Electrolysis and Its Applications to Treat¬ ment of Disease5 (1886).

AMOS, a prophet of ancient Israel, lived in the middle period of the 8th century b.c. His home was Tekoa, a mountaintop village about 12 miles south of Jerusalem, on the border of the wilderness. The prophet de¬ scribed himself as a sheep raiser and a tender of sycomore fig trees, denying all connection with the sons of the Prophets. Though a citi¬ zen of Judah, Amos preached at Bethel, one of the royal

sanctuaries of northern Israel, in the latter half of the prosperous reign of Jero¬ boam II (2 Kings xiv, 23-29). He is the earli¬ est of the ((writing prophets,55 i.e., those whose oracles have been preserved as separate books.

The book of Amos is made up of (1) An opening address to the throng at the Bethel sanctuary (Chaps, i-ii). (2) A group of three addresses each beginning (<Hear this word55 (Chaps, iii-vi). (3) A series of symbolic visions with mingled exhortations (Chaps, vii-ix), and an historical statement (vii, 10-17). The book is thus one of the most systematically arranged of all the Prophets and, at the same time, ex¬ hibits the variety of structure that enters into the composition of the prophetic writings — oratory in poetic form and diction, a bit of song (v, 2), symbolic vision, biographical narra¬ tive. Expressing himself in pure, clear Hebrew, the writer is a master of vivid illustration from nature and history, of rhythmical period or terse antithesis, of emotional appeal and con¬ crete picturing of facts. In the pages of this tiny book the horrors suffered by the people of the east- Jordan districts, over whose terri¬ tories the wars of Israel and Damascus had raged in former reigns, are still most vivid, while the vices of Israel in Jeroboam's vic¬ torious reign are most realistically presented. Bribery in the law courts, dishonesty of the merchants with their false balances and meas¬ ures, oppression of the poor to secure the means for the coarse or elegant indulgences of the newly rich and their gross wives are some of the social conditions pictured as existing in conjunction with abundant ritual of sacrifice and music, and outward observance of sacred days. With the skill of a consummate orator Amos could lead his hearers on from accepted and congenial truths to new and unwelcome ideas, or could turn from concrete description of hard fact to symbolic vision.

The message of Amos by its originality and significance marks one of the greatest advances

in religious history. Now for the first time the God of Israel is clearly presented as the God of nations who will punish injustice done by Moab to Edom as well as that done by Edom to Israel, and who uses the warring nations of the world to carry out his own righteous pur¬ poses. This great God of history is also con¬ ceived as one whose

essential service consists in righteous conduct toward men rather than in worship through sacrifices or any form of cere¬ monial. As a corollary of such conceptions, Israel's past privileges are counted ground of her greater responsibility rather than earnest of greater material blessings. Earlier teachers had made ethical demands in the name of Jeho¬ vah, but Amos first clearly pictures him as the just God of nations whose primal demand is for justice in economic and international rela¬ tions.

The book of Amos has suffered relatively less expansion by subsequent hands than many of the Prophets. The principal section gener¬ ally regarded as a later addition is ix, 8-15.

Important recent commentaries are those of G. A. Smith, (Book of the Twelve) (in Expos¬ itor's Bible*), and W. R. Harper, Amos and Hosea) (in (International Critical Commen¬ tary^. The book is discussed in the Old Testa¬ ment Introductions of Driver, Cornill, McFad- yen, Creelman, in Fowler, (History of Litera¬ ture of Israel,* and in the recent Bible diction¬ aries.

Hen$y T. Fowler,

Professor of Biblical Literature, Broum Uni¬ versity.

AMOY, a-moi', China, a city and treaty- port in the province of Fuh-kien. It is a large and exceedingly dirty place, about nine miles in circumference, and is divided into two por¬ tions, an inner and an outer town, which are separated from each other by a ridge of hills, on which a citadel of considerable strength has been built. It possesses two commodious harbors. There are dry-docks and an excellent anchorage. The chief articles imported are sugar, rice, raw cotton and opium, as well as cotton cloths, iron goods and other European manufactures. The chief exports are tea, por¬ celain and paper. The trade carried on by means of Chinese junks is said to be large, and the native merchants are considered to be among the wealthiest and most enterprising in China. The annual imports are about $10,000,- 000; the exports $2,000,000. The falling off of exports in recent years is due to the decreased demand for China tea, for which Amoy was one of the chief centres. Amoy was captured by the British in 1841, after a determined resist¬ ance, and is one of the five ports that were opened to British commerce by the treaty of 1842. It is now open to the ships of all nations. The native population is now estimated at 300,000, and the foreign residents number about

1.

AMPELOPSIS, a genus of woody vines of the family Vitacece, consisting of about 20 species in North America and Asia. The plants have simple or divided leaves, small greenish flowers in cymes, and small, variously colored, grape-like berries. Several of the species, especially A. humulifolia, A. japonica and A. hcterophylla, all natives of Asia, are commonly cultivated for covering walls and

trellises. A. arborea, the pepper vine, of the southern United States and Mexico, is some¬ times cultivated.

AMPERE, am-par', Andre Marie, French physicist and mathematician : b. Lyons, 22 J an. 1775; d. Marseilles, 10 June 1836. His father was guillotined in 1793, which tragedy had its influence on all his after life. In 1801 he was appointed professor of physics in the Central School at Bourg. Later he was called to Paris, where he served as teacher in the Polytechnic School. In 1814 he was elected a member of the Academy of Sciences and 10 years later he was appointed professor of experimental physics in the College de France. Science is largely indebted to him for his electro-dynamic theory and his original views of the identity of electricity and magnetism. He was also the inventor of the astatic needle, which made pos¬ sible the modern astatic galvanometer. He was the first to show that two parallel conductors, carrying currents traveling in the same direc¬ tion, attract each other, while if traveling in opposite directions they repel each other. He formulated the theory that there were currents of electricity circulating in the earth in the direction of its diurnal revolution which at¬ tracted the magnetic needle. The ampere, or unit of strength of an electric current, is named from him. His works are: (Sur la theorie mathematique de jeiP (Lyons 1802) ; (Recueil d'obscrvations electro-dynamiques *(Paris 1822) ; (Theorie des phenomenes electro-dyna¬ miques* (Paris 1826).

AMPERE, International. See Electri¬ cal Terms.

AMPERE TURNS, in problems concerning the magnetic field produced by a current in a coil of wire, the two necessary factors are the strength of the current in amperes and the number of revolutions or turns that the wire makes in forming the coil or solenoid. The product of these is termed ampere turns.

AMPEREMETER, am-par'e-met'er, or AMMETER, am'met'er. An instrument for the measurement of electric currents in terms of the unit called the ampere. Since electric currents may be either continuous, i.e., uni¬ directional, 6r alternating, and the latter of high or of low frequency, amperemeters may be first divided into those (a)

for continuous or direct currents, (b) for low frequency alternat¬ ing currents, and (c) for high frequency alter¬ nating currents. A continuous electric current of one ampere is defined to be one which deposits electrolytically 0.001118 of a gramme of silver per second from a neutral solution of silver nitrate. An alternating current of one ampere is defined to be one which produces the same heat in a second in a wire as the unit continuous current defined as above to be one ampere. These definitions provide a basis on which the calibration of amperemeters can be conducted. They are therefore classified accord¬ ing to the physical principle on which they are constructed. An electric current is recognized by its ability (a) to create heat in a wire through which it passes, (b) to produce a magnetic field round the conductor or wire. The heat makes itself evident by raising the temperature and therefore elongating the wire, whilst the magnetic field creates mechanical

forces which act on pieces of iron or other conductors conveying electric currents when placed in proximity to the conductor in ques¬ tion. Hence ammeters are classified into (a) Thermal; (b) Electromagnetic; and (c) Elec¬ trodynamic instruments.

AMPHIBIA, a class of back-boned creep¬ ing animals comprising the newts, frogs and toads, together with several extinct groups, which is classified between the fishes and the reptiles. The most prominent characteristic is indicated by the name, which refers to the fact that these animals are provided with a respira¬ tory apparatus which enables them to breathe both water and air. It is not meant, however, that the Amphibia are able to breathe in either air or water at the same time, but that the young are provided with gills and live in water up to a certain age, or in rare cases per¬ manently, after which they acquire lungs and thereafter breathe atmospheric air. As these young as a rule are different from their parents and must undergo metamorphosis from the larval into the adult condition, amphibians as a class are usually said to undergo metamor¬ phosis, but this is equally true of some fishes and it is not true of all amphibians. The evidence not only of modern similarity of structure, but that obtained from a study of the fossil forms, makes it plain that the Amphibia are the result of the evolution of a branch from an ancient fishstock, probably by way of the lung-fishes or Dipnoi (q.v.). On the other hand

they are related in a not very dif¬ ferent degree to the reptiles. The connection link, according to Gadow, is formed by the Stegocephali; all the recent orders are far too specialized. The line leading from Stegocephali to fossil reptiles is extremely gradual, and the same consideration applies to the line which leads downward to the fishes ; but the great gulf within the V ertebrata lies between fishes and amphibians, that is, between absolutely aquatic creatures with internal gills and fins, and terrestrial four-footed creatures with lungs and fingers and toes. No great phylogenetic importance attaches to the possession of ex¬ ternal gills, as it is not unlikely that in the Amphibia these organs owe their origin to en¬ tirely larval requirements.

Although in the Palaeozoic age the great stegocephalous amphibians (more usually called labyrinthodonts, q.v.), flourished as the only terrestrial vertebrates of importance, the class never attained a dominant position. Inter¬ mediate between the aquatic fishes and the gradually rising terrestrial reptiles, the amphib¬ ians were pushed aside in a double way by the struggle of evolution, until now most of them have become extinct. The remainder persist only because they have found shelter in the nooks and corners of the world to which they have become adapted by small size and aquatic habits; and only one group, the frogs and toads, fortunate in their plasticity, have spread over the whole globe and exhibit some richness in forms.

The class Amphibia is divided into two sub¬ classes: (1) Stegocephali (q.v.), which is wholly extinct; (2) Lissampliibia , which in¬ cludes all of the modern forms, contained in three orders: (1) Apoda, or Gymnophiona, composed of the family Coccilliidce (see Ccecil-

ian) ; (2) Urodela, including the long-tailed, smooth-skinned, aquatic salamanders, newts, mud-puppies and the like; (3) Anura, compris¬ ing the tailless forms, or frogs and toads, of which there are two divisions, — the few Aglossa, which have no tongue, and the tongue¬ bearing Phaneroglossa, which includes the great majority of forms. The existing species num¬ ber about 1,000.

Fossil Amphibia. — The modern frogs and salamanders are a small and scanty remnant of the Amphibia of Palsezoic time. During the Carboniferous and Permian periods they were the dominant form of life and of great variety in form, including some of very large size, 12 feet or more in length. All these ancient Amphibia belong to an extinct group, the Labyrinthodonta (sometimes called Stegoce- phalia), or ((armored amphibians, w distinguished by having the wide flat head completely roofed over with bone, and the body more or less armored with bony plates and scales. The skull has two openings for the eyes,

two at the front margin for the nostrils and a single one in the middle for the pineal eye. Like modern amphibians, they breathed by gills when young, but by lungs when adult. All had long tails and most of them short, stout legs. Some were elongated and snake-like, others tadpole-like with large heads shaped like a broad arrow (Diplocaulus) and no limbs; others, and these the largest, heavy-bodied, with flat conical or semi-circular heads, short legs and five-toed feet (Labyrinthodon , Eryops).

These ancient amphibians illustrate various stages in the evolution of the backbone of mod¬ ern V ertebrata from the notochord or seg¬ mented rod of cartilage from which it was derived. In the smaller and more primitive types the segments of cartilage are but slightly ossified in a number of separate plates or in¬ complete rings of bones. In others each verte¬ bra is composed of two or four pieces, which re¬ main separate during life instead of consolidat¬ ing into a single bone, as in modern vertebrates. In others, again, the vertebra is completely united. The oldest known labyrinthodonts are from the Carboniferous rocks, and are related to some of the older Palaeozoic dipnoan fishes, from which they may have been descended. In the Permian they attained large size and great abundance, and continued into the Triassic period, by the end of which they had become extinct. Their foot-tracks, often preserved in muddy sandstones of these periods, are some¬ times curiously like the impressions of a human hand, whence they received the name of Cheiro- therium, or “beast-with-a-hand,® before their nature was recognized. The frogs and sala¬ manders are probably descended from primitive labyrinthodonts, but are very little known as fossils. One fossil species, allied to the giant salamander of Japan, was found in the Miocene strata of Oeningen many years ago (1726) and was supposed by an early naturalist to be the fossil skeleton of a man, and described as ((homo diluvii testis et theoscoposn — the man who was witness to the Deluge and saw God — a quaint reminder of the geological speculations of two centuries ago. For breeding habits, dis¬ tinctive characteristics and modes of life see special articles under the various species. For good recent treatment of the Amphibians

in W InJ n-

AMPHIBIA

A Spanish Salamander (Pleurodires waltli) European Crested Newt (Triton cristatus) Menobranch (Necturus maculatus)

East African Toad (Breviceps mossambicus)

6 A Mexican Toad (Rhinophrynus dorsalis)

7 An Amohisbsena (Siphonops annulatus)

8 Horned Frog (Ceratobatrachus Guentheri)

9 Flying Frog (Rhacophorus pardalis)

consult Gadow, ‘Amphibia and Reptiles) (London 1901) ; Boulenger, (Catalogue of Eatrachia *in British Museum (London 1882) ; and many papers in English scientific periodi¬ cals : Cope, ‘Batrachia of North America) (Bulletin 34, United States National Museum, Washington 1889), which contains an extensive bibliography; also ‘Amphibia,* by Lyddeker, Cunningham, Boulenger and Thompson (London 1912). Dickerson’s ‘The Frog Book> (New York 1916) gives a popular account of the group.

AMPHIBIOUS PLANTS. Certain plants, such as some liverworts, the knot-weed, Polyganum amphibium, Sagittaria heterophylla, the water-buttercup, Ranunculus aquatilis, and the mermaid-weed, Proserpinacea. pallustris, can grow *and flourish either in water or in air, and are consequently called amphibious. The same plant will often assume great difference of form in the two environments. This is especially shown in the leaves. Those of Poly¬ gonum amphibium, hairy in air, are smooth in the water. Sagittaria has ordinary leaves in the air, but phyllodes in the water. Ranunculus and Proserpinacea have dissected leaves in the water, but leaves of the familiar broad-bladed form on land, with transitional forms at the surface of the water. It has been shown that the stimulus which produces this change in leaf-form is the transpiration which the leaf undergoes in air. Stems growing under water become flaccid at the surface, and the same plant which in the air has strength enough to hold itself erect will depend in the water on the surrounding medium for its support. Con¬ sult Coulter, J. M., Barnes, C. R., and Cowles, H. C., (A Text-Book of Botany* (Vol. II, New York 1911).

AMPHIBOLE, am'fi-bol (from the Greek amphibolos, “doubtful,** in allusion to the diffi¬ culty of distinguishing it from pyroxene). In mineralogy, (1) a common mineral, crystalliz¬ ing in the monoclinic system, and varying greatly in chemical composition. The name was first given by Hauy in 1801 as distinguishing a species of which he regarded hornblende and actinolite as varieties. In 1809 he included tremolite also. In general, the species may be described as a normal

metasilicate of calcium and magnesium, associated with iron, manga¬ nese, sodium, potassium and hydrogen.

(2) Amphibole Group. — -An important group of minerals, including the species de¬ scribed above, and taking its name therefrom. Its constituent species are widely different in chemical composition, and are closely allied to the members of the pyroxene group. All the species of the amphibole group have a prismatic cleavage of from 54° to 56°, and they also exhibit close relationships in the optical prop¬ erties. All the species of the pyroxene group have a fundamental prism with an angle of 93° and 87°, the corresponding angle in amphibole being 56° and 124°. The specific gravity of the pyroxenes is usually higher than that of the species of the amphiboles with which they are likely to be confused. Alkalis are met with more commonly in the amphiboles, and mag¬ nesium is also more prominent in that group. The amphibole group is divided into three main

sections according to the crystalline forms of its species. Dana's classification is as follows :

A. Orthorhombic Section.

Anthophyllite.

(Gedrite).

B. Monoclinic Section.

Amphibole:

Non- aluminous varieties:

Tremolite.

Actinolite.

Cummingtonite.

Dannemorite.

Griinerite.

Richterite.

Aluminous varieties:

Eden it e.

Pargasite.

Hornblende.

Glaucophane.

Riebeckite.

Crocidolite.

Arfvedsonite.

(Barkevikite).

C. Triclinic Section.

AJnigmatite.

AMPHIBOLOGY, an equivocal phrase or sentence, not from the double sense of any of the words, but from its admitting a double con¬ struction, as ((The duke yet lives that Henry shall depose.® The word that may be ambigu¬ ous, and consequently the sentence may be an example of equivocation, not amphibology. Fallacies of amphibology are purely verbal, and seldom found apart from other types of verbal fallacy. They are so obvious that they do not constitute a serious source of unsound thinking.

AMPHICTYONIC LEAGUE or COUNCIL, in ancient Greece, an assembly composed of deputies from 12 Greek tribes, each of which sent two deputies, who assembled each year at Delphi, and again at Thermopylie, with great solemnity; composed the public dis¬ sensions, and the quarrels of individual cities, by force or persuasion ; punished civil and criminal offenses, and particularly transgres¬ sions of the law of nations and violations of the temple of Delphi. It forbade the destruc¬ tion @f a city of the league or the obstruction of its water-supply in war or peace. After the decision was published a fine was inflicted on the guilty state, which, if not paid in due time, was doubled. If the state did not then sub¬ mit, the whole confederacy took arms to re¬ duce it to obedience. The assembly had also the right of excluding it from the confedera¬ tion. An instance of the exercise of this right gave rise to the Phocian War, which continued 10 years (b. c. 355-346). The council also administered the Pythian games. Consult Tittmann, ‘Uber den Bund der Amphvctyonen *(Leipzig 1880) ; Freeman, ‘History of Feder¬ al Government* (2d ed., London 1893).

AMPHICYON, a genus of extinct mam¬ mals, found fossil in Miocene

rocks, which is usually placed among the extinct Canidce (dogs), but has many bear-like features, such as plantigrade, five-toed feet and the structure of the ulna and radius. The largest species was about the size of a bear, but with a very dog-like head. It belonged to the Old World, but a closely allied American Miocene form is Daphcenus.

AMPHINEURA. See Mollusks.

AMPHION, in Greek mythology, son of Zeus and Antiope, his twin brother being Ze- thus. He is represented as being the oldest of

the Grecian musicians. In Lydia, where he married Niobe, the daughter of King Tanta¬ lus, he learned music and brought it thence into Greece. He reigned in Thebes, which he partly built, and it is said that at the sound of his lyre the stones voluntarily formed them¬ selves into walls ; also that wild beasts, and even trees, rocks and streams followed the musician. With the aid of his brother Zethus he is said to have avenged Antiope, who had been imprisoned and ill-used by his father, and to have bound Dirce, his stepmother, to the horns of a wild bull. This incident is supposed to be represented by the famous piece of sculp¬ ture, the Farnese bull, in the Farnese Palace at Rome.

AMPHIOXUS, the lancelet, a small animal of the marine sub-phylum Ceplialochor- data, of the great phylum Chordata (q.v.), to which the vertebrates belong. Its scientific name is B ran chio stoma. From its somewhat worm-like form it was for a long time re¬ garded as a worm by some authors and origin¬ ally as a mollusk (Limax) by Pallas. It is now named Branchiostoma lanceolatum ; lives buried in the sand just below low-water mark, the head or (<oral hood® projecting above into the water. It also swims in a vertical or up¬ right position, also frequently lying on one side on the sand ; and burrows head foremost rapidly downward in the sand. It extends along our coast from the mouth of Chesapeake Bay to Florida ; also on the eastern coast of South America and in the north European seas, the Mediterranean, the East Indies and Aus¬ tralasia, the species being truly cosmopolitan. Another very closely allied genus, Asymmctron, includes two species, one of which occurs at the Bahamas and the other in the Louisade Archipelago, southeast of New Guinea.

The body of Amphioxus is about two inches in length, slender,

compressed, pointed at each end, hence the generic name (Amphioxus , afil both, ofi > r , sharp), the head-end • being thin and compressed. The 62 v-shaped mus¬ cular segments are distinct to the naked eye. and alternate on the two sides. From the mouth to the vent is a deep ventral furrow and a slight dorsal fin extends along the back and beneath as far front as the vent, forming the ventral fin, while the wider portion at the tail is the caudal fin. The oral hood has a large median external opening, which is oral, sur¬ rounded with a circle of ciliated tentacles supported by semi-cartilaginous processes aris¬ ing from a circumoral ring. At the bottom of this opening is the small mouth which leads directly into a large broad pharynx or ((bran- chial sac,® protected at the entrance by a num¬ ber of minute ciliated lobes. The walls of this sac are perforated by long ciliated slits, of which there are more than a hundred pairs, comparable with those of the branchial sacs of ascidians and of Balanoglossus. The water which enters the mouth passes out through these slits, where it oxygenates the blood and enters the peribranchial cavity, thence passing out of the body through the abdominal pore (atrionore). The pharynx leads to the stom¬ ach with which is connected the liver or ccecum. There is a system of blood-vessels, but no heart. A contractile median vessel, the ventral aorta, beginning at the free end of

the liver and extending along the underside of the pharynx, sends branches to the sac and two anterior branches to the dorsal aorta. On the dorsal side of the pharynx the blood is col¬ lected by the two anterior trunks from the branchial veins which carry away the aerated blood from the branchial bars, and poured into a great longitudinal trunk or median dorsal aorta, by which it is distributed throughout the body. There are also vessels distributed to the liver, and returning vessels, representing the portal and hepatic veins. The blood-corpuscles are white and nucleated.

The vertebral column of the true verte¬ brates is represented in the lancelet by a noto¬ chord, a long, flexible, cylindrical rod pointed at both ends, which extends to the end of the head far in front of the nervous cord. The nervous cord is a rod-like structure which lies over the notochord. It is not divided into a true brain and spinal cord, though the cord is slightly enlarged at the anterior end, where a rudimentary ventricle is said to exist. The nerve-cord sends off a few nerves to the peri¬ phery, with a nerve to the single minute me¬ dian eye. An olfactory pit opens externally on the left side of the snout and communicates with the central canal of the nerve-cord. The principal excretory organs are about 90 pairs of peculiarly modified nephridia, situated above the pharynx and in relation with the main coelomic cavities. These have no common duct but empty into the peribranchial

cavity. The reproductive glands are square masses or pouches, of which there are about 26 pairs at¬ tached in a row on each of the walls of the body-cavity. The individuals may be male or female, the only sexual differences being in the reproductive glands.

The eggs may pass out of the mouth or through the pore. Kowalevsky found them issuing in May from the mouth of the female and fertilized by spermatic particles likewise issuing from the mouth of the male. The eggs are very small, 0.105 millimetres in diam¬ eter. The eggs undergo total segmentation, leaving a segmenta on cavity. The body-cavity is next formed by invagination. The blasto¬ derm now invaginates and the embryo swims about as a ciliated gastrula. The body is oval and the germ does not differ much in appear¬ ance from a worm, starfish or ascidian in the same stage of growth. No vertebrate features are developed. Soon the lively, ciliated gas¬ trula elongates, the alimentary tube arises from the primitive gastrula cavity, while the edges of the flattened side of the body grow up as ridges, which afterward, as in all vertebrate embryos, grow over and enclose the central nervous system. When the germ is 24 hours old it assumes the form of a ciliated flattened cylinder and now resembles an ascidian embryo, there being a nerve cavity with an external opening which afterward closes. The noto¬ chord appears at this time. In the next stage observed the adult characters have appeared, the mouth is formed, the first pair of gill- openings are seen, 11 additional pairs appear¬ ing. It thus appears that while the lancelet at one time in its life presents ascidian features, yet, as Balfour states, ((all the modes of devel¬ opment found in the higher vertebrates are to be looked upon as modifications of that of

Amphioxus.® Consult Willey, A., < Amphioxus and the Ancestry of the Vertebrates > (New York 1894). Any work on the Chordates or Vertebrates will contain some material on Am- phioxus.

AMPHIPODA, an order of Crustacea, in which the body is compressed and usually arched. . There is no carapace or distinct cephal- othorax, but a small head, bearing two pairs of antennae, a pair of jaws (mandibles), and three pairs of maxillae. The thoracic segments are separate and like those of the abdomen, not being fused and united with the head segments. Respiration is performed by lamellate or leaf¬ like gills arising from the thoracic feet. The three anterior abdominal segements bear swim¬ ming feet, while the three posterior

bear pos¬ teriorly directed feet adapted for springing. The heart lies forward, and the eyes are simple. The amphipods are represented by the common beach-flea or beach- or sand-hopper (Orchestia agilis) ; by Gammarus, or ®scud,® species of which live both in the sea and in fresh-water. Extreme forms are the ghost-like or skeleton-like attenuated Caprella, abounding in eel-grass below low tide ; and which in walk¬ ing loop the body somewhat like a geometricid caterpillar. Another form is Chelura terebrans, which burrows in wood, in company with the gribble. It is very active and frequently de¬ structive to submerged piles. Other forms are eyeless and live in caves or dark wells.

AMPHIPOLIS, an important city of Thrace or Macedonia ; at the mouth of the Strymon River, 31 miles from the ZEgean. It was founded as an Athenian colony about 436 b.c. ; was captured by Sparta in 424 b.c. ;*and near it the Spartans defeated the Athenians in 422 b.c. in a battle in which Cleon, the Athe¬ nian general, and Brasida, the Spartan con¬ queror of Amphipolis, were both killed. Sub¬ sequently it became a Macedonian possession; was called Popolia in the Middle Ages; and its site is now occupied by the Turkish town of Yenikeui.

AMPHISBZENA, one of the degraded worm-shaped lizards of the family Amphis- bcenidce, which lead an entirely subterranean life, burrowing like earth-worms. They have a soft skin forming numerous rings and con¬ taining only vestiges of scales except upon the head. External limbs are absent (except in one genus), and only vestiges remain of any limb-bones. Their tails are so short and blunt that they are popularly said in some countries to have two heads, whence the scientific name of the group. There is also a legend that when cut in two, the two ends will find one another and reunite. This notion is strengthened by their ability to move either forward or back¬ ward with equal ease. About a dozen genera and more than 60 species are known, most of which inhabit the warmer parts of America and Africa; some also live in Asia Minor and in Spain. They are frequently found in ants' nests, and have been called (<mothers of ants® in consequence. Their eyes and ears are con¬ cealed beneath the skin. A common species in South America and the West Indies (Am phis - bcena fuliginosa) is checkered black and white, and is from one to two feet in length. Like the others it feeds upon worms and small

insects found under the surface oi the ground. They are quite harmless.

AMPHITEATROV, Alexander Valen-

tinovitch, va-len-te-no'vich am-fe-ta-a'trof, a popular Russian writer of the naturalistic school. He was born at Kaluga (central Rus¬ sia) of ecclesiastical parentage in 1862, and studied music and jurisprudence, the latter at the Moscow University. His literary career began in 1887, when his light verse and prose commenced to appear in various humorous periodicals. As special correspondent of the foremost Russian daily, Novoye Vremia, he at one time attracted considerable attention under the pseudonym of ((Thc Old Gentleman.® In 1902 he was exiled to Siberia for certain ad¬ vanced views expressed in his own periodical, Russia. Since 1905 he has been living abroad, where he edited a progressive periodical called The Red Banner. Among his extra-literary achievements perhaps the most important was the founding at Paris of The Russian School of Social Science, at which he delivered courses of lectures.

Amphiteatrov has been an extremely pro¬ lific writer, whose literary output, if collected, might easily fill half-a-hundred volumes. His works already published include numerous novels, dramas, critical and biographical essays, studies in history and an endless variety of humor. As none of these are available in Eng¬ lish, it would be superfluous to enumerate them in a general reference work intended for Eng¬ lish readers. A few characteristic titles of his more important novels are (The Blood of Alimov) (1884), a decidedly zolaesque work with which the author first attracted general attention; (Fiedka the Murderer *(1892), a study in hereditary predisposition; cVictoria Pavlovna* (1907), a most interesting work dealing favorably with the woman question; (The Dusk of the Demigods> (1908), a two- volume work depicting the vanities and tribu¬ lations of actors, playwrights and singers, and (The Men of the Eighties and Nineties *(1907— 10), also in two volumes, constituting the initial works of a projected series which was intended to picture, in leisurely Balzac fashion, Russian society from 1880-1910. His non-fiction in¬ cludes (A Literary Album,* a volume entitled (Humor,) and a very creditable study of anti¬ semitism. His dramas are commonly adapta¬ tions from his novels — and sometimes the author reverses this process of literary manufacture.

Amphiteatrov is not in any sense a great Russian writer — not even when judged by contemporary Russian standards. He lacks the originality of Gorky, the inventiveness of Andreyev and the art of Artsybashev (qq.v.). Although he, too, is a realist, his realism is rather of the simple physiological kind of Zola than of the great Russian variety developed by Gogol, Tolstoy and Dostoyevsky (qq.v.). His special interests in human nature lie with the play of temperaments and hereditary predispo¬ sitions, both well illustrated in (The Dusk of the Demigods, *teeming with alcoholics, and in <The Men of the Eighties,*

full of degen¬ eracy. This interest in the abnormal and sub¬ normal human types, which is suggestive of Dostoyevsky and which links Amphiteatrov somewhat with Andreyev, makes most of his

novels and dramas really studies in social path¬ ology, which naturally renders their vogue ephemeral. Indeed, it is not as a writer of novels and plays that Amphiteatrov has won his real fame; his special field is literary jour¬ nalism and humorous improvisation, as he has himself avowed, and in this field he ranks easily among Russia's greatest writers.

David A. Modell.

AMPHITHEATRE, with the Romans, a building without a roof, of a round or oval form, destined for the combats of gladiators or of wild beasts. In the middle was the arena, a large place covered with sand, on which the fights were exhibited. Round about were the vaults or caves in which the animals were kept; above these was the gallery, from which ascended successive rows of seats, each of greater height and circumference than the pre¬ ceding. The first 14 were for the senators and judges, the others for the common people. Julius Caesar erected the first large amphi¬ theatre at Rome for his gladiatorial exhibitions. It was of wood. Statilius Taurus, 20 years later, built the first stone one. The Coliseum at Rome is the largest of all the ancient am¬ phitheatres. (See Coliseum). In Verona there is one the interior of which still shows the whole ancient architecture and is carefully preserved. See Hippodrome.

AMPHITRITE, in Greek mythology, a daughter of Oceanus and Tethys, or of Nereus and Doris. Poseidon wished to make her his wrife, and as she hid herself from him he sent a dolphin to find her, which brought her to him, and received as a reward a place among the stars. As a goddess and queen of the sea she is represented as drawn in a chariot of shells by tritons, or riding on a dolphin, 'be¬ fore which a cupid swims, with the trident of Poseidon in her hand.

AMPHIT'RYON, in Greek mythology,

King of Thebes, son of Alcaeus, and husband of Alcmcna. Plautus, and after him Moliere, have made the trick played upon him by Zeus (in assuming his form in order to enjoy the embraces of his wife) the subject of amusing comedies, in which the return of the true

Amphitryon, and his meeting with the false one, occasion several humorous scenes.

AMPHIUMA, a genus of Amphibians that lose their tadpole gills, but retain a gill slit. See Kongo Snake.

ˆ AMPHIUMID2E, am-fe-yu'mi-de, a family of urodele Amphibia (q.v.). There are no gills in the adult, but a single pore-like branchial fissure may persist on each side. Respiration is pulmonary, but the inspirations occur only at intervals of several minutes. The vertebrae are biconcave but, like the remainder of the skeleton except the cartilaginous carpi and tarsi, are well ossified. There is no ethmoid bone, and the internal ear is separated from the brain by membrane only. A maxillary bone is developed, and teeth are borne on the margins of both jaws, as well as on the vomers, but not on the parasphenoid. The eyes are very small and devoid of lids ; two pairs of limbs are always present, and the tail is per¬ manently provided with a fin. Two genera are known: Cryptobranchus, which contains the American hellbenders, and the giant salamander

of eastern Asia, and Amphibia, with very much reduced limbs and persistent gill-clefts, found in the Southeastern States.

AMPHORA, a vessel used by the Greeks and Romans for holding various liquids, par¬ ticularly wine. They were of various forms, but most commonly tall and narrow, with a pointed end which fitted into a hole or socket to enable them to stand upright. Properly an amphora was a two-handled vessel, from Greek amp hi, both, and phero, to carry.

AMPHOTERIC, a chemical property of many organic substances, urine, milk, blood, etc., to show acid to blue litmus and alkaline to red litmus, thus paradoxically being both acid and alkaline.

AMPLITUDE, in astronomy, the distance of any celestial body or other object (when re¬ ferred by a secondary circle to the horizon) from the east or west points; the complement to the amplitude, or the distance from the north or south point, is called the azimuth.

AMPTHILL, amt'hill, Odo William Leo¬ pold Russell, 1st baron, British diplomat and ambassador: b. Florence, 20 Feb. 1829; d. Potsdam, Germany, 25 Aug. 1884. He was educated at home, and became attache at Vienna, and later at Florence. In 1858 he re¬ moved to Rome where he remained 12 years as the real though unofficial representative of England at the Vatican. In 1871 he became

ambassador at Berlin, where he rendered great service at the congress. He kept on the best of terms with Bismarck, carefully avoiding every¬ thing that could give any cause of offense to that most jealous minister, whom he, however, did .not hesitate to withstand when his un¬ scrupulousness went the length of deliberately attempting to deceive.

AMPUDIA, am'poo-dya, Pedro de, Mexi¬ can soldier. He first appears in the wars against Texas, Santa Anna (q.v.) making him a general in 1840. He engaged in forays and fights here for some years, coming into conflict with Summerville's Texas troops and com¬ manding the. land forces in the siege of Cam- peachy; compelled to retreat 26 June 1843, he went to Tabasco, and in 1844 captured and sum¬ marily executed Sentmanat who had assaulted it. The act was loudly condemned and he was dismissed. He reappeared in the United States-Mexican War under Arista; was in the fight at Matamoras, 11 April 1846; was given command of Monterey, but surrendered to Taylor 24 September and vanishes from history.

AMPULLA (Lat.), in antiquity, a vessel bellying out like a jug, that contained unguents for the bath ; also a vessel for drinking at table. The ampulla has also been employed for cere¬ monial purposes, such as holding the oil or chrism used in various church rites and for anointing monarchs at their coronation.

AMPULLARIA. See Apple- Shell* AMPUTATION. See Surgery.

AMRAM, am'ram, Jewish educator: d. 875. A famous ˆgaon® or head of the Jewish Academy of Sura (Persia) in the 9th century. He was the author of many ˆesponsa,* but his chief work was liturgical. He was the first to arrange a complete liturgy for the synagogue, and his prayer-book ((Siddur Rab 'AmranP)

AMRAOTI —

was the foundation of most of the extant rites in use among the Jews. The <Siddur) was published in Warsaw in two parts (1865).

AMRAOTI, um-ryot'i, India, a town and district in Berar, central provinces. The dis¬ trict was reconstituted in 1905, when that of Ellichpur was incorporated with it. It is the richest town of Berar, with the most numer¬ ous and substantial commercial population. It possesses a branch of the Bank of Bombay and has the largest cotton mart, where an aver¬ age of 80,593 bojas of cotton are bought and sold annually. It has also a large grain mar¬ ket, cotton presses,

ginning factories and oil mills. The population of the town is about 35,000. The district of Amraoti has an area of 4,754 square miles. It is an extensive plain, about 800 feet above sea-level, the general flatness being only broken by a small chain of hills, running in a northwesterly direction be¬ tween Amraoti and Chandor. The principal towns, besides Amraoti, are Karinja, Kolapur and Badnera, which lie on the Great Indian Peninsula Railway, the main line of which crosses the district. Pop. about 810,000.

AMRAPHEL, King of Shinar (=Sumer, the Sumerian or south Babylonian plain), a monarch mentioned in Gen. xiv as an ally of Chedorlaomer, King of Elam, in subduing his revolted Palestinian vassals. Two other allied kings are named: Arioch of Ellasar (Larsa, South Babylonia) and Tidal of Goiim (trans¬ lated ˆnations® in Authorized Version; identi¬ fied by some with Gutium in Media, by others with <(the tribes® = the wandering Kurds). Neither of the names nor any mention of the raid is found on the inscriptions ; and the ex¬ pedition, with its capture of Lot and the suc¬ cessful recapture by Abraham, has no critical standing. Nevertheless it is most interesting historically; for the non-Jewish names are ap¬ parently genuine, and the conditions are pre¬ cisely those of the times which the names would imply. Arioch would correspond to the Babylonian Eriaku, supposed to be found in a fragmentary epic on the invasion of Babylonia; Tid ‘al to a Tudhkula or Tudhghula also said to be recognizable there ; and Chedor¬ laomer to Kudur-Laghamar, the first half of which is found in other Elamite royal names, as Kudur-Mabuk, etc., and the last is probable. As to Amraphel, he is very plausibly Hammu¬ rabi (q.v.), the great revivor of the Babylonian monarchy about 2250, after its conquest by the Elamites; or rather Hammurabi-ilu (the divine name el or ilu added, as common in Babylonian and Egyptian; cf. Joseph-el and Jacob-el against the Hebrew Joseph and Jacob), _ or perhaps Hammu-rapaltu, a probably dialectic variant of Kimta-rapashtu actually found written. Chedor- laomer’s expedition is like other known ones of Babylonian kings against the lands west of the Mediterranean, which they claimed as tributary. But there is a closer verisimilitude, which makes it practically certain that the substance of the story was taken from a Babylonian tab¬ let describing an actual occurrence; Amraphel in the story is a subordinate ally of Chedor¬ laomer and the historical Hammurabi was ap¬ parently a dependent sub-king of Babylon under the Elamites before he threw off their yoke. The added Abraham story may represent a tradition welded with the other in later times.

AMR IBN AL-ASI, umr-iben-al-azi, Arabian general: d. 6 Jan. 664. He was a violent opponent of Mohammed until his con¬ version to Islam in 629 a.d. Abu Bekr entrusted him with a high command in the army destined for the conquest of Syria, and to Amr is chiefly due the success of the expedition. In 639 he led an army into Egypt for the purpose of sub¬ jugating that country. After a long siege he reduced Alexandria and signed a treaty of peace 8 Nov. 641. Amr supported Moawiya against Ali in the contest for the caliphate and was thus instrumental in establishing the Omay- yad dynasty. In 658 he reconquered Egypt and governed it till his death. His administration was beneficent and its moderation facilitated the spread of Islam in that country. He re¬ opened a canal 80 miles long from the Nile to the Red Sea with the object of renewing com¬ munication between the latter and the Medi¬ terranean. To Amr has been attributed the burning of the famous library of Alexandria. But this crime was quite inconsistent with his character and the story may well be regarded as untrue, as it was not advanced until six centuries after Amr's death by Abulfaragius. Consult Butler, (Arab Conquest of Egypt' (Ox¬ ford 1902) ; de Goeje, M. J., ˆlemoire sur la conquete de la Syrie' (Leiden 1900) ; Gibbon, E., (Decline and Fall of the Roman Empire' ; Muir, Sir W., (The Caliphate' (London 1891).

AMRITSIR, um-nt'sar, or UMRITSIR

(that is, (<the pool of immortality"), a town of Hindustan, capital of a district of the same name, in the Punjab, the principal place of the religious worship of the Sikhs. It is, on count of its favorable situation between Cabul and Delhi, Cashmere and the Deccan, a place of great trade, and has considerable manufac¬ tures of shawls and silks ; but its chief attrac¬ tion to tue natives is the sacred pond con¬ structed by Ram Das (one of the earlier pontiffs of the Sikh faith), in which the Sikhs immerse themselves that they may be purified from all sin. This holy basin is 150 paces square, built of brick, having in its centre the chief temple of the Sikh religion. Under a silken canopy in this temple is deposited the book of Sikh religion and laws, called the Granth. The voluntary contributions of pilgrims and devo¬ tees support this place, to which 600 priests are attached. Pop. about 164,000 (including can¬ tonments). The district of Amritsir lies be¬ tween the rivers Ravi and Bias. It is inter¬ sected by numerous canals. Its area is 1,601 miles. Pop. about 2,500,000.

AMROHA, India, a town in the Morada- bad district of the United Provinces. It con¬ tains the tomb of a Mohammedan saint, Shaikh Saddu, and has been for many centuries a Mohammedan centre. Pop. about 40,000.

AMRU, originally an opponent and subse¬ quently a zealous supporter of Mohammed, and one of the ablest of the Mohammedan warriors. He brought Egypt under the power . of the Caliph Omar in 638, and governed it wisely till his death in 663. The burning of the famous Alexandrian Library has been generally attrib¬ uted to him, though only on the authority of a writer who lived six centuries later.

AMSDORF, ams'dorf, Nicolaus, a Prot¬ estant reformer of the 16th century : b. in

Gross-Zschopa, near Wurzen, on the Mulde, 3 Dec. 1483; d. 14 May 1565. He was educated at Leipzig, and then at Wittenberg, where he was one of the first who matriculated (1502) in the recently-founded university. He obtained various academical honors, and became profes¬ sor of theology in 1511. He joined Luther at the very beginning of his struggle (1517) ; con¬ tinued all along one of his most determined supporters ; was with him at the Leipzig Con¬ ference and the Diet of Worms, and was in the secret of his Wartburg seclusion. He assisted the first efforts of the Reformation at Magde¬ burg, at Goslar, and at Einbeck, took an active part in the debates at Schmalkald, where he defended the use of the sacrament by the un¬ believing, and spoke out strongly against the bigamy of the Elector of Hesse. He urged the separation of the High Lutheran party from Melancthon, got the Saxon dukes to oppose the Frankfurt Recess (1558), and continued to fight for the purity of Lutheran doctrine until his death.

AMSLER, Samuel, one of the most dis¬ tinguished of engravers : b. in Schinznach, in the canton of Aargau, 1791 ; d. 18 May 1849. Amsler's principal engravings are (The Tri¬ umphal March of Alexander the Great *and a full-length ˆChrist,* after the sculptures of Thorwaldsen and Dannecker; the (Burial of Christ, *and two (Madonnas, * after the pictures of Raphael; and the (Triumph of Religion in the Arts,* after Overbeck, his last work, on which he spent six years.

AMSTERDAM, formerly called AM- STELREDAM, the chief city of the Nether¬ lands, is situated in the province of North Holland, at the influx of the Amstel to the Ij or Y (pronounced eye), an arm of the Zuyder Zee. The city is built in the shape of a semi¬ circle, and within this semi-circle four canals — the Prinsen Gracht, Keizer's Gracht, Heeren Gracht and the Singel Gracht — extend in the form of

polygonal crescents, nearly parallel to each other, while numerous smaller canals in¬ tersect the city in every direction, dividing it into about 90 islands, with about 300 bridges. The site of Amsterdam was originally a peat bog, and all its buildings rest upon piles that are driven from 14 to 60 feet through a mass of loose sand and mud until they reach a solid stratum of firm clay. This foundation is per¬ fectly secure as long as the piles remain under water. At the beginning of the 13th century it was merely a fishing village, with a small castle, the residence of the lords of Amstel. In 1240 Giesebrecht III of Amstel built a dam to keep out the sea but, in 1296, on account of the share of Giesebrecht IV in the murder of Count Floris of Holland, the rising town passed out of the hands of the counts of Amstel and shortly thereafter, with Amstelland (the dis¬ trict on the banks of the Amstel), it was taken under the protection of the counts of Holland, and from them received several privileges which contributed to its subsequent prosperity. In 1482 it was walled and fortified. After the revolt of the seven provinces (1566) it speedily rose to be their first commercial city and a great asylum for the Flemish Protestants; and in 1585 it was considerably enlarged by the building of the new town on the west. The establishment of the Dutch East India Com¬

pany (1602) did much to forward the well¬ being of Amsterdam, which, 20 years later, had 100,000 inhabitants. In the middle of that cen¬ tury the war with England so far reduced the commerce of the port that, in 1653, 4,000 houses stood uninhabited. Amsterdam had to sur¬ render to the Prussians in 1787, to the French in 1795, and the union of Holland with France in 1810 entirely destroyed its foreign trade, while the excise and other new regulations im¬ poverished its inland resources. The old firms, however, lived through the time of difficulty, and in 1815 commerce again began to expand — an expansion greatly promoted by the recon¬ struction of the harbor, the opening in 1876 of a new and more direct waterway between the North Sea and the city, and by the building of the Merwede Canal in 1892, which places Am¬ sterdam in direct connection with the Rhine.

The city has a fine appearance when seen from the harbor or from the high bridge over the Amstel. Church towers and spires, and a perfect forest of masts, relieve the flatness of the prospect. The old ramparts have been leveled, planted with trees and formed into promenades. Between 1866 and 1876 many spa¬ cious streets and an extensive park were added to the city. Tramways have been successfully introduced and the harbor greatly improved. There are suburban steam and electric tram¬ ways and railway communication with all parts of the country and of Europe. An extensive system of canals and sluices and rich grassy meadows surround the city. On the west are a

great number of windmills for grinding corn and sawing wood. On each side of the three chief canals, with a row of trees and a carriage¬ way intervening, are handsome residences. The building material is brick, and the houses have their gables toward the streets, which gives them a picturesque appearance. Amsterdam is the centre of the national system of defense. There is a fort at the entrance of the harbor and sluices several miles from the city which can flood in a few hours the surrounding land. The population, which from 217,024 in 1794 sank to 108,179 in 1815, rose steadily to 565,589 in 1908, of whom the majority belonged to the Dutch Reformed Church. Of the remainder, about 95,000 were Catholics, 60,000 Jews from east Europe and 5,000 Portuguese Jews. The chief industrial establishments are sugar, cam¬ phor and borax refineries, engineering works, mills for polishing diamonds and other precious stones, ship-building yards, manufactories of sails, ropes, tobacco, silks, gold and silver plate and jewelry, dyes, chemicals, candles, cobalt blue and machinery, rice mills, glass blowing establishments, lumber mills, breweries, distil¬ leries, with export houses for corn and colonial produce, Amsterdam being the chief market for the Dutch East Indian trade. There is a vast system of docks, quays and storehouses, and the headquarters of the large shipping com¬ panies are here; 2,152 vessels (tonnage 2,310,- 000) entered the port in 1913 and 1,707 (ton¬ nage 1,844,000) cleared. It is also the financial centre of Holland. The present Bank of the Netherlands dates from 1814, Amsterdam's famous bank of 1609 having been dissolved in

1.

The great focus of life is the Dam. Here stands the former Stadthuis (((townhouse**),

converted in 1808 into a palace for King Louis Bonaparte, and still retained by the reigning family. Built by Van Kempen in 1648-55, and raised upon 13,659 piles, it extends 262 feet in length by 207 feet in breadth, and is sur¬ mounted by a round tower rising 182 feet from the base. It is adorned on the exterior and in the interior with sculptures by Artus Quellinus, and has a hall 120 feet long, 57 wide and 90 high, lined with white Italian marble — an apartment of great splendor. The cruciform Nieuwe Kerk (New Church), a Gothic edifice of 1408, is the finest ecclesiastical structure in the city, with a splendidly carved pulpit, and the tombs of Ad¬ miral de Ruyter, the

great Dutch poet Vondel and various other worthies. The Old Church (Oude Kerk), built in the 14th century, is rich in painted glass, has a grand organ and con¬ tains several monuments of naval heroes. Lit¬ erature and science are represented by a univer¬ sity supported by the municipality (till 1876 known as the Athenaeum Illustrc), with a library of 148,000 volumes, including the Rosen¬ thal collection of over 8,000 books on Jewish literature; by academies of arts and sciences, by museums and picture galleries, a palace of national industry, one of the finest botanical gardens in Europe, six theatres, etc. The new Rijksmuseum contains a truly national collec¬ tion of paintings, its choicest treasure being Rembrandt's (Night-guard. > The Six Gallery contains a small but priceless collection of Dutch masters. Modern art is represented in the Municipal and Fodor museums. Rembrandt (q.v.) made Amsterdam his home, and his statue (1852) now fronts the house he occupied. Spinoza was a native. There are many hospi¬ tals and benevolent institutions, well supported and managed on good principles, including the celebrated Society for Public Welfare, with branches over all Holland, and various orphan asylums. A water supply was introduced in 1853. The exports from the Amsterdam dis¬ trict to the United States attained the value of $30,183,706 in the first nine months of 1916, which is larger than the total for any corre¬ sponding period. The increase was due chiefly to the transfer to Amsterdam of the business done at Antwerp before the war. Area 18% square miles. Pop. (1909) 566,131; (1913) est.

595,258.

AMSTERDAM, N. Y., city of Montgom¬ ery County, 33 miles northwest of Albany. It is located on the Mohawk River, the Erie Canal and the West Shore Railway and is a busy manufacturing centre and Barge Canal ship¬ ping terminal. Amsterdam has numerous in¬ dustries, producing such diversified objects as carpets, knit-goods, rugs, wagon-springs, paper, silk, paper-boxes, brooms and gloves. The United States census of 1914 reports 117 manu¬ facturing establishments of factory grade, em¬ ploying 11,379 persons, of whom 10,774 are wage earners, receiving $4,998,000 annually in wages. The capital employed is $22,645,000, and the value of the product is $22,475,000; of this, $9,310,000 was added by manufacture. There are also foundries and machine-shops; three daily newspapers are published. Here are located an academy, a hospital, a board of trade and chamber of commerce, numerous churches and a Roman Catholic institute. There are well- paved streets, a fine system of drainage, an vol. 1 — 38

excellent water supply, an electric lighting sys¬ tem and free garbage

disposal plant and collec¬ tion service. Amsterdam was first settled about 1778, and until 1804 it was known as Veeders- burg. It was incorporated as a village in 1830, and as a city in 1885. Pop. (1910) 31,267;

(1920) 33,524.

AMSTERDAM, Bank of. This insti¬ tution was established in 1609, much upon the plan of the Bank of Venice. Its chief and at first its only function was that of affording payment for bills of exchange drawn upon the merchants of that great commercial port, in full-weighted coins ; the coins in common cir¬ culation being more or less below standard by reason of attrition, filing, sweating or other means of degradation. In order to give effect to the plan of the bank, the municipal law pro¬ vided that all bills of exchange above 600 guilders should be payable only at the bank. Its capital consisted entirely of its customers' deposits, whose desire to meet their bills promptly induced them to keep a sufficient bal¬ ance at the bank for that purpose. The city guaranteed the solvency of the bank; and to guard against mismanagement appointed its principal officers and made frequent examina¬ tions of its accounts. For this guarantee the bank charged the depositor and paid the city 10 guilders for each account opened, besides other small fees on transfers, amounting in the agregate to between 150,000 and 200,000 guild¬ ers per annum. ((Bank money® usually com¬ manded a premium or agio of 5 to 9 per cent in circulating money, the agio representing the difference between newly minted coins and those in circulation. It was the common belief that for every guilder represented by the bank's receipts or acknowledgments for de¬ posits there was a metallic guilder in the vaults of the bank, so that it appears to have made no loans and indulged in no enterprises or specu¬ lations. In 1672 when the French King Louis XIV was at Utrecht, the bank paid in coins, which, by the marks of fire upon them, must have lain in its vaults more than half a century. However, upon the second French invasion, 1793, the bank was found to be entirely desti¬ tute of money, the deposits having been drawn down and concealed for greater safety. After a useful career of more than two centuries the bank was wound up in 1820. For the his¬ tory of other ancient banks see list under the heading Banks, Ancient and Modern.

AMSTERDAM, an uninhabited and almost inaccessible island in the Indian Ocean, in lat. 37° 47' S. and long. 77° 34' E,, about 60 miles north of Saint Paul Island, and nearly midway between the Cape of Good Hope and Tasmania. It is an extinct volcano, rising 2,989 feet from the sea. It was discovered by An¬ thony Van Diemen in 1633

and annexed by France in 1893. In 1871 the British frigate Megaera was wrecked here, and most of the 400 persons on board had to remain upwards of three months on the island. The (Memoires) of a Frenchman, Capt. Franqois Peron, who was marooned three years on the island (1792- 95), are of much interest.

AMU, a-moo', or AMOO DARYA (Arab. Gihon), river of central Asia, the ancient Oxus. It takes its rise in the eastern Pamir near the boundary of eastern Turkestan, flows at first

generally west (to long. 66° E.), thence gen¬ erally northwest, and empties by a delta into the southern part of the Aral Sea. It receives several affluents from the mountains of Turkes¬ tan and the Hindoo Koosh. About 1,600 miles in length, it is navigable by light draught ves¬ sels for about 800. As a means of irrigation, it is of considerable importance. See Oxus.

AMULETS. In general an amulet may be described as a charm made of stone, metal, earthenware, parchment, paper or other material, having incised or inscribed magic figures, characters or a bare inscription on it. The amulet is used to protect the wearer against witchcraft, sickness, etc. It has been usually worn suspended from the neck. The words “amulet® and “talisman® are commonly considered as synonymous. But, while the amulet is supposed to be limited to protecting the bearer from all malignant outside in¬ fluences, the talisman is supposed to have, besides this power of protection from danger to its wearer, also miraculous influences on others. The talisman is supposed to be able to enforce, for its possessor, the love and influence of others.

Much study and discussion have been de¬ voted to the derivation of the word amulet. The opinion that it was from the Arabic hamail

1. Ankh. Called “girdle of Isis.” Symbol of Life.

2. Thet, Symbol of blood of Isis. Cleansed wearer from sins.

3. Dad or Ded (front and side views). Backbone or Osiris.

Cared for the wearer in the underworld.

(necklace, sword-belt), or hamalet (something suspended), is

wavering. Pliny said the country folk called the cyclamen which they planted in the house to make all poisonous drugs harm¬ less, amuletum. This derivation receives more general acceptance.

Faith in the power of amulets has existed in every nation from time immemorial. Among the ancients the most prominent Orientals to attain a fixed amulet cult were the Chaldeans, Babylonians, Persians, Indians, Chinese and Japanese. But foremost in the popular culti¬ vation of the faith in amulets must be placed the ancient Egyptians. Among the ancient Nile-dwellers the oldest and far most prolific- ally used form of amulet was the scarab (q.v.). Many thousands are to be found in the museums and other collections. These, with a multitude of peculiar amulets, are found on the mummy bodies in every Egyptian tomb, each for its specific future purpose, buried to keep the deceased free from the numerous torments of the underworld.

Among the ancients we find the Greeks favored as amulets rings of iron. Roman amulets consisted largely of necklaces, brace¬ lets, metal diadems, precious stones, and, es-

1. Ushabti Amulet. Acted as servant in the underworld.

2. Uat. Papyrus columm amulets. Rendered the wearer

immortal and immune from injury.

pecially, black coral (gorgonia antipathes) . They often enclosed their amulets in lense- shaped receptacles (bullce), and attached them to the necks of their boy children. Roman lawyers wore a baby's caul as bringing pros¬ perity. The Germanic peoples used the symbol of Thor's hammer, luck-stones, herbs, pieces of certain roots, also the prehistoric flint arrow¬ heads mounted in gold, etc. The Jews bound thongs, containing verses of the Law, round the head or arm (phylacteries) for protection from evil; the figures of gods or stars, magic rings, etc., wrere illicitly wTorn.

In the Middle Ages, when such amulets were placed under the ban of the Christian churches of Constantinople (Byzantium) and Rome, the Agnus Dei and Holy Virgin medallions took their place, or pieces of parchment were carried inscribed with the beginning of the Gospel of St. John. The Agnostic stones carried (in rings or in the clothes) by the Hermetics were strictly amulets. The early Christian, pierced ivory, glass, and bronze fishes were, undoubt¬ edly, amulets. The encolpia of the 4th

1. Masons' Plumb Line. Purpose uncertain.

2. “ Ammon’s Feathers ” Amulet. Symbol of Truth and

Righteousness — attributes of a good ruler.

century also belongs to the same category. Rings mounting a “toadstone® were worn by women to keep bad fairies from their new¬ born babes.

AMUNDSEN

595

In the present day Mohammedans carry as amulets faith-stones, rings, pieces of paper in¬ scribed with magic formulae or with the ((99 Attributes of Allah,® or verses of the Koran. I hey also adopted from the Egyptians the hand

1. Cat Amulet. Purpose uncertain.

2. “ Two Finger ” Amulet. Relaxed the mouth muscles

in the underworld when wearer was hungry.

amulet (((hand of Fatima®), to suspend in their dwellings or wear, to ward off the (<Evil Eye®; all in spite of the laws of the Koran. Italians attach small images or pieces of coral to their children’s necks <(against the Evil Eye.® They even suspend amulets to their domestic animals

io £

1. Ouza. “ Divine Eye ” amulets, (a) Double ouza amu¬ let. (b) Single “ divine eye.” Protected the wearer from the “ evil eye.”

for this purpose. In southern Europe we find coral used also as protection from hemorrhages, pieces of elkhorn as cure for epilepsy, not to mention abracadabra tablets and amulet coins. In England the widest known amulet at this day isr probably, the baby’s caul, for which

1. Scotch “ Elf-arrows.” Prehistoric flint arrowheads mounted for wear as “ lucky ” amulets.

sailors, especially, pay a good price, as it is said to be a sure protection against drowning. The Scotch, to this day, wear as amulets prehistoric flint arrowheads mounted in silver; they call them <(elf-arrows® and suppose them to have

been shot from the heavens by the fairies. These are used by the Italians also who know them as <(tongues of Saint Paul.®

Bibliography. — Blumler, M. F., (in Der Alte Orient Jahrg, Leipzig 1865) ; Kunz, George F., (The Magic of Jewels and Charms> (Phila¬ delphia 1915) ; id., (The Curious Lore of Precious Stones) (ib., 1913) ; Smith, Richard Gordon, (Ancient Talismans and Folklore of Japan) ; Thomas, William, and Pavitt, Kate, (The Book of Talismans, Amulets and Zodia¬ cal Gems) (London 1914) ; Wiedemann, Karl Alfred, (Die Amulette der Aegypter) (Leipzig 1910). Clement W. Coumbe.

AMUNDSEN, a'mun-sen, Roald, Norwe¬ gian explorer: b. Borge, Smaalenene, Norway, 16 July 1872. He studied medicine for two years at the University of Christiania, then entered the Norwegian naval service, went to sea in 1893, and in 1897 became first officer on the Belgica, of the Belgian South Polar Ex¬ pedition (1897-99). In 1901 he made ocean¬ ographic researches off the northeast coast of Greenland with the Gjoa, a small vessel regis¬ tering 47 tons, and after studying terrestrial magnetism at Wilhelmshafen, Hamburg and Potsdam set sail in June 1903 in the Gjoa to relocate the position of the Magnetic North Pole. Taking up his headquarters on the southeast side of King William's Land he made during 19 months a magnetic survey of a con¬ siderable region around the pole and was thus able to prove that it has probably no stationary position but is in continual movement. His observations were taken to Norway where their reduction is still in progress. During this ex¬ pedition Amundsen was also the first and only man to accomplish the long-attempted feat of taking a ship from the Atlantic to the Pacific through the North West Passage. He reached Herschel Island on 13 Aug. 1905, having ac¬ complished one of the most important tasks ever performed in geographic exploration. In 1909 Amundsen planned an expedition in Nansen's ship, The Fram, with the object of drifting across the North Polar Sea, but suffi¬ cient funds for this purpose were still lacking when he- learned of Peary's discovery of the North Pole. Fearing that the incentive for further contributions had been removed, he secretly resolved to make his objective point the South Pole, believing that he had sufficient equipment for an Antarctic expedition. He started on 9 Aug. 1910, first announced his change of plan to the world from Madeira, and on 14 Jan. 1911, arrived in the Bay of Whales, which he made his base, and pitched his winter camp on the Great Ice Barrier. In October 1911 he started with four companions his dash for the pole, which he reached on 16 Dec. 1911, a month before his English com¬ petitor, Captain Scott. Amundsen owed his success not only to his superb courage and endurance, and to favorable weather conditions,

but also to his attention to the smallest details of his equipment, and to his use and knowledge of dogs as draught animals. After his return he lectured in most cities of Europe, North America and Australia; and his book, (The South Pole,* was translated into many lan¬ guages and published in English in 1912. His long-delayed drift across the Arctic Ocean, on which he had planned to start in 1914, was indefinitely postponed on the outbreak of the European War, as Amundsen felt the Nor¬ wegian government might have other uses for their $40,000 appropriated for the purpose. Amundsen also wrote (The North West Pas¬ sage, > published in English in 1908.

AMUR, am-or', river formed by the junc¬ tion (about lat. 53° N. and long. 121° E.) of the Shilka and the Argun, which both come from the southwest. From the junction the river flows first southeast and then northeast, and, after a total course of 3,060 miles, falls into the Sea of Okhotsk opposite the island of Sakhalin. It is very valuable for navigation, and carries a considerable fleet of steamers, but on account of the bar at its mouth goods are generally disembarked and carried overland to Alexandrovsk. In 1636 Russian adventurers made excursions to the lower Amur, and in 1666 built stations and a fort at Albazin. In 1685 both stations and the fort were taken by the Chinese, but were promptly retaken by the Russians, who in 1689 abandoned the whole territory of the Amur to the Chinese. In 1854- 56 two military expeditions were conducted by Count Muravieff, who established the stations of Alexandrovsk and Nikolaevsk. In 1858 China agreed to the Treaty of Tien-tsin, by which the boundaries of Russia and China were defined. The left bank of the Amur and all the territory north of it became Russian ; and below the confluence of the Ussuri both banks. In 1860, after the occupation of Pekin by the British and French, General Ignatieff secured the signature of Prince Kung to a treaty by which Russia acquired the broad and wide territory comprised between the river Amur and the mouth of the Tumen, extending 10° of latitude nearer the temperate regions, and running from the shore of the north Pacific eastward to the banks of the river Ussuri, a principal affluent of the Amur. In September 1900 Russia took formal possession of the right bank of the river. This vast terri¬ tory falls into two Russian provinces — the Maritime Province between the Ussuri and the sea, and the government of Amur north of the river. The latter has an area of 175,000 square miles. The country is richly timbered, and is admirably adapted for pasturage and agricul¬ ture, though the climate is severe. Fur-bearing animals are

still plentiful and the river abounds in fish. The capital is Khabarovka. Niko¬ laevsk, once the only important place in these regions, is on the Amur, 26 miles from its mouth, where the river is 1*4 miles wide, and in places 15 feet deep; but the political centre tends southward to the more temperate Mari¬ time Province (area, 730,000 square miles), near the southern end of which is situated the important harbor of Vladivostok (<(Rule of the East®), or Port May, which in 1872 was placed in telegraphic communication with Europe by the China submarine cable, and is now the cap¬

ital of the Amur provinces. The island of Sakhalin (Saghalien), north of the Japan group, along a portion of the coast of Asiatic Russia, and formerly possessed partly by Rus¬ sia and partly by Japan, is also a part of the Amur region in the wider sense.

AMURATH I, a' moo-rat, a sultan of the Turks; succeeded his father, Orchan, in 1360. He founded the corps of Janissaries, conquered Phrygia and on the plains of Cassova defeated the Christians. In this battle he was wounded, and died the next day, 1389.

AMURATH II , one of the more illustrious of the Ottoman emperors, succeeded his father, Mohammed I, in 1421, at the age of 17. In 1423 he took Thessalonica from the Venetians; in 1435 subdued the despot of Servia, besieged Belgrade, which was successfully defended by John Hunniades; defeated the Hungarians at Varna in 1444, and slew their king, Ladislaus. He died in 1451.

AMURATH III, succeeded his father, Se¬ lim II, in 1574. His first act was the murder of his five brothers. He added several of the best provinces of Persia to the Turkish empire. He was noted for his avarice, and his sensual ex¬ cesses made him prematurely old. He died in

1.

AMURATH IV, succeeded his uncle, Mus- tapha X, 1623. After two unsuccessful at¬ tempts he took Bagdad from the Persians in 1638 and ordered the massacre of 30,000 pris¬ oners who had surrendered at discretion. The excessive cruelty and debauchery of Amurath IV have earned for him the character of being one of the worst sovereigns that ever reigned over the Ottomans. He died in 1640.

AMURATH V, Sultan of Turkey: b. 21

Sept. 1840, and succeeded to the throne in 1876 as the result of a revolution that caused the overthrow of his uncle, Abdul Aziz. His reign was for a few months only, as he developed strong symptoms of insanity and was deposed in August 1876.

AMUSSAT, Jean Zulema, a-miissa zhon ziilema, French surgeon: b. 1796; d. 1856. He entered the army in early life, was later assist¬ ant surgeon at the Salpetriere Hospital and a member of the Paris faculty of medicine. He was the inventor of many surgical appliances and first adopted the method of torsion of the arteries in haemorrhage. He was the first to perform the operation for opening the large intestine at a

point where it is not covered with peritoneum. It is still practised and is known by his name. He wrote on the nervous system and on the torsion of arteries.

AMY'CL.7E. (1) An ancient town of Laco¬ nia, on the eastern bank of the Eurotas, 2*4 miles southeast of Sparta. It was the home of Castor and Pollux, the <(Amyclaean brothers.® It was conquered by the Spartans only before the First Messenian War. (2) An ancient town of Latium, which claimed to have been built by a colony from the Greek Amyclse.

AMYGDALIN, a-mig'da-lin (from the Latin amygdcild, ((almond®), a crystalline sub¬ stance occurring in bitter almonds, in the ker¬ nels of apples, pears and peaches, in the leaves of the laurel (Cerasus lauro-cerasus) and in the leaves and bark of various species of the

genus Primus. It has the formula C20H27NO11 + 3H20, and is of special interest to the chemist because it was the first known of the numerous class of substances termed “glucosides® (q.v.). It is obtained by extraction, with boiling alco¬ hol, of the pulp left after the expression of the oil from bitter almonds. The alcoholic solution is concentrated by evaporation and the amyg¬ dalin precipitated by the addition of ether, in which it is insoluble. Like the other glucosides, amygdalin does not form salts with acids, but is decomposed by them with the formation of glucose. Amygdalin, while of a bitter taste, is not poisonous. When dissolved in water it undergoes no change but if some dilute min¬ eral acid such as emulsion be added, a kind of fermentation sets in and the amygdalin is gradually decomposed into benzaldehyde, glu¬ cose and hydrocyanic acid. Amygdalin has been produced synthetically by Emmerling from mandelic nitril glucoside and glucose, with maltase, a constituent of yeast.

AM YGDALOIDS, a-mig'da-loidz, cellular lavas, the cavities of which have been made by expanding steam before the lavas completely solidified, and which are usually filled with secondary minerals, frequently the zeolites (q.v.). The cavities are called amygdules and the rocks are said to be amygdaloidal. Amyg- daloids are characteristically extrusive. On Keweenaw Point, Mich., they are of par¬ ticular interest, because the cavities are filled with native copper and constitute the source of much of the copper mined in that region.

AM'YL (from the Latin amyluni, “starch,® its first-known compounds being obtained by the distillation of fermented starchy matter), an important organic radical having the for¬ mula GHn, and belonging in the fatty series. It is also called “pentyl,® because, in the long list of analogous radicals having the general formula CnH2n + x, amyl is the particular radical in which n = 5. Amyl cannot exist in the free state, but two of its molecules can combine to form the paraffin “decane,® C10H22, which is a liquid boiling at about 320° F. The radical amyl can have no less than eight different isomeric forms, and the chemistry of its compounds is correspondingly complicated. Of the many compounds that are known, however, only three are especially important in the arts. These are: (1) Amyl alcohol, (2) amyl acetate and (3) amyl nitrite.

(1) Eight isomeric amvl alcohols are theo¬ retically possible, one for each of the theoret¬ ically possible isomeric forms of the radical itself, and seven of these are actually known. Five of the seven are of no particular import¬ ance in practical chemistry, but the remaining two, known respectively as the “active® and “inactive® amyl alcohols, constitute the greater part of the fusel-oil (q.v.) that is obtained abundantly in the manufacture of potato brandy, and less abundantly in the preparation of many other kinds of distilled liquors. “Active® amyl alcohol has the formula CH3.CH.C2H5.CIL. OH, boils at about 262° F., and takes its name from the fact that it rotates the plane of polarized light to the left. “Inactive® amyl alcohol has the formula (CHsL.CH.CH-.Cˆ.OH, boils at about 269° F., solidifies at — 4° F., and has no effect upon polarized light. These two kinds of amyl alcohol may be obtained, mixed, by

washing fusel-oil with water and subsequent rectification. They may then be separated by fractional distillation or by other more exact methods, for which see special treatises.

(2) Amyl acetate (more exactly, “iso-amyl acetate,® since six acetates are known) is pre¬ pared by distilling a mixture of the foregoing amyl alcohols with sodium acetate and sul¬ phuric acid. It is a liquid, boiling at about 282° F., and possessing a strong fruit-like smell. It is used for flavoring cheap confectionery.

(3) Amyl nitrite, C5H11.NO2, may be formed by distilling a mixture of the foregoing amyl alcohols with potassium nitrite and dilute sul¬ phuric acid. It is a yellow liquid, with an ethereal, fruity odor. When its vapor is in¬ haled it paralyzes the vaso-motor nervous sys¬ tem and lowers the blood pressure. Amyl nitrite is often administered in the form of glass capsules or “pearls® containing one to three drops,

which are crushed in the handker¬ chief and inhaled. It is used in arteriosclerosis, angina pectoris, migraine, asthma, haemorrhage and toxic rise of blood pressure. Its effects are powerful and ' almost instantaneous, and it should never be tried except under the guidance of a physician.

AMYLENE HYDRATE, an alcohol used as a hypnotic. It is technically a tertiary iso¬ amyl alcohol f(CH3)2C(OH)CH2CH3], and is a limpid, colorless, neutral fluid with a peculiar odor and a burning taste. It is miscible with eight parts of water and freely miscible with alcohol, chloroform and fixed oils. It has an action on the human body similar to that of other alcohols and is a useful hypnotic, occupy¬ ing a position between chloral, which is twice as strong, and paraldehyde, which has about half the strength of amylene hydrate. In large doses it is a heart depressant.

AMYLOP'SIN, a chemical (or unorgan¬ ized) ferment, occurring in the pancreatic fluid, together with steapsin and trypsin. The chief function of amylopsin, in intestinal digestion, is to effect the conversion of starches and similar substances (amyloses) into sugars (dextrins, maltoses, isomaltoses and glucose). The con¬ version takes place in the small intestine. Amy¬ lopsin is often called the “pancreatic diastase.® See Pancreas.

AM'YLOSE, any carbohydrate (q.v.) which can be classified as starch, dextrin, cellu¬ lose or natural gum. The remaining members of the carbohydrate group are classed as glu¬ coses or saccharoses. The general formula of an amylose is (G;HioO:,)n. See Carbohydrate; Cellulose; Dextrin; Starch; Gum Arabic.

AMYNODONTS, a group of primitive solid-hoofed animals, fossil in American Eocene rocks, especially in the White River beds. They were large, heavy, short-legged animals, allied to the rhinoceros, but having probably more the appearance and habits of a hippopotamus. Well-known genera are Amynodon and Meta- mynadon.

AMYNTAS, a-min'tas, the name of various characters in ancient Greek or Macedonian his¬ tory, especiallv kings of Macedonia. Amyntas I was a son of Alcetas, reigned about 540 to 500 b.c. and was succeeded by his son, Alexander I. Amyntas II, sometimes called Amyntas III, was King of Macedonia, son of Philip and

brother of Perdiccas II ; reigned 393 to 369 b.c., having gained the crown by the murder of Pausanias. He was engaged in war with the Olynthians and assisted by the Spartans. He was father of Alexander, Perdiccas and the famous Philip. Philip excluded Amyntas III (or IV), the grandson of Amyntas II from his succession and he was put to death in the first year of the reign of Alexander the Great be¬ cause of a plot against the life of Alexander. Another Amyntas was a Macedonian officer in Alexander's army.

AMYNTOR, a'min-tor, Gerhard von

(pseudonym of Dagobert von Gerhardt), Ger¬ man novelist and poet : b. Liegnitz, Silesia, 12 July 1831 ; d. 1910. He entered the army in 1849, took part in the campaigns of 1864 and 1870-71 as a major, was severely wounded in the former and resigned in 1872; settled in Potsdam in 1874. His principal works are (Peter Quidam's Rhine-Journey' (1877), an epic; (Songs of a German Night Watchman) (1878) ; (The New Romancero) (1880), poems; (The Priest' (1881), an epic; novels, (It Is You' (1882) ; (A Problem) (1884) ; (Praise of Woman' (1885) ; (Gerke Suteminne' (1887), a historical romance; (A Struggle for God'

(1902).

AMYOT, Jacques, a-me-o, a French au¬ thor: b. 30 Oct. 1513; d. 6 Feb. 1593. He is famous for his translations from the Greek, which, owing to their elegant style, are con¬ sidered classical literature. They are the (Theagenes and Chariclea' of Heliodorus; (Seven Books of Diodorus Siculus,' the (Daphnis and Chloe' of Longus; and Plu¬ tarch's Lives,' which was used by Corneille as a source for his antique tragedies, and by Shakespeare (in its English version by Sir Thomas North) for some of his plays. _

AMYOT, Joseph M. See Amiot.

AMYRAUT, ame-ro, Moi'se, French Cal¬ vinist theologian : b. in Bourgueil, in the prov¬ ince of Anjou, 1596; d. 1664. He was educated at Saumur, where he was himself afterward a professor of divinity. By his talents and mod¬ eration he soon acquired reputation and influ¬ ence. In 1631 he attended the Synod of Clar¬ endon and was commissioned to present to the king the remonstrances of his brethren against the infraction of the edicts of pacification. In his mission he acted with such judgment and dignity that he succeeded in relieving the Protestant deputies from the disgraceful obli¬ gation of addressing the king on their knees. Although he was a Protestant, his amiable

temper and courteous manners commanded the regard of the Catholics and he was held in par¬ ticular esteem by Cardinal Richelieu. He en¬ deavored to bring about a complete union be¬ tween the various Protestant Churches; this object he had in view in nearly all his writings, especially in a Latin tract, cDe secessione ab ecclesia Romana, deque pace inter Evangelicos in negotio religionis instituendad Moreover, acting in concert with Richelieu, he aimed at a reconciliation between the Protestants and the Roman Catholic Church. The favor and respect with which he was treated by the heads of the French goyernment Richelieu and Mazarin, are to be ascribed to his opinions concerning the power of the princes. He publicly maintained

on several occasions the doctrine of implicit obedience to the sovereign authority, which, indeed, had also been held by the great found¬ ers of the Reformation. Amyraut was a fin¬ ished scholar and wrote Latin and French with equal ease. His numerous writings, which were received with marked favor in his time, are now nearly forgotten and not easy to be procured. Among the number we may men¬ tion (A Treatise on Religions, Against Those Who Esteem Them to Be Indifferent' ; Chris¬ tian Morals' ; (A Treatise on Dreams' ; ‘Against the Millenarists' ; Considerations on the Laws of Nature Regulating Marriage.'

AMY'RIDACEiE, a natural order of trop¬ ical plants, consisting of trees or shrubs with opposite or alternate compound leaves, fre¬ quently stipulate and dotted ; the flowers are usually bisexual, but are sometimes unisexual by abortion. They yield resinous and balsamic juices, which are sometimes used medicinally and receive such names as bdellium, elemi, frankincense, myrrh, oliban, tacamahac. (See these articles). Among the chief genera of the order are Amyris, Balsamodendron, Bos- wellia, Canarimn and Idea. They are some¬ times classed as a suborder of Anacardiacece.

AN, or ON, the Egyptian name of the city of Heliopolis.

ANA, a comparatively modern designation applied to collections of the sayings and ob¬ servations of eminent persons, as well as to gossip or criticism pertaining to them.

ANABAPTISTS (Greek) ,avdf again, fitncritieiv to baptize), those who baptize again persons admitted to their communion, when such con¬ verts have been baptized in their infancy or have been merely sprinkled and not immersed in baptism or have been baptized in any way without being capable of declaring the doc¬ trines which they

believe and giving a reason for the hope that is in them. Baptists (q.v.) of the present day are not properly to be styled Anabaptists, as they lay no capital emphasis upon the necessity for rebaptism, although they have very definite canons on the subject of im¬ mersion.

Anabaptists of the early Church. — In the

3d century of the Christian era, the century which witnessed such violent and bitter con¬ troversies, the question of baptism came also under discussion. In the Eastern Church, in¬ cluding Asia Minor, Egypt, northeastern Africa and Constantinople, it was definitely maintained that baptism was invalid unless it was administered by one of the clergy with proper matter and form. In the Western Church, including Italy, Gaul, Spain and north¬ western Africa, it was held that the virtue of baptism lay in the invocation of the Trinity and the ceremonial sprinkling with or immer¬ sion in the water. Any baptism thus admin¬ istered by a person of either sex, by a clergy¬ man or a layman, < was equally valid. When two children in their play mimicked the act of a priest whom they had seen baptizing an in¬ fant, Saint Augustine of Hippo declared that the boy who had been thus baptized by his companion was a real and actual partaker of the benefits and bound by all the vows per¬ taining to this sacrament. The controversy between the East and the West continued,

however, to rage with such fury that two councils were called to settle the question. The one was held in Iconium, Asia Minor, in 235, the other at Synnada in 256. At these theolog¬ ical synods the decision arrived at was that rebaptism was unnecessary for those who had been baptized by heretics. The storm of con¬ troversy swept westward to northern Africa as far as Carthage, where Tertullian supported the position of the Eastern Church in con¬ trariety to that of Saint Augustine and other Western doctors. Agrippinus, bishop of Car¬ thage, maintained against the bishop of Rome that baptism under certain circumstances ought to be repeated. His followers were called Agrippinians and his defiance of the bishop of Rome took the form of a concilier decree which was issued by a synod which he convened and which endorsed the sentence of Iconium. In the year 253 Stephen, bishop of Rome, fulmi¬ nated a bull of excommunication against all the bishops of Asia Minor, including Cappadocia, Galatia and Phrygia, whom he styled Rebap- tizers and Anabaptists, in an opprobrious sense.

Munster Anabaptists. — In the 16th cen¬ tury there arose in Europe a religious sect known as Anabaptists, whose main tenets car¬ ried the principles of the Reformation to the extreme limit of that revolutionary movement. Their principles were those of revolt against mediaeval feudalism just as much as against ecclesiastical authority. They were socialists as well as reformers, mystics and fanatics. Their existence was one of the results of the Renaissance as interpreted to the common mind. Their views were democratic and in¬ dividualistic. They rejected all authority, all tradition, all dogma, everything in short that militated against tbe absolute independence of the individual mind and spirit. This ten¬ dency acquired at length the character not only of liberty but of license, and the term Ana¬ baptist has thus become associated with every extreme, not only of license but of licentious¬ ness, of rebellion and political outlawry. It is quite absurd to associate the term Anabaptist as employed historically with any phase of Christian thought, practice or opinion. It really is a term applied to those who at a turn¬ ing point in the history of European thought, social, political and religious, became intoxi¬ cated with the idea of individual liberty and the result was violence and excess of the worst character.

The history of the movement is as follows: The doctrine of adult baptism was first put forth by Thomas Munzer, the Lutheran pastor of Zwickau in Saxony, in the year 1520. Mtin- zer soon obtained many followers who joined him in his uprising against all civil and reli¬ gious authority. Although openly belonging to the Reformation movement they very soon became completely repudiated by the followers of Luther and his adherents. But the spirit of insurrection against feudal tyranny pre¬ vailed amongst all the common people on the Rhine, in Westphalia, Holstein, Switzerland, Flanders and throughout the whole Nether¬ lands, and the increase of Miinzer's followers became so dangerous that the magistrates and civil authorities found it difficult to restrain them. Munzer was compelled to leave Zwic¬ kau : he visited Bohemia, resided for two years at Alstadt and Thuringia and in 1524 was

found propagating his doctrines in Switzer¬ land. He was the principal inciter of the Peasants' War, which was entered upon with a view of establishing an ideal Christian com¬ monwealth with communistic institutions. This war reached its culmination in 1525, when Munzer led his forces against the representa¬ tions of established order and' was defeated at the battle of Frankenhausen 15 May 1525, Miin- zer was taken prisoner and with several of his associate leaders was tried, condemned and executed. But all this was looked upon by the Anabaptists as merely a form of welcome persecution. New

associations were formed; new prophets and teachers arose ; the propa¬ ganda was extended amongst the peasants and serfs of Germany, Austria and Hungary in every direction. It may be necessary to state that the tenets of the Anabaptists are to be summarized in their own words as follows : <(Impiety prevails everywhere. It is therefore necessary that a new family of holy persons should be founded, enjoying, without distinc¬ tion of sex, the gift of prophecy, and skilled to interpret Divine Revelations. Hence, no need for learning; for the internal word is more than the outward expression. No Christian is to be allowed to go to law, to hold an office in the civil government, to take an oath in a court of justice or to possess any personal property ; everything amongst Christians must be in common.®

John Bochhold, or Bockel, a tailor, of Ley¬ den, aged 26, and John Matthias, or Matthiesen, a baker of Haarlem, came, in 1553, to Munster in Westphalia, a town whose inhabitants fol¬ lowed the doctrines of the Reformation. Here they soon won the adherence of the excited populace, and among the rest, of Rothmann, a Protestant clergyman, and the Councillor Knip- perdolling. The magistrates in vain excluded them from the churches. They took violent possession of the council-house, and toward the end of the year a treaty was signed securing the religious liberty of both parties. Being strengthened by the accession of the restless spirits of neighboring cities, they soon made themselves masters of the town by force, and drove out their adversaries. Matthiesen came forward as their prophet, and persuaded the people to devote gold and silver and movable property to the common use, and to burn all books but the Bible ; but in a sally against the bishop of Munster, who had laid siege to the city, he lost his life. He was succeeded in the prophetic office by Bochhold and Knipperdolling. The churches were destroyed, and 12 judges were set over the tribes, as in Israel; but even this form of government was soon abolished, and Bochhold, under the name of John of Leyden, raised himself to the dignity of king of New Zion, as the Anabaptists of Munster called their kingdom, and as such was ceremoniously crowned. From this period (1534) Munster was the scene of all excesses of fanati¬ cism, lust and cruelty. The introduction of polygamy, and the neglect of civil order, con¬ cealed from the infatuated people the avarice and madness of their tyrant and the increase of danger from abroad. Bochhold lived in luxury and magnificence ; he sent out seditious procla¬ mations against the Pope and Luther, a ! well as the neighboring authorities ; he threatened to destroy with his mob all who differed in

opinion from him; made himself an object of terror to his subjects by frequent executions, and while famine and pestilence raged in the city., persuaded the WTetched, deluded inhabitants to a stubborn resistance of their besiegers. The city was at last taken, 24 June 1535, by treachery, though not without a brave defense, in which Rothmann and others were killed, and the king¬ dom of the Anabaptists destroyed by the execu¬ tion of the chief men. Bochhold, and two of his most active companions, Knipperdolling and Kretchting, were tortured to death with red-hot pincers, and then hung up in iron cages on Saint Lambert's steeple, at Munster, as a terror to all rebels. In the meantime, some of the 26 apostles, who were sent out by Bochhold to ex¬ tend the limits of his kingdom, had been suc¬ cessful in various places ; and many other teach¬ ers, who preached the same doctrines, continued active in the work of founding a new empire of pure Christians, and propagating their visions and revelations in the countries above men¬ tioned. It is true that they rejected the prac¬ tice of polygamy, community of goods, and in¬ tolerance toward those of different opinions, which had prevailed in Munster; but they en¬ joined upon their adherents the other doctrines of the early Anabaptists and certain heretical opinions in regard to the humanity of Christ, which seemed to result from the controversies of that day about the sacrament. The most celebrated of these Anabaptist prophets were Melchior Hoffmann and David Joris. The for¬ mer, a furrier from Suabia, first appeared as a teacher in Kiel in 1527; afterward, in 1529, in Emden ; and finally in Strasburg, where, in 1540, he died in prison. He formed, chiefly, by his bold promises of a future elevation of him¬ self and his disciples, a peculiar sect, whose scattered members retained the name of Hoff- mannists in Germany till their remains were lost among the Anabaptists. They have never owned that Hoffmann recanted before his death. David Joris, or George, a glass-painter of Delft, born in 1501, and rebaptized in 1534, showed more depth of mind and warmth of imagination in his various works. In his endeavors to unite the discordant parties of the Anabap¬ tists, he collected a party of quiet adherents in the country, who studied his works (as the Gich- telians did those of Bohme), especially his book of miracles, which appeared at Deventer in 1542, and revered him as a kind of new Mes¬ siah. Unsettled in his opinions, he traveled a long time from place to place, till at last., to avoid persecution, in 1554, he became a citizen of Basil, under the name of John of Bruges. In 1556, after an honorable life, he died there among the Calvinists. In 1559 he was accused, though without much reason, of profligate doc¬ trine and conduct, and the Council of Basil or¬

dered his body to be burnt.

Undoubtedly by no means all the Anabaptists of Germany indulged in social and political ex¬ cesses. The fanaticism which characterized some of the early Anabaptists is sufficiently explained by the tendency of human nature to rush into extremes. The iron hold of the ecclesiastical hiera 'hy, which had cramped the Church for ages, peing suddenly relaxed, men had yet to learr svhat were the genuine conditions whether of cU l or religious liberty. But these consider¬ ations were overlooked, and the reformed churches, with one consent, regarded the Ana¬

baptists with horror and disdain. The corre¬ spondence of the Reformers is full of allusions to the subject. Anabaptists are spoken of with reprobation, and a distinction is not sufficiently made between the sober Christians and the worst fanatics of the party. It is probable, at least, that their faults have been exaggerated even by the best writers. Menno Simons in¬ augurated a new and prosperous era for the Anabaptists. He gathered together the scat¬ tered remnants of the sect and founded numer¬ ous congregations in Germany and the Nether¬ lands. Later they became known as Menno- nites, and are now known as Taufgesinnte in Germany, and as Doopsgezinden in Holland. These terms are very close to the English term Baptists, and avoids all association with the early Anabaptists. Menno explained his doc¬ trine in his work (Elements of the True Chris¬ tian Faith, 5 which is still . authoritative among the sect. Especial emphasis is laid on a recep¬ tion of the doctrines of Scripture with simple faith and conforming one's life to them, at the same time making no special prize of learning or the scientific explanation or elaboration of doctrines. Oaths, war, revenge, infant baptism, divorce, except for adultery, are repudiated, as also undertaking the functions of magistrates, who are regarded as a necessary present evil, in no wise necessary to God's, kingdom. Grace is universal and the Church is the community of the saints, whose purity is to be maintained by strict discipline. In Germany and Switzer¬ land their worship is closely akin to that of the Lutherans. Bishops, elders and instructors receive no remuneration. Children receive their name at birth, adults joining the body are re¬ baptized and baptism takes the place of wor¬ ship. About the beginning of the last century all the congregations of Holland were merged into one body. Consult Lindsay, (History of the Reformation5 (Vol. II, New York 1907).

ANABASIS. The Anabasis is the story in which Xenophon tells how the Ten Thousand (really some 14,000) Greeks in the year 401 b.c. went up with the younger Cyrus to help him oust his brother Artaxerxes

from the Per¬ sian throne. (The Anabasis5 proper, i. e., the going up, covers only the first book ; the re¬ maining six books tell how these Greeks, under Xenophon's leadership, came back down to the sea and finally got home. Xenophon's story, which has been for ages the first book read by students in a classical course, has made the brilliant and generous but unfortunate young Persian prince one of the best known charac¬ ters in the world's literature ; as the inimitable account of perhaps ((the most famous retreat in military history,55 it has also immortalized the author and made him one of the most fas¬ cinating figures in Greek history. It is mainly a story of adventure in distant lands and in large part among almost unknown primitive peo¬ ples, offering a wealth of material, ethnolog¬ ical and geographical ; incidentally also valuable information as to the constitution of the Greek army and its spirit, so much like that of the popular assembly at Athens. The purpose of the book? It may have been intended partly as an apologia or refutation of criticism of Xenophon's conduct of the expedition. It was probably intended also to indicate to his coun¬ trymen how rotten at the core was the Persian

empire, ready for some other Agamemnon to lead against it another victorious Hellenic host, as indeed Agesilaus attempted to do in 396 b.c. [Xenophon could not see all that was meant in the future by the expedition in which he shared as soldier and historian ; yet the pre¬ monition of it is everywhere cheerfully present; and even in the iater books, when little has to be told but of trial and loss, there is still apparent the serene confidence of a nation that was already preparing itself for another Ana¬ basis, which should be no mere brilliant and ineffectual episode, but the sure foundation of a new order of things. It is in this way that the Anabasis of Cyrus, as recorded by Xenophon, was the prologue and preparation for the mighty conquests of Alexander.® (Marshall).

For the general reader the (Anabasis) will remain simply a very interesting account of the most important episode in Xenophon's experi¬ ence —a story of warlike adventure and exploit told in clear and simple, if not always the purest, Attic Greek. It is very far from being "Xenophon's military stuff® which <(we force upon our boys,® as the editor of the Review of Reviews said to a classical club. So the classics must suffer sometimes even from would-be friends. I found the story fascinating when I read it in Greek at fifteen and when I came to edit it at fifty kept thinking, ((How ridiculously interesting and easy it

is!® A few years ago a professor of English, who is author of half a dozen books in prose and verse, came to me, after rereading the (Anabasis,) jubilant over the interest of the story and the art of the story-teller. <(A more delightful yarn it would be hard to find,® he said. Its best lesson to the modern, in the way of style, will doubtless always be its clearness and simplicity, in proof of which let one pas¬ sage, which is perhaps the best of many fine ones, be cited. The weary and footsore Greeks had been for many months marching and fight¬ ing through desert and mountain wilds when at last a guide came and told them he could lead them in five days to a place whence they could see the sea. "If I don't,® said he, <(you may put me to death.® ((0n the fifth day they came to a mountain named Theches. And when the foremost reached the summit a great shout arose. Xenophon and the rear guards heard it and thought other enemies were attacking in front. . . . But as the cry grew louder and nearer and the men as they came up ran for¬ ward to join those that were shouting, and the cry became louder as the number grew larger, Xenophon, thinking it something serious, mounted his horse and with Lycius and the horsemen went to the rescue. Soon they heard the soldiers shouting (The sea, the sea!> and passing the cry along. Then all ran, even the rear guards, and the pack-animals and horses were urged on. And when all reached the summit they wept for joy and embraced one another and the generals and captains. Sud¬ denly someone gave the word and they brought stones and made a great heap, on which they placed a great number of raw hides and staves and captured shields, the guide himself cutting up the shields and exhorting others to do this.® Under somewhat similar circumstances many a man has since remembered this scene and repeated the cry. General von Moltke relates that when he and his attendants first saw near

Samsun the gleaming sea, <(the same that drew from the Greek soldiers their celebrated O'aAarra, they too broke into shouts of joy.® Best of all is Virgil's imitation :

Italiam, Italiam primus conclamat Achates,

Italiam laato socii clamore salutant.

For an extended discussion of the Anab¬ asis, J both from a historical and military point of view, consult Goodwin and White, (Anab- asis) ; the introduction to Dakyn's *Works o£ Xenophon } (Vol. I) ; article ((Xenophon® (in. (Dictionary of Greek and Roman Biography >) ; Hertzberg, (Der Feldzug der Zehntausend GriechenF

Charles Forster Smith, Professor of Greek and Classical Philology,

University of Wisconsin.

ANABLEPS, a genus of fishes of the or¬ der Malacopterygii Abdominales, family Cypri- nidee (Cuvier), family of Cyprinodontidce (Agassiz). It is characterized by a structure of the eyes to which there is nothing similar in any other vertebrated animal. This consists in a division of the cornea and iris into two somewhat unequal elliptical parts by transverse bands, so that the creature seems to have four eyes, and there are really two pupils on each side. This peculiar structure is supposed to have been formed for the purpose of enabling the fish to see both above and below water, as it swims along the surface. The fish itself is elongated, scaly, with a flat, rounded back and depressed head. The young are born alive and in a considerably advanced stage of develop¬ ment. It occurs along the coasts and the rivers of South America, keeping to the shallow , waters. The creature cannot dive to any depth, but is capable of moving over mud flats.

ANABOLISM, the building-up process of organic life. The term metabolism (q.v.) is used to express the interchange of the life process constantly going on in living plants and animals.

ANACAONA, a'na-ka'6-na, or GOLDEN FLOWER, Haitian princess, sister of Behechio and wife of Caonabo, both chiefs of the In¬ dians of Haiti when Columbus discovered that island, in 1492. On her brother's death she became the head of the tribe, and after the death of her husband remained on friendly terms with the Spaniards until 1503, when she gave a feast in honor of Ovando, the Spanish governor, in the midst of which she was put to death by his order.

ANACARDIACE2E, a'na-kar'di-a'cee, a family of dicotyledonous plants, consisting of trees and shrubs, with acrid, resinous sap, some¬ times irritating and poisonous. It embraces about 50 genera and 500 species, mostly confined the only species indigenous to the United States, to the tropics. The sumach and poison oak are The most important genera arc the Mangif erce , Spondicce, Rhoidece and Semecarpccb. Resins and tannins are obtained from all, and are valu¬ able for the manufacture of lacquers, var¬ nishes and tanning materials. Wholesome and agreeable fruits are produced bv some of the species, and are extensively cultivated in the tropics. See Mastic Gum; Mango; Pistacia; Sumac.

ANACHARSIS, an'a-kar'sis, the name of a Scythian philosopher who flourished about

600 b.c. and was a friend of Solon, by whose influence he was received into Athenian society. Returning to Scythia, he was put to death be¬ cause of his performance of certain Greek religious ceremonies. Modern readers have been familiarized with the name through J. J. Barthelmy's famous (Voyage du Jeune Anacharsis en Grece) (1788).

ANACHRONISM, an inversion of chron¬ ological relation, unintended or otherwise. In common parlance it is confined to the ante¬ dating of customs or events, particularly in imaginative works with a basis of history.

ANACONDA, Mont., city, the county-seat of Deer Lodge County, 27 miles northwest of Butte, on the Northern Pacific, Great Northern and Butte, Anaconda & Pacific railways. It was founded in 1884, following the erection of its great copper-smelting works, which are the largest in the world. They treat dailv between 5,000 and 10,000 tons of ore mined in the vicin¬ ity. The copper produced by the Washoe Re¬ duction Works of the Anaconda Mining Com¬ pany comprises 10 per cent of the world's out¬ put. Deposits of graphite and sapphires are found near the city. Anaconda has also large railway shops, brick works, machine-shops and other manufactories, banks, telephone and tele¬ graph service, and daily and wTeekly news¬ papers. It has parks, likewise a race track and fair grounds, Hearst Free Library containing about 6,000 volumes, two opera houses and a daily and weekly newspapers. Anaconda has grown rapidly with the development of its great copper industry. In 1880 it was a small mining camp; 10 vears later its population was 3,975. Pop. (1910) 10,134; (1920) 11,668.

ANACONDA, a South American con¬ stricting serpent, the water-boa (Eunectes murinus). This is the largest of. the boas (q.v.), and like the Ceylonese python (to which the name originally belonged), may exceed 30 feet in length. It inhabits the swampy forests of the Amazonian region, where it is unpleas¬ antly numerous and greatly feared by the na¬ tives, although not at all aggressive toward mankind, which it seeks to avoid rather than to attack. Like other boas it may hang from tree-limbs awaiting chance prey passing be¬ neath, which it may seize and, by throwing powerful folds about its body, crush to death, meanwhile holding firmly to its support by its prehensile tail. Having crushed the animal, if large, into a sausage-like mass it descends and slowly swallows it, after which it lies quiet for a long time while the meal is digested. In captivity, for these reptiles arc common in zoological gardens, several months sometimes elapse

before another meal is wanted. It is rarely found far from water, and the larger part of its time, as a rule, is spent lying in the water or partly submerged on the bank, where it can seize small aquatic animals and swim¬ ming birds, which constitute most of its fare. The nostrils in this species open at the top of the snout in adaptation to this aquatic habit. During the day these water-boas live in holes in the bank, whose entrances are likely to be under water, and usually go forth only at night in search of food. Although strong enough to overcome animals as large as a jaguar or a crocodile, it will not attempt to swallow one

larger than a medium-sized dog. The females produce their young alive at irregular but long intervals and in varying numbers, one captive specimen in New York yielding 34 at a birth; but few of these survive the risk of drowming or the attacks of eagles, peccaries and other enemies.

The markings of the anaconda are leopard¬ like, the coat being greenish yellow above with one or sometimes two series of large, blackish cross-spots, and a lateral line of dark spots wdth white centres. The belly is gray spotted with black.

Ernest Ingersoll.

ANACORTES, Wash., city in Skagit County, 90 miles north of Seattle, on the Great Northern Railroad. It is a port of call for several steamship companies. The prominent features of the city are the Carnegie library, Cap Santa Park and Deception Pass. It has good water power facilities which are used to advantage in the city's industries, comprising lumber mills, fish-curing and canning plants, oil and glue works, glass and box works and shipyards. The city is governed by a mayor and council. Pop. (1920) 5,284.

ANACREON. The Anacreon of history was born at Teos in Asia Minor (hence Byron's ((Teian muse®) in the 6th century b.c. and, driven thence by the Persian invasion, lived at the courts of Polycrates of Samos and Hipparchus, tyrant of Athens. He sang in a variety of lyric measures of love and wine and revelry, and also wrote hymns to the gods and some serious epigrams in the Greek sense of the word. The Alexandrian scholars possessed his poems in five books, of which about 15 pages of fragments remain. Here are two specimens in rough renderings :

Love's purple ball my heart hath hit And with a dainty-slippered chit He lureth me to play.

But she from Lesbos' island rare Disdainful views my whitening hair And looks another way.

Why with timid sidelong glances Dost thou flee from my advances*

Thracian colt, and in thy fancies Hold my cunning in disdain?*

Know that could I but come near thee I could bridle, bit, and gear thee And around the stadium steer thee Past the goal with skilful rein.

Anacreon thus became the type of the Dionysian old man, the white-haired bard of wine, love and song. It was later a fashion¬ able literary exercise to compose in his name little verses on these themes. Thus without any conscious intention of forgery arose the collection of so-called Anacreontea which, pre¬ served in the Palatine Anthology, has usurped the name and fame of the true Anacreon. They are not in the Ionic dialect ; they do not refer to the details of Anacreon's life; they are rarely if at all quoted by the ancients as of Anacreon ; they are composed not in the variety of Greek lyric measures, but in a monotony of tripping iambics ; for the mighty god Eros of Anacreon they substitute a bevy of Alexandrian or Pompeian Eroses ; they are obviously spurious.

The publication of Stephanus' edition of the Anacreontea in 1554 was a literary event of the

revival of letters which Ronsard saluted in this strain :

To Stephanus I quaff this cup Through whom black Hell hath rendered up And given back to our desire Anacreon's lost sweet Teian lyre.

From France the fashion of Anacreontea passed to Germany where successive genera¬ tions of 17th and 18th century rhymers and readers delighted in such verse as Gleim's

Rosen pfliicken, Rosen bluhen Morgen ist nicht heut!

Keine Stunde lass entfliehen,

Fliichtig ist die Zeit.

In England Anacreontics were written under that name perhaps first by Cowley, and in form of paraphrase, free translation or imi¬ tation by William Oldys, John Sheffield, Duke of Buckinghamshire, John Phillips, Charles Cotton, John Hughes, William Hamilton, John Cunningham, William Shenstone, William Thompson, William Somerville and other bards buried in Chalmers' Johnson's poets, as well as by Herrick, Gray, Prior, Garth, Parnell, Allan Ramsay and Tom Moore.

Among the favorite motives of Anacreontea and Anacreontics are the order for a picture (paint the portrait of my love) ; Eros swal¬ lowed in a draft of wine; lines to a drinking cup ; the women tell me I am old — but ; his countless loves — mills e tre ; to a swallow; to the dove; to the happy grasshopper; all things drink, why not I ; fain would I sing of epics and w'ar, but the strings of my lyre echo only love ; I would I were thy mirror, etc., the motive of the song in Tennyson's (Miller's Daughter* ; bulls have horns and lions teeth and women beauty; the origin of roses; love and the bee; love the lost child admitted from the midnight storm and rewarding his bene¬ factor by a shaft from his bow — a theme varied in countless imitations.

Paul Shorey,

Greek Department, University of Chicago.

ANAC'REON'TICS (from the name of the Greek poet Anacreon), the title given to short lyrical pieces, of an easy kind, dealing with love and wine. The English word was first used bv Abraham Cowley in 1656, who called a section of his poems ((anacreontiques,® because they were paraphrased out of the so- called writings of Anacreon into a familiar measure which was supposed to represent the metre of the Greek. Half a century later John Phillips (1631-1706) laid down the arbitrary rule that an anacreontic line <(consists of seven syllables, without being tied to any certain law of quantity.® The best known ˆanacreontics® are those of the Irish poet, Thomas Moore.

ANADARKO, Okla., city and county-seat of Caddo County, 50 miles southwest of Okla¬ homa City, on the Washita River, and on the Chicago, Rock Island and Pacific. It is located in a prosperous agricultural district and has a large trade in corn, cotton, wheat, vegetables, fruit and other agricultural products. It con¬ tains cotton-gins, grain elevators, and oil and flour mills. The principal features of the city are its Indian schools, the county courthouse, Chautauqua

auditorium and city park. The city owns the electric-lighting plant and the waterworks. The electric plant is operated by

water power secured by a dam in the Washita River. Pop. (1920) 3,116.

ANADIR, a'na-dir, or ANADYR BAY, a

large inlet of Bering Sea, much frequented by whaling-vessels. It is about 250 miles wide, a peninsula of half that breadth lying between it and the Arctic Ocean.

ANADIR, or ANADYR, the most easter¬ ly of the larger rivers of Siberia. It rises in the Stanovoi Mountains, and falls into the Gulf of Anadyr after a course of some 400 miles.

ANADYOMENE, an'a-dl-om'e-ne, a sur¬ name of Venus, and referring to her as rising from the sea. It was applied by the ancients to a picture bv Apelles, which represented the goddess emerging from the waters.

ANADOLI HISSAR, also called Guzel Hissar, a village and castle on the Bosporus, seven miles northeast of Constantinople, of which city it is a suburb. The castle, which is variously ascribed to Bayazid I and Muham¬ mad I, consists of four round towers with a central square keep, which latter is called the Black Tower, from the darkness of its walls, within which many state prisoners ended their days. The castle is now in ruins and a habitat for numerous cranes, which are held in great respect by the Turks. Near by are the Sweet Waters of Asia (q.v.).

ANAEMIA, literally without blood, popu¬ larly poorness of blood. In medicine, however, it may signify a reduction of the amount of the blood in its entirety, in its corpuscles red or white, or in one particular or important in¬ gredient, as the red coloring matter of the blood, the hemoglobin. Anaemia is divided into primary and secondary anaemia. Primary anaemia includes two diseases entitled : Chloro¬ sis (q.v.) the green-sickness of young girls; and pernicious anaemia (q.v.), a disease of the blood-making organs. Secondary anaemia may be broadly subdivided into acute and chronic anaemia. Acute anaemia is due to haemorrhage either external or into one of the body cavi¬ ties. Chronic anaemia on the other hand may be due to a number of causes which may be generally noted as follows : Continued losses of blood, inanition, infectious diseases, malig¬ nant and long-continued wasting diseases, para¬ sites, notably in the hook-worm disease, Un- cinaria

(the poor whites of the South, earth- eaters, etc., seem to be typical examples) ; or from intoxications from inorganic poisons, lead, mercury, copper, arsenic, carbon dioxide, etc., or from organic internal intoxication as in nephritis and pregnancy. See Blood Dis¬ eases.

ANAESTHESIA. In its simplest sense this term means simply absence of feeling and has been handed down to us from a very re¬ spectable Greek antiquity. We cannot get behind this. There may be anaesthesia of a part of an organ or of a special sense or of the entire sensorium, but it is all want of feeling, want of sense perception in the part or the whole. The term, like so many of the Greek terms, is basic and inclusive. We moderns are accustomed to say there is a general and a local anaesthesia according as the entire sense of feeling is obliterated or only a section of it. There is a general anaesthesia in sound sleep, in profound stupor or coma, in surgical shock, in

the unconsciousness which comes from the in¬ halation of certain vapors and the influence upon the sensory centres of poisonous drugs, and in the rare conditions called trance and intense mental concentration when mind seems to be carrying on an independent existence apart from matter. The examples of local anaesthesia are innumerable ; tie a string around your finger, cutting off its nerve and blood supply, and feeling in the finger disappears; continue this long enough and you can have the finger cut off without knowing it, or the finger may drop off, being dead and no longer a part of the living organism. Interfere with the cir¬ culation of your foot by pressure or con¬ strained position, and you say it is asleep and has no feeling in it; freeze it and you may cut it or prick it or pinch it without wincing. Inject under the skin solutions of certain drugs or even distilled water and if properly done you may cut the skin and the tissues which are under it and even invade one of the cavities of the body and cut out diseased organs or new growths without excessive pain, perhaps with very little or none as is now being done by skillful surgeons every day. Such is the mar¬ velous control which men have gained by experience and investigation over the natural operations of physical functions.

How is this brought about? Consciousness is governed by the interaction of the blood and the nervous system. Remove a sufficient quan¬ tity of blood from anybody and consciousness ceases. If you were to look at the brain, the centre of consciousness, of one who had

lost this blood, you would find it pale instead of red as it is when the blood is flowing through it ; its blood vessels would be more or less collapsed instead of distended. This is probably what happens during natural sleep. There may be other factors, too, about which there has been much speculation and investigation, but this is the principal one.

When the brain is anaemic or when the blood flowing through it is poisoned by certain drugs there is an arrest of consciousness. This is general anaesthesia; there is no feeling either of pain or pleasure in any portion of the body. The skin, including the mucous membranes lin¬ ing certain cavities of the body, is the principal organ of sensation. We get sensations through the eyes, the nose, the ears, the mouth, but the skin, the organ of touch, is by far the most extensive and there is no portion of it which does not respond more or less actively to the impression of contact with matter in any form, to heat and cold, hard and soft, solid, fluid and gaseous.

We are conscious of this contact by means of the peripheral nerves, the sensory nerves, which are distributed to each infinitesimal por¬ tion of the skin and which converge to trunk nerves going to the spinal cord, by which the impressions are conveyed to the brain and there interpreted. If this line of communication is cut or otherwise interrupted the impression cannot reach the brain and there is local anaes¬ thesia or want of feeling at that portion of the skin where the contact was made and where under ordinary circumstances there would be consciousness of the contact.

Among the most important applications of general and local anaesthesia has been the aboli¬ tion of painful impressions in the skin by the

influence of medicine and surgery. Ancient medicine knew of drugs that would relieve pain, but not many of them. We read of the somniferous poppy, and mandragora and helle¬ bore rubbed into the skin or taken into the stomach, and wine has been celebrated from time immemorial as the unfailing remedy for hurts of mind and body. Ancient surgery was even more deficient than medicine in its means for relieving pain. Those who were compelled to undergo surgical treatment, whether in civil or military life, usually had to bear the pain if they could, and they had the consciousness of pain just as we do. If they could not bear it they succumbed, and that was the frequent accompaniment of surgical operations, far more frequently than now. The abolition of pain in very many of the hurts of life, in the painful neuralgias, in the throes of childbirth, in civil and military surgery is now a relatively simple matter by both general and local

anaesthesia.

When the anaesthetizing influence of the in¬ halation of the vapors of ether and choloro- form was announced to the world it was the dawn of a new era; it was a gift which can be appreciated only by remembering the pains of those who were deprived of it. Modifications and variations of these two substances have been devised from time to time, but they have not lost their supremacy and probably they never will. The unfavorable effect which their use often has upon those whose organs are dis¬ eased, especially the liver, kidneys, lungs and heart, has led to the wide application and em¬ ployment of local anaesthesia in surgical prac¬ tice. The seat of painful sensations resting principally in the skin, it has been found that by infiltrating the skin or injecting into the cellular tissue beneath it suitable solutions of such substances as cocaine, stovain, novocain, etc., sufficient detachment of the peripheral nerves added to the anaesthetizing effect of the drugs upon the nerves will permit of the pain¬ less or nearly painless performance of even very extensive operations, and this is of the greatest advantage to those for whom general anaesthesia would be inadmissible or at least unadvisable. Anaethesia by way of the rectum and the spinal canal are devices of recent years which have had their day and a brief one, too. They have not commended themselves to sur¬ geons generally and it is doubtful if they will ever come into general use. The use of sco- palamine and morphine in obstetric practice, which has had a vogue in certain quarters within the past few years, but which is now subsiding, is not properly a method of anaethe- sia, but of analgesia or amensia.

Andrew F. Currier, M.D.

ANAESTHETICS, agents used to produce

anaesthesia, a word first employed by Dr. Oliver Wendell Holmes. In early times it was known that pressure on the carotid arteries on each side of the neck could bring about temporary unconsciousness and resultant anaethesia. The gentle art of garrotting grew out of this gen¬ eralized knowledge. Ancient peoples used opium, Cannabis indica, and alcohol to produce anaes¬ thesia, particularly analgesia, or relief from pain, but it was not until the early part of the 19th century that the discovery of the general anaesthetics, nitrous oxide, ether and chloro¬ form, was made, and still later the wonderful

developments made in the art of local anaesthe¬ sia by the use of cocaine and its congeners.

For remedial measures anaesthesia may be local or general. Cold from ice, or from freez¬ ing mixtures, ethyl chloride, etc., is a very effi¬ cient local anaesthetic for the performance of small operations, such as opening boils, felons, etc. A large number of drugs have the power of numbing the sensory nerves of the skin and are extensively employed to relieve itching and soreness. These are mostly of the phenol or carbolic acid group, thymol, menthol, etc. Even more efficient in its action on the sensory nerve filaments is the alkaloid cocaine, obtained from the South American coca plant. Applied in appropriate watery solution (2 to 4 per cent) to the mucous membrane of the ear, eye, nose, throat, urethra, vagina or rectum, it quickly brings about loss of all pain sensations, or, in¬ jected into the skin, causes complete anaesthesia over a circumscribed area, permitting of cut¬ ting operations. When injected into the spinal canal it brings about complete loss of pain sense in all portions of the body below the site of the injection, sometimes even more exten¬ sively. This method of inducing anaesthesia without loss of consciousness has some very advantageous features in surgical procedures and was first practised by a New York physi¬ cian, Dr. J. Leonard Corning. Stovaine, discov¬ ered by Fourneau in 1904, is less dangerous in spinal analgesia than cocaine, and in this use has largely superseded that drug. Stovaine, when employed for this purpose, is often com¬ bined with strychnine. Alypin, novocaine and other drugs have in recent years been used in spinal analgesia and have been found satisfac¬ tory. Other related alkaloids, eucaine, holo- cain, have similar properties to cocaine. Still other compounds made by the synthetic chem¬ ist have been widely employed, principally as analgesics (q.v.).

General anaesthesia is usually brought about by the inhalation of some vapor. Nitrous oxid gas, chloroform, ether, ethyl chloride, etc., are those most frequently employed, especially the three former. Nitrous oxide (q.v.) was the first of this series to be suggested. It was made by Sir Humphry Davy in 1800, but was not used in practice until about 1844, when Dr. H. Wells, an American dentist, employed it in the extrac¬ tion of teeth.

The anaesthetic properties of ether were known for some years before put to practical use. As to its first use there is much contro¬ versy. It seems certain that one Dr. Crawford W. Long of Georgia first used ether as a gen¬ eral anaesthetic, but to W. T. G. Morton, a den¬ tist of Boston, should be given the credit for demonstrating its value and use to the. medi¬ cal profession. Long did his first operation un¬ der ether

30 March 1842, for the removal of a cystic tumor of the jaw. He reported his ex¬ periments to the Georgia State Medical Society in 1842. Morton's work was begun in 1846, on 30 September, when he extracted a tooth while the patient was under the influence of ether. He subsequently demonstrated his method at the Massachusetts General Hospital, and then patented his product under the name Letheon. The following year Sir J. Y. Simpson of Edin¬ burgh announced the discovery of the anaes¬ thetic properties of chloroform and demon¬ strated its value in obstetrics. At the present

time all three of these anaesthetics are exten¬ sively employed. In recent years ethyl chloride has been employed quite extensively as a gen¬ eral anaesthetic in the same class of operations as nitrous oxide. It is inhaled, and is usually given by means of a mask fitting closely to the face and a small rubber bag connected with a bottle containing the drug. The patient be¬ comes unconscious in a very few seconds. Its after effects occasionally are nausea, headache and vomiting. The mortality, it is claimed, is intermediate between that of chloroform and ether. In Europe chloroform is preferred; in this country ether is used more often. The sta¬ tistics of deaths following these two shows ether to be the less dangerous, although it has more disagreeable after-effects than chloro¬ form. Chronic bronchial and kidney disease contra-indicate the use of ether, while in re¬ spect to people with weak hearts chloroform is to be avoided. See Chloroform; Ether; Nitrous Oxide. Consult Williams, Probyn, (Guide to Administration of Anaesthetics *(New York 1901) ; Packard, F. R., (The Dis¬ covery of Ether in the History of Medicine in the United States * (Philadelphia 1901) ; Over- ton, E., (Studien fiber die Narkose* (Jena 1901). Smith Ely Jelliffe.

ANAGNI, a-na-nye, town of Italy, 40 miles east southeast of Rome. It was the birthplace of four Popes — Innocent III, Gregory IX, Alexander IV and Boniface VIII, and as the chief city of the Hernici was a place of import¬ ance during the whole period of Roman history. Virgil mentions it as <(wealthy Anagnia.® Pop. about 10,000.

ANAGRAM, a word or sentence resulting from the transposition of the letters of a given word or form of words. The most exact ana¬ gram, sometimes termed palindrome, is that formed by reading the letters backward — evil, for example, thus read, constituting live. The making of anagrams was a favorite mediaeval amusement and is still an occasional pastime.

ANAHEIM, Cal., city in Orange County, situated in a fertile valley, 28

miles south of Los Angeles, on the Southern Pacific and the Atchison, Topeka and Santa Fe railroads. It contains a public library, high schools, Saint Catherine's Academy and several churches; has fruit canning and drying establishments and manufactories of sugar, beer, wine and bran¬ dies. There is also a large trade in oil, lem¬ ons, oranges and farm and dairy products. An¬ aheim was settled on a co-operative plan in 1857 by 50 German families and was incor¬ porated in 1878. For its early history consult Nordhoff, (Communistic Societies of the United States> (New York 1895). Pop. (1920)

5,526.

ANAHUAC, a'na-wak', a name applied to the great central plateau of Mexico, elevated from 6,000 to 9,000 feet above the sea and in¬ cluding more than the area of the republic. It contains several lakes, and Popocatepetl is the loftiest of the volcanoes which rise from it.

ANAlTIS, an'a-i'tiz, the Persian water goddess of antiquity, extensively worshipped in the East.

ANAKIM (((long-necked ones® = giants), a general term, like Amorites or Rephaim, used by the Hebrews for the pre- Jewish inhab-

itants of Palestine ; but with special reference to the colossal stature accredited to them, as by others to the wild fierce tribes they encoun¬ tered on first entering their adopted land. Like the Greek giants, they were mountain-dwellers (Josh, xi, 21-2), all through Judah and Israel as later divided, and apparently with palisaded strongholds at Hebron and other places. This passage says Joshua drove them thence, but that remnants survived at Gaza, Gath and Ash- dod, then or later Philistine cities. An older passage, however, says in the Authorized Ver¬ sion that it was Caleb who expelled (<the three sons of Anak,® whose names are given, from <(the city of Arba [Kirjath-Arba] (the father of Anak), which is Hebron.® But this is a ludicrous misapprehension of the scribe. <(Sons of the Anakim® means in Oriental phraseology clans of that people, here turned into a person with personal sons. The other part is still more grotesque. (<Kirjath-Arba® means <(city of four® (probably from the incidents of its settlement) ; but the scribe has taken ((Arba® for a person. If the oldest text spoke of the city of the ((father of the Anakim® (that is,

their ancestral home), the metaphor is intelli¬ gible enough ; but as such metaphors in the East are usually feminine, it is most likely the original said <(mother of Anakim,® and the copyist corrected a supposed error.

ANALCITE, a-nal'sit (from the Greek

word meaning <(weak,® in allusion to the feeble electric properties it manifests when heated or rubbed), a mineral usually classed as a zeolite, or hydrated double silicate of sodium and aluminum, with the formula NaAlSi208+ H20 ; although Doelter maintains that the water can¬ not be water of crystallization, and writes the formula thus: NaAlSiOiT 2H2Si03. Analcite is commonly colorless or white, with a vitreous 'lustre. Its hardness is from 5 to 5.5, and its specific gravity about 2.26. It occurs in a va¬ riety of forms, .but usually in trapezohedrons. There has been much controversy over its crys¬ talline structure, owing to certain optical anomalies that it exhibits ; but it is now usu¬ ally referred to the isometric system, the weak double refraction that it often exhibits being probably due in part to anomalous internal stresses, and in part to a loss of water, and a consequent modification in molecular structure. Beautiful crystals of analcite are found near Mount 2Etna and in Nova Scotia. In the United States the mineral occurs in the trap rocks of northern New Jersey, Colorado, Cali¬ fornia and the Lake Superior region. See Leucite.

ANALEMMA, a geometrical term imply¬ ing the projection of a sphere upon the plane of a meridian with the point of sight an infi¬ nitely distant point of the radius perpendicular to that plane. This projection is sometimes styled orthographic. The sun-dial has been called an analemma, and the term has also been used to indicate a scale showing the dec¬ lination of the sun and the equation of time of various periods of the year.

ANALGESIA, (a, neg., a'lyos, pain), the loss of power to feel pain without loss of con¬ sciousness; e.g., in some nervous diseases or due to certain drugs. See Analgesics.

ANALGESICS, remedies used to control pain. These have come largely into use dur¬ ing the past 10 to 15 years. Before that time the profession had to rely chiefly on a few drugs, notably opium, cannabis indica, and their allies, for the relief of pain of nerve and muscle : neuralgia, acute rheumatism, sick head¬ ache and other transitory or persistent affec¬ tions of the sensory nerves. Synthetic chem¬ istry has introduced a large number of new drugs that have been found very useful in allaying pain and discomfort of many condi¬ tions heretofore

borne with heroic stoicism. The commonest of these new remedies are antipyrine, acetanilide or antifebrin, and phe- nacetin. These are but a few of a large list of similar drugs. The numerous drug-store mix¬ tures sold as headache powders, etc., are usu¬ ally mixtures of the cheapest of these, acetan¬ ilide or antifebrin, with other products. See Acetanilide ; Anesthetics ; Antipyretics ; Phenacetin.

ANALOGUE, a term in comparative anatomy employed to denote resemblances, as an organ of an animal or plant performing the same function as another part in a second ani¬ mal or plant differently organized. It is much used by geologists in comparing fossil remains with living specimens.

ANALOGY, a correspondence of relations between one thing and another.

In logic it implies the resemblance of rela¬ tions, a meaning given to the word first by the mathematicians. To call a country which has sent out various colonies the mother country implies an analogy between the relation in which it stands to its colonies and that which a mother holds to her children.

As more commonly used it is a resemblance on which an argument falling short of induc¬ tion may be established. Under this meaning the element of relation is not especially distin¬ guished from others. ((Analogical reasoning . . . . may be reduced to the following for¬ mula : Two things resemble each other in one or more respects ; a certain proposition is true of the one, therefore it is true of the other.® If a conjunction between a property in the one case and a property in the other finds its place in an established system of correlations, the argument rises above analogy, becoming an in¬ duction on a limited basis ; but if no such con¬ junction has been made out, then the argument is one of analogy merely. If two bodies or processes agree closely in certain respects, it is reasonable to suppose that they will also agree in those respects which have been found to be associated therewith. Metaphor and al¬ legory address the imagination, while analogy appeals to the reason. The former are founded on similarity of appearances, of effects or of incidental circumstances; the latter is built up on more essential resemblances which afford a proper basis for reasoning.

In zoology analogy is applied to the resem¬ blance between the entire bodies, or between special structures of organs, in animals of un¬ related types. Thus a whale is analogous in lorm to a fish: its paddles analogous to the fins of a fish. The wings of an insect are an¬ alogous

to those of a bird. Analogy implies a dissimilarity of the ontogenetic "and phylo¬ genetic history of two organs, with identity in

their use or function, as the legs of a bird or quadruped and those of an insect. These anal¬ ogies are the result of the adaptation of the animal to similar habits, modes of life or like environment, and result in convergence (q.v.), parallelism, and sometimes mimicry (q.v.) (see also Homology). Osborn defines analogy in evolution as embracing similar changes due to similar adaptation in function both in homolo¬ gous and in non-homologous organs, both in related and in unrelated animals. The different grades of analogy are shown by Osborn in the following table :

ANALOGY IN EVOLUTION.

Analogous Variation (Darwin): Similar congenital varia¬ tions in more or less distantly related animals and plants.

Convergence: Independent similar development of un¬ related animals, bringing them apparently closer together.

Parallelism: Independent similar development of related animals, plants, and organs.

Homoplasy (Lankester) (Ilomomorphy , Fiirbringer) : In¬ dependent similar development of homologous organs or regions giving rise to similar new parts.

ANALOGY OF RELIGION, The, a fam¬ ous work by Bishop Joseph Butler, published in 1736. The full title is ((The Analogy of Reli¬ gion, Natural and Revealed, to the Constitution and Course of Nature.) The author lays down three premises — the existence of God; the known course of nature ; and the necessary limitations of our knowledge. These enable him to take common ground with those whom he seeks to convince — the exponents of a ((loose kind of deism.® In no sense a philos¬ ophy of religion, but an attempt to remove common objections thereto, the work is neces¬ sarily narrow in scope ; but within its self-im¬ posed limitations the discussion is exhaustive, dealing with such problems as a future life; God’s moral government; man’s probation; the doctrine of necessity; and most - largely the question of revelation.

ANALYSIS. The act of decomposing or dissecting a thing, such as a substance, a proc¬ ess, or a logical concept, into its component elements, and of exhibiting its structure. The term is also used for an inventory of the re¬ sults of this dissection such as we often find preceding a long and intricate article on any subject, and also occasionally for the state re¬ sulting from the dissection.

As mathematics is the study of pure struc¬ ture, all mathematics which devotes itself to existing structures is of the nature of analysis. Accordingly, the word analysis, like the words <(calculus® and (<algebra,® is often used as a synonym of mathematical discipline, as in the names <(Analysis Situs,® (<Combinatory Analy¬ sis,® etc. That phase of mathematics, however, which puts together old elements in new forms is sympathetic in character. Now, though both these phases go hand and hand in the history of every mathematical subject, the usual rep¬ resentation of geometrical entities has made the method of construction or the synthetic method peculiarly easy and universal there. On the other hand, algebra and, more especially, those sciences whose roots are in the infinitesi¬ mal calculus are characterized by the prom¬ inence which the analytic method possesses in their investigations and are often known by the collective name of analysis. Geometry and analysis usually appeal to different types of

mathematicians, who are known respectively as geometricians or analysists.

Another mathematical use of the term is its application to the method in which you sup¬ pose the theorem you wish to prove demon¬ strated, reason back to some admitted truth, and then try to retrace the steps by which you have attained it. As to analysis in chem¬ istry see Chemical Analysis.

ANALYSIS SITUS. Let a geometrical figure — sav a closed surface in common space — be subjected to any change of form (bend¬ ing, stretching, etc.) that does not involve any Hearing® or ((joining.® An extensible rubber model will suggest the possibilities of such de¬ formation. Whatever properties of our figure are unalterable by this process from the subject matter of analysis situs, which may therefore be defined as the theory of invariants of the group (or groups, see this term) of continuous de¬ formations. Its scope, however, is not con¬ fined to common space, but embraces, in gen¬ eral, m-dimensional figures in M-dimensional space (more briefly: Rn for n-space, also in-surf aces for m-dimensional surfaces, etc.).

The effect of tearing a surface or making an incision on it along a line is to double the lat¬ ter. As the incision proceeds it substitutes for each point P of the line two points, Pi, Pr, henceforth not to be considered as consecutive, and whose successions separately constitute the left and right edges of the incision. Joining is the opposite process, each point of the junc¬ ture consisting of twin points merged into one. Corresponding definitions apply to incision and juncture along surfaces of two or more dimen¬ sions, or when the elements considered are straights, planes, etc., instead of points.

It will here be noticed that figures which are not continuously deformable into one an¬ other, or equivalent, in w-space, may become so by virtue of the additional freedom of defor- ation that n + 1-space affords. The figure of two concentric circles in a plane is not equiva¬ lent to two circles excluding one another, but becomes so in 3-space. Hence a distinction arises between absolute analysis situs, which places its figures in space of any suitable num¬ ber of dimensions, and analysis situs in a given space or surface within which all deformation must take place.

C. Jordan has shown that in the case of 2- dimensional surfaces the following four inva¬ riants form a complete system. This means that any two surfaces agreeing in these data are equivalent: (1) the number of detached por¬ tions of which they consist, and, with regard to each of these: (2) the number of curves bounding it; (3) its connectivity; (4) its later¬ ality (unilateral or bilateral type). Evidently the first and second of these could be changed by incision or juncture only.

Connectivity. — A surface is connected if it permits of continuous passage on it between any two of its points. The standard of connec¬ tivity is the area of a plane triangle, circle or equivalent figure, which is called simply-con¬ nected or elementary. On it any two curves Ci, C2 (not intersecting themselves or each other) between two points, A, B, are equiva¬ lent, and taken together they form a closed curve which divides the plane into two separate portions. This latter property received analyti-

cal demonstration from Jordan (hence “Jordan curves®) and has lately been based on the theory of assemblages by Veblen. Using Poincare’s notation we write

Ci = = Ci or Ci — C2 = = 0, where the negative sign means that the curve is to be taken in the opposite direction (from B to A), and equivalence to zero means un¬ limited contractibility. A spherical or ellipsoidal surface is also simply connected, with this dif¬ ference, that closed curves, if one obstacle (a small circle or "puncture® of the surface) be placed in the way of their contraction, may still be reduced to zero by deformation in the oppo¬ site direction. Consider, for instance, the in¬ tersection of such a surface with a movable plane as the latter moves parallel to itself in either of two directions.

Extending our definition of equivalence to zero, to sums of curves on any surface, it be¬ comes necessary to stipulate (1) that the order of terms of a sum must be preserved (non- commutative addition) and (2) that any por¬ tions of curves, if deformed so as to coincide and form negatives of one another, shall cancel. Thus on the surface of the double ring (Fig. 1) we have

Ci + C2 — C3 or Ci + C2 — C 3 = 0.

Curves form an independent set on a surface if none and no sums of them are equivalent to zero. Curves containing portions equivalent inter se (as when coiling several times about a

cylinder) shall here be excluded. Multiply-con¬ nected surfaces are then said to have connec¬ tivity c if they permit of c independent paths between any two points A, B. The connectivity of a closed surface, i.e., one without boundary and yet having all its points at finite distances, is not changed by puncturing it. For instance, the intersection of the double ring of Fig. 1 with a plane remains equivalent with itself (and to zero) no matter how the plane moves.

Taking B at an infinitesimal distance from A all paths between them but those equivalent to the shortest one approach closed curves (Fig. 2). Hence there are c — 1 independent

closed curves on a surface of connectivity c. Conversely, an independent set of c — 1 closed curves does not divide the surface (for this would give rise to an equivalence between those bounding any portion of it) and can readily be so connected with two points A, B, as to form (after slight changes) c — 1 paths from A to B, in addition to which there is the direct line join¬ ing these points.

Connectivity is often investigated by the method of sections. The latter are incisions of three types : (1) cross-sections between two

points on the boundary. They may be hound-

severing, if drawn between points of the same bounding-curve, or bound- joining, if between different ones. The former increase, the latter diminish, the number of boundaries by unity; (2) re-entrant sections, along closed curves, each furnishing two new rims; (3) c- (sigma-) sections starting at a boundary point and end¬ ing at a point of their own right or left edge. These contain a re-entrant section and a bound¬ joining section, and increase the number of bounding-curves by unity. For exceptions to these statements see the paragraph on unilateral surfaces.

Limiting our investigations to surfaces any sufficiently small area of which may be con¬ sidered simply connected, we may divide any one, or system of several, of them by a suffi¬ cient number (q) of cross-sections into (say, e) elementary areas. Since cross-sections start at a boundary, we must give a boundary to closed surfaces by puncturing them, i.e., taking out an infinitesimal area somewhere. The difference e — q then proves characteristic of our system of surfaces, and in fact is known as its char¬ acteristic: K — e — q.

To prove this, let a second division, by q cross-sections, yield e' elementary areas. Super¬ pose the tracings of both divisions and let there be t crossings of the proposed incisions. Then the e areas left whole by the first division will be cut q' + t times by the second, or the e' areas of the second q t times by the first. Both sets of incisions thus furnish e + qr + t — e'--q-\~t parts, which proves the proposition. We also see that the characteristic of a system of surfaces is the sum of their individual char¬ acteristics.

Any surface can be rendered simply con¬ nected by means of 1 — K cross-sections, for let the q cross-sections which divide it into e elementary areas be traced, and let them meet in v vertices. Consider this division as a map of e districts, the traces, counted from vertex to vertex, being its frontiers. Between any adjacent districts obliterate one frontier (there¬ by also removing two vertices). Repeat this operation on the new map, etc., until but one district remains. By what we have proven, the totality of remaining frontiers then constitute 1 — K cross-sections.

On the other hand the c — 1 nearly closed curves connecting A with B (see above) can readily be turned into cross-sections if we first draw a re-entrant section in a circle of diameter AB, thereby “puncturing® the surface. Hence, on closed surfaces, c — 1 = 1 — K, or c — 2 — K, and if we retain this formula, the connectivity of a system of m surfaces will prove to be the sum of the individual connectivities, diminished by the number (m — 1) of junctures necessary to make

one surface of the system :

1) = 1 + 2 (a — 1) .

Kronecker's researches have led to an analytical expression for the characteristic of a closed analytical surface f(x, y, a) = 0. Let f(x, 31, z) be negative in the interior of this surface, and consider the family of surfaces f(x, y, z) — A As ˆincreases from — 00 to 0, the surface has no real part at first, then, through the stage of isolated points or curves, real surfaces will develop. An. isolated point develops into an ellipsoidal surface, increasing K by 2, while a closed curve (without multiple

points) becomes an anchor-ring, leaving K unchanged. This, or the opposite, may occur several times as the parameter increases. Also, double points of the surface may arise, in the neighborhood of which the surfaces re¬ semble one- or two-sheet hyperboloids, chang¬ ing from the one shape to the other as the double-point stage is passed. In each of these cases the increase of K is found to be

fn f vi fu

, sgn (signum) meaning ± 1

— 2 sgn

fn fn fn /31 fsz f 33

according as the determinant is positive or negative, and 0 if it is 0, and

J ± f J1 f JL i Jl ' JJi

1 2 a„,- » 3 dzf In dx2 dx >

fi

dx'

dy'

, a2/ df.

f = - - — = — — t- ptc

7l2 dxdy dy’

being partial derivatives.

Examples. — - (1) The surfaces formed by rotation of the lemniscates l (x—a) 2 + y2] .[(-ˆ + a)2 + y2] (Fig. 3)

about the .r-axis. For positive 4 they present single sheets of ellipsoid connectivity (it — 2), for negative \ pairs of sheets of the same kind (K — 4). Within an infinitesimal sphere about the origin the transition is from the one-sheet to the two-sheet hyperboloid, as % decreases through zero. At ˆ — — -a* the two sheets be¬ come isolated points and vanish (K — 0). (2) The surfaces formed by rotation of the same

Fig. 3. — Lemniscates.

lemniscates about the y-axis. At 4 — — a 4 they reduce to an isolated curve and vanish without changing the characteristic (K — 0).

/11/12 /13

Thus K becomes — 2 2 sgn fnfnfn , the

/31/32/33

sum to be taken over all points of intersection of the three surfaces: fx — 0, /2 — 0, /3 — 0. Moreover, this expression lends itself to trans¬ formation into the integral by means of which Gauss represents the ((total curvature® of the surface f(x, y, z) =0, so that we finally get:

K =— total curvature.

2 rr

Connectivity of Riemann Surfaces. — If

w be an n-valued algebraic function of the com¬ plex variable z (see Complex Variable), let all values of z be represented on a spherical sur¬ face. Superpose radially n copies or sheets of this surface and imagine that for one value zo for which the n w-values are distinct, one value of w belongs to each z0, i. e., to each of the n sheets. The values Wi . . . wn will vary continuously with z, constituting n branches of the function w. For some values of z, how¬ ever, say for z —bi, bit ... , bm some among

the quantities Wx . . . Wn will turn out equal. In these points we assume connection between the corresponding sheets, and denote them as branch-points. Such connection may not be feasible where other sheets intervene. In 4-space this difficulty would not arise. Limited as we are to 3-space, we may still suppose pas¬ sage possible in these points between the sheets in question. Further, we find that whenever, starting at Zo, we take z in a loop (in all sheets simultaneously) about a branch-point, on re¬ turning to Zo the values Wi . . . w will have undergone a permutation typical of that branch¬ point. We prevent such loops, and render the branches single-valued, by means of incisions hrough all the sheets concerned, from z0 to each branch-point. We further join every left edge of these incisions with the right one that exhibits the same w-values. This process (which, strictly speaking, again calls for a fourth dimension) completes our Riemann surface.

If we use a circular punch to cut out neigh¬ borhoods of the m branch-points (through all the sheets), the portion punched out at bi, where first fiii then /?« . . . sheets are con¬ nected, will show n — (/?« — 1) — (fin — 1) — . . . . distinct simply connected parts. Thus all branch-points furnish 2;[w — '2j(ftij — 1)] ele¬ mentary areas. The neighborhood of Zo, similarly punched out, yields n separate circles. The remainder falls into n elementary surfaces by means of m incisions from Zo to the branch¬ points, through all the sheets, therefore each counting for n cross-sections. Hence

m

i£ = 2nT2[« —)] — nm—2n — 2(/?y — 1).

* = = 1 j ij

Laterality. — Granting that within a suffi¬ ciently small neighborhood of every point P, any of the surfaces we consider has two sides (right and left) distinguished by the two per¬ pendiculars to be drawn from P, it may happen that some continuous path on the surface start¬ ing at P on the right side arrives at P on the left. side. The surface is then called unilateral ; in the absence of such a possibility, bilateral. We have hitherto tacitly assumed the bilateral type for our surfaces.

Moebius called attention to the fact that a rectangular strip of paper aba'b ', if its sides ba, a'b' be joined after a twist of 180°, as Fig. 4

directs, becomes unilateral. Moebius * sheet may conveniently be

represented by folding the

rectangular strip into triangular shape as in Fig. 5. The folds may be distinguished as posi¬ tive or negative according as, on our way from ah to a'h', we pass from the lower to the upper sheet or the reverse. Each corresponds to a torsion or ± tt. Positive folds will cancel against negative ones. Evidently a strip folded into the shape of a polygon of an even number of sides will thus represent a bilateral surface ; if the number of sides be odd, a unilateral one. Ruled surfaces of the third order contain the Moebius sheet (Masckke). Closed surfaces without double points are bilateral.

•

Fig. 5.

Indicatrix. — The two half-normals at a point P, not being in the surface, are more conven¬ iently replaced by a small circle about the point, taken in a definite (say counter-clockwise) ro¬ tation about P. On the other side (of this point's neighborhood) the same rotation will be a clock¬ wise one about P. Similarly, within the surface two infinitesimal perpendicular straight lines may be drawn, which if produced would form a right-handed Cartesian co-ordinate system (see Analytic Geometry) on one side (which we may define as the right one) and a left-handed one on the other. Such alternating contrivances are called indicatrices (Klein). They may be distinguished as right and left, or as positive and negative. If constructed continuously (i.e., without sudden transition to the opposite one) on continuous paths for all points that can thus be reached, one indicatrix will result for each point on a bilateral surface, while on a unilateral one a point will have both of them. Hence the term double surfaces for the latter type.

Unilateral Surfaces. — It will be noticed that Moebius' sheet has one continuous edge. Also, if we pursue any closed path, our direction of progress and a direction on the surface per¬ pendicular to the former and pointing to the left may be taken as an indicatrix. Along some closed paths the latter will be reversed. A line

closely following such a path on its left will not close, as its beginning and end will be on oppo¬ site sides of the path. An incision along the latter evidently leaves our surface connected. Thus, on a unilateral

surface, at least one non¬ dividing re-entrant section can be made. We shall call it a bilateralizing one. In fact, the number of bilateralizing re-entrant sections will be that of independent paths along which the indicatrix is reversed. This type of the re¬

entrant section, however, yields only one new bounding-curve. For only after completing a double circuit about the above closed path will the line following it on the left close in its turn, showing that the two edges of the incision blend into one. There also becomes possible a new kind of cross-section that leaves unchanged the

Fig. 7. — Effect of a bilateralizing re-entrant section on Fig. 6. One side is shaded.

number of boundaries (bilateralizing cross-sec¬ tion), as we see by merely tracing a bilateraliz¬ ing re-entrant section and then making a cross- section that crosses the trace once between two points of one boundary.

Let our surface possess B bounding curves ; let it become simply connected by virtue of b bilateralizing, t bound-severing, and / bound¬ joining cross-sections. Thence— 1 — b — s, and B--s — (c — 1 — b — 5) = 1 or B --2sJrb = c. Since b is not zero, the number of boundaries of a uni¬ lateral surface will always be less than its con¬ nectivity : B < c.

Two Types of Unilateral Surfaces. —

Draw a line connecting two points on different bilateralizing re-entrant sections. Make the bound- joining cross-sections ab and db imme¬ diately to the right and left of it, and rejoin the re-entrant sections along the small portions da bb. The result will be a common re-entrant

section. For follow by a line immediately to the left the re-entrant section from a to b, the cross-section from b to a, the other re-entrant section to a and, finally, the cross-section to 6. It will be seen that this line is closed, and so is the corresponding edge of the whole incision.

After this process of uniting bilateralizing

re-entrant sections has been repeated as often as possible, if b is even,

no bilateralizing re¬ entrant sections remain ; if b is odd, there will

remain one. Accordingly, there are two types of unilateral surfaces:

(1) 5 + 2 + ~j — c, b even : 5 = 2 — c, when

the surface is unbounded (5 = 0), becomes 2, 0,

-2,-4 . . .

(2) B + 2(s + ~^j + l = c, b odd: K = 2-c

~ 1, — 1, — 3 . . ., when 5 = 0.

The above surface (Fig. 9) is of the first type, even if extended so as to lose its bound¬ ary ; K— 0. Steiner's surface, which is equiva¬ lent to the projective plane, is of the second type ; K = 1.

Steiner's Surface. — Project the points of the projective plane from a centre C. On each pro¬ jecting ray, whose length CP we call r, lay off

y

the segment from C. The line at infinity

will thus furnish a circle of radius unity, whose diametrically opposite points represent the same point (at oo) of our plane. Now let the entire new surface, consisting of the ends of the seg¬ ments laid off from C, be deformed into the plane area of this circle (Fig. 6). Cut the latter from C to E, roll it into a cone, putting CE on CE' (the edges of the incision on different

E

Pig. 10. — Evolution of Steiner's surface.

sides). Join the edges of CE (creating a double line) and also, by adjacent points, the two basal circles of the cone. This second juncture, by

deformation of the surface, may be made to show continuous curvature, and the apex of the cone may be made to coincide with the centre of the circle of juncture. This is Steiner's sur¬ face (Fig. 11). By punching out its centre and cutting by a plane perpendicular to the double line we get three elementary surfaces. Hence K— 1, also c = 1, b — 1, 5 = 0.

Boy has devised similar surfaces and inves¬ tigated the connection between the character¬ istic and Gauss total curvature in such cases.

Two connected surfaces possessing the same number (5) of bounding-curves, the same con¬ nectivity and, in case they are unilateral, the same number of bilateralizing re-entrant sec¬ tions, can now be made simply connected by means of the same number of independent re¬ entrant sections. After a correspondence has been decided upon between the bounding curves,

we draw c — 1 bound-joining cross-sections be¬ tween pairs of corresponding ones and further establish a one-to-one correspondence between the points of the original bounding curves, also of these cross-sections. The resulting simply connected surfaces will have their boundaries corresponding point for point. Schoenflies has demonstrated that under these conditions be¬ tween the points in the interior of the simply connected areas, too, a continuous one-to-one correspondence may be established. This proves the theorem of Jordan, to the effect that our surface is equivalent to the projective plane, which possesses any line as a bilateralizing section and is simply connected.

Space of n Dimensions. — The conceptions introduced in the analysis situs of two-dimen¬ sional surfaces in three-dimensional space per¬ mit of generalization. The indictatrix of an ra-dimensional surface will consist of m direc-

tions in (i.e., tangent to) the surface perpen¬ dicular to each other. There will be only two indicatrices (right and left), since we may bring about coincidence between a first pair of axes of different indicatrices, then between a second pair, etc. To do this, in the case of the &th pair, we have w — £-space at our dis¬ posal. This becomes a common plane for the m — first pair. For the last pair there remains a line only, so that coincidence, if not existing, cannot be forced. As a consequence, unilateral and bilateral m-surfaces must be distinguished.

Examples. — The indicatrix of a line is the line-element (or the tangent) taken in one of two possible directions. A closed curve with a

cusp might be considered one-sided, as the di¬ rection here changes abruptly as we make the circuit. A four-sided prism abcda'b' c' d' in Rt can be twisted like Moebius' sheet and its face abed joined to c'd'a'b'. The resulting surface is bounded by one bilateral 2-surface (from ab to cd—ab' and back to c'd'—ab) and two unilateral ones. We may further join these two latter 2-surfaces, their juncture only form¬ ing a unilateral surface such as we may imagine inside any solid. There will remain only one bounding bilateral 2-surface of spherical con¬ nectivity, just as Moebius' sheet has one edge. This further shows that an incision is possible along a surface of spherical connectivity, which does not divide our 3-surface, but renders it bilateral (bilateralizing closed section).

We shall now consider bilateral m-surfaces. They may be given by making the co-ordinates Xi . . . xn of a point in w-space, functions of w parameters ti . . . tm: xi = xi{t i . . . tm). m- planes will then be linear functions. Lines common planes, etc., are w-planes for m— 1, 2 . . .

In w-space, we call surfaces complementary if their dimensions add up to n, dual if they add up to n — 1. In Rs, lines and 2-surfaces are complementary, while lines are dual to lines (self-dual).

Closed w- surfaces are boundless and contain no points with infinite co-ordinates. They separate the dual planes of w-space into interior and exterior ones. Taking any complementary plane (n — w-plane) that does not intersect the closed m-surface, we can move into it any ex¬ terior dual plane (n — 1 — m-plane) without allowing it to intersect the surface on the way, can reverge it there by turning it through 180°, and bring it back to its original position along the path on which it was brought. An interior n — 1 — m-plane, if we attempted to do the same, would describe an n — m-surface which must intersect the given m-surface. Besides

distinguishing between the interior and exte¬ rior of our closed m-surface this also shows that the interior is bilateral, the exterior uni¬ lateral, with regard to the dual planes.

Examples. — (1) The limiting case of a closed figure without dimension is a couple of points. In 1-space (straight line) it bounds a segment. It separates the straights of 2-space (common plane) into those passing between it (interior) and the exterior ones, and does the same for the 2-planes of 3-space. (2) The in¬ terior of a circular circumference is an area in 2-space ; in 3-space it consists of the straight lines passing through it. Take a plane not in¬ tersecting it : An

exterior straight line may be moved into the same without coming in contact with the circle, may there be turned through 180° and brought back. — Although points can¬ not be reversed, it is as natural in an analysis situs as in projective geometry to assume uni¬ laterality for the infinite plane. This is merely to extend to a limiting case what is true generally.

Interiors of Different Orders and Degrees.

— In a plane a closed curve may have overlap¬ ping portions so as to contain a certain area twice or r times. In 3-space it may, without having any double points, coil r times about certain straight lines of its interior, which thereby become an interior of the rth order. But if, as we follow the curve in a given di¬ rection, it coils p times in an assumed positive rotation about this interior of rth order, and r

— p times negatively, we may then call p — (r — p) = 2p — r the degree of the interior. The curve C (Fig. 13) has an interior of order

c

Fig. 13. — Inteiior of order 2 and degree 0.

2 and degree 0, to which line L belongs. These considerations are applicable to w-space, where n— 1-surfaces, however, cannot possess in¬ teriors of higher orders without self-intersec¬ tion (double points, etc.). Interiors of higher orders than the first can be removed by de¬ formation, unless the curve is knotted (see below).

Locking of Dual Closed Curves.— In

n-space a closed w-surface may be locked with a closed n — 1 — w-surface, as are the links of a chain. Through neither of them can a sur¬ face one dimension higher than it be laid that does not intersect the other. Examples : A point-couple and a circle enclosing one of its points in a plane. Two linked curves in R3. For the latter, according to Gauss, the double integral

(x' — x) (dy dz' — dz dy')

- (y — y) (dz dx'—dx dz') -f-(z'—z)(dxdy' — dydx')

x'-xy + (y'-y)2-f(z'_2)

2]

x, y, s being a point of one curve, x , y , z one of the other, has the value 1. In the case of one curve coiling repeatedly about the other, the order and degree of their interlocking may again be distinguished in accordance with the reflections of the preceding paragraph. Gauss' integral then gives the degree, which may hap-

pen to be 0 if the order be even. Two spheri¬ cal surfaces transplanted into R3 may interlock.

Knots.— Closed m-surfaces, in 2m + 1-space may lock with themselves. They are then said to form knots. The various shapes of knotted curves in common space have been extensively

Fig. 14. — Treioil-knot

investigated (Listing, Tait, Simony). These researches have been referred to as topology, a word also used synonymously with analysis situs. The simplest knot is the so-called tre¬ foil-knot. It is formed by a curve of the sixth order whose equation in tetrahedral co-ordi¬ nates is given by Brill. It was thought that these knots might be forms of vortex-rings ac¬ counting for the differences of chemical ele¬ ments. There are no knots in 4-space, surface- knots first becoming possible in 5-space, and, in their turn, dissolving in 6-space.

Generalized Connectivity. — m-surfaces will be called connected with regard to tangent lines, 2-planes, etc., if any two of these can be moved into one another without ceasing to be tangent to the surface. Two spheres in R3, e.g., are disconnected as to points, connected as to tangents and tangent planes. The op¬ posite is true for the faces of a polyhedron. But we shall assume that the surfaces con¬ sidered possess all these connectivities. With regard to any of them they may be multiply- connected. Connectivity as to points (fi) is the special case treated above. It has been re¬ ferred to as cyclosis or periphraxy (Maxwell) in the case of portions of 3-space. The interior of an anchor-ring, e.g., has Ci = 2.

The c — 1 closed curves by means of which we determined the connectivity of a closed sur¬ face in 3-space will lock with other

closed curves either in the space enclosed by the sur¬ face or in the exterior. We are thus led to consider the connectivity of the portion (R3 — S2) left after subtracting from R3 the points of our surface S2.

Betti's Numbers of a Closed m-surface S. —

Imagine Sm, if necessary after continuous de¬ formation, placed in m + 1-space. Find the connectivities Ci, c2 ... c m—\ of the remainder (.Rm-h — Sm) with regard to points, lines, 2- planes, . . . m — 1-planes. These are Betti's numbers Pi, P2 . . . Pm— 1 of the surface Sm, (ck = Pk). This means that in (Rm + i—Sm) there are Pk — 1 independent closed ˆ-surfaces with which certain m — ˆ-surfaces within Sm may lock. Obviously, the m — ˆ-surfaces may be deformed out of Sm into the remainder (i?m + i — -Sm), while at the same time, and never ceasing to lock with them, the ˆ-surfaces are deformed so as to be on Sm. This shows that Pm—k is at least equal to Pk, and vice-versa, so that finally Pm—k — Pk on any closed bilateral m-surface without double points. Betti's number Pi for a 2-surface is at the same time its connectivity c.

Euler's Polyhedron Formula. — The theo¬

rem holds for any division of a spherical sur¬ face into simply connected districts by frontiers bounded by the vertices in which they concur, that v — f-pd — 2, v, being the number of vertices, / of frontiers, and d of districts. Such a map is regular if each district has the same number fd of frontiers, and if an equal number fv of these concur in each vertex. We have

v = ~ » d~ V '» and f(2fd —fdfv + 2 fv) = 2 fvfd,

J V J d

where 2 fd — fdfv~p2fv must evidently be positive. This gives rise to only five regular maps corre¬ sponding to the regular polyhedral surfaces of the tetrahedron (self-reciprocal), cube and octahedron (reciprocal to each other), dodec¬ ahedron and icosahedron (reciprocal). The regular 4-dimensional polyhedra are found to be six, viz., two self-reciprocal ones bounded by five tetrahedra and 24 octahedra respectively, one bounded by eight cubes reciprocal to one bounded by 16 tetrahedra, and one bounded bv 120 dodecahedra reciprocal to one bounded by 600 tetrahedra.

Euler's formula, extended to maps on closed 2-surfaces of connectivity c: v — f-pd — 3 — c leads to a superior limit for the number of dis¬ tricts that may be adjacent each to each on such a surface. Heffter has

investigated under what conditions this limit is actually attained, while H. S. White shows what regular maps (called by him reticulations) are possible for any given c. Generalizing still further. Euler's formula for a map on any m-surface, i.e , a di¬ vision of it into simply connected parts, the dividing m — 1-surfaces again being divided into simply connected partitions, etc., becomes :

m — 1

S (— 1)inq — 1 -f 2 (— 1)q(Pm—q — 1) ,

g = 0

nq being the number of q-dimensional parts or partitions on the map. Since for closed m-sur¬ faces we have Pk = Pm—k , if m is even this be¬ comes Z(— l) < m9 = 3 — P1-PP2 . . — Pm— 1 ; if m is odd, 2(—)qnq— 0 (Poincare).

Literature. — Since no treatise on analysis situs has been published, a few of the main papers on the subject will here be mentioned. W. Dyck {Math. Annalen Vol. 32, p. 457) gives the literature preceding this article (to 1888). The pertinent publications of the savants named above are as follows : Listing, (Der Census raumlicher Complexe) (Gottinger Abhandlungen 1861), and (Vorstudien zur Topologie) {Gottinger Studien 1847) ; C. Jor¬ dan, (Sur la deformation des Surfaces) {Liou- ville's Journal ser. 2, 11 1866) ; Klein, (Uber den Zusammenhang der Flachen *{Math. An¬ nalen 7, 1874); Moebius, < Werke,) Band 2; (t)ber die Bestimmung des Inhalts eines Polyeders-* and (Zur Theorie der Polyedcr und der ElementarverwandtschafC ; Gauss, {Trans. Roy. Soc. Edinburgh 1879, 1884, 1886; also Proceedings of the same society, 1876 to 1879) ; Simony {Math. Annalen 19 and 24) ; Brill {Math. Ann. 18) ; Heffter {Math. Ann. 38) ; Boy {Math. Ann. 57) ; Maxwell, Theory of Electricity and Magnetism } (Vol. 1, p. 18) ; Veblen {Trans. Am. Math. Soc. 1905, p. 83).

Consult also the article on Analysis Situs by M. Dehn in the (Encycklopedie der Mathematischen Wissenschaften, *and R. L. Moore, (On the Foundations of Plane Analysis Situs. y {Trans. Am. Math. Soc. for 1916). The subject of analysis situs of higher dimensions, especially of 4-space, has been greatly advanced by the following six recent papers by H. Poincare: (Analysis Situs } (Journal de I'Ecole Polytechni¬ que 1895) ; Complement a l'A. S9 (Proc . London Math. Soc. 1900) ; (Second*

comple¬ ment a FA. S.} (Rendiconti del Circolo matematico di Palermo 1899) ; (Sur certaines surfaces algebriques) {Bull. Soc. Math, de France 1902) ; (Sur les cycles des surfaces algebriques) {Journal de Math. 1902) ; (Cin- quieme complement a FA. S. Rendic. Circ. mat. di Palermo 1904).

Paul Wernicke.

ANALYST, in modern times, a person professionally skilled in chemical analysis. He may be called upon, in the discharge of his profession, to analyze a wide range of sub¬ stances. Apart from private practitioners and those engaged in large manufacturing concerns, analysts employed by public bodies are termed public analysts. In most large manufacturing establishments there is usually a staff of an¬ alysts, whose duty it is primarily to exercise con¬ stant watchfulness over the processes of man¬ ufacture, to test the purity of the substances used, as well as that of the final products. The services of analysts are constantly required in judicial enquiries, sometimes in purely criminal cases, sometimes in civil proceedings, such as offenses against the customs or excise or under the various Food and Drugs Acts.

ANALYTICAL METRICS, or NON- EUCLIDIAN GEOMETRY INTERPRET¬ ED ANALYTICALLY. For a historico- critical account of the notion and developments of Non-Euclidian geometry from the standpoint of pure geometry — from the point of view of Lobatschewsky and Bolyai — the reader is re¬ ferred to the article (Non-Euclidian Geometry, J in this work. The aim of the following para¬ graphs is to present a readily intelligible ac¬ count of the epoch-making concept by means of ideas familiar in analytical projective geometry, the point of departure and method being those of Cayley as modified and im¬ proved by Klein.

General Considerations Concerning Geo¬ metric Measurement. — Every problem of geometric measurement is reducible to one or the other or both of two fundamental prob¬ lems: (1) to find the distance between two points; (2) to find the angle between two (in¬ tersecting) lines. Any two points belong to a range; any two (intersecting) lines belong to a pencil ; a range and a pencil are one-dimensional spaces ; so it is seen that the fundamental prob¬ lems constitute the problem of measurement in one-dimensional spaces. In the projective ge¬ ometry of the plane (see Geometry, Projective, and Geometry, Modern Analytical) we learn that the range and the pencil are related by the principle of duality, or reciprocity. A range and a pencil if rendered projective, i.e., if the range can be obtained by the repeated projec¬

tion of the range established by the pencil on one of its transversals, are so related that the

anharmonic ratio of any four points (or lines) is equal to that of the corresponding four lines (or points). Countless examples are met of the fact that in general to any point (or line) proposition there corresponds a line (or point) proposition ; such pairs of propositions being so related that either proposition of a pair of reciprocals being given, the other can be found by merely exchanging the notions of point and line. This reciprocity does not, however, at first appear to be universal and all-pervasive. For

example, the distance, + V (xi— x2)2 + (yi— yJ)2, between two points (xi, yO, (x2, y-i), or Xil-j- yiV +1 = 0, x?T + y*V + 1=0, is ˆ an algebraic function of the co-ordinates ; while the angle, tan-1] (G?i — G%) : (&G + W7?) \ of the lines

(fut'i), (Gˆ)'or £i x + y + 1 = 0, Gx + V\ y + 1 = 0, is a transcendental function of the co-ordinates. Sign being disregarded, a segment of a range is uniquely determined, while an angle of a pencil may have any one of an in¬ finite series of values differing from each other by multiples of a period tt, or 180°. Again a given segment is divisible by ruler and com¬ passes into any chosen number of equal parts, while, by the same means, such division is possible in case of an arbitrarily given angle only if the division is to be bisection, quadri-section, etc., but not if it is to be trisection, for example.

It is such discrepancies in the general scheme of reciprocity that furnish the motive for seeking to generalize the ordinary concep¬ tion of distance and angle measurement in such a way that the discrepancies shall disappear and that the principle of duality shall apply without exception. Such being the motive, on the one hand, the possibility, on the other, of making the needed generalization lies in the fact that, despite the differences indicated, the ordinary notion of distance and the ordinary notion of angular measurement have two fundamental properties in common. These are: (1) That the distances between points of a range or the angles between lines of a pencil are added in such a way that, if 1, 2, 3 denote three such points or three such lines, we have in the first case seg. 12 + seg. 23 = seg. 13, and, in the sec¬ ond case, ˆ 12 + ˆ 23 = ˆ 13. In particular, seg. 11= 0 / 11=0, whence it follows that seg. 12 = — seg. 21, and ˆ 12 = — cL 21; (2) the second of the common properties is that distance and angle are not altered in magnitude by displacement, where displacement of the pen¬ cil consists in rotating it as a rigid figure about its centre or vertex, and displacement of the range consists in moving it as a rigid

figure along its base. These properties come clearly to light if we scrutinize the way in which dis¬ tance and angle are not altered in magnitude. For this purpose we use a scale, which in case of the range consists of a segment divided into equal intervals by points, and in case of the pencil consists of an angle divided into equal intervals by lines. Each interval is a unit of distance or angle. Then to measure the dis¬ tance (say) between two given points, we place any division of the scale on one of the points, and then count the number of intervals to the other given point. Analogously for angles. The first property above mentioned is used in determining the distance by counting the in-

tervals. The displacement property is em¬ ployed in that we are indifferent as to which division of the scale we start with; that is, the distance or angle is found to have the same size if we measure, then displace the scale and measure again.

Generation of Ordinary Scale by Linear Transformation. — It is important to note that the displacement property enables us to con¬ struct the ordinary scale by means of a special linear transformation. Thus if x denote dis¬ tance from a point assumed as origin in the range, then the transformation x' — x + c will serve to generate the distance-measuring scale in which the unit, or interval, is c. If x be the distance from the origin to the point 1 chosen for initial point of the scale, then x' will denote the second division point 2. A second applica¬ tion of the transformation will convert point 1 into point 2 and point 2 into a third point 3 of the scale; and so on. The transformation for generating the angle-measuring scale is xr = (x + tan y) (1 — x tan y),y being the unit of angle and x being tangent of the angle of any line of the pencil with a line assumed as origin.

Generalization by Means of Transforma¬ tion z' = (az + b) : (cz + d) — The ordinary scales being generable by special linear trans¬ formations, the possibility is suggested of gen¬ erating by more general transformations more general scales that shall involve and disclose more general concepts of distance and angle. We will first suppose the fixed elements of the transformation to be distinct (real or imagi¬ nary). Taking these as elements of reference Oi and 02 for homogeneous co-ordinates X\ and x2 in range or pencil, the transformation will assume the form z—'^z, where z — Xi: X2, and where % is the characteristic constant of the transformation. The

constant ˆ will be subject to the condition that real elements (ooints or lines) z shall be converted into real elements z' and that, in case the reference ele¬ ments z — 0 and z — ˆ> are real, ˆ shall be positive.

If now we apply the transformation suc¬ cessively to an arbitrarily chosen element zEEZi we shall obtain a series of elements Zi.ˆZi, A2Zt, %3Zi, ˆ4z, ... This series of elements con¬ stitutes our scale. Obviously this scale is con¬ verted into itself by the transformation z'— by which it was generated just as the old scales are converted respectively into themselves by the transformations generating them. Just as the interval between two successive divisions of the old scale is called unit of distance or angle because one application of the generating transformation carries us over that interval, so for the same reason we name unit of distance or angle the magnitude extending from any division to the next in the new scale. Accord¬ ingly the distances or angles from the points or lines a, fei, % 2zi , ˆ3zi, ... to point or line z, are 0, 1, 2, 3, . . . respectively. By means of the new scale we can measure distances and angles whose magnitudes reckoned from z are expressible as whole numbers. In order to render the scale available for measuring dis¬ tances and angles whose magnitudes are any rational numbers, we have merely to subdivide the scale intervals already obtained into n equal parts. This is done by applying n — 1 times to

the elements at the beginning of each interval, a transformation which repeated n times repro¬ duces the transformation z' = ˆz. The trans¬ formation required is therefore z'=ˆ1,nz where that one of the n roots of % must be used that secures that the element A1 Mz shall fall be¬ tween z and %z. We can then measure all distances or angles from Z\ to z where z is of a + /?/»

the form z— % zi, « and /3 being integers. The distance or angle from point or line a+/3/n

h zi to z 1, is precisely a-j-/3/n.

If now we suppose the subdivision extended indefinitely and if we admit the notion of irra¬ tional number, then obviously we must regard the distance or angle from the point or line Zi to the point or line z EzA* z/as being expressed by a where a may be any positive real number whatever, whole or fractional, rational or ir¬ rational.

From the last equation we have a — log*/ 2 1: log A. Hence: The distance or angle of a point or line z from the point or line zx is the loga¬ rithm of the ratio z/zx divided by the constant

log /f.

The point or line Zi was arbitrarily taken as initial element of our scale and our formula gives the distance or angle from z to any other point or line. The general linear transforma¬ tion z' — (az + b) : {cz + d) involves three parameters, two of which are determined by requiring the elements Ox and O2 to remain fixed. By means of the third parameter, the element Zx may be brought to any desired posi¬ tion z' of range or pencil. Accordingly: The distance or angle from point or line z to any other point or line z' is log zl z' : log or c log z/z , where c— 1 : log

It is readily seen that, as ought to be the case, the addition property of the old magnitude concept is preserved in the new concept just defined. That is to say, Distance (angle) zzi T distance (angle) ziz' = Distance (angle) zz'; for c log z — c log zx + c log Zx — c log z — c log z — c log z identically. Also c log z/z = =0, whence c log Zlz' — — c log z'/z con¬ formably to the like property of the ordinary notion of measure. The displacement proper¬ ty, too, is preserved; for the scale-generating transformation z1 = hz converts distance (an¬ gle) zr zp into distance (angle) /zr/zp. These magnitudes are plainly equal, for the former is c log zr — c log Zp while the latter is c log A -j- c log

Zr — C log A — C log Zp.

Geometric Meaning of the New Concept of Distance (Angle). — Let z = -zi and z = z2 be any two points (lines) of the range (pencil). The anharmonic ratio (0 zi 00 z2) of the pair (zi, Zj,) to the pair (0, 00) of fixed elements is

Urn (0-a) (r^} =

y-L.X > (z, -y) (2,-0)

Hence the distance (angle) of two points (lines) is an arbitrary constant c times the logarithm of the anharmonic ratio of the two points (lines) to the two fixed — absolute — points (lines) of the range (pencil).

Introduction of Complex (Imaginary) Elements. — Hitherto only real elements have been admitted. We now extend the generalized concept of measurement to complex elements, points or lines, for which the co-ordinates z

and z' will be of the form z— a -f- (H,z' — a'

where a,a',/3, f3' are real and i = V — 1. Now i d i 6'

z — r e and s' — r' e , whence

i (6 - 0') i .

z : z' = (r : r') e = pe Hence

/ i < p\

distance (angle) zz' = c log z/x = c log \pe)

/ i(+ 2rn r)\ / i > \

= c log \pe) - c log \pe) ± c log

in2rr

e — c log zAr — 2icnn, where n is an integer. It so appears that in the generic concept of measurement in hand distance (angle) is not a one-valued function but is an infinitely many-valued function, viz., a periodic function of period 2 cxi. The periodicity of the angle in the ordinary system of measurement is a special case of the preceding. Let 0 be the angle be¬ tween the lines y — mx + b and y — m'x + b' ; then tan ˆ = (m—m') : (1 + w'). As tan $ — tan (0 we have tan (± nr:)— (m — m') :

(1 --mm')t whence < p ± mr = tan—1 [(m—m'): (1 + mm')] ; hence < p = tan 1 [(m — m') : (1 + mm')] ± nrr.

Infinite Distances and Angles in the Gen¬ eralized System of Measurement. — We will

premise a brief account of the infinite elements in the ordinary system of measurement. For this system the scale-generating transformation for the range is z' = z--c = (z + c) : (Os -f- 1) ; for the pencil it is z' = (z + tan y): (1 — zt tan y). In the former case the fixed elements, given by Oz2 + Oz + c — 0 are z — oo and z = co ; i.e., the range's infinite (Desarguesian) point count¬ ed twice. (The symbol z is here taken to repre¬ sent distance from a finite origin). In ordinary distance measurement, the range, or right line, contains two (coincident) points from which all other points are equally and infinitely (algebraically) distant — a fact of which the average carpenter is not

aware. In this case the two points hajppen to coincide but what is here important to note is the fact that the point of coincidence is double. How stands the mat¬ ter in case of ordinary angle measurement? The fixed elements (lines) are given by making z' = z, i.e., by the equation tan y z2~\~ tan y = 0, or z =■ — *1, as tan y 0. Hence the fixed (absolute) lines of the pencil make with the origin (initial or referee line) angles whose tangents are + i and — i. Such lines are of course imaginary. Are the angles oo ? And does every other line (real) of the pencil make the same oo angle with these fixed lines? To answer, take any finite point for vertex of the pencil and choose this vertex for origin of Cartesian axes. Then the angle <P of any real line y—mx of the pencil with the line y=ix is given by tan <P —{m — i) :(1 + ini)— 1 : t— — i. Hence </> is independent of m, and hence all real lines are equi-inclined to the line y—ix. The same is true for line y= — ix. Hence as y — mx rotates about the vertex of the pencil, it keeps a constant angle with each of two imaginary lines of the pencil. This fact sug¬ gests that tan-fi' and tan*1 (— i) are each in¬ finite. That they are oo is readily established as follows: From Euler's equations e iz — cos z ~h i sin z, e — « = cos z —i sin z , we have

tan z— — i (e2zi — 1) : (e2zi +1).

In the present case tan z— ± i, whence z=°°.

The question arises : Has a range two points equidistant and infinitely distant from all its other points, and has a pencil two lines equi-inclined to and making an 00 angle with all other lines of the pencil, in case of the general¬ ized system of measurement? The answer is affirmative. In this case, the fixed elements of the scale-making transformation have been taken for origins O i and 02. Their equations are z — 0 and z = oo. Now let z' be any point or line. The distance (angle) from z^z' to z = 0 is c log (0 :zr')=a>. In like manner, the dis¬ tance (angle) from z = z' to z—oo, being c log (oo :z'), is oo. Hence the distance (angle) between either of the absolute points (lines) of a range (pencil) and any other point (line) of the range (pencil) is infinite (loga¬ rithmically).

A Restriction Removed. — We will now

abandon the supposition that the origins 0 1 and 0i coincide with the absolute elements. The absolute elements will, of course, be given by writing z' = z in the transformation z' — (az b) : (cz + d) ; i.e., they are given by the equa¬ tion cz2~\~(d — a) z — b — 0, or, as we may write it, changing the values of our constant letters, az2 -f 2bz + c = 0; or, as z~ Xiixt, & xx2= ax2 + 2bxiX2 + cx 22 — 0. Now let (x\,

x'f) and (x”i, x’) be any two points (lines) of a range (pencil), then the quantities (x'i x'\, x\ -F %x"2) for varying 2 are the co-ordinates of a variable point (line) of the range (pencil). This variable element will coincide with an absolute element for such and only such values of ˆ as satisfy the equation

a (x\ + A x"i)2 -f 2b (x'i + A x') (x\ + A x) + c

(′ + Ax"2)2 = 0,

or A2 £2 x>r x>r T 2 A £2 x> x» £2 x> x> = 0.

These values are

- V x' x" -]WX' x"> -ˆx'x'ˆx" x"

Ax= - — - ,

£2 x» x»

conjugate of A*.

The anharmonic ratio of the element pair (ˆr'l, x'2) and (x'\, x"2) to the pair of absolutes is Ai : A2 Hence, if we denote x\ :x\ by z' and (x”i'.x”22) by z” , we have the proposition Distance (angle) z’ z” —

nx'x"

- \jiPx' x" - nx' x' a x" x"

c log

ˆ x' x"

ˆ 2x ' x" - Qx' x' Q x” x"

= c log K.

Such is Klein’s expression for the metric num¬ ber of distance (angle) measured in accordance with the generalized system or scale. From it Cayley’s expression is obtainable as follows: If

n be any number, then log n = 2i cos -*(« -f 1 : 2 V n), a fact verifiable thus:

~ln+ i / _ \

n—e i 2 cos 2y— =cos | 2 cos JL± _J) -f i

\ 2 V n

sm

2 cos

~xn + i

2 V n

n 4- i

(n+i)J («+ 1)2

^ • 4 n

4 n

2V » \ 1 4„

= n.

ANALYTICAL METRICS

617

Applying that fact to the Kleinian expression, we readily obtain

c log K = 2ic cos — 1

whence, on letting c — — i :2, we obtain

ax'x*

cos 1 - —

®x' x' ^x" x"

which is Cayley's expression for distance (angle) of the elements z' = x\:x'3 and z" —

y" . y"

X l.X 2.

Application to Real Elements, Absolute Elements Distinct. — Two

cases arise accord¬ ing as the absolute elements are real or are imaginary. Consider first the case where they are real. For the sake of convenience we shall first consider the range. Denote the absolute points by F x and F2. Two points z and z may be situated (1) both of them between, (2) neither of them between, or (3) only one of them between Fx and F2. In situations (1) and (2) the anharmonic ratio of the pairs (z,z ') and (Fx, F2) is positive ; in the remaining situa¬ tion, negative. Accordingly in the former case the logarithm of the anharmonic ratio is im¬ aginary, while in the latter case, the logarithm is real except for the imaginary period before indicated. Hence in order that the distance be¬ tween two points not separated by Fx or F2 shall be real, we must assign c for our distance func¬ tion a real value. This being done, we have the theorem: The absolute points being real and distinct, the distance between two real points z and z' is real or imaginary according as the points are not or are separated by one of the absolute points. If, with Cayley, we assigned to f a pure imaginary value, viz. — i/2, then in the foregoing theorem we should have to inter¬ change the words ˆreal® and ˆimaginary® or else the phrase ((not separatedˆ and ˆseparated.® The Cayleyan choice is logically allowable. It is rejected as being inexpedient. It gives a gen¬ eralized scale needlessly unlike the ordinary scale. For example, if 1, 2, 3 denote successive divisions of the Cayleyan scale such that the successive divisions shall be a unit apart, then, if division 1 falls between Fx and F2, division 2 must fall without, division 3 within, etc.

Hence distance 13 regarded as the sum of 12 and 23 is 2 and is real but segment 13 measured directly is imaginary.

Accordingly in order that all distances be¬ tween real points shall be real, it is necessary to confine ourselves to one of the two segments into which the line is separated by the absolute or infinite points, Fx and F2. Each of these segments is infinite in length, i.e., the distance from any point in either segment to either F is infinite, as before shown.

Let z be a point of either segment. Suppose the point to move in accordance with a trans¬ formation that leaves F\ and F2 unchanged. We may name velocity of displacement the ratio of the distance traversed to the time consumed The distance is, of course, to be reckoned in the new way. If now we suppose the point to move with a constant velocity toward Fx or F2, it will approach nearer and nearer to Fx or F2 but will never reach either Fx or F2 since it would have to travel an infinite distance. If the

yjax' x ' Vx",

point be supposed to be endowed with intelli¬ gence, it could never by any motion possible to it or by any experience assure itself of the existence of Fx or F2. If the point refused to assume the existence of Fx and F2, its geometry would so far forth be Euclidean in character. It could assume the existence of Fx and F2. It could still choose between the supposition that the F's were coincident and the supposition that they were distinct. The former supposi¬ tion would bring its geometry into the category of Parabolic geometries, like our own Euclidean geometry, while the second supposition would lead to a so-called Hyperbolic theory, such as the geometry of Lobachevsky and Bolyai.

Imaginary Absolute Elements.— If the absolute elements are imaginary, let them be of the form « -f- (H and a. — (H. The anharmonic ratio of these to a pair (z,z') of real elements

is imaginary of the form e1'^ . Hence we have c log (z, a -f pi, z\ a, — (H) = c(iˆ ± 2nin) , which is pure imaginary or real according as c is taken to be real or pure imaginary. Hence in order that the distance between two real points may be real when the absolute points are conjugate imaginaries, it is necessary and sufficient to assign to c a pure imaginary value, say i c . The absolute points being imaginary, the range contains no real infinite points, or points at oo. Hence the range of straight line returns upon itself like a finite closed curve. The distance between any two of its points is periodic, of period 2ˆic = 2ˆiic'~—2ˆc' . Hence in this sys¬ tem of measurement the length of the straight line is 2 rrc'. It is this metric theory that

characterizes the so-called Elliptic Geometry of Riemann and Helmholz. The measurement of segments of the straight line of this theory is analogous to the ordinary measurement of arcs of a circle of radius cf.

Extension to the Pencil. — The foregoing conclusions respecting the range are readily ex¬ tensible to the pencil. If the two absolute lines Fx and F2 be real and distinct, the angle made with either of them by any other real line of the pencil is infinite and real. If any line rotate in accordance with any transformation leaving F i and F2 unchanged, the line will move for¬ ever without reaching either Fx or F2 — a fact that profoundly distinguishes this metric sys¬ tem from the ordinary one, for in the latter if a line rotate with any constant finite velocity, no matter how small, it will in course of a finite time return to its initial position. This possi¬ bility of thus returning is owing to the

fact, already pointed out, that in ordinary angle measurement the pencil has no real lines at oo but, on the contrary, these lines are conjugate imaginaries, viz., the familiar so-called isotropic lines of the pencil. If the absolute lines be conjugate imaginaries other than the isotropic lines of ordinary geometry, the resulting theory of angular measurement is that which belongs to the Elliptic Geometry. In this case, as in that of the range, we must take c to be pure imaginary in order that the angle between two real lines shall be real. If we set c— c'i, the angle between two lines is periodic, of period 2 tt c', and the whole angle about the vertex will be 27 re'. In ordinary geometry the whole angle is tt ; hence to pass from the elliptic theory of angle measurement to the ordinary system, we

must let c' — J4, or c — + i :2. This done, the

general expression for the angle between two lines (x\, x) and (x"i, x"i) becomes

cos

®x'x' i2x"x"

where, as the absolute lines are to be the usual

Xi "f Xi,

£2

'2

2 »

XX

£2

x" x"

x\ 2

isotropic lines, we are to take and thence £2 x> = x'i2 -

- xV, and £2 x> x" = x'ix"i + x\ x?i whence the expression for

angle becomes

x\ x"i + x'2 x'\

cos

V

(X

'.2

r + x'22) (xV + x"*2)

and this, as should be the case, is the familiar expression for the angle between two lines x\ x + x'2y = 0 , x"i x + x"2 y — 0 . We have thus the theorem : in the ordinary Euclidean geometry, the angle between two lines is /i times the logarithm of the anharmonic ratio of the given pair of lines to the pair of isotropic lines through their common point. This defini¬ tion is due to Laguerre. (Consult Nouvelles annales de Mathematiquc , 1859). If the lines are perpendicular, i.e., have slopes m and — 1/m respectively, then the anharmonic ratio in ques¬ tion is

m, i, —

m'

— i

— (m

■* > I

/

iff- /m) (f-j- m) — — 1;

hence we have in ordinary Euclidean geometry the following definition of perpendicularity: Two lines are perpendicular when and only when they are harmonic to the isotropic lines through their common point.

Absolute Elements Coincident. — We turn now to the case where the absolute elements are coincident. The anharmonic ratio of the pair (zi, z3) to the pair (z2, z 4), being (zi — z2) (z3 — z*) / (<02 — z3) (z —* Zi), is equal to 1, if the elements of a pair, as (zi, z3), coincide. Hence

if Zi = z3 be the absolute ele¬ ments, the distance (angle) z2 zi— c log 1—0, if c be finite. The same fact appears from the distance (angle) expression

2 i c cos 1

| a x' x" / yj

^ y.r ^ v" v”

»v *V A-

where fixxEEa xi2 + 2 b xi X2 ff- c X22; for, if the absolute elements are coincident, then (and only then) A =b2 — a c — 0, and ^xx=(piXi + p2x2)2; whence the distance (angle) expression becomes

(pi x'i T p2 x'2) (Pi x"i -)- p2 x"2)

2 1 r ros ^ / - - .

V (pix\ +£2 x'2)2 (pix'\ + p2 x"i) 2

— 2 ic cos lz=: 0, if c be finite.

In order to study the metric determination in case of coincident absolute elements, we must view the case as a limiting one, i.e., we must suppose the absolute elements to differ by an infinitesimal and then examine the law accord¬ ing to which the distance (angle) expression approaches zero as the absolute elements ap¬

proach coincidence. To this end observe that £2xV flx"x" — GW = = (xix"2 — x2'x"i)2 A-

Now

£2 y."

A A

2 i c cos

x'x'

£2

x"x

2 i c sin 1

(x'i x"2 — x'2 x"Q V A

flx'x'Qx"x"

a new expression for distance (angle) , admit¬ ting immediate application of the relation Urn (sin a :a)—l as a approaches zero. As the absolute elements approach coincidence, A ap¬ proaches zero, and hence the sine (in the above expression) approaches zero ; so that we may replace the sine by its sin \ We thus get for distance (angle)

2 i c V A

x'ix"j — x'2x"i

v ( ) ( )

Xi'x2"

■X*'xi"

(pi x'i 4- pi x'i) (pi x"i + pi x"i)

where we choose c so that k T 0 as A ap¬ proaches zero.' The last expression gives us the distance (angle) of two elements (x'i, x'2), (x"i, x'i) when the absolute elements (pi Xi + p2x2)2 = 0 coincide. Consider the expression E= (qi x'i + q2 x'i) / (pi x'i + p3 x'i) — (<? ix"i --qix"2) / (pix'\ + p2x"2). It is readily seen that E = k (x'i x"2 — x'2 x"i) / (pi x'2 + pi x'i) (pi x"i d- p 2 x"2) , provided we make such obvi¬ ously possible choice of the q's that qi p2 — q2 pi~k. The form E shows that the addition property of distance (angle) is valid also when the absolute elements are coincident. For let three elements be (x'i, x'2), (x"i, x"2),

(x'"i, x'"2). Substituting in E, it readily ap¬ pears that distance (angle) between elements one and two T distance (angle) between two and three = distance (angle) between one and three. Also distance (angle) between (xi, x2) and itself is (<71X1 +172X2) / (pi Xi p2 x2) — (<71 Xi + q2 Xi) / (pi Xi + p2 Xi) = 0. As to the displacement property, it readily appears that E is the difference of two anharmonic ratios, for the form (qi Xi + q2 x2) / (pi Xi + p2 x2) is the anharmonic ratio of the elements qx x% + qiXi — 0 (or zi = — q2/ qi), pi Xi + p2 x2 = 0 (or z3 = p2 / pi), (pi — qi) X\ T (p2 — q2)

x2 — 0] or ^2 — — (pi — q2) /(pi — qi) and

ˆ4 — — Xi / x 2. Now as linear transformation leaves anharmonic ratios invariant, the quantity E will remain unchanged, i.e., the displacement property is preserved also when the absolute elements fall together.

General Metric Determination in the Plane. — We have hitherto attached the gener¬ alized concept of measurement to one-dimen¬ sional spaces : the range and the pencil. It is easy to carry the concept into spaces of two dimensions, namely, the plane regarded as an ensemble of points (pencils) and of lines (ranges). The pair of absolute elements (of range, pencil) has for analogues in the plane the conic viewed on the one hand as locus and on the other as envelope. Accordingly the Ab-

solute — the configuration of reference for metric determination — in case of the plane will be some chosen conic C. Any line L will cut C in two points, real and distinct, or imaginary, or coincident. These two points will serve for absolute points in case of the range having L as base. Reciprocally, any pencil V of the plane has two lines tangent to C. These tangents, which of course may be real and distinct, or ini agin ary, or coincident, will be the absolute lines for metric determination in the pencil V.

We may represent C in homogeneous co¬ ordinates by S xx = ax + *bxf* + *ex* +

2dxix2 + 2c.ri.r3 4“ 2fx3x2 = 0. Let S' xf x' denote the result of replacing in SXx x for x and let S' xx'= = ctxix'i + bx2x\ T cx3x'3 4~ d (.Ti x\ + x 2 x\ ) 4~ e (xi x\ T x3 x\ ) + f (x2 x'3 4~ x3 x). Any two points xi and x'i (t=l, 2, 3) determine a range. This cuts C in two points. The anharmonic ratio of this pair and the given pair is

Sxxf 4“ S2xx' ~ Sxx S x' x'

• — - = R

S xx'

Sx'x'

hence the distance between the points is c log R,

or 2 i c cos—1 j Sxx' / Vsxx S x' x' \ where c is

a fixed arbitrary constant, the same for all ranges of the plane.

Reciprocally, if 2ˆ =0 be the line equation

of the Absolute, the angle between two lines and £'t (* = 1, 2, 3) is

2i c' cos

where, again, c is an arbitrarily chosen con¬ stant, the same for all pencils of the plane.

The significance of the generalized concept in hand may be exemplified by a problem.. Let it be required to find the locus of a point xi that so moves as to be always a given distance from a fixed point xi- The distance depends only on the cosine ; we may. therefore, obtain the required equation by setting it equal to a constant k. On clearing of fractions and the radical, the equation is S*xx'—k2S xxˆx'x'

which, being of second degree in the xi> repre¬ sents a conic section. This conic contains the four points common to the double line S2X: c,= =0

and the absolute SXx = Q- Now the line S xxf = 0 is the polar of the point x'i as to the abso¬ lute. Hence the conic S* xx' — k2S xx' Sxx

tangent to the absolute at the points where it is cut by the line Sxx' — 0- We have thus the

theorem: The locus of all points xi equidistant from a fixed point x'i is a conic tangent to the absolute at the points where the absolute is cut by the polar of the fixed point.

Pouring new wine into old bottles, we may call the locus in question a (generalized) circle. Its centre is the point x'i and its radius is 2 i c cos-1 k. Regarding k as a parameter, the equation S2 xx1 = k2 S xr x' Sxx represents the family of concentric circles about x'i as centre. They are all tangent to the absolute at the same contact points. The circle corresponding to k -j— 0 is degenerate, being the polar (counted twice) of the centre x'i. Its radius — 2c i cos — ' =7r ci. If k — \, the radius is 2fccos~ 1 1—0, and the circle, S2 Xx' ~ S Xx' s xx~ 0, is the

pair of tangents from the circle centre to the absolute. (Compare the isotropic lines of ordinary Euclidean geometry). The distance between any two points on either of these lines is zero, for the point of contact

is the double fixed element (the absolute points) for metric determination in the range in question. To render such distance non-zero, we should have to take c = oo , and then the distance of any two points not on a tangent to the absolute would be oo . Finally suppose k — oo ; the radius — 2 i c cos 1 oo = oo, and the circle is S xx — 0,

the absolute itself. Hence: The absolute is the locus of all points infinitely and equally distant from any point whatever not on the absolute, just as the infinite line of the ordinary pro¬ jective plane is the locus of points infinitely and equally distant from all finite points of the plane. The reader may readily solve and dis¬ cuss the solution of the reciprocal of the fore¬ going problem. The reciprocal problem is : To find the envelope of a line Hi that moves so as to make always the same angle with a given line Pi-

Displacements of the Plane. — There be¬ ing co 8 coUineations of the plane, and a conic depending on five essential constants, it is seen that a conic can be transformed into itself by oo 3 coUineations of the plane. By such a trans¬ formation any point P of the conic is converted into a point P' of the conic. P and P' are in general different points ; but any transformation converting a conic into itself converts at most two of its points each into itself. Sup¬ pose a transformation t converts the absolute into itself and that P and P' are the two points of C that are unchanged in position. Then t con¬ verts into themselves the tangent at P, the tangent at P' and the point Q common to the two tangents. That is,, t not only leaves C un¬ changed but also the triangle, P, P\ Q. Query : How many of the co 3 coUineations leaving C unchanged leave also unchanged the particular triangle in question? Takihg this triangle for triangle of reference, the equation of C is XiX2 — x* = 0. The most general collineation that leaves fixed the sides of the triangle is that defined by the equations : Xi — di x\, x2 = a2x'2, xz — a3x'3. This transformation converts C into (h a2 x' i x'2 — a 2 x'f — 0. This is identi¬ cal with C when and only when ax a2 — a 2 — 0, i.e., when the ratios, : «3, a2:a3, are subject to one condition. Hence the answer to the query is a simple infinity of coUineations. All these transformations convert into itself the quantity XiX2 / xf. Hence they convert into it¬ self each conic of the pencil XiX2 — kxf — 0 of conics. This pencil consists of all the conics tangent to C at the points where it is cut by x2 = = 0, the polar line of the point common to Xi — 0 and xz — 0.

The collineations in question fall into two classes according as o3 = -f V ax a2 or a3 — — V ax a2. The first class constitute a group, or closed system ; i.e., combination of two of them is always one of the class. Thus the transforma¬ tion Xi = ai x'i, Xi — a2 x'i, x3 = + V ax a2xf3 fol¬ lowed by the transformation x'i—Pix"i x\ =

Pix"2, x'3 — ˆ Pi pix'\ is equivalent to the

transformation xi — ai Pi x"i, x2 = «2 pt x'\,

£3 = + ˆ «i a2' Pi p2 x"3, of the same class ; while if the negative sign be used in the com¬ ponent transformations, the resultant contains

Xi — -f- V a-i a2 px p2 x "3 hence the second class closed, is not a group. Geometrically the two classes are distinguished by the fact that the transformations of the first class convert into itself each of the segments of C into which C is separated by the contact points of *i = 0 and* 2 = 0, while the transformations of the second class exchange these segments. To the collineations of the first class Klein has given the name displacementsˆ of the plane for the reason that they correspond to the collinea¬ tions — called displacements — that in the ordi¬ nary Euclidean plane leave the line at 00 un¬ changed. The second class correspond to col¬ lineations in the ordinary theory that convert figures into inversely congruent figures.

We have, therefore, the proposition : The group of displacements leave fixed not only the absolute C but also all the conics (circles in this theory) tangent to C at the two fixed points. The equation of these circles is Xi Xt — k xˆ = 0. Through any point x'i there passes in general one and but one of these cir¬ cles, viz., that whose equation is x'£ X\X* — x'i x\ xP = 0. A displacement of the plane causes each point to move on that circle on which it chances to lie. Accordingly each displacement is a rotation of the plane about a fixed point, all other points describing concentric circles (generalized) about this point. Those dis¬ placements in which the centre of rotation is at 00 are specially noteworthy. To be at co the centre must be on C. Hence the circles of motion have 4-point contact with C at their common centre. In the ordinary, or parabolic, geometry the centre would be on the line at co and the circles would have their centre at co , i.e., they would be a system of parallel lines. Motion along these is translation. Hence translation in ordinary (parabolic) geometry corresponds to those displacements (in the gen¬ eralized doctrine) ,where the centre of rotation is on the absolute conic C.

Distances (Angles) Invariant under Dis¬ placements. — Let xi and x'i

be any two points and let their range cut C in m and u'i. The anharmonic ratio of these points is unchanged by collineation. Now a displacement converts m and u' into points vi and v'i of C, and xi and x'i pass into yi and y'i collinear with vi and v'i. Hence distance between * and x'i — dis¬ tance between yi and y'i. Similar argument shows that angles are unchanged by displace¬ ments. Neither are distances and angles changed in size by the non-group class of collineations not changing C.

Generalized Measurement for Sheaf of Lines or Planes. — The line geometry of the sheaf is analogous to the point geometry of the

plane, and the plane geometry of the sheaf is quite parallel to the line geometry of the plane. The four theories may be studied simultaneous¬ ly by means of the same algebraic machinery. In order to transfer the generalized metric of the plane to the sheaf, we take for absolute in the latter a cone of second order (class) hav¬ ing the carrier point P.of the sheaf for ver¬ tex. The angle of two lines L and L' of the sheaf will be an arbitrary constant c times the logarithm of the anharmonic ratio of these lines and the pair of lines common to the ab¬ solute and the plane (pencil) of L and L'. Reciprocally, the angle of two planes ˆ and is an arbitrary constant c times the logarithm of the anharmonic ratio of these planes and the two planes tangent to the absolute cone and containing the common line of tt and 7r'. Developments in case of the sheaf quite sim¬ ilar to those found for the plane are obviously obtainable in similar manner and need not be further pursued.

The Elliptic and Hyperbolic Theories of the Plane. — Returning to the plane, it is ob¬ vious that two theories will arise according as the absolute C is real or is imaginary. If C be imaginary, the two absolute points of every real range (line) will be conjugate imaginaries. These being the infinite points of the range, this will have no infinite real points. The line will be finite in length, the length depending on the value assigned to c. No pencil will have real tangents to C. No two real lines will intersect on C, i.e., at 00 , hence no two real lines can be parallel. The resulting theory is the so-called Elliptic geometry of the plane. If our plane really is elliptic instead of being, as we commonly assume, Euclidian (or para¬ bolic) then the infinite region of it is an imaginary conic section.

If C be supposed to be real, the resulting theory accords with that of Lobachevski and Bolyai. It is that called Hyperbolic by Klein. The real points now fall into two classes ; the class E of points such that from each two real tangents can be drawn to the absolute ; and the class I

such that no real tangents proceed from its points to the absolute. These classes may be respectively described as exterior and in¬ terior. Similarly real lines compose two classes : those that cut C in two real points, and those that cut it in imaginary points. Suppose, as we must make a choice, we con¬ fine ourselves to the class / and to the lines that go through the points of I. No pencil has real lines at 00, i.e., no real tangents to the abso¬ lute. The absolute lines of any pencil are imaginary (like the isotropic lines of ordinary projective geometry). Hence, as before indi¬ cated, we take c'—ic'i, pure imaginary. The sum of the angles of any pencil is, therefore, 2c'i7r. On the other hand, every real straight line has two points at 00, namely, the points where it cuts the absolute. Accordingly we regard c as a real quantity. Owing to our choice of c and c' the angle of any two lines intersecting within the absolute is real, and real also is the distance between any two points of I. But two lines having points in I but not intersecting within the absolute make an imaginary angle with each other; and the dis¬ tance between two points, one in I and the other in E, is imaginary. The distance from

any point to the absolute is infinite. The angle of two lines intersecting on the absolute is zero. Such lines are parallel.

Suppose we are situated at some point P of 1. Suppose further that we are capable of only such motions as are furnished by displace¬ ments, transformations, that is, that leave the absolute unchanged. Just as in ordinary ge¬ ometry, so here, since the total angle about P is finite, a finite time would suffice to make a complete rotation about P by turning at any finite rate, however small. Again, just as in ordinary geometry, so here we could travel on any straight line in either direction (sense) at any finite velocity however great, without, in any finite time, however great, reaching, much less passing, the absolute conic C. The dwellers within C could not escape from the region I by any combination of displacements. For those inhabitants their plane, the region I, is strictly limited by the absolute. By no ex¬ perience possible to them could they assure themselves that C existed, or, C being granted, that there is a, region on beyond, outside of C. If we set c' 1 = 2, then the geometry within / becomes a detailed picture of the Lobachev- skian, or hyperbolic, geometry so far as con¬ cerns the plane. For example, one of the L. propositions is that through any point of the plane two lines can be drawn parallel to a given line. This proposition is matched or pictured by the fact that through any point

of / two and but two lines can be drawn meeting any line within C where the line cuts C. These two lines are parallel to the third line, meeting it at its infinite points. Another L. proposition is that as a point recedes from a line, the angle of the two parallels through the point to the line increases and approaches the value tt as the distance becomes infinite. The like holds within C, for when the point common to the parallels is a point of C, the parallels to the given line become parallel to each other, one of their angles being zero and the other tt. Again, the sum of the angle of a triangle within C is less than tt and decreases as the triangle increases, becoming zero when the vertices are infinitely apart, i.e., are on C: a fact agreeing with the L. geometry. Once more, in the L. geometry, two lines perpendicu¬ lar to a third do not intersect. Now two lines within C, to be perpendicular to a third line within C, must belong to the pencil vertexed at the pole of the third line. But this pole is outside of C. Hence the perpendicular, as re¬ garded by geometers within C, do not inter¬ sect, for, as we have seen, the region E does not exist for such geometers. They might in¬ deed posit such a region but then it would have only ideal as distinguished from intuition¬ al or experiential existence. Still again, in the L. geometry we have the proposition that a circle of infinite radius is not a straight line. Now, in theory of the region I, any circle of infinite radius and infinite centre is, as before shown, the absolute itself and so not a straight line. If the radius be kept oo and the centre be taken on C, then the circle is again not a straight line but a conic having 4-point contact with C. Is it, then, impossible to conceive a straight line of the region I as a circle? It is, unless the line be regarded as a circle having its centre in E, at the ideal pole of the given

line. In such case the radius would be imagi¬ nary.

Special Metric in the Plane. — To obtain this we take for absolute C a degenerate conic which regarded as a locus is a pair of coinci¬ dent straight lines and which regarded as an envelope is a pair of points (pencils) of the line. It is easy to see how a proper conic can degenerate into a conic of the sort described. Thus let b2x 2 -f- a2y 2 = a2bz be an ellipse. Call its vertices A (a, o) and A ' (— a, o) . For all values of m the line y — mx ± V m2a2-\~b2 is tangent to the ellipse. Now let b ap¬ proach zero. The ellipse degenerates (as a locus) into the double line y = 0, and (as an envelope) into the points A and A' enveloped by y — yn (x ± a) as m ranges through the ensemble of real numbers. Such a degraded conic being taken for absolute C, every pencil of the plane will contain two distinct absolute lines, or lines at00, viz., those that pass through A and A'. These absolute lines will be real or imaginary according as A and A' are real or imaginary.

Accordingly the special metric so far as angles are concerned is analogous to the general metric. Not so, however, in case of distances. For the absolute points of any range are coincident, namely, the two points common to the range and the double line AA\ To render the distance between two points non-zero, it is necessary to take c infinite, and then, in agreement with ordinary (parabolic) geometry, the distance becomes an algebraic instead of a transcendental function of the co-ordinates. The distance between two points of a range containing A or A' is zero, for such a range is tangent to the absolute. Similarly the angle of any two lines intersecting on A A' is zero : such lines are parallel. Every conic through A and A' is to be called a circle, and two circles tangent to each other at A and A ' are to be regarded as concentric circles. In every system of concentric circles there is one of infinite radius, namely, the double line AA', which is, accordingly, the locus of points at oo . Here, as in ordinary geometry, the principle of duality fails. For example, the envelope of a line making a constant angle with a given line is not a proper conic but a point.

The special (parabolic) geometry here indi¬ cated may be derived from ordinary projective geometry, when the double line A A' becomes the locus (counted twice) of the Desarguesian points of the plane and the points A and A' be¬ come the circular points at oo .

Generalized Metric in Space. — The absolute will naturally be a surface .S' of second order (and class). The distance between two points is an arbitrary constant c times the logarithm of the anharmonic ratio of the given pair of points and the pair of (absolute) points cut from Y by the line joining the given points. Reciprocally, the angle of two planes is an arbitrarily chosen constant c' times the anhar¬ monic ratio of the two planes to the pair of (absolute) planes, i.e., the two planes contain¬ ing the line common to the given planes and tangent to S.

There are co6 collineations of space that con¬ vert Y into itself. These fall into two classes according as they do not or do exchange the two systems of generatices of S. The colline¬ ations of the first class — called displacements

— • constitute a closed system, or group. The second class is not a group.

The locus of a point at a given distance from a fixed point is a second order surface — gener¬ alized sphere — tangent to S' along the conic cut from X by the polar plane of the given point, the sphere centre. S itself is a sphere, viz., the locus of all points at co , of all points,' that is, that, in the metric system in hand, are infinitely distant from any point not on S.

If S is imaginary, all lines are of finite length. The sum of the angles of an axial pen¬ cil of planes is finite. This general theory passes into the Elliptic geometry if we set c — i / 2, the sum of the angles of an axial pen¬ cil being thenar.

If .S' is real (and not ruled), the geometry of the interior of S includes the Hyperbolic geometry as a special case, namely, when c = i / 2.

The special metric that arises on taking S to be a degenerate surface passes over into ordinary Euclidean geometry when the degen¬ erate .S' is (as locus) the locus (counted twice) of the Desarguesian points of space and (as envelope) is the imaginary circle at infinity. See Geometry, Non-euclidean ; Geometry, Projective.

Bibliography. — Bolyai, (The Absolute Sci¬ ence of space) ; Cayley, (Sixth Memoir on Quantities > ; Chasles, ‘Aperqu historique> (3d ed., Paris 1889) ; id., (Rapport sur le progres de la geometrie (ib. 1870) ; id., (Traite de geometrie snpereienre (ib. 1880) ; Clebsch, R. F. A., (Vorlesungen fiber Geometrie) (Leipzig 1876) ; Coolidge, T. L., (Non-Euclidean Geom¬ etry *(Oxford 1909) ; Descartes, (Discours) (1637) ; Enestrom (editor), Bibliotheca Math- ematica (Leipzig) ; Halsted, (Bibliography*

(Amer . Journal of Mathematics, Vol. 1) ; Helmholz, (Ueber die Thatsachen die der Geo¬ metric zum Grunde Liegen) ; Klein, (ZurNicht- Euklidische Geometrie) (Mathematische An- nalen, Vols. IV, VI, VII and XXXVII), and lithographed (Vorlesungen fiber Nicht-Eukli- dische Geometrie *; Laguerre, (Nouvelles An- nales de Mathematique) (1859) ; Lobachevski, Geometrical Researches on the Theory of Parallels) ; Mach, Ernst, (Space and Geom¬ etry in the Light of Physiological, Psychologi¬ cal and Physical Inquiry * (1906) (this repre¬ sents what may be called the biological as dis¬ tinguished from the logical movement in mod¬ ern mathematical thought, and has for its aim to trace pure geometry back and down by a legitimate genealogy to a physical and physio¬ logical parentage, thus reattaching mathemat¬ ics to experience and reality from which the logical movement has more and more detached it) ; (Merriman and Woodward, (Higher Mathe¬ matics } (New York 1896) ; Poincare, (La sci¬ ence et l’hypothese* ; the same in English by

Halsted; Poncelet, (Traite des proprietes pro- jectives des figures *(Paris 1822) ; Riemann, (Hypotheses that lie at the Foundation of Ge¬ ometry) ; Scott, C. A., (An Introductory Ac¬ count of Certain Modern Ideas and Methods in Plane Analytical Geometry) ; id., article in Bulletin of the American Mathematical Society (Vol. Ill) ; Smith, W. B., (Introductory Mod¬ ern Geometry of the Point, Ray and Circle* ; Woods, (The Boston Colloquium.) Consult also (Encyklopadie der mathematischen Wis- senschaften* (Leipzig 1898 —) ; International

Catalogue of Scientific Literature : Mathemat¬ ics (London 1902, and annually). Records of recent publications touching the subject will be found in Jahrbuch iiber die Fortscliritte der Mathematik (Berlin 1871 —).

Cassius J. Keyser,

Adrain Professor of Mathematics, Columbia University.

ANALYZER, the portion of a polariscope fq.v.) employed in the examination of polar¬ ized light. Nicol prisms, tourmaline plates, double-refracting crystals and movable mir¬ rors are each used for this purpose.

ANAM, or ANNAM, an Asiatic country on the east side of the Indo-Chinese Peninsula, along the China Sea, about 850 miles long, with a breadth varying from over 400 miles in the north to 100 in the middle. It is composed of Tonquin or Tongking in the north and Cochin- China and Chiampa in the south. The area is 52,100 square miles, and the population (1913)

4,702,446.

Its coast is much indented, affording many fine harbors, and a mountain range extends its entire length. The Mehong, the principal river, is the boundary between Anam and Siam and is navigated by steamboats. The capital and largest city is Hue. Rice, cinnamon, sugar¬ cane, coffee, tea, tobacco, the areca nut, mul¬ berry, betel, manioc, bamboo, caoutchouc, car¬ damons, dye, medicinal plants and cotton are the chief productions, though silk is manufac¬ tured to some extent and fine woods are ex¬ ported. Iron, copper, zinc and gold are found. The mines are worked by natives. Coal mines are situated at Nongson. Cattle-rearing is be¬ coming important; in 1916 there were 215,000 head of cattle in the country. The chief imports are cotton-yarn, cottons, tea, petroleum, paper goods and tobacco ; chief exports are sugar, rice, cotton and silk tissues and paper. The

government is a monarchy, the king being nom¬ inally assisted by a council of six, but French influence predominates. The King Than Thai, who succeeded to the throne in 1889, abdicated in accordance with the wishes of the French government, in favor of his second son, Duy- Tan, b. 1900, who is under the control of a Council of Regency. The ports of Tourane, Qui-Nhon and Xuan-Day are open to European commerce and the customs revenue conceded to France. French troops occupy part of the cita¬ del of Hue, the capital (Pop. 60,611). Bin-Dinh, the largest town, has 74,400 inhabitants. Anamite functionaries, under the control of the French government, administer all the internal affairs of Anam.

The inhabitants are from two races, the Mountain Mois and the Anamese proper, and generally under the middle size and less robust than the surrounding peoples. Their language is monosyllabic and is connected with the Chinese. The religion of the majority is Bud¬ dhism, but the educated classes hold the doc¬ trines of Confucius; besides which there are 420.000 Roman Catholics. Anam was conquered by the Chinese in 214 b.c., but in 1428 a.d. com¬ pletely won its independence. The French began to interfere actively in its affairs in 1847 on the plea of protecting the native Christians. By the treaties of 1862 and 1867 they obtained the southern and most productive part of Cochin-

China, subsequently known as French Cochin- China-, and in 1874 they obtained large powers over Tonquin. By the treaty of 1884, ratified at Hue, 1886, Anam was declared a French protectorate. Consult Barral, (La Colonisation frangaise au Tonkin et en Annam) (Paris 1899) ; Dumontier, (Les symboles chez les An- namites5 (ib. 1890) ; Fourneseau, (Le Siam ancien) (ib. 1895) ; Hannah, (Brief History of Eastern Asia *(New York 1900) ; Jammes, (Au pays annamite> (Paris 1898) ; Leraye, ^'Em¬ pire d'Annam et le peuple annamite) (1899) ; Norman, (Peoples and Politics of the Far East* (London 1895) ; Patte, P., (Hinterland Moi* (Paris 1906).

ANAMORPHISM. See Metamorphism.

ANAMORPHOSIS, a term applied to a drawing so executed as to present a distorted image of the object represented, but which, if viewed from a certain point, or reflected by a curved mirror or through a polyhedron, shows the object in true proportion.

ANANIAS, a member of the Church at Jerusalem, struck dead with his wife Sapphira because of an attempt to misrepresent the amount of their gifts to the Apostle Peter. The name was also borne by a Damascus dis¬ ciple named in connection with Saul's adven¬ ture there and by a high-priest in Jerusalem belonging to the Sanhedrim.

ANANTAPUR, India, a town and district in the Madras presidency. The town has a station on the Madras Railway, 62 miles south¬ east from Bellary. Pop. about 8,000. The dis¬ trict was constituted in 1882 out of the un¬ wieldy district of Bellary. It has an area of 5,557 square miles and in its northern and central portions is a high plateau, generally un¬ dulating, with large granite rocks or low hill ranges rising here and there above its surface. In the southern portion of the district the surface is more hilly, the plateau there rising to 2,600 feet above the sea. There is a remark¬ able fortress rock at Gooty, 2,171 feet above the sea, and a similar but larger rock at Penu- konda, with an elevation equal to that of Ban¬ galore, about 3,100 feet. Gooty fortress was a stronghold of the Mahrattas, but was taken from them by Hyder Ali. In 1789 it was ceded by Tippoo to the nizam, and in 1800 the nizam ceded the district to the British in payment for a subsidiary British force. The principal crops are millet, rice, other food grains, pulse, oil seeds and cotton. There are several steam factories for pressing cotton. Pop. about

790,000.

ANAPA, a-na'pa, a seaport town of Russia, situated on the Black Sea. It has been vari¬ ously the possession of Turks and Russians, but has belonged to Russia from 1829. Pop. about 7,000.

ANAPAEST, in prosody, a foot consisting of two short syllables and one long one. In the comedies of Aristophanes it was the dom¬ inant measure, and Greek choruses employed it in their exits and entrances. From this lat¬ ter circumstance it was frequently styled the marching rhythm,

ANAPHRODISIACS, an-af'ro-diz'i-aks, are remedies that are supposed to diminish sexual power or desire. They may act directly on the vegetative genital synapses in the spinal

cord, indirectly through the circulation on the brain, or peripherally on the sense organs. Inasmuch as local irritation is a frequent cause of stimulation of the genital sense, attention to cleanliness is imperative and the removal of all sources of irritation indicated. Local analgesic applications, such as weak solutions of carbolic acid — 1 to 2 per cent

— or oxide of zinc oint¬ ment with carbolic acid, are useful. Of the general anaphrodisiacs the bromides are the best. Bromide of sodium or potassium are most frequently employed. Special medical ad¬ vice is needed in the treatment of persistent genital excitement.

ANAPHYLAXIS, an exaggerated suscepti¬ bility on the part of certain individuals to cer¬ tain chemical substances, chiefly proteids, which may either be taken into the stomach, such as mussels, crab meat, strawberries, etc., breathed, such as various hay fever and asth¬ matic reactions to various plant pollens, or which may be injected into the body, such as horse serum. Richet, a French physiologist, first studied it extensively in connection with mussel poisoning, although the studies of Jen- ner on smallpox and cowpox were really studies of this phenomena, as well as those of Magendie in 1839, Behring in 1901, but Richet first gave the name. When such substances, to which the individual is susceptible, are brought into contact with the body, they produce their sudden reaction : in some instances with a skin urticaria (hives), skin rashes, eruptions; at other times swelling of the joints, or of the mucous membranes, such as in some hay fevers, some asthmas ; again with nausea, vomiting and profuse diarrhoeas (often incorrectly called ptomaine poisoning).

The causes for these anaphylactic reactions are extremely complicated and not yet thor¬ oughly elucidated. They are not pure chemical phenomena, but are mediated by the vegetative nervous system, and are more striking in a certain group of individuals who are termed vagotonic (q.v.). Consult Hackett, (Reference Handbook of Medical Sciences) (Vol. I, 1913).

ANAPT'OMOR'PHUS, a fossil lemur from the Eocene of Wyoming, allied to the modern tarsier. Some authorities have consid¬ ered this animal as related to the ancestral line of man.

ANARCHISM, a theory of social organi¬ zation, numbering, it is said, about 1,000,000 adherents. Its doctrines represent the extreme of individualism. It looks upon all law and government as invasive, the twin sources whence flow nearly all the evils existent in so¬ ciety. It therefore advocates the abolition of all government as we to-day understand the term, save that originating in voluntary co-op¬ eration. Anarchists do not conceive of a so¬ ciety without order, but of an order arising out of the law of association, preferably through self-governing groups, for it may be said that, with here and there an exception, anarchists regard mankind as gregarious. (<Our object is to live without government and with¬ out law,® said Elisee Reclus, the eminent geog¬ rapher, and in his day the leading anarchist of

France. Anarchists do not ignore the enor¬ mous economies resulting from the law of as¬ sociation, but insist that the law will be better served in a state of freedom and in the absence

of all compulsion. They believe that everything now done by the state can be better done by voluntary or associative effort, and that no re¬ straint upon conduct is necessary, because of the natural tendency of mankind in a state of freedom to respect the rights of the individual. The repression of crime, where crime might arise, could safely be left to spontaneously cre¬ ated organizations, such as the Vigilance Com¬ mittees in early California, where no State gov¬ ernment existed. In the view of Prince Kro¬ potkin, the leading Russian anarchist, no cause for litigation would arise after we had abol¬ ished ((the present system of class privilege and unjust distribution of the wealth produced by labor, that creates and fosters crimed

To quote further from Kropotkin: ((We are nurtured from our birth to believe that we must have government. Yet the history of man proves the contrary. When small bodies or parts of humanity broke down the powers of their rulers and resumed some part of their foreordained freedom, these were always ep¬ ochs of the greatest progress, economically and intellectually. In the direct ratio to the free¬ dom of the individual he advances.®

Early attempts at mutualism were those of W. Thompson in England and J. Warren in the United States. In 1827, Warren opened a (<Time store® in Cincinnati, where labor was exchanged hour for hour in different kinds of goods.

It is not easy to sum up in a few paragraphs the leading doctrines of any economic sect and at the same time retain absolute accuracy of statement. It should therefore be said that anarchists, while agreeing that the doctrine of laissez faire should be extended to all depart¬ ments of human activity, are by no means in agreement on all points. There are evolution¬ ary and revolutionary anarchists, and com¬ munist- and individualist-anarchists. The point on which all are agreed is in their opposi¬ tion to compulsory forms of government, and in regarding the necessary despotism of major¬ ities in a democracy as only a little less hateful than the despotism of a monarchy. <(Govern- ments are the scourage of God,® says Proudhon, with whom the philosophy of modern anarchism may be

said to have begun.

Pierre Joseph Proudhon was born in Be- sangon, France, in 1809, and died in 1865. Germs of the doctrine of which he is the founder may be traced to much earlier, even ancient periods. Among his modern precursors is William Godwin (b. in Wisbech, England, 1756; d. in London, 1834), who is better known as the author of the novel, (Caleb Williams, 1 but who in his (Inquiry Concerning Political Justice,1 which appeared in 1793, advocated the abolition of every form of government, and formulated the theory of anarchistic com¬ munism. But modern anarchism as a force in sociologic thought began with the publication of Proudhon's famous essay, (What is Prop¬ erty1 (1840). In it he rejects all law and au¬ thority, but in a work which appeared in 1852 entitled, (The Federative Principle,1 he seems to have modified in a measure his former the¬ ory of government and favors the formation of self-governing communities. In the former work occurs the phrase which is destined to be forever associated with the name of Proudhon,

but which was uttered by the Girondist Brissot a half century earlier, "Property is robbery.®

It was upon the notion that he had fur¬ nished a demonstration of this thesis that Proudhon especially prided himself. But this phrase as used by the father of anarchism must be held to apply rather to modern methods of acquisition than to property itself, for Proud¬ hon was an individualist, not a communist-an¬ archist, and strove, however unsuccessful he was in making himself understood, rather to refine than to destroy the idea of property. In all his reasoning on this point there is much dialectic subtlety, of which, with perverted in¬ genuity, Proudhon was overfond; but it may be said that what he really sought was the over¬ throw of all prevailing theories of property with a view to rendering it unassailable from the standpoint of exact equality and social jus¬ tice. His chief American follower was Ben¬ jamin R. Tucker, who started a journal Lib¬ erty, in 1881, and combined Spencerianism with the views of his master. In Germany Proud¬ hon found adherents in Hess and Grim, who showed a strong Hegelian influence. The doc¬ trines of anarchism in the hands of Michael Bakunin underwent a change from the advo¬ cacy of a purely peaceful revolution to one of force. Bakunin was born in 1814, died 1876. He was prominent in the Paris Revolution of 1848, was surrendered to Russia and sent to Siberia, but succeeded in making his escape. His principal work, in addition to innumerable pam¬ phlets and addresses, is (Dieu et l'Etat.1

“The propaganda by action,® as it is termed, by which it was hoped to inspire such dread and horror as to compel the adoption of meas¬ ures of social amelioration, or perhaps the overthrow of the state itself, has borne abun¬ dant fruit in the attempted assassination of Em¬ peror William in 1878, in the attempt upon the life of the German princes in 1883, in the as¬ sassination of President Carnot, of France, in 1894, of the Empress Elizabeth, of Austria, in 1898, of King Humbert, of Italy, in 1900, and of President McKinley, by Czolgosz, in the autumn of 1901. Other anarchist crimes were the throwing of a bomb in the French Chamber of Deputies, in 1893, by Vaillant, the bomb ex¬ plosion in Paris, caused by Emile Henry, in 1894, the attempt by Lipsich on the (then) Prince of Wales at Brussels in 1900, the at¬ tempt on the lives of the King and Queen of Spain on their wedding day in 1906," and the murder of King George of Greece on 18 March 1913. See also Sabotage; Syndicalism; Ferrer, Francisco.

The Haymarket tragedy of 1886, in Chicago, by which a number lost their lives in an ex¬ plosion from a bomb thrown by some unknown hand, and which resulted in the trial and con¬ viction of seven professed teachers of anar¬ chism in that city, four to the gallows, two to life imprisonment and one to a term of 15 years, aroused the attention of the whole civil¬ ized world. It is now seen, after the lapse of 17 years, that these men, even if dangerous to the community, were convicted more largely by the existing state of public terror than by any actual evidence connecting them with the throwing of the bomb. The fact that the par¬ don of the three who escaped the gallows was petitioned for, after the terror of the time had

died away, by some of the most prominent citi¬ zens of Chicago, is proof of the change the public mind underwent regarding the accused. The controversy over the justice of their con¬ viction is still unsettled. With these acts of murder and vengeance the purely economic doctrines of anarchism have of course no rela¬ tion. <(lhe propaganda of action® is repudi¬ ated by those who are sometimes termed <(phi- losophical anarchists,® to distinguish them from the revolutionary wing. This latter school regards force as fundamentally at war with their ideals. It does not believe that the social revolution can be accomplished by the methods of Bakunin and his school. Proudhon never preached force.

With the policy of ((propaganda by action® in this country is linked

the name of Johann Most, a former member of the German Reich¬ stag; in France, that of Charles Malato (((I love and admire Vaillant just as some English Republicans love and admire Cromwell, who was also a regicide® — Charles Malato) ; and in Italy, that of Enrico Malatesta, an anarchist, like Kropotkin, of noble family. (((It seems to me that in the natural order of evolution vio¬ lence has as much a place as the eruption of a volcano. All great progress has been paid for by streams of blood. I cannot see how the present conditions based upon force can be changed in any other way than by force, and so long as they use force against us we must in self-defense employ violent methods.® — En¬ rico Malatesta).

As Proudhon was the father of anarchistic individualism, Kropotkin is as indisputably the father of anarchistic communism. Theoretic anarchism for some time subsequent to the ad¬ vent of its French founder was rigidly indi¬ vidualistic. Max Stirner, a follower of Proud¬ hon in Germany, whose philosophy was more of a blank negation than that of his master, pushed the ego to a point where it more re¬ sembles a caricature than a dogma, and Bakunin hated the idea of communism. But in Kropotkin it must be said that the idea of property has reached its disappearing point, and the ideal of anarchism is at the last purely communistic. Kropotkin's life and his roman¬ tic career, united with the vast store of knowl¬ edge he possesses, give to his professions of anarchism a fascination and a weight. Com¬ munistic anarchism is essentially the doctrine of Tolstoy, who combines it with religious mo¬ tives.

Bibliography. — Eltzbacher, P., Anarchis- mus) ; Grave, J., <La Societe au lendemain de la revolution1 (1882); Hamon, (Les hommes et les theories de l'anarchie) (1893) ; Kropot¬ kin, P. A., (Paroles d'tin revoke1 (1884); (Conquest of Bread) (1906) ; Anarchist Mo¬ rality1; (Anarchist Communism,1 etc.; Mala¬ testa, E., A Talk about Anarchist Communism1 (1891) ; Nettlan, M., < Bibliographic de l'anar- chie1 (Brussels 1897) ; Reclus, E., (Evolution and Revolution1 ;• Spooner, L., (Natural Law, or the Science of Justice1 (Boston 1891) ; Tol¬ stoy, L., (The Kingdom of God is Within You,1 etc.; Wilson, C., Anarchism1 (Fabian Tracts iv).

ANASTASIA, an-as-ta'shi-a, Saint, the name of three Christian martyrs.. (1) A virgin said to have been a pupil of Saints Peter and

Paul, and slain under Nero (54-68 A.D.). She is commemorated April 15. (2) ((The

Younger,® martyred under Diocletian, 304, wife of one Publius, a pagan, who himself laid an information against her. Two alleged let¬ ters of hers in prison have been preserved. The Greeks commemorate her the 22d of December, the Latins the 25th. (3) A Greek maiden of

Constantinople, whom Justinian (about 597) sought as a mistress. To escape him she fled to Alexandria and lived there disguised as a monk for 28 years. She is commemorated 10 March.

ANASTASIUS, an-as-ta shi'us, the name of four Popes, the first and most eminent of whom held that office 399-401. He was a strong opponent of Origen. Anastasius II succeeded Gelagius I in 496; d. 498. Anastasius III filled the papal chair 911-13. Anastasius IV was Pope 1153-54.

ANASTASIUS I, an emperor of the East who succeeded Zeno, a.d. 491: b. about 430; d. 518. He distinguished himself by suppressing the combats between men and wild beasts in the arena, abolishing the sale of offices and building the fortifications of Constantinople. His support of the heretical Eutychians led to a dangerous rebellion and his anathematization by the Pope.

ANASTASIUS II, an emperor of the East who was raised to the throne in 713. At¬ tempting various reforms, he was deposed in 716 and became a monk at Thessalonica.

ANASTASIUS, a romance by Thomas Hope (1819). The author was known to have written some learned books on furnishing and costume; but Anastasius1 gave him rank as an accomplished painter of scenery and delineator of manners. Anastasius, the hero, a young Greek ruined by injudicious indulgence, is haled before a Turkish magistrate. Discharged, he fights on the side of the Crescent and goes to Constantinople, where he resorts to all sorts of shifts for a livelihood — jugglery, peddling, nostrum-making; becomes a Mussulman, visits Egypt, Arabia, Sicily and Italy, and finally dies young, a worn-out and worthless adventurer. The book has passages of great power, often of brilliancy and wit ; but belongs to the fash¬ ion of a more leisurely day and is now seldom read.

ANASTATIC PRINTING, a process by which a facsimile of a page of type or an en¬ graving, old or new, is reproduced in the man¬ ner of a lithograph or page of letterpress.. The print or page to be transferred is dipped in di¬ luted nitric acid, and, while retaining a portion of the moisture, laid face downward on a pol¬ ished zinc plate and passed through a roller- press. The zinc is immediately corroded by the acid

contained in the paper, excepting on those parts occupied by the ink of the type or engraving. The ink, while rejecting the acid, is loosened by it and deposits a thin film on the zinc, thus protecting it from the action of the acid. The result is that those parts are left slightly raised in relief, and the plate being then washed with a weak solution of gum, and otherwise treated like a lithograph, the raised parts, being greasy, readily receive ink from the roller and give off a facsimile impression of the original.

ANAS'TOMO'SIS, in anatomy the join¬ ing of the branches of a vessel with other ves¬ sels of the same or a different branch. Anas¬ tomoses are Jound in the arteries, veins and lymphatics. Anastomoses of nerve and muscle fibres are also spoken of.

ANATASE, a mineral more correctly

known as Octahedrite (q.v.).

ANATH, a'nath, is the name of a goddess worshipped in Palestine, as apparently appears from the name of a city mentioned in Joshua and Judges — Beth-Anath, meaning the house of Anath. Anathoth, which may be the plural, is mentioned in the prophecy of Isaiah. A. H. Sayce thinks it is a Chaldean deity worshipped by the Canaanites. The name Anath is said to be found on Egyptian monuments of the 18th dynasty. Anathoth was the home of Jeremiah the prophet.

ANATHEMA, a word used in a form of excommunication from the Church. It is prop¬ erly a Greek word, and was originally applied to an object set apart and devoted to a deity, such as a gift hung up in a temple (being de¬ rived from the Greek anatithemi, I lay up) ; but it gradually came to mean separation from God and men, something accursed; and latterly to pronounce an anathema, to anathematize, became much the same as to curse. Anathema occurs repeatedly in New Testament Greek, in the English version being generally rendered “accursed,® but once the original word is re¬ tained (1 Cor. xvi, 22) along with niaranatha, the latter serving apparently to intensify the curse, though it is properly a Syriac expression signifying “the Lord will come.® The Greek and Roman Catholic Churches both make use of the anathema. In the latter it can be pro¬ nounced only by a Pope, council or some of the superior clergy. The subject of the anath¬ ema is thus declared an outcast from the Church. When councils declare

any belief heretical the declaration is couched in the fol¬ lowing form: Si quis dixerit, etc., anathema sit, “If anyone says (so and so) let him be anathema.® The anathema was thus pronounced by the Vatican Council against opponents of the doctrine of papal infallibility. In the Mid¬ dle Ages the anathema was freely used. See Excommunication.

ANATHEMA. Andreyev’s five-act drama (Anathema,) published in 1909, betrays the ef¬ fect made upon him by the book of Job. In the prologue as well as in the epilogue the Devil, who is throughout named “Anathema,® the Accursed One, appears before the eternal dual Arbitrator who guards the entrance “be¬ yond the iron Gates,® and boasts of his com¬ ing conquest of David Leizer, “a sick and foolish old Jew whom no one knows® and who seems forgotten even of God. The five acts of the play show David given over like Job to the machinations of Anathema, who, finding him in the midst of sordid poverty, brings to him as if from his brother, dead in America, a fortune of 2,000,000 rubles. At the de¬ sire of his ambitious wife, David hires a pal¬ ace; his beautiful daughter Rose tries to make the most of her attractions; his son Naum, dy¬ ing of consumption, takes dancing-lessons. David is unhappy and resolves to give away all his possessions. He commands Anathema, who,

under the name of Nullius, has stayed with him as his adviser, to summon all the poor and unfortunate to share in his worldly goods. The great fortune is utterly inadequate to meet such demands. The sick and the blind come to him for cure; those that have lost loved ones demand a miracle of him. He tries to es¬ cape ; they follow him into the wilderness, and, when they find he can do nothing for them, they stone him to death. Anathema exults and again appears before the dread guardian of the Beyond to boast of his victory, but is told that “David has attained immortality and lives forever in the deathlessness of light which is life.® Anathema refuses to believe such a tale and goes away, still blaspheming the name of Truth. There is nothing of Faust in David Leizer. He is unchanged by his new riches. Anathema is a cringing Mephistopheles who leads his victim on to apparent destruction by seeming to meet all his benevolent desires. The purely realistic scenes of the work are full of humor and pathos. These passages are prac¬ ticable on the stage, but as a whole it is rather a closet-drama than one adapted for the mod¬ ern stage. It was translated into English by Herman Bernstein and published in New York in 1910.

Nathan Haskell Dole.

ANATHOTH, a town in Palestine, as¬ signed to the Levites, the

birthplace of the prophet Jeremiah and the home of Abiathar the high-priest. It was about three miles north¬ east of Jerusalem, and the small village of An- ata occupies its site.

ANATIDˆE, the family of birds that in¬ cludes the fresh-water ducks (q.v.). The typ¬ ical genus is Anas , represented by the mallard.

ANATOL. Arthur Schnitzler, past-master of the Viennese drama, opened his career as playwright in 1893 with (Anatoly a series of seven scenes from the life of a sentimental philanderer. Anatol is a fashionable worldling who seeks relief from society in the compan¬ ionship of this or that pretty child of the peo¬ ple. Each scene exhibits some phase of an affair with a different charmer. Now he hesi¬ tates to ask his Cora, who lies hypnotized, whether she has been faithful, lest his illusion be dispelled. Now he confesses to a woman of his own class his joy in his humble mistress of the moment, a girl who lacks beauty, elegance and wit, but from whom emanates the soft lure of a spring evening and the spirit of love itself. Now Anatol grows almost tearful as he meditates upon the romance of a by-gone hour and all he must have meant to little Bianca, who presently reappears, unable even to recall him. Now he rages against his Emilie, not be¬ cause she has had another lover, but because she would keep, for its price alone, the black diamond he had given her. Now he tenders a farewell supper to a ballet dancer, dreading to break to her the news that he has found a fairer friend, but only to learn that Annie has replaced him by an artist of the chorus. Again he chafes to hear his inamorata citing against him her husband's tastes and preferences; and now on his marriage morning he finds himself embarrassed to dispose of Ilona, who has frolicked with him the night before and little dreams that he is to leave her. Thus sentiment

mingles with cynicism, melancholy with humor, in scenes which, despite their sensual implica¬ tions, are delicate and refined. Technically, (AnatoP is of interest as substituting for a dramatic story a series of impressionistic pic¬ tures linked but loosely by an art deriving less from the stage than from fiction. Schnitzler's dialogue is delightful, quick to respond to every shift of emotion, suggestive, restrained, and evincing the finest literary tact. For English readers and playgoers, the piece has been pleasantly paraphrased by Granville Barker as (The Affairs of AnatoP (1911).

Frank W. Chandler,

Dean College of Liberal Arts, University of Cincinnati.

ANATOLI, a'na-to'le, Jacob, Hebrew scholar: b. 1194; d. 1256. He was invited to Naples by the enlightened ruler, Frederick II, and under this royal patronage and in associa¬ tion with Michael Scot, made Arabic learning accessible to western readers. Among his most important services were translations of works by Averroes.

ANATOLIA, the modern name of Asia Minor. See Asia Minor.

ANATOMY, literally a cutting up; but anatomy usually signifies the special study of the structure of organic bodies, morphology (q.v.) and applies to both animals and plants. Animal morphology is the stud}'- of human or other animal forms, the study of the relation¬ ship between the forms constituting Compara¬ tive Anatomy (q.v.). The study of the minute or microscopical anatomy is termed Histology (q.v.). Developmental Anatomy is the study of the gradual growth of the animal, Embryology (q.v.). In the plant world there are also the correlated branches of Plant Morphology, Com¬ parative Anatomy, Histology and Embryology. The study of the microscopical structure of the single cell is termed Cytology; of collections of related cells and tissues constituting organs, Organology ; thus t&eˆtpdx.of the bony system is termed Osteology, of the structures of circu- latfon Angiology, of nerve structures Neurol¬ ogy, of the muscles Myology, of the viscera Splanchnology, etc. Each in its turn has its special departments of investigation.

The study of anatomy may be approached from the purely descriptive side, Descriptive Anatomy, or may deal with the anatomy of re¬ lated organs in related animals, as Systematic Anatomy. Applied or Practical Anatomy, or that branch dealing with its study as an aid in the diagnosis and treatment of disease, may be designated as Medical or Surgical Anatomy. Regional and Topographical Anatomy deals with the study of special parts or the special relations to surrounding parts.

History. — The beginnings of human knowl¬ edge of the structure of organic bodies are preserved from the earliest times in fragments only, but there are very good reasons for be¬ lieving that much more was known many thou¬ sands of years before the Christian era than there is written evidence to substantiate. The history of anatomical study is correlative with the history of medicine, and even in very early times inquiries were made concerning the structure of the human and animal body.

It is usual to ascribe to the Greeks the first foundations of anatomical knowledge, but it

seems that Chinese culture, which was highly developed when the peoples of Europe were in a very primeval condition, had a well system¬ atized medical lore that included much exact pharmacological knowledge, with some few anatomical facts, although the anatomy of the early Chinese was largely speculative. Section of the human as well as lower animal bodies was forbidden by at least two of the religious sects of early Chinese culture, the Alman and Buddha worships. It is interesting to note that as early as 2838-2699 b.c., Shinnong was a half- mythical medicine man in China, and it is said that Chinese works on medicine were written as early as 2698-2599 b.c. (Hwang Ai).

In India the sacred work of the AyurVeda, supposed to date from between the 14th to the 9th centuries b.c., at least 100 years before the cult of yEsculapius had begun, contains descrip¬ tions of the human body obtained from dissec¬ tions, and it has been maintained that Charaka and Susrutu, the earliest of Indian physicians, should be considered the. earliest anatpmists. Inasmuch as the probable dates of these Indian worthies is much more recent than was former¬ ly supposed (100 a.d.) , little can be made of these claims. At all events their anatomy was much cruder than that of the Hippocratic school circa 400 b.c. Egypt contributed some¬ what to the knowledge of anatomy, and the Papyrus Ebers, 1553? b.c., is a monument of old Egyptian medicine. It is of interest to note that some of the Hippocratic nomenclature of anatomy is of Egyptian origin. The influence of religion, however, wras very strong in the shaping of Egyptian medicine. Evisceration was largely practised and undoubtedly led to the collection of many anatomical facts, the iin-uortance of which has become lost to students. It is certain, however, that the school of medi¬ cine situated in Greece, on the island of Cos, laid the firm foundations of our knowledge of anatomy. It was in Greece also that the phy¬ sician's profession was amply recognized. This early Hippocratic age gave rise to a profes¬ sional conscience, and the <(Physician's Oath,® or the ((Hippocratic Oath,® <(is a monument of the highest rank in the history of civilization® (Gomperz: (Greek Thinkers*).

There were at least seven physicians with the name of Hippocrates who taught in the early times. Hippocrates II (430 b.c.), how¬ ever, was the great Hippocrates, but the knowl¬ edge of anatomy then possessed must be con¬ sidered as the accumulation of the school rather than the work of any one man, for, as has al¬ ready been

pointed out, some of the Hippocratic nomenclature is Egyptian in origin (v. Oefele). Inasmuch as the Hippocratic writings are partly preserved, a better idea of the anatomical knowledge of the times may be gathered from them than from the mythical, traditional, and fragmentary remnants left by other peoples. The school of Cos had a fairly accurate and ex¬ tensive knowledge of the human skeleton, and they knew the general shapes and varieties of most of the internal organs. Their physiological hypotheses, however, were crude but suggestive.

From the time of the great Hippocrates the school of Cos seemed to deteriorate, although Polvbus, the son-in-law of Hippocrates II, Syennesis, Diogenes and Praxagoras, the last named being noted for his anatomical knowl¬ edge, kept alive many of the traditions of the

school. With Aristotle (384-323 b.c.) there came a period of more exact science and the dissection of the lower animals was practised, hence Aristotle may be termed the father of Comparative Anatomy. His researches in anatomy were wide and deep and his work on animals contains much that is still taught.

The Alexandrian period, 300 b.c., during which the culture of Rome and of Greece was encouraged in Egypt under the Ptolemies, shows as a bright spot in the history of anatom¬ ical science. With the foundation of the Alex¬ andrian Museum, the analogue of a modern university, the practice of human dissection became authorized. This period was a brilliant one in the history of medicine. Herophilus and Erasistratus were among the ea.rly leaders, the former making some noteworthy contributions to the knowledge of the anatomy of the brain. He maintained that it was the organ of thought and the origin of motion. He also described the lacteals and the lymphatics, and was an indefatigable searcher for the seat of the soul, which he placed in the floor of the fourth ven¬ tricle of the brain, the place now known to be the site of the cranial nerves, that are indispen¬ sable for the function of breathing. Heroph¬ ilus also is credited with the destruction of the old doctrine that the arteries held air, hitherto the veins only having been thought to contain blood.

Erasistratus first described the valves in the veins, made the general subdivision of sensory and motor nerves, and drew the generalization of the relation of the complexity of the brain convolutions and mental

development. He also first suggested the thought of anastomoses be¬ tween the arteries and veins. Many others followed, but the rise of the Empirical school (q.v.) was the forerunner of the gradual de¬ cay of the Alexandrian school. It was to the newly arisen empire of Rome that the stream had turned, and until the time of Cato Greek physicians flourished in Rome. Asclepiadcs (126-56 b.c.) was one of the founders of the Atomic school at Rome, and Rufus (97 b.c.) of Ephesus, with A. Cornelius Celsus (25 B.C.-40 a.d.) were among those who have left definite anatomical landmarks. Celsus is known as a brilliant man, a compiler of the work of his predecessors. His anatomical work was insig¬ nificant, but he contributed largely to thera¬ peutics. The last dying ember of this Alexan¬ drian transplanted school showed in Claudius Galen, a Greek from Pergamos, a town already noted for its 2Esculapian temple. Galen was a man of great brilliancy, an independent thinker, and it was to his literary efforts that much of the history and treatment of the Hip¬ pocratic school has been preserved to us. His works on anatomy alone were at least 15 in number, nine of which are preserved. Galen systematized much of the anatomical knowledge of the time, and although much of his data was drawn from the study of apes it was to pass muster in the service of human anatomy. He was perhaps the first to make any experi¬ mental physiological studies. His descriptions of the relations of the brain to the spinal cord and his knowledge of the cranial nerves were in advance of his predecessors. Galen's work stands out as the last systematic work of the Greek period, and following his death began

the dark era of the barbaric inroads of the northern races and the dispersal of the culture of the East.

For a period of many centuries history is comparatively silent on the subject of medicine. No great schools arose, yet the doctrines of the ancient Greeks were kept alive in many places by obscure scholars and by many peoples, al¬ though it is known that the Saracens were largely instrumental in keeping intact that which Galen had handed down, without adding much, however, to his teachings. A flourishing intellectual development took place in the Byzantine countries, and many universities were founded by the Arabs, where the Roman-Hellenic culture was mingled with the Chris¬ tian-Oriental ideas to found a new culture. Among the most famous of the Oriental phy¬ sicians was Sergios von Resaina (536). He translated both Galen and Hippocrates into Syrian. Oreibasios was also a commentator of the Greeks; Avicenna (980-1036) was the Galen of the Orientals. This period of medi¬ cal history has been called the Arabic period, and not until the influence of the crusades commenced to make itself felt did

the period of the Renaissance begin.

The history of medicine (anatomy) now becomes more and more multiplex ; new schools begin to be founded. Salerno, Naples, Mont¬ pelier, Venice, Bologna, Prague, Vienna and Oxford successively built universities and at¬ tracted the ablest minds in medicine. Scholars traveled from university to university to learn from a professor here and a professor there, and the fortunes of the universities rose and fell like the tides of the sea. In 1224 it is said that the University of Bologna alone had 10,000 students. Among the early names of this period of transition mav be mentioned Lisfranc (1295) ; Mondino (1275-1327), who wrote the first anatomy since the time of Galen, and which reached 25. editions — he also suffered persecutions for his zeal in dissecting; Linacre (1461-1524), of England, was one of the earliest scholars to bring the results of the new awak¬ ening to Oxford and to Cambridge ; and Syl¬ vius, or Jacques Dubois, a Frenchman, was an¬ other of these great early anatomists of the reconstruction period. Sylvius first arranged all of the muscles of the human body and gave them the names which, for the most part, they now carry.

Andreas Vesalius (151 4—64) , a Belgian, first studied at Louvain, and later became a pupil of Sylvius at Paris. At the age of 22 he became professor of anatomy at Padua, and at 29 issued a monumental work on anatomy, the best that had been given up to that time. He corrected many of Galen's errors and had a checkered career. General gross anatomy under Vesalius, who was a son, grandson and great- grandson of a physician, began to assume more definite shape. In his student days at Paris under Sylvius, anatomy was taught upon the animal cadaver. Sylvius, however, was an un¬ compromising Galenist, and, although he made dissections, he followed Galen's treatises in very servile fashion. He was practically the last of his school, and his doctrines were swept away by the light thrown by this indefatigable seeker after truth as drawn from nature rather than from books. «My study of anatomy,® said

ANATOMY — THE HUMAN SKELETON

4 Coronal sut urr • - p3f-eia' bone

- 1 frontBl bore-
- '3 Temporal Done ft Orbits

9 Side of ocrip fal core ",r > Malar or cheeU-bone 10 Condyloid process of to wer jd*

7 Superior mex.llary — Upper jaw bone

bones 6

H Angle of lower jaw

Symphysis of lowtfi' jaw 12

Four lower cervical vertebra ■ 7 m all)

20 l*rst bon e oF sternum

Clavicles — CoHar-bones • 24 Coracoid process of scapula

_ ˆ 25 Acromion of scapula

ao upper and two tower dorsal Vertebra (12 mail) 14

Shoulder- blade

Head of bumerifs — Arm -bone

■ A n t a r i c r s>). -face ' scapula

humerus

Cartilagesˆ /. *] M of ribs

21 Second bor-e of sternum

\Z Ens-fcrm cj

*A ? * Condyles of humerus.

- *0 Heed of radius -

Outer bone of forearm

Ulna -Inner bone of forearm lumbar vertebrae (5 in number)

31 Body of radius

35 Antenor cˆperior process of ilium •3(> Anterior inferior process itium.

■ ‘39 Bnm of peiv.s

-3d. dead of femur or thigh-bone

V • •• 43 Trochanter major of remur

42 Neel*, cf femur.

\ 3& Tuoerositv'

\ of ischium

37 Symphysis pubis.

1 Coccyx

40

foramen ovate

44 Body of femur

2 Semilunar bone

•3 Cuneiform bone -'1 Pisiform bone "ft Uncform bone

Scaphoid bone 1- Trapezium S-

Trapezoid Q -

Os magnum J--- 1

9 Metacarpal bones of thumb and fingers.

row of phalanges mb and fingers

,46 Patella — 1 Knee -pan

Superior articulated surface - I of astraga 'us

3-0 first row of l phalanges of thumb ano fingers

Commencement of groove of interosseous

ligament 4 - i

"mUlujlij!

Ml: •

Condyles of femur 45

♦11 Second ro»* of l phalanges of fingers.

Jr tfi’iOr OOrlicn

of astragalus

t» rut > ecaaity of scaphoid bone ”» Scaphoid bone

Head of t« b *3* — * Thick bone on nner

Cuboid bone

JO •-

side of 'eg"

External 9 cuneiform bone

e» Middle

cunfform ocnc - -7 Internal

Cuneiform bone

0 Fibula --Thm bone on external si

M etatnrsa bores

Second row 13 of phai.jp ces

first row Zr oh^larges of toes

14 Third .row of pha'anges

- ^ . JA

ANATOMY — THE MUSCLES OF THE HUMAN BODY

ANATOMY

629

he, ((would never have succeeded had I, when working at medicine at Paris, been willing that the viscera should be merely shown to me and to my fellow students at one or another public dissection by wholly unskilled barbers, and that in the most superficial way. I had to put my own hand to the business.® Human dissection was rapidly and superficially practised, but Ve- salius is known to have haunted cemeteries and gibbets to obtain human material. The results of his

studies were published in 1543 in his masterpiece, (De Humani Corporis Fabrica. Libri VII, > the first of a long series of more distinct modern treaties on physiology as well as anatomy. Vesalius may truly be said to have been the founder of modern biological science. ((He brought into anatomy the new spirit of the time, the young men of the time who listened to the new voice.®

Of the contemporaries of Vesalius many were almost as famous as he. Eustachius at Rome, and Fallopius at Paris, Ferrara and Padua corrected many of Vesalius's details, and Eustachius may be said to have been the first to call attention to the study of embry¬ ology as an aid in the interpretation of gross anatomy. Both Eustachius and Fallopius made noteworthy additions to the knowledge of the ear. These were the days of enthusiasm in the discovery of new facts, and so great was the striving for the new culture that it is said that criminals were utilized for purposes of experi¬ ment and dissection, probably after smothering. A large coterie of brilliant men lived at this time. Servetus (1509-53), a Spaniard, first made out many of the true facts of the pulmo¬ nary circulation. Csesalpinus (1517-1603), a highly cultured scholar and a great botanist, was among the first to speak of the circulation of the blood. Varolius (1543-75) furthered the knowledge of the anatomy of the nervous system. Spigelius (1578-1625) made note¬ worthy studies of the liver. Realdo Colombo (1494-1559), who succeeded Vesalius at Padua, and was subsequently professor of anatomy at Pisa, filled out the outline of Servetus. Some authorities claim that he stole the ideas and correctly described the pulmonary circulation, although he did not appreciate the corollaries of his discovery. He imitated Vesalius and his work in a bold reproduction of his friend's studies; and Fabricius (1537-1619), who suc¬ ceeded Fallopius at Padua, built a special ana¬ tomical amphitheatre where he taught anatomy to England's great anatomist Harvey.

The time had now come for a mind who could take this accumulating mass of anatomi¬ cal facts, which after all were extensions in detail only of the old Hippocratic anatomy, and to discover new physiological principles, for it was noteworthy that although newer and better ideas of structure had been given, yet many of the old notions of function were still taught.

This was done by William Harvey of Eng¬ land. He was born in 1578, studied at many universities, mainly at Cambridge and Padua, and in 1615 first clearly demonstrated the cor¬ rect action of the heart and interpreted the his¬ tory of the circulation of the blood. Harvey's old anatomical preparations of this age are still in existence. From this

time onward newer interpretations were possible, and the study of anatomy and physiology, now correctly linked,

made rapid strides. These newer vantage grounds of interpretation were further ex¬ tended by the discovery of the microscope, and by this instrument the field of microscopical anatomy, or Histology (q.v.), was opened up, leading to far-reaching and important results to the welfare of mankind. The period of de¬ tailed and special advance may be said to have been foretold in the newly revived study of physics by Borelli and his school, and the newer chemistry of Van Helmont won from the mys¬ ticisms of alchemy. These united to interpret the results of anatomical research, and the gen¬ eral history of the subject of anatomy widens out, fan-like, into its several specialties. The subject of anatomy now becomes lost in the history of interpretations and applications, and the further developments of these are consid¬ ered in these volumes under their special heads where the developments of the various branches of anatomical research are considered. See Anatomy, Comparative; Anthropology; Biology; Chemical Physiology; Cytology; Embryology; Histology; Pathology; Physi¬ ology ; Surgical Anatomy.

Bibliography. — The most extensive of modern works on the history of anatomy is found with complete bibliography in Neuburger and Pagel's (Handbuch der Geschichte der MedicinF (2 vols., 1903) ; Garrison, (History of Medicine) (1915) ; Buck, H., (History of Med¬ icine to 1800) (1917). Of descriptive anato¬ mies there are many : Testut and Poirier in French; Bardelben and Spalteholz in German, the latter translated by Barker into English in 1903 ; Morris, Quain, Gray in English ; Leidy, Gerrish and Huntington in America. The bibliography of the special subjects will be dis¬ cussed in their sections. See Medicine, His¬ tory of.

Smith Ely Jelliffe.

ANATOMY, Comparative, is that sub¬ division of the science of zoology which deals with adult forms and structures of ani¬ mals with a view to determining their relation¬ ships. Comparative Anatomy and Embryology, the latter dealing with the immature forms and structures of animals, constitute the science of Morphology, which treats of the structure, de¬ velopment, classification and relationships of animals as contrasted with Physiology, which deals with their functions. In contradistinction to special anatomy, which has for its aim the description of all the structures and parts of any one animal, — for example, man, — the method of comparative anatomy is to compare corresponding parts in many different species, noting their

modifications and transformations with the ultimate purpose of determining the affinities or relationships of these species to one another. In the earlier history of this science the expressions ˆrelationship® or <(affinity® were used in a metaphorical sense, signifying merely relative positions in a system of classification. With the growth of the evolution idea, however, they have acquired a newr and literal meaning, since the aim of modern morphology is to deter¬ mine the genetic or blood relationships of ani¬ mals to one another and thereby to trace the evolution not only of the species but also of the various organs and parts. The great value of the comparative method in science is no¬ where better illustrated than in the study of

anatomy. There are probably not fewer than 1,000,000 known species of animals belonging to at least 10 or 12 distinct types. These ani¬ mals exhibit the various organs of animal life under a great variety of forms, and by means of comparison it is possible to determine in each case what is universal and essential and what is merely local and accidental, and also to indi¬ cate the steps by which complexity of organiza¬ tion has been attained. Furthermore the com¬ parative method throws a flood of light upon the significance of problematical and rudimen¬ tary structures such as the thyroid, the thymus and pineal glands of man, the purpose of which so puzzled the earlier anatomists. In fact it may fairly be said that it is impossible to com¬ prehend properly any structure of the human body without considering it in relation to similar structures in other animals.

I. Principles of Comparative Anatomy. — It is obvious that in the study of animals vari¬ ous standards of comparison might be employed ; for example, they might be compared as to color, size or length of life, but it is at once ap¬ parent that such comparisons would bring to¬ gether animals of the most diverse character¬ istics in other respects. As contrasted with such a purely artificial classification it was long the aim of naturalists to find a natural system ex¬ pressing the ((affinity® between organisms which could frequently be better felt than described. It was the great merit of Cuvier, often called the founder of comparative anatomy, that he insisted upon the importance of comparing the totality of the internal structures as well as the external characteristics of animals. By means of such comparisons he reached the conclusion that there were four great independ¬ ent branches or types of animal organization, namely, V ertebrata, Mollusca, Articulata, Radi- ata, each consisting of

forms fundamentally like one another but unlike those of other types. The principal criterion used by Cuvier for de¬ termining this fundamental likeness or unlike¬ ness was the relative positions of correspond¬ ing parts, particularly of the nervous system. ((The type is the relative position of parts® (Von Baer). Richard Owen, a pupil of Cuvier, introduced the term homology to describe this fundamental likeness, defining it as <(morpho- logical correspondence in the relative position and connection of parts.® He contrasted with this physiological correspondence of parts, which he named analogy. In closely allied ani¬ mals, organs which are homologous are usually also analogous, but in less closely related ones this may or may not be the case. Organs having the same function may be structurally very un¬ like, for example, the wing of a bird and that of an insect ; on the other hand, organs structurally similar may have very different functions, for example, the fore leg of a quadruped and the wing of a bird. This conception of homology lies at the very foundation of all morphological studies; it is the one criterion for determining likeness or unlikeness between organisms. Owen further distinguished between special and general homology, the former signifying fundamental likeness between corresponding parts of differ¬ ent animals, as in the case of the arm of man and the fore limb of a quadruped ; while the lat¬ ter refers to similar parts of the same individual, as in the case of the fore and hind limbs of a quadruped or the right and left sides of the

body. Since the term general homology as used by Owen is liable to misinterpretation it would be well to replace it by the expression meristic homology (Bateson), signifying by this term morphological correspondence be¬ tween parts of the same individual which may be repeated in any relation whatever. Meristic homology would thus include correspondence between parts which are repeated in a series, for example, the vertebrae of the spinal column (serial homology, homodynamy), between parts repeated on the right and left sides of the body, for example, right and left limbs (lateral homology, homotypy) and between parts re¬ peated in any other relations, for example, the fingers of one hand, upper and lower teeth, etc. (vertical homology, homonomy).

Significance of Homology. — To Cuvier and his followers homology meant <(conformity to type,® to the <(archetypal plan® established by the Creator. In the light of evolution, however, homologies are believed to be family or hered¬ itary likenesses due to inheritance from some common ancestor. For this reason special ho¬ mology might better be called homogeny (Lan- kester) or homophyly. Contrasted with this are such morphological resemblances as are not

due to inheritance, but to similarity of environment acting upon forms of dissimilar descent ; such false homology is called homoplasy (Lankester), homomorphy (Gegenbaur) or convergence. It is the task of comparative anatomy to apply to animal structures these criteria of likeness or unlikeness and to distinguish between these va¬ rious kinds of homology. These various forms of homology are summarized in the following table :

Homology

Special Homology (Homogeny, H o m o-

pliyly)

General Homology (Meristic Homology)

False Homology (Homoplasy, Homo¬ morphy, Conver¬ gence)

Homodynamy (Serial) Homotypy (Lateral) Homonomy (Vertical, etc.)

II. General Structures and Functions of Animals. — 'Although the differences between the highest and the lowest animals are enormous there are nevertheless certain structures and functions which are practically the same in all animals whatsoever. All animals and plants without exception are composed of cells, while all the functions of living things are the result¬ ants of the aggregate functions of the cells of which they are composed. The cell is thus the universal unit of organic structure and function (Cell Theory of Schleidcn and Schwann), and has been defined as a mass of protoplasm enclos¬ ing a nucleus (M. Schultze). Protoplasm or living matter is a substance, usually semi-solid, of unknown but undoubtedly very complex chemi¬ cal composition. It is probably composed of several complex compounds of C, H, O, and N, which do not form a mere mixture but are united in a definite and orderly way. Both the cell body and the nucleus are composed of pro¬ toplasm, though of very different quality in the two cases ; that which forms the chief mass of the cell, the cell body, is called cytoplasm, while that constituting the nucleus is known as karyo- plasm. At least these two kinds of protoplasm are found in every cell and are necessary to the continuance of vital activities. The cytoplasm

and karyoplasm are each composed of two or more different

substances of visibly different structure, and all these parts are put together in an orderly manner so that they bear definite relations to one another. The cell, therefore, no less certainly than a complex animal, shows or¬ ganization, that is, differentiation of unlike parts and integration of these parts into a single and complete whole.

As all organisms are composed of cells, so all living things have certain activities or functions in common. The most important of these are the following: (1) Metabolism, or the trans¬ formations of matter and energy within the living thing ; this may be subdivided into anabo¬ lism, or the change of the matter and energy of food into the matter and energy of protoplasm ; and katabolism, or the destructive changes in protoplasm by which the living matter is trans¬ formed into less complex substances (secretions, waste products, etc.), while its energy appears in various forms (heat, motion, etc.). Metabo¬ lism therefore includes nutrition, growth, waste and repair movement, secretion and excretion. (2) Irritability, or the capacity of receiving, transmitting and responding to stimuli. (3) Re¬ production, or the formation of new individuals from the substance of an old one. These general functions are characteristic of every living thing, plant or animal, simple or complex. From them all the functions of the most complex animal are built up, and as they are manifested in some de¬ gree by every cell it will be seen that the cell is the unit not only of organic structure but also of organic function.

All animals begin their individual existence as a single cell, but while some remain in this condition throughout life, others by repeated divisions of this initial cell become multicellular ; the former constituting the group Protozoa, the latter the Metazoa. Protozoa are animals in which the entire body consists of a single cell, which usually leads an independent existence, though in some cases several may be united into a colony. In some forms the substance of this cell consists of protoplasm showing very little differentiation ; in others it is differentiated into many unlike parts, each with its own specific function. The most general differentiation, apart from that of nucleus and cell body, is into a superficial dense layer, the ectoplasm, and a more fluid, granular interior, the endoplasm. Further specializations are shown by the more complex forms in the formation from the ecto¬ plasm of contractile vacuoles, serving as organs of excretion ; of thread-like processes, serving as organs of locomotion (cilia, flagellse) of contractile fibres (myophan striations) which act like muscle fibres; of stinging threads (tricho- cysts) which serve as organs of defense; of a mouth and gullet through which food is taken into the interior of the cell, and of a calcareous or silicious skeleton, frequently of great com¬ plexity and beauty. All of these structures are differentiations of a

single cell ; they show how complex such a cell may become, and they indi¬ cate that the Protozoa are, in the words of one of the old zoologists, “perfect animals.®

In all Metazoa the body is composed of many cells differing among themselves in certain re¬ spects. These cells have all arisen from a single one, the egg, which by repeated divisions (cleav¬ ages) gives rise to a group of connected cells. In typical cases these become arranged in a

single layer, forming a hollow sphere, the blastu- la, which then, by the migration of certain sur¬ face cells into the interior, becomes a two¬ layered sphere ; the gastrula, containing a central cavity; the archenteron, or primitive digestive sack, which opens at one place to the exterior by a pore, the blastopore or primitive mouth. The outer layer of the gastrula is called the ectoderm, the inner one the endoderm, while be¬ tween them a third layer, the mesoderm, usually appears, being derived from one or both of the primary layers. These three layers are known as the germ layers and from them all the organs of the adult metazoan are derived. The ecto¬ derm gives rise to the outer covering of the body, the nervous system and sense organs ; the endoderm to the alimentary canal and its out¬ growths, while from the mesoderm arise mus¬ cles, skeleton, circulatory, excretory and repro¬ ductive systems.

In all Metazoa the ectoderm and endoderm and frequently also the mesoderm consist of cells, flattened, cuboid or columnar in shape, pressed together side by side into a layer. This simplest and earliest grouping of cells in the metazoan body is called an epithelium. From one or more of these epithelial layers cells may escape into the space between the estoderm and endoderm and there become branched and irregular in shape, forming a loose grouping of cells known as mesenchyme. Epithelium and mesenchyme are the primary tissues of the metazoan body. They are the first formed in the development, and from them all other tissues are derived. The cells of one or both of these primary tissues may undergo further differentiation into con¬ tractile or muscle cells and into irritable or nerve cells, while the mesenchyme cells may give rise to non-living cell products such as fibres, spicules, cartilage, bone and fat. When cells of any one of these groups are united they constitute a tissue, so that in the body of a metazoan we recognize, in addition to epithelial and mesenchymatous tissue, muscular, nervous and sustentacular or connective tissue. Further consideration of these tissues belongs to His¬ tology rather than to Comparative Anatomv. In all Metazoa two or more of these tissues may be united to form organs, which are struct¬ ures of

definite shape and individuality having for their purpose the carrying on of specific functions. Finally two or more organs may co-operate in a common function and are then known as an organ system. The principal sys¬ tems of organs in the metazoan body are the following: (1) Integumentary; (2) Nervous; (3) Motor; (4) Skeletal; (5) Alimentary; (6) Respiratory; (7) Circulatory; (8) Excretory; (9) Reproductive.

III. Fundamental Form of the Metazoan Body. — Although the forms of multicellular ani¬ mals are extremely varied they may all be re¬ ferred to a single ground form, the gastrula. From the egg stage to the gastrula all Metazoa travel essentially the same road in their develop¬ ment ; beyond the gastrula stage they diverge in many directions. The gastrula is therefore the lat¬ est developmental stage common to all Metazoa and must be taken as the fundamental form from which they all have been derived. It is typically a double-walled sac surrounding the archenteron or primitive digestive cavity, which opens at one pole to the exterior by the blasto¬ pore or primitive mouth. It is radically sym-

metrical around an axis connecting the oral and aboral poles ; this is the primary or gastrular axis. In a few types — for example, sponges, hydroids, jellyfishes — this axis becomes the chief axis of the adult body; such animals con¬ stitute the group Protaxonia. In others (all bilateral animals) the chief axis of the adult lies almost at right angles to the gastrular axis, and it is derived in large part from one of the

A. B. C

Fig. 1

Fig. 1. — Types of Protaxonia (= Calenterata) (from Hatschek). The chief axis of the gastrula coincides with that of the adult, the apical pole of the gastrula being indicated by the head cf the arrow. — A, ground form of the Spongiaria. B, ground form of the Cnidaria. C, ground form of the Ctenophora.

secondary axes of the gastrula ; these forms are known as Heteraxonia or Bilaterata. Among the Protaxonia the adult form is radically sym¬ metrical and differs but little from the gastrula; this is especially true of the hydroids, some of which are practically gastrulas throughout life which are attached by the aboral pole and with a row of tentacles

around the mouth. Among the Heteraxonia, on the other hand, the adult

Fig. 2

Fig. 2. — Types of Heteraxonia (-Bilaterata). The gastrula axis becomes only in part the chief axis of the adult; the apical pole of the gastrula is shifted forward to the anterior end of the adult, while the oral pole of the former lies on the ventral side of the latter or near its anterior end, so that a more cr less extensive bending of the gastrular axis occurs; in all cases the brain and eye arise at or near the original apical pole.— A, gastrula. B, C, larva and adult flatworm. D, larva of annelid (trochophore) . E, larva of gastropod (veliger).

shows but little if any resemblance to the gas¬ trula from which it is derived; this is the re¬ sult not only of the change of axis just men¬ tioned but also of the complication of the gas¬ trular layers and the formation from them of complex organs and parts. In the change of axis it usually happens that the primary axis becomes so bent that the oral and aboral poles approach each other while at the same time one

of the secondary axes elongates, becoming the principal axis of the adult, and the body be¬ comes bilaterally symmetrical with reference to a plane passed through this axis and the original primary axis. The apical pole of the gastrula becomes the anterior pole of the adult; since brain and sense organs usually develop at this pole it might also be called the sense pole. The position of the oral pole of the gastrula with reference to the adult axis shows consider¬ able variation in different groups, but among invertebrates it generally lies on the ventral side, while in the case of the vertebrates it is dorsal. The chief axis of the adult connects the anterior and posterior poles and is therefore known as the antero-posterior axis. The side of the body generally directed downward, and at the anterior end of which the mouth usually lies, is ventral, while the opposite side is dorsal and the line connecting these two is the dorso- ventral axis.

There are a few apparent exceptions to the rule that Heteraxonia are bilateral forms ; some Heteraxonia are apparently radially symmetri¬ cal (starfish, sea-urchin), while others are asymmetrical (snails, amphioxus, flounders, etc.). The starfishes and sea-urchins are five-rayed animals which were classed by Cuvier among the Radiata, but a careful study of the larval as well as the adult form shows that they are really bilateral and that their radial structure has developed from a bilateral form, probably through the influence of peculiar life conditions, such as persistent attachment or fixation to foreign objects.

Snails are generally spirally coiled and asymmetrical, but here also the study of their development shows that at an early stage they are bilateral, and even in the adult condition the head and ventral parts of the body are usually bilateral ; the asymmetry of the dorsal part being due, perhaps, to its elongation and the shell formation covering it. In the case of other asymmetrical forms, like amphioxus, flounders, etc., it is certain that we are dealing with modifications of bilaterality due to peculiar conditions of life.

Another modification of the original meta¬ zoan ground form, the gastrula, which almost all Metazoa show, is due to the formation and development of a middle layer in a space, the blastoccele or primary body cavity, between the ectoderm and the endoderm, namely, the meso¬ derm. In the lowest Metazoa this consists of branched cells (mesenchyme) which are loosely packed together and contain no considerable spaces, or if present these spaces are only parts of the primary body cavity. Among the higher Metazoa the middle layer is usually divided into an inner portion lying next to the endoderm and an outer one next to the ecto¬ derm. Between these two layers of mesoderm there remains a space which is the secondary body cavity or coelom. This is lined by flattened mesoderm cells, the peritoneum, and is usually divided into right and left halves by two longi¬ tudinal partitions, the dorsal and ventral mesen¬ teries, one of which lies dorsal to the alimentary canal and the other ventral to it ; in some ani¬ mals one or both of these may be destroyed. In segmented animals the coelom may be further divided into a series of chambers by trans¬ verse partitions, the dissepiments. The excre¬ tory and sexual organs are developed in large

part from the walls of the coelom and project into its cavity. The portion of the coelom sur¬ rounding the heart is usually separated from the remainder of this cavity and is called the pericardium ; while in the highest vertebrates (mammals) the anterior portion of the coelom which contains the lungs is separated by the diaphragm from the posterior part containing the abdominal viscera.

A further complication of the metazoan body is introduced by the repetition of the prin¬ cipal organs of the body in' a series, one behind the other; such repetition is known as meta- meric segmentation, and each segment of the body is called a metamere or somite. Many of the higher Metazoa (annelids, arthropods, verte¬ brates) show this form

of segmentation. In the simplest cases each of these somites has its own section of the coelom and its own sen¬ sory, nervous, muscular, alimentary, respiratory, excretory and sexual organs, and each may bear a pair of limbs or locomotor organs. Each somite, in short, contains all of the important organs and may properly be called a little body (somite). In more highly organized segmented animals the various segments are rio longer alike (homonomous), but show physiological divisions of labor, some being differentiated for one function and some for another (heteron-

D j?

Fig. 3

Fig. 3. — 'Development of Amphioxus (from Claus after Hatschek), showing the derivation of the chordate from the gastrula. — A, blastula. B, C, D, gastrulae. E, embryo. F, larva. — N, nerve-tube; Oe, its opening to the exterior; Us, mesoblastic somites; mf, mesoblastic fold; Ch, notochord; o, mouth; K, first 'gill-cleft; D, gut; Bl, ventral blood-vessel.

omous). In this way some of the organs named above disappear in certain segments while others become greatly enlarged or modi¬ fied. Finally this specialization of the somites is carried one step farther in higher arthro¬

pods and in vertebrates in which we have an intimate fusion of metameres and coalescence of organs in certain regions such as to mask completely the fundamental segmentation. This is especially true of the vertebrates, the lower

Fig. 4

Fig. 4. — Diagrams of body layers and cavities in A, ccelen- terates; B, flatworms; C, annelids; D, vertebrates. — G, gastric cavity; g, cavity of gonad; a, primary body cavity (blastocoele) filled with branched cells (mesen¬ chyme); c, secondary body cavity (coelom); d, dorsal mesentery; m, mesenchyme filling space of original primary body cavity; n, nerve-tube.

t

forms of which group show segmentation of the axial skeleton (vertebrae and ribs) and attached muscles, of the nerves, of the gills and their blood vessels, and of the excretory and sexual organs; while in the higher vertebrates (reptiles, birds and mammals) segmentation

is limited in the adult to the axial skeleton, muscles and nerves. The fusion of somites is most pro¬ nounced at the anterior end of the body ; the head of insects contains three or four somites, while the vertebrate head is composed of not fewer than nine. Among arthropods the section of the body immediately behind the head and known as the thorax is composed of a number of fused somites, while in the posterior section of the body, the abdomen, the somites do not usually coalesce. Primitively the limbs are all alike and a pair is borne on each somite; how¬ ever in higher annelids and arthropods they disappear entirely from certain somites and in ethers undergo great modifications of structure to fit them for particular functions. In the case of vertebrates they are limited to but two pairs, and it is probable that these are derived from a continuous lateral fin by the suppression of in¬ tervening portions. The great modifications and complications which have here been briefly sketched lead far from the simple form of the gastrula, and yet comparative anatomy and em¬ bryology show that the gastrula is the ground form of all Metazoa and they indicate in many cases the steps by which these most complex parts have arisen.

IV. Classification. — Although there is much difference of opinion as to the number of types

or phyla in the animal kingdom it is certain that there are more than the four recognized by Cuvier, the number being probably not less .than 10 or 12. The present tendency among zoologists is to increase this number rather than to reduce it ; but the absolute sepa- arateness and independence of these types is not now generally maintained. Many of them have important characters in common, and while suf¬ ficiently distinct to mark the primary subdivi¬ sions of the animal kingdom are yet evidently related to one another. The primary divisions or phyla which are now most generally recog-

Fig. 5. — Diagrammatic sections of an ideal vertebrate (after Parker and Haswell). — A, sagittal section showing the brain and spinal cord on the dorsal side of the noto- • chord, and the alimentary canal and viscera on the ventral side of it. B, transverse section of the head, showing a gill-arch and filaments on the left and a gill-cleft on the right. C, transverse section of the trunk, showing the gut, the genital glands, and the excretory organs in the body cavity. D, transverse section of the tail.

nized are the following: (1) Protozoa, (2) Spongiaria, (3) Cnidaria, (4) Ctenophora, (5) Platyhclminthes, (6) Nemathelminthes, (7) Rotifera, (8) Chcetognatha, (9) Annelida, (10) Arthropoda, (11) Molluscoida, (12) Mollusca, (13) Echinodermata, (14) Chordata. Some forms cannot with certainty be assigned to any of these groups, and new phyla may need to be established for them; on the other hand fu¬ ture work may show that two or more of the groups named may be combined under a single phylum. The value of these phyla so far as the number and variety of animals included in them is concerned is very unequal, some of them including but a single order and but a few genera, while others include many classes, or¬ ders and genera ; in tact, about one-half as many species are known in a single order of the class Insecta as in all the remainder of the animal kingdom put together. A tabular classi¬ fication of each of these phyla and of the

classes into which it is subdivided is given on the three following pages :

V. Organ Systems. — When two or more organs are associated in carrying on a common function they constitute an organ system. Those systems most widely represented among animals, and therefore the most important, are those concerned with the general functions of all animals, namely, metabolism, reproduction and irritability. The first of these consists of several distinct though related functions, each with its own system of organs; accordingly . we recognize the following systems: (1) digestive, (2) respiratory, (3) circulatory, (4) excretory, (5) motor, (6) reproductive, (7) nervous, (8) sensory; to these may be added those less im¬ portant systems which serve for protection and support, namely, (9) integumentary, (10) skele¬ tal. These organ systems will now be com¬ pared in broad outlines, with a view to show¬ ing their relationships in the leading phyla of the Metazoa. For the sake of convenience the integumentary, skeletal and motor systems will here be considered before any of the others.

1. Integumentary System. — In all animals the outer covering of the body consists of a layer of epithelial cells, the ectoderm. Beneath this layer a basement membrane is present, which in some animals is thick and serves for protection and support (Cnidaria , Platoda). This epithelium is frequently ciliated and it always contains gland and sensory cells and in addition may contain nerve and muscle cells as well as stinging cells (Cnidaria) . In some animals the epithelium, which in these cases is called hypodermis, secretes on its outer surface a cuticular covering which may be a thin and flexible membrane or cuticle (hydroids, trema- todes, cestodes, annelids, rotifers),

or it may be thick and flexible (nemathelminths) or dense and inflexible except at the joints (arthropods). In other cases the epithelium secretes skeletal structures in certain regions only, thus giving rise to calcareous shells (corals, mollusks, brachiopods). In arthropods this epidermal secretion is particularly dense and tough and is known as chitin ; it may become calcified in certain portions. In mollusks the superficial epithelium remains naked except in a certain region, the embryonic shell-gland, where it first secretes a cuticular covering and then forms beneath this a dense calcareous layer, the shell ; at the margins of the shell-gland (mantle edges) the secretion of these layers continues throughout life.

CHIEF SUBDIVISIONS OF THE ANIMAL KINGDOM.

A. PROTOZOA: One-celled animals without gastric cavity, germ layers, or tissues.

Class i. Rhizopoda: With streaming protoplasmic processes (pseudopodia). Example, Amoeba.

Class 2. Flagellata: With one or two vibratile protoplasmic processes (flagellse). Example, Monad.

Class 3. Ciliata: With many vibratile protoplasmic threads (cilia). Example, Infusoria.

Class 4. Sporozoa: Parasites without mouth or organs of loco¬ motion. Example, Gregarina.

B. METAZOA: Many-celled animals with gastric cavity, germ layers, and tissues.

A. PRO TAX ONI A (- Ccelenter at a): Metazoa with gastrula-like body, persistent gastrular axis and radial symmetry.

CHIEF SUBDIVISIONS OF THE ANIMAL KINGDOM — Continued.

B. METAZOA: Many-celled animals with gastric cavity, germ layers, and tissues — continued.

A. PROTA XONIA (= Ccelenterata): Metazoa with gastrula-like body,

persistent

gastrular axis and radial symmetry — continued.

I. SPONGIARIA: Fixed aquatic animals with numerous pores in body wall through

which water is drawn into the gastric cavity and thence expelled through a large opening, the osculum. Complicated colonies are formed by incomplete budding.

Order (i). Calcarea: With skeleton formed of calcareous spicules. Example, calcareous sponge.

Order (2). Non-calcareous: With silicious, fibrous, or gelatinous skeleton. Example, commercial sponge.

II. CNIDARIA: Aquatic animals either attached (polyps) or free-swimming (Medusa)

with stinging cells (cnidae). By incomplete budding the polyps may give rise to plant-like colonies (hydroids), or by complete budding to jellyfishes (M edits ce).

Class 1. Hydrozoa: Gastric cavity without septa and without ectodermal oesophagus.

Order (1). Hydromedusae: Usually with alternation of hydroid (asexual) and medusoid (sexual) generations. Examples, hydroids, small jellyfishes.

Order (2). Siphonophora: Floating colonies of many polymorphic zooids. Example, Portuguese man-of-war.

Class 2. Scyphozoa: With radial septa in gastric cavity and with ectodermal oesophagus.

Order (1). Scyphomedusae: The solitary polyp divides into a series of jellyfishes with notched margins. Example, large jellyfishes.

Order (2). Anthozoa: The polyps divide but do not form jellyfishes. Examples, sea- anemones, corals.

III. CTENOPHORA: Two-rayed radiates with sense organ at apical pole of gastrula,

with mouth and ectodermal oesophagus at opposite pole and with

eight mer¬ idional rows of vibratile plates which serve as locomotor organs; without stinging cells. Example, the Venus girdle.

B. HETERA XONIA (= Bilaterata): Animals in which the chief axis of the adult body is not that of the gastrula; symmetry bilateral.

IV. PLATYHELMINTHES: Flatworms with mouth usually on ventral surface

and with apical (sensory) pole of gastrula near anterior end of body; primary body cavity filled with mesenchyme, no true coelom,

i. Platoda: Gastric cavity, when present, with but one opening to the

exterior, the mouth.

Class 1. Turbellaria: Free living forms; body covered by cilia. Example, planarians.

Class 2. Trematoda: Parasites without coat of cilia but with external cuticle; with suckers for attachment to host. Example, flukes.

Class 3. Cestoda: Parasites without mouth or alimentary canal;

with external cuticle, but without cilia; usually incompletely divided into segments (proglottides). Example, tapeworms.

ii. Nemertinea: Free living worms with external covering of cilia; with mouth, alimentary canal, and anus; with protrusible proboscis at anterior end of body. Example, Cerebratulus.

V. NEMATHELMINTHES: Round worms, mostly parasitic, with long, unseg¬

mented bodies covered by a dense cuticle; with primary body cavity; without cilia.

i. Nematoda: Thread worms without mesenteries or peritoneum; with nerve ring around oesophagus and dorsal and ventral nerve trunks. Examples, pinworms, vinegar-eels.

ii. Gordiacea: Hair worms parasitic during part of life; with mesenteries and peritoneum; with nerve ring and ventral nerve trunk. Example, horsehair worms.

iii. Acanthocephala: Internal parasites without alimentary canal; with proboscis and hooks for attachment to host. Example,

Echinorhynchus.

VI. ROTIFERA: Wheel animalcules with body divisible into head (trochal disk), trunk and tail (foot); with wheel or crown of cilia around head; with primary body cavity and with grinding stomach (mastax). Example, wheel animalcules.

CHIEF SUBDIVISIONS OF THE ANIMAL KINGDOM — Continued.

B. METAZOA: Many-celled animals with gastric cavity, germ layers, and tissues — continued.

B. HETERA XONIA (= Bilaterata): Animals in which the chief axis of the adult body is not that of the gastrula; symmetry bilateral — continued.

VII. CH.ETOGNATHA: Small marine worms with three body segments, namely, head, trunk and tail; with horizontal fins around tail and on sides of trunk; with bristles (chaetae) on sides of mouth; with true coelom (secondary body cavity). Example, arrow-worms.

VIII. ANNELIDA: Ringed worms with segmented bodies and true coelom; the segments

(somites) are typically similar (homonomous) and each encloses a section of the coelom and of the vascular, excretory and nervous systems.

Class i. Chcetopoda: Worms with bristle-like appendages (chaetae), which usually serve as organs of locomotion, on every somite. Example, earthworm.

Class 2. Gephyrea: Marine worms with few traces of segmen¬ tation; with crown of tentacle around mouth and with U-shaped alimentary canal, the anus opening near the mouth.

Class 3. Hirudinea: Worms with flattened bodies and rudi- mentar}ˆ coelom, without chaetae, but with anterior and posterior suckers. Example, leeches.

IX. ARTHROPODA: Animals with jointed bodies and legs; without cilia, but with the entire surface of the body covered by a coat of

dense substance, chitin. i. Bran chi ata: Aquatic animals with gills.

Class 1. Crustacea: With two pairs of antennae (feelers) and usually with gills borne on the legs. Examples, lobster, crab.

ii. Tracheata: Land animals with internal respiratory cavities (tracheae,

lung books).

Class 1. Onychophora : Worm-like animals with numerous short legs. Example, Perivatus.

Class 2. Myriopoda: Animals with head and many- jointed body, every segment bearing one or two pairs of legs. Example, centipedes.

Class 3. Insecta: Animals with body divisible into head, thorax, and abdomen; with four pairs of appendages on head, three pairs of walking legs on thorax, but without appendages on abdomen. Example, grass¬ hoppers.

Class 4. Arachnida: Body divisible into cephalo-thorax and abdomen; with six pairs of appendages on former, but none on latter. Examples, scorpions, spiders.

X. MOLLUSCOIDA: Unsegmented animals, usually stalked and attached, living

singly or in colonies; with a crown of ciliated tentacles around the mouth; generally with U-shaped ali¬ mentary canal and with anus opening near mouth.

Class 1. Phoronida: Single, stalked animals with body cavity partially divided into three portions. Example, Phoronis.

Class 2. Brachiopoda: Single animals with calcareous shell con¬ sisting of dorsal and ventral valves. Example, brachiopods.

Class 3. Polyzoa: Stalked animals which usually give rise to colonies by incomplete budding. Example, Bugula.

XI. MOLLUSCA: Unsegmented animals with reduced coelom; differing greatly in

form, but usually having a head, with tentacles and eyes; with a rasping organ (the lingual ribbon or radula) in the mouth; with dorsal visceral sac containing most of the viscera; with a free fold of the body

wall, the mantle, which usually secretes a shell, and with a ventral muscular foot.'

Class 1. Pelecypoda: Bivalve mollusks without head or lingual ribbon; with filiform or plate-like gills. Examples, clams, oysters.

Class 2. Amphineura: Bilateral animals with paired nerve trunks. Example, chitons.

Class 3. Gasteropoda: Unsymmetrical mollusks, with univalve shell, usually spirally coiled. Example, snails.

Class 4. Scaphopoda: Small mollusks with tubular, uncoiled shells. Example, Dentalium.

Class 5. Cephalopoda: Active, predaceous mollusks with unpaired mantle and shell and with eight or ten arms which bear suckers. Example, squid, octopus.

CHIEF SUBDIVISIONS OF THE ANIMAL KINGDOM — Concluded

B. METAZOA: Many-celled animals with gastric cavity, germ layers, and tissues — concluded.

B. HETERA XONIA (= Bilaterata) : Animals in which the chief axis of the adult body is not that of the gastrula; symmetry bilateral — concluded.

XII. ECHINODERMATA: Five-rayed marine animals, with dermal skeleton of spines

or plate; with ambulacral system of tubes which are filled with sea-water.

Class i. Holothuroidea: Soft, worm-like animals with reduced skeleton; the mouth surrounded by retractile ten¬ tacles. Example, sea-cucumbers.

Class 2. Echinoidea: Spherical or oval forms with complete armor of dermal plates. Example, sea-urchins.

Class 3. Asteroidea: With five arms radiating from a central disk; with open ambulacral grooves on the oral side of arms. Example, starfishes.

Class 4. Ophiuroidea: With arms and central disk, but with closed ambulacral grooves. Example, brittle stars.

Class 5. Crinoidea: The cup-shaped body bearing many branching arms is usually attached by a stem. Example, stone-lilies.

XIII. CHORDATA: Bilateral, segmented animals with an axial skeleton, the notochord,

on the dorsal side of which is the tubular nervous system and on the ventral side the alimentary canal; with gill slits opening laterally through the walls of the pharynx.

i. Hemichorda: Worm-like animals which burrow in the sand. Example,

Balanoglossus.

ii. Urochorda: Sac-like animals enclosed in thick tunic (Tunicata) in which

are inhalent and exhalent openings. Example, sea-squirts.

iii. Cephalochorda: Fish-like animals, pointed at both ends, which burrow

in the sand; without skull or brain {A crania). Example,

A mphioxus.

iv. Vertebrata: Chordates with skull and brain; with relatively few gill

slits; the notochord serves as a foundation for the vertebral

column; usually with two pairs of locomotor appendages.

(a). Anamnia: Aquatic vertebrates with functional gills; without embryonic membranes.

Class 1. Cyclostomata: Eel-like fishes without jaws, but with circular sucking mouths; with single olfactory organ; without paired fins. Example, lamprey.

Class 2. Pisces : Cartilaginous and bony fishes with paired olfactory organ, movable jaws, persistent gill clefts, two-chambered heart, paired and median fins, and dermal exoskeleton of scales. Examples, sharks, trout, lung-fish.

Class 3. Amphibia: Vertebrates with pentadactyl limbs with gills and gill clefts in larval life which may be lost in the adult; heart three-chambered. Examples, frogs, newts.

(b). Amniota: Air-breathing vertebrates in which the gills are never

functional; the embryo is surrounded by embryonic membranes (amnion and allantois).

Class 4. Reptilia: Body covered by horny scales or plates; heart usually three-chambered; one occipital condyle; both aortic arches persistent. Examples, snakes, alligators, lizards, turtles.

Class 5. Aves: Birds with body covered with feathers and usually fitted for flight; with four-chambered heart and single occipital condyle. Examples, sparrow, ostrich.

Class 6. Mammalia: Animals with the body covered with hair;

with mammary glands for suckling the young; with four-chambered heart and with two occipital condyles. Examples, duck-bill, opossum, man.

In reptiles, birds and mammals the super¬ ficial epithelium (epidermis) becomes many layers thick, and the outer layers of cells die and are transformed into horny or cuticular substance, an adaptation to life out of water. In these three classes of vertebrates there are also a number of characteristic epidermal out¬ growths : in reptiles these take the form of horny scales or plates ; in birds they appear as feathers, which are only modified scales ; and

in mammals as hair, while nails or claws are formed from the epidermis in all of these classes. In the mammals there are also epi¬ dermal ingrowths which give rise to various types of glands, such as sweat, oil, wax and milk glands, all of which are epidermal in origin.

Beneath the surface epithelium, which is al¬ ways ectodermal in origin, there is in many ani¬ mals a fibrous or connective tissue layer known

as the dermis or leather skin, since leather is always derived from this layer of skin. This layer is especially well developed among echino-

derms and vertebrates, in which it may give rise to skeletal spicules or plates, thus form¬ ing a dermal exoskeleton. Among vertebrates this is especially well developed in the fishes, the scales which cover the body being of dermal origin ; in some cases these dermal scales are covered by enamel which is derived from the epidermis. The same is also true of the teeth of vertebrates; the inner portion or dentine is of dermal origin, while the enamel comes from the epidermis; teeth are in fact only modified scales.

1. Skeleton. — An internal skeleton, not the product of the integument, is present in rela¬ tively few invertebrates, but is found in all ver¬ tebrates. Such a skeleton is found in sponges in the form of calcareous, silicious or horny spicules ; in cnidarians and ctenophores as sup¬ porting jelly; in many invertebrates as a sys¬ tem of connective tissue cells and fibres ; in cephalopods and certain arthropods as carti¬ lages surrounding the central nervous system. On the other hand the possession of a primi¬ tive axial skeleton, the notochord, is one of the chief characteristics of the Chordata; in addition to this there are generally present in this phylum many other skeletal elements which are usually cartilaginous or bony. In all true vertebrates the notochord becomes surrounded by cartilage, and the whole is then constricted into a series of segments, the centra of the vertebrae ; on the dorsal side cartilaginous arches develop around the spinal cord, while other skeletal arches, the ribs, surround the trunk and become connected with the ver¬ tebral column ; finally the ribs may be united ventrally, thus forming the sternum : these parts constitute the axial skeleton. In addition there is the skeleton of the head (the skull) and that of the limbs (the appendicular skele¬ ton). In the lower vertebrates and in the em¬ bryos of all higher forms the skull consists of a cartilaginous cranium partially surrounding the brain, and of paired cartilaginous rods forming the skeleton of the jaws and gill- arches. In higher vertebrates these cartilagi¬ nous elements undergo ossification, and in addi¬ tion dermal bones are formed which partially overlie this cartilaginous basis. The appendicu¬ lar skeleton consists of the two limb-girdles partially enclosing the trunk on the ventral side, the pectoral and pelvic arches, and of the skeleton of the limbs themselves. In the fishes the arches and limbs are peculiar and it is dif¬ ficult to homologize their skeletal parts with those of higher forms ; in all vertebrates above the fishes, however, the relations of these parts are similar and their homologies not difficult to determine.

2. Motor System. — All animals at some time in their lives have

the power of locomotion, though in some cases this is lost before adult life is reached and the animal becomes fixed like a plant (hvdroids, sponges, crinoids, mol- luscoids and many parasites). Hdwever, in all these cases certain parts of the body pre¬ serve the power of movement, though the ani¬ mal as a whole is incapable of locomotion. An¬ imal movement is of three fundamental types: amoeboid, ciliary and muscular. See Muscles.

(1) Amoeboid movement is manifested espe¬ cially by free cells and exhibits a streaming of semi-fluid protoplasm : it is typically illustrated by the proteus animalcule Amoeba. In this pro¬ tozoan small lobes or pseudopodia may appear anywhere on the body, and into one or more of these the endoplasm, with all that it contains, may be seen to stream, at the same time being withdrawn from other lobes. This flowing may continue for some time in a given direction, the outflow of protoplasm at one end of the body being compensated for by the inflow at the other end, thus producing an actively progres¬ sive movement. The mechanism of this move¬ ment is obscure, but in some cases it seems to be associated with temporary inequalities in the tension of the surface of the cell; at points where the surface tension is reduced an out¬ flow of protoplasm occurs, forming a lobe or pseudopod, into which protoplasm from the main body continues to flow so long as the surface tension is least in this direction. Usu¬ ally several points of reduced tension exist at the same time on the surface of an amoeboid cell, so that several lobes or pseudopodia are found radiating from a common centre. In other cases it is, perhaps, due to the general contractility of protoplasm, local contraction in one part of a cell causing an outflow in another part.

(2) Ciliary movement consists in the rhyth¬ mical beating of innumerable small protoplas¬ mic threads (cilia) which project from the free surfaces of certain cells and which act somewhat like oars. Among one-celled organ¬ isms the entire cell may be covered by these cilia ; in all multicellular animals they are limited to the free borders of certain epithelial cells. The beating of a cilium includes two movements, — the stroke, which is rapid and by which the cilium is sharply bent in one direc¬ tion, and the recovery of the original position, which is relatively slow and weak. It is prob¬ able that the cause of this beating is the un¬ equal contraction of the protoplasm on different sides of a cilium, by which it is bent first in one direction and then in the other. All the cilia covering a free surface beat in unison, the stroke being in one direction, and the movement is so timed that beginning at one end of a ciliated tract it seems to pass in a wave-like movement to the other end.

(3) Muscular movement, the principal type of motion in higher animals, is caused by the contraction in one direction of a muscle fibre consisting of a kind of protoplasm especially differentiated for this purpose. During the contraction or expansion of a muscle there is no change in its volume, the shortening of a fibre in one axis being compensated for by its ex¬ pansion at right angles to that axis. Such a change in the shape of a fibre could be pro¬ duced only by a change in the shape of the particles of which it is composed or by a change in their relative positions. The latter is probably the real cause of muscular contrac¬ tility.

All of these types of movement are found in certain Protozoa and in many Metazoa. Amoe¬ boid movements are, however, usually restricted to free cells without membranes or dense cor¬ tical layers of protoplasm, such as certain egg cells, embryonic cells, endoderm cells, excre-

tory, pigment and lymph cells of various Metazoa ; in no case is this type effective in the movement of large bodies. In the larvae of all phyla, except the nemathelminthes and ar¬ thropods, locomotion is brought about, at least in part, by cilia, and even among the adult forms of many lower metazoans this is the principal type of locomotion (ctenophores, tur- bellarians, nemertines, rotifers). Among the nemathelminthes and arthropods cilia are en¬ tirely lacking throughout the whole life cycle. Among large animals locomotion is effected entirely by muscular contractibility, while cilia are limited to certain regions where by their beating they produce currents. Muscle fibres are found in all i! retazoa with the possible ex¬ ception of sponges; they are of two kinds, striped and non-striped or smooth; the latter are of very wide distribution throughout the Metazoa, the former are limited to a few phyla (mollusks, arthropods, chordates). Smooth muscle is contractile to a much greater extent than striped muscle, but is much slower in ac¬ tion. The muscular system may consist of iso¬ lated fibres such as are found in many cnida- rians, platodes and rotifers, or these fibres may be united into bundles or sheets as is the case in most higher animals; these groups of muscles show many differences and can be com¬ pared only in a general way. In general the arrangement of the body muscles depends upon the presence or absence of a skeleton. Animals which have no skeleton usually have the body musculature arranged in the form of two coats : an outer layer of circular fibres and an inner of longitudinal ones,

while the intestinal mus¬ culature is also arranged in two coats, the outer (next the coelom) longitudinal and the inner circular. If an exoskeleton is present, as in arthropods, these muscular layers of the body wall are broken up into bundles which become attached to the skeleton; if an endo- skeleton is present, as in vertebrates, the muscles become attached to the bones, which serve as levers, and thus the muscles come to lie at a deep level. The locomotor apparatus of echinoderms is unique, consisting of a great number of tube feet, which are hollow muscu¬ lar tubes, closed at the end by a sucking disk. The cavity of each tube is connected with the water vascular (ambulacral) system within the body, from which water can be forced into the tube feet. In this way they are protruded until the sucking disk touches and becomes attached to some object; then by contraction of the muscles of the foot the water is forced back into the water system, and by simultaneous ac¬ tion of many of these feet the body is slowly warped along.

1. Digestive System. — With the exception of a few internal parasites which absorb their food in a digested condition from the bodies of their hosts, some form of digestive system is present in all animals.

Digestion is the process of rendering insolu¬ ble foods soluble. One of the distinguishing characteristics of animals is that they, unlike plants, take in solid food (much of which is in a colloidal condition) through a mouth opening (ingestion), and that by the process of digestion some of this insoluble food is ren¬ dered soluble and hence capable of diffusing to all parts of the organism, where by a myste¬ rious process known as assimilation some of it

is built up into the substance of the protoplasm itself. After the substances rendered soluble by digestion have been removed from the food the indigestible remnants are cast out of the body in solid form (egestion). Among the Protozoa digestion occurs within the body of a single cell, that is, it is intracellular. The same is true of the sponges, in which the food, con¬ sisting of microscopic animals or plants, is taken in by certain epithelial cells lining the cavities of the sponge and by them passed over to other cells and tissues by which the food particles ar-* ingested, digested and assimilated. In all animals above the sponges intracellular digestion is limited to endoderm cells and to certain mesoderm cells, such as white blood cor¬ puscles (leucocytes) and it is of decreasing im¬ portance as one ascends the scale. In all ani¬ mals except the lowest, digestion occurs prin¬ cipally in a digestive cavity surrounded by cells which pour their secretions into the cavity. By the action of these secretions certain insoluble food

substances are transformed into soluble ones. This digestive cavity is in all cases de¬ rived from the archenteron or primitive di¬ gestive cavity of the gastrula and in the sim¬ plest cases is little more than a sac whose walls may be folded into ridges or septa, thus en¬ larging the digestive surface (Anthozoa) , or they may be extended to form tubular canals, by means of which the digested food is dis¬ tributed to all parts of the animal (Scyphozoa , Ctenophora, Turbellaria) . In all Cnidaria ex¬ cept the lowest class, and in all animals above the Cnidaria, the ectoderm surrounding the mouth is folded in at the mouth opening, thus forming an ectodermal tube, or oesophagus, which opens at the inner end into the gastric cavity. Among chordates this ectodermal in¬ vagination forms only the mouth cavity, the oesophagus being derived from the endoderm. In all Cnidaria, Ctenophora and Platoda there is but one opening into the gastric cavity, the mouth, and through this single opening food is taken in and undigested remnants cast out. In the Nemertinea, and with a few exceptions in all higher animals, there is a second opening into the gastric cavity, namely, the anus, through which the ejecta pass. The anus is formed by an infolding of the ectoderm which meets and fuses with a portion of the archeute- ric wall; this terminal ectodermal portion of the digestive tract is the hind gut (of inverte¬ brates). With the formation of an anus the digestive tract becomes tubular, with mouth at one end and anus at the other, and the entire canal is divisible into three portions, an ectoder¬ mal fore gut, an endodermal mid gut and an ectodermal hind gut. The relative development of these three portions differs much in different phyla ; for example, among chordates the fore gut is limited to the mouth cavity and the hind gut to an insignificant terminal portion of the intestine, while the endoderm gives rise to all the intervening portions of the digestive tract. Among arthropods, on the other hand, the mid¬ gut is limited to an extremely small portion of the digestive tube between the stomach and intestine, while all the remaining portions are derived from the fore and hind guts. In the higher animals the fore and mid guts may be subdivided into mouth cavity, pharynx, oesopha¬ gus, stomach and intestine and in some cases these portions may be further subdivided, as,

for example, in birds, where the oesophagus gives rise to an enlargement, the crop, the stomach is divisible into a glandular stomach and a grinding stomach or gizzard, and the intestine consists of two portions, the small and the large intestine. Finally into a

portion of the hind gut the excretory and sexual ducts as well as the intestine may open, in which case this common chamber is called the cloaca. Various portions of the fore gut may be armed with teeth, usually of a horny character among invertebrates, and the pharynx may be protrus- ible. The digestive and absorptive surfaces of the mid gut may be increased in three dif¬ ferent ways, either (1) by an increase in length, in which case it becomes folded or coiled, or (2) by folds which project into the Canal, or (3) by diverticula, that is, blind sacs or tubes, which open out from the canal; in many higher forms all of these methods coexist in the same individual. The extent of the di¬ gestive surface depends primarily upon the character of the food; if the latter is highly nutritious the digestive surfaces are much smaller than where it is poor in nutrition. In carnivorous mammals, for example, the alimentary tract is from four to five times the length of the body, whereas in certain herbi- vora it may be from 20 to 30 times the length of the body. In the simplest Metazoa it is probable that all the cells lining the digestive cavity are alike and that they all secrete the same digestive fluids ; in more complex ani¬ mals the cells differ in structure and function in different portions of the tract. By a speciali¬ zation of the diverticula or blind tubes open¬ ing out from the canal, large digestive glands are formed which pour particular digestive secretion into the alimentary canal. The most generally distributed of all these are the sali¬ vary glands, opening into the fore gut, and the liver and pancreas (or where both are united, as often happens among the invertebrates, the hepatopancreas) , which open into the mid gut. In all of the lower invertebrates except the roundworms the food is moved about in the alimentary tract by means of cilia or by gen¬ eral contractions of the body. In all higher forms the contraction of muscle fibres sur¬ rounding the canal play an important part in this movement, though cilia may also be present. In the chordates both longitudinal and circular muscles surround the canal and by their rhythmical contractions produce a wave-like contraction of the canal (peristalsis) , which passes along the canal from mouth to anus.

1. Respiratory System. — Respiration con¬ sists in the exchange of gases between the body and the medium which surrounds it. The gas given off from the body is principally carbon dioxide, one of the products of combustion within the body, while that which must be supplied to it is oxygen. Since oxidation is the one essential feature of destructive meta¬ bolism which occurs in all living matter, it follows that respiration is a universal function among organisms. Among small and simple animals this exchange of gases takes place directlv between the living

cells and the sur¬ rounding medium and occurs all over the sur¬ face of the body. In more complex forms with body fluids the exchange takes place be¬ tween the tissues and the fluid (internal respira¬ tion) and then between the fluid and the sur¬

rounding medium (external respiration). This exchange may take place through the general integument of the body without the aid of any specific organs, as is the case in all small ani¬ mals and in many larger ones, — for example, flatworms, roundworms, rotifers, small an¬ nelids, and even some vertebrates, such as the lungless salamanders. However, in most ani¬ mals of any considerable size, special organs exist to facilitate this exchange. In such as dwell in water vascular processes are present which serve to bring the blood into close rela¬ tion with the water. These processes, which are called branchiae or gills, are covered by a thin epithelium through which an interchange of the gases contained in the blood and in the water can readily take place. To facilitate this interchange the gills are usually much folded or branched so as to afford a large surface,

Fig. 6. — Section through the gill-arch and plates of a bony fish (from Claus). — b, gill-plates with capillaries; c, afferent vessel with venous blood ; d, efferent vessel with arterial blood; a, skeleton of arch.

Fig. 7. — Part of a tracheal stem and branches of an insect (from Claus). — -Z, cellular outer wall. Sp, cuticular inner wall with spiral fibre.

Fig. 8. — Tracheal system of a fly larva (from Claus) . — Tr, longitudinal stem of right side. St', St", anterior and posterior stigmata. Mh, mouth parts.

Fig. 9. — Lateral view of grasshopper (Acridium). — St, stig¬ mata. T, tympanal organ (from Claus).

and they are frequently covered by cilia which serve to keep the water in motion, while at the same time the blood is circulated through them. The most primitive type of gill is that of a simple ciliated tentacle, which may also serve other functions, such as is found among the Molluscoida and some Mollusca; such gills may become branched or plume-like or may fuse together into plates (Lamellibranchia) . Gills are situated on those parts of the body where they will be most exposed to fresh water, and occur in the most extraordinary different positions in different phyla; thus they, may be found on the limbs (Crustacece , some annelids), on or around the head (sedentary annelids, molluscoids), along the sides of the body

(primitive mollusks), on the lateral walls of the pharynx (chordates) or as outgrowths of the hind gut (holothurians) . Homology being ˆcorrespondence in the relative position and connection of parts,® there can of course be no homology between structures occurring in such diverse positions, and yet within a given phylum

they may be homologous and of high morpho¬ logical value (for example, chordates). Among the chordates a series of gill-clefts opens right and left through the walls of the pharynx, and in the lower classes of the phylum the gills are found as highly vascular plates or tufts on the outer sides of the arches separating these clefts ; water is taken in through the mouth and then forced out through the gill-clefts and thus over the gills. In the higher classes of the phylum (reptiles, birds and mammals), the gill-clefts are present during embryonic life, though at no time in their entire life-history do these ani¬ mals have gills and respire water. The con¬ stancy of gill-clefts among vertebrates gives this character a high value in determining the affinities of such doubtful forms as Balanoglos- sus, Cephalodiscas, and Tunicata.

In animals which do not dwell in water and in some few which do (insect larvae, lung fishes, etc.), certain infolded portions of the body oc¬ cur into which air is drawn and from which it is again expelled. Among invertebrates these infolded portions are generally derived from the skin; among vertebrates from a portion of the alimentary canal, the pharynx. In the case of insects and allied forms (Tracheata) these infolded portions have the form of much- branched tubes, the tracheae, which reach to all parts of the body, the terminal twigs of the tracheal system of tubes being found in con¬ nection with almost every bit of tissue in the body. These tracheae open to the exterior through closeable pores, the stigmata, situated on the sides of the body; air is taken in through these pores and by means of the tracheal tubes penetrates to all parts of the body, the ex¬ change of gases taking place directly between the tissues and tracheae. _ Among yertebrates lungs develop as an evaginated portion of the pharynx; in most fishes this is a hydro¬ static apparatus, the swimbladder, but in the lung fishes (Dipnoi) it becomes highly vascular and may serve as a lung. In all higher vertebrates this sac is paired, and its walls, which in the lower classes are relatively simple, become much infolded and very richly supplied with blood vessels. The exchange of gases here takes place between the blood and the air within the lung, and in most

vertebrates the oxygen-carrying capacity of the blood is increased by the presence of haemoglobin (the coloring matter of red blood corpuscles) which enters into a loose chemical combination with

the oxygen. ....

1. Circulatory System — The physiological significance of the circulation of fluids within the body is the distribution of nutriment and in some cases oxygen to all the parts. In the sim¬ plest Metazoa (Cnidaria , Ctenophord) there is no need of a special circulatory apparatus other than that which is furnished by the gastric cav¬ ity itself ; this may branch and extend to vari¬ ous parts of the body or hydroid colony, thus forming a gastro-vascular system, through which the distribution of nutriment takes place; the branched gastric cavity of certain turbel- larians serves also a similar function. Circula¬ tion of bodv fluids also occurs in many lower animals without the aid of any special circula¬ tory apparatus; in such cases lymph, contain¬ ing the products of digestion, is distributed through all the intercellular spaces in the primary body cavity, and by the contractions

of the general musculature of the body it is kept in irregular movement. With the single exception of the nemerteans a blood vascular system is found only among animals with a secondary body cavity or true coelom and is lacking even in some of these, particularly such as are quite small or are evidently degenerate forms. With a few exceptions it is present in mollusks, echinoderms, annelids, arthropods and all chordates. In its simplest form it con¬ sists o«f branching and anastomosing tubes which contain blood. The walls of the tubes are composed of flattened epithelial cells (endothelium) which may be surrounded on the outside by muscle or connective tissue fibres. The blood which fills these vessels consists of a fluid or plasma within which floating cells or corpuscles are almost invariably present. With increasing complexity of this system the walls of the vessels become thicker by increase of the muscular or connective tissue coats, and in certain parts of the system the vessels be¬ come larger. The muscular walls may be pulsa¬ tile throughout the entire length of a vessel, or this function may be limited to a small por¬ tion of a large vessel, which is then known as a heart ; even in the highest animals the heart is only a differentiation of a simple pulsatile blood vessel. The vessels leading away from the heart are the arteries, those through which the blood flows back to the heart the veins, while the

small thin-walled vessels connecting the two, and through the walls of which plasma

t

Fig. 10 Fig. 11

Fig. 10. — Circulatory and nervous systems of a snail (Palu - dina) (from Claus after Leydig). — F, tentacles; Oe, oesophagus; Cg. cerebral ganglion; Pg, pedal ganglion and otocyst; Vg, visceral ganglion; Phg, pharyngeal ganglion; A, auricle of ! heart; Ve, ventricle; A a, abdom¬ inal aorta; Ac, cephalic aorta; V, veins; V c, branchial veins; Br, gills.

Fig. 11. — Anterior part of the circulatory system of an annelid (Sanuris). — The arrows indicate the direction of the flow. II. heart-like enlargement of a commissural vessel.

escapes into the tissues, are the capillaries. Among the annelids there is a large dorsal ves¬ sel and a ventral one, which are connected in each somite by commissural vessels. The dor¬ sal vessel is pulsatile along its whole length, and peristaltic contraction waves can be seen in a living worm to pass from the posterior to the anterior end ; correspondingly the blood flows forward in the dorsal vessel, down through the commissural vessels into the ven¬ tral one, and then backward through the latter to the posterior portion of the body, where the blood ascends through commissural vessels to the dorsal vessel, after which the same circuit

is repeated. Throughout this whole course the blood flows through vessels with definite walls, and the circulation is said to be closed. Among the molluscs and arthropods a heart is present

Fig. 12

Fig. 12. — Circulatory and respiratory systems of the cray¬ fish (from Claus). — C, heart with three pairs of ostia; Ps, pericardium; Ac, cephalic aorta; A. ab, abdominal aorta; 4s, sternal artery. The arrows indicate the direction of the flow.

which is more concentrated and complete than among the annelids. In the arthropods this consists of a thick-walled, pulsatile tube lying on the dorsal side of the body and extending through several somites ; in

each somite are a pair of openings, the ostia, which open into the heart from the pericardium, and through which returning blood enters the heart. Among the molluscs the heart is also of a compact type and is divided into auricular and ventricular portions. Primitively two auricles are present, though in some gasteropods this number is re¬ duced to one; in all molluscs there is but one ventricle. In primitive arthropods and mol¬ luscs the blood flows out of the ventricle at both the anterior and posterior ends ; in more highly differentiated members of these phyla, out of the anterior end only. Among the arthropods the vascular system is very incom¬ plete, the arteries soon end in lacunar spaces in the tissues, and from these spaces the blood is gathered into large sinuses and thence flows back to the heart. These lacunar spaces and sinuses are not true vessels, since they do not have definite walls, but are derived from the primary and secondary body cavities ; the cir¬ culation is therefore an open one. Among the molluscs the vascular system is more exten¬ sive than among the arthropods, but here also the circulation is open, except in the cephalo- pods, the arteries being connected with the veins by a system of lacunar spaces instead of capillaries. Finally among the echincderms and chordates the circulation is closed as among the annelids; that is, the blood throughout its entire circuit is contained within definite vessels.

The manner in which blood is supplied to the respiratory organs is of great importance in explaining the structure of the circulatory or¬ gans in air-breathing vertebrates. Among an¬ nelids, arthropods, and molluscs the blood flows directly from the heart to all parts of the body, whence it is gathered into trunks which carry it to the gills; from these organs it is then re¬ turned purified to the heart. In the fishes the blood passes from the heart directly to the gills, whence it is gathered into the dorsal aorta and distributed to all parts of the body; it is then returned laden with waste product from the tissues to the heart. In these animals the heart consists of a single auricle and ven¬ tricle, essentially a simple tube more or less

bent upon itself. In air-breathing amphibia a part of the blood passes directly from the heart to the lungs, whence it returns to the heart oxygenated, while a part of it goes at once to the body; the former is known as the pul¬ monary, the latter as the systemic circulation. In these animals the heart is incompletely di¬ vided by a partition which separates the auric¬ ular chamber into twro auricles, but which leaves the ventricle undivided. The blood re¬ turning from the body is carried into the right auricle, while that from the lungs goes into the left; in the ventricle both kinds of blood mingle to a certain extent, though by a peculiar arrangement of folds and valves the larger part

of the oxygenated blood which enters the left auricle is pumped to the anterior part of the body, while the blood from the right auricle goes to the lungs. Finally in all birds and mam-

Fig. 13 Fig. 14 Fig. 15

Fig. 13. — Heart and great blood-vessels of the turtle (from Claus).- — Ad, right auricle; As, left auricle; Ao. d, right arch of the aorta; Ao. s, left arch of the aorta; Ao, dorsal aorta; C, carotids; Ap, pulmonary arteries.

Fig. 14. — Aortic arches of a mammal, and their relations to the five embryonic arches (from Claus). — c, c', carotids; A, aorta; Ap, pulmonary artery; Aa, great arch of aorta.

Fig. 15. — Diagram of a heart completely divided into right and left halves, and of a double (systematic and pul¬ monary) circulation (from Claus). — Ad, right auricle; Vcs, anterior vena cava; Vet, posterior vena cava; Vd, right ventricle; Ap, pulmonary artery; P, lung; Vp, pulmonary vein; As, left auricle; Fs, left ventricle Ao, aorta; D, gut; L, liver; Vp, portal vein; Lv, hepatic vein.

mals and in the highest reptiles (Crocodilici) the heart is completely divided by a partition into two auricles and two ventricles, and a double circulation, systemic and pulmonary, is established. The blood from the left ventricle goes at once to all parts of the body, whence it returns to the right auricle ; it then falls into the right ventricle and is pumped from that to the lungs ; here it is oxygenated and returns to the left auricle, and then from the left ventricle is again sent out to all parts of the body.

1. Excretory System. — Execretion is the process of removing non-gaseous waste prod¬ ucts, particularly urea and allied compounds, from the body. These nitrogenous waste sub¬ stances are formed as the result of proteid combustion within the body, and as this form of metabolism is universal among animals nitrogenous waste substances are everywhere formed. With few exceptions all animals pos-

sess some form of excretoiy organ; in fact this is one of the distinguishing characteristics of animals as contrasted with plants. Among the Protozoa the excretory organ is a pulsatile vacuole which

gradually fills with fluid con¬ taining these waste products and then suddenly contracts, forcing this fluid out of the body. Among coelenterates excretion is probably per¬ formed by isolated gland cells, so that no single organ exists for this function ; even among higher animals excretion is performed to a limited extent by individual cells or small glands; for example, the chlorogogue cells of annelids, the dermal glands of Crustacea and the sweat-glands of mammals. In all higher animals a special excretory organ exists; this usually consists of minute tubules formed of cells which take up the waste substances and pass them into the tubule, whence they are car¬ ried to the exterior; such an excretory tubule is known by the general name of nephridium. The forms of nephridia differ considerably in different phyla, but two principal types may be recognized ; these are the protonephridium, or water vascular system, and the metanephridium (Hatschek). The protonephridium is found in the flat worms and rotifers; that is, among worm-like animals without a-secondary body cavity; it is also found as the larval excretory organ (head kidney) in annelids. It consists of a pair of more or less branched tubules opening at one or more places to the exterior, while the internal terminations of the tubules each end in a single large cell which closes the end of the tubule and bears a tuft of long cilia projecting into its lumen. This tuft beats with undulatory movement and looks somewhat like the flickering flame of a candle, whence it is called a Aflame® and the large cell which bears it a (<flame cell.® The tubule itself is usually composed of a single series of long glandular cells so perforated that the lumen is intracel¬ lular. In larger branches of the protonephrid¬ ium the walls of the tubule may be formed of

A.

0 & .

Fig. 16

Fig. 16. — Structure of the protonephridium (excretory organ) of a flatworm (from Hatschek) . — A , part of the excretory apparatus of a tapeworm; r, edge of body; c, collecting tubules. — ’B. Terminal cells ' with flame of cilia. — C. Diagram of terminal cell, excretory capillary, and canal.

many cells which are ciliated on the side next the lumen. These cilia as well as the flame drive fluids within the lumen to the exterior. It is probable that these fluids are transuded body fluids and that the excretion of the waste substances is brought about by the activity of

the cells which form the walls of the lumen.

The metanephridium is found among anne¬ lids, molluscs, molluscoids, prototrachcates, and chordates, while a modified form of its exists in crustaceans. Typically it consists of a tubule opening to the exterior at one end and into the body cavity or some portion of it (pericardium or blood sinus) at the other. Where it opens

Fig. 17 Fig. 18

Figs. 17, 18. — Diagrams of the excretory system in an annelid and in a shark (fromˆ Claus after Semper). — Ds, dissepiments; Wtr, ciliated funnels; Ug, segmental duct.

into the bodv cavity the tubule is widened and covered with long cilia and is known as the ciliated funnel or nephrostome. Following this is the glandular portion of the tubule, consist¬ ing of a single series of perforated cells, or in other cases of an epithelium, composed of many cells, which forms the walls of the lumen. In either case these cells are glandular in char¬ acter and are the real excretory cells, taking urea from the blood and passing it into the lumen of the tubule. The latter is ciliated throughout, and by the action of these cilia, to¬ gether with those of the ciliated funnel, ccelomic fluid is drawn into the tubule through the funnel and driven to the exterior, thus flushing the tubule and carrying away the ex¬ creted substances. Finally the terminal portion of the tubule, which is derived as an invagina¬ tion from the ectoderm, serves as a collecting tube or reservoir. Generally a single pair of these tubules is found in unsegmented animals, such as Mollusca and Molluscoidea ; this num¬ ber may be reduced, however, as in the Polyzoa, where they are entirely lacking, or in certain Gasteropoda, where one of them is suppressed, or it may be increased as in the case of certain Cephalopoda (Tetrabranchia) , where two pairs are present. In segmented animals, such as annelids, prototracheates, and chordates, it is probable that originally one pair existed in every somite, and this is still approximately the case in some of the simplest members of these phyla, while in higher forms they are limited to certain segments and have disap¬ peared from others. The segmental character of these organs is so characteristic in the phyla named that they are called ((segmental organs.® Among the Chordata these organs undergo modifications which deserve especial mention. They lie at the dorsal side of the body cavity

and on each side of the notochord. Only in Amphioxus do they open individually to the ex¬ terior; in other chordates the peripheral ends of the tubules unite on each side into a duct which grows backward and opens into the cloaca near the anus ; this is the segmental or Wolffian duct. This earliest system of segmental tubules in chordates is known as the pronephros, and it ex¬ tends throughout the entire trunk region of the lowest vertebrates (cyclostomes) , though in all higher forms it is limited to a few an¬ terior somites and is usually a purely embryonic organ. Among these higher forms longer and

A

Fig. 19

Fig. 19. — Diagrams illustrating the development of the urino-genital organs of a vertebrate (after Parker and Haswell). — A, pronephros and segmental duct; B, atrophy of pronephros, development of mesonephros; C, appearance of Mullerian duct; D, development of metanephros, male type; E, the same, female type. The sex gland, ovary, or testis is obliquely shaded; phonephros and mesonephros unshaded; metanephros stippled; Mullerian duct heavily shaded. The large chamber to the right, into which these ducts as well as the intestine open, is the cloaca.

more complicated tubules are formed in the somites behind the pronephros, which also open into the segmental duct at one end and into the body cavity at the other; near the ciliated fun¬ nel a knot of blood vessels forms' on the side of the tubule and projects into its lumen; this is the glomerulus or Malpighian corpuscle. Many of the tubules in this region then lose their ciliated funnels and no longer open into the body cavity, the tubule being flushed out by transuded plasma from the glomerulus; at the same time the single pair of tubules originally present in each somite may give rise to others by budding, so that several may be found in

each somite. This second form of the nephrid- ial system of vertebrates is known as the meso¬ nephros, and is the permanent excretory organ of fishes and amphibians, while only an em¬ bryonic orgˆn in reptiles, birds, and mammals. Finally, in the last named classes, the definite kidney or metanephros appears in several of the somites posterior to the mesonephros. Its tubules, while similar to those of the meso¬ nephros, are still more complex, having no trace of a ciliated funnel, and by budding very many of them are formed in each' somite. The duct into which they open, the ureter, is an out¬ growth of the segmental duct. It is thus to be seen that the very complex excretory

system of vertebrates can be derived, step by step, from the simple nephridial system of such inverte¬ brates as the annelids.

Finally, the nephrida may carry off from the body cavity not only ccelomic fluid, but also cells which are set free into this fluid; some of these cells in the annelids may be loaded with urates which are thus carried to the exterior (chlorogogue cells), but the most important of the cells which thus escape from the coelom are the sex cells, ova and spermato¬ zoa. The nephridia may be especially modified for carrying off these sex cells, in which case they are known as gonoducts. Even among vertebrates the oviducts and spermiducts (vasa deferentia) may be derived from the nephric system. The former in some vertebrates arises in the embryo as part of the segmental duct and opens into the body cavity at its anterior end through a pronephric tubule; in animals above the amphibians, which have a metanephros and ureter, the segmental duct serves exclusively as a spermiduct in the adult.

1. Reproductive System. — Reproduction among animals is both sexual and asexual; the former occurs among all animals, the latter is limited to the lower forms and to the constituent cells of higher ones. Sexual reproduction or amphigony consists in the union of two cells, the sex cells or gametes, to form a single cell of double origin, the oosperm or zygote, from which a new individual similar to the parental form develops. If the gametes are approxi¬ mately equal in _ form and size their union is spoken of as conjugation, if they are very unlike in these respects they are called ova and sperma¬ tozoa, and their union is known as fertilization. Both conjugation and fertilization occur among the Protozoa, whereas all Metazoa reproduce by means of differentiated sex cells, namely, ova and spermatozoa. In a few animals ova have the power of developing without previous fer¬ tilization, the process being known as partheno¬ genesis. If such development without fertiliza¬ tion occurs in larval forms which have not completed their development it is known as paedogenesis. In most animals the sexes are separate, — that is, ova and spermatozoa are produced by different individuals, males and females, and the species is dioecious ; in some cases, however, both kinds of sex cells are produced by the same individual, which is then said to be hermaphrodite, and the species to be monoecious.

The essential reproductive organs are the gonads, or the glands which produce ova and spermatozoa, namely, the ovaries and the testes. In sponges the reproductive cells are scattered

through the mesoderm so that in these animals ovaries and testes cannot be said to exist. In the lowest cnidarians (Hydrozoa) the sex cells are at first widely scattered in the ectodermal epithelium, but they actively migrate to certain portions of the hydroid stem where reproduc¬ tive buds are being formed, and, aggregating here, form gonads. In all higher animals defi¬ nite gonads are present. No genital ducts are present in the ccelenterates, and none are need¬ ed, since the sex cells can escape directly into the water. In animals above the ccelenterates the sex cells are mesodermal in origin, and in most cases form a part of the epithelium lining the coelom. In animals without a true coelom the sex cells arise within tubes or glands the cavities of which may perhaps represent the coelom. In flatworms the gonads occur in considerable numbers in a single individual. In roundworms they are limited to one or two tubes, in rotifers, molluscs, molluscoids, and echinoderms they are confined to one or at most a few sex glands, while in segmented ani¬ mals they are found in primitive forms in every body somite, though with advancing organiza¬ tion they become limited to a few segments or even to one. In most animals above the ccelen¬ terates some form of duct exists for carrying the sex cells to the exterior; among the flat- worms, roundworms, and rotifers these ducts are never the excretory tubules, though they may possibly represent the coelom of higher animals. In these higher forms they are fre¬ quently metanephridia, or modified excretory ducts.

In many animals the ova and spermatozoa escape directly into the water, and there the eggs are fertilized and undergo development ; it is probable that in these animals the escape of ova stimulates the males to eject sperma¬ tozoa so that both kinds of sex cells are shed at about the same time. In such cases enor¬ mous numbers of sex cells are produced and very many are wasted. A slight advance over this condition is found in those animals (frogs, bony fishes, etc.) in which the openings of the male and female ducts are placed close to¬ gether at the time of shedding the sex cells; his is known as external copulation. In other cases the spermatozoa only escape from the oody, and by means of currents of water they ire carried into the body of the female, where they fertilize the ova in situ, as in sponges, or in certain receptacles into which the eggs are collected, as in fresh-water mussels. In other animals copulatory organs exist which serve to introduce spermatozoa into the sex ducts of the female, thus increasing the chances for the fertilization of the ova; this is internal copula¬ tion. In many cases copulation occurs but once, and the

spermatozoa are stored in a sem¬ inal receptacle which opens into or near the oviduct. Internal copulation is a necessity in all land animals and in parasites, and it also of curs in many phyla of invertebrates (flat- worms, roundworms, rotifers, gasteropods, cephalopods, annelids, arthopods).

In certain animals the sexes differ not only with respect to the sexual apparatus but also in many other regards; when such differences are very marked they constitute what is known as sexual dimorphism. In such cases the male Is frequently very degenerate in form, being sometimes not more than a hundredth part the

size of the female and entirely lacking alimen¬ tary canal, sense organs and nervous system (rudimentary males of rotifers, barnacles, etc.).

Asexual reproduction, or monogony, consists in the formation of new individuals by division of an old one. In one-celled organisms and in the constituent cells of higher animals this takes the form of cell division. In the lower Metazoa asexual reproduction is not limited to cell division, but the entire body or portions of it may undergo constriction and subsequent division, thus giving rise to new individuals. This division may be into equal parts, in which case it is called fission ; or into unequal parts, when it is known as budding or gemmation. In animals which reproduce both sexually and asexually there is a more or less regular alter¬ nation of one method with the other; this is known as alternation of generations (q.v.) or metagenesis. The alternation of amphigony with parthenogenesis is called heterogony.

1. Nervous System and Sense Organs. — Sensation and co-ordination are manifestations of protoplasmic irritability, or that capacity of receiving and responding to stimuli characteris¬ tic of every cell. Animals, even the simplest, are sensitive to a variety of stimuli, among which may be mentioned mechanical, chemical, thermal, and electrical, as well as light, gravity, etc. These stimuli, acting on the organism, start changes in the protoplasm (impulses) which are transmitted to portions of the body distant from the point first stimulated and call forth the co-ordinated activities of many dif¬ ferent parts. In higher animals there are spe¬ cial sense organs for receiving certain of these stimuli and specialized protoplasmic fibres (nerve fibres) for transmitting impulses, while nerve centres for co-ordinating activities ap¬ pear very far down in the animal scale. In the lowest animals, however, there are neither nervous system nor

sense organs, and yet through the irritability of the general proto¬ plasm these functions are performed.

A protozoan reacts to all stimuli in the same way, and it is probable that however different the stimuli may be they produce essentially the same changes in the protoplasm. The sensa¬ tions of Protozoa, if they can be said to have sensations, must be of the most general and indefinite sort, just as their responses to stimuli show the most monotonous sameness. The same thing is probably true of sponges, where none of the cells are differentiated for receiv¬ ing and transmitting stimuli. In all other phyla, however, certain cells of the body are set apart for these particular functions, and the greater the differentiation in these respects the more definite and varied are the sensa¬ tions, the more swiftly impulses are transmitted to the motor system and the more complicated are the responses.

Nervous System. — The elements out of which the nervous system is built are nerve cells and fibres, the latter being merely out¬ growths of the former. In practically all Meta¬ zoa these cells are derived from ectoderm, and in a good many animals the sense organs and entire nervous system remain throughout life a part of the superficial epithelium which covers the body (Coelenterata , Chcetognatha, certain Annelida, Molluscoidea, many Echinodermata, Balanoglossus) ; such a nervous system is said to be epithelial. In all other Metazoa the nerv-

oils system, though formed from epithelium, separates from it in the process of develop¬ ment, so that brain, ganglia, and nerve trunks come to lie some distance from the surface of

Fig. 20 Fig. 21 Fig. 22 Fig. 23

Fig. 20. — Diagram of the nervous system of a starfish (from Claus). — N, nerve ring.

Fig. 21.— Nervous system of a flatworm (M esostomum) . — G, cerebral ganglia and eyes; St, the two lateral nerve trunks; D, intestine with mouth.

Fig. 22. — Nervous system of the larva of a ladybug (Coc - cinella). — Gfr, frontal ganglion; G, cerebral ganglia; Sg, suboesophageal ganglion; G' — G" , ganglia of the ventral chain.

Fig. 23. — Nervous system of adult ladybug. — Ag, optic ganglion.

the body; this is known as an epitheliogenous nervous system. In addition to the two classes just mentioned, which are based on the rela¬ tions of the nerve cells to the body layers, four types of nervous system are found among Metazoa which are based upon the relations of

Fig. 24

Fig. 24. — Diagrams of the vertebrate brain (after Parker and Haswell). — A, first stage, with three brain vesicles; B, second stage, four brain vesicles; C, D, side view and sagittal section of fully formed brain without cerebral hemispheres.

the nerve cells to one another; these are (1) the diffuse type, (2) the linear type, (3) the ganglionic type and (4) the tubular type.

(1) A diffuse nervous system consisting of

nerve cells and fibres scattered throughout the superficial epithelium is the simplest type known and is found among such animals as sea-ane¬ mones (Actinozoa) ; the nerve cells are here connected together by means of the fibres into a ganglionic plexus. (2) The next step in in¬ creasing complexity is represented by a linear nervous system such as is found in the jelly¬ fishes ; here many nerve cells and fibres are aggregated into a double nerve ring around the margin of the umbrella, thus forming a cen¬ tralized nervous system ; other nerve cells re¬ maining, scattered throughout the epithelium, serve to connect the ganglia with the muscles. (3) The ganglionic type. In ctenophores, a sense organ from which nerves radiate, is found at the apical pole, and in a great many of the higher animals the earliest formed and most widely represented portion of the nervous system is a sense organ and ganglion which ap¬ pear at the apical pole of the gastrula, and

Fig. 25

Fig. 25. — Diagrams of vertebrate brain (after Parker and Haswell). — E — H, transverse sections of brain at dif¬ ferent levels; E,oi the cerebrum; F, of the 'tween brain; G, of the mid brain; H, of the hind brain; I, J, side view and sagittal section of a brain with cerebral hemispheres.

becomes in the adult the cerebral ganglion or brain, lying on the dorsal side of the oesopha¬ gus. Nerve trunks are always given off

from this ganglion, and very generally two of them run down on each side of the oesophagus to its ventral side, thus forming a circum-cesophageal nerve ring. In different phyla longitudinal nerve trunks may be given off from different parts of this ring; among anne¬ lids, arthropods, mollusks, and molluscoids from the ventral side, and in annelids and arthropods this forms the (<ventral chain, }) which consists typically of a pair of ganglia in each somite connected with those in front and behind by nerve cords. The first one in the chain is the suboesophageal ganglion, connected with the cerebral ganglion by the circumcesophageal commissures. In the. mollusks the nervous sys¬ tem consists of a pair of supra- and sub-oeso¬ phageal ganglia (cerebral and pedal) which, with their connectives form an oesophageal

ring. To these is usually added a pair of pleural and of parietal ganglia forming a loop, which extend back into, the body, while ventral trunks (pedal cords) may be present in the foot. (4) The tubular type of nervous system is found only among the chordates ; here the nervous system develops from an epithelial plate (neural plate) on the dorsal surface of the embryo, which becomes invaginated in such a way as to form a longitudinal groove, the neural groove. This then separates from the

Fig. 26. — Dorsal view of vertebrate brain with the cavities of the right side exposed (after Parker and Haswell).

epithelium as a tube, which in all vertebrates is enlarged at its anterior end to form the brain. This neural tube, while apparently a continuous structure, is really composed of segments, the neuromeres, one neuromere being found in each body somite ; the neuromeres are thus comparable to the ganglia of the ventral chain of arthropods and annelids. This segmentation of the central nervous system of vertebrates is indicated even in the adult by the segmental arrangement of the spinal and cranial nerves. In the embryonic development of all vertebrates the brain consists of three enlargements or vesicles, the fore brain, mid brain and hind brain; the first gives rise to the cerebrum and ’tween brain of the adult, the second remains as the mid brain, while the third gives rise to the cerebellum and medulla. The portion of the neural tube posterior to the brain becomes the spinal cord' of the adult. With the differ¬ entiation of nerve cells and fibres in the wralls of the neural tube these

walls increase greatly in thickness, while the originally large cavity of the tube becomes restricted in size, forming in the adult the ventricles of the brain and the central canal of the cord.

Sense Organs. — The simplest sense organs are the scattered sensory cells found in the superficial epithelium of many animals; these may be solitary or aggregated into buds. They are elongated epithelial cells with a hairlike process at the free border and a fibre at the deeper end connecting with the branches of a ganglion cell. They are organs of general sen¬ sation — that is, they are capable of receiving various kinds of stimuli, such as mechanical, thermal, electrical, and chemical, and are there¬ fore largely undifferentiated, though probably chiefly subserving the sense of touch. These integumentary sense organs are found in almost every group of animals. Among the verte¬ brates they are present in primitive form over the general body surface; in the fishes and amphibia they are aggregated into buds, form¬ ing the lateral line organs, while among those vertebrates which do not dwell in water deeper- lving organs, of modified type, are found (tac¬ tile cells, corpuscles, and bulbs). In addition to these organs of general sensation, higher Meta¬ zoa generally possess specific sense organs, namely, those differentiated for the reception

of particular kinds of stimuli. These are or¬ gans of (1) smell and taste, (2) equilibrium and hearing, (3) vision.

(1) Organs of smell and taste are present in all vertebrates and in many invertebrates. Their structure is extremely simple, being but slightly modified from the type of the primitive organs described above. In fact the olfactory sense cells of vertebrates are merely scattered sensory cells, while the organs of taste (taste •buds) are simple aggregations of such cells. Throughout the Metazoa the organs of taste and smell are generally located in ciliated pits or depressions of the integument either on the head or at least near the mouth or respiratory organs. In these positions they serve in the one case to test food and in the other the quality of the medium used in respiration. Among fishes the olfactory organs are located in pits on the front of the head; in all air-

A. b.

C. D.

Fig. 27

Fig. 27. — Auditory or equilibrative organs of jelly-fishes (from

Hatschek). — A, of Cunarcha. B, of Peclis. C, of Rhopalonema. D, of Cumarina. Ok, auditory tentacle; 01, Otolith; Oh, auditory hairs; n, nerve.

breathing vertebrates these open posteriorly into the mouth cavity or pharynx, and thus form the anterior part of the respiratory tract. The organs of taste are of course in or near the mouth. Among the molluscs a sense organ which is probably olfactory in function, the osphradium, is located near the gills. Among the arthropods we find notable modifications of these organs owing to the fact that the en¬ tire body surface is there covered with an im¬ permeable chitinous coat. These sense organs are here peculiar hollow tubes, the olfactory tubes or cones, which are borne on the an¬ terior portion of the body, usually on the an¬ tennae and mouth parts; these hairs are filled with fibrillar protoplasm which connects with sense cells at the base of the hair.

(2) Organs of hearing and equilibration are very widely represented throughout the animal kingdom. It is advisable to consider these two

organ systems together, since the two functions which they subserve are united in the same general organ in the vertebrates, while in lower forms it is by no means easy to distinguish be¬ tween the two. It has long been customary to speak of all vesicular sense organs containing free solid bodies as auditory in function, but it is much more likely that in the lower Meta¬ zoa they serve to acquaint the animal with its bodily positions — that is, that they are organs of equilibration. In many respects the simplest type of organ of this class is found among cer¬ tain jellyfishes. It here consists of a short tentacle situated in a depression of the ecto¬ derm and bearing a solid body or otolith near its free end; by the movements of the tentacle the hairs or protoplasmic processes of sur¬ rounding sensory cells are stimulated. In other Mednsce the sensory cells may entirely enclose the tentacle, thus forming an auditory vesicle or otocyst. The auditory organs of most ver¬ tebrates, as well as of most invertebrates, can be traced back to this simple type. The sensory cells forming the walls of the otocyst are sim¬ ilar to tactile cells — that is, they bear processes projecting into the cavity of the otocyst, while the bases of these cells are connected with ganglion cells. By the movements of the oto¬ lith, usually a calcareous concretion, these cells are stimulated and impulses thus generated are

Fig. 28

Fig. 28. — Auditory or equilibrative organs of molluscs (from Hatschek).

conveyed away by the nerve fibre. Otocysts of this type are possessed by molluscs, certain annelids, tubellarians, and brachiopods. In the case of arthropods organs of a different type are generally found, owing to the fact that the body is here covered by chitin and that the fine protoplasmic processes or cilia are absent. Among the crustaceans the auditory organ usually consists of a cavity in the basal joint of the first antenna, which is open to the ex¬ terior and which contains water and grains of sand; the wall of the cavity bears chitinous processes or auditory hairs which have a nerv¬ ous connection at their base; these hairs are stimulated by the movements of the water and sand within the auditory sac. Many insects have a true tone-perceiving organ, the chor- dotonal organ ; in principle this consists of a few elongated cells, the chord, which are at¬ tached directly to the integument at one end and by a ligament to an opposite point of the integument ; when this apparatus is thrown into vibration impulses are conveyed to the nerve cells attached to some portion of the chord. In other insects (Orthoptera) a tympanal organ

may be present, consisting of a vibrating mem¬ brane overlying a tracheal chamber; sense cells are present between the membrane and cham¬ ber, and when the membrane is set into vibration

Fig. 29. — Internal ear of different vertebrates. I, Fishes. II, Birds. Ill, Mammals. (From Claus.) — U , utricu- lus with semicircular canals; 5, sacculus; Us, utriculus and sacculus; C, cochlear duct; L, lagena; Cr, canalis reuniens; R, recessus vestibuli.

by sound waves the sense cells are stimulated. Among aquatic vertebrates a system of integu¬ mentary sense buds is found along the lateral borders of the body and over the head, which is known as the lateral line system. The func¬ tion of these organs is not surely known, but it is probable that they are organs of touch and also of equilibration. In all vertebrates it is probable that the auditory organs, as well as the organs of smell and taste, have been de¬ rived from integumentary sense organs homo- logus with those of the lateral line. In the process of development the ear appears as a pit-like invagination of the skin which is then infolded to form a vesicle; this vesicle then becoming partially divided into two chambers, the utricle and the saccule. In most verte¬ brates the former bears three pairs of semi¬ circular canals which are organs of equilibra¬ tion, while the

latter gives rise to a recess, the lagena, which becomes the cochlear duct in mammals and is a true auditory organ. Cal¬ careous concretions or otoliths are present in

Fig. 30. — A , section through the open eye-pit of a limpet {Patella); B, the two kinds of retinal cells, pigmented and sensory (from Hatschek).

this much- folded and complicated otocyst. This sensory portion of the auditory organ is known as the inner ear; to this is added in all animals above the frogs and toads a middle ear or tym-

panum which transmits the sound waves from the surface to the inner ear. Finally, in the mammals there are folds of the integument around the tympanic membrane which serve to collect sound waves and which constitute the external ear.

(3) Visual Organs — Animals without any trace of eyes are sensitive to light (certain

P9 cv /

FiG. 31

Fig. 31. — Section through the eye cf a water-beetle (Hydrophilus) (from Hatschek); l, chitinous lens; cv, transparent cells; pg, pigment cells; R, retina.

Protozoa, Turbellaria, Larva) , and it must therefore be assumed that protoplasm may be directly stimulated by light without the inter¬ vention of any special organ. In its simplest form an eye consists of one or a few trans¬ parent cells partially surrounded by pigment in the form of a cup, so that the light can enter only from one side; the pigment not only ab¬ sorbs light rays, but it optically isolates the

cv

R

N

Fig. 32

Fig. 32. — Section through the cup-shaped eye of a gaster- opod (Haliolis) (frorp Hatschek) .— e, epithelium cov¬ ering body; cv, vitreous body; R, retina; N, nerve.

cells within from those without this cup (some Medusa, Turbellaria, Annelidce). The function of such an eye is probably to determine the di¬ rection of light, since it could give no image of luminous objects. A slight advance over this simplest type of eye is found in the cup-shaped eyes of certain mollusks ; here certain super¬ ficial epithelial cells are infolded to form a

cupj_in_ some cases deeply pigmented, while other intermediate cells remain clear and un- pigmented. The latter are the sensory cells and are connected at their bases with nerve fibres. If this cup-shaped eye becomes infolded still further and its opening grows smaller and finally closes, altogether, it forms a vesicular eye such as is present in certain molluscs and annelids. The wall of this vesicle, which is turned toward the surface, is transparent and may become thickened to form a lens ; the opposite wall of the vesicle is pigmented and is known as the retina. In such an eye the free ends of the retinal cells are turned toward the cavity of the vesicle, while the opposite ends, which are directed away from the vesicle,

Fig. 33. — Longitudinal section through the pineal eye of a lizard (Sphenodon) (after Baldwin Spencer). The eye is located in the middle of the dorsal side of the head and is covered by translucent scales. The outer wall of the eye vesicle is thickened to form a lens, while the inner pigmented wall is the retina from which the nerve proceeds.

are prolonged into fibres; such an eye has. a direct retina. This type of eye reaches its highest development among the cephalopods, where it bears a striking superficial resem¬ blance to the vertebrate eye. A rudimentary eye of this type is present in all vertebrates as the pineal organ or gland. This is an unpaired structure on the dorsal side of the ’tween brain and in certain reptiles is plainly a vesicular eye with direct retina. The paired eyes of verte¬ brates are also vesicular, but in them the retina is inverse — that is, the free ends of the retinal cells are directed away from the cavity of the vesicle, while the ends which bear the fibres are directed toward it. The explanation of this remarkable condition is found in the study of the development of these eyes. They arise as

lateral evaginations of the walls of the em¬ bryonic fore brain, are then constricted from the brain, and become vesicles connected with the fore brain by only a stalk. At this stage the vertebrate eye is like the invertebrate one save only that it has arisen from the neural in¬ stead of the superficial epithelium. All the cells which form the vesicle have their free ends directed toward its cavity, while their basal ends are directed away from it. The outer wall of this optic vesicle is then infolded until it comes into contact with the inner wall, thus forming a cup open toward the skin. The ectoderm over the opening of the optic cup is then infolded to form the lens, which com¬ pletely separates from the surface and lies in

Fig. 34. — A , section through the compound eye of a cray¬ fish (from Hatschek). — 1, cornea; 2, crystalline cones;

3, retinulae; 4, pigment cells; 5, cuticle; 6, epithelium; n, optic nerve; g, ganglia. B, A single element (omma- tidium) from the compound eye of a crayfish. — 1, corneal lens; 2, corneal cells; 3, crystalline cone cells;

4, 5, outer and inner parts of the crystalline cone; p, pig¬ ment cells; r, retinula; R, rhabdome; b, basement mem¬ brane.

the mouth of the cup. The infolded wall of the cup alone forms the retina, and therefore the free ends of the retinal cells are directed away from the lens and the cavity of the cup. The optic cup with the lens is then surrounded by an outer fibrous and an inner vascular coat, the sclerotic and choroid; a chamber is formed in front of the lens which is filled with water or aqueous humor, while one behind the lens and in front of the retina is filled with vitreous humor.

The compound eye is another type found chiefly among arthropods. It consists of a large number of closely-packed single eyes or ommatidia, each of which is surrounded by pigment and is optically isolated from the others. Each ommatidium consists of (1) a hexagonal cornea at the surface, (2) a crystal¬ line cone below this, and (3) the retinula or group of retinal cells which are connected with nerve fibres.

Bibliography. — (The Cambridge Natural History) (London 1895-1909) ; Gegenbatier, ˆergleichende Anatomie der Wirbelthiere)

(Leipzig 1898-1901) ; Hertwig, (Lehrbuch der Entwickelungsgeschichte des Menschen und der Wirbelthiere5 (9th ed. Jena 1910; ear¬ lier edition tr. by Mark, London 1892) ; Kings¬ ley, J. S., (Comparative Anatomy of Verte- brates) (Philadelphia 1912) ;

Lankester, E. R., (A Treatise on Zoology) (London 1900) ; Parker and Haswell, (Text-Book of Zoology) (London 1897) ; Sedgwick, (Students' Text- Book of Zoology5 (London 1897-1909) ; Wie-. dersheim, <Vergleichende Anatomie der Wir¬ belthiere5 (7th ed., Jena 1909; abr. tr. by Par¬ ker, London 1908).

Edwin Grant Conklin, Professor of Zoology , Princeton University.

ANATOMY OF MELANCHOLY, The.

Robert Burton spent all his mature life at Ox¬ ford in scholarly retirement. He was a library student, not a man of affairs, and not a prac¬ tical physician but a divine. He conceived of his subject in his (Anatomy [i.e. analysis of] Melancholy5 as a malady of both soul and body, and he busied himself with writing his book, so he says, to cure himself of melancholy, one of the chief causes of which he declared to be idleness. The book was a serious effort, carefully planned in its large outlines. But the main outline seems often forgotten, and is filled in with a great mass of various detail. The (<roving humour55 to which he confesses gave Burton an opportunity to provide a run¬ ning commentary on men and morals, politics, religion, business, pleasure, love, and any other topics suggested to him by the books which he had (<confusedly tumbled over.55 The book has been continuously read since the appear¬ ance of the first edition in 1621, and in a way has remained popular with the lovers of quaint literature. The sources of interest in it for the modern reader are above all its quaintness, not always intended by Burton, its out of the way scholarship which seems often grotesque nowadays, and its fidelity as a picture of a certain type of 17th century mind. It treats, moreover, with good humor and . constant vivacity of feeling, of subjects which affect all mortal men, it abounds in anecdote and lively illustration, and, mixed with its credulity, it exhibits not a little skill in analyzing the states of mind and body of mankind. <(I have laid myself open (I know it) in this treatise,55 says Burton, <(turned my inside outward,55 and the book has not a little similarity to the numerous <(confessions55 of a later day.

The style of the <Anatomy5 is one of its most notable characteristics. Burton had first intended to publish his treatise <(more contract in Latin,55 but found he could not get a long Latin book printed, though ((any scurrile pamphlet is welcome to our mercenary Sta¬ tioners in English.55 Perhaps it is fortunate that he did not find a willing publisher for the Latin version, for when he came to write in English he certainly spoke more from <(the strings of his heart55 than he would have done in writing a foreign idiom. He declared that he

wrote (<with as small deliberation as I do ordinarily speak, without all affectation of big words, fustian phrases, jingling terms, tropes, strong lines, that like Acestes' arrows caught fire as they flew, strains of wit, brave heats, elogies, hyperbolical exornations, elegancies, etc., which many so much affect. I am aqua

potor, drink no wine at all, which so much im¬ proves our modern wits, a loose, plain, rude writer.® This passage, if it does not describe Burton's style adequately, illustrates at least some of its main features. It is not a neat and meticulous style, nor is it ornate and in¬ genious. It is rather an easy, discursive essay style, often elaborated until it attains a kind of robustious eloquence. It is characterized also by a monstrous heaping of citations and quo¬ tations, like a mediaeval sermon, or as a mod¬ ern scholarly dissertation would be if the foot¬ notes were inserted in the body of the text. To read Burton with pleasure, one must regard these quotations as interruptions, not part of the rhythm of his phrasing. When they are omitted or are not present, the style moves along easily and rapidly, not unlike the style of one conversing with some degree of ani¬ mation.

George Philip Krapp,

Professor of English, Columbia University.

ANATOMY OF PLANTS. See Plants, Structure of.

ANATTO. See Annatto.

AN'AXAG'ORAS, Greek philosopher: b. Clazomenae, in Ionia, about 500 b.c. ; d. in Lamp- sacus, about 428. . Settling at Athens, his pu¬ pils included Pericles, Euripides and Socrates. In middle life he was publicly charged with impiety and condemned to death, but the sentence was commuted to perpetual ban¬ ishment. Anaxagoras held that there was an infinite number of different kinds of ele¬ mentary atoms, and that these, in themselves motionless and originally existing in a state of chaos, were put in motion by an eternal, imma¬ terial, spiritual, elementary being, from which motion the world was produced.

AN'AXAR'CHUS, a native of Abdera, who was a friend and counselor of Alexander. He was put to death by Nicocreon, Prince of Cy- prios.

ANAX'IMAN'DER, Greek philosopher, mathematician and astronomer: b. in Miletus 611 b.c. ; d. 547. The substance of his philo¬ sophical teaching is that the source of all things is an undefined substance infinite in quantity. According to his theory the universe is a series of concentric cylinders surrounding the cylin¬ drical earth. Anaximander occupied himself much with mathematics and geography, and to him are ascribed the invention of geographical maps, the first application of the gnomon or style fixed on a horizontal plane to determine the solstices and equinoxes, and the discovery of the obliquity of the ecliptic.

ANAXIMENES, an'aks-im'e-nez, OF LAMPSACUS, Greek historian: b. Lampsa- cus, Asia Minor, about 340 b.c. To him is at¬ tributed the (Ars Rhetorica ad AlexandrunP found among the writings of Aristotle. Only fragments of his histories of Philip of Mace- don, Alexander, and Greece remain.

ANAXIMENES OF MILETUS, Greek philosopher : b. Miletus, and flourished about 550 b.c. He affirmed that air was the first prin¬ ciple of all things. Finite things were formed from the infinite air by compression and rare¬ faction produced by eternally existent motion , and heat and cold resulted from varying de¬ grees of density of the primal element.

ANAYA, a-na'ya, Pedro Maria, Mexican commander: b. Huichapan 1795; d. 1854. .En¬ tering the army in 1811 he attained the rank of brigadier-general in 1833. He held several cab¬ inet positions, was acting President of Mexico for a few weeks in 1847, and at the time of his death was Postmaster-General under Santa Anna.

ANCACHS, an-kachs', or ANCASH, Peru, a department bounded on the north and northeast by La Libertad, on the east by Huanuco and Junin, on the south by Lima and on the west by the Pacific Ocean. It is estimated to contain 16,562 square miles. The ports are Santa, Chimbote, Samanco, Casma, and Huarmei. The rivers rise on the western slopes of the Cordillera, with the exception of the Santa, which, rising east of the Cordillera, flows first through the valley of the Callejon of Huaras, but in the northern part of the department turns west, unites with the Chuquisaca and passes through a deep gorge in the Cordillera to the Pacific (compare observations on the Patia River, ar¬ ticle Colombia). Its total length is about 180 miles. The valley of the Santa is extremely fertile. It is connected with the port of Chim¬ bote by a railway running as far as Tablones. The departmental capital is Huaras. Agricul¬ tural products are sugar, rice, cereals, grapes, maize and a special kind of potato (the Caras variety)

which matures in three months. Among the mineral resources we note partic¬ ularly the coal (bituminous generally, but an¬ thracite near Chimbote and Huaras), petro¬ leum, gold, copper, silver and lead. Pop. 317,-

1.

ANOffiUS, an-ke'us, the name of two of the Greek Argonauts, one the son of Poseidon and steersman of the Argo, the other a son of the Arcadian Lycurgus. Each was killed by a wild boar.

ANCELOT, ans'lo', Jacques Arsene Fran¬ cois Polycarpe, French novelist, dramatist and poet: b. Havre, 9 Feb. 1794; d. Paris, 7 Sept 1854. His tragedy, (Louis IX,5 brought him a pension in 1819, but he lost it through the revo¬ lution of 1830. He produced pleasing verses, epigrammatic satires; an epic, (Marie de Bra¬ bant5 (1825) ; a novel, (L'Homme du Monde5 (1829), as well as other works, but (Louis IX5 remains his most important achievement. His wife, Marguerite Virginie Chardon, b. Dijon, 15 March 1792; d. Paris, 21 March 1875, wrote novels and plays sometimes with him, but also independently, and won some attention as an artist.

ANCESTOR, one who has preceded an¬ other in a direct line of descent; an ascendant, a former possessor ; the person last seised. Termes de la Ley; 2 Shars. Bl. Com. 201. In the common law, the term is understood as well of the immediate parents as of those that are higher; as may appear by the statute 25 Edw. Ill, De natis ultra mare , by the statute 6 Rich. II c. 6, and by many others. But the civilians' relations in the ascending line, up to the great-grandfather's parents, and those above them, they term majores, which common lawyers aptly expound antecessors or ances¬ tors, for in the descendants of like degree they are called posteriores. Cary, Litt. 45. The

term ancestor is applied to natural persons. The words predecessors and successors are used in respect to the persons composing a body corporate. Consult 2 Bl. Com. 209 ; Bacon, Abr. ; Ayliffe, Pand. 58; Reeve, Descents.

ANCESTOR-WORSHIP. See Man.

ANCHIETA, an-shya-ta, Jose de, Portu¬ guese missionary to Brazil: b. Laguna, Tene- riffe, 1533; d. 1597. He was a Jesuit and founded in

Brazil the first institution for the conversion of the inhabitants. He was the au¬ thor of (Natural Productions of Brazil.)

ANCHISAURUS, an'ki-sa'rus, a carnivo¬ rous dinosaur of the Triassic period. It has many primitive characteristics, notably small size, four complete toes in the hind foot and five in the fore foot.

ANCHISES, an-ki'sez, a legendary hero of Troy, to whom Venus, in the guise of a Phry¬ gian shepherdess, bore a son, .Eneas. At the burning of Troy 2Eneas carried his father away on his shoulders, and their voyage to Sicily is described in Virgil's <2Eneid.)

ANCHITHERIUM, an'ki-the'ri-um, one of the three-toed fossil horses of the Middle Miocene period. Its remains have been found in Europe and North America; a complete skeleton was uncovered at Pawnee Buttes, Col., in 1901 and is now on view in the Ameri¬ can Museum of Natural History, New York. The animal was about the size of the Shetland pony; the middle toe of each foot was well developed; the lateral toes, one on each side of the middle toe, reached the ground, but were unable to support any weight owing to their delicate construction. It was formerly held that this animal was the ancestor of the mod¬ ern horse, but it is now regarded as an off¬ shoot from the main line of evolution of the horse. See also Fossil; Horse.

ANCHOR, a heavy instrument of iron, in¬ tended to be dropped from a ship to the sea- bottom, to hold her in a desired position. It usually consists of a shank, having at one end a ring, to which the cable is fastened with a cross-piece or stock, and at the other end two arms with blades at the end, called flukes. In one form of anchor the stock is not a cross¬ piece in the sense of lying transversely to the direction of the arms, but lies in the same di¬ rection. In the Homeric times large stones were used for anchors; afterward they are said to have been sometimes of wood loaded with lead. In some places baskets full of stones or sacks filled with sand were employed for the same use. All these were let down by cords into the -sea, and by their weight stayed the course of the ship. Among the Greeks of later times anchors were composed of iron. Some¬ times there was only one tooth or fluke, but generally there were two. Anchors with two flukes appear from ancient monuments to have been much the same as those used at present, but the transverse piece of wood fastened to the shank (the stock) is wanting in all of them. Every ship had several anchors, one of which, surpassing all the rest in bigness and strength, was peculiarly termed, in Greek, hiera, and in Latin sacra, and was never used but in extreme danger; whence sacram ancoram solvere is proverbially applied to such as are forced to their last refuge. When an anchor

of the usual form is let fall from the vessel, it generally strikes the bottom with the crown or curve of the arms, and then falls over on one of the ends of the stock, the arms lying flat on the ground. In this position it cannot bite, so that it has to be canted or turned over till the stock lies flat, and the point of one of the flukes (the bill or peak) rests on the ground. The canting is effected by the vessel pulling at the cable, and the longer the stock and the shorter the arms the less is the force required to perform the operation ; for this rea¬ son the stock is always made longer than the arms. The anchor will now either drag or penetrate the ground, the readiness with which it does the latter depending on the sharpness of the bill, the angle at which the fluke rests on the ground and of course the nature of the bottom. Fortunately the arms used to be rig¬ idly attached to the shank of the anchor ; but in 1838 Mr. Porter took out a patent for an anchor of a new construction (though the prin¬ ciple was known before, however), in which the arms were movable around a pivot at the end of the shank, the plane of their movement being perpendicular to the direction of the stock. The advantages of this anchor are, that there is almost no possibility of fouling it — that is, of the cable becoming entangled with one of the arms ; it cannot lodge on the stock end; it presents no upper fluke to injure the vessel to which it is attached, or others, in shoal water (since the swivel movement en¬ ables the peak of the upper fluke to come close to the shank when the anchor is fixed) ; it is not so liable to break, is more conveniently stowed on board, etc. This form of anchor as improved by Trotman is now largel}' used in the merchant service. In the navies both of Great Britain and of foreign countries the an¬ chor perhaps most commonly employed is the admiralty anchor with fixed arms, the chief recommendation of which is the excellence of its proportions. Another favorite is Rodgers', the chief peculiarity of which is its small flukes. The inventor claims for this anchor that it holds the ground better than those with large flukes. Another excellent anchor is that patented by a Frenchman named Martin. In his anchor the stock lies in the same direction as the arms, the consequence of which is that when the anchor reaches the ground it in¬ evitably falls flat, with both stock and arms resting on the bottom. The arms are capable of turning in a socket through an angle of 30° in such a manner that when the anchor is lying flat on the ground the flukes of both arms may sink into the ground at an angle of 15°. The weight of the arms and the pull of the vessel cause them to do this. It will be understood that the flukes are not, as in other anchors," perpendicular to the direction of the arms, but lie in the same direction. Besides holding the ground more firmly than any other anchor of equal weight, this anchor has the advantages of being free from liability to foul and easily stowed. The latter

circumstance particularly recommends it for use in unmasted turret ships, almost all of which are equipped with it.

The different anchors carried by a ship are bower, sheet, stream, stern, and kedge anchors. The bower anchors are so called from their be¬ ing stowed in the bow. When one bower an-

chor is heavier than the other it is called the best bower and is stowed on the starboard side. Sheet anchors are stowed in the waist of the ship as far forward as convenient. The stream anchor is used in a river or sheltered place where a large anchor is not required. The stern anchor is stowed in the stern, and is employed with a bower anchor where there is no room for a vessel to swing with the tide. The kedge anchor is used to warp a ship from place to place ; that is, the anchor is carried to a distance in a boat, and the ship is then pulled up to it by means of the cable. A large iron¬ clad carries eight anchors : two bower, two sheet and two kedge anchors, with one stream and one stern anchor. The anchor is said to be a-peak when the cable is perpendicular be¬ tween the hawse and the anchor; and to come home when it does not hold the ship. To shoe an anchor is to fix boards upon the flukes so that it may hold better in a soft bottom. Rid¬ ing at anchor is the state of the vessel when moored by the anchor or anchors. Dropping or casting anchor is letting it down into the sea. Weighing anchor is raising it from the bottom. A mooring anchor is a stationary an¬ chor in a harbor or roadstead, with a buoy at¬ tached to it by a cable, enabling a ship to moor by simply fastening itself to a ring-bolt on the buoy. These anchors should not project above the bottom, or the ship may receive injury by grounding on them. Mooring anchors are of various kinds, and in some cases a heavy block of stone or cast iron serves as such. One of the most powerful mooring anchors yet in¬ vented consists of a wrought-iron shaft with a pointed screw end, and near the lower end a cast-iron screw flange three and one-half feet in diameter. The anchor is screwed down into the solid ground, and its holding power is more than equal to that of a cast-iron anchor weighing seven tons. The making of anchors used to be a most formidable piece of smith work, but it- has been much facilitated by the invention of the steam hammer. The shank of a large anchor, nearly 20 feet long and 10 or 12 inches thick, requires to be built up of a number of bars of iron which are then welded together. Crucible steel is now to some extent used for anchors.

ANCHORAGE, a suitable place for an¬ choring. A good anchorage should have a soft bottom and a depth of from 10 to 20 fathoms. When deeper than this the cable bears too nearly perpendicular and is apt to drag up the anchor. The length of cable paid out by a ship in anchoring in ordinary weather is about three times the depth of the water. Anchorage also means dues paid by a vessel anchoring. As a rule a ship sheltering from stress of weather and not discharging cargo at the place where it anchors is not required to pay dues, but shore-dues are payable whether a ship an¬ chors or not.

ANCHORITE, ANCHORET or AN- ACHORET, one who has renounced the world and retired into a seclusion remote from inhab¬ ited places. The desire is not distinctively Christian; it manifests itself in all religions and in all ages. Anchorites of various Hindu ascetic sects are at present to be found among the jungles and hills of India, and the Orient has always been a land of them. The peculiar¬

ity of the ancient anchorites was that, though retiring for solitude to the wilderness, they lived there in fixed abodes, generally caves or hovels, in place of wandering about. When they did travel they slept wherever night over¬ took them, so that visitors might not know where to find them. They were most numerous in the Egyptian desert, where they lived on roots and plants, believing that to afflict the body was the best method of spiritually bene¬ fiting the soul. The most of them were lay¬ men. There were also female anchorites. These first arose, it is said, about the middle of the 3d century ; in the 7th the Church extended its control over them, ultimately throwing diffi¬ culties in the way of anyone who wished to adopt such a mode of life.

ANCHOVY, an-cho'vi (of uncertain origin, perhaps literally a dried or pickled fish, from Basque, antsua, dry), a small, richly flavored, herring-like fish (Engraulis encrasicholus) , of the family Engraulididce. It is caught abun¬ dantly along the sea-coasts of southern Europe when coming in from the deep sea to spawn in early summer. The Mediterranean fishers in particular salt and dry it in large quantities for export. Closely allied species are found on the eastern and western coast of America and off southern Asia. A Californian species (Engraluis mordax) is extremely abundant in large schools and is a valuable food fish. In general, anchovies are five to seven inches long, shaped like herrings, and have a pointed head and projecting upper jaw.

ANCHOVY-PEAR (Grids cauliflora) , a tree of the family Lecythidaccce, found in moist districts of the West Indies. It grows to the height of 50 feet, has oblong leaves two or three feet long, and

large white blossoms car¬ ried on short peduncles. Its fruit, somewhat larger than a hen's egg, is pickled and eaten like the mango, which it strongly resembles in taste.

ANCHUSA, an-ku'sa. See Alkanet. ANCHYLOSIS, an'ki-16'sls. See Joints. AN'CHYLO'STOMI'ASIS, disease due to the presence of an intestinal parasite, the Anchylostomum diiodenale (Uncinaria duodenalis). This parasite lives in the upper portion of the small intestine, where, by means of a series of tooth-like hooks about the mouth, it attaches itself to the mucous membrane. It is particularly prevalent among Italian and Polish laborers, especially among those who work in confined spaces, as mines, tunnels, etc.

The chief symptoms are those due to the loss of blood which the worm constantly sucks from the wall of the intestine. Gastro-intestinal disturbance, progressive anaemia, diarrhoea and colicky pains with shortness of breath and swelling of the limbs are among the important symptoms. The diagnosis can be made by means of a microscopical examination of the faeces, in which the eggs are found, and also by the microscopical examination of the blood. Careful attention given to the drinking water is one of the most important prophylactic meas¬ ures. See Parasite.

ANCIEN REGIME, an'zhan ra'gem', a French phrase commonly used, even by English writers, to denote the social and political sys¬ tem established in France under the old mon-

archy, which was swept away by the revolution of 1789. The phrase is generally applicable only to France, for in no other country, with perhaps the exception of Japan, has there been in modern times so clearly marked a division between ((the old order® and the new.

ANCIENT DEMESNE, a term employed in English law to denote ancient estates be¬ longing to the Crown. They are mentioned in Domesday Book as Terra Regis.

ANCIENT LIGHTS, a term denoting windows so long existent that they have ob¬ tained a right to the light entering them and cannot be interfered with by the owner of the property whence the light enters. Rights of this nature cannot commonly be acquired by prescription in the v United States. Ancient lights in England are now regulated by a stat¬ ute calling for but 20 years' existence to create the right.

ANCIENT MARINER, The. The best known of the poems of S. T. Coleridge. It should be read, as it was doubtless written,' as a poem of strange, romantic adventure full of the swing and charm of the old ballads. The story with its incidents and its pictures, the language with its phrases and figures, the poetic movement both in single lines and in stanzas, — all these are of the best of their kind and may give keen poetic pleasure. The poem, besides these things, is informed with a fine thought particularly expressed in the last words of the old sailor, which should not be neglected. The poem, however, is also some¬ what of a landmark in English literature and has significance in literary history. Coleridge was a leader in that movement at the beginning of the 19th century which gave to English poetry once more the charm of mystery, won¬ der, adventure and romantic beauty. He has himself told us ((Biographia Literaria) Chap. 14) of the plan of (Lyrical Ballads) by Words¬ worth and himself. The two friends talked over their literary hopes and their poetic ideals and decided to publish their poems together. Wordsworth's part was to show how much poetic beauty there was in the simple life of every day; Coleridge was to (<deal with strange supernatural subjects,® so as really to arouse emotion and feeling. (The Ancient Mariner) was the chief of Coleridge's few contributions and has always stood, if not exactly for the qualities which the author ascribes to it, ' for the essentially romantic in poetry.

Edward Everett Hale.

ANCIENT ORDER OF HIBERNIANS.

See Hibernians, Ancient Order of.

ANCIENT ROME IN THE LIGHT OF RECENT DISCOVERIES, an archaeological

work by Rodolfo Lanciani : b. 1847. In his character of official investigator Professor Lanciani has grouped in this volume various illustrations of the life of ancient Rome as shown in its recovered antiquities. From these he reads the story of the wealth, taste, habits of life, ambitions and ideals of a vanished people.

ANCIENTS, Council of, the upper one of two branches of the legislative body of France, 1795-99. It included 250 members and

its function was to consider measures submitted by the lower branch, the Council of Five Hun¬ dred.

ANCILE, a shield reported to have fallen from heaven in the time of

Numa. It was be¬ lieved to be the shield of Mars; and as the prosperity of Rome was held to depend upon its preservation, 11 facsimiles of it were made, that anyone wishing to steal it might not know which to take. It is conjectured to have been originally a lump of meteoric iron.

ANCILLON, ah'se'ydh', Charles, French Protestant leader: b. Metz, 28 July 1659; d. Berlin, 5 July 1715. He studied at Marburg, Geneva and Paris, where he was called to the bar. He became director of the Huguenot colony at Berlin and published several works on the revocation of the edict of Nantes and its consequences. His chief claim to remem¬ brance is the work that he did for education in Prussia, and the share he took, in co-operation with Leibnitz, in founding the Academy of Berlin. Of his numerous works the only one still of value is the (Histoire de l'etablissement des Frangais refugies dans les etats de Brande- bourg) (1690).

ANCILLON, Johann Peter Friedrich,

a German historian of French extraction: b. Berlin, 30 April 1767 ; d. there, 19 April 1837. Besides (Melanges of Literature and Philos¬ ophy) (1801) he was the author of a (View of the Revolutions of the Political System of Eu¬ rope ,since the 15th Century* (1803-05), which secured him the post of royal historiographer. From 1832 till his death he was Minister of Foreign Affairs.

ANCON, an-ko-n', a Peruvian coast town, of special interest to archaeologists as the site of an ancient necropolis. It is now a seaside resort 30 miles by rail northwest of Callao and has been the scene of several important his¬ torical events. Its anchorage was used by Lord' Cochrane in 1820 during his attacks on Callao; it was the landing-place of an invading Chilean army in 1838; it was bombarded by the Chileans in 1880; and in 1883 it was the meeting-place of the Chilean and Peruvian commissioners who drew up the Treaty of An¬ con, which ended the war between Chile and Peru (see Chile). One of the noteworthy contributions to our knowledge of the culture and industries of the empire of the Incas was made by Reiss and Stiibel as a result of their excavations at this place before 1880. They succeeded in making quite apparent the import¬ ance of the discovery of numerous objects which, as industrial products, belonged to the domestic economy of the people of the ancient Inca state. <(A11 these objects,® they wrote, ®have been excellently preserved, a fact due to the scarcely accidental coincidence of two cir¬ cumstances — climate and worship of the dead. To the dry climate we are primarily indebted for the fact that the rich contents of' piously equipped graves

have in manifold instances reached us uninjured, and that consequently the picture of a culture speedily swept away by the Spanish conquerors may still be restored.® Their discoveries <(in a single burial place, al¬ though one of great extent — the Ancon necropolis® — certainly helped, as they asserted, to (<carry us back to the busy life and inner

soul of the ancient Indian populations.® Con¬ sult Reiss, W., and Stiibel, A., (The Necropolis of Ancon> (3 vols. folio, Berlin 1880-87).

ANCONA, an-ko'na, Alessandro d', Ital¬ ian critic and philologist: b. Pisa, 1835, and from 1860 a professor of literature in the University of Pisa. Among the many works of this dis¬ tinguished scholar are (I Precursori di Dante* (1874) (Origini del Teatro in Italia) (1877) ; (La Poesia Popolare Italiana) (1878) ; (Va- rieta Storiche e Lettarie) (1883-85) ; (Manuale della letteratura Italiana) (1892-95).

ANCONA, Italian province of the kingdom of Italy, between Pesaro ed Urbino on the north, Macerata on the south, and the Apen¬ nines and Adriatic on the west and east ; area, 736 square miles. It is a mountainous region watered by the rivers Cesano, Esino and Mu- sone, and produces grain, wine, oil, olives, silk and fruit. Capital, Ancona. Pop. about 320,000.

ANCONA, an important Italian port on the Adriatic, the capital of the province of the same name. Its site is an amphitheatre between two headlands, and on its ancient mole, de¬ signed by Trajan, is a triumphal arch by Apol- lodorus. The modern mole is adorned by a triumphal arch by Vanvitelli. Among import¬ ant buildings are the cathedral of Saint Cyriac dating from the 11th and 12th centuries, a 13th- century town hall and a museum. Sugar-refin¬ ing, ship-building and manufactures of silk, paper and sail-cloth are the main industries. A United States consul is stationed here. The city is said to have been founded by Syracusans fleeing from the persecutions of the Elder Dionysius. Pop. about 57,000.

ANCONA, The. Italian liner, sunk in the Mediterranean on 7 Nov. 1915 by a submarine flying the Austrian flag. Bound from Naples for New York, the Ancona was one day out from Messina when she was torpedoed off the coast of Tunis with over 400 passengers on board and a crew of 172. There were 12 American passengers, of whom nine

perished. The submarine fired upon the steamer, which, according to Italian report, hove to almost instantly after the first shot. The firing con¬ tinued while the life-boats were being filled and lowered; before half of those on board could be got off in the boats a torpedo from the submarine struck and sunk the Ancona, sacrificing over 200 lives. The Austrian Ad¬ miralty asserted that the Ancona had attempted to escape and had been struck several times before heaving to; that 45 minutes' grace had been allowed by the submarine for those on board to take to the boats; that the cowardice of the crew and the prevailing panic had hampered the life-saving proceedings, and that the submarine had fired the torpedo after 50 minutes' delay, and then only because another steamer was approaching. It was denied that the lifeboats had been fired on.

An impression at first gained ground that the outrage had been committed by a German submarine masquerading under the Austrian flag, from the close resemblance between the methods of warfare employed, but the Austrian statement made it clear that that government assumed entire responsibility. The American Ambassador in Vienna was instructed to de¬ mand a detailed account of the Ancona affair from the Austro-Hungarian government. No

reply being forthcoming for three weeks, a peremptory note, dated 6 December, from the American government was presented at Vienna. Admitting that the Ancona had attempted to escape after the first (solid) shot, the note protested that (<the commander violated the principles of international law and of humanity by shelling and torpedoing the Ancona before the persons on board had been put in a place of safety or even given sufficient time to leave the vessel® ; that the conduct of the commander could (ffinly be characterized as wanton slaugh¬ ter of defenseless non-combatants, since at the time when the vessel was shelled and torpedoed she was not, it appears, resisting or attempting to escape.® The American government was unwilling <(to credit the Austro-Hungarian government with an. intention to permit its submarines to destroy the lives of helpless men, women and children. It prefers to be¬ lieve that the commander of the submarine committed this outrage without authority and contrary to the general or special instructions which he had received.® The United States government demanded a denouncement of the sinking of the Ancona ((as an illegal and inde¬ fensible act; that the officer who perpetrated the deed be punished, and that reparation by the payment of an indemnity be made for the citizens of the United States who were killed or injured by the attack on the vessel.® From the Austrian Admiralty reply dated 15 .Dec. 1915 it appeared that the commander was in¬ structed to prevent the Ancona from escaping ((in

all circumstances,® and that his conduct <(cannot be disapproved.® A more lengthy note from the Foreign Minister, Baron Burian, de¬ fended the attitude of his government and (<most sincerely deplored the fate of the inno¬ cent victims.® The American reply (19 Dec. 1915) found ((no other course open® but to hold the Austrian government ˆresponsible for the act of its naval commander and to renew the definite but respectful demands® made in the note of 6 December. The incident was closed by a note from Baron Burian dated 29 Dec. 1915, in which he reviewed in detail the cir¬ cumstances surrounding the Ancona affair. Every American demand, however, was granted on the ground that the commander of the submarine (<had omitted to take adequately into consideration the panic that had broken out among the passengers®; that the officer in question had been punished, and that indemnity would be granted.

ANCRE, aN'kr, Concino Concini, Mar¬ shal and Marquis d', a Florentine who went to France in 1600, where he obtained rapid pro¬ motion, more especially after the assassination of the King (16.0). Successively governor of Normandy, marshal of France, and last of all Prime Minister, he was thoroughly detested by all. At last a conspiracy was formed against him and he was shot dead on the bridge of the Louvre in 1617.

ANCRE, France, town in the department of the Somme, near Peronne, on the Ancre River. Ancre was a barony in 1563, was raised to a marquisate in 1576, was acquired by Con¬ cini in 1610. After his death it passed to the King's favorite, Charles d'Albert, duke of Luynes. In June 1620 by royal decree the name was changed to Albert. In 1695 the

marquisate was acquired by the Count of Toulouse and in 1769 passed to the house of Orleans, of which a member, the Duke of Penthievre, was proprietor in 1789. The town has been destroyed several times ; at first by fire in 1451, by the Imperialists in 1523, by the Bourguignous in 1553, by the Spaniards in 1637 and by another fire in 1760. It was again destroyed in the Great War, being bombarded by the British and German forces alternately. Its principal manufactures are paper, Leather, linen and foundry products. Pop. 5,473. See War, European.

ANCUD, an-kood, Chilean port, capital of the province of Chiloe. It is

situated on the island of Chiloe, about 580 miles from Val¬ paraiso, a line of steamships connecting the two. First settled in 1768, it was the last place surrendered by the Spaniards to the Chileans in 1826. Pop. about 3,500.

ANCUS MARCIUS, the fourth King of Rome : b. 638 b.c. ; d. 614 b.c. The son of Numa's daughter, he attempted to imitate his grandfather by reviving the neglected obser¬ vances of religion. His peaceful pursuits were disturbed by the Latins, whom he subdued and caused to be brought to Rome, where he as¬ signed them the Aventine to dwell upon. These conquered Latins, according to Niebuhr, formed the original plebs. He fortified the Janiculum against Etruria, connecting it with the city by the wooden bridge across the Tiber known as the Sublician; dug the ditch of the Quirites; constructed the harbor of Ostia ; and built the first Roman prison of which there is any record.

ANCYLOPODA, or ANCYLODACT- YLA, an apparently primitive extinct subordi¬ nal group of Ungulata showing certain resem¬ blances to the Perissodactyla, both as regards the cheek-teeth and the skeleton, but broadly distinguished by the feet being of an edentate type, carrying long curved and cleft terminal claws.

ANCYRA. See Angora.

ANDALUSIA, an'da-166'zi-a, Spain (Span¬ ish, Andalucia), a district in the southern part of the country, celebrated for its fertility and picturesque beauty; bounded north by Estre- madura and New Castile, east by Murcia, south by the Mediterranean Sea, and west by Portu¬ gal and the Atlantic. Length east and west about 310 miles ˆ average breadth about 120; area about 33,650 square miles. It is traversed throughout its extent by ranges of mountains. It is divided into Upper and Lower Andalusia. The Sierra Morena runs along its northern border, and in the southeast rise the mountains of Granada and the Ronda, including numerous sierras, and among them those of the famous Sierra Nevada. Lower Andalusia comprises chiefly the valley of the lower Guadalquivir. Many summits of the southern ranges are cov¬ ered with perpetual snow ; the Mulahacen ris¬ ing 11,678 feet, and the Picacho de Veleta 11,- 378 feet above the sea. All the mountains abound with mineral wealth, yielding chiefly copper, cinnabar and lead, as well as some silver and coal. Some mines have been opened by English companies, especially in the province of Huelva in the west, where the

Tharsis and Rio Tinto copper mines are situ¬ ated. The principal river of Andalusia is the Guadalquivir, which rises in the east part of the

province of Jaen, near Carzola, and thence flows west-southwest, and below Seville south- southwest, entering the sea at San Lucar. Its principal affluents are the Guadalimar, Guad- iato and Xenil. The rivers south of the Sierra Nevada are quite insignificant. The basin of the upper Guadalquivir lies at an elevation of from 500 to 1,500 feet, and consists mainly of saline wastes and other sterile tracts. The lower basin presents sharp contrasts : around Cordova and Seville luxuriant gardens; on the Xenil a desert without a drop of water; on the left bank of the lower Guadalquivir the ex¬ tensive marshy district of Marisma ; and stretching from the mouth of the Guadalquivir to that of the Rio Tinto, a sandy depression (Arenas Gordas) partially clothed with pine- woods. The lower regions have a very mild climate, but on the Atlantic coast the tempera¬ ture is much lower, and snow falls frequently. The vegetation is of the character peculiar to the extreme south of Europe and the north of Africa. Wheat, maize, barley, many varieties of fruit, grapes, honey, silk and cochineal form important articles of culture. Many cereals ripen as early as April. A large portion of the soil is in pasture. The horses are the best breed in the Peninsula; the bulls of Andalusia are sought over all Spain for bull-fighting; sheep are reared in vast numbers, and bear an abundance of good but not fine wool ; and the hogs reared on the acorns of the mountain for¬ ests furnish hams unsurpassed in any part of Europe. Andalusia has been known as the ˆgranary® of Spain since ancient times, and still remains one of the most fertile districts of the country, although famine conditions have prevailed at intervals. The most recent instance was in 1905, when thousands emi¬ grated. The chief manufactures are woolens, silk and leather, and are by no means exten¬ sive. The name Andalusia is commonly taken to have been originally Vandalusia, the land of the Vandals. The people are picturesquely attired; their language is Spanish with an ad¬ mixture of Arabic. Pop. (1910), 3,828,916. In the 5th century Andalusia came into the pos¬ session of the Vandals, whose name it bears instead of Tartessis, which it bore in classical times. It is probably the Biblical Tarshish. The Carthaginians had acquired it in the 3d century b.c., and later passed to the Romans, by whom it was called Baetica, from the river Baetis (Guadalquivir). It became very pros¬ perous under the Romans and rapidly absorbed their civilization. The Visigoths ousted the Vandals and ruled the country until the advent of the Arabs in 711. Andalusia now entered on its golden age; Cordova, Granada, Seville and Jaen, all within its borders, became centres of Mohammedan culture, commerce and industry. It was the home of learning, of art, chivalry and toleration. Cordova has been called the Athens of the West, the seat of the arts and sciences ; and when the gloom of the Dark Ages spread over Europe, Andalusia was per¬ haps

the brightest spot in that continent. Its glory faded with the disruption of Spanish Islam in the 11th century. Granada, it is true, held out for two centuries longer and the gen-

ins of the Moorish race made its home there. In 1492 Granada fell into the hands of Chris¬ tian Spain. In Spanish times the names of Cano, Murillo and Velasquez have shed ever¬ lasting lustre on Andalusia. Consult Laine, (Sur les routes d'Andalousie5 in La Nouvelle Revue (No. 115 Paris '1898), and Murray. (The Cities and V ilds of Andalusia) (London 1853) ; Hare, A. J. C., (Wanderings in Spain5 (8th ed., London 1904) ; Poole, S. Lane, (Moors in Spain (ib. 1886) ; Villaescusa, M. H., (Las Provincias de Espana5 (Barcelona 1905).

ANDALUSITE, a native anhydrous sili¬ cate of aluminum, first discovered in Andalusia. Its chemical formula is AhSiOs, and it crys¬ tallizes in the orthorhombic system. It usu¬ ally occurs in coarse crystals, prismatic in form, and nearly square. Its hardness is 7.5, at least on the basal face, and its specific gravity about 3.18. Andalusite is commonly subtranslucent and varies greatly in color. Some specimens are strongly pleochroic, changing from olive green to blood red according to the angle at which the incident light strikes them. A va¬ riety known as chiastolite contains carbona¬ ceous impurities distributed through the pris¬ matic crystal according to a definite geometric plan, so that a transverse section of the crystal presents a curious tesselated or cruciform ap¬ pearance. A variety from eastern Finland has been called <(maltesite,55 from the regularity of the Maltese cross it exhibits when seen in sec¬ tion. Andalusite is found in many parts of Europe, usually in schist or gneiss. Fine speci¬ mens also come from the province of Minas Geraes, Brazil. In the United States it occurs in Maine, New Hampshire, Vermont, Massa¬ chusetts, Connecticut, Pennsylvania, South Da¬ kota and California.

ANDAMANS, an'da-manz, a chain of vol¬ canic islands in the Bay of Bengal, 590 miles from the mouth of the Hugh, 120 miles from Cape Negrais in Burma, the nearest point on the mainland. Five large islands closely grouped together are called the Great Anda¬ man, and to the south is the island of Little Andaman. There are some 200 islets, the two principal groups being the Andaman Archipel¬ ago and the Labyrinth Islands. The total area is 2,260 square miles. The Great Andaman group is about 219 miles long, and 'at the widest 32 miles broad. The group, densely wooded, con¬ tains many valuable trees,

the best known of which is the padauk or Andaman redwood. The islands are hilly, the highest point, Saddle Peak, being 2,402 feet, and Mount Harriet, 1,196 feet in height. The islands possess a number of harbors and safe anchorages, notably, Port Blair, Port Cornwallis and Stewart Sound, the last being most favorably situated for forest trade. The aborigines, 1,317 (628 males and 689 females) in 1911, live in small groups over the islands; they are savages of a low Negrito type. The total population in 1915 was 25,732. The climate is tropical, the rainfall irregular and often excessive. In 1914 forest sales, the re¬ sult of convict labor, amounted to $13,931.59. Tea, the cocoanut, manila hemp and Bahamas aloe are successfully cultivated. In 1914 there were 12,233 head of cattle. Wireless telegraphy with Burma was established in 1904. A mail steamer connects Port Blair with Calcutta, Rangoon and Madras. The islands have been VOL. l — 42

used since 1858 by the government of India as a penal settlement for life and long-term con¬ victs. The settlement possesses about 26,600 acres of cleared land and 156 square miles of reserved forest. There were, in 1915, 12,252 convicts (including 570 women) in the place, of whom some 1,730 were on ticket-of-leave in the settlement supporting themselves. Of the women, about half are on ticket-of-leave, and married to convicts.

The Andaman Islands are under the govern¬ ment of India, and the officer in charge is the superintendent of Port Blair. The civil, mili¬ tary and convict population of Port Blair in 1915 was 16,914. For the ethnography of the Andaman aborigines consult Kloss, (In the An¬ damans and Nicobars5 (1903) ; Man, (The Aborigines of the Andaman Islands) (London 1885) ; Portman, < Notes on the Languages of the South Andaman Group5 (Calcutta 1898) ; ((The Andaman Islands55 (in The Indian Anti¬ quary, Vols. XXVIII and XXX, Bombay 1899-

1900).

ANDENNE, Belgium, a small manufac¬ turing town on the southern bank of the Meuse, eastward of Namur and west of Huy, with a population of nearly 9,000 inhabitants, chiefly engaged in paper-making, faience and pottery work. For many centuries, down to 1785, a female religious community belonging to one of the <(open55 orders, i.e., not bound by any vows, had existed here. On the opposite bank of the river lies the town of Seilles, connected with Andenne by a bridge for pedestrians with a single carriageway. During the German invasion of Belgium this light structure was blown up by the Belgian troops at 8 a.m. on 19 Aug. 1914. A few hours later an advanced guard of Uhlans entered Andenne, seized the cash at the tax-office and

took away with them the burgomaster, an old, corpulent man, who was compelled to keep pace with their horses at a run. By evening a large body of German troops had entered the town without meeting any resistance. On the following afternoon (20 August) shots were fired from the opposite bank of the Meuse, from Seilles, to which the Germans in Andenne replied. Immediately turning upon the inhabitants (of Andenne), the Germans brought machine guns into play and shot them down in large numbers for over twro hours. At 7 p.m. a considerable portion of the town was in flames. At 6 on the fol¬ lowing morning the Germans began to drag the inhabitants from their houses. Men, women and children were driven into the square, where the sexes were separated. Three men were then shot and a fourth bayoneted. The German colonel in command accused the population of firing on the soldiers; some of the prisoners were picked out, taken to the banks of the Meuse and there shot. (<Other places have suf¬ fered more than Andenne, but no other Belgian town was the theatre of so many scenes of ferocity and cruelty55 (Belgian Report). The Bryce Committee stated in their report that ((About 400 people lost their lives in this massacre, some on the banks of the Meuse, ■where they were shot according to orders given, and some in the cellars of the houses where they had taken refuge.55 The German reply to the allegations (White Book; see Aerschot) was that ((the demeanor of the in-

habitants was positively devilish" ; that (<a furi¬ ous fire broke out on all sides on the unsus¬ pecting troops," and that <(hand-bombs and hand-grenades were rained down on the de¬ fenseless men nearest at hand. . . . Machine guns sent their murderous bullets into the files of the soldiery.® In the same report, Maj. Freiherr von Langermann testifies that the German losses were ((singularly small ; the in¬ habitants ' had aimed very badly.® Lieutenant Gotze, who had been sent to Andenne to in¬ terrogate some of the survivors, reports that the burgomaster handed him a list of 234 per¬ sons who had been shot. <(An examination of this list,® said Lieutenant Gotze, <(proved that only in the case of 196 persons is it absolutely certain that they were shot ; 28 were merely missing.®

ANDERNACH, an'der-nag, Germany, a town in the Prussian Rhine province, on the left bank of the Rhine, 10 miles northwest of Coblenz. Viewed from the river it makes a gloomy, though picturesque, impression, with its parish church (a basilica dating from

the 12th century, with four towers), the round watch- tower on the Rhine and a famous crane (erected 1554) for lading merchandise. Among other buildings are a Gothic Minorite church (now Protestant), a town hall and a prison, formerly the castle of the archbishops of Cologne. Andernach has considerable indus¬ tries, brewing and manufactures of -chemicals and perfumes, and has also a trade in corn and wine. But its most notable article of commerce is that of mill-stones, made of lava and tufa- stone, a product much used by the Dutch in the construction of their dykes. It was founded by Drusus in the 3d century. In 1109 it re- . ceived civic rights, and in 1253 joined the con¬ federation of the Rhine cities. In 1794 it passed to France, but in 1815 was ceded to Russia. Pop. about 10,000.

ANDERSEN, an'der-sen, Hans Christian,

a Danish novelist, poet and writer of fairy tales : b. in Odense, 2 April 1805 ; d. Copen¬ hagen, 4 Aug. 1875. He learned to read and write in a charity school, whence he was taken when only nine years old, and was put to work in a manufactory in order that his earnings might assist his widowed mother. In his leisure time he eagerly read national ballads, poetry and plays, and wrote several tragedies which he failed to get accepted. His abilities at last brought him under the notice of Councilor Collin, a man of considerable influence, who procured for him free entrance into a govern¬ ment school at Slagelse. From this school he wras transferred to the university and soon be¬ came favorably known by his poems. His first considerable work, (A Journey on Foot from Holmen’s Canal to the East Point of Anger, > was published in 1828, the year of his admission to the university. Through the influence of Oehlenschlager and others he received a royal grant to enable him to travel, and in 1833 he visited Italv, his impressions of which he pub¬ lished in (The Improvisatoren) (1835), a work which rendered his fame European. The scene of his following novel, fO. T.,) was laid in Denmark, and in (Onlv a Fiddler ' he described his own early struggles. In 1853 appeared the first volume of his (Fairy Tales,' of which successive volumes continued to be published

year by year at Christmas, and which have been the most popular and widespread of his books. Among his other 'works are (Picture-books without Pictures,' (A Poet’s Bazaar,' and a number of dramas. In 1845 he received an annuity from the government. He visited England in 1848 and acquired such a command of the language that his next work, (The Two Baronesses,' was written in English. In 1853 he published an autobiography under the title, (My Life’s Romance,' an English translation of which, published in 1871, contained addi¬

tional chapters by the author, bringing the nar¬ rative to 1867. Among his later works are (In Sweden' (1849) ; (To Be or Not to Be' (1857) ; (Tales from Jutland) (1859) ; (The Sand-hills of Jutland' (1860) ; <The Ice Maidens' (1863) ; (In Spain' (1863).

ANDERSEN'S FAIRY TALES. See

Fairy Tales.

ANDERSON, David, Canadian clergyman: b. London 1814; d. 1885. He was educated at Edinburgh Academy and Exeter College, Ox¬ ford; consecrated bishop of Ruperts' Land, 29 May 1849 ; resigned in 1864 ; was subsequently appointed chancellor of Saint Paul's Cathedral, London, England, and vicar of Clifton. He founded Saint John's College, Winnipeg.

ANDERSON, Edwin Hatfield, American

director, New York Public Library: b. Zions- ville, Ind., 27 Sept. 1861. He was graduated from Wabash College as A.B. in 1883, later receiving the degree of A.M., and spent a year at New York State Library School, Albany, N. Y., in 1890 and 1891. He was cataloguer for one year at the Newberry Library, Chicago, Ill.; librarian of the Carnegie Free Library at Braddock, Pa., three years; and organized and was the first librarian of the Carnegie Library of Pittsburg, Pa., from 1895 until his resigna¬ tion in December 1904. He was engaged in zinc and lead mining at Carthage, Mo* during 1905; from 1 Jan. 1906 to June 1908 director of New York State Library and Library School ; June 1908 to May 1913 assistant director of the New York Public Library; 14 May 1913 to date director of the New York Public Library. President of the Keystone State Library Asso¬ ciation in 1901-02; member of the Public Records Commission and of the Historical Archives Commission of Pennsylvania in 1903- 04; president of the New York Library Asso¬ ciation in 1908, and of the New York Library Club in 1910; president of American Library Association 1913-14; Litt.D. Carnegie Institute of Technology, 1915.

ANDERSON, Elizabeth Garrett, English medical practitioner : b. Aldeburgh, Suffolk, 1836; d. there, 17 Dec. 1917. She was educated at a private school. In 1860 she resolved to study medicine, an un¬ heard-of thing for a woman in those days, and one which was regarded by old-fashioned people as almost indecent. Miss Garrett managed to obtain some more or less irregular instruction at the Middlesex Hospital, London, but was refused admission as a full student both there and at many other schools to which she applied.

Finally she studied anatomy privately at the London Hospital, and with some of the pro¬ fessors of Saint Andrew's University and at the Edinburgh Extra-Mural School. She had no

less difficulty in gaining a qualifying diploma to practise medicine. London University, the Royal College of Physicians and Surgeons and many other examining bodies refused to admit her to their examinations; but in the end she was allowed to enter for the License of Apothecaries' Hall, which she obtained in 1865. In 1870 she obtained the Paris degree of M.D. In 1871 she married J. G. S. Anderson (d. 1907), a London shipowner. She worked steadily at the development of the New Hospital for Women and at the creation of a complete school of medicine in London for women. In 1908 she was elected mayor of Aldeburgh, the first lady mayor in England. The movement for the admission of women to the medical profession, of which she was the indefatigable pi°i\eer in England, has extended to every civilized country except Spain and Turkey.

ANDERSON, George B., an American Confederate soldier: b. Wilmington, N. C., 1831 ; d. 16 Oct. 1862. He was graduated from West Point in 1852, and in 1855 obtained his commission as first lieutenant in the United States army, and served as regimental adjutant after 1858. Entering the Confederate service in 1861, he was made a brigadier-general and placed in command of the North Carolina coast defenses. While leading a brigade at the battle of Antietam, 17 Sept. 1862, he received the wound which caused his death.

ANDERSON, George Thomas, Confed¬ erate general: b. Covington, Ga., 3 Feb. 1824; d. Anniston, Ala., 4 April 1901. He entered Emory College, Oxford, Ga., but on the out¬ break of the trouble in Texas, left to join Gen¬ eral Kearney's command as lieutenant of cav¬ alry, distinguished himself in various engage¬ ments, and on being mustered out received a captain's commission in the regular army. In 1861 he became colonel of a Georgia regiment, fought at the first Manassas or Bull Run, and succeeded to the command of Barton's brigade on the latter's death. He fought throughout the Seven Days' battles (q.v.) about Richmond; was wounded at the second Bull Run ; on 1 Nov. 1862 was commissioned brigadier-general for gallantry and skill at Antietam, 16—17 Sept. 1862; fought at Fredericksburg; was wounded at Gettysburg; and upon his recovery was sent with

Longstreet to Bragg's assistance in north Georgia. He participated in the battles of Chat¬ tanooga, Knoxville, Wilderness, Spottsylvania and Cold Harbor and throughout the protracted struggle around Richmond, and was present at the surrender at Appomattox. After the war he served in several official positions in Georgia, for a short time was freight agent of the Geor¬ gia Railroad at Atlanta, was chief of police of that city and later became city clerk and tax collector of Anniston, Ala.

ANDERSON, Henry John, American edu¬ cator: b. New York, 6 Feb. 1799; d. Lahore, Hindustan, 19 Oct. 1875. He was graduated from Columbia College, 1818; M.D. College of Physicians and Surgeons, 1823. Professor of mathematics and astronomy at Columbia, 1825-*50 ; trustee 1851, and professor emeritus 1866; geologist to the Dead Sea expedition under Lieutenant Lynch ; member of the scientific ex¬ pedition to observe the transit of Venus, 1873. He died while exploring the Himalayas. He early became converted to the Catholic faith

and was active in promoting its interests in New York city. The United States govern¬ ment publish his (Geology of the Expedition to the Dead Sea) (1848).

ANDERSON, James, Scottish agricultural economist : b. Hermiston, in Midlothian, Scot¬ land, 1739; d. Isleworth 1808. When scarcely 20 years of age he invented the small two-horse plow without wheels, known as the Scotch plow. Four years later he left Hermiston and rented a large moorland farm of 1,300 acres in Aberdeenshire, where he devoted his leisure hours to writing on agricultural subjects, his first production being a series of essays on planting contributed to the Edinburgh Weekly Magazine. His principal works are, En¬ couragement of the National Fisheries* ; (An Inquiry into the Nature of Corn Laws) ; Observations on Slavery) and (Recreations in Agriculture, Natural History, Arts and Miscel¬ laneous Literature) (1799-1802).

ANDERSON, John, Scottish philosopher, founder of Anderson College, Glasgow : b. Roseneath, Dumbartonshire, 1726; d. 1796. He studied at the University of Glasgow, where he was afterward professor of Oriental languages, and later of natural philosophy. In addition to liis usual class in physics he instituted one for artisans, which he continued to conduct to the end of his life. In 1786 appeared his (Institutes of Physics,* which went through five editions in 10 years. He invented a gun whose recoil was stopped by air condensation ; but having in vain endeavored to attract the attention of the British

government to it, he went to Paris in 1791 and presented his model to the National Convention. It was hung up in their hall with this inscription over it, c(The Gift of Science to Liberty.® When the allies had drawn a military cordon around the frontiers of France Ander¬ son suggested the expedient, which was adopted, of making small paper balloons, to which news¬ papers and manifestos were fastened and car¬ ried to Germany. Anderson by his will directed that his entire effects should be devoted to the establishment of an educational institution in Glasgow for the use of the unacademical classes. This college, opened with a single course of lectures, has now nearly 20 professors and lecturers ; courses of instruction are given in physical and medical science and in chemis¬ try ; mathematics, Latin, Greek, Hebrew, French, music, etc., are also taught. As a school of medicine in particular it possesses a high reputation.

ANDERSON, John, Scottish missionary to India : b. in the parish of Kilpatrick-Durham, 23 May 1805 ; d. Madras, 25 March 1855. He wˆas educated at Divinity Hall, Edinburgh. He wras appointed to Madras as a missionary of the Church of Scotland, 28 June 1836, and sailed 13 August. He became at once the principal of Saint Andrews's School; this after¬ ward developed into the Madras Christian Col¬ lege. His fame as an educatoi* spread abroad over all India. Hundreds were educated by him. A soleridid hall was built in Madras to perpetuate the memory of Mr. Anderson.

ANDERSON, John Fisher, American phy¬ sician and bacteriologist: b. Fredericksburg, Va., 14 March 1873. Having gained his degree of M.D. in the University of Virginia in 1896,

he was appointed passed assistant surgeon in the United States Public Health and Marine Hospital Service. In 1899 he became sanitary observer at Glasgow, Liverpool and Oporto, and, in 1900, sanitary attache at the United States consulates at Barcelona, Marseilles and several other European cities. During his service abroad he continued his studies at the Thompson-Yates Laboratory and the School of Tropical Medicine in Liverpool and at the Patologische Institut in Vienna. In 1902 he was _ appointed assistant director of the Hygienic Laboratory at Washington, becoming director in 1909. In 1913 he was appointed chief of the investigation into the claims of Dr. F. F. Friedmann that he had discovered in his <(turtle serum® a cure for tuberculosis. He collaborated with T. B. McClintic on (A Method of

Standardizing Disinfectants) (1912).

ANDERSON, Martin Brewer, American educator: b. Brunswick, Me., 12 Feb. 1815; d.

26 Feb. 1890; was graduated at Waterville Col¬ lege, now Colby University, in 1840; became professor of rhetoric and organized and taught the course in modern history at Waterville; and was president of the University of Roches¬ ter, N. Y, 1853 to 1888.

ANDERSON, Mary Antoinette, American actress: b. Sacramento, Cal., 28 July 1859. She was educated at the Ursuline Convent and the Academy of the Presentation Nuns in Louis¬ ville, and when 13 years of age began to study for the stage. She first appeared at Louisville,

27 Nov. 1875, in the character of Juliet. Her success was immediate, and during the follow¬ ing years she played with increasing popularity in the principal cities of the United States in various roles. In 1883 she appeared at the Lyceum Theatre in London and opened the Memorial Theatre at Stratford-on-Avon in the character of Rosalind in (As You Like It,> and speedily became well known in England. At the age of 28 she married Antonio de Navarro and retired from the stage. In 1896 she pub¬ lished a volume entitled, (A Few Memories^ Consult her autobiography (A Few Memories> (1896) ; Winter, William, (Stage Life of Mary Anderson } (1886).

ANDERSON, Melville Best, American

educator and author : b. Kalamazoo, Mich., 28 March 1851. He was educated at Cornell Uni¬ versity (1870-74) ; the University of Gottingen (1875-76) and at the University of Paris (1876-77). Returning to the United States he occupied several professorships in some of the principal colleges, notably Butler University, Purdue University, the State University of Iowa, and in 1891 became professor of litera¬ ture in Leland Stanford, Jr. University, and since 1910 professor emeritus. He has trans¬ lated and edited Raul and Virginia) ; Hugo's AVilliam Shakespeare) ; Boissier's (Mme. de Sevigne) ; Caro's (George Sand *; Simon'^ Wictor Cousin!.; Sorel's Montesquieu*; Say's <Turgot) ; Remusat's <Thiers) ; Joutel's (Jour- nal of La Salle's Last Voyage *(1896) ; Tonty's Relation* (1898) ; (Nicholas de La Salle's Nar¬ rative *(1898) ; (Cavalier de La Salle's Dis¬ covery of the Mississippi River* (1901), etc. He also edited (Bacon's Essays, with Introduc¬ tion and Notes* (1890) ; and wrote Represent¬ ative Poets of the Nineteenth Century) (1896) ;

(Happy Teacher *(1910). For 10 years he was engaged upon a translation in triple rime of Dante's (Divina Commedia.* He has contrib¬ uted to various literary periodicals.

ANDERSON, Rasmus Bjorn, American author, editor and diplomat : b. Albion, Wis., 12 Jan. 1846. His parents were among the first emigrants from Norway to America, coming in 1836. Rasmus Bjorn was graduated with the first class from Luther College, Decorah, Iowa, in 1866. From 1866 to 1869 he was professor of Greek and modern languages at Albion Academy, Wisconsin, and from 1869 to 1875 instructor in languages at the University of Wisconsin. Because of the general interest he developed in Scandinavian studies he was made professor of Scandinavian languages and litera¬ ture in the University of Wisconsin in 1875, being the first to hold such a chair outside of the Scandinavian countries. In 1889 he was appointed United States Minister to Denmark, serving until 1889. Since 1898 he has been editor and publisher of Arnerika, a weekly Norwegian newspaper published at Madison, Wis. He has also been president of the Wis¬ consin Life Insurance Company since 1895 and of the Wisconsin Rubber Company since Pol¬ and served a short term as postmaster of Madi¬ son in 1912.

By reason of the intelligent interest he has created in Scandinavian culture Professor Anderson has often been styled the father of Norse literature in America. His first im¬ portant work appeared in 1874, entitled (America Not Discovered by Columbus, *an historical argument to substantiate the claims of the discovery of America by the Northmen in the 10th and 11th centuries. In 1875 ap¬ peared (Norse Mythology,* an exposition of the early mythological system of the north. Both of these works have appeared in several editions and have been translated into German, French, Scandinavian and Italian. Other more prominent works are (Viking Tales of the North *(1877); (The Younger Edda* (1880);

(First Chapter of Norwegian Immigration (1895) and his (Autobiography) (1915). In this work Professor Anderson gives, in connec¬ tion with a review of his own life, a survey of the Norwegian settlements in America and the activities of the nationality, as well as many hitherto unpublished incidents of states¬ men and scholars whose acquaintance he formed as diplomatist and author. Professor Anderson's translations have been many. In the early eighties he translated the novels of Bjornstjerne Bjornson for an American edi¬ tion. Other translations that followed were (History of Literature *(from the Danish) (1884) ; (Eminent Authors of the 19th Cen¬ tury* (Danish, 1886) ; ˆTeutonic Mythology) (from the Swedish, 1889) ; (Among

Cannibals) (Swedish, 1889). As literary editor Professor Anderson in 1889 supervised an English re¬ vision of Laing's (Sagas of the Kings of Nor¬ way^ supplying also the notes and maps. In 1905-06 he was the editor-in-chief in the preparation of the Rorraena Library,* a' sumptuous edition of 16 volumes containing the most notable productions of Scandinavian literature from earliest times.

Professor Anderson has been a voluminous contributor to the contemporary press and for

years was a regular contributor to the Dial and the Nation. He has also contributed to the Encyclopedia Americana) and other works of reference.

ANDERSON, Richard Henry, Ameri¬ can Confederate soldier: b. South Carolina, 7 Oct. 1821 ; d. Beaufort, S. C., 20 Feb. 1879. Graduated from West Point in 1842; served in Mexican War. In May 1861 he resigned from the United States army to join the Confederate service. He assisted in the bombardment of Fort Sumter and distinguished himself for gallantry throughout the war, especially at Fair Oaks, Gaines Mills, Frazier's Farm, Bull Run and • Gettysburg. He had the rank of major- general (1862) and lieutenant-general (1864), commanding the 4th corps of Lee's army in the last campaign.

ANDERSON, Robert, American soldier: b. near Louisville, Ky., 11 June 1805; d. in France, 26 Oct. 1871. Graduating at West Point 1825, he entered the artillery as second lieutenant. He was on Scott's staff in the Seminole War, 1837-38; in the Mexican War was badly wounded at Molino del Rey. Com¬ missioned major in 1857, in 1860 he was given command of the troops in Charleston harbor, with headquarters at Fort Moultrie. Threat¬ ened with attack, the fort untenable and the Buchanan administration making no reply to his appeals for its strengthening or for instruc¬ tions, on 26 December he removed the garrison to Fort Sumter. An attempt of the govern¬ ment to provision it being assumed by the Con¬ federates as a declaration of war, they invested it and compelled its surrender by a bombard¬ ment, 12-13 April 1861 ; its commander leaving with the honors of war. Appointed brigadier- general, he was assigned to the department of the Cumberland; but his health failing, he was relieved from active duty in October and re¬ tired in 1863. Brevetted major-general in 1865, in 1869 he went to Nice, France, for his health. He wrote works on

tactics, and was instrumental in organizing the Soldiers' Home at Washington.

ANDERSON, Rufus, American Congrega¬ tional clergyman, and secretary of the Ameri¬ can Board of Foreign Missions: b. North Yar¬ mouth, Me., 17 Aug. 1796; d. Boston, Mass., 30 May 1880. Having graduated at Bowdoin Col¬ lege in 1818, he studied theology at the Andover Theological Seminary, completing his course in 1822. In 1824 he became assistant secretary to the Board of Foreign Missions, serving as such till 1832, when he became full secretary. In this position he continued for 34 years, till 1866, when owing to his advanced age and failing health he retired. He inspected the missions in the Mediterranean in 1828-29 and again in 1843-44, the results of his tours of these years being chronicled in his Observations on the Peloponnesus and Greek Islands) (Boston, 1830). He also visited the Indian Missions in 1854-55, and the Sandwich Islands in 1863. From 1867 to 1869 he was lecturer on Foreign Missions in the Andover Theological Seminary. He with others founded the Mount Holyoke Female Seminary, at South Hadley, Mass., was for several years president of the board of trus¬ tees of Bradford Academy, Mass., and a mem¬ ber of the board of trustees of the Andover Theological Seminary. Besides his <Observa-

tions) he also wrote (The Hawaiian Islands, Their Progress and Condition under Mission¬ ary Labors) (1864); (A Pleathen Nation Civil¬ ized^; History of the Sandwich Islands' Missions *(1870); (History of the Missions of the American Board of Commissioners for For¬ eign Missions to the Oriental Churches* (3 vols., 1872-74), etc.

ANDERSON, William Franklin, Ameri¬ can clergyman : b. Morgantown, W. Va., 22 • April 1860. He studied at West Virginia Uni- ersity, graduated from Ohio Wesleyan Uni¬ versity, 1884; Drew Theological Seminary, 1887; A.M. New York University 1898. He en¬ tered the ministry of the Methodist Episcopal Church, joining the New York Conference in 1887. From 1904 to 1908 he was corresponding secretary of the Board of Education of his Church. In 1908 he was elected bishop and is now resident bishop of Cincinnati. He is the author of (The Compulsion of Love) (1903) ; editor The Challenge of To-day (1915). He also edited the magazine The Christian Student

1904-08.

ANDERSON, Ind., city and county-seat of Madison County ; on the White River, 36 miles northeast of Indianapolis on the New York Central Lines, Pennsylvania Lines and C. I. Railway. It is also the

headquarters of the Union Traction System, one of the most extensive systems of electric traction lines in the middle west. The power-house, costing $1,000,000, is the largest in the State, generating the power which carries cars to every im¬ portant city in northern and central Indiana. There is also a belt railway for factory service.

The city of Anderson lies in the centre of a rich agricultural region and is also an im¬ portant manufacturing centre. Here was es¬ tablished one of the first and largest tin plate mills, introducing that industry into the United States. One hundred and fifteen factories are engaged in industrial enterprises where nearly every commodity known to trade is made. Chief among these are glass, wire fence, steel springs, nails, automobiles, oil and gas engines, street cars, paper boxes, bottles, silos, aero¬ planes, carriages, shovels, files, wind pumps, steel fence posts, magnetos and self-starters for automobiles, vacuum cleaners, rubber tires, bed springs, mattresses, motor trucks, enamel ware, encaustic tiles, etc. The United States census of 1914 recorded 114 manufacturing es¬ tablishments of factory grade, employing 4,613 persons, of whom 3,905 were wage earners, re¬ ceiving a total of $2,425,000 annually in wages. The capital employed was $11,757,000, and the yearly output was valued at $12,789,000; of this, $5,578,000 was added by manufacture. Natural gas was discovered in 1887, and while the flow has diminished to some extent it is still suf¬ ficient in supply for heating and small manu¬ facturing purposes.

The city has eight banking institutions, with a capitalization of over $700,000, and deposits of $6,000,000 ; three daily papers ; an excellent fire department, and owns and operates its own water works and electric light and power de¬ partment. The city debt has been paid off by these plants. Electric power can be furnished at one and one-quarter cents per k. w. and light at one and three-quarter cents per k. w. Among the prominent buildings are the court-

house, erected in 1882 at a cost of $200,000, the government building for postal service, a Carnegie library, an orphans' home, a Y. M. C. A. constructed at a cost of $275,000. The pre¬ historic Mounds Park is located near Ander¬ son, which has several smaller parks and play¬ grounds. There is an excellent school system with 13 public schools and one parochial, at¬ tended by over 6,000 pupils, and a fine new Manual Training High School, costing $380,000, with 700 pupils.

Nearly all religious denomina¬ tions are represented and well housed.

The first settlement was in 1822, when, as the home of the Delaware Indians, it was known as Anderson's Town, the chief of the Delaware tribe being known as (<Kik-tha-we-nund, or Anderson/ Anderson's Town became a county- seat in 1827. The name was changed to Ander¬ son by act of the legislature in 1838, and in 1865 the city was incorporated. The city government is vested in a mayor elected every four years, a council from three wards, clerk, city comptroller and board of works. The value of taxable propertv is $11,00J,0jO. Pop.

(1910) 22,476; (1920) 29,769.

ANDERSON, S. C, city and county-seat of Anderson County. Three railroads, Blue Ridge Railroad (branch of the Southern Rail¬ way) and C. & W. C. Railway and electric Interurban, Piedmont & Northern, connecting Anderson with Greenville, Greenwood and Spartanburg, S. C. Centre of South Carolina division of the celebrated Piedmont section, also in one of the two aseptic zones of the United States, it being a medical fact that wounds heal with twice the rapidity in these zones than elsewhere in. the entire country. Fifteen churches representing all denomina¬ tions. Eight schools, seven for white children and one for colored pupils. Number of pupils enrolled 1 Jan. 1916, white 2,656; colored 1,306. Number of teachers and instructors in the schools, white 55, colored 21. Value of build¬ ings used for school purposes, not including leased property, white $132,000, colored $10,000. School enrolment 1 Jan. 1915, 3,381, increase in 1916, 581 pupils. Anderson College, a semi¬ nary for young women, value of buildings and equipment, $250,000, employs a faculty of 16 teachers and instructors, attendance 115. Anderson County is second largest in the State in the production of cotton, corn and feed stuff. Nine cotton mills within a radius of five miles of the courthouse, employing 3,200 operatives, three cotton oil mills and two fer¬ tilizer plants, foundry and machine works, two ice plants, two flour mills, three wholesale lum¬ ber mills, planing mills and variety works, mattress and spring bed factory, horse collar factory, patented metal shingle factory. The United States census of 1914 reports 28 estab¬ lishments of factory grade, employing 1,254 persons, of whom 1,145 are wage earners, re¬ ceiving $392,000 annually in wages. The capi¬ tal employed was $2,575,000, and the value of the year's output was $1,904,000; of this, $646,000 was the value added by manufacture. The city has a gas plant with 16 miles of mains and daily capacity of 165,000 cubic feet; water works and electric lights, 20,000 horsepower plant located on Sececa River, 35 miles of water mains, 9 miles of street railway, 7^2

miles of paved streets, paid fire department, auto engine and two horse-drawn trucks, 1,215 telephones. Taxable property within the city limits, not including six of the city's largest industries, $1,150,000. Aldermanic form of government vested in mayor and six aldermen. Pop. (1900) 5/98; (1910) 9,654, percentage

of increase 75 per cent; (1920) 10,570.

Increase for the past 10 years 9.5 per cent.

ANDERSONVILLE, Ga., a village of

Sumter County, 62 miles southwest of Macon, noted as the seat, during the Civil War, of a military prison of the Confederate States. This prison was established in November 1863, and consisted of an unsheltered enclosure contain¬ ing at first 22 acres, an area subsequently in¬ creased to 27. It was commanded by Gen. W. S. Winder, but the superintendent was one Henry Wirz, a Swiss. It has been stated that Ander- sonville was selected as a suitable site because secure against Federal raiders and generally considered healthful ; but that the laying waste of the fields of the South and the destruction of the means of transportation brought upon the Southern army and people great suffering, in which prisoners of war necessarily shared. It is true that rations were meagre for Con¬ federate soldiers, to whose fare such prisoners were legally entitled. But evidence shows that the conditions which prevailed at Andersonville were due to mismanagement and cruelty ; such evidence including ample Confederate testi¬ mony, as for example that rendered by Dr. G. S. Hopkins and Surgeon H. E. Watkins, constitut¬ ing a Confederate medical commission (1864), and that by Colonel Chandler of the Confed¬ erate War Department in an inspection report (5 July 1864). Into the enclosure as many as 33,000 prisoners were at times crowded, for the most part completely without shelter, and sup¬ plied with insufficient and unsuitable food. Between February 1864 and April 1865 there were received at the prison 49,485 prisoners, of whom 26 per cent, or over 12,800, died there. In the autumn of 1864 the Confederate govern¬ ment removed many to Florence, S. C., and Millen, Ga., where they fared decidedly better. Wirz was convicted in 1865 by a military court under an indictment charging him with injur¬ ing the health and destroying the lives of prisoners, and was hanged 10 November. The prison burying-ground was made a national cemetery. Consult Stevenson, R. R., (The Southern Side; or Andersonville Prison) (1876); Chipman, (The Horrors of Anderson¬ ville Rebel Prison* (1891); Schouler, (History of the United States) (Vol. VI, 1899).

ANDES, andez, the great mountain mass, or, as Humboldt called it, ((the largest mountain chain of the globe/ -extending along the entire western coast of South America and turning toward the east in the regions between the equator and lat. 12° N. Prolongations of the chain still farther eastward and, on the other hand, toward the extreme south, cannot be dis¬ cussed conveniently in this place ; it is, how¬ ever, essential to note the deflection below the Caribbean Sea and the interposition of the Antillean continent (compare article Central America) between the Andean Cordillera and the quite distinct and separate mountain sys-

tcms oi western North America. o.n regard to derivation of the name Humboldt wrote:

Andez, in the Quichua language (which lacks the consonants d, f and g), Antis, or Ante, appears to me to be made from the Peruvian word anta, signifying copper or metal in general.®

In the recent work by Professors Pirsson and Schuchert we find a condensed statement that supplies an outline of the geological story of the Andes as a whole :

j To ward the close of the Cretaceous, the Andes had been elevated and folded throughout the length of South America (4,500 miles), and during most of Tertiary time an extensive pene¬ plain (in places it was a postmature surface) was being developed in the central Andes. Vertical uplift began in later Tertiary time, ele¬ vating this peneplain from 3,000 to 7,000 feet. This was in turn eroded to mature slopes and then was rapidly warped in Pliocene and early Pleistocene time, so that now the deeply dis¬ sected erosion surface of the old peneplain stands at an average elevation of 12,000 feet, though locally it varies between 6,000 and 15,- 000 feet. Upon it in the west rest immense lava flows and lofty volcanic cones, some of which attain a height of 21,000 feet above the sea. These, are part of a great volcanic field whose development began in the early Tertiary and was completed soon after the Pliocene up¬ lift began. The central Andean plateau is the second highest in the world, being exceeded only by that of western Tibet to the north of the Himalayas of India, where the intermontane plains range from 14,000 to 17,000 feet above the sea.®

We shall now endeavor to obtain clear views of the five chief divisions

of this great uplifted region, namely, the far southern, the south central, the central, the equatorial and the northern.

The mountain region of Argentine Pata¬ gonia, which first claims attention in the far southern division, is very different from the Pampa region in topography, climate and vege¬ tation. The rainfall is very much heavier and all the conditions of the country are changed accordingly. Sheep-raising, which is the great industry of the Pampas, is not practicable in the forested Cordillera, as the feed is not suited to sheep, whereas cattle- raising, which is un¬ successful in the drier part of the Pampas, will always be a principal industry in the Cordillera. Forests, of which there is no vestige in the Pampas, clothe the mountain slopes of the Andes. In the Pampas running streams are rare, but in the Andes they constitute one of the principal natural features and, gathering in beautiful lakes or in great rivers, determine the future of the region to be one of manu¬ facturing industries based on water-power (Compare the extended and excellent study of this region by Mr. Willis, one of the best of recent works in this field. In several of the following paragraphs a few items of permanent interest from the same source are given, with minor changes).

The mountain chain of the Andes, attaining altitudes of more than 23,300 feet in its highest peaks, has impressed upon the minds of stu¬ dents the idea of an enormous mountain bar¬ rier, distinctly separating the lowlands of the Pacific coast from the vast low plains of eastern

South America. So fixed is the conception that it has affected the deliberations of statesmen and the relations of nations. The conception of a dividing wall, nowhere easy of passage and in many places impassable, was the fundamental idea according to which the boundary between Argentina and Chile was to have been traced (see Chile). Throughout the greater part of its extent the conception held true, and the engineers traced a well-defined crest which, fol¬ lowing the high summits of the Andes, coincides with the divide of the waters between the Pa¬ cific and the Atlantic. But from lat. 38° south¬ ward the topographic conditions were found to be very different. In this portion of the Cor¬ dillera it spreads out and divides into parallel mountain ranges. Some of the rivers rising in the extreme west of the mountain-belt flow to the Atlantic ; others, rising east even of the eastern Cordillera, in the Pampas themselves, flow westward across the entire zone of the Andes to the Pacific. Here was confusion for the treaty-makers, since their engineers dis¬ covered, in place of a mountain-wall, a laby¬ rinth of heights and valleys pierced in many places by rivers which wound in zigzag courses, now toward one

ocean, now toward another; and a boundary as fixed by a line along the highest crest of the Cordillera was found to di¬ verge widely from a boundary traced on the continental divide between the Atlantic and the Pacific. Fortunately for both Argentina and Chile, the treaty-makers had provided that any dispute should be settled by arbitration. In 1902, after 20 years of discussion, the arbitrator, King Edward of England, gave his award in favor of a compromise line. The foregoing statement makes it evident that the Andes of northern Patagonia constitute not a simple mountain ridge but a broad zone, including both mountains and valleys and traversed by large rivers. The summits whose altitudes most closely approach uniformity have been sculp¬ tured by erosion from the broad plateau-like mass of the older rocks of the Andes, whereas most of the isolated peaks which rise more than 7,333 feet above sea are volcanic cones built up on the plateau. The most renowned of these is El Tronador (((The Thunderer®), 11,533 feet above sea, which received its name from Friar Menendez, about 1791, when he described it as the mountain that is always thundering. At the foot of this great peak lies the most profound canyon and lake of the region, that of Nahuel Huapi. This southern division of the Andes may be subdivided into two distinct areas, and the distinction may be expressed in the simple statement that in one the valleys ex¬ tend east and wTest across the mountain zone, whereas in the other they range longitudinally from north to south within the Cordillera. The former area comprises the stretch of the Andes from lat. 38° to 41°, from Lago Alumine to Lago Nahuel Huapi. All but one of the streams within it rise in the western Cordillera and flow eastward to join their waters in the Rio Colloncura and the Rio Limay, which flow in the depression that lies along the eastern base of the Andes. Lago Lacar, though its valley once belonged to this Atlantic family, has turned away and now discharges its waters across the western range down the Pacific slope to the Chilean lakes. In this area high trans¬ verse ridges extend eastward between the drain-

age basins, and some of them attain greater elevations near their eastern extremities than at the western. They divide the area into in¬ dividual basins and more or less effectively ob¬ struct the passage from one to another within the wide belt of the Andean plateau. Where the valley floors range from 2,000 to 2,866 feet in altitude above the sea, one must rise to passes that attain 3,333 or 4,000 feet in order to cross from one valley to the next. Each of the deep

transverse valleys harbors one or more lakes, which, like the lakes of Switzerland and north¬ ern Italy, lie in deep basins sculptured by the rock-laden ice of glaciers, descending from the adjacent heights. Their shores are everywhere picturesque and in many places precipitous. About their lower eastern ends are piled the glacial moraines of an ice period which is still represented in the little glaciers that linger about the high summits. In each of these val¬ leys, at a distance of several kilometres below the moraines just mentioned, is a much older glacial moraine which marks the outermost limit attained by the ice that filled the valleys during a still earlier glacial epoch. Thus these valleys, descending from the western Cordillera to the lowland that intervenes between the An¬ des and the high plateaus of the Pampas, range in character from deep gorges in the mountains to beautiful lake basins and wide stretches of gravel plains. Their waters flow in the direc¬ tion of the western winds, in the direction in which the air currents become dryer as they un¬ load their moisture upon the mountains. The vegetation changes accordingly, and the streams, which gather their headwaters from the deep forest shades of the mountain slopes and which linger in the cold rock-bound lakes of the transverse valleys, flow on in the broad sunlight of the treeless grassy Pampas. Strong historic interests centre about localities in this area. The paso de Villarica, which crosses the Cor¬ dillera in the north, was traversed by Francisco de Villagran in 1553, the year in which Val¬ divia, the conqueror of Chile, after 12 years of struggle with the Indians, was defeated by them, taken prisoner and killed. Villagran was un¬ doubtedly the first European to cross the south¬ ern Cordillera. Subsequently Spanish captains, missionaries and embassies dispatched to nego¬ tiate conditions of peace with the Indians, fought, prayed or held council in the valleys of Lagos Huechulaufquen, Lolog and Lacar.

The section of the Cordillera south of Lago Nahuel Huapi includes a central valley which traverses it from north to south, separating the high western and eastern ranges. From Lago Nahuel Huapi itself a deep pass, which is cut nearly to the level of the lakes, leads to Lago Gutierrez, whose waters flow by way of Nahuel Huapi to the Atlantic. East of Gutierrez is the Sierra de la Ventana, and west of it El Catedral, both prominent summits among the Andean heights, yet between them one may pass from Lago Gutierrez to Lago Mascardi, over a gravel plain which, although it scarcely sepa¬ rates the two lakes, divides the waters of the eastern and western oceans. Here the continen¬ tal divide descends from El Catedral, passes across the plain between the two lakes, and ascends again to the summit of the Sierra de la Ventana. El Bolson and its neighbor, the Hoyo de Euuyen, are

the deepest valleys in this section of the Andes, lying between 900 and

1,000 feet above the sea and 1,333 feet or more below Lago Mascardi. The temperature naturally changes with the altitude. Frosts, which are common in the northern portion of the central valley, are rare during the summer in El Bolson, a valley sometimes characterized as a little paradise in the heart of the snowy mountains. In the south rises the mountain group of Cerro Tres Picos and its attendant heights, stretching clear across the mountain zone as a promontory of the western Cordillera. On the east of El Bolson the continental divide, which follows southward along the summit of the eastern Cordillera, sinks into the Pampas and, swinging eastward outside of the Andes, is marked by the ridge of a glacial moraine surrounding the basin of Cholila. South of the heights of Tres Picos a system of valleys tributary to the Rio Fetaleufu and thus to the Pacific lies between the snowy western Cor¬ dillera and the treeless heights of the Cordon de Leleque and the Cordon Esquel, which here represent the eastern Cordillera. The valley zone between the ranges is wider here than farther north, the valleys themselves are in general broader, and the western chain is more dominant as compared with the eastern. Com¬ munication across this western range is more difficult than it is farther north, . and it has been suggested that this circumstance in¬ fluenced the arbitrator in tracing the boundary upon the western range and giving the valleys of Cholila, Lago Rivadavia, Lago Fetalauf- quen and 16 de Octubre to Argentina. These valleys are rich, fertile and, owing to the brac¬ ing mountain climate and pure, swiftly flowing streams, healthful. The Bolson, the Hoyo de Epuyen, Cholila and 16 de Octubre will support prosperous communities and play an important part in the future development of the Andes.

The population in this essentially border¬ land far southern division is composed of the varied elements that usually gather on a fron¬ tier and cannot be disregarded in planning for the future occupation of the country by a more stable community. Under the treaty of 1881 defining the international boundary, Chile for 20 years laid claim to nearly all the moun¬ tain zone of the Andes, and Chileans were en¬ couraged to establish themselves in the area she claimed. It is not difficult for men accus¬ tomed to the mountain trails in the forests of southern Chile to cross the passes which lead into the eastern valleys of the Andes. There is along the boundary no conspicuous natural barrier greater than those which the Chilean Indian or half-breed with his active horses and cattle constantly traverses in his own country. Quite naturally, then, the Chilean element is large.

The Andean area which according to Mr. Willis contrasts peculiarly

and favorably with other sections of Argentina lies between lat. 38° and lat. 44° and is set apart by such climatic conditions that it may eventually be occupied by energetic people of the temperate zone and be¬ come the site of manufacturing industries on a large scale. It is an area of approximately 20,000 square miles, characterized by moderate summer temperatures, cold yet not severe winters, abundant rainfall and such remarkable scenery, that, in brief, it may be called the Argentine Switzerland.

Next, as above promised, we proceed to an

account of the south central division, in which the most interesting region is that extending eastward from the Chilean capital city.

Charles Darwin wrote that the features in the scenery of the Andes which struck him most were: The flat fringes some¬ times expanding into narrow plains on each side, — the valleys, — the bright colors, chiefly red and purple, of the utterly bare, and precipitous hills, — the grand and continuous wall-like dikes, — and the strongly marked strata which, when nearly vertical, form the most picturesque and wild pinnacles, but where less inclined, great massive mountains ; the latter occupying the outskirts of the range, and the former the central parts; — lastly, the smooth conical piles of fine and bright colored detritus, which slope at a high angle from the flanks of the mountains to their bases, some of the piles having a height of more than 2,000 feet. The quantity of crumbling stone on the Cordillera is very great. Occasionally in the spring masses of such matter slide down the moun¬ tains, and cover the snow drifts in the valleys, thus forming natural icehouses the elevation of which may be far below the limit of perpetual congelation.

The Cordillera in this part consists of two principal ranges, the passes across which attain respectively an elevation of 13,210 and 14,365 feet. The first great line (consisting, of course, of many subordinate ones) is called Peuquenes. It divides the waters of Chile and Argentina. To the eastward, a mountainous and elevated region separates it from the sec¬ ond range (called the Portillo) overlooking the Pampas (see article South America — Geology) .

The geological structure of the mountains, at this point of observation, is very briefly sketched, and first that of the Peuquenes or western line

; for the constitution of the two ranges is totally different. The lowest strati¬ fied rock is a dull red or purple claystone porphyry, of many varieties, alternating with conglomerates, and breccia composed of a similar substance; this formation attains a thickness of more than a mile. Above it there is a grand mass of gypsum, which alternates with, passes into, and is replaced by red sand¬ stone, conglomerates and black calcareous clay- slate. Even at the very crest of the Peuquenes, at the height of 13,210 feet, the black clay-slate contains numerous marine remains, amongst which a gryphsea is the most abundant, like¬ wise shells, resembling turritellae, terebratulse and an ammonite. The formation probably is of the age of the central parts of the secondary series of Europe. Ihese great piles of strata have been penetrated, upheaved and over¬ turned, in the most extraordinary manner, by masses of injected rock, equaling mountains in size. On the bare sides of the hills, compli¬ cated dikes and wedges of variously-colored porphyries and other stones, are seen travers¬ ing the strata in every possible form and di¬ rection ; proving also, by their intersections, successive periods of violence. The rock which composes the axis of these great lines of dislo¬ cation when viewed at a distance resembles granite, but on examination it is found rarely to contain any quartz; and instead of ordinary feldspar, albite. The metamorphic action has been very great, as might have been expected

from the close proximity of such grand masses of rock, which were injected when in a lique¬ fied state from heat. When it is known, first, that the stratified porphyries have flowed as streams of submarine lava under an enormous pressure, and that the mechanical beds separat¬ ing them owe their origin to explosions from the same submarine craters ; secondly, that the whole mass in the lower part has generally been so completely fused into one solid rock by metamorphic action that the lines of di¬ vision can only be traced with much difficulty; and thirdly, that masses of porphyry, undis- tinguishable bv their mineralogical characters from the two first kinds, have been subsequently injected; — the extreme complication of the whole will readily be believed.

We now come in these observations made in the south-central division of the Andes to the second range, which is of even greater altitude than the first. Its nucleus in the sec¬ tion seen by Mr. Darwin when crossing the Portillo Pass consists of magnificent pinnacles of coarsely-crystallized red granite. On the eastern flank a few patches of mica slate still adhere to the unstratified mass ; and at the foot a stream of basaltic lava has burst forth at some remote period, — perhaps when the sea covered the wide surface of the Pampas. On the western side of the axis, between the two ranges, laminated fine sandstone has

been penetrated by immense granite dikes proceed¬ ing from the central mass, and has thus been converted into granular quartz rock. The sandstone is covered by other sedimentary de¬ posits, and these again bv a coarse conglomerate of vast thickness. All these coarse mechanical beds dip from the red granite directly toward the Peuquenes range, as if they passed beneath it ; though such is not the case. Examination of the pebbles composing this conglomerate (which betray no signs of metamorphic ac¬ tion) disclose perfectly rounded masses of the black calcareous clay-slate with organic re¬ mains, — the same rock which is found on the Peuquenes. These phenomena compel us to arrive at the following conclusion : That the Peuquenes existed as dry land for a long period anterior to the formation of the second range, and that, during this period, immense quantities of shingle were accumulated at its submarine flank. The action of a disturbing force then commenced : These more modern deposits were injected by dikes, altered by heat, and tilted toward the line whence, in the form of sedi¬ ment and pebbles, they had originally pro¬ ceeded, — thus making the offspring at first appear older than its parent. This second, grand and subsequent line of elevation is parallel to the first and more ancient one.

The central division or ((Central Andes® — the name proposed by Mr. Bowman for a group of closely related natural regions that lie be¬ tween 12° and 26° south latitude — may now, in turn, receive brief attention. Here the dominat¬ ing features are two great plateaus with a cen¬ tral basin between them. These plateaus, trend¬ ing north and south, are depicted on the physical maps as two roughly-parallel mountain chains, commonly referred to as the eastern and western [central] Andes. In Bolivia, these east-central Andes are variously designated as the Cordil¬ lera Oriental, Cordillera of the East, or the Cordillera Real, the latter being an improper

extension of the specific term applied to the high, white, truly ((royal and regaP* mountain range near La Paz that is terminated on the south by Illimani and on the north by Sorata. The west-central Andes are usually called the Maritime Cordillera, a generic term applied to the aggregations of individual peaks and short volcanic ranges which surmount the western plateau. In addition, specific terms are applied to the culminating ranges. Thus, on the boundary between Chile and Bolivia, lat. 20° S., there is the Cerro de Sillilica, just as in south¬ ern Peru the mountain knot at Vilcanote is called the Cerro de Vilcanote.

In the eastern plateau the exceptional heights or the crests of the declivities that border basins and valleys are given such specific names as the Tunari de Cochabamba, Cerro de Cliza and Cordillera de Potosi. Between the two great Andine table¬ lands and their superimposed peaks and ranges is the central basin or plateau of lower altitude than the bordering highlands, separated from the latter by the two great roughlv-parallel scarps of marked rectilinear quality often for long distances. This is the alti-plano of Bolivia : an interior drainage basin, with no visible out¬ let to the sea, and therefore technically a part of the true desert area of the world. On the north the bordering scarps converge in lat. 14° S., enclosing Lake Titicaca, whose waters discharge by way of the Desaguadero River into Lake Poopo, only to be discharged in turn into the Salar de Coipasa and the adjacent salars to the south. Here and there the otherwise flat basin floor is broken by piles of volcanic detritus, lava flows from occasional centres of igneous activity, or by ancient and highly crumpled sedimentaries, as where the upturned edges of slates and quartzites rib the hills back of the port of Desaguadero. East of the central Andes, as indeed along the whole eastern front of the Andine Cordillera, from the Argentine Pampas to the Llanos of Vene¬ zuela, the dissection of the adjacent highlands has been accompanied by the formation of ex¬ tensive piedmont deposits. The western plateau descends by a relatively smooth slope to the coastal deserts of Tarapaca and Ata¬ cama. Between these deserts and the Pacific shore are low mountain ranges of complex geologic and physiographic character, the coast ranges of Chile and Peru.

A generalization by Mr. Bowman is to the effect that, in the field of human geography, the central Andes form an exceedingly im¬ portant group. It is impossible to find else¬ where in South America an area of equal size with so great a variety of life. The density of population ranges from 100 to the square mile in the vicinity of Cochabamba, Bolivia, to one- tenth to the square mile in the Territorio de los Andes, Argentina. Occupations vary between such extremes as, on the one hand, the inten¬ sive agriculture of irrigated valleys, and on the other the pastoral nomadism of Alpine meadows: customs are, in one place, those of modern civilized people, but, in another, those that bespeak an unmixed barbarism. It is the extremely wide range in the physical condi¬ tions of the central Andes that excites the in¬ terest of the geographer. The principles of geographic science rest upon the theory that man is to an important degree the product of the earth. In the varied physical environment

of this great tract we should therefore expect climate and relief to exercise a high degree of influence upon the population. A study of its

people should demonstrate both the scientific nature of geography and the wide application of its laws.

The fourth division, according to the order we are following from south to north, is the equatorial ; and here we notice the points in which this region is sharply differentiated from the other divisions. Edward Whymper, the dis¬ tinguished explorer, in his (Travels) wrote: <(In a very short time it was found that there were things to be unlearned as well as dis¬ covered in Ecuador. We ascertained that Chimborazo streamed with glaciers, although high authorities state that it has none ; and in course of time it became apparent that the two (parallel Cordilleras, y which according to geographers are the great feature of the coun¬ try, do not exists By an equatorial belt, so to speak, the parallel cordilleras observed hitherto (in this article) are constricted. But these soon diverge above the line, and more than re¬ assert their individualism before yielding to that powerful eastern impulse which we have already mentioned in the first paragraph. The axis of the Andes in Ecuador runs nearly north and south ; and toward the western edge of the main chain there is indeed, this author admits, a certain sequence of peaks more or less in a line. East of these summits there is a succession of basins of different dimensions and at various elevations. The nearest moun¬ tains on the eastern side occur at irregular distances. There is no such thing as one great valley in the interior of Ecuador. The moun¬ tains Pasochoa and Ruminahui are the only two which lie parallel to the others on the western side. All of the great Andes of the equator rise out of, or upon and above, the main chain, which was created by upheaval at some remote date (compare what has been said above in respect to time). With the exception of Sara- urcu, they are all mountains of volcanic origin, although they may not all have been active volcanoes. It seems probable that there were never many of these volcanoes in activity at any one moment. Some that are now extinct have evidently been alive ; while others, like Pichin- cha and Tunguragua, are either dormant or are not perpetually in eruption. Cotopaxi and Sangai alone are in a state of constant activity, and these two mountains seem to be increasing their elevation. Cotopaxi shows no signs of approaching decrepitude, and for many cen¬ turies)ˆet to come it may remain the highest active volcano in the world. In general the altitudes here are less by several thousand feet than those of the highest peaks in Chile and Bolivia. Of the extinct volcanoes, Cayambe, Antisana and Chimborazo are the most import¬ ant. There are no records of eruptions of Chimborazo. It must have been an extinct vol¬ cano for many ages. The complete burial of its crater, the thickness of the ice-cap at its sum¬ mit and the large size of its glaciers, the ruin and erosion of its lava-streams and

the height vegetation has attained upon its flanks, are all indications that its activity ceased at a remote period. Particularly interesting are the obser¬ vations of temperatures on summits in Ecuador. On 4 January at 5:15 p. m. the temperature on the summit of Chimborazo (height 20,498 feet)

was found to be 21° F., while at Guayaquil (6 p. m. on the same day) it was 85° F. On 18 February at 6:20 a. m. the temperature on the summit of Cotopaxi (height 19,613 feet) was 21° F. At Guayaquil on the same day at 11 a. m. the temperature was 82° F. On 10 March at 10-11 :40 a. m. the temperature on the sum¬ mit of Antisana (19,335 feet) was 44°-60° F., while at Guayaquil on the same day at 11 a. m. it was 80° F. In each case the observations were, of course, of temperatures in the shade.

The fifth division, the northern, might also be called northern and northeastern. We have already, by anticipation and quite unavoidably, given main facts touching the partition and trend of the Andes in the region between the equator and #lat. 12° N. Humboldt de¬ scribed the eastern Cordillera of Colom¬ bia — the chain which stretches toward Bo¬ gota; the chain which lies between the Mag¬ dalena and the Cauca, which he called the cen¬ tral Cordillera of New Granada (Colombia) ; and the chain which continues the Cordillera de la Costa from the basin of Almaguer, which he designated the Western Cordillera of this northern division. This tripartition of the Andes (lat. lj4°-2/4° N.) resembles that which takes place in the knot of the mountains of Huanuco and Pasco in lat. 11° S. ; but the most western of the three chains that bound the basins of the Amazon and the Huallago is the loftiest; while that of the shore (the Western Cordillera) is the least elevated of the three chains of the Republic of Colombia. The east¬ ern chain of the Andes of Colombia preserves its parallelism with the other two for a con¬ siderable distance; but beyond Tunja, in lat. 5 y2° N., it inclines more toward the northeast, passing somewhat abruptly from the direction N. 25° E. to that of N. 45° E. It is like a vein that changes its direction. The tripartition of the Cordilleras, and, above all, the spreading of their branches, have a vast influence upon the prosperity of the inhabitants. The diversity of the superposed table-lands and climates gives variety to the agricultural productions as well as to the character of the people.

Bibliography. — Bandelier, A. F. A., (The Islands of Titicaca and Koati'

(New York 1910) ; Bowman, I., (The Physiography of the Central Andes' (in the American Journal of Science , Vol. XXVIII, September and October 1909) and (Results of an Expedition to the Cen¬ tral Andes) (in Bulletin American Geographical Society, March 1914) ; Bryce, J., in 'South America,' pp. 248-281 ; Conway, W. M., ' Acon¬ cagua and Tierra del Fuego) (London 1902) and 'The Bolivian Andes' (New York and London 1901); Darwin, C., 'Journal and Re¬ marks' (Vol. 3, in the 'Narrative of the Sur¬ veying Voyages of H. M.'s Ships Adventure and Beagle' (London 1839) ; Hettner, A., 'Die Kordillere von Bogota' (Gotha 1892) ; Hum¬ boldt, A. von, 'Personal Narrative of Travels to the Equinoctial Regions of America' (Chap. XXXII. London 1853) and 'Vues des Cordil- leres' (Paris 1810) ; Huot, V., 'Geographic des hauts plateaux des Andes' (Paris 1910) ; Joyce, T. A., 'The Southern Andes and Plains' (in 'South American Archaeology,' pp. 236-254, London 1912) ; Mozans, H. J. (pseud. Zahm, I. A.), 'Along the Andes and Down the Ama¬ zon' (New York and London 1911) and 'Up the Orinoco and Down the Magdalena' (New

York 1910) ; Orton, J., 'The Andes and the Amazon' (New York 1870) ; Pirsson, L. V., and Schuchert, C., 'A Text-book of Geology', p.923 (New York 1915) ; Post, C. J., 'Across the Andes' (New York 1908) ; Reclus, E., 'Regions Andines' (Vol. XV1I1 'Nouvelle Geog. Uni- verselle,' Paris 1893) ; Sievers, W. von, 'Die Cordillerenstaaten' (Berlin 1913) ; Suess, E., 'La face de la terre' (Das Antlitz der Erde, trans. and annotated by Emm. de Margerie, tome III, 2° partie, Paris 1911) ; Whymper, E., 'Travels Amongst the Great Andes of the Equator' (New York 1902) ; Willis, B., 'North¬ ern Patagonia' (Argentina, Ministry of Public Works, 1914, and Scribner Press, New York).

Marrion Wilcox.

ANDES AND THE AMAZON, The, a

volume of travels by James Orton (1870, en¬ larged ed. 1876). Under the auspices of the Smithsonian Institution, the author, who for many years was professor of natural history at Vassar College, led an exploring expedition to the equatorial Andes and the river Amazon. Its experiences are set forth in this work.

ANDESINE, an'dez-in, a triclinic feldspar, intermediate in composition between albite and anorthite. Albite and anorthite are isornor- phous, and andesine includes those mixtures of the two in which the ratio of albite to an¬ desine ranges from 1:1 to 3:2. Andesine may be described as an anhydrous silicate of sodium, aluminum and calcium. Its hardness is from 5 to 6 and its specific gravit}' about 2.68. In color

it is white, gray, greenish, yellowish or pink. It was first found in the Andes (whence the name), but has since been observed in Al¬ sace, in Iceland and in other localities. In the United States it occurs at Sanford, Me.

ANDESITE, dn'dez-It, a common volcanic rock, consisting of a triclinic feldspar (such as andesine) mixed with hornblende or augite and sometimes also with quartz. It varies in color from green to gray and occasionally has a purplish cast. It is difficult to define andesite accurately because basalt, andesite and trachyte are similar in composition, and intermediate varieties exist, which, with the typical rocks of the three classes, form an almost continuous series. Andesite is more fusible than trachyte, but less fusible than basalt.

ANDIRA, an-di'ra, a genus of leguminous typical American trees, with fleshy plum-like fruits. The wood is well fitted for building. The bark of A. inermis, or cabbage-tree, is narcotic, and is used as an anthelminthic under the name of worm bark or cabbage bark. The powdered bark of A. araroha is employed as a remedy in certain skin diseases, as herpes.

ANDIZHA.N, an'di-jan', Russia, city and capital of the district of the same name, in the province of Ferghana, Russian Turkestan, 42 miles from Margelan, the provincial capital. Andizhan is the eastern terminus of the Trans¬ caucasian Railroad. It is the centre of an im¬ mense cotton-raising district, whence Russia received three-fourths of all the cotton used in the empire. It came into the possession of Russia in 1875. In 1902 the city was totally destroyed by an earthquake which killed over 5,000 of the 47,000 inhabitants. In 1916 it had 82,235 inhabitants.

ANDOCIDES, an'dos'i-dez, an Athenian orator : b. 467 b.c. ; d. about 393 b.c. Active in public affairs, he was four times exiled; the first time along with Alcibiades, for profaning the Eleusinian mysteries. Three of his ora¬ tions are extant.

ANDORRA, an-dor'ra, a small republic in the eastern Pyrenees between Ariege, a depart¬ ment of France, and Lerida, a province of Spain. It is about 80 miles west from the Mediterranean coast and 100 miles north of Barcelona. Its area is 175 square miles and the population 5,231. It is under the joint suze¬ rainty of France and the

Spanish bishop of Urgel. It is governed by a council of 24 mem¬ bers elected for four years by the heads of families in each of its six parishes. The coun¬ cil elect a first and second syndic to preside; the executive power is vested in the first syndic, while the judicial power is exercised by a civil judge and two magistrates (viguiers). France and the bishop of Urgel appoint each a magis¬ trate and a civil judge alternately. A per¬ manent delegate, the prefect of the Pyrenees. Orientales, moreover, has charge of the inter¬ ests of France in the republic. The Andorra valley is enclosed by mountains. There is ex¬ cellent pasture land, on which cattle are raised. Fruit trees and vines also flourish, and iron and lead are mined in the mountains. Much of the grain of the republic comes from France. The manufacture of coarse cloth is the chief indus¬ try. Wool, ores, cloth and dairy products are exported in small quantities. Andorra received its independence from Charlemagne in recog¬ nition for its services to him in his campaign against the Moors, and in 1278 was transferred to the Comte de Foix and the bishop of Urgel. During the French Revolution the French de¬ clined the annual tribute from Andorra, but in 1806 the former relations with France were resumed and cereals from France were admit¬ ted free in consideration of an annual payment of 960 francs. The bishop of Urgel receives an annual sum of 460 francs. Military service is compulsory for all citizens between the ages of 16 and 60. The capital is Andorra with a popu¬ lation of 1,000. Consult Deverell, (History of the Republic of Andorra5 (Bristol 1885) ; John¬ son, V. W., Two Quaint Republics, Andorra and San Marino5 (Boston 1913) ; Spender, H., (Through the High P}?renees) (London 1898) ; Tucker, (The Valley of Andorra 5 (Cambridge, Mass., 1882).

ANDOVER, England, a market town in Hampshire, on the river Anton, 12 miles west of Winchester. Its large parish church was built about 1850 on the site of a Norman prede¬ cessor. The Massachusetts Andover was named in honor of the Hampshire town. It manufactures iron and malt. There are re¬ mains of Roman villas in the neighborhood. Pop. (1911) 7,596.

ANDOVER, Mass., town in Essex County, including several villages south of the Merri- mac, 22 miles north of Boston, on the Boston & Maine Railroad, and on the Shawsheen River. It is the seat of the Phillips Academy for boys, founded in 1778, and of the Abbot Acad¬ emy for young ladies. It has a public library. The government is administered through town meetings, at which three selectmen are selected as executive officers, appropriations made and

other civic affairs attended to. Andover was first settled in 1643 and

was incorporated three years later. During the witchcraft agitation in 1692, three citizens of Andover were executed at Salem and several others placed on trial and acquitted. On 5 March 1698 it was attacked by Indians, who slaughtered five of the citizens and set fire to a number of buildings. Andover has manufactories of linen, twine, shoe-thread, woolen goods, ink, brushes, tubes and rubber goods. Poo. (1920) 8,230. Consult Abbot,

(History of Andover5 (Andover 1829) and Bailey, historical Sketches of Andover5 (Bos¬ ton 1880).

ANDOVER THEOLOGICAL SEMI¬ NARY, Cambridge, Mass., the oldest theolog¬ ical institution in Newr England, founded in 1807 and opened for instruction the following year, at Andover, Mass. The original founders were Samuel Abbot, Mme. Phoebe Phillips and her son John P. of Andover. The asso¬ ciate founders were William Bartlet and Moses Brown of Newburyport, and John Norris of Salem. The primary aim of the founders was to provide for the professional education of ministers for the orthodox Congregational churches, and, in pursuance of this aim, men of different theological views (Old Calvinist and Hopkinsian) united upon a common plat¬ form. The constitution sets forth a compre¬ hensive plan of instruction in all branches of Christian learning, and from the first the sem¬ inary was able to offer a more thorough prep¬ aration for the ministry than was then obtain¬ able elsewhere in this country. Among the professors have been Leonard Woods, Moses Stuart, Ebenezer Porter, Edward A. Park, Austin Phelps, Joseph Henry Thayer, Egbert C. Smyth, and William J. Tucker. In 1908 the seminary celebrated its centenary with appro¬ priate exercises. At that time it had given in¬ struction to more than 3,500 students and had sent out 2,172 graduates. The same year the seminary was removed to Cambridge and affili¬ ated with Harvard University, although retain¬ ing its own faculty and its separate corporate existence. Instruction is freely interchanged between the two institutions, and the libraries have been combined into one, the Andover- Harvard ˆTheological Library, which contains about 107,000 volumes and 51,000 pamphlets. The total endowment of the seminary, including lands and buildings, is about $1,000,000. The seminary is open to all Protestants without discrimination. Only college graduates are eli¬ gible for the degree of bachelor of divinity. The annual tuition fee is $150, which entitles the students to admission to Andover and Har¬ vard courses alike. The faculty consists of six professors (1916). For the early history of the seminary consult Leonard Woods' (History of the Andover Theological Seminary5 (Boston

1885) .

ANDRADA Y SYLVA, an-dra'da e siffva, Bonifacio Jose D’, Brazilian statesman : b.

Villa de Santos 1765; d. Nictheroy 1838. In 1800 he was appointed professor of geology at Coimbra, and soon after inspector-general of the Portuguese mines and in 1812 he was made perpetual secretary of the Academy of Lisbon. Returning to Brazil in 1819, he urged Dorn Pedro I to resist the recall of the Lisbon court and was appointed one of his ministers in 1821.

When the independence of Brazil was declared Andrada was made Minister of the Interior and of Foreign Affairs; and when it was established he was again elected by the Constituent As¬ sembly, but his democratic principles resulted in his dismissal from office, Julv 1823. On the dissolution of the Assembly in November 1823, he was arrested and banished to France, where 'he lived in exile near Bordeaux till, in 1829, he was permitted to return to Brazil. But being again arrested in 1833, and tried for intriguing on behalf of Dom Pedro I, he passed the rest of his days in retirement.

ANDRADITE (named for the Portuguese mineralogist, d’ Andrada), the common or black garnet. See Garnet.

ANDRAL, an'dral', Gabriel, French physi¬ cian and pathologist: b. Paris, 6 Nov. 1797; d. 13 Feb. 1876. In 1827 he was called to the chair of hygiene, in 1830 to that of pathology in the University of Paris. Andral may be said to have been the first to apply an analytical and inductive method to pathology. His (Medical Clinic) (1824) established his reputation, and his (Summary of Pathological Anatomy > (1829) was equally, successful. Other works of im¬ portance are his (Essay on Pathological Haema¬ tology } (1843); (Course in Pathology — In-

terne) (1836-37) ; and (Investigations into the Modification of the Relative Proportions of Haematic (Blood) Principles) ; (Traite ele- mentaire de pathologie et de therapeutique generale > (1843).

ANDRASSY, an-drash'e, the name of an Hungarian noble family bearing the title of Grof (German, “Graf®), equivalent to “count® or “earl.® The full name is “Andrassy von Csik-Szent-Kiraly und Kraszna-

Horka.® The founder of the family was Andoras, one of the leaders in the Magyar immigration in the 9th century. There are two branches of the family, which received its patent of nobility in 1779. Several Andrassys played more or less import¬ ant parts in politics and literature. The most distinguished member of the family was Count Julius Andrassy (q.v.), who died in 1890.

ANDRASSY, an'dra-shi, Julius, Count, Hungarian statesman : b. Zempben, 8 March 1823 ; d. 18 Feb. 1890. He took part in the Revo¬ lution of 1848 and was condemned to death,' f but escaped and went into exile. Appointed Premier when self-government was restored to Hungary in 1867, he became Imperial Minister for For¬ eign Affairs in 1871 ; drew up the famous An¬ drassy note to the Porte in 1876; was a conspic¬ uous member of the Congress of Berlin in 1878; negotiated the German- Austrian alliance with Bismarck in 1879, retiring the same year from public life. The Andrassy "Note® was a decla¬ ration relating to the disturbed condition of Bosnia and Herzegovina, formulated by the governments of Austria, Russia and Germanv, with the approval of England and France. It commanded the establishment of religious lib¬ erty, the application of local revenues to local purposes, and other reforms, and was formally presented to the Porte, 31 Jan. 1876.

ANDRASSY, Julius, Count, 2d son of the preceding; Hungarian statesman: b. 30 June 1860. As a young man he was attache, to the Austro-Hungarian embassies in Berlin and Constantinople, became "resident officer® in a

hussar regiment and was elected to the Hun¬ garian Reichstag in 1884. He was nominated under-secretary in the Department of the Interior in 1892, Minister of Education in 1893, and Minister at the Royal Court in 1894. On the resignation of the Wekerle Liberal Cabinet in December 1894, Baron Banffy be¬ came Premier, and Andrassy retired from office. Banffy's stormy tenure of office ended in February 1899, on which Andrassy returned to the ranks of the Liberal party after having seceded from it the previous year. He sup¬ ported in turn the Szell, Hedervary and Tisza administrations, the last of which he assisted to wreck in 1905. The Emperor-King (the late Francis Joseph) invited Count Andrassy to form a new ministry, but the sovereign firmly declined to make the concessions which Andrassy considered indispensable, the chief of which was the adoption of the Hungarian language of command in the Hungarian por¬ tion of the Dual army. All efforts to form an Andrassy ministry failed; the monarch spent 16 days in Budapest vainly endeavoring to settle the crisis. Count Stephen Tisza, though out of office from 1 Feb. 1905,

continued to act as Premier till May, begging to be relieved of the duties. Representing the coalition leaders, Count Adrassy visited the Emperor at Vienna to set forth the Hungarian program; being told that further military concessions were impossible, he withdrew from the nego¬ tiations, and Baron Fejervary became Premier, but tendered his resignation a few days later. In January 1906 the Emperor and Andrassy met to discuss the claims of the coalition ; the terms demanded by the latter were rejected,- the Diet was dissolved and the Parliament building cleared* by troops. In the end Dr. Wekerle returned to power with a coalition or compromise cabinet in which Andrassy became Minister of the Interior, holding the office till September 1909. He was then offered the premiership, but refused it; in 1911 he went over to the opposition in the Chamber. At the outbreak of the European War Count Stephen Tisza — -who with Count Berchtold was largely responsible for Austria's aggressive policy against- Serbia — again held the reins of office. Andrassy, Apponyi and Karolyi, the leaders of the so-called "Independence Party,® strongly supported Tisza's war policy; in July- 1916, however, a section led by Count Karolyi broke away from that policy, the latter having quarreled with Andrassy and Apponyi. This notable move represented the very first break away from the Teutonic war policy by any non-Socialist party of either of the two dominant Central Powers. President Wilson's reply to the German peace proposals in Feb¬ ruary 1917 led Andrassy to assert in a news¬ paper article that Austria and her allies could not accept any demands which would result in a dismemberment of the Dual Monarchy. He and Count Apponyi interposed a determined "no® when Tisza expressed himself still willing to negotiate for peace with the Allies. In April, Andrassy engineered a movement to boycott Tisza for refusing to consider voting reforms. He scoffed at the Premier's offer of cabinet posts to members of the opposition. Count Apponyi supported the agitation and when, in May 1917, the Emperor Charles re¬ fused his assent to the franchise proposals of

Count Tisza, the latter resigned and Andrassy was entrusted with the formation of a new Hungarian cabinet, 29 May 1917.

Count Andrassy is credited with pro-British sentiments ; he speaks excellent English, cares nothing for public opinion, and is deeply en¬ grossed at all times in history and constitu¬ tional law. Honesty in politics is said to be a passion with him. He has written a great many

newspaper and magazine articles in French, German and English, as well as in his native tongue, and published two important works, (Ungarns Ausgleich mit Oesterreich vom Jahre 1867) (1897), and (The Develop¬ ment of Hungarian Constitutional Liberty, > of which an English translation appeared in Lon¬ don (1908).

ANDRASSY NOTE, a memorandum drawn up by Count Andrassy (q.v.) on behalf of Austria, Germany and Russia, and presented to the Turkish government in December 1875. It set out certain reforms, which the Porte accepted with one exception, as a means of checking the revolt of the Sultan's European subjects. The British government supported the note. See Berlin Memorandum.

ANDRE, an'dra or an'dri, Charles, French astronomer : b. Chauny 1842. In 1877 he was appointed professor of astronomy at Lyons and director of the observatory in that city, for which he visited the Rocky Mountains and Australia to observe Venus in transit. He is the author of (L'astronomic pratique et les observations en Europe et Amerique depuis le milieu du XVIIe siecle jusqu'a nos jours)

(1874-82).

ANDRE, John, British soldier: b. London, of Swiss-French parentage, 1761 ; executed at Tappan, N. Y., 2 Oct. 1780. His fate is peculiar ; failure has given him a monument in Westmins¬ ter Abbey from his own side, and undying ro¬ mantic pity from the other; where success would have loaded him with infamy from the one, and made the other glad to forget him. He entered the English army at 20, and was sent to Canada in 1774; November 1775 he was taken prisoner at Saint John's by Montgomery's expedition and sent to Lancaster, Pa. Ex¬ changed in December 1776, he was made cap¬ tain in 1777, aide to Gen. Charles Grey, major in 1778, and in 1779 aide to Clinton and ad¬ jutant-general of the forces in America. He owed this rapid advancement, as he has owed his enshrinement by posterity, to his extraordi¬ nary and somewhat feminine charm of person and manner, which won the hearts not only of his chiefs and associates, but of the very offi¬ cers who put him to death. He was full of wit and vivacity, a most entertaining companion, a good amateur musician and artist and a flu¬ ent, pleasing writer, and his literary qualities led to his selection as Clinton's adjutant and secretary. He was also a fair society poet, known in London literary circles ; and his casual skits in verse, (Thc Cow Chase, > (Yankee Doodle's Expedition to Rhode Island, > (The Affair Between Generals Howe and Gadsden^ etc., were great favorites in the English army. During that army's winter in Philadelphia, 1777-78, Andre was the promoter of and a chief actor in

all the festal occasions and social events, including the ˆischianza,* a pageant in honor of Howe on his departure.

In 1780 it fell to his official duty to conduct Clinton's negotiations with Benedict Arnold (q.v.) for the betrayal of West Point, the key of the Hudson, the command of which Arnold had solicited in order to betray it. Both sides were wary and suspicious of each other, and Clinton was uncertain of his correspondent's identity or whether the affair might not be a trap. After various abortive attempts at a • secret interview, Andre, on 19 September, went as <(John Anderson® up the Hudson in the sloop-of-war Vulture, nearly to the American lines above Fort Montgomery. The plan was to meet under a flag of truce, on pretense of arranging as to the confiscated property of the loyalist Col. Beverley Robinson, whose house was Arnold's headquarters ; but this too failed, and finally on the night of 21 September Arnold induced a loyalist farmer, Joshua Smith, to carry a packet from Robinson to <(Anderson® on the Vulture. Andre returned with Smith, was met on the shore by Arnold, and after a private conference the two went to Smith's house, where they spent the night and part of the next day arranging the betrayal, which was fixed for the day of Washington's expected return. Arnold gave him six papers containing drawings of the West Point defenses and full information concerning them, and passes to re¬ turn to New York either by land or water. He also sent Smith as escort, charged not to leave Andre till he had reached the English lines in safety. But in the morning the American bat¬ teries had fired on the Vulture and driven her so far down stream that the boatmen would not carry him to her. Andre, therefore, dis¬ guising himself as a civilian, set out on horse¬ back, carrying the papers in his boots. Smith, despite Arnold's injunction, left Andre on the way, probably in fear for himself. About 9 a.m. on the 23d, near Tarrytown, and almost in sight of the British lines, he was stopped by three patriot militiamen, John Paulding, David Williams and Isaac Van Wart. Supposing them to be Tory <(cowboys,® he told them he was an English officer, and offered them money. Find¬ ing that they were not loyalists, he offered more money and his horse in addition, showing also Arnold's pass. Their suspicions thoroughly aroused, they searched him, found the papers and ˆcarried him to one Lieutenant-Colonel Jamison, who, not suspecting treachery on Ar¬ nold's part, notified him of the capture and proposed to hand the prisoner over to him. This gleam of hope was delusive, and Andre was finally sent to Washington, while Arnold fled to the Vulture and saved his own life. By military law Andre was, of course, subject to immediate hanging; but in consideration of his rank, Washington on 29 September convened a military court of six major-generals and eight brigadier-

generals, with Gen. Nathanael Greene as president, who unanimously convicted him of being a spy and sentenced him to death on 2 October. Clinton did his best to save Andre, protesting that he was not a spy because he was under a flag of truce (which was false), and that his movements were in obedience to the directions of Arnold, an American commander, — a grimly humorous defense under the circum¬ stances ; but Washington replied with firm courtesy that the circumstances justified no ex¬ ception to the rules of war. Andre died like a man and need not be grudged our pity; but he

was treated with a generous humanity curiously in contrast with the treatment accorded to Nathan Hale.

A monument to Andre was placed in West¬ minster Abbey, and in 1821 his remains were taken up and reburied near it. Consult Sparks, (Lile of Andre *(in (American Biographies)) ; Sargent, /Life of Andre* (1862); Lossing, 'Two Spies *(1886). Lord Mahon in his his¬ tory of England* assumes Clinton's case for Andre as good both in law and in equity. In 1858 Charles J. Biddle, a Philadelphia editor and ex-soldier, reviewed Mahon's opinions be¬ fore the Pennsylvania Historical Society. Con¬ sult its (Memoirs, * Vol. VI. For documents consult H. W. Smith's (Andreana* (1865); Dawson's Collections (1866). Andre's Journal was printed by the Bibliophile Society in Boston in 1904.

ANDRE, Louis Joseph Nicolas, a French military officer: b. Nuits, Burgundy, 29 March 1838; d. Dijon, France, 18 March 1913. He was graduated at the Polytechnic School, and ift 1865 became captain, serving in that capacity throughout the Franco-Prussian War of 1870 — 71. He was made general of brigade in 1893 and placed in charge of the Polytechnic School. On 29 May 1900 he was appointed Minister of War by President Loubet, succeeding General the Marquis de Gallifet, who held the office during the exciting period of the Dreyfus revision.

ANDRE, Saint Jacques d'Albon, Mar¬ quis of Fronsac, generally known as Marechal de Saint Andre, a French nobleman, made gen¬ tleman of the bedchamber by Henry II. In 1550 he was deputed to bear the collar of his order to Henry VIII of England, by whom he was invested with that of the Garter. On his return he was appointed to the command of the army in Champagne, where he greatly distinguished himself till taken prisoner at the battle of Saint Quentin. On the death

of Henry II he was chosen one of the regency. Killed at the battle of Dreux in 1562. The Huguenots called Saint Andre <(The Harquebusier of the West.®

ANDREA, Jakob, a German Protestant theologian: b. Waiblingen, 25 March 1528; d. Tubingen, 7 Jan. 1590; became professor of theology and chancellor of the University of Tubingen in 1562, and was the author of over 150 works, nearly all of a polemical character, besides being the chief author of the (Formula Concordiae.*

ANDREA, Johann Valentin, a German theologian: b. Herrenberg 1586, near Tubin¬ gen; d. Stuttgart 1654. He studied at Tubingen, became a Protestant pastor, and was chaplain to the court at Stuttgart. Eminently practical in mind, he was grieved to see the principles of Christianity made the subject of mere empty disputations, and accordingly devoted his life to the correction of this tendency of his age. His writings are remarkable for the wit and humor as well as for the acuteness and moral power which they display. He was long re¬ garded as the founder or restorer of the order of the Rosicrucians, a view based on his quaint but misunderstood (Chemical Jubilee of Chris¬ tian Rozenkreuz) (1616). But his intention was certainly not to originate or promote a secret society of mystics, but to ridicule the follies of the age, including the theosophic Rosicrucians.

He wrote mainly in Latin, but also in the Suabian dialect. Among the best of his works are his (Menippus, or a Hundred Satyric Dia- logues) (1617), and his spiritual (Clerical) Relaxation (1619).

ANDREA CHENIER, an opera in four acts by Umberto Giordano ; libretto by Luigi Illica; first performance, Milan, 28 March 1896; in New York, 13 Nov. 1896. The scene is laid in Paris during the French Revolution, and the story is woven around a real person, a poet and patriot named Andrea Chenier, born in Constantinople, who was studying in Paris when the revolution broke out. He was guillotined 25 July 1794. The first scene reveals the hall in the castle of the Countess de Coigny (whose daughter, Madeleine, is the heroine of the piece). Among the servants, who are mak¬ ing preparations for a grand ball, is one Gerard, who afterward becomes the leader of the revo¬ lution. Chenier, the poet, arrives with the guests, and is requested by Madeleine to im¬ provise a song of love. Instead, however, the poet improvises a violent diatribe against the aristocracy, which naturally displeases the haughty guests. Gerard leads in a crowd of poor, starving people, who look very much out of place amid the gorgeous surroundings. Gerard and the crowd are ordered out, and Chenier exhibits his sympathy by following them.

Five years have elapsed between the first and second acts. The latter opens with a cafe near the Seine. Andrea is seated outside at a table; at another table sit a spy and Madeleine's maid, Bersi. Roucher, a friend, warns Chenier that he is in danger and gives him a pass that will carry him to safety. Bersi, the maid, tells Chenier to wait for a lady, who turns out to be the fair Madeleine. She be¬ seeches Chenier to save her from the dreaded power of Gerard, who suddenly appears and attempts to seize the girl. Roucher intervenes and escorts the girl away, leaving Gerard and Chenier to fight a duel, in which Gerard is wounded. Gerard gallantly warns his rival that he is proscribed and implores him to save Madeleine. Chenier hurries away and Gerard disclaims any knowledge of the man who had struck him down. In the third scene, the Tribunal, Gerard is told of Chenier's arrest and is urged to denounce him, which he reluctantly does by signing the warrant. Madeleine offers her own life to save that of Chenier, and Gerard relents. But it is too late ; he has signed the paper and Chenier is sentenced to death. Act IV. Chenier is writing verses in his cell, which Madeleine enters through bribing the jailer. Gerard makes a final but ineffective appeal to Robespierre, and in the morning the two lovers go to the guillotine together.

ANDREA DEL SARTO, one of Brown¬ ing's most famous dramatic monologues, is founded upon the life of the Italian painter as given in Vasari's (Lives, *and is an attempt to explain the meaning of the portrait that del Sarto painted of himself and his wife, Lucrezia, which now hangs in the Pitti Gallery at Flor¬ ence. The poem comprises 27 2 lines of blank verse, and wras first printed in the second volume of (Men and Women* in 1855. An¬ drea, though called the ˆfaultless painter® by his contemporaries, lacked some essential qual¬ ity (according to Browming, elevation of mind,

aspiration) that enabled such painters as Michel¬ angelo, Raphael, and Leonardo, though inferior in technique, to surpass him. Browning finds in Andrea's infatuation with Lucrezia, which has led to sacrifice of character and artistic ideals, the key to this defect. This is brought out as the painter discusses himself and his art in a monologue addressed to his wife, as the two are seated in the dusk at a window of his house looking toward Fiesole. The poem is a three-sided study of character : of an artist who has failed to attain his ideal and who knows why he has failed; of a man who has lost his self-respect ; and of a lover who has given his all without return ; and yet this artist,

man, and lover, though disillusioned and hopeless, is content. The theory of art implied in the poem grows out of the character por¬ trayal and is incidental to it ; and, as is usual with Browning, this philosophic element is ren¬ dered human and ˆdramatic® as the natural ut¬ terance of the speaker under the given circum¬ stances. The quiet and restrained style of the monologue, easy and colloquial, reflects the mood of the speaker and seems colored by the autumnal silver-gray of the outer world. Few poems leave so profound and distinct an im¬ pression; few are so subtle and so rich in sug¬ gestion. As a picture of Renaissance life and character, Andrea del Sarto should be read in connection with its companion piece, Fra Lippo Lippi, to which it forms an utter contrast. In such studies Browning shows himself not only the greatest master of the dramatic monologue, but also of all poets the most profound student of the Renaissance, and the most successful in making poetry out of the subjects with which it provided him. Among the many criticisms of Andrea del Sarto may be mentioned that given by Mrs. Orr in her (Handbook ; by George Willis Cooke, in his (Browning Guide- Book,) and by Albert Fleming, (Browning So¬ ciety Papers) (No. 8, 2:9).

Marion Tucker,

Professor of English Literature , Polytechnic Institute of Brooklyn.

ANDREANI, an'dra-a'ne, Andrea, Italian wood engraver: b. Mantua about 1560; d. there 1623. Lie worked in Florence, Siena and Man¬ tua. He excelled in chiaroscuro engraving, of which he is one of the world’s greatest mas¬ ters. His arrangement of light and shade was remarkable, as also his drawing. His works include (Pavement of Siena Cathedral } ; (The Deluge, } and (The Destruction of Pharaoh’s Hostp both after Titian and Mantegna’s (Triumph of Caesar) (10 prints, 1598), which is considered his best work. His monogram is often confounded for that of Albrecht Alt¬ dorfer.

ANDREASBERG, an-dra'as-berg, Prussia, a mining town in the province of Hanover, 57 miles southeast of the town of Hanover and 14 miles from Klausthal, on a site 1,800 feet above sea-level, a little to the southwest of the Brocken. The minerals obtained in the mines of the district are silver, copper, cobalt, lead, arsenic, etc. The Samson shaft, 2,950 feet deep, is the deepest mine in the Harz Mountains. Pop. 4,600.

ANDREE, an'dra, Karl, German geogra¬ pher: b. Brunswick, 20 Oct. 1808; d. Wildungen, 10 Aug. 1875. He was educated at Jena, Got¬

tingen and Berlin. After having been impli¬ cated in a students' political agitation he became a journalist, and in 1851 founded the Bremer Handelsblatt. From 1855, however, he devoted himself entirely to geography and ethnography, working successively at Leipzig and at Dresden. In 1862 he founded the important geographical periodical Globus. His works include (Nord- amerika in Geographischen und Geschichtlichen Umrissen) (1854); (Geographische Wander- ungen J (1859) ; and (Geographie des Welt- handed (1867-72).

ANDREE, an'dra, Richard, German ethnog¬ rapher and geographer : b. Brunswick 1835 ; d. 1909. He was educated at Leipzig. In 1859ˆ63 while studying the German-Czech race conflict, he was employed as a foundryman in Bohemia. He edited the Globus from 1891 to 1903. He was appointed professor at the University of Munich in 1902. Among his works are (Nation- alitatsverhaltnisse und Sprachgrenze in Bohmen) (1870) ; (Tschechische Gange) (1872) ; (Zur Volkskunde der Juden) (1881) ; (Die Metalle bei den Naturvolkern) (1884) ; (Die Masken in der Volkerkunde) (1886) ; (Die Flutsagen* (1891), and (Braunschweiger Volkskunde)

(1896).

ANDREE, Salomon Auguste, Swedish aeronaut: b. in Grenna, 18 Oct.. 1854; date of death unknown. He was educated in Stock¬ holm. In 1882 he took part in a Swedish me- terological expedition to Spitzbergen. In 1884 he was appointed chief engineer to the Patent Office, and from 1886 to 1889 he occupied a pro¬ fessor's chair at Stockholm. In 1892 he re¬ ceived from the Swedish Academy of Sciences a subvention for the purpose of undertaking scientific aerial navigation. From that time he devoted himself to aerial navigation, making his first ascent at Stockholm in the summer of 1893. In 1895 he presented to the Academy of Sci¬ ences a well-matured project for exploring the regions of the North Pole with the aid of a balloon at an estimated cost of about $40,000. A national subscription was opened, which was completed in a few days, the King of Sweden contributing the sum of $8,280. With two com¬ panions, Dr. S. T. Strindberg and Herr Fraenckell, Andree started from Dane's Island, Spitzbergen, 11 July 1897. His balloon was 6 7% feet in diameter, with a capacity of 170,- 000 cubic feet. Its speed was estimated ?t from 12 to 15 miles an hour, at which rate the Pole should have been reached in six days provided a favorable and constant wind had been blow¬ ing. Two days after his departure a message was received from Dr. Andree by carrier pig¬ eon, which stated that at noon, 13 July, they were in lat. 82.2° and long. 15.5° E., and making good progress to the east, 10°

southerly. Sev¬ eral expeditions sent in search of Andree have returned without obtaining any further intelli¬ gence of the explorer.

ANDREINI, an'dra-e'ne, Giovanni Bat¬ tista, Italian comedian and poet : b. Florence, 1578; d. Paris, about 1650. From his sacred drama, <Adam) (1613), Milton is by some sup¬ posed to have derived the idea of (Paradise LostP

ANDREOLITE, an'dre-o'lit (from An- dreasberg, in the Harz Mountains), a mineral better known as harmotome (q.v.). The name

andreolite should be retained for it according to the law of priority ; but mineralogists have preferred to adopt the name harmotome, as given by Hairy, although no good reason can be assigned for so doing.

ANDREOSSY, an'dra'o'se', Antoine Fran¬ cois, Count, French general and statesman: b. Castelnaudary in Languedoc, 6 March 1761 ; d. Montaubon, 10 Sept. 1828. He entered the ar¬ tillery in 1781, joined the revolutionists, served under Bonaparte in Italy and Egypt, and took part in the revolution of the 18th Brumaire. He was Ambassador at London, at Vienna and at Constantinople, from which latter post he was recalled at the restoration. He was raised to the peerage by Napoleon after his return from Elba. After Waterloo he advocated the recall of the Bourbons, but, as deputy, generally took part with the Opposition. He was elected to the Academy in 1826. He was a man of emi¬ nent scientific attainments, one of his earliest works being the (Histoire Generale du Canal du Midi) (1800). Besides his scientific works he wrote several military “Memoirs.®

ANDREW, a Neapolitan king, assassinated with the connivance of his queen in 1345.

ANDREW, James Osgood, American Methodist bishop: b. Wilkes County, Ga., 3 May 1794; d. Mobile, 1 March 1871. He was an itinerant preacher in South Carolina from 1816 till consecrated bishop, 1832. His social rela¬ tions were the immediate cause of the division of the Methodist Episcopal Church into “North® and “South.® His second wife whom he married in 1844 was a slave holder; and the General Conference of that year resolved that he should “desist from the exercise of his of¬ fice® on the ground that the fact of his wife’s owning slaves “would greatly embarrass if not in some places entirely prevent® the exercise of this office. The Southern

delegates protest¬ ing against this action, the difficulty was settled only by dividing the churches and property into the Northern and Southern jurisdiction. Bishop Andrew adhered to the South, retiring from active work in 1868.

ANDREW, John Albion, American states¬ man, the “War Governor® of Massachusetts: b. Windham, Me., 31 May 1818; d. Boston, 30 Oct. 1867. He was graduated from Bowdoin College in 1837, and practised law in Boston 1840-61. He was an earnest anti-slavery advo¬ cate and defended the fugitive slaves Shadrach, Burns, and Sims. Elected to the State legisla¬ ture in 1858, was a delegate to the Chicago Con¬ vention in 1860, and being nominated governor was elected by an immense majority. He fore¬ cast the war, announced in his message the in¬ tention to put the State militia on a war foot¬ ing and privately invited co-operation from other governors. On Lincoln’s first call for troops, 15 April 1861, he sent them so promptly that on 19 April the 6th Massachusetts shed the first blood of the war in passing through Baltimore, and within a week he had dispatched to the front five regiments of infantry, a bat¬ talion of riflemen and a battery of artillery. In

1862 he urged the national abolition of slavery and the enrolment of colored troops, and in

1863 sent out the first colored regiment, 1 54th Massachusetts ; yet he repeatedly interfered to prevent harrying Southern sympathizers by ar¬ bitrary arrests, and after the war was foremost

in urging conciliation and abstinence from vin¬ dictive or humiliating measures. He was re¬ elected regularly till 1866, when he refused fur¬ ther honors from pecuniary grounds and im¬ paired health, continuing his law practice till death. He was a man of great personal charm and oratorical force, intensely sympathetic and humane, and of simple and frank nature. In religion he was a moderate Unitarian, believ¬ ing in Christ’s supernatural character, and was president of the first Unitarian National Con¬ vention in 1865.

ANDREW, Saint, one of the 12 Apos¬ tles, and the brother of Peter. There are four important references to him in the gospels, John i, 40, the only account of his introduction to Jesus, in which as a disciple of John the Bap¬ tist he follows Jesus on John’s word and brings his brother Peter to him; John vi, 8, where he calls attention to the boy with the barley loaves, when the miracle of the loaves and fishes oc¬

curs; John xii, 22, where Philip, asked by the Greeks if they may see Jesus, consults Andrew before laying the request before Jesus; and Mark xiii, 3, where he is one of the four who privately asked Jesus the meaning of his utter¬ ance about the ruin of the temple. The other two synoptics do not allude to him. John i, 44 says he was from Bethsaida in Galilee. Tra¬ dition early gave him a conspicuous place among the Twelve, and very important "acts of the Apostle Andrew® were in circulation as early as the middle of the 2d century, but have survived only in later recasting. There were also acts of Matthew and Andrew, and of Peter and Andrew, and a "Martyrdom of An¬ drew.® A gospel of Andrew is mentioned later, but not otherwise known. A tradition of un¬ known date and no value accredits him with preaching in north Greece and Epirus and in Scythia, and being martyred on a cross shaped like an X at about 70 a.d.

ANDREW I, a king of Hungary, 1046- 1061 ; compelled his subjects to embrace Chris¬ tianity, exiled his brother Bela and died in bat¬ tle.

ANDREW II, king of Hungary, 1205- 1235, who fought in the crusades, and displayed great valor; granted the Golden Voull, styled the Hungarian Magna Charta.

ANDREW III, king of Hungary, 1290- 1301. He was opposed in his claims to the throne, and involved in a civil war during his reign ; he died in 1301.

ANDREW, Saint, Cross of, is a white saltire on a blue ground, to represent the X- shaped cross on which the patron saint of Scot¬ land suffered martyrdom, from an early date adopted as the national banner of Scotland. It is combined with the crosses of Saint George and Saint Patrick in the Union Jack. The Scot¬ tish Order of the Thistle is sometimes known as the Order of Saint Andrew.

ANDREW, Saint, The Russian Order

of, the most important of Russian orders, founded by Peter the Great in 1698. It has but one class and is confined to members of the imperial family, princes and persons of the rank of general who already hold two other important orders. The badge of the order dis¬ plays on the obverse the double-headed eagle, crowned, on which is a Saint Andrew's cross

enameled in blue, with a figure of the saint and bearing in the four corners the letters S. A. P. R. (Sanctus Andreas Pair onus Hussies).

ANDREW OF CRETE, or JERUSA¬ LEM, was so named because he was bishop of the Island of Crete. He was born at Damascus about 660 and early became a monk at Jerusalem; hence his later name. He was a member of the Sixth General Council of Constantinople, 680, where he was ordained deacon. He was made archbishop of Crete by Philippus Bar- . desanes. He was a member of the Pseudo- Synod of Constantinople in 712, which restored the Monothelite heresy. Before he died he re¬ nounced his error. He was the author of sev¬ eral hymns, a considerable number of which are included in the Greek Service Books. John Mason Neale has translated several. He died aCMitylene about 714.

ANDREWES, Lancelot, English bishop : b. near Barking, Essex, 1555 ; d. London, 25 Sept. 1626. Having taken orders he was ap¬ pointed to the parsonage of Alton, afterward to the vicarage of Saint Giles, Cripplegate, and in 1589 was made a prebend and canon of Saint Paul's, and master of Pembroke Hall. Queen Elizabeth, esteeming him highly, appointed him one of her chaplains in ordinary, besides be¬ stowing other preferment upon him; and he was in no less favor with James I. In 1605 he became bishop of Chichester, in 1609 was trans¬ lated to Ely and appointed one of the King's privy councilors and in 1618 was translated to Winchester. He was one of the greatest preachers of his time, and was one of those en¬ gaged in preparing the authorized version of the Scriptures. He left sermons, lectures and other writings, a manual of private devotions compiled by him in Greek and Latin being well known through several English translations.

ANDREWS, Charles Bartlett, American jurist: b. Sunderland, Mass., 4 Nov. 1834; d. Litchfield, Conn., 12 Sept. 1902. He was grad¬ uated from Amherst College; member Con¬ necticut senate 1868-9; of the house 1878; governor of Connecticut 1879-81 ; judge of the Supreme Court 1882-89, and chief justice 1889- 1901. He presided over the Connecticut Con¬ stitutional Convention of 1902.

ANDREWS, Charles McLean, American historian: b. Wethersfield, Conn., 22 Feb. 1863. Professor of history Bryn Mawr College, 1884 — 1907 ; Johns Hopkins University, 1907-10; Far- nam professor of American history, Yale Uni¬ versity (graduate school), 1910. Author: 'River Towns of Connecticut (1889) ; 'The Old English Manor5 (1892) ; (Historical De¬ velopment of Northern Europe5 (1896) ; Con¬ temporary Europe, Asia and Africa5 (1871— 1901) ; Colonial Self-

Government5 (‘ American Nation5 Series V, 1904) ; two textbooks of English history and a number of papers and monographs on historical subjects. His chief work has been the preparation of a ‘Guide to American History in British Archives5 (2 vols., 1908, with Miss Davenport), and three reports in Reports of the American Historical Associa¬ tion, containing list of documents in the Public Record office. His lectures in colonial history, delivered at the University of Wisconsin and the University of Helsingfors, Finland, in 1911,

were published as the Colonial Period of American History5 (1912); he has prepared a (Bibliography of History5 (with Mr. Gambrill and Miss Tall), and edited a volume of the (Original Narratives of American History5 se¬ ries, entitled (Narratives of the Insurrections,

1676-1691 5 (1915).

ANDREWS, Christopher Columbus,

American diplomat and writer : b. Hillsboro, N. H., 27 Oct. 1829; was brevetted major-gen¬ eral in the Civil War; United States Minister to Sweden from 1869 to 1877, and Consul-Gen¬ eral to Brazil from 1882-85. Among his many works are (Minnesota and Dakota5 (1857) ;

(Practical Treatise on the Revenue Laws of the United States.5 (1858) ; (History of the Campaign of Mobile5 (1867), and (Brazil, Its Condition and Prospects5 (1887, 3d ed., 1895). He served as forestry commissioner of Min¬ nesota (1895-1911) and 16 of his forestry an¬ nual reports have been published.

ANDREWS, Edward Gayer, Amer¬ ican clergyman: b. New Hartford, N. Y., 7 Aug. 1825; d. Brooklyn, N. Y., 31 Dec. 1907. He was graduated from Wesleyan University 1847; entered the Methodist ministry 1848; was principal of Cazenovia Seminary 1854-64; pastor in Stamford, Conn., and Brooklyn, N. Y. 1864-72; elected bishop 24 May 1872. He vis¬ ited missions in Europe and India 1876-77 ; Mexico 1881; Japan and China 1889-90; and was delegate to English and Irish Methodist Churches 1894. He delivered the address at the state funeral of President McKinley in Wash¬ ington, 17 Sept. 1901.

ANDREWS, Elisha Benjamin, American

educator: b. Hinsdale, N. H., 10 Jan. 1844; d. 30 Oct. 1917. He served in Connecticut regiments through the Civil War and rose to the rank of second lieutenant. He was graduated from Brown University in 1870, and Newton Theo¬ logical Institution in 1874. He was prominent both

as teacher and pastor 1874— 82 and as pro¬ fessor of history and political economy at Brown University 1882-88. In the year last named he was elected president of Brown University and under his administration that institution greatly increased its efficiency. In 1898 he resigned the presidency on account of criticism of his views on the silver question, but complied with the request of his trustees to withdraw his resignation. He was elected superintendent of schools in Chicago 1898, and in July 1900, chancellor of the University of Nebraska, and became chancellor emeritus 1 Jan. 1909. During the years 1909-10 he made a tour of the world. Besides many published addresses he has written 'Institutes of Gen¬ eral History5 (1887) ; Unstitutes of Eco¬ nomics5 (1892); 'An Honest Dollar5 (1894); (Wealth and Moral Law5 (1894) ; 'History of the Last Quarter Century in the United States5 (1896); 'Cosmology5 (1900); 'History of the United States in Our Own Times5 (1904) ; 'The Call of the Land5 (1913).

ANDREWS, Ethan Allen, American

biologist: b. New York city, 10 Sept. 1859. He was graduated from Yale, then took a post¬ graduate course in the Johns Hopkins Univer¬ sity. He was appointed assistant professor of biology at the Johns Hopkins University in 1887, became associate professor in 1892 and

professor of zoology in 1908. In 1904 lie was. elected president of the Society of American Zoologists.

ANDREWS, George Pierce, American jurist: b. North Bridgeton, Me., 29 Sept. 1835; d. New York, 24 May 1902. He was educated at Yale, studied law and was admitted to the bar in 1861. He was United States district attorney for six years, assistant and corpora¬ tion counsel, New York, 1872-84, and associate justice of the New York Supreme Court, 1884- 1901. He was esteemed a high authority on municipal and corporation law and his opinions in tax cases were especially valued. A very notable event in his career was his conviction of Capt. Nathaniel Gordon in 1860 for slave trading. Gordon was captured with a crew of nearly 900 negroes, was twice tried for piracy and finally convicted as a result of the con¬ vincing argument of Andrews. It is generally conceded that the conviction and execution of Gordon ended the slave trade in the United States. It had existed for more than 300 years, and for 42 years after Congress had

made it piracy, punishable with death. Thousands of negroes had suffered tortures on the long voy¬ ages between African and American ports, and thousands more had died and been cast over¬ board, but not a person engaged in the ne¬ farious traffic had been punished in this coun¬ try until Mr. Andrews obtained the conviction and execution of Gordon. Prior to that event 130 vessels had been engaged in the slave trade, and New York was their headquarters. See United States — Slavery in the.

ANDREWS, Lorrin, American missionary: b. East Windsor, Conn., 29 April 1795 ; d. Honolulu, 29 Sept. 1868. He was educated at Jefferson College and Princeton Theological Seminary; missionary in the Hawaiian Islands 1827, until in 1840, from anti-slavery scruples, he resigned connection with the American board. He became a judge and secretary of the privy council, 1845-55 ; translated a part of the Bible into Hawaiian and compiled the following works: ˆVocabulary of Words in Hawaiian) (1836) ; (Grammar of the Hawaiian Language* (1854); dictionary of the Hawaiian Lan- guage> (1865) ; all published in the island.

ANDREWS, Saint, University of. See

Saint Andrews.

ANDREWS, Samuel James, American clergyman: b. Danbury, Conn., 31 July 1817 ; d. 11 Oct. 1906. He was graduated at Williams College 1839, he was admitted to the bar in Connecticut and Ohio and practised law in those States 1842-44. He then studied at Lane 'Theological Seminary; ordained in Congrega¬ tional ministry, 1846; pastor, East W indsor, Conn., 1848-55; adopted the Irvingite doctrines and was in charge of a Catholic and Apostolic Church congregation in Hartford, Conn., from 1868. Author of (Life of Our Lord upon Earth *(1862); (God's Revelations of Himself to Men* (1885); Christianity and Anti- Christianity in Their Final Conflict* (1898); (William Watson Andrews: A Religious Biog¬ raphy J (1900) ; (Man and the Incarnation *

(1905).

ANDREWS, Stephen Pearl, American au¬ thor: b. Templeton, Mass., 22 March 1812; d. New York city, 21 May 1886. He was educated at

Amherst; practised law in New Orleans and Texas. His enthusiastic advocacy of the abo¬ lition of slavery took him to England in 1843 to raise money to pay for the slaves and make Texas free. He learned in

England phonog¬ raphy and became the founder in this country of the present system of phonographic report¬ ing, editing journals devoted to it and publish¬ ing numerous instruction books. Early in life he announced the discovery of the unity of law in the universe, and devoted the last half of his life to developing this philosophy, called by him (and to the construction of a universal language which he named ((A1- wato,** as a part of this system of ((1886).

ANDREWS, Thomas, Irish chemist and physicist : b. Belfast, 19 Dec. 1813 ; d. there, 26 Nov. 1885. He studied at Belfast and at Glas¬ gow, and later at Trinity College, Dublin. Finally he was graduated as M.D. at Edin¬ burgh in 1835 and settled down to a successful medical practice in his native place, also giving instruction in chemistry at the Academical In¬ stitution. In 1845 he was appointed vice- president of the newly established Queen's College, Belfast, and professor of chemistry, and these two offices he held till 1879, when failing health compelled his retirement. An¬ drews first became know'n as a scientific in¬ vestigator by his work on the heat developed in chemical actions, for which the Royal So¬ ciety awarded him a medal in 1844. Another important research was devoted to ozone. But the work on which his reputation mainly rests, and which best displayed his skill and resource¬ fulness in experiment, was concerned with the liquefaction of gases. He carried out a very complete inquiry into the laws expressing the relations of pressure, temperature and volume in carbonic dioxide, in particular establishing the conceptions of critical temperature and critical pressure and showing that the gas passes from the gaseous to the liquid state without any breach of continuity.

ANDREWS, William Draper, Amer¬ ican inventor: b. Grafton, Mass., 1818; d. 1896. In 1844 he invented the centrifugal pump which made it possible to save goods riot injured by water from abandoned wrecks; the pump was manufactured in England as the Gwynne pump ; was patented in the United States in 1846. Later he invented and patented the anti¬ friction centrifugal pump ; made various modi¬ fications of centrifugal pumps and patented a widely-used system of gangs of tube-wells.

ANDREYEV, an-dra'yef, Aleksandr Nik¬ olaevich, Russian dramatist : b. Government of Pskovskaya, 18 Feb. 1830. After being grad¬ uated from an engineering school Andreyev served at first in the Ministry of Ways and

Communications and later in the Imperial Pal¬ ace, the Ministry of Finance and the Ministry of the Interior. In 1877 he resigned from the governmental service, being at that time a state councillor. He was elected honorary member of the Academy of Fine Arts and in 1860 Em¬ peror Alexander II presented him with a bril¬ liant ring. His dramas (about 20) were well received in St. Petersburg, though many of them have never been published. Some of his best dramas were published by Wolf in 1875 under the title, (<A. N. Andreyev's Theatre.® He has been even more productive in fiction and his short stories and novels, (Scenes on a Steam¬ boatˆ (Humoristic Scenes,' (The Governess,' (The Patroness,' etc., have gained him great fame. His lyric poetry has been set to music and his important work, (The Painting Art and the Painters of the Principal European Schools,' caused the Academy of Fine Arts to bestow on him the prize.

ANDREYEV, an-dra'yef, Leonid Nikolae¬ vich, Russian writer: b. Orel 1871. After studying law at the universities of Moscow and St. Petersburg he found himself temperament¬ ally unsuited for the task of making a living, which so depressed him that he attempted suicide when only 23 years of age. He finally found a position as police court reporter for a Mos¬ cow paper. This led to his attempting to write short stories, which were published in the daily papers. It was some of these that attracted the attention of Maxim Gorky to him, and this was the beginning of his success. From then until the present time he has been a prolific writer of short stories, essays and dramas. By many he is considered the leading writer of Russia and a brilliant genius. The first collection of his stories was issued in 1901 and a quarter million copies were sold within a short time. His stories have since been published in all European languages. Those that are available in English are (The Red Laugh' (1905) ; (The Seven Who Were Hanged) (1909) ;

(Judas Iscariot and the Others' (1910) ; (A Dilemma' (1910); (Anathema' (1910);

'Silence and other Stories' (1910). Besides these many others have appeared in American and English magazines as follows : 'The Burglar,' in Current Literature (May 1905) ; (His Excellency the Governor,' in Harpers Weekly. (9 Feb. to 2 March 1907) ; (To the Stars' in Poet Lore (Winter 1907) ; 'Lazarus,' in Current Literature (May 1907) ; (The Life of Man,' in Oxford and Cambridge Review (Midsummer 1908) ; 'Life is so Beautiful to the Resurrected,' in Current Literature (Sep¬ tember 1910) ; 'Love of One's Neighbor,' in The Glebe (January 1914). Like most of the Russian short story writers there is an abnor¬ mal, morbid taint in Andreyev's stories that

does not appeal to the American mind. The critics have experienced difficulty in classify¬ ing him. He has abandoned the traditional methods so apparent in his earlier work and his eccentricities have increased with the years. His philosophy is that of fatalism ; most of his heroes landing in the grave or the madhouse. Andreyev is not a realist, however, but rather a mystic with keen analytic power who writes with great originality and brilliancy, yet creates no new types nor delineated real characters. See Anathema. (Andreyev's).

ANDRIA, an'dre'a, Italy, a town and epis¬ copal see in the province of Bari, 35 miles west of the town of Bari. It was founded about 1046 by Peter, the first Norman Count of An- dria. There are several fine churches of the 13th century. It is connected with Bari by steam tramway. Pop. about 49,000.

ANDRIEUX, an'dri-e', Frangois Guil¬ laume Jean Stanislas, French man of letters: b. Strassburg, 6 May 1759; d. Paris, 9 May 1833. He was educated at Strassburg and studied law in Paris. He pra tised at the bar, but his attention was divided between his pro¬ fession and literature. His plays are of the 18th century style, comedies of intrigue, but they rank among the best of the period next to those of Beaumarchais. 'Les Etourdis,' his best comedy, was presented in 1788 and won for the author the praise of La Harpe. He hailed the beginning of the Revolution with de¬ light and received a place under the new gov¬ ernment. He was later expelled and on his retirement he again turned to write for the stage, producing 'Le Tresor' and 'Moliere avec ses amis' in 1804. He became professor of grammar and literature at the Rcole Poly¬ technique and eventually at the College de France. As a professor he was extraordinarily successful. He was rigidly classical in his tastes, and an ardent opponent of romanticism. Among his other plays are (La Comedienne' (1816) one of his best comedies, and a tragedy, (Lucius Junius Brutus' (1830). Andrieux was the author of some excellent stories and fables, (La Promenade de Fenelon' ; (La Bulle d' Al¬ exandre VI' and the (Meunier de Saint-Souci.' In 1829 he became perpetual secretary to the Academy.

ANDROCONIA, an'dro-co'm-a, certain highly modified scent-scales shaped like battle¬ dores, on the wings of certain butterflies and caddis flies (Trichoptera). In certain butter¬ flies {Thecla, Danais, etc.) they occur on the upper side of the fore wings in limited areas, such as in the discal spots, or they may be scattered in rows or irregularly over the upper surface, or in the folds of the wings. Fritz Muller has shown that these minutes scales function as scent-scales, and are confined to the males. Thomas has proved by sections of the wings of Danais, etc., that thg androconia arise from glands situated in

a fold of the wing, and that the material elaborated by the local glands, and distributed upon the surface of the wing by the androconia is that which gives to many of the Lepidoptera their charac¬ teristic odor. Scudder, who named them, says that they are very capricious in their occur¬ rence. A number of allied genera may possess' them, while a single genus, as closely allied, may be quite destitute. They occur in the Nymfhalidce, Pieridce, Lyccemidce, Papilionidce and Hesperidce.

ANDROMACHE, an-drom'a-ke, in Greek legend, the daughter of Eetion, Prince of Thebes in Mysia, and wife of Hector. She is one of the finest characters in Homer, distinguished by her affection for her husband and child, her misfortunes and the resignation with which she endures them. The death of her son Astyanax and the farewell scene between Andromache and Hector (Iliad, VI 323), were represented in ancient works of art, while Andromache her-

self is the subject of tragedies by Euripides and Racine.

ANDROMACHUS, an-drom'ak-us, a phy¬ sician to the Emperor Nero and the inventor of a celebrated compound medicine called theriake, described in Galen's works.

ANDRONICUS I, an'dro-m-cus (Com- nenus), ˆByzantine emperor: b. 1110; d. 12 Sept. 1185. In his youth he served against the Turks, in 1141 was for some time a prisoner and was afterward appointed to a military com¬ mand in Cilicia, but was unsuccessful. Engag¬ ing in a treasonable correspondence with the King of Hungary, he was thrown into prison by his cousin, the Emperor Manuel ; but after 12 years he succeeded in making his escape and reached Kiev, the residence of Prince Jaroslav. He regained the favor of his cousin by per¬ suading Jaroslav to join him in the invasion of Hungary, and by his gallantry in that war; but again incurred his displeasure and was sent in honorable banishment to Cilicia. After a pil¬ grimage to Jerusalem and his scandalous seduc¬ tion of Theodora, the widow of Baldwin, King of Jerusalem, he settled among the Turks in Asia Minor with a band of outlaws, making frequent inroads into the province of Trebi-zond ; but at length made his peace with the Emperor and was sent to CEnoe in Pontus. Upon the death of Manuel in 1182 he was re¬ called to become, first, guardian, then colleague, of the young Emperor Alexius II. Soon after he caused the Empress-mother to be strangled,

and afterward Alexius himself, whose youthful widow he married. His reign, though short, wras vigorous, and restored prosperity to the provinces ; but tyranny and murder were its characteristics in the capital. At last a destined victim, Isaac Angelus, one of his relatives, hav¬ ing fled to the church of Saint Sophia for sanc¬ tuary, a crowd gathered, and a sudden insur¬ rection placed Isaac on the throne, while An- dronicus, now 75 years of age, was put to death by the infuriated populace after horrible muti¬ lations and tortures.

ANDRONICUS OF CYRRHUS, Greek astronomer : flourished about 100 b.c. He built a (<horologium® at Athens, the so-called (<tower of the winds,® a considerable portion of which still exists. It is octagonal, with figures carved on each side, representing the eight principal winds. A brazen Triton on the summit, with a rod in his hand turned round by the wind, pointed to the quarter from which it blew. From this model is derived the custom of plac¬ ing weathercocks on steeples.

ANDRONICUS OF RHODES, a Roman philosopher who interpreted the works of Aris¬ totle (q.v.). He lived in Cicero's time. None of his known works are extant.

ANDROPOGON, an'dro-pogon, a genus of about 200 species of grasses of very diverse utility, distributed wddely, especially over dry plains throughout the temperate and tropical zones. The species are usually characterized by long, narrow leaves ; terminal and axillary spikes; sessile perfect spikelets paired with ped- icelled staminate, empty ones or scales ; and straight or twisted awns. A. halepensis, or Sorghum halepensc of some authors, Johnson grass, attains a height of from three to six feet from stout, perennial creeping rootstocks, which being difficult to eradicate make the plant a

.troublesome weed where not needed for pas¬ ture or hay, for which it is largely grown in South America, Australia and the southern United States, where it was introduced about 1830. It makes quick growth, yields abundantly and may be cut several times in a season. It is not fully, hardy in the North, where, as in Europe, it is often grown for ornament. A. schoenanthus, lemon grass, and A. nardus, cit- ronella grass, are handsome tropical species cul¬ tivated in India and Ceylon for the fragrant oils they contain, and which are used in per¬ fumery, soap-making and in the former case for the adulteration of certain perfumes, not¬ ably attar of roses. A. sorghum, or Sorghum yulgare of some authors, is of wide economic importance, its numerous varieties or sub-spe¬ cies being cultivated for fodder, sugar, alcohol, brushes, brooms and its seeds, which last are used for poultry,

stock, and human food (see Sorghum). A. provincialis, A. scoparius and various other species known as blue-stem grass, are valued as fodder grasses in arid regions where they are native.

ANDROS, Sir Edmund, an American colonial governor; b. in London, England, 6 Dec. 1637; d. there, 27 Feb. 1714. His father was master of ceremonies to Charles I. His son earned the favor of the Stuarts by steady and laborious service, unwavering loyalty and military and executive ability. In 1666 he was made major of an infantry regiment and sent to America, where he won laurels against the Dutch. In 1672, after his return to England, he became titular commander of the British forces in Barbados, and in the same year was made major in a regiment of dragoons raised for Prince Rupert; also a ((landgrave® in Caro¬ lina, two years later succeeding his father as bailiff of Guernsey.

In 1674 Andros was made <(lieutenant and governor® of ((all the Duke of York's territo¬ ries in America,® including New York (just re¬ stored by the Dutch, who had retaken it the year before), New Jersey and Delaware, Mar¬ tha's Vineyard and parts of Maine, and a claim to all Connecticut west of that river. He ar¬ rived in November, and the next year began to push the Connecticut claim ; but the Duke did not desire an appeal to force, and after making formal declarations at Saybrook, Andros re¬ tired. During the next two years the Indian troubles were acute ; and in settling these he proved himself one of the ablest and most use¬ ful of Indian managers, winning the good will of the Iroquois at a critical time, and not only keeping his own colony protected, but sending help to the outlying points in Rhode Island, Massachusetts and Maine. He spent a few months in England in 1677-78, and was knighted. In 1678-80 there was increasing friction, reli¬ gious and otherwise. He was an Episcopalian, and one of his appointees to a coadjutorship in an Albany church was tried for heresy but acquitted; Andros, however, tactfully quieted the disturbance and contributed to build a Re¬ formed church in New York. Then the mer¬ chants charged him with unfairness in trade matters, and with suppressing part of his re¬ ceipts in his public accounts, with the object of inducing the Duke to sell to some of them the right to farm the New York revenues. At this period Philip Carteret was acting as gov-

ernor of East Jersey under the Duke of York's grant to his brother and Berkeley; there were complications inherited from previous changes

which forced Andros to keep interfering, under his superior commission, and at last he sent a body of soldiers to seize Carteret and bring him to New York to be tried for exercising illegal jurisdiction. Andros acted as judge, but the jury acquitted Carteret, who was trium¬ phantly reinstated. Lady Carteret complained to the Duke of York, who recalled Andros, and sent out a commissioner to investigate this and the other charges : he reported that Andros was not in fault, but the latter was retained at home, made gentleman of the privy chamber to Charles II, and received a 99-years' grant of the island of Alderney and other favors.

The accession of the Duke of York as James II (February 1685) was followed by the return of Andros to New England, as the agent in an unpopular scheme of consolidation, and in con¬ sequence his memory has been loaded with un¬ justifiable abuse. The Massachusetts charter had been revoked in October 1684, and Charles II had appointed the notorious Col. Piercy Kirke governor; but as he never entered on his duties, Andros was commissioned governor of all New England as one centralized colony on 3 June 1686. Dislike to James has done in¬ justice to this statesmanlike scheme, distasteful though it was to the New Englanders. The in¬ tention was to create, out of the several weak and mutually contending colonies, one strong confederated colony with a militia powerful enough to resist French and Indian aggression, and under one command. Andros can only be blamed for needless harshness or blundering or corruption in obeying his instructions ; and de¬ spite the current opinion there was none of this, but rather the reverse. On arriving at Boston, 19 Dec. 1686, he organized his new government, which, as the people had no longer the right to tax themselves, levied a new tax, the exact counterpart of the old. Ipswich re¬ fused to pay, and the ringleaders were fined and imprisoned, as must happen under any law. Andros was ordered to proclaim all land titles invalid unless confirmed by the Crown for a quitrent. Outrageous as this may seem, it was held to be sound law, and he enforced it in the most humane way by bringing test suits against a few of the wealthiest citizens before proceed¬ ing further. As a fact, only a part had yielded when the Revolution interrupted it. He granted waste common-lands to individuals who would improve them ; a venial crime. Heavy fees were charged by the public officials ; but he neither fixed the rates, received the proceeds nor appointed the officers who did. He had Episcopal services held in the Old South Church, but only when its regular congregation was not using it ; this sacrilege, however, has blackened his memory worse than anything else. He was sometimes sharp in speech ; but when some wickedly foolish people charged him with secretly fomenting . an Indian war, he only laughed at them and left the courts to at¬ tend to the matter. In a word, there was neither a political nor a religious reign of terror set up; no one was persecuted for non-con¬ formity or executed or whipped for political offenses. Andros behaved like a statesman, an honest man and a humane one. He early ex¬ tended his authority over Plymouth, New

Hampshire and Rhode Island, as well as Maine and Massachusetts. In October 1687 he visited Hartford, to take up the Connecticut charter: the story of its being hidden in the Charter Oak is classic, and it is certain enough that one copy was hidden and was efficient in

restoring the charter rights of the colony later; but there was another copy, and the event was regarded as of no significance at the time. Andros, on returning to Boston in 1688, received the news that he was made governor also of all the Brit¬ ish provinces in America except Pennsylvania, Delaware, Maryland and Virginia. While mak¬ ing a tour of his northern provinces he was checked by the information that the Penobscot Indians, stirred up by Castine (q.v.), whose property had been taken, were about to go on the war-path. He collected 700 troops, and in November proceeded to Maine and garrisoned several posts. On 4 April 1689 news was re¬ ceived of the deposition of James II; on the 18th the citizens of Boston rose and captured Andros, and kept him prisoner till 2 August, when he escaped to New York, but was recap¬ tured and brought back, and not released till February 1690. He returned to England to face a trial, with a committee of his accusers, but the charges fell through. William III needed officials as able and upright as he, and in 1692 made him governor of Virginia. He carried with him the charter of William and Mary College, and till 1698 remained in Vir¬ ginia, a most public-spirited, hard-working, ex¬ cellent ruler, doing much for the progress of the colony and esteemed by its people. His removal was caused by a quarrel with the commissary of the bishop of London and presi¬ dent of the college, who quarreled with all the governor. He was governor of Jersey 1704-06. He had been governor of every mainland Eng¬ lish province in North America, and won the confidence of four successive monarchs of hos¬ tile lines. Even for New England, his departure was not an unmixed good, for it was followed by one of her bloodiest and most disastrous In¬ dian wars, which his presence might have averted. See Brodhead, Governorship of Sir Edmund Andros^ (1867) ; (Andros in New England) (1691); Andros Tracts, with Notes and a Memoir } (Prince Society, Boston 1868-

74).

ANEMOMETER, an-e-morn'e-ter, an in¬ strument for measuring the velocity of moving air or other gaseous substance. It is almost always combined with a recording device and thus becomes strictly speaking an anemograph, though it is popularly known by the former name. The instruments in use as anemometers are of five distinct types: (1) The pendulum or Brooke anemometer; (2) the cup or Robinson anemometer; (3) the ^windmill® anemometer;

(4) the U-tube or Dines anemometer; and

(5) the electrical anemometer.

The first consists essentially of a flat plate of definite area, usually one square foot, ar¬ ranged so as to swing after the manner of a pendulum, by the pressure of the wind upon it. It is used chiefly in the determination of wind pressure upon buildings, bridges and other structures, although this pressure is translated into velocity by a suitable scale. The Robinson anemometer is described at length below. The SvindmilP type is simply a minia-

ture windmill very lightly built, with small sailsˆ at the end of comparatively long arms, and held in a position to face the wind by a vane. T his instrument is much more accurate in registering sudden gusts and lulls than the cup anemometer, but has the disadvantage of having to shift its position with a change of

Robinson Anemometer

direction in the wind, and this occupies an ap¬ preciable length of time in which the record is incorrect. The U-tube anemometer is regarded as the most accurate one in common use. Its basic feature is a U-shaped tube containing a mobile liquid in the bend of the U. One of the top ends of the tube is bent so that the opening faces the draught whose velocity is to be 1 easured ; the other end is turned so that at the same time the passing draught exerts a sucking effect upon it. Under the in¬ fluence of these two forces the liquid moves in the tube on which a scale is fastened. In a modification of this instrument called the Seger anemometer, two non-miscible liquids are used, generally paraffin oil and tinted alcohol. The Fletcher anemometer is also of this type, for use under trying conditions, like measuring the velocity of draughts in industrial chimneys. The liquid used in the Fletcher anemometer is ether. The instrument is at some distance from the chimney, and the arms of the U-tube are greatly extended. The electrical anemome¬ ter, also known as the Linear Hot-Wire ane¬ mometer, depends for its action upon the cool¬ ing by the passing draught of a hot platinum ware. The w7ire is heated to a dull red phase by its resistance to an electric current passing through it. As the draught cools the wire its resistance is increased, thus disturbing the elec¬ trical balance in a Wheatstone bridge. The additional current necessary to restore this balance measures the velocity of the current blowing upon the platinum wire. This instru¬ ment is extremely sensitive to low velocities, and may be used for velocities between two feet per second and 35' feet per second.

In commercial use anemometers are em¬ ployed in measuring the velocities of gas or steam flowing through pipes; the delivery of

hot air in heating schoolrooms and other pub¬ lic apartments, and also of cool air in ventilat¬ ing them ; the regulation of the flow of gases in some industries — as in the manufacture of sulphuric acid from pyrites; and in by far the larger numbers in determining and recording the velocity and direction of winds in meteoro¬ logical and climatological observations.

The Robinson cup anemometer is used by the United States Weather Bureau. In this apparatus the hollow cups are made of thin aluminum or copper and are as nearly hemi¬ spherical as possible. These are securely fastened to small square steel arms set with their diagonals horizontal and vertical, respec¬ tively, so as to offer the greatest resistance to the bending action of the wind pressure upon the cups and as little resistance as possible to the wind itself. Copper cups should always be used for exposures where the aluminum does not well withstand the corrosive action of salt air or the acid fumes from smokestacks, etc. In the American standard instrument the cups are four inches in diameter and the arms 6.72 inches long from the axis to the centre of the cups.

The most prejudicial resistance in any part of the anemometer, when in good condition, is that occurring in the top bearing of the spindle. This bearing should first be made very smooth and polished and afterward kept clean and freely lubricated, if good results are to be expected. When well made and properly cared for the anemometer will show only a very little wear after years of exposure, even

Anemometer Dial

with comparatively high winds. The small bright spot upon the lower end of the steel spindle, where it wears against the steel plate, should never be larger than a pin head. If this portion becomes dry of oil by neglect, as some¬ times happens, it will quickly wear flat and in¬ troduce a very great amount of friction. The

instrument can then be restored to good con¬ dition only by recutting and polishing the pivot end, also the small plate, so as to conform to

the above specifications.

Certain advantages result from the use of ball-bearings in anemometers, chiefly in in¬ creasing the service to be obtained and in re¬ ducing the attention necessary to maintain the bearings in proper lubrication. The reduction in friction is not such an important gain as might be supposed, unless the instrument is used in very slight wind. The slight friction in any good anemometer is quite inconsequential in light and fresh winds, such as usually pre¬ vail at practically every station.

The ideal anemometer exposure is secured when the instrument is placed where the move¬ ment of the wind is unobstructed from any di¬ rection, suJi for example, as would be ob¬ tained in the centre of a large open expanse or plain. Only an approximation to the ideal ex¬ posure is possible in most places, but every effort should be made to better anemometer ex¬ posures in order that the records from the several stations may be comparable. Usually, with an anemometer exposed in a city or town, the great interference offered by buildings and other natural obstructions to the free move¬ ment of the wind causes the velocity to be much less in the vicinity of these obstructions than beyond such influence ; therefore, in se¬ lecting the location for an anemometer prefer¬ ence should be given to the more elevated points in the vicinity of the station, and some rigid support should be used to raise the in¬ strument as far as practicable above the im¬ mediate influence of the office building itself.

The Robinson anemometer has the fault of <(slurring® its records of gusts and lulls of the wind, due to a certain amount of inertia which cannot be overcome. Moreover, in very light winds it is not dependable, and it is customary to check its record with that of a U-tube in¬ strument placed beside it. The anemometer must be regarded as an instrument of con¬ venience rather than of precision, the difficulty lying in the fact that there is no fixed constant for moving gases, except within narrow limits. Elaborate scales have been devised for ease and rapidity of calculation, but the results, from a scientific standpoint, are at best ap¬ proximate. Consult report of the director of the meteorological office of Great Britain (London 1906). See Wind Vane.

Richard Ferris.

ANEMONE, a-nem'o-ne, wind-flower, a genus of plants belonging to the Buttercup family (Ranunculacece) containing many species found in temperate regions. Many of them occur in the United States. Several

Old World species are common in cultivation. See Sea- Anemone.

ANEMOSCOPE. An instrument for showing the course or direction of the wind. It may be combined with the anemometer, thus indicating both the direction and the force of the wind. Latterly the anemoscope has been made self-recording, and now in most observatories needs no watching, every movement of the wind being written down, the force or pres¬ sure and the velocity in miles per hour being also recorded. This is done by pencils which press lightly upon a cylinder covered with a

sheet of paper divided into horizontal hour- lines, the lines moving at the rate of half an inch an hour, a complete revolution of the cyl¬ inder occupying 24 hours. Lines marked by the pencils show by their relation to the grad¬ uated lines the direction of the wind at any moment of the day.

ANERIO, Felice, Italian composer: b. Rome 1560 ; d. Rome, 28 Sept. 1614. At the age of 15 he entered the choir at Saint Peter's as a soprano and became a pupil of G. M. Nanini. On the death of Palestrina (q.v.) in 1594, Anerio was appointed his successor as com¬ poser to the Papal Chapel, whilst Ruggiero Giovanelli was made conductor. Together with Fr. Suriano, Anerio edited the so-called Editio Medicaea of the Graduale of 1614. For many years several compositions of Anerio have been attributed to the great Palestrina himself, e.g., ((Adoramus te 'Christe® and a (<Stabat Mater.® A great number of his hymns, masses and madrigals are still preserved in his own handwriting.

ANERIO, Giovanni Francesco, Italian

composer, probably a brother of the preceding: b. and d. Rome about 1567-1620, respectively. He was a choir boy under Palestrina, and in 1609 received an appointment at the court of King Sigismund III of .Poland. In the fol¬ lowing year he became conductor in the cathe¬ dral of Verona; in 1611, prefect of the Jesuit College in Rome, and was ordained priest in 1616. He composed a great number of church pieces.

ANEROID BAROMETER, a species of barometer in which no fluid is employed, an ingenious and delicate instrument invented by M. Vidi of France in 1844. Its mechanism con¬ sists of a hollow metal cylinder, with thin and corrugated ends, which contract or expand ac¬ cording to the pressure of the atmosphere, the air within having been previously exhausted by the air-pump. The motion of the ends of the

cylinder acts upon a principal lever attached to it, and connected with two smaller levers, to one of which a chain is attached, working upon a roller, and to the axis of the roller a hand is fixed, exhibiting the variations of the atmos¬ phere by means of an index on the face of the barometer. A pocket aneroid is very useful for measuring small heights. See Barometer.

ANEURISM, a circumscribed tumor of an artery composed of a sac, the cavity of which communicates with the artery and contains liquid or coagulated blood. So-called «true® aneurisms are everywhere composed of all of the coats of the artery, and are rare and always small. Aneurisms are usually of the class an¬ atomically designated as <(false,® in which only one of the coats of the artery takes part in the formation of the walls of the sac. Con¬ densed adjoining tissues may also enter into the formation of the wall. A more common classi¬ fication divides aneurisms into (1) common or encysted aneurisms, (2) arteriovenous' aneu¬ risms, (3) circoid aneurisms and (4) dissecting aneurisms. The first division includes aneu- rismal dilatation or fusiform dilatation which extends for some distance, with the three arte¬ rial coats preserved; true aneurism, mentioned above, limited to one point ; false aneurism in which one coat has disappeared ; and consecutive or diffused aneurism in which the condensed

adjoining tissues take part. Arteriovenous an¬ eurism denotes an abnormal communication be¬ tween artery and vein with or without an inter¬ mediate sac. Circoid aneurism means the gen¬ eral dilatation of an artery and its branches and dissecting aneurism is formed by the effusion of blood between the coats of an artery. In¬ ternal aneurisms are those situated within the thoracic or abdominal cavities, external aneu¬ risms those in other parts of the body.

Aneurisms are also known as spontaneous or traumatic according to their origin. The latter occurs in consequence of sudden division or injury of the walls of an artery through some external agent or a splinter from a fractured bone. A spontaneous aneurism is due to a de¬ generative change in the wall of the artery by which its elasticity and resistance to strain are diminished. The degenerative change may be due to a lodgment of an embolus, over¬ stretching, pressure of a ligature or some other mechanical cause. Anatomical factors in the

production of an aneurism are those changes in the artery, change of direction, enlargement, bifurcation, attendant upon its course through the body. Occupations of exertion, alcoholic excess, the gouty or rheumatic diathesis, syphi¬ lis, are also causative factors. An aneurism may terminate spontaneously by coagulation of the blood within it. Absolute rest and low diet are the most essential medical means of treat¬ ment, but the treatment is largely surgical, its details depending upon the variety and situa¬ tion of the aneurismal swelling.

ANGEL-FISH. See Monk-fish.

ANGEL OF THE BATTLEFIELD. See

Anthony, Sister.

ANGELICA, a genus of herbs of the fam¬ ily Apiacece, consisting of 60 species, occurring in north temperate regions and in New Zealand, several species being natives of North America. The name angelica, however, is popularly ap¬ plied to various other members of the same family. Archangelica officinalis, to which the name is most often given, is a tall herb with much divided leaves and small white flowers in umbels, native of Europe. The leaf-stalks were formerly blanched and eaten like celery. Candied in sugar they are much used in Europe as a sweetmeat.

ANGELICO, Fra, on-ja' le-co, Florentine painter : b. Vicchio, in the province of Mugello., 1387; d. Rome 1455. II Beato Fra Giovanni Angelico da Fiesole is the name given to this celebrated painter-friar. In English it runs — the Beatified Friar John the Angelic of Fiesole. His real name was Guido, but on becoming a brother in the Dominican Order at Fiesole he took the name of Giovanni, the name of An¬ gelico by which he is always called in art circles being a surname that came to him later because of the quality of his work. We find him re¬ ferred to as Angelico already in 1 5th century. The history of his early years is extremely ob¬ scure. We know that he became a Dominican in 1407 and that he shared the vicissitudes of his brethren of the convent, wandering to vari¬ ous cities, notably Cortona, where there are a number of his works. His training as an artist was probably before 1407 and it seems likely to have been in the school of Masolino, and that he began as a miniaturist. Another artist,

of the previous generation, who influenced him is Orcagna. It is probable that Fra Angelico returned with the Dominicans to Fiesole in 1418 when they resumed their former residence. He remained there

for 18 years. Under the protection of Cosimo de Medici, the brother¬ hood was installed in the monastery of San Marco in Florence in 1436. The decoration of this edifice, including several large frescoes and a large number of small ones in the individual cells, is one of the principal monuments of the Beato Angelico's long and unusually prolific career. We find here the great (Crucifixion, } possibly unfinished, and certainly restored, which is one of the friar's most impressive works. Here also is the (Annunciation' which is generally regarded as his most beautiful ver¬ sion of a subject to which he loved to return. No single institution more fully embodies the spirit of mediaeval piety at the dawn of the Renaissance. Pope Eugenius IV, who had pre¬ sided at the installation of the convent, was so impressed with Fra Angelico's achievement that he first offered him the archbishopric of Flor¬ ence, and on his declining it, invited him to Rome to execute frescoes in the Vatican. Vasari is authority for the story, but his statement lacks authentication though credible enough in view of the humility of Fra Angelico. Fra Angelico was in Rome most of the time from 1445 until his death. In 1447 he worked for some time in the Duomo of Orvieto. He was moreover busy on easel pictures for numerous cities, now scattered to Florence (the very im¬ portant (Descent from the Cross,' the 'Last Judgment and the (Coronation of the Virgin'), Paris, London, Munich, New York, etc., but the great work of his old age was the decoration of the chapel of Nicholas V, that pontiff having succeeded Eugenius while the work was in progress. The frescoes portray eight scenes from the lives of Saint Stephen and Saint Lawrence. While we may note certain changes as we take Fra Angelico's works in chrono¬ logical order, a remarkable uniformity of ideal pervades them throughout. The. almost un¬ earthly purity of the artist's spirit, its sweetness — which never falls into weakness — and the ecstatic faith in the divinity of his guidance, combine to sweep away all obstacles of a ma¬ terial nature and produce in us the conviction that his art is sublime. Its modest exterior conceals immense gifts and inexhaustible re¬ sources which renew themselves afresh through¬ out his life. Attempting neither the emotional nor the technical scope of Giotto, Masaccio or Michelangelo, he so concentrates his spirit on his own problems that his work attains a Christian perfection even as a Greek master reaches a perfection in his sphere. In some respects he was even an innovator, being one of the first to paint the Christ Child as a real infant, and the very first to paint a landscape that can be identified. According to all accounts which have reached us, few men have deserved more nobly the distinction of beatification than Fra Giovanni Angelico. He led a holy and self- denying life, shunning all advancement, and was a brother to the poor. He painted with un¬ ceasing diligence, and

treated none but sacred subjects. Consult Langton Douglas, (Fra Angelico,) (London 1900) ; other treatises are by Supino (Florence 1898; Eng. trans. 1902); Sortais (Lille 1905) ; Newnes (London 1906).

ANGELL, an'gel, George Thorndike,

American reformer: b. Southbridge, Mass., 1823; d. 16 March 1909. He was graduated at Dartmouth College in 1846, and admitted to the bar in 1851. He was active in promoting measures for the prevention of crime, cruelties and the adulteration of food. He founded the American Humane Educational Society.

ANGELL, James Burrill, American edu¬ cator: b. Scituate, R. I., 7 Jan. 1829; d. Ann Arbor, Mich., 1 April 1916. He was graduated from Brown University in 1849; and was pro¬ fessor of modern languages and literature there, 1853-60; editor Providence Journal , 1860-66; first president of the University of Vermont, 1 866—7 1 ; became president of the University of Michigan in 1871 and held that position until 1909 when he became president emeritus, after conferring degrees on 2,500 graduates. He served as United States Minister to China (1880-81) ; and as Minister to Turkey (1897— 98). He was also one of three commissioners appointed to negotiate a new treaty with China, and was subsequently chairman of the Canadian Commission for Deep Waterways (1896). In November 1900 the Emperor of Japan con¬ ferred on him the first decoration of the Im¬ perial Order of the Sacred Treasure in token of his regard for the eminent American diplomat. Beside numerous addresses and articles in periodicals he was the author of (Manual of French Literature- *(1857) ; (Prog- ress in International Law-* (1875) ; (Reminis- cences) (1912); (Selected Addresses* (1912).

ANGELL, James Rowland, American university president : b. Burlington, Vt., 8 May 1869. He was graduated A.B., University of Michigan, 1890, A.M., 1891 ; A.M., Harvard, 1892. He also studied at Berlin and Halle in 1893 and later at .Vienna, Paris and Leipzig. He was instructor in philosophy at the Uni¬ versity of Minnesota in 1893. From 1894 to 1921 he was successively assistant professor of psychology and director of the psychological laboratory, 1894—1901 ; associate professor, 1901-05 ; professor and head of department, 1905-21 ; acting president, 1918-19, University of Chicago. On 18 Feb. 1921 he was elected president of Yale University. He served as

president of the University of Chicago Settle¬ ment. In 1914 he was Exchange professor at the Sorbonne, Paris. His publications include Psychology* (1908) ; (Chapters from Modern Psychology) (1911).

ANGELO, an'jeld, Michael. See Michel¬ angelo.

ANGELS. A creation of higher order than man mentioned in the Bible. They are often represented as the messengers of God and are frequently pictured as ministering to man. There are degrees among the angels for there are seven archangels, four of w'hom are mentioned in Scripture. All are mentioned in the book of Enoch. The idea of guardian angels was early adopted in the church. It was thought that each individual is under the care of his own particular angel. The 'Jews and Mohammedans hold the same belief.

ANGELUS, the Catholic prayer and prac¬ tice by which the mystery of the Incarnation is recalled to mind and is honored, morning, noon and evening. It forms the subject of a famous painting by Millet (q.v.).

ANGERS, an'zha', Sir Auguste Real,

Canadian statesman : b. 4 Oct. 1838. He was called to the bar, and became a Q.C. in 1880, in which year he was elected to the Dominion House of Commons. He was a puisne judge of the Superior Court of Quebec, 1880, and lieu¬ tenant-governor of the province, 1887-92, in which position he dismissed the Mercier ministry on account of the Baie des Chaleurs Railway scandal. From 1892-95 he was Dominion Minister of Agriculture, and presi¬ dent of the council, 1896. He was knighted in

1.

ANGERS, Felicite («Laure Conan*), French-Canadian novelist: b. Malbaie, Que. She is the author of a number of works which have had a wide circulation, among them (Angeline de Montbrun (1884) ; (Si les Canadiens le voulaient* ; (Elisabeth Seton*

(1903).

ANGERS, France, city, capital of the de¬ partment of Maine-et-Loire, 191 miles south¬ west of Paris. It occupies a rising ground on both banks of the Maine, which is here crossed by three bridges. Of its numerous mediaeval buildings the most important is the Cathedral of Saint Maurice, dating from the 12th century. The palais de justice, the institute, a fine theatre and a hospital are the more remarkable of the modern buildings of the town. Its edu¬ cational institutions include

ecclesiastical semi¬ naries, a lycee, a preparatory school of medi¬ cine and surgery, a university with free facul¬ ties of theology, law, letters and science, a higher school of agriculture, training colleges and a school of fine art. The prosperity of the city is largely due to the great slate quar¬ ries of the vicinity, but the distillation of liqueurs, cable, rope and thread-making, and the manufacture of boots and shoes, umbrellas and parasols are leading industries. Machine con¬ struction, wire-drawing and the manufacture of sparkling wines and preserved fruits are also carried on. The chief articles of com¬ merce, besides slate and manufactured goods, are hemp, early vegetables, fruit, flowers and live-stock. In Roman times Angers was called Juliomagus. It suffered severely from the in¬ vasions of the Northmen in the 9th century; the Huguenots took it in 1585 and the Vendean royalists were repulsed near here in 1793. Till the Revolution, Angers was the seat of a cele¬ brated university founded in the 14th century. Pop. 84,000.

ANGINA PECTORIS is a name given to a symptomatic condition characterized by at¬ tacks of pain often very severe associated with an oppressive, tightening sensation and sense of impending death. The pain may begin in re¬ mote organs or in the precordial region and from this point radiate usually to the left shoulder and arm even to the extremities of the fingers. Sometimes it attacks the right arm or both arms simultaneously.

There are two main varieties of angina pectoris, the so-called true and the false. True angina pectoris is rare, at least in this country. For this form there is an anatomical basis in the heart itself. It may be explained as a vascular cramp, the pains occurring in the vessels themselves and extending to the aorta. The condition is associated with sclerosis of the coronary arteries. The attacks may last

from fifteen minutes to an hour or two.- Some¬ times they prove directly fatal. Precipitating causes of attack are bodily exertion, marked mental excitement and errors in diet. The condition is probably due to coronary disease combined with disease of the heart muscle so that death is actually caused by failure of the latter to perform its function.

False angina pectoris is comparatively fre¬ quent and must be classed as a neuralgia of the heart. The pain simulates that of true angina

pectoris but is less severe and never fatal. The two forms, however, may be com¬ bined and are at all times difficult to differen¬ tiate. The latter belongs probably to the class of. cardiac neuroses largely of psychogenic origin.

ANGLE, strictly, the degree of inclination to one another of two lines which meet, or of two or more surfaces which meet. The same term is incorrectly used for the point in which lines meet, and for the line in which two sur¬ faces meet, but such point or such line is the vertex of the angle. The lines in the first caˆe and the surfaces in the second case are known as the sides of the angle.

An angle made by two lines is called a plane angle; that made by two planes, a dihedral angle ; that made by three or more planes, a solid angle, or a polyhedral angle. Angles may again be subdivided into rectilinear, curvilinear and mixed angles. A plane rectilinear angle is the inclination to each other of two straight lines which meet but are not in the same straight line. A curvilinear angle is the in¬ clination to each other of two curved lines which meet in a point, and is equal to the in¬ clination of the tangents to the curves at their intersection. A mixed angle is one formed by the meeting of a curve and a straight line, and is measured as the angle between the straight line and the tangent to the curve at the point of intersection.

Plane rectilinear angles are generally divided into right and oblique, or into right, obtuse and acute. When a straight line standing upon another straight line makes the two adjacent angles (those on the right and left of it) equal to one another, each of them is called a right angle. An oblique angle is one which is not a right angle. An obtuse angle is that which is greater than one right angle, but less than two. An acute angle is that which is less than a right angle ; both are oblique. A spherical angle is one formed by the intersection or the meeting of two great circles of a sphere.

The inclination of any two lines which form the sides of an angle is measured by the length of the arc they cut out on the circumference of a circle struck from the vertex of the angle as a centre. The radius of this circle is ob¬ viously a matter of convenience, as the arcs will be the same for any radius. Angles are expressed, therefore, in degrees, minutes and seconds and decimals of a second: as, for ex¬ ample, an angle of 90°, or an angle of 3° 14' 17.298". In mathematical nomenclature an angle upon a diagram is usually designated by three letters, one on each side and one at the vertex, the vertex letter being the middle one of the triad, as, the angle BCD, in which C is the letter at the vertex. In some cases where no ambiguity could arise, the same

angle might be named by its vertex letter: as, the angle C.

I he complement of an angle is that length of arc by which it falls short of 90° : that is, the complement of an angle of 32° is 58°. The supplement of an angle is that length of arc by which it falls short of 180°: that is, the supplement of 75° is 105°.

In astronomy angles are considered between lines which never meet. These angles are measured as between parallels to the original lines, so drawn or projected that they do meet.

ANGLE IRON. See Rails and Struc¬ tural Shapes.

ANGLE OF SITE. In indirect fire, when the gun and target are at different levels, it is necessary to set the gun at an elevation corre¬ sponding to the height of the target. The angu¬ lar measurement of this difference, expressed in mils, is the angle of site. Practically speak¬ ing, it is such that when set off on the quadrant, the axis of the bore will point di¬ rectly at the target. Having set off the angle of site, the gun is given the additional elevation corresponding to the range. If the target can be seen at the gun, the angle of site may be measured directly. To find the angle of site, it is necessary to determine the difference in level between the gun and the target in yards, and to convert the yards into mils. For con¬ venience the vertical scales of all artillery in¬ struments are graduated from 0 to 600, and the centre of the reading, 300, corresponds to horizontal.

ANGLE OF TRACTKDN. In draught, the angle which the plane of the traces makes with the road on which the carriage is moving. Artillery carriages having sometimes to move over the worst description of roads, the angle of traction must be slightly inclined upward, as the vertical component of the pull will then assist the wheels to surmount obstacles ; the weight being transferred to the shoulders of the horse, increasing the pressure of his feet upon the ground, thus giving him a firmer hold and enabling him to exert with ease a stronger pull, while the resistance against which he contends is at the same time diminished.

ANGLER. See Goosefish.

ANGLES, a German tribe who probably lived originally on the east side of the Elbe, be¬ tween the Saale and Ohre rivers, whence they moved to what is now the district of Angeln in Schleswig-Holstein, lying between the terri¬ tories of the Jutes and Saxons. They never approached the Rhine and the Roman frontiers, hence we do not find

their name mentioned by the Roman authors, who comprehended them, with many others, under the general name of Chauci and Germani, till the conquest of Britain made them better known as a separate nation. In the 5th century they joined their powerful northern neighbors, the Saxons, and took part in the conquest of Britain, which from them derived its future name of England. A part remained in their continental homes and gave their name also to the district of Angeln.

ANGLESEY, an'gl'-se, Henry William Paget, Marquis of, English soldier and states¬ man : b. 1768; d. 1854. He was educated at Oxford, and in 1790 entered Parliament as member for the Carnarvon boroughs. In 1794 he took part in the campaign in Flanders under

the Duke of York, and in 1808 was sent into Spain with two brigades of cavalry to join Sir John Moore, and in the retreat to Coruna com¬ manded the rear guard. In 1812 he became, by his father's death, Earl of Uxbridge. On Napoleon's escape from Elba he was appointed commander of the British cavalry, and at the battle of Waterloo overthrew the Imperial Guard. For his services he was created Mar¬ quis of Anglesey. In 1828 he became lord- lieutenant of Ireland and made himself ex¬ tremely popular, but was recalled in conse¬ quence of favoring Catholic emancipation. He was again lord-lieutenant in 1830; but lost his popularity by opposition to O'Connell and his instrumentality in the passing of the Irish coercion acts, and he quitted office in 1833.

ANGLESEY, an'gl'-se, or ANGLESEA,

an island and county of north Wales, in the Irish Sea, separated from the mainland by the Menai Strait. It is about 20 miles long and 17 miles broad, with an area of 175,836 acres, of which fully 150,000 acres are under rotation crops and permanent pasture, exclusive of mountain and heath land used for pasturage (about 7,600 acres). It is divided into three cantrefs, and each of these into two czvmwds, equivalent to the English hundreds. The sur¬ face of the island, with the exception of Holy- head, Parvs and Bodafon Mountains, is com¬ paratively flat, and the climate, though milder than that of the adjoining coast, is not so favor¬ able to the growth of trees. There are no streams of any importance, but the coast affords some natural harbors, the principal of which are Holyhead and Beaumaris. The

principal crops are oats, barley, turnips and potatoes. Cattle and sheep are the staple pro¬ ductions of the island, and large numbers of both are annually exported. Of minerals, Anglesey contains copper, lead and silver ore, limestone, marble, asbestos and marl, but the copper mines at Parys and Mona, once so cele¬ brated and productive, have much decreased in value. The Menai Strait is crossed by a magnificent suspension-bridge, 580 feet between the piers and 100 feet above high-water mark, allowing the largest vessels which navigate the strait to sail under it ; and also by the great Britannia Tubular Bridge, for the conveyance of railway trains, Holyhead being the point of departure for the Irish mails. The market towns are Holyhead, Beaumaris, Llangefni and Amlwch, the first-named by far the largest. The county itself returns a member to Parlia¬ ment. On the coast are several small islands, the chief being Holyhead and Puffin Island.

ANGLESITE, an'gle-slt (from the island of Anglesea, where it was first observed, a native sulphate of lead, PbSCh. It crystallizes in the orthorhombic system and has a hardness of from 2.75 to 3, and a specific gravity vary¬ ing from 6.1 to 6.4. It may be transparent or opaque, and in color white, greenish, yellowish or gray. It occurs in many localities, usually in connection with galena, whence it is appar¬ ently derived by oxidation. Beautiful trans¬ parent crystals of it, several inches in diameter, are known. Anglesite, in a massive form, is extensively mined as an ore of lead (q.v.)

ANGLEWORM. See Earthworm.

ANGLIA, East, an English kingdom founded by the Angles (q.v.) in the 6th cen¬

tury in the eastern part of England in what now forms the present counties of Norfolk and Suffolk. It was conquered by the Danes in 878, and became part of the English kingdom in 921, under Edward, son and successor of Alfred. The modern see of Norwich corre¬ sponds in extent to the East Anglian kingdom, and the name East Anglia is still frequently employed to denote these two shires.

ANGLICAN CHURCH. See Church of England.

ANGLIN, Margaret Mary, American actress : b. Ottawa, Ont., 3 April 1876. Her father, the Hon. T. W. Anglin, was speaker of the Canadian House of Commons. She was educated at Loretto Abbey, Toronto, and at the Sacred Heart Convent, Montreal. In May 1911 she married Howard Hull of New York. In 1894 she was graduated from the Empire School of Dramatic Acting, New York, and made her first

appearance in that city, in (Shenan¬ doah > ; an injury sustained in riding laid her up for some months, but in 1896 she became leading lady with James O'Neill and toured with him in the United States and Canada, playing with much success in (The Girl I Left Behind MeJ (Dr. Jekyll and Mr. Hyde, *(The Courier of Lyons, } (Virginius,) (Hamlet > and (Monte Christo. > Subsequently she played with the Sothern Company and scored heavily as Lady Ursula; but it was not till 1898 that as Roxane, with the late Richard Mansfield, in (Cyrano de Bergerac,* she gave evidence of her great future as an actress of sterling merit. As leading lady with Charles Frohman in California 1899, she gathered fresh laurels, which were afterward sustained, and added to, in the same capacity with the Empire Theatre Company, New York. Later she starred with Henry Miller, producing such plays as (Mrs Dane's Defence, *(Mac¬ beth^ (The Only Way,* (Zira, *(The After- math^ (Young Fernald,* (The Great Divided the latter causing a veritable sensation in the dramatic world. In 1909 she produced (The Awakening of Helena Ritchie, * having made a successful tour of Australia in Shakespearean repertoire not long before, afterward she went to Egypt. In 1910 she produced Sophocles' (Antigone) at the Greek Theatre, Berkeley, Cal., and (Electra *in 1911, when she also toured Canada in the comedy, (Green Stock¬ ings^ She produced Euripides' Uphigenia in Aulis) and <Medea) at the Greek Theatre in California during the Panama Pacific Exposi¬ tion of 1915. A Boston writer, speaking of her rendition of (Zira,* said that in a generation there had only been Bernhardt's to match it, and Mme. Bernhardt has stated her to be «one of the few dramatic geniuses of the day.**

ANGLING, the sport of fishing with hook and line. Some authorities have insisted that a rod is an essential concomitant. There is, however, on record of a court proceeding the decision that a rod is not necessary to the prac¬ tice of angling, but that the personal manipula¬ tion of the tackle as sport creates the distinc¬ tion between angling and ordinary commercial fishing.

By its devotees angling in its highest de¬ velopment is claimed to be both an art and a science, as well as the sport of sports — espe¬ cially to «the Contemplative Man** as Izaak Walton styled him nearly three centuries ago.

The requirements of a peculiarly cultivated judgment and skill, and equanimity of temper, together with the fascination of the picturesque

in nature s water courses and water levels, to be followed in solitude, stealthily and in silence, combine to give to angling a charm to which no other sport may lay equal claim.

The literature of angling has been prodi¬ gious, more than 3,000 volumes on the subject having been published since • the first, «The Treatyse of Fyshynge with an Angle,® appeared in 1496 — besides innumerable essays, papers and magazine articles.

Angling divides naturally into ((sweet water® or fresh water angling, and salt water or sea angling.

The game fish- most sought by fresh water anglers in America are, first of all, the Atlantic salmon and the brook trout, with the black bass a strong rival for the reputation of either as to the quality of piscatorial sport they afford. The favorite salmon haunts are the rivers of Canada, into which the salmon finds its way from the salt sea. The land-locked salmon and ouananiche, found in the lakes and streams of Maine and Canada, also belong in the first rank as sport fishes. The speckled trout and black bass are generally distributed all over the country, thanks to the activities of the United States Bureau of Fisheries, and there are few sections north of Georgia where they may not be found. In this organized distribution of game fishes the brown trout of Europe and the rainbow trout of the Pacific coast streams have shared with the commoner brook or speckled trout, and from year to year are to be found in increasing numbers and in an ever-widening area. Other sweet-water fish which attract the attention of discriminating sportsmen are the muscallunge, pike and pickerel, and the lake trout and salmon trout. By many anglers the world over the docile perch would be men¬ tioned among sport fishes, and with good reason if the fact that it has contributed a myriad hours of gentle sport to multitudes of simple fishers be allowed to count in its favor.

Sea angling is sport of sterner and often strenuous quality. Its captures are large and powerful fish with whom angling becomes in some instances a battle rather than a sport. The variety of game fishes sought in salt waters is much larger than that which lures the fresh water angler. Bluefish, striped bass, weakfish and sea bass are well known to the shore and off-shore anglers of the north Atlantic and north Pacific coasts. The sporting grounds for big fish are the semi-tropical waters of. Florida and the Gulf, and of southern California. Here the tarpon, tuna, yellowtail, shark, swordfish and the ray invite the absorbed attention of the most vigorous sportsman, and it must be said that the contest with a big fish on light tackle is not one for the delectation of the (<Contem- plative Man® for whom the immortal

Izaak re¬ corded his peaceful observations.

The culmination of the angler's art. is, by common consent, the capture of fish with the artificial «fly.» The special skill required in casting the fly accurately to the spot decided upon, whether it be near or far, and whatever the difficulties which nature presents, calls for devoted practice and persisting patience. A very few anglers seem to possess it naturally: for the great majority it must be acquired.

There are two schools of fly-casters among anglers, the old-fashioned wet caster, who did not restrict himself to any number of flies, and who moved up or down the stream casting fre¬ quently as he went, his fly sinking below the surface of the water, and the modern school of dry casters who restrict themselves to a single artificial fly, made very small, dressed with up¬ standing wings, so as to ensure its floating on the surface, and sometimes anointed with an odorless oil to keep it dry. The distinction is far from being a rigid one, most flycasters being quite ready to substitute a wet fly for a dry one when the fish refuse the latter. Some anglers of the ultra type do not indulge in promiscuous fishing but await the rise of a fish, and then de¬ vote their energies to the capture of that par¬ ticular specimen.

In either school the casts are divided into six classes : the overhand, the underhand, the spray cast, the wind cast, the flip cast and the switch cast. The object of them all is to cause the fly to drop upon the water as if it were a natural fly which had alighted on the surface in its natural habit, or had fallen off some over¬ hanging branch, or been blown from the grass and was floating down stream. The most com¬ monly used cast is the overhand. To perform it the angler standing on the river's brim un¬ winds a few yards of his line and lets the fly float down stream, raising his rod until it is at an angle of some 60 to 80 degrees in front of him. With a swift movement of the wrist, he lifts it so that it passes over his shoulder: the line follows and passes away beyond it. At a moment only to be learned from experience, but which every angler soon feels, he throws the rod forward and onward in the direction in front of him which he wants the fly to take, and it falls there, gently. This cast is possible wherever there are neither trees nor rocks for the necessary distance behind the angler. When these are present the switch cast is used : in that the fly is drawn along the top of the water toward the angler's feet, and then, lower¬ ing his rod by a quick downward movement, the line is sent forward rolling over and over itself in curves. When all the curves are un¬ wound the fly falls back into the water at the extreme end of the line. The first movements in the wind cast are the same as those of the switch cast : the difference is in the thrash by which the line is made to travel up

against the wind. The flip cast is made by taking the fly between the thumb and finger, pulling the top of the rod down until it is a bow, and then letting it slip back. The force will carry the fly to the desired spot. The spray cast is used now when a great length of line is out. The fly is then drawn up to the feet of the angler and the pole thrown forward up stream, not, as in the overhead cast, swished behind the line of the shoulders.

For the experienced angler there is nothing to be said — he knows it all. But for him of little experience or none, it is advised that he read freely among the books written on the subject before essaying- the adventure in the open. Careful study of the habits of the fish to be hunted will be well repaid in the weight of the creel on the homeward stretch ; and fisher¬ men's lore should be absorbed without stint. It is an old saying that ((good tackle is half the battle.® It is a common mistake to start in with

a very cheap and hence unresponsive outfit. It is unwise also to select the most refined and delicate tackle before appreciative skill is ac¬ quired. In the selection of tackle the personal equation is a large and weighty factor. The tackle which best suits the angler is that which will eventually bring him the most fish. But fishing tackle is a subject so diverse and ex¬ tended as to demand a separate article, and to that the reader is referred for detailed infor¬ mation. See Fishing Tackle.

Bibliography. — Barrington, (Seventy Years' Fishing *(London 1906) ; Bradford, C. B., (The Determined Angler and the Brook Trout* (New York 1916) ; Buxton, S., (Fishing and Shooting *(London 1902) ; Camp, S. G., (Fishing Kits and Equipment* (New York 1910) ; and (The Fine Art of Fishing* (New York 1911) ; Halford,

F. M., (The Dry-Fly Man's Handbook* (Lon¬

don 1913) ; Henshall, J. A., (Bass, Pike, Pereh and Others *(New York 1903) ; Holder, C. F., (Game Fishes of the World* (New York 1913) ; and (The Log of a Sea Angler *(Boston 1906) ; La Branche, G. M. L., (The Dry Fly and Fast Water* (New York 1914) ; McCarthy, E., fa¬ miliar Fish: Their Habits and Capture* (New York 1909) ; Rhead, L., (American Trout-

Stream Insects* (New York 1916) ; Shaw, F.

G. , (The Complete Science of Fly-Fishing and Spinning *(New York*

1915) ; Walton, Izaak, (The Compleat Angler (reprint, New York

1913).

ANGLO-AMERICAN COMMISSION,

a joint international commission appointed in 1898 by the United States and Great Britain for the negotiation of a plan for the settlement of all controversial matters between the United States and Canada. The subjects submitted for the consideration of the commission were offi¬ cially determined as follows : C(The Behring Sea sealing question, reciprocal mining regulations, the preservation of the fisheries of the Great Lakes, the north Atlantic fishery question, the boundary question, the alien labor laws, and reci¬ procity of trade.** Lord Herschell, Sir Wilfred Laurier, Sir Richard Cartwright, Sir Louis H. Davies and Mr. J. Charlton, a member of the Dominion Congress, were appointed British commissioners. The American commissioners were United States Senators Fairbanks and Gray, Congressman Dingley, Reciprocity Com¬ missioner Kasson and ex-Secretary of State Foster. The commission met at Quebec, 23 August, Lord Herschell being chosen chairman ; W. C. Cartwright, of the Foreign Office, and

H. Bourassa, member of Parliament for La- belle County, Quebec, were chosen British sec¬ retaries and C. P. Anderson United States secretary. Later in the year an adjourned ses¬ sion was held in Washington, D. C., which ad¬ journed without practical results.

ANGLO-CATHOLIC, a term applied to those members of the Anglican communion whose beliefs and religious forms most nearly approach those of the Roman Catholic Church. Ritualists, as Anglo-Catholics are frequently called, lay especial emphasis on the ((Catholic principles** of apostolic succession, regeneration in baptism, the Eucharistic real presence and the authority of tradition.

ANGLO-INDIANS, the name officially adopted in 1911 by the British government in India for those born in that country of mixed

descent, in other words, a half-breed between a European and an Asiatic parent. These were formerly styled Eurasians.

ANGLO-ISRAELITE THEORY, a pe¬ culiar belief as to English origins. It assumes that the English are descended from the lost 10 tribes of Israel; but the theory is untenable on any scientific grounds, for the tribes van¬ ished through absorption in neighboring peoples and were not lost in any real sense. Consult Streator, (The Anglo- Alliance in

Prophecy, or the Promises to the Fathers* (1900).

ANGLO-JAPANESE TREATIES. The

first treaty between England and Japan was signed 30 Jan. 1902. The text is as follows:

The Governments of Great Britain and Japan, actuated solely by a desire to maintain the status quo and general peace in the extreme East, being moreover specially interested in maintaining the independence and territorial integrity of the Empire of China and the Em¬ pire of Korea, and in securing equal oppor¬ tunities in those countries for the commerce and industry of all nations, hereby agree as follows :

Article 1. The High Contracting Parties, having mutually recognized the independence of China and Korea, declare themselves to be en¬ tirely uninfluenced by any aggressive tendencies in either country. Having in view, however, their special interests, of which those of Great Britain relate principally to China, while Japan, in addition to the interests which she possesses in China, is interested in a peculiar degree politically, as well as commercially and indus¬ trially, in Korea, the High Contracting Parties recognize that it will be admissible for either of them to take such measures as may be in¬ dispensable in order to safeguard those interests if threatened either by the aggressive action of any other Power, or by disturbances arising in China or Korea, and necessitating the inter¬ vention of either of the High Contracting Parties for the protection of the lives and prop¬ erty of its subjects.

Art. 2. If either Great Britain or Japan, in the defence of their respective interests as above described, should become involved in war with another Power, the other High Contract¬ ing Party will maintain a strict neutrality, and use its efforts to prevent other Powers from joining in hostilities against its ally.

Art. 3. If in the above event any other Power or Powers should join in hostilities against that ally, the other High Contracting Party will come to its assistance, and will con¬ duct the war in common, and make peace in mutual agreement with it.

Art. 4. The High Contracting Parties agree that neither of them will, without consulting the other, enter into separate arrangements with another Power to the prejudice of the interests above described.

Art. 5. Whenever, in the opinion of Great Britain or Japan, the above-

mentioned interests are in jeopardy, the two Governments will com¬ municate with one another fully and frankly.

Art. 6. The present agreement shall come into effect immediately after the date of its signature, and remain in force for five years from that date. In case neither of the High Contracting Parties should have notified twelve months before the expiration of the said five years the intention of terminating it, it shall

remain binding until the expiration of one year from the day on which either of the High Con¬ tracting Parties shall have denounced it. But if, when the. date fixed for its expiration arrives, either ally is. actually engaged in war, the al¬ liance shall, ipso facto, continue until peace is concluded.

The second treaty was signed at London 12 Aug. 1905. The following letter explains its objects and purposes.

Despatch to his Majesty's Ambassador at Saint Petersburg, forwarding a copy of the Agreement between the United Kingdom and Japan, signed at London, 12 Aug. 1905.

The Marquis of Landsdowne to Sir C.

Hardinge

Foreign Office, Sept. 6, 1905.

Sir, — I inclose, for your Excellency's in¬ formation, a copy of a new Agreement con¬ cluded between his Majesty's Government and that of Japan in substitution for that of Jan. 30, 1902. You will take an early opportunity of communicating the new Agreement to the Russian Government.

It was signed on Aug. 12, and you will explain that it would have been immediately made public but for the fact that negotiations had at that time already commenced between Russia and Japan, and that the publication of such a document whilst those negotiations were still in progress would obviously have been improper and inopportune.

The Russian Government will, I trust, recog¬ nize that the new Agreement is an international instrument, to which no exception can

be taken by any of the Powers interested in the affairs of the Far East. You should call special atten¬ tion to the objects mentioned in the preamble as those by which the policy of the contracting parties is inspired. His Majesty's Government believe that they may count upon the goodwill and support of all the Powers in endeavoring to maintain peace in Eastern Asia, and in seeking to uphold the integrity and independence of the Chinese Empire and the principle of equal op¬ portunities for the commerce and industry of all nations in that country.

On the other hand, the special interests of the contracting parties are of a kind upon which they are fully entitled to insist, and the an¬ nouncement that those interests must be safe¬ guarded is one which can create no surprise and need give rise to no misgivings.

I call your especial attention to the wording of Article II, which lays down distinctly that it is only in the case of an unprovoked attack made on one of the contracting parties by another Power or Powers, and when that party is defending its territorial rights and special interests from aggressive action, that the other party is bound to come to its assistance.

Article III, dealing with the question of Korea, is deserving of especial attention. It recognizes in the clearest terms the paramount position which Japan at this moment occupies and must henceforth occupy in Korea, and her right to take any measures which she may find necessary for the protection of her political, military, and economic interests in that coun¬ try. It is, however, expressly provided that such measures must not be contrary to the prin¬ ciple of equal opportunities for the commerce and industry of other nations. The new Treaty

no doubt differs at this point conspicuously from that of 1902. It has, however, become evident that Korea, owing to its close proximity to the Japanese Empire and its inability to stand alone, must fall under the control and tutelage of Japan.

His Majesty's Government observe with satisfaction that this point was readily conceded by Russia in the Treaty of Peace recently con¬ cluded with Japan, and they have every reason to believe that similar views are held by other Powers with regard to the relations which should subsist between Japan and Korea.

His Majesty's Government venture to antic¬ ipate that the alliance thus concluded, designed as it is with objects which are purely

peaceful and for the protection of rights and interests the validity of which cannot be contested, will be regarded with approval by the Government to which you are accredited. They are justified in believing that its conclusion may not have been without effect in facilitating the settle¬ ment by which the war has been so happily brought to an end, and they earnestly trust that it may, for many years to come, be instru¬ mental in securing the peace of the world in those regions which come within its scope. — I am, &c.,

(Signed) Landsdowne.

The text is as follows :

Inclosure. Agreement between the United Kingdom and Japan, signed at London, Aug. 12,

1.

Preamble. The Governments of Great Britain and Japan, being desirous of replacing the Agreement concluded between them on Jan. 30, 1902, by fresh stipulations, have agreed upon the following articles, which have for their object : —

(a) The consolidation and maintenance of the general peace in the regions of Eastern Asia and of India ;

(b) The preservation of the common inter¬ ests of all Powers in China by insuring the independence and integrity of the Chinese Empire and the principle of equal opportunities for the commerce and industry of all nations in China;

(c) The maintenance of the territorial rights of the High Contracting Parties in the regions of Eastern Asia and of India and the defence of their special interests in the said regions :

Article 1. It is agreed that whenever, in the opinion of either Great Britain or Japan, any of the rights and interests referred to in the preamble of this Agreement are in jeopardy, the two Governments will communicate with one another fully and frankly, and will con¬ sider in common the measures which should be taken to safeguard those menaced rights or interests.

Art. 2. If by reason of unprovoked attack or aggressive action, wherever arising, on the part of any other Power or Powers either con¬ tracting party should be involved in war in de¬ fence of its territorial rights or special interests mentioned in the preamble of this

Agreement, the other contracting party will at once come to the assistance of its ally, and will conduct the war in common, and make peace in mutual agreement with it.

Art. 3. Japan possessing paramount politi¬ cal, military and economic interests in Korea, Great Britain recognizes the right of Japan to take such measures of guidance, control and protection in Korea as she may deem proper and necessary to safeguard and advance those interests, provided always that such measures are not contrary to the principle of equal oppor¬ tunities for the commerce and industry of all nations.

Art. 4. Great Britain having a special in¬ terest in all that concerns the security of the Indian frontier, Japan recognizes her right to take such measures in the proximity of that frontier as she may find necessary for safe¬ guarding her Indian possessions.

Art. 5. The High Contracting Parties agree that neither of them will, without consulting the other, enter into separate arrangements with another Power to the prejudice of the objects described in the preamble of this Agree¬ ment.

Art. 6. As regards the present war between Japan and Russia, Great Britain will continue to maintain strict neutrality unless some other Power or Powers should join in hostilities against Japan, in which case Great Britain will come to the assistance of Japan, and will con¬ duct the war in common, and make peace in mutual agreement with Japan.

Art. 7. The conditions under which armed assistance shall be afforded by either Power to the other in the circumstances mentioned in the present Agreement, and the means by which such assistance is to be made available, will be arranged by the naval and military authorities of the contracting parties, who will from time to time consult one another fully and freely upon all questions of mutual interest.

Art. 8. The present Agreement shall, sub¬ ject to the provisions of Article VI, come into effect immediately after the date of its signa¬ ture, and remain in force for ten years from that date.

In case neither of the High Contracting Par¬ ties should have notified

twelve months before the expiration of the said ten years the inten¬ tion of terminating it, it shall remain binding until the expiration of one year from the day on which either of the High Contracting Parties shall have denounced it. But if, when the date fixed for its expiration arrives, either ally is actually engaged in war, the alliance shall, ipso facto, continue until peace is concluded.

In faith whereof, the undersigned, duly authorized by their respective Governments, have signed this Agreement, and have affixed thereto their seals.

Done in duplicate at London, the 12th day of August, 1905.

Landsdowne,

His Britannic Majesty's Principal Secretary of State for Foreign Affairs.

Tadasu Hayashi,

Envoy Extraordinary and Minister Plenipotentiary of His Majesty the Emperor of Japan at the Court of St. James.

Thus it will be seen that whereas the first treaty referred to China and Korea exclusively, and only became operative upon the interven¬ tion of a third Power, the treaty which is superseded applies also (<to the regions of east¬ ern Asia and of India,® and becomes operative when either party to the agreement becomes the object of wanton attack or aggression with

respect to the special interests in the regions coming within the scope of the agreement. In effect this new treaty guarantees the status quo for very nearly the entire continent of Asia, of course omitting Turkey. England will have Japan's support to withstand any foreign ag¬ gression in Persia and Afghanistan or against India, while Japan has the offensive and de¬ fensive backing of England in the new relations which she occupies toward Asiatic countries. The terms of this treaty are eminently satis¬ factory to neutral nations in that they prac¬ tically give the ˆopen-door® to all and present vast permanent commercial opportunities. Many of the principles agreed upon and incorporated in the agreement were known before the Battle of the Sea of Japan.

ANGLOMANIA, a term denoting undis¬ criminating imitation of everything English on the part of persons of other nationalities. In the United States it was formerly applied to a fad of fashionable society.

ANGLO-SAXON, the name given by modern historians to the Angles, Jutes and Saxons who migrated to Britain from Germany in the 5th and 6th centuries a.d. They emi¬ grated from the districts about the mouths of the Elbe and Weser, and the first body of them who gained a footing in England are said to have landed in 449, and to have been lead by Hengist and Horsa. The Jutes settled chiefly in Kent, the Saxons in the southern and middle country, and the Angles in the northern. Among the various Anglo-Saxon states that afterward arose those founded by the Angles first gained the preponderance, and gave to the whole country the name of Engla-land, that is, the land of the Angles.

Among the Anglo-Saxons we find the Eng¬ lish constitution already existing in all its essen¬ tials, but its origin is not to be attributed to Alfred, though he brought it to a greater pitch of completeness. In a rudimentary form it was the common property of the Germanic peoples before the emigration of the Saxons and Angles from the Continent. It developed itself more independently, however, among the Anglo- Saxons than among those Teutonic races who came into closer connection with the Romans, and afterward with the Roman hierarchy. The Anglo-Saxon community was frequently spoken of as consisting of the eorls and the ceorls, or the nobles and common freemen. The former were the men of property and position, and were themselves divided into different ranks ; the latter were the small landholders, handi¬ craftsmen, etc., who generally placed them¬ selves under the protection of some nobleman, who was hence termed their hlaford or lord. Besides these there was the class of the serfs or slaves (thcowas) , who might be either born slaves or freemen who had forfeited their lib¬ erty by their crimes, or whom poverty or the fortune of war had brought into this position. They served as agricultural laborers on their masters' estates, and though mere chattels, as absolutely the property of their master as his cattle, their lot does not appear to have been very uncomfortable. They were frequently manumitted by the will of their master at his death, and were also allowed to accumulate sav¬ ings of their own, so as to be able to purchase their freedom or that of their children.

One of the peculiar features of Anglo-Saxon society was the wergyld, or life-price, estab¬ lished for the settling of feuds. ((A sum, paid either in kind or in money where money existed, was placed upon the life of every freeman ac¬ cording to his rank in the state, his birth, or

his office. A corresponding sum was settled for every wound that could be inflicted upon his person; for nearly every injury that could be done to his civil rights, his honor, or his domestic peace ; and further fines were ap¬ pointed according to the peculiar adventitious circumstances that might appear to aggravate or extenuate the offense. From the operation of this principle no one was exempt, and the king as well as the peasant was protected by a wergyld, payable to his kinsmen and his people" (Kemble, (Saxons in England5).

The king (cyning , cyng) was at the head of the state; he was the highest of the nobles and the chief magistrate. He was not looked upon as ruling by any divine right, but by the will of the people, represented by the wit an, or Great Council of the nation. Accordingly we find that the new king was not always the direct and nearest heir of the late king, but one of the royal family whose abilities and character recommended him for the office. The king was invested with certain honors and privileges in order that he might maintain his position with becoming dignity. Besides his wergyld as an aetheling or person of royal blood, his life was further guarded by a sum of equal amount, called cynebot, or price of royalty, and the former sum was to be paid to his relations, the latter to the people. As king he held pos¬ session of the Crown lands, which were national property, distinct from any private estates he might himself purchase. Among other privi¬ leges he was entitled to a portion of the fines and confiscations laid upon offenders ; he had the right of maintaining a standing army of household troops, the duty of calling together the Council of the Witan, and of laying before them measures which concerned the welfare of the state, with certain distinctions of dress, dwelling, etc., all his privileges being possessed and exercised by the advice and consent of the witena-gemot, or Parliament.

The queen also was held in high honor. She sat by the king in the assemblies, and she possessed a separate establishment from that of the king though on a smaller scale. Next in rank and dignity to the king were the ealdor- men. These were at the head of the adminis¬ tration of justice in the shires, possessing both judicial and executive authority, and had as their officers the scir-gerefan, or sheriffs. One of their most important functions was the lead¬ ing of the armed force of the county, a duty which often fell to their share during the per¬ iod of the Danish invasions. The ealdorman, as such, held possession of certain lands at¬ tached to the office, and he was also entitled to a share of fines and other moneys levied for the king's use and passing through his hands. ((Thus the position which his nobility, his power, and his wealth secured to the ealdorman was a brilliant one. In fact, the whole executive gov¬ ernment may be considered as a great

aristo- cratical association, of which the ealdormen were the members, and the king little more than the president. They were in nearly every respect his equals, and possessed the right of

intermarriage with him ; it was solely with their consent that he could be elected or appointed to the Crown, and by their support, co-opera¬ tion, and alliance that he was maintained there. Without their concurrence and assent, their license and permission, he could not make, abro¬ gate, or alter laws ; they were the principal witan or counsellors, the leaders of the great gamot or national inquest, the guardians, up¬ holders and regulators of that aristocratical power of which he was the ultimate representa¬ tive and head" (Kemble, Vol. II, p. 142).

Under the Danish kings the ealdorman fell into a subordinate position, the eorl or earl taking his place in the county. The ealdorman and the king were both surrounded by a num¬ ber of followers called thegns or thanes, bound by close ties to their superior. The king's thanes were the higher in rank, and formed a kind of nobility by themselves. They possessed a certain quantity of land smaller in amount than that of an ealdorman, and filled offices connected with the personal service of the king or with the administration of justice. Accord¬ ing to Leppenberg they were in all respects the predecessors of the Norman barons. We fre¬ quently hear of a class of functionaries called gerefan or reeves, such as the scir-gerefa (shirereeve or sheriff), the port-gerefa (port reeve), the tun-gerefa (farm-reeve or bailiff; Scotch, grieve). These, of course, had different duties to perform, those of the shire-reeve being the most important. He presided at the county court along with the ealdorman and bishop, or alone in their absence; and had to carry out the decisions of the court, to levy fines, collect taxes, etc. In virtue of his office he had a por¬ tion of land allotted to him, hence called reeve- land. The shires were divided into hundreds and tithings, the former being equal to 10 of the latter. The tithing consisted of 10 heads of families, jointly responsible to the state for the good conduct of any member of their body. For the trial and settlement of minor causes there was a hundred court held once a month. The place of the modern Parliament was held by the witena-gemot, the representative council of the nation. Its members, who were not elect¬ ed, comprised the aethelings or princes of the blood royal, the bishops and abbots, the ealdor¬ men, the thanes, the sheriffs, etc.

Agriculture, including especially the raising of cattle, sheep and swine,

was the chief occu¬ pation of the Anglo-Saxons. Large tracts of the marshy land in the east of England were embanked and drained by them and brought into cultivation. Gardens and orchards are fre¬ quently mentioned, and vineyards w*ere common in the southern counties. The forests were ex¬ tensive, and valuable both from the mast they produced for the swine and from the beasts of the chase which they harbored. Hunting was a favorite recreation among the higher ranks, both lay and clerical. Fishing was largely car¬ ried on, herrings and salmon being the principal fish caught. The whale fishery was also pur¬ sued, when the Anglo-Saxon vessels used to go as far as Iceland. The manufactures were naturally of small moment. Iron was made to some extent, and some cloth, and salt works were numerous. In embroidery and working in gold, however, the English were famous over the continent, and very elegant specimens of gold work have come down to our times. There

was already a considerable trade at London, which was frequented by Normans, French, Flemings and the merchants of the Hanse towns. The Anglo-Saxon forefathers were no¬ torious for their excessive fondness for eating and drinking, and in this respect formed a strong contrast to the Normans who invaded the country. Ale, mead and cider were the common beverages, wine being limited to the higher classes. Pork was a favorite article of food, and so were eels, which were kept and fattened in eel ponds and sometimes paid as rent. The houses were rude, ill-built structures, mostly of wood and without proper chimneys, but were often richly furnished and hung with fine tapes¬ try. The dress of the Anglo-Saxons was loose and flowing, the materials being linen, woolen and also silk; and their garments were often adorned with embroidery. The men looked upon the hair as one of their chief ornaments, and wore it long and flowing over their shoul¬ ders, while they also usually wore beards.

Christianity was introduced among the Anglo-Saxons in the end of the 6th century by Saint Augustine, who was sent by Pope Greg¬ ory the Great and became the first archbishop of Canterbury. Kent, then under King Ethel- red, was the first place where it took root, and thence it soon spread over the rest of the country. It must, of course, be remembered that the Britons and Scots had already em¬ braced Christianity, and missionaries from these labored in the conversion of the Anglo-Saxons Monasteries were founded at an early period and became numerous. For a time the Anglo- Saxon Church maintained

customs different in discipline from Rome, but uniformity was es¬ tablished in 670 by Theodore, the archbishop of Canterbury.

ANGLO-SAXON LANGUAGE AND LITERATURE. (a) Anglo-Saxon or Old English is the period of the English language extending from the end of the 5th to the end of the 11th century, the traditional story of the coming of Hengest and Horsa to England in 449, and the Norman Conquest in 1066 being convenient but arbitrary limiting dates. In its origins it is the language brought to Britain by the Teutonic conquerors of Roman and Celtic Britain in the 5th and 6th centuries. These Teutonic invaders were of three north German tribes, the Jutes, who settled mainly in Kent and on the Isle of Wight; the Angles, who settled the country north of the Thames ; and the Saxons, who settled the regions south of the Thame§ except those occupied by the Jutes. The language of these three tribes was a branch of the West Germanic group of languages, its closest relationships being to Frisian and Low German. Following the lines of the tribal set¬ tlement in Britain, the language of the Anglo- Saxon period falls into three main dialects : (1) the Anglian, which subdivides into the Northumbrian, spoken north of the Humber, and the Mercian, spoken by the Angles occupy¬ ing the Midland counties between the Thames and the Humber; (2) the West-Saxon, spoken by the Saxons who settled in the regions south of the Thames; (3) the Kentish, spoken by the Jutes in Kent and the Isle of Wight. In time the Kentish speech was assimilated by the West- Saxon. Kentish and West-Saxon combined, thus constituting a southern dialect. Mercian and

Northumbrian a northern or Anglian dialect. As the dialect in which a literature was first produced and as the speech of originally the most powerful of the various kingdoms estab¬ lished by the invaders, the Angles gave the name to the speech of the country as a whole, Englisc or Englisc sprcec, and to the country itself, Engla-land, land of the Angles. The term Anglo-Saxon was rarely used in the Anglo-Saxon period and then only as the collective name of the people, not as the name of the language or of the country. At no time, however, in the Anglo-Saxon period was a single ˆstandard® literary or col¬ loquial speech established for all sections of the country, although an appearance of consider¬ able uniformity is presented to us now by the fact that most of the extant monuments of the Anglo-Saxon period are preserved only in the West-Saxon dialect. This is due to the im¬ portant unifying position which the West-Sax¬ on royal house took under Egbert (802-39) and his successors Alfred (871-900) and Al¬ fred's son Eadweard (900-24), Winchester, the capital of Wessex, thus becoming the lit¬ erary as well as the political capital of the country. The literature of the earlier periods, chiefly poetic and written in the

Anglian dia¬ lect, was at this time translated into West- Saxon, the West-Saxon versions replacing the more original ones, which were thus largely lost. Since the body of Anglo-Saxon literature is preserved only in the West-Saxon dialect, it is that dialect which is commonly understood by the term Anglo-Saxon and which is usually made the basis of systematic presentations of the grammar of the language.

Besides the natural changes in the vowel and consonant system to which language is al¬ ways subject, Anglo-Saxon differs from later periods of English in two main respects. First, the inflectional system of Anglo-Saxon is rela¬ tively a full one. Nouns are inflected for four cases, nominative, genitive, dative and accusa¬ tive, and for three grammatical genders, mas¬ culine, feminine and neuter. The definite arti¬ cle and the adjective are inflected in all the forms of the noun to agree with it. Adjectives are also inflected strong and weak, as they are in Modern German, according to their syntac¬ tical position. The verbal system, in its main outlines the same as that of Modern English, differs from the latter in the greater number of forms which it possesses, the subjunctive mood, for example, being still clearly distin¬ guished both in form and use. Owing to its more complicated inflectional system in gen¬ eral, the rules of concord play a much more important part in Anglo-Saxon than they do in Modern English.

The second main distinguishing character¬ istic of Anglo-Saxon as compared with the English of the Middle and Modern English periods relates to its vocabulary. The Anglo- Saxon vocabulary is practically a uni-lingual one, whereas the tremendous transforming in¬ fluence of French in the 13th and 14th cen¬ turies, and of the Renaissance in the 15th and 16th centuries, upon English, have changed the language of the later periods into a bi-lingual tongue. Aside from an insignificant Celtic element, the greater but still comparatively slight influence of Latin learning and Latin

Christianity on literary Anglo-Saxon, and toward the end of the Anglo-Saxon period, a small Scandinavian loan element, taken from the Danish and Norse conquerors of England, the vocabulary of Anglo-Saxon is an etymolog¬ ically pure one. New ideas imported into the life of the people were usually expressed by means of native words giving the language, to the historical student, an appearance of homo¬ geneity and simplicity possessed by no later period of English.

(b) Anglo-Saxon literature is rarely pre¬ served in contemporary documents, the main reason being that, in a method of manuscript transmission, early monuments are gradually altered to fit the contemporary conditions and tastes of successive later generations, with the consequence that the originals are either lost or destroyed. Since most Anglo-Saxon litera¬ ture is also anonymous, it becomes necessary to determine its date and authorship, so far as this can be done, by the internal evidence of the works themselves, aided by such slight out¬ side help as may be afforded by occasional al¬ lusions in contemporary historical documents. Chronologically we may divide the literature of the whole period into three main groups : (1) the early or Anglian period, comprising chiefly poetical works composed in the latter half of the 7th and in the 8th century; (2) the Early West-Saxon period, comprising chiefly prose works written in the time of Alfred the Great; (3) the Late West-Saxon period, centring about the name of HHfric, in the late 10th and the early 11th centuries, com¬ prising mainly works in prose but also a few attempts at a revival of the earlier poetry. The body of this literature may be most conven¬ iently reviewed under the two general heads of poetry and prose.

Anglo-Saxon poetry has been preserved to modern times in several different manuscripts of miscellaneous content, the most important being the (Vercelli Book, *or (Codex Vercellen- sis,* so called because the volume is now con¬ tained in the cathedral library at Vercelli in northern Italy; the (Exeter Book, *or (Codex Exoniensis,* still in the possession of Exeter Cathedral in England to the library of which it was pres nted about the year 1050 by Bishop Leofric; the (Junian manuscript (Junius XI), in the Bodleian Library at Oxford ; and the (Cotton Manuscript * (Cotton Vitellius A XV), in the British Museum, which contains the unique copy of the (Beowulf.* These manu¬ scripts were all written in the late 10th and early 11th centuries, although the period of the original composition of the works which they contain is of course much earlier. As to met¬ rical form, however, the whole body of this poetry is remarkably homogeneous, and a single description will answer for all of it. The normal line of Anglo-Saxon verse consists of two halves, bound together by alliteration, alliteration consisting in the identity of initial consonants, or in the case of vocalic allitera¬ tion, the alliteration of any vowel with any other vowel. Each half line contains at least one alliterating syllable, although one may con¬ tain two and the other one, or both may contain two. Normally the number of alliterating syl¬ lables in a full line cannot be more than four and is usually less. Each half line contains two feet, the principle of the structure of the

foot being accentual. Each half line contains at least two and no more

heavily stressed syl¬ lables, the metrical stress coinciding with the logical stress of the words, and at least two unstressed syllables, although the number of the unstressed syllables may vary within fairly wide limits. According to the order of the stressed and unstressed syllables the half lines fall into a limited number of types, consecutive passages being made up of half lines of the va¬ rious types arranged in whatever order the poet pleases. Within the limits of its own system the scansion of Anglo-Saxon poetry is rigid and exact. The use of stanzaic forms, except in one or two sporadic instances, was unknown to the Anglo-Saxon poets. Not only in met¬ rical form, but also in its use of the various devices of poetical ornament, the body of Anglo-Saxon verse is fairly constant for all periods. The simile is very rarely used, its place being taken by the metaphor of ((kenning. **Specially characteristic of the poetic style is the device of ˆvariation,** by which an idea once expressed is repeated in several different forms by the use of synonymous terms. This gives to the poetry a retarding effect which is often particularly noticeable, and, to our modern taste, particularly inappropriate, in the narra¬ tive verse. The diction and tone of the poetry is elevated and dignified throughout, the poetic convention apparently not tolerating anything that approached <(doggerel)) in tone.

As to its content, Anglo-Saxon poetry is best considered in two groups, according as it follows the heroic or native tradition, or the Christian or literary tradition. Anglo-Saxon poetry of the native tradition goes back in its origins to the earliest historical periods of the race. The most primitive pieces are such poems as the <Widsith,) (The Complaint of Deor, *bits of popular lore such as the <Charms) and (Riddles,* and above all the (Beowulf. *Although given a Christian color¬ ing here and there by the interpolations of later transcribers and redactors, this poetry is essen¬ tially heathen, or, at least, non-Christian, in spirit. The (Beowulf,* the most important single monument of the Anglo-Saxon period, is an heroic or epic poem of 3,182 full lines, tell¬ ing the legendary and mythical deeds of a hero, Beowulf. Although in its present form the poem was probably composed in England in the 8th century, by an unknown author or com¬ piler, from a group of more or less loosely connected lays which had grown up in popular oral tradition, its tone is that of a much earlier period. The action of the poem, which falls into two parts, is altogether legendary and myth¬ ical. It takes place not in England nor are any of the characters Anglo-Saxons. In the first part, Beowulf, a Geat from the Scandi¬ navian peninsula, comes to the great hall Heorot, the royal residence of the Danish King Hrothgar, probably on the island of Zealand, to save it from the ravages of the moor-dwell¬ ing monster Grendel. He destroys

Grendel and also Grendel's mother, both of whom may be interpreted in the terms of nature myth as symbolizing the destructive power of nature in certain phases, and then returns to his own country. In the second part, Beowulf who is now an old man and has for many years been King of the Geats, fights with a terrible fire- drake that has been devastating his land ; but

the hero himself is mortally wounded in the combat, and the poem closes with the account of his death and burial. Beside the main char¬ acter Beowulf, and the mythological characters Grendel, Grendel's mother and the fire-drake, numerous minor characters are introduced and several longer episodes of great interest and beauty are developed. Despite the mythologi¬ cal character of the main action, the poem is given a strong human interest. The tone of the narrative throughout is epic and warlike and the action is always upon an extremely noble and dignified plane. The ideal of char¬ acter presented in the hero Beowulf is one of valor and power directed by a self-sacrificing zeal for the welfare of others. Aside from the (Beowulf, 5 native Anglo-Saxon epic poetry is limited to a fragment (48 lines) of what in its complete form was probably a poem on the same scale as (Beowulf, 5 the fragment of the (Battle at Finnsburh.5 In the Late West- Saxon period a revival of interest in the earlier heroic poetry took place, the principal results being the (Battle of Brunanburh,5 descriptive of a battle between the Anglo-Saxons and the Danes in 937, and the spirited and technically admirable (Battle of Maldon,5 descriptive of a battle which took place in 991. With these poems expressive of the native or heroic spirit should be grouped a small number of shorter lyric pieces, also non-Christian in origin and feeling, (The Wanderer, 5 (The Husband's Mes¬ sage, } (The Wife's Lament,5 (The Seafarer) and a group of some 90 poetical riddles. These poems are generally elegiac in tone and are often characterized by great imaginative beauty and charm of expression.

Anglo-Saxon poetry of the Christian tradi¬ tion consists chiefly of the poetry of the Csedmonian and the Cynewulfian schools. It is Christian in subject-matter, but in method and style it resembles closely the native heroic poetry, a resemblance due to the conscious maintenance of the national and traditional poetic style. The only early authority for the existence of a poet Caedmon is Bede ((Historia Ecclesiastical Book IV, Chapter 24) who tells us that G Imon was an illiterate lay-brother of the monastery at Whitby (then known as Streoneshalh),

who received miraculously the gift of song and who versified certain stories from the Old and New Testaments. The date at which Caedmon lived, according to Bede, was several generations before himself, that is about 650. Answering in part to Bede's de¬ scription, we have still extant long versified narratives based on the story of Genesis, of Exodus, of Daniel and of Judith. That all of these, however, are the work of a single poet, and that poet the one that Bede mentions, the internal evidence of the poems themselves for¬ bids us to believe. It is probable that the only actual exact specimen of the work of Caedmon is a short poem of nine lines known as Caed¬ mon's Hymn.5 The other Caedmonic poems, although they have features in common, par¬ ticularly as to style and subject-matter, which justify holding them together in a group, are undoubtedly the work of various authors.

Our information concerning a poet Cynewulf is derived altogether from certain poems to which the author has appended his signature in runic letters woven into the context of his verse. These signed poems are the Christ,5

(J Liliana, 5 (Elene5 and the Cates of the Apos¬ tles.5 The period at which Cynewulf lived and wrote was probably the last half of the 8th century, and the region in which he lived was probably Northumberland. Various attempts have been made to identify the poet with per¬ sons mentioned in contemporary historical an¬ nals, but although the name Cynewulf is of not infrequent occurrence, none of these attempts has so far proved convincing The remaining important poems of the Cynewulf group, some of which may have been composed by Cynewulf, although in no instance do the proofs permit a positive assertion, are (Andreas, 5 based on the apocryphal legend of Saint Andrew; Cuthlac, 5 in praise of the English saint of that name ; the (Dream of the Cross5 ; (Phoenix, 5 a Chris¬ tian allegorical poem; (Harrowing of Hell5 and a number of shorter hymnic poems. The char¬ acteristics which distinguish the Cynewulfian from the Caedmonic poems are sharply marked. The subject-matter of the latter is chiefly Old Testament story, of the former, New Testa¬ ment story, as in (Christ, 5 and Christian legend, as in (Elene,5 the story of the finding of the (Cross 5 by Saint Helena, the story of Saint Juliana, of Saint Andrew and of Saint Guthlac. The Caedmonic poetry is characterized in gen¬ eral by severity and simplicity of style, whereas the Cynewulfian poetry is highly colored and romantic in tone. Particularly noticeable in the Cynewulfian poetry is the free and often extravagant use of phrases and themes bor¬ rowed from the (Beowulf.5 These differences in style, however, are relatively not great, and in a general review of Anglo-Saxon poetry one is struck by the remarkable similarity of treat¬ ment which

characterizes it throughout. There is but one metrical form, sporadic instances of attempts at stanzaic structure, as in (Deor,5 merely serving to emphasize the fixed character of the metre.

Aside also from a few pieces written under the influence of the church hymns, the basis of all Anglo-Saxon poetical composition is narra¬ tive. Moreover the authority acquired by the poetry of the native heroic tradition succeeded in imposing an established and conventional standard of style which remained constant throughout the period. In its respect for rule and convention, in its uniform and <(classic55 quality, Anglo-Saxon poetry is paralleled by only one other period of English Literature, the Augustan age of the 18th century.

Anglo-Saxon prose owes its origins to two impulses, first, a national or patriotic, and second, a religious, educational or Latin im¬ pulse. The earliest prose (consult Sweet, Eld¬ est English Texts,5 (Early English Text So¬ ciety,5 Vol. 83) dates from the end of the 7th and the beginning of the 8th centuries, and con¬ sists chiefly of glosses on Latin texts, of wills and similar legal documents. Anglo-Saxon laws were early written in the vernacular, being recorded apparently in much the same form which they had assumed in oral tradition ; and it is probable that by the middle or end of the 8th century a custom of preserving records of events of national or local interest in English had grown up at various seats of learning throughout the country. If so, however, these records have not been preserved, owing prob¬ ably to the fact that after their content had been incorporated into other and later docu-

ments, the originals were lost or destroyed.

1 he chief extant prose monuments of patriotic or national interest are the codes of laws, which were got together and revised at various periods, and under the direction of various kings, one of the most notable forms being that known as the Legal Code of Alfred, and the Anglo-Saxon ' Chronicle ’ (consult 'English Chronicles ’) , in its final form written under the direction of Alfred the Great and perhaps in part actually by him, but to some degree also based on pre-existing Anglo-Saxon and Latin documents. The prose of educational and religious interest may be considered in two groups, that centring about the name of Alfred (849-901) or Early West-Saxon prose, and

that centring about the name of 2Elfric (955— 1025?) or Late West-Saxon prose. Early West- Saxon prose consists almost altogether of trans¬ lations of Latin works. Those which there is reason to believe issued directly from the pen of King Alfred are translations of Pope Gregory's 'Cura Pastoralis,' Bede's (Historia Ecclesiastica Gentis Anglorum,' Orosius' Com¬ pendious History of the World' ((Pauli Orosii Historiarum Adversum Paganos, liber VIP), Boethius' 'De Consolatione Philoso¬ phise' and a combination from the writings of Gregory and Augustine known as the 'Blooms' (i.e., (Anthology') of Alfred. A translation of the dialogues' of Gregory was made, prob¬ ably by Bishop Werferth of Worcester, for which Alfred wrote a preface. These works differ in the degree of fidelity with which they follow their originals, some, as for example the Cura Pastoralis,' being close but always idio¬ matic translations, whereas others, for example the versions of Orosius and Boethius, are fairly free and contain extensive original additions. The style of this prose of the Early West-Saxon period, of both the religious and the patriotic interest, is generally clear and simple, but is utterly without literary quality, its highest attainment being a certain naive directness and vigor of expression.

The prose of the Late West-Saxon period consists in part of translations of Latin theo¬ logical writings and of parts of the Bible, but owing to the renewed interest in preaching ris¬ ing out of the Benedictine reform of the latter half of the 10th century, also of a considerable body of sermon literature reflective of contem¬ porary conditions in England. The chief col¬ lections are the 'Blickling Homilies,' so called because the manuscript in which they are preserved is kept at Blickling Hall, Norfolk; the sermons of Wulfstan; and the 'Homilae Catholicse' or Catholic Homilies' of 2Elfric. The 'Blickling Homilies' and the sermons of Wulfstan are popular in tone, frequently rising, especially in the sermons of Wulfstan, to passages of considerable oratorical power and effectiveness. zElfric's homilies are more liter¬ ary, both in themes and in style. They are written easily and lightly and represent the highest development of Anglo-Saxon in the direction of a literary artistic prose. 2Elfric s taste, however, is not pure, and he frequently falls into the error of a too elaborate and conscious use of ornament and figure. Very characteristic of his method is a half-verse, half-prose style, which he made use of in his 'Saints' Lives.'

A fragment of a translation of the Greek romance of Apollonius of Tyre, made from a Latin version in the Late West-Saxon period by an unknown translator, should be mentioned as the sole example in Anglo-Saxon of the literature of the imagination in prose.

Bibliography. — The standard Anglo-Saxon grammars are Siever, (Angelsaechsische Gram- matik' (3d ed., 1898, translated into English by A. S. Cook) ; Buelbring, 'Altenglisches Elemen- tarbuch' (unfinished, the first part appearing in 1902) ; and Kaluza, 'Historische Grammatik der englischen Sprache' (Pt. 1, 2d ed., 1906). More elementary presentations of the grammar will be found in the beginners' books by Sweet, 'An Anglo-Saxon Reader' (4th ed., 1881) and Bright, 'An Anglo-Saxon Reader' (3d ed., 1899). The dictionaries are Bosworth-Toller, 'Anglo-Saxon Dictionary' (1882) ; Grein, 'Sprachschatz der angelsaechsischen Dichter' (1861-64), a dictionary of only the verse texts but an invaluable aid in the study of them ; Sweet, 'Students' Dictionary of Anglo-Saxon' (1897) ; and Clark Hall, 'A Concise Anglo- Saxon" Dictionary' (1894). Practically all Anglo-Saxon poetical texts are contained in Grein- Wuelker, 'Bibliothek der angelsaech¬ sischen Poesie,' and a good part of the prose in the 'Bibliothek der angelsaechsischen Prosa,' by the same general editors. Separate editions of most texts have been made, for which and for the bibliography of Anglo-Saxon in general, consult Wuelker, 'Grundriss zur Geschichte der angelsaechsischen Litteratur' (Leipzig 1885), and Koerting, 'Grundriss der Geschichte der englischen Litteratur' (4th ed., Muenster 1905). For Anglo-Saxon metre consult Schip- per, 'Grundriss der englischen Metrik' (1895), and Siever, ' Altgermanische Metrik' (1893). The history of Anglo-Saxon literature is treated by Brooke, 'The History of Early English Lit¬ erature' (1892) and 'English Literature from the Beginning to the Norman Conquest' (1898) ; Ten Brink, 'Geschichte der englischen Littera¬ tur' (Vol. I, 1899), translation by Kennedy; Gomme, 'Translation of the Anglo-Saxon Chronicle' (1910).

George P. Krapp,

Professor of English , Columbia University.

ANGOLA, Ind., city and county-seat of Steuben County, 40 miles northeast of Fort Wayne, on the Lake Shore and Michigan Southern and the Saint Joseph Valley rail¬ roads. Tri-State College is located here. An¬ gola was settled in 1834, incorporated as a town in 1866 and a city in 1906. Pop. 2,800.

ANGOLA (Portuguese West Africa), west Africa, a Portuguese dependency on the Atlantic coast. It has a coast-line of over 1,000 miles, is bounded on the north and northeast by the Belgian Kongo, on the east by British South Africa and on the south by German Sbuthwest Africa. It has an area of about 500,000 square miles and has belonged to the Portuguese since 1575, with the exception of the

years 1641—48, when it was held by the Dutch. It is watered by the Coanza and other rivers and its climate, though excessively hot, is greatly tempered by the trade-winds. There are large tracts of amazing fertility in the interior. It is under a governor-general, who resides at Loanda. It is divided into six districts : Kongo, Loanda, Benguela, Mossamedes, Huilla and

Lunda. The capital is South Paolo de Loanda, other important towns being Cabinda, Ambriz, Novo Redondo, Benguela, Mossamedes and Port Alexander. The estimated population is about 4,000,000. There are 52 government schools, and seven municipal and two private schools, with altogether about 2,410 pupils. Various missions are at work in the country. The chief products are coffee, rubber, wax, sugar for rum distilleries, vegetable oils, cocoa- nuts, ivory, oxen and fish. Rubber supplies are now becoming exhausted ; cotton-growing, for¬ merly remunerative, has been neglected but is now increasing; tobacco is grown and manu¬ factured for local consumption ; petroleum and asphalt are worked by a British syndicate. The province contains large quantities of malachite and copper, iron, petroleum and salt. Gold has also been found. The imports in 1914 reached an aggregate value of $4,171,574 and the ex¬ ports $3,477,789. The chief imports are textiles, chiefly cotton prints, hardware, machetes, tools, cutlery, musical instruments and drugs. The chief exports are coffee, rice and tropical fruits. Dried fish are exported in considerable quanti¬ ties. The trade is largely with Portugal, the export trade exclusively. In 1914 there entered the port of Loanda 195 vessels of 293,531 tons and cleared 187 of 270,917 tons. The Portu¬ guese National Navigation Company has most of the carrying trade to and from Europe; the steamers of three British lines and one German line touch at ports of the colony. There are 818 miles of railway in operation and 2,688 miles of telegraph line with 69 telegraph offices. Angola is connected by cable with east, west and south African telegraph systems.

ANGORA, or ENGOUR, Asiatic Turkey, (the ancient Ancyra), a town 215 miles east of Constantinople, with which there is now rail¬ way communication. It is the capital of the vilayet of the same name. It has ruinous walls, and there are some remains of Byzantine archi¬ tecture belonging to the ancient city, and a few relics of earlier times, both Greek and Roman. Among the latter are the remnants of the Monumentum Ancyranum, raised in honor of the Emperor Augustus,

who much embellished the ancient city. Ancyra was the centre of the Tectosages, a Gallic tribe who settled in Ga¬ latia in the 3d century b.c., and was the capital of the Roman province of Galatia after 25 b.c. In the Byzantine period it was a place of great importance, was captured by Persians and Arabs; next fell under the sway of the Seljuk Turks, was held by the Crusaders for 18 years, and passed to the Ottoman Turks in 1360. A great battle between the Turks and Tatars was fought near Angora in 1402, in which the latter were victorious. It was reconquered by 'the Turks in 1415, and has since remained in their possession. It was taken by the Egyptians under Ibrahim Pasha in 1832. Angora is cele¬ brated for the long-haired goats bred in its vicinity called by the Arabs the chamal goat, meaning ((silky or soft.® The fineness of the hair seems to depend on some peculiarity of the atmosphere, for it is remarked that the cats, dogs and other animals of the country have exceedingly long and fine hair, and that they all lose much of their distinctive characteristic when taken from their native haunts. Goat's hair forms an important export ; other exports

being goats' skins, mohair, grain, dye-stuffs, principally madder, and yellow berries ; mastic, tragacanth and other gums; also honey and wax. Mohair cloth is manufactured. British manufactures are imported to some extent. Estimated pop. 35,000, of whom 18,000 are Moslems, 9,400 Roman Catholic Armenians and 400 Jews. Consult Wright, (Cities of PauP (Boston 1905).

ANGORA CAT. See Cat.

ANGORA GOAT. See Goat.

ANGOSTURA. See Ciudad Bolivar.

ANGOSTURA, or ANGUSTURA, an'-

gas-tur'a, BARK, the bark of a shrub or small tree of the Orinoco River Valley, Galipea cus- para, family Rutacece. It comes into the market in the form of broken quills, the outer surface being yellowish-gray and covered with small warty, corky growths. The taste is very bitter and aromatic. Its active constituents are vola¬ tile oil, hence its aromatic nature; angusturin, a bitter principle, and four alkaloids ; cusparin, C20 H19NO3; galipein, C20H21NO3', cusparedin, C™ Hi7N03; and galipedin, C19H19NO2. The action of these principles has not been thoroughly in¬ vestigated. The bark is used as an antimalarial remedy and as an aromatic bitter for the stim¬ ulation of the intestines. It is also a laxative. It is a common ingredient of many potent med¬ icines and liqueurs.

ANGOULEME, an'goo-lam', France, city, capital of the department of Charente, and for¬ merly of the province of Angoumois, on the left bank of the Charente, 60 miles north-northeast of Bordeaux. It stands on the summit of an isolated rocky hill, at the foot of which are the suburban quarters. There is a handsome mod¬ ern town-house on the site of the old castle of the ancient counts of Angouleme. The cathe¬ dral is a Romanesque building, dating from the 12th century. Angouleme possesses a lyceum, theological seminary, normal school, two hospi¬ tals, a lunatic asylum, theatre, etc. ; besides a public library and a museum of natural history. The staple manufacture is paper made in numerous mills in the neighboring valleys. There are also manufactures of carpets, linen, earthenware, woolen stuffs, fire-arms, gun¬ powder, wire, brandy, distilleries, etc. A con¬ siderable trade is carried on. Angouleme rep¬ resents the ancient Iculisma, destroyed by the Normans in the 9th century. The bishopric was founded in 379. Clovis erected the first cathe¬ dral in 507. Pop. (1911) 38,211. Consult Bab- inet de Rencogne, (L'Histoire du commerce et de l'industrie en Angoumois) (Angouleme 1879) ; Castaigne, (La Cathedrale d' Angouleme5 (ib. 1834) ; Nanglard, (Fouille historique du diocese d' Angouleme5 (ib. 1897).

ANGSTROM, ang'strem, Anders Jons, a

Swedish scientist: b. 1814; d. 1874. From 1867 to his death the secretary to the Royal Society of Sciences at Upsala. He was a recognized authority upon optics, and among his writings are (Optiska Undersokningar) (1853) ; his best known work, JRecherches sur le Spectre Solaire5 (1869) ; (Sur les Spectres des Gas Simples5 (1871) ; and (Memoire sur la Tem¬ perature de la Terre5 (1871).

ANGUIDiE, a family of vermiform, ter¬ restrial lizards, including the glass-snake of

eastern Europe, the blindworm, slowworm and related forms, one of which (the genus Ger- rhonotus of Central America and the western United States) has short, weakly developed limbs.

ANHIDROTICS, drugs which stop per¬ spiration. I he chief are atropine, agaricin, camphoric acid, picrotoxin, sulphuric acid, etc. They are used principally to check the excessive night-sweats of phthisis.

ANHYDRID, an-hfdrid (from a Greek word signifying ((without water®), an oxide which produces an acid when it combines with water, or which is obtained by removing water from an acid. Oxides which yield salts by com¬ bining directly with other more basic oxides may also be classed as anhydrids. The oxides of most of the non-metallic elements are anhydrids.

ANHYDRITE, a mineral having the com¬ position of calcium sulphate, CaSCh and differ¬ ing from gypsum in its lack of water. In its common white, massive form it much resembles the snowy-white gypsum (q.v.), but is readily distinguished by its superior hardness, 3 to 3.5. Anhydrite also occurs in orthorhombic crystals and in cleavable-lamellar and fibrous masses. Its colors are very varied, white or gray being the most common, but blue and even brick-red not being uncommon. It is brittle, breaking with an uneven or splintery fracture, or when crystallized, cleaving with ease into rectangular chips. Its lustre is also very varied, the crys¬ tals appearing pearly, greasy or vitreous accord¬ ing to the faces examined.

ANHYDROUS AMMONIA. See Gases, Compressed.

ANI, a'ne, a bird of the subfamily Croto- phagince of the cuckoo family, characterized by uniformly greenish-black or purplish-black plumage, a long, spreading tail and a high, keel¬ like projection on the top of the beak. Several species of these aberrant cuckoos inhabit South and Central America, one (Crotophaga Ani) occurring in Florida and the West Indies, where it is known as Savanna blackbird, black witch, and rain-bird. Bold but wary, the anis flit from bush to bush, uttering a mewing sound or a sharper double cry. Flocks gather in swampy woods, especially among mangrove thickets, and feed on insects, lizards, berries, etc., and accompany feeding cattle, picking ticks from their hides. These birds in most cases build huge community nests, many pairs nesting in niches in a great structure of sticks, etc., placed in some low tree; but this subject is not very well understood. An exception exists in one South American species, the ((white ani® (Gnira piririgua), which is brown, buff and white in color, and puts its pale blue eggs in individual nests.

ANILINE is an oily organic liquid classi¬ fied as a base. Its formula is CsHsNIL. It is commonly known as a derivative of coal-tar, but that substance contains only from to of 1 per cent of aniline, and the difficulties of separating it are so formidable that it is never derived from coal tar directly.

When pure, aniline is colorless, but commer¬ cial aniline turns

gradually brownish on ex¬ posure to air and light, due to a small admix¬ ture of thiophene. Aniline solidifies at 18 F.,

and boils at 330°. Its vapor is inflammable, burning above the liquid with a large, smoky flame. Aniline is an actively corrosive poison. It has a peculiar nauseating odor, and its fumes exert decided, poisonous effects upon workmen handling it.

Aniline was first discovered by Unverdorben in 1826. He found it among the products of the destructive distillation of indigo. In 1834 it was identified by Runge in coal-tar. With the dis¬ covery of the first aniline color, (<mauveine,® by Perkin, in 1856, aniline became a valuable com¬ mercial product. It is now prepared from nitro¬ benzene with the aid of clean borings of soft cast iron in an acid solution. Into a still fitted with an agitator are placed a part of the nitro¬ benzene and a small quantity of the iron borings with water and hydrochloric acid. Steam is turned in and the contents are thus boiled and constantly stirred. The distillate is turned back into the still and the remainder of the nitroben¬ zene and iron borings are fed in at intervals. When the distillate ceases to contain nitro¬ benzene the operation is at an end, and the still will contain only aniline oil, water and iron chloride and oxide. A charge of 1,000 pounds of nitrobenzene requires about 1,000 pounds of iron borings and yields about 765 pounds of aniline oil in about 10 hours' operation. The final purification of the crude aniline oil is con¬ ducted in a vacuum still.

Commercially, three forms of aniline oil are recognized: (1) Aniline oil for bine, which is unmixed aniline; (2) aniline oil for red, which is a mixture of aniline with ortho-toluene and para-toluene, and (3) aniline oil for safmnine , which is a mixture containing aniline and ortho- toluidine. See Coal-Tar Colors.

With chlorates, in the presence of metallic salts, aniline gives the indispensable dyestuff Aniline Black. It is also extensively used as raw material for many other colors used in dyeing. In the manufacture of drugs aniline is used as the starting point for the production of acetanilide, antipyrine, antifebrin, etc. Nitrated aniline has been experimented with as an explo¬ sive. It is claimed to be peculiarly adapted for use in detonators, primers, etc., and for mines and torpedoes. It is estimated that the output of aniline in the United States for the calendar year 1916 was 11,000 tons.

ANILINE POISONING. The use of the

anilines, and particularly of the new synthetic drugs derived from this

product, has become so universal that many instances of poisoning, both acute and chronic, are observed. In acute ani¬ line poisoning the chief effects are on the blood. It prevents the oxidation of haemoglobin in the red blood-cells, forms methemoglobin, causes the destruction of red blood-cells (haemolysis) and thus results in death. The chief symptoms are headache, vertigo, weakness and stumbling walk, blue color of defective blood oxidation (cyanosis), disturbances of respiration, increase of urine, which is frequently colored reddish to dark brown from the broken-down blood- cells, depression of temperature, chills, dilated pupils and death from asphyxia. The fatal dose is about 1 Yz drams. In non-fatal cases recovery may be much protracted. Treatment consists in withdrawal of all of the poison, washing the stomach, fresh air, artificial respiration and in¬ fusion of normal salt solution. The aniline

derivations mostly used are acetanilid (anti- febrin) , phenacetin, exalgen, lactophenin, metha- cetin, malakin, phenocoll, citrophen, apolysin, cosaprin, malarin, etc. Several aniline dyes are also used in medicine, of which the principal are methylene blue as a urinary antiseptic, scarlet red as an ointment on granulating surfaces, fluorsce'in, eosin and fuchsin. These dyes are also used to give an agreeable color to medi¬ cines, but they always have the same general effect. Chronic aniline poisoning, found chiefly among workers in color factories, is of much the same character, but the symptoms develop slowly. There are skin symptoms, urinary changes and various nervous attacks, with head¬ ache, tremors, changes in sensation, anaesthesia, etc. The treatment should involve the ventila¬ tion of the factories, thus getting rid of the color-dust floating in the moisture of the rooms.

ANIMA MUNDI, an'i-ma mun'di ((<soul of the world0), an ethereal essence considered by ancient philosophers as the informing prin¬ ciple of the universe of matter and bearing the same relation to it that the human mind does to the body. The conception originated in the East and was held by the Egyptians. Anaxagoras (q.v.), one of its earliest Western exponents, believed that it gave form to the universe; Plato treats of it at large in his) ; Aristotle considered the world a living entity, but in¬ formed by an external spirit. Nearly all philo¬ sophical sects dallied with the idea. The Stoics thought it the sole vital principle of the universe, but not the universe itself in a different shape, as the doctrine of pantheism imputed to them would imply. In

modern times it appears in the works of Cornelius Agrippa (who calls it spir- itus mundi), Paracelsus, Van Helmont, Giorda¬ no Bruno, Sebastian Franck, Jacob Boehme, etc., in More and Cudworth, in the later Plato- nists, and in the philosophy of Schelling, who has incorporated it into his whole system. See Animism ; Pantheism.

ANIMAL. The word ˆanimal® being de¬ rived from anima, breath, soul, suggests the dis¬ tinction popularly accorded to animals as con¬ trasted with plants. Linne said that plants grow and live, but that animals grow, live, and feel. As will be seen below, however, animals do not fundamentally and in their simplest forms dif¬ fer from the simplest plants, as both are con¬ stituted of protoplasm, which is equally contrac¬ tile in both kingdoms, and we are coming more and more to speak of living beings as organ¬ isms. All organized beings agree in being formed of protoplasm, <(the physical basis of life.® Strictly speaking, however, an animal is a living organism, the protoplasm of which does not secrete a cellulose cell-wall, and the exist¬ ence of which requires proteid material obtained from the living or dead bodies of existing plants or animals.

Differences between Plants and Animals.

— It is difficult, when we consider the simplest forms of either kingdom, to define what an animal is as distinguished from a plant, for it is impossible to draw hard and fast lines be¬ tween them. In defining the limits between the animal and vegetable kingdoms our ordinary conceptions of what a plant or an animal is will be of little use in dealing with the lowest forms of either kingdom. A horse, fish or worm

differs from an elm-tree, a lily, or a fern in hav¬ ing organs of sight, of hearing, of smell, of locomotion and special organs of digestion, cir¬ culation and respiration, but these plants also take in and absorb food, have a circulation of sap, respire through their leaves, and some plants are mechanically sensitive, while others are endowed with motion, — certain low plants, such as diatoms, etc., having this power. In plants the assimilation of food goes on all over the organism, the transfer of the sap is not confined to any one portion or set of or¬ gans as such. It is always easy to distinguish one of the higher plants from one of the higher animals. But when w7e descend to animals like the sea-anemones and coral-polyps, formerly called (<zoophytes,® so striking is the external similaritv between tffe two kinds of organisms that early observers regarded them as “animal flowers.® Sponges until a very late day vˆere regarded as plants. So-called plants, as Bac¬ terium or Bacillus and their allies, and so-called animals, as

Protamoeba , or certain monads, which are simple specks of protoplasm without genuine organs, may be referred to either king¬ dom. Indeed, a number of naturalists, notably Haeckel, relegate to a neutral kingdom (the Protista, q.v.), certain lowest plants and ani¬ mals. Even the germs (zoospores) of monads like Uvella and those of other flagellate in¬ fusoria may be mistaken for the spores of plants; and there are certain flagellate infusoria so much like low plants (such as the red-snow or Protococcus) , and the slime molds (Myx - omycetes) in the form, deportment, mode of reproduction and appearance of the spores, that even now it is possible that certain organisms placed among them are plants. It is only by a study of the connecting links between these lowest organisms, leading up to what are un¬ doubted animals or plants, that we are enabled to refer these beings to their proper kingdom.

As a rule, plants have no special organs of digestion or circulation and nothing approach¬ ing to a nervous system. The}?' differ from ani¬ mals in their metabolic processes. Most plants absorb inorganic food, such as carbonic acid gas, wratcr, nitrate of ammonia, and some phos¬ phates, silica, etc., all of these substances being taken up in minute quantities. Low fungi live on dead animal matter and promote the process of putrefaction and decay, but the food of these organisms is inorganic particles. The slime molds, however, envelop the plant or low^ ani¬ mals much as an amoeba throws itself around some of the living plant and absorbs its proto¬ plasm ; but Myxomycetcs, in their manner of taking food, are an exception to other molds and are now regarded as animals. The lowTest animals swrallow other living animals wrhole or in pieces; certain forms, like Amoeba (q.v.), bore into minute algie and absorb their proto¬ plasm ; others engulf silicious-shelled plants (diatoms), absorbing their protoplasm. No animal swMlow^s silica, lime, ammonia or any of the phosphates as food. On the other hand, plants manufacture or produce from inorganic matter starch, sugar and nitrogenous substances w'hich constitute the food of animals. During assimilation plants absorb carbonic acid and in sunlight exhale oxygen; during growth and work they, like animals, consume oxygen and exhale car¬ bonic acid.

Animals move and have special organs of lo¬ comotion ; few plants move, though some climb, and minute lorms have thread-like processes or vibratile lashes (cilia) resembling the flagella of monads, and flowers open and shut; but these motions of the higher plants are

purely me¬ chanical and are not performed by special or¬ gans controlled by nerves. The mode of repro¬ duction of plants and animals, however, is fun¬ damentally identical, and in this respect the two kingdoms unite more closely than in any other. Plants also, like animals, are formed of cells ; the latter in the higher forms combine into tissues.

Physiological Distinctions and Resem¬ blances. — As has been said, the bodies -of the lowest plants and animals are plainly enough made up of protoplasm. The irritability, con- tractibility, and metabolism of a plant-cell or a living, free unicellular plant do not differ from those of a unicellular animal (Protocoon) of the same morphological grade. The movements of the lowest algae, the sensitiveness of the leaves of the mimosa-tree, of the sun-dew and other insectivorous plants, are due to the same pri¬ mary cause as the movements of animals of all grades, as the power of lifting one's arm is fundamentally due to the contractibility of the protoplasm forming the cells of the muscles.

Also the differences in metabolism are not fundamental, those molds which do not contain chlorophyll and bacteria performing the same metabolic functions as regards carbon dioxide as animals. Animals are also subject to the same general tropisms as plants; they are geo¬ tropic, heliotropic, thermotropic, hydrotropic, chemotropic, etc. (See Tropisms). To a much greater extent than formerly supposed even in¬ sects so highly developed, as ants are subject to the influences of the primary factors of growth, morphogenesis, and of the conduct of life, and the instincts of animals in general are more dependent on these agents, on external stimuli, than was previously thought to be the case.

Plants Fixed Organisms; Animals as a Rule Free-moving. — While the lowest plants (Protophytes) are, as entire organisms, often motile, free-swimming, closely resembling mo¬ nads, the higher or more specialized forms, com¬ prising the great majority of the vegetable world, are fixed and have always remained so. It is this fixed condition of life which, so to speak, has held the plant world in an iron grasp and kept it within its natural limits. On the other hand, animals as a rule are active, free to move, restless. Whenever animals, though born as free-swimming germs or larvae, are con¬ strained by change of circumstances to become attached or fixed to the sea-bottom or solid objects, they degenerate and become more and more subject to the influence during growth of those cosmic and physical forces, such as grav¬ ity, light, air, currents of water, etc., which determine the shapes and morphology of plants. Fixed animals, like the polyps, sea-anemones, sponges, Polyzoa, etc., which lead a purely

vege¬ table life, tend to assume plant-like shapes. Even the echinoderms, as the fixed crinoids, are plant-like, hence their name, sea-lilies. Tt is freedom of motion, greater activity, which have led to the vastly more complex and higher types of life in animals, to the development of a nerv¬ ous system, and to the origin of mind and intelligence.

Plants Not the Primitive Basis of Ani¬ mal Life. — As the lowest plants and animals are scarcely distinguishable, it is probable that plants and animals first appeared contempo¬ raneously; and while plants are generally said to form the basis of animal life, this is only par¬ tially true; a large number of fungi are de¬ pendent on decaying animal matter; and most of the Protozoa (q.v.) live on animal food, as do a large proportion of the higher animals. The two kingdoms supplement each other, are mutually dependent and probably appeared si¬ multaneously in the beginning of things. It should be observed, however, that the animal kingdom greatly overtops the vegetable king¬ dom, culminating in man. (See Zoology). Con¬ sult (Cambridge Natural History > (London 1911); Bergson, (Creative Evolution> (New York 1911) ; Morgan, (Evolution and Adapta¬ tion > (New York 1903).

ANIMAL ALKALOIDS. Ptomains (q.v.)

was the name originally given to a large class of products resulting from the putre¬ factive process occurring in animal substances. These possessed many of the chemical re¬ actions of the vegetable alkaloids and have been termed animal alkaloids. Similar prod¬ ucts formed in the human body, as the result of normal metabolism chiefly of lecithin, or proteids, are termed leucomains. Many of these ptomains and leucomains are highly poisonous toxins. See Alkaloids; Metabolism; Pto¬ maines; Toxicology.

ANIMAL CHARCOAL. See Charcoal.

ANIMAL CHEMISTRY, the department of organic chemistry which investigates the composition of the fluids and the solids of ani¬ mals, and the chemical action that takes place in animal bodies. There are four elements, sometimes distinctively named organic elements, which are invariably found in living bodies, namely, carbon, hydrogen, oxygen and nitrogen. To these may be added, as frequent constituents of the human body, sulphur, phosphorus, lime, sodium, potassium, chlorine, iron and iodine. The four organic elements are found in all the fluids and solids of the body. Sulphur occurs in blood and in many of the secretions. Phos¬ phorus is also common, being found in

nerves, in the teeth and in fluids. Chlorine occurs al¬ most universally throughout the body; lime is found in bone, in the teeth and in the secre¬ tions ; iron occurs in the blood, in urine, and in bile; and sodium, like chlorine, is of almost universal occurrence. Potassium occurs in muscles, in nerves, and in the blood corpuscles. Minute quantities of copper, silicon, manganese, lead and lithium are also found in the human body. The compounds formed in the human organisms are divisible into the organic and inorganic. The most frequent of the latter is water, of which two-thirds (by weight) of the body are composed. The organic compounds may, like the foods from which they are formed, be divided into the nitrogenous and non-nitrogenous. Of the former the chief are albumen (found in blood, lymph and chyle), casein (found in milk), myosin (in muscle), gelatin (obtained from bone), and others. The non-nitrogenous compounds are represented by organic acids, such as formic, acetic, buty- ric, stearic, etc. ; by animal starches, sugars ; by fats and oils, as stearin and olein, and by

alcohols (two compounds, cholesterin and glyc¬ erin).

Bibliography. — Aberhalden, ‘Lehrbuch der physiologischen Chemie) (1906) ; Bunge, ‘Text- Book of Physiological and Pathological Chem¬ istry } (Leipzig 1894) ; Chittenden, ‘Physiolog¬ ical Economy of NutritioiP (New York 1909) ; Cohnheim, ‘Chemie der Eiweisskorper) (Leip¬ zig 1904) ; Hammarsten, ‘Text-Book of Physi¬ ological Chemistry) (New York 1904) ; Hoppe- Leyler, ‘Handbuch der physiologisch- und pathologisch-chemischen Analyse fiir Aerzte und Studirende) (Berlin 1893) ; Lea, ‘The Chemical Basis of the Animal Body) (in ap¬ pendix to Foster’s ‘Physiology^ New York 1896) ; Mann, ‘Chemistry of the Proteids> (1906) ; Salkowski, ‘Practicum der physio¬ logischen Chemie } (Berlin 1893) ; Schryver, ‘Chemistry of the Albumens > (1906) ; Waller and Lynes, ‘Elementary Physiological Chemis¬ try *(1897) ; Wurtz, ‘Traite de chimie biolog- ique* (Paris 1885).

ANIMAL COLORS. See Cochineal; Kermes; Purple Shell.

ANIMAL ELECTRICITY, electricity which certain species of animals, particularly those inhabiting the water, have the power of producing. The amount which they can pro¬ duce varies with different animals. The electric eel or torpedo can give a severe shock. Con¬ tact between the nerve and muscle of a frog will produce a feeble current of

electricity.

ANIMAL EXPERIMENTATION. A

method of studying disease by the use of lower animals in order to alleviate human suffering. The ancient Greeks practised it, even primitive tribes learned somewhat about human disease by observing lower animals and many human superstitions had their origin from such obser¬ vations. Harvey's celebrated discoveries con¬ cerning the circulation of the blood rested upon animal experimentation, and were it not for the large increase in knowledge made possible by its methods, much of our modern civilization would have been impossible. Animal experi¬ mentation moreover has benefited all those ani¬ mals which are useful to man, and most of the opposition to the application of its methods is founded upon very superficial and illogical reasoning.

The chief impetus to modern methods came after the introduction of general and local anaesthetics, such as ether, chloroform and cocaine. These substances banished all pain to the animal and permitted the delicate manipula¬ tions which were so essential to the develop¬ ments of correct methods of technique.

Animal experimentation has supplanted a great deal of guessing about disease by direct methods of proving cause and effect. To give up the knowledge acquired would be to slip back into an era of barbarism, so far as medi¬ cine is concerned. No essay could be written which could possibly exhaust the innumerable benefits which every member of an enlightened community enjoys. The chief advances have been made along so many different lines that it becomes difficult to single out those of most importance. Although disease itself in the human being is nature's great vivisector, nature's methods are so ruthless and widespread that without animal experimentation the processes which we call disease could not be minutely

analyzed. The insight obtained concerning the physiological processes of every kind of human activity would be impossible without animal experimentation. Harvey's monumental study and his discovery of the circulation of the blood is but one of a million discoveries which have established a true physiology. Without a sound physiology there can be no rational med¬ icine. The knowledge of the circulation, of the digestive system, of the formation of the blood, of the ductless glands, of the kidneys, the movements of the intestines, and above all the vast and intricate workings of the nervous system — all of these have been made possible by animal experimentation.

The successful attack upon disease is no less a result of the studies on animals. Pas¬ teur's early studies in infectious diseases were made upon lower animals. Our knowledge of every disease' of infectious origin has been vastly advanced. Tuberculosis, typhoid fever, syphilis, gonorrhoea, diphtheria, all pus infec¬ tions, meningitis, poliomyelitis, and one might go on indefinitely, have all been better under¬ stood and hence nearer cure through animal experimentation. It is less than a score of years since the secret of syphilis was unraveled by its methods — and syphilis kills more people every year than 10 world wars will ever kill. The excessive prudery of the human being who would rather indulge his infantile sexual¬ ity than understand it keeps this disease alive as a sort of policeman to aid in the attack upon man's essential sexual immorality. Gonorrhoea is the most widespread of all diseases, scatter¬ ing the sufferings of disease wherever man goes. It is still permitted to undermine the health of a nation, because of this same prudery which calls itself morality but is a hideous mask which conceals man's immorality and lust power.

Whenever large bodies of men are assem¬ bled, as in large contract enterprises, in the manoeuvres of war or similar mass actions, typhoid fever has often been a veritable scourge. Animal experimentation laid the solid foundations of anti-typhoid inoculations which have been eminently successful. The conquest of the scourge of smallpox which entered the palace as well as the hovel in Shakespeare's time has been practically eradicated through Jenner's original animal experimentations. To treat of all of the vast benefits to the farmer in the treatment of hog cholera, chicken cholera and the innumerable diseases of farm animals, which have come through animal experimenta¬ tion, would alone fill a volume. Consult Can¬ non, 'Reference Handbook of Medical Sci- ences) (1913).

Smith Ely Jelliffe.

ANIMAL FLOWER, a term applied to sea-anemones or similar polyps on account of the resemblance which their expanded tentacles bear to flower petals.

ANIMAL HEAT, nearly all animals pos¬ sess a heat-regulating mechanism by which they maintain a temperature necessary for the con¬ tinuance of life processes. In many cold¬ blooded animals this sustains a temperature only slightly above that of the surrounding media, and thus in winter they relapse into a torpid state. Some few, however — bees being an ex¬ ample — have a higher temperature and are not

torpid. In warm-blooded animals, especially those high in the evolutionary scale, a high constant temperature is usually sustained. Some warm-blooded animals occupy an intermediary position. In summer the temperature is high and constant, in winter they hibernate and the temperature is low and dependent upon that of the surrounding medium. Some cold-blooded animals living in the tropics may really show very high degrees of temperature, thus the terms warm-blooded and cold-blooded are rela¬ tive only. The mean average temperature in man is 36.97° C. (98.4° F.) in the mouth, 36.98° C. (98.5° F.) in the axilla, and 37.2° C. (99° F.) in the rectum. There are slight daily variations, the lowest temperature usually being between midnight and early morning during sleep. Certain warm-blooded animals show in¬ teresting average temperatures. Thus, the horse is 99-100° F., ox 100-101° F„ cow 101- 102° F., sheep 104-105° F, dog 100-101° F„ cat 101° F., pig 101-103° F., rabbit 101-107° F„ rhesus monkey 101° F., duckbill platypus 76° F., hen 106-109° F., duck 107-110° F., sparrow 110° F. The higher the standard of heat, the less able is the animal to bear a reduced tem¬ perature. A 30° F. drop causes vital changes in a bird or' animal, and death finally ensues. Fish and frogs, however, have been found to survive after having been enclosed in ice. In cold-bloodei animals the temperature, as has been noted, varies widely. The study of the temperature of bees is of much interest in this connection.

Several conditions modify the regulation of the animal heat ; day and night, age, muscular work, sleep, sex, race, pregnancy, idiosyncracies, surrounding temperature, season of the year, baths and certain drugs, all have a distinct influence on the heat regulatory apparatus. The variations in temperature in man compatible with life are wide ; a range of less than 2° F. is normal, but variations from 75° to 112° F. have been recorded and the patients recovered. Temperatures below' 80° F. and above 106° F. are dangerous.

The chief sources of animal heat are the chemical processes of the body and they are dependent on the food supply. Every kind of food has its definite percentage of heat-pro¬ ducing elements measured in units or calories. Thus 1 gm. (15 grains) of the white of egg has 4,896 calories ; the same amount of cow's milk 5,733 calories, of fat 9,600 calories, etc. These are purely physical values, but they have their physiological equivalents. The chief sources of heat production in the human body are the muscles, the heart contraction being a very

important one, and the glands (intestines, liver, etc.). Loss of heat takes place through the skin by radiation and conduction, by evapora¬ tion, from the respiration, and from the dejecta.

Regulation of these many factors is in the province of the nervous system. The vaso¬ motor system controls the heat loss by regu¬ lating the amount of blood in the deep and superficial portions of the body, the respiratory centre regulates the amount of respiration and the cerebral cortex regulates the amount of muscular activity that is the main source of the heat production (see Fever). Consult Kirkes, (Textbook of Physiology) (Philadelphia 1907).

ANIMAL INDUSTRY, Bureau of. See

Agriculture, Department or.

ANIMAL MAGNETISM. See Hypno¬ tism.

ANIMAL PSYCHOLOGY. Definition.

— That portion of the general science of psy¬ chology' which concerns itself especially with a study of mind in animals other than man is generally designated either as animal psychol¬ ogy or as comparative psychology. Obviously, it would be more logical as well as scientifically more profitable to designate as animal psychol¬ ogy the study of mind in animals as contrasted with the study of mind in plants. In this defi¬ nition animals should be used as inclusive of man. In this article the popular usage has been accepted, and the discussion will treat of the psychology of infrahuman animals.

History.— For many centuries, the human race has exhibited keen interest in the instincts, habits, experiences, and life-history of animals, as well as in their structures, bodily functions, and development. Animal psychology existed for Aristotle, who, at considerable pains and great expense, accumulated a vast and hetero¬ geneous assemblage of facts concerning animal behavior. Modern science finds little of value in this ancient record, for the observations were uncritically made and carelessly recorded.

In the Middle Ages and later the animal soul became a bone of contention, and men sought heatedly to prove or to disprove its existence. One camp gathered facts to prove that animals are purely' instinctive mechanisms, endowed by the Creator with the necessary powers to meet life’s demands, and lacking will, purpose, in¬ sight and reasoning ability. The other camp quite assiduously, albeit not so religiously, mar¬ shalled evidences that intelligence, even to thought

and reasoning as well as instinct, is common to brute and man.

Not until the last century did inquiry into the nature of the animal mind become fruitful of relatively disinterested and reliable results. The work of. Darwin, Wallace, and their con¬ temporaries stirred an interest in the origin, development or natural history of things biolog¬ ical, which shortly came to include mind. In fact, Darwin himself clearly indicated the pos¬ sibility of learning much concerning the evolu¬ tion of mind in animals and its growth in individuals.

In the latter half of the 19th century, especially from 1860 on, the science of animal psychology was born and vigorously advanced. England and the continent shared in this scien¬ tific achievement ; but to the former belongs the credit of having produced a small group of gifted and devoted students of animal behavior. Romanes, Lubbock, and Morgan did more to create a valuable body of knowledge than had all their precursors from Aristotle onward. Their methods, like those of earlier observers, were crude, but in a measure they abandoned the use of anecdotal materials in favor of direct experimental observation and systematic inquiry.

With the present century came another notable change. The experimental method be¬ gan to be applied systematically to specific prob¬ lems of animal psychology. Earlv observers experimented more or less profitably, but usually with scant control of their materials and for ill-defined purposes. It remained for an American psychologist, Thorndike, to dem¬ onstrate the significant applicability of the

method of experimentation to the study of various important problems of animal behavior. His discussion, in (Animal Intelligence, > of the associative processes of chicks, cats and dogs, at once brought the new science to the attention of biologists.

Presuppositions and Tendencies. — The

old problem of instinct versus intelligence in animals has nearly disappeared. It is generally admitted that many animals in addition to man possess intelligence as well as instinct. To prove the existence of mind in animals, or even the existence of intelligence, is not the task of the animal psychologist. Instead, he strives to describe mind in various organisms and to formulate its laws. Certain psychologists as¬ sume that mind in some form is coextensive with life. Others believe

that it appears at certain undetermined stages in organic evolu¬ tion. For the one group of observers the chief task is that of discovering the forms and func¬ tions of mind in different organisms ; for the other there exists the additional task of deter¬ mining what organisms are conscious. Again, it is assumed by certain observers that mind, as psychic energy, is a factor in behavior, and by others that forms of physical energy are the sole and sufficient conditions of organic be¬ havior, the mental phenomenon being, as Hux¬ ley put it, merely an epiphenomenon. Still other animal psychologists make no assumption in this matter, but patiently work toward definite knowledge of the role of mind in individual life and in organic evolution.

Methods. — The history of animal psychol¬ ogy and its present status alike indicate the prevalence of two methods and resulting kinds of psychological description, — the naturalistic and the experimental. By naturalistic observa¬ tion is meant the study of animals under nat¬ ural and uncontrolled conditions, usually, in a free state ; by experimental observation, the study of animals under definitely controlled conditions for the solution of specific problems. Experimental work is usually done in the pre¬ arranged conditions of a laboratory.

Prior to 1900, almost all of the materials of animal psychology were naturalistic or anec¬ dotal. They were gathered without systematic or thorough effort to control or even to describe the conditions. Such, for the most part, are the contributions of Aristotle, Pliny, Buffon, Huber, Hudson, Wallace, Brehm, Fabre, Burroughs, Seton. These writers have presented valuable accounts, as a result of field observations, of what animals do. The daily life activities of animals, their habits, instincts, education, free play, are the natural objects of interest. Specific problems are not necessarily in the mind of the naturalist. He seeks a kind of natural history of behavior and mind, and this he more or less satisfactorily attains.

Modern experimental work is directed toward definite problems for the solution of which animal and environment are alike com¬ manded and controlled. Whereas the naturalist seeks wood and field and by patient, persistent watching satisfies himself that the young of the cat tribe instinctively captures and kills its prey, the experimentalist places his animal sub¬ ject in an environment which calls forth what¬ ever capacity it may have to respond to prey. The one observer gains intimate and valuable acquaintance with the nature of his animal and

becomes sympathetically familiar with it ; the other proceeds directly to the solution of his problem, often ignoring materials of extreme

interest and value.

Naturalist and experimentalist are alike necessary to the progress of animal psychology. But most to be desired, perhaps, is the combina¬ tion of qualifications and interest in a single individual.

Problems. — Originally, so far as human records go, the instinctive and habitual modes of adjustment to environment fascinated ob¬ servers. Thus we find the ancient literature filled with' descriptions of individual and race preservative activities. With the birth of a more truly scientific animal psychology, evolu¬ tionary problems came to the fore. The de¬ velopment of various functions now commands attention. To-day several fairly well-defined lines of research are conspicuously furthered in important centres. Of these, six seem worthy of special mention and brief consideration as indicating characteristics of the animal psychol¬ ogist's interest. (1) Sensory functions ; (2) the role of the senses, as in orientation; (3) in¬ stinctive or hereditary modes of response; (4) emotional experience and expression; (5) modi¬ fications of behavior, as in habit formation ; (6) ideation and thought processes, together with modes of expression thereof.

Naturally, with these are bound up many problems concerning the functions of the nerv¬ ous system, on the one hand, and the charac¬ teristics of consciousness on the other. But in the main, the present-day student of animal psychology is concerned with behavior and its conditions. If he is deeply interested in mind as a factor, he may be called a psychologist; if not, he should be called a physiologist.

Each of the six varieties of problem men¬ tioned above may now be commented upon in order that the achievements of the science of animal psychology may be indicated.

Sensory Functions. — In no field of inquiry has more notable progress been made than in the study of the senses and their role in be¬ havior. The few and crude methods of research employed by the pioneers of the last century have been replaced by varied and refined methods. Nowhere is the contrast and the extent of progress more evident than in the study of color vision.

For several decades, and up to about 10 years ago, it had been customary to test the color sense of animals by noting their responses to colored objects in nature or by arranging colored surfaces so that one color should be sought, another avoided. Food was usually associated with the color to be chosen. The older naturalists and

experimentalists unhesitat¬ ingly attributed color vision of some sort to many insects and to all vertebrates.

Critical consideration of color stimuli and of the nature of animal response has indicated, during the past few years, that colored objects may be responded to specifically for various reasons, important among which are (1) color;

(2) lightness or intensity of visual stimulation ;

(3) pattern or texture of the stimulating sur¬ face; (4) apparent distance from the eye; (5) size; (6) form or shape; (7) odor or taste; (8) temperature or electrical condition; (9) tactual quality, and so on.

Only if the possibility of response to all

other sensoiy factors is eliminated or controlled can the observer be certain of color vision.

lo-day, instead of using two colored balls or bits of colored paper, the skilled and cau¬ tious animal psychologist demands for his study of color vision adequate physical means of ob¬ taining pure color stimuli, of controlling them in their various aspects and of measuring both stimuli and response.

. Modern experiments indicate that color vision is less widely distributed among animals than has been supposed. Mice and rats, if not also other rodents, possess little or no ability to distinguish colors. Cats and dogs, if not color blind, possess color senses radically differ¬ ent from the human. The color vision of bees, wasps and ants is very imperfectly known. In certain birds, color sensitivity is highly de¬ veloped. This is true, likewise, of monkeys, anthropoid apes and probably of several other mammals.

What has happened in the case of color vision is happening also for other senses. The thorough study of the senses of any particular animal requires infinite time and patience. Sight, hearing, smell, taste, touch, internal senses must be studied before the life of an animal can be adequately described, — indeed, before certain of the most important and inter¬ esting problems of habit formation can be solved. The psychology of the senses is the foundation of the modern science of animal psychology. It is difficult to exaggerate its

importance.

The Role of the Senses: Orientation. — When it is asked, how an animal can recognize and satisfactorily respond to a particular object or situation, the senses immediately come to mind, for it is their chief role to supply the guiding factors of response. So apparently simple a reaction as orientation with respect to a source of light is controlled, doubtless, by sensory processes. In fact, all forms of orienta¬ tion to near and distant objects would appear to be conditioned by the various senses. Thus, the carrier pigeon flies many miles to its cote ; the horse, dog, or cat finds its way home ; the flock of birds migrates over a long distance ; the nesting bird, insect or mammal locates its home spot, and each presumably because few or many of its senses are guiding it. It there¬ fore appears that the careful study of the senses is essential to an understanding of .many of the most interesting and puzzling things that an¬ imals do.

The problem of animal orientation, especially distance orientation, has been attacked experi¬ mentally by none so successfully as by the American psychologist, Watson, who has worked chiefly with white rats and terns. What Thorndike did for animal psychology in general by his pioneer study of cats and dogs, monkeys and chicks, Watson has done for the important problem of orientation.

Instinct: Hereditary Response. — Scientific progress has definitely settled the quarrel con¬ cerning instinct and intelligence, for it has been proved that intelligence is possessed by other animals than man and that instinct is widely distributed in the animal kingdom. Human in¬ telligence differs importantly from, that of any other animal, but so does the intelligence of the chimpanzee from that of the cat.

Experiments have further demonstrated that

instincts are not perfect and invariable from their first appearance, but instead become modi¬ fied and perfected with use. They are inti¬ mately related to habits, and in most animals form the basis for systems of habits which are developed through experience.

Studies in the heredity of mental traits and modes of response have been initiated by animal psychologists, and there are indications that the heretofore baffling problem of the origin and mode of development of instincts may shortly be solved. The modern experimental literature on instinct contrasts sharply with the older lit¬ erature, for it presents definite facts in place of. speculative imaginings, endless discussions, a priori definitions and theological

disputes.

A single example from modern experimental work must suffice to illustrate its characteristics. By Breed, the instinctive feeding behavior of young chicks has been observed, and on the basis of controlled experiments, he is able to affirm that the pecking reaction improves in definite, fashion with use, and indeed becomes the basis for complicated feeding habits.

Instinct is being brought into closer and closer relation to habit. It no longer stands apart as something mysterious, God given, un-modifiable, but instead as the hereditary or innate factor in a complex system of responses.

Emotions . and Their Expressions. — Fear, anger, astonishment, joy, are being studied to¬ day in other animals as they have been studied for years in man. The animal psychologist evidently realizes that he must discover new methods to supplement those of human pyhsi-ology and psychology.

Most promising among the innovations is the so-called reflex method, by which the variations of some particular reflex response in connection with emotion-evoking situations are measured. Heart-beat, respiration, salivary secretion and the functioning of various other glands are be¬ ing used by this method. The brilliant Russian physiologist, Pawlow, has perfected a method of using the salivary reflex in the study of the functions of the nervous system, and the method is now being adapted by animal psy¬ chologists to inquiry into the emotional or affec¬ tive responses of various animals.

Modifiability of Behavior or Habit For¬ mation. — Loeb and other physiologists and psychologists have held that the ability of organisms to profit by experience is evidence of the existence of consciousness. This cri¬ terion or test of consciousness is no longer widely accepted because of certain obvious weaknesses, but the suggestion of it stimulated observation. It appears from the results which have been accumulated that the behavior of all living beings can be modified more or less mark¬ edly and lastingly. It also appears that the nature of the modification as well as the rapid¬ ity with which it develops varies from organism to organism. Thus, whereas a single stimula¬ tion by a hot object may establish in the human infant relatively permanent avoiding reactions, the less highly organized creature, such as fish or frog, guinea pig or rat, may come to avoid the dangerous stimulus only after a number of repetitions.

Again, experimental results indicate that there are many important kinds of habits in the animal kingdom. Some involve adjustment only to present conditions ; others to conditions

which are temporally or spacially more or less remote. Some are dependent upon the initia¬ tive of the animal; others upon social stimuli. Some are evidently influenced by the results of activity ; others seemingly are not.

There is no single field of inquiry, not ex¬ cepting the senses, in which animal psychology has made more significant or more widely in¬ fluential progress than in that of the modifia¬ bility of animal behavior, habit formation, memory, imagination, the learning processes. Many new types of method have been devised, and results of obvious importance to education, to medicine, as well as to physiology and psy¬ chology, have been recorded.

The maze method, a contribution of animal psychology to biology, offers the possibility of analyzing the learning process. The sensory discrimination method enables an observer to isolate and measure the values of various im¬ portant factors in habit formation. The im¬ portance of the number and frequency of repe¬ titions of an act, the value of punishments and rewards, the mutual relations of habits and the tendency of training in one direction to facili¬ tate or interfere with effects of other kinds of training are being persistently and success¬ fully investigated.

Ideation and Reasoning. — The study of ideas, associative processes, thoughts, reasoning, is regarded as difficult. Thorndike undertook the task and achieved remarkably interesting results, but his lead was not directly followed. Instead, interest turned to the study of the senses and of habit formation. Only recently have the problems of complex behavior of the ideational sort been once more brought to the front.

Various forms of animal behavior, some doubtless ideational, others probably not, have been observed, and initial attempts are being made to analyze them. The methods of re¬ search are of considerable interest and may be briefly described.

Cole, working with raccoons, used a simple apparatus in which a number of levers served to present color stimuli. The color, the order or the number of visual stimuli presented indi¬ cated food. The animals learned to expect food as a reward on presentation of a certain visual stimulus or series of such stimuli. They even discovered how to work the levers for them¬ selves in order to cause the desired stimuli to appear. Cole considers their behavior as imagi¬ native, that

is, indicating the functioning of ideas.

For the purpose of exhibiting the reactive tendencies or capacities of different kinds of animal, Hamilton devised an ingenious method and apparatus. He places his subject, animal or man, in a room on one side of which there are four doors, all closed. According to a prear¬ ranged scheme, one of these doors will open when approached by the animal and allow it to escape to food and freedom. In that particular trial, all of the other doors are locked. In the next trial, the door which previously was un¬ locked is locked, and some one of the other three doors will open when approached. In each 100 trials, each door is unlocked 25 times.

> The question is, How will any animal meet this practical situation, ideationallv or other¬ wise, effectively or ineffectively? As Hamilton has shown, there are various degrees of ade¬

quacy or effectiveness of response possible. These may be spoken of as types of reactive tendency.

The method of Hamilton may be used sys¬ tematically to obtain knowledge of the reactive tendencies, that is, ability to solve a particular type of problem in various types of animal (he has studied cats, dogs, horses, monkeys, gophers, rats and human subjects), the same type of animal at various stages of development, as for example, in infancy, childhood, adolescence, and so on, or in various conditions of disease or defectiveness.

By Hunter, yet another ingenious means of testing for ideas has been devised and applied. It is called the delayed reaction method. The apparatus is so arranged that an animal may escape from confinement in a box and obtain the reward of food by selecting and passing through a certain exit passage. The particular passage to be selected from among others in a given trial is indicated by a light. Many ani¬ mals, such as mice, cats, rats, raccoons, quickly learn to go directly to the passage which is illuminated. This habit having been definitely established, the experimenter, before permitting the animal to make definite choice of a par¬ ticular passageway, turns off the light. It then becomes necessary for the animal to choose its path in the absence of the indicating stimulus. The question in the mind of the experimenter in this method is, Can a given animal correctly choose its way of escape on the basis of a signal which no longer exists, unless it be in its own consciousness or brain? If so, how long after disappearance of the indicating light is correct response possible, and what is the nature of the process by which choice is made?

It has been found that rats can make their choice correctly after being forced to wait for 10 seconds; raccoons, after a delay of 25 seconds ; dogs, after 300 seconds ; children, after 25 minutes. And it is conceivable that the human adult might respond properly even after an interval of many months, were the matter of extreme importance.

This ability to respond appropriately to stimuli or situations remote in time or space is indicative of what the psychologist terms im¬ ages or ideas, the representative conscious process. Thus, the method of delayed reactions tends to throw light on the ideational character of animal behavior.

Yet another method of studying the associa- tional and ideational behavior of animals in¬ volves the presentation of problems of various sorts which demand ingenuity and initiative. This is called the problem or puzzle box method. It was first extensively and systematically used by Thorndike.

The animal is placed in a box from which it may escape to food, which is visible outside, by operating some simple mechanism as, for example, a latch, bolt, lever or pedal. . It is the observer's purpose to learn whether the animal can discover the relation of means to ends, or having accidentally happened upon the correct act or series of acts, can skillfully and with ap¬ parent insight perform the necessary act when next required to.

Thorndike's discussion of how cats and dogs learn to solve simple and novel problems and Kinnaman's similar studies on monkeys indi¬ cate that these animals learn very largely by a

process of trial and error. They give slight ground for the assumption that free ideas exist and influence behavior.

Those with a penchant for ideation in ani¬ mals will take greater satisfaction in the ex¬ periments of Hobhouse, since he finds varied evidence of what he considers animal ideas.

As a last example of current methods of in¬ vestigating ideational behavior, one devised by Yerkes may be briefly described. It, too, is a problem method. As used for human subjects, the apparatus consists of a series of 12 similar keys, any number of which may be used in a given experiment. For lower animals, a series of boxes, each with an

entrance door and an exit door, takes the place of the keys.

The animal's task is to select from any group of boxes whose entrance doors are open that one which bears a particular spacial rela¬ tion to the remaining members of the group, the relation having been determined in advance by the experimenter. Thus, the right box might, in one series of observations, be defined as the middle one of the group. The animal would be rewarded when it entered the middle box by presentation of food and punished by confinement in a given box each time it chose incorrectly. It, therefore, tries to make only correct choices. This is possible only if it can perceive the relation of middleness and react to it positively. Problems varying in difficultness from the extremely simple and easy to those practically insoluble by human beings can be presented by means of the multiple choice ap¬ paratus. The method promises to be fruitful of important results in animal psychology, psychopathology, and to contribute abundantly to the materials of genetic psychology.

Animal psychology is an infant science, or part-science. It has tremendous advantage over human psychology in the greater controllability of its subjects, for lower animals can be used in experiments which are either extremely dif¬ ficult or impracticable in the case of human subjects. So vigorous has the new science be¬ come that its methods and results are pro¬ foundly influencing the development of the general science of psychology and contribut¬ ing abundantly to the advancement of genetic psychology. See Genetics; Comparative Psy¬ chology ; Genetic Psychology ; Psychology..

Bibliography. — Ancient: Aristotle, 'His- toria Animalium5 (trans. by Thompson). Early Modern: Darwin, Expressions of the Emo¬ tions in Man and Animals) (London 1872) ; Loeb, Comparative Physiology of the Brain and Comparative Psychology5 (New York 1900) ; Lubbock, 'On the Senses, Instincts, and Intelligence of Animals) (London 1888) ; 'Ants, Bees and Wasps) (ib. 1892) ; Morgan, C. Lloyd, (Animal Life and Intelligence5 (Bos¬ ton 1891) ; 'Habit and Instinct) (London 1896) ; 'Animal Behavior) (1908) ; (Intro¬

duction to Comparative Psychology5 (London 1894) ; Romanes, G. J., (Mental Evolution in Animals5 (ib. 1885) ; 'Animal Intelligence) (New York 1911) ; Schneider, G. H., 'Der tierische Wille5 ; Wasmann. E., 'Instinct and Intelligence5 ; Wundt, W., (Human and Animal Psychology5 (New York 1905). Late Modern: Bohn, G., 'La Naissance de ˆintelligence5 ; Hamilton, G. V., 'A Study of Trial and Error Reactions in Mammals5 (Journal Animal Behavior, Vol. I, 1911) ; Hobhouse, L. T.,

‘Mind in Evolution5 (1909) ; Holmes, S. J., ‘The Evolution of Animal Intelligence5 (1911) ; Hunter, W. S., (The Delayed Reaction in Ani¬ mals 5 (Behavior Monographs, No. 6, 1907) ; Jennings, H. S., ‘The Behavior of Lower Organisms5 (New York 1906) ; Kafka, G., ‘Einfiihrung in die Tierpsychologie5 ; Lucas, F., ‘Psychologie der niedersten Tiere5 ; Schneider, K. C., ‘Vorlesungen fiber Tier¬ psychologie5 ; ‘Tierpsychologisches Prakti- kum5 ; Thorndike, E. L., ‘Animal Intelligence5 (New York 1911); Washburn, M. F., ‘The Animal Mind5 (ib. 1908) ; Watson, J. B., ‘Ani¬ mal Education5 (1903); ‘Behavior: an Intro¬ duction to Comparative Psychology5 (1914) ; Wheeler, W. M., ‘Ants: Their Structure, De¬ velopment, and Behavior5 (Boston 1910); Yerkes, R. M., (The Dancing Mouse5 (New York 1907) ; ‘The Mental Life of Monkeys and Apes5 (ib. 1915). Journals and other Periodicals : The Journal of Animal Behavior ; The Animal Behavior Monographs ; The Jour¬ nal of Comparative Neurology and Psychology (now the Journal of Neurology) ; The Animal Behavior Series.

Robert M. Yerkes,

Professor of Psychology, University of Minne¬ sota.

ANIMAL WORSHIP, a practice found to prevail or to have prevailed in the most widely distant parts of the world : in India, where it is a consequence of the belief in the transmigra¬ tion of souls, according to which the soul of a god may pass into the body of an animal ; in the heart of Africa, where it is still in life; in South America, where very remarkable instances of it were met with by the earliest Spanish visitors; but its most extraordinary develop¬ ments were in ancient Egypt. Nearly all the more important animals found in the country were regarded as sacred in some part of Egypt. Some animals were held sacred throughout the whole land, but in many cases the animals en¬ joyed a local reverence only; an animal that was worshipped in one nome might be an ob¬ ject of aversion in the next and destroyed at every opportunity. The degree of reverence paid to the sacred animals was such that the voluntary killing of one was punishable with death, and if any one killed an animal involun¬ tarily in a nome in which it was held sacred he was punished by a fine. Throughout Egypt the killing of a hawk or an ibis, whether volun¬ tary or not, was punished with death. So strong was the feeling of the people on this point that when it was of the utmost impor¬ tance to the Egyptians that they should con¬ ciliate the Romans, even the intercession of the king was impotent to save from the fury of the people a Roman soldier who had killed a cat. The animals were regarded as sacred to the deities, and the worship paid to them was symbolical. The Egyptian

idols always bore on a human body the head of the animal sacred to the god represented by the idol Only in three cases were certain animals believed to be incarnations of the deities themselves. These were at Memphis, where the bull Apis was worshipped as an incarnation of Phtha ; at Heliopolis, where the bull Mnevis was rever¬ enced as an incarnation of Osiris ; and at Men- des, where a goat received worship as an in¬ carnation of Khem.

ANIMALCULE, the diminutive of animal ; an old name applied to animals of microscopic size, and now frequently used for many Protozoa, such as the Amoeba and various In¬ fusoria. The term is not now used in zoology in any strict significance, nor employed in classification.

ANIMALS, Chemical Sense in. Almost all animals exhibit specific responses to chemi¬ cal stimulation. In Amoeba proteus food-particles are ingested by the formation of a sort of invagination that surrounds them, whereas this is not true of bits of inedible material. I 1 many species of Ccelenterate we find that though contact with an inedible body produces a reaction of aversion, contact with food is followed by motions leading to its in¬ gestion. In other cases, as with Carmarina hastaia , though the reactions to chemical and mechanical stimulation are qualitatively simi¬ lar, the local sensitivity to chemical stimula¬ tion is independent of that to mechanical stimulation. In planarians the general evi¬ dence for the chemical sense resembles that in Coelenterates. According to Lehnert, a land planarian, Geodesimus bilineatus, is able to per¬ ceive the existence of food with which it is not in contact. This is the first place in the animal scale where we have evidence of any sense analogous to smell, which perceives chemical substances in the form of vapor, as apart from taste, the sensitivity of which is limited to substances in solution. This distinc¬ tion, be it noted, has only meaning in land-ani¬ mals. In most planarians, however, chemical stimulants only act on contact.

With the earthworm, the evidence for the existence of a specific chemical sense is very slight. Responses to chemical stimuli exist, and even to stimuli at a distance, but they are o- the same nature as the responses to mechani¬ cal stimuli. The only reason for regarding the chemical sense as distinct is to be found in the different speeds of the reactions to different chemical excitants.

There is good evidence for the existence of a rather sensitive chemical sense in the echino- derms and in many molluscs. In the snail, smell is apparently most acute at the ends of the feelers, but is not confined to them. An analogous distribution of chemical sensitivity is found in many crustaceans, where the anten- nulae and the mouth-parts constitute its chief, but not its sole, organ.

The first place where we find evidence of a varied and sensitive set of chemical reactions is in the insects, and more particularly in the higher hymenoptera. The marvelous powers which are possessed by bees and ants of find¬ ing their way to their hive or nest and to their food, of recognizing whether an individual belongs to their colony or not and of taking care of their young, are to be attributed in a large measure, at least, to the acuity of their sense of smell. Though the mechanism of all these actions is still a matter of the gravest uncertainty and dispute, there is evidence that in the ants of the genus Stenamma the percep¬ tion of different sorts of odors is located in different segments of the antennae, which are the principal olfactory organs in all insects. The individual odor of an ant is perceived by means of the tenth segment of the antennae, the

race odor by the eleventh and the nest odor by the twelfth.

In the lancelet, there is not much evidence for the separate existence of a specifically chemical sense. While fishes, reptiles and amphibians possess organs structurally and historically similar to the smell and taste organs of man, little is known about their function. The so-called terminal buds of fishes, resembling the taste-buds of man, are found not only in the mouth but sometimes over the whole surface of the body, but it is not completely established that they exercise a gustatory function. The existence of taste has been established in birds but little is known about their sense of smell. The taste and smell sensations of mammals would seem to bear a great resemblance to our own, though they are often far more sensitive, as in the dog. See Taste and Smell.

Norbert Wiener.

ANIMALS, Classification of. Classifi¬ cation is simply sorting out — arranging differ¬ ent things according to their likeness, putting them into groups. To these groups names are given for convenience in referring to them, and thus arises the terminology of this department of knowledge, which is the technical language of science broadly considered. In the present article, however, the writer purposes to confine himself to organic nature, and chiefly to zoology.

The ((sorting out® alluded to above is very simple and easy at first. The child undertakes it in the kindergarten when he separates blue papers from red, square blocks from round ones, the long sticks from the short. But pres¬ ently something combining more than one qual¬ ity is encountered, and the question arises : Shall I put this on this pile or on that? An infant in a kindergarten who picked up a red ball might well hesitate whether to place it with the red things by virtue of its color, or on the spherical pile by virtue of its shape. This illustrates the cardinal difficulty that has em¬ barrassed all classifiers, and has caused so great a diversity of schemes for the orderly arrangement of natural objects. Probably the only perfect classifier is nature herself, in the form of that mysterious and marvelous selector, chemical affinity. Human intelligence is less well informed as to the real constitution and affinities of the objects, animate and inanimate, that man's senses perceive, and, for the present, his arrangements of them must be imperfect and tentative. Hence classifications of the various groups, or even the limits of the groups themselves, may and do vary in at least two directions — first in the selection of a standard of comparisons, and second in knowledge or opinion of relationships.

At first, as was natural, superficial resem¬ blances sufficed to group seemingly like objects. This brought worms, spiders and insects into one lot, classed bats with birds, whales with fishes and so on. But a closer examination soon revealed these and lesser incongruities. It was ascertained that every known bird was clothed in feathers and reproduced itself by eggs. The bat, although it flew in the air, was covered with hair, brought forth its young alive and suckled them ; those were the most conspicuous and universal characteristics of

mammals. So the bat was a mammal that flew. Fishes were found to be always covered with a more or less scaly skin and breathed the air within the water by means of gills. The whales were found to breathe only atmospheric air, brought forth living young and suckled them. Plainly it was wrong to put them among the fishes, although they lived in the water — they were mammals. Thus arose the concept that fundamental structure was a better criterion by which to classify than external likeness.

Artificial Schemes. — In the early days the knowledge of animal structure was very limited. Comparative anatomy had hardly been thought of, and, indeed, arose into a defi¬ nite science largely because

of curiosity as to classification. Meanwhile naturalists wanted to group their facts, pigeon-hole and label their increasing information, which more and more was falling into coincidences and suggesting new comparisons and contrasts. Hence the early attempts at classification were frankly for convenience, hardly more scientific than the pigeon-holes in a clerk's desk. The crowning example of this, probably, is the "system® by which Linne (Linnaeus) arranged the plants of the world.

The makers of all these "artificial® arrange¬ ments, as they were called, were ever seeking for the best, the most comprehensive features by which to work. Some were fantastic, as the "circle® theory of Macleay and Vigors ; others sensible and useful. An arrangement of birds long in vogue was by the form of their feet, by which all birds were separated into several "orders® according as they were seizers, run¬ ners, climbers, etc. This was utilizing function as a criterion, and only hinted at structure.

But the untruth of this method was early perceived by some systematists who insisted that structure was the true foundation on which to erect what they styled a "natural® classification. Hence arose a classifying of classifications into two categories — the artifi¬ cial, for convenience, as a scaffolding for study ; and the natural as an expression of real truth. To some extent these lines of thought and work still exist, but the former has been nearly abandoned.

Seekers after truth of relationship by study of structure — forms of organs, morphology — increased in number from the early 17th century onward, and their accumulated in¬ formation, published in various partial schemes, together with his own exten¬ sive investigations, gave material for the first grand generalization in zoology — that by Georges Cuvier (1769-1832), whose fame was popularized in this country by the most talented of all his pupils, Louis Agassiz, himself a great investigator and the author of a remarkable "Essay on Classification.®

Cuvier's " Plans of Structure.® — Cuvier thought himself able to separate animals into four groups, distinguished by four "plans of structure,® which had been assigned by the divine Creator, and which were of equal rank. These were: (1) Vertebrata, char¬ acterized by an internal skeleton, an_ essen¬ tial part of which was a backbone ; it com¬ prised mammals, birds, reptiles (including batrachians) and fishes. (2) Mollusca, char- n acterized by a massive type of body, without ' bones ; the mollusks, brachiopods, tunicates,

etc. . (3) Articulata, with bodies composed of ring-like segments; the insects, crustaceans, annelids and spiders. (4) Radiata, character¬ ized by a radial arrangement of all the parts around a vital focus; star-fishes, polyps, worms, and animalcules.

Those four “plans of structure,® ordained from the beginning of things, Cuvier regarded as great facts; and Agassiz objected to all those like Leuckart, Vogt and others, who criticized or modified this arrangement, that they were considering too much complexity of structure and losing sight of “plan® or “type.® Agassiz pointed out that Cuvier’s divisions combined their various subdivisions ; and that this was a great step forward, even if he had not the correct measures for all his groups. “For we must remember,® said Agassiz, “that at the time he wrote naturalists were bent upon establishing one continuous, uniform series to embrace all animals, between the links of which it was supposed there were no unequal intervals.® The watchword of their school was “Nature makes no leaps®; they called their system the “Chain of Being.®

Nevertheless these views were not accepted by all investigators. One after another the leaders in biological science proposed modifica¬ tions, especially as to the Radiata. Ehrenberg in 1836 departed altogether from the Cuvierian notion, and laid down the principle that the type of development is one and the same in all animals from nomad to man; that is, he set aside the idea of “plan,® and erected a classi¬ fication on purely anatomical grounds. That of Owen, a few years later, had a similar basis. Both assembled in their schemes groups that were heterogeneous, and gave varying rank to similar aggregations. The result was that neither was much accepted. Von Siebold, in 1845, added to Cuvier’s four plans or types of structure two more — Zoophyta and Vermes — asserting that they had equal rank with the others, and Leuckart accepted them. Later Von Baer, the great embryologist, offered a classi¬ fication based on mode of development from an egg to maturity, and other embryological systems were made by Van Beneden, Rolliker and Vogt.

All these men multiplied facts, cleared up subordinate relationships, and, by the different angles from which the subject was viewed, broadened knowledge immensely. The effort of all was to find a standard that could be applied uniformly, and would necessarily reveal the true place in nature of every living thing. If a perfect order in organic nature existed, then approaches from the point of view of the embryologist and from the point of view of the anatomist ought to arrive at the same result — the real condition — the truth. Thus far it had not done so except in favorable cases. One method would

logically assign an animal, a plant or a well-defined group to a certain place in the system which would be quite negatived by other considerations.

Search for “Natural® Scheme. — Facts of biology accumulated, but a connected system for “natural® classification of them eluded all searchers. That this should be the case is not surprising when one recalls that it was be¬ lieved by all the older zoologists, except a few advanced thinkers, whose views were usually scouted, that the individuals of each kind of animal were descended from their own peculiar

ancestor; that this original pair was totally unconnected with the ancestor of any other line, having, as Buffon asserted, ˆparticipated in the grace of a distinct creation® ; that a species so created was forever unchangeable.

Classifiers sought to perfect their apprecia¬ tion of resemblances, and constantly used the word relationship, but this term, when em¬ ployed with reference to two kinds of animals having a wholly independent origin, was of course used in a purely metaphorical sense. It was not until the prevalent idea outlined above was discarded that relationship took on its real significance and became the key-word in class¬ ification; and this came about only when the doctrine and facts of organic evolution — that is, transmutation of forms of life through vari¬ ation in descent — destroyed the earlier concep¬ tion of the origin and history of living things on the globe. Then it was that all the avenues of inquiry (anatomy, embryology, geographical and geological distribution, adaptations to habits, etc.) led to the same point, indicated the true place in nature of each animal or group — true because it had become so by de¬ velopmental heredity. Instead of four or six or some other number of parallel <(plans® of immutable structure, it became plain that ani¬ mal life and plant life represented only one progressive, enlarging and ever-varying scheme of adaptative and fruitful beings.

This compelled the discarding of another old assumption, one on which, in fact, all previous schemes of classification had rested, namely, the existence and fixity of ˆspecies.® This word came into use in zoology and botany at the beginning of the 18th century, when John Ray applied it to indicate a group of animals and plants with

common characteristics that would interbreed freely. (This last test has been popularly considered definite, although not universally true.)

<(Linnseus,® says Prof. William B. Scott in his (History of Land Mammals) (1913), ˆregarded species as objective realities, con¬ crete and actual things, which it was the nat¬ uralist's business to discover and name, and held that they were fixed entities which had been separately created. This belief in the fixity and objective reality of species was al¬ most universally held until the publication of Darwin's (Origin of Species> (1859) converted the biological world to the evolutionary faith, which declares that the only objective reality among living things is the individual animal or plant.®

Descent the Test of Relationship. — This conception upset completely all previous methods of determining relationship — the basis now, as always, of classification ; and gave to that word a new and proper definition, namely, association by blood-connection de¬ rived through descent from the same stock.

The term had been so used with refer¬ ence to human affinities, and this meaning was now extended to all living things, as was right and natural. A man's relatives are those who belong to the same family-stock; the relation¬ ship between them is one of blood and inherit¬ ance. The same is true of horses, or sparrows, or fishes, or snails. Any recognizable relation¬ ships are those produced by common descent ; and when these are unrecognizable the search for them must be along lines of ancestry.

Hence the vast service of palaeontology has ren¬ dered to classification of living things — the same kind of service for the brute world that the study of genealogy has rendered to human history. Palaeontology reveals the genealogy of the animal world so far as its materials permit.

Genealogy, then, is the guide to the classifi¬ cation of the individual, whether human, quad¬ ruped, bird or lowly worm; and the old-fash¬ ioned <(plans of structure® are merely helpful indications of probable community of descent. They exhibit the groups that have resulted from the more or less gradual variations, pre¬ historic divergencies, and frequent extinc¬ tions of intermediate lines, that have affected the descent of animal life from some original source. Biological classification is the expres¬ sion of heredity.

The matter is commonly symbolized by a tree growing from seed and root to trunk, splitting into limbs that spread out in various directions,

putting forth lesser divergent branches and finally innumerable twigs. Many branches flourish to the very tip ; others remain short ; others produce twigs ; others die and disappear. Species are the latest twigs ; the lesser branches from which they spring may represent genera, families, orders, and classes, until at last the root-trunk is reached. The figure is incomplete and inadequate, but is helpful.

The newest, that is the most modern and simple manifestation of arrangement in the living world, is the species, which we may now define as an assemblage of individuals more closely related by common descent to one another than to anything outside their class. All the members of a species will interbreed, and, as a rule, will not interbreed with any other species, or at least will not produce fer¬ tile offspring. Some species are very distinct in their characteristics, others vague ; some are exceedingly numerous, others contain few in¬ dividuals ; some are strictly local in their hab¬ itat, others exist over an immense area ; some appear modern in their origin, others may be traced far back in the zoological record; some are remarkably uniform, others vary largely, so that systemists create <(sub-species® or (<geographical races® to demark their variations, which some regard as ((nascent® species.

The species, then, is the unit of classifica¬ tion, and its characteristics are mainly external peculiarities of contour and color, which by their very nature are impermanent. Let us take as an example of a species our common cat, which is, in the main, simply a domesticated form of the Egyptian wildcat, known in zo¬ ology as Felis libyca.

The earliest naturalists gave long descrip¬ tive names to animals and plants. Ray, Lin¬ naeus, and students after them have reduced these to two, and have used Latin (or Latin¬ ized) terms in order to identify the subject in all languages, and thus avoid the confusion and inaccuracy of vernacular names, which often are applied ignorantly or carelessly to very dif¬ ferent creatures. Our Canadian moose is vir¬ tually the same animal as the elk of north¬ ern Europe ; but the <(elk® of this country is not that at all but a deer closely related to the red deer of the Old World. A Japanese has no trouble in distinguishing them, however, when he reads of Alces 7nalchis (the European elk)

and Cervus canadensis (the American <(elk®). This is called the

binomial system of nomen¬ clature; and sometimes geographical varieties are designated by a third (trinomial) name, as Sturnella magna argutula, our Western mead¬ ow-lark.

After this digression on the form of specific names let us resume our account of the develop¬ ment of the scheme of arrangement of animal life.

Relative Rank in Classification. — As one

surveys the world he finds two or more species with a certain close resemblance that separtes them from others, and these he unites into a secondary group called a genus.

For instance, kinds of cats, different in habitat, size, coloring, etc., have the same general features of a comparatively elon¬ gated body, long tail, and small, plain ears; they are united in the genus Felis, with differ¬ ent specific names, as Felis libyca, Felis catus, Felis leo, etc. — the binomial being the generic and the specific name used together like Smith, John; Smith, George, and the like. But there are other kinds of cats that agree in having heavy bodies, short tails and tufted ears. These are recognized as forming another genus Lynx, and we have of these several species, as Lynx canadensis, Lynx pardalina, etc.

These several genera may now be united by common characteristics into a higher group called a family, the name of which in zoology always ends in the suffix idee, and is likely to be taken from the name of the most prominent genus as Felidce, the cat family. (Large fami¬ lies are often subdivided into sections or sub¬ families designated by the termination ince) . This family group is based on a combination of the features that ally all its constituents, and at the same time separate it from other groups of equal rank, and these are usually features of structure, rather than of form or appearance, such as the form and number of the teeth, adaptations of limbs to a special mode of life, etc. Sometimes these are very marked. For example, the family of the cats differs from that of the dogs or bears or weasels in having claws that may be withdrawn into a sheath — a distinction of family rank. The cattle family (Bovidce) includes a wide variety of forms — neat cattle, sheep, goats, and antelopes — but is separated from the deer family (Cervidce) by the fact that all have hollow but permanent horns, while the deer have solid, deciduous horns (antlers). It is such broad characteris¬ tics that make family rank; and now and then families represent divergencies from their al¬ lies so great that only a single genus, perhaps containing but one species, is given family rank. This is the . case with our American pronghorn.

The fourth rank is the order, containing a collection of families believed to have con¬ sanguinity or descent from a common stock. To determine this by the detection of a com¬ mon characteristic, usually of intimate struct¬ ure, is sometimes easy, as in the case of the order Carnivora, or beasts of prey, whose sign is the character of the teeth, and particularly the presence of the prominent canine tooth, so strongly developed in the cats, which are highly representative of that order. Orders are usually large and comprehensive groups, and often may be divided into well-marked sub-orders, as,

in this instance, the Pinnipedia, or fin-footed carnivora (seals and walruses) and the Fisi- pedia, or toed carnivora (land beasts of prey) ; and most orders include several extinct fam¬ ilies. It is probable, also, that the Carnivora and certain others ought to form a super-order Creodonta, ancestral to them. When one is dealing with groups as large and widely sep¬ arated as orders, is it possible to discover any features possessed by all that will enable us to collect them into a still higher group? It seems doubtful, when one recalls the diversity in the one group alone chosen for our illustra¬ tion. Here are 11 orders (not counting extinct ones) represented by animals so diverse as the duckbill, kangaroo, sloth, ox, manatee, whale, cat, mouse, mole, bat, and man. Have they anything in common ? Much ; and par¬ ticularly two prominent features that separate them from all other animals — their covering of hair, and their nourishing their newly-born young on mother's milk. Hence they go to¬ gether into a still larger group called a Class — the class of mammals (Mammalia) . In this class are two sub-classes, Prototheria (duckbill and the echidnas), and Eutheria (all other mammals).

The mammals are equal in rank with the classes Birds, Reptiles, Amphibia, Fishes, Round-mouths, and several others formerly re¬ garded as worms or mollusks, all of which possess one feature of prime importance — a notochord, the prototype of the spinal cord and backbone of the more highly developed forms. This unites these otherwise so varied classes into a still broader aggregation or "phylum,® the Chordata. Beyond this are only two words — Animal and Plant, indicating the two grand kingdoms of life in the world. Even these, however, are so essentially alike in their simplest form, the monad, that they are doubt¬ fully distinguishable at that point of contact, and may be combined under the term organism.

Here, then, ends our inquiry into the place in nature of our example. The animal organ¬ ism called "cat® is a chordate, eutherian, car¬ nivorous mammal of the family Felidce, genus Felis, and species libyca.

Such is the schematic history of a single animal, and it represents not only its place in nature, but its phyllogeny, that is the line of its evolution from a primitive monad to the com¬ plexity and finish of an animal highly adapted to a certain manner of life.

Biological classification is now, therefore, on a sure, philosophical, scientific basis. It has but one principle — that of descent — blood affinity. The problems are those of perception : to detect the evidence of genetic relationship. To this every fact of investigation, from the embryolo¬ gist's microscope and the anatomist's scalpel to the geologist's hammer and the field-naturalist's notebook, contributes ; and no longer is any artificial grouping possible, except on account of an ignorance that study will correct, or as a theoretical suggestion that must be proved before it is acceptable.

In the present article only a single kind of animal has been considered. The process is the same for all others, but different criteria must be employed in the various groupings, and even different terms used, or the same term with different limits. Thus "family® is a far more comprehensive and important group in

botany than in zoology. Moreover the diverse temperaments of classifiers lead them to vary in closeness of distinction. Some men see specific or generic differences that others do not admit, wishing to ignore the minute differ¬ ences that the former deem important. The tendency is toward the broader view.

Ernest Ingersoll.

ANIMALS, Cruelty to. The earliest laws for the prevention of cruelty to animals were passed in England, whence the movement spread to the Continent, and the United States. The first society for the prevention of cruelty to animals in the United States was chartered in 1866; and the agitation by similar societies has resulted in laws in almost every State provid¬ ing for the punishment of cruelty to domestic animals by fines from $5 to $100, imprisonment from 30 to 60 days, or both. These societies work also to prevent cruelty by education, ad¬ vice, and personal effort in enforcing the law.

ANIMALS, Diseases of. Domesticated animals suffer from a large number of diseases. They are the cause of the greatest loss to the animal industry of the country. Considered economically, the

infectious diseases alone are conservatively estimated to have caused a direct loss to this country of $212,000,000 in 1915. The indirect losses and those from other dis¬ orders can neither be determined nor approxi¬ mately estimated. The diseases of animals may be divided into three groups, namely: (1) general diseases; (2) specific infectious diseases; and (3) those caused by animal parasites.

The general diseases are physical disorders that result from improper care of the animals, including food and shelter, and those that are produced by infections that result in local in¬ flammations leading to abscesses, ulcers, local tissue necrosis, or a more general disturbance such as bacteriaemia or blood-poisoning. The different species of animals vary in their power of resistance to common infection. The horse kind is quite susceptible while the bovine species are more resistant to wound infection, and fowls are practically immune to ordinary pyogenic bacteria.

Animals suffer quite extensively from in¬ flammations and degenerations of the various , organs and tissues the causes of which are not very satisfactorily explained. It is believed that autointoxication is the origin of many of these conditions. Disturbances of the digestive tract as observed in various forms of indi¬ gestion or colics, and inflammations of the stomach and intestine are common, especially among horses and cattle. McCollum of the Wisconsin Agricultural Experiment Station has recently pointed out that the essential growth promoting substance is not present in many proteins used for animal food and conse¬ quently a ration that is generally considered to be proper may be unbalanced and consequently would lead to more or less serious disorders, although the quantity of food was abundant.

Many local diseases start from wounds or injuries. Cattle often suffer from traumatisms resulting from swallowing nails, pieces of wire or other pointed metallic articles which pierce through the walls of the stomach. Frequently they injure the heart causing traumatic peri¬ carditis.

Poisoning is a serious source of loss. There are a number of poisonous plants which occasionally cause the death of animals that eat them. Cattle are very susceptible to lead and not infrequently they are poisoned by licking an emptied lead pail or a newly painted fence or barn. Other poisons such as arsenic and corrosive sublimate are occasionally the cause of death among animals.

Animals suffer to a considerable extent from tumors. Cancers,

epitheliomas, sarcomas and leuksemia are quite common. Melano-sarcomata are more numerous in the horse and leuksemia or the so-called lympho-sarcoma in fowls. Benign tumors, especially those arising in the connective tissues, are also frequently encountered.

The specific infections diseases are those caused by definite pathogenic bacteria, fungi, protozoa and the filterable viruses. Each dis¬ ease is produced by its specific organism and by no other cause. For example, anthrax is caused by Bacterium anthracis, Texas, or Southern, cattle fever is caused by Piroplasma bigeminum, foot and mouth disease by a filter¬ able virus, that is, a specific substance that will pass through filters (Berkefeld) that keep back ordinary bacteria. The specific infectious dis¬ eases are sometimes confused with dietary dis¬ orders. They can be readily differentiated by taking into account the following:

Cause. — An infectious disease is produced by a specific virus. This necessitates as the first requisite an exposure to and an infection with the specific organism. Ordinarily but a few animals in a herd are infected simultane¬ ously.

Period of Incubation. — The infection must

be followed by a certain time required by the invading micro-organisms to become estab¬ lished in the body and to bring about the first symptoms of the disease. According to Vaughn it is the time required for the infect¬ ing organism to sensitize the tissues. The in¬ cubation period varies in different diseases, and, to a certain degree, in the same disease, accord¬ ing to the mode of infection, the virulence of the' organism and the resistance of the indi¬ vidual. Usually, however, it is practically the same for all individuals of the same species when subjected to the same mode of infection.

Lesions. — The tissue changes in an in¬ fectious disease are usually nearly the same in all the animals affected in the outbreak. Each pathogenic organism brings about tissue changes more or less peculiar to itself. They may, however, vary within rather definite limits. They may also be acute or chronic in nature. The cause for the changes in the body is the action upon the tissues . of exogenous and endogenous toxins (bacterial proteins), or the mechanical blocking of the vessels by the or¬ ganisms. In many epizootics, the disease ap¬ pears in an acute form in the first animals at¬ tacked while those infected later suffer from a chronic or modified form of the affection. In other outbreaks, the first cases are chronic in nature and the later ones acute. It is important to distinguish between the lesions due to the

virus and secondary tissue changes that may be present.

Duration. — In animals, as in man, most of the infectious diseases are self-limiting. After they run a certain time the animals either die

or fully recover. As a rule, the percentage of fatal cases in an outbreak is larger among animals than with people.

Transmission by Inoculation.— Finally, in making a positive diagnosis it is necessary to find the specific organism, or to prove the transmissibility of the disease from the sick or dead animals to healthy ones. The extent to which the disease spreads will also aid in de¬ termining its infectious or non-infectious na¬ ture. In diagnosing an epizootic disease, in¬ vestigations have shown that too much reliance cannot be placed on the period of incubation, or the morbid anatomy. There are many pos¬ sibilities, therefore, that an erroneous diag¬ nosis may be made when the symptoms or tis¬ sue changes. are alone considered.

Diagnosis. — The accurate diagnosis of a specific infectious disease is made by taking into account one or more of the following: (1) The symptoms; (2) the lesions or morbid anatomy; (3) the specific cause; and (4) specific reac¬ tions. The value of symptoms in making a positive diagnosis varies with the disease and often with the individual case. While each disease exhibits a somewhat constant chain of symptoms it is also true that there is a striking similarity between the symptoms exhibited in many different diseases. As a rule it is difficult to make a positive diagnosis from the symptoms alone.

The changes produced in the tissues by a specific micro-organism are usually constant in their nature. They represent the result of the reaction of the body tissues to the particular invading organism. In some diseases, like rabies, the characteristic tissue changes are microscopic and cannot be determined from the gross examination of the organs. It is very important in making a diagnosis from the lesions that the specific tissue changes be recognized and that they be accurately dif¬ ferentiated from other tissue changes that often accompany such diseases.

The positive diagnosis is made when the micro-organism that caused the disease is demonstrated in the morbid tissues. In some diseases, such as anthrax, this can be done by very simple bacteriological

methods. With other affections it requires very careful and special methods to isolate, cultivate or even to ' demonstrate the specific organism. There are, however, several epizootic diseases, such as foot and mouth disease, for which a specific organism has not been isolated.

It has been found that animals suffering from certain infectious diseases will react to the injection into the body of the specific protein of the organism with which they are infected. Thus, if mallein is injected into a horse suffer¬ ing from glanders, a definite reaction will occur which can be considered specific for glanders. There are also certain substances given off by the tissues into the blood that have a specific affinity for the antigen or species of organisms that cause the infection. There are a number of these so-called specific reactions employed in diagnosis. The more important are the reac¬ tions caused by mallein, tuberculin and other like substances, the agglutination test and the complement fixation test. When a reaction oc¬ curs with these tests it is generally considered positive evidence that the disease is present.

Control — The control or eradication of the

infectious diseases is of the greatest importance. This can be accomplished by (1) preventing the spread of the germs which cause them, or (2) immunizing susceptible animals against them.

The checking of the spread of infectious diseases involves an intimate knowledge of the organisms that cause them. It requires that one should know: (1) When in the course of the disease the virus is eliminated from the body and the channels through which it escapes. (2) What happens to the virus after it leaves the body and how long it will resist the action of external influences such as drying and sun¬ light. (3) By what means and through what channels it gains entrance to the body of the uninfected animal. When the facts regarding these points are ascertained it is not difficult to determine what should be done to prevent the virus from spreading from the animals in one herd to those in another, or from a sick indi¬ vidual to a well one in the same herd.

Immunization. — The immunizing of ani¬ mals against either sporadic or epizootic in¬ fectious diseases has been found to be practi¬ cable with certain diseases such as anthrax, black leg, hog cholera and possibly a few others. This method is valuable in those diseases where it is possible to establish an artificial immunity. It cannot be employed satisfactorily with others. The danger in this

method is, that where it is employed, precautions against infection are usually minimized and consequently if the pro¬ tection is not complete it gives a false security. The immunizing processes for the control of infectious diseases are based upon the principles of immunity and the methods for its pro¬ duction.

Parasitic Diseases. — These are morbid changes brought about by animal parasites that are large enough to be recognized without the aid of a microscope, although diseases caused by the protozoa and even bacteria may be con¬ sidered parasitic. Animal parasites cause a number of disorders that are serious and some of which, such as the nodular disease of sheep and taeniasis of fowls, are frequently mistaken for tuberculosis. There are many parasites and a discussion of their classification or the dis¬ orders they produce that would be at all ade¬ quate would require many pages. Some of the parasites attack the exterior of the body; others live in the digestive tract; others occur in the lungs ; others find their way into the organs ; and a very few appear in the blood. Many of these have a serious effect upon the animal and the losses occasioned by them are heavy. In addition to the direct injury to their hosts, a few parasites of animals are transmitted to the human family. Among these may be mentioned certain of the tapeworms and trichinella or the worm which causes trichinosis in rats, swine and people.

To summarize, the bodies of living animals are subject to a great variety of deviations from their normal condition due to unsuitable con¬ ditions of living, to infections of many kinds and to the irritation of animal parasites. These may produce changes ranging from the slight¬ est possible irritation to the destruction of the host. See also Cattle, Diseases of.

Bibliography. — Bureau of Animal Indus¬ try : Annual reports, special reports, bulletins on

animal diseases (United States Department of Agriculture, Washington, D. C.) ; Ellenberger, Schiitz and Baum, (Jahresbericht liber die Leistungen auf dem Gebiete der Veterinar- Medicin* (annually, Berlin) ; Friedberger and Frohner, (Veterinary Pathology) (6th ed. London and Chicago 1908) ; Hutyra and Marek, Special Pathology and Therapeutics of the Diseases of Domesticated Animals> (2 vols., Chicago 1916) ; Kitt, (Textbook of Comparative

General Pathology for Practitioners and Stu¬ dents of Veterinary Medicine) (Chicago 1906) ; Law, (Veterinary Medicine> (5 vols., Ithaca, N. Y., 1912) ; Moore, (The Pathology and Dif¬ ferential Diagnosis of Infectious Diseases of Animals) (New York 1916).

V. A. Moore,

Director New York State Veterinary College, Cornell University.

ANIMALS, Distribution of. See Distri¬ bution of Living Mammals.

ANIMALS, Domesticated. A very large

part of man's success upon the earth and of his achievements in supremacy are due to the ani¬ mals that he has been able to draft into his serv¬ ice through domestication. They have fed him, clothed him, carried him and his burdens, culti¬ vated his fields, drawn his machinery and have in every way surrendered their lives to him and his purposes.

Originally from the Wild. — Like the crops of the orchard, garden and field, the domesti¬ cated animals all came originally from the wild. Choosing for his purposes such of the wild animals about him as could in his opinion assist in his enterprises and as were sufficiently docile to lend themselves to his mastery without too much difficulty and danger, man while yet in the primitive state took absolute possession of cer¬ tain species, although one of his first attempts was with the wildest of the wild, the horse.

Sources of Material. — The dog is the direct descendant of the wolf, found in the wild the world over, with possibly a dash of the fox in certain breeds. The horse is the direct de¬ scendant of the wild stock of central Asia. The ass comes also directly from the wild in west¬ ern Asia and northern Africa. Common sheep are undoubtedly descended from the native stock of northern Africa and southern Europe, and the fat-tailed variety from that of western Asia. Almost every country of the earth had its wild variety that might have been developed into the domestic pig, but strangely enough we owe our present stock to a foundation developed in southeastern Asia, improved by a later dash of the wild boar of northern Europe.

In general our poultry came from south¬ eastern Asia, except the guinea from western Africa, the goose from northern Europe, the duck which is cosmopolitan from the subarctic regions, and the turkey which is a truly Ameri¬ can bird — our only contribution to the domes¬ ticated animals — from the New England woods or the

jungles of Mexico.

The elephant of India and Africa, the camel of Asia, the water buffalo of Asia and Africa, the humped cattle of India and the yak of Tibet are all developed from native stock, and in general every country has drawn upon its own resources for domestication except that Amer¬ ica, being suddenly settled and at a compara¬

tively late date, was stocked by importation, the supply coming largely from western Europe.

Degrees of Domestication. — Species differ greatly in their response to the ameliorating effects of domestication. Probably no animal is so thoroughly under the influence of and so completely responsive to his master as the dog, and none less responsive than the cat, though both have been long attached to the domiciles of man.

Most domestic animals will come at call, but few have the homing instinct sufficiently de¬ veloped to offset their native wanderlust or their natural disposition to forage for food. The result is that most animals must needs be kept in more or less strict confinement. The pig, if unrestrained, will wander wherever food is to be found. Sheep will go in flocks or bands and follow a self-appointed leader anywhere. Though every cow knows her stall in the barn, she will wander aimlessly across country and, except in rare cases, stop with perfect satis¬ faction wherever night overtakes her. Some horses (<know the way home® ; others are abso¬ lutely lost and indifferent as to their where¬ abouts. Even the trusted saddle horse responds to the call whenever a band of wild horses comes his way. The cat with all her lazy luxury goes wherever she is fed most liberally, and even the dog, most faithful of all servants to his personal master, easily turns tramp, making friends with everybody, and responsible to no¬ body, clearly demonstrating how strong after all is the call of the wild.

Domestication is at best a relative term, some species responding much more freely than others, the whole process shading off into that border land, where song birds are bred in cages and gold fish in bowls, and where the response of the animal is exceedingly problematical.

Quite aside from true domestication is that voluntary association of rats and mice with the habitations or rather the storehouses of man, not from any instinct for human society but purely from an attraction to food and warmth not far removed from the blind principles that bring weeds into the crops or parasites upon the body.

Purposes of Domestication. — Domestica¬ tion means responsibility for food and what¬ ever shelter, restraint or attendant care may be necessary. This all means heavy expense of time and money, so that the domesticated animal, while exceedingly serviceable, is at the same time extremely expensive, as will be seen when we compute the value of the hay, oats and corn crops, practically all of which go to the support of animals. Considering this fact, it is evident that man has domesticated for strictly personal reasons, never for the welfare of the animal.

Animals Domesticated for Hunting. — The

primitive man, in constant distress for food, hunting animals that were in every way his superiors except as to wits and a serviceable hand, must have early noted the habit of the wolf to hunt in packs. He was not long in finding that a litter of young pups brought up in camp became extremely loyal and still re¬ tained their hunting instinct. In this way the hunter obtained his dog. To the dog were early added the horse, the elephant, the chetah or hunting leopard, the falcon or hunting hawk and last of all the ferret.

Animals Domestcated for Their Meat. —

Here must be counted the ox — excepting the humped cattle of India not used for food — the sheep, the pig, the goat, the rabbit and a horde of birds — the chicken, the guinea, the goose, the duck, the swan, the pheasant, the peacock, the pigeon, and greatest of all the turkey. Rarely, except in war, has horse meat been offered for sale. In general it is coarse and of poor quality, while sentiment is against its use for food.

Animals Domesticated for Their Milk. —

Though the milk of all domesticated animals is sometimes used, yet it would be fair to say that probably the only animals domesticated mainly or even largely on account of their milk are the cattle, both plain and humped, the goat and the ass.

Animals Domesticated for Their Labor. —

Though the horse like the ass was domesticated for riding, he has been put to all kinds of work in Europe and in North America, seldom in

other parts of the world, where he is held su¬ perior to menial tasks. The ox, both plain and humped, the ass and his hybrid progeny the mule, the water buffalo, the elephant and the camel, the reindeer and the dog, all have been commonly put to hard labor, and up in Tibet the yak is no exception to the rule that man under almost any conditions will contrive to find some animal to bear his burdens and per¬ form his hardest labor — even drafting in the llama.

Animals Domesticated for Their Body Covering. — The skin of most animals is valu¬ able for tents, for clothing, and for the thou¬ sand and one occasions in which leather is de¬ sirable. The horse, the ox, the sheep, the pig, the goat, the dog and the rabbit all yield valu¬ able skins, especially the ox and the goat. Modern methods of tanning make even the tender sheepskin extremely useful for many purposes. One of the original objects in domes¬ ticating the sheep was its wool, first as attached to the skin, afterward for spinning into yarn and cloth. The same principle governs the semi-domestication of the. vicuna and the alpaca ; indeed, one of the marvels of early civilization was the skill developed in weaving. Latterly with the decreasing supply of fur-bearing ani¬ mals, both the fox and the skunk are artificially produced under conditions of semi-domestica¬ tion.

Animals Domesticated for Their Eggs. —

Eggs have long been in standard demand for food, and however much our poultry may have been domesticated for its meat, the egg supply doubtless played no secondary part in the rea¬ sons for dealing with so troublesome a lot of animals. Preferable as are the eggs of the chicken, those' of all domesticated varieties of poultry are sometimes used, and even so the supply is not sufficient to meet the demand, which is very largely satisfied by drawing upon the nesting places of sea fowl.

Miscellaneous Objects of Domestication. — Aside from the ordinary and more obvious reasons for domestication there are certain sec¬ ondary objects such as feathers from the goose, the swan and especially the ostrich ; honey and wax from bees; and last of all should be men¬

tioned the raising of the guinea pig for pur¬ poses of experimentation especially along patho¬ logical and physiological lines, as well as in tracing the principles of descent.

Animals Domesticated for Pets. — It is doubtful if ever an animal was domesticated primarily for other than strictly utilitarian pur¬ poses,

but once domesticated the response was often so instant and pronounced as to lead to real affection between master and servant. This explains the hold of the dog and the cat upon popular favor, even when their natural service is not needed. Horses are quite commonly kept primarily as pets, and no other impulse can explain the present day use of the swan, the parrot, the peacock, the pheasant and certain strains of the rabbit, the dog and the cat, not to mention gold fish and canaries.

Native Characteristics of Domesticated Animals. — What might be called the psy¬ chology of wild species would make an interest¬ ing study; for example, the two most faithful of all domestic species are the dog and the horse, yet in the wild state no animal is more cowardly than the wolf, and none more war¬ like than the horse. Cattle for the most part are indifferent to man, while sheep will follow him anywhere. The response of the cat to domestication is apparent rather than real. She enjoys warmth and soft places on which to lie, but it is a question whether in general the domestic cat has acquired much response to man, particularly when we remember that as large and savage a cat as the puma is credit¬ ably reported as never under any circumstances attacking a human being. The manner in which the rat and the pig respond to training is as un¬ accountable as is the limited intelligence of the sheep and the cow, or the substantially op¬ posite reaction of the horse and the ass to objects of fright, the one tending to run away and the other to investigate.

Improvement under Domestication. — Quite naturally man selected for domestication those species that served him best. Not only that, he picked the particular strains and va¬ rieties that fitted his needs the closest. He fol¬ lowed the same principle in breeding. Was it meat he desired? He bred from the heaviest fleshed individuals. Was it milk? He chose those of the heaviest flow. Was it wool? He bred from the specimens of the longest and finest fibre. Was it labor? He bred from the strongest, or if for speed from the fleetest. So it is that the domesticated animals have, gen¬ eration by generation, become constantly a little more completely adapted to the needs of man, and favorite species like the dog, the horse and the ox have been broken up into numerous breeds of all sorts and sizes, each adapted to serve the particular need or whim of a group of men sufficiently large to create a demand. Thus was laid the foundation of the science of breed¬ ing by which the domesticated species will be yet more closely adapted to the needs of man, and yet more completely freed from certain acci¬ dental but unwelcome characteristics, such as weakness of constitution, tendency to sterility, bad temper and lack of intelligence.

Unused Materials. — If the world had all been settled at once, undoubtedly every section would have developed out of its own material

its proper domesticated races. But America lagged behind. Her excellent start toward a horse had come to an end in Montana at the four-toed stage, and she had nothing to take its place ; hence the backward state of the In¬ dian, and hence the certainty of importation. She had the bison which might have been domesticated, but already the European bison had been neglected for its better compatriot, the ancestor of our common cattle. She had a pig, but she could not afford to stop to build it up in competition with what had been gained by long years in Asia and Europe. She had the turkey, and nothing under domestication was its equal for the feast, and consequently the pea¬ cock and the swan have been neglected at modern banquet boards. The prairie hen or the partridge of the woods might have afforded a domestic strain, but the chicken was better and so the natural supply was unused. The bear might have been domesticated to advantage, and no doubt he may yet follow the fox and the skunk as a denizen of the fur farm.

Be that as it may, a wealth of material was left over and neglected, not onlv here but in that great storehouse of raw material, central Asia, only because man had already all he could use to advantage.

Eugene Davenport,

Dean and Director , University of Illinois Col¬ lege of Agriculture.

ANIMALS, Mind in the Brute. Like

other phases of psychology, that which con¬ cerns itself with the minds of non-human ani¬ mals has broadened considerably in the few years just gone — so far at least as actual re¬ search-reports are concerned. How far a ques¬ tionary investigation would show the acceptance of the new liberalism among psychologists in general it is difficult indeed to be sure, since (as we- see in regard to the subconscious as¬ pect of mind) many scientific men when asked will admit the existence and even the import¬ ance of a thing which yet they wholly ignore in their own spontaneous work. Specialization is overdone in psychology as elsewhere, and few academic psychologists venture to attempt the correlation between the human and the brute.

Whatever may have been the motive of Rene Descartes for seriously declaring that of all the animals only man was conscious (per¬ haps it was due to his predominant ecclesiasti¬ cal or to his mathematical interests) no one, perhaps not even himself, ever believed the dictum any more than that his will is not free, however loud, or even however good, his argu¬ ments.

The twin-principles of analogy and of con¬ tinuity teach everyone, who is not prejudiced by some underlying system of belief, that the ˆlower® animals are conscious like ourselves; in proportion, however, to their complexity, both of environmental relationship and of functional internal relationship.

The sceptic who admits consciousness in himself but denies it in the dog and elephant and lion has one resource which he is bound to make use of continually. He can deny the principle of continuity in organic evolution and claim that the protoplasm of man is essen¬ tially different from that of all other animals, and that the difference is such that conscious¬

ness may inhere in it and not at all in the brutal organism, the consciousness accruing to it sud¬ denly as if out of Pandora's box. So arbitrary, however, is this supposition, so gratuitous in the biology of protoplasm, that it may be dis¬ regarded, the burden of proof resting wholly on its claimants. So far as every evidence goes, structural and functional, the two classes of animals compared, brute and human, are built on the one same plan, live in the light of the same consciousness, save probably for ratiocination, which has perhaps developed the vast complicating of the connections of the fibres of the brain and the consequent development of abstract symbols into speech and language. The burden of proof in this matter rests with those that deny the analogic probability.

Now going along the multitude of animal forms toward the simplest animal from the most human, where can a line be drawn be¬ yond which consciousness may be disclaimed? With wonderful morphologic variety there is striking biologic uniformity, the same use of the same mechanical principles and of chemi¬ cal reactions and assuredly of protoplasmic nature generally, so that even in Amoeba, the simplest, indeed the logical limit of animal structure, we find the same events in type and the same means for producing these events — metabolism in irritable living protoplasm. Even in Amoeba there is that same amazingly complex protoplasm whose chemiphysical in¬ teractions science is only beginning to unravel. Co-ordination in Amoeba is poor and we find him sometimes trying to crawl in opposite di¬ rections for

a brief space, for there is of course no nervous matter. For the same reason the animal's adjustment to external conditions is imperfect, although in the main protective of its life.

Notwithstanding all this, the whole varied metabolism is there, giving rise to the same sort of heat, motion and probably electricity, from the same protoplasmic life, supplied by the same nutrients and giving off the same katabolic waste as does a nerve cell or any other cell of a human body. Without a single nerve-fibril the naked protoplasm conducts im¬ pulses, as one may quickly see when the whole animal nearly at once contracts after stimula¬ tion, and co-ordination and even adjustments occur without anything which can be called nerve. Without muscle contraction takes place. Without separate gland-tissue secretion goes on. Without reproductive cells the marvelous so- called simple division of the animal occurs whenever its overgrowth demands, a process compared with which even mitosis is easy to understand. In Amoeba then, the logical limit of animal simplicity, a minute drop of un¬ colored streaming protoplasm, the matter is organized as forces which interact and are mutually and self sustaining. The adjustment of relations which is its life is nearly as per¬ fect as in other animals and because the chemi¬ physical process at the basis of this series of adjustments is perhaps even more complex than elsewhere (since every function nearly inheres in every part), a modicum, a trace, a sample of consciousness must be supposed to be concerned.

What can be supposed as to the nature of

this requisite consciousness of Amoeba? Shall we imagine it like our own? Of course not. Can we imagine it at all ? Scarcely so, it must he allowed, and yet, (<the dim crawling life® is and parcel of a system of uniformities in which we ourselves and our own consciousness partake and. within these limits we can imagine much. It is customary for descriptive psy¬ chology to say that the most prominent aspects of tnind as we know it are feeling, will and thought. The first, feeling, is based wholly on sensations, on modifications of consciousness which seem to have to do with that protoplasm, which in man and his congeners is made up as sense-organs. Amoeba's protoplasm and that of other unicells is universally sensitive to irri¬ tating stimuli, and its irritation causes reactions exactly comparable to those of protoplasm elsewhere under the influences coming from sense-organs. A dim and

simple sensation- mass would seem then to be a reasonable basis and substance of Amoeba's consciousness. Be¬ sides this there are obviously elements of which we know as will or action and this involves that something else, that <(certain plusness,® not to be defined but representing perhaps in its last analysis the life itself, action, active purposiveness, that quality by which the inter¬ actions of Amoeba's molecules exceed in com¬ plexity and in self-adjustment those of other self-regulatingv materials — if indeed any such besides bioplasm exists. Another word for will is conscious spontaneity and possessing this the animal may still be as much the slave of cir¬ cumstance as you please for its dependence on its environment is extreme. Sensation-mass and will, conscious spontaneity, such we may imagine, are present in Amoeba's consciousness. In these nerves are unnecessary, and their phy¬ sical basis is adequately enough the universally complex, irritable and active protoplasm of which the whole body is composed. So much for this logical type of animal, a speck of undifferentiated bioplasm. In this form we are interested only for these very reasons — that it is the logical type and it is undifferentiated protoplasm only.

In the series of animals from Amoeba <(up® (no scale save a very indistinct one can be made out), we find at once development in the way of a division of labor. Scarcely are we out of the protozoa, the unicellular animals, before certain cells of the various organisms begin to take on distinctly the qualities and uses of nervous tissue, the first token of this being the assumption by certain cells of a new vigor and promptness of reacting to stimulation, it being therefore the sense-organ part of the nervous system which appears first in the phy-logenic development. In this simple plan these sensitive cells are also means of defense. In animals a little more complicated we find the rudiments of an entire nervous system, the first form being a mere line or lines of fibrils, with the necessary nerve-cells connecting parts re¬ quired to work in unison for some reason or other, or where adjustment of any sort is neces¬ sary. Functional connection is primarily and always the business of these fibres. In forms of life more and more complicated, the nervous system's reticulum of fibres shows correspond¬ ing development, not only in actual intricacy, but in relative mass. Thus in a way the nerv¬ ous system comes to be a rough general index

of the complexity of any animal's life, of rela¬ tions more and more involved, not only be¬ tween cells and organs within the limits of the animal, but with numberless conditions outside the individual which are yet part of its environ¬ ment and in a biologic sense inseparable from itself. Conduction, co-ordination, adjustment, appreciation,

become more and more complete as the vital conditions demand. Small portions of the protoplasm develop into sense organs and the corresponding sensation-mass of the animal we may suppose becomes (<larger® and richer with inevitably a tinge of feeling in its nature. In very simple forms muscular tissue of a simple sort has already developed, so that actions are made more promptly and in a more perfectly adjusted way. Thus the will has de¬ veloped also in richness and in strength, as represented by what the various animals variously do.

But if sensation and violation constitute by far the larger part of the brute's consciousness (as of man's) what of cognition, the faculty of knowing, an analytically distinct aspect of the mental continuum? We have scarcely yet es¬ caped the exaggeration which the association-ists forced into psychology. Man's pride is re¬ luctant to admit how small is the proportion of cognition and especially of constructive con¬ ception in his own mental process minute by minute. If he ordinarily overestimates his own intellectualism in the determination of behavior, it is equally certain that he has somewhat underestimated the practical ideation of the brutes. Researches made of late, especially by Yerkes of Harvard, suggest beyond much doubt that the brutes conduct the rudiments of the processes of ideation (the formation of ideas) and of reasoning (with inference as its essence) much as do humans, but always in far closer connection with actual motor behavior than is the case with ourselves. E. M. Smith of Cambridge University said in 1915 : ((It is by no means disproved that animals are intelligent and have ideas. . . . The one point that

clearly emerges is the need for new methods of inquiry.®

It is plain that one of the most pressing needs of animal psychology is definite informa¬ tion in regard to the relative functions of the senses in the various genera and orders. G. H. Parker of Harvard, as well as Yerkes and many others, have set about this task more or less systematically, but curiously enough this particular line of work on the more intelligent of ((our poor relations® has been mostly neglected. Yet, before we can study intelli¬ gently the chimpanzee, the dog, the cat, the pig, we must certainly know just what their senses are like, for sensation is the <(beginning® of the reflex nerve-circuits on which all their behavior depends to a greater or less extent. Here is where new methods (often necessarily of great ingenuity), will yield most productive observa¬ tions. So far most animal psychologists have begun to study the wrong end, so to say, of the reflex ((arc,® the actual resulting behavior in¬ stead of the sensations and the feelings. School children need, above all things else, sense-

train¬ ing and for a like reason psychologists need precise facts as to the perceptual powers of the brute animals. On these data the work of proving that mind is everywhere alike with for the most part only quantitative differences

will perhaps be gratifyingly accelerated. This at least seems to me the present psychologic indication.

George Van Ness Dearborn, Professor of Physiology, Tufts College.

ANIMALS, Superstitions in Regard to.

See American Mythology.

ANIME, a-ne-ma, a resin supposed to be obtained from the trunk of an American tree (Hymencea courbaril) . It is of a transparent amber color, has a light, agreeable smell, and is soluble in alcohol. It strongly resembles co¬ pal, and, like it, is used in making varnishes. Specific gravity is 1.028 to 1.054.

ANIMIKEAN, a term used largely by Canadian geologists for what the United States Geological Survey calls Upper Huronian. See Huronian Series. *

ANIMISM, the system of philosophy pro¬ pounded by Stahl, and based on the idea that the soul (anima) is the seat of life. In mod¬ ern usage a term applied to express the general doctrine of souls and other spiritual beings, and especially to the tendency, common among sav¬ age races, to explain all the phenomena in na¬ ture not due to obvious natural causes by at¬ tributing them to spiritual agency. Among the beliefs most characteristic of animism is that • of a human apparitional soul, bearing the form and appearance of the body, and living after death a sort of semi-human life.

ANIMUCCIA, a'ne moot'cha, Giovanni, Italian musician: b. 1500; d. 1571. He was appointed chapel master of the Vatican in 1555, and composed the (Lauded to be sung at the conclusion of the regular office, and from which the oratorio is said to have developed. Hence he is often called the ((Father of the Oratorio.® He composed a number of masses, motets, madrigals, etc. His most noteworthy works are (I1 primo libro di madrigali, etcP (Rome 1595) ; c J oannis Animuccise Magistri Capellae Sacrosanctae Basilicae Vaticanae

Missarum Libri) (ib. 1567) ; ˆMagnificat ad Omnes Modos1* (ib. 1568) (I1 secondo libro delle laudi ove si contengono motetti) (ib. 1570).

ANIO, a'ne -5, ANIENE, or TEVER- ONE, an Italian river tributary to the Tiber, which it enters from the east a short distance above Rome.

ANISE, a'nez, an annual plant of the family Umbelliferae. It is a native of Egypt and the Mediterranean regions. The stem is about two feet in height, and divides into several slender branches. The leaves are wedge-shaped. It is extensively cultivated in southern Europe, Germany, India, etc. It is used as a condiment in the preparation of liqueurs, and as a stomachic stimulant in medi¬ cine, to relieve flatulence, etc., especially in infants. It contains a volatile oil, called oil of anise, which is used for purposes similar to the seed. The oil is procured either from the seed or from the stems and leaves.

ANISOPHYLLY, a'nez-6-fi'li, the phe¬ nomenon of the production of two sorts of leaves on the same shoot. It is due to the un¬ equal action of several factors, principally gravity and light. For illustrations of this phenomenon in various species consult Bos- hart, K., (Beitrage zur Kenntniss der Blatta-

symmetrie und Exotrophie) (1911) ; and Figdor, W., (Die Erschcinung der Anisophillie)

(1909).

ANKERITE, a carbonate belonging to the calcite group of minerals. It is intermediate between calcite, magnesite and siderite, the normal mineral being a carbonate of calcium, magnesium and iron, having the formula 2CaC03.MgC03.FeC03. It occurs in rhombo- hedral crystals which have perfect rhombo- hedral cleavage, a hardness of 3.5 to 4, specific gravity of about 3, vitreous to pearly lustre, and usually white color. It also occurs in granular, crystalline and compact masses.

ANKYLOSIS, an'ki-lo'sis, a stiffening of the joints, a term used by surgeons to denote fixation of a joint not dependent on rigidity of the muscles. It is caused by injury or disease, resulting in a deposit of new bone between the articular surfaces or in the formation of fibrous adhesions. In the latter case the stiff joint may be forcibly bent and the bond of union ruptured, so as to restore mobility. Passive motion, massage, friction are the usual modes of treatment. Sometimes, however, an anaes¬ thetic is administered and the joints are moved by force. See Joint, Diseases of.

ANN ARBOR, Mich., city and county-seat of Washtenaw County, on the Huron River, and the Michigan Central, the Ann Arbor and Toledo railroads and the Detroit United Rail¬ way. It is situated among the picturesque hills of southern Michigan, 38 miles from Detroit, and is regarded as one of the most desirable residential cities in the Middle West. Here is the seat of a famous school of learning, the University of Michigan (see Michigan, Uni¬ versity of). Ann Arbor has, among prominent buildings, an auditorium with seating capacity of 5,000; a university hospital, a homoeo¬ pathic and four other hospitals, county court¬ house, post-office building, high school and numerous churches and public and private schools, two schools of music, two li¬ braries. It is the business centre of a large agricultural and fruit-growing region and an important shipping point. It has ex¬ tensive manufactures of agricultural imple¬ ments, furniture, pumps, engines, automobile accessories, laces and curtains, steel ballbear¬ ings, boilers, lumber products, organs, pianos, flour, wagons, etc. The United States census of 1914 reported 75 manufacturing establish¬ ments of factory grade, employing 1,079 per¬ sons, of whom 842 were wage earners, receiving a total of $516,000 annually. The capital em¬ ployed was $2,888,000, and the value of the year's output was $2,603,000; of this, $1,301,000 was added by manufacture. The Barton Dam furnishes water power, producing electric energy sufficient for the city and surrounding territory. The city has an extensive electric light system, waterworks plant and electric traction lines connecting with Jackson, . Kala¬ mazoo, Battle Creek, Detroit and other cities. The waterworks are owned by the city. It has daily and weekly newspapers and one national bank, three savings banks and two branch banks. It was originally settled in 1824 and was incorporated as a city in 1851. Pop. (1890)

9,431; (1900) 14,509; (1910) 14,817; (1920)

ANNA, Ill., city in Union County, 35 miles northwest of Cairo, on the Illinois Central Railroad. It contains a public library and the otate Hospital for the Insane. It has a large trade in the agricultural products of the dis¬ trict, which produces corn, fruit, hay, vegetables and wheat. Pop. 2,809.

ANNA IVANOVNA, an'na e-va'nov-na, impress of Russia: b. 1693; d. 28 Oct. 1740. She was the second daughter of Ivan, brother of Peter the Great. In 1710 she was married to the Duke of Courland, who died

the follow¬ ing year, the last of his line. On the death of Peter II in 1730 the Supreme Council offered her the throne, under certain conditions re¬ stricting the power of the monarchy. Oster- mann, her former preceptor, and in 1730 Chancellor of the Empire, furthered her cause before the Council, but was later chagrined at finding her less amenable to his wishes than he had hoped. . During the earlier portion of her reign Russia was engaged in the War of the Polish Succession and also in war with Turkey in the Crimea in 1736-39. At home her administration under the influence of Biron was a very cruel one. Thousands were exiled to Siberia and other thousands were tortured at home. Among the victims were Prince Basil Dolgoruki and members of his family. The Empress's health broke down in 1740, and she died in the autumn of that year, leaving the throne to her grandnephew Ivan, under the regency of Biron. See Russia.

ANNA KARENINA. The world has come to regard Tolstoi's novel, (Anna Karenina* as one of its greatest masterpieces ; but the author himself, who in the character of Levin depicted his own vain efforts to discover the secret of happiness, began to detest it before it was half finished. He called it <(ordinary and empty,® ˆincoherent, neither fish-nor-flesh stuff® ; he even wanted to destroy, certainly to disown it. He slightingly characterized it as (<a novel, showing how an officer fell in love with a married woman.® The immediate incentive to its composition was his chancing on the com¬ mencement of a story by Pushkin. He cried out : (<That is the way to begin a book,® and on 19 March 1872 began (Anna Karenina * with the sentence, (< All happy families resemble one another; every unhappy family is unhappy in its own way.® Its publication in the Russky Vyestnik (Russian Messenger) , edited by Katkof, immediately aroused the greatest en¬ thusiasm in Russia. Tolstoi was amazed at its popularity, but soon lost interest in it and al¬ lowed months to elapse without furnishing the expected copy or even correcting the proofs. When the Turco-Russian War broke out in 1876, he brought it to a conclusion with a chapter showing his disapproval of the volun¬ teer movement. Katkof refused to publish it, returned the manuscript, and printed a brief note to the effect that the logical end of the novel was the death of Anna. The extra sec¬ tion was included in the definitive edition in three volumes aggregating 1,381 pages. The novel is panoramic : it gives a multitude of episodes of high life in Moscow and Saint Petersburg and of country life in the district of Korazinsky. Its main purpose is to con¬ trast the rather frivolous existence of a public official mingling in corrupt social circles with the serious endeavors of an idealistic land¬

owner bent on carrying out reforms among the peasantry. It also

contrasts the homely ((family happiness® of the conventionally mar¬ ried couple with the irregular relationship of a married woman and a wealthy count, logically ending in despair and death. It is really two stories in one. The unhappy love-affairs of Prince Stepan Oblonsky and of his sister Anna bring into relief the pure and delicate romance of the Princess Oblonskaya's youngest sister, the Princess Kitty Shcherbatskaya with Kon¬ stantin Levin, a landed proprietor, a bashful, erratic idealist, uncertain of himself, making all kinds of experiments, dissatisfied, but high- minded. . In Levin Tolstoi undoubtedly de¬ picted his own nature and it gave him an opportunity to introduce his own observations on philosophy, agronomy and religion. The account of Levin's proposal was taken directly from Tolstoi's wooing of Miss Sophia Beers. Indeed the author frequently drew his details from his own experiences and his characteriza¬ tions from his keen study of his relatives and friends. He painted from real life the gambling scenes, the horse-racing, the death of Levin's disreputable brother, the hunting epi¬ sodes, the quaint and often amusing naivetes of the peasantry. The tragic suicide of Anna Karenina was probably the echo of a tragedy which took place on the railway near Tolstoi's country estate, Yasnaya Polyana. (Anna Karenina* is often careless in style and con¬ tains strange incongruities, but taken all in all it seems like a veridical history rather than fiction. It belongs to world-literature. The first English translation, somewhat expurgated, was made by Nathan Haskell Dole in 1886, but revised and rendered complete in 1899. There are also translations by Leo Wiener, Mrs. Constance Garnett and Aylmer and Louise Maude.

Nathan Haskell Dole.

ANNA KARLOyNA, anna kar'lov-na, Regent of Russia during the minority of her son Ivan: b. 1718; d. 1746. She was the daughter of Charles Leopold, Duke of Meck¬ lenburg, and of Catharine, sister of the Em¬ press Anna Ivanovna. She married Anthony Ulric, Duke of Brunswick-Wolfenbiittel in

1. A son Ivan was born to them 24 Aug.

1740, and was appointed her successor by the Empress Anna Ivanovna. The latter died in October 1740, and Biron, whom she had ap¬ pointed regent, was soon overthrown. Anna Karlovna thereupon proclaimed herself Grand Duchess and Regent of Russia, but she showed little capacity for administration and soon fell under the influence of Julia Mengden, one of the ladies of her court. A conspiracy to place Elizabeth, daughter of Peter the Great, on the

throne was successful and Elizabeth was pro¬ claimed Empress 6 Dec. 1741. Ivan was soon afterward murdered at the castle of Schlussel¬ burg; Anna and her husband were condemned to prison for life and confined at Kholmogory on the White Sea, where she died in 1746. Her husband survived her 34 years, and died in prison in 1780.

ANNA LEOPOLDOVNA. See Anna

Karlovna.

ANNALS OF A SPORTSMAN, a work by Ivan Turgeneff, consists of 22 short sketches of Russian peasant life, appearing in book form

in 1852 and establishing the author's reputation as a writer of realistic fiction. Turgeneff repre¬ sents himself as on a hunting trip through the country districts, noting the local life and social conditions, and giving truthful studies of the state of the serfs before their liberation by Alexander II ; his book being one of the agen¬ cies that brought about that reform.

ANNAM, an'nam'. See Anam.

ANNAMABOE, a'na-ma-bo', Africa, sea¬ port town, with a fort, on the Gold Coast, 10 miles east of Cape Coast Castle. It was at one time a principal mart for slaves, in traffick¬ ing in which many of its inhabitants became wealthy, and is still a place of considerable trade. Pop. about 5,000.

ANNAN, Scottish seaport and parliamen¬ tary borough in Dumfriesshire, on the Annan River. It has railroad connection with Glas¬ gow, Carlisle and Edinburgh, and water con¬ nection with Liverpool and Whitehaven. The important manufactures are tanning, rope¬ weaving and cotton-spinning.

ANNAN, a river of Scotland, having a course of about 50 miles, flowing from north to south through the centre of Dumfriesshire to the Solway Firth, its sources being not far from those of the Tweed and Clyde.

ANNAPOLIS, Md., the capital and port of entry of Maryland and

county-seat of Anne Arundel County; on the Severn River, two miles from Chesapeake Bay, on the Maryland and the Annapolis, Baltimore and Washington electric railroads. It is 26 miles southeast of Baltimore and 30 miles northeast of Washing¬ ton, D. C. It is also connected by boat with Baltimore and other cities on the bay. It is in a fruit and berry-growing region; has oyster¬ packing plants, marine railway, glass factory, two banks, daily, weekly and other periodicals, and a property valuation of $3,000,000. An¬ napolis is widely known as the seat of the United States Naval Academy (q.v.), with its beautiful new buildings and grounds on which the government has expended $15,000,000. The marine barracks and naval experiment stations are also situated here. Saint John's College, the first free school in America, was established in Annapolis in 1696; there are good schools, a fine new high school and a preparatory school foi the naval academy. The State build¬ ings include the Colonial State House dating from 1772, recently rebuilt, and the little treasury building. There are Catholic and Presbyterian churches and the historic Epis¬ copal Church of Saint Anne first erected in 1695. A convent, a house of Redemptorist Fathers, formerly the Carroll residence, and some of the finest colonial mansions in the country are among other points of interest, as well as the bronze statues of Gen. John de Kalb and Chief Justice Roger B. Taney. The citv was founded in 1649 and was first named Providence. It received its present name in honor of Queen Anne and was made the capi¬ tal of the province in 1694; in 1708 it was given a charter by the Queen. Annapolis clayed an important part in early American history. On 19 Oct. 1774, the brig Peggy Stuart laden with tea was burned in the har¬ bor in protest against the taxation of the colo¬ nies by Great Britain ; the first Federal Consti¬ tutional Convention was held here in 1786, and

• in 1783 Washington surrendered his commis¬ sion in the senate room of the State House where a year later the treaty of peace with Eng¬ land was signed. Pop. (1910) 8,609; (1920) 11,214. Consult Ridgeley, (Annals of Annapolis > (Baltimore 1841), and Powell, (Historic Towns of the Southern States* (New York 1900).

ANNAPpLIS CONVENTION. This small gathering was held 11 Sept. 1786, to dis¬ cuss proposed changes in the Articles of Con¬ federation. By the time it met, the Confedera¬ tion had utterly broken down : Congress could not find means to carry on the government and the Annapolis Convention was anxiously looked to as the last hope by the business interests. Only five States were actually represented,— New York, New Jersey, Pennsylvania, Dela¬ ware and Virginia. These, however, were pre¬ cisely the ones which wished the entire Confed¬ eration remodeled. New Jersey had instructed its delegates to accept

nothing but a new Fed¬ eral government; and the New York group, headed by Alexander Hamilton, was equally zealous for a stronger system. John Dickinson, one of the chief authors of the Articles of Confederation, was made chairman; and a com¬ mittee was appointed to prepare a report, which was drafted by Hamilton, though he was not on the committee. This report recommended that the States they represented should agree, and try to induce the others to agree, (<to meet at Philadelphia on the second Monday of the next May, to consider the situation of the United States and devise such further pro¬ visions as should appear necessary to render the Constitution of the Federal government adequate to the exigencies of the nation ; and to report to Congress such an act as, when agreed to by them and confirmed by the legis¬ latures of every State, should effectually pro¬ vide for the same.® They then adjourned; but this call led to the convention of 1787, where the Constitution was adopted.

ANNAS (Hebrew, ((merciful®), a Jewish high priest ; appointed high priest by Quirinus, proconsul of Syria, about 7 a.d., and deposed by Valerius Gratus, procurator of Judea, in 14 a.d. His family was wealthy and he was evidently very influential, as the office of high priest was held by five of his sons and his son-in-law, Caiaphas, before 36 a.d. In the New Testament (Luke iii, 2; John xviii, 13; Acts iv, 6) Annas is mentioned as high priest conjointly with Caiaphas. The first hearing of Jesus was be¬ fore Annas, who sent him bound to Caiaphas.

ANNATES, an'natz, a certain portion of the year's fruits or revenues paid to the Pope and his court. The term properly denotes the sum of half a year's revenue of a vacant bene¬ fice (q.v.) payable by the new incumbent to the Pope. It was also used to indicate the tribute every bishop or mitred abbot was obliged to pay for the support of the Pope and cardi¬ nals, and the lesser sums they contributed for the support of members of the Papal household. These tributes or taxes were frequently a cause of contention between ecclesiastical and civil authorities. An effort was made to put an end to these contentions in the Councils of Pisa and Constance, and gradually all the minor tributes were abolished. In the Council of Basel it was decided to abolish every tribute of this kind, but to raise revenues for the anti-

pope Felix exactions doubly severe were im¬ posed on his adherents. In Germany the payment was satisfactorily regulated in the Concordat

of Vienna (1448) and after several modifications it -was finally abolished in 1803. In France the payment was stipulated in a Con¬ cordat between Innocent X and Francis I; it was finally refused entirely in 1789, and its abolition recognized in the Concordat of 1801. In England such sums were first paid to the archbishop of Canterbury, later to the Pope, and transferred to the Crown in 1534, the sov¬ ereign at present retaining only those derived from bishoprics and Crown livings, the rest, since Queen Anne's, time (see Queen Anne's Bounty), going to increase the poorer livings. The Pope used them to support himself, the cardinals and other papal officials; to defray the expenses of nuncios, legates, bishops exiled from their sees, princes deprived of their thrones, envoys and vicars apostolic to mis¬ sionary countries. As this source of revenue has been constantly falling off during the past century, the deficit is made up by the voluntary contributions of Catholics, known as <(Peter's Pence® (q.v.). Consult Ferraris, (Prompta Bibliotheca. > See First Fruits.

ANNATTO, an-nat'to, ANATTO, or AR- NOTTO, a small tree which grows in Central and South America. The seeds are surrounded with a thin coating of waxy pulp, which is sep¬ arated from them by washing in water, pass¬ ing the liquid through a sieve and allowing the suspended pulp to deposit. The water is then drained away and the paste dried, till it is a thick, stiff, unctuous mass. In this state it has a dark orange-red color and is known as ˆroll® or <(flag® arnotto, according to the form in which it is put up, but when further dried it is called ((cake® arnotto. It is much used by South American Indians for painting their bodies; among civilized communities its princi¬ pal use is for coloring butter, cheese and var¬ nishes. It yields a fugitive bright orange color, and is to some extent used alone, or in conjunc¬ tion with other dyes, in the dyeing of silks and in calico printing.

ANNE, an, Queen of Great Britain and Ireland: b. at Twickenham, near London, 6 Feb. 1664; d. 20 July 1714. She was the second daughter of James II, then Duke of York, and Anne, his wife, daughter of the Earl of Claren¬ don, and was educated according to the princi¬ ples of the English Church. In 1683 she was married to Prince George, brother to King Christian V of Denmark. On the arrival of the Prince of Orange in 1688 Anne desired to remain with her father; but was prevailed upon by Lord Churchill, afterward Duke of Marl¬ borough, and his wife, to join the triumphant party. After the death of William III in 1702 she ascended the English throne. Her character was amiable but lacking in firmness, and she was influenced first by Marlborough and his wife and afterward by her favorite, Mrs. Mas- ham. Most of the principal events of her reign are connected with the war of the Spanish Succession. The only important acquisition that England made by it

was Gibraltar, captured in 1704. Another very important event of this reign was the union of England and Scotland, under the name of Great Britain, which was ac¬ complished in 1707. She seems to have long

cherished a wish to secure the succession to her brother James, but this was frustrated by the internal dissensions of the Cabinet. Grieved at the disappointment of her secret wishes, she fell into a state of weakness and lethargy and died. The reign of Anne was distinguished by the brilliant successes of the British arms. Consult Oldmixon, (Life of Queen Anne) (1716); Ashton, (Social Life in the Reign of Queen Anne* (1882).

ANNE, Saint, wife of Joachim and mother of the Virgin Mary. The Catholic Church cele¬ brates her feast day on 26 July.

ANNE, Sister, the sister of Fatima in the tale of 'Bluebeard. > From the top of the castle tower she awaits the arrival of their brothers to rescue them.

ANNEALING, a process to which metals and glass are subjected in order to increase their ductility, or lessen their liability to frac¬ ture under sudden stress. It is usually effected by heating the substance to be annealed until it approaches softness, and then allowing it to cool very slowly. Copper, however, is best an¬ nealed by heating it to a high temperature and then plunging it immediately into water. Met¬ als that are to be annealed should be heated in close vessels, so that they may not be affected by direct contact with the fuel. It is not un¬ common to anneal large masses of metal or glass by allowing the fires in the heating fur¬ nace to go out, and permitting the furnace and its contents to cool together. The articles to be annealed are also often buried, while still hot, in lime, ashes or some other poor conductor of heat and left until cold. Metals that are to be drawn into wire or rolled into sheets, or pressed into complicated shapes, usually require an¬ nealing during the process, as otherwise they are likely to become brittle and crack or break. Zinc, however, grows strong and flexible as it is drawn into wire, though it loses its flexibility and regains its crystalline structure if kept in boiling water for a time. It is usually taught that the object of annealing is to soften the material sufficiently to allow molecules to move slightly among themselves, and thus relieve the strains previously introduced by sudden cooling, or by the violent stresses to which the material has been subjected in the process of working. This theory is very possibly true to a certain extent, but the anomalous cases of copper and zinc, cited above, show that it can be regarded only as a first approximation to the ideal theory of annealing, which has yet to be discovered. See Tempering.

' ANNECY, an'se, town of eastern France, situated in the central part of the department of Haute Savoie at the northwest end of Lake Annecy. It has manufactures of silk, cotton, wool and steel, and contains many buildings of historical interest, including a cathedral and the old castle of the counts of Genevois. Pop. about 15,000.

ANNENSKI, Nikolai Feodarovich,

a-nen'ske, Russian publicist and social worker: b. 1843. He spent his childhood in Siberia, where his father was engaged in military serv¬ ice. He took the degree of bachelor of law at the University of Saint Petersburg in 1867 and the bachelor's degree in history and philology in 1873. In 1867 he entered the civil service, tak-

ing first a position in the office of the state comptroller and later (1873) in the statistical department of the Ministry of Ways and Means. At the same time he was active as a writer. He contributed articles, mainly on finance and economics, to Otechestrennuiya Zapiski, Dielo, Zhurnal of the Ministry of Ways and Means, and the newspaper Russkaya Pravda. His articles in the Dielo entitled (Sketches of the New Direction in the Science of Economy > par¬ ticularly attracted attention. His literary activi¬ ties were interrupted by his arrest for participa¬ tion in the Nechayev affair. He was released in two months and rearrested twice, in 1879 and 1880. His second arrest was followed by exile to western Siberia for apolitical offenses.® In 1881 he was transferred to Sviyazhk, govern¬ ment of Kazan. Freed from police supervision, he settled first in Kazan (1881) and later (1883) in Nizhni-Novgorod, holding in both cities the position of head statistician of the Zemstvo. At that time he contributed to Volzhki Vyestnik, Russkoye Slovo and other journals. In 1895 he returned to Saint Petersburg, where he became head statistician of the Municipal Court. He was then also connected with the editorial depart¬ ment of Russkoye Bogatstvo and since 1904 has been its director-in-chief. He also wrote for the Free Economical Society. He was inter¬ ested in politics and directed protests against the oppressions of the government. He was exiled from Saint Petersburg in 1901 and again in 1904. In the autumn of the same year he re¬ turned to Saint Petersburg and continued his political activities as a director of the Emancipa¬ tion League. In 1905 he was again arrested as one of the deputies of the Writers' League of Saint Petersburg sent to Minister Witte with the request to avert an

expected bloodshed. In 1906 he became one of the founders of the People's Socialistic party (Narodno-Sotzialisticheskaya Partiya).

ANNESLEY, Samuel, English Non-con¬ formist clergyman: b. near Warwick in 1620; d. in 1686. He was educated at Oxford. He served for a time as chaplain at sea and later as parish priest of two different London con¬ gregations. He refused to conform to the <(Act of Uniformity® and suffered severe persecu¬ tions. He became a leader of the Puritans and preached almost daily. De Foe knew him well and wrote an elegy on him. It is said that ((the Non-conformists considered him a second Saint Paul.® He was the father of 27 children. Susannah, his 25th child, became the wife of Samuel Wesley and was the mother of 19 chil¬ dren, among whom were John Wesley, the founder of Methodism, and Charles, the hymn writer.

ANNESLEY, 6th earl of (Francis), son of the 5th earl : b. 1884. He succeeded to the title in 1908. He had taken up aviation some years before the outbreak of the European War, and had gone through some exciting aerial adventures during the Balkan Wars of 1912-13 on the side of the Balkan allies. He subse¬ quently joined the Royal Naval Volunteer Re¬ serve as sub-lieutenant. He had spent a few days at home on furlough from the western front, and on 5 Nov. 1914 started from East- church in an aeroplane piloted by Flight Lieut. Charles F. Beevor, R.N., en route for France. They were shot down by the Germans while

flying over Ostend, and both were instantly killed.

ANNEXATION, politically, the formal in¬ corporation by a state with itself of territory previously under another government ; usually territory contiguous to itself or its colonial pos¬ sessions, or an insular neighbor, but only be¬ cause other annexations are rarely desired, not from any principle of international law. The annexation may be by purchase, peaceful ces¬ sion or conquest. Existing laws and local au¬ thorities do not lose their binding force and title to obedience till the formal act of annexation is passed by the new power, or treaty or proclama¬ tion validates it, even after cession by the old ; though that cession cancels all legal relation to the former sovereign power.

Annexations to the United States. — (1) The Louisiana Purchase (q.v.) from Napoleon, 1803; 1,171,931 square miles, including Alabama and Mississippi south of lat. 31° S. ; the whole of Louisiana, Arkansas, Missouri, Iowa, Ne¬ braska, North and South Dakota, Idaho, Mon¬ tana, Oregon, Washington and Indian Terri¬ tory; Colorado and Wyoming east of the Rocky Mountains; Kansas, except the southwest

por¬ tion south of the Arkansas River, and Minne¬ sota west of the Mississippi. This was bought by Jefferson's administration for $15,000,000, $3,- 750,000 of it in assumption of claims of Amer¬ ican citizens against France. The preliminary convention was signed by Livingston and Mon¬ roe 30 April 1803, and was confirmed by the Senate in special session 19 Oct. 1803, and by the House the 25th, — the extreme Federalists op¬ posing it as unconstitutional, and the President acknowledging it to be so, but necessary.

(2) Florida (q.v.), 1819-21, from Spain: 59,268 square miles; price $5,000,000, entirely in assumption by the United States of claims of its citizens against Spain, and the relinquish¬ ment by it of claim to Texas and the boundary of the Rio Grande. The treaty was signed by the Spanish Minister at Washington, 22 Feb. 1819; Spain refused to ratify it till after two years of vain insistence that the United States should refuse to recognize the independence of the South American States.

(3) Texas (q.v.), 1845: 376,133 square miles. Texas, originally part of the Mexican province of Coahuila, obtained its de facto independence in the War of 1836 against Mexico, was acknowl¬ edged by the other powers in 1837, and at once began the attempts for admission into the United States which had been the ultimate ob¬ ject of its first colonization by Southern settlers. In the previous April a treaty of annexation with Texas had been concluded, but was re¬ jected by the Senate. President Tyler on the last day of his term sent a special messenger to secure the consent of the Texas Congress to annexation ; it acceded unanimously, a popular convention of 4 July ratified the action, and the annexation was completed by a joint resolution of the United States House 16 Dec. 1845, and of the Senate on the 22d. It claimed west to the Rio Grande, taking in all the immemorially Spanish province of Coahuila, a circumstance which led to the Mexican War.

. (4) New Mexico and Upper California, seized from Mexico in the War of 1847, and annexed by the treaty of Guadalupe-Hidalgo, 2 Feb. 1848 : 545,783 square miles. Besides the

present State of California it included Utah and Nevada, the most of Arizona and New Mexico and Colorado west of the Rocky Moun¬ tains. Price, $15,000,000, and the assumption by the United States of

$3,250,000 in claims of its citizens against Mexico. The portion of New Mexico east of the Rio Grande was claimed by Texas, which afterward received $10,000,000 from the United States in release.

(5) The Gadsden Purchase (q.y.), 1853, from Mexico: southern Arizona and New Mex¬ ico from the Gila Valley to Chihuahua (the Mesilla Valley), 45,535 square miles: price

$10,000,000.

(6) Alaska (q.v.), 1867; 590,884 square miles ; price, $7,200,000. Bought by the United States from Russia by treaty of 30 March, rati¬ fied by the Senate in special session 20 June.

(7) Hawaii, 6 July 1898; 6,740 square miles; price, a compensation to the Queen, Liliuokalani, recently adjusted at $200,000. Annexed by a joint resolution of Congress.

(8) Porto Rico, the Philippine Islands and Guam of the Ladrone Islands, 1898; taken from Spain as the result of war; ceded by Treaty of Paris, 10 Dec. 1898; about 150,000 square miles; price, $20,000,000, plus $100,000 subsequently paid for two small islands omitted from the treaty.

(9) Tutuila, with the smaller islets of Tau, Onesinga and Ofu, of the Samoan group, 1899; 54 square miles, including the harbor of Pago-Pago ; obtained by tripartite treaty with Great Britain and Germany.

(10) A number of small scattered islands in the Pacific, taken at different recent times, including Wake, January 1899. See United States — Territorial Expansion.

ANNIE KILBURN, a novel of New Eng¬ land life, by.W. D. Howells, published in 1888. It is a character study of awoman in her later youth who returns to her native town after a long sojourn in Rome, unfitted by her life abroad for sympathy with her girlhood friends, yet with no diminution in the strength of her Puri¬ tan conscience.

ANNIHILATION is the name of a doc¬ trine held at different periods in the history of the Church. It means the exaltation of the righteous and the annihilation of the wicked. Brahmanism holds a periodic annihilation. It is said that the Siamese hold annihilation as the crowning reward of virtue. There are some traces of a belief in the theory in the writings of the early Church fathers. Jonathan Edwards had a long controversy with Dr. Chauncey on the subject. Later Archbishop Whately held the same view regarding the wicked. From

1850 to 1860 the question was much discussed. It is now a dead question in theological circles.

ANNISTON, an'ms-ton, Ala.,, city, capital of Calhoun County; on the Louisville & N. and Southern railroads, 62 miles northeast. of Birm¬ ingham. It is in one of the most important coal- and iron-mining regions of the country; is a trade centre for cotton and agricultural products; and is noted for its manufactures of iron and steel, cast-iron piping, cotton goods, bricks, cordage and other articles. The United States census of 1914 reported 40 manufactur¬ ing establishments of factory grade, employing 2,491 persons, of whom 2,327 were wage earners, receiving annually $1,023,000 in wages.

The capital engaged aggregated $3,810,000, and the year's output was valued at $4,365,000: of this, $1,819,000 was added by manufacture. An¬ niston is the seat of the Southern Female Col¬ lege, the Noble Female Institute and the Ala¬ bama Presbyterian College for young men; has three national banks, numerous fine churches and other public buildings. It was founded by the Woodstock Iron Company in 1872 and re¬ ceived a city charter in 1879. Pop. (1910)

12,794; (1920) 17,734.

ANNONACE.ZE, an-6-na'ce-e, the custard- apple family, a group of trees and shrubs with simple, alternate leaves, destitute of stipules, by which character they are distinguished from the Magnoliacece, to which they are otherwise closely allied. -Their flowers are commonly axil¬ lary, sometimes terminal. The calyx is per¬ sistent, with three deep divisions. The corolla is formed of six petals, disposed in two series. The stamens are very numerous, forming sev¬ eral series ; their filament short, their anthers almost sessile. The carpels, generally aggre¬ gated in great numbers in the centre of the flower, are sometimes distinct, sometimes con¬ nected; each of them has a single cell which contains one or more ovules attached to the inner suture, and often forming as many dis¬ tinct fruits (rarely one only in consequence of abortion) ; sometimes they are united together and form a kind of fleshy, scaly cone. The seeds have a horny endosperm deeply grooved, and this is another character which distin¬ guishes them from the Magnoliacece. The An- nonacece are mostly tropical plants belonging both to the Old and New Worlds, the pawpaw (Asimina triloba) being the best-known Amer¬ ican species. They are generally aromatic, a quality found chiefly in the bark, but also in the leaves and flowers, and to some extent in the fruit, all of which parts are consequently employed in the countries of which the plants are native as remedies and for seasoning. Many of them yield likewise an

edible and nutritious fruit, extremely agreeable to the taste.

ANNUAL, in botany, a plant which germi¬ nates, grows and produces its seed in a single growing season, after which it dies. Plants which are annuals in temperate regions may, in tropical countries, live for several years. Winter annuals are plants which germinate in autumn, persist through the winter, then flower, pro¬ duce seed and die.

ANNUALS, in literature, the name given to a class of publications enjoying at one time an immense yearly circulation, and distin¬ guished by great magnificence both in binding and illustration, which render them much sought after as Christmas and New Year pres¬ ents. Their contents were chiefly prose tales and ballads, lyrics and other verse. The earliest was the (Forget-me-not,) started in 1822, and followed next year by the friendship's Offer¬ ingˆ The (Literary Souvenir } was begun in 1824 and the 'Keepsake *in 1827. Among the names of the editors occur those of Alaric A. Watts, Mrs. S. C. Hall, Harrison Ainsworth, Lady Blessington and Mary Howitt. The pop¬ ularity of the annuals reached its zenith about 1829, when no less than 17 made their appear¬ ance; in 1856 the 'Keepsake,* the last of the series, ceased to exist.

0< i) i I • L-J . , [• ■ .. Jif. .1. i r

• '•» : ' ; '0ˆ1 X t I, 'Wh , J 1 1 t'i : '•» •. ih

'a ■ ••ij;rn?*-i in'wmtfjc orb '(o i.ov orb <-i (tore nr

:/-if AArrt igmtot io1 6yJffcO heh ettnki

i-yˆrwd- otni c'.i.oi irrtOn .AlrtfiJ Iki'toU. rr emit

; ; i'lfjfe X&f ft; -'iiijqriit iuV ! >!: <:>b6': // irif

*>d 5 y:/v i- «5&5*DA1 ' .-/ •/;

fed i ; r n -• b K «•*.>!' •(-) i ; > .'J

s' m > ; byiiˆifiˆfutrib 5 yorl;' Tji . .'i " > n.id // ■wti/fjodjo Mr; ˆ yi/ dt r rfyii/v oil \is>r» Avmv ■« .'A

jf j -n / • y ii Ji r .K i

•

fill il . - ! - C 1 '/ • {

yrgHg, ,, h|ii;> jifX .ali - %•* < ■ norn'i;

..

. ’•• ^vrnUsi vox rn;

; iffv Uap f. mtl t„ d; u; 4?ip

rf Q } rji> . iji. ii fSl Os ,1* • ••ao

-il» y.,fy guiy r(r (t,Uv bun

J JO • ■ . ' v ici vino >»o xrt,) ejjijii i niil

K>i< Yiu j<rv $ wiioi! ■: 3 . (Ljibf j*

• • w r{ : i v '• idiw; <; ?,i f . d fine

■

.

'

Am' ft 6J"; ;< A f J. I V! l

iti • i; «i b .) t y i< i v • i

ytbwd'J s.n’ii) ■ - id \r i*»i c ,.«< -ij«B i . -/4o>s

11 , r . . i •>»,. • •) : in. m ti n - 'V

• ■ n '7 I z /•;. , •:■ i •. ,• i! >i : utin lira/ j it

:i(ri in; : pi-i.nia •’ . ■ • it' ■> i <:■-» M

,ib ‘mI K - ;>: > : ’

fivv.1^ 'jttir,h sn^l jAtJHWl'TA

:t >/ j §m ij Sr» i r • l.<. »(', u] *i' m y ; ,6l

i; lx. • m; f{ f 'i /jj:i ■ 1 " 7 . J.- s

thmn r*yi(i' i-)btr r rfeir! d jtoiU, t . Ii }.» <, Tv) tL‘i / 7/ 9 /I briS - aaai i-rrl '• < ii 3ii in

' ■ ■ -j. ■

-V'lhi-.v w('.f .iwrt'ji'/ rJ 9ko 4# tvh ,> bun

. ■'< <;

/Sd l. m l / .h • •?< '.ton vrft xj

'lir'iRO ' ' fit yd ®r*5y- hov/o it>!

:

/ *mi&A 3o 9* >fit 7|trj> 87 tib adj i « » ■

,dJiiov>v iv '.nii ') .& ,;&& y..'t ;

-<i t) it dr iiv/qII rv.'tA b<tii HOtJiii! *j(i < n.l* »x '/.}> L: nlvr. i ytlgimi/jx m}/ t«.. yiiy in

yi!.t ' > !• <*l i ' vHl 4i7 (fji tsyrti:

J'ixTiAti ifjr s- y ^tyn it

'I -i' .V fmyi ft

cl; o fejuttfily it O iO.Of: 3<- rwf f

'try A 1c *noli oq r -y]7l* . *-n* r f •

v/v I bftf; itif- >54 1 rA a; -.Miti'ii.'fe .*:• > < v \ [niiid

yiiiq jealirit ci ,(yAi<> / :(ii M

il«T ll >V U W, rc YiJ »7t (ii ,'>i :»> m ■ • •

•i 7' uigqP-

■lirr

. / J.Qf), ,

' . • ■ i . . :»rli ,i;'I i

@..l r l f J v/'d M ' Vi

Iv. ff ri ■ V 5- V: A A

.

■

ivy *,bnrtrA f > < >ditig rod d/rtf ATflfiqm / •.)•*

ˆlyioaooo : k

.iii /, jooJ • rilj W) "l yfsu >' • *n;adbO‘ u>

UtQcZ

‘

■ f'J Oi «*• > > jt»7 <ˆn .|tq i- J -Tf»7 .1 OX. * bˆ.potij (» in/ 1 yfj C >iv;iit.x 'j/ii ;inoˆ : i !..1

I U i F.“'/nij • 0 • fr .QCrvT t Of o etfslIXJ r ; "J J

n«. * A.JLbt/.Ic ninpi; i-jv.it .. . >

t

N

\

jZ

M

Vol. 2, ANNUITY TO AZZUBEYDI

Americana

,

c:

i

|

THE

I ENCYCLOPEDIA

AMERICANA

I

I I

I

i

I

i

i

JP

Iibˆt

Universal

JQowledgEj

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK CHICAGO

.V

Copyright, 1918

BY

\

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

■ >

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JflN I f5 1922

ST! ,4654317

rv^ j

PARTIAL LIST OF CONTRIBUTORS TO VOLUME II

ABBOTT, CHARLES CONRAD, M.D.

Author 4 The Stone Age in New Jersey;' 'Archaeo¬ logical Explorations in the Valley of the Delaware,' Etc.

ARCHAEOLOGY ARCHAEOLOGY, AMERICAN

BALDWIN, CHARLES SEARS, Ph.D.

Professor of Rhetoric and English Composition, Columbia University

APOLOGIA PRO VITA SUA

BOTHNE, GISLE, A.B.

Head of Department Scandinavian Languages and Literatures, University of Minnesota

AXEL AND VALBORG

BENTLEY, MADISON, B.S., Ph.D.

Professor of Psychology, University of Illinois

ASSOCIATION OF IDEAS

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

ARBUTHNOT, JOHN AUSTEN, JANE

BROYDE, ISAAC

Jewish Department, New York Public Library

ARABIAN PHILOSOPHY

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

AUSTRIA-HUNGARY, DIPLOMATIC RELATIONS

CARTER, WILLIAM HARDING

Major-General, United States Army

ARMY TRANSPORT SERVICE

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, Umveisity of Chicago

APOGAMY

APOSPORY

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of Cincinnati

AS THE LEAVES

COCKBURN, JOHN ALEXANDER

Formerly Minister of Education in South Australia

AUSTRALIA — EDUCATION AUSTRALIA — RELIGION

COGHLAN, Sir TIMOTHY AUGUSTINE

Agent-General for New South Wales

AUSTRALIA — INDUSTRIES AND COM¬ MERCE

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

ANNUNZIO, GABRIEL D\

AUSTRALIA — LITERATURE

AUSTRALIA — RAILWAYS AND TRANS¬ PORTATION

COUMBE, CLEMENT W.

Technical Art Expert

ART DRAWING

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Philosophy, Cornell University

ARISTOTLE

CUTLER, FRANCES WENTWORTH, M.A.

Instructor in English, Vassar College

AURORA LEIGH

DEAVER, JOHN B., M.D.

Specialist, Philadelphia, Pa.

APPENDICITIS

DEIMEL, RICHARD F., B.S., M.A.

Assistant -Professor of Mechanics, Stevens Institute of Technology

APPLIED MECHANICS

ELLERY, T. G.

Town Clerk of Melbourne, Victoria

AUSTRALIA — MUNICIPAL AND LOCAL GOVERNMENT

FARROW, EDWARD S., C.E.

Major, U.S.A.; Consulting Civil and Military Engineer

ARTILLERY ARMOR PLATE ARMS, HISTORY OF ARMS AND ARMOR ARMY

ARMY ORGANIZATION ARMY REGULATIONS ARMY SCHOOLS ARMY TRANSPORTATION

FULLER, LESLIE E., Ph.D.

Assistant Professor of Old Testament Interpreta¬ tion, Garrett Biblical Institute

APOCALYPTIC LITERATURE APOCRYPHA

GARNER, JAMES W., Ph.D.

Professor of Political Economy, University of Illinois

ARBITRATION. INTERNATIONAL ARMED NEUTRALITY

, GETTAMY, CHARLES F., A.M.

Director, Massachusetts Bureau of Statistics

ARBITRATION

Contributors to Volume II— Continued

HALPIN, PATRICK A., Ph.D.

Late Professor of Metaphysics and Ethics, New Rochelle College

ATONEMENT

HAMLIN, ALFRED D. F., A.M., L.H.D.

Professor, History of Architecture, Columbia Uni¬ versity

ART

HAMMOND, WILLIAM A., Ph.D.

Sage Professor of Ancient Philosophy, Cornell Uni¬ versity

ARISTOTELIANISM

HARRY, JOSEPH E., Ph.D.

Author of ‘ The Greek Tragic Poets,’ Etc.

ANTIGONE

HAUHART, WILLIAM F., Ph.D.

Assistant Professor of German, University of Michigan

ANZENGRUBER

HIBBEN, JOHN GRIER, Ph.D., LL.D., L.H.D.

President of Princeton University

AUGUSTINIANISM

HODGE, F. W.

Ethnologist in charge, Bureau of American Eth¬ nology, Smithsonian Institute, Washington, D. C.

ARIZONA

HOLDER, Sir F. W.

Speaker House of Representatives, Commonwealth Parliament, 1901-09

AUSTRALIA — FINANCE

INGERSOLL, ERNEST

Naturalist and Author

AQUARIUM

ISAACS, ABRAM S., Ph.D.

Professor of Semitic Languages, New York Uni¬ versity

ARABIAN LANGUAGE ARABIAN LITERATURE ARAMAIC LANGUAGE

JACKSON, A. V. W., L.H.D., Ph.D., LL.D.

Professor of Indo-Iranian Languages, Columbia University

AVESTA

JELLIFFE, SMITH ELY, M.D., Ph.D.

Formerly Professor of Pharmacognosy, Columbia University; Adjunct Professor of Diseases of Mind and Nervous System, Post Graduate Hospital and Medical School- Professor of Psychiatry, Fordham University, etc.

•ARTERIES

ARTHRITIS DEFORMANS

JENKINS, JOHN G.

Premier South Australia, 1901-05

AUSTRALIA — SOCIAL CONDITIONS AUSTRALIA, SOUTH

KEYSER, CASSIUS J., B.S., Ph.D.

Adrian Professor of Mathematics, Columbia Uni¬ versity

ASSEMBLAGES

KLEIN, HENRI F.

Editorial Staff of The Americana

AUSTRIA AND THE WAR ARMENIA

KRARUP, MARIUS C.

AUTOMOBILE AUTOMOBILE ENGINE AUTOMOBILE INDUSTRY

LAWRENCE, WILLIAM WITHERLE, Ph.D.

Professor of English, Columbia University

ARTHURIAN ROMANCES, THE

LIVINGSTON, ARTHUR

Professor of Romance Languages, Western Univer¬ sity, London, Ontario.

ARCADIA

MIMS, EDWIN, Ph.D.

Head of the English Department, Vanderbilt University

ANTONY AND CLEOPATRA AS YOU LIKE IT

MITCHELL, EDWIN KNOX, A.M., D.D.

Professor of Graeco-Roman and Eastern Church History, Hartford Theological Seminary

ARIANISM

MITCHELL, SAMUEL A., Ph.D.

Director, Leander McCormick Observatory, Univer¬ sity of Virginia

ASTROPHYSICS

%

MOSES, MONTROSE J., B.S.

Dramatic Critic

ARROW-MAKER, THE AS A MAN THINKS

NELSON, ERNESTO

Director-General of Secondary, Commercial and Industrial Education of the Argentine Republic

ARGENTINA

ARGENTINA — GOVERNMENT OF ARGENTINA — EDUCATION

PILCHER, LEWIS F., Ph.D.

New York State Architect

ARCHITECTURE

PRICE, IRA MAURICE, B.D., Ph.D., LL.D._

Professor of Semitic Languages and Literatures, University of Chicago

ASSYRIA

ASSYRIOLOGY

Contributors to Volume II— Continued

QUICK, Sir JOHN

Postmaster-General in Deakin's Commonwealth Government, 2 June 1909 to 29 April 1910; Joint Author of " Constitution of Australian Commonwealth."

AUSTRALIA — POLITICAL HISTORY AUSTRALIA — THE COMMONWEALTH AUSTRALIA — CONSTITUTION, ETC.

RINES, IRVING E.

Author " History of the United States "

APPOINTMENTS

APPORTIONMENT

APPROPRIATION

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers' In¬ surance Company, Hartford, Conn.

ARGON

AROMATIC COMPOUNDS ATOMIC THEORY

RITCHEY, GEORGE W.

Astronomer, Mt. Wilson Solar Observatory, Pasa¬ dena, Cal.

ASTROPHOTOGRAPHY

SENILLOSA, JUAN A.

Former Argentine Consul-General to Canada

ARGENTINA — HISTORY OF

SHOREY, PAUL, Ph.D., LL.D.

Head of Greek Department, University of Chicago

ARISTOPHANES

(SIMPSON, W. A.

Assistant Adjutant-General United States Army

ARMY AND NAVY MANOEUVRES

.>ri ' ■ j uj

SMITH, DAVID EUGENE, Ph.D., LL.D.

Professor of Mathematics, Teachers College, Col¬ umbia University

ARITHMETIC

ARITHMETIC, HISTORY OF

SNOWDEN, WILLIAM JOHN

Editor of South Australian Register

AUSTRALIA

THAYER, HARVEY W., Ph.D

Assistant Professor, Department of Modern Lan¬ guages, Princeton University

AUS DEM LEBEN EINES TAUGE- NICHTS

THOMAS, DAVID Y., M.A., Ph.D.

Professor of History and Political Science, Univer¬ sity of Arkansas

ARKANSAS

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Univer¬ sity

AREOPAGITICA ARNOLD, MATTHEW

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

ATALANTA IN CALYDON

TURNER, RT. REV. WILLIAM, S.T.D.

Bishop of Buffalo ; formerly Professor of Philosophy, The Catholic University of America

AQUINAS, SAINT THOMAS, PHILOS¬ OPHY OF

WATSON, J. C.

Premier of Australia, 1904

AUSTRALIA — THE LABOR PARTY

WELLS, BENJAMIN W., Ph.D.

Author “ Modern German Literature,” “ Modern French Literature ”

ARABIAN NIGHTS, THE ATHALIE

AUCASSIN AND NICOLETTE AUF DER HOHE

WHINERY, SAMUEL

Consulting Civil Engineer; Author, “ Municipal Public Works,” Etc.

AQUEDUCTS

WIELAND, GEORGE R., Ph.D.

Paleontologist, Yale University

ARAUCARIALES

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

APPERCEPTION

WILCOX, MARRION, A.M., LL.B.

Co-editor, “ Encyclopedia of Latin America ”

ANTILLES

APPALACHIAN MOUNTAINS ATLANTIC OCEAN ARGENTINA — AGRICULTURE ARGENTINA — COMMERCE

ARGENTINA— MINING AND MANU¬ FACTURING INDUSTRIES

NEWCOMB, SIMON, Ph.D., LL.D., D.Sc.* ERIC DOOLITTLE, C.E.

Professor of Astronomy and Director Flower Astro¬ nomical Observatory

ASTEROIDS AURORA BOREALIS ASTRONOMY

ASTRONOMY, HISTORY OF ASTRONOMY, PRACTICAL ASTRONOMY, THEORETICAL

WISSLER, CLARK, Ph.D.

Curator of Anthropology, American Museum of Natural History

ANTHROPOLOGY ANTHROPOLOGY IN AMERICA

WOLFF, SAMUEL L., Ph.D.

Instructor in English, Extension Teaching, Colum¬ bia University

ARCADIA

- Deceased

KEY TO PRONUNCIATION.

a

a

a or a

far, father

fate, hate

at, fat

n

ng

nk

Span, h, as in canon (can'yon), pin on (pen'ydn)

mingle, singing

bank, ink

a

air, care

a

ado, sofa

6

no, open

a

all, fall

o or 6

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. -e, as in de ; eu, as in neuf ; and oeu, as in boenf, coeur; Ger. 6 (or oe), as in okonomie.

oi

o or oo

oil, soil; also Ger. en, as in beutel

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

l

i or 1

file, ice

him, it

ii

between u and e, as in Fr. sur, Ger. Miiller

i

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

y

of, very

(consonantal) yes, young

j

gem, genius

z

pleasant, rose

kw

quaint, quite

zh .

azure, pleasure

n

Fr. nasal m or n, as in embon¬ point , Jean, temps

'(prime),

"(secondary) accents, to indicate syllabic stress

ANNUITY, a yearly payment of money to a specified person or persons, for a term of years, for life or perpetually. The varieties and combinations of annuity payments are almost as numerous as the contingencies or desiderata of human life ; each having figured so largely in law as to receive a specific legal title. If the annuity is for a definite term of years, it is called an annuity certain; if forever,

continu-, ing to heirs or specified successors, a perpetual annuity or perpetuity; if for a limited period, a term annuity; if during the whole of a given period, not cut short by any contingent event, a whole-term annuity; if for a short period, a short-term annuity ; if it does not begin till after a certain date, a deferred annuity; if not till after the occurrence of some specified event, a contingent annuity ; if its beginning or dura¬ tion is based on the continuance of a life or lives, it is called a life annuity; if for the time that certain persons survive, a temporary life annuity; if on any life provided another is liv¬ ing, or some event happen or not, a contingent life annuity; if it begin only after some death or deaths, a reversionary annuity-; if for the duration of the longest of two or more lives, a joint-life annuity; if to the survivor of two or more, a survivorship annuity. There are in¬ creasing and decreasing annuities, their nature obvious from their titles. An annuity ceasing only with the death of the annuitant, and with a proportionate part of the next payment made to the heirs, is called a complete annuity; if it ceases with the last payment made to the living, a curtate annuity. This by no means exhausts the forms or combinations possible or even actual ; nor does it fully define even those mentioned. Thus, in a joint-life annuity, what is to happen on the successive deaths up to the last? The shares of the dead might return to the estate, but in practice are successively added to those of the survivors in equal por¬ tions till the last survivor receives the whole. In contingent annuities the commonest con¬ tingency which terminates it is that the annui¬ tant shall become self-supporting, as on mar¬ riage or remarriage or the attaining of majority; as when a man provides for his widow or daughter or son by will.

In respect of object, annuities may be broadly divided into two sorts : those provid¬ ing for others and those providing for one's VOL. 2 — l

self. The former are probably the oldest, and are of course testamentary, taking the place of a legacy in the lump. Till modern times these were chiefly (and with great European houses are still so) charged directly on the private property of the testator in the hands of leg¬ atees or trustees. In Europe these permanent charges on property form a feature of the highest social and even political importance. The entailed estates are always incumbered with multitudes of annuities to connections or dependents of the houses, absolutely fixed, while the income from which they are to be paid may shrink indefinitely. But for a cen¬ tury and a half it has been gradually taken up by great incorporated companies and combined with the business of life insurance (q.v.). The insurance companies pay the annuities on con¬ tracts matured by the death of the testator, the payments beginning either then or at a specified time thereafter. In America this system

has also absorbed almost entirely the old con¬ tractual annuities, in which the annuitants buy incomes for themselves by paying a lump sum to a person, company or public body for a term or life.

These contractual annuities, though based on the same calculations and mathematically identical, are historically of two distinct kinds as respects their object, the one seeking se¬ curity, the other investment. The latter is the older, and resulted from conditions now obso¬ lete ; partly the paucity of investment securities, partly the laws against usury, which could be evaded by annuities, as a given sum was paid for by a return of services, and the element of interest did not formally enter into it at all. Hence the favorite method of borrowing money by the great mediaeval companies and houses, and municipalities and States as well, was by annuities, sold on a rough estimate of the chances of life; in which the. buyers were al¬ ways keener than the sellers, and till very modern times the bargain was always against the payers of the annuity. Many shrewd in¬ vestors accumulated great properties by careful selection of annuities on good lives, being al¬ lowed to propose the lives upon whose duration they laid this wager (until scientific mortality tables were constructed). The interest on gov¬ ernment debts is a perpetual annuity; and of course any investment at interest is an annuity for its term, but such investments are not

classed among annuities as the term is cur¬ rently used.

The other object, that of securing one's self against the chances of fortune, though reached by the same means, has till recently had one broad distinction, — it was done at once and usually in early life, instead of in small lots as money accumulated. It was commonly the sink¬ ing of an inherited property (rarely an acquired one), by women, or by men of quiet tastes and unsuited for the struggle of business life, to produce a sure moderate income free from care and business chances. Naturally such annuities are much commoner in the older countries than in America, though steadily growing here from the same causes. Large inherited fortunes are rare in new countries, and the desire to live in unventuring ease equally so, but as family properties increase and the struggle for life grows harder, the annuity system grows likewise. But it has been vastly extended in recent years by its junction with the insurance system, enabling even rela¬ tively poor men to buy an income for their dependents after death, or

themselves in old age, in small instalments instead of an impos¬ sible lump sum ; and also leaving to a widow a steady income for a term of years or life, in place of a lump sum to be invested by herself or trustees, and possibly mismanaged or lost or embezzled. Therefore, both in its ease of pur¬ chase and in its advantages of payment, it is steadily growing in favor, and becoming larger in proportion to the total of life-insurance dealings.

Historically, annuities are probably as old as the great Assyrian-Babylonian times, in the 7th and 6th centuries before Christ, when great banking houses that lasted for generations, and commercial and mercantile facilities, were well developed ; but the first positive mention is brought out by the Falcidian Law of Rome, 40 b.c., which enacted that not more than three- fourths of a property should be willed away in specific legacies. As this could not be obeyed unless some method of valuing annuity legacies was devised, the following rough estimate was accepted: Up to 30, 30 years more of life; up to 60, as many as were wanting to make up 60. This extremely defective calculation — which assumed that a life over 60 was not worth even a year's purchase, and was very inaccurate for others — was replaced by the great Roman jurist Ulpian (d. 228 a.d.) with one much bet¬ ter, though still imperfect; but interesting as the first known table of life probabilities grad¬ uated with reference to age, and, strangely enough, revived and used by the Tuscan gov¬ ernment in the early 19th century, long after more scientific ones were in use. It is as fol¬ lows :

Birth

to 20,

30

years

44

to 45,

15

years

20

to 28,

27

t*

45

to 46,

14

4 1

25

to 30,

25

46

to 47,

13

44

30

to 35,

22

47

to 48,

12

44

35

to 40,

20

<«

48

to 49,

11

<1

40

to 41 ,

19

49

to 50,

10

44

41

to 42,

18

<i

50

to 55,

9

44

42

to 43,

17

ii

55

to 60,

7

44

43

to 44,

16

<«

60

and up,

5

4 4

This contained no interest computation. Un¬ til the 18th century there was little advance in the scientific aspects of the business; it re¬ mained a speculation, though an extensive and recognized one, and England under William of

Orange may almost be said to have maintained her national existence by borrowing money on annuities, as the Dutch had to some extent be¬ fore it. The researches of Pascal, Fermat and Huygens in the 17th century into the theory of probabilities greatly advanced the accuracy of calculations; in 1742 Mr. Thomas Simpson pub¬ lished his (Doctrine of Annuities and Rever¬ sions, } one of the landmarks of the business; and in 1762 the Equitable Assurance Society, the first insurance company of the world, was started primarily to do annuity business, which is the parent of life insurance, though now but a minor incident in it. Several other companies were founded shortly after. The real founda¬ tion of modern life insurance, however, and of scientific annuities as well, was the publication in 1771, by Richard Price, of his Northampton Table of Mortality. This estimated the term of life-average too low, but it was the prede¬ cessor of the Carlisle and other tables on which modern life insurance is built, now supplanted by the actual experience for generations in numberless great offices.

It is obvious that while the rate of mortality is a determining factor in annuity rates as much as insurance rates, its incidence is exactly in

reverse. That is, the higher the rate of mortality and the shorter the average term of life, the less money in gross will have to be paid on a contingent annuity contract, and con¬ sequently the less will be the sum needed to sink in it, or in current phrase, the lower the rate of annual premium. Conversely, the older the buyer is, and consequently the shorter his expectation of life, the less his annuity is worth. On the contrary, the less an individual's ex¬ pectation of life under an insurance contract, the higher must his premium be to accumulate sufficient money in the assumed period to amount to the promised sum. The factor of in¬ terest is the same for both ; the higher the inter¬ est, the lower the premium or the initial sum paid. In the now frequent insurance contracts, where the principal sum is paid to the bene¬ ficiary in annuity instalments, the question is one of interest complicated by the probabilities of the beneficiary dying before the payments are completed. More usually now, however, this latter element is eliminated by providing that in such case the remainder shall be paid to the legal representatives, so that it becomes an annuity certain. An interesting concrete illus¬ tration of the effect of overrating the mortality is the sale of annuities by the English govern¬ ment under the Northampton Table. This table had figured a correct total of deaths against an incomplete table of births in a given popula¬ tion, and consequently assumed too high a death rate; the government, therefore, fixed the annuity rate too low; and vast quantities of annuities were sold under Mr. Perceval's scheme of 1808 for funding the national debt. The actuaries discovered the miscalculation, and one of them in 1819 warned the govern¬ ment that it was losing $40,000 a month on these contracts ; the advice was unheeded ; buyers continued to be shrewder than the gov¬ ernment and purchased largely of the attractive bargain, and in 1827 another actuary publicly announced that the government was losing $40,000 a week. The next year the sale was suspended, with a total loss to the government of not less than $25,000,000.

ANNULATA, OR ANNELIDS

1 Heteronereis

2 Phyllodoce Laminosa

3 Glycera

4 Arenicola

5 Rock Needle (Pontobdella muncata)

6 Nais Proboscidea

7 Terrebilli Emmalina

8 Hermella

9 Common Earth Worm (Lumbricus agricola) 10 Tubes of Hermella Alveolata

The calculations for annuities are a part of actuarial science. In the United States the fol¬ lowing are the approved rates of the best-managed companies: In consideration of $1,000 paid to a company the annuity granted to a person aged 40 would be $52.75; 45, $58.10;

50, $64.70; 55, $73.50; 60, $86.20; 65, $100; 70,

$123.45; 75, $145.95 ; 80, $180.15. But, as stated, the pure annuity, sinking a large sum to buy a yearly income, does not figure largely in America.

Legally the annuity, whether charged to the person of the grantor or on specific real or personal estate, is treated as personal property except for purposes of inheritance or devise- ment, when it is held to be real property. A rent-charge, however, is a charge on specific real estate only, and is held to be real property under all circumstances. Consult Blackstone, Commentary on the Laws of England *; Kent, Commentaries on American Law) ; Baumgart¬ ner, (Handworterbuch des gesammten Versich- erungswesen* (Vol. I, Strassburg 1898-) ; Wal- ford, insurance Cyclopaedia* (London 1880).

ANNULATA, or ANNELI'DA, a term applied to the phylum of sea-worms, comprising the most specialized worms. They are repre¬ sented by the leeches, the earthworm, the nais of fresh water and the marine annelids. The phylum is divided into four classes: (1) Cliatopoda, (2) Gepliyrea, (3) Archi-annelida and (4) Hirudinea. In the more typical form they are characterized by their long, bilaterally sym¬ metrical body, which is cylindrical, consisting of numerous segments either unarmed, or more usually provided with seta alone, or with seta and paddle-like appendages (rami). The head is simple, with a few simple eyes, or provided with tentacles (antenna) alpne, or with tenta¬ cles and branchia. An eversible pharynx, armed with teeth, is usually present. The ali¬ mentary canal is straight, the

tubular stomach sometimes sacculated ; the vent is always situ¬ ated in the last segment of the body. The nervous system is well developed, consisting of a brain and a ventral gangli- onated cord. The circulatory system is closed, with a dorsal and ventral, and lateral vessels connected by anastomosing branches in nearly every segment. The sexes are generally separate, but many annelids are hermaphrodites. The embryo passes through a cleavage-stage (morula or blastula), gastrula, sometimes a neurulan stage, and after hatching, development is either direct or there is a marked metamorphosis, the larva passing through a trochosphere and cephalad stage. Consult Parker and Haswell, <Text-book of Zoology* (New York 1897).

ANNUNCIATION, the declaration of the angel Gabriel to the Virgin Mary that she was to become the mother of our Lord (Luke i, 26-38). Annunciation or Lady Day is a feast of the Church in honor of the annunciation, celebrated in the western Churches on 25 March. The institution of this festival is gen¬ erally assigned to the 7th century. The Italian, formerly Sardinian, order of Knights of the Annunciation (Ordine Supremo dell' Annun- ziata) was instituted by Amadeus VI, Duke of Savoy, in 1360, It received statutes from Amadeus VIII in 1409, was renewed in IS 18 and raised to the first order of the Sardinian

monarchy in 1720. The subject of the Annun¬ ciation has been a favorite with artists from Fra Angelico to Dante Gabriel Rossetti.

ANNUNZIO, an-noon'tze-o, Gabriel d\ Italian novelist, dramatist and poet: b. Franca- villa, a small fishing village on the Adriatic, in 1864. He was educated at the Collegio Cicog- nini, Prato (Tuscany), and the University of Rome. At the age of 15, while still in the former school, he wrote ˆincinnato, *his first story, for which the editor of the Fanfulla della Domenica paid him 50 francs. So struck was he with the evident talent of the boy that he visited him at college, praised his work be¬ fore the assembled pupils of the school and prophesied that he would make for himself one of the greatest names in Italy. This visit had much to do with shaping D'Annunzio's life. From that moment he determined to devote himself to literature. It became to him a pas¬ sion, the one aim of his life. He continued to write stories that were accepted by the press; and while at Prato he composed an ode, (Lungo le Rive del Romuleo Tebro,* which he dedi¬ cated to King Humbert. The sovereign ac¬ knowledged the receipt of a copy; and the ar¬ rival of the royal letter caused a sensation among the masters and pupils of the school and raised the literary enthusiasm of the boy to fever heat. He read widely and wrote with feverish intensity. In his (Gonfessiones *D'Annunzio has given a vivid account of the struggle he made to master the Italian tongue. Words*

were his tools, and to use them as a master he must know them intimately. So he read widely works on science, politics, litera¬ ture, history, philosophy; and he collected vo¬ cabularies of scientific and technical subjects and proceeded to master the meaning of every word therein. He imitated Carducci and the Latin poets and French and German writers. Often he worked 18 out of the 24 hours, writ¬ ing in complete solitude, while his faithful friend Michetti (<stood guard and made his rounds to keep off intruders. (Laus Vitae was written under these conditions (8,000 lines) practically without interruption.

The publication of his first volume of poems in 1880 made a reputation for D'Annunzio as the most promising of the younger Italian poets. (Terra Vergine *and (Canto Novo* (1882) in¬ creased his fame. While still in his teens he added to these (Intermezzo di rime *(1883) ; and (I1 Libro delle Virgini* (1884). The press of Italy received the boy with open arms and he responded with (San Pantaleone *and (LTsotteo* (1886). When he left the university he became a journalist and contributed largely to the literary columns of the press of the capital. In his (Confessiones *he states that the first 33 years of his life had passed before he had mastered the art of writing with facility and that, during this literary period of 18 years, he was never able to settle down to one certain style but was constantly vacillating between the many literary claimants upon his attention. In the midst of this active journalistic life he pro¬ duced (Elegie romane* and ˆPoema para- disiaco. *Then followed a period of still greater literary activity and the production of work of a still superior quality, His first novel (Piacere,* strongly influenced by the French school of his flay, appearˆ in 1889. and was

followed by a series of novels as remarkable for their style, vivid word painting and analysis of character as anything in Italian literature. These include (L'innocente5 (1891); (Giovanni Episcopo) (1892) ; powerful but gruesome stories influenced by the Russian school then popular in Italy; (U Trionfo della Morte> (1894), a clever psychological study; (Le Vir- gini delle rocci) (1896); and (Fuoco5 (1897). The latter, a (<great success of scandal,® a powerful story, in its way, brought its author more notoriety than genuine appreciation and thus, like Carducci, he acquired a reputation for literary unwholesomeness which he long failed to live down.

Tiring of novel writing and smarting under the whip of the critics, he turned again to poetry, which he had not altogether neglected, and

begun the (Laudi,5 a series of lyrical poems in praise of the sky, the earth, the sea and great heroes. In these, which it was his intention to complete in seven books, his art showed such im¬ provement that his new poetic effort was received with great enthusiasm throughout Italy and, the French reviewers singing his praise, he awoke to find himself an international character.

But D'Annunzio had other fields to conquer. Turning to the drama he produced, in rapid succession, a series of notable plays including (La Citta Morta) (1898) ; (La Giocconda) (1898) ; (La Gloria) (1899) ; Francesca da Rimini 5 (1901) ; (La figlia di Jorio) (1904) ; (La 'fiaccola sotto il moggio) (1905) ; and two tragedies, (La Nave!5 (1908) and <Fedra) (1909). The interludes between the writing of these plays he had filled in with a vast amount of journalistic and critical work, poems and short stories. A collection of the latter, (Novelle della Pescara,5 appeared in 1902. The younger literary set of Italy gathered about him, and his became a name to conjure by. (Forse che si forseghe no) appeared 1910.

On account of the non-moral tone in the characters of many of his novels and short stories, certain critics continued to bitterly at¬ tack him ; and this, combined with his incessant desire for something new, took him to the French capital where he wrote (Le martyre de Saint Sabastien5 (1911); (Le canzoni della gesta d'oltremare) (1912) ; cLe chevrefeuille) (1913); and (Cabiria,) a very elaborate photo play based upon historical incidents in the second Punic War. (La leda senza cigno) was published in* 1917.

When the European War broke out D'An¬ nunzio volunteered as a private in the Italian army, in the aviation squad ; and entered into the conflict with all the enthusiasm of his ardent nature. He was rapidly promoted and in May 1915 he was made a lieutenant. Other military honors followed. By his personal example and with his pen and his voice he stirred Italy to the actualities of the war as no other man was able to.' In Rome and other cities, in the army and behind the lines, his voice carried the weight of his reputation as the national poet and the mouthpiece of the nation. As the na¬ tional press representative at the front he wrote some of the most vivid and intimate descrip¬ tions of war conditions penned during the European struggle. In January he was deco¬ rated with the French Croix de Guerre; and this was followed by still other recognitions of his signal service.

More spectacular, even if mock-heroic, was D'Annunzio's seizure of Fiume in Sep¬ tember 1919, in an endeavor to have that city included

in the new territory ceded to Italy after the war. Against the orders of the En¬ tente governments and against the supplications and threats of the Italian government, D'Annun¬ zio and his legionaries held the city for 15 months. For a time he was hailed as a national hero at home for his exploit, but opinion there changed gradually, and the Treaty of Rapallo, concluded between Italy and Jugoslavia on 12 Nov. 1920, brought the Italian government face to face with the necessity of ousting D'Annun¬ zio from Fiume. The latter rejected the treaty and he and his rebels declared war on the Ital¬ ian government on 3 Dec. 1920. The crews of some war vessels, dispatched to Fiume, re¬ belled and went over to D'Annunzio. General Caviglia surrounded the city on 3 December. A rigid blockade went into effect *on 21 December. Some bloodshed occurred in the street fighting that followed and on the 29th the city capitu¬ lated to Caviglia. D'Annunzio remained in close retirement in Fiume for over two weeks, but on 18 Jan. 1921, he- left for Paris by automobile. Fiume was set up as a free and inde¬ pendent state.

D'Annunzio inherited Carducci's literary mantle as the most prominent of his admirers, the most faithful of his disciples and the most ardent of his champions. As a word painter D'Annunzio is an artist of magnificent vision. His style is brilliantly perfect. In every thing he writes is the touch of the poet of plastic beauty unsurpassed in Italian literature. But most of the characters in his novels and shorter stories lack the saving sense of hu¬ manity. See Francesca da Rimini; La Citta Morte; La Giocconda. Consult Bor- gese, Gabriel D'Annunzio5 (Naples 1909) ; Col- lision-Morley, (Modern Italian Literature1* (Boston 1912) ; Gargiulo, ˆD'Annunzio5 (Bari 1912) ; D'Annunzio, (The Triumph of Death5 (New York 1896) ; (The Intruder5 (New York 1898) ; (The Victim5 (London 1899) ; (The Virgins of the Rocks5 (London 1899).

John Hubert Cornyn, National University of Mexico.

ANNUS MIRABILIS, the year 1666, famous in English history for two decisive vic¬ tories over the Dutch fleet, and for the great fire of London. Dryden's poem of this name, published in 1667, commemorates these events, and is dedicated to (<the Metropolis of Great Britain, the most renown'd and late flourishing City of London.55

ANNVILLE, Pa., township in Lebanon County, five miles west of Lebanon, the seat of Lebanon Valley College, an institution con¬ trolled by the United Brethren in Christ. It was founded in 1762. Pop. (1920) 2,651.

ANOA, a genus of Malayan buffaloes, par¬ ticularly the small black species, with low, erect horns, called sapi-utan (A. depressicornis) , and found in the highlands of Celebes. The genus was once classed with the antelopes.

ANOBIUM, a genus of beetles belonging to the family Ptinidce. It contains the death- watch insects, A. striatum , A. tesselatum , etc.

ANODE, the name given by Faraday (in 1832) to the electrode, or terminal, at which a current of positive electricity enters a battery or other electrical apparatus in which chemical work is performed. The term has since been extended so as to include the electrode by which a positive electric current enters a vacuum tube. The other electrode, in every case, is known as the ˆcathode.® The anode of a primary battery (see Battery) commonly consists of a plate or rod of zinc, while the cathode consists of a plate of carbon, or copper, or platinum. In electroly¬ sis the anode and cathode both consist, usually, of platinum or carbon. In a vacuum tube the anode commonly consists of a wire or disk of platinum, while the cathode (which is varied in shape according to the purpose to which the tube is to be put) is usually made of aluminum or platinum.

ANODONTA, a subdivision of the fresh¬ water mussels (q.v.), abundant in the streams and lakes of the United States and most temper¬ ate countries. They have smooth, thin shells without hinge-teeth.

ANODYNES. See Analgesics.

ANOINTING, an Oriental custom of ap¬ plying oil to the head or unguents to the body. The Greeks and Romans, particularly the for¬ mer, anointed themselves after the bath. Wrest¬ lers used unguents in order to render it more difficult for their antagonists to get hold of them. The use of oil for ceremonial purposes is equally ancient. Its first mention is in Gen. xxviii, 18, where Jacob, in commemoration of a remarkable dream, is said to have set up a pillar and poured oil upon it. In the Mosaic law and several ancient religions a sacred char¬ acter was attached to the anointing of the gar¬ ments of the priests and things belonging to the ceremonial of worship. This could be done only with oil made for the purpose, and signi¬ fied a consecration of the articles to the service of religion. Jewish priests and kings were

anointed when inducted into office, and were called the anointed of the Lord, to show that their persons were sacred and their office from God. The Old Testament prophecies respecting the Redeemer style him, on account of his royal descent and his dignity, Messias, that is, the Anointed, which is also the meaning of his Greek name Christ. The custom of anointing still exists in the Roman Catholic and Oriental Churches (see Sacraments), and is also fre¬ quently a part of the ceremony of coronation.

ANOKA, a-no'ka, Minn., a small city, the county-seat of Anoka County, with manufac¬ tures of lumber, flour, machinery, a sash and door factory, a motor company and a starch factory. It is 18 miles north-northwest of Min¬ neapolis on the Great Northern, Minneapolis Northern and the Northern Pacific railways and on Rum River. The commission govern¬ ment chosen (1913) provides for election of mayor and four commissioners biennially. Both water works and electric light plant are owned by the municipality. Pop. (1920) 4,287.

ANOLIS, a genus of slender, long-tailed, iguanid lizards of the American tropics, which are expert climbers and seek their insect food principally in trees and bushes. I hey have a pouch under the throat and the ability to change color. It is not surprising, therefore, that one

of the species (A. carolinensis) , a beautiful golden-green lizard, very common in our Southern States, and often kept as a pet, should be called the American chameleon. About 100 other species are known. See Chameleon.

ANOMALY, a deviation from a rule. That which deviates is called anomalous. In astronomy the true anomaly is the angle which a line drawn from a planet to the sun has passed through since the planet was last at its perihelion or nearest distance to the sun. On account of the planets not moving with the same velocity at all parts of their orbits, this angle does not increase uniformly; hence its name. The anomalistic year is the interval be¬ tween two successive times at which the earth is in perihelion, or 365 days 6 hours 13 min¬ utes 48 seconds. In consequence of the ad¬ vance of the earth's perihelion among the stars in the same direction as the earth's motion and of the precession of the equinoxes, which car¬ ries the equinoxes back in the opposite direc¬ tion to the earth's motion, the anomalistic year is longer than the sidereal year, measured by the sun's return to the same position among the stars, and still longer than the tropical or common year, measured by the earth's return to the same equinox. It exceeds the latter by 25 minutes.

ANONA, a-no'-na, a name given in Mexico, Central America and the countries of the west coast to the chirimoya and sometimes to other members of the Anonacese family.

ANONYMOUS, a term applied to a work the author of which does not give his name. There are no rules about the signing of names to works in Great Britain and the United States. Consult Cushing, (Anonyms) (Cam¬ bridge, Mass.. 1890), and (Initials and Pseudo- nyms) (1st series, New York 1885; 2d series, id. 1888) ; Halkett and Laing, (Dictionary of Anonymous and Pseudonymous Literature* (4 vols., New York 1882-88) ; Hamst, O., (Handbook of Fictitious Names) (London

1.868) .

ANOPHELES, a genus of Culicidce (mos¬ quitoes), embracing those species of blood¬ sucking mosquitoes which carry and communi¬ cate to human beings, by biting, malarial dis¬ eases. See Mosquito.

AN'OPLOTHE'RIUM, an extinct prim¬ itive ruminant fossil in the Upper Eocene formations of Europe. It was among the first fossil vertebrates discovered in the gypsum quarries of Montmartre in Paris and was named by Cuvier in 1822 from its defenseless character (Gr. clvott'Ao? , unarmed; dqpiov, beast), as it has neither tusks nor horns to protect itself from its carnivorous enemies. They form the type of a distinct family, in many respects intermediate between the swine and the true ruminants.

ANORTHITE, a triclinic feldspar, having the composition of a silicate of aluminum and calcium, CaAUShOs. It is especially interest¬ ing to the chemical mineralogist because it stands at one end of the albite-anorthite series of feldspars (see Feldspars). Its cleavage is in perfect parallel with the base and distinct paral¬ lel with the brachypinacoid. It is brittle, break¬ ing with a conchoidal to uneven fracture. Its hardness is 6 to 6.5 and specific gravity about

0

2.75. It is usually colorless or white, some¬ times grayish or inclining to brick-red. It occurs in glassy crystals in the ejected blocks at Mount Vesuvius, Italy.

ANOSMIA, the loss of the sense of smell. This may be produced by: (1) Injury to the nerves of smell as they originate in the mucous

membrane of the nose, in chronic nasal ca¬ tarrh, in polypi or in injury to the nose. (2) By injury to the olfactory bulbs or to the ol¬ factory tracts. Such injuries occur in severe blows or falls, particularly in fracture of the ethmoid plate accompanying fracture of the skull. (3) By injury to the brain centres of smell, which are located in and about the un¬ cinate gyrus. See Smell.

ANSARIES. See Nossairians.

ANSCHAR (ANSGAR or ANSKAR),

French prelate: b. near Amiens, 801; d. Bre¬ men, 3 Feb. 865. He was educated at the mon¬ asteries of Corbie and of Korvei. He be¬ longed to the Frankish nobility and under the patronage of Louis le Debonnaire, together with Autbert, went to preach Christianity to the Northmen of Schleswig. Here he en¬ dured many persecutions but succeeded suffi¬ ciently to have the Pope establish an arch¬ bishopric in Hamburg. Anschar was made the first archbishop in 831. When Hamburg was overrun and plundered by the Danes in 845, Anschar was obliged to flee. Later he preached in Denmark and Sweden. A church was named after him at Bremen. He was canon¬ ized by the Roman Catholic Church. He was the author of a life of Saint Willehad. His feast is celebrated on 3 February. Consult lives by G. H. Klippel (Bremen 1845) and Tappehorn (Munster 1863) ; also Butler, A., (Lives of the Saints) (London 1847).

ANSELM, Saint, a celebrated theologian, regarded by some as the founder of scholas¬ ticism : b. Aosta, in Piedmont, 1033 ; d. Can¬ terbury, 21 April 1109. At 27 he became a monk at Bee in Normandy, whither he had been attracted by the celebrity of his country¬ man Lanfranc, then prior of the monastery there. When Lanfranc was promoted to the abbacy of Caen, Anselm was elevated to the dignity of prior and in 1078 he was made ab¬ bot, which office he retained for 15 years. During this period he wrote his first philo¬ sophical and religious works : the dialogues on <Truth and Free-will, *(De Veritate) and (De Libertate Arbitrii* and the treatises (Mon- ologion) and ˆroslogion,* and at the same time his influence made itself so strongly felt that Bee became the chief seat of learning in Europe. In 1093 Anselm was offered the arch¬ bishopric of Canterbury, which had lain va¬ cant since the death of Lanfranc in 1089, and accepted the offer, though with great reluc¬ tance and with the condition that the King of England, William Rufus, should acknowl¬ edge Pope Urban in opposition to the antipope Clement, which the King ultimately consented to do. In 1097, a new difficulty having arisen between Anselm and William, the former set out for Rome to consult with the

Pope. Ur¬ ban received him with great distinction, but did not venture to declare himself on the side of the prelate in his dispute with the King. Meanwhile William had seized on the revenues of the see of Canterbury, which he retained

till his death in 1100. Anselm accordingly remained abroad, where he wrote his cele¬ brated treatise on the atonement, (Cur Deus Homo. *When William Rufus was succeeded by Henry I, Anselm was recalled. His canon¬ ization seems to have taken place in 1494. All the works of Anselm are directed toward founding a reasoned system of Christian truth. Such a system he considered to be a legitimate demand of reason, although he re¬ peats again and again the doctrine that faith is necessary to the intelligence of the Christian mysteries, that the teaching of revelation must first be accepted by faith and afterward shown to have the support of reason. His celebrated ontological proof of the existence of God is to be found in the (Proslogion.* The (Cur Deus Homo, *treating, as already mentioned, of the atonement, is the most important of Anselm's works. In order to satisfy the reason of the need of an atonement and of the efficacy of the particular atonement that the Christian religion represents as having been made in the death of Christ, Anselm endeavors to establish the following positions : First, that God's honor is wounded by sin and His jus¬ tice therefore requires satisfaction; second, that this satisfaction can be given only through one who is at once God and man ; and third, that the voluntary death of Christ actually accomplished this satisfaction. The works of Anselm have often been published. The last complete edition forms the 155th volume of Abbe Migne's (Patrologiae Cursus Completus.* Among the numerous separate editions of the fCur Deus Homo1 may be mentioned those of Lammer (Berlin 1857) and Fritzsche (Zurich 1868). Anselm's personal character, distin¬ guished by single-mindedness, gentleness, large-heartedness and piety, makes him one of the brightest ornaments of the Christian Church. Consult Eadmer, <Vita Anselmi* ; the works of Franck (1842) ; Hasse (1843-52) ; Remusat (1853); Church, R. W. (1870); Rigg (1896) and Welch (1900).

ANSERES (Lat. nom. plur. of anser, goose), an order of water-birds, chiefly marked by the series of tooth-like projections on the edges of both mandibles, so placed that those on the upper mandible fit into the spaces be¬ tween those on the lower when the mandibles are closed. Ducks, geese and swans (qq.v.) belong in this order and some classifications also include the screamers. They live and breed near the water, are found in all parts of the world, and are usually of large size. As a rule, they are swimming-birds and their numerous young need but little care. About 200 species are known.

ANSON, George, Lord, a celebrated Eng¬ lish navigator: b. Shugborough, 23 April 1697; d. Moor Park, 6 June 1762. He entered the navy at an early age and became a captain in 1724. In 1740 he was made commander of a fleet sent to the South Sea, directed against the trade and colonies of Spain. The expedition consisted of five men-of-war and three smaller vessels, which carried 1,400 men. After much suffering and many stirring adventures he reached the coast of Peru, made several prizes and captured and burned the city of Paita. His squadron was now reduced to one ship, the Centurion , but with it he took the Spanish

treasure galleon from Acapulco, arriving in England in 1744, with treasure to the amount of £500,000, after having circumnavigated the globe. His adventures and discoveries are de¬ scribed in the well-known Anson's (Voyage,5 compiled from materials furnished by Anson. His victory over the French admiral Jonquiere, near Cape Finisterre in 1747, raised him to the peerage with the title of Lord Anson, Baron of Soberton. Four years afterward he was made First Lord of the Admiralty. In 1758 he com¬ manded the fleet before Brest, protected the landing of the British at Saint Malo, Cherbourg, etc., and received the repulsed troops into his vessels.

ANSON, William Reynell, Rt. Hon. Sir, 3d baronet: b. 1844; d. Oxford, 4 June * 1914. A famous English jurist, educated at Eton and Oxford, where he won some of the highest academical distinctions. He practised at the bar till 1873 ; was appointed Vinerian reader in English law at Oxford (1874) ; where he took an active part in promoting the foundation of a school of law. In 1880 he made a bid for parliamentary honors as a Liberal, unsuccessfully. Elected warden of All Souls' College in 1881 ; became a member of the Hebdomadal Council in 1884 and vice- chancellor in 1898. In 1899 he was elected M.P. for Oxford University, but as a Unionist. In 1902 he was made parliamentary secretary of the Board of Education and, as the repre¬ sentative of the Education Department in the House of Commons, he had much to do with defending and bringing into operation the Edu¬ cation Act of 1903. He established an endur¬ ing reputation by his great work, <The Law and Custom of the Constitution5 (1881), a monument of learning and lucid exposition and the most trustworthy guide to the complex machinery of British government. It is the textbook from which British statesmen have to learn their business. His other chief wrork, (The Principles of the Law of Contract5 (1879),

has also become a standard classic. Sir William Anson was a trustee of the Brit¬ ish Museum — an honor more difficult of at¬ tainment than a mere peerage. The future King of England received his instruction in constitutional history from him. As Anson died unmarried, the baronetcy passed to his nephew, Sir Denis Anson, a very young man, who was drowned in the Thames a month later.

ANSON, Tex., town and county-seat of Jones County, on the Wichita Valley and the Abilene Southern railroads, 150 miles west of Fort Worth.. The town is located in the midst of a fine agricultural country and has extensive cotton and live stock interests. It contains cotton gins, confectioneries and a municipal waterworks, two banks with combined re¬ sources of $140,000, a common school and a high school and five churches. The value of taxable property is $625,000 and the municipal revenue amounts to about $7,500. The town is under the commission form of government. Pop. (1920) 1,425.

ANSONIA, Conn., city of New Haven County, situated on the Naugatuck River, a few miles above its junction with the Housa- tonic, and on the New York, N. H. & H. Rail¬ road, being also the terminus of the New

Haven and Derby branch ; 12 miles northwest of New Haven. Among its public buildings are the Anson G. Phelps public library, a memorial to the founder (in 1840) of the city, and the city hall. Ansonia has extensive manu¬ factories of brass and copper goods, clocks and clock equipments, movements, etc., elec¬ trical supplies, flour, lumber and lumber products, foundries and machine shops, etc. According to the United States census of manufactures in 1914, there were 42 establish¬ ments of factory grade employing 4,882 per¬ sons, of whom 4,312 were wage-earners, re¬ ceiving annually $2,412,000 in wages. The capital employed was $16,535,000 and the year's output was valued at $21,499,000; of this, $4,287,000 was added by manufacture. Since 1909 the capital in Ansonia's industries has increased 69.4 per cent and the output has increased 7 per cent. It was formerly a part of Derby and received its city charter from the legislature in 1892. Pop. (1910) 15,152; (1916)

17,500; (1920) 17,643.

ANSWER, in law, a defense in writing, made by a defendant to charges contained in a complaint filed by the plaintiff against him in a court of law. In all the code States a statute similar in its provisions to § 500 of the New York Code of Civil Procedure has been adopted. This section provides that the an¬ swer of the defendant must contain: (1)

A general or specific denial of each material al¬ legation of the complaint controverted by the defendant, or of any knowledge or information thereof sufficient to form a belief ; (2) a state¬ ment of any new matter constituting a defense or counterclaim, in ordinary and concise lan¬ guage, without repetition.

ANT, a small social insect of the family of Hymenoptera, characterized by unusual dis¬ tinctness of the three regions of the body, head, thorax and abdomen and by the stack or petiole of the abdomen having either one or (rarely) two “scales55 or “nodes,55 so that the abdomen moves very freely on the trunk or thorax. The antennae are elbowed as in wasps and bees. Ants live in societies, consisting, besides the males and females, of smaller wingless work¬ ers. In all ants, except the Odontomachidce and Dorylidce, the mandibles are wide apart at the base or insertion, so that they can be used without the other appendages of the mouth being opened or even moved. Both males and females are winged, but the males are much smaller than the females, while the wingless workers are smaller than the males. In these wingless forms the segments of the thorax become more or less separated, making the body much longer and slenderer and less com¬ pact than in the winged normal sexual forms, the prothorax being more developed than in the males and females. The workers often consist of two forms : one with a large cubical head, or worker major, sometimes called a soldier, and the usual small-headed form, or worker minor. In certain genera this poly¬ morphism (q.v.) is still more marked. The legs are usually long and slender, the tarsi are five-jointed as usual in Hymenoptera, but the front or basal joint is disproportionatelv long, so that it functions as if part of the tibia; the tibias of the fore pair of legs are furnished with comb for cleaning the antenna1 and mouth

appendages. A sting is sometimes present, as in the Poneridcz, which sting like wasps and bees and in the Myrmicince , while in the workers of ordinary ants it is either vestigial or en¬ tirely wanting. Some ants secrete an active poison (formic acid), which they inject into the wound made by their jaws in biting. In the F ormicince , whose sting is atrophied, the amount of poison secreted is ((relatively enor¬ mous® (Janet). Our Formica obscuripes is a very ferocious species and, like the European F. pratensis, rises upon its hind legs, curves the abdomen and ejects its venom, while Muck- ermann adds that the ejection of formic acid is so copious as to enforce the observer

to momentarily retire.

The larvae of ants are uniformly maggot¬ like, being legless, soft-bodied, cylindrical and with a small head bent on the breast. They are helpless and are fed by the workers.

Wheeler has shown that different species of ants employ very different methods of feeding their larvae. Some (those of Camponotus, For¬ mica, Lasius and Myrmica) feed their young with liquid food regurgitated from their crops and possibly also with the secretion of the sali¬ vary glands. Other species, however, Poneriruz and some Mvrmicince, feed their larvae with comminuted insects. Wheeler states that the larvae of certain ants (<are not only able to subsist on solid food, but even on food of a vegetable nature.®

The larvae of the stingless genera usually spin a delicate silken cocoon, while those of the aculeate genera do not. Within the cocoon the larva transforms into the pupa.

Nesting Habits. — The history of a for- micarium, or ants' nest, is as follows : The workers only (but in some species the winged ants) hibernate and are found early in the spring taking care of the eggs and larvae pro¬ duced by the autumnal brood of females. Every ant colony is founded by a single fer¬ tilized female. In the course of the summer the adult forms are developed, swarming on a hot, sultry day. The small yellow ants, abun¬ dant in paths and about houses in New Eng¬ land, generally swarm on the afternoon of some hot day in the first week of September, when the air is filled toward sunset with myriads of them. The females, after their marriage flight in the air, may then be seen entering the ground to lay their eggs for new colonies, or they are often seized by the work¬ ers and retained in the old colonies. Having no more use for their wings, they pluck them off and may be seen running about wingless. The female, after laying her eggs, does not go abroad in search of food, but feeds the young larvae with food regurgitated from her stom¬ ach and derived from her fat-bodies; thus the larvae are poorly fed and become workers.

Nests. — The nests of some species of Formica are six feet in diameter and contain many thousand individuals. Ants also build nests of clay or mud and inhabit hollow trees. Ants in Europe build true mounds, sometimes three feet high, but in North America they are mostly subterranean, though in Wisconsin one ant (F. obscuripes) erects a true mound about • 20 inches high.

Formica sanguinea is one of our most abundant species, making

hillocks of sand or clay, according to the nature of the ground.

From the formicary walks and underground galleries radiate in a labyrinth in all directions ; and deep down, where the soil is perpetually moist, the galleries descend to a relatively greater depth than in Europe. Packard has found a variety of this species in Labrador, where it is common. It does not throw up hillocks, but tunnels in the earth. The nest of CEcophylla smaragdina is formed by drawing together a number of green leaves, which are united with a fine web. Some nests are a foot in diameter. This species swarms in hilly for¬ ests in New Guinea. Its sting is not very se¬ vere.

It is in argillaceous countries especially that the CEcodomas build their enormous for¬ micaries, so that one perceives them from afar by the projection which they form above the . level of the soil, as well as by the absence of vegetation in their immediate neighborhood. These nests occupy a surface of many square metres and their depth varies from one to two metres. Very many openings, of a diameter of about one to three inches, are contrived from the exterior and conduct to the inner cavities which serve as storehouses for the eggs and larvae. The central part of the nest forms a sort of funnel, designed for the drain¬ age of water, from which, in a country where the rains are often abundant, they could hardly escape without being entirely submerged if they did not provide some outlet for it.

The ˆagricultural ant® myth has been ex¬ ploded by Wheeler, who shows that these ants do not plant grass seeds or <(ant-rice® for a harvest. It is probable that Lincecum's error was due to the fact that the sprouted seeds stored up and then cast away as inedible take root and thus form a partial circle of tall grass around the nest.

Mushroom Gardens. — Moller has de¬ scribed what he calls ((mushroom gardens® made by several South American species of Atta. The ants cut and bring the large pieces of leaves into their cellars, then cut them into smaller fragments and finally comminute these still further till they form a flocculent greenish-brown pulp. This pulp is heaped up and soon becomes invaded by the mycelium of a fungus (Rosites gongylophora) . The mycelium is kept aseptically clean — that is, free from all other species of fungi and even from bacteria — and induced to grow in an abnormal way by bringing forth minute swell¬ ings which constitute the only food of the ant colony. Moller likens these swellings to the kohlrabi of the German kitchen gardens.

Forel has studied the habits of two other species (Atta cephalotes and

A. sexdens) in Colombia, in relation to this process of col¬ lecting and comminuting the leaves and in cultivating the mushroom. He has found that the largest workers (soldiers) triturate the leaves and defend the nest. They draw blood when they fight. The indigenes are said to use these insects for closing wounds. They in¬ duce them to bite the two lips of the wound and thereupon sever the bodies from the heads, which then serve as a suture. The medium¬ sized workers cut the leaves from the trees, while in the nest the workers of the minim caste are forever clipping the threads of the mycelium of the Rosites, which then develops the kohlrabi on which the ants feed.

Wheeler excavated a large nest of leaf¬ cutting ants (Atta ferrens) in a piece of wood¬ land in Texas. The large burrows, nearly an inch in diameter, were found to extend down to a depth of from three to five feet, and to open into large chambers, some of which were full}" 10 inches across and five to eight inches high. A few of these chambers were traversed by the roots of a large cedar, in the shade of which the ants had dug their formicary. Mushroom gardens were found heaped upon the floor, or, more rarely, enveloping, as aerial or <(hanging® gardens, the roots that extended across the chambers.

The shape of a mushroom garden is that of a discoidal sponge. On its upper surface the ants pile up the flocculent vegetable debris, threaded in all directions with fungus hvphae, in the form of thin, vertical, anastomosing plates, so that as much surface as possible is exposed to the atmosphere of the chamber. This at¬ mosphere must contain a great amount of car¬ bon-dioxide and a very small amount of oxy¬ gen. The ants leave several tubular or funnel- shaped openings, varying in diameter, and ex¬ tending down into some chambers excavated in the base of the vegetable mass. In these cham¬ bers lives the huge queen of the colony (an insect nearly an inch long), the newly-fledged males and virgin queens, together with the lar¬ vae, pupae and attendant ants. The whole mush¬ room garden swarms with workers representing all the different castes so characteristic of the genus Atta. The big-headed soldiers stalk about slowly over the surface of the comb, descending from time to time into the interior, as if to make sure that the great family is properly at¬ tending to its multifarious occupations, while thousands of minims keep moving about through the meshes of the mycelium, weeding the garden.

Relation of Quality and Quantity of Food to the Production of the Sexless Workers. —

As is obvious, since the workers rarely lay eggs, the worker caste is not inherited either directly or collaterally from the parents. The view now suggested and supported by a con¬ siderable body of facts is that the larvae on hatching are at first all alike and that those which become workers are fed with different as well as less food than those which develop into sexual individuals. We know that the differences between the queen and the worker bees are due to differences in the nature of the food. The worker white ants have been found by Grassi to be the result of having different food and less of it than the males or females. Wasmann believes that the large workers of Polyergus rnfescens (<(ergatoid females®) are produced by the slave ants (For¬ mica fusca), living in the colony, through ex¬ cessive care and feeding of certain larvae, — that is, that the fusca workers or slaves attempt to change worker larvae of Polyergus into queens, but succeed only in producing the wingless ergatoids. Emery also holds that the sexual polymorphism of the ant colony is the result of the development of an instinct in the workers to feed the larvae in different ways and thus the characters in which the worker differs from the corresponding sexual forms are not con¬ genital but acquired.

As has been said, the female ant, on found¬ ing a new colony, herself lives and nourishes

the freshly-hatched larvae with food from her stomach, ultimately from the fat-body. Hence these larvae of the first brood are poorly fed and become small or dwarf workers (micro-ergates), These workers leave the nest and bring in food to their half-starved parent. Thus fed she be¬ comes more prolific, lays another batch of eggs and the larvae become larger and finally change into larger-sized workers. The colony thus be¬ comes more populous and, as Wheeler states, the workers of successive broods grow larger until they attain the full stature of the species. Then and not till then do the workers bring up the males and queens, which are carefully herd¬ ed, fed and groomed by the workers until ready for the marriage flight. In some species of ants the males and virgin queens do not appear till the second or third year after the colony is founded. In a few American species of the huge cosmopolitan genus Pheidole, Wheeler and others find that the large-headed and small¬ headed or dwarf workers are connected by a perfect series of intermediate forms and this is due to the varying quantity of food. After an unfavorable season (autumn and winter) of drought and cold the number of Pheidole sol¬ diers was unusually

small. Thus Grassi's view as to the origin of the polymorphic forms in the termites being dependent on the quality and quantity is borne out by recent observations on ants.

Polymorphism and Variability of Ant Castes. — No solitary ants are known to exist, in all besides the males and females there are workers, and this is the direct result of their social mode of life. In our common species there is only one kind of worker, those in which the head is of uniform size, no big-headed ones or soldiers. But in ants collectively, though not in any one genus, there may be eight sets of individuals — that is, ordinary males and <(ergatoid® males, ordinary females and erga- toid fertile females, and exceptionally (Formica rufa), a set intermediate between the female and the worker ; there are also soldiers, worker- majors and one or more kinds of worker- minors. The adult, sexually capable, though wingless forms, are called by Forel <(ergatoids® from their resemblance to workers ('Epyarˆf, a worker), this term is applied to both sexes. The worker females differ from the normal¬ winged female in the lack of a receptaculum seminis. The greatest number of castes in any one genus is five, occurring in Eciton, Crypto- cerus.

Wheeler shows that polymorphism and va¬ riability depends on the amount and nature of the food and the increase in the population of the colony, and on the care and protection af¬ forded to the reproductive individuals of the colony. There is, on the other hand, little va¬ riation in colonies which are poorly fed and therefore unable to increase rapidly in number.

Primitive Ants. — Two primitive sub¬ families of ants, the Dorylince and Ponerince, appear to have been evolved from a still more primitive and ancestral group, the Cerapachynce, which Wheeler with good reason claims to be <(the most archaic and generalized of existing F ormicidce.ˆ This group, species of which occur in Africa, southeastern Asia, Australia and the southwestern United States (Texas) is repre¬ sented in this country by Cerapachys, which mines the ground for a few inches under stones.

The colony appears to be unusually small, the queen is wingless and the workers quite blind, and its life appears to be wholly subterranean, yet possesses senses of contact, odor (judging by the thick antennae), and of hearing (it has <(a beautifully developed

stridulatory apparatus, which occupies the whole of the large membrane between the postpetiolar and first gastric seg¬ ment®) (Wheeler). This form, as Emery points out, seems to be the nearest of any ants to the Mutillidce, especially the genus Apterogy- na , which has an ant-like pedicel to the abdo¬ men, and also resembles the ants in other features. That this group is also a very primi¬ tive one is shown by the plastic forms of fe¬ males, of which there are four kinds, signifi¬ cant, as Wheeler remarks, <(as the phyletic source to which the different female forms of all the subfamilies of ants are to be traced.®

Slavery. — This phase of social life is not infrequent among ants, and it reacts upon the slaveholders by rendering them helpless. Formica sanguinea has been observed in Europe by P. Huber to go on slave-hunting expeditions. They attack a <(negro colony® belonging to a smaller black species, pillaging the nests and carrying off merely the larvae and pupae. The victors educate them in their own nests, and on arriving at maturity the negroes take the entire care of the colony. Polyergus rufescens is also a slave-making ant, and Latreille very justly observes that it is physically impossible for the rufescent ants (P. rufescens) , on account of the form of their jaws, and the accessory parts of their mouths, either to prepare habitations for their family, to procure food or to feed them. Formica sanguinea sallies forth in im¬ mensely long columns to attack the negro ant. Huber states that only five or six of these forays are made within a period of a month, at other seasons they remain at peace. Huber found that the slave-making Polyergus rufes¬ cens, when left to themselves, perish from pure laziness. They are waited upon and fed by their slaves, and when they are taken away their masters perish miserably. Sometimes they are known to labor, and were once ob¬ served to carry their slaves to a spot chosen for a nest. The Formica sanguinea are not so helpless ; they assist their negroes in the con¬ struction of their nests, they collect their sweet fluid from the Aphides ; and one of their most usual occupations is to lie in wait for a small species of ant on which they feed ; and when their nest is menaced by an enemy they show their value of these faithful servants by carry¬ ing them down into the lowest apartments, as to a place of the greatest security. Pupae of both the slave-making species were placed in the same formicary by Huber, where they were reared by the <(negroes,® and on arriving at ma¬ turity lived together under the same roof in the most perfect amity. Darwin states that in Eng¬ land Formica sanguinea does not enslave other species.

In the United States forays of a colony of Formica sanguinea upon a colony of a black spe¬ cies of Formica, in order to make slaves of

them, has been not infrequently observed. Slavery (duloris) is known to exist only be¬ tween ants belonging to the same subfamily, the species of only four genera being known to practise slavery. In Europe the <(paragon of dulotic ants® is Polyergus rufescens, or the

<(amaz,on® ant, as the workers are very warlike, though they are in other respects helpless and completely dependent on their slaves, dying of starvation if deprived of them. Darwin's ex¬ planation of the origin of the slave-making habits is that they were originally due to the predatory instincts of ants in general, seen in their carrying off the pupae of other species, which, becoming stored as food, and finally developing would in their new abode do what work they could; and this habit of collecting pupae for food might be rendered permanent for the purpose of raising slaves.

Sound Produced by Ants. — Certain spe¬ cies of ants are evidently not deaf, because capable of producing sounds which must be heard by others of their own kind. Thus Myr- mica rubra has a sound-producing apparatus, a strigil, or file on the seventh abdominal seg¬ ment (Janet) ; another ant of this group (Sima Iceviceps) is provided with a stridulating file; and in the ronerids there is a stridulating organ consisting of a band of very fine raised lines on the second segment behind the node. Other ants (Polyrhachis) tap on the surface of a leaf with their heads, producing a sound audible to human ears, as does an Assamese species by scraping the end of its abdomen on the dry leaves of its nest.

Senses of Ants. — While ants may be blind and deaf, none are known to be destitute of the sense of smell. The olefactory organs are little sensory pits in the antennae. It is un¬ doubtedly by means of their sense of smell that ants recognize the members of their own nest, and those of other species which they treat as enemies. It is probably by this means that they distinguish their friends from their enemies. Thus the cause may be the result of reflex action, rather than any special degree or kind of intelligence.

Parasitic Ants with No Workers. — Such are the ants of the genera Anergates and Epoecus ; in the former the male and females are helpless, incapable of leaving the nest and dependent on the attentions of the workers of another genus (T etramorium) which live with them. This strange relationship seems thus far inexplicable.

Symbiosis in Ants. — The relation between ants and plants is very intimate, and it assumes different phases. See Symbiosis.

Commensalism. — Ants' nests are so many apartment or boarding hives. A vast number of beetles, aphides, cockroaches, flies and arach¬ nids take up their abode in the nests of ants, where they are allowed by their willing or un¬ willing hosts to feed on the excretions of the ants themselves or their food. The fostering instincts of ants thus seem to be extended in various degrees to their guests and thus lay the foundation for this semi-parasitic community. Upward of 1,500 species of Arthropoda are known to live in more or less cordial relations with their hosts.

Bibliography. — Huber, (Recherches sur les moeurs des fourmis indigenes *(Paris and Geneva 1810) ; Forel, (Les fourmis de la Suisse) (Geneva 1874) ; Lubbock, (Ants, Bees, and Wasps) (New York 1894) ; McCook, (The Natural History of the Agricultural Ant of Texas) (Philadelphia 1879) ; (The Honey Ants of the Garden of the Gods,* etc. (Philadelphia 1882) ; Emery, (Beitrage zur Kenntniss der

i .ordamerikanischen Ameisenfauna) (in (Zoo- log-Jahrbuch,> Vols. VII and VIII 1893-94); Wheeler, (The Compound and Mixed Nests ol American Ants) (in American Naturalist, Vol. XXXV Boston 1901); Wheeler, (Ants: l heir Structure, Development and Behavior) (XTe\v York 1910).

A. S. Packard,

Late Professor of Zoology, Brown University.

ANTACIDS, or ALKALIES, drugs which correct abnormal acidity of the digestive tract or the secretions of other organs. Direct ant¬ acids are those that unite directly with acid in the stomach and intestines ; the principal are ammonia, magnesia, potassium, bicarbonate, chalk and lime water. The acetates, citrates and tartrates of the alkalies act by being changed into carbonates, and increase the alkalinity of the blood, which diminishes the acidity of the urine, and are called indirect or remote antacids. Direct antacids are given after meals to neutral¬ ize an excess of the hydrochloric acid of the stomach resulting from fermentation of the food. Remote antacids are extensively used in the treatment of gout and rheumatism.

ANTZEUS, an-te'us, the giant son of Po¬ seidon (Neptune), and Ge (the earth), who was invincible so long as he was in contact with the earth. But Heracles (Hercules), whom he challenged to combat,

perceiving the secret of his strength, lifted him in the air and strangled him.

ANTALCIDAS, Spartan statesman, chiefly known by the celebrated treaty he concluded with Persia at the close of the Corinthian War in 387 b.c. The peace which followed was styled ((The Peace of Antalcidas.®

ANTARCTIC REGIONS, the name given to part of the earth's surface surrounding the South Pole. Its limits are variously defined by geographers ; some consider it to be coexten¬ sive with the Antarctic Ocean, which in a strict sense is bounded by the Antarctic Circle, while others include also that portion of the great Southern Ocean affected by Antarctic influ¬ ences. According to the latter interpretation the region is approximately defined by the northern limit of the drifting pack-ice or about lat. 50° S., although icebergs are sometimes encountered as far north as lat. 45° S. The Antarctic region is surrounded by a great ex¬ panse of shoreless water which further north is divided by the continental lands into the At¬ lantic, Pacific and Indian Oceans. The area comprised within the Antarctic Circle is about 8,200,000 square miles.

Exploration. — The early explorations into the region south of the equator and the discov¬ ery of numerous lands gave rise to the belief that a vast continent existed near the South Pole. The first voyage of Captain Cook in 1769 showed, however, that New Zealand, contrary to the general opinion, was an island, and in his second voyage, in 1772, it was proved that the continent, if it existed, did not extend be¬ yond the Antarctic Circle. In 1773 Cook sailed south again and the following year reached lat. 71° 10' S. in long. 106° 54' W., where he was prevented from advancing further by enor¬ mous ice-floes. No land was seen on this voy¬ age, although its presence was indicated by flights of birds. In 1819 Captain Smith rounded

Cape Horn and sighted the South Shetland Islands, while in the following year Alexander Land still farther south was discovered by Bellingshausen. Morrell, an English explorer, sailing in 1822, visited the Falkland Islands, Bouvet Islands and South Georgia, and re¬ ported that he found the temperature of both air and water to be milder the farther he ad¬ vanced southward. Biscoe circumnavigated the southern ice region in 1831-32, penetrating be¬ yond lat. 67° S. ; he discovered Enderby Land and its southwestern extension, which he named Graham Land. Kemp sighted and marked Kemp Land in 1833. The Balleny Islands were discovered by Balleny in 1839, and D'Urville, in 1839-40, made a long voyage during which he visited

many of the previously discovered lands, changing their names to make room for se¬ lections of his own. The latter also found Adelie Land, an immense tract situated far south of New Zealand and stretching for an unknown distance toward the Pole. The voy¬ ages of Wilkes (1838-42) and of Ross (1841— 42) were of great importance, especially in their scientific aspects. Ross encountered land in 70° 41' S. lat., 172° 30' E. long., which had a steep, rocky coast-line; farther south in 77° 32' S. lat., he found a lofty, active volcano which he named Mount Erebus and an inactive cone called Mount Terror. He sailed for a distance of 450 miles along an unknown ice barrier rising 150 feet above the water. During the next 30 years little was added to our knowledge of the Ant¬ arctic region. Dallman in 1873-74, however, vis¬ ited many of the localities marked by previous explorers and was able to confirm their reports. The Challenger expedition, which started out in 1874, returned with proof of a floating ice bar¬ rier and also accomplished a vast amount of oceanographic investigation. More recently the expedition of Gerlache, who penetrated to lat. 71° 36' S., was fruitful in scientific results and added over 100 islands to the list of those pre¬ viously known. Borchgrevinck, a Norwegian, in charge of an English expedition, passed the win¬ ter of 1898-99 in the Antarctic and in the fol¬ lowing summer reached lat. 78° 50' S., the farthest then attained. In 1900 he set out again and succeeded in locating the south magnetic pole in lat. 73° 20' S., long. 140° E.

From 1901 to 1912 Antarctic exploration was very active. Several expeditions were fitted out in 1901 and one of these under Capt. Robert F. Scott reached lat. 82° 17', long. 163°, the farthest south. A Swedish expedition under Dr. Otto No rdenskj old, 1902-04, made many dis¬ coveries but lost its ship, the Antarctic. Other expeditions were under Dr. Erik von Drygalski (1902), W. S. Bruce (1904), Dr. Jean Charcot (1904), and Lieut. Ernest H. Shackleton (1907-09). In 1909-10 Dr. Jean Charcot on his vessel Pourquoi Pas f had a year of successful exploration, in which he found new lands, made new soundings and achieved other valuable scientific results. His work was mainly be¬ tween the 69th and 71 st parallels. In 1910 five expeditions were in the field : English, Capt. Robert F. Scott; Norwegian, Capt. Roald Amundsen ; Australia, Dr. Douglas Mawson ; Japanese, Lieutenant Shirhase; German, Lieut. William Filchner. Captain Scott sailed from New Zealand on his vessel Terra Nova 29 Nov. 1910, with the intention of establishing win-

ter headquarters at the foot of Mount Erebus and on King Edward VII Land. Captain Amundsen left Norway in the ship Fram in the summer of 1910 with the intention of rounding Cape Horn and entering upon the ice-drift across the Polar Sea which he had long con¬ templated. He changed his plans after sailing and when Captain Scott arrived at his proposed winter headquarters he found Amundsen al¬ ready there.

Amundsen was finally successful in first lo¬ cating the Pole. On his ship Fram he reached Hobart, Tasmania, 7 March 1912, on his re¬ turn voyage and announced that he had dis¬ covered the South Pole 14 Dec. 1911. The win¬ ter of 1910-11 he spent in quarters in the Bay of Whales, 164° W., 78° 48' S. On 10 Feb. 1911, he began to prepare for his winter's work and before 11 April had built caches as far south as 80°. The lowest winter temperature which he here recorded was on 13 August, minus 59° Celsius. The mean temperature for the year was minus 26° Celsius (14.8° below zero Fah¬ renheit). On 8 September, with eight men, 90 dogs and seven sledges, provisioned for four months, he started for the Pole, but only got as far as the depot at 80°. There the party re¬ mained until the middle of October when a fresh start was made with five men, 52 dogs, four sledges and four months' food. Victoria Land was reached 11 November. At 85° the land joins the Ross Barrier of ice and from that point the explorers had to climb through a region of land whose heights ranged from 2,000 to 11,000 feet high. In four days over the glaciers they reached a height of 10,600 feet, and their highest altitude, 10,750 feet, was attained on 6 December at .87° 40'. On 8 De¬ cember at 88° 23' they passed the farthest south record of Shackleton. From this point they found the going easy until on 14 December at 3 o'clock in the afternoon observations showed that they had attained their object. From 14 December to 17 December they remained at the Pole, taking observations and finally locating exactly 90° S. where they flew the Norwegian flag and named the land at the Pole King Haakon VII Plateau. Returning, winter quar¬ ters were reached 25 Jan. 1912. The principal results of the expedition were locating the Pole, determining the extent of the Ross Barrier, as¬ certaining the apparent connection of South Victoria Land and King Edward Land and the mountain ranges therein and the exploration of part of King Edward Land.

Thirty-five days after Amundsen had planted the flag of Norway at the South Pole, Capt. Robert F. Scott, R.N., unfurled the Union Jack of Great Britain, the exact points, as determined by observation, being not more than half a mile apart, and Scott took from the Amundsen tent the written message for King Haakon, which was subsequently delivered. Scott's southerly route had been practically that of his former discovery and of the Shackleton expedi¬ tion and the return

from the Pole was along the same track. Of the party of five, Petty Officer Edgar Evans was fatally injured soon after leaving the Pole and 11 miles from <(One-ton® Camp, 155 miles from the Hut Point base in MacMurdo Sound, Scott, Dr. Edward A. Wil¬ son, second in command, chief of the scientific staff, and Lieut. H. K. Bowers died in their tent of cold and privation. A few days before

Capt. L. E. G. Oates of the Inniskillen dragoons, in desperate straits, bade his commander and comrades goodby, saying as he left them : (<I

shall be gone for some time,® and upon a spot near may now be read the inscription :

“ Hereabouts died a very gallant gentleman.”

Not until the following spring (1913) did Surgeon Anderson succeed in reaching the tent of the dead and recovering the bodies of Cap¬ tain Scott and his comrade, with records, col¬ lections and scientific data. The last entry in the journal contained:

“Ido not regret this journey, which has shown that English¬ men can endure hardships, help one another and meet death with as great fortitude as ever in the past.

“ These rough notes and our dead bodies must tell the tale, but surely, surely, a great rich country like ours will see that those who are dependent on us are properly provided for.”

Sir Douglas Mawson, of Yorkshire birth, Australian training and education and professor in the University of Sydney, accomplished in 1911-14 a memorable Antarctic work of adven¬ ture and discovery. A member of the Shackle¬ ton expedition, he was of the party which suc¬ cessfully ascended the active volcano Erebus and penetrated to the floor of its crater and had demonstrated his fitness for field work and scientific research. Organizing a well-balanced party, competent in each branch of investiga¬ tion, sustained by his government and contribu¬ tions from scientific societies of Great Britain, the expedition on its leaving Sydney tarried for some time at Macquarie Island, upon which a party in charge of a wireless telegraph station was left, while the main body pushed on to a permanent base on Adelie Land. From this point work in every direction was diligently prosecuted, the coast line to the eastward being mapped and connected up with that of the Scott party in Ross Sea, while far to the west¬ ward a detachment under Capt. Frank Wild wintered, gathering

valuable data. Sir Douglas himself at the head of an inland reconnaissance party accomplished one of the most difficult and perilous marches on record, losing in its early stages, through a crevasse, Lieutenant Ninnis, R.F., and later, through illness, Dr. Anton Merz, his two comrades, and narrowly escaping with his own life. A novel and interesting feature of the expedition was the maintenance, during a large portion of the time it was absent, of wire¬ less communication with its Macquarie Island station, thence to Australia and the world, by means of which the news of the death of Cap¬ tain Scott and disaster to his expedition was received. Sir Douglas' scientific work (in rec¬ ognition of which and his exceptionally able conduct of it, and of his expedition, King George conferred upon him the order of knighthood) will require several years and a large amount of work for its complete and adequate publication.

The most ambitious and daring of all Ant¬ arctic projects was that of Sir Ernest Shackle¬ ton, launched in August 1914, after his offer of his services and that of his party to his country in the great war which had just broken out was declined. Sir Ernest's project contemplated a base on Coats Land and advance from that point directly over the ice barrier land mass and whatever might be met with to the South Pole, and thence keeping on to the familiar British Ross Sea base on the opposite side of the globe, employing for the purpose two ships,

two parties, each working in support of the other, though only that headed by himself was to make the complete transcontinental traverse. Leaving Liverpool, Sir Ernest proceeded in the Endurance via Buenos Aires and the Falkland Islands to South Georgia, whence the last word was that the ice conditions were so unfavor¬ able that the attempt upon the main land must be deferred until the following season. More than a year passed when Sir Ernest again re¬ ported that though he had sighted new land he had been unable to reach it and compelled to abandon his main objective, the traverse of the great Antarctic land mass. The Endurance had been crushed and sunk and after a peril¬ ous journey over the pack, followed by one in boats across the open sea of nearly 1,000 miles, he had left his party of 22 marooned on Elephant Island, with a short supply of provisions. Sir Ernest himself with two comrades had crossed the dis¬ tance between Elephant Island and South Georgia, landing upon it at the peril of his life, and after the loss of his boat had made his way over its interior to the Norwegian whaling sta¬ tion, whence his report was sent. U-

ruguay promptly placed a small vessel at Sir Ernest's disposal for the relief of his Elephant Island party, but the attempt was unsuccessful and at last a second and successful effort was made with a larger vessel under the Argentine flag. On the opposite side of the Antarctic continent results were equally unsatisfactory. The Au¬ rora, having landed three parties to lay depots of food for Shackleton's advance, had been torn from her anchorage and for nearly a year adrift in the pack with her wireless equipment most of the time out of commission. Late in April 1916, however, a message from the ship was picked up in New Zealand, whence relief was promptly dispatched, and on 27 April Port Chalmers was finally made. See Polar Research.

Antarctic Ocean. — The depths of the Ant¬ arctic Ocean have been explored in various parts by Ross, Wilkes, Nares (Challenger ex¬ pedition) and Gerlache. Ross sounded in 4,000 fathoms in the vicinity of South Georgia with¬ out reaching bottom. The Challenger found depths of from 1,300 to 1,950 fathoms near the Antarctic Circle, south of Australia, while farther north the soundings ranged from 950 to 2,600 fathoms. Between the Cape of Good Hope and Kerguelen Islands depths of 2,500 to 3,100 fathoms have been reported. There seems to be a gradual shoaling of the waters toward the Pole, for Wilkes sounded in 500 to 800 fathoms off Adelie Land, and in 100 to 500 fathoms off Victoria Land, while Gerlache recorded less than 200 fathoms west of Palmer Land. The bottom in the extreme south is covered with a layer of diatom ooze. Farther northward the bottom is covered with deposits of globigerina ooze made up of the casts of Foraminifera, and in still deeper water the characteristic red clay, found at great depths in all the oceans, occurs. The temperature of the surface waters of the ocean range from a few degrees below to a few degrees above the freezing point.

Antarctic Continent. — The question whether there is a large land area of continental char¬ acter within the Antarctic Circle has not yet been definitely settled, although most geog¬

raphers and explorers express an affirmative opinion. Land areas of indefinite extent have been sighted and form an interrupted ring about the Pole. The mountain ranges and peaks discovered by Ross in Victoria Land are apparently of continental character. Granite and gneiss were fpund by D'Urville near Adelie Land, and Borchgrevinck states that the rock at Cape Adare is micaschist; these are distinctly continental types. Indirect evidence is fur¬ nished by the materials transported from the far south by the icebergs, sandstone, basalt, boulders of massive rocks, and fragments of gneiss, granite, diorite and sedimentary rocks. The great icebergs which drift far into the

region of the Southern Ocean are difficult to account for on any other theory than that they have been broken off from a vast sheet of land ice like that covering Greenland.

Antarctic Ice. — The conditions of ice formation in the Antarctic differ materially from those of the Arctic region. In the north¬ ern hemisphere the polar ocean is enclosed by land, so that sea ice is much more important than land ice, the latter occurring only on the edge of the area, while in the Antarctic the reverse is true. Enormous masses of floating ice, flat-topped with perpendicular walls and oftentimes measuring many miles in width and length, are found throughout the Antarctic Ocean. The newly-formed bergs have evi¬ dently been broken off from the edge of a thick ice-cap covering the Antarctic lands and grad¬ ually pushed over the surface toward the sea. The thickness of the ice near the Pole is esti¬ mated by Croll upon theoretical grounds at from 12 to 14 miles, but off the coast of Vic¬ toria Land the ice-wall is only 10 to 20 feet high.

Climate. — The climatic conditions of the Antarctic are imperfectly understood, but tem¬ perature is extremely severe. Compared with the Arctic the region is placed at a disadvan¬ tage in having its summer during perihelion and winter in aphelion. Observations made by Ross in the vicinity of Victoria Land from 60° to 78° S. showed a mean summer temperature of 28.85° F. for the sea and 28.31° for air; in lat. 66° 29' S. the maximum temperature in the month of December was 45.52° F. Wilkes found the mean temperature for January and February near Wilkes Land to be 30.2° F., with extremes of 34.52° and 23°, while Gerlache reported a winter minimum in 71° 30' S. of —45°. The German station in South Georgia gave a mean temperature of 37.52°. The glaciation of the land areas, the great ice-floes and the saturated condition of the atmosphere, producing heavy fogs, are influen¬ tial in producing the extreme cold. Barometric observations by Ross indicate a gradual in¬ crease in pressure south of 75° S., and it is believed that an area of extreme high pressure exists around the Pole, producing a permanent anticyclone with winds blowing in a south¬ easterly direction toward the higher latitudes. No estimate of the precipitation has been made, but the atmosphere is probably comparatively dry over the land areas in the extreme south and the precipitation is in the form of fine ice crystals. Farther north there is a heavy precipitation of snow and sleet; rain seldom falls within the ice-bound region.

Fauna and Flora.- The largest of the Ant-

arctic mammals are the whales which frequent the cold waters in great numbers. Many of the species are similar to if not identical with those inhabiting the Arctic seas; rorquals, humpback whales, pilot whales, grampuses and dolphins are known, also a small whalebone whale (Ba - Icena australis), but the right whale does not exist in the Antarctic. There are 13 species of seals, including four of fur seals, which are closely related to those found in the north Pa¬ cific, the sea-lion and the sea-elephant. Among birds the penguins are most abundant, their rookeries being; found on the borders of all lands free from ice. The largest species is the king; penguin ; a specimen captured by Wilkes measured 4 feet 6 inches in height and weighed 65 pounds. A gull-plover (Chionis) is found exclusively in the Antarctic. A small teal fre¬ quents Kerguelen, and stormy petrels, alba¬ trosses, gulls, skuas and terns breed on most of the islands. Borchgrevinck found 11 species of fish in Antarctic waters, most of them new to science. Explorers have usually reported that fishes were scarce. A few species of insects have been described by Arctowski and Borch¬ grevinck. It is believed that no land animals exist in the extreme south. Of plant and in¬ vertebrate life inhabiting the Antarctic Ocean there is a great abundance. The pelagic ani¬ mals include cephalopods, brachiopods and gastropods, which furnish food for the whales, coelenterates and Protozoa. The deep-sea fauna is much more strongly developed than the shallow-water fauna living in the vicinity of the Antarctic lands. Thirteen species of phanerogamous and numerous cryptogamous plants have been found near South Georgia. Hooker obtained from Cockburn Island four species of marine algse, three of fresh-water plants and 12 land plants, the last-named mostly lichens and mosses.

Bibliography. — Murray (Antarctic Re¬ search (in Geographical Journal, Vol. Ill, London 1894), modified by later articles in the same journal for 1904 and 1905; Cook, (Through the First Antarctic Night* (New York 1900) ; Von Drygalski, {Zum Kontinent des eisigen Siidens) (Berlin 1904) ; Nordensk- j old and Anderson, (Antarctica } (New York 1905) ; Scott, R. F., (Voyage of the Discovery) (ib. 1906) ; Shackleton, Sir E., (The Heart of the Antarctic * (2 vols., London 1909) ; Charcot, (Le <(Pourquoi Pas?® dans l'Antarctique) (Paris 1910; Eng. ed., London and New York 1911) ; Amundsen, R., (The South Pole) (1913) ; Huxley, Leonard (editor), Scott's Last Expe¬ dition (2 vols., New York 1913).

Herbert L. Bridgman.

ANTARES, an-ta'rez (ˆcorresponding to Ares® or Mars, because assumed to be like Mars in color), or Alpha Scorpii, a red double star of the first magnitude, the middle one of three in the body of the constellation Scorpio ; much used by sailors in ascertaining longitude.

ANT-BEAR, the great ant-eater, or tama- noir. See Ant-eater.

ANT-BIRDS, a general term applicable to members of certain groups of birds within the Formicariidce (q.v.), a South American group, all of which subsist largely upon ants. They have no proper oscine or singing organs, yet some of them have clear musical voices, and

their notes of excitement when following the moving columns of destructive tropical ants, feeding not only upon them, but upon the in¬ sects they put to flight, are a warning which the natives understand and heed. All these birds are small and long-billed. The sub-family Thamnophilince is made up of the <(ant-shrikes.® The (<ant-wrens® belong to the sub-family Formicivorince ; and the <(ant-thrushes® are a species of the Fonnicariince, a typical sub¬ family. The pitta is also sometimes improperly called an (<ant-thrush.®

ANT-EATER, a name given to several quite different mammals, but particularly ap¬ plied to the Myrmecophagidce, a South Ameri¬ can family of Edentata, with the head ex¬ tremely long; the snout slender; the mouth, ears and eyes small ; the tongue long, cylin¬ drical and covered with a viscid saliva which holds whatever insects are licked up until the tongue can be withdrawn into the mouth. When not in use the tongue lies doubled up in the mouth. The legs are strong and heavy; the toes vary in number in the different species, but in all species are united as far as the base of the large claws, which are adapted to digging, but are turned under the feet when the animal walks. The great ant-eater or ant-bear (Myr- mecophaga jubata), found in tropical South America, is a sluggish animal, forest-dwelling, but entirely terrestrial ; it grows to a height of two feet and a length of four feet, not includ¬ ing its long and very shaggy tail, which is often carried turned over its back like an umbrella. Though timid, it is capable of effective self- defense, using its strong forearms to hug and tear its opponents. Its body color is gray, set off by a black band which crosses the breast and tapers to the top of the shoulders, and by white feet and forelegs. The hair is long, par¬ ticularly on the back toward the tail, and on the tail itself. It is very unsocial, spending much time asleep, curled up with its tail spread over it as a protection from sun or rain. As more than one is seldom produced at a birth, the great ant-eater is not numerous.

Another, much smaller, species (Tamandua tetradactyla) , which is also tropical, is arboreal and has a prehensile tail. It is about the size of a cat ; its head is broader in proportion than that of the great ant-eater ; its hair is bristly and short, black on the body, yellowish white on the head, neck, forelegs and hindquarters. A third species (Cycloturus didactylus) , the little or two-toed ant-eater, is still smaller than the tamandua and is also arboreal. Its claws are curved and very sharp for climbing, and its structure is peculiarly adapted for life in trees.

Besides the animals of this family, called the true ant-eaters, are their allies, the scaly ant-eaters • or Manids (see Manis), the aard- vark, the porcupine ant-eaters (see Echidna) and certain insectivorous marsupials found in Australia and belonging to the genus Myr-mecobius. Certain birds, such as the ant-shrike, are also called ant-eaters.

ANTECEDENT STREAM. If folding

or faulting occurs across the course of a stream slowly enough so that the river is able to cut down through the uplift as fast as it is formed, and the waters are not diverted, the stream is said to be antecedent. A well-known example is the course of the Kanawha where it crosses the Appalachian Plateau in West Virginia.

ANTEDILUVIAN («before the flood11), theologically referring to the period previous to the Deluge recorded in Genesis. Geologically a term now disused, meaning before the waters of the earth had transformed its surface into the present form by submergence, erosion, etc.

ANTELAMI, an'ta-la'me, Benedetto,

Italian sculptor. He flourished from 1177 to 1233. He was the most prominent sculptor of the Romanesque epoch. His first work is a (Descent from the Cross,1 now in the cathedral of Parma. He served both as architect and sculptor of the cathedral of Parma, of which the sculptures on the faqade, the holy-water font and the bishop’s throne are from his hand. Other works by him are in the cathedral of Borgo San Donino and the portals of Sant’ Andrea in Vercelli. Consult Venturi, (Storia dell’ arte italiana) (1907).

ANTELOPE (Greek, antholops, a horned animal), an animal of the sub-

family Anti- lopince, placed between the cattle and the goats in the family Bovida. Its members are all short-haired, lightly and gracefully built and carry their heads uplifted; in size they vary from that of a kid to the height of a tall horse, and almost all are timid and fleet-footed. Pop¬ ularly, the antelopes include such widely vary¬ ing species as the goat-antelopes (the chamois and the Rocky Mountain goat) at one extreme, and at the other the American prong-horn which has branched deciduous horns ; but scientifically both these extreme forms must be excluded, and the term confined to Asian and African species having horns present in both sexes, the cores of which are solid, and which tend to grow upward rather than out¬ ward.

Antelopes have been pronounced the most generalized of the living Bovidce, and conse¬ quently are regarded as representing the form from which the other types within the family have descended. Their earliest fossil remains are found in the Miocene, when they flourished all over Europe and Asia, and their migration into Africa seems to have been comparatively recent. When Africa was first explored by Europeans, however, they were established there and had so enormously multiplied as to be the chief resource for meat of the natives and of carnivorous animals. Colonization so wasted and scattered them, however, during the latter part of the 19th century, that some species are already extinct, and others would be except for preservation on private estates.

Antelopes may be ranged in certain groups, such as the antelopine gazelles, including many species which are beautiful in form but do not often exceed 30 inches in height, with goat¬ like teeth, hairy muzzles and ringed horns, usually either spiral or lyre-shaped. This group inhabits deserts from the Cape of Good Hope in India, and among them are the ariel and other gazelles, the springbok, . the black- buck of India, the saiga and various others. Another, the cervicaprine group, contains the little African reedbuck, the small klipspringer and rehbok, the tiny steinbok and the larger waterbucks, etc. A third group comprises sev¬ eral African forest-ranging species, among others the pygmy antelope, only 13 inches tall and the smallest known ruminant. Another group is far larger and has many of the char¬

acteristics of cattle, while still another section diverges toward the goats. The largest, most beautiful and valuable group of all is that which contains the Indian nilgai and the Af¬ rican bushbuck and eland.

There is an erroneous notion abroad that antelopes all live in large

bands, or even vast herds, that roam over flat plains and perform migrations in large bodies from one place to another as scarcity of food and the weather compel them. Instead of this uniformity, how¬ ever, there exists great variety in size, shape, color, speed, agility and habits in adaptation to the varied circumstances in which they live. Some dwell altogether in mountains and are as expert in climbing about the rocks as are the goats. Others frequent forests and rarely leave their shade. Still others remain entirely among hills where dense thickets cover the rough surface and dart in and out among the bushes so rapidly and expertly that the sports¬ man finds the greatest difficulty in getting a shot at them. Aquatic antelopes exist, espe¬ cially in south Africa, where certain kinds, as for example, the reedbucks, spend nearly all their time in marshes, wading and swimming about and feeding upon aquatic vegetation. It is indeed only the larger, stronger and better armed kinds that can endure existence in plains where they have little means of protection against leopards, lions and other enemies, and must trust entirely to escape by flight or by being overlooked. The result has been the development among them of great speed, but this has not been accompanied by endurance, since few are required or are able to continue to run swiftly any great distance. As an aid to their safety, nature has developed in the desert- and plain-dwelling species an adapta¬ tion in color to their surroundings, making them almost invisible when lying down or standing against the rock and thicket. As a rule their coats have the dull colors of a plains landscape, the only somewhat conspicuous markings being those upon the face and tail, which serve the purpose of “recognition marks® but are not sufficiently large to attract atten¬ tion at any great distance. Sometimes this protective color of antelopes is very striking, as in the case of the red hartbeest of east Africa, which frequents the open country where the soil is rust-red and termite hills are ex¬ ceedingly numerous. It is said that the most experienced hunters are constantly deceived by the exact resemblance between one of these antelopes when lying down and an ant-hill.

The flesh of most antelopes is regarded as excellent food and some of them yield meat that is most delicate eating. The hides of the larger ones make good leather, and the de¬ struction which has overtaken the race in South Africa has been brought about mainly by hide-hunters. The horns were put to many uses by the native Africans and Asiatics and are still in demand for the making of fancy handles and other articles of ornament.

For additional information see Blackbuck ; Gazelle ; Gnu ; Hartbeest ; Prongbuck and other names of groups and species in this family.

Consult also the general natural his¬ tories; Schmidt, <Mammalia) (New York 1886) ; Flower and Lydekker, (Mammals, Liv¬ ing and Extinct1 (London 1891) ; Sclater and Thomas, (Book of Antelopes1 (4 vols., qto.,

col. plates, London 1894-1900) ; Beddard, <Mammalia) (New York 1902) ; Ingersoll, (Life of Mammals) (New York 1906).

ANTHELIA, luminous rings opposite to the sun, seen when the observer looks toward his own shadow cast upon a cloud or fog bank or on the dewdrops on the grass. The shadow is observed encircled by one or several concentric rings, with the common centre at the anti¬ solar point. They are attributed to diffraction or interference, are usually colored, red inside and blue without. The radius of the rings in¬ creases with the smallness of the globules that make up the fog or cloud. Consult Pernter (Meteorologische Optik> (Vienna 1901). See Light.

ANTHELMINTIC, medicine hostile to intestinal parasites. They are divided into two classes, vermicides, those which destroy; and vermifuges, those which expel. They are ad¬ ministered after a period of fasting, so that the worms will not be protected by masses of food, and are followed within a few hours by a purgative to expel the dead or stupefied para¬ sites. See Hookworm; Tapeworm.

ANTHER, the part of a stamen which

produces pollen. Usually it consists of two diminutive sacs, separated by a certain 'amount of sterile tissue, which is often merely the top of the axis of the stamen. See Flower.

ANTHERIDIUM, the male organ of plants, in which the sperms are developed. In some plants it is a single cell ; in others, a many-celled organ of varying shape. The an- theridium bursts open in the presence of mois¬ ture, frees its mass of sperms, which then swim to the female organs. In seed-plants the organ is concealed, while in the lower groups it is conspicuous.

ANTHOLOGY (ˆnosegay®), a name originally given to a collection of short un¬ connected Greek poems from many sources, and till lately

applied only to that and its va¬ rious enlargements. In recent times it has been extended to any collection of detached pieces of miscellaneous authorship, prose or verse, to represent a language, a literature, a country, an epoch or any sort of subjective idea as a thread on which to group it. See Greek Anthology, The; Latin Anthology, The.

ANTHON, Charles, an American educa¬ tor: b. New York city, 17 Nov. 1797; d. there, 29 July 1867. He was graduated at Columbia College in 1815 and admitted to the bar in 1819, but never practised. He was adjunct profes¬ sor of Greek and Latin at Columbia 1820-30, and full professor and head master of the grammar school connected with the college 1830-64. In 1835, in connection with the Har¬ per publishing house, he projected a Classical Series) to include works used in academies, preparatory schools and colleges. It proved the most successful enterprise of its kind ever undertaken in America. Of the more than 50 volumes edited by Anthon the following are the best known : An edition of Lempriere's 'Classical Dictionary (1822); (Horace) (with notes, 1830) ; dictionary of Greek and Ro¬ man Antiquities > (1843); Classical Diction¬ ary > (1841).

ANTHONY, Alfred Williams, American clergyman: b. Providence, R. I., 13 Jan. 1860. He was graduated from Brown University and Cobb Divinity School. He also studied two years in Berlin. In 1885 he entered the pas¬ torate of the Free Baptist Church and became pastor of the Essex Street Church of Bangor. From 1890 to 1908 he was professor of New Testament Exegesis in the Cobb Divinity School; 1908 to 1911 professor of Christian literature and ethics in Bates College. Since 1911 he has been the corresponding secretary and treasurer of the General Conference of the Free Baptists. He is author of (An In¬ troduction to the Life of Jesus) (1896) ; (The Method of Jesus) (1899) ; (The Sunday School — Its Progress in Method and Scope) (1899) ; (Preachers and Preaching) (1900) ; (The Higher Criticism in the New TestamenD (1901); (1901).

ANTHONY, an'to-ni, Clemens Theodor:

b. 1755; d. 1836. King of Saxony, who suc¬ ceeded his brother Frederich August I, 5 May 1827. The French revolutionary movement of 1830, spreading to Saxony, compelled him to grant a constitutional government in 1831.

ANTHONY, Henry Bowen, American legislator: b. Coventry, R. I., 1815; d. 1889. He was graduated from Brown University in 1833 and was editor of the Providence Journal for over 20 years. He was

governor of Rhode Island in 1849 and 1850, and United States Senator from 1859 till his death.

ANTHONY, John Gould, American nat¬ uralist: b. Providence, R. I., 17 May 1804; d. Cambridge, Mass., 16 Oct. 1877. Leaving school at 12 years of age he followed a business career for 35 years. He early developed a taste for natural history, and his publications attracted the attention of Agassiz, through whom in 1863 he became head of the concho- logical department of the Museum of Com¬ parative Zoology, a post he held until his death. He was a recognized authority on the subject of American Mollusca.

ANTHONY OF PADUA, Saint: b. Lis¬ bon, 15 Aug. 1195; d. Padua, 13 June 1231. Shortly after his ordination to the priesthood he was deeply stirred by the recital of the cruel martyrdom of five Franciscan mission¬ aries whose bodies had just been brought from Morocco to Coimbra, where Anthony was then living. Having entered the Franciscan order, he soon started for Africa in the hope of be¬ ing permitted to die for Christ. He had scarcely landed when illness obliged him to leave. Hearing about the general council of his order which was going on, he started for Assisi, where he met Saint Francis, the founder of the order. His profound knowledge of sacred things, joined to his sanctity, caused him to be made the first teacher in the Fran¬ ciscan order and later on the provincial of all the convents of the order in upper Italy. His feast is celebrated 13 June. Consult Coleridge, S. J., (Life and Works* ; Meyer, (Leben des H. Antonius) ; Lepitre, (Saint Anthony of Padua,) translated by E. Guest (1903).

ANTHONY, Saint, the patriarch of mo¬ nastic institutions : b. near Heraclea, in Upper Egypt, 251 a.d. ; d. 356. Giving up all his prop¬ erty, he retired to the desert, where he was

followed by a number of disciples, who thus formed the first community of monks.

ANTHONY, Saint, Cross of, a cross in the shape of the letter T, often styled the Tau Cross. In heraldry the name is given to two stripes, a horizontal and a vertical one cross¬ ing in the middle of the escutcheon.

ANTHONY, Saint, Falls of, a noted fall in the Mississippi River, within the limits of Minneapolis, Minn, (q.v.) The entire descent of the

stream for three-quarters of a mile is 65 feet. The falls and surrounding scenery are exceedingly picturesque.

ANTHONY, Saint, Fire of, a name now applied to a form of erysipelas. A distemper of this character became epidemic in France in 1089. Many miraculous cures having been effected by the imputed intercession of Saint Anthony, the order of Canons Regular of Saint Anthony was founded the next year for the relief of those afflicted with this disease. The order continued to exist till 1790.

ANTHONY, Sister, American nurse and nun, known before entering religious life as Mary O'Connell: b. Limerick, Ireland, 15 Aug. 1815; d. Cumminsville, Ohio, 18 Dec. 1897. She came with her parents to the United States in childhood and in 1835 entered the order of Sisters of Charity at Emmittsburg, Md., removing to Cincinnati in 1837, there to take charge of work in Saint Peter's Orphan Asylum. On the establishment of Saint Joseph's Orphan Asylum at Cumminsville, in 1854, Sister Anthony was placed in charge and the next year she was transferred to Saint John's Hospital, where she remained 10 years. The terrible slaughter at the battle of Pitts¬ burgh Landing appealed so strongly to her sympathies that with two companions she ac¬ companied the noted surgeon, George C. Black¬ man, to Nashville to minister to the wounded there winning her title of ((The Angel of the Battlefield.® She returned to Cincinnati on a hospital steamer with many wounded soldiers whom she cared for at Saint John's Hospital. In 1866 two prominent Protestant business men of Cincinnati purchased the United States Marine Hospital and transferred it to the Sis¬ ters of Charity in the hands of Sister Anthony. The name was then changed to ((The Good Samaritan,® and she remained in charge till 1882. Not only was she in charge of various institutions of her order, but was several times procuratrix of the community. She is buried at the mother house of Mount Saint Joseph and her grave is annually strewn with flowers on Memorial Day by the soldiers of the Grand Army of the Republic.

ANTHONY, Susan Brownell, American reformer: b. South Adams, Mass., 15 Feb. 1820; d. Rochester, N. Y., 13 March 1906. She taught school in New York in 1835-50, in 1852 assisted in organizing the Woman's New York State Temperance Society, and in 1854 — 55 held conventions in each county in New York, in behalf of female suffrage. In 1857 she became a leader in the anti-slavery move¬ ment, and in 1858 advocated the coeducation of the sexes. She was influential in securing the passage by the New York legislature, in 1860, of the act giving married women the possession of their earnings and guardianship of their children. In 1868, with Mrs. E. C.

Stanton and Parker Pillsbury, she began the publication of the Revolutionist, a paper de¬ voted to the emancipation of woman. In 1872 she cast ballots at the State and Congressional election in Rochester, N. Y., to test the appli¬ cation of the 14th and 15th Amendments of the United States Constitution. She was indicted for illegal voting and fined, but the fine was never exacted. Her last public appearance of note was as a delegate to the International Council of Women, in London, England, in 1899. In 1900 her birthday was celebrated by an affecting popular demonstration in Wash¬ ington, D. C., and she retired from the presi¬ dency of the National American Woman Suff¬ rage Association, which she had held for many years. Consult (Life and Work of Susan B. Anthony* (1898).

ANTHONY, William Arnold, an Ameri¬ can physicist: b. Coventry, R. I., 17 Nov. 1835; d. 29 May 1908. He was graduated from Yale Scientific School 1860 and taught science in various secondary schools 186CM37. He held chairs of physics and chemistry in Antioch Col¬ lege and Iowa Agricultural College 1869-72, was professor of physics at Cornell 1872-87, and consulting electrician, Manchester, Conn., 1887-93. From 1893 till his death he was pro¬ fessor of physics in Cooper Union School of Science. He contributed many papers to the volumes of the scientific societies of which he was a member.

ANTHONY, Kan., city and county-seat of Harper County, 55 miles southwest of Wichita, on the Atchison, Topeka and Santa Fe, the Chicago, Rock Island and Pacific, the Missouri Pacific and other railroads. It contains a flour mill, an ice plant, a salt plant, and has extensive stock raising and agricultural interests. The principal buildings are the Carnegie library, opera house, two hospitals and seven churches. The city is under the commission form of gov¬ ernment, and owns the electric and water systems. Pop. 2,669.

ANTHOSIDERITE, an-tho-sid'er-It (from the Greek anthos, <(a flower,® and sideron, <(iron®), a mineral related to chloropal, oc¬ curring in fibrous tufts and sometimes in feath¬ ery forms resembling flowers. It is harder and heavier than chloropal, is usually yellowish in color, and has the composition 2Fe203.9Si02. 2H20. It is found in Brazil.

ANTHOZOA. See Actinozoa.

ANTHRACENE (from anthrax, or an- thrac-, ((coal®), a hydrocarbon having the chem¬ ical formula CuHio, and the molecular structure

It is obtained by the distillation of coal-tar, oc¬ curring in that portion of the distillate which passes over at temperatures above 500° F. The <(anthracene oil,® as this part of the crude dis-

tillate is called, is allowed to stand in the cold for a week or so, until the greater part of the anthracene has crystallized out. The solidified portion when freed from the mother-liquor by pressure or by a centrifugal separator is ground up and washed with petroleum spirit to remove as much as practicable of the paraffin and other impurities. Anthracene so obtained is then sub¬ limed and placed on the market as (<50 per cent anthracene, }) although it may contain as much as 65 per cent of the pure substance. Its precise strength is best determined by treating a known weight with boiling glacial acetic acid and chromium trioxide, and observing the quantity of anthra-quinone that is formed. The crude anthracene of commerce may be further purified by distillation with caustic potash to which a little caustic lime has been added. Most of the impurities are removed in this way, and the product is further improved by subsequent washing with petroleum spirit, or with carbon disulphide, and finally by recrystallization from a hot mixture of benzene and aniline. Pure anthracene crystallizes in white, monoclinic tab¬ lets melting at 415° F., and boiling at about 680°. It is insoluble in water and dissolves but slightly in other common solvents. It is sol¬ uble, however, in boiling glacial acetic acid, and also in hot benzene. It is used in large quanti¬ ties for the manufacture of alizarin (q.v.) Anthracene is changed, by the action of sun¬ light, into an isomeric substance known as para-anthracene (or paranthracene), which melts at 472° F., and is reconverted into anthracene by fusion. See also Coal-Tar Colors.

ANTHRACITE, a variety of coal distin¬ guished from other coals by its high propor¬ tion of carbon and small quantity of volatile matter. It has a conchoidal fracture, bright lustre, dense black color and superior hardness. The percentage of carbon is variable, ranging from a minimum of about 80 per cent to a max¬ imum of 95 per cent. Anthracite grades by imperceptible stages into bituminous coal, from which it has been produced by the action of heat or intense pressure. Semi-anthracite and semi-bituminous are intermediate grades. The coal-seams of eastern Pennsylvania are in¬ cluded in a series of strata which have been compressed and thrown into folds, while west¬ ward

in the bituminous fields of Pennsylvania and Ohio the strata lie nearly horizontal. Beds of bituminous coal are frequently observed to grade into anthracite in the vicinity of igneous intrusions, as at Crested Butte, Colo., and near Sante Fe, N. M. Where the heat has been very intense, however, the volatile matter is entirely driven off and graphite is formed.

Anthracite occurs in extensive deposits in many parts of the world. The most productive deposits are those of eastern Pennsylvania which occur in several detached fields, located as follows: The Northern field, extending through the middle of Luzerne and Lackawanna counties ; the Eastern Middle, between the Le¬ high River and Catawissa Creek; the Western Middle, between the eastern headwaters of the Little Schuylkill River and the Susquehanna; and the Southern, .or Pottsville, field, extending from the Lehigh River at Mauch Chunk south¬ west to near the Susquehanna River. These fields comprise an .area of 472 square miles and are classed under three general divisions, namely, Wyoming, Lehigh and Schuylkill re¬

gions. The Bernice field in Sullivan County produces a semi-anthracite coal and is some¬ times included with the anthracite fields. The strata with the beds of coal have been upturned and the outcropping edges subjected to long- continued erosion. The most important and persistent seam is the Mammoth, which in the Eastern Middle field has a thickness of from 60 to 90 feet and is over 100 feet thick in parts of the Southern and Western Middle fields. Al¬ together the workable seams number 15 or more, with a total thickness (increasing from west to east) ranging from 70 to 150 feet. The anthracite fields of Colorado and New Mexico are of much less importance. In foreign coun¬ tries anthracite is mined in South Wales, Ire¬ land, Belgium, France, Westphalia and Russia, and it is known to occur in very large deposits in the province of Shan-Si, China. In the south Wales field only the northern portion yields an¬ thracite, the rest of the output being semi-bitu¬ minous and bituminous coals.

Owing to its cleanliness and freedom from smoke anthracite is especially suited for house¬ hold fuel ; for steaming and metallurgical pur¬ poses it is inferior to bituminous coal. It ignites with difficulty and burns slowl)r with little flame, giving out intense heat. The amount of ash is small, ranging from 15 per cent to 6 or 7 per cent. The color of the ash is sometimes used as a basis of classification in trade, as in Pennsylvania anthracites, which are denomi¬ nated white-ash and red-ash coals. But the color depends entirely upon the amount of iron pres¬ ent and is no criterion of the value. The fol¬ lowing analyses show the relative proportions of fixed carbon, volatile matter,

ash, etc., in va¬ rious anthracites :

•

Fields

Fixed

carbon

Volatile

matter

Water J

Sulphur

Ash

Eastern Middle, Pa. .

86.38

3.08

4.12

1.62

1. 92

Southern,' Pa .

83.81

4.27

309

064

8.18

Crested Butte, Colo. .

82.33

9.96

0.81

0.81

6.90

South Wales .

92.42

597

1.60

The preparation of anthracite for the market consists in freeing it from slate and dust and sorting it into suitable sizes. Owing to the practical absence of volatile matter, anthracite will not burn unless the lumps are of fairly uni¬ form size. When hoisted from the mine it is first passed over a screen which allows most of the fine coal to pass through. The lump coal is then sorted for the purpose of removing the shale and slate, and the pure material is crushed between rolls and screened into the market sizes. In the United States the sizes generally recognized are the following: Broken or grate, which passes through a screen of 4-inch mesh but not through 2.5-inch mesh ; egg, 2.5-inch-1.75-inch; stove, 1.75-inch-1.25-inch chestnut, 1.25-inch-0.75-inch ; pea, 0.75-inch-0.50-inch ; and buckwheat, 0.50-inch-0.25-inch. Larger sizes than the above are known as lump and steam¬ boat, and smaller sizes as rice, mustard-seed, etc. The sizes from broken to chestnut, inclu¬ sive, are known as the domestic prepared sizes and constitute at present about 60 per cent of the output. The waste or fine coal which com¬ monly amounts to as much as 10 per cent of the material mined is known as culm. Immense heaps of this fine coal have accumulated at the

mines, but with the improved processes of screening and separation much of it is now saved and sold to manufacturing plants.

The growth of the anthracite mining indus¬ try in the United States has been very rapid. There are records showing that Pennsylvania anthracite was used for fuel as early as 1768, but mining was not

carried on to any extent until about 1820. The growth of the industry from this time to the close of the century is shown in the following table :

Short tons Short tons

1820 . 365 1870 . 15,664,275

1830 . 215,272 1880 . 28,649,812

1840 . 967,108 1890 . 46,468,641

1850 . 4,138,164 1900 . 57,367,915

I860 . 8,115,842 1910 . 84,485,236

The production and value of Pennsylvania anthracite during the period 1911-15 were as follows :

Production short tons

Value

1911 .

90,464,067

84,361,598

91,524,922

90,821,507

88,500,000

*$175,500,000

178,000,000

194,948,000

188,000,000

1912 .

1913 .

1914 .

1915 .

Almost the entire output of anthracite is consumed as domestic fuel. A small portion is used for manufacturing purposes in large cities, but it is being gradually superseded for this purpose by the cheaper bituminous coal. See Coal.

ANTHRAC'NOSE, a group of fungous diseases caused by various species of Glceospo- rium and Colletotrichum, which appear upon the green parts of plants as roundish spots with more or less sunken light centres and darker margins. They often cause serious damage to cultivated crops, especially grape, strawberry, raspberry, spinach, egg-plant, cotton and cu¬ cumber, under which titles they will be more fully discussed. For methods of control see Fungicide.

AN'THRACOTHERTUM, an extinct pig¬ like animal, inhabiting Europe and North America during the Oligocene and Miocene ep¬ ochs. The teeth are intermediate between those of pigs and ruminants, but it is not in the direct line of descent of either, forming a side branch which left no descendants. The name, given by Cuvier in 1822, means <(beast of the coalH (avOpa%, coal, drjpiov, beast), and is derived from the fact that its remains were first discovered in the Tertiary lignite beds of France.

ANTHRAQUINONE, an'thra-quin-on' (from anthra-cene + quinone) , a substance de¬ rived from anthracene by the action of oxidiz¬ ing agents, and used in the preparation of ali¬ zarin. It may be conveniently prepared on a small scale by dissolving anthracene in glacial acetic acid, adding potassium bichromate and heating to 212° F. The acetic acid is then dis¬ tilled off, and the anthraquinone precipitated by water. On the large scale sulphuric acid is used in the place of acetic acid. Anthraqui¬ none has the formula CnHsCb, and is insoluble

- Based on average of pieces of all grades and sizes at the mines.

(or nearly so) in water and alcohol, and but slightly soluble in benzene. It dissolves in hot sulphuric acid, separating out again, without change, upon cooling.

ANTHRAX, the name of a disease oc¬ curring epidemically among herbivora, chiefly oxen and sheep, and occasionally affecting man. It is also called malignant pustule, splenic fe¬ ver, , wool-sorters' disease, charbon, milzbrand. It is caused by a rod-shaped bacterium, the Bacillus anthracis, first seen in 1849 and iso¬ lated in 1863, and

conclusively proved by Koch in 1876 to be the cause of the disease, this be¬ ing one of the first diseases demonstrated to be caused by bacteria.

In man the bacillus is usually acquired by handling the hide of an animal having died from the disease. A local lesion, the malignant pustule, is formed, and this may lead to wide¬ spread infection with oedema and lymphatic in¬ vasion, attended by fever, gastro-enteritis, col¬ lapse, and death. The infection may remain lo¬ calized, however, and the patient may recover. Less often the infection takes place in the res¬ piratory tract, the patient having breathed the bacillus in the dust arising from handling hides or sorting wool ; in such cases a rapidly fatal form of haemorrhagic oedema may develop. A still rarer form of the disease in man affects the intestinal tract. The bacillus of anthrax is one of the largest of the pathogenic bacteria. It

f 6-8 1

is 6-8 microns i - - - [• inches long and 1.5

microns thick, being a short rod with square edges, and growing in chains. The protoplasm is finely granulated and it forms spores about the centre of the bacillus. It grows very rap¬ idly on all of the commonly used bacteriological culture media, best at a temperature of 35° C., but its multiplication ceases at temperatures be¬ low 12° C. or above 45° C. The bacilli are readily killed by temperatures of 60° C., but the spores are very resistant, and dry heat at 140° C. must be applied for several hours to kill them. In a dry condition they remain via¬ ble for several years and will resist boiling water for at least five minutes. The gastric juice also does not destroy them readily. The bacteria are found in the blood and throughout the organs of animals dying of anthrax. They are particularly numerous in the spleen and in the lymphatic structures. They poison the body by the development of a toxin or toxins which in turn cause degeneration of the tissues of the body.

Anthrax is one of the diseases in which a serum therapy was instituted early. Thus far it has not proved of signal service, although a protective serum has been made by which ani¬ mals may be immunized against the disease.

Anthrax in animals is a comparatively com¬ mon disease, affecting sheep, cattle and, more rarely, horses and members of the deer family. It is rare among the carnivora. The disease is not geographically confined, and animals in vari¬ ous parts of the world are affected by it. It is naturally less common in countries in which there is some legislative control, and rarer at present than in former times. In Britain the mortality is small; in France, at one time, as many as 10 per cent of the sheep died annually of anthrax. Since the modern method of im-

munizing cattle has been introduced the mor¬ tality has been much lessened. The symptoms vary widely, but at least three marked groups are observable. In some instances the affected animal develops symptoms of extreme collapse ; it drops to the ground ; the pulse and respira¬ tion are quickened, there is difficulty in breath¬ ing and the animal dies in convulsions within a comparatively short time. A commoner type of attack is begun by symptoms of general dis¬ tress,

the animal is (<off its feed,® the pulse and respiration are quickened, chills develop, the temperature rises to 103 or 104° F., bloody diarrhoea occurs, bloody nasal catarrh. There then may develop convulsive movements ; there is rapid loss of strength, and the animal may die in from 10 to 48 hours, sometimes at the end of three to four days. A third type is char¬ acterized by a slow onset, the lymphatic struc¬ tures are involved, they swell and form car¬ buncles, which may ulcerate. General symp¬ toms of infection may develop — the spleen may enlarge, bloody discharges are common and the animal dies of generalized haemorrhagic oedema. The diagnosis is readily made in all cases by a microscopical examination of the blood. Differ¬ ent animals show marked variations in suscep¬ tibility. The sheep, save Algerian, ox, guinea- pig and mouse, are all very susceptible, but the goat, horse, deer and pig are less often attacked. Man may be placed next in the order of liabil¬ ity; the white rat, adult carnivora, birds and amphibia are immune. The disease is conveyed to animals largely by way of the intestinal canal. The bacilli are ubiquitous in the grass and hay about an infected area.

Preventive Inoculation. — Pasteur first evolved a method of inoculation by an attenu¬ ated virus, a sort of hardening the animal, as it were, that subsequently made it resistant to the virile bacteria. Although other methods, notably the use of anti-anthrax serum, have been used, the attenuated virus method seems to give the best results. Surgical methods are the only mode of treatment for man. Thorough sterilization of hair, wool and animal skins by dry heat, steam or by chemical agents is now generally adopted to prevent the infection of man from these sources.

Pasteur's method was the injection of a cul¬ ture attenuated by 24 days' growth at a tempera¬ ture of 42.5 C., followed in 10 days by an in¬ jection of a culture attenuated by a growth of but 12 days at the same temperature. The Dawson method, invented in 1911, is the injec¬ tion of a single vaccine, differing from that of Pasteur only in degree of attenuation. It is used when animals are dying from the dis¬ ease and immediate protection is required. A passive immunity lasting from one to two weeks is thus secured within a few hours.

Bibliography. — Pollender, (Vierteljahr-

schrift fur Gerichtliche Medicin' (VIII); Davaine, (Comptes Rendus Acad. des Sciences) (LVII, p. 220 et seq.) ; Koch, (Cohn's Beitrage' (Vol. II, 1876). For later literature see Fliigge, (Die Mikroorganis-meiP ; Hoare, (A System of Veterinary Medicine) (Chicago 1913) ; Sternberg, * Man¬ ual of Bacteriology, > and the following re¬ ports

issued by the Bureau of Animal Indus¬ try, United States Department of Agriculture: (Special Report on Diseases of Cattle > (Wash¬ ington 1912) ; Washburn, H. J., (Anthrax with

Special References to Its Suppression* (ib. 1909) ; Dawson, C. F., (Anthrax with Special Reference to the Production of Immunity.)

AN'THRENUS. See Carpet Beetle.

ANTHROPOID APES, a term applied to those apes (family Simiidce) nearest in their organization to man. See Ape.

AN THROPOL'ATRY, the worship of man, a term always employed in reproach. It was applied by the Apollinarians to the ortho¬ dox Christians of the 4th and 5th centuries, who in their devotion to Christ worshipped, as was declared, only a man in whom God dwelt.

ANTHROPOLOGY. Anthropology is the name for a group of problems arising from inquiries as to man's origin. As used in the United States and England this name stands for the science that deals with these problems, but on the continent of Europe the tendency is to restrict the term anthropologv to a study of man's body, particularly his bones. This, like most other facts of this kind, has an his¬ torical explanation. Thus, the study of an¬ thropology really begins with Blumenbach (1752-1840) of Gottingen, Germany, who con¬ ceived of classifying skulls according to form and measurement. While it is true that this idea was in a way entertained by Vesalius, Linnaeus and other pioneers, nevertheless it was Blumenbach who first struck the keynote of classification according to form and dimen¬ sions of the human skull. Following him were Retzius who devised the cephalic index, Cam¬ per who invented the facial angle, and, finally, the great French anthropologists Broca and Topinard who systematized the subject. It will be noted that so far anthropology dealt almost exclusively with man's anatomy, where¬ as at present it gives even more attention to his modes of life, or his culture.

While the above interest in man's anatom¬ ical attributes was taking form other students began to systematize the available knowledge concerning the habits and customs of differ¬ ent peoples. To this study the name ethnology is often applied. The great leaders of this movement were Tvlor (England), Ratzel (Germany) and Reclus (France). The pub¬ lished works of these men dealt exclusively with the social life of man and his distribu¬ tion over the earth and in so far were distinct from the anthropology of the day. From some points of view these two subjects, eth- nologv and anthropology, as then

defined, had little in common and indeed the tendency in Germany and other continental countries is to so regard them still ; but the great synthe- tizing work of Prichard (1786-1848) in Eng¬ land gave a new unity to the whole study of man. According to this author, man should be classified according to all definitive char¬ acters : anatomy, psychology, geographical distribution, and habits. Since man's zoologi¬ cal characters were regarded as the pivotal point in his development, the term anthropol¬ ogy was applied to this new synthetic whole. This thenceforth became the ideal for Eng¬ lish students of man — to deal synthetically with all the data available bearing upon the problems of man's origin and early career. In the main, American anthropologists have fol¬ lowed the English in this respect.

ANTHROPOLOGY

1 Maori (Australian-African)

2 Zulu (Australian-African)

3 Filipino (Australian-African)

4 Bushman (Australian-African)

5 Indian- (Asian American)

6 Siberian-(Asian American)

7 Northern Mongol

8 Eskimo (Asian-American)

9 Laplander (Asian-American)

yiitij

ANTHROPOLOGY

. * . .

mw-m

% .

THE POLYNESIAN — EUROPEAN GROUP.

1 Tahitian — Polynesia

2 Singhalese — India

3 South European (Dark) 4-5 North European (Light)

ANTHROPOLOGY

21

We can define anthropology, therefore, as the natural history of man, or the science which begins where history leaves off, and which seeks to recover the story of man's origin and varying fortunes in that dim and shadowy era we call the prehistoric. The limitations that must be imposed upon this general statement wall be more apparent when we summarize the content of our subject.

The anthropology of any group of people now deals with three great classes of charac¬ ters : the somatic, linguistic, and cultural.

~~ Somatic Characters. — One of the great problems under this head is to know man's zoological position among mammals. The classification of existing men is the great pre¬ requisite to such investigations. Though as a mere proposition this seems a small task, it proves to be one of very great difficulty, so difficult that even now there is no generally accepted classification. The trouble arises from the almost hopeless blending and inter¬ grading of all the known types, or the exist¬ ence of many extremely variable characters. There is, for instance, no one somatic char¬ acter that will consistently segregate mankind ; yet there are some such as hair, color of skin, head form, face form, and bodily proportions that almost rise to that level. Of these the most consistent is the character of the hair, of which three gross types are recognized: straight, wavy, and woolly, each with a distinct cross-section and associated peculiarities. On this basis all living peoples fall into three large groups :

1. Straight hair (leiotrichi) . The Asian- American group.

2. Wavy hair (cymotrichi) . The Poly- nesian-European group-

3. Woolly hair (ulotrichi). The Austra- S* lian- African group.

\ Though the general reader will find many proposed classifications in anthropological lit¬ erature, all show a tendency to recognize this three-part grouping. Further, the color of skin, the shape of the head and the profile of the face are found to be in frequent associa¬ tion with type of hair. In consequence we have such tentative groupings as that proposed by Giddings :

<(I. The Australian- African Group. — Char¬ acteristics: black skin, dolichocephalic (long¬ headed), prognathic, woolly or frizzly-haired (cross-section of hair very elliptical). Area of distribution: Australia and Africa, south of the equator.

(<II. The P olynesian-European Group. — Characteristics : fair skin, mesocephalic, or¬ thognathic, straight or wavy hair (cross-sec¬ tion slightly elliptical). Area of distribution: broad zone from Polynesia northwestward through southwestern Asia and northern Africa and most of the continent of Europe.

(<III. The Asian-American Group. — Char- / acteristics : yellow or red skin, brachycephalic (broad-headed), narrow-eyed, lank or straight¬ haired (cylindrical in cross-section). Area of distribution : eastern Asia and western Amer- \ ica, chiefly north of the equator along the V semicircular shore-line of Asia and America.ˆ V This, however, deals only with living men and does not include extinct forms known by their fossilized fragments. Of these the fol¬ lowing have been proposed :

1. Pithecanthropus Ercctus. — A form found in Java, the zoological position of which is still in doubt.

2. Homo Heidelbergensis. — Known from a single lower jaw found at Mauer, near Heidel- beg, Germany, in 1907.

3. Homo N eanderthalensis. — This is gen¬ erally designated as Neanderthal man and is now known by skeletons from ten or more localities in western Europe.

A fragmentary skull found in Piltdown, England, has been classified as a new species, but since the validity of such a position has been seriously questioned, we omit it here. Finally, mention may be made of extinct varieties of the existing species of man, such as the Cro-Magnon, Briin, Alpine, etc., known by skeletons only.

This enumeration presents the bare content of this division of anthropology, the details of which must be sought elsewhere. As to man's precise zoological position we are still in doubt, since the final solution of that problem will be found in fossils of man and related forms.

Linguistic Characters. — The most striking human character is the art of speech. No people have yet been found who were without a highly complex language by which they were able to express very fine shades of meaning. The comparative study of these languages is one of the

highly specialized groups of prob¬ lems that fall to the lot of the anthropologist, particularly the languages of the wilder peo¬ ples. Notwithstanding the complexity of speech in general and the somewhat forbidding nature of the whole subject, it has proved easier to classify men according to language than according to somatic structure. As a result, we now have a scheme of linguistic classification that embraces almost the whole of mankind. The fundamental problem here is the same as in zoology, viz., ultimately to discover the genetic relationship between all languages. As a preliminary to this, the lan¬ guages of the world are now classified into families or stocks, with their subdivisions of languages, dialects, etc. All that show cer¬ tain evidences of having a common origin are grouped under one family name. As the sub- ject now stands we have something more than 200 such families, with a large number of distinct subdivisions. Further study promises to greatly reduce the number of these families, or at least discover genetic relations between many of them. It is the hope of anthropology that some day we may be able to project the historical evolution of this great human char¬ acter. This will be a great triumph, for the birth and development of language must be in¬ timately related to man's origin and subsequent career.

Cultural Characters. — The term culture is used to designate the total complex of man's habits and thoughts, or that which he acquires from the group into which he is born. In the zoological sense it is not inherited and so not inborn. Strictly applied, the term culture should include language also, but for purely practical reasons the two are separated. Cul¬ ture is conceived of as composed of traits or elements, but recognized in complexes. Thus, the production of pottery in a tribal group w'ould be regarded as a trait complex of that

group. The term complex is preferred be¬ cause the analysis of the phenomenon into ultimate trait elements is not only extremely difficult, but in the last analysis subjective. The subject matter of anthropology, there¬ fore, is in part data on trait complexes, con¬ sidered as group characters. Anthropologi¬ cally speaking, a group of people is not ade¬ quately described until we have enumerated its chief cultural trait complexes along with its somatic and linguistic characters.

One peculiarity of trait complexes is their frequent independent

distribution over whole geographical areas instead of being peculiar to a single tribe. This condition necessitates a geographical classification for culture trait •complexes as the initial task. From this as the point of departure, the anthropologist ap¬ proaches the great problems of culture, viz., its origin, evolution and principles of distri¬ bution. Here are to be found some of the most illuminating and stimulating studies of our subject; for example, the discussions of trait-complex diffusion from a single world centre in opposition to the view that such complexes were independently invented by many tribal groups. This applies particularly to the question as to whether the cultures the Spanish conquerors found in aboriginal Mex¬ ico and Peru were independently developed or derived directly from the Old World by mere diffusion. For these and many other enticing discussions, the reader must consult the special literature.

However, the mere question of culture dis¬ tribution is not the whole story, for many cultures have arisen and died out, leaving be¬ hind traces in the soil from which they can be partially reconstructed. The methods of investigating these extinct cultures constitute what is known as archaeology. In fact the fundamental problem in culture as a whole is to work step by step from the existing cul¬ tures to the earliest beginnings. The most complete data of this kind are from western Europe, where we find several great culture epochs with many subdivisions, as indicated in the accompanying tabulation :

1. Paleolithic Age (100,000-12,000?).

a. Pre-Chellean.

b. Chellean.

c. Acheulean.

d. Mousterian.

e. Aurignacian.

f. Solutrean.

g. Magdalenian.

h. Azylion.

1. Neolithic Age (?-2000 b.c.).

a. Campignian Culture (?— 7,000 b.c.).

b. Swiss Lake Dweller Culture (7,000-

3,000 b.c.) .

c. Late Neolithic and Copper Culture

(3,000-2,000 b.c.) .

1. Bronze Age (2000-1000 b.c.).

2. Early Iron Age, or Hallstatt Culture

(1000-500 b.c.) •

1. Later Iron Age, or La Tene Culture

(500 b.c.) .

These early periods of culture in Europe have been exclusively the discoveries of an¬ thropologists but those investigations that deal with the early fringes to the historic na¬ tions such as Greece, Rome, Egypt, Babylonia,

etc., fall rather in the domain of the classical archaeologist. The only other part of the world where extensive research of this kind has been attempted is North and South Amer¬ ica, but the cultures of the New World peo¬ ples were unknown before the voyages of Columbus. Hence we have here a closely unified problem because anthropologists can only begin with the cultures found and trace them backward by archaeological methods. Somewhat less progress has been made here than in Europe, partly because the area to be covered is ever so much greater and partly because the conditions of investigation present more difficulties. Yet the chronology of the Maya of Yucatan has been established for dates 2,000 years ago ; that of the Mexicans falls into three quite distinct periods, etc. Yet as compared with the sequences for Eur¬ ope these are all recent, for there we can trace man back into the glacial period, while in the New World there is yet no good evi¬ dence that man arrived until the close of the ice ages.

All these inquiries into the sequence of early cultures deal with geological and palaeon¬ tological questions, for if remains of man and his culture are found in association with the bones of extinct animals, we must appeal to the above sciences for aid in determining the age of such a deposit. Thus if we look back over this outline of what anthropology is we note that almost everywhere it brings to bear upon its problems data from other sciences. For this reason it may be

considered a syn- thetizing or co-ordinating science. See Ar¬ chaeology ; Anthropometry ; Civilization ; Ethnology ; Man, Christian Anthropology ; Man, Prehistoric; Prehistoric Races.

Bibliography. — The literature of anthro¬ pology is highly specialized, but the following will serve to give a general view of the sub¬ ject: Boas, Franz, (The Mind of Primitive Man' (New York 1911) ; Deniker, J., (The Races of Man : An Outline of Anthropology and Ethnography ' (London 1915) ; Duck¬ worth, W. L. H., (Morphology and Anthropol¬ ogy. A Handbook for Students' (Cambridge 1904) ; Graebner, F., (Methode der Ethnologie. Mit einem Vorwort des Herausgebers' (Heidelberg 1911) ; Haddon, Alfred C., his¬ tory of Anthropology' (London 1910) ; Kean, A. H., (Ethnology' (Cambridge 1896) ; Ma-rett, R. R., (Anthropology' (London 1911) ; Osborn, Henry Fairfield, (Men of the Old Stone Age: Their Environment, Life and Art' (New York 1916) ; Ratzel, Friedrich, (The History of Mankind' (London and New York 1896-98) ; Tylor, Edward B., (Primitive Culture. Researches into the Development of Mythology, Philosophy, Religion, Language, Art and Culture' (New York 1889).

Clark Wissler.

Curator of Anthropology , American Mus-eum of Natural History.

ANTHROPOLOGY IN AMERICA.

Since the whole habitable world has long been occupied by man we may expect an anthropol¬ ogy for each grand division of land. Thus, Europe, Asia and Africa being after all one land mass, their peoples have established vary¬ ing contacts so that the study of any single group can rarely be pursued without some con-

sideration of the whole. On the other hand, Australia and the Americas have no actual land connections with the Old World land mass and consequently the specific anthropological problems of these two areas have little direct bearing upon each other or upon those of Eu¬ rope, Asia and Africa. Naturally then, when we turn to America, its sharp cultural and racial differentiation from all other parts of the world, together with its great geographical extent and internal anthropological complexity, all combine to make its anthropology a fairly distinct field. Hence, we are justified in treat¬ ing the anthropology of America as a separate topic.

The history of American anthropology dates back to the first voyage of Columbus, that most famous of all explorers, who found not only a new land, but a new people. The term Indian first given the few known representatives of this people can be consistently applied to all from north to south for an unmistakable so¬ matic unity exists throughout. Since no traces of a totally different people have come to light in either North or South America our subject is strictly the anthropology of the American In¬ dian.

The lead in this study has been taken by the anthropologists of the United States. Among those who have contributed most to the scientific development of American anthro¬ pology are Maj. J. W. Powell, D. G. Brin- ton, Frederic Ward Putnam and Franz Boas. Under the guidance of such men scientific methods were devised and the subject placed on a level with other university studies. How¬ ever, the greatest impetus came not from the universities of the United States, but from mu¬ seums and research institutions. Perhaps the most important event in the history of Ameri¬ can anthropology was the establishment in 1879 of the Bureau of American Ethnology at Washington, D. C., as a part of the Smithso¬ nian Institution. This institution was from the first effective in research and still serves as an inspiration to all who are engaged in anthropological pursuits. The next great event was the anthropological exhibit at the World's Columbian Exposition at Chicago in 1893, or¬ ganized by Frederic Ward Putnam. As a re¬ sult of the great anthropological awakening following this exposition and Putnam's en¬ thusiasm the Field Museum of Natural His¬ tory was established in Chicago in 1894; the anthropological section of the American Mu¬ seum of Natural History in New York reor¬ ganized; and the University of California mu¬ seum established in 1901. All of these insti¬ tutions now maintain a large number of highly trained research men who give their whole at¬ tention to anthropological investigations in North and South America.

One of the most signal achievements in American research was the complete linguistic classification of North American tribes under the leadership of Major Powell. This still remains the only true scientific classification of the aboriginal population and it is not far wrong to say that its attainment marks the be¬ ginning of American anthropology as a recog¬ nized science. Practically all of the native languages spoken in the United States and Canada have been recorded and in many cases texts in the original have been printed. At

present the chief interest of anthropologists is in seeking out relationships between what have so far been considered independent languages. Already some progress has been made in this direction and

we may expect in the near future a satisfactory reconstruction of the linguistic history of the tribes inhabiting North America. For South America there has been less prog¬ ress, but a provisional classification has been' made that embraces all the known tribes.

Perhaps the next most distinctive work is that of Lewis H. Morgan and his follower, Adolph Bandelier. Morgan's work stands out as one of the world's great contributions to anthropology and sociology. His theories of marriage and the origin of society broke new ground, but they were all based upon concrete studies among living Indian tribes. Bandelier, inspired by Morgan's genius, made a critical examination of Spanish historical sources of data upon the organization of native society in Mexico City, for the first time making it evident that American native culture from the highest to the lowest had a common basis and in all probability a single origin. However, Bandelier's greatest work was ?mong the ruin- strewn mesas and deserts of southwestern United States, where he skillfully combined documentary data and native tradition with the objective study of the ruins themselves. Though essentially pioneer work, these studies of Bandelier will ever remain the great syn¬ thetic classics in American anthropology.

The next great concern of American an¬ thropologists has been the relative antiquity of man's first appearance in America and the es¬ tablishment of a chronology for his subsequent career. The most important advance in this direction was the deciphering of prehistoric in¬ scriptions found upon the famous ruined cities of the Maya in Yucatan and their co-ordina¬ tion with our own calendar, according to which we are able to establish dates as early as 200 e.c. Yet in the development of chronologies based upon archaeological stratification, little progress has been made in sharp contrast to what has been achieved in western Europe. However, there is now a newly-awakened inter¬ est in chronological research and new develop¬ ments may be expected at any moment. See Archeology; Indians; Mound Builders.

Bibliography. — Bandelier, Adolph F., (On the Distribution and Tenure of Lands and the Customs with Respect to Inheritance, among the Ancient Mexicans y (11th Annual Report, Peabody Museum of American Archaeology and Ethnology, Vol. II, No. 2, pp. 384-448, Cambridge 1878) ; (Social Organization and

Mode of Government of the Ancient Mexicans* (12th Annual Report, Peabody Museum of American Archaeology and Ethnology', Vol. II, No. 3, Cambridge 1879) ; (Final Report of In¬ vestigations among the Indians of the South¬ western United States, carried on mainly in the

years from 1880 to 1885 J (Papers, Archaeologi¬ cal Institute of America, American Series, Vol. Ill, Cambridge 1890) ; Boas, Franz, (Handbook of American Indian Languages) (Bulletin 40, Bureau of American Ethnology, Washington 1911) ; Morgan, Lewis H., An¬ cient Society or Researches in the Lines of Human Progress from Savagery through Barbarism to Civilization * (New York 1878) ; Morley, Sylvanus Griswold, (An Introduction

to the Study of the Maya Hieroglyphs' (Bul¬ letin 57, Bureau of American Ethnology, YVash- ington 1915) ; YVissler, Clark, (The American Indian, an introduction to the Anthropology of the New World) (New York 1917).

Clark Wissler,

Curator of Anthropology, American Museum of Natural History.

ANTHROPOMETRY (Greek avOpuTroc, man, and phpov , measure), a term de¬ noting both the system of identification based upon measurements of certain portions of the human frame and also — especially at the pres¬ ent time — the science having for its object the systematic examination and study by means of classification, of the height, weight, strength and other physical characteristics of individu¬ als representing the different races of man¬ kind. With the former (the system of identi¬ fication, and particularly the identification of criminals) the name of the distinguished French investigator, Alphonse Bertillon (see Bertillon and Bertillon System) is indis¬ solubly united. The tendency has become strongly marked in recent years to adopt the system of identification by finger prints in lieu of such measurements of the head, of the fore¬ arm, etc., as are more difficult to secure with the requisite degree of accuracy, in outlying districts and in fact wherever erroneous meas¬ urements might be recorded as a result of in¬ sufficient skill in the use of the Bertillon in¬ struments (see Finger Prints). Investigations purely scientific in character and covering a wide range of subjects are now classed as an- thropometrical. For example, the studies of such modifications as changes of environment produce in the bodily form of human beings, or again the statistics of physical development during courses of training under competent in¬ structors, may be appropriately classified in this manner. As for the comparative studies in this field, and the conclusions reached in the new science that may be called quite properly comparative anthropometry, their interest is merely suggested by the following list, which shows the average

height of the adult males of the principal races or nationalities of the world: Polynesians, 69.33 inches; Patagonians, 69 inches; Negroes of the Kongo, 69 inches; Scotch 68.71 inches; Iroquois Indians, 68.28 inches; Irish, 67.90 inches; United States (whites), 67.67 inches; English, 67.68 inches; Norwegians, 67.66 inches; Zulus, 67.19 inches; Welsh, 66.66 inches ; Danes, 66.65 inches ; Dutch, 66.62 inches ; American negroes, 66.62 inches ; Hungarians, 66.58 inches ; Germans, 66.54 inches ; Swiss, 66.43 inches ; Belgians, 66.38 inches; French, 66.23 inches; Berbers, 66.10 inches ; Arabs, 66.08 inches ; Russians, 66.04 inches ; Italians, 66 inches ; Spaniards, 65.66 inches; Eskimos, 65.10 inches; Papuans, 64.78 inches; Hindus, 64.76 inches; Chinese, 64.17 inches; Poles, 63.87 inches; Finns, 63.60 inches; Japanese, 63.11 inches; Peruvians, 63 inches; Malays, 62.34 inches ; Lapps, 59.2 inches ; Bos- jesmans, 52.78 inches. The average stature of man is thus about 65.25 inches.

Bibliography. — Bertillon, A., (Sur le fonc- tionnement du service des signalments an- thropometriques' (Lyons 1888) and (Signaletic Instructions' (trans. and edited, Chicago 1896) ; Boas, F., (Changes in Bodily Form of Descend-

ants of Immigrants' (New York 1912) ; Leys, N. M., and Joyce, T. A., (Series of Physical Measurements from East Africa) (Royal An¬ thropological Institute of Great Britain and Ireland Journal, London 1913) ; Ris- ley, H. H., (Thc People of India' (II, Anthropometry: India, Calcutta 1915) ;

Seaver, J. W., (Anthropometry and Phys¬

ical Examination: A Book for Practi¬ cal Use in Connection with Gymnastic Work and Physical Education' (New Haven 1909) ; Talbot, P. A., (Notes on the Anthropometry of Some Central Sudan Tribes' (Royal Anthro¬ pological Institute of Great Britain and Ireland Journal, London 1916) ; Woolley, H. B., (Men¬ tal and Physical Measurements of Working Children' (Princeton and Lancaster 1914).

ANTHROPOMORPHISM, a term ex¬ pressing the representation or conception of Deity under a human form, or with human at¬ tributes and affections. Such a conception springs from the natural inaptitude of the hu¬ man mind for conceiving spiritual things ex¬ cept through sensuous images, and in its conse¬ quent tendency to accept such expressions as those of Scripture when it speaks of the eye, the ear, and the hand of God, of His seeing and hearing, of His remembering and forget¬ ting, of His making man in His own image, etc., in a too literal sense. Thˆ term is also applied to that doctrine which attributes

to ani¬ mals mental faculties of the same nature as those of man, though much lower in degree : strictly called biological anthropomorphism, to distinguish it from anthropomorphism proper, or theological anthropomorphism.

ANTHROPOPHAGI, the name given to individuals or tribes by whom human flesh is eaten : man-eaters, cannibals. The Caribs are said to have been cannibals at the time of the Spanish conquest of America, and the word “cannibal*’ is derived from their name.

ANTI, or CAMPA, a warlike tribe of south¬ ern Peru on the eastern slope of the Andes. Their principal garment is a poncho belted at the waist. The men are workers in metal to a considerable extent, and the women are skillful weavers. They cultivate the ground, wild ani¬ mals, tamed, serving as beasts of burden.

ANTI-AIRCRAFT GUNS. As a solution

of the problem presented by the conditions of firing at great heights and at large angles in order to reach airplanes or balloons, the Krupp firm has brought out three general types of can¬ non, each of which is adapted for a special use. In the first place, there is the more simple type of cannon with field mounting, while a second type is constructed with a view of being placed upon a motor car. For use on shipboard a third type is designed intended to be rapidly rotated in all directions by the use of a central pivot base such as is usually installed on warships for coast-defense use. On the other hand, the field gun has its wheels arranged so as to turn upon pivots, which allows of placing the wheels in crosswise direction. In order to give effective results it is found that the angle of elevation must be at least 70 degrees, and the field gun is designed to reach this angle. The automo¬ bile and ship cannon will, however, make a greater angle, the maximum being for these two types as high as 75 degrees. In all these cases

a rapid rate of firing is given by an automatic opening and closing of the breech. The calibre has been reduced as much as possible, as also the weight of the projectile, while the long bore gives a high initial speed to the shot and dimin¬ ishes the time required to attain the mark. Ow¬ ing to the lessening of the calibre, greater light¬ ness is obtained, and this is of service especially in the field and the

automobile types of gun.

Sighting is carried out in the most efficient manner by the use of an appropriate form of sighting telescope in combination with a gen¬ eral finder which covers a wider range of field. There is also a range-finder by which the dis¬ tance is first obtained, and afterward the indi¬ cations are directly given so as to be able to point the gun for different heights of the air¬

ship without loss of time, and thus the use of firing tables is dispensed with in all these cases.

The question of the kind of shot which is best adapted for firing upon balloons or airships is of prime importance; and this matter has been made the object of a number of experi¬ ments. It is recognized that shrapnel will pen¬ etrate the balloon envelope, but without doing much damage, at least of an immediate nature, seeing that the holes are closed again for the most part by the internal pressure of the gas, so that the loss of gas is not a rapid one and the airship is able to reach a place of safety in the majority of cases. It is found that the most effective form of projectile is a special kind of grenade, which is designed to explode in the interior of the balloon and to bring about ignition of the gas. The projectile designed by

the Krupp firm is intended to accomplish this, and at the same time the path of the projectile from the time it leaves the gun can be followed by the use of a special smoke produced carried on the shot. By observing the trail of smoke the gunner learns whether the shot comes near the mark. When the projectile leaves the gun, the smoke producer has been set working by an appropriate device. At night the path of the shot is still followed by the light which the smoke producer gives out. When it penetrates the envelope, a very sensitive device causes the detonation of the grenade.

In the case of the field cannon, which has a 6.5 centimetre bore (2.6 inches), the weight of the gun itself is 775 pounds and that of the chassis 1,150 pounds, making a total of 1,925 pounds for the cannon when prepared for ac¬ tual service. The gun can be turned about through a complete circle, and has a maximum vertical angle of 70 degrees. The weight of the projectile for this type is nine pounds. The in¬ itial speed of the shot is 2,050 feet per second. With the field gun it is possible to cover a max¬ imum range of 28,550 feet, and a maximum height of 18,800 feet.

Of a heavier build than the former, and also of greater range, is the

second type of gun of 7.5 centimetre (three-inch) calibre, which is designed to be mounted upon a heavy motor car. Like the former, it is provided with hy¬ draulic recoil brake, and in the present case there is used a middle pivot. For elevating and lowering the gun through the required range there is used a double-toothed sector which is driven by pinion and crank. A spe¬ cial arrangement is used for the rotation, by which a slow movement is obtained, but a quick rotation may also be given by the more rapid mechanism when it is needed to turn the gun rapidly into any desired position. It is to be noted that, owing to the high speed at which airships move, such quick movements are one of the features which need to be especially de¬ signed in the case of guns for balloon firing. The weight of the gun itself, 990 pounds, com¬ bined with the weight of the support, 1,550 pounds, gives a total weight of 2,540 pounds for this type of gun. We have here the maxi¬ mum angle which is reached in the Krupp can¬ non, or 75 degrees. The weight of the pro¬ jectile is 12 pounds, and the initial speed 2,060 feet per second. The maximum range is about 30,000 feet, and the greatest height about 20,- 000 feet. As regards the automobile car which is designed to take the present cannon, its total weight (exclusive of the gun) is three and a half tons, and it has an average speed of 30 miles an hour.

Owing to the fact that both axles are driv¬ ing axles, with the use of the 50-horsepower motor the automobile car is able to travel over very difficult ground, and it easily mounts very steep grades. Under the front seat is a roomy chest which holds a good supply of tools and extra fittings, and special attention has been given to this point so that the car will not easily become disabled.

The Ehrhardt gun factory of Diisseldorf has also built various anti-aircraft guns, mounted on motor trucks, whose calibres vary from 50 to 105 millimetres. The most remark¬ able of these is the 35-calibre 65-millimetre de¬ sign which fires a 4.1 kg. projectile to a maxi-

mum height of 5,800 metres with an arc of elevation of 75 degrees and a muzzle velocity of 670 metres per second. This gun can fire three varieties of projectiles: (1) Ordinary shrapnel containing 150 steel balls of 9 grams each; (2) a smoke shrapnel of 170 steel balls of the same weight; and (3) a “balloon gren¬ ade, w which is especially adapted for use against airships. This gun is mounted on an armored motor car and weighs complete 6,650 kg. The Skoda Gun Works of

Pilzen, Austria, also sup¬ plies an anti-aircraft gun which has a bore of one and a half inches and is 70 calibres long. This gun has a muzzle velocity of 1,000 metres per second and fires a projectile weighing 0.8 kg. at an elevation up to 80 degrees. It weighs complete 615 kg. and can be mounted on any suitable high-power motor car.

ANTI-CATHOLIC RIOTS. See Orange¬ men.

ANTIARIN, the poisonous principle found in the milky juice of the upas tree (Antiaris toxicaria) in Java. It has the probable for¬ mula C14H20O5 + 2H2O. The gum prepared from the upas juice is used by the natives of Java for poisoning arrows. Antiarin, when taken into the stomach or introduced into the circula¬ tion through a wound, causes great prostration and, in sufficient quantity, paralysis of the heart.

ANTIBES, an-teb, a fortified town and seaport of France, on the Mediterranean, 11 miles south-southwest of Nice; founded about 340 b.c. by a colony of Greeks, who named it Antipolis. It has a naval school and exports olives, anchovies, perfumery, etc. Pop. town, about 6,000; commune, 11,000.

ANTIBODY. See Immunity.

ANTICHLOR, an'ti-klor (from chlorine and anti). In bleaching, any substance used to eliminate, by chemical means, the last traces of chlorine from a material that has been bleached by the action of a chlorine compound. The free chlorine can be largely removed by mere washing, but it cannot be entirely elim¬ inated in this manner, and the residuum, if not removed by chemical means, is injurious to the material and causes it to disintegrate slowly. Sulphur dioxide Was long used as an antichlor, its action being indicated by the following formula : S02 + 2H20 + 2Cl = H2S0i + 2HCf;

that is, it combines with the chlorine to form sulphuric and hydrochloric acids. Sulphite of soda, Na2SOs, is equallv effective, its action be¬ ing as follows: Na2S03 + H20 + 2Cl = Na2S04 + 2HC1. Sodium thiosulphate (better known in the arts as hyposulphite of soda, or “hypo,®) is now more commonly used as an antichlor, since it is both cheaper and more efficacious. Its formula is Na2S203, and its action is as follows : Na2S203 + 5H?0 + 8Cl = Na2SC > 4 + 8H CI + 2SO4. (Sodium thiosulphate, water, and chlorine yield sodium sulphate, hydrochloric acid, and sulphuric acid). In practice carbonate of soda is often added to the antichlor to neu¬ tralize the acids formed by the absorption of the chlorine. The resulting salts of soda are easily

washed out of the material treated ; and no damage results even if they are not entirely removed.

ANTICHRIST, a term of Biblical origin, but occurring only in the Epistles of John,

where it signifies a person or persons who deny the Father and the Son and disown the incarna¬ tion and messiahship of J-esus. They are de¬ ceivers whose presence in the world betokens the last time. This writer seems to have in mind numerous false human teachers, origin¬ ally members of, but always alien to the fol¬ lowers of Christ. He seems also to refer to some single arch-deceiver of whom all false teachers are exponents, and in whom is concen¬ trated all antagonism of error and ill will to Christ and His kingdom of truth and grace. There are, however, other Biblical passages in which such antagonisms find acute and cul¬ minating expression, and it has been the custom of students to handle all these sections under the study of the Antichrist. Such passages are Matt, xxiv, with its allusions to false prophets and false Christs; 2 Thess. ii, with its “man of sin® ; Rev. xi, xii, and xiii, with its dragon and beast; and Daniel vii and viii, with its fig¬ ures of the terrible beast and the he-goat. In all these passages a central feature is the mighty opponent and assailant of the people and purposes of God. Clustered about this central personified or personal antagonist of all worshipers of the true God numerous signifi¬ cant features continually recur. Such are names, times, places, forms. These features, variant in themselves when differently com¬ bined by would-be interpreters, yield perplex- ingly manifold and divergent schemes, as the history of the theme abundantly displays.

The history of interpretation shows four names to have special eminence alongside the name Antichrist, thus : Dragon, Satan, Demon, Belial. The efforts to identify him cluster around typical views. Some deem him to be a form of Jewish antagonism to the Christian faith. Here he is traced to Capernaum, Chora- zin, Bethsaida or to Jerusalem. Frequently he is described as hostile to the Jews, being the counterfeit and foe of the Jewish Messiah. Very many identify him in some way with Rome, naming pre-eminently Nero, or a Nero redivivus, or Titus, or Caligula. Quite com¬ monly in the Middle Ages he was seen in Mo¬ hammed or in the Turks.. Still later some Catholics identified him with Luther, while the Reformers identified him with the Pope. Many emphasized in the Antichrist, whatever hi’s form, the energy or wisdom or very being of Satan or the Dragon. Many writers refer all the Biblical allusions, to events current at the time of writing. Many others deem the reference to events still future. Still others hold the Biblical teachings to be pre¬ eminently predictive,

but find their fulfilment partial and manifold throughout all Christian history, until their final consummation will mark the end. As to the place of his appear¬ ance or activity mention may be found of the Jewish Temple, Jerusalem, Mount of Olives, heaven itself. Closely connected with these central features are various attendant elements such as Michael, his great antagonist and vic¬ tor; Gog . and Magog and the nations which are his minions ; the miracles which he works ; the two witnesses, Enoch and Elijah, whom he slays ; the sign of the Antichrist and the Son of Man ; his world dominion ; and his final doom. It is manifest that this theme presents a program of thought and activity of most profound significance, however perplexing its

solution. The persistence of its main elements through such a long train of history attests something vital in human life. But its out¬ line is nowhere complete. In recent years the effort to solve its mystery and find its mean¬ ing has taken new form and course. Scholars are trying to trace every element of the Anti¬ christ tradition to its historical source. The leaders here are Dieterich, who, in his (Abraxas > and ‘Nekyia, *traces parallelisms in Greek myths; Gunkel, who, in his (Schopfung und Chaos,* attempts the same task in old Babylonian mythology ; Bousset, who, in his (Der Antichrist, *explores post-Christian liter¬ ature of all types for echoes of the tradition ; and Friedlander, who, in his (Der Antichrist in den Vorchristlichen Jiidischen Zuellen,* tries to show that every essential trait of the Anti¬ christ is traceable in Jewish circles before the destruction of the temple. The writer last named conceives the Babylonian dragon myth, the Hebrew sons of Belial, the foes of God and his Messiah in Ps. ii, the Zedim of Ps. cxix, the minim of various Jewish writings, the Belial of the Sybilline oracle, the Gnostics, the great antagonist of Daniel, the man of sin in 2 Thess. ii, the false Christ of Matt, xxiv, the Antichrist of John’s Epistles, and the dragon of Rev. xi, to be all and severally various phases in one consistent development of the Antichrist idea. These studies, though but the early stages of a mighty task, disclose a com¬ manding theme. For a history of the expo¬ sition of 2 Thess. ii consult Bornemann’s (Com¬ mentary J in the Meyer series. For a thorough statement of the Nero speculations consult De Wette’s (Excursus * in his Commentary on Revelation xviP ; also Charles, R. H., (The Ascension of Isaiah) (§ 17).

ANTICLINE. See Folds.

ANTICLINORIUM. See Folds.

ANTICOSTI, a barren island in the Gulf of Saint Lawrence, 135 miles long and 40 miles at its greatest width. The hills in the interior rise to about 600 feet. The climate is severe ; while the surface is an alternation of rocks and swamps. It is visited by fishermen in the summer, but there are few inhabitants save lighthouse keepers and official residents. The island, which is attached to the Canadian prov¬ ince of Quebec, has considerable salmon, trout, cod and herring fisheries and is a resort for seal- and bear-hunting. In 1895 the island was purchased by M. Henri Menier of France, who had much litigation over the rights of some settlers. A decision in his favor was made in 1900. Pop. 250.

ANTICYCLONE, an atmospheric condi¬ tion characterized by high barometric pressure and outblowing winds — the opposite of cyclone. An anticyclone extends over a wdde area and in the temperate zones usually appears in the west and moves eastward with slow velocity. At the centre of the area the winds move down¬ ward, thus bringing the cool, dry air of the upper regions into contact with the earth's sur¬ face. Anticyclones are generally accompanied by clear, pleasant w'eather, but wrhen following a storm in winter they may result in cold waves. See Meteorology.

ANTICYRA, an-tis'i-ra, the name of three Grecian towns in Thessaly, Phocis and

Locris, famous for the hellebore which grew in their neighborhood. This plant was in high repute as a medicine and was thought to have the effect of clearing the brain and curing stupidity; hence the expression of Horace, (< Naviget Anticyram , **(<Let him sail to Antic- yra.**

ANTIDOTES. See Poisons.

ANTIEMETIC. A remedy employed to relieve nausea and vomiting. The choice of an antiemetic depends very largely on the nature of the cause of the nausea and vomiting. There are local antiemetics, acting solely on the mu¬ cous membrane of the pharynx, oesophagus or stomach, and central antiemetics, acting on the nervous system. Among the best local reme¬ dies are cracked ice, cold beer, cold carbonated waters, cold champagne, small doses of tincture of iodine, chloroform, belladonna, cocaine, bro¬ mides or chloral. The most

reliable general antiemetics are ipecac, opium , and its alkaloids. See Emetic.

ANTIEROSION COATING. This coat¬ ing for projectiles is used to prevent erosion by eliminating contact between the surface of the projectile and the surface of the bore dur¬ ing travel in the bore. It is not a lubricating but a plastic substance, such as silicate of soda, alone or mixed with powdered clay. Adhesion of the substance is increased by roughening the surface of the projectile, chemically or me¬ chanically. Without such precaution the coat¬ ing might be stripped off by the rifling.

ANTIETAM, an-te'tam, The Battle

of, fought on 17 Sept. 1862, in Maryland ; sometimes called the battle of Sharpsburg. It was one of the decisive engagements of the Civil War, as it ended the first Confederate attempt at invasion of the North, though tacti¬ cally a drawn battle. Lee's army of about 50,000 crossed the Potomac near Leesburg, some 30 miles above Washington, and concentrated around Frederick, about 40 miles from Wash¬ ington and 20 miles from the Pennsylvania line. When it became known that Lee had crossed into Maryland General McClellan, in command of the Army of the Potomac, pushed forward several corps with the left on the Po¬ tomac.

Meanwhile Lee had ordered a movement on Harper's Ferry (q.v.), in his rear at the junc¬ tion of the Potomac and Shenandoah. It was a valuable defense against invasion through the Valley of Virginia, but once the Confed¬ erates were across it became not only worth¬ less but a trap. Nevertheless General Halleck ordered it held ; and Lee grasped the chance of capturing its defenders (with the Martins- burg outpost) and opening up his communica¬ tions at once. This involved dividing his army for days, with a much superior force twro or three days' march off, but he gauged his foes justly enough to take the risk. The operation was effected with great skill and success and accurate co-ordination ; but it took longer than Lee expected, and a mischance befell which should have undone him. A copy of his order fell into McClellan's hands on the 13th, telling him of the dividing of that army not far off, its object, the position of the separate detachments, and the premium on expedition ; but the oppor¬ tunity was lost to the Federals through Me-

Clellan's unexplained delay in giving orders for an advance.

Lee, advised by the night of the 13th at Hagerstown that McClellan was advancing on South Mountain, marched back to resist his advance but was defeated and on the night of the 14th 'fell back to Sharpsburg, a few miles southwest of Boonsboro, as the nearest strong position for his Harper's Ferry detachments to rejoin him, as on the flank and rear, of any force menacing Maryland Heights which they occupied, and a very defensible position in it¬ self. Six or seven miles above the Heights the Potomac receives Antietam Creek, flowing through a ravine, with banks rising on the west to a low ridge having wooded patches, ledges, stone and wooden fences, cornfields, etc., as natural bulwarks, and sloping on the western side to the Potomac. Two and a half miles above the confluence a sharp eastern bend of the Potomac brings it within two and one-half miles of the Antietam ; and at about the centre of the peninsula thus formed lies Sharpsburg, in a hollow on the western slope. Lee's line, about three miles along the crest, was to rest one flank on an elevation near the Potomac, with the village in the rear centre, and a secure retreat by the Shepherdstown ford of the Potomac in the rear.

The Union troops having forced South Mountain (q.v.) by two sharp battles on the 14th, the main body issued therefrom next morning, marched the eight miles to Antietam Creek and formed in line along the east ridge. By afternoon some 50,000 troops were opposed to about 30,000 under Lee, with Longstreet and D. H. Hill. Late in the afternoon McClellan came up, was received with immense en¬ thusiasm and decided that it was too late to attack that day. On the 16th Jackson and Walker had joined Lee with fully 10,000 more. The chance of splitting the Confederate army being now lost, McClellan waited for his am¬ munition and supply trains to arrive and or¬ dered no attack save of Hooker's corps on the right late in the afternoon. A list of divisions and commanders now becomes requisite for brevity and intelligibility in describing the battle.

Union Army.

Right Wing. — Joseph Hooker. First Corps: Joseph Hooker; three divisions; commanders, Abner Doubleday, J. B. Ricketts, G. G. Meade.

Centre. — E. V. Sumner. Second Corps: E. V. Sumner; three divisions; commanders, I. B. Richardson, John Sedgwick, W. H. French. Twelfth Corps: J. K. F. Mansfield; two divi¬ sions ; commanders, A. S. Williams, G. S. Greene.

Left Wing. — A. E. Burnside. Ninth Corps: J. D. Cox; four divisions; commanders, O. B. Willcox, S. D. Sturgis, I. P. Rodman, J. D. Cox (in the battle, E. P. Scammon). But Burnside refused to take personal command of the corps because, while he had previously com¬ manded the right wing with the First and Ninth under him on the day previous, the former (Hooker's) had been taken from him and made an independent command; he feared that ac¬ quiescence would lose it to him permanently, and merely transmitted orders through Cox. The corps therefore had a technical com¬ mander who would not exercise initiative and a real one who could not.

Reserve — Fifth Corps: Fitz-John Porter; two divisions; commanders, George Morell, George Sykes. Sixth Corps : William B. Frank¬ lin ; two divisions; commanders, H. W. Slocum, W. F. Smith. Temporarily attached, D. N. Couch's division from the Fourth Corps. 4 his came from Pleasant Valley during the fore¬ noon and portions were used as reserves. Couch's division did not reach the field until after dark of the 17th.

Cavalry. — Alfred Pleasonton.

Confederate Army.

First Corps. — James Longstreet. Five divi¬ sions ; commanders, Lafayette McLaws, R. H. Anderson, D. R. Jones, J. G. Walker, J. B. Hood.

Second Corps. — T. J. ("Stonewall") Jack- son; four divisions; commanders, I. R. Jones, A. R. Lawton, A. P. Hill, D. H. Hill.

Some crucial points of the battle-ground must be noted. The heart of the fighting was north and east of a Dunkard chapel of red brick, a mile north of Sharpsburg on the west side of the Hagerstown turnpike, with tall woods free from underbrush to the west and north (the "west woods"), and elevated ground with ledges, hollows, etc., to the north (Nico- demus' Hill) and west. Next to and across the road was open ground, with a field of high strong corn opposite the north end of the west woods, and then the "east woods," also inter¬ spersed with rocks, with a commanding ridge running south, cut by a sunken road (the "Bloody Lane") running east from the turn¬ pike.

On the morning of the 17th Fitzhugh Lee's cavalry brigade and some artillery formed the extreme Confederate left, holding Nicodemus' Hill; next Jackson, Jones' division, in and in front of the west woods, and the bulk of Ewell's division on Jones' right, in the open ground

east of the Hagerstown turnpike; D. H. Hill on the left centre. Longstreet formed the centre and right, and A. P. Hill on the extreme right came up in the afternoon. Hood on the left was relieved by Ewell the night before, and formed a reserve near the Dunkard church. McLaws withdrew from Maryland Heights on the 1 5th and 16th, crossed and recrossed the Potomac and rejoined Lee early on the morn¬ ing of the 17th, also taking post on the left.

On the Union side, Hooker having crossed the Antietam, Mansfield also crossed in the night and took position in the rear. Sumner and Burnside remained east of the stream. The Confederates rightly inferred from the Union dispositions that the force of the attack was to be on their left, and strengthened it accord¬ ingly; 10 of the best brigades in their army were placed in the west and east woods and south of the cornfield. They had nearly 40,000 men in the battle ; the Union troops engaged numbered about 55,000. This superiority was little enough against the immense advantages of the Confederate position; and even so, it was frittered away in a series of disconnected attacks, which left a large part of the Confed¬ erate force usable at one time against 15,000 Federal troops at most.

1. Hooker, lying nearly a mile north of the Dunkard church, moved down against Jackson early in the morning; reported strength 14,856; actual, under 10,000. The objective point was

the elevated ground about the church. The march had its right on the turnpike and its left along the west edge of the east woods, from which a withering fire checked it a little ; the right was raked by a flanking fire from the west woods. At length the line gained the southern edge of the cornfield and engaged the Confeder¬ ates in the open ground about 220 yards distant. Under the storm of bullets, shot and shell that rained upon them, they broke and fled through the corn, to reform in a hollow beyond; the Confederates assailed the Union lines in turn, and in turn were riddled by a concentrated fire that drove them back. Again the Union troops advanced, to be forced back in disorder; and again the Confederates followed, to break and fly. This was one of the most frightful car¬ nages of the Civil War: Jackson's famous ((Stonewall® division was nearly annihilated, more than half of two brigades killed or wounded and more than a third of another, and all the regimental commanders but two. On the Union side 1,051 in Ricketts' division were cut down, a third of its whole

number, and two brigades lost over 40 per cent : Hooker was wounded and was succeeded by Meade. Hood and D. H. Hill now came up to replace Jack¬ son's losses ; and Hooker's remnants slowly withdrew northward just as the advance of the Twelfth came up, though Ricketts still held the edge of the east wood.

1. Mansfield was mortally wounded while deploying his troops about 7 a.m., and A. S. Williams took command: reported strength, 10,126; actual, about 7,000. Marching more obliquely to the road, facing southwest, they cleared the cornfield, and about 8.40 a.m. drove the Confederates across the turnpike and into the west woods.

2. The Second corps, under Sumner, had not received orders to march till 7.20, after the First was crippled and the Twelfth in the thick of action; and Richardson's waiting for Morell's division of the Fifth corps to occupy the ground he vacated caused him to be an hour later still. Sedgwick's division, with Sumner at the head, went first, French following; each with perhaps 5,000 men ; they crossed the Antie- tam, moving west by north, till the centre was nearly opposite the Dunkard church ; then de¬ ploying, faced west, French forming on Greene's left. Sedgwick passed through the east woods and the cornfield; advanced swiftly in three lines, no regiments in column or ready to face to either flank if attacked, swept by Greene's right and pressed through the west woods with left on the church, to the western edge and a wood road along it. Meantime McLaws and Walker with six brigades had come up, one brigade had been drawn from the right to re¬ inforce Early's forces of Ewell's division ; and all fell upon Sedgwick's left flank and rear. Nearly 2,000 Union soldiers were struck down at a blow without a chance to retaliate ; this division lost 2,255 men in all, more than 40 per cent of its entire number, including Sedgwick severely wounded. Sumner tried to change front, but the lines broke and scattered north¬ ward, sweeping away everything in their rush, and only reformed on the north hill where Meade and the First corps had taken refuge. A brigade of the Twelfth came up to help, but lost a third of its number, one regiment losing 60 per cent. The right of the Confederate at¬

tacking line crossed the turnpike at the Dunk- ard church and made two assaults upon Greene's position east of the church, and were repulsed with great slaughter, and Greene, making a counter charge, entered the woods beyond the church. Greene held this position until noon, when the Confederates attacked both his flanks and drove him

from the church.

Meantime W. F. Smith of Franklin's corps had come on the field. Hancock (then one of his brigadiers) obtained a regiment from Sum¬ ner, took position opposite the woods, drove away the approaching Confederate skirmishers, and silenced their batteries. A second brigade was placed on his left, and with heavy loss ad¬ vanced to near the church; but on sending for his reserve brigade to support it he found it had been ordered away to support French. The lat¬ ter moving to the left south of the east woods, over the farm lands, drove back D. H. Hill's skirmishers to his main line in the sunken road, where he engaged him over an hour, when he was joined by Richardson. Here a long and sanguinary conflict ensued : the Confederates turned the <(Bloody Lane® into a rough fortress with fence rails, and before carrying it the Union divisions had lost near a third of their total, one regiment losing 60 per cent. They had won the position by perhaps 1 p.m., and shortly afterward French's troops were relieved by a brigade of Smith's division. Richardson withdrew his men to the ridge, and about that time was mortally wounded and succeeded by Hancock. This practically ended the operations on the Federal right, and indeed the battle of Antietam so far as it had any tendency to change the status quo. When Richardson's line had been withdrawn, there was a vigorous contest of artillery. Meagher's brigade took the centre, and somewhat less than two regi¬ ments came from French to aid Richardson's division. Despite the application for artillery for the division, none had been obtained. The length of the Union line.made it impossible that more than one line of troops be formed; and so far advanced was this line that a part of it was continually swept by the fire of the bat¬ teries on the Confederate left, these batteries being protected by the west woods. An attack on the Union left was successfully repulsed by Hexamer's battery (obtained from Franklin) and Battery I, First artillery.

1. Between 4 and 5 p.m. a regiment of Franklin's corps was ordered to drive away some skirmishers of Hill's division south of the Bloody Lane and succeeded at the cost of half its force.

2. The battle which Franklin was not al¬ lowed to fight must be mentioned. It has been noted that Smith's action was paralyzed by tak¬ ing away a third of his force for service else¬ where. About noon Slocum, with the other di¬ vision, reached the field, and two brigades were at once formed in line to carry the woods around the church ; but again, the reserve brigade was ordered off. Franklin urged with all his strength to have a grand assault made with his whole corps on Lee's centre, crippled and

worn out with half a day's fighting and slaughter. With relatively fresh troops and French and Richardson to aid, it is most prob¬ able that few Confederates would have crossed into Shepherdstown. But Sumner refused to permit the movement; still, Franklin was so

urgent that he referred the decision to McClel¬ lan, but with so strong a veto that McClellan deferred to him and sanctioned the refusal. Both credited Lee with double or treble his actual numbers, and considered the terrible re¬ sistance, not as a proof that it could not be continued, but that any force which assailed him went to destruction. This refusal forms another of the might-have-beens of the battle, with some peculiarly poignant personal tragedy involved.

1. The action of the left under Burnside is an even more acute personal question. His pe¬ culiar position has already been noted. About 7 a.m. he received an order to hold himself in readiness to carry by assault a stone ridge across the Antietam about a mile southeast of Sharpsburg. About 10, when the First and Twelfth corps and Sedgwick's division were out of the fight, he received another order to carry the bridge and the heights beyond and advance on the rear of Sharpsburg. He turned it over to Cox, who ordered a brigade to storm the bridge, Rodman to cross by a ford one- third of a mile below, and the two to carry the heights and unite there. At best this could not be done in a moment, and the movement seems a covering rather than an aggressive one. But Crook missed the bridge and could not get back to it under fire: Rodman missed the ford and was two hours or so crossing under fire ; a fresh storming party finally carried the bridge, Crook crossed some companies above and others at the bridge, and Rodman and the rest united about 1 p.m., when the battle on the right was virtually over. Meantime Sturgis' division had run out of ammunition and was reported unfit for duty ; it was replaced by Willcox's (Burnside assisted in. this), and at 3 p.m. the corps was again ready to move, though much damaged by the constant Confederate ar¬ tillery fire. The right wing broke Jones' divi¬ sion and gained the suburbs of Sharpsburg ; but the left was strongly checked, and the two Wings grew widely separated. Meantime A. P. Hill came upon the -field, having marched 17 miles in seven hours. Fie took Rodman's di¬ vision in its undefended flank (the

second mis¬ adventure of the sort that day), and Rodman v as killed, while a concentric fire mowed down his men. The losses of the corps were 2,349; a fearful total, almost exactly those of Sedg¬ wick's division. A panic was averted by Scam- mon, who changed front and checked Hill for a little ; Cox called up Sturgis and made head for a while : but at length the corps was obliged to withdraw to the cover of the hills that border the Antietam.

The Union losses were 12,410: 2,108 killed, 9,549 wounded, and 753 missing. More men were killed on this one day than on any other of the Civil War. The Confederate losses were never known with exactness ; but as 2,700 of their dead were counted and buried by the Union forces, and many had previously been buried by their comrades, the total cannot have been less than the Federal. The next day Lee retreated across the Potomac unopposed : the failure to pursue him was one of the griev¬ ances against McClellan later, but most of his generals concurred with him. Although Lee had escaped destruction, he had none the less failed in his campaign.

Bibliography. — The Count of Paris' (His¬ tory of the Civil War' (Vol. II, 1876), is from the standpoint of a strong admirer of McClel¬ lan, whose staff he was on; F. W. Palfrey's (The Antietam and Fredericksburg > (1882),

from a lieutenant-colonel of Sedgwick's divi¬ sion, is sharply critical of nearly all the Union generals; John C. Ropes' (Story of the Civil War *(Vol. I, 1894), is from a noted military critic; Michie's (General McClellan } (1901), is from a distinguished engineer officer and pro¬ fessor at West Point; the account in (Battles and Leaders of the Civil War} (New York 1884-88), is by Gen. J. D. Cox. Consult also (McClellan's Own Story) (1866), and Hays, H. A., (Antietam and Its Bridges* (1910).

Forrest Morgan, Connecticut Historical Society.

ANTIFEBRIN, a trade name for the sub¬ stance known to chemists as acetanilide (q.v.).

ANTI-FEDERALISTS, the first political party in the United States after the separation from Great Britain. The loyalists having been expelled, there was no issue to divide upon till the question of replacing the loose Confed¬ eration with a stronger bond came up. The representatives of commerce and capital, and the mass of the educated classes, favored rati¬ fying the Constitution ; those who feared that a strong government meant a disguised new kingship, the local leaders

who wished to retain pre-eminence, and the conservatives who thought no evils comparable to those of change, opposed it. The names were in direct oppo¬ sition to the facts, the Federalists striving to turn the federation into a unified nation, the Anti-Federalists endeavoring to preserve a loose disintegrated federation. The victory of the superior classes was overwhelming, one great cause being that the men who were later the leaders of the Anti-Federal opposition were Federalists (q.v.) for the time being, as they felt that the existing condition of affairs was intolerable. In the organization of the first Congress and executive under the Constitution, the Federalists proper held every post but three, and even those were not technically <(anti* till later. . In this Congress, though there was much individual opposition to the Federalist measures, it was unorganized, and the Anti- Federal spirit could hardly be said to animate a body. Hamilton's scheme for clearing up the public debt was the first point of division. The payment of foreign debts was carried unani¬ mously; that for paying the Continental debt at par was opposed by Madison and others ex¬ cept as to original holders ; that for assuming the State debts was bitterly fought as defam¬ ing the States' solvency and as buying the sup¬ port of capital for the Federal government, was carried by only five votes, reconsidered and beaten by the seven votes of the new North Carolina just admitted, again reconsidered and carried by Jefferson's log-roll of establishing the new capital on the Potomac. His national- bank scheme (1791, opposed by Madison in the House and Jefferson and Randolph in the Cabi¬ net) and his tariff and excise schemes also excited a growing hostility from this element, which by the time of the 2d Congress (1 Oct. 1791) was becoming a new strict-construction party; no longer opposed to the Constitution as such, but opposed to extending its powers

beyond the most literal interpretation of its terms. Jefferson, Madison, and Randolph were now the chiefs of the new party in public office; but Jefferson disclaimed being an Anti-Federal¬ ist, based his policy on love of ˆrepublicanism,ˆ as sympathizing with the French Revolution, and called the Hamiltonians ˆmonarchists.ˆ The Republicans and Anti-Federalists comprised the same elements, however, and were based on the same natural division, and Washington's proclamation of neutrality in the European con¬ flict in 1793 fused them into one as the Repub¬ licans, later into the Democratic-Republican party.

ANTIFRICTION METALS, a group of alloys used in the manufacture of machine bearings to minimize friction. The theoreti¬ cally ideal bearing would be composed of the hardest metal available. Practically, in spite of the highest skill in forming both the journal and its bearing, there are minute inequalities which have the effect of reducing the area of actual contact to a few isolated patches, result¬ ing in the heating and eventual destruction of the shaft. To obviate this difficulty the bear¬ ing metals have been developed by so alloying their components that a very large series of plastic metals has been produced with the two essential properties of being soft enough to adapt their form to the journal for which they are intended, and hard enough to hold their form against the pressure upon them.

Two general classes of these antifriction alloys are in common use : the first consisting of a soft matrix in which are embedded small particles of a hard alloy which has crystallized in the cooling of the molten mixture (see Alloys) ; the second, in which the hard con¬ stituent of the alloy forms a sort of network, in the meshes of which is contained the soft metal which reduces the friction. Four metals are in use as components of the antifriction or bearing metals, tin, lead, antimony and cop¬ per. Some special formulas call for zinc in addition, but it is generally argued that no benefit can be thus secured which cannot be better obtained by increasing the percentage of antimony in the mixture.

By far the larger number of the antifric¬ tion metals have a basis of tin as the soft matrix, the hard constituent being particles of tin-antimony and tin-copper alloys distributed throughout the matrix. Tin has the advantage of taking a high polish and this in itself serves to reduce friction. A cheaper class of these metals has a -matrix of lead, or tin-lead, with tin-antimony as the hard constituent. Both of these are known as white-metal alloys. The class of bearing metals having a hard matrix with soft metal filling is known as plastic bronzes. They consist of a tin-copper alloy with sometimes a little zinc and occasionally nickel added, and may contain up to 30 per cent of lead. They are not as plastic as the white metals, but are more durable and better adapted for heavy pressures.

The original antifriction metal was in¬ vented by Isaac Babbitt in 1839, and was com¬ posed of tin 24 parts ; antimony 8 parts ; and copper 4 parts. A softer variety had 2 parts of antimony and 2 parts of copper to 24 parts of tin. The market was at once flooded with other combinations, good and bad, and all went under the title of Babbitt metal, and the name

still remains _ in some markets, although the original Babbitt metal was long ago supplanted by more scientifically combined alloys.

For light-work bearings the formulas vary from 73 parts tin, 9 parts copper, and 18 parts antimony ; to 85 parts tin, 5 parts copper, and 10 parts antimony.

For heavily loaded bearings: from tin 87 parts, copper 6 parts, and antimony 7 parts ; to tin 90 parts, copper 2 parts, and antimony 8 parts.

For bearings of railway car axles: from tin 67 parts, copper 11 parts, and antimony 22 parts; to tin 83 parts, copper 6 parts and anti¬ mony 11 parts. The Pennsylvania Railroad uses a special plastic bronze, composed of cop¬ per 76.8 parts, tin 8 parts, lead 15 parts, and phosphorus 0.2 part. Another bronze highly recommended for railway bearings is composed of copper 64 parts, nickel 1 part, tin 5 parts, and lead 30 parts.

For locomotive axles a plastic brass is used : copper 5.5 parts, zinc 80 parts, and tin 14.5 parts.

For propeller shafts a plastic brass is com¬ posed of copper 57 parts, zinc 29 parts and tin 14 parts.

Ajax bronze, a plastic antifriction metal, has the composition: copper 81.2 parts, in 10.7 parts, lead 7.2 parts, and phosphorus 0.4 part.

The lead-antimony bearing-metals range in composition from: lead 65 parts, antimony 25 parts, and copper 10 parts; to lead 80 parts, antimony 15 parts, and copper 5 parts.

ˆUniversaH bearing metal is composed of tin 6 parts, lead 77.75 parts, antimony 16 parts and bismuth 0.25 part. Consult Buchanan, j. F., Practical Alloying > (Cleveland, Ohio 1910) ; Gulliver, G. H., (Metallic Alloys: Their Structure and Constitution* (London 1913) ; Law, E. F., (Alloys and Their Industrial Ap¬ plication (Loudon 1909).

ANTIGO, an'ti-go, Wis., county-seat of Langlade County, a northern county of the State. It is situated in the southwestern por¬ tion of the county, 96 miles north-northwest of Oshkosh and 207 miles northwest of Milwaukee ; and it is on the Spring Brook River and the Chicago and Northwestern Railway. It is the commercial centre of an agricultural section of considerable importance, and of a timber region which has contributed largely to Wisconsin’s position in marketed forest products. Here are located several extensive manufactures of

vari¬ ous sorts, including chair, hub, broom-handle, excelsior, veneer and other factories ; also foundries, breweries, railway-shops and flour, planing and saw mills. Antigo was settled about 1878, and in 1884 was incorporated; it has the commission form of government. The most noteworthy features of the thriving city include a teachers' training school, a school for the blind, a school of chiropractic, a business college and a Carnegie public library. Altitude 600 feet. Pop. (1920) 8,451.

ANTIGONE. The subject of the Antig¬ one* of Sophocles is that immortal heroine

"who dares

To self -selected good

Prefer obedience to the primal law

Which consecrates the ties of blood."

Though written in 441 b.c., many years before the (Gidipus at Colonus,* the play treats of a later chapter in the story. It seems to have

been suggested by the last scene in the (Seven Against Thebes) of Hfschylus. At early dawn Antigone comes forth from the palace with her sister, Ismene, to talk with her alone about the edict of the king: will her sister join in her venture? (<But Creon forbids.® ((He has no right to bar me.® Thus the situation is un¬ folded at the very beginning — the conflict of wills between sovereign and subject. Ismene tries to dissuade her sister from the rash under¬ taking, but in vain. The chorus of elders enter to celebrate the day of deliverance that dawns on Thebes. Creon comes forth and addresses the nobles whom he has convened : <(Eteocles shall be buried, but the corpse of Polyneices shall be left on the field, a prey for carrion kites to feed upon and for dogs to tear. Ally your¬ selves not with the rebellious.® The heroic devotion of Antigone, burying her brother, Polyneices, and put to death for her pious dis¬ obedience of the tyrant's edict — that is the subject of the drama; and nothing could show more clearly the great originality of the poet's genius than his power to feel and to

make others feel the grandeur of that subject. The superior beauty of the play is due primarily to. the de¬ velopment of the character of Antigone. In the scene in which she and her sister, Ismene, appear together before Creon we find a happy example of the simultaneous employment of three actors. The role of Ismene reveals an in¬ novation in dramatic art ; in a manner truly Sophoclean the weaker sister is set over against the firmer Antigone. By reason of the skillful way in which the action is managed Sophocles has succeeded in extracting dramatic reversals of situation from a very simple subject; admira¬ tion, fear, sympathy, pity, indignation follow one another from scene to scene, even after the exit of the heroine.

The language of the tragedy is especially beautiful ; and the martyrdom of the girl, who does not realize herself howT noble her deed is, has commanded universal admiration. Antigone is a noble young woman, who feels that her act is right although she cannot advance arguments to justify that act. That she is truly feminine is seen in many a subtle touch. The character of Creon, the harsh tyrant, is also finely portrayed.

Joseph E. Harry.

ANTIGUA, ante'gwa, one of the British West Indian islands, situated lat. 17° 6' N. and long. 61° 45' W., about 50 miles east of Saint Kitts and the same distance north of Guade¬ loupe; area 108 square miles; dependencies Barbuda and Redonda, which have an area of 62 square miles ; population including those de¬ pendencies 34,971 (mainly negroes) in 1901, as compared with 36,819 in 1891 ; the principal island of the Leeward group; residence of gov¬ ernor and his staff ; port and chief town, Saint John; the chief products, sugar and pineapples. See Antilles; West Indies.

ANTIGUA, La, city and municipality of Guatemala, and the capital of the department of Sacatepequez. The municipality consists of the city proper, 8 villages and 12 hamlets. In the time of the Spanish domination it was the colonial capital. Destroyed in 1773, it still has remnants of past grandeur. Number of inhabit¬ ants in 1916 about 14,000.

ANTILLES, an-til'lez, name given both to the group of large islands forming the northern limit and the chain of small islands forming the eastern border of the Caribbean Sea. Prac¬ tically all of the West Indian islands (see West Indies), except the Bahamas are thus included. The Greater Antilles (Cuba, Jamaica, Haiti and Porto Rico) have about 6,700,000 inhabitants, or more than three-fourths of the

entire popu¬ lation. The Lesser Antilles extend toward the southeast in a curved line from Porto Rico to the coast of Venezuela and follow the line of that coast from the Orinoco delta westward to the Gulf of Maracaibo. Their total area is about 5,500 square miles, and their population is approximately 1,307,000.

The following classification shows the nat¬ ural grouping of the Lesser Antilles, with the area (in square miles) and the population of the islands in each of the groups: (1) Virgin Islands. — Saint Croix (A. 74, pop. 19,683); Saint John (A. 21, pop. 918) ; Saint Thomas (A. 23, pop. 10,000) ; Tortola (A. 58, pop. 4,222) ; Anegada (A. 13, pop. 300) ; Virgin Gorda (A. 176, pop. 417). (2) Outer Chain

of Caribbee Islands. — Anguilla (A. 35, pop. 3,890) ; Saint Martin (A. 38, pop. 6,700) ; Saint Bartholomew (A. 8, pop. 2,650) ; Barbuda (A. 62, pop. 639) ; Antigua (A. 108, pop. 34,971) ; Desirade (A, 10, pop. 1,400) ; Marie Galante (A. 65, pop. 13,850). (3) Liner Chain of Carib¬ bee Islands. — Saba (A. 5, pop. 1,909); Saint Eustatius or Saint Eustache (A. 7, pop. 1,408) ; Saint Christopher or Saint Kitts (A. 65, pop. 29,781) ; Nevis (A. 50, pop. 12,774) ; Montser¬ rat (A. 32, pop. 12,215) ; Guadeloupe and de¬ pendencies (A. 600, pop. 212,430) ; Dominica (A. 305, pop. 28,891) ; Martinique (A. 400, pop. 194,000) ; Saint Lucia (A. 233, pop. 50,809) ; Saint Vincent (A. 150.3, pop. 45,605) ; Grenada (A. 133, pop. 69,307). (4) Barbados. — (A.

166, pop. 173,359). (5) South American Is¬

lands. — Tobago (A. 114, pop. 20,463); Trini¬ dad (A. 1,754, pop. 352,145) ;. Buen Ayre or Bonaire (A. 95, pop. 6,547) ; Curasao (A. 210, pop. 32,959) ; smaller islands (A. 470, pop.

40,000).

English geographers call the northern part of the chain of Lesser Antilles <(The Leeward Islands,® the capital of the Leeward govern¬ ment being on Antigua, and the southern half ((The Windward Islands,® Grenada being head¬ quarters of the Windward government. The present holdings of Great Britain, France, and Holland in the Lesser Antilles are re¬ minders of the early struggles of the European nations to win supremacy in the' New World; for the West Indies were commonly regarded up to the end of the 18th century as the most valuable part of America, and these is¬ lands were the chief battle ground of the rival powers. Admiral Rodney’s victory over the French admiral De Grasse, 12 April 1782, gave England her commanding position in this re¬ gion. Her possessions constituting

several dis¬ tinct colonial governments, include the Virgin group (except the American islands, Saint Thomas, Saint Croix, and Saint John) ; all be¬ low the centre of the chain, namely, Saint Lucia, Saint Vincent, Bardados, Grenada, To¬ bago and Trinidad; the important island of Dominica, etc. The Virgin Islands are im¬ portant because they command the deep-water Anegada passage between the Atlantic Ocean

and the Caribbean Sea ; and the only deep har¬ bors (except Saint Thomas) in the Lesser An¬ tilles are in Trinidad and Saint Lucia. The French retain among their possessions the somewhat larger islands of Guadeloupe and Martinique in the centre of the chain. The Dutch, in addition to Curagao and Buen Ayre, have a part of Saint Martin and a few small islands below the Anegada Passage, the whole width of the Caribbean Sea intervening. The economic history of the islands of the Lesser Antibes is simple. Nearly all of them derived their wealth in the past from sugar culture, and with the decline in the price of sugar have sunk into poverty. Meanwhile, the black population has crowded out the Caucasians. The increase in the population of the Greater Antilles since the early years of this century is decidedly noteworthy.

Bibliography. — Aspinall, A.* E., (Pocket

Guide to the West Indies, * etc. (Chicago and New York 1914) ; Baedeker, K., (The United States, with Excursions into Mexico, Cuba, Porto Rico, 5 etc. (4th ed. rev., Leipzig 1909); (Latin America; General Descriptive Data *(Washington 1915) ; (Latin American Foreign Trade* (Washington 1915) ; Lyde, L. W., (A Geography of South America, Including the West Indies' *(Black's School Geography, Lon¬ don 1914) ; MacCorkle, W. A., (The Monroe Doctrine in Its Relation to the Republic of Haiti* (New York 1915) ; Ober, F. A., (Guide to the West Indies *(New York 1908) ; Ortiz, F., and Cabrera, R., (Revista Bimestre Cubana* ; Shepherd, W. R., (Latin America *(New York 1914) ; Verrill, A. H., (Cuba Past and Present* (New York 1914) ; (Isles of Spice and Palm *(New York 1915), and (Porto Rico Past and Present and San Domingo of To-day* (New York 1914).

Marrion Wilcox.

ANTIMASONRY. In the United States history, (1) the widespread hostility to the Freemasons, as an order whose oaths were claimed to

be superior to public duty and pri¬ vate morality, excited by the fate of William Morgan (q.v.) in 1826. He was a broken Vir¬ ginian, who had settled in Batavia, N. Y., about 1824, as a mason by trade, and professing to be a Royal Arch Mason ; and in the summer of 1826 was reported to be writing a book to expose the secrets of Freemasonry, to be printed at a local newspaper office. Though the Masons were naturally indignant and dis¬ tressed, the other citizens regarded it as a catchpenny scheme and had Morgan remained in view probably Masonry would have suffered little damage, — certainly none if the Masons had merelv denied his statements, for his word would have carried no weight. But, unluckily, just at this time suits against him for debt began suddenly to multiply and bail was either refused or disregarded. Finally on 11 August he was taken to Canandaigua, 50 miles away, on a charge of theft ; was released, but at once rearrested for debt ; and on the next night, being again released, he was at once seized and never reappeared. The public at once con¬ nected this with the Masonic exposure and threats, and vigilance committees were shortly organized which traced him beyond question, in the hands of abducting parties, to Fort Niagara, an unoccupied United States post at the mouth of the Niagara River ; the last ever vol. 2 — 3

certainly known of him, though other state¬ ments made it seem probable that he had been murdered and thrown into Lake Ontario. The excitement, increased by the belief that promi¬ nent Masons obstructed the investigations, was fanned into flame by the appearance, a few weeks later, of the first part of Morgan's book, the other parts ultimately being published also ; entitled Hllustrations of Freemasonry, by One of the Fraternity Who Has Devoted Thirty Years to the Subject *; reprinted under various titles, as (Light on Masonry,* (Freemasonry Exposed and Explained, *etc. Along with a mass of dreary ((ritual for <(working the de¬ grees, of no moment even if true, and its betrayal a scandalous violation of good faith, it included some passages which if true would have obligated him to make them known at once on joining: such as an oath requiring Masons to place their duty to a brother Mason before their oaths in court; and others pro¬ nouncing dire vengeance (graduated according to the degree thus betrayed) on Masons who should reveal the secrets of the order, and obligating every ((brother to make it his busi¬ ness to execute the threat. The denials of the Masons were not thought categorical enough. The alleged agents in the abduction were put on trial between January 1827 and 1830, and several were convicted and sentenced, some pleading guilty to save examination as to con¬ spiracy. They could not be held for murder, but popular judgment charged that crime to the fraternity if not to the individuals. Very soon Antimasonry had become the one issue of the day. Candidates for local*

*office who refused to withdraw from the order were heavily ˆscratched at elections, and great num¬ bers of lodges had to give up their charters and dissolve. From New York the feeling spread through the Union, and more than 3,000 lodges surrendered their charters before the storm blew over. The governor of New York and a large number of the leading officials and prominent public men were Masons, as now; but in the campaign of 1828 the National Republicans dared not nominate any who be¬ longed to the order. None the less the Anti¬ masons formed a regular party, holding a con¬ vention at Utica and nominating Solomon Southwick for governor. William H. Seward, Millard Fillmore and Thurlow Weed first came forward as Antimasonic candidates. A body was conveniently found in Niagara River and said to be Morgan's, though of course unrecog¬ nizable; and Weed is credited with having replied, when questioned as to its authenticity, that it was <(a good enough Morgan till after election.** The ticket polled 33,345 votes' out of 276,583 ; but it polled some 70,000 in 1829 and 128,000 in 1830 ; the National Republican party in the State was gradually absorbed and be¬ came chief anti-Democratic organization. This is the most singular feature of the whole movement; for the National Republicans, like the Whigs and Republicans later, were dis¬ tinctly the party of the upper business and professional classes, which were the very ones who formed the strength of the Masons. Yet the same result obtained everywhere : doubtless it was due to the accidental fact that Jackson, the idol of the Democracy and then President, was a Mason. A national convention was held in 1830 to organize a national party; and in

September 1831, in order to force Clay, who was a Mason, out of the field, it held a con¬ vention (in Baltimore) before any of the other parties, and nominated William Wirt of Mary¬ land and Amos Ellmaker of Pennsylvania for the Presidency. The National Republicans, however, supported Clay, and in the election of 1832 Wirt received only the electoral vote of Vermont. The party took no further national action, and with the National Republicans was soon absorbed in the new Whig party, though it retained force enough to compel the Whigs to discard Clay for Harrison in 1833 and 1839. In Pennsylvania, however, allied with the Whigs, it survived till about 1840 and elected a governor, Joseph Ritner. (2) Another Anti-masonic body was formed in 1868 as the National Christian Association, at Pittsburgh, Pa., though hostility to Masonry was only one of its tenets; it renamed itself in 1875 the American Party (q.v., No. 2), and entered politics. It opposed Freemasonry as <(false

religion and false politics,® and urged the pro¬ hibition of oath-bound lodges as acknowledging another government than that of the United States.

Bibliography. — For Morgan, consult Mor¬ ris, (History of the Morgan Affair > (1852) ; Greene, (The Broken Seal, or the Morgan Ab¬ duction and Murder *(1870). For political results, Hammond, (Political History of New York;* Hopkins, Political Parties* (1900).

ANTIMISSION BAPTISTS (their own title is <(01d School Baptists®), an American sect founded about 1835, who do not believe in Sunday-schools or theological seminaries, hold¬ ing that salvation does not depend upon human instrumentalities, but upon divine grace alone.

ANTIMONAN, an't$-mo-nan', a seaport town of Luzon, Philippine Islands, province of Tayabas. It is situated on Lamon Bay, about 100 miles southeast of Manila. Pop. about

11,000.

ANTIMONOPOLY PARTY, an Ameri¬ can political organization which in 1884 nomi¬ nated for the Presidency Benjamin F. Butler (q.v.), on a platform advocating election of United States senators by popular vote, an in¬ come tax, the repeal of all tariffs, and the prohibition of land grants to corporations. It united with the Greenback Labor party, the combined vote reaching 130,000 votes in the November election of 1884.

ANTIMONY, one of the metallic elements. It is found in nature in the metallic state, but its chief commercial source is the mineral stibnite, which is a sulphide of antimony (Sb2S3). Considerable of the metal is pro¬ duced as a by-product in the smelting of lead- silver ores. The mineral stibnite occurs in veins, commonly associated with other metallic minerals. Stibnite was known in very early times. It has been used by the women of the East for many centuries for painting the eyebrows and eyelashes and giving lustre to the eyes. Before the discovery of the metal itself, stib¬ nite was called <(antimony,® and it appears that the paint used by Jezebel (2 Kings ix, 30) was finely ground stibnite. The Arabs called this face-paint al Koh'l (compare Alcohol). The first distinct mention of the metal itself is made by Basil Valentine, who gives a process for extracting it from stibnite, though he does not

claim to have discovered it. Several methods for extracting it are now in use, chief of which is the following: Two parts of stibnite are melted

with one part of thin scrap iron, in plumbago crucibles. The sulphur, leaving the antimony, combines with the iron, so that sul¬ phide of iron and metallic antimony result, the iron sulphide floating as a slag. The crude antimony so obtained is next melted with a small amount of sulphate of soda and a little of the slag obtained from the operation next to be described. By this means the metal is puri¬ fied somewhat. It is then cast into molds, and when cold is broken up into small pieces, to prepare it for the third operation, which is called ((melting for star metal.® This last- named process consists in melting 60 parts of the broken metal with two parts of pearlash and five parts of slag from a previous operation of the same* kind. The resulting metal or regulus is poured into square molds, into which some slag has first been allowed to run, and is cooled slowly while still covered with slag. If the metal is of good quality, the resulting blocks will have a stellated or crystalline sur¬ face.

Antimony is a brilliant, bluish-white, brittle, crystalline metal, with a specific gravity vary¬ ing from 6.72 to 6.86. It melts at about 800° F., and if protected from the air boils at a white heat. At ordinary temperatures it is not acted upon by air or water, but it oxidizes quickly when melted, and at a red heat burns at a brilliant white flame, and can decompose water. It expands upon solidifying, and im¬ parts this property to its commoner alloys. Its coefficient of expansion is about .0000064 per degree F. The tensile strength of cast anti¬ mony is about 1,000 pounds per square inch of sectional area. It is a comparatively poor con¬ ductor of heat and electricity, its thermal con¬ ductivity being only about 1/25 of that of silver; its electrical resistance is 0.488 of that of mercury at 32° F., and 0.704 that of mercury at 212° F. Its chemical symbol is Sb (from the Latin word stibium), and its atomic weight is sensibly 120. It is diamagnetic; that is, a sphere made from it is repelled by a magnet, though the repulsion is hardly com¬ parable in magnitude with the force of attrac¬ tion that a magnet exerts upon iron. It also has marked thermo-electric properties, and is used in the laboratory in the construction of thermopiles. Antimony forms valuable alloys with other metals, and this is its most import¬ ant use in the arts. Type metal is an alloy of lead, antimony, and tin, with sometimes a little copper. The tin adds toughness, while the an¬ timony gives hardness and causes the alloy to expand at the instant of solidifying, giving a sharp cast of the letter. In the manufacture of munitions of war antimony plays an im¬ portant part. It is employed to give to shrapnel bullets the hardness through which they retain their spherical shape when the shell explodes. Previous to the European War the annual pro¬ duction of metallic antimony in the United States was between 2,000 and 3,000

tons — obtained mainly from antimonial lead. With the growth of the munition making industry the demand for the metal increased rapidly, and in 1915 the total production reached 18,600 tons. About 5,000 tons of this total was produced in domestic mines in Inyo, Kern and

San Benito counties of California ; in Hum- bolt and Elko counties of Nevada; and at points less notable in Arkansas, Idaho, Mon¬ tana, Oregon, Utah and Washington. A larger degree of interest, however, attached to the output of Alaska, amounting in that year to 1,390 tons of stibnite, carrying nearly 60 per cent of metallic antimony from this entirely new source. A large factor in the total was 8,500 tons from China. South America and Mexico supplied nearly all the rest. The an¬ timony prospects of Alaska are considered most promising, and the showing in recent years ($74,000 in one year) has sustained in every re¬ spect this early prospect. Besides the localities mentioned, antimony is found in France, Austra¬ lia, Japan, China, Italy, Spain, Portugal and S. Africa. See Electrochemical Industries.

ANTIMONY-POISONING, a variety of poisoning formerly more common J:han at present. The mortality is about 40 per cent. The symptoms of acute poisoning resemble closely those of arsenic-poisoning. There is sudden acute gastric pain, with nausea and vomiting, pressure in the breast and intense sense of anxiety. This is followed by colicky pains and diarrhoea. The pulse becomes small and frequent, later retarded; the respirations diminish in number, the skin is cyanotic, the temperature sinks and coma and convulsions lead to death. If vomiting develops early, be¬ fore time has elapsed to permit of the absorp¬ tion of a large amount of antimony salt, death is less likely to occur. The treatment should include washing out the stomach, inducing of vomiting and the use of tannic acid compounds.

ANTINEBRASKA PARTY. See Kan- sas-Nebraska Bill.

ANTINOMIANISM, the name applied to the doctrine that the dispensation of grace as set forth in the New Testament frees the Christian from the claims and obligations of the moral law as presented in the Old Testa¬ ment. In the early Church there were anti-nomian tendencies due to an over-emphasis of faith in opposition to works. This is especially so in some of the Gnostic systems, where faith and love are so emphasized and moral matters appear 'indifferent, and the contradictions be¬ tween the law and the gospel

are regarded as irreconcilable. Antinomianism marked many of the mediaeval sects, but reached its fullest de¬ velopment in the Reformation period. In Luther's emphasis on the doctrine of justifica¬ tion by faith he had used expressions which might be understood to indicate opposition be¬ tween the law of Moses and the gospel, as though with the establishment of the gospel the law of Moses was no longer of any value. But when Luther carefully expressed himself on this point, as he did in his instruction to the Saxon preachers in 1527, he gave to the teach¬ ings of the Old Testament their proper place in the Christian life. This was disputed by Agricola, and a controversy broke out between him and Luther, in which he treated Luther's most extreme statements in regard to faith as though they were to be taken literally. His follower Amsdorf went as far as to say that good works were detrimental to salvation. In England there were Antinomians in the various sects in the time of Cromwell. They were high Calvinists and claimed that, as the elect cannot

fall from grace, any act performed by them, however sinful it may seem to men, is not in reality sinful.

ANTIOCH (Latin, Antiochia) , the ancient capital of the Greek kings of Syria ; on the Orontes, about 21 miles from the sea. It was founded by Seleucus Nicator in 300 b.c., and named after his father Antiochus. The first inhabitants were brought from Antigonia, founded by Antigonus in 307. It was famed for the splendor of its public buildings, the Seleucid monarchs having vied with each other in embellishing their metropolis, and the Roman emperors having also done much to adorn it. It was called the ftQueen of the East® and <(The Beautiful,® and was advan¬ tageously situated for trade, being easily ap¬ proached by the caravans of the East, and through its port Seleucia having maritime com¬ munication with the West. The city is fre¬ quently mentioned in the New Testament, and it was here that the disciples of our Saviour were first called Christians (Acts xi, 26). In 64 b.c., on the breaking up of the kingdom of Syria, it was captured by Pompey; in 266 was captured bv the Persians under Sapor; and in 538 was thrown into a heap of ruins by Persians under Chosroes. It was restored by the Emperor Justinian, but never quite re¬ covered from this last blow. In the first half of the 7th century it was taken by the Saracens and remained in their possession for upward of 300 years, when it was recovered by the Greek Emperor Nicephorus Phocas. In 1098 it was taken by the Crusaders. They estab¬ lished the principality of Antioch, which lasted till 1268, when it was taken by the Mameluke Sultan of Egypt. In 1516 it passed into the hands of the Turks. The modern Antioch or Antakieh is a poor place. It has some manu¬ factures of silk stuffs, leather and carpets, and has some trade

in these articles and in goat's wool, beeswax, etc. The population is not far from 20,000.

ANTIOCH, Cal., town of Contra Costa County, on the south bank of the San Joaquin River, on the Southern Pacific and the Atchi¬ son, Topeka and Santa Fe railroads, 40 miles northeast of Oakland. Its industries comprise paper mills, potteries, shipyards and planing mills. It has twro banks wfith total resources of $1,200,000 and a total property valuation of $900,200. The principal buildings are the town hall, the grammar school and Union High School. For the fiscal year ended 30 June 1917 the town's receipts amounted to $24,736.23 and expenditures to $24,191.37. The government is vested in a board of five trustees. Pop. (1920)

1,936.

ANTIOCH COLLEGE, an American co¬ educational institution in Yellow Springs, Ohio, founded in 1852 with Horace Mann as its first president. It has an endowment of over $100,000; its grounds and buildings are valued at $250,000; and its library contains 12,000 vol¬ umes. In 1917 it had 20 instructors and 253 students.

ANTIOCHUS, the name of 13 kings of Syria: 1. Antiochus I, or Antiochus Soter, son of Seleucus : b. about 324 b.c. ; d. 261 b.c. He succeeded his father in 280 b.c. and disputed Macedonia with Antigonus Gonatas, but finally relinquished it to him. During the greater part

of his reign he was engaged in a protracted struggle with the Gauls, by whom he was killed in battle. 2. Antiochus II, or Antiochus Theos, who succeeded his father Antiochus I. Weakened by war with Egypt, he lost Parthia and Bactria by revolt. He was murdered in 246 b.c. by Laodice, his wife, whom he had put away to marry Berenice, daughter of Ptolemy. 3. Antiochus III, The Great, grandson of Antiochus II, who succeeded his father Seleu- cus Callinicus in 223 b.c. at the age of 15. He made war on Parthia and Bactria, but was com¬ pelled, after a long war, to recognize the inde¬ pendence of these kingdoms. He next invaded India, where he remained for seven years (212— 205 b.c.). Invading Asia Minor and crossing to Europe he took possession of the Thracian Chersonese. Antiochus gained an important ally in Hannibal, who had fled for refuge to his court ; but lost the opportunity of an

invasion of Italy while the Romans were en¬ gaged in war with the Gauls, of which the Carthaginian urged him to avail himself. In 192, at the request of the 2Etolians, he crossed to Greece, but was defeated by the consul Acilius Glabrio and returned to Asia. He was defeated by Scipio near Magnesia, 190 b.c. Peace was granted him in 188 b.c. on the ces¬ sion of all his dominions west of Mount Taurus, with a heavy indemnity. He also en¬ gaged to surrender refugees of his court, but he allowed Hannibal to escape. He was killed while plundering a temple in Elymais. 4. Antiochus IV, Epiphanes, son of Antiochus the Great; d. 164 b.c. He is chiefly remarkable for his attempt to extirpate the Jewish religion. 5. Antiochus V, Eupator, son of Antiochus IV, who reigned from 164 b.c. to 162 b.c. 6. Antiochus VI, Theos, ruled for three years, 145-142 b.c. 7. Antiochus VII, Sidetes, the son of Demetrius I : b. about 164 b.c. ; d. 129 b.c. He defeated the Parthians in several bat¬ tles. 8. Antiochus VIII, Grypus, son of De¬ metrius II. He ruled 125-113 b.c. and 111-96 b.c. and was slain by Heracleon in the last named year. 9. Antiochus IX, Cyzicenus, son of Antiochus VII. Defeated in battle against Seleucus V, he committed suicide in 95 b.c. 10. Antiochus X, Eusebes, son of An¬ tiochus IX. He reigned but three years and was obliged to flee to Parthia in 92 b.c. II. Antiochus XI, Epiphanes, son of Antiochus Grypus. He reigned 95-93 b.c. and was drowned in the Orontes. 12. Antiochus XII, Dionysius, 85 b.c. He was killed in battle with the Nabatoreans. 13. Antiochus XIII, Asiat- icus, the son of Antiochus X, and the twen¬ tieth of the Seleucidian dynasty. Beginning his reign in 69 b.c. he was deposed by Pompey in 65 b.c.

ANTIODACTYLA, the suborder of un¬ gulate mammals that includes the ˆsplit-hoofed® animals — cattle, deer, antelopes, sheep, etc. — in which only the third and fourth toes bear the weight of the body. See Ungulata.

ANTIOQUIA, an'te-6'ke-a, a department of the republic of Colombia, South America, embracing 24,401 square miles and divided into the provinces Centro, Oriente, Aures, Fredonia, Suroeste, Nordeste, Norte, Sopetran, Occidente and Uraba. The inhabitants are successful both in mining and in agriculture. The de¬ partmental capital is Medellin ; and as a well-

informed writer tells us, that city is not only the most important trading centre in Colombia, but is also noteworthy for its manufactures. (<The population,® he adds, (<is not quite 70,000, but its wealth is out of all proportion to the number of inhabitants.® There are few, if any, cities of its size in the whole of South America that rival it in wealth. Population of the department (1896) 648,190;

(1911) 741,816;

(1916) 776,000.

ANTIPHLOGISTIC, a term applied to medicines or methods of treatment that are intended to counteract inflammation, such as bloodletting, purgatives, diaphoretics, etc.

ANTIPHONY ((<alternate song®), a term denoting in the services of the Christian Church, a psalm, chant or other composition, sung by two parties in alternation, as by two choirs or parts of a choir, or first by a single voice and then repeated by the whole choir. The Roman Church applies the term antiphony in a restricted sense to a series of ((words or verses prefixed to and following a psalm or psalms, to express in brief the mystery which the Church is contemplating in that part of her office.® The practice of alternate singing formed a part of the old Jewish worship. Its introduction into the Christian Church is as¬ cribed to Ignatius in the 1st century after Christ. The Western Church is said to have received it more particularly from Saint Ambrose.

ANTIPODES, an-tip'6-dez (from the

Greek anti, against, and pons, a foot), the name given to inhabitants of the earth diametrically opposite to each other, and of course literally applied to those who turn their feet toward each other; or to any part of the earth's sur¬ face situated diametrically opposite any given part. The antipodes live in similar and, ex¬ cept at the equator, opposite latitudes, and their longitudes differ by 180°. Hence the difference in their time is about 12 hours, and their sea¬ sons are reversed. The spherical form of the earth naturally leads us to the idea of the antipodes, of whose existence some idea was entertained even before the age of Cicero.

ANTIPODES ISLAND, a small uninhab¬ ited island in the south Pacific Ocean, about 460 miles southeast-by-east of New Zealand; so called from being nearly antipodal to Green¬ wich, England. Its area is about 11 square miles.

ANTIPOPE, a pontiff elected in opposition to one canonically chosen. The first antipopes were : Felix, during the pontificate of Liberius (352-66). and recognized during the absence of Liberius; Ursinus, against Damasus (366- 84) ; Eulalius, against Boniface I (418-22) ; Laurentius, against Symmachus (498-514) ; Dioscurus, against Boniface II (530-32) ; Vigilius, against Sylverius, until 540, then

canonical; Constantine, against Paul (767); Anastasius, against Benedict III (855) ; John XVI, Philogathus, against Gregory V (996-99); Gregory, against Benedict VIII (1012— 24). During the middle ages several emperors of Germany set up Popes against those whom the Romans had elected without consulting them. Otho the Great displaced successively two bishops of Rome ; and when the rival Pope, Sylvester III, had expelled the simonia-

cal and profligate Benedict IX (1033ˆ15), the latter was brought back by the German King, and soon afterward relinquished his dignity in consideration of a large tribute. Gratianus, who had persuaded him to yield, was now named Pope by the Romans as Gregory VI. There were, consequently, three Popes, but their claims were all set aside at a council con¬ vened at Sutri by the Emperor, Henry III, and a new Pope elected as Clement II in 1046. Shortly after, Pope Alexander II found a rival in Honorius II, the nominee of the Emperor; but his claim was ratified by a council convened at Mantua. In 1080 the same unseemly spectacle was witnessed, when the Emperor Henry IV elevated to the papal chair Guibert of Ravenna, under the title of Clement III, in opposition to his own implacable adversary, Gregory VII. After the death of Gregory (1085), Clement was antipope successively to Victor III (1087-88) and Urban II (1088-99). Other antipopes at this period were Albert, Theodoric, Maginulf, all in one year (1100-01) ; Maurice Burdin, against Gelasius II (1118-19) and Calixtus II (1124— 30). Innocent II (11 30— 43) triumphed over the antipope Anacletus II by the help of Saint Bernard ; and Alexander

III, during his pontificate (1159-81), had to contend with three successive antipopes, the election of only one of whom, however, Victor

IV, in 1159, has any appearance of canonical validity. The others were named Pascal III (1168) and Calixtus III, the same year. After a long contest Clement V was elected in 1305, and four years later transferred his seat to Avignon, where his successors reigned for nearly 70 years, losing the while, by their sub¬ jection to French influences, the sympathies of Germany and England. Nicholas V (1328-30) was antipope against John XXII. The election of Urban VI in 1378 occasioned <(the great schism of the West,® which divided the Church for 50 years. He was elected by the Romans, who demanded an Italian Pope after the death of Gregory XI. The French cardinals,

then a majority in the curia, on the plea that they had elected the Pope only under intimidation, with¬ drew to Provence, and elected an antipope under the name of Clement VII, who was recognized by France, Spain, Savoy and Scotland; while Italy, Germany, England and the whole north of Europe supported Urban VI. For 38 years Christian Europe was scandalized by the spec¬ tacle of two Popes, one at Geneva, another at Rome, in turn hurling the most awful anathemas of the Church at each other. At the beginning of the 1 5th century an attempt was made to prevail on both the rivals, Gregory XII at Rome, and Benedict XIII at Avignon, to re¬ nounce their claims with a view to promote union, but both evaded this as long as possible. At length, however, the cardinals attached to either court agreed to summon a general coun¬ cil, which met accordingly at Pisa in 1409. The council deposed both Popes and constituted the separate bodies of cardinals into one conclave which elected Alexander V to the papal chair. The schism was finally healed when the council of Constance deposed John XXIII, and Gregory XII and Benedict XIII agreed to abdicate and recognize as Pope Martin V, against whom Peter de Luna and Munoz of Barcelona were antipopes. The council of Basel (1431-47), in its struggle with Pope

Eugenius IV (1431-47) for supremacy, at¬ tempted to arrogate to itself the papal func¬ tions and proceeded to elect Amadeus of Savoy Pope as Felix V. The attempt, however, failed; the Popes Eugenius IV and Nicholas V (1447-55) secured their authority, the am¬ bitious council finally dissolved itself and Felix V resigned his empty dignity and was raised to the rank of cardinal by the magnanimous Pope himself. This was the last occasion on which the faithful were distracted by the sight of a rival pontiff within Christendom.

ANTIPYRETICS, the name given to rem¬ edies employed to reduce temperature in dis¬ eased conditions. Direct application of cold in the form of baths, packs, ice-cloths, etc., are the most valuable and efficient antipyretics. In some definite affections, notably in malaria, quinine, by destroying the parasite that causes the disease, reduces the temperature. Of late years a large number of synthetic drugs have been introduced to be used for the purpose of reducing temperature in disease. These are more technically the antipyretics. The field of their usefulness in this particular function, however, is constantly narrowing, since it is being recognized that fever is only a symptom and often not a dangerous one at that. Rational 4 therapeutics would first eliminate the cause of fever, and drugs are then rarely necessary. The more important drug antipyretics are an¬ tipyrin, opium, quinine and its allies, salicylic acid and its compounds, alcohol, chloral, squills, phenacetin, acetanilide and others of the modern analgesics

(q.v.). The most important of the functions of most of these drugs is their power to relieve pain. Their antipyretic action is often extremely complex — in general they diminish oxidation, increase perspiration or diminish the force and frequency of the heart- muscle contractions. See Analgesics ; Animal Heat; Fever.

ANTIPYRIN, the trade name of an arti¬ ficial alkaloidal substance known to the chemist as oxydimethyl-quinizin, or, more accurately, as oxy-phenyl-di-methyl-pyrazole. It is a crystal¬ line substance melting at 235° F. and soluble in water, alcohol, ether, and chloroform. An¬ tipyrin is a derivative of coal-tar, an or¬ ganic nitrogenous basic compound with the composition C11H22N2O. It forms colorless scaly crystals devoid of odor and with a slightly bitter taste. It is soluble in water, alcohol and chloroform. It is one of the first of the modern army of synthetic drugs, and is still one of the most valuable, though not so extensively lauded as formerly, the patent on its exclusive production by one manufacturer having expired in 1899. Its action locally is somewhat antisep¬ tic, and solutions applied to mucous membranes render them slightly anaesthetic and contract the blood vessels. It therefore makes a good local application to catarrhal membranes. Taken internally it is readily absorbed, reduces the force and frequency of the heart action, causes a dilatation of the blood-vessels of the periph¬ ery of the body, thus bringing about sweating and increased heat elimination (see Animal Heat). Its chief antipyretic action is due to the co-ordinating mechanism which lowers the heat at the point where the temperature is main¬ tained and accumulated (the skin) ; the dilata¬ tion of the capillaries brings about the dissipa-

tion of this accumulation, which vascular dilata¬ tion is caused by the action of the heat-regulat¬ ing mechanism possibly situated at the base of the cerebrum. Antipyrin is also an efficient and valuable analgesic, particularly serviceable in headache, neuralgias, in dysmenorrhcea, in rheu¬ matism and in affections of the peripheral nerves and joints generally. By its pain-reliev¬ ing qualities it makes a valuable adjunct in hypnotic mixtures. It is also a good antispas-modic.

Antipyrin is mainly eliminated by the kid¬ neys. It may cause symptoms of poisoning. These are collapse, cold extremities and some degree of cyanosis and heart weakness. It is not one of the aniline (q.v.), analgesic antipyret¬ ics and hence has not the characteristic

blood- poisoning properties of the anilines (acetanilide exalgen, mathacetin and similar bodies). It may produce a number of untoward symptoms, not¬ ably skin eruptions, cramps of the intestine and of the bladder. It also may cause disturbances of sensation in the extremities. Doses of from 10 to 15 grains have caused serious symptoms of poisoning, particularly in children. See Anal¬ gesics ; Antipyretics.

ANTIQUARIES, persons devoted to the study or collection of antiquities. In most of the countries of Europe and America there are important associations of antiquaries. The ob¬ ject of these societies is the collection and pres¬ ervation of ancient manuscripts, inscriptions, coins, sculptures, etc. ; the examination of an¬ cient edifices and other remains; in short, the investigation of everything likely to throw light on the manners, customs and history of the past. The chief antiquarian society of Great Britain is the Society of Antiquaries of London, founded in 1572, revived in 1707 and incorpo¬ rated in 1751. The president for the time being is an official trustee of the British Museum.. It has published (Archaeologia) (1770, etc.), (Vetusta Monumenta) (1747), and (Proceed- ings) from 1849. The Society of Antiquaries of Scotland was founded in 1780 and incorporated in 1783. The Archaeological Institute of Great Britain and Ireland, established in 1843, is a society of similar character. The American Antiquarian Society was organized in 1812.

ANTIQUARY, The, a romance by Sir Walter Scott (1816). It is weak in its super¬ natural machinery, but strong in dialogue and humor. The plot centres about the fortunes and misfortunes of the Wardour and Glenallan families, and the chief character is Mr. Jonathan Oldbuck, the Antiquary, whose odd sayings and garrulous knowledge are inimitably reported.

ANTIQUES, a term specifically applied to remains of ancient art, such as statues, paint¬ ings, vases, cameos, and the like, and more especially to works of Grecian and Roman an¬ tiquity.

ANTIQUITIES OF THE JEWS, The,

a famous work by the historian Flavius Jo¬ sephus, concluded in the 13th year of the reign of Domitian. It was addressed especially to the Greeks and the Gentiles.

ANTIQUITY, a term generally denoting the time prior to the irruption of the barbarians into the Roman empire in the middle of the 5th century, or previous to our era. In a narrower sense it is applied to the period over which the

ancient history of the two principal nations of former times, the Greeks and Romans, extends. The name antiquities is commonly given to the remains of ancient art and industry, such as tools, weapons, sculptures, inscriptions, etc. It is also used in a wider sense to signify any¬ thing appertaining to a knowledge of the poli¬ tics, manners, religion, literature and arts of the nations of antiquity, or of the modern na¬ tions, until the existing order of things com¬ menced. See Archaeology.

ANTIRENT AGITATION, in New

York State. Although the manorial system of large landed estates with leasehold tenants dis¬ appeared early in all other parts of the north¬ ern States of the Union, it flourished vigorously along the Hudson and Mohawk until well into the 19th century. This was due probably to the high personal qualities and tenacious landlord- ship of the Van Rensselaer and Livingston families, and the desire they inspired in others to become semi-feudal country gentlemen of the same stamp. The greatest of these holdings was the Van Rensselaer patroonship, called Rensselaerswick, derived from a Dutch grant confirmed by James II; originally comprising the entire counties of Albany, Rensselaer and Columbia, — 20 miles on each side of the Hud¬ son, — and to the last retaining many hun¬ dreds of large farms in them. Almost as large was the ((Livingston Manor, w at one time hold¬ ing 162,000 acres in Dutchess and Columbia counties. The extensive Hardenburgh Patent, dating from 1749, occupied large sections in Greene and Delaware counties ; and there were many other considerable estates. The tendency in the vicinity of these great manors was not to sell farms, but lease them with feudal inci¬ dents, . in imitation of their great neighbors ; so that in 8 or 10 of the east-central counties a large part of the land was in tenant farms, mingled with and surrounded by properties in fee. There were some very annoying provisions in some leases; one for giving the landlord a quarter of the proceeds of the sales of produce in case of alienation of the fee, making the land¬ lord a partner with a one-fourth interest. In practice this provision was either not enforced or was commuted for a fraction of the value, and in the Hardenburgh Patent, where was the fiercest resistance and the most bloodshed, there was no such provision at all; but it served as a common grievance whether present or absent. Also rents were often in kind, fixed or shares, which is always fertile in heartburnings; many, however, had been commuted to money. But the actual grievances were slight, and the ten¬ ants were probably better off in income than the owners in fee. In Rensselaerswick the first seven years of a lease were usually rent-free; on the Hardenburgh Patent five years, with the next five at half rent ;

and arrears and reserva¬ tions were very laxly enforced, often not at all for years, — which was injudicious charity and produced the crisis, as enforcement of back dues meant being sold out and evicted, and agriculture is the one employment that will not endure that from private owners. The insecu¬ rity of the old feudal tenures had been removed by the legislation of 1779 and 1789, which abolished them ; and the new leases, though hav¬ ing the same rentals and services, were in fee, so that raising of rent and confiscation of im-

provements were impossible. Further legisla¬ tive regulation was attempted in 1812 to settle the respective rights of patroons and tenants ; but the friction continued, and naturally involved all other land dealings, — contracts, mortgages, etc., haying as ill an odor as leases. In 1836 a mob in Chautauqua County destroyed a land office with its records, on a rumor that the mortgages were to be foreclosed; and the same thing was only prevented at Batavia by an armed gathering of the townsmen. The mat¬ ter was brought to a head by the death of Gen. Stephen Van Rensselaer, the eighth patroon of Rensselaerswick. This fine old gentleman, who commanded at Queenstown Heights and founded Rensselaer Polytechnic Institute, died early in 1839, leaving over $200,000 of uncollected rents and any number of unenforced quarter-sales, and two heirs to whom he left his estates on the respective sides of the Hudson. These heirs undertook to collect the arrears and en¬ force the rights left in abeyance; and the tenants formed associations to resist. The first to do so were those in the Helderberg Mountains, west of Albany (whence the dis¬ turbance is sometimes called the Helderberg War) ; but those east of the Hudson in Rensse¬ laer County outdid them by forming a mob in disguise and murdering a man. The counties were in open rebellion, and in December Gov. William H. Seward issued a proclamation against the rioters. The sheriff of Albany County with a posse several hundred strong was stopped by 1,500 armed men; a company of militia was called out, but was forced back by a gathering of nearly 1,000, and at last a body of about 1,000 militia had to be sent to Albany. The executions were finally levied, and on the 12th the soldiers were sent home. On the gov¬ ernor's recommendation the legislature ap¬ pointed a commission to report on a plan of ad¬ justment; but as the only parties who wished the legal status quo changed were the tenants, the landlords considered the concessions to be all on their side and refused to listen to its recommendations. A stubborn resistance prac¬ tically nullified the collection of rents year

after year. At length in 1844 the rebellion broke out with tenfold violence, in a general organization through Rensselaer, Schenectady, Columbia, Ot¬ sego, Delaware, Ulster, Greene, Dutchess and Other counties, against the payment of any rent whatever, and to compel the lords of the manor to sell their lands to the persons occupying them as tenants. The justifications legal and equi¬ table may be surmised : that the landlords had no title, that the rent had been waived, that the paj^ment of rent was against republican in¬ stitutions, etc. A regular agrarian war was in¬ stituted : the tenants, plus all the rabble who liked to commit outrage on any side, disguised themselves as Indians and began a reign of ter¬ ror, flogging, tarring and feathering, boycotting and generally ill-using all who took leases, or in any way dealt with landlords. One laborer who had bought lumber from a leased farm and was taking it to market was shot dead by a mob in a struggle to take it from him. At length, on 7 Aug. 1845, a deputy sheriff of Delaware County was fatally shot by such a mob while serving a process ; the extortion which called for this bloodshed was two years' back rent at $32 a year. These performances went on for months; Gov. Silas W right, who in

his message of 1845 had favored commutation of rents and ownership in fee though calling for sharp laws to punish outrages, now summoned a military force and sternly put down the re¬ bellion. More than 50 convictions were ob¬ tained, two of murder with sentence of death, which the governor commuted to imprisonment for life; but in his next year's message (1846) he recommended the abolition of distress for rent and the limitation of leases to 5 or 10 years. The constitutional convention of 1846 abolished feudal tenures and limited leases to 12 years. This was not at all what the Anti¬ renters wanted, however, but abolition of rent altogether and proclamation of the lease¬ holders as owners. Their cause had been an issue in State politics for years, fomented by agitators and newspapers ; and the Whigs, see¬ ing that they controlled the legislative delega¬ tions of 11 counties, nominated for governor in 1846 their chief legislative champion, John Young, against Silas Wright, elected him by their aid, and he promptly pardoned all those who had been sentenced, pronouncing their of¬ fenses Apolitical.® He also recommended State suits against landlords to try titles. The Anti¬ renters had <(adopted® a part of the State ticket and not the rest, to show their strength, and polled about 5,000 votes; the next election (of 1848) they did the same : and the legislature, alive to the value of this body of votes, directed the attorney-general to bring a test suit against Harmon Livingston. The decision in Novem¬ ber 1850 was for Livingston ; but the nearly 12-years struggle and ruin of property val¬

ues had wearied the landlords, and the decent tenants were perhaps ashamed of their breach of contract. The former offered to sell the farms, and the latter were willing to buy; and the great patroonship and patents were rapidly broken up. Meantime there was a mass of private litigation, and several cases went up to the Court of Appeals ; which in October 1852 declared that without reference to the Consti¬ tution of 1846, agreements in restraint of alien¬ ation of titles in fee, and therefore reservations of quarter-sdles, were void. As this left the landlords no right which could oppress the ten¬ ants, and the latter nothing to oppose except a payment of honest debts, the Antirent agita¬ tion passed out of sight as a dignified political entity. But the spirit was not quite dead. As late as July 1866 an antirent riot broke out in Knox, Albany County, which had to be sup¬ pressed by the militia. The next month a land¬ owner's agent in Berne was fired at and his horses were shot. These, however, were be¬ lated estrays : for a generation land contracts have been on a footing with all others. Con¬ sult Alexander, (Political History of the State of New York *(Vol. II, New York 1906) ; Jay Gould, (History of Delaware County) (1856) ; Roberts, (History of New York* (1887) ; Cheyney, (Anti-Rent Agitation *(Philadelphia 1887) ; Wright, (Life of Governor . Silas Wright) (Auburn 1847) ; Murray, <(Anti-Rent Episode in New York® in (Report of the Ameri¬ can Historical Association* for 1896.

ANTIRRHINUM, the designation of a genus of annual or perennial plants of the natural order Scrophulariacece , commonly known as snapdragon, on account of the peculiarity of the corolla, the lower lip of

which, if parted from the upper, shuts with a snap. The plants are propagated by seeds sown in gentle heat in spring. They all pro¬ duce showy flowers and are much cultivated in gardens. Many varieties of some of them, such as the great or common snapdragon (A. majus), have been produced by gardeners. The plant is not native in America, such specimens as are seen growing wild having escaped from gardens.

ANTI-SALOON LEAGUE. See Prohi¬ bition.

ANTISANA, an'te-sa'na, a volcano in the Andes of Ecuador, 35 miles

southeast-by¬ east of Quito. Whymper, who ascended it in 1880, makes its height 19,260 feet. Tambo de Antisana, one of the highest settlements in the world, is on a slope of this mountain at an elevation of 13,000 feet.

ANTISCIAN (Greek anti, over against; skia, a shadow), a name applied to those who live under the same meridian, at the same dis¬ tance north and south of the equator, and whose shadows at noon consequently are thrown in contrary directions.

ANTISCORBUTICS. See Scurvy.

ANTI-SEMITISM. See Jews — Anti- Semitism.

ANTISEPTIC, any substance which re¬ tards or prevents the growth and development of lower forms of organisms injurious to higher forms of life. The discovery that the breaking down or decay of organic bodies was caused by minute plants, fungi, bacteria, etc., led to the idea of preventing the action of these bodies by the employment of some antagonistic sub¬ stances. In medicine it had been found that many of these bacteria produced a condition known as sepsis, or poisoning, and when Sir Joseph Lister first used the carbolic spray to prevent the development of these bacteria the word antiseptic came to be applied to any sub¬ stance that inhibits the growth or destroys bac¬ terial agents of putrefaction. A germicide is any agent that kills these low forms of plant life; fungicides are used on the large fungi; bactericides on the bacteria. The word dis¬ infectant properly applies to a substance used for the destruction of a definite infecting agent, such as exists in phthisical sputum, or in ty¬ phoid urine or stools, but it too often is em¬ ployed for some remedy that merely destroys a disagreeable odor — a deodorant. Thus most so-called disinfectants, manufactured to place in closets or urinals, are really nothing but strong-smelling deodorants. As disinfectants they are wholly useless. Germicides, bacteri¬ cides and septicides may be divided into two groups, physical and chemical. In the former group is heat, the most important of all germi¬ cides. Burning is the best means for the disin¬ fection of the non-valuable surroundings of patients who have had any severe contagious disease such as diphtheria, typhoid fever, plague, scarlet fever, etc. It is the best agent for the destruction of all tuberculous sputum. Boiling is another efficient means of disinfecting or sterilizing. The boiling of water or milk sus¬ pected to contain the bacteria of typhoid or diphtheria is effective. Boiling all bed linen which has been in contact with contagious dis¬ eases is advisable.

The boiling of preserves and the airtight sealing of the jars immediately afterward to prevent the entrance of the germs of molds and similar growths is practised by all housewives. When after this the preserved fruit “ferments, > > it has either not been boiled long enough, the jars were not thoroughly cleansed by boiling water, the rubbers and tops not sterilized or a hole has been left whereby the spores of molds have entered. Cold is a preservative only : it prevents the multiplication of these low forms of plant life, but does not destroy them. The conditions which favor putrefaction are : a moist atmosphere, warmth and the presence of micro-organisms.

Chemical antiseptics have been in use ever since the work of Tyndall, Pasteur, Koch and Lister showed the activity of lower plant forms in putrefaction and sepsis. In the arts many antiseptics are used to preserve foods. The smoking of hams and other meats is the old empirical method, antedating modern means probably by hundreds of years, the smoke con¬ taining creosote and bodies related to carbolic acid. Vinegar and spices have been long in use to preserve pickles. Sulphurous acid, alum, salicylic acid, formalin, nitre, common salt, sugar, etc., are all extensively used as food pre¬ servatives, but the four first named are consid¬ ered injurious to health and are forbidden in many States. Other uses of antiseptics in the arts are: the preservation of wood from decay by ' impregnation with creosote and related fungicides, the preservation of pastes and mucilage with carbolic or salicylic acid, the preservation of sizes used in paper making by sulphurous acid and the use of sodium bisul¬ phate or chloride of lime in sterilizing drinking water. Sodium hypochlorite is used to sterilize swimming pools, and chlorine peroxide for pol¬ luted waters. Benzoate of soda is used to pre¬ serve prepared foods and permitted by the authorities in limited quantities. Cinnamic acid is used to impregnate the wrappers in which butter is packed. In modern surgery it is not the destruction of bacteria, but rather their prevention, that is desired, and asepsis, or the prevention of infection, is the modern method, not antisepsis. By thorough sterilization of everything that comes in contact with a patient’s body the modern surgeon prevents infection by keeping bacteria out. His instruments are sterilized by boiling in water, by steam or a high degree of dry heat, by washing in chemical antiseptics or by exposing them to formaldehyde vapor. Should the nature of a wound be such that it is already infected, then antiseptics are of service. The most valuable surgical antisep¬ tics are the phenols and their derivatives (car¬ bolic acid, salicylates, etc.), salts of mercury, silver lead, aluminum, copper, and zinc, prepara¬ tions of chlorine, iodine, bromine, permangan¬ ate of potash, benzoic acid, organic aldehydes, formaldehyde,

benzaldehyde, alcohol, thymol, menthol, Cucalyptol and hydrogen peroxide. Such trade names as Dioxogen, Hydrozone, Glycozone, Pyrozone, and Peroxols, are given to mixtures of hydrogen peroxide with various other disinfectants. See Bacteria; Fungi; Infection; Koch; Pasteur; Spontaneous Generation.

ANTI-SLAVERY SOCIETY, The American, was organized in Philadelphia,

December 1833, by delegates from similar local and State societies. The first of these societies was formed in Boston in January 1832 by Wil¬ liam Lloyd Garrison and others. The American society took a radical stand for the abolition of slavery. The difference of opinion among the members caused a split in the society in 1840, and eventually both factions joined the Liberal Party. A small coterie of the original society continued to exist however until the adoption of the 15th Amendment in 1870. See Liberal Party; Slavery.

ANTISPASMODIC, a medicine proper for the cure of spasms and convulsions. In general any drug that has a sedative effect upon the nervous system, either by depressing the brain or spinal cord or by stimulating inhibitory centres, and as regulating the production of nerve force. In the former class are the bromides and chloral. The stimulating anti- spasmodics are asafetida, belladonna, camphor, musk, and valerian. Opium, balsam of Peru and the essential oils of many vegetables are also among the most useful of this class of medicines. Antispasmodics are employed in cases of nervous excitation, particularly of a hysterical nature, in asthma, alcoholism and in convulsions from epilepsy or other causes.

ANTISTHENES OF ATHENS, a Greek philosopher who founded the sect of Cynic philosophers : b. Athens 444 b.c. He was a disciple of Socrates, and is said to have aided in bringing some of his persecutors to justice. He taught at the Cynosarges, a gymnasium ap¬ propriated to Athenians who hud foreign mothers. His philosophy was a one-sided de¬ velopment of the Socratic method. Accord¬ ing to his teaching virtue should render man independent of the ordinary events of life. He himself lived in a very austere, self-denying fashion.

ANTISTROPHE (Gr. anti + strophe, from strepho, I turn), the name of one of the divisions of a Greek choral ode, corresponding to the

strophe and following it. The singing of the strophes on the stage was accompanied with a motion or turn from right to left.

ANTITORPEDO BOATS. The ideal antitorpedo boat is the destroyer. It is big enough to stay at sea in all weathers. In the United States navy it carries an armament of several four-inch guns and with its speed of from 30 to 35 knots an hour it can swiftly dash down upon torpedo-boats — or submarines — and effectively dispose of them. An essen¬ tial part of antitorpedo boat defense is de¬ cent realization. The conditions of attack are such that each defense unit must act on its own initiative, and for torpedo craft the best unit is the single gun. For administrative purposes the unit may be a group of two or three guns, and the gun group commander would have the same duties and responsibilities as a battery commander of medium guns; but for tactical purposes the gun is the best unit, and the gun captain or gun group commander, if single gun groups arc employed, must act on his own initiative.. The passing of orders, once an ac¬ tion has commenced, would be almost impos¬ sible except to each gun separately. Constant readiness for action at night and in thick weather is necessary. Consequently the de¬ tachments must be divided into watches, enough

men must be kept closely to the guns ready to man them at a moment's notice, and a look-out sentry must be posted at each gun, which must be kept loaded, with an ample supply of ammu¬ nition ready to hand on the gun floor. The duties of the sentry are to keep a sharp look¬ out seaward, and to open fire, without waiting for orders, on any torpedo craft moving at night ; only if the gun group commander were actually present on the gun floor would he take his orders before firing. In case of the alarm being given by means of the alarm gong be¬ fore a target has been sighted, the sentry would pass on the alarm to the detachment. As night attacks are the principal danger, the effective¬ ness of the antitorpedo boat armament de¬ pends on the relative position of the electric lights and guns ; and, if fighting lights are used, on their speedy manipulation in accord¬ ance with the wishes of those in command of the guns. These conditions absolutely dictate elaborate and expensive preparations in ad¬ vance ; and are quite incompatible with change of position. See Submarines ; Torpedo Boats ; Torpedoes.

ANTITOXINS, the name given to peculiar bodies developed in the human body or in the body of an animal, supposed to be antagonistic to the poisons, or toxins, of disease. These antitoxins are specific for definite diseases and constitute one of the protective agents in the body's battle with disease. For the full con¬ sideration of these and

other similar bodies see Immunity; Toxins and Antitoxins.

ANTITRADE, a name given to any of the upper tropical winds which move northward or southward in the same manner as the trade- winds which blow beneath them in the opposite direction. These great aerial currents, descend¬ ing to the surface after having passed the limits .of the trade-winds, form the southwest or west- southwest winds of the north temperate and the northwest or west-northwest winds of the south temperate zones.

ANTITRINITARIAN, a name applied to

one who does not receive the doctrine of the divine Trinity as it is represented by the Nicene and Athanasian creeds, and either puts the Son and the Holy Spirit in the Godhead below the Father, or considers Christ as merely a man, and the Holy Spirit an arbitrary personification of the divine mind. Antitrinitarians of the lat¬ ter class are Unitarians (q.v.), while those of the former class are relatively Trinitarians.

ANTITRUST LAWS, in the United States. The first of these on the statute books was an ordinance of Alabama in 1883 against the pooling of freights by railroads. The first general law against business combinations was enacted by Kansas in 1889. But the general movement against trusts which took shape in legislation was in 1889, when five States and Territories passed laws to render combinations in restraint of trade illegal and punishable, and two more (Washington and North Dakota) incorporated similar provisions into the con¬ stitutions with which they were admitted to the Union. In the first half of 1890 three more States joined the movement with legislation ; and on 2 July the Federal Congress enacted • the ((Sherman Law® against trusts. Nearly all the States have since placed like statutes on their books. The provisions are substantially

alike in all, making the persons engaged in such combinations liable to fine and imprisonment, and the corporations or firms punishable by loss of charter or of right to carry on business within the State where the offense is com¬ mitted. The decisions of the Circuit Courts at first were so narrowed as practically to nullify the provisions of the laws ; it being held that the combinations, as at common law, must be proved inequitable and injurious to the public, and calculated not

merely to abate competition, but absolutely to monopolize the business for the purpose of extortion. But these decisions were reversed by the United States Supreme Court, which held that the laws made no dis¬ tinction between partial and complete monopoly, or equitable and inequitable. It had been claimed also that the laws were unconstitu¬ tional, as violating the 5th and 14th Amend¬ ments, that no person shall be deprived of liberty without due process of law, and that the liberty of making contracts is an essential portion of this ; but the Supreme Court inter¬ prets them to mean legal contracts, and that under its power to regulate commerce Congress can decide what contracts are legal ; while the State courts hold such regulation is competent to the States under their police power.

The Sherman Act is as follows:

1. Every contract, combination in the form of trust or otherwise, or conspiracy, in re¬ straint of trade or commerce among the several States, or with foreign nations is hereby de¬ clared to be illegal. Every person who shall make any such contract or engage in any such combination or conspiracy shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceed¬ ing $5,000, or by imprisonment not exceeding one year, or by both said punishments, in the discretion of the court.

2. Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a misdemeanor, and on con¬ viction thereof shall be punished by fine not exceeding $5,000, or by imprisonment not ex¬ ceeding one year, or by both said punishments, in the discretion of the court.

3. Every contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce in any Territory of the United States or of the District of Columbia, or in restraint of trade or commerce between any such Territory and another, or between any such Territory or Territories and any State or States or the District of Columbia, or with foreign nations, or between the District of Columbia and any State or States or foreign nations, is hereby declared illegal. Every per¬ son who shall make any such contract or en¬ gage in any such combination or conspiracy shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by

fine not exceeding $5,000, or by imprisonment not exceeding one year, or by both said punish¬ ments, in the discretion of the court.

4. The several circuit courts of the United States are hereby invested with jurisdiction to prevent and restrain violations of this act, and • it shall be the duty of the several district attor¬ neys of the United States in their respective

districts, under the direction of the attorney- general, to institute proceedings in equity to prevent and restrain such violations. Such proceedings may be by way of petition setting forth the case and praying that such violation shall be enjoined or otherwise prohibited. When the parties complained of shall have been duly notified of such petition the court shall proceed, as soon as may be, to the hearing and determination of the case ; and pending such petition, and before final decree, the court may at any time make such temporary restraining order or prohibition as shall be deemed just in the premises.

1. Whenever it shall appear to the court be¬ fore which any proceedings under section four of this act may be pending, that the ends of justice require that other parties should be brought before the court, the court may cause them to be summoned, whether they reside in the district in which the court is held or not ; and subpoenas to that end may be served in any district by the marshal thereof.

2. Any property owned under any contract or by any combination, or purchased to any conspiracy (and being the subject thereof) mentioned in section one of this act, and being in the course of transportation from one State to another, or to a foreign country, shall be for¬ feited to the United States, and may be seized and condemned by like proceedings as those provided by law for the forfeiture, seizure, and condemnation of property imported into the United States contrary to law.

3. Any person who shall be injured in his business or property by any person or corpora¬ tion by reason of anything forbidden or de¬ clared to be unlawful by this act, may sue therefor in any circuit court of the United States in the district in which the defendant resides or is found, without respect to the amount in conspiracy, and shall recover three¬ fold the damages by him sustained, and the cost of suit, including a reasonable attorney's fee.

4. That the word ˆperson” or ˆpersons,® wherever used in this act, shall be deemed to include corporations and associations existing under or authorized by the laws of either the United States, the laws of any of the Terri¬ tories, the laws of any State, or the laws of any foreign country.

In February 1913 New Jersey attracted con¬ siderable attention by the passage of a bill known as ((the Seven Sisters Acts,” which were supposed to represent the personal views of President Wilson on the trust problem. These acts defined a trust as an agreement between corporations, firms or persons for the creation of trade restrictions or the acquisition of monopoly, for the limitation of production or for the raising of prices. They fix the personal responsibility of directors, officers or agents and they forbid differences in prices in dif¬ ferent sections, allowance being made for quality, cost of freight, etc., when such differ¬ ences have the obvious purpose of creating a monopoly or killing competition. They also forbid the holding of stock of other corpora¬ tions, except for payment of debts, for tem¬ porary investment of surplus funds in corpora¬ tions in other lines of business, for the invest¬ ment of benefit or insurance funds or for de¬ preciation or rebuilding purposes. Rights

previously acquired, however, are exempt. Future mergers must be approved by the board of public utility commissioners and filed with the secretary of the State.

In January 1914 four bills were introduced into Congress by Representative Clayton of the House Judiciary Committee. These de¬ fined illegal acts; the granting of relief to per¬ sons injured by the operations of trusts; check¬ ing the interlocking of boards of directors and the creation of an Interstate Trade Commission. After much discussion and compromising the final result was the passage, 15 Oct. 1914, of the Clavton Anti-Trust Act, designed as a sup¬ plement to the Sherman Anti-Trust Act in its more explicit definitions of illegal acts. It also forbids any corporation or firm from sell¬ ing its commodities at different prices to its different customers if such action tends to create a monopoly or lessen competition. Nu¬ merous exceptions are made, however. Another provision forbids a manufacturer to sell his goods to a dealer on the understanding that he will not buy goods of the same nature from a competitor. Decrees in government trust suits shall be sufficient evidence for private suits for damages under the

anti-trust laws. Furthermore, in the case of private suits the statute of limitations shall begin to run only from the date that a decree is entered in a government suit. Holding companies are pro¬ hibited in that one corporation may not own stock in another where the effect is ((to sub¬ stantially lessen competition" or to tend to create a monopoly. Another section makes it illegal for one person to be an officer in more than one bank, or of two or more corporations engaged in the same line of business. More¬ over, common carriers may not deal with cor¬ porations having, in common, directors or offi¬ cers with themselves, except by competitive bidding.

Included in the ((Clayton Anti-Trust Act" is the Trade Commission Act, which provides for the formation of the Federal Trade Commis¬ sion, to consist of five members appointed by the President and the Senate for terms of seven years, not more than three to be of the same political party. This body was to take over the bureau of corporations and continue its investigations. What constitutes <(unfair methods" of competition, when not specifically defined by the other provisions of the Act, is to be left to the judgment of the commission, which is a power similar to that given the In¬ terstate Commerce Commission, in the matter of railroad rates. The commission may order hearings and may enforce its commands through the Circuit Court of Appeals. This court is given exclusive jurisdiction and power of review over this law, but not in regard to facts with respect to orders of the commission. The commission has, in fact, almost unlimited powers in pursuing its investigations. On 13 July 1915, the commission had been organized and established, the President's nominees be¬ ing Joseph E. Davies of Wisconsin; Edward N. Hurley, Illinois; William J. Harris, Georgia; William H. Parry, Washington ; George Rublee, New Hampshire. All except the last two were confirmed by the Senate, the objections being- raised on account of political activities. Mr. Rublee, however, was given a recess appoint¬ ment when Congress adjourned. Consult

Walker, F., (Causes of Trusts and Some

Remedies *in American Economic Association Quarterly (1910) ; Giddings, F. H., (Democracy and Empire* (1900).

ANTITYPE, a word denoting a type or figure corresponding to some other type. It is in the sense of copy or likeness that the word occurs in the New Testament (Heb. ix, 24: 1 Peter iii, 21). By the fathers of the Greek Church antitype is employed as a designation of the bread and wine in the sacrament of the Lord's supper.

ANTIUM, an'shi-um, one of the most an¬ cient and powerful cities of

Latium, the chief city of the Volsci. It was situated on a prom¬ ontory, and was a flourishing seaport. It was taken by the Romans in 468 b.c., but soon re¬ volted, and maintained its independence till finally taken by Rome in 338 b.c., and after this it appears as one of the maritime colonies of Rome. Toward the close of the republic and during the empire it was a favorite residence of the wealthy Romans, and both the town and its neighborhood were adorned with temples and splendid villas. Nero and Caligula were born at Antium. It was entirely destroyed by the Saracens ; but vestiges of it still remain at Porto d'Anzo, its modern successor, near which many works of art, including the Apollo Belvi- dere and the Borghese Gladiator, have been found.

ANTIWAR DEMOCRATS, or PEACE DEMOCRATS, the Democrats in the North who were in sympathy with the Confederates during the Civil War. They opposed the draft and hindered recruiting, denounced Lincoln and predicted the failure of the war. In the heated controversies of the day they were nicknamed ˆButternuts" and <(Copperheads." There were among them secret political organizations such as the ((Sons of Liberty," ((Knights of the Golden Circle," etc. See Democratic Party.

ANTLERS, the weapons borne upon the head of a male deer during the breeding sea¬ son. They are an outgrowth of true bone sup¬ ported upon protuberances from the crown of the skull, called pedicels. As the spring ap¬ proaches, the hairy skin with which these are covered becomes highly vascular and swollen with blood and serum carrying lime salts. This grows outward and gradually assumes the form of the antler, characteristic of the species, which for a time is in a soft and vascular state, and covered with what hunters call ((velvet." There is continually deposited within this growth the substance of bone, which fills and solidifies the structure from the centre outward, until in the course of four or five months all has become solid, the outer skin shrinks and dries and presently falls or is rubbed off. These antlers remain firm upon the head and useful as weapons until the middle of the following win¬ ter, when they become loosened and fall off. The process is repeated the following spring, and the antlers are thus lost and replaced annually as long as the stag lives. In the deer, with the single exception of the reindeer, ant¬ lers are worn only by the males and are a secondary sexual character. That they are as¬ sociated with the reproductive function, says Beddard, is shown by their being shed after the period of rut ; and also by the stunting effect upon the horns which any injury to the

reproductive glands produces. Various degrees of degeneration are to be seen in the antlers of captive deer resulting from varying degrees and periods of gelding.

The sport of stag-hunting has preserved a set of ancient terms, mostly of French origin in the Middle Ages, designating the different parts of the antler and the successive stages of growth, and these have come to stand for a deer of a certain age or condition. They were all derived from and particularly applicable to the European red deer (Cervus elephas), which more than any other species is preserved for hunting in Europe. The nomenclature is sum¬ marized as follows in (Cassell's Natural His¬ tory, *Vol. Ill: <(In the common red deer, in the spring of the year following its birth, the antlers are nothing more than straight, conical and unbranched Yearns,* the animal being then known as a (brooket. *In the following spring the antler, has, besides the Team,* a small branch from its base, directed forward, known as the (brow antler *; it is then termed (spayad.* In the third year an extra front branch is formed, known as the (tres, *and the whole ant¬ ler is larger. The tres is sometimes seen in the smaller antler of the spayad. In the fourth year the brow antler is doubled to form the (brow* and the (bez-tine, *at the same time that the top of the main beam divides into the (sur-royals* of the (staggard, *or four-year-old male. In the fifth year the sur-royals become more numerous, the whole antler of the (stag* being heavier than previously, only to be ex¬ ceeded in weight by those of the fully adult (great hart *with 10 or more (points,* each being larger and longer than the year before. **A deer of 12 points is known in Scotland as a ftroyal stag,** but although sometimes antlers have more than 12 points, no recent antlers quite equal those which have been preserved from old times before all the best deer were so systematically shot each year. Where the num¬ ber of points is exceedingly large, as it is in some curious specimens which show 50 or 75, they are no longer a record of the years of the animal's life, but of injuries to the horns, causing unnatural branchings. The horn of antlers is of commercial value, being much used for the handles of knives and similar articles.

ANTLIA, or ANTLIA PNEUMATICA,

the name of one of the 14 southern constella¬ tions placed in the heavens by Lacaille in con¬ nection with his work at the Cape of Good Hope in 1751-52. It is situated between Vela, Pyxis, Hydra and Centaurus.

ANTLION, a term applied to the larva of I.Iyrmeleon, a neuropterous

insect of the family Myrmeleonidce. It is a singular-looking crea¬ ture, the body somewhat broad and flattened behind, the head provided with enormous jaws which have a groove beneath, in which the max¬ illae slide back and forth. It can thus pierce the bodies of small soft-bodied insects, flies, etc., and suck their blood without moving the jaws on which the victim is impaled. It makes a pit in fine sand, at the bottom of which it lies with its body buried and its jaws wide open, ready to seize any luckless insect which may fall in. When an insect comes near the edge of the pit, the antiion, by a toss of its head, hurls at it a shower of sand, which knocks it down, so that it slides into the pit and is seized.

Antiions are known in confinement to spend the winter in the larval state if fed with flies, caterpillars and spiders. In the spring the larva spins a rather large, round, silken cocoon covered with grains of sand, within which it changes to a pupa, and the winged insect emerges early in June. The imago has long, gauzy wings, both pairs alike, and is rarely seen in the Northern States. The conical, crater¬ like pits of the antiion may be seen in sheltered places in loose sand to the number of from 50 to 75.

ANTOFAGASTA, an'to-fa-gas'ta, Chile, a northern province which extends the whole width of the country and bounded on the north by the province of Tarapaca and on the south by the province of Atacama. Area, 46,609 square miles. It was ceded by Bolivia to Chile after the War on the Pacific. The systematic development, during ' the last 30 years, of its nitrate industry, and the exploitation of other mineral resources of this region, have greatly increased the revenues of the nation. Popula¬ tion about 120,000. For the War on the Pacific, or ((War of the Pacific,** climate, irrigated val¬ leys, etc., see Chile.

ANTOFAGASTA, Chile, capital of the province of the same name; port through which large quantities of nitrate are shipped ; terminus of one of the railways connecting cities of the Andean highlands in Bolivia with the Pacific coast. It ranks, among Chilean ports, as second in the value of materials exported and as third in the value of merchandise imported. The number of inhabitants (including, with the city, some of the adjacent regions) is about 65,000. For climate, etc., see Chile.

ANTOKOLSKII, Mark Matvyeevich,

Russian sculptor : b. Vilna 1842. He received his elementary education and his first notions of sculptural art in an engraving factory in Vilna. In 1863 he entered the Academy of Fine Arts and within two years received a prize for his wood carving (Evening Toil of an Old Jew *and*

another for the carving in ivory, (The Parsimonious Jew. As early as 1865 he attracted general attention and the Emperor sent him abroad at his own expense to con¬ tinue his studies. In 1871 appeared his remark¬ able work, (Ivan the Terrible, *which induced the Academy to elect him a permanent member. By order of Alexander II the statue was founded in bronze and a plaster molding of it was sent to the Kensington Museum in London. At that time Antokolskii made the sketches (The Controversy about the Talmud* and the (Attack of the Inquisition on the Jews *; in 1872 the colossal statue of (Peter I,* also the historic figures of (Yaroslav the Wise, *(Dimitrius of the Don* and (Ivan III. *Three years later his (Christ before the People* was accepted by Alexander II and a marble copy of it was sent to the Paris Exposition of 1878. His other works executed at that time ((Death of Socrates, *(The Last Breath,* (The Head of John the Baptist,* etc.) estab¬ lished his fame and the French Academy be¬ stowed on him the cross of the Legion d'Honneur. In 1880 the Academy of Arts in St. Petersburg organized a general exposition of his works (sculptures and sketches) and be¬ stowed on him title of professor of sculp-

1-7 Phylloxera Vastatrix 1-3 Larva, Front and Back View 2 Adult Insect

5 Grape Vine Root in which the Insects are working

6 Larva, Side View

7 Old Root, with Colonies of Lice

8 Ant-Lion (Myrmeleon formicarius). Showing

Pupa, Larva and Adult Stages

ure. Soon afterward he went to Paris where he produced ˆSpinosa,1 (NestorP (Not of the World1 and a great number of bust-portraits of notable personalities in France and Russia. Antokolskii's work represents an epoch in the Russian history of sculpture by its originality and individuality; he refrained from imitating the ancients whose aim was beauty of form, but adopted and observed as his key-

note beauty of thought and conception. He has lived to the height of his task and has suc¬ ceeded to a high degree in supplanting the beauty of form by beauty of thought.

ANTOMMARCHI, an'tom-mar'ke, Carlo Francesco, Italian physician: b. Corsica, 1780; d. San Antonio, Cuba, 3 April 1838. He was professor of anatomy at Florence when he offered himself as physician of Napoleon at Saint Helena. Napoleon at first received him with reserve, but soon admitted him to his con¬ fidence, and testified his satisfaction with him by leaving him a legacy of 100,000 francs. On his return to Europe he published the 1 Berniers moments de Napoleon1 (1823). He also wrote the text for a folio series of anatomical plates published in 1823-26, and in 1830 exhibited what he asserted to be a death mask of Na¬ poleon. In 1836 he went to New Orleans, where he practised homoeopathy.

ANTONELLI, an'to-nel'le, Giacomo, Car¬ dinal, Italian ecclesiastic: b. 1806; d. 1876. He was educated at the Grand Seminary of Rome, where he attracted the attention of Pope Greg¬ ory XVI, who appointed him to several im¬ portant offices, and on the accession of Pius IX, in 1846, Antonelli was raised to the dignity of cardinal-deacon. Two years later he became President and Minister of Foreign Affairs, and in 1850 was appointed Secretary of State. Dur¬ ing the sitting of the CEcumenical Council (1869-70) he was a prominent champion of the papal interest. He strongly opposed the as¬ sumption of the united Italian crown by Victor Emmanuel.

ANTONELLO DA MESSINA, Sicilian painter: b. Messina about 1430; d. 15 Feb. 1479. But few artists of Antonello's im¬ portance have left such slight clews for the biographer, and it is only in recent years that the diligent investigations of archaeologists have brought to light a certain amount of sure ma¬ terial as to the painter and dispelled the errors previously believed. We now know from con¬ temporary documents that he was the son of Giovanni, a sculptor, whose family name was D' Antonio. The painter's history is covered by the few dates we have concerning him. In 1457 he received a commission for a banner for a church at Reggio, Sicily. In 1460 he was in Calabria and in the next years at Messina again. In 1475 he was at Venice, where in March 1476 <(he received an invitation to enter the service of Galeazzo Maria Sforza, Duke of Milan. An- tonello accepted the invitation ; but by the fol¬ lowing month of September he was back at Messina.® He continued to live there until his death. Vasari's well-known story that An- tonello journeyed to Flanders and learned the secret of oil painting from Jan van Eyck by introducing himself in disguise into the studio of that painter has been doubted in recent

years because Vasari's account of the great Sicilian is inaccurate in many respects. Yet certain

facts remain wdiich keep open the possibility that our best guide in the histor> of old Italians may prove to be right again. One of these facts is that Antonello had mastered the tech¬ nique of oils at a time when no countryman of his knew how to employ them, whereas the Flemings were already proficient in their use. Besides, there are evidences in Antonello's work that he knew Flemish architecture, and if it be allowed that he could have learned oil-painting from seeing Flemish pictures of which there were numbers in southern Italy, it seems ex¬ tremely improbable that he could have intro¬ duced into his work the representation of places that he had not seen. Two examples in point are the (Head of a Man1 at Bergamo and Mr. H. C. Frick's deposition from the Cross1 in New York. Again the old claim that he taught oil-painting to the Venetians may easily be substantiated yet, if it is discovered that he was in Venice prior to the journey of 1475 which is the only one of which we have a sure record. We know of no Venetian painting in oil previous to 1473, and we are certain that Antonello's stay in Venetia had a marked in¬ fluence on the northern painters. The discovery of oils certainly changed Venetian painting most radically. Leaving aside historical con¬ siderations which are too apt to absorb atten¬ tion when writing of Antonello, we see him as one of the very great artists of the Renaissance. The Flemish precision which was the staff on which he leaned in early years was quickly transmuted by him into a greater thing — his Italian feeling for the rhythm of line giving a new meaning to the draughtsmanship he in¬ herited. We have but to consult the (Saint Jerome1 of the National Gallery, London, or the (Saint Sebastian1 in Dresden to confirm this idea. To find his peers in the handling a contour one must go to the supreme men, like Leonardo. His startling insight into the psy¬ chology of his portrait-sitters is to be observed in such works as the dondottiere1 of the Louvre or the (Portrait of a Man1 at the Borghese Gallery in Rome. One feels the tre¬ mendous originality of the artist before a com¬ position like the Crucifixion1 of the Antwerp Gallery, supported by his impeccable mastery of form and his beautiful color. Other import¬ ant works by him are the (Salvator Mundi,1 probably an early picture, in the National Gal¬ lery, London, which also possesses a (Portrait of a Man1; the (Dead Christ1 at the Vienna Museum, and the very fine (Man's Portrait1 in the Berlin Museum. The last named is con¬ sidered by many the best example of his work. Antonello was the only great painter of the Renaissance in south Italy. His reputation was as great among his contemporaries as in mod¬ ern times. Consult the

monographs by Di Marzo (Palermo 1903), and D'Amico (Messina 1904), and L. Venturi, (Le origine della pittura veneziana1 (Venice 1907).

ANTONINE COLUMN, the name given to the sculptured pillar erected by Marcus Aurelius to the memory of his father-in-law, Antoninus Pius. The splendid staircase, with 190 steps hewn in the 19 blocks of marble of which the column is composed — the statue of Saint Paul crowning its topˆ — and the bas- reliefs around the column illustrating the vic¬ tories of Marcus Aurelius over the Marcomans, present an appearance of singular magnificence.

The Doric and Corinthian styles are blended in the architecture of the column in a remark¬ able manner. The pedestal and top are Doric, while the proportions of the column are Corinthian. The bas-reliefs, in imitation of those of the column of Trajan, are in beauty and purity of execution rather inferior to the orig¬ inal. The column was restored to its present condition in the latter part of the 16th century by Domenico Fontana, the architect of Sixtus V, and still stands in the Piazza Colonna as one of the chief ornaments of Rome.

ANTONINUS, Marcus Aurelius. See

Aurelius Antoninus, Marcus.

ANTONIUS, Gaius, Roman consul, the colleague of Cicero, who defended him when accused of participation in the Catiline con¬ spiracy. He was the son of Marcus Antonius

the orator, and an uncle of Mark Antony.

ANTONIUS, Marcus, famous Roman law¬ yer surnamed the Orator : b. 143 b.c. ; d. 87 b.c He was praetor in 104, when he fought against the pirates of Cilicia; consul in 99, when he dis¬ tinguished himself by his resistance to the party of Saturninus ; and censor in 97. He was famed for his eloquence in the forum, rendering, ac¬ cording to Cicero, Italy the rival of Greece, and for his integrity in public life. As an aristocrat he adopted the party of Sulla, and was put to death by Marius and Cinna, when they tri¬ umphed. He was one of the interlocutors in Cicero's (De OratoreP

ANTONIUS, Marcus, commonly known as Mark Antony, a Roman

triumvir: b. 86 b.c.; d. 30 b.c. He was the grandson of Marcus An¬ tonius, the greatest orator and one of the great¬ est men of his day. His father, also Marcus Antonius, was surnamed Creticus in derision, from a disgraceful defeat which he suffered in an unprovoked invasion of the isle of Crete. He went abroad early, served with Gabinius in Syria, and distinguished himself greatly, both there and in Egypt, where he already gave tokens of consummate soldiership. He next joined Csesar in Gaul, where he passed several campaigns with increasing honor as one of his legates, and deserved much of the credit, usual¬ ly given to his leader, for the total defeat of Vercingetorix at the terrible siege of Alesia. Being elected one of the tribunes of the people, when the Senate ordered Caesar to disband his forces, he, with Quintus Cassius, vetoed the bill; and, on the Senate proceeding to arm the con¬ suls with dictatorial power by the vote ne quid respublicci detrimenti capiat, they fled together, disguised as slaves, to Caesar's camp, feigning to believe that their lives were in danger, thus giving that ambitious general the desired oc¬ casion for crossing the Rubicon and marching upon Rome. In reward for this service, when Caesar went to follow up his fortunes by crush¬ ing out the Pompeian party in Spain, he left Antony governor of Italy and lieutenant-gen¬ eral of his forces. He astounded all Italy by the ostentation and cynicism of his vices, but when the last struggle took place between Pompey and his own commander, he at once laid aside the debauchee and resumed the soldier. His skill preserved the fleet and intrenchments at Dyrrachium ; it was he who commanded the victorious left wing in the crowning conflict at Pharsalia, and turned the wavering tide of

success to the standards of Caesar. When the Ides of March had come, and great Caesar fell at the base of Pompey's statue, it was the mas¬ culine and sonorous eloquence of Antony — for he was an orator second to Cicero and Caesar only — that did actually raise the stones of Rome to mutiny and forced the discomfited murderers to fly from their half-finished task. It was Antony's soldiership and Antony's sword that defeated Cassius and drove Brutus to suicide, while the cold, cowardly, crafty Oc¬ tavius was sleeping in his secure tent. In the proscriptions which followed it is characteristic of Antony that he was by so much the more insolent, as he was the less cruel, of the trium¬ virs. But the third triumvir, the imbecile Lepidus, was soon disposed of, and Octavius and Antony divided the Roman world, as mas¬ ters. Anthony took the East; Octavius, the cold formalist, betook himself to the West. Thence¬ forth the life of Antony was one wild dream. Once he broke from his luxurious lethargy, in¬ vaded central Armenia and penetrated Parthia; and then, forced to retreat at length

by the circumstances of the country, the climate, the innumerable hordes of Oriental horse, brought off his army by a most extraordinary retreat. In 21 days he fought 18 pitched battles, marched 300 miles, through one continuous skirmish, and when he reached the boundary stream his Parthian pursuers unstrung their bows and bade him go away unharmed. He returned to his life of luxury and to Cleopatra, but his career was run. Rome took arms against him ; his troops, his mistress, his fortune deserted him; and Actium saw him, for the first time, with his back to his foes. Deceived to the last by the Egyptian Queen, who imposed upon him by a false rumor of her death, he died by his own hand. Most like he was to Mirabeau in that he was everything at times, and in everything almost the greatest, but nothing long — orator, soldier, statesman ; trifler, buffoon ; tribune, triumvir, conqueror; faithful lover, false husband, fran¬ tic debauchee; and, when the wine of life was quaffed to the lees, a fearless suicide at last.

ANTONY AND CLEOPATRA. On 20

May 1608. Blount entered in the Stationers' Register ((A Book called Antony and Cleo¬ patra.® This was undoubtedly Shakespeare's (Antony and Cleopatra. } Internal evidence also places the date of composition at 1607-08, when the dramatist was in the full maturity of his powers. So far as we know, the play was not printed until it appeared in the First Folio of 1623. Shakespeare's single source, ((The Life of Marcus Antonius® in North's Plu¬ tarch,* is followed closely, except for certain omissions which serve to accelerate the dramatic action and to free Antony from unjust charges of voluptuousness and cruelty brought against him by history. While (Antony and Cleo-patra) ranks high among the great tragedies of Shakespeare's third period of dramatic activity, it is the most faultily constructed of all of them. Certain critics profess to have detected a change of emphasis at the end of the third act, where the purely historical interest of the first part gives way to the psychological and personal interest connected with the two prin¬ cipal characters in the second part of the play. But the apparent change of emphasis is unreal ; the latter interest is dominant throughout the

play, the historical material of the first part merely furnishing a spectacular background of empire and war for the drawing of protagonists of almost superhuman proportions. A more serious blemish is the confusion resulting from the introduction, particularly

in the fourth act, of short, scrappy scenes of battle with con¬ stantly changing groups of actors. As in the fourth act of ‘King Lear,5 the necessity of tak¬ ing in imagination frequent and fatiguing jour¬ neys over thousands of miles is bewildering to the reader’s mind and detracts from the im¬ pression of unity necessary in a perfectly con¬ structed drama. In spite of differences of opinion, however, ‘Antony and Cleopatra5 is a pure tragedy, in which the moral purpose of the dramatist predominates over either historical or political considerations. The whole play is a powerful elaboration, in language of un¬ paralleled beauty and imaginative power, of the theme of inevitable destruction visited upon a man of extraordinary possibilities because of voluptuous self-indulgence. Antony, a man of prodigal powers and of heroic but unsymmetri- cal proportions, is placed in an enervating at¬ mosphere of sensuous splendors; the strong sensual set of his nature responds to the physi¬ cal fascination of Cleopatra so that he becomes her slave ; his imagination is ensnared by her endless variety; and, in spite of vigorous resist¬ ance, he finally plunges to destruction. His noble¬ ness of nature takes corruption from his one ((vicious mole of nature.® He loses his prodigious energy, forgets the meaning of honor, his judg¬ ment becomes impaired and the joy of life is swallowed up in the despair of spent forces, out of which he snatches just strength enough to die bravely. Though Shakespeare denies none of the glory of earthly pomp and the splendor of sen¬ suous passion, still as an artist he is true to the moral law which pronounces the worship of pleasure a deceit and a snare. In Cleopatra, Shakespeare has given us the most complex and wonderful of all his miraculous creations of women. She is the personification of voluptuous attractiveness, whose fascination lies in her power of appeal not merely to the senses but to the sensuous imagination. In spite of her su¬ perior mental qualities, her unparalleled grace and beauty, and her vivacity of imagination, we still find in her all that is gross and wanton in womanhood. As Mrs. Jameson says, “Cleo- patra is a brilliant antithesis, a compound of contradictions, of all that we most hate, with all that we most admire.® Yet such is the art of Shakespeare that the reader is nowhere brought into sympathetic relationship with her personality. We see the disastrous effects of her witchery and charm upon those about her ; we have reported to us the fact of her fascina¬ tion ; but when she appears she is for the most part unattractive, irrational, capricious, cunning and at times even repulsive. While we may ad¬ mire her spirit on occasion, her moral obliquity never has our sanction ; we have neither love for her in life nor pity in death. Though her love is not purified by suffering, as some have maintained, still we cannot help feeling that in the creation of this infinite character Shakes¬ peare has given to life a new and

fuller meaning.

Bibliography. — Bradley, A. C, (Shakes¬ pearean Tragedy5 (New York 1904) ; id.,

‘Oxford Lectures on English Poetry5 (ib. 1905) ; Corson, Hiram, (Introduction to the Study of Shakespeare5 (Boston 1889) ; Jame¬ son, Anna, ‘Shakespeare’s Heroines5 (1832). A complete bibliography will be found in Furness, H. H., ‘New Variorum Edition of Shakespeare5 (Philadelphia 1873 et seq.).

Edwin Mims,

Head of the English Department , Vanderbilt

University.

ANT PLANTS. See Myrmecophily.

ANTRAIGUES, an'trag, Emanuel De¬ launay, Comte d’, French politician: b. Villeneuve de Berg, 1755; d. 22 July 1812. His talents first appeared in his ‘Memoires sur les Etats-generaux5 (1788), full of daring asser¬ tions of liberty, and one of the first sparks of the fire which afterward rose to such height in the French Revolution. When chosen, in 1789, as a deputy, he defended the privileges of the hereditary aristocracy, ranked himself with those who opposed the union of the three estates, and maintained that the royal veto was an indispensable part of good government. Af¬ ter leaving the Assembly in 1790, he was em¬ ployed in diplomacy at Saint Petersburg and Vienna, where he defended the cause of the Bourbons. In 1803 he was employed under Alexander of Russia in an embassy to Dresden, where he wrote against Bonaparte a brochure entitled ‘Fragment du XVIII Livre de Polybe, trouve sur le Mont Athos.5 He afterward came to England and acquired great influence with Canning. He was murdered, with his wife, at his residence near London, by an Italian servant.

ANTRIM, Ireland, county in Ulster Province, bounded on the north by the Atlantic Ocean; east by the North Channel; south by the river Lagan and Lough Neagh and west by the river Bann. Its area is 1,237 square miles (Pop. 193,- 864), nearly all of which is under cultivation. There are rich beds of iron ore at Glenravel, and extensive mines of fine salt are being worked at Dunerul and Carrickfergus. The chief occupations of the people are the raising of flax, fishing, and the manufacture of linen, cotton and heavy woolen goods. The capital is Belfast, and other places of note are Larne and Carrickfergus. The

town of Antrim, sit¬ uated at the north end of Lough Neagh, on the Six-Mile Water, is not a place of much conse¬ quence, though bleaching and malting and linen and paper manufacturing are carried on here. There is a very perfect round tower near it.

ANTROBUS, an'tr5-bus, Sir Edmund: b. 1848; d. 11 Feb. 1915; the last hereditary owner of Stonehenge, which was included in the Amesbury Abbey estate. This remarkable pile of monoliths is considered the oldest structure in the British Isles erected by the hand of man. In 1902 Antrobus was the target of severe criticism owing to his decision to erect a fence around the pile and to exclude visitors, a step rendered necessary to protect the historic monument from the vandalistic propensities of excursionists. Stonehenge was sold by auction in September 1915 to Mr. C. H. E. Chubb, of Salisbury, for

$33,000.

ANTROPOV, Alexyei Petrovich, an-tro'- pof, Russian painter, pupil of A. Matvyeyev,

of the ikon painter Vishnyakov and of L. Car- ravac : b. 14 March 1716; d. 12 June 1795. A prominent ˆElizabethan,® a master of design and of perspective and in several respects a person of no ordinary calibre, his special and particular merit was that independence of char¬ acter which prompted the establishment of his own school of painting — a school that counter¬ balanced the official academy and produced one of the greatest of Russian painters, Levitzky. ((The descendants of the latter,® writes A. Ben- ois in (The Russian School of Painting } (New York 1916), <(have to this very day preserved memories of Antropov, as of an independent man who held in disdain the official artistic world and warned his young pupils against the pernicious influence of the Academy.® He began his quest of an artistic education when only 16 years old, in studios of different Russian and foreign painters, and again, when Rotari came to Russia about the middle of the 18th century, gladly availed himself of the opportunity to assimilate and make his own the firm and lucid manner of that Italian master; for the inde¬ pendence he had asserted and sustained against academic prejudice was not based on obstinacy or complacent self-esteem. It is in the manner perfected under Rotari’s influence that An¬ tropov’s two best portraits are executed — the portrait in the Tretyakov or Treliakof Gallery (identity of sitter

unknown) and the portrait of the Countess Rumyantzev in the Museum of Alexander III. The latter work, dated 1764, is most characteristic. Incomparably weaker are his portraits of the tsars, for the simple reason that Antropov, when painting these, was obliged to have recourse to data supplied by other peo¬ ple. These are not <(from life® ; and so rather helplessly the artist, unpracticed in this particu¬ lar form of invention, (<heaped up in these por¬ traits all sorts of details® borrowed from Tocque, Grot and DeVelis. By Antropov are also various paintings of sacred subjects for the Empress and for many churches (the ikons pre¬ served in the church of Saint Andrew at Kiev being of special interest) ; a full-length portrait of Tsar Peter III, and a portrait of Catharine II in coronation robes.

ANTSMONITE. See Stibnite.

ANTWERP, Belgium (Dutch, Antwerpen; French, Anvers; Spanish, Amber es ; Old Ger¬ man, Antorff; from ((aent werf,® <(on the wharf®), the northernmost province, consisting largely of an extensive plain of 1,096 square miles, scarcely diversified by a single elevation. It is sandy but fertile, producing grain, flax, hemp, fruit and tobacco, as well as cattle, sheep and horses ; on the north and northeast, how¬ ever, there are considerable tracts of morass and heath. The principal rivers, the Scheldt and its tributaries, the Rupel, Nethe and Dvl-e, are navigable ; while railways intersect the country in various directions, and there are also several canals. The chief towns are Antwerp, Mechlin (Malines), Turnhout, Lierre and Boom. Pop.

1,005,000.

ANTWERP, Belgium, capital of the prov¬ ince of the same name, situated about 50 miles from the open sea and 25 miles north of Brus¬ sels, in a level tract on the right hank of the Scheldt, which is there about 2,200 feet broad and has a depth at ebb-tide of from 30 to 40 feet, with a rise at spring-tides of 12 or 14.

Since 1905 new docks and granite quays with every modern improvement have greatly added to Antwerp's reputation as one of the finest harbors and one of the busiest commercial ports in the world. The volume of its exports averages annually from 6,500,000 to 8,000,000 tons in recent years, valued at from $360,000,000 to $450,000,000, while the imports average slightly above the same amounts — the largest of the imports being grain. The chief manu¬ facturing industries of Antwerp comprise tex¬ tiles, brewing, distilling, diamond-cutting, sugar refining, cigars and tobacco. Modern Antwerp is one of the most attractive of improved European cities. It still retains a few of its historical buildings.

The Cathedral of Notre Dame, dating from the 14th century, is its most noteworthy edifice, the largest and most beautiful Gothic structure in the Low Countries, with a tower over 400 feet high. Its area is 70,060 square feet and it contains Rubens' paintings, (Elevation of the Cross) and (The Assumption.) Other important buildings are the church of Saint Jacques, begun in 1491, the Hotel de Ville, the Bourse, the Museum, the old Meat Market, the Archers' Guildhall and the restored Steen, part of the old 10th century castle, now occupied as a museum of antiquities. Fine boulevards mark the sites of ancient city walls and ramparts which were gradually extended and improved until they attained a circuit of over eight miles with a system of eight outlying forts for defenses. After the Franco-German War of 1871-72 this system was strengthened by a second extended line of 15 forts which by 1913 were considered to have made Antwerp one of the strongest fortified cities in the world.

Antwerp is the birthplace of a number of distinguished men in various departments, as the painters Vandyck (b. 1599), Teniers the elder (1582), Teniers the younger (1610), Jor- daens (1594). Frans Floris (1520), Gonzales Cocques (1618); the philologist Gruter (1560), the geographer Ortelius (1527), the engraver Edelinck (1649), and, among more modern celebrities, Van Materen the historian, Ogier the dramatist, and Henri Conscience the novelist. Rubens was born at Cologne, but his family belonged to Antwerp, and he was educated, re¬ sided and died in the latter city.

Antwerp was probably founded some time before the 8th century, when the Antwerpians or Ganerbians, as they began to be called, were converted to Christianity. In 837 the town fell into the hands of the Northmen, who kept possession of it for about 60 years. It was erected into a marquLate of the Holy Roman Empire by Henry II in 1008, and as such was bestowed by Henry IV, in 1076, on Godfrey of Bouillon.

About the beginning of the 12th century it had considerable commercial prosper¬ ity; and in the 13th its municipal institutions took definite shape. It is worthy of notice that the law of 1290 contained provisions identical with those of the Habeas Corpus Act of Eng¬ land, maintaining the inviolability of the citi¬ zen's dwelling and acknowledging the right of every man to be judged by his peers and to have a voice in the imposition of taxes. As the result of such security and freedom the com¬ merce of the city rapidly increased. English wools for the great manufactories at Louvain,

Brussels, Tirlemont, Diest and Leau were im¬ ported through Antwerp; and English mer¬ chants, who formed a ˆfactory® there in 1296, received special protection by charters (1305, 1341, 1346, 1349) from the Dukes of Brabant. Between 1488 and 1570 was the time of the greatest prosperity which Antwerp was destined to attain for several centuries. The discovery of America in 1492, and of the passage to India in 1497, produced a great change in all Euro¬ pean navigation, permanently altering the old courses of commerce. While in consequence of this the cities of the Hanseatic League had withered, and Venice, Nuremberg and Bruges were sinking into decay, Antwerp was rapidly growing wealthy, but in 1576 it was taken by the Spaniards and given up to a three-days' pillage. It was vainly besieged by the Duke of Alengon in 1583; and after a very obstinate defense it fell before the assaults of the Duke of Parma, whose triumphal entry took place 17 Aug. 1585. Its glory departed; its commerce was ruined ; its inhabitants were scattered. The Dutch in their jealousy endeavored to complete its ruin by building forts on the river to inter¬ cept the passage of ships; and finally, by the peace of Westphalia in 1648, the Scheldt was definitely closed. In 1794 the city fell into the hands of the French, who opened the river and made Antwerp the capital of the depart¬ ment of Deux Nethes. It continued in French possession till 1814. Matters of dispute be¬ tween Belgium and Holland being settled by the treaty of 1839, Antwerp continued peace¬ fully to advance in prosperity until the outbreak of the great European War in 1914, when dur¬ ing the German invasion, the city was subjected to Zeppelin raids and the forts underwent a bombardment of 10 days and were reduced to ruins. The Belgian army with their British allies withdrew and, without any form of sur¬ render, the Germans entered and occupied the city 9 Oct. 1914, subsequently levying oppressive tribute on the inhabitants. Population (exclu¬ sive of suburbs) 312,000; with suburbs, 399,000.

ANUCHIN, Dimitri Nikolaievich, a-noo'- chen, Russian anthropologist and geographer: b. St. Petersburg, 27 Jan. 1843. Elementary edu¬ cation he received in a gymnasium. Later he studied history and philology at the University of St. Petersburg; specialized in anthropology and zoology at the University of Moscow. In 1880 the University of Moscow awarded him the degree of M.A. for the dissertation (Con¬ cerning Certain Anomalies of the Human Skull.) After a preliminary preparation abroad at the expense of the university, he was ap¬ pointed assistant professor in anthropology, in 1884 sub-professor in the newly established faculty of geography and anthropology, and in 1887 regular professor. In 1889 the University of Moscow awarded him the honorary degree of doctor of geography. He was the first to introduce the teaching of anthropology, ethnol¬ ogy and agriculture in Russian universities. He originated at the University of Moscow an anthropological museum (1879) and a Museum of Geography (1892). He has been connected with the Society of Amateur-Students of An¬ thropology, of which he was in succession sec¬ retary, associate chairman of the department of anthropology, vice-president and, since 1892, president. At his initiative a department of

geography was established at the University of Moscow (1892), which in 1894 started the pub¬ lication Zemleviedieniye (Geography) with Anuchin as editor. After 1875 he took part in the activities of the Imperial Archaeological Society of Moscow, of which he was asso¬ ciate chairman for 20 years. He is an honor¬ ary member of the Academy of Science of the University of Kazan, of the London Anthro¬ pological Institute and of many other scholarly societies. His most valuable works are his popular scientific articles published in Priroda (Nature, 1874-75) ; (Obschestvo Liubitelei Yes- testvovedenip (Bulletin of the Society of Ama¬ teur-Students of Natural History 1887) ; (West- ern Geographical Society y (1889) ; (Drevnosti) (Antiques, ed. by Archaeological Society of Moscow 1890) ; (Z emleviedienive) (Geography, 1895) ; (Trudui VI Odesskavo Archaeologiches Kavo Syezda> (Vol. VI of the Archaeological Society of Odessa, 1886) ; (Trudui V Tifliches- kavo Archaeologiches Kavo Syezda) (Vol. VI of the Archaeological Society of Tiflis, 1887) ; and other scientific publications. A series of his scientific articles is also published in the Encyclopaedic Dictionary) of Brockhaus and Efson. I4e also contributed to Russkaya Vied- emosti whose publisher he has been since 1883 and one of its editors since the nineties.

ANUS, the external termination of the rectum. The external and

internal sphincter muscles keep it firmly closed and the levator ani muscle supports the rectum and pelvic structures and lifts up the lower end of the gut during the act of defecation. Infants are sometimes born with a congenital closure of the rectum, consisting usually of a thin skin. The obstruction is removed by a simple surgical operation. Occasionally there are more com¬ plicated cases, such as when the gut terminates in a blind sack at a distance from the rectum, or when the rectum terminates in the bladder or vagina. These cases require opening of the abdominal cavity and creating an artificial anus in the lower part of the abdominal wall. The anus is subject to various diseases. Ulceration around or within the anus is a frequent occur¬ rence in persons of uncleanly habits. Attention to cleanliness and treating the ulcers with caustics generally effect a cure. Fissure or cracks in the folds of the skin at the verge of the anus cause great pain during evacuation and are usually treated by a diet tending to procure regular and softer evacuations, and immediately sponging with warm water. Various ointments are also applied to promote healing. Pruritus ani or itching often causes suffering and dis¬ comfort and may result from any general dis¬ order of the system. It generally disappears when the cause is removed. Other diseases of the anus are fistula, piles and prolapsus.

ANVIL, an iron or steel block with a smooth top on which malleable metals are ham¬ mered and shaped. They vary in size from the small articles used by gold- and silversmiths or jewelers to the huge blocks of power hammers. Blacksmiths' anvils have a cone at one end of the flat face for rounding metals such as horse¬ shoes. Anvils generally are made of cast iron faced with steel.

ANWYL, an''l, Sir Edward, Welsh phi¬ lologist and author: b. 1866; d. Pontypridd. South Wales, 8 Aug. 1914. He was formerly

professor of Welsh and comparative philology at the University College, Wales, was member of many educational bodies and published sev¬ eral books on the Celtic language, literature and religion. He was knighted in 1911 and shortly before his death was appointed principal of the Monmouthshire Training College.

ANZAC, an'zac, a name given by the British to a cove at Gaba Tepe, on the Cfillipoli peninsula. The word is made up of the initials of the Australian and New Zealand Army Corps, previously assembled at the

concentration camps in Egypt, which landed at this spot during the Entente Allies' ill-fated Dardanelles campaign 3 March 1915. It was proposed to alter the name to <(Anziac,® the addition of the letter ((i® being meant to include the Indian Corps which arrived in April, and with a powerful force of troops from southern France, reinforced the Allies in their naval attack on the Dardanelles, the Brit¬ ish colonials being assigned to the European side and the French to the Asiatic. The opera¬ tions were successful at first, and the Allies established themselves firmly around their po¬ sitions, although the Turks under the guidance of their German officers inflicted severe losses. Almost daily fighting continued until a landing was effected by new troops 6 August at Suvla Bay, 20 miles from the Anzac position, and fresh attacks were made in conjunction. The attack by the Anzac troops, after a series of desperate actions, was carried to the summit of the dominating Sari Bahr and the Chanak Bahr ridges, and although repulsed, positions were consolidated effectively close by. More fighting occurred until the abandonment of the Dar¬ danelles campaign led to the successful with¬ drawal on 19 December of the colonial troops from the lines which they had so gallantly won and held for over five months at Anzac and Suvla Bay in the rear of the Dardanelles forts. See Australia.

ANZENGRUBER, an'tsen-groo-ber, Lud¬ wig, German dramatist: b. Vienna, 29 Nov. 1839; d. Vienna, 10 Dec. 1889. In early life he sometimes wrote under the pseudonym L. Gru¬ ber. His father's ancestors were Austrian peasants and his mother was of Viennese descent. The elder Anzengruber, who was an admirer of Schiller, tried his hand at writing dramas and stories but without success. He was instrumental, however, in early turning the attention of his boy to the drama and the theatre. The family lived in straitened cir¬ cumstances and when the father died young Ludwig had to take a position in a bookstore. The duties of the position did not greatly ap¬ peal to him, but he had an opportunity to sat¬ isfy his taste for wide reading. His early interest in the theatre developed and in 1859 he became a traveling actor, going about the country accompanied by his mother. On these journeys he had opportunity to become ac¬ quainted with various types of characters which he later embodied in his dramas and novels. In fact, these travels brought nearly all the knowl¬ edge of peasant life that he possessed, as the rest of his davs were spent in Vienna.

In 1869, after having been without a theat¬ rical engagement for some time, he took a position as clerk in the Vienna police depart¬ ment. This experience he always valued, as it

made him more intimately acquainted with human nature and gave him a knowledge of the seamy side of life. He wrote popular plays all along but had achieved success with none of them, when suddenly in 1870 he became famous with his (Pfarrer von KirchfeldP The public was visibly affected when it was pre¬ sented on the stage and .its reputation was helped by the favorable criticism of Heinrich Laube. Anzengruber now resigned his position with the police department and devoted all his attention to literary work. Among his dramas of this neriod (Der Meineidbauer) (1871), (Die Ivreuzelschreiber) (1872), (Der G'wissens- wurnV (1874), (Der Doppelselbstmord) (1875), (Der ledige Hof) (1877), *Das vierte GeboD (1877) are the most important. In 1878 he was awarded the Schiller prize.

Then followed a period of unproductivity in the drama due largely to the failure of two of his plays in 1879. The years 1880-84 were mostly devoted to the writing of novels and short stories and the editing of a journal, Die Heimat. In 1885 he secured a fixed income as editor of the humorous paper Figaro. Begin¬ ning with 1886 the interest in his dramas was again revived in Vienna. In the meantime he had made his reputation in north Germany. (Das vierte GeboD had been especially well received in Berlin. In 1886 he was awarded the Grillparzer prize for his drama <Heimg'funden) (1885). Of his later dramas (Stahl und Stein) (1886) and (Fleck auf der Ehr} (1889) should be mentioned. At this time the Vienna theatres were again producing his plays with continued success. When Anzengruber died in 1889 he was the leading dramatist of the German¬ speaking people of that day.

He also wrote novels of interest and power, the chief ones being (Der Schandfleck) (1876, rewritten 1883) and (10 vols.,. 1890; 3d ed., 1897); Bettel- hejm, A., (Ludwig Anzengruber, der Mann, sein Werk, und seine Weltanschauung) (in ˆeistesheldenP Vol. IV, 2d ed., Berlin 1898) ; Friedmann, S., (Ludwig Anzengruber) (Leip¬ zig 1902).

William F. Hauhart,

Assistant Professor of German, University of Michigan.

AORIST (Greek, aoristos, "indefinite®) , the name given to one of the tenses of the Greek verb, expressive of indefinite past time. The Greek verb is very rich in past tenses,

possessing besides the aorist the imperfect, per¬ fect and pluperfect. While these express repe¬ tition, continuance or the relation between one time and another, no such shade of meaning attaches to the aorist. The difference between the first and the second aorist is in form only and not in meaning.

AORTA, the name given to the great arterial trunk of the body. It springs from the left ventricle of the heart, arches backward to the vertebral column, and, descending in the back portion of the thorax, passes through the diaphragm into the posterior part of the abdo¬ men, at the lower portion of which, opposite the fourth lumbar segment of the spinal col¬ umn, it divides into the two common iliac arteries. Throughout its course it becomes smaller and smaller, and gives off a large num¬ ber of branches that send blood to all parts of the body. It is not divided into any distinct divisions, but for conventional purposes of de¬ scription anatomists describe three parts, the arch, the thoracic aorta and the abdominal aorta. The arch reaches to the lower border of the fifth thoracic vertebra; from this point to the opening in the diaphragm it is known as the thoracic aorta; from the diaphragm to its bifur¬ cation into the iliacs, the abdominal aorta. At its very beginning at the top of the heart it gives off the coronary arteries that supply the walls of the heart with blood. The arch is then conventionally divided into three parts, the ascending, transverse and descending por¬ tions. From the transverse portion of the arch the great vessels of the neck, head and arms are given off, — the innominate or brachio¬ cephalic artery, that goes to the head and upper extremity of the right side, the left common carotid, to the head on the left side and the subclavian that supplies the upper extremity of the left side. There are really two large arteries supplying each side, but on the right they arise from the one branch from the aorta, while on the left side the arteries going to the head and to the upper extremities are separate. The thoracic aorta lies close to the spinal column in the chest. It supplies arteries ex¬ tending to the walls of the chest and to all the viscera in the thorax, lungs, etc., save the heart. The abdominal aorta supplies the diaphragm, the muscles of the walls of the abdomen, the liver, kidneys, spleen, stomach, . pancreas su- prarenals, the small and large intestines, the spermatic vesicles and a part of the pelvis. The two great branches into which it finally divides supply the pelvic walls, the organs in the pelvis, the external genitals and finally the lower limbs. There are a number of variations in the details of the distribution of the differ¬ ent large vessels of the aorta, but these concern the anatomist. The walls of the aorta resemble in their microscopical structure those of the arteries of the body save, in possessing more elastic fibrous tissues.

This is necessitated be¬ cause of the greater pressure on this part of the circulatory apparatus. See Artery ; Circu¬ lation ; Heart.

AOSTA, a-os'ta, Italy, town in Piedmont, 50 miles northwest of Turin. It is the seat of a bishop, and possesses a collegiate and three parish churches, two colleges and two hospitals. Among its antiquities are a triumphal arch, erected to the memory of Augustus who rebuilt

the town and gave it the name of Augusta Praetoria; a gate with three arches, and the remains of an amphitheatre, and the old Roman walls surrounding the town. It has some trade in wine, cheese, hemp and leather. Pop. 7,008.

AOUDAD, a'oo-dad, or ARUI, a some¬ what goat-like wild sheep (Ovis tragelaphus) , inhabiting the Atlas Mountains of northern Africa. It is about three feet in height, and its horns, which resemble those of the bharal are about two feet long. It is especially characterized by the long whitish hair depend¬ ing from the throat, chest and forelegs, but elsewhere, its coat is short and light brown, enabling it to hide easily among the rocks of its mountain home. Many other names are given to it, as ((ruffed moufflon,® ((bearded ar¬ gali,® (<kebsh® (Egypt)., (<tidal® or <(teybal,® and (<beden® (Nubia). It is a common resident in menageries, where it breeds readily.

AOUL, the finest of the Somaliland gazelles (Gazella, scemmerringi) , with massive lyrate horns. Its height is about 30 inches, and the borders of the ears and face are strikingly marked with black.

APACHE, a-pa'che (Pima, <(enemy*), the name of. a large Indian tribe of the Athabascan stock, kindred of the Navajos, and originally occupying the region from central Texas to the Colorado River in Arizona. The Spaniards ap¬ plied the name, borrowed from the Pimas, to all the races just north of Mexico, whom they classed as Apaches de Xila, Apaches de Navajo, and Apaches Vaqueros, the first-named being our Apaches. When the United States by the Gadsden Purchase (q.v.) first came in contact with them they numbered about 10,000 and had long been at mortal feud with the Mexicans. For a few years they gave the Americans rela¬ tively little trouble of an acute kind, but after a serious raid in 1857 it was urged by those with knowledge that they should be settled north of the Gila, taught industries, and watched. This was not done, however, and in 1860 the whole tribe went on the warpath. The next year the Civil War caused the troops to be withdrawn, and in a short time the Apaches had murdered or driven out every white in¬ habitant of the Arizona Territory except a few hundred who took refuge in Tucson. For nearly 10 years the Territory

was the scene of one of the most awful Indian wars in history, which practically stopped all progress there. On the Indian side it was entirely an affair of ambushes or of sudden raids from mountain strongholds, with burning and slaughtering, and carrying off of captives to be mutilated or outraged and then tortured to death. About a thousand men, women and children perished. Military operations were repeatedly stopped for a considerable period by the government com¬ missioners, who wished to institute a policy of kindness, but finally Gen. George H. Crook was allowed to proceed without interruption in 1872-74, and put an end to the operations of the bands as a whole in 1874. But the govern¬ ment policy of concentrating them all on one reservation of San Carlos, Arizona., had unfor¬ tunate results. They objected to live with other bands with whom they were as much at feud as with the whites, and also to leave their chosen districts once given them by the govern¬ ment ; but both General Crook and his successor,

who opposed the transfers, were removed to other departments. Again and again the bands escaped while being removed, and renewed their outrages; and for six years more there was a succession of bloody raids which swelled the total of horrors in the unfortunate Territory and in New Mexico. In 1882 Crook was restored, and by tact and their confidence in him in¬ duced about 1,500, or over a fourth of them, to live on the reservation without rations. But the rest liked their life much too well to give it up ; repeatedly they surrendered and returned with Crook only to break their promise and return to the warpath. The last time was in March 1886, when they escaped before en¬ tering Arizona and continued their outrages along the border for five months. The uproar against Crook for being duped (he had upheld the essential justice of their cause, and his be¬ lief in their willingness to behave, against the people) caused his replacement by Gen. Nelson A. Miles, who finally cornered the band and forced it to surrender. But the attempt to set¬ tle the Chirichuas and Hot Springs bands — the fiercest Indians on the continent, according to General Crook — on a reservation in Arizona roused such a storm of protest from Arizonians that they were removed to Florida instead, then to Alabama, and finally to Fort Sill, Okla., where they still remain, to the number of some 300. In all there are now about 5,200 Apaches. The name is sometimes applied to the Jicarillas, Mescaleros and Lipans by reason

of linguistic affinities ; but incorrectly. Consult Bancroft, ˆNative Races of the Pacific States) (Vol. XVII, 1880).

APALACHEE, ap-a-la'che, or APALA- CHI, a tribe of Indians of the Muskhogean stock, first mentioned in 1526 as occupying the territory about Apalachee Bay and Saint Mark's River in northwestern Florida and northward to the mountains to which they have given their name. Near the end of the 16th century Spanish Franciscan friars founded missions among them, till the war of the Span¬ ish Succession, a century later, when the Span¬ ish attempted to use the Indians as allies against the English Carolinas. Twice before the Spaniards had invaded Carolina from Saint Augustine; and now, in 1702, they headed a party of 900 Apalachees and marched into Georgia. The Creeks, who were friendly to the English, not only warned them, but a party of 500 ambushed the Apalachees and routed them with great slaughter. The Caro¬ linians determined to take the offensive and after a fruitless expedition to Saint Augustine in December 1703 one was undertaken into the Apalachian territory, which supplied that city with provisions and contained many Spanish forts. With 50 white men and 1,000 Creeks its leader stormed one fortified town and won a sharp battle, capturing several hundred Indians with women and children. Five other towns surrendered unconditionally, while a powerful cacique capitulated for his own safety. The expedition returned in March 1704 with 100 Indian slaves and 1,300 free Indians, who were settled among the Creeks. Twice more within the next four years Carolina invaded this ter¬ ritory with such results that in 1708 it held 850 Indian slaves in addition to what had been given to the Creeks. The Apalachees were thus prac¬ tically obliterated ; and though for a time they

maintained their individual existence they finally became merged with the Creeks. Consult McCready, (History of South Carolina under the Proprietary Government (New York 1897).

APALACHEE, a'pa-la'che, BAY, a large arm on the south coast of Florida, in the Gulf of Mexico, having a breadth of about 90 miles and an extent inland of 50 miles. At the month of the Saint Mark's River, which flows into the bay, is the town of Saint Mark's.

APALACHICOLA, a'pa-lach-i-k6-la, Fla., city, port of entry and county-seat of Franklin County, on Saint George Sound (Gulf of Mex¬ ico), at the mouth of the Apalachicola River; 85 miles southwest of Tallahassee; on the Carrabelle, Tallahassee & Georgia Railroad and the following lines of steamships : Plant ; People's; Merchants and Planters'; Gulf Nav¬ igation Company; Central Gulf Coast Com¬ pany;

and the Apalachicola and Chipola River line. The city has an important trade in tim¬ ber and naval stores. The value of its foreign commerce amounts to about $450,000 annually, most of which was in export trade. The city has one national and several private banks. Pop. (1920) 3,066.

APALACHICOLA, a river flowing from

southeastern Georgia across Florida and en¬ tering the Gulf of Mexico through Apalachi¬ cola Bay. It is navigable throughout its length of 90 miles and is formed by the union of the Flint and Chattahoochee rivers.

APANAGE, or APPANAGE, an allow¬ ance formerly received by the younger princes of a reigning house in which the right of primogeniture prevailed, from the revenues of the country. It consisted mostly in money, with the use of a residence and hunting grounds, attended frequently with the right of jurisdiction over these domains.

APAR, a'par, the three-banded armadillo

(Toly Rentes tricinctus), which has three mova¬ ble bands and is one of the small species able to roll itself into a ball. See Armadillo.

APAREJO, a'par-a'ho. This pack-saddle, most generally used in military service, con¬ sists of a strong leather sack, about two feet wide and from 55 to 60 inches long, according to the girth of the animal. A seam running from the front to the rear of the aparejo di¬ vides it into two equal parts, each of which is composed of a double layer of hide, with suf¬ ficient space between to introduce a suitable stuffing of hay, grass, moss, fibre, etc. These side-flaps, when fastened together at the top, form a ridge within which the backbone of the animal rests free from friction or pressure. On the inside of each flap is left a circular hole through which the stuffing material can at any time be reached. The careful packer should keep the stuffing evenly distributed, or so as to vary with the conformation of the back of the particular animal, as portions of it are constantly shifting and working up into lumps, in consequence of the travel. The drawings show the interior and exterior of the aparejo. To set up the aparejo, or to give it evenness and stiffness, small ash, rose or wil¬ low sprouts from one-half to three-fourths of an inch in diameter and as long as possille without springing (any tough and elastic wood will answer), are placed inside of it and at equal distances apart — about two

inches. On the inside of these and toward the animal coarse grass or hay (such as is light and tough and will not break up) is placed layer after layer until the sides are as full as possible. The corners should be stuffed as hard as possible by means of a sharp stick. Serious trouble is often experienced on long and toil¬ some marches from loss of flesh, causing the aparejo to fit badly and cause a sore back. Great care must be taken to make good all deficiencies in the stuffing, and when the aparejo is too large to be adapted to a thin animal by stuffing a portion should be cut out of the cen¬ tre. Straw pads are useful for protecting the hips and withers when placed under the cinches of those animals carrying rough loads.

24 inches. 9 inches. 24 inches.

When the aparejo is stuffed it should be put on the animal for which it is intended and the crupper adjusted. The shape of the aparejo enables all loads to be nicely balanced. One hundred pounds on one side may be made to ride with 50 pounds on the other without straining the animal. It presents much more surface for pressure to the animal than any other form of pack-saddle. The lower cor¬ ners secure the lash-rope and prevent it slip¬ ping when on the road. By removing the hay or stuffing from the side a sore back may be easily remedied and by properly adjusting the filling the aparejo may be made to perfectly fit a badly-shaped back. These may be cited as some of its advantages.

APARRI, a-par're, Philippines, town of the Cagayan province, on the river Cagayan, near its mouth. Pop. 11,265.

APARTMENT HOUSE, the term used in the United States to designate a structure intended to accommodate several families, each in its own set of rooms, which form a separate dwelling. Such structures are of comparative¬ ly recent introduction, but houses of this kind have long been built in Europe. In New York and other American cities there are now great blocks of such houses, which provide excellent and commodious dwellings at a lower rent than if each were a separate building. See Architecture, American.

APAT'ELITE (from the Greek apatclos, “deceitful”), a mineral related to raimondite, occurring in small yellow, triable nodules in

ihe immediate vicinity of Paris, France. It has the probable composition 4Fe203.6S0:i. 3H20.

APATITE (from the Greek word apate, “deceit,” in allusion to the fact that apatite is often confused with other minerals), a native phosphate of calcium, combined with fluorine or chlorine and crystallizing in the hexagonal system, though also occurring massive. The crystals have a specific gravity of about 3.2 and a hardness of 5. Apatite is usually green, but it may occur white or strongly red, yellow, brown, or blue. The common variety has the formula (CaF) Ca4(Po4)3 and is known as “fluor-apatite” ; but the fluorine is sometimes re¬ placed to a considerable extent, or even wholly, by chlorine. In such cases the mineral is known as “chlor-apatite.” A variety called “mangan-apatite” is also known, in which the calcium of the typical mineral is partially replaced by manganese. Apatite is widely distributed, par¬ ticularly as segregations in pegmatite dikes. The Canadian apatite occurs massive or in large crystals. It was formerly extensively mined as a fertilizer, but its use has now been almost entirely supplanted by the “rock phos¬ phate” of Florida, South Carolina and Ten- nessee.

APATITE GROUP. In mineralogy, a group of minerals crystallizing in the hexagonal system and consisting of arsenates, phosphates and vanadates of calcium and lead, associated with chlorine or fluorine. It contains apatite, pyromorphite, mimetite, vanadinite, hedyphane, pleonectite and svabite.

APE (A. S. apa, Ger. Affe), in modern usage, a term describing an Old-World tailless monkey, such as the gorilla, orang-utan, chim¬ panzee or gibbon, but originally an exact syn¬ onym for monkey and applied to any quadru- manous animal except the lemurs. For exam¬ ples of this older usage see Baboon; Macaque; Monkeys. In its modern sense it applies par¬ ticularly to the family Simiidcz, or anthropoid apes, found in the forests of the equatorial regions of the Old World and called “anthro¬ poid” on account of their great resemblance to man. This likeness is especially marked in young individuals before the face has attained its full brutality of expression, the canine teeth, their great size, and the skull, its final thickening and growth into crests and ridges. Except for the shape of the jaw (which, in¬ stead of being curved, comes to a noticeable angle on each side with a canine tooth at the apex of each angle) and for the development • of the skull already mentioned, as well as for the relative length of the arms and shortness of the legs and the fact that the great toe is short and more or less opposable to the other fingers, an ape’s skeleton is practically the same as man’s though larger and heavier in proportion to the body and lacking certain curvatures of the spine which adapt the human frame to ease in an erect position. The brain- case and the brain itself are much smaller than in man, yet similar in development and the brain is much convoluted. The teeth are of the same number as man’s

and of like character. In certain divergences of structure exhibited between the inferior families of monkeys and man, the ape resembles man and differs from the monkeys.

The gibbons (noticeable for standing erect with less difficulty than any other apes), the chimpanzee (which has the largest brain), the gorilla, and the orang-utan, together with sev¬ eral extinct and fossil species, make up the anthropoid apes. All are clothed with hair on all parts of the body except the face and palms ; they have no cheek-pouches, no tail and either no trace or but very slight traces of the naked spots or callosities seen upon the buttocks of the lower apes. All are as large or larger than man and all can walk upright, though they are more at ease in climbing than in walking. When on the ground they make their way slowly, sometimes closing the hands in order to walk on the knuckles instead of the palm and cither similarly closing the foot or walking on its side. Their food is mainly vegetable, yet their great strength, their in¬ telligence and their savage nature place them among the most dangerous of wild animals. See Chimpanzee; Gibbon; Gorilla; Orang- Utan ; Pithecanthropus.

APEGA, the wife of Nabis, a tyrant of Sparta, who invented an infernal machine which he called after his wife, <(Apega.® It was a box exactly resembling his wife in her royal apparel, but the interior was full of spikes which wounded the victim enclosed in almost every part of the body. The <(Iron Virgin0 was a similar instrument employed by the Inquisition. It represented a woman of Bavaria and the spikes were so arranged as to pierce the least vital parts in order to pro¬ long the sufferings of the victim enclosed.

APEL, a'pel, Johann August, German author: b. Leipzig 1771 ; d. 1816. His (Ge- spensterbuch) and (Wunderbuch) were both popular, the former containing the bases for the text of Weber's opera of (Der Freischiitz.) His which includes a survey of an¬ cient prosody is his best-known work.

APELDORN, a'pel-dorn, or APEL- DOORN, a notably attractive town of Hol¬ land, province of Guelderland, 17 miles north of Arnhem; with manufactures of paper, morocco leather and copper-plates. The Loo, a favorite palace of the late King of Holland, is at Apeldorn. Pop. about 28,000.

APELLES, the most famous painter of ancient Greece and of antiquity : b. in the 4th century b.c., probably at Colophon. He first studied at Ephesus, under Ephoros, and at¬ tracted by the renown of the Sicyonian school, he studied later at Sicyon. In the time of . Philip he went to Macedonia and there a close friendship between him and Alexander the Great was established. The most admired of his pictures was that of Venus rising from the sea and wringing the water from her drip¬ ping locks. His portrait of Alexander with a thunderbolt in his hand was no less cele¬ brated. His <Anadyomene) ; (Artemis Sur¬

rounded by Maidens) ; and (Slander) were also famous and the detailed description of them by Lucian inspired later artists, among others Botticelli and Differ. He appears to have returned to Asia after Alexander's con¬ quests. He visited Protogenes at Rhodes and admired his work. He was noted for his just appreciation of his rivals. His industry was unremitting, especially in drawing, so great as to give rise to the proverb <(No day without

a line.® He is also the subject of many anec¬ dotes, among which may be cited his reprov¬ ing the cobbler. It was Apelles' habit to listen to the criticisms of the common people of his pictures by concealing himself nearby. A cob¬ bler, having pointed out a fault in the shoe of a figure, Apelles rushed out and rectified it, but when the cobbler later criticized the legs of the figure Apelles told him to stick to the shoes, or, as the proverb has it, ((Let the cob¬ bler stick to his last.® His renown was at its height about b.c. 330, and he died near the end of the century. Consult Houssaye, (Histoire cfAppelles) (Paris 1867) ; Wustman, (Ape!les' Leben und Werke' (Leipzig 1870) ; Woltmann and Woermann, (History of Painting) (Vol. I, Eng. trans., New York 1886).

APENNINES, the chief mountain range of Italy, about 800 miles long and 25 to 85 miles wide, extending from Savona to Reggio in the form of a bow. Geologically the Apen¬ nines resemble the Alps and connect them with the north Sicilian and north African mountain ranges. Granite and crystalline schist (gneiss and mica-schist) are found in the Ligurian Apennines, especially in Calabria, south of the Gulf of Policastro. In the Apen¬ nines proper these older crystalline formations are entirely lacking. They consist principally of limestone, dolomite, sandstone, and marl, of the Chalk and Tertiary formations, in which occur strata of serpentine in the north, and sometimes trachyte and basalt, especially on Mount Vulture. In the northern Apennines and also in the Tuscan highlands, there are large quantities of marl, shale and blue-gray sandstone, which belong in part to the Chalk formation and in part to the early Tertiary. Limestone is found

in large quantities in the composition of the whole mountain range. Carboniferous, Permian, Triassic and Liassic deposits occur in the Apuan Alps, the famous marble of Carrara belonging to the Liassic or Triassic period. The Apennines are divided into six parts, according to the regions through which they pass and these fall into three groups, the northern Apennines (including the Ligurian and Etruscan) ; the middle Apen¬ nines (the Roman Apennines and the Abruz- zi) ; the southern Apennines (the Neapolitan and Calabrian). The Ligurian Apennines reach from the Col de Tenda, the geological boundary of the Alps, to the Pass of Cisa (about 700 miles). The southern slope falls abruptly to the sea, the northern slope grad¬ ually, with many valleys, toward the river Po. Numerous passes lead from the coast towns over the range, among them the Bochetta Pass and the Giovi Pass from Genoa; and the Genoa-Alessandria Railroad has cut a tunnel through near the last named pass. From there to the east the range almost doubles its width and increases in height. The eastern half, consisting of several parallel chains, is difficult to cross and a serious hindrance to transportation. In this portion there are prac¬ tically no thoroughfares except the railroad from Parma to Spezia.

The Etruscan Apennines, extending to the vallev of the Metauro, have a southeasterly di¬ rection throughout and consist of several ranges, one in front of the other, like the links of a chain. The most noted peaks are in the northern part, the Alpe de Succiso (about

APES AND MONKEYS

Fig. 1 Skeleton of young Orang-outang 2 Chimpanzee 3 SkuU of young Chimpanzee 4 Skull of old Gorilla 5 "iSldonW114 , , t Kahau or Proboscis Monkey 7 Mona Monkey 8 Magot or Barbary Ape

11 Black Howler 12 Coaita 13 Capucia monKey 14 Night Monkey 15 Marmoset

9 Mandrill

10 Skull of Baboon

HANDS AND FEET OF APES

yzxve*'^.

i» i

" .jwkj

1-2 Gorilla 3-9 Chimpanzee 10 Orang-Utan 11-13 Gibbon

14-15 Guereza 16-18 Barbary Ape 19-20 Dog-faced Baboon 21-22 Night Ape

\

»

t

t

6,600 feet), Mount Cusna (over 6,900 feet) and Mount Cimone (7,103 feet), the latter being the highest peak in the northern Apennines. The northern portion includes the Apuan Alps, bounded by the valley of the Serchio, the Ma- gra and the Antella, which reach the height of about 6,400 feet in Mount Pisano and are of pure marble (Carrara) on the slope toward the sea. The most important thoroughfare of the Etruscan Alps is the railroad from Bologna to Florence, which passes through a tunnel near Prachia; the La Fluta Pass, over which the road from Florence to Bologna passes, should also be mentioned. The Roman Apennines, beginning between the valleys of the Tiber and the Metauro, extend to the valley of the Tronto and Belino and consist of numerous parallel chains. In the north the main peak is Mount Catria (about 5,420 feet) ; in the south, the chain of the Sybilline Mountains rise to the height of 5,100 feet (Mount Vit¬ tore). The formation of the range here ren¬ ders the crossing easy and the railroad from Ancona to Florence and Rome crosses here. The Abruzzi extend southward from the val¬ ley of the Tronto and in their eastern chain in Gran Sasso' dltalia reach the greatest height in the whole Apennines (Mount Corno, 9,585 feet). The western chain, which, with the eastern, encloses the Plain of Aquila, has a height of almost 8,150 feet (Mount Velino) and south of the Pescara tunnel is the Majella range with a height of 9,200 feet. The Neapol¬ itan Apennines extend from the valley of the Sangro and Volturno to that of the Crati, but their altitude is much less than that of the middle Apennines, the Matesian Mountains reaching the height of over 6,700 feet in Mount Miletto. Rounded, wave-like shapes prevail in this range. On the eastern range is the extinct volcano of Mount Vulture. The roads and railroads from the west to the east coast encounter no particular difficulty in crossing this range. In the south the Apennines reach again a noticeable height

in Mount Pellino (7,450 feet) and slope abruptly to the valley of the Crati. The Calabrian Apennines con¬ sist of a small chain sloping abruptly to the Tyrrhenian Sea and of the granite plateau of the Silagian Mountains with a mean height of 3,000 feet. This north Calabrian mountain land is separated from the south Calabrian by a neck of land between the Gulf of Santa Eusemia and the Gulf of Squillace. The outer northerly and northeastern slope of the Apen¬ nines is gradual, the eastern slope almost everywhere so abrupt that on the Adriatic coast there is only room for a road. Since the Apen¬ nines to the west of the Gulf of Salerno lie near the coast, but in the north extend farther and farther away from it, there exists a three-cornered space in which lie the so-called Lower Apennines. The volcanic formation is espe¬ cially characteristic of these mountains and these regions are the classic ground of present and former volcanic action. Therefore there are here active and extinct volcanoes and hot springs, among them the springs of Voltena. The Lower Apennine region is divided into several parts by the broad valleys of the rivers flowing from the Apennines. Of these divi¬ sions the Tuscan highland is the most noted, ending on the south at the lower Tiber. In the interior are fertile plains sloping gently

toward the valley of the Arno ; in the west the highlands end with an abrupt slope, between which and the coast lie the plains of Marem-ma, from which rise a few single peaks. The part of the Lower Apennines between the val¬ leys of the Tiber and the Garigliano includes two small mountain-groups: the Alban Moun¬ tains, famed for their beautiful scenery, and the Volsker Mountains extending as far as the coast near Terracina. West of these Volscian Mountains lies a plain whose northern por¬ tion includes the Campagna of Rome, while the southern part contains the Pontine marshes. The southernmost part of the Lower Apen¬ nines extends from the Garigliano to the moun¬ tain range of Castellamare, north of Salerno, and includes the plain of Campagia, noted for its fertility as well as its beauty. From this plain rise several single volcanoes, including the extinct Mount Della Croce in the north and Vesuvius (4,200 feet) in the south. The climate is on the whole more severe than would be expected from the latitude and the position of Italy, while the heat in summer reaches a degree almost unendurable in the low and shel¬ tered valleys, and palms and other tropical vegetation can thrive on almost all the west coast; neither fruit nor grain grow on the ex¬ posed, windy heights, with their elevation of over 3,000 feet, and the trees are few and stunted. The region of vegetation may be di¬ vided into four sections: (1) The olive region to the 1,500-foot elevation, with Mediterranean flora, garden plants and winter pasturage; (2) the

region of the chestnut and oak, to the ele¬ vation of 3,000 feet with agricultural products and chestnut woods; (3) the region of the beech and coniferous trees at the height of 3,000 to 6,000 feet; (4) the region of the shrubs and Alpine plants with summer pasturage ex¬ tending to the highest peaks. In climate, there¬ fore, the northern Apennines form a line of separation between north and south ; only on their northern slopes does Italy really begin. The northern part only presents great difficul¬ ties in traveling. The mountains are now traversed by several railroads, mostly by means of tunnels.

APENRADE, a'pen-ra'de (Danish, Auben- raci), seaport in the district of Schleswig- Holstein, on the Little Belt and in the Bay (fjord) of Apenrade. It is beautifully situated in a deep valley surrounded by woody heights and a fertile country. Apenrade has a school of navigation and carries on a considerable seafaring trade. It is a popular bathing resort and is a place of considerable antiquity. Pop. about 7,000.

APERTURE, in anatomy, zoology, botany, etc. The aperture of a univalve shell is the opening or mouth. In mollusks which feed on vegetable matter it is entire; while in those which are animal feeders it has a notch or canal. In some families it has an operculum of cover. The margin of the aperture is called the peristome. In optics, see Microscope; Tele¬ scope.

APE’S HILL (Arabic, Jebel Zatut), the ancient Abyla, the extremity of a mountain range in northern Morocco, opposite Gibraltar, and one of the <(Pillars of Hercules. ®

APEX, in mining, the highest point of out¬ crop of a mineral vein or lode. This is the

common definition of the term as used by miners, although its legal significance must be interpreted in connection with the local conditions and cannot be defined in general terms. According to the Revised Statutes of the United States for 1872 the owner of a mineral claim which includes the apex is al¬ lowed to follow the vein along the dip for an indefinite distance without regard to the own¬ ership of the overlying surface, so that the proper location of the apex is of the utmost importance in establishing the lines for a claim. It has been decided by the courts that the apex need not appear necessarily at the

surface, and hence the term does not exactly coincide with the term outcrop. In the case of an inclined vein whose apex is concealed, but which outcrops at some point lower down, the right of mining is conveyed to the owner of the apex-claim in preference to the owner of the outcrop-claim. This law has been the cause of much confusion and of expensive litigation in settling the ownership of valuable mining properties in the Western States. A wiser provision is that obtaining in most Euro¬ pean countries, which grants the owner the right of mining only within the vertical limits of his claim.

APEX OF THE SUN'S WAY, a term

signifying the point in the constellation Her¬ cules to which the sun's motion in space is directed. This point is about in right ascension 18 hours 30 minutes, and declination 35° north. The point is therefore somewhat south of the zenith for the most of the United States in the early part of the evenings of August. Of course this statement is meant to indicate the locality only in the most general way. That the solar system is moving toward this part of the heavens is indicated by the apparent spread¬ ing apart of the stars in this region, together with an apparent crowding together of the stars in the opposite direction, as the trees open in front of one walking through a grove and shut together behind him. The velocity of this motion is shown by spectroscopic observa¬ tion to be about 11 miles per second. The movement, so far as observed, seems to be in a straight line, but may turn out to be in a vast curved orbit.

APHANESITE, a-fan'e-sit (from the Greek aphanes, ˆobscure,® in allusion to the difficulty of recognizing it by its crystals), a mineral now better known as clinoclasite.

APHANIP'TERA, an order of wingless insects having a sticker of three pieces and a true metamorphosis. The thorax is distinctlv separate from the abdomen, and two horny plates mark the spots where wings would be in the higher insects. It contains the Pulicidcc, or fleas.

APHANITE, af'a-nit (derivation same as for aphanesite), a variety of the rock known as diorite, in which the constituent minerals occur in such small grains that the aggregate rock appears almost (or quite) homogeneous, except when examined through a lens.

APHASIA, a-fa'zhi-a, the designation of a disorder of speech due to disturbance of the brain mechanism independently of any muscu¬ lar defect. This mechanism is complex and is usually divisible into two parts, the receptive

or sensory and emissive or motor. To the former belong those parts of the brain that store concepts of spoken words or written words; to the latter those parts concerned in co-ordinate speech or in writing. Thus aphasia may be of at least four different and independ¬ ent types. Frequently it is a combination of one or more of these. The zones in the brain that store intellectual auditory impressions are located in the first temporal convolution. Any injury to this part of the speech mechanism may produce auditory aphasia or word deaf¬ ness. A patient thus affected is able to hear words and to speak, but he does not compre¬ hend what is being said to him. He has lost his hearing word memories, and his own lan¬ guage is as a foreign language that he hears but cannot comprehend. In an analogous man¬ ner, if there is disorder of the occipital lobes, about the calcarine fissure, or of its related fibre tracts, a patient may have visual aphasia or word blindness. His own written language might as well be in Arabic, for he has lost all his memory of written words. These types of aphasia are much less common than the true type of motor aphasia or aphemia. In this the trouble is in the third left frontal convolution in the brain, Brocas convolution, or its related fibre tracts, and a patient thus affected has lost the power to say the words he desires to say. He is perfectly able to talk, may repeat words, but knowing in his mind precisely what he wishes to say is unable to express it, not be¬ cause of any failure of the muscular power of the tongue to articulate, but because of the defect in the storage centre or its fibre paths for motor speech. A fourth type is agraphia, in which the affected patient is unable to write with understanding the words with which he is familiar. The site of the lesion here is un¬ determined. It usually accompanies motor aphasia. There are also forms of combined aphasia in which the fibre tracts from one centre to another are cut off. These make para¬ phasias, and their symptoms are extremely complex. Aphasia in its various forms may differ very widely in its extent. It may be very slight or very profound. It may be temporary or permanent, depending on the nature and extent of the brain injury. Aphasia is most frequently a symptom of haemorrhage from some artery or arteries in the brain; it may be caused by the growth of a tumor or result from an injury. The treatment is that of the causing disease. In the sensory aphasias edu¬ cation of the non-affected areas is of great importance. If there is word blindness, the memory for spoken symbols should be culti¬ vated, and vice-versa.

Bibliography. — Baldwin, dictionary of Philosophy and Psychology,5 article entitled <(Speech and Its Defects® (1903); Bastian, < Aphasia and Other Speech Defects) (1898) ; Elder, (Aphasia and the Cerebral Speech Mechanism5 (with bibliography, 1897) ; Gould and

Pyle, (Cyclopedia of Medicine and Sur¬ gery) (Philadelphia 1912) ; Jelliffe and White, diseases of Nervous System5 (1917).

APHE'LION, that part in the orbit of the earth (or any other planet) which is farthest from the sun.

APHELIOTROPISM, the form of sen¬ sitiveness in planets by which their organs direct

their axes away from the source of light. See Heliotropism.

APHEMIA, a term employed to designate a motor aphasia. See Aphasia.

APHID, a plant-louse of the family Aphididce, order Hemiptera. Aphides are among the most abundant of insects and do much in¬ jury to vegetation by their habit of sucking the sap of leaves and stems of plants. They are usually very small, never over a quarter of an inch in length. Their mouth-parts form a slen¬ der beak adapted for puncturing leaves and sucking the sap. Their antennae are from three to seven- jointed, and generally longer than the body. The ocelli are usually present, and the beak is three-jointed and developed in both sexes. The legs are long and slender, with two- jointed tarsi. The males and females are winged, and also the last brood of asexual in¬ dividuals, but the early summer broods are wingless. Their bodies are flask-shaped, being cylindrical, the abdomen thick and rounded, and in aphis and lachnus provided with two tubes on the sixth segment for the passage of a sweet fluid (honey-dew) secreted from the stomach, which attracts crowds of ants (see Ant). The wings are not net-veined, having few veins, which pass outward from the costa. They are usually green in color with a soft powdery bloom exuding from their bodies. Bonnet first discovered that the summer brood of wingless individuals were born of virgin parents, hatched from eggs laid in the autumn, and that the true winged sexes composed the last generation, which united sexually, and that the female laid eggs in the autumn which produced the spring brood of asexual wingless individuals.

In the early autumn the colonies of plant-lice are composed of both male and female individ¬ uals. These pair, the males then die, and the females begin to deposit their eggs, after which they die also. Early in the spring, as soon as the sap begins to flow, these eggs are hatched, and the young lice immediately begin to pump up sap from the tender

leaves and shoots, in¬ crease rapidly in size, and in a short time come to maturity. In this state it is found that the whole brood, without a single exception, con¬ sists solely of females, or rather, and more properly, of individuals which are capable of re¬ producing their kind. This reproduction takes place by a viviparous generation, there being found in the individuals in question young lice which, when capable of entering upon individual life, escape from their progenitors and form a new and greatly increased colony. This sec¬ ond generation pursues the same course as the first, the individuals of which it is composed being, like those of the first, sexless, or at least without any trace of the male sex throughout. These same conditions are then repeated, and so on almost indefinitely, experiments having shown that the power of reproduction under such circumstances may be exercised, according to Bonnet, at least through nine generations, while Duval thus obtained 11 generations in seven months, his generations being cur¬ tailed at this stage not by a failure of the re¬ productive power, but by the approach of winter, which killed his specimens. Huber ob¬ served that a colony of Aphis dianthi, which had been brought into a constantly heated room continued to propagate for four years in this

manner without the intervention of males, and even in this instance it remains to be proved how much longer these phenomena might have been continued.

Certain species feed on the roots of plants, as asters, lettuce, grasses, etc., and these also attract numerous ants. The corn plant-louse has been found by Forbes to hibernate in the wingless, asexual form in the earth of previ¬ ously infested corn-fields. In the spring an ant (Lasius alienus), which runs its tunnels along the principal roots of the corn, collects the aphides and conveys them into its galleries, where they are watched and protected. The white-pine aphis (Lachnus strobi) is destructive to young white-pine trees. Another ,aphid is the grape Phylloxera (q.v.). The woolly aphids (Schisoneara tessellata) flock on the stems of the alder, their bodies concealed by a flocculent mass of wax. Another destructive species is the apple woolly louse (S . lanigera). Aphides can be exterminated by frequent spraying.

Bibliography. — Buckton, (Monograph on British Aphides) (Ray Society, London 1879— 83) ; Miall, L. C., (Injurious and Useful Insects) (London 1908) ; Osborn, Herbert, Agri¬ cultural Entomology) (Philadelphia 1916) ; Thomas, (Eighth Report of State Entomologist of Illinois) (Springfield 1879).

APHONIA, medical term used to designate a loss of voice more or less

complete. It may result from paralysis of the respiratory mus¬ cles, pneumonia, or pulmonary emphysema, or from diseases of the larynx, oedema of the glottis, polypus, etc., or by pressure on the larynx caused by abscesses or any morbid growth. In general it is caused by anything which interferes with expiration or with the functions of the vocal cords. It differs from mutism, in which is lost the ability of forming articulate sounds. Aphonia may exist in vary¬ ing degree according as the voice is totally or partially lost, and is very often associated with hysteria.

APHRODISIACS, af'ro diz'i-akz, drugs that excite erotic desire. True aphrodisiacs are rare and their use is attended with consid¬ erable danger. The principal are hashish, can- tharides, blatta orientalis, and damiana. Drugs with an opposite effect are known as anaphro- disiacs.

APHTH7E, af-tha, small round ulcers sur¬ rounded by a red border which appear on the mucous membrane of the mouth in the. disease known as aphthous stomatitis. The ulcers usually appear on the under surface or sides of the tongue or in the fold between lips and gums. Aphthie attack children during the dentition period, when lowered vitality is often a predisposing cause. Unclean nursing bottles and faulty oral hygiene are also factors in in¬ ducing an attack. It is not known to be con¬ tagious and as far as known there is no specific germ connected with the disease. Cleansing the mouth with antiseptic washes, treating the ulcers with caustics, such as nitrate of silver, and strict attention to oral hygiene are the usual methods of treatment.

APHYDROTROPISM, a form of sensi¬ tiveness by which a plant organ turns its axis away from the source of moisture. It is ob¬ served in the fruiting bodies of several fungi.

The vegetative filaments remain in the moisture but the reproductive filaments grow out into the drier air.

APIDˆE, the family of Hymenoptera in¬ cluding the bees. It is characterized by its members being clothed with feathered hairs, and by having the basal segment of the hind foot flat and broad. The family is very numer¬ ous and is world-wide in range. See Bee.

APIS (Egyptian Hapi), a bull at Mem¬ phis to which divine honors were paid by the ancient Egyptians, and which was regarded as the representative of Osiris. It was necessary that he should be black, with

a triangle of white on the forehead, a white spot in the form of a crescent on the right side and a sort of knot like a beetle under his tongue. Other marks are also mentioned. When a bull of this de¬ scription was found he was fed four months in a building facing the east. At the new moon he was led to a splendid ship with great solemnity, and conveyed to Heliopolis, where he was fed 40 days more by priests and women, who performed before him various indecent ceremonies. From Heliopolis the priests car¬ ried him to Memphis, where he had a temple, two chambers to dwell in, and a large court for exercise. His actions were thought to have prophetic significance, and he was believed to impart prophetic power to the children about him. His birthday was celebrated every year, when the Nile began to rise. The festival con¬ tinued for seven days, and it was said that the crocodile was always tame as long as the feast continued. Notwithstanding all this veneration, the bull was not suffered to live beyond 25 years, the reason of which is probably to be found in the astronomical theology of the Egyptians. The death of Apis, however, ex¬ cited universal mourning, which continued till the priests had found a successor to him. As it was extremely difficult to find one with all the above distinctions, fraud was often prac¬ tised by the priests.

APJOHNITE, a native manganese alum, or hydrated sulphate of aluminum and man¬ ganese, found in fibrous form and as incrusta¬ tions at Lagoa Bay, South Africa, and in Sevier County, Tenn. It is variable in composition, but some analyses indicate MnSO.».Al2(S04)3 + 24H20. It is usually white or nearly so and tastes much like common alum.

APLANATIC LENSES, a term applied to lenses nearly or quite free from spherical aberration. If the curved surfaces of a single convex lens are portions of spheres, the rays of light from one point of an object arc not accurately brought together at one correspond¬ ing point of the image, the rays passing through the outer portions of the lens being too much refracted. The result is a distorted image. Theoretically it is easy to correct this error by substituting ellipsoidal surfaces for the spherical, but such surfaces cannot be ac¬ curately constructed. Spherical aberration is corrected, in practice, by combinations of two or more lenses in one, the surfaces being of differing curvatures. The results are quite satisfactory, and the method is applied in the manufacture of objectives and eye-pieces for telescopes and microscopes, as well as in the making of lenses to be used in photography.

APOCALYPSE (Greek, apokalypsis, from apokalypto, I reveal), the name frequently given to the last book of the New Testament. It is

generally believed that the Apocalypse was writ¬ ten by John in his old age, at the end of the 1st century (95-97 a.d.), in the Isle of Patmos, whither he had been banished by the Roman Emperor Domitian. Though commonly re¬ garded as genuine in the first centuries of Christianity, critics have not been wanting who have doubted the evidence of its being the work of Saint John. Its genuineness was main¬ tained by Justin Martyr (c. 150), Irenaeus (195), Clement of Alexandria (200), Tertullian (207), and many others; and doubted by Dio¬ nysius of Alexandria (240), Cyril of Jerusalem, Chrysostom, and nearer our own times, by Luther and a majority of eminent German commentators. In recent times a composite authorship has been suggested and some have regarded it as a Jewish work adapted by a Christian writer. The Apocalypse, on account of its metaphorical language, has been ex¬ plained differently by almost ever) *interpreter, and for the same reason it has furnished all sorts of sects and fanatics with quotations to support their creeds or pretensions. There can be no doubt that the hopes of the early Chris¬ tians and the severe persecution they endured led them to regard the Roman empire as the object of prophetic denunciation, and the com¬ ing of Christ and the millennium as near at hand. When, under Constantine, however, the Christians became dominant and prosperous, the empire was considered as the scene of a millennial development, and in course of time the barbarous hordes who were closing round Rome were regarded as fulfilling the woes pre¬ dicted in the Apocalypse. At the Reformation the Protestants identified Babylon with papal Rome, and the second beast of Antichrist with a universal pontiff. The modern interpreters may be divided into three schools : namely, the historical school, who hold that the prophecy embraces the whole history of the Church and its foes from the time of its writing to the end of the world; the Praeterists, who hold that the whole, or nearly the w*hole, of the prophecy has been already fulfilled, and that it refers chiefly to the triumph of Christianity over Pa¬ ganism and Judaism; and the Futurists, who throw the whole prophecy, except the first three chapters, forward upon a time not yet reached by the Church — a period of no very long duration, which is immediately to precede Christ's second coming. The Apocalypse con¬ tains 22 chapters, which may be divided into two principal parts. The first comprises (<the things which arew — that is, the then present state of the Christian Church, including the epistolary instructions and admonitions to the angels or bishops of the seven churches of Ephesus, Smyrna, Pergamos, Thyatira, Sardis, Philadelphia and Laodicea, situated in Asia Minor. The second part comprehends a predic¬ tion of (<the things which shall be hereafter, 11 referring either to the future state of the Church through succeeding ages, from the time of the apostle to the grand consummation of all things, or to the state of the

souls of men after the general resurrection. See Apoca¬ lyptic Literature.

Bibliography. — Bousset, W., (Kommentar1 (Gottingen 1906) ; id., (The Antichrist Legend1

(London 1896) ; Charles, R. H., ‘Studies in the Apocalypse5 (Edinburgh 1913) ; Gunkel, (Schoplung und Chaos in Urzeit und Endzeit) (Gottingen 1895) ; Holtzmann, introduction to the New Testament (3d ed., Freiburg 1892) ; id., ‘Commentary on Revelation) (ib. 1908) ; Moffatt, J., Expositor’s Greek Testament5 (New York 1910) ; id., introduction to the Literature of the New Testament5 (with a complete bibliography, ib. 1911) ; Porter, “Revelation55 in Hasting’s (Dictionary of the Bible5 (ib. 1898) ; Ramsay, W. M., ‘The Let¬ ters to the Seven Churches5 (ib. 1905) ; also the commentaries by Simcox in ‘Cambridge Bible5 (Cambridge 1898) ; Scott in ‘Century Bible5 (Edinburgh 1902) ; and Sweet (New York 1909) and the introductions to the New Testament by Weiss (London 1887) and Zahn (Edinburgh 1909).

APOCALYPTIC LITERATURE. A dis¬ tinct type of religious literature emanating from Jewish and Christian sources. The form¬ ative period of its growth and development reached from 200 b.c. to 100 a.d. The name “Apocalypse55 comes from the Greek, mean¬ ing “disclosure55 or “revelation,55 and refers to a special kind of literature. The occasion for the appearance of this particular kind of lit¬ erature among the Jews was the Maccabean revolt and the attendant causes leading up to the revolt. The rebellion itself was no more or less than a severe reaction against Hellen¬ ism and the threatened domination of Jewish thought and life. It was the clash of two na¬ tionalities and two religions that were almost mutually exclusive. It was in the heat of this period of strife that this literature found its voice and its mission, and by means of its en¬ couragements became veritable “tracts for bad times.55

Origin. — The origin of the apocafyptic liter¬ ature has been the source of much discussion during the past few years. Almost every branch of Jewish society has been accredited with its production. Some authorities con¬ tend that it must have come from the Es- senes, others from Persian sources, and still others from Hellenistic sources. The best con¬ clusion seems to be that the literature is first of all

distinctly Jewish and Palestinian in origin, and that it emanated from the lay classes in¬ stead of the recognized official . classes. This condition easily accounts for its Pharisaical teachings, its demonology so often accredited wholly to Persian sources and its traces of Hellenism. The place of writing is still a mat¬ ter of conjecture, but there is much to favor the idea that it was written (that is, the most of it) in Galilee.

Characteristics and Problems. — The out¬ standing characteristics of the apocalyptic, liter¬ ature are three in number. The most signifi¬ cant one is the characteristic of pseudonymity. Some have concluded that this is the only mark of an apocalypse, and as a consequence much confusion has arisen in the use of the modern term "pseudepigrapha.55 The typical apocalypse is written under the assumed name of some ancient worthy and purports to come from his time. The use of the name in this way is regularly followed out in all apocalypses down to the 14th century a.d., with a few ex¬ ecutions in the New Testament. The real rea¬ son for this assumption of another name, as

the medium of revelation, is to be found in the crystallization of the idea of a sacred canon of Scripture. To writers of the apocalypses the canon was practically closed, the time of reve¬ lation had passed, and so in order to reach the people with a new message the Patriarchs, Enoch, Moses and Daniel are made expositors of elaborate revelations. Another marked char¬ acteristic of the apocalyptic literature is the use of symbolical language, visions and im¬ agery. The visions are elaborate and rendered somewhat mysterious in their use of symboli¬ cal language. The "horn55 of an animal gener¬ ally represents a king. The "little horn55 of Daniel represents Antiochus Epiphanes. The patriarchs are represented as "white bulls.55 Tne righteous Israelites are "sheep55 or "lambs. 55 Foreign nations are pictured as ravenous beasts. Further the legalistic emphasis of the apocalyptic is very noteworthy. In every case, with the exception of 4 Ezra, allegiance to the Law or the Torah is affirmed or assumed. In some cases the validity of the Law is recog¬ nized, even as last authority. Hand in hand with this recognition of the Law is the general expressed loyality to the Temple and its worship.

One of the greatest problems of apocalyptic literature is its relation to Old Testament prophecy. The similarities between the two forms of literature are marked. In the face of much discredit that has been thrown upon the apocalyptic writers, it must be said that they were the best successors of the great prophets, both in spirit and deed. They have the same basis of revelation and inspiration. Both possess an

eschatology and are highly ethical. On the other hand the differences are very striking. Old Testament prophecy is al¬ ways conditional in regard to future events ; but in the case of the apocalyptic, the con¬ ditions are of minor importance, as the pre¬ diction will come to pass in a mechanical way irrespective of human conduct. The most strik¬ ing difference is found in the scope of the two eschatologies. In Old Testament prophecy es¬ chatology is almost entirely concerned with the nation, but in the apocalyptic the eschatol¬ ogy of the individual is highly developed. A firm belief in the future life is one of the cardinal doctrines of the apocalyptic. Again the belief in a new heaven and a new earth is one of the finest products of this literature.

The most representative apocalypses come from the period 200 b.c. to 100 a.d. It must not be concluded that the apocalyptic sprang into being at one time. The transition toward the apocalyptic was made in the Old Testament it¬ self, as shown by the appearances of the apocalyptic tendencies in Ezekiel and Isaiah 24-27, and one of the best apocalypses, the book of Daniel. The principal Jewish apocalypses of the period 200 b.c. to 100 a.d. are, arranged in chronological order, Enoch, Testaments of . the Twelve Patriarchs, Assumption of Moses, Secrets of Enoch, 2 Baruch, 3 Baruch and 4 Ezra (2 Esdras). A general survey of the character and contents of these books is as follows:

Enoch. — It is a composite collection of writings coming from different centuries. There are indications of at least five books, so that a more appronrate title would be the “Books of Enoch.55 The oldest sections of this Enoch literature are in chapters 1-36 and 83-90. These

chapters date from the first half of the 2d cen¬ tury b.c. Chapters 83-90 are the oldest sections of the book, and by far the most complete and typical of the apocalyptic. They consist of dream visions from the beginning to the end of time. History is allegorized by use of sym¬ bolical language. Chapters 1-36 narrate the visions of Enoch and his journeys through earth, Sheol and heavenly places. This has been truly named the work of a <(Jewish Dante.® The 1st century b.c. sections are chap¬ ters 37-71 and 91-108. Chapters 37-71 have been named the <(Parables of Enoch,® and they picture the judgment of the wicked, the lot of the apostates, the blessedness of the saints and the idea of a new heaven and a new earth. Chapters 91-108 are a series of exhortations. Chapters 72-82 are a little uncertain in regard to the date, but they probably come from the 2d century b.c.

The Testaments of the Twelve Patriarchs. — It is a series of apocalyptic writings in the name of the 12 sons of Jacob. The entire set of waitings, with the exception of a few later Jewish and Christian interpolations, comes from the latter part of the 2d century b.c. The Testament of each Patriarch in turn follows the same literary form of division into a triple arrangement. The first division of each one is a historical sketch based upon Genesis. Some particular vice or virtue is emphasized. In the second division an exhortation is given rel¬ ative to these vices or virtues. The third di¬ vision deals with the future of the family and in predictive ways outlines future events. The book as a whole marks the high-water mark of Jewish ethics in this early period.

Assumption of Moses. — It was written in Palestine during the first part of the 1st cen¬ tury a.d. The interest in this apocalypse dates from the discovery of a Latin manuscript in Milan in 1861. By means of this Latin frag¬ ment, the Greek fragments and the New Testa¬ ment allusions in Jude and 2 Peter, the resto¬ ration of some of the details of the original is about complete. The author evidently was a man with Pharisaic beliefs. The chief value of the book is its close relation to the New Testament writings.

Secrets of Enoch. — The apocalypse is some¬ times called 2 Enoch. The text has been largety recovered from the Slavonic versions of the 16th and 1 7th centuries. It was writ¬ ten by a Hellenistic Jew, probably in Egypt, during the middle of the 1st century a.d. One of the prominent marks of its Hellenistic tend¬ encies is its doctrine of the pre-existence of man.

2 Baruch. — This apocalypse is often called the Syriac Apocalypse of Baruch, because of the discovery of a very fine copy of it in the Syriac language. This manuscript was a translation from an original manuscript in the Greek and was discovered in 1866. The book is composite in origin, .parts of it being writ¬ ten as early as 50 b.c. and other parts of it coming from after the fall of Jerusalem in 70 a.d. The outlook, as far as the future is con¬ cerned, in the earlier sections is very hopeful, while in the later sections all hope for a messi¬ anic kingdom is practically abandoned. The greatest value of the book is its inter-relation to the Epistles of Paul.

3 Baruch. — It is called the Greek Apoca¬ lypse of Baruch. It was not definitely recog¬

nized as a separate book from the other books of Baruch until the discovery of a manuscript in 1896. It was written in the days of the early Christian Church in the 1st century a.d. It refers to only five

heavens, while Enoch re¬ fers to seven and Secrets of Enoch to ten.

4 Ezra. — Chapters 3-14 of 2 Esdras of the Old Testament Apocrypha are the apocalypse of 4 Ezra. This order of the different books of Ezra is derived from the Vulgate. It is not a unit; some parts were written before the fall of Jerusalem in 70 a.d., and some were writ¬ ten as late as 120 a.d. The main section of the book is found in chapters 3-10, generally desig¬ nated as the Salathiel Apocalypse. The remain¬ ing sections consist of several significant vi¬ sions. The main value of the book lies in its relation to the problems of pre-Talmudic days and the New Testament.

In addition to these more important Jewish apocalypses there are numerous Christian apoc¬ alypses. Some are found in the New Testament, as, for example, the book of Revelation. The most important ones outside of the New Testa¬ ment are the Apocalypse of Peter, the Testament of Hezekiah, Shepherd of Hermas and numer¬ ous Christian Sibylline Oracles. Some of the Sibylline Oracles have a few ancient Jewish elements in them coming from the 2d century b.c. The New Testament apocalypses are not written under assumed names, which can largely be accounted for by the new emphasis upon personality in Christianity. However, closely following the period of the New Tes¬ tament the literary form of pseudonymity is again assumed. See Apocrypha.

Bibliography. — Charles, R. H., English edi¬ tions of nearly all the Jewish Apocalypses, (The Apocrypha, and Pseudepigrapha of the Old Testament (Oxford 1913), ‘Eschatology *(2d cd., London 1913), (The Religious Develop¬ ment between the Old and the New Testa¬ ments* (New York 1914) ; Deane, ‘Pseu- depigrapha> (New York 1891) ; Encyclopaedia Biblica, *article (< Apocalyptic Literature® (New York 1899) ; Fairweather, W., (The Background of the Gospels* (Edinburgh 1911) ; Schiirer, ‘History of the Jewish People in the Times of Jesus Christ* (Eng. trans., New York

1891).

Leslie E. Fuller,

Assistant Professor of Old Testament Inter¬ pretation, Garrett Biblical Institute.

APOCALYPTIC NUMBER, the mystic number 666, which, according to some authori¬ ties, should be 616, mentioned in Revelation xiii, 18. . As early as the 2d century ecclesias¬ tical writers found that the name

Antichrist was indicated by the Greek characters expres¬ sive of this number, numbers being expressed in Greek by the letters of the alphabet. By Irenaeus the word Lateinos was found in the letters of the number, and the Roman empire was therefore considered to be Antichrist. An¬ other solution is Neron Kesar (Hebrew form of Nero Caesar). Omitting the c's and the a, not written in ancient Hebrew, we get 666 as the value of the letters.

APOCRYPHA. The term ((Apocrvpha® is generally applied to distinct groups of religious literature closely associated with the canons of the Old and New Testaments. This literature was not regarded as canonical, although much

read and quoted in church and synagogue. The Old Testament group, a collection of 14 books of Jewish origin, is found in the Greek and Latin versions, but not in the Hebrew ver¬ sions. The New Testament group is rather an indefinite body of early Christian literature consisting of parallels and additions to the writings of the New Testament.

The use of the term ˆApocrypha® and ((Apoc¬ ryphal® varies to great extent, especially among Protestants and Roman Catholics. The au¬ thorities of a Protestant persuasion apply the term Apocrypha to the two groups known as the Old and the New Testament Apocrypha proper. However, the term Apocryphal is made not only to include these two groups, but also many of the Jewish pseudoepigraphic writings. The Catholics designate the books of the Old Testament Apocrypha proper as Deuetro-Canonical books (except 1 and 2 Es-dras and the Prayer of Manasses), and group all the remaining Jewish and Christian litera¬ ture of a kindred origin under the term Apoc¬ ryphal.

The meaning of the term Apocrypha (com¬ ing from the Greek word meaning (<hidden®) has undergone several very significant changes in the course of its use and application. His¬ torically considered three principal changes in the meaning of the word should be noted. In its earliest use it was restricted to the writings of more or less sacred character, but contain¬ ing certain mysterious and esoteric teachings intended only for the wise and the initiated (2 Esdras xiv, 45f). In this case there was no discredit thrown upon the writings, because of authorship or contents. Still another mean¬ ing was given to the term

by some of the Church Fathers, especially Origen, wherein it was applied to all writings of a secondary or questionable character. Many of the works thus branded were discredited as to their teachings and withdrawn from public use. Finally the term was used to designate false and heretical literature.

In addition to this general uncertainty much confusion has prevailed in regard to the value of the literature. Some of these differences can be traced back to the different ideas of canonicity as held in Jewish and Hellenistic circles. Some of the Church leaders, especially in the Western Church, ascribed full scrip¬ tural authority and inspiration to the apocry¬ phal writings. This view finally bore fruit in the Council of Trent in 1546 when 11 of the books of the Old Testament Apocrypha were declared canonical. On the other hand a great number of the leaders, because of their close association with Hebrew traditions, denied scriptural authority and value to any of the books. This view was championed by Jerome and finally found expression in the Protestant- Christian view of Reformation times. There were some who did not accept either one of these two extreme views. They clearly recog¬ nized the value of the literature, but at the same time they were not willing to place the books on the same level with the Biblical books. This latter view finally found expression in the teachings of the Church of England.

Old Testament Apocrypha. — The Old Tes¬ tament Apocrypha proper contains 14 books, and represents, except for a few minor varia¬ tions, the excess of the Greek canon over the

Hebrew canon. The books may be classified in the following way :

1. Parallels or Additions to the Old Testa- ment.— The Prayer of Manasses, The Song o'f the Three Holy Children, The History of Su¬ sanna, Bel and the Dragon, The Rest of Esther, 1 Esdras and Baruch (including the Epistle of Jeremiah).

2. Historical. — 1 Maccabees and 2 Mac¬ cabees.

3. Legendary. — Tobit and Judith.

4. Wisdom Literature. — Ecclesiasticus and Wisdom of Solomon.

5. Apocalyptical. — 2 Esdras (4 Ezra).

A brief survey of these books is as follows :

The Prayer of Manasses. — It is a product of the 1st century b.c., and

was intended to be used in connection with the story of Manas- seh's Babylonian capacity (2 Chron. xxxiii). Parts of the Prayer have found their way into Protestant liturgy.

The Song of the Three Holy Children. — One of the principal additions to Daniel. It was written about 100 b.c. and was found in¬ serted in the book of Daniel, the third chapter, right after the 23d verse.

The History of Susanna. — Another 1st cen¬ tury b.c. addition to the book of Daniel. It is generally found prefixed to the book. The purpose of the story is to magnify the powers and the judgment of the hero of the book.

Bel and the Dragon. — It was written about 100 b.c. It is the story of Daniel's sagacity in exposing some of the flagrant abuses of idolatry.

The Rest of Esther. — This writing consists of a number of additions to the Biblical book of Esther. The additions were made to add de¬ tail and make up for some of the deficiencies of the canonical book. It was written about 100 B.C.

1 Esdras. — It is the Greek version of and in some parts a reconstruction of the canonical Ezra. It was written about 100 b.c. Some of additional subject matter is from the book of Nehemiah.

Baruch. — The greater part of this book was written in the 1st century a. d. The book is written under the assumed name of Baruch, the private secretary of Jeremiah. The 6th chapter is known as the Epistle of Jeremiah. Both books contain a series of exhortations and encouragements and severe denunciations of idolatry.

1 Maccabees. — It is one of the best sources on the period from 175 to 135 b.c. It treats of the causes of the Maccabean rebellion and the rebellion itself down to the death of Simon in 135 b.c. It was written by a Jew in Palestine during the latter part of the 2d century b.c.

2 Maccabees. — It is a mixture of history and fiction. It is an abridgment of a much larger work in existence at the time of its writ¬ ing in latter part of the 2d century b.c. It treats of the period leading up to the rebellion of the Maccabees under Mattathias in Modein, and the rulership of Judas down to 161 b.c.

Tobit. — It is a popular story of romance and legend from the Jewish Dispersion in Egypt. The story was written in the 3d century b.c., and was based upon the well-known Egyptian stories of (The Fable of the

Ungrateful Dead *and (The Tractate of Khons.* The purpose of the story was to teach some useful lessons,

and at ».ne same time to correct some of the current superstitions.

Judith. — It is a legendary story of a Jewish widow who succeeded in outwitting and finally slaying a great Assyrian general, thus bringing deliverance to her oppressed people. It was written in Palestine during the latter half of the 2d century b.c., probably by a Pharisee.

Ecclesiasticns. — It is a book of proverbs and practical observations on life closely re¬ sembling the Wisdom Literature of the Old Testament. It was written about 180 b.c., and forms one of the most valuable records of early Rabbinical thought. It was translated into Greek in 132 b.c. by a grandson of the author (Jesus ben Sira).

Wisdom of Solomon. — In some respects it is one of the most valuable of the books of the Apocrypha. It was written by a Jew of the Dispersion about 65 b.c. It is similar to the Wisdom Books of the Old Testament. It was written with the distinct purpose to combat the materialistic tendencies of the canonical book of Ecclesiastes.

2 Esdras. — It is an apocalypse, especially chapters 3-14. It is composite in origin, dating from 65 b.c. to 120 a.d. The book is especially valuable, as it bears on the period of Jewish thought in relation to the fall of Jerusalem in 70 a.d. Its views on eschatology are closely allied to the teachings of the New Testament.

There are several books worthy of note be¬ longing to the general class of Jewish apocry¬ phal literature but still outside of the Apocry¬ pha proper of the Old Testament. The most noteworthy books of this class are the books of Jubilees, 3 Maccabees, 4 Maccabees, Psalms of Solomon and the Martyrdom of Isaiah. See Apocalyptic Literature.

Jubilees. — It has been called the “Little Genesis,55 as it represents the book of Genesis rewritten from the standpoint of the Law or legalistic Pharisaism. It was written during the latter half of the 2d century b.c. by a Phari¬ see. Religious institutions and concepts of the 2d century are read back into the days of the patriarchs.

3 Maccabees. — It is a religious novel com¬ ing from Hellenistic Judaism in the 1st cen¬ tury b.c. Its central theme is the marvelous

deliverance of the Jews from Egyptian perse¬ cution by divine intervention.

4 Maccabees. — It belongs to the great body of Jewish Wisdom literature, coming from Hellenistic centres. It attempts to discuss in treatise form the power of inspired reason over the passions. It was written during the 1st century a.d.

Psalms of Solomon. — A collection of Psalms resembling the Hebrew Psalter. They were written about 50 b.c. by Pharisees.

Martyrdom of Isaiah. — It is a product of the 1st century a.d. It records the tradition of the death of Isaiah at the hands of Manasseh, King of Judah.

New Testament Apocrypha. — The general character of the books of the New Testament Apocrypha is quite different from that of the Old Testament Apocrypha. In the first place the books of the New Testament group form some¬ what of an indefinite body of literature, as new ones are being discovered from time to time. The majority of the writings come from the 2d century a.d. and represent all shades of re¬

ligious belief. Further the literature differs from the Old Testament group, in that there is a deliberate attempt to fill in the gaps in the New Testament narratives, and in some cases even to supersede the earlier ones. For the most part they are writings filled with tra¬ dition, fiction and the description of the mar¬ velous. Many of the ecclesiastical dogmas of the Middle Ages can be traced to this fruitful source.

The books of the New Testament Apocry¬ pha can be arranged under three heads, namely: Gospels, Acts, and Epistles. A few of the more important under each group will be mentioned :

Gospels. The Gospel according to the Egyptians. — It reflects a severe belief in asceticism and agnosticism. Gospel according to the Hebrews. — It was written by some of the followers of the Nazarenes and the Ebionites. Gospel according to Peter. — It was discovered in 1885 and published in 1892. It was popular among the Syrian Christians. Gospel according to Thomas. — It is an attempt to fill in the story of Jesus' infancy. Jesus is described as a miracle worker from the begin¬ ning.

Acts. The most important one in this class is the Acts of Paul and Theba. It is a romantic story of a woman converted under Paul's min¬ istry. In addition to this writing there are the Acts of Andrew , John

and Peter.

Epistles. The Epistle of Abgar. — It con¬ tains the message of Abgar, the King of Edessa, to Jesus and his answer. Epistle of Barnabas. — An important Epistle of 21 chap¬ ters teaching the dangers of relapsing into Judaism. Epistle of Clement. — It seeks to bring and to restore harmony into the Church at Corinth.

Bibliography. — Bardenhewer, (Geschichte der altchristlichen Literatur) (1902) ; Charles, (The Apocrypha and Pseudepigrapha of the Old Testament5 (Oxford 1913) ; Churtow, (Uncanonical and Apocryphal Scriptures) (1884) ; Hilgenfeld, A., (Novum Testamentum extra Canonem Receptum5 (Leipzig 1884) ; id., (Evangeliorum et ceterorum quae Supersunt Editio Altero) ; Lipsius, R. A., and Bonnet, (Acta Apostolorum Apocrypha) (Leipzig 1883) ; Issaverdens, J., (The Uncanonical Writings of the Old Testament Found in the Armenian MSS. of the Library of St. Lazarus) (Venice 1901) ; Moore, G. F., “Apocrypha55 in (Jewish Encyclopaedia5 ; Kautsch, (Die Apokry- phen und Pseudepigraphen des alten Testa- ments) (Tubingen 1900) ; Pick, (Paralipomena) (1908); id., (Apocryphal Acts) (1909); Tisch- endorf, (Evangelia Apocrypha) (Leipzig 1854) ; id., (Acta Apostolorum Apocrypha5 (ib.. 1851) ; id., (Apocalypses Apocrypha^ (ib. 1866) ; Oes- terley, W. O. E., (The Books of the Apocrypha5 (New York 1914) ; Porter, F. C., “Apocrypha55 (in Hasting’s dictionary of the Bible,5 1898). For English translations consult Walker, (The Ante Nicene Christian Library. 5 For further literature and discussions consult Kruger, (His¬ tory of Early Christian Literature5 (New York 1897) ; Reid, “Apocrypha,55 in (Catholic En¬ cyclopaedia5 ; and Zahn, (Geschichte des neu- testamentlichen Kanons5 (2d cd., Leipzig 1889).

Leslie E. Fuller,

Assistant Professor of Biblical Interpretation , Garrett Biblical Institute.

APOCYNACE2E, the designation of an extensive natural order of monopetalous exog¬ enous plants, characterized by perfectly sym¬ metrical flowers, the segments of the corolla all twisted one way like a catherine-wheel, five distinct stamens, a superior ovarium, which when ripening opens into two parts that di¬ verge from each other at right angles; fruit follicular or capsular, or drupaceous or bac¬ cate, double or single. The order consists of trees or shrubs, many of whose

stems yield, when wounded, a copious milk, usually poison¬ ous. Generally found in tropical regions, they appear to be most abundant in the hot parts of Asia, are less common in the tropics of America, and still more rare in Africa. About 100 genera, including 566 species, have been enumerated. The plants of this order are in many cases poisonous, and very generally to be suspected, although in some cases they are used medicinally, and in others have an edible fruit. One of the most deadly plants of the order is the Tanghina venenata. The kernel of the fruit, although not larger than an almond, is sufficient to kill 20 men ; it was formerly used in Madagascar as an ordeal. The common oleander (Nerium oleander) is a formidable poison and death has resulted from eating its flowers.

APODICTIC JUDGMENTS, a logical term adopted by Kant from Aristotle to dis¬ tinguish judgments or conclusions which are beyond contradiction from those which are merely empirical ; or to put it differently, a judgment or conclusion which is founded on the impossibility of the opposite, not upon grounds of experience, is an apodictic judg¬ ment.

APOGAMY. In all plants which have reached the level of sexuality, a new individual is initiated by the union of two cells, called gametes. In exceptional cases the ability to reproduce sexually is lost, either temporarily or permanently. Plants which have lost this power, after having attained it, are said to be apogamous and the condition is apogamy, the word meaning that the union of gametes has been left out. The new individual may be de¬ veloped from any part of the gametophyte, or

gamete-bearing plant. When the new individ¬ ual arises from an egg, without fertilization, this kind of apogamy is called Parthenogenesis (q.v.). When the new individual arises from any other part of the gametophyte except the egg, some prefer to call the phenomenon vege¬ tative apogamy. A familiar case of vegetative apogamv is found in some common ferns, es¬ pecially' in highly cultivated greenhouse vari¬ eties. The beautiful fern, N ephrodium molle, which can be found in almost any greenhouse,

is the most thoroughly investigated illustration. The prothallium, or gametophyte (see Alter¬ nation of Generations) becomes thickened along its median portion, making it look like a very small prostrate leaf with a midrib. This thickened region grows out beyond the border of the prothallium, curves upward, then be¬ comes entirely erect and develops leaves, stem and roots. This plant, in every way, looks just like one arising from a fertilized egg. The essential feature of the

phenomenon is the transition from the gametophyte to the sporophyte generation without any fusion of gametes. The thickened rib-like region of the prothallium, viewed from the under side, is shown in Fig. 1, s. A later stage, after the young apogamous sporophyte has devel¬ oped leaves, is shown in Fig. 2, in which g is the gametophyte and s the sporophyte. Vege¬ tative apogamy has not been found in Thallo- phytes, liverworts, mosses, lycopods or equisetums ; but a score of cases have been reported in the true ferns and water ferns. No case has been established in Gymnosperms. In the Angiosperms several cases are well known. In the common onion (Allium Cepa), embryos have been found developing from the antipodal cells and from synergias. (See Alternation of Generations). In the fern (iV ephrodium molle) the number of chromosomes in the nuclei of the new sporophyte is the same as the number of nuclei of the gametophyte. In the flowering plants the gametophyte which gives rise to the apogamous embryo has the sporophyte, or 2x, number of chro¬ mosomes. Some persist in using the phe¬ nomenon of apogamy as an argument for or against certain theories of alternation of gene¬ rations; but in our opinion, apogamy is a sec¬ ondary, highly specialized condition which has no bearing upon the subject.

Bibliography. — Lang, W. H., (On Apog¬ amy and the Development of Sporangia upon Fern Prothallia' (Philosophical Transactions, Royal Society of London, Vol. CXC, p. 189, 1898) ; Yamanouchi, S., (Apogamy in Nephro- dium) (Botanical Gazette, Vol. XLV, p. 289, 1908) ; consult also any modern textbook of botany.

Charles J. Chamberlain, Professor of Botany, University of Chicago.

APOGEOTROPISM, the form of sensi¬ tiveness to gravity in plants evidenced by the universal tendency to grow vertically upward, in a direction opposite to that of the earth's attraction. When centrifugal force is brought to bear upon the plant in place of gravity the stems grow toward the centre of revolution while the roots grow in the opposite direction.

APOLLINARIANS, a sect of Christians who maintained the doctrine that the Logos (the Word) holds in Christ the place of the rational soul, and consequently that God was united in him with the human body and the sensitive soul. Apollinaris, the author of this opinion, was, from 362 a.d. till about 382 a.d., bishop of Laodicea, in Syria, and a zealous op- poser of the Aryans. As a man and a scholar he was highly esteemed, and. was among the most popular authors of his time. He formed a congregation of his adherents at Antioch, and made Vitalis their bishop. His teaching was condemned at Alexandria in

362; by Pope

Damasus in 375; and in the Council of Con¬ stantinople in 381. The Apollinarians, or Vi- talians, as their followers were called, soon spread their sentiments in Syria and the neigh¬ boring countries, established several societies, with their own bishops, and one even in Con¬ stantinople. The sect was denounced in 428 by imperial edict, and its members gradually returned to the Church or became Mono-physites (q.v.). Consult Harnack, (History of Dogma. }

APOLLO, son of Zeus (Jupiter) and Leto (Latona), who being persecuted by the jeal¬ ousy of Hera (Juno), after tedious wanderings and nine days' labor, was delivered of him and his twin sister, Artemis (Diana), on the island of Delos. He was the most important of the Olympian deities after Zeus and appears in mythology as the god of poetry, music and prophecy, the patron of physicians and shep¬ herds and the founder of cities. He aided Zeus in the war with the Titans and the giants, and destroyed the Cyclopes because they forged the thunder-bolts with which Zeus killed his son and favorite Asklepios (ZEsculapius) . All of the male sex dying suddenly without previ¬ ous sickness were supposed to be smitten by the arrows of Apollo. In the oldest poems Apollo is exhibited as the god of song, being known in this function as Apollo Citharoedus. Two statues of Apollo Citharoedus are extant, one of them at the Glyptothek in Munich, the other at the Vatican, but their date is unknown. In the festivals of the gods and those of men in which they took part he plays and sings while the Muses dance around him. Accord¬ ing to some traditions he invented the lyre, though this is generally ascribed to Hermes (Mercury). Marsyas, who ventured to con¬ tend with him on the flute, was conquered and flayed alive by the god. Apollo had an¬ other contest with Pan, in which the former played on the lyre, the latter on the pipe. Tmo- lus had already decided in favor of Apollo, when Midas, opposing the sentence, was dec¬ orated with a pair of ass's ears for his stupid¬ ity. That Apollo had the gift of prophecy ap¬ pears from the Iliad, where he is said to have bestowed it upon Calchas and Cassandra ; and in the Odyssey mention is made of an oracular response delivered by him in Delphi. The oracle at this place became very famous. He also revealed future events at Abae in Phocis, Didyma near Miletus, Claros near Colophon in Ionia, Tenedos and Patara in Lycia. Apollo, in later times, came to be regarded as the god of physic, and was represented to be the father of Asklepios, the god of healing.

He is re¬ ported to have taken charge for a long time of the herds of Admetus, according to some authorities voluntarily, according to others compelled by Zeus, on account of the murder of the Cyclopes, or the serpent Python. As a builder of cities, the founding of Cyzicum, Cyrene and Naxos in Sicily is ascribed to him, while Homer relates that he built the walls of Troy together with Poseidon (Neptune), and afflicted the city afterward with a pestilence, because Laomedon defrauded him of his pay. According to the poets and sculptors, Apollo, with Ares (Mars), Hermes (Mercury) and Dionysos (Bacchus), belongs to the beardless gods, in whom the dawnings of early manhood

appear. He is figured with a bow, a quiver and plectrum, a serpent, a shepherd's crook, a griffin and a swan, a tripod, a laurel, an olive-tree, etc. He was originally the sun-god and though in Homer he appears distinct from Helios (the sun) yet his real nature is hinted at even here by the epithet Phoebus, the radiant or beaming. In later times the view. was al¬ most universal that Apollo and Helios were identical and by this theory of his origin we can easily understand how he should be re¬ garded as the god of pastures (Nomios) and of flocks (Karneios), the god that protects and causes the fruits of the field to grow, the god that gives fair winds to mariners (Embasios), etc. As he slew the Python, that is, the hos¬ tile powers of darkness, with his arrows (the sunbeams), so in later times he was looked on as the averter of evil, the bringer of help and the punisher of overweening pride (as in the story of Niobe). From being the god of light and purity in a physical sense he gradually, as he became endowed more and more in the Greek mind with an ethical character, became the god of moral and spiritual light and purity, the source of all intellectual, social and politi¬ cal progress. Thus he came to be considered as the god of song and prophecy, the god that purifies after the commission of crimes, that averts and heals bodily suffering and disease, the institutor and guardian of civil and politi¬ cal order and the founder of cities. Though not one of the original gods of the Romans, his worship was introduced at Rome at an early period, probably in the time of the Tar- quins. Among the ancient statues of Apollo that are extant the most remarkable, and in the judgment of the learned and acute Winck- elmann the best and most perfect that art has produced, is the one called the Apollo Belve¬ dere, from the Belvedere Gallery in the Vati¬ can at Rome; also called the Pythian Apollo, because it is supposed that the artist has repre¬ sented the god in the moment of his victory over the serpent Python. This statue was found in the ruins of Antium in 1503. It is conjectured to be a cartful copy of a Greek original, perhaps of the 4th century B.C., or pos¬ sibly

a century or more later.

APOLLO, Pa., borough of Armstrong County, 25 miles northeast of Pittsburgh, on the Kiskiminetas River and the Pennsylvania Railroad. It has manufactories of lime, steel and woolens, and a large trade in coal, which is mined extensively in the district. Apollo was first settled about 1790, was laid out in 1816 and became a borough in 1848. Pop. 3,006.

APOLLO BELVEDERE, bel'va-dara.

See Apollo.

APOLLODORUS. (1) An Athenian painter of the 5th century b.c. He is credited with the introduction of rendering light and shade instead of flat coloring. (2) A Greek grammarian of the 2d century b.c. He studied philosophy at Athens and afterward became a follower of Aristarchus at Alexandria. He wrote several grammatical works and a history in iambic verse. His (On the Gods> was a history of the Greek religion. It is lost and its nature can only be judged from passing ref¬ erences. (3) A famous Roman architect of the 2d century a.d. The Emperor Trajan em¬ ployed him in the construction of his great

bridge over the Danube, in the building of the Forum, since known as the Forum Trajani, and other works. He censured the architectu¬ ral plans of Hadrian and was banished from Rome.

APOLLONIUS, Pergaeus, from Perga in Pamphylia; lived about 250-200 b.c. He was educated in Alexandria under the successors of Euclid, and became one of the greatest mathematicians of antiquity, being commonly called the (<Great Geometer.® His most im¬ portant work was a treatise on conic sections, in eight volumes, of which the first four, with the commentary of Eutocius, are extant in Greek, and all but the eighth volume in Arabic. We have also introductory (lemmata) to all the eight by Pappus, edited by Halley, (Apollonius Pergaeus Conic, } lib. VIII, c., Oxon. 1710 fol.

APOLLONIUS OF TYANA, Pythago¬ rean philosopher : b. Tyana, in Cappadocia, about whom many wonderful stories are told. He was born in the beginning of the Christian era, early adopted the Pythagorean doctrines, abstaining from animal food and living in the simplest manner, and according to the Pytha¬ gorean precept

maintained a rigid silence for five years. He traveled in Asia, disseminating his doctrines and doing many wonderful things, and proceeding as far as India, where he be¬ came initiated into the doctrines of the Brah¬ mans. When Domitian ascended the throne Apollonius was accused of having excited an insurrection in Egypt in favor of Nerva, but readily submitting to a trial he was acquitted. After this he went once more to Greece and passed over to Ephesus, where he opened a Pythagorean school, and died in 96, or, ac¬ cording to others, 110 a.d.

APOLLOS, an early Christian missionary and companion of Saint Paul. He was born at Alexandria, where he was converted to the new faith by disciples of John the Baptist. He at once became an earnest and zealous propagator of Christianity. He came to Ephesus, where he received further instruction from Aquila and Priscilla, and next proceeded to Corinth, where he labored with great success. He re¬ turned to Ephesus, but his followers recalled him to Corinth. He is last mentioned in the New Testament as about to start for Crete. Tradition has it that he became first bishop of Crete. Consult Acts xviii, 24-28; 1 Cor. i, 10- 12; iii, 4-6; xvi, 12; and Titus iii, 13.

APOLLYON, a-pol'll'on, or a-pol'yun, a rendering of the Hebrew Abaddon, meaning destruction. Apollyon is personified as the keeper of the bottomless pit.

APOLOGETICS, the department of theo¬ logical science which deals with the defense of the Christian faith. It differs from dogmatics which strives to reduce the doctrines of reli¬ gion to a systematic form ; and from polemics, which is the science of controversy, and while its subject matter comprises the differences found in different schools of believers, apolo¬ getics deals with attacks upon the faith which are made by unbelievers. Apologetics may be again distinguished from apologies. The for¬ mer has to do with the fundamental principles of the religion and with the methods of de¬ fense which apply to all attacks, but an apology has to do with some special form of unbelief.

Ihe former is the science of which the latter is an application. Yet, apologetics as a science may be best understood through its historical applications and the distinction named is made more readily in theory than exhibited in detail.

Owing to the nature of Christian theology as historically formulated, apologies have fallen under two main divisions, popularly known as

natural theology and the evidences of Chris¬ tianity. The former is usually put before the latter. It discusses the nature of God and the proofs of His existence as revealed to us in nature. It may also investigate the nature of man, his moral sense, the freedom of his will and his capacity for knowing God. Its chief reliance has been upon four arguments : the ontological, which starts from our idea of a perfect being and shows that it implies actual existence; the cosmological, which from the long line of causes and effects, each contingent, argues backward to a first great cause, which is itself uncaused ; the teleological, which shows the marks of design in nature, and from them argues to a great designer; the moral, which starts with the moral sense in man and argues to a holy and righteous maker. Some writers add an aesthetic argument, from our sense of beauty and its gratification in the universe. Then these various arguments are combined and the perfect being is shown to be the first great cause, righteous, wise and a person whom therefore we call God.

The evidences of Christianity assume the ex¬ istence of such a God, and from this basis prove Christianity to be His peculiar revela¬ tion, constituting the absolute religion. This proof ordinarily is divided into two great di¬ visions, external and internal. The external proofs are miracles and completed prophecy, which evince a power and wisdom which are Divine and guarantee the Divine authorship of the writings which they authenticate. The ex¬ ternal proofs include also the historical evi¬ dence to the genuineness of the scripture writ¬ ings. The internal evidences show the adapta¬ tion of the contents of the Bible to the needs of men, their agreement with the highest teach¬ ings of reason, and their elevating and purify¬ ing effect upon the mind and life. A further argument is based upon the experience of the Christian as testifying to the truth of the doc¬ trines involved.

This argument in both divisions, natural theology and the evidences of Christianity, oc¬ cupies the chief place in the textbooks, but, evidently, it is a form of specific apology and at best only in part illustrates essential apolo¬ getics. This it appears from a wider survey for the argument as stated above, while it meets a special situation, neither represents the actual argumentation in the first ages of the Church nor in our own day. Even in the New Testa¬ ment some of the writings have an apologetic purpose. Christianity in its early form met two opponents, Judaism and heathenism. To the first, the apostolic writers attempted to prove its truth by showing it as foretold in the Old Testament, and as completing the earlier Scriptures. When Christianity encountered Greek thought the situation was wholly differ¬ ent, and the apologists formulated the con¬ tents of the gospel in a manner which appealed to the common sense of all the serious

thinkers and intelligent men of the age. That is, Chris-

tianity was presented as completing, or at least harmonizing with, the later Greek philos¬ ophy. In this it succeeded and then ensued a long period when apologetics was in abeyance. The intellectual life of the Church was en¬ gaged in formulating dogmas and in conflicts with heresy. Only long after the Reformation was the strife renewed with men who seriously denied the truth of Christianity.

In the end of the 1 7th century and the be¬ ginning of the 18th century the minds of Eng¬ lish Churchmen were engaged by the Deistic controversy. This had to do with the evidences of Christianity. The Copernican astronomy, changing men's conceptions of the physical uni¬ verse, the discovery of China, or better its re¬ discovery and its effect upon the imagination of thoughtful men, and the attacks of the British clergy upon the miracles of the Roman Catholic Church, brought on a crisis. The new astronomy suggested the thought that the God of so great a universe could not be identi¬ cal with Jehovah, the God of a Semitic people; nor could men conceive of the earth, no longer central but a mere planet, as the scene of the drama of the incarnation and the redemption ; the consideration of China with the thought of its relatively high civilization suggested that if China had got on so well without the special teaching of the gospel with the light of reason only, the special revelation must also be value¬ less to Englishmen ; and the attacks of the clergy upon the Roman Catholic miracles as the frauds of priests led to the position that all miracles, including those of the Bible, may be put into the same category. It was further urged that the description of Jehovah in the Bible and in the doctrines of the Church does not accord with the righteousness and wisdom and power of the God disclosed by nature. The conception of nature as a vast machine was taking possession of men's minds, and God was thought to be the maker and starter of the machine, and as having no further occasion to interfere with its running. He was not denied, therefore, but He was made infinitely remote, and there seemed no opportunity for miracle, redemption or prayer. The attack called forth a multitude of replies, the (Analogy > of Bishop Butler .being the most effective and distin¬ guished. He argued that revealed and natural religion are not opposed, but that the second supplements the first, and that its peculiarities are what we should expect from a study of nature itself ; and that further, the difficulties urged by the Deists against the God of the Bible lie with equal force against their

own teaching of the God of nature. It was further argued in particular, that the account of the gospel miracles is to be accepted, because the witnesses were competent, and moreover had everything to lose and nothing to gain by their invention, proving their sincerity by dying as martyrs. The Wesleyan revivals were perhaps more influential than the arguments of the apologists by supplying the powerful evidence of the effectual working of Christianity in the hearts and lives of men. From England the controversy was carried to France, and to Ger¬ many, with phases too varied for even the briefest review^ here.

In the 19th century, from the middle dec¬ ades on, the apologetic warfare was renewed, with issues far more fundamental. Already

Hume had stated positions which threatened the beliefs of Churchmen and of Deists alike, and under the influence of - an extreme empiri¬ cism, reinforced by influences from German philosophy, men denied that God could be known at all. Hence apologetics again busied itself with the first division of topics, and dis¬ cussed man's capacity for knowdng the Infinite, and reviewed all the evidences for God's ex¬ istence in the light of the modern _ science of knowledge. The progressive establishment of the scientific conception of the universe also revived the discussion as to miracles and forced a renewed examination of the whole subject. In addition the historic credibility of the gospel narrative and the authenticity of the Biblical waitings have been re-examined from many points of view, while the discovery of the an¬ cient religions of the past and of the living re¬ ligions of Asia have caused prolonged debate as to the uniqueness and the absoluteness of the Christian teachings. Hence, the apologist is engaged in a discussion which involves phi¬ losophy, science, history, comparative theology and criticism.

In general, wre may put apologists at present into three classes : those who hold substantially the old positions and seek in part by compro¬ mise and in part by adaptation to show that their essential truth may be maintained not¬ withstanding the progress in philosophy and science ; those who abandon the old arguments, and overcome the conflict between science and philosophy on the one hand and theology on the other, by adopting wholly the modern views and reconstructing theology by their aid ; and those who attempt to discriminate between religion and science and philosophy, and by penetrating more completely into its essence to find an independent basis for the religious life which shall abide however men's views may change in these other departments. Particular arguments in reply to special attacks are of less moment than a discussion of the meaning and essence of Christianity itself, and of the prin¬ ciples which

underlie all defenses of its truth. That is, this age needs not so much an apology or defense of Christian truths as a thorough¬ going study of the science of apologetics itself.

Bibliography. — Butler, (Analogy of Re¬ ligion ; Paley, Evidences of Christianity) (1848) ; Stephens, (History of English Thought in the 18th Century *; Ebrard, (Christian Apolo¬ getics 5 ; Fisher, 'Supernatural Origin of Chris- tianitv) (1875), and (The Grounds of Theistic and Christian Belief) ; Harnack, A., 'What is Christianity?* (1901); Hettinger, 'Apology of Christianitv) ; Smythe, 'Through Science to Faith) (1902); Kaftan, The Truth of the Christian Religion (1894); Knox, The Direct and Fundamental Proof of the Christian Re¬ ligion } (1903).

George Wm. Knox,

Late Professor of Philosophy and History of Religion, Union Theological Seminary.

APOLOGIA PRO VITA SUA (first published in parts, April to June 1864; re¬ vised and republished as a whole, 1865), by Cardinal Newman, is the autobiography of a great soul. In 1845 Newman left the English for the Roman Church. Almost 20 years later Charles Kingsley included him in an incidental aspersion (Macmillan's Magazine , January

1864) of the Roman clergy's attitude toward "truth for its own sake.® The following in¬ terchange of letters, pamphlets and articles convinced Newman of the necessity of review¬ ing, for an end larger than the defense of his own integrity, the whole course of his spiritual progress. This larger aim, suggested in a title that Newman can hardly have chosen without thinking of the great (Apologia* of Socrates, gives his work a deep general interest. The debate between the two English men of letters went so unquestionably to Newman that it could hardly arouse posterity; the actual im¬ mediate issues between the two churches were too clouded by prejudice and politics to hold attention long in that form ; but beneath the controversy lay an issue that remains vital ; and beneath the history set forth in the book moves an eternal human quest.

The issue was the catholicity of the Church of England. To restore to the Church in which they were priests a general conscious¬ ness of Catholic heritage, a wider view of Catholic doctrine and history, and a

wider use of the sacraments was the mission of the young Newman and his friends, Keble, Pusey, and others less well known, in what came to be known as the Oxford Movement (q.v.). Working as scholars and as preachers toward this common end in various ways, they made their most direct and effective appeal in a se¬ ries of (Tracts for the Times) ; and their ulti¬ mate success amounted to a reformation. That the Church of England rose from insular prej¬ udices and political bondage to become a great national Church was due largely and directly to the Oxford Movement. The Catholic heri¬ tage had, indeed, been cherished and followed even in the 18th century in spite of the general depression of the Church by rationalism and politics. It had animated, for instance, those missions to the New England colonies which moved and brought about the Episcopal Church of the United States. The consecration of the first bishop of that Church was attested in a proclamation “Omnibus ubique Catholicism But that consecration was by (and in other ecclesiastical pronouncements and measures of British bishops anything short of a repudiation of catholicity. Becoming convinced that the Church of England was not in fact Catholic, he changed his allegiance.

This is the issue underlying (Apologia pro Vita Sua) ; but vital as it remains, and deeply as it is explored, it has less appeal than the autobiography for itself. The lucidity, sweet¬ ness and force spring from aspiration. The steady quest of the soul, set forth with a sin¬ cerity that makes one first pity and then for¬

get Charles Kingsley, is told with that high preoccupation which gives to a few autobiog¬ raphies permanent hold. An accomplished reasoner, Newman understood better than most men the limitations of reasoning in effect¬ iveness on conduct. «It has not pleased God to save His people through logic,® he quotes from Saint Ambrose on the title page of the most philosophical of his longer works, (A Grammar of Assent. * This book inculcates systematically the right ways of the mind seek¬ ing truth; but the <Apologia) by narrating the stages of his own_ search brings it home. We need not be convinced by his arguments nor subscribe to his conclusions to be uplifted by a noble and single mind following the <(kindly light® which he invokes in his famous hymn.

Charles Sears Baldwin, Professor of Rhetoric and English Compo¬ sition , Columbia University.

APOLOGUE, a story or relation of ficti¬ tious events intended to convey some useful truth. It differs from a parable in that the latter is drawn from events that pass among mankind whereas the apologue

may be founded on supposed actions of brutes or inanimate things. AEsop's fables furnish excellent ex¬ amples of apologues.

APOLOGY, a term at one time applied to a defense of one who is accused, or of certain doctrines called in question, but at present commonly applied to an acknowledgment of error. The apologies of Socrates attributed to Plato and Xenophon are works of the first-named character. Later rhetoricians wrote upon the use of apologies and caused them to be composed by their scholars. Of this sort are the Apologies of Libanius. Thus the name passed over to Christian authors, who gave the name of apologies to the writings which were designed to defend Christianity against the at¬ tacks and accusations of its enemies, particu¬ larly the pagan philosophers, and to justify its professors before the emperors. Of this sort were those by Justin Martyr, Athenagoras, Tertullian, Tatian and others. There are also apologies for the doctrines of particular sects; for example, Robert Barclay's (Apology for the People in Scorn called Quakers.)

APOLOGY FOR THE LIFE OF COL¬ LEY CIBBER, An, an autobiography pub¬ lished in 1740, when the author, poet-laureate, actor and man-about-town was in his 70th 3ˆear. In the annals of the stage this curious volume holds an important place as throwing light upon dramatic conditions in London after the Restoration, when the theatre began to as¬ sume its modern aspect.

APOMECOMETER. An instrument used for measuring heights, constructed in accord¬ ance with the principles which govern the sex¬ tant, viz. : As the angles of incidence and re¬ flection are always equal, the rays of an ob¬ ject being thrown on the plane of one mirror are from that reflected to the plane of another mirror, thereby making both extremes of the vertical height coincide exactly at the same point on the horizon-glass, so that by measur¬ ing the base-line we obtain a result equal to the altitude. The eye of the observer when in position will be at the lower end of the hv- pothenuse, and the summit of the object at the other. Keeping the line of vision, which

forms the base, exactly horizontal, the observer approaches the object till the images coincide, when the base will agree in length with the perpendicular and the measured length of the former will give the height of the latter.

APOMORPHINE. See Morphine. AP'ONEURO'SIS. See Tendon.

APOPHYLLITE, a-pof'i-lit (from the Greek words apo, <(off,® and phyllon, <(leaf,® in allusion to the tendency of the mineral to sepa¬ rate into thin leaves before the blowpipe), a native hydrated silicate of calcium and potas¬ sium, having the general formula K20.8Ca0. 16Si02.16H20, but with some portion of the oxygen replaced by fluorine. It crystallizes in the tetragonal system, and also occurs massive. Its crystals are usually white or gray, with a pronounced pearly lustre on the basal plane, and a vitreous lustre elsewhere. Apophyllite cleaves easily into thin folia parallel to the basal plane. Its hardness is from 4.5 to 5, and its specific gravity about 2.3. It occurs in many parts of the world. Beautiful crystals, three or four inches across, are found in India, and others nearly as large have been found at Ber¬ gen Hill and Paterson, N. J.

APOPLEXY. See Brain, Diseases of._

APOSIOPESIS, ap'o-si-6-pe'sis, a rhetor¬ ical term denoting a sudden break or stop in speaking or writing, usually for mere effect or a pretense of unwillingness to say anything on

a subject; as, <(his character is such - but it

is better I should not speak of that.®

APOSPORY. Apospory is the natural complement of apogamy (q.v.). It may be de¬ fined as the production of a gametophyte from a sporohyte (see Alternation of Genera¬ tions) without the intervention of a spore. The word means that the spore has been left out. Apospory was first discovered in the com¬ mon bracken fern (Ptcris aquilina), where it occasionally appears as an interesting freak. Tissue near the border of the leaflet, which normally develops sporangia containing spores, grows out into thin ribbon-like structures bear¬ ing some resemblance to ordinary gameto- phytes (prothallia). These structures bear the antheridia or archegonia or both, which give rise to the sperms and eggs, and, therefore, con¬ stitute a sexual generation. A transverse sec¬ tion of a normal leaflet of the bracken fern bearing normal sporangia (i-) is shown in Fig. 1 ; while Fig. 2 shows a leaflet in which pro¬ thallia (/>) with antheridia (a) have developed instead of sporangia. A comparison of the two figures shows that apospory is a <(short cut® in the life history, since, normally, a spore in the sporangium would have given rise to the prothallium. In some ferns, under moist con¬ ditions, the tips of the leaflets may develop into prothallia bearing archegonia and antheridia. In a few ferns, the first

leaf of the young sporeling, if bent over and brought into con¬ tact with moist soil, may produce prothallia along its border. Other instances of apospory in ferns might be cited, but no case has yet been reported for lycopods or equisetums. Apospory occurs in liverworts and mosses, but is not common, and no -case has been proved in Gymnosperms. In Angiosperms there are several cases, including the common dandelion, in which the egg-bearing generation (embryo

sac) does not develop from a normal spore and we must admit that apospory is present. . All these plants, however, develop their embryos from eggs without fertilization and, conse-

Fig. i

This type is so closely associated with Parthen¬ ogenesis (q.v.) that it well may be considered under that heading.

Bibliography. — Bower, F. O., (The Origin of a Land Flora *(London) ; Lang, W. H., (On Apogamy and the Development of Spor¬ angia upon Fern Prothallia) (Philosophical Transactions, Royal Society of London, Vol. CXC, 1898, p. 189) ; Yamanouchi, S., (Apog¬ amy in Nephrodium* {Botanical Gazette, Vol. XLV, 1908, p. 289).

Charles J. Chamberlain.

APOSTASY (Greek, apostasis, a standing away from), a term signifying a renunciation of opinions or practices and the adoption of contrary ones, and usually applied to renuncia¬ tion of religious opinions. It is always an ex¬ pression of reproach. What one party calls apostasy is termed by the other conversion. History mentions three eminent apostates - — Julian the Apostate, wrho had never been a Christian except nominally and by compulsion ; Henry IV, King of France, who thought that ((Paris vaut bien une messe,® and that of course all France was worth the whole Catholic faith; and William of Nassau, the stadtholder, who separated himself from the Roman Catholic Church and became a Protestant. The stat¬ ute 9 and 10 of William III, cap. xxxii, pro¬ vides that if any person educated in or having made profession of the Christian religion shall deny it to be true, he shall be rendered inca¬ pable of holding any office for the first offense, and for the second shall be made incapable of bringing any action, of being guardian, executor, legatee or purchaser of lands, and

shall suffer three years' imprisonment without bail. This act is commonly called the <(blas- phemy act.®

A POSTERIORI. See A Priori.

APOSTLE (literally one sent out, from the Greek aposiellein, to send out) and in the Christian Church the title given to the 12 men whom Jesus selected to attend Him during His ministry, witness His miracles, learn His doc¬ trines and thus be able to promulgate His re¬ ligion. Their names were Simon Peter and Andrew his brother; James the greater, and John his brother, who were sons of Zebedee ; Philip of Bethsaida; Bartholomew; Thomas; Matthew; James, the son of Alpheus, com¬ monly called James the less; Lebbeus, his brother, who was surnamed Thaddeus, and was called Judas or Jude; Simon the Canaanite ; and Judas Iscariot. Of this number Simon Peter, John, James the greater and Andrew were fishermen ; and Matthew a publican or tax-gatherer. When the apostles were reduced to 11 by the suicide of Judas, who had betrayed Christ, Matthias was chosen by lot on the propo¬ sition of Saint Peter. Soon after, their number became 13 by the miraculous vocation of Saul, who, under the name of Paul, became one of the most zealous propagators of the Christian faith. The Bible gives the name of apostle to Barnabas also, who accompanied Paul on his missions (Acts xiv, 14), and Paul seems to give it to Andronicus and Junia, his relations and companions in prison. Generally, however, the name is used in the narrower sense to desig¬ nate those whom Christ selected himself while on earth, and Paul, whom he afterward called. In a wider sense those preachers who first taught Christianity in heathen countries are frequently termed Apostles; for example, Saint Denis, the apostle of the Gauls; Saint Boniface, the apostle of Germany; Saint Augustine, the apostle of England; the Jesuit Francis Xavier, the apostle of the Indies; Adalbert of Prague, apostle of Prussia proper. Tradition reports that several of the early apostles were married. The wife of Saint Peter is said to have accom¬ panied him on his journeys, and died a martyr. The tradition further states that Saint Peter had a daughter Petronilla, who was also a martyr ; this at least say Saint Augustine, Saint Epiphanius and Saint Clement of Alexandria. Saint Philip also is said to have been married and to have had several daughters, among whom was Saint Hermione. Hegesippus speaks of two martyrs, grandsons of Saint Jude. His wife was called Mary. Saint Bartholomew is also said to have been married. Their history is largely a matter of tradition, save as it is recorded in the Acts of the Apostles.

APOSTLE OF THE ARDENNES, title bestowed on Saint Hubert, son of the Duke of Aquitaine. He was made bishop of Liege in 708 and died

in 728 a.d. About 800 his body was transferred to the Benedictine monastery of Andoin, in the Ardennes, which soon came to be called Saint Hubert. See Hubert, Saint.

APOSTLE OF THE ENGLISH, title be¬ stowed on Saint Augustine, who, with several companions, was sent as missionary to Eng¬ land by Pope Gregory I, whose interest in that people had been aroused by seeing some cap¬ tives of that race exposed for sale in the pub¬ lic mart at Rome. Saint Augustine is rather

the Apostle of Kent than of all England, since his labors were confined entirely to the south¬ eastern part of the country. See Augustine, Saint.

APOSTLE OF FREE TRADE, title be: stowed on Richard Cobden (q.v.), because of his constant advocacy of the repeal of the high-tariff schedules prevalent in England in 1830-46. He foresaw the rise of American competition with England's manufactured prod¬ ucts, and pointed out the disadvantages which would arise from a policy of high protective duties and showed that the best policy was that of free trade.

APOSTLE OF THE FRENCH, title of Saint Denis, patron of France, who suffered martyrdom at Paris in 272 a.d.

APOSTLE OF THE GENTILES, appel¬ lation of Saint Paul, who undertook ((to preach the Gospel to all mankind.®

APOSTLE OF GERMANY, title be¬ stowed on the English missionary, Saint Boni¬ face, d. 755, for his untiring labors in Christian¬ izing the German tribes. See Boniface, Saint.

APOSTLE OF THE HIGHLANDERS.

Saint Columba, founder of the monastery of Iona in the 6th century and missionary to the Scots of Alba, is known by this title. See Columba, Saint.

APOSTLE TO THE INDIANS, title given to John Eliot (q.v.) for his efforts in Christianizing the Indian tribes of New Eng¬ land in the 17th century.

APOSTLE OF THE INDIES. Name given to Bartholomew de Las Casas (q.v.), a Dominican monk, whose untiring efforts for the spiritual and temporal betterment of the American aborigines show him to have been far in advance of his time.

APOSTLE OF INFIDELITY, term ap¬ plied to Voltaire (q.v.), for his persistent at¬ tacks on organized Christianity, and for the protection afforded by him to those whom he believed persecuted or hounded by the clerics of his day.

APOSTLE OF IRELAND, title applied to Saint Patrick, who, about 432 a.d., began his mission of converting Ireland to the Christian faith, a work which he brought to a successful conclusion before his death in 493 a.d. See Patrick, Saint.

APOSTLE TO THE SCOTS, appellation given the Scottish reformer John Knox for his efforts in spreading the doctrines of Cal¬ vin in Scotland. He is also styled the Apostle of the Scottish Reformation. See Knox, John.

APOSTLE SPOONS, a name applied to sets of spoons with handles formed of images of the Twelve Apostles and the Virgin. Such sets were common as christening gifts as late as the 1 7th century. Sets of this kind are now rare and when complete fetch fancy prices, a set being sold some years ago in London for

$24,000.

APOSTLE OF TEMPERANCE, title

given to the Rev. Theobald Mathew, a native of Cork, Ireland, who performed heroic work in the cause of temperance in the first half of the 19th century. He brought hundreds of thousands under the banner of temperance in

Ireland, Scotland and the United States. See Mathew, Theobald.

APOSTLES' CREED. See Creeds and Confessions.

APOSTLES' ISLANDS, or THE TWELVE APOSTLES, the name given to a group of 27 islands in Lake Superior, be¬ longing to Wisconsin. The principal islands of the group are lie au Chene, Stockton, Bear, Madeline, and Outer. They have an area of 200 square miles. Brown sandstone is exported and the islands are covered with a rich growth of timber. The cliffs have been worn into strange forms by the action of the waves. La Pointe, on Madeline Island, "formerly the county-seat of Ashland County, Wis., was settled by the French, who established

Jesuit missions on the islands as early as 1680.

APOSTLESHIP OF PRAYER, a pious association founded in France in 1844 by Rev. Francis Gautrelet for the purpose of advanc¬ ing its members in the spiritual life and par¬ ticularly of honoring the Sacred Heart of Jesus. There are three degrees of membership, composed of those who promise to make the morning offering of their thoughts, words, ac¬ tions and sufferings to God in union with the intention of Christ; those who recite once each day the Lord's Prayer and the Hail Mary 10 times ; and those who receive Holy Communion monthly as an act of reparation to the Sacred Heart of Jesus. The membership throughout the world is supposed to be about 30,000,000, and there are about 5,000,000 in the United States. The central office is at Saint Francis Xavier Church, New York.

APOSTOLIC BRETHREN, APOSTO- LICI , or APOSTOLICS, the name given to certain sects who professed to imitate the man¬ ners and practice of the apostles. The last and most important of these was founded about 1260 by Gerhard Segarelli of Parma. They went barefooted, clothed in white, with long beard, disheveled hair and bare heads, accom¬ panied by women called spiritual sisters, beg¬ ging, preaching and singing, throughout Italy, Switzerland and France; announced the com¬ ing of the kingdom of heaven and of purer times ; denounced the papacy and its corrupt and worldly Church ; and inculcated the com¬ plete renunciation of all worldly ties, of prop¬ erty, settled abode, marriage, etc. This society was formally abolished (1286) by Honorius IV. Segarelli was burned as a heretic in 1300. Another leader now appeared, Dolcino, a learned man of Milan. In self-defense they stationed themselves in fortified places whence they might resist attacks. After having dev¬ astated a large tract of country belonging to Milan they were subdued (1307) by the troops of Bishop Raynerius in their fortress Zebello, in Vercelli, and almost all destroyed. Dolcino was burned at Vercelli, 1 June 1307. The sur¬ vivors afterward appeared in Lombardy and in the south of France as late as 1368.

APOSTOLIC CHURCH, the Church in

the time of the apostles, constituted according to their design. The name is also given to the four churches of Rome, Alexandria, Antioch and Jerusalem, and is claimed by the Roman Catholic Church and occasionally by the Epis¬ copalians.

APOSTOLIC CONSTITUTIONS AND CANONS, a collection of regulations attrib¬ uted to the apostles, but generally supposed to be

spurious. They appeared in the 4th century, are divided into eight books and consist of rules and precepts relating to the duty of Chris¬ tians, and particularly to the ceremonies and discipline of the Church.

APOSTOLIC DELEGATE, a permanent representative of the Pope in a foreign coun¬ try. The term is sometimes confounded with the word ablegate, the latter meaning a tem¬ porary representative of the Pope for some special function.

APOSTOLIC FATHERS, the disciples

and followers of the apostles, more especially those that have left written records behind. Many of these writings are in the nature of continuations of the apostolic epistles and throw much light on the early history of the Church. These writings comprise the Epistle of Clement of Rome and the so-called Second Epistle (which is not his) ; the seven Epistles of Ignatius of Antioch ; the Epistle of Poly¬ carp of Smyrna ; the Martyrdom of Polycarp ; the Teachings of the Apostles; the Epistle of Barnabas; the Shepherd of Hcrmas ; the Epistle of Diognetus ; the fragments of Papias and the Reliques of the Elders. Editions of these writings have been published by J. B. Cotelerius (Paris 1672) ; W. Jacobson (Oxford 1838) ; C. J. Hefele (Tubingen 1839) ; A. R. M. Dressel (Leipzig 1857) ; Gebhardt, Zahn and Harnack (Leipzig 1876-78; text ed. 1877 ; 3d ed. 1900) ; J. B. Lightfoot (texts and English trans. London 1891, 2d ed. 1893).

APOSTOLIC MAJESTY, a title granted by the Pope to the kings of Hungary, first conferred on Saint Stephen, the founder of the royal line of Hungary, on account of what he accomplished in the spread of Christianity.

APOSTOLIC PARTY, a name given to a body of Spanish fanatics who early in the 19th century clamored for the restoration of the Inquisition. About 1830 they became merged in the Carlist party.

APOSTOLIC SEE, official title of the

seat of the Pope of Rome, who, according to the doctrine of the Catholic Church, is the apostolic successor of Saint Peter.

APOSTOLIC SUCCESSION. The doc¬ trine of the direct and hierarchical succession from Christ's apostles. Its defenders maintain that the Christian ministry is a succession, that valid ordination is transmitted to the clergy only by accredited bishops who have received the power of ordination in direct line of suc¬ cession from the apostles. The points of con¬ troversy are (1) as to when and how

the ex¬ clusive authority of ordination was given by Christ and the apostles; (2) by what act, if any, the transmission of this authority is to be made valid; (3) along what lines has this su¬ pernatural commission come ; and (4) whether or not this supernatural grace and spiritual au¬ thority are restricted to definite official lines of transmission. In later years differences have arisen among the Anglican scholars regarding these various points. Independents and Dis¬ senters in England, of course, argue in favor of the theory that the Church itself as a body may constitute a legitimate ministry, with full

powers of ordination, etc. This in general is the attitude of non-prelatical bodies. In de¬ fense of the doctrine consult Gore, (The Church and the Ministry0 (1892); in opposi¬ tion consult Brown, John, (Apostolic Succes¬ sion) (1898). Consult also Brightman, (What Objections have been made to English Orders) (1896); Denny, (Anglican Orders and Juris¬ diction (1893) ; Haddan, (Apostolic Succes¬ sion in the Church of England } (London 1869) ; Moberly, Ministerial Priesthood)

(1898).

APOSTROPHE, a term in rhetoric indi¬ cating a figure of speech by which, according to Quintilian, a speaker turns from the rest of his audience to one person, and addresses him singly. Now, however, the signification is wider, including cases in which an impassioned orator addresses the absent, the dead, or even things inanimate.

The name is also employed in grammar to denote the substitution of a mark like this (’) for one or more letters omitted from a word, as tho’ for though, 'twas for it was, king's for kinges. It is also applied to the mark indicat¬ ing such substitution, especially in the case of the possessive. The old possessive singular was es, and the apostrophe stands for the omitted e.

APOTHEOSIS, a Greek term indicating the ceremony by which a man was raised to the rank of the gods. The custom of placing mor¬ tals who had rendered their countrymen im¬ portant services among the gods was very an¬ cient among the Greeks, who generally fol¬ lowed in so doing the advice of an oracle. On their coins most of the founders of cities and colonies are immortalized as gods ; and in sub¬

sequent times living princes assumed this title. The Romans for several centuries deified none but Romulus, and first initiated the Greeks in the fashion of frequent apotheosis after the time of Caesar.

APPALACHIAN AMERICA, a term used to designate the southeastern mountain region of the United States. This territory has a certain sociological unity, based on phys¬ ical conditions, which was long obscured by the fact that it was parceled out among several different States.

Physio graphically it is a mountainous terri¬ tory without arms of the sea, inland lakes or other national waterways ; and furthermore it is a territory which forbids canals. Its uni¬ versal characteristics are difficulty of com¬ munication, isolation and remoteness. These conditions were less severe, and were largely overcome by greater commercial and intel¬ lectual activity in the portions of the Appa¬ lachian system which lay in the northern free States. Accordingly, as a sociological grand division, Appalachian America begins with the southern boundary of Pennsylvania and the Ohio River, and embraces the mountainous por¬ tions of the Virginias and Carolinas, Kentucky and Tennessee, Georgia and Alabama. In this vast area, which is all a land of saddles and bad roads, there are, of course, great varieties of elevation and climate from the <(dissected plateaus® of Kentucky to (<the land of the sky® in North Carolina. Descriptions of the geo¬ logical formations, minerals, forests and other resources, and physiographic conditions appear

under the several States. But the one great fact about the whole territory is that it con¬ demns its inhabitants to the ills of isolation.

Historically Appalachian America received its first sparse settlements about the time of the Revolutionary War. A great tide of migra¬ tion passed through it and around it to the west, and the valley land was occupied by hardy settlers. It was these who fought the battle of King's Mountain, and in the War of 1812 riflemen from the mountains gave material assistance in defeating the British at New Orleans. When the slave power developed in the South subsequent to the Revolution, Ap¬ palachian America, retaining its revolutionary spirit of liberty, came to be looked upon with hostility by its Southern neighbors. Slavery was never common in the mountains, and the scorn of the slaveholders for those who did not hold slaves was heartily returned by the moun¬ taineers. Thus, social barriers were added to the barriers of nature and the mountain people still further isolated from the world. In the Civil War, however, they emerged from their obscurity and surprised both the North and the South by their

vigorous and effective stand for ((union and liberty.® They held Kentucky in the Union, made West Virginia ((secede from secession,® well-nigh divided Tennessee, and furnished recruits to the loyal armies even from Alabama and South Carolina. Many of these recruits were not enrolled as coming from these States, but the regular regiments enlisted from slave States, nearly all from the mountains, aggregated about 200,000 men. The sufferings of the loyal people throughout the mountains, and especially in East Tennessee, and the eloquence of ((Parson Brownlow,® for the time fixed the attention of the nation. Naturally the mountaineers have since the war followed the fortunes of the Republican party.

Sociologically Appalachian America reveals most interesting survivals of the spirit, arts and conditions of colonial times. Within its area are many valleys and villages which differ from other parts of the United States only in superficial matters like the greater number of saddle horses and the more free hospitality. But there is an immense population (com¬ monly estimated at 2,000,000) which has been little affected by modern ideas. The stock is mainly British, representing rural England and the Scotch-Irish, though with traces of the Huguenot and the German. A large number of Washington's soldiers settled in the valley land of Appalachian America, and there is no evidence that the pioneers of the mountain region were in any way inferior to the first settlers in the more favored <(bluc grass sec¬ tions.® The early settlers had the education of their time, which lessened in succeeding gen¬ erations. The conditions of life grew hard r when the valley land and game were exhausted, and the public school did not come in until the "reconstruction period.® As a result, a great part of all the native-born illiterates in the United States — many of them people of good character and good abilities — are in this region. In some counties the illiterate white voters exceed a third of the whole number. It is among these people that we find a survival of pioneer conditions' — the woodcraft, the log cabin, the open fireplace — with a noble stone chimney in Kentucky, degenerating into a stick

and mud chimney farther south. The arts of spinning, dyeing and weaving are still found, together with a wealth of Saxon speech, and even old British ballads which have come down by oral tradition. Survivals in language con¬ sist of ancient pronunciations and construc¬ tions, and the persistence of words and mean¬ ings

elsewhere obsolete ; as (<pack® for carry, «gorm® meaning to muss, etc. A kind of min¬ strelsy still exists among the ruder classes, so that we may find drinking songs and folk-lore still in the making. Preachers are few and poorly paid, and religion is of a mediaeval and fatalistic type. The feuds and homicides which attract so much at¬ tention belong with these other survivals. Weapons are carried to some extent in all parts of the South, because men retain the Elizabethan idea that while the government protects the land from foreign foes, each man is to protect his private honQr and interests with his own right arm. In the mountains this view is more plausible because the law is not always carried out with the certainty and maj¬ esty which could inspire either confidence or dread. Considering these adverse conditions of life, the general good order and morality of the mountains is very creditable. A woman or a stranger who behaves properly is always safe. The chief disorders arise from corrupt political leaders and the whisky bottle, and the mountain people have taken the first great step of progress in very generally enacting local option laws which prohibit the sale of intoxi¬ cants. Yet the <(moonshine still® — the secret manufacture of spirits on which no tax is paid — survives in many places, and makes Christ¬ mas or election time a terror to the mothers of mountain boys.

A most striking characteristic is the absence of any foreign element in the population. The 35 mountain counties of Kentucky, for example, contain about 480,000 people, with only 2,000 or 3,000 who are of foreign birth, and these massed in a few counties where mines or lumber in¬ terests have been recently established. There are 15 counties each containing less than 10 persons of foreign birth. The massing of so great a population of purely American birth and breeding is very significant. And these people who owned land but did not own slaves (never to be confused with the ((poor whites®) constitute the true yeomanry of the South, its best nucleus for a true middle class. Large families are the rule, and the standard of phys¬ ical development is high. With this large birth-rate the mountain region is approaching the limit of population and must either improve the means of subsistence or emigrate. Both movements have begun. In time the mineral wealth will bring railroads to a larger extent, and if proper educational guidance is furnished Appalachian America will become what Scot¬ land is in Great Britain, a storehouse of na¬ tional vigor and patriotism.

Printed information regarding Appalachian America is fragmentary and partial. Chas. Dudley Warner reported a charming tour (On Horseback Through Virginia) and important notices occur in Fisk's (01d Virginia and Her Neighbors, *Roosevelt's (Winning of the West,* and

Draper's (King's Mountain and Its Heroes. *The spirit of war times is reproduced in Bar¬ ton's (Hero in Homespun,* and the general

characteristics of mountain life appear in the tales of John Fox, Jr., and Mary N. Murfree ((<Charles Egbert Craddock®).

APPALACHIAN MOUNTAIN CLUB,

the name of an organization interested in the exploration and study of the mountain ranges of eastern North America and the preserva¬ tion of their woodlands, waters and historic sites for the use of the public. The club has published a journal, called Appalachia, de¬ voted to the objects of the organization, since 1894. Headquarters, Boston.

APPALACHIAN MOUNTAINS, the

great mountain system of the eastern United States extending from northern Alabama into the State of New York and according to the best recent opinion embracing also the New' England system. Thus defined it includes a number of ranges and mountain groups of which the most important are the Alleghanies, the Blue Ridge, the Cumberland, the Black Mountains, the Catskills (formerly regarded as the northern termination), the White Moun¬ tains and the Green Mountain range extend¬ ing nortlrward to the Laurentian formations. But in comparison with this great length north and south, its measurements east and west are very moderate, the w idth at no point much ex¬ ceeding 100 miles. The most remarkable feat¬ ure of the general formation of the Appala¬ chians is the regular arrangement of its ridges and valleys, these being, in general, parallel to the Atlantic coast line. This arrangement is particularly noticeable in the central part of the system, through Pennsylvania and Virginia. In general the ridges lie along two parallel lines from 50 to 100 miles apart, thus enclosing a longitudinal valley whose sides rise rather abruptly to culminating points of the moun¬ tains. This great central valley extends from New York to the southern end of the system, including the Cumberland Valley in Pennsylva¬ nia and the great valley of Virginia and of Tennessee. This region is very fertile through¬ out its whole length, and is especially well cultivated in Lancaster, Berks and Lehigh counties, Pa. The Appalachians show no remarkable elevations and the height of the summits appears less than it really is, because the mountains rise from a plateau varying from 500 feet in Pennsylvania to 1,500 and 2,000 feet in Virginia and Tennessee. The lowest peaks are found in Pennsylvania, none rising much above 2,000 feet. The culminating point of the wEole system is Mount Mitchell, in the Black Mountains (6,711 feet) ; others of the high

peaks, also found in the Black Mountain range, are Balsam Cone 6,671 feet, Black Brother 6,619 and Mount Hallback ; the Smoky Mountains, too, include some high peaks, for example, Clingmann Dome 6,619, Guyot 6,636, Mount Alexander 6,447, Mount Seconto 6,612 and Mount Curtis 6,568. The culminating point of the northern part of the system is Mount Washington, New Hampshire (6,233 feet). The peaks are generally of rounded outline and lack the bold picturesqueness that characterizes the Rocky Mountains and other geologically <(young® ranges in the western United States. Their low' altitude and smooth contour are the result of the long-continued erosion which has removed great thicknesses of strata since the first uplift.

Geology. — The Appalachians show all geo¬ logical formations from the metamorphic group of the Pre-Cambrian to the so-called coal-measures of the Carboniferous, the latter in¬ cluding sandstones, shales, limestones and coal. The strata of the western slope with their regu¬ lar horizontal arrangement show a great con¬ trast to the disturbed stratification of the east¬ ern slope. There the rock formations are con¬ fused and pressed into folds and wrinkles with an inclination generally southeast. The strata of the system are all of marine or terrestrial origin, the latest being those of the coal forma¬ tion. After the formation of these strata, prob¬ ably during Permian time, the mountains were elevated to their present position by a force that proceeded from the southeast, working probably by many successive impulses. Subse¬ quent erosion by rivers carved the gaps through the ridges so characteristic of the Appalachian topography and gave the mountains their pres¬ ent conformation. The chief minerals of the Appalachians are iron and coal. Iron ores, magnetite, hematite, and limonite, are very abundant ; the magnetic iron is found especially in what is called the Champlain Iron District. The hematite and limonite ores are found all along the great Appalachian Valley and are of great commercial importance ; while the earthy carbonite of iron found in many parts has been largely manufactured. Coal is perhaps the most important product ; the coal deposits of the Ap¬ palachians include the whole anthracite field of Pennsylvania and New York with an area of 400 to 500 square miles, and the bituminous fields of Pennsylvania and other States, with an area of 56,000 square miles. Gold, silver, cop¬ per and lead are found in comparatively small quantities and are of little importance com¬ mercially, but the deposits of marble, limestone, fire-clay, gypsum and salt are abundant and valuable.

Drainage. — The Appalachians form the watershed between the Atlantic Ocean and the Mississippi River systems; this does not lie in one continuous line, but shifts its position from one line of ridges to another, so that many of the rivers cut their way through the moun¬ tains from west to east, or east to west; the Delaware and Susquehanna, for example, with their branches. These two rivers, with the Po¬ tomac and James, drain much of the eastern slope ; the Ohio, with its tributaries, is the chief means of drainage on the western slope.

Flora and Fauna. — The mountain slopes are heavily wooded throughout the whole, sys¬ tem. The white pine is found in all portions ; the sugar maple, the white birch, ash and beech grow on the northern mountains ; the oak, cherry, white poplar, white and yellow pine farther south. On the poorer lands the ever¬ greens flourish, such as spruce, hemlock and balsam-fir, which, on account of their dark foliage covering the summits of the Black Mountains, have given this range its name. There are large quantities of flowering shrubs, particularly the rhododendrons, azaleas and laurel often growing in almost impenetrable thickets, and many varieties of smaller plants and flowers. Panthers and wolves have prac¬ tically disappeared from the mountains, but bears, deer and wild-cats are quite common. Small game birds are plentiful and wild tur¬ keys also on the southern ranges. Rattlesnakes

and copperheads are found in all parts of the Appalachians, but not in great numbers.

Bibliography. — Barrell, T., (The Upper Devonian Delta of the Appalachian Geosyn- cline) (In American Journal of Science, series 4, Vols. XXXVI and XXXVII, New Haven 1913-14) ; Guyot, (The Appalachian Moun¬ tain System5 (American Journal of Science. series 2, Vol. .XXXI) ; Hayes, ‘The Mechanics of Appalachian Mountain Structure) and (Physiography of the Chattanooga District5 (Annual Report of United States Geological Survey, XIII and XIX) ; Kephart, H., ‘Our Southern Neighbors) (New York 1913) ; Mor- lev, M. W., ‘The Carolina Mountains) (Boston 1913); Rogers, H. D. and W. B, ‘Physical Structure of the Appalachian Chain5 (Ameri¬ can Journal of Science, series 1, Vol. XLIV) ; Stockbridge, H. E., (A Bibliography of the Southern Appalachian and White Mountain Regions5 (Washington 1911) ; Willis, B., ‘The Northern Appalachians5 (New York 1895).

Marrion Wilcox.

APPALACHICOLA RIVER. See

Boundaries of the United States.

APPAM CASE, The. In February 1916 the British steamship Appam was captured at sea by the German raider Mocwe; a prize crew was put on board and the vessel was taken into Hampton Roads. Her British owners filed suit to recover possession of her from her captors. Federal Judge Edmund Waddill of Virginia, in a 15,000- word opinion, directed, 29 July 1916, that the vessel, with the cargo remaining aboard her and the pro¬ ceeds of the perishable cargo already sold, should be restored at once to the British owners. The German government appealed to the Supreme Court of the United States, which on 6 March 1917 handed down a decision that a belligerent nation may not bring prizes of war into a neutral port. The Supreme Court held that it would be unneutral for the United States to permit either belligerent to bring prizes into American ports, and that Germany could not claim such right under any of the existing treaties between that country and the United States. In bringing the Appam into an American port, it was held, the German officials were committing a clear breach of American neutrality. Ship and cargo, valued at between three and four million dollars, were delivered to the British owners 28 March 1917. The decision, written by Justice Day, affirmed decrees by Federal Judge Waddill, and upheld the original ruling by Secretary of State Lansing that prizes coming into American ports unaccompanied by captor warships have ■ the right to remain only long enough to make themselves seaworthy. The court stated that neither the Treaty of 1799 with Prussia, the Hague conventions nor the Declaration of London, entitled any belligerents to make American ports a place of deposit of prizes as spoils of war under such circumstances.

“The principles of international law,55 the opinion adds, “leaving the treaty aside, will not permit the ports of the United States to be thus used by the belligerents. If such use were permitted, it would constitute the ports of a neutral nation harbors of safety into which prizes might be safely brought and in¬ definitely kept.

<(From the beginning of its history this country has been careful to maintain a neutral position between warring governments, and not to allow use of its ports in violation of the obligations of neutralitv, nor to permit such use beyond the necessities arising from perils of the seas or the necessities of such vessels as to seaworthiness, provisions

and supplies.®

APPARENT, a term employed by mathe¬ maticians and astronomers to denote things as they appear to the eye in distinction from what they really are. Thus they speak of apparent motion, magnitude, distance, height, time, etc. So important is this difference between reality and appearance, particularly in regard to the heavenly bodies, that we find all early astron¬ omers, who were ignorant of this fact, run¬ ning continually into error; and a great ad¬ vancement in science was required before man¬ kind was able to establish systems opposed to appearances. Every one knows that a body may appear to move while it is, in fact, at rest, and the motion is in the spectator, or the place on which he stands, as is the case with the sun in relation to the inhabitants of this earth. The apparent altitude of a heavenly body is what appears to be its angle of elevation above a horizon which may itself be apparent — that is, the seeming junction of sea and sky; or ((sensi- ble® — that is, a plane passing through the point of observation at right angles to the plumb- line; or true — that is, a plane parallel to the ˆsensible® horizon and passing through the centre of the earth. When the altitude of a heavenly body is measured corrections are made for refraction, parallax, and, if the measurement is from a visible sea horizon, for the height of the observer above the water.

The phrase heir apparent signifies one whose right of inheritance is indefeasible pro¬ vided he survive his ancestor; as the eldest son or his issue, who must, by the course of the common law, be heirs to the father. Heirs presumptive are those who, if the ancestor should die immediately, would in the existing state of things be his heirs.

APPARITION, the name given to an il¬ lusion involuntarily generated, by means of which forms not present to the actual sense are depictured with intensity sufficient to create a temporary belief in their reality. It is now generally held to be the result of the reaction of an excited imagination, renovating past feel¬ ing or impressions, with an energy proportioned to the degree of excitement. But although the illusion thus generated is necessarily co¬ existent with the state of excitement in which it has its origin, or, in other words, ceases to be active when the phenomena vanish, it does not therefore follow that the mind, when it regains its ordinary condition, becomes imme¬ diately sensible of the hallucination under which it has for a time been laboring, or capable of distinguishing between perceptions of sense and phantasms of imagination. On the contrary, observation proves what theory equally sanc¬ tions, that the conviction of reality generally outlasts the impressions which originally produced it ; and

that, so far from any sus¬ picion of illusion being entertained, or any power of discriminating the actual from the imaginary being evinced, this conviction takes entire possession of the mind; in many instances

maintaining its hold with a firmness which all the force of argument and reason is insuffi¬ cient to overcome. Hence the tenacity, and, we may add, the universality of the belief in apparitions ; and hence also the prodigious diversity of forms under which these spectral illusions are presented in the popular legends and superstitions — a diversity, in fact, which seems commensurate with the incredible variety of influences, whether morbific or other, by which the imagination may be excited, and past feelings or impressions vividly renovated in consequence of its reaction on the organs of sense. Sir D. Brewster has remarked as a physical fact that <(when the eye is not exposed to the impressions of external objects, or when it is insensible to these objects, in consequence of being engrossed with its own operations, any object of mental contemplation, which has either been called up by the memory or created by the imagination, will be seen as distinctly as if it had been formed from the vision of a real object. In examining these mental impres¬ sions,® he adds, ((I have found that they follow the motions of the eyeball exactly like the spectral impressions of luminous objects, and that they resemble them also in their apparent immobility when the eyeball is displaced by an external force. If this result shall be found generally true by others it will follow that the objects of mental contemplation may be seen as distinctly as external objects, and will occupy the same local position in the axis of vision as if they had been formed by the agency of light.® This goes to the very root of the theory of apparitions, all the phenomena of which seem to depend upon the relative intensities of the two classes^ of impressions, and upon the manner of their accidental combination. In perfect health the mind not only possesses a control over its powers, but the impressions of external objects alone occupy its attention, and the play of imagination is consequently checked, except in sleep, when its operations are rela¬ tively more feeble. But in the unhealthy state of the mind, when its attention is partly with¬ drawn from the contemplation of external objects, the impressions of its own creation, or rather reproduction, will either overpower or combine themselves with the impressions of external objects, and thus generate illusions which in the one case appear alone, while in the other they are seen projected among those external objects to which the eyeball is directed, in the manner explained by Sir D. Brewster. It may be added that the reasoning applied to the impressions derived from the sense of sight is equally applicable to those received through the medium of any other sense, — as the ear,

for instance, an organ which ministers abun¬ dantly to the production of spectral illusions. This theory explains only those apparitions known to be subjective illusions, but it does not account for those objective apparitions, of which there are many and well-authenticated accounts. Modern science has explained some of the objective apparitions.

APPEAL, a legal term signifying the re¬ moval of a cause from an inferior tribunal to a superior, in order that the latter may revise, and, if needful, reverse or amend, the decision of the fortner.

In the United States the distinction be¬ tween an appeal, which originated in the civil

law, and a writ of error, which is of common- law origin, is that the former carries the whole case for review by the higher court, including both the facts and the law ; while the latter removes only questions of law. An act of Con¬ gress of 1875 provides that the judgments and decrees of the Circuit Courts of the United States shall not be re-examined in the Supreme Court unless the matter in dispute shall exceed the sum or value of $5,000, exclusive of costs. No judgment, decree, or order of a Circuit or District Court, in any civil action at law or in equity, shall be reviewed in the Supreme Court on writ of error or appeal unless the writ of error is brought or the appeal is taken within two years after the entry of such judgment, decree, or order; save in the case of infants, insane persons and imprisoned persons, when the period is two years exclusive of this term of disability. An appeal from a District Court to a Circuit Court of the United States must be taken within one year. An appeal from the District Court in admiralty to the Circuit Court must be made immediately after the decree, in open court, before the adjournment sine die; and should be taken to the next succeeding Circuit Court. An appeal may be taken from the State courts to the Supreme Court of the United States, in cases involving the validity of a treaty or statute of, or authorized under, the United States, on the ground of repug¬ nance to the Constitution, etc.

The effect of an appeal is generally to annul the judgment of the lower court so far that no action can be taken upon it until after the final decision of the cause. In many States, before the judgment of an inferior court will be reversed on the ground of error, the appel¬ lant,

as the party taking the appeal is called, must show to the court that substantial injustice has been done him. In other States courts have held that when an error is shown to have been committed it will be presumed to have been, prejudiced to the complaining party, and the judgment will be reversed unless the respondent shows that the error was harmless. Appellate courts, however, will not reverse the judgments of trial courts for technical or other errors where it appears from the record itself that the errors complained of were not preju¬ dicial to the appellant.

In legislation an appeal is the act by which a member of a legislative body who questions the correctness of a decision of the presiding officer, or <(chair,® procures a vote of the body upon the decision. In the House of Repre¬ sentatives of the United States the question on an appeal is put to the House in this form: ((Shall the decision of the chair stand as the judgment of the whole House ?}) If the appeal relate to an alleged breach of decorum, or viola¬ tion of the rules of order, the question is taken without debate. If it relate to the admissibility or relevancy of a proposition, debate is per¬ mitted, except when a motion for the previous question is pending. Consult <(Appeal and Error" (in (Corpus Juris, } Vol. Ill, pp. 256- 1449, New York 1914).

APPEARANCE, a legal term implying the coming into court as a party to a suit or action, whether as plaintiff or defendant. On the part of the plaintiff no formality is required. The appearance of the defendant may be effected by making certain formal entries in

the proper office of the court, expressing his appearance, or in case of arrest it is effected by giving bail, or by putting in an answer or a demurrer.

APPENDICITIS, the name applied to an infectious disease of the vermiform appendix, a small organ occupying the lower right side of the abdominal cavity. The first authentic rec¬ ord of the distinct localization of a lesion in the appendix was made by Saracenus in a letter 28 Aug. 1642. A number of observers described the disease in later years, but it is to the honor and credit of American medicine that Reginald Fitz of Boston wrote his epoch-making memoir in 1886, (On Perforative Inflammation of the Vermiform Appendix.* Two years later Fitz advanced the sound theory that the diseases variously described as typhlitis, peri-typhlitis, para-typhlitis, appendicular peritonitis, and peri- typhlitic abscess were all varieties of one and the same affection, namely, appendicitis. Rapid strides have been made during the last decade in the study of the disease, and mainly through

the exertions of American surgeons the treat¬ ment of appendicitis has been placed upon a sound and rational basis. In the embryologic development of the human intestinal tract there is at first a straight tube, divided into the fore¬ gut, midgut and hindgut, each of which gives rise to different structures. From the midgut a diverticulum or pouch appears which marks the dividing line between the large and small intestine. This pouch becomes larger and is called the cecum, but its terminal portion does not keep pace with the growth of the base and remains as a small projection depending from the cecum. This is the appendix vermiformis; it has no function and from its liability to disease is merely a constant source of menace.

During early intra-uterine life the appendix lies near the umbilicus (navel), but at about the sixth month descends into the right iliac fossa. If two lines are drawn at right angles to each other, intersecting at the umbilicus, the abdomen will be divided into four quadrants. The lower right quadrant will include the right iliac fossa and in the majority of cases the appendix. The base of this organ will usually be found at a point two inches from the umbilicus on a line drawn from the latter to the anterior superior spine of the iliac bone and known as McBur- ney's point.

The appendix is held in place by a fold of peritoneum called the meso-appendix through which a single artery runs to supply the needed nutrition. The meso-appendix is derived from the lower layer of the mesentery, the fold of peritoneum which suspends the small intestine. In women there is usually also another blood¬ vessel which comes up to the appendix from the ovary. The end of the appendix is free and may point in any direction. This fact explains the great diversity of the symptoms often noted in appendicitis.

Bearing in mind, then, that the appendix is without a function, hangs in a dependent posi¬ tion from a portion of bowel always containing irritating material, and has a very poor blood supply, it can readily be understood why this organ is so often attacked by disease. It hangs in a cavity lined by peritoneum, a delicate mem¬ brane covering the inner surface of the abdomen and the exterior of the intestines, which easily

absorbs poisons and transmits them to the whole body. Inflammation of this membrane is known as peritonitis, a very fatal disease and

often caused by appendicitis. Many deaths supposed to be due to peritonitis pure and simple are really caused by appendicitis. The intestines at all times are loaded with germs which under favorable conditions may be converted into deadly little organisms. These microbes at¬ tack the inner coat of the appendix, destroy it with the formation of pus, and may ulcerate through all the walls of the appendix causing an abscess, with peritonitis. But the recurrence of such a sequence of events requires certain other contributing factors. The old idea that foreign bodies, such as grape-seeds, are the cause of the disease, has been disproved. While foreign bodies are frequently found in the ap¬ pendix, in rare instances only are they seeds, etc., but are almost always found to consist of masses of fecal material which having entered the appendix while soft, become dry and hard, and form a fecal concretion (fecal calculus). By exerting pressure on the wall of the appendix these hard bodies may aid in the production of the disease. In rare instances pins have found their way into the lumen of the appendix and induced ap¬ pendicitis. It is interesting in this connection to note that worms are frequently discovered in the appendix. The Oxyuris vermicularis, or seatworm, has been found in large numbers completely filling the appendix, and the Ascaris lumbricoides , or roundworm, has sometimes oc¬ cupied this organ. In studying the etiology of appendicitis we find that young persons are more frequently attacked than the older ones, the disease occurring less commonly after the 50th year of life. It is fortunate that such is the case, because older people, as a rule, do not stand operations so well as those in early adult life. Their resistance to shock is less, and their greater liability to kidney breakdown and to pneumonia would close their prognosis in many instances. The greater susceptibility of young adults to appendicitis is due to the more fre¬ quent disturbances of their gastro-intestinal tracts from dietary indiscretions, and, secondly, to the tendency to inflammation of the adenoid (glandular) tissues throughout the body during adolescence. Analogy is found in the pre¬ dominance of lesions of the tonsils and of the glands in the neck and mesentery dur¬ ing the period of development. In children appendicitis is characterized by the intensity of the lesion as well as by the remarkable re¬ cuperative power which children have.

About two-thirds of all cases of appendicitis occur in males. The reason for such a disparity is due to several factors. Females are less ex¬ posed to inclemencies of the wreather and other deleterious influence; they undergo less mus¬ cular exertion and the female appendix in the majority of instances, has a better blood supply. Of diseases that predispose to appendicitis may be mentioned:

constipation, gastro-enteritis, dysentery, typhoid fever, influenza, etc. Con¬ stipation exerts an influence by causing slug¬ gishness of the bowels, resulting in poor drain¬ age of the appendix. Noxious materials may be retained and thus favor an increase in the viru¬ lence of bacteria, especially the Bacillus coli communis. Gastro-enteritis, or inflammation of

the stomach and intestines, is a very important etiological factor in appendicitis. In this disease the cecum may become inflamed and by exten¬ sion involve the appendix. In many instances the alterations in the walls of the appendix are slight and fail to produce any clinical mani¬ festations. At times, however, the lining mem¬ brane of the appendix is directly attacked, with acute appendicitis as the result. Under other circumstances, catarrhal changes of mild degree persist and lead to chronic appendicitis. Dysentery and typhoid fever are among the more remote causes of appendicitis. They cause catarrhal alterations, swelling, congestion and oedema of the adenoid (glandular) follicles of the organ. Not uncommonly ulcerations occur, and the resulting scar is one of the most im¬ portant factors in the subsequent development of appendicitis by causing a stricture in the lumen of the appendix, obstructing the drainage of the organ, and thereby favoring the reten¬ tion of irritating material. Influenza owing to the intestinal lesions to which it gives rise may also favor the development of appendicitis.

In general it may be stated that the under¬ lying cause of all cases of appendicitis is infec¬ tion. Emphasis has more recently been laid on the role of the streptococcus group of micro¬ organisms which frequently make their way into the circulation through the tonsils, ade¬ noids and foci of suppuration about the teeth, as well as other portals of entry in the respira¬ tory and gastro-intestinal tracts. It is probable, however, that this so-called hematogenous in¬ fection of the appendix is less common than direct infection from its own interior; the latter being favored by local abnormal condi¬ tions, such as kinks, adhesions, torsions, stric¬ tures, and contained concretions.

The most important predisposing cause of appendicitis is the fact that the appendix has already been the seat of one or more attacks of the same affection. The apparently greater num¬ ber of cases of appendicitis observed in recent years is not due to an actual increased inci¬ dence of this disease, but rather to a greater refinement in diagnosis which has enabled phy¬ sicians more readily to recognize the true nature of the malady, which in former years was variously styled inflammation of the bowels, peritonitis, gastritis, obstruction of the bowels, etc. The appendix is less resistant than other portions of

the intestinal tract to the onslaught of bacteria and other deleter¬ ious influences. This is due to several factors: The blood supply may become defective because of the liability to partial or complete obstruc¬ tion of the blood channels, as a result of kink¬ ing, twisting (volvulus), or the formation of external bands of adhesions, etc., secondary to primary inflammation of the appendix. Dis¬ turbances of circulation, and hence of nutrition, may also be produced by active and sometimes ineffectual muscular efforts of the appendix to rid itself of fecal concretions or even inspis¬ sated fecal matter. Defective drainage, which has been referred to, is of great importance in the pathogenesis of appendicitis because of the anatomical and physiological peculiarities of this organ. The average length of the appendix is about 8 to 9 cm. (3y inches), while its diameter is only 3 mm. to 5 mm. (% to % inch), thus forming a long narrow tube not favorable for

free drainage. The peritoneal covering forms what is known as the meso-appendix in such a manner as to draw the appendix into a curve and thus aid in any angula¬ tion resulting from disease. Additional fac¬ tors of importance are the relatively large ex¬ tent of mucous membrane presented by the appendix and the large amount of lymphoid (glandular) tissue, not only in the neighbor¬ hood of the valve-like opening into the cecum, known as Gerlach's valve, but also scattered throughout the wall of the appendix. The lat¬ ter is of especial significance in view of the tendency of adenoid tissue throughout the body to inflammation when subjected to even slight irritation by bacteria and their poisons. An analogous condition may be observed in the tonsils, which are so frequently invaded by bacteria with a resulting tonsilitis (quinsy). Owing to this similarity the appendix has fre¬ quently been called the <(abdominal tonsil.®

In considering the symptomatology of the two forms of appendicitis — the acute and the chronic — it must be borne in mind that the extent of disease which has actually taken place in the appendix cannot always be determined by the clinical manifestations. While it is true that, in general, the clinical symptoms become more marked with the increased severity of the appendicular and peritoneal lesions, — that is, when perforation, abscess or gangrene super¬ vene — it is also a fact that remission of all symptoms may occur, and yet the disease may be progressing to a fatal termination. It is like¬ wise a fact that the symptoms suggestive of perforation of the appendix with abscess

forma¬ tion in one patient may, in another case, be due to the development of an abscess without perforation of the organ. It is better, there¬ fore, to consider acute appendicitis as a clinical entity. Similar reasoning obtains with regard to chronic appendicitis, although in the latter the questions requiring solution are less com¬ plicated.

Acute Appendicitis. — There are three symp¬ toms of acute appendicitis so constant and, when associated, so characteristic of the disease that they are designated the ((three cardinal symp¬ toms.® These are pain, tenderness, and rigidity of the right lower quadrant of the abdominal wall. Pain is the initial symptom, and usually develops suddenly in an individual previously well. At the onset of the affection the pain is paroxysmal or colicky in character, coming in storms with intervals of rest, in which respect it simulates an attack of acute indigestion. The location is at first centred about the um¬ bilicus, or the pit of the stomach, later it be¬ comes diffused all over the abdomen, and finally localizes in the right iliac fossa. In recurr¬ ing cases the initial pain of the later at¬ tacks is often referred immediately to the right iliac fossa. The pain of appendicitis may, how¬ ever, be referred to any region of the abdomen. It is ignorance of this fact that leads to many errors of diagnosis in acute abdominal affections. The location of the pain de¬ pends to a great extent upon the position and direction of the appendix. For instance, with an appendix lying behind the cecum and point¬ ing upward until its tip nearly reaches the gall-bladder, symptoms are produced resembling very closely those induced by affections of the latter organ. In other cases pain is felt in

the left side of the abdomen and denotes that the appendix occupies a left-sided position or that it hangs into the pelvis. Tenderness upon pressure is one of the most valuable and constant signs of appendicitis. It is always present, but, unlike the subjective symptom, pain, it is limited at first to the site and the position of the appendix. To elicit this symptom abdominal pressure should be made in as light and delicate a manner as possible. The open hand should be laid over the tender area and the fingers gently depressed, ceasing as soon as the patient complains of pain. It should be remembered that the appendix may be distended with pus and on the verge of rupture, and any undue roughness in palpation may endanger the life of the patient. A celebrated German surgeon has truly said that (<many a doctor who has sufficient practice and experience nevertheless never learns to palpate, since he is wanting in lightness of hand.® It is a good plan to begin to palpate over on the left side away from the seat of pain, and gradually approach that region. As complications arise the point of

tenderness may vary; for instance, in those cases previously re¬ ferred to where the appendix occupies a pelvic position, the point of greatest tenderness will usually be found to the left of the median line. With the appendix thus located, where the dis¬ ease has advanced to a stage where an abscess has formed in the pelvis, vaginal or rectal examination will reveal a point of resistance on the right side with more or less marked tender¬ ness. The third cardinal symptom is rigidity of the right side of the abdomen and particularly of the rectus and other abdominal muscles. It is the most constant symptom of the three and ap¬ pears shortly after the onset of the attack. It varies in degree in different cases, but is gen¬ erally well marked, and is most intense over the site of the inflamed appendix. The variations observed range from rigidity so slight as to be barely appreciable up to a condition absolutely precluding any palpation, and to which the term <(board-like® rigidity is applied. The degree of rigidity is usually, but not invariably, in direct proportion to the severity of the lesion. When the peritoneal cavity becomes involved and peritonitis develops the entire abdomen becomes rigid and board-like, followed by dis¬ tension or tympany from paralysis of the intestines. While the three cardinal symptoms are the most important indications of acute appendicitis, there are other clinical manifesta¬ tions that are more or less constantly present and are of value in arriving at a diagnosis. Among these are disturbances of the gastroin¬ testinal tract (nausea and vomiting, etc), ele¬ vation of the temperature, increased pulse and respiration, changes in the urine, etc. Nausea is practically a constant symptom in appendicitis and usually coincides with the initial pain; it may be followed by vomiting, which at first consists of the gastric contents, then of bile or bile-stained fluid, and finally, if septic peritonitis develops, of the contents of the intestines. This condition, unless seen early, has frequently been mistaken by the family physician for intestinal obstruction.

In cases of appendicitis which progress rather rapidly to peritonitis, with the marked nausea and vomiting characteristic of the con¬ dition, the pain suffered is apt to be very severe.

The attending physician, often following the promptings of the patient, administers the too- convenient hypodermic of morphine, which while relieving the patient, at the same time masks the symptoms and renders the task of the sur¬ geon, called in for consultation, an exceedingly difficult one. The giving of morphine for

the relief of pain in appendicitis is a pernicious habit. Nausea and vomiting rarely persist after the pain has become localized to the right iliac fossa, though in some unfavorable cases vomit¬ ing may be continuous and uncontrollable. The condition of the bowels previous to the attack of appendicitis is very variable. In the ma¬ jority of cases constipation is observed, and such sluggishness may represent an etiologic factor of some importance. But there are many cases where diarrhoea ushers in the at¬ tack, and other instances when it may alter¬ nate with constipation. Fever must not be re¬ lied upon as a diagnostic sign, as it bears no direct relation to the gravity of the anatomical lesions. While with the onset of the disease the temperature usually rises to 101° and 102° F., it may return to normal again despite the advance of severe complications such as per¬ foration or gangrene of the appendix. Coin¬ cident with the development of an abscess around the appendix there is usually a rise of temperature, but again such a rise is not constant. There are, finally^, some cases in which the temperature continues high from the commencement to the termination of the attack, and yet the patient makes an easy recovery. The amount of fever should there¬ fore be considered as the expression of the reaction and resistance of the individual to infection. The condition of the pulse is a more constant diagnostic aid than the tempera¬ ture and its quality is of more importance than its rate of speed. If the pulse is strong, of good volume, regular, and the rate proportionate to the temperature, the out¬ look is favorable, and vice-versa. Variations in the respiration are not of much import¬ ance. The breathing is embarrassed in toxic states, from the distension of peritonitis, and sometimes, owing to the pain, the patient will use the chest muscles entirely. A quite char¬ acteristic position often assumed by the patient, and from which he resents being disturbed, is with the right leg and thigh flexed, while the left leg remains prone. In addition there may be perspiration, a furred tongue and a slight expression of anxiety upon the features. When the appendix occupies the pelvic position the patient will frequently complain of rectal and vesical (bladder) irritability. An increased fre¬ quency in urination is the usual symptom, yet there may be inability to void urine. The symp¬ toms which have been described are typical of the usual attack of acute appendicitis, though marked variations may occur, depending upon the position of the appendix or the presence of adhesions from former attacks. With a his¬ tory of previous more or less severe attacks of abdominal colic, not necessarily referred to the appendix, a person previously well is sud¬ denly seized with severe pain, usually through¬ out the abdomen followed by nausea and sometimes vomiting, pain soon becoming more intense over the site of the appendix, and in a few

hours this locality alone is involved ; if such a patient should be so fortunate as to see

his physician at this time, namely, within 24 hours of the attack, and if operation is ad¬ vised and performed, recovery is practically as¬ sured; but unfortunately this is not always the course pursued. The disease at this time is in its earliest stage, with the inflammatory lesion confined to the appendix, and the particular sequence of events which may follow in a given case cannot be foretold. In some cases the appendix under the influence of rest is able to eliminate the noxious materials causing the inflammatory lesions, recover its vitality, and apparently return to as good condition as be¬ fore the attack: but lymphoid (glandular) tis¬ sue which has once been the seat of infection is exceedingly prone to future attacks. In still other cases the disease extends through the wall of the appendix and induces a mild perito¬ nitis localized in the coils of intestines and tis¬ sues immediately contiguous to the appendix. With the appearance of infecting bacteria or of their poisons in the peritoneal cavity, this mem¬ brane throws out a thin fluid or serum and an exudate (lymph) which organizes into firm tis¬ sue, known as adhesions. These adhesions glue the coils of intestine surrounding the ap¬ pendix together, causing them to adhere to the roof of the cavity, which is the ab¬ dominal wall, and with the aid of the omen¬ tum, a fatty apron-shaped body covering the intestines, form a firm wall about a cavity con¬ taining the appendix and thus prevent the escape of toxic materials into the general peri¬ toneal cavity. Should the disease, under medical treatment, subside, the lymphatics and the white blood corpuscles speedily destroy the in¬ fectious material, but the adhesions too often remain and cause constant irritation. In time a period of chronicity is reached when any un¬ usual exertion provokes a dull ache in the lower right quadrant of the abdomen. The digestion is impaired, and the bowels become sluggish in their movements from the dragging of the ad¬ hesions upon the valve between the large and small intestines. In women subject to chronic appendicitis with involvement of the oyary and fallopian tube on the right side, slight attacks of appendiceal colic will recur during each menstrual period, and all treatment directed against dysmenorrhcea will prove un¬ availing. The appendix in such cases may be¬ come obliterated into a mere fibrous cord, or, more_ commonly, occlusion takes place at the opening into the cecum or at the site of a stricture, and the appendix becomes distended with clear mucus. While operations upon chronic forms of appendicitis in the presence of adhesions are attended with but little risk, the operation itself is more tedious and the incision longer than when the disease is operated on in its early stages. Having

dealt with the favorable terminations of acute appendicitis, it remains to consider that far too numerous class of cases in which the appendix per¬ forates, with abscess formation and some¬ times general peritonitis. If the infection of the appendix is severe enough, its walls may become gangrenous and break down and per¬ forate into the peritoneal cavity. In this case the peritoneum usually becomes in¬ fected in advance of the perforation and enough time is gained for the formation of ad¬ hesions such as have been described. In what is known as fulminating appendicitis the prog-

ress of the disease is so rapid that no ad¬ hesions are formed, and in 24 hours, or less, after the onset of the initial symptoms the patient may be suffering from a violent general peritonitis. But, as a rule, the escape of purulent material through a perforation in the appendix occurs into a preformed cavity, the walls of which consist of the abdominal wall, the iliac fossa, the cecum and matted coils of small bowel and the infiltrated omentum. This cavity becomes filled with pus and a true ap¬ pendiceal or peri-typhlitic abscess is formed. The amount of pus varies from a teaspoon ful to a pint, or in extreme cases even more. With the formation of the abscess the symptoms change somewhat. The severe pain of the early inflammatory stage becomes more dull ; sometimes is referred to the back or to the left side, tenderness is increased, while the rigidity is more marked. The tongue becomes coated and the breath foul, chills are rarely observed even in the presence of pus, and when present — especially a single, severe chill ushering in an attack — usually mean a gangrenous condi¬ tion of the appendix. There is fever, increased pulse-rate, and the patient shows the effect of absorption of poisonous products into his gen¬ eral circulation. An examination of the blood shows an increased number of the white blood corpuscles (leucocytosis) . Palpation* of the abdomen will reveal a mass in the right iliac fossa, rounded, hard and often tender. The patient may not complain of any pain beyond the dull ache referred to, though the act of coughing or taking a deep breath usually re¬ sults in an exacerbation of pain. In some cases with an appendix deep in the abdomen and behind the cecum, an abscess may exist which cannot be palpated. When such a condi¬ tion is suspected it is not wise to prod the ab¬ domen too hard for fear of rupturing the ab¬ scess. If the pus extends into the pelvis the additional symptoms of vesical and rectal ir¬ ritability will be present and vaginal or rectal examination will detect a bulging area ex¬ tremely tender to the examining finger. In women and girls the effect

of such a pelvic ab¬ scess is frequently disastrous. The open ends of the fallopian tubes become bathed with the pus, and either a salpingitis or occlusion of the tubes takes place. The tubes are thereby pre¬ vented from fulfilling their function of trans¬ mitting the ova to the uterus, and sterility may result. The extension of the pus upward toward the liver causes symptoms very much resembling infectious gall-bladder disease ; this will be discussed under differential diagnosis. In neglected cases this upward extension of pus has resulted in the formation of an abscess beneath the liver, with rupture through or be¬ hind the diaphragm, and entrance of the pus into the lung and pleural cavity from which it has been actually evacuated by coughing and expectoration. If an appendiceal abscess is small, recovery may occur without operation, although such a happy result is doubtful. The disease is progressive, and the pus tends to in¬ crease, and if not evacuated will frequently rupture the walls of the containing cavity into the cecum, occasionally, but more often, unfor¬ tunately, into the peritoneal cavity, with a re¬ sulting general purulent peritonitis and almost invariably a fatal outcome. In such a case the pulse increases in frequency and becomes full

and strong, the face becomes pinched and anxious, the eyes brighten, the mind becomes active, though delirium appears later, the abdu-men slowly distends, accompanied by marked pain and restlessness of the patient. These three pathognomonic conditions, a bright eye, an active mind and a swollen belly, indicate approaching dissolution. The distension is due to a paralysis of the bowels, gas and feces be¬ ing retained in spite of all treatment. Nausea and vomiting soon begin, the latter at first green, but later black, from evacuation of the contents of the intestines into the stomach. Death rapidly follows.

The diagnosis of appendicitis from other lesions of the abdominal cavity, if seen early, is comparatively easy in the great majority of cases. Particular attention should be paid to the history of the patient, and espe¬ cially to the character of the onset of the illness and the earlier symptoms. While inflammation of the stomach and intestines (gastro-enteritis) has caused some confusion at times, yet, un¬ fortunately, the mistake is made more often in the wrong direction. That is, a true attack of appendicitis is thought to be gastro-enteritis and treated accordingly until the appearance of an abscess with its unmistakable symptoms warns the attending physician of the true nature of the malady with which he is dealing. While the pain in both diseases may begin over the stomach (in the epigastric region) and con¬ tinue over the whole abdomen, in appendicitis the region of the appendix will be tender to palpation from the onset, and this tenderness will persist and even become more acute after the general

abdominal pain has ceased. Uni¬ lateral rigidity is quite constant in the beginning of the appendiceal attack, while in the gastro¬ intestinal disease the entire abdomen may be rigid. In certain cases of gastric ulcer, with perforation and escape of the stomach contents into the peritoneal cavity, the shock is more marked from the onset, and the more severe symptoms will occur in the upper abdomen. Ulcer of the stomach is much more common in women than in men, and often gives symptoms which can be recognized long before the ulcer has advanced to the stage of perforation. In enteritis, or inflamma¬ tion of the bowels, and particularly when poisonous food products have been eaten, the symptoms produce early and often marked shock. In the summer months iced drinks are a frequent cause of this complaint. About 18 hours after the dietary indiscretion there will be marked general abdominal pain, diarrhoea, chilliness, perspiration and a feeling of great weakness. In severe cases the depression may be so pronounced as to cause death (acute ptomaine poisoning). The greatest area of tenderness will be found about the centre of the abdomen, and careful palpation of the ap¬ pendix region may find this organ neither en¬ larged nor tender.

Mention was made earlier in this article of the symptoms produced by inflammation of an appendix behind the cecum and pointing up¬ ward toward the gall-bladder. In such in¬ stances the symptoms resemble very closely those due to inflammation of the gall-blad¬ der and sometimes the two diseases cannot be differentiated with certainty. But as both affections require surgical intervention to effect

a permanent cure, and as the incision in both instances is made in nearly the same place, the failure to make a correct diagnosis is not de¬ trimental to the patient. The pain in the gall¬ bladder affection, if referred, will cause a dull pain in the region of the liver radiating upward to the right shoulder blade. Tenderness is limited to the gall-bladder region and is a very important symptom, provided the rigidity of the right rectus muscle does not prevent palpa¬ tion. The appearance of jaundice, or the char¬ acteristic gallstone colics should decide the diagnosis. Later in the progress of the disease, the infection of the gall-bladder may produce pus, or empyema, as it is called, and the gall¬ bladder can then be palpated as a round, tender and firm mass beneath the edge of the ribs and moving with respirations. An appendiceal ab¬ scess would rarely reach as high as the costal margin without implication of the right iliac fossa, but in a high position it

might be mis¬ taken for a ruptured gall-bladder following empyema. In such a case the diagnosis would be almost impossible and practically immaterial, since the condition makes an operation impera¬ tive. Neither an infected gall-bladder nor an appendix should ever be allowed to ad¬ vance to the purulent stage without an opera¬ tion being advised. Inflammation of the fallo¬ pian tubes has been mistaken for appendicitis and vice-versa, particularly when the tube leak¬ ing into the pelvic peritoneum causes a localized inflammation of that membrane. With the knowledge that the appendix frequently oc¬ cupies the pelvis and may lie adjacent to the tube, the exact diagnosis of acute appendicitis from acute salpingitis may be difficult, and in chronic cases even more so. From the close proximity in which the two organs may be found the tube may be infected from the appendix or the latter may become involved secondarily from a pyosalpinx (pus in the tube). This still further complicates the dif¬ ferential diagnosis. If a history of specific in¬ fection can be obtained, with symptoms indi¬ cating the commencement of the disease in the lower part of the abdomen, and a vaginal ex¬ amination shows induration of the vault with tenderness to pressure on either side of the uterus, a diagnosis of salpingitis would be reasonable. A number of other diseases may be suspected in deciding upon a diagnosis. Among these may be mentioned extra-uterine pregnancy, ovarian cysts, some kidney affec¬ tions, intestinal obstruction, typhoid fever, pancreatitis, etc. The nature of this article does not warrant the full discussion of these affections.

The treatment of appendicitis has been a mooted question for some time, and it has only been within the last few years that the medical profession has accepted the dictum of those whose experience with the disease has been the greatest, that appendicitis is a surgical disease. The soundness of this teaching rests upon the fact that it is impossible to foretell in any individual case what the outcome will be, and which case will terminate favorably, or which will progress to perforation or gangrene, and the attendant peritoneal and other com¬ plications and sequelae. It is essential that phy¬ sicians appreciate the importance of early surgery, while a few patients for various rea¬ sons may refuse operation, the majority will

depend upon the attending physician for advice and accept the treatment which he advocates.

The mortality of the early operation, before the peri-appendicular structures have become involved, is nil, barring accidents, and the in¬ cision in the rectus muscle can be so closely approximated that the abdominal wall is not weakened in the slightest by the operation. The

peritoneum, the sheath of the rectus muscle and the skin, are usually sewed up in tier suture, — that is, in layers, — and the re¬ sulting scar, about two inches long, can barely be perceived after the lapse of several years. As the disease progresses the mortality in¬ creases in direct proportion to the extent to which the peri-appendicular structures have become involved. When an abscess de¬ velops, the search for the diseased appendix is difficult and often dangerous, and many surgeons simply evacuate the pus cavity and establish drainage. But the presence of a necrotic appendix is a constant menace, fre¬ quently causing secondary pus collections which may lead to a fatal termination. In all cases where pus is found the employment of drain¬ age is imperative. This means that sterile gauze must be so disposed that the purulent material is caught up and carried off by capil¬ lary drainage, thus forcing the abscess cavity to heal from the bottom upward, and avoiding “pocketing.® The course of these cases is tedious and the convalescence prolonged. The complications incident to acute appendicitis with abscess are attended with great risk to life. The most dreaded is peritonitis with invasion of the entire peritoneal cavity by the purulent and infectious products due to inward rupture of the abscess. Nearly every patient develop¬ ing general peritonitis from an appendiceal abscess will die in spite of the most careful treatment and skillful operation. In advanced stages of the disease, when the appendix becomes necrotic and gangrenous, the cecum will frequentlv be implicated and be so diseased that the removal of the appendix cannot be fol¬ lowed by closure of the wound in the cecum. In cases of this character gauze must be so placed as to isolate the fistulous opening from the general peritoneal cavity, with the hope that granulation will lead to spontaneous healing of the bowel opening; but this does not al¬ ways follow, and in such instances the hole in the cecum becomes a fecal fistula, discharging the contents of the bowel through the wound in the side. Fistulae require very frequent dressing, heal slowly and are extremely annoy¬ ing and disgusting to the patient. A third com¬ plication which may result in abscess cases is intestinal obstruction. The manner in which adhesions form has already been described. They are nature’s barriers against infection, but sometimes they prove a veritable boomerang. The author has more regard for the results of the aseptic scalpel of the surgeon administered at the opportune time than he has for nature’s attempts at cure. It is well known that after burns of the hands the resulting scar tissue will cause contraction and deformity of the fingers. In the same way the adhesions by uniting the coils of intestines together to pre¬ vent the spread of infection may encircle the bowel, and by contraction occlude its lumen, obstruct the flow of bowel contents and thus necessitate a second operation the mortality

which is quite high. Finally, if convalescence is uninterrupted and the wound heals slowly by granulation, the resulting scar is quite weak and nearly always produces a hernia (rupture).

In consideration of the facts that the course of appendicitis can never be accurately foretold, and that the dangers resulting from delay in operation are many and severe, the following outline of treatment is justified from our present knowledge of this disease: Upon the appear¬ ance of severe pain in the abdomen, with the maximum intensity over the region of the ap¬ pendix, nausea, or vomiting, and a point of tenderness in the right iliac fossa, the patient should be placed at rest, all food withheld and the family physician sent for. When the at¬ tending physician has made the diagnosis of appendicitis there is no treatment to be dis¬ cussed save operative interference. Whether the operation should be performed immediately will depend upon the extent of peritoneal in¬ volvement, but this question should be decided by the surgeon called into consultation and in whose hands the management of the case belongs. In fatal cases which have been fol¬ lowed by a reopening of the wound, a study of the conditions is of great interest. When death has taken place from a rapid septic poisoning or toxemia the abdomen may show nothing except some thin cloudy fluid in the pelvis and congestion of the peritoneum covering the intestines, giving them a ˆscalded0 appearance. In the abscess cases the right iliac fossa is found filled with a green purulent ex¬ udate adhering closely to the groin and the in¬ testines. There may be small quantities of pus which have formed since the operation. If death does not occur for several days after operation, and nature fails to check the spread of the disease, this purulent exudate may reach from the liver to the pelvis with infection of the portal vein, the liver and the lymphatics behind the peritoneum. With extensive leak¬ age, the entire peritoneal cavity may be filled with greenish pus.

There are many more cases of minor mani¬ festations of appendiceal inflammation than of the acute disease. Both clinical and mi¬ croscopical evidence proves that it is a great exception for an adult to have escaped some slight disease of the appendix. That it is possible to have a chronically diseased ap¬ pendix, or occasionally even a high grade of acute inflammation of that organ, without symptoms is now

definitely known; on the other hand, such conditions often produce symptoms which are so slight or non-character¬ istic that their origin or significance is entirely overlooked. The more typical cases of chronic appendicitis give rise to symptoms referable to the location of the appendix itself, that is, dis¬ comfort, distress of some sort or actual pain in the right lower quadrant of the abdomen. Occasionally, by reason of an abnormal situation of the appendix, the symptoms and signs may be either higher or lower than usual, or even, as occasionally happens, on the left side. Most curious and difficult of interpretation are the so-called referred symptoms. Through the medium of the nervous system and the inter¬ dependence of different portions of the gastro¬ intestinal tract, chronic irritation of the ap¬ pendix may manifest itself by symptoms point¬ ing to disease of an entirely different portion

of the tract, most often the stomach and the duodenum. The function of the large intestine also may be disturbed, suggesting disease of that organ, whereas the primary source is to be found in the appendix. This so-called ap¬ pendiceal dyspepsia is by no means uncommon and usually goes unrecognized until an attack definitely incriminating the appendix occurs. It is not far from the truth to say that appen¬ dicitis is the most common cause of dyspepsia. The only treatment of avail in such cases is removal of the offending organ, a procedure which often remedies diverse dyspeptic con¬ ditions in a most remarkable manner. Consult Brewer, G. E., (A Textbook of Surgery) (New York 1915); Deaver, J. B., c Appendicitis : Its Diagnosis and Treatment (1913) ; Kelly, H. A., (Vermiform Appendix and Its Diseases (1910).

John B. Deaver, M.D., Specialist , Philadelphia, Pa.

APPENZELL, a'pen-tsel, Switzerland, a canton wholly enclosed within the territory of the canton of Saint Gall, and, though covering an area of only 162 square miles, divided into two independent portions, Ausser- Rhoden (101 square miles) or Outer-Rhodes, which is Protestant, and Inner-Rhoden (61 square miles), or Inner-Rhodes, which is Catholic. It is an elevated district, traversed by branches of the Alps ; has large tracts of rich pasture- land and extensive forests of pine, and is watered by the Sitter and by several smaller affluents of the Rhine. Its climate is cold, but healthful. Glaciers occupy higher val¬ leys. Flax, hemp, grain, fruit, etc., are pro¬ duced, but the wealth of Inner-Rhodes, the more elevated division of the canton, lies in its numerous herds and flocks; that of Outer- Rhodes in its manufactures of silk, muslins, gauzes, cambrics and other cotton stuffs. The construction of railways has now made the canton more accessible, and great numbers of strangers flock hither annually to take advan¬ tage of the whey-cure establishments of Gais, Weissbad, Gonten, Heiden and Heinrichsbad. The inhabitants speak a peculiar dialect, which even those who are well acquainted with Swiss-German have great difficulty in under¬ standing. The town of Appenzell (German, Abtenzelle, abbot's cell), is the capital of Outer- Rhodes, beautifully situated on the Sitter, with 5,126 inhabitants. Trogen, with 2,347 inhab¬ itants, is the capital of Inner-Rhodes. Schools are numerous and education widely diffused. The division between the Protestant and Cath¬ olic portions of the canton has existed since 1597. They have each an independent local government with representation in the Federal Assembly. Pop. Outer-Rhodes (1910) 58,670; Inner-Rhodes (1910) 14,860. The former is one of the most densely-peopled parts of Europe, its population being equal to more than 500 per square mile. Consult Richman, (Appenzell } (1895).

APPENZELLER, a'-pen-tsel'-er, Henry Gerhart, American missionary to Korea : b. 6 Feb. 1858; was drowned 11 June 1902 while on his way to attend a meeting of the Bible Translation Committee. He was a graduate of Franklin and Marshall College and Drew Theological Seminary. Soon after graduating from the latter he went to Korea as one of the first missionaries of the Methodist Episcopal

Church. He served the mission efficiently in many positions. He was superintendent, treasurer, manager of the book concern, editor of the official organ of the mission and one of the editors of the Korean

Repository. His life has been written by William Eliot Griffis.

APPERCEPTION, a psychological term referring to higher consciousness. Until re¬ cently there has been considerable confusion among English and American writers on psy¬ chology as to the meaning of the terms percep¬ tion and apperception. To point out the source of this confusion requires a brief history of the term apperception. The word was first used by Leibnitz in connection with his philosophy of ˆwindowless® monads. With him every human soul is a monad which develops by an innner unfolding. When this development reaches the point of clear self-conscious being it attains what he calls apperceptive consciousness. If, on the other hand, the development is only par¬ tial, if its states are vague and only partially self-conscious, the monad has attained the level of perceptive consciousness. Thus for Leibnitz the terms perception and apperception designated simply different degrees of clearness and dis¬ tinctness of consciousness, with no reference whatever to the apprehension of external things. In fact the theory of Leibnitz rendered any such use of the terms impossible. In more recent German psychology the term perception has been dropped and that of apperception re¬ tained as an expression of all the higher forms of clear consciousness. There is, however, one important exception to this. Wundt has re¬ tained both terms and attempted to restore to them their Leibnitzian meaning without, of course, committing himself to Leibnitzian monadology. Mental processes which are clear and distinct and are also under the control of volition are called by Wundt processes of ap¬ perception. But when the mental act is merely association in character and not directly con¬ trolled by volition, or when it is obscure, Wundt calls it an act of perception.

The philosophy of Herbart doubtless, more than that of any other German writer, has brought the term apperception into prominence in American psychology. If we consider his system we shall find that here again the terms perception and apperception mark different de¬ grees of clearness and completeness of the forms of mental activity. With Herbart all mental processes are but the interactions of ideas. When a new idea enters the mind it causes a connection among the ideas already present. It disturbs the equilibrium. It is welcomed by the ideas akin to it, and opposed by those wrhich are not. When it finally be¬ comes adjusted and settled into its proper posi¬ tion among pre-existing ideas the new relation thus brought about is the result of apperception. Coming over to English and American psychol¬ ogy we meet with that difficulty and confusion referred to above. This confusion had its origin in the fact that in translating the Leib¬ nitzian terms perception and apperception into English these same identical

terms were used, regardless of the fact that in our psychology we had already a term, perception, which had ac¬ quired a fixed and definite meaning. The Eng¬ lish word already in use stood for the recogni¬ tion of objects through the senses, and this is

still its meaning. Hence it stands for the clear and self-conscious recognition of things as well as the vague and imperfect apprehension of them. The term perception brought over from German psychology, and the same word already in use, thus stood for widely different mean¬ ings, and hence the confusion. The Germans have a wholly different word (Wahrnehmung) for what we mean by perception, and conse¬ quently they cannot understand our difficulty. The result is that we have all along used the terms perception and apperception as though they distinguished wholly different mental ac¬ tivities instead of marking only different de¬ grees of the same processes, as they actually do. Apperception is only clear and self-con¬ scious perception. It involves in a highly complex way the various mental processes of memory, imagination, judging, inferring, etc., when these processes are clear and self-con¬ scious. A full treatment of apperception there¬ fore requires that these processes be taken into account. It is only necessary here to indi¬ cate briefly something of the pedagogical bear¬ ing and value of the term. Mainly through the influence of the so-called*Herbartian move¬ ment in America, this term apperception has centred attention upon, and emphasized the importance of, the processes involved and the conditions requisite for the successful acquisi¬ tion and assimilation of new knowledge with that which has already been learned. As the bodily organism separates and assimilates only such elements of the food taken into it as are needed for its growth and repair, so in a some¬ what similar manner does the mind select and appropriate only such of its' presentations as manifest a certain kinship to what is already consciously and vitally present, and rejects the rest. Elements wholly foreign to the mind's present stock of ideas escape it altogether. We must therefore learn the new by means of the old. Hence before presenting the new it is necessary to call up and make alive, by arous¬ ing interest and curiosity, those ideas and ma¬ terials of knowledge that by similarity or other bond or relation will best serve for the ready reception and complete assimilation of the truth or fact to be taught. The goal of intellectual development is mainly the acquisition of clear, distinct and adequate general conceptions, and the ability to make correct application of these to new particulars as they arise, or to see in each new fact the old in disguise.

In the development of such general concep¬ tions, two stages are recognized which may be appropriately designated by the terms

perception and apperception of German psychology, if these terms be employed without reference to whether the mental facts considered are ex¬ ternally or internally derived. The process in the first stage is for the most part involun¬ tarily and unconsciously directed, in the second it is voluntary and self-conscious. The process is not, however, first, sense impression, then percept, concept, judgment and reasoning in turn, each leaving off where the next higher begins. It dates its origin far back in the mental history of each individual, and all along in actual experience, sensing, perceiving, con¬ ceiving, judging, etc., are inextricably joined in one indivisible movement of thought-de¬ velopment. To use James' expressive phrase, the infant's consciousness is a ((big,. blooming,

buzzing confusion.® This is the child's world. It is not, however, a world with which he can be satisfied. It must be broken in pieces and continually made over again. Chaos must be made cosmos, the irrational must become pro¬ gressively rational. In fact, to rationalize the <(big confusion® becomes the great and never- to-be-finished work of education and of life. Therefore the manner of this rationalization is of especial interest to the teacher. The <(con- fusion® is not monotonous. It is not always the same. There is change. Certain elements come and go and some of them return again. By repeated recurrence these elements come to stand out in the foreground of the dark (<con- fusion.® Some of them are uniformly repeated together simultaneously or in close succession. These consequently become associated and form the basis of perception. Perception oc¬ curs when the presentation of one element im¬ mediately calls up the others belonging with it in the unity of consciousness which these elements represent. The presented element or sensation becomes the sign to which the mind at once adds the proper interpretation and ac¬ companiment. The richness of the interpreta¬ tion depends upon the mind's present attitude and condition, and its past experiences with the object presented. In other words, in all perception there is more or less of apperception. See Psychology ; Association of Ideas.

Bibliography. — Erdmann and Dodge, (Psy- chologische Untersuchungen fiber das Lesen auf experimenteller Grundlage) (Halle 1898) ; Herbert, (Text-Book in Psychology5 (New York 1891) ; Leibnitz, (New Essays) ; Stout, (Analytical Psychology) (London 1909) ; Mc- Murry, (General Method5 (1891) ; De Genno, (Essentials of

Method) (1899) ; Herbart, (Text-Book in Psychology5 ; Wundt, (Grund- zfige der Physiologischen Psychology (Leipzig 1910-11) ; Wundt, (Outlines of Psychology) (ib. 1907), <Logik) (Stuttgart 1893-95) ; Lange, (Apperception : A Monograph in Psychology and Pedagogy5 (Boston 1893).

Norbert Wiener,

Editorial Staff of The Americana.

APPERT, a 'par, Benjamin Nicolas Marie,

French philanthropist prominent in educa¬ tional matters : b. in Paris 1797 ; d. 1847. He made a careful study of prison conditions, spending much time in this pursuit, his re¬ searches being published in his (Journal des Prisons5 (1825-30). He was much opposed to solitary confinement and is said to have taught 100,000 soldiers to read and write. Besides the ˆJournal5 he published (Dix ans a la cour du Roi Louis Philippe5 (1846), and Confer¬ ences contre le Systeme Cellulaire.5

APPERT,, a'par, Francois French scien¬ tist, brother of Benjamin Appert (q.v.) :. d. 1840. His method of preserving food with¬ out chemicals is given in his (Art of Pre¬ serving Animal and Vegetable Substances5 (1811). It is the familiar method of placing the article to be preserved in a can after heat¬ ing, and then hermetically sealing, it, and for his invention he was awarded a prize of 12,000 francs from the French government.

APPETITE, a term in its widest sense denoting the natural desire for gratification, either of the body or the mind; but generally

applied to the recurrent and intermittent desire for food. A healthy appetite is favored by work, exercise, plain living and cheerfulness; absence of this feeling, or defective appetite (anorexia), indicates diseased action of the stomach, or of the nervous system or circula¬ tion, or it may result from vicious habits. De¬ praved appetite (pica), or a desire for un¬ natural food, as chalk, ashes, dirt, soap, etc., depends often in the case of children on vicious tastes or habits ; in grown-up persons it may be symptomatic of dyspepsia, pregnancy or chlorosis. Insatiable or canine appetite or voracity (bulimia), when it occurs in childhood, is generally symptomatic of worms ; in adults common causes are pregnancy, vicious habits and indigestion caused by stomach complaints or gluttony, when the gnawing pains of disease are mistaken for hunger. See Dietetics ; Dyspepsia.

APPIAN OF ALEXANDRIA, the gov¬ ernor and manager of the imperial revenues under Hadrian, Trajan, and Antoninus Pius, in Rome. He wrote a Roman history, from the earliest times to those of Augustus, in 24 books, of which only 11 have come down to us. It is written in Greek, in clear and simple style ; but it is little else than a compilation, characterized by many inaccuracies and absurd blunders. The best modern edition is that of Schweig- hauser.

APPIAN WAY, a famous Roman highway leading from Rome to Capua by way of Bo- villse, Aricia, Terracina, Formiae, Minturnae, Sinuessa, etc. ; called by Statius Regina Viarum, the Queen of Roads. It was made by Appius Claudius Crassus Caecus when he was censor, 313 b.c., and afterward extended to Brundu- sium by way of Beneventum. It was paved with hexagonal blocks of lava, exactly fitted to one another, resting on an admirable substruc¬ ture of considerable depth, and there may still be seen, particularly at Terracina, important re¬ mains which prove its excellent workmanship.

APPIANI, a'pe-a'ne, Andrea, an Italian painter: b. Milan, 23 May 1754, of noble but poor family; d. in 1817. He visited Rome three times in order to penetrate the secret of Raphael's style of fresco-painting, and soon ex¬ celled in this art every living painter in Italy. He displayed his skill particularly in the cupola of Santa Maria di S. Celso at Milan, and in the paintings representing the legend of Cupid and Psyche, which he prepared for the walls and ceiling of the villa of the Archduke Ferdinand at Monza (1795). Napoleon appointed him royal court-painter, gave him the order of the Legion of Honor and that of the Iron Crown, and made him member of the Italian Institute of Sciences and Arts. Appiani painted after¬ ward almost the whole of the imperial family. His best works are the fresco-paintings on the ceiling of the royal palace at Milan,, allegories relating to Napoleon's life, and his (Apollo with the Muses,5 in the Villa Bonaparte. Al¬ most all the palaces of Milan have fresco- paintings by him.

APPIUS CLAUDIUS CRASSUS, a

Roman patrician, of the family of the Claudii. In 451 b.c., when the decemvirs were appointed to compose a complete legal code for Rome (afterward known as the Laws of the Twelve Tables), and to wield the supreme power in the

state for a year Appius Claudius was chosen one of the 10, and when the office was con¬ tinued for another year he was re-elected. As he and some of his colleagues had ruled in a very tyrannical manner, the people had become incensed against them, and the following cir¬ cumstances led to their overthrow. Appius Claudius had conceived an evil passion for a damsel named Virginia, the daughter of Lucius Virginius, a respected plebeian, and at his in¬ stigation Marcus Claudius, one of his clients, claimed Virginia as the daughter of one of his own female slaves and offered to prove this even to the satisfaction of her reputed father, while Appius Claudius decided that in the meantime she should remain in the custody of the claimant. This decision being directly con¬ trary to law, and Icilius and her uncle Numi- torius having exposed the decemvir's criminal designs, the aspect of the people became so threatening that he wras forced to leave the maiden in the hands of her family, declaring, however, that he would finally settle the case next day. Virginius, hastily summoned from the army, appeared with his daughter next day in the forum in mourning robes and appealed to the people; but Appius Claudius, attended by a strong guard, again adjudged her to M. Claudius. Unable to rescue his daughter, the unhappy father snatched a knife from a butcher's stall and plunged it into her bosom, saying, ((There is no way but this to keep thee free.® Virginius escaped to the camp and with the army returned to Rome, demanding re¬ venge. The decemvirs were deposed by the indignant people, and the government by tribunes and consuls restored 448 b.c. Appius Claudius died in prison or was strangled? while Marcus Claudius was banished.

APPLE. Horticulturists regard this tree and its fruit as the progeny of two original stems, the Pyrus malus and Pyrus baccata, all the common species of apples being modifica¬ tions of the P. malus of Linnaeus.

Origin and Antiquity. — The common apple appears in the mythology, traditions, history and archaeology of the most ancient nations, the Bible, Code of Menu, Book of the Dead, Hesiod's <Theogony) (v. 215). Its charred remains have been found in mud of the pre¬ historic Lake Dwellings of Europe, while it is represented with sufficient fidelity in some of the most ancient stone carvings. It is men¬ tioned in the earliest annals of China, Babylon, Phrygia and Egypt. Relying upon its hybrid origin, it has been assigned by some horticul¬ turists to Higher Asia, where the P. malus and P. baccata are most likely to have become asso¬ ciated ; a theory, however, which is contested by others, who advance many reasons for its conventional origin in Asia Minor. No contest appears to have arisen with regard to the habitat of P. baccata, in Higher Asia. There were and are still baccata which,

unless they came from Higher Asia, are indigenous to America. Such are the P. ioensis, or Prairie States' crab, and P. coronaria, or Eastern States' crab. The latter is a sweet scented fruit about three-fourths of an inch in diam¬ eter, which grew wild in all the Northern and Middle States. The tree was about 15 to 20 feet high, with light-green leaves and rose-colored blossoms, which appeared in May. This plant is now cultivated in

all the States mentioned. There is also the P. rivularis, with yellow-red fruit, about the size of a cherry, native to the north Pacific, and eaten by the Chinooks ; also the P. anqustifolia of the Allegheny range; both of them native to this continent.

Appearance. — The apple tree (P. malus, order, Rosacccc), as a rule, is not over 30 feet high, the trunk and branches crooked and gnarled, leaves short-stemmed, blossoms having permanent calyces and emerging in clusters. When in leaf, the tree presents that symmetri¬ cal outline which suggests long domestication. The fruit usually round, sometimes oblate or ovoid, depressed at both ends, varies in size from two to six inches diameter, with a white, crisp, watery, sweet (or acidulous) pulp, centred by a core containing several small brown seeds and covered by a thin glossy (sometimes russet) skin, which, when cut open, yields an agreeable odor. In some varieties this becomes quite pungent.

Uses. — When eaten raw the apple is used as common food or as dessert to meals. It can be baked, roasted, stewed or boiled, made into marmalades, jellies, tarts, pies, puddings, cakes, preserves, sauces, apple-butter, Chinese chop suey or French raisine; in short, into very varied dishes. The expressed juice of selected apples forms a sparkling sweet cider, much esteemed and commonly drunk wherever the apple grows. Very strong cider is made by separating the water from the fermented juice. This is sometimes done by freezing, and skim¬ ming off the ice. Pomona wine is made by adding a gallon of brandy to six gallons of new cider, allowing the mixture to stand still several months, racking off and bottling for future use. Verjuice is a product of the crab apple, P. baccata. Apples, when pared, cut and dried in the sun, afford an excellent sub¬ stance for pies and sauces. Pomatum, as the name indicates, used to be made by mixing apple pulp with lard. Apple-wood is of fine grain and hard enough, when stained black, to pass for ebony. It is also employed in the manufacture of furniture, shoe-lasts, small cog-wheels, buttons, oriental imitations of olive wood and other objects. Dwarf apple trees are sometimes cultivated simply for ornament, as when planted for hedges, form¬ ing very beautiful ones, when judiciously selected with regard to color of blossoms and

fruit. They are also planted in limited grounds, when a variety of fruit is required to be produced in a narrow space. Many varieties grafted on the wild crab seedling grow successfully and become dwarfed. The French paradise apple, a small variety, dwarfs other varieties grafted upon it. It is less dwarf than the crab, and more dwarf than the Daucain or English paradise stock, another stock in common use for this purpose. The dwarfing of trees is carried to an astonishing degree in China and Japan, where trees not more than a single foot high are produced and kept in flower-pots holding scarcely more than a quart. In England, France and the Low Countries apples are trained not only as dwarfs, but more commonly as espaliers and balloon¬ shaped.

Apple crops exhibit great variance from year to year, sometimes halving and at other times doubling normal produce. The following

table shows a normal crop at the present time of about 240,000,000 bushels. Upon a rough computation, for which no accuracy is claimed, if 10,000,000 additional bushels of apples are annually reduced to cider and vinegar, the world's product of apples would amount to 250,000,000 bushels. Counting 200 apples to a bushel, the product would be 50,000,000,000 apples. As the Chinese, Japanese and other far eastern people export no apples and import but few, the product is substantially consumed in Europe, America and the colonies, which to¬ gether contained, at the average date embraced by the table, about 625,000,000 people. This would make an average of 80 apples a year to each person, or 400 to the average family of five persons.

Apple Crops of the World.

(Latest official returns and estimates).

Equivalents employed: 1 bbl. = 2 1-2 bushels, each of 50 lbs.; 18 bbls. = 1 long ton; 16 bbls. = 1 short ton.

Country.	Bushels.
United States of America, census, 1909 .	*146,122,318
Canada, 1900 .	18,626,186
1911 .	10,618,666

1915, average of three years . fl4,622,426

Australia, including Tasmania and New Zea¬ land, combined crop, average of three years. 5,000,000

United Kingdom, est . 1,000,000

France, 1915, 206,361 met. tons, exclusive of cider and vinegar apples, and excluding

colonies . 3,714,498

Germany and Austro-Hungary, est . 4,000,000

Luxemburg . 40 , 000

Holland and Belgium, est . 8 , 352 , 650

Italy, average crop . 7 , 000 , 000

Spain and colonies, 1910 . 6,650,000

Russia, including Poland, Siberia, Caucasus,

Crimea, etc . 8,000,000

Turkish Empire in Europe and Asia . 7,000,000

China (including Chinese Turkestan and

Thibet) and Ladakh . 9 , 000 , 000

Japan, 1912, 52,044,968 pounds . 1,000,000

All other countries, say . 18,498, 108

Grand total . 240 , 000 , 000

Value. — The average value of the apple crop of the United States of America, as shown in the last census, was about 66j4 cents per bushel.

Packing. — Experience has demonstrated the necessity of extreme care and method in packing of apples for shipment, especially when intended for exportation ; the California packers having exhibited such superior devices that they have been invited to instal them in Australia and other apple-growing countries. As yet, however, no uniform system prevails throughout the United States. Apples for

shipment are packed in baskets, crates, boxes and barrels; the last two containers for ex¬ port. The Northwestern standard box is 10ˆ4x11ˆ2x18 inches, equal to 2,l73j4 cubic inches ; each apple being wrapped in unprinted paper and the box stuffed with paper, or fine shavings, to allow for shrinkage and the effects of jolting in transit. The barrel is 1 7y& inches in diameter at the head, 26 inches between heads, 64 inches in circumference at the bulge, with staves 28j4 inches long, being somewhat smaller than its Canadian compeer. The latter, • the legal apple barrel of Canada, is of a size to contain 96 imperial quarts; the Canadian apple- box measuring 10x11x20 inches of space, in¬ side, equal to 2,200 cubic inches.

- Trees, U. S. A., 1910 of bearing age, 151,523,000; non¬ bearing age, 67,792,000, total trees, 219,115,000.

t Trees, Canada, 1911, of bearing age, 10,617,372; non¬ bearing, 5,599,894; total trees, 16,217,166.

Exportation. — During the calendar year ended 31 Dec. 1915 the exportation of domestic apples from the United States was as follows : Apples, green or ripe, 2,176,948 barrels, valued at $7,086,094, such exports being chiefly to the United Kingdom. Of apples dried, the exports were 33,905,608 pounds, valued at $2,671,601. The average value of the green apples was about $3.50 per barrel, and of the dried apples about eight cents per pound. A large propor¬ tion of the fruit exported to the United Kingdom was probably re-exported to other countries.

Varieties. — In addition to productiveness, an essential to the value of any food plant, the 12 points mentioned and explained below should be looked for in an apple variety. Of course all 12 of these qualities cannot be found greatly developed in a single variety because some are in a measure antagonistic, but by keeping these points in mind the prospective orchardist may avoid planting a variety that would not meet his own expectations or the market demands. (1) Richness, dependent upon the relative proportion of sugar to malic acid. When these are deficient in amount the fruit is insipid, but each may be present in large amount without making the fruit pro¬ nouncedly sweet or tart to the taste. Many tart apples contain more sugar than some of the so-called sweet apples. In ripe specimens of improved varieties the range of acid is from 0.19 to 1.11 per cent, and of sugar from 10 per cent or even less in poor sorts to 14 per cent or somewhat more, the usual range being from 11 to 13 per cent. (2) Flavor, a quality distinct from the taste of acid and sugar, and, like perfume, dependent upon minute quantities (seldom more than 0.5 per cent) of

a volatile oil. A highly perfumed apple is, however, not necessarily highly fla¬ vored. (3) Firmness not sponginess, crispness not hardness, tenderness not softness, melting¬ ness not juiciness are dependent upon cell structure. (4) Color is often of more import¬ ance in the uneducated market than form, size, richness and flavor combined. It is an unsafe index of the last two qualities, except that, as a rule, well-colored specimens are superior to poorly colored ones of the same variety. Color varies in all varieties with season, soil, man¬ agement, etc. The favorite color in the general market is red. (5) Form; a nearly globular shape is most desirable because fruits of that form pack better without bruising than other forms. (6) Size and uniformity. In general, a diameter of about three inches and a weight of six or eight ounces is preferred, and a va¬ riety producing such as the bulk of its crop will usually, on account of the lessened neces¬ sity for grading, be more valuable than another variety of equal productiveness but with widely varying size of fruit. (7) Smooth, tough but thin skin resists insect and fungous attacks, in¬ juries in handling and shipping, and is more economical with respect to waste. (8) Small core and few seeds save waste. (9) Maturity: The commercial variety should be ready to har¬ vest all at once. (10) Firm adherence to the tree; self-evident. Defectiveness in this re¬ spect may be due to attacks of enemies. (11) Culinary qualities : of prime importance in com¬ mercial varieties because such arc used mainly for cooking. Sweet varieties usually make in-

sipid pies but good baked apples; tart varieties make best pies and sauce. (12) Good-keeping is not dependent solely upon firmness but is usually associated with locality, climate, soil, etc., as well as with the variety and the stock upon which it is grown. Grafting and long do¬ mestication have resulted in several hundred varieties, some say 1,000. Even in Pliny's time, nearly 2,000 years ago, there were 22 varieties known to the Romans, many of them taking the name of the cultivator, a custom which prevails to the present day. Those varieties which are held in the highest esteem in the United States are the Baldwins, Newtown Pippins, Spitzen- burgh Russets, Ben Davis, Gano, Black Gilli- flower, Blue Permain, Grimes, Hubbardston, Yellow Newtown, Northern Spy, Rhode Island Greening, York Imperial, Rome Beauty, Wealthy, Stayman, Golden Russet, Oldenburg, Fameuse, Ralls, Gravenstein, Jonathan, Tomp¬ kins King, Missouri Pippin, Pennock, Peck, Twenty Ounce, Willow, Wine Sap, Wolf River and McIntosh Red.

A matter of importance in the selection of varieties of apples, and even more markedly of pears, is the determination of the fertility of the blossoms. Sterility, indicated by annual dropping of the fruit, may result from one or a combination of the following causes : Im¬ potence of the pollen or the pistils, or the pre¬ mature ripening of one or the other; injuries to the blossoms by fungous attacks, rain, frost, or continued cool weather or other cause more or less beyond the grower's control. On the other hand, it often results from impotence of the pollen to fertilize the pistil of the same variety and is noticed when trees stand singly or in blocks of one variety remote from other varieties. This may be obviated by the grower, who should plant varieties that blossom at the same time in proximity, usually in alternate rows through the orchard, or by grafting such in orchards already set. A practice resulting from this and the varying maturity of varieties with respect to fruit-bearing is the planting of ˆfiller® trees in permanent orchards. The fillers are quick-maturing varieties of usually upright growth and small size, which are set alternately with the slower-growing, more-spreading per¬ manent trees, and cut out when crowding seems to threaten. For such practice four varieties are usually selected, two fillers and two perma¬ nents, each pair blossoming at the same time. Each pair is placed alternately with the other and each member of the pair alternately with its partner. Trees in such orchards are often planted 28 feet apart on the diagonal, so that when the fillers are removed the permanents will be left in rectangles of about 40 feet, the usual distance recommended for large-growing varieties. Some growers plant as close as 30 feet, but this is too close except for trees of small growth. No other tree fruit than the apple should be planted in an apple orchard, because no two fruits demand the same treat¬ ment, and where two are planted, one or the other, perhaps both, must suffer more or less. See Orchard Culture.

Propagation. — New varieties of apples arc propagated from seeds, but since seeds rarely improve upon the parent, seedlings are chiefly used to produce stocks for grafting or budding. Standard (that is, natural-sized) trees are so

propagated. Dwarf trees result from grafting or budding the same varieties upon the small¬ growing, almost bush-like varieties, paradise and doucin, the stocks of which are produced by mound layering. Voluminous discussion has arisen concerning the relative advantages of grafting over budding, and also concerning cer¬ tain methods of grafting. Opinions in the first case are very conflicting; in the latter they seem to favor the use of a small piece of apple-

root as stock and a rather long scion to be set

deeply in nursery and orchard in order t6 ensure the rooting of the scion and thus obtain a tree drawing its nourishment from its own roots instead of from the nondescript roots of the seedling stock. In northern rigorous climates very hardy varieties are selected upon which to top-work less robust sorts, thus to increase their hardiness. When the trees are set the tops must be cut back severely to balance the

loss of root due to digging from the nur¬

sery and to start the head at the proper height from the ground. Formerly six feet was the usual length of trunk desired, but half that length is now preferred and in the central West¬ ern States even less. Trees with short bodies and low heads are less likely to be injured by wind and sun-scald than those with high heads and long bodies. Established unprofitable trees and undesirable varieties are often top-worked to valuable ones ; not more than a third of such trees being grafted each year because of the danger of producing water- sprouts. See Graftage; Pruning; Transplanting.

Soils, Fertilizers, etc. — Apples thrive upon nearly all kinds of soils, certain varieties being better adapted to light soils and others to heavy rather than the reverse in each case ; but the great majority of the almost innumerable varieties succeed best upon medium to clayey loams, especially if they are somewhat elevated, inclined or rolling, and in a clear, dry climate. Since air and water drainage are usually good in such places the fruit produced is generally of fine color, flavor and size. Upon low lands and in damp climates the fruits are usually of inferior quality and the trees more susceptible to fungous attacks (see Orchard). The fer¬ tilizers demanded by apples are mainly potash and phosphoric acid (see Manures). Some growers use a mixture of 100 pounds of muriate of potash to 200 pounds of 16 per cent super¬ phosphate at the rate of 100 pounds an acre while the trees are small, increasing to 500 pounds and even as much as 1,500 pounds an acre for trees in full bearing, the amount de¬ pending upon the character and condition of the soil, and the grower's management. If cover crops (see Green Manuring) such as clover, vetches or cow-peas are grown, they will supply all the nitrogen needed ; indeed, if long con¬ tinued or if several very heavy crops be turned under, too much nitrogen may accumulate, and recourse to a cereal crop be necessary to re¬ move the excess. Too much nitrogen induces a sappy, easily vcinter-killed growth, generally * at the expense of fruit-production. Lack of nitrogen is indicated by pale green or yellowish foliage. The preparation of the land does not differ materially from that for other crops such as corn or potatoes, each of which is often grown the

season previous to planting in order to fit the land for the orchard. The trees may

be set in spring or autumn and the cost of cultivation may be met by cropping the land for the first few years with potatoes, melons or some other low-growing, inter-tilled crop. An¬ nual cultivation consists in an early spring plowing followed by narrowings at intervals of two weeks and after rains that form a crust until mid-summer, when a cover crop is sown to be turned under in the following . spring. Deep plowing during the first five years or so will induce deep rooting which in after years will assist in withstanding drought and obviate the necessity of annual deep plowing. See Tillage.

Growers' opinions differ as to the length of trunk an apple tree should have, and also as to whether there should be a main trunk above the principal lower limbs, but all agree that a few (some growers say five, four or even three) well-placed main limbs are better than a large number. These mains should start far enough from one another to avoid the danger of splitting when under load of fruit, and should be made to rebranch near the main trunk. Some of these branches should be trained upward, the others more horizontally, so as to develop a well-rounded, symmetrical top. Four or five years' careful training should so fix the character of the tree as to obviate in great measure the necessity of subsequent prun¬ ing. See Pruning.

Insects. — Several hundred insects feed upon the apple, but the most of them are so well controlled by their enemies or by natural checks that their injuries ar*e seldom noticed. There are, however, many that are frequently troublesome, among which the following are perhaps the most commonly destructive. In connection with the specific means of control here mentioned, the reader should refer to the general article Fungicide. (1) Codlin moth (Carpocapsa pomonella) is perhaps the best- known and most widely distributed apple pest. The eggs are laid upon the fruit, the larvae al¬ most invariably entering the calyx, burrowing through the flesh and causing premature ripen¬ ing. Since two or even three broods are pro¬ duced in a season, the destruction of the first by spraying is of prime importance. This spraying must be done before the calyx closes, because the caterpillar's first meal must be pois¬ oned, to accomplish which the sepals must not have closed. A second spraying is recommended a month later. The destruction of culls, cores and parings and the use of

moth-traps, in the windows of storage-rooms also assist in con¬ trolling the pest. (2) Apple maggot (Rhag - oletis pomonella) , the footless grub (one-fifth inch long) of a two-winged fly, tunnels in the fruit and is especially troublesome in .New York and New England, attacking thin-skinned summer and autumn varieties. Windfalls may be eaten by stock running in the orchard, and stored apples may be fumigated with carbon disulphide. (3) San Jose scale (Aspidio- tus perniciosus), a minute scale insect of enormous prolificacy found upon many species of woody plants which in a few years die. When full, grown it so closely resembles some of its relatives that a microscopic examination is necessary to determine its identity. When abundant, infested twigs have a somewhat scurvy appear¬ ance resembling a coating of ashes. From be¬

neath the female scale the young appear, crawl to new feeding ground, fix themselves and re¬ produce with great rapidity. It has been esti¬ mated from careful records of close observa¬ tions that more than 3,000,000,000 scales may be produced in a single season from one female. Spraying with kerosene emulsion, lime, sulphur and salt solution, or fumigating with hydro¬ cyanic acid gas, are the popular ways of com¬ bating this pest. (4) Canker-worm, the larva; of certain moths (species of Anisopteryx and Paleacrita), most common in the northeastern United States and adjoining Canada. They at¬ tack the leaves of apple, pear and some other trees, entirely defoliating them when especially abundant. The wingless females crawl up the trunks and lay their eggs upon twigs or bark. The larvae, measuring-worms, appear shortly after the foliage from which, when disturbed, they drop at the ends of silk threads. If they reach the ground they climb the trunk to re¬ sume feeding. Pupation occurs in the ground. This climbing habit of both females and larvae, especially of the former, suggested impassable bands upon the trunk as a means of control. To be most effective these must be applied just before the female begins to climb, and since those of one species are active in the late fall and upon warm days during the winter, and those of the other in the spring, the bands must be kept in good condition during most of the year. (Consult New Hampshire Experiment Station Bulletin, No. 85, 1901). (5) Tent cat¬

erpillars, the larvae of a moth (Clisiocampa americana) , attack various trees in a large part of the United States and Canada. The eggs are deposited in gluey-looking masses upon the twigs in summer and hatch in very early spring. The larvae are gregarious, and spin a protective web from which they emerge to feed. When numerous they frequently strip large limbs or even trees of foliage. Gathering the eggs dur¬ ing the winter and cutting off the nests as soon as seen are the

two most effective methods of control. Since several parasites attack the eggs of this moth, the egg masses should be kept out of doors in a place from which the parasites, but not the newly hatched worms, can escape. (6) Web worm (Hyphantria ennea) is a cater¬ pillar similar in habits to the preceding, but en¬ closing the foliage upon which it feeds inside a web until nearly full grown, when like the former species the larvae disperse. The eggs are laid by a moth in late spring upon the undersides of leaves near the tips of branches of many trees, bushes and even clover. Cutting and burning is the most effective remedy. (7) The round-headed and the flat-headed borers are serious pests. They bore in the young wood, the latter mainly near the ground in the trunk, the former more frequently in the larger limbs. They are the larvae of two beetles (re¬ spectively, Saperda Candida and Chrysobothris femorata) . Their presence is indicated by the presence of chip-like castings at the mouths of their burrows. The only effective means of control are cutting out the larvae or prodding them to death in their burrows with a flexible wire. The application of repellants to prevent the laying of eggs upon the trunks is sometimes recommended. (8) Woolly aphis (Schizoneura lamp era) often called American blight in Eng¬ land and Australia, is a serious pest, especially

upon young trees. Two forms of this insect appear; one above ground, the other upon the roots. The former, readily recognized by its woolly appearance, is easily controlled by kero¬ sene emulsion ; the latter is hard to fight with¬ out injuring the trees. Tobacco dust worked into the ground seems to be the most effective and least harmful remedy. Nursery stock should always be carefully examined for this pest and treated, if necessary, before being planted. (9) Bud moth (Tmetocera ocellana), a tiny insect, the larvae of which appear in midsummer, pass the winter in the larval state and attack the opening buds and young leaves, over which they weave a little web in early spring, when they are most destructive. Paris green is effective. (10) Aphis fomi, the green- apple leaf aphis, which injures the leaves of young trees and stunts the growth of the fruit. It can be controlled by spraying with lime- sulphur solution in February or March, and by various insecticides, especially nicotine solu¬ tions, later on. (11) Various caterpillars, es¬ pecially the tent caterpillar, that of the gipsy-moth and that of the brown-tail moth (qq.v.). The methods of controlling these insects are treated under their respective names. The cat¬ erpillars of Tmetocera ocellana and Eccopsis malana attack the

flower-buds. (12) The pear thrips also attacks the blossoms. (13) The plum curculix Conotrachelus nenuphar, attacks the fruit, and is controllable by the same meth¬ ods as the codlin moth. (14) The green-fruit worm, Xyliner, eats a cavity out of the side of the apple. See Insecticide.

Protection from Mice and Rabbits. — Wherever mice and rabbits exist they are liable to do much damage to young trees during the winter months, especially when the ground is covered with snow. Anything that affords pro¬ tection to mice, such as grass, weeds or leaves, should be removed from around the trunks -of trees. It is only when the natural food of the rabbit is cut off by being covered with snow that this destructive little animal is forced to resort to gnawing the bark from fruit trees. To prevent this pest from doing this damage, the most effective plan is to tie some material around the body of the tree to the height of two feet or more. Cornstalks cut to the de¬ sired length serve the purpose well ; building paper, plain or tarred, and even old newspapers are effective.

Diseases. — Apple scab (Fusicladium den- driticum) is probably the most serious apple disease, since it causes the loss of much fruit and injures the appearance of much more. It appears as black spots with grayish borders on apples and pears, commonly seen on greening, snow, and yellow harvest varieties that have not been sprayed. Often the abundance of the con¬ fluent spots prevents the normal development of the fruit, which becomes lop-sided. The leaves are also attacked, but the markings are not so pronounced. Spraying with Bordeaux mixture is very effective. Rust (Roestelia pirata) appears upon the foliage in early sum¬ mer as orange spots more or less confluent. The fruit is also destroyed. The spores of this fungus will not germinate upon the apple but find a congenial host in the juniper or cedar, upon which they are called cedar apples (botan- ically, Gymnosporangium macropus) , These, when matured in the following spring, look

something like orange yellow sponge, Their spores will not germinate upon the cedar, but will upon the apple. Sometimes the fiingus perpetuates itself by its mycelium, which may live from year to year upon the young twigs and buds of the apple. Destruction of the cedars and spraying are effective. Apple canker (Nectria ditissima) destroys the bark and younger wood, and eventually the tree, but small areas may be cut out and the wounds painted with Bordeaux mixture. In fact, since this disease gains entrance through wounds, all such should be similarly treated. Burning badly infested trees is the only means of check¬ ing the spread of this disease. Powdery mil¬ dew (P

odosplicera oxycanthce) , a grayish growth upon the foliage, is often troublesome in the South upon young trees and seedlings in the nursery. It may readily be controlled by a standard fungicide. Bitter rot (Glomorella rufomasulans) appears upon the fruit as brown spots extending until they often involve the whole apple. It may attack at any time and is especially destructive to the early varieties, more in the South than in the North. Black rot (Sphceropsis malorum) resembles bitter rot and is similarly controlled. Two important bacterial pests are pear blight (Bacillus amyl- avorus), which causes cankers on the limbs and trunks, and crown-gall (Bacterium tumi- faciens), causing swellings on the trunk and roots just below the surface of the ground. Oregon canker is Neofabrcen malicorticis. See Fungicide.

Harvesting, etc. — As the fruit ripens, the starch which it contains becomes changed into sugar, the leaf green is replaced by tints char¬ acteristic of the variety, the flow of sap into the fruit diminishes until the apple has attained full size and weight, when the flow practically ceases. Since the changes that now take place are mainly chemical and continue independent of the tree, the fruit may be picked. Fruit¬ growers agree upon this time, which they de¬ termine . with each variety from experience. The fruits are still hard, but have brown seeds, and, having reached the development men¬ tioned, may be picked by slightly twisting the stem without danger of breaking the twig upon which it is borne, thus preventing a loss of bearing- wood. Fruits gathered at this time and ripened properly are superior to those allowed to hang longer upon the tree. For best results in keeping, apples should be stored as soon as possible after picking; the temperature kept uniform and near 33° F., so as to check the ripening process; draughts avoided, since they hasten decay and increase shriveling, hence closed packages are better than shelves; odors should be excluded.

By-Products. — Apple culls may be used in more ways than the culls of any other fruit crop, and each product finds a ready market, mainly at home. The better specimens' are usually evaporated, the cores and peelings of such being utilized either for cider-making or more frequently they are dried and shipped to Europe for the manufacture of certain kinds of champagne and other wines. The others are usually made into cider, which in turn may be remanufactured into jelly, apple-jack (apple brandy, a distilled liquor) or vinegar. When cider and apples are mixed and boiled with or without sugar the product is called marma-

lade, and, if spices be added, apple butter. The potriaee (as crushed fruit is called, ˆspecially after the expression of the juice) is washed to obtain the seeds, which are dried and used for planting.

Bibliography. — Bailey, Eield Notes on Apple Culture) (New York 1886): Beach, S. A., (The Apples of New York) (Albany 1905) ; Burritt, M. C., (Apple Growing) (New York 1912) ; Moore, S. W., Practical Orcharding on Rough Lands *(Akron, Ohio, 1911); (The Apple* (Nebraska State Horticultural Society, Vol. XXV, Lincoln 1894) ; Todd, (Apple Culturist) (1871) ; Warder, (American *Po¬ mology } Part I, Apples (1867) ; Waugh, F. A., (The American Apple Orchard* (New York 1908) ; Wilkinson, A. E., (The Apple) (Boston 1915) ; Woolverton, L., (The Canadian Apple Growers' Guide) (Toronto 1910), and various reports of horticultural societies, especially of the American Pomological, Michigan Pomolog- ical and Western New York Horticultural societies ; also various works on fruit culture.

APPLE BRANDY, or APPLE JACK, a

liquor made from the fermented juice of apples by ordinary processes of distillation.

APPLE OF DISCORD, according to Greek mythology, the golden fruit thrown among the Olympian divinities by the goddess of discord (Eris), bearing the inscription <(for the fairest. ** Aphrodite (Venus), Hera (Juno), and Pallas (Minerva) became competitors for it, and its award to the first by Paris so in¬ flamed the jealousy and hatred of Hera to all of the Trojan race (to which Paris belonged) that she did not cease her machinations till Troy was destroyed. This story is introduced in Tennyson’s <QEnone.)

APPLE OF SODOM, the title of a fruit described by old writers as externally of fair appearance, but turning to ashes when plucked. It is probably the fruit of Solarium sodomeum, a nightshade (q.v.) of northern Africa, which when eaten may produce delirium and even death. An American nightshade is also so called.

APPLE-SHELL, the designation of one of the large, handsomely ornamented, globose, bush-climbing pond-snails of tropical Africa and America, belonging to the genus Ampul- laria. Some species are to be found along the southern border of the Linked States. These mollusks are truly amphibious, having both lungs and gills, and are thus able to breathe in water or in air, whenever disposed to exchange an aquatic

for a terrestrial existence. Consult Semper, (Animal Life) (1881).

APPLETON, Charles Edwrard Cutts Birch, English editor and author: b. Reading, England, 16 March 1841 ; d. Luxor, Egypt, 1 Feb. 1879. He wras graduated from Saint John's College, Oxford, in 1863, studied for two years in German universities, and was ap¬ pointed lecturer in philosophy at Saint John's College. His best service to literature and his time wras his founding the Academy, a Monthly Record of Literature, Learning, Science, and Art, whose first number appeared 9 Oct. 1869. Its characteristic feature was the signing of all the critiques and leading articles with the writers' names in full, ana these included men of the highest eminence in literature and sci¬ ence. Appleton remained editor until his death.

To a volume of essays on the Endowment of Research * he contributed two articles: Eco¬ nomic Character of Subsidies to Education,* and Endowment of Research as a Form of Productive Expenditure) (1876). Consult Ap¬ pleton and Sayce, Eife and Literary Relics >

(1881).

APPLETON, Daniel, American publisher : b. Haverhill, Mass., 10 Dec. 1785; d. New York city, 27 March 1849. After engag¬ ing in the dry-goods business in Haverhill, Boston and New York, he began importing English books with his merchandise. He pres¬ ently devoted himself exclusively to the busi¬ ness of printing and publishing, and between 1830 and 1849, together with his sons, laid the foundation for the successful career of the American firm D. Appleton & Company, Its publications extend over the entire field of literature, and it has rendered great service in issuing the works of modern scientists at mod¬ erate prices; for example, Herbert Spencer, Tyndall, Huxley, Darwin, etc. Medical books form a special department, and Spanish books for the South American market a specialty W'hich the firm has made its own. In belles- lettres and American history it has a strong list of names among its authors.

APPLETON, Jesse, American theologian : b. New Ipswich, N. H., 17 Nov. 1772; d. Bruns¬ wick, Me., 12 Nov. 1819. After his graduation from Dartmouth College in 1792 he wras or¬ dained pastor of the Congregational Church at Hampton, N. H., in 1797. He wras president of Bowdoin College, 1807-19. A man of fine cul¬ ture and attractive personality, he w7as con¬ stantly in demand as a preacher on important occasions. His daughter married President Franklin Pibrce. His lectures, sermons and other writings, wfith a memoir, wTere published by Prof. A. S. Packard, (The Works of Jesse Appleton,

D.D.> (1837).

APPLETON, John Howard, American scientist: b. Portland, Me., 3 Feb. 1844. He was graduated from Brown University in 1863 and was instructor in chemistry there 1863-89, and full professor 1868-1914 and professor emeritus since 1914. He wras a member of the United States Mint Commission 1891. His chemical textbooks have been widely used, and include Qualitative Chemical Anal- vsis) (1878); Quantitative Chemical Analysis) (1881) ; (Chemistry of the Non-Metals) (1884) ; (Metals of the Chemist* (1891) ; (The Carbon Compounds) (1892).

APPLETON, Nathan, American mer¬ chant: b. New Ipswich, N. H., 1779; d. 1861. He started the first cotton powrer-loom in the United States and was one of the founders of the city of Lowrell. He sat several times in the Massachusetts legislature, and in 1830 and again in 1842 was a member of Congress.

APPLETON, Samuel, American merchant, wrell known as a philanthropist, brother of Nathan Appleton (q.v.) : b. New Ipswdch, N. H., 1766; d. 1853. He retired from business in 1823 and at his death bequeathed $200,000 for benevolent and scientific purposes.

APPLETON, Thomas Gold, American author and artist: b. Boston, Mass., 31 March 1812; d. New York, 17 April 1884. He was graduated from Harvard University in 1831 and spent much of his life abroad. A generous

patron of the fine arts, he was himself an ama¬ teur painter of considerable ability. In society he was a well-known figure, being a brilliant talker with a gift of epigram. His witticism <(Good Americans, When They Die, Go to Paris* *has been erroneously ascribed to 0. W. Holmes and others. His books are (A Sheaf of Papers) (1874); (Nile JournaP (1876); (Chequer Work: Tales and Essays) (1879); (Syrian Sunshine* (1877) ; (Windfalls) (1878). His poem (Faded Leaves) was once popular. Consult Hale, Susan, (Life and Letters) (1885).

APPLETON, William Henry. American publisher, the eldest son of Daniel Appleton (q.v.) : b. Haverhill, Mass., 27 Jan. 1814; d. 1884. In 1835 he was sent to represent his father's firm in London, and in 1836 a per¬ manent agency was established there. In 1838 he was taken into partnership, and upon the retirement of his father in 1848 he

formed a copartnership with his brothers to continue the house of Daniel Appleton & Company.

APPLETON, Wis., city and county-seat of Outagamie County, on the Fox River and the Chicago & N. W. and the Chicago, M. & St. P. railways, 25 miles southwest of Green Bay. It is at the head of navigation on Lake Winne¬ bago and on the Green Bay waterway, on a plateau 70 feet above the river, and near the Grand Chute rapids, which by a series of dams are made navigable for steamboats and with a 50-foot fall supply extensive water power for manufactures. The principal industries are the manufacture of farm implements, furniture, paper, flour, pulp, machinery and woolen and knit goods. The United States census of 1914 reported 108 manufacturing establishments of factory grade, employing 2,576 ‘persons, of whom 2,207 were wage earners, receiving a total of $1,259,000 annually in wages. The cap¬ ital engaged was $10,261,000 and the year’s out¬ put was valued at $7,777,000 ; of this, $2,835,000 was added by manufacture. These figures show an increase over those of 1909 amounting to 15.5 per cent. It is the seat of Appleton Col¬ legiate Institute and Lawrence University (Methodist Episcopal), and has university an$l public school libraries, three national banks, daily and weekly newspapers and a property valuation of over $3,500,000. The city was set¬ tled in 1848, incorporated as a village in 1853 and as a city in 1857. It has adopted the com¬ mission form of government. Pop. (1920)

19,561.

APPLIED MECHANICS. Applied me¬ chanics, based on the same laws and principles as theoretical or rational mechanics, neverthe¬ less differs from it in methods of solving problems as well as in the problems themselves. It is the aim in applied mechanics to obtain a faithful representation of the circumstances which condition the state of rest and motion of real, actual systems. It deals therefore with the rational and economic design and con¬ struction of structures (bridges, buildings, waterways, etc.) and machines (engines, motors and machinery in general). We no longer meet with the ˆperfect **fluids, the ˆperfectly** elastic, rigid, or smooth bodies of theoretical mechanics. Friction, viscosity, plasticity, deviations from the laws of Hooke, Boyle, and Charles are brought into every problem so far as mathe¬ matical difficulties and experimental deficiencies

will permit. No problem is considered solved until a result is obtained which is verified by experiment and which can be used in making numerical computations. Consider for instance the behavior of a steam

engine. The actual steam pressure on the piston varies every in¬ stant according to a law compared with which Newton's law of attraction is a model of sim¬ plicity; added to that the yielding of the parts, the rubbing of interacting surfaces, the exact role of lubricants, the vibrations- of the sup¬ ports, the escape of heat through the cylinder walls, the friction of the steam in passing through the slide valve, and the almost erratic variation of the resistance offered by the ma¬ chine actuated by the steam engine make what the mathematician terms a <(complete solution **hopeless of attainment. Applied mechanics does not attempt the impossible, yet some solution of such problems as this must most urgently be found. But the solution need not be more reliable than the measured experimental data. The precision of engineering data is hardly ever better than 1 per cent and sometimes does not exceed even 10 per cent. Therefore bold approximations and graphical processes will usually give results as precise and correct as, and decidedly more rapid than, those found by analytical methods. Sometimes the conditions which make an analytical solution too difficult to be attempted are neglected ; the formulas or results obtained by this simplification — they might be called qualitative as opposed to quan¬ titative solutions — are then compared with ex¬ periment and properly modified by means of empirical constants. Thus, the volume of water discharged from an orifice in a tank is calcu¬ lated on the assumption of steam line flow (see Hydrodynamics) ; when multiplied by an empirical coefficient it gives the precise dis¬ charge and applies also to flow under many different circumstances. Here is the keynote of the science of applied mechanics: Correct and precise results deduced as far as possible from first principles and co-ordinated with experiment. Correctness and precision differ from exactness; a yardstick may be correctly and precisely measured as being one yard long but its exact length may never be known. In physics and engineering "correct** means ac¬ cording to fundamental laws, "precise **means according to measurement. "Exact** implies a finality and absoluteness which science regards as unattainable.

Theoretical mechanics was fully developed early in the 19th century before applied me¬ chanics existed at all. Pioneers like Euler, the Bernoullis, Cauchy, Lagrange, Laplace, Gauss, Poisson, Fourier and Hamilton were primarily mathematicians. They were indeed men capable of building a utilitarian science, but it seems the element of interest was lacking. It is difficult to explain by other reasons why the perturbations in the solar system were worked out before the simple problem of finding the forces in a truss had been solved graphically,

or why the analytical theory of heat conduction should have been finished almost a quarter century before thermodynamics was really be¬ gun. But it was nevertheless a mathematician who wrote the first systematic treatise on ap¬ plied mechanics. Isolated problems had of course been studied long before. Galileo had experimented, although unsuccessfully, with

cantilever beams, and Euler, Bernoulli, Coriolis Napier, Smeaton and others had made import¬ ant contributions to hydraulics and the strength of materials. Poncelet, professor of geometry in Metz, was commissioned by the French Min¬ istry of War in 1824 to found a course in the “science of machines® at the Ecole d’Applica- tion. His (Cours de mecanique appliquee aux machines) appeared in 1826. The mathema¬ tician D.upin saw at once that applied mechanics was in itself a science and not merely a collec¬ tion of isolated applications of theoretical me¬ chanics. He reported to the Academy in 1827 :

“It is a production remarkable for the rigor of the mind that developed it [qui en a trace la marche] and for the simplifications made to render less difficult of application to practice those calculations reserved for the most part to transcendental speculations.®

Poncelet’s work was soon followed by that of others. In 1858 Rankine published the (Manual of Applied Mechanics) containing his celebrated preface on the (Harmony of Theory and Practice in Mechanics.) The inclusion of this essay in a textbook is significant in show¬ ing that the ancient scholastic contempt for experiment had been completely transformed in the minds of engineers into contempt for what they called “pure theory.® To-day, fortu¬ nately, the fictitious clash between theory and practice has vanished and to its disappearance must be attributed some of the most valuable contributions, from a utilitarian standpoint, that have been made to engineering science by such mathematician-engineers as St. Venant, Bous- sinesq and Grashof. Rankine’s (Prime Movers) shortly followed the treatise on mechanics and contained for the first time in an English book the new science of thermodynamics which he and Clausius had developed independently. Willis and Reuleux had meanwhile laid the foundations of the kinematics of mechanism. Applied mechanics thus reached maturity soon after the middle of the 19th century. Still one field, however, remained to be developed : the dynamics of machinery. The necessity of this arose in connection with

the balancing and stabilizing of high-speed engines which were now beginning to be introduced. Although in¬ vestigations along these lines were made from about 1850, by Lechatelier, Villarceau, Resal and Redtenbacher, to the important .contribution bv Radinger in 1870 ((Dampfmaschinen mit hoher KolbengeschwindigkeiD), it was left to Yarrow (1892) and Schlick (1893) to make complete application of the new methods. Since then the whole subject of balancing, governing and gyroscopic effect has been exhaustively examined with the aid of the most powerful mathematical analysis. But in spite of its value it has not yet succeeded in displacing in most textbooks a host of academic problems on falling bodies, friction, centroids and moments of inertia.

Applied mechanics is subdivided on peda¬ gogical grounds into Kinematics of Mech¬ anism ; Graphical Statics; Dynamics of Machinery; Strength of Materials; Hy¬ draulics ; Thermodynamics ; Aerodynamics. These are treated in this Encyclopedia under their respective titles.

R. F. Dei mel,

Assistant Professor of Mechanics, Stevens In¬ stitute of Technology.

APPOGGIATURA, a-pod'ja-too'ra, a mu¬ sical term applied to a small additional note of embellishment preceding the note to which it is attached, and taking away from the principal note a portion of its time. It is expressed thus :

and performed m Long ap-

g

poggiatura invariably occurs on the beat, and short appoggiatura, now commonly styled a grace-note, is written as an eighth note with a stroke through the stem.

APPOINTING POWER, Military. It

has been contended by advocates of executive discretion that army appointments are embraced in the power granted to the President in the section of the Constitution, to nominate and, by and with the advice and consent of the Senate, appoint “all other officers of the United States whose appointments are not herein otherwise provided for and which may be es¬ tablished by law. But the Congress may, by law, vest the appointment of such inferior offi¬ cers as they think proper in the President alone, in the courts of law, or in the heads of

de¬ partments.® If due regard, however, be paid to the words, “whose appointments are not herein otherwise provided for,® the pretension set up in favor of executive power will receive no support from the terms of the Constitution. The powers granted to Congress to raise and support armies, and to make all rules for the government and regulation of the land and naval forces, are necessarily so comprehensive in character as to embrace all means which Congress according to circumstances may deem proper and necessary in order to raise armies, and to govern them when raised. Rules of appointment to office, rules of promotion — another form of appointment — and all rules whatever in relation to the land and naval forces, save the appointment of the commander- in-chief of those united forces, who is desig¬ nated by the Constitution, are hence within the competency of Congress. It is true that this great power vested in Congress has been exercised, in most cases, by giving to the President a large discretion in appointments and other matters connected with the army. But the principle itself — that supreme com¬ mand is vested in Congress — has been often asserted in military legislation. Contempora¬ neously with the foundation of the government, laws have been passed giving to general and other officers the right of appointment to cer¬ tain offices; in other cases the President has been confined in his selection to classes desig¬ nated by law ; again, rules have been made by Congress for the promotion of officers, and in 1846, an army of volunteers was raised by Congress, the officers of which Congress di¬ rected should be appointed according to the laws of the States in which the troops ivere raised, excepting the general officers, who were to be appointed by the President and the Senate — a clear recognition that the troops thus raised were United States troops and not militia.

APPOINTMENT, the designation of an individual, by the person or persons having authority so to do, to perform the duties of some office or trust. The making out of a com¬ mission is conclusive evidence of an appoint¬ ment to an office for holding which a commis-

sion is required. 1 Cranch (U. S.) 137; 10 Pet. (U. S.) 343. An appointment is usually made by one person or a limited number acting with special authority, while an election is made by all of a class. In chancery practice an appoint¬ ment is the exercise of a right to designate the person or persons who are to take the use of real estate. 2 Washb. R. P. 302.

APPOINTMENTS, Federal, State and Local. The act of appointing a person to an office or governmental position is complete when the officer or body vested with the legal power has made the selection, or, if the ap¬ proval of some other authority be necessary, when such authority has sanctioned the selec¬ tion. To be legal it is not necessary that a certificate of appointment or commission be issued, but this is usually done as a formal evidence of the appointment. There is no exact line of demarcation between an officer and an employee of the government, but a legal dis¬ tinction is made according to the duties and responsibilities of the position, and to a certain degree this distinction affects the appointment and tenure of office.

Federal Appointments.

The Appointing Power. — When framing the Constitution, the Federal Convention of 1787, while vesting ˆexecutive powerˆ in the President, did not intend that he should be subjected to the annoyance of making selec¬ tions of persons for minor positions. Hence Art. II, Sec. II, H 2, provides that the President

“ shall have power, by and with the advice and consent of the Senate, to nominate and appoint ambassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the United States, whose appoint¬ ments are not herein otherwise provided for, and shall be established by law; but the Congress may by law vest the appointment of such inferior officers, as they think proper, in the President alone, in the courts of law, or in the heads of the departments.”

All three branches of the government — legislative, executive and judicial — exercise the power of appointment to public office, but from the time the first departments were established the heads thereof have made the majority of appointments, since most of the officers are con¬ nected with the executive branch of the govern¬ ment. For this reason the executive authority alone is restricted in its power to make appoint¬ ments. With few exceptions, legislative bodies choose their own officers and employees prac¬ tically without interference or regulation by either of the other two branches of the govern¬ ment; nor do the other branches, save in a few cases, hinder the independent appointments to subordinate positions connected with the courts that are made by the judicial branch. An executive appointment is usually subject to the approval of some other body.

Appointment of Members of Congress to Office. — Article I, Sec. VI, If 2 of the Consti¬ tution provides that ((no Senator or Representa¬ tive

shall, during the time for which he was elected, be appointed to any civic office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased, during such time ; and no person, holding any office under the United States, shall be a member of either House during his continuance in office.® With regard to the first clause of this paragraph there has been some dispute, though its sig¬

nificance is apparent. Some have questioned the right of a Senator, who was appointed to a Cabinet position, to receive the increased emolu¬ ment of the new office if the salary of the Cabinet officers had been increased during the time for which the Senator was elected, but such a Senator is not held to be ineligible to the Cabinet position if he surrender voluntarily the increase of salary. The last clause evi¬ dently was intended to make a sharp distinction between the legislative and executive branches, but it has been necessary to define the word office. Accordingly the House judiciary com¬ mittee has decided that members of commis¬ sions appointed for purposes of investigation but which possess or exercise no legislative, executive or judicial powers are not officers of the government within the meaning of this clause; nor can a contractor under the govern¬ ment be disqualified from serving as a member. A distinction has been made also (<between the performance of paid services for the executive, like temporary service as assistant United States attorney, and the acceptance of an in¬ compatible office.® There is also a distinction between a member and a member-elect, the latter possessing the right until Congress meets to choose between the seat and an incompatible office. On the other hand, persons holding commissions in the army and an officer in the militia of the District of Columbia are con¬ sidered ineligible.

History of the Appointing Power. — Up

to the administration of President Jackson (q.v.) in 1829, there was comparatively little abuse of the power to make appointments to Federal offices either for personal or partisan purposes. The President assumed responsibility for his appointees, endeavored to make ap¬ pointments from all parts of the country so that no section would feel slighted, and after 1793 usually made his selections from among the ad¬ herents of the dominant party, keeping the fitness of the appointee constantly in mind. But there were some attempts to gain a partisan advantage by use of the appointing power, such as Adams' appointment of the “Midnight Judges® and Jefferson's removals and appointments with the object of securing a more even balance be¬ tween the parties in the civil service. The States had become more or

less permeated with the spirit of the spoils system, particularly New York, Pennsylvania, Rhode Island and Massa¬ chusetts; in New York the Council of Ap¬ pointment and the Albany Regency (q.v.) held sway for a number of years and finally the Federal service in New York and Pennsylvania became tainted. There was a wdiolesome dis¬ trust of the life-tenure in executive and legis¬ lative office with the result that the States began to enact laws substituting a fixed term for tenure during “pleasure® or ((good be¬ havior.® The influence of these laws was felt in the Federal service, when, in 1820, Congress passed a law known as the (<Four Years Law,® limiting the tenure of office of the majority of United States officials, such as district attorneys, naval officers, surveyors, collectors of customs and others having the custody of public money. This served as an entering wedge for the in¬ troduction of the spoils system, which was used for purely partisan purpose by President Jack- son and his successors without serious hin¬ drance until 1871 and has continued in a modi-

fied form since that time. For details of the spoils system, see United States — The New Democracy and the Spoils System.

Attempts at reforming the system of ap¬ pointments were made prior to the Civil War. In 1853 Congress passed an act which graded the clerical positions according to salary and required examinations of applicants before ap¬ pointment, but as these were merely non¬ competitive or <(pass” examinations and were conducted by boards selected by department heads, the spoils system received no serious check. In 1871 the first reform law was passed as a rider to an appropriation bill, which em¬ powered the President (<to prescribe such regu¬ lations for the admission of persons into the civil service of the United States as may best promote the efficiency thereof.” President Grant appointed a commission, with George William Curtis (q.v.) as its first chairman, which formulated a set of rules for competitive examinations, but these were rendered in¬ operative by the refusal of Congress to appro¬ priate sufficient money, though in 1877 they were revived for the New York custom house and post-office. On 16 Jan. 1883 the first com¬ prehensive and detailed civil service act became law, and under it the President has power to extend its jurisdiction, so that the competitive system now covers two-thirds of the entire executive civil service of the Federal govern¬ ment. See Civil Service Reform.

State and Local Appointments.

State Appointments. — In making appoint¬ ments most States follow the practices of the Federal government, the major portion of the appointing power being exercised by the gov¬ ernor and the heads of the State departments, though there are a number of officials, elected by the people, who exercise the appointing power absolutely independent of the governor. In most States, the senate must confirm the governor's appointees, and his removals from office are subject to the same restriction. Most States limit the term of office of all the important officials, whether appointive or elective. In Maine, Massachusetts and New Hampshire there is an elective council who confirm ap¬ pointments. In the Northern States the spoils system developed early, and by 1805 had become the recognized system of appointments to office ; in both North and West it still prevails, but the system never gained a strong foothold in the South. The few weak attempts to break its influence in the North have proved unavailing and only six States now have civil service laws that apply to the State service. _

Local Appointments. — City and local governments have no uniform system of appoint¬ ments to office. As first constituted the elective city council had the power of appointment, with the exception of the most important city offi¬ cials, who were appointed by the governor of the State. Later the mayor was given power to appoint, but his appointments were subject to the approval of the city council or, if the bicameral system (q.v.) were in vogue, to the approval of the upper chamber of the council. The mayor's privilege of appointing his official family is limited also by the large number of elective officials in city governments and by the retention by the city council of the power of appointing department heads and subordinates.

In all cities the most important officials are limited in their term of office. Some cities employ the (<Brooklyn plan" of holding the mayor responsible by vesting in him unrestricted power of appointment and removal of depart¬ ment heads, and this provision was incorporated in the New York city charter. In cities under commission government, the city council usually possesses the power of appointment. In county, town and village governments all the important officials are elective. More than 200 cities are enforcing civil service laws, and they have been applied to a very few of the largest villages in New York State, but they have not been ap¬ plied in smaller units save in the police and fire departments of a few Massachusetts towns. See Ambassador; Civil Service Reform; Con¬ gress; Consular Service; Judiciary; Patron¬ age; Senate; Tenure of Office; and the fol¬ lowing

titles under the general heading United States: The Beginnings of Party Organiza¬ tion, The Cabinet of the, Judiciary of the, The New Democracy and the Spoils System, The President's Office, The Vice-Presi¬ dency, The Speaker of the House of Repre¬ sentatives.

Bibliography. — Fairlie, J. A., (The National Administration of the United States } (New York 1905) ; Fish, C. R., (Civil Service and the Patronage } (New York 1905) and article ((Re- movals of Officials by the President of the United States" (in ˆAnnual Report of the American Historical Association,) Vol. I, pp. 67-86. 1899) ; Foltz, E. B., (Federal Civil Service as a Career* (Chap. VII, New York 1909) ; Finley, J. H., and Sanderson, J. F., (The American Executive and Executive Methods) (New York 1908) ; Goodnow, F. J., Compara¬ tive Administrative Law) (New York 1903) ; Hinds, A. C., (House ManuaP (§§ 93-96, Wash¬ ington 1909) ; Reinsch, P. S., (Readings in American Federal Government (New York 1909) ; Salmon, L. M., appointing Power of the President (in (American Historical Asso¬ ciation Papers, * Vol. I, No. 5, 1886) ; Reports5 of the United States Civil Service Commission; and (Publications } of the National Civil Serv¬ ice Reform League.

Irving E. Rines.,

Author (History of the United States .*

APPOLD, ap'old, John George, English mechanician and inventor of automatic ma¬ chinery : b. 1800 ; d. 5 Aug. 1865. He invented a centrifugal pump, a brake which was used in laying the Atlantic cable, and a process for dressing furs.

APPOMATTOX COURT HOUSE, Va.,

village 20 miles east of Lynchburg on the Norfolk & Western Railroad. It is the seat of an agricultural school and a government ex¬ periment station. It was the scene, 9 April 1865, of General Lee's surrender to General Grant, an event which virtually concluded the American Civil War. Pop. about 800.

APPONYI, Albert, Count, Hungarian statesman : b. 1846. He is the son of the Count George Apponyi (q.v.) leader of the Con¬ servative party that opposed the revolutionary movement of 1848, and one time Chief Justice of Hungary. Count Albert was educated at the universities of Vienna and Budapest, en¬ tered Parliament in 1872 and became the leader of the Conservative National party. He

joined the Liberals in 1899, was elected Presi¬ dent of the Reichstag in 1901, Speaker of the Chamber 1902-04. Seceding from the Liberal party, he reorganized the National party in 1904, and was Minister of Public Education from 1906 to 1910. Beyond these few years of office, he spent nearly the whole of his parliamentary career in opposition. Together with Andrassy he led the coalition which drove Count Stephen Tisza, the pro-German ((Iron Man® from office in 1905. As a delegate to the World Peace Conference at Saint Louis he visited the United States in 1904. He made another trip to this country in 1911, when he delivered some lectures on International Peace. Count Apponyi is undoubtedly the greatest figure in Hungarian politics, an orator, statesman and born leader of men. His re¬ markable eloquence is of the soothing yet compelling type ; in some of the stormy scenes enacted in the Hungarian Parliament, when strong words, ink-bottles and fisticuffs rent the air, the masterful presence and digni¬ fied language of Count Apponyi rarely failed to restore peace and order. Intensely patriotic and absolutely honest, he can hardly be said to have found adequate opportunities to test his administrative abilities. His real strength lies in opposition, to rouse men to lofty ideals and to create enthusiasm. He is a voluminous writer and a clever linguist, able to (<switch off® into half-a-dozen languages with astonish¬ ing ease. Though his political career has been many-sided, abounding in fluctuations and party vacillations, the purity of his life and motives has never been challenged. Like his colleague Count Andrassy, he has contributed numerous articles, mainly on questions of Hungarian public law, in native and foreign magazines. He published (ˆEsthetics and Politics: the Artist and the Statesman (1905), and (A brief sketch of the Hungarian Con¬ stitution and of the relation between Austria and Hungary* (1908L

APPONYI, op'pd-nyi, Gyorgy (George),

Count, Hungarian statesman: b. 1808; d. 1899. He was Hungarian Court Chancellor in 1847. Pie was leader of the Conservative party, and opposed the revolutionary movement of 1848- 49. After some years of retirement he entered the Reichsrath of Vienna in 1859 and was ac¬ tive in furthering schemes for the welfare of Hungary, materially assisting in bringing about the union of Austria-Hungary on the present basis. As Royal Commissioner he opened the Diet at Budapest in 1861 and presided over the Upper House. He was especially successful in restoring the Constitution of Hungary.

APPORTIONMENT, a term signifying the division or distribution of a

subject matter in proportionate parts. In relation to contracts an apportionment is the allowance, in case of the partial performance of a contract, of a proportionate part of what the party would have received as a recompense for the entire performance of the contract. But where the contract is to complete a thing for a certain sum of money or other consideration, there can be no apportionment.

Apportionment-incumbrances. — The de¬ termining of the amounts which each of sev¬ eral persons interested in an estate shall pay

toward the removal or in support of the burden of an incumbrance.

Apportionment-rent. — A term denoting the allotment of shares in a rent to each of several persons owning it. It is also applied to the determination of -the amount of rent to be paid when the tenancy is terminated at some period other than one of the regular intervals for the payment of rent.

APPORTIONMENT. National Legisla¬ tors. — Article I, Sec. Ill, fl I, of the Consti¬ tution provides that the United States Senate ((shall be composed of two senators from each State,® and as provided by Article XVII (adopted in 1913) these senators shall be elected for six years by the direct vote of the people of each State. Article I, Sec. II, ft 1-3, provides that the members of the House of Representatives shall be chosen every second year, and the number shall not exceed one for every 30,000, though every State must have at least one representative. Hence the number of members of the lower House varies with the population. When the Constitutional Conven¬ tion of 1787 debated the question of representa¬ tion the delegates of the small States insisted on an equal representation of the States as such in Congress, while the delegates from the large States advocated making population the basis of representation. A compromise was effected whereby all the States were to have equal rep¬ resentation in the Senate, the members being chosen by the State legislatures, and the mem¬ bers of the lower House were to be chosen by the people and apportioned according to population. For many years the question of electing Senators by the direct vote of the peo¬ ple agitated the country and finally in 1913 the 1 7th Amendment was passed. See Constitu¬ tion of the United States.

Having decided that the basis of member¬ ship should be one for every 30,000, the Con¬ vention guessed at the relative population of the States and divided the 65 members among them. A question then arose as to whether the number of members ˆshould be ascertained by dividing the whole population of the coun¬ try by 30,000 or by

dividing the population of each State separately by 30,000 and adding the quotients. The latter method was adopted and pursued for 50 years, no attention being paid to fractions of population. In 1840, the popu¬ lation having grown enormously, the ratio was placed at 70,680 and each State was allotted as many, representatives as its population would contain the ratio, with an additional represen¬ tative if there remained a fraction of more than one-half the divisor. In 1853 -another change was made. The whole number of rep¬ resentatives was first determined and the ratio ascertained by dividing the whole population by that number; the population of each State was then divided by the ratio and the quotient rep¬ resented the number of members for the State. If this did not make the total number of rep¬ resentatives agreed upon, the number lacking was divided among the States having the largest fractional remainders. Hence it some¬ times happened that a representative was al¬ lowed to a State that did not have a remainder of one-half, while at other times States that had remainders of more than one-half failed

to receive an extra member ; occasionally the number of representatives of one State would be decreased by an increase of one in the size of the House. In 1910 a method introduced assumed that the divisor was a continuous quantity between certain limits, that is, subject to slight indefinite changes or increments. It •would be easy to determine the critical points at which the decimal part of the quotient for each State passes one-half and divisors were selected midway between each two critical points. Thus a series of tables was obtained under which each one apportioned one more representative than its predecessor and one representative for every major fraction, the minor fractions being disregarded. As decided at various times the ratio of population to each representative has been as follows :

Census

Date of Ap¬ portionment Act

States

Members

Ratio

Constitution

1789 .

13

65

30,000

1790 .

14 Apr.

1792

15

105

33,000

1800 .

14 Jan.

1802

16

141

33,000

1810 .

21 Dec.

1811

17

181

35,000

1820 .

7 Mar.

1822

24

213

40,000

1830 .

22 May

1832

24

240

47,700

1840 .

25 June

1842

26

223

70,680

1850 .

23 May

1850

32

234

93,423

1860 .

23 May

1860

34

243

127,381

1870 .

2 Feb.

1872

37

293

131,425

1880 .

25 Feb.

1882

38

325

151,911

1. .

7 Feb.

1891

44

356

173,901

1900 .

16 Jan.

1901

45

386

194,182

1910 .

8 Aug.

1911

46

433

211,877

Oftentimes after an apportionment has been made a new State or States have been admitted and they are allowed one representative until the next apportionment. Hence, while the Ap¬ portionment Act of 8 Aug. 1911 provided for 433 members, the admission of Arizona and New Mexico raised the membership to 435.

Under the Constitution the States were to be represented according to their respective members, but only three-fifths of the slaves were to be counted. Accordingly the whites of the South had a greater . proportional repre¬ sentation than the Northern whites, but the total population of the South had less represen¬ tation than the total population of the North. When slavery was abolished the question of representation again arose and the 14th Amend¬ ment was passed providing that if the right to vote in any State were abridged <(the basis of representation therein shall be reduced in the proportion which the number of such male citi¬ zens shall bear to the whole number of male citizens 21 years of age in the State." Thus if a State should allow full negro suffrage it should have full representation, but under the terms of the 1 5th Amendment, which soon fol¬ lowed, the States could not limit the suffrage because of race, color or previous condition of servitude. All States have full representation, albeit some do restrict the suffrage for rea¬ sons other than those specified in the amend¬ ment (such as educational limitations). See Electoral Qualifications.

When the apportionment has been made by Congress it is the business

of the State legisla¬ ture to lay out the State in districts for the election of Congressmen. These districts must

be contiguous and compact and as nearly equal in population as possible. In arranging these districts the dominant party by combinations of various kinds and unworthy scheming and trickery so maps the State that their opponents are in a hopeless minority at the polls. Such methods are known as the ˆgerrymander" (q.v.), the (<shoe string" or the <(saddle bag." If a State has not been divided into districts all the Congressmen are elected by general ticket, which is also the case if Congress has reduced the representation. If there be an increase of representatives and the State be not redistricted before election, the additional members are chosen by general ticket. See Congress ; House of Representatives ; Sen¬ ate of the United States.

State Legislators. — In most States the county is the unit of representation, though in a few of the older States the township is the unit. Some States require that county lines be considered in arranging the legislative districts and while this holds true in New York, a county may be divided into two or more districts. The endeavor is usually made to equalize the popu¬ lation of districts, but some of the States still retain the original privileges of their local areas, thus causing great inequalities in popula¬ tion. In some States each county is limited to one senator regardless of population, while in Rhode Island each town has a senator and one only, so that Providence has no more voice in the upper branch of the State legislature than a small village. In Massachusetts the numeri¬ cal system has been fully adopted. In some of the States with cities of enormous population, the constitutions have placed restrictions on the power these cities may exert in the legislature; for instance, New York city may never elect more than one-third of the members of the legislature. Such a restriction obtains in Pennsylvania. The legislature usually divides the State, but in some States (as New York and Michigan) the legislature only indicates the senatorial districts, leaving the establish¬ ment of assembly districts to the local authori¬ ties. There are great differences in the States regarding the methods and details of legislative apportionment. In Illinois minority represen¬ tation is in use. There senatorial and assem¬ bly districts are identical, one senator and three assemblymen representing each district. Each voter has three votes for members of the assembly.

Municipal Legislators. — The State con¬ trols city government in varying degrees and in diverse particulars. Most cities, under char¬ ters granted by the States, have a mayor and council, elected by popular vote, the first repre¬ senting the administrative branch of the

gov¬ ernment and the latter the legislative. The majority of the councils consist of a single body elected by wards or districts Usually for(one or two years. In some cities there is a bicameral council, the members of one branch being elected by districts, one member to each, while the members of the smaller branch are elected by the whole city or by larger districts. The districts or wards are usually determined by city officials and there too gerrymandering plays its part as well as in State or national politics. Under the commission form of gov¬ ernment there is no question of appointment

since the commissioners are elected at large and are presided over by the mayor, who is one of their number. These men constitute the executive and legislative branches of gov¬ ernment combined, pass all ordinances, handle the city funds, and hence centralize in them¬ selves all legislative and administrative powers.

Goodnow, F. J., (Municipal Government*

(New York 1910) ; Hart, A. B., (Actual

Government *(New York 1903) ; Hinsdale, B. A., (The American Government, National and State* (4th ed., New York 1905) ; Munro, W. B., Pity Government by Commission* (New York 1913) and Principles and Methods

Ratios under Constitution and at each Census, 1790 to 1910, by States

State

Alabama .

Arizona .

Arkansas .

California . .

Colorado .

Connecticut ....

Delaware .

Florida .

Georgia .

Idaho .

Illinois .

Indiana. .....

Iowa .

Kansas .

Kentucky .

Louisiana .

Maine .

Maryland .

Massachusetts . .

Michigan .

Minnesota. .'. ...

Mississippi .

Missouri .

Montana. .

Nebraska .

Nevada .

New Hampshire.

New Jersey .

New Mexico. . . .

New York .

North Carolina. North Dakota. .

Ohio .

Oklahoma .

Oregon .

Pennsylvania . . . Rhode Island. . . South Carolina. . South Dakota . . .

Tennessee .

Texas .

Utah .

Vermont .

Virginia .

Washington .... West Virginia. . .

Wisconsin .

Wyoming. .....

Total .

Ratios Under Constitution and Censuses

Consti¬

tution

o

o

o

©

1790

o

o

o

1800

o

o

o

<n

1810

o

o

o

i r,

1820

o

o

o

o'

1830

o

o

r-~

1840

o

00

o

o

<•-

1850

(N

O'

1860

00

<n

i--.

(N

1870

in

<N

1880

O'

in

1890

o

O'

Representation

10

8

14

10

10

13

2

6

2

19

9

17

17

12

18

2

8

4

22

65 106 I 142

10

1

*7

9

13

27

13

23

2

9

6

23

186

12

3

7

9

13

34

13

14

26

2

9

5

22

13

3

8

8

12

1

5

6

40

13

19

28

2

9

13

5

21

213 242

7

10

2

10

4

7

6

10

3

4

5

4

5

34

9

21

24

2

7

11

2

4

15

232

9

11

2

10

4

6

6

11

4 2

5 7

3

5

33

8

21

1

25

2

6

10

2

3

13

237

14

11

6

1

9

5

5

5

10

6 2 5 9

31

7

19

1

24 2 . 4

8

4

3

11

243

4

4

1

4

1

2

9

19

13

9

3

10

6

5

6 11

9

3

6

13

33

8

20

1

27

2

5

10

6

293

8

5

6

1

4

1

2

10

1

20

13 11

7

11

6

4 6

12

11

5 7

14 1 3 1 2 7

34

9

1

21

1

28

2

7

2

10

11

2

10

1

4

9

1

6

7 2 4 1 2

11

1

22

13

11

8 11

6

4

6

13

12

7

7

15

1

6

1

2

8

34

9

1

21

2

30

2

7

2

10

13

1

2

10

2

4

10

1

332 I 357

1900

(N

00

Tt <

O'

7

8

3

5 1 2

11

1

25

13 11

8

11

7

4

6

14 12

9

8 16

1

6

1

2

10

37

10

2

21

2

32

2

7

2

10

16

1

2

10

3

5

11

1

386

1910

00

10

1

7

11

4

5 1 4

12

2

27

13

11

8 11

8

4

6 16 13 10

8

16

2

6

1

2

12

1

43

10

3

22

8

3

36

3

7

3

10

18

2

2

10

5

6 11

1

435

15

- Included in the 20 members originally assigned to Massachusetts, but credited to Maine after its admission as a State Mar. 1820.

the members apportioning among themselves the headship of the main administrative de¬ partments. See Municipal Government; Com¬ mission Government; Bicameral System. Consult Ashley, R. L., (The American Federal State) (New York 1908) ; Beard, C. A., Amer¬ ican City Government (New York 1912) ; Bruere and Shepardson, (The New City Gov¬ ernment (New York 1912) ; Bryce, James, 'The American Commonwealth) (4th ed., London 1910) ; Fairlie, J. A., (Essays in Municipal Administration (New York 1910) ;

of Municipal Administration *(New York 1916) ; Reinsch, P. S., American Legislatures and Legislative Methods* (New York 1907).

Irving E. Rines,

Author (History of the United States .*

APPOSITION, a grammatical term im¬ plying the relationship in which one or more nouns or substantive phrases or clauses stand to a noun or pronoun, which they explain with¬ out being predicated of it, and with which they agree in case : as Cicero, the orator, lived in the 1st century before Christ; the opinion that a

severe winter is generally followed by a good summer is a vulgar error.

APPRAISEMENT, a formal valuation of property, according to legal requirements, or by agreement between the parties interested. Official appraisements in legal proceedings are usually performed according to statute ; the principal cases where such appraisals are or¬ dered are in the case of goods subject to duty, the personal estate of a decedent, of property taken over by government or other authorities by right of eminent domain, etc. Unofficial appraisements take place by agreement of the parties interested, such as in the case of insured property which has been partially or totally destroyed. See Customs; Tariff Laws.

APPREHENSION (Latin apprehensio, from ctd + prehendere, to seize), a term em¬ ployed to denote the subjective character of perception. In the philosophy of Aristotle the act of attaining direct acquaintance with any truth or object of knowledge was called Oiyelvy which figuratively means, a touching or immedi¬ ate contact with truth. The scholastics trans¬ lated this term by the word apprehension, which has descended with modified and ex¬ tended meaning to modern philosophy. This word has accordingly been employed to desig¬ nate the act or faculty (1) of perceiving any¬ thing through the senses, (2) of forming an image in imagination, (3) of conceiving with¬ out judging, the so-called simple apprehension of nominalistic logic; or (4) a relatively simple and immediate act of intellection with or with¬ out reference to an external object. In this use of the word it distinguishes this form of intellection from the more complex and elabo¬ rated forms of knowledge denoted by the words comprehension, judgment, etc. Thus, for ex¬ ample, when an object or event is viewed apart from other things or events, it is said to be apprehended. When brought into systematic relations with kindred objects of knowledge we say it is comprehended. Stone makes a rather important distinction between implicit and ex¬ plicit apprehension. Through frequent recog¬ nition of an object of knowledge the mind ac¬ quires the ability to distinguish and identify.it as a whole without apprehending any of its constituent elements. The act which thus grasps its object without conscious combination or synthesis of parts is an implicit apprehen¬ sion. If attention lingers upon, the object, a tendency toward multiplicity arises, the com¬ ponent parts become discernible, and implicit apprehension becomes explicit. In the one there is a distinctionless unity ; in the other a conscious synthesis. Implicit apprehension is a form of what Professor Ladd calls the con¬

densation of a series and is an important aim and result of correct mental training.

Wundt distinguishes apprehension from ap¬ perception, or what we should call clear and self-conscious perception, in a very suggestive though highly figurative way. He, of course, recognizes that in a series of temporarily suc¬ cessive ideas or mental states the one immedi¬ ately present in perception has the most favor¬ able position as regards clearness and distinct¬ ness. Likewise, in a spatial scries, or in a complex of simultaneously interconnected fact¬ ors present in consciousness, some factors are vol. 2 — 7

more favorably located than others. There is, accordingly, a state of clearest grasp in con¬ sciousness, which, when accompanied by a special feeling, is called attention. This state of clearest grasp is figuratively styled the fixa¬ tion point of consciousness, or, more briefly, the inner fixation point. In contrast the whole complex psychical content is called the field of consciousness. A conscious process which passes into an unconscious state is said to pass below the threshold of consciousness. A psy¬ chical compound which enters the field of con¬ sciousness passes on to the inner fixation point, then out again into the field, and finally de¬ scends below the threshold, is an apperceived compound. But just as such compounds may enter the field of consciousness before reaching the point of fixation, so may other compounds enter the field and pass out again without en¬ tering the fixation point at all. Such compounds are only apprehended. Thus it appears that Wundt's distinction between apprehension and apperception is simply one of relative clearness and distinctness of perception. Perceptions that are vague and unclear are called apprehen¬ sions, while those which are clear, self-con¬ scious and voluntary are apperceptions. Con¬ sult Wundt, (Outlines of Psychology) (Leipzig 1907) ; Stout, Analytical Psychology) (Lon¬ don 1909) ; Titchener, E. B., (Textbook of Psychology > (New York 1910).

APPRENTICESHIP, in law, a contract by which a person called a master, who under¬ stands some art, trade or business, undertakes to teach the same to another person, commonly a minor, and called the apprentice, who, on his part, is bound to serve the master, during a definite period of time, in such art, trade or business. At common law an infant may bind himself apprentice by indenture, because it is for his benefit. But this contract, on account of its liability to abuse, has been regulated by statute in the United States, and is not binding upon the infant unless entered into by him with the consent of the parent or guardian, or by the parent or guardian for him, with his con¬ sent.

The contract need not specify the par¬ ticular trade to be taught, but is sufficient if it be a contract to teach such manual occupa¬ tion or branch of business as shall be found best suited to the genius or capacity of the apprentice. This contract must generally be entered into by indenture or deed. The contract is to continue, if the apprentice be a male, only during minority, and if a female only until she arrives at the age of 18. The duties of the master are to instruct the apprentice, by teaching him the knowledge of the art which he had undertaken to teach him, though he will be excused for not making a good workman if the apprentice is incapable of learning the trade, the burden of proving which is on the master. Ordinarily the indenture should contain, among other things, a stipulation that the apprentice shall be taught the general rules of arithmetic. The master must not abuse his authority, either by bad treatment or by subjecting his apprentice to menial employments unconnected with the business he has to learn ; but he may correct him with moderation for negligence and mis¬ behavior. He cannot dismiss his apprentice except by consent of all the parties to the

indenture. lie cannot remove the apprentice out of the State under the laws of which he was apprenticed unless such removal is provided for in the contract or may be implied in its nature; and if he do so remove him the contract ceases to be obligatory. An infant apprentice is not capable in law of consenting to his own dis¬ charge. After the apprenticeship is at an end the master cannot retain the apprentice on the ground that he has not fulfilled his contract, unless specially authorized by statute. An ap¬ prentice is bound to obey his master in all his lawful commands, take care of his property, promote his interests, endeavor to learn his trade or business and perform all the covenants m his indenture not contrary to law. He must not leave his master's service during the term of the apprenticeship. If, without the knowl¬ edge or consent of the master, an apprentice is employed by a third person, the master is entitled to all his earnings, whether the person who employed him did or did not know that he was an apprentice. In an action for harboring or enticing away an apprentice it must be shown that the defendant had a knowledge of the apprenticeship. The enlistment of an apprentice in the military service dissolves the relation of master and servant, and the master has no claim to the bounty money or pay of the ap¬ prentice so enlisted. A

master cannot delegate to another the power to chastise his apprentice, as his authority is a personal one. At common law an apprenticeship is a relation which cannot be assigned, but if under such an assignment the apprentice continue with his new master with the consent of all the parties and his own, it will be construed as a continuation of the old apprenticeship. Consult “Apprentices^ (in (Corpus Juris, } Vol. IV, pp. 1412—54, New York

1914).

APPROACHES, Military. The succes- ors of Vauban followed up, as far as practi¬ cable, the methodical stages in conducting the attack founded upon his long experience, and which consisted in a single or a double con¬ nected attack : approaching the points assailed by as many lines of communication, directed upon them, as circumstances seemed to de¬ mand, and protecting these approaches by three continuous main lines of trenches, termed the parallels, and several portions of parallels, termed demi-parallels, placed between the sec¬ ond and third parallels, all of them very care¬ fully placed so as to be in good tactical rela¬ tions to one another.

The approaches were usually run in zigzag directions toward the salients of the defenses, crossing the lines of the capitals of these salients, the front of each approach gradually contracting as it was advanced toward the salient, and each boyau of the approach re¬ ceiving such a direction as not to expose it to an enfilading fire from any point of the de¬ fenses within cannon-range. In addition to the communications between the parallels, two or more lines of approaches were run, from the positions selected for the depots of the trenches, to points of the first parallel con¬ venient for the supplies for this and the other lines of works. These were also usually run in the direction of the capitals of some two or more of the salients.

Besides giving the boyaux directions un¬ favorable to an enfilading fire from the de¬ fenses, each one is extended some 12 or 13 yards back, to the rear of the one behind it, so that should the besieged endeavor to take up a temporary position, exterior to his main de¬ fenses, each boyau would still be covered by the portion of the one in advance of it run to the rear, not only from an enfilading but from any slant reverse views, except from points so far be}rond the defenses as to make their temporary occupation very perilous to the besieged, from their exposure to open assaults.

The positions given to the approaches along the capitals are not obligatory; but will gen¬ erally be found to offer more advantages

than any other that could be given them on ground entirely unobstructed. In the first place, the capitals are the shortest lines from the parallels to the salients of the defenses. In the second, running the boyaux across the capitals, and gradually diminishing the extent of their front, the entire approach will be better flanked by the fire of the parallel in its rear; will be in a position to receive but little if any of the fire which is delivered from the two faces of the salient upon which it is run ; will be out of the line of fire of the batteries enfilading these two faces ; and will usually be in the most favorable position to defile each boyau from the fire of the besieged.

The front occupied by each approach will depend upon the length given to each boyau. As a general rule, the boyau should not receive a greater length than 100 yards, in order not to expose too long a line to tempt the besieged to enfilade it, and the approach may be started at the first parallel with a front of 60 yards, which should be gradually narrowed, so as to have a front of about 30 yards at the position of the third parallel.

Prior to the great European War, one of the most tremendous combinations of approaches in the history of war was at the siege of Sebas¬ topol. It comprised the digging of no less than 70 miles of sunken trench, and the employment of 60,000 fascines, 80,000 gabions and 1,000,000 sand-bags to protect the men working in the trenches and at batteries. See Siege.

APPROPRIATION, a term denoting a

specific sum set apart by the legislative power for a designated purpose. In the United States no money can be drawn from the Treasury excepting by appropriations made by law (Con¬ stitution, Art. 1). See Appropriations, Amer¬ ican System of.

Appropriation of payments refers to the application of a payment made to a creditor by his debtor, to one or more of several debts. The debtor has the first right of appropriation. No precise words are required of him, his in¬ tention when made known being sufficient, but such facts must be proved as will lead a jury to infer that he did intend to make the specific appropriation claimed. An entry made by the debtor in his own book at the time of payment is an appropriation if made known to the creditor, but otherwise if not made known to him. The same rule applies to a creditor’s entry communicated to his debtor. If the debtor does not apply the payment, the creditor may do so. There are, however, some restrictions upon this right. The debtor must have known

and waived his right to appropriate. Hence an agent cannot always apply his principal's pay¬ ment. He cannot, upon receipt of money due his principal, apply the funds to debts due him¬ self as agent, selecting those barred by the statute of limitations. A creditor having sev¬ eral demands may apply the payments to a debt not secured by sureties, where other rules do not prohibit it. The court will direct the appli¬ cation of a payment upon the failure of both debtor and creditor to do so. Payments made on account are first to be applied to the interest due thereon at the time of payment, and if the payment exceed the amount of interest, the bal¬ ance goes to extinguish the principal. 3 Sandf. Ch. (N. Y.) 608; 11 Paige Cli. (N. Y.) 619. Funds must be applied by the creditor to a judg¬ ment bearing interest, in preference to an un¬ liquidated account. When no other rules of appropriation intervene, the law applies part- payments to debts in the order of time, dis¬ charging the oldest first. The general rule is that neither debtor nor creditor can so apply a payment as to affect the liability of sureties without their consent. Where a principal makes general payments the law presumes them, prima facie, to be made upon debts guaranteed by a surety rather than upon others, although cir¬ cumstances and intent will control this rule, as they do other rules of appropriation. 5 Leigh (Va.) 329. Payments upon continuous accounts are applied to the earliest items of account un¬ less a different intent can be inferred. 5 Mete. (Mass.) 268; 23 Me. 24; 3 Sumn. C. C. 98. Where a creditor of an old firm continues his account with the new firm, payments by the latter will be applied to the old debt, prima facie, the preceding rule of continuous accounts guiding the appropriations. A different intent, however, clearly proved, will prevail. The ap¬ propriation cannot be changed, when once made, but by common consent, and rendering an ac¬ count and bringing suit declaring in a particular way is evidence of an appropriation. 9 Paige Ch. (N. Y.) 165.

APPROPRIATIONS, American System

of. The Constitution of the United States provides that no money shall be drawn from the treasury except under appropriations made by law (Art. I, Sec. IX, ft 7) and that no ap¬ propriation for the army shall be made for more than two years (Art. I, Sec. VIII, ft 12). In 1789, when the Treasury Department was established, Congress directed the Secretary to prepare estimates of public expenditures, but as explained elsewhere (see Budgets, Ameri¬ can) this is purely a formal duty and

the executive estimates (known as the Book of Estimates) merely form a basis from which Congress can formulate the plans for revenues and expenditures. Thus the only manner in which the Executive Department participates in the framing of appropriation bills is through the presidential power of veto,. and accordingly the Legislature may be said to have complete control over the expenditure of public funds. The Constitution provides that all bills for raising revenue shall originate in the House of Representatives (Art. I, Sec. VII, ft 1), wherefore it was easily assumed that, having the initiative in raising revenues, the House should also have similar control over expenditures. This right has been jealously

guarded, but the placing of control of the ex¬ penditure of public funds in the hands of Con¬ gress has resulted in scattering the responsi¬ bility, though this latter evil was not so notice¬ able when the committee on ways and means had charge of both revenue and appropriation bills. In 1865, however, the task of preparing appropriation bills was taken away from this committee and delegated to a special committee on appropriations. In 1880 and 1885 still more sweeping changes were made, the committee on appropriations being deprived of some of its powers which were given to new committees created to prepare bills for separate depart¬ ments of administration. These bills were 14 in number, of which the committee on appro¬ priations was to have charge, of six, namely: (1) Legislative, executive and judicial; (2) District of Columbia; (3) fortifications; (4) pensions; (5) sundry civil; (6) deficiency. The other appropriation bills with the com¬ mittees handling them were as follows: (1) Agriculture, committee on agriculture; (2-3) army and military academy, committee on mil¬ itary affairs; (4) diplomatic and consular, committee on foreign affairs; (5) Indian, com¬ mittee on Indian affairs; (6) naval, com¬ mittee on naval affairs; (7) post-office, com¬ mittee on post-office, and (8) rivers and har¬ bors, committee on rivers- and harbors. With this divided initiative there is a tendency for each committee to magnify the importance of the work intrusted to it and to attempt log¬ rolling in an effort to secure as large an appro¬ priation as possible, regardless of the needs or merits of claims of other departments.

Annual Appropriations. — Appropriations are divided into three classes : Annual, per¬ manent specific and permanent annual. The first class is enumerated above. Under an act of 20 June 1874, unexpended balances of ap¬ propriations (with few exceptions) remaining in the treasury books for two fiscal years are to be carried to the surplus fund and turned back into the treasury. The exceptions con¬ sisted of: (1) Permanent specific appropria¬ tions; (2) continuing appropriations

such as those for rivers and harbors and public works; (3) pay of the army and navy marine corps, since the}' often participate in long cruises; (4) claims arising under a treaty with Great Britain and pre-existing contracts. Under the head of permanent specific appropriations come those specifically made for certain definite ends but which remain available until entirely expended, such as appropriations for improving rivers and harbors and the construction of public works. Among the permanent annual appro¬ priations (which do not require annual vote but which rest upon prior enactment of laws) are payments of interest on public debt, the re¬ quirements for the sinking fund, refunds and taxes collected through error, salaries of judges and expenses of collecting customs duties. The salary items contained in the regular appropria¬ tion bills might properly be classed under the head of permanent annual appropriations, since they are authorized in other statutes. An ap¬ propriation bill not only may grant money, for a specific and definite object and for a given year, but may authorize the making of con¬ tracts that will necessitate expenditures for many years to come. Though the objects of

these future expenditures may be specified and the amounts apparently restricted, the con¬ templated new works, once begun, may consti¬ tute a basis for new demands, the ultimate cost of which cannot be foreseen.

Unless unanimous consent be obtained, new legislation cannot be introduced in an appro¬ priation bill, nor can a general appropriation bill or any amendment thereto carry an ex¬ penditure not previously authorized by law. But this rule is elastic since oftentimes an ap¬ propriation bill may be passed providing sala¬ ries for new clerks or officials in a department whose positions have not previously been sanctioned by Congress ; and sometimes the clerical force of a department is reduced or part of a service already established is elimi¬ nated. Strictly speaking, the reduction as well as the increase would constitute new legisla¬ tion. In practice it would be impossible to consider every item which involved an increase or decrease of administrative force or equip¬ ment and few objections are made to such items. But occasionally party strife becomes bitter and numerous items are objected to and thrown out. Accordingly in 1906 the House adopted a rule virtually depriving members of the right to object and placing the committee in complete power, subject, of course, to ma¬

jority vote under the ordinary procedure.

Department Heads and the Deficiency Bills. — While Congress is supposed to control expenditures and appropriations, instances have occurred whereby, through loose prac¬ tices, a department head has placed Congress in such an embarrassing position that it was really coerced into making appropriations. As Mr. Tawney, chairman of the committee on appropriations, once said : ((Many of the Ex¬ ecutive Departments proceeded on the theory that they, and not Congress, should fix the standard of public expenditure, and if the amount appropriated for the service under their jurisdiction was not in their judgment adequate, they proceeded to extend the appro¬ priation upon the basis of their estimates, and then, at the next session, would submit defi¬ ciency estimates, which, if not allowed, would necessitate the suspension of the service.® Ac¬ cordingly in 1905, in a general appropriation bill, Congress decreed that grants to depart¬ ments should be apportioned by monthly allot¬ ments so as to avoid deficiencies, though this apportionment might be waived by the depart¬ ment head if he stated the reason in writing. But department heads used this privilege so freely that Congress later enacted that the ap¬ portionment might be waived only in case of emergency. Sometimes, if appropriations for a department have been reduced and a certain bureau of that department be affected consid¬ erably by the reduction, the bureau chief en¬ deavors to secure the funds he had-requested b}ˆ drawing upon the general or permanent fund, which often causes a deficiency. Large amounts are still carried in deficiency bills, in spite of all efforts to harmonize estimates of revenues and expenditures, but this is largely due to legislation that was not contemplated when the regular appropriations were under consideration. There is also lack of harmony between the executive and legislative depart¬ ments. Sometimes a department head recom¬

mends economical changes for the good of the service or the abolition or consolidation of certain customs districts which have no fiscal justification, whereupon fearing a loss of patronage, the Congressman of the district af¬ fected attempts to defeat the proposed change. Often Congress is prodigal in its appropria¬ tions in spite of executive appeals for economy, in one case the appropriations exceeding by $115,000,000 the estimates submitted by the Sec¬ retary of the Treasury. In another instance the departments asked for an increase of 171 employees, but instead of granting the request the appropriations committee reduced the ex¬ isting number by 61. Hence Congressmen do not know whose recommendations to follow.

Appropriation bills in the Senate receive somewhat different

consideration since they do not originate there. Originally the finance, committee considered all appropriation bills, but in 1867 all bills except the rivers and har¬ bors bill were taken away and assigned to the new committee on appropriations. But in order to insure harmony, one member of each of the most important committees dealing with gen¬ eral legislation is a member , of the committee on appropriations. Through its power of amending House bills the Senate exercises an important influence in determining grants and usually increases appropriations.

The President and Controller. — The Pres¬ ident may veto an appropriation bill, but is powerless to reduce it ; he must consider the bill as a whole and cannot veto separate items. He is loath to hinder the operations of govern¬ ment because of opposition to appropriations of a certain character and, knowing this, vari¬ ous riders are attached by Congress in the hope of passing the Executive, who perhaps will prefer, not to quarrel if the bill as a whole be good. The Controller of the Treasury de¬ termines whether Congress has expressly au¬ thorized an appropriation, and the appropria¬ tion is not finally secure until he has passed upon the warrant for its payment from the treasury. This official may raise technical ob¬ jections which would prevent the payment of appropriations presumably sanctioned by the necessary authority.

State and Local Appropriations. — Gen¬ eral appropriation bills are passed .by the legis¬ latures of. all but 11 of the States, but these may not include all the money appropriated. New York has a general appropriation bill covering only absolutely necessary expenses ; a supply bill which provides for unforeseen ex¬ penditures and deficiencies ; and a supplemen¬ tary supply bill at the end of the session to care for all items omitted by the others. There are a large number of separate appropriation bills in Massachusetts. As a rule, State ap¬ propriations run for a year and any balances revert to the treasury, but in some States they run for a year after the year for which they were made. In some States the governor has the power to veto items in the appropriation bills ; in some States officials have authority to borrow to meet deficiencies in their depart¬ ments, though the amount and rate of interest are generally limited. . .No Massachusetts of¬ ficial may incur liabilities greater than the amount appropriated and the commonwealth cannot be held responsible for an excess. In

some States an officer so exceeding his appro¬ priation is held personally liable. In 32 States there is a constitutional limitation on the amount of indebtedness for deficiencies of rev¬ enues. In cities appropriation bills may be pre¬ pared either by a city council or board of aider- men, or by a board of estimate consisting of executive officials. As a rule mayors may veto separate items. See Budgets, American — Slate and Local.

Bibliography. — Adams, H. C., (Science of Finance) (New York 1912) ; Beard, C. A., (Readings in American Government and Poli¬ tics } (New York 1909), and (American City Government' (New York 1912) ; Dewey, D. R., (Financial History of the United States' (3d ed., New York 1907) ; Fairlie, J. A., Munici¬ pal Administration' (New York 1910) ; Ford, H. J., (Cost of Our National Government' (New York 1910) ; Goodnow, F. J., Compara¬ tive Administrative Law' (Vol. II, New York 1893), and City Government in the United States' (New York 1904) ; Hatton, A. R., (Digest of City Charters' (Chicago 1906) ; Hotchkiss, W. E., Che Judicial Work of the Comptroller of the Treasury' (in Cornell University Studies in History and Political Sci¬ ence,' Vol. Ill, Ithaca 1911) ; Plehn, C. C., (Government Finance in the United States' (New York 1915) ; Reinsch, P. S., (Readings in American Federal Government' (Boston 1909) ; Story, Joseph, Commentaries on the Constitution' (5th ed., Boston 1891) ; Von Holst, H., Constitutional Law of the United States' (Chicago 1887).

Irving E. Rines,

Author (History of the United Statesd

APPROXIMATION, a term in mathe¬ matics signifying a continual approach to a quantity required, when no process is known for arriving at it exactly. Although, by such an approximation the exact value of a quan¬ tity cannot be discovered, yet in practise it may be found sufficiently correct; thus the diagonal of a square whose sides are represented by

unity is V'2, the exact value of which quantity cannot be obtained; but its approximate value may be substituted in the nicest calculations. This process is the basis of many calculations in pure and applied mathematics and is of fre¬ quent use and great importance in all practical operations.

APPURTENANCE, in legal phraseology anything belonging to another thing as princi¬ pal, and which passes as incident to the prin¬ cipal thing, 10 Pet. (U.S.)25 ; 1 Serg. & R. (Pa.) 169. For instance, if a house

and land be conveyed, everything passes which is necessary to the full enjoyment thereof and which is in use as incident or appurtenant thereto. If a house is blown down, a new one erected there shall have the old oppurtenances. 4 Coke 86. The appurtenances of a ship include whatever is on board of it for the objects of the voy¬ age and adventure in which she is engaged and which belong to her owner.

APRAXIA, a term denoting a loss of power to appreciate the use and nature of common objects. Thus a patient with this af¬ fection might try to comb his hair with a tooth¬ brush or blacken his boots with a dinner-plate. It is chiefly due to a cutting off of one brain

hemisphere from the other and is thus present in hemorrhage or tumor of the brain, chiefly involving corpus callosum fibres.

APRAXIN, a-praks'm, Feodor Mateje- vitch, a Russian admiral: b. in 1671; d. in Moscow in 1724. He may be considered as the creator of the Russian navy and was the most powerful and influential person at the court of Peter the Great, who made him chief admiral. In 1708 he defeated the Swedish general Liibecker in Ingermannland and saved the newly-built city of Saint Petersburg from destruction. In 1713 he took Helsingfors and Borgo and defeated the Swedish fleet. He was twice fined for embezzlement, but, being too useful to be dispensed with, Peter in both in¬ stances neutralized the effects of the condem¬ nation by conferring upon him additional riches and dignities.

APRAXIN, Stepan Feodorovitch, Rus¬ sian general, grandson of F. M. Apraxin (q.v.) : b. in 1702; d. in 1760. He defeated the army of Frederick the Great at Gross-Jagerndorf in 1757 but, omitting to follow up his victory by proceeding to Berlin, was tried by court-martial but died before sentence was pro¬ nounced.

APRICOT, a small tree (Amygdalus ar- meniaca), of the family Amygdalacecc, long grown for its fruit and supposed to be a na¬ tive of China, whence it reached Europe by way of western Asia in the time of Alexander the Great. The fruit resembles the peach in form, color and its downy skin and has a large smooth or slightly furrowed plum-like pit. It usually ripens earlier than either the peach or the plum. The choice varieties, of which, considering the length of time that it has been in cultivation there are comparatively few, are firmer, less juicy, but probably higher flavored than the peach. The tree is plum¬ like in leaf and habit and peach-like in bark. The apricot demands practically the same general management and is as hardy as the peach and succeeds in similar climates and situations.

The Russian apricot is a rather hardy race of the common species, with small fruits of generally inferior flavor. The Japanese apri¬ cot (Amygdalus mume), rather recently in¬ troduced into the United States as the Bun- goume plum, bears small greenish or yellowish rather hard and dry clingstone fruits. Its flowers are fragrant. The little cultivated black or purple apricot (Amygdalus dasycarpa) , bears globular plum-like acid clingstone fruits. See Graftage; Orchard.

Eastern Apricot Growing. — Though grown to some extent in the eastern United States the apricot has not become widely pop¬ ular for four principal reasons : Its suscepti¬ bility to injury from late spring frosts which destroy the very early-appearing blossoms; the attacks of its special enemy, the curculio (see Plum) ; incomplete knowledge of suitable stocks upon which to work it so as to ensure its most perfect growth in various soils, etc. ; and ignorance of its dessert qualities, probably owing to the lack of systematic exploitation by nurserymen. Best results seem to be ob¬ tained upon the deep, dry, gravelly loams suit¬ ed to the apple, where such lands are situated

on the leeward side of large bodies of water or elevated and facing the north. The trees are usually set 20 feet apart and cultivated like the peach but since the fruit-bearing habit is similar to that of both the plum (on spurs) and the peach (on wood of the previous sea¬ son's growth), pruning resembles most nearly that of the plum. When properly managed and grown under favorable conditions the apricot probably equals the peach in productive¬ ness, but like other tree fruits the fruit must be systematically thinned to obtain specimens of good size and to prevent bearing in alter¬ nate years. Since the apricot is even more a dessert fruit than the peach and must be care¬ fully grown, picked, packed and marketed, only the most careful Eastern fruit-growers attempt its extensive cultivation. The chief disease, leaf-spots, is treated under Peach.

California Apricot Growing.— Though the apricot has been known in California for more than a century in the vicinity of the missions, where it was grown mainly from seeds, it has become commercially important only since American occupancy, in the early years of which improved varieties were intro¬ duced from Europe. In the Old World these varieties were trained to walls and otherwise coddled; in

California they require no such treatment. As a consequence the apricot has become a leading fruit of the State where now about 40,000 acres are devoted to this crop. The world- wide demand for the fruit, fresh, dried, canned and candied, is fostering still wider planting, and California, already the greatest apricot-growing region of the world, seems destined to be still greater. The tree is found to succeed well on the higher ground of interior valleys upon a variety of soils, but, as in the East, is susceptible in the low ground to injury by late spring frosts. For detailed account of California apricot-growing con¬ sult Bailey (Cyclopedia of American Horti- culture> (1914).

APRIL (Latin, Aprilis), the fourth month of the year, consisting of 30 days, so-called probably from the word aperire, to open, as the buds begin to open at this time of the year. It was called Ooster, or Easter month, by the Anglo-Saxons and Charlemagne, in his new calendar, called it the grass month. In the Roman calendar April was the second month of the year and it was Julius Caesar who added the 30th day to it; during Nero's reign it was called Neroneus; and in the Athenian calendar it corresponds to the latter portion of Elaphe- bolion and to the greater part of Munychion. In the French revolutionary calendar, as adopted by a decree of the National Conven¬ tion on 24 Nov. 1793, it was merged into the last part of Germinal (bud month) and the first part of Floreal (flower month). Thus Germinal corresponds to the period 21 March to 19 April, and Floreal to the period 20 April to 19 May. See Calendar; Epoch.

A PRIORI, a term in logic denoting the negation of a posteriori. To prove anything a priori means to do it on grounds preceding ac¬ tual experience or independent of it. Mathe¬ matical proofs, for example, are a priori. On the contrary, judgments or proofs a posteriori are founded on knowledge before acquired,

like the conclusions of natural history and all experimental science. In ordinary speech a thing is said to be proved a priori when de¬ ductively derived from a more general princi¬ ple, even though that principle may itself be derived from experience. This, however, is not the sense which the phrase bears in philos¬ ophy. By a priori knowledge Kant, who origi¬ nated the transcendental method of philosophy, means that which is independent of all experi¬ ence, such as, iii his opinion, the knowledge of the fact that space has three, and no more than three, dimensions. The marks of a prior knowledge, according to that philosopher, are, first, that it is necessarily true, and second, that it is absolutely universal, in the logical sense — ■ that is, true of the whole subject: in the example just given it was Kant's opinion that space not only has, but must have, three dimensions and

can have no more; and that this is true of all space and not merely of some spaces. Sec Logic ; Kant ; Deduction ; Induction; Empiricism; Transcendental¬ ism ; etc.

APSE, an architectural term applied to a semi-circular or polygonal portion of a build¬ ing, roofed in by itself and most commonly appearing as the eastern termination of a church. The apse is a feature of Roman origin, corresponding to the curved recess in which sat the presiding magistrate and his as¬ sessors in the basilica or hall of justice. In front of the apse stood an ' altar for public sacrifices. When the Christians received the protection of the state in the time of Con¬ stantine, basilicas were frequently used for their assemblies, the bishops occupying the seats originally appropriated to the presiding magistrates and the inferior clergy filling the seats of the assessors, the altar still keeping its place. In the cathedrals of France, Ger¬ many and Italy the apsidal termination is fre¬ quently met with; in England it is less com¬ mon, but examples are found in Westminster Abbey and the cathedrals of Canterbury, Rochester, Norwich and Peterborough and several parish churches; examples may also be seen in Scotland in the churches of Kirk¬ liston and Dalmeny in Linlithgowshire and ot Leuchars in Fifeshire. Transepts with apsidal ends occur on the Continent, while apsidal chapels opening eastwardly from the transepts are found in England in churches of Norman date.

APSIDES, ap'si-dez (the plural of Apse or Apsis), an astronomical term designating the two points in the elliptic orbit of a planet where it is at the greatest and the least dis¬ tance respectively from the body around which it revolves. The moon moving in an elliptic orbit around the earth, which is situated in one of the foci, is at what was anciently called its higher apse when in apogee and at its lower one when in perigee. Similarly the primary planets, including the earth and some of the comets, moving in elliptic orbits around the sun, which is situated in one of the foci, pass through their higher apse when in aphe¬ lion and their lower one when in perihelion. It is the same with the satellites of Jupiter when they are farthest from Jupiter and nearest to it;

The line of the apsides is the line connect¬ ing the two apsides of a primary or secondary planet.

The progression of the moon's apsides is a slow movement in the position of the apsides of the moon produced by the perturbing at¬ traction of other heavenly bodies. It is about three degrees of angular motion, in one revo¬ lution of the moon and in the same direction as her progression in her orbit. The apsides of .the primary planets are also perturbed.

APSLEY STRAIT, a narrow channel be¬ tween Melville and Bathurst Islands, off the north coast of Australia. It is about 40 miles in length, with a breadth varying from two to five miles. The land is low on either side and the shores bordered by a broad belt of impenetrable mangroves and indented by numerous salt-water creeks, which present the appearance of rivers. Alligators of enormous size abound in the Straits, many of them measuring from 14 to 17 feet in length. A set¬ tlement was formed in 1824, on the Melville Island side of the channel, about 8 or 10 miles from its northern entrance, but subse- quently abandoned.

APTERYX, a strange flightless bird of New Zealand, representing the Apteryges, a group of ratite birds nearly related to the extinct dinornis. Four or five species are known in the various islands of the New Zealand group, besides two fossil species. These curious birds, called <(kiwis** by the na¬ tives, are about the size of domestic fowl and have very stout legs, wings reduced to a mere useless stump, long snipe-like beaks and no visible tail. The plumage is colored in streaked browns and grays, and the feathers are incom¬ plete, the disunited filaments giving them the appearance and feeling of coarse hairs. Kiwis inhabit the forested hills, going about in small flocks which during the day hide in the thickets or in cavities of the ground or rocks. They sleep during the bright part of the day rolled up into a ball, but sometimes rest for a long period in a standing position, with the point of the bill touching the ground, as though they were leaning upon it. Their feeding-time is in the dusk of early morning and at evening and their diet consists chiefly of worms, which they search for apparently mainly by the sense of smell and obtain by probing the ground with their long bills. The nostrils are at the tip of 'the beak, which is also flexible and ex¬ tremely sensitive to the touch, so that a worm may be detected when it is touched, although the bill may need to be thrust its length into the ground. The nest is usually at the end - of a round tunnel dug in soft earth by the female and consists of a little dry fern or a few leaves. The eggs, generally two in number and incu¬ bated mainly by the male, are remarkable for their size, since they are equal to a quarter of the mother's weight. They are greenish white in color with a smooth surface. As might be expected from the size of the egg, the de¬ velopment of the young reaches a high degree

of maturity before hatching. The Maoris are very fond of the flesh of the kiwi, either roasted or boiled, and their persistent hunting had greatly decreased the number of the birds before white men reached the islands! Since

that time dogs and other accompaniments of civilization have nearly exterminated these birds, which are the sole survivors of the moas. I he most complete description of their habits will be found in Buller's (Birds of New Zea¬ land *(2d ed., 1888). For 'anatomical de¬ tails and relationships consult Parker's memoirs in the Philosophical Transactions) for 1891 and 1892. A good summary of this information will be found in Newton's dictionary of Birds* (1896). See Dinornis; Moa.

APTHORP, William Foster, American dramatic and musical critic: b. Boston, Mass., 24 Oct. 1848; d. 1913. He was graduated from Harvard University in 1869 and pursued his musical studies under J. K. Paine and B. J. Lang. He taught in the New England Conservatory and College of . Music to 1884, was musical critic for the Atlantic Monthly 1872-76; the Boston Sunday Courier 1876-78; and the Evening Traveler 1878-80. He was musical and dramatic critic for the Boston Evening Transcript for 20 years and was the critical editor of Scribner's (Cyclopa:dia of Music and Musicians. *He wrote (Hector Berlioz* (1879); (By the Way*; (Musicians and Music Lovers* ; (The Opera, Past and Present.*

APUKHTIN, a-pooh'ten, Aleksei Niko- layevitch, Russian man of letters, b. Bolkhov, 15 Nov. 1840; d. 17 Jan. 1893. He descended from an old noble family. A man of extraordi¬ nary ability, he, while yet a child, betrayed an astounding memory and a fondness for read¬ ing, especially of poetry. While yet under 10 he knew by heart the works of Pushkin and Lermontov. Besides these his favorite poets and authors of later years were Gri¬ boyedov, Baratinski, Tyuchev, Fet, A. Tolstoi, L. Tolstoi, Turgenev, Dostoyevski and Ostrov¬ ski. In 1852 he entered a law-school from which he was graduated with distinction in 1859. He then entered the civil service as a member of the Ministry of Justice and after two years retirement in the country (1862-64), became associated with the Ministry of the In¬ terior. Because of a chronic disease (obesity), which began developing in his youth, he kept away from society. He spent most of his life in Saint Petersburg. His literary career began while he was yet a student. To his juvenile produc¬ tions belong 35 poems which due to his self- criticism appeared only in a posthumous edi¬ tion. His other attempts of childhood (*Epami- nondas,* ˆImitation of the Arabic, *(Ode on the occasion of the birth of the great duchess Vera Konstantinovna*) were published in the Invalid, 1854—55. His poems o£ 1859-62 ap¬ peared

.in the periodicals Sovreniennik, Vremya and Russkaya Riech. They met with great success and earned the approval of Turgenev, Nekrassov and Fet. Despite this approval he wrote nothing during 1862-68. His best works belong to the period which followed this pause. At first he did not publish anything. His works of 1868 (Requiem, *(A Night in the Monastery,* {01d Love, *and a few others were circulated in manuscript. In 1872 his poem (The Unfinished Monument* appeared arionv- mottsly in Grachdanik (Citizen). Only in 1884 did he begin to contribute to Viestnik Yevropui, Russkaya Muisl and Sievernui Viestnik. The

first edition of his works appeared in 3,000 copies in 1866. In 1890 he began writing novels. At his request his three novels (From the Archieves of a Countess) (1890), (Diary of Pavlik DolskP (1891) and (Between Life and Deaths (1892) were published posthumously. He was, however, at his best in his poems. His poetry is characterized by sincerity, sim¬ plicity, purity and deep feeling. Their form is elaborated with great care. Some of his poems ((Mad Nights*) have been set to music. Translations of some of his works ((The Russian Parnassus,* (Flies, *(I am not sorry,* (01d Love*) are contained in the collection of Fidler. Criticisms can be found in Rus- skaya Muisl (No. 5, 1886) ; Viestnik Y evropui (Vol. 2) ; Arsenyev, K. K., (Critical Studies* ; Gogorov K., Contemporary Poets *; Vengerov, Critical and Biographical Dictionary of Russian Writers and Scholars* ; Skabichevski, (History of Modern Literature.*

APULEIUS, or APPULEIUS, Lucius,

a satirist and philosopher of the 2d century: b. at Madaura, in Numidia; the time of his death is unknown. He was author of the cele¬ brated satirical romance called the Colden Ass. *He first studied at Carthage, then re¬ nowned as a school of literature, and afterward went to Athens, where he became an ardent follower of the Platonic philosophy. Falling ill while on a journey he was hospitably received in the house of Sicineus Pontianus, a former fellow-student, whose widowed mother Apu- leius married. Soon after Pontianus died, and the relatives of the rich widow publicly accused Apuleius of having used magical arts to gain her love. The speech by which he successfully defended himself (Apologia sive Oratio de Ma* gia, *is still extant. The remainder of his life, which he devoted to oratory and literature, seems to have been passed at Carthage, where, as in some other cities, a statue was erected in his honor. His (*

Metamorphoses, (Golden Ass,* a romance in 11 books, contains wit, humor, powerful satire and much poetical merit. It is supposed to have been intended as a satire on the hypocrisy and debauchery of certain orders of priests, on the tricks of pre¬ tenders to supernatural powers and on the prevalent vices generally. The finest part of this work is the episode of Psyche, called by Herder the most tender and many-sided of all romances. It is sufficient to render him im¬ mortal, even if he be, as some have supposed, only the narrator and not the inventor of the story. Apuleius was also the author of many works on philosophy and rhetoric, some of which are still extant. Cervantes, Le Sage, Boccaccio and others are indebted to Apuleius for various episodes. Consult edition of his com¬ plete works, Hildebrand (1842) ; Van Vliet (1897-1900). An English translation by Head was published in Bohn's Classical Library in 1851. See Golden Ass, The.

APULIA, province of southern Italy, composed of the provinces of Foggia, Bari and Lecce; area, 8,539 square miles; pop. about 2,000,000. The northern part forms the Apu¬ lian Plain, a rather barren tract on the whole, although affording extensive sheep pastures and isolated spots capable of cultivation, on which are wine, olives, southern fruits and maize. The isolated mountain Gargano here attains

the height of nearly 5,000 feet. The most im¬ portant river is the Ofanto (Aufidus). There are four coast-lakes of considerable size. Lake Salsi dries up in a great part in summer, and on its banks are the great salt-boiling works of Barletta. There is a considerable trade in grain, oil, salt, southern fruits, cattle, wool, etc. Apu¬ lia was in ancient times inhabited by several peoples, such as the Apuli, Messapii and Daunii. It was subdued by the Romans in 317 b.c.

APURE, a'poo-ra', river in Venezuela, formed by the junction of several streams issu¬ ing from the Sierra de Merida. After an east¬ ern course of about 300 miles it falls into the Orinoco at Capuchino, It is navigable through¬ out almost its entire course.

APURIMAC, a-poo're-mak', a highland department 6f Peru, embracing a territory of 8,187 square miles and lying between the de¬ partments of Cuzco and Ayacucho. Its capital is Abancay. It has extensive upland pastures, and the soil, fertile in the main, is watered by the Apurimac River and its tributaries. Agri¬ cultural products are cereals, sugar, rice, coffee, maize, potatoes and cocoa. The products of the mines are gold, silver, saltpetre and cop¬ per. The provinces are Abancay, Aimaraes, Andahuailas, Antabamba and . Cotabambas. Number of inhabitants (1916) 133,000.

APURIMAC, Peruvian river in South America, the outlet of a lake in the Andes of Peru, in the province of Arequipa, not far from Caylloma. It is probably the tributary of the Amazon rising nearest the Pacific Ocean. It flows through a mountainous country in a northerly direction, and, joining the Yucay or Vilcamayu at lat. 9° 15' S. ; long. 72° 30' W., forms the Ucayale, one of the principal trib¬ utaries of the Amazon. Its entire extent is between 500 and 600 miles.

APUS, a name designating a fresh-water phyllopod crustacean, remarkable for having 47 body-segments, 20 being the normal number in Crustacea. It also has 60 pairs of limbs. The body is protected by a large carapace resem¬ bling that of the king-crab (q.v.) in that it is adapted for burrowing in soft mud at the bot¬ tom of lakes or pools. Apus is locally distrib¬ uted over western North America, Asia and Australia. One form (Lcpidurus gacialis) lives in pools in the Arctic regions. It under¬ goes a complete metamorphosis, its larva being a ((Nauplius *(q.v.). Consult Packard, (Mono¬ graph of North American Phyllopod Crustacea (1883) ; Bernard, (The Apodidse* (1892). See Phyllopoda. The family (Apodidce) appears to be of great antiquity. .

AQUA (Latin, water), a word used by the alchemists and early chemists for solutions or other fluid preparations in which the men¬ struum is water. Aqua ammoniac (((ammonia water**) is an aqueous solution of ammonia gas (NH3). Aqua fortis (((strong water**) is ni¬ tric acid. Aqua regia ((<royal water**) is a mix¬ ture of nitric and hydrochloric acids, the name (bestowed by Basil Valentine) referring to its power of dissolving gold and other so-called noble metals. Aqua vitce (<(water of life**), so- called by Avicenna, is common grain alcohol. The word <(aqua* *is still in general use in phar¬ macy for designating aqueous solutions or in¬ fusions*

AQUADAG. The name of a lubricant whose basal constituent is graphite. It is made by treating graphite with tannin and various plant extracts which reduce it to so fine, a state of subdivision that it passes readily through a standard filter paper and remains permanently diffused in water. The treatment by which the graphite is thus reduced to infinitesimal par¬ ticles is called (<deflocculation.® The name of the product is formed from the word <(aqua,® meaning water, and the initial letters of the phrase rtdeflocculated Acheson-Graphite.® This lubricant has the valuable power of preventing the rusting of metal which is immersed in the water carrying the graphite. The

benefits of such a product are numerous and practical in the manufacturing world. Patents on the various processes of the manufacture of Aqua- dag have been taken out in 23 countries, which practically include the whole of the industrial world, and the word itself has also been trade marked in many countries.

AQUˆE SOLIS, the ancient Roman name of the modern English city of Bath. It was famed for the splendor of its buildings and its many springs, and the remains of several Roman baths have been discovered here.

AQUAMARINE, a -kwa-ma-ren' (from the Latin aqua marina, <(sea water,® a bluish- green variety of beryl (q.v.) esteemed as a gem. Siberia and Brazil have long been cele¬ brated localities, while magnificent gem mate¬ rial has lately been mined in North Carolina.

AQUARIANS, a name applied to Christian ascetics in the primitive Church, who conse¬ crated water instead of wine for the celebra¬ tion of the Lord's Supper — either for the sake of abstinence, or because they thought it un¬ lawful to drink wine.

AQUARIUM (Latin, a watering-place for cattle, from aqua, water), a term applied to a tank or smaller receptacle filled with water and stocked with aquatic animals and plants for study, or, in the smaller examples, for mere beauty and interest. To maintain nat¬ ural conditions, both plants and animals must be present — the plants to give off oxygen for the animals, as well as to furnish food for many of them and the animals to supply car¬ bonic acid to the plants. With aeration and the removal of any dead animal or rotting plant, the water may be kept in good condition for a long time if supplied with a number of mollusks for the consumption of the too abun¬ dant growth of the algse and of their spores, which otherwise soon fill and discolor the water. When aquaria are placed in insufficient light noxious fungi sometimes develop in them, doing injury to the other inmates. The secret of success in conducting an aquarium in a necessarily confined space is the scientific bal¬ ancing of plant and animal life, and their proper relation to the volume of water. This once accomplished, the water need never be changed. There may be a small accumulation of sediment to be removed at long intervals, and sufficient water may be added to replace that lost by evaporation. The commonest mis¬ take (to be avoided) is overcrowding. > The space in which a few animals will thrive in de¬ lightful fashion may prove a ((chamber of hor¬ rors® if too many animals are placed in it.

There is not the same danger in an oversupply of plants, and it is

better to err in this direc¬ tion than to scant the provision. However, if there are too many plants, the weaker growers will begin to die off. Then either the vege¬ tation may be reduced or another animal may be added to secure the perfect balance.

It should be remembered that in nature the only light reaching a pool comes from over¬ head. The artificial pool should counterfeit the natural conditions as nearly as may be. While it adds much to the pleasure to be derived from an aquarium to have it at a window so that the light may come through the sides, the ends should be dark, and in no case should the direct rays of the sun be allowed to penetrate into it. A curtain or shield which may shut out all light as high as the top of the tank is an advantage. It can be lowered when a clear view is desired.

Plants give off oxygen only under the in¬ fluence of light and none at all at night. For this reason aquarium plants able to give just the needed oxygen by day are not sufficient to leave enough oxygen dissolved in the water to last the animals all night, and it is not un¬ common to see the fish at the top of the water in the morning ((sucking air,® even in carefully handled aquariums. This condition suggests its own remedy in the addition of one or more plants. In winter, for the same reason, the aquarium requires at least one-third more plants, the daylight being so short and the period of inaction of the oxygen producers so long.

A cubic foot of water gives room enough for not more than three fish three or four inches long. Besides these there may be two newts, which obtain a large amount of the oxygen they need by rising to the surface and filling their air sacs. Two or three tadpoles and as many water snails will be needed to act as scavengers. They clean up decayed vegeta¬ tion, surplus food and the excreta of the higher animals. A crawfish and a small turtle may be added. In choosing the fish it is well to know that gold fish and all kinds of carp are not carnivorous, and so more easily fed, and there is less danger from uneaten food. The catfish and sunfish, however, are easy to keep, and specially prepared food may be bought for them. A variety of plants is desirable, but every aquarium should have several specimens of Vallisneria spiralis, noted as an abundant producer of oxygen. The marine aquarium is even more interesting than the frtsh water type and falls under the same rules. Salt water fish are in general carnivorous, and while they are easily fed with bits of fish or oysters, any uneaten food rapidly decomposes and fouls the water.

All aquarium fish, but particularly those in fresh water, are subject to

fungous parasites which attack their eyes, gills or any chance wound. They may frequently be cured by re¬ moval to a separate vessel in which is a large oversupply of plants, and where the light is strong on one side. Any ailing fish should re¬ ceive this <(oxygen cure.® The large public aquaria which exist in many cities are a great aid to students and a constant source of enter¬ tainment to the people. In America the aquarium of the United States Fish Commis¬ sion at Washington and New York city

aquarium are most important. The latter is under the control of the New York Zoological Society and was established in 1897 in old Fort Clinton (known for many years as Castle Gar¬ den) on the Battery. It is entirely free and has a daily average of 4,000 visitors ; both ma¬ rine and fresh-water animals are exhibited. In the floor are seven large pools, and the wall tanks number nearly 100. All the arrange¬ ments are the best which experience has yet suggested, and opportunities for special study of ichthyology and the natural history of ma¬ rine animals are afforded. ' In Europe the aquarium at Brighton, England, and particu¬ larly that connected with the Marine Labora¬ tory at Naples, are of the greatest interest and importance. Consult Smith, G. E., (The Aquarium > (New York 1900) ; Smith, E., (The Aquarium and How to Care for IF (New York 1902) ; Eggeling, O., and Ehrenberg, F., (The Fresh Water Aquarium and Its Inhab- itants5 (New York 1908) ; Verrill, Unverte¬ brates of Vineyard Sounds in the annual re¬ ports of the United States Fish Commission for 1871-72; Wolf, H. T., (Goldfish Breeds and other Aquarium Fishes* (Philadelphia

1908).

Ernest Ingersoll.

AQUARIUS (the water-bearer), in as¬ tronomy (1) the 11th of the 12 ancient zo¬ diacal constellations, now generally called signs of the Zodiac. (2) A division of the ecliptic — that between 300° and 330° of longitude which, on account of the precession of the equinoxes, has gradually advanced from the constellation Aquarius, once within those limits. The sun enters this part of his course about the 21st of January, at which time there are generally copious rains in Italy, whence the name Aqua¬ rius = the water-bearer or water-man (Her- schel's (Astronomy, } §§ 380, 381). It is

marked thus •

AQUATIC ANIMALS, a term denoting animals living constantly in water, and also those which swim on its surface or plunge be¬ neath it for food. While the great majority of crustaceans are aquatic, a few, such as the wood-louse and the land crab, are modified for life ashore. Among mollusks there is oc¬ currence of both aquatic and terrestrial habit, while numerous forms illustrate the transition from the former to the latter. The ascidians are exclusively marine. Some fishes have a limited power of life out of the water, the double-breathing Dipnoi being in this connec¬ tion especially instructive. Among many am¬ phibians the transition from water to terra firma is seen in the individual life-history, when the fish-like gilled tadpole becomes the lunged gill-less frog; while in a few exceptional cases such as the black salamander of the Alps, the life is terrestrial from first to last, and even the young dispense with their preliminary swim as tadpoles, although a brief recapitulation of their aquatic life is still represented by a gilled stage within the body of the parent. The in¬ stance of the gilled axolotl becoming, in the absence of sufficient water, the gill-less ambly- stoma, forcibly illustrates the importance of the medium as a factor in evolution. Among reptiles there are numerous aquatic forms — chelonians, lizards, snakes and crocodiles — though the absence of any gill respiration

marks the progressive general adaptation to terrestrial life. While an emphatically terres¬ trial amphibian like the tree-frog seeks a watery hole for the rearing of the young gill¬ breathing tadpoles, the habit is reversed in such reptiles as the sea turtle, which, having re¬ turned to the more primitive, aquatic home, yet revisits the land for egg-laying purposes. The cradle of the young in both cases indicates the ancestral habit of the parent. Among the emphatically aerial birds there are cases, like that of the penguin, where the structure has become adapted to an almost exclusively aquatic life. Among mammals the sea-cow, the seal and the whale are familiar illustrations of very

different types which have returned to the primeval watery home and aquatic habit, with consequent change of structure.

It is important to note the general fact that, in the water, animals are subjected to influences somewhat different in detail from those which mold their congeners ashore. Even contact with a different medium, varying in composi¬ tion, in currents, in pressure, in contained food and oxygen, and the like, obviously involves a great diversity in structure. Modes of motion, from the swimming-bell of a medusoid con¬ tracting and expanding in the tide, to that of the lowest vertebrates as illustrated in the pelagic tunicates, or from the paddling of worm and crustacean to that of fish and frog, duck and seal, are at once familiar adaptations to, and necessary results of, aquatic life. Sim¬ ilarly the smooth and frequently fish-like form, especially of actively locomotive water- animals, is a very noticeable adaptive result of the conditions of life. In the more thoroughly aquatic animals, which have remained in the primitive environment, and not merely returned to it, the blood is usually purified by being spread out on feathery gills which catch the oxygen dissolved in the water ; while in ter¬ restrial forms which have betaken themselves to an aquatic life, the ordinary direct <(air- breathing** is still accomplished at the surface of the water, or in some isolated cases of in¬ sects and spiders, by means of the air entangled in their hairs, or even conveyed into their sub¬ merged homes. The aquatic respiration of some larval insects, the power that some crus¬ taceans and fishes have of keeping up a res¬ piration on land with a minimum of water about their gills and, above all, the cases of the double-breathing fishes or Dipnoi, and of am¬ phibians already referred to, are especially in¬ structive in regard to the problem of transi¬ tion from one medium to the other. The gen¬ uinely aquatic animals are known to have a body temperature not much higher than that of the surrounding medium, and often survive even the freezing of the water; while in the higher warm-blooded vertebrates which have returned to an aquatic habit, various modifica¬ tions, such as thick fur and plumage, water¬ proof varnish, formation of blubber, serve as protections against the cold.

AQUATIC PLANTS, a term applied to

plants growing in or belonging to wrater. All vegetation was probably aquatic at first, cer¬ tain plants becoming terrestrial by degrees. Numerous plants are, moreover, in the strict sense of the word aquatic, having never ac¬ quired or having lost all direct connection with

the soil. The algae are mainly aquatic, though many occur in damp situations on land, or on other organisms, while others remain for long periods quiescent in comparative dryness. Many algae are absolutely isolated in the water, while others are more or less intimately fixed to some solid substratum. Fungi are very sel¬ dom found in water, and lichens are also em¬ phatically terrestrial. Some liverworts, again, occur floating in lakes, but the majority grow in very damp places and mark the transition to the generally terrestrial life of mosses and ferns.. Some rhizocarps, such as Salvinia, are aquatic, with leaves rising to the surface, while others are land or marsh plants, like the higher horse-tails and club-mosses.

Among the flowering plants, or phanero¬ gams, a return to aquatic life is exhibited by numerous though exceptional cases, while a very large number grow in moist situations and have a semi-aquatic habit. The simple mono¬ cotyledons, known as Helobice, or marsh lilies, are more or less strictly water-plants. The arrow-head (Sagittaria) , and other Atisma- cece ; the Butomis of the marshes; Hydrocharis, with floating kidney-shaped leaves ; the water- soldier (Stra'tiotes) , with narrow submerged leaves; and the Canadian pond-weed (Anacha - ris), which, though entirely flowerless in Eu-' rope, threatens to choke some canals and lakes, are familiar representatives. The little duck¬ weed {Lenina), floating on the surface of stag¬ nant pools, is one of the commonest aquatic monocotyledons; and the pond-weeds (Pota - niece) found in both fresh and salt water; the lattice plant (Ouvirandra) , with its skeleton leaves; various estuarine and fresh-water naia- daceous plants — for example, Zostera and Naias, are also common instances, while those grow¬ ing in marshy ground are far too numerous to mention. Among dicotyledons the white water-buttercup (Ranunculus aquatilis), with its slightly divided floating and much dissected submerged leaves ; the yellow and white water-lilies {Nymphcea) ; the sacred lotus flower of the Ganges and Nile (N elnmbium) ; the gigan¬ tic Victoria regia of tropical South America; and the insectivorous bladderwort or Utricu- laria , are among the more familiar aquatic forms.

AQUATINTA, the name given to a meth¬ od of engraving or etching upon copper or steel, invented by Leprince in 1760. The out¬ line of the subject having been etched and bit, the plate is thoroughly cleansed and a thin layer of etching ground is again spread over it. When dry the parts of the subject to be aquatinted are carefully painted over with a mixture of olive oil, turpentine and lamp¬ black; this fluid, laid on with a hair pencil, quickly dissolves the parts of the

ground it covers, which are then wiped off. The plate is next dusted all over with a finely-powdered white resin or mastic, and when equally dis¬ tributed the superfluous resin is shaken off and the plate gently heated over a charcoal fire till the resin dissolves and adheres to the bare metal. In dissolving, the grains of the resin run into small granules, ‘leaving minute and peculiarly shaped portions of the metal open to the action of the aquafortis, a weak solution of which is then poured over the plate. When corroded to the proper strength the subject has acquired what may be termed the first wash of

color. 1 he plate is then cleaned, re-covered with ground, and treated as before, for the second tint. The process is repeated until all the deeper tones of shading are completed. These operations are sometimes reversed, the darkest shades being first bit in and the lighter ones added by degrees.

AQUEDUCTS. Aqueducts are artificial channels and structures connected therewith, for conveying water from one point to an¬ other. In a broad sense the word is generic, applying to all such channels or structures, but it. is now generally restricted to elevated struc¬ tures or tunnels designed to convey water by gravity for municipal water supply, though it is not infrequently used in connection with ir¬ rigation, water power and other hydraulic de¬ velopments.

Water being a prime necessity for the sup¬ port of both animal and vegetable life, it is not surprising that devices and means for supplying it in large quantities for domestic use in cities and for irrigation purposes attracted the early attention of mankind. Their construction and use dates far back of the historical period, and they were doubtless among the earliest and most important engineering undertakings of ancient times. The ruins of these early canals and water-supply works are found in Phoenicia, Babylonia, Assyria, Egypt, Persia and Pales¬ tine. Some of them were of such magnitude and designed and constructed with such bold¬ ness and skill as to excite the wonder and ad¬ miration of the modern world.

Ancient Aqueducts. — The Phoenicians were especially notable for the character, extent and boldness of their hydraulic works and, consider¬ ing the means at their command, it is surprising what they accomplished.

At a later period Greece and Rome became famous for their water-supply projects and the building of great aqueducts. In Greece, early examples of tunnel constructions for water supply were quite

common, some of them being of comparatively great length and, at places, more than 100 feet below the surface. One such tunnel at Samos was four-fifths of a mile long, the interior dimensions being 8x8 feet — the water conduit proper being an independent stone trough. Athens was supplied by several aqueducts, built from time to time as the city grew and a larger water supply became needed. One of these, begun some 600 years b.c., under the Emperor Hadrian, is still in use.

Rome was supplied with water by about a dozen aqueducts built at different periods, nine of which are commonly referred to by writers as the more important. The first, the Aqua Appia, was built about 300 years b.c. It was about 1 1 Roman miles long and almost wholly underground. Among the latest of the nine to be built were the Aqua Claudia and the Anio Novus, completed in the first half century of the Christian era.

Some of these aqueducts would be consid¬ ered as stupendous undertakings in modern times. Thus the second one built, the Anio Vetus, was more than 40 miles long, mostly in tunnel. The Aqua Marcia, built about 140 b.c., was 60 miles long, about six miles of which were above ground, carried on masonry arches.

The Aqua Tepula, some 11 miles long, was carried for more than half the distance on a second series of arches, superimposed upon

those of the Aqua Marcia. The Aqua Augusta was 22 miles long, of which something over 1,000 feet were carried on masonry arches. The Anio Novus, 62 miles long, was carried across the Campagna for more than nine miles by a series of masonry arches, part of which still remains a conspicuous feature of Roman scenery. The water channel carried above the arches was from three to four feet wride and nine feet high, the inside being lined with Roman cement.

Not only at Rome, but in many places throughout the empire did the Romans build great aqueducts. Among the most noted of these may be mentioned those at Servigonia, Italy; Segovia and Tarragona, Spain; Metz in Alsace-Lorraine ; Carthage, Constantinople, and Nimes in France. The latter, now known as the Pont du Gard, is a magnificent structure across the river Gardon, built in the 4th cen¬ tury a.d. It has three tiers (or stories) of masonry arches, one above the other. The

lower tier has one arch (over the river), of 75 feet span and five others of 60 feet span. The third or uppermost tier is made up of a series of smaller arches, in all 873 feet long, the greatest height over the river being 188 feet. The masonry water conduit, covered by fiat * stones and lined with cement, is about four feet wide and four and one-half feet high. This grand structure, still standing in a good state of preservation, compares favorably in its en¬ gineering and architectural features with any similar work of modern times.

The aqueduct at Segovia has an arched masonry structure nearly half a mile long, hav¬ ing 109 arches which reach a height of slightly over 100 feet. The aqueduct at Tarragona, Spain, is 876 feet long and 83 feet high; that at Metz, built in the 4th century A.D., now partly in ruins, was carried across the river Moselle by a masonry structure 60 feet high ; that at Antioch, Syria, of rather unusual design, is 700 feet long and 200 feet high; that at Moris is about 500 feet long and 80 feet high, built in three tiers of arches, the uppermost of which is of brick. The Roman aqueduct at Carthage was about 60 miles long, a part of it carried by an arched masonry structure about 50 feet high. Many other notable aqueducts were built in early Roman times in Europe, Asia Minor and Africa.

With the decline of the Roman empire the building of great aqueducts almost ceased dur¬ ing the Middle Ages, though there are a few notable examples. That at Spoleto, Italy (800- 900 a.d.) , seems to have been the first instance where the Gothic arch was introduced into aqueduct work. With a height of 300 feet and its 10 arches of 66 feet span, it was of espe¬ cially light and graceful design. Among sev¬ eral mediaeval aqueducts at Constantinople, that of Justinian ((<Muallak Kemerˆ) is re¬ markable for the beauty and excellence of its design and construction. It is 720 feet long and 108 feet high, having two tiers of pointed arches, the lower having spans of 55 feet and the upper ones of 40 feet.

The Greeks and Romans had little choice in the materials or methods of aqueduct build¬ ing. Large pipes, of any material, were not available, though where pressure was to be re¬ sisted the earlier builders sometimes used as a

substitute large blocks of stone pierced with a hole of the required size for the conduit, the faces of the blocks being dressed to fit to¬ gether and to make joints as nearly water¬ tight as possible. The Romans built their water conduits, both in tunnels and over via¬ ducts, of masonry lined internally with Roman cement. The driving of long tunnels, often at considerable depths below the surface, must have

been a slow and costly process with the tools and methods then knowm. The difficulties of following correct alignments and gradients underground, with the knowledge and instru¬ ments then available, were very great, as evi¬ denced by the tortuous course of many of these tunnels. For the elevated structures stone masonry was the only adequate construc¬ tion then available. The extensive use of hy¬ draulic concrete had not been developed, though occasionally employed, but Roman cement was generally used for water-proofing. Their masonry was generally built up of large blocks of granite or other hard and durable rock, with fairly well-dressed joints, laid dry; that is, with¬ out mortar. Their foundation work seems to have been of a high order, for foundation fail¬ ures in these great structures were very rare. Brick was used to some extent, especially in their later constructions, and there are ex¬ amples of brick-faced masonry backed by concrete.

Modern Aqueducts. — The resumption of aqueduct building on a large scale dates back less than 200 years, and most of the aqueducts of any considerable magnitude are of quite recent construction. A few of the more notable on the eastern continents may be men¬ tioned.

Marseilles has a (now navigable) canal, .constructed 1837-48, 97 miles long, connecting the river Durance with the Mediterranean, and the city's water supply is carried from this canal over the river Arc by the magnificent masonry aqueduct of Roquefavour.

The Thirlmere Aqueduct supplies Manches¬ ter with about 50,000,000 gallons of water per day, bringing it from lakes 96 miles from the city. Of this length, 14 miles are in tunnel, 37 miles are (<cut and cover® work, with a water channel 7x7 feet, and 45 miles are of cast-iron pipes, the design being for five pipes of 40 inches internal diameter adjacent to each other, only three of which have yet been laid. (The term <(cut and cover® work may be briefly defined as a conduit of masonry or other material, constructed in an excavated trench wide enough to receive it and of such depth that when completed and the excavated material filled back, the conduit will be entirely covered and thus become, in effect, a tunnel). The cost of this aqueduct in its present condi¬ tion has been in the neighborhood of $20,000,-

1.

Liverpool is supplied with water from the river Vyrnwy in northern Wales, delivered through an aqueduct 68 miles long, consisting, for the most part, of two lines of cast-iron pipe from 39 to 42 inches in

diameter, provision be¬ ing made for a third pipe when it becomes necessary. The fall from the Vyrnwy to Liv¬ erpool is so great (550 feet) that it was neces¬ sary to relieve the pressure in the pipes by in¬ terposing equalizing reservoirs at a number

AQUEDUCTS

1 Cut-and-Cover Work on steep slope in Mountain Division, Los Angeles Aqueduct

2 Open Lined Conduit in Owens Valley, showing Owens Lake in background, Los Angeles Aqueduct

3 Siphon Crossing, No Name Canyon on Concrete Piers, Los Angeles Aqueduct

AQUEDUCTS

1 Catskill Aqueduct — Typical cut-and-cover aqueduct construction, showing excavated trench, steel forms, partial and

complete concrete aqueduct and ungraded earth cover. The waterway is 17 feet high and 17§ feet wide, and has an area of 241 square feet

2 Typical pressure tunnel construction, showing completed excavation and partial and completed concrete lining. The

predominating diameter is 14 feet, 6 inches and the pressure tunnels always have a cover of at least 150 feet of sound rock

AQUEDUCTS

t

)

M&df]

Cot skit! Water wdi rrse withe

CMAMBCf?

3 W SHAFT

J

Y

ROCK

PRESSURE TUNNEL

'rr "

VALVE

■% rv'T

«!Pt

• « •*

I *«« II* 1

sr <■ «««

sr as ir «««

It ** II SR

IS «t

IB IS

II It

m «r. -

-r'» 1

1 Ashokan reservoir, showing portions of the Beaverkill and Dividing dikes, the Lower and Upper gate-chambers, Ashokan

bridge, and the Dividing weir under the bridge

2 Kensico dam and reservoir viewed from the State highway which passes along the easterly side of the reservoir

3 A full circle panorama of New York City's streets around Madison square, showing Shaft 18 and a portion of the City

tunnel in the rock more than 200 feet beneath the surface

/

/

of different points. Birmingham is supplied with 75,000,000 gallons daily by an aqueduct 74 miles long.

One of the greatest and most important modern masonry aqueducts is that known as the.Nadria Bridge which carries the great irri¬ gation canals conveying the water of the lower Ganges canal over the Ivala Naddi. Its length is. very nearly one-quarter of a mile and the width between vertical ends of the arches is 150 feet. It is constructed with 15 arches of 60 feet span. The foundations were the most troublesome feature of its construction, as they consisted of 268 circular, concrete-filled, brick cylinders carried to a depth of about 50 feet below the bed of the river. The aqueduct was opened in 1889 and is said to have a capacity of 4,100 cubic feet per second.

The evidence of early aqueducts on the western continent is meager, and the remains of them so far discovered are few. It seems to be well established that the Indians of the western part of the United States constructed canals of considerable magnitude to supply water for irrigation. Recent exploration in Peru, in the heart of the Andes, has disclosed canals and aqueducts of great extent, built by the Incas or their predecessors, some of which are wonderful constructions considering their antiquity and the difficulties to be overcome. Consult Cook, O. F., in National Geographic Magazine (May 1916).

The Spanish during their occupation of Mexico built aqueducts of considerable magni¬ tude to supply the City of Mexico with water. The remains of at least one of these still exist in and near the city, consisting of an arched masonry structure quite like its Roman prede¬ cessors. It terminated in the city with a masonry fountain structure of no little artistic merit.

There are three aqueducts now supplying water to New York city. The first, or old Cro¬ ton Aqueduct, was begun in 1837 and com¬ pleted in 1843. It is mainly a masonry con¬ duit, following the surface topography wher¬ ever practicable, but there are two stretches of cast-iron pipe. It takes water from the Croton Reservoir, 41 miles north of the city. The Harlem River is crossed at a point about 11 miles north of the Battery by a masonry via¬ duct, known as High Bridge, 1,450 feet long, the greatest height above the foundations being about 150 feet. There are eight semi-circular arches of 80 feet span and seven of 50 feet span. Both in design and construction it is a

beautiful and substantial structure, a fitting monument to its builders. The aqueduct has a capacity of 80,000,000 gallons per day and cost between 11 and 12 millions of dollars.

The new Croton Aqueduct was begun in 1887 and water was turned into it 15 July 1890. The water is taken from the same source — the Croton Reservoir (or lake) — as the Old Croton Aqueduct, the two inlets being near each other. The new aqueduct follows, the same general course, but is much more direct than the old and crosses the Harlem River near the masonrv structure of the earlier Croton aqueduct. While the aqueduct proper ends at 135th street, the water is carried from there to the Central Park Reservoir through eight lines of 48-inch cast-iron pipe. The length is 30.87

miles, of which all but slightly over one mile is in tunnel. The capacity of the aqueduct is about 300,000,000 gallons per 24 hours.

The tunnels are lined with masonry and concrete, the section for 23.7 miles being of horseshoe form, 13 feet 7 inches wide, and about the same in height. The remainder is of circular section, varying in diameter from 14 feet 3 inches to 10 feet 6 inches under the Har¬ lem River. The difference in elevation between the crest of the new Croton dam and the sur¬ face of the water in the Central Park Reser¬ voir is 33.65 feet, and as the total distance is 33f4 miles, the average hydraulic gradient is about 3.3 inches per thousand feet.

The most interesting construction feature of this aqueduct is the crossing of the Harlem River. At the eastern approach to this cross¬ ing, where the tunnel is about 150 feet below the surface, it drops on a 15 per cent descend¬ ing grade for about 850 feet, followed by a 2 per cent descending grade for 200 feet, where it enters a vertical shaft 12f4 feet in diameter and 168 feet deep. From the bottom of this shaft the tunnel crosses under the river upon a 1 per cent descending grade with a diameter of W/2 feet for 1,270 feet, and rises in a ver¬ tical shaft 321 feet deep, from the top of which it descends on a slight falling grade to 135th street. The bottom of the tunnel at the river crossing is 300 feet below mean tide. This aqueduct was, at the time, by far the greatest engineering feat of its kind in America, if not in the world. Its cost was very close to $30,-

000,000.

The great Catskill Aqueduct, the completion of which was celebrated with appropriate cere¬ monies on 12-15 Oct. 1917, augments the water supply of Greater New York by from 500 to 600 million gallons

per day. Its purpose is to carry to the city the water from a new source of supply in the Catskill Mountains. The water entering it from the colossal Ashokan Reser¬ voir, about 12 miles west of Kingston, N. Y., flows by gravity through the new Hill View Reservoir just north of the city line, into the distribution system of the city. Its length to the northern boundary of the city is 92 miles, of which 55 miles is cut and cover work, 31 miles is in tunnel and 6 miles is steel pressure pipe. Seventeen miles of the tunneling is be¬ low the hydraulic grade and, therefore, sub¬ jected to greater than normal pressure and is called <(Pressure Tunnel.® These pressure tun¬ nels, of circular section, generally \Al/2 feet in¬ side diameter, are used to carry the aqueduct under streams or depressed areas along the route. As the route crosses the drainage sys¬ tem of the region, several of these pressure tunnels are required, though steel pipes are used for the purpose where the conditions made them necessary or more economical. The pressure tunnels are placed at a sufficient depth below the surface of the rock formation, usu¬ ally about 150 feet, to insure sound rock and to resist the internal water pressure. The great pressure tunnel under the Hudson River at Storm King, about four miles above West Point, is by far the boldest and most remark¬ able undertaking of the kind in the world. In order to secure sound rock and to withstand pressure and leakage, it was found necessary to drop the aqueduct tunnel to a position 1,100

feet below the surface of the river and about 1,500 feet below the hydraulic grade. Vertical shafts from the approach tunnels were sunk on each side of the river, 3,022 feet apart, to the necessary depth, and the horizontal river tun¬ nel driven between them.

All the tunnels are lined with concrete ; those upon the hydraulic grade, of horseshoe sec¬ tion, have a completed width of 14 feet 3 inches and a total height, from invert to the soffit of the arch, of 17 feet. The pressure tunnels are of circular section, varying in diameter from 16

The aqueduct proper strictly may be con¬ sidered as extending from the Ashokan Reser¬ voir to the Hill View Reservoir, though in fact it extends into and under the city. The dis¬ tribution of such an enormous volume of water to the different boroughs of the greater city presented a troublesome problem. It was solved by continuing the great tunnel southward through the borough of Manhattan and under

the East River into Brooklyn. From the ter¬ mini of this tunnel the water is carried east¬ ward into the borough of Queens and south-

I slugs fc

space by gib screws

Maximum deflection J KT-SO't

■32-} gib screws

rt iron-r

a Cast iron l Inside of bell mac lined

fat steel band shrunk on

FLEXIBLE-JOINTED PIPE NARROWS SIPHON

For City conduits of Catsklll aqueduct standard be! land- spigot cast-iron pipes and lock-bar and riveted steel pipes were used-

SHANDAKEN TUNNEL

.GRADE TUNNEL

(Kensico Reservoir to Hill View Reservoir. 17-6 • I f-SfJ

PRESSURE TUNNEL

Ronaout; Wallklff _ .14' 6'

Moodna . I4'T

Hudson, breakneck Croton Lake. _ 14'- (f

Yonkers _ _ _ , _ 16'- 7’

city - !5- mmifcr.ir cr

CUT-AND-COVER AQUEDUCT

(Kensico Reservoir to Hill View Reservoir. 17-6 •18 0 /

STEEL PIPE SIPHON

(Three pipes for each siphon)

REINFORCED CONCRETE AQUEDUCT KENSICO BY-PASS

Standard types of conduit used in the Catskill Aqueduct. (In addition to the above, riveted and lock-bar joint

steel pipes and bell-and-spigot cast-iron pipes of ordinary types were used).

feet 7 inches to 14 feet — the latter being at the Hudson River crossing. Where steel pres¬ sure pipes are used they are lined inside and sheathed outside with concrete. The cut and cover work consists of a strongly designed concrete conduit with arched invert, sides and crown, constructed in place and surrounded and covered to a depth of not less than 14 feet with earth.

The difference in elevation between the flow¬ line of the water as it emerges from the Asho¬ kan Reservoir and the water surface of the Hill View Reservoir is 216 feet, giving an average hydraulic gradient of about 2ˆ5 feet per mile.

ward to the borough of Richmond (Staten Island) through pipes, the last named branch involving the crossing of New York Bay at ((The Narrows® by a pipe laid in a trench dredged into the bottom of the bay. The length of the city tunnel is 18 miles. Its diameter, 15 feet at the northern end, decreases to 11 feet at its ends in Brooklyn as the quantity of water to be delivered diminishes. Its depth below the surface varies from 200 to 750 feet. Frequent shafts facilitated construction and provide for connection with the distributing pipe system under the streets. The cost of the aqueduct proper from the Ashokan Reservoir to the city

line has been $61,000,000, and the tunnel from the city line to Brooklyn has cost $22,500,000. The total cost of the project was $140,000,000.

Another of the yˆeatest aqueduct projects in the world is that recently completed to sup¬ ply the city of Los Angeles, Cal., with water. The source of the supply is the Owens River in the heart of the Sierra Madre Mountains. The total length of this aqueduct, including the diverting canal and reservoirs, is about 233 miles. It is designed to deliver 260,000,000 gal¬ lons per day. As this quantity is greater than will probably be needed for the domestic use of the city for many

years, it is intended to utilize the surplus for irrigation purposes, and the great fall in the course of the aqueduct is intended to be utilized for water power pur¬ poses. The water is taken from the Owens River at an elevation of 3,815 feet above the sea, and carried thence by an open canal a distance of about 60 miles to the Haiwee Reservoir, where the aqueduct proper begins, the water surface in this reservoir being 3,760 feet above sea-level. The length of the aque¬ duct from this reservoir to its end in the San Fernando Valley is about 171 miles. The lead¬ ing types of construction and the aggregate length of each type in miles is: Unlined canal, 24 ; lined canal, 37 ; covered conduit, 98 ; tunnel, 43, and steel syphon, 12.

The covered concrete canals are approxi¬ mately of rectangular section, covered by flat slabs of reinforced concrete, with an interior cross-sectional area of 94 square feet. The tunnels, lined with concrete, have curved in¬ verts, straight (inclined) sides and arched roof. Steel pipes are chiefly used to carry the aqueduct under streams and gorges and down the steep declivities below the hydraulic gra¬ dient. Such declivities or steep descents occur at three principal localities, creating great pres¬ sure, which is to be utilized for generating water powers. This will result in no loss of water, since it will be returned to the aqueduct at a lower level. The cost of the aqueduct and its accessories has been $24,600,000.

The city of Winnipeg, Canada, has built a gravity aqueduct for a new water supply. It receives water from Indian Bay on Shoal Lake and is approximately 100 miles long. It in¬ volved comparatively simple construction, 85 miles being of covered concrete conduit, 10 miles of five feet steel pipe, less than one-fifth of a mile of tunnel, and slightly over two miles of 48-inch cast-iron pipe. It is designed to de¬ liver over 100,000,000 gallons per day.

The city of Denver, Colo., has been supplied with water by an aqueduct about 20 miles long, consisting of two lines of wood-stave pipe, one of 30 inches and one of 24 inches diameter — the two delivering about 30,000,000 gallons per day.

Many other American cities have aqueducts of greater or less extent and importance con¬ nected with their water supply, and a large number of water power developments and ir¬ rigation projects utilize like structures.

Modern Construction. — High, massive stone masonry aqueducts are now seldom con¬ structed, and where such elevated structures are unavoidable, they are usually built of hy¬ draulic concrete. The

modern engineer finds it generally better and more economical to

carry his conduits under, rather than over, streams and depressions.

Th*e introduction of cast-iron and steel pipes of large size, and their comparative cheapness, as well as the wonderful develop¬ ment in the science and art of tunneling, have practically revolutionized aqueduct building since the days of the Romans.

Cast-iron pipes of sufficient strength to with¬ stand the pressures ordinarily required are now available up to a diameter of at least 48 inches and riveted steel pipes of double that diameter and capable of carrying even greater pressures are not uncommon, particularly when encased in concrete.

The general substitution of tunnels for aerial structures is largely due to the very

Kensico Dam during construction, showing the division of the dam by the expansion-joints. The two cableways spanning the valley aided in handling materials and equipment. The system of derricks on travelers and the single derricks, for placing stones and concrete, are also shown, as well as the railroad tracks for delivering materials to the derricks.

great advancement in the speed and economy of driving tunnels. The perfecting of power rock drills, the introduction of modern high explosives, and improved appliances and methods for handling the excavated material, have greatly simplified and expedited rock tun¬ neling. The invention of the Shieldˆ method, the application of compressed air to resist the ingress of water and mud, supplemented by powerful pumps, together with the use of cast- iron or concrete tunnel linings, has made tun¬ neling in soft or sub-aqueous material com¬ paratively safe and rapid.

The ability, skill and practical ingenuity of the modern civil engineer and the perfection of instruments of precision for determining and maintaining underground alignments and gra-

dients have also been an important factor in overcoming the difficulties and reducing the cost of modern tunneling.

The construction of pipes and flumes of wood has marked another important advance in aqueduct building in this country. Com¬ paratively large pipes built of- wooden staves, accurately jointed with each other and bound by steel hoops at suitable distances apart, are in common use in the western States ; and wooden flumes or canals supported upon wooden trestles, often of considerable height, may take the place of stone, concrete or steel viaducts. The durability of such wooden aque¬ ducts has not yet been satisfactorily determined, but as they are constantly filled with water and often buried in the earth, their useful life ex¬ tends over considerable periods, as experience has already demonstrated, while their low first cost compared with more permanent construc¬ tions makes them very attractive where, avail¬ able capital is an important and often control¬ ling consideration. Many miles of such wood- stave pipes are now in successful use.

Bibliography. — For ancient aqueducts con¬ sult Merckel, Curt, (Die Ingenieurtechnik im Alterthum) (Berlin 1899). For ancient and mediaeval aqueducts in Asia Minor consult Weber, G., (Wasserleitungen in Kleinasia-

tischen StadteiP (in (Jahrbuch des Kaisers, Deutsch Archaeology Inst. XIX, 1904). For Greek aqueducts consult Curtis, E., (Uber Stad- tische Wasserbauten der Hellenen) (Archceo - logische Zeitung, 1847). For Roman aqueducts consult Frontinus, Julius, two books on (The Water Supply of the City of Rome) (translated by Clemens Herschel, 1899). For modern aque¬ ducts consult Bateman, John Frederic, engineer- in-chief, (Mechanical Arrangements of the Manchester Water Works) (c Proceedings* of the Institution of Mechanical Engineers, 1866) ; Wegmann, Edward, (The Water Supply of the Cit}'- of New York) (1896) ; report of the aqueduct commissioners of New York, (<The New Croton Aqueduct® (1895) ; annual re¬ ports of the board of water supply of New York; board of public service commissioners of the city of Los Angeles; The Final Report of the Construction of the Los Angeles Aque¬ duct (1916).

S. ' Whinery,

Consulting Civil Engineer; Author (Municipal Public Works P etc.

AQUEOUS HUMOR, the designation of the transparent lymphatic fluid in the anterior chamber of the eye, or that portion of the in¬ terior of the eye in front of the crystalline lens. In its chemical composition aqueous humor closely resembles the cerebro-spinal fluid. It is a clear alkaline liquid, specific gravity, 1003-1009, and contains about 1 per

cent of solids, one-tenth of which are proteids. These are fibrinogen, serum albumin and serum globu¬ lin. Traces of urea and sarcolactic acid are present. The secretion of aqueous humor is rapid. It is supposed that this fluid is derived from the posterior surface of the iris and the ciliary body. See Eye.

AQUEOUS ROCKS, the title of a rock class including all rocks that have been depos¬ ited under water. It is the most important class of the sedimentary series, and comprises such common and widely distributed strata as

sandstones, conglomerates, shales and lime¬ stones, and many valuable products, as gypsum, salt and coal. According to their manner of origin the aqueous rocks may be subdivided into (1) mechanical deposits, (2) chemical precipitates, (3) organic accumulations. The mechanical deposits have been derived from the disintegration of pre-existing strata and the transportation of the materials by rivers, tides and currents. They are being formed at the present time beneath the ocean and in rivers and lakes. Sandstone, conglomerate, clay and shale are the most important members of this subdivision. The chemical precipitates owe their origin to the deposition of materials from solution either as a result of evaporation or by the action of precipitating agencies. Oolitic limestone, gypsum, rock salt, siliceous sinter and many iron ores are included in this subdi¬ vision. The organic accumulations have been formed from materials once belonging to living organisms. Limestones and chalk represent the comminuted and compacted remains of shells, corals, crinoids, foraminifera, etc., while certain organisms secrete silica and their casts have accumulated in the form of diatomaceous earth and chert. Peat and the different varie¬ ties of coal are deposits of vegetable matter, more or less completely transformed into car¬ bon under the influence of pressure and some¬ times also of heat.

AQUIFER, any rock mass that is suffi¬ ciently porous to be a good water carrier. It is a term much used in discussions of water supply. Due to the large size of the individual pores and the high percentage of porosity, sandstones constitute the best aquifers. Quart¬ zites, shales and most igneous rocks have either very small pores or a very low percentage of pore space or both, and rarely constitute good aquifers. See Wells; Water Supply; Arte¬ sian Wells.

AQUIFOLIACEiE, a'qm-fo-li-a'ce-e, the designation of a family of plants, composed of shrubs or trees with alternate or opposite per¬ sistent leaves, of thick texture and smooth sur¬ face, with a toothed margin, the teeth being sometimes spinous. The flowers are solitary,

or variously grouped in the axils of the leaves. The fruit is always fleshy, containing from two to six indehiscent woody or fibrous nucules or minute nuts enclosing single seeds. The Ameri¬ can holly, Ilex opaca, has foliage less glossy, and berries less red than its European rela¬ tive, Ilex aquifolium. Both are important com¬ mercially, being mostly used for decorative purposes. The leaves of a species of Ilex af¬ ford the famous Paraguay tea. But one mem¬ ber of this family is found in Europe, the com¬ mon holly (I. aquifolium). The other mem¬ bers are found sparingly scattered over differ¬ ent parts of the world, especially the West In¬ dies, South America and the Cape of Good Hope. The Latin Ilex is the holm-oak (Quercus ilex).

AQUILA, a'kwe-la, one of the early Chris¬ tians associated with Saint Paul, was, of Jew¬ ish origin and a native of Pontus. In the year 52 he, with other Jews, was expelled from Rome by an edict of Claudius. He and his wife, Priscilla, went to Corinth, where they first became acquainted with Saint Paul. The apos-

tie shared their lodgings, at the same time as¬ sisting them at their trade of weaving tent cloth. He was indebted to them for many acts of kindness and none of the Christians who aided him ever received such warm praise from his pen. Consult Epistle to the Romans xvi, 3. There are many references to Aquila in the New Testament: Acts xviii, 1-3, and 26-28; 1 Corinthians xvi, 19; 2 Timothy iv, 19. Nothing definite is known about the death of Aquila. Though he led a poverty-stricken life in Co¬ rinth and Ephesus, better days came to him ; for in the year 58 we again find him in Rome, where he and Priscilla kept a house on the Aventine, large enough to be used as a sanctu¬ ary by the Christians of Rome, to whom it was always open. Consult Fouard's (Saint Paul and His Missions *(Chap, xii) and (Saint Peter and the First Years of Christianity* (Chap, xviii).

AQUILA, Johann Kaspar, a celebrated German Protestant theologian: b. in Augsburg in 1488: d. 12 Nov. 1560. After studying sev¬ eral years in Italy he was appointed pastor of Jenga, a village near Augsburg. Here he em¬ braced the doctrines of Luther; but his bold¬ ness and zeal in the cause of reformed faith led the bishop of Atigsburg to order his ar¬ rest. Aquila passed the winter of 1519-20 in the prison of Dillingen, and from Dillingen he went to Wittenberg, where he became person¬ ally acquainted with Luther. He was subse¬ quently appointed professor of Hebrew at Wit¬ tenberg, where he

rendered valuable assistance to his colleague, Luther, in his translation of the Old Testament. In 1527 he became pas¬ tor and the following year Protestant bishop at Saalfeld; but his vehement opposition to the Interim of Charles V in 1548 obliged him to flee. He was appointed to the deanery of Schmalkalden in 1550, and restored two years after to his office at Saalfeld, where, without further molestation, he continued to discharge his duties till his death.

AQUILA, Ponticus, a native of Pontus, who flourished about 130 a.d., and is remem¬ bered for his exceedingly close and accurate translation of the Hebrew Scriptures into Greek. Consult Burkitt, (Fragments of the Book of Kings, According to the Translation of Aquila * (1897).

AQUILEJA, a'kwe-la'ja, AQUILEIA, or AGLAR, town in the Carso district, 22 miles northwest of Trieste. Before the fall of the Roman empire it was the great emporium of trade between the north and south of Europe, and was often called the ((Second Rome.)) Caesar Augustus frequentlv resided here, and several councils of the Church, the first in 381, were held at Aquileja. In the 6th century, the title of patriarch was taken by the bishops of Aquileja, who assumed second rank to the Pope. The town was destroyed by Attila in 452, . when the inhabitants numbered 100,000. It is now a small fishing village containing a number of interesting remains of its ancient splendor, and often rewarding the researchers of the anti¬ quary with relics of value. Pop. about 2,000.

%

AQUILID7E, the family of raptorial birds that includes the typical eagles (q.v.). By some it is now classed as a subfamily (Aquiline u) of the Falconxdce.

AQUINAS, Thomas, a celebrated scholas¬ tic theologian, related by birth to several of the royal families of Europe : b. near Aquino in 1227 ; d. Fossanora, 7 March 1274. He stud¬ ied at the Benedictine monastery of Monte Casino and the University of Naples. About the age of 17 he entered a convent of Domini¬ cans, much against the wishes of his family. Partly to evade the endeavors of his family to recover him, and partly on account of the ex¬ traordinary aptitude he displayed for theolog¬ ical studies, his superiors sent him to Cologne to hear the lectures of the famous Albertus Magnus. He was so remarkable for taci¬ turnity, and the assiduity and apparent stolid¬ ity with which he pursued his studies, that he was known among his fellow-students as (<the great dumb ox of Sicily.® His teacher, how¬

ever, discerned his abilities and is said to have foretold that (< this ox would one day fill the world with his bellowings.® In 1245 he visited Paris in company with Albertus. Becoming in¬ volved in the dispute between the University and the Begging Friars as to the liberty of teaching, he advocated the rights claimed by the latter with great energy, and, being called upon to defend his side in this controversy before the Pope, did so with complete success. In 1248 he returned with Albertus to Cologne, but re¬ visited Paris in 1257, when he received the de¬ gree of doctor from the Sorbonne and began to lecture on theology, rapidly acquiring the high¬ est reputation. The remainder of the life of Aquinas was one of the most varied activity. He was almost constantly engaged in lecturing and preaching, and was often sent on distant journeys in the service of his order. In 1263 he is found at the Chapter of the Dominicans in London. In 1268 he was in Italy, lecturing in Rome, Bologna and elsewhere. In 1271 he was again in Paris lecturing to the students ; in 1272 professor at Naples. In 1263 he had been of¬ fered the archbishopric of Naples by Clement IV, but refused the offer. A general council being summoned at Lyons in 1274 for the pur¬ pose of uniting the Greek and Latin Churches, Aquinas was called thither to present the coun¬ cil with a book which he had written on the subject, but died on the way. The honors paid to his memory were prodigious; beside the title of Angelic Doctor, bestowed on him after the fashion of the times, he was called the Angel of the Schools, the Eagle of Divines and the Fifth Doctor of the Church; in 1286 he was made by the Dominicans the doctor of their order (doctor or dims) ; at the request of the Domini¬ cans he was, in 1323, canonized by John XXII, his tomb supplying the necessary testimony of miracles ; and 1567 was declared by Pius V the <(Fifth Doctor of the Church.® The numerous works of Aquinas are all written in Latin. The most important of them is the f-Summa Theologise, *which, although only professing to treat of theology, is in reality designed to form a complete and systematic summary of the knowledge of the time. All the minor works of Aquinas may be looked noon as preparatory to this great one. These are (A Commentary on the Four Books of Sentences of Peter Lom¬ bard* ; 'Quodlibeta Disputata et Qusestiones Disputatae* ; the (Catena Aurea,) or Golden Chain, in form of a commentary on the four Gospels, but in substance an exhaustive expo¬ sition of the cardinal doctrines in theology of

the greatest fathers of the Church ; and com¬ mentaries upon Isaiah and Jeremiah, the Epis¬ tles of Saint John the Divine and the Psalms, as well as upon Aristotle. His works were published in Rome in 1570-71 in 17 volumes, but his (Summa Theologiae) has passed sepa¬ rately through various editions. The resem¬ blance in thinking and writing between Augus¬ tine and Aquinas is so marked, that it has been fancifully said that the soul of the one had passed into the body of the other. The disci¬ ples of Aquinas are called after him Thomists. Consult Werner, (Der Heilige Thomas) (1858) ; Gibelli, (Vita de S. Tomaso) (1862) ; Vaughan, <St. Thomas of Aquin, his Life and Labours 5 (1872) ; Cavanagh (1890).

AQUINAS, Saint Thomas, Philosophy of.

The philosophy of Saint Thomas Aquinas is the culmination of the philosophic efforts of the Christian schools of the Middle Ages. These schools, dating from their foundation in the reign of Charlemagne, set up a tradition of Aristotelian commentary and of independent speculative activity which, until the middle of the 12th century, were almost entirely circum¬ scribed by the limits of dialectic, or logic. After the middle of the 12th century the physical and metaphysical works of Aristotle (q.v.) became known in the Christian schools of Europe, and with them were introduced Arabian commen¬ taries which interpreted the text of Aristotle in a sense contrary to Christian theism. At the beginning of the 13th century a number of Christian teachers, especially Alexander of Hales and later, Albert the Great, undertook the task of expounding the theistic and spirit¬ ualistic philosophy of the Christian schools on the basis of Aristotle's physical and metaphysi¬ cal doctrines, rejecting from the current Aris¬ totelian teaching whatever they considered to be due to the influence of the Arabian commen¬ tators. These teachers prepared the way for Saint Thomas Aquinas (1225-74), whose chief merit is, not that he created a new method or contributed a new system of thought, but that he gave to the work of his predecessors and contemporaries a more compact synthesis and expounded this synthetic system with a sim¬ plicity and lucidity rarely to be met with in systems which like his carry complexity to a high degree of organic unity. Saint Thomas' most important works are the (Summa contra Gentiles) and the (Summa Theologise.* The former, begun at Paris about the year 1257 and completed some time between the years 1261 and 1264, was undertaken at the request of Saint Raymond of Pennafort for the purpose of defending the truths of Christianity against the Arabian pantheists and their followers. It is, therefore, apologetic ratner than constructive in method and contents. The (Summa Theo- logise) was commenced at Bologna in 1271, and was never completed. Unlike the

(Summa con¬ tra Gentiles, } it is constructive in aim and method. It is Saint Thomas' greatest work, his last and most important contribution to Chris¬ tian theology and philosophy ; for, although the work is entitled (Summa Theologiae) and is, in fact, a compendious treatise on all the ques¬ tions of Catholic theology, it is also a summary of philosophy. It begins with the question of the existence of God, treats of the attributes of God, traces the origin of things from God

and the return of man to God through Christ. It deals, therefore, with the creation and gov¬ ernment of the universe, with the origin and nature of man, with human destiny, with vir¬ tues, vices and laws — with all the great prob¬ lems of speculative and practical t philosopliv. It contains the maturer views of its author, so that whenever discrepancies occur between the doctrines of the Summa and the views ex¬ pressed in his earlier works, the Summa is to be taken as the key to the mind of the master.

The method used by Saint Thomas in all his constructive works is a developed and per¬ fected form of the dialectic method which we find anticipated in a short treatise by Gerbert (Pope Sylvester II, died 1003) and of which the first definite example is the Sic et Non of Abelard (d. 1142). In this treatise Abelard presents in contrast the affirmative. (Sic) and the negative (Non) opinions of patristic writers in reference to each successive problem of Catholic theology, without, however, furnishing principles by which the discrepancies, real or •apparent, are explained. This was, as far as we know, first done by Alexander of Hales (d. 1245), whose method was to set forth the arguments against his thesis, then the argu¬ ments for the thesis and finally to answer the objections. Saint Thomas practically adopted the method as he found it in use in the schools of his day, giving to each article discussed the recognized tripartite division videtnr quod non (introducing objections), sed contra (introduc¬ ing the argument for his thesis), and responde- tur ad primuni, etc. (answers to objections). Underlying this somewhat formal method was the principle which the schoolmen derived from Aristotle, that it is only by the dialectic discussion of the affirmative and negative sides of a question the truth is to be discovered and defined. In other words the faculty of the mind on which philosophy chiefly relies is not intuition but ratiocination.

In describing the content of Saint Thomas' philosophy one must advert, in the first place, to the Aristotelian mold in which all his philo¬ sophical doctrines are cast. For him Aristotle is the philosopher. On the questions of method and doctrine which divide the Platonists from the Aristotelians Saint Thomas unhesitatingly and invariably takes the side of Aristotle. In fact, he is the Christian

Aristotelian in the sense in which Saint Augustine is the Christian Platonist. It would, however, be fatal to a proper estimation of his philosophy to overlook the elements in it which cannot be traced to Aris¬ totle. He was no slavish imitator; he main¬ tained as a principle of method that the argu¬ ment from authority is (in philosophy) the weakest of all arguments. It was only in the age of decay of the philosophy of the schools, when the letter rather than the spirit ruled the tradition of Thomistic teaching, his name and the name of Aristotle were invoked as authority to put an end to all discussion.

To say that Saint Thomas was an Aristo¬ telian means little when we remember that in his day there were mere followers of Averroes, materialists and pantheists, who might with equal justice claim to be representatives of the Stagyrite. Saint Thomas was an Aristotelian who brought to the elucidation of his Master all the tradition of Christian speculation from Justin, the first of the Apologists, down to his

own immediate predecessors and contempora¬ ries. The thought which inspired the Chris¬ tian philosophers was that above the order of natural truth, that is, of truth which can be at¬ tained and comprehended by the human mind unaided, there is another order of truth, the supernatural, which human reason cannot of itself attain, but which is known to us on the authority of divine revelation. Natural truth belongs to reason, and supernatural truth to faith. Christian philosophy from the beginning took its stand on the principle that these two orders of truth must, in some way, be capable of harmonious adjustment. Rationalism exag¬ gerated the power of reason, mysticism tended to slight reason and to emphasize and unduly extend the scope of faith. Throughout the early Middle Ages these two tendencies were at war with each other in the Christian schools. It is one of Saint Thomas' chief titles to distinction that he united in his system what is true in rationalism with what is true in mysticism. The rationalism of Abelard obliterated all dis¬ tinction between supernatural and natural truths when it treated mysteries of faith as if they were conclusions of theology and used the Scriptures as if they were sources of argument in philosophy. In an opposite sense, the mys¬ ticism of Erigena removed all distinction be¬ tween the two orders of truth, when it main¬ tained that even truths of the natural order are known to us by a special theophania, or di¬ vine manifestation. Saint Thomas taught that the two orders of truth are distinct ; that our knowledge of supernatural truth rests on the

authority of revelation, while our knowledge of natural truth rests on the evidence of reason. He maintained, at the same time, that they are consonant with each other, that since God is the author of all truth there can be no con¬ tradiction between what revelation proposes for our belief and what reason proclaims to be evident. This thought, namely, that revelation is reasonable and reason divine, crystallized the fundamental concepts of all the preceding sys¬ tems of Christian speculation, reconciled mys¬ ticism with rationalism and gave permanent form to the credo ut intelligam and the intelligo ut credam of scholasticism. The reconciliation of reason with revelation is of interest not merely to the Christian Apologist . but. to the philosopher as well. For it is inspired by the desire to establish between the supernatural and the natural that relation of continuity which Greek philosophy at the highest point of its development established between the spiritual and the material.

To the controversy concerning the mode or manner of the existence of universal, which, during the 11th and 12th centuries, had been so prominently before the minds of philosophic thinkers, Saint Thomas contributed his doctrine of moderate Realism. The Nominalists con¬ tended that universal are mere names ; the ex¬ aggerated Realists, influenced for the most part by Plato, maintained that universals are things really existing outside the mind as completely developed universal forms. The doctrine of moderate Realism (q.v.) is that, while univer¬ sals are not mere names but real things, they exist outside the mind not ps full-blown uni¬ versals but only as potentially universal es¬ sences which receive their formal aspect of universality from the mind in the act by which

it compares and discusses individual objects and abstracts therefrom the formally universal concept. Saint Thomas found this doctrine es¬ tablished in the schools of his time. He adopt¬ ed it and gave to it, as to so many other tenets of the schools, its final and most clear-cut form.

One of Saint Thomas' most noteworthy con¬ tributions to philosophy was his elucidation in the Christian and theistic sense of some of the more obscure points of Aristotelian teach¬ ing. Having before him a translation made di¬ rectly from the Greek text — a translation which is, indeed, far from correct, yet which in spite of many ludicrous verbal blunders is immeas¬ urably superior to the translations made through the medium of Syriac and Arabic — he sought to free from the accretion of Neo- Platonic and Arabian commentary the original doctrine of Aristotle on the question of the nature of the Active Intellect. Rejecting what may be called the transcendentalist view,

which held the Active Intellect to be something more than human, something akin to God and in some way common to all men, he defended the anthropological view, which held that the Active Intellect is a part of the individual soul, and, therefore, not common to all, but proper to each. In this way, he strengthened the defense of the immortality of the individual soul.

Saint Thomas founded a school within the schools. To the Franciscan teachers, such as Alexander of Hales, Saint Bonaventure and Roger Bacon, certain doctrines of Saint Au¬ gustine recommended themselves, to the detri¬ ment of the strict Aristotelianism which they professed. These Franciscan teachers were op¬ posed by the Dominicans, who, like Albert the Great and Saint Thomas, recognized in the Augustinian doctrines in question an element of Platonism which was inconsistent with thor¬ ough Aristotelianism. The struggle between Augustinianism (q.v.) and Aristotelianism (q.v.) was waged in the schools, especially at Paris, during the first decades of the 13th cen¬ tury. The doctrines under discussion were mostly psychological : for instance, the Aristo¬ telians maintained that there is but one sub¬ stantial form in man, the soul, while the Au- gustinians maintained that there are several substantial forms; the latter contended that there is no real distinction between the soul and its faculties, while the former defended the real distinction ; the Aristotelians main¬ tained that there are subsistent forms, that is to say, purely spiritual created substances, without any matter, while the Augustinians taught that all creatures, even the angels, are composed of matter and form. On all these questions Saint Thomas took the part of the Aristotelians and thus became the leader in the Dominican, or, as it is sometimes called, the Thomistic school in the stricter sense of the word.

The controversies between the Dominican and the Franciscan schools brought out an im¬ portant general trait of Saint Thomas' philoso¬ phy. Duns Scotus (1274-1308), the ablest of the Franciscan opponents of Saint Thomas, adopting the principle of voluntarism, brought to the surface the intellectualism which per¬ vades Saint Thomas' speculative system. Saint Thomas pushed to its utmost consequences the intelligo ut credam of the earlier scholastics : he made intellect superior to will and sought in every thing to find an intellectual basis for be-

lief. Scotus maintained that on many ques¬ tions of the highest

importance reason fails to give a satisfactory explanation or proof and that we must fall back on will.

To say, however, that Saint Thomas was an Aristotelian in the Christian, as opposed to the Averroistic, sense ; that he gave final form to the idea which inspired scholastic, and indeed all Christian, speculation ; that he was a mod¬ erate Realist ; that he held to the strict sys¬ tematic Aristotelianism and excluded certain Augustinian and Platonic elements; that he was an intellectualist, is to give but a faint idea of his claims to pre-eminence as a repre¬ sentative of scholastic philosophy. Of him, as of all the great speculative thinkers, it may be said that the spirit of his work is more potent than the letter. To the modern mind, especially, he appeals in virtue of the spirit in which he undertook the work of adjusting his beliefs as a Christian to the scientific and philosophic thought of his age. To this task he addressed himself with an instinctive sense of completeness which impelled him to leave nothing incomplete or imperfect except so far as everything human is. incomplete and imper¬ fect. He brought to his task a mind appre¬ ciative of the value of truth wheresoever truth is found, whether in pagan, Jew or Gentile, and a belief — stronger in him than in any other Christian writer since Saint Au¬ gustine — that all truths and all contributions to knowledge, from whatsoever source they are derived, must be capable of harmonious adjustment.

• Bibliography. — Vaughan, (Life and Labors of Saint Thomas) (London 1871, 2 vols.) ; Werner, (Der Heil. Thomas von Aquino) (Re¬ gensburg 1858, 3 vols.) ; Touron, (Vie de S. Thomas d'Aquin} (Paris 1773) ; De Wulf,

' (Histoire de la phi 1. medievale> (Louvain 1900), pp. 259ff; Stockl, cGesch. der Phil, des Mittelalters) (Mainz, 1864ff), II, 421ff; (Lehrbuch der Gesch. der PhilP (Mainz 1888), pp. 431ff; Turner, (History of Phi¬ losophy) (Boston 1903). For complete bibliog¬ raphy consult Potthast, (Wegweiser durch die Geschichtswerke des Europ. Mittelalters) (Berlin 1896), p. 1601.

William Turner,

Professor of Philosophy, Catholic University.

ARABESQUE, ar'a-besk', a term applied to a particular species of decoration employed in Arabian and Moorish architecture. The fol¬ lowers of Mohammed, being prohibited by the Koran from representing the figures of men and beasts, endeavored to evade this law by inventing a series of monsters, griffins, dragons, strange birds

and chimeras ; affixing the head, wings and talons of birds to the bodies of lions, horses and other quadrupeds ; and making the upper parts of children, men and beasts spring from among clusters of foliage and the like. In the Vatican there are paintings, executed by Giovanni da Udine from the drawings of Raphael, in this style, which are deservedly much admired.

ARABGIR, a'rab-ger', <pr ARABKIR, town in Asiatic Turkey, 147 miles southwest of Erzerum. It owes its enlargement and pros¬ perity to the Armenians, who form about one- fourth of the population, and it is especially

noted for its manufacture of silk and cotton goods. Pop. about 23,000.

ARABI, a-ra'be, Ahmed El (usually knowm as Arabi Pasha), an Egyptian national leader: b. in Lower Egypt about 1837 ; d. Cairo, 21 Sept. 1911. He was the son of a common peasant, and, entering the army, rose to the rank of col¬ onel and became the head of a party desiring to replace Turkish officers by Egyptians. On 9 Sept. 1881 he led the troops to the Khedive's palace and demanded the dismissal of the min¬ istry, the convocation of a parliament and the increase of the army. The first two demands Avere granted, the third was referred to Con¬ stantinople ; but the military party, which w?as mistakenly regarded by foreign observers as a Nationalist and Home Rule party, gradually became dominant, and Arabi was made War Minister. Flushed wuth success, he acted as if head of the state and rashly undertook to over¬ throw the Anglo-French control of the finances. In view of the situation a conference Avas held at Constantinople, and British and French fleets Avere sent to Alexandria; a massacre of Christians took place in that city (11 June 1882) and the British fleet, in the belief that the forts were preparing to fire, bombarded them, the French fleet withdrawing. Alex¬ andria Avas burnt by the Egyptian troops, and the British expedition to Egypt followed. Arabi gave himself up and Avas tried for treason ; acting on advice he pleaded guilty, an under¬ standing having previously been arrived at Avith the Marquis of Dufferin, then Special British Commissioner, that the sentence Avould be commuted to banishment for life. Khedive TeAvfik's desire Avas to put Arabi out of the Avay for good, and was only induced with great difficulty to consent to the arrangement. Arabi Avas sent to Ceylon, Avhere he lived as a political prisoner on a small pension, but in May 1901 the Khedive Abbas Hilmi pardoned him and he returned to Egypt. A neAV genera¬ tion of nationalists had grown up, wdiich neg¬ lected him ; observing the remarkable progress of his country during the 19 years of his ex¬ ile, Arabi became converted to approve of British rule.

ARABIA, the peninsula in the southwestern part of Asia, called by the natives Jeziret el Arab, that is, the Peninsula of the Arabs; and by the Turks and Persians, Ara- bistan. It is encompassed on three sides by the sea, namely, on the northeast by the Per¬ sian Gulf and Gulf of Oman, on the southeast by the Indian Ocean and on the southwest by the Red Sea. Its extreme southern point, Ras- Arah (the Cape Saint Anthony of some maps), lies in lat. 12° 35' N. ; long. 44° 4' E. Thirty miles Avest of it are the Straits of Bab-el- Mandeb. The extreme eastern point of Arabia, Ras-el-Had, stands in lat. 22° 23' N., long. 60° 5' E. A line drawn from the head of' the Gulf of Suez to that of the Persian Gulf, and mark¬ ing the limits of the Arabian peninsula on the north, will be found to run nearly in the 30th parallel of north latitude, but a portion of what is considered Arabia extends north of this. Arabia includes also the peninsula of Sinai, be¬ tween the Gulf of Suez and that of Akabah. The whole area of the vast country thus de¬ scribed does not probably fall much short of 1,250,000 square miles.

Divisions. — According to Ptolemy, ancient Arabia consisted of Arabia Petrsea, Arabia De- serta and Arabia Felix, a division likewise fol¬ lowed in modern times, but which is not only l ounded on erroneous principles, but unwar¬ ranted by the example of the inhabitants of the country. The name of Arabia Felix, or Ara¬ bia the Happy, is derived from an incorrect translation of the word Yemen , which does not signify happy, but the country lying to the right of Mecca, in the same manner as the Arabic term for Syria, Al-Sham, denotes the country lying to the left of that city. Arabia Petnea likewise has been erroneously translated Stony Arabia, the epithet Petraea having been bestowed on it by Ptolemy, from the once flourishing city of Petra.

The first of the divisions met with in pro¬ ceeding down the Red Sea is Hejaz, which, as it includes the sacred cities Mecca and Medina, is always set forth conspicuously by Arab ge¬ ographers. It extends a short way within the mountain barrier and terminates in the south in about lat. 20° N. Next comes Yemen which, according to some writers, embraces the whole of south Arabia; but the name- is now gen¬ erally used in a confined sense, Yemen proper occupying the southwest part of the peninsula, and comprising a Tehama or maritime lowland on the shores of the Red Sea, with an elevated inland district of considerable breadth. It con¬ tains the towns of Sana and Mocha. Apper¬ taining to Yemen is Aden, now a free port in the hands of the British. Next Yemen, on the east, is Pladramaut, the western portion of

which is a desert five days' journey in length. The limits of this province are, however, vari¬ ously assigned by authors, some extending the name to almost the whole of the southeast coast, while others confine it to a district only 100 miles in length. Beyond Hadramaut, in the latter narrower sense, lies Mahrah, beyond which again extends the principality of Shejer or Shehr, at the eastern termination of which, near the coast, is the populous district of Dhofar, which has occasionally figured as an inde¬ pendent state. At the east angle of the penin¬ sula is situated Oman. On the south shores of the Persian Gulf is Bahrein, from which, to¬ ward the head of the Gulf, extends the mari¬ time district of Hasa, while at a short distance southwest in the interior lies the fertile district of El-Ahsa, the name of which is sometimes also given to the coast. The interior of Arabia from Hejaz and Yemen across to the vicinity of the Persian Gulf is comprised by Arab ge¬ ographers under the single name of Nejed. The Sinaitic peninsula is called Al-Tih. The remaining divisions are Dahna, the great terri¬ tory between Hadramaut, Oman and Nejed. Toward the north are the deserts of Sinai and those of Sham, Jezireh and Irak (Syria, Mesopotamia and Babylon). The two most populous districts are Yemen and Oman.

The climate of Arabia resembles that of Africa. The mountains obstruct the mitigating influence of the sea breeze; scorching aridity and barrenness characterize both high and low grounds, and the date palm is often the only representative of vegetable existence. There are even districts which in the course of the year are refreshed by only one shower of rain, while a sky almost perpetually unclouded over¬ spreads the sterile plains. The short rainy

season, which, in consequence of the shifting winds prevailing in the Red Sea, visits the west coasts in our summer months, fills with water, but only periodically, the depressions in the surface, or wadis, and a winter marked by slight frosts occurs in the table-lands of the interior and northeast. The simoom occasion¬ ally blows during the hot season, though only in the northern districts.

Productions. — Arabia is destitute of large forests, and plains of green turf have their place supplied by steppe-like tracts, which, how¬ ever, covered with aromatic herbs, afford ex¬ cellent pasture to noble breeds of horses. The terrace portions of the country, which enjoy a more temperate climate, exhibit a greater lux¬ uriance of vegetation. Here the date and co- coanut palms and various excellent sorts of fruit flourish along with durra (a species of millet which is here generally cultivated instead of European corn), the finest coffee in the world (the staple commercial product of the country), and many aromatic

plants and sub¬ stances, such as gum-arabic, benzoin, mastic, balsam, aloes, myrrh, frankincense, etc. There are also cultivated in different parts of the peninsula, according to the nature of the soil and climate, beans, rice, lentils, tobacco, melons, saffron, colocynths, poppies, olives, the kath bush (Catha or Celastrus edulis), the leaves of which are in general use, like those of the coca in Peru, as an excitant, sesame, the castor-oil plant, etc. In its fauna also, as corresponding with the desert nature of the country, Arabia presents much of an African type. Sheep, goats and oxen supply man's immediate domes¬ tic and personal ' wants ; the horse and camel are his faithful attendants on his travels ; asses and mules, of a stronger make and better ap¬ pearance than those of Europe, are common in the mountainous districts ; the desert is inhab¬ ited by gazelles and ostriches hurrying rapidly from oasis to oasis; and the lion, panther, hyena and jackal crouch in ambush for the passing prey. Monkeys, pheasants and doves are the peaceful occupants of the fertile dis¬ tricts, in which, however, locusts frequently commit tremendous havoc. There are several species of serpents and lizards, and scorpions and poisonous spiders are numerous. Fish and turtles abound on the coasts, and pearl oys¬ ters in the Persian Gulf. Among mineral prod¬ ucts may be mentioned saltpetre, mineral pitch and petroleum, which are found in the interior highlands, salt, sulphur (in Hadra¬ maut), and several precious stones, as the car- nelian, agate and onyx. Iron, copper and lead are far from abundant, and the country is also poor in the precious metals.

Population. — The population of Arabia has been estimated by some authorities at 12,000,- 000, by others at no more than 4,000,000. The former number is certainly too high. Palgrave estimated that Hejaz contained about 1,000,000 inhabitants, Yemen 1,000,000, Hadramaut and Mahra 1,000,000, Oman and Hasa 2,500,000 and Nejed 2,000,000. This would make a total for Arabia of about 7,500,000, which figure is prob¬ ably too high, but in the absence of any regular census and with our total ignorance of a large part of the interior it is impossible to verify any statement on this point. The Arabs pre¬ sent, as a nation and as individuals, much that is peculiar both in their mental and physical

development. They are of middle stature, of a powerful make and have skin of a brownish color. Their features express dignity and pride; they are naturally active, intelligent and courteous ; and their

character is marked by temperance, bravery and hospitality, along with a strong propensity for poetry. On the other hand, they are revengeful in their disposition and predatory in their habits. The women have the entire education of the children in their early years. The most fortunate events in the estimation of an Arab are the birth of a camel, a mare of noble breed bringing forth a foal or a triumph achieved by a poet. The first religion of the Arabs, the worship of the stars, was supplanted by the doctrines of Mohamme¬ danism, which succeeded rapidly in establishing itself throughout Arabia. Besides the two principal sects of Islam, the Sunnites (the most numerous) and the Shiites (on the east coast), there also exists, in very considerable numbers, a third sect, the Wahabees, which arose in the latter half of the 18th century, and to which the Bedouins of Nejed belong. There are also numerous Jews, who dwell among the Ara¬ bians and are chiefly employed in trade.

The whole of the west coast, comprising the districts of Hejaz and Yemen, and in quite recent times part of the cast coast, namely Koweit, at the head of the Persian Gulf, and the district of El Ahsa, are more or less under the suzerainty of the Turks. The area of the western strip is about 200,000 square miles in extent, and has a population of about 1,130,000; while the eastern has an area of about 31,000 square miles and a population of nearly 200,000. Even in thesfe districts, how¬ ever, the chief offices of government are per¬ formed by the chieftains of the small territories into which the districts are subdivided. The most extensive districts politically united in the rest of Arabia are the kingdoms of Oman and Nejed, the former with an area of 81,000 square miles and a population of 1,598,000; the latter (the kingdom of the Wahabees) with an area of perhaps 200,000 square miles and a population of about 1,219,000.

The mode of life of the Arabs is either nomadic or settled, or in other words, they either live in tents and derive their subsistence from the rearing of cattle, wherever sufficient pasture is obtainable, and from the transport of caravans through the desert; or from the pur¬ suits of agriculture and commerce. The no¬ madic tribes in Arabia are termed Bedouins, Beduins or Bedawins; those following settled occupations, Hadji and Fellahs. A consider¬ able trade, partly overland, partly maritime, is carried on, chiefly in coffee, dates, figs, spices and aromatic substances of various kinds, though its present amount is scarcely a shadow of what it was in times previous to the dis¬ covery of the passage by the Cape of Good Hope. Commerce is partly in the hands of foreigners, among whom the Jews and Banians are the most numerous. The latter are a tribe of Indian merchants, who, however, only re¬ main long enough in the country to enable them to return

with wealth to their own land. At present the trade of Arabia is almost exclu¬ sively confined to exports of raw material or imports of foreign manufactures, domestic in¬ dustry being scarcely able to supply the most necessary articles of consumption, and the in¬

habitants are thus rendered dependent on for¬ eign nations for the greater portion of their manufactured commodities. The period of in¬ tellectual development among the Arabs is now indeed long past its zenith, but it does not ap¬ pear yet to have sunk so low as is often as¬ sumed. Even in the desert children are taught to read, write and cipher, and in the towns there are higher schools for satisfying the taste for scientific pursuits. The political constitu¬ tion of the Arabs is patriarchal, and based on a love of freedom. The titles of the chiefs of the tribes are emir, sheikh or imam, personages whose functions appear in general to be limited to the command of the army in war, the collec¬ tion of tribute and the administration of law by the cadis or judges.

History. — The history of the Arabs pre¬ vious to Mohammed is obscure, and, owing to their slight connection with the rest of the world, of little interest. The evidence of lan¬ guage, tradition and other things, establishes the fact that Arabia must have been settled at a very early date by two branches of one race. One of these branches inhabits the south and east of the peninsula (Yemen, Hadramaut and Oman), and considers itself as forming the “pure” Arabs, while to the other branch it gives the name of Mostareb, or “Arabified.” The oldest traditions regarding the origin of the former branch point to an immigration from Africa which took place about the southwest corner of the peninsula, and the physical ap¬ pearance and structure of the southern Arabs, the remnants of their dialect (which is now superseded by that of the northern branch), and various institutions and customs prevailing in the parts of Arabia inhabited by them, all confirm the notion that they were originally identical with the nearest inhabitants of Africa. The northern branch, on the other hand, though bearing an unmistakable affinity with the south¬ ern, shows (in its language and other respects) more traces of Asiatic than African influence. The Arabs of the southern branch were the first to attain any considerable political power. A kingdom belonging to this branch is said to have existed in the south for upward of 2,000 years, embracing, when in a flourishing condition, the whole of the south half of the peninsula, and sometimes extending its bounda¬ ries by conquest very much farther. There is no doubt that there was actually such a king¬ dom, called the kingdom of Yemen, and having its capital first at March and afterward at Sana, both in the district of that name; but how long that kingdom subsisted cannot be deter¬ mined.

Its kings belonged to the Himyarite dynasty, but this designation Himyarite is some¬ times applied by Arab writers to the ruling classes of the southern branch, and sometimes to the whole branch. The Yemenite kingdom was rendered subject b}r the Abyssinians for upward of 70 years in the 6th century of the Christian era, during which period Christianity was proclaimed in the land. Ultimately the heir to the throne of the Himyarite dynasty was restored through the assistance of Chosroes, King of Persia (605 a.d), but about 30 years later the kingdom was finally overthrown by the followers of Mohammed. Another Himyarite kingdom was that of Hira on the west shore of the lower Euphrates. It seems also to have extended at times to the region between the

Euphrates and the Tigris, so as to give the name of Irak Arabi to that district. The dates given for the foundation of this kingdom are widely different. Its overthrow is placed in the 5th century of our era. In the 1st century of the Christian era the Himyarite kingdom of Ghassan was founded in lower Syria and Hejaz. It lasted till the time of Mohammed. The last Himyarite kingdom that need be men¬ tioned is that of Ivindeh, which detached itself from that of Hira early in the 3d century, and lasted about 160 years. Its sway extended over northern Nejed. The divided forces of the Arabs could not always successfully resist the Roman arms, and though their country was never completely reduced to the condition of a province, yet the princes in the north at least lived in a state of dependence on the Roman emperors, and were regarded as their viceroys. In the south the Romans had no influence. An expedition was fitted out against Yemen in the reign of Augustus (24 b.c.), but it completely miscarried. With the decline of the Roman empire Arabia made vigorous struggles for in¬ dependence, which could easily have been brought about by a union of the various tribes. But the Arabian peoples continued dispersed and broken, and passed many centuries in in¬ ternal conflicts, during which the central high¬ lands (Nejed) became the theatre of those chivalrous contests so celebrated by the native poets. Christianity early gained many ad¬ herents in Arabia, though it did not succeed in entirely banishing the ancient worship of the stars. Several Christian bishoprics were estab¬ lished, subject to the metropolitan at Bozra, in Palestine. The town of Elhira, near the Eu¬ phrates, contained many Arabian Christians and convents, and the reigning King, Ennoman-ben- el-mondsir, became a convert to Christianity not long before the time of Mohammed. The conflict of

the Arabs with Roman despotism was more especially the cause of attracting to their country numbers of Christian sects, among others the Monophysites and Nestorians, seek¬ ing a refuge from the persecutions to which they were subjected by the maintainers of orthodoxy throughout the East. Jews also were very numerous in Arabia after the de¬ struction of Jerusalem, and even made some proselytes, chiefly in Yemen. The wide differ¬ ences between the various sects produced in the minds of many an indifference to all the exist¬ ing religions, and was probably one of the principal causes that the doctrines of Moham¬ med found so speedy an acceptance in Arabia. With Mohammed a new phase commences in the history of the Arabian peoples, who are wont to designate respectively the periods be¬ fore and after the appearance of the Prophet as those of ignorance and knowledge. Moham¬ med belonged to the Mostareb, and among them to the tribe of Ivoreysh, which had occupied a position of great influence in Arabia since the beginning of the 5th century, when it managed by craft to obtain possession of. the city of Mecca, which was not only a city of great commercial importance, but was regarded as sacred by the Arabs on account of its contain¬ ing the Kaaba. During the whole of the 6th century the Mostareb generally were increas¬ ing in power, and by the beginning of the 7th, when Mohammed had grown to manhood, they had absorbed the kingdom of Eindeh, and had

extended their sway at the expense of those of Yemen, Hira and Ghassan. By the time of Mohammed's death, in 632, his religion had ac¬ quired a firm hold in Arabia, and after that event his successors, acting on the commands of the Koran, began to spread it by force of arms beyond the bounds of the peninsula. The nation, now for the first time acting as a body, played for several centuries an important part in the world's history, advancing in a career of victory beyond its natural frontiers, to found empires in three-quarters of the globe. The brilliant period of Arabian history, indeed, as regards foreign countries, came to ,a termina¬ tion in Asia in 1258, on the fall of the caliphate of Bagdad, as also about the same time in Africa and Europe, in the latter of which the Moorish dominion was finally overthrown (in the kingdom of Granada in Spain) in the last decade of the 15th century; yet the epoch of the Arab sway must ever occupy a distin¬ guished place in the intellectual history of man¬ kind. The internal history of the country dur¬ ing its foreign conflicts presents little more than unimportant accounts of some Bedouin tribes, and the fortunes of the caravans which made the annual pilgrimage to Mecca. In 1517 Tur¬ key subjected Hejaz and Yemen, and received the nominal submission of the tribes inhabiting the rest of Arabia. The subjection

of Hejaz has continued down to the present day, with a brief interval in the latter half of the 16th century, and another longer interval in the 19th century, when the Pasha of Egypt was domi¬ nant in Arabia; but Yemen achieved its inde¬ pendence in 1630 and maintained it till 1871, when the territory again fell into the hands of the Turks. In 1839 Aden, in Yemen, was occu¬ pied by the British.

In the east Oman became virtually inde¬ pendent of the caliphs in the middle of the 8th century, and grew into a well-organized kingdom. In 1507, however, its capital, Maskat, or Muscat, was occupied by the Portuguese, who were not driven out till 1651. Oman was temporarily subjugated by the Persians under Nadir Shah in the first half of the 18th century. They were expelled by Saood, who was made imam of Oman, and under whom it extended its sway ov'er part of the opposite coast of Per¬ sia as well as the islands lying between and over the coast of Zanzibar. Since 1867 the kingdom of Oman has been again confined to the mainland of Arabia. The appearance of the Wahabees about the middle of the 18th century is the first event since the time of Mohammed that affected Arabia generally. The moral ef¬ fects of this event exercise still a powerful influence ; the political were soon effaced by the ruler of the neighboring country of Egypt. Mehemet Ali, Pasha of Egypt, subdued the coast of Hejaz, as also several places on that of Yemen, and in 1818, by means of a great victory gained by Ibrahim Pasha, and the de¬ struction of their capital city Derreyeh, put a stop to the further extension of the Wahabite power. He also expended large sums in the maintenance of his sway in Arabia, which se¬ cured to him the trade of the Red Sea. The events of 1840, however, in Syria, compelled him to concentrate his forces, and he soon found himself obliged, as thwarting the Euro¬ pean line of policy, to renounce all claims to the territories lying beyond a line drawn from

the Dead Sea to the Gulf of Akabah. The Hejaz thus again became immediately subject to Turkish sway. Turkey afterward extended its rule not only over Yemen as already men¬ tioned, but also over the district of El Ahsa on the Persian Gulf. During the great Euro¬ pean War, strategic points of Arabia be¬ came scenes of active operations on the part of Turkish troops led by German officers against British domination in Egypt, the Sin- aiti-c Peninsula being a dependency of Egypt, now a British possession. Hejaz and Yemen, on the west coast, and Hasa, on the east coast, were Turkish vilayets. There was an

independ¬ ent imam in Oman, and Aden and the sur¬ rounding district was a protectorate of Great Britain. The remainder consisted of several independent and semi-independent states under chiefs, elected or hereditary, bearing the title of emir, sheikh or imam. During the progress of the war, Arabia was the scene of revolts, uprisings and conflicts against Turkish authority and on 25 Oct. 1916 the Kingdom of Arabia was established with Grand Sheri f Hussein Ben Ali as King, and Mecca as capital. On 3 Jan. 1917, the Grand Sherif of Mecca adopted the title of the King of the Hejaz, and the new kingdom was recognized by England, France and Russia. See War', European.

Modern Explorations. — Until about 1760 our knowledge of Arabia was based mainly on Greek and Latin writers such as Herodotus, Strabo, Pliny, Ptolemy and others. This in¬ formation was meagre and not altogether re¬ liable. The best sources were the Arabic writers and geographers, such as Hamadani's (Arabian Peninsula,) Bekri and Yaqut's geo¬ graphical and historical dictionaries. These works and others of their kind contain various fabulous and legendary traditions, based partly on native legends and partly on Jewish fancies. The Assyrian cuneiform inscriptions have yielded us much valuable material on the early history of Arabia. But above all we are in¬ debted to scholars like Halevy, Muller, Glaser, Hommel, \ inckler and others. The first European to engage in a scientific exploration of Arabia was C. Niebuhr, who, in 1761-64, at the order of the Danish government, undertook an expedition to the -peninsula. In 1799, Remand, an agent of the East India Company, followed Niebuhr and in 1808-11 the Russian scientist, U. J. Seetzen, undertook a , similar journey of exploration and for the first time copied several south-Arabian inscriptions in the district of Himyar. A few years later, in 1814-16, one of the most distinguished of Arabian explorers, the Swiss, J. L. Burckhardt, journeyed to Hijaz and also to Mecca and Medina. His information is accurate, copious and interesting. Captain W. R. Wellsted, in 1834-35, made a tour of Oman and Hadramaut, and in 1838, C. J. Crittenden journeyed from Mokha to Sana and copied several south- Arabian inscriptions, which Rodiger and Gese- nius undertook to decipher. In 1843, Adolf von Wrede, a German, visited Wadi Doan and other parts of Hadramaut and discovered and copied an important five-line inscription. In the same year T. J. Arnaud journeyed from Sana to Marib, the capital of the ancient kingdom of the Sabeans, and gathered about 56 inscriptions. In 1845-48 Wallin journeyed through Hayil, Medina and Taima. In 1853

Richard Burton, translator of the (Arabian Nights } made a pilgrimage to Mecca and Medina and in 1877 and 1878 visited twice the land of Midian, in north Arabia. In 1861, Jacob Saphir, a Jew of Jerusalem,

visited Yemen, where he formed several Jewish set¬ tlements, and other parts of Arabia. In 1862- 63 W. Gifford Palgrave, an Englishman, journeyed from the Dead Sea to Oatif and Oman, visiting the northwestern territory be¬ tween the Sinaitic peninsula, the Euphrates, Hayil, Medina, Nejed, and nearly all central Arabia, till then unknown. Central Arabia was visited by Felly in 1865 and in 1869 Halevy, the great Orientalist and pioneer in Sabean philology; disguised himself as a poor Jew from Jerusalem, and penetrated Yemen and south Arabia. On this trip he copied about 700 inscriptions. He succeeded in reaching the south-Arabian Jof, the territory of the ancient Mineans. In 1870-71, H. von Maltzan made several trips from Aden along the coast, and, in 1876-78, Charles Doughty made a famous tour to Mada in Salih, Hayil, Taina, Khaibar, Boraida, Onaiza and Tayif. He unearthed several Sabatean, Lihyanian, or Tamudic, Minean and so-called proto-Arabic inscriptions. In 1877-80, the Italian, Renzo Manzoni, made three journeys to Sana, the Turkish capital of Yemen. Glaser, in 1882-84, made his first journey to south Arabia, where he discovered and copied numerous inscriptions and in 1883— 84, with Euting, visited north Arabia, where they discovered the famous Aramaic inscrip¬ tions of Taima (6th century b.c.). In 1884-85, Glaser again visited southern Arabia and col¬ lected several Minean inscriptions. His third journey was made in 1887-88 and was remark¬ ably fruitful, especially as far as epigraphical results are concerned. The inscriptions copied numbered over 400, the most valuable among them being the so-called ˆDam-inscription/ of 100 lines (5th and 6th centuries a.d.), and the ((Sirwah inscription/ of about 1,000 words (about 550 b.c.). Glaser's fourth journey was made in 1892-94 and was also rich in results. In 1893, Leo Hirscfi visited Hadramaut, and so did Theodore Bent and his wife in 1893-94. In 1896-97, Count Carlo Landberg, a distinguished Arabic scholar, visited the coast of south Arabia, where he made special studies of the modern Arabic dialects there, in addition to other geographical and epigraphical researches. In 1898-99 the Vienna Academy sent an expedi¬ tion to Shabwa under the direction of Count Landberg and D. H. Muller. Other expeditions have since been engaged in the work of ex¬ ploration. The results of all thˆse have been threefold : geographical, epigraphical and his¬ torical. These results have opened the way not only to fresh views and studies concerning the various ancient south-Arabian dialects, such as Minean, Sabean, or Himyarite, Hadra- mautic and Katabanian, but have also thrown unexpected light on the history of the old south-Arabian kingdoms and dynasties. These same discoveries have also added to our knowl¬ edge of Old Testament history and of Hebrew and comparative Semitic philology. See Arabian Philosophy; Arabic Language and Arabic Literature.

Bibliography. — Geography. — Niebuhr, (De¬ scription de I'Arabieˆ (Paris 1779) ; Jomard, (Etudes geographiques et historiques sur

1 Arabic' (ib. 1839) ; Wellsted, 'Travels in Arabia' (London 1839) ; Burckhardt, 'Travels in Arabia' (ib. 1829) ; Ritter, C., 'Arabien' (Berlin 1847) ; Playfair, (A History of Arabia Felix or Yemen' (Bombay 1859); Maltzan, 'Reisen in Arabien' (Braunschweig 1873) ; Guarmani 'El Neged settentrionale' 'Jerusalem 1866); Sprenger, A., 'Die alte Geographic Arabians' (Bern 1875) ; Zehme, Albrecht, 'Arabien und die Araber seit hundert Jahren cine geographische und geschichtliche Skizze' (Halle 1875) ; Manzoni, R., 'El Yemen tre anni nell' Arabia felice' (Rome 1884) ; Huber, Ch., 'Voyage dans l'Arabie centrale' (Paris 1885). Interesting sources on Yemen are 'Voyage d'Halevy' and the 'Rapport d'un colonel turc'

In Melanges orientanx and Reclus, E., 'Nouvelle Geographic universelle.' Niebuhr, 'Reisebe- schreibung von Arabien und anderen umliegen- den Landern' (Copenhagen 1778) ; Desvergers, 'Arabie' (Paris 1847) ; Glaser, 'Geschichte und Geographic Arabiens'o (Berlin 1890) ; Wallin, 'Reseanteckningar fran Orienten' (Helsing¬ fors 1866) ; Burton, 'Personal Narrative of a • Pilgrimage to al Medinah and Mecca' (Lon¬ don 1855) ; Palgrave, 'Narrative of a Journey through Central and Eastern Arabia' (ib. 1871) ; Wrede, 'Reise in Hadramaut' (1873) ; Beke, 'Sinai in Arabia' (London 1878) ; Blunt, Lady Anne, 'A Pilgrimage to Nejd' (London

1881) ; Doughty, 'Travels in Arabia Deserta' (London 1908) ; Hurgronge, 'Mekka' (The Hague 1888); Van den Berg, 'Le Hadramut' (Batavia 1885) ; Harris, 'A Journey through the Yemen' (Edinburgh 1893) ; Nolde, 'Reise nach Inner-Arabien' (Brunswick (1895) ; Euting. 'Tagebuch eir.er Reise nach Inner- Arabien' (Leyden 1896) ; Hirsch, Leo, 'Reisen in Siidarabien, Mahra-Land und Hadramut' (Leyden 1897) ; Landberg, 'Die sudarabische Expedition' (Munich 1899) ; Bent, 'Southern Arabia' (London 1900) ; Hogarth, 'Penetration of Arabia' (London 1905) ; Phillips, L. M., 'In the Desert' (London 1905) ; Jourdain, 'Journal of John Jourdain, 1608-1 7 ' (London 1905) ; Musil, 'Arabia Petrsea' (Vienna 1908). Anthropology. — D'Avril, L'Arabie contern- poraine' (Paris 1868) ; Spencer, H., 'De¬ scriptive Sociology' (London 1881); Topinard, Paul, 'l'Anthropologie' (Paris 1878) ; La- mette, Charles, 'Etude sur l'Yemen' (Rouen

1882) ; Le Bon, Gustave, ‘La Civiliza¬ tion des Arabes’ (Paris 1884) ; Zaborowski, ‘l’Emploi des metaux chez les Egvptiens et les Chaldeens’ (Paris 1886) ; Dusseaud, ‘Les Arabes en Syrie avant l’lslam’ (Paris 1907) ; Weber, ‘Glasers Forschungsreisen in Siidara- bien’ (Berlin 1909). History. — Caussin de Perceval, ‘Essai sur l’histoire des Arabes avant ITslamisme’ (3 vols., Paris 1847) ; Fleischer, ‘Abufedae historia Anteislamitica’ Leipzig 1831); Wiislenfeld, ‘Genealogische Tabellen der Arabischen Stamme und Familien’ (Gottingen 1853) ; Weil, G., ‘Geschichte der Chalifen’ (3 vols., Mannheim 1851) ; Zehme, A., ‘Arabien und die Araber seit hundert Jahren’ (Halle 1875) ; Salil ibn Rasik, ‘History of the Imans and Seyyids of Oman’ (London 1871); Hakami, ‘Yaman, Its Early Mediaeval History, Text translation and Notes,’ by Kay (London 1892) ; Briinnow and Domaszew- ski. ‘Die Provincia Arabia’ (Leipzig 1906) ; Caetani, ‘Studi di Storia Orientali’ (Milan

1911); Jaussen et Savignac, ‘Mission archeo- logique an Arabie’ (Paris 1913).

ARABIA, Kingdom of. See Hejas.

ARABIAN NIGHTS, The. ‘The Ara¬ bian Nights,’ or more properly ‘The Thousand Nights and a Night’ (Alf leilah wa-leilah), is a collection of stories in Arabic connected by a frame-story, probably Persian in origin and much older than most, possibly than any, of them. This frame-story, the distinctive feature of the ‘Nights,’ is essentially as follows: Shah- riar, King of India and China, finding his wife false and that his brother and a genii are in like misfortune, kills the unfaithful wife and afterward each successive bride on the morning following the marriage. Public dis¬ tress induces the vizier’s daughter, Sharazad, to offer herself “to be a ransom for the daughters of the Mohammedans or the cause of their deliverance.” She “beguiles the wak¬ ing hour” of the king by beginning a story which she interrupts at a point of suspense. Her life is spared that she may continue it. She repeats the device, linking tale to tale or involving one in another, till at the end of the 1,001 nights she asks her life, receives favor and is made full cpieen.

A Persian collection of tales with the same frame-story is mentioned by the Arabian his¬ torian Masudi in 943 ; another historian, Abu Yakub al Nadim, writing in 987, says this col¬ lection was written by Princess Homai, daugh¬ ter of Bahman, that it counted 200 tales dis¬ tributed through 1,000 nights, and was a “meagre and uninteresting publication.” It has perished, but it seems probable that some fifth part of the ‘Nights’ we know was de¬ rived from it, though with far-

reaching modi¬ fications throughout. The frame-story is much older, possibly, if the ingenious identification of Sharazad-Homai with the Biblical Esther, attempted by the late Professor de Goeje of Leyden, be accepted, as early as 300 b.c.

Such a frame-story offers indefinite possi¬ bilities of extension and adaptation. Few manuscripts of the 'Nights' agree in their version of any single tale, in the order of the stories, or even in the make-up of the collec¬ tion. We may suppose that some favorite and favored rawi, professional stor3'-teller, found a recorder, or was asked by some wealthy ad¬ mirer to furnish a record of his narrations, in which professional successors would make developments, suppressions, substitutions, as conditions changed or their genius suggested. The division into 'Nights' was obviously con¬ venient for the professional narrator, living bv his art. It is found in manuscripts of tales that do not form part of any regular manu¬ script of the 'Nights' known to scholars. The very popular story of- Aladdin and the Wonder¬ ful Lamp is rarely found in such manuscripts; Ali Baba and the Forty Thieves, no less popu¬ lar among the Bedawi, occurs in none of them. Sir Richard Burton, after translating one manuscript of the 'Nights' in 10 volumes, could fill six more with "supplementary" tales, often with equal literary claim to inclusion. We have not and are not likely to have any "canon" for 'The Arabian Nights.'

The stories of 'Tne Arabian Nights' are of many countries and times, .but whatever their age or source all have been so transformed

that they are Moslem to the core, thoroughly Arabian in temper and in spirit. The scene is sometimes in China, India, even the land of the Franks; the time is often of the 8th or 9th century, or even earlier ; but the rawi is as indifferent as his auditors to anachronisms, and will speak in these very stories of cannon or coffee, neither of which were known in Egypt till late in the 14th century. In one instance he names tobacco, which was not known till the 16th. The manners and cus¬ toms assumed throughout are those of Egypt from about 1400 to 1550, and it was during this period, probably at Cairo, that the <Nig'nts) took their present form.

A rawi must be ready with a tale to suit any audience. He may have to gain his bread to-day in camp, to-morrow in the bazaar or the inn, among simple folk, or, if fortune smile, at the festivities of the rich. So

a col¬ lection made from his bps or for his benefit will show wide variation in tone and theme. There are the old (an Arabic Cinderella among them, animal fables, like those of Bidpai and 2Esop, Bedawi adventures, lovers' romances, merchant voyages to strange and distant lands, adventurous wanderings in the spirit, and now and then, almost in the letter of the Odyssey, quests in the land of the Amazons and the isles of Wak-Wak in search of the lost beloved, tales of chivalry, taken from the historians, showing curiously the other side of the crusades and Moslem reaction to the Christian Church-Militant, some of them deadly serious, others frankly burlesque, pica¬ roon tales of successful knavery, and finally a curious group in which the beau role is so persistently given to women, either some Prin¬ cess Badoura or some slave Zumroud, that they seem designed less for any male audience than for idle hours of the haremlik. In nearly all the stories the actors live and move in momentary expectation of supernatural inter¬ vention. Any jar or well may hold an efrit or a genii, any lamp respond to a rub, any talis¬ man to a turn, or rock to an <(open-sesame.® Any day may see the pauper a prince, the prince a pauper, the <(sleeper awakened.® Fancy sits here on her magic carpet and travels in a twinkling wherever she will to (<expatia.te free® without trammel from laws of probabil¬ ity, gravity or economics. There, in its power to give passing release from the cares, and burdens of work-a-day life, lies the primary appeal of (The Arabian Nights* to the Arab or Egyptian who reads or more probably listens to them.

The style of the <Nights) is hardly ever studied, often it is slovenly to a degree sug¬ gested by none of the translations, meant, like its abounding poetical tags, to be spoken or chanted, rather than react. Character studies, such as the admirably comic barber, El Samet, are very rare. But there is a verve and fire of imagination in the stories that has defied, even inept translators to quench, though the inter¬ est that these tales awaken in a western man or boy, Oriental scholar, or plain reader, must at best be different from that which they arouse in those to the manner born when heard on Arabian nights.

First to introduce th« <Nights) to western readers was the French traveler, Abbe Gal- land. His adaptation and transmutation of

the manners and speech of Cairo to those of Versailles, appearing in successive volumes from 1704 to 1717, won immediate popularity. Its first English echo was Addison's retelling of the story of Alnashar in the Spectator of 13 Nov. 1712. The popular English versions of the (Nights) are humbler adaptations of Gal- land's paraphrase, whatever their pretention of ˆrevision® and new translation from the Arabic. This was first seriously attempted by the Irish novelist Henry Torrens,

who issued in 1838 a translation of the first 50 (Nights./ made at Simla and, though abounding in errors, conveying more of the spirit of the East to English readers than does any of those that have followed. In 1839 the distinguished Egyptologist Lane at Cairo issued the first volume of a translation finished in 1842, and Torrens abandoned his work; unfortunately, for, though Lane knew far more Arabic, he had less imagination and was more attracted by the sociological interest of the <Nights) than by their power to work illusion. His version is very scholarly, very labored. It omits or * softens with over-anxious care all that seemed likely to offend European morals or even Victorian conventions. John Payne's privately printed version (1882-84) is complete and writ¬ ten with purely literary aim, solely for the story's sake, but with more of the temper of medkeval Europe than of Egypt or Arabia. It is least happy in its rendering of the sim¬ plest folk-tales. Sir Richard Burton knew more of the <Nights) and of the life they de¬ pict than any of his predecessors. His transla¬ tion (1886-88) is also complete for the manu¬ script selected. Six supplementary volumes contain stories found in others only. Burton's notes bring together a vast deal of curious in¬ formation, hardly to be found elsewhere, but the English reflects the extreme eccentricity of the translator, even to the point of perversity ; and though his work was pruned for a house hold edition, of matter that could not be pub' lished, it has not become popular. The judg¬ ment of the multitude is not altogether unen ¬ lightened in continuing to abide faithful to the Gallic English of the adapters of Galland's adaptation, so long as their desire is less to know of Arabian manners or Egyptian ways than to be made fancy free. For such no literal translation can serve, least of all in case of the frequent lapses into verse. Some adaptation there must be. English readers have still to await a satisfactory re-creator of (The Arabian Nights/

The stories in any of their versions are of very varying interest. Beside Ali Baba and Aladdin, which may lack a bibliographer's title to inclusion but have every other, it is enough to recall the names of Sindbad the Sailor, of Abou-Hassan, the Sleeper Awakened, of the scapegrace Ali of Cairo, of Noureddin and Bedreddin, of Hassan of Balsora, Joudar, Alishir, Zumroud, Camaralzaman, Badoura, Gulnare, Marouf, prince of ready-tongued im¬ postors, the Hunchback and El Samet, the bar¬ ber of unquenchable garrulity ; of the gracious Peri Banou, of the Porter and the Three Ladies of Bagdad; of the Magic Horse, the Magic Carpet and the City of Brass, to realize how large is the debt of English literature and English readers to (The Arabian Nights/ They have made it hard to think in terms of

historical reality of the Caliph Haroun al Raschid.

Benjamin W. Wells,

Author (Modern German Literature f (Modern

French Literature 9

ARABIAN PHILOSOPHY. Specula¬ tive activities were stimulated into action among the Arabians with the appearance of sects in the world of Islam. As soon as Mohammedanism came in contact with older civilizations, notably with that of Persia, the ideas and mental habits of the new converts created a spirit of investigation into the doc¬ trines of the Koran, which until then had been accepted in blind faith on the authority of divine revelation. The first manifestation of this spirit was the coming into existence of the sect known as “Kadariyah® (from the Arabic Kadara, to have power), whose partisans proclaimed the freedom of the will, in contrast with the “Jabariyah® (jabara , to force, to compel), who defended the generally accepted belief of the orthodox that man is completely dependent upon the divine will, and that not only his destiny but also his conduct is de¬ termined, and his own will does not count.

From the “Kadariyah® developed the school of theologians known as the Motazilites (from itacala, to separate oneself). In addition to the doctrine of free will the Motazilites taught that God is an absolute unity, and no attributes can be ascribed to him. They further asserted that revelation is a natural product of the human faculties ; that all knowledge necessary for the salvation of man emanates from his reason. To defend their doctrines against the attacks of the orthodox, the Motazilites elaborated a system of a rational theology, which they designated ((Ilm al-Kalam® (science of the word). Its pro¬ fessors the Motekallamin (known in Hebrew as Medabberim and as loquentes in the Latin versions) may be compared with the scholas¬ tics of the Catholic Church. After the intro¬ duction of the Greek philosophy among the Arabians, the Motekallamin directed all their efforts against the philosophers. Their prin¬ cipal aim was to defend against the Peripa¬ tetics the creation of matter, and the existence of . a god who exercised a direct action upon the making and the keeping of the world. To that end they adopted the theory of atoms as enunciated by Democritus. They taught that space is pervaded by atoms possessing no quality or extension, and time was similarly divided into innumerable instants. The atoms were originally created by God, and

are created now as occasion seems to require. Bodies come into existence or die through the aggregation or disintegration of these atoms. There is no causality in the laws of nature, God alone is the cause. The supposed uni¬ formity and necessity of causation is only an effect of custom ; the universe could be entirely different from what it is.

In reaction against both the Motekallamin and the philosophers there arose, in the land of the Magis, the mystic sect of the “Sufis® who subsequently exercised a great influence on the Islamic world. The Sufis protested against all philosophical inquiry, and declared theological knowledge to be far inferior to inward perception, or mystic intuition ac¬ quired through religious ecstatics. From the

conflict of these divergent forces there arose, in the 9th century, the tendency of thought represented by the philosophers of Islam. The initiators of this tendency were Syrian Chris¬ tians, who, encouraged by the enlightened caliphs of the Abbasside dynasty, and especially by Almamun (813-33), transplanted Greek science and philosophy to the Arabian soil. In addition to works of science, they trans¬ lated the <Timaeus,) the (Laws) and the

(Republic } of Plato, and when, attracted by the medical treatises of Galen, they were led to the study of Aristotle, the Arabians trans¬ lated not only the genuine writings of the Stagirite, but also the so-called (Theologia Aristotelis) which was merely a compilation from the (Enneads) of Plotinus, and the

(Liber de Causis) which was a compilation from the (Elements of Theology) of Proclus. The erroneous attribution of these two works to Aristotle, together with the translations of the neo-Platonic commentators, such as Por¬ phyry and Ammonius, imparted from the be¬ ginning to Aristotelian teaching a neo-Platonic meaning; and even those of the Arabian philosophers who came to be recognized as the most faithful exponents of Peripateticism were not entirely free from the influence of neo-Platonism.

Among the Arabian philosophers of the East the most prominent were Abu Jusuf Ja’Kub ben Ishak al-Kendi (d. about 870), Abu Nasr Mohammed al-Farabi (d. 950), Abu Ali ibn Abdallah Ibn Sina (Avicenna, 980-1037) and Abu Hamed Mohammed Al- Ghazali. Of the 200 treatises which Al-Kendi is said to have composed on all themes of science and philosophy, there remained only a few works on medicine and one on the astro¬ logical-astronomy of his age, in which he ex¬ presses the opinion that all things are bound together by

harmonious causal relations, that each, when completely conceived, must repre¬ sent as in a mirror the whole universe. Al- Farabi gave the tone and direction to nearly all subsequent speculations among the Arabi¬ ans, and his works on logic became authorita¬ tive among the Latin schoolmen. Among the contents of his metaphysics mention is to be made of his proof of the existence of God, which was employed by Albertus Magnus and later philosophers. Taking for base the Aristotelian principle that all change and all development must have a cause, Al-Farabi distinguishes between that which has a possible and that which has a necessary existence. If the possible is to exist in reality, a cause is necessary thereto. As the world is a com¬ posite it must have had a beginning or was caused; but as the series of causes and effects can neither recede in infinitum , nor return like a circle into itself, it must depend on some necessary link, and this link is the first being (ens primum). This first being exists necessarily; it is the cause of all that exists. It is simple and unchangeable. In his teach¬ ing respecting that which is caused from God, Al-Farabi follows the neo-Platonists. His fundamental conception is expressed by the word emariation. Prophecy is in Al-Farabi's opinion merely a natural manifestation of the intellect. It emanates from a soul of purified reasoning powers; the soul associates itself with the active reason and receives from it

aid and instruction. I.Ian's supreme aim is to elevate his capabilities to the highest degree of perfection attainable. Contemporary with Al-Farabi was the semi-religious and semi- philosophical society of the <(Brethren of Purity.® The treatises of this society afford a kind of encyclopedic survey of the sciences of all nations and religions known to their time. Their philosophy of nature, however, ends almost entirely in psychology. The soul is the real being of man which has developed on a mystic path of ascent from the lower natural orders through the animal stage to an increasingly higher grade of perfection.

Avicenna exercised a great influence in Europe both by his medical canon and by his works on logic and metaphysics. In the domain of the latter he set out from the doctrines of Al-Farabi, but modified them by omitting many neo-Platonic theorems and approximating more nearly to the real doc¬ trine of Aristotle. He taught that while all things are primarily traceable to the agency of an immediate influence of such a diety, inasmuch as the immutable cannot itself create substances subject to the element of change, the first and only

immediate product of God is the intelligentia prima, from which the chain of emanations extended through the various celestial spheres down to our earth. But the issuing of the lower from the higher is to be conceived not as a single, temporal act, but as an eternal act. The cause which gave to things their existence must continually maintain them in existence. However, not¬ withstanding its dependence on God, the world has existed from eternity. Time and motion always were. Avicenna distinguishes a twofold development of our potential under¬ standing into actuality, the one depending on instruction, the other rare and dependent on immediate divine illumination.

Ghazali, the last philosopher of the East, marked a reaction of the exclusive religious principles of Mohammedanism against philo¬ sophical speculation. After having expounded in his (Makasid al-Filasafah) (Tendencies of the Philosophers) the teachings of the Peri¬ patetics, he shows in (Tahafut al-FilasafalP (Destruction of the Philosophers) their weak¬ ness. He makes a critical analysis of 20 points — 16 of which belong to the domain of metaphysics, and four to that of physics — and demonstrates their contradictions. Like the Motekallarnin he rejects the theory of causality, and asserts that there is not neces¬ sarily any connection between phenomena that usually occur in a certain order. This indict¬ ment against liberal thought was afterward refuted by Averroes, who reproaches Ghazali with duplicity ; but it sounded the death knell of the st.udy of philosophy in the East.

The Arabian philosophers of the West showed greater independence than their pred¬ ecessors of the East and freed themselves more from the theological bias. The first among them was Avicebrol who, considered by the Christian scholastics as an Arabian, was identified by modern scholars with the Jewish famous poet Ibh Gabirol. His main thesis in his work, which was rendered into Latin in 1150 under the title (Fons Vitae/ is that the materia universalis is the substratum of all that exists ; one and the same matter

runs through the whole universe from the highest limits of the spiritual down to the lowest limits of the physical, excepting that matter the further it is removed from its first source becomes less and less spiritual. Though essen¬ tially a neo-Platonist, Avicebrol departed from the pantheistic emanation doctrine, originat¬ ing that of the divine will.

An exponent of a purer Aristotelianism was Abu Bekr Mohammed ben Jahya Ibn Badja (d. 1138), known to the Latin world as Avempace. Besides commenting on various physical treatises of Aristotle, he composed the (Conduct of the Solitary/ in which h treats of the

degrees by which the soul rises from that instructive life which it shares with the lower animals through gradual emancipa¬ tion from materiality and potentiality to the acquired intellect, which is an emanation from the active intellect or Deity. This idea is more fully developed by Abu Bekr Mohammed ben Abd al-Malik Ibn Tofail (1100-85) known as Abubacer, in his philosophical novel (Haj' ben JokdarP (the Living, the Son of the Waking One). Borrowing from Avicenna the allegorical character of the ideal man Hay ben Jokdan, Ibn Tofail describes the development of a thinker growing up far from all human intercourse on a lonely island. He creates for himself the conditions of material exist¬ ence, and in his mature age is led by the contemplation of nature to the vision of God. He then meets a philosopher who has risen beyond the limitations of human society, and the two resolve to communicate this pure knowledge to the people ; soon, however, they realize the vanity of the undertaking, as the people are ripe only for Mohammed's allegories.

The last and greatest philosopher of the West was Abu al-Walid Mohammed Ibn Roshd (1126-98), known as Averroes. While his predecessors sought more or less to at¬ tenuate the theories of Aristotle when they were in direct apposition to religion, Averroes endorsed them to their utmost, and seemed to take pleasure in emphasizing them. In his opinion science is the sole arbiter in matters of this world; and religion is not a branch of knowledge to be reduced to propositions and systems of dogma, but an inward power, an individual truth which stands distinct from, and not contradictory to, the universalities of scientific law. The perplexing problems of creation, providence and immortality were solved by Averroes in a true Aristotelian spirit. With regard to creation he goes still further than Aristotle himself, declaring that not only is matter eternal, but that form even is potentially existent, otherwise there would be creation ex nihilo, which is inadmissible.

With Averroes the Arabian philosophy came to a close in the Islamic world, but it exerted for centuries great influence on- Chris¬ tian schoolmen. Though the Arabian philoso¬ phers can lay no claim to originality, civiliza¬ tion owes them a debt of gratitude for having preserved the writings of Aristotle the study of which led to the birth of the modern philosophy.

Bibliography. — Wenrich, (De auctorum Graecorum. Versionibus et commentariis Syri- acis, Arabicis, Armeniacis, Persicisque1* (Leip¬ zig 1842) ; (Munk, (Melanges de Philosophic Juive et Arabe> (Paris 1859) ; Renan, (Aver-

roes et l'Averroisme5 (Paris 1862) ; Schmold- ers, 'Documenta Philosophise Arabum5 (Bonn 1836) ; id. (Essai sur les Ecoles Philosoph¬ ises chez les Arabes5 (Paris 1842); Diete- rici, ' Streit zwischen Mensch und Thier) (Berlin 1852) ; and his other translations of the (Encyclopedia of the Brethren of Purity5; Ueberweg, (History of Philosophy 5 (London 1872, Vol. I) ; Archiv fiir Gcschichte der Philosoph (for 1899 and 1904); Turner, (History of Philosophy5 (Boston 1903).

Isaac Broyde,

Jewish Department New York Public Library.

ARABIC LANGUAGE. Among the languages termed Semitic, subdivided into Northern, embracing Aramean, Canaanitic, and Hebrew, the Babylonian and Assyrian, and Southern, including Arabic, Himyaritic, Geez or Ethopian, the Arabic in its historical growth and development and its present-day wide diffusion and prominence, is the richest and most important of the entire group. Com¬ pared with its sister idioms, it has the merit of modernity and completeness. Re¬ garded as an ancient tongue, it has the vigor and freshness of youth. In the earlier times, as the Bible and the inscriptions show, the constant migrations from central Arabia into Babylonia, Egypt, and south into Yemen and Abyssinia brought about reciprocal changes in dialects and customs. It was Schrader's, view, contested by other authorities, that Arabia was the starting-point of Semitic culture. His¬ torical and geographical conditions, however, tended to preserve its earliest roots and forms until the 6th or 7th century of our era, being more, fortunate than Aramean and Can- aanite and the Phoenician in their closer con¬ tact with foreign nations that was disturbing and led to destruction. Another happy cir¬ cumstance was the fixation by the Koran of the Koreish dialect, the tribe settled in and around Mecca, and from which branch Mo¬ hammed sprang, as the future literary language of the whole nation. Even if with Noldeke we deny the theory that classical Arabic is nothing' but the dialect of Mecca which the Koran brought into fashion, we must admit how vital the Koran has proved, despite some variations from classical rules, as the store¬ house of the national tongue. Mohammed's grammatical and orthographic errors were later sanctified and introduced into the lan¬ guage as standard authority. Hence the essential unity of Arabic wherever spoken or written. From the mouth of the Tigris, through all

Mesopotamia, Syria and Palestine, in Arabia proper, Egypt and north Africa as far as Morocco, the language is the same, although some decay in inflection is to be observed. Wright claims its purest form is found among the Bedouin and its most corrupt on the Island of Malta. In its long stretch of history it has not been untouched by foreign in¬ fluences; it has absorbed in particular Greek elements of culture, but not to the same ex¬ tent of assimilation as an Indo-Germanic dialect would have done. Its antiquity and influence are shown in the earliest records of the Old Testament in grammatical forms and words, while in later centuries Arab wisdom was personified in the Queen of Sheba, in the friends of Job and in Solomon's own sagacity being compared to that of the Arab.

It was the Koran and the religion of Mohammed which made Arabic one of the chief languages in the world and subjected half the earth to the sway of Islam. The linguistic changes that naturally followed the military domination of the 1st century dis¬ appeared a century later when Arabic gram¬ mar was constructed so firmly as to undergo subsequently no essential variation. The zeal of Arabic philologists has opened to the world the vocabulary of the language, its wealth of words and ease of modification, which is the more wonderful when we consider the simple conditions of Arab life and how monotonous the land. The grammatical forms, too, are exceedingly rich, with the lavish development of broken plurals and verbal nouns, while it possesses the poetical freedom that seems the characteristic of the Hebrew. It is adapted as well for business as for society, and for abstract subjects in particular. Minor Arabic dialects developed with time and diverged one from the other. The present speech of Egypt and the African coastal lands — the Maghrib — from Tripoli to Morocco have been made in¬ telligible by special grammars. Maltese for nine centuries has been isolated from the influence of literary Arabic and exposed to that of Italian, and forms an interesting language for the philologist. Noldeke asserts, however, that with all their variations these dialects do not differ as much from classical Arabic as French and Rumanian do from Latin. Despite the puzzling appearance to the novice of Arabic script, it is comparatively easy to learn. The real mystery of the Semitic lan¬ guages, seen in the Arabic in its most bewilder¬ ing form, is the triliteral root which consists of three consonantal letters. While the vowels are only subordinate, expressing the word's modifications, the consonants give its meaning.

In the group of Arabic is to be included the South Arabian or Himyaritic, called also Sabsean, which extends along the south coast of Arabia from the strait of Bab-el-Mandeb on the west to the mouth of the Persian Gulf on the east. Inscriptions found in great num¬ bers

particularly in the province of Yemen are in the ancient Himyaritic, dating to the 3d and 4th centuries of our era. None of the monuments in that dialect are older than the 7th century. The paucity of vowels in the inscriptions renders its knowledge more diffi¬ cult, but the resemblances to Arabic are marked. Geez or Ethiopic is the language of the Abyssinians — its modern dialects are found in the Tigre and Amharic in the mountainous regions southwest of Arabia. The oldest Ethiopic monuments — apart from the Ethiopic version of the Bible — are a few inscriptions which date from the first five or six centuries of our era. When the ancient language had died out among the people it was still cultivated by the priesthood. Its litera-- ture is largely modern, consisting of transla¬ tions from the Coptic and more often from the Arabic from the 13th to the 16th centuries.

Bibliography. — Caspari, (Arabic Grammar5 (Oxford) ; Crow, F. E., (Arabic Manual5 (Lon¬ don 1901) ; Dirr, A., (Colloquial Egyptian Arabic5 (London 1904) ; Forbes, D.., (Arabic Grammar5 (London) ; Green, A. O., Practical Arabic Grammar5 (Oxford 1901) ; Harder, E., (Deutsch-Arabisches Handworterbuch5 (Hei-

delberg 1903) ; Lane, E. W., (Arabic- English Lexicon (1863-93) ; Lansing, J. G., (An Arabic ManuaP (Chicago 1886) ; Palmer, E. H.,

(Arabic ManuaP (London 1906) ; Salmone, H. A., (Arabic-English Dictionary > (1890) ; Stein- gass, F., (Arabic Dictionary) (London 1884) ; Thimm, C. A., (Arabic Self-Taught' (London 1899) ; Vollers, C., (Modern Egyptian Arabic'

(Cambridge 1895) ; Wright, (Arabic Grammar' ; Wright, William, cLectures on the Comparative Grammar of the Semitic Languages ' (Cam¬ bridge 1890) ; Zimmern, Heinrich, (Vergl. Gramm, d. Semit Sprachen' (Berlin 1898). Brockelmann and Noldeke are leading author¬ ities in this field.

Abram S. Isaacs,

Professor of Semitic Languages, New York University.

ARABIC LITERATURE. While it is only the last century before Mohammed which has left a few traces of early Arabic literature, from the era of the prophet of Islam it grew with marvelous rapidity to become one of the most widely cultivated in successive ages. An

outgrowth of the wandering Bedouin of the desert, it was to include nearly all the branches of human knowledge and research. Theology, medicine, philosophy, philology, history, mathe¬ matics, geography, astronomy and poetry, in particular, were extensively represented, even if the modern world has had, as yet, only an introduction to these treasures, which were less cultivated after the 14th century. The begin¬ nings sprang from the desert, when the Bedouin with his camel, long his only steed, his nearby herbage and frequent encampments, became rhymster and balladist in a fashion. His sub¬ jects were limited — the face of some dear one, the abandoned camp and its lost treasures, the strife over camel or caravan — nothing very monumental or superhuman as might be traced in the early literary effort of the Indo-Euro¬ pean. The primitive Arabic poems in quaint measures are satires and sharp epigrams, pass¬ ing from tribe to tribe of a common origin, and composed by the Sha-ir, sage and diviner as well. Of such productions nothing remains. Popular songs orally transmitted in memory of victory over the Romans were soon forgotten, for nothing was written in those times.

It is not surprising that the most ancient of the Arabic poems date only from the 6th century of our era when Nabatean travelers brought the Estrangelo alphabet from Syria and applied it to the Arabic. The poets of the desert traced their rhymes and metre to the soothsayer's formula and chant ; the measure was to be changed as new conditions of life arose with music and the dance, and the bustl¬ ing town supplanted the wilderness.

Out of the pre-Islamic period the earliest poems comprise the seven mu-allaqat or liter- - ally the ˆsuspended" — a term of later origin to indicate the high honor in which they were held, like some glittering pendant ; they were also called a <(necklace of pearls." The word is also held to signify ˆexcellent.® The seven poets whose names were thus strung together are Imru'u'l-Qais, Tarafa, Zuhair, Labid, Amr, Antara and Al-Harith. In the opinion of some the two last are Nabigha and A'sha. They created the qasida, with its definite rules and forms. It treated of the abandoned camp, and

those who had forsaken it. Some love theme is interwoven and then the hard desert journey is mentioned, with the faithful steed's desperate plight. The last lines dwell on the glory of the ruler before whom the poem is recited and from whom a gift is expected. Of these the name of Antara survives in the Romance of Antar — a true desert poet, as contrasted with the courtier poet Nabigha or with Imru-ul-Quais of royal lineage and regarded by Mo¬ hammed as best of all.

Other pre-Islamic poems preserved are the Diwans (anthologies arranged according to the alphabetical order of the rhyme) of the six poets brought together by the grammarian Al- Asma'i, preserved in revised form by a learned Spanish Arab of the 11th century, and pub¬ lished by Ahlwardt. In the same class is AL Mufaddal's collection of poems, Mufaddaliyyat in one volume in the 11th century, of whose publication Thorbecke has made a beginning ; and also the Jamharat Ash'ari a! Arab, quoted in the 11th century by Ibn Rashiq and printed at Bulaq. Betterˆ known is the Hamasa or anthology of war-like exploits, by Abu Tam- mam, translated into German by Ruckert. Ley¬ den has a manuscript copy of a work of the same name and kind and dating from the same century, the ninth, compiled by A1 Buhturi. Wright has issued a fragment of Sukkari's stories of brigands. But the most valuable source to early poems and poets is the Kitab- al Aghani (Book of Songs) by Abul'l-Faraj, published at Bulaq in 20 volumes, with an addi¬ tional volume by M. Briinnow from manu¬ scripts discovered in European libraries. Suk- kari has also collected poems of the Hudhai- lites, who dwell southeast of Mecca, which have been studied and translated in part by Kose- garten, Abicht and Wellhausen. In addition to their anthologies many warriors sang their own deeds in love and war, like Ta'abbata-Sharran and his companion Shanfara, Urwa ibn al- Ward, Dhul-Asba, Al-Hadira, Abid, Hatim, Umayya, whose subjects were religious, and who died in 630. Of a religious turn and famous in his day was Al-Asha. Al-Khansa was renowned for her elegies, a necessary part of funerals, and whose composition was con¬ fided to women. There were a number of Jewish poets in that early period, whose colonies dated from the Roman conquest of Palestine; local legend asserts an earlier origin. Their language had been Arab, but they had retained their religion and were propagandists in a way as Arab tribes associated themselves with them. The greatest was Samuel ibn Adiya, and next to him in fame was possibly A1 Rabi, whose sons were bitter enemies of Mohammed. Christianity had made proselytes in Arabia, with churches and monasteries in Syria, with the constant caravans of north¬ ern Arabs, while Mesopotamia was wholly Christian. Adi ibn Zaid was the most famous of the Christian poets, coming from Hira, with its mixed elements of Arameans and Arabs. Of the prose of these early centuries, there are no traces extant, as nothing was written or deemed worthy of such honor. The literary art which attained later such magnificent develop¬ ment was limited to stories and recitals of martial deeds, to proverbs and legends. With the Koran began a new period of Arabic

thought. Whatever elements, whether Jewish, Christian or a blend of the two, like the Essenes, were at the basis of Islam, the Koran founded the classic literature of the Arabs. Revealed in bits and fragments, with its style differing according to the periods of the prophet's life at which he was inspired, written throughout in rhymed prose, and finally edited under Caliph Uthman, with its chapters or suras, excepting the first, arranged artificially according to their length, the work became corner stone and temple, foundation and edifice, authority and inspiration to worshipper and worker. All copies of the Koran now existing are copies of Uthman's edition — other texts were done away with by that Caliph, except the authoritative text of Abu Bekr, which was soon afterward destroyed by the governor of Medina. Unanimity and unity had been pre¬ served. In the largest measure Arabic litera¬ ture is the Koran, studied, interpreted in prose or verse, eulogized, made the point of departure for thought in a thousand fields, all closely connected with the history of the Arab people at home and in their conquered realms.

Under the Ommeyyads, when less simplicity prevailed, than under the first four caliphs, as town life grew more attractive, the old forms of poetry were maintained with all their artifi¬ cial character. Three brilliant names appear in this period — Akhtal, Ferazdaq and Jarir, whose merits were a constant source of dis¬ pute at the court. Minor poets were numerous. Many, the best known of whom was, Ajjaj and his son, Ruba (edited in 1903 by Ahlwardt and translated by him a year later), revived the rajas, a very simple prosodic metre, used for improvisation in pre-Islamic times. With the rise of the Abbasside line and the wider diffu¬ sion of Persian influence, a new literary period began. Bagdad was founded, and became a famous centre. The Arab gave way to the Persian in poetry, theology and law. If Arabic now became the sole language of the vast empire of the caliphs, it was written and spoken by men who were Arabs only by edu¬ cation. Changes in the character of poetry and its subjects were soon to follow. Less and less attention was paid to the quarrels and exploits of the tribes and more to general culture and interests. Among the large group of poets, the most distinguished was Abu Ninvas, born in the heart of Susiana about 756. He prac¬ tised every form of Arabic verse with a range and ability that gave him fame. Others of more or less prominence were Muti ibn Ayas ; the blind Bashshar, ibn Burd (d. 783), Abu Dulama, Marwan (d. 797), a Jewish writer from Khurasan; Ibn al-Ahnaf, Muslim (d. 803), who. at the point of death caused a rough copy of his poems to be cast into the river; Abul 'Atahiha, Di'bil (d. 850), Ibn al Mutazz, a caliph's son who was a dainty poet and wrote the first great Arabic work on rhetoric. The list could be greatly

extended. The provinces claimed a full share of writers, some of whom rivaled those of the capital, names like Ismail of Bassora (d. 789). Dik-al-Jinn of Syria, (d. 809), Al-Ma'arri born in Syria 973; Abu Firas, of princely family; Al Nami of Aleppo (d. 963) ; Tughra'i, born at Ispahan (d. 1121), Al- Wawa, of Damascus, Al Haziri of Turkish origin (d. 1235). The most famous represen¬ tative of the provinces was Mutanabbi, Syrian

(b. 905), who became so popular that 40 com¬ mentaries were written to explain his verse. Persia had a group of poets in Arabic, among whom can be mentioned Al-Busti (971-1010), who composed in prose and verse; Al- Abiwardi, poet and scholar; Al-Khayyat (1058-1123, whose <Diwan) was widely read in the Middle Ages; Al-Ghazzi (1049-1130), a Pales¬ tinian; and the most illustrious of all Sadi (d. 1291), who wrote Arabic odes as well as his immortal <Gulistan) and Besides flourishing in Syria, Persia and Egypt, Arabic poets were found in Spain and Sicily. In rhymed prose Al-Hamadhani (968-1008) wrote his (Maquamas,) or lectures with rare skill. Al-Hariri (1054-1122) wras the most brilliant in this field. As late as the last century he was imitated by the Sheik Nasif (d. 1871). Tales in a similar vein, written in the 9th and 10th centuries, are found in the anthologies. Stories, too were borrowed from the Pehlevi version of Bidpai's fables in Arabic translation by Ibn Muqaffa in the 8th century, under title (Kalila wa DimnaC and from the Indian through the Persian, made as early as the 9th century, of (The Book of the 1001 Nights,* which took its present form with local varia¬ tions about the 13th century.

During the dynasty of the Abbassides the science of languages was studied as zealously as poetry. The schools of Kufa and Bassora fur¬ nished a long array of authors in Arabic, with their grammars, word-studies, philological treaties on the Koran. The Nizamiyya Uni¬ versity of Bagdad proved a centre of research for studies in poetry, rhetoric and lexicography chiefly by scholars of Persian origin. History, which began with works devoted to the sway of Mohammed, was soon concerned with the biography of the prophet as the tradition was more closely investigated. Early historians were Ibn Ishaq (d. 768), the great part of whose biography of Mohammed, preserved in Ibn Hisham's compilation, was translated into German by Weil, and Al-Waqidi (747-823), whose work was issued at Calcutta by von Kremer. There were many others who fol¬ lowed in the field of history, some very cele¬ brated. Tabari (838-923), is probably the most important; his (History of the Prophets and Kings> is the most ancient record in its line extant. Mada'ini's (History of the Caliphs,* issued before Tabari, is known only in the selections given by later

writers. Historical anecdotes and legends were embodied in a number of works. Out of this period, too, comes the (Fihrist,) a bibliographical treatise of writings which have disappeared, owing largely to the destruction of the Bagdad libraries by the Mongols in the 13th century and by Tamerlane in the 15th. Provincial histories, biographies of Saladin and others,, autobiog¬ raphies which began with Ibn Munqidh (1095— 1188) were written, while jurisprudence at¬ tracted numerous authors, commentators on the canonical books, criticism of the authorities of the tradition, and an endless array of. treatises on Moslem law in its varied ramifications, and on dogmatic theology and mysticism. Transla¬ tions from the Greek formed an integral por¬ tion of Arabic literature. Greek works on philosophy and science had been translated by the Syrian monks and were thus reproduced by the Arabs. Caliph Al-Ma'mum by founding a

university at Bagdad was the first to give dis¬ tinct impetus to Arabic science which through Moslem Spain was to arouse all Europe. Then followed a rapidly increasing mass of books on philosophy, mathematics, astronomy and astrol¬ ogy, geography, medicine, alchemy, encyclo¬ paedias, whose influence was widely extended through the then known world. One famous name may be mentioned, Ibn Khallikan (1211- 1282), whose anecdotal biographical work, ˆObituaries of Great Men,> was translated into English by de Slane (London 1842-71).

It is difficult to do justice to the strength and character of Arabic literature in the cen¬ turies of its fullest blossoming. Rulers as a class vied with each other in establishing schools and colleges. Besides Bagdad, Bas- sora and Ivufa, Aleppo, Ispahan and Samarcand became homes of science, while Cairo, Fez and Morocco contained academies of learning, with rich libraries, the precious storehouses of knowledge for later times. Cordova was to Europe what Bagdad was to Asia for several centuries. Students from other parts of Europe journeyed to the Arab schools in Spain to learn particularly medicine and mathematics. In arithmetic, geometry and astronomy the Arabs were the pathfinders of their da)C Arab Spain furnished a remarkable contrast to the spectacle of comparative ignorance in the rest of Europe: In mathematics their influence was of signal character. They added the decimal system and the Arabic numerals, whose origin, however, can be traced to India ; they simpli¬ fied the trigonometry of the Greeks and widened the application of algebra. In the line of

inventions and discoveries they merit much distinction ; they brought paper from Asia and were the first to employ cotton instead of silk in its manufacture. Gunpowder was known to them a century earlier than before any trace of it appeared in European history. Already in the lltli century they had the compass.

With the rise of the Turkish body-guard under Ma'mun's successor in the 9th century began the gradual decline of the Abbassides, which became more rapid as the Caliphates ended when the Mongols in 1258 captured Bag¬ dad. The changed conditions now under Turk¬ ish and now under Persian sway had their natural effect on Arabic literature. Yet it can point none the less to a continuous array of works on poetry, history — in the latter branch Ibn Khaldun (1332-1406) is one of the greatest in Arab annals — philology, anthologies and romances, — which Lane describes in his (Mod¬ ern Egyptians > ; with fables such as those of Luqman, through the medium of a Syriac ver¬ sion (1299), by Barsuma, a Christian (d. 1316). Luqman is considered by some to be identical with ˆEsop.

The 19th century witnessed much literary activity in Arabic-speaking lands, not only in Egypt, Syria, Tunis, Algeria and Morocco, but also in cities like Constantinople and Paris, where Oriental writers are accustomed to meet and the learned recognize the wealth and power of the Arabic. Among the more notable writ¬ ers were Sabbagh (d. 1816), who left a num¬ ber of works in manuscript in the fields of history and grammar; his friend Boqtor (1784—1821), who left an Arabic-French dic¬ tionary; Shaikh Rifa'a, who spent the closing years of his life as head of the Translating

Office at Cairo; Faris A1 Shidyaq (d. about 1890), who translated the Bible into Arabic and wrote on Arabic synonyms, on animal nature, on his travels, and made various literary and scientific contributions to an Ara¬ bic newspaper; Butrus Bistani (1819-83), a Maronite who became a Protestant, wrote on Arabic literature, arithmetic, grammar, etc. Rushaid Dahdah published a number of Arabic texts, chiefly in France. Beyrout was the cen¬ tre of a literary movement in the 19th century; poems, grammars, dictionaries, biographies were written and the knowledge of the Arabic classic spread, Father Cherkho of the Beyrout University of Saint Joseph being the chief pioneer. History was much cultivated in the Lebanon. Damascus in the seventies and eighties produced many books on law, phi¬ losophy, logic, hygiene and theology. Egypt has vied with Syria in its literary activity, the printing presses at Bulaq and private enter¬ prise at Cairo familiarizing the public with Moslem classics, while new writers have done their share in poetry, geography, history. Two historical novels

were composed by Zaidan (1834—90), a Syrian Christian. Ali-pacha (1823-93), Minister of Public Instruction, wrote on the metric system (1892) and founded the Cairo Viceregal Library (1870). Habib A. Salmone of Beyrout and London compiled a. great Arabic dictionary and translated Swe¬ denborg's (Heaven and HelP into Arabic (1896). In physics, chemistry and natural science there have been numerous authors. The woman question has its expositors and topics of the day are discussed by some writers. To this summary must be added the issue of many newspapers and copious translations from European languages.

Bibliography. — Brockelman, Carl, (Gesch. d. Arab. Litt) (Weimar 1898; Leipzig 1901); Clouston, W. A., (Arabian Poetry for English Readers) (Glasgow 1881) ; Chenery, T., and Steingass, F., cThe Assemblies of Al-HarirP (trans., 2 vols., London 1867, 1898) ; Gold-zieher, I, (Abhand. zur Arab. Philologie) (Ley¬ den 1876) ; Huart, Clement, 'A History of Arabic Literature) (New York 1903) ; Lyall, C. J., translations of Ancient Arabian Poetry) (London 1885) ; Noldeke, Th., (Beitr. zur Kontniss der Poesie der alten Arab* (Hanover 1864).
Abram S. Isaacs,

Professor of Semitic Languages, New York University.

ARABIC, The. A steamship of the White Star line, torpedoed without « warning by a German submarine about 60 miles off Fastnet (not far from the scene of the Lusitania wreck), on the morning of 19 Aug.. 1915, one day out from Liverpool. Bound for New York, the Arabic was unarmed and carried 180 pas¬ sengers (29 Americans) and 243 in crew. She sank in 11 minutes; 44 lives were lost — 19 passengers and 25 of the crew. Two Ameri¬ can citizens were drowned, Dr. Edmund F. Woods of Janesville, Wis., and Mrs. Josephine L. Bruguiere of New York. The effect of the sinking of the vessel was to aggravate the strained diplomatic relations between the United States government and Germany creat¬ ed by the sinking of the Lusitania (q.v.) three months earlier. On 21 July the American gov¬ ernment had informed Germany that a repeti-

tion of such "illegal and inhuman acts® as the sinking of the Lusitania would be regarded by the United States as "deliberately unfriend¬ ly® when American citizens were affected. Nevertheless, the Arabic was sunk; none saw the submarine and no attempt had been made to

search the vessel or to warn the captain. Five days later (24 August) the German Am¬ bassador in Washington informed the Depart¬ ment of State that the German government trusted that the American government would “not take a definite stand at hearing only the reports of one side, which, in the opinion of the Imperial government, cannot correspond with the facts, but that a chance will be given to Germany to be heard equally.® Although the German government “does not doubt the good faith® of the eye-witnesses of the disas¬ ter, “it should be borne in mind that these statements are naturally made under excite¬ ment which might easily produce wrong im¬ pressions.® This somewhat naive communi¬ cation overlooked the central and indisputable fact that the vessel had actually been torpedoed and sunk ; it wound up with the declaration that “if Americans should actually have lost their lives, this would naturally be contrary to our intentions® ; that the German govern¬ ment “would deeply regret the fact,® and ten¬ dered “sincerest sympathies to the American government.® On 25 August the German Chancellor did “not even know whether the sinking of the ship was caused by a mine or by a torpedo fired from a German submarine,® nor did he know whether “the Arabic herself may not by her actions, perhaps, have justified the proceedings of the commander of the sub¬ marine.® On 1 September the German Am¬ bassador wrote Mr. Lansing to the effect that his government had already accepted the American declaration on the submarine war¬ fare before the sinking of the Arabic, and he produced the following extract from a pro¬ posed reply to the hitherto unanswered Ameri¬ can note of 21 July: “Liners will not be sunk by our submarines without warning and with¬ out safety of the lives of non-combatants, pro¬ vided that the liners do not try to escape or offer resistance.® Seven days after the wreck of the Arabic a dispatch from Berlin an¬ nounced “on the best authority that the Arabic incident may be considered as eliminated as a source of discord between Germany and Amer¬ ica ; or at least is regarded by the German government in that light.® Furthermore, “in its desire to continue its friendly relations with the United States,® Germany “had adopted before the sinking of the Arabic a policy de¬ signed to settle completely the whole subma¬ rine problem as affecting America, on the basis of goodwill and mutual understanding.® The German report on the Arabic case, dated 7 Sept. 1915, was cabled to Washington by Mr. Gerard, American Ambassador in Berlin, on 9 September. It stated that on 19 August a German submarine stopped the English steam¬ er Dunsley south of Kinsale and was on the point of sinking her by gunfire after the crew had abandoned the ship. “At this moment the commander (of the submarine) saw a large steamer making directly toward him. This

steamer, as developed later, was the Arabic. She was recognized as an enemy vessel, as she did not fly any flag and bore no neutral mark-

ings. When she approached she altered her original course but then again pointed directly toward the submarine. From this the com¬ mander became convinced that the steamer had the intention of attacking and ramming her. In order to anticipate this attack he gave or¬ ders for the submarine to dive and fired a torpedo at the steamer. After firing, he con¬ vinced himself that the people on board were being rescued in 15 boats.® The commander's conclusion, the report continued, was "all the more obvious as he had been fired upon at a great distance in the Irish Sea on 14 August — that is, a few days before — 'by a large pas¬ senger steamer apparently belonging to the British Royal Mail Steam Packet Company, which he had neither attacked nor stopped.® While regretting that lives had been lost, the German government was "unable, however, to acknowledge any obligation to grant indemnity in the matter, even if the commander should have been mistaken as to the aggressive inten¬ tions of the Arabic ,® Against this presenta¬ tion of the case must be placed the statement of Captain Finch of the Arabic: "I did not see a single sign of a submarine, and, as far as I am aware, nobody else saw a submarine, either before or after the occurrence.® In case a harmonious opinion on the point could not be reached, the German government "would be prepared to submit the difference of opinion, as being a question of international law, to The Hague Tribunal for arbitration. . . .® Hav¬ ing collected all the available evidence of the ship's officers and passengers, the United States government demanded a disavowal of the act and reparation for the American lives lost. While the arbitration proposal was rejected — the principle involving the safety of American lives — the German assurance of 1 September was accepted. On the question as to the amount of indemnity, arbitration would be agreed to. The unalterable determination of the American government led to the desired result, for on 5 Oct. 1915 the German Am¬ bassador in Washington presented to Mr. Lan¬ sing the German government's disavowal of the submarine commander's act and expressions of regret for the incident. The Ambassador was also authorized to accept liability for all damages caused to American citizens through the sinking of the Arabic, and to negotiate the amounts of the claims. See Ancona ; Falaba ; Lusitania; Orduna; Sussex; William P. Frye.

ARABIN, the chief constituent of gum- arabic, obtained by precipitating an acidulated aqueous solution of gum-arabic with

alcohol.

ARACAJU, a-raka-zhoo', a city of Brazil, capital of the state of Sergipe. It is situated on the Cotindiba River about seven miles from the Atlantic Ocean, lat. 10° 58' S., and is the port through which passes Sergipe's limited coast-wise and foreign commerce. Products of agricultural industry, especially sugar, rice, cotton and hides, are shipped in vessels of moderate draught, and there is transportation by rail between Aracaju and the interior towns Signao Diaz and Capella. Pop. about 6,000 actual residents of the city, or 30,000 if we in¬ clude the district, as is customary.

ARA'CEiE, the designation of an order of endogenous plants having for their inflores-

cence a spadix placed within a spathe. They have neither calyx nor corolla. The leaves are frequently cordate; the fruit succulent, with many seeds. They are acrid in character and often poisonous. The Caladium sequinum, or dumb cane of the West Indies and South America, when chewed, causes the tongue to swell so as to cause temporary dumbness. A common English species is the wake-robin. The nearest relatives of the family in America are the Indian turnip, water-arum and skunk's cabbage.

ARACHNIDA, the name applied to the class of arthropods represented by the scorpion, spider and mite. The body is divided into two regions, the cephalothorax and abdomen, the head having been in embryonic life folded back over and fused with the thorax. There are no antennae, the first pair of appendages resembling mandibles, and called chelicerae ; the second pair end in a large forceps, or chelae, or in a palpus-shaped appendage called <(pedi- palpi.® The head appendages are not differ¬ entiated into antennae, mandibles, maxillae and maxillipeds, as in Crustacea. There are four pairs of legs ending in a pair of minute claws. On the abdomen there are no appendages. The respiratory organs are spiracles opening into tracheas or air-tubes, or pouches containing numerous leaves or their sacs, resembling the leaves of a book, and hence called <(book- lungs.® The eyes are simple, never compound, two being situated in the middle of the head, others on each side of it. There may be as many as five pairs of nephridia. The genital outlet is single instead of being double, as in Limulus. They have a pair of malpighian tubes or urinary

vessels, but, like Limulus, possess two large digestive glands, the <(liver.®

The young are hatched in the form of the adult, there being no metamorphosis except a slight one in the mites. Their embryos have, on at least six abdominal segments, rudiments of limbs, which indicate their descent from ani¬ mals like Limulus. All of the Arachnida are terrestrial, none of them living in or near fresh¬ water, except a few mites. Their embryology is like that of Limulus, which suggests that the Arachnida have descended from the Merosto- mata (q.v.) Whether we take into account the mode of development or the very primitive nature of the appendages, it appears that the Arachnida are much less closely allied to in¬ sects than was formerly supposed. On the other hand, they differ from the merostomes, and especially their living representative, the king crab (q.v.), in having no gills. Their embryology and morphology tend ,to show that the class has probably descended from limuloid ancestors, of which there are examples in the Silurian rocks, intermediate between limuloid (Xiphosura) and eurypteroid (Euryptcrida) forms. The characters in which Arachnida re¬ semble insects, as respiration by tracheie and the presence of urinary tubes (which do not occur in Crustacea or in any other marine or branchiate arthropods), are probably adaptive and were acquired during a change from a marine to a terrestrial life, and not primitive heirlooms. Arachnida also show their later origin than merostomes by the fact that their sexual ducts (oviduct, etc.) are in most cases single, unpaired and in all cases open exter¬ nally by a common single genital aperture in

the median line of the body, at the base of the abdomen. In this respect Limulus, with its pair of genital (male and female) openings, situated each at the end of a papilla, which are placed widely apart at the base of the first abdominal legs, is decidedly more archaic. The Arachnida are divided into six _ groups or orders: (1) Scorpionida (scorpions); (2) Pseudoscorpionida (false- or book-scorpions) ;

(3) Pedipalpida (Phrynus or scorpion-spiders) ;

(4) Solpugida (galeodes) ; (5) Phalangida

(harvest men) ; (6) Araneida (spiders) ; (7) Acarida (mites and ticks), the latter compris¬ ing the aberrant and degenerate forms, many of them parasitic ; while of somewhat doubtful relationship to the A carina are three aberrant groups: the Linguatulida, Pycnogonida, and Tardigrada. See Mite; Scorpion; Spiders.

Several of the Arachnida are of interest in medicine. A few of the scorpions are poison¬ ous, their sting even causing death, although it is quite certain that there are no poisonous spiders north of Mexico. A number of the mites are found in man. One, the Demodex earns, is frequently found in the sebaceous fol¬ licles of the skin, notably in comedos, or black¬ heads. The itch mite (Sarcoptes scabeii) bores little canals under the skin, in which it deposits its eggs. The itch is a common disease of Europe, and is becoming more frequent in this country. Sulphur ointment is one of the best parasiticides for this small nuisance.

In the warm countries ticks (Ixodes) are troublesome pests. See Parasites.

ARAGO, a'ra-go, Dominique Francois, a celebrated French astronomer : b. in Estagel 1786; d. in Paris, 2 Oct. 1853. After studying at the Polytechnic School at Paris he was ap¬ pointed secretary of the Bureau des Longitudes, and in 1806 was associated with the Biot and in completing the measurements of Delambre and Mechain to obtain an arc of the meridian which was to serve as the basis of a new metrical system. In 1809 he was elected to fill the seat left vacant by the death of Lalande in the Academy of Sciences, and at the same time he was appointed a professor of the Polytechnic School. In 1811 he communicated to the Insti¬ tute a paper on a particular modification which the luminous rays experience in their passage through certain transparent bodies, thus paving the way for some of the most brilliant discov¬ eries made in optical science since the days of Newton. In 1812 he began a series of lectures on astronomy, which created an immense sensa¬ tion. With Gay-Lussac he established in 1816 the (Annales de Chimie et de Physique. > His discovery of the magnetic properties of sub¬ stances devoid of iron procured him the Copley medal of the Royal Society of London in 1825, and a further consideration of the same sub¬ ject led to the equally remarkable discovery of the production of magnetism by electricity. In 1830, on the death of Fourier, Arago succeeded him as perpetual secretary to the Academy of Sciences, becoming in the same year director of the Observatory. After the expulsion of the Bourbons Arago was elected to the Cham¬ ber of Deputies as representative of the Pyrenees-Orientales, taking his place on the extreme left, and proving a ready and effective speaker. The revolution of 1848 brought him still more prominently upon the scene, first as Minister of War and Marine in the provisional

government, and then as a member of the executive committee of the National Assem¬ bly. His (Works, } edited by Barral, appeared in 1854-62.

ARAGON, an ancient kingdom in the northern part of the Iberian Peninsula, com¬ prised in the modern Spanish provinces of Huesca, Teruel and Zaragoza. Its area is 18,294 square miles. It is drained by the Ebro and its tributary streams, which traverse a central plain. The northern and southern por¬ tions are mountainous and the climate varies according to the elevation above sea-level. It is often very sultry in the plains and valleys while generally cool at higher elevations on the mountain slopes. Wheat, corn and other crops of the cooler climes are grown in the more elevated portions while the olive and vine thrive in the warmer valleys. Copper, lead, salt and sulphur are mined in small quantities in Teruel. Manufactures are in a backward state, coarse linens and woolens being almost the only products. Agriculture is carried on in a primitive fashion ; indeed, the burdens im¬ posed on the farmer and agriculturist leave him little incentive to improve his methods or extend production. Trade is hampered with like restrictions. The total population of the region to-day is 971,515. Zaragoza is the chief city, with a population of 112,000. Aragon formed a part of the Roman province, of His- pania Tarraconensis, fell to the Visigoths in the 5th century and to the Moors in 711 a.d. A few of the Christian inhabitants fled to the fastnesses of the north where they managed to maintain a degree of independence. This small state was long ruled by Gothic counts, who joined it with Navarre. Ramiro I secured its complete independence in 1035 and it began its 450 years of existence as a kingdom. It was in constant conflict with the Moors and gradually wrested from them important towns and fortresses. By 1118 the kingdom had at¬ tained its full territorial growth in the Penin¬ sula, and in 1137 it was joined to Catalonia through the marriage of the respective sovereigns. The new state extended its power to the Balearic Islands, Sardinia, Sicily and Naples, all of which came under its sway before 1340. Barcelona became the commercial rival of Genoa and constant war was waged between them. Aragon was united with Castile in 1479, Ferdinand of Aragon having married Isabella of Castile in 1469. Aragon became definitely merged in the new Spain in 1516 when Charles I ascended the throne. See Spain ; Sicily.

ARAGONITE, a mineral having the formula CaC03, and therefore identical with calcite in composition. It is classed as a separate species, however, because it crystallizes in the orthorhombic system.

Its specific gravity is also somewhat higher than that of calcite. Occasionally it contains a little strontium, lead, or zinc, and it often occurs in connection with pyrites, galena, or malachite. It is trans¬ lucent and usually white with a vitreous lustre. In hardness it varies from 3.5 to 4, and it has a specific gravity of about 2.94. Aragonite occurs in fine crystals at Aragon, Spain (whence its name), near Bilin, Bohemia, in Hungary and Sicily, and near Frizington, England. There are no important American localities, though it occurs on stalactitic calcite in caves in New

Mexico, Arizona and elsewhere. The coral- loidal form, called “flos-ferri,® is most beauti¬ fully developed in Styria. It is said to be forming rapidly at the present time in the Eureka mine in Nevada.

The minerals aragonite, bromlite, witherite, strontianite and cerussite, all of which are car¬ bonates crystallizing in the orthorhombic sys¬ tem, are classed together as the (<aragonite group.®

ARAGUA, a-ra'gwa, one of the states of the republic of Venezuela, including the nine districts of Bruzual, Gisardot, Marino, Ricaurte, Roscio, San Casimiro, San Sebastian, Urdaneta and Zamora. It is bounded on the north by the Caribbean Sea and Federal Dis¬ trict, on the east by the state of Miranda, on the south by Guarico and on the west by Carabobo and Zamora. Its capital is La Victoria, a city of 8,000 inhabitants founded by Francisco Loreto in 1593 in the fertile valley of Aragua. Principal towns are Barbacoas, Ciudad de Cura, Maracay, Ortiz and San Mateo. Chief rivers are the Guarico, Aragua, Tiznados and Chirqua, the first three being affluents of the Orinoco. The last flows into the great Lake of Valencia. The mean annual temperature of the state varies between 74° F. in La Victoria and Maracay and 80° F. in Ciudad de Cura and Ortiz. The industries are chiefly agricultural and pastoral, the products of the former being coffee, sugar, cocoa and cereals. Pop. (1916) 154,000.

ARAI HAKUSEKI, a'rl, ha'koo-sa-ke, Japanese scholar: b. 1657; d. 1725. He is one of the most noted of the brilliant group of scholars in Yeddo who followed the philosophi¬ cal doctrines of Chu-Hi. He was a liberal thinker and opposed to the Ivogaku school of philosophy. Banned and oppressed his fol¬ lowers instructed young gentlemen throughout the country and so molded public opinion that supreme power was restored to the Mikado in 1868. Hakuseki wrote an autobiography in 1716, one of the first of such works in Japan. He wrote the (Hankampu) in 1701. It is a history of the Daimios of Japan from 1600 to 1680 in 30 volumes. The (Tokushi Yoron} is a general history of Japan covering a period of 2,000 years. His (Seiyo Kibun)

gives an account of Europe ; it was translated by S. R. Brown and appeared in the (New York 1899), and Florenz, (Geschichte der japanischen Litteratur) (Leipzig 1906).

ARALIA, the designation of a widely dis¬ tributed genius of about 20 species of dicotyled¬ onous shrubs, trees and perennial herbs typ¬ ical of the family Araliacece. The species have large alternate compound deciduous leaves, small umbels of whitish flowers usually ar¬ ranged in panicles, and two- to five-seeded, variously colored, globular, berry-like drupes. All parts of the plants have a warm, aromatic taste. A. spinosa, devil's walking-stick, angelica tree, Hercules' club, toothache tree, a very ornamental shrub or small tree about 12 feet tall (sometimes 40 feet), is common in moist woods and along river banks from Pennsyl¬ vania to Indiana and southward to the Gulf of Mexico. Its very stout, prickly stemˆ large

pinnate leaves and clusters of flowers which appear in midsummer, give a decided sub¬ tropical effect upon lawns in the South. It is not hardy in the North. A racemosa, spikenard, a widely branched herbaceous species, with large, spicy, aromatic roots and greenish-white flowers which appear in midsummer, is com¬ mon in rich woods from New Brunswick to Minnesota and southward to the mountains of Georgia. A. nudicaulis , wild sarsaparilla, small spikenard, a nearly stemless herbaceous species with a single pinnate leaf a foot high, is com¬ mon in rocky and sandy places from New¬ foundland to Missouri and southward to the mountains of North Carolina. It bears from two to seven umbels of greenish flowers in late spring. The long, horizontal, aromatic roots are believed to be equal to those of sar¬ saparilla as an alterative and tonic. A. hispida, wild elder, bristly sarsaparilla, a bristly stemmed perennial, is found in the same lo¬ calities and soils as the preceding. It bears several terminal umbels of white flowers in early summer. Among foreign Aralias the Asiatic species are perhaps of most importance. Some, notably A. cordata, known as Udo, are of value as human food; others as stock food when grasses are scarce. A. chinensis, Chinese angelica tree, is much like its American rela¬ tive, A. spinosa, but is hardier and blossoms somewhat later.

ARAMAEANS, a branch of the Semites, who dwelt in the districts comprised in the Syria of the ancient Greeks, and in Mesopo¬ tamia. Their language spread to the neighbor¬ ing peoples and this fact often

renders it diffi¬ cult to determine the precise limits inhabited by the true Aramaic stock. Their original home is unknown. It is now generally held that the Aramaeans moved from northeast Arabia into Syria, Mesopotamia, Assyria, Babylonia and beyond the Tigris about 1500 b.c. They spread the knowledge of the alpha¬ bet and exercised a great influence on the advance of civilization. Consult (Aram} in Encyclopaedia Biblicaˆ (1899) ; Meyer, Ed¬ uard, (Die Israelitien) (1906) ; Schiffer, Sina, (Die Aramaer) (1911). See Semites.

ARAMAIC LANGUAGE. Among the Semitic languages, which are variously grouped as Northern or Assyrian, Central or Aramaic, Western or Canaanite, Southern or Arabic and Ethiopic, according to Wright, or as East Semitic, that is Babylonian and Assyrian, and West Semitic, Aramaic, Canaanite, Arabic, Ethiopic, which is Zimmern's broader and more historical division, the Aramaic has many elements of distinction and covers a long range of centuries. It includes monuments of litera¬ ture as well as the literature of monuments. While of its original home nothing definite is known, at an early date Aramaic appears in the Old Testament to designate certain dis¬ tricts in Syria ((<Aram of Damascus®) and in Mesopotamia (((Aram of the Two Rivers®). A number of Aramaisms in the vocabulary of the older Biblical books shows the close rela¬ tionship between Hebrew and Aramaic, al¬ though the latter was considered by the He¬ brews a foreign tongue and 100 years before the Babylonian Exile was understood in Jeru¬ salem only by people of culture, a fact proved by the episode in 2 Kings xviii, 26; Isaiah xxxvi,

1. Centuries earlier kinship was illustrated bv genealogical tablets and primitive narratives, as for instance, when Kemuel, a son of Nahor, the brother of Abraham, is called Mather of Aram® (Gen. xxii, 21). Jacob is termed <(A wandering Aramaean® (Deut. xxvi, 5). Dur¬ ing the entire period of the Kings, Israel and the Aramaeans of the west, whose land was later called Syria and lies north and northeast of Palestine, were in steady intercourse. By a curious fate, Aramaic was to supplant Hebrew, after national decline, as the vernacular and acquire a prominent rank, with the adoption of Aramaized Hebrew forms, as the literary lan¬ guage of the Jews for many centuries in the lands of their dispersion. Before Palestine was Aramaized the language spread gradually and occupied all Syria. It was spoken in the Euphrates toward the east and throughout the districts of the Tigris north and west of the Armenian and Kurdish mountains. <(The coun-_ try of the Aramaeans® was the name applied to the province in which the capitals of the Ar- sacids and the Sassanids were situated. We know, too, that although

Assyrian was the lan¬ guage of the government, at a very early date a large body of the people in Babylonia and Assyria were probably Aramaeans.

Dialects. — Owing to the rapid spread of the Aramaeans, their language received varied development both in grammatical form and idiom as well as in its literary development. Among its chief dialects may be mentioned the Syriac of northern Mesopotamia, in particular the district around Edessa, and it flourished as a literary language from the 2d to the 13th century. Then the Aramaic, as commonly known, includes besides two words in Genesis (xxxi, 47) and a verse in Jeremiah (x, 2), as its oldest remains in the branch passages in Ezra (iv, 8; vii, 8; vii, 12, 26) dating from the end of the 6th or beginning of the 5th century b.c. Next come the portions of the book of Daniel, whose exact date is still a matter of doubt. A much more extensive mon¬ ument is the Targum literature, which in On- kelos and Jonathan differ little from Biblical Aramaic. To this must be added Talmud and Midrash, which contain much Hebrew as well as Aramaic. The Aramaic portions of both Talmuds (Babylonian, completed at end of 5th century, and Palestinian, completed in be¬ ginning of 5th) are of great value. The Ara¬ maic literature of the Jews includes as well certain portions of the Apocrypha, legal de¬ cisions of the Geonim, rabbinical authorities in the early centuries of the Diaspora, when Aramaic at first was the vernacular; liturgical selections, the book Zohar, famous in ,the Cabala, together with a large part of rabbinical literature. Further must be added the dialect of the Samaritans, exemplified in their Targum of the Pentateuch, their liturgy and' hymns; Egyptian Aramaic; the Nabatean and Pal¬ myrene of the inscriptions. There is also to be mentioned the dialect retained for some time by the Christians of Palestine as a literary and ecclesiastical language and in which ap¬ pear Gospel translations and fragments of other works dating from about the 5th century. The language of the Mandsean writings closely resembles that of the Babylonian Talmud. The spread of the Aramaic was effectually checked

in the 7th century by the Arab conquests and it gradually lost its predominance for more than 10 centuries, yielding to a more forceful rival.

Inscriptions. — Some Assyrian weights, which go back to the 7th and 8th century before our era, with some gems and seals of nearly the

same age, furnish the oldest data as to the Aramaic alphabet. In the field of inscriptions the material is richer ; the most ancient include the colossal statue of the god Radad, found in 1890 near Zenjirli, in northwest Syria, from the first half of the 8th century b.c. with other writings in that vicinity of a slightly later date, and two in¬ scriptions found in 1891 at Nerab, near Aleppo, alleged by Cl. Ganneau to belong to the 6th century b.c. Some Aramaic inscrip¬ tions have been found in Egypt, of the Persian period, one bearing the date of the year of Xerxes, 482 b.c. A few ancient Aramaic in¬ scriptions have been found in Arabia, at Tema, probably from the 5th century b.c. Within recent decades valuable data have come to light from the 4th century, bearing upon Jewish military colonists and others who came to Egypt — the Judaco- Aramaic papyri are likely to be supplemented in time. Of special interest by reason of their number and con¬ tents are the Palmyrene inscriptions, votive, honorary, sepulchral, etc., which began shortly before the Christian era, and extend to about the middle of the 3d century, as well as the Nabatean, whose kingdom was centred at Petra, in northern Arabia, and who were Arabs, but used Aramaic for writing and com¬ merce. It was finally absorbed by Rome in 106 a.d. To this class belong the Sinaitic in¬ scriptions, written in Nabatean dialect and script and dating from the first four centuries a.d. They were found along trade routes in out-of-the-way valleys. Their number can be gathered from the fact that Euting has recorded 677 in his standard collection (1891). This fact would indicate the extent of Aramaic influence.

Characteristics. — Noldeke denies any pov¬ erty in Aramaic, as has been asserted, and claims that, despite its larger borrowings from foreign languages, the proportion of really foreign words in older Aramaic writings is smaller than the proportion of . Romance words in German or Dutch. With its special treatment of dentals, it is poorer in _ vowels than Hebrew. It is rich, however, in con¬ junctions and adverbs, thus _ enabling it to express slight changes in meaning, and permits much freedom in the order of words, becom¬ ing rather diffuse as well in its use of addi¬ tional pronouns. One peculiarity may be men¬ tioned ; in the western dialect the. prefix of the third person of the imperfect is y odh; in Syriac, with changes in other of the eastern dialects, it is nun.

Bibliography. — Cooke, (Text Book of North Semitic Inscriptions) (Oxford 1903) ; Wright, Comparative Grammar of Semitic Languages* (Cambridge 1890) ; Drivers, Samuel, Introduction > (Oxford 1913).

Abram S. Isaacs,

Professor of Semitic Languages, New York University.

ARAN ISLANDS, or SOUTH ARAN,

Ireland, three islands situated on the west coast

at the entrance of Galway Bay, to which they form a natural breakwater. They lie in a southeasterly direction. Beginning with the northernmost they are called respectively Inish- more or Great Island; Inishmaan or Middle Island; and Inishiar or Eastern Island. The highest elevation is 354 feet. The islands are formed of carboniferous limestone, and the soil is very sandy, affording scant pasturage and yields little to cultivation. The total area of the islands is about 11,500 acres. The in¬ habitants are perhaps the most primitive people of Europe in their mode of life and thought. Gaelic is the common tongue, although English is understood fairly well on Inishmore. Here may still be seen a curious intermingling of Christian and Druidic worship. The main in¬ dustries are fishing and kelp-burning. There is steamer communication with Galway, 30 miles distant. The population in 1911 was 2,679. These islands are remarkable for a number of architectural remains of early date. On Inish¬ more, on a cliff 220 feet high, stand the re¬ mains of a circular cyclopean fortress called Dun Aengus ; its chcvaux de frise is s,till to be seen. It is ascribed to the 1st century of our era. Inishmore is often called Ara na Naomh, Aran-of-the-Saints, from the numbers of religious recluses who dwelt here soon after the introduction of Christianity in the 5th cen¬ tury. Here too are the remains of the abbey of Saint Enda, the patron of the islands. The chief town is Kilronan, on Inishmore, with a population of 460. In recent years the islands have been the hunting ground for philologists, linguists, artists, etc., who find here open chap¬ ters in the history of the race which have been long since closed elsewhere. The islands were a favorite resort of the late John Millington Synge, the Irish playwright, who made them the scene of his drama (Riders to the Sea,* and has recorded his impressions of the islands and their inhabitants in (The Aran Islands> (Dublin 1903).

ARANSAS, a-ran 'zas, BAY, an inlet on the coast of Texas, connected with the Gulf of Mexico by a channel known as Aransas Pass. A bar at its mouth renders its harbor of very little commercial importance, in spite of the money lavished in various attempts to establish there a harbor and port of entry. During the Civil War it was the scene of a conflict be¬ tween the Confederate and Federal troops.

ARANSAS PASS. See Aransas Bay.

ARANY, 6' rony, Janos, Hungarian poet : b. Nagy-Szalonta, 1 March 1817 ; d. Pesth, 22 Oct. 1882. He was of humble parentage; his parents were very poor, but they made every effort to give him an education. At 15 he entered the college of Debreczin, where he distinguished himself. He was attracted to the stage, joined a company of strolling players, but soon returned discouraged to his father's house. He became a notary and lived in re¬ tirement for several years. In 1845 he pub¬ lished the satirical epic (Az elveszett alkot- many,* which won a prize for the most humor¬ ous poem offered by the Kisfaludy Society of Pesth. Two years later he was awarded a second prize for the first part of <Toldi, J his great trilogy founded upon Magyar traditions. This work brought him a widespread popular¬ ity both among the learned and among the

lowest ranks of the people, who recognized his gift of weaving their traditional legends and his appeal to the spirit of national pride so characteristic of the Magyar peoples. In 1860 he became director and afterward secretary of the Kisfaludy Society, and in 1870 he was ap¬ pointed general secretary of the Hungarian Academy of Science. His more noteworthy works are (Murany ostroma) ; (King Buda's Deaths an epic in 12 cantos; (Toldi's Love) and (Toldi's Evening, > the second and third parts of the Toldi trilogy. Arany is regarded as, next to Petofi, the greatest of modern Hun¬ garian poets ; the one who raised Hungarian poetry to its greatest height. His work is noted for its artistic finish and its happy combination of the spirit of old Magyar folklore with the classic polish of a master. His works have been translated several times into German, among others, by Kertbeny (Leipzig 1851) ; Korodi, L., (Kronstadt 1863) ; Dux (Pesth 1861) ; and Sponer (Leipzig 1880).

ARARAT, or PILOT MOUNTAIN, an

American mountain about 3,000 feet in height, in Surrey County, N. C. It is situated between the Ararat and Dan rivers and is visible for a long distance.

ARAS, a-ras, a river of Armenia, rising in the Turkish pashalic of Erzerum. After flow¬ ing for some miles through Turkish territory to the new Russian frontier, it turns eastward to the Ervian plain north of Ararat, whence it sweeps in a semi-circle mostly between the Russian and Persian territories to its confluence with the Kur, 60 miles from its

mouth in the Caspian Sea. Its entire course is about 500 miles. Modern research has discovered that it originally flowed directly into the Caspian Sea, as ancient writers had claimed. It is identical with the ancient Araxes.

ARAUCANA, a'romka'ne-a, LA, the famous ˆepopeya,® as it is called by Chilean scholars, written by D. Alonso de Ercilla y Zuniga. It describes, in 37 cantos, the conquest of Chile, and takes rank as the finest heroic poem in the Spanish language. Further, as Senor Medina writes in his preface to the recent edition (Santiago de Chile 1910), of which he is both editor and publisher, Chile's good fortune, unique in modern times, is most remarkable in this respect, that its origines (he might have added aborigines) have been im¬ mortalized by the most notable epopeya of Castilian literature. Ercilla, who was born in Madrid, 7 Aug. 1533, came to the New World in his 21st year, and, as a soldier, shared the adventurous life of the Spanish conquerors or their successors in South America's far south for eight years, more or less. After returning to Spain (in 1562) he completed the Arau¬ cariaˆ the composition of which he had begun in Chile. We shall not at present discuss the editions ; it is enough in this brief note to say that the edition of Madrid (1589-90) was in its day truly definitive, inasmuch as it was undoubtedly printed under the immediate in¬ spection of the poet — the last edition, indeed, to receive his personal attention. It is known that Ercilla died at Madrid ; the date is given conjecturally as 29 Nov. 1595. See Chile.

ARAUCANIANS, a'row-ka'ne-ans, a South American native race in the southern

part of Chile, formerly occupying Chile, Ar¬ gentina, Chiloe and the Chonos Archipelago, etc. When first encountered by the Spaniards in 1535 they were a confederacy of the loosest kind, with many tribes and sub-tribes in entire independence, and in about the same political stage as the North American Indians, electing a toqui or war-chief and deposing him at will, with no authoritative head in peace, practising polygamy, and for worship conciliating an evil spirit, Quecubu, — probably the same as the Fuegian spirit immortalized by Shakespeare as (<Setebos,® the shape given it by Magellan's sailors. They were divided into Picun-che or North-men, living north of the river Maule; Pehuen-che or Pine-men, occupying through central Chile and the pine forests on the west¬ ern slopes of the Andes (the chief division of the tribe, and from whom most of the modern Araucanians are descended) ; Huilli-che or South-men, occupying the rest of the Chilean mainland; Puel-che or East-men; South-men or Patagonians; Chono ; Lubu-che or Water¬ men ; Cuncho ; Payo, etc. But their

instant and indomitable cohesion in face of the Spanish attack shows that they were of much higher political stamp than the North Americans. No other native race in the western hemisphere re¬ tained its independence anything like as long. For over two centuries they waged warfare with the Spaniards, broken only by truces sought by the latter, though their numbers were small compared with Aztecs or Quichuas, who went down at a blow. Ercilla's famous epic <Auracana) (q.v.) commemorates their early heroism and that of their powerful chief, Cau- polican. In 1641 Spain conceded their inde¬ pendence, confirming it in 1655, imposing only the condition that no enemies of Spain should be allowed to enter their country; an easy con¬ dition, as it amounted only to keeping out all foreigners, which they were glad to do. The territory left them was about 30,000 square miles, from the Andes to the sea, and from Arauco Bay to the river Calle-Calle. The war was renewed nevertheless, and went on a cen¬ tury and a third longer; till in 1773 the natives, * weakened by war and social practices, were compelled to submit. They had not lost the memory of their past, however, and in 1861 a French adventurer named Antoine Tounens, originally a provincial lawyer, had himself elected king of Araucania as Orelie Antoine I ; but the Chilean government conquered and deposed him and sent him back to France. In 1870 the Araucanians recognized the sov¬ ereignty of Chile. Araucania occupies a great part of the province of Arauco in south Chile, and is divided into four parallel north-and- south districts, each formerly governed by a toqui whose rule had become hereditary before its extinction. The inhabitants are now a mixed race with much Spanish blood. They number perhaps about 50,000, but are said to be decreas¬ ing, owing to smallpox, dysentery, liquors and polygamy. They are of a pale yellow color, and in character and life resemble the higher North American plains Indians, such as the Navajos. They are uncivilizable and unchris¬ tianized ; nomad herdsmen of horses, cattle and sheep; despising agriculture, eating little but meat, and living in skin tents ; but skillful wool- weavers, skin-dressers and weapon-makers. Their language is so harmonious and flexible

that an enthusiastic missionary student once attempted to introduce it into Europe to super¬ sede Latin. Their stock in Chiloe are called Chilotes.

ARAUCARIALES, a greater group of coniferous trees, once of cosmopolitan distribu¬ tion, but now restricted to two genera, Arau¬

caria and Dammara, both of the southern hemisphere. The name is derived from Arau- cania or Arauco, the district of southern Chile where the superb form Araucaria imbricata of the Nahuel Bute mountains and upper Biobio valley was early observed (1786). The seeds of large size formed an important food of the indigenous Araucanian Indians.

Araucaria imbricata, the Chile pine, Pehuen or (<monkey puzzle® is the hardiest forest- maker of its order. The Andine forest oc¬ cupies the higher volcanic ridges and crests along both flanks from lat. 37° 30' to 40° S. with a width of little more than 100 kilometres, between the altitudes of 600 and 2,000 metres. On the Chilean side there is a heavy snowfall. According to altitude, and to exposure which is greater in the Argentine extension, the trees vary much in size ; but they may grow straight as a granite column to an extreme height of 45 metres and diameter of two or more metres. Both stem and branches of the young trees are closely beset by the imbricating spirals of broadly spinose leaves, as persistent as those of cycads. The stem tends to retain a nearly constant diameter throughout its length as the irregular whorls of lesser lateral branches are constantly shed and overgrown. Only a thick¬ set crown finally surmounts the heavy col¬ umnar trunk. After excision of the leaves the outer bark slowly divides into irregularly poly¬ gonal deeply-pitted plates. The appearance of the trees is singular, that of the pure stand forests remarkable. Like most other members of the Araucariales these trees are character¬ istically dioecious. The staminate cones are larger than in any of the Coniferales, having the size seen in some of the cycads. They are oval, 10 or more centimetres long, by 5 centi¬ metres thick, and borne terminally in groups of four or five in the lateral branches. Ovulate cones are terminal on the lateral branches and may reach a length of 16 centimetres with a diameter of 20. There is a more gradual tran¬ sition from foliage to fertile leaves than in any other existing gymnosperm. The mega- sporophyll bears a single large dicotyle- donous seed four or more centimetres long. The wood is rather hard, smooth and durable ; but the forests, owing to their isolated position, retain nearly their primaeval facies. In Chile lofty hardwood forests with a dense undergrowth of bamboo give way to the Araucarias. These then extend to the tree line as a more and more open forest. As seen about Llaima and other volcanoes of the Biobio, the sharp transition to grassy slopes, often ending in more or less permanent snow fields, produces a rarely pic¬ turesque effect. Rather the purest stands occur on the Argentine side of the Andes in the lake region between lat. 38° and 40° S. Lago Alumine and other lakes where the trees are abundant have their North American counterparts in the

Cascade Mountains south of the heavier coniferous forests and next the dry interior Washington basin. Lake Chelan is

one of these physiographic equivalents with like climate and soil. Trees a half metre in diameter with an age of possibly 100 years prove the successful introduction into Cali¬ fornia.

Araucaria brasiliana, the Brazil pine, a closely related more sub-tropical species, is a culminant forest constituent of the uplands of southern Brazil, mainly between 25° and 30°. Especially in the state of Santa Catarina, to the south of the Iguassu River, this tree dominates a remarkable stratified columnar facies. There the open forest is about equally made up of tree ferns three to five metres in height, slender-stemmed palms 10 metres high and the over-topping pines 20 to 30 metres in height. Some outliers of this imposing forest occur further north in the state of Minas Geraes. At Cobijan in the mountains of south¬ eastern Bolivia (lat. 21° S.) there is also a small area of A. brasiliana or a closely related form (A. saviand).

Other species with large leaves are Arau¬ caria Bidwilli, the Bunya Bunya of Queensland, and A. Hunsteinii of Kaiser Wilhelm's Land. The remainder of the Australo-Malayan species are small and narrow-leafed, but lofty forms. They centre in New Caledonia with A. Cooki, A. Balanscc, A. montana, A. Muelleri and A. Rulei. The two latter have staminate cones of unusual length (24 to 25 centimetres). The majestic Araucaria excelsa, or Norfolk Island pine, was discovered by Captain Cook, who says that on nearing Norfolk Island the stems were taken for basaltic columns ! This species attains a height of over 200 feet. The cone scales are winged with a hooked apex. The half-hardy young plants are widely grown in conservatories. Araucaria Cunning hamii, the Moreton Bay pine, is the most widely spread of the Australian species, extending to Cape York and New Guinea.

The genus Dammara (dam'-a-ra) is con¬ tinental only in Queensland (D . robusta, D. Palmerstoni) and the Malay Peninsula (D. lorant hi folia) . It is essentially a Malaysian island type. D. obtusa occurs in New Heb¬ rides, D. Moorei is New Caledonian and D. Vitiensis Fijian. D. macrophylla, with the largest leaves of all (17 centimetres long by five broad), is a native of the Queen Charlotte Islands. One of the best-known species is the Amboyna pitch pine, D. orientalis, found also in Java, Sumatra, Borneo and other eastern islands. The highly aromatic gum of this tree, called by Amboyna islanders ((Dammar puti,® gives its name to the genus. The Kauri pine (or Kowrie), Dammara australis of New Zea¬ land, abundant in the North Island between the North Cape and lat. 38° S., is perhaps the most striking species. The finest

forest tree of New Zealand, it often reaches a height of 30 metres and thickness of three metres. But columnar forms with bushy heads may reach 50 metres high by five to seven metres in diameter. Darwin says ((Voyage of the BeagleQ, ((The crown of branches at the sum¬ mit is out of all proportion small to the trunk; and the leaves are likewise small compared with the branches.® The bark is thick and resiniferous. As in the other Dammaran forms the leaves are narrow-based with a broad lamina and much like those of cycads; they are

four to five centimetres long by one centimetre broad, thick, leathery and persistive. The seed cones are spherical and five to eight centimetres in diameter, or much smaller than in Araucaria. The rich brown amber yellow Kauri gum or resin is abundant in the sites

strength, durability and easy working; lumber¬ ing and destructive fires are fast limiting the forests.

Fossil Record.— The geological history of the Araucariales is long. Owing to the re¬ semblance of the wood to that of Cordaitaleans

Fig. 3. — Araucaria Braziliana. Left above, staminate, right above, young ovulate cones. Right below, mature ovulate cone, a a' and b b', side and front views respectively of micro- and megasporophyll; c c', cone scale; d, cone scale showing seed. All figures, about half size, except a a', which is enlarged.

of previous forests in lumps reaching the size of the largest Araucarian cones. The properties are similar to that of the <(cat's eye® or Dammar of D. orientalis. This gum oozes from the tree in large quantities in a soft, viscous state. The timber is notable for

it is difficult to prove which of the so-called Araucarioxylon types, so abundant in the Palaeozoic, are directly related to the modern forms; but from the Rhaetic on, the presence of Araucariales closely related to those of to¬ day is well attested. Rollick and Jeffrey de-

ARAUCARIALES

Fig.

Fig.

1 — Araucaria imbricata, pure stand forest of the Chalil, Argentina. (Observe the young plants, some springing

from roots)

2 — Araucaria imbricata, pure stand forest of the Chalil, Argentina, at upper limit of two thousand meters or over

scribe various forms from the Cretaceous of Staten and Long Island. A fine cone called Araucaria hespera occurs with the horned dinosaurs of the Laramie, also a branch (A. Hatcheri) closely related to the Brazil pine. Araucarian types had a wide distribution in the climax forests of both the northern and southern hemispheres during all of the Jurassic, and appear to culminate in the Cretaceous. Toward the close of the Cretaceous they ceased to play a greater role as forest dominants and began a retreat or restriction which lasted throughout Tertiary time, and ended in the scant distribution outlined above. Geologically speaking the Araucariales are very slowly moving toward extinction.

Relationships. — The origin of the Arau¬ cariales, and their relationships to other gym- nospermous groups, are uncertain. Neither systematists nor morphologists are here in ac¬ cord. Every possible hypothesis of descent has been suggested. It is urged (1) that the Arau¬ cariales sprang from Cycadofilicaleans direct, (2) that they are of Cordaitean origin, (3) that they are Lycopodiaceous derivatives, (4) that the Abietinese are the oldest conifers and Araucarians a modern offshoot from them. (I) The possibility of Cycadofilicalean origin is much strengthened by recent investigations of the Cycadeoids. It is now seen that Arau¬ caria has much in common with both Cycads and Cycadeoids : the robust armored stem is analogous to that of the Cycadeoids, this being true of structure, cortical development and both the major and minor branching; the roots freely send up young plants, and seed¬ lings are stout and tenacious of life ; the re¬ newed growth of the reproductive shoot from a lateral bud is cycadaceous and cycadeoid; the large pith and thin, woody cylinder of the shoots, vegetative and reproductive, and the complete transition from foliage to fertile scales of the large cones are also cycad-like; while the megasporophyll with its small ligule finds a counterpart in the decurved micro- sporophyll of the Cycadeoids. Finally the presence of

a leaf gap opposite the outgo¬ ing foliar trace, not only in the cone, but in stem and seedling, is also a Pteropsid feature and not lycopodiaceous. (II) Relationship to the Cordaitales is found in the retention of pitting of the tracheids in different regions of the plant recognized as primitive. Especi¬ ally in the cone the pitting may be as much as five-seriate, with the pits alternate, hex¬ agonal and extending from end to end of the tracheid. As in Cordaiteans, too, the medul¬ lary ray cells are thin-walled and less specialized than in the pines. The resin tissue of the sec¬ ondary wood consists simply in resinous tracheids associated with the medullary rays, and of parenchyma derived from tracheary tissue. Stem and leaf morphology, as well as habitus, suggest Cordaitean affinity. (Ill) In defense of a lycopodiaceous derivation it is pointed out that Cheirostrobus serves to bridge the gap between the male sporophylls of Arau¬ caria and the Lycopods ; that Lepidocarpon, which is outwardly a seed, is the link between the Araucarian seed and the Lycopod sporan¬ gium ; that lycopodiaceous wood with its scalari- form pitting does not fundamentally differ from Araucarian wood; that transitions be¬ tween the pitted and scalariform sculpturing of

the radial tracheidal wall occur in various plants recent and extinct. (IV) The theory of an Abietinean ancestry depends on certain traumatic “revivals,” and on the Cretaceous occurrence of Abietineans (Prepinus) with leaf bundles possessing centripetal wood like those of Cordaites. Even more than the pre¬ ceding views of relationship and descent, this latter theory requires rigid examination in the light of the fossil record and all the evidence it may be made to yield. It has been suggested that all the forms discussed have been dis¬ crete since Palaeozoic time.

Bibliography. — Complete references to the literature bearing on the Araucariales will be found appended to the following five major contributions: (Plant Succession, *an analysis of the development of vegetation, by Frederic E. Clements (Carnegie Institution of Washing¬ ton Pub. No. 24 2, 1916) ; (Cretaceous Conifer¬ ous Remains from Kreischerville, N. Y.,* by Arthur Hollick and E. C. Jeffrey, Mem. New York Bot. Garden (Vol. Ill, 1909) ; <The Araucarieae, Recent and Extinct,) by A. C. Seward and Sibille O. Ford (Phil. Trans. Roy. Soc. London, Series B., Vol. 198, 1906) ; (On the Comparative Anatomy and Affinities of the Araucarineae, *by Robert Boyd Thomson (Phil. Trans. Roy. Soc. London, Series B, Vol. 204, 1912) ; (American Fossil Cycads,* by G. R. Wieland (Carnegie Institution of Washington Pub. No. 34, Vol. I, 1906; Vol. II, 1916).

G. R. Wieland,

Lecturer in Paleontology, Yale University.

ARAUCO, a-ro'ko, a province of Chile with an area of 2,457 square miles. It is bounded by the provinces of Concepcion, Bio¬ bio, Malleco and Cautin, forming but a strip along the Pacific coast. The inhabitants num¬ ber about 62,500 or 63,000 (1916). The capital is Lebu, with population of 3,500.

ARAUJO DE AZEVEDO, a-row'zho da

ii-za-va'do, Portuguese statesman: b. Sa, 1754; d. Rio de Janeiro, 1817. In 1789 he became Am¬ bassador at The Hague and in 1797 negotiated a treaty in Paris which the Directory refused to ratify. Soon afterward he was appointed Ambassador in Berlin and later to a similar post at Saint Petersburg. He became Minister of Foreign Affairs in 1803, but on the capture of Lisbon by Napoleon in 1807 accompanied the King to Brazil. At Rio de Janeiro he founded schools of fine arts and medicine, introduced the tea culture into Brazil and was an active patron of agriculture and other industries. In 1815 he was created Count of Barca. His liter¬ ary pretensions were not inconsiderable. He wrote two tragedies, and translations from Horace, Gray and Dryden.

ARAUJO PORTO-ALEGRE, a-row'zho por'to-a-la'gra, Manoel de, Brazilian poet and architect: b. Rio Pardo, 1806; d. 1879. He studied art at Rio de Janeiro and studied archi¬ tecture and art in Paris and Italy and became professor at the Academy of Art in Rio de Janeiro. In 1859 he was appointe. Consul- General at Stettin. He not only designed sev¬ eral important buildings in Rio de Janeiro, but was the author of several comedies, of (Co¬ lombo^ an epic, and ^rasilianas,* a collec¬ tion of poems (1863).

ARAUNA, a'ra-oo'na, the name of a South American tribe of Tacanan stock, whose

home is on the borders of Peru and Bolivia, regarding whose appearance and customs trav¬ elers differ widely. According to some accounts they are naked and ill-formed cannibals, while according to others they are light-colored, mild-mannered agriculturists. Another account states that they have temples with idols of wood and stone and exclude women from all religious rites. See Tacana.

ARAURE, a-row'ra, Venezuela, a town in the state of Lara, 20 miles south of Barquisi- meto, the centre of a fertile region producing coffee, cotton and cattle. The battle of Araure took place near here, 4 Dec. 1813. Pop. 4,000.

ARAVULLI, ar'a-vul'le or ARAVALLI,

a mountain range in Hindustan about 300 miles in length and a width varying from 10 to 60 miles from lat. 22° 40' N. to lat. 26° 50' N. Its river system is extensive, but the valleys enclosed within the range are mainly sterile. The vegetation is poor.

ARAWAKAN, a-ra-wa'kan, STOCK (from the Arawaks, q.v.), the most widely diffused linguistic stock of South America, and originally forming a curious and significant link between the South and North American regional if not philological stocks. Their habitat reached from Bolivia and southern Brazil not only to the northern coast of Venezuela, but — while barred to the westward by the Colombian Chibchas or Muycas of the Magdalena basin — occupied the entire West Indies and had an outlier of several villages in Florida. Just be¬ fore Columbus' discovery, however, they had been expelled from the southern Antilles and part of the adjoining South American coast by the fierce Caribs (q.v.) from the lower Or¬ inoco, who had seized their women for wives, most of the latter still speaking Arawak when the Spaniards found them. The larger Antilles were still Arawak, and the names given in the early West India voyages are intelligible in this set of languages yet. The Arawakans have neither the energy and cohesiveness of the Araucans, the splendid physique and fiery vigor of the Caribs, nor the political development of the Quichuas in the past ; they are below the medium stature, and of no great stamina. Yet they had, perhaps owing to this very lack of savage vigor, an intellectual and artistic de¬ velopment and a stage of culture above the sur¬ rounding tribes : they made fictile vases deco¬ rated with grotesques of men and animals, were skilled artisans in stone, gold and wood and excellent weavers ; and the island Arawakans cultivated not only corn and manioc for food, but cotton and tobacco, whose use the Euro¬ peans took from them. There are probably a hundred or more different tribes of this stock scattered through Brazil, Bolivia, the Guianas, Venezuela and Colombia. Among the chief, besides those mentioned below under Arawaks, are the Manaos near that city, at the junction of the Amazon and Negro; the Waupes, Maipures and Miranhas, in the extreme west of Brazil next to Colombia, on the llamos be¬ tween the Negro and Amazon; the Goajiros on that peninsula west of the Gulf of Venezuela; the Piaroas on the Orinoco near its junction with the Meta; the Maneteneris in the north¬ west

angle of Bolivia ; the Baures and the Moxos or Mojos in northeast Bolivia, next Matto Grosso ; and the Antas in extreme south

Brazil, near Uruguay. Beuchat and Rivet within recent years have in .their studies sought to extend the original territory occupied by the Arawakan stock. Consult recent works of Beuchat and Rivet, Chamberlain, Koch-Griin- berg, Schmidt, especially Koch-Griinberg's (Die Aruak-Sprachen Nordwestbrasiliens) (Vienna

1911).

ARAWAKS, a'ra-waks (name most im¬ probably defined ˆmeal-eaters® — that is, of cassava bread — from a Tupi word: not more descriptive of them now than the Tupis or any other South American race except the Arau- canians, and they hunt and fish as well as raise corn and manioc. Their own name is Lokono or Lukkunnu, ((men® : cf. the names Illinois, Innuit, Alemanni, etc.), a tribe of South American Indians living on the coast of British and Dutch Guiana, across the Corentyne and Berbice rivers, and taken as the type of the great Arawakan stock (above). They are not pure-blooded, however, being mixed with Car¬ ibs, etc., in a conglomerate of plantation labor¬ ers. The term is also used in a broader sense to include all the tribes of this stock in British Guiana and the neighboring corner of Brazil, with the extension noted into Dutch Guiana : Tarumas and Atoradis of the upper Essequibo basin, Wapisianas of the upper Rio Branco in Brazil, etc., as well as Arawaks proper. All these are in a very primitive stage of culture, making marriages by abduction after orgies on corn spirits, counting descent through females, having the clan system, and practising the couvade (q.v.). The Atoradis are almost white, or not duskier than South Europeans, with fine figures, especially the women having much beauty and dignity of appearance. The Wap¬ isianas are browner and less graceful, but their language is so soft, sonorous and vocalic that it is the general medium of communication for trade and other intercourses among all the tribes in this region, even the Caribs ; and the Atoradis have nearly abandoned their own for it.

ARAXES. See Aras.

ARAYAT, a-ri'at, Philippines, town on the island of Luzon, province of Pampanga, 12 miles north of Bacolor, occupied by the American army under General Young 12 Oct. 1899. Nearby is an extinct volcanic cone, 3,564 feet high. Pop. 12,904.

ARBACES, a Median general under Sar- danapalus and the founder of the Median em¬ pire in 876 b.c. The dynasty founded by Arba- ces lasted till its overthrow by Cyrus, 559 b.c.

ARBALEST. See Cross-bow.

ARBELA, now ARBEEL, a small town in Asiatic Turkey which gave its name to a decisive battle fought by Alexander the Great against Darius at Gaugamela, about 20 miles distant from it, 1 Oct. 331 b.c. There are sev¬ eral large mosques in the modern town. Pop. about 6,000.

ARBER, Edward, English scholar : b. 1836; d. London, 23 Nov. 1912. He was pro¬ fessor of English literature at the University of Birmingham, 1881-94. Mainly self-educated, he became a clerk in the Admiralty, studied English literature in his spare time and under¬ took the editing and republication of many English books and tracts of the 16th and 17tli

centuries, beginning in 1868 with Milton's (Areopagitica.> He was knocked down and killed in the street by a taxicab. His best- known editions are (English Reprints > (1868- 80); (Tyndale's New Testament of 1525 5 (1871) ; (A Transcript of the Registers of the Company of the Stationers at London) (1875— 94); cAn English Garner) (1877-96) ; (An English Scholar's Library > (1878-84) ; ˆThe First Three English Books on America *(1885) ; cThe Story of the Pilgrim Fathers, 1606-23* (1897) (British Anthologies * (1899— 1901) ; (The Term Catalogues) (1904-06).

ARBITRATION, History of in the United States. See United States — Arbitra¬ tion.

ARBITRATION, Industrial. This is the process by which an authoritative decision is obtained in the case of a controversy arising between one or more employers and a group of employees, or between two or more groups of employees, when such controversy cannot be settled by direct negotiations between the par¬ ties concerned. In such cases it is customary to refer the questions at issue to one or more persons, called ˆarbitrators," who are appointed to investigate the facts and to render a <(de- cision" or <(award." Conciliation and media¬ tion are less formal methods of settling indus¬ trial disputes, and consist merely of endeavors on the part of

some person or group of per¬ sons, not a party to the dispute, to promote amicable negotiations between the disputants, which may lead, either to an immediate settle¬ ment, or to an agreement to submit the matter in question to arbitration.

Statutory provision for the formation of permanent official or semi-official boards of arbitration is made in many countries and smaller political subdivisions. In some in¬ stances the submission of matters in contro¬ versy is compulsory, but more often it is pro¬ vided that upon application of one or both of the parties the board shall provide for the hold¬ ing of hearings, at which testimony is taken, and following which the board shall render an award. Where arbitration is voluntary, it is customary for both parties to enter into a for¬ mal agreement to abide by the decision of the arbitrators.

In the settlement of controversies with ref¬ erence to wages, hours of labor and general conditions of employment, voluntary arbitration has proved very effective, and in many in¬ stances disastrous strikes and lockouts have been averted or brought to an end by this means ; but where questions of principle or general policy, such as recognition of the union, exclusive employment of union labor, use of union label, etc., are involved, the parties frequently decline to voluntarily submit the question at issue to arbitration, when, there¬ fore, it becomes necessary for public authori¬ ties in the interest of public welfare to insist that the matter be so submitted. Such com¬ pulsory arbitration may be limited merely to the reference of the dispute to arbitrators for investigation, during which period hostilities shall be suspended, as in Canada; or, in addi¬ tion to such reference, the arbitrators may be empowered to compel the attendance of wit¬ nesses and the production of papers, as in Ger¬ many; or it may be even further provided, as

in New Zealand and other Australian states, that the disputants shall be compelled by law to abide by the decision of the arbitrators, under specific penalty for non-observance of the terms of the award.

In the following paragraphs several im¬ portant systems of industrial arbitration pro¬ vided for by law are briefly described. Purely unofficial boards of arbitrators, most of which are formed merely in connection with a single controversy, are not, because of the great variety of such boards, included within the scope of this article.

France. — The first definite provision for the settlement of industrial disputes appears to have been the tribunal established before the French Revolution at Lyons, France, for the settlement of disputes in

the silk industry. Al¬ though this tribunal was abolished with the trade guilds in 1791, it had proved so effective that, in 1806, Napoleon created the councils of experts. (Conseils des Prud'hommes') having quite similar functions. The councils, at first established in only a few cities, are now found in all of the important industrial centres in France, and similar councils have been estab¬ lished in other countries. For many years these councils considered only controversies between employers and individual employees, and it was not until the passage of the Con¬ ciliation and Arbitration Act in 1892 that pro¬ vision was made for the settlement of collective disputes, that is, disputes between one or more employers and a group of employees. To the extent that application has been made for the settlement of industrial disputes under the provisions of this act, its operation has been fairly successful ; but unfortunately only minor matters are thus referred for settlement, and it does not appear that the act has, to any great extent, served to prevent strikes and lockouts, which during very recent years have been both numerous and important.

Germany. — Industrial courts having juris¬ diction in the manufacturing industries (Ge- werbegerichte) had been established in various localities in Germany since the first quarter of the 19th century, and previous to 1869 three states — Prussia, Saxony and Saxe-Weimar — had passed laws providing for the establish¬ ment of such courts. By a provision of the industrial code of 1869 local authorities were authorized to establish such courts, provided employers and employees were equally repre¬ sented thereon. In 1890 an imperial act was passed establishing uniform regulations gov¬ erning the form and procedure of the local courts and extending their functions so as to provide for the arbitration of collective dis¬ putes.. An act passed in 1901 amended in cer¬ tain important particulars the act of 1890, es¬ pecially with reference to the settlement of collective disputes, which prior to that date had not been arbitrated with any large measure of success. The act of 1901 authorized the courts* to act on their own initiative without waiting for either party to the dispute to make application for its services, and provided that the arbitrators should be appointed by the parties concerned in the controversy. The ap¬ pearance of the parties to the dispute was made compulsory and a penalty was provided for non-attendance. When both parties ask for

arbitration the court then ceases to be a board of conciliation and becomes a board of arbi¬ tration; and if only one party makes applica¬ tion it is the president's duty to urge arbitration upon the other party. Decisions in cases of arbitrations are rendered by a majority of the arbitrators, but the president may abstain from voting in case of tie. The acceptance of the decision is not compulsory except when both parties have previously agreed to abide by the award. The act of 1901 further provided for the compulsory establishment of industrial courts in all cities having a population of over 20,000, and they may be formed elsewhere at the option of the state or upon joint appli¬ cation of employers and wage earners. In 1904 mercantile courts (Kaufmannsgerichte) for the settlement of disputes between mer¬ chants and their employees were established. Although the records for recent years show that there has been a growing disposition to refer industrial disputes to the courts, never¬ theless the number of disputes thus referred has constituted only a very small percentage of the total number arising.

Great Britain. — Several important acts with reference to the settlement of industrial disputes by conciliation or arbitration were passed in Great Britain during the 19th century, among which may be mentioned the Consolidation Act of 1824, the Con¬ ciliation Act of 1867, the Arbitration (Masters and Workmen) Act of 1872 and the Conciliation Act of 1896. Of these four acts, the last named may well be described briefly in this connection. This act provides for the registration of private conciliation or arbi¬ tration boards by the British Board of Trade. Registration is optional, but any board so registered is required to ((furnish such returns of the proceedings and other documents as the Board of Trade may reasonably require.® Should it appear to the Board of Trade that no adequate conciliation board has been estab¬ lished to which may be submitted disputes which might arise in any locality or industry, the board is authorized to inquire into the causes and circumstances and to take such steps as are deemed expedient for the purpose of bringing the parties together with a view to conciliation and, on application of either party, to appoint one or more persons as conciliators, and on application of both parties to appoint an arbitrator.' In 1911, following the great railway strike, an Industrial Council was es¬ tablished for the purpose of considering mat¬ ters referred to it, especially with reference to disputes which would affect the principal trades of the country. The Industrial Council has no compulsory powers. Its primary function ap¬ pears to be the encouragement of voluntary arbitration and the establishment of rules and regulations governing the procedure of unoffi¬ cial boards. In 1915 and 1916 acts known as <(The

Munitions of War Acts,® providing for conciliation and arbitration of disputes arising in munition manufacturing industries,* were passed, and in making awards under these acts it is held that the rights of employers and employees engaged in these industries may not be exercised as freely as in times of peace, and although parties to the controversies are not compelled to abide by any award, they are called upon and expected, during the continuance

of the war, to forego certain principles, in order that harmonious relationships may be main¬ tained and production continued without in¬ terruption. In the settlement of minor disputes the English system appears to have been quite successful, and undoubtedly the number of serious industrial disputes has been somewhat diminished, but a large number of very serious disturbances have arisen notwithstanding the provision which has been made for voluntary arbitration.

New Zealand. — A statute enacted in New Zealand in 1894 provided for the compulsory arbitration of industrial disputes, and several other Australian states have since passed simi¬ lar measures. An act of this character, passed by the commonwealth in 1914, was made appli¬ cable to disputes ˆextending beyond the bound¬ aries of any one state.® Under the provisions of the New Zealand act district boards of con¬ ciliation are created, on which board associa¬ tions of employers and of workmen are equally represented, and an ˆimperial chairman® is elected by each board. In 1909 the act was amended so as to provide for the appointment of three commissioners of conciliation. When a controversy arises one of these commission¬ ers endeavors to bring about a settlement and, if successful, he organizes a council of con¬ ciliation, consisting of two or more representa¬ tives of each party, to whom the matter is referred. Should such council fail to effect a settlement of the dispute, it is then referred to the Industrial Court, which consists of three members appointed by the governor for a term of three years, one of whom (the presiding officer) is a judge of the Supreme Court, an¬ other a representative of the employers, and another a representative of the employees. Cases also may be referred directly to the court without first having been referred to the coun¬ cil of conciliation. Pending consideration of a dispute by the court, strikes and lockouts are forbidden. The awards of the court are bind¬ ing upon both parties and penalties are im¬ posed for failure of either party to observe the conditions of the award. The factory in¬ spectors are charged with the enforcement of the awards. For some years, under this sys¬ tem of compulsory arbitration, New Zealand was properly described as <(a country without strikes,® but during recent years strikes have been wholly prevented in that state, even though rather heavy penalties have been im¬ posed for failure to observe the

awards of the court. Some of these controversies, however, which have resulted in open conflict, have not come within the scope of the law.

Canada. — The Conciliation Act, passed by the Canadian Parliament in 1900, followed closely the phraseology of the British Act of 1896, which sought to encourage voluntary arbitration of labor disputes. The Railway Labor Disputes Act, passed in 1903, introduced the principle of compulsory investigation of railway disputes and recognized <(the influence of an informed public opinion upon matters of vital concern to the public itself.® In 1907, following a serious and protracted strike of coal miners in one of the Western provinces, the Industrial Disputes Investigation Act was passed, which provided for the compulsory investigation of all disputes involving 10 or

more persons employed in mining, or in con¬ nection with public service utilities. This act has since been amended so as to include all controversies arising in connection with the manufacture of military supplies. Employers and workmen are required to give at least 30 days' notice of an intended change affecting the conditions of employment with respect to wages and hours, and a strike or lockout is pro¬ hibited while the matters in dispute are being considered by an official board to which they shall have been referred for investigation. Heavy penalties may be imposed for failure to observe the provisions of the law. It is the duty of such boards to endeavor to effect a settlement by means of conciliation and media¬ tion, and, if unable to do so, they are required to investigate the questions at issue, to prepare a report and to render an award which shall be made public, but they are not empowered to enforce the provisions of their awards. Al¬ though strikes in the industries covered by the act have not been altogether prevented, never¬ theless the operation of the act has been re¬ markably successful, and it has been found that the weight of public opinion, based on authoritative facts determined after thorough investigation by such official boards, has been sufficient in most instances to induce the par¬ ties to the disputes to accept the awards of such boards without resorting to strike or lockout.

Norway. — During the year 1915 industrial unrest in Norway assumed alarming propor¬ tions and early in 1916 a lockout affecting ap¬ proximately 20,000 employees in the metallurgi¬ cal industries was

declared by the mine operat¬ ors and a general sympathetic strike in all branches of industry was imminent. This sit¬ uation made it necessary for the government to take extraordinary action and Storting therefore passed, on 9 June that year, an act providing for compulsory arbitration of indus¬ trial disputes by an impartial commission, con¬ sisting of an equal number of representatives of employers and workmen. Provision is made for compulsory investigation and for a cessa¬ tion of hostilities pending investigation and the rendering of an award. In this respect the act is similar to the Canadian Industrial Disputes Investigation Act of 1907, discussed above.

Sweden. — In accordance with the provi¬ sions of a law passed in 1907, Sweden is divided into seven districts, in each of which a ˆConciliator,® appointed by the Crown, shall endeavor to promote the settlement of indus¬ trial disputes and to advise and assist in the framing of agreements designed to preserve amicable relations between employers and workmen.

United States. — -At least 29 of the 48 States have statutory provision for conciliation, mediation or arbitration in the case of indus¬ trial disputes. New York State and Massachu¬ setts each created such a board as early as 1886. In 15 States a special board has been created for this purpose; in 11 States these functions are performed by boards, commissions or de¬ partments having other duties, and in three States provision is made for the appointment of special boards when deemed advisable. In no case are the awards of such boards binding, but in several States the boards may initiate action and have powers similar to those of the

lower courts as respects the summoning of witnesses, compelling testimony, production of records, etc.

A Federal statute passed in 1888, applicable only to disputes between railroads and other transportation companies engaged in interstate commerce, created machinery for voluntary arbitration of railway disputes at the request of either party and for public investigation of such disputes upon the initiative of the gov¬ ernment. This act remained practically a dead letter, and it was superseded in 1898 by the ((Erdman Act,® which provided for mediation and voluntary arbitration in the case of con¬ troversies arising between railroad companies and those employees directly engaged in the movement of trains, namely, engineers, firemen, conductors, trainmen, switchmen and telegra¬ phers. By this act the chairman of the Inter¬ state Commerce Commission and the Commis¬ sioner of Labor were

designated <(Federal Mediators,® who, upon the request of either party, should first seek to bring about an ami¬ cable adjustment of controversies through mediation and, if unsuccessful,- they should endeavor to have such controversies submitted to boards of arbitration to be established as provided for in the act. The ((Newlands Act,® passed in 1913 and now in effect, established the United States Board of Mediation and Conciliation consisting of a commissioner, an assistant commissioner and two other officials of the government, all of whom are appointed by the President. In general the provisions of the Erdman Law were re-enacted and provision was made for the appointment of six-member boards of arbitration composed of two repre¬ sentatives of each party to a controversy and two members representing the public, instead of the former three-member boards on which the neutral member alone held the deciding vote. Since the organization of the board in July 1913 and up to 18 Oct. 1916, the services of the board were requested in 61 controversies between railroad companies and their em¬ ployees. Of this number 46 were settled by mediation, 11 by arbitration and four by media¬ tion and arbitration. Two of these contro¬ versies were of unusual importance — one in •1913 involving over 92,000 conductors and trainmen in the eastern section of the country, and another in 1914-15 affecting about 55,000 locomotive engineers and firemen employed on railroads west of the Mississippi River. In each of several other controversies over 25,000 railway employees were involved. It has been authoritatively stated that in railway contro¬ versies ((the results which have been accom¬ plished under the Newlands Law have been without a parallel abroad.® In only one case has the board failed to effect a peaceful set¬ tlement of a controversy referred to it. The recent refusal of the four large railway broth¬ erhoods (Locomotive Engineers, Locomotive Firemen and Engineers, Railroad Conductors and Railroad Trainmen, together representing nearly 400,000 employees) to refer to arbitra¬ tion the so-called ((eight-hour® controversy, re¬ sulted in a deadlock, and in August 1916, a gen¬ eral railroad strike appeared to be imminent. In order to prevent such a public calamity President Wilson urged the immediate passage of legislation by Congress, then in session and early in September the Adamson bill was passed

by a large majority in both Houses. The act provided that, beginning 1 Jan. 1917, eight hours should, in contracts for labor and service, be deemed a day's work and the measure or standard of a day's work for the purpose of reckoning the compensation for services of all

employees engaged in the operation of trains (with certain specified exceptions), and further provided for the appointment of a commission which should observe the operation and effects of the institution of such eight-hour standard work day for a period of not less than six months, nor more than nine months, and within 30 days thereafter should report its findings to the President and Congress. It was also provided that, pending the report of the com¬ mission and for a period of 30 days thereafter, the compensation of railway employees covered by this act should not be reduced below the present standard day's wage, and, for all neces¬ sary time in excess of eight hours, such em¬ ployees should be paid at a rate not less than the pro rata for such standard eight hours of work. Penalties for violation of the provisions of the act were also provided. This law not only regulated the hours of labor of railway employees but also determined wage standards. As a measure fixing wages, its constitutionality has been questioned, and pending a determina¬ tion of its constitutionalty several railway com¬ panies declined to observe the provisions of the act. Accordingly the chiefs of the four rail¬ road brotherhoods called a strike to begin on 17 March 1917 on certain eastern railroads and to extend successively to other railroads until a general strike on all important railroads should result. Conferences between the rail¬ road managers and the brotherhood chiefs were held, but without resulting in concessions by either party. Thereupon the President, through a special committee of mediation, urged that in view of the gravity of the inter¬ national situation at the time, the two parties to the dispute, as a patriotic duty, should reach an immediate settlement of the controversy. Through the efforts of the mediators a post¬ ponement of the strike for 48 hours was se¬ cured, and on 19 March the railroad managers agreed to establish the basic eight-hour day and the threatened strike was averted. On the same day a decision of the Supreme Court up¬ holding the constitutionality of the eight-hour law was announced. This decision established the principle that Congress has authority not only to regulate the hours of labor of em¬ ployees engaged in interstate commerce, but also to determine wage standards. It was fur¬ ther established by the decision that : ((The public right to have interstate commerce unin¬ terrupted is a basic principle paramount to the interests of the railroads or of their employers, both in public service, and subject to the su¬ preme, unrestricted power of Congress to take any action necessary to maintain freedom and uninterruption of interstate commerce.® A pre¬ cedent having thus been established, it remains to be determined whether or not the settlement, by special legislation, of controversies which seriously endanger the public welfare shall prove as satisfactory or effective as adjust¬ ments through mediation and voluntary arbi¬

tration. See Eight-hour Law; Labor Legis¬ lation; Labor Movement in America; Labor Unions.

Bibliography. — Books and Articles. — Academy of Political Science, Vol. VII, No. 1, article on ((Labor Disputes and Public Service Corporations" (New York, January 1917) ; Adams and Sumner, (Labor Problems) (New York 1905) ; American Academy of Political and Social Science, Annals, articles on ((The Settlement of Labor Disputes" (Philadelphia 1910) ; American Yearbook, 1916, articles on (< Arbitration and Conciliation" (New York and London 1917) ; Barnett, G. E., and McCabe, D. A., (Mediation, Investigation, and Arbitration in Industrial Disputes) (1916); Gilman, N. P., (Methods of Industrial Peace *(Boston 1904) ; Lloyd, Henry D., (A Country without Strikes) (New York 1900) ; Mote, Carl H., industrial Arbitration (Brooklyn 1916) ; Robbins, E. C., (The Trainmen's Eight-Hour Day* (in Polit¬ ical Science Quarterly, Vol. XXXI, No. 4, De¬ cember 1916).

Government Reports. — Canada, ((Ninth Re¬ port of the Registrar of Boards of Conciliation and Investigation of Proceedings under the In¬ dustrial Disputes Investigation Act, 1907" (Ot¬ tawa 1916) ; Germany. ((Statistiches Jahrbuch fur das Deutsche Reich" (annual, Berlin) and <(Reichsarbeitsblatt" (monthly, Berlin) ; Great Britain, British Board of Trade Labor Gazette, articles on ((Recent Conciliation and Arbitra¬ tion Cases" (monthly, London) ; France, <(Bul- letin du Ministere du Travail et de la Prevoy- ance Sociale" (monthly, Paris) ; United States Industrial Commission, Vol. XVII (Washing¬ ton 1901) ; United States, Department of Com¬ merce and Labor Bulletin No. 60, <(Government Industrial Arbitration" (Washington 1905) ; United States Bureau of Labor, Bulletin No. 98 ; four articles : ((Mediation and Arbitration of Railway Disputes in the United States" ; ((Canadian Industrial Disputes Investigation Act of 1907" ; ˆConciliation and Arbitration in Great Britain" ; and ˆIndustrial Courts in France, Germany and Switzerland" (Washing¬ ton 1912) ; United States Senate Document No. 493, 64th Congress, 1st Session, <(Railroad Labor Arbitrations" (Washington 1916).

Charles F. Gettemy,

Director Massachusetts Bureau of Statistics.

ARBITRATION, International. A

quasi-judicial mode of settling controversies between states which it has not been possible to settle through diplomatic negotiation. This method of adjudicating international disputes is an old one, many

such instances having oc¬ curred in ancient times, notably among the Greeks and Romans. It has been frequently resorted to in modern times and the increasing disposition in late years to employ it justifies the hope that it may ultimately take the place of armed force as the accepted method of de¬ termining international controversies. Ac¬ cording to Dr. W. Evans Darby in his Mod¬ ern Pacific Settlements,* six international con¬ troversies were settled by arbitration in the 18th century; 471 in the 19th and 63 during the first three years of the present century. Since the beginning of our national existence some 83 disputes between the United States and some 24 different countries have been amicably settled through the decisions of mixed commissions or arbitral tribunals. Of the pecuniary awards made in these cases, 74.8 per cent, or a total of $69,501,682, were

made in favor of the United States, and 25.2 per cent, or a total of $23,353,762, were made against the United States. Numerous bound¬ ary disputes have been settled in this way; the Alabama claims controversy with Great Britain, growing out of the Civil War; the fur-seal controversy; and several fisheries dis¬ putes with Great Britain are examples of other important differences which have been arbi¬ trated.

The history of international arbitration has gone through an interesting evolution. In the beginning bilateral arbitration treaties and general international conventions for the pacific settlement of disputes were unknown. Whenever two states wished to arbitrate dif¬ ferences existing between them they entered into a special agreement called a compromis, which defined the nature of the controversy, named the arbiters or designated a mode of selecting them, set forth their powers and laid down the rules of procedure by which they were to be guided in reaching a decision on the points at issue. Early in the 19th century the practice of inserting an arbitral clause in •general treaties became common. This clause usually stipulated that in case a difference of opinion should arise regarding the interpreta¬ tion of the treaty or some one of its provi¬ sions, the contracting parties would submit the question to arbitration. Thus the duty to ar¬ bitrate in certain cas.es was made obligatory. It has been stated that 142 such treaties have been entered into by the countries of America since 1832. The next step was reached when states began to conclude permanent arbitra¬ tion treaties with one another which provided for the settlement by this mode of all disputes of a certain character

which might arise in the future between the contracting parties. Finally, The Hague Peace conferences of 1899 and 1907 adopted general conventions for the pacific settlement of international disputes and provided for the creation at The Hague of a so-called permanent court of arbitration to which the contracting parties might sub¬ mit their differences. _

The first arbitration treaty concluded be¬ tween the United States and a foreign power was that of 1897 with Great Britain. This treaty provided that certain classes of dis¬ putes which might arise between the two gov¬ ernments should be submitted to the _ arbitra¬ tion of judges to be appointed according to a mode prescribed by the treaty and in accord¬ ance with certain rules of procedure which it laid down. The Senate, however, declined to give its advice and consent to the ratifica¬ tion of this treaty and it never went into ef¬ fect. In 1905 President Roosevelt negotiated a number of arbitration treaties with foreign powers, but they were ratified only after the Senate had amended them in important par¬ ticulars. The amendments being unacceptable to the President, he refused to lay them be¬ fore the other parties for their approval. In 1908 arbitration treaties were concluded be¬ tween the United States and France, Switzer¬ land, Mexico, Denmark, Italy, Great Britain, Norway, Portugal, Spain, Sweden, the Nether¬ lands and Japan and these were duly ratified by the Senate. Similar treaties have since been concluded with various other foreign powers, so that at the present time arbitration

agreements exist between the United States and 28 different countries, or more than half the sovereign states of the world. In 1915 Brazil was a party to 33 such treaties, Italy to 25, Portugal to 18, Salvador to 20, Spain to 31, etc. Between 1902 and 1915, 164 arbitra¬ tion treaties were concluded between the vari¬ ous powers of the world, and at the outbreak of the European War the German Empire was the only great power which was not a party to one or more arbitration agreements.

The majority of these treaties provide that differences of a legal nature which it may not have been possible to settle by diplomacy shall be referred to the permanent Court of Arbitration at The Hague (see Hague Court, The). Disputes, however, which affect vital interests, the honor or the independence of the contracting parties, or which involve the interests of third parties, are generally excluded from the provisions of the treaties, and there is therefore no obligation to submit them to arbitration. These exceptions are ob¬ viously quite elastic and it would be possible for one of the contracting parties, by a liberal interpretation of the terms <(honor® and <(vital interests,® to avoid the obligation to arbitrate any dispute which it might choose

to regard as one which involved its ((honor® or ((vital interests.® In 1911 President Taft concluded treaties with several powers, the purpose of which was to remove the possibilities of eva¬ sion which these expressions create. In gen¬ eral, these treaties provided for the arbitra¬ tion of all differences which were ˆjustifiable in their nature by reason of being susceptible of decision by the application of the princi¬ ples of law and equity,® but they were radi¬ cally amended by the Senate, in consequence of which they were dropped by the President.

Lange, in his work entitled (Union Inter- parlementaire ; l'Arbitrage obligatoire en 1913, > thus summarizes the scope of the exist¬ ing arbitration treaties :

1. Arbitration of all disputes without re¬ serve — 36 bipartite treaties.

2. Arbitration of all disputes subject to reserve of constitutional provisions — 13 treaties.

3. Arbitration of all disputes except those affecting vital interests, honor, or independ¬ ence, or the interests of third parties — 46 treaties.

4. Arbitration of all disputes of a legal nature or those relative to the interpretation of treaties — 65 treaties.

5. Arbitration of differences relating to the interpretation or application of international law or conventions — 44 treaties.

As stated above, the first Hague confer¬ ence of 1899 adopted a convention for the pacific settlement of international disputes, and the conference of 1907 revised and ex¬ tended in certain particulars the earlier con¬ vention. These conventions were ratified or adhered to by practically all the states of the world, and being of unlimited duration, they are permanent. The conventions provide for the creation of a permanent Court of Arbi¬ tration to meet at The Hague for the decision of cases that may be referred to it, and through the generosity of Mr. Andrew Car¬ negie a palace has been erected there for the holding of the sessions of the court and for

the housing of its permanent offices. The conventions stipulate that

each contracting power shall select not more than four persons, of known competence in questions of inter¬ national law and of the highest moral char¬ acter, to constitute a panel from which arbi¬ ters may be selected whenever any of the con¬ tracting parties shall agree to submit a dis¬ pute to the court for adjudication. The con¬ ference of 1899 formulated a code of proced¬ ure to be followed by the court in the hearing of cases submitted to it, and this code was revised and elaborated by the conference of 1907. Since 1899, 15 cases have been sub¬ mitted to the court for decision, the first one being a dispute between the United States and Mexico concerning the so-called Pious Fund (q.v.) of the Californias. The decision was rendered 14 Oct. 1902 in favor of the United States and was duly carried into effect. The second case involved the question of whether Great Britain, Germany and Italy, three Powers which had blockaded the ports of Venezuela and seized certain of the Vene¬ zuelan customs houses on account of the re¬ fusal of the government of Venezuela to settle various claims preferred against it by those Powers, were entitled to priority of payment over other governments, including that of the United States, which also had claims against Venezuela, but which had not participated in the blockade of her ports. The decision was rendered 22 Feb. 1904 in favor of the blockading Powers. Among the other more important cases decided by The Hague Court were: The controversy between Germany, France and Great Britain on the one hand and Japan on the other, regarding certain perpetual leases in Japan (decided 22 May 1905) ; a dispute between Germany and France concerning aid alleged to have been given by the German consul to certain desert¬ ers from the French legation in Morocco (de¬ cided 22 May 1909) ; an important and long¬ standing dispute between Great Britain and the United States regarding the north Atlan¬ tic fisheries (decided 7 Sept. 1910) ; the dis¬ pute between France and Great Britain re¬ garding the arrest by the French authorities at Marseilles of a fugitive named Savakar, who had escaped from a British vessel upon which he was being transported to India for trial (decided 24 Feb. 1911) ; and a controversy between France and Italy concerning the seizure by the Italian authorities of two French vessels during the Turco-Italian War (decided 6 May

1913).

In every case the decision of The Hague Court was accepted by the parties and was duly carried into effect. It soon became evi¬ dent, however, that the organization of the court was defective. In the first place, it was not a court in the true sense of the word, but simply a panel of names from which the judges were to be selected by the parties when¬ ever disputants had occasion to resort to the court. This

involved long and expensive de¬ lays ; besides, under such an arrangement, the court lacked permanency and continuity. These defects were the subject of serious con¬ sideration at the second conference in 1907, and with a view to remedying them, the con¬ ference adopted a convention providing for {he creation of a permanent court of arbitral

justice to be composed of judges appointed for terms of 12 years and to be paid regular salaries. The proposed tribunal was intended to be not merely a list of names kept at The Hague, but a fully organized body which was to meet once a year and to proceed with any cases which might be on its docket. It would not be necessary, therefore, to constitute a court every time a case was to be decided. Unfortunately, however, it proved impossible for the powers to agree upon the size of the court and the mode of selecting the judges. The smaller states at the conference insisted on equality of representation in the court, the effect of which, had their contention been ad¬ mitted, would have been to create a tribunal of such size as to be unworkable. Various modes were proposed for selecting the judges and insuring some representation to all the powers, but no agreement was ever reached, and as a consequence the proposed court re¬ mains unorganized. The so-called permanent court provided for by the conventions of 1899 and 1907, however, may still be called into existence wdienever recourse to it is desired.

The desirability of establishing a general system of compulsory arbitration has been much discussed in recent years and various projects with this end in view have been put forward. In 1890 the first Pan-American con¬ ference at Washington adopted a project for a general treaty of obligatory arbitration but it was never ratified by the states repre¬ sented at the conference. At both The Hague conferences of 1899 and 1907 several projects for limited obligatory arbitration were pro¬ posed, but largely on account of the opposi¬ tion of Germany they were defeated. The Russian proposal of 1899 provided for inclu¬ sive ' obligatory arbitration for differences in¬ volving pecuniary claims and those relating to the interpretation of treaties. In 1907 a similar, but more elaborate, project proposed by Port¬ ugal was discussed, but like the project of 1899, it was defeated. At the latter confer¬ ence a project of exclusive obligatory arbitra¬ tion was proposed — one which provided that ˆdifferences of a legal nature and primarily those relating to the interpretation of treaties® should be submitted to arbitration, provided they did not involve the vital interests, honor or independence of the disputing parties, or did not affect the interests of other states not parties to the dispute. This project had the support of a large majority of the states rep¬ resented

at the conference, but it was dropped mainly because of the opposition of Austria- Hungary and Germany. Nevertheless the conference of 1907 unanimously adopted a vceu admitting the principle of compulsory arbitration and declaring' that certain differ¬ ences,. particularly those relating to the inter¬ pretation of treaties, might be submitted to arbitration without restriction. Finally, the conference, in adopting the Porter convention respecting the limitation of the employment of force for the recovery of contract debts, in effect sanctioned obligatory arbitration for one class of disputes.

It is apparent from the above summary that the movement looking toward the sub¬ stitution of judicial methods in the place of armed force for the settlement of international disputes has made remarkable progress in re-

cent years. The obstacle which has stood in the way of further progress has of course been the feeling among states that they can¬ not consent to submit their international con¬ troversies to the decision of judges represent¬ ing other nations without compromising their sovereignty and running the risk of surren¬ dering their rights. If every nation which be¬ comes involved in a controversy with another were absolutely certain of finding an impar¬ tial and unprejudiced tribunal to which it could resort with the certainty of obtaining justice, there would be little reluctance to adopt this method of settling disputes. As yet, however, no means has been discovered by which the selection of competent arbiters without national prejudices and sympathies can always be assured. The method provided by The Hague conventions for the constitu¬ tion of an arbitral tribunal has not escaped criticism. Its members are to a certain ex¬ tent under the control of the governments which select them and therefore tend to repre¬ sent the views of their governments ; in some instances, indeed, they have been regular legal or diplomatic officials. Greater independence and impartiality might be obtained by for¬ bidding the appointment as members of the court of persons holding official positions un¬ der the government which they represent. Furthermore, it might be desirable to forbid any judge of the court from practising before it ; it might, indeed, be desirable to go still further and prohibit any citizen of a disput¬ ing state from sitting in a case in which his government is a party ; finally, a more ad¬ vanced step, which is quite in line with sound judicial theories, would be to exclude the par¬ ties

from choosing their own judges, this, because so long as they are allowed to do so they will appoint representatives who are pre¬ possessed in favor of the claims of their own government. In short, arbiters so chosen are more likely to assume the role of advocates rather than that of judges. It would seem that if The Hague Court were constituted ac¬ cording to these principles, and if, in addition, the judges were appointed for life and were paid salaries commensurate with the dignity and importance of their positions, we should have a tribunal composed of men as nearly independent and free from prejudices as it would be possible to obtain. See Hague Court, The; International Law; Mediation; Pan-American Conference; Triple Alli¬ ance; Triple Entente.

Bibliography. — Barclay, (Problems of In¬ ternational Practice and Diplomacy > (Boston and London 1907) ; Darby, (International Tri¬ bunal (London 1904) ; Foster, Arbitration and the Hague Court *(New York 1904); Hershey, (Essentials of International Public Law* (New York 1912) ; Higgins, (The Hague Peace Conferences *(Cambridge 1909) ; Holls, (The Peace Conference at The Hague) (New York 1900) ; Hull, (The Two Hague Peace Conferences> (Boston 1908) ; Law¬ rence, (International Problems and The Hague Conferences) (4th ed., Boston 1911) ; Lemo- non, (La Seconde Conference de la . Paix* (Paris 1908) ; Meurer, <Die Haager Friedens- konferenz* (Munchen 1905, 1907) ; Moore, (History and Digest of International Arbitra¬ tions } (6 vols., Washington 1898) ; Nippold,

(Die Zwiete Haager Friedenskonferenz *(Leipzig 1908) ; Ralston, (International Arbi¬ tral Law and Procedure) (Boston and Lon¬ don 1910) ; Scott, 'The Hague Peace Confer¬ ences of 1899 and 1907 > (Baltimore 1909) ; Wilson, (The Hague Arbitration Cases* (New York 1915).

James W. Garner,

Professor of Political Science, University of Illinois.

ARBOGA, ar-bo'ga, a Swedish city, once important commercially but now only of his¬ torical interest from having been at one time a residence of the royal family of Vasa, the scene of church assemblies and national diets and for the antiquities in its neighborhood. Pop. about 5,250.

ARBOLEDA, ar'bo-la'da, Julio, South American poet and statesman : b. Barbacoas, Colombia, 9 June 1817; d. 1862. He was edu¬ cated in

Europe and on his return to Colom¬ bia engaged in journalism. In the various Colombian revolutions he was a liberal Con¬ servative and more than once declined the vice-presidency of the republic. His poems are much esteemed in Spanish-American lit¬ erature.

ARBOR DAY, an annual tree-planting day appointed by nearly every State and Ter¬ ritory of the Union, sometimes as a legal hol¬ iday and sometimes merely advisory, to as¬ sist in foresting or reforesting scantily-wooded tracts or shading or beautifying towns. It is generally in special connection with the public schools, to impress children with the import¬ ance of forestry and natural beauty in our civilization. The date depends on the climate of different sections and is absolutely fixed in but few ; most northern States hold it in April or early in May; Arizona, Texas and Alabama in February, the two latter on Wash¬ ington's birthday; Florida in January, Georgia in December and New Mexico in March; many, make it . optional either with the State or with localities, and West Virginia holds it twice a year, in spring and fall. It arose from the alarm felt by. the most far-sighted public men over the rapid and reckless deforestation of many parts of the Union, and the prospects of its extending to all the States, and a realiza¬ tion of what that deforestation meant to the future welfare and development of the United States (see Forestry). Most civilized gov¬ ernments at different times have looked after their forests to assure a supply of timber for naval construction; New Hampshire and New York, even in the colonial period, felt it needful to check the inroads on them ; the United States government at. the begin¬ ning of the 19th century bought timber lands and a quarter of a century later authorized the President to take measures for their preser¬ vation ; and about the same time the Massa¬ chusetts Society for Promoting Agriculture offered prizes for forest planting. But the first widespread realization of its importance was caused in 1864 by the notable book, of George P. Marsh (q.v.), the eminent American scholar and diplomat, entitled (Man and Na¬ ture >-; the chapter on <(The Woods® aroused especial attention and in 1865 Birdsey G. North¬ rop, then secretary of the Connecticut Board of

Education, suggested that States might profit¬ ably plant trees every year at the proper time, or supervise their planting. The subject brought out several books and many articles ; the late Dr. Franklin B. Hough, the first Forest Com¬ missioner, publishing a work upon it as early as 1873. But the first to propose a regular Arbor Day for the

purpose was J. Sterling Morton, late Commissioner of Agriculture, then of Nebraska, who in 1872 succeeded in inducing his almost treeless State to set apart a day for the purpose. Great enthusiasm was aroused and over a million trees were planted that year. In 1885 it was made a legal State holiday on 22 April, Mr. Morton's birthday. The movement did not at first spread very rapidly, though some localities took it up; the first States to copy the legal enactment were Kansas and Tennessee in 1875, and the next year Minne¬ sota. It was six years before another joined, Ohio in 1882, followed by West Virginia in 1883 ; then the tide began to rush in and within five years 26 more States and Territories had adopted the observance. See Forestry; For¬ est Service and consult Schauffler, R. H., (ed.) (Arbor Day5 (1909).

ARBOR VITˆ (Latin, «tree of life®), the designation of several trees belonging to the family Pinaceˆe and allied to the cypress. The genus consists of evergreen trees and shrubs, with flattened branchlets and small, imbricated or scale-like leaves. The common arbor vitae (Thuja occidentals) is a native of eastern North America and reaches a height of 50 feet in favorable locations. The cones are small ; the young twigs have an agreeable balsamic smell; the wood is soft and light, but tough and durable. The other North American species is T. Plicata, found on the Pacific coast from the region of San Francisco Bay north to Alaska. The Chinese arbor vitae (T . orientals) is often cultivated. Its upright branches and larger cones easily distinguish it from the former. It yields a resin which was formerly thought to have medicinal vir¬ tues, like the wood and young twigs of T. occi¬ dentals; hence the name — arbor vitae.

ARBORETUM (Latin arbor, a tree), a place set apart for the cultivation of different trees and shrubs for scientific or educational purposes. See Botanic Gardens; Forestry.

ARBORICULTURE, the scientific cul¬ tivation of trees. It embraces that part of horticulture which treats of the planting and cultivation of ornamental and fruit trees and that part of forestry known as sylviculture. For the horticultural growing of various trees see under the corresponding special headings. See also Forestry.

ARBUTHNOT, John, Scotch physician and author: b. Arbuthnot, Kincardineshire, Scotland, 29 April 1667 ; d. London, 27 Feb. 1735. Arbuthnot was the eldest child of Alex¬ ander Arbuthnot, rector of Arbuthnot, and Margaret [Lammy] Arbuthnot. Little is known of John Arbuthnot's early life; he was probably educated at Marischal College, Aberdeen, but almost nothing else can be stated of his minority. It is

known, however, that as a result of the Revolution of 1688, his father who was a stout supporter of the Stuarts, lost his preferment and, on his death in 1691, his sons were obliged to seek their

fortunes abroad. John went to London, where he supported himself by teaching mathe¬ matics. The following year he probably pub¬ lished a little book entitled (The Laws of Chance,5 but it may not be definitely assigned to him. In October 1694 he entered University College, Oxford, and in September, two years later, took his doctor's degree in medicine at Saint Andrews. Shortly afterward, in all prob¬ ability, he settled in London for the remainder of his life.

Arbuthnot's first important work was (An Examination of Dr. Woodward's Account of the Deluge) (1697), a work in which Arbuthnot showed his interest in questions of science and the candor and fairness of his mind. His next piece, (An Essay on the Usefulness of Mathe¬ matical Learning,5 appeared in 1701. His prog¬ ress in distinction was so rapid that in 1704 he was elected a Fellow of the Royal Society and the following year was made Physician Extraordinary to the Queen. In 1709 he was appointed Physician in Ordinary to the Queen, and the following year was admitted as Fellow to the College of Physicians. His publications of the period are of a somewhat miscellaneous character: (Tables of the Grecian, Roman and Jewish Measures, Weights and Coins, Reduced to the English Standard5 (1705), (A Sermon Preached to the People at the Mercat-Cross of Edinburgh; on the subject of the Union5 (1706) and (An Argument for Divine Provi¬ dence, taken from the Constant Regularity Observed in the Births of Both Sexes5 (1710). Because of his well-known good humor, fair¬ ness of mind and ability he was frequently named to settle vexed questions and rival claims.

Arbuthnot is remembered in English litera¬ ture chiefly for the friendships which he made and the work that he did during the next four years. He became acquainted with Swift in 1711 and with Pope two years later, and both friendships were close and life-long. It was possibly under the influence of the former that he contributed several interesting satires to the support of the Tory administration. In Feb¬ ruary 1712 appeared (The Story of the Saint Albans Ghost, or the Apparition of Mother Haggy,5 a satire upon the Duke and Duchess of Marlborough. In the spring and summer of the same year there appeared in five instalments, the much more important (Law is a Bottomless Pit,5 called later and better known as (The History of John Bull.5 Both were attributed to Swift and have been included frequently in his published works, in spite of his denial of them. (John Bull5 is undoubtedly one of the masterpieces of English political satire

of the milder sort. It pursues throughout the method of the narrative parts of Swift's (Tale of a Tub5 and it ˆives an account of the history of English foreign politics of the time, but its quality is. more genially humorous than vio¬ lently satirical. It is particularly notable for the name and character of John Bull, which Arbuthnot created. In October of the same year Arbuthnot published <The Art of Politi¬ cal Lying,5 a satire of an extraordinary rather than a dramatic cast.

The friendship of Arbuthnot with Swift, Pope and the Tory leaders resulted in a society for the diversion of its members in times of political turmoil. Out of that sprang the

Scriblerus Club. The object of the club was, in the words of Pope, ((to have ridiculed all the false tastes in learning, under the character of a man of capacity enough, that had dipped into every art and science, but injudiciously in each." The members were Arbuthnot, Swift, Pope, Gay, and Parnell, but almost exclusively to Arbuthnot alone belong the (Memoirs of the Extraordinary Life, Works, and Discoveries of Martinus Scriblerus, ' probably written in 1713-14, but published in 1741 by Pope. The (Memoirs' are usually included in Pope's works, who wrote only the excellent (Art of Sinking in Poetry. ' The reason that so many of Ar- buthnot's works have been attributed to other writers is that literature was to him a diversion and he made little attempt to keep his writings.

On the death of Queen Anne in 1714, Arbuth¬ not, along with the Tory ministers and their supporters, lost their places at court, but Ar¬ buthnot retained his favor with influential peo¬ ple. In his profession he was honored by being made, in 1723, Second Censor bv the College of Physicians and, possibly in 1730, Physician to the Queen. His writing up to his death con¬ sisted of an amplification of his (Tables of Ancient Coins) (1727), some satirical notes, with Swift, to the (Duncaid' (1729), a popular (Essay Concerning the Nature of Ailments and the Choice of Them' (1731), to which the fol¬ lowing year he added (Practical Rules of Diet,' an (Essay Concerning the Effects of Air on Human Bodies' (1733), and a poem, (Know Thyself' (1734). Alone and in collaboration with his friends he probably wrote a number of satirical pieces, which are often included in his works but which cannot be definitely assigned to him. The last 10 years of his life were marked by several illnesses, but he never lost his cheerfulness and good-nature. A few weeks before his death appeared

Pope's masterly (Epistle to Dr. Arbuthnot,' which is interesting in part as a proof of the esteem in which he was held by his friends and by which he is best known to the average reader.

Bibliography. — The chief source of in¬ formation about Arbuthnot is George A. Ait- ken's (The Life and Works of John Arbuth¬ not' (Oxford 1892), wherein all that is defi¬ nitely known to be Arbuthnot's is included ex¬ cept the technical treatises. The other chief source of information is Leslie Stephen's arti¬ cle in the dictionary of National Biography.' References to the history of the Scriblerus Club and Arbuthnot's relations to the great men of letters of the time are to be found in the separate lives of these men and in the literary histories.

William T. Brewster,

Professor of English, Columbia University.

ARBUTHNOT, Marriot, English ad¬ miral: b. 1711; d. 1794. With Sir Henry Clin¬ ton he captured Charleston, S. C., 20 May 1780, after the city had withstood a long siege, and commanded in a sea fight with a French fleet off Cape Henry in March 1781.

ARBUTUS, ar'bu-tus, the designation of a genus of about 20 species of shrubs and small trees, mostly evergreen, of the family Ericacece, natives mainly of Europe and North America. The species, many of which have smooth, red branches, are often used for ornamental pur¬ poses. A. unedo, the strawberry tree, a species

from southern Europe, is often planted in Cali¬ fornia, its profusion of white or rosy flowrers and strawberry-colored fruits which ripen dur- • ing the blossoming period of the following year being greatly admired. In Spain this fruit is used to make sugar and a kind of liquor. A. menziesii, the madrona, a native of the Pa¬ cific Coast States, attains a height of about 100 feet and is the hardiest and perhaps the handsomest species of the genus. A. arizonicus, another American species, which sometimes reaches a height of 50 feet, has white bark on the trunk, red branches, pale-green leaves, loose panicles of white flowers and dark orange-red fruits.

ARBUTUS, Trailing, an evergreen creep¬ ing plant (Epigcea repens) of the family Eri¬ cacece, growing in shaded sandy and rocky soils especially in pine woods, from Newfoundland to Florida and westward to Minnesota. It is known in New England as the Mayflower and in the southern United States as ground laurel, and is everywhere prized for its fragrant rose- colored or white flowers.

ARC, a geometrical term denoting a por¬ tion of the circumference of a circle, often cut off by two lines which intersect it. The name is also applied to a portion of any other curve. The magnitude of an arc of a circle is stated in degrees, minutes and seconds, which are equal to those of the angle at the centre which it subtends. Hence, counted by degrees, minutes and seconds, the arc of elevation and the angle of elevation of a heavenly body are the same, and the two terms may be used in most cases indifferently. The straight line uniting the two extremities of an arc is called its chord. Equal arcs must come from circles of equal magni¬ tude, and each must contain the same number of degrees, minutes and seconds as the others. Similar arcs must also each have the same num¬ ber of degrees, minutes and seconds, but they belong to circles of unequal magnitude. Con¬ centric arcs are arcs having the same centre. In mathematical geography an arc of the earth's meridian, or a meridional arc, is an arc partly measured on the surface of the earth from north to south, partly calculated by trigo¬ nometry. By these measurements the earth was discovered to be an oblate spheroid.

ARC, Electric. See Electric Light.

ARC, Joan of. See Joan of Arc.

ARCA, a term applied to a genus of con- chiferous mollusks, the typical one of the fam¬ ily Arcadce. The shell is strongly ribbed or cancellated, hinge straight, with very numerous transverse teeth. They are universally distrib¬ uted, but are commonest in warm seas. They inhabit the zone from low water to 230 fathoms. The fossil species are found in the United States, Europe and southern India.

ARCADELT, Jacob, Flemish composer : d. Paris 1570 or 1575. The date of his birth is uncertain, but it was probably during the first quarter of the 16th century. His works are among the finest examples of contrapuntal music of the time He assisted in founding the classical Italian school of music. From 1539 to 1555 he was engaged as singer and teacher in the Papal Chapel at Rome. He composed madrigals, masses and motets. He entered the service of Cardinal Charles, Duke of Guise, in

1557, and accompanied the latter to Paris, where he died. Consult Ambros, (Geschichte der ' MusilP (Vol. II, Leipzig 1909) ; Burney,

Gen¬ eral History of Music* (Vol. Ill, London

1789).

ARCADIA. The <Arcadia) of Jacopo Sannazaro (1456-1530) is the most celebrated of the Italian pastoral romances of the Renais¬ sance. Composed between 1481 and 1486, it first appeared in a pirated edition at Venice in 1502, in an authorized print at Naples in 1504 (edited by Summonte), finally in the Aldine edition of Venice 1514. It is this text of Aldo Manuzio that. has formed the basis of the numberless more recent edi¬ tions of the work. A large . variety of considerations have tended to give the (Ar¬ cadia } a greater eminence in literary history than for intrinsic value it would seem to de¬ serve. It is the most considerable production of the Neapolitan school of literature in the 15th century, a group comprising Pietro Jacopo de Jennaro, Caritheo, Pietro Antonio Caracciolo and Giannantonio Petrucci. This school, aside from affirming the Petrarchistic trends in Italian poetry, is important as showing in dic¬ tion the curious linguistic hybridism that pre¬ ceded the constitution of the national Italian language on a classic basis (imitation of Dante, Petrarch and Boccaccio). The 'Arcadia, *in fact, has in its earlier forms a distinct Neapol¬ itan coloring. But in successive redactions, Sannazaro made it conform more and more to the language and style of the Tuscan Boccac¬ cio ; and the triumphant classic purism of the 16th century came to recognize the 'Arcadia* as one of the supreme models of linguistic cor¬ rectness and good taste. The Renaissance doc¬ trine of "imitation® likewise enthroned this romance of Sannazaro as the perfect model of the pastoral "genre,® especially as regards the eclogue. The imitation of the Arcadia,5 be¬ ginning with Serafino dall' Aquila, extends in Italy through Castiglione, Tasso, Guarini and lesser men down to the end of the 18th century. Castiglione himself seems to have introduced the 'Arcadia *to the Spanish court. Its popu¬ larity in Spain is attested by imitations by Garcilaso de la Vega, by Montemayor (Diana), by Cervantes (Galatea) and hosts of others. In France the <Arcadia) inspired the (Bergerie) of Remy Belleau and to some extent also the work of Ronsard. For England we have the (Shepherd's Kalendar* of Spenser and the (Ar¬ cadia,) no less, of Philip Sydney. To be sure, in all these epigones of Sannazaro's work, it is not always easy to separate the influence of the Arcadia5 from that of its own sources. Sannazaro composed it directly on the model of Boccaccio (e.g., 'Ameto*), utilizing also Virgil, Ovid, Theocritus, Bion and Moschus. The later pastorals, moreover, borrowed largely from the Spanish romance.

The ' Arcadia > tells the story of an idyllic, unhappy love, to which

legend assigns a bio¬ graphical value for the poet. Sincerus (Sanna¬ zaro) driven wandering by love, goes breathing the sighs of his melancholy spirit through the groves of Arcadia, inhabited by the most erudite, aesthetic and delicately sensualistic shepherds imaginable. Sincerus is warned by an evil dream that his “nymph® is in danger; he returns to his home, to find her dead.

Around this tenuous plot is arranged a whole gallery of word-paintings, brilliantly colored and elaborated in detail. The work is suffused with tints of quintessential delicacy; we meet there only the softest murmurs, the tenderest- emotions, the most fainting languors. There is a constant tickling of the senses with stimuli attenuated to the point of vanishing, but calcu¬ lated to arouse in souls properly (<sublimated® greatest intensity of emotional strain. Thus the <Arcadia) expresses the ideal of aesthetic refinement held up before the court society of Italy, and by the Italians passed on as the foundation of good manners to France and the rest of the world. However, such sublimity always totters on the brink of the ridiculous. There is a vein of possible humor underneath which alone can save such artificiality. The self-consciousness of this humor is the saving quality of Tasso’s pastoral art; the lack of it constitutes the prevailing defect of the ‘Ar- cadia) of Sannazaro.

Arthur Livingston,

Professor of Romance Languages, Western University, London, Ont.

ARCADIA. (The Countesse of Pem¬ broke’s Arcadia, * a long and elaborate romance by Sir Philip Sidney, was written during or before 1580, and sent in scraps of manuscript

by the author to the Countess, his sister. Its

five books, in prose, with “eclogues® in verse after each in the manner of Sannazaro’s (Ar¬ cadia,) told the story of a king who, to avoid the fulfilment of a threatening oracle, retired with his wife and two daughters to a lodge in the forest, but whose plan was frustrated

by the arrival of two princely heroes, so that

after many chivalrous and pastoral episodes all the virtuous were made happy. The con¬ tents — the travels, shipwrecks and hairbreadth escapes, the courtships, captivities, trials at law and harangues, the disguises and mistaken identities, deaths real and deaths feigned, re¬ bellions and tyrannicides, children lost and re¬ stored, in a word, the strange turns of love and fortune — were partly

Sidney's invention, but were chiefly derived from romances of chivalry (in particular the (Amadis of GauP) and from the Greek romances (in particular the GEthiopica *of Heliodorus and the 'Clitophon and Leucippe* of Achilles Tatius). The narrative was straightforward and easy to fol¬ low.

This original or "Old® <Arcadia) had cir¬ culated in manuscript for several years when Sidney began a revision, which he left unfin¬ ished at his death. He had, however, recast about half his old material, and cast a consid¬ erable quantity of new material with it into the elaborate and complex structure of Helio- do rus's '2Ethiopica,* which conceals the key of the narrative, overlays, interlaces and inter¬ rupts the main story with many episodes, and inverts the chronological order to conform to the antique epic convention in medias res. The first edition, 1590, quarto, consists of this new version only. The second edition, published by the Countess and her friends in 1592, con¬ sists, first, . of the new version as far as it goes, that is, to the middle of the third book; next, of a few words of transition; and, finally, of the remainder of the old third book and the whole of the old fourth and fifth books.

This patchwork is the current or standard ver¬ sion. The original (Arcadia > has never been printed, though several manuscript copies of it were found by Bertram Dobell, the London bookseller and scholar, in and after 1907.

As a romance of love and adventure the ˆrcadia' is still good reading, despite the riddle of its plot, which one soon ((gives up.® Its sweet, rhythmical style, full of Renaissance imitations of late Greek and Roman rhetoric, full of antitheses and conceits and lofty senti¬ ment and show-pieces of description and ora¬ tory, is one phase of the Italianate style of Elizabethan courtly literature.

The intrinsic merit of the (Arcadia) gave it deep literary influence. Elizabethan books allude often to both the old and the new ver¬ sions ; Greene and Lodge imitated its plot and structure in several prose romances ; Shake¬ speare borrowed from it the story of Kent in (King Lear) ; Beaumont and Fletcher derived from it the plot of (Cupid's Revenge) ; King Charles I adopted from it his prayer on the eve of execution. It was often reprinted in the 1 7th century, when also it reached France in translation, and helped in the elaborate con¬

struction of the French ((heroic romances.® It is the only work of Elizabethan fiction that continued to be popular throughout that cen¬ tury and into the 18th, where its influence — certain as regards Richardson — has yet to be fully worked out. Scott's (Ivanhoe) exhibits many borrowings. On the whole, the (Arcadia) probably brought into English fiction that sus¬ tained elaboration of structure which distin¬ guishes the novel from the short story and the picaresque tale. It is thus a literary proto¬ type. Editions: 1590 (quarto); facsimile re¬ print, ed., H. Oskar Sommer (London 1891) ; ed. Albert Feuillerat (Cambridge 1912) ; 1592 version often reprinted, recently ed., Ernest A. Baker (London and New York 1907). Con¬ sult Dobell, Bertram, (New Light on Sid¬ ney's Arcadia} (Quarterly Review, Vol. 211, pp. 74-100, July 1909) ; Wolff, Samuel L., (The Greek Romances in Elizabethan Prose Fic¬ tion > (Newr York 1912, pp. 262-366, 461-64).

Samuel L. Wolff,

Instructor in English, Extension Teaching, Columbia University.

ARCADIA, Fla., city and county-seat of De Soto County, 75 miles southeast of Tampa, on the Charlotte Harbor and Northern, the Sea¬ board Air Line and the Atlantic Coast Line railroads. The principal industries are cattle, orange and citrus fruit and vegetable farming, phosphate production, etc. It contains a city hall, county courthouse and two school build¬ ings, and has 15 miles of asphalt streets. The city's two banks and a trust company have re¬ sources aggregating $225,000. In 1917-18, dur¬ ing America's preparation for entering the European War, two aviation camps were lo¬ cated at Arcadia. Pop. (1920) 3,479.

ARCADIUS, the first Emperor of the East : b. 377 ; d. 408. He was son of the Em¬ peror Theodosius, on whose death in 395 the empire was divided, he obtaining the East and his brother Honorius the West. He proved unable to govern for himself and was a mere tool, first in the hands of Rufinus, then of the eunuch Eutropius, and then of his Queen, Eudoxist.

ARC DE TRIOMPHE DU CARROU¬ SEL, ark de tre'onf dii ka'roo'zel. See Arch, Memorial and Triumphal.

ARC DE TRIOMPHE DE L'ETOILE,

ark de tre'onf dii la'twal. See Arch, Memo¬ rial and Triumph.

ARC LAMP. See Electrical Terms.

ARCESILAUS, ar'ke-si'los, Greek phil¬ osopher: b. Pitane, Aeolis, 316 b.c. ; d. 241 b.c. He studied philosophy at Athens and was largely influenced by Crates and Crantor. At the latter's death he became the head of the Academic School. Arcesilaus denied the cer¬ tainty of intellectual and sensuous knowledge and recommended abstinence from all dog¬ matic judgments. In practice he held we must act on grounds of probability. He wrote noth¬ ing and confined his activities to expounding the Socratic method, yet he wielded a vast in¬ fluence on philosophic thought. He was noted for his clearness of thought, his w'it, facility of speech and amiable disposition and bearing both to his opponents and pupils. Consult Zel¬ ler, (Geschichte der griechischen Philosophy (Leipzig 1893).

ARCH, an architectural term denoting a structural form made up of a series of wedge- shaped stones or bricks so arranged over a door or window in an edifice for habitation, or between the piers of a bridge, as to support each other and to carry in addition the weight of the superstructure. These stones and bricks, of a truncated wedge shape, used in building arches, are called voussoirs. The side of an arch between the crown and the springer, or skewhack, is called its haunch or flank, and by old English writers of the 16th century, its hanse. The highest part of the arch is called its crown, or by the old English authors, the scheme or skeen, from the Italian scliiena, the back. The lowest voussoirs of an arch are called springers, or skewhacks, and the cen¬ tral one, the keystone. The under or concave side of the voussoirs is called the intrados, and the outer or convex one the extrados of the arch. A chord of the arch at its lower part is called its span, and a line drawn at right angles to this chord and extending upward to the under side of the keystone is called its rise. The impost of an arch is the portion of the pier or abutment whence the arch springs ; the thrust of the arch is its outward pressure against the abutments. The voussoirs are also called ring-stones. The spandrel is the part above the haunches, or, in a bridge, the part between the arch-ring and the roadway. If the height of the crown of an arch above the level of its impost be greater than half the span of the arch, the arch is said to be sur¬ mounted. If, on the contrary, it be less, the arch is said to be surbased. The curved arch was known to the Assyrians and the old Egyp¬ tians. Sir J. G. Wilkinson considers that it existed in brick in the reign of Amenophis I, about 1540 b.c., and in stone in the time of Psammetichus II, 600 b.c. The evidence is de¬ rived from the ruins of actual buildings, but paintings appear to carry the arch back to about 2020 b.c. There is no mention of the genuine arch in Scripture, the term "arches,® in Ezek. xl, 16, being a mistranslation. The round arch was brought into extensive use by the Romans and

prevailed, everywhere until

the 12th century a.d., when the arch pointed at the apex, and called in consequence the pointed arch — the one so frequently seen in Gothic architecture — appeared in Europe as its rival. The forms of both curved and pointed arches may be varied indefinitely. Of the former may be mentioned the horseshoe arch, a name which explains itself, and the foil arch, from Latin folium, a leaf, of which there are the trefoil, the cinquefoil and the multifoil varieties, so named from the plant-forms after which they are modeled. Other arches are the equilateral, in which the centres of the circles whose inter¬ section constitutes the pointed arch coincide with the angular points at the two sides of the base; the lancet, in which the centres of the circles fall beyond these points ; the drop arch, where they fall within the base ; and the seg¬ mental arch, the sides of which constitute seg¬ ments of circles containing less than 180 de¬ grees. Besides these there are several other varieties of arch distinguished by their respec¬ tive forms. The names applied to arches may be divided into several classes, as referring to geometric or familiar forms, style or position in the building. The following are different geometrical forms : The flat arch, with vous- soirs radiating from one centre. Arches with one centre are : semi-circular, segmental, horse¬ shoe. Arches with two centres are : the equilat¬ eral pointed arch, where the centres of the circles coincide with the angular points at the tw'o sides of the base; the drop arch, where they fall within the base ; the lancet, where they fall outside of it, and the pointed horse¬ shoe. The common three-centred arch is called basket-handled arch, this being the form generally used instead of an ellipse. Four- centred, six-centred and other similar forms are occasionally used. The names horseshoe, lancet, basket-handled, etc., are given because of their resemblance to familiar forms. Gothic, Roman and Moorish arches are names given because these forms were used in those archi¬ tectural styles. Certain names are given with reference to the position of the arch in the building, such as discharging or relieving arch, where the arch is placed over a lintel to carry pressure to the sides.

Examples of arches are the Cloaca Maxima, built about 641 b.c., with three concentric rings of voussoirs, inside diameter, 14 feet; the Pont du Card, built by Agrippa, 19 b.c., which has semi-circular arches, built of Pozzuolani concrete with stone or brick facing. The long¬ est masonry span in Europe is the railway bridge over the Pruth,

Jaremcze, Austria, 213 feet wide with a rise of 59 feet, and built in 1892. This shows hollow spandrels, which are constructionally and artistically correct. The Cabin John Bridge, near Washington, D. C., which carries an aqueduct and highway 220 feet. The Wheeling, W. Va., Main St. Bridge, built in 1892, 159 feet long, 28 feet rise, is de¬ ceptive, as spandrels are hollow, but appear to be solid. The great arch now built for the cathedral of Saint John the Divine, New York, is of masonry resting on the top of piers 86 feet high. The span is 114 feet from outside to outside of voussoirs. In 1896 was built the first large concrete arch in the United States, 40 feet span, seven feet rise, all of con¬ crete. This was for a highway bridge. There is also a 60-foot, arch of steel-concrete in

Franklin Bridge, Forest Park, Saint Louis, Mo. ((Concrete reinforced® is the name given to the combination of concrete with steel or iron in building. Steel-concrete, armored concrete, beton arme, ament arme, are various terms for such construction, now coming into frequent use.

The Melan arch system was developed by Prof. Joseph Melan, using stiff steel ribs or beams embedded in concrete to form the arch ring, following Austrian experiments. Exam¬ ples of Melan arch are found in Eden Park, Cincinnati, Ohio, 70 feet span; railway bridge over Southern Boulevard, Detroit, Mich. ; road bridges over the Passaic, Paterson, N. J. ; Kan¬ sas Avenue, Topeka, Kan., this being the longest, having five arches, one of 125 feet, two of 110 feet each, two of 97 feet each; Hyde- Park-on-Hudson for F. W. Vanderbilt, 75 feet span ; a foot bridge in park, Stockbridge, Mass., 100 feet span, rise 10 feet, only nine inches thick at crown ; three-hinged arch, Steyr, Hun¬ gary, span 137 feet, rise only nine feet, or one- fifteenth of span. The Monier method is concrete with wire netting embedded near the soffit. Arches of long span and slight rise in building construction are being made with the Guastavino system of cohesive construction, which is practically a revival of ancient and mediaeval building methods. See Arch, Memo¬ rial and Triumphal; Bridge; Buttress; Vault.

Frank D. Bourne, Architect, Boston, Mass.

ARCH, Memorial and Triumphal, a

monumental structure erected in honor of some prominent person or memorable event. In the custom of temporarily decorating the gates of cities with garlands and trophies, on the return of a victorious general, we can find the origin of the triumphal arch. These are similar in form whether commemorating a peaceful event or a military triumph. In

the time of the Roman republic temporary arches were erected in honor of triumphant generals. At that period also memorial arches or fornices, were erected in memory of some individual or to ornament a city, but it was not until the time of the empire that the triumphal arch, the arcus, came into use, to perpetuate the glory of a person who had obtained the honors of a triumph. Arches were often placed at the en¬ trances of cities, becoming in such a position merely monumental forms of city gate. The usual form of triumphal or memorial arch employed a high and imposing semi-circular arch as its central motive, resting on heavy piers, which were decorated generally with Corinthian columns and other architectural de¬ tails, statuary, and bas-reliefs. Above this was a heavy mass of stone-work or attic, on which was placed a suitable inscription. The arch of Titus, at Rome, is the most remarkable for its purity, the beauty of its sculpture and the har¬ mony of its proportions. It was probably erected by Domitian in honor of Titus to recall his conquest of Jerusalem. In panels on the inner sides of the piers are sculptured, on one side the triumphant Titus on his quadriga sur¬ rounded by soldiers; on the other side the tri¬ umphal procession, with, the spoils of the Temple, the sacred vessels and the seven- branched candlestick. At the foot of the Capi-

tol, at the side of the Forum, is the arch of Septimius Severus, erected in honor of this emperor and his two sons to commemorate their victories over the Parthians and the Arabians. It has small side arches reached by a few steps, and a large central arch. The most important arch in Rome is that to Constantine, which is similar to that of Septimius Severus. It was erected by the Senate and the Roman people in honor of Constantine. The arch of Trajan at Ancona was erected on a pier which serves as a base, and was a memorial of the completion of that port. It is said that an¬ other arch of Trajan at Benevento was erected to commemorate an extension of the Appian Way. In modern times the name ((triumphal arch" is given to a structure of wood or staff decorated with flags, banners and floral designs, as a part of some public celebration, or in honor of some person ; for example, the Dewey arch in New York. This is an outgrowth of the old Roman idea. Modern history has il¬ lustrations of many examples of this form of arch. Albert Diirer has made many engravings of the triumphal entry of the Emperor Maxi¬ milian, and of the arches erected in his honor. There are also illustrations of arches for Charles V at Boulogne; to Henry III at Lido, on his trip to Venice. Rubens made the de¬ signs for the triumphal arch for Ferdinand of Austria at Antwerp, and a large

arch was erected to Louis XIV at the Barriere du Trone. There are also triumphal arches in Paris : the Arc du Carrousel near the Louvre, built by Napoleon I, now destroyed; Porte Saint Denis, built by Louis XIV ; the large Arc de l'Ltoile, dedicated by Napoleon to his soldiers and sailors; and Porte Saint Martin (1674); in Berlin the Brandenburgerthor at the en¬ trance of the Thiergarten. In the United States there are arches of this character in Brooklyn, N. Y., and Hartford, Conn., and the Washington arch in New York.

Among celebrated arches of this character, mediaeval and modern, may be named the fol¬ lowing gateways: At Naples, the Arch of Al¬ fonso of Aragon (1470), and the Porta Capu- ana ; at Burgos, the Santa Maria ; at Mont¬ pellier, a 17th century memorial of the revoca¬ tion of the Edict of Nantes; at Milan, Della Pace; at Munich, Siegesthor (Victory Gate) (1850) ; and at London, the Marble Arch. See Arch ; Gateway.

Bibliography. — Bartoli, P. S., (Veteres Arcvs Avgvstorvm Trivmphis Insignes ex Re- liqviis qvae Romse adhvc Svpersvnt' 46 pis. (Rome 1824) ; Beauvais, C. T., (Monuments des victoires et conquetes des Frangais' (1822) ; Kinch, (L'Arc. de triomphe de Salonique) (1890); Knight, W., (The Arch of Titus and the Spoils of the Temple ' (1867) ; Normand; L. M., (Arc de triomphe des Tuileries erige en 1806, d'apres les dessins de MM. C. Percier et P. F. L. Fontaine) (1830) ; Piccioni, M.,

(Sculpture of the Arch of Constantine and Trajan's Column' Romae, n.d. ; Reina, J., de¬ scription of the Arch of Peace in MilaiP (Milan 1839); Reinach, S., (L'Arc de Titus' (1800); Reland, <De Spoliis Temple Hierosolymitani in Arcu Titans' ; Rossini, L., (Gli Archi Trion- fali, Onorarii e Funebri degli Antichi Romani Sparsi per Tutta Italia' (1836).

ARCH BRIDGES. See Bridge Con¬ struction, Modern Methods of.

ARCH OF CONSTANTINE, a triumphal

arch at the junction of the Via Sacra with the Via 1 riumphalis, Rome. It was erected in 315 a.d. in commemoration of Constantine's victory over Maxentius and is the best pre¬ served monument of ancient Rome, probably because it was built by a Christian emperor. The inscription on its face is interesting to Christians as revealing the Emperor's con¬ version from paganism. (See Arch, Memo¬ rial). Consult Platner, (The Topography and Monuments of Ancient Rome' (New York

1911).

ARCH OF SEPTIMIUS SEVERUS, a

well-preserved triumphal arch, erected 203 a.d., in the Forum, Rome, to commemorate the victories of Severus over the Parthians. The arch is 75 feet high and 82 feet broad. Above the outer arches are panels representing the campaigns of Severus; the pedestals of the columns show groups of prisoners taken dur¬ ing the war. The arch was used as a strong¬ hold in the Middle Ages and for a time in the 1 7 th century the side passages were turned into shops. See Arch, Memorial.

ARCH OF TITUS, a memorial arch at Rome on the Via Sacra, erected in 80 a.d. in honor of the conquest of Judaea. It is richly sculptured and shows reliefs of Titus in triumph, with the plunder of the temple at Jerusalem, including the seven-branched candle¬ stick and the table of showbread. In the Mid¬ dle Ages the fortifications of the Frangipani were built up about the arch, and when these were taken down in 1822, the arch was also taken down and rebuilt as fears were enter¬ tained for its safety. See Arch, Memorial.

ARCH OF TRAJAN. 1. A well-preserved memorial arch at Ancona, Italy. It was erected by the Roman Senate in 112 a.d. to commemorate the new harbor works erected by Trajan. It has a single archway 29 by 46 feet. 2. A white marble arch erected at Bene¬ vento, Italy, in 114 a.d. to commemorate the completion of a new road to Brundisium by Trajan. It is 50 feet in height and its reliefs portray Trajan’s victories over the Dacians. It is one of the best-preserved specimens of the Roman arch.

ARCHAEAN. See Archean.

ARCHAEAN, ar-ke'an, PERIOD, a term applied to the most ancient division of the geological time-scale. The rocks referred to this period underlie the oldest sedimentary and fossiliferous strata and hence are often called the fundamental complex. They are entirely of crystalline character, consisting of granite and basic eruptives, gneisses and schists, all of which bear evidence of having under¬ gone great disturbance and metamorphism, so that it is impossible to work out any order of stratagraphic succession that will apply to dif¬ ferent regions. Their great uniformity of com¬ position over wide areas, their marked charac¬ teristics which differentiate them from all other groups of rocks, and their basal position in the geological scale have led many geologists to believe that the Archaean rocks represent a portion of the original crust of the earth as it solidified from molten

magma. While this view has not found universal acceptance, it is quite certain that if the first solidification of

the earth is still preserved anywhere, it is present in this formation. The Archaean rocks are known to occur in all of the continents, al¬ though in some regions they have been brought to the surface only after long periods of erosion during which immense thicknesses of overlying strata were removed. In North America they cover much of the region be¬ tween the Arctic Ocean and the Great Lakes, and are also found in the Adirondacks, along the Appalachians and in the Rocky Mountains. They occur in many parts of Europe, especially in Scandinavia, France, Germany and Austria, in eastern Asia and in central Africa. See Geology.

ARCHAEOLOGICAL, ar-ke-6-loj'i-kal, INSTITUTE OF AMERICA, a society formed in 1879 for the purpose of promoting and directing archaeological investigation and research. Under its direction several import¬ ant excavations were conducted on the site of the ancient city of Assos. It publishes a bi¬ monthly Journal, which is its official organ. It has a membership of 1,050.

ARCHAEOLOGY, ar'ke-ol'o-ji ((<antiq- uity-study®), the history of antique human progress as inferred from relics of man's in¬ dustry or presence, apart from written records. It is thus identical with history where there are no such records, and supplementary mate¬ rial for it when they exist. It is distinguished from anthropology as concerned chiefly with industrial and artistic rather than social and political progress. But its limit neither of date nor of subject can be sharply fixed. The antiquities of a country are relative to its present and its records ; 400 years in Mexico brings us to pure archaeology, 2,000 in Greece and Rome is almost this side of it, all west- Asian history belongs to it. Even written records, if inscriptions on stone or brick, or papyri, are archaeological when pertaining to an extinct civilization ; if classical, they are history, epigraphy, or palaeography. Nor can we wholly dissociate the biological study of the bones found in a prehistoric camp, river drift or cave (palaeontology), from that of the flints, worked bones, drawings, etc., found with them, as evidences of mechanical and intellectual progress (archaeology), and the social organ¬ ism implied by the camps, food, ruddle, etc. (anthropology). The genesis of the science restricted the name at first to remains of classical art and architecture, still often re¬ garded as its most

important section, through its illumination of classic literature ; but gen¬ eral archaeology does not merely supplement a developed history; it reveals the ver}r existence of empires, nations, races, cultures, stages of human progress, otherwise unsuspected, and carries our knowledge far into the geological past.

The classical branch, whose material was relatively accessible and its bearing obvious, naturally originated first in the 18th century; general archaeology is the creation wholly of the 19th century and has two independent origins. On one side it springs from the de¬ cipherment of the Egyptian hieroglyphs, un¬ veiling a remote history implying a still more remote one and making scholars realize for the first time how futile were the distorted scraps of classical tradition. This was fol¬

lowed by excavations in Mesopotamia which uncovered the remains of the Assyrian cul¬ ture, and by the decipherment of the cuneiform characters. * Here it was first realized that archaeology is the one branch of history (for numismatics is a department of archaeology) that absolutely settles historical questions. A written statement may be a falsehood or mis¬ take, but an inscription is conclusive as to its date and writer. On the other side, archaeology springs from the examination of relics of an¬ tique man in burial mounds, kitchen middens, lake dwellings, caverns and river drifts, show¬ ing his coexistence with animals long extinct and in geologic ages long gone by. These two streams have gradually resulted in a vast storehouse of verified knowledge, not only un¬ suspected, but revolutionary of assertions pre¬ viously supposed axiomatic. Briefly, archaeol¬ ogy has shown that civilization is not a sudden mushroom growth of a few dozen centuries, from a single centre and a highly developed group, but a gradual evolution through enor¬ mous ages in all parts of the world, from that intermediate condition between apchood and manhood which wTe know must have existed, but of which no positively demonstrable evi¬ dence has been discovered. Savagery, as we know it, is a long step in advance.

In place of the convenient division into ((civilized, half-civilized, and barbarous,® we have many stages of culture, based on the knowledge of natural forces, the utilizing of natural products by art and the co-ordination of social groups, in combinations almost as endless as the notes of an organ, the same tribe being almost civilized on one side and wholly savage on another. The classification of these grades is somewhat different in archaeology and anthropology. The latter, in Lewis H. Mor¬ gan's system (which needs much qualification) marks seven stages : The first prior to the use of fire; the second marked by

the discovery of fire (fire can hardly be said to have been discovered by man, as it long preceded the dawn of humanity, and its availability for warmth, and subsequently for cooking, would come about naturally, i. e., without any effort of intellectuality on man's part), and of catching fish; the third by the bow and arrow (the significance of the bow and arrow in archaeol¬ ogy is not the same wherever this form of weapon was in use. It had an independent origin in each continental area, and whatever the starting point or prompting of the inventive faculty, the ultimate outcome would neces¬ sarily be the. same. If, as persistently claimed, North America received its quota of humanity from Asia, it is certain it was at a date so early that the bow had not anywhere been in¬ vented) ; the fourth by pottery; the fifth by the domestication of animals, or the use of ir¬ rigation, polished stone or bronze tools,, and the occurrence of adobe or stone architecture ; the sixth by the use of iron ; the seventh, or true civilization, by phonetic alphabets and written records. Archaeology, however, finds it con¬ venient to classify man wholly according to the material and construction of his imple¬ ments, these having in fact accompanied and determined with great accuracy a correspond¬ ing. set of changes in industrial arts and even social development. Accordingly it divides hu¬ man progress into the Eolithic (<(Stone-Dawn®)

the Palaeolithic or Old Stone, the Neolithic or New Stone, the Bronze and the Iron Ages; a portion of these being still further subdivided.

For vast epochs after the appearance of man upon the earth no record of his presence exists or can exist except a palaeontological one — his bones. He doubtless wrenched off tree branches and threw or hammered with stones, like the higher simians, but we cannot prove a broken branch or scratches on a stone to be artificial, or due to man rather than to orang. When, however, a stone is rubbed, or evidently bruised from repeated use, still more when a number of these are found near together, we know that something more than casual use by an animal has produced the result ; but it may mark only the utterly unrisen savage, who lives on nuts and fruits and sleeps under any casual tree or bank and has not thought of im¬ proving on nature.

The distinction must be kept in mind, how¬ ever, between an implement and an artifact and the former is even more durable than any skeleton or part thereof ; but no amount of use of a pebble as a

hammer can distinguish its abraded surface from that of one in use by the latest aborigines. This is peculiarly true of quartzite pebbles, that seem to take on no ap¬ preciable patinations, that sure guide to the antiquity or lack of it, of an artifact. The first identifiable stage of real culture is :

The Eolithic Age. — This probably began (probably elsewhere also) in Kent, England, where loose flints lay about or might be easily dug from the chalk. These were very roughly hammered into an edge that would bruise off a stick or into a grip for the hand ; so roughly, indeed, that their having received deliberate art at all was long bitterly contested. They are found in river deposits on the top of hills 600 feet above the present stream-beds, which must therefore have been excavated since. Even in this remote antiquity man was no new organism on the earth, and this stage of cul¬ ture, from the excessive slowness of progress in the early stages, must have lasted for a long period.

The eolithic implement will always be a sub¬ ject for dispute, because so like in every char¬ acteristic the unfinished implement of a more specialized type. Wherever the unmistakable polarlithic artifact is found, there will also be a still cruder object, yet distinctly artificial, wdiich comes within the classification of (<eo- lith.ˆ It may or may not be, under such cir¬ cumstances, but such objects tell quite another story when they are found in deposits of gravel older than the latest glacial drift, and unassociated with any other trace of. man's handiwork. This occurs in North America and serves the double purpose of establishing the geological antiquity of man on this continent and demonstrating the fact of an eolithic culture in Europe and presumably in Asia and Africa.

The Palaeolithic Age succeeded ; the former till recently was reckoned a part of it. It is now further divided into two chief periods, from the anthropological differences implied, those of the river gravels and of the cave- dwellers ; and the latter again into three others, with well-marked stages of culture. More spe¬ cifically :

1. River gravels up to 200 feet above pres¬ ent beds (ˆAchuleen®). The remains are mas¬

sive flints scarcely less rude than the former, but unmistakably worked. They still antedate any permanent dwelling or shelter.

1. Cave-dwellers. Man now has a perma¬ nent though not artificial dwelling, and the germ of tamily life is born, (a) (<Mouste-

rien® : Flint flakes split off (the first true ar¬ tificial tool), and massive flints hammered into definite shapes, with others rude like the for¬ mer. (b) ˆSolutrien® : Flints carefully worked and finely shaped, (c) ˆMagdalenien® : Well¬ shaped flint tools, plentiful bone-working with them, and drawings on implements and the walls of caves.

All these remains have been found, along with fossils of the mammoth, cave-bear, cave- lion, sabre-toothed tiger and other extinct forms, in ancient river deposits, deep under stalagmitic accumulations in caves, beneath American lava-beds, etc. The age assigned to these deposits by geologists is from 100,000 to 300,000 years. Another clue of the same sig¬ nificance is the circumstance that in Egypt flints are found together, of which the latest, neolithic, were dug and worked fully 7,000 years ago, and are tinged only a faint brown, while others, palaeolithic, have turned nearly black. The most conservative estimate is 100,- 000 B.c. for the beginning of the eolithic pe¬ riod ; the palaeolithic had not ended yet, but in the advanced regions it began to be dis¬ placed by the neolithic perhaps 10,000 b.c. Roughly speaking, the Old Stone periods cover a space 10 times as long as all those since put together, the latter succeeding each other with relative swiftness, as progress accelerates by its own development. In some respects the 19th century has shown more advance than all the previous half-million years of man's exist¬ ence. The rate of progress has depended greatly also on the natural advantages offered : the flint mines of the English chalk hills with the early savage perhaps corresponded to the coal and iron mines of the present, producing rapid advance in skill and also competition of tribes, the stronger expelling the weaker from the coveted districts. On the other hand, the lack of domesticable animals in America had much to do with its slight progress under barbarism.

The occurrence of a Palceolithic Age in North America gave rise, when first suggested, to intemperate opposition and as this was based on ignorance, the illogical position was more amusing than convincing; but the evidence of a geological antiquity steadily accumulated un¬ til now the existence of man in North America in what is accepted as the palaeolithic culture is a commonplace in the world's range of knowledge.

What is included in the term Palceolithic is still a subject of debate. The name, as origi¬ nally applied by Lubbock (Lord Avebury) to the large almond-shaped artifacts of ancient gravel deposits, has been extended until it in¬ cludes more specialized forms of artifacts and, as a whole, indicates that man at that time and under those conditions

was not as bestial as some groups of man, not yet, or but recently, extinct.

Our knowledge of man's career on earth, ah initio, is too fragmentary to speak in posi¬ tive terms as to the progress any group made before its disappearance, for there is no in¬ stance of a people continuing from late tertiary

time to the present in any one locality. Oc¬ cupation, abandonment and reoccupation was the rule, and hence it follows that no worked instance has been brought to light of a strictly palaeolithic people gradually becoming neo¬ lithic in culture. The more specialized status replaced the less advanced, and two peoples, not one, appear in the change. That the North American Indian emerged from a palaeolithic to a neolithic stage is a natural inference, as we have no geological conditions as in Europe to guide us in determining relative antiquity of this or that area and its artifacts, but so dis¬ tinct are the conditions that separate one de¬ posit of sand, gravel and clay from another, and so characteristic are the artifacts of those different deposits, it is logical to assume that one period of occupation ceased before a suc¬ ceeding one began. Were we dealing with stratified rock, there would be no confusion; no question could arise, and the determination of actual conditions could, in the case of sands, be accomplished by excavations on so great a scale that demonstration could be had by virtue of numbers of artifacts found and circumstance of occurrence recorded. This has now been done and not only has the antiquity of man in North America been fully established, but the incoming and vanishing of one or more peo¬ ples occurred prior to the final possessing of the land by the historic Indian.

The Neolithic Age is the evident begin¬ ning of modern life, made possible by improved working tools. The remains of this period are not buried under geologic deposits, but lie on or near the surface. Recent finds in Florida of apparently neolithic culture have occurred at such depth and under such geological con¬ ditions as to indicate a greater antiquity of Neolithic Man in North America than had been held. They are no longer merely ham¬ mered or chipped, but rubbed or ground to shape, giving a sharper edge and a smoother surface. There is a gradual advance in the best specimens to weapons and tools almost equal to metal, such as lance heads, arrow heads, knives, daggers, awls, chisels and axes of razor-like sharpness and needle

points, serv¬ iceable for and accompanied by highly devel¬ oped arts and manufactures, agriculture and navigation, of remarkable magnitude and va¬ riety. As timber could now be easily cut, men built large wooden dwellings and rowing gal¬ leys. Early in the period we find immense earthworks both for defense and for burial ; later, in the cities, brick architecture and fine engineering. The lake dwellings of central Eu¬ rope and England belong to this period, and, being^ built on piles over the water, combined security against wild beast and animals with easy fishing, a fashion that spread widely and no doubt rapidly: indeed, some of them with their neolithic inhabitants lasted into historic times. From these discoveries it is evident that man not only hunted and fished, but raised grain, vines, fruit and flax, breeding domestic animals to draw the plow, another immense gain to agriculture; spun and wove; made pot¬ tery, and not only ornamented that but his tools as well, shaping them for beauty as well as use, thus showing development of aesthetic taste. Still more important was the social de¬ velopment. The large camps indicate a settled tribal society, the careful selection of material

from considerable depths indicates combined labor in mining.

Between this and the Bronze Age there ex¬ isted in some countries what is called by some archaeologists a Copper Age, where native cop¬ per was hardened with oxide of arsenic ; but as it did not drive out flint tools, but only supple¬ mented them, it is hardly entitled to be called an epoch, and is not accompanied by any iden¬ tifiable advance in general progress consequent upon it, like the others.

This is peculiarly true of North America, where copper was used extensively and fash¬ ioned not only into useful but ornamental shapes, but it always supplemented and never replaced the use of elaborately chipped and polished stone artifacts. It is known almost to a certainty that the Indians were well sup¬ plied with copper at the time of initial Euro¬ pean contact, and some of it appears to have been mistaken for gold by the avaricious col¬ onists. As metal, it was of use to the Euro¬ peans and collected wherever possible for con¬ version into vessels for culinary use. In this way was lost a vast amount of valuable eth¬ nological material, which, had it been pre¬ served, would have thrown much light on the status of the aborigine at that time.

The Bronze Age, however, was an enor¬ mous step forward. It was earlier in Assyria than Egypt, probably from the Armenian cop¬ per: the former introduced it by 5000 b.c. ; the latter not fully till about 3000, and did not use jt freely till 1600, only 500 years or so before

iron displaced it. And in all countries stone implements were still used in sacrifices to the gods, who did not like new inventions. The hardness of the alloy of copper and tin seems to have been realized before its toughness and the many advantages given by ability to cast it; hence at first the stone tools and imple¬ ments were simply copied in massive bronze, and were needlessly heavy and limited in pat¬ tern. But as its properties became evident the tools were much lightened, and made thin yet stiff with embossed patterns, and various kinds invented which could not have been made in stone, as the sickle gouge, etc. The axe, or celt, was first made as a plain bronze wedge fastened by a thong, as with stone; then cast with a socket for the helve, an extraordinary gain in efficiency. There were light cups and kettles, knives and chisels, spear- and arrow¬ heads, swords and daggers and bronze-bound shields and a mass of personal fastenings and adornments. Some of these were impossible in stone, as buttons, buckles and pins, necklets, bracelets, rings and earrings. A priceless col- lection. of these objects was found at Bologna, Italy, in the shape of the abandoned stock of an ancient bronze founder. The industrial ad¬ vantage of this newly found hardness, tough¬ ness and variety developed industries arid trade immensely; it also made possible for the first time true stone architecture and engineering of hewn and dressed stone. No small branch of business in stoneless Egypt was the quarrying and transportation of stone for the public works from the southern rockier regions.

Megolithic ˆ remains, wherever they occur, have always given rise to much speculation as to age and origin. If our present actual knowl¬ edge of such antiquities jn Europe and Asia lays bare the secret of their origin and approx-

imate date of construction, the same cannot be said of somewhat similar structures in North, Central and South America. Led by resem¬ blances, real or fancied, these examples in American forests of masonry on a gigantic scale have been held to demonstrate the ˆinfluence® of that people of another continent, whose work ˆappears® to have been the model for the American structure.

This is scarcely logical. Close resemblance may be accidental and the same thought may arise in minds that have no knowledge of the existence of another people than themselves. A rock-shelter or a limestone cavern may read¬ ily suggest an artificial shelter of stone

and once this thought arises, the steps toward elab¬ orate, artistic and we may add scientifically constructed buildings would inevitably follow. The engineering difficulties would be solved, if not everywhere in the same, always in a simi¬ lar way, and no borrowing of ideas is called for.

As it cannot be shown that the climatic or physical conditions in the Americas was ever such that local advance was impossible among its native races, the ˆinfluence® or actual pres¬ ence of a foreign people is not called for to make plain the peopling of these continents, and the checkered careers of its various na¬ tions, races, tribes or whatsoever designation may be preferred in distinguishing them.

The Iron Age is the present (though the 19th century developed what is really a distinct era, the Steel Age, making possible many ad¬ vances beyond those of iron), and the most of its course belongs to history. It originated from about 1200 to 1000 b.c. — that strange period, in seeming the blackest in the calendar of the ancient world, when the old civilization of Mesopotamia had collapsed under the Se¬ mitic invaders, Egypt had sunk into decay, and barbarism seemed to have reasserted its reign over both the Eastern and Western world, yet in which lies the birth of perhaps the three greatest factors of human progress in historic times — the use of iron, the alphabet, and the Hebrew nation. The first is thought to have sprung from Armenia; regarding the second, the Phoenician origin is still valid; the third is a mysterious gift of Arabia.

Babylonia and Assyria. — The civilization of the Mesopotamian plain is not only the old¬ est in the world so far as known, but the first (unless with the possible exception of Egypt) where men settled in great city communities under an orderly government with a developed religion, practising agriculture by irrigation, erecting adobe buildings and using a syllabified writing. All modern Western civilization is its direct descendant through Greek and Ro¬ man periods, so that in studying it we are studying our own ultimate intellectual and even religious pedigree. Its astronomers gave us the division of the year into months, weeks . and days, the signs of the zodiac, the constellations, the division of the circle into degrees; its art was the foundation on which Greek and Etrus¬ can art was built; its religious names, forms and traditions are a deep element in the He¬ brew, as in its cosmogony and mythology and such forms as the Psalms, and hence enter into Christian thought. Nor are we the only bene¬ ficiaries. For some 6,000 years the. cuneiform was the business and literary script of the whole civilized world, the one method of writ¬

ing from the western Mediterranean to India, and probably the origin even of the Chinese, as Mesopotamian civilization was the parent of Chinese civilization.

The physical difficulties and dangers of ex¬ ploration in this district (once a garden and turned into a desert by Turkish misgovernment, a region without supplies or administrative or¬ der, and infested by hordes of dangerous Bedouins), as well as the difficulty of obtaining justice or possession of one's goods from the Turkish authorities after finding them, have kept it far behind that of Egypt in thorough¬ ness ; but the results have been not less splendid in additions to our knowledge of the past. The earliest studies — those of J. B. Rich, Indian Consul-General at Bagdad, in 1818-20, who col¬ lected sculptures and outlined Assyrian art ; the excavations by the French consul, Botta, at Khorsabad in 1843, of Nimrud and Nineveh by Layard in 1845-51, and Hormuzd Rassam in 1854 — were of relatively modern Assyrian sites. The first entrance on the ancient Baby¬ lonian civilization was made at Erech (1849- 52) by Loftus; a further one by Sarzac in the important Tello excavations of 1876-81 ; but by far the most important was by the Americans, Peters and Haynes, with Hilprecht, at Nippur from 1889 down. This was prob¬ ably the first city foundation in the world, dating from about 7000 b.c., then a seaport and now 120 miles inland; and the great temple library has poured floods of light on the politi¬ cal and social condition of this mother-land of modern culture. Next to this, our greatest source of information — for Babylonian history almost the whole — has been the library of Nabonidus, the last king, at Babylon. The whole fabric of Assyrian chronology rests on his statement that Naram-Sin, the son of Sar- gon, lived 3,200 years before his time — a sus¬ picious number, the dubiousness of which leaves half that chronology a thousand years or so doubtful. But the subject was practically sealed till the decipherment of the inscriptions gave the key; and this was immensely compli¬ cated by the fact that the cuneiform character, like the modern alphabet, did not imply any given language, but was used for all the tongues of the then civilization. The first step was taken in 1800 by Grotefend, who identified Persian names and then applied the characters to other names, till he made out several Per¬ sian inscriptions, while Bournouf (1836) and Lassen (1836-44) worked out the rest of the Persian alphabet. But this was only a small part of the enormous Assyrian syllabary of 600 signs. The task was finally accomplished by Sir Henry Rawlinson by means of the great trilingual Behistun (q.v.) inscription, in Assy¬ rian, Median, or Vannic, and Persian; his knowledge of old Persian gained from Zend and Sanskrit enabled him to identify the

Per¬ sian words in Assyrian character, and thus re¬ solve the vast Assyrian syllabary. This has given the clue in turn to the other languages written in the cuneiform : the old Sumerian, Median, etc.

The general results are as follows : The earliest inscriptions show us a mixed people speaking two languages : one certainly Semitic, the other an archaic Semitic or Aryan (the Ural-Altaic affinity is now discredited). The non-Semitic element known as Sumerian

((< river-men® ?) is believed to be Aryan, re¬ lated to the Caucasian tribes, and to be the original settlers of the valley. Into this valley came, somewhere between 10,000 and 8000 b.c., a Semitic invasion (Accadians = ((highland- ersw?) from the upper Euphrates-Tigris val¬ leys, and by 5000 b.c. had developed, through the mixture of two powerful stocks, the won¬ derful civilization we know. The beginnings were in the Neolithic Age, but by 7000 b.c. the people were already organized into nations, and built fortified towns, the centre and heart of each being the temple of the local god, raised on immense piles of brickwork. They had finely colored and ornamented pottery, made with the potter's wheel. The principle of the arch was known as early as 5000 b.c. ; the archi¬ tecture was careful and related to the nature of material ; drainage systems were constructed to prevent soaking into the adobe. Several important centres existed by about 7000 b.c., including Nippur, Ur, Eridu and probably Erech. When we first find inscriptions, per¬ haps about 4000 b.c., there had already been evolved from the old picture-writing a system of conventionalized line-symbols, some pure pictographs, some ideographs, some syllables ; and while at first the writing was entirely vo¬ tive or commemorative, and stone used as the material with straight lines, it was soon ap¬ plied to business and record, the ever-present clay utilized and the lines assumed the fa¬ miliar wedge or cuneiform shape. Sculpture and the engraving of gems and gold were al¬ ready at a high level shortly after 4000.

The history will be found under Assyria and Babylonia. The great landmarks are the reign of Sargon, the Charlemagne of the an¬ cient world, who founded a huge west-Asiatic (<empirew from north Arabia to Armenia and west to the Mediterranean ; the second great Semitic invasion from Arabia about 2500 b.c., overrunning south Babylonia, and the Elamite invasion from the Karun valley in Persia about 2300 b.c., subjugating the remainder; the expulsion of the

Elamites about 2250 by Ham¬ murabi UAmraphel®), and the founding of Babylon, which became for 17 centuries the Rome of the Asiatic world, the political and religious centre at once; the first emergence of Assyria, on the Accadian highlands, about 1800; the Kassite invasion from the Persian highlands 1782 b.c., founding a dynasty which ruled Babylonia till 1207 ; their expulsion ; the great double invasion of Semites from the south and Aryans from the north, which broke up the Hittite empire and overwhelmed Baby¬ lonia and Assyria in a common wreck; the collapse of the Old World civilization ; the re- emergence of Assyria and its domination over Babylonia, from about 900; its eclipse by the growth of Armenia in the 8th century; its new and enormous power under Tiglath-Pileser II, who annexes Babylonia; the destruction of Babylonia by Sennacherib, 689 b.c., and its re¬ building by his son Esarhaddon; the rebirth of Babylonia under Nabopolassar, the Chaldaean, who extinguished Assyria, 610 or 609 b.c., and, after a short, brilliant career, the end of the Babylonian-Assyrian power forever through its conquest by Cyrus. The relation of the As¬ syrian power to the Babylonian was much like that of Rome to Greece ; though on a lower scale, for the Assyrians, though great warriors,

had none of the organizing and assimilating power of Rome. Assyria copied laboriously, and on the whole clumsily, the literature and art of its intellectual masters, and produced no literature proper of its own. But its libraries, copied from the Babylonian tablets with minute textual and critical accuracy, give it an im¬ perishable claim to our gratitude.

Egypt. — The archaeological history of pre¬ historic civilizations was studied in Egypt ear¬ lier, and has been studied there more fully, than elsewhere, from the accessibility of relics and safety of work, the involution of Egyptian pol¬ itics and history with records in a classic lan¬ guage through the existence of an Egyptian state under classic rulers, and the survival of a descendant of the Egyptian language to our own day. It was the latter which furnished the key to the decipherment of the hiero¬ glyphic records. The Rosetta Stone (q.v.), discovered by the French in 1799, bearing a proclamation in hieroglyphic, demotic and Greek, invited a textual comparison. An Eng¬ lishman, Young, devised a correct principle, but had neither knowledge nor interest to apply it in full ; Sir William Gell utilized his knowl¬ edge of Coptic, and identified three-fourths of the signs; Champollion, the Frenchman, was a thorough Coptic student, and in 1821-32 worked out the entire system for use. This first made it possible to rescue Egyptian history in pre¬ classic times from the fog of distorted Greek legends, scraps of priestly record and misap¬ plied

Biblical comparisons, while the excava¬ tions at Thebes in 1820-30 opened up the Ramesside and neighboring periods 1500-1000 b.c. Later, Lepsius and Mariette were fore¬ most in revealing the period of the Pyramid- Builders, carrying us back to far past 3000 b.c. ; and still later Dr. Flinders Petrie has not only turned the First Dynasty and others still farther back, from myth into solid history, but has recreated the prehistoric world prior to the organization of the monarchy, about 4800 b.c., with a surety as great as that of written rec¬ ord. In the historic periods, the total lack of any chronological sense in the Egyptians, who in this respect were very different from the Assyrians, and the catastrophe of the Hyksos invasion, make its history in large portions less clear than the Babylonian ; but we know its general outline at worst, and the synchronism and variations of arts and industries often sup¬ ply the lack of dated chronology.

The oldest inhabitants of upper Egypt known were of the same race as the Algerian Kabyles of to-day — a white-skinned, blond, blue-eyed, narrow-headed race, with a negro strain, allied to the south European races. They had acquired by 5000 b.c. the highest grade of Neolithic civilization ever reached in the world, so far as evidenced by tools and implements — ■ the finish of the flint-knives and lances being incomparable — and were using copper ones also. They built brick towns and carried on an active Mediterranean commerce in large rowed galleys ; they made leather and woven linen clothes, beautiful and varied pottery with¬ out the wheel, perfect vases of the hardest stone without the lathe, applied colored glazes even to great rock carvings, manufactured or¬ naments of precious stones, metals and ivory, ivory spoons and combs, games, etc. Their art, however, was very crude, and they had no

system of writing whatever, though using marks. About 5000 b.c. a much more developed race invaded Egypt — probably from Arabia, whence the Hyksos and the Hebrews and the other Semites came : a race which used metals more freely, had a system of writing, a better government organization and higher artistic taste. Here, as in Assyria, the blending of two able but diverse strains made the great Egyp¬ tian type and civilization of the Old Kingdom which we know from their monuments and achievements. They were a grand people in every way : active warriors and administrators, firm in policy, fine mechanicians, adepts in or¬ ganizing combined labor ; strong artists, with lofty conceptions; withal a sensitive, kindly, sympathetic folk, with the least strain of fero¬ cious savagery of any great people in history. This long era has left us the pyramids and magnificent monumental tombs, masses of grand and accurate architecture and noble sculpture. This great age could not last for¬ ever, and for some centuries after about 2500 b.c. it was in decline, to revive only less bril¬ liantly in the 12th dynasty about 2000 b.c., con¬ sidered by Egyptian writers their Golden Age of art and literature. The tremendous catas¬ trophe of the Hyksos invasion, already men¬ tioned, took place probably about 1780 b.c., and the <(Shepherd Kings** remained till about 1600. Their final expulsion opened a new and bril¬ liant era, of expansion into and domination over west Asia, of the closest relations with the Mediterranean countries, of a general spread of luxury through the people. Egypt for the first time threw off its exclusion and became part of the current of the world's progress. In this period (about 1600-1200) we find, near the beginning, the great Thothmes III, whose exploits were exaggerated into the Sesostris of Greek tradition ; near the end the rather braggart King Rameses II, commonly identified with Joseph's Pharaoh, and his son Meneptah, often accredited as the Pharaoh of the Exodus. But the empire had the doom of all states which live on the tribute of foreign districts : the outside revenue stopped, the hab¬ its of luxury remained and the nation declined. In the thousand years to follow before.it was absorbed in Rome, it had much prosperity and some periods of brief glory, but the vital spirit had gone.

Syria. — While the work of the Palestine Exploration Fund, from 1866 onward, has thor¬ oughly mapped out the surface of the country, relatively little has been done in excavation here or in Turkey; for political reasons (as before noted) mainly, as the interest in Bibli¬ cal sites and classical remains is the keenest of all. The chief part thus far has been at Jeru¬ salem and the Philistine cities, and in the north at

Zinjirli; but few inscriptions have been found even where the excavation has been done, and no very ancient ones. The most important historically is that of Mesha, King of Moab (? 896 b.c.). It would seem that by the time the Jewish nation was advanced enough to make inscriptions, its intellectual ac¬ tivity was drawn off in other directions, and the hope of finding masses of archaeological confirmation of or supplement to Biblical rec¬ ords has been disappointed. The chief histori¬ cal result of Syrian research has been to re¬ store the Hittites (q.v.) to history: formerly

regarded as a Canaanitish tribe, they are now known to have been a powerful people from Cappadocia, which formed for a couple of centuries a strong state ruling north Syria and much of Asia Minor, with its centre at Carchemish, till broken up by the great south¬ ward Aryan movement of which the Dorian in¬ vasion was a part. Its writing is almost unde¬ ciphered. Curiously enough, the most import¬ ant documents for ancient Syrian history have been found not in Syria, but in Egypt — the Tel-el-Amarna tablets, containing a 15th cen¬ tury correspondence with Egypt in cuneiform.

Classical Archaeology. — Till the very re¬ cent excavations at Troy, Mycense, etc., result¬ ing from enthusiasm for the Homeric poems, archaeological research in the classic lands was mostly confined to illustrating historical pe¬ riods, and to a study of Greek and Roman art and architecture ; even now the light on pre¬ historic times is not from written records and inscriptions as in the East, but inferential from material objects. It has, however, in confirma¬ tion of Egyptian and other records, and by comparison of objects with those of known date in that country and Babylonia, given un¬ mistakable proof of a hitherto unsuspected stratum of old Greek history. From foreign pottery found in Egypt, 5000-3000 b.c., Greece and Italy probably had a Neolithic pottery¬ making population at those times. But the first positive beginning of civilized settlement is in the lowest Troy, dating certainly before 2000 b.c., and perhaps 3000; almost no metal is found there. Still before 2000 is another Troy with fine vases and golden ornaments. This was contemporary with the supremacy of Crete, then the mistress of the seas, as the Etruscans and Phoenicians were later; and there was a direct connection between Crete and Troy. The legends of the great law-making Cretan kings and their suzerainty over Greece and exactions of tribute from it are doubtless based on fact; even the Labyrinth has been uncovered, and a nucleus of fact in much of the old Greek leg¬ endary lore made probable. Three times after this was Troy abandoned and rebuilt before the contemporary of the Mycenaean kingdom of about 1500 b.c. is reached. At this time the coasts of Greece and the AEgean islands were the seat of a high

culture radiating in all direc¬ tions, and even influencing the East, so that this has been styled the <(AEgean Period** of civiliza¬ tion. There was a powerful and wealthy king¬ dom with its centre at Mycenae, where we find magnificent domed tombs, fine jewelry and metal work, exquisite pottery and ornaments, etc., as also at other great towns marked by hill fortresses, Athens, Tiryns and other places. This rich and prosperous land traded with all the Mediterranean countries, but chiefly with Egypt, in whose ruins are found hosts of Greek objects of this period. By 1100 b.c. this civiliza¬ tion had begun to droop, and about 1000 the in¬ vasion of the barbarous Dorians from the north temporarily overwhelmed it on the mainland. But it was only for a time : even where the Dorians had conquered, the union of old and new flowered into richer bloom, and Athens, the chief city which they had not conquered, became the head and heart of a far more splen¬ did revival of every art and literature, the fore¬ most in the world to the present time. By the 7th century the immortals had begun to spring

up : Archilochus and Sappho were islanders, and the great time of Athens had not yet come, but the thronging masters show that society had become fairly settled once more.

The development of civilization was very much later in Italy than in Greece, and more slowly affected by outside civilizations except on the southern coast. The Neolithic Age, with black pottery and lake dwellings, lasted down to nearly or quite 1000 b.c., the full development of the Bronze Age not taking place till about 800. The Etruscan invasion, which tradition brings from Asia Minor, cannot be dated, but was probably later than 1000 b.c. The art and religion of the Etruscans were entirely foreign, indicating rather a Northern than an Eastern origin ; but they were not an original people, and borrowed elements of civilization and art from every nation they came in contact with, — Italians, Greeks, Egyptians and Assyrians. In this assimilativeness they remind one of the Northmen, and the tradition of their origin may be wholly wrong. The one great specialty of the Etruscans was engineering. Their history and affiliations remain a mystery chiefly because their language is such. Known since historic times, and in the last century thousands of in¬ scriptions in it copied, and even many words translated for us, the language remains an ab¬ solute secret to the laborious and penetrating scholarship directed on it.

Bibliography. — Berard, V., (Les Pheni- ceans et l'Odyssee5 (Paris 1902-03) ; Baumeis- ter's articles <(Kyklopenban,55 (<Mykenai,55 <(Teryns55 (in (Denkmaler des klassichen Alter- thums5, Munich 1884-88) ; Baumgarten et al., (Die hellenische Kultur) (Leipzig 1905) ; Cauer, P., (Grundfragen der Homerkritik) (Leipzig 1895) ; Collignon, M., (La peinture prehellenique en Crete) (in Gazette des Beaux- Arts, July 1909) ; Dorpfeld, ˆroja und Ilion) (Athens 1902) ; Dussand, R., Questions myceniennes5 (Paris 1905) ; id., (Les civilizations prehellen- iques dans le basin de la mer Egee (ib. 1910) ; Evans, A. J., (Essai de classification des ep- oques de la civilisation Minoenne) ; id., (My¬ cenaean Tree and Pillar Cult) (London 1901) ; id., Prehistoric Tombs of Knossos) (ib. 1906) ; Fick, A., (Vorgriechische Ortenamen) (Got¬ tingen 1905) ; Fimmen, D., (Zeit und Dauer der kretisch-mykenischen Kultur) (Leipzig 1909) ; Fyfe, D. F., (Plaster Decoration of Knossos5 (in Journal of the Institute of British Archi¬ tects, December 1902) ; Harrison, J. E., (The Religion of Ancient Greece5 (London 1905) ; Lang, A., (Homer and His Age5 (ib. 1906) ; La Grange, (La Crete ancienne5 (Paris 1908) ; Milchhofer, (Anfange der Kunst in Griechen- land5 (Leipzig 1883) ; Mitchell, (History of Ancient Sculpture5 (New York 1883) ; Michaelis, A., (Die archaeologischen Entdeck- ungen des neunzehnten Jahrhunderts5 (1909) ; Mosso, A., (Escursioni nel Mediterraneo e gli scavi di Creta5 (1907) ; id., (Le origine della Civilta Mediterranea5 (1910) Noack, (Homer- ische Palaeste5 (Leipzig 1903) ; Perrot and Chipiez, (Histoire de l'art dans l'antiquite5 (Paris 1894) ; Poulsen, (Die Dipylon Graber und die Dipylonvasen5 (Leipzig 1905) ; Ridge¬ way, (The Early Age of Greece5 (Cambridge 1901) ; Seager, R. B., (Excavations on the Island of Mochlos, Crete in 19085 (1909) ;

Walters, H. B., (Art of the Greeks5 (London 1906) ; Middleton, (The Engraved Gems of

Classical Times5 (Cambridge 1891); Hartwig, (Griechische Meisterschalen5 (Stuttgart and Berlin 1893) ; King, E. S., (Roman Sculpture5 (New York 1907) ; Walters, H. B., (Art of the Romans5 (ib. 1911) ; Wickoff, (Roman Art5 (ib. 1900) ; Cobern, Camden M., (The New Archaeological Discoveries5 (1916).

Revised by Charles Conrad Abbott.

ARCHEOLOGY, American. America's place in the world's history has been an abun¬ dant source of discussion among geologists and archaeologists and there existed until recently a wide range of opinion, particularly concern¬ ing the antiquity of man on this continent. There is uniformity of opinion as to the occur¬ ence in

definite superficial strata of traces of man's handiwork, but the geological history of these strata has been variously considered. It is now generally concluded, however, that they are the products of the concluding activi¬ ties of various Glacial Epochs, material laid down by floods caused by the melting of the glaciers that filled the valleys and not improb¬ ably accompanied by rainfall far in excess of any in post-glacial times.

As yet the evidences of man's antiquity may be summed up in the discoveries made in the valley of the Delaware River (1872-1902) on the Atlantic slope and the shell-heap discov¬ eries (Dali) on the Pacific slope. In the in¬ terior of the continent there have been many reported discoveries of evidences of equal an¬ tiquity, but so generally were they held to be open to possible errors of observation, due to lack of the skill required in such investigations, that their acceptance has not been general, but their claim is now more and more seen to be valid, in view of similar discoveries elsewhere, where no possible error of observation could occur. This is true even of the much-discussed Calaveras skull and Nampa image. This, how¬ ever, is not true of the human cranium known as the ((Lansing skull,55 from Kansas and the age of the deposit in which it was found only is in dispute. Much more satisfactory is the result before mentioned obtained by Dali in his investigation of the Pacific coast shell- heaps. Here we have evidence of a gradual change of habit, of a succession of occupations of the region that enables us to deal with <(time relative55 if not <(time absolute,55 and to feel assured that man's first appearance on the western coast of North America was in the extremely long distant past as measured by years. As shown that traces of man occur in deposits on the Atlantic coast, notably in the valley of the Delaware River, the dual question arises just when and whence came man to the American continent? It is inherently improba¬ ble that he did so while glacial conditions ob¬ tained in the northern half of the country, for in that case he would have confined himself to those unglaciated regions in the south, where the struggle for existence was reduced to its minimum. It is far more probable that his ar¬ rival on the continent was preglacial and that when driven southward by the steady encroach¬ ment of the ice-sheet he lingered at its south¬ ward limit of extension and lived in a manner not essentially dissimilar to that of the present boreal races, but more favorable in that the fauna was richer than that of the circumpolar regions of to-day. This is not to say that the glacial man of the Delaware Valley and the Es-

kimo of to-day were racially the same, but merely that similar physical conditions would produce essentially the same modes of living.

It can scarcely be questioned that man origi¬ nally was a tropical animal, and the existence of boreal races indicates that primitive man was slowly differentiated and spreading over the earth, so far changed in habit as the environ¬ ment required. Preglacial man-1— at least in North America — is yet to be demonstrated by unquestionable discoveries of his remains, but theoretically nothing can be more reasonable than the claim of his one-time existence. A modification of this view is that in some one of the inter-glacial periods, man may have first appeared. These inter-glacial periods were of sufficiently long duration to permit of vast changes and give ample time for a nomadic man to reach this continent or part of it from some distant point. What that point may be is still a matter of conjecture. We have many theories, but painfully few facts.

From what other continent man came to America is still an unsettled question. The necessity for an ultra- American origin is in¬ sisted upon, perhaps illogically, but, accepting the necessity, a migration route is fancied from the direction of Japan or directly across Bering Strait from Siberia and that North America was peopled by an incursion of wan¬ dering humanity into the northwest portion of the continent and thence followed down the Pacific coast and finally spread eastwardly until the Atlantic checked the movement. That the Japanese archipelago was the ((home)) of the first American is possible, so far as our present knowledge warrants our forming any opinion on this point ; but, accepting this or another Asiatic origin of this country's ((first0 people, it is clearly evident, from the traces of them that have been discovered, that the trans-Pacific migration occurred in what we known as preglacial time, and so, so far in the past that race-differentiation had not pro¬ gressed to an extent at all comparable to what has since occurred. The pioneer invaders of the American continent were doubtless much the same as folk wherever found at that time ; in other words, still very near to that primi¬ tive condition in which man remained so long after losing all visible traces of its pithecoid ancestry. If such was his condition, man might well have wandered over a wide terri¬ tory, tracing each river's valley, up or down, as the case might be, and, depending upon his physical strength and the simplest of weapons, it is little wonder that no recognizable traces of him should be found. His inventive inge¬ nuity was subsequently developed and it is in tracing this from its humblest

manifestations to the degree of skill in tool-making ultimately acquired that the archaeologist is able to dem¬ onstrate that man in the lowest state of sav¬ agery originally peopled this continent and that there has been here a growth or develop¬ ment of human faculties which may be con¬ sidered strictly indigenous. This advance to¬ ward what we call ˆcivilization® reached its highest point in Mexico, in Central America and in Peru. That it was influenced in Mexico and Central America, if not elsewhere, by an occasional influx of Asiatic people who had outreached their distant cousins, is persistently

claimed; and certainly, if at a far more remote period an Asiatic savage had reached this country, it is not improbable that such an oc¬ currence should happen in later time, when savagery had given way to a higher cult and travel by land and water was a less formidable undertaking. Such influence may have been im¬ pressed at times upon the growing American civilization, but never to such a degree as radi¬ cally to change its character. The American race was too firmly fixed to be wholly altered, and whatsoever reached it from the East in re¬ cent times — geologically speaking — made but an inconsiderable impression.

The very exhaustive study of this whole subject by the late Dr. A. H. Keane is quite sufficient to show that the Americans have al¬ ways been equal to the task of producing all that exploration has shown these people did produce, and without aid or hint from peoples of other continental areas. Fortuitous resem¬ blance has been allowed to play too great a part in ethnological speculation and the writ¬ ings therefore of any author who has a pre¬ conceived idea, as notably the late O. T. Mason and other students of the historic Indian — a subject unrelated to archaeology — lose much of their value. The chapter entitled Homo Americanus (<Ethnology) by A. H. Keane, chap, xiii) may be taken as the most logical and authoritative yet written. Therein, the specious pleadings of a non-American origin of all superior output of human skill is shown in its proper light of defective scholar¬ ship and lack of experience in the field, where impressions are obtained by. the unbiased mind that cannot be had from specimens of stone implements displayed in museum cases.

Dating, then, the Appearance of man on this continent prior to the first (Kansan) Glacial period (q.v.) and inferring that his career of differentiation from the universal or palaeolithic status commenced in the first inter¬ glacial period, we find him a <(stone-using animal® rather than a man as now recognized, and living such a life as that pictured by Euro¬ pean archaeologists as obtaining on that con¬

tinent. Inevitably change took place as soon as the rigors of an Arctic condition (if they obtained) gave way to the temperate condi¬ tions of the inter-glacial interims ; for it is now established that not one but three or four periods have occurred and so ample time is allowed for the many changes that have taken place since man's advent. The principal indica¬ tions of the earliest, i.e., palaeolithic man, are al¬ mond-shaped, circular and oval implements, the first mentioned distinctly pointed and all edged so sharply as to be available for cutting. While quartzite pebbles were largely used, the majority were fashioned from basalt and greatly decomposed on surface, and of argil¬ lite — slate- that has been fused by volcanic heat — and these likewise are decomposed to a greater or less extent. It has been suggested that this alteration of surface was due rather to submergence in salt water, than to ordinary weathering. (Winchell.)ˆ

The intermediate periods were of indefi¬ nitely long duration and the changes incident to the first were • repeated subsequently, and inferentially man witnessed them all, as lie was unquestionably present at the beginning of

the Pleistocene period. During these, the sur¬ face was at first but sparsely clad with vege¬ tation and tree growth may have been limited to coniferous forests, and evep later to a decidu¬ ous forest, which was swept away by the reoc¬ currence of glacial conditions. At some un¬ determined point in time, the bow came into use and there was a faint foreshadowing of the manifold activities of later date, and pos¬ sible pottery of the very rudest form, but this is doubtful. It was not until these several periods of occupation had passed and traces of them largely obliterated that the "Indian® occupation really commenced. The Indian is a man of history and of that misty bor¬ derland of history and geology known as pre¬ historic time. That there were interims when the "argillite® man was absent and the flint¬ chipping, pottery-making Indian finally ap¬ peared, has been demonstrated. It has been suggested by Hrdlicka that if the argillite man was in possession of the land when the later Indian arrived, there would be found a modification in skull type result¬ ing from the absorption of one race by another. As yet such crania have not been discovered. This is negative evidence and it is offset by the fact that skulls have been dis¬ covered in undisturbed glacial strata that are of wholly different type from that of the Indian. How far we can be guided by crani- ology alone has yet to be determined, but tak¬ ing in

this case all conditions under considera¬ tion, in the Delaware valley, where exhaustive researches have been made (Volk), there is evidence that can. scarcely be disputed that man was here to witness the closing acts of the ice-dramas — if not their entire progress — and continued to live in 'this river valley during the subsequent centuries that bring us to the confines of historic time. What relation he bore to the Indian who succeeded him has yet to be determined. The appearances to-day of the soil and underlying sands, each with its imperishable traces of man, suggest continu¬ ous occupation of the region, but do not prove it. In 1914, the anthropological department of the American Museum of Natural History, New York, under general direction of Dr. Clark Wissler, made a most thorough exami¬ nation of the region, near Trenton, N. J., and the scene of Abbott's and Volk's labors for many years previously. The result was to confirm in every particular the conclusions reached by Abbott and Volk. (Consult 46th and 47th (Annual Reports) of American Mu¬ seum of Natural History, New York). The author of this article was present at these explorations and was firmly convinced that there was no evidence of actual contact of an earlier and later people, but the proba¬ bility is strong that such contact did occur. If it did not, Hrdlicka's criticism fails in per¬ tinence and as yet craniology has not shown that a pre-Indian might not have had the same skeletal structure as his successor. Such osteological differences might have obtained in the formative period of the human, species, but not later, when race differentiation was well established. The basalt-chipper need not have been essentially different from the more skillful fabricator of chert implements. How¬ ever all this may be, it does not affect the se¬

quence here given of man's career on the At¬ lantic slope of North America.

A. Pleistocene Man (pre-glacial and palaeolithic in culture)

B. Inter-Glacial Man

(neolithic in culture but absense of polished stone ?)

C. Historic Indian

The so-called Indian of this continent has been so closely studied and his handiwork, whether of stone, bone, metal or clay, scruti¬ nized so exhaustively by ethnologists that everything relating to him is familiar to all. But our knowledge is not as definite and free from contradiction as might be wished. Theo¬ ries beyond count have been elaborately set forth, each claiming to fix finally the career of these people. The

literature of the subject is enormous and stands quite as much a monu¬ ment to our ignorance as to our erudition. That the Indian is a descendant of the man who reached the continent in pre-glacial time or during an immediately succeeding period is in all probability true. That the variations in his degree of culture and all that he has suc¬ ceeded in accomplishing are due to his environ¬ ment on this continent — are an unfolding of his faculties uninfluenced except by Nature — may be accepted as in all probability true of him ; even such advanced outreaching toward our own conception of civilization as was found in Mexico, Central America and in Peru does not call for the incoming of a superior people. The Indian of North America, in possession when the country was invaded by the Euro¬ pean, has been denied any significant antiquity and not a trace of his labors, whether earth¬ work, shell-heap or deeply-buried implement has been admitted to possess an age at all sug¬ gestive. All the “mounds® have been declared to be of Cherokee origin and not one dating so far back that the years may not be easily counted. Here the pendulum swung too far toward the craze for modernity. As well con¬ fuse the Aztec and the Eskimo. There are mounds and mounds — mounds proper, the history of which had faded from the traditions of the Indians ; and earthworks that were not beyond the capabilities of the various tribal groups or tribes known to the Jesuit fathers who saw the people to such excellent advantage.

It is to the careful examination of our sea- coast shell-heaps that we must look for those evidences of prolonged occupation of the coun¬ try which admit practically of no dispute. These accumulations of clam and oyster shells in many localities show that they were begun when the shore level was not what it now is : the base of the heaps being now several feet below the water’s surface at low tide. These shell-heaps are to be judged by the traces of handiwork found in them and likewise by a careful study of the shells themselves. The im¬ plements and pottery have been found in some instances to be of the rudest description, while in others the traces are of workmanship that was reached only in the palmiest days of Indian time. .This might prove a snare to the archaeol¬ ogist if all considerations were not kept in view, for not a one-time village site in the land but shows a curious commingling of crude and elaborate implements, weapons and orna¬ ments; but it has been found — on the North

Atlantic coast, at least — that shell-heaps that are apparently older are

really such from the fact that argillite and basalt implements, and no pottery, arc found. This significance of argillite and basalt unassociated with objects of other material has already been pointed out. But more full of meaning than all else is the fact that the same species of mollusk has gradually undergone a change during the time that elapsed between the laying down of the base of the shell-heap and the day of its final abandonment. Evolution is as slow as it is sure, and the change mentioned is alone suffi¬ cient to indicate beyond cavil the antiquity of the sea-coast dweller, who must be considered strictly post-glacial, but impressively prehis¬ toric. An overlooked feature of the subject is that of the marked difference in the traces of man found in different village sites scattered over a limited area, as of 10 or 20 square miles. It has not infrequently happened that traces of human occupation have been brought to light wherein nothing but the rudest forms of implements and coarsest grade of pottery occur. Such have been found, too, remote from present watercourses, deeply buried, and the spot still retaining evidences of being heav¬ ily forested after the site was abandoned by man. No one can unearth such evidences of one-time human presence without being im¬ pressed with their antiquity as counted by years ; but of far greater significance is the occurrence of such a village site finally abandoned, overgrown and buried by drifting sands, and then, when not a vestige of it remained visible, the spot being reoccupied by an Indian of greater skill in handicraft. Ex¬ posing the relics of the two occupations and placing them side by side, the difference is eloquent of the lapse of time beyond the skill of pen to picture.

That a family likeness should be traceable among the native races of the Americas is not remarkable and as yet there has been no suffi¬ ciency of evidence to lead us to the conclusion that the so-called ˆIndians® are referable to diverse origins. The cranial differences are of degree only, and when a number of skulls are brought together, the extremes are united by a series of gradations that stamp them all as one in anatomical essentials. Yet, viewing the vast territory as a whole, we find wide dif¬ ferences among these people, differences which may be explained, however, by the wholly dissimilar environment ; this not including the strictly boreal people, though their variations from the typical Indian are not, perhaps, so great as has been asserted. The marked fea¬ ture of the handiwork of Arctic man is skill in carving ivory and very strikingly etching it in such a manner that frequently the fauna of the region and mode of life of inhabitants are plainly depicted. But considering that bone and ivory take the place of stone so largely and that there is so much enforced idleness during the long Arctic winter, this artistic taste has been most

naturally developed. There must of necessity be some occupation, and the artistic instinct is common to all mankind. Whether or not it flourishes — is a vigorous or a stunted growth — • is, again, a matter of environment only. The comparatively few stone imple¬ ments found in the far North are not notice¬ ably well-fashioned, and the majority of their

patterns are to be duplicated in the one-time Indian village sites of the temperate regions.

1 he purported Indian etchings on slate are not as artistic in any instance as those on ivory made within or near the Arctic circle, and it is possible that all or nearly all of them should be ruled out of court. They usually tell too much, when they pass from a series of Hally marks® or merely ornamental zigzag lines, which may or may not have had a sig¬ nificance beyond the fabricator's idea of decora¬ tion. The tablets from Iowan mounds and the remarkable Lenape stone (q.v.) from eastern Pennsylvania stand out so prominently among the Indian relics of their respective neighbor¬ hoods, and especially the latter, that an un¬ qualified acceptance cannot be accorded them. If they were the culmination of artistic effort on the part of the Indians of the central West and Atlantic seaboard respectively, the ques¬ tion arises where are the pictured tablets of lesser degree of merit. There is too great a difference between the notches, straight or zig¬ zag lines and the thrilling scene of battling with a mastodon that finally is stricken by lightning. If all this ever occurred we have no evidence that any Indian of that day had the skill to tell the story in this manner. The same is true of the Iowan tablets. That the Indian had not knowledge of the mastodon we do not claim, for there is every reason to be¬ lieve that it became extinct in comparatively recent times ; probably not more than 25 cen¬ turies ago. The conditions under which its bones have been found and the instances of association of human and elephantine bones show that before this country's (<autochthonic hunter, Behemoth melted away.®

As ethnologic importance continues to be claimed by its sole protagonist, of this ((Lenape stone,® it may be well to state that it has recently been examined by one well qualified for the task and the decision reached was that, if genuine , its fabricator was familiar with all the folk-lore of North America from Hudson Bay to Florida. This at once shows the object's fraudulent origin. Consult Keane, c Ethnology, } p. 343.

What the Indian was at the time of the Columbian discovery has a distinct bearing on the archaeology of the country he occupied, inasmuch as an agriculturist he was in posses¬ sion of maize and grew it extensively. This plant had become during that time a product of artificially or cultivated growth, so modified that but for man's care it would have been lost. Whatever the plant from which it came there is no resemblance to it now. To effect such a change calls for an immense lapse of time. Other products of agricultural skill were as carefully grown and the impression that the results of the chase were the main food supply is not a correct one. The researches of Carr on this subject show how methodical these people were as tillers of the soil and that great suffering followed when their crops failed. The Indians did not come to America as agri¬ culturists ; of that we can be very sure, and to pass from the hunter-stage of life to that of cultivator of the ground is not conceivable as a sudden transition ; but is intelligible as a slow evolutionary process. This development, in no mean stage as finally reached, shows the up¬ ward tendency of the Indians in given areas

over what is now the United States, and how much beyond the status gained they would have progressed had not European invasion checked their career is conjectural. Herbert Spencer believes they had reached the full limit of their capabilities, but among such a people as these Indians in the 1 5th century it is conceivable that superior intellects might appear occasionally and such men would have their following. If such men are philosophers and not fanatics, a distinct gain is the result. When it is considered that people with merely a novel view and usually an absurd one be¬ come prominent for a day and have a host of applauders, it is not unreasonable to sup¬ pose that among the Algonkins or Iroquois there might have risen those who saw the folly of war and set forth convincingly the manifold blessings of peace; who realized the advantages of agriculture over the difficulties attending hunting and so brought into existence a train of thought that would influence the people who gave them a hearing. Attracted first by the novelty of the suggestion, they would later see the logic of the argument, if such existed, and a distinct gain be made. That their growth toward our civilization would ever have been equal to our own is quite improbable, as these people have been as long upon the earth as any other race and America offers opportunities for intellectual growth equal to Asia or Europe. What does appear is that the upward growth was in ex¬ istence when the blight of European

contact fell upon them. Certainly the savage of 10,000 years ago was far lower in skill, in handicraft and culture generally than the men who witnessed the landing of the Norsemen. Then, or about that time, a fatal scourge seems to have raged along the Atlantic sea¬ board and the natives suffered a serious check, the result of which appears to have lowered their status, as smallpox and syphilis, intro¬ duced by Europeans later, largely decimated their numbers. The Indians for a time were driven to the dire necessity of daily struggle for bare existence, and many of the better things of which they were capable fell into disuse. So, at least, it seems most rational to explain the fact that these people, when Euro¬ pean contact became permanent, were not what they had been. They had not been able wholly to recover from one disaster before another overtook them; the last, Spanish, French and English invasion, proving as destructive as fire upon the dry prairie.

The accounts of what the Jesuit fathers saw and the records of Kalm, Loskiel, Haeckewelder and many others make no mention of many forms of implements, ceremonial objects and talismans that are now familiar objects in all considerable collections of Indian antiquities ; but the simpler forms, as the grooved axe, the polished celt, the arrow-head, flake-knife and pottery are not only referred to definitely, but the method of manufacture is given in consider¬ able detail. Their hunting and agriculture are made plain, and we know with what tools they sought their game and tilled the soil, and more prominent than all else, the culture of tobacco, and the pipe in which it was burned, figure in the pages of the early travelers. Not less con¬ spicuous as objects were more than one form of wrought stone implements to which no refer¬

ence is made. It is inconceivable that they wre're successfully hidden, and we can only conclude that they had passed wholly out of use. Assuming that all the products of the Indian’s skill in shaping stone, of which we now know nothing, were wholly in disuse and either intentionally hidden or effectually lost, it is strange that the pioneer explorers should have had so little of the archaeological instinct as not to have detected traces of them.

With so great an extent of country and such diverse physical and climatic conditions, it is obvious that what were originally one people should by force of environment be¬ come widely differentiated in habits of life, and that what are now the almost tropical regions of Arizona, New Mexico and southern Colorado have been long peopled with Indians that superficially differ widely from those of. the more northern regions. Their cliff dwellings, rock shelters and well-built

permanent dwell¬ ings other than those on the faces of cliffs ; their pottery, wffiich they had learned to color; their weaving, basket-making and skill in stone chipping and polishing, all point to a distinct advance over the more northern nomadic tribes. It is practically demonstrated, in the judgment of those who have most exhaustively explored this southwestern region of the United States, that when the country was first occupied by the ancestors of the present Pueblo Indian, the physical conditions and climate were more favorable for human occu¬ pation than at present; a fact that has its significance, for the antiquity of man in Ameri¬ ca is one that has been long disputed; at least an antiquity at all comparable to that of man in Europe. Wandering along our Atlantic coast and laboriously picking from the accu¬ mulated shells that have almost hardened into rock, trifling potsherd, or a rude arrow point , or inland, walking over 'a newly-ploughed field, we gather a grooved stone axe, a celt, spear-head, arrow-point, skin-scraper or a drill ; some one or two or perhaps all of these in the course of a morning, we are enabled at best to picture man in but an humble way and think of him as almost one with the wild beasts of the forest on which he preyed — an erroneous, but common impression — then, transplanted quickly to the vast southwest, note the substantial dwelling and skillful prod¬ ucts in many lines, it is, at first, difficult to think that these people are but as branches of the same tree. The contrast is impressive and by just so much is it misleading. Step by step the gradations may be traced and when familiar with the handiwork of early man everywhere in North America, the relationship is quite apparent. The need of foreign influence to produce the differences, impressed here and there and again and again, is not apparent.

Mexico and Central America present prob¬ lems that are not yet solved. Here we are brought face to face with what may be digni¬ fied as a real civilization, and so far as its gene¬ sis and continuance have been determined, it is essentially a thing of itself and points to no influences other than those that the country might exert. That a foreign element gained lodgment here and through intellectual superi¬ ority gained control over and finally absorbed a pre-occupying people has not been demon¬ strated. So far as we now know of it, it is not

a civilization beyond the reach of a native Amer¬ ican race. All that is in it that resembles the culture in other continents is far more likely to

be coincidence than a transplantation. That essentially the same ideas in given lines may independently arise is beyond dispute. So much more impressive is all that remains of ancient Mexican centres of population that attention has been called to the subject for more than a century and the literature of the subject is enormous, and not free of the curse of undue haste in reaching a conclusion. The Aztec has not been shown to be other than an American Indian, but one advanced beyond the (<hunter stage® and so with a fixed habitation. He dwelt where his forefathers had lived and so a more rational, that is, truthful form of tra¬ dition was preserved. They were mechanics and artists. They ((made useful implements and weapons and high-grade ornaments and jewels from stones, obsidian, and metal (cop¬ per, tin, lead, silver, gold) ; made paper and dyes and were far advanced in weaving, em¬ broidery and feather-work.® (Hrdlicka). They knew well the properties of clay and so ceramic skill was highly developed. With these ac¬ complishments, it is not to be wondered at that they were also skilled in architecture and erected not dwellings merely, but temples on an elaborate scale and carved their surfaces in most intricate manner. The advanced artisan is always an aspirant and not satisfied, as he might well be, with the acquirements of reason¬ able creature comfort ; in this instance of the Aztec he devised an intricate form of govern¬ ment and formulated a religion, polytheistic and including ((the cult of the sun, moon, and stars ; but with this there was a well-defined belief in a single Supreme Deity.® (Hrdlicka). This Aztecan civilization was not alone in America. The Mayans of Yucatan were equally advanced as architects, as artisans and with society established on an elaborate and intricate basis. If their records have been read aright, ihey reach back for some 75 or more centuries, and granting this as approximating the truth, and claiming the culture existing as an in¬ digenous growth, the date of man's appearance on the continent is carried so far into the past that we must reckon by centuries and not by years. Pure-blooded Aztecs still survive, but the glory of their culture as it blossomed in pre-conquest times is a matter of history. How great, how far comparable this civilization was to our own can be judged by the exhaustive studies of Madam Zelia Nuttall in her work, (The Fundamental Principles of Old and New World Civilizations) (Peabody Museum Memoirs 1901). There is nothing suggestive of the ((Indian® as we know him in all these pages. Astronomy, mathematics and abstruse philosophical disquisition are dealt with and- we find, not unnaturally, that in striving to compass the unknowable they were led to the most extreme cruelty through that anthropo¬ morphic idea of Deity which universally has proved a curse to mankind. The conclusion reached by Mrs. Nuttall is directly the opposite of what has been held in this article as almost if not quite

demonstrable; the home, origin and growth of what has been revealed by archaeological research. She writes : ((I can but think that the material I have collected will also lead to a recognition that the role of

the Phoenicians, as intermediaries of ancient civilization, was greater than has been sup¬ posed, and that it is imperative that future re¬ search be devoted to a fresh study and ex¬ amination of those indications which appear to show that America must have been intermit¬ tently colonized by the intermediation of Med¬ iterranean sea-farers.®

Southward, when the adjoining continent is reached, we find in the vast plains, forests, and following the wonderful rivers of that region, savages that have not as high a standing as those of the temperate regions of North Amer¬ ica. The struggle for existence has been, in the tropics, and is, too keen to give opportunity to a mental growth not directly concerned with the bodily passions and demands. Above all else, the savage must eat, and if the food supply is to be had without effort, the result is bodily inactivity and mental stultification. If the food required must be struggled for, then the body only is excited to vigor; and food obtained, the body is too fatigued to follow physical exertion by mental. This is the result in the extremes of tropical conditions and it is not surprising that man shows to more advantage as the climate becomes more temperate. Mind and body seem then to have more equal chance ; and the same unevenness of development is found among South American Indians that originally obtained in North America. The differences are those that the different physical features of the country suggested. As Mexico stands to the country north of it, the favored spot wherein flowered and fruited the native civili¬ zation of that continent, so in Peru, we find a people who abandoned the more primitive features of a nomadic life, and establishing cities, organized government, society, gave such attention to art, agriculture and skill in varied handicraft, that they stood apart, finally, from the other peoples of South America. Compared with the advanced civilization of to¬ day it may seem crude indeed, but if we take their products of handicraft separately into consideration we shall find that they made most excellent thread and dyed it so honestly that to-day many a fabric a thousand or more years old has not lost its brilliancy of color. They were honest workmen as well as artists. It has often been asked would this culture in the interior of Peru have gone on developing had not it been snuffed out by a really as sav¬ age but more powerful a people. It cannot be determined, but as civilization is merely evolu¬ tion, there is no logical reason why the potter in Peru should not finally have vitrified and glazed his wares, and the metal workers have wrought even greater wonders with the

prod¬ uct brought to them by miners who knew their w7ork. Peruvian products in pre-Columbian time never found a foreign market, but it is rash to say they never would have found it had they not been molested and their career destroyed for all time by the infamous invader. An antiquity of the South American native has been frequently claimed by those well qualified to express an opinion, equal to that of the North American aborigine. This is in¬ herently probable. The indications of such antiquity are well attested, and the recent ef¬ forts of modernists of the radical type to mini¬ mize the importance of the conclusions of South American archaeologists have proved an

utter failure. The antiquity of man in South America may yet be in the non-proved stage, but to date the claimants of antiquity have far the better of the question.

Whether in North, Central or South Amer¬ ica, there were centres where things higher than mere animal wants found chance to flour¬ ish and the upward growth toward rational rather than mere physical man took place, and all about these centres roamed those outlying people, who were not degenerates, but the as yet unadvanced descendants of that original people of the early stone age to whom it fell to populate these two continents. See Mound Builders.

Bibliography. — The bibliography of American archaeology is more extensive than comprehensive and much more theoretical than practical. The (Smithsonian Contributions to Ivnowedge5 (Washington, D. C., 1847-1900) contain many important monographs ; also the (Annual Reports5 of the same institution. The volumes of the (Antiquarian Society of Worcester,5 Mass., of the now non-existent American Ethnological Society, also, are val¬ uable; likewise the (Annual Reports of the Regents of the State University, 5 Albany, N. Y. The Bureau of Ethnology, Washington, D. C., has issued an annual volume of inestimable value for many years; and the publications of the Peabody Museum of Archaeology, Cam¬ bridge, Mass., and certain of the bulletins of the American Museum of Natural History, New York, are authoritative and necessary for a full understanding of the subject. The sep¬ arate works that have been published are of less importance. Those prior to 1850 are purely of a speculative character. Of later date, the works of Brinton are of most importance ; not¬ ably his American Race5 ; Essays of an Americanist ; and (Notes on the Floridian Peninsula.5- Of equal importance is

Bancroft's (Native Races of the Pacific Coast.5 Consult also Dellenbaugh, Moore, Jones, and Volk for resume of subjects covering North America, Florida, the Southern States and valley of the Delaware River, and in the order named; Ab¬ bott, C. C., (Stone Age in Newr Jersey 5 (Ameri¬ can Naturalist, 1872), (Stone Age in New Jer¬ sey5 (Smithsonian Annual Report, 1876). Prim¬ itive Industry5 (Salem, Mass. 1881), (Archse- ologia Nova Caesarea5 (1907-09). (Ten Years' Diggings in LenapeLand5 (1912)/ Archaeological Significance of an Inland Dune5 (in Proceed¬ ings American Philosophical Society, 1917) ; Balch, Parly Man in America5 (in Proceed¬ ings American Philosophical Society, 1917) ; Keane, A. H., (Ethnology5 (1900); id., (Man: Past and Present5 (1900) ; Keith, A., (Antiquity of Man5 (1914); Sellards, E. H., (Human Re¬ mains and Assorted Fossils from the Pleisto¬ cene of Florida5 (Annual Report State Geolo¬ gist, 1916) ; Spier, L., (NewT Data on the Tren¬ ton (N. J.) Argillite Culture5 (American An¬ thropologist, Vol. XVIII, No. 2, 1916) ; Volk, E., (Archaeology of the Delaware Valley5 (Pea¬ body Museum Papers, Vol. V, 1911) ; Winchel, N. H., WVeathering of Stone Artifacts5 (Min¬ nesota Historical Society, 1913).

Mexico. — • Kingsborough, (Antiquities5 ; Mayer, (Mexico as It Was and Is5 ; Hum¬ boldt, (Vues des Cordilleres5 ; and the pub¬ lications of Zelia Nuttall in the series issued by Peabody Museum, Cambridge, Mass., not¬

ably (The Fundamental Principles of the Old and New World Civilizations.5 Consult also Stephens, (Yucatan. 5

Peru. — Transactions of the Ethnological Society of London ; biennial reports of Inter¬ national Congress of Americanists; von Tschudi, (Peru.5

Brazil. — Bates, 'Naturalist on River Ama¬ zons5 (1863) ; Agassiz, 'Journey in Brazil5 (1868) ; Kidder and Fletcher, (Brazil and Bra¬ zilians5 ; Burton, R. F., (Explorations in High¬ lands of Brazil5 (1869).

Patagonia. — Dobrizhoffer, (Abiponer 5 (1822) ; Muster, 'At Home With the Pata¬ gonians5 ; and for South America generally, transactions of learned societies in Europe — German, French and English. Also Bingham, Hiram, (Explorations in Land of Incas5 ; Cook, O. F., (Staircase Farms of Ancients' (No. 5, Vol. XXIX of National Geographic Magazine). These articles settle the question forever of the geological antiquity of man in South America.

Charles Conrad Abbott, Author (The Stone Age in New Jersey 5 ; Ar di¬ ce ological Explorations in the Valley of the Delaware ,5 etc.

ARCHEOLOGY, Christian. See Chris¬ tian Archaeology.

ARCHEOPTERYX, ar'ke-op'te-riks, an extinct bird exhibiting many reptilian charac¬ ters, especially in having jaws provided with teeth, and a long tail of many vertebne ; and it constitutes a link between birds and reptiles. It lived during the Jurassic period and is by far the most ancient bird known. Its distinct¬ ness from all other birds is expressed by plac¬ ing it by itself in a separate sub-class; the Archaeornithes birds are the rarest of fossils, and this one is known only from two skeletons and a single feather, all preserved in the litho¬ graphic limestone quarries of Solenhofen, Bavaria. The skeletons, one in the British, the other in the Berlin Museum, are wonder¬ fully well preserved in the fine, smooth-grained stone and have the impressions of the feathers in their natural position. They show that the Archaeopteryx had short wings with primary and secondary feathers arranged much as in modern birds ; but the bones of the wing are not so specialized for their peculiar use as in modern birds; the metacarpal bones are sep¬ arate and the digits free and complete, each with a claw on its tip, while in modern birds the first and third digits are rudimentary and the metacarpals fused into a single bone. The long tail of 23 separate vertebrae has the feathers arranged in pairs springing from the sides of each vertebra except toward the tip; in modern birds the tail-feathers spring from a triangular bony plate at the end of the short rudimentary tails. (See Birds). The teeth are like those of many lizards, sharp, conical, each set in a separate socket, and there is no horny bill as in modern birds.

The extinct Dinosaurs are the reptiles which come nearest to Archaeopteryx, and it is prob¬ able that they are descended from a common stock, the ancestors of the birds becoming arboreal and acquiring rudimentary wings to assist them in leaping from tree to tree. A somewhat analogous case is seen in the fold of skin and hair which the modern flying squirrels

have developed for the same purpose; if fur¬ ther developed and specialized this would enable them to accomplish true flight. In Archaeop¬ teryx the wings are short and the attachments for the breast muscles (those chiefly used in flight) arc small in comparison

with those of modern birds, so that the creature must have had very limited powers in this direction.

ARCHˆORNITHES, one of the two sub¬ classes of birds, including only Archaeopteryx (q.v.). The other sub-class, Neornithes ,• in¬ cludes all the remainder, either fossil or living.

ARCHZEOZOIC. See Archean.

ARCHAMBEAULT, Sir Horace, Cana¬ dian jurist: b. L'Assomption, Quebec province, 6 March 1857. He was educated at L'Assomp¬ tion College and Laval University, Montreal, where he was graduated Master of Laws in 1878 and was afterward (1881) professor of commercial and maritime law. Appointed to the legislative council of Quebec in 1888, he was speaker of that body and Attorney-General (1897-1905). In 1890 he became a member of the Council of Public Instruction. He was appointed a puisne judge of the Court of King's Bench of Quebec in 1908, and Chief Justice in 1911. He was knighted in 1914.

ARCHANGEL, an angel of superior or of the highest rank. They are seven in number, of which Michael, Gabriel and Raphael are mentioned in Scripture.

ARCHANGEL, ark-an'jel, seaport, capital of the Russian government of same name, on the right bank of the northern Dwina, about 20 miles above its mouth in the White Sea. The port is closed for six months by ice. Arch¬ angel, founded in 1584, was long the only port which Russia possessed. Pop. 21,930. The province contains 331,490 square miles; pop.

348,500.

ARCHBALD, Pa., borough in Lackawanna County, 10 miles northeast of Scranton, on the Delaware & Hudson and the New York, On¬ tario & Western railroads. It was first settled by Welsh miners in 1831 and is to-day essen¬ tially a mining town. It has. many churches and schools and several imposing public build¬ ings. Silk mills give employment to 350 per¬ sons, while over 3,500 men and boys are em¬ ployed in coal mining. Pop. (1920) 8,603.

ARCHBISHOP. The name of a chief bishop. The attentive reader of the Acts of the Apostles, noting that nearly the whole mis¬ sionary energy of Saint Paul was expended upon the cities and chief towns, rather than on the villages and the country districts, will be prepared to learn that there were flourishing churches in the leading centres of

population, while, as yet, nearly all other parts remained pagan. So strong, however, was the evan¬ gelistic spirit prevailing that a number of younger and less powerful congregations were called into being. The pastors of these new churches being called bishops, that term no longer appeared a dignified enough appellation for the spiritual chief of the mother church, and about a.d. 340 the Greek title of archie-piscopos was introduced.

An archbishop is often called a metropoli¬ tan. He exercises a certain supervision over the bishops of his province, who are called his suffragans; convenes and presides over them

in provincial councils} receives appeals against their decisions in matters of discipline and, in the event of the death of one of them, pro¬ vides for the administration of the diocese. In the United States the Roman Catholic Church is the only one which has dignitaries of this rank, and in 1900 the entire country comprised 14 archdioceses, Baltimore, as the first estab¬ lished see, having the dignity of primacy.

In England the early British churches were, in large measure, swept away by the Anglo- Saxon invaders, who were heathens, and the country consequently required to be recon¬ verted. The great southern centre from which this was done was Canterbury, then the capital of Kent, where King Egbert gave Augustine, the chief missionary, a settlement. In the north, York, the chief town of Northumbria, where King Edwin built a shrine for Paulinus, became the great focus of operation for that part of England ; hence the two archbishop¬ rics now existing are those of Canterbury and of York. The prelate who occupies the former see is Primate of all England, while his brother of York is only Primate of England, the supe¬ riority of the see of Canterbury, long con¬ tested by that of York, having been formally settled in a.d. 1072. The former is the first in dignity after the princes of the blood ; the latter is not second, but third, the Lord Chan¬ cellor taking precedence of him in official rank. In Ireland the same distinction holds for Ar¬ magh and Dublin. When the Catholic hier¬ archy was established in England in 1850 West¬ minster was constituted the metropolitan see.

ARCHBOLD, John Dustin, American oil magnate: b. Leesburg, Ohio, 26 June 1848; d. Tarrytown, N. Y., 6 Dec. 1916. After attending the public schools at Leesburg Mr. Archbold became a clerk in a country store at Salem, Ohio. He remained there for two years and in 1864 went to the Pennsylvania oil regions, where for 11 years he was actively identified with various branches of the industry in Oil City, Pa. He became chief owner and president of the Acme Oil Company

and in 1875 director of the Standard Oil Company. Of the first nine trustees of the Standard Oil ˆTrust® formed in 1882, Mr. Archbold alone remained in that capacity until its dissolution in 1911, by the order of the United States Supreme Court, after which he became president and director of the Standard Oil Company of New Jersey. He was an intimate associate of John D. Rockefeller; active in philanthropic asso¬ ciations and president of the board of trus¬ tees of Syracuse University, to which institu¬ tion he gave large endowments. His fortune at the time of his death was estimated at $100,-

000,000.

ARCHDALE, arch-dal, John, American colonial governor: b. Buckinghamshire, Eng¬ land, probably about 1635. Ferdinando Gorges, the last proprietor of Maine, married his sister Mary in 1660, and in 1664 sent him to Maine to set up Gorges government afresh in opposi¬ tion to Massachusetts, under whose protection the settlements there had placed themselves. (See Gorges). They resisted Archdale so fiercely that the next year he sailed for home, entirely baffled. In May 1681 he acquired a dubious title to a share in the proprietorship of the Carolinas, and in 1682 the proprietors

commissioned him to come over and receive their rents from <(Albemarle55 (North Caro¬ lina). He was there by 1683, with the intention of settling permanently (as his daughter did) — perhaps drawn by a liking for the Quakers in the colony, he having been converted by George Fox. A few years later, however, he returned to England, and was one of the chief managers of the proprietary affairs. In 1688 he appears on depositions in the Gorges matter, private claims being still unsettled ; but there is no evidence that he visited Maine again. In 1694, the Carolina proprietors needing some manager on the spot he was induced to become governor of South and North Carolina by the title of Handgrave55 and the attendant barony of 48,000 acres; but it was not till 17 Aug. 1695 that he assumed the government at Charleston, and he retained it but a year, then turning it over to a deputy and returning to England again. The complimentary address of the assembly on his departure, has been taken literally as a proof of influential and pregnant statesmanship; but in fact he dissolved his first assembly in haste from a quarrel over abatement of quit-rents, compromised with the second, left the Huguenots unenfranchised and

the unsatisfactory Indian trade as it was and made no strong impress. His spirit was good, however : he treated the Indians with humanity and modified some hard restrictions on them; drew up a militia act (into which the assem¬ bly unanimously refused to put a clause ex¬ empting the Quakers), and established a bureau of public charities.

He is also credited with having introduced rice culture into the Carolinas, through a bag of rice which a merchant vessel brought from Madagascar and he distributed among his friends.

In 1698, elected a member of Parliament, he refused to take the oath; would only affirm, and was not permitted to take his seat. In 1707 appeared (A New Description of that Fertile and Pleasant Province of Carolina,5 by him, a vindication of his administration, of little value except for some original documents.

ARCHDEACON, an ecclesiastical dig¬ nitary next in rank below a bishop, who has jurisdiction either over a part of or over the whole diocese. He is usually appointed by the bishop, under whom he performs various duties, and he holds a court which decides cases subject to an appeal to the bishop. The dignity is still maintained in the Anglican but not in the Roman Catholic Church, the canons or rural deans exercising the same functions as archdeacons.

ARCHDUKE, a duke whose authority and power is superior to that of other dukes, a title in the present day assumed only by the princes of the imperial house of Austria. In France, in the reign of Dagobert, there was an Archduke of Austrasia ; and at a later period, the governors of provinces of Brabant and Lorraine were termed archdukes. The dukes of Austria assumed the title of arch¬ duke in 1156; but the dignity was not confirmed till 1453.

ARCHEAN, a geologic time unit usually given the rank of a period, and the system of rocks laid down during that period. It is the earliest division of the Proterozoic Era. This

time unit is sometimes given the rank of an era under the name of Archeozoic. The rocks of the system are well exposed in the Lake Superior region, though rocks believed to be of equivalent age are exposed in the Piedmont Belt, in the Ozarks, at many points in the Rocky Mountains, over much of Canada and northern Europe and at places in other conti¬ nents. The rocks are dominantly igneous, con¬ sisting of thick lava flows interbedded with minor amounts of sediment (the Keewatin) an'd cut by great batholiths (q.v.) of granite (the Laurentian). They contain the iron ores of the Vermilion Range

(q.v.) in Minnesota. No direct evidences of life have been found in Archean rocks. Of the climate or geography of the period practically nothing is known.

ARCHEGONIUM, the female organ of mosses, liverworts, ferns, conifers, etc. It is usually flask-shaped with a neck of varying length and a venter more or less bulbous. A single egg reposes in the venter, and in the process of fertilization the sperm enters by the neck and reaches the egg. The archegonia are variously placed in the bryophvtes, pterido- phytes and the gymnosperms. The neck cells secrete a substance which attracts their own particular sperms toward them.

ARCHEGOSAURUS, ar'ke-go-so'rus, a fossil saurian reptile, found in 1847, in large concretionary measures of clay-ironstone, from the coal field of Saarbriick. Four species have been described. Professor Owen makes it a con¬ necting link between the reptile and the fish, and on these grounds : it is related to the sala- mandroid-ganoid fishes by the conformity of pattern in the plates of the external cranial skeleton, and by the persistence of the chorda dorsalis, as in the sturgeon, while it is allied to the reptiles by the persistence of the chorda dorsalis, and the branchial arches, and by the absence of the occipital condyle or condyles, as in Lepidosiren, and by the presence of laby- rinthic teeth, as in Labyrinthodon, which, how¬ ever, also ally it to the ganoid Lepidosteus. See Stegocelphalia.

ARCHELAUS, ar'ke-la-us, the name of several personages in ancient history, of whom we need mention only Archelaus, the son of Herod the Great. This prince received from Augustus, with the title of Ethnarch, the sovereignty of Judea, Samaria and Idumea. His reign is described as most tyrannical and bloody. The people at length accused him be¬ fore Augustus, who, after hearing his defense, banished him in a.d. 10 to Vienne, in Gaul, where he died. To avoid the fury of Arche¬ laus, Joseph and Mary, with the infant Jesus, retired to Nazareth.

ARCHENHOLZ, ar'Hen-holts, Johann Wilhelm von, German historian : b. 5 Sept. 1743; d. 28 Feb. 1812. He took part in the closing campaigns of the Seven Years' War and retired as captain, 1763; traveled exten¬ sively in Europe, lived in England the greater part of 1769-79, and settled in Hamburg in 1792. His book on (England and Italy5 (1785), extensively translated, obtained a phenomenal success. A sequel to it was (Annals of British History5 (1789-98, 20 vols.) . His (History of the Seven Years' War5 (1789; augmented 1893, 13th ed. 1892) is still the most popular account of that war.

ARCHEOZOIC. See Archean.

ARCHER, Branch T., Texan revolution¬ ist: b. Virginia 1790; d. Texas, 22 Sept. 1856. He studied medicine in Philadelphia, practised many years in Virginia and was repeatedly a member of the legislature. In 1831 he removed to Texas, and was one of the leaders in pre¬ paring for the revolution determined upon far in advance of the actual crisis. On 3 Nov. 1835 he presided over the celebrated <(consulta- tion® of the American settlers concerning inde¬ pendence, and immediately after was one of three commissioners — the others being Stephen Austin and N. H. Wharton — to solicit aid from the United States. The next year he became speaker of the House in the first Texan Congress; and he was Secretary of War for Texas 1839-42, when bodily infirmity compelled him to retire from public life.

ARCHER, Frederic, organist and musical director: b. Oxford, England, 1838; d. Pitts¬ burgh, Pa., 1901. Educated at Oxford, London and Leipzig, and held important positions as organist in Oxford, London and Glasgow, 1852- 79. Organist Plymouth Church, Brooklyn, N. Y., 1880-85 ; conductor Boston Oratorio So¬ ciety, 1887 ; founded Pittsburgh Symphony Orchestra, 1896; organist Church of the Ascen¬ sion, Pittsburgh, 1899-1901. He gave recitals and lectured on musical subjects throughout the United States and Canada. Founded and edited The Keynote (1885).

ARCHER, John, American physician : b- Harford County, Md., 6 June 1741 ; d. there 1810. He was graduated at Princeton, 1760, and in 1768 received from the Philadelphia Medical College the first medical diploma is¬ sued in America. He raised and commanded a military company during the Revolution, served several years in State legislature, was a presidential elector in 1801, and member of Congress 1801-07. He made several discover¬ ies in medicine which have been adopted by the profession.

ARCHER, William, English author and critic : b. Perth, Scotland, 23 Sept. 1856. Edu¬ cated at Edinburgh University; became bar¬ rister, Middle Temple, 1883. Went to London 1878, became dramatic critic of the Figaro, 1879-81, and London World, 1884-1905, after¬ wards of the Tribune and Nation, now of the Star. He has edited and translated Ibsen's (Prose Dramas) (5 vols.) and with his brother translated Ibsen's cPeer Gynt.5 He has written (Life of Macready>

(1890) ; (English Drama¬ tists of To-day) (1882) ; (The Theatrical World) (5 vols., 1893-97) ; (Study and Stage) (1899); (America To-day) (1900); (Poets of the Younger Generation5 (1901) ; (Masks or Faces : a Study in the Psychology of Acting) ; (Real Conversations) (1904) ; (Through Afro- America5 (1910); ˆlay-making5 (1912); (Life, Trial and Death of Francisco Ferrer5 (1912) ; (The Great Analysis5 (1913).

ARCHER-FISH, a fish reputed to be able to shoot drops of water from its mouth at insects in the air above, thus bringing the in¬ sects down where they can be seized. The name is most frequently applied to a single species, Toxotes jaculator, a fish six or seven inches long, a native of Java and the neighbor¬ ing islands, which represents an aberrant group of chaetodonts, or coral fishes (q.v.). This,

however, is an error of identification, the true fish with this habit being a related small coral fish (Chelmon rostratus) of India. This genus has its mouth extended into a tube-like snout, forming a sort of nozzle. When it perceives an insect perched on a plant over the water, it swims to within a distance of from four to six feet, and then with surprising dexterity will eject a single drop of water with so true an aim as to knock the insect into the water where it is instantly seized. Captives will do this in a tank or aquarium; whereas experiments show that the Toxotes never does such a thing for which its mouth is entirely unfitted.

ARCHERY. Ages after the bow and arrow had disappeared in general use from Europe and many other countries, it was the universal arm both for war and sport in the Americas, from Patagonia to the Arctic Circle, and its use lingered on the borders of advanc¬ ing civilization till within the memory of thou¬ sands living. It may indeed be considered the most characteristic American weapon, yet the practice of archery as a recreation is limited. A few societies of Toxophilites exist and hold monthly meetings and annual contests. The principal clubs are in the neighborhood of Washington, D. C., and of Cincinnati.

A faithful band, too, of whom the late Maurice Thompson, author of (Alice of Old Vincennes,5 was the exponent, have continued into this 20th century to take the bow and arrow into field and forest, and to live while in camp by the product of their skill in its use. Several charming pen pictures may be found in the pages of Scribner's, Harper's, Outing and the Badminton magazines, relating their hunts after turkeys, herons, wild duck, wood- duck and squirrels, and even fish, in Florida, Georgia, Illinois, Indiana and other States. For practical purposes, however, the attention may be confined to archery

as popularly under¬ stood : that is, shooting at the target as a recreation and to acquire skill. This form of its use continued long after gunpowder had be¬ come common : in fact the first book of in¬ struction in archery, that of Roger Ascham, the teacher of Lady Jane Grey, and professor of Greek at Cambridge, (Toxophilus or the Schole of Shooting,5 was published in 1571, when the bow had practically become obsolete as a weapon of offense. The bow used for recrea¬ tion is the long-bow and not the arbalest or cross-bow which was used by William Tell. That style of the bow was never popular in England. _ As gunpowder came more and more into use in sports, the interest in the bow and arrow faded. About the year 1760 the pos¬ sibilities of archery as a builder up of the body and the eye-sight were rediscovered, and from thenceforward it had a lusty growth and has always had a considerable following of dev¬ otees both in England and America. Bows are made either of one piece of wood, or two or more strips glued together, preferably of yew. A man's bow is about six feet in length, and a woman's some half a foot shorter. A man's bow requires a pull of from 40 to 50 pounds, a woman's about half that amount. The distance shot varies with the kind of con¬ test. A Potomac round consists of 24 arrows at 80 yards, 24 at 70 and 24 at 60; a double Columbia round of 48 arrows at 50 yards, and 48 at 40. A double York round of 144 arrows

at 100 yards, 96 at 80 and 48 at 60. A double National round of 96 arrows at 60 yards and 48 at 50, and a double American round of 60 arrows at 60 yards, 60 at 50 and 60 at 40. The arrow's shape and feathering is a matter of personal inclination. The targets are four feet in diameter, made of banded straw with a canvas front painted in five concentric rings, the centre gold, then red, blue, black and white ; the value in counting shots being, respectively, 9, 7, 5, 3 and 1. There are in the National meet also competitions for longest flight and annual team competitions of 96 arrows at 60 yards for men and 96 arrows at 50 yards for women. Consult Ascham, Roger, (Toxophilus, or the Schole of Shooting *(London 1868) ; Hansard, G. A., (The Book of Archery* (ib. 1840) ; Morse, E. S., (Archery, Ancient and Modern) (Worcester, Mass., 1792) ; Thompson, Maurice, (The Witchery of Archery* (New York 1878) ; Roberts, T., (The English Bow- man) (London 1801) ; Waring, T., (A Treatise on Archery * (ib. 1828).

ARCHES COURT, the chief and most ancient consistory court, belonging to the arch¬ bishopric of Canterbury, for the debating of

spiritual causes. It is named from the church in London, Saint Mary le Bow, or Bow Church (so-called from a fine arched crypt), where it was formerly held.

ARCHIBALD, Sir Adams George, Ca¬ nadian statesman: b. Truro, Nova Scotia, 18 May 1814; d. Halifax, 14 Dec. 1892. He was secretary of state for the provinces in the Do¬ minion government, 1867-68; lieutenant-gover¬ nor of Manitoba and the Northwest Territories, 1870-72 ; and held the same office in Nova Scotia, 1873-83. He was created K. C. M. G. in

1.

ARCHIDAMUS, ar'ki-da'mus, the name of several kings of Sparta. I. The son of Anaxidamus, who lived during the Tegeatan War, which broke out soon after the termina¬ tion of the second Messenian War, in the year 668 b.c. II. The son of Zeuxidamus, who suc¬ ceeded to the throne in the year 469 b.c. In the fifth year of his reign there was an earth¬ quake in Laconia which almost destroyed Sparta. In that trying period the foresight of Archidamus probably saved the surviving citi¬ zens from being massacred by the Helots. In the discussions at Sparta and Corinth, which preceded the rupture with Athens, he acted a prominent part, and always as the advocate of peace and moderation. He survived the out¬ break of the Peloponnesian War about five years, during which time he had the conduct of three expeditions against Attica and one against Platiea. Archidamus died in the 42d year of his reign, 427 b.c. III. Son of Agesilaus II. While yet a boy he prevailed on his father to pardon Sphodrias, who had dared to make an irruption into Attica at a time of profound peace. In 371 b.c. he was sent to the relief of his countrymen who had been vanished at Leuctra. In 367 b.c. he de¬ feated the Arcadians and Argives in what the Spartans termed the ((scarless battle,® because they had won it without the loss of a single man. Archidamus III appears to have been a warlike prince, but he was neither a great gen¬ eral nor a great statesman, and makes but a poor figure in either capacity after such kings

as his father and grandfather. IV. Son of Eudamidas 1 and grandson of Archidamus III, was King of Sparta in 296 b.c. V. Son of Eudamidas II. Archidamus V was the last king of the Eurypontid race that reigned in Sparta. When he was killed the rights of his children were disregarded and his crown was given to a stranger.

ARCHIL, ar'kil, or ORCHIL, or'kil, a coloring matter obtained from various kinds of lichens, the most important of which are the Roccella

tinctoria and the R. fuciformis. The Lecanora tartarea, or cudbear, is another of the same nature ; orchella-weed and dyer's-moss are common names for them. The R. tinctoria, or archil plant proper, is abundant in the Ca¬ naries and Cape Verde Islands, and in the Levant ; the R. fuciformis also grows chiefly in warm climates, as the coasts of Africa (Angola) and Madagascar. The lichens, which are chiefly collected from rocks near the sea, are cleaned and ground into a pulp with water, after which some ammoniacal liquor is added, when the coloring matter, red, violet or purple, is evolved and falls to the bottom. The red coloring matter of Lecanora tartarea produces litmus when lime or an alkali is added. Archil has a beautiful violet color. It is used for improving the tints of other dyes, as from its want of permanence it cannot be used alone.

ARCHILOCHUS, ar-kil'6-kus, a Greek poet, classed by Cicero with Homer and Sophocles: b. in the Island of Paros, flourished between 720 and 660 b.c. While a resident of Thasos, he incurred disgrace by throwing away his shield in a battle. He was the inventor of iambics. His terrible invective is said to have caused several suicides. A hymn to Hercules was the most esteemed of his poems, and used to be sung three times in honor of the victors at the games.

ARCHIMANDRITE, ar'ki-man'drit, in

the Greek Church, an abbot or abbot-general, who has the superintendence of many abbots and convents.

ARCHIMEDES, ar'ki-me'dez, one of the most celebrated among the ancient physicists and geometricians : b. Syracuse about 287 b.c. Though, according to some accounts, a relation and certainly a friend of King Hiero, he ap¬ pears to have borne no public office, but to have devoted himself entirely to science. We cannot fully estimate his services to mathema¬ tics for want of an acquaintance with the previous state of science ; still we know that he enriched it with discoveries of the highest importance, upon which the moderns have founded their admeasurements of curvilinear surfaces and solids. Euclid, in his (Elements,* considers only the relation of some of these magnitudes to each other, but does not com¬ pare them with surfaces and solids bounded by straight lines. Archimedes has developed the propositions necessary for effecting this com¬ parison in his treatises on the sphere and cylin¬ der, the spheroid and conoid, and in his work on the measure of the circle. He rose to still more abstruse considerations in his treatise on the spiral, which, however, even those ac¬ quainted with the subjects can with difficulty comprehend. Archimedes is the only one among the ancients who has left us

anything satisfactory on the theory of mechanics, and

on hydrostatics. He first taught the principle “that a body immersed in a fluid loses as much in weight as the weight of an equal volume of the fluid,55 and determined, by means of it, that an artist had fraudulently added too much alloy to a crown which King Hiero had ordered to be made of pure gold. He discovered the solution of this problem while bathing; and it is said to have caused him so much joy, that he hastened home from the bath undressed, and crying out, Eureka! Eureka! ((I have found it ; I have found it !5) Practical me¬ chanics, also, received a great deal of attention from Archimedes. He is the inventor of the compound pulley, probably of the endless screw, etc. During the siege of Syracuse he devoted all his talents to the defense of his native coun¬ try. Polybius, Livy and Plutarch speak in de¬ tail with admiration, and probably with exag¬ geration, of the machines with which he re¬ pelled the attacks of the Romans. They make no mention of his having set on fire the enemy’s fleet by burning-glasses, — a thing which is in itself very improbable, and related only in the later writings of Galen and Lucian. At the moment when the Romans, under Marcellus, gained possession of the city by assault, tra¬ dition relates that Archimedes was sitting in the market-place absorbed in thought, and con¬ templating some figures which he had drawn in the sand. To a Roman soldier who addressed him, he is related to have cried out, ((Disturb not my circle !55 but the rough warrior little heeded his request, and struck him down. The conquest of Syracuse is placed in the year 212 b.c. On his tombstone was placed a cylinder, with a sphere inscribed in it, thereby to im¬ mortalize his discovery of their mutual relation, on which he set particular value. Cicero, who was appointed quaestor over Sicily, found this monument in a thicket which concealed it. Of the works of Archimedes there are extant a treatise on (Equiponderants and Centres of Gravity,5 in which the theory of the lever and other mechanical problems are treated; on the (Quadrature of the Parabola5 ; on the (Sphere and Cylinder5; on the dimensions of the Circle5 ; on (Spirals5 ; on (Conoids and Spheroids5 ; the (Arenarius,5 a speculative treatise intended to refute the popular notion that the number of grains of sand on the sea¬ shore is infinite by showing that a definite num¬ ber might be assigned to a quantity of grains sufficient to fill the sphere of the fixed stars, re¬ markable as containing an anticipation of the modern discovery of logarithms; on (Floating Bodies5 ; a treatise called (Lemmata, 5 of doubt¬ ful authenticity, on plane geometry. A

very complete and splendid edition of the works of Archimedes issued from the Clarendon Press, at Oxford, in 1792. Other editions appeared in 1881 and 1897.

ARCHIMEDES, Principle of. See Ar¬

chimedes.

ARCHIMEDES' SCREW, a machine in¬ vented by Archimedes while studying in Egypt. Observing the difficulty of raising water from the Nile he is said to have designed this screw as a means of overcoming the obstacle. It con¬ sists of a pipe twisted in a spiral form around a cylinder, which, when at work, is supported in an inclined position. The lower end of the pipe is immersed in water, and when the. cylin¬ der is made to revolve on its own axis, the

water is raised from bend to bend in the spiral pipe until it flows »out at the top. The Archi- median screw is still used in Holland for rais¬ ing water and draining low grounds. The Dutch water-screws are .mostly of large size, and are moved by the wind, one windmill furnishing sufficient motive power to keep several screws going at once.

ARCHIPELAGO, ar'ki-pel'a-go, a term originally applied to the. TEgean, the sea lying between Greece and Asia Minor, then to the numerous islands situated therein and latterly to any cluster of islands. In the Grecian Archi¬ pelago the islands nearest the European coast lie together almost in a circle, and for this rea¬ son are called the Cyclades (Gr. kyklos, a cir¬ cle) ; those nearest the Asiatic, being farther from one another, the Sporades (ˆscattered55) . (See these articles, and Cyprus; Eubcea; Rhodes; Samos; Scio, etc.). The Malay, In¬ dian or Eastern Archipelago, on the east of Asia, includes Borneo, Sumatra and other large islands. See Malay Archipelago.

ARCHITECTURE. Architecture is the art of building wisely and, as the embodied philosophy of man's community ideals, is the complete index of the civilization of each age. Beauty in architecture involves such a dispo¬ sition of the structural elements demanded by a problem as will give to each a maximum value in the given situation. The development, growth, and change that characterize archi¬ tectural expression in different climates, countries, and ages determine historic styles. No style is the result of chance, but is always the concrete representation of the humanities, a reflection of intellectual, social, religious, military, and political conditions. Architectural Styles are identified by the means employed to cover enclosed spaces ; first,

by the character¬ istic forms of the supports ; and secondly, by* the decorative embellishment of the elements of the structural form.

Prehistoric Monuments. — Geographically and chronologically, the earliest construction forms are the Lake Dwellings which have been discovered at the bottom of some of the Swiss lakes. These lake dwellings were very primitive houses or huts erected on piles. These hut villages were built over the water for protec¬ tion. They were known to writers of antiq¬ uity, and Assyrian reliefs picture them. They date back to the Paleolithic Age. More im¬ portant from the standpoint of architecture are the Megalithic remains of Europe and Asia. They are widely distributed and probably were erected as religious or funerary monuments. Upright stones without lintels are called Men¬ hirs; tomb chambers consisting of upright stones carrying a lintel are termed Dolmens. The circles of stones, the Cromlechs, the most famous of which is at Stonehenge, near Salis¬ bury, in England, has a religious significance. While it is true that the earliest human works known, found in the caves of the provinces of Dordogne, France, and Santander, Spain, show various decorative treatments, no evidences of structural art appear. There is every reason to believe that the state of civilization marked by these finds in the caves of Western Europe typify an era of the Stone Age, during which the South of Europe was populated. This being true, it is possible to establish as an approximate

date for the inception of prehistoric styles, a date of 25,000 or 30,000 years before Christ.

Egypt. — The Valley of the Nile was peo¬ pled as long ago as 7000 b.c. with a race highly skilled in prehistoric arts. Dr. Petrie's dis¬ coveries between Nagada and Ballos have shown that a flint working people in the Paleolithic era dwelt in this region. Their technique, judged from the knives and bracelets that have been found, was more advanced than in any other country where relics of the stone age have been exhumed. These finds character¬ ize an art that must have been developed over a vast series of years, and the remark¬ able skill in manipulating stone exhibited in the Pyramids and structures of the dynastic periods is directly traceable to these Stone Age ancestors. The works, major and minor, of the historic Egyptians from the time of the ancient Empire through the Roman period are characterized by a lavish use of color. The presence of this chromatic element indicates

the persistent influence of a race whose art was de¬ veloped out of the clay industries, for the evolution of the pottery art brought into use, necessarily, constant and various methods of color decoration. The question as to the origin of this color influence is satisfactorily answered by the examination of the development of the arts of Mesopotamia. The absence of the color feature before the time of the early Memphitic dynasties and its lavish use subsequent to that time indicates that the historic Egyptians com¬ bined a Nilo-Prehistoric and a Mesopotamian race, and the art of the Valley of the Nile, hitherto considered simple and elemental, is in reality a composite of earlier totally opposite origins. A general survey of the entire field of Egyptian architecture develops five notable characteristics. First, the colossal character of the monuments ; second, the evolution of the * proto-Doric and the proto-Corinthian columns and capitals; third, the development of the clere¬ story and its effect upon the problems of scale and ornament ; fourth, the Egyptian temple, containing as it does the elements of the Greek temple and the later Christian Basilica, from which was subsequently developed the form of the Romanesque churches and Gothic cathe¬ drals; fifth, architectural refinements, by which certain optical illusions were counteracted and vigor of aspect was added to the monuments. Five distinct periods marked the history of Egyptian architecture. The ancient empire is characterized by sepulchral works and includes the most ancient monumental buildings of which we have any remains. The period is terminated by the 10th dynasty, 3000 B.C., and the centre of the constructive activity was Memphis. The most typical works of the era, the Pyramids, number over a hundred, and in six groups extended from Abu Roash in the north to Medum in the south. They were all tombs, and housing the requirements of the religious ideal of the Egyptians contained a sepulchral chamber, to¬ gether with a dependency votive chapel built separate from but adjacent to the pyramid. As the cardinal point in the religious doctrine of the Egyptians was the belief in a future state of existence, — that at some distant time the body would be revivified, — so every effort was directed to the preservation of the embalmed body to insure the comfort of the soul. The stupendous pyramids and numerous mastabas

and rock-cut tombs were lavishly decorated with scenes depicting surroundings and conditions of the life of the deceased. Each fresco wall is a page from the history of the civilization that flourished 5000 years ago. The Gizeh group, three in number, presents the most perfect type of pyramid construction. The works of the Middle Empire (3000 to 2100 b.c.) were almost entirely sepulchral in character, although the rock-cut tombs hewn in the limestone cliffs at Beni-

Hassan for the great vassal princes of the 11th and 12th dynasties furnish, in their disposition and decoration, an indestructible record of the domestic habitations of the period. Likewise they register the experimentations in the civil architecture of the age. The first evi¬ dences of temple architecture that occur in Egyptian history belong to this middle period, dating probably from the 12th dynasty, about 2000 b.c. From these remains, both at Bubastis and Karnak, it is certain that structural stone columns as well as monolithic stone columns were used as elements of Egyptian architecture. It can be definitely assumed that the philosophy of the whole architectural system of the new empire, and subsequently of the historic col¬ umnar eras in Europe, had their origins in the age of the Middle Empire. There was an interruption in the current of Egyptian art his¬ tory for some five centuries following the fall of the Middle Empire. The re-establishment of the Theban supremacy in the 18th dynasty marked the inception of an extraordinary series of religious and funerary monuments. In the development of these structures the column formed an important part. This period, com¬ prising the 18th to the 20th dynasties, 1700- 1000 b.c., was characterized by the great temple constructions at Karnak, Luxor, and a mag¬ nificent series of tombs, some of which were structural and others excavated, the most mag¬ nificent of which were those of Queen Hatasu at Deir-El-Bahari and that of Rameses II and Rameses III, erected on the west bank of the Nile opposite Thebes. During this period col¬ umnar architecture was magnified to an ex¬ traordinary scale and the planning of the tre¬ mendous temple halls, the roofs of which were upheld by numerous massive columns, brought to the designer a new problem, the solution of which was. destined to find its most notable expression thousands of years later in the noble cathedrals of Northern Europe. The problem presented by these Egyptian archi¬ tects of the Theban supermaev was one of light¬ ing the interior parts of the far extending temple halls. The difficulty was solved by lift¬ ing the central part of the hypostyle roof (a roof resting on columns) clear above the roof of the sides of the hall. The part of the hall which, higher than the parts adjoining, admits light through traceried openings is called a clere-story. A most important architectural re¬ sult of this solution of the lighting problem was the development of a great central nave which for its proper construction necessitated details proportionate to its height and width. Larger shafts called for increased capitals. The bell-shaped or campaniform capital was used to meet the conditions of scale imposed by the new problem. The form was not a new one. It appears in the wall decorations of the earliest dynasties, and in the sanctuary area of the great Ammon Ra, Karnak, we find it cut in exquisitely

ARCHITECTURE

ARCHITECTURE

Permission of the Metropolitan Museum of Art, New York

1 Pantheon, Rome 2 Parthenon, Athens

ARCHITECTURE

•

PilllPl

■ ^?r-?-v'cr"S >'• < >--•-

Vs . . - •.. • • ' •

■ -f -■ ' \ ■

♦> vy*i*'

.

EsSi?®'

i

te&j

■ •

' " * A ' •■ '*Xv

■ps *tomwfftfm*- wamiHV' ^.!i

!®f^v-4p': f < '•'» ' •.'.*■• " < rr ft '^fS,

^gilS

t IrnwmmmMmmmmmk

.5

3

a

cn

«

w

•O

£

43

tn

S3

O

►3

**-4

o

-4-*

Ul

3

O

u

a >

43

3

O

« »H > ti,

G

u.

0)

-*->

in

<u

£

Photograph by J. Laurent, Madrid

ARCHITECTURE

Copyright 1918, Underwood & Underwood, New York

Cathedral of Notre Dame, Paris

executed relief upon a monolith that belonged to an older temple of the 12th dynasty. The bell shape accorded with the imagery of re¬ ligious tradition, recalling either the papyrus or the lotus and it afforded profiles that solved effectively the problem of scale and surfaces, that, under the peculiar conditions of illumina¬ tion would, to the best advantage, carry a curved and colored decoration. The artistic consistency of the Egyptian decorator is shown by the careful adjustment of his decorative lines to the profile of the embellished objects. The abacus block, borrowed originally from the proto-doric order, was retained as part of the calyx or bell capital. There being no connec¬ tion between the vertical lines of this block and the flowering curves of the bell, an aesthetic dis¬ cord resulted which the Egyptian artists were never able to obviate. The Greeks received this calyx order as an artistic heritage from the older civilization and developed a form, to-day called the Corinthian, which, in a mechanized Roman adaptation, appears frequently in mod¬ ern architecture. The splendor of the Theban period was followed by a decadence that con¬ tinued through the Saitic period (1000-324 b.c.) During the Revival (324 B.C.-330 a.d.) an epoch comprising Ptolemaic and Roman domina¬ tions foreign influence brought certain changes. While there was no attempt to create a new architecture, the eclecticism of the Greek and his love of light caused the innovation of a screen wall in place of the sombre pylons of the Pharonic temple. The simple decorated inverted bell capital of the former period was replaced by a variety of liberally

carved modi¬ fications. The Greek influence is most typi¬ cally expressed at Phylase and Dendera, while the mechanization of Rome is shown at Koum Ombos and Edfu. The temple form in its general divisions underwent great change through all of the various eras of Egytian history. Its origins are lost in the mists of antiquity. Undoubtedly the early nature worshippers of Egypt did homage to a sacred stone or shaft. The holy object at first was un¬ protected, but in time an enclosing wall or wooden palisade more practically isolated it, creating a Temenos, or sacred enclosure. Early, too, a shelter was provided. Because the huts of the chiefs or leaders of the aborigines had been marked by wooden posts or stone shafts, this custom was employed to dignify the en¬ trance to the simple shrine. In historic temples this procedure is reflected in the obelisks and. great votive statues that were used to flank the entrances to the sacred edifice. As the temple, in the course of time, was looked upon not as a place of meeting for worshippers, but as a dwelling place for deity, whose presence was indicated by a consecrated effigy, provi¬ sion had to be made for the people. To this end an antespace, an hypostyle hall was added to the shrine.

The progress of a race from a state of bar¬ barism to one of enlightenment is always a slow and involved one, so that the simple temple, consisting of Temenos, hypostyle hall, and shrine must have been the result of a normal development extending over a period of thou¬ sands of years. With the increase of power and wealth on the part of the priests, and the development of a complex ritual, the shrine was divided into a number of chambers, the

innermost of which, the sekos, enclosed the effigy or symbol of the god. The adjacent chambers were planned to contain the treasures of the sanctuary and in certain instances to be used in carrying out the intricate ceremonies of initiation into the secrets of the priesthood. The hypostyle hall was really a great cere¬ monial chamber. The title employed in the hieroglyphic inscription, the Hall of Appear¬ ance, clearly indicates its intention. Entrance to the sekos portion of the edifice was re¬ stricted to the superior priests and the king. At the celebration of religious rites the in¬ ferior priests would await the appearance of the emblem, a statue of the god, in the hall of the columns. In the earlier temples this feature was of modest size. In the southern temple of Karnak, but eight columns were re¬ quired to support the hypostyle roof, but in the great temple of Ammon Ra, Karnak, 134 columns, arranged in 16 rows, were employed. Here the shafts supporting the clere-story ceil¬ ing were of colossal size — 113/5 feet in diameter and 69 feet in height. The fact that it would require six men, with outstretched arms to span one of the huge

columns will convey an idea of their bulk. This Hall of Assembly was separated from both the sanc¬ tuary and atrium or fore court by huge pylons. The ceremonial procession being marshalled, it advanced into the atrium, an hypaethral or open court, with colonnades upon two or three of its sides, seldom toward the entrance. As in the case of the Mohammedan mosques, the atrium served also as a place of instruction. Here, seated about their hieratic teachers, the Egyptian youth would pursue a curriculum that was unequalled in the ancient world. An enormous masonry screen, the pro-pylon, formed the fagade of this court. This feature was generally composed of three parts, a cen¬ tral doorway and two flanking, truncated pyramidal towrers. Its corners were decora- tively strengthened with three-quarter round mouldings, and the summits of the three ele¬ ments wrere crowned with the cavetto cornices. Recesses wrere built into the front to provide for masts, from which pennons were displayed. Provision was made in the interior for stair¬ ways and chambers, the purpose of which is unknown. The external and accessory parts of the temple scheme -were the temenos, the sacred lake, and the Dromos. The elaborate ceremonies at the sacred lake made necessary an extensive fore-yard, an area hidden from the inquisitive eyes of the people. Before the mummy of the Egyptian, poor or rich, could be borne to its final resting place in the necropolis, it had to pass the ordeal, known as <(the judgment of the dead.® This trial was held upon the shore of the sacred lake, before a tribunal impersonating Osiris and his coad¬ jutors. Proof of an evil life condemned the soul of the unworthy one to wander for 100 years in the world of the dead, and burial place for the mummy in the sacred precincts of the necropolis was refused.

Necessarily a large area wis required for the enacting of this complex ritual, and the Temenos so used formed an important adjunct to the temple. It was enclosed with a wall 40 feet high and 33 feet thick, pierced by a monu¬ mental entrance. A paved causeway, the Dromos, formed the approach to this gatewajˆ.

It was decorated with sphinxes or kriosphinxes. The Dromos leading from Luxor to Karnak was 76 feet wide and was bordered with 500 kriosphinxes on each side of it.

As the hieratic imagery dictated in great measure the general plan of the Temple, so, too, the details were in many points subjectively treated. When the English architect, John Penne- thorne, in 1833 made a tour of Egypt he dis¬ covered that in the atrium of the temple of Medinet Habou, erected by Rameses III, that the cornices were not constructed plumb and straight but were arranged horizontally as seg¬ ments of circles. It is a notable fact that, whereas the Greek curves are traced in vertical planes, these Egyptian arcs are constructed in horizontal planes.

In 1890 Prof. W. H. Goodyear of the Brooklyn Institute found these curves to exist also in the Temple of Edfu, and the author in 1897 verified them by surveys at both Medinet Habou and Edfu. The reasons underlying the use of these curves are complex. It is evi¬ dent that <(all architectural lines that are curved in horizontal planes, convex to the posi¬ tion of the spectator, produce the effect of curves in elevation.® Curves so formed ex¬ aggerate the effects of curvilinear perspective and the observer gets the effect of a building appreciably larger than the facts record. A mathematically straight line above the plane of the eye appears alwavs as slightly concave, for the intersection of the plan of rays, that con¬ vey the line to the eye, with the hemispherical retina is a curve, and in all cases, not con¬ sciously corrected, is registered in the brain as a curve. If the reader will notice the way in which the cornice line of a block of houses gradually dips until in the distance it meets the plane of the street which in its turn has bent slightly upward, he will have an example of this phenomenon. In the case of the level street and the straight cornice we know that there is no actual curvature, but in the registra¬ tion or perception of these distances the effect of a curve is produced. If, then, in experience, one finds that a lone line above the eye is registered as a curve, how natural it would be if a shorter straight line above the eye were actually curved, to give to the shorter line thus curved the distance quality that would exist in a straight line that produced the illusion of an equal curve. The architects of Egypt had observed this curiosity of optics and with great care built the cornices of cer¬ tain of their temples so that the cornices were actually curved as explained above. Then, too, under certain conditions a line, above the level of the eye, will appear concave, a result that is architecturally unpleasant. In order to over¬ come this disagreeable illusion, the ancient designers at times substituted a convex curve for a straight line. This last condition always results when the horizontal straight line is in¬ tersected by slanting lines. Thus the sloping planes of the pylons of the Egyptian temples being in the field of sight of a person observ¬ ing the cornices of the forecourt, would tend to make the

cornice lines of these courts appear concave unless these lines were really curved in the opposite or convex direction to overcome the illusion. As a matter of fact, to the modern traveler, the cornice lines of these temple courts appear straight and the courts

in area seem to be greater than they actually are. In the wonders of Greek architecture these corrective methods were developed to a degree unthought of in Egypt. Many new conditions, material and subjective, were re¬ sponsible for the system of Ictinus in the Parthenon at Athens. Another refinement in the Egyptian technique is found in the treat¬ ment of the four faces of the obelisks. These surfaces are curved outward both in the verti¬ cal and horizontal planes. This curvature was without doubt to correct the illusion of con¬ cavity resulting from the use of straight planes. Entasis, the slight bowing out of the shaft, was given to columns and pilasters for the same reason.

Chaldaean and Assyrian. — 'The civilization that was contemporary with Egypt was that of the Tigro-Euphrates Valley. Civilization of Chaldaea and Assyria alternately ruled in this valley until the conquest by the Persians. Its art and architecture was predominately royal. Extravagence and splendor marked the con¬ struction of palaces, especially those of Assyria, and the temples were comparatively moderate compared with the hieratic monuments of Egypt. Scarcity of timber and the difficulty of obtaining good stone for structural use forced the Mesopotamian monarchs to evolve a structural system adapted to the use of the available material. The solution of their struc¬ tural problem developed the arch. To roof corridors or rooms, baked clay bricks were as¬ sembled on a curved form of wood. The bricks being inelastic material and in compres¬ sion exerted lateral pressure or thrusts which were ultimately transmitted to walls or abut¬ ments. The thickness of the wall is propor¬ tionate to the amount of the arch thrust, and in the case of the Mesopotamian edifices, these superimposed weights were very great, hence the walls that held the load in check had to be enormously thick. The repetition of the arch, i.e. continuous arch formed a vault and the vault upon the circular base produced the dome. The column did not appear in Mesopotamian architecture as a constructive element. Palace architecture at Nineveh, Koyvndjic, Ivhorsabad and Nimroud exemplify the character of the Chaldaeo-Assyrian palace. The religious archi¬ tecture, exemplified by the ruins at Mugheir, Warka and Nippur, indicate terraced temples constructed with crude brick faced with burnt brick carefully set and often coated with enamel. Sculpture and relief, together with tile decoration, were used in the embellishment of the constructions of Chaldaea and

Assyria. Winged bulls carved in high relief appear fre¬ quently as decorations of the jambs of arched gateways. Wall slabs of alabaster exquisitely carved in relief depicting subjects of war and hunting or of the king doing worship to his gods ornamentated the state apartments of the palaces. Individuality in design and ornamenta¬ tion is lacking. The architecture throughout has the sombre stamp of officialdom. Expressing as it did the civilization with which Greece, Rome and Byzantium were in sympathy, Meso¬ potamian art became a fountain head of in¬ spiration and influence for the arts of the Occident. That miracle of Justinian, the Church of. Hagia Sophia in Constantinople had its origin in Mesopotamia.

Persia. — • The mountain races of Persia,

previous to Cyrus, developed no architectural monuments. From the latter part of the 6th century, however, until the conquest of the Persian Empire by Alexander, 334 b.c., an architecture of terraced palaces and columned halls, laid out upon terraces and platforms, served to splendidly house the royal court and dependencies of the Persian monarchs, Cyrus the Great and his Achaememidae successors. At Pasargadae, Persepolis and Susa, are ruins scarcely yielding in point of decorative mag¬ nificence and impressive monumentality to the master works of Assyria and Chaldaea. The notable detail of Persian architecture is the capital and shaft, perhaps best expressed in the form employed in the palace at Persepolis. This capital was composed of the head and fore¬ legs of recumbent bulls or lions between whose arched heads rested the beam that supported a timber roof. While it is a notable fact that the Persian bull kept his place unique in the his¬ tory of architecture and. is without derivatives, the supported entablature, developed after the wooden prototypes used by the ancestors of the Persians in constructing their huts, gave us the elements of the classic Ionic and Corinthian entablatures.

Hittites. — The source of many oft-repeated motifs in Egyptian, Mesopotamian and Minoan arts, certainly not originated by these civiliza¬ tions, was the Hittites, from whose capitals at Kadesh and Carchemish, Western Asia and the FEgaean were controlled. The power of the race was overshadowed by the conquering arms of the Assyrians in the 8th century b. c. The architecture and art forms of this people are hardly known to us as yet. The curious pic¬ torial records found in many places of Asia Minor are still the subject of

much study by the Oriental philologist. It is certain, how¬ ever, that many forms that appeared in the architecture of Mediaeval and Renaissance times had their origins in the building activities of this race. At Senjirli extensive ruins of a fortified palace have been excavated. The gateway was planned as a portico. A guard room, the ceiling of which was supported by columns, intervened between the moat and the keep. The lower part of the walls of this room was decorated with reliefs of hunting scenes, and figures of gods, unmistakably Hittite. The columns were supported upon the backs of animal grotesques. In a relief at Boghaz-Keny the deities are represented as being supported by the symbols of temporal and mystic power. The lion, the king of beasts, represents in the most satisfactory way the idea of physical supe¬ riority. The double-headed eagle presents the idea of supernatural control. The two heads indi¬ cates the ability to gather all experience from the past and to forecast the future, in fine, a pictograph of omniscience. The persistency of artistic tradition is well illustrated in the way these Hittite forms have been transmitted from nation to nation, long ago having lost their significance in imagery, but ever striking in effect. The column carried upon the backs of animals was carved by the Assyrians in their decorative reliefs and the Etruscans carried the motif to Italy. The portal of the Romanesque cathedral at Verona exhibits its employment. In both the lower and upper colonnades of the entrance broadly treated grotesques support

small Corinthianesque columns. All through northern and eastern Italy this imported Hittite motif was used. In designing ecclesiastical fur¬ niture this seemingly popular form was used continually. The Prior's Door of Ely cathedral, England, illustrates the introduction of the Hittite column form into English Norman work. In Italy, again, the pulpit that Nicolas Pisano carved for the Baptistry of Pisa, gave Renaissance expression to the ancient Hittite theme. So far researches among the scattered fragments in the rubbish heaps of Asia Minor oblige us to look upon the Hittites as the origi¬ nators of an individual and vigorous art, the effect of which has been lasting and wide¬ spread. Art history, in part, must be rewritten and a place made for this virile nation. Im¬ portant as their original contributions were, the greatest credit of the Hittites was in the fact that they were the principal mediating influence between Mesopotamia and Egypt in the East, and Greece, Etruria and Rome in the West.

Phoenicia and Cyprus. — Lesser interme¬ diaries between Asiatic peoples, the Egyptians and the Greeks were the Cypriotes, Phoenicians and Lycians. It is possible that from Cyprus the Greeks borrowed the volute form in Ionic archi¬ tecture, for it appears in the decorative

patterns of pottery and Steles from Cyprus. The Phoe¬ nicians were purveyors of art. They developed that which was merchantable and produced quantities of objects, bronze, gold, terra cotta, glass and textiles. Little remains to-day of the military, civil or religious construction of this people. The military and civil constructions by which their cities were rendered almost im¬ pregnable seem to have been inspired by the Hittites, and the temple form, the general scheme of which constituted a cella divided into two parts and surrounded by a Te- menos, was adapted from Egyptian sanctua¬ ries, through the Hebrew mediation. The Hebrews did not originate a new style of archi¬ tecture, and being prohibited by their religion from making graven images, <(never developed a sculptural proficiency.ˆ They, nevertheless, occupy a most noteworthy place in the history of the world's art because the plans for their places of worship form the link between the temples of Egype and the shrines of Greece.

Lycia. — Lycia developed a serious art, in its earlier forms, constructed in wood; in its later phase these earlier types were translated into stone. Typical Lycian examples entirely of a mortuary character are to be found at Antiphellus, Myra and Telmissus in Asia Minor.

Phrygia. — The Phrygian Empire was at its height about 700 b.c. and occupied the plateau of Asia Minor. Many of the monuments that have been characterized as Phrygian are either original Hittite works or Phrygian construc¬ tions designed in the manner and style of the earlier art. Among the Phrygians, semi-bar¬ baric wanderers and dwellers in tents, was the desire to fashion their tombs in the form of their earthly domiciles. This led to the representation of the patterned tent cover¬ ing as a tomb facade decoration. The most interesting example of this design is known as the Tomb of Midas near Sivrihissar.

Lydia. — It is probable that the early Lydians were a division of the Phrygians. In Lydia as well as Caria the conical tumulus is

the characteristic form for monumental tombs. Developed in Asia Minor and transmitted through the medium of the Etruscans, Rome utilized the tumulus as the chief element for some of her most monumental efforts. The original inspiration for the Roman form which achieved its greatest expression in the noble Pantheon, the

wonder of Roman construction, is to be found in the tumulus constructions erected by the early inhabitants of Thrace and Asia Minor.

iEgean. — While the early civilizations of the Egyptians and Plittites w7ere developing, about the eastern Mediterranean there was formally established a great controlling empire which we have come to know as the Minoan. Recent explorations at Cnossus and Phaestus in Crete, and exploration of the Ionian Islands and the islands of the Aegean, various parts of the Peloponnesus and northern parts of Greece, have established the fact that Crete was the centre of the civilization whose wTide ramifica- cations extended from Egypt and Mesopotamia to the west shores of the Adriatic, Sardinia, Sicily and Spain. 2Egean or Minoan art is divided into three periods, the first or early Minoan period comprised a semi-barbaric stone age civilization and a bronze age period. The close of the era is believed to have been about 2000 b.c. The middle Minoan period (2200- 1400 b.c.) was the age of the early palace build¬ ing. Wall painting was developed and the manufacture of fine faience was established. The first palaces at Cnossus and Phaestus were destroyed previous to 1850 b.c. The later palaces at these two sites were rebuilt and re¬ modelled previous to 1400 b.c. There seems to have been no architectural group arrangement for the Minoan palace plan. Expediency and utility characterize the general arrangement. Numerous courts and confusedly arranged passages occur. In some portions one story was superimposed on another. A remarkable feature is the great staircase running through three stories. What appears to have been a theatral area, a paved court with banks of steps on two sides for the use of spectators, is a nota¬ ble feature. The employment of a monumental stairway by the Minoans initiated a monumen¬ tal structural feature that does not appear again until the Roman era. A knowledge of sanitary construction is evidenced by the exhumation of pottery drain tile. The appre¬ ciation of structural and sanitary systems, adapted to the needs of the Minoan civilization, established the existence of an architectural style which, for utility, was remarkable and in every way was superior to the clumsy ex¬ perimentations of the dark ages which inter¬ vened between its use and the establishment of the classic periods of Greece and Rome. The late Minoan period reached its culmination about the time of the 18th dynasty of the new Egyptian Empire and is remarkable for a widespread building activity throughout the 2Egean. The citadel palaces at Mycenae and Tiryns belong to this period. The arch in its true form was not used by the Minoans but cor¬ beled walls were used for the passages in the enclosing ramparts of the Tiryns citadel and the corbeled vault in

circular form was employed in several tombs at Mvcenae and Orchomenos. At times the Minoan builders relieved stone lintels of superimposed weight by constructing above

the lintel a false arch. The Gate of the Lions at Mycenae is an instance of this construction.

Greece.— About 1100 b.c. the zEgean civili¬ zation succumbed to the age of iron, and on its ruins developed historic Greece. The ex¬ perimental period closed with the victory over the Persians, 479 b.c., which established a con¬ sciousness of power that found its highest ex¬ pression in the presentation of civic and re¬ ligious ideals. This abstract conception was translated through the medium of the arts into terms intelligible to the mass of the people. The real secret of the perfection of Greek architecture is to be found in the fact that to the Greek mind religion and life were indis¬ solubly interwoven. Their architecture was en¬ tirely a public architecture and the nucleus of this was the temple. Their early itinerary ex¬ istence was filled with warlike struggle and religious worship. The shrine of beneficent deity served as the depository for their wealth and battle trophies. It was natural, therefore, in the development of the race, to base their subsequent public types upon those evolved in the perfection of the temple, a form that in each detail expressed the highest aesthetic and utili¬ tarian value, effectually representing, in a con¬ crete way, the Hellenic ideal of power. The earliest temples were mere rectangular enclos¬ ures devoid of ornament and without architec¬ tural pretense ; selected because of the existence of some natural phenomenon, which appeared to indicate the presence of the gods or because the site had from primeval times been the place of worship of personifications of the forces of nature. In the archaic temple of Apollo, at Delos, there are two important parts, the cella and the space about the cella used for the performance of certain rites. These two elements that appear in this pre¬ historic example were retained by the builders of all Greek temples in more or less modified form. In no other place in Greece has an original primitive sanctuary been preserved. In the less sacred localities, the early cellas, we may suppose, were rudely constructed of timber. The first departure from the simple cella was the addition of an entrance porch. In front of and between the projecting side walls were placed piers or columns, similar to the scheme used at Beni Hassan in Egypt. This plan was the natural outcome of a more complex liturgy. There is every reason to believe that Doric architecture was the natural outcome of the problem of adapting the primitive wood superstructure, translated into stone, to the exigencies of a design in which columns were used for a porch in front of the temple. In course of time the idea of

entirely surrounding the temple with columns suggested itself. The natural inference is that the peristyle en¬ tirely surrounding the edifice simply continued the tradition of the sacred area which originally surrounded the primitive temples. The great temples of Greece with few exceptions were designed in the Doric style, the elements of that order being best adapted to produce the effect of monumental equipoise and aesthetic concord. For the examples illustrating the experimental phases of the Doric style one must look to the archaic temples o[Magna Graecia and Sicily, for the temples erected in Greece proper, during the 6th century b.c., have dis¬ appeared; in many cases, possibly along with

the Athena temple on the Acropolis, they were destroyed by the Persians ; in the enthusiasm after Salamis the archaic edifices were felt to be unworthy of the gods who helped the Greeks to glorious victory, and they were replaced with more pretentious monuments. The north¬ ern temple of Selinus, 610-590 b.c., is

heavy in detail and lacks the evident refine¬ ments of the works of later periods. The ideal of beauty was intimately associated with the religion of the Greeks and it was the constant effort of her artists to achieve a perfection of form and proportion. It follows that each shrine that was erected presented an oppor¬ tunity to overcome any defects in composition that had become apparent in an earlier edifice. Thus each part of the architectural mass was carefully studied, the purpose being to produce an effect of absolute unity upon the observer. The transitional period (500-460 b.c.) exhibits in the temple of Zeus at Olympia and the Aphaea temple on the island of TEgina, a great advance in harmony of proportion and delicacy of detail. Sicilian temples of Segesta at Agrigentum and upon the acropolis and eastern plateau of Selinus, offer particularly striking contrasts to the archaic types. The final solution of the Per¬ ipteral temple arrangement was achieved during the Periclean era (460-400 b.c.) in the Parthe¬ non (438 b.c.) , the shrine of Athena Parthenos, the world's architectural masterpiece. In addi¬ tion to the Parthenon the two great monuments of this age of Greek architecture were the Propylaea, the monumental gateway to the Acropolis of Athens, and the temple of Apollo Epicurius, at Phigalaea (Bassae) ; in the former many of the Parthenon refinements appear, but the latter, although attributed to Ictinius, the architect of the Parthenon, was wholly devoid of the wonderful subtleties of the Attic master¬ piece. The Greek Ionic style, developed

under the influence of Asiatic types, was not generally used in Greece until late in the 5th century when the Naval Confederacy brought Asia Minor and Continental Greece into relations. The style was universal in Ionic and ZEolian territory, there being but a single Doric temple in Asia Minor. During the period of Pericles the Ionic order was used in the temple of Nike Apteros and the Erechtheion and the interior of the Propylaea on the Acropolis, Athens. The desire to simplify the execution of the various elements of the Doric style and reduce the time and cost of execution, led, during the Alex¬ andrian (400-300 b.c.) and Decadent (300- 100 b.c.) eras, to various debasements.

Straight lines and geometric curves replaced the delicate refinements of the Periclean period. The capital from the portico of Philip 360 b.c., upon the Island of Delos, illustrates the dry and characterless ap¬ pearance of the late Doric style. During the Periclean age a capital form of foreign origin made its appearance. On account of its florid gorgeousness of detail the innovation was called Corinthian. The type in a marked manner was an index to the national spirit of the period succeeding the Peloponnesian wars. The individual had asserted himself — no longer was the state and its glories uppermost in the minds of men. The pursuit of wealth, luxury and pleasure, caused the change in character and art and reflected the new conditions in the more sensuous styles of the Ionic and Corin¬

thian. The Corinthian form never achieved the distinctiveness of an independent order in Greece. It was throughout a foreign element engrafted upon the Ionic style. It was only in Roman times that a Corinthian canon or rule was established. The Choragic monument of Lysicrates, at Athens, erected (325 b.c.) by Lysicrates, exhibits the possibilities of the Greek Corinthian style. While secular monuments propylaea, colonnades, stoae, theatres, and odeons were constructed with architectural care and embellished with elaborate detail, little import¬ ance was given to domestic architecture and our knowledge of the Greek houses is prin¬ cipally derived from description. In general arrangement the domiciles must have resembled the houses of Pompeii.

Rome. — The situation at Rome was partic¬ ularly advantageous for its work as an or¬ ganizer. Her citizens had a special aptitude for government, but had neither the time nor in¬ clination to evolve a new decorative style. Rome was adjoined by nations the value of whose art is still evidenced by remains of great monumental and engineering interest. The southern portion of Magna Graecia and Sicily was rich in examples of the Greek columnar styles erected by the Doric colonists who settled these districts during the 8th and 7th

centuries b.c. To the north were the Etrus¬ cans, a people of Turanian origin, who mi¬ grated, according to conjecture, from Asia in the 13th century b.c. The Etruscans from the remotest antiquity possessed knowledge of the arch and simple vault construction. In their rectangular and circular temples we find the origins of the religious types of the Roman Empire. In the history of art, Roman archi¬ tecture is of the greatest importance, because it is the fountain head out of which the styles of the Early Christian, Mediaeval, Renaissance, and Modern eras were developed. It forms the connecting link between the practise of subsequent ages and the experimentations and perfections of the various peoples with whom the Romans came into contact. It must not be thought that Rome served as an artistic clearing house for the early arts and was wholly devoid of originality. As inventors they contributed to the resources of the designer the groined vault and dome, derivatives of the arch which revolutionized the science of planning, making possible the substitution of vast open interiors for the column encumbered halls of Egypt and the narrow structures of Greece, for in all of these earlier constructions the unobstructed areas were limited by the restriction of the lintel. The Etruscans employed the arch principle in the construction of barrelled vaults (a con¬ tinuous arch roofing the space between parallel walls). The preservation of the Eternal City is due to a vaulted work of this kind. The Great Sewer, by which name the Cloaca Maxima is known, was built by the Etruscan tyrant, Tarquinius Superbus (500 b.c.). Symmetry was the dominant law of Roman composition, and in its employment the design was certain to achieve results that everyone could understand. Horizontal dual symmetry has an aesthetic value in that designs laid out in deference to its laws make an immediate appeal to all people. To the Roman, with his ideas of or¬ ganization, simple symmetry was the best method of portraying his racial characteristic.

Architecturally, the most important vaulted building was the Pantheon built by Hadrian between the years 117-138 a.d. The study of this monument inspired in the Florentine renais¬ sance architect, Brunelleschi, the idea which he executed in the construction of the dome of Santa Maria del Fiore of Florence. With the Romans, the building of a great monument com¬ prised two distinct operations, first, the fabri¬ cation of the ossature or core, and secondly, the envelope or decoration which was as independent of the construction as cloth¬ ing is independent of the man. The necessity of rapid

building and the availability of numerous unskilled laborers, drawn from the population of slaves and soldiers, rendered essential the development of a new con¬ structive process. The solution of the prob¬ lem was found in the use of concrete, not only for the walls, but also for the vaults and domes of their innumerable architectural undertakings. Great quantities of lime and cement rock are found in Italy, so that concrete of a fine grade was possible with a minimum of labor and cost. Skilled engineers would carefully plot out the lines of the foundations and walls and test the bearing power of the ground upon which the great vault supports were to stand. Hundreds of unskilled work¬ men excavated for the foundations and mixed the ingredients for the concrete. Chosen artisans laid up rough brick wall faces ; the space between them was filled with concrete as fast as the faces were carried up. Then in a short time, the supporting walls would be raised to the height where the vaults were to com¬ mence. Temporary centres, or forms of wood, were then erected upon which the laborers moulded vaults. At times, in order to obviate the labor and expense of enormous timber cen¬ tering, a light slat centre was used, upon which a vault of thin tiles set in hydraulic cement was laid. Upon this shell the concrete was heaped to the required thickness, rarely less than 6 feet over the thinest part. When the core of the monument was thus completed the task of decorating it was undertaken. Artists and precious materials were commandeered without regard to cost. The vaulted ceilings were embellished with moulded stock, lavishly painted and gilded, and the roof walls were covered with marble veneering, columns and entablatures. The decorative procedure of enveloping their arcuated masonry masses with columns and their accompanying acces¬ sories confronted the Roman architects with the problems of harmonizing in the same design the conflicting forms of the lintels and the arch. In the older arts, where the two constructive principles were used to¬ gether, the arch had been placed above the lintel to relieve that weaker member from the weight of the superimposed mass (entrance to Pyramid of Cheops, Egypt). In the Im¬ perial system the orders were introduced merely as ornamental features without constructive functions and the salient horizontal lines of the entablatures were designed to mark the division of the stories or the place of springing of great vaults. The columnar forms engaged to the masonry mass between the arches were in¬ troduced to give apparent support to the en¬ tablature. This arrangement inverted the position of the lintel and the arch as hitherto

used, placing the weaker member above the stronger, and has been criticised as a repre¬ hensible departure from structural propriety. The

contention is not valid, however, for two obvious reasons; first, engaged columns neces¬ sitated an overhanging entablature whose pro¬ jection beyond the face of the arch masonry indicated very clearly its introduction as an applied and not a structural feature, and secondly, through the contrast of the straight lines of the “Order® with the curves of the arches a pleasing variety was obtained, the popular value of which has been attested by the adoption and use of the Roman Arcade scheme in all subsequent styles even to our day. The columnar forms, as placed by the Romans, ful¬ filled, too, an aesthetic function in that they emphasized the constructional divisions and elements of the building and gave to the monu¬ ments a sparkle and play of light and shadow that added greatly to their appearance. The Romans being an essentially commercial people and their chief interests directed to the exten¬ sion of their power, religious observations and its accompanying architecture were relegated to a subordinate place. Great halls for the trans¬ action of business and the dispensing of justice assumed a far more important position. Lux¬ ury and the desire upon the part of the rulers to popularize their regimes necessitated the erection of fora, amphitheatres, baths, palaces, triumphal arches and a host of constructions such as aqueducts, roads, bridges, etc. The temples were of two types, rectangular and circular. The plans of both classes were of Etruscan origin. The rectangular shrine comprised of a deep porch led to the cella in which the statue of the deity was placed. Monumental stairways approached the porch. The circular temple plan achieved its most monumental results in Rome itself, although throughout the Latin world many minor mon¬ uments of this class were built. With the development of vaulting it was possible to greatly enlarge this type of structure until finally the imposing rotunda of the Pantheon was produced. The Roman basilica was a form adapted from the Greek royal house for the transaction of judicial and commercial business. Oblong in shape, it consisted of a broad and lofty central nave separated from double or single side aisles by colonnades. The roof of the nave was carried above the level of that of the side aisle forming a clere-story, which was pierced with windows. To the time of Constantine these structures were covered with wooden roofs, and it was that Emperor who completed the edifice commenced by Maxentius who first endowed the Basilica with a vaulted, fireproof covering. These basilicas are of especial importance because of the con¬ trolling influence that they exerted upon the later architectural styles of the Basilican, Byzantine, and Romanesque styles.

Early Christian or Romano-Christian. — The Emperor Constantine (328 a.d.) made Christianity legal. Throughout the preceding four

centuries Christian art had been slowly developing. Hidden and secret, its earlv forms were domestic or sepulchral. With the freedom of worship possible under the enlightened Con¬ stantine, the. Christians appropriated for their religious edifices all that was adaptable in Roman architecture. The early Christians

translated in their liturgical forms the organi¬ zation that they had become habituated to in the conduct of Roman affairs ; thus the Basilica in which the business of the Empire had been transacted served as a basis for a proper hous¬ ing for the performance of the public rites of Christians. The broad and lofty nave of the basilica with its single or double aisles, pro¬ vided ample space for worshippers. Above the nave columns rose the lofty clere-story walls pierced with windows. Immense wooden trusses carried the roof of the nave. At the far end was the apse with seats for the clergy, and in front of the apse was the altar. Generally, a forecourt, surrounded by a covered arcade, preceded the basilica proper. This was connected with the church by a porch. One of the most impressive places of worship in the world to-day is the rebuilt basilica of Saint Paul without the walls at Rome, erected in 386 a.d. by Theodosius! In the general survey of architecture this edifice is of peculiar importance because the arches of the nave arcade are turned from column to column without the use of an intervening en¬ tablature between the capital of the column and the spring of the arch. The first known case of such use of columns as arch bearers was in the palace of Diocletian at Spalato. This nave arcade motif, modified by the struc¬ tural changes of the Romanesque and Gothic periods finally flowered into the wonderful nave arcade conceptions of the ecclesiastical master¬ pieces of Amiens and Rheims.

Byzantine. — Under Constantine, the Greek city Byzantium, renamed Constantinople, be¬ came the chief city of Christendom. Under Justinian, 527 to 565 a.d., the structural under¬ takings of the Eastern Empire developed an extraordinary activity especially in the building of churches. Syria, Dalmatia, Macedonia and Ravenna were scenes of architectural industry, for the most part under the direction of Asiatic Greeks. Engrafted upon the Latin type of church — the basilica with its three aisles and wooden roof — were certain traditional vault¬ ing methods in brick and stone of Asiatic origin. The most notable

characteristic of this structural method is the central dome on pendentives, a device by which a circular vault can be erected upon a series of isolated sup¬ ports. By this scheme of dome construction polygonal chambers were built which could be monumentally roofed and would permit the floor plan to be extended indefinitely in any direction. The Byzantine plans are of great variety and enable the designer to achieve results which for propriety of scale and effectiveness of decora¬ tion have never been excelled. The great masterpiece of the style is Hagia Sophia, often called ((Saint Sophia,® built under the orders of Justinian, 532-538 a.d., to replace an earlier Basilican building. This huge church, one of the greatest of the world's art masterpieces, marks the culmination of the style. It was followed by a long and gradual decline in artistic value. Some five centuries later a re¬ crudescence of the style appears in the church of Saint Mark at Venice (1047-71), where a combination of Greek and Italian artists pro¬ duced a masterpiece of great beauty which sub¬ sequently influenced the plan of the, Roman¬ esque church of Saint Front at Perigueux, vol. 2 — 12

France. The Romanesque cathedral of Cahors, France, was probably inspired by the Justinian church of the Holy Peace, Hagia Irene. All church building, even the latest and richest Gothic has the exterior for its chief splendor. The Byzantines apparently gave little thought to the embellishment of the exterior of their buildings, and lavished all of their decorative effort upon the interior. This style, invented in practically a single effort, a result not known to have been achieved anywhere else in the history of art, has prevailed ever since through¬ out the lands extending from the Red Sea northward through Russia.

Sasanian and Mohammedan. — Contem¬ poraneous with the development of Roman and Byzantine rule under the Sasanian dynasties (227-641 a.d.) an art was developed in Western Asia based upon Hellenistic columnar pre¬ cedent, combined with vaulted methods, the knowledge of which had its origin in the subterranean vaults and fragment domes of Mesopotamia. The royal palace at Ctesiphon, with its great eliptically arched hall, is a monumental example of the remarkable tenacity with which these Oriental peoples held fast to their own artistic traditions. The two Oriental lines of architectural influence lead, one toward the Far East, expressing itself in the types found in India and China ; and the other in the Levant, embracing practically all of the countries which ultimately came under the faith of Islam. The architectural styles that followed in the wake of the Mohammedan conquests were marked by certain common characteristics which differentiate them from the contemporary Christian styles. The decora¬ tive consideration was ever controlling.

Con¬ struction was relegated to a secondary place. Restricted by the Mohammedan canon there is an absence of illustrative decoration and sculp¬ ture throughout Arabic, Persian, Turkish and Indian buildings. The profuse conventional decoration that necessarily took the place of humanistic representation showed a great love for minute surface ornament. The mosque and tombs throughout the Arabic countries of the Mediterranean exhibit frequently a remarkable degree of decorative elegance. In northern Africa, the Arabs restricted construction and gave free play to decorative license. This par¬ ticular phase of architectural expression is known as the Moresque style, horseshoe cusped arches were substituted for the simpler and structural architectural forms. Plaster relief entirely took the place of more endurable materials. Arabic architecture attained a re¬ markable splendor, curiously enough, not in Africa, but in Spain, the southern portion of which was overrun by the Moors, 710-713 a.d.; where petty kingdoms were developed most im¬ portant of which were Granada, Seville and Toledo; until the capture of Granada in 1492 when the Moorish rule in Spain was ended, there was an extraordinary activity in build¬ ing. Mosques, castles, acqueducts were reared and the climax of the style was reached in the construction of the great mosque at Cordova, the Giralda at Seville and the Al¬ hambra at Granada, the latter universally con¬ sidered to be the masterpiece of Hispano- Moresque art.

Persian architecture, after the Arab con¬ quest was strongly influenced by the Sasanian

palaces. The dome and vault, the colossal portal-arches and the use of brick and tile evi¬ dence the Mesopotamian origin carried to Persia through the medium of Sasanian design. From Persia, the Mohammedan architecture of India received its inspiration and beginning in the 11th century there appears the growth of an Indo-Moslem architectural style char¬ acterized by a grandeur and amplitude of dis¬ position and a symmetry and monumental dignity which, contrasted with the Moresque style of the Arabs, awards every advantage to Indian work. The dome on a square plan was almost universal. The Bvzantine pen- dentive was not used, but in its place original combinations of vaulting surfaces of corbeling and ribs appear. Artistic settings for the monuments of this type are noted, and in the greatest of the Indian monu¬ ments, the Taj Mahal at Agra, the style pos¬ sesses a production in which constructive science combined

with noble proportions and exquisite beauty is unsurpassed by any of the greatest architectural triumphs of the world. After the conquest of Constantinople in 1453, the Christian church of Hagia Sophia was occupied as the chief mosque and served as an official type to control Turkish mosque design in plan and constructive principle. Thus, out of the Jus¬ tinian edifice, was developed a style of archi¬ tecture less decorative and voluptuous than the style of Persia, Africa, or India, but neverthe¬ less of great dignity. The Turkish mosque, the Suleimaniyeh (1553), with its soaring min¬ arets, serves as a Turkish type that governs to the present day.

Romanesque. — The Dark Ages that fol¬ lowed the fall of Rome (476 a.d.) constituted an experimental period during which the peoples of Europe were being Christianized and the influence of the Church was being established. Nations and individuals were groping for truth in government, religion and in life, and through¬ out Northern Italy, the Rhine Provinces, lie de France, Southern France, Normandy, and Nor¬ man England, art in its various departments was called upon to express each stage of ad¬ vance. Roman monuments existed in all parts of the Christianized regions, and these monu¬ ments of antiquity, serving as constructive models, inspired a new architecture, modified by the liturgical requirements of the early Christians. This architecture, primarily based upon the Roman, varying in each province ac¬ cording to the exigencies of climate, and the registration of racial characteristics in decora¬ tive form and structural inventiveness, is known under the generic title of the Romanesque Style. In Tuscany, the churches were Basilican in plan with timbered ceilings and high clere¬ story. In Lombardy, in the 11th and 12th cen¬ turies the Basilican plans of classic Italy were translated into stone. Variations in plan re¬ sulted from the necessities of the lithic prob¬ lems. The naves were narrowed and instead of rows of columns carrying a high clere-story wall, as used in the Tuscan Romanesque churches, heavy piers connected by wide-spread¬ ing nave arches supported the heavv ribs of the roof vaulting as in S. Ambrogio, Milan. Dur¬ ing the 11th and 12th centuries in Northern and Western Europe, the church builders labored to adapt, like the Lombards in Italy, the Basili¬

can plan to the requirements of vaulted con¬ struction. Throughout France, Western Ger¬ many, England and Belgium, the designers were constantly in trouble, caused by the diffi¬ culty of building the round arched vault over the several portions of the churches. The thrusts of the clumsy vaults used to roof the nave were inadequately resisted by half barreled vaults over the side aisles, through the medium of which the strains of the great central vaults were transmitted to enormously

heavy side walls. In these cases the clere-story necessarily disap¬ peared and the lighting problem, which did not amount to much in the southern provinces, be¬ came a serious consideration in the cloudy regions of the north. There it was necessary to raise the nave vault higher in order to in¬ troduce clere-story windows. To accomplish the introduction of the clere-story windows groined vaults replaced the barreled vault. The introduction of the groined vault made possible the concentration of the roof thrusts upon a series of isolated supports or clustered piers. The groined vaults were of two forms, four- part and six-part. The four-part vault is per¬ haps best typified in the church at Vezelay, France. The six-part vault was used in Nor¬ mandy in the Abbaye aux Hommes and the Abbaye aux Dames built in the time of Wil¬ liam the Conqueror. The use of the six-part vault in these churches, while making possible a higher clere-story, was an awkward expedient, for the division of the square vaulting bay into six parts by the diagonal groinings and a middle transverse rib, necessitated two nar¬ row skew vaults meeting at the centre of the vaulting bay. Although an unsatisfactory de¬ vice, this vaulting scheme was retained for a hundred years or more, and even after the adop¬ tion of the pointed arch form, it was common in the 12th century churches, both in France and in England. In constructing these vaults, the various ribs were erected independently of the vaulting surfaces, a principle of construction which the Romans had used in their concrete vaults. The buttressing necessary to support the various vaulted roofs was mainly internal and unsatisfactory. Subsequent to the Norman conquest, 1066, church and abbey building was greatly stimulated. Typical of the period in England and expressing the two various phases of the Norman style in England, are the cathedrals of Durham (1096) and Ely (1107). The original vaulting scheme of Durham was borrowed from the six-part vault method employed in Normandy. The instability of the six-part Norman construction is evidenced by the fact that the early vaults at Durham were replaced by four-part Roman¬ esque construction. The English churches differ from the Continental edifices in two particulars. First, a huge tower was usually erected over the crossing of the nave and the transept, and sec¬ ondly, the western portals were not emphasized. At Ely there appears a notable variant from the Durham Norman style, due conjecturallv, to the influence of the Tuscan Romanesque. At Ely a bascilican church was designed in which the graceful and elegant details of the Italian Pisan churches was replaced by the heavy forms of the Norman art used not in a structure but, a wholly decorative manner. A timber ceiling was used instead of stone vaults. This

ARCHITECTURE

• ARCH OF TITUS. ROME.

MONUMENT OF LYS1 CRATES.

CHURCH AT RIMINI.

RESTORATION OF THE FORUM. RO, ME.

HAGAI, LA. ROME. (Restored..)

ARCHITECTURE

CORINTKIAX .0 RDS

ARCHITECTURE

phase of the English Norman is prac¬ tically nothing more than the Italian Basilica with a Norman envelope. In Germany a few churches dating back to the 9th century, in great part rebuilt, express the character of this period in that region. The church at Aix- la-Chapelle in Prussia has been greatly altered, but it was without a doubt inspired by that of San Vitale at Ravenna. The Byzantine type here shown was repeated in a number of later churches. The conventual church at Hechingen, near Stuttgart, and at Quedlinburg, Saxony, exhibited quasi-classical sculpture with scroll work and elaborate mouldings. Groined vaults, low and narrow, are used. The same timidity and lack of stability in vault construction is apparent here as in other parts of Europe. The great cathedral of Speyer, Bavaria, and the church at Gernrode belong to the 12th century, as do the church of Saint Michael at Hildesheim, the cathedral of Mayence, and the cathedral at Worms. These churches have been practically unchanged since the time of their building, and exhibit perhaps the most efficient examples of the Romanesque style. The Romanesque influence expresses itself in the far north in the cathedral of Lund in Sweden with the characteristics of the architecture of the period. The Scandinavian Peninsula depended for the most part upon timber for its construction and upon elaborate carving for its decoration. In Spain the Moors dominated the larger part of that country during the Romanesque era, but after the capture of Toledo (1062) by the Christians, there was a recession of Moorish influence, and in the northern provinces of Spain a number of im¬ portant churches were erected which reflected the influence of French Romanesque models.

The Church of Saint Iago at Compostella is typical of these Spanish Romanesque edifices. Barrel vaults over the nave, groin vaulting over the side aisles, follow the precedents of France. In the employment of a dome or cupola, as in the old cathedral at Salamanca, over the cross¬ ing of the nave and transepts is exhibited a characteristic departure from the French types.

Gothic. — The practical difficulties en¬ countered by the Romanesque builders found a structural solution during the 12th century, when, under the influences of a firmly estab¬ lished state and a supremacy of episcopacy over monastic provincialism, ecclesiastical architec¬ ture assumed a foremost place in the social organization of the time. The basic principles •of the Gothic styles were, first, the concentra¬ tion of thrusts upon isolated points of support, a method adopted by the late Romanesque designers in their substitution of groined for barrel vaults, and, second, balanced thrusts, by which the strain weights exerted by the stone vaults were opposed by counter-thrusts, until these various thrusts were concentrated into a final resultant pressure which was transmitted by flying half-arches to external buttresses. The natural corollaries, whose development was forced through the application of those two principles, were ribbed vaulting and the pointed arch. This latter feature had been used in the Romanesque period, but it remained for the Gothic creators to appreciate its full structural possibilities. They built their groin ribs of semi-circular or pointed form, but the wall ribs were, without exception, pointed arches of such curvature as would bring the apex of each

nearly to the level of the groin intersection. The pointed arch, thus introduced as a structural device for the vaulting ribs, necessarily deter¬ mined the profiles of the windows and nave arches. The advance in constructive science made possible the enlargement of the windows and the suppression of enclosing walls, condi¬ tions which promoted the use of stained glass and the necessary tracery for the support of the glass. The constructive supports were care¬ fully moulded and buttresses were terminated with pinnacles — structural propriety was em¬ phasized by decorative embellishment until there was produced a complex of constructive beauty which in its mystery and vivacity harmoniously presented the great ethical ideal of deity. The various styles of Gothic are universally dif¬ ferentiated by the character of the window tracery. The formative era is known as the Early Pointed Period (1160-1275). The sim¬ plicity and conventional treatment of structure and detail of this period gradually underwent change. In the Middle Pointed Period (1275— 1375), knowledge of construction brought per¬ fection in vaulting, and skill, resulting from training, developed a school of sculptors who delighted in the

expression of naturalistic forms of mature foliage. The tracery, with its slender moulded bars and geometric combinations re¬ flected the varieties of the achieved structural science. Skill and fancy finally suppressed the decorous art of the Middle Pointed Period, and flowing or flamboyant tracery in France and perpendicular bars and four centred arches in England and <(branch-tracery 3) in Germany characterized the final or Floric Gothic (1375—

1525).

The masterpieces of cathedral design are Notre Dame, Paris, Amiens, Rheims, in France; Canterbury, Lincoln and Salisbury in England ; Strassburg and Cologne in Germany ; the Ca¬ thedral of Antwerp in Belgium and the noble structures at Toledo and Burgos in Spain. In Italy civic pride expressed itself typically in the imposing edifice at Milan and Santa Maria del Fiore at Florence.

Renaissance. — During the Mediaeval period arbitrary authority and ecclesiastical organiza¬ tion had inhibited the individual expression of human intellect and will. During the 12th and 13th centuries in Italy, the restrictions of dog¬ matism and centralized arbitrary authority and artificial union gradually gave way before th % tide of Humanism, a movement that was related to every phase of life and expressed itself sym¬ pathetically in a reapplication of classic methods and an adaptation of antique art to the require¬ ments of the period of the Rebirth, or Re¬ naissance. Back, almost in the Dark Ages, may be found the beginnings of this movement. Classicism had never lost its influence among the scholars of the East and in mediaeval times the intellectual centres of Italy were continually influenced by the teachings of visiting Greeks from Constantinople. The living examples of Roman and Greek art that showed their types of studied beauty continually before their eyes could not fail to affect the literature and art of Italy. A group of men who laid the founda¬ tion for the registering of the exultant awaken¬ ing of modern thought and life, were Petrarch; Giotto (the architect-sculptor); the Pizani; Brunelleschi (architect and structural inventor) ; Donatello (sculptor), and Masaccio (the

apostle of individualism). The entire gamut of nature forms and the whole fundament of Roman structural possibilities and decorative individualism was made plain to the world in the teachings of the

masterpieces produced by them. As the result of foreign invasion and commercial intercourse, the Humanistic styles of Italy came early in contact with France, the

Netherlands, Germany, England and Spain. _ In

Italy, (<although the new architecture began with the colossal dome of the Cathedral' of Florence and culminated with the stupendous church of Saint Peter, at Rome, it was predominantly an architecture of palaces and villas, of fagades and decorative display. Constructive difficulties were reduced to their lowest terms and the con¬ structive framework was concealed, not em¬ phasized by the decorative apparel of the de- signA Among the masterpieces of the Re¬ naissance are many buildings of small dimen¬ sions, such as gates, chapels, tombs and fountains. In these, the individual fancy had full sway and produced surprising results by the beauty of carved detail. While the general styles of the Renaissance in all countries may be divided into the formative period, the classic period, the de¬ cline and the rococo period, nevertheless on ac¬ count of the personal expression of the styles, the real name that should be assigned to a given period should be the name of the great master of an era. The architectural motifs instituted by Brunelleschi in the construction of the dome of Santa Maria del Fiore in Florence (1420), and the Pazzi Chapel (1429) ; the Church of Santa Maria Novella (1456) and the Strozzi (1490) and Rucellai (1460), Palaces, Florence by Alberti; the Cancelleria (1500), the ((Tem- pietto® (1500), at San Pietro in Montorio by Bramante in Rome; the Farnese palace (1520), by San Gallo; the Massimi palace (1531), Rome, by Peruzzi, the dome of Saint Peter's (1564), at Rome by Michelangelo; the Palace Pompeii (1530), Verona, by Sanmicheli ; the Basilica, Vicenza (1560), by Palladio; the Palace Caprarola (1530), by Vignola; the Palace Grimani (1535), Venice, by Sanmicheli; the Library of Saint Mark (1536), by Sanso¬ vino, Venice, and Santa Maria della Salute (1631), by Longhena, Venice, are types estab¬ lishing styles of architectural composition and decoration that continued strong in their in¬ fluence from the time of their creation to the present day. These edifices are true indices characteristic of the Humanesque civiliza¬ tion in Italy. They are essentially prod¬ ucts of adaptation, and, involving no new principles of construction, did not have in¬ herent in their styles the germ of a new architecture. The Italian campaigns of Charles VIII (1489), Louis XII (1499), and Francis I (1515), resulted in the introduction of Italian culture into France. The personal contact made possible by these military activities emphasized a developing love for the luxurious facilities for living and the new mental bearing toward life resulting from an understanding of the aesthetic classic attitude. The structural char¬ acter of the early

French Renaissance was feudal. In the Royal Chateaux the military structural character compromised with Italian decorative styles and evolved a formative Renais¬ sance art distinguished for its picturesqueness and the free and exuberant use of classic detail.

This blending period occupied practically the entire era of the Valois rule and covers the styles of the transition (1483 to 1515), the style of Francis I (1520-47), and the style of the ad¬ vanced Renaissance (1547-89), by which time the classic methods of design had replaced the delicacy, richness 'and picturesqueness of the Formative period. The Classic era, with the fulsome, florid styles of Henry IV, Louis XIV followed, succeeded in 1715 by the extravagances and capriciousness of the Rococo period. Sev¬ eral edifices reflect in the broadest artistic sense the stylistic peculiarities of these three eras of the French Renaissance. The Chateaux at Blois, begun by Louis XII depicts all of the variations of the Blending or Formative period. The increasing use of the orders of architecture and the restrictive following of antique precedents exhibited in the Luxembourg Palace, the monumental colonnade of the Louvre, the Hotel des Invalides, and the Place Vendome exhibit the stage of development under the Bourbons. License overcame, under Louis XV, the monumental observations of formal principles of classic design. The notable exceptions to this general trend of capricious¬ ness is found in the works of the Ecole Mili- taire, originally terminating the Champ de Mars, and the two imposing edifices, adorned with monumental colonnades, of the Place de la Concorde, Paris, planned by the gifted Gabriel, which are the great architectural achievements of the period of the Decline, and, while the style of Louis XV itself was a style that char¬ acteristically avoided the formality that dis¬ tinguishes classic design, these particular works have served as inspiring examples for all sub¬ sequent architects. The style of the Decline was halted by the revival of interest in things of classic origin during the period of reaction under Louis XV and the Empire, when in the Pantheon and the Madeleine and the Arc de l'Etoile there was a registration of the convic¬ tion that the translation of grandeur was pos¬ sible only through the expression in architec¬ tural forms of classic Roman canon. The ar¬ tistic history of the Louvre is an epitome of the entire history of French architectural develop¬ ment. Commenced under Francis I (1546), the beginning exhibits an Italian character. The work associated with the reigns of Henry II, Charles IX and Henry III (1547 to 1589), char¬ acterize the developing Renaissance. The addi¬ tions made during the reigns of Henry IV,. Louis XIII and Louis XIV exhibit the develop¬ ment of the orders and matured Renaissance method, while the colonnade under Louis XIV types the high water mark of

Classicism. Napoleon I added his quota, and under Napo¬ leon III, the Empire found its expression in what is now known as the New Louvre, two wings projecting from the old palace.

In England, The Netherlands and Germany, during the time contemporaneous with the Valois era in France, the great country man¬ sions, manor houses and palaces were the first to receive and show Italian influence. The Renaissance in England makes its first feeble appearance in a decorative way during the Tudor period, a debased Gothic style. There followed during the Elizabethan period (1 566— 1603), by Dutch and Italian artists, a curious mixture of Gothic and Italian forms, wffiich is

well exemplified in the Burghley House. De¬ tails of freely treated classic forms, which came into use during the reign of James I (1603-25), illustrate the Jacobean style. This style in reality was the introduction to the Classic period in which, under Inigo Jones (1572-1652) and Sir Christopher Wren, (1632- 1723), correctly proportioned and monumen¬ tally conceived public works were erected. The palace at Whitehall (Jones) and Saint Paul's Cathedral (Wren) summarize the achievements of this period. Under the Georges a revival of Roman precedents, due to the genius of Robert Adam (1728-92), took place. With the idea that the architect should control all phases of his design, including even interior decora¬ tions and furniture, the name of Adam became synonymous with an English decorative school that produced results showing a rare taste in combining classic motifs with fertile fancy. The abandonment during the late Georgian period of the stiffness of the earlier era marks the characteristic of the style that served as the fountain head from which the American colonies borrowed models of their earliest architecture. The American churches were adapted from the Wren-Gibbs precedents (Saint Paul's, New York 1766). The drawings of Adam and his associates affected all phases of the domestic design. The translations into wood and brick of the Georgian stone motifs distinguished the early American style to which the name Colonial has been applied. (Mt. Vernon, the Home of General Washington).

The same general progression that marked the development of the Renaissance styles in France occurred in Germany, although the periods are not as definitely established. Be¬ ginning late (1555) the change from Gothic to Classic was rapid. Unlike France, the chief

examples of the various periods are for the most part confined to secular architecture. In castles, town halls and corporation houses, irregularity of plan and a tendency to distrib¬ ute ornament freely over facades, feature the German Renaissance. The orderly character of the French and Italian designer is replaced by the personal preferences of the German carver. The highest achievement of the era is the Castle of Heidelberg (1601) and its climax is reached in the degraded use of Rococo orna¬ ment in the Zwinger Palace, Dresden.

In Spain skill in metal work and delicate carving characterize a free and joyous appli¬ cation of Italian Renaissance forms to con¬ structions of the early 16th century. This style, known as the Ploteresque (1556), was widespread throughout Spain. The portal of the University at Salamanca and the Church of San Domingo at Salamanca are excellent examples of the style. The artistic barrenness of the reign of Philip II was followed by a cold classic era — Griego-Romano — whose masterpiece was the Escurial, completed by the great Herrera. The palace of Charles V, ad¬ joining the Alhambra, Granada, by Beruguete exhibits the Spanish adaptation of the Italian-Paladian style. Toward the end of. the 17th century a period of decadence set in during which debased taste and the throwing aside of all architectural restraint gave rise to the style Churrigueresque.

The Netherlands were late in re-acting to

the influence of Humanism and, in general, tended toward florid and unrestricted combina¬ tions of Italian, Spanish and French prece¬ dents.

Modern. — During the latter half of the 18th century a great activity in archaeological re¬ search took place. Scientific examination of classic and pre-classic monuments and sites was undertaken, which procedure, with increas¬ ing enthusiasm, has continued to the present day. Academic theory and fanciful classic idealism gave way to definite and rational un¬ derstanding of Roman and Greek methods of construction. The first effect of the publica¬ tion of archaeological research inspired the am¬ bition upon the part of designers in various countries to design and construct after the form of the classic prototypes. This struc¬ tural interest gave rise during the first half of the 19th century to the Greek and Roman classic revivals. The works of Piranesi, Lord Burlington, the illustrated description of the excavations at Pompeii, Herculanaeum, Pal¬ myra and Baalbek and Spalato, stimulated a Roman revival which in France expressed itself structurally in the Pantheon (1759—90) in which the dome and the porch of the Pantheon in Rome was the prototype. Napoleon

commissioned Yignon (1807) to erect the Church of the Madeleine, a design whose interior is based upon the Roman Thermae and its exterior a monumental peristyle of Roman Corinthian columns. The column of Trajan in Rome inspired the Napoleonic column of the Place Vendome, and the various monumental arches of triumph re¬ echo the Roman triumph forms.

The publications of Greek archaeological research, the antiquities of Athens by Stuart and Revett, Paestum by Major, the practical in¬ terest of Lord Elgin, and particularly the his¬ tory of art by Winckelman, issued synchro¬ nously wfith the works of Stuart and Revett, in which the enunciation of the principle that a canonical relation between a whole and the various parts of a structure was necessary to produce an harmonious and balanced result forced the acceptance by many of the belief that the prototypes oi a perfect architecture were to be found not in Roman examples but in Hellenic. Many buildings were therefore erected in England, Germany, France and America in the style of the Greek revival, in which Greek Ionic ana Doric columns and de¬ tails were used in profusion. While monu¬ mentally and dignity were obtained, the failure to appreciate the interdependence of the func¬ tions of Greek sculpture and Greek architec¬ ture with its then unknown refinements, re¬ sulted for the most part in an architectural style that was lacking in animation and national character. In Germany, the Greek revival was frequently modified to meet the needs of modern conditions, and while archaeological correctness was to a degree subordinate, the more rational use of the Greek forms achieved a better style than in England. The style in England is exemplified by the Bank of Eng¬ land (1788), the British Museum (1823), Saint George's Hall, Liverpool (1815), and in Ger¬ many by the Brandenburg Gate, Berlin (1784), the Old Museum, Berlin, and the Propylaea, Munich, and in America is best expressed in the

Treasury, Washington, the old Custom House, New York, Girard College, Philadelphia, and the State House, Albany.

The results shown in the architectural monu¬ ments of the period in Germany, England and America were disappointing, for architecture to be completely successful must reflect the conditions of the civilization whose activities it is planned to house. The impossibility of in¬ stilling into modern life the conditioning causes of a dead

civilization, made it impossible for the structural forms that were employed to re¬ flect the functioning of the civilization of to¬ day.

In France the enthusiasm that resulted from the Greek revival stimulated an ambition for added refinement and purity. The delicacy of detail and the spirit of spontaneity that marks the Library of the ficole des Beaux-Arts and the Library of Ste. Genevieve exhibit well the possibilities of the aesthetic influence of Greek types.

Contemporaneous with the Roman and Greek revivals due to the influence of scholars and artists who travelled in the Far East, a pseudo-Chinese design became the vogue for many porticoes, pavilions and landscape acces¬ sories throughout France and England. The novelty and decorative possibilities of this Oriental influence, although for years imper¬ fectly understood, have markedly influenced sportive and landscape design to the present day.

In Great Britain, about the middle of the 19th century, there appeared a revival founded upon the national Gothic architecture. The movement known as Victorian Gothic had its beginning in an archaeological enthusiasm in which the decorative possibilities of English Gothic caused many misapplications of the Insular Gothic forms. Subsequent to 1850, archaeological method gave way to an intel¬ ligent effort to adapt the Gothic principles to modern requirements, as the result of which ac¬ tivity there arose a number of monuments im¬ posing in mass and refined in detail, the most successful of which is the building that houses Parliament at Westminster, London. The in¬ fluence of this style extended to America dur¬ ing the last 40 years, but having no deep foundation in national requirements it has fallen into disuse and, like the Greek and Roman styles, has been replaced by designs founded upon Renaissance principles. In France, the 19th century Gothic revival very slightly affected the development of the modern Renaissance. The few buildings that were erected are generally superior to the English examples resulting from the same influence, in that the structural side of the problem has been scientificallv dealt with ; for the English and American interiors of the pseudo-Gothic style, for the most part completed with plaster- work, compared unfavorably with the French constructions in that, in France, the vaultings and dependent details are executed in masonry. Among the various nations in Europe, eclecti¬ cism made itself apparent during the last quar¬ ter of the 19th century. In modern times, the desire for truth and logic through struc¬ tural form has appeared in a number of suc¬ cessful buildings in France, Germany and Eng¬ land. Perhaps the most remarkable example of eclecticism is the Trocadero, Paris. It is im¬

possible to classify this edifice according to architectural styles, but fulfilling its functions as a great Expositional Building, it is typical of the possibilities of a structurally trained archi¬ tectural mind, in which license and extrava¬ gance are restrained by a knowledge of stylistic precedents.

The United States. — It has been the ex¬ perience of all civilizations that a national art is not attained until there has been developed a suitable centralized authority, possible only with the establishment of a political and commercial independence. A nation achieves such a posi¬ tion after a long struggle, and, from the time of primitive conditions each step in the formation of an effective national life is marked by archi¬ tectural and constructive methods which punc¬ tuate the epochs of the country's advance. Commercial conditions, utilitarian requirements and scientific discovery necessitate modifica¬ tions in structural procedure and types of plan and mass composition adapted to new and local requirements. Dependence upon historic ante¬ cedents is continually evident. The historic development of the architecture of the United States aptly illustrates the conditions that must surround and control the evolution of archi¬ tecture and its dependent arts in a growing and virile nation. From the time of the colonization of America, until the first half of the 18th cen¬ tury, building was confined almost entirely to sheltering and utility structures. During the period from 1725 to 1776, increase in wealth and population brought about a style based upon that in vogue in England at the time. Trained architects were not to be had in the colonies and the models which set the colonial fashion, due to lack of training of America's builders in classic traditions and the necessity of alterations caused by the use of brick and wood instead of stone, produced an architecture, which, while interesting, had no truly monumental character. In churches in New England and the Middle States, the English designs by Wren and Gibbs obviously served as prototypes and the influence of Adam and Sheraton is patent. Craigie House, Cambridge ; Independence Hall at Philadelphia and the Old State House at Bos¬ ton, while refined in mass and detail are not monumentally striking. In the West, in¬ fluenced by Spanish types, were built picturesque mission buildings, and a few churches and secular buildings which exhibited a translated phase of the Spanish Churrigueresque. The era between 1776 to 1812 following the growth of the national government and the development of Federal strength, a characteristic monumen- tality became evident as is well exemplified in the central portion of the present Capitol at Washington, the City Hall, New York, and the State House at Boston. The enthusiasm which resulted from the ar¬ chaeological discoveries

in classic lands spread to the United States, and previous to 1850 re¬ sulted in an architectural classic revival. The chaotic conditions surrounding the Civil War seriously impeded structural progress from 1850 to 1876. However a few monumental undertakings belong to this otherwise construc¬ tively poor era. The Capitol at Albany, the dome of the Capitol at Washington, Saint Patrick's Cathedral in New York, belong to. this period. Due to a variety of causes, the opening up of the West, the great conflagrations

in Boston and Chicago, and the return from Europe of Hunt and Richardson, men thoroughly trained by European study, a re¬ vival in architectural spirit and production of the most powerful nature made itself felt throughout the country during the last quarter of the 19th century. With the Romanesque style as his vehicle, Richardson left an artistic imprint upon the nation's art that continues to the present day. Structural verity and dignity of mass mark his works (Trinity Church, Bos¬ ton; County buildings in Pittsburgh). Hunt, with his great faculty for organization and his thorough founding in the principles of the Renaissance, formally established the Renais¬ sance style. The Marble House, the Breakers at Newport and the Metropolitan Museum of Art in New York exhibit his genius for organ¬ ized plan and standardization of style. The demand for great commercial buildings in which height was a necessary component on account of the problem of housing multifarious activities in restricted areas, caused the de¬ velopment of new structural form. The intro¬ duction of elevators, the invention of various methods of fireproof construction, the inauguration of a skeleton steel fabric and the solution of problems of lighting, heating and sanitation made possible the rearing of great ((sky scrapers, M the most notable example of which is the Woolworth Building, New York. In spite of the great advances that have been made in the development of architectural science in the United States, no style can be said to have developed that is new and char¬ acteristic. Commercial requirements, the de¬ mand for speed in design and construction and the experimental conditionings that restrict the modern designer have discouraged the evolu¬ tion of a typical national style. In works of a public and commercial character the necessity for a co-operative understanding between the architect and the engineer is increasingly^ felt. It is only when a unified resultant combining the efforts of the architect and the engineer has been achieved — a resultant in which plan and detail shall adequately and truly function with the discoveries of modern science, that a new

American style will appear.

Lewis F. Pilcher.

State Architect of New York.

ARCHITECTURE, Education in. Train¬ ing. — The ideal architect is an artist who em¬ ploys structure as his medium of expression, — whose function it is to produce beautiful build- ings.

That this ideal is realized by relatively few of those who are called architects in our day is due to the fact that its embodiment under modern conditions involves the correlation of activities of very diverse nature; and few there are who display in just proportion the capaci¬ ties these diverse activities involve. These may be placed in three great groups, and the archi¬ tect's training may be considered under three headings, namely, his artistic education, his technical education, his business education.

The student who hopes to be an artist-archi¬ tect must train himself somewhat as do all artists in all other fields. Yet he cannot with his own hands bring into existence the building his imagination pictures; he is compelled, as no other artist is, to rely upon the work of others

in the realization of his artistic creations. Hence it becomes very important for him to gain a very special technical training in order (1) that he may learn how to indicate to his artisan helpers the nature of the work to be done, and (2) that he may become acquainted with the methods proper to these artisans in the accomplishment of their several tasks.

But beyond this the architect who would reach the highest goal should prepare himself for a business career. For unlike other artists he is usually unable to express himself in his chosen medium unless others entrust to him the expenditure of large sums of money. And if he is to be thus trusted he must exhibit executive ability, a knowledge of men and capacity to manage them, and at the same time he must possess unquestioned reliability and business sagacity.

In this connection it may perhaps be well to note that in our time there are not a few men who are counted as successful architects who are really merely good business men working in a special field, men without high artistic ideals or susceptibilities, and who gain such success as they attain by the mere direction of hired designers, and by the careful management of the business of their clients. The education of such men involves only such general training as is required by

other business men, with the addition of such studies as will give them a knowledge of the architectural forms current in our time, and such a superficial acquaintance with the principles of architectural design as will enable them to choose as employees de¬ signers whose work will satisfy the average taste of their clients.

We need not concern ourselves, however, with business men of this type, for they will not be looked upon as architects by those to follow us unless they combine with their busi¬ ness skill the other qualities demanded of the ideal architect, to the consideration of whose training we may now turn our attention.

Apprentice System. — As is indicated by the etymology of his name, the architect was originally a master workman ; one who had arisen from the ranks because he had evinced skill and imagination in guiding the construc¬ tion of buildings after the methods current in his time, and who through the exercise of this skill and imagination had produced buildings which were looked upon as beautiful by his fellows.

The methods employed by the architects of antiquity are little known to us, yet as the work under their control became more com¬ plicated they must have found it necessary to employ assistants who at first were without doubt merely trade apprentices, and from among these the architects of the next genera¬ tion would most naturally be chosen.

In modern times, as the use of complicated drawings has become more and more import¬ ant, the architect has found it necessary to use his assistants on special work which does not involve the skill acquired by artisans in- construction ; and thus the type of man serving as the architect's apprentice has changed. While not an artisan himself he has 1 arned his master's methods, and presently we find men thus trained assuming the function of the architect without any preliminary practice as constructors.

The apprentice system of education for the architect as thus developed was not unlike that adopted in the earlier days in the training of artists in other fields, and with such modifi¬ cations as are natural in relation to the com¬ plexity of modern life it has persisted even to our day in many lands. In England a large proportion of the eminent

architects of the day have been educated in this manner, and until within a generation in this country no other system of training for the architect was avail¬ able.

A similar apprentice system obtained in the training of lawyers and doctors until a late period when special schools of law and medi¬ cine became established. The success of these schools called attention to the fact that, from a certain point of view, the architect is as clearly a professional man as the doctor or lawyer, and that the weaknesses in the train¬ ing of doctors and lawyers under the appren¬ tice system, which had led to the establishment of their special schools, existed also in con¬ nection with the study of architecture.

These weaknesses need but to be stated to be apparent to all. Evidently the teaching a busy architect can give to his pupil must vary greatly in quality and amount as the demands of his practice vary. Evidently his teaching is likely to be unsystematic ; and it is certain to be biased by his individual taste, a matter which is of importance in relation to certain subjects, to be referred to below, where the broadest catholicity is of importance.

Thus following the example set in other professions, there have been established schools of architecture in which an effort is made to give the student a systematic training which shall not vary in quality and amount from year to year, and which shall avoid the unfortunate influences which are liable to obtain under the apprentice system. It will be generally con¬ ceded that the schools as a rule have been rea¬ sonably successful in this effort, if general re¬ sults are considered, if particular instances are not overemphasized.

But the abandonment of the apprentice sys¬ tem of training in the law and medicine car¬ ried with it a loss which was generally over¬ looked. The newer method tended to minimize if not to eliminate the inspiration which comes to the student as the result of contact with the living master in the active practice of his pro¬ fession. Nowadays students in law and med¬ icine appreciate this loss and are supplementing their school training with practice under the guidance of men of reputation in their special fields.

But the loss to the student of architecture who fails to come under the influence of a practising master can scarcely be overstated. For the artist such an influence is of vital im¬ portance ; under it he will absorb, as it were, stores of lore peculiar to his art which can never be .expressed in the alien words of the lecturer, or upon the pages of a textbook. Fortunately the architects themselves are be¬ ginning to see

that in one way or another the architectural student must be brought to feel this influence. What was valuable in the ap¬ prentice method of education, and has been in many cases lost, must be regained. In no inconsiderable measure it has been regained in the atelier system as developed in the Ecole

des Beaux Arts in Paris, and fortunately a distinct movement in the same direction is noted in the later developments of the schools existing in this country.

Granting then that there is a vital something of supreme importance to the architectural student which the school training cannot give, let us ask what he can gain in the schools, with economy of his time and labor, in connection with the training which we have seen to be desirable in the three directions above spoken of, which for convenience we shall treat in re- verse order.

Business Training. — The architect's busi¬ ness training cannot be materially advanced in the architectural school. The general educa¬ tion, and the influences which produce the reliable, accurate and farseeing business man, can best be gained quite apart from the school course, in the practising architect's studio. In this connection it may be noted that, while the artistic side of the architect's life must always be first considered, it is easy to under¬ estimate the importance of his business career. The student fresh from the schools too often thinks that he may at once undertake import¬ ant commissions without the business expe¬ rience which a long-established practice brings. He will tell you that this can be purchased ready made by the employment of others to attend to this drudgery so repugnant to a man of artistic temperament.

But in this view there lurks a hidden danger to the art of architecture itself. As has been said above, the confidence of the client must be obtained by the man who is to spend the cli¬ ent's money, and if the skilled designer is not one who inspires this confidence the control of great constructions will surely go to men of less artistic ability, and the skilled designer will find himself directed, rather than the director of the work necessary to the embodi¬ ment in solid form of the ideas which his imagination creates. Nothing can be more dangerous to progress in architecture as an art than the establishment of a belief that the architect's function ends with the creation of designs on paper ; his art product is in the constructed building, and if effective artistic result is to be gained he should actually direct the construction in all particulars and to the very end, and should train himself to assume all the labor and responsibilities this direction involves.

Technical Training. — We may now turn

to the consideration of the architect's technical training, which in the first place must result in the mastery of methods of representing his conceptions so that they may be understood by his clients, and comprehended by the work¬ men who are to be employed to embody them in material form. This means in the main the attainment of skill in technical draughting; and this can very clearly be better and more quickly gained by the concentrated effort possible in a school than in the course of the routine work in an architect's office. The student should be warned, however, that a danger is connected with the attainment of this skill if he comes to look upon his drawings, which are no more than tools of his trade, as works of art in themselves ; for these drawings are necessarily on plane surfaces, and if he gives too much thought to their perfection he is liable to over-

look the importance for him as an architect of thinking in solid dimensions.

The general principles governing the repre¬ sentation of details of, and the writing of speci¬ fications descriptive of, the work to be done can also be learned in the schools, but little more than these general principles ; the student must not hope to gain facility in these im¬ portant matters without the experience of actual office practice.

Artistic Training.— It is true of all artists, as it is of poets in particular, that they are born and not made ; and surely unless all op¬ portunity is lacking the born architect of genius will show his power whatever his training may be. Nevertheless there are certain matters which even the genius must learn by his own often bitter experience, or else from those who have practised his art before him; and these matters may in some particulars be learned most quickly and surely in a school. It will be agreed for instance that each artist should un¬ derstand well the nature of the medium in which he is to express his measure of genius. The medium of the artist-architect is construc¬ tion in masonry, in iron and in wood ; and a thorough knowledge of the principles of con¬ struction is most important to his progress. This knowledge is the ground work of engi¬ neering, and clearly can best be gained in a school. In relation to this special study it may be said, on the one hand, that the most thorough training in engineering cannot injure an archi¬ tect provided it does not take from the time to be given to

other equally important matters to be referred to below. On the other hand it must not be forgotten that the architect's func¬ tion is not merely building as such, but build¬ ing in a manner that shall stimulate in his fellows the sense of beauty. This molding of constructional forms into shapes which are beautiful is a matter of difficulty which has been attained by architects in the past only through numberless trials, with their failures and successes ; through the elimination of the ugly, and the repetition with ever increasing improvement of that which has shown itself to be pleasing. The architect has thus always worked with, and upon, established modes of construction, and he always will ; and this dis¬ tinguishes his work from that of the engineer, whose function it is to devise special modes of structure to meet special structural demands. It is apparent then that the training of the architect in relation to his structural medium differs from that to be given to the engineer, in that the architect does not need to gain more than a thorough understanding of the princi¬ ples of structure which he is to use in his work, and this does not necessarily involve so pro¬ longed or detailed a study of the sciences as is needful for the engineer.

The Architect as a Designer. — We may now turn to the consideration of what is of the highest importance to the architect, namely, his training as a designer. As we have suggested above, no amount of training can' give to a man that measure of genius which constitutes him an artist. None the less the greatest genius will gain much if he learn the lessons taught by the experience of the masters of the past, and the man who is less than a genius were stupid if he did not welcome this teaching. The masters of architecture of the

past have left us a record of the forms and relations of parts which after long series of studies and experiments they have found to be most beautiful, d his record is not found in writ¬ ten word, but in the great monuments which have been left to us; and the study of these monuments after a certain method constitutes the history of architecture. The student should gain as thorough a knowledge as possible of this history, with especial reference to the vital development of the various greater and lesser styles, giving particular attention to those forms in which the highest perfection has been attained in the past, and making a special study of those forms which appeal to him as most likely to be of service to him under the con¬ ditions which surround him. He should, also gain a considerable acquaintance with the other arts, especially with those most closely related with architecture, namely, sculpture and paint¬ ing.

It must be apparent to the reader from what has preceded this that no

student should under¬ take the practice of architecture without facing the fact that he has before him a long road, and a life of arduous efforts. Evidently a large part of the information just referred to can be gained through textbooks and illustrated lec¬ tures given in the schools. But as clearly is it important for the architect to study the art products themselves, and this can only be done satisfactorily by travel in the Old World, where the great architectural monuments of the past exist. Where such travel is impossible, he may gain something approximating to it by studying such models of masterpieces of the past as are available in museums, and by the thoughtful use of photographs of existing masterpieces.

Conclusions. — - The conclusions reached may now be summarized in a few words. Be¬ yond such general culture as he may be able ,to gain, the most desirable special training for an architectural student will be given by certain studies which can best be taken in established architectural schools, supplemented by careful observations of monuments of architecture in the course of travel in Europe, and by work in the studio and business office of a skilled practitioner who is a masterful artist.

It were well if life were so ordered that the acquisition of technical facility, and the study of design -under a master, could begin in early youth, and continuing could fill the leisure hours of the student while gathering the store of general information which tends to broaden his life ; but under existing conditions such an order of work is difficult to arrange.

If choice is to be made among the archi¬ tectural schools, the one chosen should if pos¬ sible be one situated in a city where building operations are proceeding on a large scale, and especially one in which design is taught by masters of architecture who are in active practice.

Finally the student would do well who could manage to obtain a position in the draughting room and business office of some architect in active practice during a large proportion of the long school vacations so gen¬ erally given during the summer season. See Painting, Education in ; Sculpture, Educa¬ tion in.

Henry Rutgers Marshall.

ARCHITRAVE, ar'ki-trav, in classical architecture and imitations of it, the part of an entablature which rests immediately on the heads of the columns, being the lowest of its three principal divisions; also the molded en¬ richment on the faces of the jambs and lintels of a doorway or window, this being a part of the entablature carried around the opening and mitred at the upper corners.

ARCHIVES, ar'klvz (Latin archivum), a room or building in which are kept the records, charters and other papers belonging to any State, community or family. Very frequently the name is applied to the documents them¬ selves. The archives of the United States are now superintended by the heads of departments.

ARCHIVES, Imperial Russian. This term (ˆarchives®) appears in Russian legislation for the first time during the reign of Peter the Great, but the idea of conserving the important acts is very old in Russia, in fact it dates from the earliest period of Russian literacy. Be¬ sides the earliest ˆdoskas® (i.e., tablets) which were exchanged between the government of the old Novgorod and the German statesmen in their diplomatic negotiations, there are written acts from the 14th century preserved under the name, (History of the Russian Civil Code) (I, § 45). Churches and monasteries had, at the time of Peter the Great, well-kept archives not only relating to ecclesiastical matters but also to state affairs : but the great reformer was not satisfied with them and he ordered all the ministries to use the official acts only for three years and after the expiration of that period to place them in the care of an archivist specially appointed by the Emperor. During the reign of Empress Katharine II her archives were left in the custody of a special institu¬ tion which passed over to the Ministry of Justice. Later, however, that Empress, in the pursuit of her reforms, abolished many institu¬ tions and for the custody of documents and acts she ordered two historic archives to be established : one in St. Petersburg and the other in Moscow. The most important archives in the Russian empire are the following: (1) The Archives of the Imperial Council which were kept, until 1886, together with the archives of the Senate in the building of the Senate but since that time they have been moved to a magnificent palace in the <(Millionaya® street in Petrograd. (2) The State Archives which are kept in the Ministry for Foreign Affairs at Petrograd. Those archives contain, among other important diplomatic documents, the secret papers of the Cabinet of Empress Katharine II, as also those relative to the death of Emperor Alexander I and the succession to the throne of Emperor Nikolas I and the docu¬ ments of the Supreme Court. (3) The Central Archives of Moscow , which is the richest store¬ house of the most important historic docu¬ ments in Russia.

Established by Peter the Great those archives contain most of the docu¬ ments of the Russian Embassies abroad and it was impossible for a long time to separate them and transfer them to the Ministry of Foreign Affairs, to which institution they rightly belong. (4) The Archives of the Holy Synod, kept in the palace of the Synod, con¬ tain several documents previous to 1721 (i.e., two documents from the 16th century, 15 from

the 17th century and 70 from the 18th century) relative to important historic events and to the archives of the Synod itself. (5) The Moscow Archives of the Ministry of Justice, containing documents relative to the affairs of the State Senate as also some of the oldest records of judicial proceedings from the 13th to the 18th century. (6) In the Ministry of Pub¬ lic Education there are two important historic archives: (a) Archives of Kief, established by Imperial decree in 1852 in the building of the University of Saint Vladimir for the purpose of keeping the ancient documents of the gov¬ ernments of Kievskaya, Podolskaya and Volyn¬ skaya; (b) The Central Archives of Vilen¬ skaya, established at the same time as the Archives of Kief, for the purpose of keeping the documents belonging until that time to the various institutions in the governments: Vilenskaya, Grodnenskaya, Kovenskaya and Minskaya. Besides those there are the fol¬ lowing archives of minor importance: (1) The Central Archives of Vitebskaya; (2) The Military-Scientific Archives of the Imperial Russian General Staff; (3) The Archives of the Imperial Russian Admiralty ; (4) Historic Archives of the various governments , etc.

ARCHIVOLT, ar'ki-volt, in architecture, the ornamental band, often of moldings, on the face of an arch and following its contour.

ARCHONS, ar'konz, the highest magis¬ trates in Athens. There was for a long period only one archon, who possessed for life all the power and dignity of a king, and was chosen from the royal race of Codrus. In 752 b.c. a change was introduced, and the tenure of the archonship was restricted to 10 years, the per¬ son appointed being still a member of the royal race. In 714 the latter condition was abolished and the archonship thrown open to all the Eupatrids or nobles ; and in 683 a still greater change was introduced, the office being now made annual and its functions distributed among a body of nine. The reforms of Solon threw the archonship open to all who possessed a certain amount of property, whether noble by birth or not; and in 477 Aristides made it accessible to all Athenian citizens, without dis¬ tinction. Until 508 the mode of election was by suffrage of the nobles; election by lot was then introduced, and the person elected had to undergo a scrutiny before the Senate and be¬ fore the Agora in order

to show that his ances¬ tors had been citizens for three generations, and had to swear to obey the laws. The first of the nine archons was called <(the archon,® and sometimes the Archon Eponymus, because he gave his name to the year in all public records. He had the care of minors and orphans, and had to superintend some of the festivals. The second archon was called the King Archon. Upon him chiefly devolved the care of the religious concerns of the people, in connection with which he had to act as prosecu¬ tor of murderers and offenders against religion. The third archon had the name of Polemarch, and was originally entrusted with the super¬ intendence of military matters, though in lat°r times his duties were chiefly confined to the protection and superintendence of the resident aliens. The rest of the archons were called Thesmothetae, and exercised a general supervi¬ sion over the laws of the state.

ARCHYTAS, ar-ki'tas, an ancient Greek, a native of Tarcntum, a famous Pythagorean philosopher, renowned also as a truly wise man, a great mathematician, statesman and general. He was the contemporary of Plato whose life he is reputed to have saved by his influence with Dionysius, and flourished about 400-365 b.c., but the dates of his birth and death are unknown. The invention of the analytic method in mathematics is ascribed to him, as well as the solution of many geome¬ trical and mechanical problems. He con¬ structed various machines and automata, among the most celebrated of which was his flying pigeon. He is credited also with the invention of the pulley. He taught that the earth is a sphere rotating on its axis every 24 hours and that the heavenly bodies move around it. Plato is said to have borrowed some of his opinions from Archytas and Aristotle also is said to have been indebted to him for the idea of his categories and some of his ethical opinions. These opinions, however, appear to depend on spurious writings, the real philosophical re¬ mains of Archytas being of inconsiderable value. Horace mentions him in one of his poems (Carm. i, 28) as having been drowned on the coast of Apulia. For his mathematical fragments consult Blass, (Melanges Graux} (Paris 1884). The fragments attributed to him which relate to logic, physics and ethics are to be found in Mullach, (Philosophorum Graecorum Fragmenta) (Vol. I, Paris 1860-81).

ARCIFERA (Latin, arcus, bow, + ferre, to bear, carry), a division of Anura, including the toads.

ARCIS-SUR-AUBE, ar'se'su'rob', France, a town of the department of Aube on the river Aube. It is the birthplace of Danton, to whom a monument was erected here in 1886. In 1814 a battle was fought here between Napoleon and the allies in which the latter, with a much superior force, had the advantage and after¬ ward marched to Paris. Pop. 2,841.

ARCO, Italy, a town in the Tyrol, not far from the Lake of Garda, on account of its situation and mild climate a favorite winter resort of invalids. Pop. 3,782.

ARCOLE, ar'ko-la, a village in north Italy, in the province and 15 miles southeast of the town of Verona, on the left bank of the Alpone, celebrated for the battles of 15, 16 and 17 Nov. 1796, fought between the French under Bonaparte and the. Austrians in which the latter were defeated with great slaughter.

ARQON, ar-soh, Jean Claude Eleonore d', a French military engineer: b. Pontarlier 1733; d. 1 July 1800. He was received into the military school at Mezieres, 1754, and in the Seven Years' War he highly distinguished him¬ self, particularly at the defense of Cassel in 1761. In 1780 he invented the floating batteries for the attack of Gibraltar, which, however, were destroyed by the red-hot shot of the be¬ sieged. At the invasion of Holland under Dumouriez (in 1793) he took several places, including Breda. He then went into retire¬ ment, where he wrote his important '^Considera¬ tions Militaires et Politiques sur les Fortifi- cations> (1795).

ARCONA. See Arkona.

ARCOS DE LA FRONTERA, ar'kos da la fronta'ra, a town in Spain in the province of

Cadiz, on the right bank of the Guadalete, which is here crossed by a stone bridge. The sandstone rock on which the town, in form of a bow, is placed, rises 570 feet above the level of the river, which surrounds it on three sides. The houses are mean looking; the streets paved, but generally steep and narrow ; and the ancient walls and defenses are in a ruinous state. On the highest part of the rock stands the castle of the dukes of Arcos, partly in ruins. Pop. 15,700.

ARCOT, ar-kot', the name of two districts and a town of India within the presidency of Madras. North Arcot is an inland district with an area of 7,256 square miles. The coun¬ try is partly flat and partly mountainous. Pop.

I, 817,814. South Arcot lies on the Bay of Ben¬ gal, and has two seaports, Cuddalor and Porto Novo. Pop. 1,814,738. The town of Arcot is in North Arcot, on the Palar, about 70 miles west-by-south of Madras. There is a military cantonment three miles distant. The town contains handsome mosques, a Nawab's palace in ruins and the remains of an extensive fort. Arcot played an important part in the wars which resulted in the ascendency of the British in India. It was taken by Clive, 31 Aug. 1751, and heroically defended bv him against an over¬ whelming force under Rajah Sahib. Pop.

II, 000.

ARCTIC, a term applied to the North Pole, or the pole raised above our horizon, from the proximity of the constellation of the Bear, in Greek called arktos. The Arctic Circle is an imaginary circle on the globe, parallel to the equator, and 23° 28' distant from the North Pole, from whence its name. This and its op¬ posite, the Antarctic, are called the polar circles. Within these circles the sun does not set during a part of the year, and during a corresponding part does not rise.

ARCTIC CHARR. See Trout.

ARCTIC EXPLORATION. See Polar

Research.

ARCTIC REGION, the name given to the region of land and water surrounding the .North Pole, reaching on all sides to lat. 66° 32' N. The Arctic or North Polar Circle touches the northern headlands of Iceland; cuts off the southern and narrowest portion of Greenland ; crosses Fox Strait north of Hud¬ son Bay, whence it goes over the American continent to Bering Strait. Thence it runs to Obdorsk at the mouth of the Obi ; then, cross¬ ing northern Russia, the White Sea and the Scandinavian peninsula, returns to Iceland.

Climate. — ■ The most important facts now ascertained respecting the climate of the Arctic regions are, that the main line of extreme cold extends across the Polar Sea from the meridian of 90° W. to that of 130° E., reaching much farther on the Asiatic than on the American side, so that the winter temperature of Yakutsk (lat. 62° 2') is 7° F. lower than that of Rens¬ selaer harbor, in Smith Sound (lat. 78° 37'). But the American limit of cold oscillates much less than the Asiatic, the summer temperature at Rensselaer harbor being but 62°, while at Yakutsk it is 95° F. above that of winter. This difference is due to the

absorption of summer heat by the comparatively dry plains of Siberia,

while on the North American continent the numerous lakes and inlets moderate the climate throughout the year. To this it may perhaps be added that Greenland, owing to its peculiar constitution and position, is to North America a source of refrigeration which has no counter¬ part in the eastern continent. This circum¬ stance, and the humid atmosphere maintained by the numerous lakes, somewhat moderates the severity of the cold, but at the same time renders it somewhat more constant.

Arctic Ocean. — In its widest sense that portion of the ocean which extends from the Arctic Circle (lat. 66° 32' N.) to the North Pole, or more restrictedly from about lat. 70° N. Assuming the former limit, the Arctic Ocean is found entering deeply, in the form of gulfs, bays, etc., into the northern parts of the continents of Europe, Asia and America. The principal of these indentations are the White Sea in Europe ; Kara Sea, Gulfs of Obi and Yenisei in Siberia; and Baffin Bay in North America. It is united to the Pacific by Bering Strait, and to the Atlantic by a wide stretch of sea extending from Greenland to Norway. Among the principal islands of the Arctic Ocean are Greenland (at last proved to be an island) and east of Greenland the extensive group known under the name of Spitzbergen, the small island of Jan Mayen, and Iceland. West of Greenland and divided from it by Davis Strait and Baffin Bay there are a considerable number of islands of great size but little interest. North of Europe are the islands of Nova Zembla; and north from these Franz Josef Land, an archipelago as yet imperfectly known. The water of the Arctic Ocean is extremely pure, shells being distinctly visible at a great depth ; it also presents rapid transitions of color, chiefly from ultramarine to olive-green, the latter variations of color being produced by myriads of minute animals belong¬ ing for the most part to the Ccelenterata and Mollusca classes. Many have adopted the be¬ lief in the existence of an open polar sea about the North Pole. But this belief is not sup¬ ported by any positive evidence. Ice is nearly constant everywhere between Spitzbergen and the southern point of Greenland. This is called the main north ice. East of Spitzbergen and near Nova Zembla the sea is always beset, if not completely barred, by ice. In Baffin Bay and thence west to Bering Strait numerous expeditions have had a perpetual struggle with ice. The expedition of 1875-76 under Captain Nares, members of which reached a point 30 miles farther north than

had ever previously been attained, proceeding by way of Baffin Bay and Smith Sound, found no indications of an open polar sea. On the contrary the ex¬ plorers found north of 82° 27' a sea consisting of one unbroken sheet of old ice of immense thickness, which effectually barred the further progress of the vessels, while the ruggedness of the ice rendered it impossible to reach the pole by sledge. Nansen more recently found abundance of ice in the tract of sea crossed by him.

Arctic Current. — It seems certain that a current sets into the polar basin along the coasts of Norway and Lapland. It is probably the effect of prevalent southwest winds, though some call it a branch of the Gulf Stream. There is also a strong current running in at

Bering Strait. On the other hand, along the east coast of Greenland and in Baffin Bay the movement is generally south. In the numerous channels between Baffin Bay and Bering Strait the tides are regular but feeble ; indeed, it seems possible to trace across Bar- row Strait the line of neutralized or no tide, and this, there is reason to suspect, is also the line of comparatively permanent ice.

Minerals. — Valuable minerals, fossils, etc., have been discovered within these Arctic regions. In the archipelago north of the American continent excellent coal frequently occurs. The mineral cryolite is mined in Greenland and carried to the United States. Among other fossils the remains of large saurians are found in the Lias, which extends widely over the northern archipelago, and am¬ monites collected in abundance prove that in lat. 73° N. there was once a tropical tem¬ perature. The group of islands opposite the mouth of the Lena, in lat. 73°, are little more than accumulations of fossil remains carried down by the river and are annually visited for the purpose of digging fossil ivory.

Vegetation. — The plants peculiar to the frigid zone are stunted more by the dry winter winds than by short growing seasons and long winters. The reduction is confined to the limbs, as roots are as long and penetrate as far as in more temperate climates. The vege¬ tation is widely distributed, the species found in North America being practically the same as those found in Europe and Asia, and since trees become more and more scarce as the Pole is approached, the prevalence of the tun¬ dra formation is characteristic of the region. In respect to distribution, Arctic plants differ from Alpine plants (q.v.) which, though other¬ wise similar, especially in the census of cushion and rosette plants and plants with thick- skinned evergreen leaves, include many en¬ demic species. Arctic perennials are noted for the high percentage of species that develop winter-time flowering buds

which burst into bloom early in the spring. In the Arctic zone, less than 2,000 species have been de¬ scribed, among them very few trees. These are mostly stunted willows, junipers and birches, and beyond their northern limits flowering plants, grasses, mosses and lichens extend to the most northern land seen by man. Commonest among the flowering species are crowfoots, potentillas, poppies, saxifrages, whit¬ low grass (Draba) and scurvy grass (Cockle - aria). Thyme and angelica, growing in shel¬ tered spots, are the only perfume-bearers.

The English expedition of 1875-76 found 20 or 30 species of phanerogamous plants be¬ tween lat. 82° and 83°. From Churchill River on the west side of Hudson Bay (lat. 53°), the line limiting the forest runs constantly to the north of west till it reaches Norton Sound, a little south of Bering Strait, larch and poplar making their appearance as we go west. In Siberia, where the summer, heat is greater, woods flourish to a much higher lati¬ tude within the Polar Circle. In the Scan¬ dinavian peninsula the red pine reaches lat. 69°, the Scotch fir 70°, the birch 71°. Animal life is by no means deficient within the Polar Circle. Species indeed are few, but the in¬ dividuals are extremely numerous. The proof of this is to be found in the immense number

of skins of fur-bearing animals, eider clucks, seals, walrus, etc., annually supplied to com¬ merce. Recent expeditions have found the usual Arctic quadrupeds and birds as far north as the land extended. How far north the cetaceans reach is doubtful.

Notwithstanding this apparent abundance, the human being has in general a severe strug¬ gle for subsistence beyond 64° north latitude, although traces of Eskimos have been found as far north as 81° 52'. The Eskimos who in¬ habit Greenland and the extreme1 north of America have a hard life of it, often pressed, and not seldom cut off, by famine. Under their rigorous skies the resources derivable from the surrounding abundance of animal life can support only a handful of men. Even in Siberia, where the reindeer trained to the sledge and the great rivers frozen throughout the winter add so greatly to the facilities of intercourse or emigration, whole communities are frequently cut off by famine or disease. Yet we see Europeans settled under the paral¬ lel of 73° at Upernavik in Greenland, of 72° 2' at

Ustyarsk in Siberia, and of 70° 40' at Hammerfest in Norway, and explorers have wintered far north of this. The settlements in Greenland, northern Siberia, Kamchatka and the Hudson Bay territories are all more or less connected by trade with southern coun¬ tries, whence they derive their power of en¬ durance; and from the constant care required in order to guard against the consequences of the severe climate it is evident that to man the support of life within the Polar Circle must ever be difficult and precarious. Never¬ theless, owing to the abundance of lower ani¬ mal life, men have visited these regions for centuries to gather the exceedingly rich har¬ vests of furs and oil.

Following are the farthest .points of north latitude reached previous to the discovery of the Pole by Peary in 1909 : 1607, Hudson, 80° 23'; 1773, Phipps, 80° 48'; 1806, Scoresby, 81° 12' 42"; 1827, Parry, 82° 50'; 1874, Meyer (on land), 82°; 1875, Markham and Parr (Nares' expedition), 83° 20' 26"; 1876, Payer, 83° 7'; 1884, Lockwood, 83° 24'; 1896, Nansen, 86° 14' ; 1900, Abruzzi, 86° 33' ; 1906, Peary, 87° 6'.

Bibliography. — Conway, (The First Cross¬ ing of Spitzbergen) ; Greely, (Arctic Service> ; (Handbook of Arctic Discovery5 (5th ed.,

1910) ; and (Report on the Proceedings of the United States Expedition to Lady Franklin Bay) ; Hayes, (Arctic Boat Journey) ; Jack- son, (A Thousand Days in the Arctic5 ; and (The Great Frozen Land5 ; Tones, T., Nat¬ ural History, Geology and Physics of Green¬ land and Adjacent Regions5 ; Kane, (Arctic Explorations, the Second Expedition in Search of Sir John Franklin5 ; Nansen, (Farthest North5 ; Peary, (The North Pole5 (1910) ; Ray, (Report of the Expedition to Point Barrow5 ; Seton, E. T., (The Arctic Prairies5 (New York

1911) ; Schokulsky, (Russian Hydrographical Expedition to the Arctic Ocean5 (Edinburgh 1914) ; Wright, (Greenland Ice Fields and Life in the North Atlantic.5

John B. McDonnell.

Editorial Staff of The Americana.

ARCTURUS, a fixed star of the first magnitude in the constellation of Bootes, and thought by some to be one of the largest of the

fixed stars. It has a large proper motion, and is a noticeable object in the northern heavens.

ARCUS SENILIS, a term applied to a white or grayish white rim on the

outer edge of the cornea, due to the infiltration of a finely granular hyaline substance, heretofore thought to be a form of fatty degeneration. This is probably not the case, since the infiltration ma¬ terial has no relation to the corneal cells. It is more probably a condition due to changes in the blood vessels of the cornea and is frequently a result of old age. It is a normal phenomenon, however, occurring sometimes in perfectly healthy people, and there is no invariable rela¬ tionship to fatty degeneration of the blood ves¬ sels, heart, or other organ.

ARDAHAN, Armenia, village in the por¬ tion of Turkish Armenia ceded in 1878 to Rus¬ sia, 35 miles northwest of Kars. Its position gives it strategic importance. Its fortress was dismantled by the Russians in the war of 1854- 56; in 1878 the Berlin Congress sanctioned the cession to Russia of Ardahan, which had been captured early in the war.

ARDEID/E, a family of wading-birds (Order Ciconxiformes) including the herons, egrets, night herons, bitterns and some African forms related to the shoe-billed stork (qq.v.). They differ from other families of the order in holding the head drawn by an S-curve of the neck when flying. This family is represented in all the warmer parts of the world.

ARDITI, ar-de'te, Luigi, Italian musician and composer: b. Piedmont, 16 July 1822; d. Hove, Sussex, 1 May 1903. Famous first as a violinist, then as a conductor, he went to London in 1857, and from that year till 1878 was musical director at Her Majesty’s Theatre. He has conducted Italian opera and concerts in places as remote from one another as New York and Constantinople; has published the operas (I Briganti5 (1841) ; and (La Spia5 (1856) ; and is known as author of much popular music — songs, violin duets and waltzes, such as HI Bacio.5 He published his Remin¬ iscences5 in 1896.

ARDMORE, Okla., city and county seat of Carter County, 100 miles south of Okla¬ homa City, on the Gulf, Colorado & Santa Fe, C., R. I. & Pacific. Saint Louis & San Francisco, and O., N. M. & Pacific railways. The soil is well adapted to fruits, cotton, corn, cereals and forage crops. There are only three months in the year when range cattle must be fed, the climate, abundant rainfall and the fine grass making ideal conditions for stock raising. The production of gas is becoming more and more extensive and important. The Healdton oil field, as reported 8 Aug. 1915, has a total of 311 wells with a production of over 85,000 barrels of oil daily. The gas production of the same field shows 300,000,000 cubic feet a day. Ardmore’s

industries include a cottonseed oil mill, cotton compress, an ice plant, machine shops, brick plant, mattress factory, electric light and power plant, two planing mills, oil re¬ finery, flouring mill, cotton gins, cigar factory, paint factory, bottling works, paving plant and asphalt brick plant. The machine shops of the Rock Island and Frisco railroads are located here, and Ardmore is the general headquarters of the Oklahoma, New Mexico and Pacific

Railway. The city has three national banks and one State bank, with a combined capitaliza¬ tion, surplus and profits of nearly $4,000,000, an increase of $1,850,000 since 1 Oct. 1915. Ardmore has 12 churches for whites and 4 for negroes. The public school system is especially well organized and intelligently administered. The school population totals about 2,500, the enrolment 2,343, and the average daily attend¬ ance 2,048. The high school, costing $150,000, is a handsome structure and the pride of the city. There is also a fine Catholic parish school, and the government school for Indians is lo¬ cated here. The city is under the commission form of government the officials being a mayor and four commissioners. The annual income of the city is $140,000. An artificial lake, covering 300 acres, furnishes Ardmore's water supply. The entire plant, including 1,400 acres of land, is owned by the city. Pop. (1920) 14,181.

ARECA, the designation of a genus of palms, possessing pinnate leaves and a fruit consisting of a one-seeded berry or drupe, with a fibrous rind. To this genus belongs the betel- nut (A. Catechu), a native of the East Indies, and cultivated there in many varieties. It is a very beautiful palm, with a slender stem often 40 feet high. Its nuts, called betel-nuts, are rolled into a leaf of the betel-pepper along with a little lime, and are then chewed. The nut contains at least four alkaloids, Arecoline, Are- caidine, Arecaine and Guvacine, the former alone having known active properties. Areco¬ line is an active taeniacide and widely used in veterinary practice for the treatment of tape¬ worms. It is also an active cathartic and my¬ driatic. In the latter case it is extensively used as a stimulant.

ARECIBO, a'ra-se'bd, Porto Rico, import¬ ant commercial town on the northern coast, facing the Atlantic Ocean, 50 miles west of San Juan. It resembles ordinary Spanish towns in having a plaza, surrounded by

the church and other public buildings, in the centre, with streets running from it in right angles, forming regular squares. The buildings are of wood and brick. The harbor is poor, being exposed to the full force of the ocean.

ARENACEOUS ROCKS, the name ap¬ plied to a petrographic division including loose sands and gravels, sandstone, conglomerate, quartzites and such rocks as are mainly com¬ posed of quartz particles. They are of mechan¬ ical origin, being derived from disintegration of pre-existing strata and removal and deposition of the materials by wind or water. The grains are generally waterworn and rounded ; in some cases, however, they are more or less angular, or rounded and angular grains occur com¬ mingled. In older deposits the grains of sand are bound together by silicious, calcareous, argil¬ laceous, or ferruginous cements. It is seldom that a rock is composed of quartzose materials alone ; grains or particles of other mineral sub¬ stances are frequently mingled with the grains of quartz. Silvery flakes of mica are seldom absent; often occurring in layers parallel to the planes of stratification, thus causing the rock to split into thin slabs, and exposing a glitter¬ ing surface. These are called micaceous sand¬ stones. When grains of feldspar occur, the rock is a feldspathic sandstone. Often large quantities of calcareous matter, either as cement

or as distinct grains, occur ; and these are called calcareous sandstones. In like manner we have silicious and ferruginous sandstones, when silica and oxide of iron are conspicuously present as cementing or binding materials. Clay and carbonaceous matter, when plentifully diffused through the rock, give rise to argilla¬ ceous, carbonaceous and bituminous sandstones. Greensand, or glauconitic sandstone, is a rock containing abundant grains of the dirty green¬ ish mineral called glauconite. Arkose is a sandstone composed of disintegrated granite; volcanic sandstone, trappean sandstone, etc., being composed of disintegrated igneous rocks. The presence of lime can always be detected by the effervescence which takes place on the application of hydrochloric or other acid. A sandstone of homogeneous composition, which may be worked freely in any direction, is called freestone or liver rock. Flagstone is a sand¬ stone capable of being split into thin beds or flags along the planes of deposition. When the sandstone is coarse-grained, it is usually called grit. If it contain, more or less abundantly, grains large enough to be called pebbles, the sandstone is said to be conglomeratic ; and if the pebbles or stones be angular, the rock is described as a brecciaform sandstone. Coarse¬ grained grits and pebbly or conglomeratic sandstones pass into conglomerate or pud- dingstone, which consists of a mass of various sized water-worn stones. Brecciaform sand¬

stones frequently pass into breccia, an aggre¬ gate of angular and sub-angular fragments. Graywacke is an argillaceous sandstone, more or less altered and sometimes semi-crystalline, met with among palaeozoic formations. Lime¬ stones and. shales containing much sand are said to be arenaceous.

AR'ENA'RIA, the name given to a genus of plants of the Alsinacece or chickweed family. They number upward of 200 species, and are usually low-tufted herbs with white flowers. Many species occur in the United States, and others are found nearly everywhere except in tropical regions.

ARENBERG, or AREMBERG, August

Maria Raimund, Prince, also known as Count La Marcic, Belgian soldier and writer, brother of the Duke of Arenberg: b. Brussels, 23 Aug. 1753; d. there, 26 Sept. 1833. Began his career as a cadet in the military service of the Duke Charles von Lothringen. .Served under the French in India and against the English in America from. 1780 to 1782. During the French Revolution he became intimately asso¬ ciated with the famous leader, Mirabeau. His chief literary work, of much value for the light it throws on French history during the Revo¬ lution, is (Correspondance entre ie comte de Mirabeau et le comte de La Marck) (edited by Vacourt, 2 vols., Brussels 1851).

ARENBERG, or AREMBERG, Leopold Philipp Karl Joseph, Duke of, Austrian soldier: b. Brussels, Belgium, 1690; d. Lowen 1754. He began his career as a soldier as a mere child and at the age of 16 was already colonel. Gaining the favor of Archduke Charles, who later became Emperor Charles VI, he served him as Councillor of State. In 1709 he became grand bailiff of Hainault. In . 1716 he went to Hungary and served under Prince Eugene and especially distinguished

himself at the battle of Belgrade. Subse¬ quently he attained the rank of field marshal and was commander-in-chicf of the Imperial forces in the Netherlands and as such com¬ manded the operations at the battle of Det- tingen. In 1747 he became president of the commission governing the Netherlands. Aside from his military interests, he was an ardent patron of learning and a close friend and pa¬ tron of Jean Jacques Rousseau. He maintained an intimate correspondence with Frederick the Great and Voltaire. Consult Gachard (in the (Biographie

Nationale,> published by the Royal Academy of Belgium).

ARENBERG, or AREMBERG, formerly a German duchy, between Jiilich and Cologne, now incorporated in the Prussian administra¬ tive district of Coblenz. Its rulers played a part of some importance in German history of the 12th century, but in 1280 the male line died out. One of the female descendants married the Count de La Marck, the younger of whose two sons became the Lord of Aremberg. In. 1547 the male line again died out, but the heiress married into the Ligne family and her husband was made a count of the empire by Charles V. Because of the services rendered by him and his sons to the Emperor, his title was raised to that of duke. See Arenberg, Duke of.

ARENDAL, Norway, a town at the mouth of the Nid Elf, in the Bay of Christiania. It is sometimes called <(the little Venice,® because of the fact that many of its houses are built over the water on piles. The harbor is well pro¬ tected by the island of Tromo, which has favored the development of the town as a com¬ mercial port. The principal exports are timber, wood pulp and iron ore from the mines nearby. Pop. (1910) 10,315.

ARENDT, a' rent, Otto, » German econ¬ omist : b. Berlin, 10 Oct. 1854. He studied, first law, then economics, in the universities of Leipzig and Freiburg. In 1882 he was one of the founders of a society for the promo¬ tion of a movement for international bimetal¬ lism, which evolved into a political party, of which he was the chief. In 1885 he was elected to the Prussian House of Representatives. In 1888 he became editor of the Deutsches IVochenblatt, a publication that advocated a strong colonial policy. His works are (Die vertragsmassige Doppelwahrung) (1880); (Leitfaden der Wahrungsfrage) (17th ed., 1895) ; (Die Ursache der Silberentwertung) (1899); (Die parlamentarischen Studienreisen nach West- und Ost-Afrika) (1906) ; (Geld, Bank, Borse) (1907).

ARENDT, Rudolf, German chemist : b. Frankfurt-on-the-Oder 1828; d. 1902. After graduating from the University of Leipzig he became a teacher in a business college in his native town. Later he was editor of the Chemisches Centrcilblatt, a position he held for many years. His chief works on chemistry are (Technik der Experimental Chemie) (2 vols., 1881); ˆnschauungsunterricht in der Naturlehre) (4th ed., 1886) ; (Leitfaden fur den Unterricht in der Chemie> (7th ed., 1899) ; {Grundzuge der Chemie-* (8th ed., 1903).

ARENE, a'ren', Paul Auguste, French poet: b. Sisteron 1843; d. Antibes 1896. He

was successively director of the Lyceum at Marseilles and the Lyceum at Vanves. In 1865 he attracted wide attention by the pro- duction of a one-act comedy, in verse, (Pierrot heritier.) His other works are dramas, (Jean des figues) (1870) ; (Les comediens errants* (1873) ; cLe duel aux lanternes) (1875) ; prose fiction, (Au bon soleiP (1879) ; (Le canot des six capitaines) (1888); descriptive travel, (Vingt jours en Tunisie) (1884). Consult Ar- mand Silvestre in preface to <Poesies) (Paris 1900) ; (Lorenz Petry) (Halle 1910).

ARENG PALM, the name of a palm, Arenga saccharifera. It grows wild in the islands of southern Asia and is cultivated in India. The sap furnishes ((arenga sugar® and the black fibre of the leaf bases, known as gomuta fibre, is used in filters and for calking ships.

ARENSKI, a-ren'ske, Anton Stepano- witch, Russian composer: b. Novgorod, 30 July 1861 ; d. Tarioki, Finland, 25 Feb. 1906. He graduated 1882 from the Conservatory at St. Petersburg, where he had been a pupil of Rimski-Korsakoff. The following year he was appointed professor of composition at the Im¬ perial Conservatory in Moscow, where he first began to attract general attention. In 1895 he succeeded Balakireff as conductor of the Im¬ perial Court chorus. His most noted composi¬ tions are operas., (Dream on the Volga) (1892) ; (RaphaeP (1894) ; (Nala and Da- mayantP (1899) ; orchestral music, two sym¬ phonies ; concerto for piano ; concerto for the violin ; a fantasia for piano and orchestra ; chamber music, string quartets, trios, quintets. His written works are (Treatise on Harmony) ; (Handbook of Musical Forms. >

ARENTS, a'rents, Albert, German-Amer- ican metallurgist : b. Klausthal, Germany, 14 March 1840. After studying mining engineer¬ ing in Berlin he came to America, in 1865, and went to the lead mines in Hampton County, Mass. Later he went west, where he acted as engineer for various mining enterprises. He is chiefly known for his inventions, among which is a siphon tap for lead blast furnaces.

ARENTZEN, a'rentz-en, Kristian August Emil, Danish poet: b- Copenhagen, 10 Nov. 1823; d. there January 1900. After making a tour of Iceland and Italy, he became professor of aesthetics at the University of Copenhagen. In 1872 he was granted a pension by the govern¬ ment to enable him to devote himself exclu¬ sively to his literary work. Among his works are dramas, (Gunlog Ormetunge) (1852) ; (Knud den Hellige) (1853) ; a volume of col¬ lected poems, (Digte) (1854), republished as (Ny Dygtsamling) (1867) ; a critical work, (Baggesen og OhlenschlageU (8 vols., 1878).

AREOIS, a'ra-6'ez, a society of natives of Tahiti, of a semi-religious nature. The nearest parallel to the character of this peculiar native institution is found in the orgies of some of the Greek mysteries of antiquity. The members exalted the sex pleasures, the women being compelled by the oaths of initiation to renounce all desire for maternity. Dancing, singing and the representation of stirring events of the past, by a sort of pageantry, were also a part of their practices.

AREOMETER. See Hydrometer.

AREOPAGITICA, the best-known of the prose works of John Milton. The full title runs (Areopagitica : a Speech of Mr. John Mil- ton for the Liberty of Unlicenc'd Printing, to the Parliament of England.) These words recall Isocrates and Mars Hill, and illustrate Milton's erudition, as well as his predilection for what he terms (<the old and elegant hu¬ manity of Greece.® They indicate also that his plea was made, not so much for full lib¬ erty of the press and toleration of opinion — although splendidly high-minded and liberal he was not prepared to tolerate <(Popery and open superstition® — as for the abolition of that sys¬ tem of licensing books and tracts, the stupidity and inconvenience of which he could expose and denounce from personal experience and with weighty arguments drawn from an extraordi¬ narily wide reading of history and literature.

The tract, for it is a speech in form only, appeared in November 1644 after Milton had caused to be printed without license two pamphlets on divorce, which had occasioned much scandal and had involved him, not seri¬ ously as it turned out, in trouble with the House of Commons. It is needless to add that the (Areopagitica) was itself unlicensed, and it is pleasant to know that although shortly after it was published there seemed to be a chance that the House of Lords would call its author to account, he did not suffer for his boldness (consult for full details Masson, Vol. Ill, pp. 262-97, and the most elaborate edition, that of T. Holt White, 1819).

Its subject matter still possessing wide¬ spread interest and great importance, and its style being more equable and less cumbrous than that of Milton's other prose works, the <Areopagitica) has naturally surpassed them in permanent influence and, if the word may be employed in connection with Milton, in popu¬ larity. More wonderfully eloquent passages may be found in other tracts, as well as

a larger number of indispensable autobiographical de¬ tails, but Milton the <(lord of language,® as Tennyson called Virgil, and Milton the noble patriot and man are perhaps nowhere else in the prose works so accessible to the latter-day reader. How Milton towers above other mor¬ tals is well perceived by anyone who examines the pamphlets on the freedom of the press published in some quantity two generations later, to which such authors as Tindal and Defoe contributed ; but one need not search outside the (Areopagitica) itself for proofs of Milton's superiority as a man and a writer. Take for example the famous passages on killing a good book, on (<a fugitive and cloistered Virtue,® and <(our sage and serious Poet Spencer ,® on the essen¬ tial intelligence of the people, — the roots of democracy were in this intellectual aristocrat — on the visit to Galileo, on the dismemberment of ((the Virgin Truth,® on England, ((a nation not slow and dull,® which later he sees ((as an Eagle muing her mighty youth.® Eloquence and personal dignity and learning are here in full measure, but the (Areopagitica > is also notably practical, and its sarcasm is rendered more than usually effective and even agreeable by a vein of genuine though grim humor, which perhaps only once is unintelligible save to the student of Latin. Barring the almost ludicrous depreciation of Aristophanes, the tract is but

slightly amenable to hostile criticism, and one is not surprised to find that two poets, Thom¬ son of (The Seasons) and Lowell, have written introductions to it, and that on the eve of the French Revolution Mirabeau appears to have abridged it in (Sur la Liberte de la Presse, Imitee de l'Anglois de Milton.*

William P. Trent,

Professor of English Literature , Columbia U niversity.

AREOPAGUS, the designation of the oldest Athenian court of justice. It obtained its name from its place of meeting, on the Hill of Ares (Mars), near the citadel. Its establish¬ ment is ascribed by some to Cecrops, by others to Solon; from the latter, however, it seems to have only received a better constitution and more important privileges, and it is probable that it existed from very remote times. Of how many members it consisted is not now known. A seat in it was held for life. The members were men who in their former ca¬ pacity of archons had rendered themselves worthy of this honor by the honest and diligent execution of their office, and whose character and conduct had been subjected to a particular examination. Aristides called the Areopagus the most sacred tribunal of Greece, and De¬ mosthenes assures us that they never passed a sentence in which both parties did not concur.

Crimes tried before the tribunal were wilful murder, poisoning, robbery, arson, dissoluteness of morals and innovations in the state and in religion ; at the same time it took care of help¬ less orphans. The other states of Greece some¬ times submitted their disputes to the judgment of the Areopagus. Its meetings were held in the open air and in the night time. After the investigation of a case the votes were collected. In the time of Pericles its political influence was materially lessened, but it continued a much venerated assemblage, and in Roman times its decisions still commanded respect. The Apostle Paul is sometimes thought to have been brought before this ancient court, but it is more likely that his famous address on Mars Hill was before an assemblage of philosophers there. Consult Botsford, (The Athenian Consti¬ tution (1893) ; Busolt, (Handbuch) (Nordlin- gen 1887) ; Philippi, (Areopag und Epheten> (Berlin 1874) ; Schomann, (Griechische Alter- thiimer) (ib. 1897) ; Meier and Schomann, (Der attische Prozess) (Berlin 1883-87).

AREQUIPA, a'ra-ke'pa, Peru, city and capital of a department of the same name. It is situated in a fertile valley 200 miles south of Cuzco, at the height of 7,550 feet above the sea. Prior to the earthquake of 13 Aug. 1868, which did not leave a single house habitable, it was one of the best-built towns of South America. Beside it rise lofty mountains, El Misti, Omati, Ubinas and Pichu Pichu. It contains a cathe¬ dral, university, hospital, nunneries, convents, etc. Near at hand Harvard University has an observatory, at an altitude of over 8,000 feet. It is subject to frequent earthquakes, but this evil seems to be overbalanced by the mildness of the climate and the beauty and fertility of portions of the country round about. Islay was formerly the provincial port, but it has been superseded by the neighboring Mollendo, connected by railway with Arequipa and the highlands beyond. The industrial products of

the city are varied, including cotton and woolen textiles, leather, gold- and silver-smiths' work, etc. The engineering shops of the Southern Railway are at a short distance from the cen¬ tral plaza. The inhabitants number about 35,000. See the description of the department Arequipa.

AREQUIPA, Peru, a coast department estimated to contain 21,947 square miles; bounded on the north by lea, Ayacucho and Cuzco ; on the east by Puno and Moquegua ; and by the Pacific on the southwest.

Its most important port is Mollendo, which the Southern Railway of Peru connects first with the capital of the department and then with Cuzco, Puno and other cities or towns of the highlands. The provinces are Arequipa (capital Arequipa), Cailloma (capital Cailloma), Camana (capital Camana), Castilla (capital Aplao), Condesuyos (capital Chuquibamba), Islay (capital Mol¬ lendo) and La Union (capital Cotahuasi). Olives, grapes, sugar and cotton are grown in the valleys, and the uplands produce cereals, potatoes, etc. Minerals found in the depart¬ ment are gold, silver, copper, lead, coal, sulphur, manganese, rock-salt, borax, gypsum and kaolin clay. In the Desert of Islay, through which runs the above-mentioned railway, are the migrating, crescent-shaped sand dunes, remark¬ able for beauty of form and the impressiveness of the landscape in which they are seen. Pop.

172,000.

ARET.7E'US, physician of ancient Greece: b. in Cappadocia. He lived in Rome during the latter half of the 1st century and the beginning of the 2d century a.d. Next to Hippocrates he has been considered the best physician of his period. He left behind a monumental work, written in Ionic, the first four books of which are devoted to the diagnosis of acute and chronic diseases ; the latter four volumes treat of their cure. The finest edition of the original is the one edited by J. Wigan (Oxford 1723). An excellent German translation has also been published (Vienna 1790-1802). The best Eng¬ lish translation is by T. F. Reynolds (London

1837).

ARETAS, King of the Nabataean Arabs. Originally his name was 2Eneas but he as¬ sumed the name Aretas. He gained the city of Damascus, probably as a gift from Caligula, about the time Paul the Apostle was there. Aretas attacked and defeated Herod Antipas about 28 a.d., partly because of the divorce of his daughter by Herod. He lived until about 40 a.d. Under him the kingdom of Nabataea stretched from the Euphrates to the Red Sea. By the year 106 the whole kingdom was an¬ nexed by the Romans and was known as the province of Arabia. Damascus had been re¬ gained as early as 62.

ARETHAS, Byzantine theological writer and scholar: b. Patrae about 860. He became archbishop of Caesarea under Emperor Leo VI and as such was next in rank to the patriarch of Constantinople. He must have lived to a good old age, as we have a manuscript letter of his to the Emperor Romanus. He was a defender of Orthodoxy as it was understood by Photius. He was the author of a Greek com¬ mentary

on the Apocalypse, avowedly based on that of Andrew, his predecessor in the arch¬ bishopric. In spite of its author's modest esti-

mate, Arethas' work is by no means a slavish compilation; it contains additions from other sources and especial care has been taken in verifying the references. His interest extended beyond theological literature. He annotated the margins of his classical texts with numer¬ ous scholia, and had several manuscripts copied at his own expense, among them the (Codex Clarkianus} of Plato (brought to England from the monastery' of Saint John in Patmos) and the Dorvilian manuscript of Euclid, now at Oxford. Text of his commentary is in Migne, (Patrologia Graeca) (Vol. CVI, pp. 487-786) and Cramer, (Catena Graeco rum patrum in Novum TestamentunP (Vol. VIII, pp. 176-582, Oxford 1844). Consult Gebhardt, O., and Harnack, A., (Texte und Untersuchuneen zur Geschichte der altchristlichen Litt. (Vol. I, pp. 36- 46, 1882), and (Vita EuthymiP (ed. C. E. de Boor, 1888) ; Wace, H., dictionary of Chris¬ tian Biography > (Vol. I) ; Krumbacher, C., (Geschichte der byzantinischen LitteratuD

(1897).

ARETHUSA. See Alpheus.

ARETINO, a'ra-te'no, Carlo, properly Carlo Marsuppini, Italian scholar: b. Arezzo 1399; d. 1453. He obtained a finished classical education at Florence, being at one time a pupil of Giovanni da Ravenna and Manuel Chryso- loras. The profound knowledge of the classic writers he showed in his lectures won him immediate fame. He finally became first apos¬ tolic secretary, then, in 1444, was appointed chancellor of the republic of Florence. He translated the first book of the (Iliad) and the (Batrachomyomachia) into Latin. His tomb in the Church of Santa Croce, at Florence, is one of the finest examples of the sculptural art of the Renaissance yet to be seen in that city. Consult Nisard, (Les gladiateurs de la repub- lique des lettres aux XVe, XVIe et XVIIe siecles) (Paris 1860).

ARETINO, Guido, or GUIDO D' AREZ¬ ZO, Benedictine monk and reformer of music: b. probably near Paris, about 995 ; d. probably at Avellano, 1050. For a long time it was be¬ lieved that he was born at Arezzo but Dom Germain Morin found evidence that Guido had received his education at the monastery of Saint Maur des Fosses, near Paris, a fact which adds to the probability of his having been born near Paris. He is supposed to have first re¬ duced the science of music to a fixed system and to have been the inventor of the mono¬ syllables

of the Solfeggio — ut, re, mi, fa, sol, la, drawn from the words of a Latin hymn. The monosyllable si, for the seventh of the scale, is a later invention. The syllables ut, re, mi, etc., are taken from a Latin hymn in honor of Saint John, composed in 770:

Ut queant laxis i?e-sonare fibris

Mi- ra gestorum Fa-muli tuorum.

Sol-ve polluti La-bii reatum.

It is narrated that on one occasion, while chanting this hymn, Guido noticed the gradual and regularly ascending tones of the first syl¬ lables of each hemistich in the three verses given above and promptly systematized and fitted these to his system of solfeggio. The fame of this system spread afar and Guido was subjected to much jealousy and ill-will both in his own and other monasteries, but

also attracted the favorable attention of Pope John XIX, who invited him to Rome. Guido was well received at the papal court, and taught the Pope his new system, which the latter helped to spread. In 1029 Guido was appointed prior of Avellano, where he probably remained until his death. The introduction of the four- line staff is ascribed to him. Guido wrote much in explanation of his musical doctrines, of which the most important are the (Micrololo- gus} and the (Argumentum Novi Cantus In- veniendiP Consult Michael, (Geschichte des deutschen Volkes vom 13 Jahrhundert bis zum Ausgang des Mittelalters5 (Vol. IV. p. 338,

1906).

ARETINO, Pietro, Italian writer and poet: b. Arezzo, 20 April 1492; d. Venice, 21 Oct. 1557. Aretino's life and character find almost a complete parallel in the career of the better known French profligate poet and crim¬ inal Frangois Villon, of whom he was a con¬ temporary. He was the natural son of one Luigi Bacci, a gentleman of the town. Early in life he went to Perugia, where he worked as a bookbinder. In 1517 he went to Rome, where he obtained a minor position at the Vatican. Here he began attracting attention by his verse and even obtained the favor of Pope Leo X and Cardinal Giulio de Medici, but soon lost it through the licentious character of some sonnets he wrote. Finally, in 1527, he went to Venice, where he

gained powerful and influen¬ tial friends, and there he spent most of his later life. Among his patrons were Francis I and Charles V, who made him rich gifts of jewelry and even allowed him pensions, all of which enabled him to live a luxurious life. Aretino's talents were most remarkable in the production of satirical verse, which he could make so biting that at one time he was feared by most of the public men of Italy. On the strength of this fear he worked to his own advantage, exercising a sort of blackmail over prominent personages. Aside from his poetry he wrote some comedies and one tragedy, the latter, <Orazio,) showing a fair measure of talent. Of his comedies only <Cortigiana.) and (Talanta} are of any merit. Consult Van Dyke, (Renascence Portraits) (New York 1905).

AREZZO, a-ret'-so, Italy, city and capital of a province of the same name in Tuscany. In ancient times it was known as Arretium, when it was one of the most prosperous cities of Italy. During the 3d and 4th centuries b.c. it was bitterly opposed to Rome, but on the occasion of Hannibal's invasion it supported the Romans. Later, when the Gauls began invading Italy it sought the support of the Romans. At that time it was famous for its pottery. It was the birthplace of a number of famous men, among them Petrarch, Leonardo Aretino, the historian, Cesalpino, the botanist, Pope Julius II and Vascari. It is still a city of some attractions, having broad, well-paved streets, a museum, a library, several convents and a cathedral built in the 13th century. It is surrounded by a fertile country producing grain, olives, wines and fruits. In the city are located a number of industrial plants in which are manufactured silk fabrics, leather goods and textiles. Pop. (1911) 48,170.

ARGALL, Sir Samuel, navigator and American colonial official : b. Walthamstow,

Essex, England, about 1580; d. 24 Jan. 1626. He was a type of the founders of English colonial dominion — energetic, resourceful and masterful; his further repute as a sort of un¬ principled buccaneer and tyrant is due to senti¬ ment and partisanship. In May 1609, he was sent with a small barque to the new settlement at Jamestown, Va., to trade and fish on behoof of the owner. He seems to have found a shorter route than usual, and soon established a reputation for unprecedentedly quick pas¬ sages. The next year he took out Lord Dela- warr to Jamestown, arriving just in time to ' prevent the entire colony, with the governor, Sir Thomas Dale, leaving for Newfoundland to avoid starvation. He was sent to the Ber¬ mudas for swine to replace those the colonists had eaten, but was driven by storms to Cape Cod where he found good fishing and returned in

August ; established a corn trade with the Indians above Jamestown, and early in 1611 returned to England with Delawarr, whose health was bad. In September 1621, he was again at Jamestown after the then swift pas¬ sage of 51 days, and the rest of the year he and Dale spent in corn hunting among the Indians. Powhatan had a number of English prisoners in his hands and a quantity of weapons and implements, and Argali hearing that the chieftain's daughter Pocahontas was with her uncle ˆPowtownec® (Potomac), had the happy thought of securing, her to exchange against them, a feat accomplished by threats and the offer of a copper kettle to her uncle. The stock denunciation of him for this (<nefa- rious treachery® is best answered by the fact that no one was harmed, all parties were bene¬ fited and a most desirable aim was achieved. Pocahontas herself considered it a piece of rare good fortune, would not leave the whites and soon after married one of them, while the pris¬ oners were released and peace restored to the colony. Argali handed her over to Sir Thomas Gates and explored the east shore of Chesa¬ peake Bay, fishing and trading. Later in the year he was sent with a vessel of 14 guns to destroy the French settlements on the north coast, regarded as infringing on the Virginia patent. He captured Mount Desert, Saint Croix and Port Royal (N. S.), carried off the settlers as prisoners to Jamestown, and on the way forced the commandant at New Amster¬ dam to recognize English suzerainty by hauling down the Dutch flag and running up the Eng¬ lish. In 1614 he sailed for England, and was put on his defense for these high-handed acts, but completely justified himself. In May 1617, he was made deputy governor of Virginia, and remained two years in a broil with part of the citizens, but justified by others. He was ac¬ cused of illegal trade with the West Indies, and repeatedly ordered to return to England for trial,, a command which he ignored for a time, possibly in reliance on the Earl of Warwick, who is supposed to have financed and shared his ventures. In 1620 he served against the Algerine pirates with a 24-gun merchant vessel, under Sir Robert Mansell. He was knighted in 1622. In 1625 he was admiral of a squadron cruising after a hostile Dunkirk fleet, and took some prizes. On 3 October of that year he em¬ barked with the squadron in the expedition against Cadiz under Lord Wimbledon, with Lord Essex on board as vice-admiral and com-

mander of land forces; Argali's flagship was the Swiftsure. He reported the fortress too strong to be taken without a siege, the mer¬ chant vessels were ill supplied and unpaid, and after waiting till December

for relief from Charles I they went home. Argali died the next month, it was said from a broken heart because the captain of the Swiftsure was <(very backward and cross® to him. (Argali's own narrative comes down to 12 May 1613).

ARGAND, ar'gan, Aime, Swiss-Italian in¬ ventor: b. Geneva 1775; d. London, 24 Oct. 1803. He is principally known as t'he inventor of the lamp burner which still bears his name, though he was also a mathematician of some note. The idea of the burner, the steadying of the flame by a current of air coming up through a hollow centre, was stolen from him by a French pharmacist, Quinquet, when he, Argand, became involved in difficulties during the French Revolution. Brooding over this caused him to lose his reason. He was also the inventor of a pneumatic machine of some value. He wrote (Decouverte des lampes a courant d'air et a cylindre> (1785).

ARGELANDER, ar'ge-lan'der, Fried¬ rich Wilhelm August, German astronomer: b. Memel, Prussia, 22 March 1799; d. Bonn, 17 Feb. 1875. His first interests as a student at Konigsberg were in economics, but after attend¬ ing several lectures on astronomy by Bessel he decided to devote himself to astronomy. In 1820 he was made Bessel's assistant in the Konigsberg Observatory; three years later he became astronomer at the observatory in Abo, Finland. It was here that he began those ob¬ servations which later made him one of the most noted astronomers of his time, though later the destruction of the observatory by a fire compelled him to continue his work at Helsingfors. In 1837 he becaffie professor of astronomy at Bonn. Argelander has added much to the knowledge of the progressive motion through space of the solar system. His chief wrork is the (Atlas des nordlichen ge- stirnten Himmels) (Bonn 1857).

ARGENIS, a romance written in Latin by John Barclay, published in 1621. Like Gulli¬ ver's Travels, } it is really a commentary on current historical events, thinly veneered by its fictional form. But even as a piece of fiction it has some merits, for Cowper said of it that it was ((the most amusing romance that was ever written.® Fenelon's (Telemaque) is said to have been suggested by it. Cardinal Riche¬ lieu also prized it very highly and is supposed to have been inspired in his diplomacy by its suggestive character. The characters in the romance represent Henry IV, Queen Elizabeth and Philip II of Spain.

ARGENSOLA, Bartolome Leonardo de, Spanish poet : b. Barbastro, Aragbn, 26 Aug. 1562; d. Saragossa, 26 Feb. 1631. Until 1610 he lived in Salamanca, when he accompanied the Count de Lemos to Naples (see Argensola, Lupercio), together with his brother. On the death of

the latter, in 1613, he returned to Spain, where he succeeded to his brother's posi¬ tion as historiographer of Aragon. Here he took up his brother's unfinished work, a con¬ tinuation of Zurita's (Annals of Aragon.* The collected poems of the two brothers were pub¬ lished by Lupercio's son after their death,

under the title (Rimas) (1634). The best mod¬ ern edition of their works is that which was edited by the Count de la Vinaza and in the Goleccion de escritores castellanos> (1889). In this also is included two plays by Lupercio, (Isabela) and 'Alejandra.*

ARGENSOLA, Lupercio Leonardo de,

Spanish poet: b. Barbastro, Aragon, 14 Dec. 1559; d. Naples, March 1613. He and his younger brother, Bartolome (q.v.), have sometimes been called the ˆSpanish Horaces.® Both brothers enjoyed the special protec¬ tion and favor of Maria, widow of Emperor Maximilian II of Austria. After having served her as secretary for some time, Lupercio was appointed official historian of Aragon by Philip III. In 1610 he accompanied the Spanish viceroy, Count de Lemos, to Naples, where he filled the position of State Secretary until his death three years later. Before leaving Spain he had written for the Count de Lemos, who was then president of the Indian Council, Gonquista de las Islas Molucas* (1609). Con¬ sult Crawford, (Notes on the Tragedies of Lupercio Leonardo de Argensola) (in the Romanic Review, Vol. IV, 1913).

ARGENSON, ar'-zhan'-son', Marc Pierre de Voyer, Count d', French statesman, brother of Rene Louis de Voyer d'Argenson (q.v.) : b. Paris, 16 Aug. 1696; d. there, 22 Aug. 1764. At the age of 24 he was lieutenant-general of the provincial gendarmerie. In 1742 he suc¬ ceeded de Breteuil in the war office and after the death of Cardinal Fleury, in 1743, found himself supreme chief of the French war operations. To his energy and administrative ability is due in no small measure the final success of the French arms against the Aus¬ trians, who had threatened the very existence of the nation and had already invaded Alsace and Lorraine. After the favorable termination of the war, with the Treaty of Aix-la-Chapelle in 1748, Argenson continued his work in the war office with a general reorganization of the French armies, one of his reforms being the establishment of the Ecole Militaire in 1751. How he stood in the world of arts and letters may be judged from the fact that Voltaire wrote his (Siecle de Louis XIV *largely from material supplied him by Argenson, and the famous (Encyclopedic* was dedicated to him by its illustrious editors, Diderot and D'Alem¬ bert.

ARGENSON, Marc Rene, Marquis d’, French statesman: b. Venice, Italy, 4 Nov. 1652; d. Paris, 8 May 1721. He was. for some years chief of the Paris gendarmerie, but in 1718 was made Keeper of the Seal and, two years later, Minister of State. But the mad schemes for the financial regeneration of the treasury which John Law was then involving the king in caused Argenson soon to resign. He was a very generous patron of letters and arts and was made a member of the Academy.

ARGENSON, Rene Louis de Voyer,

Marquis d\ French writer: b. 18 Oct. 1694; d 10 Jan. 1757. While Minister of Foreign Af¬ fairs under Louis XV, from 1744 to 1747, he foiled the intrigues of the Spanish Court in cer¬ tain diplomatic negotiations of a delicate nature. But Spanish influence still remained strong enough in the French Court to cause his resignation, whereupon he retired to private life

and followed the life of a student and a man of letters. He was a close friend of Voltaire. His chief works are Considerations sur le gouvernement ancien et present de la France > (1764); his (Memoirs) (9 vols., 1861-67); (La France au milieu du XVIII6 siecle) (1898). Consult Ogle, (The Marquis cFArgen- son) (1893).

ARGENTA, ar-gen'ta, Ark., city in Pu¬ laski County, on the Arkansas River, opposite Little Rock and on the Saint Louis Southwest¬ ern, the Saint Louis, Iron Mountain and South¬ ern and the Chicago, Rock Island and Pacific railroads. It is in the centre of a fertile agri¬ cultural region producing corn and other grains. Natural gas is available and is utilized by a number of manufacturing plants, includ¬ ing extensive railroad repair shops, four cot¬ ton oil mills and a boiler and iron works. The municinality owns and operates its own electric lighting plant. Pop. (1910) 11,138.

ARGENTEUIL, ar'zhan-te'-y’, France, a town on the right bank of the Seine, seven miles northwest of Paris in the department of Seine-et-Oise. It supplies much wine, fruit and vegetables for the Parisian market. Excellent asparagus is produced in the vicinity. Alcohol, files, pasteboard, and watches are manufac¬ tured. The famous Heloise was abbess of its now ruined priory from 1120. This priory was founded by Charlemagne in the 7th century, and his daughter Theodada was

its abbess. The town grew up about the priory. Pop. (1911)

24,282.

ARGENTINA, OR THE ARGENTINE REPUBLIC. A federal republic, the second largest of South America, situated in the southern extremity of South America, be¬ tween the 22d and 55th parallels of south lati¬ tude and between the meridians of 54° 20' and 73° 30' of longitude west of Greenwich, the greater part of the territory thus lying within the temperate zone. It is bounded on the north by Bolivia, Paraguay and Brazil, on the east by Uruguay and on the west by Chile. Its eastern boundary is composed en¬ tirely of maritime or fluvial coasts, in direct contact with the world's commerce by means of numerous ports of easy access. Its area is 1,153,119 square miles. The history and political and industrial development of Argentina are treated under the following headings:

1. Physiography. 7. Commerce.

2. Political Divisions, Popu- 8. Mining and Manufac-

lation and Immigration. turing Industries.

1. History 9. Banking and Finance.

2. Government. 10. National Wealth.

5- Education. 11. Transportation.

1. Agriculture. 12. Army and Navy.

2. PHYSIOGRAPHY. 1. A notable char¬ acteristic is found in the Pampas which cover more than three-fourths of the country. The plains, however, can be further divided into four great sections: (1) The Chaco plains, between the rivers Pilcomayo, Parana, and Salado del Norte, comprising the eastern por¬ tion of Jujuy, Salta, and Tucuman, the territory of the Chaco, part of the province of Santiago del Estero and the north of Santa Fe; all of it being warm, thickly wooded and rich in excel¬ lent timber. Here preference is given to the cultivation of sugar-cane, cotton-growing and

quebracho-cutting. (2) The pampas properly so called, most notable on account of the uni¬ formity of level and the almost total absence of trees, but covered by excellent pastures in which gramineous grasses preponderate. This region is gradually being devoted to agricul¬ tural

purposes such as the cultivation of wheat, linseed and corn, after having first served for cattle-feeding. (3) Between the last two re¬ gions the saline plains extend from the range of Aconquija to that of Cordoba and reach to the Salado River. This region derives its name from the great amount of salt covering the soil. (4) The southern plains, south of the 38th parallel, and popularly known as Pata¬ gonia, comprise the territories of Rio Negro, Chubut, Santa Cruz and Tierra del Fuego, sloping down from the Andes in three suc¬ cessive inclines. <(Stock farming, especially sheep farming, dominates in this field, yielding large profits,® says Mr. Marrion Wilcox, an American expert on Latin- American countries, adding: ((New port works, extension of the sheep industry, plans for rendering navigable the Patagonian rivers, the production of min¬ erals in the Cordillera and the Far South — all these forms of activity show that in a com¬ mercial sense Patagonia is to be regarded as a land of the future.® (In Bulletin of the Amer¬ ican Geographical Society, Vol. XLII, No. 12, pp. 903, seq.).

II. The Argentine Mesopotamia lies between the rivers Parana and Uruguay and comprises the provinces of Entre Rios and Corrientes and the national territory of Misiones. At its south¬ ern extremity the rich alluvial soil covering the numberless islands forming the delta of the Parana River has helped the development of a luxuriant vegetation. Toward the north a network of streams intersect an undulating land where tree-clad hill slopes alternate with rich meadows. At Corrientes the soil is damp and marshy but rises again in Misiones, where it becomes hilly.

III. The mountains belong to four separate systems, of which the most important is the Andean system. The coasts are 1,500 miles in length and are generally low and sandy from Buenos Aires to Rio Negro. South of this point they are higher, often rising in bluffs and cliffs forming innumerable gulfs and bays. In the Plata estuary the most interesting island is Martin Garcia, which commands the mouth of the rivers Parana and Uruguay. About 400 miles, off the shores, of Santa Cruz are the Malvinas Islands, which the Argentine govern¬ ment claims as part of its territory although England has occupied them since 1833, having named them Falkland Islands.

Tierra del Fuego is also an island, belong¬ ing half to Argentina and half to Chile. Staten Island, separated from Tierra del Fuego by the Lemair Strait, is used as a place of deporta¬ tion for criminals. There are several other islands of lesser importance.

Omitting all minor differences, the Argen¬ tine Republic may be

divided into three great sections : the central plains, the river region on the eastern side, and the mountain systems.

The Cordillera of the Andes which runs throughout the whole extent of the Argentine Republic and forms its western limit is the most important, mountain system of the coun¬ try. Commencing at the extreme south of the

65 :

Sahama'

Es'

Pisajpu

JuniM

% &•

. .XarapacIT

IqUMl'1

Ea N«*

5 Sucre

B

GuanilloV

o.o -

79" ^ J "

Vv^w , ,, , '..'nuif

A

I

/

y

A

fos%Tua Vol.V.ˆO'

U*® x- '-

;Mino.Uo(>

TocoplV

„ J™ , • ˆv//0;A 3I cl'aca

Punta Ancamos JlcjUlO'Hif

d.lft'V

.liL3f

Salma

m/. nt r»PBlOO»» del ˆ Salinas rt5gF;Ml

twpw.ojcmjio s ;sMgA„,ol,mm-% l ˆ4ypsalˆF??««ˆi

I- ■• b /< >'->, ,; U--;. p N«*?

Antot'*1? ,- = fiev. MintquesJ".-ˆˆ. \ \ Uj ˆ }* ■ JujuyS:ˆ%ˆ '

iicu.oba Vo«. ˆ "IP i) XJ SJ <?T * \ V W*f5 V.-lmnAjr'.ˆvr/?,# > ' 'Sttlˆdt £) A—fA A \ Ye\ “*

, I c\ˆx » ˆM>.- •QciriHoe ˆ

Xcaonrnn .

a . . -J

Sag A|s;y ajT

<

25

Antot*A®®_j r Pant* 3* tm

FA Co)t||

Blanca E«c Pta. dos Reyes

Sf/J/n a a ; ˆ

P,.aY. -Negro*-/ Salinas de Pccitpt d

\ Liu 1 jjijaoo v?fl3jˆ< ˆ.Arizaro .i<TNc'._aˆ;!.'u , .. i-,,

NACHTENES

„ LEHGUAS Vm«£Lˆde] fo,_

©(ho©©

7-0 S 4 S

Saa Salvador-? i/

dabau

I ’ , I" 0Horqua«ii n

- 1 -£#/# -.5 oiH-eprio /s]

~<Q4j* \ v- _- v t~irˆ7ia~

Q,„ (3 © J* © a 3'>

iSTˆ

*Srica,0

Eahia

ia j,**'™ S'"01;

}j a 1 © > x

4 _ .W"" - y- -h - *© 3 iMfesl.JHI iˆ= ■$. y

A _ - - 'Uo™ ˆ

'* ; C H A C o>»

© }i|a © v (ij

*7

. 7~ *us* ,.- - - rjwS» ic — -/-H- s:u "xrs c

, \ P,:ˆ R A G ir. A y

i >, jUik

t Bernardo

98.9 i v-' ; 1 ?:

laSHIIPIW £-- • r/.' V V/ ' 1 _ - «-

fV *Via* © *a xo a* ‘Tmrei*M**L * “ VC”

$r>tottdlit L /. = / — / Ajmlta 'p

' S ' Aotiaapwt*^/- -r Cafftyate/ C:<>po/

fil/ / Hilo ^ - i -5 Ant,,^««.;/- - Caf.»W

-Carru.alillo a ^ q ^ ■

„ a.. A»<-».*rrA, W* 4's h ' ,■**"• oP\ „ yff?’

!<\ SnAUvao f = w . 'fAQiliwI Vi

e>as 4 \ ,> o.VA i v 1 1

1 ’ A,;;y » *taoa m/a-* \ *5* ^, * /....«» *m*> <» "J

if A/ - „ -rv --r . l.i'len Ccncep

I "x Sa p A ;« t ,-inialat. [^

1 V^— i ASlT?«iIONt-'"\s«“ B«rn«r.lm.. MVr | '/

' ^ "cX'WlMy ’:■» ^ 1 1 a < „ M , <A“ «o- J

i t

Car'-i7a7j CarTwal BoWj Canto f'-'

<o

8

40

SANTIAGO

0Tintina

Con

*N

Puerto de los *V 1 IBP \ 'N r‘%i:

11 w \petorca

Valparais

25°

«7'uilino Laffbnaa 6aLSUaai. \ i ‘vHorsi

- FuneaJc

San Roque1 I Vincente

I

k-Bagualˆ

nvgueiro

CJinccto Str

o»f.

{ahuel Huhpi) I

uco viejo \ /

Campos de V ~ c

Maquinchao j *o ˆ ˆ

, v , > .

£ H U B U T

-r tc » _ˆPunta Sur

lAjˆrho ˆucho

W”- — U t;

ec _ X \ -A ™mar Chi quit a

w

ar del Plata

‘lift. j}®

Corrientee

oar del Sur

■‘“chea 0

CHILE

c

8

! Gamas

Punta Rubia

Viedmaˆyˆ/" de Patagones

Gulf of San Mafias

Rynta Norte LW ALDES :.' •> _

W Peninsula

Jjm , ,

‘ ^^Punta Delgada

ARGENTINE REP. PARAGUAY and URUGUAY

40 9

V

SCALES

Statute Miles, 1-15 = 1 Inch.

25 50 75 100_ 150 200

Kilometres, 253=1 Inch.

50 100 200_ 800

250

For extreme southern part- of Chili and Argentina see general map of South America.

75°

c

E

55,

•

'

.

■

republic in the shape of low ranges of hills, isolated by the waters of the Pacific which, in addition, have invaded its valleys, forming an immense number of picturesque channels, it little by little became of greater height and breadth until it forms in the north the elevated tablelands of Atacama and Jujuy, with a mean height of 13,000 feet above sea-level. The abundant vegetation which covers its lower slopes in the south disappears on passing be¬ yond the 37° of latitude, and in the same man¬ ner the snow, in the north, has only a per¬ manent character on the summits of the most elevated peaks, such as the Aconcagua, Mer- cedario, Tupungato, and Juenal. Another inter¬ esting feature of the southern part of the Cor¬ dillera is the existence of deep gullies which run through it and allow the passage of im¬ portant rivers formed by the waters of the eastern slopes, which otherwise would have found an outlet toward the Atlantic Ocean. Besides the Andean system there is a central system formed by three parallel ranges known by the general name of Cordoba and San Luis ranges ; the Buenos Aires system formed by two isolated ranges and the Misiones system formed by the western extremity of two moun¬ tain ranges entering the Argentine territory from Brazil and forming a letter Y by their joining together.

In regard to the hydrographic system of the country, we may divide it into four systems : the system formed by the rivers within the Plata basin ; the central system, the Patagonian system formed by the basins of the rivers flow¬ ing from the eastern slope of the Andes, and lastly, the system of the province of Buenos Aires.

The basin of the Plata, which includes most of the territory of Argentina and part of those of Brazil, Uruguay and Paraguay, is drained by the river Plata, justly considered as the en¬ trance gate to South America; the rivers Uru¬ guay and Parana which debouch into the Plata after a course of 900 miles in the first case and of 2,000 in

the second ; the river Paraguay, which forms the axis of the system and joins the Parana at 1,200 miles from its source; the Pilcomayo and Bermejo rivers which rise in Bolivia and fall into the Paraguay after having crossed the territory of the Chaco; the Salado del Norte River which runs through the provinces of Santiago del Estero and Santa Fe to discharge into the Parana near the city of Santa Fe; the river Carcarana, another affluent of the Parana formed by the union of the Tercero and Cuarto rivers which have their sources in the Cordoba range ; and in addition other rivers of less importance, all of which rise in the province of Buenos Aires and are affluents of the river Parana and the river Plata.

Mr. E. L. Corthell, an American engineer, says that ((the Parana has a larger discharge than the Mississippi ; its annual flow is double that of the Ganges, three times that of the Saint Lawrence, four times that of the Danube and five times that of the Nile. There are records of 608 cubic miles in one year.® The Parana River is one of South America's great water¬ ways. Transatlantic steamers of 10,000 tons drawing 23 feet can enter the river up to Ro¬ sario, 240 miles from Buenos Aires. Those of 6,000 tons. can reach the ports of Parana and

Colastine. Specially constructed vessels can go farther, to Corrientes, 640 miles above Buenos Aires. . At Corrientes the Paraguay River flows into the Parana which at this point makes a sharp turn toward the south. From the point of view of navigation the Paraguay River is a natural continuance of the Parana. Steamers drawing 13 feet ply from Buenos Aires or Cor¬ rientes to Asuncion, on the Paraguay River, during nine months of the year.

The upper Parana, frem Corrientes toward the east, is navigable by large boats only to the falls of Apipe, 145 miles above Corrientes. But smaller steamers ply regularly beyond Apipe up to Posadas and still smaller craft up to near Iguazu Falls, on the boundary line be¬ tween Argentina, Paraguay and Brazil.

The river Uruguay is navigable by large steamers up to Concordia which is an import¬ ant agricultural and commercial centre. But during the floods the river is everywhere navi¬ gable. These floods are quite sudden but not long continued. The floods of the Parana are much longer continued, because its source is in the tropical and rainy regions of Brazil and it receives also, through the Paraguay, the waters from the flanks of the Andes. At the conflu¬ ence of the latter river with the Parana at Corrientes, the rise of the floods is about 33 feet; at Rosario it is from 19.7 to 23.5 feet.

Of the other rivers belonging naturally to the Plata system, such as the Pilcomayo, the Bermejo and the Salado, none at present is of economic importance. Further south the Parana River receives the Carcarana, formed by the confluence of the Tercero and Cuarto rivers which drain the southeastern part of Cordoba. These rivers are used for irrigation purposes and the Argentine government has entered into an extensive program of irri¬ gation works contemplating the reclamation of large tracts of land along the valleys of these rivers and also of the Quinto, which more properly belongs to the central system.

The central hydrographic basin is formed by a vast depression that in its lowest part is occupied by the lakes of Porongos and Mar Chiquita into which several rivers such as the Dulce and the Primero and Segundo fall. Irri¬ gation works in these rivers have been going forward on a large scale. The Rio Primero dam holds 260,000,000 cubic metres and the Segundo River dam 350,000,000 cubic metres.

The hydrographic basin of the Colorado River commences in the north of Rioja with several rivers which, after forming the Ber¬ mejo, are lost in the lagunes of Huanacache, together with the rivers San Juan and Men¬ doza ; and in succession to these we have the streams that run from north to south, which join the waters with the Desaguadero or, as we may call it, the channel for the discharge of the lakes of Huanacache, and this con¬ junction flows on toward the south under the names of Salado, Chadileuvu, and Curico until it falls into the Colorado, having on its course southward formed many lakes and marshes; and lastly the Grande and Barrancas that in combination form the Colorado River, which having traversed the pampas from east to west debouches into the Atlantic Ocean a little to the south of the estuary of Bahia Blanca.

Most of these rivers are used for irrigating the grape and fruit districts of Mendoza and

San Juan, as well as the pasture lands of San Luis.

The basin of the Rio Negro is also of great importance, being formed by the streams which flow down from the Cordillera of the Andes between 37° and 41° south latitude. This basin, like all the others that are found further south, has the peculiarity of encircling within it a large number of lakes which, while con¬ stituting one of the principal

attractions of the Cordillera of the Andes, have a beneficial in¬ fluence on the regulation of the waters. There are several other lakes whose natural drainage is the river Limay which, together with the Neuquen, forms the Rio Negro, the mouth of the main river on the Atlantic being a little to the south of the Rio Colorado. The island of Choele-Choel, renowned for its great fertility, is about midway between the confluence of the Limay and Neuquen and the sea, but nearer to the former.

Extensive irrigation works are being com¬ pleted at Negro River, with the purpose of irrigating the barren pampas stretching between that river and the Colorado, as well as the lands south of the Negro. The Patagonian rivers are also navigable to a certain extent. Flat boats have to be used, however.

The drainage of the remaining lakes of the Cordillera is effected by means of the river Senguer, an affluent of the Chubut ; the beauti¬ ful lakes of Buenos Aires and San Martin, whose waters make their way through the Cor¬ dillera of the Andes to fall into the Pacific in the same manner as do those of the lake Lacar and many others farther north; the Ar¬ gentine and Viedma lakes whose drainage forms the river Santa Cruz, one of the most important in Patagonia, which, with the Deseado and the Gallegos, completes the hydro- graphic system of this region.

The most important rivers of the province of Buenos Aires are the Salado del Sur, whose valley is considered as being only a continuation of that of the Rio Quinto, which flows down from the ˆSierras® of San Luis. This river gives rise to important lagunes and receives, before falling into the bay of San Borombon, the superfluity of waters of many others.

The remaining rivers of that province which debouch directly into the ocean are the San Borombon, Quequen Grande, Quequen Salado, Naposta, Sauce Grande and Sauce Chico.

As regards the Argentine Mesopotamia, it is, on account of the impermeability of its soil, a region traversed by numerous rivers and streams which flow into the Parana and Uru¬ guay. The province of Corrientes, in particu¬ lar, contains the immense lagunes of Ibera and Maloya, up to the present almost unexplored.

To conclude this hydrographic sketch of the republic we may call attention to the existence of a certain number of depressions, occupied by salt lakes and deposits of salt, that constitute so many additional

basins into which there flow streams of brackish water, which, on evapora¬ tion, deposit the salt they held in solution, forming real natural salt pans, some of them being worked to supply the requirements of the inhabitants of the interior. In the high table¬ lands of Atacama and Jujuy are other deposits which are doubly interesting on account of the deposits of borax which they contain. There are, also, distributed throughout the whole

Andine region, numerous water-courses, which are taken advantage of near their sources for the irrigation of the soil but which, their course being through immense zones of permeable land, are quickly lost in the subsoil. Among these we may mention, as examples, the rivers Tala, the Valle, and the Paclin, which give life to the beautiful valley of Catamarca, and to the city of that name. Irrigation works are also prominent in some of these rivers.

Climate. — Almost any desired climate, from tropical to frigid, may be had in a country that extends through more than 34 degrees of latitude, or more than 2,300 miles, from latitude 2 2° to 56° south, and is in places 800 miles wide. Conditions vary widely in the same latitude. Rainfall diminishes from the east to the west until the very base of the Andes is reached. Temperature is highest in the central part of the country, falling rapidly in the Andean region to a point many degrees below the tem¬ perature of localities due east. Temperature also diminishes toward the south.

In the northern part of Argentina the transi¬ tion from the rainy to the dry season is very marked. A four-season climate prevails in Corrientes, Entre Rios, Santa Fe, Cordoba, Buenos Aires, Mendoza, San Luis and the re¬ maining country lying south. However, there is always a prevalence of rains from October to April. In the provinces of Corrientes, Salta, Jujuy, Catamarca and Santiago del Estero and the territories of Chaco, Formosa, Andes and Misiones, climatic conditions are those of sub¬ tropical countries. In Buenos Aires, Santa Fe, Entre Rios, La Rioja, San Juan and San Luis, south of Corrientes, Santiago and Catamarca and territories of La Pampa Neuquen and Rio Negro, the climate is temperate. In Santa Cruz, Tierra del Fuego and Chubut, the climate is cold but not so severe as to pre¬ vent these southeastern regions from being habitable.

The highest recorded temperature, 120°, was during the hot wave of February 1900, in the province of Catamarca at the extreme north, and the lowest recorded temperature was 3°, in the southern extremity of the continent, a range of 117° of temperature in 33 degrees of latitude. The Argentina weather bureau states, however, that lower

temperatures are probably experienced in the interior of the territory of Santa Cruz. In the northern part of the Litoral the ordinary range of temperature is from 41° to 106° and in the southern section of the Litoral the usual limits are from 32° to 102°. This is the territory in which most of the corn is raised, and the summer temperature averages from 72° to 77° and is rarely above 96°.

The meteorological system of Argentina con¬ sists of 200 meteorological and 1,600 rain-gauge stations. Besides, the Argentine Weather Serv¬ ice receives information from 12 Brazilian, 10 Chilean and six Uruguayan stations. The Argentine weather map issued daily shows conditions reigning from Para (Brazil) to the southernmost limit of the continent. At the South Orkney station (lat. 61° S.) there is a fully equipped meteorological and magnetic station. The hydrometric service has estab¬ lished nearly. 150 river gauges and information is published in the daily weather map as to the depth of the water at the principal ports and shallow passes of the navigable rivers as well

as timely warnings of the approach of the freshets in the rivers. The magnetic service is well equipped for the observation of the solar spots and spectroscopic observations, atmos¬ pheric electricity, kite work and the prepara¬ tion of the isogonic chart of the country.

Geology. — In the Tertiary period the up¬ lifting of the Cordilleras and of the Andes was effected, and the leveling of the Pampas, giving to the country the physical aspect of to-day. The Pampean system is characterized by the abundance of deposits of an argillaceous sand of great fineness, of gray color peculiar to de¬ posits of sand and clay or alumina, the first of which encompasses the slopes of the Sierras, while the second is found along the margin of the Plata. The Pampean system is character¬ ized, moreover, by an abundant and marvelous fauna of fossil mammals.

The works of Florentino Ameghino, who collected hundreds of fossil specimens on the banks of Patagonian rivers, will help in clear¬ ing up many points related to the origin and distribution of mammals, man included. The fact that most of the fossils appear in forma¬ tions older than those in which the same species are to be found in the northern hemi¬ sphere is leading some palaeontologists to assign man

an antiquity not hitherto suspected. In this connection the finding in 1914 by a com¬ mission from the Buenos Aires Museum of Natural History of an arrowhead — evidently the work of man — embedded in a bone of Tox- odon remains one of the most sensational palae¬ ontological discoveries of the age. To compre¬ hend the abundance of fossil mammals in Pam¬ pean soil it is necessary to remember that in the Cretacean epoch the southern hemisphere contained relatively more land than water; while in the northern hemisphere the con¬ trary condition existed. This naturally greatly favored the deposit of a varied fauna of mammalia.

The Cretacean epoch is represented in Ar¬ gentina by the Chubutian and Guaranitican formations, which belong respectively to the lower and upper Cretacean. The former ex¬ tends over the territory of Chubut, occupying the most central part, and is characterized by a very hard sand of very marked color. Both land and marine fossils are found in it. The latter formation is found in Corrientes and Misiones, reappearing in the Rio Negro and also in Chubut, resting upon the former.

The period of the Tertiary epoch is repre¬ sented along the coast of Patagonia and sea¬ shore region from Puerto Madryn to the bot¬ tom of the Gulf of Nuevo, as far as the mouth of the Santa Cruz River, where it disappears under the Atlantic. The fossils are marine on the coast, and land toward the west. To the south of Patagonia, between the rivers Chico and Gallegos, there extend other formations of the same period.

The Oligocene period is represented by a succession of layers principally of marine origin, which appear in the province of Entre Rios along the whole length of the Parana River. The same layers reappear farther south at the mouth of the river Negro and extend along the Patagonian coast as far as the Gulf of Nuevo.

Remains of the Miocene period cover the central and southwestern Pampas, as well as

a portion of Catamarca and Tucuman. To this period belongs the immense quantity of rounded gravel which covers the whole surface of Pata¬ gonia from the river Negro to the south.

Of the Pliocene period may be found rep¬ resentations in the Pampean formation, or in the great deposit of lime and reddish gray clay which covers the province of Buenos Aires.

Representations of the Quaternary and re¬ cent epochs are met with in isolated deposits throughout the length of the republic.

Flora. — According to Professors Holm- berg, Spegazzini, and Gallardo, the Argentine flora represents almost one-tenth of the flora of the world. Professor Stuckert claims to have studied and classified as many as 8,000 phanerogamous and vascular cryptogamous plants. The number of known plants among the cryptogamous alone is calculated at 3,000 species. Only a fourth of the phanerogamous and less than a tenth of the cryptogamous plants have been classified. The microscopic flora is almost entirely unknown. The prov¬ ince of Buenos Aires is almost devoid of trees; the only part where they are found is along the coast, but they are small and consist prin¬ cipally of mimosae, which make excellent fuel. Calden is to be found in the west. In part of Santa Fe, the Chaco, Santiago del Estero, Entre Rios, Corrientes, Misiones, Tacuman, etc., there are immense forests of the finest and most useful classes of trees, from the easily worked cedar to the quebraco (axe breaker) used for railway sleepers, nandubay for fenc¬ ing posts, lapacho, algarroba and numerous varieties of wood for shipbuilding' and fur¬ niture. The ombu is useless as timber, and is not even suitable for firewood, but is valued for its shade, while the ceibo bears an extremely beautiful flower of a deep crimson color.

Fauna. — Very few species of animals per¬ tain exclusively to Argentina. Among the mammals are recognized two, the vizcacha, which is not found outside of the Pampas, and the hare of Patagonia. Among birds may be numbered two species characteristic of Argen¬ tina; the marineta, a bird of the heron family, and the- gallito, or small cock, which also live on the Pampas, but farther south than the two species first named. Most of the animal species which live in Argentina are met beyond the frontiers of the country in Brazil, in Bolivia and in Chile. Some of these are also common to the Antilles and to North America.

There is a great variety and diversity in the fauna, according to the region studied, since the animals of the east or of the north differ considerably from those of the west and the south. Dr. Lahille has divided southern South America into three regions: (1) The Andean, which comprises the whole of Chile, all of Pat¬ agonia and the greater part of the Andean provinces; (2) the central region, formed by the basin of the Parana River; (3) the Brazil¬ ian, which comprises the territories of Mis¬ iones, a part of the province of Corrientes, and also the northern part of the republic of Uru¬ guay. In the eastern zone of Argentina live the animals that have emigrated from the table¬ lands of Brazil.

The wild animals are numerous, being the jaguar (tigar), puma (leon) and various kinds of wild cats, the aguara-guazu (fox of Para¬ guay), an animal of a reddish color with a

black stripe along the back ; gray and red foxes, various kinds of weasels, otters, skunks or pole¬ cats, nutria, a rodent which is called an otter but is Myopatamis Copyus, having a tail like a rat ; seals, opossums, raccoons, vicuna, huanaco, elamas and alpacas, the last two said to be the domesticated varieties of the preced¬ ing two, various kinds of deer varying in size from that of the red deer of Europe down to 18 inches in height; armadillos of four varie¬ ties, the wild guinea pig, the pampa hare, which is not a hare but Dolichotis Patagonica, and several monkeys, carpincho or water hog, viz- cacha or prairie dog, tapir, peccari, ant-eaters. The vizcacha was some years ago very numer¬ ous, but is not now to be found on the inside camps, that is land that has been stocked for many years, as a war of extermination was waged against them some 25 or 30 years back. Birds are also numerous, the more notable be¬ ing the vultures, hawks, ostrich (rhea or nandu), eagles, owls, parrots, woodpeckers, ovenbuilders, humming birds, ibis, flamingo, spoonbill, swallows, pigeons, doves, egrets, storks, wood turkeys, partridges of various kinds, snipe, plovers, ducks, swan, geese, gulls, bustard and in the far south the penguin and other sea birds. The house sparrow was in¬ troduced some years ago and has now become a thorough nuisance, as are also the descend¬ ants of imported hares in Santa Fe and the north of Buenos Aires.

The best fish are the pejerrey (a kind of trout), dorado (something like salmon but of a golden color), corvina, palometa, pacu, anchoa (a large fish not a bit like an anchovy), flatfish, zurubi, an immense yellow and black spotted catfish. The only fish we know that will take the artificial fly are the pejerrey, do¬ rado and the mojarra, a small fish very like a sardine. Alligators are still to be found in the upper Parana and Paraguay; iguanas are to be found in the northern provinces and lizards throughout the country.

Snakes are numerous but the only danger¬ ous ones are the rattlesnake and the vibora de la cruz; possibly some of the large water boas may be so, but no instance has been reported of man being attacked by them.

Some years ago it was successfully dem¬ onstrated that oysters could be brought from the favored localities of the United States and placed in the bays of the Atlantic coast of this republic and there multiply, grow and fatten.

Bibliography. — Holland, W- J., etc. (New York 1914) ; Pan-Ameri¬ can Union, (Argentine Republic: General De¬ scriptive Data* (Washington 1914) ; Ross G., Argentina and Uruguay * (New York

1916) ; Willis, B., (Northern Patagonia, Character and Resourc.es) (Vol. I, a study of the elements of development in the region tributary to the national railway from Port San Antonio to Lago Nahuel Huapi, etc, under caption Min¬ istry of Public Works, Buenos Aires 1911-14). See also Bibliographies under History, Agri¬ culture, etc.

Ernesto Nelson,

Director-General of Secondary, Commercial and Industrial Education of the Argentine Republic.

1. POLITICAL DIVISIONS, POPU¬ LATION AND IMMIGRATION. The

Argentine Republic consists of 14 provinces, 10 territories and a federal district. These, with their areas and populations, are as fol¬ lows :

Area

PROVINCES

(in square miles)

Population

Buenos Aires (Federal District) . . .

Buenos Aires .

Santa Fe .

Cordoba .

Entre Rios .

Corrientes .

San Luis .

Santiago del Fuego .

Tucuman .

Mendoza .

San Juan .

La Rioja .

Catamarca .

Salta .

Jujuy .

72

117,777 50,713 66,912 29,241 33,535 29 , 035 55,385 10,422 56,502 37,865 37,839 36,800 48,302 14,802

1,594,170

2,155,118

922,406

598,545

423,100

365,434

126,895

247,004

348,582

296,553

130,412

104,550

112,995

161,150

73,062

Territories

Misiones .

Formosa .

Chaco .

Pampa Central .

Neuquen .

Rio Negro .

Chubut .

Santa Cruz .

Tierra del Fuego .

Los Andes .

Total .

11,511

41,402

52,741

56,320

40,530

79,805

93,427

109,142

8,299

34,740

52,603

27,902

49,500

98,841

30,085

37,302

25,143

8,630

2,420

2,552

1,153,119

7,979,259

The returns of the 1914 census,, pub¬ lished in September 1916, gave 7,885,237 inhab¬ itants as the total population on 1 June 1914. The (Argentine Year Book,* 1915-16, gives, as the estimated population for 1915 (a calculation by the National Statistical Office), 7,979,259. The estimates 9,000,000 or 10,000,000 frequently given appear to be based upon the growth of cities, with which the rural population does not keep pace. The urban population, constituting 42.8 per cent of the total population of Argen¬ tina in 1895, increases from year to year out of all proportion to the rural ; and the movement toward the cities, especially Buenos Aires, has been marked in the decade 1908-17.

Of the total population of the republic about 2,000,000 are foreigners, or ftiore than 25 per cent as against 10 per cent in the rest of South America and 13 per cent in the United States. About one-fifth of the entire population of the country is in the capital city, of which about 40 per cent are foreigners. This shows that an undue proportion of immigrants remains in Buenos Aires, while the sparsely settled country districts have received a minority of them. To counteract this tendency the Immi¬ gration Bureau now offers free lodging during jO days in the agricultural centres to all those immigrants willing to go there. Transporta¬ tion to those districts is also free to the immi¬ grant, his family and baggage.

Only second and third class passengers are considered immigrants by Argentine law. Im¬ migration regulations are very strict regarding health of immigrants and the hygienic and safe conditions of steamers carrying them. On their arrival at Buenos Aires immigrants are pro¬ vided with board and lodging, valid for five

days, which term may be renewed in case of sickness. The Immigrants' Hotel is a model establishment offering accommodations for 1,000 persons at a time. Dormitory buildings, dining hall, lecture-rooms, lavatories and hot and cold baths and swimming pools are the chief features. There are also immigrants' hotels at Rosario and Bahia Blanca. The Na¬ tional Labor Bureaus use every means to find a situation for the immigrant in the art, craft or industry in which he wishes to apply him¬ self. Since the country was opened to immi¬ grants in 1854 about 4,750,000 immigrants have entered Argentina, of which number 30 per cent have returned to their native land. In 1913; the year before the European War, 302,- 047 immigrants entered Argentina. The immi¬ grants have come in gpeat numbers from Italy and Spain, and lately from Russia and the Balkans. The immigrants can acquire rich government land without being subjected to na¬ tionalization. Provision is also made for the supply of the necessary funds to furnish the colonist with implements and other equipment to enable him to begin work immediately.

One of the drawbacks the country has had to contend with is that the feudal land system instituted by Spain was continued under the republic. The conquered land in the provinces was already mostly held in private estates. The remnant was won by degrees from the Indians. After conquering from them the rich lands of southern Argentina in 1885, land was sold off in blocks with a square league (6,250 acres) as a unit at a nominal price. The army re¬ ceived a vast grant of these lands in payment of the work accomplished. All these tended to create vast latifundia which, fortunately, are being gradually broken up. From 1905 to 1915 the number of holdings of less than 12,- 000 acres has increased in the proportion of 100 to 171, while the number of big holdings of 12,000 acres upward has diminished in the proportion of 100 to 56.

Bibliography. — Alberdi, J. B., (Organiza- cion de la Confederacion Argentina5 (Buenos Aires 1913) ; Antokletz, D., (Histoire de la Diplomatic Argentine5 (Tome 1, Paris 1914) ;

(Argentine Republic: General Descriptive Data Prepared by the Pan-American Union) (Wash¬ ington 1916); (Argentine Republic: Statutes, Code's5 (Buenos Aires 1913) ; (Argentine Year Book) (10th ed., 1915-16, Buenos Aires 1916); (Buenos Aires: Universidad Nacional: Facul- tad de Filosofia y Letras, Documentos para la Historia Argentina) (Buenos Aires 1913-14) ; Davis, W. G., (Climate of the Argentine Re¬ public (Buenos Aires 1910); (Law and Regu¬ lations

Respecting General Enrollment in, the Argentine Republic5 (London 1913) ; Martinez, A. B., < Baedeker of the Argentine Republic5 (New York and London 1916) ; Nelson. E., (Un Experimento Trascendental en la Educa- cion Argentina 5 _ (Buenos Aires 1912). See also bibliographies under History, Agricul¬ ture, Banking and Finance.

Marrion Wilcox,

Co-editor of cThe Encyclopedia of Latin America 5 and editor (Harper's History of the War in the Philippinesˆ

1. HISTORY. Exploration Period. —

Spain, not being satisfied with the discoveries and conquests which she had effected in Amer¬ ica, was made ambitious by her rival. Portugal,

regarding the known riches of the Molucca Islands, in the Malay Archipelago. To pos¬ sess herself of these she looked for a channel between the Atlantic and Pacific oceans travers¬ ing the new continent, and the mission of find¬ ing this was entrusted to the most able mariner of the day, Capt. Juan de Solis, who in 1515 a.d., navigating with two boats along the coast of America, arrived at 35° S. latitude. He proceeded along what is now knowm as the river Plata (Rio de la Plata) until he reached the mouth of the Uruguay River, and anchored his vessels there, in front of a little island which he named Martin Garcia, in honor of the second commander of the expedition.

Solis and some of his companions went to the eastern bank of the river, but they had hardly disembarked when they wrere killed by the Charrua Indians. Deprived of their leader the company did not venture to begin the ex¬ ploration of the newly-discovered country, and returned to Spain. This dismal failure dis¬ heartened the Spanish government until 15 years later, when the discovery of Brazil and the conquests of the Portuguese revived the ambition of Spain. In 1526 the Spanish gov¬ ernment sent nearly simultaneously two expe¬ ditions to the south, one under the command of Diego Garcia, with the intention of stopping the advance of the Portuguese, and the other in charge of the English captain Sebastian .Cabot, with the object of finding an interoceanic passage. The lack of provisions and a mutiny among the sailors prevented Cabot from carry¬ ing out his designs, and unfortunately while navigating in the river discovered by Solis, and following the Uruguay River, the detach¬ ment that disembarked to explore the region had no better fate than that of Solis and perished at the hands of the Charruas. Cabot therefore changed his route a*nd

discovered the mouth of the Parana. Here he established in the delta the first European port in the region of the Rio de la Plata, the fort Espiritu Santo. Ascending the Parana to its junction with the Paraguay, Cabot began trading with various tribes of Indians, whom he found using many silver ornaments and utensils. This excited the cupidity of the explorer, who, thinking he had discovered a region of silver mines, named the estuary then known as Rio de Solis the Rio de la Plata, or Silver River.

By chance the expedition of Diego Garcia, which, as previously stated, had been sent out to stop the advance of the Portuguese, arrived at the mouth of the river Plata. Quarrels broke out between the two commanders which obliged Diego Garcia to return to Spain, and fearing the decision of the government at Madrid would be unfavorable to himself, Cabot returned to Europe, leaving large supplies in the fort Espiritu Santo, 'which was soon as¬ saulted in an unexpected way and burned to the ground by the Timbu Indians, who up to this time had maintained friendly relations with the Spaniards.

These early discoveries in the Rio de la Plata led to a great deal of jealousy and desire for territorial expansion on the part of Euro¬ pean monarchs. Carlos V, King of Spain and Emperor of Austria, who was at war with Francis I of France, not being able to disband his army nor to give much attention to the con¬ quest of America, decided to send out explor-

ing parties to annex definitely the territory of the river Plata. A rich Spanish noble, Don Pedro de Mendoza, arranged with his govern¬ ment to equip at his own cost an expedition, on condition that he was to be named governor over all the territories which he discovered or conquered. The Mendoza expedition consisted of a fleet of 14 vessels and about 2,000 men, many of whom were Germans. This force en¬ tered the river Plata 20 Feb. 1535, and landed on the spot where now stands the capital of the Argentine Republic. There a town site was chosen, Mendoza giving it the name of Santa Maria de Buenos Aires, which means Saint Mary of the Good Breezes. Subsequently the little town was destroyed by the Querandi In¬ dians who inhabited the region. The expedition escaped to the Espiritu Santo fort, leaving seven horses and five mares, the first herd of horses in Argentina. From Espiritu Santo Mendoza sent his principal lieutenant, Don Juan de Ayolas, to explore the Parana River. After numerous fights with the

various Indian tribes Ayolas occupied the land and founded the town of Asuncion in 1537. He intended later to pene¬ trate as far as Lima in Peru. Mendoza, sick and discouraged, started to return to Spain, but died on the way. Ayolas succeeded him in command of the Spaniards on the Plata.

From Asuncion, Ayolas went on an expedi¬ tion to Peru, and upon his return was killed by the Indians. This expedition brought from Peru some ewes which had been imported from Spain via Panama. These ewes constituted the nucleus of the Argentine flocks. Several years before this seven cows and one bull, the first cattle in the river Plata territory, had arrived at Asuncion.

All the people who did not care to follow Ayolas on his unfortunate expedition across the unknown continent remained in Asuncion. Among them were many Germans and some French, Belgians, and Italians. They elected Domingo Martinez de Irala as governor, and formed the first autonomic government of South America, organizing the first colony and entering into friendly relations with the neighboring tribes of Indians.

The polygamous condition of these tribes made easy the multiplication of the colonials, thus originating the half-breed type, who in their turn joining with the Europeans gave the racial character of the new population of the region. D'Orbigny thus describes the Mestizo, or mixed blend of people: <(The mixture of the Spaniards with the Guaranies produces men of large form, nearly white, and having beauti¬ ful faces even from the first generation; large eyes, clear complexion, and nose generally like the Spaniards. As a rule they have scanty beards until the third generation, when it be¬ comes as thick as the white man's.®

During the second half of the 16th century, while they were founding and organizing the governments of Paraguay and Rio de la Plata, other expeditions leaving Peru by land ex¬ plored and settled the interior territory of the Plata. In this way were founded the cities of Estero, Tucuman, Cordoba, Salta, Rioja and Jujuy. Other conquerors, coming from the general headquarters in Chile, took possession of the Cuyo region and founded the cities of San Juan, Mendoza and San Luis.

The inefficiency of the military conquest of

the Indians and their continued insubordination decided the government at Asuncion to try to bring them into submission through

the medium of church missions, which they commissioned the Jesuit Fathers, already established in Peru, to undertake. The missionaries founded their schools in Salta, Cordoba, and Santa Fe. Others went to unexplored sections and established missions with the most perfect theocratic gov¬ ernment among the Guaranies.

The government of Spain, after the death of Irala, sent out Don Juan de Garay as governor of Paraguay. Needing a fortified position nearer to the ocean, Garay descended from Asuncion resolved to reconquer the site occu¬ pied by Mendoza in 1536, and succeeded in re¬ establishing, 11 June 1580, the abandoned colony of Buenos Aires. Plans were made for the laying out of the town which the Indians again tried to destroy. The first inhabitants of Buenos Aires were 19 Spanish and 50 Creoles. With the founding of Buenos Aires the period of conquest in the region now comprising the Argentine Republic may be said to have finally closed, to be followed by the colonial regime.

The desire to secure communication be¬ tween Buenos Aires and Asuncion necessitated the foundation of various forts and colonies along the Parana River in the region which to-day constitutes the provinces of Santa Fe, Entre Rios, and Corrientes.

During this time the Portuguese were ad¬ vancing their explorations south along the At¬ lantic coast, arriving at the left margin of the Rio de la Plata. This alarmed the Spanish government, which, being powerless to quell the internal anarchy of the colonies while in the midst of the fight with rebellious tribes of Indians, separated Buenos Aires from the gov¬ ernment of Paraguay, instituting the province of Rio de la Plata dependent on the viceroy of Peru, and named for governor-general Bruno de Zabala, who, in 1726, founded the city of Montevideo, now the capital of the republic of Uruguay.

The Spanish government did not permit commercial importation through the port of Buenos Aires and the colonists of this region were obliged to resort to troublesome trans¬ continental traffic to reach Lima, the capital of the viceroyalty, the only market of importa¬ tion which they could count on. But as Para¬ guay received direct importations in freight boats for the official agents of the Spanish gov¬ ernment, and the traffic necessarily had to pass near to Buenos Aires, the inhabitants of this city devised methods to organize a trade with Cadiz, from which place there were secretly sent to Buenos Aires books that the Spanish government did not permit to circulate even in Spain, which contained comments on the Amer¬ ican Revolution and philosophical writings such as preceded the French Revolution. One can understand that these books found eager read¬ ers, since the

cultured class of Buenos Aires had been recruited from liberals, who, fleeing from persecution in Spain, preferred as a refuge the modest city on the banks of the Rio de la Plata to the brilliant capital of Peru, centre of military and ecclesiastical prestige and head of an aristocracy formed from de¬ scendants of successful adventurers. The lib¬ eral ideas of this class separated them some¬ what from the theocratic and military influence

which ruled the interior, but during the next two centuries Buenos Aires received only such liberal literature as could be smuggled from Europe.

Colonial Period. — In the middle of the 18th century Spain was engaged in war with Portugal, which, allied with England, sent a fleet to the Rio de la Plata and took possession of a small port on the left bank of Buenos Aires. The government sent forces which repelled the invasion and, in view of the fact that the river la Plata required more safe¬ guards, reorganized the colonial administra¬ tion, constituting the viceroyalty of Buenos Aires with its jurisdiction in the territories now occupied by the republics of Uruguay, Paraguay, Bolivia and Argentina, and opening in 1776 the ports of the river Plata to impor¬ tation.

The first viceroy, Zeballos, explored part of the coast of Patagonia. His successor, Juan Jose de Vertiz, a Mexican of excellent ante¬ cedents, dedicated himself to the advancement of the city of Buenos Aires, using for this ob¬ ject the property confiscated from the Jesuits by Carlos III. Buenos Aires at that time, 1778, contained 22,000 white inhabitants, of whom 15,000 were European Spaniards. The total population of the country was 300,000, of whom 10 per cent were negroes or mulattoes. The buildings were almost exclusively of unbaked bricks, roofed with straw. The increase of the horses, abandoned by Mendoza, that had scat¬ tered themselves through the pampas, had modified the traits of the Indians of the region, who, becoming horsemen, fled from the harsh treatment of their conquerors.

The facility with which a colonist could make himself a large landed proprietor, and the impossibility of inducing the natives to work, promoted the importation of negroes as slaves, and in 1715 the government had con¬ ceded to an English company the monopoly of

importing 1,200 negroes a year, which conces¬ sion, however, was abolished in 1728, although the importation continued in a very light pro¬ portion till the beginning of the 19th century.

At this time it was the custom of the wealthy class in these colonies to send their studious young men to complete their educa¬ tion in the schools and colleges of Europe. The unliberal spirit which ruled in the University of Cordoba in the centre of the country did not attract the young men of Buenos Aires.

In 1806 an English expedition, returning from the conquest of the Boer colonies at Cape Town, South Africa, crossed the Atlantic and invaded Buenos Aires. The viceroy, Sobre- monte, fled to the interior of the country, leav¬ ing the defense of the city to the Spanish residents and natives. The English assault was repelled, all being made prisoners, although taking advantage of the confusion, the invad¬ ers seized $1,500,000, which was in the fiscal treasury and which they sent to England. This produced an extraordinary effect in London in regard to the riches of the Rio de la Plata region and induced the English government to send another and better equipped expedition, consisting of 60 boats and 12,000 men, to take possession of Buenos Aires. This second at¬ tempt, however, had no better success than the first and many English prisoners remained in the country where they eventually intermar-

ried with the natives. The authorities and the Spanish residents accused the masses of sym¬ pathy with the invaders; nevertheless the Eng¬ lish were freed and received by the first fam¬ ilies, thus helping to constitute the liberal ele¬ ment which was later to have the direction of the revolution of independence.

The Republic. — The government of Spain, alarmed at the projects of Napoleon, could not extricate itself from warring elements and had refused to send aid for the defense of the river Plata. The citizens of Buenos Aires, proud of their triumphs and dissatisfied with the viceroy, Sobremonte, deposed him and named as his successor Liniers, a French cap¬ tain who had helped them in the first defense against the English ; but the Spanish govern¬ ment denounced this act and appointed as viceroy a Spanish marshal, Cisneros. At this time, because of Napoleon's domination over Spain, the authority of the Spanish viceroy was not recognized and fresh germs of inde¬ pendence were sown. With this impetus some of the patriots met and announced a govern¬ ment Junta. This assembly took place 25 May

1810, the date which the Argentine Republic celebrates as its. birthday. This congress in¬ vited all the authorities of the viceroyalty to join the movement, and founded a periodical of revolutionary tendencies called The Buenos Aires Gazette; for it was evident that the power of Spain could only be broken by united effort of the patriots who were scattered throughout the southern portion of the con¬ tinent, and that Buenos Aires was the natural leader in such an enterprise. The colonial au¬ thorities, however, refused the invitation and, supported by the loyal colonists, repelled the revolutionary expeditions which were later sent from Buenos Aires to overthrow the Spanish authorities.

For seven years the success of the insur¬ rection remained in doubt. The Argentines suffered defeats in Paraguay and in Upper Peru (now Bolivia), and the Spanish held un¬ conquered the fort of Montevideo at the mouth of the river Plata. During this time the en¬ thusiastic propaganda for liberty and equality, and the revolutionary documents sent out from Buenos Aires to all the colonies, had awakened fanciful ambitions and uneasy repinings among the natives and illiterate semi-barbarous half- breeds, who during the progress of seven gen¬ erations — more than two centuries — had submissively considered themselves inferior to the whites. So when the Argentines had once conquered the Spanish forts of Montevideo and Asuncion, the provinces of Paraguay and Uru¬ guay declared themselves independent.

By 1815 the leaders having sown anarchy in all the colonies, the revolutionary govern¬ ment of Buenos Aires saw itself beset by the danger of invasion of the territory of the provinces of the Plata by the forces under the command of the Viceroy of Peru, and on the borders of the Plata River by the Spanish fleet. In such emergencies the larger part of the directors of the revolutionary movement felt powerless to follow the model of the re¬ public established by the English colonies, in North America and discussed a monarchical government (one of the leaders even proposed annexation .to the British empire) in order to link the provinces of Rio de la Plata with

European countries, and to silence the resent¬ ments of Spain. At the same time they would submit to the insurgents who were breaking up the country by encouraging the passions of the half-breeds, and stimulating their narrow clannishness which they disguised under the

name of federalism. To bring about a crisis the revolutionary government convoked a con¬ gress of representatives from all the provinces united with Buenos Aires. This congress met in the city of Tucuman 9 July 1816, and pledged itself to a Declaration of Independence for the United Provinces of Rio de la Plata, a date which the Argentines celebrate as a national holiday. The Congress of Tucuman, where the local element predominated, decided also that the form of the government should be demo¬ cratic-republican-federal, by which title the Congress exalted the elements of anarchy and diminished the prestige of the active industrial class which produced the independent move¬ ment whose centre was Buenos Aires.

England and the United States, the former to limit the political power of Spain, the latter to remove from the American continent the other great powers, were the first nations to recognize the independence of the Argentines. It was then that President Monroe proclaimed the doctrine, (<America for the Americans.® However, the Spanish rule was not ended in America, but maintained itself firmly in the rest of the colonies. It was the destiny of Ar¬ gentina to fulfil her mission as Liberator.

Lima, the capital of Peru, was the centre of the Spanish power which extended through the latter country, Chile, and the northern part of South America, Central America, and Mexico. Besides, the Spaniards still held the city of Montevideo, which was their bulwark on the Atlantic coast.

To reach Lima by land was a task beyond the bounds of possibility, on account of the geographical conditions which favored the Spanish troops by offering them a safe posi¬ tion within easy reach of their headquarters. The Argentine Congress had the good fortune, however, to find a soldier of genius to whom they confided this new undertaking. His name was San Martin. Realizing the risk of meet¬ ing the Spanish forces on land, he conceived the project of crossing the Andes to drive out the Spaniards from Chile and to reach Lima by sea. This bold enterprise was secretly pre¬ paring for two years, and in 1817 General San Martin led across the Andes an army of 5,000 Argentine soldiers, largely recruited from the hardy plainsmen and cowboys. This little force of rough-riders, by defeating the Spanish troops in the battle of Chacabuco, gave inde¬ pendence to the Chilean people. San Martin was also successful against the Spaniards in Peru, entering Lima as a liberator in 1821. Though urged to take the civil government of the countries he had freed, this soldier of splendid quality refused the. rewards, honors and offices of civil life, which

men fulfilling similar missions in other countries have almost without exception consented to receive.

While the patriotic army gloriously ended their campaign on the Pacific, ambitious lead¬ ers had converted the country at home into various feudal dependencies, which were at war with one another. The government, being powerless to contend with the factions, dis-

solved, leaving the provinces to take care of themselves. This picture of savagery discour¬ aged San Martin, who, upon his return from his campaign, despairing of seeing the return of order and peace in the new communities, re¬ tired to France, where he died some years later.

The province of Buenos Aires had, no doubt, an exemplary government. The soul of it was Bernardino Rivadavia, a mulatto, who, as secretary of the government, com¬ pleted commercial treaties with England and other countries, and obtained in London, through the Baring Bank, a loan of £1,000,000 at 6 per cent interest, which was totally covered at the fixed rate of 70 per cent. He also in¬ terested some small English capitalists in the enterprise of sending over the first herds of fine cattle.

Rivadavia also founded a bank of discount and for the issue of paper money, which began its operations with an issue of $290,000, the first Argentine currency.

But the half-civilized conditions continued in the rest of the country, though the leaders of emancipation tried to reunite the provinces under national control, naming Rivadavia as President. Here we encounter the origin of the two great political parties in the history of the Argentine Republic, one being the Uni¬ tary, which favored a strong central govern¬ ment, in opposition to the localism of the Federals, or State-Rights party.

Rivadavia advanced his epoch, and to him Argentina owes many progressive ideas, among others the governmental ownership of the land and the natural sources of wealth. He carried on great works of public utility, employing the funds obtained from Baring Bank to found schools, universities, a national bank, hospitals and other benevolent institutions. However, he could not triumph over the local rivalries and, discouraged, like San Martin, gave up the gov¬ ernment, which dissolved immediately, having been unable to crush out anarchy, which now broke out more furiously than ever. The dis¬

count bank of the province of Buenos Aires had been changed to a national bank, and its issue of paper money now rose to $2,700,000, yet the payment of the debt to Baring Bank had not even been commenced.

The new Empire of Brazil, heir to the Por¬ tuguese policy in South America, expected to reach the river Plata and to dominate Monte¬ video, the capital of the republic of Uruguay. Buenos Aires, which had inherited at the same time the Spanish secular views, notwithstand¬ ing that it was itself menaced by anarchy, aided the Republic of Uruguay to obtain its independence from Brazil in a war which lasted three years and whose chief purpose was to drive out the Brazilians from the Plata

(1828).

The anarchical wars had reduced consider¬ ably the masculine part of the population, which in 1810 numbered half a million, the fourth part of which were quadroons de¬ scended from half-breeds, mulattoes, and ne¬ groes. A leader unbalanced and fierce, Juan Manuel de Rozas, chief of the federals, now assumed command, and pleased himself with collecting the savage negroes of the popula¬ tion, some 40,000, recently emancipated slaves, nearly all in the province of Buenos Aires, and

bringing about the exile of the cultivated and industrious elements, who took refuge mostly in the republic of Uruguay and in Chile. The reckless spirit that during 25 years reigned in all the local military dictatorships had ended in destroying the mining and wine-making in¬ dustries that the Spanish colonies had started in the interior.

The diplomats of Europe, acknowledging the Monroe Doctrine, hastened to recognize the self-styled republic. In 1829 England recog¬ nized the independence of the new country and entered into diplomatic relations with the tyrant Rozas. The final recognition of it by Spain in 1842 completed the assurance of the leaders, who, confident of their independence, had now no other idea but to destroy each other.

Of all the old provinces of the ancient vice¬ royalty of Buenos Aires, the only one which prospered through these years wras the new republic of Paraguay, in reality an absolute kingdom at the mercy of

the powerful will of the tyrant dictator Francia. Its independence was recognized by Europe and Brazil but not by Buenos Aires, and this made it impossible for Paraguay to enlarge its outside commerce, as its only outlet to the sea was by way of sailing 850 miles on the rivers Parana and Plata. This obliged them to pass in front of Buenos Aires with all their export and import traffic.

Because Rozas at Buenos Aires could close the natural channels and hinder the traffic of Paraguay with Brazil and Europe, the English and French governments decided in 1845 to establish a blockade of Buenos Aires and open to free navigation the Parana, and thus assure international communication with Paraguay. This blockade lasted two years, and in 1847 the English fleet abandoned the waters of the Plata. During these two years the English of¬ ficials tried to excite the settlers of Buenos Aires to rise against the tyrant Rozas, but they were weak and timid and did not think they could free themselves without the help of the exiled patriots and their allies. Various at¬ tempts had been made to expel Rozas but with¬ out success until, understanding that the prob¬ lem was not local but national, they united with the expatriated from other provinces, and counting on the help of the dictator who ruled the province of Entre Rios (separated from Buenos Aires by the Parana River) and with the aid of the troops sent by the Empire of Brazil, they deposed Rozas and instituted the national government with its capital in the city of Parana, province of Entre Rios, Then, taught by experience, the people resolved to safeguard their rights and privileges for the future. On 25 May 1853, a Constitution closely resembling that of the United States was formed, with some modifications, particularly in regard to civil legislation which is national and not provincial, and the United Provinces of Rio de la Plata took the name of Argen¬ tine Republic (from the Latin Argentum, silver).

Constitutional Consolidation. — Here be¬ gan a period of national reconstruction and the normalization of the provincial autonomies. The country entered into commercial treaties with various European countries and with Bra¬ zil, and began to pay the Baring Bank of Lon¬

don the accumulated interest and collateral on the loan obtained by Rivadavia 25 years be¬ fore. The national bank, founded by Riva¬ davia and* converted into a mint by Rozas, became the Provincial Bank of Buenos Aires.

The ensuing years witnessed some practical advances, such as the inter-provincial telegraph, the construction of the first railroad, and com¬ munications bv steamboat between the- Rio de la Plata and

Europe, reducing to 40 or 50 days the passage which up to this time had taken three or four months by sailing vessels.

But the incipient economic interests had not yet much political representation. Personal rivalries among the commanders of the army, and the troublesome pride of Buenos Aires, jealous at seeing the national capital in the city of Parana, separated that province from the rest of the confederacy, and civil war be¬ gan once more, hindering the steps of real progress which had been taken. After various bloody battles, in 1861, the hegemony of Buenos Aires threatened the integrity of the rest of the country and the provisional capital was moved to that city. But the aggressions of the tyrant Solano Lopez, dictator of Paraguay, a country which had been formed under the fiercest of the dictatorships which the people of the south had been subjected to, had forced Brazil to war. The invasions into the Argen¬ tine territory by Paraguayan armies, which moved toward the republic of Uruguay with a view to assuring an outlet to the ocean, pro¬ voked the offensive and defensive alliance of Brazil with the republics of Uruguay and Ar¬ gentina, which brought on a devastating war that lasted five years, and in which 70,000 com¬ batants took part. Its outcome was the com¬ plete overthrow of Paraguay, whose male pop¬ ulation was reduced to one-tenth.

Already the Argentine government had be¬ come suspicious of the policy of Chile, a coun¬ try less democratic than its neighbors, who found themselves exhausted by civil and other wars. Chile manifested a strong inclination to obtain ports on tire Atlantic side of Patagonia. Notwithstanding the complete victory over Paraguay, the Argentine government asserted the doctrine that (<victory does not give rights, w and offered to submit to the arbitration of President Hayes of the United States the ques¬ tion of the boundaries of Paraguay, thus mak¬ ing an honorable precedent in international policy.

The costs of the war with Paraguay were defrayed by a loan contracted with the Bank of London. The honorable arrangement which in 1854 the government had proposed to the Baring Bank to pay the debt made in 1825 had aroused English capitalists, who not only cov¬ ered the loan for the war but also organized railroad and marine transportation companies.

The continuous issue of fiat money had de¬ preciated the currency to an extreme limit so that the rate of exchange was 27 pesos to one gold dollar. In 1867 the Provincial Bank es¬ tablished the rate of exchange at the fixed point of one dollar gold for 25 paper, and vice- versa.

The v/ar, notwithstanding its epidemics and miseries, did not wholly check the progress of civilization. The struggle with the foreigner united the confederate provinces against Buenos Aires, which, though politically allied

to the rest of the country, socially still felt it¬ self aloof. At the same time the influx of British capital and the entrance of some thou¬ sands of immigrants changed this* feeling a little. Meanwhile citizens who were enthusi¬ astic admirers of the republic of the United States endeavored to make this the general opinion, and in 1868 a pacific presidential elec¬ tion took place in Argentina, resulting in the choice of Domingo Sarmiento, who was at that time the Argentine Minister in Washington. He was devoted to the progress of civilization in South America, through schools and indus¬ tries. He established throughout the country compulsory and free public schools, and invit¬ ing normal teachers and scientists from the United States and Germany, he founded insti¬ tutions of scientific and general culture and strengthened the sway of the national Lyceums, instituted by his predecessor, General Mitre, and established in all the provinces. Sarmien¬ to obtained from the Bank of London $5,200,000 gold, which he employed in public works.

Faith in the progress of the country had grown much firmer through the fact of the peaceful presidential election. People trusted in personal and property, guarantees, and the rural industries, using wire fences to enclose pastures, passed from the nomadic and route systems which the cowboy had opened up to civilization. But the adventurous element of the low class, result of the mixed races, and composed of uncultured men, asserted their rights to political equality, stirred up provincial revolutions and uprisings in the city of Buenos Aires, placing again in constant uncertainty industry and commerce and checking immigra¬ tion. Yet through it all the new modes of communication and the work of Sarmiento little by little made stable the growth of civili¬ zation.

As a result of wars and revolutions the scourge of cholera for two years decimated the country and an epidemic of yellow fever, brought from Brazil, in its turn for a third time destroyed the population on the banks of the Plata, whose death rate remained for years about 45 per thousand. In 1873 the population of the city of Buenos Aires was about 220,000, almost all whites; the whole population of the country

was about 2,000,000, nearly a third part of them half-breeds. Stability of money was impossible, and the Provincial Bank closed its office of exchange. The wars of independ¬ ence, revolutions and uprisings during the period of anarchy and tyranny, the war with Paraguay and the civil wars had reduced con¬ siderably the masculine part among the creoles half-breeds, and negroes, so that the feminine element made alliances with the European im¬ migrants.

But the foreigner, who was indifferent to the quarrels of the political leaders and to the depreciation of paper money, which had fallen to the ratio of 30 to 1, entered heartily into agriculture which had recently shown unusual results, and the political leaders became uncer¬ tain of a field for their propaganda, warlike and personal.

Withal they had to solve the problem of the capital, up to that date provisionally located in the city of Buenos Aires, which was also the capital of the province of the same name. In 1880, because of the presidential election,

the national government, which was beginning to organize its small army in the conquest of the desert, reducing the nomadic tribes which existed in those regions, and which had ex¬ tended the railroads to the distant provinces, and increased the schools, was violently ex¬ pelled by the government of the province of Buenos Aires, which, with the help of the party preponderant in the city of Buenos Aires, headed by ex-President Mitre, resisted the en¬ trance of the national forces. After many bloody combats, however, the national forces triumphed and fixed forever the national capi¬ tal at Buenos Aires.

The government of Buenos Aires province removed its capital in 1882, founding the city of La Plata on the banks of the river of that name, 57 kilometres from the city of Buenos Aires. The founding of this city of La Plata cost $30,000,000.

After the Paraguay War the twro political parties ceased to exist. This gave rise to the founding of personalistic parties named for their leaders. After having lost the city of Buenos Aires in 1880 the party of Mitre re¬ treated from the electoral struggle, and their chief, General Mitre, devoted himself to litera¬ ture and high politics, becoming a famous fig¬ ure in the nation, and popular with the masses, on account of his daily paper La Ndcion, which united the characteristics of the English daily and French review. The electoral withdrawal of the Mitristas gave opportunity to the party of Federal origin, which was under the con¬ trol of General Boca, who was then President of the republic, to take possession of all gov¬ ernment positions, both

national and provin¬ cial.

Chile, having defeated Peru and taken from it the provinces of Tacna and Arica, now raised the question of the boundaries along the ridge of the Andes. Being short of squadrons and provisions to defend the desert coast of Patagonia and the valleys of the Andes, the Argentine government ceded a part and recog¬ nized the claim of Chile to part of Patagonia and Tierra del Fuego; and by common agree¬ ment both governments left out the surveying of the boundaries of the land, thus allaying fears of a new war.

Although in the hands of the party of Fed¬ eral origin and under a Federal Constitution, the national government adopted as its own the program of centralization laid down by Rivadavia, the founder of the Unitary party, and continued somewhat the work of progress begun by Sarmiento. It secured another loan from the Baring Bank for $12,000,000 gold, at the rate of 90 per cent and at 1 per cent interest, to be used in railroad extension. Two years later, in 1882, it obtained another loan of $9,000,000, gold, at the rate of 84 per cent and 5 per cent interest, to found a na¬ tional bank, and immediately Parliament au¬ thorized another loan of $20,000,000, gold, for public schools.

The conquest of the desert and the reduc¬ tion of the Indian tribes was followed by great prosperity, enriching the government by the possession of millions of square miles of ex¬ cellent ground for pasture. These most val¬ uable regions were divided among the military who had made the campaign of the desert, and government politicians. The increase of immi-

gration, which was now about 100,000 a year, in most part northern Spaniards and northern Italians, attracted by the advertisements of free lands and the advantages offered by the gov¬ ernment, and the investments of foreign capi¬ tal in railroad companies and public improve¬ ments in the cities of La Plata and Buenos Aires, inflated considerably the price of land in the hands of the military and government leaders. In less than one year it doubled in price. The national government continued to ask for loans from the Bank of London, and again obtained $20,000,000, gold, at 6 per cent interest, for the construction of the port at Buenos Aires. In 1886 another loan was made of $42,000,000, gold, at 80 per cent rate and at 5 per cent interest, to unify diverse loans for public works.

In these conditions the military, in great part made up of half-breeds and quadroons, en¬ riched by the gain of their desert conquests, and by the prodigality with which the Londoff bankers loaned money to the government, out¬ shone the old, cultured and quiet well-to-do people of Buenos Aires and other centres. The latter were descendants of the patriots of the War of Independence, and of the exiled patri¬ cians, yet they were overshadowed by the new military plutocracy, who had no thought but ostentation, and were destitute of all idea of duty, civic and social. They simply centred in Buenos Aires to enjoy life in pseudo-Pari¬ sian style.

In 1886 the government, hindered by the difficulty of obtaining more loans in London, abolished the law of ˆconversion,® and began again to issue millions of fiat money, thus giv¬ ing a chance to stock jobbing and producing an extreme instability of currency, which in 1889 had a relation of five pesos to one gold dollar. At that time the fiat money reached the sum of $80,200,000. The London bankers had not only been beguiled into loaning money to the national government, but had also made loans to provincial and municipal governments to the extent of $80,000,000 in gold, which was largely embezzled by the intermediaries in Europe and the retainers of the authorities of those centres.

Recent History. — In the Pan-American Congress held at Washington in 1889, the Ar¬ gentine representatives, fearing the interpreta¬ tion Mr. Blaine gave to the Monroe Doctrine, ((America for the Americans,® would be ratified by the Congress, declared as the Argentine sen¬ timent, <(America for Humanity,® expressing the Argentine inheritance of blood and of in¬ terests through the mixtures of the Spanish, English, French and Italian races, and its independence of the rest of the American continent outside of its own boundaries.

Argentina now had more than $500,000,000 English capital invested in the country and more than a half a million Italian citizens. Political and administrative corruption, how¬ ever, seemed to know no bounds. Fiat money reached $197,000,000, making the national dollar less than 30 cents, gold, and the credit of the country was compromised in loans of more than $300,000,000, gold, covered by mortgages on its inalienable property and interests, which amounted to more than 40 per cent of its esti¬ mated wealth.

The inaction of public opinion and the lack of any party of opposition moved the young

men of the universities and those in active bus¬ iness to form a

protesting party — <(The Na¬ tional Civic Union,® — which in a few months after its founding conspired with some of the chiefs and officials of the army and navy, and incited mutinies and mobs which drove the President, in 1890, to resign his position. The Vice-President, Dr. Pellegrini, a man of great energy and capacity, but lacking political tact, remained in office and partly quelled the provin¬ cial revolutions. Meanwhile, the personalist leaders, reviving the traditions of the old parties, Federal and Unitary, separated the ele¬ ments which formed the young party of the Civic Union.

The national government had to ask delay from the European banks, and finally the Na¬ tional Bank with the Provincial Bank of Buenos Aires failed. The Argentine credit was completely lost, immigration ceased as well as the coming in of foreign capital; public service became uncertain. Money was wanted to prosecute public improvements and educa¬ tion. The country found itself exhausted, and again threatened by Chile, which had recently come out of a cruel civil war, the only one in its history, and had been cleverly militarized under the direction of German officials. Now Chile wanted the boundaries on the Andean frontier to be made at once. As the interests of English and Italians were great in Argen¬ tina the danger of war opened again an oppor¬ tunity for credit to improve the national de¬ fense, and the government spent more than $100,000,000, gold, in forming a modern navy, making strategic lines and military posts, and purchasing military supplies. During this time agriculture and stock-raising prospered and in a few years doubled the exportation.

The government in 1891 founded the Bank of the Nation and offered to the public a sub¬ scription for $250,000,000, to be used as its cap¬ ital. The public did not respond to any ex¬ tent and the government only saved the situa¬ tion by resorting again to the issue of fiat money. In 1892 the government founded the <(Caja de Conversion® (Exchange office) and in 1899 modified its organization, forming a reserve fund to change the bills in circulation at the price fixed by law of 44 cents, gold, to one peso, and pledging itself to set aside gold corresponding to this price for each new issue. See Banking and Finance.

Disquietude over the boundaries of Chile and the costs occasioned by it did not disap¬ pear till 1902, when the differences were re¬ ferred to and settled by the King of England, followed by a treaty of partial disarmament, signed in Buenos Aires, in 1904, the only in¬ stance of the kind in the history of peace, and which reflected great honor on both peoples.

The hard experience during a decade of complicity between some national and local leaders and European bankers which endan¬ gered and discredited the country, and another decade of anxieties and expenses for the na¬ tional defense, moved Argentine opinion to sustain the Calvo doctrine, proposed by Drago and upheld by the Argentine representative.ˆ in the Pan-American Congress at Rio de Janeiro, 1906, according to which the new nations have a right to repudiate the debts contracted with foreign banks which enter into treaties and plots with the reckless heads of government.

This was opposed to the Roosevelt doctrine according to which payments of debts con¬ tracted by the agents of those in authority are to be coerced from the defrauded people.

The rare coincidence of the almost simul¬ taneous disappearance of men who were most prominent in politics — ex-President Gen. Bartolome Mitre, ex-President Dr. Carlos Pel- ligrini, President Dr. Manuel Quinta, ex-Gov. Dr. Barnardo Trigoyen — whose deaths oc¬ curred in 1906, left the party of opposition without leaders, and the old political Unitary organization changed its name, substituting for it <(The National Autonomistic Party,® directed by ex-President Julio A. Roca.

In 1906 Dr. Figueroa Alcorta was elected President. Serious disturbances occurred dur¬ ing the first week of May 1909, in consequence of labor troubles and anarchist agitation. On 13 March 1910 Dr. Roque Saenz Pena was the successful candidate for the presidency. Two months later Buenos Aires was thrown into great confusion by an attempt to call out a general strike. The 100th anniversary of the birth of the nation was celebrated 25 May. Dip¬ lomatic relations between Argentina and Bo¬ livia, which had been interrupted ’as a result of boundary disputes, were resumed in January 1911, through the good offices of the United States. In November 1913 Colonel Roosevelt, ex-President of the United States, visited the Argentine Republic. On 9 Feb. 1914 the min¬ istry resigned, after President Saenz Pena, who had been ill for a long time, turned over his functions to the Vice-President, Dr. Vic- torino de la Plaza. On. 25 April, four days after the United States had inaugurated hos¬ tilities at Vera Cruz, diplomatic representatives at Washington, D. C., of the (<A. B. C.® pow¬ ers, Argentina, Brazil, and Chile, offered to act as mediators between the American and Mexi¬ can governments. (See

Mexico — History). In 1915 the first actual treaty between Argen¬ tina, Brazil, and Chile, signed at Buenos Aires 25 May, provided for five years of peace be¬ tween the three nations, during which time each of said nations was pledged not to make war on either of the others until the causes of con¬ flict should have been investigated and reported upon by an impartial commission. Independ¬ ence Day was celebrated with special ceremo¬ nies — that being the centenary — on 9 July 1916. Argentina, after more than 80 years of distracted political life hindering its develop¬ ment, has succeeded in the last 25 years in es¬ tablishing its prominence among the young na¬ tions, and in bringing to itself immigrants from the European races. On 12 June 1916 Hipolito Irigoyen was elected to the Presidency. His administration was at once confronted with a national problem, which arose from the sinking of Argentine vessels by Germany. On 16 April 1917 a mob attacked the German Legation and Consulate and the offices of German journals in Buenos Aires in retaliation for the ruthless destruction of Argentine shipping and com¬ merce. A protest was made by Germany which was answered in a conciliatory tone by Argen¬ tina, who at the same time sought guarantees for the safety of her merchant shipping in the war zone. Many times in the course of the following months diplomatic relations were strained to the breaking point, but a crisis was reached in September 1917, when the Depart¬

ment of State of the United States made public dispatches from Count Luxburg, German Min¬ ister at Buenos Aires, to his government, in which he advised ˆsinking without leaving a trace® of Argentine vessels. The Argentine people, now thoroughly aroused, demanded the prompt severing of relations with Germany and late in September the lower house by a sub¬ stantial majority and the Senate almost unani¬ mously (23 to 1) voted to sever diplomatic relations with Germany. Meanwhile Germany recalled Luxburg and he was given his pass¬ ports. For subsequent developments see Latin America and the War.

Bibliography. — Bilbao, M., (Buenos Aires desde su fundaciorP (Buenos Aires 1902) ; Guastavino, J. E., (San Martin y Simon Boli¬ var *(Buenos Aires 1913) ; Mitre, B., (Archivo del General Mitre) (Buenos Aires 1911-13), (Historia de Belgrano y de la Independencia A.rgentina) (Buenos Aires 1887), and (The Emancipation of South America* (London 1893) ; Sarmiento, D. F., (Obras *(Paris 1895- 1909) ; Canepa, (La historia argentina) (Buenos Aires 1904) ; Martinez and Lewan- dowski, (Argentine in the Twentieth Century* (3d ed., London 1911). See also Bibliographies under Agriculture, Banking and Finance, Government, etc.

Tuan A. Senillosa,

Former Argentine Consul-General to Canada.

1. GOVERNMENT. The form of gov¬ ernment of Argentina is a representative re¬ publican-federal one, modeled after that of the United States of North America, and in ac¬ cordance with its historical antecedents every province keeps its own peculiar autonomy, drawing up its own constitution, fixing the number of its magistrates, the organization of its municipalities, and administering its prop¬ erty without the intervention of the national government.

The executive power is vested in an officer bearing the title of President of the Nation. The terms of office of the President and Vice-President are six jrears, and they cannot be re-elected until after the passing of a presi¬ dential period. The Ministers are eight : In¬ terior, Foreign Relations and Worship, Treas¬ ury, Justice and Public Instruction, War, Navy, Public Works, and Agriculture, Industry and Commerce.

The legislative power is vested in tw'o bod¬ ies or chambers, that of the deputies and that of the senators. The former are elected by a majority of the votes of the people, and the latter by the legislatures of the provinces, thus ensuring two senators for each Federal State and tw'o senators for the capital elected by the people.

The judiciary is vested in the Supreme Court of Justice, Federal Chambers of Appeal in the capital and also in the cities Cordoba, Parana and La Plata; Federal courts in the capital and throughout the provinces and terri¬ tories; Chambers of Appeal in the capital for civil, commercial, criminal and correctional cases. Each province has its own judicial sys¬ tem with a Supreme Court and several minor courts. Penal, civil, commercial and military law's are national laws, uniform throughout the republic and codified under national codes. The provinces can only enact such laws of pro¬ cedure as do not affect the national laws.

ARGENTINA

fe . . i* A

1 Jockey Club Building, Buenos Aires

2 Grand Staircase, Jockey Club Building

ARGENTINA

1 Board of Education and School Museum, Buenos A.'res

2 Argentine Pavilion, Museum of National Products, Buenos Aires

ARGENTINA

1 Museum of the University of La Plata

2 Astronomical Observatory (La Plata University)

ARGENTINA

Copyright, Newman Traveltalks and Brown & Dawson, N. Y.

1 Municipalidad “La Plata” 2 Theatre Colon, Opera House in Buenos Aires

The seat of the national government is Buenos Aires, the Federal capital of the Re¬ public. The national territories are ruled by governors appointed by the Executive Power, with the consent of the Senate.

The governors of the provinces are elected by the people. Foreign citizens can hold real estate.

Article 14 of the Constitution provides for the absolute freedom of the people of the na¬ tion in the exercise of their religious faith.

There is no state religion though in accord¬ ance with the Constitution the state contributes to the support of the Roman Catholic religion, the expenses of which are about $1,000,000 in gold per year; but it likewise contributes aid for the support of educational or charitable in¬ stitutions established by other denominations. In 1884 civil marriage was established.

The ecclesiastical government consists of an archdiocese and seven dioceses, under the patronage of the national government which authorizes or prohibits the carrying out of papal decrees. Ernesto Nelson,

Director-General of Secondary, Commercial and Industrial Education

of the Argentine Republic.

1. EDUCATION. As reformed in March 1916, this comprises six divisions: Pri¬ mary (four years), Intermediate (two years), Secondary (five years), Normal (four and seven years), and Higher education (from five to seven years). The sixth division includes Industrial, Commercial and Education of the Abnormals and is called Special Education. Agricultural education is partly controlled by the universities and partly by the Department of Agriculture. Public education is free throughout.

Primary. — Primary schools are the con¬ cern of state (provincial) authorities. The ex¬ ceptions are : the control of the primary schools of the Federal city of Buenos Aires by the National Board of Education, and a sys¬ tem of subsidies by the Federal government for the benefit of certain provinces whose finances are not equal to the needs of primary education. In 1894 there were 3,000 primary schools, public and private, which increased during the next 20 years to 7,877 schools ; like¬ wise did the teaching force of these schools grow from 7,800 to over 26,000 teachers, 80 per cent of whom are women. The pupils at¬ tending the primary schools in 1894 numbered 280,000, whereas in 1914 the attendance in¬ creased to 900,000 pupils. The expenditures incurred for the maintenance of the schools rose sixfold. Population increased less than twofold during that period.

Secondary. — Secondary education was originally shaped after European models, but the schools are already responding to the mod¬ ern demands of democracy. From mere pre¬ paratory institutions for the university they are fast becoming schools of advanced education to an increasing number of men and women. In 1894 the students in secondary colleges num¬ bered 3,000, which number rose to 10,000 in 1914, the expenses being increased from $400,- 000 to $2,500,000. There are 33 of such lyce- ums (16 in 1894) eight of which are in the city of Buenos Aires (only one in 1894). Secon¬ dary education is not compulsory.

Normal. — Normal schools are for primary' teachers and for secondary teachers. There are also special institutions for teachers of VOL. 2 — 14

modern languages and of physical training. Normal schools for primary teachers numbered 70 in 1914 (10 of which were in the city of Buenos Aires) with an enrolment of 8,970 students, about six times those enrolled 20 years before. They offer a four-year general course followed by a three-year special course leading to the professor’s

diploma. Teachers graduating from normal schools are eligible for positions of $900 a year. Principals get from $1,250 to $1,500. After 25 years teachers may retire with 95 per cent of their salary, provided it has been earned during four years and also that the candidate is more than 45 years old. Normal schools for secondary teach¬ ers offer courses in different specialties besides the general courses. Graduates who secure po¬ sitions as teachers in secondary schools get from $800 to $3,600. Salaries of principals vary from $2,500 to $4,000 a year. Both teach¬ ers and principals' also retire with the 95 per cent of their last salary, but only after 30 years' work the remaining conditions being equal.

Minor terms of special study are required for qualification for the professions of chemist, midwife, dental surgeon, surveyor and architect.

The University of Cordoba is composed of the school of medicine, the school of engineer¬ ing and the school of law, in connection with the National Academy of Sciences.

In order to follow his profession in the country, the professional graduate of a foreign university is obliged to prove his ability by means of an examination before some Argen¬ tine university.

Technical. — Technical education also is encouraged by the national and provincial governments. Prominent among those of the first category are the national industrial schools, similar in type to the manual training high schools in the United States, although the courses cover six years and afford speciali¬ zation in engineering, architecture, chemistry and mechanics. Other technical schools of a vocational type provide training in the various trades. There are about 15 trade schools for girls also under the control of the national gov¬ ernment giving instruction in dressmaking, em¬ broidery, millinery, flower, lace and glove mak¬ ing, metal work, telegraph operating, drawing, painting and industrial arts. Several provinces also have established schools similar to these.

Agricultural. — Agricultural education is of a two-fold type, special and general. Special or so-called regional schools look toward the education of future workers in special fields, such as the sugar industries of Tucuman, the wine industries of Mendoza, the lumber in¬ dustry of Misiones, the dairy industry of the Plata Valley, the fruit industry of San Juan and several other regional activities. Other schools provide for the thorough scientific in¬ struction underlying all agricultural occupa¬ tions, and they are of a type similar to the ag¬

ricultural colleges in the United States.

Commercial Schools. — Commercial schools for men and women offer courses in commer¬ cial practice (five years), bookkeeping (four years) leading to the degree of public account¬ ant (three more years). A more recent addi¬ tion to the scope of the commercial schools is the degree of doctor for advanced work in eco¬ nomics.

Other Educational Interests. — Besides

national schools for abnormal children, deaf, dumb and blind, the government is establishing a number of special schools for weak children in need of 'fresh air as well as mountain or seaside climate. In connection with such pro¬ visions for the health of children it is inter¬ esting to mention here that every school child in the city of Buenos Aires is given a glass of milk at the noon hour. After 15 years of such practice milk drinking has become a habit among all classes of the population, thereby re¬ ducing the consumption of intoxicating liquors.

The National Academy of Fine Arts gives free instruction in drawing, painting, decora¬ tive and industrial arts.

Popular interest in education is shown by the number of organizations established either with the purpose of studying educational prob¬ lems, helping the schools or conducting edu¬ cational centres. The working classes them¬ selves, through the Socialistic party, have done considerable good in organizing lectures, edu¬ cational excursions and other elements of self- improvement.

Education of women has made great prog¬ ress in Argentina. In certain districts primary and secondary schools are co-educational. Also some of the normal schools and all the univer¬ sities. Pedagogical departments are well pat¬ ronized by women who also are pre-eminent in medical studies. Women take an active inter¬ est in social work, notably through the remark¬ able Philanthropic Association, which although recognized and endowed by the national gov¬ ernment is practically under the management of a woman's board. Women are active in education and have also done much to bring the child-saving agencies to the present state of efficiency.

The national government, as well as some of the provinces, maintains

numerous scholarships to support Argentine students in England, the United States, Canada, Italy, France and Ger¬ many. Those in the United States number about 50, and as many more are supported by their own means or enjoy private scholarships; they are principally engaged in studying en¬ gineering, agriculture and commerce.

No fewer than 300 young Argentinos are at¬ tending courses in Europe, the great majority of them paying their own expenses.

Ernesto Nelson,

Director-General of Secondary, Commercial and Industrial Education of the Argentine Republic.

1. AGRICULTURE. Under this title we shall endeavor to treat of Argentine agri¬ culture as the great importance of the subject deserves, in the broadest sense of the word, with such economic, geographic and even his¬ toric implications as are, for the sincerity and thoroughness of our study, really indispensable.

The area of land under cultivation is more than 95,000 square miles, and its chief products are as follows : Wheat, more than 105,000,000 bushels; oats, 61,000,000 bushels; maize, 190,- 000,000 bushels ; linseed, 40,000,000 bushels ; sugar, more than 280,000 tons. Analyzing the statistics for recent years we find that between 16,000,000 and 17,000,000 acres are devoted to wheat, about 16,000,000 acres to alfalfa, 10,000,- 000 to 11,000,000 acres to Indian corn (maize), over 4,000,000 acres to linseed, and over 3,000,- 000 acres to oats, the other crops being barley,

sugar cane, grapes, rice, potatoes, cotton, to¬ bacco, etc. But the fact is to be noted that of the somewhat more than 1,000,000 square miles embraced in the republic more than one-third (about 334,000) are arable. In other words, 241,000 square miles of the arable regions re¬ main to be brought under cultivation. It is therefore proper to regard the present output of cereals, despite its unquestionable impor¬ tance, as only a promise of the vastly greater crops which will be secured when the limit of Argentina's potential productivity has been even approximately attained. Moreover the agricul¬ tural system accepted and practised in Argen¬ tina at the present time is as far as possible removed from the intensive system, its aim be¬ ing simply and frankly, and perhaps with over¬ emphasis of facility, to obtain the maximum of profit with a minimum of capital and labor. Compare it with the agricultural system of Canada. We may call the former ˆextensive,® the latter intensive. Thus, in Canada the farms of less

than 200 acres constitute 88 per cent of the total of holdings of rural property ; in Ar¬ gentina the holdings are relatively large and it appears that farms which best respond to the present conditions of agriculture there are those of 500 to 750 acres. The capital required for farming operations in Canada is $59.25 gold per hectare (2.47 acres) including the value of the land, buildings and machinery; in Argen¬ tina, $27.70 gold per hectare. The amount pro¬ duced in a given area by the Argentine farmer can be greatly increased whenever it becomes more profitable to cultivate intensely than simply to extend the margin of cultivation.

In addition to the arable regions we have to consider a second one-third part of the entire area of the republic — roughly speaking 333,000 to 335,000 square miles that .can be utilized for sheep or cattle and to a large extent already have been assigned to the stock-raising indus¬ try. In fact live-stock has been, from the early years of Spanish colonization, one of the two principal sources from which the wealth of the inhabitants has been derived ; and the figures given in a recent census are, for the entire country : 80,000,000 sheep, 29,500,000 bo¬ vine cattle, 9,700,000 horses, 452,000 goats, 3,050,000 pigs and 920,000 asses and mules — the estimated total value being $700,000,000 gold. The nucleus of the supply of live-stock was derived mainly from Peru and Spain in the 16th and 17th centuries.

The remaining areas are commonly assumed to be (in the agricultural sense) unproductive; and as an illustration or the most striking ex¬ ample of the worthless section, it has been cus¬ tomary in the past to mention Argentine Pata¬ gonia. But in the light of recent investigations and practical experiments we are enabled to correct that erroneous impression ; and it is reasonable to expect that the whole subject of Argentine agricultural expansion will be re¬ vised when essential new facts, which would have been called heresies even a decade or so ago, are arrayed against very old but wholly unwarranted prejudice. Our task at the moment is to set forth such essential facts.

Agricultural Patagonia. — Argentine Pat¬ agonia is divided into five parts, namely, the territories of Rio Negro, Neuquen, Chubut, Santa Cruz and Tierra del Fuego, whose com¬ bined areas (about 775,000 square kilometres or

i JMI

[

b Ira

r jwi

ff f i

{g-yBri

MAY AVENUE, BUENOS AIRES

The Government House is in the distance

302,250 square miles) exceed the total area of Chile, and constitute between one-third and one-fourth of the entire area of the republic of Argentina, or nearly one-twentieth of the continent of South America. A comparatively small portion of the Patagonian regions be¬ longs to Chile, and forms the Chilean territory of Magallanes. In view of the circumstance that its climate, ranging from temperate to cold (since it extends, roughly speaking, be¬ tween lat. 40° S. and lat. 55 u S.), favors the development of vigorous communities, we note with special interest records of Patagonia's agricultural achievements which demonstrate the fertility of the soil, accessibility of the in¬ terior districts, facilities for irrigation, etc. The question whether this distinctly habitable one- twentieth of South America possesses such ele¬ ments of substantial prosperity has entered a new phase ; and it is obviously a very large question. The 18th century witnessed a race between England and Spain for the control of this region. In 1774 the Jesuit, Thomas Faulk¬ ner, having penetrated to the heart of the country, found the interior so unexpectedly de¬ sirable that he urged England to undertake its conquest. The Spanish government, when this project became known, hastened to take formal possession of the coast by establishing forts there. On 15 Dec. 1778, an expedition was sent from Montevideo, and, after a voyage of 22 days, a landing was made on the north shore of Valdez Peninsula. The bay (a por¬ tion of the Gulf of San Matias) where this landing was effected received the name of San Jose. Spanish settlements were established there and at Puerto Deseado — the latter in what is to-day the territory of Santa Cruz. When Spain was on the point of losing forever her control over

Argentina, England decided to strike, but aiming first at the capital, neglected to put sufficient force into the blow — and the captured English regimental flags are still to be seen in frames and under glass on the pillars of San Domingo Church at Buenos Aires. A quarter of a century passed. Argen¬ tina, distressed by war and political dissen¬ sions, was shunned by nearly all Europeans excepting soldiers of fortune. Then, after 1832, the world received from one of its great¬ est men extremely unfavorable impressions in regard to this portion of the far south. When Captain Fitzroy on the Beagle was devoting his attention to Patagonian hydrography, Charles Darwin, as the naturalist accompanying the expedition, pursued his investigations on land. But inasmuch as Darwin's studies were in the main confined to the dreary repellent wastes of the littoral, he of course depicted the land in darkest colors on account of its lack of vegetation. To this condemnatory judgment was due, in part, the delay in colonizing cen¬ tral and southern Patagonia. Genuine coloniza¬ tion of central Patagonia — the Chubut terri¬ tory — began in the year 1865. In 1862 an im¬ portant emigration society had been formed in England with the object of establishing col¬ onies in Patagonia. Two representatives had examined Chubut Valley and subsequently ap¬ plied to the Argentine Minister of the Inte¬ rior, Dr. Rawson, for an assignment of na¬ tional government lands. In the name of the government the minister stated that he was

ready to give to each family of immigrants an adequate portion of the national land. On 28 July 1865, a ship arrived from Liverpool with 153 Welshmen on board, and in September of the same year Colonel Murga, thereto commis¬ sioned by the government, came to point out to the immigrants the land assigned to them in Chubut Valley. On 16 September the colony was formally established. The Argentine flag was hoisted and the place received the name of the Minister of the Interior, Rawson. From the very beginning a lack of means of sub¬ sistence occasioned great suffering. Forty-eight newcomers abandoned the community, and the government, whose energies were absorbed by the war with Paraguay, could extend no aid. Fortunately the starving Welshmen obtained a little food from the Tehuelche Indians. The second harvest was a failure because the rain¬ fall was insufficient. When the colonists aban¬ doned their settlement and betook themselves to the neighborhood of the port of Madryn, Dr. Rawson promised support to the poor people and requested them to remain one year longer in the colony. Thereupon irrigation canals were cut. At one stroke the situation changed. Splendid crops of wheat were pro¬ duced. From the year 1867 onward the har¬ vests were good, but communication with the outside world was very imperfect.

Application was made to the national government for as¬ sistance in exporting wheat. New bands of Welsh immigrants came in 1874 and 1875. Chu¬ but wheat was then sent to Buenos Aires and the Falkland Islands. The colonists established a species of autonomous government, electing for this purpose a council which consisted of 12 members and which promoted the public in¬ terests and discouraged private quarrels. This council of 12 elected a president. Thus matters stood until 1876, when a commissioner was ap¬ pointed to represent the national administra¬ tion. In 1881 the inhabitants of Chubut Valley numbered 1,000. The law of 16 Oct. 1884 re¬ lating to the national territory prescribed for Chubut the following boundaries : On the north, lat. 42° S., on the east, the Atlantic Ocean, on the south, lat. 46° S., and the Chilean fron¬ tier on the west. Under this law a governor, a Federal judge and other officials were as¬ signed to each territory. The first governor of Chubut, L. J. Fontana, installed the territorial administration at Rawson. Governor Fontana promptly realized that he knew nothing about the 10,000 square leagues constituting his realm. Therefore, in the spring of the year 1885 he set out with 30 men to explore the Andean valleys. The entire outfit — provisions, a large number of cattle, etc. — had been supplied by the par¬ ticipants themselves ; and the reason why so many colonists undertook the journey was that certain friendly Indians had told them about the fruitfulness and beauty of the Cordillera valleys, and the agreeable climate prevailing there had been the subject of much praise. The interior of Chubut had, indeed, been studied at certain points by foreign geologists and botan¬ ists but not a word had been said about the agricultural possibilities of the hinterland; and in Buenos Aires the commercial world knew probably less about the southern territories than did the people of Europe.

Fontana’s expedition reached the foot of

the Cordilleras after a journey of three months, and there the wanderers discovered a beautiful wide valley which their leader, in honor of the day on which the territorial divisions had been decreed, named Valle 16 de Octubre. A stock¬ farming colony was founded there. Fontana has characterized the newly discovered regions in the south as follows : C(There were 30 of us and we belonged to four different nationalities, yet all declared to me unanimously that they had seen no other spot on earth where nature had combined on such a liberal scale whatever is necessary for the welfare of mankind.®

A word of explanation is necessary in re¬ gard to conflicting accounts of certain portions of the Patagonian territories. The Rio Negro Valley and Limay region have been described by some writers as very fertile, while other writers have represented them to be entirely worthless for agriculture. If a visitor hap¬ pened to come at the close of a rainy season he found luxuriant vegetation; whereas an¬ other visitor arriving in time of drought could scarcely obtain fodder for his horse. The facts that the wheat grown in the valley of the Rio Negro is as good as or better than the Chu- but wheat, and that both are superior to the wheat grown in the warm northern provinces, deserve to be kept in mind.

Increase of Agricultural Resources. — The assertion has been made that the Rio Negro Valley in many respects is like the Nile Valley. Its total length, from the point where the Neuquen and Limay rivers unite to form the Rio Negro to the disemboguement of the latter in the Atlantic, is about 275 miles, and the average width about four miles. Great Britain's old ambition to which we have re¬ ferred has in our own times manifested itself in the construction of railways and the invest¬ ment of very large sums of money in the de¬ velopment of the country. On 1 June 1899 the railway connecting Bahia Blanca and Buenos Aires with Neuquen was opened, and this gave ready access to regions which formerly were reached by long stage-coach journeys. The English spirit of daring which undertook the extension of the great system of the Southern Railroad merits recognition. The region to be crossed was in part so poor that the prospect of good financial returns was frankly admitted to be remote, and no colonization could be ex¬ pected to follow except in the Rio Negro Valley. But English capitalists looked far beyond the present and saw in the line connecting Bahia Blanca with Neuquen only the first half of the great Trans- Andean route, which should sup¬ ply, for the products of south Argentina and south Chile, an outlet at that point (Bahia Blanca) which has, as its most valuable asset, a natural harbor, much deeper and better for large vessels than the harbor of any other place in the extreme southeast. As evidence of the interest that the Argentine government takes in the southern territories, we may men¬ tion the construction of the Patagonian Rail¬ road, which was begun in 1908. The discovery of petroleum about 1907 near Comodoro Riva- davia is another factor in the growing pros¬ perity of southern or Patagonian Argentina. It is to be noted also that the cultivation of ce¬ reals, with all its promise, is not the most im¬ portant source of wealth. Stock-farming, es¬

pecially sheep-farming, dominates here ; in fact, this region sustains a relation to the provinces on the Rio de la Plata analogous to that

which the Southwest and West in the United States held to the Middle and Eastern Sates just after the Mexican War. The progress made in re¬ cent years proves that these territories can at least produce all that is requisite for the con¬ tinuance of prosperity. The territory of Neu¬ quen made gains in the matter of population (white and Indian in the proportion of three to one) to such an extent that it had recently about 30,000 white inhabitants, most of whom were Chileans, and about 10,000 Indians ; and it was recorded that these 40,000 individuals possessed or were in the employ of those who possessed 195,000 cattle, 105,000 horses, 676,- 000 sheep, 170,000 goats and 7,000 mules. Con¬ sidering only one item, we note that there were 16.9 sheep for each man, woman and child. Some progress has been made in the plans for rendering navigable the Santa Cruz River. In 1909 a steamer carrying many passengers and a cargo of 80 tons succeeded in going up against the rapid current of that stream as far as the Rincon Chico region, which was for¬ merly regarded as inaccessible. The feasibility of plans for river improvement which shall en¬ able larger vessels to come and go between the wide interior zone and the outside world has to be conceded. It is of highest importance to consider the agricultural possibilities of these very extensive regions, situated in latitudes that favor their development by the more vig¬ orous classes of immigrants. The observation has quite recently been made that Argentina's expansion into the temperate southern regions of the South American continent is in its own way not less truly interesting than are the similar westward movements in the United States and Canada, the eastward one in Russia or the northward one of South Africa. This is Argentina's wide and deep frontier, the borderland in which pioneer conditions give place to rapidly growing settlements, and scien¬ tific methods convert supposedly useless areas into sources of economic wealth.

Argentina's Chief Agricultural Products. — At this point it is desirable to form correct and very distinct impressions in respect to each of the items that stand at the head of the list of agricultural products. We begin with the wheat. It will be seen that wheat, represent¬ ing 57 per cent of all cereals produced in the republic, covers approximately 17,000,000 acres of land ; but if labor were available no less than 80,000,000 acres could at once be brought under the plow for its cultivation. There is a decided tendency to increase the area of wheat-sown lands toward the south, where the cli¬ matic conditions are even more favorable — a tendency attributable to the new shipping facilities at Bahia Blanca.

With the steady encroachments of tillage upon the pasture the need for opening up fresh areas is making itself felt. The vast available

tracts of unoccupied lands could, of course, be utilized for stock-raising, but the indigenous grasses are too coarse and unpalatable for for¬ age purposes. These coarse grasses will have to be replaced by the fine short grasses grow¬ ing in the lowlands, and gradually superseded by alfalfa, rye, barley and oats. These changes

cannot be effected without a considerable out¬ lay of capital, which may in turn enhance the already high prices of cattle.

The fertile region lying north of the prov¬ ince of Buenos Aires, close to the banks of the Parana — at one time the realm of herds and flocks — is to-day the principal centre of maize cultivation. Levee work is in progress on one of the islands in the Parana River near Rosario with a view to preventing inundation at the period of floods. Should the venture prove successful considerable land will be re¬ claimed on this and on other islands where the soil is very fertile. It is estimated that these reclaimed lands are worth $100 per acre.

A recent issue of (The Argentine Year Book) contains the statement that improvement in the grade of cattle has been brought about by the importation of pedigree animals valued at $8,000,000 in about 13 years. The essentially cattle-breeding zones are now to be found in the provinces of Entre Rios and Corrientes. Here the climate, the pastures and the water¬ courses are ideal features that have insured the lasting prosperity of this pastoral zone, in which the old meat-packing industry still sur¬ vives the advent of the large modern factories. The pastoral industry is, as we have said, ex¬ tending into Patagonia, which is already being covered from the Cordillera to the Atlantic, with flocks that promise to be the best in the republic. The Argentine Republic annually produces in the neighborhood of 300,000,000 pounds of wool, 75 per cent of which comes from white-faced, long-wool sheep, Lincolns and Leicesters, and is known in the world mar¬ kets as Argentine crossbred. When sorted, this wrool grades largely into coarse and me¬ dium crossbred, corresponding to domestic commons and domestic one- fourth bloods in the United States. The fine crossbred of Ar¬ gentina is known in the United States as do¬ mestic three-eighths blood. Merino fleeces form 20 per cent of the yearly total, produc¬ ing wool that is graded as domestic fine in the United States. The remaining 5 per cent is wool of black-faced and domestic sheep. The average weight of the fleece is 5.3 pounds. Previous to the war France and Germany were the principal buyers of

the wool crop, but the United States has now become the principal purchaser, taking 152,330 bales (925 pounds) of the 298,939 bales exported in the year end¬ ing 30 Sept. 1916. This industry in Santa Cruz is represented by 5,000,000 sheep, which yield 12,000 metric tons (2,204.6 pounds) of wool, all of which is exported. Within the last 30 years the area devoted to linseed has increased 20 fold. Argentina is to-dav the largest lin¬ seed producer in the world. Although the plant can be grown in nearly any part of the republic, its cultivation is confined mainly to the territory of Pampa Central andˆ to the provinces of Buenos Aires, Santa Fe, Entre Rios and Cordoba.

The richest alfalfa fields are to be found on the immense pampa plains. The cultivation of alfalfa has assumed vast proportions, as will be seen from the following figures : 1872, 264,- 500 acres; 1888, 585,000 acres; 1895, 1,780,000 acres; 1912, 13,501,500 acres; 1914, 16,725,250 acres. This forage plant, which is displacing the native grasses, grows so rapidly when

favored by the weather that three or four crops are easily obtained. Its yield is six to eight tons per acre. Formerly all the alfalfa grown was consumed in the country, but it is now being exported to Brazil.

Large tracts of land in the northwestern section of the country are well adapted to cot¬ ton, but the crop has made little progress. Most of the cotton grown comes from the territory of Chaco. It is also grown in Cor¬ doba, Santa Fe and Corrientes. The annual production is about 1,230,000 pounds, of which about 60 per cent is exported. About 71,536 acres were planted under beans in 1914, but although a primarily agricultural country, Ar¬ gentina is dependent to a large extent on im¬ ports for its supply of beans, peas and chick¬ peas. Rice is produced to the extent of 15,000,- 000 pounds annually, which is only 14 per cent of the rice consumed in the republic.

When discussing the general outlook in a year (1914) of depression in the land market, the (South American Year Book* for 1915 published the following:

<(As a general rule, land values in the Ar¬ gentine are below those current in other coun¬ tries less favorably situated as regards fertility, climatic conditions and accessibility to mar¬ kets, and that being so, it would be only a matter of time when prices would revert to their old level. Every year the land is becom¬ ing more and more closely settled and its productive power increased and the country is in the happy position of having a practi¬ cally unlimited market for its staple com¬ modities?

If we desire to found our opinions in regard to the permanence of the agricultural pros¬ perity of a large country even in part upon the statistics of production (a procedure always attended by risk of error), we must at least examine the figures that relate to long periods of time and to years in which fairly normal conditions prevailed, rather than to a single year, or to two or three recent years alone, in which the conditions may have been excep¬ tional. With this rule in mind we may now revert to the Canadiafi-Argentine comparison, and may mention the suggestive and somewhat propagandist statistics prepared by Senor La- hitte, chief of the Bureau of Agricultural Sta¬ tistics and Rural Economy for the Ministry of Agriculture of the Argentine Republic, which show that the increase in land farmed in Can¬ ada between 1871 and 1891 was 75 per cent; the increase in the area devoted exclusively to the cultivation of cereals in Argentina between 1895 and 1909 was 284 per cent. Such figures arrest attention, especially because the inhabit¬ ants of the two countries compared are about equal in number. The increase in the number of hectares (one hectare = 2.47 acres) of culti¬ vated land in Argentina since the first year of independence is shown as follows: From 1810 to 1888, only 2,300,000 hectares; from 1888 to 1910, nearly 17,000,000 hectares. Exported products of stock farming alone were valued at only $3,300,000 in 1822 and at $71,075,955 in 1888, but in 1915 their value was $218,780,485. From statistics prepared in the year 1914 (De¬ partment of Agriculture, Argentine Republic; Ricardo Pillardo, Director-General, Commerce and Industry) we extract the returns of the

four principal products of the arable regions, showing that Argentina exported as follows :

In 1904

Wheat . $66,947,891 gold

Maize . 44,391 , 196 gold

Linseed . 28,359,923 gold

Oats . 541,973 gold

In 1913

Wheat . $102,631,143 gold

Maize . 112,292,394 gold

Linseed . . . 49,910,201 gold

Oats . 20,447,278 gold

Summarized, the value of exports of these four products increased during that decade from $140,240,983 gold in 1904 to $285,281,016 gold in 1913. In 1916 there were 16,088,963 acres under wheat, 3,207,411 acres under lin¬ seed and 2,525,402 acres under oa.ts. The of¬ ficial estimate, published 17 Dec. 1916, places the wheat yield for 1916 at 77,393,258 bushels, linseed 5,280,071 bushels and oats at 33,610,157 bushels. Exports of linseed from 1 Jan. to 7 Dec. 1916 amounted to 619,210 tons, of which the United States took 209,337 tons.

Another comparison was suggested to the writer in the course of studies he made in the province of Buenos Aires and in the Para- guay-Parana-La Plata regions between Asun¬ cion and the city of Buenos Aires, namely, the comparison with the pastoral industry of Aus¬ tralia, that country which rivals Argentina in flocks and herds, as clearly appears from the fact that Australia at the close of 1904 pos¬ sessed 65,822,918 sheep, 7,868,520 cattle, 1,595,- 256 horses, etc. ; and, thanks to the character¬ istic Australian rapidity of increase at the end of 1911 the number of sheep in the common¬ wealth was 93,003,521; of cattle 11,828,954, and of horses 2,279,027. In regard to this matter the writer was glad to avail himself of the tes¬ timony of those who have engaged in this in¬ dustry on a large scale in both countries ; and there seems to be no doubt that, tested by such practical experience, the conditions in southern and central Argentina are found to be unsur¬ passed.

Unquestionably the main support, and a very substantial one, of Argentina's leadership in varied or mixed agriculture is her possession of good, fertile soils, in flat or nearly level areas of vast extent, grass-grown and not cov¬ ered with forests that have to be cleared away, easy of access, lying open and ready for the plough in regions so temperate, as a rule, that agricultural work can proceed almost without interruption throughout the entire year and cattle can be kept always in the open and at pasture. Invasions of locusts occur and in the past have proved to be exceedingly destruc¬ tive ; but preventive measures can in the long run so reduce the injury from this source that it will become a negligible quantity. Irrigation is required in

many sections, though it is true that in the rich alluvial central basin of the valley of the Rio de la Plata the annual rain¬ fall averages 30 inches ; but it is demonstrable that irrigation constitutes a better and much safer reliance for the farmer than, mere rain¬ fall in every region not mountainous and not occupying an exceptional position with respect to permanent air and water currents. From Rio Negro to Misiones, in the sub-tropical northeast, and to Jujuy and Catamarca, in the Andean Northwest, soils of excellent quality and

great or sufficient depth have been known, or cultivated successfully without knowledge, for many years ; and, as we have seen, we are at liberty to entertain a favorable opinion in re¬ gard to soils in the Argentine Patagonian ter¬ ritories.

Bibliography. — Agricultural Argentina: prepared by the Bureau of Agricultural Sta- tistics > (Buenos Aires 1910) ; Ambrosetti, J. B., (Exploraciones . . . Provincia de Salta5 (Buenos Aires 1907-08) ; Anuario Kraft: Gran Guia GeneraP (Buenos Aires 1915) ; Clemen- ceau, G., (Notes de Voyage dans l'Amerique du Sud) (Paris 1911) ; Gancedo, A., Jr., (La Argen¬ tina, su Evolucion) (Buenos Aires 1913) ; Hirst, W. A., A Guide to South America5 (New York 1915); Holland, W. J., <To the River Plate and Back: the Narrative of a Scientific Mission5 (New York 1913) ; Huret, J., (En Argentine5 (Paris 1913) ; Koebel, W. H., (The South Americans5 (New York 1915) ; Larden, W., Argentine Plains and Andine Glaciers5 (New York and London 1911) ; Mills, G. J., Argentina; Physical Features, Natural Resources, etc.5 (London 1914) ; Moses, B., (The Spanish Dependencies in South America5 (New York 1914) ; Pennington, A. S., (The Argentine Republic5 (London and New York 1910) ; Regel, F., i.e. Christian Friedrich Leo¬ pold, Argentinien5 (Frankfurt a. M. 1914) ; Ross, E. A., (South of Panama5 (New York 1915, pp. 114-138 et passim) ; Schmidt, U., and Cabeza de Vaca, A. N., (The Conquest of the River Plate 1535—55 5 (London 1891); Schuster, A. N., Argentinien: Land, Volk, Wirtschafts- leben und Kolonisation5 (Miinchen 1913) ; Wil¬ lis, B., {The Physical Basis of the Argentine Nation5 (in Clark University Addresses, Worcester, Mass., Latin America, New York

1914).

Marrion Wilcox.

1. COMMERCE. In the year 1915 Ar¬ gentina's imports amounted to $218,951,000 and exports to $539,000,000, while in 1916 the value of imports was $211,310,688 and of exports $453,841,507. In 1914 the total foreign trade, exclusive of coin

and bullion, was $602,439,880 (U. S. gold), that being the sum of imports to the value of $263,663,363 and exports, $338,776,-517. More nearly normal was the year 1913, the last wholly normal year before the Euro¬ pean War, in which, according to the official report of the statistical office, the total foreign trade of the republic was $877,711,376 (U. S. gold, equivalent to 904,857,089 pesos), that be¬ ing the sum of imports valued at $408,711,966 (421,352,542 pesos) and exports $468,999,410 (483,504,547 pesos). In 1913 the imports from Great Britain were valued at $126,959,989; from Germany, $69,172,279; from the United States, $60, 171,867 ; from France, $36,933,537. To Great Britain in the same year the exports were, in value, $11,756,777; to Germany. $56,- 178,368; to France, $36,586,981; to the United States, $22,207,965. The chief imports are : Food products, textiles and allied products, manufactured articles of iron and steel, rail¬ way supplies, agricultural implements, electric apparatus, glass and chinaware, chemicals, building materials, manufactured articles of hides and skins, oils and beverages. The chief exports are products of agricultural and pas¬ toral industry, of the forests and of the mines.

ARGENTINA — MINING AND MANUFACTURING INDUSTRIES (8)
215

During the decade 1904-13, commercial prog¬ ress on the part of Argentina, Uruguay, Chile and Brazil has been especially noteworthy ; and we learn by consultation of the official data that the percentages of increase are as follows : Argentina, slightly more than 108 per cent in¬ crease ; Uruguay, 104 per cent increase; Chile, slightly more than 94 per cent increase ; Brazil, 54 per cent increase. Argentine exports (with values in gold dollars) in a single year pre¬ ceding the outbreak of the war in Europe are listed as follows: Live-stock, $8,770,045; meat, hides, wool, etc., $136,336,218; manufactured animal products, $18,124,419; by-products, $2,- 569,451 ; agricultural products (in the restricted sense, products of tillage or of the field and garden), including raw material, manufactured and by-products, $301,267,094; woodland prod¬ ucts, $10,617,985; products of the chase, $1,-816,911 ; mineral products, $194,690; other prod¬ ucts, $3,807,734.

Of the cereals, Argentina exported 592,797 tons of oats in 1915, 74,899 tons of barley, 4,921 tons of rye, 4,330,594 tons of corn, 2,511,514 tons of wheat and 116,049 tons of corn meal. The exports of frozen beef reached a record figure in 1916, while the exports of mutton were less than in any year in the last five-year period. The

shipments of chilled and frozen beef in 1916 were 47 per cent more than in the last normal year, 1913.

Argentine imports, value in gold dollars, during the same year were: Live-stock, $1,419,- 290; animal foods, $6,572,463 ; vegetable foods and fruits, $2,583,251 ; spices and condiments, $8,098,967; vegetables and cereals, $6,727,848; substances for infusions, etc., $9,517,360; flour, macaroni, bread, etc., $1,434,066; tobacco and manufactures of, $7,038,055; wines, $9,866,310; spirits and liquors, $3,022,088; other drinks, $1,- 153,760; textiles, raw and manufactured, $89,- 560,214 (this includes silk, $7,080,063; wool, $16,751,832; cotton, $41,407,338, and sundries, 824,320,981) ; vegetable and mineral oils, $23,- 778,916; chemical, medicinal and pharmaceuti¬ cal substances and products, $15,193,658; paints and dyes, $2,535,437 ; timber in bulk, $4,252,600 ; timber worked, $6,576,339; paper and paste¬ board, $6,011,345; sundry paper manufactures, $3,890,640; leather and manufactures of, $4,- 610,560; iron (raw material), $24,149,251; iron and steel manufactures, $25,891,054; other metals unwrought or manufactured, $14,257,- 919; agricultural machinery, sacking, seeds, etc., $9,124,632; railway material, vehicles of all classes, etc., $37,223,336; stone, _ clay, glass, $36,577,913 (including raw material, $31,640,- 937, and manufactured, $4,936,994) ; building material, $35,775,580; electrical supplies, $10,110,- 088; sundry articles and manufactures, $14,399,- 584. The foreign trade of Argentina in 1916 amounted to 760,755,161 gold pesos ($733,748,- 324), of which imports represented 217,409,322 pesos ($202,940,400) and exports 543,345,839 pesos ($524,057,350). This gives the country an apparent favorable balance of trade of 325,- 936,517 pesos ($314,365,752).

Commerce with the United States. — In 1915 the exports from the United States to Argentina were valued at $53,912,544. The rec¬ ord of Argentina's commerce with the United States during 20 years (1895 to 1914, inclu¬ sive) shows a very marked preponderance of imports over exports, except in the first and

last of those years. Thus, in 1895 Argentina imported from the United States goods valued at $6,419,519, and exported to the United States goods valued at $8,589,278; and in 1914 the figures were $35,585,913 for imports and $41,680,985 for exports. But in the years that intervened the balance of trade in favor of the United States was conspicuously large. The importance of the Argentine market will be most readily appreciated when we ascertain, from a study of the records for the year 1913, that the value of merchandise exported

from the United States to Argentina was nearly (within $7,430) as great as the value of mer¬ chandise exported from the United States to Brazil, Uruguay, Paraguay and Ecuador com¬ bined; and that it was $12,543,939 greater than the sum of exports from the United States to Chile, Colombia, Peru, Venezuela, British Guiana, Bolivia, Dutch Guiana, French Guiana and the Falkland Islands. In brief, Argentina received 36.2 per cent of the total exports from the United States to South America. The principal articles thus supplied by the United States to Argentina were : Iron and steel, raw material and manufactures of 33.4 per cent of total supplied by the United States to South America; wood and manufactures, 62 per cent of total; oils — animal, mineral and vegetable, 39.8 per cent of total ; agricultural implements, 82 per cent of total ; cars, carriages, other vehicles and parts of, 35.8 per cent of total; leather and manufactures of, 42.5 per cent of total ; fibres, vegetables and manufactures of, 74 per cent of total ; engines, locomotives and railway material, 21.1 per cent of total; aero¬ planes, automobiles, bicycles, motor and other cycles, 38.5 per cent of total ; chemicals, drugs, dyes and medicines, 36 per cent of total ; naval stores, 36.4 per cent of total ; paper and manu¬ factures of 44.6 per cent of total ; other goods of minor importance, 14.9 per cent of total. According to the Argentine commercial statistics of 1913 goods to the value of $22,- 135,215 from the United States were received duty free. It is necessary, however, to em¬ phasize in this connection the fact that among the seven nations that lead in exports to Argen¬ tina, the United States took only a third posi¬ tion, surpassed by Great Britain and Germany and followed by France, Italy, Belgium and Spain, until there came the enormous increase that characterized the years 1913-17, inclusive, and which was due to the vast decrease in pro¬ duction of the European countries because of the war.

In 1916 the United States imported from Argentina articles valued at $100,000,000, ap¬ proximately, and the value of exports from the United States to Argentina in 1916 was about $65,000,000. Consult Americas , The (New York, published monthly, 1914 et seq.) ; Ar¬ gentine International Trade) (Panama-Pacific Int. Exp., 1915, Buenos Aires, Department of Agriculture, 1914).

Marrion Wilcox.

1. MINING AND MANUFACTURING INDUSTRIES. Although it is true that gold, silver and copper have been mined in a small way from early times, the mining indus¬ try in Argentina has not been developed to any great extent. It is often said that the main reason is the total lack of manual labor; that the mineral

outcrops are found in the Andean

region where labor is scarce ; that the mineral zone has an area of 48,000 square miles and is inhabited by only 20,000 people, living mostly in or near the town of San Rafael ; and that a large area is altogether unpopulated. The means of communication (as stated in consular reports, etc.,) are insufficient, and on those lines that do exist a prohibitive freight is ex¬ acted. Writers mention districts ((reported to contain® copper, petroleum, silver, iron, borax, sulphur, gold and tin. But it is quite safe to say that districts which are with cer¬ tainty known to contain such things in paying quantities do not remain unpopulated or wholly unprovided with manual labor. Means of communication are provided readily enough in any part of the republic that particularly re¬ quires and can make uncommonly good use of them ; in fact, the capitalists interested in Argentine railway development are especially alert. The conclusion is that mines which are referred to in such terms are not of sufficient value to attract capital and labor for their development. But in Cordoba province (which has a large population and railways) copper, silver, gold, marble and lime are found. Jujuy has mines of gold, silver, copper, mercury, borax, salt and asphalt. Other mining dis¬ tricts are those of the province of Salta,, which have kaolin, beside the minerals found in Jujuy. Similarly the provinces of Catamarca, Rioja and San Juan have mineral products. Mining of marble and wolfram is the principal indus- trv of San Luis ; Chubut and Mendoza produce coal and petroleum. In 1915 there were 15 petroleum wells ; petroleum is exploited by the government and eight private companies ; gold is found in Tierra del Fuego, Santa Cruz and Chubut. See Commerce (Article 7).

Nearly all the important branches of human industry are represented in the period of de¬ velopment that began after the year 1875. Manufacturing establishments at the present time produce standard varieties of food, cloth¬ ing, building material, furniture, etc., to a limited extent ; but the republic, agriculturally so powerful, is both willing and able to con¬ tinue to be a purchaser of such manufactured articles as can be produced more correctly and at less cost in the United States and in Europe. Naturally the preparation of products of agri¬ cultural and pastoral industries for domestic and foreign markets increases rapidly, favored by wholly exceptional conditions. Flour and sugar mills are in vigorous and profitable oper¬ ation, and the dairies

have increased remark¬ ably. There are 525 creameries, 16 butter fac¬ tories, 129 cheese factories, etc., a total of 1,259 establishments connected with dairies. During the last reported year over 35,000,000 pounds of cream were produced, 20,000,000 pounds of butter, and 12,000,000 of cheese. The estimated value of these products was about $8,000,000. The production of sugar and wine tends to increase, the annual output now exceeding 230,000 tons of the former and 500,- 000,000 quarts of the latter. Tucuman has 72 per cent of the registered sugar mills of the republic. Mendoza is the centre of the wine district. Important also are the tanneries (about 200 in number), the manufactories of cigars and cigarettes, of furniture, etc. But it is a mistake to speak of Argentine manufac¬ tures and mining as though they ranked with

Argentine agriculture. They do not ; and their attainment of such rank in the near future is highly improbable. According to the last industrial census, there were 31,988 fac¬ tories in Argentina, employing a total of 329ˆ 490 persons. The total capital was $727,591,135, and the output was valued at $1,227,549, 196.

According to an industrial census taken in 1914, Buenos Aires at that time had 437 shoe manufactories, which gave employment to 9,970 workmen and consumed raw material valued at $8,460,418, of which $5,854,172 worth was domestic and $2, 606,246 imported. The combined annual sales of these factories amounted to $16,448,514. It is estimated that the industry in Buenos Aires represents ap¬ proximately 75 per cent of the total for the country.

Marrion Wilcox.

1. BANKING AND FINANCE. The

first important operation of credit made by Argentina wras a loan negotiated with Messrs. Baring Bros. & Co., of London, in the year 1823, bearing interest at the rate of 6 per cent and 2j4 per cent amortization, issued at 90 per cent. Shortly after this operation, internal political troubles caused the suspension of in¬ terest ; and not until many years after, during the administration of President Mitre, did the republic resume the service on its debt. Eventualˆ the stockholders of the bonds re¬ ceived their full capital and interest in new bonds. During the years 1883 to 1885 many of the Argentine provinces issued loans in order to assist in establishing national banks under a special national law. A number of these provinces negotiated their loans in Europe, principal with French bankers. Unfortu¬ nately, owing to the crisis in 1890, the provinces suspended service of interest

on these loans, the country suffering at the same time a great crisis ; and although the national government, during the presidency of Dr. Pellegrini, who is remembered as an able statesman, endeavored to continue the service in cash, it could not do so. At that time Dr. Victorino de la Plaza (subsequently President of the republic) trans¬ mitted to Buenos Aires sound financial views prevailing in London, and by his counsel the funding loan was issued to pay service in bonds instead of cash for five years. Before the ex¬ piration of that time the country renewed the normal service in cash of its entire debt. Soon afterward the national government decided, in the interest of the credit of the country, to make arrangements to assume the loans created by the provinces, giving national bonds in ex¬ change for the provincial bonds ; and thus the loans issued by the different provinces, as we have mentioned above, were withdrawn. The same thing was done with the railway guar¬ anties, under national laws, given for the con¬ struction and equipment of lines. In conse¬ quence of the financial crisis of 1890, these guaranties were not punctually paid, and it wras decided to treat this question in a radical wray by computing the value of each guaranty and giving ,to the railway 4 per cent national bonds. Fifty million dollars assigned to this purpose are known as national railway bonds. The credit of the Argentine Republic, thus com¬ pletely re-established, has been maintained dur¬ ing a long period without an interruption, not¬ withstanding the difficult moments experienced

in the years 1914—16 over all the world in con¬ sequence of the European War. It is but just and right to mention in this connection the able manner in which the President, Dr. de la Plaza, controlled the finances of the country.

Aid Extended by British and American Bankers. — Nearly all the loans made by the Argentine Republic were issued under the auspices of Messrs. Baring Bros. & Co., who have been the friends and bankers of the coun¬ try from the beginning, and have won the respect and the sympathy of all the Argentine people. Many of the principal loans of the republic were issued solely for the construc¬ tion of railways, water and drainage, port- works, and other improvements, all of which belong to the national government and earn enough to pay the service.

American bankers have had until quite re¬ cently little direct

negotiation with Argentina. Messrs. J. S. Morgan & Co., of London, issued a loan jointly with Messrs. Baring Bros. & Co., in 1886-87 ; again, but on this occasion unaided, issued the funding loan of 1890; and also or¬ ganized and retained a large interest in one of the railway companies, the Argentine Great Western Railway, now known as the Pacific Railways. The only direct loan contracted with American bankers was one for $10,000,000 made by the province of Buenos Aires in 1882 with Messrs. Morton, Bliss & Co., who took the whole amount. This loan, according to the state¬ ment in Don Pedro Agote's book on finance, was the first Argentine loan issued at par, and was brought out in the London market. The same firm, afterwards the Morton Trust Co., now the Guaranty Trust Co., of New York, has maintained intelligent interest in and con¬ tinued its friendly relations and financial con¬ nections with Argentina. Compare the memo¬ randum on the finances of Argentina submitted by Dr. Samuel Hale Pearson, in Proceedings of the First Pan-American Financial Confer¬ ence (Washington 1915).

Since the loan of 1882, the first financial operation of marked and conspicuous impor¬ tance negotiated with the banks of the United States was an advance for a short period of $15,000,000 made in 1914 by the National City Bank of New York and its associates. Its sequel was the new issue made in 1915 by the same bank and its associates for a further amount of $25,000,000, the object of the second issue being the retirement of the first advance of $1 5,000,000 ; and it must be understood that the issue by the National City Bank and its associates was part of a loan of $50,000,000 of which Messrs. Baring Bros. & Co., of London, issued the other half in London. W ith this loan for five years, a number of small advances have been retired.

La Caja de Conversion was created by national law in the year 1896. Its duties have relation to the exchange of used notes for new; the receipts of gold' and issuance of paper money for its legal value (44tf, gold, per dol¬ lar), or, vice versa, the conversion of paper into gold at the same rate; the exclusive con¬ trol of the printing and issuing of the cur¬ rency of the country, etc. When the Caja de Conversion was created the circulation of cur¬ rency in the republic was about $300,000,000, but to-day it is about $600,000,000; the gold value is about $425,000,000, and against this

there is in the vault nearly $300,000,000, or about 70 per cent of the notes issued.

Development of Argentine Banking. —

And now a few words in regard to the Argen¬ tine banking system. During the early years of the independence of the country a number of banks were established, although the old Bank of the Province of Buenos Aires, founded in the year 1802, continued to lead them all. This was a bank of issue, having fiscal privi¬ leges, and became a very powerful institution. It was, indeed, the pioneer and founder of the wealth of the country, its useful practice be¬ ing to loan its money at low interest, with a 5 per cent amortization each three months, to the farmers and owners of land, enabling them to improve and develop the ranches. By such means did the principal land owners of Argen¬ tina make their fortunes. This bank had close relations with Messrs. Baring Bros. & Co., and became very powerful, having large credits in London and controlling the exchange market for many years ; nevertheless the financial and political crisis of 1890 caused its suspension, and years passed before it was reorganized with a capital of $30,000,000. To-day it is half-owned by the province of Buenos Aires and half by private shareholders. In the year 1873 a group of wealthy citizens organized a national bank, the government contributing half of the capital, and for many years this was a powerful institution, helping the develop¬ ment of Argentine industries, such as the sugar in Tucuman, the wine industry in the provinces of Mendoza and San Juan, and agriculture in the province of Santa Fe. This institution also experienced financial difficul¬ ties in the crisis of the year 1890. During Dr. Pellegrini's administration, in the year 1891, the Banco de la Nacion Argentina was created, with a capital of $50,000,000 currency (this bank taking over the liquidation of the Banco Nacional). It is an entirely official bank, and one of the articles of its (<law of creation® con¬ tains the provision that all the net profits are to be applied to the increase of its capital. To-day that capital has reached the sum of $128,000,000 paper, equivalent to over $60,000,- 000, currency of the United States, and the bank has besides a reserve fund of $14,500,000 in gold. The management does not sustain such relations of dependence upon the national government as the circumstances that the di¬ rectors are named by the President of the re¬ public, and their nominations require confirma¬ tion by the national Senate, would seem to indicate. It has over 150 branches in Argen¬ tina and is constantly increasing the number, following the growth of the nation. It has no agencies abroad, although its financial relations with the principal banks and bankers of the world are being increased every year, and it now has very friendly relations with some of the principal banks of the Lbiited States. Its deposits have reached over $300,000,000 gold, and during the universal financial difficulties of 1915 it helped the commerce and industry of the republic, which would otherwise have suf¬ fered more severely from the restriction of

credits caused by the war.

Beside the Bank of the Nation and the banks of the province of Buenos Aires to which we have referred, there are several private banks, formed solely with Argentine capital,

which are very prosperous institutions and have been created as the requirements of the country demanded, such as the Banco Espanol and Banco de Italia del Rio de la Plata, whose combined capital is over $80,000,000 (gold). There are also several foreign banks which have aided materially in the development of the trade of the country. One of the first of these was the Bank of Maua (now liquidated), es¬ tablished in Buenos Aires and Montevideo about 1855. The very important London and River Plate Bank was founded in the year 1862. Since that date the following have been established : The London and Brazilian Bank, The British Bank, Anglo-South American Bank, two German and several other banks, in¬ cluding Italian, Spanish and Dutch, with a total capital of about $300,000,000. The most re¬ cently established is the agency of the National City Bank of New York.

The National Mortgage Bank is strictly a governmental institution managed by a board of directors appointed by the President of the Republic and confirmed by the Senate. This bank issues national cedillas (real estate mort¬ gage bonds). The transaction must not in amount exceed 50 per cent of the value of the lands. Loans are limited to $250,000 to any one person. These cedulas bear either 5 or 6 per cent interest, and, because this bank is a national institution, have the guaranty of the Argentine Republic. Some of the first issues were of 7 per cent, but all have 1 per cent amortization. They were principally held in Belgium, having been one of the favorite in¬ vestments of the Belgian public. The total amount of cedulas issued is in the neighborhood of $200,000,000.

Argentine finances suffered from a crisis that began in 1913 and went on with increasing stress until the end of 1914 and the early months of 1915, when conditions began to im¬ prove. The European War was, of course, a tremendous shock, which further unsettled the financial structure of the country, but which offered some compensating advantages in the form of increased demand and higher prices for the food products which Argentina was so abundantly able to supply. The

situation in 1915 improved rapidly, and in 1916 decidedly favorable tendencies prevailed.

The national finances, collection of customs, stamp taxes, disbursements, and the service of the public debt are entrusted to the Depart¬ ment of Finance; and the conversion office (Caja de Conversion) is charged with the maintenance, as we have said above, of the proper relation between gold and paper money, besides having in its care the national archives, the bureau of statistics, the national chemical office (established to enforce the national pure food law), the custom-houses, ports, and all banks.

The basis of the monetary system of Ar¬ gentina is the gold standard. The unit is a gold peso, divided into 100 centavos, weighing 1.6129 grammes of gold .900 fine, or, say, 1.4516 grammes fine gold. Its par value, expressed in terms of United States currency, is $0.96475. The parity of $1 United States currency in terms of Argentine gold pesos is $1.0365. The actual currency of Argentina is government notes, to which a value of 44 per cent of the gold peso has been assigned by the government.

This parity of 44 per cent is maintained through the medium of a conversion fund which ex¬ changes gold for paper, and vice versa, on the basis of $44 gold for $100 paper, or $227.27 paper for $100 gold. Therefore, since the value of the paper peso is fixed by governmental de¬ cree and is maintained through the conversion fund, the paper peso represents 0.6387 grammes of fine gold, and its parity expressed in terms of United States currency is $0.4245. The parity of $1 United States currency in terms of Argentine paper pesos is $2.35576 curso legal (paper currency). Bills of exchange on foreign countries are quoted in both paper and gold, but usually they are quoted in gold. When Buenos Aires quotes New York exchange on the basis of paper currency, the quotation rep¬ resents the equivalent in United States currency of $1 paper peso. Thus, 42.50 means that $0.4250 United States currency is the equivalent of $1 peso, paper. When Buenos Aires quotes New York exchange on the basis of the gold peso, the quotation is expressed in gold pesos ; thus, ((New York sight $1.0375)) means that $1.0375 Argentine gold pesos equal $1 United States currency.

The trade balance in favor of Argentina in 19X5 was noteworthy : 331,000,000 Argentine gold pesos. Failures in the republic during the recent period of financial crisis are summarized as follows: Year 1912, assets $95,000,000 and liabilities $82,000,000; year 1913, assets $200,- 000,000 and liabilities $173,000,000; year 1914, assets

$603,800,000 and liabilities $422,800,000 ; year 1915, assets $233,500,000 and liabilities $178,000,000. These figures, supplied to us by the courtesy of the National City Bank of New York, clearly demonstrate both the stress and the recovery mentioned above. The budgets at hand give us: Total estimated ordinary revenue for the year 1913, $342,292,894.54 curso legal; and for the year 1914, $361,773,132. The new budget, signed 22 Feb. 1917, appropriates the same amount as in 1916, namely, 381,000,000 paper pesos ($161,772,600) . The latter proved to be excessive. The income for custom houses and port services during 1916 amounted to $118,587,979, against $108,929,011 for 1915, and $133,352,488 for 1914. The total debt of the republic, 31 Dec. 1911 was $526,540,088 gold; at the end of 1912 it was $532,398,699 gold ; on 31 Dec. 1913 it amounted to $544,820,000 gold; and on 31 Dec. 1914 it was $545,023,470 gold. We must add to the total for 1913 about $100,000,000 gold in order to approximate the amount of the public debt in 1915 and 1916.

Bibliography. — Americas, The (New York 1914 et seq.), published monthly and giving reliable information; Cosby, J. T., (Latin

American Monetary Systems and Exchange Conditions) (New York 1915) ; (Financial Con¬ ference. Proceeedings of the First Pan-American) (Washington 1915); Funes, G.,.(Ensayo de la Historia Civil de Buenos Aires} (Buenos Aires 1856) ; Gonzales, V., (Modern Foreign Exchange > (New York 1914) ; Lough, W. H., financial Developments in South American Countries) (Washington 1915).

Marrion Wilcox.

1. NATIONAL WEALTH. Dr. Al¬ berto Martinez, director of the last national census of Argentina, has estimated the aggre¬ gate wealth of the people of Argentina at 34,260

million paper pesos in 1916, or $14,546,796,000 (American currency), as against the small sum of only $2,740,600,000, the estimate of the census of 1895 which appears to have been somewhat incorrect.

Property of a private character, owned by the. state, is valued at $1,126,000,000, showing an increase of nearly $850,000,000, as compared with 1888. The industrial property of the state was estimated at $480,000,000 in 1914, as against $53,000,000 in 1884. It

consisted of the follow¬ ing items in 1914 : Sanitary works, $145,000,000 ; State railways, $136,000,000; port works, $168,- 000,000; irrigation works, $15,000,000; hydraulic works, $12,000,000; telegraphs, $4,000,000. In 1888 the government lands, were valued at $104,- 000,000 (301,000,000 acres at 34.4 cents per acre). By 1914 their value had increased to $220,000,000, although their area in the mean¬ time had been reduced to 205,000,000 acres, the value per acre evidently being estimated at

$1.07.

The bulk of the people's wealth is repre¬ sented by agricultural property, the value of which is estimated at $7,218,200,000. Industrial, factory and shop properties are estimated at $758,760,000. It is noted that 75 per cent of the raw materials employed by the industries is of domestic origin. Argentine industries sup¬ ply 7l per cent of the demand for manufactured articles. Reckoning the population at close to 9,000,000, and the aggregate wealth at $14,546,- 796,000, the wealth per capita — statistical aver¬ age — is $1,616.

Another estimate of the national wealth was made in 1917 by Dr. Alejandro E. Bunge, di¬ rector general of the National Bureau of Statistics. He gives the following estimates of Argentina's national wealth for the years 1908 and 1916:

Form of wealth

1908

1916

Lands and grounds . 52,758,000,000

Fixed investments . 267,000,000

Cities and villages . J 2,547, 000 , 000

Personal and household!

54,510,000,000

456,000,000

2,887,000,000

effects .

Live stock .

Agricultural products ....

Industrial products .

Agricultural implements

and machinery .

Industrial machinery ....

Stock of gold .

Railways .

637,000,000

628,000,000

530,000,000

637,000,000

78,000,000

170,000,000

168,000,000

890,000,000

722,000,000

1,360,000,000

530,000,000

700,000,000

172,000,000

187,000,000

338,000,000

1,433,000,000

Street railways, tele¬ graphs, telephones, electricity, and gas

works .

Port works, canals ships. .

Total .

255,000,000

255,000,000

59,820,000,000

290,000,000 280 , 000 , 000

513,865,000,000

The difference in the valuation of lands and grounds for the year 1916 and that for 1908, amounting to $1,752,000,000, or 63.5 per cent, does not represent a real increase in the value of land. No such increase in land values has taken place. The difference is to be explained by the difference in the methods of estimating values employed for the two censuses. Ihe same holds true in regard to the valuation of live stock, the value of which is estimated at $628,000,000 for 1908 and $1,360,000,000 for 1916. The difference of $732,000,000 would rep¬ resent an increase of 116.5 per cent.

For the purpose of comparing the national wealth of Argentina with that of other nations the following table is submitted, showing the aggregate and the per capita wealth of the prin¬ cipal nations :

Country

Year

National

wealth

Popula¬

tion

Wealth

per

capita

Argentina. . .

1 1908

59,820,000,000

6,050, 000

51,623

France .

l 1916

13,805,000,000

8,070,000

1,718

1908

55,391,000,000

39,280,000

1,410

Germany . . . United

1908

83,300,000,000

62,800,000

1,325

Kingdom

1908

67,012,000,000

44,500,000

1,506

United

/ 1904

107,104,000,000

81,200.000

1,318

States. . . .

\ 1912

187,739,000,000

95,540,000

1,965

It should be noted, however, that these figures are not directly comparable. The purchasing power of money differs in different countries and, moreover, if the real economic power of a country is to be measured correctly it is necessary, in addition to the property existing within the boundaries of the country, to con¬ sider also the investments placed in foreign countries. The European nations in particular have enormous investments abroad, with con¬ siderable returns in the form of interest and dividends. This fact must be taken into ac¬ count, particularly if a comparison of the tax¬ able wealth of different countries is attempted. Argentina's foreign investments are nil, while millions of dollars have been invested by foreigners in her various public and private enterprises. Consult (Tercero Censo de la Republica Argentina de 1914} (Buenos Aires 1916), and (Commerce Reportsˆ issue of 29 Sept. 1917 (Bureau of Foreign and Domestic Commerce, Washington. D. C).

John B. McDonnell, Editorial Staff of The Americana.

1. TRANSPORTATION AND COM¬ MUNICATION. Shipping. — We shall first consider the shipping at the ports of the river system (La Plata, Parana, etc.) ; and the magnitude of British trading interests in Ar¬ gentina is one of the facts that will claim our attention immediately. The preponderating share of the United Kingdom in the sea-borne commerce of the Parana-La Plata

River sys¬ tem, as the (South American Year Book* sug¬ gests, may be summed up in a single sentence: the number and tonnage of British shipping in Argentine waters exceeds that of all the other nations put together. So important is the sea-carrying trade of the British flag, and so keen has become the competition of foreign shipping, that even so slight a fall in the relative position of British shipping as one-half per cent before the European War began was commented upon by British writers as a not altogether propitious sign. Taking the shipping of all the ports of the river Plata as a whole, the tonnage of the vessels owned by British subjects represented in 1912 no less than 3,557,700 tons, or 60j4 per cent of the total shipping, but compared with 1911 there was a falling-off of 97,000 tons to be recorded. In the year last mentioned the British tonnage attained 3,654,700 tons, or 61 per cent of the tonnage of all nations. Germany took the

second place with 661,400 tons, followed by Italy with 426,500 tons, and France with 400,- 000 tons. Germany and France were credited with an increase of 16,300 and 46,990 tons respectively ; the Italian flag showing the con¬ siderable decrease of 140,300 tons, as a result of the' utilization of liners as transports. Under the Argentine flag we find 78 steam vessels with 43,001 tons, and 9 sailing vessels with 7,052 tons. At the Atlantic port of Bahia Blanca, during the normal period before August 1914, the number and tonnage of British vessels nearly doubled in the short space of a single year. Practically all the important shipments here were made in British vessels, notwithstanding the efforts of Germany to secure a footing in this trade. Rapid travel has become a necessity in Argentina as else¬ where. Competition between the various steamship companies for fast services between Argentine ports and Europe has become keener than ever.

The efforts of the government to foster the Argentine coasting trade have accomplished, unfortunately, very little. As for river com¬ munication, some progress is now being made and the communications with Paraguay by the Parana River are gradually improving. There is a service of rather light-draft steamers from Buenos Aires as far as Asuncion, while transit by water between the capital and Rosario, to which port on the Parana River ocean-going steamships ascend, is beginning to compete advantageously with the

railways- From a handbook prepared by the Pan Ameri¬ can Union ((Argentine Republic,* Washington, D. C., 1916) we quote as follows : <(Austrian, Belgian, Brazilian, British, Danish, Dutch, French, German, Italian, Spanish and Swed¬ ish steamers arrive and depart regularly from the ports of Argentina to all quarters of the earth. There are 50 lines with agencies in Buenos Aires. Regular passenger service is maintained to the various ports of Europe and steamers leave or arrive several times a week. To New York, while there are not so many steamers, opportunity is offered at least once in a fortnight for the traveler to take a direct steamer.® Argentine official statistics show that since the year 1900 the total tonnage (entrances and clearings to and from ports of the Argentine Republic) have increased 124.2 per cent. In March 1917 a regular line of cargo steamers was inaugurated between Japan and Argentina and Brazil.

Railway Postal and Telegraph Services. — Argentine railways have at least one char¬ acteristic which distinguishes them from those of the other South American countries; each is part of a system designed to promote the development of the entire republic.

For a number of years practically all im¬ ports were sent to Buenos Aires, and thence forwarded to the centres of consumption- That made necessary the joining of Buenos Aires with all the interior districts by a num¬ ber of radiating main lines. These help to develop the agricultural districts they influence, which in turn give them a large amount of traffic. Secondary lines are then intercon¬ nected and the points where such lines cross the original lines become in turn new centres. Subsequently, radiating lines were constructed from other important places also, such as

Bahia Blanca, Rosario and Santa Fe, the shipping facilities of these foci being increased to accommodate the growing traffic. The result is seen in the present logically developed system which is uncommonly efficient and capable of almost indefinite expansion. Up to the beginning of the year 1914 there had been constructed and, as a rule, very well equipped, 20,502 miles of railways. Of these, 6,226 miles were of narrow gauge; 1,611 miles of standard gauge and 12,967 miles of broad gauge. Private corporations owned 17,351 miles, while 3,454 miles belonged to the state. The railway system was extended 391 miles during the year 1913. In 1915 there were open 22,688 miles of railways, of which 4,136 miles belong to the state. This railway expansion places Argentina in the ninth position, with respect to length of railways, among the countries of the world ; more extensive sys¬ tems exist only in the United States, Germany, Russia, France, India, Great Britain, Austria- Hungary and Canada. «The

nation has real¬ ized,® says the (Argentine Handbook,* <(that to have a population to develop the rich soil of the country, the railway must go in advance of settlement. Surveys have therefore been encouraged and actual construction has been hastened into regions practically unvisited by man until then.® A phase of the railway development during 1913 was the practical com¬ pletion of the line westward from the Port of San Antonio, in Rio Negro Territory, to Lake Nauhal Huape; the plan being to extend this road into Chile through the neighboring Cordillera. The Southern Railway also has continued construction from Neuquen toward the Andes, and the intention is to cross into Chile not far from Valdivia.

The provinces of Buenos Aires, Santa Fe and Cordoba excel in the development of their railway systems ; but each large political sub¬ division, except Los Andes and Tierra del Fuego, has at least some line built or building. The government by its plan of extension has carried its own lines into Jujuy, and thus to the Bolivian frontier, where connection is to be established with La Paz. Of international interest also was the inauguration and opera¬ tion (1913) of a through passenger and freight service between Buenos Aires and Asuncion, the capital of Paragua)ˆ. A lav/ passed by the Argentine Congress in 1915 pro¬ vides for the collection of a pension fund for railway employees. In 1912 a law was passed providing for the canalization of the Upper Uruguay; the work to be carried out jointly by Argentina, Brazil and Uruguay. A ferry boat service was also projected between Paraguay and Argentina at Posadas and Encarnacion.

The so-called Mitre law, which went into effect 1 April 1908, is of great importance to investors in Argentine railways. Article 8 of that law states, with regard to railways :

The materials and articles for construction and operation which are imported into the country shall be exempt from import taxes, and this exemption shall be effective until 1 Jan. 1947. The company shall pay, during the same period, regardless of the date of its concession, a single contribution [tax] equiv¬ alent to 3 per cent of the net earnings of its lines, being exempted during same period

from all other national, provincial, or muni¬ cipal taxes.

In 1906 the national Supreme Court decided that this law exempted

the railway companies from the payment of any tax except the 3 per cent of their net earnings, the net earnings being assumed to be 40 per cent of the gross earnings ; but it has recently revised its de¬ cision, and the municipalities are now attempt¬ ing to compel the railway companies to pay several years' back taxes for paving, lighting, etc. Some of the railway companies are pay¬ ing the municipal taxes under protest. The principal railway companies operating in the republic have asked Congress to pass a resolu¬ tion enjoining the municipalities and provinces from collecting these taxes, and it is expected that the present Congress will decide definitely what interpretation is to be placed on the law.

The 3 per cent tax is expended on im¬ provement to highways leading to the stations of the railway paying the tax.

The organization of posts and telegraphs was established by law in 1878. Argentina is a member of the Universal Postal Union, and the parcel-post convention with the United States was signed in September 1915. The mails receive systematic attention, and delivery is made to every place in the country. The number of permanent employees is about 13,500 and about 1,250,000,000 pieces are carried annually by railways, steamers, stage-coaches and mounted messengers. In May 1913, there were 43,202 miles of telegraph, with about 2,600 telegraph offices, employing more than 10,000 persons in the service. The revenue of the Postal Department was $4,967,910 for 1914—15. The government owns about one-half of the telegraph system and the provinces of Buenos Aires and Entre Rios have lines. Cable serv¬ ice between Argentina and other countries is chiefly in the hands of private companies. By agreement with Bolivia, Paraguay and Uru¬ guay, the charges to those countries are the same as the Argentine inland rates. Argen¬ tina was the first of South American states to adopt wireless telegraphy. There are 12 sta¬ tions for wireless telegraphy. All ships with a crew of over 50 and touching at Argentine ports are compelled by law to be provided with wireless equipment.

Bibliography. — Killik, S. H. M., (Manual of Argentine Railways* ; Pan-American Union, (Argentine Republic (Washington 1916) ; Martinez, A. B., 'Baedeker of the Argentine Republic (4th ed., New \ork and London 1916). See Bibliographies under Agriculture, etc.

Marrion Wilcox.

1. ARMY AND NAVY. Military service is compulsory to all Argentine citizens for the nominal term of 25 years, between the

ages of 20 and 45. By means of an annual drawing of lots conscripts of 20 years of age are designated to serve for one year (army) or two years (navy). Conscripts who can not read and write are taught during the term of military service. Those joining the army are also given instruction in agriculture. After the conscription service the citizens do not receive militarv training although they belong to the active army (first 10 years), then make up the national guard (following 10 years), and lastly the territorial guard (remaining five years).

There is also provision for soldiers enlisting under contract, for citizens serving as a punish¬ ment for breach of the Military Law, and for voluntarily enlisted musicians. The standing army has 20 infantry battalions of three com¬ panies each, nine cavalry regiments of four squadrons each, five regiments of field artillery, each having four 6-gun batteries, one regiment of howitzers, some mountain artillery and heavy artillery, six battalions of engineers of two companies each, cyclist, administrative companies, etc. The army expenditure in 1915 was $28,334,556 paper.

The total establishment of the standing army was about 22,000 in 1916. The com¬ pulsory service was created in 1901 and since that time nearly 200,000 men have been trained.

All officers in the army are graduates from the military school at San Martin. Besides there are a Superior Military School, a Cavalry School, a school for petty officers, a school for marksmen, another for gunsmiths and an Aviation School.

In the navy the two-year conscription sys¬ tem provides the men for ordinary duties of the navy while officers are selected from the Naval School at Rio Santiago. In addition there are special training schools for mechanics, electricians, artillerymen, torpedo crews, stok¬ ers, clerks, wireless operators, pilots, sailors and ship boys. The entire fleet is mobilized for four months in every year and during that period a number of reserve men are called up for service. The reserve force consists of 12,000, of whom one-half belongs to the first reserve and the other half to the second. Before graduating as midshipmen the students of the Naval School spend the last year of instruction on board of a training ship making a cruise around the world. The war navy consists of 2 dreadnaughts, 2 pre-dreadnaughts, 4 armored cruisers, 3 protected cruisers, 2 armored gunboats, 2 torpedo gunboats, 15 destroyers, 8 torpedo boats and some miscel¬ laneous craft.

Marrion Wilcox.

ARGENTINE, Kansas, formerly a city in Wyandotte County on the Atchison, Topeka and Santa Fe Railroad ; annexed to Kansas City in 1910. It has extensive smelting interests, a structural steel company, zinc and chemical works, an ice plant, railroad repair shops ahd several grain elevators. Pop. at time of annex¬ ation, about 6,200.

ARGENTINE, the name of a group of small smelt-like fishes, living in the open seas of the north temperate zone, and distinguished by the brilliant, silvery appearance of their scales. Some ascend rivers to deposit their spawn, where they are caught in large quantities and eaten as a delicacy. This group is also famed for the abundance of nacre, the sub¬ stance used in making artificial pearls, which is attached to their air bladders in the form of a coat of silvery fibres.

ARGENTITE (from the Latin, argentum, “silver®), a native sulphide of silver, belonging in the galena group, crystallizing in the iso¬ metric system and having the formula Ag2S. It is opaque and has a metallic lustre and a dark, leaden gray color. Its hardness is from 2 to 2.5, and its specific gravity is about 7.3. Ar- gentite occurs in many countries and when

found in quantity is a valuable ore of silver. It occurs in crystals (often distorted), massive, in crusts, and in thread-like aggregates. Choice speciments occur in the silver mines of Joac- himsthal, Bohemia and Freiberg, Saxony ; in Bolivia, Chile and Peru, and notably at Bato- pilas, Mexico ; also in many silver mines in Colorado, Nevada, and elsewhere in the United States. Argentite is often called <(silver glance® by miners.

ARGENTORATUM, an Old Celtic word, meaning ((stones of Argantos,® the old Roman name for Strassburg.

AR'GILLA'CEOUS ROCKS, a petro¬ graphic division including those rocks that are largely composed of clay. They owe their origin to the disintegration and decomposition of other rocks and hence are always of second¬ ary nature. Among the common varieties be¬ longing to this class are ordinary brick-clay, fire-clay, potter’s-clay, kaolin, mudstone, shale and marl (qq.v.). Clay rocks are easily influ¬ enced by metamorphic agencies, yielding shale, micaschist, graywacke and other hard rocks. See Sedimentary Rocks.

ARGINUSiE, ar'ji-nu'se, the name of several small islands southeast of the Island of Mitylene (Lesbos), now belonging to Greece. In their vicinity the Athenians, under Conon, 406 b.c., defeated the Spartans under Calli- cratides, in a hard-contested naval battle.

ARGIVES, or ARGIVI, the inhabitants of Argos ; a term used by Homer and other ancient authors as a generic appellation for all Greeks.

ARGO, the important southern constella¬ tion of the Ship, which is nearly 75 degrees in length, and contains over 800 stars visible to the naked eye. It has been subdivided into the smaller constellations: Puppis (the Poop), Vela (the Sails) and Carina (the Keel). Canopus, a star of the first magnitude, is its chief orna¬ ment. It is invisible in the northern and cen¬ tral United States. The variable star, N. Argus, has deeply interested astronomers, because of its great changes in brightness.

ARGO. See Argonauts.

ARGOB, the name of a district in Bashan, referred to in Deut. iii, 4, as the kingdom of Og, and containing threescore walled cities. Its precise location has not been determined. In this connection consult De Vogue, (Syrie Centrale (Paris 1869) ; Porter, (Five Years in Damascus) (London 1870) ; (Giant Cities of Bashan} (ib. 1869) all interesting if not very reliable. Consult also the careful description given in Wetzstein, J. G., (Reisebericht fiber Hauran und die TrachoneiP (Berlin 1860).

ARGOL (origin of the word unknown), a term applied to the crude acid tartrate (or bi¬ tartrate) of potassium, as deposited on the sides of the vats in which wine is fermenting. It exists in the grapes from which the wine is made, but is precipitated from solution in the vats by the alcohol formed during the fermen¬ tation. Like many other precipitates, argol brings down more or less of the coloring matter in the solution from which it is deposited, and it is white or red, according to the color of the wine from which it is formed. When purified by re-crystallization from its solution in hot water, argol is known in commerce as ((cream

of tartar. ® The purified salt is extensively used in baking powders and to a lesser extent in medicine. It is used in its crude state in metallurgy as a reducing agent in fire assay¬ ing.

ARGOLIS, a peninsular state of ancient Greece; between the bays of Nauplia and .TEgina, now forming with Corinth, a nome or

department. Argolis was the eastern region of Peloponnesus, and its inhabitants were often called Afgives. According to the monuments of Greek mythology, Argolis was peculiarly rich, and early cultivated. Here reigned Pelops, an emigrant from Asia Minor, from whom the peninsula derives its name. It was afterward the seat of government of Atreus and Agamem¬ non, Adrastus, Eurystheus and Diomedes. In the earliest times it was divided into the small kingdoms of Argos, Mycenae, Tiryns, Troezene, Hermione and Epidaurus, which afterward formed free states. The chief city, Argos, has retained its name since 1800 b.c. Its inhab¬ itants were renowned for their love of the fine arts, particularly of music. Some vestiges re¬ main of its ancient splendor, and it has at present about 9,000 inhabitants. Near it is the modern capital of Argolis, Nauplia or Napoli di Romania, with an excellent harbor, and the most important fortress of the peninsula. Pop. of the nome of Argolis and Corinth (1907)

153,172.

ARGON (Greek, ˆinactive,® in allusion to its entire lack of chemical affinity), a gaseous substance, presumably an element, discovered in the earth's atmosphere in 1894 by Lord Ray¬ leigh and Prof. William Ramsay. For some years previous to this discovery, Lord Ray¬ leigh had been engaged in a careful determina¬ tion of the densities of certain gases, and con¬ sistent results had been obtained for all of them save nitrogen. This gas, when prepared from air by the abstraction of all other known components, was found to be heavier, by about one part in 200, than the nitrogen prepared from ammonia. There could be no doubt about the reality of the difference, because the same experimental methods, when applied to other gases, gave results that were consistent with one another to about one part in 10,000. In studying the cause of the discrepancy, Lord Rayleigh prepared nitrogen from ammonium nitrite, from urea, and from nitric and nitrous oxides ; and found that all specimens of the gas that were prepared from nitrogen com¬ pound agree with one another in density, but that the specimens of nitrogen that he pre¬ pared from air were uniformly and consistently heavier, by the same constant amount of one part in 200. Provisionally, therefore, he recog¬ nized two kinds of nitrogen, which he called ((chemical nitrogen® and (<atmospheric nitrogen,® respectively, to indicate the sources whence they were obtained. He then published a letter in Nature,, narrating these facts, and calling for suggestions from chemists as to the cause of the systematic difference in density. No ideas of value were elicited. The possibility that "chemical® nitrogen might be contaminated with hydrogen, and that the experimental methods failed to eliminate the last traces of this very light gas, was tested by

adding hydrogen to ((atmospheric® nitrogen, and then submitting the mixture to the same process employed for

removing any hydrogen that might have existed in the “chemical® nitrogen. If the hydrogen theory of the discrepancy had been true, it would have been found that “atmospheric® nitrogen, when treated in this way, would ulti¬ mately agree in density with “chemical® nitro¬ gen ; but the test showed that “atmospheric® nitrogen, after the addition and subsequent re¬ moval of hydrogen, returned to its original state of higher density, thus proving the ade¬ quacy of the experimental methods, and dis¬ proving the hypothesis that the difference in density was due to hydrogen. The suggestion was also made that the “atmospheric® nitrogen had partly polymerized into an allotropic state analogous to ozone, or that the “chemical® nitrogen had partially dissociated into mona¬ tomic molecules. These possibilities were tested by subjecting both kinds of nitrogen to the action of the silent electric discharge, in an apparatus designed for the production of ozone from oxygen. It would certainly be ex¬ pected that the difference in density would partially or wholly disappear under this treat¬ ment if there were any basis to the polymeriza¬ tion or dissociation hypotheses ; but it was found that both kinds of nitrogen retained their initial densities, so that the original differ¬ ence persisted undiminished in amount. Fur¬ thermore, if the lightness of “chemical® nitro¬ gen were due to a partial dissociation induced by the method of preparation, it would be rea¬ sonable to expect that the molecules would re¬ combine in time with a resulting return of the density to that observed in “atmospheric® ni¬ trogen. Specimens of “chemical® nitrogen that were allowed to stand for eight months, how¬ ever, were found to retain their characteristic lightness. At this stage in the investigation, Professor Ramsay asked permission to co¬ operate in the investigation, and his services were gladly accepted. The hypothesis was made that “chemical® nitrogen contains an un¬ known gas, lighter than true nitrogen; or that “atmospheric® nitrogen contains some similar gas that is heavier than true nitrogen. In spite of the many analyses that had been made of the air, it was thought more probable that the unknown gas would be found in “atmospheric® than in “chemical® nitrogen ; and hence the experimenters turned their attention to the problem of removing “true® nitrogen from the “atmospheric® nitrogen, with the idea of obtain¬ ing a possible residuum, which would at least contain the unknown gas in concentrated form. For this purpose it was proposed

to take ad¬ vantage of the known fact that at a red heat nitrogen will combine with metallic magnesium, with , the formation of magnesium nitride. “Atmospheric® nitrogen, carefully freed from all known impurities, was therefore passed through a long tube of hard glass filled with magnesium shavings and heated in a furnace. The first experiment of this sort was made in May 1894, and gave encouraging results, the “atmospheric® nitrogen showing a slight but unmistakable increase in density. A more elaborate experiment of the same sort followed, in which “atmospheric® nitrogen was caused to pass over hot magnesium for more than two weeks. By this means its density, originally about 14 (that of hydrogen being 1), was in¬ creased to 19.09, and the bulk of the gas under examination was diminished until not much

more than 1 per cent of it remained. Plainly a great concentration of the unknown gas had been effected. To remove the last traces of true nitrogen, pure oxygen was next added, and the mixture exposed to a rain of electric sparks in the presence of caustic soda. When so treated the experimental gas contracted, in¬ dicating that the nitrogen was being withdrawn in the form of nitrate of sodium. When con¬ traction was no longer noted, the nitrate of sodium and the excess of oxygen were re¬ moved, and it was found that the remaining gas had a density about 20 times as great as that of hydrogen. When subjected to the electric spark and examined by the spectro¬ scope, this residual gas was found to exhibit certain characteristic groups of red and green lines that did not correspond to any element previously known. The experimenters, there¬ fore, felt reasonably sure that a new element had been discovered, and this conclusion has been borne out by all subsequent investigations. The discovery of this element (to which the name “argon® and the chemical symbol “A® have been assigned), was formally announced to the public in August 1895, and for it Lord Rayleigh and Professor Ramsay were awarded the Hodgkins prize and also the grand prize of the Smithsonian Institution. See Air.

As it was found that air contains 0.933 of 1 per cent (by volume) of argon, it is natural to ask why the new element had escaped de¬ tection in the vast number of air-analyses that have been made in the past. The answer is that argon shows no chemical affinity whatever, and as nitrogen is also inert in comparison with most elements, the two were very easily confused. Chemists have almost invariably estimated the nitrogen of the air “by differ¬ ence® ; that is, by removing all such constituents as oxygen, carbon dioxid and ammonia, and taking it for granted that the inert remainder is nitrogen. It might be thought that the spectroscope would betray the presence of argon, when the spectra of “atmospheric® and

“chemical® nitrogen were compared; but the curious fact has been established that when argon and nitrogen are mixed, the argon does not reveal itself to the spectroscope unless the mixture contains at least 37 per cent of argon. Upon looking over the work that had been previously done upon air, it was found that Cavendish had isolated nearly pure argon as long ago as 1785, but without recognizing its real nature. Thus, knowing that air contains a considerable quantity of nitrogen, he raised the question whether all of the apparently ni¬ trogenous part of the air “could be reduced to nitrous acid, or whether there was not a part of a different nature from the rest which would refuse to undergo that change.® To decide this point he added excess of oxygen to air and passed electric sparks through the mixture (precisely as Rayleigh and Ramsay did) until no further diminution of volume occurred. He then removed the excess of oxygen, together with the oxids of nitrogen that had been formed, and found that only a small bubble re¬ mained unabsorbed, which, he says, was not more than one one-hundred and twentieth of the bulk of the original nitrogen. The bubble that he thus obtained and whose nature he did not further question must have been nearly pure argon.

Argon having been discovered, chemists at once undertook to ascertain its chemical prop¬ erties, but here they met with an obstacle that has not yet been overcome, and which consti¬ tutes one of the strangest facts known to chem¬ istry. It was found, namely, that argon can¬ not be made to enter into chemical combination with any substance whatsoever. Thus Rayleigh and Ramsay have stated that (<argon does not combine with oxygen in presence of alkali under the influence of the electric discharge, nor with hydrogen in presence of acid or alkali, nor when sparked, nor with phosphorus at a bright red heat, nor with sulphur. Tellurium may be distilled in it and also sodium and potassium. Red hot sodium peroxid has no effect. Persulphids of sodium and calcium have no effect at a red heat. Platinum sponge does not absorb it. Aqua regia, bromine water, bromine and alkali, and potassium permanga¬ nate are all without influence. Mixtures of metallic sodium and silica, or of sodium and boric acid, are likewise without influence, and hence also nascent silicon and boron.® Mois- san further found that fluorin does not act upon it at any temperature. In short, it may be said that every reagent that the previous ex¬ perience of chemists indicated as likely to com¬ bine with argon has been tried without success, and hence the chemical properties of the ele¬ ment (if, indeed, it has any such

properties), are as yet quite unknown. Several announce¬ ments of the existence of compounds of argon have been made, but no really convincing evi¬ dence of such combination has been given. For example, Berthollet subjected a mixture of argon and benzene to the action of the silent electric discharge for a long time, and observed a diminution in the volume of the argon, which he attributed to its combination with the benzene. Benzene when treated in this way forms a resinous mass, which coats the walls of the tube, and it is not improbable that the small quantity of argon which disappears is held mechanically by the gummy deposit, either in solution or by absorption. At all events the original quantity of argon is restored, un¬ changed, by heating the resin. It cannot be positively affirmed that no compound of argon exists, but there is no previously known ele¬ ment (not even the metals of the platinum group) that could withstand the action of the substances whose activity has been exerted without effect upon argon. Until some com¬ pound can be formed we shall therefore have to infer the atomic weight of argon from de¬ terminations of the density of the gas, taken in connection with Avogadro's law. The best determinations made up to the present time in¬ dicate that the density of argon is 19.942 times that of hydrogen. If the molecules of argon are diatomic, then 19.94 is the atomic weight of the element, but if they are monatomic, we must double this estimate and conclude that the atomic weight is 39.88 (see Atomic Theory; also Gases, Kinetic Theory of). To settle this doubtful point experiments were made to find the ratio of the two specific heats of the gas, and it was found that the specific heat of argon at constant pressure is about 1.644 times as great as the specific heat at con¬ stant volume. This indicates that the molecule of the gas contains but one atom, and hence it is necessary to conclude that the atomic

weight of argon is 39.88, the atomic weight of hydrogen being taken as 1. Argon has been liquefied and solidified. Its critical tempera¬ ture is 179.3° F. below zero, and its critical pressure is about 52.9 atmospheres. Liquid argon boils (under ordinary atmospheric pres¬ sure) at about 303° F. below zero, and at about 309.3° below zero it freezes. The density of liquid argon is about 1.4046 at its boiling point. Four other elements, associated with argon in the air and closely resembling it in properties, have been discovered as the result of researches suggested by the discovery of argon. They are called, respectively, helium, neon, krypton and xenon (qq.v.). Hundreds of papers dealing with argon and the other gases just mentioned have appeared in the scientific periodicals, so that no bibliography of the subject can be at¬ tempted here. Ramsay's book, (The Gases of the Atmosphere1* (1896) gives an excellent ac¬ count of the chemistry of

the air, from the earliest times down to 1896. It must be re¬ membered, however, that our knowledge of argon and its allies is growing rapidly, so that some of the statements that Ramsay makes can be no longer admitted to be true. For ex¬ ample, he states that helium (which had al¬ ready been discovered when his book was writ¬ ten) does not occur in the air, but it has since been shown that it is a component of the air, forming from one to two one-millionths of its bulk. (See Gases, Compressed). Travers' (The Experimental Study of Gases) may also be consulted with advantage.

A. D. Risteen.

ARGONAUT, the appellation of an eight¬ armed oceanic cephalopod, closely allied to the octopus, and having the same power of swimming backward by forcing water through its funnel. Though called ((paper nautilus® it is entirely different from the true nautilus (q.v.), and although, since the earliest days, it has been said to sail upon the surface of the ocean, in its shell as a boat, with two web-like arms spread for sails, this belief is pure fable. Argonauts remain in deep water except in spawning sea¬ son, and then come to the surface only at night. The male is a naked octopod, and the <(boat® of the female has no organic connection with her body, but is a mere receptacle for holding eggs, retained in place by the two dor¬ sal arms, which are membranous and secrete it from their inner surfaces. It is not cham¬ bered like that of the true nautilus, but has a radially fluted, semi-transparent spiral shell, enveloping the body as far as the base of the tentacles, increasing in size with the growth of the animal, , and attaining a length of six inches. The male is only about an inch in length; one of its very short arms is specialized into an organ of generation, called a (<hectocotyle,® which detaches itself from the male body, and, having independent locomotory powers, at¬ taches itself to the female, and in some man¬ ner unknown fertilizes the eggs. Only a single species is known (A. Juans), represent¬ ing the family Argonautidce. See Nautilus: Octopus.

ARGONAUTS, the name given in Greek legends to the sailors, who, in a ship called the Argo, made a hazardous voyage to Colchis un¬ der the leadership of Jason, in quest of the golden fleece. Jason's uncle Pelias had usurped

the kingdom of lolcos and would resign it only on condition that Jason

should first bring from Colchis the golden fleece suspended in a conse¬ crated grove at Colchis. Among Jason's com¬ panions were Hercules, Castor and Pollux, Peleus, Admetus, Meleager, Orpheus, Telamon, Theseus, and his friend Pirithous, Hylas and Lynceus. Having sailed from the promontory of Magnesia, in Thessaly, they reached the har¬ bor of Lemnos, where they remained two years. The women of Lemnos, instigated by the of¬ fended Aphrodite (Venus), had slain all the males among them, except Thoas, and they detained among them the welcome strangers. At length they proceeded to the Troad, where Hjdas and Hercules were left behind. After various adventures they approached the dreaded Symplegades, rocks which closed together and dashed in pieces vessels passing through them. According to instructions previously received, they caused a dove to fly through before them, and followed, rowing with all their strength, while Orpheus played on his lyre. The rocks stood firm, and the danger was escaped. The last adventure awaited them at the Island of Aretias. Here they found the Stymphalides, birds which shot their feathers like arrows, and from which the heroes could only protect them¬ selves by a violent clashing of weapons. On their arrival at Colchis King Hfetes did not re¬ fuse absolutely to deliver the golden fleece, but charged Jason with three dangerous labors, thus hoping to destroy him. Jason was to yoke the two fire-breathing bulls of Hephaestus to a ploughshare of adamant, and to plough with them four acres of land consecrated to Ares (Mars), and never before turned up. He was then to sow in the furrows the remaining ser¬ pents' teeth of Cadmus, in the possession of JEetes, and to kill the armed heroes which they produced; .at last, to fight with and slay the dragon that guarded the golden fleece. All three labors he was to accomplish in a single day. With the help of Medea, the daughter of 2Eetes, these tasks were accomplished and the fleece obtained. Jason then fled with Medea, but the fugitives were pursued and on the point of being overtaken when Medea averted the danger by killing her brother Absyrtus, and strewing on the road his mangled limbs. The unhappy father quitted the pursuit to collect the bloody limbs of his son and the fugitives escaped. The return of the Argonauts is variously told, but after many perils they reached lolcos and gave the fleece to Pelias. Whatever the origin of the story, it was cer¬ tainly developed under the influence of the great period of Greek colonization in the 8th and 7th centuries b.c., when the adventures of the navigators and explorers of the western Mediterranean and the Black sea were told of gods and heroes. The story is scattered through nearly all the literature of Greece. Apollonius of Rhodes first gathered the mass of material into a connected consistent narra¬ tive.

ARGONAUTS OF ’49, a literary name (the colloquial one being ((Forty-niners))) ap¬ plied to the California pioneers. The first dis¬ covery of gold was in January 1848, but it was not generally realized till April; from thence till the following winter California itself (re¬ cently obtained bv the United States from Mexico) was partially depopulated outside the

mining camps, even soldiers and sailors de¬ serting in great numbers and rushing to the mines, while executive authority was paralyzed. These local changes of place, however, did not constitute a ˆvoyage for the Golden Fleece® from far distant regions, which is what the term implies. The excitement, spread by offi¬ cial reports, and intensified by journalistic in¬ ventions, had fully roused the east by winter; from January onward the great sea routes were thronged- By the end of the year the new province (it never was organized as a Terri¬ tory, entering the Union as a State from a condition of legal nullity or permitted tres¬ pass) contained toward 100,000 people. The imperfect State census of 1852 showed 264,435, nearly all Argonauts proper.

Much the greater portion came by sea ; the favored route being by the Isthmus of Panama. The passengers landed at Chagrcs, took boat up that river to Cruces, then crossed over by horse or mule conveyance to Panama, where they took such coasting steamers or sailing craft as came along. The crowds which flocked thither by all sorts of Atlantic vessels far out¬ ran the Pacific fleet’s capacity, and large num¬ bers had to wait many weary weeks for a passage. At one time 3,000 were collected at Panama, so wild with impatience that several small companies unsuccessfully attempted to make the voyage to San Francisco in the natives’ log canoes. An assemblage of several hundred to a thousand was common; and at one time they enlivened the tedium by issuing a newspaper. But a far more terrible foe than ennui had to be faced: the cholera and Panama fever, which carried off great numbers of the emigrants and a quarter of the inhabitants of Panama. Before the excitement had begun, two new steamers, the California and Oregon , were assigned to this route to run monthly. The fare was $300, and the competition for space was so great that double price was some¬ times paid. The California reached San Francisco on her first trip 28 Feb. 1849. When she came up the west coast after rounding the Horn to reach Panama, the gold fever had just reached Peru, and 75 Peruvians took passage. This preoccupation of space so enraged the 1,000 or so of waiting Americans that they in¬ duced the commandant of the United States forces in California, who was waiting with them, to issue a proclamation ejecting the Peruvians as

intending trespassers on United States public lands not yet opened for settle¬ ment. As they refused to go, however, no one dared use force. In one case some 300 intend¬ ing passengers drew lots for the 52 steamer tickets on sale. Many gold-seekers crossed at Nicaragua, at the Isthmus of Tehuantepec, or at central Mexico. Many thousands, how¬ ever, chose the cheaper and unbroken but time- wasting sailing voyage of several months around Cape Horn. The vessels on this route were miscellaneous and often unfit and ill manned; the food was poor and insufficient, and the voyage full of hardship. There was also a large overland emigration across the plains, through the Great Basin and its alkali deserts, and over the Coast Range. This jour¬ ney, too, was full of suffering from lack of food, lack of water, lost trails, and exhaustion ; and sometimes after a summer of endurance to the last gasp, the pilgrims saw the snows

close lip the mountain passes before them, and either wintered or died on the eastern flank, or lost themselves trying to penetrate through the snow. This overland body had two strongly distinguishing marks from the immigrants by sea. First, it contained nearly all the families among the Argonauts, as distinguished from the solitary masculine adventurers ; and there¬ fore nearly all the women. Second, it was nearly all a Northern and free-labor element — an important point in the struggle to make new States free or slave then going on be¬ tween the sections.

The characteristics of the Argonauts as a body were these : First, they were mostly men, \vith a few low-caste women, and their moral sense was not therefore quickened by the presence and needs of family life ; though families and reputable women were by no means so utterly absent as the exaggerated myths of the old-timers would make it appear. Second, few intended to remain longer than was needed to acquire a fortune and return East. This did not make their settlement in the least less enduring or desirable, but with the paucity of family life, it prevented them for some time from feeling a proper respon¬ sibility for public order and the creation of solid institutions, and spasms of illegal violence were expected to do the work of steady legality. Third, they were from all sections of the country, at a time when North and South were daily becoming hostile races. Though the free-State people wˆere largely in the ascendant, the Southerners were the political leaders and the State was steadily Democratic. Yet the former class had no idea of letting sectional politics rule their general

action ; home issues were too pressing and national ones too aca¬ demic; and while California as a free State sympathized with and furnished splendid help to the Union, her politics have never been affected by the issues either of slavery or of re¬ construction. Fourth, along with men of char¬ acter and ability, since prominent as business and professional men, State officials, editors, etc., there w-ere of course great numbers of blacklegs, desperadoes, and refugees from jus¬ tice. These not only defied all law in their re¬ lations with each other, but frequently out¬ raged, plundered and murdered the native Spanish inhabitants, and required an amount of time and effort to keep them in order, which the decent element — who Were in a great majority — were unwilling to give. Hence society again and again seemed on the verge of being dominated wholly by its criminal classes, and the fear of an occasional uprising of the orderly element did not countervail its being only occasional and the chance of escap¬ ing it (see Vigilance Committees). But the best praise wffiich can be given to the essential soundness of the Argonauts is that in a remark¬ ably short time they rose to the same sense of their responsibilities as older commonwealths, and the California of 1860 was not inferior to any of its companions. Consult Audubon, (Western Journal > (Cleveland 1906) ; Bret Harte, (Tales of the Argonauts) (Boston 1875) ; Royce, (History of California) (1891) ; Bancroft, H. H., (Historv of California) (4 vols., San Francisco 1884—90) ; id., California inter Pocula) (San Francisco 1888) ; Shinn, (Mining Camps) (1885); Taylor, Bayard,

< Eldorado > (New York 1862) ; Burnett,

(Reminiscences of an Old Pioneer *(1880); Mcllhany, (Recollections of a Forty-Niner* (Kansas City 1908); Stillman, (Seeking the Golden Fleece) (San Francisco 1877).

ARGONNE, ar'gun', France, a hilly rock and forest covered district of the northeastern region, on the borders of Lorraine and Cham¬ pagne, now contained in the departments of Marne, Meuse and Ardennes. The forest of Argonne over 30 miles long and from one. to 8 miles wide, is celebrated for the Campaign of Dumouriez against the Prussians in 1792, and was also the scene of several events in the Franco-Prussian War, 1871-72, and in the great European War, 1914 —17.

ARGOS, an important ctey of ancient Greece. The conquest of Argos by the Dorians forms the first really authenticated event in its history. Argos wˆas now a Doric city, though it retained w-ith part of its Achiean population some of its ancient habits, particularly the wor¬

ship of Hera (Juno). It had also a temple of peculiar sacredness to Apollo. It w'as long the first Dorian city in Greece, Sparta being the second, and Messene the third. From the time of the ascendency of Sparta, Argos wras divided between a democratic and an oligarchic party, the former of which inclined to the Athenian, the latter to the Spartan alliance ; but the gen¬ eral spirit of the city tended toward enmity to Sparta. In 362 Argos fought with Thebes against Sparta and Athens. The celebrated Pyrrhus wms killed in an invasion of Argos in 272. In 229 Argos joined the Achaian League, to which it continued to adhere till its over¬ throw by the Romans. The town of Argos is a straggling modern place, with houses mostly surrounded by gardens, and few buildings of importance. The chief relic of the ancient city is the theatre. There is an acropolis, 1,000 feet high, crowned bv a ruined castle. Pop. about

9,000.

ARGOS, Ind., town of Marshall County, eight miles south of Plymouth, the county-seat, on the Dixie Highway and on the New York, Chicago and Saint Louis and the Lake Erie and Western railroads. It contains a sawr mill, bending factory, printing establishment, two grain elevators and three banks with combined resources of $200,000. It is the headquarters of the National Retail Hardware Association. The value of its taxable property is estimated at $525,745. It has a high school. Pop. 1,200.

ARGOSTOLI, ar'gos-to'le, an important

city of the Ionian Islands, the capital of Cepha- lonia. Its harbor is considered the best in the Ionian Islands, and there are excellent quays. The towm is the residence of a Greek bishop. Wine, oil, melons and currants are exported. Several mills here are driven by a current of sea wmter flowdng through an artificial channel and then disappearing through fissures in the rocks. A naval school has been established here. Pop. about 14,000.

ARGOSY (a corruption, by transposition of letters, of the name of the seaport Ragusa), the term originally for a carrack or merchant ship from Ragusa and other Adriatic ports, now used poetically of any vessel carrying rich merchandise. In English writings of the 16th century the seaport named is variously written

Ragusa, Aragousc or Aragosa, and ships com¬ ing thence were named Ragusyes, Arguzes and Argosies ; the last form surviving and passing into literature. The incorrect derivation from Jason's ship, the Argo, is of modern origin.

ARGOUT, ar'goo', Antoine Maurice Apollinaire, Count d', a French statesman and financier : b. Isere 1782; d. 1858. In 1810 he was auditor to the Council of State, was made prefect of Gard in 1817 and peer of France in 1819. In July 1830 he acted as mediator be¬ tween Charles X and the popular leaders. Fte obtained several concessions from the former, but these came too late. In the same year Argout became Minister of Marine and in 1833 Minister of the Interior. He was governor of the Bank of France, after 1834, except for a time in 1836 when he was Minister of Finance.

ARGUELLES, ar-gwa'lyas, Agustin, Spanish statesman : b. Rivadisella, Asturias, 1776; d. Madrid, 23 March 1844. On the out¬ break of the war of independence in 1808 he attached himself to the patriotic party, and, as representative of his native province in the Cortes, gained a high reputation for eloquence (1812-14). On the restoration of Ferdinand VII, Arguelles was arrested, and suffered sev¬ eral years' imprisonment in the galleys till the revolution of 1820 restored him to freedom. He became Minister of the Interior, but soon resigned, being displeased with the narrow bigotry of the court. On the fall of the Con¬ stitution (1823) he fled to England, where he remained till the amnesty of 1832. On his return to Spain, being nominated to the Cortes, he was repeatedly made president and vice- president of the Chamber of Deputies, and always showed himself a moderate but un¬ wavering reformer. In 1841 he opposed all concordats with the Pope. He was guardian of the young Queen Isabella during the regency of Espartero. To the last he displayed those remarkable oratorical gifts which in his youth earned for him the sobriquet of ((Madrid 1851).

ARGUMENT, a term sometimes employed as synonymous with the subject of a discourse, but more frequently appropriated to any kind of method employed for the purpose of confuting or at least silencing an opponent. Logicians have reduced arguments to several distinct heads, of which the only one that can be said to have truth only for its object is the argumen- tum ad judicium, founded on proof and ad¬ dressed to the judgment. See Argumentation; Logic.

ARGUMENTATION is the process of proving or attempting to prove a given proposi¬ tion the truth of which is doubtful or disputed. It is, in many respects, the converse of the proc¬ ess of inference which is reasoning from premises to a conclusion. In arguing, the con¬ clusion

becomes a thesis and the facts or premises from which it was inferred become, the reasons by which it is proved. Inference is a forward movement from the premises to the conclusion ; arguing is a backward movement, or reference, from the thesis to the grounds which support it. Inference is the process by which we ourselves reach a conclusion or be¬ lief ; arguing is the process by which we seek to induce belief in others.

Proof requires that the proposition to be proved be brought within the scope of an ac¬ cepted law or principle, a law or principle be¬ ing defined as every general proposition that includes, or may be applied to, unascertained cases. This may be done by setting forth evi¬ dence, that is, facts observed by those sought to be convinced, or established to their satis¬ faction, which show the relation between the two. . In practice argumentation is usually elliptical. The whole of the proof is seldom stated in full. The advocate is usually content to state one or more facts, leaving it to those addressed to. supply the presuppositions in the light of which alone such facts may be in¬ terpreted. Implications which may be readily supplied are usually omitted. Thus, if it be argued that (<Congress is in session® for the reason that ((the flag is flying over the Capitol,® it is clear that the assertor relies not only on the fact given as a reason but also on an implied assumption which may be expressed as a gen¬ eral proposition : ˆWhenever the flag is flying over the Capitol, Congress is in session.® Every valid argument, then, when fully expressed, con¬ sists of a proposition to be proved which may be called the Thesis, and two proving proposi¬ tions usually called the reasons or the proof, one of which is a general proposition and may be called the Principle, and the other is a state¬ ment of evidence and may be called for distinc¬ tion the Reason, and shows that the thesis is brought within the scope of the principle. A thesis is said to be proved: (1) if the reason and the principle are known or admitted to be true, and (2) if the thesis is contained, involved or implied in them. An argument may be com¬ pared to a lever; the thesis is the weight to be lifted, the principle is the fulcrum and the rea¬ son, the power. The first requirement of proof has reference to those sought to be convinced. The advocate must found his thesis on some¬ thing which they recognize to be true. If the reason or principle be not accepted, the proof remains incomplete until the disputed proposi¬ tion is itself proved by reference to another reason and principle, and so on until some holding ground is reached, some reason and principle which will be unchallenged. The sec¬ ond requirement is concerned with the rela¬ tion of the thesis to the other propositions of the argument. If the principle and the reason are both expressed, the question whether or not they imply the thesis

is manifest in most cases on simple inspection.

Proof may be either conclusive or probable. To prove a proposition means strictly to estab¬ lish its truth conclusively and beyond all doubt. In practice, however, a proposition is said to be proved when its truth is shown to be probable or highly probable, or so probable that we do not hesitate to act as if it were true. Thus, in a criminal trial a prisoner's guilt is said to be proved if it be established beyond a reasonable doubt ; and in a civil trial the plaintiff's case is said to be proved if there is a mere preponder¬ ance of evidence in its favor. There are many principles that cannot be asserted or accepted as true universally, but only generally, or in most cases, and when such a principle is relied on as the foundation of an argument the thesis can only be asserted as probably true. So if the reason can only be asserted as probable, the thesis can have no higher certainty. In most

cases it is only possible to establish a disputed question with more or less probability, to afford a presumption of its truth, and to shift the bur¬ den of proof on him who maintains the con¬ trary.

Proof is said to be direct when the reasons directly imply the thesis, and indirect when they imply the falsity of all possible alternatives, and hence indirectly imply the truth of the thesis. Thus, if we argue that a given straight line, AB, is equal to another given straight line, CD, we employ the indirect mode of proof if we show that AB is not greater than CD, and that it is not less. The only possible alternative is that AB is equal to CD.

Argumentation includes also the processes of disproof and of refutation which, however, are fundamentally processes of proof, since dis¬ proof consists in proving that a given thesis is false, and refutation consists in proving that a thesis for which reasons have been given is not proved by them, having regard to the require¬ ments of proof.

Principles may be divided according to their source into two general classes, namely, those derived from Experience and those derived from Authority. Principles derived from Ex¬ perience include the laws of nature, scientific truths and, in short, all general propositions which are suggested or confirmed by experience, as for example, ((all men are mortal® ; the air has weight® ; ˆunsupported bodies fall to the

ground® ; ((division of labor increases its ef¬ ficiency.®

Principles derived from Authority include civil laws, rules of action and other general propositions, declared, enacted or promulgated, usually for the guidance or government of a class or community, by a legislature, church, judge, lawgiver, teacher, inspired writers or by any man or body of men having or assuming authority, as for example : (<every person who, being a witness in a judicial proceeding, makes a statement under oath which he knows to be false is guilty of perjury and is liable to a pen¬ alty® ; <(it is wrong to commit murder® ; <(all men are created free and equal® ; ((all who be¬ lieve will be saved.®

Arguments may be divided into two general classes, according as the principle on which they are based is derived from Authority or from Experience. This division is similar to that adopted by lawyers when they speak of issues of law and issues of fact. The following is an example of an argument where the principle is an enacted lawr :

Thesis: This prisoner is guilty of perjury and is liable to a penalty.

Reason: Because being a witness in a judicial proceeding he made a statement under oath which he knew to be false.

Principle : Because every person who, being a witness in a judicial proceeding, makes a statement under oath which he knows to be false, is guilty of perjury and is liable to penalty.

Arguments based on principles derived from Experience may be conveniently divided into eight general classes, namely : arguments to prove facts of Causation, arguments from Ex¬ ample, from Analogy, from Cause to Effect, from Effect to Cause, from Testimony, from Sign and from Circumstantial Evidence.

Facts of Causation. — That one thing is

the cause or the effect of another may be proved by reference to one of the five principles first formulated by John Stuart Mill, which are as follows :

(a) Agreement. — When two or more in¬ stances of the phenomenon under investigation have only one circumstance in common, the cir¬ cumstance in which alone all the instances agree is the cause (or effect) of the given phenome¬ non.

(b) Difference. — If an instance in which the phenomenon under

investigation occurs and an instance in which it does not occur have every circumstance in common save one, that one oc¬ curring only in the former, the circumstance in which alone the two instances differ is the effect or the cause or an indispensable part of the cause of the phenomenon.

(c) Joint Method. — If twro or more in¬ stances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of instances differ is the effect or the cause or an indispensable part of the cause of the phenomenon.

(d) Residues. — Subduct from any phenom¬ enon such part as previous induction has shown to be the effect of certain antecedents and the residue of the phenomenon is the effect of the remaining antecedents.

(e) Concomitant Variations. — Whatever phe¬ nomenon varies in any manner whenever an¬ other phenomenon varies in some particular manner is either a cause or an effect of that phenomenon or is connected with it through some fact of causation.

These five principles may be reduced to two, which are : negatively, that none of the ante¬ cedents of an effect that can be dispensed with without preventing the effect is the cause, and positively, that every antecedent of an effect that cannot be dispensed with without prevent¬ ing the effect is the cause or part of the cause. These principles may be proved by reference to two principles which are the ultimate founda¬ tion of all arguments from Experience. These are the law of Universal Causation which may be expressed by saying that <(Every event has a cause,® and the law of the Uniformity of Causes which may be expressed by saying that <(Like causes produce like effects in like circum¬ stances.®

It is in accordance with these principles that investigations are carried on in every branch of science that has to do with tracing the relation of cause and effect, and establishing principles based thereon.

Example. — We use the argument from Example when we cite as a reason for the truth of a general proposition a number of observed or known facts similar to those summed up in the thesis, the facts set forth being examples of the general truth they are cited to prove. Thus, we argue that all horned animals are ruminant because the ox, the sheep, the deer and other horned animals are rumi¬ nant. In an

argument of this kind the reason is seldom stated in full and the principle is seldom stated at all. When the proposition to be proved is universal, the advocate relies on the implied assumptions that no negative ex¬ ample has been found and that the search has

been exhaustive. He is usually content to state one or more positive instances and shift on his opponent the burden of showing an exception, or that the search has not been complete. The argument may be stated in full as follows: rl hesis : All horned animals are ruminant ; Reason : Because A, B, C and a number of other horned animals are ruminant and no horned animal has been found, after due search, that is not ruminant ; Principle : What¬ ever has been found to be true in a number of instances of a phenomenon and never found to be false, after due search, in any, is true of all.

In like manner we may argue that all men are mortal, that unsupported bodies fall to the ground, that food is necessary to animal life, that the price of protected manufactures tends to decline.

Analogy. — In an argument from Analogy points of resemblance between two things are relied on to prove that the resemblance extends further than is actually known or observed. Thus, when we argue that a given specimen of handwriting was written by a particular person because it resembles handwriting that is known to have been written by that person, we employ an argument from Analogy. The principle upon which this argument is based may be stated as follows : ((Whatever is true of a thing is true of what essentially resembles it.® It is sometimes said that no thesis can be proved conclusively by analogical evidence, but if es¬ sential resemblance can be shown, if, in other words, the analogy is complete, the argument may be as conclusive as any other. In many cases in which the argument from analogy is employed it is impossible to show essential resemblance, and, of course, the thesis cannot be asserted as more than probably true. Thus, in the argument that Mars is inhabited because of its many points of resemblance to the earth it is impossible to say that the thesis is even probably true, since there are so many points of essential difference and so many essential points as to which it is unknown whether Mars resembles the earth or not. To justify a prob¬ able conclusion there must be more points of resemblance than of difference and the points as to which we do not know whether the two things compared agree or differ should be con¬ sidered as points

of difference. Moreover, of all possible points of resemblance and of dif¬ ference only those should be considered which are essential, that is to say, which have a direct bearing on the question to be proved. The principle upon which we rely in using a prob¬ able argument from analogy may be stated as follows : (<When two things resemble each other in a preponderating number of essential particulars what is true of one is probably true of the other.®

The arguments from Example and from An¬ alogy depend in the last analysis upon causa¬ tion. The uniformity of the facts in the one case and the essential similarity of the facts in the other lead us to infer a cause which, although not known, is assumed to exist to account for the fact or class of facts to be proved.

Cause to Effect. — An argument from

Cause to Effect is one in which the existence of a known cause is given as a reason to prove an effect, as when we argue that a man will die because he is afflicted with a particular

disease. Such an argument may be only prob¬ able since the action of every cause is liable to be frustrated by other agencies, and it ap¬ proaches to conclusiveness in so far as it can be shown that no other agency is operating or will operate to prevent the effect. When an argument of this kind is employed the as¬ sumptions relied on are that the circumstance given as a reason has been found to be ade¬ quate to produce the alleged effect, that its action cannot be frustrated and that it will be followed by its effect in this case as in the former case or cases, or in other words, that like causes produce like effects. The argument may be expressed in full as follows : T : A will die ; R : Because he is afflicted with X, a cause of death that cannot be frustrated; P: Every cause that cannot be frustrated will be fol¬ lowed by its effect. The argument may be stated more simply by using as a principle the law of the particular effect: T : A will die; R: Because he is afflicted with X ; P : Because all who are afflicted with X die. In like manner we may argue from motives to actions which they tend to produce.

Effect to Cause. — An argument from Effect to Cause is one in which the existence of an effect is given as a reason to prove a cause that is known to be adequate to produce that effect. Such an argument may only be probable since the same effect may be pro¬ duced by two or more causes, and it approaches to conclusiveness in so far as all the causes but one can be shown not to be operative. Thus, when we argue that it has rained because the streets are wet we use an argument from an effect (the wet street) to a cause (rain), and it is conclusive in so far as we show that no other cause operated which might produce the effect, as for example, a heavy dew, melt¬ ing snow, the sprinkling cart, the bursting of a water main, etc.

The principle relied on in arguments of this kind may be stated as follows: when any cir¬ cumstance is known to be adequate to produce a given effect, that effect having appeared and no other cause having operated to produce it, the effect in question was preceded by that circumstance.

Testimony. — An argument from Testi¬ mony may be regarded as an argument from an effect to a condition, the giving of the testi¬ mony being the effect and the reality of the fact testified to being a more or less probable condition of the effect; in other words we argue that the testimony would not have been given if the fact testified to were not true. The assumption relied on in every argument from testimony is that the witness is trust¬ worthy, and the principle on which we rely is : what a trustworthy witness testifies to is true. An argument from testimony may be stated formally thus : T : A assaulted B ; R : Because C, a trustworthy witness, testifies that he saw him do it ; P : Because what a trustworthy wit¬ ness testifies to is true. It is assumed both in the courts of justice as well as in the ordi¬ nary affairs of life that a witness is trustworthy unless the contrary is shown, in much the same way that an accused person is presumed to be innocent until he is proved to be guilty, and the burden of showing that he is not trust¬ worthy is usually upon him who asserts his untrustworthiness.

Sign. — An argument from Sign is one in which the fact to be proved and the fact cited as a reason, although not related as cause and effect, are associated through some fact of caus¬ ation, usually as joint effects of a common cause either known or assumed to exist. Thus, when we argue that it will rain because the mercury is falling in the

barometer, or that this animal is a ruminant because it is horned, or that Congress is in session because the flag is flying over the Capitol, we use arguments from sign. Arguments from testimony, from cause to effect and from effect to cause, are also sometimes called arguments from sign, but it is convenient to use the term in the sense above indicated. In a wide sense all arguments are arguments from sign since sign is only another name for evidence. The principle relied on in this argument is usually a law already estab¬ lished by the argument from Example.

Circumstantial Evidence. — In this argu¬ ment the reason consists of a number of facts or circumstances any one of which taken by itself may have little evidential force, but which taken together form a body of evidence that is often stronger than the direct testimony of wit¬ nesses. It is in the nature of an argument from cause to effect or from effect to cause or from sign, or it may contain elements of all three. An example of the establishment of a thesis by circumstantial evidence may be taken from al¬ most any criminal trial. In one case the house of a license inspector, who had aroused the hostility of liquor sellers by a strict enforce¬ ment of the law, was wrecked by some ex¬ plosive. Shortly after the explosion, which happened about one o'clock in the morning, marks of footsteps in the fresh snow were found leading from the place of the explosion to one of the hotels, not by the most direct route, but circuitously around a block and through a back alley to the rear entrance of the hotel. In one of the rooms was found a pair of boots which coincided with the footmarks made in the snow, and under the mattress of the bed there were two sticks of dynamite and an unused dynamite fuse. The owner of the boots who occupied that room was unable to give any satisfactory explanation of these facts, and he was tried and convicted of the crime. The reason in an argument of this kind is seldom stated in full. The advocate relies on an implied assumption that the facts stated as evidence cannot be accounted for in any rea¬ sonable way except on the truth of the thesis. The proof of incriminating facts has the effect of shifting upon the accused the burden of showing that the facts can be explained or accounted for in some other way. The prin¬ ciple upon which an argument of this kind is based may be stated as follows : <(Every thesis that is exclusively sufficient to explain a given set of facts is true,® and the whole argument may be stated formally as follows : T : A caused the death of B; R: Because that thesis is exclusively sufficient to explain the facts A, B, C, D, etc. ; P : Every thesis that is exclu¬ sively sufficient to explain a given set of facts is true. The same kind of argument is em¬ ployed in a great variety of other cases, as for example in proving the existence of a glacial epoch in prehistoric

times, or that Sir Philip Francis wrote the letters of Junius.

Arguments from example, from analogy

and to prove facts of causation are usually classed as inductive arguments and all others as deductive. For the distinction between in¬ ductive and deductive see the article on Logic.

Disproof, like proof, may be direct or indi¬ rect. It is direct when the reasons directly imply the falsity of the thesis, and it is indirect when the reasons imply the truth of any one alternative, or of any fact inconsistent with the truth of the thesis. Thus, the thesis in a crim¬ inal trial that the prisoner at such a time and place committed a certain offense may be dis¬ proved indirectly b}ˆ the proof that the prisoner at that time was elsewhere, usually called prov¬ ing an alibi. A general proposition may be dis¬ proved indirectly in two ways, first, by proving exceptions called exceptive disproof ; secondly, by showing that a proposition manifestly absurd is logically deducible from it, called a rcductio ad absurdutn.

Refutation consists in showing the fallacy of an argument having regard to the require¬ ments of proof. This may be done in two ways, first, by showing that the reason or the principle relied on, whether express or implied, is untrue. Thus, an argument from Testimony may be refuted by showing that the witness is untrustworthy, as for example, that lie lacked the means or opportunity for accurately observ¬ ing the facts testified to, that he was biased by interest or hostility, that his testimony is incon¬ sistent with itself or with other facts better known or better established, that his memory is defective, that he is known to be untruthful, etc. An argument from Example may be re¬ futed by showing exceptions to the general law sought to be proved, or by showing that the search for negative examples has not been ex¬ haustive. An argument from Analogy may be refuted by showing points of essential dif¬ ference between the things compared ; an argu¬ ment from Cause to Effect, by showing the operation of other causes to prevent the effect; and an argument from Effect to Cause, by show¬ ing the operation of other causes to produce the same effect. The common fallacy com¬ mitted in arguments to prove facts of causation is to argue that one thing is the effect of an¬ other merely because it follows that other — Post hoc ergo propter hoc — other antecedents of the effect besides the alleged cause being overlooked. In an argument from circum¬ stantial evidence there is an implied assump¬ tion that the facts given as a reason cannot be explained or accounted for in any reasonable way except on the supposition that the thesis is true. The argument may be refuted by

showing that the facts may be otherwise ex¬ plained. The so-called <(theory of the defense® in a criminal trial is usually a thesis by which the facts may be accounted for consistently with the prisoner's innocence.

Secondly, an argument may be refuted by showing that the principle and the reason, even if true, do not imply the thesis. Fallacies of this kind all involve some form of irrelevancy. Thus, in the fallacy of <(evading the issue,® the reasons imply an irrelevant conclusion, or in other, words, the conclusion proved is not the question in dispute, but is either (1) a thesis that is like it and is intended to be mistaken for it; or (2) a thesis that is entirely different from the question at issue, the argument being often employed to distract attention from the

real issue, or as it is sometimes expressed, ((to draw a herring across the trail.)) The argu¬ ment ad homincm which is addressed, not to the merits of the case, but to the character, principles or conduct of an opponent; the argu¬ ment ad populum or ad captandum, which con¬ sists in making an improper appeal to the feel¬ ings of those addressed; the argument ad vere- cundiam (reverence) which invokes the au¬ thority of a great name as concluding the ques¬ tion ; the tu quoque argument — are all forms of the fallacy of evading the issue, as opposed to the argument ad rem , which is addressed to the matter in dispute. This fallacy is often committed in refutation when our opponent by way of answer elaborately disproves a proposi¬ tion which we never maintained, a process which is sometimes called ((setting a straw man up only to knock him down.® In like manner the reason or the principle or both may be ir¬ relevant through ambiguity of language or otherwise.

The fallacy of (<begging the question® con¬ sists in attempting to prove a thesis by itself which in the course of the argument is either tacitly assumed to be true or, if expressed as a reason, is disguised in an equivalent form of words.

The fallacy of non sequitur (it does not fol¬ low) really includes all the foregoing fallacies of the second class, but the name is usually restricted to loosely constructed arguments, for which no appropriate name has been found. Professor DeMorgan gives the following ex¬ ample: <(Episcopacy is of Scripture origin; the Church of England is

the only Episcopal Church in England; therefore, the Church established is the Church that should be supported.®

Bibliography. — Bain, Eogic Deductive and Inductive) ; Baynes, (Analytic of Logical Forms > ; Boole, Eogic- *; Bosanquet, Es¬ sentials of Logic) ; Bowen, ; Bradley, Principles of Logic* ; Creighton, intro¬ ductory Logic *; Day, (Art of Discourse-1 ; DeMorgan, (Formal Logic* ; Fowler, (Deduc¬ tive Logic, *inductive' Logic) ; Hamilton, (Lectures on Logic) ; Hibben, inductive Logic) ; Hill, Principles of Rhetoric) ; Hys- lop, Elements of Logic,* Eogic and Argu¬ ment ; Jevons, Eessons in Logic,) Principles of Science) ; McCosh, Eogic) ; McGregor, (System of Logic*; Mill, (System of Logic*; Minto, Eogic, Inductive and Deductive *; Sidgwick, (Argument, > Eallacies* ; Sigwart, Eogic> ; Spencer, Principles of Psychology *; Thomson, (Outline of the Laws of Thought ; Venn, Empirical Logic) ; Whateley, Elements of Logic,* Elements of Rhetoric) ; Wills, (Circumstantial Evidence.)

Edwin Bell,

Member of the Canadian Bar.

ARGUNOV, ar-goo'noff, Ivan P., Russian painter: b. 1727; was a serf of Count Shere- metyev (A. Matvyeyev's relation) and became a pupil of G. H. Grot. The date of his death is not positively known. That event occurred, we think, not in 1797, as sometimes stated, but probably later by a year or more. Despite the researches of S. Dyagilen, he still remains, as A. Benois says in (The Russian School of Painting) (New York 1916), a somewhat ob¬ scure figure; indeed the obscurity or lack of

certainty extends to the authorship of some of the paintings usually attributed to him, one reason for such uncertainty being traceable to the circumstance that he did not hesitate to sign portraits copied from other artists' orig¬ inals — in this respect adopting a practice too common among his contemporaries. Benois observes that such (<mixing of copies with original work makes the estimation of his talent a difficult task. Thus it is to be regretted that we cannot be certain of Argunov's author¬ ship in regard to one of the best productions of 18th century Russian painting, the portrait of Countess Barbara Alexeyevna Sheremetyev, which can bear comparison with the portraits of Tocque, Rotari and Van Loo. Of course all the interest of this characteristic and soundly realistic portrait would be lost if the work proved to be Argunov's copy from the forgotten original by one of these masters.® Other meritorious portraits are those of Count P. Sheremetyev, Field Marshal Boris Petrovich Sheremetyev and

Countess V. P. Razumovsky. Engravings of the foregoing, with the excep¬ tion of the last mentioned, were made by P. Antipiev. Almost incomparably inferior are, as a rule, other portraits of the Argunov series ; j*et even in the poorer work we find, besides the mere charm of the past and of interesting costumes and poses, many fine qualities, not a little purely pictorial merit — fairly good painting and sufficiently correct design. We mention finally, as by him, the <Cleopatra) (1750) in the Roumientsef Mu¬ seum at Moscow ; on the Sheremetyev estate portraits of Prince Michael Golitzin (engraved by A. Radigues) and of Prince A. M. Tscher- kaski ; on the Ostankina estate a full-length portrait of Czar Paul I. Still other portraits attributed to him are in the Tretiakof or Tret¬ yakov Museum at Moscow.

ARGUS, (1) a personage represented in Greek mythology as having 100 eyes, or as hav¬ ing his whole body covered with eyes, half of these being always awake while the rest were closed in sleep. The jealous Hera made him keeper of the unhappy Io; but Hermes lulled him to sleep with the sound of his flute and cut off his head. Hera afterward took his eyes to adorn the tail of the peacock. (2) The son of Zeus and Niobe and mythical ancestor of the Argives, and founder of Argos. (3) The builder of the ship Argo. See Argonauts. (4) Argus, the dog of Odysseus, who recognized his master after 20 years' absence, and died of joy. (5) In Homer, the kingdom of Agamem¬ non, the Peloponnesus and even all Greece. Also the name of several Greek cities and towns of which Argos, capital of Argolis, was the most renowned.

ARGUS AND PELICAN, Battle of the.

In the War of 1812 Capt. William H. Allen (q.v.) in the sloop-of-war Argus (rated as a 16 but carrying 18 24's and two long 12's) had wrought great havoc among British merchant¬ men in the English Channel, in a single month destroying more than 20 ships valued at $2,000,- 000. Accordingly the British admiralty sent ships iti pursuit, one of which, the Pelican (16 32's, four long 12's and one short 12), Capt. John F. Maples, overtook the American ship on 14 Aug. 1813 in the Irish Channel, off the Welsh coast. At first the Argus, having

the advantage of position, raked the Pelican, but her guns were so poorly served and so badly aimed that the Pelican was almost un¬

injured. On the other hand, the British gun¬ nery was excellent, and soon the* rigging of the Argus was in such condition that she be¬ came unmanageable, whereupon the Pelican for 20 minutes raked her at close range from the starboard quarter without receiving a single shot in return. After 43 minutes of fighting the British prepared to board the Argus, but the latter struck her colors, having lost six killed and 17 wounded, while the Brit¬ ish loss was only seven killed and wounded. Allen was mortally wounded and died in a hospital at Plymouth, England. As Allen was responsible for the high degree of excellence attained by the gunners of the frigate United States (q.v), the poor marksmanship of the Argus crew seems inexplicable unless, as some have stated, part of the crew was drunk, a brig from Oporto, laden with wine, having been captured the night before the battle. Consult Cooper, J. F., (Naval History> (Vol. II, pp. 1 13—15) ; Maclay, E. S., (History of the Navy' (Vol. I, pp. 523-29) ; Roosevelt, (Naval War of 1812' (pp. 205-09) ; Adams, 'United States> (Vol. VII, pp. 303-08) ; Mahan, A. T., 'War of 1812> (Vol. II, p. 217 et seq.) ; James, William, 'Naval Actions' (pp. 74—78) ; Wiley and Rines, 'The United States' (Vol. V, pp. 475-77) ; Bowen, Abel, 'Naval Monument' (pp. 69-77) ; Spears, J. R., 'History of Our Navy' (Vol. II, pp. 356-71).

ARGYLE, ar-gll', Campbells of, the desig¬ nation of a distinguished Scottish family. Among its most noted representatives are : Archibald the 2d Earl, who was killed at the battle of Flodden, 1513. Archibald, 5th Earl, attached himself to the party of Mary of Guise, and was the means of averting a collision between the reformers and the French troops in 1559. He was commissioner of regency after Mary's abdication, but afterward commanded her troops at the battle of Langside, and died in 1575. Archibald, 8th Earl and Marquis, b. 1598, was a zealous partisan of the Cov¬ enanters, and was created a marquis by Charles I. It was by his persuasion that Charles II visited Scotland and was crowned at Scone in 1651. At the restoration he was committed to the Tower, and afterward sent to Scotland, where he was tried for high treason, and be¬ headed in 1661. Archibald, 9th Earl, son of the preceding, served the King with great bravery at the battle of Dunbar and was ac¬ cordingly excluded from the general pardon by Cromwell in 1654. On the passing of the Test Act in 1681 he refused to take the required oath except with a reservation. For this he - was tried and sentenced to death. He, how¬ ever, escaped to Holland, whence he returned with a view to aiding the Duke of Monmouth. H is plan failed, and he was taken and conveyed to Edinburgh, where he was beheaded in 1685. Archibald, 10th Earl and 1st Duke, son of the nreccding, died in 1703. He took an active part in the revolution of 1688-89 which placed Wil¬ liam and Marv on the

throne, and was rewarded by several important appointments and the title of duke. John, 2d Duke, and Duke of Green¬ wich, son of the above, was born in 1680 and died in 1743. He served under Marlborough at the battles of Ramilies, Oudenarde and

Malplaquet, and assisted at the sieges of Lisle and Ghent. In 1715 he fought an indecisive battle with the Earl of Mar's forces at Sheriff-muir, near Dunblane, and forced the pretender to quit the kingdom. George John Douglas Campbell, 8th Duke, Baron Sundridge and Hamilton, was born in 1823 and died 24 April 1900. He early took a part in politics, especially in discussions regarding the Presbyterian Church of Scotland. In 1852 he became Lord Privy Seal under Lord Aberdeen, and again under Lord Palmerston, in 1859; Postmaster-General in 1860; Secretary for India from 1868 to 1874; again Lord Privy Seal in 1880, but re¬ tired, being unable to agree with his colleagues on their Irish policy. He was the author of 'The Reign of Law' (1866) ; 'Primeval Man' (1869); 'The Burdens of Belief' (1894); 'Organic Evolution' (1898). Sir John Doug¬ lass Sutherland Campbell, 9th Diike of Argyll in the peerage of Scotland and 2d in that of the United Kingdom, hereditary chief of the Clan Campbell, Knight of the Most Noble Order of the Garter, K. T., G. C. M. G. : b. 6 Aug. 1845 ; d. 2 May 1914. He was prob¬ ably better known by his former title of Mar¬ quis of Lome. He married, 21 March 1871, Princess Louise, daughter of Queen Victoria; was educated Edinburgh Academy, Eton, Saint Andrew's University and Trinity College, Cam¬ bridge. Represented Argyllshire as a Liberal 1868-78. When his father was Secretary of State for India (1868-71) he was his private secretary; he was made a privy councillor in 1875, and was governor-general of Canada 1878-83. In the Home Rule split of 1886 he separated from the Liberal party and contested Central Bradford as a Unionist in 1892. Three years later he was returned for South Man¬ chester and sat in Parliament till 1900, when he succeeded his father in the dukedom. King Edward VII appointed him chancellor of the order of Saint Michael and Saint George ; he was hereditary master of the King's household in Scotland, and at the last two English coro¬ nations he carried the sceptre and the garter. He was an honorary colonel of the Argyll and Sutherland Highlanders, the London Scottish and several other regiments. The Duke was a many-sided man, intensely Scottish and en¬ dowed with high literary talent. He wrote poetry, books on travel, imperial politics and Scottish social history. Among his best-known works are 'A Trip to the Tropics and Home Through America' (1867) ; 'Guido and Lita' (1875); 'Imperial Federation' (1885); 'Life of Palmerston (1892) ; 'The Life and Times of Queen Victoria' (1901) ; 'Passages from the Past' (1907); and

‘Yesterday and To¬ morrow in Canada’ (1910). As he left no heir the. title devolved upon his nephew, Niall Diar- maid Campbell.

ARGYLLSHIRE, ar-gil'shir, Scotland, a west midland county bordering on the Atlantic Ocean and the Irish Sea. it consists partly of mainland and partly of islands belonging to the Hebrides group. Total area is 3,230 square miles, including area of islets, 616 square miles. The greatest length of mainland is about 115 miles, the greatest width 55 miles. From the windings of the numerous bays and creeks with which the land is everywhere indented it has more than 2,200 miles of sea-coast. The chief towns are the capital, Inverary, Campbeltown,

Oban, Dunoon, Lochgilphead and Tobermory. The chief articles of export are sheep, cattle, horses, fish, slate and granite. One of the most important branches of industry besides sheep¬ grazing. is the fishing of herring, cod and ling. 1 he principal manufactures are whisky and coarse woolens. Argyllshire was anciently ruled by the Macdonalds of the isles and later by the Campbells, whose present representa¬ tives, the Duke of Argyll and the Marquis of Breadalbane, are the chief landed proprietors. Among the antiquities of Argyllshire are the celebrated monastery of Iona and the remains of a Cistercian priory in Oronsay. The most noted of its natural curiosities are the basaltic columns and cave of Staffa (q.v.). Pop. 71,000.

ARGY'RIA, or SILVER POISONING.

See Toxicology.

ARGYR'ODITE (Greek, ((like silver®), a mineral first observed at Freiberg, Saxony, and found upon analysis to contain a previously unknown metallic element, to which the name ˆgermanium® has been given. Argyrodite has the formula 4AGaS.GeS2, and crystallizes in the isometric system. It has a hardness 2.5 and a specific gravity varying from 6.08 to 6.26. It has a metallic lustre, and fresh fractures show *i gray color tinged with red or violet. Its crystals are usually small and it also occurs massive. Large crystals have been found in Bolivia.

ARI THORGILSSON, a' re-tor'gel-son,

the father of Icelandic literature: b. 1067; d. 1148. He was the first Icelander to use his mother tongue as a literary medium. His Hslendingabok,* a concise history of Iceland from its settlement

(about 870) until 1120 is preserved only in an abstract. Later Icelandic writers modeled their style upon his.

ARIA, a're-a or a'ria (Ital. for <(air®), musical term, equivalent to the English <(air,® signif}'ing a melody apart from the harmony, but especially a musical composition for a single voice or instrument, with an accompani¬ ment of other voices or instrument's.

A'RIAD'NE, the daughter of Minos, King of Crete, who, having fallen in love with Theseus when engaged in his attempt to de¬ stroy the Minotaur, gave him a clue of thread, which served to guide him out of the labyrinth after having slain the monster. Theseus, on leaving the island, took with him Ariadne, but deserted her on the Isle of Naxos. Dionysus found Ariadne and made her his bride. Ariad¬ ne's fortunes have been a favorite subject with artists.

ARIANISM is the name given to the doc¬ trine of the person of Christ advocated by Arius and his followers. It contained nothing essentially new, but it crystallized certain modes and tendencies of thought which had been more or less prevalent in the Church for three or four generations. (See Christology). The views of Arius and the strict Arian party may be summarized as follows: (1) The Son was created out of nothing and is therefore differ¬ ent in essence from the Father. He is Logos, Wisdom, Son of God, but so only by the grace of God and not in and of himself. (2) There was (before time began) when he was not; that is, he is a finite being. (3) He was cre¬ ated before everything else, and through him the universe was created and is administered.

(4) The Logos became the soul of the his¬ torical Christ, and the human elements in the character of Jesus belonged to the Logos.

(5) Although the incarnate Logos is finite and hence is not God, he is to be worshipped, since he is exalted far above all other creatures, and is both Ruler and Redeemer.

The discussions at the Nicene Council re¬ vealed the fact that there were three parties present : the strict Arians, the scmi-Arians and the Alexander-Athanasian party. The latter party, with the help of Constantine and the Western bishops, secured the adoption of a creed (see Creeds) which no strict Arian could subscribe to, since it declared that the Son is identical in essence (homoousian) with the Father. The semi-Arians, although they main¬ tained that the Son was not identical in es¬ sence, but of similar essence (liomoiousian) with the Father, were finally constrained to sign the document. Soon after the closing of the council the semi-Arians began to assail the Nicene

creed, and finally, through the influence of Eusebius (q.v.), they secured the recall of Arius and his companions and the deposition and banishment of Athanasius. The sons of Constantine continued to favor the semi-Arian party, which included a large majority of the Eastern bishops; but the Western churches gen¬ erally adhered to the Nicene creed. But the death of Constantius II in 361 and the acces¬ sion of Julian left the Arian party without imperial support and Athanasius and his fol¬ lowers regained considerable influence in the east. The accession of Valens in 363, however, reversed the governmental policy and led to the fanatical persecution of the Nicenes. But the distracted condition of the Orient, due to the war with Persia, and the demoralized state of many of the bishoprics under Arian leader¬ ship, made it relatively easy for Theodosius the Great to espouse and support the Nicene party. A second oecumenical council held at Constanti¬ nople in 381 reaffirmed the Nicene creed with slight additions and curtailments, thus complet¬ ing the victory of Nicara in favor of the full deity of the Son. Arianism was soon sup¬ pressed within the empire, but it continued for a long time to prevail among the barbarians. The conversion of Clovis, King of the Franks, to the orthodox faith in 496 was followed by a rapid decline of Arianism among the Teutonic peoples. (See Arius). Consult Gwatkin, H. M., (Arianism> (in Cambridge Medieval His¬ toryˆ Cambridge 1911) ; Newman, J. H., (The Arians of the Fourth Century) (5th ed., Lon¬ don 1888).

Edwin Knox Mitchell.

ARIANO, a're-a'nd, Italy, town in the province of Avellino, 44 miles northeast of Naples, in one of the most frequented passes of the Apennines. In the limestone cliffs of the neighborhood caves have been hollowed out and serve as dwellings for many of the poorer classes. Earthenware is the chief manufacture. It is the seat of a bishop and contains a hand¬ some cathedral. Pop. (1901) 17,650.

ARIAS, a'ri-as, Montanus Benedictus, Spanish Orientalist and editor of the Antwerp Polyglot : b. Fregenal de la Sierra, Estrema- dura, 1527; d. Seville 1598. He was educated at Seville and at Alcala, where he became dis¬ tinguished for his proficiency in the Semitic

languages. He traveled through France, Italy, Germany, England and Holland and thus be¬ came acquainted with several modern tongues.

About 1559 he took orders and attended the Council of Trent as consulting theologian to the bishop of Segovia. On his return he se¬ cluded himself in a cloister among the moun¬ tains of Andalusia in order to. give his whole time to literature. Philip II drew him forth from his seclusion in 1568 and persuaded him to go to Antwerp to superintend and edit the (Polyglot Bible,5 proiected in that city by the celebrated printer, Christopher Plantin. The work appeared in eight volumes folio between 1568 and 1573. Only 500 sets were printed and the greater part of them were lost at sea, on the way to Spain. The work was well received by all except the Jesuits, to whom Arias was strenuously opposed. Leon de Castro, a pro¬ fessor at Salamanca, brought charges of heresy against Arias because he had included much rabbinical matter in the work and the latter journeyed to Rome in 1575-76 to clear himself and was acquitted. Philip gave him a pension and made him court chaplain. He wrote sev¬ eral works dealing with the Bible, Jewish antiquities, etc., and also a history of nature and several Latin poems. The best known is his (Jewish Antiquities, 5 attached to the (Poly¬ glot, J and also published separately. Consult Gorris, (Vie d'Arias Montano5 (Brussels 1842) and (Memorias de la real Academia de la Historia5 (Vol. II, Madrid 1832).

ARICA, a-re'ka, Chile, seaport in lat. 18° 29' S. It is connected by rail with Tacna, cap¬ ital of the province of that name, 45 miles distant, and so with La Paz, Bolivia ; also with Valparaiso, 987 miles away. During the war between Chile and Peru it was bombarded by the Chilean forces and it passed into the possession of Chile in 1883. The chief exports were formerly silver and silver ore, copper, bark, chinchilla skins and alpaca wool ; at present it is of importance as the only port in the province of Tacna and the terminus of the Arica-La Paz Railway, which carries by far the greater share of the outward and inward trade of Bolivia (q.v.). Loading and unloading is effected by lighterage, and there is safe anchor¬ age in eight to nine fathoms behind the island of Alacran, which protects the roadstead. There are telegraphic stations, both cable and wireless. The shipping movement in normal years amounts to 400 or 500 overseas steamers and 200 to 300 coasters. Pop. (1916) about 6,000.

ARICHAT, a re-shat', Nova Scotia, seat of Richmond County. It is situated on Madame Island and is a seaport of some im¬ portance, being the centre of quite an extensive fishing and canning industry. Ships of all sizes find accommodation in its harbor, the com¬ merce being important enough to warrant a United States consular agent. The town is the see of a Roman Catholic episcopate. Pop. about 2,500.

ARICI, a-re'che, Cesare, Italian poet: b. Brescia, 2 July 1782; d. there, 2 July 1836. Under Bonaparte he was secretary of the de¬ partmental court in his native city. In 1810 he was appointed professor of elocution in the Brescia Lyceum. Later he became professor of history and literature and then professor of Latin. His chief works are (La coltivazione

degli olivi5 (1808) ; (La pastorizia5 (1814) ; (I1 campo santo di Brescia.5 A collection of his works was published under the title (Opere5 (6 vols., Padua 1858).

ARI'CIA, or ARICCIA, Italy, town 16 miles from Rome, on the famous Appian Way. It is one of the most ancient communities now surviving from classical times. Its name fig¬ ures in history as earlv as 338 b.c., when it was conquered by C. Msenius. It has an old church, built by Vernini in 1664 near where once had stood a magnificent temple to Diana.

ARID LANDS. See Deserts.

ARIEGE, a're-azh', France, inland depart¬ ment, bounded on the south by Spain, west and north by the department of Haute-Garonne, northeast and east by Aude. It has an area of 1,893 square miles and is for the most part mountainous. The climate is mild in the south, but naturally very severe among the mountains. Wheat, maize and potatoes are the chief crops. Good vineyards and market gardens are found in the north. Flax and hemp are also culti¬ vated. The mountains afford excellent pasture, and a considerable number of cattle, sheep and swine are reared. Poultry- and bee-farming flourish. Forests cover more than one-third of the department and harbor wild boars and even bears. Game, birds of prey and fish are plenti¬ ful. There is abundance of minerals, including lead, copper, manganese and especially iron. Iron founding and forging are the principal in¬ dustries. Flour-milling, paper-making and cloth-weaving may also be mentioned. The capital is Foix. Pop. (1911) 198,725.

ARIES, a'rT-ez, (((The Ram55), in astron¬ omy, the first sign of the Zodiac, denoted by the sign Y. in imitation of a ram’s head. The name is probably to be associated with the fact that when the sun is in this part of the heavens (in spring) sheep bring forth their young; this finds a parallel in ((Aquarius, 55 when there is much rain; It includes the first 30° of the ecliptic, beginning from the vernal equinox. The vernal equinox, sometimes called the first point of Aries, continually changes its position among the fixed stars because of the procession of the equinoxes, moving 50.2" westward each year. For this reason the sign

Aries has ceased to correspond with the constellation of the same name, as it did 20 centuries ago, when the ecliptic was divided into its 12 parts, each represented by a sign which was named after the group of stars through which it passed. At the present time the sign Aries is in the constellation Pisces, 30° westward of the orig¬ inal sign. It will require 24,000 years before the sign and the constellation again correspond.

A'RIMATHZE'A, a town in Judea and according to Saint Jerome, not far .fromLydda. It is mentioned in the Gospels as the home of Joseph, a member of the Sanhedrin, who had the honor of giving the burial place for the body of the crucified Christ. Joseph of Arima- thea is also mentioned in Arthurian legends as having brought the Holy Grail from Jerusalem. Its site is not definitely known, but was prob¬ ably Ramah, the home of Samuel in the hill country, the modern Er Ram, 19 miles north¬ west of Jerusalem.

ARIMINUM. See Rimini.

ARION, a lute player of ancient Greece, native o-f Lesbos. He lived abom 600 b.c. Herodotus tells the storjr that Anon was sent by Periander, tyrant of Corinth, to Italy to com¬ pete there in a great competition for musicians and singers. Arion went and so enchanted the judges with his playing that he won all the prizes. As he was returning home on a Corin¬ thian ship, with all his rich prizes, Apollo ap¬ peared to him in a dream and warned him that the sailors were plotting to murder him. Whereupon he asked the sailors that he be permitted to play his lute once more. This request being granted, he stood on deck and began playing, whereupon the dolphins, fasci¬ nated by his sweet music, gathered thickly about the vessel. Then as the sailors were about to slay him, he leaped overboard. One of the dolphins lifted him up on its back and swam ashore with him, landing him safely on the promonotory of Taenarius, from which place he journeyed to Corinth. When the sailors arrived at Corinth they assured Periander that Arion was dead, whereupon they were con¬ fronted by him and then crucified. As proof of the truth of this story Herodotus points to the fact that there existed at Taenarus a bronze statue of Arion riding on the dolphin’s back. The lute and the dolphin were raised to the constellations and the story became a tradition among the Greeks. It was said that Arion was the inventor of the dithyramb. A. W. Schlegel recites the story of Arion in one of his best poems.

ARIOSTO, ar-yos'-td, Ludovico, an Italian poet: b. Reggio, 8 Sept. 1474; d. Ferrara, 6 June 1533. His father, who was commander of the citadel of Reggio, proposed that he should study law, but, as he showed no indi¬ cation of being fitted for this profession, he was finally permitted to follow his own in¬ clinations. These led' him to the study of literature, especially the classics, and he soon developed so much ability as a poet that, as early as 1495, he wrote several comedies. Two of them were acted about 1512, and they attracted the attention of Cardinal Ippolito d'Este, who sent him as an ambassador to the court of Pope Julius II. In 1517 he offended the cardinal by refusing to accompany him to Hungary, but he immediately entered the serv¬ ice of Alfonso, Duke of Ferrara, by whom he was appointed governor of Garfagnana, a posi¬ tion which he filled successfully for several years. The last years of his life were spent in writing comedies and in completing his prin¬ cipal work, a romantic epic, (Orlando FuriosoP which has been called <(the greatest poem of its kind in any language. ® His <Satires) in the Horatian style were not published until after his death. His last days were spent in a modest home of his own in Ferrara. It has been care¬ fully preserved. Recent editions of (Orlando Furioso' are those by Casella (Florence 1877), and Popini (ib. 1903). His minor works were edited by Polidori (2 vols.; Florence 1891) under the title (Opere minori in verso e in prosa.J *The best English translations are those by Sir John Harrington (London 1591), by Hoole (ib. 1783), and by W. Stewart Rose (ib. 1823). Consult the biography by A. Cappelli, in his collection of Ariosto's ˆLetters1* (Milan 1887) ; Giosue Carducci, (Studi su Ludovico Ariosto e Torquato Tasso* (Bologna 1905) ; Gardner

(The King of Court Poets: Ludovic Ariosto) (New 'Vork 1906), and De Sanctis (Storia della Letteratura Italiana,* edited by B. Croce (Vol. II, Bari 1912). See Orlando Fitrioso.

ARTSTZE'US, a divinity of ancient Greece widely worshipped, but of whom few details are known. From what is known of the few fragments of the traditions of the period sur¬ viving in historic records, he was supposed to be the son of Apollo and Cyrene, the latter being the granddaughter of the river god Pen- eus. She was delivered to Aristseus on the coast of Libya. Another record has him born in Thessaly where he became the pupil of Chiron, the centaur. Numerous such stories survive, each probably representing a local tra¬ dition. Aristseus was the protector of the hunters and herdsmen and also was credited with having taught bee-keeping and the spin¬ ning of wool. All the traditions assign to him good qualities, as his name signifies.

AR'ISTAG'ORAS, Satrap of Miletus.

He was the son-in-law of Histiseus, whose in¬ fluence at the Persian court obtained for him his position, in about the year 500 b.c. He attempted to conquer Naxos for the Persians, but failed. Anticipating punishment for his failure, he made a tour of the Ionian cities and persuaded them to join a general revolt against the rule of the Persians. He next appealed to Sparta, without success, but the Athenians came to his assistance with 25 ships and an army. At the head of the Greek allies, he attacked Sardis, 499 b.c. and burned it. But the Persians finally defeated him and he fled to Thrace, where he was put to death by the Edonians.

ARTSTAR'CHUS, ancient astronomer, native of Samos, who lived in about the middle of the 3d century b.c. He was known as the chief exponent of the heliocentric theory of the universe ; that the sun stood still and the earth and the rest of the universe revolved around it. Because of this he was accused of heresy. He was supposed to have written ex¬ tensively on his science, but all that survives is a short essay on the sizes of the sun and the moon and his estimates of their distances from each other and from the earth. He was the first to attempt to work out this problem by trigonometry, but on account of not having accurate instruments for measuring his esti¬ mates were inaccurate, though his theory was sound enough. This essay was first published by Valla, in Latin (1498). Later it was issued in Greek and Latin by Wallis (1688). Consult Heath, (Aristarchus of Samos, the Ancient Copernicus) (Oxford 1913).

ARIS'TEAS, a fabulous character of the ancient Greeks, sometimes styled the ((Wander¬ ing Jew® of ancient Greece. He was accredited with supernatural powers, one of his practices being to leave his body and re-enter it at his own free will. It is therefore not surprising that he has been reported to haye lived at various times over a period covering several centuries. His first appearance is as the teacher of Homer. Then, some generations afterward, he is born on Proconnesus, an island in the Sea of Marmora. Next he pays a visit to the Hyperboreans. On his return he dies. But a traveler reports having met him some time afterward and being accosted by

him. Seven years later he appears in the role of an author, and during this incarnation he composes an epic poem called (Leipzig

1900).

ARISTEAS, an official of Ptolemy Phila- delphus, who is said to have sent him to Jeru¬ salem, 273 b.c. with the mission of obtaining from the high priest there, Eleazar, a copy of the Pentateuch. Consult Schiirer, (Geschichte des jiidischen Volkes5 (Vol. II, p. 819, 1886).

ARISTIDES, ar'is-tl-dez, ZElius, ancient Greek orator: b. Hadrianoi Mysia, 129; d. Smyrna, 189 a.d. His father was Eudemon, a priest in the temple of Zeus. He was a pupil of the most famous rhetoricians of the period, among his teachers being Herodes Atticus of Athens and Aristocles of Pergamus. Having finished his education he made a journey through foreign countries, visiting Asia and Egypt and Italy. In Rome he gained the favor of the Emperor, Marcus Aurelius, over whom he maintained so powerful an influence that he was able to persuade him to rebuild Smyrna at Roman expense, the city having been destroyed by an earthquake. There are extant two rhetorical treatises and over 50 speeches ascribed to him, among the latter being six (Sacred Speeches, > reporting the words of ZEsculapius through his priests. The speeches of Aristides are often quoted as samples of Attic style. The writings ascribed to him have been edited by Dindorf (3 vols., Leipzig 1829). Consult Sandys, (A History of Classical Scholarship* (Vol. I, Cambridge 1906).

ARISTIDES, Quintilianus, a famous Greek grammarian probably of the 3d century a.d., whose treatise on music is esteemed the most valuable of all ancient writings upon that theme. It was printed by Meibomius in his (Antiquse Musicse Auctores Septem *(Amster¬ dam 1652) and was edited by Jahn in 1882. Consult Casar, (Die Grundziige der griechischen Rythmik im Anschluss an Aristeid.es* (Mar¬ burg 1861) ; Goodell, T. D., Chapters on Greek Metric> (New York 1902) ; Pauly-Wissowa, (Realencyclopadie* (Vol. II, 894).

ARISTIDES, Saint, famous Greek con¬ vert to Christianity, who lived in about the 2d century a.d. In 1889 Dr. J. R. Harris found a complete copy of an (Apology * for the Chris¬ tian faith, written by Aristides, on Mount Sinai. It was a Syriac version of the original and was addressed to the Emperor Titus Hadrianus An- tonius Augustus Pius. Previously only a frag¬ ment of this writing had been in existence, pub¬ lished in Venice (1878). Consult Harris, (The Apology of Aristides) (in his (Text and Studies,* 1891).

ARISTIDES, of Thebes, ancient Greek painter, who lived in about the middle of the 4th century b.c. He learned his art from his father, Nicomachus. His works brought very high prices. One of his most

famous pictures was a great battle scene, showing over a hun¬ dred figures. His power of expression was

best shown in the picture of a woman, lying wounded on a battlefield, fearfully attempting to hide the blood on her breast from her nurs¬ ing child.

ARISTIDES THE JUST, an Athenian statesman: b. near the middle of the 6th cen¬ tury b.c. ; d. about 468 b.c. He was the son of Lysimachus and belonged to one of the great Athenian families. He was one of the 10 generals of the Athenians when they fought against the Persians at Marathon, 490 b.c. Ac¬ cording to the usual arrangement the command of the army was held by each of the generals in rotation for one day. But Aristides pre¬ vailed on his colleagues each to give up his day to Miltiades; and to this, in a great meas¬ ure, must be ascribed the victory of the Greeks. In the following year he was elected chief archon. His policy aimed at constituting Athens as a land power and this brought him into direct conflict with Themistocles who ad¬ vocated a naval policy. The conflict ended in the ostracism of Aristides about 485 b.c. A story is told that on the day of the voting, an ignorant voter asked Aristides himself to write the name ((Aristides® upon his ostrakon. The latter asked him if Aristides had wronged him ; to which the voter replied that he did not even know Aristides, but was irritated to hear him everywhere called ((the Just.® In 480 a general amnesty was decreed at Athens because of the threatening Persian invasion and Aristides re¬ turned to Athens and was elected strategus for 480-79. He loyally supported Themistocles in the Salamis campaign and annihilated the Per¬ sian garrison on the island of Psyttaleia. In the following year he commanded the Athenian forces at Platsea and arranged for the celebra¬ tion of the victory over the Persians. About 477 Aristides commanded the Athenian fleet off Byzantium and, after the Ionian allies revolted from Pausanias, was offered the chief command and given full powers to fix the contributions of the newly-founded Delian League. His assessment was deemed most equitable and it is probably from this that he gained the title of <(the Just.® Soon afterward he yielded his com¬ mand to his friend Cimon and returned to Athens where he continued to occupy a prom¬ inent place. Many ancient writers have repre¬ sented Aristides as a democratic reformer, but there appears little justification for this as the period during which he shaped the national policy was one of conservative tendency. His estate suffered during the Persian invasions and he died poor, not leaving enough money to pay the expenses of his burial. A son and two daughters survived him and received state pen¬ sions. He was buried at Phalerum. Consult Herodotus VIII, 79-81, 95; IX, 28

Plutarch, <Aristides) (translated by B. Perrin, New York 1901); Nepos, Cornelius, (Vita Aristidis *; Meyer, E., (Geschichte des Altertums.* (Stutt¬ gart 1901).

ARISTIDES, Apology of, a popular

Christian theology written by Marcianus Aris¬ tides, an Athenian philosopher, in the 2d cen¬ tury a.d. (according to Eusebius, Hist. eccl. IV, 3). Little was known of the work until 1891 when Harris and Robinson published a complete Syriac version and proved at the same time that the greater part of the apology is contained in the legend of Barlaam and joso-

phat extant in many Greek manuscripts and numerous translations. Since that time much attention has been paid to the work. It is ad¬ dressed to Antonius Pius and has points of contact with the (Kerygma) of Peter, the (Shepherd) of Hermas, the ˆidache1* and Jus¬ tin, but more especially with the letter to Diognetus. After speaking of the true idea of God (chap. I) it takes up the origin of those nations which followed error and those which followed truth. The barbarians are treated in Chapters III-VII ; the errors of the Hellenes in VIII-XIII, with an excursus on the Egyptians (XII). Chapter XIV is devoted to the Jews; and XV-XVII speak of the Christians, especial¬ ly of their life and customs, in an attractive and instructive manner. Through the

AR'ISTIP'PUS, a disciple of Socrates, and founder of a philosophical school among the Greeks, which was called the Cyrenaic, from his native city Cyrene, in Africa; flourished 380 b.c. His moral philosophy differed widely from that of Socrates, and was a science of re¬ fined voluptuousness. His fundamental prin¬ ciples were that all human sensations may be reduced to two, pleasure and plain. Pleasure is a gentle, and pain a violent, emotion. All liv¬ ing beings seek the former and avoid the lat¬ ter. Happiness is nothing but a continued pleasure, composed of separate gratifications.

ARISTOBULUS, Jew of Alexandria, who lived about 180 b.c., in the time of Ptolemy VII, whose teacher he was supposed to have claimed to have been. The work which brings his name down to modern times and of which only parts are still in existence was a com¬ mentary on the Pentateuch, in which he at¬ tempted to prove his theory that much of the literature of ancient Greece had been borrowed from that

book. To uphold his view he quoted copiously from works supposed to have been written by Homer, Orpheus, Linus and Hesiod. He has been the subject of much controversy, many scholars, including Renan, Eichhorn, Wendland and others, contending that his work was not genuine. Their arguments are mainly based on the peculiar forms of the quotations and the supposed claim of Aristobulus to be the teacher of Ptolemy. On the other hand

such authorities as Vlackenaer, Freudenthal, Clemen, Schlatter and Schiirer maintain that Aristobulus may have taken his Greek quota¬ tions from some older Jewish writer, which would account for the similarity of their style to the Old Testament. A full discussion of the subject, together with a bibliography, is given in Schurer's (Geschichte des jiidischen Volkes) (Vol. Ill, p. 512, 4th ed., 1909).

ARISTOBULUS I, prince of Judaea, son of John Hyrcanus, the high priest, whom he succeeded 104 b.c. His mother had been given the royal title, but on his father's death Aris¬ tobulus threw her into prison and allowed her to starve to death. He then assumed the kingly office as well as that of high priest. He was very much disliked by his people on ac¬ count of his brutality, not only against his mother but his brothers as well, whom he caused to be murdered at the behest of Queen Salome. It is said that he was strongly in¬ clined toward the Greek pagan worship, but on the other hand Josephus declares that he conquered a great deal of Iturean territory and forced the people to accept the Jewish faith. His reign lasted not over a year, when he died of an acute disease. Consult Welhau- sen, Hsraelitische und judische Geschichte) (p. 256, 3d ed, 1901).

ARISTOBULUS II, Jewish priest and ruler, son of Alexander Jannaeus and Salome Alexandra, the widow of Aristobulus I (q.v.). He lived during the 1st century b.c, dying in the year 49. His brother, Plyrcanus II, was the rightful ruler and high priest, but Aristob¬ ulus succeeded in ousting him from both of¬ fices and installing himself, 69 b.c. The de¬ posed brother appealed to Pompey, and after much indecision and intriguing Pompey finally declared himself against the usurper. In 63 b.c. Aristobulus' resistance was overcome and he himself was taken a prisoner to Rome. 'Seven years later he escaped, returned to Judsea and again raised an army against Rome. Again he was defeated and taken prisoner to Rome. Caesar released him in 49 and sent him with the Roman troops to Judaea against Pom¬ pey, but some months later he was murdered by adherents of Pompey by means of poison.

ARISTOBULUS OF CASSANDRIA,

ancient Greek historian : b. Chalcidice, about the middle of the 4th century b.c. In about 316 b.c. he went to Cassandria and became a citizen there. He accompanied Alexander the Great on his campaign into Asia. With this experi¬ ence as a basis he wrote an historical work, the title of which remains unknown. Its text is preserved through the quotations of later writers, among them being Strabo, Plutarch , and Arrian.

ARISTOCRACY — (Greek apiGTOKparia from apioroq best, and uparog , power). Etymologically, the rule of the best, but in its more usual significance, any system of govern¬ ment in which the right to govern is vested in a few; an oligarchy. From its strict political meaning and the fact that most aristocracies have been hereditary, it has taken on the secondary significance of any hereditary caste which has claimed or has been accorded a su¬ perior rank in social matters. The ancient Spartan state, the Athenian state before the Persian wars, the Roman republic are good

examples of communities where the aristocratic tendencies predominated. Though mediaeval feudalism involved the existence of privileged classes, the dominating aspect of the system was a graduated hierarchy of absolute mon- archs. It is on the break-up of feudalism and the origin of the Italian city-state or the subor¬ dination of the French and British petty lords to the king that we see the nobles again assume power by virtue of their membership of a privi¬ leged class and not by virtue of their territorial rule. When a weak monarch or dynasty came on the throne, as was the case with the house of Valois in France or the four Georges in England, it became easy for vigorous noble families to assume the real control of the state. At present the aristocratic system of rule sur¬ vives in greatest measure in Germany and Aus¬ tria-Hungary; in Great Britain the aristocracy has political power not so much through its constitutional position in the House of Lords as through the custom in many noble families of standing as candidates for seats in the House of Commons and the political prestige which attaches to their rank. See Government.

ARISTOLOCHIA, ˆ-ns'td-lo-ki'a, a genus of plants of the family Aristolochiacece, consisting of 180 species, mostly climbing, na¬ tives

of tropical regions, a few occurring in temperate countries. The plants are remark¬ able for their curious llowers, the corolla-like calyx of which is tubular and usually variously bent and often showy. Many of them are cul¬ tivated, the best known being the Dutchman's pipe (A. macro p hylla) , a native of the south¬ eastern United States, and the goose-flower, pelican-flower or swan-flower (A. grandiflora) , native of tropical America, whose flowers bear a singular resemblance to a bird. The roots of some species are used in medicine, for ex¬ ample those of A. serpentaria, Virginia snake- root, native of the eastern United States, and of A. clematitis, birthwort, a European species.

ARISTOPHANES. Modern comedy de¬ rives by way of Plautus, Terence, and Moliere from the so-called New Comedy of Menander and his contemporaries. The so-called old com¬ edy, of which Aristophanes is the only surviv¬ ing representative, flourished 100 years earlier at the time of that Peloponnesian War which shook Greek civilization as the European War shakes that of Europe. There is no good single modern analogue of the old comedy. It is a blend of Shakespeare's (Midsummer Night's Dream) with Bernard Shaw, musical comedy and a revue de fin d'annee. It is extravaganza combined wTith the dramatic criticism of ideas and set off with occasional flights of true po¬ etry and wood notes wild. So at least, it ap¬ pears in Aristophanes, who in native genius and spontaneous mastery of expression ranks with the four or five supreme poets of Greece. Though Aristophanes was easily the foremost representative of the old comedy, the extant fragments of his contemporaries, Eupolis, Cra- tinus and others, indicate that he found this comedy an already established literary form. It was presumably, like everything else in the world, an evolution. The performance of com¬ edies at the winter and spring festivals of the wine god, Dionysus (the Lenaea and the Greater Dionysia) was for the Athenians a ceremony of the state religion. But modern attempts to

trace the processes of the origin of comedy in primitive rites, revels and superstitions, and its development in imitation of tragedy are, in the absence of evidence, merely conjecture masking as science. They distract our atten¬ tion from the broadly human literary aspects of that comedy and throw into false perspective the life, thought, politics and civilization of Periclean Athens, which were its real shaping environment.

Apart from his 11 extant plays little is known of Aristophanes' life. His first play, the lost (Banqueters,) was produced in the year 427, like other of the earlier plays under the name of another comedian because, as Aristophanes tells us, in (The Clouds) and in (The Wasps

> he was still too young to woo public favor in his own name. Whether this is literally and historically true or not it im¬ plies that he was a young man in 427 and may have been born between 448 and 455. His last extant play dates from 388 and he is supposed to have died between 385 and 375. An obscure jest in his (Knights } implies that he was in some way connected with the island of Hfgina, recently conquered by Athens — possibly be¬ cause his father held an allotment of land there. The praise of country life and the pictures of rustic types in his plays indicate familiarity with the rural life of Attica and perhaps sym¬ pathy with the sturdy farming class, the back¬ bone of sane, conservative democracy. But until the seige penned them within the long walls many Athenian families lived by preference on their country estates, and we need not assume that the lover of the country was himself a farmer or a bidder for the farmer's vote. In any case, Aristophanes is no less familiar with the city and the life and gossip of the young bloods about town. Plato in the (Symposium* depicts him as dining with Agathon and in the company of that Socrates whom he had lam¬ pooned in his (Clouds.)

His criticism of life and that of the old comedy generally is on the whole conservative, with many lapses into irresponsible and in¬ consistent buffoonery. He satirizes in strangely modern style the new thought, the new educa¬ tion, the new music, the new poetry, the new liberal theology, the new radical democracy and its demagogues. Modern critics, in reac¬ tion against naive older interpretations, warn us not to take too seriously the criticism of life of one whose main purpose was to make the people laugh. The psychology of the possible mixture of motives is ingeniously analyzed in Browning's (Aristophanes' Apology. } The pre¬ dominating conservatism of Aristophanes may be due in part to the natural tendency of com¬ edy to satirize the newness and in part to a genuine conviction that the progressives were moving too fast and that <(Athens was dying of the triumph of the liberal party.® It was not sympathy with the reactionary plots of the young aristocrats with whom Plato shows him in familiar association. Aristophanes was a true patriot and a sincere if critical democrat.

The first extant play, (The Acharnians,* 425, turns on the fancy of a militant pacifist's establishing a private peace for himself while the state is at war. This happy thought is hotly debated in the first half of the play, and in the second half illustrated by farcical scenes of contrast between the riotous living of the

pacifist and the bread ticket diet of the war party. rI his way of composition gives the formula of many Aristophanic comedies. (The Knights 5 (424), named from its chorus, is an open assault on the demagogue, Cleon, who is outfaced by a still more scurrilous ruffian who fights fire with fire. Aristophanes elsewhere in¬ forms us that Cleon dragged him or the poet who produced his lost (Babylonians 5 into court on a charge of treason.

(The Clouds * (423, 2d. ed., 422) is a gross caricature of Socrates treated as representa¬ tive of sophistry, the new education, atheism, and the new science of nature. The chorus of clouds symbolizes the mists of the new thought. In the second edition Aristophanes bitterly re¬ proaches the audience for not giving the prize to this cleveres.t of his comedies. See Clouds,

The happy thought of (The Wasps 5 (422) is the institution of a court in a private house to satisfy the litigious mania of an old profes¬ sional juryman, Love-Cleon, whose dashing son Hate-Cleon has vainly attempted all other means of restraint. The first case brought before the court is the trial of the house dog for stealing a . Sicilian cheese, a motive borrowed by Ben Jonson. The chorus of wasps symbolizes jury¬ men and native children of the soil as they Ex¬ plain :

“ Do you wonder, O spectators, thus to see me spliced and braced,

Like a wasp in form and figure, tapering inwards at the waist ?

We on whom this stern-appendage, this portentous tail is found,

Are the genuine old Autochthons, native children of the ground;” (Rogers)

Many of the scenes are pure farce. In its larger purport the play may be a conservative satire on that palladium of advanced democ¬ racy, the huge popular courts in which from 500 to 2,000 jurymen as judges of both law and fact gave irresponsible decisions according to their own good pleasure and the plausibility of the orators.

(The Peace) (421) develops still further

the motive of protest against the Peloponnesian War. Poor Peace has been buried out of sight, but the farmers and other men of good will with a long pull and a strong pull all to¬ gether draw her forth and celebrate with wild revels her nuptials with their worthy leader

Trygaeus, who had sailed not across, the ocean, but up to heaven on a black beetle in order to find out how to get the boys out of the trenches.

After (The Birds) (414) the year 411 yields two comedies with similar motives. In (The Lysistrata5 the women of all Greece plot to enforce a peace by divorce, from bed . and board. In (The Thesmophoriazusse,5 a licen¬ tious picture of the women celebrating the festival of Demeter is converted into a liter¬ ary satire of Euripides, whom the women con¬ demn for his well-known misogynism and whose representative caught spying upon them, they arrest and hold as a hostage. After 1 The Frogs5 (405), (The Ecclesiazusae5 or (Ladies in Parliament 5 (393) portrays the women of Athens seizing the reins ot government and establishing a communism and community ol wives, the relation of which to Plato s * Repub¬ lic has been endlessly discussed. (The Plou- tos) (388) in its present form presents a tamed and subdued comedy of transition shorn of the

chorus. The blind god of wealth recovers his sight by incubation in the temple of Hisculapius and the consequences are portrayed in scenes which caused the play to be much used as an edifying school book in the Renaissance and after. An earlier edition of (The Ploutos) (408) is supposed to have been charged with political allusions to the restoration of wealth to Athens by the victories of Alcibiades. See Bums, The; Frogs, The.

The best complete translation of Aris¬ tophanes is that which accompanies the sepa¬ rate plays in Roger's edition. Convenient and accessible is the reprint in Morley's Library of Frere's racy rendering of (The Acharnians,5 (The Knights5 and (The Birds.5 Murray's translation of (The Frogs5 is masterly. No formal and printable translation can recreate the atmosphere of an Aristophanic comedy — the cumulative hilarity of the exuberant rush of puns, surprises, local hits and topical song allusions. Only an impressionistic viva voce version, compact of up-to-date analogies and equivalents, could approximate to that effect, and such a rendering, if printed, would lose its flavor and become more obsolete than Aris¬ tophanes himself in a decade. All histories of Greek literature give a chapter to Aris¬ tophanes. Croiset's (Aristophanes and the Po¬ litical Parties at Athens,5 translated by James Loeb (London and New York 1909) is an ad¬ mirable and very readable monograph. Con¬ sult also Conybeare, F. C., (A Message from Aristophanes5 (Open Court, Vol. XXX, pp. 41-59, Chicago 1916) ; Courtney, W. L., (Aris¬ tophanes, the Pacifist5 (Fortnightly Review, New York 1916) ; Petrie, R., (Aristophanes and Socrates5 {Mind, London 1911) ; Todd, O. J., (Quo Modo

Aristophanes Rem Temporalem in Fabulis Suis Tractaverit5 (Harvard Studies in Classical Philology, Cambridge, Mass., 1915).

Paul Shorey,

Greek Department, University of Chicago. ARISTOPHANES, The English, a name frequently applied to Samuel Foote (q.v.), also called ((The Modern Aristophanes,55 because of his abundant good spirits and skill in unsparing ridicule. Garrick was a common object of his wit.

ARISTOPHANES, The French, a

name sometimes applied to the French drama¬ tist, J. B. P. Moliere (q.v.).

ARISTOPHANES' APOLOGY, a poem by Robert Browning (q.v.), published in 1875; the title being in full, (Aristophanes' Apology; Including a Transcript from Euripides: Being the Last Adventure of Balaustion.5 It is a sequel to the poem (Balaustion's Adventure.5 A long work in blank verse, it commemorates the defense made by Aristophanes of his comic art, on learning through Sophocles of the death of Euripides, the tragedian. An extensive ar¬ ticle on it may be found in Berdoe's (Browning Cyclopaedia5 (1892), with a glossary of terms, etc.

ARISTOPHANES OF BYZANTIUM,

Greek grammarian : b. about 262 b.c. ; d. about 185. He was educated under Zenodotus at Al¬ exandria, and became the chief librarian of the great Alexandrian library. Ancient critics rank him among the most celebrated critics and grammarians. He deserves great credit for his services to the Greek language and litera-

ture, With Aristarchus, he was the principal expert in determining the so-called Alexandri¬ an canon of the classical writers of Greece. He invented a series of critical signs, and greatly improved the notation employed in prosody, including accent, quantity and breath¬ ing. His publications include important critical editions of Greek writers, particularly of Homer — the first of its kind — Hesiod and the lyricists Alcaeus and Pindar. For the plays of the tragic and comic poets he wrote intro¬ ductions. Little of what he wrote is extant, save

fragments in the scholia of the poets, some argumenta to the dramatic writers, and a part of the A stjeig (ˆ Glossary)) . Consult Nauck, (Aristophanis Byzantii Fragmenta) (1848) ; Sandys, lA History of Classical Schol- arship) (Vol. I, pp. 126-131, Cambridge 1906).

ARISTOTELIANISM. Aristotle . is the first philosophical writer to make a strict sep¬ aration of the branches of philosophy. His writings, in terms of their subject matter, fall into the following groups : Logic, Metaphysics, Physics, Ethics, Politics and the Philosophy of Art. A classification made by Aristotle, but not applied to the arrangement of his writ¬ ings, is: (1) theoretic philosophy; (2) philos¬ ophy of conduct; (3) philosophy of production, that is, of art. The analysis of the problems and subject matter of philosophy and science begins with him. In Plato's writings the vari¬ ous problems are fused together and treated integrally and synthetically in an ethico-meta- physical system.

Logic. — For Aristotle logic is a methodol¬ ogy of science, a propaedeutic to the other dis¬ ciplines. It is not strictly a science, because science has some essence or aspect of reality for its subject matter, while logic is concerned with the forms of knowing. Formal logic was founded by Aristotle and almost completely de¬ veloped by him. Its chief feature is the doc¬ trine of the syllogism, the process of reaching scientific or apodictic conclusions. The syllo¬ gistic process is a deductive process, that is, it derives particular conclusions from general principles or accepted premises. The possibil¬ ity of deriving such conclusions rests upon the axiomatic principles of contradiction and the excluded middle, that is, two contradictories cannot at the same time and in the same ref¬ erence be true; and of two contradictory prop¬ ositions, one must be true and the other false, and a third intermediate proposition is ex¬ cluded. The logical treatises were grouped to¬ gether by Aristotle's successors and called the Organon or instrument of science. The Sev¬ eral treatises consist of the Categories, the Hermeneutics, the Analytics and the Topics. The Categories discuss simple terms; the Hermeneutics discuss the combination of terms with a predicate, that is, the judgment or prop¬ osition; and the Analytics and Topics discuss the combination of propositions in the syllo¬ gism. The syllogistic conclusion is the deriva¬ tion of one judgment from another by means of a middle term. The notion, judgment and con¬ clusion are the three elements with which formal logic operates. The categories, or gen¬ eral notions under which reality is viewed, are enumerated by Aristotle as substance, quantity, quality, relation, place, time, position, posses¬ sion, action, passion. These ten categories are

evidently not derived from any single prin¬ ciple and are neither exhaustive nor mutually exclusive. Aristotle's main interest is in the syllogism ; simple terms or notions and the judgment are scantily treated. His treatment of the syllogism is practically exhaustive. Mod¬ ern logic has supplemented his work by add¬ ing to his theory of the categorical conclusion, which was his chief interest, the theory of hy¬ pothetical and disjunctive conclusions; further, by adding a fourth figure to his three, and lastly by developing the theory of inductive logic and the method of the sciences. Aristotle regards deductive logic as the only method that can furnish demonstration or apodictic con¬ clusions. Science, however, would not be pos¬ sible with syllogistic demonstration alone, for if all our premises had to be proved we should be forced into an endless regress. Therefore, science must accept certain fundamental prin¬ ciples as its axiomatic postulates. From these accepted postulates scientific proof proceeds by deduction. In addition to this Aristotle men¬ tions the further method of induction without elaborating it, saying, however, that universal principles are secured by it from particular in¬ stances and that it has the advantage over de¬ duction by being nearer to our sense experience and therefore more generally intelligible. On the other hand, he insists that a complete knowledge of particulars is necessary to a com¬ pletely certain induction, and this, owing to the multiplicity of particulars, being rarely pos¬ sible, induction lacks in its conclusions the co¬ gency of the deductive syllogism.

Metaphysics. — First Philosophy (the term Metaphysics is not used by Aristotle, but is a word applied to the First Philosophy on ac¬ count of its being placed after the treatises on Physics by the early editor of the works) is the philosophy of first principles as such ; sec¬ ond philosophy or physics is the philosophy of these principles applied to concrete phenomena, the phenomena of motion and matter. Aris¬ totle is a disciple of Plato and, like his master, he viewed the world from the standpoint of teleology. The cosmic processes are determined by final causes. He makes more of facts than Plato does, has a much larger mass of empiri¬ cal data for his constructions and is more catholic in his scientific interests. His meta¬ physics, however, like Plato's, is based on high speculative ideas and he explains the world-order by means of these general and ultimate principles, so that he is not a realist in the sense of confining reality merely to particular facts Like Plato, he sought the essence of phenomena in the concept and law, but unlike Plato he sought it in a concept given in the phenomena as their inner principle of development and not in a transcendent principle. If there is no concept or universal there can be no scientific knowledge. The concept is not, however, an idea isolated

from particular things,- but as the ■universal reality it is immanent in particulars (universalia in re not ante rem), the individ¬ ual being the only self-existent real. Against Plato's doctrine of ideas Aristotle brings the following criticisms: (1) The Platonists fur¬ nish no adequate proof of the existence of ideas as hvpostasized entities; (2) The Platonic ideas, because transcendent, cannot explain the phenomenal world, which is left without a principle of motion; (3) The world of ideas

is only a reduplication of the world of sense in its generic aspect; (4) The explanation of the relation of the ideal to the sensible world by the terms archetype, pattern, image, etc., is only metaphorical. The universal is real as the formative principle in things, giving to them their generic character, while matter is the principle of individuality. Form and matter are explanatory of genus and individual. In every particular thing, with the exception of God or the Prime Mover (who is pure form), the two principles of form and matter are pres¬ ent ; form making the classification of things and scientific knowledge possible, and matter making possible the concreteness of objects. Form and matter are two aspects of individual things and are not really, but only notionally, separable. Everything is both form and sub¬ strate, idea and matter, significance and stuff, soul and body, with the single exception of the Supreme Being. Form is the moving principle of development and matter is the passive poten¬ tiality. Plastic stuff or matter is molded after generic patterns. In nature's processes Aris¬ totle calls them energy and potentiality. The real is an explication of a prior potential. The • transition of a thing from a condition of poten¬ tiality to a condition of actuality is ac¬ complished by some form of motion. Motion in turn (which is of several kinds: spatial, that is, locomotion ; qualitative, that is, trans¬ mutation of substances ; quantitative, that is, growth) implies a moving cause, and any given moving cause an antecedent cause and so the causal regress would be endless, were we not to posit a Prime Mover or uncaused First Cause. The First Cause is the origin and source of all motion and life. As motion is eternal, so the Prime Mover is eternal; it is also immaterial, passionless and motionless, for the Prime Mover causes motion merely as an ideal toward which matter strives in the processes of nature, analogously to the power of attraction in beauty. The activity of God is pure thought or thought turned upon itself, which theoretic life is for Aristotle the perfect type of life. Between God, as pure form, and matter, as formless stuff — the extreme cos¬ mic principles —

Aristotle places the world of natural phenomena, which are all composites of the two principles. His doctrine of the Prime Mover is a direct product of his philos¬ ophy and is the first attempt to found a theis- tic theory on a philosophical basis. Aristotle . specifies as the four causes operative in nature the formal, final, efficient, and material. But as form contains wdthin itself the principles of efficiency, purpose and meaning, these four causes are reducible to his dualism of form and matter. As an example of his application of the four causes, a statue presupposes: (1) matter, for example, clay, wood or marble; (2) a form or idea in the artist's mind; (3) an ef¬ ficient cause, such as the energy applied to tools; (4) a motive or purpose.

Physics. — While the metaphysics treats of being as such, of the unconditioned, of the ulti¬ mate principles explanatory of reality, Physics treats of the contingent, the conditioned and of the quantitative and qualitative relations of things. In the philosophy of nature's phenom¬ ena, the concept of motion plays the chief role, effecting the transition of potentiality to ac¬ tuality and having its ultimate source in the vol. 2 — 16

Prime Mover. The whole of growth and de¬ velopment proceeds from one form of being to another form of being, but not from nothing to something, or from non-existence to exist¬ ence. For Aristotle as for all the Greek philos¬ ophers the maxim holds : ex nihilo nihil fit. In¬ ert matter is the most formless element in na¬ ture and man is the stage in which the high¬ est form manifests itself. Between these na¬ ture exhibits a graded scale of development, that is, from the most inorganic to the highest organism. This scale itself is static and not a scale of evolution in the modern sense. The scale of beings is a fixed cosmic hierarchy, not determined by protoplasmic conditions plus en¬ vironment. The Aristotelian world is a teleo¬ logical system, the eternal forms working them¬ selves out in plastic and contingent matter with reference to fixed final goals, the whole exhib¬ iting plan, not planless, as Aristotle says, <(like a bad tragedy.® As the Prime Mover is per¬ fect so the world shows that degree of perfec¬ tion which is possible with the contingency and imperfection of matter. God is both in the world and outside of it as the transcendent cause of its order, just as the discipline of an army is in the army and outside of it in the person of the general. The universe is con¬ ceived by Aristotle to be spherical in form, not infinite. Its periphery consists of the region of the fixed stars, which revolve in a perfectly circular motion. They do not move freely in space, but are attached to the ethereal body of the outer heaven and move as a rider in a char¬ iot. Their motion is caused immediately by the Prime Mover and being nearest to him, their motion is most perfect. The earth is at the centre

of the universe and is fixed. Be¬ tween the centre and the circumference are the seven planets, including the sun and moon. The motion of these, although concentric with the circumference, is less perfect, deviating from an exact circle. The earth is the region of rectilinear motion. The general presuppo¬ sitions of motion are space and time. Space is, in Aristotle's conception, strictly speaking, only place, that is, it is the room occupied by body, and time is the measure of motion with reference to earlier and later. Motion being endless, time as the measure of its discrete mo¬ ments is infinite. Space is finite, for there is no space outside the corporeal world. The ele¬ ments in the cosmos are fire, earth, air, water and ether. Of these the first four are subli- matory. The celestial spheres consist of pure ether.

Psychology. — Aristotle defines soul as the <(complete realization of a body endowed with the capacity of life.® Every body, therefore, that has life, has soul, and psychology in the narrow sense would be a branch of biology. The physical world, according to Aristotle, is divided into two realms, the inorganic and the organic. The characteristic mark of the latter is the possession of life, or <(soul.® Soul is syn¬ onymous with the principle of life, by virtue of which a thing is endowed with the power of self-movement. Life is the universal form of organic activity, feeling and reason are spe¬ cific forms of the same power. The highest manifestation of psychical activity is rational thought. There are four main forms in which life manifests itself: (1) Nutrition, growth, decay and the power in things to reproduce,

each after its kind, whereby the continuity of life is maintained; (2) locomotion; (3) sen¬ sation; (4) reason. These various types of life are forms of self-movement. The first form is found in the plant world as well as in the ani¬ mal world, the last three only in the animal world. Soul as life is found in every part of the body, to which it is related as form to mat¬ ter. The heart as the anatomical and physi¬ ological centre is also the life-centre. The heart, therefore, and not the brain, is the or¬ gan of consciousness, for consciousness is' one of the forms of life. The processes of know¬ ing or conscious life are developed in these stages: (1) sensation; (2) imagination, the power of using images of absent objects, com¬ bined with memory; (3) rational thought. Rea¬ son, according to Aristotle, is two-fold, crea¬ tive and passive. All knowledge, in the last analysis, is derived from sense-perception.

The mass of sense-perceptions which are held to¬ gether by memory and stored in the central sense (sensoriuni) are the passive reason, that is, they constitute the matter which the creative reason transforms into conceptual knowledge. The two stand related to each other, therefore, as form to matter, actuality to potentiality.

Ethics. — The ethics of Aristotle consists mainly in a theory of the final end of conduct or the summum bonum and an account of the individual virtues. The chief good is happi¬ ness (well-being), which is defined as <(activity of the reason in accordance with virtue in a complete life.® This conception of happiness as consisting in theoretic activity is based on the peculiar function of man. Reason being the differential mark of man, his peculiar good should be discoverable in the activity of rea¬ son. Further, the good consists in the realiza¬ tion of the rational self in an ethical life that is complete and not of fragmentary duration, for (<one swallow does not make spring.® The virtues of an individual are divided into ethi¬ cal and dianoetic. The ethical virtues are lib¬ erality, temperance, justice, courage, friendship, high-mindedness, gentleness, veracity. The dianoetic virtues are wrisdom, art, insight, clev¬ erness and such excellencies as attach to the theoretic activity, while the moral virtues are reasonableness expressed in action. Virtue is the power or persistent quality in an individual which enables him to perform his function well. Aristotle otherwise defines it as a <(moral habit based on a life of deliberation, and expressed in the observance of a rational mean.® The connecting link between ethics and politics is found in the social virtue of friendship.

Politics. — Aristotle gave to politics the posi¬ tion of an independent science, which he based on the study of over 150 actual constitutions. Politics, as the architectonic science, considers the complete good of man, for it is only in the state that man's full realization is attained, and man is by nature a Apolitical animal.® Ethics is, therefore, a branch of politics. Although the state is notionally prior to the household and village, it is preceded by them in the order of development. The state is such an aggrega¬ tion of households and villages as to be self- sufficing. While it comes into being primarily for the sake of life, its growth is determined by the interests of a good and complete life. The individual is not self-sufficient. The end of the state is not power, or the protection of

life, property or industry, but the promotion of noble life in its citizens and the happi¬ ness that springs from such life. The function of the state is educational and moral. One has to keep in mind that the Aristotelian state is a city-state and not an empire. The various forms

of good constitutions are: royalty (rule of one), aristocracy (rule of few), polity (rule of the entire people). The corresponding cor¬ rupt forms are tyranny, oligarchy and democ¬ racy. The best constitution under most actual conditions is the polity, a constitutional democ¬ racy, wrhich more than any form of govern¬ ment embodies the principle of the mean and on the average best meets the demands of the greatest number. Under completely ideal con¬ ditions monarchy is the best form of govern¬ ment.

Art. — Art has for its function partly the supplementing of nature and partly the imita¬ tion of nature. Nature has left man naked and defenseless, but provided him with the ((tool of tools,® a hand. The useful arts serve the in¬ terests of life; imitative and decorative arts serve the ends of noble pleasure and relaxa¬ tion. The Aristotelian exposition of the philos¬ ophy of art is confined almost entirely to the extant fragment of the Poetics,5 in which scarcely more than the theory of tragedy has survived. The function of tragedy is de¬ scribed as catharsis. The conclusion of a tragic representation that is true to the principles of art has the cathartic effect on the spectator of purifying his emotions by the instruments of pity and fear.

History cf Aristotelianism. — Aristotelian- ism was continued in the peripatetic school (the name ((peripatetic® came from Aristotle's method of giving instruction while walking, or from the walks — Trep'nraToi — in the Lyceum's grounds) down to 529 a.d., wrhen the Emperor Justinian closed all the Athenian schools. Dur¬ ing the early Middle Ages it was kept alive by the works of Boethius and the <Isagoge) of Porphyrv. Later by its fusion with the theol¬ ogy of Thomas Aquinas it became practically the official philosophy of Roman Catholicism, which it still continues to be. The Arabs in Spain were the bearers of Aristotelianism to mediaeval Europe, and by 1220 almost all of Aristotle's works had been translated from the Arabic into Latin. A little later, by the efforts of Thomas Aquinas, they were translated from Greek originals, and Aristotle's authority in sci¬ ence became well-nigh absolute. With the rise . of Humanism Aristotelianism began to wane, and with the development of modern science and the Cartesian philosophy his influence out- side. the Catholic Church was to a large extent nullified. Within the Church, however, during tim last quarter of the 19th century, through the efforts of Leo XIII, the influence of Thomism and Aristotelianism increased.

Bibliography. — B o n i t z , (Metaphysics >

(1848); Butcher, (Poetics) (London 1902); Bywater, (Poetics) (Oxford

1909) ; id., (Eth- ics> (1890) ; Jowett, Politics *(1885) ; Ham¬ mond, Psychology (1902) ; Navarre, (Essai sur la rhetorique grecque avant Aristote* (Paris 1900); Newman, Politics *(1887); Sandys Constitution of Athens-* (London 1893) ; id., (Rhetoric *(Cambridge 1877) ; Ram- sauer, (Nicomachean Ethics* (1878) ; Spengel, Phetoric* (1867) ; Wallace, (Outlines of the

Philosophy of Aristotle> (Oxford 1883) ; Wil- amowitz, Constitution of Athens' (Berlin 1891); Stahr, (Aristotelia' (2 vols., 1830- 32) ; Grote, (Aristotle' (2 vols., 2d ed., 1880) ; Grant, (Aristotle' (1874) ; Lewes, (Aristotle, a chapter from the History of Sci¬ ence' (1864); Siebeck, (Aristoteles' (1899); Prantl, (Geschichte der Logik im Abendlande' (4 vols., 1855-70) ; Zeller, (Aristotle and the Earlier Peripatetics' (2 vols., 1897).

William A. Hammond, Sage Professor of Ancient Philosophy, Cornell U niversity.

ARISTOTLE, Greek philosopher, and one of the greatest thinkers and scientific investi¬ gators and organizers the world has ever seen.

Life. — Aristotle was born in 384 and died 322 b.c. His birthplace was Stagira (hence he is often called <(the Stagirite"), a city on the Thracian peninsula known as Chalcidice, which was at that time thoroughly Hellenic coun¬ try, enjoying all the advantages of Greek cul¬ ture. His father, Nicomachus, was the court physician and friend of the Macedonian King Amyntas. The medical profession is said to have been hereditary in his family, and the sci¬ entific and medical atmosphere in which he grew up probably helped to form his mind in those habits of accuracy and exactness for which he is famous. Both parents having died, his education was directed by Proxenus of Atarneus. In 367 b.c., when in his 18th year, Aristotle came to Athens, and became a mem¬ ber of the Academy, the school of Plato (q.v.). Here he remained until the death of Plato, 20 years later. Before this time, he had be¬ come renowned for his scholarship and brilliant writings, as well as through his public lectures on rhetoric. Doubtless he had also already developed to some extent his own philosophical views. There seems to be no truth in the charges that were brought against Aristotle by later writers, that he was guilty of ingratitude and active hostility toward his teacher, Plato. As we have seen, he remained a member of the Academy until Plato's death, and in his

later writings, although criticising with keen insight certain Platonic doctrines, he speaks of his master with the greatest reverence and affec¬ tion (cf. Zeller, (Aristotle and the Earlier Peri¬ patetics,' Vol. I, Chap. I).

After Plato's death, Aristotle resided for three years at the court of Hermias, ruler of Atarneus, who had been at one time a member of the Academy, marrying there Pythias, the niece, or, as some say, the daughter of the Prince. Hermias, however, was treacherously put to death by the Persians, and Aristotle withdrew to Mitylene. Soon after (343) Aris¬ totle was called by Philip of Macedon to under¬ take the education of his son Alexander, the future conqueror of the world, then a boy of 13 years. Nothing is known regarding the na¬ ture of the education which Aristotle gave to his distinguished pupil. The regular instruc¬ tion of the Prince must have ceased three years later when he was made regent by his father and entrusted with military duties. Aristotle remained in the north engaged in scientific work, though probably still retaining some connection with the Prince and the Macedonian court. When Alexander set out upon his cam¬ paign in Asia, Aristotle went to Athens and founded there his school. Its place of meeting

was the Lyceum, a gymnasium attached to the temple of the Lyceian Apollo. He was accustomed to talk to his pupils as he walked to and fro in the gardens of the Lyceum, and from this custom the school became known as the ((Peripatetic" (nepnraTeiv, to walk up and down).

Here Aristotle taught and directed the vari¬ ous scientific activities of the school for 12 years (335-323). This school was not merely an institution for imparting instruction. It was also an intimate association of scientific workers, many of them, like Theophrastus (who succeeded Aristotle in the leadership), mature men and ripe scholars. The organiza¬ tion and direction of the investigation as well as the fruitful utilization of materials and synthesis of results were, however, the work of the master. During these years, Aristotle systematized the knowledge of the past, and thus defined the limits and laid the foundations of the sciences of the western nations. But he did more. He carried on investigations and extended the 'boundaries of knowledge in almost every field. In logic, metaphysics, ethics and politics, he reached conclusions that are of great and permanent significance for all time. Moreover, in psychology, zo¬ ology, physics, astronomy, aesthetics, and also in his historical investigations, his work is of the greatest value and importance for all the subsequent development of these sciences. See Aristotelianism.

After the death of Alexander the Great, the Greek states, with Athens at their head, at¬ tempted to free themselves from the Macedo¬ nian power. Aristotle's former relation to Alexander, and his friendship for Antipater, the Macedonian governor, made him at once an object of attack. The charge of Atheism was brought against him, as it had formerly been brought against Anaxagoras and Socrates and he retired to Chalcis in Euboea, where, in the following year (322), he died.

Writings. — The writings that have come down to us under the name of Aristotle do not by any means represent his complete literary activity. It is moreover known that the writings of Aristotle which were lost included : (1) Certain popular works published by Aris¬ totle probably during the time of his connec¬ tion with the Academy. He himself refers to these as the ((exotcric," or popular writings. They were written generally in dialogue form, and modeled, both in subject matter and style, after the works of Plato. (2) Compilations of scientific, historical, and political materials, which were used by Aristotle as data in the preparation of his theoretical works. To this class belongs the Constitution of Athens,' for¬ tunately discovered in nearly complete form a few years ago and published in 1891 (English translations, by F. G. Kenyon and E. Poste, both London, 1891).

The works which have survived are those which set forth Aristotle's system in more com¬ plete and systematic form, and which were used within the school. The writings which have lr-en known to tradition as. those of Aristotle appear to have come essentially from the edi¬ tion of Aristotle's works prepared and arranged by Andronicus of Rhodes about the middle of the 1st century b.c. Of present-day editions of Aristotle's works that of the Berlin Academy

(1831-70) may be Mentioned. These writings may be classified in the following way:

(a) Treatises on Logic. — These were later collected under the title of the (Organon.5 This included the Categories' (De Interpretatione) (on the parts and kinds of propositions) ; the (Analytics, 5 prior and posterior (consisting of two books each, and developing the doctrine of the syllogism and dealing with scientific methods in general) ; the ˆTopics5 (dealing with probable conclusions) ; and on (Sophistical Elenchi5 (which discusses certain fallacies and the ways of refuting them). The Bohn Library gives an English translation of these works in

two volumes by O. F. Owen.

(b) The iRhetoric'> and the (Poetics .5 — The former consists of three books, of which only the first two are regarded as genuine. (English translation by T. Buckley in Bohn Library). The (Poetics 5 has been preserved only in a very incomplete and fragmentary condition. An English translation is given in S. H. Butcher's (Aristotle's Theory of Poqtry and the Fine Arts) (3d ed., 1902). See Poetics, The.

(c) The Work iOn the First Philosophy 5 — our <Metaphysics5 — which Zeller describes as a torso arbitrarily bound up with a number of other fragments, some genuine, some spuri¬ ous. (English translation in Bohn Library, by J. H. McMahon, 1889).

(d) The Works on Natural Science. — To

this class belong (1) the (Physics, 5 with the connected works, (On the Heavens,5 (On Growth and Decay,5 and the (Meteorology 5 ; and (2) the zoological treatises, (The History of Animals, 5 (On the Parts of Animals, 5 (On the Movement of Animals, 5 and (On the Gen¬ eration of Animals 5 ; (3) the psychological

writings, including the (De Anima,5 and the smaller treatises known as the (Parva Natu- ralia. 5 Of these works (The History of Ani- mals) is translated by W. Cresswell in the Bohn Library; (On the Parts of Animals) by J. Ogle (1882); the <De Anima5 by E. Wal¬ lace (1882), and W. A. Hammond (1902). The latter writer under the title (Aristotle's Psychology5 has given also a translation of the (Parva Natural) a. 5

(e) The Ethics and Politics. — Aristotle's treatise on ethics is known as the (Nicoma- chean Ethics.5 It has 10 books, of which books V to VII are largely made up of additions from the (Eudemian Ethics.5 This latter work is a revision of the Aristotelian ethics by Eudemus, of which only a part has been preserved. The (Nicomachean Ethics5 has often been translated into English. Two of the most recent and best translations are those of F. H. Peters (4th ed., 1891), and J. E. C. Welldon (1892). The (Politics, 5 in eight books, was left in an incomplete and frag¬ mentary condition. (English translations by B. Jowett and J. E. C. Welldon). See Aris- totelianism and consult works there referred to.

James E. Creighton,

Professor of Philosophy, Cornell University. ARISTOTLE'S LANTERN, the complex dentary apparatus or oral skeleton and associ¬ ate soft

parts of a sea-urchin (q.v.). The oral skeleton attains its highest development in the Echinidea in the Aristotle's lantern of the sea-urchins. The lantern is composed of 20 prin¬ cipal pieces — five teeth, five alveoli, five

rotulse arid five radii — of which the alveoli are again divided into four pieces each, and the radii into two, thus making a total of 40 pieces. This complex apparatus has, beside the inter-alveolar muscles, protractor, oblique, transverse, and retractor muscles. A somewhat similar but less complicated oral skeleton is found in the Clypeastroida.

AR'ISTOX'ENUS, Greek musician and philosopher of Tarentum, flourished about 350-324 b.c. He was one of the oldest writers, and probably was the greatest of Greek stu¬ dents of the science of music and all its branches. He was a son of Spintharus, who taught him music, having himself studied under Socrates and being possessed of a great knowl¬ edge of musical matters. After having re¬ ceived his elementary education he went to study music under Lamprus of Erythrae, and later became a student of philosophy under the Pythagorean Xenophilus of Chalcidice. He afterward went to Athens to study philosophy under Aristotle, and made such rapid strides that, upon the death of Aristotle, he aspired to be his successor and head of the philoso- nhical school ; Theophrastus was, however, ap¬ pointed in his stead. He founded a school of musicians, who were called, after him, Aris- toxeneans. The main difference between the svstems of the Pythagoreans and the Aristox- eneans lay in the fact that the latter judged of the notes in the diatonic scale exclusively by the ear, while the former determined these mathe¬ matically. The only one of his works of any value now extant is a treatise on music, (The Elements of Harmony.5 It was published in three volumes by Meursius in 1616. There is an English translation by Marcran (Oxford 1902). The best edition is that by Marquard (Berlin 1868). Consult Goodell, T. D., (Chap- ters on Greek Metric5 (New York 1902) ; Laloy, LAristoxene de Tarente et la musique de l'an- tiquite5 (Paris 1904) ; Westphal, (Melik und Rhythmik5 (Leipzig 1893) ; Mahme, W. L.,

(Diatribe de Aristoxeno5 (Amsterdam 1793).

ARISUGAWA, a're-soo-ga'wa, the title of a noble Japanese family founded in the 17th century and prominent in civil and military affairs. This ancient family was founded by the seventh son of the Mikado Go-Yozei, dur¬ ing his reign from 1587 to 1611. The mem¬ bers of the family did not, however, attain much prominence until January 1868, when Arisugawa Taruhito (b. Kioto, 1835; d. 1886),

who was the uncle of the Mikado, was ap¬ pointed supreme administrator and commander- in-chief of the army. It was at this time that the duarchv of Mikado and Shogun was abol¬ ished _ and the present form of government established,. with the Emperor Mutsuhito as dictator with undivided power. Upon taking office he at once reorganized the army to put down the rebellion in the north, led the im¬ perial troops against the rebels, completely routing them and saving Yedo from destruc¬ tion. After this he began military operations in the north, and by his skillful manoeuvres soon brought the rebels to terms and the war to a quick conclusion. The next year, in 1869, he returned the sword of justice and the brocade banner, which he had received at the beginning of his campaign against the rebels, to the Em¬ peror, thus signifving that he had brought the

empire to a state of complete subjugation. In 1875 he became president of the senate, and again in 1877 was placed in command of the forces sent to suppress the Satsuma rebellion, under the leadership of Saigo Takamori. This was a long and severe test of his military ability, and his success, though won only after seven months of hard fighting and the sacrifice of 20,000 soldiers and $50,000,000, showed him to be a leader born of the highest order of military genius. For this great service the Emperor decorated Arisugawa with the Order of the Chrysanthemum and appointed him field-marshal and junior Prime Minister. A superb bronze equestrian statue of Arisugawa Taruhito on a lofty granite pedestal stands in Tokio.

ARISUGAWA Takehito, b. 1862; d. 6

July 1913; brother of the above, was adopted by him as his heir and was also heir pre¬ sumptive to the throne till 1879, when a son was born to the Emperor. He served three years in the British navy, commanded a cruiser in the war with China (1894-95) and later served as superintendent of the naval base at Yokosuka. He was guardian of the person of the Crown Prince in 1902-03, represented the Emperor at the marriage of the German Crown Prince in 1905 and later visited England as the guest of Edward VII. Takehito's only son died in 1895 while serving as a naval cadet. In the ordinary course the house would become extinct, but in view of the special relation of the house to the court, the Emperor ordered his third son, Prince -

Nobuhito Terunomiya (b. 3 Jan. 1905) to become, on attaining his majority, the head of the Arisugawa House.

ARITA, a-re'ta, a Japanese town in the western part of Kyushu, famous for its pottery works, dating from the end of the 16th century. The Arita porcelain is highly esteemed.

ARITHMETIC. This word has been and still is used in two quite distinct senses. It formerly signified merely the science of num¬ bers (see Arithmetic, History of), and treated such numeral properties as seemed mys¬ terious or peculiar. With the invention of al¬ gebra it was often taken to include such por¬ tions of that science as referred to the opera¬ tions and to the number theory. In this sense it is still used in Germany and France to-day, the art of computation being indicated by the names Rechnung and Calcul. In English, how¬ ever, the term early came to be applied to both the science of numbers and the art of compu¬ tation. As the former branch developed the advanced portion was given the distinctive name of Theory of Numbers (q.v.), leaving the name Arithmetic to apply to calculation and its application to business problems. With the recent relegation of the progressions and the roots to algebra, this is the sense in which the word is used in the United States to-day. With this understanding of the term, the lead¬ ing topics relating to the subject will be con¬ sidered.

I. Notation and Numeration. — The former referring to the number of symbols is from the mediaeval Latin note, meaning the numeral characters (see Numerals), and the latter, re¬ ferring to number names, is from numerus, number. The distinction between the terms is

coming, however, to be less marked than for¬ merly, the word numeration being used for both. The writing and reading of numbers generally refers to positive integers, common fractions (or vulgar fractions, so called to dis¬ tinguish them from the fractiones physics or astronomies, the old sexagesimal fractions still met in angle measure), decimal fractions, com¬ pound numbers and surd numbers. Of these the positive integers are known as natural num¬ bers, the others as artificial numbers. Negative numbers, also belonging to the artificial group, have until recently been excluded from arith¬ metic. They have, however, so many practical applications that they are beginning to find a place, and in time they will probably be treated in arithmetic so far as necessary for cases in¬ volving numbers of opposite nature, like debit and credit, opposed forces, and contrary direc¬ tions.

The distinctive feature of our present nu¬ meral system (see Numerals) is its place value. The characters for 5 and 1, written in juxtapo¬ sition, indicate addition in the Roman system (VI) ; but in the Arab-Hindu notation (51) they indicate 5 tens and 1 unit, the 5 having a place value showing that it represents tens. Thus by means of only 10 characters we are able to write numbers of any desired magni¬ tude, and by means of the simple device of decimal fractions we are also able to represent any numbers, however small.

II. Scales. — Because man has a natural counting apparatus in his 10 fingers (see Finger Notation) the world has come to write num¬ bers on a scale of 10, and to give them names based upon a decimal system. We might use other scales, and the duodecimal (scale of 12) would be better on several accounts, although a change is not practicable. There has always been some tendency to use the scale of 12, as is seen in such tables as 12 inch— 1 ft., 12 oz.— 1 lb. troy. Th.e superiority of the duodecimal over the decimal scale lies in the fact that 12 has more exact divisors than 10 has. Therefore the fractions most commonly employed could better be represented on the scale of 12, as is here shown :

L

i-

A

4

Scale of io

Scale of 12

0-5

0.6

0-333- • •

0.4

0 . 666 . . .

0.8

0.25

0.3

o.7S

0.9

0.125

0.15

0.08333. . .

1. 1

In the tables of denominate numbers the tendency formerly was to adopt a varying scale, but at present it is entirely toward a uniform scale, as in the metric system (q.v.) :

Uniform scale io mills = i cent io cents = i dime io dimes = i dollar

Yarying scale 2 pints = i quart 8 quarts = i peck 4 pecks = i bushel

III. The Fundamental Operations.-— These are now commonly considered as four in num¬ ber, although formerly as many as nine species, atti, or passioni, as they were called, were given. They sometimes included doubling (duplicatio) , because a common method of multiplication was by successive duplications. They also included halving (mediatio), this operation being often used in effecting a division. The Rule of Three, Evolution, and Progressions were also

commonly included. The fundamental opera¬ tions may more scientifically be classified as follows, each direct process having two in¬

verses :

Direct

Addition: 2 + 3 = 5. Multiplication: 2 X$3 = $6.

Involution: 23 = 8.

Inverse

Subtraction: 5 — 2 = 3.

. 5—3 = 2* Division: $6 -r 2 = ˆ3.

$6-ˆ + 3 = ˆ Evolution: 2 = V8*

Logarithms: 3 = log2 8.

Of these the primitive one is addition, mul¬ tiplication by a positive integer arising when the addenda are equals, and involution to a positive integral. power arising from multiplica¬ tion when the factors are equal. Arbitrarily, elementary arithmetic has usually excluded evo¬ lution beyond the cube root, and logarithms. It is now tending to relegate cube root to algebra on account of its difficulty and lack of applications. The exclusion of logarithms (q.v.) is due to their relatively late invention, since, if the theory of their computation is ex¬ cluded, the subject is simple of presentation and valuable in application.

From the primary operations with natural numbers have been derived operations, desig¬ nated by the same names and subject to the same laws, involving the artificial numbers. For example, 2X$3 = $6 means that $3 is taken twice as an addendum, thus : $3 + $3. But cannot mean that %■ is taken as an addend % of a time. It means that % of % is taken, or that Ys of % is taken 2 times. It is, however, con¬ venient to broaden the definitions so as to use the same phraseology and symbols as in the case of positive integers. Similar considerations fix a meaning for — 2 X — 3 = + 6, V2 X V3 = V6, and V — 2 XV — 3 = - — V6. For the justifi¬ cation of these usages, see Algebra, Definitions and Fundamental Concept. In certain cases an operation is so difficult that it is more con¬ venient to substitute for it another which gives the same result. This is seen in the case of the division of fractions, where to divide % by 3/i it is easier to multiply % by % than to reduce to a common denominator as was for¬ merly done, and then divide, thus : % + Yz —

%-21/9 = %!*

Of the four common operations, addition is the simplest of comprehension, although not in actual work. In fractions it is usually easier to multiply than to add, as in the case of Yi X 14/27 compared with Yi +]%7* With inte¬ gers, both addition and multiplication require the learning of 45 combinations of numbers

(1 + 2, 1 + 3, _ 1X2, 1X3 _), and the

mere memorizing of these facts is as easy in one operation as the other. Subtraction does not require memorizing a table, since it is merely the inverse of addition, and if taught by the <(making change® method it uses the addition table, as division uses that of multiplication.

IV. Checks. — An important consideration in all computations is the checking of the work, to be reasonably sure that no error enters. Checks should be applied at every opportunity so that' an error may be discovered as soon as it is made, and not vitiate the further work. The most important check in addition is the repeat¬ ing of the work in the opposite direction, adding downward if the first addition was upward. The psychological reason for this is that like stimuli tend to produce like reactions, and if an

error has been made it is liable to be made again if the numbers are soon met in the same order. Hence the order is reversed to counter¬ act this tendency. In subtraction the best check is that of adding the subtrahend and remainder. If the remainder was obtained by the ˆAustrian® or <(making change® method, this addition should be performed in the oppo¬ site direction as in the check for addition. The best check for multiplication and division is that of ((casting out nines.® This ancient Oriental method was of especial value when the sand- board form of the abacus (q.v.) was used, since the numbers were so frequently erased as to render a general review of the work impossible. This check has gone out of use in American schools, but it is so simple and valuable that it will probably be revived. The check depends upon two propositions: (1) The excess of 9's in a number (that is, the remainder arising from dividing a number by 9) is the same as the excess in the sum of the digits. In the case of 1247 the sum of the digits is 14, and this divided by 9 gives a remainder of 5. It is customary to cast out the 9's as the digits are added, thus: 7 + 4=11; cast out 9 and 2 is left; 2 + 2+ 1 = 5, the excess. I247

(2) The excess of 9's in the prod- _ 21

uct equals the excess in the prod- 1247 \6/

uct of the excesses of the factors. -2-4-94. . 3//6\f In the case here given, the ex- 26187 cesses in the factors are 5 and 3, indicated in the right and left angles of the croˆss. The excess in their product (15) is 6, indicated in the upper angle. The excess in the product, 26187 is 6, indicated in the lower angle. The upper and lower numbers in the cross are the same, shoAving that the result is probably correct. In division, the excess of 9's in the dividend equals the excess in the

product of the excesses of the divisor and the quotient, plus that in the remainder. Of course, the check of 9's fails to detect an error involving a multiple of 9. There is a somewhat similar check by casting out ll's requiring slightly longer time, but in some re¬ spects more liable to detect errors.

V. Short Processes. — There are numerous

short processes of performing operations, or rather of securing results by substituting simpler operations than those to be performed. Thus to multiply by 1214 it is often easier to annex two zeros (or move the decimal point two places to the right) and divide by 8. In the same way it is easier to multiply by 100 and divide by 4 than to multiply by 25. Such processes depend upon simple number relations of the following kind: 12§— 25 = 33ˆ= 125 = ˆ,

75%=94, 125%t=ll4. 66§%=§. The publication of extensive tables and the perfecting of calcu¬ lating machines (q.v.) have rendered obsolete most of the short processes involving other kinds of multipliers and divisors.

VI. Compound Numbers. — The four funda¬ mental processes with compound numbers were formerly considered of much importance, since before the introduction of decimal fractions most tables of denominate numbers were on a varying scale. Within a century, however, the metric system (q.v.) and various monetary tables have so decimalized denominate numbers as to take from compound numbers most of their former importance. The only case in which several denominations are commonly used in writing a number to-day is that of English

money. In most countries the whole subject is obsolete. Ihe United States still uses the British system except in the monetary table, but it has greatly simplified it, rarely using more than two denominations in the same number. Indeed, within a single generation the metric system has come to be used exclusively in this country in scientific laboratories, and the efforts now being made to secure a large foreign trade will make the system more and more known in commercial and industrial affairs.

VII. Methods of Solving Problems. — There are five general methods of attacking an applied problem, as follows :

(1) We may study typical problems and thus acquire the habit of solving others of the same nature. This is the oldest method, and was practically the only one in use before the 17th century. At present it is coming into renewed prominence in American schools, the type problem being attended (as was not formerly the case) by a large number of exercises.

(2) We may commit to memory rules for all general classes of problems liable to be met. Historically, this is the second method of at¬ tack, and it characterizes the American text¬ books until nearly the close of the 19th century. The rules were usually inductively inferred from type problems, and pupils committed them to memory. Since in practical life we never depend upon a verbatim rule, this method is rapidly becoming obsolete. In mediaeval times there was much effort expended in searching for a general rule that would solve all arith¬ metical problems. Hence arose the Rule of Three (see Arithmetic, History of), the Rule of False Position, and other rules of less im¬ portance, all of which lost their chief value when algebraic symbolism was invented. Of these general rules only the Rule of Three has survived, being now recognized in the form of proportion.

(3) We may learn formulas instead of rules. This method was received with some favor for a time, but it has been discarded as a general plan. It has all of the defects of the method of rules, with the added difficulty of an unnecessarily confusing algebraic symbolism.

(4) We may analyze each problem as it arises, simply applying common sense to the solution. When problems are, as they always should be, properly graded to the understand¬ ing of the pupils, this plan is better than any of the preceding ones. It establishes a habit of independence and of confidence that is wholly wanting in the older methods.

(5) We may bring to the aid of analysis the representation of the unknown quantity by the familiar algebraic symbol x. This mate¬ rially simplifies the analysis, and most writers on arithmetic at the present time advocate the plan. The concept of the linear equation with one unknown quantity is a very simple one, and it greatly clarifies the analysis in many cases.

VIII. Nature of the Problems in Arith¬ metic. — The interests of the ancient and mediaeval philosophers were not at all commer¬ cial. These men were attracted rather by con¬ siderations of the properties of numbers and by puzzles which were imagined to sharpen the wit. The rise of commerce in the later Middle Ages and at the time of the

Renaissance, brought into the science a large number of

applied problems representing actual business conditions. Principles of conservatism have tended to keep these ancient problems from generation to generation, strengthened by the feeling that mental discipline was as well secured from an obsolete as from a modern problem. . It is therefore only recently that the question has arisen : What should be the nature of the problems set for children study¬ ing arithmetic? In answer to this question teachers seem to be tending to observe the fol¬ lowing principles :

(1) A problem that pretends to set forth a business custom should state the real business conditions of the present. This excludes obso¬ lete business problems, it being the opinion that better mental discipline can be secured from a question relating to genuine commercial matters of the present, than from one relating solely to forgotten customs.

(2) Problems should appeal to the interests and understanding of the children in their re¬ spective school years. Arithmetic was formerly taught only to boys who could read and write and who were preparing for business. When the subject found its way into the earlier school years it carried many difficult problems of busi¬ ness down to immature minds. The modern tendency is to replace such problems by others that relate to children's interests. Thus in the primary grades there should be the study of home purchases, of the application of number to the large interests of the country, especially such as appeal to a child's love of nature and of the heroic, and such as relate to the sources of food and clothing. Later, the problems should refer to the more detailed features of the national and world life, to the great industries, trades and transportation facilities. Finally they should relate to the details of the indus¬ trial and commercial life, thus preparing both the boy and the girl for earning a livelihood. In all this there should be an effort to make arithmetic interesting, since when the interest of the pupil is secured the work is prosecuted with more zeal and is attended with better and more permanent results.

(3) In the effort to modernize the problems care must be taken to avoid the extreme of withdrawing from arithmetic all topics involv¬ ing effort, thus making the subject insipid from its very lack of fibre.

IX. Sequence of Topics. — Formerly arith¬ metic was taught from a single book, each im¬ portant topic being met but once. Then came the two-book series, the second book covering the ground of the first, but with more difficult ex¬ amples, thus forming a spiral of two

revolu¬ tions. In this way there arose the so-called Spiral Method of treatment, which certain devotees have carried to the extreme of return¬ ing to each topic every few days. Between the topical method and the radical spiral method there has been much strife. Advocates of the latter said that the former encouraged forget¬ fulness through lack of review, while advocates of the former said that the latter gave the pupil no feeling of mastery of any subject. The result has been a compromise, seen in all modern American courses. Such important topics as percentage are treated several times, ' with progressive difficulty, applications like simple interest offering new features on each succeeding occasion, On the other hand, such

relatively unimportant chapters as that on longitude and time (semi-geographical) are met but once. In the same spirit, the fundamental operations with integers, decimal fractions, and those common fractions often met in business, are frequently reviewed, while compound num¬ bers and fractions involving unusual numer¬ ators and denominators are less emphasized. The technicalities of business, including the study of investments, insurance, banking and exchange, are reserved until the last years of the grammar school, when a child beginning to look forward to being self-supporting is pre¬ pared to understand them.

X. Methods. — Various methods have been suggested for presenting arithmetic to children, especially in the primary grades. The serious consideration of this phase of the subject be¬ gan toward the. close of the 18th century, particularly in Germany and Switzerland. With it are connected such names as Trapp, von Busse, Kranckes, Pestalozzi, Tillich, Grube, Tanck, Knilling and Kaselitz. Each of these writers stood for some principle which he car¬ ried to such an extreme as to render the method generally unusable. Pestalozzi, for example, did great good in his judicious use of objective illustration, but he went to an unwarranted ex¬ treme in his emphasis of the unit and in his devotion to abstract work. Tillich suggested a valuable set of number blocks, but his follow¬ ers went to the extreme of eliminating all other material. Grube wrote a condensed manual for teachers, and systematically treated num¬ bers in concentric circles of progressive dif¬ ficulty, but he went to several extremes that made the system so absurd that it is now nearly forgotten. On the other hand, every promi¬ nent writer of this class has usually suggested some slight improvement which has gradually worked its way into the schools. It

has been the universal experience that no advocate of a single method has been able to impress this method on any considerable number of fol¬ lowers. The best teacher has been the one who, being interested in the subject, has im¬ parted that interest to the pupils, who has not been limited to any one set of objects or to any peculiar device, who has made arithmetic modern in its applications, and who has fol¬ lowed the best curricula of the day.

XL Time Required for the Subject in the Schools. — There has been a gradual diminution in the time allowed to arithmetic in American schools -for a number of years past, on account of the demands of more modern studies for a place in the curriculum. As a result there has been decreased attention to the subject, there is less ability on the part of pupils to grapple with problems, and the question has arisen as to the amount of time necessary to secure a reason¬ able facility in the arithmetical processes. Al¬ though the textbooks and the teaching have both improved, the curtailment of time and the scattering of the pupils' attention over more subjects have left the results far from satisfac¬ tory. It has even been urged that arithmetic be not taught before the third or after the seventh school year, thus allowing five instead of eight years to the subject. But although it • is true that the necessary parts of arithmetic can be covered in five school years, it is equally true that the child has as much delight in his work with numbers in his first school year as

he has in the other subjects studied, and quite as much need for this work. It is also true that the number facts are more easily impressed on the memory if the work is begun, as Pes¬ talozzi advised, when a child first enters school. It is therefore better to allow arithmetic to ex¬ tend throughout the elementary grades, com¬ bining with it, if the class is well advanced, some constructive geometry and the first steps in algebra in the eighth school year.

Bibliography. — Smith, (The Teaching of Elementary Mathematics 1 (New York 1900) ; (The Outlook for Arithmetic in America1 (Boston 1904) ; Brooks, <The Philosophy of Arithmetic1 (Philadelphia, 2d ed., 1901) ; Unger, <Die Methodik der praktischen Arith- metik1 (Leipzig 1880) ; McMurray, (Special Method in Arithmetic1 (New York 1911) ; Sussallo, (The Teaching of Primary Arithmetic1 (Boston 1911).

David Eugene Smith,

Professor of Mathematics , Teachers College, Columbia University , New York.

ARITHMETIC, History of. Among the ancients there were two distinct sciences now called by the name arithmetic. One had to do with the science of numbers and the other with the art of computation. The former was called, by the Greeks, arithmetic (apidperiK?/) t and the latter logistic (loyiorLnfj) . Logistic was taught to boys going into trade and among the most ancient peoples it probably involved the use of the abacus (q.v.) and commercial rules relating to rents, loans, exchange and the settlement of accounts. The nature of the problems being simple, and abacus computa¬ tion depending largely upon manual training, the instruction in this art seems to have been entirely oral. On this account no ancient work upon the subject is extant, and our knowledge concerning it is derived from such sources as the Babylonian cylinders, early Cretan remains, certain fragments of Egyptian papyri and the occasional references of literary writers. In the Middle Ages the instruction offered by the Church schools was so meagre from the com¬ mercial standpoint that arithmetic schools (Reclienschulen) were established, and in these logistic (Rechnung) was taught. A number of manuscripts of the 13th, 14th and 15th cen¬ turies are extant showing the nature of the problems then considered necessary, but ex¬ tant treatises on counter reckoning (see Abacus) are mostly confined to the first cen¬ tury of printing. Not a few of the problems of importance at that time still survive in the arithmetics of to-day, although substantially obsolete from the commercial standpoint.

The Greek arithmetic, or theory of num¬ bers, begins with Pythagoras (q.v.),. about 530 b.c., who taught their mystic properties, and to whose school is probably due most of their ancient classification. The fundamental divi¬ sion of numbers seems to have been into odd (apnoL) and even (7r epiTroi)> the former be¬ ing masculine, divine, lucky, and the latter feminine, earthly, unlucky. The expression f(There is luck in odd numbers,11 appears in Virgil as aNumero Deus impare gaudet ? and probably goes back to the Pythagoreans. The odd numbers were, on account of their geo¬ metric representations, also called gnomons (yv&poves)> and it was well known that the sum of the first n of these gnomons,, including

1 (which was not generally considered a num¬ ber until the 17th century), was a square rerpayovog) . The side (tt hevpa) of the square was called by the later writers radix (root, whence radical). It is therefore evident that the Greeks looked upon arithmetic from the

standpoint of geometry. Following out this plan, they studied triangular numbers, formed by arranging dots in the form of a triangle, as in the case of 3 (.'.), 6, 10, etc., and also pentagonal and other figurate numbers, solid as well as plane. Many other classifications were suggested by the Greeks, some of which have ' remained in our school books until quite re¬ cently. Such, for example, included perfect numbers (reletoi) } which are equal to the sum of all possible factors, including 1 (for ex¬ ample, 28— 1 + 2 + 4 + 7 + 14), and amicable numbers (ihioi)f each of which equals the sum of the possible factors of the other, in¬ cluding 1 (for example, 220 and 284). Euclid (q.v.) (c. 300 b.c.) emphasized the ancient arith¬ metic in his books II, V, VII, VIII, IX and X, although II, V and X are nominally geometric. Soon after, Eratosthenes (q.v.) (c. 225 b.c) 'made a particular study of primes, and invented a "sieve® (KoaKivov)t which bears his name, for the purpose of sifting out the composite num¬ bers. In the next century Hypsicles (c. 180 b.c.)_ made a more extensive study of progres¬ sions than had before been attempted. It is, however, to Nicomachus (q.v.) (c. 100 a.d.) that we owe the first great treatise on arith¬ metic (E«r ayuy?) apiO/ir/Tucy), a work which sought to do for that subject what Euclid had done for geometry, and which actually suc¬ ceeded in turning the attention of the later Greeks from the science of form to the science of number. The next great arithmetician was Diophantus, who wrote probably in the 4th century. His arithmetic ('ApiOpyrim) pro¬ fesses to be in 13 books, but only six (seven in one Vatican MS.) are extant. In the main, however, this treatise relates rather to algebra.

The greatest difficulty of the ancient arith¬ meticians and calculators lay in the treatment of fractions. This is seen in the oldest mathe¬ matical treatise of any note as yet deciphered, a papyrus copied by one Ahmes, an Egyptian scribe of c. 1700 b.c., from an earlier MS., prob¬ ably dating from c. 2300 b.c. Here all of the fractions, save 2/z, have 1 as a numerator. For example, X2T was written, in hieratic characters, as A A A. this meaning that the sum of these unit fractions equals h . The Akhmin papyrus, written more than 3,000 years after the original of the Ahmes work, gives the same treatment of fractions, thus testifying to the difficulty of the subject. While the Greeks and Romans simplified the subject and improved the symbol¬ ism, it is to the Hindus and Arabs that we are indebted for our present convenient forms.

The Romans contributed but little to the theory of numbers, although their mercantile spirit doubtless led them to improve the abacus. Their only writer of prominence was Boethius (q.v.), who, early in the 6th century, did much to make the ideas of Nicomachus known in western

Europe, and whose treatise was the standard in the Church schools for many cen¬ turies.

Of the early Hindu arithmeticians but little is known. There are, however, several works extant that set forth the theory and practice

of numbers in the period following the intro¬ duction of the zero and the consequent per¬ fecting of the system of place value. (See Numerals). It is in this period that the foun¬ dations for our common arithmetical op¬ erations were laid. From the Hindus the Arabs of the Bagdad school (c. 800 a.d.) drew their inspiration. The earliest Arab writer to make extensive use of the Hindu numerals, in a textbook on arithmetic, was A1 Khowarazmi (q.v.). So prominent was his treatise that his name became a synonym for the Hindu arith¬ metic, even as Euclid became synonymous with geometry. The early Latin translations, one of which was made by Adelard of Bath (q.v.) (c. 1120 a.d.) , went by such names as (Liber Algoritmi' ((The Book of A1 Khowarazmi') , whence comes our word algorism (algorithm, in Chaucer augrim), a name for a long time used to mean the arithmetic of the Hindu numerals.

The Arab arithmetic became known in Chris¬ tian Europe chiefly through the c Liber abaci' of Leonardo Fibonacci of Pisa (q.v.), in 1202. In the 13th century the great rivalry of trade brought into prominence the commercial aspect of the subject, and from this time on the theo¬ retical treatment as exemplified in the works of Nicomachus and Boethius gradually lost7 ground.

The first printed arithmetic appeared anony¬ mously at Treviso, in Italy, in 1478. In Ger¬ many the first one to appear from the press was published at Bamberg in 1482. The com¬ mercial supremacy of Italy and Germany was such that their works for the next century were largely mercantile, the arithmetic of the Boe- thian type being published more often in Paris than elsewhere. It was quite late in the 16th century before France produced many com¬ mercial arithmetics, and when these did appear the tendency to unite some of the features of the Boethian arithmetic gave their books con¬ siderable influence. The first arithmetic to be printed in England was the prolix theoretical work of Bishop Tonstall (1522), and it was not until about the middle of the century that Recorde (q.v.) began to publish his popular commercial textbook. Owing to the great mercantile activity of Holland between 1575 and 1650, a large number of arithmetics ap¬ peared in that country early in the 17th century, and materially influenced the textbooks of England. To this creative period of arith¬ metic is due a large amount of matter once of importance but now

quite obsolete. An ex¬ tended treatment of compound numbers and of certain forms of exchange was more necessary then than now ; barter was of great importance ; partnership accounts were settled b3r a process quite different from that of to-day; alligation was of real use in the numerous mints then existing; proportion (usually in the form of the Rule of Three, Regula de ire, Regeldetri) was much more often used in practice than at present. The first arithmetic to be printed in America was Hodder's popular English work, which was republished in Boston in 1719.

The symbolism of arithmetic amounted to very little before the 19th century, when the symbols invented for algebra (q.v.) between 1550 and 1650 were rather injudiciously adopted in elementary arithmetic. The greatest ad¬ vance since 1600 has been the invention of decimal fractions, a feature which revolution-

ized business arithmetic, making percentage simple and common, and rendering tables prac¬ ticable.

The operations of arithmetic were formerly performed on some kind of abacus (q.v.) At the time of the invention of printing our present forms of addition and subtraction were quite common. There were, however, several meth¬ ods of multiplication, although our present form was already in favor. The present method of division did not come into general use until the 17th century, although it appears in rare cases in the 15th.

Bibliography. — Kerr, (Geschichte der Methodik) (Gotha 1888) ; McLellan, J. A., and Dewey, J., Psychology of Number) (New York 1895) ; Beman, W. W., and Smith, D. E., (Higher Arithmetic (Boston 1897) ; Tannery, (Legons d'arithmetique theorique et pratique > (Paris 1894) ; Unger, Pie Methodik der praktischen Arithmetic (Leipzig 1888) ; Can¬ tor, Worlesungen fiber Geschichte der Mathematik) (Leipzig 1880-1900, 3 vols., various editions) ; Sterner, (Geschichte der Rechen- kunsD (Munich 1891) ; Fink, (History of Math- ematics) (trans. by Beman and Smith; Chicago 1900) ; Peacock, article on ˆArithmetic® in the Encyclopaedia Metropolitana) ; Cajori, F., (History of Mathematics) (New York 1913).

David Eugene Smith,

Professor of Mathematics, Teachers College, Columbia University ,

New York.

ARIUS, an Alexandrian theologian and controversialist, the father of Arianism (q.v.) : b. in Libya, north Africa, about 256 a.d. ; d. Constantinople, 336. He was educated under Lucien at Antioch and later went to Alexandria, where several years afterward he so severely suffered from the Diocletian persecution. He was ordained deacon by Peter, Bishop of Alex¬ andria, whom he had joined in the Meletian Schism; then joined the schismatics and in consequence was excommunicated ; later re¬ pented and was restored to his former good standing; and about 311 was advanced to the priesthood and placed in charge of a suburban church.

In 318 Arius became involved in a contro¬ versy with Alexander, Bishop of Alexandria, about the doctrine of the person of Christ, the latter contending that there was only a single essence, whereas Arius denied that Christ was

unoriginated being, but was created out of nothing and therefore in essence must be dif¬ ferent from the Father. He also affirmed that though Christ were the Son of God, he was not so in and of himself, but only so by the grace of God the Father; and that, were he in the truest sense a son, he must have come after the Father, therefore the time obviously was when he was not, and hence he was a finite being. These doctrines, emanating from a man of so great personal popularity and so highly regarded as a presbyter, though they contained nothing essentially new or original in thought and had been more or less prevalent in the Church for three or four generations, soon gained many adherents. Alexander, fearing the spread of the so-called heresy, in 321 called a council of 100 Egyptian and Libyan bishops, and Arius was immediately excommunicated.

Arius then retired to Nicomedia, under the protection of one of his supporters, Eusebius, Bishop of Nicomedia, who, notwithstanding

Alexander's exhortations to exclude the her¬ etic, absolved him, and at a local synod in 323 brought about an endorsement of his opinions and actions. The dispute soon attracted the attention of Constantine, who had become em¬ peror in 323. Thinking to avert further con¬ troversy he sent his ecclesiastical adviser, Ho- sius, Bishop of Cordova, to Alexandria, in an effort to arrange, through concessions by both parties, a doctrine to which both would sub¬ scribe. This attempt at reconciliation being barren of results, Constantine in 325 called a general council of all the bishops of the Church at Nicsea, in Bithynia, Asia Minor. This was the first oecumenical council and the attendance

has been variously estimated. Gibbon places the number of bishops at 318; Eusebius at 250; and others at 300 and 320. About 2,000 other representatives of the Church throughout the East also attended the sessions. The Eastern bishops attended in person ; the Western Church was represented by seven delegates, the most important of whom was Hosius, Bishop of Cordova, who presided over the sittings, which continued for about two months.

The conference developed into three distinct parties: (1) The strict Arians, led by Arius himself, who claimed that Christ was a pre¬ existent, divine, finite being and was different in essence (heteroousios) from the Father ; that he was created by the Father out of nothing, but that he himself was the creator of the world and the incarnate Saviour; (2) The semi-Arians, who maintained that Christ was not identical in essence, but was of similar essence (homoiousios) with the Father; and (3) the Athanasians, led by Athanasius (q.v.), a young deacon of Alexandria, as Alexander's personal representative, who contended that the Son was identical in essence (homoousios} . There were two other parties present, those of Eusebius of Nicomedia, and those of Eusebius of Caesarea, the latter of which formulated a compromise creed, which was not, however, adopted. These two favored Arius and were classed as heretical, but later both signed the creed as adopted. After much discussion of the doctrines of Arius, his creed was torn in pieces and he himself ejected from the council, and the Athanasians succeeded, with the help of Constantine and the Western bishops, in securing the adoption of a creed to which the Arians would not subscribe. The council de¬ clared that it was and always had been the teaching of the Church Apostolic, in conformity with the apostolic tradition in all the churches, that Jesus Christ was (<consubstantial® — in essence the same — with the Father. Thus in the Nicene Creed will be found the words con- substantialis patri, an exact rendering of the Athanasian claim homoousios. The creed reads: ((We believe in the God, the Father Al¬ mighty, maker of all things visible and invisi¬ ble; and in one Lord Jesus Christ the only- begotten Son of God, begotten of the Father (that is of the essence of the Father) before all worlds God of God, Light of Light, Very God of Very God, begotten, not made, being one substance (homoousios) with the Father,® etc. This was < somewhat abridged in the Nicaeno-Constantinopolitan creed of 381 a.d. In consequence of refusing to sign the creed as adopted, Arius and two of his companions were excommunicated and banished to Illyria.

ARIZONA

Soon after the Nicene Council had con¬ cluded its work, the semi-Arians began to as¬ sail the creed, and during the next few years Arius himself carried on propaganda work against it, corresponding with several prominent bishops, with the result that in 331, through the influence of Eusebius and Constantia, sister of the Emperor, Arius was recalled to court. Constantine, upon being convinced that the creeds of Arius and Athanasius were sub¬ stantially alike, ordered Athanasius to receive Arius into the communion of the Church. Athanasius refused, was deposed by a synod of bishops at Tyre in 335, and sent to Gaul. A second S}mod, convened at Jerusalem in the same year, remitted the decree of excommuni¬ cation against Arius and his followers, but even this did not establish him in his former exalted position nor cause his doctrines to be accepted by the followers of Athanasius. Dis¬ appointed and disheartened, Arius in 336 re¬ turned to Constantinople, where, again con¬ vincing Constantine of his orthodoxy, orders were issued to Alexander, Bishop of Constan¬ tinople, to administer the holy communion to him the following Sunday, but on the Saturday preceding his expected restoration, he was sud¬ denly taken ill and died. See Arianism ; Christology; Council; Creeds; Eusebius of Nicomedia; Eusebius of Caesarea; Incar¬ nation; Nicasa, Council of; Nicene Creed.

ARIZONA (from the former Papago lo¬ cality of Arizonac, or Arizonaca, probably meaning <(place of small springs,® a few miles from the present Nogales, where some celebrat¬ ed nuggets of silver were discovered in 1736- 41. It has no connection with ((arid zone,® etc.). A State of the United States (Western or Pacific group), bounded by Utah and Ne¬ vada m the north, New Mexico on the east, Mexico on the south, Nevada, California and Lower California on the west. It extends from lat. 31° 20' to 37° N. and from long. 109° 2' to 114° 35' W. Land area, 113,810 square miles (72,838,400 acres), thus ranking fifth in size among the States. Pop. (1910) 204,354, (1920) 333,903. Increase 63.4 per cent. The capital is Phoenix.

Topography and Geology. — Topographi¬ cally Arizona presents two great divisions : a plateau region in the north, made up of ap¬ proximately horizontal strata ; and the moun¬ tainous region in the south, consisting o f up¬ lifted strata plicated and folded with mineral rocks and intrusive veins. These mountain ranges are numerous and have a general north¬ west and southeast trend, with intermediate broad valleys often 20 to 30 miles wide. The chief mountain masses are the Castle Dome, Big Horn, Eagletail, Chocolate, Dome_ Rock, Palomas, Harquahala and Harcuvar in the southwest ; the Aquarius and Colorado in the west ; the great plateaus rising in what are sometimes called the Northside Mountains in the northwest; the San

Francisco and Black in the north central ; the Carrizo, Lukachukai and Tunicha in the northeast; the Zuni, White, Mogollon and Apache in the east; the Gila, Peloncillo, Pinaleno, Dragoon, Galiuro, Santa Catalina, Huachuca and Baboquivari in the southeast and south. The isolated volcanic San Francisco Mountains above Flagstaff are the highest of all, rising in their greatest height to 12,794 feet, and in Humphrey Peak to

12,562 feet. The other important peaks in the State are Thomas, 11,496 feet; Escudillo, 10,- 691; Graham, 10,516; Ord, 10,266; and Greens, 10,115, while many others exceed 5,000 feet, io the south the surface falls sharply to low ridges, mostly volcanic ; thence by 'terraced mesas to a great desert plain little above sea- level,, cut by gullied stream-beds drawing the occasional rainfall to the broad and shallow Gila. The great northern plateau, or series of plateaus, . range in altitude from 5,000 to 7,500 feet; rising from them are numerous moun¬ tain spurs, buttes and the cones of extinct vol¬ canoes, while the Colorado River has cut through 6,000 feet of strata, exposing forma¬ tions down to Carboniferous and Tertiary marine strata, underlying Tertiary lake sedi¬ ments and later alluvium ; indeed it has been said that every period of the world's history since the dawn of life is represented in the geology of Arizona. The surface of the land as it lies was. formed by a huge Eocene uplift, the water action afterward cutting the gorges and shaping the mesas and buttes ; another took place in the Miocene, with eruptive volca¬ noes. Near Holbrook, Navajo County, is a wonderful chalcedony forest (see Forest, Pet¬ rified), with prostrate trunks four feet thick cracked into exquisitely colored blocks. Every¬ where a feature of the landscape in the north¬ ern section is the great isolated mesas of sandstone with scarped and pinnacled sides, often more than 1,000 feet in sheer height. Most of the stream courses are dry save in the rainy season, and even then thei'r flow is some¬ times swallowed by the sands. The one con¬ siderable river is the Colorado (q.v.) which flows generally southwest from Utah for 400 miles through the famous Grand Canon of Ari¬ zona (q.v.), one of the wonders of the world, then turning south, forming the western bound¬ ary of the State until shortly before it reaches the Gulf of California. Its chief affluent in the State is the Gila, which flows entirely across its southern portion; other tributaries are the Vir¬ gin, which crosses the extreme northwest cor¬ ner; the Colorado Chiquito or Little Colorado in the north, and Bill Williams fork in the west. Important tributaries of the Gila are the Salado, or Salt, and the Verde from the north and the San Pedro from the south.

Climate. — ■ Arizona is entirely within the arid region, but owing to the difference in alti¬ tude of' the northern and southern portions

there is a wide range in temperature, as like¬ wise in precipitation between the two sections. The average annual precipitation at Flagstaff since 1850 averaged 24.65 inches, that of Yuma 2.84 inches ; while the mean temperature is 45° in the north and 69° in the south. The sandy plains of the southwestern part are the hottest region north of the Isthmus of Panama, 120° in the shade being frequent in summer; but even in this lower area, owing to the dryness of the atmosphere, the heat is not very oppres¬ sive in summer, while the winter climate is usually delightful. Heavy snows occur in the mountainous country of the north and sharp frosts are frequent even in the Salt and Gila valleys ; but nowhere are the mountains per¬ petually snow-capped. In recent years Arizona has become a popular resort for those suffering from pulmonary tuberculosis and catarrhal ailments, but notwithstanding the deaths of

those who settle in Arizona when seriously af¬ flicted with tuberculosis, the total death rate in 1914 was only 14.98. In 1913, out of 779 deaths from this cause, 538 cases had their origin outside the State.

Minerals and Mines. — Arizona is rich in minerals and its mining industry is of prime importance. In 1915 it was first among the States in copper production, 459,972,295 pounds having been mined; it wTas fifth in silver (5,649,020 fine ounces, commercial value $2,- 864,053), and fifth also in gold (201,531 fine ounces, commercial value $4,166,025). Of lead, 21,738,969 pounds were produced, valued at $1,- 021,732, and of zinc (spelter) 8,428,526 pounds,. There are also deposits of coal (as yet but little worked), fluorspar, mica, molybdenum, nickel ores, limestone, marble, granite, sandstone in limitless quantities, chalcedony, tungsten, tur¬ quoise, vanadium, garnet (pyrope) and other minerals, and there are numerous hot and min¬ eral springs. In 1915 Arizona ranked seventh in mineral products, the value being $91,541,-

1.

Soil, Agriculture, Forestry. — Of the 72,-

838,400 acres in Arizona, 1,935,327 acres were cultivated in 1900 and 1,246,613 acres in 1910, a decrease of 35.6 per cent ; farm property, however, increased in value from $29,993,847 to

$75,123,970 during the decade, while the num¬ ber of farms increased from 4,985 to 8,203, of which latter number 7,038 farms were free from mortgage. Only 1.7 per cent of the total land area was in farms in 1910. The valley lands are marvelously fertile, experiment dem¬ onstrating that in the southern part, under fa¬ vorable conditions, the yield per acre is 2,150 pounds for wheat, 4,000 to 5,000 pounds for potatoes, 12,300 pounds for tomatoes, 5,000 pounds for strawberries, 27,000 pounds for melons and 1,735 pounds for corn. Lack of water has been more or less a hindrance to the development of the agricultural sections, but with the construction of storage reservoirs in recent years by the government, it is esti¬ mated that a total of 10,000,000 acres will be reclaimed. In 1910, 320,051 acres were under irrigation. The staple crops are alfalfa, barley, corn, wheat, sugar beets, green vegetables and orchard fruits and grapes. Experiments in the cultivation of Egyptian cotton have proved successful, 6,500 acres having been picked in 1916; and tracts of alkali lands in the south, hitherto believed to be waste, are ncrw being utilized largely by the State for date culture.

The mountains and mesas of the northern part are generally covered with nutritious grasses, forming excellent pasturage for cattle and sheep, while irrigated pastures in the south afford means of fattening for market. In 1910 there were 833,458 cattle, 1,227,864 sheep, 114,609 horses, 5,284 mules, 9,982 asses, 259,- 396 goats and 18,512 swine. Fowls were valued at $1,545,966, bees at $104,374, and dairy prod¬ ucts at $909,411. The wool production in 1909 was valued at $983,761 and mohair at $63,120. Of the total value of crops in the same year, 46.4 per cent was in hay and forage ($2,553,- 228), and 28.6 per cent in cereals ($1,570,853). The value of all crops was $5,496,872, an in¬ crease of 122 per cent in 10 years.

The southern plains and parts of the north have a dress of sagebrush, greasewood, yucca, cactus and other desert growths. Cottonwoods

line almost every stream. Mesquite, the giant cactus or saguaro, paloverde, ironwood, Jeru¬ salem thorn and other trees are indigenous to the southern plains, and vast mountain areas throughout Arizona are covered with pine, cedar, juniper and other valuable timber. An important lumbering industry has been devel¬ oped in the vicinity of the San Francisco Mountains, but vast tracts of timber in this and other sections have been set aside by the government in the Kaibab, Coconino, Dixie, Prescott, Sitgreaves, Tonto, Apache, Coronado, Garces, Chiricahua and other forest reserves.

Industry, Commerce. — Mining is the chief industry of Arizona and copper the chief metal mined, although considerable gold, silver and lead are also produced. (See above). In manu¬ facturing Arizona holds no important place, ranking 42d among the States, but gaining an increase of 27.5 per cent in value of products in five years. In 1914 it had 321 manufactur¬ ing establishments, representing an investment of $40,282,000, a product worth $64,068,000, and wage-earners numbering 6,888, with wages amounting to $6,221,000. In 1909 there were 251 producing mines and quarries, with 16,917 wage-earners and with products valued a $34,- 217,651, of which sum $31,614,116 was in cop¬ per.

Finance. — • The total receipts for the fiscal year 1919 were $5,257,140 and the expenditures $5,760,455. On 30 June 1919 there was an un¬ expended balance in the State treasury of $1,329,261, while the bonded debt amounted to $897,972. The assessed valuation of all prop¬ erties amounted to $834,020,532, the general levy rate being $4.48. The same year the number of National banks was 13 and of State banks 47, with a capitalization of $3,046,452, and total deposits amounting to $30,093,522.

Railroads. — The railroad mileage in 1916 was 2,404 and was valued for assessment at $93,147,822; of the mileage 69.88 miles, valued at $1,165,200, were exempt from taxation until

1.

Defense. — -In 1915 the national guard of Arizona numbered 883 men ; in addition there were 12 civilian rifle clubs with a membership nearly equalling that of the organized militia. The only armory in the State was erected at Tucson in 1915 at a cost of $28,000. In 1913- Arizona's rifle team won 10th place among 45 competitive teams at Camp Perry; and in 1914, at Fort Riley, with matches open to entries from the United States army and western and southwestern States, the Arizona marksmen re¬ ceived first awards in all of the eight matches with the exception of two, establishing a State record.

Education. — Arizona has a good public

school system and is energetic in extending its facilities to its children despite the scattered population. Education is compulsory. The school population in 1914 was 53,845 ; the esti¬ mated number of children of school age (5 to 18 years) being 57,491. The value of school real and personal property was $501,852,186 ; teachers employed, 154 men (average salary, $113.87), 942 women (average salary, $85.59).

In teach¬ ers' salaries Arizona is exceeded by only six States. Cost of maintenance, 1885, $138,164; in 1914. $2,135,549. There is a State Univer¬ sity at Tucson (308 pupils), normal schools at

ARIZONA.

Estimated population, 272,034

COUNTIES

Pop.

9,196

Apache .

. L 5

Pop.

3,773 Mohave .

. . . .C 4

34,591

Cochise .

. . . K 12

11,471 Navajo .

. . . . J 6

8,130

Coconino. . . .

. F 4

22,818 Pima .

..G 11

16,348

Gila .

. J 8

9,045 Pinal .

. .H 10

9,181

Graham .

. . . . K 10

6,766 Santa Cruz . . .

. . . I 12

14,818

Greenlee . . .

. L 9

15,996 Yavapai .

. . . .F 6

34,488

Maricopa . . . .

7,733 Yurpa .

. . . B 9

[Incorporated Cities and Towns

£9,019

Blsbee .

. . . .K 13

500 Pima .

. .K 10

y*« 275

Chloride .

. B 5

5,092 Prescott .

,...F7

4,874

Clifton .

. M 9

929 Safford .

. . K 10

6,437

Douglas .

. . . .L 13

1,473 Tempe .

1,633

Flagstaff. . . .

. G 5

904 Thatcher .

. .K 10

807

Florence. . . .

. H 9

1,582 Tombstone . . .

...K12

7,083

Globe .

. 19

16,750 Tucson .

...Ill

2,393

Jerome .

. F 6

570 Wickenburg. .

,...E8

1,692

Mesa .

. G 9

1,267 Williams .

. . . .F 5

3,514

Nogales ....

2,381 Winslow .

8,621

Phoenix ....

. F 8

2,914 Yuma .

. . . A 10

Longitude West

Greenwich

ASt. George

Colord.

Kavrnb

Round Peak Carrleˆo r >

VcARRlSCiSsˆ UJ MTS rfc’

JˆvTuWfcr Butte'*,

i >■< <}<, Crt

/ˆiv**'Echo Peaks - 2 \

jgv A

C ' Xavajo Spring]

A nteh.

°J3hort Creek 'Ifredonia

aria

reran] j~, Sorvu

Mt. Bangs \

s&SttaJIlack Iwck eg :\SprinJf >

Parla Plateau <i

,*t Pastor* I peak

{V* Ulnkaret a.

A 5 1j|

;A o Plateau

Needles

&t*Uf»o Spring

1 ' / ˆKavent»A

NATIONAL MONUMENT

) Los Glgantes \» ' Butte /|

Bitter Spring Kc

Peto Spring i r (Kearn District) 1/fhlte

' White IHesqjjS!!

i NA V A JO Nat. BrldgMW/.

Mnngum Sprii Big Spring

Kaibab

Plateau

Cane r Spring

Shantu Sitritaf

Pi tsc hy tso Butte ■

Roof Butte

8t. Thomas

Def/ebckifl f <v Lako %

0.8SK . .

,. eS&fZlIleiaf \ |‘Chinuˆ

Mesa p'eatˆpnUto 2$ £ /~?,t

HOPt (Moqui) Tghau<tM\

• j /, — ˆ Sppng oZˆUc'y vˆ'

lokamka V ? - J

.VpHnˆ

DE MOTTE PAKK

NIc Dolt Soe*. Peak *

\ Tfrtf Lake

RESERVA TIOl

2

C'l\rf SezhtnJy :Vio hah i /

A ^ r'b. A Sonsala Butt?'/^.

[«(zo LaAre L ^ o,

7 ^ «!w®

S|

NATIONAL

'INDIAN

CoconincT

Coconino \ Plateau '

'M/V RESERVATION V

Iralbi / , >V X

. %

j'-'"TU$AtAN" Kearns Canary Slants Chaii^1 Jadi# <

Peak% C Goldˆf ■ Basin ^

■1 A i 'OX /Hop!

(Anita Red Butte

‘ 7,<W)

Wlllaha

‘Howard / Hill |

Whlteh ill's

Black

Cornfields

Corner Springˆ Cottonwood Spring u

, Sunrise Sprii 38 Spring

It. I / ˆ / '•

/ I L > pH

AlianˆwnV/

; -'pVhˆSc

'{/ ,r V/ˆfchambers

NavaiOjˆfc'V.

ig*? 1 Squaw Spring ˆPinto

Chloride

Keystone

ˆ — f MineralyJWˆ-

rv§ .) \Park f ;hi » *' 1 Ccrbat i p > v~£ BullijHeadˆ / Ul R°cKlfc \Unlonr4iJ I = % BLACK

- r- M.Tt > Nutt/ ˆ7

i4fc uTE li

oh are “ofiˆdroad ˆ.-JT City °0dtrf\an '- (Ml

r*v- / 0rnn < l]

O! Leary Peak Fallt\

lc,' > H

:t MTS.

Age s s iˆfefTv- ClMt. Elden'O'*

Indian .Wells ,

TwlnJButte

Castle / Butte

Chlmfiey , '•Butte J

H*

I VC. Peaooqki

fe Lf Berry ^ peakˆ7. ˆdTLoulse 6,208

f Kiiiffnian

MeConnico > ,: ^ i '

JiancockˆHualpal Pe.ak)-» «

DrakeiˆˆB — - . /? < : ’

P|lgt,Rook

ˆPloaoho

Butte

Lithe I

BrSS H

Sunset ^| Kno.Hˆ > -

AˆButte'

ˆAt hurst Lake (j

Kaster-

ˆAdamana

o

r’pˆTRlFlEO FOREST l

Hit «3»ˆWT -

: Wford / <

h Woodruft Butte'

Mojave.

CjLMohon Mt.

MTS.

£2*5 .V^^tˆilson Mt-. -rˆ ˆpˆ(dˆ0oA I Mu r\ˆs- M iif 0 St

a v?se

■ Pass

ipignus Peal

4ˆJV1cHeffyt js ted lea ˆ Butte

Woodruff

iranlWtPeak • Vˆ_

4ˆ/Havl,

ˆFranconia

MOHAVE

MTS.

kˆ-Brossmai

Peak

if ') tf

Tivin Butte /

/ Hunt yolvrttdV\

Stl .loHns

Conch < 4 -;N *

Spring J , * ,£ Lake £

e • •■'T-. f- ˆal,avA x1 'f'sN ‘VolcanoˆX (

. ! <r 'SKUˆjuj.

!. f Spring ■

Gteen PeakˆˆA*,

■f ’ˆˆjˆl0ˆ'Hfˆgolˆerˆˆˆ

|y/c4v

Thousand | Cave Mfc •

Baker Butte

Steamboat ˆ Rock .

• Shumway; “Vˆl — J PinedaieˆT Silver Creek

/ I “/ -v. Linden/ 1 I

Pk.ˆ

ˆSˆ-Cbildso

Turret Peak

North Peak

Tonto Basin

Dikmond Buf/tteˆ

' ˆ / klwt

■“ Pleasant Vdlley*&rˆ.

Bloody

Basin s

FORT APACHE.

Silver Bail "loj

Peak im&.a" 1

‘INDIAN RESERVA!

L'd:v.-t> ˆutt:

LlnsTrey

/) N utrloao o L\1££-' I

'Mareht^^ \ © AqA-t Alpine (

OTirfy .Peak; — 1

7/ ˆ11 496 / P

Cibecuc.

Castle, Mt,

h'fa ,/ftr'r,lnghr PaJ£

Red’Rooˆ'..

lot Springs,'

Porepaugh

DLORADOi 4 Hou

]m-rnm

IND. /Lf » ,0ˆ

flTW.rˆer \l

e v-fLookout Mt. sombrero.

m \4ib*,4i

Du t ofov 0 m an Bu WjLgfzZ*

Roosrbefhˆ \ ! fc/\l

Mt.'Bulord

ˆ(SlaoKiM. ™a»-Fout'/ rcOTJiV£LL« (f.ryy Peaks

rRTvpj

' Cave Creek ˆ ’/ .Pinnacle Mt,

N cDow«%»E3 v ThoMpsoTf 4

oˆpk./ˆrˆ

Haystack Vicksburg; -t* iButW //#- 4_y

rCJ: ' 1

. fe’»ocd.tilˆ4i4 =

[uartzslteˆ

iAV.ˆh

ˆpNUMEN-

Harqua Hala Desertl

SAN CARLOS

/ Vi v!u

'Cihol. (tV

,c/6o;ti 1 ' 5..

v\ 5 / J 1 S

Va//e!t ˆ A- \%»

'{light Houfe Roek’ˆVf:

(rr-t\ V'i

A v ˆ —-Castle Dome5 O ., Peak #/

JNDIAˆ

Tplets

I' i"

««agy.t

1 Si,

ˆ71 v ˆOlaricopa Slnokttnter nSS£«

§ (*’ Pap ig‘ ’jNn > '

f*£i! ®utte P\ ˆNkCasa | Grande ' -ˆrArisolft

Casa' Grande Mt. ˆTolteo

ifp.n Kofa°ˆ'Jtw

Peak

Polaris'

Mt. Bjlaaˆ®- r25ˆSl.ro„ImˆW

dtftFort ThuW

Sfsˆri j

Bun\er?Vr CliftOIl

/inly den - ˆVrlnkelmanr

£ Teldman

Agua Oalienti

" Corked'? M.UbtvrXV

Thumb

Palomasw

f) iLarruna ' \ /•' _ rt Jr ˆLaguna : gN Dome

'Texas Hi M

Norton1!!

r'£ˆ

.m J-

oj Butte

I Bu,,e a'j

L .Mid-/ I? »*j/

Copper Creeki

/ v

Eureka i.C Spring'

Santa Cruz'

Mammoth < Shultz

Plcachh'

S» Ocntilla •*

" '? > DCˆ d l \ Red Rocket'

■° Somerton.? -'JF ■

s- -*z '/'

4 Golden _ Picaoho Peak

'Oracle ,

Apache r jPeak.

Sa8co'

JOOTH

Orange

(jadsden

Marbleˆ Pk. —

f k/VRedlngtoni

. S .

ˆNViajoes MT

Ip rM stockham /Mica'Ml. .

:fejkae°"i'#s

™ˆ®lˆu > 5xE,«-o?d , §

.PAPAOO7]! !lx“':"BiSNSJall- .; “

Escala

PRlETi

.Marana X Rjlllto

SUvcrl

McAlister Raso/(3cˆ>Nˆ-

•

. WUlcox/oˆ,

Hade /SS&fc

ohnL'0""“."D°,*cli't*

/Cochise

ro/w: Flat '

<■* y- VServoss (rngoonv —

jwTemarch'

Nine Mile Peak'

£ San Simon! kd' y. Head I /SˆBbje Mtj .ˆfepvaradlseJ

'ˆVliinzoi

luijotoa

•-" \M[Ofitezum« •yRe Heˆ3

Cienegm'

BahaaritaP^”-’^^^,.

In.rt MfFajan .. \

Morales l ˆ RiT A { lanoe/ •• ˆCob|<

V4 7vs"‘lh:l

tA>ut'5Br.ˆ. *p 'a i

Light

cj,1/— WUgus /

.cˆ/ˆ7{fBaboquivari It 3 5 |ˆk*oERRo r2ˆ- ˆ1 §1 C0LS?s.D0|

53 cd. % Cerro Coloradoˆ 00 5 O Aguirre 8' r Peak

vSaaftbefa

.6® n- 4 POZOˆ

’ verdeV f MTS.

.6" ˆ Indian

in.Buttei

, r4|Ii,ddl‘ lcSndˆ«l». C-I “"A*"

ro,7r/4v'. Sˆ. .TomSStone f

' ' yJastro, | , Elfrida \SV

ˆ.Charleston oi

f/BTRanch A ˆjslspfinga Sori<i-Vfom'8,0R'i j u ~~£\'

*y%mi/Res. '

ˆandi>.W5P'Vur* : At><ln hup (Corta Cal urn

Railroads

7?Amadu jˆe 4-.0

r-

Eleotric Lines

!rittend«n

TcimaofeyfTraS

Matˆ-Morlumentˆo \ «,•

4 A '-'Gro UlancoSiWnvˆ-

f J\ ivEncina Lj4 / 'V.

ARIZONA

Frinteras

Statute Miles, 39 = 1 Inch,

Cananca

Clbuta

Rand McNally's 1L x 14 Map of Arizona. Copyright bT Rand McNally k Co,

Ytabai

Tempe and Flagstaff and 17 high schools. There are also numerous private and sectarian schools. The government and various secta¬ rian organizations maintain 59 boarding and day schools for Indians among the various tribes and there are also government non-res¬ ervation schools at Phoenix and Fort Mohave. In 1916 these had a capacity of 5,275 pupils, a total enrolment of 5,076 and an average atten¬ dance of 4,159.

Religious. — Owing to the large number of persons of Spanish descent, locally known as ˆMexicans,** and to the activities of the early Jesuit and Franciscan missionaries, more than half the communicants in the State are of the Roman Catholic faith, followed in order by the Latter Day Saints (Mormons), Presbyterians and Methodists. So far as the statistics are available, the Roman Catholics and the Meth¬ odists have an almost equal number of church organizations, and the Roman Catholics and Episcopalians an equal number of church build¬ ings. In value of church property the Catholics exceed the Methodists only slightly, while in indebtedness the Catholic churches greatly ex- .ceed that of any other denomination. The Methodists have a greater number of Sunday-schools than any other religious organization, followed by the Catholics and the Latter Day Saints respectively; while in Sunday-school pupils the order is Latter Day Saints, Meth¬ odists, Catholics, Presbyterians, and Baptists.

Charitable, Penal. — The State maintains an asylum for the insane near Phoenix, a home for aged and infirm pioneers at Prescott, the Flor¬ ence Crittenden Home and Children's Home at Phoenix, a penitentiary at Florence and an in¬ dustrial school for juvenile offenders on the site of Fort Grant near Willcox. The University of Arizona maintains a department for the deaf.

Population and Divisions. — The first sep¬ arate census was taken in 1870, giving, exclu¬ sive of Indians, 9,658; in 1880, 40,440; in 1890, 88,243 (including Indian lands and reserva¬ tions) ; in 1900, 122,931; in 1910, 204,354; in 1917 (est.), 263,788. The principal Indian

tribes are: Navajo (partly in New Mexico), 21,763; Papago, 7,112; Pima, 4,892; San Carlos Apache, 2,584; White Mountain Apache, 2,384; other Apache, 646 ; Mohave, 584 ; Hopi, 2,476 ; Walapai, 470; Maricopa, 269; Chemehuevi, 1,002; Havasupai, 170; Paiute, 285. There are 14 counties in the State, as follows, with their county seats, population, etc. :

Popula-

Area,

tion, 1917

County

sq. mi.

(est.)

Apache .

. 10,736

9,853

Cochise .

. 6,147

53,089

Coconino .

. 19,322

10,041

Gila .

. 4,542

22,993

Graham .

Greenlee . . .

. 6,500

*30,601

Maricopa .

. 8,816

44,731

Mohave .

. 13,421

4,026

Navajo .

. 9,826

13,399

Pima .

. 9,424

28,751

Pinal .

. 5,324

9,968

Santa Cruz .

. 1,212

8,387

Y avapai .

. 7,863

17,598

Y uma .

. 9,787

10,351

In addition to towns named in table, the following contained more than 1,000 inhabit¬ ants in 1910: Bisbee, 9,019; Douglas, 6,937 ; Jerome, 2,393; Winslow, 2,381.

Government. — < Sessions of the legislature are held biennially, commencing on the second Monday of January next after the election of members of the legislature. By constitutional provision the people reserve the power and priv¬ ileges of initiative and referendum. Women were granted full suffrage in 1912 and in 1914 the State declared for absolute prohibition against the manufacture, sale or transportation of intoxicants. The hours of labor for women in laundries, bakeries, mercantile establish¬ ments, hotels and restaurants and also in tele¬ graph and telephone offices in which more than three women are employed shall not exceed eight hours per day or 56 hours a week; for fe¬ males under 18, the maximum is 48 hours a week. For females under 18, night work is pro¬ hibited from 7 p.m. to 7 a.m. The law provides also that seats shall be furnished in mills, fac¬ tories, mercantile establishments, laundries and offices. Mothers are provided pensions under certain conditions. Eight hours constitute a law¬ ful day's work in all employment by or in behalf of the State or any political subdivision there¬ of, and also in most cases the same length of day is provided for all workers in mines, smelters, etc. No child under 14 years of age shall be employed in any gainful occupation during school hours and no child under 16 years of age shall be employed in a mine or in any other injurious or hazardous occupation, or in any occupation at night. Female labor in or about any mine, quarry or coal-breaker is prohibited. Provision is made for employers' liability and for compulsory compensation ap¬ plicable to workmen engaged in dangerous oc¬ cupations. The minimum wage for females (except family domestics) is $10 per week.

Archaeology. — Practically throughout the State are the remains of innumerable struc¬ tures, the homes of Indian tribes in former times. The more celebrated of these are Casa Grande, the main building of a large group of similar structures near Florence ; the cliff- dwellings of the Navajo National Monument within the Navajo Indian Reservation in the extreme northern part of the State ; Montezuma Castle on Beaver Creek near old Camp Verde; the cliff-dwellings of Walnut Canyon near Flagstaff and near the Roosevelt Dam. Many others are situated along the water-courses,

Assessed value, 1912f	Pop-ulation 1910	County-seat
$2,369,479	835	St.Johns .
32,500,762	1,582	Tombstone .
6,808,956	1,633	Flagstaff .
10,661,644	7,083	Globe .
3,670,178	595	Solomonsville .
10,568,766	4,874	Clifton .
27,599,786	11,134	Phoenix .
5,973,265	900	Kingman .
3,094,025	609	Holbrook .
8,955,961	13,193	Tucson .
5,123,447	807	Florence .
2,418,170	3,514	Nogales .
16,111,921	5,092	Prescott .
4,481,831	2,914	Yuma .

- Includes the population of Greenlee County, organized from part of Graham County, 1 Jan. 1911.

t Assessed valuation of all property (real, $144,332,802; personal, $56,282,974; other, $207,924,507), $408,540,283. The total assessed valuation of all property subject to ad valorem taxation (see table) is $140,338,191. or $608,03 per capita.

and indeed in many instances away from any present water supply. These remains for the greater part are probably at least a thousand years old, but others show evidence of having been inhabited not very long before the discov¬ ery of America, while still others were doubt¬ less occupied within the historic period.

History. — The first white men to enter Ari¬ zona were probably Juan de la Asuncion and Pedro Nadal, two friars of whom little is known, who penetrated the region in 1538. Fray Marcos of Niza and his negro companion Estevanico, in 1539, journeyed from Mexico to the sources of the Rio San Pedro, thence across the southeastern part of the present State to the province of Cibola. (See New Mexico). In the following year Niza served as guide to Francisco Vasquez Coronado, who, with a con¬ siderable force, visited Cibola and sent two small expeditions which discovered the Hopi villages (called Tusayan) and the Grand Canon of the Colorado. Meanwhile other parties went from the settlement which Coronado es¬ tablished on the Rio Sonora in northwestern Mexico, explored the region, later known as the Papagueria (from the Papago Indians), to the mouth of the Colorado, where letters had been buried by Hernando de Alarcon who com- maned a joint expedition by sea and went up the Colorado for 85 leagues. Antonio de Es- pejo visited the Hopi villages in the north¬ eastern part in 1583, as did Juan de Onate, the first governor and colonizer of New Mexico, in 1598, the latter also passing entirely across the State to the mouth of the Colorado and back in 1604-05. The first missions were es¬ tablished among the Hopi by Franciscans in the summer of 1629, which, barring the killing of some of the missionaries by the Indians, were successfully continued until August 1680, when, in a general uprising of the Pueblos, the mis¬ sionaries were murdered and little effort made thenceforth to introduce Christianity. From 1687 the Jesuits, particularly Padre Eusebio Kino, made various journeys into southern Arizona, establishing the missions of San Xavier del Bac in 1699 or 1700, and that of Guevavi in 1732. The present church of San Xavier was begun about 1783 and finished in 1797. In 1752 a presidio was established at Tubac, but in 1776 it was removed to a ranch- eria of about 80 families of Pima,

Papago, and Sobaipuri Indians, known as San Augustin de Tucson (the present Tucson) a few miles northward, at which a few Spaniards may also have settled after 1763. Another mission of importance, the walls of whose fine church are still standing, was that of San Jose Tumaca-cori, erected in 1752. The missions and their visitas led a precarious existence after 1750— 53, during which years the Pima were at war against the Spaniards, killing several priests and plundering the missions, in¬ cluding that of San Xavier. The Jesuits were expelled in 1767 and were followed by Franciscans, who rehabilitated the mission settlements and conducted explorations in un¬ known or forgotten regions. For many years before and after, the Apache tribes were at almost constant war with the more sedentary Indians of southern Arizona, raiding their set¬ tlements, killing the men and carrying off the women ; nor did the white settlements fare much better, notwithstanding the presence of

presidios. At the time of the conquest of New Mexico in 1846 by Gen. S. W. Kearny, Arizona formed a part of that territory. By the Treaty of Guadalupe Hidalgo in 1848 the section north of the Gila was ceded by Mexico to the United States, while that south of the river was ob¬ tained through the Gadsden Purchase (q.v.), approved in 1854. Raids continued, various military expeditions were conducted and out¬ posts established, and rich mineral deposits were discovered during the next few years. By act of Congress approved 24 Feb. 1863, Arizona was erected into a separate Territory, and on 29 December it was formally organized at Navajo Springs. The withdrawal of troops from the frontier at the beginning of the Civil War left the country practically at the mercy of Apaches, who continued their depredations ; mines were abandoned and settlements deserted, but with the re-establishment of the military posts the development of the Territory was renewed and has since continued.

In June 1910 Congress passed an act to enable Arizona and New Mexico to form State constitutions and governments and to be ad¬ mitted to the Union. In December of that year a proposed State constitution for Arizona was adopted by a convention held at Phoenix and was ratified by the people in February 1911. This constitution received the conditional approval of the Federal government in August 1911 and was referred to the people of the Ter¬ ritory for amendment. On 14 Feb. 1912 the Territory became a State of the Union.

The Territorial and State governors have

been :

John N. Goodwin . .

TERRITORIAL . Republican. . .

. . 1863-66

Richard C. McCormick

U

. . 1866-69

A. P. K. Safford .

a

. . 1869-77

John P. Hoyt .

u

. . 1877-78

John C. Fremont .

a

. . 1878-81

Frederick A. Tritle .

u

. . 1881-85

C. Meyer Zulick .

. Democrat. . . .

. . 1885-89

Lewis Wolfley . .

. Republican. . .

. . 1889-90

John N. Irwin .

U

. . 1890-92

Nathan O. Murphy. . . .

u

. . 1892-93

Louis C. Hughes .

. Democrat ....

. . 1893-96

Benjamin J. Franklin. .

. . 1896-97

Myron H. McCord .

U

. . 1897-98

Nathan O. Murphy. . . .

U

. . 1898-1902

Alexander O. Brodie . . .

a

. . 1902-05

Joseph H. Kibbey .

a

. . 1905-09

Richard E. Sloan .

a

. . 1909-12

G. W. P. Hunt .

STATE

. . 1912-

Bibliography. — Although among the young¬ est of the States, the literature of Arizona is voluminous. For a list of writings on the subject, consult Hector Alliot, (Bibliography of Arizona, (Los Angeles 1914). The publica¬ tions of the Federal government cover a very wide range of subjects and are embodied in the reports and bulletins of the Bureau of Ameri¬ can Ethnology of the Smithsonian Institution, the Bureau of the Census and the War Depart¬ ment (especially the reports and narrations of various engineer officers of the army in the forties and fifties) ; the Mineral Resources of the United States, published by the Geological Survey, the reports of the governors of Ari¬ zona published by the United States Depart¬ ment of the Interior during the territorial gov¬ ernment of Arizona ; the bulletins of the United States Bureau of Labor Statistics, the circulars of the Children's Bureau, etc. For more general information on various topics

regarding Arizona, consult Bancroft, H. H., < History of Arizona and New Mexico > (San Francisco 1889) ; Benavides, Fray Alonso, (Memorial > (trans. by Mrs. E. E. Ayer; anno¬ tated by F. W. Hodge and C. F. Lummis, Chicago 1916) ; Bolton, H. E., (Spanish Ex¬ ploration in the Southwest, 1542— 1706> (New York 1916) ; Bourke, J. G., (The Snake-Dance of the Moquis of Arizona) (ib. 1884) ; id., (An Apache Campaign > (ib. 1886) ; id., (On the Border with Crook> (ib. 1891) ; Coues, E., (On the Trail of a Spanish Pioneer; The Diary and Itinerary of Francisco Garces) (ib. 1900) ; Dellenbaugh, F. S., (Romance of the Colorado River *(ib. 1903) ; DeLong, S. R., (History of Arizona) (San Francisco 1905) ; Farish, T. E., (History of Arizona) (Phoenix 1915) ; Hough, Walter, (Archeological Field Work in North¬ eastern Arizona) (Washington 1903) ; id., Cul¬ ture of the Ancient Pueblos of the Upper Gila* (ib. 1914) ; id., (The Hopi Indians) (Cedar Rapids 1915) ; James, G. W., (In and Around the Grand Canyon *(Boston 1900) ; id., Ari¬ zona the Wonderland> (ib. 1917) ; McClintock, J. H., (Arizona, Prehistoric, Aboriginal, Pi¬ oneer, Modern*

(Chicago 1916) ; Powell, J. W., (Report of Explorations of the Colorado of the West) (Washington 1874) ; Prudden, T. M., (On the Great American Plateau) (New York

1906).

F. W. Hodge,

Smithsonian Institution, Washington, D. C.

ARIZONA, University of, State institu¬ tion, established by the legislature in 1885 and opened in 1891 at Tucson, Ariz. Its buildings and grounds are valued at about $500,000. The United States government appropriates annually $50,000 to the institution and the State appro¬ priation amounts to $120,000. The library con¬ tains 23,000 volumes and in 1920 there were in the institution 70 professors and instructors and 1,156 students. The departments are those of agriculture, civil, electric, mechanical and mining engineering, commerce, liberal arts, and economics.

ARK, (1) the box made of bulrushes in which Pharaoh's daughter found the infant Moses. (2) The great vessel or ship in which Noah took refuge during the deluge. Accord¬ ing to the story in Genesis, Noah's ark was large enough to contain his family and repre¬ sentatives of each kind of animal. Its dimen¬ sions were 450 feet long, 75 feet broad and 45 feet high. It was made of (<gopher® wood, which has been variously identified with cypress, pine, and cedar. Until the advent of ((the higher criticism® there were many theories as to the number of animals and the space necessary for their reception. Modern criti¬ cism and the surrender of attempts to square scientific facts with a literal interpretation of the Bible are indicated by the following sug¬ gestion of Bishop Stillingfleet, approved by many eminent authorities : (<The insuperable dif¬ ficulties connected with the belief that all the existing species of animals were provided for in the ark, are obviated if we assume that the deluge did not extend beyond the region of the earth then inhabited, and that only the animals of that region were preserved in the ark.® (3) A chest or cupboard in the Jewish synagogue in which are placed the scrolls of the Torah. It is placed against or in the wall in the direc¬

tion of J erusalem. (4) The Ark of the Covenant, Ark of the Revelation, Ark of the Testimony, are the full names of the sacred chest of acacia wood, overlaid with gold, which the Israelites took with them on their journey into Palestine. It was an oblong box three feet nine inches in length, two feet three inches broad and the same in height. It was

lined within and without with gold, and through four golden rings were placed staves of acacia wood, by means of which it was carried. In it were preserved the tables of the law. It was borne by the Levites, often at the head oi a battle host, and had an eventful history be¬ fore it was finally placed in the city of Jeru¬ salem by David. Later its importance was ap¬ parently merged with that of the Temple which Solomon erected. There is no record of when or how it finally disappeared, but there are many popular legends regarding it, one of which speaks of its translation to heaven until the coming of the Messiah.

ARKADELPHIA, Ark., county -seat of Clark County, 65 miles southwest from Little Rock. It is situated on the banks of Ouachita River, on the Saint Louis, Iron Mountain and Southern Railroad. Its industries include cot¬ ton mills, a foundry, machine shops and a roller-mill. Henderson-Brown and Ouachita col¬ leges are located here and also a school for negro children. Pop. 3,311.

ARKANSAS, ar'kan-sa, the «Bcar State.® A south-central State of the United States, bounded on the north by Missouri, on the east by Missouri and the Mississippi River, on the south by Louisiana and Texas, on the west by Texas and Oklahoma. It measures about 250 miles north and south and from 175 to 275 east and west. Area, 52,525 square miles of land, 810 of water. Capital, Little Rock (q.v.).

Topograph — About one-fourth of the State is mouiudinous. In the northwest are the Ozark Mountains (q.v.), a continuation of that system from Missouri. The most ex¬ tensive ranges are the Boston Mountains north of the Arkansas River and the Ouachita south. The highest peak is Magazine Mountain, 2,785 feet, in Logan County. Several others ap¬ proach 2,000 feet. There are several unex¬ plored caves of large dimensions, notably in Newton and Washington counties. Broken ranges extend eastward on the north as far as Sharpe and Independence counties and to Pulaski, Pike and Howard on the south. East and south of a line connecting these counties is a considerable tract of hilly country sloping east and south. Beyond this and ex¬ tending to the Mississippi are the alluvial lands, swamps, lakes and bayous of the river (<bottoms® 40 to 50 miles wide. The elevation of this region ranges from 350 feet along the border of the uplands to 100 feet in the extreme southeast. Much of it, excepting the prairie lands of Lonoke, Prairie and Arkansas counties, is still subject to overflow, though a considerable area has been recovered by a splendid system of drainage ditches and levees.

Hydrography. — Except for a few miles on the north the Mississippi

touches the State on its entire eastern border. Four large tribu¬ taries flow through the State. The Saint Francis (450 miles long) parallels the Missis¬ sippi from the Missouri border to a short dis-

tance above Helena. The region between the two is full of swamps and lakes, but is dotted with thriving settlements. The White River (800 miles) rises in Arkansas, passes into Missouri, re-enters the State, receives the Black (400 miles) at Jacksonport, the Cache near Clarendon, and enters the Mississippi in Arkansas County. The Arkansas River (q.v.), bisects the State from northwest to southeast and enters the Mississippi just below the White. It has no considerable tributaries. The Red River crosses the southwestern corner and receives the Ouachita (500 miles), which leaves the State through Union County. An incomplete survey of the streams in the north¬ west showed 525,000 horse-power. The total in the State probably amounts to 1,000,000.

Climate and Sanitary Conditions. — The mean temperature is 60.8; for the winter 41.6, summer 78.9; lowest on record — 32 (1862), highest 112. The variation between the north¬ ern and southern part of the State is about 5 degrees. The average rainfall is 46.7 ; it is somewhat higher in the eastern and southern part. Severe droughts are unknown. Floods are common in the river sections. The eastern and southern river bottoms are hot and mala¬ rial, but drainage has improved conditions greatly and a beginning has been made of the destruction of the mosquito. The uplands are healthful and the Ozark region is much fre¬ quented as a summer resort.

Geology. — Several distinct periods of geo¬ logical formation are represented in the State. The oldest is the Ordovician, found in several counties between the White River and the Missouri boundary and a narrow strip extend¬ ing westward from Pulaski County. The next oldest belongs to the Lower Carboniferous age and extends in general from east to west along the crest of the Ozark Mountains. Most of the region between 34° and 36°, and extending east to meridian 93 on the south and 91 on the north is Middle and Upper Carboniferous. Just below this is a small patch of Cretaceous. The rest eastward to the Mississippi is Ter¬ tiary and Quaternary.

Minerals and Mining. — The following non-metals are found in the State : Agate, asphalt, basalt, clay, coal, diamonds, fuller's earth,

granite, graphite, lime, limestone, min¬ eral waters, natural gas, novaculite (oilstone), phosphate rock, salt, sand and gravel, sandstone, slate, and tripoli. The clay products for 1914 amounted to $451,986, of which $19,400 was pottery. A small beginning has been made of the clay in Saline County for pottery work called Niloak, of a very artistic type. The coal is of two kinds, ordinary bituminous and semi-anthracite. The total production 1915 was 1,652,106 tons, valued at $2,950,456. In common with other States Arkansas suffered a depression in the industry in 1914—15. The production 1913 was 2,234,107 tons, valued at $3,923,701. Men employed in the mines, 4,339. The industry is confined mostly to Franklin, Johnson and Sebastian counties. Pike County enjoys the distinction of holding the only known deposit of diamonds in North America. The discovery was made in 1906. The product to date amounts to about 1,700 stones aggre¬ gating 575 carats. The first discovery of fuller's earth in the United States was made in Saline County in 1891, but several States

now surpass Arkansas in its production. The granite industry is considerable, amounting to $378,110 (1913). Marble of beautiful colors is found in abundance near Batesville. There are 18 mineral springs, most of them found at Hot Springs (q.v.). The production of natural gas was small up to 1916, but that year several strong wells were opened in the region of Alma and Ozark. Hot Springs, Gar¬ land and adjoining counties are rich in novac¬ ulite, out of which are made the <(Arkansas)} and ˆOuachita® oilstones, the finest sharpening instruments in the world. Common whet¬ stones, grindstones and millstones are made from the coarser grades. In this industry the State ranks first. Quartz sand is found in the northwest, but there is no glass industry. In the southwestern part of the State are deposits of asphalt, graphite and chalk out of which Portland cement is made, but they are still undeveloped. The following metals occur in varying quantities : bauxite, copper, gold, iron, lead, manganese ore, manganiferous ore, nickel and zinc. Only four, bauxite, lead, manganiferous ore and zinc are now of com¬ mercial value. Bauxite, extensively used in making aluminum, was first discovered in Arkansas in 1891 and the bauxite industry was established by 1896. For several years the State has led in production, yielding nearly half of the world's output, though the industry is hampered by lack of transportation. Most of the ore comes from Saline and Pulaski counties. The production in 1913 amounted to 180,000 tons worth $855,000. There are large deposits of zinc (with lead by-products) in the northern part of the State, but the industry declined after 1908 until 1915, when it was considerably revived. The production in 1915 was valued at $801,754, compared with $65,214 in 1914; 7,925 tons of zinc carbonate, value $408,079,

an increase in bulk of 700 per cent, and in value of 1500 per cent over 1914, were exported.

Soils. — The soils in the mountainous region, west and northwest, are derived from sandstones and shales and range from sandy to heavy loams. Much of it has little agricul¬ tural value, though there are many valuable farms in the valleys. The highest percentage of area in farms, 60 to 80 per cent, is found in several of these counties. Red clay and loam abound in the limestone region, sandy loam in the Arkansas valley, clay and sand in the eastern valley, deep black soil in the “bottoms® known as “buckshot® (of inexhaustible fertil¬ ity), and the red sticky “gumbo® in the Red River valley. The southern portion is covered by an extension of the sandy loams of Louisiana.

Agriculture, Farms. — An abundance of rainfall and a fertile soil make the greater part of the State well adapted to agriculture. In 1910 out of 588,133 males 10 years of age and over, 510,410 were engaged in agriculture. The number of farms has risen from 39,004 in 1860 to 214,678 in 1910, the acreage in farms from 1,983,313 to 8,076,254. The greatest per¬ centage of increase in farm property came 1850-60, but the increase 1900-10 was note¬ worthy, 120.5 per cent. The average number of acres per farm had fallen from 245 in 1860 to 81 in 1910. This was partly due to the break¬ ing up of the plantation system or the aboli-

ARKANSAS.

Estimated population, 1,792,965

COUNTIES

Pop.

Pop.

16,103 Arkansas .

. .H 5

24,252

Lee .

. .1 4

2 5,268 Ashley .

• . . . G 7

15,118

Lincoln .

. .G 6

10,389 Baxter .

....FI

13,597

Little River .

. .B 6

33,389 Benton .

. . . .B 1

26,350

Logan .

. C 3

14,318 Boone .

. . . . D 1

27,983

Lonoke .

14,518 Bradley .

26,056

Madison .

. .C 1

9,894 Calhoun .

10,203

Marion .

..El

16,829 Carroll .

...Cl

19,555

Miller .

. .C 7

21,987 Chicot .

. . . .H 7

10,468

Mississippi .

. .J 2

23,686 Clark .

. . D 5

39,907

Monroe .

. .H 4

23,690 Clay .

. . . .J 1

12,455

Montgomery. . . .

. C 4

11,903 Cleburne .

19,344

Nevada .

. . D 6

13,481 Cleveland .

. . . . F 6

10,612

Newton .

. D 2

23,820 Columbia .

. . . D 7

21,774

Ouachita .

. .E 6

22,729 Conway .

. . . .E 3

9,402

Perry .

. .E 4

27,627 Craighead .

.12

33,535

Phillips .

15

23,942 Crawford .

. . . .B 2

12,565

Pike .

22,447 Crittenden. . . .

. . . . J 3

12,791

Poinsett .

14,042 Cross .

...13

17,216

Polk .

. .B 5

12,621 Dallas .

,..,E6

24,527

Pope .

. D 3

15,274 Desha .

. . .H 6

13,853

Prairie .

21,960 Drew .

. . . .G 6

86,751

Pulaski .

. .F 4

23,708 Faulkner .

. . . .F 3

18.987

Randolph .

.11

20,638 Franklin .

. . . .C 2

22,548

St. Francis .

.13

12,193 Fulton .

. . . . G 1

16,657

Saline .

27,271 Garland .

. . D 4

14,302

Scott .

. -B 4

9,425 Grant .

. . . .F 5

14,825

Searcy .

. ,E 2

23,852 Greene .

...11

52,278

Sebastian .

. .B 3

28,285 Hempstead....

,...C6

16,616

Sevier .

. .B 6

15,022 Hot Spring _

....E 5

11,688

Sharp .

16,898 Howard .

. . . .C 6

8,946

Stone .

. .F 2

24.776 Independence.

...,G2

30,723

Union .

14,561 Izard .

. . G 1

13,509

Van Buren .

. .E 2

23,501 Jackson .

. . .H 2

33,889

Washington .

. .B 2

52,734 Jefferson .

... .G 5

28,574

White .

. .G 3

19,698 Johnson .

. . D 2

20,049

Woodruff .

H 3

13,741 Lafayette .

26.323

Yell .

D 4

20,001 Lawrence .

...HI

Incorporated Cities,

Towns.

and Villages

141 Alexander .

...F4

231

Dalark .

. .E 6

168 Alicia .

. . .H 2

803

Danville .

565 Alma .

1,757

Dardanelle .

. ,D 3

252 Almyra .

...G5

244

Datto, Clay ....

. . J 1

659 Altus .

. . . .C 3

246

Decatur .

. .B 1

813 Amity .

. . .D 5

76

Deckerville .

. . J 3

14,907 Argenta .

. . . .F 4

539

Delight .

. .C 6

2,745 Arkadelphia. . .

...D5

162

Dell .

K 2

1,485 Arkansas City . .

. ...H 6

757

Denning .

. .C 3

160 Arklnda .

. . .B 6

2,018

De Queen .

.B 5

1,247 Ashdown .

I..B6

1,662

Dermott .

.H 7

31 Askew, Lee . . .

....14

1.061

Des Arc .

.G 4

115 Athens .

...B5

924

Devall Bluff . . . .

. H 4

1,258 Atkins .

. . .E 3

831

De Witt .

H 5

1,520 Augusta .

. . ,H 3

272

Dierks .

. .C 5

177 Austin Station.

...F4

298

Douglas .

.H 6

617 Baldknob .

. . .G 3

385

Dover .

.D 3

244 Banks .

...F6

18

Dryden .

. .1 2

272 Bates .

. . .B 4

519

Dumas .

.H 6

3,399 Batesville .

,..G2

433

Dyer .

439 Bearden .

...E6

1,542

Earle .

. .1 3

873 Beebe .

. . .G

[342

Edgemont, Cleburne

142 Beebranch .

. . .F

F 3

335 Belleville .

...C3

4,202

El Dorado .

E 7

431 Ben Lomond . .

. . B 6

270

Emmet .

1,708 Benton .

...E4

1,407

England .

.G 4

1,956 Bentonville. . . .

. . ,B 1

292

Esau, Perry .

E 4

785 Berry ville .

...Cl

606

Eudora .

.H 7

435 Biggers .

...11

3,228

Eureka Springs. .

,.C 1

1,078 Black Rock. . . .

...HI

289

Evening Shade . . .

G 1

296 Blissville .

...G7

53

Fair Oaks .

.13

3,849 Blytheville. . . .

. . ,K 2

4,471

Fayetteville .

.B 1

811 Bonanza .

...A3

273

Felsenthal .

1,631 Booneville .

...C3

165

Fisher .

.13

382 Bradford .

...G3

2,794

Fordyce .

.F 6

123 Bradley .

...C7

2,484

Forrest City .

.14

271 Branch .

...C3

28,638

Fort Smith .

.B 3

5,133 Brinkley .

. . .H 4

177

Frostville .

91 Bryant .

647

Fulton .

240 Buckner .

...D7

277

Garland .

441 Cabot .

198

Gassville .

.F 1

401 Calico Rock. . . .

...FI

668

Gentry City .

. B 1

3,995 Camden .

. . . E 6

256

Gillett .

.H 5

516 Carlisle .

...G4

291

Gillham .

.B 5

386 Carthage .

...E5

768

Glenwood .

.O 5

310 Casa .

...D4

*57

Gould .

.G 6

278 Cave City .

. . .G 2

<180

Grady .

G 5

328 Center Point. . .

J569

Gravette .

• B 1

576 Charleston .

. . .C 3

136

Grays .

162 Chester .

. . .B 2

771

Graysonia, Clark.

. D 5

211 Chidester .

. .D 6

635

Green Forest .

2,037 Clarendon .

. .H 4

108

Greenland .

.B 2

1,456 Clarksville .

. . .D 3

1390

Greenway .

1 64 Cleveland .

,..E3

1,124

Greenwood .

.B 3

1,229 Coal Hill .

...03

202

Griffith ville .

197 Collins .

...G7

178

Grubbs .

.H 2

2,794 Conway .

. . .F 3

. 1296

Guion .

1,439 Corning .

...11

1,284

Gurdon .

.D 6

894 Cotter .

...FI

[363

Hackett .

.B 3

1,081 Cotton Plant. . .

. . H 4

257

Halley . •.

.H 7

2,038 Crossett .

...F7

1,787

Hamburg .

.G 7

244 Cushman .

. . .G 2

353

Hampton .

.E 7

136 Daisy .

ffi 329

Hardy .

H 1

INCORPORATED CITIES. ETC.— Co i

Pop.

Pop.

942 Harrisburg .

. .1 2

173 Palestine .

. .1

1,602 Harrison .

.D

5,248 Paragould .

. .1

1,780 Hartford .

. .B 3

194 Paraloma .

. C

621 Havana .

. ,C3

'.497 Paris .

. .C

687 Hazen .

• G 4

383 Parkdale .

H

1,126 Heber Springs. . .

.G 2

355 Perry ville .

. .E

10,796 Helena .

..14

1,150 Piggott .

. .J 1

247 Hermitage .

.F 7

335 Pike City .

. .C 5

336 Higden .

.F 2

17,447 Pine Bluff .

. .F 5

192 Higginson .

G 3

853 Plain view .

.D 4

536 Holly Grove . . . .

.H 4

'151 Pleasant Plains .,

G 2

3,639 Hope .

. .C 6

*495 Plumerville .

. .E 3

605 Horatio .

B 6

1,547 Pocahontas.....

H 1

17,238 Hot Springs .

.D 5

367 Portia .

.11

915 Hoxie .

. .1 1

a '823 Portland .

131 Hudspeth .

.H 7

205 Pottsville .

E 3

380 Humphrey .

.G 5

:^/191 Powhatan .

H 1

508 Hunter .

.H 4

774 Prairie Grove . . .

.B 2

1,700 Huntington .

.B 3

2,705 Prescott .

.D 6

1,240 Huttig .

.F 7

132 Princeton .

600 Imboden .

II 1

J883 Pulaski Heights

373 Jacksonport .

.H 2

Pulaski .

114 Jamestown .

. G 2

471 Quitman .

.F 3

242 Jasper .

.D 2

65 Raggio City. Lee

. .1 4

88 Johnsville, Bradley F 7

175 Ratcliff, Logan .

.C 3

7,123 Jonesboro .

.12

189 Ravenden Springs. H 1

746 Judsonia .

G 3

214 Readland .

.H 7

1,065 Junction City. . . .

.E 7

1,859 Rector .

. .J 1

175 Keo .

.G 4

278 Redfield .

.F 5

131 Kimberley, Pike .

.C 5

290 Reyno .

.11

445 Kingsland .

. F 6

725 Rison .

.F 6

362 Knobel .

.11

2,820 Rogers .

.B 1

448 Lake City .

.12

320 Rosboro, Pike .

.C 5

1,074 Lake Village . . . .

.H 7

147 Russell .

. G 3

520 Lamar .

D 3

2,936 Russellville .

D 3

398 Leola .

. E 5

459 St. Francis .

. J 1

154 Lepanto .

.J 2

159 St. Joe, Searcv. . .

.E 2

1.898 Leslie .

.E 2

430 St. Paul .

975 Lewisville .

.O 7

2,331 Searcy .

• G 3

292 Lincoln .

.B 2

96 Sedgwick .

.12

57,343 Little Rock .

.E 4

481 Sheridan .

.F 5

748 Lockesburg .

.B 6

251 Shiloh .

.F 3

303 London .

D 3

2,405 Siloam Springs . .

• B 1

1,547 Lonoke .

. G 4

185 South Bend...

.H 5

193 Lowell .

1,755 Springdale .

.B 1

677 Luxora .

.K 2

1140 Springtown .

.B 1

637 McCrory .

.H 3

2,316 Stamps .

C 7

1,157 McGehee .

.H 6

396 Star City .

.G 6

271 McNab .

.C 6

572 Stephens .

D 7

482 McNeil .

.D 7

465 Strong .

F 7

968 Magazine .

.C 3

2,740 Stuttgart .

H 5

216 Magness .

G 2

1 379 Success .

. .1 1

2,045 Magnolia .

.D 7

f 252 Sulphur Rock ....

. H 2

2,778 Malvern .

.E 5

[500 Sulphur Springs . .

B 1

817 Mammoth Spring.. ,G 1

290 Swifton .

H 2

562 Manila .

. J 2

5.655 Texarkana .

.C 7

816 Mansfield .

.B 3

811 Thornton .

.E 6

4,810 Marianna .

.14

180 Tillar .

2,026 Marked Tree .

. .1 2

222 Tontitown .

.B 1

780 Marmaduke .

.J 1

228 Traskwood .

558 Marshall .

.E 2

583 Tuckerman .

.H 2

556 Marvel .

.1 5

205 Tupelo .

.H 3

295 Maynard .

.1 1

115 Ulm .

282 Melbourne .

• G 1

136 Umpire .

.B 5

3,953 Mena .

. B 5

52 Upland .

E 7

639 Midland .

B 3

3,878 Van Buren .

.B 3

432 Mineral Springs .

.B 6

920 Varner .

• G 6

251 Minturn .

.1 2

149 Walcott .

.1 2

559 Monette .

J 2

597 Waldo .

.D 7

95 Monte Ne .

,C 1

900 Waldron .

2,274 Monticello .

. G 9

1,798 Walnut Ridge . . .

.1 1

2,424 Morrillton .

• E 3

2,057 Warren .

.F 6

446 Mountain Home .

.F 1

399 Washington .

.C 6

272 Mountain View . .

.F 2

232 Weiner .

.1 2

10 Mount Nebo .

D 3

694 Wesson .

. E 7

722 Mulberry... .

.B 2

116 West Point .

H 3

516 Murfreesboro .

.C 5

330 Wheatley .

.1 4

2,374 Nashville .

.C 6

42 Whitecliffs .

.C 6

1,080 Nettleton .

.1 2

245 Widener .

I 3

595 Newark .

H 2

929 Wilmar .

.G 6

3,557 Newport .

H 2

622 Wilmot .

G 7

612 New Rocky Comfort,

294 Wilton .

.B 6

Little River

B 6

289 Winslow .

.B 2

397 Ogden .

.B 6

552 Womble .

399 Okolona .

D 6

2,353 Wynne .

516 Ola .

,D 4

463 Y ell ville .

E 1

1,769 Osceola .

.J 2

136 Youngstown,

129 Ozan..' .

.C 3

Lincoln .

G 6

1,146 Ozark .

.C 6

173 Zinc .

.E 1

Hfer.l Garfield y

I ˆalatka/Moitrk faVV* .n i i ., 'Success A- 8 b

a l_\ yˆDatto / HJooria,/' Pollard

/Keyno 8tm/ /W"

Debow VˆWesei-e C Jf ˆIkV.l., il/ˆ 8"

tott/ S4"" f /* Kll«>' HemmeB

j/PyH

f y / |M«.*llu§i?r’EJa'-rj VCS’toucwaU .Jp Re ' ˆ1‘elaplaJneX Orchardˆ\ i_afe Tok iw>f_ ->\Shannob/i Hl'Af ri eVˆ-f \ ), tr “ *

f O H o 1 in « ~ˆoBe<oh Grove -V Man bou jfoteafi Gaines v Ule £LBagwM

■rˆyyfhˆ GR E E\ N/E d&

odd./Ok«,i./fr-Jrgiˆ'eClowDj

p < X/irTs0-. V. w ajoottˆyˆ- .Car djtelr ff/

[Cricket or /V [Omaha /j I

1 iP.O. / Lowry I X 8elf Lead Hillp | Burlingtonˆ Myrtle I o Willis

B 0,0 N Ed,

'rancUo -fcJ,

sAlpena Pass xˆfter Batavia

• <» Pleaeaptrfdˆe _

sEverlt

adrid

Mlddleb«;ook

Oakjrove,

Jliwait

.Francis

Fooum©

.Cisco Denver.

k&U'a*..

/Three Brothers | VW«tte|

'- V o Custer ® V l61a

FlendcraonV iRuthC/ ! (

BAXTER ? / „ |

- © Mou ii tu in IljOm v %rS®^

oBenville ElizabKS0 of1'1 Wville T^nt ^y^hcry 1/)) Buford ® r^forl| fiuron oife

SiJal*

[alo^) Rock' - \1” Cr'7°|] -A*1

r\ MoPh«*r»on | I CJi

[c ^Vllk °/10 J.h.‘

j r.ivflatT^0ptimu9^3)Lu ,CE

Itwater I IL/ <J. B

Eureka Springs

Peelo Ly (Oakland I

© Monarch . xj W City ^ i- Am<£^

m'a R 10 N C

^rXjsUiiUs,

Frr,oPal]li Rd;i|0 0

•™ cBruno° _ ^Dupcer v. Rush0

HnLe.r?nO. .

Beutojivifle

'■Centeirton'

Decatur

| Winst> jmstrout

'llardy .

Salem©

. < T bCarvy/Me Patter- VNummins son •A»f Kennet

. « ,J*W flsi.

SoUthforE0^ Wheeling °He -t X oiyiorristo.

Cherokee City . . /Gentry

i Forest ^ "Vvil XCabanal - l 0Rule - I \ CerrAllton0 I \° Rudd l.

■ Osage c ' r

ffork I*clmar° I, \iiiii i4 > J\c Dinsnioro 0 IL o'^oorge

cavenden o I

(Springe RAN DO Pocahontas c Birdello I f

'^^Xmboden 1/

(Annie ville\ Nolaifd J: rill. SloanV^ >— t-

\ _ Black Rook\ntichwi \Dentono -y p . \ Powhatan' rXQFl, \°
SmithTille 13XJ

WorL A W/RBiN/

m. Moifiry* Rookhouseci ',r« — A |a ©ciiftj

» Cbtpllno Iprinplalo f '/„" + r'i

oS^or. m.nd.Vm. 41*b0»“' 'T\ mV,, “...\fcil

GMhen^ AHuntsvilleN

Monte 0 e\ Pu

0 Cantonal -?r — , Willilord fa

olard pa

SH.AR PV„'

larnthersville

Elmwood

JX _ Center

Shade Poughkeepsie © Balboa° Reed° *«] Sidney 0 Calamine

Ml-CanloitAT

trevillfc'

•X 1‘nittvˆw

1 . WiUcooks.

;ˆSA,v«d..£

J as p crV-r ˆyfenon ©Venh Redrockˆx-ˆ |

l)yersbui'gj

|lt. fIor8cy'

Lowgftl

;]jTHTppS'

Gilbert

Tahlequahp f'fj

CHER OXIe

TjMlnturn . z/\ °BessleA

4nbla _ y

~Tfa**W '

fvwden'p / jbash /Gin*?

Clarkson

I ©Ppini Peter! Jvecreek o Blant iSnoWballo

[oPolki

JSfv o DollieˆSZ/E. j

3 \ Sylamora-cXˆU

‘ '0 MˆTSiaiSTvibW

Newnau y

"'S-xTnboO N

llaweld

rel

Lomato

.Marshall

£uria^

indtown

i lie. •Powe1'

JoWeOjvro <■/

ArchlMlea Bur (title y

X Walnut Gyve 'harlotjo* y^enyon.

^> / 1 t is*

Ktlfrwj W.taulJwti

i]/ I ^T;ll.\ille'

^Vala ©Catalpa , n

®Oiri — Fort Douglas 4,X“ Dale fgZZSfMllri

J.O’H IN S O'N >

.AUDERDAliE

v Kahoka j j ^ la \ lMarcellac|xOt oLuber Bellmore o\^~

i noford Manj

•stone

Davldsoft© Odell i iLeecred

Moore

jfi?nx5 1- rase^ »

”em j p Barnes. «HMaur. ta in ^Top© Whiio° Jethro / _R2fk. ^Wstaliif

Korea

. Rushing

r Ojlunal© Arlborj

1 ~eCopeland 1

vo Retreat \ 0 tbtree o X© Archer ey <rVX

0 Alread *^V. \ Rex / Clinton^

’uokem

, J 1 —.Jj me b town IVnagnestT ^reQ ‘bJilroond 0

ua o' r _ I'flaV ° x

Irnyruu.

y ClieBterA^ T? Mpuntainburg J~/ /^8"N«tot»l Dam K/

,C R A WO,R D

1 ?JS£Sr . /?£»«»(«

T Mull.s^ Braioard / 1 Greenfield! i elner / 9

Prim

eBrcwci

PlantjShi

^ttlcmTmX

1 Eglantine

CTJurtalolnkl J uddfilill a

J / SimpsoDT

D

‘ownsville

Brownsville X

HAYWOOD

,1 uport

North wood, GalJrieW

PuaahwBg V

n r -Xe

Pleasant Plains

Covingtonˆ

T I P T/0 N

Swporl1

Kil

'Waldenbuxg

Salllsaw

ply pliant X McLain © Ingleside a\J a-'

.mark //jrandginise'

i'lngR Roosevelt, 1

•avenporto 0 A'*°

Jolncw

ˆ~Kettal Heetor |

Culpeper M oFormosa . Selllralmh' ˆ

1h W hippie N

Auvefgne“ Shoffner Welibn ElAtralle

} Boeder. II

, •* Miller

Madelia i Poarson 'Quitman oDa

Claude o y

Scottsville

7S Van Buren'

0 Bradfordˆ ˆ Bliss W// Clear Water \ / / r» olRue8ell/| /l® aldˆnob / I 1(

wamwa \ rˆyWest Polnt\

Hickory Ridge

Tupefo ,

' Fitzhugh Qfi _ Goodrich1

AaBII»UKeJe

I > ranch

8 Morr'eoa Dlu

st7v«X|S;

Bloomer0 \ i "Auburn. I I

3J I A N t c /Fidelity 3s, ,G'reenwo6d

© Mariirfville . Pˆ Guy° ®] o Republican oKendall / ©Gre? > (brler

Clarkedalek ~ — Jeriohox

SCLBnnorer

jyTn. IrolOBo

[»1J TxPr«wt«

“y3cenN < i“'

snetUi Gavin'

I /•

{Tilton /

Scurcyˆ;

Jpgginsoi

Ellsworth.

ilaiuo Hobart °

Bonanza]

7 Fakts. l (Grave

fwoqi

'Gregory 7 . regrohill / ec(McClelland

jCniBmvillh. to, Mfazl

MiHard

l£i vr*

ta°elsior Uar J> ©VWitchcriille

^'ˆO'Xblott ˆ £_ˆ-ˆSlunefi<.dT-'Rj — ˆ>Hoy«l — /

SUfford o

■ 0° cPblckJlahVV

^^88JCenten«k1ˆ Vl

WivilW

Howell

fndei

llicmann Colti

'ˆMlxor'

Inetreeo n'ortin W

CaT/TwcllV l<i*a

- S T(. F \R A

Forrest CltjAyˆ0

Potenn,

r”Homej City 1

Jnroline /®° utnoi othe / ° Goidoi

[Belcher.

Prestoi ;opid /

ladHob

'US ton'

• Nimrod.

Walnutlˆref

Maherr;

-(Hartford *0o

'ˆaidknor Ai|stli

ˆtinev.illX\

Muore8ville\

Dos Arc

Shark

diaUli-b

•rnckney/

lent Palestine , Goodwin-oˆ

, PlalnvW V »i.or

■o „ o Jenning&2« Rover P-alTs P

fayflower

C&too

Jferu p. (Dansby ivllle \ Bicdsoeˆ

•Green ridge */

ˆ"X'Wiafield©) X'©W u I d ro

c0 l Brnwley / Stringer i Harvey

S _C OoˆXxewm.ˆ

Sullivan "'x ˆ°*eyˆM*a?kiXCedarcreek Blackford/ v° NenXXjjˆuck Knob •

MounUlno0ato >

ike Connora

Briggeville v

/°Blufftoa'

Gttavelly

’bornburg

R R (y *

Persliiug

•afmt J) Wattensavr W aterpi

Heaven!

,leO»« „ JW*',J

.UiieU

Water?

Hayoea

c/Brlckeys' Park P'“° ‘ _ Pete

[Bonier

Hernando

Clifton 0s . Felton 1

Isˆ Tfe /KcevU [ailiBluff \ .

/ / Rich x, Lm/o N ROE*' Clarendon

1 A\

// V oA .©

1 \ o/X1 s

Morˆ

Tl.oiuasV't-

Mˆriaui

jAllen-v

Irazilaft. Cold 8pru er

,c Abflene

.. o Kˆ kV

t Pettus NywJ1 Cullor_

VoIttO ° «

. oCohbf X a

if ‘

- o Jabb

jTxi- 1: Robiˆˆ vS.0'5

lHal stead0

ad « — gJ(S|.ringyJy-ˆ/ \

r&Lim

ˆ'vvC cXV * ©aiato o T

,,/f ˆ/Beaudrj »iad6tone y v J JfSsievilley x- Muse

-

'^vjlagieton

tainforˆX > Aˆ

MeuAˆA

Storj

Washita,

Tunica

Blfckton

umr /-tf- MoUDtaiDjXˆ

TTld.Crr-'O spr.ng.GˆA R L A N

-%CJ HotSp&ˆ«p

Chandler Mud.Wˆfx .

ˆ 7hZ tut‘

■ s«0. I * Jldlv.

olT 4sJp R/f

(Duffie\ Ocroclfc j}/

rmond “Axsbin \/ ˆ ... 'm

North CreeUexaKUUV'la,n'IXˆ Lat our /xiJJIjf e Pftrk!

fT .CvperV 1 S“ld» M

Senatobia

o Hnoda -vfairqfo

T U/N I C A

ileua/

[rotters/Polnt /— -

itsvillu V‘ roWam ＞oo^ , oQak. ale

awQX^

ietontP\?- T

■ F BOskell

Tombei Una ,v-

Sardis

c Plum "jlayou

bGrtdr L OO SlUrrlllt &

nHatfleld

'Cove

Crocketts Blut

Redfielc

Indian

[Lakevlew

/ ° Tull [enter . Bel fast c \o Buie

Charles^

Waliash

Yandervi

[Hattohrl

Kcarn^i,

Jeffersloa'

Eastwjood

.Hartley

tilenwood*

Olena

liatesviile

[Ascites

Rosboro'

Bples\ W > ■Reiter A

Blu.X-X

Sorrells/ Noble Lakk

oWyˆd# mc

faith? ˆ I Xrr- -

o Locust .c ottu * hp:;

\

Cl*0 VJ , York tc

•idan

Alice ‘ Creek '

'Eagleuest

Lenox

/ Elmore Doualjison Chase

Kdb'j £ff

iittlerˆ

M ell 1 wood Ferignson L

Deluoe V Hcknor ' _ ‘ Weber,

Vuliian?

Cˆathurn1

Antimony 1 g \ " EucUa °

"J1 Abneˆ Wright

PaVA,f v

pi (/Mnrfrer

-JˆHighland l ■ R5y- I > e 1 i :

["MX-BHIb

Dalevll

Matt9on'

Sbanon

oBrookBj

/ lAconia /]

Henrico yC)

Charleston

° Bleekc/v o Staves

CoflcvvHle

, Lehigh)

‘Curtisj,

mithton'

.Princeton

ˆ < Vtaio» < iys

ui) 'Illtˆ lMeroBeyˆ

Cerrogordoj

yirlggˆ

KCi E

i.JoUmo

Idaho!

Lombardy

Cham]

iGurdon'

I Jewel

W i n Ou o \ \j3 vi

Llpptotoˆ V.

vins 4

Fleaneyville NjJoughton

Hebron

jtosedale

BOt-l.

Whelen.

ˆSprings

ˆReader

JVBarh o! \Ck

iCornervillxˆ®ˆ

iet,e!»Ytoo,V'*“.1 oAlkbrouk f Jn'llj'inni e“ £oCaaml,.iV .*
*i.M.cJ*bW«8hliWtR?\

IH E M Rs VfefV

0°d \S

In Chester'

D E S,

Robwer f

Hartley6

Dpckery

,PlaUto»vIU.0ol; 'tongo tomans."

Cliambprailll ®H e<

.1'Vl*Xc»<\»r ii

' Big,lim\ Spr.i/lV V

.hbdowi

■wLaneburg Bldff Cit; l Sutton \

flit. Moriah® oCMo iwSprh.© .Bo,,,',

I) Azor (

| /oBodsnw J

I ',,1,,. I Woodlawn ^Willisville o || 1 Delta© Leake »

*| 1 Davidsono^1

\\J' /Col leech ill oStepbenB[

y/x,'4" £

Arden

Clarksville

jrCt'Gue

•eppard

Colcr

EfaimE&c \ Coleboro

"As*

jtndeu'

3J

/ ^1\fnp,‘/n© vYfhrl

C AML H O U/N r

\® Raiford' / „ f

_ A H J A. Gra J®

X'iK I n"" ft

^ A YSlUneJ

\ " V V^iirtebi/u i

itV*® pPCbampairnulle

rnscyl

0Stoi«*1

< hooU] Lone, Susaf riP

Deane \ ˆCotai®to

Homan

.Winona

"Finnsˆ L istay' . iy Tate f y Elliott L Klrklaml'

Patmos'

Buena,

Dgamai

y MnDdevltfoˆ

/Texarkana

g. L. * ■ 1 — r:

Sv ?\o®X

.Lad del [Bclpio,

TexarkanJ-

ˆlnsonp

Elizabeth

:d water

Milner

Garlam

r Staml'/ [

■ Kress/ / MfcKamiel

■y Mars' w/uaiifleld

'ETToE

Glasgow

introsc \ a ■Hand Chi dpt.

Fork Muni ,

fucrnoliu

.Wilmington

feees 0Calrd

■BVul.r E1

v uˆjcn

amburg

| oBoael /Eudora i iplre J Indian)

Pleasant

Brusheyl

I Orossat

ˆsenthal

Kerlin

ˆruftvillai

Atlanta

bBrister 1 l Atlanta o_j v Emerson T) Mohawk

iBriehtstarf

P/Porkda

/Wilruo

Kimball

Wesson

\ yj niillborp

“llJ/jCsftdflBls

/Cromer] Elon° J jVThlte f

K..O l)ui litre rficld

^~2yK',r I _

Rayana

lluttlg]

Linden

"TPiltshn

A\M p

WEST

QARROLL

A/Y E T T E , Oxford

Watervalley

Pittsboro

©

CALHOUN

i?

.<% D A

(lrenada

ARKANSAS

SCALE

Statute Miles, 29 =1 Inch.

Longitude Wept from Greenwich

Rand McNally's New 11 x 14 Map of Arkansas. Copyright by Rand McNally & Co.

3030

ARKANSAS

tion of slavery. There are still several large holdings in the cotton region. The average value per farm in 1910 was $1,864, the total value for the State being $400,089,303. The average value per acre of the farm is $14.38, but it varies greatly in different counties, ranging from $5 in some to $50 in others. The farms are equally divided between tenants and owners. However, 75.8 per cent of the land farmed by whites was in the hands of owners, while 54.4 of the lands operated by negroes was in the hands- of tenants. The percentage of tenants is increasing. Twenty- two thousand three hundred and seventy -four farms were (1910) under mortgage.

Agricultural Products. — Agriculture is the leading industry and cotton is the chief product. The acreage devoted to cotton ad¬ vanced steadily from 1870 to 1913, when it reached 2,502,000 and the product was 1,073,000 bales. The yield per acre is slightly above the average, as also the price. The former is due to the rich bottom lands, the latter to the superior grade of cotton, approaching the long staple variety. The low price in 1914 led to a regular campaign for diversified farming and the result was the product dropped to 785,000 bales in 1915. The same year the corn crop increased 20,000,000 bushels, or about 50 per cent and several other crops in like pro¬ portion, especially hay and oats. One of the most striking things is the development of the rice industry, which was introduced in 1904. In five years the acreage had risen to 27,419, in another five years to 100,000. The yield is 12 bushels above the., average for the United States and the price 2.5 cents higher. The product in 1915 was 4,840,000 bushels worth $4,598,000. Cultivation is confined mainly to Lonoke, Prairie and Arkansas counties. Since 1909 Arkansas has risen from rank 13 among the States in production of apples to rank three, and from rank three in peaches to rank two. By far the larger part of the apples is grown in the three northwestern counties, the peaches in the western and southwestern counties below the Ozarks. One peach orchard in Pike County contains 5,000 acres, said to be the largest in the world. The berry crop is large in the eastern and central region. Large quantities of cantaloupes and strawberries are grown in the western counties, and strawberries in White County. The State ranked fourth in acreage devoted to vineyards (1915). The following table gives the amount and value of the chief products in 1916:

Acreage Production Value

Cotton.... 2,635,000 1,145,000 (bales) $107,430,000

Corn . 2,550,000 45 , 135 , 000 (bu.) 44,232,000

Hay . 375,000 469,000 (tons) 5,862,000

Oats . 350,000 7,350,000 (bu.) 4,998,000

Rice . 125,000 6,312,000 6,060,000

Potatoes.. 25,000 1,625,000 3,088,000

Wheat _ 255,000 2,040,000 3,325,000

The total value of the crops for 1916 was $175,057,000, an increase of $59,101,300 over that of 1915. More attention is being given to live stock and within the last few years there has been a notable improvement in the breed of cattle, yet the dairy industry, to which the State is so well adapted, is still in its infancy. In 1916 there were 1,589,000 hogs worth $8,- 581,000; 270,000 horses worth $22,140,000;

240,000 mules worth $24,480,000 ; 402,000 milch cows worth $15,276,000.

vol. 2 — 17

Forests and Forest Products. — The for¬ ested part of the State covers nearly three- fourths of its area. The area of national for¬ est lands in 1916 was 916,919 acres. More than 100 varieties of wood are found, but only a few appear in considerable quantities. The leading variety is pine (chiefly short leaf yellow), which covers the southern part of the State. Several varieties of oak, hickory, ash, gum, maple and elm are scattered widely over the State. Cypress abounds in the swamps of the Saint Francis and Mississippi valleys. Red cedar and cotton wood are found in the Arkansas valley. The estimated stand of timber in 1909 was 81,600,000,000 board feet, which was exceeded by only two Southern States. Of this amount all but 2,900,000,000 was privately owned. All but 300,000,000 feet of this was in two National forests, the Arkansas, 680,000 acres, and the Ozark, 488,949 acres. In 1916, 240,000 acres in these forests were thrown open to homestead. Since 1909 the cut has amounted to about 14,000,000,000 feet, leaving 67,500,000,000 in 1916. In 1909, 2,060 mills were cutting 1,313,668,000 feet of pine, 358,556,- 000 of oak and other varieties in amounts bringing the total up to 2,111,300,000 feet worth $31,839,283. This does not include cross ties, poles, staves and firewood or whole logs shipped out of the State. Since 1909 the annual cut has decreased. In 1915, 1,150 mills pro¬ duced

1,800,000,000 feet. A great part of this, both soft and hard, is dressed or used for manufactures within the State.

Manufactures. — Arkansas is still a dis¬ tinctly agricultural State, but there is a steady increase of manufactures. The number of establishments rose from 1,746 in 1899 to 2,925 in 1909 ; the number of wage earners from 31,525 to 44,982; the value of the products from $39,888,000 to $74,916,000. The following table shows the standing of the leading industries in 1909:

No. of Value

estab- Value added by

lish- Wage of manu-

ments earners products facture

Lumber and timber

products, 1909.. 1,697 32,923 $40,640,000 $26,340,000 Oil, cotton seed and

cake . 44 1,086 7,789,000 1,784,000

Flour and grist

mills . 113 312 5,615,000 756,000

Cars and shop work

(R. R.) . 16 3,249 4,154,000 2,395,000

Printing and pub¬ lishing . 295 981 2,082,000 1,546,000

Furniture and re¬ frigerators . 20 680 975,000 496,000

All others . 740 5,751 13,661,000 6,664,ooo

Total . 2,925 44,982 $74,916,000 $39,981,000

While in 1914 the number of establishments and wage-earners had decreased, capital in¬ vested, wages, and output had increased, as shown in the following table :

Number of establishments. . 2,604

Number of wage-earners . 41 , 979

Capital invested . $77,162,000

Wages . 20,752,000

Value of materials used . 44 , 907 , 000

Value of products . 83 , 940 , 000

The manufacture of lumber is easily the lead¬ ing industry, employing 73.2 per cent of the wage earners and contributing over half to the value of products. While the number of

establishments is large compared with the amount of products the tendency toward large scale production is easily apparent. Of the 1,697 lumber and timber companies, 97 em¬ ployed 17,300 wage earners and produced $22,848,000, while the other 1,600 employed 15,632 wage earners and produced $17,792,000. In the oil, cotton seed and cake industry 30 establishments employed 920 wage earners and produced $6,819,000 while 14 employed 166 and produced $969,000. The industries are centred mainly in five cities, Little Rock, North Little Rock, Fort Smith, Pine Bluff and Hot Springs. A law of 1915 requires railroads to make re¬ pairs within theˆ State.

Transportation and Commerce. — Though bountifully supplied with rivers the State has little water transportation of much value except that of the Mississippi. This stream gives deep water communication with other States and with the Gulf. New Orleans is the port for Arkansas and through this large quantities of lumber and cotton are exported. The Arkansas River is navigable a part of the year for boats of light draft from the eastern to the western border, a distance of about 400 miles, the White to Jacksonport, about 250 miles; also the Red and Ouachita for short distances, but the ton¬ nage on all of them is very small. The main reliance is upon railroads. In 1861 railway construction had just begun. In 1870 there were only 256 miles in the State. By 1890 the mileage had risen to 2,203, in 1900 to 3,082 and in 1916 to 5,407, or one to every 10 square miles of territory. A railroad commission was created in 1909. Farmers still labor under great difficulties in getting their produce to the railroads. The State maintains a highway com¬ mission which aids counties and localities in construction of roads. There are about 36,500 miles of road in the

State, of which 1,185 are improved. Seven lines of electric street rail¬ ways operate 134 miles of track.

Banks. — There were 59 National banks in Arkansas (1915) with capital of $5,301,000; surplus and undivided profits, $3,331,121 ; re¬ sources, $34,641,315. There are 404 State banks (five private, 46 trust companies included), sur¬ plus and undivided profits, $5,457,353 ; capital, $13,763,892; resources, $61,989,094. Only seven National banks have ever failed in the State, two of these in 1915 (one of which was restored to solvency), and one in 1916. In 1915, five State banks failed, assets $78,450, liabilities $127,847. The office of State bank commissioner was created in 1913. There are very few savings banks separately organized, but most State banks run a savings department, paying 4 per cent. Their savings accounts amount to $3,719,007. There are 41 loan and trust companies, capital $4,741,875. A Federal Re¬ serve branch bank is located at Little Rock.

Finances. — The assessed valuation in¬ creased from $299,730,877 ($199,331,562 real, $100,399,315 personal) in 1905, to $447,020,270 in 1915. A good part of the increase was due to the activity of the State tax commission, created in 1909. The total revenue collected in 1905 was $5,037,665; in 1915, nearly $7,000,000. The poll tax amounted to about $260,000, of which $190,000 is paid by whites. Another large item for non-property taxes was for liquor licenses. This amounted to $93,000 in 1913, $69,540 in

1914, $54,550 in 1915 and was entirely cut off by the <(dry>:> law of 1916. The insurance companies paid $60,000 in fees and $112,412 in taxes. The return from the inheritance tax law was small, though the law is drastic in form. The only rec¬ ognized bonded debt is that of $1,134,500 bor¬ rowed from the permanent school fund many years ago and $116,000 taken in like manner from the University endowment. On these the State pays 3 per cent. In 1917, the legislature authorized the issuance of $750,000, short term notes, to take up outstanding warrants of sev¬ eral years' accumulation. Education, Confed¬ erate pensioners, charitable institution and of¬ ficers' and employees' salaries constitute the chief subjects for expenditures.

Education. — The educational conditions in Arkansas are not the best, neither are they the worst. A very decided improvement has been made in the last few years. In 1909 counties were authorized to elect superintendents and 25 counties now have this officer. In 1911 a State board of education (eight) was created with considerable administrative powers to be exercised with the State superintendent.

Pro¬ vision was made for the consolidation of weak districts and $50,000 was appropriated to aid high schools. The latter was declared uncon¬ stitutional in 1915 because the appropriation was made from the school fund. The legislature of 1917 provided aid for rural high schools, also funds necessary to receive the Federal grant under the Smith-Lever Act. A State supervisor of high schools, a State supervisor of rural schools and a school improvement organizer are supported by the general education board. A compulsory attendance law was passed in 1909 (amended twice since), but 28 counties are exempt and it is not well enforced. A child labor law was adopted by popular vote in 1914. Sˆate uniformitv of textbooks was provided in

1.

The school revenue is derived almost wholly from taxation. In 1907 the State levy was raised from 2 mills to 3 mills and school dis¬ tricts were authorized to vote 7 mills instead of 5. In November 1916, the people adopted an amendment raising the latter limit to 12 mills. The total expenditures in 1915 were $4,454,737 as compared with $3,187,083 in 1909 and' $1,369, - 810 in 1900. The value of all school property in 1915 was $12,660,849 as compared with $6,- 939,000 in 1909 and $2,500,000 in 1900.

The census of 1910 showed 142,954 illiter¬ ates, or 12.6 per cent of the population, as against 20.4 per cent in 1900. The percentage for whites was 7.1, negroes 26.4 as against 11.6 per cent and 43 per cent in 1900. The percent¬ age of illiterates 10 to 14 years of age was 8.2 per cent in 1910, 16.2 per cent in 1900. The school population in 1916 was 649,083, of whom 460,145 were white, 188,938 colored. The en¬ rolment was 332,914 white, 114,812 colored, total 447,725. About 6,250 were enrolled in private schools. The percentage of the school population enrolled in the public schools is higher than in any State east of the Mississippi. The average length of the term is 134.9 days, the average daily attendance 304,401. The average salary of teachers is $51.50, or about $325 a year; $65 monthly for male teachers, $50 for female teachers. The number of teach¬ ers was, male, 4,982 ; female, 6,080. Arkan-

sas ranks first in the percentage of revenue paid to teachers. There are 145 schools giving high school instruction, but only 82 maintain a four years' course. The en¬ rolment in public high schools is 9,505,

private 1,356. Four agricultural high schools (at Jonesboro, Russellville, Magnolia and Monti- celloj and one normal (at Conway) are sup¬ ported out of the general revenue. Also a ((Branch Normal® for negroes at Pine Bluff. The University of Arkansas (Fayetteville 1872) has a total annual revenue of about $300,000. In 1917, it was put on a mileage basis. The enrolment is about 800. A medical de¬ partment at Little Rock was added in 1911. Besides these there are the following private institutions: Arkansas College (Presbyterian, Batesville 1872) ; Hendrix College (Methodist, Conway 1884) ; Ouachita College (Baptist, Arkadelphia 1886) ; Henderson-Brown (Metho¬ dist, Arkadelphia 1890) ; Arkansas Cumberland College (Presbyterian, Clarksville 1891) ; Gal¬ loway Female College (Methodist, Searcy) ; Central Baptist College for Women (Conway) ; Crescent College (Eureka Springs) ; Arkansas Law School (Little Rock) ; Little Rock College (Roman Catholic) ; Subiaca College (Roman Catholic) ; Roman Catholic Scholasticate (Logan County), and Roman Catholic Monas¬ tery (Subiaca).

Churches. — All denominations are well represented, but Baptists and Methodists lead in membership. The Christian Church (Camp- bellite) is one of the leading denominations with a rapidly increasing membership. The Catholics, Disciples of Christ, Presbyterians and Episcopalians also have a large and grow¬ ing membership.

Charitable and Penal Institutions. — There are 27 benevolent institutions in the State. The following are maintained by the State in or near Little Rock: School for the blind, school for deaf mutes, hospital for nervous diseases, reform school and home for Confederate soldiers. The State also pays $1,000,000 a year in pensions to ex-Confeder- ates. The tuberculosis sanatorium is located at Booneville. The State prison is located at Lit¬ tle Rock, the State penal farm for whites in Jefferson County, for negroes in Lincoln County. At the last census the number of de¬ pendent paupers was 534, or 33.9 per 100,000 of the population.

Population. — The estimated population in 1916 was 1,753,033; 1920, 1,752,204. The State lost heavily to Oklahoma when that State was opened to settlement. Of the total population, 71.8 per cent are whites, 28.1 per cent are colored. In 14 of the 75 counties over half the population are colored, but in 26 counties the whites make up 95 per cent. The foreign popu¬ lation is 16,909 or 1.4 per cent, though native whites of foreign parentage make up 2.3 per cent. Of these the Germans contributed 34.4 per cent. In 1910 there were only 28 incorpo¬ rated places of more than 2,500 population and these contained only 12.9 per cent of the total population. There were

395,842 males, 21 years of age in 1910, and 263,055 qualified voters (who had paid the poll tax) in 1915. The lead¬ ing cities are Little Rock, 65,030 ; Fort Smith, 28,870; Pine Bluff, 19,280; Hot Springs, 11,695; North Little Rock, 14,048. t .

Government. — The constitution, in effect since 1874, has undergone few material changes.

Suffrage depends on a year's residence and the payment of a poll tax. The Governor and other State officers hold office for two years. The salary of the Governor is $4,000 a year plus $1,000 for house rent. His veto may be overridden by a simple majority. He has an extensive power of appointment. If the office becomes vacant within the first year, a new election is held; if later, the Presi¬ dent of the Senate fills out the term. The legis¬ lature meets biennially. The members of the House of Representatives (100) are elected every two years of the Senate (35) for four. The per diem ($6) is limited to 60 days, after which the legislature may sit without pay. Special sessions are limited to 15 days. The Supreme Court has five members elected for eight years. There are 18 circuit and 12 chan¬ cery courts; also municipal courts and the usual county and probate courts and justices of the peace. There is an optional primary election law. A corrupt practices act applies to all elections.

Governors of the State.

t

TERRITORIAL

James Miller .

. 1819-25

George Izard .

. 1825-29

John Pope .

. 1829-35

William S. Fulton .

STATE

. 1835-36

James S. Conway .

. . Democrat ....

1836-40

Archibald Yell .

it

1840-44

Samuel Adams .

it

1844

Thomas S. Drew .

a

1844-48

John S. Roane .

it

1848-52

Elias N. Conway .

u

1852-60

Henry M. Rector .

a

1860-62

Harris Flanagan .

a

1862-64

Isaac Murphy .

. . Republican . . .

1864-68

Powell Clayton .

1868-71

Ozro A. Hadley .

U

1871-72

Elisha Baxter .

il

1872-74

Augustus H. Garland. . .

. . Democrat ....

1874-77

Wm. R. Miller .

a

1877—81

Thomas J. Churchill . . .

u

1881-83

James H. Berry .

a

1883-85

Simon P. Hughes .

1885-89

James P. Eagle .

a

1889-93

William M. Fishback...

a

1893-95

James P. Clarke .

tt

1895-97

Daniel W. Jones .

it

1897-01

Jeff Davis .

a

1901-07

John S. Little .

a

1907

X. O. Pindall .

it

1907-09

George W. Donaghey...

tt

1909-13

Joseph T. Robinson . . . .

(t

1913

W. K. Oldham .

tt

March 8-23

J. M. Futrell .

a

March 23-Aug. 6

G. W. Hayes .

a

1913-17

C. H. Brough .

u

• • • •

1917-21

Thomas C. McRae. . . .

«

• • • •

1921

State Militia. — There are 6,019 officers and enlisted men (June 1917). Two permanent army camps — Camp Pike and Fort Logan H. Roots — are located across the river from Little Rock. Eberts Field, an aviation centre, is located near Lonoke.

Politics. — The State has been democratic since 1874. It sends seven

representatives to Congress.

History. — De Soto was the first white man to set foot in the State; the French explorers, Marquette and Joliet, came down the Mississippi in 1673 and found near *the mouth of the Ar¬ kansas River a tribe of Indians, the Arkansas, from whom the State and river were named. The first settlement was made under direction of De Tonti at Arkansas Post in 1686 a few miles above the mouth of the Arkansas River. But settlement was slow and inhabitants were very few in 1803 when the United States ac¬ quired the territory as a part of Louisiana. In 1812 it was separated from Louisiana as a part

of Missouri. In 1819 Arkansas Territory, in¬ cluding what is now Oklahoma, was organized. It was admitted as a slave State 15 June 1836. Though settled chiefly by the southern people it was greatly divided on the question of seces¬ sion and the convention adjourned without passing an ordinance, but President Lincoln's call for troops led to the reassembling of the convention and the ordinance of secession was adopted 6 May 1861. Several battles took place in the State, but it did not suffer from military operations like the others. By 1863 a large part of the State had been recovered by the Union and a loyal State government was established in 1864, with Isaac Murphy, governor. How¬ ever the State had to undergo reconstruction and was not readmitted to the Union until 23 June 1868. The anarchy of the carpet-bag regime reached its climax in 1872 in an armed conflict between Brooks and Baxter for the governor¬ ship. The Democrats supported Baxter, Re¬ publican, and he held until 1874. A new consti¬ tution was adopted that year and the Democrats recovered the State government, which they have held ever since.

The constitution of 1874, which was some¬ what reactionary in type, is still in force, though 13 amendments have been added. The most radical is that providing for the initiative and referendum (1910). In recent years the leg¬ islature has passed some progressive and a few radical measures. The attempt to regulate freight and passenger rates on railroads (1907) was taken into the Federal courts, along with like attempts in Minnesota and Missouri. After a long delay the action of the State was sus¬ tained in part, but soon overruled by new suits and decisions. A drastic anti-trust act (1905) drove the insurance companies and some other concerns out of the State for a while, but it was amended and the companies returned. The (fellow servants) rule

was abolished after a long drawn-out fight. The convict lease system has been greatly improved and vir¬ tually abolished. The legislature of 1915 passed a State-wide prohibition law, though a similar law originated by petition had been re¬ jected in 1912, a drastic inheritance tax law, and a minimum wage law. In 1917 the ballot was conferred on women in primary elections; the tax laws were revised; an amendment was sub¬ mitted authorizing the State to issue $9,000,000 of bonds to loan to farmers for the purchase of lands ; and a convention was called to re¬ vise the constitution. The convention met, ap¬ pointed committees, and adjourned to July,

1.

The first opportunity to use the initiative and referendum came in 1912. One legislative act was referred by petition and three other acts originated under the initiative. The first was a revenue law, the others related to pro¬ hibition, elections and uniform and free text¬ books. All were rejected. Five amendments were voted on, two submitted by the legisla¬ ture and three under- the initiative. One, the <(grandfather clause, » was defeated. All the others received a majority of the votes cast on them, but the Supreme Court held that only three could be submitted at one time and that a majority of the total vote cast was required for adoption. This cut out all initiated amend¬ ments except the one limiting the legislature to 60 days. In 1914 two acts were sub¬

mitted under the initiative, a child labor law after the preceding legislature had re¬ fused to pass one, and a “publicity-* act, which subsidizes the press through public advertising. Both were adopted. An amendment (by peti¬ tion, 1916) providing for good roads received a majority of the vote cast on it, but not a ma¬ jority of the total vote. A primary election law, the repeal of the prohibition law and two amendments originated by petition were sub¬ mitted in 1916. The first wras adopted. Also the amendment raising the limit of the school tax to 12 mills. The others failed.

Bibliography. — (The South in the Building of the Nation) (Vols. Ill, V, VI, Richmond 1909) ; Publications of the Arkansas Historical Society (3 vols., Fayetteville 1906-) ; Harris,

Maxwell and Keifer, (Wood Using Industries and Natural Forests of Arkansas* (U. S. Forest Service Bulletin, No. 106, 1912) ; U. S. Geologi¬ cal Survey, Mineral Resources ; Publications of the State Geological Survey, Branner, Purdue, Steele (Fayetteville) ; Reports of the Secretary of State, the Auditor and Superintendent of Public

Instruction (Little Rock).

David Y. Thomas,

Professor of History and Political Science, University of Arkansas.

ARKANSAS, University of, a State insti¬ tution founded in 1871 at Fayetteville, Ark. It comprises a college of liberal arts and sciences, colleges of engineering and agriculture, an agri¬ cultural experiment station and a department of education. The medical and law faculties are located at Little Rock and at Pine Bluff there is a branch normal college for negroes. The annual income is about $250,000, derived from Federal and State endowments and appro¬ priation. The university plant and grounds are valued at more than $1,000,000. The library contains 25,000 volumes. The State appro¬ priates $20,000 annually to the medical school. Tuition .is free in all departments except in the professional schools. In 1917 the institu¬ tion had 70 instructors and 814 students.

ARKANSAS CITY, Kan., city of Cowley County, 50 miles southeast of Wichita, near the southern border of the State, on Arkansas River, near the Walnut River, and furnished with water power by a canal uniting them. It was settled as Greswell in 1870, and incor¬ porated under its present name in 1872. It is on the Atchison. Topeka and Santa Fe, the Missouri Pacific, the St. Louis and San Fran¬ cisco, the Midland Valley and Kansas S. W. rail¬ ways, and manufactures agricultural implements, windmills, wire mattresses, flour and lumber. The new western oil fields around have added largely to its prosperity and it has a large trade with Indian posts and agencies in Oklahoma and Indian Territory. It contains a United States Indian School ; operates municipal water works ; and since 1912 is governed by commis¬ sion. Pop. 8,500.

ARKANSAS POST, Ark., village in Ar¬ kansas County; on the Arkansas River, 117 miles southeast of Little Rock. It is on a high bluff and was the site of the first settlement made within the present limits of Arkansas by French missionaries in 1685. Its elevated loca¬ tion gave it considerable military importance during the Civil War. The Confederates es¬ tablished strong works here, which were re-

duced by a combined assault of a portion of the Federal army, under General McClernand, and a naval command under Admiral Porter, on

11 Jan. 1863.

ARKANSAS RIVER, the largest affluent of the Mississippi save the Missouri; length, nearly 2,000 miles ; area of basin, 189,000 square miles ; mean discharge, 63,000 cubic feet. It rises in central Colorado ; flows east with a rapid current through deep, narrow canons, and over a rocky bed till it emerges on the naked, arid plains of eastern Colorado and western Kansas; runs east several hundred miles in Kansas, and turning southeast leaves it near Arkansas City. It then cuts a cantle off Oklahoma, — where it receives the Cimar¬ ron and the broad shallow Canadian . from the west, with the Verdigris and Neosho from the north, — and becomes navigable 650 miles to its mouth in Arkansas (which it bisects). In Fremont County, Colo., it flows through the Royal Gorge, one of the deepest canons in the United States.

ARKANSAS STONE, a name given to the oilstones made from two grades of novacu- lite quarried in Hot Springs, Garland County, and also in adjoining counties in Arkansas. The rocks cover a large area and yield the finest whetstones. From them the highest grades of both whetstones and razor hones are made.

ARKLOW, Ireland, seaport town of county Wicklow, 14 miles southwest of the town of that name, on the right bank and just above the mouth of the Avoca, here crossed by a bridge of 19 arches. Fishing is the chief in¬ dustry, gunpowder is manufactured, and copper and lead are exported. There are remains of an old monastery, and of the castle of the Or- monds, the latter destroyed by Cromwell in 1649. Here in 1798 the United Irishmen suf¬ fered a defeat. Pop. 5,000.

ARKONA, the northeast promontory of the German island of Riigen, in the Baltic. Its chalk cliffs rise to a height of 177 feet, topped with a lighthouse, built in 1827, from which the Danish island of Moen, 33 miles northwest, can be seen. Here stood the famous fortifica¬ tion (Slavonic, Urkan) so long impregnable, and the temple of the Wend deity Swantewit, the most sacred sanctuary of the Slavs of northern Germany.

ARKOSE, ar-kos', a variety of sandstone that contains many fragments of feldspar. Arkose commonly results from the incomplete, or mechanical weathering of a granite, so that the grains of quartz and feldspar fall apart into what is called a feldspathic sand or arkose sand. The feldspar grains remain unweathered. This type of weathering is common where frost or great heat without much moisture is the agent, as on high mountains or in deserts. By

cementing together of this feldspathic sand an arkose results.

ARKWRIGHT, Sir Richard, English in¬ ventor: b. Preston, Lancashire, 23 Dec. 1732; d.

3 Aug. 1792. He was the youngest of 13 chil¬ dren, and was bred to the trade of a barber. His residence in a cotton-spinning district (Bol¬ ton) drew his attention to the operations of that manufacture; but he was 35 before he de¬ voted himself to consideration of the subject.

The spinning- jenny, invented in 1767 by Har¬ greaves, gave the means of spinning 20 or 30 threads at once with no more labor than had previously been required to spin a single thread ; but the thread spun by the jenny, could not, however, be used as warp, being destitute of the firmness required. Arkwright supplied this deficiency by the invention of the spinning- frame, which spins a vast number of threads of any degree of fineness and hardness, leaving the operator merely to feed the machine with cot¬ ton and to join the threads when they happen to break. His invention introduced the system of spinning by rollers, the carding or roving as it is technically termed (that is, the soft, loose strip of cotton) passing through one pair of rollers and being received by a second pair, which are made to revolve with three, four or five times the velocity of the first pair. By this contrivance the roving is drawn out into a thread of the desired degree of tenuity, a twist being given to it by the adaptation of the spindle and fly of the old flaxwhecl to the ma¬ chinery. The precise date of his invention is not known, but it is most probable that the idea of spinning by rollers had occurred to his mind as early as the period when Hargreaves was engaged in the invention of the jenny. He re¬ moved to Nottingham in 1768, in order to avoid the attacks of the lawless rabble who thought his machines would deprive many workmen of a livelihood. Arkwright erected his first mill, which was driven by horses, at Nottingham, and took out a patent for spinning by rollers, in 1769. He built a second factory on a much larger scale at Cromford, in Derbyshire, in 1771, the machinery being turned by a waterwheel, and having made several additional discoveries and improvements, took out a fresh patent for the whole in 1775, thus completing a series of ingenious and complicated machinery. When the importance of his inventions became known efforts were made to have the patent set aside, and in 1781 Arkwright brought actions against a number of persons for invading his patent. Only one cause was tried, that against Colonel Mordaunt in the Court of King’s Bench in July 1781 ; and in that the verdict went against Arkwright on the ground of defective specification. In February 1785, a second action was tried in the court of common pleas, in which Arkwright brought a

number of persons to prove that they could make machines from his specifications, in consequence of which he obtained a verdict in his favor. This pro¬ ducing great alarm among many who had erected machines for cotton spinning, and from whom a royalty was demanded, in order to settle the dispute a suit was brought against Arkwright in the Court of King's Bench, in which the whole question was argued, not only as to the intelligibility of his specification, but on the less technical and more important ground of his not being himself the inventor of the machines for which he had obtained a patent. After a long and ably-conducted trial a verdict was given against Arkwright, and in November 1785 the patent was canceled. None of Ark¬ wright's most intimate friends, or those best ac¬ quainted with his character, ever had the slight¬ est doubt with respect to the originality of his invention. In 1786 Arkwright received the honor of knighthood from George III, and un¬ like many inventors, he amassed a large fortune

by his inventions. Consult Baines, (History of Cotton Manufacture) (London 1861), and Ure, (The Cotton Manufacture of Great Britain) (London).

ARLBERG. a mountain pass between the Rhaetian and the Lech Alps, in the west of Tyrol; between Tyrol and Vorarlberg, pierced by one of the longest railway tunnels in the world. It is six and one-half miles long, was finished in November 1883 and connects the val¬ ley of the Inn with that of the Rhine, and the Austrian railway system with the Swiss rail¬ ways. In 1786 a road was constructed across the pass and was for a long time the only means of communication between Vorarlberg and the rest of the county.

ARLES,, arl, (ancient, Arelate), France, town on the Rhone, about 25 miles from its mouth, in the department of Bouches-du-Rhone. A canal has been cut which connects it with the Mediterranean. It stands on a rocky limestone eminence, sloping to the river, and has irregular streets, presenting many interesting features. In a large square is an ancient granite monolith, and among other remarkable objects are the Romanesque cathedral of Saint Trophimus, with a fine portal and some good paintings and sculptures ; and especially numerous ancient re¬ mains, of which the most conspicuous are those of a Roman amphitheatre which accommodated 24,000 spectators, and those of a Roman theatre. It has railway workshops, manufactures silk, hats,

flour, etc., and forms a market for the productions of the surrounding country. It possesses a college, a naval school, a public library and several museums. Arles was founded several centuries before the Christian era and was the chief colony of Massilia (Mar¬ seilles). In the 4th and 5th centuries several church councils met here. From 897 to 1150 it was the capital of a kingdom bearing its name. Pop. (1911) 16,746.

ARLINGTON, Mass., town in Middlesex County, about seven miles northwest of Boston, on the Boston & Maine Railroad. It contains several fine buildings, among which is a library given to the town by Mrs. Eli Robbins at a cost of $200,000. The town has electric lights and car service to Boston, of which it is prac¬ tically an attractive residential suburb. Local industries include flower and market gardening, chrome works, piano case and wire factories. The United States census of 1914 recorded 19 manufacturing establishments of factory grade, employing 303 persons, of whom 246 were wage earners, receiving a total of $185,000 annually in wages. The capital invested amounted to $1,056,000 and the year's output was valued at $641,000. As Menotomy, Arlington was settled about 1650; in 1807 it was renamed West Cam¬ bridge, and received its present name in 1867. Pop. (1920) 18,665.

ARLINGTON, Wash., town in the north¬ ern part of Snohomish County, at the con¬ fluence of the forks of the Stilliguamish River, and on the Northern Pacific Railroad, 60 miles north of Seattle and 22 miles northeast of Everett, the county-seat. It has saw mills, a shingle mill, a creamery and pasteurizing plant, cannery, machine shops, blacksmith and car¬ penter shops, two banks, a post-office, two hospitals and a weekly newspaper. It has a graded school system, with a fully accredited

high school, and six churches representing the leading denominations. The principal agricul¬ tural industries are dairying, grain-growing, bush-fruit growing, etc. Poultry raising is also important. The lumber industry is extensive. The two banks have resources aggregating $600,000. The assessed valuation of the town is $450,000, said to represent but 33 per cent of the actual value. The annual expenses amount to about $8,000, of which about $1,000 are raised otherwise than by direct taxes. The government is vested in a mayor and council. Pop. (1920) 2,028.

ARLINGTON CONFEDERATE MON¬ UMENT ASSOCIATION. During the ad¬ ministration of President McKinley the Con¬ federate dead buried in the city of Washington, D. C., and vicinity were removed to

the Na¬ tional Cemetery at Arlington, Va., the old home of Robert E. Lee, where they were reinterred in a plot of ground set apart by the President for that purpose and designated <(The Con¬ federate Section.® The Arlington Confederate Monument Association was formed for the purpose of erecting in this section a suitable monument to the dead there buried and to stand, in a larger sense, as a memorial to all those who lost their lives in defense of the Confederacy, as well as to the cause they represented.

ARLON, ar'lon, Belgium, the capital of the province of Luxembourg, in the midst of the woods and mountain ridges of the Ar¬ dennes. It is a thriving place, with manufac¬ tures of ironware, leather, tobacco, earthen¬ ware and clay pipes. It appears in the Antonine Itinerary, and from the coins, inscriptions and other antiquities found, must have possessed some importance even in the time of the Ro¬ mans. It is mentioned under its present name in 870, in connection with the partition of Lor¬ raine. It has suffered much in the various wars which swept across this part of Europe. From 1684 to 1697 it was in the hands of the French. It was ceded to Belgium in 1831. Pop. (1910)

12,012.

ARM, a term technically applied to that portion of the upper extremity of the body extending from the shoulder joint to the elbow, but popularly used to denote both arm and fore¬ arm. The arm proper has one large and strong bone, the humerus, covered by strong muscles, which protect the blood vessels and nerves. The upper end of the humerus fits into the head of the scapula and with the clavicle forms the shoulder joint. The head of the humerus is held in the joint partly by ligaments, but mainly by the muscles attached to it. The motions of the arm are many. Those muscles that move the arm inward toward the chest are known as the abductors. These are the pectoralis major, coraco brachialis, which also flex the arm, and the latissimus dorsi and teres major, which also extend the arm. The arm is moved away from the body by the deltoid, a large muscle on the outer side, and the supraspinatus, a smaller muscle going from the scapula. The arm is rotated outward by the infraspinatus and the teres minor, and rotated inward by the sub- scapularis. All of these muscles are fastened about the upper part of the humerus. The greater mass of the muscles of the arm are those that go to the forearm and that move

SIR RICHARD ARKWRIGHT

Famous for Inventions in Cotton Spinning

that member. Those that flex the forearm, or bend the elbow, are the biceps, the brachiates and the brachio-radials, the former being the most important. It also aids in turning the forearm palm downward. The muscles that ex¬ tend or stretch the forearm are the triceps and the anconeus. There are other movements of the forearm. The arm having two bones, the radius and ulna, one turns on the other and the movements of pronation and supination are produced. Pronation is accomplished by two muscles, the pronator teres and the pronator quadratus ; the supinator makes the movement outward. The movements of flexion and ex¬ tension take place in the elbow joint, which is hinged like those of pronation and supination, just below the elbow joint, the radius moving on the ulna. The union of the radius and ulna with the bones of the wrist make a hinge-like joint, the wrist joint. Movements at the wrist are in four directions, flexion and extension, abduction and adduction. These movements, as well as those of the fingers, are made by a large group of muscles some 20 in number. There are in all 48 muscles concerned in the movements of the arm, forearm and hand. The blood supply of the arm is derived from the brachiocephalic of the right side and from the arch of the aorta on the left (see Aorta) in a single main trunk that divides at the bend of the elbow. The first portion is called the sub¬ clavian and is not in the arm proper; the axillary, or second portion, begins at the outer border of the first rib and becomes the brachial just about the armpit where it may be felt and compressed. The brachial artery is the great trunk of the arm. It may be felt just inside the inner edge of the biceps muscle about the middle and there may be readily compressed in case of haemorrhage. At the. bend of the elbow the brachial artery divides into the radial and ulnar, which supply the outer and inner sides of the forearm respectively. The radial artery is the one most frequently felt in deter¬ mining the pulse ; the ulnar may be used but as it lies deeper it is felt less easily. In the hand these arterial branches anastomose to form a superficial and a deep palmar arch from which branches go to supply the fingers. Haemorrhages in the palm of the hand can be controlled there¬ fore only by controlling both radial and ulnar arteries, or better by controlling the brachial just above the bifurcation in the elbow. This may be done by strongly flexing the forearm or by something held against the artery. The prin¬ cipal veins of the forearm are the ulnar, the median and the radial ; of the arm the cephalic and basilic. These empty into the axillary vein and this into the sub-clavian. The nerve sup¬ ply of the arm is derived from the spinal cord from the fifth, sixth, seventh and eighth cervical, and

the first, second and third thoracic nerves. These form a complex plexus, the brachial plexus. The main branches going to the differ¬ ent muscles and supplying the skin areas are the median, ulnar, musculo spiral, musculo cutaneous and circumflex. Their distribution is exremely complex. See Joint, Diseases of.

ARMADA, ar-ma'da or ar-ma'da, the Spanish name for any armed force, especially a naval force. The term Spanish Armada is applied to that great naval armament which Philip II, in 1588, fitted out under the command of the Duke of Medina-Sidonia and Martinez

de Recaldo, against Queen Elizabeth, with the view of conquering England. The fleet consisted of 131 great and many smaller ships of war, and carried 19,000 marines and 8,000 sailors. The ships had scarcely left Lisbon on 29 May 1588 when they were scattered by a storm and had to be refitted in Corunna. Ad¬ vancing in the form of a half-moon of seven miles in extent, it came in sight, off Plymouth, of the English fleet, scarcely numbering 80 sail, and commanded by Lord Howard, who, en¬ deavored by dexterous seamanship and the discharge of well-directed volleys of shot at alternately long and short distances, to damage the vessels of the enemy. Some of these, in¬ cluding the galleon laden with treasure, fell into the hands of the English or were destroyed. Arrived at length off Dunkirk, on the 7 August the armada was becalmed and thrown into such confusion by the arrival in the fleet of eight fire-ships sent by the English admiral, that on the morning of the 8th Lord Howard was en¬ abled to attack it on several sides. Notwith¬ standing a brave resistance, many of the Spanish vessels were destroyed or fell into the hands of the English and Dutch, and in con¬ sequence the Duke of Medina-Sidonia resolved to abandon the enterprise, conceiving the idea of conveying his fleet to Spain by a voyage round the north of Great Britain. A hurricane which now broke forth with tremendous vio¬ lence on the already dispirited Spaniards, scat¬ tered their ships in all directions. Some went down on the cliffs of Norway, others in the open sea and still others on the Scottish coast. About 30 vessels reached the Atlantic Ocean, and of these several were driven by a west wind on the coast of Ireland and wrecked. In all, the armada is said to have lost in the open sea 72 large vessels, exclusive of smaller craft, and 10,185 men, while every family of distinction in Spain had to mourn the loss of one or more of its members. Only about 50 vessels reached Spain on the return voyage.

Bibliography. — Corbett, (Drake and the Tudor Navy*; Creasy, (Fifteen Decisive Bat- tles) ; Froude, (The Spanish Story of the Ar¬ mada* (London 1892) ; Gardiner, (Historical Biographies: Drake * ; Green, (History of

the English People *; Motley, (History of the United Netherlands* ; Laughton, J. K. (ed.), (State Papers Relating to the Defeat of the Spanish Armada) (London 1894).

ARMADALE, the title of a novel by Wilkie Collins (1866). The plot of this, like that of (The New Magdalen* and others of its author's later novels, is a gauntlet of defiance to the critics who had asserted that all the in¬ terest of his stories lay in the ˆsuspension of knowledge as to the denouement. The ma¬ chinery is in full view, yet in spite of this dis¬ closure, the reader's attention is held until he knows whether the villain or her victims will come out victorious.

ARMADILLO (Sp. dim. of armada, armed, referring to its pony shell). 1. A. edentate, mammal of the family Dasypodidce, found in South and Central America and notable for its defensive armor. This armor consists of small roundish bony plates, ossified within the skin, and united to form solid shields, one over the shoulders, one over the haunches, and, between these two, tranverse bands of movable/ plates, which protect, but

leave freedom of motion, to the trunk of the body. These plates are overlaid by a thin, horny pellicle, and between them grow hairs varying in length and amount with the species, from almost none in some to a coat in others, hiding the shell ; and the unarmored central surface is also hairy. The head is provided with a shield entirely separate from that of the shoulders, and in some species even the tail is protected by bands of plates. The various forms of armadillos are distinguished largely by the number of movable thin bands of plates lying between the large fixed anterior and pos¬ terior shields, up to as many as a dozen in the cabassous (Xenurus) . This armor serves the purpose of defense, and some of the tribe (only those of the genus Tolypeutes, however), in¬ crease its value by exercising the power of roll¬ ing themselves up into a ball so that the tender under parts of the body may be completely pro¬ tected. This ability depends upon the number of bands in the central portion of the armor- case. Although true edentates, these animals have a few small, useless teeth, without true roots ; the tongue is covered with a sticky fluid like that secreted by the tongue of an ant-eater, but it is not protrusile.

The armadillos are timid, nocturnal animals, living on insects, carrion and vegetable matter; their legs and claws are adapted to burrowing, and, when pursued, they usually bury them¬ selves more quickly than the pursuer can follow them. Only one species (Dasypus villosus) is sufficiently adaptable to hold its own when a wild region is settled; the others soon disap¬ pear. One of the most interesting of them all is the pichichago (Chlamydophorus trunca¬ tes), found in Argentina, which lives entirely underground like a mole, and exhibits a pe¬ culiar structure in many ways, the body hav¬ ing an appearance of truncation, as if the hinder part had been cut squarely off, instead of ending in curved lines. It is very small, only five to six inches long, while the giant armadillo (Priodon gig as) measures three feet, exclusive of the tail. Some of the armadillos range north and south as far as Texas and Argentina; among these is the peba, or nine- banded armadillo (Tatusia novemcincta) . The family is divided into several genera and the species are numerous and are known as peludos, cabassous, apars, etc., elsewhere described. They are eaten by the South Americans and even esteemed delicate, but their flesh is usually so flavored by the insects and decayed matter which they eat that only a few vegetable-eating species are inoffensive to an unaccustomed palate.

Many forms of fossil armadillos are known from both North and South America, a fossil species of Dasypus having been six feet long. Another genus was Eutatus, which had a shield formed of 36 distinct bands, of which the last 12 were soldered together. These lead back to the large group Gravigrada. (See Glyptodon ; Mylodon.) Good accounts of the armadillos are given in both the <Standard) and the (1892) ; Alston's 'Biologia Americana Central) ; <Mammals), (1879-82), with colored plates; Azara's (Historia Natural de los Paxaros del Paraguay) (Madrid 1805) ; (Mammals of Uru¬ guay } in the Proceedings of the Zoological So¬

ciety of London for 1894; Newman (The Amer¬ ican NaturalisD (September 1913).

ARMADILLO, in entomology. See Wood¬ louse.

ARMAGEDDON, ar'ma-ged'don, the great battlefield where occurred the chief con¬ flicts between the Israelites and their enemies. The name was applied to the tableland of Esdraelon in Galilee and Samaria, in the cen¬ tre of which stood the town Megiddo, on the site of the modern Lejjun; used figuratively in the Apocalypse to signify the place of athe battle of the great day of God.® From the ap¬

plications of the word Armageddon to the great battle at the end of time it has come to be used for any great slaughter or conflict.

ARMAGH, ar-ma', Ireland, a county in the province of Ulster. Its area is about 500 square miles. The northern part of the county, bordering on Lough Neagh, consists princi¬ pally of extensive bogs of great depth, with a remarkably black soil. Oats, potatoes, wheat, fruit, flax and turnips are the principal crops. Cattle, hogs and sheep are raised. The manu¬ facture of linen is carried on very extensively. The chief towns are Armagh, Lurgan, Porta- down. Armagh is the county town. Pop. (1901)

125,238; (1911) 120,291.

ARMAGH, Ireland, city and capital of the county of Armagh. It contains two cathedrals, a Protestant and a Roman Catholic; county court-house, prison, infirmary, lunatic asylum, linen hall, music hall, a public library and an observatory. In the Middle Ages Armagh was an extensive and populous city, and celebrated for its learning, having at one period 7,000 students at its college. There is a modern col¬ lege, a barracks, an observatory and a large library. Among its benevolent institutions are an infirmary, fever hospital and lunatic asylum. Linen weaving is the chief industry. Not far from Armagh was the palace of Emania, the royal residence from the 5th to the 9th cen¬ tury. Between 839 and 1092 the Danes sacked the town five times. Armagh was again a battleground in the religious struggle between the English and Irish. Pop. (1911) 7,356. Con¬ sult Stuart, b, (Historical Memoirs of Armagh > (Dublin 1900).

ARMAGNAC, ar'ma-nyak', Counts of, an ancient French family, said to have sprung from a branch of the Merovingians. Many of its members hold a prominent place in the his¬ tory of France. One of the most celebrated was Bernard VII, son of John II, surnamed the Hunchback. He succeeded his brother, John III, in 1391, and greatly extended his territories by the most unscrupulous means, putting several of his relations to death because they stood in the way of his ambitious schemes. Another of the family, John V, grandson of the above, who succeeded his father, John IV, in 1450, made himself notorious for his crimes. On a pretended dispensation from the Pope he married his own sister, by whom he had three children. Charles VII took his possessions, but they were restored by Louis XI. By joining the <fLeague for the Public Weal® he was driven into Aragon and had his estate forfeited. Armagnac was slain by the King’s soldiers.

ARMAGNAC, the title of a former dis¬ trict of France now included in

the department

ARMADILLOS AND ANT-EATERS

1 Pangolin (Manis pentadactyla)

2 Three-banded Armadillo (Tolypeutes tricinctus)

3 Aard-Vark (Orycteropus afra)

4 Pichiciago (Chlamydophorus trunoatus)

5 Tamandua (Tamandua tetradactyla)

6 Great Ant-Eater tMyrmecophaga jubata)

of Gers. Its inhabitants figured largely in the wars of the Middle Ages, one of their contests being known as the ((Armagnac War,® in which the Armagnac mercenaries of the Emperor Frederick III were defeated by the Swiss, 26 Aug. 1444. See Berthault's <L'Armagnac)

(1899).

ARMAGNAC WAR, The, (Bellum Ar- meniacum ; in German called frequently Ar-

megeckenkrieg) , the struggle between the Swiss and the Armagnac mercenaries of Frederick III in 1444. The war was concluded by the defeat of the Armagnacs at Saint Jacob on the Birs 26 Aug. 1444. See Armagnacs, The.

ARMAGNACS, The, mercenary bands, derived chiefly from the district of Ar¬ magnac in southern France, and largely trained in the army recruited in 1410 by Count Bernard of Armagnac for his contest with the Duke of Burgundy. They made themselves ex¬ tremely oppressive in France through their plundering; and when the Emperor Frederick III requested auxiliary troops from Charles VII, to assist in the conquest of the Swiss, the latter gladly dispatched the Armagnacs. Doubtless the King believed he might at the same time be able to gain control of territory on the left bank of the upper Rhine. What is known as the Armagnac War ensued. In Ger¬ many the word Armagnac was converted into armer Geek (<(poor fool®), and the war fre¬ quently styled Armegeckenkrieg . On band of 20,000 Armagnacs proceeded by

way of Lor¬ raine, another of 30,000 to southern Alsace, whence it marched against the Swiss. At Saint Jacob on the Birs, 26 Aug. 1444, it was badly defeated, with a loss of 6,000, by 2,000 Swiss. It then retired to Alsace, and on 28 October a treaty (that of Ensisheim) was concluded be¬ tween France and the Swiss Confederation. The Armagnacs continued for a time to work havoc in Alsace and Swabia, where the peas¬ antry retaliated by condemning to death an Armagnac whenever they caught one. In 1445 the remnant was in part dismissed by Charles VII, in part incorporated with other companies of soldiery. Consult the article by Barthold in Raumer's (Historisches Taschenbuch) (2d series, Vol. Ill, 1842) ; Wiilcken, (Urkunden und Schreiber, betreffend den Zug der Armag- naken) (Frankfort 1873) ; Chevalier, U., Reper¬ toire des sources historiques du moyen age) (Montbeliard 1894) ; Dognon, Paul, (Les Ar¬ magnacs, J etc., in Annales du Midi (1889) ; Witte, (Die Armagnaken im Elsass, 1439-1445 > (Strassburg 1889).

ARMAMENT, a term used in its broader sense to designate the military and naval equip¬ ments or forces of a nation ; in its more tech¬ nical meaning it is used to designate the weapons with which these forces are supplied, such as ammunition and gun mountings, tor¬ pedoes, torpedo tubes, etc. See Ammunition; Army; Arms and Armor; Naval Guns; War¬ ships, etc.

ARMAMENT DISTRICT. For the

maintenance and improvement of the mobile and seacoast artillery and accessories, arma¬ ment districts are established in orders from the War Department, and the assignment of ar¬ mament officers to the charge of these districts is made by the chief of ordnance. These officers keep themselves informed of the condition of

the material by inspections and by direct cor¬ respondence with the various district and post commanders. The former are authorized to make the necessary repairs to material in their districts, but no alterations can be made without the authority of the chief of ordnance. Where repairs indicate improper handling or neglect of material, the circumstances are reported to the chief of ordnance. When mechanics em¬ ployed by an armament officer are on duty at a post or in a district, they, in the absence of the armament officer, are under the supervision of the post or district commander. When a part of or an accessory to an article constituting a portion of the armament of a district becomes obsolete and is replaced, the obsolete part or accessory is transferred by the district com¬ mander to an arsenal to be designated by the armament officer.

ARMAND, ar'man, Charles Teffin, (Mar¬ quis de la Rouarie), French soldier: b. 1753; d. 1793. He was dismissed from the French army for fighting a duel about an actress. Com¬ ing to America in 1777, he was given a colonel's commission in the American army, succeeded Pulaski in command of the <(Pulaski Legion,® in 1779, soon renamed <(Armand's Partisan Corps,® and became a brigadier-general in 1783. Re¬ turning to France he was active on the Royalist side in the French Revolution. Consult the (Memoir > by Townshend Ward (in Pennsyl¬ vania Magazine of History and Biography, Philadelphia 1878).

ARMANDE, an elder sister of Hen- riette in Moliere's Res Femmes Savantes.*

ARMANSPERG, ar'mans-perg, Joseph Ludwig, Count von, Bavarian statesman : b. 1787; d. 1853. He became Bavarian minister of foreign affairs in 1826, and later of the interior and finances. His opposition to the claims of Rome drew upon him the hatred of the Catholic clergy and contributed to bring about his dis¬ missal. He accompanied King Otho to Greece in 1830. He was president of the regency of Greece, 1833-35, and chancellor of state,

1835-37.

ARMATOLES, ar'ma-tolz, bodies of Greek militia inhabiting districts in the mountains of Greece assigned to a capitani for protection before Greece became independent of Turkey. To these fastnesses fled the independent part of the Greeks, in order to continue the war under leaders called capitanis. A capitani collected generally a troop of from 50 to 200 men, who remained true to him through every variety of fortune, and attacked the enemy everywhere. Thus involved in an endless struggle with their oppressors, these Greeks were apt to degenerate and become little better than bandits. A large number of them wrere careful to confine their depredations to Mussulmans ; but many in¬ stances occurred in which Greeks were attacked when the booty expected was considerable. The Turkish pashas, unable to subdue the armatoles, treated with them; and the capitanis received, on condition of remaining quiet, money, stores or other perquisites. They thus became a sort of rural police, having custody of the highways. The Turks disliked their growing 'power and after 1739 sought to weaken the organization by restricting the privileges and introducing Mohammedan Albanians into the companies, or arinatoliks. The armatoles aided Ali Pasha

considerably in 1820-22, and greatly aided their countrymen during the Greek war of inde¬ pendence.

ARMATURE, a term applied to the piece of soft iron placed across the poles of per¬ manent or electro-magnets to receive and con¬ centrate the attractive force. In the case of permanent magnets it is also important for preserving their magnetism when not in use, and hence it is sometimes termed the keeper. It produces this effect in virtue of the well- known law of induction, by which the armature, when placed near or across the poles of the magnet, is itself converted into a temporary magnet with reversed poles, and these, reacting upon the permanent magnet, keep its particles in a state of constant magnetic tension, or, in other words, in that constrained position sup¬ posed to constitute magnetism. A horseshoe magnet should therefore never be laid aside without its armature; and in the case of straight bar-magnets, two should be placed parallel to each other, with poles reversed, and a keeper or armature across them at both ends. The term armature is also applied to the core and coil of the electro-magnet, which revolves before the poles of the permanent magnet in the magneto-electric machine, and to a part of the telegraph sounder. It is also very gener¬ ally applied to the part which is revolved be¬ tween the poles of the field magnets of a dynamo or motor. The iron cores on which the coils are wound afford a magnetic connection between the poles. Consult Cramp, (New York 1906).

ARMED NEUTRALITY. The term

((armed neutrality® has been applied to the collective action of the neutral states which employ their armed strength for the purpose of compelling belligerents to respect their rights. There have been two well known examples of armed neutralities, namely those of 1780 and 1800. Both were formed mainly for the purpose of bringing pressure to bear upon Great Britain to compel her to respect the rights of neutral powers during the war in which she was then engaged and for placing a check upon her exaggerated assertion of bel¬ ligerent claims. Neutrals complained that in consequence of her naval supremacy she com¬ mitted unwarranted aggressions upon neutral commerce, in particular that she seized enemy non-contraband property in neutral ships, ex¬ tended the doctrine of contraband beyond all reason and maintained blockades which were illegal because of their ineffectiveness. Among the parties to the first armed

neutrality were Russia, Sweden, Denmark, Spain, France, Hol¬ land, Prussia, Austria, Portugal and the two Sicilies.

It adopted a declaration that enemy goods in neutral vessels, contraband of war excepted, were not liable to capture ; that a blockade to be legal must be effective, that is to say, vessels of the blockading squadron must be placed suf¬ ficiently near the blockaded port to make en¬ trance to it dangerous ; and other similar rules in the interest of neutrals were laid down.

The second armed neutrality of 1800 was a similar arrangement for similar purposes. The objects of both were partially realized but it is significant that when the parties became bel¬

ligerents themselves, as most of them did shortly afterward, they abandoned for the most part the principles which as neutrals they had striven to enforce. See Neutrality.

James W. Garner.

ARMED SHIP, a term applied to a ship formerly which had been granted a letter of marque by government authority and which entitled it to the privilege of mounting guns and attacking an enemy's commerce, such ves¬ sels being more commonly known as privateers. The term now applies more to commercial ships which are utilized by the government in time of war, in part or wholly, and are armed at the government exjpense. Special signifi¬ cance was attached to the term during the great European War, on account of the tend¬ ency of the commanders of German submarines to sink all vessels without warning, the United States government contending that all unarmed ships should first be warned and the crew and passengers be given time to leave.

ARMED SOLDIER OF DEMOC¬ RACY, a term occasionallv applied to Na¬ poleon Bonaparte because of his supposed expression of the ideals following the French Revolution.

ARMENIA, a mountainous region of western Asia with an area of about 140,000 square miles. It was partitioned among Turkey, Persia and Russia. It became a republic in 1920. Its area is 80,000 square miles.

The plateau of which Armenia chiefly con¬ sists is a continuation of the Great Tranian plateau. It is bounded on the north by the Black Sea, descends abruptly to the lowlands of Mesopotamia on the south and more grad¬ ually on the east and west to the plateaus of Persia

and Asia Minor. It has a mean eleva¬ tion of about 6,000 feet and is mountainous and volcanic. The ridges, of which there are four principal, are generally parallel to each other, running, with sundry deviations, east and west, and between them are broad valleys ; that of the Aras, at Mount Ararat, being 2,890 feet and many others 5,000 to 7,000 feet above the sea-level. The mountains are mainly com¬ posed of stratified rocks, with slate, lime¬ stone, etc., appearing on the sides of the chains. Granite is also met with but is not frequent; and in the north Palaeozoic and in the south later sedimentary rocks are super¬ imposed on archaic rocks. Its volcanoes are all quiescent, unless we except Ararat, of which an eruption took place in 1840, accom¬ panied by a disastrous earthquake. A few mountains, as Ararat, 17,000 feet, Alaghez and Bingol Dagh, rise above the line of perpetual snow but this is not generally the case ; and there are no passes but such as can be crossed in a single day. Saltpetre, lead, iron and .cop¬ per are found in the mountains ; and the last two have to some extent been wrought in modern times. Rock salt is plentiful and is exported in considerable quantities to Persia and elsewhere. Mineral waters abound but little or nothing is known of their qualities. Several important rivers take their rise in Armenia, namely the Kur or Cyrus, and its tributary the Aras or Araxes, flowing east to the Caspian Sea; the Churuk Su, or Tchorak and the Halys or Kelkid Irmak, flowing north to the Black Sea; and the Tigris and

Euphrates, which flow into the Persian Gulf. There are also several minor tributary streams. The only considerable lakes are those of Van, in Turkish Armenia, 78 miles in length and about 32 in breadth ; Goukcha or Sevan north¬ east of Erivan, in Russian Armenia, about 40 miles long by 15 broad; and Urumiyah or Urmia, in Persian Armenia, 80 miles long and 24 broad. It is abnormally salty, while Lake Van is heavily charged with soda.

The climate of Armenia is very severe, presenting a marked contrast to that of the warm regions of the Lower Euphrates and to the mildness prevalent on the shores of the Black Sea. Winter in Armenia continues from October to May, spring and harvest a month each, and the change to the summer is very rapid. The heat, especially in the val¬ leys during summer, is great and rain seldom falls. In Erivan, which is a degree of lati¬ tude south from Trebizond, the thermometer in winter falls 36° F. lower than it does in the latter; and in summer it rises 24° F. higher. On the plateaus of Erzerum, Gumri, etc., the

difference is still greater; indeed, in the town of Erzeroom the snow lies in the streets for eight months of the year. East and southeast winds in summer, west winds in spring and northeast storm winds in winter, are most prevalent. The soil of Armenia is reckoned on the whole productive, though in many places it would be quite barren were it not for the great care taken to irrigate it. Wheat, barley, tobacco, hemp, grapes and cotton are raised; and in some of the valleys apricots, peaches, mulberries and walnuts are grown. From the nature of the country the rearing of stock is carried on to a greater extent than agriculture. The horses are spirited, fleet and fiery. Pines, birches, poplars and beeches flourish but there are no thick forests except in the northern parts of the country. The flora is not so varied as might be expected in such an Alpine country; in several respects it resembles the vegetation of the Alps of Tyrol and Switzerland.

The inhabitants of former Turkish Armenia number about 2,470,000. Besides those of the genuine Armenian stock, in consequence of the repeated subjugation of the country, various other races have obtained a footing. Of these the principal are the Turks and the predatory Kurds; on the Tchorak, Georgians; and throughout the whole country, Greeks, Jews and Gypsies. Before the European War the total number of Armenians was estimated at over 2,500,000, of whom about 650,000 were in Turkish Armenia ; about 576,000 in the rest of Asiatic Turkey; about 400,000 in European Turkey; about 1,119,000 in Russian Trans¬ caucasia; and 100,000 in Persia. Since the outbreak of the war, however, an appallingly large number have been exterminated in Tur¬ key. The remainder, like the Jews, are scat¬ tered over various countries, and being strongly addicted to commerce, play an im¬ portant part as merchants. Of late years many have emigrated to America and they are also to be found in Hungary, Italy, Africa and India, chiefly in the great marts, Bom¬ bay, Madras and Calcutta. Everywhere they are engaged in banking and trading. Their eyes and hair are black, their looks lively, noses aquiline and their complexion somewhat

swarthy. The women are remarkable for the delicacy and regularity of their features. Like the Jews, whom in many respects they resemble, their ruling passion appears to be an inordinate love of gain, but they are generally esteemed honest. Their mental capacity is good and those who are educated are distin¬ guished by superior cultivation and refined manners ; but the mass of the people inhabit¬ ing their native country, in consequence of centuries of neglect, are grossly ignorant and superstitious.

History. — The legendary history of Ar¬ menia begins with Ha'ik, son

of Togarmah, the great grandson of Noah, mentioned in Gen. x, 3. He is said to have taken refuge in Armenia from the tyranny of Belus, King of Babylon, who was slain in pursuit of him. The seventh king in descent from Ha'ik was killed in battle with Semiramis and the country became tributary to Assyria. From. Ha'ik the country derived the name Haikistan, and from Armenak, one of his successors, that of Armenia. Armenia continued subject to Assyria under its own princes till the re¬ volt of the Medes and Babylonians against Sardanapalus, when Barbak, the King of Ar¬ menia, joined these powers and recovered his independence. Tigranes I is said to have been the ally of Cyrus against Astyages and to have built the city of Tigranocerta. His suc¬ cessor, Vhakin, the legendary hero of Arme¬ nia, was deified after his death. Vahi, the last of the dynasty of Ha'ik, was killed in fighting against Alexander the Great as the ally or vassal of Darius. The duration of the dynasty was about 1,800 years. Armenia was now incorporated with the kingdom of Syria. It recovered its independence under Ardvates, 317 b.c., during the dissension among the suc¬ cessors of Alexander, but on his death sub¬ mitted to the Seleucidae. About 190 b.c. Ar- taxias and Zariadres, two Armenian nobles, freed themselves from the dominion of An- tiochus the Great and established the kingdoms of Armenia Major and Armenia Minor. Ar¬ menia Major was reconquered from Artaxias II by Antiochus Epiphanes. About 149 b.c. Mithridates, or Arsaces VI, King of Parthia, whose dominion extended over Media, Persia and Babylonia, placed his brother Wagher- shag or Valarsaces on the throne of Armenia and introduced the dynasty of the Arsacidae into the country. He built cities and organ¬ ized the defenses of the country. His great grandson, Tigranes II, whose long reign ap¬ pears to have begun about 96 b.c., conquered Artenes, King of Sophene or Armenia Minor, and united all Armenia under his sway. He was successful in war against the Parthians and made himself master of the whole Syrian monarchy. He is also said to have founded or built Tigranocerta, the origin of which is likewise attributed to his probably mythical predecessor. Being the son-in-law of Mith¬ ridates, King of Pontus, while Mithridates was preparing to renew his war with the Romans after the death of Sulla, he invaded Cappa¬ docia at his instigation and carried away much spoil and many prisoners. Mithridates, after his defeat, took refuge with Tigranes, who does not seem to have been disposed to render him active assistance; but Luculhis made_ a peremptory demand through Appius Clodius

for his surrender, which left Tigranes no al¬ ternative but a declaration of war, 69 b.c. Disregarding an invasion of Cilicia, Lucullus at once carried the war into Armenia, de¬ feated the numerous forces of Tigranes and captured Tigranocerta. Antiochus Eusebes was reinstated on the throne of Syria, and other dependents of Tigranes revolted. Ti¬ granes in the meantime, with the assistance of Mithridates, collected another army which was again defeated by Lucullus. Favored by disaffection among the Roman troops, how¬ ever, Tigranes recovered the greater part of Armenia and defeated Fannius, the lieutenant of Lucullus. Pompey, who arrived in 66 b.c., after overthrowing Mithridates, who had also recovered his dominions, advanced to Arme¬ nia, which was at the same time invaded by the Parthians, instigated by the revolted son of Tigranes. The Parthians speedily with¬ drew and young Tigranes fled to Pompey. At this critical juncture the elder Tigranes hastened to make his submission to the Roman general, who left him in possession of his kingdom, but deprived him of the provinces of Sophene and Gordyene, which he erected into a kingdom for the younger Tigranes. The elder Tigranes continued faithful to the Roman alliance, and Gordyene, which had been seized by the Parthians, was soon after re¬ stored to him. Tigranes died about 55 b.c. His son Artavasdes was made prisoner by Antony and carried to Egypt where he was put to death by Cleopatra in 30 b.c. Armenia, lying between the Roman and Parthian em¬ pires, became a battlefield where they dis¬ puted for mastery, and with difficulty main¬ tained its independence under princes from the family of the Arsacidae till the time of Trajan, who made it a province. It was given up by Hadrian and again ruled by the Arsa- cidae. Chosroes defended it during a long reign against the power of Persia, which had recently re-established its monarchy on the ruins of the Parthian empire ; but about 258- 59 a.d. Sapor, King of Persia, unable to sub¬ due Chosroes by force of arms, caused him to be assassinated, and his son Tiridates be¬ ing an infant, took possession of the country. Tiridates was restored by the Romans in 286, the third year of Diocletian. At the beginning of his reign he persecuted the Christians, who were numerous in Armenia, but was himself converted to Christianity, it is said, by Greg¬ ory the Illuminator. Armenia was thus the first country which officially embraced Chris¬ tianity. On the defeat of Galerius by the Persians in 296 Tiridates, who fought valiantly as the ally of the Romans, was compelled to follow the retreat of his protectors ; but the succeeding campaign restored him and his dominions were extended in the peace with Persia which followed. By the treaty into which Jovian, the successor of Julius, entered with Sapor II, 363 a.d., the Romans were compelled to abandon the protection of Armenia. It was speedily

reduced to a Per¬ sian province, but after the death of Sapor its independence was restored in a new treaty of peace made with Theodosius in 384. The country long oppressed by the contentions between the Romans and Persians, soon fell into division through the attraction of these rival powers (387). A Persian king or gov¬

ernor, Chosroes, was set up over the eastern, and a Roman, Arsaces, over the western por¬ tion of the country, both being of the royal house of Armenia. On the death of Arsaces the Romans suppressed the form of royalty and annexed their portion of the country to the empire under the military command of a count of the Armenian frontier. This oc¬ curred in the reign of Theodosius II. On the death of Artasires or Ardashir, the suc¬ cessor of Chosroes, Bahram V of Persia (about 428) annexed the Persian portion un¬ der the name of Persarmenia. The Persians exerted themselves to extirpate Christianity but failed to do so; and on the fall of Sas- sanidae (632) the country was united again under the Greek empire. After the Arab in¬ vasion in 637 it became the scene of incessant struggles between the declining empire and the rising Mohammedan power and as it was persecuted by the emperors for its adoption of the Monophysite heresy its sympathies were not always with the former. The dynasty of the Pagratids or Bagratidae was established by the arms and influence of the caliphs. It was a family of Jewish origin and appears to have risen gradually to influence in the coun¬ try. The date of its elevation to royalty is usually given as 885, but a much earlier date is sometimes assigned. It lasted till 1079, when the country again became dependent on the Greek empire. During this period several other dynasties which it is not necessary spe¬ cifically to notice reigned simultaneously in different parts of the country. On the fall of the Pagratidse, Rhupen or Ruben, a relative of the last king, founded a small kingdom in the north of Cilicia, which gradually ex¬ tended to the Mediterranean and was known as Lesser Armenia. It rendered valuable assist¬ ance to the Crusaders, and its later rulers were of the house of Lusignan, styled Kings of Cyprus, Jerusalem and Armenia, the last of whom, Leon VI, was taken prisoner when the country was_ conquered by the Mamelukes in 1375. Armenia formed part of the empires of Genghis Khan and Tamerlane and a great part of it was conquered by Selim II in 1522. Henceforth it was shared between the Turks and Persians, the former having the greater part of it. In 1828 Russia obtained a consid¬ erable portion of Persian Armenia and this was. augmented in 1878 by the Turkish pos¬ sessions of Batum, Ardahan and Kars, ceded by the treaty of Berlin. Russian Armenia in¬ cluded the governments of Erivan and Eliza- bethpol, the territory of Kars, etc., with the important towns of Tiflis, Kars and Erivan. Persian Armenia formed

part of the province of Azerbaijan. Turkish Armenia, which in¬ cluded most of Kurdistan, was comoosed of the vilayets of Erzerum, Mamuret-ul-Aziz, Diar- behr, Bitlis and Van, with an area of 71,990 square miles.

Armenian Question.— The so-called «Ar- menian Question® began after the Russo-Turk- ish War of 1877-78. By the treaty of Berlin the Sultan promised much needed reforms for his .Armenian subjects to the great Powers, particularly Great Britain and Russia. After 1884, however, Russia's policy toward the Ar¬ menians changed, the reforms were not ef¬ fected and revolutionary movements, in imita¬ tion of the Russian Nihilist propaganda,

started among the oppressed Armenians. The Turkish government called upon the Kurds to police the country, sanguinary conflicts en¬ sued, and in 1895-96 brutal and atrocious mas¬ sacres by the Kurds, aided by Turkish sol¬ diers, occurred at Trebizond, Van, Bitlis and in many other parts of the country and entire Armenian communities were wiped out. Eng¬ land, France and Russia protested, the Sultan promised reform and reparation, a commis¬ sion of investigation was formed, but the massacres continued, and in August 1896 from 4,000 to 6,000 Armenians perished in the streets of Constantinople at the hands of the mob, in retaliation for the seizure of the Ot¬ toman bank by Armenian insurgents. Revo¬ lutionary propaganda and minor massacres continued until the Young Turk Revolution of 1908, at first enthusiastically supported by the Armenians. A year later, however, at Adana and throughout Cilicia and northern Syria another massacre on a large scale oc¬ curred and 30,000 Armenians were killed. In April 1915, after the outbreak of the European War, the Turkish government started to put into execution what seemed a systematic plan for the extermination- of the Armenian race, and it has been estimated that nearly a million Armenians have perished.

Art. — The only important ruins of the Roman period are at Kami. After the coun¬ try had become Christian many churches were built, possessing much architectural character. The oldest of these still surviving is probably the Church of Saint Ripsima at Vagashabad (618), but the most interesting is the cathe¬ dral at Ani, built about 1010, while of nearly equal importance is the cathedral of Kiutas, on the basilican plan. A church with a strik¬ ing dome and five naves, belonging to the same century, is found at Mowki and there are many

others remarkable for the delicacy" of decorative details. The most richly orna¬ mented of these is that at Mtzkhet in Georgia, belonging to the 15th century. The Armenian architects and artists were much given to the employment of decorative inscriptions, as were their Mohammedan neighbors, and in their use of animal and decorative sculpture, espe¬ cially for wall panels and for broad bands surrounding windows they showed great ar¬ tistic sense and originality. Carving in wood and ivory was much practised but the Armeni¬ ans especially excelled in the production of cloisonne enamel and in the employment of geo¬ metric ornament applied to buildings as well as to small objects, such as the sacred vessels of the church and toilet articles. Wall-painting was also an Armenian accomplishment and one in which not a little independence of By¬ zantine influence was exhibited. Illuminated Mss. were brought to great perfection in the 13th century. Fine collections of them are preserved in the Armenian Library in Venice and in the monastery of Etchmiadzin in Rus¬ sian Caucasus, the national sanctuary of the Armenian church.

Armenian Church. — The Armenians re¬ ceived Christianity as early as the 3d century. During the Monophysitic disputes, being dis¬ satisfied with the decisions of the Council of Chalcedon (451), they separated from the Greek Church in the year 536 and called themselves the Gregorian Church, after Greg¬

ory the Illuminator. The Popes have at dif¬ ferent times attempted to gain them over to the Roman Catholic faith but have not been able to unite them permanently and generally with the Roman Church. There are, however, at present about 100,000 United Armenians scattered in Russia, Poland, Galicia, Persia and Italy who acknowledge the spiritual su¬ premacy of the Pope; they agree in their doc¬ trines with the Catholics but retain their pe¬ culiar ceremonies and discipline. At different times force has been used to make the Gregorian Armenians conform to the religion of Mohammed; but the far greater part are yet Monophysites and in spite of fierce per¬ secutions have remained faithful to their old religion and worship. Their doctrine differs from the orthodox chiefly in their admitting only one nature in Christ and believing the Holy Spirit to issue from the Father alone. In their seven sacraments, which they call mysteries, there are these peculiarities, that in baptism they sprinkle thrice and dip thrice, and this is immediately followed by confirma¬ tion ; that in the Lord’s Supper they mix no water with the wine and use leavened bread, which they distribute dipped in wine ; and that they allow extreme unction only to divines immediately after their death. They adore saints and their images, but do not believe in purgatory. In fasting they surpass the

Greeks. Their feasts are fewer than those of the Greeks but they celebrate them more devoutly. They worship, in Turkey mostly in the night time; the mass is said in the ancient Armenian, the sermon is preached in the modern. Their hierarchy differs little from that of the Greeks. The catholicus or head of the church has his seat at Etchmiadzin, a monastery near Erivan, the capital of the Russian Armenia, on Mount Ararat. The holy oil, which he prepares and sells to the clergy and the frequent pilgrimages of the Armenians to Etchmiadzin, supply him with means for the support of a magnificent style of worship and of establishments for' educa¬ tion. He maintains in his residence a semi¬ nary for the education of divines. There is here also a printing press. When the office of catholicus is vacant two candidates are elected by the people, through their repre¬ sentatives in each diocese, and the Tsar chooses between them. The patriarchs of Con¬ stantinople and Jerusalem, the bishops and arch¬ bishops are invested by the Catholicus and every three years confirmed in their offices or recalled. In Turkey the Patriarch of Constan¬ tinople is the official as well as the real ecclesi¬ astical head of the nation and presides over the National Assembly which includes two ad¬ ministrative bodies : the committee for civil affairs and the committee for ecclesiastical affairs. The remainder of the clergy are often ignorant but generally respected and re¬ semble the priests of the orthodox church in rank and duties. The monks follow the rule of Saint Basil. The vartahets, who live like monks, cultivate the sciences, take degrees, which may be compared with the usual aca¬ demical honors and are the vicars of the bishops, form a class of divines peculiar to the Armenian Church. The secular priests must be married once, but are not allowed to take a second wife. Armenian churches have

been established in the United States wherever a considerable body of Armenian refugees have settled.

Language and Literature. — The Armenian language is, according to H. Hubschmann, one of the main divisions of the Indo-Germanic group of languages though formerly consid¬ ered a dialect of the Iranic branch. The Old Armenian or Hailcan language, which is still the literary and ecclesiastical language, is dis¬ tinguished from the New Armenian, the ordi¬ nary spoken language, which contains a large intermixture of Persian and Turkish elements. The most learned Armenian antiquaries do not pretend to trace their literature further

back than about 150 years before the Christian era when Marabas Catina wrote a history of Armenia, and earned for himself the title of the Armenian Herodotus. He was followed by some half dozen historians and mythologists, but all these early productions are lost, though they have not been quite valueless, inasmuch as they were the sources whence later Arme¬ nian writers compiled work still extant. The authors who lived in the 4th century of the Christian era are the first whose writings have been preserved. Christianity then prevailed in Armenia, and her authors were princes and prelates. The 5th century was the golden age of Haikan literature. This* century was fruitful in authors, and was further distin¬ guished by two events important to the pro¬ gress of learning. The Armenians till then had had no alphabet of their own, indifferently using Greek, Syrias, and Persian characters. Early in the 5th century Mesrop Masdoty in¬ vented a Haikan alphabet of 36 letters, still called, in honor of the inventor, Mesropian, and now employed as capitals, since others of more convenient form have supplanted them in com¬ mon use. About the same time schools were instituted throughout Armenia, and the scholars there trained exerted themselves in producing Haikan versions of the Bible, the earliest of which was completed by 412, and of the masterpieces of Greece and Rome. One of the most distinguished authors who now appeared was Archbishop Moses Chorenensis or Moses of Chorene. Besides innumerable translations, he wrote a history of Armenia, and a treatise on rhetoric — all of which, to¬ gether with some homilies, have been preserved as well as some hymns still habitually sung in the Armenian Church service. A treatise on geography also ascribed to him dates probably from the 7th century.. His (History of Ar- menia) was published in London in 1736, with a Latin translation, by the celebrated W. Whis- ton and his son George. It was published at Venice in 1752, 1827, 1865 and 1881; was trans¬ lated into French by Levaillant de Florival in 1841, and into German by Latter (Regensburg 1869). Other celebrated Armenian authors of the golden age are Eznik of Golp; Korune, the biographer of the learned Mesrop; Elis- aeus, author of a history of the Vardanants; Lazar of Parpi ; Agathangelos, and the histor¬ ian Faustus of Byzantium, who probably wrote in Greek. In the 6th century Haikan litera¬ ture first remained stationary, and then began to decline. It revived somewhat in the 12th century but after the 14th declined steadily until the 1 7th. During this period authors abounded, but in a literary sense their pro¬

ductions were worthless. A few histories, however, national, Tartar, Arab etc., some of them in verse deserve esteem for the informa¬ tion they contain. In the 17th century Arme¬ nian schools and colleges

arose in the East and in the West, Armenian printing presses were set up in various towns, and Armenian litera¬ ture began to revive. In the 18th century the revival was complete, very much owing to the zealous and judicious exertions of Petro Mechitar, a Catholic Armenian, who in 1701 founded a religious society at Constantinople for the purpose of elevating the Armenians by diffusing among them a knowledge of their ancient literature and language. Being perse¬ cuted by the opposite sect he fled with his ad¬ herents to the Morea, then under the Vene¬ tians, and established a monastery and acad¬ emy at Modon. The Morea reverting to the Ottoman sceptre, Mechitar transferred his in¬ stitution to the small island of San Lazaro at Venice, where it has ever since remained and prospered. Abbot Mechitar, during the re¬ mainder of his life (he died in 1749) success¬ fully exerted himself to render his monastic college the chief seat of Armenian erudition and education. The best Armenian press ex¬ tant is the Mechitarist, from which issues a newspaper that circulates widely in the Levant. Here many of the classical works of England, France, Italy, and Germany have been trans¬ lated into Armenian. There is also a Mechita¬ rist college in Vienna, and a branch in Munich. Wherever any extensive community of Armeni¬ ans have settled they have set up a printing press, as in Amsterdam, Leghorn, Moscow, Venice, Astrakhan, Constantinople, Smyrna, Tiflis, Saint Petersburg, Madras, Calcutta, etc., and at several of these places periodicals are published. The founder and greatest master of modern Armenian literature is the novelist Raffi (1837-1888). A splendid dictionary of the. Armenian language with Latin and Greek equivalents for each word was published by the Mechitarist press at Venice in 1836. The best Armenian dictionaries for foreigners are the Armenian-French one published at Venice in 1812; the Armenian-Italian of Emmanuel Tchaktchak (Venice 1837) ; the Armenian-English of Aucher as improved by Bedrossian (Venice 1868-79, both Armenian-English and English-Armenian) ; and the French- Arme¬ nian of Norayr (Constantinople 1884).

Bibliography. — General Works — Buxton,

N. and H., (Travel and Politics in Armenia) (New York 1914) ; Bryce, J., (Transcaucasia and Ararat* (London 1896) ; Deniker, J.,

(Races of Man) (London 1900) ; Gaidzakian,

O. , Ullustratcd Armenia and the Arinenians) (Boston 1898) ; Gatteyrias, J., <L'Armenie) (Paris 1882) ; Hoffmeister, E. V., (Durch Ar- menien, eine militar-geographische Studie *(Leipzig 1911); Lynch, H. F. B., (Armenia, Travels, and Studies* (London 1901), a com¬

prehensive work with complete bibliography; Nogueres, E., (Armenie: geographic, histoire, religion, moeurs litterature *(Paris 1897) ; Rikli M., (Natur und Kulturbilder aus den kaukaslandern und Hoch-armenien) (Zurich 1914) ; Tehobanian, A., (L'Armenie, son his¬ toire, sa litterature, son role en Orient* (Paris 1897) ; ib., (Le peuple armenien, son passe, sa culture, son avenir* (Paris 1913). History and Politics. — Adossides, A., (Armeniens et Jeunes

Turcs) (Paris 1910) ; Aslan, K., (Etudes his- toriques sur le peuple armenien) (Paris 1909) ; Bliss, E. M., (Turkey and the Armenian Atro¬ cities *(New York 1896) ; Dolens and Khatch, ˆHistoire des anciens Armeniens* (Geneva 1907).; Gibbons, H. A., (The Blackest Pape of Modern History, Events in Armenia, 1915 * (New York 1916) ; Gladstone, W., (The Ar¬ menian Question *(London 1896) ; Hyvernat, H., (L'histoire ancienne de l'Armenie et les inscriptions cuneiformes du bassin de Van* (Paris 1892) ; Langlois, Collection des his- toriens anciens et modernes de 1'Armenie *(Paris 1867-69) ; Leart, M., (La Question ar- menienne a la lumiere des documents * (Paris 1913) ; Lepsius, (Armenia and Europe> (Ber¬ lin 1896) ; Tournebize, F., (Histoire politique et religieuse de l'Armenie depuis les origines jusqu'a la mort de leur dernier roi) (Paris 1910). Armenian Church. — Adenev, (Greek and Eastern Churches * (New York 1908) ; Ormanian, M., (The Armenian Church > (Eng. trans. by G. M. Gregory, London 1901 ; French trans., Paris 1910). Language, Art, Litera¬ ture. — Adjarian, Classification des dialectes armeniens* (Paris 1909) ; Finck, F. N., (Lehr- buch der neuesten armenischen Litteratur- sprache) (Vargashapat 1902) ; Hubschmann, H., (Armenische Studien) (Leipzig 1883) ; Laurer et Carrere, (Grammaire Armenienne* (Paris 1833) ; Neumann, (Geschichte der armenischen Litteratur> (Leipzig 1836) ; Mourier, (L'art Religieux au Caucase) (Paris 1887), and general works mentioned.

Henri Klein and C. L. Stuart.

ARMENIAN ART. See Armenia.

ARMENIAN CHURCH. See Armenia.

ARMENIAN LANGUAGE AND LIT¬ ERATURE. See Armenia.

ARMENTIERES, ar'man'tyar' (Latin, Armentaria) , France, town on the Belgian fron¬ tier, 10 miles west-northwest of Lille, on the Lys. The

town has a communal college and factories for spinning flax, hemp and cotton yarn. There are also ‘manufactories of woolen cloth, table linen, calicoes, lace, thread, beet¬ root sugar and tobacco ; bleachfields, distilleries, soap-works, tanneries and salt-refineries, with a considerable trade in grain, brandy, iron, to¬ bacco, soap, etc. Bricks are made in the neigh¬ borhood in large quantities. Armentieres was occupied by the German armies in their offen¬ sive against Paris in 1914. In the several offensives during the war it was the scene of much hard fighting. Pop. (1911) 28,625.

ARMFELT, Gustav Mauritz, Swedish courtier and diplomat : b. Finland, 31 March 1757; d. Tsarskoe-Selo, 19 Aug. 1814. His amiability, brilliant social gifts and unwavering loyalty commended him to Gustavus III, who entrusted him with important negotiations. In 1783 he took part in the negotiations with Catherine II, with the Danish government in 1787 and during the Russian war of 1788-90 was one of the most active counselors. He displayed great bravery in the field and con¬ cluded the peace of Verela in 1790. By the will of Gustavus III, who was assassinated in 1792, Armfelt was appointed to care for the infant son of Gustavus and made a member of the council of the regent, Charles, Duke of Suder-

mania. The latter found means to destroy the will and Armfelt was sent as an ambassador to Naples to be out of the regent’s way. From Naples he wrote to Catherine II, urging her to help overthrow the regency and induce the states to proclaim Gustavus IV of age. The regent’s spies discovered the plot and Armfelt only escaped from the war vessel sent to Naples to seize him, through the aid of Queen Caroline. He fled to Russia, and at home was condemned to confiscation of property and death as a trator. When Gus¬ tavus IV reached his majority in 1799 Armfelt was restored to all his honors. He was sent as ambassador to Vienna in 1802, but was obliged to quit this post for attacking the Austrian pol¬ icy in relation to Napoleon I. In 1805-07 he commanded the Swedish forces in Pomerania and there he displayed remarkable ability. When Gustavus IV was deposed in 1809 Armfelt would not treat with the revolutionary leaders. He was among the most courageous supporters of the Crown Prince Gustavus, and when Ber- nadotte was placed at the head of the nation Armfelt decided to remove to Finland. In 1811 he was expelled as a conspirator. On retiring to Finland he was held in high esteem by Alex¬ ander I. The grand-duchy of Finland was erected into an autonomous state and Armfelt was its first governor-general. He was made a count and appointed chancellor of the Univer¬ sity of Abo, and member of the Russian senate. Consult Bain, R. N., (Gustavus IIP (Vol. II, London 1895), and Tegner, Elof, (Gustaf Mauritz Armfelt *

(Stockholm 1887).

ARMIDA, a grand heroic opera by Chris¬ toph W. Gluck (1714-87) ; libretto by Philippe Quinault, a 17th century poet, who had written it for another composer, Lully. It is founded on an episode from Tasso's ((Gerusalemme liberata,** and was utilized by Gluck nearly 100 years after the libretto had been written. The music he composed to it is sublime in grandeur and is regarded as a classic of the highest type. Armida, the Queen and enchantress, dwells in a magnificent palace in Damascus; the period is the 11th century. The gallant knights crusaders fall under the charm of Armida ; but not so Rinaldo, the famous hero in Godfrey de Bouillon's army. Unjustly accused of a misdemeanor, Rinaldo has been expelled from the army and wanders alone in the forest. He has been warned against the wiles of Armida, but he scoffs at the idea of any woman compelling his love. But the sorcery of Armida is at work ; lan¬ guorous music overcomes him and he falls asleep in a green valley. Enraged at his scornful indifference, Armida has decided to kill him, but love conquers hate and the dagger falls from her hand. Though she strives against her tender passion, she succeeds in enthralling him with her display of devotion. Meanwhile de Bouillon has dispatched two knights to recall Rinaldo — a Danish warrior and the knight Ubalt. These two also fall vic¬ tims to Armida's witchery. The Dane meets a demon who has assumed his bride's face and tenderly calls him, but Ubalt breaks the spell and both reach Armida and Rinaldo. The call of duty and honor awakens Rinaldo from his love dream and he resolves to return with his companions. Armida's passionate entreaties

%

fail to shake his resolution ; he departs, and in despair she curses her love and him who pro¬ voked it, and turns her palace and gardens into a wilderness. In the sequel Armida be¬ comes a Christian. Aside from the ones al¬ ready named, the story has been made the sub¬ ject of operas by Cherubini (1784), Zingarelli (1786), and Rossini (1816). Consult Beloni, (Gli epigoni della Gerusalemme liberata) (Padova 1893).

ARMIDALE, Australia, town in Sandon County, New South Wales, 313 miles north of Sydney. It lies at an elevation of 3,313 feet, in a picturesque mountainous district, for the most part pastoral and

agricultural, though it con¬ tains some alluvial gold diggings. Antimony is found in large quantities near the town. It has two fine cathedrals, its schools include the New England Girls' School, Saint Patrick's College, the high school, the Ursuline Convent and state schools. Armidale became a municipality in 1863. Pop. 4,250.

ARMINIANISM, a term applied to a cer¬ tain phase of Protestant theology. In the Netherlands early in the 17th century there was a revolt against the doctrine of unconditional election as taught by the rigid Calvinists. The most important person, though not the first one, in this revolt was Jacob Arminius (q.v.) A controversy was carried on between him and Gomarus over the question of predestination, and, after the death of Arminius, with increased vigor by their followers. In 1610 the Arminians set forth their views in a (Remonstrance > cov¬ ering the points in controversy which in sub¬ stance was as follows :

(1) God decreed to save through Christ those who believe in his Son and who persevere in faith and obedience through life, but he leaves in sin those who are not believers. (2) Christ died for all, but no one except the believer has remission of sins. (3) Man can neither do nor think -anything truly good until he is born again through the Holy Spirit. (4) All good in the regenerate man is brought about by the grace of God, but this grace is not ir¬ resistible. (5) Those who are truly converted have power given them through the Holy Spirit and the help of Christ, so that if they desire his aid and are not inactive, no power can take them away from Christ.

In 1618 the Synod of Dort met and con¬ demned the five articles, and many of the remonstrant ministers were deposed, but in 1630 they were granted religious liberty. They have continued to the present as one of the smaller religious sects of Holland with a pres- byterial organization and a theological seminary at Amsterdam. The present importance of Arminianism is due to the fact that the founders of Methodism (q.v.) incorporated into their system the teachings of Arminius and his im¬ mediate followers. This is the belief of the Methodist Church to-day, as well as that of many individuals belonging to churches nomi¬ nally Calvinistic. Consult Annan, W., (The Difficulties of Arminian AlethodisnP (Philadel¬ phia 1860) ; Blok, ˆHistory of the People of the Netherlands } (Part III, trans. Putnam, New York 1900) ; Gill, J., < The Cause of God and Truth: Being an Examination of the Principal Passages of Scripture made use of by the Ar¬

minians in Favour of Their Sc.heme) (4 vols., London 1735-38) ; (The Works of Arminius) (trans. 2 vols., Buffalo 1853).

ARMINIUS, the German national hero celebrated by his fellow-countrymen as their deliverer from the Roman yoke: b. 17 b.c. ; d. 21 a.d. He was the son of Segimer, a prince of the Cherusci, a tribe inhabiting parts of what is to-day Brunswick and Hanover. His early life was spent in the Roman army where he, served with distinction and attained the rank of eques. This period was one of great peril for Germany. The Romans had advanced far into the territory of the Teutonic tribes and had erected a series of strong fortresses in order to keep the more turbulent districts in subjection. From 9 b.c. to about 4 a.d. Drusus and Tiberius had campaigned against the Ger¬ mans; Tiberius proceeded with great circum¬ spection, however, and induced the Germans to live on good terms with the Romans, to adopt Roman habits and mode of living, etc. Ar¬ minius, during his years of service with the Roman legions had acquired a knowledge of Latin and also gained an insight into the art of war as practised by the Romans. Returning home in 7 a.d. he found his people secretly chafing under the Roman governor, Quintilius Varus, and resolved to deliver his countrymen from Roman rule.

With this object he secretly organized all the tribes as far as the Elbe, induced Varus to scatter his forces, and in 9 a.d. decoyed Varus with three legions into the fastnesses of the Teutoburg Forest, probably between the modern towns of Detmold and Wiederbruck and near the headwaters of the Ems and the Weser. Arminius fell upon the legions un¬ expectedly and virtually annihilated them. The news of the disaster caused consternation in Rome and gave rise to the Emperor's despairing utterance: <(Varus, restore to me my legions.® The Germans did not follow up their victory, however, and both sides maintained peace until 15 a.d., when Germanicus Caesar led the Ro¬ mans against Arminius and reduced the latter to great straits, capturing his wife, Thusnelda. In 17 a.d. he was recalled by Tiberius and the results of his two years' campaign against Ar¬ minius were lost. After this time no Roman army ever penetrated to the heart of Germany. Arminius' later years were troubled with the internal feuds which broke out among the sev¬ eral tribes, his chief opponent being Marbod, prince of the Marcomanni. By aiming to found a powerful kingdom Arminius drew upon him¬ self the hatred of his countrymen and he was assassinated in 21 a.d. Of him Tacitus says (<Annalia)) : <(Arminius fought with the vicis¬ situdes of fortune, and fell at last by the treachery of his own relatives ; a man of war¬ like genius, and beyond all question the liber¬ ator of Germany.® In 1875 a great monument to Arminius was completed. It was by Bandel and was erected on the Grotenburg Mountain, near Detmold. The exploits of Arminius have furnished material for the dramas of Klopstock and

others. Consult Dunzelmann, E., (Der Schauplatz der VarusschlachD (1889) ; Fischer, F. W., (Armin und die Romer) (1893) ; Kem- mer, O., <Arminius) (1893) ; Meyer, E., (Un- tersuchungen fiber di-e Schlacht im Teutoburger Walde) (1893) ; Uhl, W., (Das Portrait des

Arminius* (1898) ; Wilms, A., (Die Schlacht im Teutoburger Walde) (1899).

ARMINIUS, Jacobus, or JACOB HAR- MENSEN, the founder of Arminianism (q.v.) : b. Oudewater, Holland, 10 Oct. 1560; d. Leyden, 19 Oct. 1609. He early showed marked promise as a scholar, and entered the University of Leyden at the age of 15. His ability was so apparent that certain officials of Amsterdam undertook the expense of his educa¬ tion for the service of the Church. This en¬ abled him to study at Geneva, where Beza was at the height of his influence and by whom Arminius was greatly influenced. He also studied at Basel and Padua and visited Rome, returning to Holland he was ordained in 1588 and became pastor of the Reformed Church at Amsterdam. At that time he was a rigid Cal¬ vinist, but milder views of predestination than those which he had learned from Beza having made their way into Holland, Arminius was called upon for a defense of Calvinism. He made a more careful examination of the dis¬ puted points and as a result modified his own views, though still holding to predestination. In spite of the opposition which arose because of his changed opinions he was offered and accepted a professorship in the University of Leyden in 1603. A controversy soon broke out between him and his colleague, Gomarus, a zealous and extreme Calvinist. Two parties were formed in and beyond the university, and the controversy was kept up till his death in 1609. See Arminianism. Consult (J. Ar- minni Opera Theologica) (Leyden 1629), 'The Works of Arminius) (English translation, Buf¬ falo 1853) ; and Nichols, (Life of Jacobus Arminius * (London 1843).

ARMISTICE, a suspension of hostilities between two belligerent powers or two armies by mutual agreement. It may either be for a definite period or until its termination is pro¬ claimed. An armistice throughout the whole theatre of war can be concluded only by the belligerent governments, and does not take full effect until it has been ratified. A partial armistice may, however, be concluded by the commanders of individual armies or army corps, and such an armistice requires no ratifi¬ cation, although it may be disapproved

and abolished by the government. An armistice is often concluded for only a few hours to bury the slain, remove the wounded, and exchange prisoners, and also sometimes to allow of a parley between the opposing generals. A breach of an armistice is regarded as a viola¬ tion of the law of nations. Sometimes a reg¬ ular armistice is preceded by an actual sus¬ pension of hostilities. If the conditions on which an armistice was agreed upon, as that while it lasted all preparations for attack or defense should cease, are violated by either side, the enemy is entitled to resume hostilities at once. A general armistice is usually the pre¬ liminary of a peace, and can only be proclaimed by the commanders-in-chief or their home governments.

ARMITAGE, Edward, English historical and mural painter: b. London, 20 May 1817; d. 1896. He studied in Paris, where, 1842, he exhibited his first independent work. In # the following year his 'Landing of Csesar* gained a prize of $1,500 in London; and in 1845 and vol. 2 — 18

1847 he carried off prizes of $1,000 and $2,500. He was made a fellow of the Royal Academy in 1872, and in 1875 was appointed lecturer on painting there. His mural paintings include a series of noble figures of Christ and the 12 apostles, executed for Saint John's Roman Catholic Church in London. His (Lectures on Paintings, *to the students of the Royal Academy, were published 1883 and another volume, 'Pictures and Drawings* was issued

1.

ARMITAGE, Thomas, American clergy¬ man: b. Pontefract, England, 2 Aug. 1819; d. Yonkers, N. Y., 20 Jan. 1896. He prepared himself for the ministry and preached his first sermon when 16 years old. Coming to New York city in 1838, he was actively engaged in the ministry of the Methodist Church until 1848, when he became a Baptist, and was pastor of the Norfolk Street Church (later the Fifth Avenue Baptist Church). In 1890 he was made pastor emeritus, given a residence in Yonkers. He was one of the founders of the American Bible Union. He advocated the re¬ vision of the Bible, especially in regard to the correct interpretation of the words therein relating to baptism. He published 'Jesus: His Self-IntrospectioiP (1878) ; 'Lectures on Preaching) (1880) 'History of the Baptists)

(1886).

ARMOR. See Arms and Armor.

ARMOR-CLADS. See Warships.

ARMOR-PIERCING PROJECTILES.

Projectiles intended for practice at objects composed of wood, masonry, or earth are made of cast-iron; but since the introduction of iron for the defense of ships and for fortifications, a material possessing greater hardness than ordinary cast-iron is required to overcome the resistance opposed by thick wrought-iron plates. Both elongated and spherical projectiles for use against armor should be of the hardest and toughest material possible. The power of a projectile to stand up to its work and deliver its full blow on the target depends on the shape as much as on the quality of the metal of which it is composed.

The flat-ended form of elongated projectiles possesses a peculiar advantage as regards the projectile, and another as concerns the plate. As to the projectiles, in direct impact the whole of the resistance of the target acts in lines parallel to the projectile's axis, which direction is the most favorable to the projectile retaining its mass and delivering its full blow on the target ; and, again, if the target is to be punched by actual shearing, the flat head is the form best adapted to effect it. The flat head would probably be best in the case of direct firing against plates composed of hard iron, for it is easy to conceive of a hard material offering very great resistance to the forcing open of a pointed head, which might be punched by the clean shearing of a flat-headed projectile. The power given by rotation of keeping the same portion of a projectile presented to the front is of peculiar value in punching armor plates ; it enables the head of the projectile to be made of any desired form, while the power of reducing the calibre of projectile in pro¬ portion to its weight, which is perhaps the principal advantage obtained by rifling, is also

most important here, the depth of penetration being in inverse proportion to the circum¬ ference. In shells, however, this stability of the axis of rotation tells more fully, for it enables

Six-inch Ribbed Cavity Armor-Piercing Shell.

Projectile was loaded with 2 pounds of black charcoal powder and fused with magazine fuse. Fired at 6- inch Krupp hard-faced armor plate. Shell burst about 8 feet to rear of plate after penetrating the

same. Weight of largest fragment recovered 10j pounds. Average weight of fragments 2 ounces. Total number of pieces re¬ covered, 650.

every part of the projectile to be made of such proportions as will give the maximum power at the moment of impact. The walls of an elongated shell being chiefly subjected to a longitudinal strain, an interior hollow may be made without entailing the great weakness existing in spherical shells as compared with solid shot. Hence it follows that while smooth¬ bore shells have seldom or never been fired at armor, rifled shells have proved very suc¬ cessful.

There are two causes which contribute to give shells peculiar power against iron plates. The first is that it is not necessary to weaken the head of a shell by making a fusehole in it, because no fuse is required, the heat generated on the impact of a projectile against the armor being sufficient to fire the bursting-charge. To such an extent is light as well as heat gen¬ erated, that on firing at a target after dark a pale flash is seen to follow the impact. The second cause that operates to favor the action of shells is the fact that when the shell has penetrated to a depth of even a few inches before rupture occurs, the sides are supported by the armor around them, and the explosion, being confined at the sides, acts to the front with greatly increased force.

In a conical head the normal pressures throughout form a zone of compression acting as a wedge toward the body of the' projectile, whose angle is the supplement of that of the

cone of the head. This is better than that formed in the spherical head, because the angle is less acute, and because the apex of the wedge, instead of being a fixed point through¬ out (the centre of the sphere) moves along the axis of the projectile as it enters deeper and deeper into the target. In the ogival head it will easily be seen how much superior is the action. In this the wedge is at the com¬ mencement slightly acute, but then the resist¬ ance acts on a small surface and is compara¬ tively small, and the angle increases, till, at the junction of head and body, it becomes 180°, or a straight line, so that we then have the body of the projectile in much the same con¬ dition as the flat-headed bolt driving before it an ogival wedge, which opens the armor by wedging rather than by clipping or punching. As the softer and more plastic natures of plate-iron have been found to hold their bolts the best, and stand the longest, and so have been universally adopted, the ogival has become obviously the correct form of head.

The effect of hardening projectiles is probably much greater than is

generally supposed, that is, the amount of work gained is much greater than the increase of strength of the projectile. It is well known that a very small force may under certain circumstances determine the per¬ formance or non-performance of a very large amount of work. In like manner a very slight addition to the rigidity of a projectile, by hardening or otherwise, may determine whether a very large amount of work shall be wasted upon the projectile or expended upon the plate. Another means of increasing the work done upon the armor plate in comparison with that done upon the projectile is by increasing the velocity of the latter. That is, a projectile moving at a low velocity may be smashed up or flattened against the plate, while the same projectile fired at a higher velocity may go through the same plate almost uninjured. On this principle a lead shot may be fired through an iron plate, or a tallow candle through a pine board.

Armor-Piercing Projectiles Capped and Uncapped.

The projectiles shown are a 3-inch capped, a 4-inch capped, a 5 inch and a 6-inch uncapped, 8-inch uncapped and capped, 10-inch uncapped and capped and 12 inch capped.

Numerous trials have shown a superiority of steel projectiles over those made of chilled cast-iron ; and although the former are some¬ what more expensive than the latter, it would

be misplaced economy to leave any means unavailed of to increase the penetrating power of projectiles. The quality of chilled pro¬ jectiles, from the nature of their manufacture, is necessarily unreliable; whereas this is not the case with hammered cast-steel, or at least not to the same extent by far, even when large masses are produced, and the difficulty of manufacture increases with the calibre. The most essential difference in the behavior of steel and chilled projectiles on striking the target consists in the reaction on the projectile showing itself in the latter by breaking up, while the former are only set up. As the breaking uo of the chilled shells may take place before the bursting-charge comes into opera¬ tion, whereby the rending effect is considerably prejudiced, this material appears far less adapted for shells than steel. The superiority of steel in this respect is still further increased by the fact that the steel shell can have thinner walls, consequently a larger chamber, and can thus hold a larger bursting-charge than the chilled metal. See Armor Plate; Projectiles.

ARMOR PLATE. The idea of protect¬ ing ships of war and the fronts of fortifications by means of armor plate dates from about the middle of the 19th century. In 1842 experi¬ ments were conducted with iron plates made by riveting together plates three-eighths of an inch in thickness to a total thickness of six inches. Those plates did not successfully re¬ sist 8-inch guns or heavy 32-pounders at 400 yards ; so some modifications were introduced and further experiments made in 1850. In 1853 the French constructed floating batteries which carried four inches of iron armor.

While the European ships were, for the most part, modifications of existing types, the American ships were constructed from new designs, or railway iron and the like was at¬ tached to existing vessels. The old Monitor and Merrimac are the first examples; but with the improvements in gun manufacture, it be¬ came apparent that the wrought iron plates as first used could not withstand heavy gun fire. As a result a compound armor plate was de¬ veloped in England and an all steel plate in France. In 1889 nickel was introduced in steel and a plate of great toughness and resistance was produced. This type of armor proved superior to the old and from then onward the march of progress has increased. In 1890 the Harvey process was advanced and met with great success, followed in 1895 by the Krupp process. These two processes are essentially the same in principle and represent the highest development of the compound type of armor.

Formerly this kind of armor was manu¬ factured by taking a wrought iron plate as a backing and casting upon its face a plate of steel, the former being so heated as to produce as perfect a union as possible. This operation was based on the theory that a plate to resist the powerful energy of a projectile must have a hard face to resist penetration and a tough back to prevent shattering on impact. Diffi¬ culty, however, was experienced with the flak¬ ing of the steel face, so that the homogeneous nickel-steel plate really superseded this type.

Harvey Process. — Compound armor held the record against shell until the invention of Harveyized plates, introduced in the United States in 1891. A solid steel plate was cemented

on the face and then water-hardened, a glass- hard face with a tough backing being thus pro¬ vided. This invention at once raised the resist¬ ing power of armor by at least 50 per cent. When Harvey adopted the method of harden¬ ing the surface of plates with a powdered cementing material, Messrs. Schneider invented a process of cementing by means o.f hydro¬ carbon gas, followed by water hardening, and this superseded the Harveyizing system. The Harvey

plate was faulty in respect of the back not being sufficiently tough to resist the racking effects, of the projectiles. The addition of chromium to the nickel-steel and differential treatment, in hardening (variation in degree of hardness imparted to front and back), provided the necessary toughness. Nickel-chrome steel is carbonized and hardened on the outer face, gas being used for carbonizing and a water spray for hardening.

Krupp Process. — The manufacture of Krupp armor plate consists of a series of dis¬ tinct operations requiring great care and atten¬ tion. and covers a period of from four to nine months, depending on the thickness of the plate. The composition of the plate having been determined upon, the necessary elements are melted together in an open hearth furnace. When ready for tapping, the ingot mould hav¬ ing been prepared, the metal is run into a large ladle, from which it is poured into the mould through a gate on the outside, which connects with the interior of the mould at the bottom. The ingot is bottom poured so as to get a more perfect ingot and the large projection on the upper end the sink-head, is an aid in handling. The mould is made up of cast iron sections bolted together to facilitate the stripping of the ingot. After the ingot has cooled it is stripped, that is, it is removed from the mould. Usually 24 hours suffice for the ingot to solid¬ ify and cool sufficiently to permit its being stripped, and then the ingot is sent to the heat¬ ing furnaces preparatory to forging. The in¬ got after being heated for about 24 hours is taken out of the furnace and receives its first forging. This operation is one of the most wonderful sights in a steel plant : to see a red hot mass of metal, weighing in the neighbor¬ hood of 80 tons, being handled entirely by me¬ chanical means with the ease that one would handle a pencil. The ingot is placed on a die under a 14,500-ton hydraulic press and there forged to within a few inches of its finished thickness. At each working of the press the metal is decreased about three inches in thick¬ ness, the ingot being moved along until its whole length has been forged. Of course, the length and breadth are increased, the metal under such great pressure flowing evenly in all directions, and this operation is repeated until the required dimensions are obtained.

Schneider Process. — Armored plates are cemented on the surface in furnaces designed for that special purpose. At the Creusot works hydro-carbon gas is used, introduced through pipes. At a dark red heat the hvdro-carbons separate, and the liberated carbon penetrates the surface of the steel. The furnaces are fitted with movable hearths on wheels. The plates, having been already molded to their curves by templet, are placed one above an¬ other, with spaces between them, into which the gas is introduced. Each space is enclosed

by a cast-steel frame inserted between adjacent plates and rendered gas-tight with an asbestos strand. The sides of the frame are drilled to receive the rows of gas pipes. The pipes, which are water-cooled, contain passages for the gas inlet, the water outlet and the gas es¬ cape. The furnace is fired from each side, with blast. The deposition of the carbon goes on until, by a certain appearance of the flame given by the ignition of the escaping gas, the progress of the cementing operation is esti¬ mated when the admission of the gas is stop¬ ped for a while to permit of equal saturation of the opposed faces. It is then turned on again for a time and these stages are repeated until the cementation is equalized and com¬ pleted. The temperature of the furnaces is regulated in such a way as to effect the maxi¬ mum of cementation without risk of melting the surfaces of the plates. The plates cool down in the furnaces to be reheated and hard¬ ened subsequently. They are reheated in the vertical position in furnaces and for the water¬ hardening they are suspended vertically in tanks, through which jets of water are sprinkled on the surfaces of the plates. The rates of cooling can be varied by altering the distances between the plates and walls.

Cementation Process. — It has been the practice of some manufacturers of armor plate to use a series of rolls instead of a press, but it has been proved that the forging of a plate under a hydraulic press effects a more uniform working of the metal and produces a finished plate far superior to one which has been rolled. This statement is borne out by the fact that many of the plants which had installed a costly set of rolls have had the same removed and replaced by powerful hydraulic presses. After forging, the sink-head is cut off and the plate allowed to cool a little in air before annealing. From the annealing furnace the plate is taken to be scaled by pneumatic hammers prepara¬ tory to carbonizing. This process consists es¬ sentially of heating the plate in the presence of dry carbon or in a gas-carbonizing furnace.

Dry-Carbon Process. — In this process a special dry-carbon furnace is employed; coal is used in the furnace as fuel and the flame passes over the plates, down in front and back under again to the smoke-stack. Usually sev¬ eral plates are carbonized at the same time, the plates being arranged in pairs. The faces to be carbonized are placed together, separated only by a layer of finely powdered wood and animal charcoal. The edges are well sealed and the plates are placed

in the furnace through the top and lowered on a bed of sand; the whole is then well covered with sand and if more than one pair are carbonized at the same time they are treated in like manner and placed on top of the first. When all are well pro¬ tected from contact with the flame the furnace top is closed and the furnace brought up to heat. The heat is maintained at a uniform temperature for a considerable length of time, this time depending on the amount of carbon to be absorbed by the plates and then the fur¬ nace allowed to cool. Almost a month is em¬ ployed in this process from the time' the plate is charged until it is taken from the furnace.

Gas-Carbonizing Process. — In the em¬ ployment of this process the plate, with the face to be carbonized exposed, is placed on a bed of

sand in a furnace which is heated by some highly carbonized gas. The flues for the flame entry are built on each side of the furnace and so arranged that they can be used alternately, while a deflector causes the flame to first strike the top of the furnace and then pass downward. After the furnace has been raised to heat, coal gas or one rich in hydrocarbons, is passed along the surface of the plate and the intense heat causes this to be broken up, depositing carbon on the face of the plate. The plate is left in the furnace until the required degree of carbonization is attained. The plate is again scaled and reheated for its second or final forg¬ ing to bring it to gauge. This forging also serves to smooth up any roughness on the sur¬ face. After forging it is again annealed and from the annealing furnace goes to the ma¬ chine shop, for such machining as can be done preparatory to bending. On return from the machine shop the plate is heated preparatory to bending and this operation requires the greatest skill and experience in order to pre¬ vent cracking to a degree which would result in the condemnation of the plate. An allow¬ ance, too, must be made for any slight dis¬ tortion which may occur in the next operation, that of tempering and water hardening. The plate is heated to the required temperature and then subjected to a cold water spray. The bath is of a special design and is arranged to give a pressure of about 15 pounds per square inch.

Manufacture. — The process of manufac¬ ture in every detail is of scientific nicety. The melted steel is drawn off into ladles, transported by electric cranes capable of lifting 120 tons and poured into massive ingot moulds, some of which weigh 60 tons without the steel. Some of the ingots weigh 50 tons and are 36 inches thick. They are reheated and rolled out in an immense mill. One of these mills at Messrs. Vickers' works has rolls 36 inches in diameter and 12 feet in length. An ingot 36 inches thick can be rolled down to six inches within half

an hour. The thickness after rolling is equal, but the edges are rough and irregular. At this stage the first portion of the cementing process is performed. The plates are laid one on top of another in specially constructed furnaces. Powdered charcoal is sprinkled between the opposed surfaces and the plates remain in the furnaces from 10 to 12 days, the temperature being regulated by pyrometers. During that period the charcoal is absorbed by the plates, increasing the quantity of carbon at and near the surfaces. This does not harden the sur¬ face of the plate, but it prepares it for the sub¬ sequent hardening which is done at a later stage, after the bending in the case of those plates which have to be curved, and after the planing off of the rough edges in the case of all plates. Both operations involve the use of much massive machinery and careful handling.

Bending and Planing. — The bending is done in hydraulic presses. Messrs. Vickers have two of 8,000 tons power, which will bend plates up to 21 feet long and 11 feet wide. The pressure exerted is three tons to each square inch of the rams. Each weighs 600 tons. The bending of the thickest plates under the pow¬ erful persuasion of these presses is easily and quickly accomplished. In the next stage the surfaces are planed on machines which will

carry a plate weighing 30 tons on a moving table, weighing as much, and will reciprocate it under the cutting tools, which cut in both di¬ rections. The plate moves at a rate of about 11 feet a minute. In other types of machines the plate is fixed in a pit below and the cutting tools are traversed over it. It is necessary to plane the surfaces of the plates smoothly, for, although they have been rolled and are smooth, the thicknesses are not so uniform as they should be to enable them to be fitted perfectly in their places. Afterward the very rough and irregular edges are planed in machines of a totally different design. Many plates must have their edges beveled and provision is made for dealing with these by means of hinged tool holders. When a large cpiantity of metal has to be removed the edges are cut or parted with circular saws.

Hardening. — The hardening process com¬ prises two stages — the moderate hardening of the plate right through, which might be more correctly termed tempering, and the intense hardening of the outer face. The first is done with oil, the second with water. In the first stage the plate is reheated in a furnace to an exact temperature and dropped

suddenly into a bath of cottonseed oil, large enough to tem¬ per the entire plate without becoming itself sensibly overheated. The result is that the plate is hardened or toughened throughout without being rendered brittle. It is both stronger and tougher than it was before im¬ mersion, but it would not resist a modern soft- nosed shell. Afterward the surface, which has been saturated with carbon to a depth of from two and a half to three inches, is ren¬ dered of excessive hardness by a chilling pro¬ cess. A series of jets of cold water are di¬ rected under pressure against the highly car¬ bonized surface, the plate having been heated first. This is continued during two or three hours, by which time the surface to a depth as far as the carbon has penetrated has become of glasslike hardness.

The finished plate is made ready for the in¬ spector who goes carefully over the whole carbonized face, testing every square foot for hardness. The punch must be dulled and the surface of the plate show practically no mark. If this test is satisfactory the coupon, which has been previously cut in the machine shop, is broken off to show the structure of the plate by its fracture. Then follows the drill test to show the depth of chill and if the plate passes this test, bars are taken to show its physical characteristics, that is, tensile strength, elastic limit and extension.

Final Test. — After the above tests are completed the ballistic plate is picked — that is, a plate to be fired at and which represents a group of plates. The armor for a battleship is divided into groups of from 400 to 600 tons, as determined by the department. This test is the most important and on its acceptance or rejection hangs the fate of the whole group of armor; as a result the inspector usually picks that plate of a group, which in his opin¬ ion is the least likely to pass. Of course, he has a record of all the plates, and going oyer these most carefully, he chooses the one which for some slight reason or other is not as per¬ fect as the others, assuming that if the plate in question can pass the severe test required of

it, the other plates of the group most assuredly can.

The plate having been decided on, it is sent to the proving ground for test. Here it is attached to a structure, braced from the rear and bolted in the same manner as armor on shipboard. When in readiness three shots are fired at it, the actual thickness of the plate determining the gun to be used and the initial velocity. Approximately a gun of the same calibre in inches as the armor in thickness is used and no projectile or fragment thereof shall get entirely through the plate, nor shall any through crack develop to an edge of the plate or to another

impact. The plate having successfully passed test, the group is accepted and the remaining plates are finished machined ; a replacing plate is substituted for the ballistic one.

Edward S. Farrow, Consulting Civil and Military Engineer.

ARMORED TRACTORS. As the re¬ sult of experiments conducted in November 1915, at Fort Sill, under the direction of the Field Artillery Board, with caterpillar tractors as motive power for field artillery, and other experiments conducted both at Fort Sill and the Rock Island Arsenal with motor trucks as transports for the same arm of the service, the United States Army has its newest Field Ar¬ tillery regiment moved by motor power com¬ pletely. Thus it would appear that the United States was in the lead in establishing practical applications to military use of American com¬ mercial engines ; and that when the editor of the Field Artillery Journal wrote the caption beneath a photograph of a tractor ((Artillery Horse of the Future® he was nearer to the truth than such glimpses into the future usu¬ ally are.

The American built caterpillar tractors, heavily armored, made their appearance from behind the British lines in the battle of the Somme and were revealed as armored motor cars capable of advancing over the rough ter¬ rain resulting from the terrific bombardment by high-powered explosive shells. The car or tractor resembles an enormous armadillo. The crew is protected by varying numbers of arm¬ ored plates, any one of which is impervious to machine gun or rifle fire as well as shrapnel bullets. It is asserted that only a direct hit from a gun of large caliber could put one of these monsters out of action. The car com¬ pletes the work of the artillery bombardment on the enemy trenches before the infantry ad¬ vances. Its chief wTork on the Somme front was to locate the German machine gunners and blow them out of their positions so that they could not mow down the advancing infantry. This done, the infantry could occupy the aban¬ doned enemy positions with comparative ease.

The completed car, as employed by the Brit¬ ish, is made simply by enlarging the platform on the tractor so that it extends over most of the machinery and furnishes room for machine guns and their crews and by covering the whole with a tortoise shell of steel armor.

The machine has a fore wheel which is used only for guiding purposes. No weight rests on this wheel and it could be removed altogether without causing the frame of the tractor to dip more than a few inches. The weight is

carried on the two caterpillars. These consist of two belts with corrugated surfaces, on the inside of each of which are two lines of steel rails, jointed in short sections and operated by sprocket wheels. As the endless belt turns with the progression of the machine the for¬ ward sprocket wheel lays down the track and the rear one picks it up again.

Each of the caterpillars is under independent control and by starting one while the other is motionless the entire machine can be turned in its own length — a characteristic which would account for some of the strange manoeu¬ vres which led observers to describe the <(tanks® as wallowing about, <(eating houses and pawing the debris under their bellies® and so on.

The pressure on the ground under the cater¬ pillar — the string of steel plates seven feet long and two feet wide on which the entire weight of the machine is supported — is less than that caused by the foot of a horse or even of a man. And owing to the construction and location of the engines, the centre of gravity of the whole machine is near the back of the caterpillar and not more than 18 inches off the ground. For this reason the machine can roll along without danger of tipping over on an almost incredible slope and it can run consid¬ erably more than half its length forward over a chasm without any support at all.

When it moves across a trench the front wheel, on which normally no weight rests, crosses first. The forward end of the cater¬ pillar would then move forward over the open part of the trench and the machine be sup¬ ported by the rear of the caterpillar, where most of the weight was concentrated, on one side with the guide wheel forward to act as a steadier in front. Then by the time the rear part of the caterpillar had reached the edge of the trench the forward part would already be across and there would be very little displace¬ ment of the machine. In this way the machine could cross a trench almost as wide as the ground length of the caterpillar.

ARMORER, a term formerly applied to a maker of arms and armor, a very important handicraftsman in the Middle Ages and down to the end of the 16th century and even later. (See Arms and Armor). At the present day the term denotes persons employed to keep the arms of the soldiers in repair, or the custodian of an armory. On board a man-

of-war the ar¬ morer is a petty officer appointed to keep the small arms in complete condition for service.

ARMORICA, the country of the Armorici. The name was formed from two Celtic words signifying <(upon the sea,® and was apparently applied in ancient times to the whole northern and western coast of Gaul. It was afterward confined to the province of Brittany.

ARMORY, a building, or military station appropriated to the storage of arms, or the use of troops. In the United States the term is generally applied to the headquarters of the local militia, and signifies almost the equivalent of a club house, to which is added a drill shed, for military manoeuvres. Many of these are fine examples of military architecture and are equipped with every modern convenience. In Europe the term is often applied to a museum of military antiquities, but is used more gen¬

erally of the part of an arsenal, barracks, etc., set apart for the armorer and his assistants or where arms and equipment are stored.

ARMOUR, Herman Ossian, American merchant: b. Stockbridge, N. Y., 1837 ; d. 1901. After several years spent in the grain com¬ mission business in Chicago he became in 1865 the New York representative of the Milwaukee firm of Armour, Plankinton & Co., which re¬ tained the firm name of H. O. Armour & Co. until 1870. The name was then altered to Armour & Co., which is now the most import¬ ant provision firm in the world.

ARMOUR, John Douglas, Canadian judge: b. 1830; d. 1903. Educated at Upper Canada College and Toronto University, he was called to the bar in 1853. Appointed a judge of Queen's Bench of Ontario, 1877 ; was chief justice 1887-90; president of the Court of Ap¬ peal 1890-1902; and judge of the Supreme Court 1902-03. He was one of the Canadian representatives on the Alaska Boundary Com¬ mission in 1903.

ARMOUR, J. Ogden, American capitalist and packer: b. in Milwaukee, Wis., 11 Nov. 1863, the son of Philip Danforth Armour and Malvina Belle Armour. His mother was a daughter of Jonathan Ogden, a prominent mer¬ chant of Cincinnati, and his father, Philip Dan¬ forth Armour, was a pioneer in the meat pack¬ ing industry in America and also widely known for his philanthropy. He endowed the Armour Institute of Technology and the Armour Mis¬ sion in Chicago, giving them a total of over $2,500,000. J. Ogden Armour was educated at the Harvard School, Chicago, and at Yale Uni¬ versity. He did not

complete the course at the latter institution, but yielded to the request of his father that he should return to Chicago and relieve him of some of his business cares. Consequently he entered the business house of Armour & Co. in 1883. Beginning as a subor¬ dinate, he soon became a partner and later, upon the incorporation of the firm in 1900, was made a director and vice-president. Upon the death of his father in 1901 he became president of Armour & Co. Under his direc¬ tion the steady and vigorous growth of the firm and its subsidiaries has been maintained. He finds his greatest satisfaction in having suc¬ cessfully carried on, extended and developed the industrial activities and the philanthropic enterprises bequeathed him by his father. Mr. Armour married Lolita, daughter of Martin J. Sheldon, retired capitalist of Suffield, Conn. Mr. Armour is a director in various corpora¬ tions, including the Chicago, Milwaukee and Saint Paul Railway Co., the National City Bank of New York, the Fort Worth Stock Yards Co., the Stock Yards National Bank, South Omaha, the Continental and Commercial Na¬ tional Bank, the Northwestern National Insur¬ ance Co., the Continental and Commercial Trust and Savings Bank, etc. He is also a member of the Illinois State Council of De¬ fense and has published (The Packers and the People > (1906).

ARMOUR, Philip Danforth, American merchant and philanthropist : b. Stockbridge, N. Y, 16 May 1832; d. 6 Jan. 1901. He was a miner in California in 1852—56, but engaged in the commission business in Milwaukee in 1856— 63; and later became the head of the pork

packing firm of Armour, Plankinton & Co., which was transferred to Chicago in 1870 and reorganized under the firm name of Armour & Co. Its business increased rapidly and it exported its products to every land. It also invested in the refrigerator car service and in the storage and handling of grain. Armour became noted for his philanthropy as well as for his astonishing business ability. He founded the Armour Mission and the Armour Institute of Technology (q.v.), both in Chicago; the former at a cost of about $250,000 and the latter with an endowment of $1,500,000, subse¬ quently increased. His philanthropic work has been carried on and extended by his son, Jonathan Ogden Armour (q.v.).

ARMOUR INSTITUTE OF TECH¬ NOLOGY. — This institution was founded in 1892 by Mr. Philip Danforth Armour of Chi¬ cago. The work of instruction was begun in September 1893. The aim of the

Institute was expressed in its first public announcement as follows : <(This institution is founded for the purpose of giving to young men an opportunity to secure a liberal education. It is hoped that its benefits may reach all classes. It is not in¬ tended for the poor or the rich, as sections of society, but for any and all who are earnestly seeking technical education. Its aim is broadly philanthropic. Profoundly realizing the im¬ portance of self-reliance as a factor in the de¬ velopment of character, the founder has con¬ ditioned his benefactions in such a way as to emphasize both their value and the student's self-respect. The Institute is not a free school; but its charges for instruction are in harmony with the spirit which animates alike the founder, the trustees and the faculty; namely, the desire to help those who wish to help them¬ selves." Four-year courses in mechanical and electrical engineering were first organized. A union was effected with the Art Institute of Chicago for the purpose of developing the course in architecture which that institution had successfully maintained since 1889. The result was the establishment in 1895 of the Chi¬ cago School of Architecture. In 1899 the course in civil engineering was added ; in 1901, the course in chemical engineering; in 1903, the course in fire protection engineering, and in 1911, the course in industrial arts. The courses now offered in mechanical engineering, electrical engineering, civil engineering, chemi¬ cal engineering, fire protection engineering, ar¬ chitecture and industrial arts, all lead to the de¬ gree of Bachelor of Science.

ARMS. History. — When the naked sav¬ age found himself face to face with the wild beast, hungry and fierce, but not within strik¬ ing distance, he swiftly seized a jagged frag¬ ment of rock from the ground and hurled it with all his force at the blazing eyes before him ; then another and another, until the beast, dazed from the unexpected blows, fell back and gave him a chance to escape. At that mo¬ ment the -savage had invented arms and am¬ munition. He had found a way to strike a harder blow than the blow of his fist, at a greater distance than the length of his arm, and his brain showed him how to do it. The cave man and his descendants learned the val¬ uable lesson of stone-throwing and it made hunters of them, and so it went on for cen¬

turies. At last, however, there appeared a great inventor — a nameless Edison of his day. He took his girdle of skin and placed a stone in its centre, holding both ends with his right hand. He whirled the girdle twice around his head, then released one end so that the leather strip flew out and the stone shot straight for¬ ward. Here was the first slingman in action. A little practice made expert marksmen, and most of the early races used it for hunting and in war. We find it shown in

pictures made many thousands of years ago in ancient Egypt and Assyria. We find it in the Roman army, where the slingman was called a <(funditor.® We find it in the Bible, where it is written of the tribe of Benjamin: (<Among all these peo¬ ple there were 700 chosen men left-handed; every one could sling a stone at an hair breadth and not miss.® Likewise the story of David and Goliath is remembered, when the young shepherd ((prevailed over the Philistine with a sling and with a stone.® Slings were used in European armies until nearly 100 years after America was discovered.

A little later we find man armed with his ((bow and arrow® as an instrument of war. The cross-bow, the Chinese repeating cross-bow, the ballista and catapult, all played their parts up to the invention of gunpowder, when fire¬ arms were born, and we have the rapid devel¬ opment of the cannon, the petronel, the hand- culverin, the match-lock, the serpentin, the harquebus, the wheel-lock, the Monk's gun and flint-lock.

It is doubtful at what time guns were first used as sporting arms; but early French and Italian works seem to indicate the close of the 14th century. We find a curious illustration in an old manuscript entitled, <(Ye Gonne and How to Use It,® dated 1446. This curious sketch is evidently a caricature ; but it is suf¬ ficient to show that all firearms were used for game shooting in the early part of the 15th century. We have notices of the same in sev¬ eral records of that century, and by the close of the 16th century the gun seems to have become so general a sporting weapon as to necessitate special regulations in several Eu¬ ropean countries. About 1580, an Italian work informs us, shooting at birds flying and ani¬ mals in motion was first practiced ; but this could not have been to any great extent. It was not until the close of the 18th century that shooting on the wing became at all com¬ mon. Since that time it has been so univer¬ sally practised as to make shooting at any fixed object with a shot-gun unsportsmanlike.

Breech-Loaders. — Sporting arms may be classed as shot-guns, pistols, carbines and rifles. Muzzle-loaders are but little used at the pres¬ ent time. Most breech-loaders employ the me¬ tallic case cartridge, and are divided into simple breech-loaders and repeaters. The essential parts of all such arms are the barrel, the cham¬ ber, the breech-mechanism, the lock, the stock, the sights and the mountings, and in repeaters, the magazine. If the chamber be made in the piece which closes the breech, commonly called the breech-block, the arm is said to have a movable chamber. The latter has great ad¬ vantages and is generally used. With the fixed chamber the interior of the barrel is divided into two distinct parts, viz., the bore proper or space through

which the projectile moves

under the influence of the powder and the chamber in which the charge is deposited. The principal parts peculiar to breech-loaders are :

(1) The movable breech-block, by which the chamber is opened and closed; (2) the breech- frame, upon which the breech-block is mounted and united to the barrel; (3) the chamber, with its recess, to receive the rim of the cartridge ; (4) the firing-pin, which transmits the blow of the hammer to the cartridge; (5) the extractor, by which the empty case is removed after fir¬ ing.

The foregoing named parts may be said to be essential to all breech-loading arms in which the metallic cartridge is used ; the dif¬ ferent ways in which they are combined mark the systems. These combinations have refer¬ ence chiefly to the modes of operating and locking the breech-lock. The different sys¬ tems may be classified into: (1) those with a fixed chamber; (2) those with a movable chamber. The latter have now become obso¬ lete. The first class have (1) a movable barrel;

(2) a movable breech-block. With each the

motion may be sliding, in which case it moves in grooves ; rotating when it swings on a hinge; or sliding and rotating combined. The greater number of systems belong to the class of a ((movable breech-block rotating about an axis.® In arms of this class the axis of motion may be parallel to the axis of the barrel, and above, below, or to one side of it; or perpendicular to that axis, being vertical or horizontal, and lying in or out of the plane of the axis. The position of the hinge has an important influence on the facility of oper¬ ating the block, inserting the cartridge, and extracting the empty shell ; the most suitable position is deemed to be in front of the centre of the block. In this case the motion of opening and closing the block is natural and easy ; the cartridge is pushed into its place by the block, and a very simple retractor serves to withdraw the empty shell after firing. The most serious defect found in breech-loading arms was the escape of the flame through the joint, which not only incommoded the shooter, but, by fouling the machinery, seriously inter¬ fered with its operation. At present this is entirely overcome by the elastic metallic

case of the cartridge. The advantages of breech¬ loading over muzzle-loading arms are (1) greater certainty and rapidity of fire ; (2)

greater security from accidents and loading;

(3) the impossibility of getting more than one cartridge into the piece at the same time; (4) greater facility of loading under all circum¬ stances, and particularly when the soldier is mounted, lying on the ground or firing from behind any cover.

The Barrel. — There are certain functions performed by, and certain important condi¬ tions to be fulfilled in the construction of, the different portions of a small-arm. The barrel is . by far the most important part, its office being to concentrate the force of a charge of powder on a projectile, and give it proper ini¬ tial velocity and direction ; for these purposes, and for the safety of th'e firer, it should be made of the best material and with the great¬ est care. In determining the exterior form, it is not only necessary to give such thickness to the different parts as will best resist the explosion effect of the charge, but such as

will prevent it from being bent when subject to rough usage. Weight, to a certain extent is necessary to limit recoil, to give steadiness to the barrel in aiming, and to prevent it from ˆspringing® in firing. The latter defect gener¬ ally arises from bad workmanship, whereby there is a greater thickness of metal and con¬ sequently less expansion on one side of the bore than on the other.

Calibre. — Three points are to he consid¬ ered in determining the calibre of small arms : (1) it should be as small as possible to enable the hunter or soldier to carry the greatest number of cartridges; (2) to diminish the amount of ammunition required, and to pre¬ vent the confusion liable to arise from a vari- erty of calibres, there should not be more than two for all arms of the same service, viz., one for the rifle and the carbine, and one for the pistol; (3) this point relates to the force and accuracy of the projectile, and to the flatness of its trajectory. The introduction of the elongated projectiles afforded the means of increasing the accuracy and range of firearms, without increasing the weight of the projectile, simply by reducing the calibre, which diminished the surface, opposed to the air. Too great reduction of calibre, however, gives a very long and weak projectile; and be¬ sides, the effect of a projectile on an animate object depends not only on its penetration, but also on the shock communicated by it to the nervous system, or upon the surface of contact. These considerations have led to a general reduction of calibre of rifles.

Grooves. — The grooves being for the pur¬ pose of communicating a rotary motion to the projectile around an axis coincident with its flight, their construction will depend upon the form, dimension and material of the projec¬ tile, charge of powder, and angle of fire. The points to be considered in determining the form of grooves for arms are range, accuracy of fire, endurance, and facility of cleaning the bore. Experiment has shown that for breech-loaders these points are best attained by making the grooves broad and shallow, and with a rapid twist. The chamber being a receptacle for the charge, its shape is made to conform to that of the cartridge. Its diameter is made a little larger, and that of the bore a little smaller than that of the pro¬ jectile. This facilitates the insertion of the charge, and causes the projectile to be com¬ pressed and held firmly by the bands in its passage through the bore. The bottom of the grooves and the surface of the chamber are generally continuous.

Breech-Mechanism. — The breech-mechan¬ ism comprises the principal parts that are peculiar to arms loading at the breech. The functions of these parts are the opening, clos¬ ing, and locking of the breech, firing the charge and removing the empty cartridge shell. These are. the objects for the accomplishment of which the different systems are variously con¬ trived, and with which alone they are con¬ cerned. The most important conditions to be fulfilled in the arrangement of this mechan¬ ism are: (1) the number of parts should be as few as possible, and all should be of the simplest construction; (2) the strength and union of the parts should be such as not only to resist repeated discharges, but the bursting

ARMS AND ARMOR

Burgonst, French, 1550 Armor for Man and Horse, Italian, 1575

of a cartridge case, which sometimes occurs from defective material or workmanship; (3) the locking of the breech-block should not only be secure, but all the parts by which it is effected should work freely without sticking; (4) the parts should be so arranged that the hammer cannot strike the firing-pin until the breech-block is properly locked; (5) the ham¬ mer should not necessarily rest on the firing- pin when the piece is carried loaded ; (6) the breech should be unlocked without the ham¬ mer being brought necessarily to full cock; (7) the working parts should, as far as pos¬ sible, be covered from dust and water; (8)

the extractor should be so arranged as to require no cuts or openings in that part of the chamber which surrounds the body of the cartridge case.

The Lock. — The lock is the machine by which the charge in the cartridge is ignited. Those of the present day belong to the percus¬ sion class, in which fire is produced by a blow upon the fulminating powder, contained in the cartridge case. Locks are divided into side and centre locks, depending upon the position occupied in the stock; each of these may be either front action, wherein the main¬ spring is in front of the tumbler or back- action, where the spring is in rear of the tumbler. The mortise, which forms a bed for the lock of the latter construction, seri¬ ously affects the strength of the stock at the handle, and for this reason the front-action lock is generally preferred for all arms, ex¬ cept revolvers. The conditions to be fulfilled in the construction of a lock are simplicity, strength, certainty of action, and freedom from such accidental motion of the parts as might produce explosion of the charge in the barrel.

The Stock. — The stock is the wooden part of the firearm, to which all the parts are assembled ; it is preferable that it should be in one piece. The material should be light, strong, and well seasoned. The butt, the part intended to rest against the shoulder and to support the recoil of the piece, should be of such length and shape as will enable jt to transmit the recoil with the least inconvenience to the sportsman. The longer it is, to a cer¬ tain extent, the more firmly will it be pressed against the shoulder, and the effect of the recoil will be a push rather than a blow. The stock is crooked at the handle for convenience in aiming, and for the purpose of diminishing the direct-action of the recoil. Changing the direction of the recoil in this manner causes the piece to rotate around the shoulder; but if the stock be made too crooked, the butt will be liable to fly up and strike the face.

The Sights.— The sights are guides by which the piece is given the elevation and direction necessary to hit the object. They are two : called front and rear sights. The front sight is fixed to the barrel near the muzzle. The fineness of its point is regu¬ lated by the length of the barrel, or distance from the eye, and the size and distance of the object generally aimed at. It is made coarser in military than in sporting arms, to prevent injury. The rear sight is attached to the barrel a short distance from the breech; it has a -movable part, capable of being adjusted for different elevations of the barrel. A sight

should satisfy the following conditions, viz. (1) it should be easily adjusted for all dis¬ tances within effective range : (2) the form of the

notch should permit the eye to catch the object quickly; (3) it should not be easily deranged by accidents. Globe and telescopic sights are used for very accurate sporting arms, but they are too delicate in their struc¬ ture and too slow in their operations for gen¬ eral purposes.

The Mountings. — The mountings may be

divided into two classes, viz. (1) those which serve to connect the principal parts, generally bands and screws; (2) those which protect from wear or strengthen the stock at certain points, as the butt-plate, guard-plate, tup; (3) the minor parts which secure the different parts (including the mountings proper), in their place, consisting of springs, screws, rivets, pins, washers and nuts.

Modern Instruments. — Trench warfare has created absolutely new conditions and has brought into use new weapons, revived old ones, and brought forth new methods in their use. The use of cover in connection with increased fire effect has greatly increased the power of the defense. The attack will not succeed unless the defense has first been com¬ pletely shaken. Never before has human in¬ genuity been so taxed to devise and supply so many murderous instruments of combat.

The modern sabre, bayonet and lance are the successors of the ancient instruments of a similar nature appearing in the Stone, and later in the Bronze and Iron ages. Scottish regiments have used the dagger; Indian troops, the throwing knife, a successor to the javelin. The modern rifle represents the culmination of the same idea found in the sling-shot, later in the bow and arrow, and in the cross-bow. Another variation is the aero-arrow used by the French and English. The revolver is the successor of the pistol. The flat trajectory of the modern rifle has brought about the use of new means to reach troops under cover. The ancients used the ballista and the catapult. The first mortars used also fired stone projec¬ tiles. The modern howitzers resemble in their ballistic properties the first guns that were used. Large calibre mortars have been de¬ veloped, such as the 42 centimetre mortars. Their life is very short. The machine gun is the successor to the Gatling gun. The use of trench mortars and hand grenades dates back to the 16th century. The Japanese were the first to revive their use. See Arms and Armor; Artillery; Cannon and Small Arms.

Edward S. Farrow, Consulting Civil and Military Engineer.

ARMS, Stand of, the outfit of arms neces¬ sary for the equipment of a single soldier in¬ cluding rifle, bayonet, cartridge box and belt. The

term is fast becoming obsolete.

ARMS AND ARMOR. The earliest arms were everywhere made of stone. Stone was succeeded by bronze in the manufacture of weapons of war. The commonest warlike relics of the bronze age that have come down to us are daggers and spear-heads. Fjom the de¬ scriptions of Homer we know that almost all the Grecian armor, defensive and offensive, in his time was bronze, although it is evident that iron was sometimes used in the time of Flomer for making weapons, from the fact that

he occasionally uses the Greek word for iron (sideros) for a sword. Not the sword, how¬ ever, but the lance, spear and javelin, were the principal weapons of this age among the Greeks. The bow is not often mentioned, al¬ though a bow belonging to Pandarus is de¬ scribed in the Iliad, and in the Odyssey, Ulysses is represented as very expert in the use of this weapon. Among the most ancient nations the Egyptians seem to have been most accustomed to the use of the bow, which was the principal weapon of the Egyptian infantry. The Egypt¬ ian bow was somewhat shorter than the height of a man ; the arrow was usually made of reed, the head of bronze, but sometimes of flint. Peculiar to the Egyptians was a defen¬ sive weapon the object of which was to catch and break the sword of the enemy. With the Assyrians also the bow was a favorite weapon; but with them lances, spears and javelins were in more common use than with the Egyptians. Most of the large engines of war, chariots with scythes projecting at each side from the axle, catapults, and ballistse, seem to have been of Assyrian origin. All of those mentioned can at any rate be traced back to the Assyrians, to whom the invention of the catapult and the ballista was attributed by classical writers. During the historical age of Greece the charac¬ teristic weapon was a heavy spear from 21 to 24 feet in length. The sword used by the Greeks was short, and was worn on the right side. The Roman sword was of Spanish origin, from 22 to 24 inches in length, straight, two-edged, and obtusely pointed, and as by the Greeks was worn on the right side. It was used principally as a stabbing weapon. On the Trajan column, belonging to 114 a.d., the sword appears considerably longer than that used at an earlier period. The Roman sword was originally of bronze, but like all other offensive weapons among the Romans was always of iron in the time of Polybius (2d century b.c.), when bronze continued in use only for defensive armor. The character¬ istic

weapon of the Roman soldier was the pilum, a kind of pike or javelin, about five or six feet in length, with a wooden shaft and an iron head, the latter of which was about one third of the length of the whole. The pilum was sometimes used at close quarters both as an offensive weapon and as a means of parrying blows, but more commonly it was thrown along with the other javelin, which every Roman spearman (hastarius) carried when within 10 or 15 paces of the enemy. The pilum, when thrown from this distance, would fix itself in the enemy's shield, where¬ upon the Romans would rush up, and seizing hold of the shafts of their pila draw down the shields in which they were fixed, and follow up the attack with their swords. In addition to the large engines of war that have been al¬ ready mentioned as of Assyrian origin (scythe- chariots, catapults, and ballistas) the Romans made use of battering-rams for making breaches in the walls of fortified places. The Greeks are said to have used a sort of cannon made on the principle of the modern air-gun. The Romans also employed caltrops to embarrass the move¬ ments of an enemy's cavalry.

The principal pieces of defensive armor used by the ancients were shields, helmets, cuirasses, and greaves. No shields were car¬

ried by the Egyptian archers; but the Egyptian spearmen had large shields, rectangular below and semi-circular at the top, and with a round sight-hole in this semicircular part. In the heroic age of Greece the shield is described as of immense size, so as to be capable of de¬ fending the whole body. In the early monu¬ ments the shield is still large, though not so large as it appears to have been in the heroic age. In shape it is round or oval, with a very considerable degree of convexity. At the time of the Peloponnesian War a still smaller shield came into use. The Romans had two sorts of shields — the scutum, a large, oblong, rect¬ angular, highly convex shield, carried by the legionaries — and the parma, a small, round or oval, flat shield, carried by the light-armed troops and the cavalry. In the declining days of Rome the shields became larger and more varied in form. The helmet was a character¬ istic piece of armor among the Assyrians, Greeks, Etruscans, and Romans. Like all other body armor it was usually made of bronze. The Assyrian helmet was frequently conical. Sometimes it had the form of a truncated cone, and sometimes the pointed extremity was curved forward. The helmet of the his¬ torical age of Greece was distinguished by its lefty crest, which tapered dowmvard to the back of the neck. The Etruscan helmet was also, very high crested and sometimes had a wing rising to a considerable height on either side from points near the summit. The Roman helmet in the time of the early emperors fitted close to the head and had a hollow

neck-guard and hinged cheek-pieces fastened under the chin, and a small bar across the face for a visor. The neck-guard and check-pieces were not peculiar to the Roman helmet, but were in common use wherever the helmet was worn. In later days the helmet of the Romans had a higher crown than that of the early emperors. The cuirasses of the Assyrians were close- fitting tunics made of several layers of flax plaited or interwoven and glued together. This kind of cuirass was introduced into Greece during the Peloponnesian War and was some¬ times used even by the Romans. Before the Peloponnesian War the Greeks had the upper part of their body defended by bronze cuirasses. The defensive body armor of the Egyptian archers consisted of a quilted coat. The Egyptian spearmen had cuirasses of bronze scales or quilted with bands of metal. Under the Roman republic all the legionaries wore a bronze cuirass, consisting of a breast and back plate, with a border of pendent leather straps defending the lower part of the body On the columns of Trajan and Antonine this cuirass is given only to officers, the legion¬ aries wearing at that period only leather oi¬ lmen cuirasses, on which circular plates of metal and metal shoulder-pieces were sewed, and to the lower border of which were attached oblong plates which served the purpose of the leather straps of the other cuirass. In the time of. Trajan and Septimius Sevcrus a flexible cuirass was added to the equipment of the Roman knight or horseman. This was made either of scales (lorica squamcita') or of chains (lorica hamata) . One of the latter kind has be-n found at Avenches in Switzerland, and is there exhibited. Greaves do not seem to have been worn by any of the eastern nations

<D

O

<D

'f®

TS H

C ' «

.9

ft

C/3

ay 2

aa§25So,

•asˆsMU*

Sˆ§T)-loW

»fiali!s

•*H CSOT W C<M M O r j H o ˆ2

•a a) tfl ns’.S J3 fl w rt u. oi s c/3 « tj O pq c/3 M

«s>ohnmi«

HHHHH

6 a

._ (U

■8hO

S«3fl 13 c« p*?3

armor

French Foot Soldier, Eighth Century Polish Knight, end of Fifteenth Century French Soldier, about 1120 A. D.

Battle of Askalon (1099) from a Window in the Church of St, Louis, Pans

5-6 German Full Armor, of the time of Maximilian I A Mottled or Striped Armor. B Ringed Armor. C Fettered Armor. D Shield Ornament. E Plate Armor. F Chain Armor

except the Persians, whose defensive armor resembled pretty closely that of the Middle Ages. The greaves of the Greeks (knemides) were made in two pieces which were fastened together by clasps. The Roman greaves (ocrece) were made in one piece and were often worn only on one leg. The Samnite practice was to wear the greave

upon the left leg, which is the leg advanced in fighting with a shield on the lett arm; but Vegetius men¬ tions that the greave was worn by the Roman legionaries upon the right leg. The greave reached only from the knee to the ankle. The Roman soldiers had their feet protected by shoes set with nails (caligce).

The favorite weapons of the Germanic races, by which the ancient civilization of Rome was to a large extent overthrown, were the battle-axe, the lance or dart, and the swrord. Their defensive armor consisted almost exclusively of a shield made of plaited osier covered with leather and generally eight feet by two inches in size. Afterwards it was made round and bound with iron, and had several prominent bosses on its surface. The Frankish form of the German battle-axe was called francisca (francisque), and was the characteristic weapon of that tribe. It had a broad single-edged blade and a short haft, and was often used as a mis¬ sile. The lance or dart of the Franks, called angon, closely resembled and was used exactly in the same way as the Roman pilum. The sword among the Franks was only a horse¬ man's weapon. The shield of the Franks was round. Hardly any body armor (scarcely even a helmet) was used by them until the Car- lovingian days. Swords belonging to the early iron age in Scandinavia are frequently found in the marshes of Schleswig. They . are long, straight, two-edged, and often richly dama¬ scened. Shields belonging to the same district and epoch were made of wood, and were flat, round, and from 22ˆ2 to 44 inches in diameter. They were bossed and otherwise mounted, gen¬ erally in bronze, sometimes in iron. The com¬ mon arms of the Anglo-Saxon infantry were a spear, and axe, and a scramasaxe (a heavy single-edged knife). With the Anglo-Saxons as with the Franks the sword was especially a horseman's weapon, being carried by none under the rank of thane. The sword carried by them was three feet long, broad in the blade, and round at the point. The Saxon shield was round or oval, made of wood covered with leather, and furnished with a high conical boss.

The arms and armor both of the Normans and Anglo-Saxons, but especially of the former, at the time of the Norman conquest of England are pretty fully illustrated by the Bayeux tapestry. On this work the horsemen appear armed with long lances as well as swords. The Normans are represented as well furnished with archers and cavalry, of which arms the Saxons do not seem to have had any. Maces, clubs, axes with shafts from four to five feet long, are seen in the hands of both. The shields are long, rounded above and taper¬ ing to a point at the bottom. The body-armor consists of a long hauberk ringed or trellised. The helmet is conical and has a sort of tongue in front which comes down over the nose.

Chain armor of interlinked rings came into use at the time of the Crusades and continued

in use till the beginning of the 14th century. From the latter date to early in the 15th cen¬ tury mixed chains and plate armor was in use, and from about the year 1410 to the beginning of the next century the body armor was en¬ tirely of plate, and complete suits of plate armor did not altogether go out of use for another century. Below the waist the body was protected by taces, a series of narrow over¬ lapping plates attached to a lining of leather. After the introduction of complete suits of plate armor the chief modifications consisted in the strengthening of the weakest parts, especially on the right side. By the end of the 15th century plate armor had attained its highest development, even the horses at that period being protected by plate armor every¬ where except on the legs. By this time, in fact, the fabrication of armor had reached such a degree of perfection that it was scarcely pos¬ sible for men-at-arms engaged in combat to find any spot where the armor of their an¬ tagonist could be pierced. Combatants equipped in this manner aimed accordingly less at wounding than at unhorsing one another, for a man-at-arms unhorsed was at the mercy of his antagonist, who, if he could not find any weak point where he could pierce the armor of his fallen foe, might beat him to death with the heavy mace with which he was armed. Many savage encounters of this nature are recorded by the chroniclers of the time. Usually, how¬ ever, a man-at-arms when unhorsed became the prisoner of his conqueror, and many battles were decided, especially in the wars between the states of Italy, carried on by means of mer¬ cenaries, almost or altogether without the shed¬ ding of blood either on the side of the van¬ quisher or the vanquished. When body-armor had come to be manufactured with such perfec¬ tion shields were almost entirely discarded. In England, indeed, no effigy has been found rep¬ resenting a man-at-arms bearing a shield of later date than the last quarter of the 14th century, from which it would seem that that defense had gone out of use even before the adoption of complete suits of plate armor. Perhaps the most characteristic portion of the body-armor of the 15th century was that which protected the feet. The coverings for the feet during this period were laminated sollerets (as they were called), actually pointed or rounded off at the toes. In the following century these were succeeded by sabbatons, cut off square at the toes. In this century the armor gradually became less rigid and cumbrous, and often consisted of small plates of metal quilted within linen or other tissues. As the century advanced the manufacture of body-armor de¬ clined, and after the close of the century armor was worn as much for show as for real service. Metal cuirasses gave place,

as a rule, to buff suits and jerkins, although the former armor is not entirely disused even at the present day. The principal weapons of the man-at-arms were the lance, sword, battle-axe, and mace, all of which were remarkable for their massiveness, as might be expected from the resistance they had to meet. The lance (see Lance and Tournament) was the weapon which he used to unhorse his antagonist if he could not wound him with it. Two-handed swords were in common use in the 16th century. The sword- breaker, consisting of a deeply notched blade

about 15 inches in length, and intended to catch and break the sword of an antagonist, belongs to the same period.

During all the time that the use of heavy armor prevailed, the horsemen, who alone were so armed, formed the principal strength of armies; and so much was this the case that infantry were generally regarded as of hardly any account. An exception must, however, be made in the case of England, the archers of which were almost at all times, before the invention of gunpowder, an important and sometimes the chief force in the army. It has been already mentioned that the Bayeux tap¬ estry furnishes us with evidence of the fact that the Normans were provided with archers at the time of the conquest. The bows used by them were small, being little more than a yard in length. The deadly weapon afterward used by the English archers was from five to six feet in length, and the arrow discharged from it was itself a yard long. The bow used in Germany as well as that used in Italy (where steel was the material of which it was usually made) was about a yard and a half long. There is no evidence of the cross-bow having been used before the 11th century. Its use against Christians was forbidden by the Council of the Lateran in 1139. The long-bow con¬ tinued in general use in England till the end of the reign of Elizabeth, and even as late as 1627 there was a body of English archers in the pay of Richelieu at the siege of La Ro¬ chelle. The cross-bow did not go out of use in the French army till the 17th century. Among the other hand-arms in use before the invention of gunpowder were the sling and the fustibale, which was nothing else than a sling with a handle to it. The large engines of war used in the Middle Ages were the same as those that had been employed by the Romans, with only slight modifications. A coat made of leather or quilted stuff, called in French gam- boison or gambeson, was almost the only de¬ fensive armor of the foot-soldier during the greater part

of the period of which we are now treating.

The use of gunpowder as a means of dis¬ charging projectiles and the gradual improve¬ ment of firearms. effected in course of time a complete change in all the methods and acces¬ sories of warfare. Details regarding the con¬ struction and recent improvements of large and small firearms and projectiles will be found un¬ der Bomb, Bullet, Cannon, Gun, Musket, Rifle, Shell, etc. Gunpowder was not used in Europe to discharge projectiles till the begin¬ ning of the 14th century. Cannon are first mentioned in England in 1338, and there seems no doubt that they were used by the English at the siege of Cambrai in 1339. All early cannon were breech-loaders. In the oldest form the breech consists of wedges of wood or metal and this form was succeeded by cannons with mov¬ able breech-piece. The projectiles first used for cannon were of stone. Field-guns were intro¬ duced in the course of the 15th century. A ri¬ fled cannon of the 1 5th century is to be seen in the museum of The Hague. Mortars were in¬ troduced into the French army in 1634. Hand firearms date from the 15th century. The Swiss at the battle of Morat in 1476 are said to have been provided with 6,000 arms of this kind. In England the yeomen of the guard

were armed with them in 1485. At first they required two men to serve them, and it was necessary to rest the muzzle on a stand in aim¬ ing and firing. Lighter hand-firearms called pe- tronels seem to have been first used by cavalry. Hand-firearms were at first fired in the same way as cannon, by means of a slow match car¬ ried in the hand and applied to the powder at the touchhole. The first improvement was the invention of the matchlock about 1476. In the matchlock the slow match was held at the end of one arm of a bent lever attached to the side of the piece in such a manner that by the action of a trigger it could be brought down upon the powder in the pan at the touchhole. This kind of lock was superseded by two others, the wheel-lock and the snaphance, that seem to have been invented about the same time early in the 16th century, although the match¬ lock continued in use long after that date, and indeed was not altogether abandoned till the beginning of the 18th century. The wheel-lock is generally said to have been invented at Nurnberg, and was largely used in Germany. It consisted of a steel wheel which was made to revolve by a spring, and in revolving struck fire from a flint, and at the same time lifted a cap which kept the powder in the pan from being wet by rain or blown away by the wind. The chief objection to it was that it was slow in its operation, as the spring had to be wound up every time it was used. The snaphance was largely used in the Spanish dominions. It was the immediate predecessor of the flintlock, from which it differed only in

making the flint strike against a fixed upright piece of iron in front of the powder-pan, while in the flintlock this upright piece was attached to another piece that covered the pan and which turned on a hinge, so that when the flint descended and struck sparks from the iron it at the same time uncovered the pan. The flintlock was invented in France about 1640, and gradually came into universal use, until it was itself superseded by the percussion-lock. This last was patented by a Scotch clergyman named Alexander Forsyth in 1807, and had been adopted every¬ where by the year 1820. The first model of the needle-gun was made in 1827 by J. N. Dreyse of Erfurt. It was first made breech¬ loading in 1836. The only important weapon not a firearm that has been invented since the introduction of gunpowder is the bayonet, which is believed to have been invented about 1650. The socket-bayonet, fitted round the muzzle of the gun, was introduced into the French army by Vauban.

The earliest collection of arms and armor was that made by Louis XII, at Amboise in 1502. There is a fine collection at Dresden, be¬ gun in 1553. Among others may be mentioned the collection in the Metropolitan Museum, New York, recently augmented by the. acqui¬ sition of the celebrated Riggs collection, which makes . the New York collection one of the finest in the world. The Riggs lot contains about 2,500 separate pieces, many of historic interest as well as of artistic importance ; the Ambras collection, commenced in 1570, now at Vienna, and those at Turin, Sigmaringen, Tsarsko-selo, Petrograd, Madrid and in the Tower of London. The last mentioned was classified by Dr. Meyrick and catalogued by J. Hewitt. The Antiquarian Museum of Edin-

burgh is rich in weapons of the stone and bronze periods, but has few specimens of arms and armor of more modern times. Of works specially devoted to the subject of arms and armor the most worthy of mention are Grose,

(Treatise on Ancient Armor and Weapons *(1785-86; Supp. 1789; afterward annexed to the second edition of the same author's (Military Antiquities,* 1801), and Meyrick, (Critical In¬ quiry into Ancient Armor as it existed in Eu¬ rope, but particularly in England, from the Norman Conquest to the reign of King Charles IP (1824). An excellent compendium on the subject by Auguste Demmin was published in 1869 in French, English and German. The title of the English edition is

(Weapons of War *; it gives a history of arms and armor from the earliest period to the present time. Consult also Dean Bashford in (Bulletin of the Metropolitan Museum* (Vol. IX, New York 1914) ; id., (Arms and Armor) (ib. 1915).

Edward S. Farrow,

Consulting Civil and Military Engineer.

ARMSTEAD, Henry Hugh, English sculptor and worker in metals : b. in London 1828; d. 1905. He studied at the School of Design and later in the Royal Academy Schools, Somerset House, and at first was much influenced by the elegance of his in¬ structor, E. H. Bailey. He presently exhibited greater insight and was employed by Sir Gil¬ bert Scott to execute portions of the Albert Memorial, London. A noted portrait statue sculptured by him is that of Bishop Wilber- force in the north transept of Winchester Cathedral. Other marble effigies by him will be found in Westminster Abbey. Consult bi¬ ography by his daughter (1906).

ARMSTRONG, Andrew Campbell,

American educator: b. New York City, 22 Aug. 1860. After graduating from Princeton University in 1881 he entered Princeton Theo¬ logical Seminary. Having finished his four- years' course he went to Berlin, there to take a post-graduate course in Berlin University. He was then appointed associate professor of ecclesiastical history at Princeton Seminary. Two years later he became instructor in his¬ tory at Princeton College, but a year later was called to Wesleyan University. From 1904 to 1909 h was co-operating editor of the Psycho¬ logical Review. Aside from his many articles on psychological and philosophical subjects, he has written ˆTransitional Eras in Thought *(1904), and has translated Falckenberg's his¬ tory of Modern Philosophy* (1903).

ARMSTRONG, David Maitland, Ameri¬ can artist; b. Newburgh, N. Y., 5 April 1836, d 26 May 1918. Graduated, Trinity College, Hartford. 'A.B.A.M. 1858, was a member of the New York Bar, practised law in New York six years, and studied art in Rome and Paris. He was a pupil of Luc Olivier Merson. United States Consul General for Italy at Rome 1869-72, Director of American Art Department, Pans Exposition, 18/8 and Chevalier of . the Legion of Honor of France. He was associate member of National Academy of Design, of the Archi¬ tectural League and other art societies, Na¬ tional Society of Mural Painters Century Club Trustee New York Society Library. He

and his wife constituted the heads of the firm of Maitland Armstrong & Co., designers and makers of stained Class. Many hundred im¬ portant memorial and other windows in various parts of the United States and Canada were designed by them.

ARMSTRONG, Edward, English educa¬ tor and historian : b. Grahamstown, South Africa, 3 March 1846. He is a graduate of Exeter College, Oxford, where he took his final examinations in 1869. During the follow¬ ing year he served as tutor at Queen's College, when he was appointed assistant master at Rugby. In 1873 he returned to Oxford. From 1878 to 1911 he was bursar at Queen's College and lecturer on modern history; while in the university he was lecturer on foreign history and a member of the board of finance. Since 1910 he has been warden of Bradfield College. Among other positions he held was that of curator of the Taylor Institute and the Botanic Gardens. His writings in book form are (Elisabeth Farnese) (1892) ; (Lorenzo de' Medici* (1897) ; (The Emperor Charles V) (2 vols., 1902) ; (The French Wars of Religion> (2d ed., 1904).

ARMSTRONG, Edward Cooke, Ameri¬ can educator: b. Winchester, Va., 24 Aug. 1871. Graduating from Randolph-Macon College in 1890, he took a post-graduate course at Johns Hopkins and was accorded a degree of PhD. in 1897. Later he took up studies at Paris and Berlin. In 1897 he became professor of the French language at Johns Hopkins, and in 1910 chairman of the Romance department.

ARMSTRONG, George, called the (<Father of the United States Railway Mail Service® : b. Armagh, Ireland, 27 Oct. 1822; d. Chicago 5 May 1871. His parents came to the United States when he was eight years old and settled in Baltimore. He entered the postal service in Washington when a young man, and his ability won him promotion in 1854 to assistant post¬ master at Chicago. He then made a study of mail transportation, wrote exhaustively on the subject, and in July 1864 was given author¬ ity by Postmaster-General Montgomery Blair to experiment on any railroad he might select. The first trial took place on the Northwestern Railroad 28 Aug. 1864, between Chicago and Clinton, Iowa, and was a complete success. He was the head of the service from the start but was assigned to headquarters in the West with general supervision of the service in the East. In 1869 President Grant directed that a bureau be made of the railway postal service, and placed Amstrong at the head as general super¬ intendent, a position which he held until his death two years later. A bronze statue in memory of his work was erected in the post- office building, Chicago, in May 1881. See Postal Service in Commerce.

ARMSTRONG, John, American soldier: b. Ireland 1725; d. Carlisle, Pa., 1795. In 1756 he was the leader of a successful campaign against the Indians at Kittanning, Pa. In 1776 he was made a brigadier-general in the Con¬ tinental army. He resigned his commission after 13 months and took a similar rank in the militia of Pennsylvania. He commanded this force at Brandywine (11 Sept. 1777) and at Germantown (4 Oct. 1777) and was appointed

major-general in January of the following year. He served as member of the Continental Congress in 1778-80 and in 1787-88.

ARMSTRONG, John, American author and soldier; b. Carlisle, Pa., 25 Nov. 1758; d., Red Hook, N. Y., 1 April 1843. While an undergraduate at Princeton he enlisted in the army and became aide-de-camp to General Mer¬ cer, being made a major at the same time. For a time after the close of the war he was successively Secretary of State and Attorney- General of Pennsylvania and in 1787 was sent to Congress from that State. Two years later he married, removed to New York State and in 1800-04 was United States Senator from that State. He was United States Minister to France, 1804-10, and afterward to Spain; and Secretary of War, 1813-14. The failure of the Canada expedition and the capture of Washing¬ ton were the cause of his becoming very un¬ popular and he resigned. He wrote the (New- burg Addresses) in 1783, anonymously, with the intent to arouse Congress to redress army griev¬ ances. He also wrote (Notices of the War of 1812) (1836) ; memoirs of Generals Mont¬ gomery and Wayne in Sparks's (American Biographies,) and prepared in part a history of the American Revolution. Consult Adams, Henry, 'History of the United States, 1801-17) (New York 1889-90).

ARMSTRONG, Paul, American play¬ wright : b. Kidder, Mo., 25 April 1869 ; d. 29 Aug. 1915. From 1890 to 1895 he was a licensed master mariner, commanding steam¬ ships on the Great Lakes. In 1904 he had pro¬ duced his first play, 'The Heir to the Hoorah.) Then followed 'Saint AnnJ (1904); (Salomy Jane} (1905) ; (In a Blaze of Glory) (1906) ; 'Via Wireless) (in collaboration with Winchell Smith, 1909) ; 'Alias Jimmy Valentine) (1909) ; 'The Deep Purple) and 'The Greyhound) (in collaboration with Wilson Mizner, 1910 and 1911) ; (A Romance of the Underworld) (1911) ; (The Escape) (1913).

ARMSTRONG, Robert, American soldier : b. Tennessee, 1790; d.

Washington, D. C., 23 Feb. 1854. He was an artillery captain in the war with the Creek Indians in 1813, being badly wounded at Taladega. At the Battle of New Orleans, 8 Jan. 1815, he was in chief command of the American artillery, and during the sec¬ ond Seminole War, 1835-37, he was a brigadier- general. In 1845 he was appointed United States Consul at Liverpool, where he remained for seven years, after which he returned home and became proprietor and editor of the Wash¬ ington Union. During this period he was con¬ fidential adviser to President Polk.

ARMSTRONG, Robert Allen, American educator: b. Frenchton, Va., (now West Vir¬ ginia) 23 Sept. 1860. In 1886 he graduated from the West Virginia University after which he took post-graduate courses at Chicago, Columbian (now George Washington), and Harvard universities. He was first appointed principal of. the West Liberty State Normal School, during which period he also studied law and was later admitted to the bar. In 1893 he was appointed professor of English at West Virginia University, becoming head of the English department there 10 years later. From 1899 to 1909 he was secretary of the West Vir¬ ginia Board of School Examiners. In 1904 he

became editor of the West Virginia School Journal. He is the author of (Geography of West Virginia, — Supplement to the Natural Geography ; (1899); (Life out of Death)

(1906) ; (The Law of Service) (1907) ; ‘Dramatic Interpretation of Shakespeare’s Tragedies) (1907); (Mastering the Books of the Bible) (1916).

ARMSTRONG, Samuel Chapman, an

American educator: b. Wailuku, Maui, Hawaii, 30 Jan. 1839; d. Hampton, Va., 11 May 1893. He was a son of Richard Armstrong, one of the earliest American missionaries to Hawaiian Islands and founder of their educational sys¬ tem. The son was educated at Oahu College, Honolulu, till 1860, and graduating from Wil¬ liams College in 1862, at once entered the Union army. He served till the end of the Civil War and was mustered out with the rank of briga¬ dier-general of volunteers. In 1866 Gen. O. O. Howard, who had noted Armstrong’s interest in the colored troops, induced him to take a position with the Freedman’s Bureau, where he was charged with the oversight of all colored people in 10 Virginia counties. After two years of successful administration, during which he had worked out a careful plan of negro educa¬ tion, he enlisted the aid of the American Mis¬ sionary Association and personal friends in the North, and founded the

Hampton Normal and Agricultural Institute. Its object was to give the negroes practical education, to train teachers, and to render its graduates self-sup¬ porting. For 10 years the students were negroes exclusively; then (1878) the United States gov¬ ernment, attracted by Armstrong's success, ar¬ ranged to have Indian children taught there. This experiment has also proved successful. General Armstrong devoted his life to the school and made it the best known and studied one of its kind in the world. At his death it had 100 teachers and employees, 200 Indian and 600 colored students. Consult Ogden, R. C., 'Sketch of Armstrong) (New York 1894).

ARMSTRONG, Sir Walter, British writer and art critic : b. Roxburghshire, Scotland, 1850. After finishing his education at Harrow and at Exeter College, Oxford, he became art critic on the staff of the Pall Mall Gazette, the Saint James' Gazette and the Manchester Guardian. In 1892 he became director of the National Art Gallery, Dublin. In 1899 he was knighted. Among his works are (The Art of Velazquez) and 'The Life of Velazquez) (1896) ; 'Art in Great Britain and Ireland) (1909) ; (Sir Henry Raeburn) (1901); (Sir Joshua Reynolds) (1900); (J. M. W. Turner J (1901)': (Sir Thomas Lawrence) (1913).

ARMSTRONG, Baron, William George,

an English engineer and mechanical inventor : b. Newcastle-on-Tyne, 26 Nov. 1810; d. Roth- bury, 27 Dec. 1900. He was trained as a solicitor, and practised as such for some time, though his tastes scarcely lay in that direction. Among his early inventions were the hydro¬ electric machine, a powerful apparatus for pro¬ ducing frictional electricity, and the hydraulic crane. In 1847 the Elswick works, near New¬ castle, were established for the manufacture of his cranes and other heavy iron machinery, and these works are now among the most extensive oil their kind. It was here that the first rifled ordnance gun which bears his name

vvas made in 1854. His improvements in the manufacture of guns and shells led to his being appointed engineer of rifled ordnance under government, and he was knighted in 1858. 1 his appointment came to an end in 1863, since which time his ordnance has taken a prominent place in the armaments of different countries. He was raised to the peerage as Baron Arm¬ strong in 1887.

ARMSTRONG-HOPKINS, Saleni, Ameri¬ can physician, author and lecturer: b. London, Ont., 21 Jan. 1855. She was educated at the high school, Blair, Neb., and at Northwestern University. She studied medicine at the Woman's Medical College, New York Infirmary and at the Woman's Medical College of Penn¬ sylvania, where she was graduated in 1885. She engaged in social work, taking 13 small waifs from Philadelphia and Chicago to the West, and established them in the homes of farmers in Nebraska. She was one of the founders of the Park Hill Orphan Plome, now the Mothers' Jewels' Home, at York, Neb. In 1886 she was sent out to India as a medical missionary by Bishop William Taylor. She was founder of Ivhetwadi Castle Hospital and the Ivhetwadi Training School for Nurses at Bombay, 1887- 88. In the latter year she was elected national lecturer on heredity by the Women's Christian Temperance Union of Bombay. She was ap¬ pointed by the British government physician-in¬ charge of the Woman's Hospital Dispensary and Training School for Nurses at Lahore, India in 1889 and later was made physician-in¬ charge to the Woman's Hospital Dispensary' at Hyderabad, Sindh. She returned to America in 1893, bringing 'with her six natives of India to be educated as missionaries to their own people. In 1893-95 she was resident physician of the Armstrong-Hopkins Private Hospital for Women and Children at Omaha, Neb., and has since practised medicine and surgery, and lectured and preached in Colorado, Delaware, Virginia and New York. She has published several wrorks, including (Divine Call to Foreign Missionary Service) ; (Record of Daily Work* ; (Heroes and Heroines of Zion' ; (In the Zenana Homes of Indian Princes) ; (Khet- wadi Castle, } etc.

ARMY. Among nations of antiquity all men capable of bearing arms were liable to be called on to serve as soldiers, with the ex¬ ception of the Egyptians, Indians of Aryan race, and. the Israelites. In the first two of these nations the warrior formed a separate class or caste of the community, ranking next in dignity and influence to that of the priests. In Egypt the military caste shared w'ith the king and the priests the whole of the soil. The members of the caste were interdicted from all handicrafts. The Egyptian infantry was mainly composed of archers. Foreign auxiliaries were also employed, but kept in a strictly subordinate position, except under the last native kings of Egypt; and the different policy pursued by them wras without doubt in a great measure to blame for the easy conquest of Egypt by Cambyses. In India the members of the warrior caste were called Kshatriyas, and after the complete subjugation of the non-Aryan inhabitants whom they found in the peninsula when it was invaded by them, seem generally to have liv?d an indolent life. Among the Israelites the only

portion of the

male population exempt from military serv¬ ice was of the tribe of Levi. In the other tribes all men above 20 might be called upon to serve in the army when occasion required. At first the army of the Israelities consisted en¬ tirely of infantry. David introduced chariot¬ eers, and Solomon added a regiment of cav¬ alry. In later times an Egyptian auxiliary cavalry is sometimes found serving in the Jewish armies. The beginning of a standing army was made by Saul, who raised a body¬ guard of 3,000 men. After the captivity ~a new organization developed itself under the Maccabees. John Hyrcanus raised an army of foreign soldiers, chiefly Arabs.

From the monuments found in the valleys of the Euphrates and the Tigris we learn that at an early date the Assyrians, Babylonians, and Medes possessed armies of infantry, cavalry, and charioteers and divided into light and heavy armed troops, distinguished by dress, equipment, and arms. But is was after the establishment of the Persian empire that the army system of the East attained its highest point of development. When the Persians had extended their empire over almost the whole of western Asia it was necessary to maintain a standing army to keep down con¬ quered tribes and to guard the frontiers. The various sections of this army were each levied in the province to which it belonged, and were partly stationed in fortified towns, partly dis¬ tributed over the country districts. Their pay was derived from the revenues of the province, but their commanders were wholly in¬ dependent of the satraps or provincial gover¬ nors. Yearly reviews were held in order to see that they were constantly kept in a state of effi¬ ciency. The troops of the standing army in¬ cluded a light and heavy infantry, as well as strong bodies of cavalry, part of whom were clad in armor. The subdivisions of the army (both cavalry and infantry) were according to the decimal system. Originally all the forces were Persians, but in later times Asiatics and Greeks were also enrolled. Express messengers, stationed throughout the empire at the distance of a day's journey from one another, formed the means of communication between the dif¬ ferent parts of the army. In addition to this provincial force the king had a body-guard of 10,000 men, called the immortals, from the fact that their numbers were always kept full. When great expeditions (such as the inva¬ sions of Greece) were undertaken a levy of the whole people was made. Fifty-six nations, according to Herodotus, were represented in the levy made by Xerxes for his celebrated Greek expedition.

In the small free states of Greece the armies consisted of a civic militia, in which it was the right and duty of every freeman to serve.

In times of emergency the slaves also were armed. The Greek armies often consisted exclusively of infantry. Athens never had more than 1,000 cavalry. The foot soldiers were divided into hoplitai, or heavy-armed, whose equipments consisted of a long lance, a sword, and a large shield; peltastai, armed with a short spear, and carrying a small round shield; psiloi, carrying no shields, and armed only with javelins, bows and arrows, or slings; and gymnetes, also without shields, and chiefly composed of slaves and foreigners. The age

for military service was 20 to 40 at Athens and 20 to 60 at Sparta. In Athens, however, every youth was enrolled at the age of 18, although not liable to be called on for active service till he had reached the age of 20. The command of the Athenian army was divided among 10 generals, who were elected for one year, one by each of the 10 Attic tribes, and each of whom had the chief command in turn for one day, when they were all present with the army. To obviate the manifest inconvenience of this arrangement nine of the generals were some¬ times left behind, and sometimes one of the archons called the Polemarch took the field, in . which case the duties of a commander-in¬ chief were in a great measure left to him. Until after the Peloponnesian War Athenian soldiers received no pay, but from that date a small pay was given to those in the field. At Sparta the command of the army belonged to the two kings, and usually two armies were formed, each king having the command of one of them. When only one army was formed one of the kings remained at home. Although in Sparta, as in Athens, the army consisted of the free citizens generally, yet, as in the former city it was always kept ready for war, it constituted a kind of standing army. It was divided into five moras or regiments, one for each tribe. After the time of the Peloponnesian War it became more and more common for all the Greek states to employ mercenary troops, and the Greeks themselves often entered into foreign service. The Mace¬ donian standing army was created by Philip, and from the time of Alexander was composed chiefly of mercenaries. The Carthaginian armies consisted in large part, and indeed mainly, of mercenaries. The body-guard of the general, called the (<sacred band,® was, however, entirely made up of Carthaginians by birth, but was distinguished less by its valor than by the splendor of its equipments. In the army of Hannibal, Gauls, Iberians, and Ligurians formed the main force; Numidian cavalry hovered on the wings ; Balearic slingers and elephants led by Ethiopian masters were drawn up in front. In Rome every citizen from

the age of 17 to 46 was bound to serve in the army till he had made 16 (or in emer¬ gencies 20) campaigns on foot or 10 in the cavalry, and no citizen could become a candi¬ date for any magisterial office unless he had been 10 years on foot or 5 mounted. During the best times of the Roman army the troops were selected with great care, and the disci¬ pline and training of the legions were admir¬ able, so that the Roman infantry (of which the legions were mainly composed) was the best the world had yet seen. The Roman cavalry, on the other hand, was numerically weak, and was excelled by the Numidian, and still more so by the Parthian. Pay was given to the Roman troops from the time of the siege of Veii (406 b.c.). When the Roman empire in the West fell to pieces, in conse¬ quence of the repeated inroads and settlement within its borders of German tribes, there was an end for the time to all regular army organi¬ zation in western Europe. The forces by means of which the Roman empire had been gradually dismembered consisted, like the Persian hordes that 1,000 years before had conquered western Asia, of armed nations ;

but a new military organization, greatly in¬ ferior, however, to that of the Romans, grew up in process of time out of an institution com¬ mon to all the German tribes. This was the practice followed by the chiefs of gathering round themselves bodies of retainers con¬ stantly ready to fight under them, in the expectation of being rewarded out of the spoils of conquest. As long as the Germans were confined to their original settlements outside the Roman empire these bodies of retainers bore a small proportion to the total strength of the armed population ; but when extensive conquests of land were made within the Roman empire more or less of the conquered territory was always seized by the conquerors, and the personal retainers of the conquering chiefs were often so richly rewarded that the retinues of the chiefs were rapidly swelled by the ad¬ hesion of those who hoped for equal gain. At first these grants were looked upon simply as rewards for past services, but they soon came to be given and received as pledges of future service, every person receiving a grant being bound to serve his chief in war whenever called upon. In this way the feudal system, as it is called, gradually arose, and feudal armies finally superseded the national levies of the German tribes. When Charles Martel conquered the Saracens at Tours in 732 the transition from national to feudal armies was not yet accomplished, but it was almost com¬ pleted under Charlemagne at the end of the same century. The chief strength of the feudal armies lay in the men-at-arms, who were all mounted, heavily armed, and pro¬ tected by shields and defensive armor. After the introduction of firearms, shields and armor ceased to be an effectual protection, personal valor and bodily strength became of less

mo¬ ment, disciplined armies were found to be necessary, and the knights entered these armies as officers. The military forces of the small states that rose up in Italy from the 12th century resembled those of the states of ancient Greece in being at first nothing more than a civic militia. In later times hardly any troops were used, but mercenaries were employed, led by condottieri, and these at last were superseded by standing armies.

Among the countries of modern Europe the foundation of a standing army was first laid in France. In 1439 Charles VII of France issued an ordinance . called the Ordinance of Orleans for the creation of a number of troops of horse (hence called compagnies d'ordon- noitce or ordinance companies), which were to be maintained by the cities and villages in war and peace. In 1448 the same king established a corresponding body of infantry called Francs-archers. Henceforward the feudal militia fell more and more into disrepute, and the vassals assembled their forces only on occasions of great emergency. The example of France was followed elsewhere, and dur¬ ing the wars of Francis I and Charles V at the beginning of. the 16th century, France, Germany and Spain were all in possession of considerable standing armies. These armies were all raised, mainly by voluntary enlistment, compulsory levies being resorted to only under the pressure of very exceptional circumstances. The usual practice was for the king to contract with some nobleman or gentleman

tor the raising of a regiment; but in the Ihirty Years' War Gustavus Adolphus set the example of raising all his troops directly for his own service. In this same war, however, a whole army was raised for the emperor bv a private gentleman (the celebrated Wallen¬ stein), the emperor engaging to give him the command of it. Gustavus Adolphus was also the author of many reforms in army organiza¬ tion. He established smaller divisions, intro¬ duced lighter weapons, separated the pikemen from the musketeers, who had hitherto been mixed together, and made many improvements in the artillery; by all of which changes quicker and more complicated movements became practicable. The soldier was more thoroughly drilled and reduced almost to a machine, while the responsibilities of the officers were increased. The wars of Louis XIV led to further improvements in military organization and tactics, and in a still greater degree to the increase of the size of armies. Instead of the 14,000 men maintained by Henry IV of France, Louis XIV, after the Peace of Nijmegen (1678)

had on foot an army of 140,000 men. Armies were likewise increased by all the other powers of Europe except England and Holland, where the strengthening of the standing army was looked on with great jealousy, and till the time of William III continually opposed by the repre¬ sentatives of the people as dangerous to free¬ dom. Among the military powers that came to the front in the next century the new Prussian monarchy was perhaps the most con¬ spicuous. Frederick William I devoted all his energies to the creation of a strong military force, and his army of 80,000 was increased by Frederick II to 200,000. The latter intro¬ duced the system which still prevails in Prus¬ sia, and is now extended to the whole German empire, of localizing the different sections of his army. Each regiment was assigned to a certain district, which was bound to keep it at its full complement. Where voluntary enlist¬ ment did not suffice for this purpose resort was had to conscription ; but this was applied only to the lowest classes of the community. The systems of drill now followed in all European armies are founded on that intro¬ duced into the Prussian army by Leopold of Dessau, who organized it under Frederick Wil¬ liam I. Cavalry tactics were greatly improved by Frederick the Great himself, wffio also was the first to use horse artillery. The dividing of artillery into batteries is of about the same date, but is due to a Frenchman named Gri- beauval.

Since the time of Frederick the Great a great change has taken place in the composition of armies through the reintroduction of the principle of the universal liability of all men capable of bearing arms to military service, or, in other words, through the raising of armies by a general conscription, now practised in every European country. Conscription was first adopted by France in 1798, and it was by means of it that Napoleon was able to raise the large armies with which he overran and conquered a great part of the Continent. In 1808 it was adopted by Prussia, by which power it has been applied with greater rigor than by any other. In Prussia it was combined with the short-service system, a mode of train-

ing the population to arms suggested by Napo¬ leon's attempt in the Peace of Tilsit to limit the Prussian army to a certain strength. This system consists in requiring those serving in the active army to remain under arms for a comparatively short term (in Prussia three years), during which they become thoroughly trained soldiers ready for active service on any emergency. Every year a certain number return from the army to civil life, and are replaced by others who are subjected to mili¬ tary training for the same term. By this means Prussia, while never maintaining a larger active army than that prescribed by the Peace of Tilsit, was able to train its whole able-bodied male

population to arms, and that without allowing the fact to be discovered until it was made manifest by the war of revenge in 1813. In other countries where the principle of conscription had been adopted its operation was greatly weakened by the numerous exemptions that might be obtained, and especially by allowing those required to serve to obtain exemption by paying for a substitute. Especially was this the case in France, where, under Napoleon III, the army had again become to all intents and purposes a professional one. In army organization the principal change that has been made since the introduction of conscription has been the establishment of army corps (corps d'annee), that is, divisions of an army composed of all arms (infantry, cavalry and artillery), and placed under the command of a single general. These divisions were first established by Na¬ poleon, who placed them under the command of his marshals. The division was afterward adopted by Prussia and extended to the Ger¬ man empire, where the further improvement is made of localizing each army corps in a certain province or member of the empire, in which it is reunited, and in which are kept all the arms and other equipments necessary for its mobilization. In the Prussian army the cavalry are very numerous, and are used principally on the march, when they are sent in front to cover the advance of the main body of the troops, and to collect information. In all armies considerable changes in tactics have resulted from the increased range, precision and rapidity of fire of the improved artillery and musketry now in use.

In most nations, will now be found an army of reserve, intended to augment the standing army from a peace to a war strength, and con¬ sisting of two classes — those waiting an im¬ mediate call to arms, if required, and those constituting the militia — .the entire effective military power of the state. It may be of interest here to mention certain distinctions in the application of the word army. A covering army is encamped for the protection of the different passes or roads which lead to the town or other place to be protected. A siege army is ranged around or in front of a forti¬ fied place, to capture it by a regular process of besieging. A blockading army, either inde¬ pendent of, or auxiliary to, a siege army, is intended to prevent all ingress and egress at the streets or gates of a besieged place. An army of observation takes up an advanced posi¬ tion, and by celerity of movement keeps a close watch on all the manceuvres of the enemy. An army of reconnaissance has a

more special duty at a particular time and place, to ascertain the strength and position of the enemy's forces. A flying column is a small army carrying all its supplies with it, so as to be able to operate quickly and in any direction, independently of its original base of operations.

Edward S. Farrow,

Consulting Civil and Military Engineer.

ARMY ADMINISTRATION. The ad¬ ministrative branch of the government, known as the War Department, and presided over by the Secretary of War, is second to none in real importance. Much of the business carried on by the Secretary of War has little or no con¬ nection with the military arm of the govern¬ ment, but by a process of accumulation of statutes and authorities, resulting often from the expediency of the moment, the present vast dimensions have been reached. The methods of conduct of business remain practically the same to-day as in the War of 1812, except that through a long course of years, there has grown up a system of laws and regulations fixing in great detail the complex duties of the various bureaus.

Ordinarily army administration consists in the organization and other means by which various administrative duties are performed, necessary to provide for the wants of troops, and for all the foreseen demands of a state of war, including labor and the supplies for garri¬ sons, sieges, etc. Such duties embrace sub¬ sistence-magazines, daily rations, forage, dress, encampments, barracks, hospitals, transporta¬ tion, etc., the administrative duties of engineers and of the ordnance department, estimates, ac¬ countability, payments, recruiting and in gen¬ eral the receipt and proper application of money. The Secretary of War, under the orders of the President, is the head of military administra¬ tion in the United States. The object of such administration is to provide, through the re¬ sources placed by law at his disposition, for the constant wants, regular or accidental, of all who compose the army. Good administration embraces a foreknowledge of wants, as well as the creation, operation and watchfulness of the ways and means necessary to satisfy them ; the payment of expenses, and the settlement of ac¬ counts. Army administration is divided into several branches determined by law. These different branches constitute the administrative service of an army, the operations of which should be so regulated that the Secretary of War will be always informed of the condition of each, and be able to exercise, subordinate to law, a complete financial control over each. The Adjutant-General of the army and the heads of the

administrative corps have each been assigned a bureau in the War Department, under the direction of the Secretary of War, for the management of the administrative duties with which they have been respectively charged. Administration and Command are distinct. Ad¬ ministration is controlled by the head of an executive department of the government, under the orders of the President, by means of legally- appointed administrative agents, with or with¬ out rank; while Command, or the discipline, military control and direction of military service of officers and soldiers, can be legally exercised only by the military hierarchy, at the head of which is the constitutional commander-in-chief

of the army, navy and militia, followed by the commander of the army, and other military grades.

ARMY AVIATORS. See Military

Aeronautics.

ARMY BOUNTY. See Bounty.

ARMY COMMISSARY. The duties of

an army or corps commissary, like those of division, brigade or regimental commissaries, are to see that all troops with or in his par¬ ticular command are properly supplied with good and wholesome food ; these duties for an army are, of course, on a more extended scale than for a regiment, but in general principles, forms, manner of procuring and issuing stores, in nearly all cases, the same rules will apply to the one as to the other.

The requisitions of an army commissary should always be approved by the commanding officer of the army; he should know accurately the number of troops in the command, and their different posts or stations. If the command is an extended one, there being many detached posts, he should at once ascertain the different methods of access to them, the probability of continuous or interrupted transportation, and endeavor to keep each post supplied in. such a manner as to guard against any contingency arising from a lack of transportation. He should know the amount of stores on hand at any time, and the amount of stores due on any requisition. In order to facilitate his work, he should call upon all subordinate officers, par¬ ticularly upon those having charge of stores in bulk, to make frequent reports (trimonthly are usually sufficient) showing the amount of stores on hand at each depot or post suitable for issue or for sale to

officers. Should any stores at the different posts become damaged, or unfit for issue, he should require that they be immediately reported to him, in order that he may make the necessary arrangements for replacing them. In an extended command he should make, or if his duties will not permit of his attending to it personally, he should have at least one practical commissary to act as an in¬ spector, who should make frequent inspections of the stores at every post, examining the stores, their condition, quantity, quality, and, above all, the manner of caring for and pro¬ tecting them.

The more stores are handled from the time they leave the depot until their final distribution to the different companies of the regiment for which they were drawn, the greater is the dam¬ age and wastage, and when possible for the division commissary to draw in bulk, and issue at once on the proper returns, the damage is slight and the wastage, if any, is easily ac¬ counted for by the one officer ; but if he again transfers to a brigade commissary, who, in turn, transfers to a regimental commissary, the same wastage occurs in the second and third trans¬ fer, and subsequent issues., as would occur in the first, while the proportion would be greatly reduced if but one officer had the entire charge of the issue.

ARMY CORPS. When an army is very large, three or four divisions are joined to¬ gether and form an <(Army Corps.® The officer commanding an army corps should be of a higher grade than he who commands a division.

This grade, in the United States Army, is that of major-general. An army corps is most gen¬ erally composed of all arms of service, and is, to all intents and purposes, an army complete in itself. Two or more army corps, or armies, would be under the command of the general, or of a general-in-chief. The functions of general officers are to command armies, or fractions of an army greater than a regiment, when mobilized. In time of peace, when the regiments are not formed into brigades or di¬ visions, but are distributed over districts of country, the function of the general is to com¬ mand the troops in these districts, which are then designated by the term “military depart- ments.®

ARMY DISPENSARIES. Medical offi¬ cers and contract surgeons on duty attend officers, enlisted men, contract surgeons, act¬ ing dental

surgeons, members of the nurse corps, prisoners of war, and other persons in military custody or confinement, and appli¬ cants for enlistment while held under observa¬ tion ; also, when practicable, the families of officers and enlisted men ; and at stations, or in the field, where other medical attendance can¬ not be procured, civilian employees. Medicines are dispensed to all persons entitled to medical attendance, and hospital stores to enlisted men and hospital matrons, also to officers at posts or stations where they cannot be procured by purchase. Medical officers and contract sur¬ geons at their stations furnish medical attend¬ ance to officers and enlisted men on the retired list, but they are not required to leave their stations for that purpose. Medicines, dressings, etc., are supplied to retired officers and enlisted men from army dispensaries on medical officers' prescriptions.

ARMY FIELD ENGINEERS SCHOOL.

See Army Schools.

ARMY FIELD SERVICE SCHOOL FOR MEDICAL OFFICERS. See Army

Schools.

ARMY MEDICAL BOARD. A board

of at least three officers, appointed by the Sec¬ retary of War, which passes on the appoint¬ ment and promotion of officers in the Medical Corps of the .United States army. The pre¬ liminary examinations for commissions in the Medical Corps may also be given by other designated boards.

ARMY MEDICAL SCHOOL. A school located in Washington, D. C. Its personnel consists of the faculty, such special professors and instructors as may be assigned to tem¬ porary duty at the school, the students and such enlisted men and civilian employees as are assigned to it for duty. Its object is to train the students therein in the subjects that pertain to the duties of the medical depart¬ ment. It also carries on such scientific work and investigations as are directed or author¬ ized by proper authority. The commandant, professors and assistant professors are de¬ tailed by the War Department from among the officers of the medical corps; the special professors are nominated by the faculty, with the approval of the surgeon-general, from among distinguished members of the medical reserve corps; the instructors are officers of other branches of the army detailed by the

War Department to give special courses of instruction. The faculty

consists of the com¬ mandant who is its president, the professors and assistant professors. It meets at such times as the commandant deems advisable. It arranges the program of instruction, pre¬ scribes the textbooks appropriate thereto, the allotment of time to each subject, and the char¬ acter and scope of the examinations, and has final determination of all questions concern¬ ing the proficiency of students, subject, how¬ ever, in all respects to the express provisions of law. The adjutant is the secretary of the faculty and is chosen by the commandant from among the professors or assistant pro¬ fessors. He is the custodian of the records of the faculty, conducts the correspondence of the school and promulgates the orders of the commandant.

The student-body consists of officers of the medical reserve corps who are candi¬ dates for appointment in the medical corps, such medical officers of the army and of the organized militia as may be ordered or au¬ thorized to attend the school, and enlisted men of the hospital corps ordered to the school for instruction. The army field service and cor¬ respondence school for medical officers is a branch of the army service schools at Fort Leavenworth and is governed by regulations published in general orders.

ARMY AND NAVY BOUNTIES. See

Bounties.

ARMY AND NAVY GENERAL HOS¬ PITAL. This hospital located at Hot Springs, Ark., is under the direction of the Secretary of War, and is devoted to the treatment of the officers and enlisted men of the military and naval service of the United States, cadets at the United States military and naval academies, officers of the Revenue-Cutter service, officers of the Public Health service and honorably dis¬ charged soldiers and sailors of the regular and volunteer army and navy of the United States, for such diseases as the waters of the Hot Springs of Arkansas have an established repu¬ tation in benefiting. Admission to this hospital is restricted to those of the above-named classes who require medical treatment in the following order of preference: (1) Officers and enlisted men of the army, the navy, and the marine corps on the active lists, and cadets at the United States military and naval academies ;

(2) Officers and enlisted men of the army, the navy and the marine corps on the retired lists ;

(3) Officers of the Revenue-Cutter service and of the Public Health

service; (4) Honorably discharged soldiers and sailors of the regular and volunteer army and navy of the United States may also be admitted by authority of the surgeon-general when there are vacant beds in the hospital.

ARMY AND NAVY MANCEUVRES.

The object of manoeuvres is to train, in time of peace, the fighting forces of a nation by han¬ dling them, as far as practicable, as in time of war, the forces designated being divided for this purpose into two opposing bodies. Previous military training is presupposed. Manoeuvres are of three kinds : First, Land manoeuvres, tak¬ ing place entirely on land; second, Naval manoeuvres, where fleets manoeuvre against

fleets ; third, Combined army and navy manoeu¬ vres. The last two are of comparatively recent origin. Manoeuvres are now annually held in all the principal countries of Europe. They are the culmination and test of the military in¬ struction of the year. As operations in the grand manoeuvres are carried on over a large extent of territory, the time fixed is after the crops are harvested so that agricultural interests are interfered with as little as possible. The annual manoeuvres begin with regimental and brigade exercises for the infantry, with battalion exercises for field artillery (a battalion consists of two or more batteries) and with special manoeuvres for cavalry. Manoeuvres are also carried on all over the country by the army corps not participating in the grand manoeuvres. The program for the grand manoeuvres is carefully worked out beforehand by the general staff.

These manoeuvres are of great value in train¬ ing officers, especially staff officers. They also serve as a sort of examination for officers, whose work in the field comes under the obser¬ vation of their superiors. Officers showing zeal and ability are marked for advancement, while those whose work does not come up to the standard are reproved or even more severely dealt with. In the United States circumstances have prevented the carrying on of army manoeu¬ vres except on a small scale, the American army being so widely scattered that a large enough force to make it worth while could not be brought together without great inconvenience and expense.

Naval Manoeuvres may be tactical or stra¬ tegical ; the former having to do with the handling of fleets when they are within sight of each other, the latter when they are not. As all the elements, such as size and speed, character and arrangement of armor, number and power of guns, of different classes of ships, battle¬ ships, cruisers and torpedo boats, are well known, it is supposed, when they come in con¬ flict, that the result will be a foregone conclu¬ sion, assuming the personnel to be of equal quality. The personal element, the man behind the gun, while of vital importance in war, is a factor that cannot be easily estimated in tactical manoeuvres. Much more attention is therefore given to strategical manoeuvres. A fleet going out for manoeuvres is divided into two squad¬ rons, one to attack, the other to defend. A passive defense is not contemplated. While the object may be the defense of a harbor, the way to accomplish it is not to wait in port for the enemy, but to go out to seek him on the open sea. Otherwise the advantage of one of the most valuable characteristics of ships, their mobility, would be lost. In the United States combined army and navy manoeuvres were in¬ augurated in 1902. The decision as to whether the fleet or the land forces win is of minor im¬ portance. The manoeuvres are of great value to both the army and navy. For the former they give instruction in the most efficient means of coast defense, including the co-ordination of all its various elements ; the best system of fire control ; the best location and employment of search-lights and range-finders ; the best means of obtaining and transmitting information. They serve to point out any defects in the lo¬ cation and plans of the fortifications, and

whether the number, type and mounting of guns are the best adapted for the purpose at any particular site. For the navy they afford a test of the means of obtaining the ranges of the forts and batteries, and of conveying the infor¬ mation to the officers in charge of the guns. They give information as to the effect of mines and obstructions in impeding the movements of ships and the methods to be used in forcing such a passage or in removing the obstructions. They give instruction as to the best manner of approach and of manoeuvring under fire, the formations to be used, the speed and the dis¬ tance between ships ; the method of attacking by night or in a fog; the use of the search-light for lighting the target or blinding the eyes of the enemy's gunners or range-finders. The manoeuvres rouse the interest and stimulate the esprit de corps of the personnel of both services and teach it to make the best use of war ma¬ terial under conditions as nearly as possible like those of actual war.

W. A. Simpson,

Assistant Adjutant-General , United States

A rmy.

ARMY AND NAVY UNION. An or¬ ganization composed exclusively of men who have served in some branch of the army or navy of the United States. Its objects are (<to bring together and unite in benevolent and social fellowship those who have served their country honorably ; to provide for the sick and distressed; to assist in the burial of the dead, and to extend a helping hand to the family of a deceased comrade or shipmate.®

ARMY NURSE CORPS. The super¬ intendent of the nurse corps, under the direc¬ tion of the surgeon-general, has general super¬ vision of the corps, and her duties and the duties of chief nurses and nurses are as pre¬ scribed by the surgeon-general. The services of army nurses are afforded sick and wounded officers, enlisted men, and other patients in military hospitals. When traveling under orders on transports they assist in the care of sick officers and enlisted men, under the direction of the transport surgeon. Members of officers' and enlisted men's families are not entitled to the services of army nurses, but in great emergencies and for the manifest interest of the service, nurses will care for such patients when so directed by the officer in charge of the hospital, a report of the fact being made in each instance to the surgeon-general through military channels. At places where the serv¬ ices of trained nurses are not otherwise ob¬ tainable, a nurse may, if she so desires, and with the approval of the officer in charge of the hospital, be granted a special leave, without pay and allowances, in order to take a private case, such leaves not to exceed 60 days. The pay, allowances, and privileges of nurses are specified by law, and they are forbidden to re¬ ceive presents from patients, or from the rela¬ tives or friends of patients, for services ren¬ dered when on duty.

ARMY OF THE UNITED STATES.—

See United States, Army of.

ARMY ORGANIZATION. United States. — The land forces of the United States are classified into the Regular Army, in which enlistment is for four years with the colors and

three in the unorganized Army Reserve, the Officers Reserve Corps, and the Enlisted Reserve Corps, torces called or drafted into the service of the United States, the Organized Militia of the several States, and the unorganized mili¬ tia, consisting of all males between 18 and 45 who are fit to bear arms and are citizens of the United States, or have declared their in¬ tention to become citizens. The President of the United States is the Commander-in-chief of the United States Army by right of office, and he nominates for the approval of Congress such general officers of the rank of general or lieutenant-general as he deems necessary properly to officer the higher commands. The administration is carried on by the War De¬ partment under the direction of the Secretary of War, who is a member of the official cabi¬ net of the President. For administrative purposes the following divisions are made : The General Staff Corps prepares all plans for national defense, for mobilization of the forces, and has a general supervision of all questions affecting the efficiencv of the Army, and is under the charge of the chief of staff. The Adjutant-General's Department keeps all records and has charge of all correspondence, the issuing of orders, notices, bulletins and official literature, and is under the charge of the Adjutant-General. The Inspector-Gener¬ al's Department exercises general supervision over all matters that have to do with the efficiency of the Army — the conduct and dis¬ cipline, condition of uniforms, equipments, supplies and expenditure of public money, and is under the charge of the Inspector-General. The Judge-Advocate's Department is the cus¬ todian of all legal records, has a general su¬ pervision over all courts-martial, courts of inquiry and military commissions, and is un¬ der the charge of the Judge- Advocate-Gen¬ eral. The Ordnance Department supplies all arms, equipments and other fighting material and maintains the arsenal and depots for the manufacture, distribution and safe-keeping of military stores, and is under the charge of the Chief of Ordnance. The Quartermaster Corps takes care of all matters of supply (other than ordnance), transportation, distribution of funds and payment of troops, and is under the charge of the Quartermaster-General. The Engineer Corps is in charge of the con¬ struction and maintenance of all fortifications, military posts, lines of communication and rivers and harbors, as far as is necessary for their use for military or naval purposes, and is under the charge of the Chief of En¬ gineers. The Coast Artillery Corps is in charge of the garrisoning of all coast fortifi¬ cations and coast and harbor defense and siege work, and is commanded by the Chief of Coast Artillery. The Signal Corps is in charge of all methods of communication bv balloons, aeroplanes, wireless telegraphy, telephones and visual signaling, and is commanded by the Chief Signal Officer. The Medical

Department is subdivided into (a) the Medical Corps, which is in charge of the sick and wounded and the physical and sanitary condition of the army, detachments of which are known as sanitary troops when serving with other troops; (b) the Dental Corps, which is in charge of the teeth ; (c) the Medical Reserve Corps, which secures a reserve of medical

officers available for military service; (d) the Hospital Corps, which renders all necessary hospital services in garrison, camp or field (including the ambulance service) ; (e) the

Nurse Corps, from which nurses may be as¬ signed to active duty when the emergency of the service demands. The Surgeon-General is in charge of the Medical Department and all its branches. The Bureau of Insular Af¬ fairs is in charge of all matters of a military nature and of the supplies* that affect the col¬ onies, and is under the control of the Chiei of Insular Affairs. The Bureau of Militia Affairs is in charge of the affairs of the N? tional Guard and is under the direction of thv. Chief of Militia Affairs.

The organization of the fighting forces of the United States in May 1917, was based on following units: A Squad consisting of 1 corporal, as squad commander, and 7 pri¬ vates, or privates, first class: a Platoon con¬ sisting of 1 first lieutenant, second lieutenant or sergeant, as platoon commander, and 4 squads. The organization of the United States Army at the present time (1917) is in a state of change. Besides the scheme out¬ lined in the ˆTables of Organization® on 3 May, a new organization for overseas service was outlined in the Official Bulletin for 22 September. The following table is an outline of the comparative structure of the two sys¬ tems (the numbers stand for officers and men combined) :

In an infantry division there are

SCHEME OF 3 MAY 1917 (Maximum strength)

1 division headquarters under a major-general (153)

3 infantry brigades (18,579)

1 field-artillery brigade

(4,030)

1 cavalry regiment (1,579)

1 field signal battalion (259)

1 regiment of engineers

(1,098)

1 train headquarters and mili¬ tary police (332)

1 ammunition train (702)

1 supply train (332)

1 engineer train (170)

1 sanitary train (927)

1 aero squadron (173) Total, 28,334

SCHEME OF 22 SEPTEMBER

1917

1 division headquarters under a major-general (164)

1 machine-gun battalion of four companies (768)

2 infantry brigades (16,420)

1 field-artillery brigade

(5,068)

1 field signal battalion (262)

1 regiment of engineers

(1,666)

1 train headquarters and mili¬ tary police (337)

1 ammunition train (962)

1 supply train (472)

1 engineer train (84)

1 sanitary train (4 field hos¬ pital companies and 4 am¬ bulance companies (949)

Total, 27,152

In an infantry brigade there are

1 headquarters (19) 1 headquarters (about 1-10)

3 infantry regiments (6,060) 2 infantry regiments (7,510)

1 machine-gun battalion of three companies (560) Total, 6,079 Total, 8,210

In a field artillery brigade there are

1 headquarters (19) 1 headquarters

2 regiments of 3-inch field 3 regiments of 75 mm. field

guns (2,687) guns ( )

1 regiment of 3 8-inch howit- 1 trench-mortar battery C) zers (1,337)

Total, 3,943 Total, 5,068

An infantry regiment contains

1 headquarters and head¬ quarters company (61)

3 battalions of four line com¬ panies each (1,842)

1 supply company (39)

1 machine gun company (78) 1 medical detachment (38) Total, 2,958

1 headquarters and head¬ quarters company (303)

3 battalions of, four line com¬ panies each (3,078)

1 supply company (140)

1 machine gun company (1 78) 1 medical detachment (56) Total, 3,755

An ordinary infantry company contains

1 captain, 1 first lieutenant,

1 second lieutenant, 1 first sergeant, 1 mess ser¬ geant, 1 supply sergeant, 8 sergeants, 17 corporals,

2 mechanics, 3 cooks, 2 buglers, 28 privates (first class), 87 privates. Total,

3 officers, 150 men.

1 headquarters (2 officers, 18 men), 4 platoons, each in¬ cluding 1

headquarters (1 officer, 1 man), 2 sections riflemen (24 men), 1 section bombers and rifle grena¬ diers (22 men), 1 section auto riflemen (11 men, 4 guns). Total, 6 officers, 250 men.

An infantry sup:]y company contains

1 captain (chief supply offi¬ cer), 1 second lieutenant as assistant, 3 regimental

supply sergeants, 1 first (Composition not officially pub- sergeant, 1 mess sergeant, lished).

1 stable sergeant, 1 cor¬ poral, 1 horseshoer, 1 sad¬ dler, 27 wagoners and 1 cook. Total, 39. Total, 140

A machine-gun company contains

1 captain, 1 first lieutenant, 2 second lieutenants, 1 first sergeant, 1 supply sergeant, 1 mess sergeant, 1 stable sergeant, 7 sergeants, 8 corporals, 1 horseshoer, 2 mechanics, 2 cooks, 2 buglers, 12 privates (first class), 36 privates. Total, 4 officers, 74 men, 6 guns.

1 headquarters (3 officers and 21 men), 3 platoons (each containing one officer and 46 men), a train of 13 men, armament, 12 heavy ma¬ chine guns and four spare guns. Total, 6 officers, 172 men, 16 guns.

An infantry headquarters company contains

1 captain (regimental adju¬ tant), 1 regimental ser¬ geant-major, 3 regimental supply sergeants, 1 first sergeant, 1 mess sergeant, 1 supply sergeant, 1 stable sergeant, 1 sergeant, 1 horseshoer, 2 cooks, 4 pri¬ vates (first class), 12 pri¬ vates, 28 men in band. Total, 1 officer, 56 men.

1 headquarters platoon (93 officers and men), including 1 staff section (36 officers and men), 1 orderlies' section (29), 1 band section (28 men), 1 signal platoon (77 officers and men) , including 1 telephone section (5 1 men), 1 section with head¬ quarters (10 men), 1 section with 3 battalions (16 officers and men), 1 sappers' and bombers' platoon, includ¬ ing 1 section sappers (9) for digging and special work, one section bombers (34 officers and men), 1 pioneer platoon (55 officers and men), 1 one-pounder can¬ non platoon (33 officers and men). Total, 7 officers, 294 men.

In addition to the units already described, the establishment of 3 May contains the fol¬ lowing organizations: A troop of cavalry is organized

as an infantry company with the addition of a stable sergeant, 2 horseshoers, and 7 saddlers, and with only 5 sergeants, 8 corporals, 2 cooks, 20 privates, first class, and 61 privates. A supply troop of cavalry is as prescribed for an infantry supply company with an extra second lieutenant and an extra corporal, an extra horseshoer, an extra sad¬ dler, an extra cook and 10 extra wagoners. A coast artillery company is as prescribed for a line company of infantry, except that certain enlisted men, according to their duties, are rated as follows : casemate electricians, ob¬ servers first class, observers second class, plotters, chief planters, coxswains, chief load¬ ers, gun commanders and gun pointers. A field artillery battery of 4 guns (3 in.) is or¬ ganized as prescribed for a line company of infantry, there being in addition an extra first lieutenant, an extra second lieutenant, an ex¬ tra sergeant, 3 extra corporals, a chief me¬ chanic and an extra mechanic, 3 horseshoers, an extra bugler, 7 extra privates, first class, and 21 extra privates, the privates being some¬ times called drivers and cannoneers. A pioneer company of engineers is as prescribed

for a line company of infantry, except for an extra first lieutenant and 3 sergeants, first class. Mounted companies are organized as cavalry troops with an extra first lieutenant and 2 sergeants, first class. A pontoon com¬ pany of engineers is as prescribed for a line company of infantry, having in addition 2 saddlers in charge of harness and equipment, 2 farriers in charge of wagons. A signal corps radio company consisting of 1 captain as commanding officer, 2 first lieutenants, 1 master electricians, 6 sergeants, first class, 9 sergeants, 15 corporals, 2 cooks, 1 horseshoer, 35 privates, first class, and 6 privates. A signal corps wire company consists of 1 cap¬ tain as commanding officer, 2 first lieutenants, 1 master electrician, 5 sergeants, first class, 7 sergeants, 12 corporals, 2 cooks, 1 horseshoer, 39 privates, first class, and 8 privates. A sig¬ nal corps outpost company consists of 1 cap¬ tain as commanding officer, 4 first lieutenants, 1 master electrician, 3 sergeants, first class, 15 sergeants, 14 corporals, 2 cooks, 1 horseshoer, 37 privates, first class, and 12 privates. A company of military police is as pre¬ scribed for a company of infantry, with 4 less privates, first class, and 2 less privates. An ambulance company consists of 1 surgeon with the rank of captain as commanding officer, 4 assistant surgeons with rank of captain or first lieutenant, 2 sergeants, first class, 11 ser¬ geants, 6 corporals, 1 mechanic, 3 cooks, 96 privates in a motor-driven company, 124 in an animal-driven company, and in addition to a horseshoer, a saddler and a farrier. An ammunition train section (wagon transporta¬ tion) consists of 1 captain or first lieutenant as commanding officer, 1 sergeant (wagonmas- ter), 1 clerk, 2 sergeants

(assistant wagon- masters), 1 mess sergeant, 4 sergeant horse¬ shoers, 2 sergeant farriers, 2 sergeant sad¬ dlers, 1 sergeant mechanic, 1 sergeant agent, 4 corporals (assistant wagonmasters), 1 cor¬ poral agent, 2 cooks, 60 privates, first class (teamsters and orderly), and 12 privates (laborers). An ammunition train section (motor transportation) consists of 1 first lieu¬ tenant as commanding officer, 1 sergeant (truckmaster), 1 clerk, 3 sergeants (assistant truckmasters), 1 mess sergeant, 1 sergeant me¬ chanic, 1 sergeant agent, 1 corporal agent, 2 cooks, 33 privates, first class (chauffeurs), 2 privates, first class (assistant mechanics), and 9 privates as assistant chauffeurs. A field bakery consists of 1 captain or lieutenant as commanding officer, 60 men, rated as cooks, and 12 bake ovens. A battalion of infantry consists of 1 major as battalion commander,

1 headquarters and 4 line companies. A squadron of cavalry corresponds to a battalion of infantry and contains 4 line troops. A battalion of field artillery, as prescribed, con¬ tains 1 major, 1 headquarters and 3 batteries. A battalion of engineers is constituted as pre¬ scribed for a battalion of infantry and con¬ tains 3 companies. A battalion of signal corps (field battalion) consists of 1 major as com¬ manding officer, 1 headquarters, 1 supply sec¬ tion of a supply sergeant and 5 men, 1 wire company, 1 radio company and 1 outpost company. A battalion of signal corps (aero squadron) consists of 1 major as command ing officer, 1 headquarters section under the adjutant, containing 10 men, 1 supplv section with 2 officers and 37 men, 1 engineering see-

tion with 2 officers and 19 men, 12 aero squad¬ rons, each containing 1 captain or first lieu¬ tenant, 1 sergeant, first class, as mechanician, 2 sergeants or corporals as mechanicians, 2 privates, first class, and 2 privates. There are attached to the squadron 1 surgeon and 4 en¬ listed men, medical department. For a regiment of infantry see the tables of the old and new establishments. A regiment of cav¬ alry consists of headquarters, 3 squadrons of cavalry, a headquarters troop, a machine-gun troop and a supply troop. A machine-gun troop — the cavalry equivalent of a machine- gun company — contains 1 more sergeant, 1 more private, first class, and 13 more privates than its analogue. A regiment of field artil¬ lery contains a headquarters, 2 or 3 battalions of field artillery, a headquarters company and a supply company. A regiment of engineers is as prescribed for infantry without the ma¬ chine-gun company and with only 2 battalions. A regimental

detachment of the medical corps consists of 1 surgeon with the rank of major, 2 or 3 assistant surgeons with the rank of captain or first lieutenant, 2 veterinarians in mounted regiments, 1 sergeant, first class, 2 or 3 sergeants, 17-29 privates, and privates first class. A brigade consists of 1 brigadier- general as brigade commander and his head¬ quarters and of 2 or 3 regiments of one arm. For the constitution of an infantry division see the tables of the old and new establish¬ ments. A cavalry division consists of head¬ quarters, train headquarters and military po¬ lice, much like those of an infantry division, together with 3 brigades of cavalry, 1 regi¬ ment of horse artillery, 1 mounted battalion of engineers, 1 mounted battalion of signal corps, 1 aero squadron, 1 ammunition train, 1 sanitary train and 1 supply train. A field army, the equivalent of the army corps of for¬ eign countries, consists of 1 lieutenant-gen¬ eral or major-general as commander, the following officers, whose duties are the same as the departments and corps they repre¬ sent — 1 brigadier-general (chief of staff), 1 colonel (adjutant), 1 colonel (inspector), 1 colonel (judge-advocate), 1 colonel (chief quartermaster), 1 colonel (chief of engineers), 1 colonel (chief surgeon), 1 lieutenant-colonel (assistant chief surgeon), 1 lieutenant-colonel (chief of ordnance), 1 lieutenant-colonel (chief signal officer), 3 lieutenant-colonels (aides-de- camp), 2 or more divisions with additional so-called field army troops, including such troops as regiments of heavy artillery, and pontoon battalions of engineers. An army consists of such number of field armies as may be required.

The organization of the coast artillery is territorial and not by battalions or regiments. A coast artillery battery is manned by a com¬ pany. Battery commands are organized into fire commands or mine commands under the charge of a major. These, together with such troops of the mobile army as may be used for purposes of support, are grouped into fort commands under majors or lieutenant- colonels. Several fort commands make a coast defense command under colonels. These again are grouped into coast artillery districts. As the coast artillery is a highly technical service, a large number of commissioned and

non-commissioned staff officers are required at every stage of organization.

Foreign Countries. — The general features of army organization are much the same throughout the world and conform very close¬ ly to the scheme adopted by the United States on 22 September 1917. The range of varia¬ tion is fairly indicated by the two schemes of this table. In particular, the size of an infantry company is usually from

200 to 250 men, and that of a battalion in the neighbor¬ hood of 1,000 men. The nomenclature and administration of cavalry units in the United States army is not reproduced exactly else¬ where; the usual arrangement is by squadrons of about 150 sabres, corresponding to infantry companies and grouped into regiments of four or five squadrons. The troop in the British army corresponds to a platoon and is led by a subaltern. Artillery administration is also very variable ; batteries of field artillery, how¬ ever, usually consist, as in the United States, of four guns. The organization known in America as a battalion of field artillery is known abroad variously as an Abteilung, group, brigade, or division. The organization of the technical troops, such as the engineers, train and signal corps men, is different in each army. In general, the aviators are rec¬ ognized as a separate arm and are not sub¬ ordinated to the Signal Corps. The army police is usually a separate organization and not, as until recently in our army, made up by details from other troops. In the British army it contains no privates — every man ranks at least as lance-corporal. In most Continental nations part or the whole of the municipal police and fire departments receive a military organization and is regarded as part of the army.

England. — The military services in the British Empire comprise the Regular Army, the Army Reserve, the Special Reserve, the Territorials, the Indian Army and the Militia forces of the various colonies. The Regular Army is organized into an expeditionary force, serving in the British Isles, and a colonial force, serving in the various colonies and India. Enlistment is normally for 12 years, which is variously divided in different branches of the army between the Regular Army and the Army Reserve. At present the terms of enlistment for active service are the duration of the war, with a minimum term of three years. The Special Reserve, for all service, and the Territorial force, for service in the United Kingdom, correspond to the organized militia in the United States, and arc organized into divisions in a way in general similar to that in the Regular Army. The na¬ tive Indian Army is composed of native troops under British officers and is a distinct service from that part of the Regular Army which also serves in India. All colonies also main¬ tain bodies of troops organized in a manner similar to that in the Regular Army. In Aus¬ tralia and New Zealand military service is compulsory.

The British infantry is not organized into regiments as administrative units and a regi¬ ment is a mere collection of battalions of various sorts, usually recruited within a speci¬ fied. area. The battalions are grouped directly into brigades. The whole artillery force is

known as the Royal Regiment of Artillery and is not divided into tactical regiments. Regiments as administrative and tactical or¬ ganizations are found in the cavalry. The train and pay services are separate, whereas in the United States both are under the Quartermaster Corps.

France.— The military services in France comprise the Metropolitan Army, the Colonial Forces and the Territorial Army. Service in the Metropolitan Army is compulsory and that in the Colonial Forces is by voluntary enlistment. All males between the ages of 18 and 45 are liable to military service, which is divided into (a) that with the colors (3 years) ; (b) that in the Metropolitan Army

Reserve (10 years) ; (c) that in the Terri¬ torial Army (5 years) ; and that (final serv¬ ice) in the Territorial Army Reserve (9 years). The Metropolitan Army is organized into the Army of the Interior and the Al- gerian-Tunisian Army. The Colonial Forces are partly French and partly native troops.

Germany. — There are two main divisions of the military service in Germany — • (a) regular service; (b) service in the Landsturm. All males between the ages of 17 and 45 are required to perform service in one or the other of these main divisions. Men selected for the regular service serve seven years with the standing army (three with the colons and four in reserve) and then are passed into the Landwehr, where they continue service until their 39th year. Service from the 39th to the 45th year is in the Landsturm. Men who for any reason are not required to serve in the standing army are placed in the Eratz reserve (special reserve) for 12 years and then passed to the Landsturm.

Austria-Hungary. — The military service of the Austro-Hungarian empire is divided into — (a) the Landwehr, or National Army of Austria; (b) the Honved, or National Army of Hungary; (c) the Gemeinsames Heer, or common army of both countries; (d) the Landsturm, or second reserve of Austria and Hungary. All males between the ages of 19 and 42 are liable to military serv¬ ice, and it is decided by lot whether such service will be in a national army or in the common army. Actual service begins at the age of 21 and lasts for 12 years. Men draw¬ ing assignment to the common army serve three years with the colors and seven years in the reserve, of that army.

They then serve an additional two years in the reserve of a national army, and at the expiration of this service pass to the Landsturm. Men draw¬ ing assignment to a national army serve two years with the colors of that army and 10 years in its reserve. They then pass to the Landsturm.

The Austro-Hungarian army in war time is not divided into three forces as in peace, but forms one army composed of all three elements. The administrative unit is the field army, consisting of from two to four corps, and these in turn of usually three divisions. Two of these divisions are drawn from the common army and the third from the Land¬ wehr or Honved, or from the reserves of the first line.

Italy . — Military service in Italy comprises (a) that in the standing army; (b) that in

the Mobile Militia; and (c) that in the Ter¬ ritorial Militia. Every adult male between the ages of 20 and 39 years is liable to serv¬ ice in one of these branches. In time of war the army is the grand unit of organization in the Italian service. Each army is composed of three corps, one division of cavalry and auxiliary troops.

Russia. — All male Russian subjects, with the exception of the Mohammedan native Caucasian population and the population of a few provinces, are liable to military service from the 21st to the 44th year of age. This service is divided into (a) that in the stand¬ ing army and reserves, and (b) that in the Imperial Militia. At the annual levy the class of service to which a man is assigned is determined by lot.

Japan. — The military service in Japan is divided into — (a) the active army (Gen- yeki) ; (b) first reserve (Yobi) ; (c) second

reserve (Kobi) ; (d) replacement troops (re¬ serve of recruitment) (Hoju) ; (e) the Na- tionalT army, first and second parts (Ko kumin- hei). Service is obligatory on all males between the ages of 17 and 40. The active army is divided into divisions and re¬ serve divisions, each of which occupies a mili¬ tary district and is complete in itself, not only as regards combatant troops, but as regards auxiliary troops, including the medical de¬ partment. In matters of general administra¬ tion, decentralization is the keynote of the Japanese army, and each division is almost autonomous. It is maintained complete in all its branches in time of peace so that it can be moved in its entirety in time of war and its place immediately taken by a reserve division. In time of war two or more divisions (usual¬ ly three) are mobilized to form field armies. See Army; Artillery; Cavalry; Infantry; Rank;

Tactics. Consult Balck, (Tactics) (tr. Fort Leavenworth, Kan., 1914) ; War Depart¬ ment, (Tables of Organization } (Washington 1914 and 1917).

Edward S. Farrow,

Consulting Civil and Military Engineer.

ARMY RATION. There are three vari¬ eties of the American army ration, garrison, field and emergency. The garrison ration is given soldiers at regularly established military posts; while the field ration is issued to troops in the field in active campaign. The emergency ration is a condensed ration, in which the best and most valuable nutritive elements are com¬ bined in the smallest bulk. In composition, the garrison and field ration are almost identical. Each ration, which is supposed to keep the soldier one day, furnishing- breakfast, dinner and supper, consists of 20 ounces of fresh beef or mutton, 12 ounces of bacon, 16 ounces of canned meat or canned fish, 14 ounces of dried fish or 18 ounces of pickled fish, 18 ounces of flour or 20 ounces of corn meal, either I ounces of beans or peas or 1§ ounces of rice or hominy, and either 16 ounces of potatoes or 121 ounces of potatoes together with 11 ounces of dried fruit, 1! ounces of coffee, and 31 ounces of sugar. The ration also includes small quan¬ tities of vinegar, salt, pepper, soap and candles.

Rations are usually computed by the hun¬ dred, and are issued for ten days. To a com¬ pany of 100 men, would, therefore, be issued 1,000 rations. In the field, each soldier is sup-

posed to carry one regular ration and one emergency ration all the time. The emergency ration is never eaten, except in case of last resort, and the regular ration is issued every day.

1 he army ration, it will be seen, contains none of those things which are ordinarily con¬ sidered luxuries. For instance, there is no milk included in the ration, and the soldier must take his coffee black, unless he is able to purchase a can of condensed milk from the <(sales store0 with his “savings.0 Congress has authorized the commissary to keep on hand other articles of food that are not included in the regular ration. These are kept in the “sales stores,® and are issued to the mess stewards, in return for “savings® from the regular rations. Out of a company of a hun¬ dred men there are a

number who do not eat all of the articles in the ration These would be wasted if drawn by the mess steward ; there¬ fore, when the thousand rations are issued to him, he returns to the commissary that part of the various components that he thinks will not be used. This, in the language of the army, is making a “savings® on the rations.

The value of the articles returned to the commissary is computed, and the mess steward is allowed to draw from the “sales stores® a sufficient quantity of luxuries that are not in the regular issue, equal to the value of his “saving.® The government, however, will not allow a “saving® to be made on certain articles in the ration. Fresh meat, dried or preserved fish, potatoes, onions, tomatoes, prunes, apples and peaches must be used; a “saving® cannot be made on these articles. They contain just the proper nutritive elements, and the quantities given are what the normal soldier should eat.

ARMY REGISTER. The official list of the United States army, published annually, showing the position, rank and duties of offi¬ cers, regiments, companies, etc., with the pro¬ motions and casualties during the preceding 12 months.

ARMY REGULATIONS. The Consti¬ tution of the United States provides that “Con¬ gress shall have power to make rules for the government and regulation of the land and naval forces.® The only acts of Congress in force, authorizing the President to make regu¬ lations better defining the powers and duties of officers, are contained in the 5th section of the act of 3 March 1913, and the 9th section of the act approved 26 April 1816. The first of these acts is an act for the better organization of the General Staff of the army, and the sec¬ ond relates (with the exception of the last section) to the same subject.

The words regulate and regulation are used in several places in the Constitution of the United States. Thus, Congress has power to “regulate® commerce, to “regulate® the value of money, to make rules for the government and “regulation® of the land and naval forces, to make “regulations® with regard to the elections of senators and representatives, to make “regulations® with reference to the jurisdiction of the Supreme Court, in certain cases, and to make needful rules and “regulations® respect¬ ing the territory and other property of the United States. In all these cases regulation is legislation.

By virtue of its power to make rules and regulations for the land and naval forces, Con¬ gress covers a large field of legislation relating; to the administration of military affairs. When this is done there still

remains a mass of mat' ters appertaining to the military establishment, which it is necessary to “regulate.® Legislation cannot enter into all the details of this regula¬ tion, and, if it could, it would not be desirable, because a legislative code controlling the whole subject of military administration would not have the necessary elasticity. The Constitu¬ tion provides a way of supplementing this power of Congress, the President, as executive and commander-in-chief of the army, having the power to make regulations for its govern¬ ment.

The regulations for the transaction of the public duties and business relating to the mili¬ tary establishment, adopted by the President in the exercise of this power, are designated as the army regulations. They may be divided- into several classes, viz. :

1. Those which have received the sanction of Congress. These cannot be altered, nor can exceptions to them be made by the execu¬ tive authority unless the regulations themselves provide for it. In reality, the approval of Con¬ gress makes them legislative regulations, and they might, therefore, be more strictly classified with other statutory regulations with reference to subjects of military administration. They are, however, included under the general head of army regulations, as approved codes of executive regulations.

2. Those that are made pursuant to, or in execution of, a statute — meaning by the latter expression those that are supplemental to particular statutes, and, in the absence of suf¬ ficient legislative regulation, prescribe means for carrying them out. These, if it be not pro¬ hibited by the statute, may be modified by the executive authority, but until this is done they are binding as well on the authority that made them as on others. It has been held that a regulation of the Treasury Department, made in pursuance of an act of Congress, “becomes a part of the law, and of as binding force as if incorporated in the body of the act itself.® So it has been held that the civil service rules, promulgated under the Civil Service Act, “be¬ came a part of the law,® and that removal from a position placed under the act and the rules can only be made agreeably to the terms and provisions of both the act and the rules, and an army regulation made pursuant to a pro¬ vision contained in an act of Congress is of the same force. Examples of regulations of this class are those relating to the examination of enlisted men for commissions, under the act of Congress of 30 July 1892, and the executive order of 30 March 1898, prescribing limits of punishment.

3. Those emanating from, and depending on, the constitutional authority of the President, as commander-in-chief of the army and as execu¬ tive, and not made in supplement to particular statutes. These constitute the greater part of the army regulations. They are not only modified at will by the President, but exemp¬ tions from particular regulations are given in exceptional cases; the exercise of this power with reference to them being found necessary. “The authority which makes them (regulations)

can modify or suspend them as to any case, or class of cases, or generally.®

1. Departmental regulations, made by virtue of the authority conferred by section 161, Re¬ vised Statutes, on the head of each ' depart¬ ment Kto prescribe regulations not inconsistent with law, for the government of his depart¬ ment, the conduct of its officers and clerks, the distribution and performance of its business, and the custody, use, and preservation of its records, papers and property appertaining thereto.®

Mere repetitions of legislative enactments are not included under any of these heads. A long continued practice has been held equivalent to a specific regulation.

As to the subject-matter of regulations for the government of the army, no distinct line can be drawn separating the President’s con¬ stitutional power to make them from the con¬ stitutional power of Congress ((to make rules for the government and regulation® of the land forces. Regulations are, when they relate to subjects within the constitutional jurisdiction of Congress, unquestionably of a legislative character; and if it were practicable for Con¬ gress completely to regulate the methods of mili¬ tary administration, it might, under the Consti¬ tution, do so. But it is entirely impracticable, and therefore it is in a great measure left to the President to do it. So far as Congress chooses to exercise its jurisdiction in this re¬ spect, it occupies the field, and the President cannot encroach on it. But when it does not see fit to do so, the President’s power, of neces¬ sity, is called into action. It is, indeed, of the commonest occurrence for Congress to regu¬ late a subject in part, and for the Executive to regulate some remaining part, and this without any pretense of statutory authority,

but upon the broad basis of constitutional power. We thus have a legislative jurisdiction, and, sub¬ ject to it, an executive jurisdiction extending over the same matter.

So, also, as between the legislative and judi¬ cial powers, Congress may regulate the pro¬ cedure of the Federal courts, but in so far as it does not do it, the courts may prescribe their own regulations. And this is, in fact, the exist¬ ing condition. Congress has exercised the power in part, leaving it to the courts to regu¬ late what it has not provided for. Courts can¬ not exercise their jurisdiction without rules of procedure, and necessarily have the original power of adopting their own when the legisla¬ ture does not prescribe them; just as the Presi¬ dent cannot exercise his power as commander- in-chief without the power to make orders for the regulation of the army. In fact, each branch of government — the legislative, execu¬ tive and judicial — has the original power of making regulations for the transaction of its business — most manifestly so when the busi¬ ness is of direct constitutional origin — but the legislative has sometimes a jurisdiction over the regulations of the other branches, and when this happens its jurisdiction is superior.

In speaking of the powers of Congress over the administration of the affairs of the army, it is, of course, not intended to include what would properly come under the head of the direction of military movements. This belongs to command, and neither the power of Congress to raise and support armies, nor the power to

make rules for the government and regulation of the land and naval forces, nor the power to declare war, gives it the command of the army. Here the constitutional power of the President as commander-in-chief is exclusive.

When Congress fails to make regulations with reference to a matter of military adminis¬ tration, but either expressly or silently leaves it to the President to do so, it does not dele¬ gate its own legislative power to him, because that would be unconstitutional, but expressly or silently gives him the opportunity to call his executive power into play. It is, perhaps, not easy to explain why, if regulations may, under the Constitution, be made both by the legislative and executive branches, one should have pre¬ cedence over the other ; but it is to be noticed that the power of Congress is the express one ((to make rules for the government and regu¬ lation of the land and naval forces,® whereas the power of the President is a construction of his position as executive and commander-in¬ chief. The legislative power, by the words quoted, covers the whole field of military ad¬ ministration, but

it is not always certain how far the executive power may go. It is not as well defined as the legislative power, but it is undoubtedly limited to so much of the subject as is not already controlled by the latter. The jurisdiction of the executive power is not, how¬ ever, within this limit, coextensive with that of the legislative power, because the legislative branch of the government has a constitutional field of operation peculiar to itself, and yet there are army regulations which seem to be of a legislative character. It is because of this that difficulty sometimes occurs, a difficulty which has in the past quite often taken the form of a difference of views between the War Department and the accounting officers of the Treasury.

An impression has existed that a peculiar ((force of law® is given to regulations by their approval by Congress, but it seems to be an erroneous one. If, as above stated, the making of regulations is within the jurisdiction both of Congress and the President, but the author¬ ity of Congress is superior to that of the Presi¬ dent, it follows that when regulations are ap¬ proved by Congress they cannot be altered by him until the approval is removed. To this ex¬ tent, regulations approved by Congress may be said to have a superior force of law to those not thus approved, but this is not the erroneous impression referred to. Precisely what it is, is not clear, but it seems to have been believed that the approval of regulations by Congress makes them of higher obligation. This, how¬ ever, is not true. Whether approved by Con¬ gress or not, they have, so long and so far as they are in force, the force of law, and are, therefore, binding. The distinction, in this respect that has sometimes been made between regulations approved by Congress and those not thus approved is misleading. Congress has, on several occasions, given its sanction to army regulations :

1. An Act of 3 March 1813, provided, <(That it shall be the duty of the Secretary of the War Department, and he is hereby authorized, to prepare general regulations, better defining and prescribing the respective duties and powers of the several officers in the adjutant-general, inspector-general, quartermaster-general and

commissary or ordnance departments, of the topographical engineers, of the aids of gen¬ erals, and generally of the general and regi¬ mental staff ; which regulations, when ap¬ proved by the President of the United States, shall be respected and obeyed, until altered or

revoked by the same authority. And the said general regulations, thus prepared and ap¬ proved, shall be laid before Congress at their next session.®

A system of regulations was laid before Congress as required by the act. It was pub¬ lished (together with the statutes relating to the military establishment) in book form, from the adjutant and inspector-general's office, 1 May 1813, and may also be found in volume I of the (American State Papers on Military Affairs. >

1. By Act of 24 April 1816, it was pre¬ scribed ((that the regulations in force before the reduction of the army be recognized, as far as the same shall be found applicable to the service, subject, however, to such altera¬ tions as the Secretary of War may adopt, with the approbation of the President.® The reduc¬ tion referred to was made in June 1815, pur¬ suant to an Act of 3 March. The Act of 24 April 1816, did not relate to any particular code of army regulations, but to all the regulations which were in force.

2. On 22 Dec. 1819, the House of Repre¬ sentatives resolved that ((the Secretary of War be instructed to cause to be prepared and laid before this House, at the next session of Con¬ gress, a system of martial law, and a system of field service and police, for the government of the Army of the United States.®

On 22 Dec. 1820, the Secretary of War accordingly submitted a system of ((martial law,® prepared by Judge- Advocate Major Storrow (which was never adopted), and a system of field service and police, which had been pre¬ pared by General Scott, and submitted to the War Department in September 1818.

On 26 Dec. 1820, the Speaker laid them be¬ fore the House. The document was in manu¬ script, and was ordered to be printed, and a copy laid upon the desk of each member. (It is reprinted in the third volume of the State Papers on Military Affairs.) When the book was printed, several copies were sent to Gen¬ eral Scott, who made certain corrections, and on 20 Feb. 1821, returned a copy (of which he retained a duplicate) to the War Department for the Committee of the House. It was re¬ ceived by the chairman of the Military Com¬ mittee on 23 Feb. 1821.

On 27 Feb. 1821, the chairman of the Mili¬ tary Committee of the House reported the Senate bill, ((To reduce and fix the military peace establishment,® with certain amendments, among which was the

addition of a section ap¬ proving and adopting <(the system of General Regulations for the Army, compiled by Major- General Scott.® The bill, including this (the 14th) section, became law 2 March 1821. Early in that month, General Scott received directions to put the book to press for the use of the army, and, having received a letter from the chairman of the Military Committee of the House, in¬ forming him that the corrected copy had been received, and section 14 added to the army bill by way of amendment, he caused the book to be

reprinted from his retained duplicate corrected copy.

1. By an Act of Congress of 28 July 1866, the Secretary of War was directed to have pre¬ pared, and to report to Congress, at its next session, a code of regulations for the govern¬ ment of the army and of the militia in actual service, including rules for the government of courts-martial, the existing regulations (those of 1863) to remain in force until Congress should have acted on such report.

It was said by the Court of Claims, and repeated by Attorney-General Brewster, that under the act of 1866 a report of a code of regulations for the government of the army was made but not acted on. This was evidently a mistake. A system of regulations was pre¬ pared by a board consisting of Generals Sher¬ man, Sheridan and Augur, but it does not ap¬ pear to have been submitted to Congress. A revision of the articles of war was reported, but not, it would seem, a code of regulations.

The act of 1866 was construed by the Court of Claims, the Attorney-General, the second comptroller, and Secretary of War Belknap, to have had the effect of an adoption by Congress of the regulations of 1863, but there has been little agreement as to how long the regulations so adopted remained in force. The legislation has sometimes been regarded as repealed by the repeal provisions (section 5596) of the Revised Statutes, if not already superseded by the act of 15 July 1870, which again provided for the preparation of a system of regulations, to be reported to Congress ((at its next session.® It has also been held that the regulations of 1863 remained in force, by virtue of the legislation of 1866, until superseded by the regulations of 1881, issued under the act of 23 July 1879, au¬ thorizing the Secretary of War to cause all the regulations of the army and general orders then in force to be codified and published. And they have been treated as in force subsequently to this.

After this no revision of the regulations ap¬ pears to have been undertaken until December 1888, when a board was appointed <(for the purpose of revising and condensing the regula¬ tions of the army and preparing a new edition of the same.® The work of this board finally took the form of the regulations of 1889.

The general regulations, with their accom¬ paniment of manuals, may be regarded as form¬ ing the regulations of 1895. One of these manuals — the Manual for Courts-Martial — -was not, indeed, a staff manual at all, but is a general system of rules for the administration of military justice. It was the first of its kind promulgated by the War Department, and was an outgrowth and enlargement of the directions on the subject which it was formerly the prac¬ tice to issue from the headquarters of military departments. Regulations, approved by the Secretary of War, had, however, before this been issued by several of the staff departments for their own government.

The regulations for the United States Mili¬ tary Academy also emanate from the Presi¬ dent's constitutional power. There can be no doubt, however, that, within limits, the superin¬ tendent of the United States Military Academy, the same as any officer in control of a public institution peopled with persons whose good conduct is entrusted to his charge, may also lay

down rules or regulations. He does, in fact, exercise this power in issuing certain orders. A distinction has, indeed, been made between regulations and orders, but it cannot be said that there is any essential difference between regulations and general orders laying down general rules of action.

As a good illustration of this power, as vested in superintendents of institutions of this character, we may take the various soldiers' homes. For these, certain regulations are pre¬ scribed by statute, and others by their boards of managers, necessarily, however, leaving a very considerable residue of matters, principally relating to discipline, to be regulated by the superintendents of the institutions. It may, of course, sometimes be difficult to decide what the limit of the power is, but that the power exists seems clear. Without it, public institu¬ tions of this kind could not be controlled, and, therefore, could not be managed for the pur¬ pose for which they are established.

Commanding officers of military posts have this power in a marked degree — limited, it is true, in their cases, by statute and regulation of higher authority; but, subject to these, having a distinct, necessary and unquestioned jurisdic¬ tion. In this case, however, as also in the case of the superintendent of the Military Academy, the power is a part of an independent military system. But it is the same kind of power that is exercised by the school-teacher in the main¬ tenance of the discipline of his school.

The army regulations issued 15 Nov. 1913, in 80 articles and 1,573 paragraphs, are en¬ dorsed as follows by the Secretary of War: <(The President of the United States directs that these regulations for the army be published for the government of all concerned, and that they be strictly observed. Nothing contrary to the tenor of these regulations will be enjoined in any part of the forces of the United States by any commander whomsoever.®

Edward S. Farrow,

Consulting Civil and Military Engineer.

ARMY RESERVE. The regular army- reserve, established in 1916, in the United States consists of men not over 45 years of age, physically qualified, who enlist for four years. The President is authorized to assign members of the army reserve as reserves to particular organizations of the army, or to organize the reserve, or any part thereof, into units or detachments as he may prescribe, and to assign to such units and detachments officers of the regular army or of the officers' reserve corps ; and he may summon the regular army reserve or any part thereof for field training for not exceeding 15 days in each year, reserv¬ ists to receive travel expenses and pay at rate of their grades; and in event of actual or threatened hostilities he may mobilize the re¬ serve, and thereafter retain it, or any part thereof, in active service for such period as he . may determine conditions demand. All enlist¬ ments in the regular army, including those in the reserve, in force on date of outbreak of war, continue in force for one year, unless sooner terminated by order of the Secretary of War. Subject to such regulations as the Presi¬ dent may prescribe for proper identification, location and physical condition, members of the

army reserve shall be paid semi-annually at the rate of $24 a year while in the reserve.

When mobilized the reserve, while in active service, receives pay and allowances of enlisted men of like grades, including additional pay provided for second enlistments. Upon report¬ ing for duty, and being found physically fit, members of the reserve receive $3 per month for each month they shall have belonged to the reserve, as well as actual necessary cost of transportation and subsistence from their homes to places where they are summoned to report for duty. Service in the reserve confers no rights to retirement or retired pay. Title to pension is attained only through disability in¬ curred on active duty.

The law contemplates that the President may cause reservists to be organized at all times in the manner indicated and that, in the discretion of the President, they may be attached, as such, to organizations of the regular army that are at maximum strength, but when so attached, they are not constituent parts of such organizations and form no part of the numbers authorized by law for such organizations.

ARMY SCHOOL OF THE LINE. See

Army Schools.

ARMY SCHOOLS. New inventions and rapid progress in the development of materials c ause radical changes in the methods of mak¬ ing war. It is necessary to have post-graduate instruction in many forms to keep pace with modern improvements. The American military educational system now comprises : The United States Military Academy; the Army War Col¬ lege; the Army Staff College; the Army School of the Line; the Coast Artillery School ; the Engineer School ; the Mounted Service School; the Army Medical School; the Army Signal School ; the Army Field En¬ gineer School ; the Army Field School for Medical Officers; the School of Musketry; and the Field Artillery School of Fire. There are also schools for training bakers and cooks for the army. The educational scheme con¬ templates that beginning his career in the garrison school, every officer shall fit himself thoroughly for the duties of his grade while advancing to the Army School of the Line, the Army Staff College and the Army War College; and in this way it is expected that the nation will eventually have at its disposal a highly trained body of officers.

United States Military Academy. — This school was established in 1802 and designed for the practical and theoretical training of cadets for the military service. Upon com¬ pleting its course satisfactorily, cadets are eligible for promotion and commission as second lieutenants in any arm or corps of the army, the duties of which they

have been judged competent to perform. The super¬ vision and charge of the academy are in the War Department under such officer or officers as the Secretary of War may assign to that duty. In conformity with the provisions of section 1331, Revised Statutes, the chief of staff is, by direction of the Secretary, charged " ith the supervision of matters in the War Department pertaining to the academy. See United States Military Academy.

Army War College. — This institution at Washington, D. C., was formerly established

by General Orders 155, 27 Nov. 1901. This order provided for the executive head of the college to be an officer not below the grade of field officer, and for a War College Board to prepare regulations for the government of the college, .etc. The objects of the War Col¬ lege are: (a) The direction and co-ordination of military education in the army and in civil schools and colleges at which officers of the army are detailed under acts of Congress and the extension of opportunities for in¬ vestigation and study in the militia of the United States, (b) To provide facilities for and to promote advanced study of military subjects and to formulate the opinions of the college body on the subjects studied for the information of the chief of staff. The per¬ sonnel of the Army War College is in part permanent and in part temporary. The per¬ manent personnel consists of a president, to be assigned to that duty by the Secretary of War, and the officers for the time being of the second section, War Department General Staff. Two directors and a secretary of the college are selected from the permanent personnel of the section.

Army Staff College. — The object of this college is to train the selected graduates of the Army School of the Line for the more important staff duties with large commands in time of war. The assistant commandant of the Army Service Schools is the director of the Army Staff College. Selections of student officers are made as follows: (a) They are detailed annually, by the War Department, from the highest graduates of the latest class of the Army School of the Line who receive the recommendation of the academic board, approved by the commandant, and who desire to take the course : provided that an officer once detailed to the Army Staff College, and through sickness or War Department orders, is prevented from completing the course, may be redetailed as a member of a succeeding class, upon the

recommendation of the academic board, approved by the commandant, (b) With the exceptions noted under (c) no officer of the army is detailed for instruction in the Army Staff College who has not been graduated at the Army School of the Line with a standing as high as No. 18, exclusive of militia officers, and no militia officer is eligible for admission to the college unless he has been graduated at the Army School of the Line with a percentage as high as that of the regular officer lowest in class standing who has qualified in accordance with the fore¬ going. No officer is detailed for instruction in the Army Staff College without the recom¬ mendation of the academic board,. approved by the commandant, (c) In addition to the students who become eligible under, (a) and (b) there may be detailed annually by the War Department, upon the recommendation of the academic board, approved by the commandant, not to exceed two graduates of the Army Field Engineer School, who may so desire, to receive instruction in the Army Staff College. To become eligible for such detail, graduates of the Army Field Engineer School must attain a percentage in the course in military art as high as the student officer graduating No.. 18 in that course of the Army School of the Line.

The course of study is embraced in four

departments, as follows: (1) The department of military art; (2) The department of mili¬ tary engineering; (3) The department of military law; (4) The department of lan- gauges.

Army School of the Line. — The object

of this school is the instruction of specially selected officers from the line of the army in the proper methods to be employed in the leading and care of troops in time of war, and their training in time of peace. The assistant commandant of the Army Service Schools is the director of the Army School of the Line. Selections of student officers are made as follows: (a) One officer of grade not lower than that of captain and of not less than five years' commissioned service from each regiment of cavalry, field artillery, and infantry serving within the limits of North America and the Hawaiian Islands, and such other officers as are hereinafter specified. Offi¬ cers are not detailed from regiments in service, or about to serve in the Philippine Islands, but in lieu thereof additional officers may be de¬ tailed from regiments of the same arm which have most recently returned, or are about to return, from Philippine service to home sta¬ tions ; but not more than five officers are de¬ tailed from the field artillery for any one class. (b) The commanding officer of each regiment of cavalry, field artillery and infantry serving within the limits of North America and the Hawaiian

Islands submit directly to the adjutant general of the army, not later than 1 January of each year, the names of two officers (one as principal and the other as alternate) recommended for instruction at the school. From the officers thus recommended selections are made by the Secretary of War. (c) In a similar manner, the chief signal officer of the army may annually recommend one permanent officer of his corps, with the same limitations as to grade and length of service. The course of study is embraced in three departments, as follows: (1) The depart¬ ment of military art; (2) The department of military engineering; (3) The department of military law.

For Coast Artillery School, School of Fire for Field Artillery, School of Musketry, School for Bakers and Cooks, Post schools for the instruction of enlisted men, Garrison schools for the instruction of officers in sub¬ jects pertaining to the performance of their ordinary duties and the military departments of civil institutions at which officers of the army are detailed under the provisions of law, see Military Education.

Army Field Engineer School. — The ob¬ ject of this school is (1) the instruction of officers of the corps of engineers and of engineer officers of the organized militia in their military duties; (2) To furnish such instruction in military engineering as the schedules of the other schools comprising the Army Service School may call for. There is detailed a field officer of the corps of en¬ gineers to report to the commandant of the Army Service Schools for duty as director of the Army Feld Engineer School. Selections of student officers will be made as follows: (a) The chief of engineers may submit to the ad¬ jutant-general of the army, not later than 1 January of each year, the names of not less

than 2 nor more than 10 officers of the corps of engineers, of grade not below that of captain, for instruction in the school. (b) There may also be detailed such engineer officers of the organized militia as may apply for entrance, subject to certain provisions. The course of study is embraced in two de¬ partments, as follows: (1) The department of military engineering, (2) The department of military art.

Army Field Service School for Medical Officers. — This school consists of two parts : (1) The Field Service School for Medical Officers, at which attendance in person for the pursuance of a graded course of

study is required; (2) The Correspondence School, wherein answers and solutions to such ques¬ tions and problems as may be sent to desig¬ nated medical officers, at their posts or sta- t:ons, are required. Its object is in the Field Service School: (a) To instruct officers of the medical corps and medical officers of. the organized militia in their duties as adminis¬ trative and staff officers on field service, and to make research into such subjects as may concern medical officers under field conditions.

(b) To give such technical instruction to stu¬ dents in the other schools as the schedules of those schools, approved by the commandant, may call for. In the Correspondence School :

(c) To afford opportunity for such wider ele¬

mentary instruction in the methods and pur¬ poses of military plans and movements as will enable medical officers of the regular army better to fulfil their duties in the field ; and to prepare them to participate to better advantage as students in actual attendance at the Field Service School for Medical Officers. There is detailed a field officer of the medical corps to report to the commandant of the Army Schools for duty as director of the Army Field Sendee and Correspondence School for Medical Officers. The course of study is con¬ ducted under the School for Medical Officers and covers a period of not less than six weeks between 1 April and 15 May of each year. Selection of student officers is made as fol¬ lows: (a) The surgeon-general will submit

to the adjutant-general of the army not later than 1 January of each year the names of not less than four nor more than eight officers of the medical corps whom he recommends for Medical officers of the organized militia who may apply for entrance and whose admission detail for construction in this school. (b) may receive the approval of the Secretary of War, not to exceed a total of six in any one session, may also be detailed for instruction in the school subject to certain provisions. The course of study is conducted under the Field Service School for Medical Officers, the Army Staff College and the Army Field Engineer School. Its details are prepared by the director of the Army Field Service and Correspond¬ ence School for Medical Officers, in co-opera¬ tion with the directors of the Army Staff Col¬ lege and the Army Field Engineer School sub¬ ject to the approval of the commandant.

Army Signal School. — The object of this school is: (1) To prepare officers of the signal corps for the better performance of the duties of

their profession, to provide instruction in signal duties for such officers of the line as may be designated therefor, and to make re¬

search and practical experiments in such sub¬ jects as relate to the duties of the signal corps. (2) To supplement the instruction given in the Army School of the Line and the Army Staff College along the special technical lines of the signal corps, as called for by the sched¬ ules of the latter schools, having especially in view the relation of the signal corps to the whole army and the function it fulfils in time of war. There is detailed a field officer of the signal corps to report to the commandant of the Army Service Schools for duty as di¬ rector of the Army Signal School. Selections of student officers are made as follows: (a) The chief signal officer of the army may sub¬ mit to the adjutant-general of the army, not later than 1 January of each year, the names of not less than two nor more than five officers holding permanent appointments in the signal corps for instruction in the school, (b) Also there may be detailed such officers of the rank of captain or first lieutenant from the army, at large as may make application to the adju¬ tant-general of the army and receive the recommendation of the commandant of the Army Service Schools, provided that the total number of officers detailed under (a) and (b). exclusive of militia officers, shall not exceed 15; also such signal officers of the organized militia as may apply for entrance, subject to certain provisions. The course of study is embraced in three departments, as follows :

(1) The department of signal engineering;

(2) The department of topographs; (3) The department of languages.

The whole scheme of the army schools results from a fixed policy, the object of which is to make the army as perfect as pos¬ sible, not only in the performance of its own duties, but in its capacity as instructor for the hundreds of thousands of citizen soldiers necessary in any war of magnitude. See Military Education.

Edward S. Farrow,

Consulting Civil and Military Engineer.

ARMY SERVICE CORPS, in the British army, is the commissariat and transport de¬ partment. The corps is organized in 51 horse transport companies, 18 mechanical transport companies, 5 supply companies, and 4 remount companies. The transport companies are sta¬ tioned at the various large garrisons at home and in the colonies, and all the transport serv¬ ices required by the troops are carried out either by

these companies or by civilian trans¬ port hired from local contractors and carried out under the supervision of army corps offi¬ cers. In large stations like Aldershot, where there are huge army abattoirs and bakeries, not only is the food issued, but it is actually pre¬ pared by the army service corps. The me¬ chanical transport companies are a modern creation ; they utilize three grades of motors — heavy, medium and light — 'drawing from one to five 4-ton trucks. The remount com¬ panies have the care of the young horses at the government depots, and are mainly com¬ posed of men transferred from the artillery and cavalry. For active service the A.S.C. units are formed into "trains® and "supply columns,® one column being attached to each division (infantry or cavalry), each brigade and each field army. The field bakery attached to each divisional train and supply column is

capable of baking bread for 26,000 men. The strain thrown upon the A.S.C. in war time is enormous. By day and night a never-ending procession of A S.C. trucks plough along the roads and through the mud behind the firing line, often traveling great distances from the base to carry food, clothing, munitions, medic¬ aments and innumerable other items roughly classified as ((stores)) to the men on the battle¬ field. His Royal Highness, the Duke of Con¬ naught, is colonel of the corps.

ARMY SERVICE SCHOOLS. In addi¬ tion to the Military Academy at West Point, which trains candidates for com¬ missions in the army, certain schools are maintained for the instruction of selected officers and men in their duties after they have been admitted to the service. These are the Army War College at Washington, D. C. ; the Army Staff Col¬ lege at Fort Leavenworth, Kan. ; the Coast Artillery School at Fort Monroe, Va.; the Engineer School at Washington Barracks, D. C. ; the Mounted Service School at Fort Ri¬ ley, Kan.; the Army Medical School (q.v.) at Washington, D. C. ; the Army Signal School at Fort Leavenworth, Kan. ; the Schools for Bakers and Cooks at Washington Barracks, D. C. ; the Presidio of Monterey, Cal.; Fort Sam Houston, Tex.; Fort Shafter, Hawaii; Fort Riley, Kan.; Fort William Mc¬ Kinley, P. I.; the Army Field Service and Correspondence School for Medical Officers, Fort Leavenworth, Kan. ; the School of Fire for Field Artillery, Fort Sill, Okla. ; the School of Musketry, Fort Sill, Okla. ; the Signal Corps Aviation Schools at San Diego, Cal.; Mineola, New York; and near Chicago, Ill. ; the United States Army Balloon School at Fort

Omaha, Neb.; and the Ordnance School of Application, Sandy Hook Proving Ground, N. J. Certain of these schools are not under the command of the commander of the department in which they are situated, except in matters concerning courts-martial. Many of them have special details of enlisted men attached to them permanently. See also Army Schools.

ARMY SIGNAL SCHOOL. See Army

Schools.

ARMY SIGNAL TROUPS. See Mili¬ tary Signalling and Telegraphing.

ARMY STAFF COLLEGE. See Army

Schools.

ARMY STAFFS. The general command¬ ing a large body of troops must have assistants to generally supervise the fighting forces under his command. These assistants form his ˆstaff.® To a certain extent, an arbitrary rule decides what portion of the latter is designated as gen¬ eral staff.® In some armies all the staff belongs to the general staff, but a necessity has univer¬ sally been felt of haying a distinct portion of the staff entrusted with planning and carrying out the movements of armies in the field, and generally distinguished by some special name.

The enormous numerical strength of modern armies, and the way they must be organized to meet the constantly changing requirements of war, render an immense amount of detail neces¬ sary in carrying out military operations even under apparently similar circumstances of time and place. Thus the higher leaders and com¬

manders necessarily require the permanent sup¬ port of specially selected and trained officers. But there is another case in which this neces¬ sity of assistance is felt, and which is more intimately connected with the handling of troops in action, viz., the reconnaissance of the ground and of the positions and movements of the enemy, and the observation of the state of affairs in an engagement, at a point removed from the personal observation of the general commanding.

It is now considered part of the duty of the general staff to be invariably watching over the military efficiency and material welfare of the troops. # On every large staff all branches of the service are represented by certain indi¬ viduals or heads of departments, and it is

naturally their duty, in the first place, to see to the proper efficiency of their respective branches or departments; but being often ignorant of the general military: situation, or not rightly understanding sudden changes in the state of affairs, they are unable to carry out what is expected from them. The general staff is consequently called upon to act as a directing and explaining body toward these individuals by keeping itself in constant communication with them, the chief of the general staff being at the same time regarded, in a general way, as head of the whole staff.

Officers of the general staff are invested with no military command. But even without having any command they can make themselves extremely useful in an engagement by carrying out any special and important duties that may be entrusted to them by the general command¬ ing, in addition to devoting themselves to their general duties. Their usefulness in this respect will be found to depend not only on their fit¬ ness and ability, but on their tact and discre¬ tion as well, in rightly appreciating the position they hold, both as regards general and troops. The conditions to fulfil this, however, are not entirely one-sided. Troops very soon find out, especially in war, whether the duties of the general staff are in good hands.

The duties of the general staff in war are : 1. Working out all arrangements necessary for quarters, precautions against surprise, move¬ ments and battle ; 2. Communicating the neces¬ sary orders, either verbally or in writing, at the right time and place, and in sufficient de¬ tail ; 3. Obtaining, collecting and compiling in order all information concerning the nature and the military character of the theatre of war; 4. Collecting and estimating the value of in¬ formation received concerning the enemy's forces; 5. Watching over the fighting condition of the troops, and being constantly informed of their efficiency in every respect ; 6. Keeping journals and diaries, drawing up reports on engagements, and collecting important materials, to afterward form a history of the war.

General staff officers have to take, as a basis for carrying out their duties in all the branches that have been assigned them, the wish and determination of the general in com¬ mand, in which, however, initiative on their part is by no means excluded, but rather in¬ vited. A general staff officer cannot excuse himself for any neglect on his part on the plea that no order on the subject had been given him by his general. He should only consider himself freed from responsibility when his sug-

gestion has been declined by the general. This gives rise to no small amount of constant re¬ sponsibility, which rests anything but lightly on the. shoulders of the general staff in war, and which obliges it to be devoted to an untiring energy.

The (<great general staff,® a body of general staff officers who are not attached to any corps, is entrusted, under the immediate supervision of the chief of the general staff, with drawing up and preparing schemes for the strategical concentration of the army in certain particular directions by road and rail, with collecting and estimating the strength, etc., of the various armies, with the study of theatres of war, and with the preparation of military map?. It is also employed in promoting military science, es¬ pecially military history, and in the supervision of the training of young officers.

The general staff corps, United States army, is composed of officers detailed for serv¬ ice in said corps for a period of four years, unless sooner relieved, under rule of selection prescribed by the President. Upon being re¬ lieved from duty in the general staff corps, offi¬ cers return to the branch of the army in which they hold permanent commissions, and except in case of emergency or in time of war are not eligible to further detail therein until they have served for two years with the branch of the army in which commissioned. This ineligibility does not apply to any officer who has been re¬ lieved prior to the expiration of four years' duty with the corps ; but such officer will be¬ come ineligible as soon as he shall have com¬ pleted a total of four years of said duty. While serving in the general staff corps officers may be temporarily assigned to duty with any branch of the army.

The general staff corps, under the direction of the chief of staff, is charged with the duty of investigating and reporting upon all ques¬ tions affecting the efficiency of the army and its state of preparation for military operations, and to this end considers and reports upon all questions relating to organization, distribution, equipment, armament and training of the mili¬ tary forces, proposed legislative enactments and general and special regulations affecting the army, transportation, communications, quar¬ ters and supplies; prepares projects for manoeu¬ vres; revises estimates for appropriations for the support of the army and advises as to dis¬ bursement of such appropriations ; exercises supervision over inspections, military educa¬ tion and instruction, examinations for the ap¬ pointment and promotion of officers, efficiency records, details and assignments, and all orders and

instructions originating in the course of administration in any branch of the service which have relation to the efficiency of the military forces ; prepares important orders and correspondence embodying the orders and in¬ structions of the President and Secretar}ˆ of War to the army ; reviews the reports of exam¬ ining and retiring boards, and acts upon such other matters as the Secretary of War may determine.

The general staff corps, under like direction, is further charged with the duty of preparing plans for the national defense and for the mobilization of the military forces (including the assignment to armies, corps, divisions and other headquarters of the necessary quota of

general staff and other staff officers), and in¬ cident thereto with the study of possible theatres of war and of strategic questions in general; with the collection of military in¬ formation; the preparation of plans of cam¬ paign, of reports of campaigns, battles, en¬ gagements and expeditions, and of technical histories of military operations of the United States.

Edward S. Farrow,

Consulting Civil and Military Engineer.

ARMY TERRITORIALE. As soon as the men complete nine years service in the French army, and reserve, they are trans¬ ferred for five vears to the army territoriale, and after its expiration are transferred for six years to the reserve of the army territoriale, when their liability to military duty ceases. The army territoriale embraces troops of all arms and is organized substantially on the same basis as the regular army.

ARMY TRANSPORT SERVICE. At

the outbreak of the war with Spain the water transportation in the possession of the United States consisted of a few small tugs, ferry¬ boats and launches. Suddenly confronted with the necessity of dispatching armies across the seas, it is not surprising that some confusion and delay were encountered in selecting, char¬ tering and assembling fleets capable of trans¬ porting troops, with their guns, animals and impedimenta, to Cuba, Porto Rico and the Philippine Islands. To convert the vessels com¬ posing the several fleets from ordinary freight- ships into commodious and comfortable troop-transports required time and much outlay. The arrangement of sleeping accommodations for the men, stalls for the animals, increased

water- supply and ventilation involved a practical re¬ construction of the interior of every vessel. It was particularly necessary to have those ves¬ sels destined for the Philippines made safe and comfortable, for it was anticipated that the troops might pass direct from the decks to the battle-field. Hospital ships were fitted out as quickly as possible and served a useful purpose during the time of greatest need.

It was apparent at the outset that the prob¬ lem of water transportation required careful and continuous study, and immediately after the surrender of Santiago de Cuba a division of transportation was created by the Secretary of War and charged with supervision and control of all rail and water transportation; with the inspection of ships wTith reference to charter or purchase for use as transports, and with the arrangements, for sending troops by rail to and from the various ports. When it became ap¬ parent that vessels would be required for a prolonged period, and that it was a very ex¬ pensive proceeding to alter chartered vessels, the department began to purchase such ships as seemed best adapted to use as transports. Aside from the mere act of affording a passage to troops across the seas, the question of fur¬ nishing them supplies after landing involved many intricate problems, each requiring a spe¬ cial solution. American troops submit cheer¬ fully. to any amount of necessary hardships, but consider themselves entitled to the best (of everything, regardless of cost, when the emer¬ gency has passed. For supplying their needs, it was necessary to construct refrigerator com-

partments in the transports to carry fresh beef and other perishable stores to the most remote and hitherto little known islands of our new possessions.

During the first few months of the heavy demands for transportation, the quartermaster's department was much hampered because vessels of foreign register could not be employed for the service and Congress refused to grant American register to such vessels. Neverthe¬ less, by 1 July 1898, 43 chartered vessels had been secured and fitted up for the transporta¬ tion of troops, animals and supplies. The diffi¬ culties and expense attendant upon securing efficient service with chartered vessels led to the gradual, substitution of transports pur¬ chased by the government and permanently fitted up as troopships. The largest and best transports averaged nearly 6,000 tons capacity; and when, after some practical experience, a general plan of fitting up had been

adopted, the transport service became a prominent feature of army administration, and attracted the at¬ tention and admiration of the civilized world. The urgency of the situation on the Pacific compelled a continuance of the charter system; but a fleet of government transports was gradu¬ ally put in commission on the Atlantic, and as soon as the withdrawal of the volunteer army from Cuba permitted, many of the transports were sent to Manila by way of the Suez Canal and put on the San Francisco-Manila route. The Grant , Sherman and Sheridan were the first vessels fitted out for this service, and their sailing from New York for Manila marked a new era in the occupation of the Philippines. The character of these transports may be comprehended by the statement that the Grant sailed from New York on 19 Jan. 1899, with the 4th United States infantry and one battalion of the 17th United States infantry, with a total strength of 50 officers and 1,703 enlisted men. The Sherman sailed on 2 February with the 3d United States infantry and one battalion of the 17th United States infantry, with a passenger list of 1,812 persons, followed by the Sheridan on 19 February with the 12th United States infantry and the 3d battalion, 17th infantˆ, with a total passenger list of 2,017 persons. These vessels made the long voyage to Manila with such success and comfort that the regiments were enabled to enter immediately upon active service. The experience of these, voyages dictated some val¬ uable suggestions, which w*ere availed of at once in making desirable changes to perfect the transport service generally.

The large number of troops remaining in Cuba and Porto Rico after the return of the main body of regulars and volunteers necessi¬ tated the establishment of a regular line wdth weekly sailing dates. Advantage was taken of the regular steamship lines as far as possible for the larger movement of returning troops. The transportation to Spain of the Spanish prisoners was accomplished under contract, in accordance with stipulations under which the surrender of Santiago took place. More than 22,000 Spanish prisoners were thus returned from the eastern end of Cuba to Spain within 60 days of their surrender, in an economical and apparently satisfactory manner. .

The outbreak of the insurrection in the Phil¬ ippines made it necessary to hasten relief to the vol. 2 — 20

volunteer regiments still held in those islands, and the presence there of the old Spanish gar¬ risons which, under the terms of the treaty of peace, were entitled to repatriation, made it desirable that they should be returned to Spain without delay. The transport service was strained to the utmost limit, but fulfilled its part in the most gratifying manner. During its first year of existence a total of 202,587 pas¬ sengers were

transported across the seas by army transports without responsibility for the loss of a single life.

The question of transportation of animals was one requiring much study and experiment, for there was little experience available to guide the department in a solution of the problem of landing cavalry horses in fit condition for serv¬ ice after a voyage of 7,000 miles. Some dis¬ couraging losses of mules occurred at a critical moment in the campaign against the insurgents, but gradually the system was perfected and the loss of animals actually reduced below the per¬ centage of loss from injury and disease .which should be expected in the herds on shore. Nearly 20,000 animals were transported during the year ending 30 June 1901.

At a time when every effort was being put forth to meet the requirements of the military situation Porto Rico was devastated by a hurri¬ cane, and the transport service was called upon to distribute relief stores to the unfortunate inhabitants who, just released from the worries of war, found themselves threatened with fam¬ ine and pestilence.

As conditions in the Philippines gradually settled down to a guerilla warfare the troops were distributed at about 400 stations, necessi¬ tating an inter-island transport service. Just as everything was becoming adjusted to the new conditions which followed the dispersal of Aguinaldo's army the unfortunate ˆBoxer® outbreak took place in China. The experience already obtained enabled the department to handle the transportation question in such a way as to win the admiration of all the foreign contingent composing the Chinese relief expedi¬ tion which finally entered the sacred city of Pekin.

Following the signing of the treaty of peace with Spain it was necessary to maintain a considerable force in Cuba during the period required to establish the new government of the island upon a reasonably stable basis. Spain had for many years garrisoned the island with a force several times as large as the entire United States army. Affairs grad¬ ually assumed a normal condition and on 30 June 1901 the transport service between the United States and the islands of Cuba and Porto Rico was discontinued.

Under the American volunteer system the men were enlisted for the war with Spain under contracts calling for two years' service or during the war. With the signing of the treaty of peace it had been necessary tor Con¬ gress to authorize the enlistment of 35,000 vol¬ unteers to assist the regular army in putting down the insurrection in the

Philippines and permit of the discharge of those who had en¬ listed for the war with Spain. In its refusal to increase the regular army and its substi¬ tution of a force of volunteers whose enlist¬ ments should not extend beyond 1 July 1901, Congress found itself confronted again with

the necessity for keeping faith with the 35,- 000 volunteers, and arrangements were made to transport them home before their enlist¬ ments should expire.

The records show that more than 500,000 passengers had been safely transported across the seas, in some instances as much as 11,000 miles upon single voyages, without the loss of a passenger due to the transport service.

Following the discharge of the volunteers and a reorganization of the regular army in 1901, the number of transports was reduced by disposing of the least efficient in respect to carrying capacity and economy of operation. The vessels retained in service represented the finest types of transports then in the service of any nation. They contained all the im¬ provements suggested by several years of ex¬ tended experience and were of the tonnage deemed most economical for the peculiar service required. Until very recently when Congress authorized utilization of space for non-military freight from the congested ports of the Philippines, there was little cargo on the homeward run. The space was usually util¬ ized for coal from Nagasaki where the cheap¬ est fuel on the Pacific shores is available. The question of fuel supply for American ships in the Pacific is a very serious one and will not be solved until the coal fields of Alaska become available. Vessels of Ameri¬ can register are handicapped in several ways in their competition with Japanese ships and cheaper fuel than heretofore available on our Pacific coast is a maritime necessity.

The second occupation of Cuba required the restoration of the service in the Atlantic which was continued until the final evacua¬ tion of that island by American troops during the spring of 1909, concerning which the quartermaster-general reported : <(The move¬ ment was made without delay or casualty and the troops arrived at their final stations in the United States in good condition. The dis¬ patch and ease with which this movement was accomplished, without

instructions from this office other than general directions for opera¬ tions under the decentralization system, show conclusively the thorough efficiency with which field operations may be conducted according to that method. w

Upon conclusion of this movement the small fleet of Atlantic transports was again withdrawn from service and the vessels laid up at Newport News, Va., where they re¬ mained until the conditions in Mexico brought about the concentration of the sec¬ ond division of the army at Galveston and Texas City with a view to meeting any emer¬ gencies. The transports were speedily put in commission and assembled in the harbor of Galveston where they remained until their services were demanded for the movement of troops to Vera Cruz, and then to maintain their connection with the base of supplies. During the continuance of the revolution in Mexico transports have been used to bring home American citizens from both Atlantic and Pacific coast ports. With the withdrawal of troops from Vera Cruz the Atlantic trans¬ ports were again ordered out of commission to await the next of the recurring calls for over¬ sea service to which the American army has been so frequently summoned since the war

with Spain pushed the frontier of our altru¬ istic and trade interests beyond our territorial borders.

The Pacific transports have continued a monthly schedule of sailings between San Francisco, Honolulu, Guam and Manila. Guam is maintained as a naval station and the only regular communication is by the monthly transport going to Manila. On the homeward- bound voyage the transports sail via Nagasaki and take on coal. From Nagasaki the voyage continues direct to Honolulu and San Fran¬ cisco, passengers from Guam for the United States being compelled to make the long de¬ tours. The traffic has materially increased since the garrisons of Oahu and. Guam have been enlarged, and averages over 2,000 pas¬ sengers per month.

The Pacific fleet has continued the trans¬ portation of horses and mules on a special horse transport which has been a pronounced success from the beginning. The delivery of animals in condition for immediate service after voyages of upward of 7,000 miles con¬ tinues to elicit the admiration of the army. The laying of cables has been not the least important work of the transport service in the Philippines and Alaska. A very large and seemingly growing amount of passengers and freight has been carried for the navy and civil governments of the several island de¬ pendencies. Without the accommodations af¬ forded by the transports it would be impossi¬ ble for the families of

civil, military and naval officers and soldiers to follow them across the seas. The inter-island service in the Philippines has covered an enormous number of voyages since the occupation of those outposts began, and now the needs of the garrison at Tientsin, China, are supplied by those vessels having Manila for a base.

W hen the success of the transport service had become widely known the propriety of its continuance in competition with commer¬ cial liners was frequently under discussion and attracted the attention of Congress. The matter was settled in favor of the continuance of the transports by the enactment of legisla¬ tion at the session of 1902-03, providing that the service should not be abandoned without the consent of Congress.

William Harding Carter, Major-General, United States Army.

ARMY TRANSPORTATION. The

European War has made a radical change in the systems of army transportation. Both strategy and tactics have been affected by motor transport. The strategical mobility of troops has been increased, and they have been rendered less dependent upon lines of communi¬ cation. The increased size of armies engaging in warfare make necessary the more rapid con¬ centration of superior forces. While armies are being mobilized, concentrated and engaged in warfare, they must be fed, clothed and fur¬ nished with ammunition. The development of railroads has had a decided effect toward mak¬ ing possible the rapid mobilization and con¬ centration of armies; but, as the locomotive is tied to the rails, it necessarily follows that it cannot always move immediately with the army. So exorbitant is the demand on the sources of supply for draft animals in any modern war that the question of mechanical

transportation has become one of great mili¬ tary interest, and no military man will deny the fact that the army which can mobilize and concentrate most quickly, and can most rapidly advance after concentration, will have a de¬ cided advantage over its opponent.

It is also true that the expense of carrying on a modern war is so great that no nation can neglect to take advantage of every means that will have a tendency to shorten the war and bring about a decisive conclusion. Troops must be fed and it is hardly possible that in any

theatre of war in the future sufficient subsist¬ ence for hundreds of thousands of troops can be secured by means of forced contributions. Especially will this be true of the advancing army which will have to traverse the territory over which the retiring army has already passed, and which it has already devastated. The immense amount of ammunition expended in modern battles makes its supply more im¬ portant and difficult. The use of heavy artillery is absolutely necessary, and the transportation of this class of artillery and the ammunition for it adds another difficulty and materially in¬ creases the demands on the transportation of an army. The extensive frontage of 50 to 100 miles occupied by large modern armies in the field makes more difficult the dis¬ tribution of supplies to the smaller units. These and other considerations make it more impera¬ tive that no practical means be neglected whereby an army may more quickly and efficiently supply its parts and reduce the neces¬ sity for draft animals.

With the development of firearms has come an increase in the distance that must be ob¬ served between the parts or elements of a column on the march. With the increased size of armies has also come the necessity for the utilization of more roads in an advance or re¬ treat, as the principle still holds that only about 30,000 men may use the same road on the same day for the purposes of a march; and thus is increased the frontage of an army on the march. This has brought about the necessity for a more effective means of communication between the parts of a column and between the different columns. As the commander of an army will often be separated from some parts of his army by a distance of 40 or 50 miles, his personal observation of the conditions existing at the front are absolutely prevented unless he employs some more effective means of travel than that furnished by the horse. The signal troops, with telephone and telegraph, have sup¬ plied the means of communicating; but even these sometimes fail, and, at most, they do not furnish to the commander of the army that detailed information and that understanding of the situation which he can get from a personal observation.

Animal Transportation. — Motor vehicles deteriorate rapidly under the service demanded in war and are very vulnerable to missiles. Beyond their limited sphere of utility, other facilities for transportation must be provided. On good roads and for long drives, the motor truck is very satisfactory. On bad roads and for short hauls, horse power is more econom¬ ical and much more satisfactory. The latter must, therefore, still supply the principal means of transportation over muddy roads and ploughed fields, across streams and ditches and

up steep slopes. Experiments conducted at the University of Wisconsin have indicated that, due to the intelligence with which the horse applies his motive force, and to the flexile qual¬ ities of the latter, the efficiency of the horse as a traction agent is much higher than the horse power developed would alone indicate.

The heavy purchases of horses made by the European belligerents show clearly that experi¬ ence in the field caused a renewed recognition of the important place of the horse in the work of war. The best estimates indicate that there were purchased in the United States alone, for use in the European War, about 1,000,000 horses at an average initial price of about $170, increased by a further cost for transportation, etc., of from $115 to $130. This makes the average cost of the horse, landed in Europe, from $300 to $315. If the millions expended for horses as above did not show sufficiently their recognized importance in the face of all competition from motor vehicles, further proof of their essential place in war is found in the greatly improved arrangements, visible in all the belligerent armies, for the care and preser¬ vation of the animals and for the prompt treat¬ ment when wounded.

Railroad Transportation. — In time of war, the railroads give life to armies, provide food, clothing, materials and munitions rapidly. They give freedom and vigor in the movement of large bodies of troops, remove sick and wounded rapidly, deliver reinforcements promptly. In fact, the railroad is indispensable in utilizing a nation's forces to their greatest capacity and with the maximum effect.

Germany has a highly developed and bril¬ liantly organized military railroad service. They had on hand in 1914 at the outbreak of hostilities all material and rolling stock neces¬ sary for the transportation and concentration of men, animals and materials. Tables for the dispatch and conduct of trains were all ready. The system for handling sick, wounded and prisoners was carefully worked out. The principal reason for the superiority of the Ger¬ mans over their adversaries was that their rail¬ road systems, were perfectly organized, allowing them to mobilize much more rapidly and giving them greater mobility in operations. It might almost be said that their plans of war consisted of the judicious and intensive development of their railway systems.. There are nine railroad lines, each absolutely independent of the others, operating in the province of Lorraine. Seven days was the maximum required to put all the first line troops on the frontier, and on the 10th they invaded France. On the west front, the great bases are Diisseldorf, Cologne, Coblenz, Mayence, Mannheim, Strassburg and Leo- polsche. The bases on the east front

are Dan¬ zig, Thorn, Posen, Ostrowa, Breslau, Myslo- witz and Cracow. These great bases are linked in all their enormous extension by 800 kilo¬ metres of line separate from the nine great lines connecting the two fronts.

France had her railroad service well organ¬ ized and almost all the materials and rolling stock required was on hand. The • railroad service was divided into two divisions of sub¬ services (1) Transports over the interior sys¬ tem ; (2) transports over the army systems. The interior system receives orders from the Minister of War and the army system receives

its orders from the commander-in-chief of the army only. To insure normal functioning ot these services, <(regulating stations® were estab¬ lished in regions of notable importance and in favorable situations. An officer of the general staff had, charge of each of these stations. Hav¬ ing helped in the preparation of the general plans of mobilization, he had a perfect knowl¬ edge of the conditions to be met. Rapid trans¬ portation of artillery and its prompt entrance in great masses into the conflict is possible only if railway facilities exist and are used. When Paris was threatened, the French brought an entire army from the south in a few days.

Wagon Transportation. — Wagon trains are slow moving, excessively wasteful of road space and very vulnerable. The train guard must fight to save its convoy if attacked and its excessive length requires a large force to ensure its safety. A few mules dropped and the road is effectively blocked. Consider an auto train carrying the same quantity of stores. It will be about one-sixth the length of the wagon train. Its comparatively small cavalry escort, scouting well to the front and flanks, will notify it of danger in time to permit a counter-march and a retreat which will soon easily outdistance pursuit by even cavalry. A hundred shots might hit the truck without damaging the engines and a bullet-proof shield could easily be provided to protect the chauffeur. The empty wagons returning to the base are sup¬ posed to carry sick and wounded, to assist in the prompt evacuation of the field hospitals.

A brigade wagon train in service in the field will vary from 70 to 100 wagons and teams, ac¬ cording to the strength of the brigade, the dis¬ tance from the depots or base of supplies, the character of the roads, nature of the climate or season of the year. Such a brigade train on the

march, allowed to go at will, as the roads average, will take up a mile of road. For con¬ venience of handling it, the brigade train should be divided into three parts of from 20 to 25 wagons each. These lesser divisions of the train should march slightly separated from each other. Should they have to leave the road, or halt on the march, each separate train should pull out at the same time into a field or open space, and be parked with the mules facing the road. In such position, all the trains can simul¬ taneously pull into the road and occupy their proper space and distances without consuming time in waiting for each other. If parked with wagon tongues toward the road, the train is ready to march in either direction which neces¬ sity shall require. If the teams are parked three or four deep, that number can start si¬ multaneously at the word.

In Europe nearly all the work of transpor¬ tation from railroad is by motor. To give some idea of the extent of the transportation prob¬ lem, the example of a division may be taken. This is the administrative and tactical unit and comprises 22,665 men, 4,463 horses and 2,912 mules. The daily march averages 12*4 miles and the road space is 15.4 miles. The daily supplies of a division weigh 175,000 pounds. The net cargo in the supply trains of a division, exclusive of pack trains and artillery ammuni¬ tion, is 2,143,000 pounds. These supplies and the regularity of renewal are essential to the well-being and morale of an army.

Lines of communication comprise the base section, where supplies are accumulated and forwarded by rail and boat ; the intermediate section, comprising the transportation routes to railroad; and the advance section, where is found the great problem of the daily renewal of the supplies expended, amounting to 175,000 pounds for a division. The division supply train carries two days' food for the men and two days' forage for the animals. The division train transports supplies from the refilling point to the distributing point, whence distribution to the troops is made by the ration and field trains. On wagon transportation, capable of a daily movement of only 18 miles, a division has a very limited radius of action from railhead.

Ammunition expenditure, both artillery and small arms, is enormous, and transportation must be provided accordingly. The daily ex¬ penditure per man for small arms ammunition, formerly calculated at 240 rounds, is now cal¬ culated at 1,000 rounds per day in action. The Germans have 48 machine guns per regiment.

For efficiency in supply, proper organization must be had in the transport. In motor trans¬ port, the unit is the truck, its driver and his

helper, and the best truck for general purposes appears to be the l*4-ton truck. These units must be organized into companies. Companies must be limited to the number of trucks that can be properly supervised by one man, and also to the number that can be properly served by one supply and repair truck. In addition to the supply and repair truck, arrangements must be made for shops where more extensive re¬ pairs can be made.

The most convenient and efficient division supply train is made up of two units, each com¬ prising 60 baggage trucks, 1*4 ton; three fuel supply trucks ; three repair trucks ; one office truck ; four high-speed cars for officers ; eight motorcycles. This corresponds to an organiza¬ tion of squads of five trucks, two squads to a section, two sections to a platoon and three platoons to a company, with a personnel of a captain, three lieutenants and 154 men.

Edward S. Farrow, Consulting Civil and Military Engineer.

ARMY-WORM, the caterpillar of the moth Leucania unipunctata. The adult meas¬ ures about one and a half inches across the expanded wings, which are dull brown, the anterior pair bearing near the centre a small white dot which has suggested the specific name. Like most moths, this species flies at night and, in seasons when they are specially abundant, are the most commonly captured insects at lights and baits of sugar or syrup, of which they are very fond. The eggs are usually con¬ cealed on herbage in fields, especially where vegetation is luxuriant, as in wheat fields. Un¬ less checked by enemies the caterpillars quickly reach maturity, pupate a short time under ground, emerge, pair and lay eggs from which a larger brood than the first is hatched. This brood, after devouring every green thing soft enough to eat, spread destruction as they march, army-like, from the place where they were hatched to fresh feeding grounds. When full grown these larvae pupate; some for only a short time, others until the following spring. The former lay eggs for a third brood of cater¬ pillars which endeavor to pass the winter as

larvae, so that larvae, pupae and adults may be found throughout the year. The caterpillars attain a length of about two inches, are dark gray, striped with light yellow and green. 1 hough annually common east of the Rocky Mountains they are generally so well controlled naturally that their depredations are insignifi¬ cant, and usually when

they do become a pest their enemies so quickly master them that they very rarely are troublesome in the same locality two years in succession. The most important of these enemies are fungous diseases and, especially, parasitic insects. Artificial controls are almost all mechanical. Occasionally the larvae of the first brood may be noticed in time to apply an insecticide (q.v.) such as Paris green mixed with soap-suds instead of water to make it more adhesive to the grass ; but usually the safest plan is promptly to bury the crop by plowing, or to burn it. If migration has started a strip of land should be ploughed across the line of march, harrowed and rolled constantly to crush the worms, or kerosene emulsion, di¬ luted only five times, must be sprayed upon the advancing worms and also upon their recent feeding ground. The name army-worm is given to other species of caterpillars, especially to Laphygna frugiperda, which is better known as grass-worm. Consult (Third Report) United States Entomological Commission (Washington 1883) ; (Bulletin 133 J Cornell Experiment

Station.

ARN, ARNO or AQUILA, bishop and archbishop of Salzburg: b. c. 750; d. 24 Jan. 821. Entering the Church at an early age, he became abbot of Elnon or Saint Amond. In 785 he became bishop of Salzburg, and in 787 was an envoy to Charlemagne at Rome for Tassilo III, Duke of the Bavarians. The Frankish King made Salzburg an archbishopric in 798 and Arno became first archbishop metropolitan of Bavaria and received the pallium from Pope Leo III. From that time he began to take an active interest in the government. He spent some time at the court of Charlemagne; estab¬ lished a library at Salzburg and presided over several synods for the improvement of the condition of the Church in Bavaria. With the aid of a deacon named Benedict, Arn drew up a catalogue of lands belonging to the Church of Bavaria under the title of (Vol. VII, edited by L. Rockinger, Munich 1856). W. Von Giese- brecht considers Arn the author of an early history of the Frankish kings from 741-829, in (Annales Laurissenses majores,* an edition of which appears in (Monumenta Germanise his- torica Scriptores) (Vol. I, pp. 128-31, ed. by G. H. Perz, Hanover 1826). This work is the first to apply the name «Deutsch)) to the German language.

ARNA, or ARNEE, ar'ne, large animal of the ox genus, a native of India and the Indian Archipelago. See Buffalo.

ARNAULD, ar-no', ancient noble family, among whose most distinguished members are the familv of Auvergne. (1) Angelioite: b. Paris, 24 Nov. 1624; d. 24 Jan. 1684. She was

the granddaughter of the great Arnauld and was abbess of the famous nunnery of Port Royal from 1678. Consult Lives by Martin (1876); Monlaur (1901) and (Angelique of Port RoyaP (1905). (2) Antoine: b. Paris

1560; d. 1619. He was a zealous defender of the cause of Henry IV, and was distinguished for several political pamphlets and for his powerful and successful defense of the Univer¬ sity of Paris against the Jesuits in 1594. He drew on himself the hatred of the Jesuits, but was esteemed the greatest lawyer of his time. His numerous children formed the nucleus of the sect of the Jansenists (see Jansenius) in France. (3) Antoine, called the ((Great Ar¬ nauld,® youngest child of the lawyer Antoine Arnauld: b. Paris, 6 Feb. 1612; d. Brussels, 9 Aug. 1694. He devoted himself to theology, and was received in 1641 among the doctors of the Sorbonne. In the same year he attacked the Jesuits in two works, (De la frequente Com- munioiP and (La Theologie Morale des JesuitesP the first of which occasioned much controversy because it applied the principles of the Jansenists to the receiving of the sacrament. After 1650, when Jansenism had become an object of public odium and the watchword of an important party in the state, Arnauld en¬ gaged in all the quarrels of the French Jan¬ senists with the Jesuits, the clergy and the government, was their chief writer and was considered their head. The intrigues of the court occasioned his exclusion from the Sor¬ bonne (1656) and the persecutions which com¬ pelled him to conceal himself. After the recon¬ ciliation between Pope Clement IX and the Jansenists, in 1668, he appeared in public and enjoyed the homage which even the court did not refuse to his merits and talents. He now attacked the Calvinists in many controversial tracts ((Renversement de la Morale de Jesus Christ par les Calvinistes *; (L'impiete de la Morale des CalvinistesP etc.), and with his friend Nicole composed the great work, (La Perpetuite de la Foi de 1'Eglise Catholique touchant l'Euchariste,* in opposition to them. On account of the new persecutions of the court, or rather of the Jesuits, he fled, in 1679, to the Netherlands. He was a man of a vigor¬ ous and consistent mind, full of solid knowledge and great thoughts ; in his writings, bold and violent to bitterness, undaunted in danger and of irreproachable morals. His works were pub¬ lished at Lausanne between 1775 and 1783, and again at Paris in 1843. There is no modern biography. For his philosophy consult Bouil- lier, (Histoire de la philosophic cartesienne) (Paris 1868) ; and for his mathematical achieve¬ ments consult Bopp, (Abhandlungen zur Ge- schichte der mathematischen Wissenschaften) (Leipzig 1902). (4) Jacqueline Marie, sister

of the preceding, a French nun better known as Marie Angelique de

Sainte Madeleine. She was famed for piety and was prominent among the Jansenists. She was prioress of Port Royal. Consult Life by Martin (1873).

ARNAUT KEUI, koi, a village on the European side of the Bosporus, five miles northeast of Constantinople, of which city it is a suburb. It is built on the site of the Byzantine Michaelion, where stood the more ancient Hes- tiae. The name Michaelion was derived from the church erected there to Saint Michael by Constantine and rebuilt by Justinian. It was

broken down by Muhammad II, who used the materials for building the citadel at Rumeli

Hissar.

ARNAUTS, ar 'nats, or ALBANIANS.

See Albania — History.

ARNDT, arnt, Ernst Moritz, German poet and patriot : b. Schoritz, on the Island of Riigen (then Swedish territory), 26 Dec. 1769; d. Bonn, 29 Jan. 1860. His father was a prosperous peasant and gave his son a good schooling with the object of training him for the ministry. He finished his studies at Greifswald and Jena, after which, deciding that he did not want to enter the clerical profession, he visited many other countries. In 1806 he was appointed professor of history at Greifswald. Here he wrote (Der Geist der Zeit) (1807), in which he attacked Napoleon with such boldness that after the battle of Jena he was obliged to flee to Sweden. Three years later he was able to return to his pro¬ fessorial work. In 1812, however, he was again obliged to leave the country and this time, on the invitation of Baron von Stein, he went to Russia. After the defeat of the French in Russia in that same year he re¬ turned to Prussia where he continued to ad¬ vocate German unity. He was in the midst of the agitation that resulted in the War of Liberation which culminated in the battle of Leipzig. His writings, full of energy and fire, roused the German patriots during this period and several poems which he wrote then were put to music and sung by the soldiers ; since then several of them have become national songs. Most notable of these, WVas ist des Deutschen Vaterland?, *is now sung wherever German is spoken. In 1817 he married the sister of Schleiermacher, the great liberal preacher and theologian. The*

following year he was appointed professor of history in the newly-established University of Bonn, but his liberal views brought him into disfavor with the authorities and two years later he was suspended. The next 20 years of his life was spent in retirement. On the accession of Frederick Wilhelm IV to the throne of Prus¬ sia he was, in 1840, restored to his professor¬ ship at Bonn. In 1848 he was one of the deputation to offer to the King of Prussia the crown of Imperial Germany. Arndt's fame rests rather on his ability to rouse the fires of enthusiasm in others than on any great talents displayed in his work. He was im¬ mensely popular in his time and his popularity was •founded on such sincere and true personal qualities that it has never since quite died out. His chief works are (Marchen und Jugender- innerungen) (1818) ; (Versuch einer Ge- schichte der Leibeigenschaft in Pommern und Riigen) (1803); (Deutscher Volkskatechis- mus) (1812) ; (Was bedeutet Landwehr und Landsturm?) (1813) ; (Der Rhein, Deutsch- lands Strom aber nicht Deutschlands Grenze> (1813); (Erinnerungen aus meinem aussern Leben) (Leipzig 1840). The latter work forms the basis of E. M. Seeley's (Life and Adventures of E. M. Arndt (1879). Vari¬ ous biographies have been written, the best being by Schenkel (Elberfeld 1869), Langen- berg (Bonn 1869) and Bauer (Hamburg

1882).

ARNDT, or ARND, Johann, German

Protestant theologian : b. Ballenstedt, Anhalt,

27 Dec. 1555; d. Celle, Hanover, 11 May 1621. After having studied at Wittenberg, Strass- burg and Basel, he was made pastor at Bade- born, Anhalt, 1583. This place he filled for seven years, when because of a dispute with Duke John George over procedure in the rit¬ ual he was deposed. He was, however, soon able to find another place at Quedlinburg, but here he was so much disliked by the townspeople that in 1599 he left, going then to Brunswick. In 1611 he was appointed gen¬ eral superintendent at Celle, Hanover, where he remained until his death. His chief works are (True Christianity) (1610) ; (Garden of Paradise* (1612). The best English transla¬ tion of the first is that edited by Charles F. Schaeffer (1868). Of the latter the best Eng¬ lish translation is by A. W. Boehm (1716).

ARNDT, Wilhelm, German historian : b. Lobsens, Posen, Prussia, 1838; d. 1895. He was graduated from the University of Got¬ tingen and became connected with the Uni¬ versity of Leipzig. For many years he was a collaborator on the * Monumenta Germanise Historical His chief works are (Kleine Denkmaler aus der Merowingerzeit) (1874) ;

(Schrifttafeln zur Erlernung der lateinischen Palaographie* (1874, 3d ed., 1898).

ARNDTS VON ARNESBERG, Ludwig,

German jurist: b. Arnsberg, Prussia, 19 Aug. 1803 ; d. Vienna, 1 March 1878. He wras first appointed professor of jurisprudence at Bonn, then held the same position at Breslau, Mu¬ nich and finally, in 1855, in Vienna, where he remained until his death. In 1848 he was a member of the National Assembly at Frank¬ furt where he advocated strongly the right of Austria to enter the German Confederacy. In 1871 he was knighted by the Emperor of Austria. His chief works are (Lehrbuch der Pandekten) (14th ed., 1899) ; (Juristische En- cyclopadie und Methodologie *(9th ed., 1895) ; (Die Lehre von den Vermachtnissen* (3 vols., 1875) ; (Gesammelte zivilistische Schriften' (3 vols., 1874) ; UCritische Uberschan der deutschen Gesetzgebung und Rechtswissen- schaft) (in collaboration with Bluntschli and Pozl, 8 vols., 1854).

ARNE, arn, Thomas Augustine, English composer: b. London, 12 March 1710; d. 5 March 1778. His father, a prosperous trades¬ man, sent him to Eton, then to law school. But even while studying law Arne devoted most of his leisure to music, becoming an ac¬ complished violinist. Finally, however, he de¬ cided to abandon the legal profession in favor of his music. His first notable composition wˆas the opera (Rosamond, > which was produced with great success in 1733. His next work, which was even a greater success, displaying a more fluent technique, was the comic opera, (Tom Thumb, or the Opera of Operas,* which was produced, together with (Comus,) in 1738. His success encouraged his sister to cultivate her voice and she afterward be¬ came a famous singer under the name Mrs. Cibber. In 1736 he married a popular singer, Cecilia Young. With her he made a very successful two years' tour of Ireland after which, in 1745, he became composer for the Drury Lane Theatre. «Rule Britannia" (q.v.), the British national air, is his composition!

ARNETH

ARNIM

311

In 1762 he produced ' Artaxerxes,' an opera in the Italian style, but his talents were not adapted to dramatic effects in music. His most successful pieces were simple melodies and glee songs. The music to Garrick's (Ode to Shakespeare,' played in 1760 for the jubilee at

Stratford1on-the-Avon, was by him. Consult Horner, (Life and Works of Dr. Arne) (London 1893).

ARNETH, Alfred, Ritter Von, Austrian historian: b. Vienna, 10 July 1819; d. there, 30 July 1897. From 1848-49 he represented the dis¬ trict of Neuenkirchen at the Frankfort Par¬ liament ; in 1861 was elected to the Diet of Lower Austria ; in 1868 was made director of the state archives and president of the Academy of Sciences (1879). His chief works are (Prinz Eugen von Savoyen) (3 vols., 1864) ; (Geschichte der Maria Theresia' (10 vols., 1863-79) ; (Korrespondenzen von Maria Theresia, ' of Marie Antoinette, Jo¬ seph II, Leopold II, Katharina von Russland, etc.; (Graf Cobenzl und seine Memoiren' (1885) ; 'Anton, Ritter von Schmerling' C 1895 S ; (Aus meinem Leben) (2 vols., 1893).

ARNHEM, or ARNHEIM, Holland, town in the province of Gelderland, on the right bank of the Rhine, 35 miles southeast of Utrecht. It was once fortified but the forti¬ fications have been converted into public walks. The environs of Arnhem being more agreeable than those of almost any other town in Holland, it is much frequented by summer visitors. Among the chief buildings may be mentioned the Groote Kerk, or high church, containing the fine monument of Charles, Duke of Egmont ; the Prinzenhof, the town-house and the barracks. Its manufactures consist of cabinet wares, mirrors, carriages, mathe¬ matical and physical instruments, etc., and there are numerous paper-mills in the neigh¬ borhood. Its trade partly direct in grain and partly transit to Amsterdam, Rotterdam, etc., is important. In the Middle Ages it was a member of the Hanseatic League. It was taken by the French in 1672. In 1795 it was again stormed by the French who were driven from it by the Prussians in 1813. Pop. (1910)

65,685.

ARNICA, genus of plants belonging to the natural order Composite ?, and containing 18 species, mostly northwest American. The most important species is arnica montana, a perennial herb found in upland meadows _ in western and central Europe but not extending to Britain. It yields an essential oil in small quantity and a resinous matter called arnicin, C12H22O2, a yellow crystalline substance with an acrid taste. The tincture prepared from it is an old remedy which has a popular repu¬ tation in the treatment of bruises and sprains.

ARNIM, ar'mm, Elisabeth von, more generally known as Bettina, German writer, sister of Clemens Brentano and wife of Lud¬ wig Achim von Arnim: b. Frankfort-on-the- Main, 4 April 1785; d. Berlin,

20 Jan. 1859. Even during her girlhood, most of which was spent in a convent, she showed signs of that eccentricity which characterizes her work. She is more generally known, however, on account of her relations with Goethe and the publication of her correspondence with him in the form of a book entitled (Goethes Brief-

wechsel mit einem Kindc> (1835). This work, though for long accepted as genuine, proved largely fictitious. Genuine sonnets by Goethe quoted in it were not addressed to her, but to Minna Herzlieb. In some of her other works, asˆin (Dies Buch gehort dem Konig' (1843), and its sequel, 'Gesprache mit Da- monen' (1852), she attempts to expound cer¬ tain sociological and political theories of her own. Her supposed correspondence with Goethe was translated into English by her¬ self. Her other wTorks are 'Die Gimderode' (1840); (Klemens Brentanos Friihlingskranz) (1844); (Ilius Pamphilius und die Ambrosia' (1848). Her collected works were published in Berlin (11 vols., 1853). Her youngest daughter married Herman Grimm. (See Des Knaben Wunderhorn). Consult Dege, M., 'Bettina von Arnim' (Kiel 1904); Oehlke, W., 'Bettina von Arnims Brief romane' (Ber¬ lin 1904).

ARNIM, Harry Karl Kurt Eduard Von,

German diplomatist : b. Pomerania, 3 Oct. 1824; d. Vienna, 19 May 1881. In 1864 he was appointed Prussian envoy at the Papal court. In 1869 he proposed that the govern¬ ments should appoint representatives to be present at the Vatican Council, a suggestion which was rejected by Bismarck. After the recall of the French troops from Rome he attempted unsuccessfully to mediate between the Pope and the Italian government. In 1871 he was appointed German commissioner to arrange the final treaty with France, a task which he carried out with such success that he was appointed German envoy at Paris and in 1872 became Ambassador. Differences soon arose between him and Bismarck, but the latter was unable to recall him because of the great influence which he enjoyed at court and the confidence which the Emperor reposed in him. By the Conservatives he was regarded as Bismarck's successor. In 1874 he was recalled from Paris and soon after was arrested on the charge of embezzling state papers. He was condemned to three months' imprisonment, which he avoided by leaving the country. In 1875 at Zurich he published a pamphlet in which he attempted to show that the attack on him was caused by Bismarck's personal jealousy. He made re¬ peated attempts to be allowed to return to Germany; his request had just been granted when he died.

ARNIM, Ludwig Achim von, German poet and novelist: b. Berlin, 26

Jan. 1781; d. Wiepersdorf, 21 Jan. 1831. He studied at Gottingen, being especially interested in the natural sciences. He first attained popularity by writing, in collaboration with Clemens Brentano, a collection of old German folk songs under the title ‘Des Knaben Wunder¬ horn’ (1808-19). In 1811 he married Bren- tano’s sister, Elisabeth, who herself gained some popularity as a writer (see Arnim, Elisabeth von). His novels are character¬ ize! by a fantastic imagination of great origi¬ nality especially marked in ‘Theorie der elek- trischen Erscheinungen’ (Halle 1799) and ‘Hollins Liebeleben’ (1802). His other works are ‘Ariels Offenbarungen’ (1804) : ‘Der Wintergarten’ (1809) ; ‘Die Grafin Dolores’ (1810); ‘Halle und Jerusalem’ (1811);

(Isabelle von Agypten *(1811) ; (Die Kronen- wachter* (1817). His works were collected and published with an introduction by Wil¬ helm Grimm (20 vols., 1839ˆ4-8). Consult Hartmann, M., (L. von Arnim als Dramatiker) (Breslau 1910).

ARNIM-BOYTZENBURG, Hans Georg Von, German general and diplomatist: b. Boytzenburg 1581 : d. Dresden 1641. He took part in the Russian War on the side of Gustavus Adolphus and afterward, fought with Poland against the Turks. He is chiefly known through his attachment for Wallen¬ stein, by whom he was induced in 1626 to join the imperial forces in spite of his Protestant convictions. He rose rapidly to the rank of field marshal. When Wallenstein was dis¬ missed and German Protestantism was tot¬ tering he quit the imperial service for that of the Elector of Saxony. He fought on the side of the Swedes at Breitenfeld (1631), at the head of the Saxon army, and was active in forming an alliance of these two powers in the cause of their common religion. The re¬ appearance of Wallenstein caused him to hes¬ itate and open negotiations, without conceal¬ ing his plans from Gustavus. After the death of that King he renewed overtures to Wallen¬ stein. But on the assassination of his former commander he began active operations once more. He won an important victory at Lieg- nitz in 1634, but became more estranged from the Swedes. The peace of Prague witnessed his withdrawal from active life. In 1638 he was imprisoned in Stockholm by the Swedes, but having made his escape, he returned to Saxony and died in the midst of plans to raise an army to liberate German soil from foreign armies. Consult Helbig, K. G., (Wallenstein und Arnim > (1850) and (Der Prage Friede* (in Raumer’s (Historisches TaschenbuchC 1858) ; Kirchner, E. D. M., (Das

Schloss Boytzenburg) (1860) ; (Archiv fur die sach- siche Geschichte) (Vol. VIII, 1870).

ARNO (anciently Arnus), one of the lar¬ gest rivers of Italy. It divides Tuscany into two parts and rises in the Apennines on the east of Florence on the border of Romagna, 15 miles west of the sources of the Tiber. It then turns southward toward Arezzo, after which it runs westward through Florence and enters the Mediterranean four miles below Pisa. In ancient times Pisa was situated at the mouth of the river. Near Arezzo the Arno is connected with the Tiber through the canalized portion of its tributary, the Chiana. It is navigable for barges as far as Florence. In many places its banks are protected by dykes because of the frequent rises to which it is subject. From any hill in the neighbor¬ hood of Florence the view into the valley of the Arno is charming. The entire course of the river is about 140 miles.

ARNOBIUS (called <(Afer,® sometimes ((the Elder®), a teacher of rhetoric: b. Numidia, Africa; flourished about 300 A.n. At first he was a fierce opponent of Christianity; but he was converted and wrote seven books, (Adver- sus Nationes) (or Gentes), in which he seeks to refute the charge of his contemporaries that Christianity was the cause of all misery in the world. To this point he devotes books I and II. The other books are a polemic against

heathenism, showing in III, IV and V the folly and immorality of the polytheistic mythology; while VI and VII speak of the heathen temple and sacrificial service. When the work was composed cannot be stated exactly, but prob¬ ably it was after 303. Arnobius was neither a clear thinker nor a skillful writer. The work lacks a comprehensive knowledge of the Scrip¬ ture and is influenced greatly by Lucretius and Plato. Greek mythology he knew only from the (Protrepticus) of Clement of Alexandria, and Roman mythology from the writings of Cornelius Labeo. His naive modalism is merely the expression of a very superstitious senti¬ ment, and his notions concerning the origin, nature and continuance of the soul have any¬ thing but a Christian-ecclesiastical color. He is, on the whole, a tedious author. The work was edited by Migne in (Patrologia Latina> (Vol. XIV, p. 399) ; by Reifferscheid in the (Vienna Corpus Scripti Ecclesiastici LatinE (1875, English translation with bibliography in (Ante-Nicene Fathers,) Vol. VI, 1887). Con¬ sult Moule, H. C. G., in dictionary Christian* Biography J (Vol. I) ; Herzog-Hauck, (Real- encyklopadie) ; Kruger, G., (Early Christian

Literature) (with bibliography, p. 304) ; Spind- ler, (De Arnobii genere dicendE (Strassburg 1901) ; Scharnagl, (De Arnobii majoris

latinitate) (Gorz 1894-95).

ARNOBIUS THE YOUNGER, Chris- tian priest or bishop in Gaul, who flourished aoout 460 a.d. He is the reputed author of certain writings, concerning which scholars are not agreed, except that they belong to the 5th century. They include (Commentarii in psalmosC which are usually thought to be the work of a semi-Pelagian Gaul, though they may have been written in Rome; (Adnotationes ad qusedam evangeliorum locaE which seems to have been used in the supposed gospel-commentary of Theophilus of Antioch; and (Arnobii catho- lici et Serapionis conflictus de Deo trino et unoE The so-called Consult Zahn, (Forschungcn zur Geschichte des Kanons} (Vol. II, pp. 104- 19) ; Baiimer. S. (in (Der KatholikE Vol. II, pp. 398-406, 1887).

ARNOLD, Abraham Kerns, American soldier: b. Bedford, Pa., 24 March 1837;

d. 1901. He was educated at West Point, and commissioned 1st lieutenant, Fifth Cavalry, 17 July 1862. Lie was brevetted captain for gal¬ lant and meritorious service in the battle of Gaines' Mill, Va., and major for similar service at the battle of Todd’s Tavern, Va. He re¬ ceived a congressional medal of honor for gal¬ lantry in action at Davenport Bridge, Va., 18 May 1864. He commanded the field operations in southeastern Arizona against the Apaches in 1879, and against the Crows in 1887. During the Spanish- American War he commanded the 2d Division of the 7th Army Corps in Cuba. He wrote (Notes on Horses for Cavalry Service > (1869).

ARNOLD, Sir Arthur, an English states¬ man and author: b. 1833; d. 1902. He acted as assistant commissioner to administer the public works acts during the cotton famine, 1863-66, and afterward wrote (The History of the Cot¬ ton Famine.) Other literary productions have

been (From the Levant) (1868) ; (Through Persia by Caravan) ; (Social Politics } ; and

(Free Land.’ He sat in Parliament as a Lib¬ eral member for Salford, 1880-85. Established and was president of the Free Land League from 1885 to 1895; was chairman London county council, 1895-96, and was knighted in June 1895. H-e was a brother of Sir Edwin Arnold (q.v.).

ARNOLD, Benedict, a colonial governor of Rhode Island: b. England, 21 Dec. 1615; d. 20 June 1678. He was a leader of the opposi¬ tion to Samuel Gorton's settlement at Pawtuxct, 1641. His knowledge of Indian languages en¬ abled him to effect important negotiations with the Indians in 1645. In May 1657 Arnold suc¬ ceeded Roger Williams as president of the colony, and upon the granting of the royal charter to the colony in 1663 was made the first governor, being re-elected in 1664, 1669, 1677, 1678. He took an active part in the reconcilia¬ tion and union of the two colonies of Rhode Island and the Providence plantations. The famous windmill at Newport, whose erection was long ascribed to the Northmen, appears to have been built by him.

ARNOLD, Benedict, American general, commonly known as <(The Traitorˆ: b. Nor¬ wich, Conn., 14 Jan. 1741 ; d. London, Eng., 14 June 1801. He descended from a leading Rhode Island family; was fairly educated. He was early noted for athletic prowess, reckless daring and resource, and as a man displayed a proud, passionate, uncontrolled nature, quickly responding to affection or resentment. He be¬ came a druggist and bookseller in New Haven at 21 ; prospered, and embarked in the West India trade. At the news of the battle of Lexington he armed a body of 60 volunteers, marched to Cambridge and proposed the cap¬ ture of Ticonderoga and Crown Point. The Massachusetts Provincial Congress gave him supplies therefor, a commission as colonel and authority to raise troops ; but finding at his recruiting ground that an expedition had al¬ ready started, he hastened after it and claimed command under his commission. As the com¬ mander was Ethan Allen, both Allen and the troops declined to pay any attention to it ; and Arnold under protest accompanied it as a vol¬ unteer and entered Ticonderoga beside Allen. Four days later he was joined by a band of his own, and at once sailed down Lake Champlain and captured Saint John's.

Refused the command of the captured forts, he returned to Cambridge, proposed to Wash¬ ington an expedition against Quebec, and on 11 September left for the Kennebec with 1,100 men, to cross the divide between its head¬ waters and the early Chaudiere. After a fearful march through sleet storms, frozen lakes, rapids and forests, he reached Quebec 13 No¬ vember, scaled the heights to the Plains of Abraham and dared the garrison of thrice his numbers to come out and fight. They refused, and reinforcements from Sir Guy Carleton com¬ pelled him to fall back. On the arrival of Montgomery the two undertook an assault (31 December) in which the latter was killed and Arnold's leg shattered, but he still blockaded the place till relieved by Wooster in April. Mean¬ time he had been commissioned brigadier-gen¬ eral and given command of Montreal. On the

expulsion of the United States troops from Canada, the British planned an invasion by way of Lake Champlain, and Arnold went to Ti¬ conderoga and spent the summer building a fleet to bar their way. On 11 October he fought one of the most obstinate and heroic naval battles in our history, near Valcour Island off Plattsburg. Hopelessly outnumbered, he never¬ theless escaped with the most of his boats and all of his men. The British retired to Montreal, and the Americans sent Washington the 3,000 men which enabled the battles of Trenton and Princeton to be fought.

One of Allen's men, whose promotion had been opposed by Arnold on the ground that he had plundered officers' baggage in Canada, brought counter-charges of malfeasance against him in December, which the board of war pro¬ nounced ((cruel and groundless. w But Congress in making five new major-generals, 19 Feb. 1777 passed over Arnold, the senior brigadier, on the ground that Connecticut had two already, and appointed Stirling, Mifflin, St. Clair, Stephen and Lincoln, all of whom together had not a tithe of Arnold's abilities or achievements. He had a right to be enraged ; but he contented himself with asking to be made ranking officer as before; offered to serve under his juniors for the present; and in Tryon's invasion of Connecticut in April, did such splendid deeds that Congress for very shame gave him the major-generalship, but still left him at the foot. Meantime he was in pressing need of having his claims against Congress settled. Pay and supplies were hard to extract from that body, and Arnold, in his Canadian expedition and elsewhere, had used his own money freely and pledged his credit repeatedly to keep the move¬ ments from utter collapse for lack of them. But the claims were large, Congress was suspicious and dilatory, Arnold's business was half ruined and he needed the money. He was at Philadel¬ phia, seeking restoration of his rank, and, his patience exhausted at the refusal of Congress to act in his behalf, had asked permission to resign, when Burgoyne's invasion of 1777 loomed up imminent, and Washington wrote urgent and repeated requests to Congress to send Arnold north to oppose him. Soothed by this flattering request, he withdrew his resigna¬ tion and hastened north. In this crisis, it is to him that the country owed its salvation. By a decoy, messenger he scattered St. Leger's army in a panic, its Indian allies turning against it and butchering the whites as they retreated. He then foiled Burgoyne's flanking attempt at Freeman's farm 19 September, unsupported by Gates, and in the final battle of 7 October, took command without official right and routed Bur¬ goyne's army. This victory gained for the United States the French alliance, and ulti¬ mately the surrender at Yorktown. During the engagement Arnold's leg was shattered and

he remained in Albany disabled till spring. On 20 Jan. 1778, Congress restored him his senior rank.

In June he was given command of Philadel¬ phia, where he became engaged to a beautiful girl of a loyalist family, Margaret Shippen. The testimony is conclusive that she had nothing to do with his fall ; but her family and the always powerful loyalist society of Phila¬ delphia had for the next two years a great in¬ fluence over him. The prospects of the United

States grew so bad that even Washington well- nigh lost all hope ; the English government offered such seductive proposals that many pa¬ triotic citizens considered it wanton wickedness to prolong bloodshed and misery, when all that the war was waged to obtain was offered with fair guarantees. Congress was so faction-rid¬ den and incompetent that many more thought the future of independenceˆ most calamitous even if it could be obtained ;* the soldiers were unpaid and unclothed, deserting fast and near¬ ing a dangerous mutiny which soon broke out. In this state of things, every influential officer at odds with Congress was besieged with ex¬ pressions of loyalist opinion, and Arnold was in the thick of all that could shake his resolution. As always, he lived beyond his means, and as always he was in bitter feud with the other powers. He had determined to retire and settle on a New York land grant, when he was as¬ sailed with a series of charges by the State authorities, headed by Joseph Reed, president of the executive council. Most of the charges were frivolous, but two — that he courted the loyalists at the expense of the patriots, and that he had used his position to make illegal purchases — were serious. A committee of Congress acquitted him absolutely except on two foolish counts, and advised ignoring them. Arnold was satisfied and resigned his command. Reed protested on the ground that he had more evidence, a fresh committee referred the charges to a court-martial, and Arnold spent month after month urging a speedy trial. Reed with equal pertinacity delayed his ˆevidence® till more than a year after the first indictment ; the court-martial returned its verdict 26 Jan. 1780. The court returned the same verdict as the committee, but recommended that Arnold be reprimanded for two frivolous counts, and Washington was compelled to discharge this odious office. He did it in the mildest of terms, however, and offered Arnold the post of honor in the next campaign.

But it was too late; the public disgrace im¬ posed on Arnold after his magnificent services, wounds and losses filled him with determina¬ tion for revenge, justified to himself by the reasons above stated. Inviting examples were put before him : chiefly of Monk, who had re¬ stored Charles II and been rewarded by honors and gratitude ; more pertinently, of Marlbor¬ ough's betrayal of James II by taking his whole army over to William ; and others. He really seems to have argued himself into believing that he should be playing the part of a patriot by ending the war at a blow, restoring peace and prosperity, giving the colonies a much better government than they had now or before the war, and practically secure independence under the English offers ; and that this once done, all parties would thank and honor him, as he could control negotiations with the English govern¬ ment. This decisive blow would be the putting of the English in control of the Hudson, gain¬ ing at a stroke the object of Burgoyne's and other campaigns, — severing the New England colonies from the rest and giving the enemy New York, the central colony. For this end he asked of Washington the command of West Point, the key of the Hudson, with its mass of military stores ; the colonies could hardly hold out after such a loss, aside from the strategic gain. He pleaded ill health for asking this in¬

stead of the proffered command; and Washing¬ ton accorded it to him. After the capture of Andre he escaped to the Vulture, and issued a proclamation justifying himself and asking his countrymen to do likewise, making glowing offers to deserters. The British made him a brigadier-general, and on 20 December he sailed for the James River, where he burned Rich¬ mond, entrenched himself for the winter at Portsmouth and in June 1781, returned to New York. In September he was ordered to raid New London, Conn., 14 miles from his birth¬ place. He burned a quantity of shipping and stores, which set fire to and partially destroyed the town; and the ˆmassacre" of Fort Griswold was achieved by a detachment on the other side of the river Thames.

Shortly after the surrender of Cornwallis in October, he was sent to London to confer with the ministry on the further conduct of the war. The King and the court received him well ; but the Liberals denounced him as bitterly as the Americans, and a large share even of the Tories distrusted a renegade and detested a betrayer of his trust. The officers in the British army despised a colonial as heartily as in Brad- dock's days, and therefore it was found im¬ possible to give him the employment in the army he eagerly coveted. In 1787 he removed to New Brunswick and engaged in the West India trade, with two sons; but in 1791 he returned to London. The next year he fought a bloodless duel with the Earl of Lauderdale, for a stinging insult of the

latter in debate in the House of Lords. In 1794 he went to the West Indies to settle, but the Anglo-French wars made it impossible, and he was twice ex¬ tricated from great personal danger by his alert resource. He rendered great service to the British commanders and in 1795 was thanked by the committee of West India planters, with the wish that he might remain in public service. He also formulated plans for the British cap¬ ture of the Spanish West Indies; and in 1798 asked for military service, but his request was not granted, even after personal solicitation. The refusal helped greatly to break him down ; his unthrifty habits had drained his purse and he had intense pecuniary embarrassments. He was active in fitting out privateers, a specula¬ tion which gave him more anxiety than profit ; and he died at 60, a worn-out, harassed, un¬ happy man, seeing that his crime was also a colossal blunder. But that he had first saved the country he tried to ruin, that he was grossly wronged and greatly tempted on his best as well as on his worst side, and that he deserves far more pity than hate, cannot be doubted. Consult <Lives) by Sparks (Boston 1838) ; I. N. Arnold (Chicago 1880) ; Todd (New York

1903).

ARNOLD, Bion Joseph, American elec¬ trical engineer : b. Casnovia, Mich., 14 Aug. 1861. After graduating from Hillsdale College, in 1881, he studied at Cornell and the Univer¬ sity of Nebraska. He then became an inde¬ pendent consulting engineer, and as such be¬ came widely known as a traction expert. In this capacity he was connected with the building of the New York subway, the rebuilding of the Chicago street railway system and the electri¬ fication of the New York Central lines. He was one of the first to introduce the use of alternating current and single phase traction

systems, and he was the inventor of a great number of devices for use on electric railways. In 1903 he became president of the American Institute of Electrical Engineers.

ARNOLD, Sir Edwin, English poet and journalist: b. Gravesend, 10 June 1832; d. 24 March 1904. He graduated from Oxford in 1854; taught for a while in Birmingham; and became principal of the Sanskrit College at Poona, near Bombay, where he rendered im¬ portant service to the government during the mutiny in India. Returning to London in 1861, he joined the editorial staff of the Daily

Tele¬ graph. In 1888 he was made K. C. S. I. After 28 years of successful newspaper work, he be¬ gan in 1889 a series of rambles in the East, of which he has left vivid and picturesque ac¬ counts in his books of travel. He frequently visited Japan and was attracted by the social and artistic side of Japanese life. He twice visited the United States on lecture tours. Of his original poetry, inspired by Oriental themes and legends, the most famous work is (The Light of Asia, a Poetic Presentation of the Life and Teaching of Gautama) (1876). (Indian

Idylls J (1883) ; (Pearls of the FaitlP ; (Sa'di in the Garden5 ; (The Light of the World5 ; (Potiphar's Wife) ; (India Revisited) ; (Japon- ica), and (The Tenth Muse and Other Poems) ; East and West) (1896) ; (The Voyage of Itho- baP (1901), are among his many works. The popularity gained by (The Light of Asia> was not sustained by the appearance of his later poetical works. See Light of Asia, The.

ARNOLD, Edwin Lester, English author, son of Sir Edwin Arnold. He has written (A Summer Holiday in Scandinavia5 (1877) ; (On the Indian Hills5 (1881) ; (Bird Life in Eng¬ land5 (1887) ; (England as She Seems5 (1888) ; the novels (Phra the Phoenician5 (1890), and (The Story of Ulla5 (1895) ; (Lepidus, the Centurion,5 etc.

ARNOLD, George, American poet: b. New York city, 24 June 1834; d. New Jersey, 3 Nov. 1865. As a child he showed a talent for drawing and for some time studied with a por¬ trait painter in New York. He soon abandoned this career and adopting literature as a pro¬ fession he contributed prose and verse to Van¬ ity Fair, The Leader and other periodicals of his day. The ((Macarone55 papers established his reputation as a humorist, and the (Johy Old Pedagogue5 is his best known poem. During the Civil War he did military duty at one of the forts on Staten Island. His published vol¬ umes are (Drift : a Seashore Idyl5 (1866); (Poems, Grave and Gay5 (1867) ; (Poems 5 (ed. with a biographical sketch by Wm. Winter, Boston 1870; new ed., 1889).

ARNOLD, Isaac Newton, American law¬ yer and author: b. Hartwick, Otsego County, N. Y., 30 Nov. 1815; d. Chicago, 24 April 1884. Admitted to the bar in 1835, he removed in 1836 to Chicago, where he resided the remainder of his life, engaged in legal practice and taking an active part in politics. From 1861 to 1865 he was a member of Congress, and had a prom¬ inent share in measures leading to the abolition of slavery. His ablest speech was on the con¬ fiscation bill, 2 May 1862. Upon his retirement from Congress President Johnson appointed him an auditor of the United States, treasury. A lifelong friend and intimate of Lincoln, he

wrote (History of Abraham Lincoln and ti - Overthrow of Slavery5 (1867; new ed., 1885). His (Life of Benedict Arnold; His Patriotism and His Treason5 (1870) is in the nature of an apologia. (Recollections of the Early Chica¬ go and Illinois Bar5 appeared in 1880. Consult Washburne, E. B., (Isaac Newton Arnold,5 an address delivered before the Chicago Historical Society of which Arnold was president for several years (Chicago 1884).

ARNOLD, Johann Georg Daniel, Alsa¬ tian dialect poet and jurist: b. Strassburg, 18 Feb. 1780; d. there, 18 Feb. 1829. He was edu¬ cated in his native city, at Gottingen and at Paris. In 1806-09 he was instructor in French civil law in the Coblenz Law School and in the latter year became professor of history at Strassburg and of Roman law after 1811. His lyrics (in High German) are meritorious, but he is at his best in (Pentecost Monday5 (1816), a comedy in Strassburg dialect and rhymed Alexandrine verse, pronounced by Goethe ((an incomparable monument of ancient Strassburg custom and language, a work which in clear¬ ness and completeness of intuition and in¬ genious delineation of detail can scarcely be equalled.55 He wrote a notable legal work en¬ titled ((Elementa Juris Civilis Justinianei cum Codice Napoleoneo et Reliquis Legum Codici- bus Collata5 (1812).

ARNOLD, Matthew, English poet, essay¬ ist and critic : b. Laleham, 24 Dec. 1822 ; d. Liv¬ erpool, 15 April 1888. The eldest son of Thomas Arnold (q.v.), the historian and head¬ master of Rugby, he was taught at Laleham by a clerical uncle, and, after a short period at another school, was transferred to Rugby in 1837. Here he won a prize for a Byronic poem, (Alaric in Rome5 (1840). In 1841 he en¬ tered Balliol College, Oxford, and in 1843 he took the Newdigate prize with a poem on Cromwell, which sold remarkably well. He graduated the next year, and in 1845 was elected to a fellowship at Oriel. After teaching a little at Rugby he became private secretary to the Marquis of Lansdowne, who had charge of the administration of public instruction (1847). In 1849 he published over the initial <(A,55 a small volume entitled (The Strayed Reveller, and Other Poems,5 which he withdrew from cir¬ culation before many copies had been sold. In 1851 he was appointed an inspector of schools, a laborious post which he held for over 30 years.

In 1852 he issued his second collection of verse, (Empedocles on Etna, and Other Poems,5 of which the semi-dramatic title-piece and (Tristram and Iseult5 were the chief features. There were also some excellent lyrics, but the volume, though full of promise, was somewhat too academic to command attention, and Arnold soon withdrew it. In 1853 he made a fresh attempt with Eoems by Matthew Arnold, a New

Edition,5 which included the best pieces of his former volumes, except Empedocles on Etna,5 and gave for the first time two of the finest of his ambitious poems, (Sohrab and Rustum,5 and (The Scholar Gipsy.5 To this volume, which went through three editions in four years, he prefixed as a preface a plea for the establish¬ ment of a more classical and simple taste in poetry. This was important because it laid down the main critical principles Arnold was

himself to follow, and indicated the lines of his subsequent opposition to many English habits and beliefs.

In 1855 he published a second series of his poems mainly consisting of previously issued pieces omitted from the volume of 1853, but presenting also an important new narrative poem drawn from Scandinavian mythology, (Balder DeadP His poetical work had now attracted enough notice to secure his election, in May 1857, as professor of poetry at Oxford. After one term of five years he was re-elected.

His 10 years of lecturing naturally did much to formulate his critical principles. In 1861 he published three lectures (On Translating Homer, *and the next year added (On Trans¬ lating Homer: Last Words. * The volumes dis¬ played the blended strength and weakness that were to mark his critical work as a whole. Their style was admirably simple and polished, but was marred by too frequent repetition of phrases and over-emphasis upon favorite ideas. The matter was sound, original, bril¬ liant ; yet the lecturer devoted too much atten¬ tion to the errors of individual translators and displayed a too manifest enjoyment of his own cleverness, which involved a jaunty disregard for the feelings of others. Arnold had a native gift for apprehending and expounding the es¬ sential principles underlying the various forms of literature that appeal widely and deeply through a long period of time. In other words, he was born to comprehend and love and in¬ terpret works of classical quality — particularly great poetry. With works of more individual quality, with much of mediaeval and romantic literature, with the lighter varieties of verse and prose, and with not a little of the work of his contemporaries he was scarcely sure in his critical touch. He was not altogether catholic in his tastes and applied his formulas too rigor¬ ously, as when he underrated Shelley's poetry largely because it did not furnish such ((a criti¬ cism of life® as could be found in the verse of his own favorite, Wordsworth. Then again, Arnold tended to forget that too great insistence upon one's own ideas and*

bantering sarcasm toward one's opponents are often fatal to success as an advocate, and, despite his striving after disin¬ terestedness, he was a born advocate and con¬ troversialist. At bottom, he was true, simple, modest ; on the surface he was flippant and dogmatic and rather intolerant. He would dis¬ cuss charmingly and brilliantly, it is true, such topics as (The Study of Celtic Literature) (1867), on which he could scarcely speak with authority, and he thus exposed himself to criti¬ cism by inferior men who were able to lessen his proper influence on public opinion. In 1865, however, the first series of his (Essays in Criticism, with its illuminating, unpedantic dis¬ cussion of important writers, both classical and modern, placed Arnold above all contemporary English critics and gave his utterances, on lit¬ erature at least, decided authority and influence. British insularity and superciliousness in liter¬ ary matters could not be uprooted, but were somewhat pruned. This service makes Arnold a public benefactor, whether or not his indebt¬ edness to Sainte-Beuve, Goethe and Heine pre¬ vents our ranking him among the world's most original critics. But he did more than convince some of his countrymen that they should not foster ˆphilistine® and ((barbarian® tastes; he

gave them sound critical principles, brilliantly phrased, which they could apply not only to their reading, but to their lives.

Meanwhile, he had been performing more overtly practical services, not only in inspecting and commenting on English schools, but in studying and reporting on the educational sys¬ tems of the Continent. (Popular Education of France) appeared in 1861 ; (A French Eton *in 1864, and (Schools and Universities of the Continent in 1868.* The next year he published (Culture and Anarchy *(previously issued in the Cornhill Magazine) , the most influential of all his attacks upon philistinism, especially in social matters. In his sprightliest book, friendship's Garland) (1871), he carried the war he was waging under the banner of culture, or of ((sweetness and light,® more specifically into the domain of politics, where his success was less conspicuous, partly on account, it would seem, of a temperamental unfitness to grapple with the practical side of the problems peculiar to the new field. The year before he had made a still more venturesome incursion into the domain of religion and theology. Al¬ though a few of the more advanced of his countrymen were prepared to welcome his efforts to popularize the results of German and French investigation of Biblical problems, many of his readers, repelled by his apparent unortho¬ doxy, denounced him or pitied him for his hos¬ tility or disloyalty to religion and the Church, both of which he was, in his own somewhat- detached way, heartily endeavoring to serve. Nevertheless, faint Paul and Protestantism* (1870), (Literature and Dogma*. (1873) — the best of the series— (God and the Bible) (1875), and (Last Essays

on Church and State) (1877) were serviceable in breaking down prejudices, and, however lacking in permanent value as contributions to literature, were seemingly pro¬ ductive of lasting benefit.

During most of this period of brilliant prose¬ writing and wearisome school-inspecting Ar¬ nold's far from copious spring of poetry almost ran dry. The year after he began his duties as professor of poetry at Oxford he published his experiment in tragedy of the Grecian type — (Merope *(1858). No reprint of it was needed until 1885. In 1867, the year he was superseded as lecturer at his alma mater, he published a volume of <New Poems,* in which he made good his claim to rank with Gray as an elegiac poet by his beautiful pastoral elegy (Thyrsis, *in honor of his friend, the poet with whose name his own is often associated, Arthur Hugh Clough (q.v.), and by the equally beautiful and pathetic, but less complex and academic (A Southern Night, * in memory of his brother, William Delafield Arnold, director of public instruction in the Punjab. Another elegy of much merit was (Rugby Chapel,* in memory of his father, written 10 years before in the short rhymeless verses he liked to experiment in. Elegiac also, in the sense that in them he be¬ moaned the passing of old forms of faith and the misery of buffeted souls like his own, were the nobly beautiful (Stanzas from the Grande Chartreuse, * another poem that serves to link Arnold's name with that of Gray. In 1869 his poems were collected in two volumes. His work as a poet was now practically over, save jor an occasional tribute — such as the stanzas in memory of Dean Stanley and the pathetic

poems on Geist, the dachshund, and other household pets. He had become more and more reflective and, in consequence, more and more prone to select moral and intellectual themes, rather than such as appeal primarily to the simpler emotions and stimulate the creative faculty of the born lyrical or narra¬ tive poet. His creative spontaneity declined in equal measure with the increase of his argu¬ mentative combativeness and of his absorption in the religious and political problems of the period. For about a quarter of a century, dur¬ ing which his fame spread widely, the public knew him chiefly as a man of letters of great versatility and of acknowledged authority in literary criticism rather than as one of the most highly gifted and original of the Victorian poets. Reprints of his poetry had, however, been welcomed in 1877 and 1885 — not to speak of the selections from his poems made by him¬ self in 1878 — and before he died a grateful though not a wide recognition had been given to this earlier and, in

the opinion of some, more beneficent and attractive side of his genius. Much of this admiration had been yielded to him by readers who had found that his poems of religious unrest reflected their own doubts and regrets even better than the similar poems of Clough. Some readers, however, were at¬ tracted rather by the clear if cold perfection of his classical poetic style. Since his death the opinion has been quite freely expressed — with more reason, perhaps, by the second of the groups of readers just described — that in a generation or two his fame will rest mainly and securely upon his work in verse.

Despite the drudgery of the post Arnold served as an inspector of schools until 1883, when he was enabled to retire owing to the fact that, much to his surprise, Mr. Gladstone had caused a pension of £250 a year to be conferred upon him. His home had been for some years in London, then in the neighborhood of Har¬ row, and in 1873 he had settled at Cobham. His domestic life was uneventful and happy, save for the deaths of children and other parental afflictions. During his later years he continued his critical writing in the magazines, gathering his articles into such volumes as (Mixed Essays ' (1879), (Irish Essays and Others) (1882), and discourses in America) (1885). The last named was composed of the three lectures — 'Numbers; or, The Majority and the Remnant,' 'Literature and Science,' and 'Emerson' — which he delivered during his first visit to the United States, where he had a married daughter living. He came first in 1883 and lectured into the next year ; in 1886 he came again. In 1888 a volume of papers 'Civilization in the United States; First and Last Impressions' was pub¬ lished at Boston, but not in England. Besides collecting his essays and lectures, he also edited during this period several volumes of selections from favorite authors — 'A Bible-Reading for Schools,) (1872) — Isaiah, chapters 40-66 —

the 'Six Chief Lives' (1878) from Johnson's 'Lives of the Poets,' selections from Words¬ worth (1879) and Byron (1881), 'Edmund Burke on Irish Affairs' (1881) and 'Isaiah of Jerusalem' (1883).

When he was at the very height of his fame, he died suddenly of heart-disease at Liverpool, where he had gone to welcome his daughter home from America. He was buried in the

churchyard of All Saints at Laleham, his birth¬ place. See Empeixdci.es on tEtna.

Bibliography. — The year of his death some of his literary essays, including those on Gray and Keats contributed to Ward's 'English Poets,' were gathered under the title 'Essays in Criticism, Second

Series.' The next year his 'Reports on Elementary Schools, 1852-1882' were edited by Sir Francis Sandford. In 1895 two volumes of his letters, scarcely great as lit¬ erature, but full of intimate and valuable de¬ tails, were edited by Mr. G. W. E. Russell. His 'Note Books' appeared in 1902. Uniform edi¬ tions of his writings have been attainable in America for over 20 years, and there are popu¬ lar one-volume editions of his poems. Three critical biographies, each of brief compass, have been devoted to hirm — one by Professor Saints- bury (1899, 'Modern English Writers'), one by Mr. Hubert Paul (1902, in the new series of 'English Men of Letters') — neither thoroughly satisfactory — and one by Mr. G. W. E. Russell (1904, 'Literary Lives') — more of a study than a biography on account of Arnold's wish that no formal life of himself should be under¬ taken. For further criticism consult Stedman, 'Victorian Poets' (1885), Walker, Hugh, 'The Greater Victorian Poets' (1895) and Dawson, W. H., 'Matthew Arnold' (1904), as well as essays by George E. Woodbcrry ('Warner's Library'), Frederic Harrison ('Tennyson, Rus¬ lan, Mill'), Lewis E. Gates ('Three Studies in Literature'), W. C. Brownell ('Victorian Prose Masters'), T. H. Ward (Ward's 'Eng¬ lish Poets,' Vol. IV, enlarged edition), A. Bir¬ red ('Res Judicatse'), W. N. Guthrie ('Mod¬ ern Poet Prophets'), W. E. Henley ('Views and Reviews'), Henrv James, 'Matthew Ar¬ nold's Essays' (Boston 1908), Chapman, 'Eng¬ lish Literature' (ib. 1910) ; Benson, 'Leaves of the Tree' (New York 1911), Leslie Stephen ('Studies of a Biographer,' Vol. II), Richard Garnett ('Essays of an ex-Librarian' and the 'Dictionary of National Biography,' supple¬ ment, Vol. Ill) and the late Sir J. G. Fitch's ('The Arnolds and their Influence on English Education'). There is an excellent bibliog¬ raphy of Arnold's writings by T. B. Smart (1892). William P. Trent,

Professor of English Literature, Columbia University.

ARNOLD, Richard, German-American musician: b. Eilenberg, Prussia, 10 Jan. 1845. He came to the United States when a child and here received his early education and first musical training. At the age of four he was able to play simple melodies on the violin, and at the age of 12 he took his place in a full orchestra. In 1864 he supplemented his ele¬ mentary training with a course in the Con¬ servatory at Leipzig. On returning to America he became a member of the Theodore Thomas orchestra. In 1880 he became the concert master of the New York Philharmonic So¬ ciety, a position he held continuously until

1.

ARNOLD, Samuel, English composer: b. London 1740; d. 1802, In 1760 he was ap¬ pointed a composer at the Covent Garden Theatre, and set to music the 'Maid of the Mill.' He also produced the oratorios of the 'Prodigal Son,' the 'Resurrection,' and others. He was made a doctor of music in 1773, and in

1783 was appointed organist of the chapel royal. He edited the works of Handel, in 36 volumes folio. In 1794 he was made organist at Westminster Abbey. In 1798 he composed his oratorio of < Elijah. } Various as were his com¬ positions, his inventive talent was but limited. His (Cathedral Music) was published in 1790.

ARNOLD, Samuel Greene, American historian : b. Providence, R. I., 12 April 1821 ; d. there, 12 Feb. 1880. He was graduated from Brown University in 1841, and traveled exten¬ sively in Europe, South America and the East. He was lieutenant-governor of Rhode Island 1852, 1861-62, and sat for part of a term in the United States Senate 1862-63. He wrote a valuable (History of Rhode Island and Prov¬ idence Plantations) (2 vols., 1860), and was for many years president of the Rhode Island Historical Society.

ARNOLD, Sarah Louise, American edu¬ cator and writer: b. North Abington, Mass., 15 Feb. 1859. She received her technical edu¬ cation as a teacher at the Bridgewater (Mass.) State Normal School, from which she was graduated in 1878. After teaching for some years she became principal of a training school at Saratoga, N. Y., then

supervisor of schools in Minneapolis, Minn., later in Boston, Mass., and finally, in 1902, was appointed dean of Sim¬ mons College. She has written extensively on educational subjects. Chief among her works are (Waymarks for Teachers) (1894) ; a se¬ ries of readers, (Stepping Stones to Litera- ture) (1897) ; (Reading: How to Teach It) (1899) ; (The Mother Tongue* (in collabora¬ tion with G. L. Kittredge, 1900) ; (Plans for Busy Work) (1901) ; (Manual for Teachers *

(1913).

ARNOLD, Thomas, English scholar, headmaster of Rugby School and professor of modern history in the University of Oxford: b. Cowes, Isle of Wight, 13 June 1795; d. 12 June 1842. He received the elements of his education at Warminster, and at the age of 12 was removed to the public school at Winches¬ ter. Having obtained a scholarship in Corpus Christi College, Oxford, he entered that col¬ lege in his 16th year, and though naturally of a shy disposition soon became remarked for the boldness and independence of his views, and the ability, firmness and zeal with which he maintained them. In 1815 he was elected Fel¬ low of Oriel College, and both in that year and 1817 obtained the chancellor's prize for Latin and English essays. His views had been early directed to the Church, but some scruples as to signing the articles made him hesitate for a time. At length these scruples gave way be¬ fore a more careful examination, and he took deacon's orders in 1818. In 1819 he settled at Laleham, near Staines, where he employed him¬ self in preparing young men for the universi¬ ties, and in 1820 married the sister of one of his earliest school and college friends, Tre- venen Penrose. About this time a remarkable change appears to have come over him ; his re¬ ligious views became finally settled and his whole mind appears to have been wound up to a determination to use life diligently and earnestly for the best and holiest purposes. At Laleham he had much leisure, which he em¬ ployed partly in the cultivation of general lit¬ erature, and partly in writing articles on Ro¬

man history for the (Encyclopedia Metropoli- tana) and collecting materials for an edition of Thucydides, whose writings, as well as those of Aristotle, had long been his favorites. In 1828, by the unanimous vote of the trustees, who were told on high authority that (<he would change the face of education all through the public schools of England,® he was ap¬ pointed headmaster of Rugby School and de¬ voted himself to his new duties with the great¬ est ardor. While giving due prominence to the classics he deprived them of their exclu¬ siveness by introducing various other branches into his course, and was particularly careful that the education which he furnished

should be in the highest sense moral and Christian. His success was remarkable. Not only did Rugby School become crowded beyond any former precedent, but its pupils on removing to the universities carried off a very large pro¬ portion of prizes, and the superiority of Dr. Arnold's system became so generally recog¬ nized that it may be justly said to have done much for the general improvement of the pub¬ lic schools of England. In his position as a director of the London University he zealously endeavored to extend the benefits of a lite¬ rary and scientific education to all classes and creeds without excluding religion ; but failing in his efforts to make examination in the Scriptures requisite to obtain a degree, re¬ signed his office. In 1841 he was appointed professor of modern history at Oxford, and delivered his introductory course of lectures with great success. The works by which Dr. Arnold will continue to be best known are his edition of Thucydides, his (Roman History, *unhappily left unfinished, and his Sermons/ most of them prepared for his own chapel at Rugby, and so admirably adapted to the cir¬ cumstances of the youths who formed the greater part of his audience, that, though writ¬ ten hastily and at broken intervals snatched from other labors, they are justly held to be models in their kind. Consult Stanley, A. P., (Life and Correspondence of Thomas Arnold) (Boston 1860) ; Worboise, (Life of Dr. Thomas Arnold* (London 1859) ; Fitch, (Thomas and Matthew Arnold* (New York 1897) ; Hughes, (Tom Brown's School Days) (London 1857). Also biographies in German by Wittig (Han¬ over 1884) and Zinzow (Stettin 1869).

ARNOLD, Thomas, English writer on literature and editor of old texts, son of Dr. Arnold of Rugby, brother of Matthew Arnold and father of Mrs. Humphry Ward: b. Lale¬ ham, 30 Nov. 1823; d. 1900. He was edu¬ cated at Rugby and Oxford, took his degree in 1845 and was appointed colonial school in¬ spector in Tasmania. He became a Roman Catholic in 1856 and was associated with John Henry Newman as professor in the New Cath¬ olic University of Dublin. When Newman re¬ tired from the presidency of this institution Arnold followed him to the Oratory at Birm¬ ingham. He appears to have abandoned Ca¬ tholicism for a time, becoming lecturer and examiner at Oxford and at the Royal Univer¬ sity of Ireland. After his wife's death in 1888 he was again closely associated with Newman. Among his works are (A Manual of English Literature) ; (Select English Works of Wyclif* (3 vols., 1869) ; Selections from the Specta-

tor' ; (Beowulf * (text, translation, and notes) ; (Henry of Huntingdon

; (Symeon of Dur¬ ham } ; and (Chronicles of the Abbey of Bury St. Edmunds ; (Passages in a Wandering

Life* (1900), containing much of interest con¬ cerning Cardinal Newman and other friends prominent in the Tractarian Movement.

ARNOLD, Thomas Kerchever, English educator: b. Stamford 1800; d. 1853. He was educated at Cambridge University, became an Anglican clergyman and was appointed rector of Lydon, Rutlandshire. He was successively editor of the Churchman's Quarterly Magazine , the Churchman's Monthly Companion and the Theological Critic. He published theological pamphlets and treatises, (Short Helps to Daily Devotion* (1847) and some volumes of ser¬ mons.

ARNOLD, William Rosenzweig, Ameri¬ can Orientalist: b. Beirut, Syria, 14 Nov. 1872. In 1892 he graduated from Ohio Wesleyan University, then took a three-years' course at the Union Theological Seminary. The follow¬ ing year he was made curator of the depart¬ ment of antiquities in the Metropolitan Mu¬ seum of Art in New York city, a position he held for two years, after which he became a lecturer on the Old Testament and professor of the Hebrew language and literature at An¬ dover Theological Seminary. In 1908 he un¬ dertook similar work at Harvard. He has written (Ancient Babylonian Temple Records *(1896) ; (The Rhythms of Ancient Hebrews* (1908) ; (The Passover Papyrus from El- phantine* (1912).

ARNOLD, Yuri von, Russian composer and writer on musical subjects: b. St Peters¬ burg, 1 Nov. 1811 ; d. 1898. He studied for two years at Dorpat, then received a commission as a cavalry officer, in which capacity he fought several battles in Poland. After the conclusion of hostilities he became a secret- police officer. Meanwhile he had been devot¬ ing himself to a study of music and musical composition and in 1839 he won a prize of¬ fered by the St. Petersburg Philharmonic So¬ ciety. Later he became musical critic on the Signale at Leipzig. In 1870 he was appointed professor of vocal music at the Moscow Con¬ servatory. In 1888 he received an appoint¬ ment at the Moscow University as professor of the history of musical art. His composi¬ tions are (Svyetlana *(cantata 1839) ; (The Gypsy: an Overture to Boris Godunov* (op¬ era). Among his contributions to the literature of music are (Theory of the Ancient Russian Church and Folk Singing *(1888) ; (Is it pos¬ sible in Musical Art to Establish a character¬ istically National School of Singing, and on what Data must it be based?* (1889).

ARNOLD OF BRESCIA, bresh'a (Arnaldo da Brescia), Italian religious and political reformer and agitator: b. about 1100; d. 1155. He was

one of the disciples of Abelard, and on returning from Paris began to preach in his native city. In this way he stirred up the people against the clergy; and in France, whither he was forced to flee in 1139, he also found numerous adherents, for the immorality and arrogance of the clergy excited much discontent. The flame which he had kindled could not be extinguished by the excommunication pronounced against him and

his adherents by Innocent II. lie preached his doctrines in safety at Zurich in Switzerland till about 1144, when he appeared at Rome, where his eloquence occasioned among the people great disorder. The furious multitude, whom he himself could no longer restrain, revered him as their father, and even the Senate pro¬ tected him till Adrian IV, in 1155, laid an in¬ terdict upon the city. This subdued the Ro¬ mans, and Arnold was obliged to flee. He was taken in Campania and executed at Rome and his body burned; his ashes were thrown into the Tiber and his party was suppressed. His followers were known as Arnoldists.

ARNOLD OF WINKELRIED, wing'- kel-red, a Swiss hero, who, at the battle of Sempach, in 1386, sacrificed himself to ensure victory to his countrymen. The Austrian knights, dismounted, had formed themselves into a phalanx, which the Swiss vainly strove to pierce, when Arnold, rushing on the spear points of the enemy and burying several in his breast, thus opened a gap in the fence of steel. The Swiss rushed in through the open¬ ing and routed the Austrians with great slaughter.

ARNOLDISTS. See Arnold of Brescia.

ARNOLFO DI CAMBIO, ar-nol-fo de kam'byd, also known as Arnolfo di Lapo, Italian architect and sculptor: b. Colle, Tus¬ cany, 1232; d. 1302. He was a pupil of Nic- cola Pisana, the sculptor. He has been con¬ sidered one of the greatest architects of Flor¬ ence of the Gothic period and also one of the greatest sculptors of that period. The Church of Santa Croce in Florence is one of his ear¬ liest works. In 1296 he was assigned the task of reconstructing the cathedral of Florence. He died before this work was completed, only the first story having been built, and his suc¬ cessor did not follow out his plans.

ARNON, now known as the Wady Mojib, a river emptying into the Dead Sea. It is a short stream not over 13 miles in length, but runs through so rough a country that no one has been able to follow it along its entire course. At both sides rise towering cliffs of limestone and basalt rocks often reaching a sheer height of 1,700 feet. Waterfalls

break its course in two places, falling from no great height but so close together are the walls of the deep gorge that the thunder of the falling water reverberates miles away. The Arnon is mentioned in the Bible in several places. In Num. xxi, 14, 15, it is referred to as Moab's frontier supposedly against Sihon's kingdom and his advance to the river is also described in xxi, 28. For description with photographs consult Schmidt, N., (The River Arnon* (in The Journal of Biblical Litera¬ ture, 1906).

ARNOT, William, clergyman of the Free Church of Scotland: b. Scone, 6 Nov. 1808; d. Edinburgh, 3 June 1875. He was educated at the University of Glasgow. In 1838 he became pastor of Saint Peter's Presbyterian Church, Glasgow. In 1843 he joined the Free Church movement and became pastor of Free Saint Peter's Church, Glasgow. After 20 years' service here he succeeded Professor Rainey as pastor of the Free High Church, Edinburgh, serving it until his death. He came to America three times, once as dele-

gate to the Evangelical Alliance. He was author of the (Life of James Halley) (1842); (The Race for Riches) (1851) ; (Laws from Heaven for the Life on Earth > (2 vols., 1857— 58) ; (The Parables of Our Lord) (1864) ; (The Life of James Hamilton) (1870).

ARNOTTO, coloring matter obtained from the seed of the Bixa orellana, an ever¬ green plant indigenous to Brazil, Cayenne, and other places. It is used in dyeing and calico printing and as a coloring ingredient in oint¬ ments, varnishes and also for butter and cheese. In extracting it the seeds of the fruit capsules are crushed and fermented; they are next rubbed, mashed and the coloring matter washed away. The water is next drawn off and the coloring matter allowed to dry in the shade. It is then broken into cakes and wrapped in leaves. It is insoluble in water but dissolves with a red color in alcohol, fixed oils, etc. It is used as a body-paint by the Indians as a protection against mosquito-bites.

ARNOULD, ar'noo, Sophie, French ac¬ tress and singer: b. Paris 1744; d. 1802. She made her debut at the Grand Opera, Paris, 15 Dec. 1757 and attained great success. For over 20 years thereafter she was the most prominent singer at the Royal Opera. She created the role of Iphigenia in Gluck's Uphigenia in Aulis.) She was also famed for her beauty and wit and was intimate with Helvetius, D'Alembert, Diderot,

Rousseau and other great men of the time. Her epigrams and witticisms were collected and appeared in a volume under the title of (ArnouldianaP

ARNPRIOR, Canada, the county-seat of Pembroke, Ontario, situated 37 miles west of Ottawa, on the Canadian P. and Grand Trunk railways, at the junction of the Ottawa and Madawaska rivers. The town is beautifully situated, has excellent water and sewerage systems ; has two large saw-mills employing 700 men, sash factories, woolen, knitting and mica factories and a creamery. Pop. (1911)

4,405.

ARNSBERG, arns'berg, Prussia, capital of an administrative district of the same name, province of Westphalia. It is located on high ground which is swept on three sides by the river Ruhr, overtopped by the ruins of the old castle of the counts of Arnsberg. Its industries consist chiefly of the produc¬ tion of paper, spirits and beer and there is a large railroad repair shop there. Not far distant in the Helve and Mohne valleys is a storage reservoir dam which is one of the largest pieces of engineering work of its kind in Europe. Pop. 10,256.

ARNSTADT, Germany, capital of the state of Schwarzburg-Sondershausen, 12 miles south of Erfurt on the banks of the Gera on the Dietendorf-Umenau Railroad. It is an important market for grain and other agricultural products raised in the surround¬ ing country. Its manufacturing industries are textiles, shoes, gloves and beer. There are old copper mines in the neighborhood and salt deposits. Its warm springs have made it an important summer health resort. Among its notable public buildings are an old castle in which is exhibited a valuable porcelain Collection. In one of its churches, Saint Bon¬

iface, the famous composer, J. S. Bach, was for some years organist. Pop. 17,907.

ARNULF, King of Germany, Roman Emperor, natural son of the East-Frankish King, Karlmann and Liutswinda, sister of the North Gaulish Count Ernert : b. about 850; d. 899. He was elected King of the East Franks, after heading a revolt which deposed Karl the Fat. In 891 he repelled an invasion by the Norsemen and drove them out of his kingdom. Three years later he led an army into Italy where in 896 he had himself crowned emperor.

ARNULF, Saint, bishop of Metz, ances¬ tor of the Carlovingian rulers : b. 582 ; d. 6 Aug. 641. In 627 he retired from the bishop¬ ric and

became a hermit in the Vosges. The year after his death his body was brought down into Metz and interred in the church there bearing his name.

AROK-SZALLAS, or-ok-sal'ash, or JASZ-AROK-SZALLAS, Hungary, privi¬ leged market-town, 44 miles northeast of Budapest. It has a large trade in grain. Pop. 12,067.

AROLSEN, a'rol-sen, Germany, town, capital of the state of Waldeck, on the river Aar, 21 miles northwest of Cassel. It contains a castle, art gallery, a gymnasium and a parish church and a valuable library. Rauch, the sculptor, and the painters, Wilhelm and Friedrich Kaulbach, were born in Arol- sen. Pop. 2,811.

AROMA, Greek term denoting perfume. Many plants yield a more or less delightful odor, often due to volatile oils called es¬ sences, which can be separated from them by suitable processes. Sometimes odor proceeds from a substance which cannot be seized and to which the name of aroma is more particu¬ larly applied. It appears that substances al¬ together, or almost altogether, inodorous may be made to diffuse a strong odor by the mix¬ ture of different substances which facilitate their volatilization. Thus, when musk is dried, ammonia is separated from it and seems to be the vehicle of the odor since the residuum becomes inodorous and yet may again be made as odoriferous as it was at first by impreg¬ nating it with a quantity of the substance which had been carried off. Tobacco, in like manner, owes part of its odor to ammoniacal salts mixed with it in the process of manu¬ facture. One singular fact is that many plants of tolerably strong odor yield an inodorous liquid when dissolved in water and yet com¬ municate odor to the oils with which they are macerated. See Perfumery.

AROMATIC COMPOUNDS, a numer¬ ous and exceedingly important class of sub¬ stances, fundamentally differing from the fatty compounds in constitution, and named from the fact that the earliest known representatives of the class were resins, oils and balsams, distin¬ guished by a marked aromatic odor. The name is now applied to all substances containing a ((benzene nucleus" (presently to be described). Benzene itself is the simplest example of an aromatic body. Its formula, expressed in the simplest way, is CoHe, but when the attempt was made to represent the composition of ben¬ zene by a ˆstructural formula," numerous diffi-

cullies were encountered. For example, benzene behaves like a saturated compound in most re¬ spects, yet it contains eight atoms less of hydrogen than the saturated paraffin ((hexane® (CeHn) containing the same number of carbon atoms. Again, any or all of the hydrogen atoms in benzene can be replaced by other monovalent elements (or radicals) ; and the persistence of the group Ce in the derivations of benzene, even when all the original hydrogen atoms have been replaced by other elements or radicals, indicates that the carbon atoms in that body are inti¬ mately related to one another, in some manner. Furthermore, it has been proved by experiment that the hydrogen atoms in benzene are <(of equal value,® so that it makes no difference, in forming a substitution compound, which atom of hydrogen is replaced, and this fact indicates that the hydrogen atoms should occur in the

H

structural formula symmetrically. To reconcile these considerations (and many others) Kekule, in 1865, proposed for benzene the structural formula preceding.

The symmetry of the body with respect to hydrogen is here evident, and the persistence of the group Ce is explained by assuming the six carbon atoms to be united to one another in the form of a closed chain, supposed to possess sufficient chemical strength to maintain its own integrity, save under exceptional circumstances. The closed ring of six carbon atoms is the ((benzene nucleus,® referred to above, which constitutes the distinctive feature of the aro¬ matic compounds as a class. It will be observed that in Kekule's structural formula the carbon atoms are all tetravalent, just as the carbon is in carbon dioxide (C02), and that three of the four valencies of each carbon atom are satisfied by the valencies of other carbon atoms, while the fourth is satisfied, in each case, by a hydro¬ gen atom. Von Baeyer has proposed a slightly different structural formula for benzene, even

H

more symmetrical in appearance than Kekule's, but which raises certain questions that are not yet answered. His formula is as shown here¬ with. The closed carbon chain is present here

also, but only three of the valencies of each carbon atom are definitely

provided for, and it is assumed that the six remaining valencies (one to each carbon atom) are satisfied by a

H

C

sort of <(central linkage,® whose precise nature is not determined or defined. It is customary, at the present time, to express the structural formula of benzene in the simple form without attempting any explanation of the fact that the carbon atoms are here apparently trivalent. Much thought has been expended upon this matter, and the constitution of benzene is one of the most interesting problems in the realm of organic chemistry. The structural formulas presented above are not to be taken in any sense as pictorial representations of the actual geometrical configuration of the benzene mole¬ cule. We know nothing at all about the shape of a molecule, nor about the way in which its parts are associated with one another, in space. The structural formulas employed in chemistry are mere empirical diagrams, for representing, to the eye, the chemical properties and relations that have been observed in the laboratory.

Compounds have been prepared which con¬ tain closed rings of three, four and five atoms of carbon, respectively, but these are not classed as aromatic compounds. They are intermediate, in general properties, between the aromatic series and the fatty series, but resemble the

latter more closely. Compounds are also known in which the chain is closed by an atom of oxygen, or of sulphur, or of nitrogen. Thus the structural formula of pyridine is as shown herewith. Such substances could be classed as <(aromatic compounds® by an extension of the definition of the aromatic group, but are usually regarded as outside of the limits of that group. The aromatic compounds are so numerous, and include so many substances of technical im¬ portance, that only the merest outline of their general character can be given in this place. In general it may be said that they are derived from benzene by replacing one or more of its typical hydrogen atoms by an equal number of monovalent radicals (either simple or com¬ pound). The essential features of these substi¬ tutions may be illustrated by considering the

chlorobenzenes. By the action of chlorine upon cold benzene, several

substitution products are formed, having the formulas CeHsCl, CgH4.C12, CcHaCb, etc. according to the number of atoms of hydrogen that are replaced by the chlorine. The first of these substitution products, CoHs.Cl, is called simply ˆchlorobenzene,® and it is to be noted that since the hydrogen atoms in the orig¬ inal benzene are all ((of equal value® (that is, all involved symmetrically), it makes no differ¬ ence which hydrogen atom is replaced by the chlorine ; hence only one chlorobenzene having the formula C«H5.C1 is possible. But when a second atom of hydrogen is replaced by chlorine, the resulting compound, CgH4.C12 (known as di¬ chlorobenzene), can exist in no less than three distinct isomeric forms, according to the rela¬ tive positions of the chlorine atoms in the benzene ring. Let the structural formula of chlorobenzene (C0H5.CI) be represented by the skeletonized scheme, the numbers represent¬ ing the several groups of CH, in one of which the hydrogen is to be replaced by a further substitution of chlorine. It is evident that the next chlorine atom may replace a hydrogen atom at any one of the five vertices to which numbers have been attached; but it is also evi¬ dent from symmetry that the two positions numbered <(1® must be considered as essentially identical, as far as the product resulting from a substitution is concerned, and the same is also true of the two positions marked <(2.® Only three essentially different ways of substituting the second chlorine atom need therefore be considered. When the second chlorine atom is situated at an angle adjacent to the first, the product is known as or//m-dichlorobenzene ; when the second chlorine atom is separated from the first by one vertex which still retains its hydrogen, the product is known as meta- dichlo¬ robenzene ; and, finally, when the two substituted atoms of chlorine are opposite one another, the product is known as />ara-dichlorobenzene. The three different dichlorobenzenes thus shown by the structural formula to be possible are ac¬ tually known. All aromatic compounds having the general formula CeH4Y2 (where Y is a monovalent element or radical) occur in three isomeric series, just as the chlorobenzenes do, and the separate compounds are distinguished, as already explained in the case of dichloroben¬ zene, by the prefixes ortho-, meta- and para-. These prefixes are frequently abbreviated to single letters, in works on chemistry. Thus p- dihydroxybenzene is often written in the place of the full name, ((paradihydroxybenzene.®

Cl

This particular substance (used in photography and commonly known as ((hydroquinone®) is formed, as its name implies, by the substitution of two molecules of hydroxyl (HO) for two

atoms of hydrogen in the benzene ring, the hydroxyl molecules being opposite each other (as indicated by the prefix para-). Its struc¬ tural formula, therefore, is as below. The

C.OH

ortho- compound having the same composition (except that its two hydroxyl molecules are in the ((ortho® positions), is a different substance, known more familiarly as catechol, or pyro- catechin, and the meta- compound (where the two molecules of hydroxyl are in the wmeta® positions) is quite different from either of the others, and is known as resorcinol. The sub¬ stitutions of monovalent radicals for the hydro¬ gen atoms in benzene are by no means limited to two, nor need the radicals that are substi¬ tuted be alike. Thus pyrogallic acid, so exten¬ sively used as a developer in photography, is obtained from benzene by the substitution of three molecules of hydroxyl for three mole¬ cules of the benzene hydrogen ; and it there¬ fore has the formula CgH3. (OH) 3. Vanillin, now largely used in the place of extract of vanilla for flavoring confectionery and ices, is benzene in which three atoms of the original hydrogen have been replaced, respectively, by the groups (CHO), (OCH3) and (OH). On account of the typographical difficulties in¬ volved in printing the structural formulas of the aromatic compounds, chemists often specify the constitution of these compounds by num¬ bering the original hydrogen atoms of the ben¬ zene from 1 to 6, and then specifying by num¬ ber, which hydrogen atom has been replaced by each of the substituted radicals. Thus vanillin (referred to above) consists of benzene in which CHO has been substituted for the first hydrogen atom, OCH3 for the third, and OH for the fourth : and with this convention the constitution of vanillin may be expressed thus : CHO: OCHa: OH = 1:3:4.

The existence of tertiary (and higher) sub¬ stitution products of benzene makes it possible to identify the ortho-, meta- and para- di- sub¬ stitution compounds, so that the proper designa¬ tion can be attached to each of them. The di- brompbenzenes afford a good example of the way in which this is accomplished. The three essentially different compounds obtained by sub¬ stituting bromine for two of the hydrogen atoms in benzene are (according to the notation just given) Br: Br=l: 2, Br: Br — 1: 3, and Br : Br— 1 : 4, these being ortho-dibromobenzene, meta-dibromobenzene and para- dibromoben- zene, respectively. Now if an atom of hydrogen in the first of these be replaced by another atom of bromine, it is evident that the new bromine atom may have the position 3, 4, 5 or 6; but the compounds in which the bromine occupies the positions 1:2:3 and

1:2:6 must be regarded as identical, as will be seen by constructing the diagram ; and, similarly, those in which it occu-

pies the positions 1:2:4 and 1:2:5 must be considered identical. Hence the further intro¬ duction of bromine into ortho-dibromobenzene can give rise only to the two distinct tri-bromo¬ benzenes 1:2:3 and 1:2:4. If the remain¬ ing dibromobenzenes be examined in the same way, it will be found that meta-dibromoben- zene can yield (upon further bromination) the three distinct tri-bromobenzenes 1 : 2 : 3, 1 : 3 : 4 and 1 : 3 : 3. Finally, it will be found that para-dibromobenzene can yield only one tri- bromobenzene ; namely, 1 : 2 : 4 : The identifi¬ cation of a di-substitution bromobenzene as or¬ tho-, meta- or para- is therefore seen to be equivalent to determining how many different tri-bromobenzenes the given di-bromobenzene can yield. This problem has been fully worked out in the case here taken as an illustration, and it has been shown that of the three known di-bromobenzenes, the ortho- compound is the one boiling at 435° F., the meta- compound is the one boiling at 427° F., and the para- com¬ pound is the one melting at 180° F. The mode of identification here discussed in detail for bromine substitution products can be applied in other cases also, but the labor involved in the operation is so great that it is usually easier to ascertain the proper prefix for a new di-substi¬ tution compound by noting which of the bromo- substitution products must be used as a starting point, in the synthesis of the proposed com¬ pound. There is usually but little difference in the boiling points of ortho-, meta- and para- compounds, but the para- compounds have the highest melting points. The benzene ring of ortho- compounds is liable to be broken up by oxidation, while in the other two classes the ring usually persists. The following general law appears to hold true of di-substitution aro¬ matic compounds : When a radical is introduced into a benzene ring in which one hydrogen atom has already been replaced by a radical, the second radical will take a position ˆmeta® to the first one, provided the first was COOH, SOaH, N02, or (probably) CN, CHO or CO.CHa. In most other cases the second rad¬ ical will mainly take the ˆpara® position, though some of the ˆortho^ compound is almost in¬ variably produced at the same time. The aro¬ matic bodies include many acids, the simpler of which may be conveniently classified according to the number of molecules of carboxyl "COOH) that they contain, and according to the number of hydrogen atoms that have been displaced in the original benzene ring. The simpler and more familiar aromatic acids mostly contain one carboxyl group, and

are therefore said to be ˆmono-carboxyjic.ˆ In the mono-carboxylic group, benzoic acid, GHs.CO OH, is ˆmono-hydricˆ ; salicylic acid, CH4OH.- COOH, is ˆdi-hydric® ; proto-catechuic acid, GH3. (OH)2.COOH, is <(tri-hydric)) ; and gallic acid, GH2.(OH)3.COOH, is «tetra-hydric.» Numerous substances classed by the chemist as alcohols also occur in the aromatic group. The simplest of these (and the only one containing only six atoms of carbon) is phenyl alcohol, which is also known as phenol, and as carbolic acid. This substance is formed when benzene is oxidized by peroxide of hydrogen, in accord¬ ance with the equation :

GH6 + H202 = GH..OH + H20.

Benzene. Hydrogen Phenyl al- Water

peroxide. cohol.

Phenol is called an alcohol on account of its chemical structure (see Alcohol), but it differs widely from the alcohols of the fatty series, since it does not yield an aldehyde, an acid or a ketone, and it is not easily oxidized. Other aromatic alcohols may be prepared by replacing a hydrogen atom in benzene by one of the alcohol radicals (CnH2n+d of the fatty series, and then substituting an OH group for one of the hydrogen atoms in the compound so formed. The resulting substance has widely different properties, according to the position of the OH group so introduced. If the OH replaces a hydrogen atom in the alcohol radical, the final compound is called an alcohol ; but if it replaces a hydrogen atom in tfye original benzene ring, the final compound is more ac¬ curately classed as a phenol. For example, if CH3 be substituted for an atom of hydrogen in benzene, toluene (GH5.CH3) is formed. If, now, OH is substituted for a hydrogen atom in the CH3, the resulting substance, GH5.CH2OH, is known as benzyl alcohol; while if the OH is substituted for an H in the original ring, we have GH4. (OH) ,CH3, a substance known as cresol, and more properly described as a phenol than as an alcohol. One of the most important members of the aromatic group is amido-ben- zene, or aniline (q.v.).

A. D. Risteen.

AROMATIC VINEGAR, a liquid con¬ sisting of strong acetic acid, and obtained by distilling crystallized diacetate of copper. Its aroma is due to the presence of acetone, but it is also usually highly flavored with prepara¬ tions such as cloves, calamus, etc. It has a pleasant perfume, and its vapor, when inhaled, has a powerful effect on the nostrils, and

acts as a strong excitant on the whole system. The liquid is highly corrosive.

AROMATICS, plants (sometimes animal and other substances) which have a spicy odor and pungent taste and are used in medicine, cookery, and perfumery. They are largely em¬ ployed to disguise the taste of drugs, are usu¬ ally reputed stimulant, anti-spasmodic and, if bitter, tonic and vermifuge ; externally they are applied as antiseptics, local anaesthetics and counter-irritants. Their active principles are volatile oils obtained by distillation ; but some contain camphor-like substances, such as tur¬ pentine; others are bitter like tans}7; still others contain an odorous resin, for example, myrrh and benzoin ; and lastly there are those with a musky odor, such as the musk plant (q.v.). Among aromatics and the families to which they belong are peppermint, thyme, lavender, of the Labiatce — the whole plant, especially the leaves; caraway, dill, anise, of the Umbellifera? — the seeds or seed capsules; ginger, Zingibe- racece — the root-stocks; cinnamon, cassia, of the Lauracece Myrtacece — the bark; cloves, Myrtacece — the flower buds; and vanilla, of the Orchidacece — the fruits. In some cases the aromatic properties are diffused throughout all parts of the plant, but also are often con¬ fined to particular organs, such as the root, in ginger; or the bark, in cinnamon; or the flow¬ ers, as in cloves; or the fruit, as in vanilla; or the wood, as in aloes-wood.

ARONA, a-ro'na, Italy, ancient town near the southern extremity of Lago Maggiore and about 40 miles northwest of Milan. In summer

there is steamer service to Locarno, Switzer¬ land. In the vicinity is the colossal statue of San Carlo Borromeo, 70 feet high, exclusive of the pedestal, 42 feet high. There are silk, cotton and metal works here. Pop. (1911)

6,271.

ARONHOLD, a'ron-holt, Siegfried Hein¬ rich, German mathematician : b. Augerburg, 1819; d. 1884. He was professor of mathe¬ matics in the School of Architecture and in the School of Engineering and Artillery in Berlin. The theory of the forms of algebra was developed by Aronhold and the two English mathematicians, Cayley and

Sylvester. He was also one of the founders of the mathe¬ matical theory of invariants, to which he first contributed the symbolic notation.

AROO. See Arru Islands.

AROOSTOOK, a-roos'tok, a river in Maine. It rises in Piscataquis County, Me. ; flows more than 120 miles in a circular course and enters the Saint John River in New Bruns¬ wick. It drains an area about 2,300 square miles and falls 705 feet in its course within the State, and thus affords valuable water power. It was an important factor in the set¬ tlement of the long-pending dispute concerning the boundary between the United States and British America.

AROOSTOOK, Lady of The, the title of a book written by W. D. Howells in 1879 — one of the author's early works. The Aroostook is a trading vessel, and the lady of the story is the sole woman passenger in a voyage across the Atlantic. The story is strong and interest¬ ing, and contributed greatly to the early repu¬ tation of Mr. Howells.

AROUET, a' roo'a'. See Voltaire.

AROUND THE WORLD IN EIGHTY DAYS, a noted romance by Jules Verne. Phineas Fogg, an English gentleman, wagers that a man can travel around the world in 80 days. He wins his wager after a series of ex¬ citing adventures.

AROUND-THE-WORLD RECORDS.

Many years have elapsed since Mr. Phineas Fogg, M. Jules Verne's mythical hero, accom¬ plished the supposedly impossible task of cir¬ cumnavigating the globe in 80 days, a feat which won for him a wager of $100,000 and inciden¬ tally a wife. Since that time, however, so many improvements have been made in methods of transportation, so many new routes — like that of the Trans-Siberian Railway (q.v.) — have been completed that Mr. Fogg's once re¬ markable trip now appears in the light of an extremely commonplace achievement. In fact the person who, to-day, could not travel around the world in less than 80 days would be re¬ garded as a very inexperienced globe-trotter. The first serious attempt to lower Jules Verne's imaginary record was made in 1890, when Miss Nellie Bly, who represented the New York World, made the trip around the world against time. She was followed by the late George Francis Train, and both succeeded in accom¬ plishing the tour in less than 70 davs. Ten years later Mr. George Griffith, of Chiswick, England, established a new record at

641/2 days, but this record stood for less than a year, it having been reduced, in 1901, to 60 days and 131/2 hours, by Charles C. Fitzmorris, who made

the trip at the request of Hearst's Chicago American. The success of Fitzmorris was the means of inspiring many persons to participate in this unique form of record breaking, among the contestants there being several journalists, the representatives of European and Canadian papers. All attempts to lower this last record were unsuccessful, however, until December 1903, when Mr. James Willis Sayre of Seattle, Wash., earned the honor for record breaking by girdling the globe in 54 days, 9 hours and 42 minutes, an achievement that lowered the Fitzmorris record by more than six days and three hours. On 17 July 1911, Andre jager-Schmidt, a reporter on Excelsior, a Paris daily news¬ paper, left that city under instructions to lower this record. The trip was made without an ac¬ cident or any unnecessary delay and the trav¬ eler arrived in Paris on 26 August, having suc¬ ceeded in establishing a new record in girdling the earth. M. Jager-Schmidt's official time was 39 days, 19 hours, 43 minutes and 37 4/5 seconds but this time would have been lowered to the extent of a few hours if he had not stopped at Cherbourg to attend a reception.

ARPAD, the conqueror of Hungary, and founder of the Arpad dynasty, which reigned till 1301. He was born in the second half of the 9th century; died in 907. He was -the son of Almus, whom the seven Magyar clans dwelling in the steppes northeast of the Cas¬ pian Sea had elected their hereditary chief about 889. Thus united into one nation, the Magyars, mustering about 25,000 warriors, crossed the Carpathians and conquered Hun¬ gary, when Arpad was elected their prince. Arpad made a raid into Italy about 900 and returned with a large quantity of booty. The first crowned king of the Arpad dynasty was Saint Stephen, who began his reign in 997. This dynasty ended with Andrew III in 1301. Arpad is the national hero of Hungary, and his history is narrated in the oldest chronicles, mixed up with the national legends. His ex¬ ploits also form the theme of many of the popular songs of the country.

ARPEGGIO, ar-ped'jo (Italian, from Arp a, a harp), in music, the playing of a chord on a keyed or stringed instrument by sounding the notes, not together, but in rapid succession.

ARPINO, ar-pe'no (ancient Arpinum), Italy, town in the province of Caserta cele¬ brated as the birthplace of Caius Marius and Cicero. It is situated on a rising ground near the river Garigliano, was originally

founded by the Volsci, and became a municipal town under the Romans who took the town in 305 b.c. Its inhabitants became full citizens in 188 b.c. It is still a place of some importance, possesses a royal college called Collegio Tul- liano and several churches, and manufactures woolens. Paper, parchment and leather are also manufactured here and marble is quarried near by. Pop. (1911) 10,309. Consult Kel- sall, (Classical Excursion to Arpino) (Geneva

1820).

ARQUEBUS, ar'kwe-bus, an ancient species of firearm resembling a musket. It was fired from a forked rest, and sometimes cocked by a wdieel, and carried a ball that weighed nearly two ounces. A larger kind

used in fortresses carried a heavier shot. See Ordnance.

ARRACACHA, ARACACHA, ARRA- CACIA, ar-ra-ka'c.ha, a number of plants be¬ longing to the genus Arr acacia of the Umbelli- fercc family, all of which have tuberous roots, which are used by the natives of the uplands of Venezuela, Colombia, Bolivia, Peru and Chile as a food. They boil the arracacha and use it as potatoes are used in other countries. The roots, which are divided into a number of parts resembling large carrots, which often take the shape of cow’s horns, have a flavor somewhat like parsnips. They are lighter and more palatable than the potato; and they are said to contain more nutriment and to be more digestible. The edible arracacha goes under various designations and even botanists have given it different names, the principal of which are conium arracacha, arracacha escu- Icnta and arracacha or arracacia xanthorriza. The plant has also a variety of native names ac¬ cording to the district in which it is grown. The esculenta variety, which is cultivated ex¬ tensively in Peru, is known in the English market under the name of the Peruvian carrot. Another variety is grown in the West Indies where it is extensively cultivated and used as an article of food. Some authorities say it is a native of Jamaica, while others assert that the West Indies variety was transplanted there from the mainland. A liquor for the treat¬ ment of stomach diseases is also manufactured from the arracacha. In appearance the plant has all the marks of the umbelliferse family; it is from two to three feet in height and has deeply indented, symmetrical, dark-green leaves and yellowish or dull purple flowers which occur in

compound umbels. The arra¬ cacha, on account of its prolific growth and its excellent food qualities, was at one time strongly recommended as a substitute for potatoes. Sir William Hooker of the Royal Horticultural Society of England was mainly instrumental in its introduction into Great Britain. The Messrs. Vimorin introduced it into France; cultivated it themselves and in¬ duced others to do the same ; and Alph de Can¬ dolle advocated its cultivation in Switzerland. But all the attempts were failures, as the plant did not grow fast enough to mature before the frost came and killed it; for it requires somewhat warm climatic conditions, more or less evenness of temperature and the unusual conditions that are found on the upland plateaus of the Andes, where the air is, on an average, about one-third lighter than at the level of the sea-coast lands. These conditions include almost constant sunshine and plenty of moisture, never excessive yet constant. The arracacha grows in deep, loose soil and is generally propagated by means of shoots from the crown of the root. In all, more than a dozen species are said to exist throughout the long length of the Andes.

ARRACK, or RACK, a name applied by Orientals to a strong spirituous liquor distilled from rice, from the juice of the cocoanut, date and other palms, or from molasses. The arrack of Gor and Colombo in Ceylon is distilled from palm-juice alone, after being allowed to fer¬ ment; that of Batavia and Jamaica from rice and molasses. The rice is turned into malt by

being soaked in water and allowed to sprout, after which the arrack is distilled from it on fermentation taking place in the same way as whisky from barley-malt. The rice is also often used without being malted. The distilla¬ tion of the fermented liquor affords the third or worst sort of arrack; this mixed with a little water and again distilled gives the second best sort; a third distillation produces the best sort, which is seldom exported. The arrack sold in Europe is seldom genuine. Pure ar¬ rack is clear and transparent, with a yellowish or straw color, and a peculiar but agreeable taste and smell ; it contains at least 52 to 54 per cent of alcohol. Not much of it is im¬ ported into England, but it is largely drunk in India and the East generally, the Indian and Pacific Islands, Africa and South America. The arrack of Japan is known as saki.

ARRAGONITE, a common but erroneous spelling for the mineral Aragonite (q.v.).

ARRAH, India, towui in Bengal in the dis¬ trict of Shahabad, 33 miles west of Patna. The surrounding country is fertile and well cultivated,

and near the town is a large and beautiful lake. It was rendered famous dur¬ ing the mutiny of 1857 by the heroic resistance of a body of 20 English civilians and 50 Sikhs, cooped up within a detached house, to a force of 3,000 Sepoys, who were ultimately routed and overthrown by the arrival of a small Euro¬ pean reinforcement. Pop. (1901) 46,170.

ARRAH NA POGUE, ar-ra na pog, a plav by Dion Boucicault (q.v.)

ARRAIGNMENT, in the practice of crim¬ inal law the calling of a prisoner by his name to the bar of the court to answer the matter charged upon him in the indictment. His in¬ nocence being presumed, it is the law, and is so laid down in the most ancient books, that, though charged upon an indictment of the gravest nature, he is entitled to stand at the bar in the character of a free man, without irons or any manner of shackles or bonds, un¬ less there be evident danger of his escape, or of violence at his hands. The indictment is read to him or he is furnished a copy; he is asked by the court whether he pleads guilty or not guilty thereto. If indicted for a felony the criminal must personally appear, but may do so by counsel in case of a misdemeanor. The accused may then ask for time in which to make answer or he may move that the in¬ dictment be set aside, or he may demur or plead.

ARRAN, ar'ran, Scotland, island in the Firth of Clyde, 20 miles long and 10 miles wide, with an area of 165 square miles. The island attains its loftiest summit in Goatfell, which is 2,900 feet high. The southern por¬ tion is rather hilly than mountainous, and con¬ tains several arable tracts of considerable ex¬ tent and tolerable fertility. The geology of Arran has attracted much attention, as fur¬ nishing within a comparatively narrow space distinct sections of the great geological forma¬ tions. The botany possesses almost equal in¬ terest, both in the variety and the rarity of many of its plants. Among objects of histori¬ cal interest are the cave of Drumidoon, relics of Danish forts and Druidical stones. Cattle raising and fishing are the principal industries.

Brodick and Lamlash are the chief harbors, both on the east coast. About half the popu¬ lation speak both Gaelic and English. Pop. (1900) 6,000. Consult (A May Week in Ar¬ ran } (1882) and (The Book of ArraiP (edited by J. A. Balfour, Glasgow 1910).

ARRAN, Earls of, the extinct Scottish title of the earls of Arran (not to be confused with the modern Irish earls of Arran — from the Arran or Aran Islands, Galway — a title created in 1762), borne by some famous char¬ acters in Scottish history. Except the first earl, Thomas Boyd and Tames Stewart, all of the earls of Arran were of the Hamilton family. James Hamilton, 1st earl: b. 1475; d. 1529. He was the son of James, first Lord Hamilton, and Mary Stewart, daughter of James II of Scotland. In 1479 he succeeded to1 his father's title. In 1489 he was made sher¬ iff of Lanark, appointed privy councillor to James IV, and in 1503 negotiated the mar¬ riage between the King and Margaret Tudor. In the same year he was made Earl of Arran. In 1504 he was lieutenant-general of the Scot¬ tish realm and took an active part in reducing the Hebrides and was sent to aid John of Den¬ mark with a large army. In 1507 he was Ambassador to France and on his return was imprisoned by Henry VII. When Henry VIII came to the throne Arran signed the treaty of peace between the two countries and was given command of a fleet equipped to aid France. The expedition proved a failure. He returned to find his rival Angus in control of the government, whereupon he turned to the French party, but became weary of it and on the departure of the Duke of Albany was chosen president of the council of regency and provost of Edinburgh. After another short absence he was kept out of Edinburgh by the Douglases and a battle was fought on 30 April 1520 in which the Hamiltons were worsted. But by allying himself with Angus' wife, the Queen-mother, he gained another op¬ portunity for power, which he held from 1522-24, when he was forced to include Angus in the government. Angus was finally conquered in 1526 and Arran joined the King at Sterling. He was succeeded by James Hamilton, who was also Duke of Chatelherault : b. about 1515; d. 22 Jan. 1575. On the death of James V he was proclaimed protector of the realm and heir presumptive to the throne. He was a zealous supporter of the Reformation. At first he supported the English policy in opposition to Cardinal Beaton, but later joined the French party and became a Roman Catholic. In 1544 he signed a bond repudiating the English al¬ liance. In 1545 he accepted Mary of Lorraine as a sharer in the government, and in the meantime was forced to meet the English army at Pinkie, where the Scots were defeated. He reluctantly agreed to the marriage of the Dauphin with Mary, whom he had designed for his son, and accepting a duchy in France, al¬ lowed his title to descend to his eldest son. On 12 April 1554 he abdicated in favor of the Queen-mother, whose government he supported until the capture of Edinburgh by the lords of the congregation, when he declared himself on their side and took the covenant. After sev¬ eral vacillations among the various factions he was declared a traitor and went into exile

for five years. He went to France; returned after the murder of Mary's husband and on her abdication was nominated one of the re¬ gents, whereupon he returned to Scotland, acknowledged James as king, but treacher¬ ously supported the cause of Mary, and when the regency was given to Lennox called a par¬ liament which annulled the King's coronation. In August he was declared a traitor, lost his estates and finally in 1573 acknowledged James' authority and laid down his arms. He married Margaret, daughter of James Doug¬ las, 3d Earl of Morton, and had several daughters and four sons. James, his eldest son, succeeded him as 3d Earl of Arran: b. 1537 ; d. 1609. He was betrothed to the Princess Elizabeth and was early involved in political broils. He was seized as a hostage in 1546 by the murderers of Cardinal Beaton. Later he went to France in command of the Scots Guards and in 1557 distinguished himself in the defense of Saint Quentin. He was a strong adherent of the Reformed doctrine. At the wish of Mary he was declared a traitor in 1559 and to escape arrest he fled to Geneva and England. He returned to Scotland in Sep¬ tember, supported his father against Mary of Lorraine, upheld the alliance with Elizabeth and fought the French at Dysart. He signed the treaty of Berwick, became one of the lords of the congregation and with the strong support of the Protestants and Hamiltons refused the proposals of marriage with Elizabeth and pre¬ sented his suit for Mary without success. Lie became a member of her council in 1561, but took a hostile attitude toward her court be¬ cause of the prevalence of the Roman Catho¬ lic religion. He showed marked signs of in¬ sanity and was confined in Edinburgh Castle, where he remained until 1566. His estates were administered by his brother John, 1st Marquess of Hamilton. Arran and his mother were besieged on the pretense of delivering him from unlawful confinement and brought to Linlithgow while the charge of his estates was taken over by the government and James Stewart was appointed his guardian. The for¬ feiture was repealed in 1586 and the title de¬ volved on Arran's nephew, James, 2d Mar¬ quess of Hamilton. James Stewart, son of Andrew Stewart, 2d Lord Ochiltree: b. about 1556; d. 1596. In his youth he served with the Dutch forces against the Spanish. Returning to Scotland, he became a favorite of the King. In 1581 he was the principal accuser of the Earl of Morton and for his share in the latter's destruction was ap¬ pointed a member of the Privy Council. By a grant he became Earl of Arran and Hamil¬ ton on the ground of the illegitimacy of the children of his grandmother's father. In the same year he married Elizabeth, daughter of John Stewart. By the raid of Rutliven in August 1582 he was deprived of office and imprisoned. In 1583 he led a force of 12,000 men against the new government and after the overthrow of the Protestant Lords was made governor of Stirling Castle and Lord

Chan¬ cellor. After executing Earl Gowrie he was made governor of Edinburgh Castle, provost of the city and lieutenant-general of the King's forces. Arran induced the English gov¬ ernment to refrain from aiding the banished

lords and further secured his power by the forfeitures of his opponents. His tyranny and insolence caused his rapid fall from power. In 1586 he was ordered to leave the country. In 1592 he returned to Edinburgh, but his at¬ tempts to be reinstated were unsuccessful. Elis career was finally terminated by assassination at the hands of the nephew of the Earl of Morton, who carried his head in triumph on the point of a spear through the country.

ARRAS, a'ras', France, capital of the de¬ partment of Pas-de-Calais, in the middle of an extensive and fertile plain, on the Scarpe, which here becomes navigable. It is an im¬ portant station on the French Northern Rail¬ way, is 134 miles by rail from Paris and 97 miles from Brussels. It is a well-built town, and has several handsome squares and a cita¬ del, but is no longer fortified. The chief pub¬ lic buildings are the modern cathedral, the ex¬ tensive buildings of the former abbey of Saint Vaast, now accommodating a museum and the public library of 50,000 volumes ; the Hotel de Ville, one of the handsomest in the north of France, with a fine Gothic fagade; the theatre, Hotel de la Prefecture, barracks, etc. Its in¬ dustries are varied and important. These in¬ clude beet sugar, agricultural implements, hos¬ iery, leather and petroleum products. There is also a large trade in flour, grain, oil, wines, •etc. In the Middle Ages it was famous for the manufacture of tapestry, to which the English applied the name of the town itself. The corn-market of Arras is the most import¬ ant in the north of France. Arras in ancient times was the capital of the Atrebates. It was ceded to Louis XI in 1482, but the inhabitants having revolted, the King stormed it and put the people to the sword or expelled them and named the place Franchise. In 1493 it was ceded to Maximilian of Austria, and was re¬ tained by the Hapsburgs until 1640. Arras suf¬ fered greatly during the Revolution and again in the European War when it was practically razed by the conflict of British and German guns. During the early stages of the War the French were driven back at Arras on 4 Oct. 1914. About the time fierce battles were raging on the Yser, at La Bassee and Ypres, the Germans made a determined attack on Arras 20 October. They had already bombarded the city during the first week of the month and had attempted to storm it on

the 7th. For six days, from the 20th to the 26th, they poured a torrent of shells into Arras. The main attack was made on the 24th ; whole quarters of the city were wrecked, but the French line remained firm. Had the Germans succeeded in breaking through they would not only have attained the channel ports and recovered the northern road to Paris, but they would have achieved their main .objective, the splitting of the Allied line into two parts, of which the northern must have been annihilated or captured. On the 26th the French under General Maud'huy counter¬ attacked and drove the enemy out of the front trenches, gradually widening the circle till Arras was beyond the range of the heavy howitzers. The farthest advance of the Germans brought them 11 miles west of Arras in 1914 ; by January 1918 they had been pushed back eight miles east of the city. Arras was the birthplace of Robespierre. Pop. about 26,000.

ARREST

ARRATE Y ACOSTA, ar-ra'ta e a-kos'ta, a Cuban historian: b. Havana 1697; d. 1766. Ele studied law in Mexico and Havana and in 1752 was named alcalde of the latter city. His history of Cuba entitled (Llave del Nuevo Mundo y antemural de las Indias Occidentales) remained in manuscript until 1830. A new edition was issued in 1876.

ARRAWAK, ar'ra-wak. See Arawaks.

ARREBO, ar're-bo, Anders Christensen,

a Danish poet: b. Arooskjobing 1587; d. 1637. He was made bishop of Drontheim, Norway, when only 31, but deposed in 1622, owing to his objectionable life; he was afterward re¬ habilitated as preacher in Vordingborg. As the pioneer of the Renaissance movement he is considered the father of modern poetry in Den¬ mark. His rhymed translation of the (Psalms of David) (1623), but especially his (Hexam-eron) (1641), an imitation of a once famous poem of the French poet Du Bartas on the (Creation, } are highly esteemed. Consult the <Life) by Rordam (Copenhagen 1857).

ARREST, the seizure of a suspected crim¬ inal or delinquent that security may be taken for his appearance at the proper time before a court to answer to a charge. Ordinarily a person can be arrested only by a warrant from a justice of the peace; but there are exceptional cases in which he can be apprehended by an officer without a warrant, by a private person also without a warrant, or by what is techni¬ cally called a ((hue and cry.®

Any peace officer, as a justice of the peace, sheriff, coroner, or watchman may, without a warrant, arrest anyone committing a felony in his presence, 3 Hawkins PI. Cr. 164; Tiner v. State, 44 Tex. 128; Reg. v. Chapman, 12 Cox C. C. 4, or committing a breach of the peace, during its continuance, 3 Wend. (N. Y.) 384, or even to prevent the commission of a breach of the peace, Rex v. Herns, 7 C. & P. 312, 32 E. C. L. 522, and such officer may arrest anyone whom he reasonably suspects of having com¬ mitted a felony, whether a felony has actually been committed or not. 40 N. Y. 463; 3 Park. Cr. (N. Y.) 249; 99 Pa. St. 63.

A private person who is present when a felony is committed, 3 Wend. (N. Y.) 353; 1 Mood. 93; or during the commission of a breach of the peace, 10 Cl. & Fin. Hon. L. 28; 25 Vt. 261, may and should arrest the felon, and may upon reasonable suspicion that the person arrested is the felon, if a felony has been committed. 3 Wend. (N. Y.) 353; 6 Term

1.

An arrest is made by touching the body of the person accused. The object of arrest being to make sure that he answers to a charge about to be brought against him, it does not follow that after being seized he is incarcerated; if bail for his appearance at the proper time be given, and the case be not too aggravated a one for such security to be accepted, he will be released till the day of trial. Consult Free¬ man, (Treaties on the Law of Executions in Civil Cases) (3d ed., San Francisco 1900), and Hawley, (Law of Arrest on Criminal Charges 5 (2d ed., Chicago 1891).

ARREST, Military. Before an officer or soldier, or other person subject to military law, can be brought to trial, he must be charged

with some crime or offense against the rules and articles of war, and placed in arrest. The articles of war direct that whenever any officer shall be charged with a crime he shall be ar¬ rested and confined in his barracks, quarters or tent, and deprived of his sword by the com¬ manding officer, and that ((non-commissioned officers and soldiers charged with crimes shall be confined until tried by a court-martial, or released by proper authority.® The arrest of an officer is generally executed through a staff officer; by an adjutant, if ordered by the com¬ manding officer of a regiment; or by an officer of the general

staff, if ordered by a superior officer ; and sometimes by the officer with whom the arrest originates. On being placed in ar¬ rest an officer resigns his sword. It is cus¬ tomary, except in capital cases, to allow an officers in arrest the limits of the garrison, or even greater limits, at the discretion of the commanding officer, who regulates his conduct by the dictates of propriety and humanity. A non-commissioned officer or soldier is confined in charge of a guard ; but, by the custom of the service, the non-commissioned staff and the sergeants may be simply arrested. The articles of war declare (<that no officer or soldier who shall be put in arrest or imprisonment shall continue in his confinement more than eight days, or until such time as a court-martial can be conveniently assembled.®

It is declared by the articles of war that <(no officer commanding a guard, or provost- marshal, shall refuse to receive or keep any prisoner committed to his charge by any offi¬ cer belonging to the forces of the United States; provided, the officer committing shall, at the same time, deliver an account in writing, signed by himself, of the crime with which the said prisoner is charged,® and it is also declared that <(no officer commanding a- guard or provost- marshal shall presume to release any prisoner committed to his charge without proper au¬ thority for so doing, nor shall he suffer any person to escape, on the penalty of being punished for it by the sentence of a court- martial. Every officer or provost-marshal to whose charge prisoners shall be committed shall, within 24 hours after such commitment, or as soon as he shall be relieved from his guard, make report in writing to the command¬ ing officer, of their names, their crimes, and the names of the officers who committed them.® Thus the liberty of the citizen, under military law, so far as is consistent with the ends of justice, seems to be guarded with precautions little inferior to those which secure personal liberty under the civil laws of the State. The penalty of an officer's breaking his arrest, or leaving his confinement before he is set at liberty by his commanding officer, or by a su¬ perior officer, is declared to be cashiering by sentence of a general court-martial. A court- martial has no control over the nature of the arrest of a prisoner except as to his personal freedom in court ; the court cannot, even to facilitate his defense, interfere to cause a close arrest to be enlarged. The officer in command is alone responsible for the prisoners under his charge. Individuals placed in arrest may be released, without being brought before a court- martial, by the authority ordering the arrest or by superior authority. It is not obligatory on the commander to place an officer in arrest on

application to that effect from an officer under his command. He will exercise a sound dis¬ cretion on the subject. But in all applications for

redress of supposed grievances inflicted by a superior, it will be his duty, in case he shall not deem it proper to order an investigation, to give his reasons, in. writing, for declining to act ; these reasons, if not satisfactory, the complaining party may forward to the next common superior, together with a copy of his application for redress. An officer has no right to demand a court-martial, either on himself or on others; the general-in-chief,, or offic.ei competent to order a court, is the judge of its necessity or propriety. Nor has any officer who may have been placed in arrest any right to demand a trial, or to persist in considering himself under arrest, after he shall have beer, released by proper authority. An. officer under arrest will not make a visit of etiquette to the commanding officer or other superior officer, or call on him, unless sent for; and in case of business he will make known his object in waiting. It is considered indecorous in an offi¬ cer in arrest to appear at public places.

ARREST OF JUDGMENT, in law, is the act or process of preventing a judgment or verdict from being carried out till it shall be ascertained whether it is faulty or legally correct. Judgment may be arrested (1) when the declaration made varies from the original writ; (2) where the verdict materially diffe'ni from the pleadings and issue thereon; and (3) where the case laid in the declaration is not sufficient in law to admit of an action being founded upon it. A motion for arrest of judg- ment must be grounded on some objection arising on the face of the record itself. Peo¬ ple v. Thompson, 41 N. Y. 1 ; People v. Kelley, 94 N. Y. 526. If the judgment is arrested all the proceedings are set aside, and judgment of acquittal is given, but this will be no bar to a new indictment. See Judgment and consult works there referred to.

ARRETIUM, ar-re-shi-um. See Arezzo

AR'RHENATHE'RUM, genus of three species of tall perennial grasses closely allied to the oat (q.v.). A. elatius or avenaceum (also known as Avena elatius and Holcus aven- aceus), which, as these names imply, bears a resemblance to oats, and is sometimes called oat grass and French rye grass, is widely culti¬ vated for fodder in France. True rye grass (Lolium) is, however, not a close relative. It is grown in the United States as a hay grass, but is. confined to the States east of the Miss¬ issippi.

ARRHENIUS, ar-ra'nT-us, Svante Au¬ gust, Swedish chemist and physicist : b. Wijk, 19 Feb. 1859. He wras educated at the University of Upsala and after making many original inves¬ tigations became professor in the University of Stockholm in 1891. His researches have been of the highest importance, the establishment of the theory of

electrolytic dissociation being due to him. This theory supplies a reasonable ex¬ planation of many chemical phenomena other¬ wise insoluble and correlates various hitherto unconnected facts. In 1903 he was awarded the Nobel prize in chemistry. He has pub¬ lished (Sur la conductibilite galvanique des electrolytes* (1884); (Larobok i teoretik)

(translated into German and English, 1900) ; (Lehrbuch dcr komischen Physik) (1903) ; (Immunochemistry) (1907) embodying the course of lectures which he delivered in 1904 at the University of California; (Das Werden der Welten *(1907), published in English as (Worlds in the Making* (1908), a widely dis¬ cussed work which maintains the theory of the perpetual self-renovating energy of the world against the Clausian theory of final glacial de¬ cay, and initiates the theory of universally dif¬ fused life, emanating continually as spores from all habitable worlds, which, unless de¬ stroyed by contact with flaming stars, propa¬ gate life on habitable worlds they may reach.

ARRIA, celebrated Roman matron, wife of Caecinna Paetus, consul during the reign of Claudius, about 41 a.d. Paetus having raised an unsuccessful revolt against Claudius, in Illyria, was condemned to die, but was allowed the option of ending his life by suicide, which the Romans did not deem a crime. Paetus hesi¬ tated; Arria seized the dagger, plunged it into her bosom, and then presenting it to her hus¬ band, said, (<It is not painful, Paetus. ** She fell dead and Paetus at once killed himself with the weapon. Arria was the mother of Arria, who became the wife of P. Clodius Thrasea Paetus.

ARRIAGA, ar're-a'ga, Manoel de, 1st

President of Portugal: b. Horta, Azores, 1842; d. 5 March 1917. Began practising law in Lis¬ bon and became one of its foremost lawyers. He was always a Republican by conviction, and in 1861 he was sent to the Chamber of Representa¬ tives by the Republicans. It was here, where he served his party for many years, that he gained a reputation as a fluent speaker. At one time he was offered the position of tutor to the royal princess, but this honor he refused as incon¬ sistent with his Republican principles. He took a leading part in the revolution which in 1911 dethroned the King and proclaimed the re¬ public; on 24 August of that same year he was elected the 1st President of the republic, receiving 121 votes as against 86 cast for Senhor Machado.

See Portugal — History.

ARRIANUS, Flavius, a celebrated Greek philosopher and historian: b. Nicomedia, Bi- thynia, who flourished in the 2d century under the Emperor Hadrian and the Antonines. He was a disciple of Epictetus, whose lectures he edited. While residing in Greece he gained the friendship of the Emperor Hadrian, who bestowed upon him the citizenship of Rome (124 a.d.) , and subsequently appointed him pre¬ fect of Cappadocia. He was afterward ad¬ vanced to the senatorial and even consular dig¬ nities. Like Xenophon, whom he imitated in style, he united the literary with the military character. His writings were numerous, but many of them have perished. His (Anabasis> of Alexander the Great, still extant, narrates the Asiatic expedition of Alexander, and being based on the memoirs of Ptolemy Lagus and Aristobulus, who both served under that King, is proportionably valuable. To this is added a book on the affairs of India, which pursues the history of Alexander, but is not deemed of equal authority. An epistle from Arrianus to Hadrian is also extant, entitled (Periplus Ponti EuxinP (A Voyage Around the Euxine or Black Sea). There are also ascribed to him

Hreatise on Tactics) ; and a (Periplus of the Sea of Azof * and of the Red Sea, of which the authority is doubtful. We possess also his ˆEnchiridion, *a moral treatise containing an abstract of the practical philosophy of Epicte¬ tus. There have been various editions of the (Enchiridion* and the ‘Anabasis. *His philo¬ sophical works have been translated by T. W. Higginson (Boston 1891) and the ‘Anabasis* by Chinnock (1893). For biographies consult Bolla, E., (Arriano di Nicomedia) (Rome 1890) ; Pelham, H., ‘Arrian as Legate of Cap- padocia) (Eng. Hist. Rev. October 1896).

ARROL, Sir William, British engineer: b. Scotland 1840; d. Ayr, 20 Feb. 1913. Ap¬ prenticed to a smith at Paisley in boyhood, he worked in various engineering shops, and set up as a boilermaker in a small way in 1865. In 1872 he started the Dalmarnock Iron Works, and gradually took up construction work in steel. His first important work was the Cale¬ donian railway bridge at Glasgow. He recon¬ structed the Tay bridge after the disaster of 1879, which occupied five years, and the Forth bridge, 1882-89. He also built the steel work of the Tower bridge, London, and the Nile bridge at Cairo, and widened Blackfriars bridge across the Thames. Arrol devised many ingenious implements for drilling, riveting and other operations. Originally a Liberal, he left the party in the Home Rule split of 1886 and sat as Unionist M.P. for Ayrshire 1895-1906.

ARRONDISSEMENT, a'ron-des-man, name given in France to the 362 subdivisions of the 87 departments, or of the quarters of some of the larger cities, as in Paris. The ar- rondissement is under the government of a sub-prefect.

ARROO. See Arru Islands.

ARROW, a missile weapon, straight, slen¬ der, pointed and barbed, to be shot with a bow. See Archery.

ARROW LAKE, the name given to an ex¬ pansion of the Columbia River, in British Co¬ lumbia, about 95 miles long from north to south. It is often regarded as forming two lakes — the Upper and Lower Arrow.

ARROW-MAKER, The. This play, re¬ flective of American Indian life, especially of the Paiutes, in the Sierras, is by Mrs. Mary Austin. Presented at the New Theatre, New York, under the management of Winthrop Ames, in February 1911, certain concessions had to be made, so the author confessed, “to what was thought to be the demand for a drama of Indian life which should present the Indian more nearly as he is popularly con¬ ceived.* *But, even in the presentation, care was taken that the music be reminiscent of In¬ dian themes, that the chants be played from phonograph records of Indian ceremonials, that the dances be taught by one Chief Red Eagle, and that the costumes and properties have the authenticity of the American Museum of Nat¬ ural History. When the play was. revised and issued definitely in 1915 (Boston), its notes and glossary revealed Mrs. Austin’s desire to make of ‘The Arrow-Maker* an archaeologically cor¬ rect representation of the Indian as known to her.

The central character in the drama, The Chisera, is a Medicine Woman of the Paiutes — who, in commune with the gods, is supposed to be as one removed from human passion. Those who come to her regard her as an intermediary, with the power of influencing the Great One. They all work her ((to their best advantage.® But The Chisera tires of lonely commune and gives her love to Simwa, the Arrow-Maker. In the tribal matters that follow this complication the drama is a tragic revelation of Indian plot¬ ting and deceit. The Chisera is deserted by Simwa for the chief’s daughter, and though this Medicine Woman has not been taught the potent exercise of hate, she ceases to exercise her

power of intercession with the gods. And this brings misfortune to the tribe and grief to those involved in the way of Simwa and of one Padahoon, both rivals for tribal leader¬ ship. The final curtain falls on the death of The Chisera, mortally, wounded by one of her own enchanted arrows.

Apart from its archaeological faithfulness, (The Arrow-Maker J is a dignified attempt to write an American Indian drama. It is the latest in a long line of Indian dramas, the first of which, Maj. Robert Roger's (Ponteach,) was written in 1767.

Montrose J. Moses.

ARROW-ROOT, a fine-grained starch es¬ teemed for making desserts and invalid foods. It is extracted from the underground parts of various tropical plants, especially of the genus Maranta of the family Marantacea. The popular name is said to be derived from the practice of the South American Indians who used the freshly dug rootstocks as an antidote for poisoned arrow-wounds. Probably, how¬ ever, the derivation is from the Indian word ara. The principal species is Maranta arun- dinacea, indigenous to tropical America and cultivated in the West Indies, India and other warm countries. It is a perennial plant about two feet high, has small white flowers and fruits about the size and form of currants. The rootstocks, which often exceed a foot in length and three-quarters of an inch in diameter, are yellowish white, jointed and covered with loose scales which must be carefully removed before the extraction of the starch, because they im¬ part their disagreeable flavor if allowed to re¬ main. The process of extraction, which is simnle but usually crudely practised, is as fol¬ lows : The rootstocks are dug when a year old, well washed, peeled, beaten to a milky pulp in deep wooden mortars, and well washed to re¬ move the fibrous parts, which are thrown away. The crude starch is next passed through a sieve or a coarse cloth and allowed to stand until the starch has settled, when the water is drawn and the white residue again washed. After again settling, the water is drawn off and the pulp when dried in the sun is reduced to powder. On a large scale arrow-root is manu¬ factured with the aid of specially constructed machinery, but the process is essentially as de¬ scribed. Bermudian arrow-root is considered the best in the market, and next to it is that of Jamaica. The East Indian product is be¬ lieved to be inferior, perhaps because of adul¬ teration with or substitution of other starches, practices induced by the great demand and the high prices paid for the genuine. Some of these other starches are obtained from closely

related plants, among which may be mentioned certain species of the genera Canna (q.v.), Cur¬ cuma (see Turmeric), Manihot (see Cassava), Tacca (q.v.), and Arum. Potato, corn, rice and wheat starch and fine sago are also sold for arrow-root, but may be identified by micro¬ scopical examination ; the form and markings of the starch grains differ from those of the arrow-root granules. When dry, arrow-root is odorless, but when damp has a slight smell. Like other carhohydrate foods, it is a source of energy, but since it is deficient in nitrogen compounds it should be mixed with eggs, milk or other substances rich in nitrogenous mate¬ rials, to form a well-balanced diet.

The amount of fecula or starch present in the roots of the Maranta varies according to age, and runs from 8 per cent, in those of the young plants, to 26 per cent when full grown. The latter stage is reached when the plant is 10 to 12 months old; and the roots then present the following composition in 100 parts :

Starch, fecula, or airow-root . 26

Woody fibre . 6

Albumen . 1 \

Gummy extract, volatile oil, and salts . 1

Water . 65 £

Arrow-root is exported in tin cases, barrels or boxes, carefully closed up. It is a light, opaque, white powder, which, when rubbed be¬ tween the fingers, produces a slight crackling noise like that heard when newly fallen snow is being made into a snowball. Through the microscope the particles are seen to be convex, more or less elliptical, sometimes obscurely triangular, and not very different in size. The dry farina is quite inodorous, but when dis¬ solved in boiling water it has a slight peculiar smell and swells up into a very perfect jelly. Potato starch, with which it is often adulter¬ ated, may be distinguished by the greater size of its particles, their coarser and more distinct rings, and their more glistening appearance. Refined sago flour is used for adulteration, many of the particles of which have a trun¬ cated extremity, and their surface is irregular or tuberculate. Arrow-root is also sometimes adulterated with rice starch and with the com¬ mon starch of wheat flour.

The starch of the. cassava, manihot or manioc is sometimes imported into Europe under the name of Brazilian arrow-root. Po¬ tato starch,

carefully prepared, is sometimes sold as English arrow-root ; and the farina ob¬ tained from the roots of Arum maculatum as Portland arrow-root. Otaheite arrow-root is the starch of Tacca pinnatifida. All these, as well as Oswego and Chicago corn flour — the starch of maize or Indian corn — are so nearly allied to true arrow-root as not to be certainly distinguishable by chemical test ; but the forms of the granules differ, so that they can be dis¬ tinguished by the microscope.

ARROWHEAD, Sagittaria, a genus of plants of the natural order Alismacccc, distin¬ guished by unisexual flowers, having three her¬ baceous sepals and three colored petals, numer¬ ous stamens and numerous carpels, which are compressed, one-seeded, and on a globose re¬ ceptacle. They are aquatic plants, natives of very different climates, from the tropics to the cold regions of the world. The common arrow¬ head (S . sagittifolia) is a beautiful plant, a native of England, with arrow-shaped leaves

which rise above the surface of the water. It is one of those plants which have enjoyed an undeserved reputation as cures for hydro¬ phobia. The corms (or solid bulbs), dried and powdered, have sometimes been used for food, but have an acrid, unpleasant taste. The Chinese arrowhead (S. sinensis) is a native of China, and has long been cultivated in that country and Japan for its eatable corms, which, in a fresh state, are somewhat acrid, but abound in starch. It has arrow-shaped acute leaves and a branched polygonal scape (leafless stem). It is grown in ditches and ponds and is one of the plants sometimes cultivated in tanks in hot¬ houses.

ARROYO, ar-ro'yo (Sp. ˆstream®) the name of two towns of Spain, in Estremadura. Arroyo del Puerco, about 10 miles west of Caceres, has a palace of the old dukes of Bene- vente, and a parish church adorned with some paintings by Morales, Arroyo Molinos de Mon- tanches, about 27 miles southeast of Caceres, is noted as the scene of the defeat of the French, 28 Oct. 1811, by the British under Lord Hill.

ARROYO, Porto Rico, town in the de¬ partment of Guayama. It is situated on the south coast of the island, at the head of the harbor of the same name, being 40 miles south¬ east of San Juan. It is the centre of a rich sugar-producing region and exports much rum and

molasses. In 1899 it was partially de¬ stroyed by a hurricane. Pop. 3,220.

ARRU (a-roo) ISLANDS, a group be¬ longing to the Dutch, situated to the south of western New Guinea, and extending from north to south about 127 miles. They consist of one large island and a number of smaller. They are all low and swampy, but well wooded and tolerably fertile. The natives belong to the Papuan race, and many of them have been converted to Christianity by Dutch mission¬ aries. The chief exports are trepang, tortoise¬ shell, pearls, mother-of-pearl and edible birds- nests, which they exchange for European goods. Agriculture is in a primitive state, but maize, sugar-cane, beans, bananas, etc., are cultivated. Sago is the chief diet, little animal food being eaten. Pop., mainly Papuans, about 23,000.

ARSACES, ar-sa-sez, founder of a dynasty of Parthian kings, who, taking their name from him, are called Arsacidse.

ARSCHOT, or ˆRSCHOT, Philippe de Croy, Duke of, Flemish statesman : b. Valenciennes, France, 1526; d. Venice, 11 Dec. 1595. The heir to the wealth of the Croy family, he adopted the profession of arms and received his knighthood from the Spanish King Philip II, who employed him on diplomatic missions. His fanatical zeal for the Roman Catholic Church brought him into great favor with his royal patron and led to his appoint¬ ment, in 1577, as military governor of Antwerp citadel after the withdrawal of the Spanish troops. Hated by most and mistrusted by all, he was nevertheless appointed governor-general of Flanders by the State Council, which was composed of nine members, himself being the chief one. During a riot at Ghent he was captured by the populace, who exacted from him a promise to resign his post. He took some part in the administration of the Nether¬ lands at a later period. The story of his

devious career is told by Motley, who describes him as <(a splendid seignor, magnificent in cramoisy velvet, but a poor creature,® and that he was <(to serve all, essay to rule all, and to betray all.® (The Rise of the Dutch Republic).

ARSENAL, a magazine, or place appointed for the making, repairing, keeping and issuing of ordnance and other appliances required in warfare, whether in the army or navy. Some¬ times the name is applied to an establishment where such articles are kept in store only, but the chief arsenals also embrace large factories or workshops. The principal arsenals of the United States are those in Allegheny, Pa. ; Augusta, Ga. ; Benicia, Cal.; Columbia, Tenn. ; Fort Monroe, Va. ;

Frankford, Pa.; Indianapo¬ lis, Ind. ; Augusta Me.; New York, N. Y. ; Rock Island, Ill.; San Antonio, Tex.; Water- town, Mass., and Watervliet, N. Y. There are also powder depots at Saint Louis, Mo., and Dover, N. J., a noted armory at Springfield, Mass., an ordnance proving ground at Sandy Hook, N. J. The Royal Arsenal, Woolwich, England, which manufactures warlike imple¬ ments and stores for the army and navy, was formed about 1720. In France, each territorial military district (19 in all, including Algeria) has its own special arsenal or its own depot of war material. In continental Europe estab¬ lishments corresponding to our navy yards are included under the general term arsenal, such as are found in France at Cherbourg, Brest, Lorient, Rochefort and Toulon. The chief arsenals of Germany are situated at Spandau, Cologne and Dantzig, that at the first-mentioned place being the great centre of the military manufactories. The chief Austrian arsenal is the immense establishment at Vienna, which includes gun-factory, laboratory, small-arms and carriage factories, etc. Austria also pur¬ chases quantities of her military stores from private manufacturers. Russia has her prin¬ cipal arsenal at Petrograd with supplementary arsenals elsewhere. In Italy, Turin is the centre of the military factories. One of the most important naval arsenals on the Mediter¬ ranean is at Cartagena, Spain.

ARSENIC, steel-gray metal having a high lustre when freshly broken but soon tarnishing. It is very brittle and has a specific gravity of 5.7. Compounds of this element have been known for many centuries, chiefly on account of their poisonous character. The yellow sulphide of arsenic, otherwise called ((orpi- ment,® was known to Dioscorides, who called it arsenikon , probably on account of its powerful properties ; the Greek word arsen, from which it is derived, signifying ((male.® Arsenic occurs in the metallic form in nature, usually with ores of iron, silver, lead, cobalt, nickel and antimony. Large masses of it are found at Zimeoff, in Siberia, and it occurs also in Sax¬ ony, Alsace, Bohemia, Transylvania, in the Harz, in Chile, in Japan, at Kongsberg in Nor¬ way, and in the United States in New Hamp¬ shire, Maine, Colorado and Washington, and in British Columbia. Combined with other sub¬ stances it is one of the most widely distributed of the elements, although the total amount of it in the world does not appear to be large. It occurs in various kinds of pyrites, and is there¬ fore a common impurity in sulphuric acid (much of which is made from pyrites), and in substances in the manufacture of which this

acid is used. The minerals known as kupfer- nickel (niccolite), realgar, orpiment, mispickcl (arsenopyrite), and nickelglance ’(gersdorffite) contain it, as well as many others. The appear¬ ance of metallic arsenic varies greatly with the source from which it is obtained, and the method adopted for preparing it. That ob¬ tained from pyrites is usually compact, crys¬ talline and nearly white, while that obtained from arsenious acid is gray and pulverulent. Metallic arsenic may be obtained by refining the element as it occurs in nature, or by ex¬ tracting it from arsenopyrite. The process of extraction from arsenopyrite consists in roast¬ ing that mineral in earthenware retorts or tubes arranged horizontally in a long furnace, and each having a piece of thin sheet-iron rolled up and inserted into its mouth. On dis¬ tilling, most of the arsenic condenses on the sheet-iron, from which, after cooling, it may be detached. The product so obtained is fur¬ ther purified by mixing it with pulverized char¬ coal and redistilling. The earthenware retorts that are used in the process are made with great care. They are composed of one part of fresh clay and two parts of pulverized bricks or old retorts, and are coated with a mixture of blood, loam, forge scales and alum, which produces a glaze through which the poisonous vapors of the arsenic cannot penetrate. They are then fired. Practically all the arsenic mar¬ keted in the United States is a by-product of the smelting of arsenical lead and copper. In 1916 there were made in this way 5,986 short tons valued at $555,186. It would have been as easy to have made 20,000 tons had there been a demand for it. Owing to the fact that the smelters which work on arsenical pyrites (chiefly copper) are located in the Far West, a price of four cents a pound in the New York market is the minimum at which the production of arsenic as a by-product becomes commer¬ cially advantageous. It is interesting to note that besides the domestic production there was imported into the United States, in 1916, 1,071 tons of white arsenic, and 1,092 tons of orpi¬ ment (arsenic sulphide). The total value of these imports was $232,694.

Arsenic is crystalline, and its hardness, on the mineralogical scale, is about 3.5. It has several allotropic forms, one of which is crys¬ talline, and the other black and amorphous. The specific heat of the crystalline variety is 0.083, and' that of the amorphous variety is 0.076. Arsenic conducts electricity better than mercury does; for if the specific resistance of mercury at 32° F. be taken as unity, the specific resistance of arsenic is 0.373 at 32° F., and 0.534 at 212° F. The chemical symbol of arsenic is As, and its atomic wreight is about 74.44 (Clarke). Its coefficient of expansion is .000- 00311 per degree F. Arsenic oxidizes slowly wdien exposed to the air, forming a gray pow¬ der which is sometimes sold under the name of ((fly-powder.®

It is not affected by pure water. When heated in the air it burns with a blue flame, giving off a characteristic, highly dis¬ agreeable, garlic-like odor. When protected from the air, metallic arsenic volatilizes at a red heat wdthout melting; its vapor being a light citron yellow, and phosphorescent. When heated under heavy pressure arsenic melts at about 900° F.

Metallic arsenic forms alloys with many

metals, some of which are produced by pulver¬ izing and intimately mixing the constituents, and subjecting them to a pressure of 6,000 or 7,000 atmospheres. If much arsenic be present the alloys are usually brittle. Arsenic is an undesirable impurity in iron, in general, but it is sometimes added to iron and steel for the manufacture of small chains and ornaments, because it makes the metal susceptible of a ver\ brilliant polish. When alloyed wdth copper, arsenic gives a brittle gray metal, having a brilliant, silvery appearance, which is used to some extent in making buttons The chief use of metallic arsenic, however, is in the manu¬ facture of small shot. Pure melted lead, when dropped from a height, tends to form tailed drops ; but if arsenic be added in small quanti¬ ties this tendency disappears and the drops are nearly spherical. Another important use of metallic arsenic is in the manufacture of special alloys for bearings. With hydrogen, arsenic forms a very important gaseous compound known as arseniuretted hydrogen, or arsine, and having the formula AsEU This compound is best obtained by the action of sulphuric acid upon an alloy of arsenic and zinc. It is color¬ less, and so poisonous that Gehlen, its discov¬ erer, wras killed by inhaling a single bubble of it. Arseniuretted hydrogen burns wdth a bluish flame, and metallic arsenic is deposited upon a cold body that is held in the flame. Marsh's test for arsenic depends upon this fact. In executing this test, zinc and sulphuric acid are added to the solution to be tested, and the hydrogen evolved is allowed to issue from a small jet, where it is lighted. A piece of cold white porcelain is then held in the flame, and if arsenic be present, the characteristic dark, metallic, mirror-like deposit will be produced, owing to the arseniuretted hydrogen that is evolved, simultaneously with the hydrogen. Antimony gives the same kind of a deposit, so that it is important to examine the deposit (or ((arsenical mirror,® as it is technically called), to make sure that it is not composed of anti¬ mony. Marsh's test is extremely delicate, and will demonstrate the presence of incredibly small traces of arsenic, if proper precautions are taken to ensure absolute purity in the zinc and sulphuric acid that are used. Scheele's green (known chemically as (<arsenite of cop¬ per®) is a compound of copper arsenic, oxygen and hydrogen of a light green color. It wra:; formerly much used in calico printing and for

wall paper. Schwreinfurth green is a different compound of the same elements, and is used for similar purposes. A great diversity of opinion has prevailed among chemists as to the danger of using arsenical colors, especially in connection with wall papers. Some maintain that <(there is no possibility of any arsenical ex¬ halation arising from the w-alls, as has been al¬ leged® ; while others claim that certain micro¬ scopic fungi and other low forms of vegetable life act upon these coloring matters and cause the production of arseniuretted hydrogen, which can actually be detected in the air of rooms hung with arsenical papers. Schwein- furth green is better known in the United States by the name (<Paris green,® and is much used for preventing the destruction of crops by insects.

The most familiar compound of arsenic (wdth the possible exception of Paris green) is

undoubtedly arsenious oxide, As-jOs (often written AS2O3), or <(white arsenic,® known to the general public simply as “arsenic.® This is used extensively in the arts, in the manufacture of indigo blue and aniline; in glass-making, to remove the color due to the lower oxides of iron; in fly and rat poisons; in taxidermy; in making fireworks ; and for several other pur¬ poses. Paris green and London purple are used in large quantities as insecticides. Arsenic is used in medicine in the treatment of anaemia and asthma. Not all persons, however, can take it. In homoeopathic treatment in minute quantities it is administered for several ail¬ ments.

ARSENICAL POISONING. Arsenic is now used in so many ways that accidental poisoning occurs very often. As a poison em¬ ployed in committing suicide, and for slow noisoning with homicidal intent, it is less in favor than formerly. The forms of poisoning mostly seen are of the chronic type. These occur from the use of paints containing large quantities of either Scheele’s green or Paris green: the use of spraying solutions, now widely employed as a means of protection from insect and fungus pests, and from the addition of arsenic to foodstuffs, as a preservative. Acute forms of poisoning are more often the result of attempts to commit suicide. In acute arsenical poisoning the early symptoms are those of an acute inflammation of the stomach and intestines, coming on about half an hour after taking the poison. If taken when the stomach is empty the symptoms may be ex¬ hibited within 10 minutes; if when the stom¬ ach is full, the effects may not

appear for 10 to 12 hours. The premonitory symptoms of distress, difficulty in swallowing and a burn¬ ing pain in the throat, are followed closely by violent cramp-like pains with nausea, vomiting and diarrhoea. The severe symptoms multiply, the diarrhoea becomes watery, “rice water® and blood may appear in the vomit. A cold, damp skin of bluish hue, feeble and irregular heart- action, collapse and sighing respiration may precede death, attended at times with convul¬ sions. Death may occur within 24 hours, but it is apt to be delayed from two to four days, the patient usually dying of the secondary de¬ generations in the organs and of exhaustion. Examination of an arsenically poisoned body after death shows arsenic in nearly every part, particularly in the liver and kidneys. It is found also in the brain and even in the spongy parts of the bones. Death by arsenic is very painful. It is, moreover, an extremely uncer¬ tain poison, because of its insolubility, and of the vomiting reaction it induces. Many acute cases pass into the chronic stage.

Chronic arsenical poisoning may result from a single large dose, but more often results from the long-continued use of small quanti¬ ties of the poison. In a recent outbreak of chronic arsenical poisoning in Manchester, hun¬ dreds of people were affected. The source of the poisoning was from arsenic in iron pyrites employed in making sulphuric acid ; this cer¬ tain sulphuric acid had been utilized in the manufacture of glucose. Several firms had purchased this glucose for the manufacture of beer, and many hundreds of the consumers of this beer suffered from various forms of ar¬ senical poisoning. Chronic arsenical poisoning

may result from the use of wall papers and hangings colored by arsenical dyes, although such modes of poisoning may be considered ex¬ tremely rare. The symptoms of this type of poisoning are of gradual onset: the patient is languid, weak and loses his appetite. There is discomfort in the intestines, pains similar to colic and diarrhoea or constipation may result. A sub-acute inflammation of the mucous mem¬ brane of the nose and gums then develops, with sore gums, puffiness under the eyes with inflammation of the lids and running from the nose. Sneezing, coughing and hoarseness may occur, various skin eruptions are not uncom¬ mon and a curious pigmentation of the skin is nearly always observed. The patient prog¬ resses until poisoning of the ends of the nerves begins, with disturbances in sensation, anaes¬ thesia, paraestfmsia and pain. There may then develop paralysis of the extremity, frequently the toe _ (drop-toe) ; or the wrist (drop-wrist). Paralysis of sensation may also occur. The course of a chronic poisoning may not be over three or four days, but it usually requires three or four weeks, sometimes longer.

Some indi¬ viduals use arsenic throughout their lives and are never poisoned. The treatment of acute poisoning consists in the thorough and pro¬ longed washing out of the stomach and the use of large quantities of magnesia. Support¬ ive treatment is needed in the stage of collapse. Heat, alcohol and coffee are indicated. Brandy and ether are administered hypodermically and morphine is injected to allay the acute suffer¬ ing. In chronic poisoning electricity and tonic treatment are required. See Arsenic.

ARSENIOUS ACID, the arsenical com¬ pound familiarly known and popularly called arsenic. It is obtained principally during the roasting of the arsenican nickel ores in Ger¬ many in furnaces communicating with flues. The ordinary arsenious (which is what is pop¬ ularly known as arsenic) is a white crystalline powder, decidedly gritty, like fine sand, and with no well-marked taste. It is very heavy, so much so as at once to be noticeable when a paper or bottle containing it is lifted by the hand. It is soluble in water, to the extent of one part of acid in about 100 parts of cold water, and one part of acid in about 10 parts of boiling water. When placed in a spoon or other vessel and heated, it volatilizes and con¬ denses in crystals on any cool vessel held above. By this means it can be distinguished from or¬ dinary flour, which, when heated, chars and leaves a coal behind; and from chalk, stucco, baking-soda, tooth-powder and other white substances that, when heated, remain in the vessel as a non-volatile white residue. In some countries, as in the mountainous regions of Austria, Styria and the Tyrol, arsenic is eaten habitually, beginning with small doses and grad¬ ually increasing them. It is said to clear the complexion, favor nutrition and to improve the respiration in ascending heights. Some of the “arsenicophages® can take great quantities with impunity. See Mineral Production of the United States.

ARSENOLITE, a native trioxide of ar¬ senic, having the formula AsjOr, (often written As203), and crystallizing in the isometric sys¬ tem — usually in octahedrons. It is commonly white, with a vitreous lustre. Its hardness is

1.5, and its specific gravity about 3.71. It oc¬ curs in connection with ores of silver and lead, and with those of other metals when arsenic is associated with them. In the United States it has been found in Nevada and California. Arsenolite and senarmontite (an antimonial mineral of analogous composition and similar crystalline form) are collectively

known by mineralogists as the “arsenolite group.®

ARSENOPYRITE, ar-sen-o-pi'rit (“ar¬ senical “pyrites®), a tin-white, opaque mineral, with a metallic lustre, crystallizing in the or¬ thorhombic system. It contains arsenic, iron and sulphur, and has the formula FeAsS. Its hardness varies from 5.5 to 6.0, and its specific gravity from 5.9 to 6.2. Arsenopyrite is largely used as a source of “white arsenic,® or arsenic trioxide. It occurs chiefly in the crystalline rocks with gold and ores of silver, lead and tin. It abounds in Germany, England and the United States.

ARSENYEV, Konstantin Ivanovich,

ar-sanyef, Russian statistician, historian and geographer: b. 12 Oct. 1789; d. Petrazavodsk, 29 Nov. 1865. He was the son of a priest of the village of Mirkhanov, -government of Kos¬ troma, Chukhlomski district. He was educated in the Seminary of Kostroma and the Peda¬ gogical Institute of Saint Petersburg, from which he was graduated in 1810. A year later he was appointed instructor of geography and Latin at the institute. In 1819 the institute was changed to the University of Saint Petersburg and Arsenyev became adjunct professor of geog¬ raphy and statistics. He was dismissed, how¬ ever, two years later on the charges of free- thinking and teaching rules destructive to the morality of the students. He continued, how¬ ever, teaching in the School of Engineers and Artillerists where he also held a position. In 1824 he became instructor in statistics and his¬ tory to Crown Prince Aleksandr II. He un¬ doubtedly influenced the mind and the charac¬ ter of the future Tsar-Liberator. Quitting his duties as educator of the Crown Prince, he en¬ tered the civil service, at the same time devot¬ ing himself to scientific wrork. He held the posi¬ tion of head statistician of the Ministry of the Interior (1832-53), then newly organized. He did a great deal for the organization of Russian statistics and can be called one of its fathers. In 1845, together with Count Th. P. Litke, he founded the Geographical Society of which he was associate chairman (1850-54). He had attained the rank of privy councillor at the time of his death. His most valuable contri¬ butions are his historical work (The Rule of Peter IP (Saint Petersburg 1839) ; (The Rule of Catherine P (Saint Petersburg 1856). As the educator of the Crown Prince he had access to the documents of the imperial archives and ministerial bulletins. This enabled him to en¬ rich Russian history with many new data. His < Statistical Sketches of Russia) (Saint Peters¬ burg 1848), for which he used unpub¬ lished documents of the department of mines of the Ministry of the Interior and other government bureaus are also of great value. Besides the works mentioned he wrote (The History of the People and the Re¬

publics of Ancient Greece) (Saint Petersburg 1825-26) ; (Short General Geography) (ib. 1818, 20th ed., 1849, the only textbook for 30 years) ;

(Survey of the Physical Conditions of Russia and its Advantages for the Existing Public Industries) (Saint Petersburg 1818). He also contributed a number of articles and studies to current periodicals. Consult (Historical Papers of K. I. Arsenyev) edited posthumously by Pekarski in Saint Petersburg 1872. It repre¬ sents a collection of documents from archives and has Arsenyev's biography attached to it.

ARSINOE, ar-sm'6-e, the name of several celebrated women of antiquity, the most noted of whom is the daughter of Ptolemy I of Egypt, and Bernice: b. about 316 b.c. ; she married Lysimachus, King of Thrace, in 300 b.c. Desirous of securing the crown for her own children, Arsinoe persuaded Lysimachus to put Agathocles, the son of his former wife, to death. This crime proved fatal to the Thra¬ cian king; for Lysandra, the wife of the mur¬ dered prince, fled with her children to the court of Seleucus Nicator of Syria, who took up arms in her favor. In the course of the war Lysimachus was slain and his kingdom taken possession of by the conqueror. Arsinoe now fled into Macedonia, which was soon overrun by the Syrian army. In less than a year after¬ ward, however, Seleucus was assassinated by Ptolemy Ceraunus, half-brother of Arsinoe. This queen, who held the city of Cassandria in Macedonia, was induced, under promise of marriage, to admit Ptolemy within its walls ; but no sooner had he entered than her two children were butchered before her eyes. She succeeded in making her escape to Egypt, where she became the second wife of Ptolemy II, Philadelphus, her own brother (279 b.c.), thus affording a precedent to these unnatural unions which afterward became common among the Greek rulers of Egypt. She bore no children to her brother, who, however, seems to have had a strong affection for her, as he called one of the districts of Egypt by her name and employed the architect Dino¬ chares to build a temple in her honor. The first wife of Ptolemy II, also named Arsinoe, was a daughter of Lysimachus. A daughter of Ptolemy III, also of the same name, mar¬ ried her brother Ptolemy IV. Cleopatra's younger sister, Arsinoe, was taken prisoner by Julius Csesar and later ordered by Mark Antony to be put to death, 41 b.c.

ARSINOE, city of ancient Egypt, on Lake Mceris, said to have been founded about 2300 b.c., but renamed after Arsinoe, wife and sister of Ptolemy II, of Egypt. The site of Arsinoe is now occupied by the town of Medinet-el-Faium. The sacred crocodiles were kept here.

ARSON, the malicious and wilful burning of a dwelling-house or out-house belonging to another person by directly setting fire to it, or even by igniting some edifice of one's own in its immediate vicinity. If a person, by mali¬ ciously setting fire to an inhabited house, cause the death of one or more of the inmates, the deed is murder, and capital punishment may be inflicted. When no one is fatally injured the crime is not capital, but is still heavily pun¬ ishable; it is a penal offense also to attempt to set a house on fire, even if the endeavor does not succeed. The New York Penal Code provides that a person who wilfully burns, or sets on fire in the nighttime, either (1) a

dwelling-house in which there is, at the time, a human being; or (2) a car, vessel, or other vehicle, or a structure or building other than a dwelling-house, wherein, to the knowledge of the offender, there is, at the time, a human being, is guilty of arson in the first degree. Many statutory changes have been made in the common law upon this subject. There are three degrees of arson in the State of New York. Arson in the first degree is punishable by imprisonment for any term not exceeding 40 years ; in the second degree by imprison¬ ment for a term not exceeding 25 years ; in the third degree for a term not exceeding 15 years. Before the crime of arson is complete, the house, or some portion of it, however small, must be burned, or consumed by fire.

ARSUF, Palestine, a town on the coast, 12 miles north of Jaffa, famous as the scene of a victory of the crusaders under Richard I of England over the army of Saladin.

ART, in its broadest sense, is the purpose¬ ful exercise of human activities for the ac¬ complishment of some predetermined end of use or pleasure. Art is thus set apart from Nature which exists and operates outside of man, and which can enter the domain of Art only when and in so far as man calls her into his service by employing her powers for his own purposed ends. The distinction between Art and Nature, and the relations between them, have been a fruitful subject of philosoph¬ ical discussion, which cannot here be sum¬ marized, as it nowhere contravenes the defini¬ tion given above. Art is also distinguished from Science, which investigates phenomena, declares facts, and lays down rules, but does not, as Science, execute the operations dic¬ tated by these rules. It is Art which, having conceived the end to be realized, learns from Science the laws and rules which

must be observed in the exercise of the activities by which the preconceived end is to be attained, and then applies them to that end.

While in the above-defined broad sense the name of art may be applied to the com¬ monest human activities controlled by the will for a definite end — so that one may speak of an art of eating or walking — in general usage it is confined to such activities as involve ingenuity, judgment and skill. In this sense one speaks of the art of fishing, of building, of dress-making, of piano-playing. And in nearly all uses of the term there is present the idˆa of producing or creating, which is warranted by the etymology of the word in nearly all languages. The Latin Ars, from which we derive the English Art, is traceable to an ancient root Ar which is believed to signify a creation or begetting. Elence the word is also applied to the generality or total¬ ity of the products of the human creative activity in a given field, place or age, as when one speaks of mediaeval art, American art, the art of the Flemish looms, referring not to the activity which created, but to the products of that activity.

In ancient and mediaeval times, • the whole field of liberal culture was embraced in the term “arts® or ((liberal arts® ; and this usage survives in the modern degrees of Bachelor of Arts and Master of Arts and the name “Faculty of Arts® or “College of Arts® tradi¬ tionally applied to certain faculties and insti¬

tutions engaged in liberal education as dis¬ tinguished from professional education. Gener¬ ally, however, modern usage prefers the term “culture® to “arts® to designate the whole body of non-professional or theoretical educa¬ tion and activity, in which are included litera¬ ture, philosophy, language, history and pure science.

From the foregoing observations it will be seen that in every occupation, trade or pur¬ suit there are involved both an art and a sci¬ ence. The carpenter who makes a box must first conceive mentally — that is imagine — the box he is to produce, and exercise his activities to bring this conception into being: this is Art. Science teaches him the nature of his materials, and the laws which must con¬ trol the use of his tools and materials to realize his conception. Then Art again ap¬ pears in his application of his mental powers of skill and judgment and of his bodily powers of muscular activity, in conformity with the rules and laws of Science, and the box which is the product of this application is a work of the carpenter’s art.

The mental preconception of a work of art, whether recorded in visible form by a draw¬ ing or specification or not, is a design. So in

the art of war, the commander's predeter¬ mined plan of campaign or system of strategy is a design, as truly as is the architect's draw¬ ing of a projected building, or the weaver's pattern of the proposed rug or brocade. Thus in every art there are two distinct elements or stages — design and execution. Design springs from the imagination, and guides and directs the execution. Everything that per¬ tains to the execution is a part of the technic of the art ; the rules and laws of the technic are the contribution of Science.

Classifications. — It is customary and con¬ venient as well as reasonable to distinguish between those arts which minister primarily to the physical or material needs of man, and those whose primary and dominant pur¬ pose is to minister to man's emotions, apart from practical or material service. The arts of the first sort we call the useful arts ; those of the second sort the fine arts. The products of the useful arts are designed for purposes external to themselves, to serve the needs of daily life; in other words they are made to be used. The products of the fine arts, on the other hand, are created for their own sake ; they are an end in themselves, or — to be more accurate — they exist for the sake of the emotions they are designed to express and arouse. A chair, however superbly carved, is primarily a wrork of useful art, because made primarily to be sat on ; but a picture is painted for its own sake, not to be used but to be looked at and to excite pleasurable emo¬ tions by its beauty of subject, of drawing, of color: it is a work of fine art. So also a poem or a symphony is produced for the sake of the aesthetic emotions it arouses, not for that of any practical or material use to which it is to be put ; it is a work of fine art. The fine arts, then, are those whose appeal is to the aesthetic emotions; and just to the extent in which any work of art does so appeal does it enter within the domain of the fine arts. Painting, sculpture, music and pottery belong obviously in this domain ; pottery, weaving,

building, metal-working are as obviously use¬ ful arts.

Since, however, useful objects are often made of such forms and so adorned as to be not only useful but also beautiful to look upon, and therefore to appeal to the aesthetic sense, there is seen to be a wide border-land of art in which both use and beauty are kept in view, and both skill and imagination exer¬ cised by the designer and maker of the useful object. The arts which are thus concerned with making

useful objects beautiful are some¬ times called the industrial arts, sometimes the decorative arts. But these terms cannot be used either as synonyms or as mutually ex¬ clusive designations, for by many the name (<industrial arts® is applied to the useful arts, as such; while certain of the decorative arts belong wholly in the category of fine art. (See Fine Arts). Indeed, architecture, which is universally classed as a fine art, is the most important of the decorative arts, to which many of the decorative arts are ancillary and subordinate, such as mosaic, decorative carv¬ ing, marble inlay and the like. (See Decora¬ tive Art). It is therefore evident that any classification of the arts into rigid categories such as the scientists have devised for their fauna and flora or for the sciences themselves is quite out of the question, because of the varying degrees to which the utilitarian and aesthetic elements prevail in the different prod¬ ucts of man's industry, and in different works even of the same general kind.

Sciences Related to Art. — In connection with the arts, especially the fine arts, there have been developed a number of fields of intellectual activity which are not themselves arts, but rather sciences, although they con¬ cern themselves wholly with inquiries into matters of art. The investigation and discus¬ sion of the nature of beauty and of the appeal which works of art make to the emotions is a branch of philosophy, and is called /Esthet¬ ics (q.v.). The study of the origin, achieve¬ ments, progress and decline of the arts or of an art is a branch of history, especially of the history of civilization. The exploration of ancient remains and the study and discus¬ sion of the arts of a more or less remote an- tiauity constitute the science of Archceology (q.v.). The discussion of the qualities, char¬ acteristics, merits and defects of an art, a style or a period of art, or of a particular work of art, is a special branch of Criticism (q.v.). The principles and laws at the basis of an art and the rules for. its practice form a body known as the Theory of Art, closely related to the science of aesthetics. Every one of these divisions of knowledge concerning Art and the arts has given birth to an exten¬ sive literature, and the amount of such litera¬ ture is enormous. Thus, for example, in the Avery Library of Columbia University at New York, there are at this writing 25,000 volumes devoted exclusively to architecture and the allied arts.

For information concerning various divi¬ sions of the general subject see the articles Aboriginal Art; ˆEsthetics; American Art; Archeology; Architecture; Dancing; Dec¬ orative Art; Interior Decoration; Drama; Fine Arts; Music; Opera; Painting; Paint¬ ing, American; Painting., Education in;

Poetry; Pyrotechny; Sculpture; Sculpture in the United States ; Sculpture, Education in ; and the various industries or useful arts each under its own title.

Alfred D. F. Hamlin,

Professor History of Architecture , Columbia University.

ART, American. See American Art.

ART, Decorative. See Decorative Art.

ART, Ecclesiastical. See Ecclesiastical Art.

ART DRAWING: Pictorial Representa¬ tion and Decorative Design. Drawing in general falls into two distinct divisions, namely, Constructive Drawing and Art Drawing. Con¬ structive or Mechanical Drawing is a conven¬ tional method of representing all the facts of form, size and structure of an object from which the object may be constructed. Art Drawing deals with the representation of the appearance of objects and the evolving of forms for the decoration of surfaces. As taught in art academies and practised in studios, it comprises the subjects of Pictorial Represen¬ tation and Decorative Design.

Pictorial Representation.

As the title implies, the ultimate aim of pictorial representation, commonly known as free-hand drawing, is the creation of a pic¬ ture — the graphic expression of the beautiful in plant-life, animal-life and landscape. A true picture shows not merely how an object or group of objects appears, but it tells how these objects impressed the artist. It is the draughts¬ man's concrete effort to communicate to his fellow beings the aesthetic sensation he ex¬ perienced in the presence of nature.

To attain his end, the artist must augment a natural aptitude for the subject by a study of linear and aerial perspective in landscape and marine drawing, anatomy in figure and animal drawing, and the principles of selection and arrangement (pictorial composition) in all the types of representation. He must, moreover, be acquainted with the qualities and limitations of the several forms of rendering and mediums used.

Free-Hand Perspective. — In looking thoughtfully at a landscape, we shall notice that objects diminish in size as they recede farther and

farther from the eye; and that forms we know to be rectangular or circular appear modified according to the different po¬ sitions in which they are placed in relation to the observer. These changes in form and size are due to what is termed linear perspec¬ tive. We shall also notice that objects in the distance appear paler and grayer in color, due to the action of what is called aerial perpec- tive.

The draughtsman need not necessarily go into a scientific study of linear perspective; but he must embody in his work what is known as free-hand perspective — the general prin¬ ciples of the subject deduced from observa¬ tion and practice. These principles are here¬ with stated :

1. The apparent form of any object, ex¬ cept a sphere, varies with every position in which it is placed in regard to the observer.

2. The apparent size of an object decreases as its distance from the observer increases.

1. A circle seen obliquely always appears like an ellipse.

2. The more obliquely the circle is seen, the more nearly the ellipse approaches a straight line.

3. A horizontal face, when above or below the eye, appears fore-shortened.

4. All parallel horizontal edges receding from the e}ˆe appear to converge to a point on the horizon — an imaginary line on a level with the eye.

5. Parallel horizontal edges receding to the left appear to converge to a point on the hori¬ zon at the left of the object, called Vanishing Point 1 ; those receding to the right appear to converge to the right of the object, called Van¬ ishing Point 2.

6. For rectangular objects standing with the side faces turned equally away, the vanish¬ ing points are equidistant from the object. (Fig. 1).

y.Fj HO R IZOn irf>2

1. For rectangular objects standing with side faces turned unequally away, Vanishing Points 1 and 2 are unequally distant from the object according to the angles at which the objects stand. (Fig. 2).

2. Receding parallel lines situated obliquely in relation to the observer appear to converge in a vertical vanishing line. (Fig. 3).

Forms of Rendering.— There are four modes in which objects may be rendered. They may be drawn in outline, in neutral values of light and dark, in light and shade, or painted in color masses. With the last form vol. 2 — 22

of rendering we are not concerned in this article. See Painting.

Rendering in Outline. — The practice of drawing in outline as an independent form of pictorial representation is not much in vogue now, as it is more or less abstract and limited in its power to convey to the mind all the truths in the appearance of an object. Never¬ theless, an experienced artist can express many characteristics of an object by a skill¬ ful modulation of line : now thin, and then thick; here long, graceful and rhythmic, and there short, hard and angular.

Rendering in Flat Values of Light and Dark. — • On a gray day when the sky is over¬ cast, the light does not come from a particular spot, but is rather diffused from the sky gener¬ ally. We shall find that then all the elements in a landscape, as trees, buildings, distant hills, etc., appear in simple flat masses of color. If we interpret in black and white the character¬ istic forms and relative degree of light and dark, called the values, of these color masses, we shall have a landscape drawing rendered in flat values of light and dark.

This method of rendering is now frequently used bv artists in still-life, landscape and figure compositions where decorative effects are re¬ quired, as in poster work and mural decora¬ tions. (Fig. 4).

Rendering in Light and Shade. — A draw¬ ing made in light and shade seeks to express the values of the masses as modified by the effect of sunlight, and shadow. It is the most realistic of all the methods of pictorial repre¬ sentation in monochrome, as it depicts all the characteristics of the subject with the excep¬ tion of its actual color. (Fig. 5).

Pictorial Composition. — In order to ex¬ press his idea perfectly and beautifully, whether it be in still-life, landscape or animal drawing, the artist must use in his work the fundamental principles underlying good arrangement of lines and masses in a picture, known as pic¬ torial composition. These principles are :

1. Dominance, which requires that there be one object or centre in a picture of major interest, having the strongest emphasis or accentuation and all other objects subordinate.

2. Opposition, which requires that the vari¬ ous elements in a composition show contrast and variety of line, shape, and value.

3. Balance, which requires that there be such an adjustment of these contrasts that the whole effect will be harmonious.

In the charcoal drawing, (<Sheep Entering a Barn,® by the famous Dutch painter Anton Mauve (Fig. 6), we have an example of good composition. The eye first discerns the prin¬ cipal elements, namely, the old man and the sheep, because they occupy a dominant posi¬ tion (near the centre), and their values are accentuated at the expense of the other details, which are purposely kept subdued. Besides, a little scrutiny will reveal that the picture also has ample contrast and variety in line, shape, and tone, and perfect balance of its various attractive forces.

Mediums Used in Drawing. — Of the vari¬ ous materials used in drawing, the most im¬ portant are lead-pencil, ink and charcoal, each having its special qualities and limitations.

Lead-pencil Drawing. — The lead-pencil

has always been a favorite with artists in male-

ing preparatory studies for their pictures, and a number in the past, as Lalanne, Ingres, Rousseau and Legros, have used it as an inde¬ pendent means of expression. The technique of lead-pencil drawing is very simple. For ordinary outline work a medium soft pencil is used, held by the thumb and fore-finger three or four inches from the point so that it has the support of the . middle finger. The shading is rendered by means of broad intermingled strokes of a soft pencil (4B), held sideways under the fingers. This method is known as pencil-

painting. (Fig. 5).

Ink Drawing. — There are three kinds of ink rendering: pure line drawing, made with a pen ; tone drawing produced with a brush ; and combination drawing of lines supplemented by tones.

In a pure line drawing in ink, the draughts¬ man seeks to render the light and dark values in his subject by means of pen strokes of graded widths. For this purpose India ink and pens of special make are used. (Fig. 7).

An ink tone drawing is made with washes produced by means of a sable or camel's hair brush and India ink, diluted with quantities of water according to the intensity of the tones desired.

Combining lines and tones in an ink draw¬ ing is now very popular with artists, as this method is capable of producing highly inter¬ esting effects.

Charcoal Drawing. — 'One of charcoal's admirable characteristics is that it produces a wide range of subtle grays. Its pale tones are semi-transparent silvery grays, so useful in depicting aerial perspective, and its dark tones are rich and velvety, extremely valuable in landscape and figure drawing generally.

Its chief quality, however, lies in the fact that it is easily removed, enabling the artist to alter the arrangement of the masses as he composes. These changes are done with the chamois skin and kneaded rubber.

When completed, the drawing can be made permanent by spraying with a solution of white shellac and alcohol, called fixative.

DECORATIVE DESIGN.

By design is meant the originating of objects and their decoration according to the laws of use and beauty. It thus naturally falls into two grand divisions, namely, con¬ structive design and decorative design.

Constructive Design, or design in three dimensions, deals with the evolving of objects having length, breadth and thickness. It covers all the fields of human invention, as vessels, utensils, apparel, furniture, architecture and machinery. Each of these forms a distinct de¬ partment of design. . We thus speak of archi¬ tectural design, machine design, jewelry design, etc.

The chief aim of constructive design is the creation of an article of use and beauty. The object designed must show fitness for its pur¬ pose in size, form, material, and in beauty of its proportion. For example, we would be violating the laws of use and beauty if we were to make a chair out of cardboard, the size of a table, and in the form of a pyramid.

But very often objects, although fully satis¬ factory in themselves as regards use and beauty, nevertheless present blank surfaces the

appearance of which might greatly be im¬ proved by the application of ornamentation. This leads us to a consideration of decorative design.

Decorative Desigji, or design in two di¬ mensions, may be defined as the evolving of forms for the enrichment of surfaces. The result of decorative design, commonly knowm as ornament, produces its legitimate effect when, without concentration upon itself, it makes the object to which it is applied more pleasing than if unadorned.

To produce satisfactory work, the decora¬ tive designer must study the materials of design, the systems and principles, of arrange¬ ment, and the various methods of application.

Materials of Decorative Design. — Designs may be produced from abstract shapes, from conventionalized natural forms, as plants, animals and landscape, and from lettering.

Abstract Forms in Design are derived from the exhaustless field of geometry. They are arrived at by combining lines of various widths, or by cutting up such geometric sur¬ faces as the square, oblong triangle, circle, etc., into smaller interesting areas. (Fig. 8).

Fig. 8 — Design for a Tile (abstract motive).

Nature Forms in Design. — By far the

most important elements of design are derived from plant-life, animal-life and landscape. But as the decoration of an object should be subordinate to the object itself, a realistic treatment of a nature subject is not permis¬ sible. Before being applied it must be con¬ ventionalized.

Conventionalization.— By conventionaliza¬ tion is meant the adaptation of a natural form for design purposes. In a botanic drawing of a flower, for instance, the various organs, as petals, sepals, pistil

and stamen are studied with minuteness and all the wonderful struc¬ ture is revealed. But in drawing it for decora¬ tive purposes, the flower is idealized, by keep¬ ing only the general characteristics of growth, form and proportion, while simplifying out¬ lines, rejecting unimportant details, and ren¬ dering it in flattened values.

Conventionalization may be formal or in¬ formal. A nature motive is formally con¬ ventionalized, when its elements are decidedly simplified in outline, form and value, and symmetrically arranged.

Informal conventionalization refers to the use of the perspective appearance of a nature

Fig > n — The Anatomy of an all-over Pattern (full drop alternate repeat)

Fig. 4 (1) A Still-life Drawing, rendered in light and shade Fig. 5 (2) A Still-life Drawing, rendered in light and shade. Example of Pencil Painting

Fig. 6 (3) A Charcoal comoosition by Anton Mauve (Dutch) Fig. 7 (4) A Pen and Ink Drawing by Birket Foster (English)

subject but slightly modified for decorative purposes.

Systems of Arrangement. — The principal forms of decorative arrangement include :

Fig. 9 — Design for Blotter-pad Corner in Pierced Metal. Example of a design for an enclosed area.

1. Designs for unlimited areas, or all-over patterns.

2. Designs for partly limited areas or borders.

3. Designs for limited or enclosed areas. (Fig. 9).

Fig. 10 — Design Units. A — Formally balanced.

B — Informally balanced.

In each of these kinds of design, what is termed the unit , or motive, is repeated in a particular mode. The unit of design is a simple decorative figure, either symmetrically arranged, or informally balanced about a vertical line. (Fig. 10).

All-over Patterns, as designs for textiles, cretonnes and wall-papers, are developed by the rhythmic repetition of a unit over a sur¬ face in all directions. When the unit is re¬

pealed in rhythmic rows which are both hori¬ zontal and vertical the design is called a full drop regular repeat; when the unit is repeated in alternating rows, the pattern is known as a full drop alternate repeat. (Fig. 11). In what is termed a half drop repeat, the unit is re¬ peated in alternating rows in which every other row is dropped one-half the height of the unit.

This regular recurrence of a unit over a surface in such a way as to lead the eye con¬ sistently through all parts of the pattern is called rhythm, which is responsible for a great deal of the charm that obtains in all kinds of surface design.

Borders. — Borders, or designs used for limiting surfaces, are produced by the rhythmic repetition of a unit in one direction. (Fig. 12).

Lettering in Design. — Lettering forms the major motive in designs for monograms, book¬ plates book-covers and posters. The alpha¬ bets now generally used are the modern Gothic and Roman.

Monograms. — A monogram is a character consisting of two or more letters, interwoven

Fig. 13 — Design for a Monogram, into one, usualfy the initials of a name or several names. Besides unity, balance and rhythm, which are essential in all surface design, the special principle governing a good monogram is intricacy. By this is meant the pleasing effect obtained by a happy interlacing or interweaving of the letters. The more subtle the interweaving, the more attractive the design. (Fig. 13). Unity in a monogram is best obtained by a proper distribution of the letters within any geometric surface as a square circle, kiteform, hexagon, etc. Mono¬ grams are generally applied to jewelry, sta¬ tionery and linen.

Bookplates. — A bookplate or ((Ex Libris® is the little label or plate put into a book by its owner. The designer must introduce into the bookplate as much as possible the char¬ acter, taste, ambition or hobby of the person, for whose library the plate is designed. For

Fig. 12 — Design for a Border.

instance, if the person is romantic, — knights, castles and brave deeds appeal to him — a decorative treatment of a castle would be ap¬ propriate. The lettering, of course, plays the most important part. It should be legible and in such a style as will suit the general idea, and must have a well thought out and im¬ portant position. (Fig. 14).

Pig. 14 — Design for a Bookplate.

Book-covers. — • A design for a book-cover generally contains several lines of lettering, that is, the title and the name of the author, and an ornament. The ornament may be a purely decorative figure, or a decorative treat¬ ment of a landscape, marine or figure com¬ position, suggesting the contents of the book. All the lettering on the cover should be of the same style, and the title made con¬ spicuous by the use of intense tones.

Posters. — A poster is a placard announc¬ ing an event, or advertising an article. It is considered effective, naturally, when it attracts attention, and excites interest in the event announced or the article advertised. To im¬ part this attractive power to his design, the poster designer makes use of either some catch phrase, or some peculiar pictorial decora¬ tion, or a combination of both.

Bibliography. — Allonge, (Charcoal Draw- ing) (New York) ; Batchelder, (Design in Theory and Practice) (New York 1912) ; Brown, (Letters and Lettering) (Boston 1904) ; Crane, (Line and Form) (London 1914) ; Day, (Nature and Ornament } (London 1909) ; Dow, (Composition) (New York 1910) ; Harding, (Lessons on Trees) (New York) ; Jackson, (Theory and Practice of Design) (London 1895) ; Lilley and Midgeley, (Plant Form and Design) (London 1910) ; Maginis, (Pen Draw- ing5 (Boston) ; Norton, (Freehand Perspective and Sketching) (Brooklyn 1909) ; Parsons,

(Principles of Advertising Arrangement) (New York 1914) ; Rankine, (Nature Study and Brush Drawing } (New York 1908) ; Ross, Denman,

(Theory of Pure Design } (New York 1907); Turbayne, (Monograms and Ciphers* (New York 1916) ; Vanderpoel, (The Human Figure) (Chicago).

A. G. Schulman,

Department of Art, College of the City of New York.

ART EDUCATION. See Architecture, Education in; Painting, Education in.

ART ENAMELS. Certain art produc¬ tions beautified by decoration in enamel are termed by connoisseurs enamels. The enamel body is either translucent or opaque. It is composed of a frit or flux of lead glass. The lead ingredient has for its chief purpose the lowering of the melting point of the medium. This vitreous body, by the addition of metallic oxides, produces a colored translucent enamel. (See Enamel). It is rendered opaque by a proportion of bone-ash or of oxide of tin. Ground to a degree of extreme fineness this body is washed and moistened to the re¬ quired consistency and then applied to the article to be decorated. It is then melted in a muffle oven and thereby adheres, in its fused condition, to the surface of the metallic back¬ ground. The origin of the word enamel is its French synonym email. In most methods of art enameling the reverse side receives a coat of enamel ; this so-called contre-email reduces the risk of the glassy decoration splitting or splintering off in the process of cooling.

Proofs lead to the supposition that the art of enamel decoration originated in the East. Any trace of the date of its discovery is lost, but the art dates very far back. The several different processes can be brought under the two heads: ˆIncrusted” (i.e., inlaid), such as champleve and cloisonne ; and that superficially applied, the emaux peints, and the so-called ˆVenetian” enamels. It had been quite gen¬ erally supposed that the colored vitreous in¬ lays in extant specimens of ancient Egyptian decoration were enamel work. Flinders-Petrie, however, declares they are inlaid pieces of glass and that the early Egyptians were not able to do enamel work on metal. But there are extant examples of Greek cloisonne enamels dating from the <(finest Greek period” (about 400 b.c.) . Brooches (fibulce), and horse-harness plates extant of Gallic origin show enamel work. Several vessels and pieces of personal adornment existing with enamel decorationˆ appear to have been made some¬ where between the 2d and 3d centuries a.d. In Ireland and England numerous wonderfully artistic and perfectly enameled ornaments have been dug up from the soil, proving that the Celts and Anglo-Saxons were experts in enamel

decoration. Of such we have the Ardagh chalice, Tara brooch, King 2Ethelwulf's gold ring, King Alfred's jewel, brooches, pins, rings, armor, horse-harness plates, etc., in blue, ver¬ milion, green, white enamel. These are in champleve wTork.

Cloisonne Enamels. — The process of cloisonne work is, briefly, the following: Wire is bent into curves and angles to form the outline of the design required. This wire net¬ work is soldered or otherwise fastened to the

metal surface which is to form the base on which the decoration is to be applied. The different colored enamel powders are next used in filling in the open spaces or cells (cloisons) . Then the piece is subjected to the muffle oven to fuse the enamel. When cooled the enamel is found to have melted dowm be¬ low the level of the wire. Additional enamel is ˆcharged® to fill the cells again, and the fusing process is repeated. This process of filling the cells and fusing is continued till the enamel, after fusion, is about level •with the top of the wire. The surface of the piece is then filed off flat (termed stoned). If left with its natural surface after firing it is termed flushed. The surface is next given a friction polish. The early art of enameling in the West appears to have died out, but in the East (about the 7th century) the art was practised in Byzantium (ancient Constanti-. nople). It was cloisonne work. Of this period (in Byzantine enamels) there is extant the (<Iron Crown® of Lombardy at Monza. (See Crowns). Of later dates are the < or San Ambrogio altar (835) by Volvinius in Milan (see Altar) made to the order of Archbishop Angilbert ; the processional cross of Emperor Lotharius I (795-855) in the Cathedral of Aix-la-Chapelle. The votive crown in Saint Mark's, Venice (9th century), has enamel ornament. An enameled reliquary in Limburg (containing a piece of the Holy Cross) by its inscription informs us it was made to the order of Emperor Constantine VII (976). Gospel (Textus) covers of the 10th century of beautiful cloisonne decoration ex¬ tant are several in Saint Mark's, Venice, one each in Saint Gall and Sienna. Some gold plates in the National Hungarian Museum, Pest, with their cloisonne pictures of the Em¬ peror Konstantine IX, Monomachos and the Empress Theodora and Zoe are, probably, parts of a crown, and date from 1042 and 1054. The Hungarian Stephan's crown (see Crowns) has enameled plates in both arches and the circlet. The Pala d'Oro (see Altar) in Saint Mark's, Venice, was formerly an antependium and the enamel picture was

made for Doge Pietro Orseolo I in Constantinople (976) and the added enamel plates were done for Doge Ordelafo Falieri (1105). Quite a large num¬ ber of works were produced in Constantinople in Byzantine style for the European churches, such as reliquary caskets (chasses), crosses, book-covers, etc. ; some show an inscription as proof. Under competition with the new champleve, Byzantine enamels disappear about the 12th century.

Champleve Enamels. — 'The process of champleve enamel work consists of carving recesses in the body of the metal base and leaving the outline of the design on the metal untouched. In other words, instead of placing a network of wire to represent the design's outline (as with cloisonne) the body is carved away leaving only the outline as upper sur¬ face. The sunken recesses are filled in with enamel and fired (fused) and finished as with cloisonne work. A defect in the cloisonne process is the fact that it is practical only on a gold, silver, gilt or a copper base. Cham¬ pleve work can be practised on the baser metals, thus greatly reducing the expense of the material. No contre-eniail is required in

this style. The French often term this style en faille d'epargne. By the 11th century Ger¬ many was resorting to champleve enamel work on copper, and we find, for about two centuries, first one style alongside the other or the two methods displayed in one and the same piece. Whether Germany preceded Limoges in the production of champleve or the reverse seems to be a never-ending dis¬ cussion. We are assured that Abbe Suger, of Saint Denis (1144), had work done by gold¬ smiths from Lorraine. Champleve style was termed, in the 12th century, opus Lemoviticum quite frequently. But the Rhine provinces (Cologne, etc.) and Lower Saxony were active centres for this work at this time. While the Rhine product came from monasteries, that of Limoges was produced in workshops of civilians; the former, therefore, have tenden¬ cies toward ecclesiastical symbolism, and the latter display simple, popular subjects and fewer inscriptions. Some early examples ex¬ tant follow : Portable altars, one in the Treasury at Berlin; another in the Bamberg Cathedral (chest with flat cover), was, tradi¬ tionally, a gift of the Emperor Heinrich (1 002— 24), having angel figures of enamel on the cover, Christ, Holv Virgin and Disciples on the sides. Enamel work is on the ambo (pul¬ pit) at Aix-la-Chapelle; two crosses of similar form are in the Welfenschatz of Hanover, where are also two reliquary chests (chasses), one of which is the same Byzantine church form as that in the South Kensington Museum, from the Soltykoff collection. The other is in the form of a portable altar, rich in combined champleve and cloisonne, and has the inscrip¬ tion ((Eilbertes Coloniensis Me Fecit.® Sieg- burg also has

several enamel decorated rel¬ iquaries and portable altars of Cologne work¬ manship. Saint Mary's Church, Cologne, has two very fine reliquaries, one of Saint Maurus, the other of Saint Albin. A noted example is the sarcophagus of Charlemagne in Aix-la- Chapelle Cathedral. The richest of enameled reliquaries is that of the ((Three Kings® in Cologne Cathedral with its chased work, precious stones, cameos and enamel work in cloisonne and champleve (end of 12th cen¬ tury). The so-called ((Verdun altar® in Klos- terneuburg, near Vienna, was an antependium in 1181, and consisted of 45 plates, but six were added in 1329, producing an altarpiece with wings. The plates have scenes from the Old Testament and the Evangels. The enamel triptych from Alton Towers, now in the Vic¬ toria and Albert Museum (London), was made at Huy by Godfrey de Claire middle of the 12th century. Of the 73 Limoges champleve examples in Cluny Museum the two plates representing Saint Stephen de Muret are of the 12th century. In the Paris Louvre, among 80 Limoges champleve pieces we find a rosette¬ shaped plate displaying the Vision of Saint Francis of Assisi; it is of the 13th century transition period, when the entire picture be¬ comes covered with enamel and engraved work. In this new style the background is enameled but the figure is bare metal and en¬ graved with line work. This left most of the art work to the engraver and the enamel took second consideration. This 13th centurv inno¬ vation soon caused decadence in art enameling. In Italy some work was done in champleve,

mostly on small plates of copper or silver, for the decoration of crucifixes, chalices, etc. They display, of course, Italian design. In Spain champleve work was done in the 16th century.

fimaux en Basse-Taille. — Called also translucent enamel work. This style is a com¬ bination of sculpture and enameling. It origi¬ nated with the 13th century Italian Renaissance goldsmiths, and the 14th century goldsmiths continued it. The process consisted of sculp¬ tured work in low relief on the' metallic base and the filling in of the uneven surface with colored translucent enamels. Flesh parts are either colorless or of weak violet enamel. Noted enamelers in this style were Andre Og- nobene (antependium in San Giacomo at Pis- toja) ; Andrea Arditi (life-size bust of Saint Zanobi in Florence Cathedral) ; Francia, as Forzore; Veri (two reliquaries in Orvieto) ; Leonardo and Piero (parts of the altar of Pis- toja) ; Braccini (chalice in Pistoja) ; Nicolo and Enrico Bonaventura (reliquary of the- head of Saint Sigismond at

Sienna) ; Pollajuolo (altar cross and pax in Florence) ; Finiguerra, the artist. The same style was practised in France in the reign of Franqois Premier, but the Limoges enamelers soon suppressed it. We find in this style extant a monstrance in the cathe¬ dral treasury at Aix-la-Chapelle, dated 13th century, and two reliquaries in the form of chapels with translucent enamel windows ; in Cologne Cathedral treasury is a superb cross in this style.

Emaux Peints. — This style is similar to ordinary painting, the canvas being represented by a surface of enamel and enamel colors sub¬ stituting oil colors. Its origin is in doubt. We first know of it as done in Limoges in the second half of the 15th century. The oldest known piece extant is a reliquary in the chapel of Saint Sulpice-les-Feuilles at Bourganeuf ; arrived there 1479. One process was to engrave an outline on the copper with an etching needle, cover thinly with translucent enamel, then trace the outlines in dark enamel. These lines formed the border for the other colors. The technique changed in the 16th century, when painting in white was done on a thick coat of black or dark enamel. Thin layers of white formed the half-lights, heavy layers produced the lights ; hatch¬ ing the thick layers with a point some¬ times produced the shading. Such manipulation produced the so-called en grisaille (gray on gray) style. Flesh parts were generally given a reddish color. Numerous firings were needed. After the beginning of the 16th century the copper received a background of brown, and the painting was done in translucent colors, the flesh parts being in opaque enamels. Limoges painters generally selected biblical subjects or saints till middle of the 16th century. Italian Renaissance decoration then appeared. Rosso and Primaticcio, Italian artists, called to the court of Frangois Premier, made sketches for models, later taking to the work themselves. Plates were no longer the sole pieces, but also vessels and services, dishes, plates, bowls, pitchers, saltcellars, candlesticks, etc. They are found everywhere in collections. Of well-known artists in this style must be mentioned the three Penicauds, Raymond, Leonard, Fran¬

cois and Joseph Limosin, the Nouailher family, Courtois (or Courteys) family, Laudin family, H. Poncet, etc. In England Nic. Hilliard (1547-1619) did fine enamel miniatures. In York House, Battersea (London), at Billston and Liverpool, popular enamel painting on cop¬ per was done.

ˆVenetian® Enamels. — This term defined certain dishes, pitchers, etc., in repousse (em¬ bossed) work of the 16th century, generally of Renaissance forms, and entirely coated in enamel.

Enamels of the 17th and 18th Centuries.

— In 1632 Jean Toutin, French goldsmith, dis¬ covered a process of painting in vitreous opaque colors on gold coated with white, or weakly colored, enamel, then firing. It was like painting on paper with water-colors, in sim¬ plicity, as it avoided hatching for shades and .coloring with translucent enamels. The process, however, changed the style and enamel painting gave way to miniature painting in enamel pigments. It soon went out of fashion. Toutin and pastel painter Gribelin worked in this style and had many followers decorating vases, watches, rings, with genre scenes, flowers, etc. Noted in this style are Jean Peti- tot, Georg Strauch, the brothers Peter and Amicus Huot, G. F. Dinglinger, Blesender, Mengs, Boit, van Mevtens, Meier, etc.

Emaux en Resille. — -A French style of enameling in the 16th century termed thus was done in enamel work. A piece of gold plate with stamped pattern was fitted into a cavity in the glass ; the cavity was filled in with trans¬ lucent enamel which was then fused. The process, whose origin is unknown, was known as email en resille, or email en resille sur verre. Few specimens are extant. One (a crystal bowl with the cipher of Diana of Poitiers) is in the Uffici Palace, Florence; a small oval crystal mirror-back in this style is in the Louvre.

Asiatic Enamels. — From Russia in the 17th century came vessels of cloisonne ware built up of rather heavy wire and with insuffi¬ cient enamel to reach the upper surface of the wire. Designs are in Byzantine style. Chinese old enamels are greatly prized by collectors ; pieces of the Ming dynasty (1368-1644) show perfection of workmanship, harmony of color and beauty of design. They are all cham¬ pleve. The Japanese are past-masters in the art of enamel work. Their artists are often representatives of enamel workers of successive generations of the same family for hundreds of years. They do cloisonne work on iron as well as copper and gold. The East Indian is unrivaled in the delicate class of gorgeous champleve work in arabesque designs of elab¬ orate elegance. The workers of Jeypore, Delhi, Lahore, Benares, Lucknow, are in a class by themselves, and their expert knowledge of the art dates back very far, as pieces extant show.

Modern Enamels. — While most of our modern enamel wares are derived from the sources above mentioned, France has its La- lique and Thesmar ; England its Thomas Fish¬ er, whose work is considered fit for exhibition in the Victoria and Albert Museum. George Frampton, R.A., and Mrs. Traquair (Edin¬ burgh) are talented

enamelers.

Enamel work is done on glass for windows of churches, also on show pieces of crystal

ART ENAMELS

. . ■frinim

. . • _

4 M- & 5 s .. ■.

■ 1

imp** •;/' m

(. ^

g§&.? . . v If

^ : % -1

1 I

\

4lM < *03*

K'4. ' W 2 w 'ij$r

;; , N&J

V\tA

MQfftfk f&i i

FJBK&I

1 Benvenuto Cellini — Cup of gold and enamel called the Rospigliosi Coupe

2 Limoges Enamel French, 1495-1520 Nardon Penicaud — Triptych. Annunciation, Birth of Christ, Circumcision

ware, such as goblets, etc., and on modern table glass, dc luxe. See Glass.

Bibliography. — Brinkley, Capt. F., (Japan: Its Arts, Etc.' (Boston and Tokio 1902) ; Brongniart, A., (Traite des Arts ceramiques et des. Poteries) (Paris 1845) ; Bucher, B., (Ge- schichte der technischen Kiinste) (Vol. I, Stuttgart 1875) ; Cunynghame, H. H. S., Euro¬ pean Enamels ' (London 1906) ; Dawson, E. B., Enamels' (Chicago 1908); Dussieux, L. E., (Recherches sur l'Histoire de la Peinture sur Email . . . specialement en France' (Paris 1841) ; Gamier, £., (Histoire de la Verrerie et de l'Emaillerie' (Tours 1886) ; Hampel, (Das mittelalterliche Draht-EmaiP (Buda-Pest 1888) ; Hermann, F., (Glass, Porzellan, und Email' (Vienna 1894) ; Jacob, S. S., and Hendley, T. H., (Jeypore Enamels' (London 1886) ; Kondokow, (Geschichte und Denkmaler des byzantinischen Emails' (Frankfort 1892) ; La- borde, M. de, (Notice des Emaux exposees dans le Louvre' (Paris 1852) ; Labarte, J., (Histoire des Arts industriels' (Paris 1864) ; Labarte, J., (Recherches sur la Peinture en Email dans l'Antiquite et du Moyen Age' (Paris 1856) ; Linas, C. de, Hvoires et Emaux' (Bruges 1886); Lippmann, F., Eine Studie fiber chinesische Emailvasen' (Vienna 1870) ; Luthmer, (Das Email' (Leipzig 1892) ; Moli- nier, E., (Dictionnaire des Emailleurs' (Paris 1884) ; Palustre, L., and Barbier de Montault, X., (Orfevrerie et Emaillerie limousines' (Paris 1886) ; Popelin, Ducarre, Ees Emaux peints' (description by E. Molinier, Paris 1890—92) ; Rupin, E., E'Oeuvre de Limoges' (Paris 1890) ; Schulz, J., (Der byzantinische Zellen- schmelz' (Frankfort 1890) ; Way, A.., Enamels' (lectures in London Archaeological Institute, London 1846) ; Xvenigorodskoi, A. V., (Byzan¬ tinische Zellen-Emails' (Frankfort

1892).

Clement W. Coumbe.

ART GALLERIES, primarily buildings or rooms dedicated to art and used for the ex¬ hibition of works of art ; hence, secondarily, im¬ portant public or semi-public collections of art objects. In ancient Athens the marble hall that formed the north wing of the Propylaea con¬ tained works of celebrated painters and was called the Pinacotheca, gallery of pictures. But in Rome, at the time of Augustus, a .wholly different plan was adopted. The design of Augustus and his successors was not to as¬ semble works of art in a single great building, or a number of such buildings devoted exclu¬ sively to that use ; rather it was to make Rome itself a true Pinacotheca, and to give the utmost publicity to both paintings and statues by plac¬ ing them where they would be seen of all men, in porticos, along the promenades, and wher¬ ever public meetings were customarily held. Thus even the Roman Forum was brilliant with paintings, and the porticos of Philip,. Octavia and Pompey were literally covered with them. Later, when Constantine made Byzantium the imperial capital and assembled there, from all parts meritorious statues and paintings, <(the idea did not occur to him," as has been well said, «to shut them up in a single locality; he made them serve for the decoration of various edifices and promenades of the city," which thus became, as Rome had been, one immense museum of art. During the Middle Ages, when

art sought ecclesiastical protection, the churches were the only museums of sculpture and paint¬ ing; but toward the close of that period kings and nobles, as well as powerful ecclesiastics, formed collections which eventually became nuclei of many of the great public European art galleries of the present day. In this sense the collections of the Medici family became the art galleries of Florence ; the collections of the Popes constituted the Vatican galleries; the Farnese collection was the starting-point of the Studj at Naples; and it is well known that the Louvre embraces collections of several other sovereigns beside those of Francis I and Louis XIV. •

Now, although it may be truly said that, so long as they remained princely or royal proper¬ ties, these galleries were as a rule opened freely to artists, we must bear in mind the vicissitudes to which they were exposed. The privilege of visiting them might be withdrawn by their owners at any time. Morever a politi¬ cal revolution might occasion their dispersal — the fate that actuallv overtook the magnificent collection of King Charles I of England. It was only after

the French Revolution that art galleries and museums became to such an ex¬ tent genuinely public institutions that, although still in certain countries dependent upon the power of the Crown, the collections were at least inalienable and not subject to important modifications without the consent of the > repre¬ sentatives of the nation ; and, as we shall presently note, this change was accompanied by a partial return to the old Roman ideals of publicity, accessibility, utility. Toward the end of the 18th century France set an example to other countries, making the Louvre the first truly national art-institution in Europe. To¬ gether with the less important art galleries or art museums of the French capital and provinces, the Louvre became absolutely the nation's property, and as such open to all ; and soon the observation was made that not alone artists, tourists and cultivated persons of the leisure class visited the democratized galleries, but that they rapidly grew to be favorite <(places of pilgrimage" for the laboring class ; that they were becoming higher schools of in¬ dustry, so to speak, and in this way rendered much practical service to the State. The utili¬ tarian influence of the art galleries of Paris was so thoroughly appreciated that many de¬ partmental institutions of a similar character were established, such as those of Dijon, Lyons, Bordeaux,' Marseilles, Toulouse, Orleans, Rouen, Avignon, Arras and Grenoble.

Observation of the satisfactory French ex¬ perience in connection with the democratization of art galleries had four results in other lands : (1) It popularized the theory that art-educa¬ tion must, so far as possible, be provided for all the people; (2) the number of art galleries was greatly increased; (3) systematic efforts were made to utilize such galleries for the pro¬ motion of artistry in every form; and (4) gal¬ leries and museums of art began to extend their good offices far beyond their walls. They are at present concerned not only with the persons who may come to them seeking instruction but also with the study, registration and conserva¬ tion of objects — the artistic, the historically valuable and the beautiful things in their

neighborhood. Mr. Benjamin Ives Gilman, secretary of the Museum of Fine Arts, Boston, writes: ((Let each American museum of art take its neighborhood for its province, acquir¬ ing and imparting information about any local works 6f art, public or private, whose owners may offer them for the purpose. A knowledge of what we have is the necessary and often sufficient condition of its preservation. » This

excellent program expressly includes the accurate and complete registry, by description, measurement, photography and otherwise, of such buildings, monuments, paintings, sculp¬ tures, etc., in the locality as the officers of the museum may consider of public interest from an artistic point of view ; and this may be taken as the last word, up to 1917, in regard to the extension of any art gallery's or art museum's influence beyond its own walls.

But even more noteworthy than such extra¬ mural activity is the intra-mural ; and here the most important subjects are the following: (1) The advanced thought of the day in regard to the adequate installation and exhibition of ob¬ jects of art, especially paintings; and (2) the development of educational features. As for the first of these subjects, the best usage at present authorizes the propositions that the several collections or groups in a large gallery or museum of art should be arranged in chronological order, to bring out the historical, as well as the aesthetic, relationships ; but that, within each of the large groups, the purely aesthetic arrangement should be preferred to the chronological. The effect of this is, that a visitor can observe and study the history of art, from the earliest times to our own day, simply by making intelligent use of his eyes in one gallery after another, taking the rooms or galleries in the prescribed sequence and con¬ sulting such catalogues as will give in compact form the last word in competent connoisseur- ship. That ideal may not indeed be fully real¬ ized, but that it shall be approximated is clearly the purpose of the most enlightened and pro¬ gressive art directors.

In order to appreciate the value of the principle involved, let us note its application to the arrangement and display of paintings only, rather than to the entire museum with all its collections, embracing architecture, sculpture, etc., as well as the pictures. The advanced thought in regard to adequate installation and exhibition of paintings is that we should do our best to make it convenient for visitors to look at them in the way it was intended (by their makers) they should be looked at — not contenting ourselves with merely having them numbered or labeled and hung in serried rows in a gallery no better suited to the purpose than are some of the European art galleries and museums. A distinguished art expert writes that the public collections of Europe seem to put every possible or conceivable obstacle in the way of our enjoyment. He believes that each masterpiece should be isolated in a special niche like the image of a jealous god, and he complains that, on the contrary, it is often stuck like a postage stamp on a wall covered with paintings that have little or nothing but arch¬ aeological interest to recommend them. Another art critic, looking backward to the times when altar-pieces and easel-pictures (now in

our

galleries) were visible in the very places for which their painters had designed them — and therefore in their own sympathetic surround¬ ings — manifests an art-lover's longing for the restoration of surroundings that might at least be suitable, although, naturally, never again quite the same. Progressives who hold that it is not practicable to isolate every masterpiece in a special niche, nevertheless advocate the construction of galleries with wall-space so ample that even those pictures which lack some¬ thing of the superlative quality we revere in the greatest masterpieces need not be crowded to¬ gether; since it is very difficult to appreciate fully any single painting when others in the same field of vision compete with it for our attention. Summarizing the conclusions reached by authorities in this field, we may say that, for the better enjoyment of all the oldest paintings, it is desired to reproduce, so far as practicable, such surroundings as they had originally. With only a small collection, this certainly can be done ; how far, then, can such a principle of reform apply to large galleries? Admittedly it is possible to achieve, even with very large collections, vastly better results in the future than any to which we have hitherto attained. It is well understood that eventually the reform must be thorough going; that, for example, a systematized collection of paintings in the midst of unorganized collections of architectural and sculptural examples could never produce its proper effect. It must be a part of the harmonious development that shall prevail in every part of the art gallery of the future.

In America every important public collection of art objects is regarded as a part of the educational system ; and this view has been both qualified and explained in the following- terms : <(The main preceptor must always be one's own eye, and the way to cultivate itb powers must always be to use them. This means that, as conditions are in our country to¬ day, almost all valid training in the appreciation of art must be gained in the public museum or gallery. And it follows that in all possible ways the museum, the gallery, should itself facilitate, stimulate, and guide the self-education of the people. w And fortunately it is permissible to add that the more progressive galleries or museums of art (<are working out schemes of various kinds for the definite instruction of the public. Study-rooms devoted to one branch of art or another, handbooks and special treatises, illustrated lectures delivered in the museum or elsewhere, tours of the galleries under guid¬ ance, loan collections sent to various parts of the city — these are some of the methods that they adopt, always with the conviction that true teaching means advising the eye how to educate itself and therefore always with the aid of the museum collections. It is our mu¬

seums themselves that have started this novel work,w which has already been endorsed and facilitated by schools and colleges and by National, State, and municipal authorities, and is winning the support of many others who care for education and who care for art. Consult Wilcox, M., in The International Studio, July 1917, p. xxii, and Van Rensselaer, M. G,, ibid, p. 2; also Jackson, M. T., (The Museum* (Lon¬ don 1917),

Here follows a selected list of art galleries and museums in various parts of the world:

United States and Canada.

Albany, N. Y. — Albany Institute and Historical and Art Society.

Baltimore, Md. — Walters Gallery.

Boston, Mass. — Museum of Fine Arts.

Buffalo, N. Y. — Albright Art Gallery.

Chicago, III. — Art Institute of Chicago.

Cincinnati, Ohio. — The Cincinnati Museum Association.

Cleveland, Ohio. — The Cleveland Museum of Art.

Detroit, Mich. — The Detroit Museum of Art.

Hartford, Conn. — Wadsworth Atheneum and Morgan Memorial.

Milwaukee, Wis. — Layton Art Gallery.

Minneapolis, Minn. — The Minneapolis Institute of Arts.

Montreal, Canada. — Montreal Art Gallery.

New Haven, Conn. — Yale School of Fine Arts (Jarvis Col¬ lection, Trumbull Collection, etc.).

New Orleans, La. — Delgado Museum of Art.

New York City, N. Y. — Brooklyn Institute of Arts and Sciences;

Hispanic Society of America; Historical So¬ ciety; Metropolitan Museum of Art; Public Library (paintings and prints department).

Ottawa, Canada. — The National Gallery of Canada.

Philadelphia, Pa. — Pennsylvania Academy of the Fine Arts; Pennsylvania Museum and School of Industrial Art; Wilstach Gallery.

Pittsburgh, Pa. — Carnegie Institute.

Princeton, N. J. — Museum of Historic Art of Princeton University.

Providence, R. I. — Rhode Island School of Design.

Quebec, Canada. — Museum of the Universite Laval.

Rochester, N. Y. — Memorial Art Gallery.

St. Louis, Mo. — City Art Museum.

San Francisco, Cal. — The San Francisco Art Association.

Syracuse, N. Y. — The Syracuse Museum of Fine Arts.

Toledo, Ohio. — The Toledo Museum of Art.

Toronto, Canada. — Toronto Museum of Art (“ The Grange ”).

Washington, D. C. — Corcbran Gallery of Art; National Gallery of Art.

Winnipeg, Canada. — Museum of Fine Arts.

Worcester, Mass. — The Worcester Art Museum.

Latin America

Buenos Aires, Argentina. — Museo Nacional de Bellas Artes.

Caracas, Venezuela. — Academia de Bellas Artes.

Kingston, Jamaica. — Jamaica History Gallery.

Lima, Peru. — Gallery of Paintings in the Museo de Historia Natural, Palacio de la Exposicion.

Mexico City, Mexico. — Museo de Arte de Academia de Ciencias.

Montevideo, Uruguay. — Museo Nacional de Bellas Artes.

Rio de Janeiro, Brazil. — Escola Nacional de Bellas Artes.

Santiago, Chile. — Museo de Bellas Artes.

Europe, Australia, Africa and Asia

Australia. — National Gallery at Melbourne.

Austria. — Art-history Museum, Gallery of Paintings and Liechtenstein Gallery, Vienna.

Belgium. — Galleries of old and modern pictures in the Royal ' Museums, Brussels.

China. — Peking Imperial Museum in Peking.

Denmark. — Art Museum at Copenhagen.

Egypt. — Graeco-Roman Museum at Alexandria, and Museum of Egyptian Antiquities and National Museum of Arab Art at Cairo.

France. — Louvre, Mus6e du Luxembourg and Musee de Cluny, at Paris, and Musee National at Versailles. Musses des Departments that have shown positive evi¬ dence of growth during the last quarter of a century are those of Amiens, Abbeville, Boulogne-sur-mer, Clarmont Douai, Lille, Poitiers, Saint- Quen tin, Senlis and Valen¬ ciennes.

Germany. — Old and New Museums and National Gallery at Berlin, the Royal Gallery of Paintings at Dresden, and the Glyptothek and the Old and New Pinakothek at Munich.

Great Britain. — • Museum and Art Gallery at Birmingham, the National Gallery and the Municipal Gallery of Modern Art at Dublin, the National Gallery of Scotland at Edinburgh, the Art Gallery and Museum at Glasgow, the Walker Art Gallery at Liverpool, the Ruskin Mu¬ seum at Sheffield, and the following in London: National Gallery, National Portrait Gallery, National Gallery of British Art (formerly the Tate,) Victoria and Albert Museum (formerly South Kensington Museum), British Museum, and Wallace Collection.

Greece. — National Museum at Athens.

Holland. — Koninkiyk Kabinet van Schilderyen and Mu¬ nicipal Museum at The Hague and Museum-Boijmans at Rotterdam.

India. — The Indian Museum at Calcutta.

Italy. — The Accademia di Belli Arti, the Uffizi, the Pitti Palace and the Bargello, at Florence, the Brera at Milan, the Museo Nazionale at Naples, the Vatican, the Capi- toline, the Borghese and the Doria at Rome, and the Accademia di Belli Arti at Venice.

Japan. — The Imperial Museums in Tokio, in Kioto, and in Nara.

Korea. — The Korean Museum in Keijo.

Norway. — - The Statens Museum of Art (Nationalgalleriet) at Christiania.

Portugal. — Museu Nacional de Arte Antiga and Museu Nacional de Arte Contemporanea at 'Lisbon.

Russia. — The Hermitage and the Russian Museum of Alexander III at Petrograd.

Spain. — Museo del Prado and Academia de Bellas Artes at Madrid, the Casa Greca at Toledo, and the Palacio de Bellas Artes at Barcelona.

Sweden. — National Museum at Stockholm.

Switzerland. — Picture Gallery at Basle.

Marrion Wilcox.

ART, Metropolitan Museum of, New

York city, one of the famous art institutions of the world, situated in Central Park, on the east side, and extending between 80th and 85th streets on Fifth avenue, in grounds covering 18j4 acres. The first portion of the building facing south in Central Park, was opened in March 1880, and with subsequent additions, south (1888), north (1894), the ornate east ex¬ tensions on Fifth avenue designed by Richard Morris Hunt, opened in 1902 and 1908, and further extensions provided for, represent an outlay of about $20,000,000, which was author¬ ized in various appropriations by the State legislature. Among the priceless treasures of the museum, which include the munificent Morgan, Vanderbilt, Wolfe, Altman, Hearn and Marquand bequests, are the varied collections of paintings of Dutch, Flemish, Italian, French, English and American schools; collections of sculpture and architecture, ancient and modern, including Greek and Roman marbles and bronzes, modern French, American and other statuary; casts and replicas of famous pieces, etc. ; Assyrian, Babylonian, Egyptian, Phoenic¬ ian, Cypriote and Etruscan antiquities

— the Cesnola collection of Cyprian antiquities ac¬ quired in 1870 for $60,000, the Babylonian cylinders, Egyptian mummies and cases, and an Etruscan bronze chariot of the 6th century b.c., being unrivalled in the world. Decorative arts are also exhaustively represented and comprise the Dino and Ellis and the Riggs collections of mediaeval arms and armor ; the Avery collection of spoons; the Lazarus collection of fans; col¬ lections of laces, European textile fabrics ; European ceramics, including the Le Breton collection of French faience; the Crosby-Brown collection of musical instruments ; woodwork and furniture including the Hoentschel collec¬ tion of 18th century French decorative arts; collection of ormolu ; Heber-Bishop collection of jade; Germanic and Merovingian antiquities; and collections of wood-work, metal-work, cera¬ mics and textiles, representative of China, Japan, Persia and Asia Minor. Special atten¬ tion is also given to American decorative arts. The inception of the museum dates from 1869 and a public meeting at which a committee com¬ posed of members of the National Academy of Designs and generous art patrons, organized to raise an endowment of $250,000 and outlined the plan which received a charter of incorpora¬ tion 13 April 1870. The corporation now num¬ bers over 3,100 fellows and members rated ac¬ cording to the amount of their annual con¬ tributions. A board of trustees elected from the fellows governs the museum, which is ad-

ministered by a director and regular staff. While the ground and buildings are public prop¬ erty, the additions to the museum and cost of administration (in a recent year over $461,500) with the exception of the city's annual contri¬ bution of $200,000, are covered by gifts and an endowment created by rich benefactions. Among the chief benefactors of the museum have been its presidents, John Taylor Johnson, Henry Marquand and J. Pierpont Morgan ; Miss Catharine Lorillard Wolfe who besides her collection of paintings donated $200,000; Jacob H. Rogers (1901), $6,000,000; John S. Kennedy (1909), $2,500,000; Francis L. Leland (1912), $1,000,000; Frederick T. Hewitt, $1,- 600,000 and Mrs. Morris K. Jesup (1915), $200,000 with a collection of paintings. The directors of the museum have been Gen. L. P. di Cesnola (1879-1904) ; Sir Caspar Purdon Clarke (1905-10) and Edward Robinson (1910—) . Mr. Robert W. De Forest was elected president after Mr. J. Pierpont Morgan's death in 1913. The total attendance of visitors to the museum during 1915 was 913,320.

ART OF POETRY, The ( ). a famous work by Horace. This is not the name given it by its author, who called it merely a (Letter to the PisosP Horace treats of the unity that is essential to every composition, and the harmonious combination of the several parts, without which there can be no lasting success. In the second part, the poet confines himself to the form of the drama, the principles he has already established being so general that they apply to every class of composition. See Horace.

ART OF WAR. The art of war may be conveniently subdivided into the following sec¬ tions : (a) The organization of armies; (b) logistics; (c) strategy; (d) engineering; (e) tactics. The organization of armies is the build¬ ing up necessary for the application of the prin¬ ciples of strategy to them. Logistics is the art of moving and supplying armies. Strategy is the art of directing armies upon the theatre of • war. Engineering is the art of disposing troops and making arrangements of obstacles by means of which an inferior force may successfully resist the attacks of a superior force ; and also the art of overcoming and removing all ob¬ stacles placed in the way by an opposing force. The following are the duties of engineers of an army: the construction and maintenance of field-telegraphs, the construction of fortifica¬ tions, the conduct of engineering operations at sieges, mining, bridging, surveying, reconnoiter- ing, opening and making roads, choosing posi¬ tions, sketching ground, etc. Tactics is the art of putting into execution the projects of strategy. An intimate knowledge of all these branches is absolutely necessary in order to be a great and successful general. The forma¬ tion of a plan, that is, deciding the nature of the war that will be waged; determining the objects to be attained, and the best manner and means of attaining them; or, in other words, outlining the general features of a campaign, belongs to strategy. The execution of the plan decided upon belongs to tactics. The country in which the opposing armies can come into col¬ lision is the province of battle.. The principles of war cannot be violated with impunity. These

principles are fixed and are determined from the narrative of operations conducted by suc¬ cessful generals. A study of military history is then necessary for a proper understanding of the principles of war; and as in all other professions, so in war, he who is most pro¬ ficient in the lessons as taught by the masters of the art will be most successful.

The duties of each arm of the service over¬ lap and blend into one another, and the higher the grade an officer attains, the more requisite it is that he should be acquainted generally with the duties of those arms of the service to which he himself does not belong. By this

means alone can we hope to obtain that intelligent co¬ operation, that harmonious working of all branches of the service together, which makes a perfect machine out of the various elements comprising an army, and at the same time gives the surest guarantee of success. In armies, as elsewhere, there is a tendency for every one to think his own branch, that which he has studied most and knows best, the most important. Such feelings are very natural and in the lower grades often do much good; but as men rise in the service it is desirable that they should know something of the duties of other branches, and the difficulties others have to contend with. Such knowledge tends to produce cordiality and forbearance. Cavalry officers falling into command of mixed forces will not then expect their infantry to gallop ; infantry officers will not seek to bind the cavalry to pace of their infantry. A knowledge of capabilities of other arms will enable officers to use those arms to the best advantage as occasion offers. It should, however, be borne in mind that it is impossible to lay down fixed rules of action. Nearly ever)' military regulation should be followed by the words (<according to the ground and according to the circumstances.® Practice and experience alone can decide many points ; practice and ex¬ perience alone can give the power of applying rules ; but theory, by which is really meant the experience obtained by others, is not the less important and valuable. Principles are but guides, which must be revised, examined and verified after each war, after each discovery that may be brought to bear on the military art. See Army Administration ; Army Regu¬ lations ; Army Transportations; Artillery; Ballistics ; Cavalry ; Engineering, Military ; Gunnery ; Military Education ; Tactics.

ART STUDENTS' LEAGUE OF NEW YORK, an important art school, at 215 West 57th street, New York city. It was founded in 1875 by a number of students of the National Academy of Design dissatisfied with the con¬ ventions of the older schools. The school is entirely self-supporting, being maintained from the fees of its students, which range from $30 to $70. The membership has grown steadily until now it is over 1,500, while the average number of pupils is about 500. The courses include drawing, antique drawing, composition, still life and miniature painting, modeling, painting from life, illustration, anatomy and study of the theory and history of art. Night classes and a summer term are also among its features. During the summer a course in land¬ scape painting is given at Woodstock, Ulster County, N. Y. There are practically no en¬ trance requirements. The government of

the institution is vested in a board of control, elected by the members, themselves elected from the advanced students. Among the prizes awarded are, the $100 prize, for the best paint¬ ing, the Saltus Prize, $50, for antique drawing, the Saint-Gaudens Prize, $75, for figure model¬ ing, the Saint-Gaudens Prize, $25, for com¬ position modeling and the Evans Prize, $50, for applied art.

ARTA, ar'ta, the name of a gulf, town, and river. The gulf (ancient Ambracius Sinus), an arm of the Ionian Sea, between Greece and Albania, is about 20 miles long by 10 miles broad. Near its entrance the battle of Actium was fought. The town, called also Narda (the ancient Ambracia) , about six miles north of the gulf, stands on the river, which is here about 200 yards wide, and begins to be navi¬ gable. It carries on a considerable trade in wine, oranges and tobacco. Pop. 8,600.

ARTABANUS IV, the last of the Parthian monarchs, who 217 a.d., escaping with great difficulty from a perfidious massacre be¬ gun by the Romans under Caracalla, mustered an army, and engaged his foes in a battle which lasted for two days. Peace was then concluded, but Artabanus afterward incited his subjects to revolt, and in a battle, in 226, was captured and put to death.

ARTABAZUS, the name of several dis¬ tinguished Persians under the dynasty of the Achaemenidae. An Artabazus led the Parthians and Chorasmians against Xerxes. Another Ar¬ tabazus, a general under the Persian King, Artaxerxes II, afterward revolted against Artaxerxes III. He was forgiven through the exertions of his brother-in-law, Mentor, a favorite and staunch supporter of the next king, Darius, whom Artabazus faithfully at¬ tended after the battle of Arbela. Alexander rewarded his loyalty by making him satrap of Bactria.

ARTAGNAN d’, dar'ta-nyiin', the hero of Dumas’ (Trois Mousquetaires,* (Vingt ans apresP and (Le Vicomte de BragelonneP He is a Gascon adventurer, very popular among heroes of romance. There was, however, a Count d’ Artagnan (b. about 1612; d. 1673), who was an officer of musketeers, and fell in the siege of Maestricht.

ARTASIRES, the last Arsacid monarch of . Armenia. He was placed on the throne by Bahram V of Persia, who afterward deposed him and annexed his dominions to Persia, under the name of Persarmenia, 248 b.c.

ARTAVASDES, ar'ta-vas'dez, I, a king of Armenia, who succeeded his father Tigranes. He joined the Roman forces commanded by Crassus,

but deserting to the enemy, caused the defeat of the Romans, and the death of Crassus. He similarly betrayed Mark Antony when en¬ gaged against the Medes; but afterward falling into Antony's power, was taken with his wife and children to Alexandria, where they were dragged at the victor's chariot wheels in golden chains. After the battle of Actium, Cleopatra caused his head to be struck off and sent to the King of Media.

ARTAXATA, the name of the ancient capital of Armenia, the refuge of Hannibal when forsaken by Antiochus. Its ruins are now known as Ardashir.

ARTAXERXES, ar'taks-erks'ez, the name of several Persian kings: (1) Artaxerxes I, surnamed Longimanus, because his right hand was longer than his left, the second • son of Xerxes, escaped from Artabanus and the other conspirators who had murdered his father and elder brother Darius, and in 465 b.c. ascended the throne. He conquered the rebellious Egyp¬ tians, terminated the war with Athens by grant¬ ing freedom to the Greek cities of Asia, governed his subjects in peace, and died 425 b.c. (2) Artaxerxes II, surnamed Mnemon, from his strong memory, succeeded his father, Darius II, in the year 405 b.c. After vanquish¬ ing his brother Cyrus he made war on the Spar¬ tans, and forced them to abandon the Greek cities and islands of Asia to the Persians. He favored the Athenians, and endeavored to fo¬ ment dissensions among the Greeks. His last days were embittered by the unnatural conduct of his son Ochus,, who, to secure the crown to himself, caused the destruction of two of his brothers. On the death of Artaxerxes Mnemon, 359 b.c., Ochus ascended the throne under the name of (3) Artaxerxes Ochus. After having subdued the Phoenicians and Egyptians, and dis¬ played great cruelty in both Egypt and Phoe¬ nicia, he was poisoned in 339 b.c. by his general, Bagoas. (4) Artaxerxes Bebegan was the first King of Persia of the race of Sassanides. He was a shepherd's son; but his grandfather, by the mother's side, being governor of a prov¬ ince, he was sent to the court of King Ardavan. On his grandfather's death, Artaxerxes, ex¬ citing the people to revolt, defeated and slew Ardavan and his son, and assumed the title of King of Kings. He made vast conquests, and wisely administered the affairs of his kingdom.

ARTEDI, ar-ta'de, Peter, an eminent Swedish naturalist : b. Anund, 22 Feb. 1705 ; d. Amsterdam, Holland, 27 Sept. 1735. He went in 1724 to Upsala to study theology, and turn¬ ing his attention to natural history, soon rose to considerable eminence, particularly in the department of ichthyology, the classification of which he reformed on philosophical principles. This arrangement added greatly to his

reputa¬ tion as a naturalist at the time, and afterward he became popular over Europe. Four years later Linnaeus (q.v.) arrived in Upsala, and a life-long friendship grew between the two men. In 1732 both left Upsala — Artedi for England, in pursuit of his favorite study; and Linnaeus for Lapland, to examine its natural productions ; but before parting they reciprocally bequeathed to each other their manuscripts and books upon the event of death. According to agreement his manuscripts came into the hands of Linnaeus, and his (Bibliotheca Ichthyologica) and (Phi- losophia Ichthyological together with a life of the author, were published at Leyden in the year 1738. Linnaeus named a genus of umbelli¬ ferous plants Artedia, in memory of his friend.

ARTEMIA. See Brine-Shrimp.

ARTEMIDORUS, a Greek geographer: b. in Ephesus, who flourished about 100 b.c. His <Geographoumena) in clever books was an exhaustive work on the various features, geo¬ graphical, physical, historical and political, of the larger part of the then known world, founded on the writer's own investigations and the work of preceding writers. Only fragments of his work are extant.

ARTEMIS, a Greek goddess, identified with the Roman Diana. She was the daughter of Zeus (Jupiter) and Leto or Latona, and was the twin* sister of Apollo, born in the island of Delos. She is variously represented as a hunt¬ ress, with bow and arrows ; as a goddess of the nymphs, in a chariot drawn by four stags; and as the moon goddess, with the crescent above her forehead. She was a maiden divinity, demanding the strictest chastity from her wor¬ shippers, and is represented as having changed Actseon into a stag, and caused him to be torn in pieces by his own dogs, because he had se¬ cretly watched her as she was bathing. The Artemisia was a festival celebrated in her honor at Delphi. The famous temple of Artemis at Ephesus was considered one of the wonders of the world, but the goddess worshipped there was very different from the huntress goddess of Greece, being of Eastern origin, and regarded as the symbol of fruitful nature.

ARTEMISIA, a genus of aromatic, her¬ baceous or shrubby plants of the family Astcracece, consisting of about 250 species, natives of temperate or subarctic regions. A. dracunculus is tarragon or estragon,

the leaves of which are used for seasoning. A. absinthium, wormwood, is the source of absinthe and is also used medicinally. A. abrotanum, southernwood, and A. stellcriano, old woman, are cultivated as ornamental plants. A. tridentata is the common sagebrush of the plains of the western United States, being the most common and character¬ istic plant over many thousands of square miles.

ARTEMISIA I, ar'te-rmzh'i-a, or mish-T-a, a queen of Caria, who lived in the 5th century b.c., and assisted Xerxes in person against the Greeks, and behaved with such valor that the Athenians offered a reward for her capture, and the Spartans erected a statue to her.

ARTEMISIA II, a queen of Caria, who flourished about 350 b.c. She was the sister and wife of Mausolus, whose death she lamented deeply, and to whom she erected, in her capital, Halicarnassus, a monument reckoned among the seven wonders of the world. The principal architects of Greece labored on it. Bryaxis, Scopas, Leochares and Timotheus made the decorations on the four sides of the edifice ; Pythes, the chariot drawn by four horses, which adorned the conical top. Vitruvius thought that Praxiteles was also employed on it. After the death of Artemisia the artists finished it with¬ out compensation, that they might not be de¬ prived of the honor of their labor. It was an oblong square, 411 feet in compass, and 130 feet high. The principal side was adorned with 36 columns, and 24 steps led to the entrance. From the tomb of Mausolus is derived the word ˆmausoleum.®

ARTEMISIUM, ar-te-mish-i-um, a prom¬ ontory in Euboea, an island of the vEgean, near which a great naval battle between the Greeks and Persians was fought, 480 b.c. It was named from a temple to Artemis situated here.

ARTEMUS WARD. See Browne, Charles Farrar.

ARTERIAL PRESSURE. See Blood Pressure.

ARTERIES are the elastic tubes or ves¬ sels that carry blood from the heart to the tissues of the body. They owe their name,

which was connected by the older anatomists with the Greek aer, air, to the belief that they contained air, since they were found empty after death. The arteries spring from the heart in two 'great trunks, the pulmonary artery which carries blood to the lungs, and the aorta through which the blood is sent throughout the body. Each of these two main trunks divides and redivides until they become the minute

vessels known as arterioles. Arteries show a ready adaptation in change of position attendant upon evolutionary development or mechanical obstruction in the individual organism. The main trunks occupy relatively constant positions but as the branches become smaller and smaller their position is less constantly determined. As they approach the periphery of any organ their minute branches connect through the hair¬ like capillaries with the minute divisions of the veins, which carry the blood back to the heart, thus completing the round of the circulation. The carotid is the branch of the aorta which mainly supplies the blood to the head, the superficial or external carotid supplying the outer structures and the deep or internal carotid nourishing the brain and deeper lying parts. There are numerous anastomoses between the branches of the caro • tid arteries. The most important of these form a vascular circle, the circle of Willis, which affords freedom of arterial circulation by the anastomoses between arteries not only on the same side but also on opposite sides of the medial plane. For the other main branches of the aorta see Aorta.

The minute structure of the arteries is well adapted to the varying functions that these ves¬ sels perform. Their walls consist of several coats. The outer coat, or the tunica adven¬ titia is composed of white, fibrous connective tissue. Next to this is the yellow elastic and within this the muscular coat composed of in¬ voluntary muscular tissue. The elastic coat is much thicker in the large arteries than the muscular but in the smaller there is a relatively stronger muscular coat. In the first part of the aorta, pulmonary artery, and arteries of the retina there is no muscular coat. The vaso¬ motor nerves terminate in the muscular coat. Within this layer is a smooth elastic coat perforated by small apertures. The innermost .coat is a layer of endothelial cells which forms the free surface over which the blood flows with a minimum of friction. The extreme toughness of the outer layer strengthens and protects while the elasticity with which the walls are provided permits the artery to return to its average diameter after it has been contracted or dilated by the muscular layer. The large arteries are thus more elastic and less con¬ tractile while for the smaller ones the reverse is true. The arteries are nourished by their own blood supply through minute vessels, vasa vasorum, distributed through the fibrous, elas¬ tic and muscular coats.

Smith Ely Jelliffe.

ARTERIES, Diseases of. The arteries

are subject to a number of diseases which may be classed as (1) due to

infectious micro-organ¬ isms, (2) degenerations with increase of con¬ nective tissue, (3) aneurisms, (4) inflammation due to injury or extension of inflammation from surrounding parts, (5) ((Fatty Degenera-

tionw i.e., fat replacing some, of the elastic muscular and connective tissue and so interfer¬ ing with arterial functions. Of the acute in¬ fectious diseases, tuberculosis and syphilis, par¬ ticularly the latter, are important. Syphilis is one of the most important causes of arterial de¬ generation. Acute arteritis is a definite disease, although the great pathologist, Virchow, taught that it was a secondary affection. Recent bac¬ teriological studies, however, have shown that bacterial infection of the arterial walls is a fun¬ damental and important process. It is fre¬ quently the cause of an arterial thrombus and often develops into a true arteriosclerosis or hardening of arteries. Hardening occurring in large arteries is known as atheroma. See Arteriosclerosis.

ARTERIOSCLEROSIS. The term Ar¬ teriosclerosis or ˆhardening of the arteries® seems an inappropriate one (though hardening of these vessels is mainly noticed) for the con¬ dition is usually associated with heart and kid¬ ney disease. Hence, some writers use instead, the terms ˆCardiovascular® or <(Cardio-vascular — venal disease.® There is reason to believe that the disease is in reality a general one due primarily to a ˆdisturbance of metabolism® or a disturbance of the relation of certain ma¬ terial which comes from the food for the nour¬ ishment and health of the cells of the body. Then the liver, spleen, thyroid gland, supra- venal glands and other metabolic function organs are affected, and the involvement of other organs is a matter of sequence. Har¬ dening of the arteries is a very important dis¬ eased condition. Though found in the young it is usually a disease of advanced life, and prevails especially among the so-called ((com- fortable classes.® It interferes with the proper supply of blood to various organs, principally the heart, kidneys and brain and may cause actual disease — filro-myocarditis, nephritis and a weakened condition of the arterioles of the brain, which very readily results in cerebral haemorrhage, one of the forms of apoplexy. The various steps in the production of arteriosclerosis are often — an acute illness or severe nervous shock, defective metabolism, organs concerned in metabolism don’t act properly, kidneys be¬ come sclerotic and do not eliminate waste products, then there is a rise of blood pressure to assist them, so the heart hypertrophies. Then comes an increase in

connective tissue of the arteries with hypertrophy of their muscular ele¬ ments and a thinning or a diffuse or circum¬ scribed thickening of their lining membranes, and if affecting superficial arteries they are recognized as hardened. For there may be sclerosis of internal arteries and none of the superficial. Arteriosclerosis may show irregu¬ lar patches of a gelatinous character which at a later period become hard, even calcified and cause arteries to become brittle like pipe stems. Among the causes which favor its development are changes in the blood from the infection of syphilis and chronic rheumatism, the excessive use of alcohol, the disturbed metabolism caused by diabetes, gout, Bright's disease, etc., and changes in the blood pressure. Arteriosclerosis is maintained and even caused by an over-in¬ dulgence of the appetites, and a sluggish mind and body as well as by the wear and tear of modern life, the struggle for wealth and posi¬ tion and by excessive and prolonged muscular

exertion and intense emotional activity, es¬ pecially in middle and later life.

Arteriosclerosis, even if there is a tendency to inheritance, can frequently be checked by real temperance and moderation in all things, food and drink, work and play and emotional excitement. While medicines are necessary for special conditions, the removal from the diet of offending food elements, systematic and ap¬ propriate exercise and keeping the intestinal tract clean are the principal remedies. See Old Age and Its Diseases.

ARTESIAN (ar-te'zhan) WELLS, bor¬ ings of considerable depth which tap a subter¬ ranean stream or sheet of water. The name is derived from Artois (Latin artesium), a prov¬ ince in France where the first deep borings in Europe were made. Strictly speaking the term artesian is applicable only to such wells as dis¬ charge water at the surface under natural con¬ ditions (that is, self-flowing Wells), but in America the term is commonly applied to any wells of more than ordinary depth. The United States Geological Survey restricts the term to a well in which the water rises under its own pressure above the point at which it was first encountered, even though it does not flow out at the surface, and this is the sense in which the term is here used. The conditions which determine the presence of artesian water in a region relate to the geological structure of the underlying strata. It is essential in the first place that a pervious stratum be overlaid by an impervious layer. The pervious bed, usually sandstone or sand, serves as a reservoir for the accumulation of water, while the impervious bed prevents this water from escaping. The second requisite is that the strata have a gentle pitch toward the site of the well and that they

outcrop at some place above the well. The dis¬ tance of the outcropping edges, which receive the water supply from rains, is sometimes very great. Owing to friction the water column of the well never reaches the level of the outcrop¬ ping source. The conditions for artesian water are particularly favorable when the strata are arranged in the form of a geological basin dip¬ ping in all directions toward the well, as there then is no opportunity for the water to escape at a lower level. From these considerations it is evident that the discharge from an artesian well depends upon the rainfall of the region and upon the area of the exposed porous stratum. At first the discharge is usually very abundant owing to the long accumulation, and unless this drain is constantly supplied the flow will gradually decrease until a balance is estab¬ lished. When several wells are bored in the same vicinity, the flow from each may be di¬ minished, but the total discharge will increase until the limit of supply is reached. This is well illustrated in the wells bored in the Lon¬ don basin which in 1838 gave a total daily sup¬ ply of 6,000,000 gallons; in 1851 with a larger number of borings the supply was about doubled, while the force had diminished very markedly; also in Denver, Colo., where some years ago there were many flowing wells which yielded water in large volume and with suf¬ ficient head to rise to the upper floors of the buildings. As wells multiplied the head and volume decreased so that in 1916 all wells in the centre of the city had to be pumped and artesian water was available only in the lower

parts of some of the surrounding country. The large area in which flows were obtained in southern California has also been greatly de¬ creased by the heavy draft of water to irrigate orange orchards. Artesian water is valuable not only for domestic use, for which it is usually adapted by its purity, but it is also ex¬ tensively employed in the irrigation of arid regions. Some parts of the Sahara Desert have been reclaimed by making use of the subter¬ ranean stores of water, and recent investiga¬ tions have shown that there are many areas which may yet be brought under cultivation. It is, however, in the United States that irriga¬ tion by artesian waters has reached its greatest development. Special surveys of the Great Plains region have been undertaken by the United States Geological Survey for the pur¬ pose of defining the areas where successful bor¬ ings may be made, and artesian wells are now largely employed for irrigation in South Dakota, New Mexico, Texas, California and Montana. The supply is drawn mostly from the Cretaceous sandstone, which is reached at a

depth varying from less than 100 to more than 1,500 feet. When the flow of water is sufficiently strong it may be utilized for power purposes as is done in some parts of Europe and at several points in the Dakotas. In Wiir- temberg a supply of warm water is applied to the heating of buildings.

The depth at which artesian water may be found depends entirely upon local conditions. In the Paris basin the water-bearing stratum is usually encountered at a depth exceeding 1,500 feet. The famous well at Grenelle, near Paris, was begun in 1833, and operations were con¬ tinued until 1841 when at a depth of 1,797 feet the water poured out with great force at the rate of 500,000 gallons per day. Another well was sunk near by at Passy, which yielded 5,600,000 gallons daily, the water rising to a height of 54 feet above the mouth. This well was 1,923 feet deep and had the unusual diameter of two feet four inches. A well at Kissingen, Bavaria, furnishes a supply of saline water from a depth of 1,878 feet. Another noted foreign well is that at Schladenbach, near Leipzig, with a depth of 5,735 feet. In the United States there are many notable examples of artesian wells. The first boring of great depth was made at Saint Louis in 1849-54; a flow of 75 gallons per minute was obtained from a depth of 2,200 feet, but the water was so heavily charged with sul¬ phuretted hydrogen and mineral matter as to be unfit for domestic use. Another boring was subsequently made to a depth of 3,843 feet. A well at Louisville, Ky., is 2,086 feet deep and yields 330,000 gallons per day. Among other noteworthv wrells are the following: Columbus, O. (2,775 feet) ; Galveston, Tex., (3,071 feet) ; Charleston, S. C. (1,250 feet) ; Pittsburgh, Pa. (4,625 feet) ; Chicago (710 feet) ; and Edge- mont, S. D., where two wells (2,965 feet each) yield flows of 1,000,000 gallons a day at tem¬ perature of 100°. A great many wells have been bored in recent years within the Atlantic Coastal Plain, especially in New Jersey, and many cities have thus obtained supplies of pure water. The temperature of the waters from the average artesian well is from 40° to 50° F., but in the case of very deep wells the water often reaches a temperature of from 70° to 80° F. At Charleston, S. C., there is a well the water

from which avewges 87° F. The cost of sink¬ ing artesian wells varies with the depth and the character of the strata encountered. Up to 500 feet the cost commonly ranges from $1.50 to $3 per foot, but below this limit the cost increases in proportion to the depth. The apparatus used in boring does not differ from that employed in sinking for petroleum. The first artesian borings were probably made by the Chinese. In the upper basin of the Yang-tse-Kiang there are wells 1,500 to 3,000 feet in depth from which brine for salt manufacture is

obtained. This industry has been carried on since a very early period and is an illustration of the compara¬ tively advanced state of progress attained by this people long before the western nations had developed the mechanical arts beyond the crude stage. Deep wells have been found also in Egypt which are thought to have been the work of the ancient Egyptians. A well bored in the year 1126 at Lillers, department of Pas-de- Calais, France, is still flowing. For informa¬ tion regarding artesian areas in the United States consult bulletins and annual reports of the United States Geological Survey, and of the geological surveys of several States, particularly those of Iowa, Mississippi, Missouri and New Jersey.

ARTEVELD, ar'te-vel'de, or ARTE- VELDE, the name of two men distinguished in the history of the Netherlands. (1) Jacob van, a brewrer of Ghent, b. about 1290; d. 17 July 1345. He was selected by his fellow townsmen to lead them in their struggles against Count Louis of Flanders. In 1338 he was appointed captain of the forces of Ghent, and for several years exercised a sort of sovereign power. A proposal to make the Black Prince, son of Edward III of England, governor of Flanders, led to an insurrection, in which Arteveld lost his life. (2) Philip van, son of Jacob: b. 1340; d. 27 Nov. 1382. At the head of the forces of Ghent he gained a great victory over the Count of Flanders, Louis II, and for a time assumed the state of a sovereign prince. His reign proved short¬ lived. The Count of Flanders returned with a large French force, fully disciplined and skil¬ fully commanded. Arteveld was rash enough to meet them in the open field at Roosebeke, between Courtrai and Ghent, in 1382, and fell with 25,000 Flemings. Consult Ashley, (James and Philip van Artavelde) (1883) ; Hutton, (James van Artavelde) (1882).

ARTEVELDE, Philip van, the title of a tragedy by Sir Henry Taylor, published in 1834. It is one of the best modern English tragedies by an author distinguished for his protest, in the spirit of Wordsworth, against the extreme sentimentalism of Byron. In this play with admirable power he brings back the stress and storm of 14th century life, The father of Philip, the great Jacob van Artevelde, an immensely rich brewer, eloquent and ener¬ getic, had played a great part as popular leader at Ghent, 1335-45; and it fell to his son to figure similarly in 1381, but to be slain in a great defeat of the forces of Ghent the next year. Taylor’s tragedy recalls the events of these two years.

ARTFUL DODGER, The, the nickname of John Dawkins, a young pickpocket in Dickens’ (Oliver Twist.)

ARTHOIS, ar'-twa/, Jacques d', Belgian landscape painter: b. Brussels, 1613; d. 1686. Though he studied his art under Jan Mertens, he later became strongly influenced by the Ruebens school. His pictures are mostly of great size and the. subjects Biblical, being painted largely for churches and monasteries. He often collaborated with Teniers, Van der Meulen and other noted painters of his time, who painted the figures in his pictures. His color schemes were always rich and virile, but his drawing was sometimes bad. His canvasses are found in nearly all the important galleries of Europe.

ARTHRITIS, an acute or chronic in¬ flammation of the joints, usually due to bac¬ terial infection. Such infection may follow a wound, a perforating injury, an operative in¬ cision, or the micro-organisms may come to the joint through the blood stream, as in rheu¬ matism, gonorrhoea, typhoid, or pyemia. In some cases of arthritis the causes seem to be resident in defective metabolism — gout is an illustration of this type of arthritis. In acute cases there are pain, swelling, heat and oc¬ casionally suppuration. In the chronic forms the main symptoms are pain and stiffness. The treatment should include rest, counter-irrita¬ tion, and, in the suppurative cases, prompt surgical attention. In the more chronic cases counter-irritation, dry, hot air, static electricity, and potassium iodide are of service. Some¬ times cupping or leeching may be indicated. See Arthritis Deformans; Gout; Joints, Diseases of; Rheumatism.

ARTHRITIS DEFORMANS (rheuma¬ toid arthritis, or osteo-arthritis), a group of chronic progressive diseases of the joints chiefly affecting the articular cartilages, bones and synovial membranes, and producing loss of function and great deformity from ossifi¬ cation of some parts of the joint and atrophy of others. Their origins are various, some of which are known and some still under investi¬ gation, the external appearance of the deform¬ ity showing less variation than the internal causes. Thus there are chronic arthropathies which produce the characteristic deformities and result from chronic gonorrhoea of the joints; others follow tonsillar infections, others are related in some way to infections from the teeth. In the majority of the cases there are unconscious mental factors — chiefly, hate re¬ actions — which in some, as yet not perfectly clear manner, have a very definite influence upon the nervous regulation of the bony and joint metabolism, permitting toxic, bacterial, dietetic or climatic factors to have their in¬ fluence. Though sometimes spoken of as rheu¬ matic gout, they

are believed to have little in common with rheumatism or gout, but may coexist with either. This type of disorder is very rare in children, occurs occasionally in old age, is. more common between 25 and 50, and in females than in males. In certain of its forms, it most often appears after the meno¬ pause, though it may occur earlier, as when following parturition. Heredity plays a part in certain arthropathies which come under this group. In the older descriptions one reads of two theories as to the immediate cause of the affection. For previously the group of different diseases were treated as one disease.

The first, the nervous or neuropathic theory, is based upon the symmetrical distribution of the joint-lesions, the trophic changes in the skin, nails, etc., etc., the frequent pre-existing mental disturbances, shock, grief, worry and the like, the disproportionate muscular atrophy, and the similarity of the lesions to those ar¬ thropathies of locomotor ataxia and other affections of the spinal cord. The second or infectious theory is derived from the facts that micro-organisms have been found in the fluids and tissues of the joints, that the dis¬ ease sometimes begins with an acute onset, as do many of the infectious diseases, and that enlargement of the spleen and lymph- glands is found in some cases. It is difficult to say which tissue is primarily at fault but sooner or later nearly all are involved. The synovial membrane inflames and papillary outgrowths and cartilaginous nodules form upon it. These last may undergo fatty degen¬ eration or they may ossify. They may slip into the joint-cavity. If serous effusion occurs it is absorbed early in the disease. The car¬ tilages lose their cells, become fibrillated and soft and are removed by friction and absorp¬ tion. The ends of the bones (the interarticu- lar cartilages being absorbed) by friction be¬ come smooth, rounded and shiny like polished ivory (eburnated). The eburnated surfaces, by attrition, become grooved and minute per¬ forations of the Haversian canals result. De¬ posits of new bone form around the margins of the joints and may be often felt externally. The muscles atrophy and are of a brownish color. Fibrous adhesions and bony anchylosis occur. Some of the small joints of the fin¬ gers for example may move a little, but the knees, etc., may be interlocked by reason of the rims of bony material deposited. Dis¬ location or subluxation may result. The periosteum along the shafts of the bones may thicken or ossify in nodules. A combined hypothesis which deals with both sets of fac¬ tors with interplay between is probably nearer the real facts. In certain cases the nervous instability is accompanied by endocrinous — thyroid — deficiency. An acute form of a general or multiple progressive type is rare after 40. Smaller joints become simultaneously painful, tender and swollen but not red as in rheumatism ; there is no migration from

joint to joint, the affected joints are inflamed, while others are becoming diseased. Pa¬ tients are anaemic, mentally depressed and complain of headache and malaise. Fever seldom goes above 102° F. Temporary im¬ provement occurs, but the disease advances. The chronic form of this type is insidious and more common. One joint (of finger or toe) is involved; the disease affects the correspond¬ ing joint and then other joints; pain may be mild or very severe ; there are delusive inter¬ vals while the disease marches on. After months, or it may be years, all or nearly all of the joints are thickened, rigid and distorted. The hands are bent toward the ulnar side, fingers strongly flexed, nails in the palms of the hands. The thumbs, though drawn in, may be used. The knees are generally crossed. The general health through it all may be fair, as visceral lesions are uncommon.

In the monarticular or localized type, the changes are usually confined to one or two of

the larger joints, occurs mostly in men and after 50. The knee, shoulder, elbow or hip is generally affected, but the vertebrae may be, the entire spinal column becoming rigid. Mo¬ tion of affected joints often produces a creak¬ ing or grating sound. The pathological ap¬ pearances are similar to those of the general type of the disease, but joint-injuries are more often an exciting cause. The joint becomes stiff, sore and painful and there is absorption of the ends of the bones, dislocation and de¬ formity.

Heberden's nodes or nodosities, described by him in 1805, are small exostoses (((small hard knobs®), seldom larger than peas, which form on either side of the distal joints of fingers. They may be present in either type of the disease, at first are tender and swollen, but later on apparently cause little discomfort. Sometimes the bone-enlargement surrounds the joint.

Arthritis deformans in children, although not frequent, is more acute and is more influ¬ enced by poor food, cold and damp, etc. There is fever, sometimes a chill. The swell¬ ing, stiffness and tenderness seem to be more in the soft parts than in harder tissues. The fingers are flexed and overlapped, the feet are strongly extended and the joints are rigid.

The diagnosis of arthritis deformans must be made from subacute and

chronic rheuma¬ tism, gonorrhoeal rheumatism, gout, progres¬ sive muscular atrophy, Charcot's disease, etc. Recovery is rare, but the disease is not di¬ rectly dangerous to life.

Treatment will vary according to the type of cause. Chronic infective foci as from ton¬ sils, teeth, old suppuratur foci of the tubes, endometrium, intestines, prostate, etc., etc., should all be cleared up, not by too radical a surgery, such as divest the human being from his teeth, his intestines or other of his essen¬ tiaˆ properties, but a stimulating, healthful, tonic therapy, chiefly psycho-therapeutic with the accessory aids of travel, or by hydrotherapy, or specially indicated pharmacotherapy — iron or arsenic if anaemia be present, mercury for syphilis, etc. Local treatment is usually worth¬ less but certain forms of baking, counter-irri¬ tation to the joints and certain types of deep massage for the trophic vegetative nerve fibers are indicated. See Anthritis ; Gout; Rheu¬ matism. Consult J elliffe and White, dis¬ eases of the Nervous System) (Chapters on the Vegetative Nervous System and Bony Syndromes).

Smith Ely Jelliffe.

ARTHROCACE (Neo.-Lat. from Gk. apdpov , joint + kokti, evil), a disease of the joints in which the bone is disintegrated and carried away piecemeal. See Caries.

ARTHRODIA. See Joint.

ARTHRODYNIA (Neo.-Lat. from Gk. apdpov , joint + rjodvvr/, pain), pain in a joint; practically synonymous with arthralgia.

ARTHROGASTRA (Neo.-Lat. from Gk. apdpov f joint + yaorr/p , abdomen), a division of the insect class Arachnida (q.v.), having the abdomen annulated, and including spiders and scorpions. See Scorpion.

ARTHROMERE (Gk. apdpov, joint + ˆP°Q, part), one of the series of segments of which arthropoda (q.v.) are composed.

ARTHROPATHY, a disorder of the

joints either due to local inflammatory reac¬ tions as in the various acute or chronic rheu¬ matic infections or resulting from disorder of the nervous control of the healthy metabolism of the joints as seen in tabetic arthropathy or the arthropathies of chronic lung and heart disease, multiple sclerosis, poliomye¬ litis, syringomyelia, etc. The health of the joint is largely dependent upon the function¬ ing of the

vegetative nervous system which controls the growth or trophiem of the joint. The cells regulating this control are located in the lateral horns of the spinal cord.

ARTHROPHRAGM (Gk. apdpov, joint -j- (ftpaypa , fence), a partition between certain articulations as for example in the crayfish (q.v.).

ARTHROPLEURE (Neo.-Lat. Arthro- pleura, from Gr. apdpov, joint + *r Aevpa, side), the lateral portions of the arthroderm, or crust, of articulated animals. See Articulata.

ARTHROPODA, a phylum comprising those articulated animals which have jointed appendages such as antennse, jaws, maxillae (or accessory jaws), palpi and legs arranged in pairs, the two halves of the body thus be¬ ing more markedly symmetrical than in the lower animals. It is by far the most numerous in species of any in the animal kingdom, the insects alone probably numbering upward of a million species ; other representative or typical forms are the trilobites, king crabs, scorpions, spiders and myriopods. The skin is usually hardened by the deposition of salts (carbonate and phosphate of lime) and of a peculiar organic substance called chitine. The segments (somites or arthromeres) composing the body are usually limited in number, 20 (or 21) in the crustaceans and insects ; while each arthromere is primarily divided into an upper (tergum), lower (ster¬ num) and lateral portion (pleurum). These divisions, however, cannot be traced in the head of either the crustaceans or the insects. Moreover, the head is well marked with one or two pairs of feelers or antennse and from two to four pairs of biting mouth-parts or jaws and two compound eyes; besides the compound eyes there are simple eyes in the insects. The germ is three-layered and there is usually in the more specialized forms a well-marked metamorphosis. The Arthropoda are most nearly related to the worms, certain annelides, with their soft-jointed appendages (tentacles as well as lateral cirri) and more or less definite head, anticipating or foreshad¬ owing the arthropods. On the other hand, certain low parasitic arthropods, as lingua- tula, have been mistaken for geunine parasitic worms.

Segmentation of the Body.— The seg¬ ments (somites metameres) are merely thick¬ enings of the skin connected by a. thin inter- segmental membrane, so that the segments can telescope into each other or extend, thus lending the greatest freedom of motion to the trunk as well as to the appendages; otherwise a rigid chitinous skin would not permit of any movement. As in the annelid worms, this segmentation of the integument is correlated with the serial repetition of the ganglia of the nervous system, of the ostia of the dorsal

vessel, the primitive disposition of the seg¬ mental and reproductive organs, of the soft, muscular dissepiments which correspond to the suture between the segments and with the metameric arrangement of the muscles con¬ trolling the movements of the segments on each other; and this internal segmentation or metamerism is indicated very early in embry¬ onic life by the mesoblastic somites.

While we look upon the dermal tube of worms as a single but flexible lever, the body of the arthropods, as Graber states, is a linear system of stiff levers. We have here a series of stiff, solid rings or hoops united by the intersegmental membrane into a whole. When the muscles extending from one ring to the next behind contract, and so on through the entire series, the rings approximate each other.

The origin of the joints or segments in the limbs of arthropods was probably due to the mechanical strains to which what were at first soft fleshy outgrowths along the sides of the body became subjected. Indeed, cer¬ tain annelid worms of the family Syllida have segmented tentacles and parapodia, as in Du- jardinia. We do not know enough about the habits of these worms to understand how this metamerism may have arisen, but it is possibly due to the act of pushing or repeated efforts to support the body while creeping over the bottom among broken shells, over coarse gravel or among sea-weeds. It is obvious, however, that the jointed structure of the limbs of arthropods, if we are to attempt any explanation at all, was primarily due mainly to lateral strains and impacts resulting from the primitive endeavors of the ancestral arthro¬ pods to raise and to support the body while thus raised and then to push or drag it for¬ ward by means of the soft, partially jointed lateral limbs which were armed with bristles, hooks or finally claws. By adaptation or as the result of parasitism and consequent lack of active motion the original number of seg¬ ments may by disuse be diminished. Thus in adult wasps and bees the last three or four abdominal segments may be nearly lost, though the larval number is 10. During metamor¬ phosis the body is made over and the number, shape and structure of the segments are greatly modified.

History and Present Classification. — The

group or sub-kingdom (phylum) of Arthro¬ poda was founded in 1848 by Siebold. It has been supposed until recently to be a natural group.

In 1893 Kingsley and also Kennel first suggested doubts as to the homogeneity of the group and in the same vear Packard published the view ’that there are four independent lines of development in the Arthropoda, and in 1894 Kingsley divided the group into three subphyla, Laurie and Pocock also considering that the group is polyphyletic. In 1898 Pack¬ ard stated: (<It is becoming evident, however, that there was no common ancestor of the Arthropoda as a whole, and that the group is a polyphyletic one. Hence, though a con¬ venient group, it is a somewhat artificial one, and may eventually be dismembered into at least three or four phyla or branches.ˆ

The five phyla as afterward proposed by Packard are, beginning with the most primitive : (1) Palaostraca, embracing the classes of Tril- obita; (2) Merostomata (Limulus) , and Arach- vol. 2 — 23

nida; (3) Pancarida (Crustacea) ; (4) Prosogo- neata, including three classes : Pauropoda, Dip- lopoda and Lymphyla (Scolopcndrella) ; and (5) Entomoptera , comprising the Chilopoda and Insecta; the great majority of the group being winged insects. Each of these phyla represent independent lines of development, judging by their structure and what we know of their de¬ velopment, and have no genetic connection be¬ yond the theory that they each have descended from one or more annelid worms.

ARTHROSTRACA, Crustacea of the sub¬ class Malacostraca in which the first, sometimes the second thoracic segment is fused with the head and bears maxillipedes ; the remaining seven being free and bearing legs. The eyes are usually sessile. The group is divided into the Amphipoda (q.v.) and Isopoda (q.v.) Com¬ mon examples are pill-bug, wood-louse, etc.

ARTHUR, king of the Silures in the 6th century, an ancient British hero, whose story has been the theme of much romantic fiction. He is said to have been the son of Uthyr, chief commander of the Britons, and to have been born about 501. In 516 he succeeded his father in the office of general, and performed those heroic deeds against the Saxons, Scots and Piets which have made him so celebrated. He married the celebrated Guinevere belonging to the family of the dukes of Cornwall ; estab¬ lished the famous order of the Round Table; and reigned, surrounded by a splendid court, 12 years in peace. After this he is reported to have conquered Denmark, Norway and France, slain the giants of Spain and journeyed to Rome. From thence he is said to have hastened home on account of the faithlessness of his wife, and Modred, his nephew, who car¬ ried on an adulterous intercourse, and stirred up his subjects to rebellion; to have subdued the rebels, but to

have died in consequence of his wounds, in 542, on the island of Avalon, where it is pretended that his grave was found in the reign of Henry II. The story of Arthur is supposed to have some foundation in fact, and it is generally believed that he was one of the last great Celtic chiefs who led his country¬ men from the west to resist the settlement of the Saxons in southern Britain. But many au¬ thorities regard him as a leader of the Cymrv of Cumbria and Strath-Clyde against the An¬ glo-Saxon invaders of the east coast and the Piets and Scots north of the Forth and the Clyde. In our own day the interest of the old legends has been revived by the works of Lyt- ton and especially Tennyson. For bibliography, see Arthurian Legends.

ARTHUR, Prince. See Connaught, Duke of.

ARTHUR, duke of Brittany, the grandson of King Henry II of England: b. 1187; d. 1203. On the death in 1199 of his uncle, Richard I, who had declared the boy his heir, Arthur was proclaimed King of England by the nobles of Anjou, Touraine and Maine, while the English lords decided in John's favor. King Philip of France supported the claims of Arthur, but a peace being presently concluded between John and Philip, Arthur came later into the hands of his uncle, King John, and soon mysteriously disappeared. According to general belief Ar¬ thur was murdered by command of his uncle.

The story of Arthur forms a portion of Shakes¬ peare's (King JohnP See John.

ARTHUR, Chester Alan, the 21st Presi¬ dent of the United States: b. Fairfield, Vt., 5 Oct. 1830; d. New York, 18 Nov. 1886. He was graduated from Union College at 18, was prin¬ cipal of an academy at North Pownal, Vt., and in 1853 began the practice of law in New York, where he argued several important legal cases in behalf of the colored people. Through these and other cases he became noted in his profes¬ sion, and he was also prominent as a Republi¬ can politician. In April 1861 Gov. E. D. Mor¬ gan made him acting quartermaster-general, and later he was made full quartermaster- general. For the next decade he was a suc¬ cessful and widely known practising lawyer and a leading Republican politician of New York, chairman of the Grant Club in 1868, and of the executive committee of the Republican State committee in 1869. He was appointed by President Grant, 20 Nov. 1871 to the highest office in the State patronage, the

collectorship of the port of New York, which he held till 11 July 1878. His business conduct of the office was not impeached, and he was retained by President Hayes for over a year after his accession ; but he was first of all a political manager, in open hostility to civil service re¬ form. As a matter of actual practice and not theory, however, Mr. Arthur produced figures to show that the annual percentage of removals under him for all causes had been only 2ˆ4 per cent, as against an annual average of 24 per cent since 1857. In 1880 he was nominated for the vice-presidency, chiefly to conciliate the Grant section of the Republicans, sore at the defeat of the third-term project, and was elected with Garfield. In place of the customary dig¬ nified nullity of his office, he remained an active party leader in the patronage contest of his State between the “Stalwarts® or Grant section led by Roscoe Conkling (q.v.), and of which Mr. Arthur was chief lieutenant, and the “Half- Breeds® or more independent wing which Gar¬ field was trying to build up. Conkling soon resigned his seat in the Senate, declaring that Garfield had broken his promises to him, and the Garfield party for the time was triumphant ; but the assassination of Garfield, shortly after, reversed the situation. The open lamentations of the press at the prospect of the accession of so convinced a spoilsman as himself deeply hurt Mr. Arthur, who felt that he was misjudged, and determined on the most admirable revenge, that of disappointing their prophecies of evil. He did so ; not only was his term of office measurably free from the dominance of patronage, but he extended the civil service rules and kept faith with them. In other respects his administration was so excel¬ lent that the leading Independents had an¬ nounced their intention of supporting him for President if nominated in 1884. Its most notable incident was the appointment of a commission to revise the tariff, which, though composed of strong Protectionists, reported that the tariff should be reduced 20 per cent all around, a rec¬ ommendation unheeded by Congress. Several commercial treaties were passed, however. He vetoed a Chinese immigration bill as inconsist¬ ent with treaty obligations; favored the strin¬ gent laws passed against polygamy, appointed a

Utah commission to supervise their enforce¬ ment ; managed Indian affairs wisely, promot¬ ing Indian education and the breaking up of the tribal system; extended postal facilities; took measures to increase the navy, improve its discipline and efficiency and provide for coast defense; supported the improvement of Mis¬ sissippi River navigation, etc. The attempts at remonetizing silver, and at forcibly abrogating the Clayton-Bulwer treaty to build a Nicaragua Canal, were in accordance with general party feeling at the time. The lingering scandal of the

Star Route frauds, however, injured the party somewhat, and its policy and methods were gravely disapproved of by the Independ¬ ents ; but this was much more than counter¬ balanced by distrust of the Democratic party for its alliance with the Greenback element. Mr. Arthur's defeat for the nomination was not caused by any demerits of his own, still less by desire to conciliate the Independents, but by the personal ambitions of Republican leaders, which, justly or unjustly, had aroused and ex¬ asperated the Republicans of the State of New York, causing the defeat of C. J. Folger for Governor, and resulting in the nomination of Blaine in 1884. Arthur, although a close ad¬ herent of Conkling, supported Blaine. Consult Smalley, G. W., 'Life of C. A. Arthur) (New York 1880).

ARTHUR, Sir George, British colonial administrator: b. 1784; d. 1854. He was lieu¬ tenant-governor of the Honduras 1814-22; of Van Diemen's Land 1824-37, and the last lieu¬ tenant-governor of Tipper Canada 1837-41. It fell to his duty to suppress the Upper Canada rebellion of 1837-38, and for his services he was rewarded with a baronetcy. He was gov¬ ernor of Bombay 1842-46, and only the state of his health prevented him from succeeding to the position of Viceroy of India.

ARTHUR, Joseph Charles, American bot¬ anist: b. Lowville, N. Y., 11 Jan. 1850. He was graduated from Iowa State College in 1872, and subsequently studied at the universities of Johns Hopkins, . Harvard and Bonn, Germany. He was instructor in the universities of Minnesota and Wisconsin ; botanist at the Experiment Sta¬ tion, Geneva, N. Y., and for 28 years professor of vegetable physiology and pathology at Pur¬ due University, Lafayette, Ind. Since Septem¬ ber 1915, he has been professor emeritus of botany at the last-named institution. He is the author of more than 200 articles in periodicals of a scientific nature, and some 80 of these refer to plant rusts of Uredinales. He has written (with Barnes and Coulter) 'Handbook of Plant Dissection > (1886) ; (with 'MacDou- gal) 'Living Plants and Their Properties)

(1898).

ARTHUR, Julia, the stage name of Ida Lewis, an American actress : b. Hamilton, Ont., 3 May 1869. She made her professional debut at the age of 14 as the Prince of Wales in 'Richard II I,) and then, after three seasons, went to England to study music and drama. Her first New York success was in 'The Black Masque } at the Union Square Theatre. She made her London debut February 1895 in Henry Irving's company at the Lyceum, playing roles next to Miss Terry. Next year she accom¬

panied Irving and Terry to America. In 1897

she brought out in New York (A Lady of Quality J on an elaborate scale; the following season she appeared as Rosalind in (As You Like ID at Wallack's Theatre. In 1899 she produced, at the Broadway Theatre, (More Than Queen,) from the French of Emile Ber- gerat, taking the part of Josephine Bonaparte, which obtained a great success. She is the wife of B. P. Cheney. Consult Clapp, J. B., and Edgett, E. F., (Players of the Present* (1899), and Strang, L. C., (Famous Actresses of the Day in America * (1899).

ARTHUR, Timothy Shay, an American author: b. Newburgh, N. Y., 1809; d. Philadel¬ phia, 6 March 1885. In 1852 he founded Arthur s Home Magazine. He was a volumi¬ nous writer of moral and domestic tales. His works are over 100 in number, and have had a large sale in England as well as in the United States. His most popular work was the famous (Ten Nights in a Bar-Room. * Among his other publications were (Tales for Rich and Poor,* (Tales of Married Life) and (Lights and Shadows.)

ARTHUR, William, Irish author and clergyman: b. 1819; d. 1901. During his early career he was for three years a missionary in India, after which he became secretary of the Wesleyan Church Missionary Society, {hen, in 1868, principal of the Wesleyan College in Bel¬ fast. Among his works are (Personal Remi¬ niscences of a Mission to the Mysore * (Lon¬ don 1847) ; (The Tongue of Fire, or True Power of Christianity > (1856; 40th ed., 1885); (The People's Day *(1855; 11th ed., 1856); (Italy in Transition* (I860) ; (The Pope, the Kings and the People) (1903).

ARTHURIAN ROMANCES, The. The

figure of Arthur rests, in all probability, upon a historical basis, which has been completely transformed by the accretions of mythology, legend and romance. In the (Historia Brit- onum) of Nennius, a compilation of very un¬ certain date, mention is made of a certain Arthur who was <(dux bellorum *of the Britons against the Saxon invaders. His most brilliant achievement is stated to have been the British victory at Mount Badon (early in the 6th cen¬ tury). This testimony is substantiated by the Latin work of Gildas, an ecclesiastic of the 6th century, although Gildas does not mention Arthur by name. The memory of*

a conquering leader of this sort may well have been cherished by the English Celts in their later adversities, and his deeds magnified into the exaggerated exploits of a popular hero. The more primitive conception of Arthur is revealed in certain por¬ tions of the Welsh (Mabinogion. In the tale of (Kilhwch and Olwen, for example, he ap¬ pears as the leader of a far ruder company than that generally associated with his name. In the course of time many features belonging to Celtic mythology became attached to him and his followers, which are occasionally plainly visible in the later romantic narratives. Sir Thomas Malory describes the strength of Gawain as waxing and waning each day, a peculiarity originally belonging to a super¬ natural being. Episodes in the story of Ar¬ thur's life may in all probability be traced to a similar source. The faithlessness of his wife and treachery of his nephew may perhaps be the rationalized form of an old myth. It has

even been argued that Arthur was originally a Welsh deity or culture-hero, but this theory has not met with general acceptance.

The conception of Arthur as the heroic king of mediaeval romance is due largely to Geoffrey of Monmouth. In his fictitious (Historia Regum Britanniae,* about 1136, or later, he elabo¬ rated the slight hints offered by Nen¬ nius and presented a complete and well-

rounded portrait. A romantic parentage and a wonderful boyhood are given to Arthur, in

which supernatural occurrences are not absent. A warrior of surpassing valor, he not only puts to rout the invading Saxons, but subdues Eu¬ rope to his s wav. In the midst of his last for¬ eign campaign he learns of the infidelity of his wife Guanhumara and the treason of his nephew Modred, to whom he has entrusted the govern¬ ment of Britain. Hurriedly returning, he de¬ feats Modred in a bloody combat, but himself receives a mortal wound, and is borne to Avalon to be healed. Too much importance can hardly be attached to this narrative, which forms the beginning of the great body of romantic litera¬ ture which clustered about the name of Arthur, although the later romancers worked along very different lines from those laid down by Geoffrey. Much of the material in the (Historia* is no doubt due to the author's own vivid imagina¬ tion, but it is certain that he made use of the Arthurian legends in circulation in his native country near the Welsh border. In the 12th century there must have been many of these current among the Welsh people. On the Con¬ tinent as well, the name and fame of Arthur appear to have been well known in early days. The Celts who crossed the Channel, mainly in the 5th and 6th centuries, and settled in Ar¬ morica, carried these legends with

them, devel¬ oped them in their own way, and transmitted them to their French neighbors. The question whence the early trouveres got the matiere de Bretagne has been much discussed. It has been contended by some scholars that this was chiefly, if not wholly, derived from the Con¬ tinent. Others have maintained that the trans¬ mission of the Arthurian stories by the Welsh to the Anglo-Normans was the most important factor in their later literary development. Suf¬ ficient evidence exists to prove the early circu¬ lation of this material both in Wales and Brittany, and the most reasonable view would seem to be that each locality contributed its share, but that a just apportionment of the indebtedness of the later romances is hardly possible.

The most illustrious shaper of Arthurian legend after Geoffrey was a Frenchman, Chres- tien de Troyes. A native of Champagne, he wrote in the second half of the 12th century a series of long poems in octosyllabic couplets dealing with prominent knights of Arthur's court, Erec, Lancelot, Yvain and Perceval. A fifth piece, <Cliges,* is connected with Arthur in a different way, while a romance dealing with Tristram has not been preserved. Chrestien carried still further the process which had been begun by Geoffrey. In his hands the knights become representative of the highest chivalric culture. They are not merely patterns of bravery, but men of sensitiveness and refinement, drawn with a surprising care for psychological analysis. Chrestien introduced into his stories the elabo¬ rate love-conventions of the day, which often

produces a certain artificiality. He stood pre¬ eminent among his contemporaries, and exerted a great influence, not only in France, but in neighboring countries as well, particularly in Germany. The (Erec5 and (Yvain5 were trans¬ lated by Hartmann von Aue, and the (Parzival5 of Wolfram von Eschenbach probably owes a good deal to the (Conte del Graal,5 although the extent of this indebtedness is disputed.

Chrestien's sources are no longer extant, but it seems likely that these consisted largely of short narratives in verse. Some idea of the character of these may be gained from the Breton lais of the poetess Marie de France, although Marie's poems are no doubt far more artistic than the reworkings of popular story of which Chrestien made use. Many lays upon Arthurian subjects must have been in existence at

this time. The work of Marie herself, al¬ though indirectly most significant in considering the literary evolution of the Arthurian legends, is but slightly connected with Arthur, only one of her lays having a setting at his court.

Meanwhile the popularity of Geoffrey of Monmouth's imaginary history was calling forth various paraphrases in England. The demand for a version in French was met by the rhymed translation of Geoffrey Gaimar, produced shortly before the middle of the 12th century. Only a part of this is extant, but a compensa¬ tion for its loss appears in the poem by the Norman Wace, which seems to have been con¬ sidered a more distinguished work than Gai- mar's. Wace treated Geoffrey's material with considerable freedom, making additions and omissions as he thought fit. His work falls early in the third quarter of the 12th century.

The chronicle of the British monarchs was put into English about the year 1205 by Laya¬ mon, a monk of Ernley on the Severn, and called, after the reputed founder of the royal line, the Brut. Of this, about one-third deals with Arthur. It was based largely on the poem of Wace, but the English monk gave a very different coloring to his work than did the elegant Norman. Arthur becomes a more truly English hero, and his deeds are told in the alliterative verse of the Germanic stock, al¬ though rhyme and even assonance occasionally appear. The English character of the work is apparent in the vocabulary, which contains very few words of Romance origin. Like Geoffrey of Monmouth, Layamon drew from traditions near the Welsh border, adding to the Arthurian story material of great interest. Particularly noteworthy is the account of the Round Table, an institution borrowed from Celtic sources to settle questions of precedence in sitting at meat.

In the further development of the Arthurian romances the tendency to exalt the individual knights rather than the great king becomes more marked. Arthur is, indeed, the most majestic figure of all, but he remains in the background, while great exploits are performed by his fol¬ lowers. Gradually a number of cycles arise, centring about prominent figures, Gawain, Lancelot, Perceval, Yvain, Merlin. Tales origi¬ nally unconnected with Arthur's court are partly localized there, and their heroes made members of the Round Table fellowship, as the Quest of the Holy Grail, which consists of the fusion of a Celtic narrative of adventure and an ecclesias¬ tical legend, or the story of Tristram and Ysolt.

A vast body of verse-romances thus came into existence, together with long compilations in prose. Chaucer did his part in telling of ((tholde

dayes of the king Arthour55 in the Wife of Bath's tale. In the 15th century the degen¬ eration of the minstrel romance was rapid. With the decline of the chivalric system came the decay of the romantic stories which glorified it. Prose redactions, often of inferior artistic merit, became more and more common. Mean- while some Arthurian material reappeared in altered form in the popular ballads. A notable exception to the general level of romance¬ writing in this period is the (Morte Darthur) of Sir Thomas Malory, a book which unites episodes drawn from various sources into one harmonious whole, and presents, not merely an account of Arthur's death, but of his whole life, with detailed descriptions of the adventures of the knights of his court. For charm of narra¬ tive, and cadence and melody of language, it has no rival among English romances. Written about 1470, and published 15 years later by Caxton, it may be regarded as the classic presentation of the Arthurian story for English readers.

There is little consistency in the legends grouped about the figure of Arthur. Not only were episodes altered at will, but the concep¬ tions of the characters of prominent persons vary in different versions. As the taste of the times changed, one hero displaced another, and one set of romances drove others out of vogue. In the Grail romances, for example, the earlier heroes Gawain and Perceval were supplanted in times of greater insistence upon purity by the stainless, but less virile Galahad. Lancelot and Merlin were particularly popular in later days. Still further changes have been introduced in modern times. The (Faerie Queene5 of Spen¬ ser, which presents Arthur as the ideal type of manhood, bears little resemblance to earlier portraits of the hero. It is well known that Milton projected an epic on the story of Arthur before turning to the composition of (Paradise Lost.5 The most important effort of modern times to reproduce Arthurian legend is perhaps Tennyson's (Idylls of the King.5 These are based mainly on Malory, but the poet allowed himself much freedom both in episode and characterization. Swinburne, Matthew Arnold, William Morris and others have rendered sev¬ eral of the old stories into verse. In foreign countries the Arthurian material has enjoyed considerable popularity. Especially noteworthy are Wagner's music-dramas, Carsifal5 and tristan und Isolde.5 See Mabinogion; Ava¬ lon ; Tristan.

Bibliography.— Sommer, (Morte d'Ar- thur) (3 vols., 1889-91) ; Comfort, (Erec and Enid5 (in (Everyman's Library5); Cam¬ bridge History of English Literature5 (Vol. I, London 1907) ; Rhys, (Studies in the Ar¬ thurian Legend5 (Oxford 1891); Zimmer, H., (Nennius Vindicatus5 (Berlin 1893) ; Fletcher, the Arthurian Material in the Chronicles5 (Boston 1906) ; Guest, (Lady) Charlotte, translation of the Mabinogion5 ; MacCallum, (Tennyson's Idylls of the King5 (Glasgow

1894) ; Maclean, the Literature of the Celts5 (London 1902) ; Maynadier, the Arthur of the English Poets5 (Boston 1907); Jones, W. Lewis, (King Arthur in History and Legend5 (Cambridge 1911); Paris, Gaston, (Histoire

litteraire de la France *(Vol. XXX, Paris 1888) ; Porkorny, (Der Ursprung der Arthur- sage } (Vienna 1909) ; Nutt, (Celtic and Mediae¬ val Romance) (London 1899) ; Newell, (King Arthur and the Table Round* (Boston 1897) ; Forster, W. (editor), (Works of Chrestien de Troyes *(Halle 1884—99) ; Ward, (Catalogue of Romances in the Department of Manuscripts in the British Museum) (Vol. I, London 1883) ; Saintsbury, flourishing of Romance) (New York 1897) ; Schofield, (English Literature from the Norman Conquest to Chaucer) (New York 1906) ; Skene, (Four Ancient Books of Wales* (Edinburgh 1868) ; Brown, A. C. L., (Ywain: A Study in the Origins of Arthurian Romance> (Boston 1902).

William Witherle Lawrence,

Professor of English, Columbia University.

ARTHUR'S SEAT, a hill overlooking Edinburgh, Scotland, said to have been so called from a tradition that King Arthur surveyed the country from its summit and defeated the Saxons in its neighborhood. It is a steep, and in some places precipitous, rock, exhibiting on the south side a range of perpendicular basaltic columns, called Samson's Ribs. The highest point is 822 feet above sea-level. From hence may be seen a wide expanse of sea, the course of the Forth, the distant Grampians, etc., and a large portion of the most populous and best cultivated part of Scotland, including the pic-, turesque city of Edinburgh and its castle. On the north side are the ruins of a chapel and hermitage, dedicated to Saint Anthony, and a fine spring called Saint Anton's Well. A carriage road called the Queen's Drive goes round its base.

ARTICHOKE, two plants of the family Asteracece. The true, sometimes called French, artichoke (Cynara scolymus) , a native of the Mediterranean region, is a coarse, stout, peren¬ nial, thistle-like herb, three to five feet tall, with rather spiny leaves, the lower of which are often three feet or more long, and large terminal heads of blue or white flowers. It is cultivated for the edible thickened outer scales and "bot¬ toms** (receptacles) of the flower heads which sometimes exceed four inches in diameter with¬ out becoming too old for eating

raw as salad, pickled or cooked like cauliflower. Sometimes the young stems and leaves are blanched and cooked as a pot-herb. In Europe many varieties are popular; in America the globe variety is planted almost to the exclusion of others, with the result that this variety has almost become united to the name in popular usage. The cul¬ tivation of this species in America is confined mostly to the southern States and California. Since the plant is rather tender, winter pro¬ tection must be given where the ground freezes. If planted in rich soil and set four feet apart the plants will yield two or three crops before a new plantation should be made ; if allowed to stand longer the yield gradually diminishes. New plantations are made either with seedling or sucker plants. Most of the artichokes offered in the Northern markets of the United States come from California.

The Jerusalem artichoke (Helianthus tuber- osus), a native of eastern North America, is a perennial sunflower-like herb, five to 12 feet tall, with rough leaves four to eight inches long and many yellow terminal flower-heads often

two to three inches in diameter. The edible pear-shaped purplish, red, white or yellow tubers for which the plant is often cultivated are numerous, seldom more than three inches in diameter, rather watery but of pleasant flavor, especially when prepared like cauliflower, with a white sauce. Perhaps no vegetable is of easier cultivation. For home use the tubers are generally planted in well-drained soil in some out of the way corner of the garden and al¬ lowed to take care of themselves from year to year, the few tubers and pieces of root left after digging sufficing to restock the bed. In field culture the methods are like those prac¬ tised with the potato except that the tubers may be left in the ground over winter and dug when needed. They are not injured by frost if in the soil, but if frozen after being dug they spoil quickly. If desired they may be dug and stored in pits like turnips, but with a somewhat lighter covering of straw and earth. The usual yield is from 200 to 500 bushels to the acre. When land becomes infested, as it sometimes does, with the plant, pigs, for which the tubers make valuable food, may be turned loose upon the field. The tubers resemble potatoes in com¬ position and like them are used largely in Europe for the manufacture of alcohol. The young plants are sometimes used as cattle food and the dry stalks for fuel. Consult (Bur or Globe Artichoke) (in United States Depart¬ ment of Agriculture Year Book, 1899) ; Circu¬ lar 31 (1899) ; Bailey, Standard Cyclopedia of Horticulture) (1914) ; Vilmorin, (The Vege¬ table Garden) (translation by Robinson, 1885).

ARTICLE, in grammar, a part of speech used before nouns to limit or

define their ap¬ plication. In the English language a or an is the indefinite article (the latter form being used before a vowel sound) and the the definite article. The English indefinite article is really a modified form of the numeral adjective one ; so the German ein and the French un stand for the numeral and the article. There are traces in various languages showing that the definite article was originally a pronoun ; thus the Eng¬ lish the is closely akin to both this and that. The Latin language has neither the definite nor the indefinite article; the Greek has the defi¬ nite ; the Hebrew and Arabic definite article was prefixed to its noun, while, on the other hand, in the Syriac and Chaldaic it was affixed to the noun, as it is in the Icelandic. In the Scandinavian language the definite article is appended to the end of the word as hus-et, the house. There is no article in Russian.

Articles, divisions of a printed or written document or agreement. A specification of dis¬ tinct matters agreed upon or established by authority or requiring judicial action. In chan¬ cery practice articles are a formal written state¬ ment of objections to the credibility of wit¬ nesses in a cause in chancery, filed by a party to the proceedings, after the depositions have been taken and published. The object of articles is to enable the party filing them to introduce evidence to discredit the witnesses to whom the objections apply, where it is too late to do so in any other manner (2 Daniel Chan. Pr. 1158), and to notify the party whose witnesses are objected to of the nature of the objections, that he may be prepared to meet them. Upon filing the articles a special order is obtained to

take evidence. The interrogatories must be so shaped as not to call for evidence which applies directly to facts in issue in the case. 3 Johns. Ch. N. Y. 558. The objections can be taken only to the credit and not to the competency of the witnesses. 3 Johns. Ch. N. Y. 558; 3 Atk. Ch. 643, and the court are to hear all the evidence read and judge of its value. 2 Ves. Ch. 219.

Articles of Association. — In law, written regulations agreed upon by the parties to a joint enterprise.

Articles of Agreement. — A written mem¬ orandum of the terms of an agreement. They may relate either to real or personal estate, or both, and if in proper form will create an equi¬ table estate or trust such that a specific per¬ formance may be had in equity. The articles of

agreement should contain a clear and ex¬ plicit statement of the names of the parties, with their additions for purposes of distinction, as well as a designation as parties of the first, second, etc., part; the subject-matter of the contract, including the time, place, and more important details of the manner of perform¬ ance ; the covenants to be performed by each party ; the date, which should be truly stated. It should be signed by the parties or their agents. When signed by an agent the proper form is A. B., by his agent (or attorney), C. D.

Articles of Confederation. — The title of the compact which was made by the 13 original States of the United States of America. It was adopted and carried into force 1 March 1781 and remained as the supreme law until the first Wednesday of March 1789.

Articles of Faith. — Summarized state¬ ments of religious views relating to the central doctrines of a theological system. Protestant divines divide these into fundamental and non¬ fundamental articles. Familiar examples of articles of faith are the Nicene, Apostles' and Athanaisan creeds, the Thirty-Nine Articles, the Westminster, Augsburg and Helvetic Con¬ fessions. See Creed and Confessions.

Articles of Impeachment. — A written articulate allegation of the causes for impeach¬ ment. Blackstone calls them a kind of bill of indictment, and they perform the same office which an indictment does in a common criminal case. They do not usually pursue the strict form and accuracy of an indictment, but are sometimes quite general in the form of their allegations. They should, however, contain so much certainty as to enable a party to put him¬ self on the proper defense, and in case of an acquittal to avail himself of it as a bar to another impeachment. Additional articles may perhaps be exhibited at any stage of the pro¬ ceedings. The answer to articles of impeach¬ ment is exempted from observing great strict¬ ness of form, and it may contain arguments as well as facts. A full and particular answer to each article of the accusation should be given.

Articles of Partnership. — A written agree¬ ment by which the parties enter into a partner¬ ship upon the conditions therein mentioned. The instrument should contain the names of the contracting parties severally set out ; the agree¬ ment that the parties do by the instrument enter into a partnership, expressed in such terms as to distinguish from a covenant to enter into a partnership at a subsequent time; the date and necessary stipulations, some of the more com¬

mon of which follow. The commencement of the partnership should

be expressly provided for. The date of the articles is the time, when no other time is fixed by them. The duration of the partnership should be expressly stated. It may be for life, for a limited period of time, or for a limited number of adventures. When a term is fixed it is presumed to endure until that period has elapsed, and when no term is fixed, for the life of the parties, unless sooner dissolved by the acts of one of them, by mutual consent, or operation of law. The duration will not be presumed to be beyond the life of all the partners, but provision may be made in the articles for the succession of the ex¬ ecutors or administrators or child or chil¬ dren of a deceased partner to his place and rights. Where provision is made for a succession by appointment and the partner dies without appointing, his executor or administrators may continue the partnership or not at their option. A continuance of the partnership beyond the period fixed for its termination, in the absence of circumstances showing intent, will be implied to be upon the basis of the old articles (15 Ves. Ch. 218), but for an indefinite time. The nature of the busi¬ ness and the place of carrying it on should be carefully stated. An injunction will be granted by a court of equity when one or more of the partners endeavors, against the wishes of one or more of them, to extend such business be¬ yond the provision contained in the articles. The name of the firm should be ascertained. The members of the partnership are required to use the name thus agreed upon, and a de¬ parture from it will make them individually liable to third persons or to their partners in individual cases. The management of the busi¬ ness, or of some particular branch of it, is fre¬ quently entrusted by stipulation to one partner, and such partner will be protected in his rights by equity, or it may be to a majority of the partners, and should be where they are numer¬ ous. The manner of furnishing capital and stock should be provided for. When a partner agrees to furnish his proportion of the stock at stated periods, or pay by installments, he will, where there are no stipulations to the con¬ trary, be considered a debtor to the firm. Some¬ times a provision is inserted that real estate and fixtures belonging to the firm shall be con¬ sidered as between the partners, not as part¬ nership, but as individual property. In cases of bankruptcy, this property will be treated as the separate property of the partners. The appor¬ tionment of profits and losses should be pro¬ vided for. The law distributes these equally, in the absence of controlling circumstances, without regard to the capital furnished by each. Periodical accounts of the property of the part¬ nership may be stipulated for. These, when settled, are at least prima facie evidence .of the facts they contain. The expulsion of a partner for gross misconduct, bankruptcy, or other specified causes may be provided for, and the provision will govern when the case occurs. A settlement

of the affairs of the partnership should always be provided for. It is generally accomplished in one of the three following ways: First, by turning all of the assets into cash, and after paying all the liabilities of the partnership, dividing such money in proportion to the several interests of the parties; or, sec -

ond, by providing that one or more of the partners shall be entitled to purchase the shares ol the others at a valuation; or, third , that all the property of the partnership shall be ap¬ praised, and that after paying the partnership debts it shall be divided in the proper propor¬ tions. The first of these modes is adopted by courts of equity in the absence of express stipulations. Submission of disputes to arbi¬ tration is frequently provided for, but such a clause is nugatory, as no action will lie for a breach.

ARTICLES OF WAR. Until the civil war in England in the reign of Charles I, it is probable that no regular permanent code of rules or articles for enforcing military disci¬ pline was in existence ; the ruling authority had promulgated its orders for the government and regulation of the army as occasion required. Each war, each expedition, had its own edict, which fell into disuse again upon the disbanding of the army, which inevitably followed the cessation of hostilities. The experience of ages and the precedents of former wars, there¬ fore, enabled the authorities to frame a suffi¬ ciently comprehensive code in case of need; accordingly, soon after the outbreak of the civil war, the necessities of the case compelled the Parliament to enact ordinances or articles of war. The first complete <(Laws and Ordi¬ nances of Warre® were issued by Essex, the commander-in-chief of the Parliamentary Army in 1642. These articles are remarkable and interesting, as undoubtedly forming the groundwork of those now in use. Two years after the publication of Essex's ordinances, on the marching of the Scottish army into Eng¬ land, soon after the ratification of the solemn league and covenant, (<articles of war® were issued for its government. These articles, al¬ though very dissimilar to those of Essex, con¬ sidering that both were in force in the same kingdom at the same time, and were applicable to armies fighting on the same side, neverthe¬ less treat mainly of the same offenses. The form of judicature established consisted of two courts of justice, called' ((councils of war,® the one superior and the other inferior. The su¬ perior court, also called the <(court of war,® took cognizance of the more serious offenses, and likewise heard

appeals from the decisions of the lower court, called the (<martial court.® No trace of the constitution of these courts is now to be found except that ((the judges were sworn to do justice.® Within a few months of the promulgation of the latter (August 1644), the same Parliament that was the author of the petition of right passed an ordinance establish¬ ing a system of martial law, applicable not only to soldiers, but to all persons alike. By this ordinance the Earl of Essex, captain-general of the parliamentary forces, together with 56 others named therein (among them were peers, members of the House of Commons, gentry and officers of the army), were constituted ˆcommissioners,® and any 12 of them author¬ ized to hear and determine all such causes as <(belonged to military cognizance.® according to the articles mentioned in the ordinance, and to proceed to the trial, condemnation and execu¬ tion of all offenders against the said articles, and to inflict upon them such punishment, either by death or otherwise, corporally, as the said

commissioners, or the major part of them then present, should judge to appertain to justice, ac¬ cording to the measure of the offense. Under cover of this ordinance, which, after one re¬ fusal by the peers, was subsequently renewed, Parliament proceeded to issue a variety of orders for the conduct of the war and the regulation of the army ; and many persons were tried by court-martial and executed. Af¬ ter the expiration of this last ordinance, the absolute executive power, in all matters of mil¬ itary law, fell into the hands of Cromwell, who claimed it as his right, in virtue of his office of general-in-chief. ((The general,® says Whit- locke, <(sent his order to several garrisons to hold courts-martial for the punishment of sol¬ diers offending against the articles of war; provided that if any be sentenced to lose life or limb, then they transmit to the judge-advo¬ cate the examinations and proceedings of the court-martial, that the general's pleasure may be known thereon.® On one occasion, deeming it necessary, for the sake of discipline, to make an immediate example, Cromwell seized several officers with his own hand, called a court- martial on the field, condemned them to death, and shot one forthwith at the head of his regi¬ ment. It will thus be seen that the administra¬ tion of martial law was almost invariably in the hands of the most considerable power in the state — it alternated between King and Par¬ liament, and between Parliament and Dictator, as each became uppermost in the realm. On the restoration of Charles II, the army, with the exception of about 5,000 men, consisting of General Monk's regiment, called <(the Cold¬ stream,® the first regiment of foot, the royal regiment of Horse-Guards, called the ((Oxford Blues,® and a few other regiments, was dis¬ banded. The force kept on foot was the first

permanent military force, or <(Standing Army,® known in England; and from it the present army dates its origin.

A statute passed in the reign of Charles II, entitled <(An Act for ordering the forces in the several counties of this kingdom,® recites that ((within all his Majesty's realms and dominions, the sole and supreme power, government, com¬ mand, and disposition of the militia, and of all forces by sea and land, and of all forts and places of strength is, and by the laws of Eng¬ land ever was, the undoubted right of his Majesty, and his royal predecessors, kings and queens of England.® With the exception of some slight encroachment on the part of the Crown, and protests on the part of the Parlia¬ ment, matters remained in very much the same state till the Revolution, at which period mili¬ tary law assumed a permanent and definite form as it now exists. The only allusions to the military power of the. Crown, in the Bill of Rights, are ˆthat the raising and keeping of a standing army in time of peace without con¬ sent of Parliament, is contrary to law®; and that <(subjects, if Protestants, may have arms for their defense, suitable to their condition, and as allowed by law.® In the first year, how¬ ever, of the reign of William and Mary, Brit¬ ish regiments, jealous of the supposed prefer¬ ence shown by William for his Dutch troops, mutinied at Ipswich. The King suppressed the mutiny with a strong hand, at the same time communicating the event to Parliament. Par¬ liament, anxious to devise means for the con-

venient application of a code of laws for the regulation and management of the army, and at the same time determined to place a check upon the exercise of the military power of the King, passed, on 3 April 1689, for a period of six months only, the first Mutiny Act, the pre¬ amble of which is as follows : (<Whereas, the raising or keeping a standing army within this kingdome, in time of peace, unlesse it be with the consent of Parlyament, is against law; and whereas it is judged necessary by their majes- tyes and this present Parlyament that, during this time of war, severall of the forces which are now on foote should be continued and others raised, for the safety of the kingdome, for the common defence of the Protestant re¬ ligion, and for the reducing of Ireland. And whereas no man can be prejudged of life or limb, or subjected to any kinde of punishment by martiall law, or in any other manner than by the judgment of his peeres, and according to the knowne and established lawes of this realme ; yet, nevertheless, it being requisite for retaining such forces as are or shall

be raised during this exisgence of affaires in their duty, that an exact discipline be observed ; and that soldiers who shall mutiny or stirr up sedition, or who shall desert their majestyes' service, be brought to more exemploary and speedy pun¬ ishment than the usual formes of law will al¬ low.® The act provides for the assembling and constitution of courts-martial, for the oath of members, for the punishment of desertion, mutiny, sedition, false musters, etc. ; for the regulation of billets; and is ordered to be read at the head of every regiment, troops, or com¬ pany, at every muster, <(that noe soldier may pretend ignorance.® No power is, however, reserved to the sovereign to make articles of war. This act was renewed soon after its ex¬ piration ; and with the exception of about three years only, viz., from 10 April 1698, to 20 Feb. 1701, has been annually re-enacted (with many alterations and amendments).

Under the Constitution of the United States, Congress only can make rules of government and regulation for the land forces, and those rules, commonly called articles of war, were originally borrowed jointly from the English Mutiny Act annually passed by Parliament, and their articles of war established by the King. The existing articles for the government of the army of the United States, enacted 10 April 1806, are substantially the same as those orig¬ inally borrowed 30 July 1775, and enlarged by the old Congress from the same sources 20 Sept. 1776. The act consists of but three sec¬ tions. The first declares : <(The following shall be the rules and articles by which the armies of the United States shall be governed® ; and gives 101 articles. Each article is confined, in express terms, to the persons composing the army. The second section contains the only exception in the cases as follows : ((In time of war, all persons not citizens of, or owing allegi¬ ance to the United States of America wrho shall be found lurking, as spies, in or about the forti¬ fications or encampments of the armies of the United States, or any of them, shall suffer death, according to the law and usage of nations , by sentence of a general court-martial.® The third section merely repeals the previous act for governing the army. The articles of war, therefore, are, and under the Constitution

of the United States can be, nothing more than a code for the government and regulation of the army. Or, in other words, within the United States these articles are (<a system of rules superadded to the common law for regu¬ lating the citizen in his character of a soldier,® and applicable to no other citizens. Beyond the United States, another code is essential ; for although armies take with them the rules and articles of war, and the custom of war in like cases, in a foreign country, the soldier must be tried by some tribunal for offenses which at home would be punishable by the ordinary courts of law. It is

impossible to subject him to any foreign dominion, and hence in the ab¬ sence of rules made by Congress for the gov¬ ernment of the army under such circumstances, the will of the commander of the troops, ex necessitate rei, takes the place of law, and the declaration of his will is called martial law. The most casual reader of the articles of war will be struck by the fact that whereas the Mutiny Act of Great Britain is annually sub¬ jected to the supervision of Parliament, and altered or modified according to circumstances, yet the rules and articles of war passed in 1806 have remained upon our statute-book from that day to the present without any general revision. Another fact equally important is that while the King of Great Britain not only commands but governs the British army, and therefore modifies the government of the army at his pleasure, the President of the United States is simply the commander of our army, under such rules for raising, supporting, governing and regulating it as Congress may appoint.

The articles of war, as revised in 1916, mod¬ ernize the proceedings of courts-martial. There are no radical changes, and the most important are those which harmonize the proceedings of the military courts with those of modern civil courts. The reviewing authority of the pro¬ ceeding of the court-martial includes: (a) The power to approve or disapprove a finding and to approve only so much of a finding of guilty of a particular offense as involves a finding of guilty of a lesser included offense when in the opinon of the authority having power to ap¬ prove the evidence of record requires a finding of only the lesser degree of guilt; and (b) the power to approve or disapprove the whole or any part of the sentence.

Under the new articles it is no longer man¬ datory for a court to sentence an offender to dismissal for drunkenness while on duty in time of peace. The court can use its discretion. For the first time military authorities are per¬ muted to adjudicate the affairs of deceased officers and soldiers and to hold inquests. Rights to remove civil suits or criminal prose¬ cution against military persons from State to Federal courts are conferred upon military au¬ thorities. These cases include acts done in the line of duty. Depositions are authorized in many cases which were not provided for under the old articles of war.

ARTICLES, The Six. In English Church history these were articles of faith imposed by the Act 31 Henry VIII, cap. xiv, passed by Parliament in 1539, and known as the Six¬ stringed Whip or Bloody Statute, from the merciless persecutions to which it gave rise. They are supposed to have been the composition

of King Henry himself, and they had no formal authority from the Church. They enforced be¬ lief in transubstantiation ; declared communion m both kinds unnecessary; the marriage of priests was unlawful ; that vows of chastity or widowhood were absolutely binding; and that private masses and auricular confession were expedient and necessary. The severity of the act was soon mitigated, and it was finally re¬ pealed in the first year of Edward VI.

ARTICLES, The Thirty-nine, of the

Church of England, a term applied to a body of divinity, chiefly founded on the formulary of Forty-Two Articles compiled by Archbishop Cranmer in 1551, in obedience to the command of Edward VI and the privy council, who in¬ structed him to ((frame a book of articles of re¬ ligion, for the preserving and maintaining peace and unity of doctrine in this Church, that, be¬ ing finished, they might be set forth by public authority.® Several of these articles (the 1st, 2d, 25th and 31st) were drawn directly from the Augsburg Confession, and the 9th and 16th are traceable to the same source. During the reign of Mary the Articles were suppressed, but the accession of Elizabeth offered an oppor¬ tunity of drawing up a fresh formulary. In 1562ˆ63 a convocation was held, in the course of whose sitting King Edward's Articles were carefully considered and revised. As the result of this revision (mainly the work of Arch¬ bishop Parker, assisted by Bishops Grindal, Horn and Fox) four of the original 42 articles were omitted, namely, the 10th, 16th, 19th and 41st, and articles 5th, 12th, 29th and 30th were newly introduced; 17 other articles were more or less modified. On a further revision articles 39th, 40th and 42d were struck out, and some slight changes made in several others. These 39 articles were drawn up and ratified in Latin, but when printed both in Latin and English the 29th was omitted and the first clause of the 20th struck out. The 39th was, however, restored on a final revision by Parker in 1571, and then imposed on the clergy for subscription. They were ratified anew in 1604 and 1628. All can¬ didates for ordination must subscribe these articles, but subscription is no longer necessary on matriculating or taking a degree at Oxford or Cambridge. This formulary is now accepted by the Episcopalian Churches of Scotland, Ire¬ land and America.

The first five articles contain a profession of faith in the Trinity, the incarnation of Jesus Christ, his descent to hell, and his resurrection,

and the divinity of the Holy Ghost. The three following relate to the canon of the Scripture. The 8th article declares a belief in the Apostles', Nicene and Athanasian creeds. The 9th and following articles contain the doctrine of orig¬ inal sin, of justification by faith alone, of pre¬ destination, etc. The 19th, 20th and 21st de¬ clare the Church to be the assembly of the faithful, and that it can decide nothing except by the Scriptures. The 22d rejects the doctrine of purgatory, indulgences, the adoration of images and the invocation of saints. The 23d decides that only those lawfully called shall preach or administer the sacraments. The 24th requires the liturgy to be in English. The 25th and 26th declare the sacraments effectual signs of grace (though administered by evil men), by which God excites and confirms our faith. They are two : Baptism and the Lord's

Supper. Baptism, according to the 27th article, is a sign of regeneration, the seal of our adop¬ tion, by which faith is confirmed and grace increased. In the Lord's Supper, according to article 28th, the bread is the communion of the body of Christ, the wine the communion of his blood, but only through faith (article 29) ; and the communion must be administered in both kinds (article 30). The 28th article con¬ demns the doctrine of transubstantiation, and the elevation and adoration of the Host; the 31st rejects the sacrifice of the mass as blas¬ phemous; the 32d permits the marriage of the clergy ; the 33d maintains the efficacy of ex- communication. The remaining articles relate to the supremacy of the king, the condemna¬ tion of Anabaptists, etc.

ARTICULATA, a name given by Cu¬ vier to a branch of the animal kingdom em¬ bracing the worms (Annulate) and Arthropoda (q.v.). The group is not now considered a natural one, and has been subdivided into sev¬ eral branches or phyla.

ARTICULATION. See Joint.

ARTIFICIAL CAMPHOR, a product manufactured from turpentine. The sap of the pine tree after it is distilled and purified is the turpentine of commerce. A couple of thousand pounds of this material is placed in great steam reaction tanks ; these are covered with asbestos to retain the heat. A quantity of oxalic acid, which is rich in oxygen, is likewise placed in the reaction tanks, together with the turpentine, and when the chemical action resulting from the union has been completed two new chem¬ icals are formed and are known as pinol oxalate and pinol formate, respectively. These are in liquid form and are conveyed to a set of dis¬ tilling tanks by means of a force pump; in these tanks a new element is introduced in the form of an alkali, and when mixed

with the liquid live steam is turned on. After distillation camphor results, together with some of the es¬ sential oils, such as oil of lemon and others, but these are dissolved in the reaction products, which also contain a kind of camphor termed borneol.

ARTIFICIAL FLOWERS, flowers made of a large variety of materials in close imita¬ tion of natural flowers for purposes of orna¬ ment and instruction. The famous collection of Harvard University, made wholly of glass and illustrating the flora of the United States is the best example of the latter. The art was known to the ancients, for the ancient Egyp¬ tians made flowers of painted linen and stained horn shavings ; gold was also used. Rice paper is used by the Chinese and Japanese and to some extent also in the United States. The South American Indians have fashioned beauti¬ ful flowers from varicolored feathers. Crape paper, ribbon and velvet are extensively used. The chief centres for the manufacture of flowers are France and the United States. Wax-flower making is a special branch of the art. The industry first developed in the United States during the decade 1830-40 ; there are now about 250 establishments in the United States engaged in the manufacture of artificial flowers, and employing 5,000 wage earners, and having an annual output of a value aggregating $9,041,447. In addition to the materials alread? named silks, cambric, calico, muslin and sati*

are used in this industry. The leaves and petals are generally made of silk or cambric punched out to proper shapes and sizes. These are tinted with a brush and color, and if necessary glazed with gum or sprinkled with fine flock to imitate the glossy or velvety surface of natural flowers. The ribs, where present, are indented with a warm iron. The stamens and pistils are formed of wire covered with silk and dipped in gum- water to form the anthers. The stalk is then made of wire, coated with green paper and fixed to the stamens and pistil, around which are attached the petals, and lastly the calyx. Buds are made of cotton or glass balls covered with cambric of a proper color. The coloring matter, however, used for these articles is often nothing less than the deadly poison arsenic. Hoffman and other chemists have shown that the most terrible effects may spring from the use of these arsenical compounds. Consult Van Kleeck, M., (Artificial Flower Makers5 (New York 1913).

ARTIFICIAL LIMBS, substitutes for human arms and legs and parts

thereof, toes, feet, hands and fingers, appliances for exci¬ sions, fractures and other disabilities of lower and upper extremities, the manufacture of which has received the attention of surgeons and mechanics from a very early date. In the great work on surgery by Ambrose Pare, in 1579, he refers to and gives detailed illustra¬ tions of an artificial arm and leg, and although the construction was of a rude character they showed a very good attempt to conceal the mutilation. In 1696 an artificial leg was in¬ vented by Verduin, a Dutch surgeon. It was composed of a wooden foot, to which was fastened two strips of steel extending up to the knee. To these strips was riveted a copper socket to receive the stump; a leather for lacing around the thigh was connected to the socket by two steel side-joints, thus dividing the points of support between the thigh and stump. The construction of this leg was improved later by Professor Serre of Montpelier. Im¬ provements and new limbs were more recently introduced into England and France by Fred. Martin, M. Charriere, MM. Mathieu and Bechard, but these were mostly unprotected by patents. Thomas Mann secured patents for artificial limbs 20 Jan. 1790, and 1810. James Potts of England patented a new leg 15 Nov. 1800. This soon became celebrated as the “Anglesea leg, 55 because it was so long worn by the Marquis of Anglesea. An improvement on this leg was patented by William Selpho, who was the first manufacturer of note in New York, where he established himself in 1839. Other inventors and manufacturers soon took a great interest in the business — so many, in fact, that the American patent office shows a record of about 150 patents on artificial legs, or more than double that of all European pat¬ ents on limbs. The Civil War, w'hich caused the mutilation of so many soldiers and sailors, and the liberality of the government in supply¬ ing their losses with artificial limbs, naturally stimulated the efforts of inventors in producing such substitutes as would be accepted. These soldiers and sailors were supplied once in every five years, and to this demand is added that of those who have lost limbs from disease or acci¬ dent, making in all about 100,000 in the United States who have to be supplied with new limbs

on an average of about once in every five to eigfct years. The perfection to which limbs have been brought is wonderful and very inter¬ esting. A person with two artificial legs can walk so perfectly as to avoid detection, and a person with a single amputation can almost defy detection. Notable improvements in artificial limbs, and more particularly in legs, were made by C. A. Frees, by J. Condell and by A. A. Marks of New York. One of these improve¬ ments, and one of the most important, consists in the movements of the knee and ankle joints, by which the whole limb is strengthened and made more

durable. An important feature of this piece of mechanism consists in the intro¬ duction of a universal motion at the ankle-joint, imitating the astragalus movement with an ad¬ ditional joint, and thus producing a most per¬ fect artificial substitute. Another of his im¬ provements, of equal importance, is in the knee- joint of the leg for thigh amputation, which is so arranged that when in a sitting position the cord and spring are entirely relaxed, re¬ lieving all strain and pressure ; and when rising to an upright position the cord and spring are again brought into proper position without strain or unnatural movement, no extra attach¬ ments being required. Artificial arms and ex¬ tension apparatus for short legs are also won¬ derful examples of American ingenuity.

The great European War gave a great im¬ petus to the manufacture of artificial limbs, and organized effort was made especially by the French authorities to place the entire tech¬ nique of artificial limb supply upon a standard¬ ized scientific basis. A laboratory of military prosthesis was established in Paris wLere care¬ ful determinations were made of the muscular and nervous conditions in and around the damaged limb. In accordance with these ob¬ servations, individual prescriptions were made and carried out with a degree of skill wdiich could not by any possibility be approached in times of peace, with the negligible number of cases which then arise. A German firm per¬ fected a system attached rigidly to the shoulder, whereby movements based upon the humerus, collar-bone or shoulder-blade are transmitted to the stump of the forearm. The hook ter¬ minating this artificial arm can be subjected to heavy loads without in the least straining the enfeebled muscles of the wounded man.

An artificial arm for those whose amputa¬ tion had preserved the elbow- joint wˆas con¬ structed by an American firm which made possible a large variety of movements. Flexions of the wrist, opening and rotating of the “hand,55 placing the “fingers55 in certain positions and holding them firmly there, are all accom¬ plished with no intervention of the other hand aside from the engaging and disengaging of a catch.

The average price for an arm fitted to an amputation above elbow, w- ith full finger and universal wrist movement is from $100 to $125 and $150; below the elbow from $75 to $100; for a leg above or below the knee the prices are about similar. Consult Condell, J., (Life-like Artificial Legs and Arms5 (New York 1886) ; Marks, A. A., (Manual of Artificial Limbs5 (New York 1914) ; Palmer, B. F., <Will the American Government Present an Artificial Arm (Not a “Clutch55) to the Mutilated Amer¬ ican Soldier?5 (Philadelphia 1863).

ARTIFICIAL PRECIOUS STONES.

See Chemistry, Progress of; Gems.

ARTIFICIAL RESPIRATION. See

Asphyxia; Drowning (Treatment); Respira¬ tion.

ARTIFICIAL RUBBER. See Rubber.

ARTIFICIAL STONE, a combination of hydraulic cement, broken stone, sand, etc., cemented together. There are many varieties, some of which are exceedingly valuable for building purposes, especially in localities where building-stone is not readily obtained. Cements thus made increase in strength and solidity for an indefinite period. This stone is in constantly increasing demand. For the various kinds and uses see Cement.

ARTIGAS, ar-te'gas, Fernando Jose, a

South American soldier, dictator of Uruguay: b. Montevideo, 1755; d. 1851. At an early age he was appointed captain of a corps in the Spanish provincial service. In 1811 he joined the revolt of Buenos Aires against Spain, whose troops he repeatedly defeated; but acting for himself was outlawed by the insurrection¬ ary junta, whose troops in turn he routed and compelled it to cede Uruguay to him in 1814. He then Assumed the dictatorship, but in 1820 was defeated and fled to Paraguay, where the dictator Francia banished him to Candelaria. Thereafter he devoted himself to agriculture and philanthropy.

ARTIGAS, Uruguay, a department of the republic, established by the law of 20 Sept. 1884, which occupies the northern extremity of the country. Its capital, San Eugenio del Careim (also called Cuareim) is situated on the Cuarcim River, which separates Uruguay from Brazil. The department is bounded on the north and northeast by Brazil, on the southeast by the department of Rivera, on the south by the department of Salto and on the west by the Uruguay River and Argentina. It is the eighth in size of the 19 Uruguayan departments; is crossed by two railway lines ; is divided into the eight judicial sections known as San Eugenio, Cuaso Grande, Catalan Chico, Yacu- are, Yucutuja, Estacion Isla Sarandi, Santa Rosa and Estacion Cabello, and has about 33,000 inhabitants (est. 1916). The name Arti- gas is also

given in honor of Fernando Jose Artigas (q.v.) to a town of 1,300 inhabitants in the department of Cerro Largo, Uruguay.

ARTILLERY. Projectile arms using gas as a propelling force, and also the troops serv¬ ing these arms. The history of artillery dates from the discovery of gunpowder in the 13th century. Several small guns were in action at the battle of Crecy in 1346. In the French War of Independence against the English, artil¬ lery was in constant use, and in 1428 Joan of Arc is said to have pointed the guns herself. During the 16th century brass guns and cast- iron projectiles were adopted throughout Europe, while Tartaglia in Italy made great improvements in gunnery. During the latter part of this century case-shot was invented and shells were fired from mortars. The first half of the 17th century forms an era in the his¬ tory of artillery. Maurice and Henry Fred¬ erick of Nassau made much advancement in it, but it was under Gustavus Adolphus that it first began to take its true position on the battle¬

field. He attached two guns to each regiment, and proved its utility in the Thirty Years' War. During his life he did much to forward the science of artillery, increasing its mobility and its rapidity of fire. The laboratory at Wool¬ wich was established in 1672, and a reorganiza¬ tion of artillery took place in 1682 under Lord Dartmouth. Louis XIV raised in 1671 a regi¬ ment for artillery duty, and in 1690 founded the first artillery schools. The inventions of the elevating-screw, the prolonge and the prim¬ ing-tube filled with powder, were made during his reign.

Prussian artillery was very backward during the first part of the 18th century, and Frederick the Great did not at first place much value upon it. Although it contributed much to his victory at Rossbach, it was usually no match for the well-handled Austrian guns, which fact im¬ pressed him with the importance of giving more attention to this branch. He therefore raised the proportions of guns, and established horse-artillery in 1759.

After the Seven Years' War the Austrians recognized the importance of artillery in mod¬ ern warfare, and Prince Lichtenstein was com¬ missioned to reorganize it. Frederick was struck with the improvements effected in Aus¬ tria, and strove on his return to build up a complete system, as to both personnel and materiel, making a separate provision for field, siege, garrison and coast artillery. At first his reforms met great opposition, but in 1776 he became First Inspector-General of Artillery, and was able to carry through his improve¬ ments. French horse-artillery dates from 1791, and the last

step in the complete organization of field-artillery was made in 1800, when the establishment of a Drivers' Corps put an end to the old system of horsing by contract. Na¬ poleon introduced the tactical combination with brilliant success. To his wars we first look for instances of the important effects pro¬ duced by this arm in that concentration of fire which in those days was produced only by mass¬ ing guns. After the war of 1870-71, in which French artillery proved itself far inferior to the German, the French made remarkably suc¬ cessful experiments with a view to the intro¬ duction of superior guns. Similar progress has been made by the other great European Powers.

British artillery had greatly deteriorated during the 18th century, and was not up to the standard of other countries, but horse-artillery was formed in 1793, and a Drivers' Corps in¬ troduced the following year. At the commence¬ ment of the 19th century Prussian artillery was powerful rather than mobile ; but after the dis¬ asters of 1806-07, this defect was remedied. In 1872 German artillery was reorganized, the field-artillery of each army corps being aug¬ mented to 17 batteries and divided into two regiments. Austrian artillery has always been pre-eminent both in the excellence of its materiel and in tactical handling on the field. Russia won special distinction in the Napole¬ onic wars by the power and good service of its artillery, and has continued to give great atten¬ tion to this arm. Having adopted the breech¬ loading system of Prussia, Russia increased its field-artillery from three to four batteries per division, with 38 batteries of mitrailleuses added.

The defense of warships with iron armor caused an increase in the size, weight and cali¬ bres of sea-coast and naval cannon, and the whole method of gun-construction was altered. Armstrong was the first in England to see the necessity of a change, and his method was im-

fully a foot of wrought-iron. This monster, ponderous as it is, is surpassed in two import¬ ant respects by the 16.25-inch breech-loading gun. This celebrated weapon throws a pro¬ jectile weighing two cwt. less than the 17- inch, but has a more powerful muzzle velocity

British 6-inch Siege Howitzer, Mark I*.

proved by Whitworth, Fraser, Palliser, Blakely and others. Francis Krupp of Essen, Prussia, invented a new method which proved so suc¬ cessful that it was introduced in Germany, Russia, Austria, Belgium and Spain. The body of the gun was fabricated from a solid ingot of low steel worked under heavy steel ham¬ mers and was strengthened by three or more steel tubes shrunk upon the central tube of the gun, the last ring, or tube, inclosing the breech, being forged in one piece with the trunnions, without a weld. The rings had various lengths and the gun was diminished in thickness to¬ ward the muzzle, not by tapering, but by being turned with concentric steps of diminished heights. Krupp made all his projectiles and gun-carriages of steel. In the United States, Rodman, Dahlgren and Parrott devoted them¬ selves to the art of gun-construction. The Rodman gun was of cast-iron ; it was cast hollow and cooled from the inside, the exterior being in the meantime kept from rapid cooling by fires built around the gun in the casting pit. The Dahlgren gun was of iron cast solid and cooled from the exterior, very thick at the breech up to the trunnions, then diminishing in thickness to the muzzle. The Parrott gun, like the Rodman, was of cast-iron, cast hollow, cooled from the inside and strengthened about the chamber by an exterior tube of wrought- iron bars spirally coiled and shrunk on.

During the past 25 years the struggle be¬ tween gun and armor has gone continuously forward. An examination of the products of the Midvale Steel Company, Bethlehem Steel Company and foreign ordnance corporations shows ever-increasing gun power, culminating in the English made, Italian-owned gun, hav¬ ing a bore whose diameter is 17 inches. The actual 'weight of this gun is 104 tons and its projectile turns the scale at 2,000 pounds. The execution of this gun will be realized when it is remembered that the six-inch gun is capable of crashing a 100-pound projectile through

and a penetrating power superior by a couple of inches. With an initial velocity of 23 miles per minute it is not surprising that this gun can send a projectile through three feet of solid wrought-iron like so much cardboard.

One of the teachings of the great Euro¬ pean War was the indisputable necessity in the modern army of a numerous and heavy ar¬ tillery. The question of type is complicated. Without excessive multiplication of calibres it was, nevertheless, necessary to have various types of heavy guns, because they all had defi¬ nite functions. A review of the different cali¬ bres employed by the Germans leads to the conclusion that the modern army should have : (1) Heavy corps artillery, composed of com¬ paratively light pieces, from 2,000 to

3,000 kg. writh limber, pulled like ordinary field artillery, by six horses and able to follow the infantry in all of its movements on any ground. The light 105 mm. howitzer, model 1898, and the heavy 150 mm. howitzer, model 1905, repre¬ sent this type in the German Army. These howitzers fire a projectile weighing, respec¬ tively, 15 and 40 kg. (2) Heavy army artil¬ lery, including the heaviest guns, drawn by 10 or 12 horses, weighing in general from 4,000 to 6,000 kgs., and firing from take-down plat¬ forms. In the German Army this artillery is composed of long 19 cm., 13 cm., and 15 cm. calibres, having a range between 14 and 18 kms., and also of the 21 cm. mortars, throw¬ ing a shell of 110 kgs. to a distance of- nine kms. (3) Heavy siege artillery, composed of the 28 cm., 30.5 cm. and 42 cm. mortars of great range and of naval guns, mounted on trucks. This formidable artillery naturally re¬ quires motor traction.

Field Artillery. — The manner of placing artillery and its employment must be regulated by its relative importance, under given circum¬ stances, with respect to the action of the other arms. In the defensive, the principal part is usually assigned to the artillery; and the posi-

tions taken up by the other arms will, therefore, be subordinate to those of this arm. Unless the batteries are on points which are inaccessible to the enemy's cavalry and infantry, they must be placed under the protection of the other troops, and be outflanked by them. As in the defensive, we should be prepared to receive the enemy on every point ; the batteries must be distributed along the entire front of the posi¬ tion occupied, and on those points from which they can obtain a good sweep over the avenues of approach to it, the guns being masked, when the ground favors, from the enemy's view, until the proper moment arrives for opening their fire. The distance between the batteries should not be much over 600 paces, so that by their fire they may cover well the ground intervening between them and afford mutual support, the light guns being placed on the more salient points of the front, from their shorter range and greater facility of manoeuvring; the heavier guns on the more retired points. Guns of vari¬ ous calibre should not be placed in the same battery. A sufficient interval should also be left between batteries of different calibre to prevent the enemy from judging, by the variations in the effect of the shot, of the weight of metal of the batteries. Those positions for batteries should be sought for from which a fire can be maintained until the enemy has approached even within good rifle-range of them.

Where the wings of a position are weak, batteries of the heaviest calibre should be placed to secure them. A sufficient number of pieces — selecting for the object in view horse-artillery in prefer¬ ence to any other — should be held in reserve for a moment of need ; to be thrown upon any point where the enemy's progress threatens danger ; or to be used in covering the retreat. The collection of a large number of pieces in a single battery is a dangerous arrangement, particularly at the outset of an engagement. The exposure of so many guns together might present a strong inducement to the enemy to make an effort to carry the battery; a feat the more likely to succeed, as it is difficult either to withdraw the guns or change their position

promptly after their fire is opened; and one which, if successful, might entail a fatal disaster on the assailed, from the loss of so many pieces at once. In the outset of offensive movements, good positions should be selected for the heaviest pieces, from which they can maintain a strong fire on the enemy until the lighter pieces and the columns of attack are brought into action. These positions should be taken on the flanks of the ground occupied by the assailant, or on the centre if more favorable to the end to be attained. In all cases, wide intervals should be left between the heavy bat¬ teries and the other troops, in order that the latter may not suffer from the return-fire which the assailed will probably open on the batteries. For the same reason, care should be taken not to place other troops behind a point occupied by a battery, where they would be exposed to the return-fire of the assailed. When this cannot be avoided the troops should be so placed as to be covered by any undulation of the ground, or else be deployed in line to lessen the effects of the shot. The artillery which moves with the columns of attack should be divided into several strong batteries, as the object in this case is to produce a decisive impression upon a few points of the enemy's line by bringing an overwhelming fire to bear upon these points. These batteries should keep near enough to the other troops to be in safety from any attempts of the assailed to capture them. Their usual positions will be on the flanks and near the heads of the columns of attack; the intervals between the batteries being sufficient for the free manoeuvres of the other troops in large bodies. The manoeuvres of these batteries should be made with promptitude, so that no time may be lost for the action of their fire. They should get rapidly over unfavorable ground to good positions for firing, and maintain these as long as possible ; detaching, in such cases a few pieces to accompany the columns of attack. In all the movements of the batteries great care should be taken not to place them so that they shall in the least impede the operations of the other troops.

French 75 millimeter Field Gun.

The United States is the only country to maintain approximately full strength batteries in time of peace. All other nations skeletonize the firing battery for training purposes, impress teams for ammunition supply and maintain re¬ serves. Howitzers enable a division to act in¬ dependently. Before the war of 1914 the Germans with 6.4 guns had the highest per¬ centage per 1,000 rifles; the United States with 3.1 the lowest. Nowadays the proportion is enormously greater in all armies. Artillery can easily keep up with the troops it accompanies. In advancing to position it usually moves at the trot, in occupying position at the walk or trot. It seldom moves at the gallop, but when circumstances require it gallops in line for short distances only. The average march for a battery is 15 to 20 miles per day.

The statement that a battery seen is a bat¬ tery lost still holds true. In the Balkan wars

behind the crest are greater mobility, ability to act by surprise, greater field of fire, hostile ob¬ servation made more difficult, ammunition sup¬ ply easier.

A battery occupies a front of 100 yards, a battalion 400 yards, a regiment 900 yards. Light guns are rarely placed in tiers. With howitzers or heavy guns in the second line this may be done. Firing over infantry must be considered as the normal procedure and is not dangerous. The artillery can support the in¬ fantry up to 100 yards from the hostile trenches and on the defense until the hostile attack ar¬ rives within charging distance. In offensive action the necessity of getting within suitable and effective range of the hostile positions will usually govern.

Early German successes in the European War were due in great measure to the heavy field artillery and its proper handling. The

British 10-pounder Mountain Gun (near wheel removed).

the Bulgarians relied upon long-distance firing. The Serbians usually tried to get within 2,000 yards. At Yenidze-Yardar the Turks held up two Greek divisions by covering a bridge at 6,800 yards. As a rule

rather than cross ex¬ posed areas, extreme ranges were used or dark¬ ness was awaited. In order to be able to deliver an effective fire, the artillery must take its chance and not be afraid to suffer losses. On the march, artillery must be placed with a view to security and availability. Artillery is usually not assigned to the advance guard of a force smaller than a brigade. It is not the size but the mission of the command that should determine the strength in artillery. A pursuit will soon resolve itself into attacks on well- defined positions which the retreating force de¬ fends to cover the assembly of its march col¬ umns on the roads. A retreating force which adheres to roads will outdistance a pursuing force advancing across country.

Firing practice and exercises in time of peace have the fault of inculcating false ideas concerning the kinds of positions which artil¬ lery should occupy. Two essential conditions are that the position be within range of the enemy, and that it be possible to lay upon him. Mountain artillery is especially suited to ac¬ company the infantry line. At present artil¬ lery to accompany the infantry line is furnished by the so-called Hanks.® In considering a po¬ sition, protection is secondary to ability to de¬ liver effective fire, Advantages of positions

French relied upon their light ((75.® The Ger¬ man heavy artillery, using aeroplane reconnais¬ sance, was able to destroy entire batteries of c<75's>) without themselves suffering any dam¬ age. The lesson is that heavy calibres and good ammunition supply give better support to the infantry, and this means success. The idea that the six-inch howitzer, with its 120-pound pro¬ jectile, was the heaviest needed with an army is, of course, discarded, as well as the idea that the only use of the heavier pieces would be in the destruction of permanent fortifications. Howitzers from 11 -inch to 16-inch calibres are now transported with armies in the field and the successes obtained by the Germans and Aus¬ trians on the Eastern front were due in no small measure to the use of these enormous field pieces.

The <(field artillery® used in the present war may be divided into four great classes : (1) “light artillery,® or field artillery proper, which includes all pieces less than about, four inches in calibre. These pieces are especially useful in the destruction of wire entangle¬ ments, but are too feeble to damage w'ell con¬ structed dug-outs. (2) “Artillery of medium calibre,® up to about six inches in calibre. This is used for the demolition of the less strongly constructed dugouts. (3) “Heavy artillery of great power,® including such weapons as howitzers and mortars, which are used to de¬ molish the strongest trench structures. (4) “Heavy artillery of long range,® to destroy the

enemy's artillery, which is placed far back of the hostile line. The order given is the ap¬ proximate order of the batteries from front to rear.

Siege Artillery. — An examination of the German formations for sieges indicates that their organization is based on the theories — aggressiveness, quick resolution and celerity of movement. A character of their formations is the great abundance of means provided, and especially of transportation, with a view to promptly re-enforcing any field unit charged with a siege with a large number of medium calibre batteries, completely provided with everything necessary for their separate organi¬ zation, so as to make possible prompt and effi¬ cient action on their part.

Thus, many battalions of fortress artillery have a complete equipment of draught animals ; the 6-inch howitzers and the 8.2-inch mor¬ tars, for example, are organized as heavy field artillery and assigned in considerable numbers to army corps. Each corps has a battalion of four four-gun howitzer batteries — either of 6-inch howitzer battalions, organized as above or else a battalion of two four-gun 8.2-inch mortar batteries.

To each battalion of fortress artillery there is assigned an ammunition company, which provides not only ammunition but also spare supplies and, to assist in furnishing the same, has as part of its equipment a narrow-gauge railway 4.7 miles long, using animal traction. Each such ammunition company has, in addi¬ tion, a detachment of mechanics who relieve the batteries of much work ; and, besides, it has been found that by keeping the same men constantly busy at the same kind of work, they become more proficient and render better serv¬ ice than do men temporarily employed on sev¬ eral different kinds of work.

The commandant of the field unit is the commandant of the sector, and commands not only his own troops, but all special troops as¬ signed to the sectors. For though there is an artillery commander for the siege artillery to assist the commander-in-chief, yet, after mak¬ ing the necessary reconnaissances, he is charged only with advising as to the general distribution of the siege artillery among the various sectors. The employment of medium- calibre batteries is left entirely to the sector commandants, through their own artillery com¬ manders, and the commander for siege artillery limits himself during the attack to re-enforcing the local sector artillery, as may be required, by drawing on units in reserve, or newly ar¬ rived, or by transferring artillery found to be in excess in one sector to another section.

The French regulations differ from the Ger¬ man in that the control of their medium-calibre artillery is directly exercised by the commander of the siege artillery, the sector commandants controlling all troops in their sectors other than the siege artillery.

As all the incidents of the siege from the very commencement of the investment, such as the laying out of lines of communication, un¬ loading the siege material, etc., depend directly on the selection made for the point of attack, it is evident that it is of the greatest impor¬ tance to decide this point as soon as possible. It is quite practicable to do this, when we con¬ sider that the studies made and data required

in time of peace concerning fortresses which might become objectives for various armies, usually contain information of great impor¬ tance, and that in addition preliminary recon¬ naissances can be undertaken by selected offi¬ cers sent ahead with the advance troops, inde¬ pendent cavalry, advance guard, etc., who can to a certain extent complete this information in such manner as to enable the siege com¬ mander to come to a proper decision.

A decision as to the selection of the point to be attacked must be based not only on the defensive powers of the various faces of the fortress and the conformation of the terrain in their fronts, which should be such as to admit of proper deployment of the siege artillery, but should be based also on the influence which the fall of the face attacked will have on the ultimate fate of the fortress. Moreover, con¬ sideration must be given to the strategical sit¬ uation and to the means of communication, which should be such as to facilitate the pro¬ vision of all necessary supplies and accessories. The state of the defensive works will, of course, not be completely revealed until the attack has actually commenced and often not until it has been pushed

well forward.

The general plan of the siege and the points of attack having been determined on, the va¬ rious available forces and material are assigned and a general scheme of operation is decided on. It is unnecessary to determine every small de¬ tail, it being better to leave liberty in such mat¬ ters to commandants of sectors, so that they may conform to the changing circumstances and incidents of the attack, as they successively develop; for the relations of the attack to the defense are constantly changing, requiring ad¬ justment of plans for the employment of troops and siege materiel.

As to the distance at which artillery ought to be deployed, it being recognized that the nature of the ground and the construction and armament of the hostile works will be quite different in different sectors, a broad initiative is left to sector commandants, in order to per¬ mit them from the very commencement of operations the better to take advantage of favorable circumstances in advancing their siege batteries as near as possible to the for¬ tress. The removal of vegetation from the field of fire, the capture by surprise of some advanced post of the defense, inferior condi¬ tions of observation or of fire of the defenders' batteries, may permit more progress in one zone than in another. But the possibility of such progress rarely appears at the beginning of operations, when the general plan for the artillery is decided on ; it only becomes ap¬ parent as the siege progresses, and then the in¬ tervention of the commander-in-chief may em¬ barrass and retard the prompt seizing at op¬ portune moments of advantageous points which the local situation may permit.

There is no doubt that a large part of the losses sustained in siege warfare occur during short range fighting, in which the fire from small arms, machine guns and rapid-fire guns may become annihilating when the enemy is held under their fire for but a very few moments by some simple obstacles. Wire en¬ tanglements, ditches temporarily impassable, a wall which the artillery has previously failed to destroy or at least breach, all may cause enor-

mous losses to the attacker, who unexpectedly finds his progress stopped by such obstacles. However, one of the lessons of the present war has been that no permanent fortification, no matter how strong it

may be, can hold out against the heavy artillery fire of the besiegers, and that earthworks, with dugouts far beneath the surface of the ground, which can be re¬ paired with relative ease under hostile fire, furnish the only type of fortification which can resist the power of modern arms. The result of this has been that at present we have a use of artillery which renders it neither strictly field artillery nor strictly siege artillery, but a third kind partaking of the nature of both and primarily adapted to the warfare of positions.

Seacoast Artillery. — With few exceptions, the characteristics of the 8-inch, 10-inch and 12-inch rifles are essentially the same. The 12-inch is the gun intended to cope with capi¬ tal ships carrying the heaviest guns and armor. The 14-inch gun, advocated by the United States Ordnance Department, was later de¬ signed to provide a weapon that would take the place of the 12-inch gun. The length of the gun (34 calibres) was limited so that it could, if found desirable, be used in emplace¬ ments already provided for 12-inch guns. The muzzle velocity was established at 2,150 feet per second to secure a penetration at 8,000 yards, ap¬ proximately equal to that of the 12-inch 2,500 f.s. gun, while securing an accuracy life which has proved to be approximately four times as long. While the danger space is somewhat less than that of the 12-inch, 2,500 f.s. gun, the striking energy is materially greater at all ranges, and the bursting charge is approxi¬ mately 50 per cent greater. Not only for coast fortifications but for the battleships as well, all countries and technical students of the subject have now committed themselves to large cali¬ bres, and at present in no situation would it be desired to have the 9.5-inch piece the weapon of maximum size and strength. It has been fully demonstrated that fire against modern armor must be perforating fire with large cali¬ bres and explosive charges of from 3.5 to 4.5 per cent of the weight of the projectile; but if at some future time, on account of an al¬ teration in naval construction or for any other cause, the semi-perforating shell with a 10 per cent explosive charge is considered advanta¬ geous, then at that time the major calibres will still have a very great superiority. In the first place, they are able to keep the battleships at distances of from 20 to 25 km., as compared with 13 or 14 km. in the case of 240-mm. (9.5- in.) guns; moreover, a battery of two 381-mm. (15-in.), 40-calibre guns, for example, firing 1.2 shots per minute (which is the rate of fire given in tables computed by the Vickers com¬ pany) will be able to hurl at the enemy 182.4 kg. of explosive in place of 240 leg., which can be thrown by a battery of four 240-mm. (9.5-in.) guns in the same length of time, while the pro¬ jectiles of the former, piercing the armor be¬ fore bursting, and exploding a great quantity of powder (76 kg. each time),

will have a much greater effect than those of the latter, which will cause, in most cases, an inoffensive ex¬ plosion against the exterior of the armor, at the same time that those which do happen to penetrate, since they carry a relatively small charge (20 kg.), will not have a very great ex¬

plosive effect Major calibres are also able to utilize a short cap for this type of shell in the attack of decks of battleships thereby causing an enormous amount of damage.

The hauling of the large guns and how¬ itzers is a difficult operation. Two of the Krupp 42-cm. guns need no fewer than 26 trac¬ tion engines. Each is in four pieces (i.e. loads) and each piece is drawn by three traction en¬ gines, the spare engines going on ahead to be used as helpers up hills. The 11.2-inch Krupp howitzer travels on a special wagon, the cradle is converted into a carriage by putting a pair of wheels on the cradle trunnions, which are central ; and the trail and wheels for a third carriage, 4ˆ2 girdles, weighing one-half ton each, travel when not in use, on a girdle wagon, weighing four tons gross. The high elevation, namely 65°, of which this howitzer is capable is intended to allow it to be fired with full charge at short ranges, so as to obtain a high remaining velocity and steep angle of descent.

Recent increase in range and power of guns is more in favor of an attacking fleet than of the fixed defenses ashore, for several reasons. First, it gives the attack a greater choice of positions from which to attack, not only be¬ cause the area over which the attack can oper¬ ate naturally increases with the length of range at which they can attack, but also because, when restricted to short ranges, ships would also in all probability be confined to certain channels, on account of shoals and banks lying near shore, and these channels — possibly nar¬ row and intricate of navigation — could also be mined. Thus, a fleet armed with modern guns has a greater choice of positions ; it could, for instance, take up an enfilading position from which perhaps only one gun of a shore battery could bear, and could more easily bring the concentrated fire of several ships on to one work. This relative advantage of attack over defense would hold good even if the increase in power and range of the defense guns had kept pace with that of naval guns ; but it never has and never will.

Again, the increased protection given to modern ships, and the possibilities of observa¬ tion of fire conferred on them by the introduc¬ tion of airships, very largely detracts from the advantage hitherto enjoyed by shore defenses of being lyss vulnerable and of possessing greater facilities for observation of fire than their

adversaries.

Also the good effect of increased range in the gun is limited at night by the effective radius of illumination of electric lights, and may be limited by day by atmospheric condi¬ tions ; and this neutralized the advantages of long-range guns to the defense in certain forms of attack, as, for instance, in the case of a mine-layer laying mines in a channel of ap¬ proach beyond efficient electric light limit. .Long range guns would be powerless to prevent this. Again, . under cover of a fog a ship or squad¬ ron might approach to within medium range; the defense would lose all the advantage of long range by being unable to attack during the approach, while at a medium range the greater number of guns probably carried by the attack would enable it to overwhelm and smother the defense. But great as has been the development of guns, the development of torpedoes in speed, range and accuracy has

been as great, if not greater. The advent and development of the submarine has done still more to increase the power of the torpedo as an offensive weapon, and on the whole this de¬ velopment of the torpedo is in favor of the defense.

It would, therefore, seem probable that the future development of coast defense would lie in increasing the number and efficiency of de¬ fense flotillas of torpedo boats and submarines, rather than in the size and number of the guns on fixed mountings ashore. The gun cannot altogether disappear, there must always be a last entrenchment — a keep ; and that keep will be the shore batteries.

One of the greatest lessons learned in the European War is the increased importance of heavy mobile artillery, and the necessity for devising plans to use effectively sea-coast arma¬ ment and designing mounts for howitzers and mortars to permit them to be easily transported and quickly mounted. Whatever the design, it should fulfil the following requirements: (1) It should be mobile and capable of being trans¬ ported quickly either by railroad on flat cars or by gasoline tractors .over ordinary roads. (2) It should be capable of being mounted quickly on a concrete emplacement of simple design. (3) It should be more powerful than any similar weapon that can be brought against it. (4) In addition to being equipped with the ordinary telescopic sight, it should be prac¬ ticable to lay it in azimuth and

range as is done with the present type of sea-coast mortars. In drawing up a project for the defense of a locality on the sea-coast, sites for mobile how¬ itzer batteries should be selected for defense against attack from the land side. The em¬ placements for these batteries might be con¬ structed in time of peace or upon the outbreak of war. Each coast defense should be equipped permanently with one or more of these bat¬ teries to supplement the fixed armament and for the purpose of training coast artillery companies in their use. See Ammunition; Armor Plate; Coast Defense; Fortifica¬ tions ; Gunnery ; Horse Artillery ; Light Ar¬ tillery; Mountain Artillery; Ordnance; and Projectiles.

Bibliography. — Bethel, (Modern Guns and Gunnery1 (Woolwich 1910) ; id., (Modern Ar¬ tillery in the Field1 (London 1911) ; Birkhimer, (Historical Sketch of the Artillery, United States Army1 (Washington 1884) ; Birnie, (Gun-Making in the LInited States1 (in Journal of Military Service Institution, Governor's Island, N. Y., 1891) ; Lloyd and Hadcock, /Ar¬ tillery7 ; Its Progress and Present Position1 (Portsmouth 1893) ; May, (Field Artillery with the Other Arms1 (London 1898) ; Spaulding, (Notes on Field Artillery1 (Fort Leavenworth 1908) ; Roquerol, (The Tactical Employment of Quick-Firing Field Artillery1 (translated by Radcliffe, London 1903) ; the Field Artillery Journal (Washington, D. C.) ; the Journal of the United States Artillery (Fort Monroe, Va.) the Royal Artillery Journal (Woolwich, Eng¬ land), and official publications of the Ordnance Department of the United States Army.

Edward S. Farrow,

Consulting Civil and Military Engineer*.

ARTILLERY COMPANY, The An¬ cient and Honorable, a military organiza¬ tion of Boston, Mass. It was copied from

that of London, was formed in 1637 and was the first regularly organized military com¬ pany in America. The company hold their drill in Faneuil Hall, Boston.

ARTILLERY COMPANY, The Hon¬ orable, the oldest existing body of volun¬ teers in Great Britain. It was instituted in 1537 and comprises six companies of infantry, besides artillery, gernadiers, light infantry and yagers. It furnishes a guard of honor to the sovereign when visiting London. The King is "Captain-General and Colonel11 of the force.

ARTILLERY CORPS, the official name of the entire artillery service of the United States army.

ARTILLERY PARK. A collective name given to the whole of the guns, carriages, am¬ munition and other appurtenances essential to the working of siege or field-artillery. Be¬ sides reserve guns and carriages there belong to it the ammunition wagons, as well for the in¬ fantry and cavalry as for the artillery, the im¬ plements and materials necessary for repair¬ ing and completing equipments, harness-stores, field-forges, laboratories and (in some armies) transport and provision wagons. The per¬ sonnel of a park of artillery consists of ar¬ tillery officers, non-commissioned officers and artillerymen, besides a large number of smiths, wheelwrights, saddlers, armorers, drivers and other mechanics and laborers. Sometimes the term is applied to the place selected as well as the vast military stores collected there.

ARTILLERY SCHOOLS are institutions established for the purpose of giving a special training to the officers and in some cases the men belonging to the artillery service. See Military Education.

ARTIODACTYLA the Suborder of ungu¬ late mammals in which the central (and in some cases the only) pair of toes in each foot are arranged symmetrically on each side of a verti¬ cal line running through the axes of. the limbs.

ARTIST'S LETTERS FROM JAPAN,

An, a work by the noted American artist, John La Farge. The drift of the book is toward a purer art ; but it contains much lively matter — accounts of the butterfly dance in the temple of the Green Lotus, and of fishing with trained cormorants. A thread runs through the letters, tracing the character and progress of the usurping Tokugawa family, from the cradle of their fisherman ancestors to the graves of the great shogun and his grandson in the Holy Mountain of Nikko.

ARTOCARPUS, the generic name of the bread-fruit tree (q.v.).

ARTOIS, ar'twa', the name of a former province of France anciently one of the 17 provinces of the Netherlands. It was bounded on the south and west by Picardy, on the east by Hainault and on the north by Flanders. It is now almost completely included in the de¬ partment of Pas de Calais. Artois is a fertile region, producing grain and hops. Its capital was Arras. The district was the scene of some of the most desperate fighting in the European War.

ARTOTYPE. See Photography.

ARTS, the designation of branches of study in the Middle Ages, originally called the

liberal arts to distinguish them from the servile arts or mechanical occupations. These arts were usually classed as grammar, dialectics, rhetoric, music, arithmetic, geometry and as¬ tronomy. Hence originated the terms (<art classes,® <(degrees in arts,® <(master of arts,® still in common use in universities, the faculty of arts being distinguished from those of divin¬ ity, law, medicine or science.

ARTSYBASHEV, Mikhail Petrovitch,

maternal great-grandson of Kosciusko, Rus¬ sian writer : b. 1878. Like many of the Little Russians, he is of mixed descent, being of Tartar and Polish as well as of Slavic blood. As a boy he studied painting, but later he turned to short-story writing and when his first story wras published he was so encouraged as to determine to make a career of literature. At the age of 25 he wrote his first long work, a novel called (1907), w7hich at once gained him a national reputation. Like Gorky and Andreyev and other Russian writers of the modern school, his writings show the revo¬ lutionary tendency of present-day Russia in their frank, almost brutal, treatment of the re¬ alities of life.

ARTUSI, ar-too-se, Giovanni Maria, mus¬ ical writer and composer: b. Bologna 1550; d. 18 Aug. 1613. He was a canon of San Salva¬ tore, in Venice, and extremely conservative in his stand against the progressive tendencies of Gabrieli and Monteverde and other radicals of that school, whom he attacked vigorously. His works are ˆ'Artusi, ovvero delle imperfezioni della moderna musica) (Venice 1600) ; (L'arte del contrappunto) (Venice 1589). Among his compositions are a to be found in the Vincenti collection.

ARU. See Arru Islands.

ARUBA, or ORUBA, a-roo'ba, a Dutch island of the Antilles, west of Curasao, of which it is an administrative part. It is ex¬ tremely mountainous and abounds in phos¬ phate deposits. Gold, too, is found in suf¬ ficient quantities to warrant mining operations. Its area amounts to about 70 square miles with a population of 10,000, most of which is con¬ centrated about Oranjestadt, the capital.

ARUM, a small genus of tuberous tropical and subtropical perennial

herbs (commonly called callas) of the natural order Araccce, with simple leaves and diversely colored convolute spathes, for which they are cultivated either under glass or, in the case of some hardy species, in the open air, as ornamental plants. The naked topped spadices bear staminate flow¬ ers just above the pistillate ones at the bases. The tender species are managed like the fancy¬ leaved caladium (q.v.) ; the hardy must be planted in rich soil in cool, moist situations and must be well mulched during the winter. A. maculatuni, lords-and-ladies, cuckoo-pint, wake-robin, from Europe, is, with its many cultivated varieties, perhaps the best known hardy species grown in America. The leaves and corms are acrid; but the latter when ripe contain starch which may be extracted and used as a food. In places where it abounds it has long been converted into a kind of arrow- root and has been proposed as a substitute for the potato, but the corms are too small for

profitable culture. Some closely related native American plants of somewhat similar habit are skunk cabbage (q.v.), water calla (see Calla), Indian turnip (see Jack-in-the-Pul- pit). The Arum lily (Richardia cethiopica) is an arad with a pure white spathe and brilliant yellow spadix; a favorite drawing room flower. Anthurium, a well-known genus of greenhouse plants, is also nearly allied.

ARUNDEL, ar'-un-del, Thomas, an Eng¬ lish prelate, third son of Richard Fitz-Alan, Earl of Arundel: b. Sussex 1353; d. Canter¬ bury, 19 Feb. 1414. He became Archdeacon of Taunton (1373) and Bishop of Ely in August of the same year. In 1388 he was transferred to the archbishopric of York. He was Chan¬ cellor of England from 1386-89, and from 1391-1396, and Archbishop of Canterbury in 1396. He concerted with Bolingbroke to de¬ liver the nation from the oppressions of Rich¬ ard II, for which he was banished from Eng¬ land. On going to Rome he was very favorably received by Boniface IX, who later deprived him of his see and transferred him to Saint Andrews in Scotland. He returned in 1399 and was reinstated at Canterbury. He crowned Henry IV and served as Lord Chancellor for a few days. He persecuted the Lollards and was a chief instrument in procuring the act for the burning of heretics. He also procured a synodal constitution which forbade the translation of the Scriptures into the vulgar tongue.

ARUNDEL, Thomas Howard 2d earl of:

b. Essex 1586; d. 1646. An English art col¬ lector, the first to make any large assemblage of works of art in England. He received his edu¬ cation at Trinity College, Cambridge, and in 1616 was appointed a

Privy Councillor and in 1621 Earl Marshal of England. In 1636 he ex¬ ecuted an important diplomatic mission at the Court of Vienna. See Arundel Society ; Ar- undelian Marbles.

ARUNDEL, England, a small town in Sussex, famous as containing Arundel castle, the family seat of the dukes of Norfolk. It is on the small river Arun and has a showy Roman Catholic cathedral erected by the Duke of Norfolk. Pop. (1911) 2,842.

ARUNDEL HOUSE, on the Strand, London, the residence of Lord Arundel, where the Arundelian Marbles (q.v.) were housed. Another Arundel House, less known, was that in which Lord Bacon died and which stood near Highgate.

ARUNDEL SOCIETY, a society insti¬ tuted in London in 1848 for promoting the knowledge of art by the publication of fac¬ similes and photographs. It was named for the collector of the Arundelian Marbles.

ARUNDELIAN MARBLES, a series of sculptured marbles discovered by William Petty, who explored the ruins of Greece for Thomas Howard, Earl of Arundel, in the reign of the first Stuart kings, James I and Charles I, and devoted a large portion of his fortune to the collection of monuments illustrative of the arts and of the history of Greece and Rome. These marbles arrived in England in the year 1627 with many statues, busts, sarco¬ phagi, etc. John Selden published some of the inscriptions which he thought most interesting.

under the title of (Marmora Arundeliana* (1628). Henry Howard, Duke of Norfolk, grandson of the collector, presented them in 1667 to the University of Oxford, where. they still remain. The whole collection of inscrip¬ tions was published by Humphrey Prideaux in 1676; by Michael Maittaire in 1732; by Chan¬ dler in 1763. These inscriptions are records of treaties, public contracts, thanks of the state to patriotic individuals, etc., and many of a private nature. The most curious and in¬ teresting is one usually known by the name of the Parian Chronicle, from having been kept in the Island of Paros. It is a chronolog¬ ical account of the principal events in Grecian, and particularly in Athenian history, during a period of 1318 years, from the reign of Cecrops (1450 b.c.) to the archbishop of Diognetus (264 b.c.) . The authenticity of this chronicle has been called in question,

but has been vindi¬ cated by many of the most learned men. The best edition is that of Boeckh, with a full Latin commentary in (Corpus Inscriptionum Grseca- rum) (Berlin 1828-77) ; the new fragment is published in cMitteilungen des kaiserlich- deutschen archaologischen Instituts, Athen- esche Abteilung (Vol. XXIV, Berlin 1897). Consult Sandys (A History of Classical Schol¬ arship } (Vol. II, pp. 342-343, Cambridge 1908).

ARUSPICES, Roman priests and prophets, who foretold events from inspection of the en¬ trails of sacrificed animals. They observed, too, all the circumstances which accompanied or happened during the sacrifice ; for example, the flame, the mode in which the animal be¬ haved, the smoke. The origin is to be sought for in Etruria. They were introduced into Rome by Romulus, where they flourished till the time of the Emperor Constantine (337 a.d.), who prohibited all soothsaying on pain of death.

ARUSPICES, ON THE REPLY OF THE, an oration by Cicero. After Cicero's recall from exile different prodigies alarmed the people of Rome. The aruspices being con¬ sulted, answered that the public ceremonies had been neglected, the holy places profaned and frightful calamities decreed in consequence. Thereupon Clodius denounced Cicero as the cause of the misfortunes that menaced the city, and on the following day the orator replied in the Senate to the attack. The speech takes rank among the greatest of Cicero's orations, though he had little time for preparation and suffered under the disadvantage of addressing an audience at first openly unfriendly. .

ARUWIMI, a' roo-we'me, (1) a river of equatorial Africa having its source in the hills to the west of Albert Nyanza and tributary to the Kongo. Its length is a little over 800 miles and its breadth at its confluence with the Kongo is about a mile. It is navigable up to Yambuya, but beyond that place there are many rapids. In its upper course it is called the Ituri. Stan¬ ley discovered its mouth in 1877 and traced a considerable part of its course in his search for Emin Pasha in 1887. (2) One of the 16 districts into which the Kongo Free State is divided.

ARVAL BROTHERS, or ARVA'LES FRATRES, a Roman college of priests, 12 in number, whose duty it was to offer sacrifices for the fertility of the fields. That they were

of extreme antiquity is proved by the legend which refers their institution to Romulus, of whom it is said that when his nurse Acca Sa- rentia lost one of her 12 sons he allowed him¬ self to be adopted

by her in his place and called himself and the remaining eleven <(Ar-vales Fratres.® In 1570 at the place called Affoga l'Asino, a little beyond the fifth mile¬ stone on the Via Portuensis, inscriptions were found sufficient to identify the spot as the grave of the Dea Dia where the chief festival of the Arvales was held. We have now the protocols of 96 annual meetings dating from 14 a.d. to 241, and a list of officers dating from 2 b.c. to 27 a.d. From the time of Augustus it became usual to appoint princes of the imperial family as extra members. The members were elected for life by the college, usually on the nomination of the emperor. The officers were a magister, who presided ; the flamen, who assisted in the sacrifices, and four boys whose parents were living and who were sons of sen¬ ators, were the attendants. The college had also its staff of servants. The officers wore as a sign of office a chaplet of ears of corn fastened about their head with a white band. The principal duty of the Arvales was to cele¬ brate a three-days' festival in honor of the Dea Dia, formerly supposed to be Ceres, but now more correctly identified with Ops ; the divinity of Ceres, as Marquardt observes, not forming a part of the old Roman worship. The feast was celebrated by offerings to the goddess and the ˆtouching® or consecrating of the grain, on the first day. On the second, two pigs, a white heifer and a sheep were sac¬ rificed in the sacred grove, while two of their number collected grains of corn in earthen bowls, probably from the crowd at the temple door; after which the brethren performed the sacred song and dance within the temple and officers were elected for the coming year and there were races in the grove. The third day was celebrated by a sacrifice in the city. The other duties of the Arvales were to pronounce solemn vows for important events in the im¬ perial family — the birthday, marriage, illness or recovery of the emperor, his setting out or returning from serious undertakings, etc. The Ambarvalia, according to the best opinion, were entirely separate from the functions of the Fratres Arvales. The documents with a valuable commentary were published by Gae¬ tano Marini (2 vols., Rome 1795). Consult Henzen, (Acta Fratrum Arvalium) (Berlin 1874) ; Brown, Tome and the Campagna) (p. 440) ; Preller, (R6mische Mythologie) (pp. 422-430) ; and Marquardt (Vol. VI, 428-443).

ARVE, arv, a river tributary of the Rhone, which it enters near Geneva after a course of about 50 miles. It flows through the valley of Chamouni and many of the most famous re¬ sorts of Switzerland are found in its vicinity.

ARVEYRON, a river in the department of Haute-Savoie, France, having its rise 4,400 feet above sea-level in the Alps and emptying in the Arve.

ARWIDSSON, ar'-ved-son, Adolf Ivar, Swedish poet: b. Padasjoki, Finland, 7 Aug. 1791; d. Viborg, 21 June 1858. He studied at the University of Abo and in 1817 was appointed docent of history in the same institution. The strong critical stand he took against the uni-

versity authorities caused his dismissal in 1822, and not long after, because of an essay he had published, he was banished by the government and compelled to seek refuge in Sweden. In Stockholm he found a position in the Royal Library, of which he became director in 1843. His chief work, 'Svenska fornsanger' (Stock¬ holm 1834-42), is a collection of old Swedish folk lore and songs. His original poems appear under the title 'Ungdoms rimfrost af sonen i ornskog) (Stockholm 1832). His other works are 'Svenska konungar och deras tidehvarf' (1830-43) ; 'Stockholn fore och nu' (1837-40) ; and a translation of the Icelandic 'Frithiof- saga' (2d ed. 1841).

ARYA SOMAJ, a religion founded in In¬ dia by Swami Dayanand Sarasavati (1824-83) ; 10 April 1875 is the date of the founding of the cult at Bombay. The official creed was in the form of a decalogue. Their doctrine of Niyoga is practically that of free-love. The govern¬ ment is by the local congregation, the Provin¬ cial Synod and the General Synod for all India. While it comes from Hinduism it is largely an eclectic religion and borrows from other reli¬ gions. It is missionary in character and fol¬ lows the methods of the Christian missionary societies. Its membership is estimated at more than 100,000. It lays great emphasis on educa¬ tion and social reform. The sect has a college at Lahore.

ARYABHATTA, ar'-ya-b'hat'a, Hindu as¬ tronomer and mathematician of the 5th cen¬ tury : b. 476 a.d. His only known work, the ' Aryabhattiya,' is a mathematical treatise in verse; frequent reference is made to his writ¬ ings by later Hindu scholars. In the solution of quadratic equations and the application of algebra to geometry and astronomy he antici¬ pated some of the discoveries of modern al¬ gebra. He also announced the correct theory of the diurnal rotation of the earth and the correct explanation of solar and lunar eclipses See Algebra, History of.

ARYAN (ar'yan, or ar'-i-an) LAN¬ GUAGES, an important language family fre¬ quently styled the Indo-European or Indo-Ger- manic family of tongues. They have reached a higher development than

those of the second great family, the Semitic, and are far in ad¬ vance of the next one — that comprising the Turanian tongues. Like the Syro-Arabian forms of speech they are .inflectional; while those of Turanian origin are only agglutinate. Max Muller separated the Aryan family of languages primarily into a southern and a northern division. The former is subdivided into two classes: (1) The Indie; and (2) the Iranic; and the latter into six: (1) The Celtic; (2) the Italic; (3) the Illyric; (4) the Hellenic; (5) the Windic; and (6) the Teutonic. It is often said that Sanskrit, spoken by the old Brahmins, is the root of all these classes of tongues. It is more correct to consider it as the first branch and assume the existence of a root not now accessible to direct investigation. Students and experts in Aryan language claim that the entire structure is developed out of monosyllabic elements, usually called roots. These were of two classes, predicative or ver¬ bal, indicating action or quality; and demon¬ strative or pronominal, indicating position or direction. By the combination of these two, es¬

pecially, were grammatical forms made and parts of speech distinguished. The addition of pronominal endings to verbal roots made a verbal tense in three numbers (the dual per¬ haps of later origin than singular and plural, and mostly lost again in the later languages) with three persons in each. The prefixion of an “augment” (doubtless a pronominal adverb, meaning “then”) made of this a past tense; but this augment-preterite has left only scanty and doubtful relics, except in Indo-Persian and Greek. Another past tense, or perfect, was formed by reduplicating the roots, apparently to signify completed action. This is the origin of the Greek and Latin perfects, our (Strong® or irregular) preterite, etc. Futures were made later, with auxiliary verbs. Into the declen¬ sional inflection of nouns, adjectives and pro¬ nouns was introduced the distinction of sex; first by the special characterization of a fem¬ inine ; later, by the additional separation of a neuter. In later history of the family primitive structure of Aryan language has been variously modified, reduced and added to. It was most fully and distinctly preserved in the Sanskrit, which on that account casts most light upon the common history of all ; but there are points in which each branch leads the rest. As an il¬ lustration of the affinity among the Aryan tongues the common word daughter may be instanced. It is in Swedish, dotter ; Danish, datter ; Dutch, dochter; German, tochter; Old Hebrew German, tohtar ; Gothic, dauhtar ; Lith¬ uanian, duktere ; Greek, thygater; Armenian, dustr ; Sanskrit, duhitri; the last-named word signifying primarily ((milkmaid,® that being the function in the early Brahman or Aryan house¬ hold which the daughter discharged. Not only are the roots of very many words akin through¬ out the several

Aryan tongues, but (a more im¬ portant fact) so also are the inflections. Thus the first person singular of a well-known verb is in Latin, do; Greek, didomi; Lithuanian, dumi; Old Slavonic, darny ; Zend, dadhami; Sanskrit, dadami; and the third person singu¬ lar present indicative of the substantive verb is in English, is; Gothic, ist; Latin, est; Greek, esti; Sanskrit, asti.

Bibliography. — Ehrlich, (Zur indo-german- ischen Sprachgeschichte' (Konigsberg 1910) ; Hirt, (Die Indo-germanen) (Strassburg 1905) ; and (Untersuchungen zur Indo-germanischen Altertumskunde) (1907); Michelis, E. de, 'L'Origine degli Indo-Europei' (Turin 1903) ; Much, 'Heimat der Indo-germanen) (Berlin 1904) ; Reinach, 'L'Origine des Aryens) (Paris 1892) ; Ripley, (Races of Europe' (New York 1899) ; Schrader, (Reallexikon der indo-ger¬ manischen Altertumskunde > (Strassburg 1901) ; Sergi, 'Mediterranean Races' (1901) ; Taylor, 'Origin of the Aryans' (New York 1890) ; Sieg, E. and Siegling, W. 'Toeharisch, die Sprache der Indoskvthen' (Berlin 1908)..

ARYAN RACE, a name sometimes applied to that particular ethnological division of man¬ kind otherwise called Indo-European or Indo- Germanic, but more properly to the Indo- Iranian group alone. The Indo-European divi¬ sion includes two branches, the western, which comprises the inhabitants of Europe, with the exception of the Turks, the Magyars of Hun¬ gary, the Basques of the Pyrenees, and the Finns of Lapland, and the eastern, which com¬ prehends those of Armenia, Persia, Afghanis-

tan and northern Hindustan. From a multitude of details it has been established that the origi¬ nal mother tongue of all these peoples was the same. It is supposed that the Aryan nations were at first located somewhere in central Asizf, probably east of the Caspian and north of the Hindu Kush and Paropamisan mountains. From this centre successive migrations took place toward the northwest. The first swarm formed the Celts, who at one time occupied a great part of Europe ; at a considerably later epoch came the ancestors of the Italians, the Greeks, and the Teutonic people. The stream that formed the Slavonic nations is thought to have taken the route by the north of the Cas¬ pian. At a later period the remnant of the primitive stock would seem to have broken up. Part passed southward and became the dom¬ inant race in the valley of the Ganges, while the rest settled in Persia and became the Medes and Persians of history. It is from

these east¬ ern members that the whole family takes its name. In the most ancient Sanskrit writings (the Veda) the Hindus style themselves Aryas, the word signifying “excellent,® “honorable,® originally “lord of the soil.®

Bibliography. — Burge, L., (Pre-glacial man and the Aryan Race) (Boston 1887) ; Cur- zon, A., (On the original extension of the Sans¬ krit language over certain portions of Asia and Europe) (London 1856) ; Huxley, T. H., (Man’s Place in Nature) (New York 1900) ; Sayce, A. H., cThe Primitive Home of the Aryans5 (Washington 1891) ; Taylor, (The Origin of the Aryans) (New York 1890) ; Widney, J. P., (Race Life of the Aryan Peoples5 (New York

1907).

AR'ZACHEL, Jewish astronomer: born in Spain about 1050. He discovered the obli¬ quity of the ecliptic and compiled certain as¬ tronomical tables known as the “Toledo Tables,® on which two centuries later were based the famous “Alphonsine Tables.®

ARZAMAS, ar'za-mas, manufacturing town in the Russian government of Nijni-Nov- gorod, situated on the right bank of the Tiesha, 250 miles east of Moscow. It contains 34 churches, several convents and schools, 19 tan¬ neries, several soap-works, linen factories, etc., and has a considerable trade. Pop. about

12,400.

AS, a word which the Romans employed in three different ways: to denote (1) any unit whatever considered as divisible; (2) the unit of weight, or the pound (libra) ; (3) a coin. The as, whatever unit it represented, was di¬ vided into 12 parts, or ounces (uncice). Schol¬ ars are not agreed on the weight of a Roman pound, but it was not far from 237.5 grains avoirdupois, or 327.1873 grammes, French measure. In the most ancient times of Rome the copper coin which was called as actually weighed an as, or a pound, but in 264 b.c. was reduced to two ounces, in 217 to one ounce, and in 191 to one-half ounce. In 269 b.c., when silver money was first struck by the Romans, the as was superseded as a money of account by the sestertius coined from the more precious metal.

AS A MAN THINKS. In 1907, Augustus Thomas produced his play, (The Witching Hour,5 different from any work he had pre¬ viously done. It was more intellectual, more concerned with ideas; it was a departure from

the drama of mere situation. Its central theme was telepathy, hypnotism ; and Mr. Thomas maintained cleverly, theatrically, this theme from one end of his play to the other. His in¬ terest in psychic forces was further the central motive in his next play, (The Harvest Moon,5 produced in 1909. Here the influence of men¬ tal suggestion was the theme, and, though the play was less powerful than its predecessor in its theatrical effectiveness, it revealed Mr. Thomas still concerned with the phenomena of mind.

Undoubtedly these two plays influenced the writing of (As a Man Thinks.5 When it was produced in New York, at the 39th Street Theatre on 13 March 1911, it showed the same psychological purpose, and impressed the audi¬ ence with the fact that whatever Mr. Thomas was in the past, or might be in the future, at that moment he was passing through the phase of challenging thinker and teacher. In (The Witching Hour5 and (The Harvest Moon5 he held to one theme; but (As a Man Thinks,5 strong in its human quality, skilful in its con¬ struction, and brilliant in the French quality of its dialogue, is marred by diffuseness of pur¬ pose. For each act of this play is indicative of new intellectual interests in Mr. Thomas. Is the central theme of (As a Man Thinks5 a dis¬ cussion of the double moral standard society maintained in 1911 a.d. for men and women? Is it the question of intermarriage between Jew and Gentile and the reasons for race hatred? Is it a rendering of New Testament ethics, and again the mental suggestion of the previous play, (The Harvest Moon5 ? Mr. Thomas does not answer us. Or rather, he was not certain in his own mind, while writing this play, which in¬ terest was the greatest. The consequence is, (As a Man Thinks5 is marred by overabun¬ dance of material ; its claim to interest is due to the skilful workmanship which makes of the Jewish doctor a human personality, apart from being a mouthpiece for the dramatist's preach¬ ment.

No one story runs through (As a Man Thinks.5 The Jewish doctor preaches Chris¬ tian ethics to a man who has deceived his wife, and in turn has been challenged by her. Yet the doctor is crushed when his daughter mar¬ ries a Gentile. The Christian wife morally de¬ fies her Christian husband by throwing to the winds the conventional moral discretion which he has discarded many times, but no special plea is convincingly given for the adoption of one moral standard for both. Intellectually, Mr. Thomas merely skims, in each act, over a different motive, in itself important enough for an entire play. It is his technical ability and the interest he creates in his characters which makes (As a Man Thinks5 a worthy drama, if not one with full literary distinction. It was published in 1911.

Montrose J. Moses.

AS IT WAS WRITTEN, the title of a

romance by Sidney Luska (Henry Harland), the scene of which is laid in modern New York. Sombre and tragic though it is, the romance shows unusual vigor of conception and execution and extraordinary intuitive know1- edge of the psychology of the Jewish race.

AS THE LEAVES ((Come le foglie5). Giuseppe Giacosa (1847-1906), one of the three

or four great playwrights of modern Italy, be¬ gan as a romanticist but gradually fell beneath the spell of the social and domestic drama de¬ veloped in France by Augier and the younger Dumas, and in Norway by Bjornson and Ib¬ sen. <As the Leaves,* produced in 1900, seems consciously reminiscent of Bjornson's (A Bank¬ ruptcyˆ first played in 1874. Both exhibit a family grown corrupt through wealth and shaken by its loss. Whereas Bjornson is characteristically optimistic in emphasizing the regeneration of the Tjalde family through work, Giacosa depicts rather the inability of the Rosanis to cope with poverty. Giovanni Rosani finds that he has never stiffened the will of those dependent upon him, and that, in conse¬ quence, they are blown hither and thither ((as the leaves® by gusts of misfortune. His second wife lies, steals and succumbs to her fancy for a fellow artist. His son turns to gambling and consents to marry a disreputable woman in order to pay a debt. His more worthy daugh¬ ter struggles in vain to uplift the others and to earn a livelihood by teaching until, discouraged, she plans to take her life. But her father and the lover, her cousin, whom she has disdained, both intercept her. At last she understands the worth of this self-made cousin who alone has endeavored to assist the family in distress. She will marry him, since he at least has learned in the school of adversity to be self-sufficient. The moral purpose of the dramatist is obvious here, although not unduly accentuated. His in¬ terest lies in character rather than in plot. (As the Leaves) has been successful upon the stage in Italy and France, and it may be read in Eng¬ lish in an anonymous version printed in Drama (1911) and in a translation by Edith and Allan Updegraff (1913) of three of Giacosa's plays.

Frank W. Chandler.

AS YOU LIKE IT. The joyous and ro¬ mantic comedy, (As You Like It,* was never more happily characterized than by Robert Louis Stevenson in one of his letters : ®My view of life is essentially the comic; and the romantically comic (As You Like ID is to me the most bird-haunted spot in letters. . . . To me these things are the good : beauty, touched with sex and laughter; beauty with God's earth for the background. . . . The comedy which keeps the beauty and touches the terrors of our life (laughter and tragedy- in-a-good-humor having kissed), that is the last word of moved representation; embracing the greatest number of elements of fate and character ; and telling its story, not with one eye of pity, but with the two of pity and mirth.® The tone of the play, its atmosphere, the principal characters, and the genial criti¬ cism of life which pervades their words, are all suggested in these words and scarcely need further comment.

From internal evidence — the quotation of one of Marlowe's lines from the latter's (Hero and Leander,* published in 1598 — and from external evidence — an entry in the Sta¬ tioner's register in 1600 — the date of the play is generally agreed to be 1599 or 1600. This date fits in admirably with the chronological order of Shakespeare's plays, which would in¬ dicate that at the end of the period of his his¬ torical plays and his comedies and just before he entered on the period of his great tragedies,

he found refreshment in this comedy and in (Twelfth Night* and (Much Ado about Nothing. * It is not fanciful to say that ((he turned with a sense of relief and a long ease¬ ful sigh from the oppressive subjects of his¬ tory, so grave, so real, so massive, and found rest and freedom and pleasure in escape from courts and camps to the Forest of Arden.® In this play we are conscious of (<a sunlight tem¬ pered by forest boughs, a breeze upon his fore¬ head, a stream humming in his ears.®

For the story in its main outlines and even for much of the language, Shakespeare was in¬ debted to Lodge's (Rosalynde* (1590). A com¬ parison of the prose romance and the play re¬ veals the fact that the dramatist was indiffer¬ ent as to his appropriation of material ; his main idea being to create a play — the play's the thing. To this end he visualized the char¬ acters, arranged them in contrasted groups or types, introduced new characters such as Corin, Touchstone, Audrey and Jaques, and made an organic structure out of what was incoherent and desultory.

The pastoral story or drama had its origin in the tendency — first in Italy and then in England — to escape from the life of the city or court

into a sort of Arcadia or ideal world of happiness. The main features of the pas¬ toral drama, the more artificial character of which is parodied in the Sylvius and Phebe scenes, are combined in (As You Like It) with the more distinctively English ideals of free and rural life, such as may be found in the Robin Hood ballads and the dramatized forms thereof. The careless, happy life of foresters and freebooters is everywhere manifest. The forest of Arden, despite the presence of trop¬ ical plants and animals, has many of the aspects of the forests in which Shakespeare wandered as a boy; and the figures of an artificial Ar¬ cadia are balanced by the sun-burnt maids and men of the soil. In a word, he has recurred to the old tale of English outlawry and vengeance which had been modified to suit the demands of the Italian pastoral. One of the chief sources of delight in the play is the three lyrics, <(Under the Greenwood Tree,® ((Blow, Blow, Thou Winter Wind,® and ((It was a Lover and his Lass.® In no other play does one get a better idea of the wave of melody that swept over England in the Age of Elizabeth — a time when ((tinkers sang catches, milkmaids sang ballads and carters whistled.® The songs rep¬ resent that perfect blending of poetry and music — the first fine careless rapture of Eng¬ lish song which has never been recaptured. An¬ other feature of the play is the large number of popular quotations such as the Duke's sum¬ ming up of the uses of adversity, the seven ages of man as characterized by the somewhat cynical Jaques, Rosalind's description of . the marks of a lover and many other passages and phrases that have become proverbial. But these passages are after all subsidiary to the characters who utter them — all of them drawn to the life. Among all these Rosalind stands out as the entrancing, commanding personality. Her brightness, joyousness, her happy nature, (<mount and sing like a bird let loose from a cage.® ((The wild-wood freedom of the forest is in her heart, its beauty in her eyes, its sum¬ mer in her temper.® She is the central figure

thioughout the play and at the end naturally plays the role of Providence in setting all things right.

Edwin Mims,

Head of English Department, Vanderbilt Uni¬ versity.

ASA, 3d king of Judah. During the first 10 years of his reign his kingdom enjoyed peace and prosperity, but in the 11th year he was

attacked by the Ethiopian king Zerah at the head of a vast army, which he completely routed. On his triumphant return Asa was met by the prophet Azariah, who encouraged him to persevere in the extirpation of idolatry, in the 36th year of Asa's reign Baasha, king of Israel, occupied Ramah and proceeded to fortify it as a frontier barrier. Asa called in the aid of Benhadad, king of Syria, and recov¬ ered the city, but incurred the rebuke of the prophet Hanani for seeking help elsewhere than from the Lord. The incensed king threw the prophet into prison. He died after a pros¬ perous reign of 41 years.

AS ABA, a-sa'ba, a town in west Africa, (Nigeria) on the Niger River, 150 miles from the coast. It is the seat of the Supreme Court and contains the central prison, civil and mili¬ tary hospitals and other public buildings. It was the seat of the Royal Niger Company. Near Asaba large deposits of lignite were dis¬ covered in a mineral survey of southern Nigeria. The town has grown rapidly in the last decade and is now an important commercial centre.

ASAFCETIDA is a gum resin obtained from the root of Ferula fcetida. Although the United States pharmacopoeia limits the produc¬ ing plant, it is quite probable that asafoetida is obtained from two or even three or four species of Ferula, F. narthcx, F. fcctidissima , F. jasclikeanum. The main sources, however, are F. fcetida and F. narthex. These are coarse herbs of the Umbelliferce family distributed through¬ out the eastern Asiatic provinces from Persia, Turkestan, Afghanistan. The root is cleaned from the leaves and while growing is cut off close to the ground. This is then covered with leaves and in five or six weeks a slice is cut off, and from the cut surfaces the juice exudes. This juice has an overpowering odor, which much resembles that of garlic. This on thick¬ ening forms the asafoetida of commerce. The chemical composition is complex. It consists of resin, gum. ethereal oil, vanillin and ferulaic acid. Asafoetida is highly prized in the East as a seasoning. In medicine it is stimulant to the sympathetic nervous system and is an ex¬ cellent carminative stimulant and antispasmodic. It is particularly valuable in expelling flatus from the peristalsis it induces. It is also used in hysteria, but in an empirical fashion.

ASAKAWA, a'sa-ka'wa. Kwan-ichi, Jap- anese-American anthropologist; b. Nihonmatsu, Japan, 20 Dec. 1873. After graduating from Waseda University in Tokio he came to the United States to continue his studies at Dart¬ mouth College and Yale University. For sev¬ eral years he was lecturer on the history and civilization of east Asia at Dartmouth College. In 1906 he returned to Janan, where he

was appointed professor of English at Waseda Uni¬ versity. Here he remained only a year, how¬ ever, when he returned to the United States .to accept an appointment as instructor in the his¬

tory of Japanese civilization at Yale Univer¬ sity, becoming assistant professor in 1910. Au¬ thor of (The Early Institutional Life of Japan > (1903); (The Russo-Japanese Conflict: Its Causes and Issues) (1904) ; 'Notes on Village Government in Japan after 1600ˆ (1910);

'Origin of Feudal Land-Tenure in Japan > (1914) ; concluding chapters in the new edition of 'Japan, } edited by Capt. F. Brinkley (1904) ; edited 'JapaiP in the 'History of the Nations Series* (1907).

AS AM, a-sam, Hans Georg, .father of a famous family of Bavarian artists: b. 1649; d. 1711. He was a teacher of architecture at Prague. Notable among his works are his frescoes in the churches at Benediktbeuren and Tegernsee. His son, Cosmas Damian: b. 1680; d. 1742, was also a painter of high rank. An¬ other son, ZEgidius Quirinus : d. about 1746, was a sculptor who studied at Rome and settled in Munich in 1715. Their works in com¬ mon were the cathedral of Freising, which they completely remodeled; the decoration of the monasteries of Maria-Einsiedeln and Metten and the church of Saint Emmerain at Ratis- bon ; the building of the Congregational Hall at Ingolstadt and the church of Saint John. Their own residence was another of their ar¬ chitectural works which is considered one of the best examples of the Baroque school of architecture in Germany.

ASAMA-YAMA, a-sama-yama, an active volcano of Japan about 50 miles northwest of Tokio, 8,280 feet high. Its latest destructive eruption was in 1783.

ASAPH, the Levite and psalmist whom David appointed as leading chorister in the temple. It is supposed that his office became hereditary in his family, or that he founded a school of poets and musicians called, after him, "the sons of Asaph.®

AS'ARABAC'CA, a European herb. See Asarum.

AS'ARUM, a small genus of herbs of the family Aristolochiacece, widely distributed in rich, shady woods throughout the northern hemisphere. They have odd chocolate or pur¬ plish, bell-shaped, three-lobed perianths con¬ taining 12 horned stamens. The flowers which are borne close to or upon the ground are hid¬ den by the kidney-shaped or heart-shaped leaves. A. canadense, wild ginger, or

Canada snake-root, is warmly aromatic. It is common in the eastern United States and is often culti¬ vated in wild gardens as are also the following species: A. virginicum, A. arifolimn, both com¬ mon from Virginia southward; A. caudatum, a Pacific coast species, A. lemmoni and A. hart- wegii, both of the Sierra Nevada of California at altitudes of 4,000 to 7,000 feet. A. euro- pceum is also cultivated. It was formerly used as an emetic, a role now played by ipecacuanha. Its leaves are still made into snuffs and are deemed efficacious as counter-irritants.

ASBEN (Sahara). See Air.

ASBESTIC, a by-product in the mining of asbestos suitable for wall plaster. It is a mixture of a second grade asbestos with ser¬ pentine which is crushed and mixed with lime . and is susceptible of an excellent finish.

ASBESTOS (named from a Greek com¬ pound word signifying inextinguishable , incom¬ bustible), a fibrous fireproof mineral substance, one of the most remarkable found in nature. Several minerals are mined and sold as as¬ bestos. The most important is chrysotile, the fibrous form of serpentine (H4Mg3Si20a) . Ac- tinolite [Ca(MgFe)3(Si03)*] yields a variety usually known as hornblende asbestos. An¬ other variety comes from the mineral known as anthophyllite (MgFe)SiOa. The fibres formed by the chemical combination above given are perfectly smooth, and in this respect are different from all other known fibres. Par¬ adoxically, it is at once fibrous and crystalline, elastic and brittle, heavy as a rock in its crude state, yet as light as thistledown when treated mechanically. Added to this, its fibres, soft, white and delicate, have, by their inherent qual¬ ity of indestructibility, withstood the action of the elements since the world began. Asbestos is found widely distributed throughout the world, although the principal supply of crude asbestos suitable for the manufacture of fire¬ proof cloths and curtains comes from near Black Lake and Thetford, Canada, about 75 miles from Quebec, where it has been mined since 1877. The Italian, Corsican and South European mineral has a fine, silk-like fibre, but is lacking in the essential characteristic of strength. The product obtained from South Carolina has a soft, woody, yellowish fibre, which quickly powders under pressure. The South African asbestos from Griqua Town is of a dark slate or black color, with exception¬ ally long, strong fibres, but

owing to its stiff and horny texture it cannot be manufactured into a fine fabric, hence the superiority of the Canadian asbestos and its large consumption in the United States.

The asbestos usually occurs in veins, most commonly in serpentine rock which has re¬ sulted from the alteration of basic igneous rock, usually peridotites (q.v.). The chrysotile commonly occurs with the fibres across the vein, and is known as <(cross fibre.® The hornblende asbestos more often occurs along slip fractures with the fibre parallel to the plane of slipping, and is called <(slip fibre.®

The mining of asbestos differs radically from the mining of other minerals, since no shafts are sunk, but excavations are made in the open, somewhat after the manner of a stone quarry. Canadian asbestos, however, is found in narrow veins or seams about an inch and a quarter in thickness, and embedded in rock which is easily severed from it. The rock to which the mineral is attached shows on fresh fracture a serpentine mineral of a green shade containing finely divided particles of chromic and magnetic iron. The asbestos on cleavage presents a brilliant, dark-green surface by re¬ flected light, but the fibres after they are de¬ tached are perfectly white. The act of separat¬ ing the mineral from its matrix of rock is termed (<hand cobbing,® and after this process the mineral is shipped to various factories in the United States.

The process of manufacture begins by plac¬ ing the asbestos mineral in a chaser mill, a machine comprising a rotating edge-wheel re- * volving at the end of a radical arm in a trough, which cliches the mineral, dividing the fibres

without destroying them. The result is a snowy mass of mineral wool ready for winnowing, a method of removing the minute particles of rock still clinging to the fibres very much like the winnowing of grain ; this is done by means of a blast of air, which separates and blows away the foreign matter, leaving the fibres in a re¬ fined state and in proper condition for the third stage of manufacture. This is termed air fibre raising, and as the name implies, the fibres are raised by a current of air produced by a blower of large dimensions through a vertical pipe in¬ clined at a small angle. The object of this pro¬ cedure will be obvious, when it is stated that the air blown across the fibres causes those of coarser texture to be deposited in a compart¬ ment near the bottom of the pipe. The medium fibres will be projected a little higher, and these will fall into a second compartment. The finer fibres will be blown to a higher point, and there collected, while the dust will be carried to the top and deposited. The fibres are in this

way sorted into different lots according to their tex¬ ture, and are ready to be made into articles for which they are best adapted. The fluffy stuff now goes to the carding room, just as though it were genuine wool sheared from a sheep or pure cotton fresh from the plant on which it grows, instead of a mineral substance that iil its original state was mined like a lump of an¬ thracite coal. A carding machine, similar to that employed in preparing wool, cotton or flax fibres before spinning, has been adopted by the manufacturers. The problem of mechanically combing these fibres was no small one, and the carding takes place in a machine having a large central rotating cylinder covered with card clothing, that is, strips of leather set with pro¬ jecting wires termed teeth. Around the main cylinder there are a number of smaller cylin¬ ders, also provided with card clothing, which engages the teeth of the central cylinder rotating in the reverse direction. This machine straight¬ ens out the fibres and lays them parallel; after passing through the first breaker, they are fed into a second carding engine or breaker, which is set to a finer gauge than the preceding. A third and last carding process takes place in a machine called a finisher or condenser, when all the irregularities are eliminated, and the fibres are stripped from the final cylinder by means of a fly-comb and are converted into unspun threads, when they are delivered on a traveling apron or endless band, and are gath¬ ered into rows by reciprocating scrapers ; they are then condensed, and the process is continued in the coiling cans. In spinning the yarn, the rovings are delivered to the spindles on a car¬ riage, which then recedes, when the fibres are twisted, and returns when the spun asbestos yarn is wound on the spindles. The spinning frames do not draw the yarn, and no strain is placed on it until after it is twisted. This brings the manufacture of the fireproof material to a point where it is to be woven into cloth, packing, or other forms; for asbestos is used for divers other purposes than those appertain¬ ing to theatres,

While adulterated asbestos may be used in some of the mechanical arts, for theatrical hang¬ ings its purity should be 100 per cent; it then forms one of the safest barriers against the calamity of fire, As a matter of fact, much of

that which is termed commercially pure asbestos cloth contains from 5 to 20 per cent of com¬ bustible matter, but absolutely pure Amer¬ ican-made cloth may be obtained. Not only is purity essential in asbestos cloth where Used for protection against fire, but strength as

well; and after asbestos is subjected to a high tempera¬ ture, it has a tendency to powder, when, owing to its weight, It may break through, and its utility be impaired.

One of the leading manufacturers has made an improvement in weaving asbestos cloth for theatre curtains; it consists of two strands of asbestos spun around a strand of high-tempera¬ ture-melting brass wire, so that the wire is completely embedded and concealed. These as¬ bestos metallic strands form the warp, so that the threads run the long way of the cloth when finished. The weft, or filling-in cross threads, is made of plain, pure asbestos. Such a curtain will stand well under a severe high-tempera¬ ture test without breaking. Not only theatre curtains, but set scenery of all kinds may be constructed of asbestos. Scenic artists find it more difficult to paint, but the finer textures may be utilized for this purpose ; and although asbestos cloth does not take colors as satisfac¬ torily as cheese cloth and burlap, yet its use should be provided for wherever audiences are to be assembled. Flooring and woodwork in general may easily be replaced by compressed asbestos fibre board, and it has been shown that the latter may be stained, polished and finished to as high a degree as wood. All the upholstery should be of pure asbestos cloth, and carpeting is also made to take the place of the combustible vegetable and animal fibres now used so extensively. One of the peculiar prop¬ erties of asbestos carpeting is that the longer it is in service, the tougher it becomes.

Asbestos is utilized in the arts in many other forms than cloth; it may be worked into a pulp, and a fireproof paper is obtained. This paper is now used on roofs, between walls, flooring, etc. Fireproof rope three-eights inch in diameter for the suspension of curtains and other uses is made, having a tensile strength of 1,650 pounds per foot. High-grade asbestos plaster is fire¬ proof, sound-proof, and hangs together with great tenacity when subjected to water.

In the United States asbestos is produced in five States — Arizona, California, Idaho, Georgia and Virginia. Of these Arizona and Georgia yield the largest output ; Arizona of high grade fibre, and Georgia of fibre below the spinning grade. The asbestos of Arizona is chrysotile, and occurs in serpentine associated with lime¬ stone altered by intrusions of diabase. The strata are nearly horizontal, and are exposed along the walls of canyons throughout the State. The asbestos is worked out by tunneling into the canyon wall. Two grades are secured; one very fine and silky, of first-class spinning quality, and the other harsh, splintery and quite unsuited for textile purposes. Both qualities are found in the same mine. The Arizona asbestos has a much

smaller percentage of iron than the Canadian staple, and is, therefore, better adapted for electrical insulations. In Georgia the asbestos mine near Sail Mountain has been for years the largest producer of asbestos in the United States. Only the sur¬ face portion of the deposit, which has been

softened by weathering, is milled for fibre; the deeper lying rock is too hard.

California, Idaho, and Virginia produce no fibre of spinning grade, and their output is small. It is used chiefly for making fibre board and heat insulation, and as a filler for fire¬ proofing cements, plaster and paints.

An undeveloped source, considered of great possibilities, is the area of asbestos-bearing rocks of Vermont, an extension of the noted deposits of the Quebec region of Canada. Enough work has been done in this section to demonstrate its potential value.

The marketed production of asbestos in the United States in 1916 was 1,479 short tons, valued at $448,214. In addition to this supply, 114,978 tons of raw fibre, valued at $3,069,617, were imported from Canada; 1,072 tons, valued at $223,228, from England; and 112 tons, valued at $10,625, from British South Africa. There was also imported a value of $135,064 in manu¬ factured articles of asbestos, nearly all of which came from England. The asbestos mines of Quebec were extremely active in 1916. Their shipments amounted to 133,339 tons, valued at $5,182,905; of which the United States bought 86 per cent. The market, however, was so scantily supplied that prices rose from the aver¬ age normal of $350 to $400 per ton for high grade fibre, to $1,250 per ton, and in some cases much higher ; and even the low grade short fibre brought 100 per cent more than its usual price. (See Mineral Production of the United States). Consult Cirkel, F., (Chrysotile Asbes¬ tos 5 (Canada Department of Mines, Ottawa

1910).

ASBJORNSEN, as-byern'sen, Peter Kris¬ ten, a Norwegian folklorist and zoologist: b. Christiania, 15 Jan. 1812; d. there, 6 Jan. 1885. While pursuing botanical and zoological studies, and subsequently during various travels at gov¬ ernment expense, he collected folk tales and legends, aided by his friend Jorgen Moe, with whom he published (Norwegian Folk Tales) (1842-44); and (Norwegian Gnome Stories and Folk Legends1* (1845—48 ; 3d ed., 1870), pro¬ nounced by Jacob Grimm the best fairy tales in existence. Consult Braekstad, (

Fairy Tales from the Far North5 (New York 1897) ; Dasent, G., (Popular Tales from the Norse5 and (Tales from the Fjeld5 (London).

ASBOTH, osh'bot, Sandor (Alexander),

a Hungarian- American soldier: b. in 1811; d. in 1868. He came to America with Kossuth in 1851, and became a United States citizen, serv¬ ing in the Civil War in the Federal army, at¬ taining the rank of a brevet major-general. He was United States Minister to Argentina when he died from wounds received in 1862 and

1.

ASBURY, az'ber-i, Francis, the first bishop of the Methodist Episcopal Church in the United States. He was born in Hands- worth, Staffordshire, England, 20 Aug. 1745; d. Spottsylvania, Va., 31 March 1816. He joined the local ministry of the Methodists at the age of 16, the itinerant ministry six years later, and was sent by John Wesley as missionary to America at the age of 25. In 1772 he was ap¬ pointed by Wesley general superintendent of the connection in America, the duties of which office he exercised through the entire period of the American Revolution. Until the termina-

tion of the war the Methodists of America had called themselves members of the Church of England, and their ministers laymen. They now considered the political changes of the country as separating them from that Church, and therefore established an organization for themselves. Francis Asbury was constituted the first bishop of the new Church ‘(1784), which office he held till his death. During the 30 years of his episcopal labors he traveled annually from the Androscoggin to the Gulf of Mexico, and from the Atlantic to the Mississippi, or¬ dained not less than 3,000 preachers, and preached about 17,000 sermons. Identified with the religious interests of this country through the two great struggles Avhich have so greatly modified our political and social char¬ acter, he became eminently American in his sympathies and character, and left the mark of his native enthusiasm and energy upon the ec¬ clesiastical history of the United States. He wrote his journals, published in New York 1852. (3 vols.) .

Bibliography. — Briggs, F. W., (Bishop As- bury} (London 1874) ; Du Bose, H. M., Fran¬ cis Asbury} (Nashville, Tenn., 1909) ; Larrabee, W.

C., (Asbury and His Co-Laborers) (Cincin¬ nati 1853) ; Strickland. W. P., (The Pioneer Bishop (New York 1858).

ASBURY PARK, N. J., a city and popu¬ lar summer resort in Monmouth County, on the Atlantic Ocean, six miles south of Long Branch and 40 miles south of New York city. It is on the line of the Pennsylvania and the Central Railroad of New Jersey. It adjoins Ocean Grove on the north, being separated from it by Wesley Lake. It was founded in 1869, and given a city charter in 1897. It has a property valuation of $3,000,000. Asbury Park and Ocean Grove were originally laid out by members of the Methodist Episcopal Church for camp meetings and other purposes. At Ocean Grove is one of the largest musical auditoriums in the country. The beach front, waterworks and sewage system are owned by the munici¬ pality. Pop. (1920) 12,400, in summer, 25,000 and upward.

ASCALON, or ASHKELON, a ruined town of Palestine, on the sea-coast, 40 miles west-southwest of Jerusalem. It was noted during the Crusades, Godfrey de Bouillon gain¬ ing here a great victory over the Egyptians in 1099, and it was captured by the English, under Richard I, in 1191. During the European War Ascalon was taken by the British 10 Nov. 1917. Its site is now a complete scene of desolation. See War, European; Turkish Campaign.

ASCANIUS, a son of 2Eneas and Creusa, who accompanied his father to Italy. He sup¬ ported 2Eneas in his war with the Latins, and succeeded him in the government of Latium. His descendants ruled over Alba for 420 years. He is known also as lulus.

ASCARIS. See Round-worms; Thread¬ worms.

ASCENDANTS, in law, the opposites to

descendants in succession. When a father succeeds his son or an uncle his nephew, etc., the inheritance is said to ascend or to go to ascendants.

ASCENSION, an isolated volcanic island 700 miles northwest of Saint Helena, near the middle of the south Atlantic Ocean, about

lat. 7° 55' S.; long. 14° 21' W. ; area

about 34 square miles. It belongs to Great Britain; is the sanatorium for the British West African squadron. There are about 200 inhab¬ itants, mainly government employees and their families. Ascension is celebrated for its turtle, which weigh in many cases from 500 to 800

pounds. This island was discovered on Ascen¬ sion Day, 1502, by the Portuguese, and hence its name ; but it was never formally occupied by any nation till Great Britain took possession of it in 1815, after the transportation of Na¬ poleon to Saint Helena. The island is con¬ nected by cable with Buenos Aires, England and the Cape.

ASCENSION, Right, a term employed in astronomy in allusion to the position of a star or other heavenly body. Such position is known when we know the right ascension and declination, these terms corresponding respec¬ tively to longitude and latitude as applied to the position of places on the globe. Right ascension is measured on the equinoctial or celestial equator, the first point of Aries being taken as the starting point; and the right as¬ cension of any star is the distance measured eastward along the celestial equator from the first point of Aries to the point where an hour- circle, passing through the star, cuts the equator. The right ascension is easily found by means of the sidereal clock, which, when the first point of Aries passes the meridian, gives the time as 0 hours, 0 minutes, 0 seconds. By noting on the clock the time at which the body is on the meridian, we obtain the right ascen¬ sion in time, which may be converted into de¬ grees, minutes and seconds at the rate of one hour to 15°.

ASCENSION DAY, a religious festival of many churches in commemoration of the as¬ cension of the Saviour. It is a movable feast, always falling on the Thursday but one before Whitsuntide. It was first observed about the 4th century.

ASCETICISM is the exercise of the facul¬ ties in moral and religious practices, the applica¬ tion of Saint Paul's comparison between an athlete's and a Christian's life (1 Cor. ix, 24, 27). It is negative, when the object of this exercise is to avoid evil, to curb vicious ten¬ dencies, moderate excessive passion, and deny the soul and body any indulgence which might become inordinate or unlawful, and whenever it implies active measures against such dis¬ orders as gluttony, sloth, anger, pride and lust, by abstinence, fasting, watching, self-restraint, modesty and habits conducive to continence. It is positive, when its object is the exercise or training in the virtues which perfect life, and the cultivation of the means most efficacious for this end, such as devout reading, especially of the scripture, meditation, prayer, examination of conscience, exertion and sacrifice for the good of others, zealous promotion of good enterprises ; in a word, anything that can help one to do what is best, constantly, unhesitat¬ ingly and with facility. This is the aim of all true asceticism, whether based on the principles of natural or of positive and revealed law. This aim, as well as many of the means above

enumerated, is found to some extent in Pagan and Jewish, as well as in Christian asceticism. The latter employs additional means of incul¬ cating and developing the habit of virtue, such

as the religious life, divine worship, and in particular the sacramental system of the Church. Asceticism has some part in every rightly regulated life, even in one based on purely ethical principles; but in Christian life it is most systematic and far-reaching. The whole Christian economy depends on self-denial and the active pursuit of virtue according to fixed principles. Every sincere Christian is, accordingly, an ascetic; some are professedly so, men and women, whether in the conventual cloister or domestic circle, who strive to acquire by daily practice habits of virtue, and to ad¬ vance in holiness. Naturally counsel and di¬ rection are needed in a matter so difficult, and it is for want of due attention to these that as¬ ceticism is often misunderstood, and is re¬ garded by some as grotesque, a shield for cer¬ tain excesses and extravagances, associated often with the external observances of com¬ munities like the Essenes, with the singularities of some hermits and anchorites, the frenzy of fanatics like the Flagellants, the exclusiveness of the Brahmins, the ablutions of the Moham¬ medan, the dream of men like those composing the Brook Farm Community. To appreciate asceticism in its normal exercise, one must study it in the examples of men and women noted for its exercise, or in the books whose guidance they followed, in works of the great ascetical and sermon writers, but chiefly in scripture, and in the life of Christ and of per¬ sons distinguished for holiness.

Bibliography. — Bentham, J., (History of Morals and Legislation (Chap. I) ; Frazer, J. G., (The Golden Bough) (1900) ; Green, T. H., (Prolegomena to Ethics *(Chap. V, 1883) ; Harrison, J. E., (Prolegomena to Study of Greek Religion * (1905) ; Hastings, Encyclo¬ pedia of Religion and Ethics) (gives a re¬ markably complete treatment of this topic) ; Moore, (Greek and Roman Ascetic Tendencies) (Boston 1912) ; Tylor, E. B., (Primitive Cul- ture) (1908); Zoeckel, O., (Askese • und Moencthum* (1897).

ASCETICS, a name anciently given to those Christians who devoted themselves to severe exercises of piety, and strove to distin¬ guish themselves from the world by abstinence from sensual enjoyments and by voluntary penances. Hence those writings which teach the spiritual exercises of piety are termed ascetic writings. Even before Christ, and

in the time of the early Christian Church, there were similar ascetics among the Jews, such as the Essenes, also among the philosophers of Greece, and in particular among the Platonics. The expression is borrowed from the Greek word askesis (exercise), used to signify the spare diet of the athletae, who, to prepare them¬ selves for their combats, abstained from many indulgences. Consult Frazer, J. G., (The Golden Bough *(London 1900) ; Moore, G., (Greek and Roman Ascetic Tendencies* (Boston 1912) ; Muller, F. Max (ed.), * Sacred Books of the East) (London).

ASCH, ash, manufacturing town in the extreme northwest corner of Bohemia. It con¬ tains a large Protestant and a newly erected Roman Catholic Church, a real-school, schools of design, weaving, etc. The inhabitants are mainly employed in cotton, wooden and silk manufacture, bleachfields and dye-works. Pop.

(1910) 21,583.

ASCHAFFENBURG, a-sha'fen-burg, a town of Bavaria, 26 miles east-southeast of Frankfort. The chief edifice is castle of Johan- nisberg, built in 1605-14. There is also the Pompeianum, an edifice built by King Louis of Bavaria, in imitation of the Casa del questore (commonly called the Castor and Pollux House) at Pompeii. The principal industries are the manufactures of colored paper, tobacco and liquors. There are also large breweries, and an extensive trade is done in wine and tim¬ ber. Aschaffenburg long belonged to the arch¬ bishops of Mainz. Pop. 31,000.

ASCHAM, as'kam, Roger, English scholar: b. Kirby Wiske, Yorkshire, 1515; d. London, 30 Dec. 1568. YVhile still a child, he was taken into the family of Sir Anthony Wing¬ field and educated with the latter's children. He made rapid progress in English and classical studies, and was taught archery by Sir Anthony himself. The same generous patron sent him in 1530 to Saint John's College, Cambridge, where he read nearly all extant Latin literature, acquiring an elegant Latin style that proved most useful to him later, and developed an es¬ pecial aptitude for Greek, which he taught to students younger than himself. Besides this, he paid some attention to mathematics, became an accomplished musician, and acquired re¬ markable skill in penmanship. He received his B.A. degree in February 1533—34, and became a fellow of his college. His reputation for Greek learning soon brought him many pupils, several of whom later rose to distinction, and students from other colleges attended his lectures. In five years, he afterward said, Sophocles and Euripides had become at his col¬ lege as familiar as Plautus had been previously, and Demonsthenes was as much

discussed as Cicero. The beauty of his handwriting and the purity of his Latin led to his being em¬ ployed to write the official letters of the uni¬ versity. He took an active part in the contro¬ versy as to the correct mode of pronouncing Greek, opposing Sir John Cheke's system, but later adopting it. In 1543-44 he wrote his famous treatise on archery, (Toxophilus, *and in person presented a copy of it to Henry VIII, who so approved of the work that he gave the author an annual pension of HO, which was renewed by Edward VI, whose Latin secretary Ascham became. In 1548 he was appointed tutor to Princess Elizabeth. He read with her all (Cicero,* the greater part of (Livy, *the (New Testament* in Greek, (Isocrates,*

(Sophocles, *and portions of (Cyprian) and (Melancthon.* Two years later he was nomi¬ nated secretary to Sir Richard Morysin, am¬ bassador to the Emperor Charles V. Their headquarters were at Augsburg, but Ascham made trips to Louvain, Halle, Innsbruck, Venice and Brussels, visiting famous teachers and schol¬ ars. He lived on excellent terms with Sir Rich¬ ard, reading Greek with him five days in the week. The death of Edward caused the recall of the embassy in 1553, when Ascham became Latin secretary to Queen Mary. With the accession of Elizabeth, he was continued in his offices, and became in addition private tutor to the Queen, reading several hours a day with her in the learned languages. She bestowed on him the prebend of Wetwang in York Cathedral 5 Oct. 1559. His last years were filled with

anxiety and care due to domestic afflictions and pecuniary embarrassment. Between 1563 and his death he found relief in the composition of his best known work, (The Scholemaster,' of which he completed two books. The first is a general discussion of education with arguments in favor of inducing a child to study by gentle¬ ness rather than by force. The second is an exposition of his famous method of teaching Latin, by means of (<double translation,® etc., a method which has been endorsed by all subse¬ quent writers on the theory and methods of education. When Queen Elizabeth heard of Ascham's death, she is said to have exclaimed that she would rather have cast £10,000 into the sea than to have lost her tutor, Ascham. Scholars in England and on the Continent mourned for him, and expressed their grief in stately Latin verses. In English literature Ascham has a secure place on account of the strength and vigor of his English prose, highly Latinized though it was in construction and vocabulary. His style is without the tricks that Lyby introduced, and

has an easy flow and straightforwardness.

Bibliography. — By far the best edition of Ascham's writings is (The Whole Works of Roger Ascham . . . with a Life by Dr. J. A. Giles) (3 vols. in 4 parts, London 1864-65). This edition includes 295 Latin and English let¬ ters, many printed for the first time. (Toxo- philus) was first published in 1545; other edi¬ tions appeared in 1571, 1589, 1788, 1821, 1865 (by J. A. Giles), 1868 (by E. Arber). (The Scholemaster' was first issued 1570, and was followed by editions in 1571, 1572, 1573, 1579, 1583, 1589, 1711, 1743. Prof. J. E. B. Mayor published the best modern edition 1863, and E. Arber reprinted the first edition 1870. The best exposition of Ascham's educational sys¬ tem is in R. H. Quick's (Essays on Educational Reformers> (1868). His English works, edited by Wright, were published in 1905.

ASCHBACH, ash-baH, Joseph, German historian : b. Hochst, on the Main, 29 April 1801 ; d. Vienna, 25 April 1882. He studied at Heidelberg, at first taking up philosophy and theology and later history. In 1842 he was ap¬ pointed professor of history at Bonn Univer¬ sity. Nine years later he was called to fill the same position at the University of Vienna, where he remained until 1872. In his ˆeschichte der Westgoten) (Frankfurt 1827) he cleared up what had been until then a very obscure period in history. Among his other works are (Geschichte der Omajjaden in Spanien' (1829) ; (Geschichte Kaiser Sigis- munds) (1834-45); (Geschichte der Wiener Universitat' (1865); (Roswitha und Konrad Celtes' (1867).

ASCHERSLEBEN, a'shers-la'ben, a town of Prussian Saxony, in the district of Magde¬ burg. It is walled and entered by five gates, and contains several churches, a synagogue, and a real-school of the first class. There are manufactures of woolen goods, paper, sugar, artificial manures, earthenware, etc. Among several interesting ruins in the vicinity is the old castle of Askanien, the cradle of the house of Anhalt. Pop. about 29,000.

ASCHERSON, a'sher-zon, Paul Fried¬ rich August, German botanist : b. Berlin, 4 June 1834; d. 1913. In 1873 he was appointed

professor of botany at the University of Berlin. A few months later he accompanied Rohlfs as botanist on an expedition to the Libyan Desert. The following winter he paid a visit alone to the Little Oasis. In 1884 he was appointed custodian of the Botanical Museum in Berlin. Among his works are (Flora der Provinz Brandenburg' (Berlin 1864) ; (Synopsis der

mitteleuropaischen Flora' (2d ed., 1912). He also collaborated with Rohlfs on (Reise von Tripolis nach der Oase Kufra.'

ASCIANS, ash'yanz, people who live on the equator and consequently, at midday, twice a year, have the sun directly overhead.

ASCIDIAN, a marine animal, so called from Ascidia, a genus of Tunicata. Ascidians were once regarded as mollusks, and afterward as worms, but when their embryology and early stages were studied and it was found that they passed through a tadpole-like stage, in which the tail is supported by a notochord, and that in other respects they approached the verte¬ brates, they were placed with the vertebrates in the group Chordata. The simple ascidians at¬ tain to a large size, A. callosa being about two inches in diameter, quite round, and in shape and color much like a potato. The ((sea-peach" (Cynthia pyriformis) is of the size and general shape of a peach, with its rich bloom and red¬ dish tints. It is common at a depth of 10 to 50 fathoms on both sides of the north Atlantic. While other forms, as Boltenia, are stalked and fixed to the bottom, certain pelagic forms, as Pyrosoma and Salpa (q.v.), are free-swimming. The compound ascidians, such as Amarcccium, grow in white or reddish masses on sea-weeds, rocks, shells, etc., the individual animals being minute. The interesting form Perophora grows in bunches on piles and wharves on the south¬ ern coast of New England; it is perfectly trans¬ parent, so that the heart and circulation of the blood can readily be observed under the micro¬ scope.. The heart is a straight tube, open at each end; after beating for a number of times, throwing the blood with its corpuscles in one direction, the beatings or contractions are regu¬ larly reversed, and the blood forced in an oppo¬ site direction. For a general account of the anatomy, development and metamorphoses of these animals, see Tunicata.

ASCLE'PIADA'CEiE, a family of more

than 200 genera and 2,000 species of dicotyledon¬ ous herbs and shrubs, most of them with milky juice and many of them twining. The species are widely distributed in the temperate and tropical zones of both hemispheres and are es¬ pecially abundant in Africa. They differ greatly in their characteristics and uses ; some, like Stephanotis floribunda, are delightfully fra¬ grant; others, like Stapelia gigantea, carrion flower, are repellantly odoriferous. Some spe¬ cies yield a fibre from their stems or- their pods ; some are used in medicine ; others are planted for ornament. They are characterized by opposite or whorled, seldom scattered, entire leaves without stipules ; umbels of symmetrical flowers, without calyx and with a five-parted corolla

with often reflexed lobes ; five stamens attached to the corolla and more or less united around the stigma; pollen grains more or less coherent ; the ovary composed of two carpels ; style short; stigma discoid; fruit a follicle or pod ; seed flattened, with long silky hairs, which

buoy it up in the air for dispersal ; cotyledons flat. In the United States Asclepias (q.v.), or milkweed, is the principal genus. Some of the more important genera are as follows : Mars- denia, Stcphanotis, Ceropegia, Stapclia, Hoya, Gonolobus, Periploca, Asclepias , Cynanchum, Vincetoxicum.

ASCLEPIADES, as'kle-pi'a-dez, the name of several ancient Greek writers — poets, gram¬ marians, etc. — of whom little is known, as well as of several physicians, the most celebrated of whom was Asclepiades, of Bithynia, who ac¬ quired considerable repute at Rome about the beginning of the 1st century b.c. Though it is doubtful if he ever learned either medicine or physiology, he obtained some measure of suc¬ cess by prescribing adherence to simple hygienic rules.

ASCLEPIAS, milkweed, silkweed, the type genus, of about 125 species, of the family Asclepiadacece (q.v.), the species, of which are mostly erect perennial weeds with thick, deep roots common in pastures and waste places. Some furnish a fibre strong enough for ropes, and the silky down attached to the seeds is often used for stuffing pillows, etc. The young shoots of some species are occasionally cooked like asparagus, which they are said to resemble somewhat. A. tuberosa, butterfly-weed, pleu¬ risy root, common in dry banks and fields from New England to Florida, is very showy and seems to deserve a place in the flower-garden. Other well-known American species are A. rubra , A. purpurascens, A. syriaca, etc. The few species cultivated for ornament in America are mostly foreign. The genus is named in honor of the Greek god Asclepine, since some of the species are reputed carminatives, sud- orifics and expectorants. Medicinally the milk¬ weeds are of secondary value only. They are irritants, and cause nausea, vomiting and diar¬ rhoea. They also cause diuresis and diaphoresis, but their exact action is in need of investigation.

ASCOLI, as'ko-le, Graziado Isaia, Jewish- Italian philologist: b. Gorz, Austria, 16 July 1829; d. 1907. At the age of 16 he had pre¬ pared a paper on south-European dialects which showed remarkable

originality. In spite of the fact that he had had no collegiate train¬ ing, he was, after the publication of his first work, (Studi orientali linguistic^ (1854), ap¬ pointed professor of philology at the Academy of Milan. He was elected a member of the In¬ stitute of France, and of the Academies of Vienna, Budapest, Berlin and St. Petersburg, and in 1888 to the Italian Senate. His most notable work is (Saggi ladinP (1873).

ASCOLI, or ASCOLI PICENO, as'ko-le pecha'no (the ancient Asculum), an Italian town, 90 miles northeast of Rome. The town, one of the most ancient in Italy, is well built, and contains many handsome edifices and noble mansions, and the remains of an ancient the¬ atre, temples, etc. It has manufactories of woolen cloths, leather, hats, cream of tartar, chinaware, sealing-wax, paper and glass. It has an active trade, and its port, at the mouth of the river Tronto, is much frequented by coasting vessels. Pop. about 30,000.

ASCOLI SATRIANO (anc. Asculum Apulum), a town of southern Italy, 20 miles south of Foggia. Pop. about 10,000.

ASCOMYCETES, a large and important group of fungi, so called from their spores be¬ ing contained in asci or sacs. This group in¬ cludes mildews, rusts, smuts, the truffle, the morel and (according to Schwendener and other authorities) the lichens. Consult Engler and Prantl, (Die natiirlichen PflanzenfamilienP See Fungi.

ASCONIUS (Quintus A. Pedianus), a Roman historian of the 1st century a.d., who wrote a life of Sallust, a reply to the critics of Virgil, and valuable commentaries to Cicero’s orations, some of which are extant.

ASCOT, a celebrated English race-course in Berkshire, near the southwest extremity of the Windsor park and 29 miles southwest of London. The annual races, which take place in the second week in June, are attended by the fashionable and sporting public. From the accounts of the master of horse for the year 1712 it would appear that they were instituted, not in 1727, as is commonly supposed, but by Queen Anne on 6 Aug. 1711. Consult Caw- thorne, (Royal Ascot } (1902).

ASDOOD, or ASDOUD, a seaport of Palestine, on the Mediterranean, 35 miles west of Jerusalem. It was the Ashdod of scripture, one of the five confederate cities of the Philis¬ tines and one of the seats of the worship of Dagon (1 Sam. v, 5). It occupied a command¬ ing position on the high road from Palestine to Egypt, and was never subdued by

the Israelites. It sustained against Psammetichus a siege of 29 years ; was destroyed by the Maccabees, and restored by the Romans. It is now an insignifi¬ cant village, from which the sea is constantly receding.

ASELLI, a-sel'le, Gasparo, a famous Ital¬ ian physician: b. Cremona about 1580; d. 1626. He was professor of anatomy and surgery at Padua, and in 1623 discovered the lacteal ves¬ sels, which he seems, however, never to have understood or described with complete accur¬ acy. He left a treatise, (De Lactibus) (1627).

ASELLUS, a fresh-water isopod crusta¬ cean, allied to the wood-lice (q.v.), common in ponds and standing water, under sticks and stones, and in open caves. These crustaceans differ from the common pill bugs of the land in having a pair of rather long forked two- jointed caudal appendages and antennae of the second pair reaching to the telson. The body is broad and flat, with a broad shield-like telson, formed by the fusion of the last abdominal seg¬ ments. There are six pairs of legs arising from the middle region of the body between the head and telson. The female carries her eggs under her breast, behind the head. Respiration is carried on by several pairs of broad, gill-like sacs appended to the broad, flat, abdominal legs. Blind individuals occur in caves, which are allied to the true blind Asellus ccecidotcea.

ASEN, a'sen, in northern mythology, the most powerful of the gods. They included 12 gods and the same number of goddesses, among the most renowned of whom were Odin, Thor. Baldur, Freyr, Frigga, Freyja, Idunna, Eira and Saga. Their dwelling-place was Asgard. Though this worship was native only to the tribes of Scandinavia, its influence extended throughout ancient Germany, and may still be traced in many German proper names. Thus

the German names of the days of the week, which through the Saxons became incorporated into the English language, are derived from this mythology (see Asgard). Asen was also the name of several mediaeval czars of Bulgaria.

ASENATH, the daughter of Potipherah, priest of On, and the wife of Joseph (Gen. xli,

45, 50).

ASEPSIS. See Antiseptics.

ASEXUAL GENERATION. See Par¬ thenogenesis.

ASGARD, as'gard, the home of the ˆEsir, or Asen, and the Olympus of northern mythol¬ ogy. The city of Asgard is fabled to have been built in the middle of Ida's plain, the very centre of the universe. Here the ˆEsir erected a court for themselves with seats for 12 and one high seat for Odin, the All-father, and also a lofty abode for the goddesses, called Vingolf. They worked diligently, played at games, were rich in gold and all precious things, and happy, till three maidens from Jotunheim, the giants' world, crossed Ida's plain and entered Asaheim, when corruption spread among its inmates. As¬ gard had many mansions, the largest and no¬ blest of which was Gladsheim; while another, not so spacious, but the fairest of all and brighter than the sun, was called Gimli. See Scandinavian Mythology.

ASGILL, as'gil, John, English writer: b. Hanley Castle 1659; d. 1738. He was bred to the law, and gained considerable reputation, not only by skill in his profession, but from his pamphlet declaring that man might pass into eternal life without dying. In 1703 he took his seat in the Irish Parliament, but was dismissed after four days on account of his so-called blasphemous pamphlet. In 1705 he sat in the English Parliament for Bramber; but in 1707 he was expelled, nominally on account of his unlucky pamphlet, but really perhaps because of his debts. The remainder of his life he spent in the Fleet and King's Bench prisons, in one of which he died. He wrote a number of pam¬ phlets against the Pretender in behalf of the Hanoverian succession.

ASH (Fraxinus), a genus of about 50 spe¬ cies of hardy, ornamental trees of the family Oleaceo ?, natives mainly of North America, Europe and western Asia. The species are prized for street and park planting for which their usually tall pyramidal or broad-topped hab¬ it and light green foliage, which turns yellow or purple in autumn but which falls early, make them specially attractive. From the ele¬ gance of their forms several species, notably the first mentioned below, have been called the Venus of the forest; the oak being the Her¬ cules. The leaves are rather large, opposite, pinnate and deciduous; the flowers greenish or whitish in panicles, appearing either before, with or after the leaves ; the fruits are rather small samaras. Since grass and other plants do not grow well in the immediate vicinity of the ash it is not a good lawn species. The common ash (Fraxinus excelsior) , a native of Europe and western Asia, found in its perfection upon loamv soil, often attains a height of 120 or even 150 feet. It also thrives in exposed and ele¬ vated situations better than many other trees. Its

naked flowers appear long before the leaves, which drop early in the autumn, but during the

summer are very ornamental. Its leaflets are ses¬ sile and toothed. Its tough, hard, white wood makes excellent fuel and is highly valued for turning (for carriage wheels especially) when the tree has grown rapidly, since the toughness is then very great. It is then particu¬ larly valuable for carriage shafts, ladders, and handles of agricultural tools, such as rakes, pitchforks and hoes, where pliability, toughness and lightness are essential. For such uses its only important rival in America is the hickory. When gnarled, as it occasionally is, it is pre¬ pared like ˆcurly® maple for cabinet work and furniture, especially fine-grained specimens be¬ ing used as veneer. The bark is used to some extent in leather tanning. A large number of cultivated varieties have been produced, among which the most remarkable are : monophylla, with simple instead of compound leaves or with only one or two small leaflets at the base of the main leaf-blade; albo-marginata, the leaflets of which are bordered with white ; albo-varie-gata, with mottled white and green leaflets ; aurea, yellow-branched; aurea-pendnla, droop¬ ing yellow branches; pendula, one of the best weeping trees ; crispa, with curled and twisted very dark green leaves. The American or white ash (F . americana), a very variable species common from New Brunswick to Florida and westward to Minnesota and Texas, attains about the same size as the preceding species, but has lighter bark and leaves. The leaflets have short stalks and are entire. In rich, moist, dense woods the trunks often attain a height of 40 feet without a branch, thus fur¬ nishing valuable timber, which is used for the same purposes as that of the preceding species. There* are many varieties which more or less resemble those of the common ash. The black or water ash (F. nigra), common in swamps and upon stream banks from Nova Scotia to Minnesota and southward to Missouri and Vir¬ ginia, often attains a height of 80 feet. Its wood is softer than that of the preceding, but, being tough and easily separable longitudinally into layers, is largely used for veneer, baskets, barrel staves and hoops. The red ash (F. penn- sylvanica) is common in low ground from mari¬ time Canada to Florida, being especially abun¬ dant in the swamps of Pennsylvania, Maryland and Virginia. It is rare west of Ohio, though found as far west as Dakota and Minnesota. It resembles the American ash in uses and in gen¬ eral appearance. The interior of the outer bark of the branches is cinnamon color or red when fresh. The blue ash (F . qnadrangulata) , com¬ mon in rich, dry or moist woods from Michigan and Minnesota to Tennessee and Arkansas, and especially abundant in Ohio and Kentucky, at¬ tains a height of 80 to 120 feet. Its branches are more

or less four-angled, hence the spe¬ cific name. The inner bark yields a blue color when steeped in water, hence the common name. The green ash (F. lanceolata) , a species very widely distributed over eastern Canada and the United States, is so called from the brilliant green of its young shoots. It is extensively planted to form wind-breaks in Minnesota and the Dakotas on account of its extreme hardiness and because it is easily propagated by seeds and also because it grows very rapidly. It is less valued for its wood than the white ash, but is useful for fuel. The Carolina or water ash

(F. caroliniana) seldom exceeds 40 feet in height, but is noted for its very large leaflets. It is distributed from Virginia to Florida and westward to Arkansas and Texas, being most plentiful in swamps, along watercourses and in damp, rich woods. Its wood is used like that of the white ash. F. cuspidcita, a native of the southwestern United States and northern Mexico, is a shrub or small tree which seldom exceeds 20 feet in height, and on account of its conspicuous panicles of fragrant flowers is often planted in temperate climates for orna¬ mental purposes. F. velutina, another species of the same region, seldom attains a height of 50 feet, and not being hardy is confined to southern planting. The manna or flowering ash (F. Ornus), a native of southern Europe and western Asia, is a small tree 25 feet tall which resembles the common ash. It furnishes manna (q.v.). It is a native of Greece. Many other species are of botanical, economic or ornamen¬ tal interest, but probably none of as much im¬ portance as the species mentioned. The moun¬ tain ash (q.v.), a member of the family Mala¬ cca obtains its name from its ash-like leaves. Consult Nicholson, dictionary of Garden- ing) (1888) ; Bailey, (Standard Cyclopedia of Horticulture) (1914).

ASH-LEAVED MAPLE. See Box

Elder.

ASH-WEDNESDAY, the first day of Lent in the Western Church, so named from the ceremonial use of ashes as a symbol of peni¬ tence in the service for the day. The ceremony is of great antiquity, being confined at first to those performing a public penance. Later it was extended to the entire congregation. In 1191 its universal use was first sanctioned by Pope Celestin III. The present custom in the Roman Catholic Church is to take the ashes, made by burning the palms or

their substitutes used in the ceremonial of the previous Palm Sunday, and after a prayer the priest, dipping his thumb in the ashes, marks those present, as they kneel, with the sign of the cross on the forhead, or, in the case of clerics, on the place of tonsure, with the words: Memento, homo, quia pulvus es et in pulverem reverteris (Re¬ member, man, that thou art dust and into dust thou shalt return). Of the Reformed churches th" Anglican Church and the Protestant Epis¬ copal Church in the United States alone have a special service for this day. In the former a series of denunciations against sinners — the commination — and penitential prayers are ap¬ pointed to be read ; but in the American only the penitential prayers. Consult Duchesne, L., (Christian Worship,* translated by M. L. Mc¬ Clure (London 1904) and Wetzer and Welte (Kirchenlexikon.)

ASHANTI, or ASHANTEE, a-shan'te, a former negro kingdom of western Africa, since 27 Aug. 1896, a British colony of the Gold Coast administered by its governor, under a separate constitution, and definitely annexed, 26 Sept. 1901. Its boundaries defined 22 Oct. 1906, enclose an area of 20,000 square miles. It is in general hilly and is largely covered with forests. It is well watered and extremely fertile, but the climate is unhealthful. Among the trees are the baobab, palms and cotton trees. The crops are chiefly rice, corn, sugar-cane and yams, the last forming the staple vegetable

food of the natives. The domestic animals are cattle, horses of small size, goats, and a species of hairy sheep. The larger wild animals are the elephant, rhinoceros, buffalo, lion, hippopota¬ mus, etc. Birds are numerous and crocodiles and other reptiles abound. Gold is obtained in the form of dust or in nuggets ; in 1914 the output was 113,286 ounces valued at $2,406,350. Under British rule, agriculture has extended, cocoa and rubber plantations have been established, and the valuable forest trees exploited. Imports into Ashanti in 1914 amounted to $4,427,645; exports, $5,851,350, besides gold, comprising cocoa, $1,750,000; kola, $900,000; rubber, $100,000. The Ashantis long made themselves known as warlike and ferocious, with a love of shedding human blood amounting to a passion. Human teeth and jawbones were worn as personal ornaments, and human sacrifices used to be frequent. On the death of a king or chief enormous numbers of victims were slaughtered with circumstances of revolting cruelty, and there were regularly recurring periods, at inter¬ vals of 18 or 24 days, called the great and little adai, when human sacrifices were made. Notwithstanding this there exist, among them certain of the arts of civilization. They excel in the manufacture of cotton cloths and in the fabrication of articles in gold; they make good earthenware, tan leather, and make sword- blades of superior workmanship. The

native government was a monarchy. The chief town is Coomassie or Kumasi ; pop. 20,000. The British first came in contact with the Ashan¬ tis in 1807, when a treaty was concluded by the governor of Cape Coast with the king of Ashanti, acknowledging the sovereignty of the latter by right of conquest over the coast, including Cape Coast Castle. In 1823 war was proclaimed by the Ashantis against the British, and they succeeded in the following year in de¬ feating a small body of troops led by the gov¬ ernor, who perished with almost all his officers ; but in 1826 the Ashantis were completely de¬ feated near Accra. At the close of another war, in 1831, the river Prah was fixed as the boundary between the Ashanti kingdom and the states protected by Great Britain, but the Ash¬ antis soon began to interfere beyond the bound¬ ary. Early in 1873 the Ashantis again in¬ vaded the territory protected by Great Britain, and General Wolseley (subsequently Viscount Wolseley) was sent against them. The Ashanti general Amanquantia had concentrated his troops, 20,000 strong, at Amoaful, 20 miles from Coomassie. The British general led to the attack 1,481 English and 708 native troops, whom he formed into a square. The battle be¬ gan on 31 January, on which day Amoaful was taken. On the 4th Coomassie was entered. The loss of the British in killed and wounded was 300, and a large number ultimately suc¬ cumbed to the climate. As the King refused to enter Coomassie to sign a treaty, the British set fire to the town and began their return march on the 6th. The treaty signed soon after stipulated that the King of Ashanti should renounce his claims to the protectorate over the allies of Great Britain ; that free trade and open communication should be established with the coast, and that the King should pay an indemnity of 50,000 ounces of gold. The last condition was not faithfully observed, but the

result of the war was greatly to weaken the power of the Ashantis. The conduct of King Prempeh, a successor of King Koffee, led to the dispatch of another British expedition, which in 1896 entered Coomassie without resistance, and received the submission of the King, who was taken and sent into banishment. A British resident was stationed in the country, which became a British protectorate, subordinate to the governor of the Gold Coast. In June 1898 an agreement was arrived at between Great Britain and France with regard to the bound¬ aries between their respective territories here. In 1900 the Ashantis rose in rebellion and be¬ sieged the governor and 700 troops in Coomas¬ sie. The governor and part of the garrison

fought their way out 23 June, and after four months' siege an expedition reoccupied the capital 15 July. The definite annexation to the British empire followed 26 Sept. 1901. Pop.

300,000.

ASHBOURNE, Edward Gibson, 1st

Baron of, Irish jurist and politician: b. 4 Dec. 1837; d. 1913. After graduating from Trinity College he began practising law, becoming a Queen's Counsel in 1872. In 1875 he was sent to Parliament, where he served his constituency until 1885. From 1877 until 1880 he was at¬ torney-general for Ireland and in 1885 he was made Lord Chancellor of Ireland. Here he remained, having a seat in the Cabinet, until 1892. In 1885 he was awarded his title.

ASHBURN, Ga., city and county-seat of Turner County, 85 miles south of Macon, on the Georgia Southern and Florida, and the Hawkinsville and Florida Southern railways. It has manufactures of yellow pine, a cotton¬ seed-oil mill, a fertilizer factory, feed mills and naval stores. It has also three banks, an as¬ sessed property valuation of $1,100,000, county and city buildings, schools for white and col¬ ored children and churches of four denomina¬ tions. The waterworks, lighting plant and sewer system are owned by the municipality, the government of which is vested in a mayor and five councilmen. Pop. 2,500.

ASH'BURNER, Charles Albert, Ameri¬ can geologist: b. Philadelphia, 9 Feb. 1854; d. Pittsburgh, 24 Dec. 1889. He was graduated head of his class at the University of Pennsyl¬ vania, and was appointed assistant State geol¬ ogist in 1875. He originated a method of sur¬ veying and representing the geology of the anthracite coal fields which received the appro¬ bation of mining engineers throughout the world. He was also an accepted authority on the natural-gas fields. In 1886 he entered pri¬ vate practice as an expert and became closely associated with the Westinghouse interests. He prepared over 20 of the Pennsylvania State geological survey reports, and contributed to scientific and technical journals.

ASHBURNHAM, John, English Royalist: b. 1603; d. 15 Jan. 1671. Under Buckingham's patronage, he began his court career very early. In 1627 he was sent to Paris to make overtures for peace, and in 1628 he prepared to join the expedition to Rochelle, interrupted by the Duke's assassination. The same year he was made Groom of the Bedchamber and elected member of Parliament for Hastings. He also represented this borough in the Long Parlia¬ ment of 1640. In this

capacity he rendered

services by reporting proceedings to the King. He made a considerable fortune and recovered the Ashburnham estates alienated by his father. He became one of the King's chief advisers and had his full confidence. In the Civil War he was made treasurer of the Royal army ; in 1664 he was a commissioner at Uxbridge and one of the four appointed to lay the King's pro¬ posals before Parliament. He accompanied Charles in his flight from Oxford to the Scots and subsequently escaped abroad to Paris and then to Rouen, after which he was sent to The Hague to obtain aid from the Prince of Orange. After the seizure of Charles by the army, Ash¬ burnham joined him at Hampton Court in 1647. When Charles escaped he took Ashburnham's advice and went to the Isle of Wight where he fell into the hands of Hammond. He left Charles, waited on the mainland for his escape, and was later captured and imprisoned at Windsor. During the Civil War, he was ex¬ changed for Sir W. Masham. In November he was allowed to compound for his estates. After the King's death, he remained in Eng¬ land, an object of suspicion to all parties, until, at the Restoration, he regained his place as Knight of the Bedchamber and was compensated for his losses. He represented Sussex in Par¬ liament from 1661-67 when he was expelled for taking a bribe from the French wine merchants. Consult <Narrative) published by Lord Ash¬ burnham (3d Earl) in 1830.

ASHBURTON, Alexander Baring, Lord, English statesman and financier: b. London, 27 Oct. 1774; d. 13 May 1848. He was the second son of Sir Francis Baring, and the affairs of the famous mercantile house estab¬ lished by his father kept him employed in Canada and the United States for many years. In 1810 he became the head of the house of Baring Brothers. He sat in Parliament for different constituencies from 1806 to 1835. He was created Baron Ashburton in 1835. He was appointed special ambassador to the United States in 1842 to settle the northwestern bound¬ ary question and other matters in dispute be¬ tween England and America. A street in Bos¬ ton, known as Ashburton Place, was named in his honor.

ASHBURTON RIVER, a stream in west¬ ern Australia flowing 400 miles and empty¬ ing into the Indian Ocean, lat. 22° S. ; long. 115° W.

ASHBURTON TREATY, a treaty con¬ cluded at Washington in August 1842 by Alex¬ ander Baring, Lord Ashburton, and the Presi¬ dent of the United States. It defined the boundaries between the United States and Canada.

ASHBY-STERRY, Joseph, English jour¬ nalist b. London. Studied painting, then be¬ came illustrator for Punch and other papers. Later he took to writing and abandoned illus¬ trating. Among his wTorks are (Nutshell Novels) (1890); (Lazy MinstreP (1892); ˆNaughty Girl; a Story of 1893 5 (1893); (A Tale of the Thames in Verse) (1896) ; (The Bystanders; or, Leaves for the Lazy *(1900); ˆSketches in Song* (1903); (River Poems*

(1909).

ASHBY-DE-LA-ZOUCHE, ash'bi-de-la- zooch', market town in Leicestershire, England, on the borders of Derbyshire, 17 miles north-

west of Leicester. It has wide, well-paved streets, and its parish church of Saint Helen is a _ handsome building with fine stained-glass windows, carvings and monuments. The I van- hoe baths attract visitors, the waters being bene¬ ficial for some ailments. The ruins of Ashby Castle, well known to readers of Uvanhoe,* which received Mary Queen of Scots as a prisoner, are still visible. Pop. (1911) 4,927.

ASHDOD. See Asdood.

ASHE, ash, John, American soldier: b. in North Carolina 1720; d. 24 Oct. 1781. He was a member of the 1st Provincial Congress and served in the American Revolution as a brigadier-general of North Carolina troops. Asheville, N. C., was called in his honor.

ASH'ER, the name of the eighth son of Jacob. He founded the tribe called after him, which occupied a fertile territory in Palestine along the coast between Carmel and Lebanon.

ASHER, Ben Yehiel, eminent Talmudist: b. west Germany about 1250; d. Toledo, Spain, 1328. He was of a very learned family. To escape persecution, he fled to Spain, where he became rabbi at Toledo. Although he had had considerable means in Germany, he lost much of it and was forced to live in poverty in Toledo. In his religious attitude he resembled his teacher, Meir of Rothenburg, representing the school which was opposed to lenient de¬ cisions in legal matters, and secular knowledge. He possessed a vast Talmudic learning and was distinguished for his terseness in summing up long Talmudic discussions. His attitude toward secular knowledge made his influence on the Spanish Jews a narrowing one, which turned them from

scientific research to the study of the Talmud. He was the first of the German rabbis who displayed a genius for sys¬ tematization. His works consist of a com¬ mentary on (Zera im,5 a Compendium of the Talmud5 and various other glosses and com¬ mentaries. His son Jacob was the author of the four <Turim,) a very profound and popu¬ lar codification of the rabbinical law. It was the standard work on law until Joseph Quaro directly based on it his Code of Jewish Law, the (Shulan Arukh.) Consult Weiss, (Dor Dor we Dorshaw) (Vol. V, 61-70) ; Gratz, (Geschichte der Juden) (3d ed., VII, 233 et seq.).

ASHEVILLE, ash'vTl, N. C, city and county-seat of Buncombe County, on the Southern Railroad, near the French Broad Riv¬ er, 275 miles west of Raleigh. It is in a tobac¬ co-growing and market garden region, famous for its fruit, especially apples; and it is widely famed as a winter and summer resort. Its principal manufactures are of cotton goods, shoes, ice, tobacco and flour. The United States census of 1914 recorded 46 manufactur¬ ing establishments of factory grade, employing 1,135 persons, of whom 1,006 were wage earners, receiving annually $394,000 in wages. The capital invested amounted to $2,956,000, and the year's production was valued at $3,- 202,000; of this $1,027,000 was added by manufacture. The city is 2,350 feet above the level of the sea and is surrounded by impres¬ sive mountain scenery. It has the Asheville College for Young Women, Bingham Military School, Asheville Farm School for Boys, Normal College and Collegiate Institute for voi.. 2 — 25

Young Women, Home Industrial School for Girls, Industrial School for Colored Youth, large central auditorium seating 2,000 and free to conventions, sanitarium, weather bureau, national banks, fine parks, beautiful drives, hotels, boarding-houses, etc., and among notable public buildings, post-office, government build¬ ing, county courthouse, city hall and free public library. It has electric light and gas plants, a modern system of sewers, a water supply by 17 miles of pipe line from trout streams on the water shed of Mount Mitchell, and an electric street car system with a trolley road to Sunset Mountains. In the suburbs are : the magnifi¬ cent estate of Biltmore, established by George Vanderbilt of New York city; one of the finest botanical gardens in the world ; Pisgah Forest, a hunting preserve of 84,000 acres ; Riverside parks ; and Mount Beaumont, 2,800 feet high. Asheville was settled in 1792 and was named in honor of Samuel Ashe (1725-1813) jurist, and John Ashe (1720-81) soldier. It received a charter of incorporation in 1835. In 1905 the city boundaries were extended. The commission form of government has been adopted. Pop.

(1920) 28,504.

ASHFORD, Bailey Kelly, American surgeon : b. Washington, D. C., 18 Sept. 1873. Graduating from the Georgetown University Medical School in 1896, and from the Army Medical School two years later, he accom¬ panied the army to Porto Rico in 1898. Here he made a special study of anaemia and the hookworm disease and organized the govern¬ ment's campaign against the plague, resulting in a lowering of the death rate from anaemia by 90 per cent. From 1904 to 1906 he served as a member of the Porto Rico Anaemia Com¬ mission, which he himself had organized. He was also chairman of the consulting staff of the Presbyterian Hospital in San Juan. He has written (Anaemia in Porto Rico) (1904) ; (Uncinariasis in Porto Rico: a Medical and Economic Problem5 (1911).

ASHFORD, England, market town in Kent, pleasantly situated on the river Stour, 56 miles from London. There are corn and cattle markets, and the Southeastern Railway Company have their principal locomotive and carriage establishments here. Pop. (1914)

13,668.

ASHI, Rabbi, Jewish scholar of ancient Babylon : b. 352 a.d. ; d. 427 a.d. While still a young man he was the head of the academy at Sura. He is principally known because of his compilation, the ffiemara,5 composed of the discussions of the Jewish rabbis on the Mishnah and which constitutes an important part of the Talmud.

ASHHURST, John, American surgeon: b. 1839; d. 1900. He graduated at the Uni¬ versity of Pennsylvania in 1857 ; served as an army surgeon in the Civil War ; became sur¬ geon of several Philadelphia hospitals after his return ; and was made president of the College of Physicians in Philadelphia in 1898. He held surgical chairs in the University of Pennsyl¬ vania; was a member of the principal medical and surgical associations of the country; and besides many individual publications edited the (International Encyclopaedia of Surgery5 (1881-86); and (Lippincott's New Medical Dictionary.5 He was the author of Unjuries

of the Spine1* (1867) ; and Principles and Practice of Surgery > (1871).

ASHIKAGA, a'she-ka'ga, Japan, town 17 miles by rail from Tokio. From the 9th to the 1 7th century it was of much importance as a seat of learning. It is now noted for its trade in silk and cotton. Pop. about 24,000.

ASHIO, Honshiu, Japan, town, famous because of two copper mines in the vicinity, the largest in the country, whose output in 1910 exceeded 300,000 tons. Silver is also mined in the district. Extensive smelting works make the town quite an industrial centre. Pop. about 22,000.

ASHKELON. See Ascalon.

ASHLAND, Ill., town in Cass County, on the Chicago and Alton, and the Baltimore and Ohio railroads, 20 miles west by north of Springfield. It contains a high school, public primary school, city hall, four churches, and two banks with combined resources amounting to $800,000. It is located in a thriving agricul¬ tural region and has grain elevators and a brick and tile factory. The municipal revenue amounts annually to about $4,000. The govern¬ ment is vested in a president and board of trustees. Pop. 1,200.

ASHLAND, Ky., city of Boyd County, on the Ohio River and on the Chesapeake & Ohio, Norfolk & Western and other railroads, 130 miles northeast of Frankfort. It was settled in 1854 and chartered as a city in 1870. Its manufactures include cut and wire nails, steel billets, sheet steel, leather furniture, etc., and it is a shipping point for iron ore and coal. Among the city's attractive features are Cen¬ tral Park and the corporation-administered Clyffeside Recreation Park. Pop. 14,729.

ASHLAND, Ohio, town and county-seat of Ashland County, on the Erie Railroad, 65 miles southwest of -Cleveland. It has import¬ ant manufactures of rubber goods,. .pumps, tools, etc., municipal waterworks, public library and carries on a large trade in hay, stock and poultry foods. Pop. (1920) 9,249.

ASHLAND, Ore., city and county-seat of Jackson County, situated in the extreme southern part of the State, on the Southern Pacific Railroad, 341 miles south from Port¬ land and 431 miles northerly from San Fran¬ cisco. Ashland is the seat of the Southern Oregon State Normal School, and has three public school buildings and eight church build¬ ings. The city has an excellent municipal organization and police regulation. Ashland owns its own water system. There is an ex¬ tensive electric-light .and power plant, flour¬ mill, ice plant, sash and door factories, box factory, quartz-mill, foundry and machine shops,

and three newspapers. The Southern Oregon Chautauqua Association is located here. There are valuable gold mines in the mountains near by, some of them almost within the city limits. Copper, iron and coal have also been found as well as other valuable minerals, such as cinnabar, kaolin, marble, sandstone, etc. In the vicinity are many mineral springs, whose waters contain medicinal properties. Pop. 6,000.

ASHLAND, Pa., borough in Schuylkill County, in the valley of the Mahanoy, and on the Lehigh Valley and other railroads, 12

miles northwest of Pottsville. It is in the centre of the great anthracite coal field, has extensive mining industries, large machine

shops, foundries and factories, municipal

waterworks, and contains the State Miners' Hospital, a national bank, public hall and sev¬ eral churches. Settled in 1850 and named after Henry Clay's home at Lexington, Ky., Ash¬ land was incorporated in 1857. Pop. 6,855.

ASHLAND, Va, town of Hanover

County, situated on the Richmond, F. & P. Railroad, 17 miles north of Richmond. It is the seat of Randolph-Macon College, one of the oldest Methodist Episcopal Colleges in the United States, founded in Mecklenburg County in 1832, and removed to Ashland in 1866. Ashland was the scene of several battles dur¬ ing the Civil War. Within short distances of the town are the birthplaces of Henry Clay and Patrick Henry. Pop. 1,324.

ASHLAND, Wis., city and county-seat of Ashland County, on Chequamegon Bay, Lake Superior, and several railroads; 80 miles east of Duluth. It has one of the finest harbors on the lake,, and beside its general lake traffic is the principal shipping port for the hematite ore of the great Gogebic Iron Range. To accom¬ modate its iron interests it has a number of enormous ore docks. Other important interests are lumber and brown stone. It has very large charcoal blast furnaces, used for the manu¬ facture of pig iron, and since 1885, when the real development of the Gogebic iron mines began, the city has grown rapidly. Near by is the scenic and historic group of Apostles' Islands. The city has several industries of the manufacturing class, including flouring mills, pulp mills, creameries, etc. The United States census of 1914 reported 37 manufactur¬ ing establishments of factory grade, employing 924 persons, of whom 797 were wage earners, receiving

$510,000 annually in wages. The capital invested was $3,463,000, and the value of the year's output was $1,827,000; of this, $750,000 was added by manufacture. The in¬ stitutions include the North Wisconsin Acad¬ emy, Sisters' Hospital (Roman Catholic) and Rhinehart Hospital. Ashland was settled in 1854, incorporated in 1863, received a city charter in 1887, and since 1913 is administered by a commission form of government. Pop.

14,500.

ASHLEY, Lord. See Shaftesbury.

ASHLEY, William H., fur trader, soldier and congressman: b. Powhatan County, Va., about 1788; d. near Booneville, Mo., 26 March 1838. After a public school education he re¬ moved to Missouri (then upper Louisiana) in 1808. In the territorial militia he rose to the rank of brigadier-general. Embarking in the fur trade, he organized a company of 300 mem¬ bers which in 1822 ranged as far as the Rocky Mountains and entered into trading relations with the Indians of the region. He amassed considerable wealth ; was appointed lieutenant-governor of Illinois in 1820, and was elected as representative for Missouri to the Congress from 1831-37. Consult Houck, (History of Missouri, } and Chittenden, (Fur Traded

ASHLEY, William James, Anglo-Ameri¬ can economist : b. London, England, 25 Feb. 1860. He was graduated from Balliol College, Oxford, in 1881 ; was Fellow of Lincoln Col-

lege, Oxford; lecturer in history in Lincoln and Corpus Christi, 1885-88, and professor of political economy and constitutional history at the University of Toronto, Canada, 1888-92. He has been professor of economic history at Harvard University, 1892-1901, and since 1901 professor of commerce and public finance in the University of Birmingham. He has writ¬ ten (Introduction to English Economic His¬ tory and Theory) (1888-93) ; (Surveys, His¬ toric and Economic (1900) ; (Tariff Problem) (1903) (Progress of the German Working Classes5 (1904); (The Rise in Prices) (1912); (Gold and Prices) (1912) ; (Economic Organi¬ zation of England> (1914). He has edited some important works bearing on economics.

ASHLEY, Pa., town in Luzerne County, near Wilkes-Barre, on the Central of New Jersey and the YVilkes-Barre and Hazelton railroads. It

is an active coal mining centre and the site of important railroad repair shops. Pop. 5,601.

ASHMEAD-BARTLETT, Sir Ellis,

English politician: b. Brooklyn, N. Y., 1849; d. London, England, 18 Jan. 1902. He was educated at Christ Church College, Oxford, and admitted to the bar in 1877. He was ex¬ aminer of the Education Department, 1874-80; Conservative member of Parliament for the borough of Eye, 1880-85, and from Sheffield,

1885- 1902; Civil Lord of the Admiralty, 1885,

1886- 92 ; and was knighted in 1892. His popularity with political audiences in the early 80's was second only to that of Lord Randolph Churchill, but he lost much of this influence in later years owing to his association with the Turks and Swazis — a connection which sub¬ jected him to considerable ridicule in the House of Commons and the press. His chief literary production was (The Battlefields of Thessaly) (1897), a record of his experiences in the last war between Greece and Turkey.

ASHMEAD-BARTLETT, Ellis, English war correspondent: b. 1881, son of preceding. He accompanied his father during the Graeco- Turkish War and was taken prisoner by the Greeks. He has served as war correspondent in the Russo-Japanese War, the Moroccan campaign in 1907, accompanied the Spanish army in the expedition against the Riffs in Morocco in 1909, and the Italian army in the Tripolitan campaign; was through the first and second Balkan wars (1912-13), and correspond¬ ent in the European War, 1914-16. He is the author of (Port Arthur, the Siege and Capture) ; (The Passing of the Shereefian Empire.5

ASHMOLE, Elias, English antiquary: b. Lichfield 1617; d. 1692. He practised as a chancery solicitor till the breaking out of the Civil War, when he retired to Oxford and entered himself at Brasenose College, and en¬ gaged in the study of natural philosophy, math¬ ematics and astronomy. At the Restoration he received the post of Windsor herald and other appointments both honorable and lucrative. In 1672 appeared his (History of the Order of the Garter. 5 Other works of his are {The Antiquities of Berkshire5 (1719) ; and his (Diary5 (1717). He presented to the Uni¬ versity of Oxford his collection of rarities to which he afterward added his books and

manuscripts, thereby commencing the Ash- molean Museum.

ASPIMOLEAN MUSEUM, Oxford, the first public museum of antiquities and curiosi¬ ties in England, was founded by Elias Ash- mole (q.v.) in 1679 and presented to Oxford University. The building was erected by Sir Christopher Wren in 1682.

ASHMUN, George, American lawyer : b. Blandford, Mass., 1804 ; d. 1870. He served for several years in the legislature of his na¬ tive State and was prominent in Congress in 1845—50. He presided over the Chicago Con¬ vention which in 1860 nominated Lincoln for the presidency.

ASHMUN, Jehudi, American missionary : b. Champlain, N. Y., April 1794; d. Boston, Mass., 25 Aug. 1828. He prepared for the Congregational ministry and became professor in Bangor Theological Seminary. Later he joined the Protestant Episcopal Church and edited one of its periodicals The Theological Repertory. He discovered his true vocation when he became an agent of the American Colonization Society and took charge of a re¬ inforcement for the colony of Liberia in 1822. He found the colony utterly disorganized but in six years his energy and ability had thor¬ oughly reorganized it and he left it in a pros¬ perous and orderly condition. He died soon af¬ ter his return to the United States. He wrote (Memoirs of Samuel Bacon5 (1822) ; and his own life was written by R. R. Gurley (1839).

ASHOCHIMI, ash-6-che-me, or WAPPO. A tribe of North American Indians who for¬ merly ranged in California from the geysers to Calistoga hot springs and in Knight's Val¬ ley.

ASHOKAN RESERVOIR, a pool formed by the Olive Bridge Dam across Eso- pus Creek 14 miles west of Kingston, N. Y., and 90 miles north of New York city. It forms part of the Catskill water system and has a capacity of some 132,000,000,000 gallons.

ASHRAF, a-schraf', Persia, a town near the southern coast of the Caspian Sea, 56 miles west of Astrabad. It was a favorite residence of Shah Abbas the Great and was adorned by him with splendid buildings, of which only a few miserable ruins now remain.

ASHTABULA, Ohio, city in Ashtabula County, on Lake Erie, at the mouth of the Ashtabula River, 54 miles east of Cleveland, on the New York, C. & Saint Louis, the Pitts¬ burgh, Y. & A. and the Lake Shore & M. S. railroads. It is the centre of an extensive agricultural and dairying region, largely set¬ tled by inhabitants of Finnish extraction, and has large manufactories of leather, woolen goods and farm implements. The United States census of 1914 reported 57 manu¬

facturing establishments of factory grade employing 2,028 persons, of whom 1,864 were wage earners receiving a total of $1,345,000 annually in wages. The capital invested was $4,298,000 and the value of the vear's output was $5,021,000: of this $2,206,000 was the value added by manufacture. It has a Car¬ negie public library, three national banks, city hospital and numerous large buildings. Its extensive railroad and lake commerce, facili¬ tated by extensive river and harbor improve-

ments, makes it an important transfer ship¬ ping point, especially for iron and coal. The city was first settled in 1801, was organized as a township in 1805, incorporated in 1831, and received a city charter in 1892. On 29 Dec. 1876 a railroad accident here at a high bridge over the river resulted in the loss of over 100 lives. The city is governed under the commission-manager plan. Pop. 20,000.

ASHTAROTH, a goddess anciently wor¬ shipped by the Jews. Ashtaroth is the Astarte of the Greeks and Romans, and is identified by ancient writers with the goddess Venus (Aphro¬ dite). She is probably the same as the Isis of the Egyptians. In Scripture she is almost al¬ ways joined with Baal, and is called god, Scrip¬ ture having no particular word for expressing goddess. She was the goddess of the moon ; her temples generally accompanied those of the sun, and while bloody sacrifices or human victims were offered to Baal, bread, liquors and per¬ fumes were presented to Astarte.

ASHTAROTH KARNAIM, supposed to

be the modern Tell-Ashtarah, on the Bashan Plateau, 21 miles east of the shores of Lake Galilee. It is mentioned in Gen. xiv, 5. Consult Moore, (Journal of Biblical Literature) (Vol. XV, p. 155, 1896).

ASHTAVAKRA, ash-ta-va'kra. In Hindu legend, the hero of a story in the Mahabharata. His father, Kahoda, devoted to study, neglected his wife. Ashtavakra, though still unborn, re¬ buked him, and the angry father condemned the son to be crooked (hence the name, from Ash-tan, eight, and vakra, crooked). At the court of Janaka, King of Mithila, Kahoda was de¬ feated in argument by a Buddhist sage and was drowned in accordance with the conditions. In his 12th year Ashtavakra set out to avenge his father, and worsted the sage, who declared him¬ self to be a son of Varuna sent to obtain Brah¬ mins to

officiate at a sacrifice. Kahoda was re¬ stored to life, and commanded his son to bathe in the Samanga River, whence the boy becomes perfectly straight. In the Vishnu Purana some celestial nymphs see Ashtavakra performing penance in the water and worship him. He promises them a boon and they ask the best of husbands. When he offers himself they laugh in derision at his crookedness. He cannot re¬ call his blessing, but condemns them to fall into the hands of thieves.

ASHTON, Algernon Bennet Langton,

English composer : b. Durham, 9 Dec. 1856. In 1879 he graduated from the Conservatory at Leipzig, after which he took a special course in composition with Raff. In 1885 he was ap¬ pointed professor of piano music at the Royal College of Music. He has composed three overtures, four symphonies, two string quar¬ tets, two quintets for wind instruments, several compositions for the organ, choruses and songs and many sonatas for piano solo, piano and violin, piano and ’cello and one sonata for piano and viola.

ASHTON, Lucy, the heroine of Sir Walter Scott’s novel, (The Bride of Lammer- moorP Engaged to a man she loves, she is forced to marry another, and dies a maniac on her wedding day.

ASHTON'-IN-MAK'ERFIELD, Eng¬ land, town of Lancashire, 15 miles from Man¬

chester, and noted for its potteries, collieries and cotton mills. Pop. 21,543.

ASHTON-UNDER-LYNE, England, a market-town of Lancashire, six miles east of Manchester, on the north bank of the river Tame. It was an ancient Saxon town; the most interesting building is the parish church built in the reign of Henry V. Since 1769 it has grown rapidly through the extension of the cotton manufacture, both the spinning of cot¬ ton yarn and the weaving of calicoes being carried on in the town to a great extent. Up¬ ward of 20,000 work people are employed in factories. There are also collieries and iron¬ works in the neighborhood which employ a great many persons. Pop. 45,172.

ASHURST, Henry Fountain, American legislator: b. Winnemucca, Nev., 13 Sept. 1875. After attending the public schools of Flagstaff, Ariz., he began, in 1903, a special course in law and economics at the University of Michigan. In 1896 he became a member of the Arizona Territorial House of Representatives, of which he was chosen speaker two years later. After a term in the territorial Senate he became dis¬

trict attorney of Coconino County. On 27 March 1913, he was elected to the United States Senate by the unanimous vote of the first leg¬ islative assembly of the State of Arizona for a term ending in 1917.

ASIA, the largest of the five continental divisions of the earth, lying eastward of the Eu¬ ropean and African continents, and separated from the American continent by Bering Strait and the Pacific Ocean. It is wholly within the northern hemisphere, but some of the adja¬ cent islands extend south of the equator. It is bounded north, east and south, respectively, by the Arctic, Pacific and Indian oceans, with their various branches and inlets ; it is divided from Africa on the southwest by the narrow isthmian Suez Canal ; and is connected with Europe on the northwest across the whole breadth of that continent. The natural western boundaries are the Ural Mountains, the Caspian Sea, Caucasus Mountains, the Black Sea, 2Egean Sea, the Mediterranean and Red Seas. The sin¬ uosities of the Asiatic coast are very extensive; on the south the chief ocean inlets are the Gulf of Aden; the Arabian Sea with its inlets, the Gulf of Oman, the Persian Gulf, and the Gulfs of Cutch, Cambay and Manar, and the Bay of Bengal containing the Gulf of Martaban. On the eastern or Pacific coast proceeding north¬ ward the principal indentations are the China Sea with the Gulfs of Siam and of Tonkin; the Tung-hai or Eastern Sea; the Hwang-hai or Yellow Sea with the Gulf of Pechili and Korea Bay; the Sea of Japan with the Gulf of Tar¬ tary; the Sea of Okhotsk, and Bering Sea with the Gulf of Anadyr. On the north or arctic coast are the Nordenskjold Sea and the Kara Sea with the Gulf of Obi. The coast line is about 35,000 miles, giving a proportion of one mile of coast line to 496 square miles of sur¬ face. From the extreme southwestern point of Arabia, at the Strait of Bab-el Mandeb to the extreme northeastern point of Cape Deshnef or East Cape, the length of Asia is about 6,900 miles, its breadth from Cape Chelyuskin or Northeast Cape in Siberia to Cape Romania, the southern extremity of the Malay Peninsula, is about 5,300 miles. The total area is estimated

Bering Strait

fcolyuchtn b.

La" *pro «*•:

Si*"

LONELY 1. /V ˆ

7bTai"1!/ r i

£ a

/Rhatxagˆ ˆ

Ar. koje <

■ftlinia

/ r -?.v

Q X. Voevolit

'Viliuiflfc

Lower

•Swoienj

c; °‘*n*r0|?

jf*_^^,PodkainetincJ TV' ' ^TunKuskoe ,

'emiaDskoo

IVTvV"?, ”"""- w*tk»;^jW-¥v-a/t

[V r Tcniaeiaki^ rmf^^T^r '%

y»‘v 0,,'*f‘-'a J BrJusnora^khvLik^

Izn&SlA ^

Sta-sI\J8' Ka“^nog®r?« Jo” f 90

. ~'*A>-' > <- ,/ \ sS^Vv.Wv^ _ • /> ° t'r

jamara

-4

7 j/ f 8 i'/-~Y~^° p a v] 0 6l

S"" a

afience 0s^*

tCONsr >

nwk U (j„

vth®)^& vo-<fe

MT. Elbruz

4

Ma©

f 4“o”?4°

^gaLmts^L \

«*fa\ lUiasutal 7

r^r

Cuh'inctoktioij

U‘fJo

Lcpsinak'

'v) jTihwafu _ ' ,

— l- / w, Barkul

- — 1 Turfnii ‘ '. .

^ CRjirnshar Harnl0 g

'KjJ'fiaC^’^^., * R

Sachuj

\ ; ?■ 04',',ai

d «i»e«

’arkutn

.*** >

Khotan,

o Montcalm

rjsincUo*

[an >

i^’S cw^fj 1

iore/;/Q'4niri <

tafcirv4c?NS-s-‘Nij >'° •jwx

ouo r«H ., '

^.^V^Gartok "V (T? Ia

-pdngniyu^cho,. .

vd.. ^

.^i,v

rVA = £

•ˆWˆrtlala0

7/ˆ' DEu!S“i/ˆ

«£ .»SS $

;Us'"‘sh1e5i

ˆcAˆyA,

<ˆ—<,Chetnng (

«.X" u"A5,

KtEoY-

Wov/s'

° _y\L-J° s«»s0'

0TaJ > Ju vˆoa1

ASSAM / ˆ Maaipurv

aralAigj'v.;ˆˆ

*pT

?ye9M ursb idabattfx ˆ

~ ~~~Bard Ivan's yX Qband.irna?ar > 7(ft. \ .N Lalc-.VtU'p \\

J-.tong'ˆV

.•HjA0 dˆ.r a m u

l *a,a ['ˆh!

oMbgol

(*Ti Bilaspur* •CENTRAL

y ~~ ˆˆˆ74

/ /,°fihhoa (

Pi-abang AHa-tlo" S pun(bˆpˆ,6Al\«ao6lt' ˆrˆV) nw*

(u

ii#/Siep toP»Ial>s“P Wl j

a- ■

Y or '

Hlc»kTAb«» ˆ C l»'

Cjˆ” v* lAJVn

fBalasur

VS£ˆ ˆ -ˆ,v

- CN«0

faipur0

!>J. ✓ˆV'izajapatam

ˆVaDuop (Fr.)

’jˆ-ˆˆulipatam Jl) Si }

tf Ongole

AN ellv.ro

W Coromandel r> rr \rs

rauadras n&jy C

K, Coast 'PondJchˆry (Fr.; garikil fFr.)

Negapatam LPa/k ˆ<r. jˆJAFFNa l.

ˆJVTrinkoHiall

f XCEYLON

**T \Batticaloa

C. Negrais

' ort /

'd U iii |it ˆy'Q„ T» r . : rV».?'

NORTH

ANDAMAN.

'ACCao,

MerguftV

Tenassev'iiiL

Mergui q d

Archipelago/* Isthmus of)/

KrawˆZ

MIDDLE ANDA.MANI

SOUTH (ANDAMAN/ (Bn Duncan Passage

LITTLE ANDAMAN 0

Ten Degree Channel

CARNICOIUR#

camorta “"ft

KATOHALflˆJ SALANG OR J).

5om6r«ro C/u # junkbeylON t

Nicobar Is. ˆ 0R- „ 4o S

(Rb, NICOBAR O*

"ˆandnn, C. Coto01

ASIA

BRu N£/ A!

-ˆALDIVK I

C'ar(iiVa

C/tannet

5/utau8aia

j S320 foot

°n<irn

SCALES

STtatnte miles, CCO =. 1 Inch.

Kotaraja

-Kilometres, 10642 =1 Inch.

C 200 400 600 800 loop 1»QQ

Sambas

tannel

Rand MoNallj'B New 11 * 14 Map of Agfa Copyright by lˆand MoNally & Co.

Simalu l.

Channel

Longitude East from Greenwich

pontl0ˆ

ASIA

389

at 17,296,000 square miles. The most promi¬ nent features of the southern coast are the three great peninsulas of Arabia, India, and the Indo- Chinese Peninsula. The east coast is also flanked with insular and peninsular projections, forming a series of sheltered seas and bays. A series of large islands extends to the south¬ east of the continent, forming a connection with Australia ; while a multitude of smaller is¬ lands are scattered over the Pacific and Indian oceans. The principal peninsulas on the east are Kamchatka and Korea. The larger

islands, proceeding from the northeast coast, are Sagha- lien, the Japanese Islands, the Philippine Is¬ lands, Borneo, Sumatra, Java, Celebes, the Mo¬ luccas, Papua or New Guinea, which, however, is Australasian rather than Asiatic, and lastly Ceylon at the southeastern extremity of the In¬ dian Peninsula. The Kurile Islands between Kamchatka and Japan, the islands of Loo Choo, Formosa and Hainan on the Chinese coast, and the Andaman and Nicobar Islands in the Indian Ocean, may also be noticed. On the west or Mediterranean coast the principal islands be¬ longing to Asia are Cyprus and Rhodes. The northern coast, from East Cape or Deshnef, in Bering Strait, and on the Arctic Circle, to the Yalmal Peninsula, in the extreme north¬ west, is almost entirely contained within that circle. The highest point, Cape Chelyuskin, is about 78° N. The largest group of islands on the north coast is the Liakhov Islands (New Si¬ beria) ; the largest indentation is the Gulf of Obi, which reaches below the Arctic Circle, and receives the river Obi about that latitude.

Mountains. — The mountain systems of Asia are of great extent, and their culminating points are the highest in the world. There are also vast plateaus and elevated valley regions, but large portions of the continent are low and flat. Such are the greater portions of Siberia, from the Ural Mountains across the north of the continent, and the western central region of the continent, where an area of great depression culminates in the Caspian. The greatest moun¬ tain system in Asia, and so far at least as alti¬ tude is concerned, of the world, is the Hima¬ layan system, the principal mass of which lies between long. 65° and 110° E. and lat. 28° and 37° N. It thus occupies a position not very far from the centre of the continent, though nearer the southern edge than the northern. It ex¬ tends, roughly speaking, from northwest to southeast, its total length being about 2,000 miles, while its breadth varies from 100 to 500 or 600. Different names have been given to dif¬ ferent portions of the system, such as Hindu Kush (the northwestern extremity), Karako¬ ram and Kuen-Lun, while Himalaya is more especially confined to the portion forming the northern barrier of Hindustan; but all these are really portions of the same connected moun¬ tain mass. The Kuen-Lun simply forms the northern flank of the mass, and is not, as it has been represented, a distinct chain ; while the Karakoram Mountains have so little to dis¬ tinguish them from the rest of the elevated mass to which they belong that they may be crossed without the traveler being aware of it. The broadest part of the system, the elevated table¬ land of Tibet, lies between the Himalaya proper and the Kuen-Lun. The Tibetan Mountains are connected on the east with the mountains of

China and with those that spread to the south¬ east over the Indo-

Chinese Peninsula. The Thian-Shan is another great mountain system of central Asia connected with the Himalayan system by the important Pamir Plateau or ('roof of the world® in long. 70°-80° E. ; lat. 37°-40° N. The point of junction forms ((a huge boss or knot,® from which the Thian- Shan runs northwestward for a distance of some 1,200 miles. Between these two systems, which curve round it on the west, lies eastern Turkestan, right in the centre of Asia. The greatest elevations of the Himalayan system are to be found among the Himalayas proper, where is Mount Everest, 29,002 feet high, Kun- chinjinga, 28,156, etc. The principal passes here, which rise to the height of 18,000 to 20,000 feet, are the highest in the world. The Kuen- Lun summits reach a height of 22,000 feet. The Himalayas descend by successive slopes to the plain of northern India, which has an elevation of about 1,000 feet above the level of the sea. The Vindhyas cross the peninsula, dividing northern from southern India; the latter is further bounded by the eastern and the western Ghats, which run along the coasts ; while the interior consists of elevated tablelands rising toward the south, where they attain in the neighborhood of the Nilgiri Hills an elevation of 7,000 feet. The Himalayas are not only connected with the mountains in the interior of India, and with ramifications into China and tile Indo-Chinese Peninsula, but on the west with the mountains of Baluchistan and Afghan¬ istan. The Suliman and Hala ranges bound India on the west, and unite with the mountains of Baluchistan ; while the Hindu Kush, pass¬ ing westward through the north of Afghanis¬ tan, has continuations more or less distinct through Persia to the Elburz range south of the Caspian, and so onward to Mount Ararat. From this point again it forms connections with the mountains of Armenia, with the Cau¬ casus, with the Taurus range in Asia Minor, and with the mountains which run to the south of Persia. The mountains belonging to this series form the boundaries of an elevated plateau extending from the Mediterranean to the Indus. On the north they are frequently of great elevation, Mount Demavend in the El¬ burz range reaching the height of 18,460 feet, while Ararat is nearly 17,000. The Thian-Shan system is continued to the northeast by the Altai and Sajansk ranges, the whole separating the Chinese Empire from Russian Turkestan and Siberia. Tengri-Khan in the Thian-Shan Mountains is estimated to have a height of 21,320 feet. A line of moderate elevation ex¬ tends from the Altai westward to the Ural Mountains. To the east of the Sajansk range the Yablonoi Mountains run northeast toward the coast, along which they are continued northward under the name of Stanovoi to Ber¬ ing Strait.

Table-lands; Plains and Deserts. — Tibet forms the most elevated

table-land in Asia, its mean height being estimated at 15,000 feet. Its surface is very rugged, being intersected by a number of mountain ranges running generally in an easterly and westerlv direction. On the east it is bounded by lofty mountains which separate it from China. Some of the largest rivers of southern and southeastern Asia have

their origin in Tibet, including the Indus, the Brahmaputra, the Yang-tse and the Hoang-Ho. In this region a numerous series of lakes run in a chain parallel to the Himalayas. Another great plateau, much lower, however, than that of Tibet, is the plateau of Iran, occupying a large portion of western Asia, extending from the Indus to the Mediterranean, and from the Persian Gulf to the Caspian Sea. It comprises the countries known as Afghanistan, Baluchis¬ tan, Persia, Armenia and Asia Minor. It lies at altitudes varying from 2,000 to 8,000 feet above the sea. The eastern half of it consists to a large extent of unproductive wastes. Of great political and strategical importance at the junction of Turkestan, Afghanistan and India is the Pamir Plateau, already alluded to, called by the natives ((the roof of the world.® Its val¬ leys are at an elevation of from 11,000 to 13,000 feet above the sea. Another table-land of smaller extent and elevation is the Deccan Plateau, India, south of the parallel of lat. 25° N. The principal plain of Asia, as already men¬ tioned, is that of Siberia, which extends along the north of the continent and forms a vast alluvial tract sloping to the Arctic Ocean, and traversed by large rivers, such as the Obi, the Yenisei and the Lena, that convey its drainage to that ocean. Vast swamps of peat-mosses called tundras cover large portions of this region. Southwest of Siberia, and stretching eastward from the Caspian to the Thian-Shan Mountains, is a low-lying tract, consisting to a great extent of steppes and deserts, and in¬ cluding in its area the Sea of Aral, Bokhara, Khiva and other districts. This is a region of internal drainage, the rivers, among which are the Amu Daria and the Syr Daria, either falling into the Sea of Aral or into other smaller sheets of water. In the east of China there is an al¬ luvial plain of some 200,000 square miles in ex¬ tent, most of it productive and highly culti¬ vated ; in Hindustan there are plains extending for 2,000 miles along the south slope of the Himalayas ; and between Arabia and Persia, watered by the Tigris and Euphrates, is the plain of Mesopotamia or Assyria, which could be made one of the richest in the world. Of the deserts of Asia the largest is that of Gobi, which is bounded on the north by the Yablonoi and Thian-Shan Mountains, on the south by Tibet, on the east by the Khingan

Mountains on the borders of China ; while in the west it extends into eastern Turkestan. Large portions of it are covered with nothing but sand or dis¬ play a surface of bare rock. This desert forms a large part of the country known as Mongolia, the whole of which forms an area of internal drainage, deficient in rainfall. There are also extensive desert tracts in Persia, Arabia and Hindustan. An almost continuous desert region may be traced from the African desert through Arabia, Persia and Baluchistan to the Indus.

Rivers and Lakes. — Asia contains some of the largest rivers in the world. It is remark¬ able among the continents for the number of its rivers, some of them of large size, that never find their way to the ocean, their waters either being lost in the sand or falling into lakes that have no outlet. The chief rivers in western Asia are the Tigris and Euphrates, that rise in the Armenian plateau and fall into the Persian Gulf ; the Indus, from the Tibetan plateau, flows through northwestern Hindustan and

falls into the Arabian Sea; the Ganges, which rises in the Himalayas and flows eastward through northern Hindustan, and the Brahma¬ putra, which rises in Tibet and flows through Assam and Bengal, both enter the Bay of Bengal; the Irrawaddy and the Salwen, rising in the mountains of the Indo-Chinese Peninsula, and both flowing through Burma, likewise en¬ ter the Bay of Bengal ; the Mekong or Cam¬ bodia, the largest river of this peninsula, has its sources in the same mountains, and flowing southeastward enters the south China Sea ; the Yang-tse and the Hoang-Ho, the two great rivers of China, rise in the Tibetan plateau ; and enter the ocean after a winding easterly course; the Amur, the only other great river of eastern Asia, rises in Mongolia, and after a cir¬ cuitous course enters the Sea of Okhotsk; the great rivers of northern Asia, the Lena, Yenisei and Obi, have already been mentioned. The Yen¬ isei is believed to have a length of 3,400 miles, the Yang-tse of at least 3,000, the Lena of 2,770, the Hoang-Ho of 2,600. The basin of the Obi, including of course those of its tributaries, the Tobol and the Irtish, is believed to be the largest of any river in the world, except the Amazon and the Mississippi, being considerably over 1,000,000 square miles in area.

The largest lake of Asia is the Caspian Sea, which, however, is partly in Europe, its largest tributary being the Volga. The chief Asiatic rivers falling into this sea are the Kur from the Caucasus, the Aras from Armenia, and the Atrek from northern Persia — the river Ural being partly European, partly Asiatic. The Cas¬ pian lies in the centre of a great depression, being 83 feet below the level of the Sea of Azof. East from the Caspian, as already men¬ tioned, is the Sea of Aral, which,

like the Cas¬ pian, has no outlet, and is fed by the rivers Amu Daria and Syr Daria. Its area is esti¬ mated at 27,000 square miles. Still farther east, to the north of the Thian-Shan Mountains, and fed by the Ili and other streams from this sys¬ tem, is Lake Balkash, a somewhat crescent¬ shaped sheet of water, with an area of 8,400 square miles. The lake has no outlet ; its water is clear but very salt and disagreeable. There are also several other smaller lakes in this re¬ gion, such as Issik-Ivul, Kara-Kul, Ala-Kul, Baratala, etc. In the south of Siberia, between long. 104° and 110° E., is Lake Baikal, a moun¬ tain lake from which the Yenisei draws a por¬ tion of its waters ; its area is estimated at about 12,500 square miles. In the very centre of the continent is the Lob Lake, or Lob Nor, to which all the drainage of eastern Turkestan converges, being conveyed to it by the Yarkand, Kashgar and other streams. These unite to form the Tarim River, which, from the source of the Yarkand, has a total length of over 1,200 miles. Lob seems to be rather a swampy tract than a lake proper. On the borders of Afghan¬ istan, Persia and Baluchistan, is a similar swampy lake that receives the Helmund and other streams from Afghanistan. Of the nu¬ merous lakes in Tibet Dangra-yum Nor and Tengri Nor seem to be the largest; the former is 45 miles long and 25 broad.

Geology. — Though in population and his¬ tory the most ancient continent, geologically speaking Asia is considered, as regards its pres¬ ent aspect, to be one of the newest. The prin¬ cipal mountain chains are composed largely of

Cape

IVORY

TIMBE]

I'BERIAN

Wtter

WOOL

"fill ASH

SILVER

9f R E P U

(Sˆa»Iiaar

fyOOL Yar/kand

tUjSH.

GOA TS

.CalcupA J

tobac/w

■4fi£jr

ASIA

(Commercial)

Scale

mdiche'rjy'

c Cambodˆ-

<$90 Statute Milts to one inch.

Principal Products .

Navigable Portions of "Rivers Most important Railroads ■

Most important Steamship Lines . —

Longitude *0 ”East from Greenwich

PLATEA

2ˆ L/ra"'tiyer £ pr £

- 'y&xJ"'*

KOBDO

PL*TeA

THAR

DESERT

Mt. Everest vj

Isotherm

ASIA

(Physical)

Scale

OP

SIAM

Sgo Statute Miles to one inch _ Explanation _

.Cam»°dXX

kCEYLON

.DEPRESSION.

■out Greenwich

Copyright by Rand McNally &• Company

granitic rocks. The Himalayan range of moun¬ tains bears a striking resemblance in geological structure to the Alps ; they are composed of granite gneiss and mica-schist, with syenite and amphibolites or trap-rocks, particularly primi¬ tive greenstone ; the Altai Mountains contain granite in layers without alteration of gneiss, argillaceous schist in contact with greenstone, and containing augite, jasper, calcareous rocks, argentiferous lead ore and copper. The rami¬ fications of the Altai into Russian Asia contain also coal-grit, schists, quartz and greenstone, rich with lead, silver and auriferous sand. The lower ranges are covered with transported layers of rolled stones of granite, gneiss and porphyry, in which are found agates, carnelians and chalcedonies. In the Kuen-Lun group are found rubies, lapis-lazuli and turquoises. In the eastern part of the Urals the granite, of which the chain is composed, along with gneiss and other rocks, is extremely rich in iron and copper. The Caucasus contains granite, argil¬ laceous schist, basaltic porphyry, petroleum and gold, which is also found in Siberia, northern India, Siam, Borneo and Tibet. Diamonds and other precious stones are also found in Borneo as well as in India and Ceylon. The coal fields of China are perhaps the largest in the world.

The great plains of northern India, Mesopotamia, central Asia and Siberia are re¬ garded as of very recent geological origin. From various indications many geologists are of opinion that the greater part of western Asia was occupied at no very distant period by an ocean, of which the Caspian and Aral Seas are the remains. It is also conjectured that a continental area extending across the Indian Ocean united Asia during the Permian period to Africa and Australia. Siberia is supposed to have been twice submerged during the Palae¬ ozoic and the later Tertiary period. A line of volcanic action extends on the eastern coast from Kamchatka through the Philippines and the Malay Archipelago to Aracan in the Bay of Bengal. In Kamchatka there are eight or nine active volcanoes; in the interior of the con¬ tinent there appear to be none at present active.

Climate, Soil, etc. — The size of Asia, the great altitudes and depressions of the continent, along with the variations of latitude and the disposition of sea and land, etc., afford an inex¬ haustible source of complexity in the variety and distribution of climate. In Tibet, with a mean elevation of about 15,000 feet, the climate is rigorous, combining great cold with drought ; vegetation is scanty, trees almost absent and the population mostly nomadic ; except in the lower valleys, where there is an agricultural population, it is very sparse. The climate of central Asia generally presents extremes of heat and cold and great deficiency of rain. It has accordingly a deficient vegetation and a scanty nomadic population. The great region of Si¬ beria, which, as already mentioned, is a level or slightly undulating plain, lying wholly within the temperate and frigid zones, has a climate which generally resembles that of similar lati¬ tudes in Europe, with the exception of greater heat and drought in summer and greater cold in winter. The rainfall is very moderate, but the drainage is deficient and the soil often becomes swampy. The vegetation is scanty, consisting mostly of grasses and shrubs in the plains and pine forests on the mountains. There is very

little land under cultivation and the population is very thin. The northern part of China to the east of central Asia has a temperate climate with a warm summer, and in the extreme north a severe winter. It is well watered and wooded, possesses a fertile and well-cultivated soil yield¬ ing the usual products of temperate regions, and is thickly peopled. The district lying to the south of the central region, comprising the two Indian peninsulas, southern China, and the ad¬ jacent islands, presents the characteristic climate and vegetation of the southern temperate and tropical regions. Here, however, the modifying effects of altitude come most largely into play, and every variety of climate and form of vege¬ tation is to be found on the

slopes of the Himalayas, and the mountains and plains of southern India and of the Eastern Peninsula. The part of Asia south of the Himalayas, though not all lying within the tropics, is all subject to tropical influences. Among the principal of these may be reckoned the effects of the tropical heat upon the air-currents. To this cause are due the trade-winds, which, carrying the moist¬ ure of the southern seas to the continents to be condensed by the mountain masses against which they strike, by determining the rainfall of the various continental districts, and affecting the size and course of the rivers, produce so many climatic effects. More local in their effects as well as arbitrary in their occurrence, and consequently fatal in their violence, are the cyclones, or circular storms, common in the Bay of Bengal and the China Sea. The normal directions of the monsoons are northeast and southwest ; the northeast monsoon begins in October and the southwest in April ; but the direction, duration and intensity of these winds are greatly modified, especially on land, by local circumstances. The soil of the southern regions is usually good, and where moisture is sufficient vegetation is rich and even exuberant. The soil of India is so finely comminuted that it has been said it is possible to go from the Bay of Bengal to the Indus and return again to the sea without finding a single pebble. The rainfall in those regions is extremely irregular. There are belts where hardly any rain falls at all, others of moderate and others of very heavy rainfall. On the Khasia Hills, to the northeast of the delta of the Ganges and Brahmaputra, the heaviest rainfall in the world takes place, the average fall observed being 550 inches a year. The principal period of rain is during the southwest monsoon. On the mountains which directly face the winds, charged with vapor as they come from the sea, the rain will fall in abundance, while they pass over intermediate plains without parting with their moisture. The rainfall, the course of the rivers and the irriga¬ tion and fertility of the plains of India are accordingly determined by the position of the Himalayas, the Ghats and other mountain ranges. The high plateau which extends from Asia Minor to the Indus has a temperate cli¬ mate, with some extremity of heat in summer and cold in winter. Rain falls chiefly in winter and spring. The eastern part of this plateau is deficient in rain and the soil is poor and un¬ productive; the western portion, consisting of Asia Minor, is more favored of nature. The desert character of large parts of Arabia, Persia and Baluchistan has already been alluded to. Some parts of the coast of Arabia, as Yemen

and Oman, are fertile, but the greater part, especially on the Red Sea,

is barren and deso¬ late. A desert belt surrounds an interior plateau of 1,000 to 3,000 feet in height, and of moderate fertility. Syria is divided between hilly and fertile and low desert tracts. The Japanese Islands, which are traversed by mountains of considerable elevation and extend over about 15° of latitude, experience a great variety of climates. In the north the climate is rigorous, owing to the Siberian winds ; in the south it is mild. The eastern coast is milder than the west, being sheltered by the mountain ranges from the cold winds of the continent. The country generally is fertile and populous. The character and productions of the other islands are mostly tropical.

A greater extreme of cold is reached in North America than in northern Asia, the mean temperature of the east coast of Siberia being above the zero of Fahrenheit ; and the heat of southern Asia is less than that of Africa, which has more land lying within the tropics. In Siberia the extremes of temperature are great, exceeding 100° between the mean of the hottest and coldest month on the coast, and being com¬ monly over 60° throughout the country. As the equator is approached the extremes of tem¬ perature diminish till at the southern extremity of the continent they approach within 5°. The highest temperature attained in southern Asia is about 112b, the highest mean about 82°. The summers of the northern latitudes, though shorter, attain a maximum of heat not much short of the tropics, the greater length of the day compensating for the less intensity of the midday heat. On the Persian plateau the sum¬ mer heat is increased by the want of rain, and the severity of the winter by the elevation.

Vegetation. — 'The plants and animals of northern Asia generally resemble those of sim¬ ilar latitudes in Europe, though the extremes of climate are greater. The plateau extending from Asia Minor to the Himalayas resembles southern Europe in its productions, and the desert belt of Asia has an affinity to the African desert. The characteristic types of Siberia are continued to the high regions of central Asia. The community of type with European forms also extends to north China, where is developed besides a relation with the types of North America. The whole of northern Asia differs from Europe more in species than in genera of vegetable productions. Oaks and heaths are absent in Siberia. The principal mountain trees are the pine, larch and birch ; the willow, alder and poplar are found in lower grounds. The cultivated plants of Asia Minor and Persia resemble those of southern Europe. In the central region European species reach as far as the western and central Himalayas, but are rare in the eastern. They are here met by Chinese and Japanese forms. The lower slopes of the Himalayas are clothed almost exclusively with tropical forms ;

higher up, between 4,000 and 10,000 feet, is the region of forests and cultiva¬ tion, producing all types of trees and plants that belong to the temperate zone, and having ex¬ tensive forests of conifers; in the east forest trees are met with at a' height of 13,000 feet. Rhododendrons extend to 14,000 feet, and pha¬ nerogamous plants are found at the height of 19,500 feet. The southeastern region, including India, the Eastern Peninsula and China, with

the islands, contains a vast variety of indigenous species, varying with the humidity of the cli¬ mate and the elevation, the forms of higher latitudes being represented on the mountains. In this region we find growing wild a number of plants that have become of the utmost im¬ portance to man, such as the sugar-cane, rice, cotton and indigo, pepper, cinnamon, cassia, clove, nutmeg and cardamons, banana, cocoanut, areca and sago palms; the mango and many other fruits, with plants producing a vast num¬ ber of drugs, caoutchouc and gutta-percha. The forests of India contain the oak, teak, sal, deodar and other timber woods, besides bam¬ boos, palms, sandal-wood, laurels, fig-trees, etc. The Malay Peninsula contains dense forests of similar kinds. The cultivated plants of India in¬ clude wheat, barley, rice, maize, millet, sorghum, tea, indigo, jute, opium, etc. North of the tropic wheat is sown in November and reaped early in April, and a crop of rice or other tropical cereal is sown in June and July, and reaped in September and October. Wheat and barley do not grow in southern India, the winter not be¬ ing sufficiently severe to prepare the ground for them. Cotton, indigo, sugar, tea, tobacco, coffee, pepper, plantains, mangoes, etc., are cultivated in China. Of the Chinese flora the larger por¬ tion resembles the Indian while much is local. In north China, the country between it and the Amur (Manchuria), and the Japanese Islands, large numbers of deciduous trees occur, such as oaks, maples, limes, walnuts, poplars and willows, the genera being European but the in¬ dividual species Asiatic. Among cultivated plants are wheat, and in favorable situations rice, cotton, the vine, etc. Japan and the northern parts of this region are rich in species of the pine tribe. According to elevation the islands of the Asiatic Archipelago display an equal diversity with the mainland, the more trop¬ ical types being represented on the lower eleva¬ tions, the more northern on the higher. Coffee, rice, maize, etc., are extensively grown in some of the islands. A line of demarcation called Wallace's line has been drawn at the Strait of Macassar, at which the flora and fauna of Australia begin to appear, and gradually be¬ come more pronounced as the distance from Asia and the proximity to Australia increases. The variety of plants of the desert region of Arabia, Persia and Baluchistan is comparatively small. The

predominance of a few species gives character to the whole region. Vegetation is most abundant in spring, when herbaceous and bulbous plants, which extend through this re¬ gion from Syria to the Himalayas, are abun¬ dant. In Arabia Felix and the warmer valleys of Persia, Afghanistan and Baluchistan, where the hills are high enough to afford a sufficient rainfall, aromatic shrubs are abundant. Wheat, barley, cotton and indigo are cultivated in Arabia, and the date-palm flourishes in .the desert. On the mountain slopes of western Arabia (Arabia Felix) the coffee-plant, which has probably been derived from Africa, is cul¬ tivated. Gum-producing acacias are, with the date-palm, the commonest trees in Arabia; the latter also extends through Persia, and even reaches the shore of the Caspian. Fleshy plants are characteristic of the most arid portions. In the higher parts of Persia and Afghanistan numerous forms of Umbelliferce of great size, as well as thistles and the borage tribe, are

ˆy/ds ro

abundant. African forms are found not only extending from the African desert along the desert region of Asia, but from south Africa to Ceylon. The Caspian lowlands are the tract where the saline vegetation that is spread over the whole region of steppes and deserts has its greatest development. This region is regarded as the native country of the melon.

Zoology. — There is a still closer resem¬ blance in the fauna than in the flora of northern Asia to that of Europe. Asia south to the Himalayas, together with Europe and north Africa, forms a continuous region, which Dr. Sclater has designated as the Palaearctic ; south¬ eastern Asia, with Sumatra, Java, Borneo and the Philippines, he calls the Indian region ; Africa south of the Atlas, with Arabia, Pales¬ tine, south Persia, the dry part of Baluchistan and Sind, form the Ethiopian region ; Celebes and the other islands beyond Wallace's line, with Australasia, the Australian region. Nearly all the mammals of Europe occur in northern Asia, with numerous additions to the species. Quadrumana are rare, Carnivora numerous, especially bears, wolves and weasels. Moles, shrews and hedgehogs are common among Insectivora. Rodents are represented by mar¬ mots, the pika, jerboas, rats, mice, etc. There are numerous species of wild sheep, antelopes and deer. Of the last, the musk and many others are characteristic. In the Indian region there are several peculiar genera of the Quad¬

rumana or monkey tribe. Among the distinctive forms of this region is the elephant, the Asiatic species being distinct from the African. The lion, tiger, leopard, which are considered as Ethiopian forms, the bear, civets, ichneumons and other carnivorous animals are found. The lion inhabits Arabia, Persia, Asia Minor, Ba¬ luchistan, etc., and extends as far east as India, being now, however, confined to Guzerat. The tiger is the most characteristic of the larger Asiatic Carnivora. It extends from Armenia across the entire continent, being absent, how¬ ever, fr.om the greater portion of Siberia and from the tableland of Tibet; it extends also into Sumatra, Java and Bali. The horse, ass and camel have their true home in Asia. In the Indian region we also find the rhinoceros, buf¬ falo, ox, deer, squirrels, porcupines, as well as various species of Edentata. The avifaunas of Europe and northern Asia are identified to a still greater extent. A large number of Euro¬ pean species extend over northern Asia as far as Japan. In the Malay Archipelago marsupial animals first occur in the Moluccas and Celebes, while various mammals common in the western part of the archipelago are absent. A similar transition toward the Australian type takes place in the species of birds. Of marine mam¬ mals the dugong is peculiar to the Indian Ocean ; in the Ganges is found a peculiar species of dolphin. In birds, nearly every order except ostriches is represented. Among the most in¬ teresting forms are the hornbills, the peacock, the Impey pheasant, the tragopans and other gallinaceous birds, the pheasant family being verv characteristic of the region. The pheasant proper in the wild state is peculiar to northern Asia, the golden pheasant and several other species of pheasants to the northeast. The genera and species of passerine birds are very numerous. The desert region, extending from Arabia to Sind, is chiefly distinguished by the

absence of many Indian forms and the presence of some African ones, which, however, are not widely spread, most of them being limited to Arabia and Syria. The chief haunts of the Reptilia of Asia are the northern portion of Hindustan, the southeastern peninsula, China and the islands of Ceylon, Sumatra and Java. At the head of the reptiles stands the Gangetic crocodile, frequenting the Ganges and other large rivers ; the helmeted crocodile and the double-crested crocodile are numerous in various quarters, both insular and continental. Among the serpents are the cobra de capello and the Ceylonese tic-palonga, both among the most deadly snakes in existence ; there are also very large pythons, besides sea and fresh-water snakes. There are also a number of species of frogs and toads and of fresh-water tortoises as well as many terrestrial and aquatic lizards. The seas and rivers of Asia produce a great variety of fish. The Salmonidce are found in

rivers flowing into the Arctic and north Pacific oceans, but not in southern Asia. Large num¬ bers are caught. Trout are found in the feeders of the Indus and the Caspian. Sturgeons abound in the Black Sea and the Caspian. Two rather remarkable kinds of fishes are the climbing perch and the eriapthalmus. The well-known gold-fish, is a native of China.

Asiatic Races. — The Mongolian race is the most numerous in Asia, and includes about two-thirds of the inhabitants. It occupies the Chinese empire, Tartary and probably Japan, with part of the Indo-Chinese Peninsula. It is partly settled, as in China, Japan and the penin¬ sula; partly nomadic, as in Tartary and Mon¬ golia. The Aryan is the next in numbers, and the most civilized of the Asiatic races. It was until the Mohammedan conquest the dominant, as it is still the most- numerous, race in India. It also prevails in Persia and in the middle region from Afghanistan to Asia Minor. The Semitic race is widely spread in Arabia and southwest¬ ern Asia, and formerly at least extended to Africa. The black race is represented by the Negritos of the Philippines, the Papuans and some tribes of the Malay Peninsula. The Dravidian race in south India, the Malays in the Eastern Peninsula, the Ainos of Japan and other races locally distributed, have no well- defined relation with the larger races. The Dravidians are variously associated with the Mongols and the Australians. The latter theory is connected with the hypothesis of a southern continent, which also connects these races with Africa. See Ethnology.

Political Divisions. — A large portion of Asia is under the dominion of European powers. Russia possesses the whole of north¬ ern Asia (Siberia) and a considerable portion of central Asia, together with a great part of ancient Armenia, on the south of the Caucasus ; in all an area of 6,294,119 square miles with a population of (1913) 27,788,000. Turkey holds Asia Minor, Syria and Palestine, part of Arabia, Mesopotamia, Kurdistan, Armenia, Hejaz and Yemen in Arabia, with a total area of 699,342 square miles and a population of 19,382,900. Great Britain rules over India, Cey¬ lon, a part of the Indo-Chinese Peninsula (Upper and Lower Burma), Aden, Cyprus, Hongkong, etc., in all an area of 1,969,065 square miles, with a population of over 323,- 000,000; France has acquired a considerable

portion of the Indo-Chinese Peninsula (Cochin- China, Anam, Tonkin,

Cambodia) and has be¬ sides Pondicherry and four other colonies in India, making a total area of about 256,200 square miles with a population of about 17,- 000,000, while to Holland belong Java, Sumatra and other islands or parts of islands in the Asiatic or Malay Archipelago, with an approxi¬ mate area, including New Guinea, of 736,400 square miles and a population of about 38,000,- 000. The chief independent states are the Chinese Republic and its dependencies, including Mongolia and Tibet, occupying an area of about 3,913,560 square miles with a population esti¬ mated at about 320,650,000. Japan, including Korea, Formosa, Sakhalen, Pescadores, with an area of 260,738 square miles and a population of about 70,000,000 ; Siam, area about 195,000 square miles, population about 8,149,000; Af¬ ghanistan, area about 250,000 square miles, pop¬ ulation about 6,000,000; Persia, area about 628,000 square miles, population about 9,500,000, and the Arabian states occupying about 5 per cent of the area of Asia. The total population of the continent is estimated at 918,000,000.

Religions. — ■ Asia has been the birthplace of religions; the Jewish, Buddhist, Christian and Mohammedan having their origin in Asia, where they grew up under the influence of still older religions, the Babylonian and that of Zoroaster, both also of Asiatic origin. At pres¬ ent it is estimated that there are 138,000,000 Buddhists in Asia, 210,000,000 Hindus (chiefly in India), 142,000,000 Mohammedans (in west¬ ern and part of central Asia), 300,000,000 Con- fucianists and Yavists (chiefly in China), 17,200,000 Orthodox Greeks and Armenian Catholics (in Armenia, Siberia, Caucasus and Turkestan), 5,500,000 Roman Catholics and 6,000,000 Protestants. Roman Catholic and Protestant missions are established in almost every part of Asia, particularly in India, China and Japan. About 500,000 Jews are scattered mostly in western and central Asia. A few fire-worshippers, Guebers or Parsis of India and Persia are the sole remnant of the religion of Zoroaster ; while vestiges of Sabaeism are found amidst the Gesides and Sabians on the Tigris.

Civilization. — There are to be found in Asia all varieties of civilization, the primitive tribes of northeastern Siberia, the confedera¬ tions of nomadic shepherds and great nations in possession of a common stock of national cus¬ toms, beliefs and literature, like China; the tribal stage ; the compound family, forming the real basis of China's social organization ; the rural community, both of the Indian and Mussulman type ; the loose aggregations of Tchuktchis (northern Siberia), having no rulers and no religion beyond the worship of forces of nature, but professing with regard to one another principles of morality and mutual support often forgotten

in higher stages of civilization ; and despotic monarchies with a powerful clergy. So also in economic life. While the tribes of the northeast find their means of subsistence exclusively in fishing and hunting, carried on wdth the simplest imple¬ ments, among which stone weapons have not yet quite disappeared, and the tribes of central Asia carry on primitive cattle-breeding and lead a half-nomadic life, others are agriculturists,

and have brought irrigation (in Turkestan) to a degree of perfection hardly known in Europe.

Internal Communication. — Caravans of camels are the chief means of transport for goods and travelers in the interior; donkeys, yaks and even goats and sheep are employed in crossing the high passages of the Himalayas ; human porters and mules are the usual means of transport in most parts of China, horses in Siberia, and in the barren tracts of the north the reindeer, and, still farther north, the dog, are made use of. Fortunately the great rivers of Asia provide water communication over im¬ mense distances. The deep and broad streams of China, allowing heavy boats to penetrate far into the interior of the country, connect it with the sea; a brisk traffic is carried on along these arteries. In Siberia the bifurcated rivers supply a waterway, not only north and south along the course of the chief rivers running toward the Arctic Ocean, but also west and east; thus a great line of water communication crosses Siberia, and is, with but few interruptions, con¬ tinued in the east by the Amur, navigable for more than 2,000 miles. In the winter the rivers and plains of Siberia become excellent roads for sledges, on which goods are still chiefly transported.

Railways. — In 1912 the lines in existence had a total length of about 63,320 miles, of which 32,667 miles belonged to British India and Ceylon, 10,586 to Asiatic Russia and 5,420 miles to China, about 1,300 miles of which was constructed by British capital. The lines are very remunerative, especially that from Peking to Tien-Tsin. Japan is well provided with rail¬ roads, the length being 6,093 miles (including Korea) in 1912. In the same year the French possessions in Cochin-China, Anam and Tonkin had 2,178 miles, the Dutch Indies 1,551 miles, Siam 637 miles. There are as yet no railroads in Persia of any consequence; but in 1914 there were 2,836 miles in Asiatic Turkey, not includ¬ ing the most recently opened sections of the Bagdad Railway, w hich is being constructed by German capital and is to extend the Anatolian line from Kornia to Adana, Mosul, Bagdad and Basra, with many branch lines. The great Trans-Siberian Railway connecting Moscow and Petrograd wdth Vladivostok and Port Arthur

was completed in 1904.

Telegraph communications are in a much more advanced state than the roads. Petro¬ grad is connected by telegraph with the mouth of the Amur and Vladivostok (on the frontier of Korea) ; while another branch, crossing Turkestan and Mongolia, runs on to Tashkend, Peking and Shanghai; Constanti¬ nople is connected with Bombay, Madras, Singapore, Saigon, Hongkong, and Nagasaki in Japan; and Singapore stands in telegraphic communication with Java, and Port Darwdn in Australia. Finally, Odessa is connected by wire with Tiflis in Caucasus, Teheran and Bombay.

Trade. — Notwithstanding the difficulties of communication a brisk trade is carried on between the different parts of Asia, but there is no possibility of arriving at even an approxi¬ mate estimate of its aggregate value. The mari¬ time exports to Europe, the United States, and overland to Russia, have an annual value of about $900,000,000, and the imports of about $750,000,000. The bulk of the enormous trade between Great Britain, India, China and Japan

is carried on via the Suez Canal, opened 1869, and there is a steadily growing over-sea trade between China and Japan and the Pacific ports of. the United States and Canada. Asia deals chiefly in raw materials, gold, silver, precious stones, petroleum, teak and a variety of timber-wood, furs, raw cotton, silk, wool, tallow and so on ; the products of her tea, coffee and spice plantations ; and a yearly increasing amount of wheat and other grain. Steam industry is only now making its appearance in Asia, and, al¬ though but a very few years old, threatens to become a rival to European manufacture. In¬ dian cottons of European patterns and jute- stuffs already compete with the looms of her European sister countries. Several of the petty trades carried on in India, China, Japan, Asia Minor and some parts of Persia have been brought to so high a perfection that the silks, printed cottons, carpets, jewelry and cutlery of particular districts far surpass in their artistic taste many like productions of Europe. The export of these articles is steadily increasing, and Japan supplies Europe with thousands of small articles — applications of Japanese art and taste to objects of European household furniture.

History. — The origin of the name Asia is involved in obscurity, and it is not certainly known whether it arose among the Greeks or was

borrowed by them from some Asiatic people. Modern scholars are inclined to believe that the name Asia is connected with the San¬ skrit ushas, the dawn, as Europe may be con¬ nected with the Hebrew ereb, the west or the sun-setting.

The oldest historical documents are of Asiatic origin, and next to the immediately con¬ tiguous kingdoms of Egypt, Asia possesses the oldest historical monuments in the world.

The oldest historical monuments in Asia are those of Assyria (see Assyria), and with them are associated traditions which carry us back to a remote and indefinite antiquity. A similar vague antiquity belongs to the historical tradi¬ tions of India and China. Criticism, however, reduces all these claims to moderate dimen¬ sions, and assigns to the oldest ascertained facts a period not more remote than some 4,000 years from the present.

The earliest facts in the history of Asia, apart from documents and monuments, consist in the migrations of races, the evidence of which is derived from tradition, from language, from customs and from religion. The earliest known seat of the Aryan race was on the banks of the Oxus. Hence probably from the pressure of the Mongolian tribes to the north they spread themselves to the southeast and southwest, pressing upon the Dravidian inhabitants of In¬ dia and the Semitic races of southwestern Asia. Finally they drove the Dravidians to the south of India and occupied Persia and other parts of western Asia, spreading into Europe. It is a remarkable circumstance that in this invasion the Aryans appear to have acquired the use of letters from the peoples with whom they came in contact, the Dravidian letters being borrowed in India and the Semitic in Persia as the origi¬ nal basis of the Sanskrit and Zendic alphabets. At a later period the Greeks likewise adopted a Semitic alphabet from the Phoenicians. The Semites have spread within historical times into northern Africa, and their migrations had prob¬

ably taken a similar course before they were recorded in history. A large portion of the Mongols are still, as they have always been, a nomadic race, and their migrations, carrying everywhere the terror of predatory arms, have spread from the settled part of their own race in China along the north of Asia into northern Europe.

The early religion of the Aryan race, — a nation of shepherds, — divided itself after their separation into two related but widely different developments, Brahmanism and Zoroastrianism (see India (Religion) ; Zend-Avesta). The former became rich in mythological,

theolog¬ ical and philosophical literature ; but historical literature properly so called is wanting, and consequently there is a great absence of cer¬ tainty with regard to the dates of early events. The war which the Mahabharata (see San¬ skrit Language and Literature) professes to narrate is believed to be the earliest event in Indian history that can be regarded as historical, and probably took place about 1200-1400 b.c. In China authentic history extends back prob¬ ably to about 1100 b.c., with a long preceding period of which the names of dynasties are pre¬ served without chronological arrangement. The kingdoms of Assyria, Babylonia, Media and Persia alternately predominated in southwest¬ ern Asia. The arms of the Pharaohs also ex¬ tended into Asia, but their conquests there were short-lived. From Cyrus (b.c. 559), who ex¬ tended the empire of Persia from the Indus to the Mediterranean, while his son, Cambyses, added Egypt and Libya to it, to the conquest of Alexander (b.c. 330), Persia was the dominant power in Asia. The administration of Persia was. not without vigor and policy, yet the Mace¬ donian conquest was an event of great import¬ ance to Asia, bringing it, along with northern Africa, into closer relation with the more ad¬ vanced and progressive continent of Europe. The division of Alexander's empire led to the protracted struggle between the Greek dynasties of Egypt and Syria, which ended in the absorp¬ tion of both kingdoms in the Roman empire. After the unfortunate issue of the second Punic War Hannibal took refuge with Antiochus the Great of Syria, who, in the course of his con¬ quests, had come in contact with the Romans, and wras at length incited to try his strength with them. In the course of the war wfith Antiochus, L. Scipio, together with his brother, the conqueror of Carthage, passed into Asia. The kingdom of Antiochus wras spared after his overthrow7 ; but in b.c. 65 Syria became a Roman province. The Roman empire ultimately ex¬ tended to the Tigris.

The knowledge of Asia possessed by the Greeks and Romans was at its widest extent very limited. The countries with which they wrere best acquainted v/ere naturally in the wrest. China they knew as the country of the Seres or Sinae, and the northern portions of the con¬ tinent, inhabited by predatory Mongol tribes, wrere vaguely designated as Scythia. Of India the northwestern and western parts were known, and Ceylon likewise, under the name of Tapro- bane. The country traversed by the Hindu Kush and the sources of the Oxus, was known as Bactria ; that between the Oxus and the Tax- artes as Sodgians ; a large and vaguely defined central district, including Persia, was known as Ariana. Ptolemy had some acquaintance with

the Indian Peninsula, with the table-land of central Asia, with the Himalayas (Imaus) and China. The better known countries of the southwest comprised Asia Minor, Armenia, Arabia, Persia, Media, Parthia, Mesopotamia, Babylonia, Assyria, Syria.

Soon after the most civilized portions of the three continents had been reduced under one empire the great event took place which forms the dividing line of history. Christianity spread rapidly in the Roman empire ; but Armenia was the first country which received it as a national religion. In a.d. 226 the Parthian monarchy which had arisen in eastern Persia about b.c. 250, and had disputed the empire of Asia with the Romans, was overthrown by the revived Persian dynasty of the Sassanidae. The empire of Asia was now disputed with the Romans by the Persians. In the revived Persian empire the Magian religion was restored, and after the establishment of Christianity in the Roman em¬ pire religious jealousy embittered the feud between the two powers. The possession of Armenia was the subject of a protracted strug¬ gle between them ; but its religion inclined it to the Roman alliance. The Tigris formed the most permanent boundary between the two empires, neither being able long to maintain any conquests beyond _ it. Christianity was perse¬ cuted in the Persian empire, and could not extend itself freely beyond the Roman limits. After the division of the Roman empire (a.d. 364) the struggle continued between the east¬ ern and the Persian empires until the rise of a new power destined to absorb them both. While the eastern empire was struggling more and more feebly with the Persians, the Mon¬ gols and the barbarians of Europe, a new re¬ ligion arose in Arabia (a. d. 622), which gathered around it a band of enthusiasts, small at first, but inspired with the most ardent zeal of proselytism. The central tenet of the unity of God gave them the sympathy of the Mono- physite sect, which, persecuted in the empire, was powerful in Egypt, Syria, Mesopotamia and Armenia. Arabia, the country of the Prophet, soon gave its adherence to the new faith. The sword was consecrated as the instrument of its propagation. Persia, was the first great con¬ quest of the Arabians. Syria and Egypt soon fell before their arms, powerfully aided by the defection of the heretics of the empire, and within 40 years of the celebrated flight of Mo¬ hammed from Mecca, which constitutes the era of his followers, the sixth of the Caliphs, or successors of the Prophet, was the most power¬ ful sovereign of Asia. Heraclius, one of the most warlike, and in the early part of his reign one of the most successful of the eastern emperors, had succumbed to this torrent of con¬ quest, and his successors trembled at the names of their rivals. The successors of Mohammed

were at first austere and simple in their man¬ ners, and narrow and zealous in their religious faith; but from the accession of Moawiyah (a.d. 661), the time when the seat of empire was transferred first to Damascus and subse¬ quently to Bagdad, the throne of the Caliphs was as splendid as it was powerful. The gener¬ ous blood of Arabia, nourished by more genial climes, showed an aptitude for all that is great, not only in military achievement, but in learn¬ ing, science, literature and art. The empire was soon divided, but wherever the Arab sway pre¬

vailed a liberal patronage of learning and tol¬ eration even of speculative inquiry distinguished it. The career of conquest was not soon ended. It spread with astonishing rapidity over Africa and Europe, and was finally checked only by the fatal divisions which originated in the dis¬ putes between the descendants of the Prophet and the dynasty of the Ommiades, descended from his mortal foe and tardy convert, Abu Sophian.

Among the alternate protectors and op¬ pressors of the eastern Roman empire were the various Mongol tribes, whose predatory course led them to the west. In these also the Arab rulers found dangerous converts, who first sup¬ plied the place of their own troops, grown effeminate with luxury, and then planted them¬ selves on the throne of which they had super¬ seded the natural defenders. While the Caliphs of Bagdad still held a nominal sway, subject to the dictation of their Turkish guards, Mahmud, the Mongolian Mohammedan ruler of Ghazni, asserted his independence (999), conquered In¬ dia, and established the Mohammedan power in the Punjab. Another revolt from the empire of Mahmud founded the Seljuk dynasty, which established itself in Aleppo, Damascus, Iconium and Kharism, and which was distinguished for its struggles with the Crusaders. Othman, an emir of the Seljuk Sultan of Iconium, estab¬ lished the Ottoman empire in 1300. About 1220 Genghis Khan, an independent Mongol chief, made himself master of central Asia, conquered northern China, overran Turkestan, Afghanis¬ tan and Persia; his successors took Bagdad and extinguished the remains of the caliphate. In Asia Minor they overthrew the Seljuk dynasty. His grandson, Kublai Khan, conquered China in 1260. The successors of Genghis Khan also invaded Russia, and the Christian empire estab¬ lished by Vladimir was overthrown by the Golden Horde, led by his grandson Batu (1240). Timur or Tamerlane, who professed to be a descendant of Genghis, carried fire and sword over northern India and western Asia, defeated and took prisoner Bajazet, the descendant of Othman (1402), and received tribute from the Greek Emperor. The Ottoman empire soon recovered from this blow, and Constantinople was taken and the

eastern empire overthrown by the Sultan Mohammed II in 1453. A de¬ scendant of Timur, Baber, again invaded India early in the 16th century, and his grandson, Akbar the Great (1556ˆ-1605), founded the Mogul empire at Delhi, for two centuries one of the most brilliant Asia has known. China recovered its independence about 1368 and was again subjected by the Manchu Tartars (1618— 45), soon after which it began to extend its empire over central Asia. Siberia was conquered bv the Cossacks on behalf of Russia (1580-84) The same country effected a settlement in the Caucasus about 1786, and has since continued to make steady advances into central Asia. The discovery by the Portuguese of the passage to India by the Cape of Good Hope led to their establishment on the coast of the peninsula (1498) and opened a new era in the history of the East, which had been practically isolated from the West since the time of the Crusades. They were speedily followed by the Spanish, Dutch, French and British. The struggle be¬ tween the last two powers for the supremacy of India was completed by the destruction of

ASIA

Copyright by Underwood <X Underwood, N. V.

1 Smyrna. Scene along the busy Harbor-front 3 Foundations of the Tower of Babel, Babylon

2 The Tigris River at Bagdad and the “ Kufas ” or circular 4 Scene in Mt. Sinai Valley. The Rock from which

ferry-boats Moses read the Ten Commandments

the French settlements (1760-65), and from that time the conquest of India by the British progressed with uninterrupted success. In 1858 India came directly under the British Crown. The extension of the influence and possessions of European powers, especially Russia, Great Britain and France; Germany’s seizure of Kiau- Chau in the Chinese province of Shantung in 1897 ; the rapid development of Japan into a power capable of competing on equal terms with those of Europe, as demonstrated by the vic¬ tories over China (1895) and Russia (1904-05), the annexation of Korea (22 Aug. 1910), and capture of Kiau-Chau from Germany (7 Nov. 1914) ; the conquest of the Philippine Islands from Spain by the United States (1899) ; the Boxer rebellion (1900-01) ; overthrow of the Manchu dynasty in China and

proclamation of the Chinese Republic (12 Feb. 1912); the Jap¬ anese demands considered menacing to the in¬ dependence of China and the agreement of 8 May 1915 between the two nations; the partici¬ pation of Turkey in the European War on the side of the Central Powers are the most im¬ portant events in modern Asiatic history. For particular phases of this history see China; Korea; Japan; Manchuria; Russia and Tur¬ key. Also Boxers and Triple Alliance.

Bibliography. — For general bibliographies consult Quaritch, (Catalogue of Geography, Voyages, Travels and History of America, Af¬ rica, Australia and Asia *(London 1899) ; and Muller, (Asie, histoire, geographic, voyages Catalogue) (Amsterdam 1901). General Works: Reclus, (Nouvelle geographic universelle) (Paris 1881-84) ; Eng. translation, (Universal Geography* (London 1890) ; Keane, (New York 1901) ; Huntington, (The Pulse of Asia* (Bos¬ ton 1907) ; Grothe, (Zur Natur und Wirthschaft von Vorder-AsieiP (Frankfort 1911). Geol¬ ogy: Humboldt, (Fragments de geologie et climatologie asiatique) (Paris 1832) ; Suess, (Das Antlitz der Erde) (Leipzig 1855-88) ; Eng. translation, (The Face of the Earth* (Oxford 1906-08) ; Neumayr, (Erdgeschichte) (Leipzig 1895) ; Futterer, (Die allgemeinen geologischen Ergebnisse der neuen Forschun- gen in Zentral-Asien und China* (Gotha 1896). Ethnology : Winkler, (Ural altaische Volker und Sprachen) (Berlin 1884) ; Brinton, (Races and Peoples) (New York 1890) ; Keane, (Eth- nology) (Cambridge 1896) ; Ratzel, ˆHistory of Mankind* (Eng. trans. London 1896-98) ; Deni- ker, (Races of Man* (London 1900) ; Volz, (Asien> (in Illustrierte Vo'kerkunde, Stuttgart 1910) ; Buschan, (Die Sitten der Volker* (Stuttgart 1914). Travel and Exploration:

(Dutreuil de Rhins L'Asie Centrale) (Paris 1889) ; Windt, (From Pekin to Calais by Land) (London 1889) ; Bonvalot, (Through the Heart of Asia) (Eng. trans. by Pitman, London 1889) ; id., (From Paris to Tonkin *(London 1891) ; Younghusband, (The Heart of a Continent (London 1893) ; de Decken, (A travers l'Asie* (Brussels 1894) ; Sven Hedin, (Through Asia) (London 1898) ; id., (Central Asia and Tibet * (ib. 1903) ; id., (From Pole to Pole *(ib. 1912) ; Cobbold, Unnermost Asia) (London 1900) ; (The Book of Ser Marco Polo) (trans. by Yule, revised in light of modern discoveries by Cordier, London 1903) ; Little, (The Far East) (London 1905) ; Redway, (A11 Around Asia* (New York 1910) ; Tocugiro, '■L'Asia Centrale ; note di viaggio et studi di un diplo- matico giapponese) (trans. by Nocentini, Turin 1911). History and Politics: Curzon, (Problems of the Far East) (London 1894) ; Norman, (The Peoples and Politics of the Far East) (London 1894) ; Mahan, (The Problem of Asia) (Boston 1900) ; Wirth, (Entwickelung Asiens von altesten Zeiten bis zur Gegemvart *(Frankfort 1901) ; Justi*

*and Williams, (Central and East Asia in Antiquity * (Philadelphia 1902) ; Townsend, (Asia and Europe) (New York 1904) ; Foster, (American Diplomacy in the Orient) (Boston 1903) ; Andrews, Con¬ temporary Asia and Africa) (Philadelphia 1905) ; Wirth, (Geschichte Asiens und Ost-europas> (Halle 1905) ; Cordier, (General Sur¬ vey of History of Asia* (Boston 1906) ; Duchesne, (Asia and the War* (Oxford Pamphlets, London 1914).

Henri F. Klein,

Charles Leonard Stuart, Members of The Americana Staff.

ASIA, Central, a designation loosely ap¬ plied to that enormous region of Asiatic ter¬ ritory lying between the Altai Mountains and the Persian Gulf, and includes part of Siberia, all Turkestan, Afghanistan, Baluchistan and part of Persia. Humboldt's definition of cen¬ tral Asia gave that name to the khanates of Bokhara and Tartary. In Russian official lan¬ guage, central Asia is an administrative por¬ tion of the empire lying to the southwest of Siberia and comprises with part of what used to be called Siberia the recent Russian annex¬ ations in Turkestan. The total area is given at 1,366,000 square miles and the population at 11,135,500. The eastern portion belongs to China; the western or Russian portion is di¬ vided into the governments of Akmolinsk, Semipalatinsk, Turgai, Uralsk, Semirechinsk, Ferghana, Samarkand Syr-Daria and the Trans-Caspian territory. For the geography, ethnography, etc., of the region see Asia ; also Turkestan, Khiva, Khokand, Siberia, Russia, etc. Consult Cobbold, R. P., Unner¬ most Asia *(London 1900) ; Knight, E. F., (Where Three Empires Meet) (London 1893) ; Krafft, H., (A travers le Turkestan Russe) (Paris 1901) ; Meakin, Annette, Un Russian Turkestan* (London 1915) ; Phibbs, I. M., (A Visit to the Russians in Central Asia) (London 1899) ; Skrine, F. H., (The Expan¬ sion of Russia) 1815-1900 (London 1903). Bokhara: Curzon, G. N. (Lord), (Russians in Central Asia) (London 1889) and (The Pamirs and the Source of the Oxus) (London 1897) ; O'Donovan, E., (The Merv Oasis) (London 1889) ; Vambery, A., (History of

Bokhara *(London 1873). Khiva : Burnaby, Col. F., CA Ride to Khiva1* (London 1884) ; Wood, H., (The Shores of the Lake Aral* (London 1876).

ASIA, in the Bible. In the Old Testa¬ ment there is no reference to

Asia, but in the Apocrypha it is applied to the territory cover¬ ing the Tigris and the Euphrates valleys, part of Asia Minor, Syria, Phoenicia and Palestine, practically the same countries to which the Romans applied the name. Consult Acts xix, 10, 26, which refers to Paul laboring in Ephe¬ sus, chief city of the Biblical Asia. Paul ad¬ dressed the circular epistle to the churches of this region, for reference to which see the closing salutation of Corinthians (which was written from Ephesus) xvi, 19. They are also made the recipients of the message of John in the Book of Revelation.

ASIA MINOR (((Asia the Less®). Mod¬ ern Anatolia is the extreme western peninsula projection of Asia, forming part of Turkey in Asia. The name is not very ancient ; orig¬ inally the Greeks seem by Asia to have meant only the western part of Asia Minor, but with their geographical knowledge the scope of the name Asia gradually widened. The late Greek name for Asia Minor is Anatolia — Anatole, ((the East,® whence is formed the Turkish Anadoli. Asia Minor includes the peninsula ; it is bounded on the north by the Black Sea and Sea of Marmora, on the west by the TEgean Sea, on the south by the Mediterranean and on the east by the Armenian highlands and the Euphrates. In the extreme northwest it is separated from Europe by the Straits of the Bosporus and the Dardenelles. The western coast is indented with innumerable bays and gulfs, beyond which lie the islands of the Grecian Archipelago. The area of the peninsula is about 199,272 square miles. It con¬ stitutes the western prolongation of the high table-land of Armenia with its border mountain ranges. The interior consists of a great plateau or rather series of plateaus, rising in gradation from 3,500 to 4,000 feet, with bare steppes, salt plains, marshes and salt lakes ; the struc¬ ture is volcanic and there are several conical mountains, one of which, the Ergish-dagh (Argaeus), with two craters, attains a height of 13,100 feet, towering above the plain of Kaisarieh which has itself an elevation of be¬ tween 2,000 and 3,000 feet. The plateau is bordered on the north by the Pontic Coast range, a long train of parallel mountains 4,000 to 6,000 feet high and cut up into groups by cross-valleys. These mountains sink abruptly down on the northern side to a nar¬ row strip of coast; their slopes toward the interior are gentler and bare of wood. Simi¬ lar is the character of the border ranges on the south, the ancient Taurus, only that they are more continuous and higher, having an average elevation of about 7,000 feet and ris¬ ing to over 10,000 feet in Lycia and Cilicia. The western border is intersected by numerous valleys opening upon the archipelago to the northern part of which Mounts Ida and Olym¬ pus belong. Between the highlands and the sea lie the fertile coast lands of the Levant. * Of the rivers the largest is the Kizil

Irmak (Halys), which, like the Yeshil Irmak (Iris), and the Sakaria (Sangarius). flows into the Black Sea; the Gediz Chai (Hermus) with its

affluents the Pactole and Menderes (Mseander), flow into the ydvgean.

Climate. — The climate has on the whole a southern European character, except on the central plateau which is more Asiatic, and has very little rain, a hot summer and a long, cold winter; the southern coast has mild win¬ ters and scorching summers, while on the coast of the ˆEgean there is the mildest of climates, the summer being tempered by sea breezes and a magnificent vegetation. On the northern side, being exposed to the northeast winds from the Black Sea, the climate is not so mild, but there are abundant rains and the vegetation is luxuriant.

Industrial Development.- — In point of natural history Asia Minor partakes of the character of the East and of the West. The forest trees and cultivated plants of Europe are seen mingled with the forms characteris¬ tic of Persia and Syria. The central plateau, which is barren, has the character of an Asi¬ atic steppe, more adapted to the raising of flocks and herds than for agriculture, except the cultivation of wheat and other grains ; horses, excellent mule-camels and the Angora- goat are bred here. The coasts are rich in all European products, fine fruits, olives, vines and silk have quite the character of the south of Europe, which on the warmer and drier southern coast shades into that of Africa. The chief products besides those mentioned are wheat and other grains, cotton, tobacco, flax, poppy-seed and licorice. Carpets, rugs and silk stuffs are the principal manufac¬ tures. Asia Minor has considerable mineral wealth, including lead, copper, petroleum, meerschaum, gold, silver, coal and salt, but it is as yet almost undeveloped. The main ex¬ ports are figs, raisins and other fruits, olive oil, silk, cocoons, carpets, sponges, mohair, wool, hides, cattle, gum, poultry, wax and to¬ bacco.

The People. — The inhabitants, some 10,- 000,000 in number, consist of the most various races. The dominant race are the Osmanli Turks, who number about 7,000,000, and are spread over the whole country; they are main¬ ly engaged in agriculture and cattle-raising. Allied to these are the Turkomans and Yuruks, speaking a dialect of the same language. The latter are found chiefly on the tableland, leading a nomadic life; there are also hordes of nomadic Kurds. Among the mountains east of Trebizond are the robber tribes of the Lazes. Before the European War the Greeks and Armenians were the most progressive elements in the population and had most of the trade. While the Greeks monopolized the professions, the ownership of the

land was largely passing into the hands of the Greeks, Armenians and Jews.

Administration. — The country falls into eight vilayets or governments with their cap¬ itals in Brusa, Smyrna, Konia (Iconium), Adana, Sivas, Angora, Trebizond and Kas- tamuni, respectively, and the two <(independ- ent® Sanjaks of Ismid and Bigha. In ancient times the divisions were Pontus, Paphlagonia, Bithynia in the north ; Mvsia, Lydia, Caria in the west; Pisidia and Cilicia in the south; Cappadocia in the west ; and Galatia with Lycaonia and Phrygia in the centre. The 2Egean Islands, which have recently passed

ASIATIC ART

1 Dancing Staff from Sumatra

2 Fetich from Nias

3 Aino Shuttle

4 Bashkir Ornament

5 Bronze Buddha

6 Helmet

7 Gauntlet

8 Japanese Kettle, Silver and Bronze

9 Singhalese Work

ASIATIC ART

10 Dancing Staff from Sumatra

11 Head Covering from Luzon I 12 Hat from Borneo

13-16 Articles from Samoa and Tonga Islands 17 Bashkir Ornament

18 Suit of Armor

19 Armored Shoe

20 Aino Quiver

21 Mandarin’s Staff in Red Lacquer

out of the hands of Turkey, belonged most of them to Asia Minor.

Railways. — The right to construct rail¬ ways in northeastern Asia Minor and Arme¬ nia has been conceded to Russia. The earliest roads, however, were constructed by English and French companies in 1856 and 1866, re¬ spectively, the first running from Smyrna to Aidin and Dineir with several branch lines ; the second from Smyrna to Cassaba with ex¬ tensions to Afion and Karalussar. The main or Anatolian line was opened about 1873, the first section running from Haidar Pasha to Ismid. In 1888 it was taken over by the German Society of Anatolian Railways, financed by the Bank of Berlin, and in 1892 was extended to Angora, and in 1896 to Ko- nia. In 1902 the German Bank received the concession for the Bagdad Railway (q.v.) by which the Anatolian line was to be extended from Konia to Adana, Mosul, Bagdad and Basra, with numerous branch lines. It has been completed continuoTisly as far as Kara Buna in Cilicia (1911-12) and with the vari¬ ous sections already completed was in 1916 operating along a length of 538 miles from Konia. The total length of railways in Asia Minor is about 1,500 miles and the benefits derived from them by the country are ines¬ timable.

History. — Here, especially in Ionia, was the early seat of Grecian civilization and here were the countries of Phrygia, Lycia, Caria, Paphlagonia, Bithynia, Lydia, Pamphylia, Isauria, Cilicia, Galatia, Cappadocia, etc., with Troy, Ephesus, Smyrna and many other great and famous cities, including the seven churches of the book of Revelation. Here in the dawn of history the non-Aryan race of the Hittites, whose capital is thought to have been at Bo- ghaz Keni, rose to power; here from the ob¬ scure era of Semiramis (about 2000 b.c.) to the time of Osman (about 1300 a.d.), the greatest conquerors of the world contended for supremacy; and here took place the wars of the Medes and Persians with the Scythians; of the Greeks with the Persians ; of the Romans with Mithridates and the Parthians ; of the Arabs, Seljuks, Mongols and Osmanli Turks with the weak Byzantine empire. Here Alexander the Great and the Romans suc¬ cessfully contended for the mastery of the civilized world, and here the Crusaders passed on their way to the Holy Sepulchre. But not¬ withstanding all these wars the country still continued to enjoy some measure of prosper¬ ity till it fell into the hands of the Turks, under

whose military despotism its ancient civilization has been sadly brought to ruin. Recently considerable portions of Armenia have been absorbed by Russia. In 1878 Great Britain made a secret engagement to guaran¬ tee against Russian aggression the Asiatic dominions of the Porte. Of recent years German influence has been preponderant throughout the Turkish empire and in Asia Minor all the railroads of the plateau are practically in the hands of German capitalists.

Bibliography. — Clark, F. E., <The Holy Land of Asia Minor) (New York 1914) ; Flitch, (Le Chemin de for de Bagdad* (Brus¬ sels 1914) ; Gallais, E., (Asie Mineure et Sy- rie) (Paris 1907) ; Kaunenberg, K., Hvleina- siens Naturschatze) (Berlin 1897) ; Leonhard,

R., (Paphlagonia } (Berlin 1915) ; Obcrhum- mer and Zimmerer, (Durch Syrien und Klein- asien> (Leipzig 1898); Percy, Earl, (The Highlands of Asiatic Turkey) (London 1901) ; Philippson, A., (Reisen und Forschungen im Westlichen Kleinasien* (Gotha 1910-13) ; Ramsay, W. M., (Historical Geography of

Asia Minor) (London 1890) ; Reclus, E., Universal Geography, Asiatic Turkey* (Lon¬ don n. d.).

ASIAGO, Italy, town of the province of Vicenza, 1 7 miles north of the city of that name. It is the capital of the district of Setti Communi; has manufactories of straw hats and has a large percentage of Teutons among its inhabitants who number about 5,500. In the great German drive of November 1917 Asiago and the surrounding plateau were menaced by the Teuton forces. For a detailed account of the military operations in Venetia see War, European.

ASIARCH, a'shl-ark, a Roman officer ap¬ pointed as director-general of religious cere¬ monies in the province of Asia. The expres¬ sion occurs in the Greek Testament, Tines de kai ton Asiarchon, ((And certain also of the Asiarchs** (Acts xix, 31). Properly speaking there was but one Asiarch residing at Ephe¬ sus; the others referred to were his subordi¬ nates.

ASIATIC BROTHERS, the designation of a secret society organized in Germany about 1780. See Rosicrucians.

ASIATIC SOCIETIES, learned associa¬ tions formed for the purpose of collecting and disseminating valuable information respecting the different countries of Asia. The Royal Asiatic Society of Great Britain and Ireland was established 19 March 1823. With it in 1828 was connected a very active translation committee which publishes

English, French and Latin translations of Oriental works, oc¬ casionally accompanied with the originals. Similar societies have been formed in Asia itself, such as the Asiatic Society of Bengal at Calcutta, founded in 1784 by Sir William Jones. Since 1846 the Bibliotheca Indica, — a series of Oriental works in text and trans¬ lation, — has been published under the super¬ vision of this society at the expense of the Anglo-Indian government. There are similar societies on the Continent and in America, such as the Societe Asiatique at Paris, found¬ ed in 1822, the Oriental Society of Germany (Deutsche Morgenliindische Gesellschaft), founded in 1845, and the American Oriental Society, organized 7 Sept. 1842, and which in 1915 had a membership of 304.

ASIMINA, a-sim'i-na, Papaw, a genus of nine species of shrubs or small trees of the family Anonacece, eight of which are natives of eastern North America, the West Indies and Mexico, with attractive foliage and large purple or whitish axillary flowers appearing in early spring, and large edible fruits. Two species are cultivated for ornament and deserve more atten¬ tion at the hands of horticulturists. One of these, A. triloba, which has produced some va¬ rieties, is the only arborescent species of the genus. It is hardy as far north as Massa¬ chusetts and produces very large-seeded fruits, often more than three inches long and too

highly aromatic to suit all palates. The other species A. grandiflora, is found in Georgia and Florida and is said to produce delicious fruits.

A'SIPHONA'TA, an order of lamelli- branchiate, bivalve mollusks, destitute of the siphon or tube through which, in the Siphona- ta, the water that enters the gills is passed outward. It includes the oysters, the scallop shells, the pearl oyster, the mussels, and in general the most useful and valuable mollusks.

ASIR, Arabia, district lying between lat. 17° 30' and 21° N. and long. 40° 30' and 45° E. ; bounded north by Hejoz, east by Nejd, south by Yemen and west by the Red Sea. Its length along the coast is about 230 miles and its breadth about 180. The lowland is

hot and barren. Kanfuda is the chief port

of the district; Marsa, Hali and El Itwad are smaller ports. The mountainous tract has an average altitude of between 6,000 and 7,000

feet, with a temperate climate and regular rainfall, and is fertile and populous. The

valleys are well watered and produce excellent crops of cereals and dates. Juniper forests are said to exist on the higher mountains. The inhabitants are a brave and warlike race of mountaineers and aided by the natural strength of the country have hitherto preserved their independence. The Turks have made repeated attempts to conquer Asir, but beyond occupy¬ ing Kanfuda and one or two points in the in¬ terior, they have effected nothing. No part of Arabia would better repay exploration.

ASK, in Scandinavian mythology, the name of the first man created. According to the legend the gods, Odin, Haener and Loder, found two trees by the seaside, an ash and an elm. From these they created the first man and first woman, Ask and Embla, and gave them the earth as their dwelling place.

ASKABAD, as'ka-bad', Russia, town in central Asia, capital of the Transcaspian province, 345 miles by rail southeast of Kras- novodsk and 594 from Samarkand, situated in a small oasis at the northern foot of the Kopet-dagh range. It has a public library and a technical railway school ; also cotton¬ cleaning works, tanneries, brick-works and a mineral-water factory. The trade is valued at $1,250,000 a year. The population, 2,500 in 1881 when the Russians seized it, is now about 20,000, one-third of whom are Persians, many of them belonging to the Babi sect.

ASKE, Robert, English rebel : d. 1537. He was of an old Yorkshire family. He be¬ came an attorney and fellow at Gray's Inn. Little of his personal history is known, except in connection with the insurrection called the <(Pilgrimage of Grace,® which began in Lincoln¬ shire in October 1536, as an outbreak against the law passed by Parliament suppressing those monasteries whose revenues fell below £200 a year. Other laws were enacted abrogating a number of old holidays and increasing taxes which aroused the indignation of the people. Aske led the uprising in Yorkshire. His army took Lord Daev and the archbishop of York prisoners, who were then forced to take the oath of the rebels. The monks and nuns were reinstated ; the royal herald was not permitted to read the King's proclamation ; and announc¬ ing his intention of marching to London to

declare the grievances of the commons to the sovereign himself, Aske soon had the whole country under his control. A military organiza¬ tion with posts from Newcastle to Hull was established and Hull was

provided with cannon. No terms could be agreed upon, and it was decided to fight a battle on 27 October. A heavy rain prevented the consummation of this plan. The King, in the meantime, sent a con¬ ciliatory message which Aske prevailed upon his followers to accept. Aske was pardoned, but the King's promises were not considered sufficient and another insurrection broke out in the east. For his efforts in suppressing this, Aske was thanked by the King. However, in spite of the fact that he had done nothing to forfeit the King's favor, he was sent to the Tower of London and sentenced to be hanged. He was paraded back to York and executed there in July. There is a striking inscription on a tower of the church of Aughtor in East Riding by a member of his family to commem¬ orate the year 1536. Consult Gasquet, F. A., (Henry VIII and the English Monasteries) (1906) ; (Letters and Papers of the Reign of Henry VHP (Vols. XI and XII); English Historical Review (Vol. V, pp. 330, 550) ; (Chronicle of Henry VHP (translated by M. A. S. Hume, 1889) ; Whitaker, (Richmondshire) (Vol. I, p. 116), containing a pedigree of the Askes ; Hall's Chronicle*, and Wriothesley's (Chronicle. >

ASKEW, as'ku, or ASCOUGH, Anne,

English religious zealot and martyr : b. Stall- ingborough 1521; d. Smithfield, 16 July 1546. On the death of her sister she was induced to become the wife of her sister's fiance, Thomas Kyme, by whom she had two children. She was a staunch Protestant, and upon being de¬ nounced by the family priest, her husband, a Catholic, turned her out of his house. She went to London, where she was arrested and charged with heresy, March 1545. On this charge she was acquitted, but persisting still in devotion to her faith, she was again arrested, June 1546, and tortured on the rack, in spite of which she refused to recant. In the following month, 16 July 1546, she was burned at the stake in Smithfield. Consult Bale, J., <The Lattre Examinacyon of Anne Askew* (Mar¬ burg 1547), and Webb, (An Account of Anne Askew * (London 1865).

ASKHABAD, as'kha-bad', the thriving administrative centre of the Russian province of Transcaspia, situated in the Akhal Tekke oasis, and occupied by Skobeleff in January 1881, after the sack of Geok Tepe. Its distance from Merv is 232 miles, from Herat 388 miles. Pop. about 52,000.

ASKJA, ask'ya, a volcano in the centre of Iceland, first brought into notice by an eruption in 1875. Its crater is 17 miles in circumference, surrounded by a mountain-ring from 500 to 1,000 feet high, the height of the mountain itself being between 4,000 and 5,000 feet.

ASLAUGA'S U-slow'gaz) KNIGHT, the title of a romantic tale of mediaeval chiv¬ alry, by Friedrich, Baron de la Motte-Fouque. It was published in 1814. The story is told with simplicitv and grace, and with it may be compared (The Fostering of Aslang) in Wm. Morris' (Earthly Paradise.*

ASMAI, as'mi, or ASMAYI, an Arabic writer, the instructor of Harun-al-Rashid : b. about 740; d. 830. His history of the kings of Arabia and Persia, prior to Islam, is of great value, while his romance of (Antar5 has been called (<the Iliad of the desert.55

ASMANITE, a variety of silica, occur¬ ring in small grains in certain meteoric irons, and now believed to be identical with tridy- mite (q.v.).

ASMARA, Africa, capital of the Italian colony of Eritrea in northeast Africa. It is built on the Hamasen plateau, at an elevation of 7,800 feet, and is 40 miles southwest of the seaport of Massawa. The town is strongly fortified. The European quarter contains sev¬ eral fine public buildings, including the resi¬ dence of the governor, club house, barracks and hospital. Fort Baldissera is built on a hill to the southwest and is considered impregnable. It was occupied by the Italians in 1889, and in 1900 the seat of government was transferred thither from Massawa. It is surrounded by rich agricultural lands, cultivated in part by Italian immigrants and is a busy trading centre. A railway from Massawa to Asmara was com¬ pleted as far as Ghinda in 1904. There are gold mines about six miles to the north which have been partially worked. The population is about 10,000, including the garrison of 300 Italian and some 1,000 native troops. The European civil population* numbers over 500; the rest of the inhabitants are chiefly Abyssinians.

ASMODEUS, or ASM O DAI, in He¬ brew mythology, an evil spirit which slew seven husbands of Sara, daughter of Raguel, at Rages. By the direction of the angel Raphael the young Tobias exorcised Asmodeus with the smell of a fish's liver burned on the coals, into the uttermost parts of Egypt, whither he was pursued by Raphael, who bound him, so that thereafter Tobias and Sarah might be undis¬ turbed by him. (Tobit VI, 14; VII, 2). Ac¬ cording to the Talmudic legends Asmodeus had divers relations with King Solomon, whom on several occasions he aided, especially in planning and constructing the

temple. In many of the legends he is given as the cause of the sins and excesses which besmirched the char¬ acter of Solomon. Several scholars have iden¬ tified Asmodeus with 2Eshma dseva, the demon of wrath, prominent in Mazdaism, the religion of Persia. Consult Jastrow, (Hebrew and Babylonian Traditions) (New York 1914) ; Hastings, dictionary of the Bible) (ib., 1910).

ASMODEUS, The Lame Devil ((Le Diable Boiteux5). A novel by Alain Rene Le Sage, first published in 1707, and republished by the author, with many changes and addi¬ tions, in 1725. It is sometimes knowm in Eng¬ lish as (Asmodeus,5 and sometimes as (The Devil on Two Sticks, 5 under which title the first English translation appeared, and was dramatized by Henry Fielding in 1768.

ASMONiEANS, a family of high priests and princes who ruled over the Jews for about 130 years, from 153 b.c. See Mac¬ cabees.

ASMUS, as'mus, Georg, German-Ameri- can poet: b. Giessen, 27 Nov. 1830; d. Bonn, 31 May 1892. He came to the United States to conduct some mining operations in the copper vol. 2 — 26

region of Lake Superior; then lived in New York until 1884, when he returned to Europe. Among the German population of the United States he had an enormous success with his (American Sketch-Booklet) (1875), an epistle in verse, written in Upper Hessian dialect and overflowing with delicious humor. It was fol¬ lowed by (New American Sketch-Booklet> (1876). He also wrote (Camp Paradise5 (1877), a story, and a collection of miscellane¬ ous poems (1891).

ASNYK, as 'nek, Adam, Polish patriot and poet: b. Kalish, 11 Sept. 1838; d. Cracow, 2 Aug. 1897. He participated in the insurrec¬ tion of 1863, for which he had to spend some years in exile in Germany. He was author of (Poezye5 (1872-80), and several successful dramas, (The Jew5 ; (Cola RienzP ; (The Friends of Job.5

ASOKA (Jonesia asoca), an Indian tree, of the natural order Leguminosce, sub-order Caesalpinece , with a flower showing orange, scarlet and bright yellow tints. It is sacred to the god Siva, and often mentioned in Indian literature.

ASOKA (a-so'ka) VARDHANA, an In¬ dian sovereign, who reigned 264-227 b.c. over the whole of northern Hindustan. He em¬ braced Buddhism, and forced his subjects also to become converts. Many temples and topes still remaining are attributed to him.

ASOLANDO: Facts and Fancies, the latest volume of poems written by

Robert Browning and published on the day of his death, 12 Dec. 1889.

ASOLO, Italy, town of Venetia, in the province of Treviso, about 19 miles northwest of Treviso, and 10 miles east of Bassano. It is well situated on a hill, 690 feet above sea-level. Remains of Roman baths and of a theatre have been discovered. Asolo was the residence of Catherine Cornaro, Queen of Cyprus, after her abdication. Paulus Manutius was born here. Pop. 5,847.

ASOPUS, the name of several rivers in Greece. The most celebrated of this name are those in Achaia and Boeotia.

ASOTUS, one of the characters in (Cyn¬ thia's Revels,5 by Jonson. He is a toady to Amorphus.

ASP, a venomous snake. The name as applied in the Bible probably refers to the hooded, or African cobra (Naja haje), common in Egypt, and often represented in hiero¬ glyphics. The naja haje is from three to five feet long, and the loose skin on its neck can be dilated into a hood like that of the Indian cobra, but its markings differ. (See Cobra). The asp employed for suicide by Cleopatra was probably the small-horned viper (Aspis hassel- quistii). The asp of southern Europe is V ip era aspis , found from France to the Tyrol and in Italy. See Viper.

ASPARAGIN, or ASPARAGINE, a ni¬ trogenous substance having the formula CiHs- N203, or CONH2. CH2CH (NHQ.COOH, oc¬ curring in the juice of most plants, and notably in the growing buds of asparagus. It is readily obtained by filtering the plant juice, and evapo¬ rating it to a syrupy consistency. The asparagin then separates in the form of trimetric pris-

matic crystals, which are soluble in water and in acids and alkalis, but insoluble in alcohol or ether. Asparagin undoubtedly plays a very important (though yet unknown) part in the chemistry of plants, since it occurs in large amounts in germinating seeds, and wherever growth is actively proceeding.

ASPARAGUS, a- genus of about 150 spe¬ cies of mostly tuberous-rooted, climbing, droop¬ ing, trailing or erect perennial herbs or shrubs widely distributed in tropical and warm tem¬ perate countries, especially in southern Europe and southern Africa, but more or less culti¬ vated for food or ornament in all civilized countries. Some

species rival and even excel the most delicate ferns in beauty of habit and foliage, which, botanically considered, consists not of leaves but leaf-like stems. The orna¬ mental species with the exception of A: verti- cillatus (see below), must all be grown in green¬ houses, except in southern Florida and south¬ ern California, where they may be planted with safety out of doors. They are readily and usually propagated by seeds, but often also by cuttings and by division. Among the best- known ornamental species cultivated in Ameri¬ ca are the following: A. asparagoidcs, also known as Myrsiphyllum asparagoidcs, the smilax of the florist, is widely grown for dec¬ orative purposes, for which its glossy green leaves specially commend it. (For culture, see Smilax). A. sprengeri is a species native in Natal, with long drooping branches, glossy light-green leaves (white in one variety), small white fragrant flowers in small racemes, and little red berries. It is very popular, especially for planting in hanging baskets. A. plumosus, a tall climbing species from South Africa with horizontal branches of beautiful form, tex¬ ture, and color, which qualities are retained for weeks or even months after cutting, is de¬ servedly one of the most popular of decorative plants. It has developed several varieties, some of which, especially the variety tenuissi- mus, are even more popular than the original species. A. vcrticillatus, a hardy species with tufts of hair-like leaves and small red berries, is a native of Persia and Siberia, and climbs to a height of 12 to 15 feet from a woody root- stock. Several other species are cultivated for ornament in America.

Best and most widely known, however, is A. officinalis, esculent asparagus, which is also used to some extent as an ornamental plant. It is a perennial herb, native of Europe and Asia, and commonly found growing on sandy loam or sea shores, river banks and among shrubby undergrowth. In a wild state it rarely exceeds a foot in height and a stem diameter of more than one-third of an inch; but in gar¬ dens sprouts are sometimes obtained as thick as a man's wrist, and the plants often grow more than four feet tall. For more than 2,000 years it has been cultivated for its succulent young shoots, produced from the thick root¬ stocks in spring. An excellent method of growing the plant may be epitomized as fol¬ lows :

The land chosen for the bed should be a rich, friable and warm loam, preferably ex¬ posed to the south or east. Manure should be applied without stint before the plants are set, and the preparation of the soil should be deep

and thorough. The plants may be home-grown or purchased. One-year-old plants, if sturdy, are preferable to older ones. For home

grow¬ ing a separate nursery bed should be prepared, and the seed previously soaked 24 hours in order to hasten germination, sown in early spring, about two inches apart and one inch deep, at which rate an ounce should be enough for 200 or more feet of drill. Some radish seed of a small early maturing variety should be sown in the same drill, so that the young radish plants, which quickly appear, may mark the position of the rows of the slower-appear¬ ing and less-conspicuous asparagus plants. As soon as the radishes are of edible size, or even before, if necessary, they should be pulled and the asparagus plants, then an inch or two tall, left in possession of the ground. Beyond keep¬ ing down wreeds, destroying pests and thinning the plants to four inches asunder, no further attention is necessary during the first year. In the spring of the second year, if properly man¬ aged during the first, the plants should be large enough to be transplanted to the permanent bed. If too small they should be transplanted at least eight inches asunder and grown a second 3ˆear in a nursery bed. In the permanent bed the plants should stand at least two feet asunder in rows not less than four feet apart. Five or even six feet for the larger growing varieties is much better. Staminate plants are more productive of shoots than pistillate, but are difficult to recognize until the plants flower. The furrows are plowed six inches deep or deeper, the plants set in the bottom, but at first covered with only about twro inches of earth. After growth starts the trench is gradually filled by cultivation which must be thorough, both among the plants and between the rows. Not before the second spring after planting in permanent quarters should any shoots be gath¬ ered. At the time of planting a liberal dressing of some slowly decomposing fertilizer, such as ground bone, should be given in the drill, and in the spring of each year complete fertilizers should be applied liberally. (See Ferti¬ lizers). In addition to such applications many growers spread stable manure upon the bed in the autumn after the tops have been removed, a necessary practice to prevent the scattering of the seeds upon the bed. In the spring as soon as the soil can be worked the land is either plowed shallow or cultivated deeply to bury the manure. Since the plants are gross feeders there need be little fear of fertilizing too heavily. Methods of gathering depend somewhat upon whether the stalks are to be blanched or left green. Blanching is done by ridging the soil 13 inches deep above the crowns. Stalks so produced are gathered as soon as the tips appear above the soil ; green stalks are cut when about nine inches long, in¬ cluding the base of two or more inches below the surface of the ground. In each case' the stalk may be cut with an asparagus knife or preferably snapped near the crown, or at least at the proper depth, if blanched, by plunging the hand down in the loose soil beside the stalk and severing it with the fingers. By

the latter method there is less danger of injuring other shoots. All cutting should cease when green peas, grown in the same locality, are ready for the table, because the plants must be given op¬ portunity to store up food for the following

year. The stems are usually sold in bunches of various sizes, the grade depending upon the length and nuifiber of stalks in the bunch. The bunch commonly sold is eight and one-half inches long, weighs about two pounds and con¬ tains 30 spears. As a rule, the thicker the spear the better. First-class spears are three-quarters of an inch thick or thicker. Every care must be taken in handling to prevent bruising, since a gummy juice collects in the broken cells, and the injured stalks spoil by heating. After wash¬ ing, the stalks should be dried and kept cool. If to be shipped long distances, their butts should rest in damp sphagnum moss or similar material. In the home garden, where horse cultivation is not practicable, the plants may be set even as close as 18 inches by two feet, but the manuring, cultivation and other care must be increased in order to obtain choice shoots. Each spring the very liberal dressing of manure applied the previous autumn should be forked, not dug, in, and a lavish amount of commercial fertilizer, rich in potash, phosphoric acid and nitrogen, applied. Soap suds may be emptied upon the bed ; they have more or less potash in them. Asparagus sometimes is forced in hotbeds, under green-house benches, in cel¬ lars, etc., by setting mature crowns (plants) close together and supplying heat and mois¬ ture. A large amount of light is not essential. It is also forced in the field by covering the beds with cloth and applying heat by means of portable steam pipes, either in or upon the ground. In the former case the roots are ruined by the process ; in the latter, they are not, but should be given one or more years to recuperate. (Consult reports and bulletins of Cornell Experiment Station and of Missouri Experiment Station). Several other species furnish edible shoots; for example, A. acuti- folius, A. albus and A. tenuifolius, all European species. The tubers of A. lucidus are eaten in China and Japan, where the species is indige¬ nous. The shoots of A. s caber , which resemble those of A. officialis, are inedible because bit¬ ter.

Enemies. — Asparagus has only two import¬ ant enemies, and when compared with other general crops, long cultivated, only a few less serious ones. Asparagus rust (Puccinia as- paragi) has been known for about 100 years, and sometimes does serious damage. In a badly

infested field the plants as a whole seem to be maturing very early, their deep green having been replaced by a tawny brown. The stems, examined closely, show a blistered and ruptured skin, beneath which are brown masses of spores or, in late autumn, almost black win¬ ter spores. In the spring the “cluster cup® is the form observed. The most effective control is the resin-Bordeaux mixture, made by adding to each 48 gallons of standard Bordeaux mix¬ ture two gallons of resin stock solution, made as follows : Heat five pounds of resin and one pint of fish-oil in a kettle until the resin is dis¬ solved. If very hot, allow to cool somewhat. Then slowly stir in one pound of potash lye and heat again till the mixture becomes the color of amber, when five gallons of water must be added. If the potash be added while the resin is too hot, the mixture may ignite. This solution increases the adhesiveness of Bordeaux mixture. (See Fungicide). With the mixture 50 per cent greater yield has been

obtained in unfavorable seasons, and 70 per cent in favorable. Growers cutting 800 bunches or more per acre find that thorough spraying each week for four, five or even more weeks pays well. For detailed account of this disease and specific methods of control, consult N. Y. Experiment Station Report (1901). The as¬ paragus beetle (Crioceris asparagi), a Euro¬ pean insect introduced about 1856, the only se¬ riously injurious insect pest, is about one- quarter of an inch long with black and yellow or red wing-covers. It belongs to the Chryso- melidce. It appears as the adult in spring, and lays eggs on the shoots. In a few days grayish- green grubs appear and gnaw the green parts of the plants. When full grown they burrow in the ground to pupate for a short time. The broods succeed each other at intervals of about a month, if the weather be favorable. Their natural enemies are lady-bird beetles and sol¬ dier beetles. The popular remedies are the cor¬ ralling of chickens, ducks and turkeys in the plantation ; cutting all volunteer plants in waste places ; cutting new shoots daily ; allowing spindling shoots to remain in alternate rows for the insects to deposit their eggs upon and burn¬ ing the shoots not less often than once a week; dusting with air-slaked lime or road dust while the dew is on ; brushing the grubs to the hot ground from the full grown plants, the middle of the day being chosen for this operation ; spraying with arsenites, hellebore or other stomach poisons, etc. A case of fight early and fight late ! The 12-spotted asparagus beetle (Crioceris 1 2-punctatus) , about the same size as its relative just described, but orange red with black dots, has a similar life history, and may be controlled in the same way, but is not yet seriously troublesome, except in a few lo¬ calities. Several plant bugs, moth larvae, beetles and aphids also feed upon asparagus, but have not

become serious pests. Consult Year-book United States Department of Agriculture (Washington 1896), and Bulletin No. 10 (1898). See Insecticides.

For fuller details of asparagus culture con¬ sult Hexamer, (Asparagus Culture) (1901) ; Bailey, (Standard Cyclopedia of FIorticulture) (1914). In the latter will also be found spe¬ cific instruction for the cultivation of orna¬ mental asparagus.

ASPARAGUS-STONE, a variety of apa¬ tite, found in Murcia, Spain, in the form of small, transparent, yellowish-green crystals.

ASPASIA, as-pa'shi-a, a celebrated woman of ancient Greece: b. in Miletus in Ionia, but spending a great part of her life in Athens. Her house was the resort of the most virtuous, learned and distinguished men in Greece. She inspired the strongest and most enduring af¬ fection in the heart of Pericles, who had sep¬ arated from his own wife and united himself to Aspasia as closely as was permitted by the Athenian law, which declared marriage with a foreign woman illegal. When the Athenians were dissatisfied with Pericles, instead of at¬ tacking him they persecuted the objects of his particular favor, and accused Aspasia of con¬ tempt of the gods. Pericles defended her in the Areopagus, but it required all his influence to procure her acquittal. After his death (b.c. 429) Aspasia is said to have attached herself to a wealthy but obscure cattle-dealer, of the

name of Lysicles, whom she soon made, how¬ ever, an influential citizen in Athens. She had a son by Pericles, who was legitimated by a special decree of the people.

ASPASIA THE YOUNGER, called Milto by Plutarch, a native of Phocea. She was at first the wife of Cyrus the Younger, who gave her the name Aspasia (q.v.) after the famous wife of Pericles of Athens, whose name had become synonymous with wit and brilliance. When Cyrus died his brother Ar- taxerxes, as his successor, claimed Aspasia, ac¬ cording to the Persian custom. With him she lived until Darius was proclaimed his successor, whereupon Darius claimed her as his rightful property, upon which Artaxerxes made her a priestess of the temple. So bitter did Darius become over being thus foiled in his desire that he began planning to murder his father, but the result was that he was himself slain.

ASPECT, a term in astronomy and astrol¬ ogy, denoting the situation of the planets and stars with respect to each other. There are five principal aspects: (1) sextile aspect, when the planets or stars are 60° distant and marked thus, *; (2) the quartile or quadrate, when they are 90° distant, marked □ ; (3) trine, when 120° distant, marked A ; (4) opposition,

when 180° distant, marked 9 ; and (5) con¬ junction, when both are in the same degree, marked q- Kepler added eight more. It is

to be observed that these aspects, being first introduced by astrologers, were distinguished into benign, malignant and indifferent ; and Kepler's definition of aspect, in consequence, is ((Aspect is the angle formed by the rays of two stars meeting on the earth, whereby their good or bad influence is measured.)y The as¬ pects now in use are conjunction, , opposition and quadrature.

ASPEN, trees of the family Salicacece and genus Populus, native of the cooler parts of Europe and Asia, and succeeding best upon moist, gravelly soils. They grow quickly; usually attain a height of 50 to 60 feet, some¬ times even 100 feet ; have light, small, thin, toothed leaf-blades upon long, slender, flat¬ tened petioles which permit the blade to flutter with the least breeze, hence the specific name of the European aspen, P. tremula, <(tremulous.)) The wood being white, light, soft, and porous, is not a valuable fuel, but is useful for making charcoal for the manufacture of gunpowder, and for turning, often being employed for making bowls, trays, troughs, and pails. The wood may be made harder and thus rendered useful for interior work in houses by peeling off the bark and allowing the stem to dry be¬ fore felling it. In places where this tree abounds, and other timber is scarce or expen¬ sive, this method of hardening is very useful. The bark is rich in glucoside called salicin and used in leather tanning. In the United States the European tree is best known as an ornamental one, its variety, pendula, with graceful, drooping branches, being per¬ haps the best weeping poplar. The male plants are preferred because of the abundance of their catkins which appear in early spring before the catkins of American species blos¬

som. The American aspen (Populus tremu- loides), very generally distributed from Alaska to Labrador and southward tb Pennsylvania and California, and in the mountains to Mex¬ ico, closely resembles the preceding species. Its light-gray branches render it conspicuous in clearings where it is one of the first trees to appear. It is said to attain a height of 100 feet when grown in the forest, but is usually much smaller. This tree, like the following, is widely used in the

manufacture of wood pulp. The large-toothed aspen (Populus grandiden- tata) is a large American species found from Nova Scotia to Minnesota and southward to Tennessee. See Poplar.

ASPEN, Col., city and countv-seat of Pitkin County, on the Roaring Fork of Grand River, and the Colorado Midland and the Denver & R. G. railways ; 30 miles west of Leadville. It is situated at an altitude of 7,900 feet. Aspen was incorporated in 1881 ; and has since become the centre of a rich min¬ ing section. In the city and vicinity are more than 20 mines, for which there are a number of silver, zinc, and lead ore mills. While the smelting and concentrating of ores is the dis¬ tinctive industry, the city has several minor factories, and it is also the principal mining- trade centre of the Roaring Fork Valley. The government is vested in a mayor, elected every two years, and a council composed of the mayor and four aldermen. Pop. 1,834.

ASPERGES, the ceremony of sprinkling the people with holy water at the beginning of mass in the Catholic Church. The term is de¬ rived from the first word in the Psalm which is recited in Latin by the officiating priest.

ASPERN, as-pern, and ESSLINGEN,

two villages a few miles east of Vienna, on the opposite bank of the Danube, celebrated for the battle fought 21 and 22 May 1809, be¬ tween the Archduke Charles with 70,000 Aus¬ trians and Napoleon with 36,000 French, in which the latter were defeated. After the fall of the capital the Austrian general resolved to suffer a part of the enemy's forces to pass the Danube, and then to surround them with his own army and drive them if possible into the river. Everything depended on the posses¬ sion of these two villages : Aspern was at first taken by the Austrians, again lost and retaken, till they at length remained masters of it : from Esslingen they were continually repulsed. The battle was renewed on the 22d ; the French army being now increased so as at least to equal the Austrians in number. Thousands of lives were sacrificed in vain attempts to cap¬ ture the villages. Aspern continued to be the stronghold of the Austrians and Esslingen of the French. When the army of Napoleon gave up all hopes of gaining the victory by forcing the centre of the Austrians, Esslingen served to secure their retreat to the island of Lob'au. The loss of the Austrians in killed, wounded, etc., was estimated at less than a third of the whole army; that of the French at .half. The latter lost on this occasion Marshal Lannes and General St. Hilaire. The Austrians had 4,000 men killed and 16,000 wounded, the French 8,000 killed and 30,000 wounded. By the French the engagement is known as the

battle of Essling or Esslingen, but the Aus¬ trians style it the battle of Aspern.

ASPHALT. The general term asphalt is applied to the several varieties of hydrocarbons of an asphaltic base which exist in all condi¬ tions from the liquid to the solid state. It is more specifically employed to include the purer forms of hard and soft bitumen, such as elater- ite, albertite, gilsonite, nigrite, wurtzilite, brea, etc. The term bituminous rock includes sand¬ stones and limestones impregnated with bitu¬ men or asphalt. This rock, usually shipped without previous refining, is used principally for street pavements and is mixed with other ingredients at the place of use.

The importation of asphalt into the United States is chiefly from the island of Trinidad, off the coast of Venezuela, and from Venezuela itself. Bituminous limestones are imported from Neuchatel and Val de Travers, in Switz¬ erland, from Seyssel in France, and in small quantities from Germany, Italy, Russia, Austria- Hungary, Spain, Turkey in Asia, Great Britain, the United States of Colombia, Canada, the Netherlands, Cuba and Mexico. The total im¬ ports from Trinidad and Venezuela in 1916 amounted to 147,383 short tons. The island of Trinidad, one of the British West Indian pos¬ sessions, is the largest producer of asphalt in the world. The deposits are operated by an American corporation under a concession from the British government, and also, independently, from land not belonging to the Crown, ac¬ quired by purchase. The chief source of sup¬ ply is a lake of pitch. This lake lies 138 feet above the sea-level and has an area of about 114 acres. The supply is partly renewed by a constant flow of soft pitch into the centre of the lake from subterranean sources. The ship¬ ments of this lake pitch average over 140,000 tons per year, and the flow into the lake is at the rate of about 20,000 tons per year. The depth of this lake is about 135 feet at the centre. Distinct from the lake pitch is what is known as wland pitch,® the overflow in past times of pitch from the lake, and deposits of similar nature. During recent years strenuous efforts have been made to discredit all asphalt mined from properties located outside of Pitch Lake. These efforts seem to have failed, how¬ ever. Careful analyses of samples of asphalt taken from different parts of Pitch Lake, from deposits outside the lake and from the district of La Brea show that these asphalts are so similar in composition that for practical pur¬ poses they may be considered as identical in quality. The samples have a common origin, for the

presence of mineral matter in these asphalts cannot be regarded as adventitious, since it is thoroughly incorporated with the bitumen in the same proportion and has the same percentage of composition, as regards the relative proportions of matter soluble in water, in acids and insoluble substances. There is no doubt that the pitch found in the deposits out¬ side the lake has been derived from the lake itself by the subterranean flow of pitch in the viscous condition. It is true there is a differ¬ ence in the crude materials in these asphalts; one is softer than the other, because' of con¬ taining more volatile oils. Nature simply be¬ gan on the asphalt outside the lake ; it being more exposed to the rays of the tropical sun, the process of refining it drove those volatile oils off, a necessary accomplishment to make the material fit for paving purposes. It would

appear, therefore, that a part of the labor of refining has been done on the land or overflow asphalt which remains to be done with the lake asphalt.

In 1875 the asphalt paving industry was in its infancy in the United States. In 1903 there were about 42,000,000 square yards of asphalt, sheet and block, which has been laid at a cost of about $110,000,000. These pavements are frequently called bituminous pavements, inas¬ much as bitumen is the largest constituent of the asphalt, frequently running as high as 9 per cent. Asphalt is manufactured into a ce¬ ment by mixing it with other forms of bitumen and this cement is in turn used to bind to¬ gether particles of sand and limestone in the asphalt pavement. No two asphalts are alike. The life of the pavement depends upon the crude bitumen used, the skill in its manufac¬ ture into bituminous cement, the proper pro¬ portioning and mixing of the cement with the sand and dust and in the selection of the min¬ eral aggregate.

In 1870, Prof. E. J. Smedt, a Belgian chem¬ ist, laid the first sheet asphalt pavement in this country, in Newark, N. J. Prior to this date coal tar had been used as the cementing mate¬ rial, but with little satisfaction. In 1876 Con¬ gress appointed a commission, consisting of Gens. Horatio G. Wright and Quincey A. Gilmore, of the corps of engineers, and Edward Clark, architect of the capitol, to select the best pavement for Pennsylvania Avenue in Wash¬ ington. Forty-one proposals for stone, macad¬ am, tar and asphalt pavements were received. The commission selected two and decided to use Neuchatel rock asphalt and De Smedt's artificial Trinidad mixture, in the proportion of two to three. The artificial Trinidad mixture has been most satisfactory. When it was de¬ cided, in 1889, to repave Pennsylvania Avenue in Washington, the entire avenue was relaid

with it, and the Neuchatel was discarded.

Trinidad Pitch Lake has furnished over 85 per cent of the asphalt used in the United States. The liquid asphalt passing, through clay saturates it or carries it in suspension and becomes a brown, earthy, non-viscous substance, chemically composed as follows :

Bitumen . 47 per cent

Infusorial earth . 28 per cent

Water . 25 pei cent

The water is evaporated in refining and the residue (approximately one-third clay and two- thirds hard asphalt) regains some of its vis¬ cosity and requires the admixture of some flux or softening agent to give it the proper con¬ sistency for paving operations. Samples taken at 100 and 150 feet deep at the centre of Pitch Lake do not differ in composition from those taken on the surface near the shore, showing the homogeneousness of the entire mass. The surface is in constant motion, and gradually lowers as the asphalt is removed. Refined as¬ phalt is shipped from Trinidad to Mexico, South America and other foreign countries ; but, owing to the very high duty on refined asphalt coming into the United States, it is cheaper to refine here.

In 1892 the New York and Bermudez Com¬ pany began the importation of a very pure and hard asphalt from a deposit in the state of Bermudez, Venezuela. The Bermudez Asphalt

Lake, covering an area of about 1,000 acres, lies about 20 miles from the Gulf of Paria, in a straight line. There are many springs of soft asphalt or maltha, the largest being about seven acres in area. Outside of the springs, where new material is constantly exuding, the surface of the lake is covered with vegetation and trees, which must first be cut off to reach the asphalt. The quality of the asphalt varies from maltha or liquid asphalt exuding from the springs, to a hard glance pitch. The crude Bermudez asphalt contains on an average about 31 per cent of water, which is present as a mixture and not as an emulsion, and about 66 per cent of bitumen. This asphalt is softer and more brittle than Trinidad, but possesses all essential cementitious qualities. In 1912 exten¬ sive deposits of asphalt were discovered in Leyte, Philippine Islands, by a ranger of the Insular Bureau of

Forestry. The products of these deposits are now being used in paving the streets of Manila and are also being exported to other points in the Orient by a strongly capitalized corporation.

As early as 1879 asphalt found in southern California was laid at an intersection on Mar¬ ket Street, San Francisco, which is the heaviest traveled street in that city. In 1884 the late Jesse Warren reported on these California asphalts, the only indications of which were slight surface exudations of liquid asphalt and large banks of bituminous sandstone (sand sat¬ urated with asphalt). In 1895 the Alcatraz Company successfully laid two streets in New York city and acquired a high standing for the California product which was subsequently con¬ trolled by the Asphalt Company of America. It has been laid in many eastern cities under the trade name of ((Alcatraz,® ˆStandard,® (< Ven¬ tura,® etc., and has been uniformly successful when refined, mixed and laid intelligently by men experienced in handling asphalt in all its stages. Shortly after the organization of the Asphalt Company of America beds of very pure, high grade, liquid asphalt were discovered in southern California. This being a nearly pure, viscous bitumen, it does not require a softening agent or flux, nor the admixture of other bituminous material to make it of the proper consistency for paving.

Asphalt deposits have been found in many widely separated areas in the United States, but commercial production is limited to a few localities in six States, whose output for 1916 is shown in the following tables :

Short tons Value

California . 18,135 $45,102

Kentucky and Texas .37,777 122,984

Oklahoma . 15,431 112,555

Utah and Colorado. . .27, 134 642,640

Total . 98,477 $923,281

Within the past few years manufactured or oil asphalt has become an increasingly import¬ ant part of the industry in the United States and in several countries of Europe. In the United States it is manufactured from certain grades of crude petroleum found in Colorado, Louisiana, Oklahoma, Kansas and Illinois. In 1907 the output of this artificial product for the first time exceeded the combined output of the natural varieties by a margin of over 52,000 short tons. Of late years Mexican

oil has proved a strong competitor with our domestic materials, the asphalt product of such oils in

1916 amounting to 572,387 short tons, valued at

$6,018,851.

In 1914 there were in the United States 44 plants for the manufacture of artificial asphalt. The following table shows the output and value of the artificial product, made from domestic material, since 1909 :

	Short Tons	Value
1909 .	129,594	$1,565,000
1910 .	161,187	2,225,000
1911 .	277,192	3,173,000
1912 .	354,344	3,755,000
1913 .	436,586	4,531,000
1914 .	360,683	3,015,000
1915 .	664,503	4,715,583
1916 .	688,334	6,178,851

Recent analyses of true Barbados asphalt and of the artificial have given the following results: Specific gravity, natural, 1.0143; arti¬ ficial, 1.393. Hardness according to Mohs, nat¬ ural, one to two degrees M. ; artificial, two to three degrees M. Hardness according to Breit- haupt, natural, one to two degrees B. ; artificial, three degrees B. Soluble in petroleum, natural, very easily ; artificial, with great difficulty, slowly and incompletely. Soluble in benzine, natural, very easily and completely; artificial, with great difficulty, slowly and incompletely. Soluble in benzol, natural, very easily and com¬ pletely; artificial, rather easily. Solubility in wax, natural, not known ; artificial, in five to six days, _ leaving an amber-like remainder. The solution in benzine of the Barbados natural as¬ phalt gives a beautiful brownish varnish layer which dries in about 10 minutes ; that of the artificial asphalt, however, does not ; therefore, the first is to be preferred for fine varnish.

Uses of Asphalt. — The purest varieties of asphalt are used to a great extent in the manu¬ facture of asphalt varnish. A refined asphalt

usually mixed with some petroleum residuum is used for saturating felt; machinery is used in the process, and a paint or varnish of similar composition is usually applied after the asphalt felt is in place. Asphalt felting has an advan¬ tage over coal-tar felting in that it is not ren¬ dered brittle by heat or with age. Insulating paints are made from extracted bitumens of asphalt admixed with various substances, so as to produce a hard product corresponding to ebonite. The most important application of asphalt is in the paving industry, in which two methods are employed; asphalt block paving, in which blocks of asphalt composition are first manufactured by machinery, and sheet asphalt, in which the asphalt composition is spread and rolled so as to form large continuous sheets. Upward of 3,000,000 square yards of such pave¬ ments were laid in the principal cities of the United States in 1916. The consumption of as¬ phalt and asphaltic materials in the United States is rapidly increasing, amounting in 1916 to 1,456,634 short tons — as compared with 1,224,037 short tons in 1915, and 851,699 short tons in 1914. Besides the domestic consump¬ tion, the United States manufactured and ex¬ ported in 1916 asphaltic articles amounting in value to $494,895, in addition to an export of 36,443 tons of crude asphalt ; the entire export trade being valued at $1,254,664.

Bibliography.— Klein and Peckham, As¬ phalt Paving0 (Report of the Commissioners of Accounts of the City of New York 1904) ; Kohler, (Die Chemie und Technologie der natiirliche und kiinstliche Asphalte) (Braun-

schweig 1904) ; Richardson, (Modern Asphalt Pavement (New York 1905; 2d ed., 1908); and 1 Asphalt Construction for Pavements and Highways* (New York 1913) ; Eldridge, (The Asphalt and Bituminous Rock Deposits of the United States) (in 22d annual report of the United States Geological Survey, pt. 1, Wash¬ ington 1901). See Mineral Production of the United States.

ASPHALT PAINTING. Asphalt was once largely used in painting, especially in the old Dutch school. It was dissolved in spirits of wine to ensure greater permanence. Be¬ cause of its unreliabiity it ceased to be used.

ASPHALTIC COAL, coal-like substances which though they have sometimes been classi¬ fied as coals, differ from all the true coals in

respect to both their geological position and their composition. They do not occur in strata, but occupy cavities and fissures, into which they appear to have flowed when plastic. They have been found in Devonian, Carboniferous and Tertiary rock. The regions in which they are principally mined are Albert County, New Brunswick (albertite), the Uinta Mountains, Utah (gibsonite and uintahite), and Colorado, West Virginia, Texas and Mexico (grahamite). Wurtzilite is found also in Utah. Their chief uses are as a basis for varnishes and as insu¬ lators. Consult Blake, (Uintahite, Albertite, etc. *; ˆTransactions* of the American Insti¬ tute of Mining Engineers (Vol. XVIII, 1890).

ASPHODEL, the name applied to plants of two genera, Asphodelus and Asphodeline, hardy annual and perennial fleshy-rooted herbs, natives of the Mediterranean region, belonging to the family Liliacece. Asphodeline lutea, king's spear, or yellow asphodel, the true as¬ phodel of the ancients, attains a height of two to four feet, has numerous long (3 to 12 inches) narrow rough-margined leaves which embrace the stem, and in early summer yellow flowers in long racemes (6 to 18 inches), and large persistent membranous bracts. Aspho¬ delus albus, branching or white asphodel, which has radical leaves, blossoms about the same time as the preceding species, and produces its white funnel-shaped blossoms in branched clusters. Both species are readily propagated by division and are of easy cultivation in any soil. They thrive fairly well in partial shade, but do better when more or less exposed to the sun. Forms of the last species are cultivated in Algeria and some other countries for the starchy roots which are used to make alcohol. The refuse from this manufacture, together with the leaves and stems, is employed in paper and cardboard-making. Several other related plants are often called asphodel, among which are Narthecium ossifragum, bog asphodel, com¬ mon on European moors ; N. americanum, American bog asphodel. False asphodel is a name given to several species of Tolfiedia. The asphodel of the poets is Narcissus pseudo- narcissus.

ASPHYXIA, etymologically, pulseless¬ ness, but literally a condition of partial or com¬ plete loss of consciousness because of defective oxidation of the blood. The symptoms may be developed rapidly or slowly. In sudden oc¬ clusion of the air passages, such as caused by a foreign body in the larynx, or compression of the throat as in hanging or strangling, there

is usually a quiet period of from 20 to 30 seconds after which respiratory movements, both of inspiration and of expiration, follow. These gradually increase in frequency and depth until in about a minute powerful ex¬ piratory convulsions occur ; convulsive move¬

ments of inspiration are also produced, but these are usually milder in character. A period of exhaustion sets in, the respiratory move¬ ments become slower and more irregular, and gradually cease. During this period the face has become pallid and then deeply cyanosed and flushed, the lips blue to purple, and the body temperature, at first increased, gradually diminishes. The blood pressure is at first in¬ creased and then falls gradually to zero. Un¬ consciousness develops about a minute after the occlusion, although there is great individual variation, the sphincters relax and the urine and faeces are passed. There is a loss of muscle- tone, and the reflexes are abolished. In as¬ phyxia both lack of oxygen and increase of carbonic-acid gas in the blood are important factors. Asphyxia may result from an excess of carbonic-acid gas with a normal amount of oxygen, and may be produced, if the amount of oxygen is diminished one-half, with no varia¬ tion of the carbon dioxide. For treatment, see Drowning.

ASPHYXIATING GASES. The employ¬ ment of asphyxiants as special munitions of war in the form of shells or other projectiles, which when set free produce a suffocating and poisonous effect, is not new. From the earliest times the Chinese have employed various de¬ vices of this sort, and in their ((stink-pot** secured such results. .The French made ex¬ periments with asphyxiating shot at Brest in 1851. The use of asphyxiating gases has al¬ ways been discouraged by the more enlightened authorities, both military and civil. The Hague Conference of 1899 strongly condemned their employment. Lyddite shells were used by the British in the Boer War pf 1899-1902, and shimose and similar shells, opaque powders, etc., were used by both sides in the Russo- Japanese War. While not strictly asphyxiat¬ ing they render untenable a larger area of ground than would be accomplished by an or¬ dinary projectile striking in the same place.

In the European War, at the second battle of Ypres, asphyxiating gases were employed with fearful results. The' gases not only caused death but also produced great suffer¬ ing. The men were seized immediately with an intolerable irritation of throat, nose and eyes, violent choking and severe pains in the chest, accompanied by uncontrollable cough¬ ing. Many fell and rose no more. The greater part of those who escaped were sick for seve¬ ral days and many of these after apparent recovery succumbed to pulmonary diseases. After the great outcry in the Allied and neu¬ tral press against the action of the Germans in using these gases, the German legation in Berne issued a statement claiming that the French had authorized the use of similar gases two months before their use by the Germans. However, it is claimed the gases authorized by the French cause no permanent injury, but merely sufficient discomfort to force the enemy to leave his trenches. The

British have also used asphyxiating gases in their campaign in Picardy and Flanders.

ASPIC, (Fr.) a dish consisting of a clear, savory meat jelly containing fowl, game, fish, etc. In the 18th century the name was applied to a cannon throwing a 12-pound shot. In poetry the word is used in the sense of asp (Shakespeare, Tennyson, Browning). The great lavender or spikenard, French spic, Italian spigo, is frequently termed aspic.

ASPINWALL, William, American physi¬ cian: b. Brookline, Mass., 23 May 1743; d. 16 April 1823. He studied medicine in Phila¬ delphia, and practised in his native town. He served as surgeon with the Revolutionary army and later became interested in the subject of vaccination and established that preventive in American practice.

ASPINWALL, William H., American con¬ structor of railroads: b. New York city, 16 Dec. 1807; d. 18 Jan. 1875. He was for many years a partner in a large shipping firm in New York, but retiring from it in 1850, turned his attention to building the Panama Railroad, whose east¬ ern terminus of Aspinwall (now Colon) was named in his honor. He was likewise prom¬ inent in forming the Pacific Mail Steamship Company.

ASPINWALL, Pa., borough in Allegheny County, three miles northeast of Pittsburgh, of which it is practically a suburb. It is situ¬ ated on the banks of the Allegheny River and on the Pennsylvania Railroad. The water works and the lighting system are municipally owned. The government is vested in a council of seven, chosen by popular vote. Pop. 2,592.

ASPIRATOR, a surgical instrument used for drawing off pus fj-om ulcerations other¬ wise inaccessible, somewhat on the order of a syringe. One form of this instrument con¬ sists of a hollow needle, with which internal organs may be reached without extensive oper¬ ation and through which the pus of a tumor may be pumped out. Other forms are used for drawing, off air or other gases with the object of creating a vacuum.

ASPIRIN, acetyl-salicylic acid. An un- officinal salicylate, thought to be more efficient than others and to cause less gastric disturb¬ ance because it passes through the stomach un¬ changed and liberates its salicylic acid in the intestine. It is a white powder, soluble in 100

parts of water. It is employed in rheuma¬ tism, gout, tonsilitis, pleurisy, chorea, neural¬ gia and multiple neuritis.

ASPIROZ, as-pe'roth, Manuel de, Mexi¬ can soldier, statesman and diplomat: b. Puebla, 9 June 1836; d. Washington, D. C., 24 March 1905. He was graduated from the University of Mexico in 1855, was licensed to practise law in 1863, but upon the French invasion entered the army. In the Juarez insurrection of 1863 against Maximilian, he served in the insurgent army with great distinction, rising from 2d lieutenant to colonel. After the fall of Quere- taro he was appointed judge-advocate of the military court which sentenced the Emperor to death, thereby incurring the lasting hatred of the imperial house of Austria, of which Maxi¬ milian was a member. In 1867 Aspiroz became assistant Secretary of State for Foreign Affairs in the new republic; in 1872 he did much to set¬ tle amicablv the claims between the United States and Mexico, which dated from the Mex¬

ican War in 1845; in 1873-75 was consul at San Francisco ; and in 1875 was elected senator from his native province to the Mexican Na¬ tional Congress. In 1881 he left the Senate to become a member of the commission appointed to make treaties with the powers of the world; was law professor in the College of Puebla from 1883 to 1890, when he was again ap¬ pointed by President Diaz assistant Secretary of State, serving in that capacity until appointed, in 1899, first Mexican Ambassador to the United States, a position he held till his death. In 1900 he was the Mexican representative at The Hague tribunal; was a member of several scientific organizations, a knight commander of the military Order of Our Lord Jesus Christ of Portugal, and had been presented by the Shah of Persia with the decoration of the Order of the Lion and Rising Sun, and by the Dowager Empress of China with the insignia of the Order of the Dragon, in both cases in appreciation of his services in negotiating trea¬ ties between their respective countries. He published (Codigo de extranjeria de los Esta- dos Unidos Mexicanos) (1876) ; and (La lib- ertad civil como base del derecho internacional privado> (1896).

ASPLENIUM, a genus of about 200 species of small ferns of world-wide distribu¬ tion, belonging to the family P olypodiacece , characterized by free veins and elongated sori covered by an indusium. Many of the species are very beautiful and are consequently favor¬ ites with cultivators whose space is limited. A. viride, A. adiantum-nigrum, A. trichomanes, and other species are commonly called spleen- wort from their formerly supposed efficacy in internal medicine. The two last-mentioned species also bear the name of maiden-hair, but are not the true maiden-hair fern (Adiantum) . In the

eastern United States a dozen or more species are to be found growing wild, among which the more common are A. acrostichoidcs, A. ongustifolium and A. filix-foemina which reach a height of from one to four feet. In cultivation, slight shade is almost essential, as is also abundant water at the roots, but the air must not be very moist else the leaves will turn brown. The plants thrive in peaty soil. See Ferns.

ASQUITH, Herbert Henry, English

statesman: b. Morley, Yorkshire, 12 Sept. 1852. He was educated at City of London School, and Balliol College, Oxford, of which he was a distinguished student. He was called to the bar of Lincoln's Inn in 1876; early took a high place in his profession, was junior to Sir Charles Russel as counsel for the Irish Na¬ tionalists in the Parnell Commission ; and in 1890 was made King's Counsel. He supported the Home Rule policy of Mr. Gladstone, and was returned to the House of Commons as member for East Fife in 1886, a constituency he has since continued to represent. In 1892 he was chosen by Mr. Gladstone to move the vote of no-confidence in the Salisbury govern¬ ment, and stepped at once into front rank as Secretary for Home Affairs in the subsequent Liberal administrations between 1892 and 1895. On the defeat of the Liberal government in the latter year he resumed his practice at the bar. In 1894 he married as his second wife Margot Tennant, a daughter of Sir Charles

Tennant, Bart. At the time of the South African War he was attached to the Imperial¬ ist wing of the Liberal party as opposed to the pro-Boer section led by Sir Henry Campbell- Bannerman, and consequently for a time lost favor with the majority of the party. He took a leading and indeed dominating part in the fiscal controversies raised by Mr. Cham¬ berlain, and was the principal speaker on the Liberal side in combatting the arguments of the tariff reformers. On the accession of the Liberals to power in 1905 he became Chan¬ cellor of the Exchequer, and as such intro¬ duced the Old Age Pensions Bill which was subsequently passed into law. During the ill¬ ness of Sir Henry Campbell-Bannerman he led the House of Commons with so much ability and address that on the death of the Prime Minister he was called upon to succeed him, 8 April 1908. Since then he has emerged from some great controversies with his posi¬ tion and authority strengthened in the country. The rejection bv the House of Lords of Mr. Lloyd George's budget of 1909 was followed by two successful

appeals to the electorate on the part of Mr. Asquith, and as a result the Parliament Act was passed in 1911, which deals drastically with the powers formerly possessed by the upper House of mutilating and rejecting the measures sent up to it by Liberal governments. Mr. Asquith was for a long time regarded as lukewarm on the ques¬ tion of Irish Home Rule; but a vital stage was passed in that old and much controverted issue when in 1914 he finally passed the Home Rule Bill. The Insurance Act (1912) and the Welsh Disestablishment Act (1914) stand also to the credit of his government. He is a be¬ liever in the Gladstonian principle of never dealing with a question until it is fully ripe ; but once a resolution is taken, he acts with promptitude, as witness his assumption of the war secretaryship when civil control of the army appeared to be called in question during the crisis of the Ulster dispute. After the outbreak of the European War his cabinet passed through a series of crises, and he was constrained to form a national coalition min¬ istry' in May 1915. This coalition cabinet fell in December 1916. Attacks wrere made on it from all sides but more particularly from the (<gin- ger group,® so-called because it w'anted the gov¬ ernment to inject more ginger into its actions and display more force. Differences also existed between Mr. Asquith and David Lloyd George. These came to a head v'hen Lloyd George de¬ manded a smaller wrar council which wrould have power to act independently of the cabinet as a whole. When Asquith refused his assent to this proposal Lloyd George resigned and forced the resignation of Mr. Asquith 5 Dec. 1916, after eight stormy years of domestic and foreign history. Lloyd George succeeded to the premiership 7 Dec. -1916.

ASS (As. assa, Goth, asilus, Rus. assyol, Lat. asinus, probably of eastern origin; cf. Heb. athon, she-ass) or, wrhen domesticated, Donkey. A member of the family Equidce and usually placed in the genus Equus, wdth the horse, though sometimes made the type of a separate genus Asinus. There are at least three species, one Asiatic, and the others Afri¬ can. From the north African species the do¬ mesticated ass or donkey has probably de¬

scended, although many of its characteristics, particularly its spirit and bearing, are greatly altered. In size, in the short hair and termi¬ nal tuft of the tail, and in the fact that only the fore-legs present callosities, the ass resem¬ bles the zebra rather than the horse ; and al¬ though not striped like the zebra, it has a vary¬ ing tendency to stripes on the legs. The Asi¬ atic ass (Equus hemionus) is divided into three local varieties, of w'hich the one found in Persia and Syria must be that which the Old Testament writers used as a type of unham¬ pered wildness. Of the others, the kiang, koulan, or dziggetai of Tibet, is the largest and most strikingly colored. Its height is some¬

times four feet at the shoulders. Like all asses, it is pale underneath, but the color above is a dark red with a narrow black stripe along the mane and backbone from head to tail. The third variety, the onager or ghorkhar, like the first, is smaller and paler; sometimes it is even silvery, and its dorsal stripe is broader in pro¬ portion than that of the Tibetan ass. It in¬ habits the plains of northwestern India, Af¬ ghanistan and Baluchistan. Unlike the donkey, these wild asses are so extremely swift, en¬ during and agile that on the plains they cannot be overtaken by a single horseman. In the mountains they are less shy and sometimes vol¬ untarily approach travelers. Wild asses are hunted for sport and it is said of their flesh that, while resembling venison, it has an even finer quality. The asses of the plains migrate to the hills in summer when the plains are dry. See Kiang.

The African ass (Equus Africanus) differs widely from the Asiatic, being larger and hav¬ ing a bluish tint rather than a tendency to red. It is sometimes as much as 14 hands high and has the very large ears wrhich characterize the donkey. The dark stripe on the back begins only at the shoulder, but extends from the tail down the withers ; the hair of the mane and tail is short, and varies little from that of the body in color. It is found in all the open re¬ gions 'of northeastern Africa, and westward through the Sahara and Sudan. Like the Asi¬ atic ass, it is extremely wild and fleet. A sec¬ ond species of African wild ass (Equus sonial- icus) was found in Somaliland some years ago, which is distinguished by its grayer color and faintness of its strides; it also has smaller ears and a more flowing mane. Living ex¬ amples have been kept in London.

The donkey, or domestic ass, was probably first tamed in Egypt, where it wras known be¬ fore the horse, and has ahvays been much used; some of the eastern breeds of the donkey are far larger and finer than those commonly seen in Europe, though in Spain and Italy, wrhere they are more used, they are superior to those of other European countries. In England they are little employed, but in America are kept by stock raisers in the Middle and South¬ ern States for the breeding of mules and hin¬ nies. (See Mule). Their milk is recommended in cases of consumption and dyspepsia and their skins furnish the leather called shagreen, besides an excellent shoe-leather and the cov¬ ering of drums.

ASS, Feast of The, a mock ceremony observed in northern France in the Mid¬ dle Ages. It was originally a good-natured

parody on the church service without inten¬ tional irreverence, but degenerated into an in¬ decent performance. It was in substance a brief farce in which Balaam's ass appeared be¬ fore the church altar to prophesy the coming of Christ.

ASSAB, as-sab', an Italian trading station on the coast of the Red Sea (Eritrea), 40 miles from the Strait of Bab-el-Mandeb. The neigh¬ boring district with an area of 243 square miles was sold in 1870 by some Danakil chief¬ tains to an Italian steamship company for a coaling station on the road to India. In 1880 it wras taken over' by the Italian government, which, since 1884, has improved the harbor and erected a lighthouse. The ˆcommissariat® of Assab has an area of 5,500 square miles and a population of only 3,000.

ASSAI, as-si, a food made from the fruit pulp of various species of Brazilian palms closely allied to the cabbage palm (q.v.) and largely used in the lower Amazon region. A beverage is also made from the pulp by pour¬ ing warm water on the fruit and by kneading. It is thick and creamy and purplish in color and has a rather pleasant flavor. The princi¬ pal species are Euterpe edulis and E. catinga. The first species grows in tide-flooded swamps, where it may attain a height of 90 feet with a diameter of only four or five inches: It pro¬ duces upon branched spadices an abundance of small pea-like purple fruit with a thin firm pulp and a hard seed. These fruits are kneaded in warm water to produce the thick purplish assai which is generally eaten with starchy foods. The terminal bud of this species is eaten like that of its close relative, E. olera- cea, the cabbage palm, and its stems are used as rafters and poles. The other species grow on dry, sandy, upland soils, its smaller quantity of fruit furnishing a sweeter assai.

ASSAL, as-saT, a large salt lake in the dis¬ trict of Adal, in eastern Africa, near the coast of the Bay of Tajura. It is nearly 600 feet below the level of the sea. Abyssinian caravans resort to Assai for the purpose of carrying off the salt, thickly encrusted on its shores.

ASSAM, a chief-commissionership of British India, on the northeastern border of Bengal, bounded on the north by the eastern section of the great Himalayan range ; on the northeast by the Mishmi Hills, which sweep round the head of the Brahmaputra Valley; on the east by the mountains inhabited by Ivham- tis, Singphos and various Naga tribes, and by the Burmese frontier where it runs with that of the state of

Manipur ; on the south by the Chin Hills, the Chittagong Hill Tracts, and the state of Hill Tippera; and on the west by the Bengal districts of Tippera, Mymensingh and Rangpur, the state of Cooch Behar, and Jalpaiguri District. The area of Assam proper is 53,015 square miles, and with the native state of Manipur (8,456 square miles), a total of 61,-471 square miles. The territory may be con¬ sidered as a long series of fertile valleys watered by the Brahmaputra and its tributaries. The valley of the Brahmaputra consists of rich alluvial plains, about 450 miles in length, with an average breadth of about 50 miles, either but little elevated above the flood-level of the river and its feeders, or so low that large ex¬

tents of them are flooded for three or four days once or twice in the year. The Surma Valley is a flat plain about 125 miles long by 60 miles wide, shut in on three sides by ranges of hills. It is even more subjected to inundations than the plains of the Brahmaputra, but as the Surma and its tributaries have more permanent banks, the shifting is trifling compared with the banks of the Brahmaputra. The range of mountains which separates these two valleys projects at right angles from the Burmese system, and lies almost due east and west. At its western end it attains a height of more than 4,600 feet in the peak of Nokrek, above the station of Tura. Here the hills are broken up into sharply-serrated ridges and deep valleys, all covered with forest. Farther east, in the Shillong peak, they reach a height of 6,450 feet; but this is only the highest point in a table-land of which hardly any part falls much below 6,000 feet. The highest point in Assam is reached in Japvo, on the border of the Naga Hills Dis¬ trict, still further eastward. The state of Manipur consists of a fertile valley, covering an area of about 650 square miles, surrounded by ranges of hills.

In Assam are found the valuable teak and sissoo trees, date and sago palms, the areca palm or betel-nut tree, the Indian fig-tree, oak, pine and bamboo. But the article of most com¬ mercial importance grown in Assam is tea, for the production of which there were 779 gardens in 1915, with a total area under crop of 383,821 acres, producing 245,385,920 pounds of manu¬ factured tea. The plant was discovered growing in this region in 1821, but it was not till 1838 that the first shipment reached England. Though not regarded as specifically distinct from the Chinese variety, the plant is much larger and more vigorous. Rice covers a large extent of the cultivated soil, occupying nearly 2,000,000 acres. The other crops include maize, pulse, oil-seeds, sugar-cane, hemp, jute, potatoes, etc. The State Forest Department controlled (1915) 4,528 square miles of forest, while the public forest land amounted to 18,218 square miles, a total of 22,746

square miles. In the jungles roam herds of elephants; in the dense and swampy parts of the forests the rhinoceros, tiger and wild buffalo abound; leopards, bears and wild hogs are numerous, as also are jackals, foxes, goats, deer and the venomous cobra. Coal, petroleum, limestone and iron are found, and gold dust is met with in many of the rivers. The climate is character¬ ized by coolness and extreme humidity, the natural result of the great water surface and the extensive forests over which evaporation and condensation proceed, and the close prox¬ imity of the hill ranges, on which an excessive precipitation takes place. Its most distinguish¬ ing feature is the copious rainfall between March and May, at a time when precipitation over upper India is at its minimum. The year is thus roughly divided into two seasons, the cold season and the rains, the hot season of the rest of India being completely absent. Storms often occur in the spring months, generally accompanied by high winds and heavy local rainfall, but seldom take the form of destruc¬ tive cyclones. From the beginning of November till the end of February the climate is cool and extremely pleasant, and at no period of the year is the heat excessive. Assam is subject to earth-

quakes. In 1607 hills are said to have been rent asunder and swallowed up ; writing in 1837, McCosh reported that, some 20 years be¬ fore, a village near Goalpara had completely disappeared, leaving a pool of water in its place. Severe shocks were felt at Silchar in 1809 and 1882, and in 1875 some damage was done to houses in Shillong and Gauhati. The greatest seismic disturbance, however, occurred 12 June 1897, when the station of Shillong was razed to the ground and nearly all masonry buildings in Gauhati and Sylhet were completely wrecked, while much damage was done in neighboring towns. Two Europeans and 1,540 natives were killed, the majority by landslips in the hills and by the falling in of river banks in Sylhet. In 1915 there were over 6,000 miles of roads in Assam, besides 2,770 miles of bridle roads, chiefly maintained by the Public Works Department.

The inhabitants are mainly engagea in agri¬ culture. There is no Assamese nation proper, numerous ethnical groups being represented. The total population revealed by the last (1911) census was 7,059,857. Of these, 6,713,635 be¬ longed to Assam proper and 346,222 to Assam state (Manipur), showing an increase over 1901 of 871,757 for Assam and 61,757 for Mani¬ pur. The birthrate for 1914 was 32.9 per 1,000 ; deaths, 24.7 per 1,000. The density of popula¬

tion per square mile was (1911) 127 for As¬ sam and only 41 for Manipur.

Religions. — Hindus, Aryans and Brahmans made up a total of 3,637,828; Sikhs, 750; Jains, 2,398; Buddhists, 10,506; Parsecs, 5; Moham¬ medans, 1,886,528; Christians, 66,430; Animis¬ tic, 1,109,187; others, 2; and, curiously enough, only one Jew. Every census has disclosed a deficiency of women, due to the disproportion between the sexes among immigrants. Child- marriage is common among both Hindus and Muslims in the Surma Valley and in Goalpara; but in Assam proper only Brahmans and Ganaks adhere rigidly to this rule, and the lower castes usually defer marriage till the girl is of age. No fewer than 167 different lan¬ guages are spoken in Assam, the two chief being Bengali and Assamese. There is a large number of languages belonging mostly to the Tibeto-Burman stock, such as Bodo, or plains Kachari, Khasi, Synteng, the various forms of Naga dialects, Garo, Manipuri, Lushai, Mikir, Miri and Kuki. The principal foreign languages are Hindustani, Mundari, Santali, Oriya, Eastern and Western Hindi. The peo¬ ple seem to be contented, good-natured and in¬ clined to indolence ; they have few wants be¬ yond what can easily be supplied from their fertile fields, for which they pay but a very small rental. There are two systems of land tenure, the Zamindari, where single proprietors or proprietary brotherhoods possess large es¬ tates for definite periods, and the Raiyatwari, where each petty proprietor (ryot) holds his plot directly from the state, usually cultivates his land himself, and has no landlord between himself and the government. The area operated amounted in 1915 to 5,475,901 acres for the Zamidari, and 25,829,673 acres for the Raiyat¬ wari, producing revenues of $371,405 and $2,- 226,985, respectively.

Education and Justice. — There were 4,635 public educational institutions in 1915. with an

attendance of 226,652 scholars and 187 private institutions with an attendance of 7,231 schol¬ ars. The expenditure on education for that year was $884,745. The proportion of illiteracy is high, only 32.8 per cent of the boys and 5.9 per cent of the girls attend school in British India. In Assam there were 18 vernacular newspapers published in 1915. The administra¬ tion of justice is vested in the courts of magis¬ trates, divided into three classes ; and the courts of session for criminal cases. The highest judicial authority is the high court of Calcutta, i.e., there is no appeal to the Privy Council in England.

Assam, known in ancient history as Kama- rupa, formed in the 7th

century a.d. a powerful independent kingdom under a Brahman sov¬ ereign, but in the 1 5th century it broke up into 12 separate states, which, in spite of their numerous internal struggles, were generally able to resist the attacks of the powerful Mogul emperors. Late in the 18th century its condi¬ tion encouraged the Burmese to make the country a dependency of Ava, but the Bur¬ mese encroachments on the territory of the East India Company brought about war with the British. In 1826 Assam became a posses¬ sion of Great Britain under the administration of the lieutenant-governor of Bengal, and in 1874 was created a chief-commissionership. In 1905 Assam was reunited with eastern Bengal, but by proclamation 22 March 1912 the Assam territories were placed under the immediate authority and management of the governor- general (viceroy) of India in Council and formed into a chief-commissionership. The chief-commissioner presides over a legislative council composed of 26 members; 10 being official, 15 unofficial and 1 expert. The rev¬ enue 1914-15 amounted to 1,72,39,180 rupees ($5,746,393) ; the expenditure to 1,44,64,977 rupees ($4,821,659). There are no large towns of importance. Shillong Town (pop. about 9,000), was chosen as the capital in 1874 on account of its salubrity and convenient position between the Brahmaputra and Surma valleys. The dis¬ trict of Sylhet was also separated from eastern Bengal and incorporated with Assam in 1912, thus adding a territory of 5,388 square miles.

Bibliography.— (The Imperial Gazetteer of India) (London 1909) ; Shakespear, W. L., (History of Upper Assam, Upper Burmah and North-Eastern FrontieU (London 1914) ; Wat¬ son, J. F., and Kaye, J. W., (The People of India* (ib. 1866-70). Henri F. Klein.

ASSAS, as'sa, Nicolas, Chevalier d', a

French officer, celebrated for an act of patri¬ otism which cost him his life. He was cap¬ tain in the regiment of Auvergne when the French army was stationed near Gueldres, in 1760, and on 15 October, while engaged in re- connoitering, was taken prisoner by a division of the enemy advancing to surprise the French camp, and threatened with death if a word es¬ caped him. He shouted, ((A moi, Auvergne, voila les ennemis and was instantly struck down. An annual pension was allowed to his descendants.

ASSASSINATION, a term denoting the murder of any one by surprise or treachery. It is commonly applied to the murder of a public personage by one who aims solely at the death of his victim. In ancient times, assassination

was often even applauded, as in the Scriptural instances of Ehud and Jael, and in the murder of Hipparchus by Harmodius and Aristogeiton ; but assassination by fanatics and men devoted to an idea first became prominent in the reli¬ gious struggles of the 16th and 17th centuries. To this class belong the plots against the life of Queen Elizabeth, and in recent years the political assassinations committed by anar¬ chists, while the succession of assassinations of Roman emperors is but a series of murders prompted by self-interest or revenge. Omitting these last, the following list includes the most important assassinations, arranged in chrono¬ logical order. Fuller accounts of the persons mentioned will be found under their particular headings :

Philip of Macedon . B.c. 366

Tiberius Gracchus . B.c. 133

Julius Caesar . Mar. 15, b.c. 44

Hypatia . a.d. 415

Thomas a Becket . Dec. 29, a.d. 1170

Albert I, Emperor of Germany . May 1, 1308

James I of Scotland . . Feb. 21, 1437

Alessandro de Medici . Jan. 5, 1537

Cardinal Beaton . May 29, 1546

David Riccio . Mar. 9, 1566

Lord Darnley . Feb. 10, 1567

James, Earl of Murray, Regent of Scotland. . . Jan. 23, 1570

William of Orange . July 10, 1584

Henry III of France . Aug. 1-2, 1589

Henry IV of France . May 14, 1610

Villiers, Duke of Buckingham . Aug. 23, 1628

Wallenstein . Feb. 25,1634

Archbishop Sharp . May 3, 1679

Peter III of Russia . July 17,1762

Gustavus III of Sweden, Mar. 16; d . Mar. 29, 1792

Marat by Charlotte Corday . July 13, 1793

General Kleber at Cairo . June 14, 1800

Paul I, Czar of Russia . Mar. 24, 1801

Spencer Perceval, premier . May 11, 1812

Kotzebue, the dramatist . Mar. 23, 1816

Due de Berri . Feb. 13, 1820

Charles III, Duke of Parma, Mar. 26; d . . . . Mar. 2.7, 1854

President Abraham Lincoln, April 14; d . April 15, 1865

Michael, Prince of Servia . June 10, 1868

Marshal Prim, Dec. 28; d . Dec. 30, 1870

Georges Darboy, archbishop of Paris . May 24, 1871

Earl of Mayo, governor-general of India . Feb. 8,1872

Sultan Abdul- Aziz . June 4, 1876

Alexander II, Czar of Russia . Mar. 13, 1881

President James A. Garfield, July 2; d . Sept. 19, 1881

Lord Frederick Cavendish and T. H. Burke,

in Phcenix Row, Dublin . May 6, 1882

Carter Harrison, mayor of Chicago. . . Oct. 28, 1893

President Sadi Carnot, France . . . June 24, 1894

Ex-Premier Stefan Stambuloff, Bulgaria, July

15; d . , . July 18, 1895

Premier Canovas del Castillo, Spain . Aug. 8, 1897

President Juan Idiarte, Uruguay . Aug. 25, 1897

Empress Elizabeth of Austria, in Geneva . Sept. 10, 1898

Pres. Jose Maria Reyna Barrios, Guatemala.. Feb. 18, 1898

Pres. Ulisses Heureaux, Santo Domingo . July 26, 1899

King Humbert of Italy . July 29, 1900

President McKinley, Sept. 6; d . Sept. 14, 1901

Alexander of Servia and wife, Queen Draga.. . June 11, 1903 Von Plehve, Russian Minister of the Interior. . July 28, 1904

Grand Duke Sergius of Russia . Feb. 17, 1905

King Carlos I and son, of Portugal . Feb. 1, 1908

Prince Ito of Japan . . Oct. 26, 1909

Premier Stolypin of Russia . . . Sept. 14, 1911

Prime Minister Canalejas of Spain. * . Nov. 12, 1912

Nazim Pasha, Turkish Minister of War . Jan. 23, 1913

Pres. Francisco I. Madeiro, of Mexico . Feb. 23, 1913

King George of Greece . . . Mar. 18, 1913

Archduke Francis Ferdinand of Austria-Hun¬ gary and wife, Duchess of Hohenberg . June 28, 1914

Jean L. Jaures, French Socialist leader . July 31, 1914

Pres. Guillaume Sam of Hayti . July 28, 1915

Many attempts at assassination have been unsuccessful. Among the most prominent of these may be named: Against Alexander III of Russia, repeatedly; Alfonso XII of Spain, 1878 and 1879 ; Amadeus of Spain, 1872 ; Due d'Au- male, 1841; Prince Bismarck, 1866 and 1874;

Francis Joseph of Austria, 1853; George III of England, 1786 and 1800; George IV (when Re¬ gent), 1817; Humbert I of Italy, 1878 and 1897;

Isabella II of Spain, 1847, 1852 and 1856; Louis Philippe, six attempts, from 1835 to 1846; Lord Lytton, viceroy of India, 1878; Baron Hardinge, viceroy of India, 1910; Napoleon I, by infernal machine, 1800; Napoleon III, twice in 1855, and Orsini's attempt in 1858; Queen Vic¬ toria, 10 June 1840, 30 May 1842, 3 July 1842, 19 May 1849 and 2 March 1882; William I of Germany, 1861, 1875 and twice in 1878; Presi¬ dent Diaz of Mexico and President Morales of Brazil, both in 1897; Edward VII as the Prince of Wales in 1900; Alfonso of Spain in 1905, 1906 and 1913. Consult Johnson, (Famous Assassinations) (Chicago 1903).

ASSASSINS, or HASHISHEENS, a

term applied to a secret order of religious fanatics who flourished in the 11th and 12th centuries. They derived their name of assassins originally from their immoderate use of hash¬ eesh, which produces an intense cerebral excite¬ ment, often amounting to fury. Their founder and lawgiver was Hassan-ben-Sabah, to whom the Orientals gave the name of Sheikh-el- Jobelz, but who was better known in Europe as the ((01d Man of the Mountain. w Their principal article of belief was that the Holy Ghost was embodied in their chief and that his orders proceeded from the Deity. They be¬ lieved assassination to be meritorious when sanctioned by his command, and courted danger and death in the execution of his orders. They were frequently styled Ismaili. A feeble res¬ idue of the sect, from whom proceeded the Druses, about a.d. 1020, has survived in Persia and Syria. The Syrian Ismaili dwell around Mesiode and on Lebanon. They are under Turkish dominion, with a sheikh of their own, and formerly enjoyed a productive and flour¬ ishing agriculture and commerce. Since the war with the Nassarians, 1809-10, they have dragged out a miserable existence, but are com¬ mended by modern travelers for their hospi¬ tality, frugality, gentleness and piety.

ASSAULT. In law , an assault is a move¬ ment virtually implying a threat to strike, as when a person raises his hand or his cane in a menacing manner, or strikes at another but misses him. It is not needful to touch one to constitute an assault. When a blow actually takes effect the crime is not simple assault, but assault and battery. Assault, however, is usu¬ ally coupled with battery and for the reason that they generally _ go together ; but the as¬ sault is rather the initiation or offer to com¬ mit the. act of which the battery is the

con¬ summation. An assault is included in every battery. An aggravated assault is one per¬ formed with the intention of committing some additional crime, such as an assault with intent to commit rape, assault with intent to murder, an assault with a deadly weapon, an indecent assault. The defenses usually interposed in cases of assault are self-defense, recapture of property, ejectment of trespassers, defense of property, defense of family, accident, etc. A person assaulting another may be prosecuted by him for the civil injury and also be punished by the criminal law for the injury done to the public.

In militarv language an assault is a furious effect to carry a fortified post, camp or for¬ tress where the assailants do not screen them-

selves by any works. It is the appropriate termination of a siege which has not led to the capitulation of the garrison. To give an as¬ sault: To attack any post. To repulse an as¬ sault: To cause the assailants to retreat; to beat them back. To carry by assault : To gain a post by storm. In fencing, an assault of (or at) arms is an attack on each other (not in earnest), made by two fencers to exhibit or increase their skill. (Sometimes it is used in a wider sense for other military exercises).

ASSAY OFFICES. See Assaying.

ASSAYE, as-si', village in southern India, where Wellington gained a famous victory in 1803. With only 4,500 troops at his disposal he completely routed the Mahratta force of 50,000 men and 100 guns. The victory, how¬ ever, cost him the loss of more than a third of his men.

ASSAYING, the art of testing ores or al¬ loys for the purpose of determining the amount of some particular metal that is present in the material analyzed. Assays may be made by (<wet® or ((dry® methods, and will vary greatly in detail, according to the metal to be de¬ termined. The present article will be chiefly devoted to the usual process of estimating gold and silver in the <(dry® way. The mode of pro¬ cedure is substantially the same, whether the assay is made upon ore or upon bullion, except as to the method of obtaining the sample to be examined. If the material proposed for the assay is bullion, or any metallic alloy, the sample for examination is obtained by drilling into the specimen in different places, and mixing the borings. In the

case of an ore, the usual method of obtaining a sample for assaying is by ˆquartering.® If this is done by hand, every tenth shovelful of the ore to be examined is thrown upon the floor, until a conical heap containing perhaps 10 tons has been accumulated. This heap is next flattened somewhat and divided into four quarters, as nearly equal as possible. Two of the diagonally opposite quarters are thrown back into the main body of ore, and the re¬ maining two quarters are thoroughly mixed, spread out into a second pile and ˆquartered® again in the same manner. The process is con¬ tinued (the ore being crushed in the mean¬ time as often as appears necessary) until the original sample has been reduced to from one to three pounds, after which it is ground fine and the specimens desired for examination are made up by random selections from the final pulverized product. More commonly, ores are sampled by mechanical or semi-mechanical methods and the sampling is not done by the miner, but by a <(sampling mill,® which acts as the agent both of the miner and of the smelt¬ ing works. In such cases the ore is first shipped to the sampling mill, where it is unloaded, weighed, crushed and passed through a chute in which one quarter is mechanically selected and passed into a separate bin. The quarter thus mechanically reserved is next thoroughly mixed, after which the <(cutting down® is com¬ menced. This consists in removing the ore from the floor by means of a specially con¬ structed sampling shovel which catches about half of it, and lets the remainder fall into a barrow. The ore retained by the shovel is

thrown into three buckets, in rotation, and the contents of the buckets are then coned up in one pile and divided again in the same man¬ ner. The ore is then further crushed, and the process is continued until, finally, three samples, weighing about 10 pounds each, are obtained Part of each of these is sent separately to the assayer, who assays all three. If the results are not adjudged to be sufficiently accordant, the sampler concludes that the mixing was not well done, and the operations described are re¬ peated. But if the three samples agree fairly well, their average is taken as representing the value of the ore; and on this basis the sampler settles with the miner and afterward with the smelter, thus acting as a middle-man in the sale of the ore.

The specimen of ore received by the assayer is ground fine enough to pass through a 60- mesh or a 100-mesh screen, any <(metallics® (or particles of metal that will not pass through the screen being carefully collected and re¬ served for a separate assay). If the ore is new to the assayer, his next step is to examine it microscopically and to apply various prelimi¬ nary tests so that the general nature of the ore may

be known before the quantitative work begins. If assays of the same material have been made before, and the only object is to as¬ certain the richness of this particular lot of ore, he may proceed directly to the process of ((scorification,® by which the gold and silver present in the ore are obtained in the form of a metallic button. The scorification process de¬ pends for its success upon the fact that when an ore of gold and silver is strongly heated with metallic lead in the presence of air, the baser metals that are present will oxidize and the lead oxide that is also formed will dissolve the silica (or quartz) that is present; while the gold and silver will not oxidize, but will be left in the metallic state, alloyed with that por¬ tion of the lead which remains unoxidized. To apply this principle, 50 grains or so of the ore are mixed with some 500 grains of granulated lead and placed in a sort of crucible, called a ((scorifier.® Another charge of 500 grains of lead is spread evenly over the mass, and a few grains of borax are sprinkled upon the top. The crucible and its contents are next heated for about three-quarters of an hour in a muffle to which a small amount of air is admitted, after which the melted mass in the crucible is poured into a mold to ((set,® or cool. When the mold is cold it will be found to contain a button of metallic lead (in which the gold and silver originally in the ore are concentrated), and also a considerable amount of slag, consisting of oxide of lead, oxide of the base metals that are present in the ore and silicates of lead, derived from the combination of the melted lead oxide with the quartz of the ore. The slag is readily detached from the metallic button by taps with a hammer.

The next step is to <(cupel® the button, so as to obtain the gold and silver in a pure state. Cupellation is based upon the fact that when an alloy of gold, silver, lead, and base metals is heated in a current of air, the lead and the other base metals will oxidize, and the melted lead oxide (((litharge®) will retain the other oxides in solution. Moreover, if the crucible in which the operation is carried out is porous, the melted lead oxide will soak into it, carry-

ing the base oxides with it, and leaving a button of pure gold and silver behind.

The ˆcupel11 in which this is performed is made of bone-ash, and after the button left from the scorification process has been heated in the cupel for a short time, the process indi¬ cated above takes place, its completion being indicated, to -the practiced eye, by play of ir¬ idescent colors on the cupelled button. The button is finally allowed to

cool, and after it has been taken from the cupel, any small parti¬ cles of bone-ash that remain adhering to it are removed by a brush.

If the original ore contained no silver, the assay is now completed, and it only remains to weigh the gold button, and compare its weight with that of the sample of ore used in the assay. But if silver is present, one other process, known as ˆparting,11 must be carried out, in order to separate the gold from the silver. Parting depends upon the fact that nitric acid will dissolve the silver out of an alloy of silver and gold, provided the weight of silver present is at least 2.5 times as great as the weight of the gold. In order to ensure the fulfilment of this necessary condition, the button, as it comes from the cupel, is melted with 2.5 or 3 times its own weight of silver that is known to be free from gold, and the alloy so formed is flattened out into a thin plate or ribbon, which is then rolled up into a little spiral, or <(cornet,):> and boiled in nitric acid. The cornet is next washed in dis¬ tilled water, and boiled again in nitric acid, to remove the last traces of silver; after which it is thrown into a crucible and melted into a but¬ ton, for weighing. The button obtained by this final process consists of pure gold.

Assay Offices in the United States are gov¬ ernment establishments in which citizens may deposit gold and silver bullion, receiving in re¬ turn its value, less charges. The offices are in New York city; Boise City, Idaho; Helena, Mont. ; Denver, Col. ; Seattle, Wash. ; San Francisco, Cal.; Charlotte, N. C. ; and Saint Louis, Mo.; Carson City, Nev. ; Deadwood, S. D. ; New Orleans, La.; Philadelphia, Pa.

The assay office in New York was estab¬ lished by law in 1853, and was opened in the autumn of 1854. The first assayer of the New York assay office was Dr. John Torrey of Co¬ lumbia College, who was appointed in 1854 and held his position till 1873. On his death he was succeeded by his son, Herbert Gray Torrey. Andrew Mason, who was appointed superin¬ tendent in 1883, having previously been assistant assayer and melter and refiner. While holding the latter office he substituted the use of sul¬ phuric for nitric acid in the refining process, thus saving this one assay office $100,000 per annum.

The United States assay office is in a build¬ ing located beside the more imposing sub¬ treasury building, at the intersection of Wall and Broad streets, which marks one of the most historic spots in the country, namely, the site of the old Federal Hall, where Washing¬ ton took the oath as first President of the United States. Although the building is small, yet it only masks a really large, inner building surrounded on all sides by office buildings and the sub-treasury. The

assay offices, and particu¬ larly this one, have an important position in the world of finance, for here the precious met-

als — gold and silver — in all forms and con¬ ditions of fineness are assayed and refined. In brief, the work of this office consists in assay¬ ing or determining the value of gold and silver, in whatever form presented, as coin, jewelry, or in any other shape. Any one wishing to have gold or silver assayed in quantity or wishing to sell to the government may present his property at the assay office, where he may have the metal reduced and made into bars, or if he prefers, he may sell his bullion to the gov¬ ernment. The charge for doing the work is merely nominal, and based on the actual cost. Millions of dollars are stored at all times in the vaults. When the metal is received, the first step consists in weighing the coin, bars, jewelry or tableware. This is done with great exact¬ ness and a receipt is given. Each person's hold¬ ings are placed in a box and are taken to the melting-room, where they are placed in cruci¬ bles with a flux and smelted and cast in ingot molds, the pouring being a highly picturesque operation. A small chip is taken from the bar for assay. See Coinage.

If the depositor wishes to part with his bullion, the government pays for it at the pre¬ vailing price and proceeds to separate or part the gold from the silver. The price of gold never varies, costing $20.67 a fine ounce. Sil¬ ver fluctuates with the market.

The importance of the assay office in its rela¬ tion to the financial world, the treasury, and the mint cannot be overestimated. During a recent year 10,739 melts of gold deposits and 1,642 melts of silver deposits were assayed. Fine gold melts numbered 324 and fine silver melts 49. The number of special assays was 850. The total assays was 71,000. Consult Bugbee, E. E., (Text-book of Fire Assaying) (Boston

1915) ; Outerbridge, A. E., (Assaying by the Spectroscope) (Philadelphia 1874) ; Ricketts, P. de P., (London 1913) ; Furman, H. v F., (Manual of Practical Assaying) (New York 1910) ; Smith, J. R., (Modern Assaying) (Philadelphia 1910) ; Fulton, C. H., (Manual of Fire Assaying) (New York 1911) ; Lon, A. H., (Technical Methods of Ore Analysis1 (New York 1911) ; Rhead, E. L., and Sexton, A. H., (Assaying and Metallurgical Analysis for the Use of Students, Chemists and Assayers1 (Lon¬ don 1911) ; Park, J., (Text-book of Practical Assaying1 (London 1914) ; Wraight, E. A., (Assaying in Theory and Practice1 (New York

1916) ; (Laws of the United States relating to the Annual Assay1 (Washington 1880).

ASSEGAI, as'se-ga, a short spear em¬ ployed as a weapon among the Kaffirs of south Africa. It is made of hard wood tipped with iron, and used for throwing or thrusting.

ASSELIN, as'sel'-aii, Joseph Frangois Olivar, Canadian nationalist : b. Saint Hilarion, Quebec province, 9 Nov. 1874. He was edu¬ cated at Rimouski College, was afterward prin¬ cipal of the evening school at Woonsocket, R. I., and private secretary to Sir Lomer Gouin (1901-03). During the Cuban War he served as a private with the United States troops. Since his return to Canada he has taken a prominent part in the advancement of Nation¬ alist sentiment in his own province, has been associated with La Presse and LeDevoir news-

papers, and in 1904 founded and was for a time editor of Le Nationalists. He is the author of a series of political brochures under the title of (Feuilles de combatˆ and is also au¬ thor of (A Quebec View of Canadian Nation¬ alism: an Essay by a Dyed-in-the-Wool French Canadian* (1910).

ASSEMANI, as'se-ma'ne, (1) Joseph Si¬ mon, a famous Orientalist : b. of a Maronite family in Tripoli, Syria, 1687 ; d. Rome, 14 Jan. 1768. He traveled on the Pope’s com¬ mission through Egypt and Syria, collecting many Oriental manuscripts and coins for the Vatican library, of which he was appointed keeper. Of his numerous learned .works, the most important is (Bibliotheca Orientalist is¬ sued by order of Clement XI and containing (in manuscript form) the Vatican codices in Syriac, Arabic, Persian, Turkish, Hebrew, Sa¬ maritan, Armenian, Ethiopian, Greek, Egyptian, Iberian and Malabaric. (2) Stephen Epho- nius (1707-82), also a learned author of books on Oriental learning. He was titular arch¬ bishop of Apomaca, Syria. Yet another nephew and Orientalist was (3) Joseph Aloy- sius (1710-82), professor at Rome. (4) Simon, a relative of the preceding, b. Tripoli 1752; d. Padua, 8 April 1821. He filled the chair of Oriental languages at Padua. He wrote an im¬ portant work on ancient coins, (Museo Cufico Naniano Illustrato) (1787-88).

ASSEMBLAGES, General Theory of.

The doctrine variously entitled Mengenlehre and

Mannigfaltigkeitslehre by the Germans, Theorie des ensembles by the French, and sometimes referred to in English as the theory or doctrine of manifolds or aggregates or by other analogous designations. Many of its ideas are at least as ancient as historical thought and have figured in important ways in logic, philosophy and mathematics steadily from the earliest times. On the other hand, many of the chief concepts involved in it, its char¬ acteristic notions, and their organization into a distinct and self-supporting body of coherent doctrine, may be said to constitute the latest great mathematical creation. Indeed the ma¬ jority of the founders and builders of the doc¬ trine, including Georg Cantor as easily the first of them all, are still among the living. As mathematics is the most fundamental of the sciences, the theory of assemblages seems des¬ tined to be regarded, if it be not already re¬ garded, as the most fundamental branch of mathematics. Viewed in retrospect, it appears as an inevitable product of the modern critical spirit. Already it is seen to underlie and inter¬ penetrate both geometry and analysis. Its con¬ nection with mathematical logic is most inti¬ mate, often approximating identity with the latter ; and even philosophy is surely, if but slowly, beginning to recognize in the theory of manifolds her own most inviting and promis¬ ing field.

The Notions, Assemblage and Element.

— Roughly speaking, any collection of objects or things of whatever kind or kinds is an as¬ semblage. Whitehead and Russell, however, have shown, that certain limitations must be imposed on this great generality to avoid the most baffling paradoxes. Each object in the collection is called an element of the assem¬ blage. An assemblage, to be mathematically

available, must be defined, or, as usage has it, well-defined, (wohldefinirt , bien defini). An assemblage is defined when, by the logical prin¬ ciple of the excluded middle, it can be regarded as intrinsically determined whether an arbi¬ trarily given object is or is not an element of it. Means may or may not be known for mak¬ ing the determination actual or extrinsic. Thus if the elements of the assemblage be completely tabulated the determination can be actually ef¬ fected by comparing the given object with the elements of the table. Again, if an assemblage, such as that of the endless sequence 1, 2, 3, ... of integers, be given by a definite law of formation of its elements, the law will gener¬ ally enable one to determine actually whether any given object, as 5 or \ or an apple or a sunset, is an element of the assemblage or not. But the possession of means the application of which is in our power is not essential to the notion of

defined assemblage. A real * num¬ ber is called algebraic or transcendental accord¬ ing as it is or is not a root of an equation of the form, axn + ax»~l + ax*-2 + . . . + an_x + a n = o,

having integral coefficients. Any real number, no matter what its origin or definition, is either algebraic or transcendental ; it cannot be both and it cannot be neither. Hence the real alge¬ braic numbers constitute a defined assemblage, and so, too, the transcendentals. Nevertheless no means is known for ascertaining in every case whether a given number is algebraic or not. It was really a great achievement when the trans¬ cendental character of the long familiar clas¬ sical numbers e and tt was proved, for e by Hermite in 1874 and for n nine years later by Lindemann. Even the existence _ of non-alge-braic numbers was unknown till it was proved by Liouville in 1851.

Depiction and Correspondence. — Assem¬ blages will be denoted by large and elements by small letters. If, in any way, each element a of A is uniquely associated with an element b of B, A is said to be depicted on B. The b's so used are the pictures of the as. If all the b's are thus made pictures, B is also depicted on A and the as are pictures of the b's. If each a is a picture of a b and reciprocally, so that there is a one-to-one correspondence be¬ tween them, the depiction is called similar. Ob¬ viously an assemblage can be depicted either similarly or dissimilarly on itself, generally in more than one way, often in an endless variety of ways.

Chains. — -If the elements of A are ele¬ ments of B, A is part of B. If in this case not all b's are as, A is a proper part of B. Any assemblage is part, but not proper part, of itself. One of the most important ideas con¬ nected with that of the depiction of an assem¬ blage on itself is the notion of a chain : if A be depicted on itself in any definite way, then any part of A that consists of the pictures thus formed is a chain. The theory of chains, due to Dedekind, has fundamental bearings in logic. Sec Induction, Mathematical.

The Concept of Equivalence or Sameness of Power. — If A and B are such that each may be similarly depicted on the other, i.e., if a

*The exigencies of the present undertaking demand the expository use of data drawn from the Theory of the Real Variable (which see) and other theories, although these are themselves branches of assemblage theory.

one-to-one correspondence can be established between the elements of A and those of B, A and B are said to be equivalent or to have the same power (Mdchtigkeit) , a relation sym¬ bolically expressed by writing A ~ B or B ~ A. Thus if A denote the assemblage of positive integers and B denote, say, the even positive integers, A ~ B, for plainly one may pair 1 with 2, 2 with 4, 3 with 6, and so on. Other ways of pairing A and B in this case will readily occur to the reader.

Distinction of Finite and Infinite. — An assemblage is infinite if it has the same power as some proper part of itself. Thus A of the last example is infinite. So, too, is B, for it is easily seen that if A B and if either A or B is infinite, so is the other. The foregoing defi¬ nition of infinite is one of the most fruitful of modern concepts. It is due independently to Dedekind and Georg Cantor. A finite assem¬ blage is one which can be exhausted by the re¬ moval of its elements one at a time. Some¬ times an infinite assemblage is defined to be one that cannot be exhausted or emptied by remov¬ ing from it one element at a time. It has not been proved that the two definitions are logi¬ cally equivalent. All apparent proofs of this depend on the questionable axiom of Zermelo (see below). For the purposes of investiga¬ tion, the former is found to be by far the bet¬ ter instrument. An infinite assemblage is often described as transfinite.

Denumerability. — Let A denote the assem¬ blage of positive integers. Any assemblage B such that B ~ A is said to be denumerable or to have the power of the denumerable assem¬ blage. As A ~ A, A is itself denumerable, and it serves conveniently as the type of denumer¬ able assemblages. The domain of such assem¬ blages is exceedingly rich and is replete with surprises. For example, though the rational fractions, that is, fractions having integral terms, are so numerous that between any two of them, however near to each other in value, there is an infinity of others, nevertheless the assemblage of rational fractions including the integers is denumerable. Of this the reader can quickly convince himself by reflecting that there is but a finite number of such fractions of which each has a specified integer n for sum of its terms. Thus, if n = 2, one has 1 or i; if n = 3, one has l and f; if n = 4, 3, I, 1; and so on. Some are repeated; repetitions may be kept or rejected. Dropping them, the required equivalence is seen in the pairing: (1, 1.) (2, 5), (3 , f) ; (4, ˆ) , . (5, f), (6, *)»

In ordinary speech one is justified in saying that rational numbers are neither more nor less numerous than the integers or than the odd or the even integers. It is plain that the familiar axiom, the whole is

greater than any of its parts, is not valid for infinite assemblages. For finite assemblages it is valid absolutely ; whether for others is not known. For another example, consider the algebraic numbers before men¬ tioned. These include the rationals and in¬ finitely many besides. Nevertheless the assem¬ blage of all algebraic numbers is denumerable. The proof is too long to insert here. Yet more astonishing is the theorem that an assemblage composed of all the elements of a denumerable infinity of denumerably infinite assemblages is denumerable.

The Power of the Continuum. — At this

stage the query is natural : is every possible as¬ semblage denumerable? The answer is, no. The assemblage of all real numbers, i.e., of all rationals and irrationals, is said to constitute a continuum: The assemblage of points of a straight line is a continuum, in particular a linear continuum. The last two assemblages are in fact of the same power, but neither is denumerable. This is demonstrated by letting ai, as, . . an, . . . represent any denumerable as¬ semblage of real numbers and then proving that between any two arbitrarily assumed numbers a and there is one number and therefore an infinity of > numbers not in the given sequence. From this proposition of Cantor's the existence of transcendental numbers, which had been otherwise previously proved by Liouville, fol¬ lows as a corollary. Any assemblage equiva¬ lent to that of the real numbers or to that of the points of a straight line is said to have the power of the continuum. The assemblage of points of any line-segment however short or, what is the same, the assemblage of numbers between any two numbers however nearly equal, has the power of the continuum. In¬ deed, either of these assemblages is a con¬ tinuum. But an assemblage may have the power of the continuum without being a continuum. For example, the assemblage of transcendental numbers, though it is not a continuum, has the power of a continuum. In fact, the assemblage left on suppressing from a continuum any de¬ numerable assemblage of elements is equivalent to the original assemblage. This last is a special case of the proposition: If A be infinite, and if the remainder R on suppressing a de¬ numerable part of A be infinite, then R ~ A. As above seen the power of the continuum is higher than that of the denumerable assemblage, but whether it is the next higher is an outstand¬ ing question. There are higher powers than that of any given power (for there is no assem¬ blage of all things), but no assemblage of points has a power higher than that of a continuum. On the contrary, it is one of the most marvelous of known facts that the assemblage of points on a line-segment however short is equivalent to the assemblage of all the points of space, nay, is equivalent to all the

points of a space having not merely, like our own, three dimensions, but a denumerable infinity of dimensions.

Limit-points, Dense and Derived Assem¬ blages. — A neighborhood or vicinity of a point p is a region small at will taken about p. If p be in space, a neighborhood may be a sphere hav¬ ing p as centre; if p be in a plane or in a line, a neighborhood will naturally be a circle or a line-segment. The following discussion, con¬ ducted for assemblages of points of a straight line, is readily extensible to other points assem¬ blages. Denote by P any given assemblage of points of a line. If there be a point p, in P or not, such that in any neighborhood of p there is one point (and hence an infinity of points) of P, then p is a limit-point of P. If p be in P but not a limit-point, p is an isolated point of P. The assemblage of all the limit- points of P is the first derived assemblage or derivative P(1) of P. The first derivative of P(1) is the second derivative of P, namely, P(2) ; and so on. If P be finite, its P(1) contains no points, it is empty . If P be infinite and in a segment, P(1) contains at least one point — a proposi-

ti®n of exceeding importance in function theory. If the nth derivative P(”) be empty and the pre¬ ceding derivative contains one or more points, P is said to be of the first genus and nth species. If Pt”) contain points for every positive integral value of n, P is said to be of second genus. Every point of a given derivative of P is a point of each preceding derivative, but P may contain points not in any of its derivatives. If some or all of the points of P are in an interval (a . . . /?) and if every sub-interval of the given one contains a point or points of P, P is said to be dense throughout the given interval. For example, the assemblage of points whose, dis¬ tances from a fixed point of the line are.rational numbers is dense throughout every interval. If P be dense throughout a given interval, so is every derivative ; in fact, each derivative in such case contains all points of the interval, and conversely. Hence one might lay down the definition : P is dense throughout an interval when and only when P(1) contains every point of the interval. Obviously, if P is dense throughout an interval, P is of second genus, and so, too, are its derivatives. It follows that if P or one of its derivatives be of first genus, P is not dense in any interval. But it is not true that every P of second genus is dense throughout some interval.

Greatest Common Divisor, Least Com¬ mon Multiple. — The equation

P = Q will sig¬ nify that the point assemblages P and Q are identical. Two assemblages having no element in common are said to be without connection. If P contains all and only the points of the as¬ semblages Pi, Pi. . . ., every two of the latter being without connection, the fact is expressed bv writing P = 'Pi, Pi, . . .). A part of P is called a divisor of it, and P is a multiple of each of its divisors. The symbol, D(Pi, P2, ...), is read greatest common divisor of Pi, P2, . . . and is the assemblage of their common points. M(Pi, Pi, . . .) is read least common multiple of Pi, Pi, . . . and is the assemblage of all the different points of the P's, it being understood that the latter have no common point. _To ex¬ press that P is empty, one may write P = 0. If and only if P and Q are without connection, D(P, Q) = 0. Each derivative of P is a divisor of every preceding derivative. If P is of sec¬ ond genus, then PW = (Q, R) , where Q is the assemblage of those points of PO.that are not common to PC1) , PC3) , . . . , and R is the assem¬ blage of those that are common.

Transfinite Derivatives. — R is therefore defined by the equation R = D (P(1), P(2) . . ,) or by R = D(PO, PC3), . . .), or by RˆDiPin1), Pin2) ,...), where m, n2, . . . are a denumerably infinite assemblage of increasing positive in¬ tegers. R is called a derivative of P, but the order of the derivative is not expressible by a number of the sequence 1, 2, 3, . . . ; these numbers are finite. The order of the derivative is denoted by the transfinite number and

one may write R = P Cw). The first derivative of p(w) is denoted by P(w + X) and the wth by pCˆ-j-n). p(w)have a derivative of transfinite order it is denoted by P(2w). Continuation of the process yields P(w2), P(o)u) = zD(P(u), P(w2),

P(cj3) ,. . .) , p(ˆQ), and so on endlessly. For any assemblage P of first genus, P(«)EEO,an equation serving to characterize assemblage vol. 2 — 27

of first genus. Assemblages of the second genus are definable for which the derivative of any given transfinite order shall consist of a single specified point.

If D(P, P(1)) EE 0, P is an assemblage of isolated points. From any assemblage P, an assemblage Q of isolated points is obtainable by suppressing from P the assemblage D(P, P(3)), and one may write Q— P — D(P, P(1)). It is known that if P be an assemblage of iso¬ lated points, it is denumerable, though, as above noted, the converse is not true. Also, if PC1) is denumerable, so is P ; but not conversely, for, for example, the assemblage of rational fractions is denumerable, while

its first deriva¬ tive is a continuum, namely, the assemblage of real numbers. Again, if P be of second genus, and if P(°),a being finite or transfinite, be denumerable, so, too, is P denumerable. A very remarkable theorem is the following: if P be in any given interval and if P(1). be de¬ numerable, the points of P can be enclosed in a finite number of sub-intervals having a sum less than any prescribed length.

Perfect Assemblages. — If P and P(1) co¬ incide P is called a perfect assemblage; in the contrary case, imperfect. For example, if P is the assemblage of points of the interval from pi to p-, including pi and pi, P is perfect; but if P includes only the points between pi and pi, P is imperfect, for clearly P(1) includes pi and pi. The definition just given is Cantor's. Another current definition is that by Jordan: P is per¬ fect if it includes P(1 >. It has been proposed to distinguish the two by describing an assem¬ blage, if perfect in Cantor's sense, as perfect, and, if perfect in Jordan's but not in Cantor's sense, as closed. It has been proved that if P be closed, the assemblage R which results on suppressing P(1 > from P is denumerable. But it is not true that every absolutely perfect assemblage is decomposable into a closed assemblage and a denumerable assemblage. The theory of perfect assemblages, though ex¬ ceedingly subtle, is far simpler than that of imperfect assemblages. Every derivative of P is relatively perfect. There are absolutely per¬ fect assemblages not dense in any interval.

Measure and Measurable Assemblages. — This subject can best be considered by limiting our discussion to sets of numbers in the interval between 0 and 1. Let P be such a set, and let Q be the complementary set — the set of all numbers between 0 and 1 that are not in P. Suppose that a denumerable number of inter¬ vals — i.e., sets of all the numbers between k and k +£, exclusive of these values — have been found, including all the points of P. These intervals have lengths, and these lengths, added in the descending order of magnitude, form a series. If this series is convergent, it has a sum, which we shall call .S' ; if the series diverges, we shall say that 5 is infinite. S' de¬ pends in general on the particular choice of in¬ tervals containing P. However, 6" will have either a minimum value or a lower limiting

value. This is called m (P), or the upper measure of P, and depends on P alone. If 1 — m (Q) — the lower measure of P — is equal to m (P), their common value is called m (P), the measure of P. A set which has a measure is said to be measurable. The theory of meas¬ urable sets is of the utmost importance in the

modern discussion of integration (see Real Variable, Theory of Functions of). Whether there are sets that are not measurable is un¬ known ; an apparent exemplification of such sets by Van Vleck rests on the precarious axiom of Zermelo. Every limited closed assemblage is measurcable.

Improper Infinite and Proper Infinite, or Transfinite. — ’The ordinary notion of mathe¬ matical infinity is that of a finite variable, such as tan a, which can take a finite value greater than any previously specified finite value; and such an equation as tan 90° = co is understood by mathematicians to be a kind of short-hand for saying that, by taking a near enough to 90°, tan cl can be made to exceed any nreassigned finite number, and it does not mean that oo is a value that tan « may assume. Similar illus¬ trations abound. Such a variable as thus remains always finite but may be made large at will 'is sometimes described as an infinite (variable) in analogy with the reciprocal notion of Infinitesimal, a variable that remains always finite but may be made small at will. Such infinites are described by Cantor as improper infinites. On the other hand both geometry and analysis have long recognized another sort of infinite, viz., one that is not variable but is constant. Such an infinite, for example, is the distance from any finite point of a range (see Projective Geometry) to the point common to the range and any parallel range. Another example is the distance from any finite point of the complex plane to an ˆinfinite point® of

the plane (see Complex Variable). Such in¬ finites are proper infinites. Proper infinites of a very different sort arise in the theory of as¬ semblages. We shall now give an account of their genesis and nature.

Transfinite Cardinal Numbers and their Laws. — Denote by A any assemblage of ele¬ ments a ; symbolically, A = { a \ . On disregard¬ ing both the character of the a’s and any and every order of their arrangement, a new as¬ semblage, an orderless assemblage of character¬ less elements (units), arises, called the power or cardinal number of A and denoted by the

symbol A* Herewith the term poiver (Mach - tigkeit) is itself defined; sameness of poiver was defined above. Plainly every class has a definite power, or cardinal number. The equation

A = B means that A and B have the same or equal powers or cardinal numbers. It is easily

seen that, when and only when A ~ B, A-B. If A, B, C, . . . have no common element, the assemblage of all the elements involved will be denoted by (A, B, C, . . .). If also A', B', C , . . . have no common element, and if A^A\

B~ B',C*C _ _ then (A, B, C, . . .)- (A\

B', C\ . . .), and the cardinal numbers of these composite assemblages are equal, or the same.

Notion of Greater and Less Powers or Cardinals. — If A and B are such that A has no part equivalent to B and that B has a part equivalent to A, the cardinal number of A is said to be less than that of B, that of B greater

than that of A ; symbolically, A < B, or B > A.

*This is not to be taken as a precise logical definition of number, but as a rough visualization of the process which will be found treated in detail under Algebra, Definitions and Fundamental Concepts.

If a, /?, y are cardinal numbers, and if a < P, and p < y, then a <y. Any one of the relations a=fi, a < p, a > ft, excludes the other two. But it does not follow that every pair of cardinals a and P must satisfy one of the three relations, and it is not known whether they satisfy one of them. This last proposition belongs to the theory of well-ordered assemblages, a term explained at a later stage of this writing.

Addition of Powers or Cardinals. — If a and ft be the cardinal numbers of A and B, A and B having no common element, and if 7 be the power of (A. B), then ci--fi=y. Such is the definition of addition. As a power in an orderless assemblage, «+ P = P + a, and, in case of any three powers, a (ft +7) — (a fi~P) +7; that is, addition of powers is commutative and associative.

Multiplication. — Let A = \a\ and B=]b\ , Associate each' a with each b. Consider each pair (a, b) as an element. The assemblage of these is denoted by (A.B). Hence (A.B) =

| (a, ft) | . The power 7 of this last obviously depends only on the powers a and b of A and B. Hence the definition of product : a' P = y- As the power, or cardinal number, of an assem¬ blage is orderless, it is readily seen thata-/3=/3-a and that , for any three powers , a • (/? • y) = (a ■ fi) • y, a" (ft + y) —a- ft +0-7; that is, multiplication of powers is commutative, associative and dis¬ tributive.

Involution. — If with each a of A a b of B be associated, any a and the associate b will be a pair. The same b may enter two or more pairs. The assemblage of all the pairs result¬ ing from any such definite association is called a covering of A with B, and is denoted by f(A). A different covering results if with any a there be associated a b not associated with it before. The assemblage of all possible coverings of A with B is denoted by (B\A) ; then (B\A) =

\f(A). The power 7 of (B\A) depends only on the powers a and ft of A and B; hence the definition : aP~y. It may be proved that, if a, P, y denote any three powers, afi -af = aP +7

• p 7 = (a • (?) y , and (aP) 7 = aP * 7.

It is an interesting fact that by means of the foregoing definitions of power, and addition, multiplication and involution of powers, the definition and the fundamental properties of the ordinary (finite) cardinals 1, 2, 3, ... ,

, . . . can be rigorously deduced.

The Smallest Transfinite Cardinal. — The cardinal number of the assemblage] v } of finite cardinals is denoted by No, alef-null.

Symbolically, N0 = The transfinite num¬

ber No, has the properties: N0 + 1 = No; No > h where p is any finite cardinal ; No < a, where a is any transfinite cardinal different from No; No T No =No, *v • No= =No • v=k0) where v is any finite cardinal; No* N0 = N0; n0f = No; etc. It is one of the interesting facts met with in the doctrine of transfinite assemblages that the cardinal number of the points of

space or other continuum is precisely 2 Sn-

Simply Ordered Assemblages, Order- types. — A is simply ordered when and only when its elements a are so disposed that of every pair ah a2 of them, one, as at, precedes, i. e., has lower rank and the other, as a2, comes after, i.e., has higher rank, and of every

triplet at, a2, a3, at is lower than a3, if «i is lower than a2 and a2 is lower than a'a. To say symbolically that ax is lower in rank than a-i

and that a> is higher than au we write either ˆ ! a2 or a3 f ch. A simply ordered assemblage that is further so arranged that it has an ele¬ ment of lowest rank, a first element, and that every part of it has a first element, is said to be well-ordered. For example, the assemblage of rational fractions greater than zero and less than one, if arranged in natural order, so that the larger the fraction the higher its rank, is simply ordered but not well-ordered. The same assemblage can, however, be well- ordered, thus : 2, b, t, §, b, §, f, . . . , where

the scheme is that — shall have lower rank

than ˆ when pi + qi is less than p> + q2, and

if pi + qi = p3 + q2, then the fraction having the smaller number for its numerator shall have the lower rank.

If A be a simply ordered assemblage, the new assemblage obtained by abstracting from the character of the elements of A is called

the order-type of A and is denoted by A. Ob¬ viously, A is simply ordered. If A and B are simply ordered, and if their elements can be paired in one-to-one fashion so that the rank relation of every two elements and o2 of A shall be the same as the rank relation of their correspondents bi and b2 in B, then A and B are said to be similar, and to be depictable on one another. These definitions of similar and depictable, it is noteworthy, are more restricted than that above given. The similarity of two similar simply ordered assemblages A and B is expressed by writing A2lB. If A is simply ordered, A2LA, and if B and C are simply

ordered, and if A2iC and B 2LC, then A2LB. It is_ plain, too, that either of the relations,

A=B, A2LB, implies the other. The definition of similarity given here is analogous to that of sameness of power in an earlier paragraph and can be rendered precise in the same man¬ ner.

To every order-type, or ordinal number, corresponds a power, _or cardinal number.

Thus to A corresponds A. The distinction of ordinal and cardinal is of no importance for finite assemblages, but is absolutely indis¬ pensable in the doctrine of transfinites. All order-types corresponding to a finite cardinal a are similar, but those corresponding to a transfinite cardinal present a countless variety and are said to constitute a type-class [a]. To every transfinite cardinal corresponds such a type-class. Any type-

class is itself an assem¬ blage, namely, of order-types, and as such has its own cardinal number, which may be shown to be greater than that of each of the order- types involved.

Addition and Multiplication of Order- types. — If A and B are simply ordered, it will be understood that in their union (A, B) the dements of A have the same rank relation as in A, that the like is true of B, and that every a is of lower rank than every b. Hence (A, B) is simply ordered. If A ' and B' are simply

ordered and if A21.A' and B2L B\ then (A, B)2L(A\ B'). Hence the order-type of

(A, B) depends only on a =A and ft-B. Hence the definition of addition: a-j-ft—(A, B). Here a is the augend and ft the addend. If a, 3, 7 be any three types, a ft- (ft + 7) = (® + 3) + y; i.e., addition of ordinals is asso¬ ciative; but, unlike cardinals, ordinals do not in general obey the commutative law. For

example, if <■> = E, where E denotes ei, e2, ... , tv . . . . \ev\ev + t], and if / be any new ele¬ ment, then 1 + w does not equal w -j- 1, for (/, E) and (E, f) are not similar, the latter having a last element, while the former has not.

Next from the simply ordered assemblages A and B, form the assemblage .S' by replacing

each b by an assemblage Ab2LA. It is easily seen_that the order-type of S' depends only on

a-A and 3 = B. JHence the definition of mul¬ tiplication: a-ft-S. Here a is multiplicand and ft is multiplier. It is readily proved, in respect to three types a, ft, 7, that (a - ft) - 7 — a • (ft • 7) and that a • (ft -j- y) = a- ft -f a • 7. That is, multiplication of ordinals like that of cardinals is associative and distributive. But in general ordinals do not obey, while car¬ dinals always obey, the commutative law. The reader can easily convince himself that, for example, 2 2.«. w2 is defined as

<*> -f «.2 +w.3 ft- , and such order-types as

ucj2t , etc., are defined by analogous chains of additions.

Order-type of Rationals. — Denote by R the rational numbers less than 1 and greater

than zero, taken in natural order. Let V = R. Obviously v belongs to

the type-class Xo, for we have seen that R is denumerable. More¬ over, R is dense (contains an element between every two elements) and has no element of lowest rank and none of highest. By these three properties, R is completely characterized; that means that if A is simply ordered, dense, de¬ numerable, and has neither lowest nor highest

element, A and R are similar, and v - A. It follows that vft-V = V, V'V— V, (l ft- v) V = v , (r/ + i)V = V, (1-H + l)V = V, but, ? + 1 = { = 1 + ?, and, though 77 + I ft-V = V, V + v --v ^y,ii v > 1.

Order-type of Linear Continuum. — De¬ note by 0 the order-type _of jthe linear con¬ tinuum X- { x [, where 0 < X < 1 , and where X is disposed in natural order, i.e., so that if x and xf be any two elements of X, x\ x\ when and only when x<x\ Now X is dense and perfect. It also contains R in such way that in respect to rank there are elements of R between every pair of x's. So is suggested the following fundamental theorem, which serves to characterize the type of the linear con¬ tinuum completely : If a simply ordered as¬ semblage A is perfect and if it contains a denumerable assemblage P such that in respect to rank P has elements between every two

elements of A, then 6= A.

Zermelo's Axiom. — In 1904, Zermelo pointed out that a certain principle, which amounts to the statement that given an as¬ semblage A of assemblages B, there exists an assemblage C containing just one member from every B, was being tacitly employed through¬ out the theory of assemblages. Zermelo con¬ sidered this axiomatic, but as soon as it was

rendered explicit, most of the mathematicians who had formerly unconsciously employed it disowned it, and set themselves the task of freeing the theory of assemblages from all taint of it. In general, this work has been very successful, but there are a group of outstanding propositions which have not been proved except on the basis of Zermelo's axiom, some of which actually imply it. Among there are (1) that of two unequal transfinite cardinal numbers, one is always the greater;

(2) that every assemblage can be well-ordered ;

(3) that every number is either finite or infinite (in the senses already defined). The con¬ scientious mathematician, vdien he employs this principle, wall always make clear the fact of this employment explicit. See also Alge¬ bra, Definitions and Fundamental Con¬ cepts.

Bibliography. — Bettazi, (Teoria delle

grandezze) (1891) ; Bolzano, (Paradoxien des Unendlichen) (1850) ; du Bois-Reymond, (Die allgemeine Funktionlehre> (1882) ; Borel, (Legons sur la theorie des fonctions> (1898) ; Cantor, G.,

(Grundlagen einer allgemeinen Mannigfaltigkeitslehre) (1883) and many ar¬ ticles in Mathematische Annalen and Acta Mathematics; Dedekind, (Was sind und was sollen die Zahlen? >; Hobson, J., (Theory of the Functions of a Real Variable) (Cam¬ bridge 1907); Russell, B. A: W., (Prin- ciples of Mathematics > (Cambridge 1903) ; Schonflies, A., (Beitrage zur Theorie der Punktmengen) (in Mathematische Annalen , Leipzig 1906) ; Veronese, (Fondamenti di geometria) (1891) ; Whitehead, A. N., and Russell, B. A. W., (Principia Mathematica) (Cambridge 1910-) ; Young, W. H. and G. C., (The Theory of Sets of Points) (Cambridge 1906) ; Zermelo, article in Vol. LIX, Mathe¬ matische Annalen (1904).

Cassius J. Keyser,

Adrain Professor of Mathematics , Columbia U niversity.

ASSEMBLY, Colonial. See Colonial

Government, Proprietary.

ASSEMBLY, Constituent. See Assem¬ bly, National.

ASSEMBLY, General, the name applied to the highest ecclesiastical court of the Established Church of Scotland. It consists of delegates from every presbytery, university and royal burgh in Scotland, holds meetings annu¬ ally, in the month of May, and usually continues to sit for 12 days. In its judicial capacity and as the court of last resort, the General Assembly has a right to determine finally every question brought from the inferior courts, by reference, complaint or appeal. The laws enacted by the assembly, after receiving the sanction of a majority of presbyteries, are the established and permanent statutes of the Church, by which everything belonging to the ecclesiastical state, or to the Church courts, is authoritatively reg¬ ulated. The United Free Church of Scotland has a General Assembly similar in its constitu¬ tion and functions to that of the Established Church, and the same is true of the Presby¬ terian churches (q.v.) of Ireland and America. See General Assembly of the Presbyterian Church.

ASSEMBLY, Legislative. The legis¬ lative assembly of a State, sometimes called the General Assembly or State Legislature, is the body of representatives elected by the people to enact laws for the State, corresponding to the Congress of the United States wdiich enacts laws for the nation. It is composed of upper and lower houses, the members of the former (the senate) usually being elected for a longer term than the members of the latter (sometimes called the

assembly, the house of representa¬ tives or the house of delegates). While the Constitution of the United States (Art. I, Sec. X) limits the powers of the legislative as¬ sembly, its principal powers and limitations are defined in the State Constitutions. The course of legislation varies in the several States, but in general follows the practices of the national Congress, the enacting clauses usually reading, ((Be it enacted by the people of the State.® Consult Hart, A. B., (Actual Government (New York 1903).

ASSEMBLY, National, a body estab¬ lished in France in 1789, and also known as Constituent Assembly. Upon the convocation of. the States-General by Louis XVI, the privileged nobles and clergy refused to deliber¬ ate in the same chamber with the commons, or tiers-etat (third estate). The latter, therefore, on the proposition of the Abbe Sieyes, consti¬ tuted themselves an Assemblee Nationale, with legislative powers, 17 June 1789. They bound themselves by oath not to separate until they had furnished France with a constitution, and the court was compelled to give its assent. In the 3,250 degrees passed by the assembly were laid the foundations of a new epoch, and hav¬ ing accomplished this task, it dissolved itself 30 Sept. 1791. The term is also applied to a joint meeting of the Senate and Corps Legis¬ late, for the purpose of electing a chief magis¬ trate or the transaction of other extraordinary business. Consult Stephens, (History of the French Revolution *(1886-91) ; Doniol, (La Revolution et la Feodalite* (1874).

ASSEMBLY, Right of. The first amend¬ ment to the Constitution of the United States provides that <(Congress shall make no law abridging the right of the people peaceably to assemble and to petition the government for a redress of grievances.® This guaranty is con¬ tained also in the various State Constitutions, but it cannot be understood to limit assem¬ blages which have for their object the petition¬ ing of government for a redress of grievances. Unless the public peace, security or welfare be endangered by the exercise of the right to assemble, this guaranty against legislative pro¬ hibition would extend protection to assemblies for social, religious or political purposes, but if the assembly be conducted in such a manner as to result in public inconvenience, or if the right to assemble be used to promote unlawful purposes, the right may be restricted. The amendment to the national Constitution is a limitation only on the powers of the national government. These constitutional provisions, however, do not protect the right of assembly against arbitrary interference of administrative or judicial, officials. Such interference, of course, is illegal and the injured party has remedy in an action at law for damages' or a criminal proceeding under Federal or State

statutes. Theoretically the constitutional pro¬ visions are adequate to protect the right of assembly, but in practice they have not always been found sufficient to prevent occasional in¬ fringement. The unauthorized and often in¬ discreet use of the powers conferred upon or possessed by administrative or judicial officials constitutes the chief danger to the due exercise of the right.

ASSEMBLY DISTRICT. See District.

ASSEMBLY OF DIVINES, a celebrated assembly appointed by the Long Parliament, and held at Westminster to determine upon the doctrine and liturgy of the English Church. By an ordinance passed 12 June 1643, 121 clergy¬ men, with 10 Lords and 20 Commoners as lay assessors, were nominated as constituents of the assembly. The assembly began its sittings in July 1643, in Westminster Abbey, but in the meantime a royal proclamation had been .issued forbidding the assembly to meet, which had the effect of inducing the greater part of the Episco¬ pal members to absent themselves. The ma¬ jority of those who remained were Presbyte¬ rians, but there was a strong minority of inde¬ pendents. A deputation was now sent along with commissioners from the English Parlia¬ ment to the General Assembly of the Scottish Church and the Scottish Convention of Estates, soliciting their co-operation in the proceedings of the Westminster Assembly, and in Septem¬ ber four Scotch clergymen, with two laymen, were admitted to seats and votes. The assem¬ bly continued to hold its sittings till February 1649. Among the results of its deliberations were the Directory of Public Worship, the Con¬ fession of Faith, and the Larger and Shorter Catechisms, which remain practically the stand¬ ards of the Presbyterians to the present day. At the Restoration the whole proceedings of the Westminster Assembly were annulled as invalid. Consult Hethorington, (History of the Westminster Assembly* (1843) ; Masson, ‘Life of Milton > (1858-79).

AS'SEN, a'sen, Holland, the capital of the province of Drenthe. Near it are the Giants’ Caves, to which Tacitus makes allusion. Pop.

11,191.

ASSENT, in law, an undertaking to do something in compliance with a request. Ap¬ proval of something done. Express assent is that which is openly declared. Implied assent is that which is presumed by law.

Assent must be to the same thing in the same sense. It must embrace the whole of the proposition, must be exactly equal to its extent and provisions, and must not qualify them by any new matter. Un¬ less express dissent is shown, acceptance of what it is for a person's benefit to take, is pre¬ sumed, as in the case of a conveyance of land.

The Royal Assent is the approbation given by the sovereign in Parliament to a bill which has passed both houses, after which it becomes a law. It may be given in person, when the sovereign comes to the House of Peers and the assent (in Norman French) is declared by the clerk of Parliament; or may be declared by letters patent under the great seal, signed by the sovereign.

ASSER, ii'ser, Tobias Michael Carel,

Dptch educator and an authority on interna¬

tional law: b. Amsterdam 1838; d. 1913. He was professor of law, first in the Athenaeum of Amsterdam, then, after 1876, in the Univer¬ sity of Amsterdam. In 1875 he became coun¬ sellor to the Dutch Foreign Office and in 1893 member of the Council of State. In 1899 he represented Holland at The Hague Peace Con¬ ference and again at the International Court of Arbitration in 1900. In 1911 he was awarded the Nobel peace prize. His works include (Schets van het Nederlandsche Handelsregt *(1899) ; 'Schets van het International Privats- regt* (1899) ; (La codification du droit inter¬ national prive* (1901) ; (Arbitrage interna¬

tional entre les Etats-Unis d'Amerique et la Russie) (1902).

ASSESSMENT is the determining of the value of a man's property or occupation for the purpose of levying a tax. Determining the share of a tax to be paid by each individual. Laying a tax. Adjusting the shares of a con¬ tribution by several toward a common beneficial object according to the benefit received. As¬ sessment of damages includes fixing the amount of damages to which the prevailing party in a suit is entitled. It may be done by the court through its proper officer, the clerk or protho- notary, where the assessment is a mere matter of calculation, but must be done by a jury in other cases. Insurance assessment is an appor¬ tionment made in general average upon the various articles and interests at risk, accord¬ ing to their value at the time and place of be¬ ing in safety for contribution for damage and sacrifices purposely made, and expenses incurred for escape from impending common peril. An assessment is also made upon premium-notes given by the members of mutual fire insurance companies,

constituting their capital, and being a substitute for the investment of the paid-up stock of a stock company, the liability to such assessments being regulated by the charter and by-laws, 12 N. Y. 477; 14 Barb. (N. Y.) 374.

Special assessments, or betterment taxes, are charges for improvements which are considered to bring a special benefit upon a piece of real estate over and above the benefit derived from the community at large. Such assessments are levied only on property and are not a personal liability of the taxpayer. Opening of new streets, construction of pavements, sewers and sanitary improvements are the most important objects for which special assessments are levied.

The term assessment is applied also to con¬ tributions levied by party committees upon the holders of appointive offices in the civil serv¬ ice. Party committees also make assessments upon candidates for elective offices. This sys¬ tem is noticeable in American political life as early as 1840. It was, however, always looked upon as an abuse but it was not abated until Congress had passed laws making the solicita¬ tion of funds from public officers a criminal offense. It has persisted to a limited extent in spite of hostile legislation. Recent legislation in many States requiring the publicity of all political expenditures, and the gradual exten¬ sion of the (<merit system® have greatly di¬ minished the abuse. Consult Brooks, R. C., Corruption in American Politics and Life) (1910) and Jenks, J. W., ‘Money in Practical Politics* (in Century Magazine, XLIV, 1892).

ASSESSOR, (1) one who advises or as¬ sists. Both in Great Britain and the United States nautical assessors are called in to advise and assist the courts in the administration of admiralty cases on difficult questions of naviga¬ tion. Assessors are also called into various other courts, as the court of appeals or county courts, in Great Britain to act in an advisory capacity. By Federal statute in the United States, our foreign consuls may call in assess¬ ors to act in certain criminal cases. (2) One who assesses, as taxes. The term is used in this sense both in Great Britain and the United States. His duties are mainly to adjudge the value of real and personal property and com¬ pute the taxes thereon.

ASSETEAGUE (as'se-teg') ISLAND, a small island off the coast of Virginia in North¬ ampton County. Upon it is a lighthouse 150 feet in

height.

ASSETS, in law, strictly the property of a debtor in the hands of his representative suffi¬ cient for the satisfaction of his creditors or legatees. Thus the property of a bankrupt is termed his assets and is the fund out of which his liabilties must be paid. All property of the debtor is assets, and it is not necessary that it should have been reduced into possession by him.

ASSIENTO, asyan'to (Spanish, asiento, seat, contract, treaty), a term especially applied to an agreement between the Spanish govern¬ ment and a foreign nation to import negro slaves from Africa into the Spanish colonies in America, for a limited time, on payment of certain duties. The English were the sole pos¬ sessors of this assiento till 1701. In 1713 the celebrated assiento treaty with Britain for 30 years was concluded at Utrecht. By this con¬ tract the English, among other privileges, ob¬ tained the right of sending a permission or assiento ship, so called, of 500 tons every year, with all sorts of merchandise, to the Spanish colonies. By the treaty of Madrid, 5 Oct. 1750, the contract was annulled.

ASSIER, as'ya, Adolphe d', French phil¬ ologist : b. Labastide de Seron 1828. He spent much of his life traveling, on which his earlier writings are based, but his later books are on the science of philology. He is the author of (Le Bresil contemporain, races, mceurs, insti¬ tutions, pavsages) (1867) ; (Souvenirs des

Pyrenees *(3d ed., 1885) ; (Essai de grammaire generale, d'apres la comparaison des princi¬ pals langues indo-europeennes* (1857); (Histoire naturelle du langage; Physiologie du langage phonetique* (1868); (Le langage graphique) (1868).

ASSIGNATION. See Assignment.

ASSIGNATS, a-se-nya, or as-ig-nats, a term applied to the paper money issued during the French Revolution. The French National Assembly after appropriating to national pur¬ poses the land belonging to the Church instead of selling it at a time when its value was greatly depreciated, because of the unsettled state of affairs, issued bonds on the security of it, which were called assignats, as representing land as¬ signed to the holder. This paper currency con¬ sisted chiefly of notes for 100 francs each, though many of them were for lower sums. The first issue in 1790 amounted to 400,-

000,000 francs. The government was relieved by this plan, for the

time being the assignats saved the Revolution. This arrangement for relieving the necessities of the government seemed so easy that recourse was. repeatedly had to it, as the property of wealthy emigres, until the amount arose to the vast sum of 46,000,000,- 000 francs, besides many forged notes. The con¬ sequence was that the value of assignats sank to almost nothing. In March 1796, a louis d'or (24 francs) bought 7,200 francs in assignats. They were withdrawn from the currency after this, and redeemed at a thirtieth of their nomi¬ nal value, by ˆterritorial mandates, ** a new kind of paper currency, which empowered the holder at once to take possession of public lands at the estimated value, while assignats could only be offered at a sale. These territorial mandates afterward became almost worthless and were returned to the government in payment of taxes or of land. Early in 1797 the system came sud¬ denly 'to an end.

ASSIGNMENT, a term denoting a trans¬ fer by deed of any property, or right, title or interest in property, real or personal. Assign¬ ments are usually given for leases, mortgages, and funded property. In the United States, as¬ signment is of broader signification and applies also to the transfer of real property by certain conveyance. In general, every right of property, real or personal, and every demand connected with a right of property, real or personal ; and all choses in action, as bonds, notes, judgments, mortgages, debts, contracts, agreements, relating both to real and personal property, are as¬

signable, and the assignment thereof will pass to the assignee a right of action in the name of such assignee against all parties liable to an action. It is now most frequently used to describe the transfer of non-negotiable choses in action ; and is more particularly applied to a written transfer, as distinguished from a transfer by mere deliver}'. Assignment carries with it all collateral securities held by the assignor for the collection of a debt

or the fulfilment of a contract, and is

subject to all the equities and charges which attached in the hands of the as¬ signor. A personal trust, as the right of a master in his indentured apprentice, or the du¬ ties of a testamentary guardian, or the office of executor, trustee, etc., is not assignable. The validity of an assignment must be determined by the law of the State in which it was made, provided the thing assigned is subject of munic¬ ipal or State law; but copyrights, patents, and government claims are governed by acts of

Congress. In general, assignments should be recorded in the office

prescribed by law, or are void as against those claiming under subsequent assignments. In a few States, filing or record¬ ing is necessary to the assignment of certain classes of choses in action, such as future earn¬ ings. In many States statutes give preference to laborers for their claims to payment of debts due them for labor furnished, and it has been generally held that these rights to priority of payment, so given or recognized, pass to the assignees of the laborer. In order to be en¬ titled to preference, the assignee's claim must be for money advanced to the laborers them¬ selves as distinguished from a mere advance to the employer with which to pay the laborers.

See Bankruptcy Laws; Bill of Svle; Con¬ tracts.

ASSIMILATION, a term denoting the transformation of foods into living substance. The animal body is constantly changing. New compounds are being made from others; old products are cast off. There is a constant inter¬ change of materials, some building up, others breaking down. The chief factors in the assimilative process are the foods and the oxy¬ gen in the air. Another sense of the word im¬ plies the act of making similar; also to acquire, as ˆassimilation of knowledge.® For a discus¬ sion of the former, see Digestion; Nutrition; for the latter see Respiration. See also Met¬ abolism.

ASSIMILATION, in geology, that proc¬ ess by which fragments of the wall rock of an intrusive mass are broken away and melted so that they finally become a part of the molten intrusive itself.

ASSING, a' sing, Ludmilla, German writer, niece of Varnhagen von Ense, who adopted her: b. Hamburg, 22 Feb. 1827; d. 25 March 1880. On the death of her mother, Rosa Maria Assing, who was a poet of some note, she was adopted by and went to live with her uncle, who gave her an excellent education. Through him she became inti¬ mately acquainted with Alexander von Hum¬ boldt. Her first notable work was a biography of the Countess Elise Ahlefeldt (Berlin 1857). On the death of her uncle she published a correspondence that had been carried on be¬ tween him and von Humboldt, under the title (Brief e Alexander von Humboldt an Varn¬ hagen von Ense) (Leipzig 1860), which was followed by her uncle's memoirs and diary (14 vols. 1861-71). Certain references to political matters in the latter aroused the wrath of the government, with the result that she was tried and

sentenced to eight months' imprisonment. In the meantime, however, she had fled to Florence, where she im¬ mediately published further instalments of the diary, whereupon she was again tried and sentenced to two years' imprisonment. In 1866, however, a general amnesty enabled her to return to Germany. Among her other works are (Piero Cironi, ein Beitrag zur Geschichte der Revolution in Italien) (Leipzig 1867) ; (Furst Hermann Piickler-MuskaiP (Ham¬ burg 1868).

ASSINI, as-se'ne, small seaport in the French Sudan, about 120 miles west of Cape Coast Castle. It taps much of the trade in that section of the Ivory Coast. Considerable coffee is being grown in the region about, but hardwood timber is the chief export. The population, mostly native, is about 3,000.

ASSINIBOIA, as-stn'i-boi'a, formerly a district in northwestern Canada, west of Manitoba, having the district of Saskatchewan on the north and Alberta on the west. On 1 Sept. 1905 Assiniboia was united with the province of Saskatchewan and the eastern por¬ tion of Athabasca to form the new province of Saskatchewan (q.v.).

ASSINIBOIN, as-sin'i-boin, signifying stone boilers, a name applied bv the Algon- quian Indians to a Siouan tribe which formerly inhabited the territory between the Missouri and the Saskatchewan and who did their cook¬

ing by dropping heated stones in water. They are distantly related to the Dakotas, with whom they are able to make themselves under¬ stood in conversation. The few survivors now live on reservations in Montana and on the other side of the Canadian border, altogether numbering about 2,000. Consult Lowie, R. H., (The Assiniboine) (in (Anthropological Pa¬ pers, > American Museum of Natural History, Vol. IV, 1910).

ASSINIBOINE, a river of Canada, which flows through Manitoba and joins the Red River at Winnipeg, about 40 miles above the entrance of the latter into Lake Winnipeg. It has a somewhat circuitous course of about 500 miles and steamers ply on it for over 300 miles.

ASSISI, as-se'se, Italy, a hill town in the province of Umbria, 20 miles from Spoleto. It is the see of a bishop and is famous as the birthplace of Saint Francis, founder of the Franciscan Order, and of Saint Clara, found¬ ress of a religious community for women. The splendid church built over the chapel where Saint Francis received his first impulse to de¬ votion is one of the finest remains of the architecture of the Middle Ages. Pop. (1911) 18,587. Consult ((Assisi® in (Mediaeval

Towns Series) (1901).

ASSISTANCE, Writ of, legal term, ap¬ plied to an order issued by a court of equity to a sheriff or any other officer of similar authority authorizing him to enforce a decree for the possession of land. The English term is (< writ of possession.® In colonial days the term was also applied to orders issued to customs and revenue officers, authorizing them to seize goods on which duty had not been paid. Consult . Quincy's (Reports, Superior Court of Judicature, Province of Massachusetts Bay, 1761-72, with an Appendix upon Writs of Assistance) (Boston 1865).

ASSIUT, Egypt, the capital of the province of the same name, and the largest and best built town in the Nile Valley south of Cairo, from which it is distant 248 miles by rail. There are several bazaars, baths and handsome mosques. It is famous for its red and black pottery and for ornamental wood and ivory work, which find a ready market all over Egypt. It is one of the chief centres of the Copts. Here also is the northern terminus of the caravan route across the desert to Darfur. There are many archaeological remains in the neighborhood. Pop. 42,000.

ASSIZE' OF ARMS. A law enacted in the reign of Henry II which enjoined every able-bodied man in the realm to maintain arms, suitable to his rank and condition of life, at his own expense. Of this law our militia is the modern offspring.

ASSIZE OF CLARENDON, regulations established by Henry II of England in 1166. They provided for juries, one in each county, each jury composed of 12 men from each hundred freeholders and iour from each vil¬ lage. The function of this body was to present before the justices all who were charged with murder or robbery, or of harboring such criminals. Certain sections also provided for the prosecution of heretics. Consult Adams and Stephens, (Select Documents of English Constitutional History) (New York 1901).

ASSIZE OF JERUSALEM, a code of laws in force in the Christian kingdom of Jerusalem and Cyprus. It consisted of two parts, the assize of the high court with juris¬ diction over the nobles, and the assize of the court of burgesses, or code of the common people. It was supposed for some time that the laws were framed by Godfrey de Bouillon; but this is now known to be incorrect. The assize of the high court was

first framed as a code about 1255, the assize of the court of burgesses, in the latter part of the 12th cen¬ tury, but the exact date is uncertain.

ASSIZES, an English legal term signify¬ ing the sessions of the courts held at intervals in every county by the judges. The whole country is divided into circuits, and three times in the year two judges, who are members of the highest courts in England, hold assizes . in all the counties of their respective circuit. In London and Middlesex, instead of circuits, what are known as courts of nisi prins are held. At the assizes all the justices of the peace of the county are bound to attend, or else are liable to a fine ; and also all the per¬ sons who have been summoned as grand jury¬ men or petit jurymen by the sheriff. At these assizes the judges sit under five separate com¬ missions, some of which relate to civil and some to criminal causes or business. In this manner, and by these means, the jails are in general cleared, and offenders tried and con¬ victed or acquitted at least every half year. In America there are no courts or sessions of courts technically called assizes. The judges, however, perform the same duties in the counties, within their respective circuits and jurisdictions, as the English judges, and gener¬ ally in the same manner, that is to say, accord¬ ing to the course of the common law. Since 1808 there have been assize courts in the judi¬ cial system in France. With the English insti¬ tutions, however, they have scarcely anything in common but the name. In the law of Scot¬ land assize is the technical term applied in cases tried in the court of justiciary to the jury of 15 sworn men, selected by ballot from a greater number not exceeding 45.

ASSMANNSHAUSEN, Prussia, a village in the province of Wiesbaden, on the Rhine, on the railroad from Frankfort-on-the-Main to Niederlahnstein. It is celebrated for pro¬ ducing the best red wine in the Rhine prov¬ inces. It has several baths and a warm spring, which have made of it a popular health resort. Pop. about 1,000.

ASSOCIATED PRESS, a co-operative

organization formed to gather news for the daily papers. Even before the Civil War the New York newspapers realized that each was paying large sums of money for news that was accessible to all. Accordingly provision was made for a joint agency which acted as a sort of clearing house through which each paper gave to all other papers (members of the agency) any news that it might receive. This formed the nucleus for the later organization known as the New York Associated Press. In 1865 the western papers incorporated their agency known as the Western Associated Press ; and there were several minor associations which formed a general alliance centred in

the New York association. In 1892 a general as¬

sociation in the nature of a stock corporation was formed, and its stockholders, being news¬ paper proprietors, were not allowed to hold more than eight shares of stock apiece, though, being a mutual organization in operation, it was not necessary that proprietors be stock¬ holders in order to become members of the as¬ sociation or to secure its news service. In 1900 the association was changed from a stock cor¬ poration into a mutual association for such newspaper proprietors as were entitled to re¬ ceive press reports. This was done 22 May 1900, when the present association was organ¬ ized under New York laws. Proprietors of papers or executive officers of corporations owning papers entitled to reports constitute the membership, though only as representing their papers. The income of the association is de¬ rived from members (of which there are about 860) by weeklv assessment prorated according to the cost and value of the service. The asso¬ ciation has its own system of leased wires for its more important service (about 22,000 miles of day wires and 28,000 miles of night wires), stretching across the continent from Saint John, N. B., to Seattle, Wash., and San Diego, Cal., and from Duluth, Minn., to New Orleans, La., Galveston, Tex., and Mexico City. The num¬ ber of words received and transmitted daily at each of the more important offices is 50,000, equivalent to about 35 columns of the average newspaper. See Press Associations.

ASSOCIATION AREAS. In the brain

of many lower animals as well as in that of man there are definite areas associated with other areas by sets of fibres, known as associa¬ tion fibres. These different areas act together in performing many of the complicated acts of human life. Thus, the general sensory area in the brain, that feels the skin sensations and determines their character, is in close associa¬ tion with the motor area determining the move¬ ments of the body in correspondence with the knowledge given by the sensory areas. Under the heading Aphasia several of these associa¬ tion areas are discussed. The studies of psy¬ chology and of mental diseases are largely con¬ cerned with the relations and connections of the association areas in the brain.

ASSOCIATION FIBRES, a term applied

to those fibres that connect different parts of the brain, particularly those that unite different areas in the same hemisphere, distinguishing them from the commissural fibres that connect areas in different hemispheres, or projection fibres that bind the cerebrum with the

lower cerebellar or spinal systems. These association fibres form late in childhood and on their de¬ velopment depends much of the increased intel¬ lectual growth of the individual.

ASSOCIATIONS OF CATHOLIC COL¬ LEGES OF THE UNITED STATES, an

organization founded in Chicago in 1899 under the guidance of Rt. Rev. Mgr. Thomas Conety, rector of the Catholic University. Its purpose is to study the questions connected with col¬ lege education, to enlarge the development of college work and to advance the unification of system of Catholic education. Representa¬ tives from 53 colleges joined in the first or¬ ganization of the Association, which now in¬ cludes about 90 colleges, conducted chiefly by religious teaching orders of men. The studies

range from classical to commercial subjects. No uniformity of entrance requirements exist.

ASSOCIATION OF IDEAS, a phrase current in philosophy and psychology since the days of John Locke. The term “association® has had, in this connection, many different meanings. In popular psychology, it indicates the way the mind passes from idea to idea; or the way one idea suggests or “reproduces® another. Thus, in passing from the thought of gold to the recollection of a recent visit to a mining camp and then to the plot of a novel laid in a mountainous region, one may be said to “associate® the story with the idea of the mining camp, and this, in turn, with the idea of gold (see Memory). It is but a step from this popular conception of association — asso¬ ciation as “reproduction® — to the notion that association is an explanation of reproduction. Association then becomes (to change the figure) not the actual passage from idea to idea, but the intangible bond which holds ideas together and which enables one idea (that is, the “gold® idea) to drag after it another (the “camp® idea). This second interpretation of the term is in disrepute among psychologists because no evidence of such a bond as the interpretation implies is to be found in consciousness. It may be. urged, however, that even if association in this causal sense be undiscoverable by intro¬ spection it may, nevertheless, be regarded as a general principle of mental activity; — as the means by which the mind creates knowledge. When, however, association is thus interpreted to mean a principle

underlying and condition¬ ing the process of knowing it passes from psychology to epistemology (see Psychology). The doctrine of Associationism, which is con¬ nected with the names of David Hume, James Mill, Alexander Bain and other “association- ists,® rests upon this epistemological meaning of the term.

Returning to the psychological use of the word “association,® we may note that the popu¬ lar conception stands in need of modification and precision. (1) To say that mind “asso¬ ciates® idea with idea implies that ideas are by nature separate and distinct and require some “gentle force® (as Hume puts it) to bring them together. This is not true. Ideas are inter¬ woven ; they are organically connected ; they are not held together as in a bundle. (2) In the second place, the popular use of the term is too narrow ; a chain of actions, or of emotions, or of feelings, may be associated as well as a chain of ideas. In habitual performances, for example, — such as dressing — one act calls forth the next, this in turn the next, and so on ; or emotion may be linked with emotion, as anger following fear; or, finally, associations may set out from a perception, as the thought of home from the sight of a letter. (3) Again, association does not necessarily imply a se¬ quence of associated elements. It may be simultaneous, as well as successive; for ex¬ ample, I see the table before me and, at the same time, I apprehend it as a hard resisting substance, or I hear the rumble of a carriage behind me and I see, in my “mind’s eye,® its form and color (see Perception). (4) Finally, association in the popular sense simply states that idea follows idea ; it tells us nothing of the nature of the associated consciousness; of how, that is, an association differs from a per¬

ception. Now association, in its strict tech¬ nical sense, means the associated elements of consciousness ; to illustrate, it means the mass of constantly shifting processes which make up mind while one is thinking gold — mining- camp — novel. Just as there exist typical groups of mental processes which underlie the perception of a landscape, a swinging pendulum or a musical composition, there exist other typical groups — such as those already men¬ tioned — which are known as associations.

Psychological work upon association has been directed, for the most part, upon the con¬ ditions under which associative groups arise. These conditions have, since the days of Aris¬ totle, been set down under the heading of “principles® or “laws® of association. Thus a is said to call up or reproduce b when a and b have, at some previous time, stood together in consciousness (law of contiguity), or when a has been the cause of b (law of causality), or when a resembles b (law

of similarity), etc. At the present time, these “laws® of association are usually reduced to two; the law of con¬ tiguity and the law of similarity. But even these are by no means final or adequate state¬ ments of the conditions under which associa¬ tions arise; for — to point to only two or three of their imperfections — “similarity® is an ex¬ tremely ambiguous term; it may mean simple likeness, or partial identity, or likeness of re¬ lationship ; and “contiguity® is indefinite — it does not determine how near processes must lie in consciousness in order for one to reproduce the other. Moreover, it should be said that there are thousands of contiguity and similarity connections that are never realized in associa¬ tion ; this follows from the fact that almost everything is, to some extent, similar to every¬ thing else, and that the elementary processes of mind have appeared “contiguously® in almost every conceivable form of combination. Both terms are, then, too broad to have much signifi¬ cance. If we set them down as “laws,® we have still to determine under what particular conditions a given association is formed. Many of these particular and more important condi¬ tions have been determined ; they include re¬ cency, frequency, vividness (the more recently or frequently or vividly a process or group of processes has stood in consciousness the greater the liability of its appearing in an associative connection), the general interests of the indi¬ vidual mind (for example, botanical ideas crop up in the botanist’s mind, geological ideas in the mind of the geologist) the presence or ab¬ sence of inhibitory associations (if a has already stood associated with b and c, its chances for associating with d will be lessened), mood (unpleasant subjects crowd into mind when one is depressed), etc. . The actual liability of a given association being formed is thus seen to rest upon a great number of possible conditions. So far as there is any truth in a general all- inclusive “law® of association it is best ex¬ pressed as a law of neutral habit. This law is formulated by W. James as follows: “When two elementary brain-processes have been active together or in immediate succession, one of them, on reoccurring, tends to propagate its excitement into the other.® The relation of this law to the law of contiguity is obvious.

Consult Claparede, (L’association des idees) (Paris 1903) ; Bain, A., (Mental and Moral

Science) (London 1884) ; Stout, (A Manual of Psychology (London 1899) ; Jung, (Lectures and Addresses at the Twentieth Anniversary of Clark University5 (Worcester 1910) ; James, Principles of Psychology5

(New York 1890, ch. xiv) ; Titchener, Experimental Psychology5 (pt. II, 402 1901) ; Kuelpe, (Outlines of Psy¬ chology5 (trans. 1895, I77ff) ; Calkins, intro¬ duction to Psychology5 (1901, 157ff).

Madison Bentley,

Professor of Psychology, University of Illinois.

ASSOLLANT, as'so'lan', Alfred, a French novelist and political writer : b. Aubusson, 20 March 1827 ; d: Paris, March 1880. Having traveled extensively over the United States, he published, on his return, (Scenes from Life in the United States5 (1858), a series of tales which attracted a good deal of attention. Among his numerous novels are (Two Friends in 1 792 5 (1859), a story of the Reign of Terror; Prancas5 (1859), a picture of the corruption under Louis Philippe; (Gabrielle de Chenevert5 (1865), portraying the provincial nobility be¬ fore the Revolution; Pendragon5 (1881); and Plantagenet5 (1885).

ASSOMMOIR, L\ la'so'mwar', a novel by Emile Zola, entitled (Gervaise5 in the English translation, published in 1877. It forms one of the series dealing with the fortunes of the Rougon-Macquart family, and is a series of repulsive pictures unrelieved by one gleam of a nobler humanity, but only (<realistic55 as scraps ; the life as a possible whole is as purely imaginative as if it were lovely instead of loathsome.

ASSONANCE, in poetry, a term used when the lines end with the same vowel-sound, but make no proper rhyme. Such verses having what we should consider false rhymes are regu¬ larly employed in Spanish poetry; as in ligera, cubierta, tierra, mesa.

ASSOS, as'os, an ancient Hellenic port on the Gulf of Edremid, from whose still imposing remains the successful excavations, in 1881-83, of the American Institute of Archaeology have brought to light the agora, with senate house and colonnade, a bath, theatre, gymnasium, statues of heroes, and seven Christian churches.

ASSOUAN, a-swan', or ASSUAN, also called Aswan (Arabic al suaan , <(the opening,55 that is, of the Nile; the ancient Syene, whence the red granite of the vicinity — from whose famous quarries were cut under the earliest dynasties so many of the huge obelisks and colossal statues that adorned the temples and palaces of Egypt — is called syenite), capital of the province of the same name, the south¬ ernmost city of Egypt proper, near Nubia, on the right or eastern bank of the

Nile, and beside the first or lowest cataract, 590 miles by rail south of Cairo. Near it are the islands of Philae and Elephantine, the ruined monu¬ ments of the former of which are of such fascination to tourists; on the left bank are many rock tombs of the ancient dynasties. Up to the crushing of the Mahdist rebellion Assouan was an important garrison town and the central depot for the Sudan caravan trade. This, as well as its military importance, has since declined but the opening of a railway to Alexandria has increased its commercial pros¬ perity. The chief export is senna. Assouan is also a famous health and tourist resort.

Pop. (1907), including suburbs, 16,125. Of still greater importance is the new dam which has added 1,408,000 acres to the arable soil of Egypt, besides steadying the fertility of the older lands, and which is described in extenso below.

The monumental dam .at Assouan, one of the greatest achievements of the kind in ancient or modern times, forms a reservoir in the Nile Valley capable of storing 2,423,000,000 cubic metres of water. It has not only pro¬ duced a revolution in the primitive and labori¬ ous methods of irrigation in Egypt, but has reclaimed vast areas of land that have hitherto been accounted as arid and worthless. The old system of irrigation was little more than a high Nile flooding of different areas of land or basins surrounded by embankments. Less than a hundred years ago, the introduction of perennial irrigation was first attempted under Inchemet Ali by cutting deep canals to convey the water to the lands when the Nile was at its low summer level. When the Nile rose, these canals had to be blocked by temporary earthen dams, or the current would have wrought de¬ struction. As a result, they silted up, and had to be cleared of many millions of tons of mud each year by enforced labor, much misery and extortion resulting therefrom. About half a century ago the first serious attempt to im¬ prove matters was made by the construction of the celebrated Barrage at the apex of the delta. This work consists, in effect, of two brick-arched viaducts crossing the Rosetta and Damietta, branches of the Nile, having together 132 arches of 16 feet 4 inches span, which were entirely closed by iron sluices during the summer months, thus heading up the water some 15 feet and throwing it at a high level into the six main irrigation canals below Cairo. In the summer months the whole flow of the Nile is arrested and thrown into the aforesaid canals. The old Barrage was constructed under great difficulties by French engineers, subject to the passing whims of their Oriental chiefs. About 15 years elapsed between the commencement of the work and the closing of all the sluices, and another 20 years before the structure was sufficiently strengthened by British engineers to

fulfil the duties for which it was originally designed. Forced labor was largely employed in its con¬ struction and at one time 12,000 soldiers, 3,000 marines, 2,000 laborers and 1,000 masons were at work at the old Barrage.

In connection with the Nile reservoir sub¬ sidiary weirs were constructed below the old Barrage to reduce the stress on that structure. The system adopted was a novel one, devised by Major Brown, inspector-general of irriga¬ tion in lower Egypt. His aim was to dispense almost entirely with plant and skilled labor; and so, without attempting to dry the bed of the river, he made solid masonry blocks1 under water by grouting rubble dropped by natives into a movable timber caisson. Both branches of the Nile were thus dammed in three sea¬ sons at a cost, including navigation locks, of about $2,500,000. Many other subsidiary works have been and will be constructed, including regulators such as that on the Bahr Yusuf Canal. The most important of the works are the Barrage across the Nile at Assiut, about 250 miles above Cairo, which was commenced bv Sir John Aird & Co. in the winter of 1898

OAHHAGt

steMfe

jfeMAaea;

iff5?®#,,

«&s@S

ssviMMVia

Arctt of Diocletian

Temple ofHathor

PHARAOH'S ft BCD

ASSOUAN DAM

Bird's-eye View of the Structure and Surrounding Region

and completed in 1902, the Barrage at Zifta, designed and built by Sir

Hanbury Brown, 1900-02; and the Barrage at Esna, designed by Sir Arthur Webb, built by M. McDonald, 1906-08. The great dam at Assouan, 590 miles above Cairo, is not a solid wall, but is pierced with sluice openings of sufficient area for the flood discharge of the river, which may amount to 15,000 tons of water per sec¬ ond. There are 180 such openings, the lower 140 are 23 feet high by 6*4 feet wide, the up¬ per 40 are 11 by 6ˆ4 feet; and where subject to heavy pressure when being moved they are of the well-known Stoney roller pattern. The total length of the dam is about 1*4 miles; the original height from foundation, about 130 feet; the difference of level water above and below, 65 feet ; and the weight of masonry 149.5 pounds per cubic foot. The total ex¬ cavation has been estimated at 824,000 cubic yards and the masonry at 704,000 cubic yards. Navigation is provided for by a ((ladder)) of four locks, each 260 feet long by 32 feet wide. As was the case at Assiut, the difficulties in dam construction are not in design but in the carrying out of the works. When the <(rotten rock® in the bed was discovered, Sir Benjamin Baker reported to Lord Cromer frankly that he could not say what the extra cost or time involved by this and other unforeseen condi¬ tions would be, and that all that could be said was that, however bad the conditions, the job could be done. Lord Cromer replied that the dam had to be completed whatever the time and cost involved. The contract was let to Sir John Aird & Co., of London, with Messrs. Ransomes and Rapier, of London, as sub-contractors for the iron work, in Febru¬ ary 1898. The engineer who designed it was Sir William Willcocks. Two months after signing the contract the permanent works were commenced, and before the end of the year thousands of native laborers and hundreds ot Italian granite masons were hard at work. On 12 Feb. 1899, the foundation stone of the dam was laid by the Duke of Connaught. Many plans were considered by the engineers and contractors for putting in the foundations of the dam across the roaring cataract chan¬ nels, and it was finally decided to form tem¬ porary rubble dams across three of the chan¬ nels below the site of the great dam, so as to break the force of the torrent and get a pond of comparatively still water up stream to work in. Stones of from one ton to 12 tons in weight were tipped into the cataract, till finally a rubble mound appeared above the surface. The first channel was successfully closed on 17 May 1899, the depth being about 30 feet and the velocity of current nearly 15 miles an hour. In the case of another channel the clos¬ ing had to be helped by tipping in railway cars themselves, loaded with heavy stones and bound together with wire ropes, making a mass of about 50 tons, the great mass being- necessary to resist displacement by the torrent.

These rubble dams were well tested when the high Nile ran over them ; and on work being resumed in November, after the fall of the river, water-tight sandbag dams, or <fsudds,® were made around the site of the dam foundation in the still waters above the rubble dams, and pumps were fixed to lay dry the bed of the river. This was the most ex¬

citing time in this stage of the operations, for no one could predict whether it would be possible to dry the bed, or whether the water would not pour through the fissured rock in overwhelming volume. Twenty-four 12-inch centrifugal pumps were provided to deal, if necessary, with one small channel ; but happily the sandbags and gravel and sand embank¬ ments stanched the fissures in the rock and interstices between the great boulders cover¬ ing the bottom of this channel, and a couple of 12-inch pumps sufficed. The masonry of the dam is of local granite, set in British Portland cement mortar. The interior is of rubble set by hand, with about 40 per cent of the bulk in cement mortar, four of sand to one of cement. All the face work is of coursed rock-faced ashlar, except the sluice linings, which are finely dressed. This was steam crane and Italian masons' work. There was a great pressure at times to get a section completed before the inevitable rise of the Nile, and as much as 3,600 tons of masonry was executed per day, chiefly at one point in the dam. A triple line of railway and numer¬ ous cars and locomotives were provided to convey the materials from quarries and stores to every part of the work. The maximum number of men employed was 11,000, of whom 1,000 were European masons and other skilled men. Mr. Wilfred Stokes, chief en¬ gineer and managing director of Messrs. Ransomes and Rapier, was responsible for the detailed designing and manufacture of the sluices and lock gates ; 140 of the sluices are 23 feet high by 6 feet 6 inches wide, and 40 of them half that height ; 130 of the sluices are on the ((Stoney® principle with rollers, and the remainder move on sliding surfaces. The larger of the Stoney sluices weigh 14 tons, and are capable of being moved by hand under a head of water producing a pres¬ sure, after the heightening of the dam, of 325 tons against the gate. There are five lock gates, 32 feet wide and varying in height up to 62 feet. They are of an entirely different type from ordinary folding lock gates, being hung from the top on rollers and moving like a sliding coach-house door. This ar¬ rangement was adopted for safety, as over 1,000,000,000 tons of water are stored up above the lock gates, and each of the two upper gates is made strong enough to hold up the water, assuming that the four other gates were destroyed. After the heightening of the dam a fifth lock and gate were added. When the river is rising the sluices are open and the red water passes freely

through, without de¬ positing the fertilizing silt. After the flood when the water has become clear and the discharge of the Nile has fallen to about 2,000 tons per second, the gates without rollers are closed, and then some of those with roll¬ ers; so that between December and March the reservoir is gradually filled. The reopen¬ ing of the sluices takes place between May and July, according to the state of the Nile and the requirements of the crops. On 10 Dec. 1902 the dam was formally declared com¬ plete, the total cost having been about $11,-900,000. In 1907-12, in accordance with a plan prepared by Sir Benjamin Baker, it was raised about 16*4 feet and its thickness in¬ creased about an equal amount. The capacity

of the original dam was thus increased from about 1,000,000,000 cubic metres to 2,423,000,- 000 cubic metres, its depth from about 65 feet to 88 feet, and the extent of river affected from 140 miles to 185 miles. The total cost of raising the dam was about $7,500,000. It has been estimated that each milliard of cubic metres of water suffices for the irrigation of 225,000 acres of summer crop and has a value to the treasury of about $2,500,000 per year. In 1905-06 a talus was constructed down stream at a cost of $1,413,500. Since the rais¬ ing of the dam the Island of Philae is flooded between December and May, when the res¬ ervoir is full, and is only entirely above wa¬ ter between August and December. Elaborate operations have taken place to preserve the ruins as far as possible from the injury which is bound to ensue from their annual submer¬ gence. It is impossible to estimate the far- reaching beneficial influence these irrigation works will bestow upon Egypt ; but the recla¬ mation of so many thousands of acres of desert for agricultural development cannot fail to improve the agricultural possibilities of the land and assist Egypt to regain the pros¬ perity it enjoyed in the era of the Pharaohs, with a greater cultivable area than it had even then. See Irrigation; Nile. Consult Willcocks, (The Nile Reservoir Dam at As- suan) (London 1903) ; Willcocks and Craig, (Egyptian Irrigation) (London 1913) and Fowler, heightening of the Assuan Dam> (in Engineering News, 30 Sept. 1909).

ASSUMPSIT, in law, an action to recover a compensation in damages for non-perform¬ ance of a simple contract; that is, a promise, whether verbal or written, not contained in a deed under seal. The word assumpsit (Latin) means, he has undertaken, and was taken as the name of this action from its occurrence in dec¬ larations, that is,

formal statements of the plain¬ tiff's cause of action, when these were in Latin. Assumpsits were of two kinds, express and implied; the former being where the contracts were actually made in word or writing; the lat¬ ter being such as the law implies from the jus¬ tice of the case; as, for instance, if one is em¬ ployed to perform service or labor, the obvious justice of paying him a reasonable sum there¬ for when completed raises an implication, in law, of a promise to make such payment.

ASSUMPTION, a church festival cele¬ brating the translation into heaven of the Vir¬ gin Mary, kept on 15 August. The legend first appeared in the 3d or 4th century, and the fes¬ tival was instituted some three centuries later. The story has been made the subject of a num¬ ber of paintings by the most celebrated artists in history. The following are the best known : (1) Titian: in the Accademia in Venice; rep¬ resents the Virgin being carried on bright clouds to heaven, surrounded by rejoicing angels, while the apostles look up from earth in amazement; (2) Titian: another painting in the Cathedral of Verona; (3) Correggio: frescoes in the cupola of the cathedral in Parma, Italy; (4) Rubens : painting in the cathedral at Ant¬ werp, Belgium ; representing the Virgin being carried to heaven, surrounded by angels, while several apostles and women are gathered at the empty tomb below; (5) Perugino : in the Accad¬ emia, in Florence; showing, in addition to the

Virgin, four saints in the foreground ; the rep¬ resentation of the Virgin is considered one of Perugino's most beautiful figures; (6) Guido Reni : a large canvas in Bridgewater House, in London; (7) Gaudenzio Ferrari: fresco in the Church of San Cristoforo, in Vercelli, Italy; showing figures of the Father, the Virgin, the angels and the apostles ; (8) Murillo : painting in the Hermitage Museum, Petrograd; repre¬ senting the Virgin floating.

ASSUMPTION, city in Paraguay. See

Asuncion.

ASSUR, as'-soor, chief god of the ancient Assyrians, who first created himself and then created all things. (See Assyria). Also the name of the first capital of ancient Assyria, built on the western bank of the Tigris, 37 miles below its juncture with the upper Zab and near the modern Kalat Sherkat. It is referred to in the Bible (Gen. ii, 14). In 1903 extensive excavation was begun by the Deutsche Orient- Gesellschaft which has continued up to the present. Whole buildings, streets and quays along the ancient bed of the river have been laid bare and many

objects of artistic and his¬ torical interest have been found. The city was destroyed in 606 b.c. by the Medes. Consult (Mitteilungen der deutschen Orient-Gesell- schaft) (1903-14), Andrse, (Die Festungs-werke von Assur) (1913).

ASSURANCE. See Insurance.

ASSURANCE, Sisters of the, a teaching

Order of Sisters in the Catholic Church, founded by Monsignor Affre in Paris in 1839.

ASSURBANIPAL, as'soor-ba'ne-pal'. See

Assyria; Nineveh; Sardanapalus.

ASSUS. See Assos.

ASSYNT, as'int, a wild and rugged dis¬ trict of Scotland. There are inexhaustible quarries of marble, both white and variegated. Fresh-water lakes are numerous; the largest, Loch Assynt, is about seven miles in length and one mile in breadth.

ASSYRIA (the Asshnr of the Hebrews, Athura of the ancient Persians), the ancient name of a portion of Mesopotamia, lying main¬ ly between the Euphrates and the Tigris, the seat of the earliest recorded monarchy. In the earliest times it was probably limited to the low-lying tract between the Jebel Makloub and the little Zab (Zab-Asfal), on the left bank of the Tigris ; but at its greatest extent Assyria must have been nearly 500 miles long, with an area of about 100,000 square miles. Toward the north Assyria bordered on the mountainous country of Armenia, which was at times under Assyrian dominion, but which at no time was considered as an actual part of the country. On the east dwelt numerous independent and warlike tribes, sheltered by the fastnesses of the Zagros Mountains. On the southeast Susi- ana or Elam was the frontier state east of the Tigris, while Babylonia occupied the same posi¬ tion between the rivers. Southwest of Assyria lay Arabia, and higher up Syria and the land of the Hittites. The chief cities of Assyria in the days of its greatest prosperity were Nine¬ veh, whose site is marked by the mounds oppo¬ site Mosul (Nebi Yunus and Kuyunjik), Calah (or Kalakh, the modern Nimrud), Assur (or A1 Asur, Kalat Sherkat), Sargina (Khorsa-

bad), Arbela (Arbil), etc. The surface of the country within its widest limits was of a diver¬ sified character. On the north and east the lofty mountain-ranges of Armenia and Kurdistan are succeeded by low ranges of arid limestone hills, occasionally enclosing fertile plains and valleys. Immediately south of this is a well-watered, productive and undulating belt of country, into which run limestone rocks of a golden color and wooded with dwarf-oak. This sinks sud¬ denly down upon the great Mesopotamian plain (the modern El Jezireh), about 250 miles in length, interrupted only by a single limestone range branching off from the Zagros Mountains across the plain. The numerous remains of ancient habitations show how thickly this vast flat must have once been peopled ; now, for the most part, it is a mere wilderness.

History. — Scripture tells us that the early inhabitants of Assyria went from Babylon, and the traditions of later times, as well as inscriptions on the disinterred Assyrian monu¬ ments, and the character of those remains go to show that the power and civilization of Babylon were earlier than those of Assyria. In Genesis x, 11 it is mentioned that Nineveh was founded by Assur, but for long the country was subject to governors appointed by the kings of Babylon. We learn from monumental in¬ scriptions that about 1820 b.c., when Assur was the capital of the country, Shamshi-Adad III founded temples there to Assur, the great national deity, and to Anu and Adad, besides a temple to the goddess of Nineveh in the city of that name. The Assyrian rulers gradually began to treat with their southern neighbors on equal terms, the boundaries of the two coun¬ tries were for a time clearly marked out, and intermarriages among the reigning families oc¬ casionally took place. About the latter end of the 14th century Shalmaneser I acquired the whole of Naharina (the country round the sources of the Euphrates and Tigris) by con¬ quest, and planted Assyrian colonies there ; he also founded the city of Calah or Kalakh and restored the great temple at Nineveh. About 1300 b.c. he was succeeded by his son Tukulti- Ninib I, who conquered the whole of the valley of the Euphrates and built or restored the palace at the city of Assur. The five follow¬ ing reigns were occupied with wars, more or less successful, with the Babylonians. About the year 1107 b.c. Tiglathpileser I, one of the most eminent of the sovereigns of the first As¬ syrian monarchy, ascended the throne, begin¬ ning his reign by the conquest of the Syrians and Hittites in the west. He then carried his arms far and wide, subjugating the Moschians, Commagenians, Urumanians and other tribes in the north; on the south he shattered the Baby¬ lonian power and took their capital. But this empire, acquired and ruled by the energy and genius of one man, began to fall

to pieces at his death. The period of decline lasted over 200 years, during which time little is known of Assyrian history. Under Assurnasirpal, who reigned from 884 to 858 b.c., Assyria once more advanced to the position of the leading power in the world. The extent of his kingdom was greater than that of Tiglathpileser, and the magnificent palaces, temples and other build¬ ings erected during his reign, with their elabo¬ rate sculptures and paintings, proved that wealth, art and luxury must have reached a high stage

of development. When he ascended the throne Nineveh was the capital of the kingdom, but he restored and beautified Calah, which had suffered during the troubled and declining years of the country, made it his favorite resi¬ dence, and raised it to the dignity of the chief city of the state. Among the first acts of his reign was the suppression of a revolt by the Assyrian colonists of Naharina (883). This was followed by the victorious campaigns in Zamua on the eastern frontier (882-881), against several rebellious provinces in the northwest (880), and against the Shukhi or Shuhites, who then occupied a tract of country between Babylon and Assyria (879). In an¬ other expedition he crossed the Euphrates and advanced to the Mediterranean, near the mouth of the Orontes. In 858 Assurnasirpal was suc¬ ceeded by his son Shalmaneser III, whose career of conquest was equally successful. The clos¬ ing years of his reign were troubled by the re¬ bellion of his eldest son, Assur-danin-apli, who had gained over to his side the cities of Nine¬ veh, Assur, Arbela and other important towns. After much fighting the rebellion was put down by Shalmaneser's second son Shamshi-Adad V. who succeeded to the throne in 823. The old dynasty came to an end in the person of As-sur-nirari V, who was driven from the throne by a usurper, Tiglathpileser, in 745, after a struggle of some years. (See Assyriology) . Tiglathpileser IV was driven from his throne by another claimant named Shalmaneser V. (727). (See Assyriology). His successor was Sargon II (722-705). (See Assyriology). The attitude of Babylonia now began to look extremely dangerous. Merodachbaladan, a Chaldaean leader, taking advantage of the troubles which closed the reign of Tiglath¬ pileser, had possessed himself of Babylonia and held it for 12 years, strengthening himself by alliances with Egypt and the various rulers of Palestine. In 710 Merodach-baladan was driven out of Babylonia; in a single campaign the allies were crushed, Judah was overrun, and Ashdod leveled to the ground. Sargon spent the latter years of his reign in internal reforms, and in founding or beautifying several cities of his kingdom. A new city, called Dur-Sargina, was founded to the north-northeast of Nineveh, now Khorsabad, the library of Calah was re¬ stored and enlarged, and special attention

was devoted to law reform. In the midst of these labors Sargon was murdered, and was suc¬ ceeded by Sennacherib, one of his younger sons, in 705.

No sooner was Sennacherib seated on the throne than he was compelled to take up arms against Merodach-baladan, who had again ob¬ tained possession of Babylon. In 701 fresh outbreaks in Syria led him in that direction. He first swept down on Sidon, the King fled to Cyprus, and Sennacherib seated Tubal on his empty throne. Next he deposed Zidqa of Aske- lon, and advanced against Ekron and Judah. The people of Ekron had dethroned Padi, their King, and gave him into the hands of Hezekiah, King of Judah. The Egyptian and Ethiopian forces advanced to the assistance of their Ju¬ dean allies, but Sennacherib totally routed the confederates at Elteku, and he rapidly overran Judah, taking 46 of its fortified cities. Heze¬ kiah now submitted and paid the conqueror a sum of 30 talents of gold and 800 talents of

silver. Padi was given up and restored to Ekron, and Sennacherib chastised the rebels. His expedition into Syria is one of the most memorable in the history of Assyria, and is briefly recorded in 2 Kings xix. But his career of conquest was stopped by an appalling catas¬ trophe : his army lay before Libna, when in one night ((the angel of Jehovah went out and smote in the camp of the Assyrians 185,000 men® (2 Kings xix, 35). Sennacherib himself returned to Assyria, and occupied much of the last years of his reign in repressing the outbreaks of the Babylonians and Elamites, in constructing canals and aqueducts, and in entirely rebuilding Nineveh. In 681 he was murdered by his two sons, Adrammelech and Sharezer, but they soon found themselves confronted by a. veteran army under Esarhaddon, their father's younger and favorite son, who defeated them in a battle at Khanigalbat, and assumed the crown (680). See Assyriology.

Esarhaddon ruled vigorously for 12 years (680-668). (See Assyriology). The King died the next year. At the climax of Assurbani-pal's reign constant wars were beginning to ex¬ haust the men and treasure of the empire ; and luxury, which had flowed in suddenly like a flood, was enervating the people. The King now no longer appeared at the head of his army, but entrusted it to generals, and aban¬ doned himself to indolence and sensuality. Assurbanipal was a zealous patron of the arts ; learned men from all countries were welcomed to

his court; literary works were collected from all sources; the library of Nineveh was greatly augmented; the study of the dead language of Akkad was encouraged and dictionaries and grammars were compiled. The buildings were unrivalled for magnificence, his palace glittered with gold and silver and was adorned with the rarest sculptures. Unfortunately the King's character was marked by cruelty and sensu¬ ality, and his example descended through the court to the people. He died in 626 and was succeeded by his son Assur-etil-ilani under whom Babylon definitely threw off the Assyrian yoke. The country continued rapidly to decline, fighting hard for mere existence until, under its last king, Sin-shar-ishkun, Nineveh was cap¬ tured and destroyed by the Medes in 606 b.c.

Ethnology, Language, Religion, etc. — The original inhabitants of Assyria and Baby¬ lonia are thought by some scholars to have belonged to that race variously called Turanian, Ural-Altaic, Scythian, or Tatar, and which ap¬ pears at one time to have occupied the entire region from the Caucasus to the Indian Ocean, and from the Mediterranean to the delta of the Ganges. The ancient inhabitants of Babylonia, therefore, were possibly of the same stock as that from which the Finns, Turks and Magyars have descended; and their language, which has been preserved to us in inscriptions, and is known by the name of Sumerian, is allied to the Ugro-Bulgaric division of the Finnic group of languages. The Sumerian race descended from the mountainous region of Elam on the east, and the origin of Chaldaean civilization and writing was due to them. In course of time, however, a Semitic race of people spread themselves over the country and mingled with or supplanted the original inhabitants, while their language took the place of the Sumerian,

the latter becoming a dead language. Belong¬ ing to the Semitic family, these later Assyrians were thus members of the same great division of the human race as the Hebrews, Syrians, Phoenicians and modern Arabians. The lan¬ guage differed little from the Babylonian, which was characterized by a preference for the softer sounds and a fuller use of the vowels. Both languages retained traces of the influence of the earlier Sumerian. Assyrian is closely al¬ lied to Hebrew and Phoenician; it has their peculiarities of phonology, vocabulary and grammar, and some obscure points in Hebrew etymology have been cleared up by its aid. The language changed little throughout the 1,500 years during which we can trace its career in the recently deciphered inscriptions. It con¬ tinued to be written with the cuneiform charac¬ ter down to the 3d century b.c. Assyria could boast of but little native literature; it was a land of warriors, and the peaceful arts had their home in Babylonia. It was not until the

time of Assurbanipal that any attempt was made to rival Babylon in learning. Their orig¬ inal works were for the first time composed, and treatises were composed even, in the dead Sumerian language. The greater part of the literature was stamped in minute characters on baked bricks, but papyrus was also used, al¬ though no books in this form have come down to us. The subjects of the Assyrian literature comprise hymns to the gods, mythological and epic poems and works on history, chronology, astrology, law, etc. (See Babylonian Litera¬ ture). The Assyrian religion, like the language and arts, was in most essential points derived from Babylonia. There were the same gods, the same ceremonials and prayers, and even the temples had the same names. There is, how¬ ever, in one point a notable difference. In addi¬ tion to the worship of the Babylonian deities the Assyrians adored their national deity Assur, placing him at the head of the Pantheon. He was called king of all the chief gods, the god who created himself, it being supposed that he was self-existent and the creator of all things. After Assur come the. 12 chief deities, Anu, god of heaven, ruler of angels and spirits; Bel, the father of the gods; Ea, king of the sea; Sin, or the Moon, lord of crowns ; Shamash, or the Sun, judge of heaven and earth; Nimb, god of hunting; Nergal, god of war; Nusku, bestower of sceptres; Beltis, mother of the gods; Ishtar, leader of heaven and earth, and Bel, or Mero- dach, lord of Babylon. Most of those divinities had consorts, who were not, however, admitted to the first rank of the gods. Below this first rank was a number of spirits, good and evil, who presided over the minor operations of na¬ ture. There were set forms regulating the worship of all the gods and spirits, and prayers to each were inscribed on clay tablets with blanks for the names of the persons using them.

Art and Science, etc. — Although in art, as in other things, Assyria was the pupil of Baby¬ lon, there was yet a notable difference between its development in the two countries, due partly to two causes. The alabaster quarries scattered over the country supplied the Assyrians with a material inaccessible to their southern neigh¬ bors on which they could represent, far better than the Babylonians on their enameled bricks,

the scenes which interested them. Sculpture was naturally developed by the one, just as painting was by the other, and the ornamentation which could be lavished on the exterior of buildings in Assyria had to be confined to the interior in Babylonia. The Assyrian artists, faithful

and indefatigable, acquired a considerable power in representing the forms of men and animals, and produced vivid and striking scenes of the chief occupations of human life. If they did not strive greatly after the ideal, and never in this direction reached a very exalted rank, yet even here their emblematic figures of the gods have a dignity and grandeur which implies the possession of some elevated feelings. But their grand merit is in the representation of the real. Their scenes of war and of the chase, and even sometimes of the more peaceful incidents of life, have a fidelity, boldness and lifelike ap¬ pearance which place them high among the realistic schools. Unlike that of the Egyptians, which remained comparatively stationary from the earliest to the latest ages, the art of the Assyrians is plainly progressive, becoming gradually more natural and less uncouth, more lifelike and less stiff, more varied and less con¬ ventional. It may be said to have reached its highest stage of development in the reign of Assurbanipal when it was characterized by great chasteness and softness, delicacy and fin¬ ish. The beginning of Greek art coincides with the decadence of the Assyrian, and there can be no doubt that the Hellenic artists owe much to their Assyrian predecessors. The advanced condition of the Assyrians in various other re¬ spects is sufficiently evidenced by the represen¬ tations on the sculptures and by the remains discovered among their ruined buildings. We now know that they understood and applied the arch ; that they constructed tunnels, aque¬ ducts and drains ; that they used the lever and the roller; that they engraved gems in a highly artistic way; that they understood the arts of inlaying, enameling and overlaying with metals ; that they manufactured porcelain and transparent and colored glass, and were ac¬ quainted with the lens ; that they possessed vases, jars and other dishes, bronze and ivory ornaments, bells, gold earrings and bracelets of excellent design and workmanship. Their household furniture also gives us a high idea of. their skill, taste, minuteness and accuracy. The cities of Nineveh, Assur and Arbela had each its royal observatory, superintended by an as¬ tronomer-royal, who had to send in his report to the king twice a month. At an early date the stars were numbered and named; a calendar was formed, in which the year was divided into 12 months (of 30 days each) called after the zodiacal signs, but as this division was found to be inaccurate an intercalary month was added every six years. The week was divided into seven days, the seventh being a day of rest; the day was divided into 12 casbu of two hours each, each casbu being subdivided into 60 min¬ utes, and these again into 60 seconds. Eclipses were recorded from a very remote epoch, and their recurrence roughly determined. The prin¬ cipal astronomical work, called the (Illumina¬ tion of Bel,* was compiled for the library of Sargon of Agade ; it was inscribed on 70

tab¬ lets, and went through numerous editions, one of the latest being in the British Museum. It treats, among other things, on observations of

comets, the polar star, the conjunction of the sun and moon and motions of Venus and Mars. The study of mathematics was fairly advanced, and the people who were acquainted with the sundial, the clepsydra, the pulley and the lever must have had considerable knowledge of me¬ chanics. See Assyriology.

Government. — Like all the ancient mon¬ archies which attained to any considerable ex¬ tent, Assyria was composed of a number of separate kingdoms. In the East conquest has very seldom led to amalgamation, and in the primitive empires there was not even any at¬ tempt at that governmental centralization which we find at a later period in the satrapal system of Persia. The Assyrian monarchs reigned over a number of petty kings, the native rulers of the several countries, over the whole extent of their dominions. These native princes were feudatories of the Great Monarch, holding their crowns from him by the double tenure of hom¬ age and tribute. This system naturally led to the frequent outbreak of troubles. See Cunei¬ form Writing; Nineveh; Nippur.

Bibliography. — Botta and Flandin, Mon¬ uments de Ninive) (1847-50) ; Layard, (Nine- veh and its Remains y (1849) ; Oppert, (Histoire des Empires de Chaldee et d'Assyrie) (1866) ; George Smith, (Assyrian Discoveries) ; (As¬ syria, > and (The Assyrian Eponym, (1875) ; Sayce, (Ancient Empires of the East) (1884); his (Assyria: its Princes, Priests and People> (1885), and his (Fresh Light from the Ancient Monuments* (1886) ; Jastrow, (Religion of Babylonia and Assyria) (1898) ; Maspero, (The Dawn of Civilization (1894), etc. See Assy¬ riology for detailed bibliography.

Ira Maurice Price,

Professor of Semitic Languages and Litera¬ tures, University of Chicago.

ASSYRIOLOGY. Assyriology may be defined as that department of study and in¬ vestigation which embraces within its realm the country, people, languages, literature and his¬ tory of ancient Mesopotamia, Babylonia and so much of adjoining countries as shared in the life of the Semitic vallej'-peoples prior to 538 b.c. The term is often popularly employed to cover a study of those languages written in the cuneiform script, or their immediate ante¬ cedents, the linear

and picture methods of writing, current in primaeval times in this great river valley. Such a delimitation of our theme would include a study of early Babylonia, As¬ syria, somewhat of Elam and somewhat of later Persia, and slightly of the Greek period. As¬ syriology, therefore, deals with an antiquity which was centred in the great Babylonian Val¬ ley, and embodied in the cuneiform languages.

Age. — • This is a comparatively new de¬ partment of research. It has been built up upon the basis of the discoveries of antiquities which have been made during the last three- quarters of a century in the countries tributary to the Persian Gulf. The tentacles of this de¬ partment reach out into every phase of ancient Oriental life and knowledge, and require of the modern investigator a comparatively com¬ prehensive understanding of the complexities of that primitive life. This department includes in its sphere some of the most important of all branches of ancient lore. Among these we note especially Semitic philology, general archaeology, architecture, sculpture, history, legend, so'-called

science, and religion. Assyriology has already taken its place as one of the great departments of human knowledge and. research. The results of its investigations must now be reckoned with in any estimate of early Semitic legends, tradi¬ tions or history. Its importance to the student of the Old Testament is assuming greater pro¬ portions with each old site overturned by the spade of the excavator. The great museums of Europe and America count among their chief treasures the magnificent colossi, bas-reliefs, slabs, statues and tablets that belong to the department of Assyriology.

Names. — The oldest of the governments represented in Assyriology is that centred in the Babylonian Valley. Its earliest known mention at the beginning of the last century was that found in Genesis x, 10, where the beginning of the kingdom of Nimrod is said to have been Babel (Hebrew, Snn), probably the city of Babylon, <(in the land of Shinar® (Hebrew,), a name for lower Babylonia. In post- exilic times the country was designated Chal¬ dea, or Hand of the Chaldeans® (Hebrew, DHBO ps), Ezek. i, 3. Classical writers named this country after Babylon, that metropolitan city of their day, Babylonia, and this name has been attached to it down to the present time.

The next great country covered by Assyri¬ ology is Assyria. The

Hebrews called it (Gen. x, 11) Asshur ( ), either the name of a

personage, of a city or of a country, probably the last. The translators of the Septuagint called it acraovp and aacvpioq f while Josephus, a couple of centuries later, refers to it as Aaavpia. The Aramaeans named it Athur, or Athuriya, the Persians Arthura.

Boundaries. — The territory covered by an¬ cient Babylonia was delimited on the west by the Arabian Desert, on the south by the Persian Gulf and Arabian Desert, on the east by Elamite territory backed up by the Zagros Mountains, and on the north by the uplands of Assyria. Assyria proper, in its primitive period, was delimited on the east by the mountains of Kur¬ distan, on the north by those of Armenia, on the south by Babylonia, with an ever-shifting boundary line, and on the west by the western limits of the Tigris Valley and plain. In a word, Assyria was anciently seated in the upper Tigris Valley, in possession of several great city- centres.

These two important countries were thus largely guarded by nature from foes on the south and southwest, but were always open to the intrigues of invaders from the east, north or northwest. The historical records of these lands confirm this statement.

Description. — The great valley of Baby¬ lonia derives its marvelous fertility from its two notable rivers, the Tigris and Euphrates. Both have their rise in the mountains of Ar¬ menia, and both have their debouchement in the Persian Gulf. The Tigris, from its source, flows in a southeasterly and southerly direction, cutting through the uplands of Assyria, and along the eastern side of the Babylonian Valley, until, mingling with the waters of the Euphrates, it falls into the Persian Gulf. The Euphrates, from its source, flows toward the southwest and bends southward within 100 miles of the Medi¬ terranean Sea, and thence in general toward the southeast and south until, in union with the Tigris, it pours into the same gulf. These two

arterial streams are the life of this great lower valley. By irrigation they were made to fertilize all their adjacent lands, and thus placed these among the richest countries on earth. In addi¬ tion to water these streams bring annually from the mountains of Armenia great quantities of alluvium and deposit it in the lower valley. Geologists estimate that the shores of the Per¬ sian Gulf have been pushed southward, by de¬ posits of this alluvium, fully 125 miles since the earliest periods of Babylonian history. In other words, the Tigris and Euphrates rivers that now enter the Gulf as one stream forming a vast morass, formerly had separate mouths, about 125 miles north-

northwest of their present out¬ let. If this estimate be correct, the ancient Ur of the Chaldees (modern Mugheir) was prac¬ tically a seaport city. The Tigris, being the shorter river, has a very swift current, and is less valuable for navigation than the Euphrates. Upon this latter stream vessels of profitable draft may ride to a distance of 800 miles above its mouth. The territory of Mesopotamia proper is watered by the Balikh and Khabur, two rivers that flow southward, emptying into the Euphrates above the site of ancient Baby¬ lon. The region of Babylonia proper, though a waste to-day, shows marks of having sup¬ ported a dense population in antiquity.

References to Ancient Peoples. — Present- day students and scholars inferred from fre¬ quent references in the Old Testament and in the compiled works of Berosus, Manetho, Jo¬ sephus and others that this valley had been the headquarters of mighty nations. Classical writers carry echoes of an ancient glory won by great armies and powerful monarchs from the East, whose records were otherwise unknown, and whose mighty deeds seemed as unreal as fiction. The rise, conquest and reign of these giant figures aroused the enthusiasm of every student of ancient history. The far-reaching influence and power over neighboring kings of these monarchs, dimly outlined in the vague second-hand records, set scholars to work. It drove them to search far and wide for other traces of peoples who had completely perished from the face of the earth, and who had, so far as they could see, left no story of their achieve¬ ments. The reports of travelers who had passed through and spent some time in those countries attracted their attention.

Ancient Remains. — The entire territory drained by the two great rivers, Tigris and Euphrates, was found to be dotted by extensive mounds, ruins of ancient walls, piles of dis¬ integrating towers, beds of ancient irrigating Canals and other marks of a once elaborate civilization. Travelers had often picked up near these mounds little bits of antiquities, bricks, tablets and cylinder seals, that carried on their surfaces many curious wedge-shaped characters, which they regarded either as writing or orna¬ mentation. These miscellaneous curios- were thought to represent the civilizations of an unknown past, of peoples who occupied this territory in the days when prosperous cities and fruitful fields filled this great valley.

Earliest Excavations. — The first persons to take an active interest in the ruins of Baby¬ lonia and Assyria were Englishmen resident as government officials in some one of the chief modern cities of that country. C. J. Rich, a resident of Bagdad (1808-21), carefully ex-

amined and described several mounds, and some inscriptions, in small works published during his residence. These attracted considerable at¬ tention. But the first systematic excavations within this valley were undertaken by P. E. Botta, French consul at the time in Mosul, a modern city of some commercial and political importance on the upper Tigris River, in 1842- 45. He began work on the colossal mounds opposite Mosul, on the east bank of the Tigris River ; but he had little success until he trans¬ ferred his force to the mound Khorsabad, about 14 miles north-northeast of the first site. Khorsa¬ bad proved to be an immense treasure-house of antiquities. Here he uncovered the stupendous royal palace which later proved to be that of Sargon II (722-705 b.c.), with a mass of in¬ scriptions and antiquities of various kinds. This splendid find was greeted with enthusiasm by the scholarly world, and set minds to think¬ ing and wills to acting to uncover other antiqui¬ ties representing such a marvelous past. In 1845ˆ47, A. H. Layard, an Englishman, began to dig at Nimroud, the ancient Calah, a mound about 20 miles south of Mosul, on the east bank of the Tigris. Persevering through almost in¬ describable difficulties, Layard finally succeeded in bringing to light the palaces of Assurnasirpal (884—858 b.c.) . Shalmaneser III (858-823 b.c.) and Esarhaddon (680-668 b.c.). In 1849-51 this same intrepid excavator burrowed into the mound Kuyunjik, one of the mounds of ancient Nineveh, and laid bare two more great palaces, that of Sennacherib (705-680 b.c.), and that of Assurbanipal (668-626 b.c.). Botta's finds, so far as transportable, were taken to Paris and deposited in the Museum of the Louvre ; those of Layard to the British Museum in London, but the largest objects were again buried for their better preservation.

In this same period, Hormuzd Rassam, trained under Layard, made some valuable dis¬ coveries (1851—54) at Kuyunjik for the Eng¬ lish; and Victor Place at Khorsabad and Ful- gence Fresnel and Jules Oppert at Hillah for the French. In most of the work undertaken by the English, Henry C. Rawlinson was a close adviser and an enthusiastic promoter.

Later Excavatiorls. — The next 20 years (1854-73) were a period of cessation of excava¬ tions of any note. An occasional traveler or explorer found a few specimens of antiquities and did a little desultory work. This 20 years, however, saw the publication of many notable works by Botta, Layard, Place, Oppert and Rawlinson on the results of

the active work of excavating and of the decipherment of inscrip¬ tions previously gathered out of the mounds. The second period of excavations began in 1873, when George Smith, of the British Museum, who had found some fragments of tablets describing a deluge, was sent by the London Daily Telegraph to the site of ancient Nineveh to find other fragments of the same kind. Smith's phenomenal success in finding Assurb&nipal's 30,000-tablet-library gave new life to archaeological research, and was the im¬ mediate cause of his being sent on three ex¬ peditions, on the last of which he succumbed to a fever at Aleppo 19 Aug. 1875. Smith's genius had presented to the world such representations of the important discoveries made by himself and others that the contagion spread, and other centres of scholarship turned their eyes toward

the mounds of Babylonia and Assyria. Rassam was again called into requisition, and in 1877-78 gathered rich spoils on the site of old Nineveh, at Nimrud, and at Balawat, where he found the remains of the bronze doors of Shalmaneser III (858-823 b.c.) . In 1878-79 and 1880-81 he also found valuable relics on Babylonian ground.

From 1877 to the present day the French government has conducted excavations inter¬ mittently at Telloh, in lower Babylonia; for more than 23 years under the superintendence of E. de Sarzec, and since that date under Com¬ mandant G. Cros. This mound has yielded a rich store of antiquities, consisting of many thousands of tablets, of several beautiful diorite statues, of friezes, of palace plans, and of cylinders, many of which are deposited and mounted in the superb collection in the Louvre in Paris. These represent the remains of the old Sumerian civilization of the 3d and 4th millenium b.c. The accompanying illustration presents two views of a part of the mound Telloh, where such notable discoveries have been made. The same government inaugurated and carried on excavations at Susa under M. and Mme. Dieulafoy (1884-86) ; and latterly under M. J. de Morgan, and has thus opened up new volumes on the history of ancient Elam and its relations to adjoining countries.

A few broad-minded gentlemen, under the leadership of E. W. Clark, of Philadelphia, provided the means for the organization and prosecution of an expedition to Babylonia under the auspices of the University of Pennsylvania. This expedition was duly organized and equipped and prosecuted work under the direc¬ tion of John P. Peters, during 1888-90 at the mound Niffer, about 30 miles southeast of Babylon. Since that time the same institution has carried on work

intermittently on this site, under supervision of H. V. Hilprecht, and, for the most part, under the directorship of John Henry Haynes, and has brought to light thou¬ sands of inscriptions and other antiquities. These have made the University of Pennsyl¬ vania the richest Babylonian-Assyrian museum in America in antiquities of both the Sumerian and Semitic population of early Babylonia.

Beginning with the year 1897 German archae¬ ologists under the leadership of Robert Kolde- wey have carried on extensive excavations on the site of old Babylon and the old city of Ashur. The full results of their activity are being published in beautifully illustrated vol¬ umes and series of texts.

In 1903 the Oriental Exploration Fund of the University of Chicago was organized, and an expedition sent out under the direction of Robert Francis Harper, and under the field di¬ rectorship of Edgar James Banks, to excavate on the old site Bismya, in lower Babylonia. The first season's work justified the hope that this might prove to be a fruitful mound, belonging to a high antiquity. The old city proved to be the ancient Adab, and the many antiquities un¬ covered, including a famous statue, now in the Imperial Ottoman Museum at Constantinople, to belong to the 3d millenium b.c.

Outside of Babylonia proper, some notable discoveries of cuneiform inscriptions have been made by explorers. A stele of Sargon II was found in the Island of Cyprus in 1845. There were found at Tel-el-Amarna, in Egypt, in 1887, more than 300 cuneiform tablets, which proved

to be correspondence between the kings of Egypt and their Asiatic underlords and rulers in the 15th century b.c. Even Palestine has pro¬ duced a couple of tablets in its excavated cities. Luschan found at Zinjirli, Asia Minor, among a host of Hittite antiquities, a statue and in¬ scription of Esarhaddon (680-668 b.c.). And the Germans under the leadership of Hugo Winckler brought to light at Boghaz-Keui a splendid collection of cuneiform tablets, in Sumerian, Babylonian and the Hittite languages (first reported in 1906L

Decipherment of Inscriptions. — The neat little wedge-shaped characters, put together in so many combinations to form individual signs, very early attracted the genius of the linguist. As early as 1801,

Grotefend, a German, discov¬ ered the significance of some of the old Persian cuneiform characters ; and other scholars, fol¬ lowing in his wake, likewise made some advance in identification of those old characters. But the long and sure step ahead was not made until Henry C. Rawlinson, the Englishman, took up the problem. As an officer in the Persian army about 1835, he had unusual facilities for examining ancient ruins in that country. He observed at Behistun, in the Zagros Mountains, a rock stretching up almost 1,700 feet above the plain, and at about 350 feet above its base a large space carefully smoothed off. Upon this space was inscribed a mass of writing, dis¬ tributed in several columns of varying lengths. After years of toil at intervals, he succeeded in copying the entire set. In a study of them he found that they contained three languages. The first, the Old Persian, through his knowledge of modern Persian and other related tongues, after years of study, he was able to decipher, and sent his translation to London, where, in 1847, it was published in the Journal of the Royal Asiatic Society. Rawlinson's success was epochal, for it broke the seal into the hidden treasures of the cuneiform languages of Babylonia. His decipherment of one of the trilingual inscriptions opened the door into the next, the Susian or Elamite. These two being deciphered, scholars were soon able to penetrate the mysteries of the third language, the Baby- lonian-Assyrian.

These triumphs extended, roughly, over the years 1845-55. In 1857 the British Museum made a test of scholars' ability to decipher the Assyrian tongue. Four men, H. C. Rawlinson, Edward Hincks, Jules Oppert and H. F. Talbot, were given a fine copy of a long historical inscription of Tiglathpileser I (ca. 1107 b.c.), and were requested each to make an independ¬ ent translation of the text and report on their results. At a given time these scholars re¬ ported ; and to the amazement, one should say, of all concerned, their translations were in sub¬ stantial agreement from first to last. This was the crowning triumph of all in the eyes of other departments of learning. It showed that the riddle had been solved, that the Babylonian Valley would henceforth speak for itself through its multitudes of ancient records.

Furthermore, this triumph of philology suc¬ ceeded in placing in the galaxy of ancient nations some of the most powerful of peoples. Babylonia, Assyria and Elam henceforth became the early home of vigorous nations, well-organ¬ ized governments, conquering armies and world¬ wide rulers. The ruin-covered wastes were

suddenly transformed into fertile fields and prosperous cities, occupied by peoples whose influence touched the horizon of civilization in every direction. In short, this triumph of philology

opened a door to a new world in southwestern Asia, prior to, and contemporane¬ ous with, the times of the Hebrew kingdom.

Language. — The language in which this new-old material is preserved is the so-called Babylonian-Assyrian wedge-writing. Although the Old Persian is alphabetic, the Babylonian- Assyrian is a sign and syllable tongue. Each separate wedge (7), or each combination of wedges ( ), constitutes a sign. This lan¬

guage was written by pressing the wedges with an instrument into clay or cutting them into stone or metal, for they never appear in relief. The primitive signs were probably rude pic¬ tures, which gradually grew through use into the form of curved and straight lines; these lines soon took on the artistic form of wedges. This evolution is seen in the fact that a large number of the signs possess merely an ideo¬ graphic value; for example, we find a sign for the idea Hand® ( )> Hun® ( ).

((male® (7), ˆfemale® (|ˆ~ b <(make,® ((fish,® <(king,® etc. Some of these signs also possess a syllabic value, as da, ra, la, mat, lak, rid, zun, pad, etc. Quite a number possess several syl¬ labic values, the context being the reader's only guide as to which should be used in any given case. The reader's troubles are still more aggravated by the fact that the same sign some¬ times has both ideographic and syllabic values. In this, as in the preceding case, the reader's skill must find in the context the reason for the reading which he should adopt.

There are about 600 independent and entirely distinct signs formed by combinations of any¬ where from two to 30 wedges set together at different angles, or paralleled, or inserted within other combinations. But the great difficulties arise when we find that there were almost num¬ berless combinations of anywhere from two to six different ideographic signs to express other and often compound ideas. There are fully 20,000 such combinations known to-day to Assyriologists.

The number of inscriptions, small and large, discovered in Babylonia up to the present, is about 150,000. At Telloh, the French alone found in one library 30,000; and at Nippur the University of Pennsylvania secured 20,000, all large aids in our quest.

This Babylonian-Assyrian language is Se¬ mitic in character, though its soil is thought, by most English, German and French scholars, to be a non-Semitic tongue, the so-called Su¬ merian, in which most of the valuable finds made by the French at Telloh are written, and some of the inscriptions found at Nippur. The Babylonian-Assyrian tongue is a

half-sister to the Hebrew of the Old Testament, and has al¬ ready proved its real value in the interpretation of that book. See Assyria. •

The People. — The peoples best known to Assyriology are Semites. The primitive inhab¬ itants of Babylonia, the predecessors of the Semitic population of Babylonia and Assyria, were probably a mixture of various nationalities, with the Sumerians in the lead. Whence the Sumerians or Semites came has not been posi¬ tively ascertained. The Semites were in the

BLACK DIORITE STATUE OF GUDEA FROM TELLOH {after de Sarzec)

(About 2800 B. C.)

(Now in the Louvre, Paris)

RELIEFS ON THE BLACK OBELISK OF SHALMANESER H. (860-825 B. C.)

(Found by Layard at Nimroud, now in the British Museum)

Second tier represents Jehu, King of Israel, rendering submission to Shalmaneser II. (About 842 B. C.)

\

la,nd by 4,000- b.c. Side by side they lived and amalgamated in succeeding years. These Su¬ merians were the predecessors and probably for a long time the contemporaries of the Semites, the one-time-supposed inventors of the ideo¬ graphic cuneiform language of those countries. We know, at least, from inscriptions found at Nippur, that the Semitic language was in use in Babylonia as early as the 4th millenium b.c. The population of Babylonia and Assyria in later historic times was Semitic. Their location made them warriors, for they had to be per¬ petually on the defense. The Babylonians culti¬ vated the peaceful arts and were wide awake to the best things of life in their time and day. The Assyrians, on the other hand, built up an engine of warfare, a tremendous military ma¬ chine, that, under

powerful leaders, beat down and overthrew nations on every hand. Someone has compared Babylonia and Assyria to Greece and Rome respectively, as fostering and further¬ ing different elements of national life and char¬ acter.

The Civilization. — One of the marvels of these ancient peoples was their advancement in all that counts for civilization. Their govern¬ ments were monarchical and well organized, with standing armies for their immediate protection. Their civil court's were provided with ample laws for the regulation of society and of trade. Their cities were advantageously built, and sur¬ rounded with walls of a magnitude sufficient to withstand any ordinary attack. Their schools were carefully fostered and occupied a first place in their peaceful life. They cultivated the arts with assiduity and attained a notable de¬ gree of perfection in some lines. Their archi¬ tecture and sculpture, their language and litera¬ ture, are marks of a people high in the scale of Oriental civilization. Of religious ritual and all its accompaniments and organization, we have a detailed description, which exhibits this as a favorite side of that early Sumerian and Semitic life. Their industry and trade activities were such as to place them in the front rank of com¬ mercial peoples. Their amusements and sports were of that adventurous and daring kind that bespeak the virility and strength of charac¬ ter found only among a hardy and vigorous people. Their political and commercial relations with their neighbors were such as mark an ad¬ vanced stage in cordial international affairs. Their methods of warfare, and their treatment of their subjects, while often cruel and in¬ human, were distinguished by a high grade of intelligence, and more than ordinary genius (cf. Assyria).

Natural Resources. — The wasteness and barrenness of modern Babylonia give little in¬ timation of its early resources. Its flora was quite varied and useful. Its plains were plenti¬ fully supplied with fruit trees of various kinds, such as fig-, olive-, date-, palm-, vine- and vari¬ ous nut-trees. On the mountain sides were found the oak, plane and pine trees of different varieties. By cultivation the land produced wheat, barley, sesame, millet, hemp and other cereals and articles of commerce. The date- palm was their universal utility article, for from it they seem to have manufactured honey, flour, vinegar, wine and raw material for wickerwork. The reed that grew with such luxuriance on the banks of the rivers and canals was utilized for a number of purposes. It served for build¬

ing huts, weaving mats and for boat-building, and for layering mortar in the construction of walls.

The absence of stone and minerals in the basin of the valley was partially compensated for by their proximity to the mountains on the north and east, though clay bricks, sun-dried and burnt, were always their chief building ma¬ terial. When marble, alabaster, diorite or any of the precious metals were used they were brought either from their mountain borders or from distant lands. Stone was used for colossi, statues, . wall decorations, bas-reliefs and some inscriptions. The precious metals were em¬ ployed for making jewelry, ornaments, service¬ able utensils, decorations on buildings and gates and for tablets upon which inscriptions were engraved.

The list of the fauna of the country is made quite complete by the pictures found on the walls of the old palaces and temples, and by the catalogues of names preserved in their litera¬ ture. These reveal to us a great variety of valuable animals. Among them we find the lion, the favorite game hunted by kings, the panther, the wild ox, the fox, the wild boar, wild asses and camels — especially in later periods of his¬ tory. There were also several kinds of gazelles and antelopes that played about on the border hills and mountains. Of domestic animals, there were the horse in later times, the ass, the camel, the cow, sheep, goat and dog. Of wild birds, the inscriptions mention most frequently the eagle and the owl ; also the swallow, dove, raven, geese and other waterfowls.

Cities. — There is no more notable index of a great people than the number and magni¬ tude of its great cities. Babylonia-Assyria, through the decipherment of the monuments, is seen to have been well dotted over with pros¬ perous cities. Beginning in the south and pro¬ ceeding northward, we find in that ancient day, Adab, Eridu, Ur, Erech, Larsa, Lagash, Nisin, Nippur, Borsippa, Babylon, Cutha, Sippar and Agade (!) — all famous cities in the Babylonian kingdoms and empires of four millenniums ago. The earliest civilization of that valley was cen¬ tred in these cities, most of which seem to have been originally capitals of districts. There are other mounds in considerable quantity that have not been identified, but which doubtless cover still other cities that played an important role in the life of early Babylonia.

As we advance into the territory occupied by Assyria great cities present themselves in a formidable array. The ancient mother city of Assyria was Assur, located on the right bank of the Tigris, near the modern Kalat Sherkdt, recently excavated by a German expedition. As we pass up the Tigris River of that day the next city of importance that one meets is Calah, or Nimrud, on the left bank of the river, just above the junction with the Tigris of the Upper Zab River. This was a

palatial city, first un¬ earthed by Layard, and then by Rassam, con¬ taining at least three royal palaces already mentioned. Off to the east of Calah, on the east bank of the Upper Zab, was Arbela, a city of minor importance. Nineveh, whose mounds stand on the eastern bank of the Tigris opposite the modern Mosul, was a very ancient city. The small stream or river Khosr, passing be¬ tween the two great mounds Kuyunjik and Nebi Yunus, that represent the remains of

Nineveh, empties into the Tigris. Sargon II (722-705 b.c.) built for himself at Khorsabad, north of Nineveh, a veritable royal city, the most magnificent building of which was his palace, uncovered by Botta and Place. Its name, Dur-Sargina, <(the wall or fortress of Sargon,® designates sufficiently its significance for his reign. To the southeast of Nineveh we find another city of especial significance in the reign of Shalmaneser III (858-823 b.c.), Imgur- Bel, on the site of the modern Balawat.

Adjacent to this valley were such mighty cities and fortresses as Susa in Elam and Harran in upper Mesopotamia, and Carche- mish, which the British have partially exca¬ vated within the past five years, with other cities on its western frontier — all evidence of the thrift and permanency of the civilization of 3,000 and 4,000 years ago.

Architecture. — The buildings of Baby- lonia-Assyria were modified architecturally, no doubt, by the character of the material accessible for their construction. Throughout this entire valley the absence of stone led to the use of clay bricks, sun- and kiln-dried, for building material. This, of course, necessitated a plain¬ ness of form that admitted of little exterior decoration. The walls were often built very thick, of sun-dried, with a veneer of kiln-dried, bricks. This veneer was a protection against the ravages of the weather and the depredations of robbers, who could readily dig through a thick wall of merely sun-dried bricks. The strength of a sun-dried brick wall was some¬ times increased by inserting between the courses of bricks, layers of reeds. The entire struc¬ ture was built on an artificially raised mound, primarily to lift the building above the danger of the overflowings of the rivers, but later ap¬ parently because of the age-long custom of placing it on an eminence. The entrances to the palaces and temples were usually guarded by great monolithic colossi, human-headed bulls or lions, standing on either side and facing out¬ ward. Within were courts of different sizes that served the royal personages or their at¬

tendants. In immediate connection with each palace or group of royal buildings, particularly in Babylonia, was the tower or temple. It was a structure that towered above everything else, and rose from its base to its summit in a series of stages, sometimes seven, or steps, by which one ascended. On the top of this massive pile one would find the image of the god held in particular reverence, or to whom the tower was dedicated. There are several remains of these sacred structures found in Babylonia to¬ day. Their ability to withstand the ravages of time is due to the hard burnt bricks with which they were constructed. The remains of the tower at Mugheir, the ancient <(Ur of the Chaldees,® was built, according to its present indication, upon a platform 20 feet above the plain ; its base was a parallelogram about 200 feet by 135 feet.

One of the niceties of these constructions was their adaptation to the necessities and com¬ forts of the people. There was an admirable system of drainage, of hydraulics in general, that embodied some of the best principles of modern sanitation. The arch contributed no little to the construction of some of the primi¬ tive royal buildings of the 20th century b.c. (cf. Assyria).

Sculpture, Engraving, etc. — The most pre¬ cious contents of the temples and palaces were the statues of the gods and kings, respectively. They are the best specimens of the sculpture of the Babylonian-Assyrian peoples. These works of art were often chiseled out of diorite, as those found by the French at Telloh; out of alabaster, as many of the giant colossi, or out of a basaltic rock, or black marble. The sculptors, even as far back as 3000 b.c., executed some wonderful work. Even more striking and complicated were their bas-reliefs, found so numerously on the walls of the palaces of the Assyrian kings. In this species of art there is often superb' genius displayed in the introduction of many figures, of warriors, war-chariots, cavalry charges, battle scenes, sieges and captures of cities, and divinities of various grades. But in all these representations the modern student must not be disconcerted because of the lack of perspective. This is one of the charac¬ teristics of all early relief work and painting, and must be reckoned with in our study of those times.

Besides the large and imposing works of art, there were numerous small objects that occupied large attention and revealed some real artistic skill. There were the silver vases of the time of Entemena (about 2900 b.c.), ivory objects showing exquisite workmanship, gold ornaments, cylinder seals reaching back to 4000 b.c., of many precious stones whose intaglio work would be a credit to this day. The method of executing such fine work on the hardest of precious stones

is still a puzzle to modern engravers. The decorations of Assyr¬ ian and Persian palaces include also painting, though of a kind that reveals more crudeness than the specimens of the engraver's art.

Literature. — The discoveries of the last three-quarters of a century have opened for us the doors to a new library of ancient Oriental literature. These clay and alabaster volumes cover a large range of subjects, and treat them in a manner entirely unique. The first that attracted attention was, of course, the immense amount of historical matter, found mainly in the ruins of Assyria. Another large element in these tablets, particularly in Babylonia, is the poetry, pure Semitic poetry, or interlineated with so-called Accadian or Sumerian poetry, whose character is determined by the presence of parallel members. This poetry contains hymns to the gods, penitential psalms, incanta¬ tions, magical formulas, and even epics of sur¬ prising strength. Examples of this poetry in Assyria were copied from Babylonian originals, as Assyria was notably weak in its literary abil¬ ity. Then there are legends, mythology and popular treatments of technical subjects. We find also treatises that are geographical, biolog¬ ical, geological ; tablets that are commercial in character, recording loans, deeds, rents and trades ; long lists of matter that is purely linguistic, for it deals with signs and their values ; a codified system of laws that touched almost every complication in the complexities of Babylonian life; letters, domestic and inter¬ national, that reveal both the home customs of the nation and their foreign relationships and authority.

Myth and Legend. — The poems that are sometimes called epic, in the literature of Baby¬ lonia, are based upon events that are usually

termed mythical. The epic and mythical ele¬ ments are so thoroughly commingled that the entire narrative may be termed mythological. 1 he scenes depicted are those between gods and gods, and between gods and men, and other creatures. The most famous stories classified as mythology are the so-called creation epic, the epic of Gilgamesh, of the eleventh tablet or poem in the Babylonian story of the deluge. There are several legends and fragments of legends which have received careful study in recent years, whose matter is arranged on the customary Babylonian poetical plan. Some of these are, the descent of Ishtar into the world of departed spirits, the Namtar legend, the Adapa and Etana legends, and legends of va¬ rious gods. Some of these entertaining literary stories take their place for real merit and

in¬ terest beside the best legendary lore of ancient Greece. Their archaeological value is often con¬ siderable, and their relation to the religious life of Babylonia-Assyria immeasurable.

Religion. — The primitive religion of Baby¬ lonia was doubtless the worship of the different powers of nature. These became personified and everything that took place in the world was simply the result of the action of some particu¬ lar god, who stood above man in the scale of being, and executed all movements in the espe¬ cial sphere where he was supreme. The repre¬ sentatives of these divinities on the monuments are seen sometimes to be men, and at other times to be part man and part beast and bird. Those in the form of men possessed attributes like, but far superior to, man. Since they rep¬ resented different powers in nature, none of them was all-powerful. Their functions lay in special lines, and for these they were wor¬ shipped. In Assyria the gods as a whole were practically borrowed from Babylonia. But Asshur, the great divinity of Assyria, stood alone, unique in all the Mesopotamian pantheon and supreme in Assyria. The chief gods of Babylonia, those that were supreme in its pantheon, were three, Anu, the god of heaven; Bel, the god of the earth, and Ea, the god of the abyss and of secret knowledge. These great three were followed by another triad, who reg¬ ulated light and the weather, namely, Shamash, the sun-god, Sin, the moon-god, and Ramman or Adad, the weather-god. These six divinities were localized, in that each was the patron deity of some city. For example, . Anu was the patron deity of Erech, Bel of Nippur, Ea of Eridu, Shamash of Larsa and Sippar, and Sin of Ur (of the Chaldees). There is a long list of other gods and goddesses who were doubtless re¬ lated to the two chief triads, but up to the pres¬ ent time this relationship in all cases cannot be determined. Slightly aside from the lists al¬ ready named we find the great goddess Ishtar, one of whose feats is described in the legend, (Descent of Ishtar.5

Worship. — The cities of Babylonia-Assyria were well supplied with temples in which the gods were devotedly and assiduously wor¬ shipped. Indeed, this worship was an essential element in the life of the Babylonians, to a greater extent than among the Assyrians. The temples were the most elaborate buildings of Babylonia, and were under the immediate direc¬ tion of the priesthood, the most powerful class of men, next to the king, in the nation. Baby¬ lonian inscriptions, particularly, enumerate

many temples in the chief cities that were dedi¬ cated to the patron deity of each several city. Each temple had an organization of official priests, whose duties included the preservation and propagation of the

worship of the god of that temple, and the ritual and traditions thereof. The king was the great overlord or guardian of the temple, and spared no means to keep it in a thoroughly good state of preservation and to increase its popularity among his subjects. The support of the priesthood was provided for by revenues produced by the lands attached to the temple, or belonging thereto, supple¬ mented by regular offerings. These priests, as those in Egypt, were the most influential men in the kingdom, for they controlled the religious life of the community and had no small part in the affairs of political and civil life. They were probably the best educated men in the nation, and by their learning filled the offices that required a somewhat broad training, such as scribes, historians and librarians.

The regular duties of the priests in connec¬ tion with the temple service were (1) to offi¬ ciate at all the regularly appointed services of the temple, including the monthly and annual set-feasts, and (2) to carry out the worshipful desires of any individual worshipper. The minutiae of conditions regnant in temple service are voluminous and touch almost every condi¬ tion of life. Some of the incantations and psalms, already referred to, preserve the peti¬ tions that must be recited by the suppliant. Other tablets enumerate the great variety of offerings that must be presented to the gods to secure their good-will and blessings. The multiplicity of such requirements easily kept an army pf priests busy in the great temples of the principal cities of Babylonia-Assyria.

Sources of Babylonian-Assyrian History. — Before the excavations of the last 75 years in the ruins of Babylonia-Assyria, the two main sources of the history of the peoples and coun¬ try in our theme were (1) the books of the Old Testament, and (2) the second-hand narratives of Berosus, Manetho and Josephus, with a few scattered statements and some questionable narrative in Greek and Roman writers. The discoveries in the ruins of Mesopotamia have now given us first-hand information of the best kind, narratives just as they were written down by the original scribes, and not copies made from age to age. as are the works above referred to. These clay, stone and metal rec¬ ords stretch not continuously as yet, but with breaks here and there, from at least 4000 b.c. down through the fall of Babylon before the army of Cyrus 538 b.c. Of course, they cannot be regarded as infallible, but are still for our purpose reasonably reliable. They give us, at least, a new panorama, of the most vivid kind, of the great nations that moved down the ave¬ nue of time in Babylonia for nearly 4,000 years.

Chronology. — The chronology of Baby¬ lonia must be described in

part separately from that of Assyria. The early Babylonians reck¬ oned events from some great calamity or oc¬ currence, such as the destruction of a city, the dedication of a temple, or the opening of a new irrigating canal. Later down in the history they counted time by the years of a reigning king. There were several early dynasties in Babylonia whose succession of rulers is pretty well established. Such are those of Sumer,

Akkad, Nisin, Larsa and Babylon, whose be¬ ginnings fall approximately within 3000 to 2200 b.c. (cf. King, (A History of Sumer and Ak¬ kadˆ appendix 2, and (A History of Babylon, *appendices). The (List of Kings,* a list of the kings (not complete) of Babylon from about 2400 b.c. to 625 b.c., by dynasties, with the length of reign of each king and of each dy¬ nasty, and the so-called (Babylonian Chron¬ icle, * consisting of a record of events in Baby¬ lonia and Assyria from about 745 b.c., early in the reign of Nabonassar, to 669 b.c., the begin¬ ning year of the reign of Shamash-shum-ukin, are valuable documents. The Ptolemaic Canon, which has some reliable features, also begins with Nabonassar's reign. Besides these guides there are references here and there that both serve as checks and give us fixed points from which and toward which we may figure. One of the most striking is that mentioned by Na- bonidus (555-538 b.c.) on one of his cylinder inscriptions. He there states that an inscrip¬ tion of Sargon which he found in the corner¬ stone of a temole had been deposited in its hid¬ ing place 3,200 years before his day, or about 3750 b.c. The more we find of ancient Baby¬ lonian facts the less probable the correctness of this date seems to be. It should be reduced about 1,100 years. Then there are chronological notes and hints, such as the statement that Burna-buriash lived 700 years after Ham¬ murabi, that Marduk-nadin-akhe defeated Tig- lathpileser I 418 years before Sennacherib con¬ quered Babylon. Each such hint furnishes a valuable check on the whole chronological scheme, and aids the scholar in his construc¬ tion of a valid and reliable list of rulers and events, even though for the present there are some wide and embarrassing gaps in the period covered by the early history of Babylonia.

Assyrian chronology follows a unique plan. It names the years after certain officers, termed eponyms, whose term of office extended over but one year. Lists of these eponyms have been found stretching from 893 b.c., during the reign of Adad-nirari III (911-889 b.c.) down to Assurbanipal (668-626 b.c.). On some of these lists we find merely the

name of the eponvm, on others there is found the name of the king in authority (in fact he usually was an eponym at some time during his reign), and some one chief event of each year. The suc¬ cession of events between the limit years men¬ tioned above is now positively known. To verify our calculation that these Assyrian records are correctly poised in time, we find that in the month of Sivan, year of the eponymy. of Pur- Shagalti, there was a total eclipse of the sun in Nineveh. Astronomers' have located this same eclipse on June 15, 763 b.c., thus giving us a fixed point for our calculations, and for settling specifically the dates of the entire As¬ syrian eponym lists.

The Historical Periods — Babylonia —The history of Babylonia may be roughly divided into three periods: (1) That stretch of time reaching from the remotest recorded events down to the time of the consolidation of the city-kingdoms of Babylonia under Hammurabi at Babylon about 2130 b.c. ; (2) the time included between Hammurabi's supremacy and 626 b.c., the death of Assurbanipal, last great king of Assyria, and the rise of Nabopolassar, first king of the new Babylonian kingdom • (3) be¬

ginning of Nabopolassar's reign (625 b.c.) to the fall of Babylon before Cyrus (538 b.c.).

First Period — Babylonia. — The begin¬ nings of this period are enveloped in fog. Scat¬ tered fragments of antiquities and archaic in¬ scriptions tell a broken tale of a very remote antiquity. Telloh, Nippur, Babylon and Susa have yielded to the excavator many evidences of an extreme antiquity and have put into our hands material for beginning to estimate some of the elements of such early civilizations. Some of the earliest kings were those who ruled over Sumer, Akkad, Nisin, Larsa, Erech, Lagash and Babylon, which occupied territory on either side of the Tigris and Euphrates rivers. Other kingdoms in this early period, about 3400 b.c., were Kish and Ur. The formal name of a governor in this earliest age was patesi. Lugal-zag-gi-si, however, King of Erech, apparently a Semitic name, designates himself <(King of Erech, King of the world,® but calls his father Ukush, <(patesi of Gishban.® Other kings of this very early period were Ur-Nina, the foundations of whose palace at Telloh are to be seen in the first illustration. Lagash seized and maintained authority, among others, over Gishban, Kish, Erech, Ur and Larsa. These events must have occurred about 3400 b.c.

About 2650 b.c., according to the corrected reckoning of Nabonidus, already mentioned, we find Sargon I in power, swaying his sceptre to the westward as far as the shores of the Med¬ iterranean Sea. His son,

Naram-Sin, carried on the extensions of his father's kingdom until he included in his realm northern Syria, northern Arabia, Mesopotamia and Elam. He designates himself, therefore, ((King of the four quarters of the world.® There is a break in the records at this point. The next ruler, rather patesi, of Lagash apparently inaugurates a new reign, that enfolds within its borders the sway of all southeastern Babylonia, including also Elam. This patesi was Gudea, one of the most famous rulers of this valley, at about 2500 b.c. The accompanying cut represents one of his inscribed -statues of black diorite found at Telloh, around which we find 366 lines of writing very artistically cut into this hard stone. On the lap of the statue there is a plan of a building, designed in exact proportions, reveal¬ ing the standard of measurements current in Gudea's day. His numerous inscriptions tell us of his world-wide commercial activity, though his political power may not have included more than Elam outside of Babylonian territory. The power of the patesis of Lagash stretched over some time, and was a distinct force in the civ¬ ilization of lower Babylonia. We have also the names of several kings of Ur, of Nisin, of Erech, of Larsa andˆ of some smaller cities, whose exact location in the chain of history is not as yet fixed.

Second Period — Babylonia: 1st to 3d Dynasties. Beginning of Assyria, 2232-1181

B.C. — The isolated city-kingdoms of Baby¬ lonia had already existed for centuries, with here and there a ruler who had been able to gain the supremacy over one or more of his neighbors for a time. But the ma. above all others who unified these scattered realms under his own sceptre, with Babylon as a centre, was Hammurabi, whose long reign of 55 years be¬ gan about 2130 b.c. He greatly improved the

internal condition of his own country, both ma¬ terially and politically, and carried his conquests to Elam, as had Sargon I, his predecessor by 500 years. Hammurabi's influence and power for the welfare of his subjects have been brought out anew by the discovery at Susa, in December 1901-January 1902, by M. J. de Mor¬ gan at the head of the French expedition, of a code of laws which had been compiled under his direction and orders. This remarkable doc¬ ument shows that Hammurabi's government was thoroughly regulated, for it provides laws now intact to the number of 243, to govern the complexities of commercial, social and official life. Successive kings of

this 1st dynasty, founded about 2232 b.c. by Sumu-abu, are known as yet but slightly, though many con¬ tract tablets belonging to this period have been found.

The 2d dynasty in the (List of Kings) began in 1927 b.c. and consists of 11 rulers, about whom we know nothing. It is thought that during their reign the Kassites made their way into Babylonia from the countries of Media and Elam and secured a hold on the throne.

The 3d dynasty in the ‘List of Kings, y beginning at 1757 b.c., is' made up of 36 kings, but only a few names at the beginning and at the close are preserved. The ‘Synchronous History/ however, supplements this lacuna in some respects and gives us an idea of the rela¬ tions of this dynasty to Assyria. In fact, early in this dynasty the former little colony of Assyria, which had migrated from Babylon some time about 2500-2300 b.c., rebelled against its mother-country, Babylon, and secured its independence. Its first king of whom we know the name was Bel-Kapkapu (about 1900 b.c.), mentioned by Adad-nirari IV (810-781 b.c.) as an early king on the Assyrian throne. Ashur- bel-nishishu is the first king about whom we know anything of value. He ruled about 1480 b.c. and was on friendly terms with Kara- indashi, a king of the 3d Babylonian dynasty. Several successive Assyrian kings seem to have perpetuated this friendship, but jealousy and hostility sprung up and there were, repeatedly, clashes of arms, in which, on the whole, the young and vigorous Assyrian kingdom was vic¬ torious. One of the notable Assyrian kings of this period was Shalmaneser I, who ruled about 1300 b.c. His great campaigns against the territory northwest of Assyria are celebrated in the records of Assurnasirpal (884-858 b.c.).

Second Period — Babylonia: 4th to 7th Dynasties. Assyria, 1180-997 B.C. — We do not know the name of the founder of the 4th Babylonian dynasty. It came into being about 1180 b.c. The ‘List of Kings) is, unfortunately, mutilated so that we have only portions of the names of the last three kings. The ‘Synchronous History) fills part of the gap by giving some of the relations between Babylonia and Assyria during the life of this dynasty. These relations were hostile in some of its earlier years, when Nebuchadrezzar I (1140 b.c.) was on the throne, and the battle went against the Babylonians. Then Marduk- nadin-akhe, a Babylonian king, wrested victorv from the Assyrians. Tiglathpileser I (1107 b.c.), King of Assyria, on the other hand, com¬ pletely routed the same Babylonian king, cap¬ tured a number of cities in north Babylonia,

and even the city of Babylon itself. Succeed¬ ing kings of this

Babylonian dynasty and of Assyria made treaties of peace, and for the time being ceased their wasteful warfare. Of all the Assyrian kings who reigned in the time of this Babylonian dynasty, Tiglathpileser I was the . most vigorous, aggressive and successful. His example furnished an inspiration for all succeeding Assyrian rulers, and his conquests, related in full in his cylinder inscription, give us a fine specimen of early Assyrian historical writing.

The 5th Babylonian dynasty (about 1046- 1024 b.c.) consisted of three kings whose full time of reigning was 21 years and five months. It has been called the "Sea-land® dynasty, be¬ cause it is thought probable that the Chaldeans about the head of the Persian Gulf were the occupants of the throne. At least, it is prob¬ able that the country was in political confusion during the life of this dynasty.

The 6th dynasty (about 1024-1003 b.c.) like its predecessor, had just three kings, cover¬ ing 20 years and three months, of whose acts very little is known.

A gap of about 100 }rears is found at this place in our sources, a part of which is attrib¬ uted to an Elamite dynasty of one king who ruled six years.

Assyrian history likewise has a gap of more than 100 years (1070-950 b.c.). The 'Synchro¬ nous History) leaves us in the dark in this period.

Second Period — Babylonia: 8th Dynas¬ ty, 996-815 B.C. Assyria about 930-783 B.C. — The 8th dynasty of Babylon is sup¬ posed to have been native Babylonian, and oc¬ cupied the throne from about 996 to ca. 815 b.c. The kings who ruled in Babylon during these 200 years fought a losing battle with the As¬ syrians, for in almost every clash the Assyrian was victorious. Though many of the names of the early kings of this dynasty are lost, we know those of the kings who waged war with Assyria during the larger portion of the life of the dynasty. With this dynasty the 'Synchro¬ nous History0 closes.

The Assyrian records, the 'Eponym Canon/ begin in this period, at 893 b.c., and give us a continuous annual list down to 666 b.c. One of the most notable Assyrian kings of this pe¬ riod who have left us their records was Assur- nasirpal (884-858 b.c.). This king wTas one of the most energetic and aggressive monarchs of Assyria. He established Assyria's authority in every direction, even to the coasts of the far- off Mediterranean Sea. His reign wˆas vigor¬ ous, cruel and even barbaric. Locally, he built a great palace at Calah, and one at Nineveh, and restored the temple of Ishtar at the latter place. His son,

Shalmaneser III (858-823 b.c.) , still further extended the limits of his paternal realm by including lakes Van and Urumiyeh, in Armenia, and becoming protector of Babylon. To students of the Old Testament his reign assumes more than ordinary import¬ ance, for he was the first Assyrian king to come into contact wuth the Hebrew nation of Palestine. He mentions “Ahab of Israel® and “Jehu, son of Omri,® both of wrhom became his subjects in the Westland. The accompanying illustration presents four of the five reliefs on one of the four sides of the famous Black Obe¬ lisk of Shalmaneser III. These four represent

the t r il >ute paid by four foreign countries to the Assyrian king. The inscription over the first relief reads: “Tribute of Sua of the land of Guzan, silver, gold®; over the second: “Trib¬ ute of Jehu, son of Omri, silver®; over the third: “Tribute of the land of Mutsri, double-humped dromedaries®; over the fourth: “Trib¬ ute of Merodach-abil-utsur of the land of the Sukhites.® These four reliefs and inscriptions are only the first of four, the other three being found on the other three sides of the obelisk. Shalmaneser’s son, Shamshi-Adad V (823-810 b.c.), succeeded him on the throne, and rescued the kingdom from a rebellion which had been stirred up by a brother. His only notable con¬ quest was over Babylon under command of King Marduk-balatsu-ikbi.

The next king of Assyria was Adad-nirari IV (810-781 b.c.) , son and successor of his father. His was a prosperous reign, reaching to Tyre, Sidon, Palestine and Philistia. Even Mari’, king of Damascus, yielded submission to his sway.

As in Babylonia, so the next rulers in As¬ syria, three in number, amounted to little.

Assyrian Supremacy: Tiglathpileser IV, Babylonian Subjection. — > Assyria’s three lethargic rulers between 783 and 745 left no records that deserve mention. But their great successor, Tiglathpileser IV (745-727 b.c.), re¬ deemed the ancient reputation of Assyria. This new king, although a usurper, revolutionized the policy and methods of the Assyrian empire. He pushed out the boundaries of Assyria far¬ ther than any predecessor on the throne. He completely subdued Syria, Palestine and Philistia. According to his own records he, more than any other Assyrian monarch, came into close contact with the

Hebrews. The Hebrew monarchies were subservient to his sway. He mentions Menahem, Pekah and Hoshea, kings of the northern kingdom, and Uzziah and Ahaz, kings of the southern king¬ dom. To him also is to be attributed the policy of deportation of captives from a given dis¬ trict, and importation into that same district of peoples from distant districts, in order thereby to prevent the possibility of uprisings and re¬ bellion. He also inaugurated a kind of local self-government, or provincial districts, as parts of his administrative policy, thus making a de¬ cided advance over the reigns of his prede¬ cessors.

The next Babylonian king of whom we know anything of consequence is Nabonassar (747- 734 b.c.) , mentioned in the Canon of Ptolemy, as well as in the (List of Kings) and the Baby¬ lonian Chronicle.5 But from this time down to the rise of the new Babylonian empire, Baby¬ lon was everywhere practically in the hands of Assyria, though there were some sanguinary struggles for the supremacy.

Sargon II, 722-705 ' B.C.— Tiglathpile- ser's successor was Shalmaneser V (727-722 b.c), about whom we know little, as none of his inscriptions have been found. He blockaded Tyre for five years, and on the treacherous re¬ volt of Hoshea, King of Samaria, laid siege to that city (724 b.c.) but did not take it. His successor was Sargon II, whose first act was the capture of Samaria in 722 and the deporta¬ tion of the Jewish captives to various parts of his empire. He overthrew the combined forces of Elam and Babylon. Tn 717 he besieged and

captured the citv of Carchemish belonging to the Hittites. This Sargon was a master ruler, who not only subdued and held in subjection the peoples on the east coast of the Mediterranean Sea, but also with indefatigable skill put down Merodach-baladan of Babylon and his at¬ tempted conspiracy (cf. Isa. xxxix). Sargon's great home achievement was the construction of that colossal palace at Khorsabad, north-northeast of Nineveh, that was first discovered by Botta in 1842, as already described.

Sennacherib, 705-680 B.C. — Sargon II wras assassinated in his new palace at Khorsa¬ bad in 705 b.c. and was succeeded by Senna¬ cherib, his son. This vigorous ruler conducted at least three successful campaigns: (1) against the Westland : Syria, Phoenicia, and Palestine (701 b.c.) , when he overran Judah, carried off 200,150 captives, threatened Jerusalem, making Hezekiah his subject, and met and, according to his own records, defeated an Egyptian army at Elteku; (2) in an expedition against Elam (693 b.c.) he was only partial^7

successful, not quite reaching the capital, Susa; (3) in 689 he sacked, burned and practically destroyed the city of Babylon in revenge for the rebellious acts of its former ruler and inhabitants. Senna¬ cherib removed the capital from Calah to Nineveh, and erected for himself a magnificent palace in that newly-made capital of the unified Assyrian-Babylonian empire. Other public works of an extensive nature, such as walls, gates, moats, arsenals and wTater supply, were the objects of his energy. Sennacherib was murdered by one of his sons, according to the Babylonian Chronicle,5 and was succeeded by Esarhaddon, his son, who was not implicated in the conspiracy.

Esarhaddon, 680-668 B.C.; Assurbanipal, 668-626 B.C. — Sennacherib's son, Esarhad¬ don, made one of his residences at Babylon, carried on a successful warfare against the mountaineers to the north and northeast, and was the first Assyrian ruler to carry his con¬ quests into Egypt. In 670 b.c. he crossed the frontier of that age-old land, took Memphis, and carried his arms as far as Thebes, driving the Ethiopian monarch of Egypt, Tirhaqa, back into his home land. He was the first king of Assyria who could add to his title, Egypt, Paturisi (biblical, "Pathros®) and Kus (biblical, "Cush,® "Ethiopia®). He associated with him on the throne his son Assurbanipal (669). In his list of 22 tribute-paying kings of the West- land we find "Manasseh of Judah.® His suc¬ cessor was his son, Assurbanipal (the "Sar-danapalus® of the Greeks, and "Osnappar® of Ezra iv, 10). Egypt had revolted about the time of the death of Esarhaddon, and thus necessitated the early attention of Assurbanipal to hold it. Pie was completely successful, driv¬ ing back the rebel Tirhaqa and re-establishing his authority over the whole land. A second expedition was required again in 663 b.c., when the land was completely reconquered and As¬ syrian authority re-established. Very soon, however, Psammeticus of Egypt, with the help of foreign troops, threw off the yoke of As¬ syria. Assurbanipal's great work was the con¬ quest of Babylon and his rebellious brother Shamash-shum-ukin in 647 b.c. ; and, after sev¬ eral terrific battles, the crushing of the power of the Elamites in 640 b.c., by the capture and destruction of their great capital, Susa. These

colossal military achievements marked the cul¬ mination of Assyria's career, for henceforth there vyas a rapid decline (see Assyria). As-surbanipal's notable contribution to the history of literature was his causing to be collected and copied for his royal library at Nineveh

many of the most famous pieces of literature found in the libraries of Babylon. The last years of his reign are wrapped in obscurity.

Third Period — - Babylonia: Rise of the Neo-Babylonian Empire 625 B.C. Fall of Assyria, 606 B.C. — • Almost simultaneously with the death of Assurbanipal (626 b.c.) we find one of his former generals, Nabopolassar, a Chaldean by descent, securing the throne of Babylon for himself (625-605 b.c.). While he was developing and extending his influence and grasp over the territory that was naturally trib¬ utary to Babylon, momentous events were oc¬ curring in the north country, in and about As¬ syria. The growing Median power threatened its very life. One son of Assurbanipal, Assur- etil-ilani and possibly a brother, Sin-shar- ishkun, occupied the Assyrian throne, the for¬ mer about six and the latter about seven years. The waves of the Umman-Manda, peoples to the north and northeast of Nineveh, were roll¬ ing over the mountains of eastern Armenia and northern Media. According to an inscription of Nabonidus, written about 553 b.c., these mountaineers, in conjunction with the Medes, finally succeeded in overwhelming Nineveh, the last hiding-place of the Assyrian tyrant and op¬ pressor, in 606 b.c. ; this was done probably with the direct or indirect support of Nabopolassar of Babylon.

Nebuchadrezzar II, 604-561 B.C. — Si¬ multaneously with the fall of Nineveh we find an Egyptian army under Necho encamped in northern Syria, in full possession of the eastern coast of the Mediterranean Sea. In a crushing defeat Nebuchadrezzar overthrew and pursued the Egyptian invaders, and secured that terri¬ tory for the new Babylonian empire. Within the 43 years of his reign, Nebuchadrezzar made Babylon the up-to-that-time greatest of em¬ pires. His authority extended, on biblical evi¬ dence, even into Egypt, and his activities were something phenomenal. In fact, the larger part of his inscriptions already found are devoted to his immense building projects, including temples, palaces, streets, embankments and walls. Babylon was built in great magnificence, and in every important aspect did credit to the enterprise and genius of Babylonia's greatest monarch. His own records thus far found do not give us any account of his dealings with the Jewrs, either at Jerusalem or those in exile — described in the Old Testament. After a long and prosperous reign he was succeeded on the throne by his son, Evil-Merodach. This king was assassinated after a reign of two years (561-559 b.c.) , by Neriglissar, his brother-in- law. This usurper ruled four years (559-555 b.c.) , and spent most of his time, according to his inscriptions, in building operations. At his death his son, Labashi-Marduk, not yet of age, succeeded him, but fell under the assassin's dagger within nine months.

Nabonidus, 555-538 B.C. — By some ma¬ chinations of the priesthood, apparently, the new king, Nabonidus, was a native Babylonian and not a Chaldean as was the dynasty of Na¬ bopolassar. He was an enthusiastic, religionist

and antiquarian. He built and rebuilt many temples in the principal cities of his kingdom. He was the discoverer, in the foundations of a temple, as already stated, of an inscription of Sargon I, which had been placed there 3,200 years before his day, making the date of said Sargon, on his calculation, about 3750 b.c., or, as corrected, 2650 b.c. Nabonidus' enthusiasm carried him too far, for he attempted to cen¬ tralize in Babylon the religion of the kingdom. In doing this he alienated the priesthood, and even aroused their active opposition. For throughout the history of Babylonia each city had its own patron deity, to whom its temple was dedicated and its people devoted. The images and shrines of these various divinities were collected in Babylon. This act, with others of similar offense to the priests, paved the way for his downfall before a mightier power.

Cyrus, 538-529 B.C. — Cyrus, an Elamite and Persian by descent, began an active career as a conqueror in 558 b.c. He conquered suc¬ cessively the Medes under Astyages (550 b.c.), Croesus and Asia Minor (547 b.c.), and then moved against Nabonidus, who had allied him¬ self against this new conqueror. The Baby¬ lonian army was probably under the command of Nabonidus' son, Belshazzar. Suffering a de¬ feat at Opis, the army of Babylon later scarcely offered resistance. Cyrus marched, almost with¬ out further opposition, to the gates of the cap¬ ital city. The outraged priesthood and citizens, in open defiance of their own king, flung open the gates and welcomed the new and liberal conqueror to authority over them. Cyrus re¬ stored the gods to their cities and shrines, and permitted enforced exiles to return to their native places and lands. Besides, he became one of the ardent worshippers of the gods of the land and established himself as a liberty-loving, people-serving potentate.

The fall of Babylon before the advance of Cyrus meant the fall of Semitic sway in Baby¬ lonia, and the rise of Aryan power. The cunei¬ form tongue served the purpose of a language in Babylonia for long years after this revolu¬ tion. In fact, throughout the Persian and Greek periods, this same language was used in Babylonia, particularly in writing contract tab¬ lets. There are some inscriptions dating from the Parthian era, due doubtless to the enthusi¬ astic support of the priesthood of those times- Thus for nearly or quite 4,000 years the cunei¬ form language was the vehicle of expression for the peoples of Babylonia.

Bibliography. — The literature on Baby- lonia-Assyria has already become voluminous.. Consequently, in a limited bibliography, only se¬ lections will be given. These will cover the following departments of study:

(1) Explorations and Discoveries. — These include the early works of C. J. Rich, J. E. Taylor, A. H. Layard, P. E. Botta, Felix Jones, W. K. Loftus and J. Oppert. Since 1870' the most important works are those of George Smith, H. Rassam, E. de Sarzec, John P. Peters, H. V. Hilprecht and M. J. de Morgan, R. Zehnpfund and R. KoMewey, freely cited in all works on discoveries in those lands; (Mit- teilungen de deutschen Orient-GesellschafC (1 898—) .

(2) Inscriptions and Texts — Cuneiform texts very early began to be published. The first notable publication was Rawlinson's text

and translation of the Behistun Inscription (in the Journal of the Royal Asiatic Society, Vol. X, 1847). Botta, Layard and Oppert also pub¬ lished inscriptions as a result of their explora¬ tions and excavations. H. C. Rawlinson edited (1861-84) for the trustees of the British Mu¬ seum five standard volumes of texts under the title (Cuneiform Inscriptions of Western Asia. *Many minor series have appeared since that date, such as (Assyriologische Bibliothek) (1881- edited by Delitzsch and Haupt) ; 'Babylonian Expedition of the University of Pennsylvania* (edited by H. V. Hilprecht, many volumes, 1893-) ; Cuneiform Texts in the British Museum) (34 parts have appeared to 1917), by officials of that museum; (Decou- vertes en Chaldee* (1884-1913), by E. de Sar- zec ; 14 volumes of (Assyrian-Babylonian

Letters) (1892-1914), by R. F. Harper, and ˆMemoires de M. J. de Morgan *at Susa, in which V. Schell has edited notable Elamite- Anzanite texts, including the Code of Ham¬ murabi; Ira M. Price, (The Great Cylinders A and B of Gudea) (1899). A series of valuable texts (13 parts in 1914) entitled (Vorder- asiatische Schriftdenkmaler der Koniglichen Museen zu BerliiP edited by Frdr. Delitzsch, 1 907—) ; A. T. Clay, (Babylonian Records in the Library of J. Pierpont Morgan,* (Parts I and II, 1912, 1913) ; G. A. Barton, (Haverford Library Collection of Cuneiform Tablets) (Parts I, II, III, 1905-14) ; Mary I. Hussey, (Sumerian Tablets in the Harvard Semitic MuseunP (Part I, 1912; Part II, 1914); A. T. Clay, Miscella¬ neous Inscriptions in the Yale Babylonian Col¬ lection : Babylonian Texts* (Vol. I, 1915). In addition

to these there are scores of texts of lesser value to the student.

(3) Equipment for Study of the Lan¬ guage. — The former dearth in this field has been largely supplied by Frdr. Delitzsch. His (Assyrische Lesestiicke) (5th ed.) ; his (Assy- rische Grammatik *(2d ed., 1906) ; B. Meissner, (Kurzgefasste assyrische Grammatik* (1907); Delitzsch, (AssyrLches Worterbuch) (1887 —), and (Assyrisches Handworterbuch) (1896), con¬ stitute a fairly good outfit. Other works help¬ ful in the same line are Briinnow's Classified List of Cuneiform Ideographs) (1889) ; Muss- Arnolt's Concise Dictionary of the Assyrian Language) (1894-1905) ; L. W. King and H. Winckler have likewise contributed liberally to this department of work. The new field of Sumerian study, so closely intenvoven with Babylonian-Assyrian, has also acquired new equipment. We now have S. Langdon, (A Sumerian Grammar and Chrestomathy *(1911) ; Frdr. Delitzsch, (Sumerische Grammatik) (1914); (Klcine sumerische Sprachlehre* (1914), and (Sumerisches Glossar* (1914).

(4) Translations, Commentaries, etc. — There is a long list of this material, but some of the most useful for modern students are JKeilinschriftliche Bibliothck) (1889-, ed¬ ited by E. Schrader) : ˆAssyrian and Baby¬ lonian Literature *(1901, edited by R. F. Har¬ per) ; (Zeitschrift fiir Assyriologie) (1 886—, ed¬ ited by C. Bezold) ; several volumes in De¬ litzsch and Haupt's (Assyriologische Bibliothek* and (Beitrage zur Assyriologie *(1889 —) ; A. T. Clay, ˆPersonal Names of the Cassite Period* (Yale Oriental Series, Vol I, 1912) ; < Vorderasiatische Bibliothck* (1 906—, edited

by A. Jeremais, H. Winckler, and Otto Weber) ; and many valuable volumes by L. W. King and R. C. Thompson, published by the British Museum; and other volumes issued by C. H. W. Johns of Cambridge.

(5) Learning, Religion, Art. — Selections only: F. Hommel, die Vorsemitische Kul- turen in 2Egypten und Babylonien *(1883) ; A. H. Sayce, (Religion of the Ancient Babyloni- ans) (Hibbert Lectures, 1887) ; (Higher Criti¬ cism and the Monuments* (1893, several editions later) ; A. Jeremias, (Babylonische- assyrische Vorstellungen vom Leben nach dem Tode *(1887) ; C. P. Tiele, Ceschichte d. tTgyptischen u. d. babyl.-assyr. Religion * (1895) ; M. Jastrow, Jr., (Religion of Babylonia and Assyria* (1898, newly revised and greatly en¬ larged ed., 1905-12, in German) ; H. Zimmern, (Beitriige zur Kenntniss der babylonischen Re- ligioiP (1901) ; Perrot and Chipiez, (Histoire de l'art dans l'antiquite *(Vol. II) Chaldee et Assyrie) (1884) ; Collection de Clercq* (1888-); Virolleaud, (L'Astrologie Chal- deenne* (1905-); older works, such as those of Botta, Layard and Place, are of value chiefly for their

illustrations.

(6) History and Archaeology. — Some of the most recent works superseding the large work of George Rawlinson are F. Hommel, Ceschichte Babyloniens u. Assyriens) (1885— 89) ; C. P. Tiele, (Babyl. -Assyrische Geschichte) (1886-88) ; H. Winckler, Ceschichte Babyl. u. Assyriens) (1892) ; J. F. McCurdy, (History, Prophecy and the Monuments *(1894-1901) ; H. R. Hall, (Ancient History of the Near East) (1913) ; R. W. Rogers, (History of Babylonia and Assyria1* (6th ed., 1915) ; L. W. King, 'A History of Sumer and Akkad *(1910), and (A History of Babylon* (1915) ; Schrader- Winckler-Zimmern, (Die Keilinschriften und das Alte Testament *(3te Auflage, 1901-03) ; A. Jeremias, das Alte Testament im Lichte des alten Orients* (2d ed., 1906) ; (Handbuch der altorientalischen Geisteskultur *(1913) ; M. Jastrow, Jr., (The Civilization of Babylonia and Assyria* (1915).

Further bibliographical material may be found in the periodicals devoted to Assyriol- ogy, Zeitschrift fiir Assyriologie, the American Journal of Semitic Languages and Literatures, Orientalische Bibliographic, Orientalistische Lit- eraturzeitung (189S-); Revue d' Assyriol¬ ogie et d'Archeologie Orientale (1884-); also in the comprehensive articles on <(Assyria **and Babylonia** by Hommel and King in Hast¬ ings' (Dictionarv of the Bible *and Cheyne's (Encyclopaedia Biblica* respectively.

Ira Maurice Price,

Professor of Semitic Languages and Litera¬ tures, University of Chicago.

AST, ast, Georg Anton Friedrich, Ger¬ man scholar and philosophical writer : b. Gotha, 29 Dec. 1778; d. Munich, 31 Oct. 1841. In 1805 he was appointed to the chair of classical lit¬ erature at Landshut and in 1826 accepted an appointment to the same chair in the Univer¬ sity of Munich. Among his best known publi¬ cations are: (Handbuch der Aesthetik *(1805) ; (Grundriss der Geschichte der Philosophic* (1807); _ WVissenschaftliche Darstellung der Grammatik, Hermeneutik und Kritik *(1808) ; dlatos Leben und Schriften* (1816). He also published an edition of the works of Plato in

11 volumes with a Latin translation and a commentary (1810-32).

ASTACIDiE, the family of decapod Crustacea containing the crayfishes (q.v.). It is divided by some into two families — Asta- cidcc of the northern hemisphere, and Paras- tacidcc of the southern. ((There can be no doubt,® says W. T. Caiman ((Life of Crusta¬ ceaˆ 1911), ((that the two families have been derived from a common stock of marine, lob¬ ster-like animals, and it is reasonable to sup¬ pose that two branches of this stock became in¬ dependently adapted to a fresh-water habitat in the North and in the South.®

ASTACUS, a genus of decapod Crusta¬ ceans of the family Astacidce, including the A. rnarinus, or lobster, and the A. fluviatilis, or crayfish. The species A. fluviatilis contain the crayfishes of Europe, and also those of the Pa¬ cific States of the United States, while those found along the Atlantic coast belong to the species Cambarus.

ASTARA, a port of Transcaucasia, in the district of Baku on the Caspian in lat. 38° 27' N., and long. 48° 53' E. on a river of the same name whifch forms the frontier between Persia and Russia. Russian merchandise is landed there and forwarded to Azerbaijan and Tabriz via Ardebil.

A.STARABAD, Persia, province bounded on the north by the Caspian Sea and Trans- caspia, south by the Elburz Mountains, west by Mazandaran, and east by Kharasan. The country is mountainous, possesses exten¬ sive forests, fertile valleys, producing rice, wheat and other grains in abundance, and rich pasturages. The soil is exceedingly produc¬ tive owing to the abundance of water which irrigates and fertilizes it. It is, however, a prey to the ravages of disease, principally malarial fevers due to the extensive swamps formed by waters stagnating in the forests, and to the frequent incursions of the Turko¬ mans. The inhabitants, nevertheless, are a strong and athletic race. The population is about 100,000. Astarabad, the capital, is sit¬ uated on the Astar, has post and telegraph offices, and a population of about 10,000.

ASTARTE, a genus of bivalve mollusks belonging to the family Cyprinidce. They have 2-2 hinge teeth and are suborbicular, com¬ pressed, thick, smooth or concentrically fur¬ rowed shells. Tate estimated the recent species known at 20 and the fossil at 285. The former belong to the temperate and Arctic zones, and the latter to the rocks from the carboniferous formation upward.

ASTARTE, as-tar'te, a character in By¬ ron's play, <Manfred.) The hero guiltily falls in love with her, and in the second act her shadow appears to him in a denunciatory at¬ titude.

ASTARTE, as-tar-te, or ASHTORETH,

a Syrian goddess, probably identical with the Semele of the Greeks, and the Ashtaroth of the Hebrews, and worshipped also by the Phoe¬ nicians and Carthaginians, being regarded by some as the original of the Greek goddess Aph¬ rodite (Venus). She was the moon-goddess, or goddess of the heavens, and appears also to have been worshipped as the goddess of fruit¬ fulness. In the Old Testament,' Astarte is fre¬

quently mentioned as the goddess of the Sido- nians (see 1 Kings xi, 5-33; 2 Kings xxiii, 13), but the form of her name seems to have been perverted, to her original name of Ashtart being infixed the vowels of Bosheth, or ((shame,® and we find her there called Ashto- rath. . In 1 Samuel xxxi, 10, Astarte is again mentioned, as is also the fact that a temple was built to her at Ashkelon. There were also temples at Citium in Cyprus, at Eryx in Sicily and in Carthage. The Syrians also built a famous temple to her at Hierapolis, at Tyre and at Sidon. She is probably identical with the Assyrian goddess Ishtar, or Istar, the ((Lady,® the ((Queen of the Gods® or the virgin goddess of death and war, who enforces strict chastity upon her priests and priestesses. As¬ tarte is represented in various forms, but more usually with four wings, the two uppermost representing the horns of the moon and hav¬ ing on her head a pointed cap and a white dove in her hand. Others represent her as a naked female figure, short and stout and the hands holding the breasts. She is also represented in Phoenicia as a cow.

ASTATIC (as-tat'ik) NEEDLE (Greek, ˆunstable®), in physics, a magnetic needle whose tendency to set itself in the magnetic meridian has been nearly or quite neutralized in some way, so that while the needle retains its full magnetic power it will remain indiffer¬ ently in any position, even when quite free to turn. A magnetic needle may be made astatic in various ways ; for example, by disposing magnets in the vicinity of the needle in such a way that their field of force opposes and neu¬ tralizes the earth’s field. A commoner method is to make use of a pair of needles of equal size and equal magnetic strength, securing them together, one above the other, by a light, rigid connection, so that their lengths shall be par¬ allel and their poles turned in opposite direc¬ tions. If the conditions here assumed are ful¬ filled rigorously the system will have no di¬ rective tendency whatever. In practice it is quite possible to secure an adjustment so good that the directive tendency is masked by the torsional force of the suspending fibre. Astatic needles are used in the construction of deli¬ cate galvanometers, the coil conveying the cur¬ rent passing around only one of the needles of the system or around both of them

in opposite directions. The full magnetic moment of the current is thus obtained, while the directive action of the earth's field remains practically zero and the motion of the needle is opposed only by the torsion of the suspension. See Galvanometer.

ASTEN, ' as'ten, Friedrich Emil von,

German astronomer: b. Cologne 1842; d. 1878. From 1870 he was employed at the Imperial Russian Observatory at Pulkowa. He will be best remembered for his work upon Encke's comet, the results of which were published in 1877, and included an elaborate discussion of all the appearances of this interesting body from 1819 to 1875.

ASTER, a genus of plants belonging to the family Asteracece, and comprehending several hundred species, mostly natives of North America, although some of the species are found over most regions of the globe. The name is derived from the Greek aster, a star,

and is due to the fact that the heads of the flowers bear some resemblance to stars. The species are mostly herbaceous plants. Large as the genus is, it contains no species of any great utility in the arts, but many are culti¬ vated as ornamental plants. The most beau¬ tiful species among those which are natives of Europe are A. alpinus, A. amellus and A. Pyreneans , and among those of America, A. puniceus, A. multiflorus and A. novce-anglice. The China aster (Callistephus chinensis) , intro¬ duced from China upward of a hundred years ago, is a well-known annual, growing to a height of from 12 to 18 inches and bearing an abundance of large and beautiful flowers, exhib¬ iting in the numerous varieties every hue except yellow and a great diversity of marking. This plant lends itself readily to culture and flor¬ ists are constantly adding new varieties to a stock that already numbers nearly 300. The French call this species Reine Marguerite. The chrysanthemum and peony flowered vari¬ eties are particularly worthy of cultivation for the size, color and abundance of their flowers. From the lateness of the season in which they bloom some species of aster have obtained the name in England of Christmas daisy.

ASTER, as'ter, Ernst Ludwig von, Ger¬ man military engineer: b. Dresden 5 Oct. 1778; d. Berlin, 10 Feb. 1855. His first service was in the Saxon army. It was in 1810, as an of¬ ficer in this army, that he submitted his plans, subsequently accepted, for the fortification of

Torgau to Napoleon. Subsequently he entered the Russian service and soon after 1815 the Prussian. While in the last service he under¬ took the fortification of Coblentz and Ehren- breitstein, and in 1842 was appointed general and inspector of all the Prussian fortresses.

ASTERISK (<(a little star®), a sign or symbol (*) used in writing and printing, as a reference to a note at the bottom or on the margin of the page. The obelisk or dagger (t) and many other marks are similarly em¬ ployed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, etc. The asterisk often marks the omission of words or sentences, or it distinguishes words as conjectural or ob¬ scure, or it may be used merely as a typo¬ graphical mark for any specified purpose.

ASTERISM, a property possessed by a few minerals of exhibiting star-like rays. It is due either to reflection of light from twin¬ ning lamellae or minute enclosed tubes, as in the case of star-sapphire (q.v.), star-ruby and star-quartz (q.v.), or to the regular arrange¬ ment of minute enclosed crystals as seen by transmitted light in the case of some phlog- opite or star-mica.

ASTEROI'DEA, an order of echinoder- niata. See Starfish.

ASTEROIDS, a group of small planetary bodies known also as minor planets which revolve round the sun between the orbits of Mars and Jupiter. The most remarkable feature of these bodies is that they occupy a vacant place in the solar system in which a planet would naturally belong. Between the orbit of Mars, the fourth planet in order, and that of Jupiter, the fifth, there is a space more than double the radius of the orbit of

Mars. This gap was noticed from the time that the distances of the planets were laid down by Kepler. It was long suspected that a planet would be found occupying such space and an organized effort was made to discover it. The discovery of a planet which was sup¬ posed to be the long-sought body was made by Piazzi at Palermo on the first day of the 19th century. To the great surprise of astronomers three other planets were found in the course of the next six years to be revolving in the same region. The smallness of the four bodies gave rise to the celebrated hypothesis of Olbers that these bodies were the frag¬ ments of a single planet which had been dis¬ rupted by some cataclysm. Some 40 years elapsed when in 1846 a fifth asteroid was dis¬ covered. Others soon followed. More pow¬ erful telescopes were applied to the search, a thorough system was introduced and in this way the number known went on increasing until it mounted into the hundreds, and now a dozen or more are frequently added to the list in a single year.

When photography was applied to form a permanent picture of the stars in the sky; it was found that this method was the easiest by which discoveries of these objects could be made. Whatever method may be used, the difficulty of discovering an asteroid arises from the fact that it is impossible to distin¬ guish such a body from a fixed star by its mere aspect. It can be detected only by its motion among the stars and therefore re¬ quires that the same body should be observed at different times. But a photograph enables the motion to be detected in a very simple way, as follows :

If a telescope, mounted so as to serve as a camera, is pointed at a given region of the sky for half an hour or more the images of the stars which fall on the plate remain im¬ movable, and these bodies are photographed as simple points of light. But if an asteroid is in the field, its motion during the exposure is quite appreciable ; and its picture appears as a short line, equal in length to the amount of motion during the exposure of the plate, which can be detected at sight. A decided improvement to this photographic method has been recently devised which consists in sub¬ jecting the plate to a slight,

uniform, side- wise motion equal to that of the average as¬ teroid in the part of the skv under examina¬ tion. The stars are thus photographed upon the plate as trails while the asteroid appears as a very much shorter trail or as a point of light; its image is thus rendered far more intense than if it were allowed to trail, and numerous asteroids have been thus discovered which would have been far too faint to be detected by the older method. During the last 10 years the number discovered has carried the total list up to more than 800, a number so great that it is almost impossible to com¬ pute the orbits or motions or even to find separate and appropriate names for the bodies.

The asteroids are distinguished from the major planets by several distinct and inter¬ esting features. One of these concerns their orbits. While the major planets, with the exception of Mercury, all move in nearly cir¬ cular orbits, the orbits of the asteroids are, in the general average, markedly eccentric.

In some cases the asteroid is twice as far from the sun at aphelion as at perihelion. One result of this is that they appear several times brighter when seen in opposition at perihelion than at aphelion. The inclination of the orbits is ■ also frequently very large. That of Pallas, one of the original four, is inclined no less than 34° to the elliptic. The result of this is that many of these bodies wander far outside of the limits of the Zo¬ diac ; indeed, in many cases they are seen north of the zenith in our latitudes when near¬ est the earth.

The size and mass of the asteroids do not admit of very accurate definition, for the reason that, with rare exceptions, they are seen in the telescopes only as points of light. Barnard has, however, succeeded in measur¬ ing the apparent diameter of the first four, three of which are probably the largest of the group, with the great Lick telescope. The results are :

Miles

Diameter of Ceres . 488

Diameter of Pallas . 304

Diameter of Vesta . 248

Only the largest shows a diameter exceed¬ ing one-twentieth that of the earth, and all the others are much smaller than this. Judging from the amount of light they reflect very few of them are 100 miles in diameter and most of those known may not exceed 10 or 12 miles in extent. Indeed, we have reason to believe that as we take smaller diameters the number increases without any limit. The same remark might apply in a still greater extent to the masses. The latter are so small that the attrac¬ tion of the whole mass of all the asteroids does not produce any effect that has yet been ob¬ served upon any planet or comet.

Of the total number of these bodies it is hardly possible to form any estimate, because the more powerful the means of research the more are found. We can hardly be astray in supposing that thousands exist, and if we in¬ clude those that must forever remain invisible to us, the number must be countless. Yet they are all so minute that the total mass cannot be as great as that of the planet Mercury.

The hypothesis already mentioned, that these bodies are fragments of a great planet, has been effectually disproved by modern research. Apart from the impossibility of an explosion which would rend a planet, we have the fact that in the event of a disruption all the orbits would pass through a single point. It is true that this coincidence would not continue indefinitely, be¬ cause the orbits would change their positions by the attraction of the other planets ; but their sizes are found to be such that they could not originally have passed through any single point. It is more probable that the asteroids are merely scattered meteoric material which formed a small part of the original nebula from which the solar system was developed but which was prevented from becoming aggregated into a single world, probably by the great disturb¬ ances produced by the attraction of the nearby planet, Jupiter. There is a curious grouping of the orbits which seems to have some connec¬ tion with the origin of the whole collection. Many years ago it was noticed by Kirkwood that, if the orbits were arranged according to

their mean distance from the sun, there would be gaps in the series at those points where the time of revolution was commensurable with the period of Jupiter. For example, there are no known asteroids having a period one-third that of Jupiter, or one-half or two-fifths, al¬ though there are plenty of orbits within and outside these peculiar limiting values. The sub¬ sequent discovery of hundreds of these bodies has led to a slight modification of this law. The orbits not only

seem to avoid these peculiar values, but to accumulate midway between them. To get an idea of the results suppose that every orbit stretched into a circle of a radius equal to its mean distance. Then treat¬ ing these orbits as hoops, suppose that we ar¬ range them all round on one centre. We should then find that the rings are divisible into four, five or six nearly distinct groups with vacant, spaces between them. The explanation seems* to be that the material which might have been originally in these vacant zones could not long remain there, for the accumulating, periodic, planetary perturbations would speedily force it nearer or farther away from the sun.

Perhaps the most remarkable of the aster¬ oids was one discovered in 1898. Some of its peculiarities have excited great attention on the part of the astronomical world. The orbits of all the other known asteroids are contained between the orbits of Mars and Jupiter, no known orbits approaching very near either of these planets. But, in the summer of 1898, Witt, of Berlin, found an asteroid which at perihelion came far inside the orbit of Mars, indeed within 13,500,000 miles of the orbit of the earth. Its orbit was found to be extremely eccentric and, which was more curious, it was interlinked with that of Mars, so that if the orbits were rings, they would have passed through each other and hung together like two links. What gives this planet especial interest is that on these rare occasions when it comes nearest to the earth its parallax can be meas¬ ured with greater precision than that of any of the other planets. It therefore affords us the best possible method of directly measuring the solar system ; but, most unfortunately, it is only at intervals of 37 years that the nearest approaches occur. What is most tantalizing, is that only six years before it was discovered, it is known to have passed at nearly the least distance from the earth, but it was then unseen by human eye. It was found to have been photographed a great number of times at the Harvard Observatory; but among the hun¬ dreds of stars whose images were found on the plate, its image was completely lost after the discovery in 1898. It was recognized through the determination of its orbit which made pos¬ sible the computation of its position in the heavens at former positions.

In the winter of 1900-01 there was as close an approach to the earth as would occur during the next 30 years, although the distance was then but little less than 30,000,000 miles. A co¬ operative effort was made to measure the paral¬ lax on this occasion. No less than 58 observa¬ tories took part, some making photographic and others micrometric measures of the planet, while many others co-operated by making meridian observations of reference stars. When the great mass of observational material was finally reduced, there resulted for the

parallax the value, 8. "806 with a probable error of but 0."004. This is the most accurate value thus far determined by any method. The next closest approach of Eros to the earth will occur in 1931 when the distance apart of the planets will be less than half as great as it was at the time of their closest approach in 1900. Soon after this date, therefore, the value of the fundamental unit of astronomy will become known with a far greater accuracy.

A curious property of this most remarkable body is a periodical variation in its light which was noticed during the opposition of 1900-01. It was found to go through a series of changes in the course of five hours quite similar to those of a variable star. The period was found to be two and one-half hours, but possibly the same brightness was not reproduced except in a period of five hours. It was yet more curi- •ous that these variations seemed to have nearly or quite ceased at the next opposition.

Simon Newcomb.

Revised by Eric Doolittle, Professor of As¬ tronomy and Director Flower Astronomical Observatory.

ASTEROL'EPIS, a genus of ganoid fishes named on account of the starry color of its scales. A bone of a species belonging to this genus, found at Stromness, the capital of Orkney, suggested to Hugh Miller the writing of his beautiful volume entitled footprints of the Creator; or, the Asterolepis of Stromness.* It was an elaborate argument against the develop¬ ment hypothesis. According to that hypothesis, the first species of any class appearing on the scene should be low in organization, and prob¬ ably small in size. Mr. Miller showed that the asterolepis was large in size and high in organ¬ ization, and yet it was at that time believed to be the oldest fossil vertebrate found in Scot¬ land. His argument was subsequently weak¬ ened by the discovery that the Stromness rocks were less ancient than the Forfarshire beds, containing cephalaspis and other fish genera subsequently discovered, mostly of small size, though not of low organization.

AS'TEROPH'YLLITES, fossil plant re¬ mains, w'hich with Annularia and Sphenophyl- lum form the leaves of the group Calamites of the Devonian, Carboniferous and Permian periods.

ASTHENIA, a disease of poultry, known in' the United States as <(going light.)) The treatment is purgation and tonics. Also a symptom of many disorders of the body char¬ acterized by muscular weakness. Such muscu¬ lar weakness is normal in fatigue, but such fatigue may be greatly exaggerated wfien toxic factors reduce the muscular power. Such re¬ duction is frequent in disease of the adrenal system. See Adrenals.

ASTHENOPIA, or WEAK SIGHT, common affection of the eye, due immediately to muscular fatigue. Its chief symptoms are pain in and around the eyes or headache, which is increased by use of the eyes on near objects and in artificial light. It occurs most frequently in persons of weakened constitu¬ tion and especially neurasthenics. A prolonged strain may have serious results, often causing temporary dimness of vision, double vision, and otherwise may cause general sight dis¬ orders. See Eye, Diseases of.

ASTHMA, as'ma, or az'ma, a disorder of respiration characterized by more or less severe paroxysms of difficult breathing accompanied by coughing, wheezing and, in severe attacks, by slight asphyxia. The attacks usually come on suddenly, last from a few minutes to many hours and are generally followed by complete relief, and recur at more or less frequent in¬ tervals. They are characterized by extreme difficulty both in inspiration and expiration. Numerous theories have been advanced in regard to the causation of the disease, but the svmptoms are best explained by ascribing it to a spasmodic contraction of the muscles of the bronchioles (small bronchial tubes). The underlying causes of this are manifold, but there are a few which are of special import¬ ance and attention to these may help greatly in avoiding or lessening the severity of the attack. The predisposition of asthmatics is usually a hypersensitive nervous system or an irritable nasal mucous membrane, or the at¬ tack may be started by some external irritant. Asthma occurs oftener in men than in women, and frequently in children, especially after bronchitis, measles or whooping cough. It may occur in any climate or locality, in the mountains or at the seashore. A change of air or of locality is an important factor in some cases. The affection is most common during spring and autumn, which may be due to the larger amount of dust and pollen in the air at those seasons. The malady is often¬ times inherited, passing from one generation to another; statistics show this to be true in 50 per cent of the cases. Gout and rheumatism are causes frequently associated with the dis¬ ease. Among reflex causes are constipation, indigestion, uterine disturbances, nasal catarrh and growths of the nose pressing upon the septum higher up. Touching certain spots in the nose causes some persons to sneeze and may

excite a paroxysm ; pregnancy has been recognized as causing asthma in some cases. Disorders of the heart and kidneys produce respectively cardiac and renal asthma. Dust, fog, pollen, sulphur from matches, emanations from horses, cats, dogs, etc., fumes from cer¬ tain chemicals are all external irritants which may cause an attack in a person constitution¬ ally predisposed. Physical excitement, anger, grief, etc., are also causes. Asthma is never due to disease of the lungs and is never directly associated with tuberculosis. Some¬ times cases occur with no apparent cause to account for the onset of the symptoms.

The symptoms may come on at any time during the day or the night, but in the majority of cases the attack begins during the night, sometimes abruptly but often by degrees. A sense, of marked fatigue, sneezing or heavi¬ ness in the pit of the stomach are signs w-hich the patient soon learns to recognize as the forerunners of an approaching attack. He is aroused from sleep after midnight with a choking sensation. In some cases this condi¬ tion increases slowdy, not becoming acute for an hour or more. In sudden, severe attacks the patient springs from bed and rushes to an open window for air or else he will place himself in a chair and try to get into a position most comfortable for breathing. Most asth¬ matics have some special attitude which best enables them to use all the auxiliary muscles

of respiration and which they assume at the onset of the attack and keep until it begins to subside. The face becomes pale and anx¬ ious, the voice is gasping and speech is diffi¬ cult, the eyes bulge and the face becomes cya¬ notic as the paroxysm continues ; cold clammy perspiration covers the face, breathing becomes more difficult and laborious as the chest is now expanded and the expiration of air is very much prolonged. This breathing is ac¬ companied by wheezing sounds upon the chest. The attack may last from one hour to several days ; it subsides gradually, the patient begins to cough and rids his lungs of some frothy mucus in which is mixed grayish-white masses ; he then feels greatly relieved, the color returns to his face, and he goes off into a sound sleep from which he awakens feeling greatly re¬ freshed. A patient rarely, if ever, dies during a paroxysm as it is of spasmodic character, and once over it, he quickly regains his normal condition.

Children bear attacks better than adults, and in their case the disease

is usually periodic in its recurrence, but as the years advance it tends to become more erratic both in its mani¬ festations and time of appearance, and is apt to disappear at puberty. Persons past middle age are not apt to rid themselves of it, al¬ though they may live to a good old age and die of some other disease. Much can be done to prevent future attacks if the cause of the paroxysm can be determined and properly treated. Constipation, over-eating, and eating at bedtime should be avoided. An operation upon the nose may be necessary to remove a growth that is causing undue pressure upon the nasal septum. It is often advisable to move to another climate or locality. Endeavor should be made to strengthen the nervous system, if that be at fault; breathing exercises are often helpful. Another method, which has come into prominence of late, is to restore the stability of the respiratory centre by cauterizing the septal mucous membrane, and combining this with hygienic measures. This is performed bv painting one side of the nasal septum with a few drops of cocaine and resorcin, and then drawing a line with a galvano-cautery point from a spot opposite the middle turbinated body, forward and slightly downward for a little less than half an inch. After an interval of six or seven days the operation is repeated on the other side. The heart, kidneys, gout and rheumatism should be treated separately and without reference to1 an asthmatic attack. During the attack a hypodermic injection of y grain of morphia generally gives relief ; amyl- nitrite inhaled or nitroglycerine 1/100 grain in¬ jected lessens the severity of an attack. Adren¬ alin by hypodermic injection is claimed by some to be very useful. Cigarettes of various kinds usually composed of a combination of the leaves of belladonna, stramonium and hyoscyamus are used and help some patients very much. Inhalation of fumes from burn¬ ing blotting paper soaked in potassium nitrate (1/15) is also used. In the interval remedies recommended for internal use to prevent and lessen the severity of future attacks are potas¬ sium iodide, belladona, lobelia, hyoscyamus and grindelia robust.

ASTI, Italy, known in ancient times as Asta Pompeia, a city in the province of Ales¬

sandria. It is on the left bank of the Tanaro and on the railroad running from Alessandro to Turin, being about 35 -miles southeast from the latter city. In outer aspect it presents much the same appearance that it did during* the Middle Ages, with its narrow, twisting streets, and ancient buildings. Among the latter is the cathedral, which was built in 1348. Early in its history it was noted for its beau¬ tiful pottery. In the Middle Ages it was one of the formidable city republics into which Italy was then divided. It is the centre of a fertile agricultural region; but the chief prod¬ uct of the

neighboring districts is the spark¬ ling wine named after the city and which alone causes it to be remembered in modern times. Pop. 41,252.

ASTIE, as'tya', Jean Frederic, French the¬ ologian: b. Nerac, 21 Sept. 1822; d. 20 May 1894. He studied at Geneva, Halle and Berlin, then, in 1848, came to the United States, where he remained as a clergyman for five years. In 1856 he was appointed professer of philos¬ ophy and theology at Lausanne, Switzerland. In 1868 he became the editor of the Revue de Theologie et de Philosophic. He wrote (His- toire de la republique des Etats-Unis) (2 vols;, 1865) ; (Melanges de theologie et de philos¬ ophy (Lausanne 1878) ; (Realite, franchise et courage) (Paris 1888).

ASTIGMATISM, a defect of vision in which the rays of light do not converge to a single point on the retina. It is usually due to irregularities in the curvature of either the cornea or the crystalline lens, or of both, so that rays refracted in one meridian are brought to a focus at a point in advance of or behind those refracted in the meridian at right angles to the first, or it may be due to functional de¬ fective control of the crystalline lens. A slight degree of astigmatism is present in all eyes, be¬ cause neither the cornea nor the anterior or posterior lens surface is part of a perfect sphere; but normally the defect is so slight as not to be noticeable. The conventional star¬ shaped appearance assumed by very distant points of light, as, for example, the stars them¬ selves, is due to this universal defect. If, how¬ ever, the radii of curvature are markedly un¬ equal in the different meridians, a more or less serious blurring of the images formed on the retina by all objects results. Two main va¬ rieties of astigmatism are recognized. The commoner is regular astigmatism, in which there is a difference of curvature in two me¬ ridians, usually at right angles to each other, but the refraction is the same throughout any given meridian. In irregular astigmatism, how¬ ever, there are variations of curvature along the length of the different meridians them¬ selves ; that is, each one does not, as in regular astigmatism, represent a segment of a circle. This form is usually the result of injury or disease of the cornea or lens, and is difficult to correct by glasses. Regular astigmatism is nearly always congenital and is frequently pres¬ ent in several members of the same family. The symptoms produced by astigmatism may be purely local and comprise blurred vision and fatigue after protracted near work, but even slight amounts may in some cases cause serious disturbances of the general health by the con¬ stant headache and reflex symptoms, such as

nausea and vomiting, dizziness, etc., that result. Many of these symptoms may be purely psycho¬ genic and indicate an unwillingness on the part of the unconscious to overcome slight defects.

' The difficulties complained of are usually, at least partly, relieved by resting the eyes. Numer¬ ous methods of examination are employed by oculists to detect astigmatism, one of the sim¬ plest being the use of test diagrams represent¬ ing radiating lines or sectors, rows of dots, etc., which, to the astigmatic eye, appear more or less blurred in certain meridians. The treat¬ ment consists in the use of glasses which are ground so as to compensate for the variations in refracting power of the optic media in the different meridians. This correction is accom¬ plished by using cylindrical lenses, which are segments of cylinders and refract only at right angles to their axis, combined, if necessary, with the appropriate spherical lenses. Psycho¬ genic symptoms may be relieved by a proper psychotherapy. See Eye; Vision, Defects of.

ASTLEY, Hugh John Dukinfield, Eng¬ lish theologian and anthropologist : b. 29 Sept. 1856. In 1881 he was ordained a clergyman of the Church of England ; in 1894 he was incum¬ bent of the parish of Saint John the Evan¬ gelist, Brixton, after which he became vicar of East and West Rudham, Norfolk. In 1906 he was appointed Donellan lecturer at the University of Dublin. He was also librarian of the British Numismatic Society. Among his works are (The Resurrection and Modern Thought5 (1889) ; (The Date of the Samaritan Pentateuch5 (1892) ; (The Housing Problems in the Country5 (1901) ; (The Higher Critics and Holy Writ5 (1905) ; Portuguese Paral¬ lels to the Clydeside Discoveries5 (1904) ; (The Saxon Church at Bradford-on- Avon5 (1905) ; <Memorials of Old Norfolk5 (1908); Prehis¬ toric Archaeology and the Old Testament5

(1908).

ASTON, William George, Irish philolo¬ gist : b. near Londonderry in 1841 ; d. Devon¬ shire, 22 Nov. 1911. He became interpreter and translator to the British Legation at Tokio in 1870; assistant Japanese secretary at Tokio in 1875—80 ; consul-general for Korea in 1884- 86; Japanese secretary at Tokio in 1886; and was retired in 1889. He published (A Gram¬ mar of the Japanese Spoken Language5 ; (A Grammar of the Japanese Written Language5 ; (A Translation of the Nihongi; or, Annals of Ancient Japan5 ; (History of Japanese Litera¬ ture5 ; (Shinto,5 etc.

ASTON HALL, an old manor house in Birmingham, England, purchased by the city and turned into a museum. It is supposed to be the original <(Bracebridge Hall55 described by Washington Irving.

ASTOR, John Jacob, American merchant: b. Waldorf, Baden, near Heidelberg, 17 July 1763; d. 29 March 1848. He came to America in 1783, where his elder brother had settled and invested his savings in the fur trade. In 1784 he went with a cargo of furs to London ; sold them and formed connection with fur houses there, and as his capital increased, made annual trips to Montreal, buying furs there and ship¬ ping them direct to London, as Canada was allowed to trade only with the mother country. In 1794 Jay's treaty removed this embargo, and Astor, then in London, at once made a contract

with the Northwest Company of Montreal and Quebec (then the magnate of the Canadian Northwest fur trade), imported furs from Montreal to New York, and shipped them to all parts of Europe and China. The surrender of the lake posts under the treaty also greatly extended the trading limits, and Astor in a few years became one of the leading merchants and capitalists of the country, having a quarter of a million in 1798, and double that a few years later. In 1807 he embarked in direct trade with the Indians by way of the Mohawk, and with the English fur companies ; but found the American trade chiefly monopolized by the Mackinaw Company, and knowing our govern¬ ment's desire to keep its home trade in home hands, proposed with its protection to accom¬ plish this himself. In 1809 he secured a New York charter for the <(American Fur Company,55 but the War of 1812 suspended operations, and after it a government prohibition of British fur trade in the United States broke up the company. Meantime a grander scheme had been initiated. Sir Alexander Mackenzie, after crossing the continent far north in 1793, had suggested establishing a line of trading posts from ocean to ocean, with terminal, coast and island stations, to draw all except the Russian fur trade into one channel. Lewis and Clarke's transcontinental expedition in 1804 proved its practicability on American soil, and Mr. Astor evolved the plan of distributing such posts along the Missouri and Columbia rivers, with a central station at the mouth of the latter, where all the peltries from the interior and those gathered by coasting vessels were to be collected and taken by a yearly ship to Canton, loading in return with Chinese goods. A later development was to operate a line of ships from the Pacific coast to the Chinese and East Indian ports, with a Hawaiian island for an intermediate port. The Russian Fur Company had already complained to the United States of the casual American trading vessels selling liquor and firearms to their Indians ; the Amer¬ ican government had consulted Astor for a remedy and his idea was to

abolish this irre¬ sponsible trading by making his yearly supply ship take its place. To prevent ruinous com¬ petition he offered the Northwest Company a one-third interest in the enterprise; but they declined it and sent a company to seize the mouth of the Columbia before his party could arrive. He succeeded in spite of them, how¬ ever, in planting a settlement, which was named Astoria ; but on the Creaking out of the War of 1812 the English seized it. It reverted to the United States by the Treaty of Ghent, and Astor wished to revive the project, but the government was cool, and he dropped it, still however, buying his furs direct and trading with many countries, more particularly China, at that time the best fur mart in the world. He also made large amounts by buying de¬ preciated government securities, which after¬ ward commanded a considerable premium. But his chief investment was the one which has founded the family greatness on a rock. Fore¬ seeing the immense growth of New York city, he bought large tracts on Manhattan Island far beyond the then city limits, taught his son to invest his accumulations in the same way, and established the system of handling them de¬ scribed under Astor Family. In 1827 he and

his son William, who had been his partner since 1815, withdrew from the China trade and formed the American Fur Company, chiefly managed by the great expert ; but a few years later he retired from business altogether, thenceforth devoting himself to his invest¬ ments, and devising, in consultation with others, plans for a public library suggested by Wash¬ ington Irving, — afterward the Astor Library, lor which he left $400,000 in his will. He made gifts and bequests to other objects ; among them $50,000 for a school for poor children and a home for the indigent aged in his birthplace, Waldorf, called the Astor House. He was much more than a great trader : he had a breadth of conception, a combined energy and patience of execution, a mastery of detail, a retentiveness of memory and a sagacity of judgment, which in the opinion of his inti¬ mates would have raised him to greatness in any line. He left two sons, William B. and John Jacob, and three daughters.

ASTOR, John Jacob, American capitalist and soldier, son of William B. ; b. New York, 10 June 1822; d. 22 Feb. 1890. He was edu¬ cated at Columbia University and at Gottingen ; he then took the full course at the Harvard Law School, and practised law for a year, solely to qualify himself for assisting in the management of the immense estate, one-

half of which later descended to him. In the Civil War he served on McClellan's staff, with the rank of colonel ; and was a devoted and hard¬ working military student. He always regarded this period as the best of his life, and attended the reunions of the Loyal Legion with zeal. Not only was he always a liberal giver to pub¬ lic institutions and charities, but he gave much personal time and devotion to them, especially to the Astor Library and Trinity Church; but he shrank from public notice. On his father's death in 1875 he received half of the estate, es¬ timated at considerably over $100,000,000 ; all which, with accumulations believed to have swollen it to some $200,000,000, he left to his only son, William Waldorf Astor. His wife, Charlotte Augusta Gibbs, was an active assistant in his charitable work, taking part in personal service as (<Sister Augusta,® incognito.

ASTOR, John Jacob, American capital¬ ist and inventor, fourth of the name, nephew of John Jacob the third, and son of William: b. Rhinebeck, N. Y., 13 July 1864; d. at sea (Titanic wreck) 15 April 1912. He was gradu¬ ated from Harvard in 1888. He was the man¬ ager of the Astor properties in America; a director in many banking, insurance and rail¬ road companies, and member of various clubs and social organizations. He built in 1897 a very costly hotel, the Astoria (named after the famous fur settlement of 1811), on Fifth ave¬ nue, New York, adjoining the Waldorf built by his cousin, William Waldorf, the two being now joined as the Waldorf-Astoria. Besides his business activities, he had strong individual faculties. He was an expert in marine mechanics, inventor of a bicycle brake, and a pneumatic road improver; and was a member of scientific and other intellectual societies. He wrote (A Journey in Other Worlds: a Romance of the Future) (1894). He was on Governor Morton's staff 1894-96, and in the Spanish- American War of 1898 was commissioned lieu- voc. 2 — 29

tenant-colonel of United States Volunteers, and served in the Santiago campaign.

ASTOR, William Backhouse, American merchant and capitalist, eldest son of John Jacob Astor: b. New York, 19 Sept. 1792; d. 24 Nov, 1875. He was trained in his father's busi¬ ness in the intervals of public school educa¬ tion; and the father is said to have remarked that (<William would never make money, but would keep what he had.® At 16 he was sent to Heidelberg University, and at 18 went to Gottingen, where he was tutored by Bunsen, afterward the great chevalier, Returning to New York in 1815, he was made a partner in his father's foreign shipping trade, especially culti¬ vating the Chinese field. The firm was John Jacob Astor & Son till 1827, when it

dissolved and both partners gave up the China trade to form the American Fur Company, of which William was president, but John Jacob the head manager till he withdrew from active business life a few years later. He was shortly followed into retirement by his son. By 1848 he had amassed a fortune of his own; besides receiving a legacy of half a million from his uncle Henry, and a gift of the Astor House from his father; the latter on his death in that year leaving him sole legatee save for minor bequests, the prop¬ erty being estimated at $20,000,000 to $30,000,- 000. His life thenceforth was spent in conserv¬ ing and developing this. He built nearly a thousand houses on his uptown lots, and was currently termed (<the landlord of New York.® He was also a heavy investor in other lines, notably coal and railroad stocks. He founded the Astor Library under his father's bequest, adding by gifts and bequests over $600,000 to his father's gift, giving much time to its ad¬ ministration from the completion of the build¬ ing in 1853 on his plans. His wife was the daughter of Madison's second Secretary of War; his sons were John Jacob and William, and the estate was shared between them.

ASTOR, William Waldorf, capitalist: b. New York, 31 March 1848; d. 1919. He was called to the United States Bar in 1875 ; was a member of the legislature of the State of New York 1878-81 ; and was United States Minister to Italy 1882-85. In 1890 he transferred his resi¬ dence to England and in 1899 became a natural¬ ized British subject. In 1892 he purchased the Pall Mall Gazette; in 1893 he established the Pall Mall Magazine, and in 1911 acquired The Observer. In 1912 he sold the first named journal, and in 1914 made a present of the Pall Mall Gazette and The Observer, with the build¬ ing in Newton street and its contents, to his son, Maj. Waldorf Astor, M.P. He is the author of (Valentino,ˆ a story of Rome (1886) ; ˆforzaP an historical romance of the 16th century in Italy (1889) ; (Pharaoh's Daughter, and Other Stories) (1889), besides numerous stories and articles that appeared in the pages of the Pall Mall Magazine. His benevolence is well known and his gifts to charities amounted to very considerable sums. Among those charities benefited by his gifts are The Hospital for Sick Children, Great Ormond street (to which he gave $250,000 in 1903) ; University College, London ; The Cancer Re¬ search Fund; Oxford University; Cambridge University; The National Society for the Pre¬ vention of Cruelty to Children; The British

Red Cross Society ; Gordon Memorial College, Khartum ; The Soldier

and Sailors' Families Association, and the Women's Memorial to Queen Victoria. His gifts to the war chari¬ ties included $125,000 to the Prince of Wales's National Relief Fund; a similar amount to Princess Louise's Officers' Families Fund; $200,000 to the British Red Cross Society; $25,- 000 to Queen Mary's Employment Committee, and a similar sum to the Lord Mayor's National Bands Fund. He gave $5,000 to King Edward's Hospital Fund annually from 1897 when the fund was started. On 1 Jan. 1916, he was offered and accepted a peerage of the United Kingdom under the title of Baron Astor of Hever Castle in the County of Kent. Hever Castle is well known as having been the residence of Anne Boleyn and the place at which her courtship by Henry VIII was car¬ ried on. It was purchased with the surround¬ ing estate by Mr. Astor in 1903. On 3 June 1917 Baron Astor was elevated to the rank of Viscount.

ASTOR FAMILY, a famous American family representing one of the three or four greatest private properties in the world. A family in the Old World sense, — a territorial aristocracy, impossible to destroy, and fortified with legal immunities and privileges, — can hardly be founded in America ; .but the Astors have approached it as nearly as our institutions will admit. They form a group of immense hereditary real-estate owners, with holdings so solidly based and well distributed in the metrop¬ olis of America that no apparent catastrophe save a failure of heirs could extinguish it; and though originally springing from mercantile business, removed by some three-quarters of a century from its actual conduct. For many years they were known as (<the landlords of New York,® and the best of landlords, prompt, just and courteous ; they still probably form the largest set of individual real-estate holders. The family is also connected with notable municipal charities and public foundations. See Astor, John Jacob (1763-1848) ; Astor, Toh.n Jacob (1822-90) ; Astor, John Jacob (1864-1912) ; Astor, William Backhouse (1792-1875) ; Astor, William Waldorf (1848-1919).

ASTOR LIBRARY. See New York Public Library.

ASTOR PLACE RIOT, in American his¬ tory: a riot on the evening of 10 May 1849, in Astor Place, New York. It was an attempt to drive the English actor, William Charles Macready (q.v.) from the stage, and grew out of a London tour of Edwin Forrest (q.v.), in which he played Virginius and Richelieu with great success till Macready bought the acting rights for himself, though he had personally treated Forrest with kindness. Forrest then essayed Macbeth, but it was unsuited to his style and presence, and he was hissed. He at¬ tributed this to Macreadv's machinations, and when Macready four years later

announced (Macbeth) in the Astor Place Opera House, a crowd of Forrest's partisans gathered early in the evening before the theatre, and waiting till the performance had begun, attempted to force a way inside and put a stop to it. The police were powerless and sent for the military; the Seventh Regiment (New York militia) came up, and was assailed by the mob with showers

of brickbats and stones. Before the fray was ended, 34 rioters were killed, a great number wounded and 141 of the regiment injured by the missiles. The mob was successful in its purpose, however. Macready had to cancel his engagement, conceal himself in a private house for a couple of days, and then travel secretly to Boston, whence he sailed for England. Consult Barrett, (Edwin Forrest) (1882).

ASTORGA, Emanuele d', an Italian composer: b. Palermo, 11 Dec. 1681; d. 21 Aug. 1736. He was educated in a monastery in As- torga in Spain, from which he afterward took his name. A (Stabat Mater,) which he is said to have written in London, is considered the best of his works, and is still highly regarded.

ASTORGA, as-tor'ga, a city in northwest Spain, province of Leon, the Asturica Augusta of the Romans. It figured prominently during the Peninsular War; was taken by the French after an obstinate defense, 1810; and retaken by the Spaniards, 1812. It is the see of a bishop. Pop. 7,600.

ASTORIA, Ore., city, port of entry and seat of Clatsop County, on the Columbia River, nine miles from its mouth, and 101 miles by the Astoria & C. R. Railroad from Portland. Sev¬ eral foreign steamship lines touch here, the largest vessels coming up to its five miles of water frontage through the deep, broad channel dredged in the bar at the river mouth. Its salmon fishing and canning industries are among the greatest in the world : several hun¬ dred boats go out to the fishing grounds on the bar every afternoon during the season of about 100 days, some 1,500 in all being employed; and the canneries utilize some $2, 000,000 capital, and turn out about 15,000,000 cans of salmon a year. It has also subsidiary can manufactories and iron works, great lumber works from the vast forests of the Pacific slope, flouring mills, breweries, etc. The United States census of 1914 recorded 57 manufacturing establishments of factory grade, employing 1,375 persons, of whom 1,172 were wage earners, receiving $866,000 annually in wages. The capital in¬ vested aggregated $5,293,000, and the year's pro¬ duction was valued at $4,587,000: of this, $1,- 836,000 was the value added by manufacture. The city has a very large export trade in the special

products of Oregon and Washington — lumber, wheat, oats, live stock, wool, potatoes, apples, etc. Among its buildings, the most notable are the United States custom-house, the post office, Saint Mary's Hospital (R. C.), and Fort Clatsop dating from its foundation by the Lewis and Clarke expedition in 1805. For the founding of Astoria in 1811, see Astor, John Jacob, and consult Irving, W., (Astoria, or Anecdotes of an Enterprise beyond the Rocky Mountains) (Philadelphia 1836). On its seizure by the English in the War of 1812, they re¬ named it Fort Saint George; in 1818 it was re¬ stored to the United States, though occupied till 1845 by the fur stations first of the North¬ west Company, then of the Hudson Bay Com¬ pany with which the former consolidated. It received a citv charter in 1876. Pop. (1910)

9,599; (1920) 14,027.

ASTORIA, or Anecdotes of an Enter¬ prise Beyond the Rocky Mountains, a ram¬ bling work by Washington Irving (1836). It comprises stories of expeditions by land and

sea, and as a chapter of Far West history, does not lose its value by the lapse of time.

ASTRABAD, as'tra-bad', Persia, a town about 30 miles east of the Caspian Sea. It car¬ ries on a trade in horses, sheep, cotton, silk, woolen fabrics, etc., and is connected by cara¬ van with Afghanistan and is the seat of a Rus¬ sian consulate. Pop. estimated at about 15,000 to 20,000.

ASTRZEA, The Divine, a name applied to the English novelist and dramatist, Mrs. Aphra Behn, a Jewess, who was noted for the coarse¬ ness of her plays. (<The stage how loosely doth Astriea tread.)J She was the first English female novelist.

ASTRZEA, in mythology, the daughter of Zeus and Themis, and goddess of justice. In the age of gold she was a regular inhabitant of this world; in the age of silver an occasional visitor; and in the age of brass, when men be¬ gan to forge weapons of war, fled to the skies, where she is seen in the Zodiac, forming the constellation Virgo. She is usually represented with scales in her hand and a crown of stars on her head.

ASTRAGAL, in architecture, a small semi-circular molding, with a

fillet beneath it, encircling a column and separating the shaft from the capital.

AS'TRAGALOMAN'CY (Greek astra- galos, in the plural — dice, and manteia— divi¬ nation), a pretended divination performed by casting down dice with marks corresponding to letters of the alphabet, and observing words thus formed. It was practised in the temple of Hercules, in Achaia.

ASTRAGALUS. See Foot.

ASTRAGALUS, Milk Vetch, a genus of more than 1,000 species of hardy leguminous herbs and under-shrubs which, except in Australia where they have not been found, are of world-wide distribution on dry soils. A. gumviifer and other species yield tragacanth (q.v.) gum. Certain species native to the west¬ ern United States called crazy weeds (q.v.) are considered responsible for crazy disease of stock. The leaves are usually pinnate ; the flowers arranged in racemes, white or purple. A few native and foreign species are grown from seed for ornamental purposes. They succeed best on dry, porous soil in sunny situa¬ tions.

ASTRAKHAN, a name given to sheep¬ skins with a curled woolly surface obtained from a variety of sheep found in Bokhara, Persia and Syria, and also to a rough fabric with a pile in imitation of this.

ASTRAKHAN, as'tra khan', a government in the southeast of European Russia, on the Caspian ; with an area of about 91,042 square miles. It consists almost entirely of two vast steppes separated from each other by the Volga, and forming for the most part arid sterile deserts. The livestock consist chiefly of sheep of the broad-tailed species. The chief employ¬ ments are pasturage and fishing — the former occupying the rural and nomadic tribes, and the latter the tribes on the Caspian coast and the banks of the Volga. The extraction of salt from the lakes is also a source of employment. The population is extremely diverse — consist¬

ing of Kirghiz, Kalmucks, Tatars, Cossacks, Armenians and Jews — and numbered in 1914

1,315,900.

ASTRAKHAN, the capital of the Russian government of the same name. It is situated on an island in the Volga, about 60 miles from the Caspian Sea, is surrounded by a wall and consists of crooked, dirty, but broad streets, with irregular lines of houses. The communi¬ cation

with the opposite banks of the river is maintained by numerous bridges. It is the see of Greek Catholic and Armenian archbishops, and there are numerous sacred edifices, includ¬ ing mosques and an Indian temple. The most important edifice is the cathedral, of a rec¬ tangular form, with four small gilt and painted cupolas on the roof, and a large one in the centre. The city gives its name to a kind of fur, the skin of new-born Persian lamb, and its imitation in rough woolen coats. The manu¬ factures, consisting of silks, cottons, woolens, shagreen skins, morocco leather and soap, are increasing in extent. The fisheries, shipbuild¬ ing and tanning are the staple industries. Im¬ mense quantities of fish, caviar, and isinglass are exported to foreign countries. In the fish¬ ing season from 20,000 to 30,000 persons con¬ nected with the fisheries frequent the city. It is the naval station of the Caspian fleet; is the most important port of the Caspian, and has regular steam communication with the principal towns on the shores of that sea. The develop¬ ment of the petroleum fields at Baku and the opening of the Trans-Caspian Railway have in¬ creased its importance as a centre of trade be¬ tween western Europe and central Asia. The city fell into the hands of Russia in 1554. Pop.

(1913) 162,482.

ASTRAL BODY, a term used by Theos- ophists. According to their belief the soul has two bodies, one of attenuated matter which is sometimes able to carry the spirit away from the material body during sleep, and which may survive the death of the material body for some time. See Theosophy.

ASTRAL SPIRITS, spirits believed by the Greeks and Orientals to inhabit the heavenly bodies or the aerial regions. In the Middle Ages they were variously conceived as fallen angels, souls of departed men or spirits originating in fire, and belonging neither to heaven, earth nor hell. Paracelsus regarded them as demoniacal in character.

ASTRAPOTHERIIDZE, a family of hoofed mammals, fossil in the Santa Cruz beds of Miocene Age in Patagonia, which had a rude resemblance to the primitive rhinoceroses. Their most remarkable feature was a long, trunk-like proboscis.

ASTRINGENTS. Substances that have the property of precipitating albumin and other proteids act as astringents. When used on mucous membranes they contract the tissues, diminish the blood supply, decrease the mucus and modify the sense perceptions in the part. In the mouth they cause the well-known sensa¬ tion of puckering. Their action is purely local. Vegetable astringents all contain tannic acid, to

which substance their action is due. Nearly all of the mineral salts are astringent when used well diluted with water. In con¬ centrated solution their coagulant action is so

pronounced as to cause death of the tissue (caustic). The astringents are particularly serviceable in stimulating atomic mucous mem¬ branes, causing them to secrete less mucus. They are thus useful in chronic diarrhoeas, in leucorrhcea and in mucous discharges from other parts of the body. The most serviceable of the vegetable astringents is tannic acid, or its compounds, tannalbin, tannigen and re¬ lated bodies. Others used are rhatany, catechu, kino, logwood and white-oak bark. Of the mineral salts, solutions of copper sulphate, zinc sulphate, lead acetate, nitrate of silver, sulphate and chloride of iron, alum, sulphuric, hydrochloric, nitric acid, and the aluminum salts are the most useful.

ASTROCARYUM, a genus of about 30 species of tropical American pinnate¬ leaved palms noted for their profuse sharp spines sometimes a foot long. A. murumuru , the murumuru palm, a common species in the lower Amazon region, seldom attains a height of more than 20 feet. It bears an edible, melon-flavored, musky-scented ovoid fruit about an inch long, the pulp of which is highly prized as food for man and cattle. Hogs crush the seeds, which are almost as hard as vegetable ivory, and fatten well upon them. A. tucuma, the tucuma palm, reaches a height of 30 to 40 feet, and has very regularly ar¬ ranged spines, bears an edible, globular fruit, and is native of the same region as the pre¬ ceding species. A. vulgare is a taller-growing palm than the above. The unexpanded leaves furnish a strong fibre, for which the tree is often cultivated where it is not native. To obtain this fibre the terminal bud is cut and the epidermis of the delicate leaves carefully peeled in ribbon-like strips that when dry are twisted into fine, strong, durable threads used for making twine, bowstrings, hammocks, fish¬ nets, etc. The fibre of older leaves is coarser, tougher and stronger and is used for cordage; the petioles of the young leaves are used for making into baskets and hats. This species, commonly known as the tecum palm, is distinct from the tucuma palm noted above, but was confounded with it by Martius, who pictured the tucuma as the fibre-bearing species. Consult Wallace, (Palm Trees of the Amazon } (1853). Several species, are cultivated in greenhouses for ornamental purposes and specimens as large as 10 feet tall often bear fruit. For culture, consult Bailey, (Standard Cyclopedia of

Horticulture) (1914).

ASTROLABE (from Greek astron, a star, and lambano, I take), the name given by the Greeks to any circular instrument having one or more graduated circles. In modern astronomy this instrument is no longer used, because wholly superseded by the sextant. The first application of the astrolabe to navigation was made by the physicians, Roderick and Joseph and Martin Behaim of Niirnberg, when John II, King of Portugal, desired them to in¬ vent a method of preserving a certain course at sea. Angles of altitude were found by sus¬ pending the astrolabe perpendicularly.

ASTROLOGY, the science which claims to foretell future events, especially the fate of men, from the position of the stars. Originally, that is, among the Greeks and Romans, the word

had the meaning of (<astronomy,® and, as in the case of alchemy and chemistry, the pseudo¬ science and the real science had the same origin. In early times, when the earth was regarded as the centre of the universe and as that to which all else was somehow tributary, it was a not unnatural hypothesis that the changing con¬ figurations of the heavenly bodies might be indicative of human destiny, or might influence human character. Hence, the Chinese, the Egyptians, the Chaldaeans, the Romans and most other ancient nations, with the exception of the Greeks, became implicit believers in as¬ trology. It was partly the cause and partly the effect of the prevalent worship of the heavenly bodies. The ˆstar-gazers,® sarcastically referred to in Isa. xlvii, 13, were perhaps astrologers; so also may have been what are called in the margin (<viewers of the heavens® ; but the Hebrew word rendered ((astrologers® in Dan. i, 20 ; ii, 2, 27 ; iv, 7 ; v, 7, is a much vaguer one, meaning those who practise incantations, with¬ out indicating what the character of these in¬ cantations may be. The later Jews, the Arabs, with other Mohammedan races, and the Chris¬ tians in mediaeval Europe were all great culti¬ vators of astrology. Some of the greatest as¬ tronomers, among whom was John Kepler, who knew very much better, were accustomed to ((cast horoscopes,® and to receive large fees for so doing. The ordinary method of procedure in the Middle Ages was to divide a globe or a planisphere into 12 portions by circles running from pole to pole, like those which now mark meridians of longitude. Each of the 12 spaces or intervals between these circles was called a ((house® of heaven. The sun, the moon and the stars all pass once in 24 hours through the portion of heavens represented by the 12 (<houses.® Every house has one of the heavenly bodies ruling over it as its lord.

The houses symbolize different advantages or disadvantages. The first is the house of life; the second, of riches; the third, of brethren; the fourth, of narents ; the fifth, of children ; the sixth, of health ; the seventh, of marriage ; the eighth, of death; the ninth, of religion; the tenth, of dignities; the eleventh, of friends; and the twelfth, of enemies. The houses vary in strength, the first one, that containing the part of the heavens about to rise, being the most powerful of all ; it is called the ascendant, while the point of the ecliptic just rising is termed the horoscope. The important matter was to ascer¬ tain what house and star was in the as¬ cendant at the moment of a person's birth, from which it was deemed possible to augur his for¬ tune. It followed that all people born in the same part of the world at the same time ought to have had the same future, an allegation which experience decisively contradicted. Even apart from this, astrological predictions of all kinds had a fatal tendency to pass away with¬ out being fulfilled ; and when, finally, it was dis¬ covered that the earth was not the centre of the universe, but only a planet revolving around an¬ other body, and itself much exceeded in size by several of its compeers, every scientific mind in Europe felt itself unable any longer to believe in astrology, which has been in an increasingly languishing state since the middle of the 17th century. It still flourishes, however, in Asia and Africa, and is a means of livelihood to

many charlatans who prey upon the ignorant classes in all countries.

ASTRONOMICAL CLOCKS. See

Astronomy, Practical.

ASTRONOMY. Astronomy is that branch of science which treats of the heavenly bodies — including practically all the bodies of the universe. The great advance which our times have witnessed in the methods of re¬ search has made it one of the most progressive of the sciences, while it is, at the same time, the oldest of all. The vast extent of its field, including the entire universe within its bounds, leads to its having a number of different branches. There is, first, a branch which em¬ braces our general knowledge of the heavenly bodies, their motions, aspects and physical con¬ stitution. This branch is commonly termed descriptive or general astronomy. It is now recognized as having two divisions, one relating principally to the motion, mutual relations and general aspects of the heavenly bodies; the other to their

physical constitution, considered individually. The former division is sometimes termed astrometry, because it is principally con¬ cerned with measurements of position, motion, mass, etc. The other branch is termed astro¬ physics, and is that which has received its greatest development in recent times. There is also a branch which teaches the methods of observing the heavenly bodies, including the in¬ struments used in observation and measure¬ ment, and the principles governing their use, as well as the practical computations incident thereto. This branch is termed practical as¬ tronomy. Another branch is the mathematical one, which determines the orbits and motions of. the heavenly bodies by deductive methods, taking as a basis the facts of observation and the laws of motion, especially that of gravita¬ tion. This branch treats of the orbits of the heavenly bodies and of the methods of comput¬ ing the effects of their mutual attraction. It is commonly termed theoretical astronomy, while the more purely mathematical theory is known as celestial mechanics.

The subject of astronomy is treated in the present work on the following plan: We begin with a brief but comprehensive survey of the universe, referring to special articles — Stars, Universe, Nebulae, Solar System, etc., for de¬ tails. This survey will be followed by reviews of Practical Astronomy, Theoretical Astron¬ omy and of the historical development of the science.

Descriptive Astronomy.— Considered as to their nature, the heavenly bodies may be di¬ vided into two great classes ; the one, incandes¬ cent bodies which shine by their own light ; the other, opaque bodies which are visible only by reflecting the light of some incandescent body in their neighborhood. Examples of the first class are the stars which stud the heavens at night ; examples of the second are the planets, of which our earth is one. From the very na¬ ture of the case, little can be learned of the possible number of opaque bodies which may exist in the universe. There may be some rather uncertain ground for inferring that they are less massive and less numerous than the incandescent bodies ; but it is sometimes sup¬ posed that they may far outnumber the latter without our being aware of the fact. The.

stars are scattered through the wilderness of space at distances which baffle all our powers of conception. Light moves with such speed that it would make the circuit of the earth seven times in a single second. But the cases are rather exceptional when a star is so near one of its neighbors that light would not take years to travel over the distance which separates them. Indeed, the only known exceptions be¬ long to the class of double or multiple stars — twro or more such bodies forming a system by themselves. There is only one star so near us that

its light would reach us in four years, and the same is probably true of most other stars. That the universe of stars extends to distances which light would require several thousand years to travel is certain ; but no well-defined limit has yet been set to its extent. Our sun is one of the stars, and is the one of which we know most because of our proximity to it. It is the centre around which eight great planets and a number of other bodies perform their revolutions. On one of these great planets, the third in the order of distance, we dwell. Our knowledge of the heavens is largely con¬ ditioned by our residence on this planet. We see the other planets by the light of the sun, which they reflect. They present to the naked eye the appearance of stars; and it is only when scrutinized with the telescope that they are found to have a measurable apparent size. Vast indeed is their distance from the sun when measured by our standards. Yet, the dimensions of our solar system are very small when compared with the distance which sepa¬ rates the stars. Light passes from the sun to the outer planet, Neptune, in about four hours, while, as we have said, it requires years to reach any star. The nearest star is therefore thousands of times farther than the most distant planet. A most interesting question is whether other stars have systems of planets revolving round them, as our sun has. This is a question which it is impossible to answer conclusively. Such planets would be absolutely invisible through the most powerful telescope that man can ever hope to construct. Yet certain theo¬ retical considerations seem to render it prob¬ able that many, and perhaps the majority, of the stars have planets revolving around them. It is generally held by astronomers that all stars were originally nebulae ; investigation shows that if the nebula was of a more or less heterogeneous structure it will develop, at least usually, into a central sun attended by a system of planets (see Cosmogony). As by far the greater part of the nebulae of the sky are of a spiral structure, and hence far from haying a uniform density, it is indicated that this is the usual condition of these objects; it is thus rendered probable that at least many of the stars are the centres of systems which more or less closely resemble our own. In special cases evidence on the subject is afforded by the spectroscope, which shows that great numbers of stars really have one or more dark bodies revolving around them. But, in order to be observable with the spectroscope, these bodies must be vastly larger than the planets which revolve round our sun. The existence of a planet like that on which we dwell could not be determined even with the best spectroscope.

The bodies of the solar system are bound together by the law of gravitation. Were it

not for the attraction of the sun each planet would fly off in a straight line through space. Through the attraction of the sun all the planets are kept in their several orbits. Every con¬ sideration leads us to believe that gravitation extends from one star to all the others, but diminishing as the inverse square of the dis¬ tance. Revolving double stars show that sys¬ tems of two stars in proximity to each other are subject to the law of mutual attraction and hence that gravitation is not peculiar to our solar system, but operates throughout the entire visible universe.

All of the stars are in motion, some of them with exceedingly high velocities, but though there are several instances of streams of stars, the members of which are moving along parallel paths with the same velocities, in nearly all cases the stars are found to be moving indif¬ ferently in any direction and with different velocities. Though we do not doubt that their motion is fully determined by the combined pull upon them of all of the bodies which com¬ pose our universe, the nature of the resulting motion in any particular case is necessarily very complicated. Attempts have been made from a study of the actual motions observed to estimate the total mass of our universe and so to form an estimate of the mass of the dark suns and other opaque matter which is invisible to us. But the result is naturally subject to very great uncertainty. It will require the ob¬ servations of many centuries, and perhaps of many millenniums, before the total mass of matter in our universe and its distribution can be determined in this way.

The three fundamental facts which deter¬ mine the great phenomena of astronomy, as we observe them in the course of our lives, are (1) the globular form of the earth on which we dwell; (2) its diurnal rotation on its axis; (3) its annual revolution round the sun. The first of these facts is so familiar to all that we need not discuss it. Out of it grow the general phenomena of the sky. The heavenly bodies surround us in every direction. They are really as numerous by day as by night, only in the former case they are blotted out by the brightness of the sky. To imagine the heavens as they really are we must fancy stars as al¬ ways visible in every part of the sky. Then, by day, we should see the sun among the stars, and perhaps the moon also. Mere observation of a heavenly body gives us no idea of its dis¬ tance. By looking at a star we cannot tell whether its distance is to be measured by hun¬ dreds of miles, by millions or by thousands of millions, which it actually is. Hence, all the heavenly bodies appear to us to be at the same distance, as if they were set upon the interior

surface of a stupendous sphere in the centre of which we seem to be placed. This imaginary form is called the celestial sphere ; it is one of the most ancient conceptions of astronomy, and it is used in the science to the present day to represent the appearance of the heavens. It is divided into two hemi¬ spheres, a visible and an invisible one. The visible hemisphere is the half which is above the horizon, which we call the sky and can always see, except so far as obstructions or inequalities of the ground may prevent. The other half is below the horizon, and is hidden from our view because the earth is opaque.

Were the latter transparent, we should see the heavenly bodies in every possible direction. The rotation of the earth on its axis pro¬ duces the phenomena of day and night, and the apparent rising and setting of the heavenly bodies. This is known as the diurnal motion. The latter may be considered in two aspects, either as the real rotation of the earth on its axis, in a direction always toward the east, or as an apparent rotation of the heavens in the opposite direction, due to our being uncon¬ scious of the motion of the earth. In conse¬ quence of the diurnal motion the celestial sphere, seeming to our eyes to carry the heav¬ enly bodies on its interior surface, appears to us to nrake a daily rotation on its axis. The two opposite points of the celestial sphere situated on the prolongation of the earth's axis are called the celestial poles. On these poles as pivots the celestial sphere seems to turn. They are called north or south ac¬ cording to the direction. Their apparent po¬ sition in the sky depends on the latitude of the place where the observer is situated. A heavenly body situated at either pole does not seem to have any diurnal motion. This is nearly the case with the pole star, which dwell¬ ers north of the equator can always see at an altitude above the northern horizon equal to their latitude. A voyager into the southern hemisphere sees the pole star set when he crosses the equator. Then, the south polar star would be visible if there were one. But it happens there is no bright star very near the southern prolongation of the axis. In the United States, say from 30° to 45° of latitude, the pole star is at a corresponding altitude above the horizon, and all the stars in its neigh¬ borhood appear to make a diurnal rotation round it, without changing their form or posi¬ tion, and without ever setting. Any one who chooses can verify this fact by noting the ap¬ pearance of the northern sky about the end of twilight, and then looking at it again tw^o or three hours later. He wdll then see that stars below the pole have moved toward the east ; those on the east side of it have risen higher, and those on the wrest side are low-er, while those above have moved over toward the wrest. For us, therefore, the sphere of the heavens may be divided into three parts ; a circle round the north celestial pole within w'hich stars never

set ; a corresponding circle round the south pole, the stars in which never rise above our horizon, and a broad middle region where they rise and set.

To represent the positions of the stars, as¬ tronomers imagine circles on the celestial sphere corresponding to the circles of longitude and latitude on the earth. As we imagine north and south meridians drawn on the earth from one pole to another, to measure terrestrial longitudes, so we imagine in the heavens, cir¬ cles drawn on the sphere from the north celes¬ tial pole to the south one. As the longitude of a place on the earth is expressed by the angle which its meridian makes wdth the merid¬ ian of Greenwich, so the corresponding quan¬ tity for a star is the angle vdiich the circle through it makes with a certain prime merid¬ ian on the celestial sphere. This quantity for the stars is not called longitude, but right ascension, and the celestial meridians -which de¬ termine it are called hour circles.

Rotunda Panel in the State Education Building, Albany, JT. Y. Mural Painting. Copyright by Will H. Low

ASTRONOMY AND GEOGRAPHY

Minerva, goddess of wisdom, encircles with her arm a young child, while through the telescope she directs his gaze to the “ clear night of stars ” spread above him; at sight of which the child clasps his hands with a gesture of wonder. Near at hand a seated youth, holding the symbolic lamp of research, is bent over a large globe following the path of man over the traveled earth. Above and behind the terrace on which these figures are seated rises the facade of the library of Columbia University, New York

Six-inch steel Meridian Circle, U. S. Naval Observatory, Washington Steel Position Micrometer

ASTRONOMICAL INSTRUMENTS

In the same way as we have on the earth a great circle spanning it, everywhere equally distant from the two poles, and called the equa¬ tor, so we imagine a circle spanning the heavens, everywhere equally distant from the north and south celestial poles, which is called the celestial equator, or the equinoctial. At any one place this circle will

be apparently fixed in its position, always intersecting the horizon at its east and west points, and, in our lati¬ tudes, intersecting the meridian south of the zenith by a distance equal to our distance from the equator. For example, to a dweller in latitude 40°, the highest point of the celestial equator will be 40° from the zenith, and 50° above the horizon. From this point it spreads toward the east and west until it intersects the horizon as just stated. As a traveler journeys south, the position of the celestial equator be¬ comes more and more nearly vertical ; at the equator it rises vertically and passes through the zenith ; south of the equator it passes north of the zenith.

As the latitude of a place is measured by its angular distance from the equator north or south, so the corresponding number for a star is measured by its mean angular distance from the celestial equator, whether north or south. This is called the star's declination. Thus the right ascension and declination of a star deter¬ mine its position on the celestial sphere just as longitude and latitude determine the position of a city on the earth. All star charts are constructed with this system of circles as a basis ; in all modern star catalogues it is the right ascension and declination that are tabu¬ lated.

We now have to consider the effect of the annual motion of the earth round the sun. If we watch the heavens at a certain hour every evening, say eight o'clock p.m., we shall find that the stars are every night a little farther advanced in their diurnal motion then they were the night before. If they are in a certain posi¬ tion at eight o'clock on one evening, they will pass the same position four minutes before

eight on the next night, eight minutes before

eight on the next night, and so on. In the

course of a year these continually accumulat¬ ing changes make up the whole 24 hours, so that a star which is in the zenith this evening will be on the meridian at eight o'clock in the

morning six months hence, while at eight in the evening it will be at its greatest distance below the horizon. If we could see the sun among the stars, what we should notice would be that our luminary always forges a little farther east day after day, and in the course of a year seems to make a complete revolution among the stars. The result is that while the sun rises and sets 365 times, the stars rise and set 366 times. Since the latter are always in the same absolute direction, and seem to rise and set in consequence of the earth's rotation on its axis, we infer that the direction of the sun from the earth goes through a

complete revolution in the course of a year. In other words, the sun appears to us to make an annual revolution around the celestial sphere among the stars. Since the time of Copernicus it has been known that this appearance is due to the actual revolution of the earth around the sun.

The apparent path of the sun among the stars can be mapped out by astronomical ob¬

servation. When carefully observed, it is found to be a great circle of the sphere, called the ecliptic. We thus have two imaginary cir¬ cles of fundamental importance spanning the heavens. One is the celestial equator, the other the ecliptic in which the sun seems to travel. These circles do not coincide, but intersect each other at two opposite points at an angle of 23ˆ4°. This is called the obliquity of the eclip¬ tic. The result of it. is that during one-half the year the sun is south of the celestial equa¬ tor, and during the other half is north of it. In the northern half of its course we have summer in the northern hemisphere and winter in the southern; in the southern half we have summer in the southern hemisphere and winter in the northern. Thus the changing seasons are due to the obliquity of the ecliptic. If the latter coincided with the equator, we should have no such annual round of seasons as that with which we are familiar.

There are two opposite points on the celes¬ tial sphere at which the equator and the eclip¬ tic intersect. These are called equinoxes be¬ cause, when the sun crosses them, the days and nights are equal all over the earth. That equinox which the sun passes toward the north is called the vernal equinox, because the crossing marks spring in the northern hemisphere. The other is called the autumnal equinox for a similar reason. Observations continued through many centuries show that the equinoxes are not fixed, but travel slowly along the ecliptic at such a rate that they make a complete revolution from the east toward the west in about 26,000 years. This motion is called the precession of the equinoxes. Its existence shows that the direc¬ tion of the earth's axis is slowly changing, and hence the position of the celestial pole is chang¬ ing also. Since the equator is defined by the condition that it spans the heavens midway between the celestial poles, this change in the poles causes a corresponding change in the equator.

The actual motion of the pole is at the rate of about 20" per year. The smallest visible object that can be seen with the naked eye to be anything else than a point of light subtends an angle of about V or 60". It follows that the pole moves through this smallest visible space in three years. In a long life of 90 years the change would be about

equal to the diameter of the sun or moon. The centre of the motion is the pole of the ecliptic which is distant from that of the equator by about 23ˆ4°. Owing to the smallness of the obliquity, the equinox travels along the ecliptic at more than twice the rate of the pole, or about 50" per year. It has therefore changed about 30° since its motion was first noticed, about 2,000 years ago. It is found that the planets describe their course around the sphere in circles which do not de¬ viate greatly from the ecliptic. A belt of the heavens extending 8° on each side of the eclip¬ tic will include all the planets visible to the naked eye. This belt is called the zodiac. Be¬ ginning at the vernal equinox it is divided into 12 portions, of 30° each, known as the signs of the zodiac. In former times great stress was laid upon the entrance of the sun into these several signs, which entrances occurred about a month apart. They now occur about the 20th of every month. In our times, when the super¬ stitions connected with this subject have van-

ished, the entrance of the sun into the signs is no longer of importance (see Zodiac). There are also 12 constellations, beginning with Aries, and ending with Pisces, which have the same names as the signs of the zodiac, and are scattered along its course. Two thousand years ago these constellations coincided pretty closely with the signs. But now, in consequence of the precession of the equinoxes, the two no longer correspond. The sign Aries is now lo¬ cated in the constellation Pisces; the sign Tau¬ rus in the constellation Aries, etc.

The ecliptic, together with circles drawn parallel to it on the celestial sphere, is fre¬ quently used as a reference circle to indicate the positions of stars and planets, the circles drawn through the poles of the ecliptic then taking the place of the hour circles already described. The co-ordinates of the object in this system are known as Longitude and Latitude, respectively, but it is to be noticed that these are not analogous to latitude and longitude on the earth since the equator is no longer the fun¬ damental reference circle. This system is em¬ ployed almost exclusively in orbit work and in celestial mechanics, but it is inconvenient for the purposes of practical astronomy.

The Time of Day. — It is in its relation to times and seasons that the results of astro¬ nomical science come into every household. Our daily round of activity and rest is deter¬ mined by the earth’s rotation on its axis, alter¬ nately bringing us under the sun, and then carrying us around until it is hidden from our sight. A century ago people used

to set their clocks at 12 when the sun crossed the meridian. This moment, being the middle of the day, is noon properly so-called. But if a good clock is exactly regulated, and kept going all the time, it will not show noon at the true time. The reason is that the intervals of time between one noon and the next are not exactly the same. See Time.

Bibliography. — The most extended gen¬ eral treatise on astronomy for the use of the general reader is Chambers' (Astronomy) (3 vols., 8vo., London) ; briefer is Newcomb's (Astronomy for Everybody) ; Ball, (Story of the Heavens) ; Flammarion, (Popular Astron- omy' ; etc.

Simon Newcomb.

Revised by Eric Doolittle, Professor of As¬ tronomy and Director Flower Astronomical

Obsei'vatory.

ASTRONOMY, History of. We may

recognize four great periods in the history of astronomical knowledge. The first and most ancient is that in which no accurate observa¬ tions were made, but in which men had a gen¬ eral knowledge of the apparent annual revolu¬ tion of the sun, of the constellations and of the relation of the sun's annual course to the changes of the seasons. The next period was that of the celebrated Alexandrian school, so-called because Alexandria was the principal seat of its activity. This period was distin¬ guished as that at which the first attempts were made at precise observation and measurement. It began three or four centuries before Christ. It is very remarkable that, at so early a period as this, men to whom all our modern science was completely unknown, had so far advanced in astronomical observation as to measure the

obliquity of the ecliptic, determine the times of the equinoxes and detect their precession. The latter was done by a comparison of two methods of determining the length of the year, as measured by the sun's apparent revolution around the celestial sphere. Timocharis, who flourished about 300 b.c., determined the mo¬ ment at which the sun crossed the equinox by means of an east and' west line on the level sandy plains of Egypt, showing exactly where the sun rose or set. The day on which the point of setting in the west was exactly oppo¬ site that of its rising in the east marked the equinox, which could thus be determined within a few hours. The annual course of the sun can

also be determined by the time which it takes to return to the same position among the stars after an annual apparent revolution. As the stars and sun cannot be seen at the Same time, the adopted plan was to measure the dis¬ tance of the sun from the moon before sunset, and after dark to measure the distance from the moon to some bright star. Allowing for the motion of the moon during the interval, the distance of the sun from the star would be known. In this way the curious discovery was made that the year as determined from the equinoxes was several minutes shorter than that determined from the stars. This discov¬ ery was made by Hipparchus through a com¬ parison of his observations with those of Ti¬ mocharis about 150 years before.

Eratosthenes, who flourished just before Timocharis, was enabled to estimate the size of the earth. This he did by noting that at the ancient town of Syene, in central Egypt, the sun was exactly in the zenith at the time of the summer solstice, so that the gnomons of the sun-dials cast no shadows, while at Alex¬ andria the sun was 1/50 of a circumference south of the zenith. He therefore concluded that the circumference of the earth was 50 times the distance between Alexandria and Syene. The latter being 5,000 stadia, it followed that the circumference of the earth was 250,000 stadia. Although many different stadia were in use, the records of Pliny show that the stadium of Eratosthenes must have been a length of very approximately 516.73 feet; the resulting diameter of the earth is 7,788 miles, — a very fair approximation.

Hipparchus was considered as the greatest astronomer of antiquity. He made more ac¬ curate observations than any of his predeces¬ sors upon the courses of the sun, moon and planets, determining their times of revolution with extraordinary exactness. Unfortunately none of his works survive, and our knowledge of them is derived mainly from Ptolemy's (Al¬ magest. >

The celebrated Ptolemy (q.v.), besides be¬ ing a practical astronomer, was accomplished as .a musician, a geographer and a mathe¬ matician. His most important discovery in astronomy was the evection of the moon. He also was the first to point out the effect of refraction. He was the founder of the false system, known by his name, and which was universally accepted as the true theory of the universe until the researches of Copernicus exploded it. The Ptolemaic system placed the earth, immovable, in the centre of the universe, making the entire heavens revolve round it in

COMPARATIVE DISTANCES OF THE PLANETS . I FROM THE SUN.

SATUR*

COMPARATIVE SIZE OF THE SUN AS SEEN \ FROM THE PLANETS.

Circumference of the Sun, 2,764,600 mile* ; the 'Diameter , 882.O00 mi let.

Halley '8 Come.t

VENUS

Brorsen’s Comet

Arrest’s Comet'

Halley' t Comet revolves in 76 years v PnJee's, in 3 years, 4 months; \ ~Biela's, in 6 years, 9 months ; \ and Faye's, in 7,Wj years.

fUO BA,

PAIL AS

-

The Sun's diameter is equal to HIM times the diameter of the Barth. It 9 j circumference embraces a volume of matter about 1,300,000 times larger than the Earth and more than 500 times greater than that of all the Planets ■ The Sun's mean distance is equal to 12,000 times the diameter of the Earth or about 95,000,000 milet

Juno, and Vesta, first observed 1 near the commencement of the 1 present century, and upwards of] a hundred others, discovered since! 1845, are known as Minor Planets\ o* -Asteroids. Their dimensions , are much less than those of the other Planets, the largest not beingl 230 miles in diameter, while »ianu are less than 50 miles . Their Or- j bits are much more elliptical than I

VESTA

JUNO

PALLAS

JUPITER

SATURN

URANUS

The Solar System (otisistsit\ of the Sun, \ from vhich it takes its name • the Planets, and .. /)T\ unknown number o/sˆl Comets. Of the Planets, such as move] Hk directly round the Sun yBUh ar.e called Primary ; otherˆ&L are called Secondary, heco they move round the Primary \ Planets. The Secondary PlanetS ar< called Satellites. TheZEaHh 71, 1 Satellite, or Moon ; Jupiter, 4 ; urn, 8; TJranus, probably 6 ;Neptt least 1 : Saturn »« surrounded bu

NEPTUNE

\Biela's Comet

COMPARATIVE SIZE OF THE PLANETS.

MERCURY

The mean Orbital velocity of the plane's per second

ts, Mercury, so miles ; Venus, 23 ; _ Earth K 19 Hpffie Europe Psyche

Pallas . . . .11 Loetitia

Ceres , . . , J1 Juno .... ,12

Eunomia A mphitrite Hebe -1 Teti*

Ins ˆ

Vesta . 13

On account of their great distance, the Orbits of Uranus

Neptune can not be shown ojt this ˆ

VENUS

Small Planets

The Planets ar«. retained tn their Orbits 7>y the opposing actions of the centrifugal and centripetal forces. Each Planet moves

upon its own axis,.

URANUS

sourly**ˆ

MOTION.

109,000 miles 80,000 “ 63,000 “

53,000 <* 25,000 "

21,000 “* 16.000 “

.12,000 "

NEPTUNE

Mercury

Venus

Earth

Mars

Jupiter

Saturn

Uranus

Neptune

THE MOON,

UPITER

The Diameter of the Moon is 2,160 miles ; her mean distance from the \ Barth, 237,519 miles; her magnitude, 1 -49th that oftkeJSarth ; and the period of her revolution 27 days, '1 hours, 43 minutes, 5 seconds. The Moon turns roun<Z7ier axis in the same lime that she revolves inher orbit round the Earth.

NEPTUNE

SATURN

THEORY OF THE TIDES.

NEAP TIDES SPRINGTIDES

LUNAR ECLIPSE

SOLAR ECLIPSE

FULL MOON

THE ZODIA C represents that path in the heavens -which the Sun seems to describe by the Earth's revolution around it. It is di-ˆS vided into twelve equal parts or Signs, each of which con- tains thirty degrees..

THE EA RTH advances thirty degrees every month in each of these ■x. Signs, which causes the Sun apparently to do the same in the opposite Sign ; thus, when the Earth is in Scorpio, the Sun appears tobe in Taurus, which is the opposite Sign, and so on through the others.

- All the Planets move round the Sun from West to East. The j paths in which the Planets move round the Sun are Li called their Orbits .

'JUNE 21

T\e Earth travels at the rate of about 19 miles per second, and 5 hours, 48 minutes, 62 seconds.

These

Orbits are not exactly circuMx lar, but elliptical, so that I I the Planets are nearer MerwJ Sun uThen in one part qˆljr [their Orbits than in anothe-M I When the Earth or any olherUA Planet is in that part of its a| Orbit nearest the Sun, it is ■ said to be in itsPerihelion ; * and when most remote, in its Aphelion.

IS When the Sun or the Moon's

■ lower limb appears fust rest -

■ tng on the Horizon, the entire fi body of either is actually be- ml low it , and would be quite ’J concealed ~by the convexity of

< the Earth, but for the upward bending of the rays in their pas¬ sage through the air.

Diameter of the Earth, 7,902 miles

Circumference, 25,000 miles j mean distance from the Sun, 95 millions of miles.

ˆ/ROTUNDITY OF THE EARTH AND REFRACTION Or- THE ATMOSPHERE.

Apparent Place

| APHELION

RAND. MC N ALLY 4 CO.. ENˆR’S', CHICAGO.

DIAMETEE

LENGTH OF

ˆLENGTH OF

[N MILES.

YEAR.

T>AY.

3,150

88 days

24 lours 5J* min.

7,718

225 “

21

“ 21 «

7,916

365 H “

24

“ 21 “

4,093

687 “

24

“ 40 “

85,96S

12 years nearly

9

" 55 “

79,013

30

“ «

10

“ 16 «

34,292

84

«, < «

7

“ 16 “

37,000

64

tt «

ASTRONOMY

457

the course of 24 hours. The work by which he is best known, however, is the collection and systematic arrangement of the ancient observa¬ tions in his great work, the (Megale Syntaxis, *which gives a complete resume of the astronom¬ ical knowledge of the day. This work was translated into Arabic in the first part of the 9th century and was called by the Arabs the Almagest, and by this name it is known to¬ day in its various translations into Greek and Latin. The most important part of it is the seventh and eighth books, which contain the catalogue of stars which bears*

Ptolemy's name, though it is only a compilation of the catalogue of Hipparchus w ith the positions brought up to the time of Ptolemy. This work was all ac¬ complished during the years 127-151 a.d. The dates of Ptolemy's birth and death are un¬ known. The advance of astronomy almost ceased, after the death of Ptolemy, and his (Almagest, together wfith the false system of the universe which it taught, continued to be the recognized authority in Europe for the next 14 centuries.

With the death of Ptolemy, everything in the way of actual progress in astronomical

theory appeared to cease. The Arabians con¬ tinued astronomical observations from time to time, and made or proposed many improve¬ ments in the ancient astronomical instruments, but they slavishly followed the system of

Ptolemy, and made no attempts to penetrate the mystery of the celestial motions. They

had little capacity for speculation, and through¬ out held the Greek theories in superstitious

reverence. The most illustrious of the Arabian school were Albategnus, orAlBatani (880 a.d.), who discovered the motion of the solar apogee, and who wras also the first to make use of sines and versed sines instead of chords ; and Ibn- Junis (1,000 a.d.) , an excellent mathematician, w'ho made observations of great importance on eclipses of the sun and moon and the motions of Jupiter and Saturn, and who was the first to use cotangents and secants. Likewise, at about the same time, Abul Wefa discovered the third inequality in the moon's motion, the vari¬ ation, and determined its amount. About four centuries later, in the first half of the 15th century, lived Ulugh Beg (q.v.), a Tartar prince, who made important additions to astronomical knowledge.

The third period commenced when Coper¬ nicus, in 1543, first demonstrated the true theory of the universe to his fellow men in his great work (De Revolutionibus Orbium Ccelestium.* His two fundamental principles were that, in¬ stead of the diurnal motion of the heavens being real, it was only apparent, being due to the revolution of the earth on its own axis; and that the apparent revolution of the sun around the sky was, in the same way, due to the actual revolution of the earth around the sun, which latter remained at rest. Centuries of observation have shown that these two prin¬ ciples explain so exactly every detail of celes¬ tial phenomena that

they are subject to no more doubt than our conclusions .as to the arrange¬ ment of streets and houses in a city which we see every day of our lives. Half a century after the death of Copernicus flourished Galileo and Kepler, of wdiom the first invented the telescope, while the second demonstrated the correctness of the Copernican theory, and also

showed that the planet Mars revolved around the sun in an ellipse with the sun in its focus.

The invention of the telescope added another proof to the Copernican theory, and also en¬ larged our views of the universe by showing that Jupiter and his satellites formed a minia¬ ture solar system on the Copernican plan ; that the planet Venus had phases like the moon; that the moon itself had a variegated surface apparently similar to that of our globe, and that the wonderful Milky Way was composed of innumerable stars too faint to be seen sep¬ arately by the naked eye. The spots on the sun were also discovered, and the rotation of our central luminary on its axis made known. Such enormous advances were too great for the human mind at once to grasp, and the generation in which Galileo lived had to pass away before the Copernican theory was uni¬ versally accepted by the learned world. To this same period belong the observations of Tycho Brahe on the motions of the sun, moon and planets, which were, most unfortunately, made just before the invention of the tele¬ scope, and so failed of the precision which would have been gained by the use of that instrument. But, as it was, they were the basis on which Kepler founded his celebrated laws of planetary motion.

The fourth and last period began when Newton showed that all the complicated phe¬ nomena of the celestial motions — the revolu¬ tion of the planets in elliptic orbits, and the revolution of the satellites around their pri¬ maries, were all due to the mutual gravitation of these bodies, and took place according to the same laws which govern the motion of matter around us on the earth. As in the case of the Copernican theory, it took the learned world a whole generation to grasp the idea of Newton as to the theory of gravitation. The progress made in our knowledge of the celestial motions during the two centuries since Newton’s time have all rested on the principle which he discovered.

Toward the end of the 18th century, Sir William Herschel, then in the zenith of his fame, was interesting the whole world by his wonderful discoveries. With his great reflec¬ tors he made a step forward in the size and power of the telescope greater than any before or since.

Although his greatest and best in¬ strument would be considered extremely imper¬ fect at the present time, those which it super¬ seded were hardly more than what we should now call spy glasses. Herschel was so far the greatest figure of the time in astronomical science, and his work so overshadowed that of his contemporaries on the Continent, that the work of everyone else at the time seems unim¬ portant in comparison. Yet not only were great successors of Herschel coming on the stage, but important additions to our knowledge of the heavens were being made outside of Eng¬ land. William Herschel's son, John, was a lad of eight years. In France, Arago, a boy of 14, was fitting himself for the Lcole Polvtech- nique. At Paris, Lalande, the leading astrono¬ mer of France, was actively preparing a cata¬ logue of the fainter stars with an instrument which would now be consigned to the junkshop. But it was the first attempt that had ever been made to determine accurately the positions of the many thousand telescopic stars invisible to

the naked eye, and in consequence the (Histoire Celeste* is still one of the classics of the astro¬ nomical investigator. In Germany, Olbers com¬ bined the professions of physician and astron¬ omer, and Bessel, a youth of 16, was clerk in a mercantile house.

The first day of the century was marked by a discovery of capital interest and importance. The wide gap between the planets Mars and Jupiter had been a source of wonder, and the conviction that there must be a planet in it had become so strong that an association of astron¬ omers was formed to search for it. But, on 1 Jan. 1801, before they got to work, Piazzi, the Italian astronomer of Palermo, found Ceres. The year following Olbers discovered Pallas, and propounded his celebrated theory that the newly-formed bodies were fragments of a shat¬ tered planet, more of which might be found. This anticipation was amply justified by the result, though the theory of a shattered planet has long been rejected. By 1868 the number reached 100. When the sky was systematically watched 100 more were found. When the process of photographing the stars was per¬ fected, so many new ones were found on the photographic plates that it is almost impossible to follow them up. About 750 have had their orbits mapped out. See Asteroids.

In this country, David Rittenhouse, almost the only American of Revolutionary times who has a place in scientific history, had been

dead four years when the century began, and there was no one to take his place. He was one of the committee of the American Philosophical Society that made an extensive and well-planned set of observations on the transit of Venus in 1769. The first American after the Revolu¬ tion to acquire eminence in any department of astronomical science was Nathaniel Bowditch. A Boston ship-captain by profession, he first prepared his (Navigator, 5 the standard work of the sailor through most of the century. He mastered the great work of Laplace, and made it accessible to students by a translation and commentary explaining the processes in detail. So far as practical astronomy was concerned, it might be regarded as non-existent among us during at least the first third of the century. We know little more of it than that Robert Treat Paine, grandson of the signer of the Declaration of Independence, used to compute eclipses and publish the results in the Amer¬ ican Almanac, * and the Boston Advertiser. About 1840, Dr. Lardner paid a visit to this country and remained several years, delivering public lectures, which, though not of a high order when measured by the standard of to¬ day, were much above any which Americans had then heard.

During the first half of the century, the ad¬ vance of astronomical science consisted prin- cially in a form of development which goes on without any striking discovery, and has there¬ fore little interest for the general public. When bright comets appeared they were carefully studied by observers, at the head of whom were Bessel and Olbers. It was thus found that the tail of a comet was not an appendage carried along with it, like the tail of an animal, but merely a tenuous stream arising from it and apparently repelled by a force residing in the sun. The discovery of telescopic comets by observers, here and there, continually added to

the number of these bodies known. Most of them were found to be moving in such orbits that they would require thousands of years, perhaps tens of thousands, to return to the sun, if, indeed, they ever reappeared. But this, though the general rule, is far from being universal. From time to time comets were found moving in closed orbits and performing their revolution in periods of a few years, mostly between 3 years and 10.

One of the noteworthy discoveries of the third quarter of the century was that of the relation between comets and shooting stars. The first discovery of this relation came about in a curious way. The researches of H. A. Newton and others had made it quite clear that shooting stars were due to the impact of count¬ less minute bodies revolving around the sun in various orbits and now and then encountering our

atmosphere. It was also known that the great November meteoric showers must be due to a stream of such bodies. One astronomer computed the orbit of the November meteors; and another quite independently published the orbit of a comet which appeared in 1866. A third astronomer, Schiaparelli, noticed that the two orbits were practically the same. The conclusion was obvious. The minute bodies which caused the shower moved in the path of the comet and were portions of its substance which had from time to time separated from it. The disappointing failure of the shower in 1899 and 1900 can have but one cause — a small change in the orbit of the meteoric swarm caused by the attraction of the planets. Nor has the comet associated with them shown it¬ self ; it was perhaps dissipated like that of Biela's. Apart from this, the question of the constitution of comets is still not completely solved. Their spectrum is that of a body which shines bv its own light, but we are not certain whether this light principally emanates from matter in a radiant condition or whether it is due (at least in large part), to electrical dis¬ charges through the enveloping gases between the particles of the comet. But it is very prob¬ able that all comets are vast cloudlike swarms, made up of meteoric particles, cosmic dust and matter in a radiant condition, the whole im¬ mersed in and surrounded by the gases whose spectra it is that we obtain in our instruments. The brighter comets may have a more or less massive nucleus. Yet it is not certain that the nucleus is entirely opaque. In 1882, the astrono¬ mers at the Cape of Good Hope enjoyed the opportunity of seeing a comet enter on the disc of the sun. Unfortunately, the sun disap¬ peared from view a very few minutes after¬ ward. But not a trace of the comet could be seen on the sun as a spot. It was seemingly quite transparent to the solar rays. That the fainter comets have no nucleus and are merely composed of a collection of foggy particles seems certain. See Comet.

The Greenwich Observatory was taken in charge by Airy in 1834. He immediately insti¬ tuted a great improvement in its organization and work, but it was not till 1850 that he ac¬ quired for it new instruments of great import- 'ance. He was the founder of what has some¬ times been called the Greenwich system : the astronomers of an institution taking a part like those of. soldiers in an army, making all their observations on a plan prescribed by the author-

itv and rarely using their own discretion in any way. The mathematical theory of the -motions of the planets, and especially the

moon, re¬ ceived its greatest improvement from the hands of Hansen, born about 1795. He may fairly rank as the greatest of celestial mechanicians since the time of Laplace. Toward the middle of the century, he prepared the first tables of the moon which could satisfy the requirements of modern astronomic theory. These were published by the British government in 1857, and have now formed the basis of astronomical ephemerides for nearly half a century. The most striking event of the mid-century period, and one which in the popular mind must long hold its place as among the greatest of intel¬ lectual achievements, was the computation by Leverrier of the position of an unknown planet from its attraction on Uranus. The speedy discovery of the planet on the very night it was first looked for was, for the public, a proof of the absolute correctness of gravita¬ tional theories that surpassed all others. It was as a first and bold attempt to sail into an unknown sea; 3ˆet, as in the case of Colum¬ bus and the Atlantic, its repetition would not now be generally considered a difficult matter.' With the discovery of Neptune and with the advance in the art of astronomical observa¬ tion, improvements in the theories of the move¬ ments of the planets were necessary. The greatest step forward in this -direction was taken by Leverrier. Among the results of his work was the discovery that the perihelion of Mercury moves more rapidly than it should under the influence of gravitation. This ex¬ cess of movement has been abundantly proved by observation since his time, but its cause has only very recently been plausibly explained. (See Astronomy, Theoretical). As a general rule, it may be said that during the last half century the Germans have been the leaders in astronom¬ ical research. Their work on the subject has been more voluminous than that of any other nation. The leading astronomical journal of the world is still that of Germany. But when we consider not quantity of work, but the special importance of particular works, preced¬ ence has, from one point of view, passed to America. While, perhaps, we still have fewer students pursuing astronomy in the United States than they have in Germany, the number among us who have acquired the highest dis¬ tinction and most skilfully made applications of this science is greater than in any other country. The rapidity of progress from small beginnings is very remarkable.

In 1832, Professor Airy delivered, before the British Association for the Advancement of Science, an address on the progress of astron¬ omy, which soon acquired celebrity. The state of astronomy in different countries was re¬ viewed. America was dismissed with the re¬ mark that he was not aware of any observatory existing in that country. In the revival of as¬ tronomy among us and its advance to its present position in popular favor, one agency has not been esteemed

so highly as it deserves. Con¬ temporaneous with the visit of Dr. Lardner were the lectures of Prof. Ormsby M. Mitchel. With unsurpassed eloquence he explained the wonders of astronomy to audiences intensely interested in the novelties of the subject. From a scientific point of view the lectures

were probably not of a high order, nor could it be said that Mitchel himself, active and enthusi¬ astic though he was, was a profound astron¬ omer. Yet it may well be said that to him is due the ability of our astronomers since that time to secure the public support necessary to the erection of the fabric of their science. A few years after Airy's address small college observatories were founded at Williams College and at the Western Reserve College, Ohio. These were doubtless a stimulus to students, but can hardly have added to astronomical science. When the Wilkes Exploring Expedi¬ tion was being organized it was found neces¬ sary to have a continuous series of observations made at home during the absence of the expedi¬ tion which compared with those made on the ships would enable the navigators to determine the longitudes of the lands they discovered. A little wooden structure, erected by Captain Gil- liss for this purpose, on Capitol Hill, Wash¬ ington city, was in some sort the beginning of our National Observatory. The actual founda¬ tion of the latter was almost contemporaneous with that of the Harvard Observatory, both being commenced about the year 1843. The Harvard Observatory was placed under the di¬ rection of William C. Bond, who had, for many years, made observations, first at his own house in Dorchester, and then on top of a house at Cambridge. At Washington the Naval Observ¬ atory was placed under the charge of Lieu¬ tenant Maury. After getting its instruments in operation, he devoted himself almost entirely to those researches on ocean currents, which, so long as the commerce of the world was car¬ ried on mostly in sailing vessels, were of the first importance. But the institution soon ac¬ quired astronomical celebrity in other ways. Here Sears Cook Walker made the first thor¬ ough investigation of the orbit of Leverrier's newly-discovered planet, and showed that it had been twice observed by Lalande as far back as 1795, but without its character being sus¬ pected. Here also the device of recording the transits of stars by means of the chronograph and determining the longitude of places by tele¬ graph found their first application. New ob¬ servatories, some founded in connection with colleges, others by private individuals, now sprang up rapidly among us in every quarter. Twenty-four were enumerated by Loomis in 1856. What figure the number has now reached it is impossible to say; in a catalogue of the observatories of the world compiled in 1907 by Strobant, of the Royal Observatory of

Belgium, there are included no less than 107 from the Llnited States.

Beside the very important Naval Observa- tor)r, above referred to, the four largest observatories of our country are (in the order of their establishment), the Harvard Observa¬ tory, at Cambridge, Mass., the Lick Observa¬ tory at Mount Hamilton, Cal., the Yerkes Observatory of the University of Chicago (situ¬ ated at Williams Bay, Wis.) and the Carnegie Solar Observatory at Mount Wilson, Cal. At each of these there are many astronomers, and many different lines of investigation are simul¬ taneously carried on, but it should not be over¬ looked that American astronomy is also being advanced by many smaller institutions. Sev¬ eral of these are of sufficient size to be also classed as great observatories, but their energies

are wisely concentrated along blit one or two lines of specialized work. At institutions where the equipment and personnel arc still smaller, but one kind of research is usually undertaken. A great part of the advancement of the science throughout the world is due to such, somewhat smaller, observatories when their resources are devoted to fundamental work, although the total amount accomplished by any one of them is less than that of the larger institutions be¬ cause their field of research is necessarily less diversified.

The Harvard Observatory, while a respect¬ able institution from its foundation and made famous by the work of the Bonds, had never commanded the means necessary to prosecute astronomical research on a large scale. When Pickering assumed the directorship in 1875, he devoted his energies to those branches of re¬ search which are now known under the general term of astro-physics, being concerned with the physical constitutions of the heavenly bodies rather than with their motions. The extension of his work was made possible by very large additions to the endowment of the observatory. It thus became one of the best-supported insti¬ tutions of the kind in the world. Photometry and spectroscopy have been its main subjects. With the aid of a branch established in Are- quipa, Peru, the magnitudes of all the stars in the heavens visible to the naked e}re, as well as many fainter ones, have been determined. A system of constantly photographing the heavens is also here carried on; the tens of thousands of plates thus far secured have many times Droved of great value for reference, constitut¬ ing, as they do, a permanent record of the appearance of the face of the sky.

The success of the Lick Observatory in a different, yet not wholly dissimilar, direction must be regarded as one of the most extraor¬ dinary developments of our time. Commencing work about the beginning of 1888, under the direction of Holden, and supplied with the greatest telescope that human art had then pro¬ duced, the observations of Burnham and Bar¬ nard excited universal interest, both among astronomers and the public. The discovery of a fifth satellite of Jupiter was made there by Barnard in 1892, and very recently two addi¬ tional satellites of this planet were discovered at the same observatory. Later, the optical discovery of the companion of Procyon, an object known to exist from its attraction on that star, was made by Schaeberle. But its most epoch-making work is due in still more recent years to Campbell, by measurements of the motion of stars in the line of sight with the spectroscope, who, armed with the best spectro¬ graph that human art could make, the gift of D. O. Mills, has, by the introduction of every refinement of his method, brought into these measures a degree of precision never before reached. The cases of variable motion, as found by him, are so numerous as to indicate that isolated stars may be the exception rather than the rule among the brighter stars. As to the host of very faint stars, the detection of the irregularities in the motion of these is as yet far beyond the power of any spectroscope.

The construction of the great Yerkes Ob¬ servatory was begun in 1892 and completed in 1897. Here there is mounted an equatorial tele¬ scope of 40 inches aperture, the largest refract¬

ing telescope in existence. This, together with the numerous smaller instruments, is devoted in part to spectroscopic work and in part to (he accurate measures in astronomy of position. Under the former head, most important and fundamental researches have been continuously prosecuted in the spectra of the stars, while under the latter are most accurate determina¬ tions of the parallaxes of numerous stars, both bv the photographic and the visual methods, and micrometric measures and discoveries on double stars and other heavenly bodies. The first director was George E. Hale, who was succeeded in 1905 by E. B. Frost, with whom are associated Burnham, Barnard and many other astronomers.

The Mount Wilson Solar Observatory of the Carnegie Institution of Washington was begun in 1904, with George E. Hale as director ; it is situated on the summit of Mount Wilson, 12 miles from Pasadena, Cal. Though pri¬ marily designed for the spectroscopic study of the sun, many other lines of work are also prosecuted; the spectroscopic studies of the stars and the unexcelled photographs of nebulas here

secured are especially noteworthy. (See Astronomical Photography). The peculiar and unusual forms of some of the telescopes designed for the special work of this observa¬ tory aroused much interest among astronomers. There is a reflecting telescope of 60 feet focal length which lies horizontally, and twro refract¬ ing telescopes of which the lenses are placed on the summits of vertical towers, 60 and 150 feet in height, respectively, while the spectro¬ scopes and photographic apparatus are placed in wells below the towers. The second tower telescope, because of its great focal length, forms an image of the sun 17 inches in diameter. There is also, a 60-inch reflecting telescope, and a 100-inch mirror, which last, after many fail¬ ures arising from the difficulty of casting so large a disc of glass, has now been figured, and mounted for use.

Bibliography. — In French, we have the monumental works of Delambre; in English, Clerke, Agnes M., (Popular History of Astron¬ omy in the 19th Century } ; Grant, Robert, his¬ tory of Physical Astronomy. >

Simon Newcomb.

Revised by Eric Doolittle, Professor of Astronomy and Director Flower Astronom¬ ical Observatory.

ASTRONOMY, Practical. The instru¬ ments of observation used by the working astronomer are made up mainly of various com¬ binations of three appliances. These are the telescope, the graduated circle and the clock

(for the principles of the first see Telescope). W ith the clock is associated the chronograph as part of a combination for measuring time. Many auxiliary appliances are also brought into use of which the micrometer and the spirit level are the most important. The usefulness of the telescope in measurement does not arise solely from its enabling the observer to see objects otherwise invisible. A telescope with

ASTRONOMICAL instruments

1 Equatorial in the Observatory at Pulkova 2 Photographic Refractor 3 Eye-end of Ko. 4 4 Heliometer

i

I

ASTRONOMY

no magnifying power at all would still enable him to determine the directions of the heavenly bodies at any moment with greater accuracy than would otherwise be attainable. The prin-

Fig. 2.

ciple on which the telescope is used in celestial measurement will first be explained. Let Fig. 1 represent the section of a telescope ; A B being the object glass, and C the eye-end, where the rays from a star are brought to a focus. The lines converging to the plane E F represent the rays of light from a star reaching the focus. Here they form an image of the star, which the observer sees by looking into the eye-piece at C. The plane, of which the dotted line E F is a section, passing through the focus at right angles to the telescope, is called the focal plane. By changing slightly the di¬ rection in which the telescope is pointed, the rays may come to a focus on any point in this plane not too far from the axis or central line of the telescope. In the focal plane is placed a system of very fine threads which the ob¬ server sees when he looks into the eye-piece. These threads are generally made of fibres of spider-web, a substance so well adapted to this purpose that nothing better has yet come into use. To fix the ideas we shall suppose several cross threads ; then the observer by looking into the telescope may see the stars and the cross-threads as represented in Fig. 2. Here we have the images of two stars quite near the crossing point of the threads. The observer moves the telescope until one of the stars is seen exactly at the point of intersection of the two threads. The fundamental principle in the use of the telescope is that when this occurs the star is apparently situated exactly on a straight line passing through the cross-threads, 'and the centre of the object glass. This line is called the line of sight of the telescope.

Now, let the observer move the telescope until he finds another star, whose image he brings upon the cross-threads. The angle through which he has moved the telescope from one star to the other, supposing the two stars to be at rest, will then be precisely the angle between the rays of light coming from the two stars. If, then, any system is adopted of de¬ termining through how many degrees, minutes, etc., the telescope has moved, the angular dis¬ tance between the stars is known. The studious reader will remark that, owing to the rotation of the earth, the image of a star seen in a fixed telescope is continually moving across the field

of view. To explain the principle we must, however, leave this motion out of account, or suppose it allowed for.

We have next to show how a large angle through which the telescope may be moved is measured. This is done by means of the grad¬ uated circle, a representation of which is showrn in Fig. 3. It will be seen that the rim of the circle is divided up into degrees by fine lines as represented in the figure, where, however, only every fifth degree is

marked. In the in¬ struments actually used in astronomy, not only is every degree marked, but in the circles for the finest observations the degrees are still further subdivided into spaces of 5', 3', or even 2'. Since there are 360° in a circumference, it follows that in a division to 2' there will be 10,800 of the graduations, or fine marks, on the circle. These marks must all be as nearly equidistant as human art can make them, and the problem of doing this, together with that of making them so fine and sharp that they can be used in the most precise measurement,

Fig. 3.

is one of the most difficult with which the in¬ strument maker has to deal. The way in which the divided circle is used to measure the angular motion of the telescope is shown by

the dotted outline of the latter. The circle is attached to it so that both move on an axis concentric with the circle and perpendicular to its plane. Then, when the telescope is turned on this axis, the circle turns writh it as a grindstone does on its axis. The distance through w'hich

Fig. 4.

telescope and circle are turned is then measured by means of the graduations. To show how this is done, other appliances must be described.

Instead of two stars being far apart, so that the telescope has to be moved, they may be alongside of each other, as in Fig. 2 ; then, the observer, by moving the cross-threads from one star to the other, and measuring the amount of the motion, can determine the angular distance between the stars, and their relation to each other. This is done by a micrometer, one kind of which will now be described.

The Filar Micrometer. — This adjunct is so called because an essential part of it consists in fine threads of spider lines stretched across the field of view, as already described. The aim of its construction is to admit of these threads being moved in a direction at right angles to their length, by a very .fine screw, so that the space over which they pass may be measured by the turns of the screw. The principal appliances for effecting this are a fixed frame, A B C D, Fig. 4, in which slides another frame, E F G, moved by a fine screw at S. Across

this inner frame is stretched the spider line J, and across the fixed one the spider line H. To the head of the screw is attached a cylindrical rim, which has 100 or some other number of divi¬ sions cut upon it. An index mark serves to show how far the screw is turned. An apparatus for measuring the number of turns of the screw is attached, but need not be described here. Then when the observer turns the screw, the

movable frame of the spider lines is slowly carried along with it. The position of the spider lines as they move is then showm at every mo¬ ment by the number of turns of the screw and the fractions of a turn. To show the accuracy with which this can be done, we remark that the screws used by astronomers may have 100 or even 125 turns to the inch. Then, each revo¬ lution of the screw, as read off on the head, measures to a motion through this space. There being 100 graduations on the head, each grad¬ uation may measure the motion of 1-10,000 of an inch. But the observer may estimate the tenths between the divisions, thus carrying his measurements down to the 1-100,000 of an inch. Beside the movable spider line across the frame, fixed spider lines may also be stretched across the fixed frame. Then wre shall have two systems of spider lines, one movable and the other fixed. The relation of each to the other is measured by the turns of the screw.

To determine the exact position of the grad¬ uated circle, a filar micrometer O is attached to a microscope of the form shown in Fig. 5, and the latter is finally fastened to a fixed frame in such a position that, when the ob¬ server looks into the microscope, he sees the graduations on the circle magnified as many times as necessary, and also the threads of the micrometer. The microscope being fixed re¬ mains at rest while the circle turns. If the instrument were geometrically perfect in every respect, one reading microscope would answer the purpose ; but, as the circle cannot be cen¬ tred with mathematical exactness, pairs of microscopes are used which are at opposite ends of diameters of the circle. For example, when the graduation 15° 20' is brought under one microscope, the graduation 195° 15' would be under the opposite one. It is customary, for greater precision, to have two such pairs at right angles to each other, or four microscopes in all.

To determine the position of the circle, and hence the direction in wThich the telescope at¬ tached to it points, the observer looks into one of the microscopes and fixes upon some grad¬ uation of the circle, turns the micrometer screw till a spider line, or the middle of a pair of lines, is central on the graduation, and then reads the indication of the

head of the screw. It will be noticed that in Fig. 5 the mark 21° is central under the miscroscope. By pointing his telescope on one star after another and reading the microscope in this way, noting

Fig. 5.

on each occasion what graduation is read, the distance through which the telescope is moved, and therefore the angles between the stars, are measured with the highest precision.

The Clock. — The astronomical clock does not differ greatly in its construction from the ordinary clock. Its arrangement and the num¬ bers on its face are, however, adapted to the measures of time used by astronomers. Mean solar time, which is the time we make use of in the affairs of daily life, is also used by the astronomer with a slightly different arrange¬ ment. Instead of the hours being designated as a.m. and p.m., the astronomer counts through the whole 24 hours. Moreover, the count does not begin at midnight, but at noon, which is therefore the commencement of the astronom¬ ical day. For purely scientific purposes this is the natural time to begin the day, because it is determined by the passage of the sun across the meridian. Therefore, any day of the month, as used by the astronomer, continues until noon of the following day, when a new day begins. For this reason the hour hand of his clock only makes one revolution in the 24 hours, the hours being numbered from 0 to 23. The as¬ tronomer makes use of a second system of time, entirely different from that used in daily life, being based on the apparent diurnal move¬ ment of the stars. We have explained, in the preceding article (Astronomy) that the time between two passages of the same star over the meridian of a place is not quite 24 hours, but nearly four minutes less. This is the true time of rotation of the earth on its axis, be¬ cause, in consequence of the advance of the earth in its orbit, it must go through a little more than its true revolution in order that the meridian of any place on its surface — that of Washington for example — may again pass directly under the sun. The astronomer there¬ fore uses a (<sidereal day,w which is shorter than the day determined by the sun in the proportion 365.24 :366.24. This day is divided into 24 sidereal hours, and each hour into sidereal minutes and seconds, according to the usual system. A sidereal clock is regulated so as to gain about 3 m. 56 s._ every day on our ordinary clocks and, in this way, keep time with the apparent diurnal movement of the fixed stars.

It is so set that it shall read O h., 0 m., 0 s. at the moment when the vernal equinox crosses the meridian. As any of us, by looking at the clock, can tell, by the time of day, whether the sun is in the east, south or west, so the astronomer, by his sidereal clock, can tell in what part of its apparent diurnal course any star may be situated. For ex¬ ample, at 5 h. he knows that the constellation Auriga is on the meridian, and at 18 h. 34 m. that the beautiful Lyra is crossing the meridian.

The Chronograph. — There are two prin¬ cipal methods by which the astronomer notes the time of occurrence of an instantaneous phenomenon to a fraction of a second. On the older system, which is not without its ad¬ vantages, the observer, looking at his clock, counts its beats until the occurrence of the phenomenon he is to observe. We may take, as an example, the occultation of a star by the moon. He sees the limb of the moon ap¬ proaching the star until it is clear that, in a few seconds, it is going to pass over it and hide it from view. Then looking at the clock, he listens to the seconds, mentally counting the

number of each beat. At length, there is a certain beat of the clock when the star is not yet hidden, while before the next beat the star has disappeared from view. He estimates how many tenths of the interval between the beats of the clock had elapsed when the star dis¬ appeared, and records the hours, minutes, seconds and tenths in his note-book. The skilled observer will seldom be more than a few tenths of a second in error in this estimate. It requires long practice, and much natural aptitude, to be able to make an accurate obser¬ vation in this way. The method has also the inconvenience that there is no permanent record except that which is written down at the moment, so that, if the observer has made an error of any kind, he has no direct way of detecting it except by subsequently discover¬ ing that something must be wrong. This diffi¬ culty is avoided by means of a chronograph. In the form commonly used, the chronograph consists essentially of a cylinder, generally about eight inches in diameter and one or two feet iff length, revolving on its axis by clock work at the rate of one turn a minute. Around the cylinder is stretched a sheet of paper, which is carried with it in its motion. The sheet is pressed by a pen, pencil or other point, so as to leave a mark on the paper as the cylinder revolves. The pen is carried by a little carriage moving slowly forward from one end of the cylinder to the other at a rate of about one-tenth of an inch, or a little more, in a minute. Consequently, the point describes a spiral line on the paper as the chronograph goes through its successive revolutions, until the pen arrives at the farther end of the cyl¬ inder. This may take a period of two, three or four

hours, according to the adjustments. The pen is connected with an electro-magnet, the current around which passes through the works of the clock. The arrangement is such that at every beat of the clock, or sometimes at every alternate beat, the electric current is either closed or broken. With each closing or breaking of the current a slight motion is given to the pen so that the seconds are marked on the paper on the revolving cylinder. The same or another current also passes through a key held in the hand of the observer. When the latter sees the moment of the phe¬ nomenon he is to note approaching, he holds the key in his hand, and presses it at the exact moment to be recorded. A motion is thus given to the pen, and the position of the signal on the paper among the signals given by the clock shows the moment to a fraction of a second at which the signal was given.

m OSec.

II. -A

15-A

Fig. 6.

Different systems are used based on this general principle. There are various ways in which the pen marks the clock beats on the paper. In that mostly used in this country the pen is not raised from the paper, but is given a sudden lateral jerk, producing a notch in the line, as shown in Fig. 6, which is a copy of a small portion of a chronograph record. On

another system the pen simply makes dots on the paper at each beat of the clock. Some¬ times the current passes around the electric magnet all the time except at the instant a signal is made. Then one and the same elec¬ tric circuit is used for both the clock and the observer. Sometimes the clock only makes the circuit at the moment of its beat; then the circuit at the command of the observer is a second one, which he makes by pressing the key. The main point in all systems is that the beginnings of the minutes all come under each other so that, by taking the sheet off of the

A B

Fig. 7.

cylinder, and spreading it out, writing in the minutes and the lines of seconds, the ob¬ server can determine the exact momeflts at which every one of any number of signals were made while the chronograph was running. For example, in Fig. 6 it will be seen that the ob¬ server pressed the key at 12 m. 3.4 s. and again at 13 m. 2.4 s.

The Spirit Level. — Another appliance much used in astronomy is the spirit level. It serves to set the axis of an instrument exactly horizontal. It consists of a glass tube, gen¬ erally six or eight inches long, of which the rounded surface is not a perfect cylinder, but is formed by the revolution of the arc of a very large circle around its chord. The tube is therefore of the shape shown in Fig. 7, slightly larger in the middle part than at the two ends. The amount of bulging is, however, so slight that the eye cannot perceive it. In the

most delicate levels, a section of the curved surface is an arc of a circle perhaps half a mile, more or less, in diameter. The tube is nearly filled with chloroform or ether. Water, or even alcohol, is not liquid enough for the purpose. A small vacant bubble is left at the top of the cylinder, as shown at A B in Fig. 7. When this bubble is in the middle of the tube, the axis of the level is perfectly horizontal. The remainder of the level is sketched in Fig. 8, which shows the level completely mounted, so that it can be set on the horizontal pivots of the instrument of observation. The true horizontality of the pivots is tested by reversing the level end for end, reading the position of the bubble at each setting. Details need not be entered into at present, as we only wish to make the principle of the instrument clear. Nearly all instruments for .astronomical measurement are made by putting together some combination of the devices we have described. The two combinations most used in astro¬ nomical observations are the Meridian Circle or Transit Circle, which are the same in principle, and the Equatorial Telescope.

The Meridian Circle. — This instrument is

used for two distinct purposes. One is the de¬ termination of the right ascensions of the heavenly bodies; the other the determination of their declinations. It will conduce to clear¬

ness to consider these two functions separately and begin with the instrument as adapted to the first purpose. In this form it is called the transit instrument and is shown in Fig. 9. It consists essentially of a telescope mounted on a horizontal east and west axis P Q, the hori¬ zontality of which is tested from time to time by a spirit level. As thus mounted it will be seen that the telescope cannot move out of the

meridian; by turning it on its axis, its line of sight marks out the meridian. Consequently, if an observer looking into it sees a star, or other heavenly body, he knows that the star must be near the meridian. To make the ob¬

servation more exact, a system of spider lines, shown in Fig. 10, is stretched across the focal plane, as already described. The middle line is so adjusted as to mark the meridian with the

greatest possible exactness. The result is that the observer, looking into the instrument, sees these spider lines, and he may also see a star moving toward the meridian by virtue of its apparent diurnal motion as shown in the figure, where it is about to cross the meridian line. Watching it with a key connected with the electric circuit of the chronograph in his hand, he taps the key at the moment the image of the star crosses each of the lines. The middle line marks the passage across the meridian. The other lines are used in order to secure greater exactness by taking the mean of all the transits across the separate lines. Thus, by pointing his instrument into any part of the meridian, the observer may determine the times by his sidereal clock at which any number of stars crossed the meridian of his place.

In order that the line of sight of the in¬ strument may describe the true meridian, it is necessary that, when the instrument is turned in the proper direction, the line shall pass

A! M

B R

Fig. 11.

through the celestial pole. This is effected by the follow ing arrangement : In the course of its apparent diurnal motion, a star near the pole will cross the meridian of any place twice in the course of a sidereal day, first above the pole and then below it. Let the dotted circle in Fig. 11 be its apparent diurnal circuit around the pole P. Let the vertical line M R be the true meridian passing through the pole, and the other line A B that marked out by the line of sight of the transit instrument, supposed not to be exactly in the meridian. Then the star will take a less time in passing around from A to B on the left than in the other part of its course from B to A. Therefore by ob¬

serving the transit both above and below the pole, across the middle thread of the instru¬ ment, the observer determines whether the line of sight of the instrument passes east or west of the pole and may adjust it accordingly. It may be said that, in astronomical practice, no instrument is ever assumed to be perfectly ad¬ justed. The clock of the astronomer is never assumed to be correct, nor his transit instru¬ ment to be in the true meridian. What he does is, assuming them wrong, to make his observations, determine the errors, and correct his observations accordingly. This is called ˆreducing® the observation. We have already explained that, when a star is exactly in the same hour circle with the vernal equinox, its right ascension is 0 h., 0 m., 0 s. Since the

clock, assumed to be correct, then reads exactly 0 h., it follows that the star in question will cross the meridian at this time by the clock. Then, as the sphere revolves, the right ascen¬ sions of the stars are all equal to the sidereal time at which they cross the meridian. Thus the observer, by noting these times, measures the right ascensions of the heavenly bodies. This system of using the clock instead of a divided circle for determining right ascensionˆ constitutes one of the greatest advances ever made in astronomical measurement. It de¬ pends upon the perfect uniformity of the earth's rotation and the excellence with which a clock can be made.

In this manner wre may obtain the right ascension of any star. If we suppose that the error of the clock is knowm and that the mid¬ dle wire is exactly in the meridian, the cor¬ rected (sidereal) clock time when the star is bisected by the middle ware will be precisely the same as the right ascension of the star. The clock error is determined by observing the transits of a selected number of funda¬ mental stars whose right ascensions are as¬ sumed to be known; the deviations of the middle wire from the meridian are also deter¬ mined from these transits, and finally, the combined effect of these errors and the error of level is readily computed and applied to the recorded time of transit of the star whose right ascension is desired.

A far more troublesome source of error, howrever, and one which it is exceedingly difficult to completely eliminate is known to astronomers as the Personal Equation. By this is meant the difference between the time when the star is actually bisected and the time at which the observer presses the chrono- graphic key. The latter is usually later by about 0.2 second, an amount wdiich approxi¬ mates to the <(Reaction timeˆ of the psycholo¬ gists, but this is by no means

always the case. Moreover, as the apparent motion of equatorial stars across the field is very rapid compared with that of stars near the pole, there occurs a marked variation in the observer's personal equation, depending on the declination of the star observed. It is found that a minute vari¬ ation also occurs which depends upon the brightness of the star, and finally, the personal equation varies with the physical condition, fatigue, etc., of the observer, though with an observer of long experience who takes care to work as far as is possible only under normal conditions, the last source of error should be slight.

As meridian work is the most important and fundamental of all observation for the purposes of exact astronomy, every effort is made to either determine or eliminate the ef¬ fects of personal equation. In the United States Naval Observatory, it is directly determined for each observer by means of an artificial star which is made to cross the field at all varying rates of speed and automatically to record upon the chronograph the instants when it wras bisected by each wire ; the ob¬ server's records appear upon the same sheet, whence the personal equation follows by a di¬ rect measurement. Here also a screen is placed before the objective of the telescope by w'hich all stars observed are made to appear equally bright during the transit. There are

two devices already coming into considerable use which almost completely eliminate this troublesome source of error. In the first, called the. Transit Micrometer, a moving wire is kept accurately bisecting the star as the lat¬ ter crosses the field. The frame which carries the movable wire automatically makes an electric contact and records on the chrono- graphic sheet when this movable wire reaches the successive transverse wires indicated in Fig. 10, which latter are therefore omitted. The second device is the Photo-chronograph. Here the eye is replaced by a small photo¬ graphic plate on which the star photographs itself as a straight line, or <(Trail.® An elec¬ tro-magnet is so arranged that at every sec¬ ond or fourth beat of the clock the plate is displaced slightly upward or downward ; the trail thus appears on the developed plate as a series of short dashes arranged alternately in two parallel lines. The image of the wires is afterward obtained by holding a light for a few seconds in front of the object glass. By a later measurement of the developed plate under a microscope a result is obtained which is practically free from the effects of personal equation.

The Meridian Circle is the transit instru¬ ment, just described, with one or two grad¬ uated circles on its axis of rotation. The method of using it and determining the arc through which the circle has moved at any time has already been explained. The in¬ quiring reader may wish to know how', by such readings, the astronomer can determine the declination of stars. If the celestial pole were a visible point in the heavens this would be very simple ; the observer would turn his instrument until it pointed exactly at the pole and then read his microscopes. Then as one star after another crossed the meridian he would make a similar pointing, reading his microscope for the transit of each star. The difference between the reading on the pole and that on the different stars would show their distances from the pole. Subtracting each of these from 90° would give the declina¬ tion of the stars as seen in the instrument.

But, unfortunately, the pole is not a visible point. The observer has therefore to refer his position to the direction of gravity, which is done by a very ingenious use of a basin of quicksilver. The basin is set on a firm sup¬ port on the ground under the telescope, and the latter is pointed directly downward. By mounting up to the eye-piece and looking down, the observer looks perpendicularly into the basin of mercury. A combination of re¬ flectors is then arranged in the eye-piece of the telescope so that he can, at the same time, see the threads in his eye-piece and the images of these threads as reflected from the basin of mercury. When a telescope is so adjusted that the image and the thread coincide, he knows that the line of sight of his telescone is truly vertical. He then reads the microscope of his circle and so determines what the reading of his circle is for the vertical position. He knows that if the telescope is pointed at the zenith, the reading will be different by exactly 180°. He thus determines the exact distance at which the heavenly bodies crossed the me¬ ridian north or south of his zenith. From

this, the determination of the declination is, in principle, a simple matter.

The Equatorial. — One of the most import¬ ant arrangements of nature with which the astronomer has to deal is the diurnal motion. This takes place so slowly that, in looking at the stars, we do not notice it unless we watch for some time. But, if we point a telescope at a heavenly body, it magnifies the diurnal motion as much as it does the object. The result is that such a body, seen in a fixed tele¬ scope, is continually traveling across the field of view, and the instrument has to be moved continually to keep up with it.

In order to avoid this inconvenience, it is necessary that, if measures are to be made up¬ on the body, or Jf it is to be continuously studied, the telescope must move to correspond. This is brought about by mounting it upon an axis parallel to that of the earth, and there¬ fore oblique to the horizon, called the polar axis. The inclination to the horizon must be equal to the latitude df the place. All great telescopes are thus mounted. The way in which this is done will be seen by the ac¬ companying picture of the great telescope mounted at Pulkova, Russia. In order to keep the telescope pointed at the object it must be turned upon the polar axis by clock¬ work, moving it steadily at a rate equal to the diurnal motion of the object observed. In reality the telescope is then pointed in a fixed direction, the motion of the earth being simply neutralized by the clock-work of the telescope carrying the latter in the opposite direction. The equatorial telescope must also have a second axis, called the declination axis, in order that it may be pointed at stars in different declinations. The direction is deter¬ mined by circles attached to the telescope, which show, at any time, to what declination on the celestial sphere the instrument is pointed. By a combination of contrivances the astronomer can point his telescope by day at any star bright enough to be visible in it ; or, by night, at any object visible to the naked eye, of which he knows the right ascension and declination. He first turns his telescope until one divided circle corresponds to the declination of the star, and then clamps it in that position. Then, looking at his sidereal clock and taking the difference between the sidereal time and the right ascension of the star, he turns his telescope on the polar axis until the other circle shows the correct point¬ ing. Then he starts the clock-work which sets the telescope in motion, and looking into the eve-piece, sees the required object. Every large telescope is also supplied with a finder. This consists of a smaller telescope fastened to the larger one in such a way that the cen¬ tre of the field of view is the same in both. But the finder has a lower magnifying power, and therefore a much larger field. Looking into it and recognizing the object he wishes to observe, the observer moves the telescope until the object is seen on the cross-threads of the finder. Then he knows that it is in the field of view of the large telescope.

Application of Photography to Astron¬ omy. — 'From the time that photographic methods were introduced, the idea of taking pictures of the heavenly bodies by such methods must have occurred to astronomers.

About the year 1840, Prof. J. W. Draper of New York put this method into practice by taking a daguerreotype of the moon. Shortly after our present system of photography was devised, several American astronomers car¬ ried the experiment yet farther. Notable among these were G. P. Bond, first assistant and afterward director of the Harvard Ob¬ servatory; and L. M. Rutherford of New York, who was the possessor of an excellent telescope, and brought the method to a high state of perfection.

The principle on which a photograph of a heavenly body is taken is extremely simple. A telescope is pointed at the body so that the image of the latter is formed in its focus. A sensitized plate is* placed in the focus and ex¬ posed for the necessary time. This may be only a fraction of a second, or it may be sev¬ eral hours. Unless the exposure is very brief, it is necessary that the telescope shall be kept in motion, so as to follow the object in its apparent diurnal course. When the exposure is completed, the image is developed in the usual way. In photographing, the ordinary telescope, as used for eye observations, is not well suited to the purpose, for the reason that

Fig. 12 — The Photochronograph

ihe chromatic aberration is not the same for the visual and for the photographic rays. It is necessary to have a somewhat stronger crown lens or a weaker flint lens if a tele¬ scope is to be used in photographing than if it is to be used by the eye. But the necessity of having telescopes of the two kinds is now, to a certain extent, done away with by the use of sensitized plates which are especially sensi¬ tive to the visual rays. By putting in an ab¬ sorbing screen through which the rays must pass before they reach the focus and which allows only the visual rays to pass, very ac¬ curate photographs can be taken by the plates. This defect is felt only in the refracting tele¬ scope. A reflecting telescope brings all the rays, of whatever color, to one and the same focus, and therefore may be used either for photographing or for seeing. Improvements made in recent times in the sensitiveness of photographic plates have given an enormous extension to this method in astronomy. It is now found that celestial objects completely invisible to ordinary vision can be photo¬

graphed. While only a few thousand nebulae have been catalogued as visible to the naked eye, it is found that there are hundreds of thousands which admit of being determined by photography.

Photography is now employed for two dis¬ tinct purposes. The first is simply that of forming a picture of the sky, or rather of the stars in the

sky. For this purpose the best telescope is one as large as can conveniently be obtained, but of short focal length. A great enterprise in this direction was started in 1887 by an association of astronomers who met at the Paris Observatory, and put into operation a plan of photographing the entire heavens on from 10,000 to 20,000 plates, each two degrees square. The labor of measuring these plates and of afterward reducing the measures from them is so great that at least 30 years will probably elapse before this cat¬ alogue is completed and published. A similar object is reached on a different system at the Harvard Observatory. There photographs are being constantly taken with telescopes much shorter than those used for the international chart. In this way new stars are from time to time discovered and variations in the light of different stars are brought out. The other purpose is that of exact measurement. When the astronomer had to determine the respec¬ tive distances of stars in the same field of view he has hitherto generally depended on the filar or other micrometer. The use of this instrument is laborious. When the photo¬ graphic method is used he simply takes a pic¬ ture of the stars he wishes to measure, and at any convenient time, places it under a measuring engine supplied with sliding micro¬ scopes, and measures off the distance on his negative. The result of these two applications is that photography is now slowly supplanting eye observations in an important fraction of the astronomical work of the world.

Simon Newcomb.

Revised by Eric Doolittle, Professor of Astronomy and Director Flower Astronom¬ ical Observatory.

ASTRONOMY, Theoretical. This branch of the science grows out of the great discovery of Newton, that the motions of the heavenly bodies, especially those of the solar system, are determined by their mutual gravitation. The re¬ sults of this theory are now worked out by purely mathematical methods with a degree of precision scarcely attainable in any other branch of science. The adopted method consists first in expressing the attraction or pull experienced by each body from all the others in the form of differential equations. These equations ex¬ press, in the most general way, the acceleration which the planets experience at every moment from the attraction of the other bodies. We do not write them because they would be under¬ stood only by a reader expert in the calculus, who, if he desires to be acquainted with them, will consult special treatises. It will suffice to say that there are three differential equations for each planet, which express the attraction, and its effect on the motion of the planet at any instant, in the direction of three co-ordi¬ nates. The problem then becomes the

purely algebraic one of integrating these equations. The result of this process is that the effect of the

attraction or pull upon the body, through a pe¬ riod of days, years or even centuries, is summed up with great exactness, so that the motion of the body through the whole period can be expressed by algebraic equations. The simplest case occurs when there are only two bodies. The integration shows that, in this case, the bodies revolve round their common centre of gravity in orbits each of which is an ellipse. Commonly it is necessary to consider only the motion of the smaller of the two bodies, the mo¬ tion being defined as if the larger were at rest. This is the case of a planet revolving around the sun, or of a satellite round its primary. It is then found that the orbit described by the re¬ volving body round the great central body is an ellipse having the latter in one of its foci. The discovery of this fact, which marked an epoch in the development of astronomy, was due to Kepler; it is known as Kepler's First Law. Kepler also discovered that the motion is sub¬ ject to two other laws. One of these is that the radius vector, that is to say, the line drawn from the central body to the other, sweeps over equal areas in equal times. The result of this is that if A B be the orbit having the sun, S,

in the focus; and if we mark on the orbit the points a, b, c, etc., which the planet passes through at any equal intervals of time, and then draw lines from each of these points to the sun, the areas included between these lines will all be equal to each other. A glance is sufficient to show that the nearer the body is to the sun the more rapidly it must move.

The position of the orbit and the place of the body in it are determined by six quantities called elements. Two of these elements ex¬ press the position of the plane in which the ellipse lies, and therefore in which the planet moves. One is the inclination of the plane of the orbit to some other plane taken as that of reference. For the latter is commonly adopted the plane of the ecliptic, in which the earth revolves round the sun. When the in¬ clination of the orbit of any other planet is spoken of, the astronomer means the angle which the plane of its orbit makes with the plane of the ecliptic. The other of the two elements expresses the line passing through the sun along which the two planes intersect. This

is called the Line of Nodes. The position of the node is defined by the angle, as seen from the sun, between the vernal equinox and that node where the planet crosses from the south to the north side of the ecliptic. Three other elements determine the size and form of the elliptic orbit, and its position in its plane. The semi-major axis, A B, of the ellipse is called the mean distance of the planet from the sun, it being half the sum of the greatest and least distances. The other of these elements is the eccentricity of the orbit, which is equal to the quotient obtained by dividing the distance of the sun, O S, from the centre of the orbit by O A, the semi-major axis. These two elements completely determine the ellipse. The exact position of the ellipse in the plane may then be defined by the angle which the semi-major axis, O B, makes with the line of the nodes. It will be seen that the point B is that at which the planet is nearest to the sun. This is called the perihelion of the orbit if the central body is the sun; if the earth is the centre, the perigee. The opposite point, A, where the planet is most distant, is called the aphelion, or apogee. Finally, the sixth element defines the position of the planet at some given moment of time.

The time of revolution of the planet is given by Kepler's Third Law, which is that the squares of these times are proportional to the cubes of the major axes of their orbits. For example, let one planet be four times as far as another from the sun. The cube of 4 is 64. The square root of this is 8. It follows that the planet which is four times as far will be eight times as long in completing its circuit. If the outer planet went as rapidly as the other, it would be only four times as long. Its orbital motion is therefore, on the average, only about half as rapid.

The three laws just described were discov¬ ered by Kepler from a prolonged study of the observations of planetary positions made by-Tycho Brahe; they could then have been re¬ garded as interesting coincidences merely, or at most as facts of which the explanation was un¬ known. Upon Newton's discovery of the law of universal gravitation, however, they were at once seen to be immediate and very simnle consequences of this law, but it then appeared that the third law in the form stated by Ken- ler was slightly inexact. For it could be easilv demonstrated that it was not the squares of the times of revolution which are proportional to the cubes of the major axes of the orbits, but that the products of the squares of these times multiplied by the sum of the masses of the cen¬ tral and of the revolving body are proportional to these quantities. This is sometimes called Kepler's Modified Third Law. It furnishes us with a very simple means of finding with a high accuracy the masses of such planets as have satellites revolving around them. The intro¬ duction of the

masses into Kepler's third law alters the results by quantities far too small to have been detected in the observations studied by him ; thus, it can be shown that were the earth suddenly to diminish to a mere particle, devoid of weight, the length of the year would be increased by only 47.8 seconds.

In theoretical astronomy a unit of distance is necessary. Our ordinary units do not well serve the purpose of the astronomer for two

reasons. They are too short for the great distances he has to measure, and the mag¬ nitude of the heavens in terms of miles is not known with sufficient exactness to make that measure convenient. What the astronomer does, therefore, is to take the mean distance of the earth from the sun as his yardstick, and to express the distance of all the bodies of the solar system, both from the earth and from each other, the moon sometimes excepted, in terms of this unit.

From the laws of motion based on gravita¬ tion may be derived several interesting theo¬ rems. For example, suppose that at some point in the solar system, — we may take, to fix the ideas, a point at the mean distance of the earth from the sun, — a number of bodies are pro¬ jected in different directions, but all with the same velocity. Then, the equations of motion

show that the major axes of the orbits which

these bodies describe will all be equal. Then,

from Kepler's third law it follows that the

times of revolution will also be equal. Con¬ sequently, at the end of a certain period the bodies will all return at the same moment to the point from which they started. This period will depend only on the velocity with which the body is projected. There is a certain velocity, called the circular velocity, which is such that if the bodies are projected in a direction at right angles to that of the sun, they will de¬ scribe circular orbits. If all the bodies are pro¬ jected at different directions with this same velocity, they will all be exactly one year in getting around and returning to the starting point. Now suppose that, instead of the bodies being projected with this circular velocity, which is very nearly that of the earth in its orbit, they are projected with a somewhat smaller velocity.' Then, the less the velocity the less the

major axis of the orbit, and tne greater the velocity the greater the major axis. A body projected with a speed one-third greater than that of the earth would fly out beyond the orbit of Jupiter. A slightly greater speed would carry it beyond the orbit of Neptune, the rea¬ son being that, as the body recedes, the attrac¬ tion of the sun diminishes at so rapid a rate that the weak attraction left is not sufficient to overcome the slight surplus velocity. Finally, if the speed is equal to that of the earth mul¬ tiplied by the square root of two, that is to say, about 26 miles per second, the body will never return. The ellipse in which it should move is stretched out into a parabola, still having the sun in its focus. If the velocity is greater than this, the parabola will be still farther changed into a hyperbola. Then the body would fly out into the stellar spaces, perhaps in the course of millions of years reaching some other sun, but would certainly never return to our system. Another theorem is that the velocity, no matter what the form of the orbit, dimin¬ ishes as we go out from the sun in proportion to the square root of the distance. This we have already seen by Kepler's third law, when we found from that law that a planet four times as far from the sun would move only half as fast. Thus the parabolic velocity is less the farther a body is from the sun. At the planet Uranus it is less than six miles per second; at that of Neptune, about five miles per sec¬ ond. Still another theorem is that if a planet moving in a circular orbit were stopped at any

point of its motion, and then were allowed to drop toward the sun, the time of reaching the sun would be equal to that of revolution divided by the square root of 32. It follows that if the earth should be stopped in its motion, it would drop to the sun in a number of days found by dividing 365.24 by the square root of 32. This would be approximately 64 days.

The orbits of most of the large planets are nearly circular. For particulars relating to them see Solar System. The orbits of comets are, however, mostly parabolas, or ellipses which cannot be distinguished from parabolas when the comet is near enough the sun to be visible. It is possible that some of those orbits which are ellipses have become so through the comet at some time in its history passing very near a planet. (See Comet). One of the prob¬ lems of theoretical astronomy which the astron¬ omer often meets with is that of determining the orbit of a newly-discovered body of the solar system. Three complete observations of such a body, that is to say, three observations each . of which determines exactly the apparent position of the body on the celestial sphere, enable the astronomer to determine the orbit in which it is moving round the sun. The calcula¬ tion requires from five to ten hours' work by an expert calculator having at his command the

necessary tables. The first orbit thus com¬ puted may be considerably in error, because the effect of errors of observation is multiplied many fold, unless the planet has moved through a considerable arc of its orbit between the times of observation. But the longer the planet is observed, the more exactly the elements of its orbit can be determined. It is found that when two stars are so near each other as to be kept together by their mutual attraction, they revolve around each other in an elliptic orbit. It fol¬ lows that the law of gravitation extends to these systems. Thus the calculations of the theoret¬ ical astronomer are not confined. to the solar system, but may be extended to the fixed stars.

In all that precedes we have considered only the motion of two bodies, the smaller of which moves around the larger in an elliptic orbit. But, as a matter of fact, every planet of the solar system is acted upon not only by the great central body, but by every one of the other planets. The result is that the actual orbit, although very nearly an ellipse, deviates slightly from it, and the motion is not exactly in ac¬ cordance with Kepler's laws. The problem of taking account of these additional forces is an extremely complicated one, in which success has been reached only by successive generations of the ablest mathematicians devoting long years of study and calculation to the subject. While the solution, even to-day, is far from complete, it has been so far advanced that it is possible to prepare tables of the motions of the planets which shall hold good for genera¬ tions, and even for centuries. The method in which the problem can best be solved was devised by Lagrange, who flourished in France toward the latter part of the 18th century. The fundamental idea of his method was that the motion of the planet at every instant should be represented by an ellipse, but this ellipse con¬ tinually changes its form and dimensions so as to fit in with the actual motion of the planet under the influence of the attraction of all the

other planets. Some idea of the case may be imagined by supposing a cord of some light material made into an ellipse very nearly a circle, and left to float on the waves of the ocean. Then we should see the cord, while still remaining almost in its original shape, con¬ tinually bending and twisting as it was moved by the waves. So does the variable ellipse in which the planet moves. It is exactly defined by supposing that, at any one instant, the attrac¬ tion of all the other bodies, the sun excepted, ceases. Then the planet would move in a

fixed and unchangeable ellipse. This ellipse is taken as that which corresponds with the motion of the planet at the instant. At a second instant the planet would actually have deviated slightly in consequence of the attraction of the othei planets, but there would still be a corresponding ellipse, but somewhat different. So the ellipse goes on changing continually.

When these changes are subjected to the rigor of mathematical formula, it is found that they nearly, but not quite, compensate each other in the long run. Let us take, for example, the eccentricity of any one orbit. This will vary in the course of every revolution of the planet, and may come back to its original amount any number of times. But, if we watch it revolu¬ tion after revolution, we shall find that, in the long run, it continually increases or diminishes. It is thus found that the eccentricity of the earth's orbit has been diminishing through all historic times. Moreover, the general rule is that the perihelion of the planet is gradually moving forward, and the line of nodes back¬ ward. These variations, which go on century after century, are called secular variations, while those which are compensated from time to time are called periodic. Now, the most interesting and important question of celestial mechanics is whether the secular variations will continue forever in the same direction. The profound analysis of Laplace and La¬ grange shows that such will not be the case so far as the eccentricities are concerned. At the end of immense periods the direction will be reversed. It is now known that the eccentricity of the earth's orbit after diminishing to about the value 0.003 will increase for a certain period. It is thus with all the orbits ; the motions go through a series of oscillations hav¬ ing periods of hundreds of thousands of years — like (<great clocks of eternity which beat ages as ours beat seconds.® The precision with which the astronomer is now able to predict the motions of the heavenly bodies is reached by a combination of mathematical computations of the most difficult and complicated character, with the most refined observations upon the positions of the moon and planets, year after year.

The most complex of all the problems is that of the moon's motion around the earth, of which we shall mention some features. In this case the central body, the earth, is vastly smaller than the sun. But, owing to the great distance from the sun and the consequent small difference in the force of its attraction upon the earth and moon, it happens that the moon re¬ volves around the earth in an orbit which ap¬ proximates to an ellipse. But the changes and motions in this ellipse are much larger and more rapid than in the case of the planets. For example, the perigee of tb~ moon's orbit makes

a revolution round the earth in 8.85 years, while the node on the ecliptic makes a revolu¬ tion in 18.6 years. The moon also makes two swings back and forth during the space between two full moons, and the eccentricity and perigee both make an annual swing, all owing to the action of the sun. See Moon.

The principles of theoretical astronomy and the operations of practical astronomy are com¬ bined in one of the greatest achievements of the human intellect — that of measuring the heav¬ ens and weighing the planets, and, in a few cases, even the fixed stars.

The distance of the moon is determined in two ways, the results of which agree within the necessary range of uncertainty of the meth¬ ods. One is the measurement of the moon's parallax, taking as the base line two distant observatories, Greenwich and the Cape of Good Hope. (See Parallax). The other method consists in determining exactly what ought to be the size of the moon's orbit in order that she may make her revolution around the earth in the time that she actually does. The probable error of the distance of the moon at any time, as determined in this way, is not more than 40 or 50 miles.

The proportions between the orbits of the several planets are known with the greatest ex¬ actness from their observed times of revolution, and from Kepler's third law. It follows that if we can get the exact distance of any one planet at any one time, all the other distances in the solar system may be derived by the known pro¬ portion. The fundamental quantity which is used as a unit of measure is the distance of the sun. This distance has been determined by four complete separate and independent methods, the agreement between which illus¬ trates the great exactness of astronomical theory.

The first method is by measures of parallax. The application of this method is fully de¬ scribed in the article Parallax. It requires that the apparent direction of a planet among the stars be observed with great exactness from two far distant points of the earth's surface, or at two times of day during the interval between which the observer is carried around by the rotation of the earth. These observations have to be on a planet and not on the sun, because the latter, owing to the brilliancy of its light, cannot be measured with the necessary pre¬ cision. The most celebrated way of determin¬ ing parallax has been by observing transits of Venus (q.v.). But these occur at such rare intervals, the last having been in 1882, and there being no other to occur during the 20th century, that the measures have to be made on other planets which approach nearest to the earth. For this purpose Mars has sometimes been used, because it occasionally approaches us within

less than half the distance of the sun. But the most exact observations can be made on minor planets at the time of their nearest approach ; the minor planet Eros thus furnishes a more accurate value than can be obtained in any other way.

The second method is by the velocity of light. This method is, in principle, the most simple and elegant of all. It rests on the fact that it is possible, by two kinds of observation, to determine how long it takes light to pass from the sun to the earth, or to cross the

earth's orbit. If then we can determine by measures of the earth's surface how fast light travels, it follows that by multiplying this ve¬ locity by the time it takes to travel from the earth to the sun, we shall have the distance of the sun. The velocity of light has actually been determined with great precision by means of the revolving mirror. (See Light, Velocity of). The result is a speed of 186,330 miles per second. The time required for light to cross the earth's orbit is much more difficult to de¬ termine. The only way in which a direct determination can be made is through observa¬ tions of the eclipses of Jupiter's first satellite. By comparing the times of these eclipses through a long series of years when Jupiter is at various distances from the earth, it is found that the eclipses are seen later, the farther Jupiter is from the earth at the time. This is because light requires time to travel over the different distances. But the determinations made in this way are not very exact, because such eclipses take place so gradually that it is impossible to fix upon a precise phase without a possible error of several seconds. All we can say as a result of this method is that it takes about 8 m. 20 s. for light to pass from the sun to the earth.

A more exact result is reached by measuring the displacement of the fixed stars produced by aberration. As the earth makes its annual course around the sun, the position of every star in the heavens is, at every moment, slightly displaced toward the direction in which the earth is, at the moment, moving. This is due to the proportion between the velocity of light and the speed of the earth in its orbit. Unfor¬ tunately, the speed is so great that the displace¬ ment in question is only about 20.5" ; an arc too small to be determined with the precision that is desirable. Still, the observations avail¬ able are so numerous that the result, 20.52", found by Chandler, is probably within one, or, at most, two hundredths of a second of the truth.

Accepting Chandler's number, light re¬ quires 499.67 seconds to pass over the distance which separates the sun from the earth. Mul¬ tiplying this by the speed of light, we have, 186,330X499.67 = 93,103,511 miles as the distance of the sun.

The third method is a very recondite one, because it rests on the mathematical principles of celestial mechanics, applied to the case of the earth's motion around the sun. It requires, in advance, an exact determination of the ratio of the mass of the sun to that of the earth. This is best found by observations of Venus, which now extend through more than a century and a half, by which the motion of the node of Venus on the ecliptic is determined. This motion is due principally to the attraction of the earth; and from it the proportion between the mass of the earth, and that of the sun is determined. The next step requires a compari¬ son between the distance which a body falls at the surface of the earth from its own gravita¬ tion, and the fall of the earth toward the sun as shown by the curvature of its orbit. By combining these various ratios, the distance of the sun is calculated. The fourth method also rests on the theory of gravitation. One conse¬ quence of the sun's action on the moon is that the latter falls behind about two minutes in its monthly course near the time of the first

quarter, and is ahead by the same amount near the last quarter. Knowing the exact amount of this swing, the distance at which the sun must be placed in order to produce it is deter¬ mined. Each of these four methods has its strong and its weak points; and there is no one of them so much better than all the others that we can rely upon it exclusively. Still, their agreement affords a remarkable proof of the accuracy of astronomical theory, and of the precision with which astronomical measures are made under such difficulties as the observer and computer have to encounter. The astronomer does not use the distance of the sun in his computations, because, as already remarked, this is simply his unit of length. What he actually uses is the sun's parallax; this is equal to the angle which the equatorial radius of the earth subtends when seen at a distance equal to that of the sun. The latest results for this parallax from the four methods are the following:

First method, from Eros, 8.806"

Second method, light, 8.78"

Third method, mass eaith, 8.762"

Fourth method, moon, 8.773"

The general conclusion which we reach is that the distance of the sun is very nearly 93,- 000,000 miles, probably a little less, rather than a little more.

What may seem a yet more wonderful result of celestial measurement is the weighing of the planets and other heavenly bodies. This re¬ quires very complex mathematics. But, after all, the principles on which the method rests can readily be made clear. In the case of the planets, there are two methods, one of which can be applied only when a planet has a satellite moving around it. We have already seen that the motion of every planet which, were there no other planet, would take place in an ellipse having the sun in a focus, is changed by the attraction of other planets. The observa¬ tion of the deviations, when carefully measured through many revolutions of a planet, enable the mathematical astronomer to compute the ratio of the mass of each attracting planet to that of the sun. This ratio is all that the astronomer requires for his ordinary work.

When the planet has a satellite, its mass can be determined with much more ease and sim¬ plicity by a direct application of the modifica¬ tion of Kepler's third law. The measurements of the distance of the satellite from the planet, carried through a great number of revolutions of the former, enable the astron¬ omer to determine this distance with high ac¬ curacy; combining this with the time of revolu¬ tion of the satellite and substituting the values in the equation which expresses the law, it will be noticed that two unknown quantities appear in the equation. The first of these is the de¬ sired sum of the masses of the planet and its satellite, and the second is the constant ex¬ pressing the ratio of the law. The figure expressing the latter can be found by applying the equation to any system all of whose ele¬ ments are known, such, for example, as the earth-sun system ; when this is done, the sum of the masses of the planet and its satellite re¬ mains as the only unknown quantity ; the solu¬ tion of the equation will thus furnish this sum in terms of the sum of the masses of the earth and sun as a unit.

It is in exactly the game way that the com-

billed mass of two suns forming a double-star system is determined. The distance of the sys¬ tem from the earth must be known and the motion must have been sufficiently rapid to enable the period and the

major axis of the relative orbit to have been determined. The law then gives us directly the total mass com¬ pared with that of the earth and sun. In this case the two bodies are frequently of nearly equal mass and the motion of each takes place about the common centre of gravity of the sys¬ tem. If we determine the actual motion of each star by measuring its positions with refer¬ ence to one or more fixed stars which happen to be found in the field of view, the position of the centre of gravity, and hence the com¬ parative masses of the two stars of the system, can readily be found. From this the actual weight of each star separately at once follows. The masses determined by astronomical methods are all expressed by taking the mass of the sun as the unit. To translate the result into our ordinary measures of weight, we must know the mass of some one body, say the earth, in pounds or kilograms. How this is found is set forth in the article Gravitation.

Simon Newcomb.

Revised by Eric Doolittle, Professor of As¬ tronomy and Director Flozver Astronomical Observatory.

ASTROPALIA, an island of the Sporades, the modern name for the ancient Greek Asty- palaea. It is high and rugged and almost the shape of a dumbbell, its centre being a narrow isthmus connecting the larger ends. It has an area of about 80 square miles and several good harbors for small craft. Pop. about 2,000.

ASTROPHEL, the nom-de-plume of Sir Philip Sidney in writing the famous sonnets to ˆStella® (1591); They are considered his mas¬ terpiece. Spenser so entitled an elegy which he wrote to Sidney.

ASTROPHOTOGRAPHY. The use of

photographic methods in astronomical observa¬ tions has very greatly increased both the ef¬ fective power of astronomical telescopes and also the accuracy of astronomical measure¬ ments.

By exposing a photographic plate to the light of a heavenly body, at the focus of a suitable telescope or camera, and giving the requisite motion to the telescope to compensate for the apparent motion of the heavenly body, we are able to secure an autographic record of the form and details of that body, and also of its apparent position with reference to the sur¬ rounding stars. In the case of celestial objects such as the nebulae and the more distant stars, whose light is in most cases so faint that they cannot be properly studied or measured by

visual observations even with the greatest tele¬ scopes, long exposures of the photographic plate enable us to secure strong and distinct photo¬ graphic records which can be studied and meas¬ ured with ease and certainty. Furthermore, the more recent photographs show countless stars and countless details of nebulae which are so faint that no trace of them can be detected visually with any telescope.

Photographic methods have been applied to solar and stellar spectroscopy with results fully as important and remarkable as in the case of the direct photography of stars and nebulae.

These methods are described in separate ar¬ ticles.

The present paper describes briefly the methods and instruments used in photographing the Milky Way or galaxy, star-fields, star clus¬ ters, nebulae, planets, comets and the moon. These methods will be described under the heads (1) astrophotography with refracting telescopes; (2) astrophotography with reflect¬ ing telescopes.

The telescope is used as a great camera. The large lens, or in the case of a reflecting telescope the speculum, of the telescope serves as the lens of the camera ; the tube of the telescope serves as the camera body or box; the photographic plate is placed at the focus of the lens or speculum. The telescope is moved slowly by a powerful machine called the driv¬ ing-clock, so that it continually points accu¬ rately at the apparently moving celestial body. In addition, a guiding or pointing telescope is usually attached rigidly to the tube of the pho¬ tographic telescope, to enable the astronomer to watch throughout the exposure of the photo¬ graphic plate, and to introduce minute cor¬ rections of motion or position, when he sees that such corrections are necessary.

Astrophotography with Refracting Tel¬ escopes. — Among the earliest celestial pho¬ tographs of great value secured with refracting telescopes were those made by Barnard, Rus¬ sell, Wolf and others, using the type of refractor known as the portrait-lens or photo¬ graphic doublet. This type of instrument pos¬ sesses the advantage that it includes a large area of the sky in one photograph, with con¬ siderable sharpness of detail all over ; the best instruments of this class give a usable field of 10 or 12 degrees of arc in diameter, whereas the usual type of photographic refractor gives a usable field only one or two degrees in diameter. The astronomical photographic doublet is usually made of relatively small focal length, the ratio of focal length to aperture being 4*4 or 5 to 1 ; this of course results in a relatively low magnifying power. In fact the great usefulness of this

type of in¬ strument is due primarily to the large area of sky which it includes ; and sharpness of detail is to some extent sacrificed in order to cover a very large field.

Using this type of instrument Barnard, Wolf, the astronomers of Harvard University Observatory, Franklin- Adams and others have been eminently successful. Barnard, using first the six-inch Willard doublet of the Lick Ob¬ servatory, and later the 10-inch Bruce doublet of the Yerkes Observatory, has photographed the great star-clouds and the remarkable dark rifts of the Milky Way, the great areas of extended faint nebulosity and comets. Wolf at Heidelberg, using a pair of 16-inch photo¬ graphic doublets, has made a study of all of the known large nebulae and nebulous regions' of the northern heavens. The Harvard University astronomers have covered the entire northern heavens again and again with similar instru¬ ments of moderate power at Cambridge, and have also established an extremely powerful 24-inch telescope of this type at Arequipa, Peru, with which they have photographed the Milky Way, the Magellanic Clouds, the star- clusters and the nebulse of the southern celestial hemisphere. Franklin-Adams, using a 10-inch

1 The double-slide plate-carrier of the 60-inch reflector, Mt. Wilson Observatory

2 Globular star-cluster Messier, 13 in constellation of Hercules

instrument, and working in England and in southern Africa, has included the entire north¬ ern and southern celestial hemispheres in his series of photographs.

In the hands of Barnard and others the portrait-lens type of refractor has been of great service in the photography of comets, with their extended tails. This type of instrument has been successfully used also in the discovery of faint comets and asteroids, by means of the slight movement of the comet or asteroid among the surrounding stars, in an exposure of several hours' duration.

An entirely different type of photographic refractor is that which was first used by Rutherford of New York, a great pioneer in this work. About 1870 Rutherford took a fine achromatic visual objective of 12

inches aper¬ ture and 15 feet focal length, and deliberately modified the surfaces of the glasses composing this objective, in such a way as to convert the visual objective into a photographic one. With this telescope Rutherford made a series of fine photographs of the moon and the coarser star clusters. About 15 years later the Henry brothers of the Paris Observatory constructed first an eight-inch, then a 13-inch photographic telescope of a type which proved so successful that it was adopted at the Paris conference of astronomers in 1887 for use in making the International photographic map of the heavens. Observatories of many nations have co-operated in this great work, the telescopes used being of uniform size and power. Each telescope has both a photographic and a visual lens or ob¬ jective, the two objectives being mounted side by side in a double tube. The visual lens enables the astronomer to watch and to intro¬ duce the necessary minute corrections in the motion of the telescope while the photograph is being taken with the other lens. The photo¬ graphic lens or objective does not give a sharp visual image or focus, but does unite in sharp focus all of the rays of light of the blue region of the spectrum, which rays are the ones which are chiefly effective in photography. Similarly the visual lens or objective would not give a sharp photograph, unless special precautions were taken, as described later in this article, but it does unite in one sharp focus all of the rays of light in the yellow region of the spec¬ trum, which rays chiefly affect the human eye. The type of photographic refractor now being described gives sharply defined photographs covering an area of the sky about two degrees in diameter ; and by its use the work of chart¬ ing the stars of the entire heavens down to stars of the 13th magnitude has progressed with much success.

The marked success of the type of photo¬ graphic refractor just described has led to the construction of several telescopes of much greater size but of similar type ; i.e., with both photographic and visual objectives. Two of these great instruments, one at Meudon, France, and one at Potsdam, Prussia, are probably the largest and finest refractors in Europe. They have been used largely in spectroscopic work, and also for direct photography of star-clusters, planetary nebulse, etc.

In the United States, methods very different from the above have been used for adapting for photographic purposes the very large visual refractors of the Lick, Yerkes and other ob¬

servatories. The 36-inch Lick refractor is pro¬ vided with an additional single lens, 33 inches in diameter, called the photographic corrector, which can be attached to the cell directly in front of the two

lenses comprising the visual objective. The resulting combination of three lenses gives a sharp blue or photographic image or focus. This combination was utilized by Burnham, Colton and others in making a very fine series of photographs of the moon. A lunar atlas comprising these photographs was published by the Lick Observatory.

At the Yerkes Observatory a much simpler and more economical method is used for adapt¬ ing the 40-inch visual refractor to photographic purposes. A yellow color-screen or ray-filter is used at the focal plane in contact with a very sensitive Hsochromatic^ or yellow-sensi¬ tive photographic plate. The ray-filter excludes the out-of-focus blue image (which otherwise would destroy the sharpness of the photograph) and allows the sharp and intense yellow image given by the visual objective to pass through and act upon the yellow-sensitive plate. By this means Ritchey secured a series of very sharp photographs of lunar details, and with the addition of a double-slide plate-carrier for guiding during long exposures, the same ob¬ server secured a series of large-scale photo¬ graphs of the dense globular star-clusters. With the same telescope and with similar methods Barnard secured very fine photographs of the brighter planetary nebulae and of the planets. The use in this way of the yellow ray-filter and yellow-sensitive plates has made all visual refractors available for photographic purposes. In fact several of the largest visual refractors in the world are now being used, by this means, in securing photographs for meas¬ urements of the very greatest refinement and accuracy, including measurements for stellar parallax.

Astrophotography with Reflecting Tel¬ escopes. — For photographic purposes the re¬ flecting telescope possesses several most im¬ portant advantages over the refractor. First of these is its perfect achromatism; that is, in the reflector all colors or wave-lengths of light are brought to a focus in one and the same focal plane. A second advantage is that, in the case of the very large telescopes necessary in modern astrophotography, discs of glass of a quality suitable for reflectors can be secured much more easily and cheaply than those re¬ quired for refractors; in practice this means that reflecting telescopes can be made of very much greater size and power than is possible in the case of refractors. A third advantage of the reflector is that a single instrument can be so designed and constructed that it can be quickly adapted to various focal lengths, and it is therefore readily available for the photog¬ raphy of celestial objects requiring either low, intermediate or high magnifying powers. A fourth great practical advantage is that the reflector is relatively a short and compact form of telescope; this ensures comparative freedom from flexures which would affect the accuracy of the resulting photographs ; and it greatly

reduces the size and cost of the protecting dome and building.

About 1863, De La Rue in England and Draper in America first used reflecting tele¬ scopes for celestial photography, chiefly of the

moon; De La Rue using a 13-inch telescope with speculum-metal mirror and Draper a 16- inch with silvered glass mirror. About 1886 Common in England, using a 37-inch reflecting telescope with mirror by Calver, made the finest photographs of the larger and brighter nebulae made up to that time. Common's success was so encouraging that he later constructed a 60- inch reflector, with which he secured many ex¬ quisite photographs of nebulae. A marked con¬ tribution made to astrophotography at this time was the invention by Common of the double-slide plate-carrier in its simple form, for guiding during long exposures. In 1888 Roberts in England, using a 20-inch reflector with mir¬ ror by Grubb, began a long series of photo¬ graphs of nebulae and star-clusters. Common's and Roberts' work with reflectors aroused pro¬ found interest among astronomers, as did also the Henry brothers' work with refractors, for these were the first highly successful efforts in astrophotography with large instruments and with long exposures. Common's 37-inch re¬ flector was bought by Crossley, and was pre¬ sented by him to Lick Observatory in California, where about 1899 it was used by Keeler, with more refined methods than had hitherto been applied, in making a long series of exquisite photographs of faint nebulae and star-clusters. As a result of these photographs Keeler was able to announce two discoveries of capital im¬ portance: First, that the spiral nebula is the prevailing or most numerous type of nebulae; second, that hundreds of thousands of spiral nebulae are within the reach, photographically, of such an instrument as the Crossley reflector. Keeler's epoch-making work was interrupted by his death in 1900, but since has been continued at the Lick Observatory by Pcrrine, Curtis and others.

In 1901 Ritchey completed the 24-inch re¬ flector of the Yerkes Observatory, and in 1901 and 1902 secured with it a series of photographs of the remarkable changing nebulosity around the star Nova Persei, a work which was simul¬ taneously carried on by Perrine at Lick Ob¬ servatory. This nebulosity .was so faint that it was invisible in all visual telescopes, and could be photographed successfully only with the great short-focus reflectors. Later Parkhurst and others used the 24-inch reflector with great success in stellar

photometry.

In 1908, under Ritchey's superintendence, the 60-inch reflector of the Mount Wilson Observa¬ tory was completed and installed at the summit of Mount Wilson, California, nearly 6,000 feet above sea-level. This great instrument, de¬ signed esnecially for celestial photography in many lines, is unique in many respects, two of which may be mentioned : first, nearly the en¬ tire weight of the moving parts is floated in mercury, thus securing a very high degree of smoothness of motion in following the apparent motion of the heavenly bodies ; second, a series of interchangeable ends of the telescope tube allows any one of a number of small mirrors, plane and convex, to be used in combination with the great mirror; by this means the tele¬ scope can be very quickly changed to any one of the various forms needed for the various kinds of work in celestial photography; the forms used are the Newtonian, the Cassegrainian and the Coude.

With this instrument used in a superb cli¬

mate, and combining great size with great refinement of construction and the high photo¬ graphic efficiency of the reflector, remarkable results have been secured in many lines of astrophotography. Adams and others have conducted epoch-making researches in stellar spectroscopy ; Sears and Shapley have secured a long series of observations of the highest accuracy in stellar photometry; Van Maanen has made investigations of high accuracy in stellar parallax. Ritchey has made a series of photographs of spiral and other nebulae and of star-clusters for the purpose of studying inter¬ nal rotation and proper motion of these bodies. Fath and Pease have also made many fine di¬ rect photographs of nebulae, and have made very long-exposure photographs of the spectra of nebulae and star-clusters.

As an illustration of the degree of refine¬ ment attained in astrophotography with sucii an instrument as the 60-inch reflector, the at¬ tachment used in direct photography, and illus¬ trated in Fig. 1, mav be briefly described. It is the improved double-slide plate-carrier, de¬ veloped by Ritchey from the simple form devised by Common. The telescope tube of course moves bv clock-work to follow the ap¬ parent motion of the heavenly bodies due to the earth's daily rotation. This motion of the telescope is marvelously smooth and accurate, but is nevertheless far from being accurate enough to suffice, alone. To secure the sharpest attainable photographs the observer must watch, throughout the entire time of exposure of the sensitive plate, a suitable guide-star as close as possible to the object being photographed; this is done by means of a high-powrer eye-piece or

microscope with illuminated cross-lines of spider-web at its focus. Minute corrections of position are constantly introduced by the ob¬ server by means of two screws, the large milled heads of which are held in the observer's fin¬ gers ; these screws move the two slides, at right angles to each other, which carry the plate- holder. A second guiding eye-piece, on the opposite side of the plate-holder, is also used to permit the detection and correction of any slight rotation of the field; this rotation is certain to occur in an instrument as powerful and sensitive as the 60-inch, and long-exposure photographs would be ruined by it unless such corrections were introduced. Furthermore, as the length of the steel tube of the .telescope changes slightly with temperature throughout the night, the focal plane of the mirror changes slightly with reference to the plane of the pho¬ tographic plate. Hence an accurate method of refocussing is used, by which this relative change is corrected at frequent intervals. With these refinements very long exposures on ex¬ cessively faint objects can be continued hour after hour and night after night with the cer¬ tainty that no errors can occur which could injure the sharpness of the photographs. Two concrete examples will illustrate the results secured by these methods. A photograph of the spiral nebula Messier 33 Triari'guli, taken with an exposure of ST/2 hours, shows over 26,000 nebulous stars undoubtedly belonging to the nebula itself, besides about 3,500 other stars not nebulous, which lie between us and the nebula; all of these are within an area of the sky 30 minutes of arc square. A photograph of the globular star-cluster Messier 13 Hercules ,

with 1 1 hours' exposure, shows by actual count over 30,000 stars in the cluster, outside of the dense central region in which the star-images to some extent superpose, and where counting is therefore impossible ; photometric measures show, however, that, at least an equal number of stars are present in this dense central region. In the latter photograph the faintest stars shown are of 21 p2 magnitude; this is five mag¬ nitudes, or approximated 100 times, fainter than the faintest stars which can be seen (visually) in the largest visual refractors. In the best of these photographs the fainter star- images arc less than one second of arc in diameter.

Another illustration of the extraordinary results in astrophotography made possible by the great modern reflecting telescopes is the recent discovery of numbers of very faint novae or "temporary stars® in the spiral nebulae. These stars apparently correspond in all re¬ spects to

the novae which occur in our own stellar system or galaxy; they form another link in the chain of evidence tending to show that some of the spiral nebulae, at least, are other stellar systems similar to our own. A comparison of the average brightness of all of the novae which have occurred in our own galaxy (about Sy2 magnitude) with the aver¬ age brightness of all of those which have re¬ cently been discovered in the photographs of spiral nebulae (about 14 magnitude), affords what is at present the most reliable method of estimating the average distance from us of the spiral nebulae, as compared with that of the novae in our galaxy; this relative distance is thus shown to be of the order of 50 to 1.

George W. Ritchey,

Astronomer, Mt. Wilson Solar Observatory, Pasadena, Cal.

ASTROPHYSICS, or the new astronomy, the science dealing with the physical nature of the heavenly bodies, has revealed in a re¬ markable manner, through its discoveries during the last half-century, the wonderful ability and resourcefulness of the human mind. By means of the spectroscope we have been able to investigate the physical constitution of the sun, planets and far-off stars ; it has be¬ come possible to measure motions, not athwart the sky as the older astronomy was able to do, but to or from the observer in the line of sight; and it has been possible to arrange the stars in orderly series, tracing their evolu¬ tion from the primaeval nebula, till now we are well on the way toward the solution of the grandest problem of human investigation, whence came we and whither are we going? Since its birth in 1859, when Kirchhoff dis¬ covered the principles of spectrum analysis, astrophysics has advanced with great rapidity, due to the improvement of instruments and to the application of the photographic plate. This important acquisition has a two-fold ad¬ vantage over the human eye : the eye can re¬ ceive and retain an impression for a small fraction of a second only; the photographic plate accumulates impressions, no matter how faint, with the result that by long exposures there is brought to view objects the eve could never hope to see ; and secondly, the photo¬ graph gives a permanent record that can be examined and studied at leisure.

Instruments. — A spectrum is produced

either by a prism or a grating. With prisms, increased dispersion is obtained by additional prisms. . In work on the sun, before the use of gratings, it was quite common to employ 20 or more prisms. Gratings were used as early, as 1815 by Fraunhofer and were made by winding

fine wire over two exactly similar screws. . Rutherfurd of New York ruled some very satisfactory gratings on speculum metal. A diamond is used as the ruling point and the plate to be ruled is moved by means of a screw. The character of the grating depends on the excellence of the screw. Rowland of Johns Hopkins University made a dmding engine , of such accuracy that he was able to rule six-inch gratings with 20,000 lines per inch.. The splendid definition of Rowland gratings has. never been surpassed. Rowland made the brilliant discovery that if the grat¬ ing were ruled on a concave surface the spec¬ trum could be focussed without the use of collimator or camera lenses. By the elimina¬ tion of these lenses not only was the sharpness of definition increased but the region of short wave-lengths could be investigated. This vast increase in accuracy, coupled with other prop¬ erties of the grating, namely, normal spectrum, overlapping spectra and astigmatism, whereby comparisons are rendered easy by coinci¬ dences, have wonderfully augmented the power of the astrophysicist to determine accurate wave-lengths. The concave grating thus marked a new epoch in the history of spec¬ troscopy. The formula for resolving power

l

which is defined as 7 la , where al is the

difference of wave-length of two lines of mean wave-length l which can just be di¬ vided, can easily be expressed for a grating and is the product of the total number of lines of the grating and the order of the spec¬ trum. Ordinary six-inch Rowland gratings have a resolving power of about 400,000. Rowland's dividing engine was not capable of ruling gratings greater than six inches in diameter. Quite recently Michelson of the University of Chicago and Anderson of the Carnegie Solar Observatory have succeeded in ruling 10-inch gratings with an accuracy quite comparable with that attained by Row¬ land. A grating of different form is the echelon invented by Michelson, made by put¬ ting together glass plates of uniform thick¬ ness. By this means Michelson has obtained a resolving power as great as 900,000. The precision of wave-lengths has been still fur¬ ther increased by the use of interferometres. Four different kinds have been invented by Michelson, Perot and Fabry, Hamy, and Lum- mer and Gehrcke. Michelson has been able to compare directly the wave-lengths of the prominent cadmium lines with the Internation¬ al Metre (Michelson, (Light Waves and Their Uses^ 1903), and has separated lines less than 0.01 tenth-metre apart which appear single in the most powerful gratings, while Perot and Fabry have observed interference with the green mercury line at a difference in path of 790,000 wave-lengths.

Wave-lengths. — The unit generally used in the measurement of wave-lengths is the Angstrom, or tenth-metre, or metre divided by 1010. A great change has recently come over our ideas of the wave-length, Formerly

the wave-length was looked upon as an in¬ variable property of a line in the spectrum, unalterably fixed by nature, and consequently it was thought that a wave-length determina¬ tion would give a standard measure of dis¬ tance more reliable even than that obtained by the use of the International Metre (Mi- chelson, (Astronomy and Astrophysics,5 XIII, 92, 1894). But we now know that the position of the lines in the spectrum may vary with the pressure of the gas in which they are produced, and moreover, single lines, by the action of a magnetic field, have been sep¬ arated into as many as 19 different components. The shift in the lines of the spectrum due to motion in the line of sight, which has been shown experimentally in the laboratory, has given rise to many interesting developments in astrophysics, the discovery of an entirely new class of stars called spectroscopic binaries, the measurement of the axial rotation of the sun and Jupiter, and has confirmed in a magnificent manner the meteoric constitution of Saturn's rings.

Spectra of the Elements. — The invention of the concave grating and the manufacture of nearly perfect gratings, plane and concave, by Rowland, enormously increased the accuracy of the wrave-lengths in the spectra of the ele¬ ments. The chief investigations in this field have been carried on by Rowland and his as¬ sistants, by Kayser, Runge, Paschen, Hassel- berg, Liveing and Dewar, Eder and Valenta, Exner and Haschek, Hartley and Adeney, Trowbridge, Ames, Lockyer, Deslandres, Lohse and others. The most complete tables of wave¬ lengths are those of Exner and Haschek, in which the wave-lengths are given to 0.01 Angs¬ trom. Other tables are Watt's (Index of Spectra.5 The standards on which all wave¬ length tables are based are Rowland's (Table of Solar Spectrum Wave-Lengths,5 which were based on Bell's determination of absolute wave¬ length, American Journal of Science , XXXIII, March 1887. For a discussion of methods of de¬ termining wave-lengths consult Perot and Fabry, (Ann. Chim. et Phys.,5 ser. 7, XV, 1899, also XXV, 1902, and Bell (Astrophysical Journal, XV, 157, 1902). The infra-red spec¬ trum of the elements has been investigated by prism and concave grating with the help of bolometer and radiomicrometer by Snow, Lewis, Rubens, Paschen,

Julius, Nichols and others. Short wrave-lengths are absorbed by even a few centimetres of air, but Schumann ((Sitz. Akad. d. Wissens. in Wien,5 CII. Abth. 2a, 1893), has greatly increased our informa¬ tion of this region of the spectrum. By means of a spectroscopic apparatus in a vacuum with lenses and prisms of fluorite and photographic plates prepared by himself, a wave-length of 7- 1,000 was supposed to be reached. More ac¬ curate wave-lengths have been determined by Lyman of Harvard, using a concave grating in a vacuum and photographic plates poor in gela¬ tine, as shown by Schumann. Lyman has reached as short wave-lengths as 7, 600 (As¬ trophysical Journal, XLIII, 89, 1916), and the limit of short wave-lengths can probably be pushed still .farther by this same method.

Line Series. — That there is some orderly arrangement in the lines of a spectrum was shown by Balmer's law for the hydrogen se¬ ries in 1885, and by the presence of numerous

triplets in the' spectra of magnesium, calcium and zinc. Researches by Kayser and Runge, Rydberg and Schuster, with the development by them of empirical and mathematical for¬ mulae, have led to a great deal of interesting information regarding these series of lines. Our knowledge of the spectrum of hydrogen is derived mainly from the observations of the heavenly bodies. In the laboratory, compara¬ tively few lines are found in the series obey¬ ing Balmer's law, but these lines are well shown in the spectra of hydrogen-type or class A stars, and as many as 32 lines of this series have been measured by Mitchell in the eclipse spectra of the sun. The further interdependence of astronomy and physics was clearly demon¬ strated when Pickering in 1896 discovered a new series of lines in the spectrum of the star £ Puppis. It was not till 1892 that Fowler of London succeeded in finding in the laboratory some lines of the £ Puppis series, and also 4 4686, and other lines of the Principal series of hydrogen. At the same time Fowler discov¬ ered a second Principal series of hydrogen, and comes to the conclusion that ((there are no spe¬ cial kinds of matter in celestial bodies and that most, if not all, of the celestial spectra are well within range of laboratory experiments.55 ("Monthly Notices,55 R. A. S., LXXIII, 62, 1912). However, in a great majority of the elements the series already discovered com¬ prise only a small percentage of the total num¬ ber of lines. The exact meaning of these se¬ ries is as yet unknown, although several very promising attempts have been made to explain them from theoretical considerations. The chief among them may be mentioned those of Julius, Ames, Kovesligethy and Stoney. Stoney ((Trans. Roy. Soc.,5 Dublin 1891) has sought to explain multiple lines from dynamical con¬ siderations, comparing the motions of the mole¬ cule with those of the bodies of

the solar sys¬ tem whose motions in ellipses are perturbed by the presence of other bodies. Stoney, more¬ over, shows that the conclusions drawn by these dynamical methods may also be considered valid under the electro-magnetic theory of light, a statement which receives support from Pres¬ ton's observations of the Zeeman effect (Philo¬ sophical Magazine, XLVII, 176, 1899). For de¬ tailed information on spectral series consult Kayser's (Handbuch der Spectroscopie5 Vol. II.

Change in Physical Conditions. — The early idea that the position of a line of a spec¬ trum was the result of chance is still further modified by the change of the wave-length of a line resulting from a change in the physical conditions. Jewell noticed while measuring solar spectrum photographs that the arc lines of the comparison spectrum did not in many cases exactly correspond with the lines in the sun. This led to the investigations of Jewell, Humphrevs and Mohler (Astrophysical Jour¬ nal, VI, 169, 1897), on the spectra of an arc under pressure of from one to 15 atmospheres. From measurements of the spectra of 53 ele¬ ments, it was shown that the lines are shifted by pressure toward the red end of the spec¬ trum, the amount of the shift being directly proportional* to the increase of pressure, but being independent of the temperature. For a given element, the shifts of similar lines are proportional to their wave-length, but lines of

different series, principal, first and second sub¬ ordinate, are shifted in the ratios of 1 :2 :4.

The appearances of lines in a spectrum are greatly altered by other physical conditions. Eder and Valenta have found that argon gives three distinct spectra under different electrical conditions, Schenck that the spark line of Mg at 7 4481, which has so often been considered as a sure sign of a high temperature, vanishes if the electrodes become so hot that they glow and begin to melt. Lockyer has made a great number of investigations on ˆenhanced® lines, or those which are brighter in the spark than in the arc. He explains their meaning on the assumption that the spark is hotter than the arc, an assumption which is hard to reconcile with other observed phenomena. In this con¬ nection, Kayser, in his excellent (Handbuch der Spectroscopies Vol. II, p. 181, says: ((We can¬ not assume any connection between the spec¬ trum and the temperature of the body produc¬ ing it, and all conclusions which are based on the

temperature at which a line or band will appear are quite unsound.® Enhanced lines are found in the spectrum of certain stars like a Cygni, and also in the flash spectrum taken at the time of a total solar eclipse of the sun. Evershed of India, and the observers at Mount Wilson, Adams, Gale and St. John, recog¬ nize the importance of enhanced lines in the interpretation of solar phenomena. Observa¬ tions of solar spectra, with and without an eclipse, point to the conclusion (Astro physical Journal , XXXVIII, 407, 1913), that «the vapors forming the enhanced lines ascend to relatively high altitudes from which there results a de¬ crease in pressure and a mixing with hydrogen, and that on account of height, reduced pres¬ sure and the presence of hydrogen, the en¬ hanced lines become relatively strong.

Solar Spectrum. — The infra-red solar spectrum has been investigated by Becquerel and Lommel to 7 9500 by using phosphorescent screens, by Abney to 7 27,000, who photo¬ graphed with a special emulsion of silver bromide and collodion, and by Langley by the use of the bolometer to 7, 53,386. Rowland's

(Photographic Map of the Normal Solar Spec- trum > (Baltimore 1888), made with a powerful concave grating extending from 7. 3000 to

7' 6950, and his (Table of Solar Spectrum Wave-Lengths } (Chicago 1898), which contain accurate measures of some 20,000 lines, give the most accurate information we possess of the solar spectrum, and have been accepted by all astrophysicists as the common standard of reference. Rowland's determinations, of relative wave-lengths leave little to be desired in ac¬ curacy. Measures were made by the method of coincidences which is rendered possible by the use of concave gratings which permit two over¬ lapping spectra to be photographed on the same plate without change of focus. However, the standard lines of the spectrum have not had their wave-lengths determined with equal ac¬ curacy, and they have not been quite properly spaced throughout the spectrum, with the re¬ sult that at the Saint Louis conference, 1905, a redetermination of Rowland's standards was re¬ garded as one of the present greatest needs in astrophysics. Considerable work has already been done toward obtaining the wave-lengths of 200 standard lines to be reduced to the so- called international system.® This work has

made evident the difficulty of obtaining satis¬ factory wave-lengths for the standard lines on account of a -slight change in wave-length due to a change in physical conditions. Although the systematic deviations of Rowland's wave¬ lengths from the international system

amounts to 0.02 Angstroms or more, the accidental er¬ rors are much less than 0.01 Angstrom. As present-day investigations of solar problems need the third decimal place in the wave¬ lengths, St. John concludes (Proceedings } of the National Academy of Sciences, April 1916), that it will be more satisfactory to re¬ duce all wave-lengths to the Rowland standard until some years hence, when complete tables of solar wave-lengths based on the new stand¬ ards will be available.

The importance of a detailed study of our nearest fixed star, the sun, has been empha¬ sized by the erection by the Carnegie Institu¬ tion at Washington of the Solar Observatory at Mount Wilson. The discoveries at this ob¬ servatory have been epoch-making. The work at Mount Wilson has demanded (1) a large image of the sun; (2) that spectrographs be kept under as nearly constant conditions of temperature as possible. Hence there has been the erection by Hale of the (<:tower telescope.® There was first erected a 60-foot towrer, arid this proving successful, there was later put up a tower 150 feet high. A beam of sunlight re¬ flected from a plane mirror at the top of the tower passes through an objective and is brought to a focus on the slit plate of the spec¬ trograph. From the slit, the beam passes ver¬ tically down a 75-foot well, at the bottom of which is placed a concave grating. The splen¬ did definition obtained in California, and the great dispersion of the large spectrograph, have permitted a detailed study of spots on the sun. The work of Hale has shown (1) that sun¬ spots are cooler than the rest of the sun; (2) that the spots are vortices; (3) that they are centres of magnetic disturbance. These facts have been verified only after a great variety of experiments carried out at Mount Wilson and at the Solar Observatory Office in Pasa¬ dena.

Eclipses have furnished interesting develop¬ ments in the history of spectrum analysis. The spectroscope was first used at the eclipse of 1868 by Janssen in India, when it was shown that the prominences give a bright line spectrum, thus showing that they are masses of gas. The lines appeared so bright in the spectroscope that Janssen looked for them the next day without an eclipse and found them readily enough. In 1869 helium was discovered on the sun, though it was not found in the laboratory by Sir William Ramsay till 1895; in 1870 Young discovered the ((flash spectrum.®

Observations similar to Janssen's of 1868 were independently carried out by Lockver in England, who found the prominendes without the aid of an eclipse. Both communicated their results to the French Academy, and by a strange coincidence both papers were read at the same meeting of the Academy. Prominences thus ceased to be purely

eclipse phenomena. Val¬ uable observations were made by Young, who used visual methods. In 1890 Hale invented the spectroheliograph, by means of which it was possible to photograph the prominences. Quite independently, Deslandres of Paris in-

vented a similar instrument. The essential feature of the spectroheliograph is the second slit, which is placed directly in -front of the photograph plate and is used to allow light of only one wave-length to reach the plate. Hale's spectroheliograph reached its highest develop¬ ment on the 40-inch Yerkes telescope. By set¬ ting the second slit on a certain line of the spectrum it was possible to photograph the prominence in the light of that line only. Pho¬ tographs could thus be obtained in the light of glowing calcium vapor by utilizing the H or the K line of calcium, or from glowing hydro¬ gen using the C or H a line. The exquisite de¬ fining power of the 40-inch lens has permitted remarkable detail to be shown in the prom¬ inence photographs. At times prominences reach the great elevations of 300,000 miles above the sun, and are shot up with velocities as great as 100 miles per second. The chief workers along these lines have been Hale, Des- landres, Evershed, Fox, Slocum and Ellerman. They all have shown that prominences are in¬ timately associated with sun spots.

In photographing the surface of the sun by means of the spectroheliograph, Hale discov¬ ered bright patches of gas which he called (<flocculi.® In his investigations of flocculi, Hale found that the photographs showed differ¬ ent appearances when the slit was shifted to a slight amount from the centre of the line of the spectrum which was being utilized. A photo¬ graph may be taken with the slit of the spectro¬ heliograph at the centre of the K line at 7. 3933.8, another with the slit moved a trifle to 7 3932, and still others with the slit at 7, 3929 and 7 3924. These photographs show bright <(flocculi,® but the four of them not only differ from photographs taken with the calcium H or with hydrogen C or F lines, but differ ma¬ terially among themselves. These photographs are explained as being due to a difference in level of the gases, and from these and other results it seems probable that the calcium flocculi are in general made up of a scries of columns, which expand as they reach higher levels, and in many cases overhang laterally. Both prominences and flocculi may be photo¬ graphed by a spectroheliograph attached to a horizontal telescope in which the light is fed to the objective by means

of a plane mirror, as Hale has shown at Mount Wilson and Evershed in India. These horizontal telescopes, however, do not equal the definition obtained by the 40- inch telescope.

The dark Fraunhofer lines of the solar spectrum are caused by the absorption of light as it passes from the hot photosphere through the relatively cooler layers of atmosphere sur¬ rounding the photosphere, the so-called <(re- versing layer.® The gases forming the revers¬ ing layer are cool only in contrast to the very hot matter making up the photosphere, but these gases, nevertheless, are at such a high temperature, that if we could obtain their spectrum separated from the photosphere, the spectrum would consist of a series of bright lines on a dark background. At the time of a total eclipse of the sun, we are permitted to obtain the spectrum of the reversing layer. So long as even a small portion of the sun's disc remains visible, the light from the photosphere is so overpowering compared with that of the reversing layer, that the ordinary, dark-line

Fraunhofer spectrum is obtained. Just before lotalitv a few bright lines of the upper chromo¬ sphere become visible, first the H and K lines of calcium, and these are followed by the hydrogen and helium lines. At the instant that the sun's disc is entirely covered by the moon, there flashes out the bright line spectrum of the reversing layer. The change from dark-line to bright-line spectrum is so rapid that Young in 1870, who was the first to see it, called it the ((flash spectrum.® The flash remains visible in its entirety only for a few seconds, while the moon is passing over the relatively shallow re¬ versing layer. The flash spectrum was first photographed in the year 1896 by Shackleton, who used a prismatic camera. The most com¬ plete results so far published are those of Mitchell, who obtained exquisite definition on his photographs at the 1905 eclipse. The ap¬ paratus used was extremely simple, and con¬ sisted of a plane mirror to turn the sun's light horizontally. From the mirror, the beam of light fell on a concave grating by means of which the spectrum was brought to a focus on the photographic plate. No slit was used. Photographs were obtained extending from 3- 3300 in the violet to 7, 5900, with a dispersion of one mm equal 10.8 Angstroms. The wave¬ lengths of 2841 lines in this region (Astrophys - ical Journal, XXXVIII, 407, 1913), show an accuracy of 0.02 Angstroms. In addition to the wave-lengths, there were also given the heights to which the vapors forming each line of the spectrum extend in kilometres above the sun's photosphere. The general conclusions from this eclipse work are: (1) That the reversing layer is merely the densest part of the chromo¬ sphere, and has no existence separate from the chromosphere; (2) that the reversing layer extends about 600 kilometres above the photo¬ sphere; (3) that there

is no difference in wave¬ lengths between the spectrum of the reversing layer and Rowland's values for the Fraunhofer lines, showing that in reality the flash spectrum is truly a reversal spectrum; but (4) there are great differences in intensities between the lines of the flash spectrum and the Fraunhofer spectrum. These intensity differences find a ready explanation in the differences in height to which the vapors extend. On account of the great heights, . the H and K lines of calcium, the hydrogen series, and the helium lines are all strong in the flash spectrum. Very great dif¬ ferences in intensity are shown by the enhanced lines.

Prominences are merely portions of the chromosphere shot up to great heights above the sun. Since we are able to photograph the prominences without waiting for an eclipse, would it not be possible to obtain a photograph of the chromosphere, even of the portion that lies closest to the photosphere, the reversing layer, which produces the flash spectrum? Young many years ago observed the brighter chromosphere lines without an eclipse. Evi¬ dently it would be quite possible to photograph the flash spectrum provided that during the ex¬ posure the slit could be held pointed at the reversing layer, arid the photosphere not be allowed to encroach. An idea can be obtained of the accuracy demanded in pointing the slit to the proper region on the sun when it is realized that the sun is 866,000 miles in diam¬ eter, while the reversing layer is less than 400

miles in thickness. To photograph the flash spectrum without an eclipse, there is hence needed a large image of the sun, and some con¬ venient guiding device. Hale and Adams, using a very ingenious arrangement and the 60- foot tower telescope, have obtained the only photo¬ graphs of the flash spectrum without an eclipse. Using a dispersion of 1 mm equal 0.9 Ang¬ stroms, excellent photographs have been ob¬ tained which show about as many lines as se¬ cured by Mitchell with an accuracy of wave¬ length about the same as that obtained by him.

Success, however, has not followed the at¬ tempts to photograph the corona in full sun¬ light without an eclipse. This was tried as early as 1885 by Sir William Huggins. In 1893 and 1894, Ricco at Mount Etna, and Hale at Pike's Peak, attempted to photograph the corona, both by direct photography and also bv the spec- troheliograph, which has been so successful in obtaining photographs of the prominences.

Failure to reach results, turned Hale's attention to the bolometer joined up with a sensitive gal¬ vanometer, and many experiments were made at Yerkes Observatory between the years 1895 and 1900 (Astrophysical Journal , I, 3 72, 1900). The cause of the failures is shown from the measures at the eclipse of 1908 by Abbot with the aid of the bolometer. The work of Abbot OSunP p. 132, 1911) shows that the davlight sky as seen from sea-level even 20° from the sun is fully 10 times as bright as the corona in its brightest parts close to the sun's limb. Close to the sun's edge the daylight sky is so in¬ tensely brilliant compared with the corona, that no method yet attempted, even when tried at a mountain top to diminish the atmospheric glare, has had the slightest amount of success.

Remarkable work has been done by Evershed in measuring the radial motion of matter form¬ ing sun-spots. With the better equipment at Mount Wilson, St. John has carried out Ever- shed's work more in detail. His researches {Astrophysical Journal , XXXVIII, 341, 1913) have been supplemented by the determination of heights by Mitchell from observations at the time of an eclipse. These results show that the different displacements of the Fraunhofer lines at the edges of sun-spots seem to find their simplest explanation in movements of the solar vapors tangential to the solar surface with velocities varying with the elevation : large out¬ flowing displacements are taken by vapors that exist at low heights while large inflowing mo¬ tions are taken by vapors like calcium and hydrogen which exist at great heights. This excellent work of St. John's gives a very clear insight into the physical constitution of sun¬ spots. The lighter materials of the chromo¬ sphere which cause the darkest lines in the sun's spectrum, hydrogen, helium, calcium and sub¬ stances forming the stronger enhanced lines, flow in to the spots, the higher the elevation above the photosphere the greater the speed of the in-flow. This in-flow of matter is partly bal¬ anced by the out-flow of matter from the spot, matter at the least heights above the photo¬ sphere flowing with the greatest velocities. The spot vortex, therefore, resembles in appearance that of an inverted water-spout seen in a ter¬ restrial storm. In addition to giving great in¬ formation regarding sun-spots, St. John's work coupled with eclipse observations has given the means of measuring the depths of the layers of

gases forming the inner chromosphere, while Hale's wonderful researches on flocculi can be interpreted only by assuming differences of elevations in the outer chromosphere. We therefore seem to have more information con¬ cerning what is happening at different elevations in the sun's atmosphere than what is taking place in the earth's atmosphere in spite of the great improvements in methods of

observing meteorological phenomena.

Motion in the Line of Sight. — One of the greatest triumphs of astrophysics has been the measurement of radial velocity, or motion in the line of sight, in linear units of miles or kilometres per second. The Doppler-Fizeau principle is easy to understand. Light is a wave phenomenon. When the source of light and the observer are approaching each other, either by a motion of the object, or the observer, or both combined, then the number of waves which reach the eye per second is increased, while if the observer and object are moving from each other, fewer light waves reach the eye per sec¬ ond. If more waves are met, the wave-length must be shortened. The position of a line in the spectrum is known by its wave-length, and, if in consequence of motion, the wave-length is shortened, the position of the line is shifted toward the region of short wave-lengths, the violet. The measurement of the amount of the shift gives the means of determining the velocity in the line of sight. Consequently, a shift toward the violet means a motion of the object toward the observer (the motion taking place either in the object, or in the observer, or both), while a shift toward the red means a motion increasing the distance between ob¬ server and object. This is the Doppler- Fizeau principle. All are familiar with this same principle in sound, in the sudden drop in the pitch of the whistle of a locomotive as a train going in the opposite direction is met and passed. The motion in the line of sight corre¬ sponding to a shift A/ of a spectral line of wave-length 7 is given by the formula

Where

is the velocity of the star relative to

the observer, and

is the velocity of light.

If the velocity of light is measured in miles per second (186,300), the velocity is known

in miles per second. In scientific work veloci¬ ties are usually determined in kilometres per second, when the velocity of light (in round numbers) is 300,000. One can easily see, there¬ fore, the accuracy necessary in the measure¬ ment of spectrograms in order to attain knowl¬ edge of radial motions of stars to a given de¬ gree of refinement. If, for instance, we wish to know the velocity in the line of sight ac¬ curately within one kilometre per second, it will be

necessary to determine wave-lengths with a precision of one part in 300,000. For a line of wave-lengths 7, 4500, it is necessary to measure the shift in wave-lengths within 0.015 Angstroms. This accuracy is reached in the best work done with our best spectrographs, when the spectrum of the star being investi-

gated consists of fine, clean-cut lines. With a slit spectrograph a comparison spectrum is placed alongside the stellar spectrum. From the known wave-lengths of the comparison lines the wave-lengths of the stellar lines may be found, and these, compared with the normal wave-lengths, give the shift due to the motion of .the star in the line of sight. The grandest application is seen in Keeler's proof (Astrophysical Journal , I, 416, 1895) of the meteoric constitution of Saturn's rings. If meteoric, the linear motion of the rings will be greatest nearest the planet and decrease outward; if solid the rings will rotate as a whole, all par¬ ticles having the same angular motion, the linear speed increasing from centre to circum¬ ference. With solid rings and a slit placed across the planet's equator, the lines on the side moving toward us would be shifted toward the region of short wave-lengths, the shift being proportional to the linear motion, while for the side moving away from us the lines would be shifted in the opposite direction. Thus, on account of the gradual increase in linear motion from centre to circumference, the lines would be gradually shifted, in the complete spectrum having the effect of lines slightly inclined. Such, however, is not the appearance of the lines photographed by Keeler, and these can be ex¬ plained only under the assumption that the rings are a collection of small satellites, giving, therefore, a direct confirmation of the mathe¬ matical theory of Maxwell.

One of the most interesting applications of the Doppler-Fizeau principle is the determina¬ tion of the rotation periods of the sun and the planets. As the sun rotates the eastern edge moves toward us while the western moves away from us. Measurements of the rotation of the sun have been carried out mainly by Halm of Edinburgh, Plaskett at Ottawa, and Adams at Mount Wilson. The rotation time at the sun's equator is found to be 24.8 days ; at latitude 30°, 26.3q days; at latitude 45°, 28.1 days; at latitude 60°, 30.2 days; and at latitude 75°, 31.9 days. Adams used more than 20 lines of iron, titanum, manganese, etc., and he found that the different elements do not all show the same rotation period. The differences, according to Adams, can be explained as being due to differences of level of the layers

producing the different lines. Most interesting are the results from the H a line which shows a rotation pe¬ riod at the equator of 24.0 days instead of 24.8, and at latitude 75°, a rotation in 26.3 days in¬ stead of 31.9 days, as shown by the metallic lines at the same latitude. Hale has investigated the rotation time by means of the flocculi. The calcium flocculi show a decrease in rotation speed in higher latitudes, just as is shown by the spots, but in a lesser degree, while on the other hand the hydrogen flocculi H <5 show an increase from a rotation speed of 25.2 days at the equator to 24.7 days in middle latitudes. There is still a vast amount of work left to be done before a thorough knowledge is obtained of the manner of rotation of the sun.

In investigating the rotation of the planets, most satisfactory results are obtained from Jupiter. On account of its great size and rapid rotation, a point on Jupiter's equator moves with a speed of \2l/2 kilometres per second. If the slit of the spectrograph is placed across the planet, parallel to the equator, the lines of the

spectrum will be inclined on account of the great rotational velocity. Although the planet Uranus shows no conspicuous markings, and its rotation time, therefore, cannot be deter¬ mined from visual observations, Lowell and Slipher have been able to show from spectro¬ scopic observations that it rotates once in 10J4 hours, and in the retrograde direction, or in the same direction that the satellites move about Uranus. Applied to Venus, the' spectro¬ scopic method has not had the same degree of success due to the fact that the linear motion from rotation is small, and, consequently, diffi¬ cult to measure. While Slipher finds the rota¬ tion period to be 225 days, thus corroborating the results obtained visually by Schiaparelli and Lowell, Belopolsky in Pulkowa finds a period of about 24 hours.

Water Vapor on Mars. — According to Percival Lowell there are a great number of canals on Mars which are for the purpose of irrigating the arid planet. As there is very little water visible on the surface of Mars, Lowell concludes that the atmosphere is rich in water vapor. This is a matter that can be investigated spectroscopically. Since the moon has no atmosphere, it shows the same spectrum as the sun. In coming from the moon, rays of light pass through the earth's atmosphere, so that its spectrum might show atmospheric lines due to the earth's water vapor. . When light reaches us from Mars the rays from the sun have twice passed through the atmosphere of Mars. If the spectrum of Mars is compared with that of the moon, care being taken that the two spectra are observed under as nearly as possible identical conditions regarding alti¬ tude, the presence of water vapor in the earth's atmosphere, etc., then if the atmosphere of Mars is rich in

water vapor, these lines shoula show by increased absorption at the red end of the spectrum. Slipher believes that he has proved this to be the case. Campbell, under vastly superior conditions, observing from the top of Mount Whitney (15,000 feet), finds that the spectra of Mars and moon are identical. Campbell has also tested this matter in a differ¬ ent manner, but with negative results. The water vapor lines resulting from the earth's atmosphere should show a different radial ve¬ locity from those formed by the Martian at¬ mosphere, since Mars is moving. Although the terrestrial atmospheric lines were found and measured by Campbell, there were none found due to Mars.

The Solar Constant. — Astrophysical work along entirely different lines has been carried out at the Astrophysical Observatory of the Smithsonian Institution for the purpose of de¬ termining the value of the solar constant, or the amount of heat from the sun that reaches the outside of the earth's atmosphere. The amount of heat received at the surface of the earth is measured by means of the pyrheli- ometer or actinometer. It is very difficult to eliminate the absorbing effect of the earth's atmosphere. Abbot has shown that this can be accomplished by the use of the bolometer, invented by Langley and used in connection with a sensitive galvanometer. The bolometer and galvanometer, both perfected in the hands of Abbot, are used to measure the energy at different regions of the spectrum of the sun. The determination made by Langley from the

top of Mount Whitney placed the value of the solar constant at 3.0 calories. More complete observations have been made by Abbot at Washington at sea-level, at Mount Wilson at an altitude of 5,700 feet, at Bassour in north¬ ern Africa, 3,900 feet, and at Mount Whitney in California at an altitude of 14,500 feet. Ob¬ servations nearly simultaneous have been car¬ ried on at Washington and Mount Wilson, and also at Bassour and Mount Wilson, though these latter places are separated in longitude by one-third of the earth's circumference. These measures have been supplemented by observations with a pyrheliometer in a manned balloon which reached the altitude of nearly 25,000 feet, where the pressure of the atmos¬ phere was 298 mm. of mercury, and also by pyrheliometer observations in a free balloon, which reached the great height of 72,000 feet at a pressure of 30 mm. of mercury. Observa¬ tions along parallel lines have been made by Abbot for the purpose of investigating the ab¬ sorption of the gases forming the solar en¬

velope. The results from 1,000 determinations of the solar constant have proved conclusively that the so-called constant of solar radiation is 1.93 calories per square circumference per minute, that this value is not a constant, but that it varies as much as 10 per cent, that this variation is caused by changes in the absorption of the sun's atmosphere, and that as a result of these variations in the amount of heat sent out by the sun, there are parallel changes in terrestrial temperatures. The interdependence of these variations brings to view one of the most important developments of astrophysics. That terrestrial temperatures should be shown to be so closely connected with variations in the sun's heat is very remarkable ; it would be very valuable if it were possible to forecast tem¬ peratures on the earth as a result of solar ob¬ servations — a result which is not impossible.

Stellar Spectra. — Due to the fact that gratings spread the light into a number of or¬ ders of spectra, prisms are almost exclusively used in stellar investigations. A prism may be combined with the telescope, either with or without a slit. If without a slit the prism is placed outside the objective. In such a com¬ bination the dispersion is usually not very great. At Harvard College Observatory, where the best work with this method has been done, Pickering combines a prism of 15° angle with an objective of 11 inches aperture. In this manner are obtained spectra of a large number of stars at one time. To increase the width of the photographed spectra, the prism is mounted with its edge parallel to the celestial equator, and the clock-work driving the telescope is rated so as to run a little slow, or fast. To in¬ crease the dispersion, a second or third prism may be added. With the objective prism, it has so far been impossible to obtain radial ve¬ locities with the accuracy that is attained with a slit spectrograph, though Pickering has superimposed some very satisfactory additional lines in the stellar spectra by means of the ab¬ sorption of neodymium. When a slit is used, it is placed at the focus of the objective. After passing through the slit the light passes through the collimator lens, from which it emerges parallel. The light is refracted by the prism, or prisms, and is brought to a focus by the camera objective, so that the spectrum may be photographed or viewed with an eyepiece. vol. 2 — 31

Photography is almost exclusively used in mod¬ ern work. One, two or three prisms may be used to obtain dispersion. Needless to say, in¬ crease in the dispersion adds to the time of ex¬ posure necessary to obtain a photograph.

Modern stellar spectroscopes are best repre¬ sented by the Mills spectrograph of the Lick Observatory (Campbell, Astro physical

Journal, VIII, 123, 1898), by the Bruce spectrograph of the Yerkes Observatory (Frost, Astrophysical Journal, XV, 1, 1902), and that of the Astro- physical Observatory of Potsdam (Hartmann, Zeitsch. fur Instrum., December 1901). The spectrographs are similar in having the slit placed at the focus of the great telescope, and a dispersion of three prisms giving a total de¬ viation of 180°. By means of a guiding eye¬ piece, it is possible to keep the star's light cen¬ trally on the slit during the exposure. Since this exposure may last for four or five hours, it is necessary, in order to have perfect defini¬ tion, to keep the temperature constant. This is accomplished by means of an automatic tem¬ perature control which will keep the prisms of the spectrograph within 0.1° C. during an ex¬ posure, when outside in the dome the tempera¬ ture may change by several degrees. A stellar spectrum is photographed alongside a compari¬ son spectrum in order to determine wave¬ lengths more accurately, and to give measures of the motion in the line of sight, the most im¬ portant work of stellar spectroscopy. The spec¬ trograms are most readily reduced by the Hart- mann-Cornu formula :

where 70, c and are constants and .? is the scale reading of the line whose wave-length is desired.

It needed little investigation of the stars to show that difference in color of the stars cor¬ responded to differences in the character of their spectra. One of the best known classifi¬ cations is that of Secchi, who divided the stars into the following types :

Type I. — White or blue stars, the spectrum characterized by the breadth and intensity of the hydrogen lines with metallic lines very faint. This type includes more than half the stars.

Type II. — Yellow stars like our sun, with spectra resembling that of the sun very closely, consisting of a great number of fine dark lines.

Type III.— Red and orange stars, including most of the variables. The spectrum is crossed by numerous dark bands or flutings, which are sharply defined on the blue side and shade off toward the red. a Orionis, Antares and 0 Ceti are good examples.

Type IV. — Deep reddish stars, all faint. The spectrum resembles that of Type III, but the flutings are reversed in direction, being sharply defined on the red side. 152 Schjellerup is the best example.

Pickering has added a fifth type to include many stars having bright lines in their spectra, and the planetary nebulse.

Other satisfactory classifications are those of Vogel and Lockyer. The classification most used at the present time is the one devised at Harvard College Observatory. In this, not only are there the main classes, but also sub¬ divisions of each class as, B0, Bl, B2, B3, . . . B9. The main classes are :

Class O. — Stars with bright bands. Wolf- Rayet stars. Typical stars 7 Velorum, £ Puppis.

Class B. — Helium stars, represented by and £ Orionis.

Class A. — Hydrogen stars, represented by Syrius and Vega, and characterized by the great intensity of the hydrogen lines.

Class F. — Calcium stars, in which H and K have the greatest intensity; represented by ˆ Aquilae and a Carinae.

Class G. — Solar type, represented by the sun and Capella.

Class K. — Represented by Arcturus. There is a decrease in intensity at the violet end of the spectrum.

Class M. — Represented by B Andromedae, a Orionis, a Hercules and Mira Ceti. Absorp¬ tion bands are found in the blue-green.

Class N. — Similar to Secchi's type IV.

Miss Cannon of Harvard College Observa¬ tory has completed the classification of 250,000 stars according to the above system. This clas¬ sification seems to represent successive steps in the evolution of the stars.

By common consent the nebula is regarded as being the primordial matter. The first stage of development is represented, according to Huggins ((Atlas of Representative Stellar Spectra,* London 1899), a masterpiece with superb illustrations, by a star like A of & Orionis, one of the stars of the great nebula. Orion and helium stars are followed in devel¬ opment by the white stars of Secchi's first type. Evolution can be traced step by step, through stages like those represented by the stars a Lyrae, Sirius, Castor (fainter star), « Aquilae, Procyon, 7 Cygni, till we come to the fully developed second type star like Capella and the sun. Increased absorption at the violet end of the

spectrum gives the red stars of Secchi's third and fourth types which, according to Hug¬ gins, develop in parallel lines. The period of in¬ creasing old age is evident from the carbon ab¬ sorption bands, and it is easy to imagine this ab¬ sorption increasing in amount till the whole light of the star is cut off. But even at this stage, when the star gives no light, the spectroscope is not powerless to follow, for if the dark star accompanies a bright one, its presence is re¬ vealed through a change in the motion of the line of sight. There has been quite consider¬ able discussion as to which star, Sirius or the sun, is in the hotter stage of development. The color of Sirius, and the maximum in its spec¬ trum being more toward the violet end than in the case of the sun, would seem to indicate a higher temperature. Huggins and a great many astronomers think that the sun is in the hottest state, but that the great absorption in its atmosphere, compared with that of Sirius, makes the color of the sun yellow.

All classifications of stellar spectra begin writh white stars and end with red. If we in¬ terpret this as the result of a change in tem¬ perature corresponding to a progress in evolu¬ tion, as .shown by Wien's law, and if the in¬ tensities of the different regions of the spec¬ trum are measured by a spectral photometer and Planck's energy equation is applied, as in the case of the sun, then we find the following approximate effective temperatures of the stars of the different classes: Class Oe5, 12,000° C; classes B and A, 10,000° C; class F, 7,500° C;

class G, 5,500° C; class K, 4,000° C; and class M, 3,000° C. Other methods of evolution among the stars have been shown possible by Lock- yer, Russell and others.

Motions of the Stars. — Proper motion is determined from -meridian circle observations. The motions are measured in angular units of seconds of arc per year. The most complete work is the Preliminary General Catalogue* of Boss containing the proper motions of 6,188 stars. Radial velocities are measured by the spectrograph in linear units of miles, or kilo¬ metres per second. The most prominent work¬ ers in this field have been : Vogel, Duner, Campbell, Frost, Belopolsky, Hartmann, Schles- inger, Plaskett and Adams, who together have pretty thoroughly surveyed the northern hemi¬ sphere. Work in the southern hemisphere has been done by the Lick Observatory station at Santiago, Chile, and by the Cape Observatory in South Africa. In stellar spectroscopic work the advantage is shown of the great light-gathering power of the large modern reflecting telescopes. The advantage of the reflector over the refrac¬ tor in this field of work is that there is no chromatic aberration, so the light of all wave¬ lengths

is brought to a focus on the slit. The small field of good definition, which the reflec¬ tor shows in comparison with the refractor, is no drawback in spectroscopic work. With the five-foot reflector of Mount Wilson, it has been possible to photograph the spectra of stars as faint as the 12th magnitude, while with the 100- inch reflector, it will be possible to photograph the spectra of stars of the 15th magnitude, or even fainter. In addition to measuring the motion of the star toward, or away from, the observer in the line of sight, the spectrograph has permitted the discovery of an entirely new class of stars known as spectroscopic binaries. The first discovered was Mizar by Pickering, who noticed the periodic doubling of the lines of the spectrum. It is comparatively rare that both stars are of so nearly equal bright¬ ness that both show the stellar absorption lines. But when the motion of the star in the line of sight varies in amount (after eliminating the motion of the earth about the sun), this change in velocity is certain proof of the presence of a second body. Repeated observations of such stars permit the determination of their orbits. It is found that the periods have a wide range, from 0.19 days in the case of B Cephei, to 6.0 years as in a Orionis, this latter period being longer than that of the shortest period of a visual binary Equulei, which has a period of 5.7 years. Among the brighter stars, about one star in every four is found to be a spec¬ troscopic binary.

The most complete work on radial velocities so far published is (Stellar Motions,* Camp¬ bell, Yale University Press, 1913. Campbell has made the remarkable discovery that as the stars increase in age their velocities increase ac¬ cording to the following table :

Spectral Classes Number of Average radial

Stars Velocities

O and B . 141 8.99 km.

A . 133 9-94

F . 159 13.90

G and K . 529 15-15

M . 72 16.55

There is no satisfactory explanation of this curious increase of speed with age unless we

accept that of Adams (Astrophysical Journal, XLII, 172, 1915). The early type stars have smaller proper motions and are at much greater distances from us than the later type stars. Due to the fact that Campbell's work has been lim¬ ited to stars brighter than 5.0 magnitude, he has, in consequence, measured stars of higher average velocities in the later types than in the earlier. Kapteyn has shown that there is an intimate connection between proper motion, radial velocity, magnitude and spectral type of the stars, and has derived empirical formulae showing the connection. The most complete work in this field has been done by van Rhijn (Astrophysical Journal, XLIII, 36, 1916). This work shows very clearly that the early type stars belonging to the O, B and A classes on the average are much more distant than the stars belonging to the later types. Adams at Mount Wilson has gone a step farther, and has made the wonderful discovery (Proceedings > of the National Academy, April 1916), that the relative intensities of certain lines in stellar spectra show changes depending on the absolute luminosity of the stars, and by means of meas¬ ures of these intensities, Adams has been able to determine the parallaxes of the stars. The spectrum of the sun is almost identical with that of Capella, which shows that the sun is a star, rendered brighter and bigger on account of its nearness. The stellar magnitude of the sun is — 26.4 on the same scale that Sirius is a star of magnitude — 1.4. Thus, according to Newcomb ((Stars, > p. 27), the sun gives us:

10,000,000,000 times the light of Sirius.

91,000,000,000 times the light of a star of magnitude I.

9,100,000,000,000 times the light of a star of magnitude 6.

The square roots of these numbers show the number of times we should increase the actual distance of the sun in order that it might shine as a star of the corresponding magnitude. Under these conditions the distance and paral¬ lax of the sun would be :

Sirius; Distance, 100,000: Parallax, 2". 06

Mag. 1; Distance, 302,000: Parallax, 0".68

Mag. 6; Distance, 3,020,000: Parallax, 0".07

From the large size of the parallaxes, it is evident that the sun must be a very small star in the heavens. But its nearness renders it a very

important star, one in which we can study the second stage of stellar development in all its details.

Researches by means of radial velocity, proper motion and parallax determinations show the presence of groups of stars in the sky like the Taurus group, the Ursa Major group, etc., in which the stars are moving with motions that are equal and parallel. To the Ursa Major group belong all tbe stars of the dipper'* ex¬ cept the two extreme ones, and also such widely separated stars as Sirius, P Aurigas and a Corona. Such results show the necessity of co-operation among the different observatories in order that observational work may be done with the highest degree of accuracy. So far the weakest part of the measured values has been the parallax determinations. Recent work by means of photography with telescopes of great focal length has shown the possibility of greatly increasing the accuracy of parallax measures over the results obtained visually. Several American observatories possessing

large telescopes, together with the Greenwich Observatory, are co-operating in parallax de¬ terminations. The American observatories are : Allegheny, Dearborn, McCormick, Mount Wil¬ son, Swarthmore, Van Vleck and Yerkes.

The position of the apex of the solar motion is fixed by Weersma from the proper motions of 3,600 stars at right ascension 268° and dec¬ lination, 31°, north, and by Boss from 5,400 proper motions deduced from his Preliminary General Catalogue, } at right ascension 271° and declination 34°, north. Campbell, from the investigations of the spectra of 1,047 stars, places the position at right ascension 272° and declination 27°, north. The motion of the solar system through space was found by Campbell to be 17.85 kilometres, or about 12 miles per second. This speed carries the solar system 255,000,000 miles per year, or 3.75 times the earth's mean distance from the sun.

Twentieth century astronomy will have as its special study more detailed information con¬ cerning the motions of the stars and their dis¬ tances in order that more complete knowledge may be gained regarding stellar evolution, and regarding the shape and size of the universe, and the distribution and motions of the heavenly bodies forming it.

Bibliography. — The best books on the subject are Kayser's (Handbuch der Spectro- scopie> (6 vols.) ; Schemers' (Astronomical Spectroscopie) (Frost's translation) ; Camp¬ bell's (Stellar Motions) and Newcomb-Engel- mann's (Populare Astronomies

Samuel A. Mitchell,

Director Leander McCormick Observatory,

University of Virginia.

ASTRUC, as'truk', Jean, French physi¬ cian; b. 19 March 1684; d. Paris, 5 March 1766. He acquired high reputation as an anatomist, and was the author of (Venereal Diseases) (1736), and other medical works. The work, however, which has immortalized him is purely theological and is entitled (Conjectures as to the Original Materials of Which Moses Seems to Have Availed Himself in Composing the Book of Genesis) (1753). In this he divides the book of Genesis into two parts, on the ground of the use of Elohim (God) or Yahveh (Jehovah). He holds that these two names for the Deity point to the fact that Genesis was compiled from two parallel, independent docu¬ ments. His memoir forms the origin of modern criticism on the Pentateuch.

ASTRUP, Eivind, Norwegian explorer: b. Christiania 1870; d. 1896. He was a member of the first and second Peary expeditions, 1891 and 1893, and made the first survey of the northern coast of Melville Bay. He perished while on a snowshoe expedition from Dovre, Norway.

ASTURA, as-too'ra, Italy, a maritime vil¬ lage 40 miles from Rome. In its little harbor a high tower is said to stand on the site of the villa of Cicero, where Cicero was slain by order of Antony 43 b.c.

ASTURIASˆ as-too'rias, The, a former principality of Spain. To this mountainous country of the north of Spain the Goths re¬ treated in the 8th century before the sword of the Saracens. The inhabitants of Asturias are said to be less industrious than the Galicians, and less sociable than the Biscayans. The

hereditary Prince of Spain has borne since 1388 the title of Prince of Asturias, or of the Asturians, according to the obsolete division into Asturias de Oviedo and Asturias de San- tillana, Oviedo and Santillana being the two chief cities of the principality. Since 1838 the principality has been officially known as the province of Oviedo. See Oviedo.

ASTY'AGES, the last King of Media, reigned 594—559 b.c. In the latter year he was dethroned by Cyrus, who, according to Herodo¬ tus, was

his grandson. Cyrus revolted in 559, and defeated Astyages, whom he took prisoner, but afterward appointed governor of Hyrcania.

ASTY'ANAX, sometimes known as Sca- mandrius. A Greek legendary character, the son of Hector and Andromache.

ASUNCION, a-soon'the-on, or NUES- TRA SENORA DE LA ASUNCION (in

English, Assumption) , the capital of Paraguay, on the river Paraguay. The principal edifices are the cathedral, several other churches and convents, the President's palace, house of Con¬ gress, arsenal, National Library, custom-house, a college, hospital, railway station, etc. In the Museum of Fine Arts there are a few old paint¬ ings not without interest. The trade of the town is in Paraguay tea, tobacco, fruits, hides, timber, provisions, manufactured goods, very beautiful lace (made by the civilized Indians), excellent hammocks, preserves and sweetmeats. The location of Asuncion on a hill above the river favors natural drainage, and to this cir¬ cumstance is due, in part at least, its established reputation as a healthful place. The dictator Lopez endeavored to give his little capital the appearance of grandeur, and that design was expressed in the larger buildings completed (with a single exception) before the war with Argentina, Brazil and Uruguay (see Paraguay — History). There are through services, by river steamers and rail, with Buenos Aires. Pop. 80,000 in 1916.

ASURNAZIRPAL, a'soor-na'zer-pal, a

King of Assyria from 881 b.c. to 860. He was one of the most warlike of Assyrian kings, and in numerous campaigns enlarged his empire, especially toward the westward, extending it from Lebanon to the Tigris. He also rebuilt Calah, his capital, and left a record of his achievements in the so-called (Standard In¬ scription.) See Assyria; Assyriology.

ASVALAYANA, also ACVALYANA,

ancient Hindu author. He is supposed to have written the Srauta-Sutra and the Grhya-Sutra of the Vedas.

ASVIN, or ACVIN, two Vedic divinities, Basra and Nasatya. They were the husbands of Surya, daughter of the sun god, and they brought the light of the sun to the world each morning. They could cure all ills of the flesh and the sickly and the diseased prayed to them for health. Consult Bergaigne, (La religion vedique) (Vol. II, Paris 1878-83) ; Myriantheus, (Die Agvins oder arischen Dioskuren) (Munich

1876).

ASWAL, as'wal, a Hindu name of the sloth-bear. See Bears.

ASYLUM, a place where persons flee for protection. Under the Mosaic dispensation cities of refuge were set apart to which the slayer might flee so that innocent blood should

not be shed, in case the person was not worthy of death — that is, in case the act was acciden¬ tal and not malicious. But among the ancients, outside of the Jews, it seems that temples, statues to the gods, and altars particularly con¬ secrated for such purposes, constituted places of refuge for persons generally, and it was deemed an act of impiety to remove, forcibly, one who had fled to such an asylum for protec¬ tion. However, Tiberius abolished all asylums except the temples of Juno and Aesculapius. These asylums finally passed over to the Chris¬ tian world, and under Constantine the Great all Christian churches were made asylums for all those who were pursued by officers of jus¬ tice or the violence of their enemies, and the younger Theodosius, in the year 431, extended these privileges to all courts, gardens, walks and houses belonging to the Church. In the year 631 the Synod of Toledo extended the limits of asylums 30 paces from every church, and this privilege afterward prevailed in Catholic countries, and it is said to have been a strong armor of defense against the wild spirit of the Middle Ages, and not without good consequences at the time when force often prevailed against justice. But in later times as other and better systems of procedure in the administration of justice became adopted, asy¬ lums were abolished in most countries. This seems to have been the origin, nature and ob¬ ject of asylums, and such the common accepta¬ tion of the term, but more recently in some countries, the name has been given to institu¬ tions for the protection and care of the poor, blind, deaf and dumb and lunatics who are incapable of taking care of themselves.

ASYLUM, Right of. In modern interna- national law the phrase means the privilege ex¬ tended to foreign legations, whether by the law of nations or by custom, to afford shelter to persons who are subject to the jurisdiction of the states in which the legations are located. Actually no person may claim the right of asy¬ lum but the legation may extend its protection, and thus the modern right differs greatly from the ancient.

Asylum in Legations. — Prior to the mid¬ dle of the 17th century, diplomatic agents based their claims to the right to grant asylum to fugitives from local authorities on the doc¬ trine of the

extraterritoriality of the official residence — that is, the exclusion of the domes¬ tic jurisdiction of one state from the precincts of the legation of another state. When a per¬ son took refuge within, a legation he was con¬ sidered to be under the protection of the coun¬ try to which that legation belonged and dur¬ ing his stay to be absolutely exempt from the operation of the domestic laws. The legation officials might surrender him-, either at pleasure or through extradition (q.v.) proceedings; but any attempt to capture him or compel his re¬ lease by force was deemed an invasion of the territory of the state to which the legation be¬ longed. Since the middle of the 17th century the theory of extraterritoriality in this respect has been abandoned and the claim to exercise the right of asylum has been modified greatly. Attempts have been made to justify the right of asylum on the ground of the inviolability of diplomatic agents, but while the legation is still deemed to be exempt from local jurisdiction and an asylum for the diplomatic agent and his

1)ona fide official and personal household, and while others for a time may gain immunity 1 rom arrest bv entering a legation, the opinion now prevails that the right of asylum in lega¬ tions does not apply to visitors or strangers temporarily residing with the agent and still less to fugitives (save perhaps in states where the government is insecure or where frequent revolutions occur) and that fugitives should be surrendered to local officials on demand of the proper authorities. The United States has repeatedly endeavored to secure an inter¬ national agreement respecting this right but has failed, owing to practices prevailing in states outside of Europe and the United States. The representatives of the Powers often exercised the right in Greece during the revolution 'of 1862 and in Spain during various periods of anarchy; and as late as 1895 the British Ambas¬ sador at Constantinople extended the privilege to the deposed Grand Vizier. In Asia and the South and Central American states there have been numerous instances of granting asylum, but even in these states asylum for other than political offenders is rarely granted and then it is justified by the states exercising it on humane rather than on legal grounds. The United States has discouraged the practice even in this restricted form and has instructed its diplomatic agents to the effect that <(The privilege of immunity from local jurisdiction does not embrace the right of asylum for per¬ sons outside of a representative's

diplomatic or personal household.® In some instances the grant of asylum is regulated by treaty, as that of 1856 between the United States and Persia, Article VII of which provides that ((The diplo¬ matic agent or consuls of the United States shall not protect secretly or publicly the sub¬ jects of the Persian government, and they shall never suffer a departure from the principles here laid down and agreed to by mutual con¬ sent. In no case is a minister permitted to offer his dwelling as a resort for refugees and if a fugitive, uninvited, should apply for pro¬ tection, this should be granted only if his life be in imminent danger from mob violence and only during the continuance of such danger.

Asylum in Consulates. — Under the treaty of 1856 mentioned above no consulate is to be used as a place of asylum for fugitives from local authorities, but other treaties, as that with Italy in 1871, state that such offices ((shall never serve as places of asylum.® There have been some extreme cases, as in Oriental and South American states, where the consulates have been used as asylums, and in 1903-04, dur¬ ing the Dominican revolution, when political prisoners were threatened with execution, a large number of refugees found asylum in the United States and British consulates. Since consuls are not diplomatic agents they are not by right exempt from local jurisdiction and hence cannot claim the right to extend asylum, but they are sometimes granted immunities, though more as an act of courtesy than as a conceded right.

Asylum on Ships. — In some respects pub¬ lic ships, such as ships of war, are similar to legations, so far as the right of asylum is con¬ cerned, since they are generally conceded to be exempt from the local jurisdiction of the ports which they enter; in certain cases the com¬ manders of such ships may extend asylum to

refugees, but they are supposed not to abuse the local hospitality by making their vessels places of refuge for offenders against the laws. The navy regulations state: ((The right of asy¬ lum for political or other refugees has no foundation in international law. In countries, however, where frequent insurrections occur, and constant instability exists, usage sanctions the granting of asylum ; but, even in the waters of such countries, officers should refuse all ap¬ plications for asylum, except when required in the interests of humanity, in extreme or excep¬ tional cases, such as the pursuit of a refugee by a mob. Officers must not directly or in¬ directly invite refugees to accept asylum.® Under modern usage asylum on private ships is not permissible and even though a vessel be in transit criminals aboard such vessels are amenable to local jurisdiction for crimes com¬ mitted prior to

embarkation. Merchant vessels are not exempt from local jurisdiction and can¬ not claim the right to grant asylum. The right of neutrals to grant asylum to belligerent forces is covered by The Hague Convention of '29 July 1899, articles 57 to 59 of the regula¬ tions which relate to the Laws and Customs of War on Land. See Aliens ; Extradition ; Extraterritoriality; Intervention; Neutral¬ ity; Refuge, Cities of; Sanctuary.

Bibliography. — Hall, W. E., (Internation¬ al Law- *(Oxford 1909) ; Moore, J. B., (Asylum in Legations and Consulates and in Vessels* (New York 1892), and (Digest of International Law *(Washington 1906) ; Phillimore, Sir R. J., Commentaries upon International Law) (London 1879-89) ; Snow, Freeman, (Inter¬ national Law* (Washington 1898) ; Westlake, J., (International Law1* (Cambridge 1908) ;

Wharton, Francis, (A Digest of the Interna¬ tional Law of the United States *(Washington 1896) ; Woolsey, T. D., (International Law* (New York 1899) ; Wilson, G. G., (Interna¬ tional Law* (New York 1910).

ASYMMETRIC (as-i-met'rik) SYS¬ TEM, in crystallography, the crystal form now more commonly called ((triclinic.® It was called asymmetric because it has no plane of symmetry. See Crystal.

ASYMPTOTE, as'im-tdt (from three Greek words, meaning <(not to fall with® or coincide), a term used in geometry to designate a line which continually approaches a curved line, but becomes tangent to it only at an infinite distance. Though the existence of such a line seems paradoxical, it can be demonstrated on the strictest mathematical principles, as in the case of the hyperbola and its directrix. The term first occurs in the conic sections of Apol¬ lonius. Asymptotes are of two classes : recti¬ linear and curvilinear. The latter class includes the spiral, which is also known as a circular asymptote. The equation of the rectilinear asymptote referred to any rectangular axis is

ˆjjZ-(„-).(,)

in which x" and y” denote the co-ordinates of

dy"

the point of contact, and the differential

coefficient of the ordinate of any point when x " and y” are substituted for x and y. The asymptote idea is applied also to surfaces.

AT ODDS, the title of a novel by the Baroness Tautphceus (1863), dealing with the vicissitudes of a Bavarian family during the stormy epoch from Hohenlinden to Wagram. It is told with a happy ease and directness ; and if it has not the brilliancy of (The Initials, > is not less clever as a study of character.

ATA, the people of the Davao district in the island of Mindanao, Philippine Islands. They present the physical characteristics of both the negroid Papuans and the later Malaj's, from which it is inferred that they are a mixture of both races. This theory is still further borne out by the fact that they do not show any of the homogeneity of a tribe, but are broken up into various isolated groups, some of these groups speaking a dialect only distantly similar to the speech of the rest.

ATACAMA, a'ta-ka'ma, the name, for¬ merly, of two South American provinces: (1) A northern province of Chile, with an area of more than 29,000 square miles. This was, be¬ fore the war on the Pacific (see Chile), the Chilean part of the great Atacama desert region. (2) A Bolivian department, which formerly extended as far north as Peru, and east to Argentina. All that part of the district west of the Andes was ceded, in 1884, to the Chileans, and formed into the department of Antofagasta. The former capital, Cobija, was long the only port in the district ; but the rival port of Antofagasta, founded in 1870, rapidly outstripped it (see Antofagasta). At present the Chilean Atacama is bounded on the north by the province of Antofagasta, by the Argentine Republic on the east, by the province of Coquimbo on the south, and the Pacific Ocean on the west. The area is given as 30,-728 square miles. Saltpetre, copper and silver are the most important products of the mines. Capital, Copiapo; best seaport, Caldera. Pop. 65,000 to 66,000.

ATACAMA, a desert region on the west coast of South America, formerly belonging partly to Bolivia, partly to Chile, but now be¬ longing wholly to the latter. It lies between the Andes and the sea and much of it at the height of 3,000 to 5,000 feet above the sea. The surface is diversified with many mountains. The Salina of Atacama, a salt morass, mostly dried up, has a surface of 1,084 square miles, and lies at the height of over 7,000 feet. The best and most recently published description of <(the lofty Puna de Atacama, }) situated between 23° and 26° S. latitude, is in the (Bulletin of the American Geographical Society) (Vol. XLVI, No. 3).

ATACAMITE, -tak'-, a mineral, originally found as sand in the Atacama province, in northern Chile. It is essentially a hydroxy- chloride of copper, having the formula CuC12.3Cu(OH)2. It crystallizes in the ortho¬ rhombic system, and has a hardness of from 3 to 3.5, and a specific gravity of 3.76. Atacamite is green in color, and commonly occurs either massive or in the form of sand. A coating having the same chemical composition is formed on metallic copper, as the result of prolonged exposure to sea-water or air. Atacamite ex¬ ists in considerable quantity in various parts of South America, and in Australia ; and has been used to some extent as a source of copper.

In the United States it is found at Jerome, Ariz.

ATAHUALPA (d. 1533), son of the

famous Inca Emperor Huayna Capac, of in¬ terest chiefly because of his unfortunate career as ruler of Peru. On the death of Atahualpa's father (1525), his half-brother (Huascar) usurped the throne. In the civil war that im¬ mediately followed between the followers of the two claimants — a long struggle whose de¬ tails are not clearly recorded — Atahualpa's fac¬ tion gained complete victory. The usurper, Huascar, was taken prisoner and confined in the strong fortress of Xauxa. The massacre usual under such circumstances followed, affect¬ ing all the royalists who had sided with Huas¬ car. But Atahualpa's reign was proved to be neither long nor happy. Soon after he had been recognized as the rightful ruler of Peru, a Spanish Catholic leader, Pizarro, came . to urge upon Atahualpa to embrace the Christian faith and become a vassal of Charles V. This proved to be a mere pretext, however, for wresting the kingdom from the young ruler's hands. Even while these overtures were being made, Pizarro's army had already mustered at Cassamarca, where the Inca then was. Sud¬ denly, without the slightest warning, Pizarro gave the signal for attack. The Peruvians, of course, were absolutely unprepared to with¬ stand this prearranged attack. After hundreds of them had been slain and their king made prisoner, the one-sided onslaught ceased. Atahualpa's release, however, was repeatedly put off, despite his readiness to pay the de¬ manded ransom money. It would seem that Atahualpa, while still in captivity, fostered a counter-attack upon the invaders and also con¬ spired for the assassination of his treacherous half-brother, then in league with the Spaniards. Accounts of his intrigue are neither clear nor very convincing. At any rate, it was on these charges, colored with the accusation of heresy, that Atahualpa, after a mock trial, was con¬ demned to death. He was burned at the stake on 29 Aug. 1533. Consult Prescott's (History of PeriP and

Garcilasso de la Vega's (Royal Commentaries of the Incas.)

ATALA, the heroine in a romance by Chateaubriand, bearing her name as the title. She is the daughter of an American Indian chief. The braves of her tribe bring into camp a prisoner, the chief of another tribe. She falls in love with him, releases him and flees with him. But having made a vow to her Christian mother that she would never marry, she has no alternative between breaking her vow and leaving her lover. Finally she commits suicide. The romance was first published in the news¬ paper Mercure de France (1801).

ATALANTA, the name of two heroines in Greek mythology. One was a native of Ar¬ cadia, celebrated for her skill in archery-. She slew with her arrows the Centaurs Rhoecus and Hylaeus, sailed to Colchis with the Argonauts, and was present at the chase of the Caledonian boar, which she first wounded ; hence Meleager awarded to her the prize. She was renowned for her beauty and swiftness in running. She stipulated that every candidate, for her hand should run a race with her, and if he conquered her she was his own, but if he was conquered he was doomed to death at her hand. Many

fallen victims in the attempt, when Meilanion, by the aid of Aphrodite, overcame her. I he goddess gave him three golden apples, which he threw behind him, one after another, as he ran. Atalanta stopped to pick them up and Meilanion reached the goal before her. She accordingly became his wife. The other Atalanta, who cannot very well be dis¬ tinguished from the preceding, the same stories being told about both, is connected with Boeotia and Boeotian localities. She is said to have been married to Hippomenes. Consult Morris, ˆAtalanta's Race. 5

ATALANTA IN CALYDON. Swin¬ burne's (Atalanta in Calydon,5 perhaps the greatest, certainly the best known, of his works, is a lyrical drama after the Greek model. Though lacking the severe nobility and re¬ straint of Milton's (Samson Agonistes,5 it is more purely Greek in- other respects, and re¬ mains the masterpiece of its kind in all modern poetry. Published in 1865, when the poet was 28 years old, it created a literary sensation com¬ parable only to that of (Childe Harold) and brought to Swinburne a fame almost as sudden and splendid as that of Byron. No English poet has surpassed Swinburne in familiarity with both the spirit and form of Greek litera¬

ture; and (Atalanta 5 reads not like an imitation of some remote and inimitable original, but like the spontaneous utterance of a poet ‘who feels like a Greek, has a Greek story to tell, and inevitably expresses himself in a Greek form. The plot, founded on the story of the hunting of the wild boar of Calydon as told by Homer and later by Ovid, is tragic, simple and replete with all the elements of passion, and is handled with superb skill, from the first en¬ trance of the mother Althea, with her forebod¬ ing of woe, to the final dirge over her dying son Meleager. The blank verse of the recitative abounds with subtle and varied harmonies un¬ surpassed in modern English poetry. The choral passages, while perhaps more intimately related to the action than those of Euripides, are less so than those of 2Eschylus and Soph¬ ocles. Eulogy has exhausted itself over the lyrical power and splendor of the choruses in Atalanta, which surpass even Shelley in vehe¬ mence and richness and which added new re¬ sources to English verse. The irresistible melody of such lyrics as <(When the hounds of spring are on winter’s traces,® ((Before the be¬ ginning of years,® (<We have seen thee, O Love, thou art fair,® show what music our language may become in the hands of a master. It is doubtful if any single work ancient or modern offers a greater variety of metrical effects. What may be termed the theology of (Atalanta, 5 with its bitter arraignment of fate and its hatred of the gods, is scarcely classic, though here and there such a note is sounded by Euripides. Swinburne has here injected into the drama something of his own .pessimism and his re¬ bellion against established beliefs. Again, while the story, the form, the general sentiment and many of the details of <Atalanta) are purely Greek, the style, incomparably splendid as it is, lacks on the whole the conciseness and restraint of Greek tragedy. However, such faults, if faults they be, are negligible in a work which stands as one of the most remarkable achieve¬ ments of modern poetry. Consult Gosse, (Life of Swinburne,5 (ch. 4) ; Wratislaw, Theodore,

Algernon Charles Swinburne, Study 5 ; Thomas, Edward, (Algernon Charles Swinburne, Criti¬ cal Study5 ; Pound, Olivia, (On the Applica¬ tion of the Principles of Greek Lyric Tragedy in the Classic Dramas of Swinburne5 (Uni¬ versity of Nebraska Studies, Vol. XIII).

Marion Tucker.

ATAMAN, the title of the chief of the Cossack tribes. See Hetman.

ATARGATIS, a Syrian deity referred to in the Apocrypha. She is generally described as the <(fish goddess.® The name is derived by compounding two divine names : the first part being a form of the Himyaritic ((Athtar,® the equivalent of the Old Testament

((Ashtoreth,® and the Phoenician ((Astarte,® with the feminine ending omitted; and the second is a Palmyrene name ((Athe® (i.e., tempus opportunum) which occurs as part of many compounds. This simi¬ larity of the first syllable has led to the confu¬ sion of the goddess with Astarte. The origin of both deities is probably the same. A plau¬ sible hypothesis is that after the political ex¬ tinction of the Semites and the consequent de¬ terioration of the cult of Astarte, it was found necessary to perpetuate some of the leading features of such a widespread and deep-rooted cult. The fertility and life-giving power of water was one of the most familiar of the con¬ ceptions of the world of thought and fancy of which Astarte was the centre, the idea being in a large measure suggested by the mysterious origin and fecundity of fish. These conse¬ quently figure very largely among other elements in the cult of Atargatis which replaced but did not supersede the worship of Astarte. Atar¬ gatis had a temple at Carnion in Gilead (1 Macc. v, 24, and 2 Macc. xii, 26, but the proper home of the goddess was not Palestine but Syria, at Hierapolis where she had a great temple and a large following. From Syria her worship extended to Greece, Italy, Sicily and even to the farthest northern limits of the Roman empire, carried no doubt by the Syrian merchants, slaves and mercenary troops. The legends concerning her origin are numerous and of an astrological character, intended to ac¬ count for the Syrian dove-worship and absti¬ nence from fish. According to the story in Athenaeus VIII, 37, she is derived from arep TanSo?, (without Gatis), a queen who is said to have forbidden the eating of fish. Diodurus Siculus tells how she fell in love with a youth who was worshipping at the shrine of Aphro¬ dite, and by him became the mother of Semi-ramis, the Assyrian Queen, and how in shame she flung herself into a pool at Ascalon and was changed into a fish. In another story she was hatched from an egg, found by some fish in the Euphrates and by them pushed ashore, where it was hatched by a dove. Out of gratitude she persuaded Jupiter to transfer the fish to the Zodiac (cf. Ovid, Fast. II, 459ˆ174; Metam V, 331). The source of the Chaboras River was worshipped also as the place where Atargatis bathed after her marriage with Hadad (Baal). It was said that the waters gave out a sweet odor and were full of sacred fishes. Together with Hadad, she is the protecting deity of the community, wearing a mural crown. She is the ancestor of the royal house, the founder of social and religious life, the goddess of genera¬ tion and fertility (hence the prevalence of

phallic emblems) and the inventor of useful appliances. Not

unnaturally she is identified with the Greek Aphrodite. By a conjunction of these many functions, she becomes ultimately a great Nature goddess, analogous to Cybele and Rhea ; in one aspect she typifies the function of water in producing life; in another, the uni¬ versal mother-earth (Macrobius, Saturn 1, 23) ; in a third, the power of destiny. Consult articles in Herzog-Hauck, (Realencyklopadie) (1897); Robertson-Smith, (Religion of the Semites > (2d ed., pp. 172-75, London 1914) and in the English Historical Review, 1887 ; Pietschmann, ˆeschichte der Phonizier) (1889).

ATAULFUS, ATAULF, or ADOLF,

King of the Visigoths. The date of his birth is unknown. He was the brother-in-law of Alaric, whom he assisted in the sieges of Rome. After Alarc's death he went to Gaul and married Galla Placidia, sister of the emperor, June 414. In the same year he went to Spain and was assassinated at Barcelona in 415.

ATAVISM (Latin atavus; originally "an¬ cestor,® later specialized as "great-great-great- grandfather®) ; in biology, the reappearance in an organic being of specific ancestral peculiari¬ ties which have not appeared in intermediate generations, or of peculiarities of ancestral side branches not represented in the direct line. It is often loosely used as synonymous with rever¬ sion, but in scientific usage the latter is not the reappearance of single characteristics, and certainly not of abnormal ones, but the return in general type to the primitive type from which the special race was evolved. In this sense, it may be said that reversion is the extreme backward limit of atavism. For example, the birth of a six-fingered child with a six-fingered grandfather or uncle but normal parents would be atavism ; but the approach of human beings left on a desert island to the prognathous and hairy type of the simians, were it conceivable, would be reversion. Sometimes the two are hardly to be discriminated ; thus, the appearance of a tail-bone or pointed ears would be an atavism Fecalling the primitive type, as are horses with toes, yet not quite a reversion. A true reversion is the banded pigeon which is a frequent "sport® among fancy breeds; and the still commoner mongrel "yellow dog,® a rever¬ sion to the jackal type. Atavisms are part of the perpetual family wonders, the reproduction of minute special features, habits, tricks of be¬ havior, even tastes and fashions of speech, char¬ acteristic of distant relatives or far-back ances¬ tors, but perhaps obliterated for long periods. In sociology, especially criminology, the word is used precisely in the sense of reversion to primi¬ tive instincts and passions, supposed to be over¬ laid or suppressed by civilization. The criminal on this theory is a being who has lost his evolved

characteristics, and gone backward to the primitive savage. This, however, has too many flaws to be scientifically acceptable.

ATAXIA, an irregularity of function, but the term is usually applied to incoordination of muscular movements. It is a phenomenon seen in many disordered states of the body and not confined to the one disease, locomotor ataxia. Thus, ataxia is a common symptom of alco¬ holic intoxication. Two forms of ataxia may be distinguished, static and motor. In static ataxia there is an irregularity in • the mainte¬

nance of attitudes and positions. This form of ataxia is common in chronic cocaine poisoning and is present in some severe cases of chorea, or Saint Vitus' dance. The patients' limbs seem to give way beneath them and there is a restless irregularity in attitude and pose. Static ataxia is also a symptom in certain types of insanity, notably the disease termed catatonia. Motor ataxia is a much commoner form of this con¬ dition. In alcoholic intoxication it is well de¬ veloped and the loss of control, largely due to diminution of the function of the sensory nerves, is too well known to need description. In a number of diseases of the nervous system ataxia of the muscles of the arms, lips, tongue, trunk and lower limbs is a prominent symptom. x\taxia is to be distinguished from loss of the sense of equilibrium. See Cerebellum ; Co¬ ordination ; Equilibrium ; Hemiplegia ; Loco¬ motor Ataxia; Sclerosis.

ATBARA, at-ba'ra (Bahr-el-Agwad , or Black River), an important tributary of the Nile. It rises in Abyssinia to the northwest of Lake Tzana, flows to the north, receiving sev¬ eral large tributaries, especially the Mareb and Tacazze, and enters the Nile lat. 17° N. Llere Lord Kitchener defeated the Mahdists 8 April

1.

ATCHAFALAYA, ach'a-fa-li'ya, a river in Louisiana, an outlet of the Red River. It flows southward through Grand Lake, and enters the Gulf of Mexico by Atchafalaya Bay. Its length is estimated at 250 miles and it is supposed to have been formerly the principal channel of the Red River.

ATCHEEN, a province of the Dutch Indies, until 1873 an independent state in the northwest part of Sumatra. Area 20,544 square miles, and containing a population of over 500,000. See Achin.

ATCHISON, David Rice, American legis¬ lator: b. Frogtown, Ky., 11 Aug. 1807; d. 26 June 1886. He was educated for the bar, and began

practising in Missouri, in 1830. He was elected to the legislature in 1834 and 1838; was appointed judge of the Platt County Circuit Court, and, in 1843, while holding this office, was appointed United States senator to fill a va¬ cancy. He was twice elected to the last office, and during several sessions was president pro tempore of the Senate. During Sunday 4 March 1849, he was the legal President of the United States, as General Taylor, the President¬ elect, was not sworn into office until the follow¬ ing day. Senator Atchison became conspicuous in the slavery debates and in the Kansas-Ne- braska struggle, because of his strong pro-slav¬ ery views. The city of Atchison, Kan., was named after him.

ATCHISON, Kan., city and county-seat of Atchison County, on the Missouri River, 20 miles, above Fort Leavenworth, and on. the Atchison, Topeka and Santa Fe, the Chicago, Rock Island and Pacific, the Burlington and Quincy and other railroads. The city is beau¬ tifully situated on the “Great Bend® of the Mis¬ souri River, and because of its excellent river and extensive railroad facilities it is an import¬ ant commercial centre, and one of the principal cities of the State. It exports large quantities of grain, flour, livestock, coal, lumber, fruit and general agricultural produce. The whole-

sale trade of the city in groceries, drugs, hard¬ ware, etc., is also very extensive, representing annually more than $50,000,000. The manufac¬ turing interests of Atchison are important, there being over 50 large industrial establishments, including grain elevators, flouring-mills, foun¬ dries, railroad shops, carriage works, brick yards, furniture, broom and harness factories, etc. The United States census of 1914 recorded 60 manufacturing establishments of factory grade, employing 859 persons, of whom 684 are wage earners, receiving $403,000 annually in wages. The capital invested aggregates $2,073,000, and the value of the year’s -output was $3,899,000. The city contains many attractive buildings, notably the county courthouse and government build¬ ing, and the union depot erected at a cost of $140,000. The Missouri River is bridged by a noteworthy structure some 1,200 feet long. There are three parks in the city — Forest, City and Central ; three banks with a combined cap¬ ital of $300,000 and an annual business of $7,000,000 ; daily, weekly and monthly periodi¬ cals, and gas, electric-light, sewer, water and electric railway plants. Atchison is the seat of the State Soldiers’ Orphans’ Home; Wells’ In¬ sane Asylum ; Allaman’s Hospital ; Midland College

(Lutheran) ; Saint Benedict's College (Roman Catholic) ; Mount Saint Scholastica's Academy (Roman Catholic) ; has a fine public library and an excellent system of public educa¬ tion (8 public and 3 parish schools). The school board is chosen by popular vote. The city is governed by a mayor elected every two years, and a municipal council of 10 members. The mayor appoints the administrative officials who are subject to confirmation by the city council. The city was first settled in 1854 and was named in honor of Senator D. R. Atchison. It was incorporated as a city in 1859. Pop.

(1910) 16,429; (1920) 12,630.

ATCHISON, TOPEKA & SANTA FE RAILWAY, The, one of the most important railways in the United States, and including a long list of auxiliary companies. The charter was granted 3 March 1863, the route prescribed being from Atchison on the Missouri River to the western boundary of the State of Kansas, in the direction of Santa ' Fe, N. Mex., a distance estimated at 500 miles. The time for completion was limited to 10 years, which ex¬ pired 3 March 1873. Five years and six months were allowed to pass without commencing operations. In September 1868 the charter was transferred to new parties. In 1869, 28 miles were built; in 1870, 34 miles; in 1871, 75 miles. The western boundary of Kansas not having been established, it was estimated that the re¬ mainder to be built, with only one year for the completion of the road and telegraph line which was to accompany it, was 345 miles. By great effort the means were provided, and the work completed with rapidity then unprecedented, and the cars were run over the entire line from the Missouri River to Colorado, about 470 miles, on 28 Dec. 1872, thereby saving the land grant, which would have been forfeited had the road not been completed before 3 March 1873. The road was remarkably well built, much better than the majority of western railways at that time, and in general construc¬ tion bore comparison with the best roads either east or west. It ran for the greater part in the

valley of the Arkansas River, with easy grades and curves, and almost immediately developed an amount of business that surprised the owner¬ ship and the public. The part which this rail¬ way has had in the building up of Kansas, Colorado and other sections through which it runs cannot be overestimated. It opened vast tracts of productive land to settlement, and drew a large emigration from the East to that region, where thriving towns and fertile farms took the place of wrhat had been a desert. The road acquired a large share of through business in 1876 by leasing the Pueblo & Arkansas Valley and the Kansas City, Topeka & Western. Steel rails were adopted in place of iron, and

neither effort nor expense were spared to bring the road up to the highest standard.

The growth of the Atchison, Topeka & Santa Fe in 40 years is shown by recent statis¬ tics. In 1875 the gross earnings of the system were $1,500,000, operating expenses $700,000; and net earnings $800,000; in 1917 the gross earnings were $156,179,120; operating expenses $96,333,568; and net earnings $51,321,917. The growth of mileage has been equally rapid. In 1875 the road only extended from Kansas City and Atchison to Wichita and Pueblo, 711 miles. On 30 June 1902 the main track mileage oper¬ ated was about 7,900. On 30 June 1917 it had increased to 11,261.98 miles, the difference repre¬ senting new lines. The rolling stock, about 38 years ago, consisted of 38 locomotives and 1,028 cars, including two Pullmans. By recent figures (30 June 1915) it was 2,105 locomotives and 72,748 cars. Locomotive repairs were $60,000 in the early period, and $7,639,717.69 in the present. Grain shipments in 1875 were 28,400 tons, and were by later figures 2,862,382 tons. Live stock jumped from 87,500 head to 1,200,-420 head. Passenger and freight figures showed proportionate increase. These figures give an idea not only of the growth of the Atchison, Topeka & Santa Fe system, but also of the strides made by the western United States in the past 40 years.

In one of the reports of the Atchison, To¬ peka & Santa Fe Railway Company, President Edward P. Ripley said :

(<The large increase in the system earnings reflects the rapid growth of the territory served by your lines in population and wealth, and this growth is likely to continue. Many miles of your main lines are fed by but few branches and extensive territory that should furnish profitable traffic to the system still remains, in a great measure, undeveloped for want of ade¬ quate railroad facilities. The construction of additional branches and feeders will be desira¬ ble in the near future, in order to increase the earnings of the system and strengthen its posi¬ tion, and in order to furnish additional trans¬ portation facilities to the growing territory through which the system extends. Further¬ more, the traffic on your main lines has become so dense that the construction of second tracks and provision for additional equipment will soon be imperative. Since the year 1896 more than $30,000,000 of surplus net income has been applied to the development and enlargement of your properties, and it is expected that a con¬ siderable amount of surplus net -income will be applied in like manner hereafter; but it is the opinion of your directors that additional capital should be obtained during the next few years

for the purposes above referred to, and it is believed that the expenditure of this capital will result in a substantial increase of the sur¬ plus net income of the company.®

In the fiscal year 1916-17 the company's operating expenses consisted of $19,119,336 for maintenance of way, $25,273,168 for equipment, $2,780,823 for traffic, $45,910,504 for transporta¬ tion, and $3,494,122 for general expenses.

ATE, a'te, among the Greeks the goddess of hate, injustice, crime and retribution. Ac¬ cording to Homer she was the daughter of Zeus, but according to Hesiod, the daughter of Eris (Strife). She was a vengeful goddess and was banished from Olympus by Zeus, whom she had induced to take an oath of which he subsequently repented. Her influence was always pernicious, and in her journeyings over the earth she afflicted mankind, but she was followed by other goddesses, the benevo¬ lent daughters of Zeus, who restored those who had come under Ate's evil influence.

ATELES, a genus of South American monkeys of the division with long prehensile tails, to which the name Sapajou is sometimes collectively applied. The head is round, and the facial angle about 60 degrees ; the limbs are re¬ markably long and slender, upon which account the English name of spider monkey is some¬ times used as a generic designation ; the fore¬ limbs are either destitute of a thumb or have a rudimentary one.

ATELESTITE, a native basic arsenate of bismuth, having the formula 3Bi203.As205. 2H20. It is yellow in color, and translucent with an adamantine lustre. It occurs in small monoclinic crystals, at Schneeberg, Saxony.

ATELIERS NATIONAUX, a-te-lia'

nasyo'no', national workshops established by the provisional government of France in 1848. Previous to the outbreak of the revolution of February 1848, there had been two years of scar¬ city, inundations and commercial crisis. Ateliers nationaux, or national workshops, were opened at once. The workmen were organized under lieutenants and brigadiers of their election. The number of applicants including arrivals from the provinces at length exceeded 100,000 and the total expense reached nearly 16,000,000 francs. The men were

employed on roads, railways, earthworks, etc., but it was impossible to find work for the whole, and a great part of the labor was unprofitable. There were besides 30,000 to 40,000 women employed in prepar¬ ing articles of outfit for the army, whose work left only a trifling loss. In June the Constit¬ uent Assembly resolved upon the immediate closing of the ateliers. This rash step pro¬ voked the insurrection of the Red Republicans (23-26 June), suppressed by General Cavaig- nac with fearful slaughter. In Lyons the ateliers were closed without disturbance, but in some other towns trouble was occasioned.

ATELLANZE FABULZE (called also Oscan plays), a kind of light interlude between tragedy and comedy, performed by freeborn young Romans. This kind of a play is said to have originated in Atella, a city of the Oscans, between Capua and Naples, and a few discon¬ nected fragments are all that remain of a na¬ tional Italian comedy, consisting of farce sea¬ soned by satire.

ATESHGA (the place of fire), a place much revered by Persian fire-worshippers. It is on the peninsula of Apsheron, on the west coast of the Caspian, and is visited by large numbers of pilgrims, who bow before the sacred flames issuing from the bituminous soil.

ATH, at, town of Belgium, 14 miles from Mons. It has a hospital and college and import¬ ant manufactures of linen, lace, cutlery, soap and large hammers. It was formerly a fortress. Pop. at outbreak of European War about

12,000.

ATHA, a false prophet in the reign of the Caliph Mehedy, or his predecessor, Al- mansur. He taught the doctrine of metem¬ psychosis, and claimed to be an incarnation of divinity. He had lost one of his eyes, on ac¬ count of which he always wore a veil, whence he received the epithet of Mokanna. He is the hero of Moore’s ((Veiled Prophet of Khorassan® in (Lalla RookhP

ATHABASCA, ath'a-bas'ka, formerly a district in northwestern Canada formed in 1882 and enlarged in 1895. On 1 Sept. 1905 the province was divided, the westerly portion being united to Alberta (q.v.), and the easterly portion combined with Saskatchewan and As- siniboia to form the province of Saskatchewan (q.v.).

ATHABASCA, (1) the name of a river in northwestern Canada which has its source in the eastern slopes of the Rocky Mountains, near

Mount Brown, pursues a tortuous course to the north till it falls into Lake Athabasca. (2) The name of a Canadian lake, in the north¬ west territories, also called Lake of the Hills, 230 miles in length and averaging 14 miles in width. Near its southwestern extremity it re¬ ceives the Athabasca River and discharges its waters northward by the Great Slave River. The north shore is high and rocky and thickly wooded with firs and poplars, etc., the south shore is level.

ATHABASCA PASS, a narrow passage in the Canadian Rocky Mountains, between Mount Brown and Mount Hooker. It crosses the boundary between the district of Alberta and British Columbia.

ATHALARIC, a king of the Ostrogoths: b. 516; d. 534. He was the grandson of Theodoric the Great and succeeded him on the throne, but died at the early age of 18 from dissipation.

ATHALIAH, the daughter of Ahab, King of Israel, and wife of Joram, King of Judah. She was a woman of abandoned character, and fond of power, who, after the death of her son Ahaziah, opened her way to the throne by the murder of 42 princes of the royal blood. She reigned six years ; in the seventh the high priest Jehoiada placed joash, the young son of Aha¬ ziah, on the throne of his father. Athaliah, attracted by the noise of the people who were crowding to the coronation of Joash, entered with them into the temple, where the ceremony was going on. At the sight of the new king, surrounded by priests, Levites, great officers of the. kingdom, and the joyful people, she was beside herself ; she tore her hair, and cried out, <(Treason!® Jehoiada ordered her to be imme¬ diately led from the temple by the officers, and commanded that all who should offer to defend

her should be slain ; blit she was put to death at the gate of the palace without opposition. The altars of Baal, which she had erected, were thrown down, and the worship of God restored (about 877 b.c.) (2 Kings viii, ix). This story is the theme of Racine's ˆthalie,5 written at the request of Madame de Maintenon.

ATHALIE. This drama by Racine was called by Voltaire ((the masterpiece of the human intellect® and by Boileau Racine's <(most beautiful work.® Most modern critics would accord it at least the second place among his dramas. But it was slow in winning general recognition. After his (Esther) had been pro¬ duced with much eclat

in 1689 by the aristo¬ cratic young ladies of Madame de Maintenon's foundation at Saint Cyr, Louis XIV ordered the poet to compose for the same amateur stage a new tragedy drawn also from the Scriptures. Two years later (Athalie) was ready, but Madame de Maintenon had conceived scruples, as to the disturbing effect of dramatic repre¬ sentations on her educational wards. It was accorded only a chamber performance with¬ out costumes in 1691, and passed almost un¬ noticed. Had the express will of king and author been followed, the French stage would have been permanently deprived of a great masterpiece. It was first presented to the theatre-going public 3 March 1716. The sub¬ ject of the play is the revolt of the loyalist priesthood under Jehoiada against the usurping Queen Athaliah, the anointing of the Child-King Jehoash, the destruction of the temple of Baal, the slaying of his priest Mathan and finally of Athaliah as told in 2 Kings xi, supplemented by the account in 2 Chronicles, xxii and xxiii. In the poet's hands this rather crude account of dynastic rivalries and sacerdotal ambition has become a splendid picture of religious enthusiasm, a superb plea for the divinity that was supposed to hedge true royal blood as well at the court of Versailles as in Jerusalem. Racine's is a grandly tragic portrayal of a commanding woman who knows no law but the feverish pursuit of the objects of her inconsequent passion. Prone to superstition, she struggles wildly with the portents of her fears, dashing herself against righteous fate to ruin. Joab, the high priest, is the type of a pitiless fanatic, disinterested personally but unscrupulous by conviction. Abner is the sim¬ ple soldier, Mathan the ambitious priest who seeks to make a stepping stone of religion, Nabal the selfish zealot, Joas one of the very few genially conceived children of the stage. To a chorus of Levite girls the poet has given several canticles, yielding little to those of (Esther > in devout beauty. There are transla¬ tions of the play by R. B.' Boswell and others.

Benjamin W. Wells.

ATHAMAS, the son of yEolus, and husband of Nephele, the cloud goddess. Their children were Helle and Phryxus. Being after¬ ward separated from Nephele, he had by Ino, his second wife, Learchus, Melicertes and Eurycleia. Athamas, having lost his reason through the anger of Hera, and taking Ino and her children for a lioness and her whelps, seized Learchus and dashed him against a stone ; while Ino, with Melicertes in her arms, plunged into the sea, and became the sea god¬ dess Leucothea, Melicertes being transformed into Palsenon, a divinity worshipped by sailors.

Athamas now abandoned Boeotia and fled to Phthiotis, where he built

Alos, and united him¬ self with Themisto.

ATHAN'AGILD, the 14th king of the Spanish Visigoths, who succeeded Agila in 554, and died in 566. Being threatened by Agila, he applied for aid to Justinian, Emperor of the East, who sent troops, and Athanagild defeated his adversary, who was obliged to retire to Merida. Athanagild was re-established at Toledo, which he made his capital.

ATHAN'ARIC, a king of the Visigoths in Thrace about the middle of the 4th century: d. Constantinople, 25 Jan. 381. The Emperor Valens made war upon him and compelled him to sue for peace, but Athanaric would not come upon the Roman territory to sign the treaty, while Valens thought it beneath his dignity to visit the barbarian at home. Accordingly a bridge of boats was constructed across the Danube, and the two potentates met in the middle. In 380 he was compelled to flee to Constantinople, where Theodosius received him hospitably, and gave him a small pension until his death. Consult Hodgkin, (Italy and Her Invaders1* (Vol. I, 1880).

ATHANASIAN (ath'a-na'zhan) CREED. See Creed.

ATHANASIUS, ath'a-na zhi-us, Saint, bishop of Alexandria, a celebrated Greek theo¬ logian : b. Alexandria about 296; d. 373. He had a Christian education, and came into the family of Alexander, afterward archbishop of Alexandria. Alexander took him to the council at Nice, where he gained the highest esteem of the fathers by the talents he displayed in the Arian controversy. About 326 he became bishop of Alexandria. The complaints and accusations of his enemies at length induced the Emperor Constantine to summon him in 334 before the councils of Tyre and Jerusalem, but his judges could do nothing, however, further than sus¬ pend him from his office. He still continued in the discharge of his duties until the Emperor, deceived by new falsehoods, banished him to Treves. The death of Constantine put an end to this banishment at the end of a year and some months. Constantius, Emperor of the East, recalled the holy patriarch. His return to Alexandria resembled a triumph. The Arians made new complaints against him, and he was condemned by 90 Arian bishops assem¬ bled at Antioch, while 100 orthodox bishops, assembled at Alexandria, declared him inno¬ cent. Pope Julius confirmed this sentence, in conjunction with more than 300 bishops assem¬ bled at Sardis from the east and west, and in consequence of this he returned a second time to his diocese. But when Constans, Emperor of the West, died, and Constantius became mas¬ ter of the whole empire, the Arians ventured to rise up against Athanasius. Athanasius, displaced

for a third time, fled into the deserts of Egypt. His enemies pursued him even here, and set a price on his head. To relieve the hermits who dwelt in these solitary places, and who would not betray his retreat, from suffer¬ ing on his account, he went into those parts of the desert which were . entirely uninhabited. He was followed by a faithful servant, who, at the risk of his life supplied him with the means of subsistence. In this undisturbed spot Athanasius composed many writings, full of

eloquence, to strengthen the faith of the be¬ lievers, or expose the falsehood of his enemies. When Julian the Apostate ascended the throne he allowed the orthodox bishops to return to their churches. Athanasius therefore re¬ turned after an absence of six years. The mildness which he exercised toward his enemies was imitated in Gaul, Spain, Italy and Greece, and restored peace to the Church. But this peace was interrupted by the complaints of the heathen, whose temples the zeal of Atha¬ nasius kept always empty. They excited the Emperor against him, and he was obliged to flee to Thebais to save his life. The death of the Emperor and the accession of Jovian again brought him back; but Valens becoming Em¬ peror eight months after, and the Arians re¬ covering the superiority, he was once more compelled to flee. He concealed himself four months, until Valens, moved by the pressing entreaties and threats of the Alexandrians, al¬ lowed him to return. From this period he re¬ mained undisturbed in his office until he died, 373. Of the 46 years of his official life he spent 20 in banishment, and the greater part of the remainder in defending the Nicene Creed. Athanasius is one of the greatest men of whom the Church can boast. His deep mind, his noble heart, his invincible courage, his living faith, his unbounded benevolence, sincere humil- itv, lofty eloquence, and strictly virtuous life, gained the honor and love of all. His volumi¬ nous writings, which are chiefly controversial and dogmatical, treat of the mysterious doc¬ trines of the Trinity, the incarnation of Christ and the divinity of the Holy Spirit. His (Apology Against the Arians,) addressed to the Emperor Constantine, is a masterpiece. The creed which goes under his name was not writ¬ ten by him, but belongs to a later time (see Creed). The most complete edition of his works is that published at Padua in 1777 (4 vols. folio).

Bibliography. — Bishop, development of the Trinitarian Doctrine in the Nicene and Athanasian Creed *(New York 1911) ; Burn, (The Athanasian Creed* (London 1912) ; Bright, (Lessons from the Lives of

Three Great Fathers) (London 1890) ; Cave, W., dives of the Fathers) (Oxford 1840) ; Farrar, (Lives of the Fathers) (1889) ; Fisher, dis¬ tory of Christian Doctrine) (1896) ; Harnack, (History of Dogma, * Vol. IV (1898); Migne, (Patrologia Grseca *(Paris 1857) ; Mohler, (Athanasius and the Church of His Time) ; Hergenrother, (Athanasius the Great, Gorres Gesellschaft* ; Robertson, A., (Nicene and Post-Nicene Fathers *(New York 1892) ; Smith and Wace,(Dictionary of Christian Biography* ; Simpson, ˆAthanasian Warning) (New York 1911) ; Taylor, (Athanasian Creed in the Twentieth Century* (ib. 1911).

ATHAPASCAN STOCK (also Tinneh), of American Indians, and one of their most numerous and widely distributed linguistic and ethnological groups. The type-name is taken from a northwest Canadian group, the western Montagnais ; but the tribes are scattered from Alaska to Mexico. The original stock were semi-arctic, along the Yukon and Mackenzie, fierce and energetic, but of a low type of cul¬ ture; and spread southward by conquest on both sides of the Rocky Mountains. They are divided into three chief groups, the northern,

the Pacific and the southern. The first are those in the original home, — northwest Canada and interior Alaska, — Montagnais, Montag-nards, Chippewayan, Kutchin, etc. These number about 8,500. The second are those of Washington, Oregon and California, except the Thlinkeet coast tribes which extend along the Alaskan coast also. These are few and scattered tribes, about 900 souls in all. The southern, and far the most important, com¬ prises some 23,500, mostly of the great Apache and Navajo confederacies, also the Jicarillas and Mescaleros, and the Lipan, of Mexico.

ATHARVANA, at'har'vana, the fourth of

the Indian Vedas. Its language is more modern than that of the other three. The theological treatises, regarded as 52 in number, called Up-anishads, are appended to the Atharvan Veda.

ATHEISM, the denial of the existence of a God. Among the Greeks atheism consisted in a denial or non-recognition of the gods of the state. Socrates was put to death for as¬ serting the superiority of the divine wisdom to the other gods as the ruler and disposer of the universe thus contradicting Greek mythol¬ ogy, which assigned that office to Zeus. In Latin times atheism still continued to be a negation, with no pretension to rank as a system. It was closely akin to that cultured unbelief which extensively prevailed among the Humanists during the earty part of the Renaissance. The atheism of the 18th century was a protest against current religious hypo¬ crisy; and, like

its predecessors, put forward little or nothing to replace the system it at¬ tempted to destroy. The atheism of the 19th century may be taken to include every philo¬ sophic system which rejects the notion of a personal Creator ; in this sense it ranks as a genus, of which Atomism, Pantheism, Posi- tiyism, etc., are species. Strictly it is the doc¬ trine that sees in matter the sole principle of the universe. Popularly, atheism consists in the denial of a God ; this view is probably founded on the mistranslation of Psalms xiv, 1, and liii, 1, which should be, ((The fool hath said in his heart, No God for me, *that is, he strenuously rejects the traditional God of established religions. Among well-known modern atheists figure Voltaire, Thomas Paine, J. Holzoake, Charles Bradlaugh and Robert G. Ingersoll. Consult Ainslie, R., Hs there a God?* (London 1840); Beecher, L., (Lectures on Scepticism *(Cincinnati 1835) ; Belot, G., (L'idee de Dieu et l'atheisme* (Paris 1913) • Bentley, R., (The Folly of Atheism *(London 1836-38) ; Braden, C., (The Problem of Prob¬ lems and Its Various Solutions, or Atheism, Darwinism, and Theism* (Cincinnati 1877) ; Browne, W. R., (The Present Aspect of the Conflict with Atheism *(London 1883) ; Car- ref, J., demonstration de l'inexistence de Dieu* (Paris 1912); Cilleuls, A. de, (Germes et fruits de l'atheisme social *(Paris 1900) ; Crusus, T. T., (The Origins of Atheism* (London 1684) ; Du Bois, H. A., (The Scien¬ tific Atheism of the Darwinian School of Evolutionists *(New York 1880) ; Dwight T., (The Nature and Danger of Infidel Philos¬ ophy* (New Haven 1798); Gentili, R., <L' Atheisme refute par la science *(Paris 1869) ; Gibbon, J. M., (Atheism and Faith* (London 1904) ; Kerby, W. J. (Atheism and Socialism*

(Lancaster 1905) ; Le Dantee, F., (Altdorf 1713) ; Voltaire, F. M. A. de, (Ecrasons l'infame* (Paris 1881) ; Harnack, A., (Der Vorwurf des Atheismus) (Leipzig

1905).

ATHEL, or .7ETHEL, an Old English word signifying noble, eminent, not only in blood or by descent, but in mind. It is fre¬ quently a part of Anglo-Saxon proper names.

ATHELING, a title of honor among the Anglo-Saxons, meaning one who is of noble blood. The title was gradually confined to princes of the blood royal, and in the 9th and 10th centuries applied exclusively to the sons or brothers of the reigning king. It was first conferred on Edgar by Edward the Confessor, his granduncle, who bestowed it

when he de¬ signed to make him successor to himself.

ATHELNEY, ath'el-m, a marshy island in Somersetshire, England, about seven miles southeast of Bridgewater. It is formed by the junction of the rivers Parret and Tone. Al¬ fred the Great established a fortified post here during a Danish invasion, and afterward founded an abbey which has entirely vanished.

ATHELSTAN, a Saxon monarch, the first to assume the title of King of England. He succeeded his father, Edward the Elder, in 925, and died in Gloucester, 27 Oct. 940. He was victorious in his wars with the Danes of Northumberland, and the Scots, by whom they were assisted. After the overthrow of his enemies at Brunanburh (937), which be¬ came famous in Saxon song, he governed in peace and with great ability.

ATHEN2EUM, the general name of temples to Athena, but more especially applied to the temple at Athens, frequented by poets, learned men and orators. Instruction was also given there to the youth, and in later times the name was applied to all places of education for the young. The same name was given at Rome to the celebrated school which Hadrian established on the Capitoline Mount about 135 a.d. Many learned men received ample salaries for giving instruction in this institution, and that they might be enabled to study at leisure. Here also learned men as¬ sembled to exchange ideas.

ATHENiEUS, Greek rhetorician and grammarian: b. Naucratis, lived first in Egypt, then at Alexandria, and afterward at Rome, at the end of the 2d and beginning of the 3d century after Christ. He has left an encyclo¬ pedic work in the form of conversation, called the (Feast of the Learned) (Deipnosophistse) , a rich but ill-arranged treasury of historical, antiquarian, philosophical, grammatical and other knowledge. The principal editions are those of Schweighauser (1801-07) ; Dindorf (1827); Meineke (1859—67) and was translated by Yonge in (Bohn’s Classical Library* (1854).

ATHENAGORAS, Christian philosopher of Athens, who wrote in Greek an (Apology for the Christians, * addressed to the Emperor Marcus Aurelius, in 177. This work defends the Christians from the accusations brought against them by the heathens (of atheism, of incest, of eating murdered children and the like), with a philosophical spirit and in a lively and forcible style.

ATH'ENA'IS, or EUDOCIA, Empress of the East, daughter of the Athenian philosopher Leontius : b. Athens about 393-94 a.d. ; d.

Jerusalem about 465. Athenais gaining the favor of Pulcheria, sister of the Emperor Theodosius, a youth of 20 years of age, presently became the wife of Theodosius and was persuaded to receive baptism by the name of Eudocia. By Theodosius she had a daughter, Eudoxia, who was married to Val- entinian III, Emperor of the West. She was indisposed to submit to the authority of Pul¬ cheria, who virtually ruled the empire of the East, and a quarrel ensued, in which Eudocia had for a time the ascendency; but the jeal¬ ousy of her husband being aroused, the au¬ thority of Pulcheria was restored, and Eudocia was permitted to retire to Jerusalem. When her daughter and granddaughters were taken prisoners by Genseric she became reconciled to the orthodox Church.

ATHENE, a-the'ne. See Minerva.

ATHENE, Temple of. See 2Egina.

' ATHENE PARTHENOS (Athene the Virgin), a copv of the statue, of Athene by Phidias, but much inferior to it, now in pos¬ session of the National Museum at Athens.

ATHEN'ODO'RUS, the name of several noted men of ancient Greece. (1) Antheno- dorus of Tarsus, surnamed Cananites, son of Sandon: b. Tarsus 74 b.c. ; d. 8 a.d. He was a philosopher of the school of the Stoics and the teacher of the Roman Emperor Augustus when the latter was a boy. On becoming emperor Augustus sent for him and made him the teacher of young Tiberius. Strabo refers to him as a man of profound learning. He was also on friendly terms with Cicero. His' influence with the Emperor was strong, but he did not exercise it to any great extent, beyond allowing himself a wide latitude in the mat¬ ter of free speech. It is said that he advised the Emperor to repeat the alphabet to himself whenever he felt offended. A few years be¬ fore his death he returned to his native Tarsus.

(2) A sculptor of the Rhodian school who, in collaboration with Agesander and Polydoros, executed that remarkable group, the Laocoon, and who lived during the 1st century b.c.

(3) A Stoic ohilosopher: b. Tarsus 110 b.c.; d. 40 b.c. He was chief of the library at Pergamum, where he attempted to revise the whole literature of the Stoics by cutting out of the writings of all of its writers passages with which he did not agree. Later in life he removed to Rome.

ATHENS, Ala., county-seat of Limestone County, situated on the

Louisville & N. Rail¬ road, 95 miles north of Birmingham. Athens has a cotton factory, knitting mill, sash, door and blind factory, two large lumber mills and State Agricultural School. It is the seat of Athens Female College, opened in 1843, under ownership and direction of North Alabama Conference, Methodist Episcopal Church south, and also of Greens University and Trinity Col¬ lege (colored). It has five churches for whites and several churches for colored population, and two newspapers. Surrounded by a splendid agricultural country and has many advantages. City owns and operates water and light plant and the town has an excellent sewer system. City also owns and operates a dispensary.

During the Civil War Colonel Campbell with 600 Federal troops surrendered here on 23 Sept. 1864 to the Confederate forces under General Forrest. Pop. (1920) 3,323.

ATHENS, Ga., a city and county-seat of Clarke County, on the Oconee River, and the Central of G., the Georgia, the Southern, the Gainesville M. and the Seaboard A. L. rail¬ roads, 67 miles east of Atlanta, the State capital. It is in a cotton-growing region; has a large trade in that staple ; and contains cot¬ ton and woollen, cotton-seed oil, bobbin and hosiery mills, iron works, furniture factories, and other industrial plants. T1 e United States census of 1914 recorded 48 manufacturing plants of factory grade, employing 1,480 persons, of whom 1,398 were wage earners, receiving $450,000 annually in wages. The capital in¬ vested amounted to $3,230,000, and the year's output was valued at $3,023,000 ; of this, $1,080,- 000 was the value added by manufacture. It is the seat of the University of Georgia, the State College of Agriculture and Mechanic Arts, Lucy Cobb Institute, Knox Institute, Jeruel Academy and a State Normal School. There are electric light and street railway plants, a public library, two national banks, several hotels and daily, weekly and monthly periodicals. The waterworks are owned and operated by the city. The government is vested in a mayor elected for two years, and a council. The assessed property valuation ex¬ ceeds $6,000,000. Athens was first settled in 1801. Pop. (1910) 14,913; (1920) 16,748.

ATHENS (ancient Greek, Athenai), Greece, the capital of the kingdom anciently the capital of the state of Attica and the centre of Greek culture. Its origin and early history are shrouded in darkness. It is situated in the central plain of Attica, which is bounded on the north

and northwest by Mounts Parnes and Hrgaleos, east and northeast by Pentelikon and Hymettos and on the south by the Saronic Gulf or Gulf of Athens, an arm of the ZEgean Sea, running in between the mainland of Greece and the Peloponnesus from which Athens is about four miles distant. The site is irregular, the city having been built on and around several hills rising from the plain, Mount Lycabettus, on the northeast, overlooking the whole. The principal eminence within the city boundary was the Acropolis, the site first built on ; west from-the Acropolis was a lower hill, called the Areopagus; southwest from the Areopagus was the Pnyx and south from the Pnyx the Museum Hill ; toward the sea on the south the view was unimpeded. On the east of the city was the stream known as the Ilissus, and on the west the Cephissus. On the Acropolis, the Pnyx and the line of hills that run north and south to the west of it traces of numerous dwellings cut in the rocks have recently been found. At its most flourishing period, in the 5th century b.c., Athens was connected with its port-town Piraeus and the harbors of Cantharus, Zea and Munychia by two massive walls called the <(Long Walls® 550 feet apart. It is thought that a third wall ran to the less important har¬ bor of Phalerum but this was not rebuilt after its destruction at the close of the Peloponnesian War. The first harbor was considered the most convenient, and was one of the emporiums of Grecian commerce. Piraeus was considered

part of Athens, the joint city being often termed the Polis while Athens proper was called Asty. The surrounding coast was cov¬ ered with magnificent buildings, whose splendor vied with those of the city. The walls of rough stone which connected the harbors with the city were about 10 feet thick and 60 feet high. The Acropolis contained the most splendid works of art of which Athens could boast. Its chief ornament was the Parthenon or Temple of Athena Parthenos (the Virgin). This magnificent building was 228 feet long, 101 broad and 66 high. It was built under the administration of Pericles, on the site of a temple started probably by Themistocles, and was finished in 438 b.c. It was of the Doric order of architecture, and was built of Pentelic marble, resting upon a basement of limestone. The architects were Callicrates and Tetinos. It had columns on all sides, eight at either front and 17 at the sides, counting the corner columns twice. These columns were fully six feet in diameter at the base, and 34 feet high. The structure was adorned both within and without, with statues, reliefs and other sculp¬ tures. The frieze and pediments — remains of which are now in the British Museum — are ascribed to Phidias. Inside the temple stood the statue of Athena by Phidias, a master¬ piece of art, 42p2 feet high, the unclothed por¬ tions formed of ivory, the drapery of plates of gold, the value of which was estimated at 44 talents (about

$750,000). The Propylaea, a magnificent building, built of white Pentelic marble, begun in 437 b.c. and probably never completed according to the original plan, formed the entrance to the Acropolis, of which it covered the whole western end. A splendid marble stair, 70 feet broad, led up to the Propylaea. The chief building on the Acropolis, in addition to the Parthenon and the Propylaea, was the Erechtheum, a kind of double temple, especially sacred to Athena Polias (or Athena, guardian of the city), and Erechtheus and pos¬ sibly also Poseidon. On the Acropolis also were other temples, altars, statues, etc., includ¬ ing a colossal bronze statue of Athena Proma¬ chos by Phidias, about 30 feet high. On the south slope of the Acropolis were the theatre of Dionysus, the sanctuary of Asclepius, the Odeum of Pericles, and the later Odeum of Herodes, the latter two buildings being intended for musical competitions. In the lower city the greatest pieces of architecture were the so-called temple of Theseus (more probably temple of Hephaestus), and the temple of Olympian Zeus, one of which stood on the northwest, the other on the southeast side of the Acropolis. The first was of Doric archi¬ tecture, and resembled the Parthenon. On the metopes of this temple the famous deeds of Hercules and Theseus were excellently repre¬ sented. The temple of Zeus Olympius was of Corinthian architecture, and was the largest temple in Athens, and the greatest ever erected to the supreme deity of the Greeks. It was begun by Pisistratus about 530 b.c., and con¬ tinued from time to time until at length, after 700 years, it was finished by Hadrian. 'J'he outside of this temple was adorned by 104 fluted columns, 56*4 feet high and Sy2 feet in diameter. It was 354 feet long and 135 broad. Other structures deserving of notice were the Horologium of Andronicus Cyrrhestes or the

ATHENS

PARTHENON AND ACROPOLIS

1 Acropolis from the Hill of the Museum

2 Parthenon (west front) restored

<(Tower of the Winds," the choragic monument of Lysicrates, and the Stoa Poikile or Painted Porch, in the Hellenic Agora or Market. Be¬ sides these wonderful works of art Athens contained many other

places which must always be interesting from the recollections connected with them. Such a spot was the renowned Academy where Plato taught, lying about six stadia (J4 of a mile) north of the city, and con¬ sisting of a gymnasium surrounded by walks, groves and fountains. Such a place was the Lyceum, where Aristotle taught, and which, through him, became the seat of the Peripatetic School. It lay on the bank of the Ilissus, oppo¬ site the city, and was also used for gymnastic exercises. Not far from thence was the less renowned Cynosarges, where Antisthenes, the founder of the Cynic School, taught. The sects of Zeno and Epicurus held their meetings in the city. Zeno chose the well-known Poikile, and Epicurus established himself in a garden within the walls, for he loved both society and rural quiet. Not only literary but political assemblies gave a particular interest to different places in Athens. Here was the court of Areop¬ agus, where that illustrious body gave their decisions; the Prytaneum or centre of official life and the Buleuterium or senate-house; the Pnyx, where the free people of Athens deliber¬ ated. After 23 centuries of war and devasta¬ tion, of changes from civilized to savage mas¬ ters, have passed over this great city, its ruins still excite astonishment. The northern wing of the Propylaea is still tolerably perfect, and the inner wall, with its five gateways leading into the Acropolis, still stands. The Parthenon remained almost entire till 1687, when it was much injured by an explosion of gunpowder during the siege of Athens by the Venetians. It is now a magnificent ruin. Its two pedi¬ ments represented, respectively, the contest of Poseidon and Athena for Athens and the birth of the goddess, while the metopes represented the battles of the gods and the giants, of the Athenians and the Amazons,. of the Centaurs and Lapithas, and lastly the siege of Troy and victory over the Persians. The celebrated frieze depicted the great Panathenaic procession in honor of the goddess. A great number of these sculptures are now in the British Museum. In the whole of this mutilated building we find an indescribable expression of grandeur and sublimity. Near the Propylaea is the small but elegant Ionic temple of Athena Nike or Nike Apteros (Wingless Victory), which having been destroyed in 1687, wras re-erected in 1835 from its remains. There are well-preserved remains to be seen of the Erechtheum, especially the beautiful female figures called Caryatides, supporting the roof of the southern portico. The Tower of the Winds is still tolerably per¬ fect. Its form is an octagon ; on each side it is covered with reliefs, which represent one of the principal winds. The choragic. monument of Lysicrates also remains. It consists of a ped¬ estal surrounded by a colonnade, and is sur¬ mounted by a dome of Corinthian architecture. In southeast Athens are the lofty ruins of the temple of the Olympian Zeus. Of 104 pillars 16 remain, but none of

the statues are in exist¬ ence. The pedestals and inscriptions are scat¬ tered here and there, and partly buried in the earth. The main body of the temple of Hephaes¬ tus has remained almost entire, and is the best

preserved edifice of the ancient Greek world; it now contains a Byzantine collection. On the hill where the famous court of Areopagus held its sittings are to be seen steps hewn in the rock, a roughly leveled platform* and cuttings in the rock. The Pnyx, the place of assembly for the people,, not far from the Areopagus, is very nearly in its primitive state. One may see the place from which the orators spoke hewn in the rock, the seats of the scribes, and at both ends the places of those officers whose duty it was to preserve silence, and to make known the events of public deliberations. The niches for votive offerings are still to be seen. The spot occupied by the Lyceum has not been ex¬ actly identified. The ground occupied by the gardens of the-Academy is still well cultivated and fertile. The long walls are totally de¬ stroyed, though the foundations are 3ret to be found on the plain. The Piraeus has scarcely anything of its ancient splendor, except a few ruined pillars scattered here and there, though it promises to become a handsome modern town and has again a harbor filled with ship¬ ping, engaged in carrying on a considerable trade. The ancient Stadium, 670 feet long by 109 wide, where the Panathenaic games were held, first constructed by Lycurgus, c. 330 b.c., and rebuilt in white marble by Herodes Atticus, 140 a.d., has recently been magnificently re¬ stored through the generosity of another Greek merchant, M. Averoff, in accordance with the ancient remains. The Olympic games were held here in 1896 and 1906. Ancient Athens is believed to have had a population of not more than 200,000.

Athens was at no time so splendid as under the Antonines, when the magnificent works of from 8 to 10 centuries stood in view, and the edifices of Pericles were in equal preserva¬ tion with the new buildings. Plutarch himself wonders how the ancient structures could re¬ tain such a perpetual freshness. Pausanias, who traveled in Greece at this time, that is, in the 2d century a.d., has left a valuable account of the state of Athens as he saw it. Many of the edifices of later times were due to foreign potentates, rulers of Pergamus, of Egypt, of Rome. But after a time the whole¬ sale robberies of collectors, the removal of great quantities of the works of art, first to Rome and then to Constantinople, Christian zeal, and the attacks of barbarians, made sad inroads among the monuments. When Justin¬ ian closed the schools of the philosophers in 529, Athens soon ceased to be a centre of intel¬ lectual activity. The Parthenon was turned into a church of the Virgin Mary, and Saint George stepped into the place of

Hephaestus. In 1456 Athens fell into the hands of the Turks, under whom the Parthenon became a mosque. In 1687 it was partially destroyed by the Vene¬ tians. When it was selected as the capital of the modern kingdom in 1834, it had only a scanty population inhabiting a scene of ruins.

Modern Athens lies mostly northward and eastward from the Acropolis, and consists of well-built streets, the most important being Piraeus, Athens, Stadion and University, which radiate from the Place de la Concorde. Among the principal buildings are the royal palace, the university, the academy of science and art, the polytechnic, the national museum, the observa¬ tory, the chamber of deputies, exhibition build-

ings, new theatre and new library. The palace (1834-38) is a conspicuous but unattractive building of limestone with marble portico. The beautiful gardens were laid out by Queen Amelia. The National University, founded in 1837, is a handsome structure, with a large number of teachers and an attendance of over 2,500 students. The academy is a beautiful building faced with Pentelic marble ; the new National Library, also the University Library, is a fine building, containing 250,000 volumes and 2,300 manuscripts, and so is the Polytechnic School, part of which is occupied as a museum. The National Archaeological Museum, built 1866, contains the Schliemann and other priceless collections of antiquities. There is another in¬ teresting museum on the Acropolis. The Metro¬ politan Church is a tasteless modern structure. More noteworthy is the Small Metropolis dating from the 9th century, the oldest of the Byzantine churches. Athens is well equipped with educational institutions, possessing besides the National University and Polytechnic School, a number of high schools, a gymnasium, a school for the higher education of girls and female teachers, orphanages for boys and girls, and a national and four foreign archaeological schools or institutes, the French, German, American (opened 1882) and British. The city is governed by a mayor elected every four years, with a council of 18 members. There is a municipal fire department and the citv con¬ trols the gas, electric light and water works, but the water supply is so inefficient that the in¬ habitants are obliged to have recourse to water carriers. Street cars cross the city in all directions and it is an important railroad centre. The bathing resort of Phaleron, adjoining the port of Piraeus, is connected with Athens by a suburban railroad. The city has very little

manufacturing, although the financial centre of the kingdom, and its trade is concerned chiefly with its own requirements. Its industrial and commercial activities are centred in the Piraeus, now the chief port of the -TEgean, with a popu¬ lation of 73,579. Pop. 167,479.

Bibliography. — Consult Leake, (Topog- raphy of Athens *(London 1841) ; Wachsmuth, (Die Stadt Athen im Aliertum* (Leipzig 1874- 90) ; Curtius, (Stadtgeschichte von Athen *(in¬ cluding Milchhofer's <Schriftquellen,) Berlin 1891) ; Judeich, (Topographie von A then* (Munich 1905, the most complete single treat¬ ise) ; Gardner, (Ancient Athens) (New York 1907) ; D'Ooges, (Acropolis of Athens) (New York 1908) ; Frazer, (Pausanias' Description of Greece) (London 1913) ; Weller, (Athens and its Monuments) (New York 1913). For his¬ tory see Greece; consult Miller, (Latins in the Levant *(London 1908) ; Ferguson, (Hellenistic Athens) (London 1911). For modern Athens consult Horton, (Modern Athens* (London 1901), and Whiting, (Athens the Violet- Crowned) (Boston 1913).

ATHENS, N. Y., village of Greene County, on the west bank of the Pludson River ; on the West Shore Railroad, connected with the New York Central by ferry; State road trunk line connects with Berkshires. The chief industries are fruit raising and the manufacture of tex¬ tiles, knit-goods and ice tools. It contains a self-sustaining public library, a high school, six grade schools and a bank with a capital of

$25,000; taxable property valued at $1,450,374. Pop. (1920; 1,814.

ATHENS, Ohio, city and county-seat of Athens County, 75 miles southwest of Colum¬ bus, situated on the Hocking River and the Baltimore & O. S. W., the Toledo & O. C., the Hocking V., the Kanawha & M. railroads, and Hocking Sunday Creek Traction line. Athens is in the heart of a rich coal mining region and fruit belt, and has important clay industries, brick and woodworking plants. It has four banks, with a combined capital of $2,000,000; a government building worth $100,000; court¬ house, city building, State armory (costing $20,000), children's home, infirmary, six large churches and a Carnegie library. It is the seat of the Ohio State University (q.v.), the State Normal School and the State Hospital for Insane. There is an annual summer school with a large attendance. Taxable property is valued at about $8,000,000. There are 15 miles of paved streets. Natural gas and a central power plant make fuel and power exceptionally cheap. Athens was settled in 1797, and in 1811 was incorporated. The government is by a mayor, elected every two years, and a city council. The town owns and operates the water¬ works (reservoir system). The government receipts and expenses are about

$35,000 a year. Pop. (1910) 5,463; (1920) 6,418.

ATHENS, Pa., borough of Bradford County, near the New York State line, on the Lehigh Valley Railroad, and on the Chemung and Susquehanna rivers. It has manufactories of cigars, overalls, tools and furniture, and con¬ tains in addition planing mills, silk mills, foundries, boatworks and milling and produce companies. Pop. 3,796.

ATHENS, Tenn., town and county-seat of McMinn County, on the Southern Railway, half way between Knoxville and Chattanooga, 56 miles to either city. The town was laid out in 1823 and incorporated in 1868. It has woolen mills, spinning mills, lumber factories and two newspapers. It is the seat of the Methodist- Episcopal Grant Memorial University. Pop.

3,000.

ATHENS, Texas, city and county-seat of Henderson County, at the junction of the Saint Louis & S. W. and the Texas & N. O. railroad, 75 miles southwest of Dallas. It is sit¬ uated in a cotton, fruit and vegetable-growing region, which also contains coal and hard and soft timber. Athens is an important manufac¬ turing town and has pressed brick, fire brick and tile works, cotton-oil mills, potteries and other industries. There are excellent public schools, a fine courthouse, four churches and two national banks. Athens was first settled in 1850 and was incorporated as a city in 1901. The waterworks are owned by the municipality. Pop. 3,000.

ATHENS, American School at, an insti¬ tution for classical study, founded in Athens, Greece, in 1882. It is affiliated with the Arch¬ aeological Institute of America and is man¬ aged by a committee representing the colleges in the United States which contribute to its support. The building was erected by means of private subscriptions on grounds donated by the Greek government, and the institution has an endowment of $50,000.

ATHENS OF AMERICA, a name fre¬ quently applied to Boston, Mass., on account of her intellectual and literary pre-eminence.

ATHENS OF THE NORTH , a name given . to Edinburgh, Scotland, on account of the picturesqueness of the site and beauty of architecture, as well as intellectual distinction. Copenhagen also is often so called.

ATHENS OF THE WEST, a name given to Cordova, Spain, the centre of Arab learning and culture in the Middle Ages.

ATHERINE, a small fish, from five to six inches long, called also the sandsmelt.

ATHEROMA, properly a wen (sebaceous cyst), so named from the porridge-like char¬ acter of the contents. The term is applied also to the later stages of arteriosclerosis when the fatty and calcareous degeneration of the coats of the aorta and other arteries mani¬ fests itself in yellow patches of induration or of softening. See Arteries, Diseases of.

ATHERTON, Charles Gordon, American politician: b. Amherst, N. H., 1804; d. Man¬ chester, N. H., 15 Nov. 1853. He was grad¬ uated from Harvard in 1822, was a member of the New Hampshire legislature for five years and speaker of the lower house for four, and in 1837-43 was a Democratic represent¬ ative from New Hampshire in Congress. In 1843-49 and 1852-53 he was a member of the Senate. On 11 Dec. 1838 he introduced in the House the so-called <(Atherton gag® resolution, which provided that all bills or petitions on the subject of slavery should be “laid on the table without being debated, printed or referred.® The resolution was passed by a vote of 126 to 73, and remained in effect until 1844. It was resolutely opposed by J. Q. Adams, who advocated the (<right of petition.® Adams was ultimately victorious and on 3 Dec. 1844 the 21st rule of the House, providing that no pa¬ per praying the abolition of slavery or the slave trade should be in any wise entertained, was abolished by a vote of 108 to 80. See Gag- Rules.

ATHERTON, George William, American educator: b. Boxford, Mass., 20 June 1837 ; d. Belief onte, Pa., 24 July 1906. He worked his way through Phillips Exeter Academy and Yale College; was professor of political econ¬ omy and constitutional law in Rutgers Col¬ lege, N. J., in 1869-82 ; was admitted to the bar of New Jersey in 1878; and from 1882- 1906 was president of the Pennsylvania State College.

ATHERTON, Gertrude Franklin

(Horn), American novelist: b. San Francisco. Since the death of her husband she has chiefly pursued a literary career. She has written (The Doomswoman) (1892) ; (Before the Gringo Came5 (1894); (A Whirl Asunder) (1895) ; ‘Patience Sparhawk and Her Times> (1897) ; (American Wives and English Hus¬ bands5 (1898) ; (The Californians5 (1898) ; (A Daughter of the Vine) (1899); (The Valiant

Runaways) (1899); ‘Senator North5 (1900); ‘The Aristocrats5 (1901); (The Conqueror5 (1902); ‘The Splendid Idle Forties) (1902, a revision of ‘Before the Gringo Came5); ‘Rulers of Kings5 (1904) ; ‘The Bell in the Fog) (1905) ; ‘The Travelling Thirds) (1905) ; ‘Rezanov5 (1906) ; ‘Ancestors) (1907) ; ‘The

vol. 2 — 32

Gorgeous Isle* (1908); ‘Tower of Ivory5 (1910) ; ‘Julia France and Her Times5 (1912) ; ‘Perch of the Devil5 (1914); ‘California: An Intimate History } (1914) ; ‘The Conqueror5 (23d ed., 1915) ; ‘Mrs. Balfame5 (New York

1916) .

ATHERTON, a manufacturing town of England, Lancashire, 13 miles northwest of Manchester, containing cotton-factories, col¬ lieries, iron-works. Pop. 18,982.

ATHERTON RESOLUTIONS. See

Gag Rules.

ATHETOSIS, a peculiar movement, usually of the hands and fingers, occurring after some destructive process in the brain. It is seen in the young who have suffered severe injuries at birth and sometimes following an apoplectic stroke. The movement is slow and purposeless, the fingers flexing and extending separately in an irregular manner. The whole hand is also affected and sometimes the arms, toes and feet. The movements may or may not continue during sleep. They are increased by voluntary movements, and will-power cannot subdue them for more than a moment. The af¬ fection arises generally from a lesion of the brain which has caused hemiplegia. No satis¬ factory treatment has been discovered. The condition generally continues unchanged for years, though in minor forms improvement and even complete recovery occurs.

ATHLETE, The, a statue found in Pompeii and now in the Museo Nazionale at Naples. It is a copy of the spear bearer of Polycletus. So beautifully shaped and propor¬ tioned is it that it is regarded as the ideal of physical manhood.

ATHLETES (Greek, athletai), combat¬ ants who took part in the public games of Greece ; also young men who went through the gymnastic exercises to harden themselves and to become fit to bear arms. In a narrower sense athletes were those who made the athletic or

gymnastic exercises their principal business, particularly wrestlers and boxers. Their busi¬ ness was to contend at the public festivals, and they regulated their habits of life for this end. Not only the applause of the people, but also crowns and statues, were conferred upon the victor. He was led in triumph ; his name was written in the public records ; and poets sang his praise. He also received peculiar privileges, had a yearly pension and the foremost seat at the sacred games.

ATHLETICS, or ATHLETISM, is the

exhibition of man's physical prowess in games of skill and endurance, and though in passing centuries it has undergone many phases, it is practically the same to-day as when the Olym¬ pian games, which were resumed at the Pan- American Exhibition at Buffalo in 1901, were originally given 2,500 years ago, and Greece was in her prime. Then not only Greek met Greek, but the influence of the Olympian, Pythean, Nemean and Isthmian games was felt to the farthest extreme of Asia. After the fall of Rome, the mantle of physical prowess which that nation had inherited from the Greeks fell upon the shoulders of the sturdy Norseman, whose chief glory was in his individual capacity to bear unflinchingly the stress and strain of

contests and the elements. They bred into the bone the hardihood and love of personal achievement which in turn carried the current through the Dark Ages, even into those of the exaggerated chivalry, which Cervantes killed with ridicule in (Don Quixote. > The spirit of the Greek, Roman and Norseman planted its seeds in the hardy Anglo-Saxons, who in turn transplanted them into Virginian and New Eng¬ land soils on the northern continent of Amer¬ ica, where its influence has been felt, even to the entire disappearance of the softer Latin races' supremacy. It is not surprising, there¬ fore, that, with the disappearance of the earlier modes of life of the first settlers, calling for all the physical strain that the human frame was capable of, and the return of the compara¬ tive leisure- which in early youth now surrounds the American universities and colleges, there has reappeared a yearning after opportunities to supply, artificially, if so it must be, the stress and contest, physical effort and the proof of supremacy of the earlier ages, when such con¬ ditions were compulsory. It was in the blood, and it came out, much to the nation's benefit. First in the form of isolated college and club contests, and

subsequently in such a volume as to need a separation of contests into classes and the creation of an especial federation of the separate units, to regulate and control it. In the beginning, athletics developed in this or that college, or university or club, acting separately and indiscriminately in its scope. Ultimately the lines of natural cleavage forced athletics into its two great branches : one out¬ doors, commonly known as track-events ; the other, those carried on in a gymnasium. The outdoor events are those which are now usually meant when the term athletics is used. The de¬ velopment of these came tentatively. First one college, or university, or club, then another, organized outdoor contests, until at length the net was spread over all the rising generation, and the Amateur Athletic Union was formed, whose fundamental rule is that ((no person shall be eligible to compete in any athletic meeting, game or entertainment given or sanctioned by this Union who has (1) received or competed for compensation or reward, in any form, for the display, exercise or example of his skill in or knowledge of any athletic exercise, or for rendering personal service of any kind to any athletic organization, or for becoming or con¬ tinuing a member of any athletic organization; or (2) has entered any competition under a name other than his own, or from a club of which he was not at that time a member in good standing; or (3) has knowingly entered any competition open to any professional or pro¬ fessionals, or has knowingly competed with any professional for any prize or token; or (4) has issued or allowed to be issued in his behalf any challenge to compete against any pro¬ fessional, or for money; or (5) has pawned, bartered or sold any prize won in athletic com¬ petition ; or (6) is not a registered athlete. Nor shall any person residing within the territory of any active member of this Union be eligible to compete for or to enter any competition as a member of any club in the territory of any other active member of this Union, unless he shall have been elected to membership in such club prior to 1 April 1891 ; provided, however, that this restriction as to residence shall not

apply to undergraduates connected with any allied college athletic organization.

<(No one shall be eligible to compete in any athletic meeting, games or entertainment given or sanctioned by this Union, unless he shall be a duly registered athlete, a member of the or¬ ganization from which he enters, and shall not have competed from any club in this Union during a period of three months next preceding such entry; nor shall any member of any club in this Union, or any club in any district in this Union be allowed to compete in case he has within one year competed as a member of any other club then in this Union, except

with the consent of such other club, which consent shall be filed with the registration committee of his district prior to such competition unless such other club shall have disbanded or practically ceased to exist ; provided that the requirements of this section shall not apply to any athletic meeting, games, or entertainment, the entries for which are confined to the club or organiza¬ tion giving such meeting or entertainment.

<(No athlete who has been released from a club which is a member of this Union, and who competes for another club directly thereafter, shall be allowed to compete again for the club he was released from for one year from the date of his release, except that the club has disbanded or ceased to exist.

((No person shall be eligible to compete for or enter any competition as a member of any club in the territory of any active member of this Union, unless he shall have resided within the territory of said active member at least four months previous to entering for competition ; nor shall any person be eligible to enter or compete in any district championship meeting unless he shall have been a bona-fide resident of such district for at least six months prior to the holding of such championship meeting; and no person shall be eligible to compete in a championship meeting of more than one dis¬ trict in one year. The restrictions contained in this section shall not affect the eligibility of an undergraduate connected with any allied college athletic organization who shall have been elected to membership in any club of this Union prior to 20 Nov. 1899, to represent such club as long as he remains an undergraduate ; nor shall these restrictions apply to an undergraduate competing for any college belonging to an allied body.®

The Amateur Athletic Union (A. A. U.) of the United States has jurisdiction over the fol¬ lowing games or sports : Basketball, billiards, boxing, fencing, gymnastics, handball, hurdle, racing, jumping, lacrosse, pole vaulting, putting the shot and throwing the discus, ham¬ mer and weights, running, swimming, tugs of war, walking and wrestling. The Union con¬ sists of the Metropolitan Association compris¬ ing the States of New York, New Jer¬ sey, north of Trenton; the New Eng¬ land Association, comprising Maine, New Hampshire Vermont, Massachusetts, Rhode Island and Connecticut; the Atlantic Asso¬ ciation, comprising New Jersey, south of and including Trenton, Delaware, Maryland, Pennsylvania, West Virginia, District of Co¬ lumbia, Virginia, North Carolina and South Carolina; the Central Association, comprising Ohio, Illinois, Indiana, Michigan, Wisconsin,

Iowa and Minnesota; the Pacific Association, comprising California, Arizona, Nevada and Utah; the Southern Association , comprising Alabama, Louisiana, Florida, Mississippi, Texas, Georgia and Tennessee; the Western Associa¬ tion, comprising Missouri, Wyoming, Arkansas, Oklahoma, South Dakota, North Dakota, In¬ dian Territory, Kansas, Kentucky, New Mexico and Colorado ; and the Pacific Northwest Asso¬ ciation, comprising Idaho, Montana, Oregon,

hands from a seven-foot circle, the hammer being swung around the head. Putting the shot consists of throwing a 16-pound iron ball straight from the shoulder with one hand. Throwing the discus is somewhat similar; the discus, a flat, circular stone or piece of meal, weighing four pounds and seven ounces, is hurled from a nine-foot square.

The following table shows some of the prin¬ cipal American Amateur Athletic records :

Event

Record

When made

100 yard dash .

440 yard run .

1 mile run .

5 mile run .

25 mile run .

120 yard low hurdles .

120 yard high hurdles .

Standing high jump .

Running high jump .

Pole vault .

Throwing hammer .

Putting shot (16 lb.) .

Throwing discus (Olympic style)

9 3/5 seconds* .

47 seconds*. . .

4 minutes 12 3/5 seconds*. . . .

25 minutes 8 seconds .

2 hours 44 5/6. minutes .

14 2/5 seconds .

15 seconds* .

5 feet 5 J inches* .

6 feet 7 5/16 inches* .

13 feet 2\ inches* .

189 feet 65 inches* .

51 feet* .

156 feet If inches .

23 June 1906 29 Sept. 1900

16 July 1915

1 Nov. 1913 8 Jan. 1909 6 Sept. 1909

10 May 1913 14 June 1913

2 May 1914 8 June 1912

17 Aug. 1913 21 Aug. 1909 27 May 1912

Champion

Dan J. Kelly.

M. W. Long.

N. S. Taber.

H. Kolehmainen. M. Maloney.

J. J. Eller.

F. W. Kelly.

Leo Goehring.

E. Beeson.

M. S. Wright.

P. Ryan.

Ralph Rose. James Duncan.

- Also world record.

Washington and Alaska. All its meetings are under the direction of (<a games committee,® one referee, two or more inspectors, three judges at finish, three or more timekeepers, a starter, a clerk of the course, a scorer and a marshal ; besides which all the conditions and restrictions for various events : the number of throws allowed, the size and area of prelim¬ inary effort, as in shot-putting, etc., are subject to definitions from time to time promulgated, and imposed, by virtue of the authority of the A. A. U. in meeting assembled.

The Intercollegiate Association of Amateur Athletes of America is the governing body of intercollege athletics. Its championship must be wron at the annual meeting. The events at outdoor field meetings, track and field athletics, as they are more closely defined, include the following :

Flat racing, subdivided into sprint, middle- distance and long-distance races. <(Snrinting® signifies top speed running, up to 300 yards. ˆMiddle-distance® events are the half-mile, mile and two-mile race, longer stretches being <(long- distance.®

Hurdle racing, covering two events, the 120- yard and 220-yard hurdle race. The first is run over 10 flights of hurdles, 10 yards apart, the first being 15 yards from the start, each hurdle being three and a half feet in height. The 220-yard race is over 10 hurdles two and a half feet high, the conditions being otherwise the same.

Jumping, including the broad jump, the high jump and the pole vault. The first is a running jump from the edge of a plank sunk into the track, with a distance as the main object. The high jump is over a bar, with height as the main object. Vaulting is the same as high jump¬ ing, except that the athlete has the assistance of a 14-foot pole.

Weight events, including throwing the ham¬ mer, putting the shot and throwing the discus. In the first a 16-pound hammer with a four- foot flexible wire handle is thrown with both

See also Amateur; Gymnastics; Educa¬ tional Athletics.

Bibliography. — Stonehange, (Rural Sports) (illustrated edition) ; Cassell, (Sports and Pastimes) (with 700 illustrations) ; (Athletics) (by various authors, in the (Encyclopedia of SportsO ; Sullivan James, (Athletic Almanacks) (issued yearly) ; Graham and Clark's (Practical Track and Field Athletics) (1910) ; (Spaulding's Athletic Library) (Official Athletic Almanac, annual) .

ATHLONE, ath-lon', Ireland, town on the Shannon, about 67 miles west by north of Dub¬ lin. It is divided by the river into two nearly equal parts, which communicate by a handsome stone bridge of five arches. It is one of the chief depots for troops and military stores; and the barracks, occupying a height above the river, can accommodate 15,000 men, and have attached an ordnance yard, magazines and armory provided with a large stand of arms. By means of a canal the Shannon has been rendered navigable for 71 miles above the town, which, being also terminus of four important railways, carries on a brisk trade. The chief industrial establishment is an extensive woolen factory, and there are also large saw-mills. Pop. 9,631.

ATHOL, Mass., town in Worcester County, on Miller's River and the Boston & A. and Fitchburg railroads, 26 miles north¬ west of Worcester. It contains several villages, has electric railways connecting with the sub¬ urbs, municipal water works, and is principally engaged in the manufacture of cotton warps, shoes, sewing-silk, fine mechanical tools, matches, organ-cases, pocketbooks, billiard- tables and furniture. The town has two national banks, public library, high school, several weekly and monthly periodicals, and a property valuation exceeding $4,000,000. From its settle¬ ment in 1735 until its incorporation in 1762, Athol was known as Pequoig. Pop. (1920)

9,792.

ATHOL, or ATHOLE, a mountainous and romantic district, situated in the north of Perthshire, Scotland. It gives the title of duke to a branch of the house of Murray, and the Duke owns the greater part of the district.

ATHOR, a'thor, HATHOR or HETH-

ER, an Egyptian goddess, identified with Aphrodite (Venus). Her symbol was the cow bearing between its horns the solar disc and hawk feather plumes. Her chief temple was at Denderah. From her the third month of the Egyptian year derived its name.

ATHOS , now HAGION OROS or MONTE SANTO (Holy Mountain), a high mountain in Macedonia, 50 miles east of Salo- nica, the extremity of a long chain of mountains which runs through a peninsula jutting into the Archipelago. The peninsula is about 30 miles long and five miles broad. It is covered with forests of various kinds of trees, and with vineyards and plantations of olive and other fruit-trees. The surface is very irregular, and the coast displays numerous creeks and inlets of the sea. In ancient history the peninsula is mentioned chiefly on account of the shipwreck which here befell the Persian fleet under Mardonius in 493 b.c., and on account of the canal which, in order to avoid a similar calamity, Xerxes caused to be cut through the isthmus that joins the peninsula to the mainland. The whole penin¬ sula, as well as the mountain, which is about 6,700 feet above the level of the sea, receives the name of Athos. It contains some 20 mon¬ asteries, and a multitude of hermitages, inhab¬ ited by about 6,000 monks and hermits of the Order of Saint Basil. They are extremely in¬ dustrious : they diligently cultivate the soil, grow vines and olives, vegetables, etc., and actively engage in fishing, and they also carve statues of the saints, Agni Dei, crucifixes, rosa¬ ries, etc., which they send to the small town of Karyes, on the mountain, where weekly markets are held, and to the rest of Europe, especially to Russia. They also collected alms to pay their heavy yearly tax to the Porte. There is an academy in which the younger monks receive instruction in various subjects. The libraries of the monasteries are rich in literary treas¬ ures, particularly in manuscripts, partly pro¬ cured from Constantinople before its conquest by the Turks, partly presented to them from the same place, and partly written by the labo¬ rious monks. Many books have been brought thence to the great collections at Paris, Vienna, etc., and the rest are but little used among the monks themselves. Their monasteries and churches were the only ones in the Ottoman empire which had bells. Every nation belong¬

ing to the Greek Church has here one or more monasteries of its own, annually visited by pil¬ grims from Russia, Serbia, Bulgaria, etc., as well as from Greece, Asia Minor and Constanti¬ nople. The privileges which the members of the various establishments enjoy they owe to Murad II, who, on account of their voluntary submission, even before the capture of Constan¬ tinople, granted them his protection. Hermits were established on Athos in the middle of the 9th century, and the first monastery, that of Saint Lavra, was founded by the monk Athana¬ sius in 968. In 1912 Athos was occupied by the Greeks during the Balkan War, and is now un¬ der Greek sovereignty.

ATHOS, a'tds', a character who figures in Dumas' (Musketeer 5 novels. He is one of the three guardsmen associated with d'Artagan.

ATHY, a-thi', a market-town in Ireland, 37 miles southwest of Dublin, with Protestant and Roman Catholic churches, extensive county jail, police barracks, etc. It has a large trade in corn, by canal and river, and is an import¬ ant railway station.

ATITLAN, a'te-tlan', a lake, mountain and town of Central America, in Guatemala. The lake is about 24 miles long and 10 broad; the mountain an active volcano, 12,160 feet high. The town, known also as Santiago de Atitlan, is located on the side of the mountain, and is chiefly known for its medicinal springs. Pop. about 11,300.

ATJEH. See Achin'.

ATKINSON, Edward, American econo¬ mist : b. Brookline, Mass., 10 Feb. 1827 ; d. Bos¬ ton, 11 Dec. 1905. He was educated in private schools. He invented a cooking-stove called the (<Aladdin Oven,55 and was president of the Boston Manufacturers' Mutual Fire Insurance Company after 1878. His wide reputation was due chiefly to the fact that for 40 years he was a prolific writer of pamphlets on economic, commercial and political subjects, including banking, competition, railroads, fire-prevention, economic legislation, industrial education, the money and tariff questions, and colonial ex¬ pansion. He vigorously opposed the war in the Philippines, and during 1899-1900 published the Anti-Imperialist in support of his views. The following is a selected list of his more import¬ ant publications: (Cheap Cotton by Free Labor) (1861); Collection of Revenue) (1866) ; (Reform of the Legal Tender Act5 (1874) ; (The Fire-Engineer, the Architect and the Underwriter5 (1880); distribution of Prod- ucts) (1885); (The Margin of Profit5 (1887);

(Taxation and Work 5 ; (Science of Nutrition5 ; Prevention of Loss by

Fire5 ; Pifty Years' Record of Factory Mutual Insurance5 (1900) ;

(Facts and Figures the Basis of Economic Science5 (1904). Consult the biographical notice by T. W. Higginson in Proceedings of the American Academy of Arts and Sciences5 (Boston 1907).

ATKINSON, Eleanor (Stackhouse), American writer: b. Rensselaer, Ind. For sev¬ eral years she was a public school teacher in Indianapolis and Chicago, but in 1889 she took up newspaper work, becoming a special writer on. the staff of the Chicago Tribune. Here her writing became familiar under the pen name of ((Nora Marks.55 In 1891 she married Francis Blake Atkinson. In 1900 she became editor of The Little Chronicle, in which position she con¬ tinued for seven years. Among her books are (Mamzelle Fifine5 (1903); Poyhood of Lin¬ coln5 (1908) ; Pincoln's Love Story5 (-1909) ; (The Story of Chicago5 (1910); <The Stu¬ dents' Reference Work5 (Vol. V, 1911) ; drey-friars Bobby5 (1912); Poyal Love5 (1912); (How and Why Library5 (1913) ; < Johnny Ap- pleseed5 (1915).

ATKINSON, George Francis, American botanist: b. Raisinville, Mich., 26 Jan. 1854; d. 14 Nov. 1918. He was educated at Olivet College, Michigan, and Cornell University, and was grad¬ uated in 1885. He taught general zoology, bi-

ology and entomology in the universities of North Carolina, South Carolina and the Alabama Agri- ?±,ralrand ˆecˆanmal College, from 1885 to C hie was botanist of the South Carolina Agricultural Experiment Station, 1888-89, and biologist of the Alabama Agricultural Experi¬ ment Station 1889-92. He was assistant and professor of crvptogamic botany at Cornell Uni¬ versity, 1892-96, and professor of botanv there after 1896, and botanist of the Cornell Univer¬ sity Agricultural Experiment Station, 1892-1906 He wrote (Biologv of Ferns) (1894); (First Studies of Plant Life> (1904); 'Studies of American FungP (1900); 'Mushrooms' (1903) * 'Elementary Botany> ; 'High School Botany';

College Textbook of Botany.' He was a fellow of the American Association for the Ad¬ vancement of Science; of the Botanical Society of America ; member of the American Philo¬ sophical Society; member of the American Ge¬ netic Association, and corresponding member of the Torrey Botanical Club. He was actively engaged in

botanical research and made numer¬ ous original contributions to botanical science in foreign and American journals.

ATKINSON, George Wesley, American writer: b. Charleston, W. Va., 29 June 1845. In 1875 he was admitted to the bar, but the following year he was appointed internal rev¬ enue agent. From 1881 to 1885 he was United States marshal in West Virginia. In 1889 he was elected to Congress and in 1897 he was elected governor of his State for a four-years' term. In 1905 he was appointed a judge of the United States Court of Claims. Among his writings are 'History of Kanawha' (1876) ; 'After the Moonshiners' (1879) ; 'Handbook for Revenue Officers' (1881) ; 'A B C of the Tariff' (1882) ; 'Prominent Men of West Vir¬ ginia' (1895); 'Psychology Simplified' (1897); 'Public Addresses' (1901) ; 'Chips and Whet¬ stones' (1908).

ATKINSON, John, American clergyman : b. Deerfield, N. Y., 6 Sept. 1835 ; d. Haverstraw, N. Y., 8 Dec. 1897. He entered the Methodist ministry in 1853, and held pastorates in Newark, Jersey City, Chicago, Bay City, Adrian and Haverstraw. He was the author of the hymn 'Shall We Meet Beyond the River?' He wrote 'The Living Way' (1856); 'Memorials of Methodism in New Jersey' (2d ed., 1860) ; 'The Garden of Sorrows' (1868); 'Centennial History of American Methodism' (1884) ; 'The Beginnings of the Wesleyan Movement in America, and the Establishment Therein of Methodism' (1896).

ATKINSON, John Christopher, English clergyman and antiquary: b. Eddhangor, Eng¬ land, 1814; d. 1900. He was for half a century vicar of the parish of Danby in the North Rid¬ ing of Yorkshire, which he has described in his delightful 'Forty Years in a Moorland Parish' (1891). He wrote much on natural history, and his 'Walks, Talks, Travels and Exploits of Two School-Boys' (1859) ; 'Play Hours and Half Holidays' (1880), 'British Birds' Eggs and Nests' (1861), and 'The Last of the Giant Killers' (1891), have been widely read.

ATKINSON, Thomas, American bishop: b. Mansfield, Va., 6 Aug. 1807 ; d. Wilmington, N. C., 4 Tan. 1881. He was graduated from Hampden-Sidney College, Virginia, in 1825. and practised law for nine years. Ordained

priest in the Episcopal Church in 1837, he served as rector in Norfolk and Lynchburg, Va., and Baltimore, Md., whence he was elected third bishop of North Carolina 26 May 1853. He was an able administrator and prominent in the councils of his Church. He published vari¬ ous sermons and Eoiscopal charges.

ATKINSON, Thomas Witlam, English traveler, writer and artist: b. Yorkshire, 6 March 1799; d. Kent, 13 Aug. 1861. He began his career as an architect in Manchester, where he built a large church. It was in this con¬ nection that he acquired a facility for drawing which he later developed into the ability to draw and paint. Becoming interested in cen¬ tral Asia through the works of Humboldt, # he went to Saint Petersburg in 1844 and -thence began one of the most remarkable series of journeys and explorations ever undertaken. He wandered across the Russian steppes, over the plains of Siberia, into central Mongolia and even ventured into Chinese Tibet, many stretches of this extended journey being un¬ dertaken on foot. On returning to England in 1853 he estimated that he had traveled some 30,000 miles, much of it being through country then practically unknown to Europeans. His experiences are related in ‘Explorations in Oriental and Western Siberia' (1858) and ‘Travels in the Regions of the Upper and Lower Amoor' (1860).

ATKYNS, Sir Robert, English jurist and statesman ; b. Gloucester 1621 ; d. Sapperton Hill, Gloucestershire, 1709. He was the son of a distinguished family, of which no less than four generations had been represented in high judicial offices. In 1659 he entered Parliament and being a strong partisan of the king, he was made Knight of the Bath at the coronation in 1661. In the same year he became recorder of the city of Bristol. In 1672 he was judge of the Court of Common Pleas. But on account of friction with Chief Justice Scroggs he resigned from office in 1680 and retired to his family estate in Gloucestershire. During this period, however, he showed himself bitterly opposed to the Stuarts and after the flight of James II he openly proclaimed himself for the lords, acting as their legal adviser, pleading especially for Lord William Russell. When that noble¬ man came up for trial in 1683, Atkyns pub¬ lished two pamphlets in his defense. When William III came on the throne he was made Lord Chief Baron of the Exchequer, in which office he remained until 1694. From 1689 to 1693 he was speaker in the House of Lords. His one work was his ‘Parliamentary and Po¬ litical Tracts' (1734).

ATLANTA, Ga., city, capital of the State, and county-seat of Fulton County, 290 miles northwest of Savannah, with railway facilities including 15 radiating lines, five of which be¬ long to the Southern Railway, and three con¬ trolled by the Louisville & Nashville system. Belt lines complete the terminal system, which centres in a fine union depot completed at a cost of $1,000,000. Local transportation is unified in a system of well-equipped street rail- vrays. covering 235 miles of track, 200 -within the city, the rest extending eight miles out. At¬ lanta is locally called the “manufacturing and industrial

metropolis of the southeast." The area of the city is 26 square miles, and the

boundary is nearly a circle of 3l/i miles diame¬ ter, extended in two suburbs. Situated at the foot of the Appalachian chain of mountains on the ridge dividing the watershed of the Atlantic Ocean from that of the Gulf of Mexico, the altitude of 1,050 feet at the lowest point and 1,100 feet at the highest makes the climate cooler than the latitude, 33° 44' 58.8", would indicate, and the air has a bracing and invigor¬ ating effect conducive to mental and physical vigor which makes Atlanta a desirable place or residence. The mean summer temperature is 77° ; winter, 44°. This commanding site was developed by the building of railroads in the first half of the 19th century. The village of Marthasville was first a terminus of the line from Savannah and Macon. As one road after another centred there the place grew rapidly and became known as ˆTerminus® ; its destiny as a business centre was foreseen, and the name changed to Atlanta. Here eastern and western traffic meet. After the vicissitudes of the Civil War, the legislature removed from Milledgeville and Atlanta became the capital of the State during the reconstruction era. It was made the permanent capital by vote of the people in 1887, and the capitol building was completed in 1889 at a cost of $1,000,000. At¬ lanta became the business centre of the South¬ eastern States and shared the general growth, developing rapidly after the Cotton Exposition of 1881, projected by citizens of Atlanta, be¬ came a rallying point for Southern industry. A second exposition held in 1895 greatly stimu¬ lated the growth of business ; in 1914 the national government selected Atlanta as a site for the regional bank to serve the Southeastern States of Alabama, Florida, Georgia, Missis¬ sippi, North and South Carolina and Tennes¬ see; and in 1915 the annual fair became a per¬ manent fixture. Bank clearings increased from $56,000,000 in 1894 to $73 9,294,232 in 1915. In the same period bank deposits grew from less than $4,000,000 to $36,216,566. Business in¬ creased four times as fast as population, al¬ though that has grown at the rate of 4 per cent a year. The wholesale and retail trade of one year is now estimated at $200,000,000. The mule market is now the second most important in the country. Sales for any recent year are estimated at 65,000 head, valued at more than $11,000,000. Total trade and manufactures, $300,000,000. As a manufacturing centre, At¬ lanta’s output is varied. A recent census re¬ ported 898 establishments with $62,614,590 of capital, 21,482 wage earners,

$14,284,923 total wages, and $55,01 1,690 of products. The most important products are cotton goods, fertilizers, gins, engines, car-wheels, machinery, lumber, sheet -metal work, terra-cotta, brick, wagons, carriages and buggies, furniture, confectionery, crackers, cigars, coffins, chemicals, printing, lithographing, electrotyping, engraving, paper- bags, flour and meal, paints, varnish, cotton¬ seed oil and cake, ice, harness, belting, hosiery, suspenders, underwear, neckwear, woolen goods, clothing, trunks and condiments.

The factories of the city use 45,000 horse¬ power furnished by steam and electricity. A massive masonry dam has been constructed at Bull Sluice Shoals on the Chattahoochee, and a plant costing $2,000,000, completed near the middle of 1904, delivers 11,000 horse-power of electric current in the city. This gave a new

impetus to manufacturing, much of the addi¬ tional power having been taken in advance of completion. Atlanta's central position has made it southern headquarters for large business concerns. It is the fourth insurance centre of the United States, with premium collections estimated at $11,000,000 per annum, and is head¬ quarters for the railways, telegraphs, tele¬ phones and the large industrial corporations doing business in the Southern or Southeastern States. The concentration of these interests has created such a demand for quarters that Atlanta has more fireproof office buildings than any other Southern city. A fireproof hotel with over 300 rooms was recently com¬ pleted. With other excellent hotels, Atlanta has been famous for many years as (<A Convention City® and has an auditorium seating 8,000 peo¬ ple. Atlanta is the most important centre of publication for newspapers and periodicals in the Southern States. The postal receipts for second-class matter reach $100,000 in a single fiscal year, thus exceeding those of Brooklyn, Baltimore, Buffalo, Washington city, Omaha, New Orleans, Louisville or Indianapolis, while the increase of general postal receipts since the exposition has been remarkable and now ex¬ ceed $1,466,000 for a single year. Congress appropriated $200,000 for an entire block of ground upon which a very handsome post-office and custom house has been erected at a cost of $1,000,000. This and the State capitol, al¬ ready mentioned, with its exterior of oolitic limestone and the interior ornamented with Georgia marble, are the chief among the fine buildings of the city. Street improvements have cost more than $10,000,000, including 292 miles of sewers, 230 of paved streets, 487 of side¬ walks. Fifteen miles of streets are paved with asphalt, the remainder with granite blocks, macadam and vitrified brick. The city water works takes its supply from the Chattahoochee River above Peachtree Creek, in a sparsely pop¬ ulated district. By settling and

filtration water is purified. Two engines of 15,000,000 gallons daily capacity each pump it into the city. The consumption is nearly 20,000,000 gallons a day. For domestic use water is supplied at 10 cents per thousand gallons. At this rate, with some reduction to manufacturers, the city makes a profit. Fire, police, sanitary and other city de¬ partments are well equipped and efficient. The city government is administered by a mayor and general council. Appropriation bills are voted separately by two legislative branches, and the mayor has a veto. Bonded debt is limited by State Constitution to 7 per cent of the taxable wealth. The charter requires a sinking fund to retire all bonds in 30 years from date of issue. Atlanta is one of 10 cities designated by the Secretary of the Treasury whose bonds might be used as security for Federal deposits. The tax rate is 1% per cent and the assessment aver¬ ages 60 per cent of actual value. The city as¬ sessment for 1915 showed $185,825,693 of tax¬ able wealth. The streets of the residential sec¬ tions are particularly attractive with grassy lawns and shade trees. Grant Park, Piedmont Park, Lakewood, East Lake, Ponce De Leon Spring and the Chattahoochee River are outing resorts. A bill has been introduced in Congress to make a national military park on the battle ground north of the city. Public spirit is strong in Atlanta. The Chamber of

ATLANTA, GA

CARNEGIE LIBRARY

GEORGIA SCHOOL OF TECHNOLOGY

ATLANTA, GA

J&W . . ■

» «

gga-a

jffljg

— ft j

?-T/ ■

1

-i 4% • ■

v ˆ ; • rrM

1

I II 11 ll iff

t

X

iff fS!

l liu

t. ˆ11

1 Club House of the Druid Hills Golf Club

2 View of Broad Street, looking North from Marietta Street

3 View of Five Points, the Centre of Atlanta

4 Statue of Henry W. Grady

Commerce, Clearing House Association, Credit Men's Association, Manufacturers' Association and Freight Bureau are organs for concerted action among business men. The Greater Georgia Association, projected by the Atlanta Chamber of Commerce, unites the efforts of Georgia towns, cities and counties to develop the resources of the State. Fraternal and social organizations are numerous and active. Re¬ ligious denominations are well organized. The public school system comprises grammar schools and high schools, with over 26,000 pupils, three business colleges have 1,500 students, medical and dental colleges have 1,500. Two male colleges, a female seminary and sev¬ eral select schools for boys have an attendance of 2,500. The Georgia Institute of Technology with 900 students is the most important institu¬ tion for higher education. It has textile, me¬ chanical engineering and electrical engineering schools and machine-shop practice in addition to literary and scientific courses. The total number of students in the city in higher in¬ stitutions for white youths and girls is about 7,000. A site has been donated and funds are partially raised for the Oglethorpe (Presby¬ terian) University, the total investment of which is estimated at $1,000,000. Emory

(Methodist) University is also being established with funds already acquired, amounting to $3,000,000.

There are six institutions for the higher edu¬ cation of colored youth, with a total attendance of 3,000. They include literary and scientific schools, theology, industrial training and a training school for nurses. Charities are nu¬ merous and include such educational features as free kindergartens, night schools and three or¬ phan asylums. Grady Hospital is supported by the city; Saint Joseph's Infirmary by the Roman Catholics, and the Presbyterian Hospital by the Presbyterians. Private hospitals or sanatoriums are numerous and well equipped. There are two theatres with 2,500 and 2,000 seating capacity, and two lyceum or lecture associa¬ tions. Carnegie Library is a white marble building in classic style, and contains over 40,000 volumes. Atlanta is also the seat of a great Federal prison. There are 264 churches, including missions, and the at¬ tendance is made up of a fair proportion of all of the population. The total membership ex¬ ceeds a third of the population. Atlanta was an important strategic point in the Civil W ar. In 1861 it became a depot of Confederate mili¬ tary supplies, and this made it an objective point in General Sherman's march to the sea. After a siege of several weeks he occupied the city (see Jonesboro, Battle of, and Fall of Atlanta), and by his order it was burned 17 Nov. 1864. In later years General Sherman de¬ scribed the strategic position of Atlanta by com¬ paring it to the wrist of a hand whose fingers reached the five principal ports of the gulf and south Atlantic coast. Twice the test of war has approved the site, and twice a citv has been built on the same spot. In 1865 the military government of Georgia was established there.

'During the Spanish War the city was, and still is, headquarters for the Department of the Gulf. From 39,000 in 1880 the population grew to 89,872 in 1900. The census of 1910 showed the population to be 154,485, an increase of 72.3 per cent as against a 37.1 per cent increase from

1880 to 1890. The present population (1920) is 200,616.

Walter G. Cooper, Secretary Chamber of Commerce.

ATLANTA UNIVERSITY, a coeduca¬ tional (non-sectarian) institution for negroes, in Atlanta, Ga., organized in 1869. In 1913 it had 34 officers and instructors, 404 students, 15,000 volumes in the library, grounds and buildings valued at $285,000, and an endowment of $100,000.

ATLANTES, at'lan'tez, in architecture, colossal statues of men used instead of pillars to support an entablature. Roman architects called them telamones (Greek).

ATLANTIC, Iowa, city and county-seat of Cass County, situated on East Nishnabatna River and on the Chicago, R. I. & P. Railroad, 80 miles southwest of Des Moines. It has vari¬ ous manufacturing interests, including iron and bridge works, planing mills, canning factories, starch-works, soap-factory, two machine shops, and operates municipal water works and elec¬ tric lighting plants. It was chartered as a city in 1869. Pop. (1910) 4,560; (1920) 5,329.

ATLANTIC CITY, N. J., city and popular seaside resort in Atlantic County ; on the At¬ lantic Ocean and on the Reading and the Penn¬ sylvania railroads, 60 miles southeast of Phil¬ adelphia and 136 miles southwest of New York. It is built on a long, sandy island, known as Absecon Beach, which stretches along the coast for 10 miles ; has an average width of three- fourths of a mile and is from four to five miles from the mainland. At the north end is the Absecon Light, 160 feet high, well-known to coastwise sailors. The city has several miles of bathing beach, six great recreation piers, a magnificent promenade — the famous ((Board Walkw of steel and concrete, covered with board flooring, eight miles long, — on the ocean front, nearly 100 hotels and boarding-houses, electric lights, municipal water works, public schools, churches of the principal denominations, seven national banks, and daily, weekly and monthly periodicals. It is probably the most important all-the-year-round resort in the United States, its splendid climate giving it a large popular patronage even in the dead of winter. About 100,000 persons bathe daily in the height of the summer season. The assessed property valua¬ tion exceeds $59,000,000. A. fire in April 1902 destroyed many hotels and other buildings and led to a municipal enactment that all structures henceforth erected within the municipal limits must be fireproof. While not known as a manu¬ facturing city, the United States census recorded 105 manufacturing establishments of factory grade, employing 1,230 persons, of whom 917 were wage earners, receiving $614,000 annually in wages. The capital invested aggregated $7,-050,000, and the value of the year's output was $2,908,000; of this, $1,556,000 was the value added by manufacture. Atlantic City was first settled in 1854 on the site of a fishing settle¬ ment dating from 1780. It is governed, subject to referendum and recall, by five commissioners, elected every four years. Pop. (1920) 50,682; in summer, about 350,000.

ATLANTIC COAST LINE RAILROAD COMPANY, The. A railway system

extend¬ ing from Richmond, Va., to Port Tampa, Fla.,

a trunk line distance of 900 miles, with many auxiliaries and branches. On 30 June 1916 the system was operating 4,773.66 miles of road, of which 52.17 miles were operated under lease, and 53.79 miles under trackage rights. The Company also owned several small branches (totalling 16.83 miles) which it did not operate.

The Atlantic Coast Line Railroad Company had its beginning in the Richmond & Peters¬ burg Railroad Company chartered by the State of Virginia in 1836. In 1900 the name was changed to The Atlantic Coast Line Railroad Company of Virginia. Later in that year the Norfolk & Carolina Railroad, the Wilmington & Weldon Railroad, the South Eastern Rail¬ road and the Atlantic Coast Line Railroad of South Carolina were consolidated with it, and the name was again changed to its present title.

The Company's operating revenues for the fiscal year ended 30 June 1916 were $34,445,- 110; earned by the transportation of 7,850,394 passengers and 12,291,713 tons of freight. The passenger travel averaged 48.07 miles per per¬ son, at a charge of 2.192 cents per mile — ag¬ gregating in the year 377,368,440 passenger miles, and $8,271,629. The freight traffic aver¬ aged 167.08 miles per ton, at a charge of 1.835 cents per ton-mile — aggregating in the year 10,296,523,340 ton-miles, and $23,292,589. The operating expenses for the year were $22,797,- 008. After deducting taxes and bills uncollect¬ ible, the total operating income was $9,838,805. A dividend income of $2,386,447 and other non¬ operating income increased the gross income to $13,975,955. The interest paid on the funded debt amounted to $5,846,656, and this, with other miscellaneous deductions, reduced the net in¬ come to $7,755,536. Of this, $140,551 was ap¬ propriated for physical betterments and $7,- 598,893 was transferred to profit-and-loss ac¬ count. The operating revenue per mile of road was $7,324 and the operating expenses $4,847 ; making the net operating revenue per mile of road $2,476.

The equipment of the road on 30 June 1916 consisted of 820 locomotives, with an aggre¬ gate tractive capacity of 18,411,700 pounds; 353 passenger coaches; and 28,313 freight cars — of which 635 were coal cars with an aggregate capacity of 25,400 tons. The largest item of freight carried on the road is lumber, amounting to

2,658,210 tons. Following this in tonnage are mining products, including 683,470 tons of bitu¬ minous coal, amounting to 2,104,921 tons; forest products not included under lumber, 1,748,292 tons; and cotton, fruit and vegetables, with other agricultural products, 1,697,912 tons.

The entire investment in the road and its equipment on 30 June 1916 was $178,568,333. Investments of the Company in affiliated com¬ panies amounted to $60.432,922 ; and other in¬ vestments totaled $3,193,230. The stock out¬ standing on the date named was $73,574,272 (out of $100,000,000 authorized), and the total long term debt was $138,777,635. The credit balance of the profit-and-loss account was $33,- 583,626. The Company owns a majority of the capital stock of the Louisville & Nashville Rail¬ road Company, and with the latter jointly leases the Georgia Railroad and its dependencies, covering 591 miles. The Atlantic Coast Line Railroad Company is affiliated with the Atlantic Coast Line Company, a security-holding corpo¬

ration which owns $18,413,600 of the stock of the railroad company.

ATLANTIC HIGHLANDS, N. J,

borough and summer resort of Monmouth County, 20 miles south of Jersey City, on Sandy Hook Bay, and on the Central Railroad of New Jersey. There are the usual resort amusements, yacht and tennis clubs, a casino, and very many residences, hotels and boarding¬ houses. The waterworks and electric-lighting plants are the property of the borough. Pop.

1,645.

ATLANTIC OCEAN, the body of water lying between the eastern coasts of the Amer¬ icas and the western coasts of Europe and Africa, and extending from the Arctic Basin to the Great Southern Ocean. Its greatest breadth, attained in lat. 25° N., is 4,500 miles; but between Cape S. Roque in Brazil and Cape Palmas its breadth is only 1,600 miles. Its superficial extent, not including the inland seas, is approximately 23,2 15,000 square miles, or 10,- 588,000 square miles in the north Atlantic Ocean and 12,627,000 square miles in the south Atlantic. The mean depth of the north Atlan¬ tic is 2,047 fathoms; of the south Atlantic 2,067 fathoms.

Chief Distinguishing Characteristics. — A

preliminary and strictly condensed statement may serve, in some

slight degree, to character¬ ize this ocean and to differentiate it from the others. In the following respects, then, if we limit the number of particulars to a dozen, the Atlantic seems to be most clearly differentia¬ ted: (1) It has a much larger drainage area than either the Indian Ocean or the Pacific Ocean. (2) That portion of the Atlantic Ocean lying north of the equator and known as the north Atlantic has been more carefully studied than the other main divisions of the hydrosphere ; and the interest manifested in this way is partly due to the number and ex¬ ceptional importance of the enclosed seas con¬ nected with it. (3) The Atlantic Basin has, as the dominant feature of its relief, a sub¬ marine ridge that extends, approximately, from lat. 50° N. to lat. 40° S. and divides the basin into the eastern and western submarine valleys or troughs. (4) The number of islands in the Atlantic is relatively small — particularly small in the. south Atlantic. (5) The basin of the Atlantic Ocean was formed in comparatively recent geologic time. It dates probably from the Mesozoic age, whereas the Pacific Ocean's basin is of truly great antiquity. (6) The salinity of the Atlantic far exceeds that of the other great oceans; it is especially marked in its great inland sea, the Mediterranean, and increases as we ˆproceed toward the eastern part of that sea. (7) As compared with the wind circulation over the other great oceans, that over the Atlantic has a very definite character. (We shall refer to this, subject again in con¬ nection with the formation of drifts and cur¬ rents). (8) The Atlantic contains the Gulf stream, which probably exceeds in volume and in rapidity all other stream currents in the world. (9) Between lat. 20° N. and 35° N. ' and long. 40° W. and 75° W. there is a dis¬ tinctively Atlantic area in which there is prac¬ tically no surface circulation and which — owing to the circumstance that it is covered by enormous banks of gulf-weed (Sargassum

buccifcrum — has received the name Sargasso Sea. (10) Between South America and Africa, a secondary tidal-wave moves north¬ ward ; and this is produced by, or perhaps de¬ flected from, the east-to-west tidal-wave of the Southern Ocean. (11) Ice formations of the north Atlantic are noticeably different in character from those of the north Pacific. (12) The entire Atlantic, vast though it is, may be called simply the greatest of inland seas, rather than a true ocean. (The reasons for this will be mentioned in the paragraph Fauna) .

Islands and Enclosed Seas. — The principal oceanic islands are the Canaries, Azores, Cape Verde Islands, Madeira, Ascension, Saint

Helena, Bouvet Island and Tristan da Cunha; while those classed as continental groups are the British Isles, West Indies, Iceland, Newfound¬ land and the Falklands. Connected with the Atlantic are, on the eastern side, the Mediter¬ ranean and the Black Sea, the North Sea and the Baltic ; on the western side are the Gulf of Mexico and the Caribbean Sea (together form¬ ing the American Mediterranean), Hudson Bay and the Gulf of Saint Lawrence.

Winds and Currents. — Of the winds of the Atlantic, the most remarkable are (1) the perennial or trade winds which blow con¬ stantly in one direction, or nearly so — from east to west, southeast to northwest, or north¬ east to southwest, and (2) the so-called (<roar-ing forties. w The region of the trade winds north of the equator is known as the zone of the northeast trades ; that south of the equa¬ tor as the region of the southeast trades. The northeast trade wind blows with less steadiness than the southeast ; in the West Indies, how¬ ever, the former seldom forsakes its regular course. Both are found to be most constant when the observations are taken far out at sea; less steady on the land or near it. Com¬ mander W. W. Campbell Hepworth has written (in the Geographical Journal, November 1914, Vol. XLIV, No. 5) : <(The northeast and southeast drift-currents, following the course of the wind, gradually turn more and more to the eastward [as the source, not the direction of their movement], and increase in volume, in breadth and depth as they flow toward the equator until they unite and form the Equa¬ torial Current. For convenience, the northern portion of this great ocean river, which owes its origin mainly to the northeast trade wind, is called the North Equatorial Current, while the southern portion, which is derived mainly from the southeast trade wind drift-current, is called the South Equatorial Current ; but there is in fact no definite dividing line, except that during the six months of the year, June to November, the heaped-up waters of the two currents overflow between the third and 13th parallels of north latitude, east of about the 50th meridian, and turn to the eastward, thus becoming a counter current, which subse¬ quently joins a southeastward setting branch of the northeast trade wind drift-current and a northeastward setting branch of the southeast trade wind drift-current, when the combined current flows eastward, immediately south of and parallel to the Guinea CoastT The Gulf Stream is a continuation, partly of the main and partly of the north equatorial currents, which pass across the Atlantic to the South

American coast. That portion of the ocean river deflected northward then runs along the coast until it enters the American Mediter¬ ranean; receiving later the name of Gulf Stream when (and because) it issues, between Florida and Cuba, from the Gulf of Mexico. It

afterward flows nearly parallel to the coast of the United States, separated from it by a belt of cold water. Off Cape Hatteras it attains a width of 167 miles and com¬ prises three warm sections with two cold belts interposed. On passing Sandy Hook it turns eastward and continues to be recognizable, partly by its characteristic blue color, until it reaches long. 30° W., where, with diminished temperature, it is found flowing nearly due east. The warm drift from it that reaches the coasts of the British Isles represents, not the Gulf Stream proper, but a side branch, which derives its impetus from the southwest winds of those latitudes. There is, none the less, a real connection between the two. The Brazil Current is formed by that portion of the equa¬ torial ocean river which is turned southward from Cape S. Roque in South America. The South African current originates near the Cape of Good Hope and flows in a north¬ westerly direction, eventually uniting with the equatorial currents. The Cape Horn current flows from the Southern into the Atlantic Ocean, its general direction being east-north¬ east. Rennel current, a drift from the Gulf Stream, enters the Bay of Biscay from the west. The Arctic current runs along the east coast of Greenland and continues along the coast of the United. States, from which it separates the Gulf Stream by a band of cold water. An Antarctic current of cold water — not at the surface, like the foregoing, but at a great depth — flows from Antarctic regions toward the equator.

Fauna. — The suggestion has been made by several geologists that the Atlantic is not a true ocean like the Pacific, but rather a basin of secondary formation and comparatively recent origin. Moreover it has been shown that, meteorologically, the Atlantic should be considered as an inland sea — not a true ocean. Mr. Austin H. Clark has recently discussed the same matter from the biological stand¬ point. We premise that an inland sea is, biologically speaking, a more or less enclosed body of water that is connected with an ocean and has received all of its fauna from that ocean. Its fauna is therefore composed of the same types that occur in the ocean with which it is connected, except that the less plastic and adaptable types mav have been eliminated and the remainder modified in proportion to the difference between the physical and chemical conditions of the inland sea and that of the parent ocean. After a protracted statement of the evidence, Mr. Clark concludes : <(Thus we are justified in assuming that, so far as the evidence to be deduced from the study of the recent crinoids permits us to judge, the Atlantic Ocean is biologically, as it is geologically and oceanographically, an inland sea, for it has received its entire fauna from outside, by means of four different routes, only two of which are now open, and has never originated any type within

its own basin. Furthermore it is an inland sea largely, if not entirely, formed through the unequal subsidence of a land mass;

for the fauna of the Caribbean region, composed of ancient and generalized types, appears to have become established before the intrusion of the species from the Mediterranean region, which are more modern and more specialized, became possible.®

Depths. — The most profound depression yet discovered in the Atlantic, is the ((deep,® north of Porto Rico, measured by scientists of the coast survey steamer Blake (4,561 fathoms or 27,366 feet — 708 fathoms less than that given by soundings near Guam in the Pacific). Recurring now to the two great undersea valleys or troughs we have mentioned, we note that the mean depth of the east valley is about 14,000 or 15,000 feet, while the maximum depth of the west valley or trough is 16,800 feet. The submarine ridge separating these troughs is submerged to a depth of 1,600 fathoms from the Azores to the latitude of the Hebrides. It then rises gradually, emerg¬ ing and culminating in Iceland. The south Atlantic has a slightly greater average depth than the north Atlantic.

Bibliography. — Albert I, Prince of Monaco, ˆOceanography of the North Atlantic (Geo¬ graphical Journal, Vol. XII, London 1898) ; Clark, A. H., (The Atlantic Ocean Biologically an Inland Sea0 (Leipzig 1914) ; Hull, E., (Monograph on the Sub-Oceanic Physiography of the North Atlantic Ocean, > with a chapter on the sub-oceanic physical features off the coast of North America and the West Indian Islands, by Prof. J. W. W. Spencer (London 1912) ; Murray, J., (The Floor of the North Atlantic Ocean} (American Geographical Society Bulletin, Vol. XXXVII, New York 1905), and, with Hjort, J., and others, (The Depths of the Ocean) (London 1912) ; Reclus, £., (The Ocean, J etc. (New York 1873) ; Schott, G., (Geographic des Atl. Ozeans) (Hamburg 1912) ; Thomson, C. W., (The Depths of the Sea) (London 1874).

Marrion . Wilcox.

ATLANTIC SEABOARD DIFFEREN¬ TIALS. See Differentials in Railroad Traffic.

ATLANTIC TELEGRAPH. See Tele¬ graph.

ATLANTIC©, Colombia, the smallest of the departments of the

republic, bounded on the north and northwest by the Caribbean Sea, on the east by Magdalena and on the south and southwest by Bolivar. Area 1,082 square miles; capital Barranquilla. Its provinces are Barranquilla and Sabanalarga. Its plains, sloping to the Magdalena River or to the Caribbean Sea, are of value as pastures for cattle and also for the cultivation of tropical fruits, etc. There are 67 primary schools in the department, with 4,273 pupils (3.71 per cent of total population), and the school budget is about 15.54 per cent of the entire departmental budget. Pop. 116,000.

ATLANTIDA, a department of Honduras, Central America, established in 1902. It is bounded on the north by the Caribbean Sea and Gulf of Honduras, on the east by the department of Colon, on the south by Y.oro, and on the west by Cortes. It embraces the municipalities of La Ceiba (the capital, with 6,000 inhabitants), Tela, El Porvenir, San Cristobal and San Francisco. Chief elevation,

the Cerro de Bonito (5,900 feet) ; capes, Can- grejal, Hisopo, Papaloteca, Salado and Ulua; rivers, the Ulua, the Colorado, the Cuero, Bonito and Bonitillo ; products, cocoa, coffee, sugar, aguacates, oranges, lemons, pineapples, and all sorts of vegetables. Pop. 20,000.

ATLANTIDES, a name given to the Pleiades, the seven daughters of Atlas or of his brother Hesperus.

ATLANTIS, or ATLANTICA, a large island traditionally asserted to have once existed in the ocean immediately beyond the Strait of Gades; that is, in what is now called the Atlantic Ocean, a short distance west of the Strait of Gibraltar. Homer, Horace and some others made two Atlanticas, distinguished as the Hesperides and the Elysian Fields, and believed to be the abodes of the blessed. Plato states that an easy passage existed from the one Atlantis into other islands, which lay near a continent exceeding in size all Europe and Asia. Some have thought this America. At¬ lantis is represented as having ultimately sunk beneath the waves, leaving only isolated rocks and shoals in its place. Geologists have discov¬ ered that the coast line of western Europe did once run farther in the direction of America than now ; but its submergence seems to have taken place long before historic times. Plato's accounts in his <Timaeus) and (Critias) are considered a pure invention by some, but very many regard them as real tradition. (The New Atlantis *is the title which Lord Bacon gives to a literary fragment, in which he sketched out an ideal commonwealth. Consult Steiner, Submerged Continents of Atlantis and Lemuria) (Chicago 1911) and Volquardsen, (Ueber die Mythen bei Plato* (Schleswug

1871).

ATLAS, an anatomical term applied to the first vertebra of the neck, which supports the head. It is connected with the occipital bone in such a way as to permit of the nodding movement of the head, and rests on the second vertebra or axis, their union allowing the head to turn from side to side.

ATLAS, in Greek mythology, the Titan whom Zeus condemned to bear the vault of heaven. The same name is given to a collection of maps and charts, and wras first used by Gerard Mercator in the 16th century, the figure of Atlas bearing the globe being represented on the titlepages of such works.

ATLAS, an extensive mountain system in north Africa, starting near Cape Nun, on the Atlantic Ocean, traversing Morocco, Algiers and Tunis, and terminating on the coast of the Mediterranean. It is divided into the Moroccan, or western, and the Algerian, or eastern, Atlas. The western group is divided into the great Atlas, the little Atlas on the Mediterranean coast, and the anti-Atlas, southwest of the great Atlas

and near the Atlantic coast. The great Atlas contains the highest peaks of the W'hole system, Jebel Ayashin (14,600 feet) and Tamjurt (14,500 feet). On the coast, the range skirts the Mediterranean, from Cape Spartel, and the Straits of Gibraltar, to Cape Bon, on the northeast of Tunis. The Atlantic shore is sometimes sandy and low, at other times formed by cliffs, which do not attain any great height, except at Cape Ghir. The Mediter-

ranean shore, between Capes Spartel and Bon, is generally rugged, and in places attains a considerable height. Between Cape Bon and the Gulf of Gabes it is rocky, but without reaching any great elevation. The southern slope of the Atlas reaches the great desert, from which it is separated by a region of sand hills, shifting with every strong wind, and gradually making encroachments on the fertile lands at the foot of the mountains. On the west of the Gulf of Gabes, Mount Nofusa, the last eastern spur of the Atlas, joins Mount Garian, which extends into Tripoli. The French geographers include within the limits of the Atlas their own province of Algeria, together with Morocco, and a part of Tunis. The rocks of the system are igneous and sedimentary of the Archaean and Paleozoic periods. There are also many Jurassic and Tertiary formations. Copper, iron, marble and salt are found. While snow remains on the higher peaks during the greater part of the year no peak has a perpetual cover of snow. The whole area is 500,000 square miles, includ¬ ing a great variety of surface, mountains, valleys and extensive plains. The valleys are very fertile, are nearly all under cultivation and compare most favorably with other Mediterranean regions. Consult Fischer, T., ((Paris 1906); Schnell, P., (L'Atlas marocain) (Paris 1898) ; Thomson, Joseph, (Travels in the Atlas and Southern Morocco* (London 1889).

ATLAS POWDER, highly explosive dyna¬ mite used in mining, quarrying, tunneling, shaft and well sinking, submarine blasting, road build¬ ing, in farming to remove tree stumps or bould¬ ers from land, and subsoiling. It is composed of nitroglycerin, sodium nitrate, wood pulp, and a small quantity of some anti-acid, as chalk, etc. For special requirements as to strength and destructive potentiality the proportions of the ingredients are varied. When not confined it will burn harmlessly, but when fired by a deto¬ nating cap it explodes with enormous force. It is put up in cartridges about 8 inches long and from seven-eighths to two inches in di¬ ameter, containing from 25 to 75 per cent of nitroglycerin, according to the use to which it is to be

put. See Explosives.

ATLEE, Washington Lemuel, American surgeon: b. Lancaster, Pa., 22 Feb. 1808; d. 6 Sept. 1878. He became noted as a pioneer in ovariotomy and the removal of uterine fibroid tumors, and published (Ovarian Tumors) (1873), Struggles and Triumphs of Ovariotomy) (1875), and a prize essay on (Fibroid Tumors of the Uterus * (1876).

ATMIDOMETER, an instrument for measuring the evaporation from water, ice, snow, etc. It consists of two glass or metal bulbs, one of them placed above the other, with which it communicates by a narrow neck. The instru¬ ment having been immersed in a vessel of wa¬ ter through a circular hole in which the steam rises, distilled water is gradually poured into the pan above, causing it to sink to the point at which the zero of the stem is on a level with the cover of the vessel. As then the water in the pan gradually evaporates, the steam

slowly ascends, the amount of evaporation being- indicated in grains on the graduated scale.

ATMOL'YSIS, the separation of the com¬ ponents of a gaseous mixture by means of diffusion. See Diffusion.

ATMOGRAPH, an instrument recording water evaporation. See Atmometer.

ATMOMETER, an instrument for measur¬ ing the quantity of moisture exhaled in the open air in a given time from any moist surface, or from the surface of a liquid. The first in¬ strument of this kind was invented by Sir John Leslie. It consisted of a very thin ball of porous earthenware, from one to three inches in diame¬ ter, having a small neck firmly cemented to a long and rather wide glass tube, to which is fitted a brass cap with a leather collar. It is filled with distilled or pure water and its cap is screwed on tightly. It is then suspended out of doors where it is exposed to the action of the wind but is sheltered from rain. As the water evaporates from the surface of the ball the waste is indicated by a corresponding de¬ scent of the water level in the glass tube, accu¬ rately measured by a finely-graduated scale. Another form of this instrument consists of a round dish into which is placed an inclined scale, which gives a magnified record of the rate of evaporation from the surface of the liquid in the dish. Sometimes the loss of mois¬ ture through evaporation is recorded by means of weighing. The Marvin atmometer consists of a surface of water fed from a supply well where the rate of evaporation can be measured. The Piche instrument is a glass tube, closed on top and open below.

The open bottom is then rested on a disc of paper and fastened to it. The water is absorbed by the paper, whence it evaporates, the rate of evaporation being indi-_ cated by tbe descending level in the glass tube as in tbe Leslie instrument. This instrument, however, is more accurate because of the fact that the paper surface gives off more evapora¬ tion than does the exposed surface of the water in an open dish. There is also the balance in¬ strument invented by Wild, in which a pan of water forms the weight on a balance scale, the action of the scale indicating the loss by evapo¬ ration. For a detailed description of atmom- eters consult Russell's (Meteorology * (New York 1899).

ATMORE, Charles, English Wesleyan clergyman: b. Heacham, 17 Aug. 1759; d. Shef¬ field, 1 July 1826. Fie was received into the Wesleyan Church in 1779 by the noted Joseph Pilmoor, one of Mr. Wesley's missionaries to America. In 1781 he met John Wesley and then decided to enter the Wesleyan ministry, and served in various places for nearly 45 years. He was pastor in Glasgow for a time and served in several of the leading English cities. He was author of (The Methodist MemoriaP (1801) ; (A Concise History of the Introduction of Methodism in America) (1802) ; (The Whole Duty of Man* (1811) ; (Familiar Discourses on the Lord's Praver) (1821), and was the editor of several volumes.

ATMOSPHERE (Greek, ((vaporous sphere®), in ordinary usage, the gaseous en¬ velope that surrounds th£ earth. The atmos¬ phere consists chiefly of the gases, oxygen and nitrogen, not chemically combined, but mechani¬ cally mixed in the proportion of about 21 vol-

umes of oxygen to 79 of nitrogen. It also contains small quantities of carbon dioxide, or¬ ganic matter, water vapor, argon and other substances. (For a more precise statement of its composition, see Air). At the surface of the earth it has a density of about l/800th of that of water, though this varies somewhat with the height above the sea-level at which the determi¬ nation is made, and with the temperature and barometric pressure prevailing at the time. The presence of free nitrogen in the atmosphere may be attributed, probably, to the comparative inertness of that gas, so far as any tendency to form chemical compounds is concerned. The presence of free oxygen cannot be explained in this manner, however, because oxygen is one of the

most active chemical substances known. It appears more probable that oxygen is present in the free state simply on account of the im¬ mense quantity of that element that the earth contains. In past geological times, it com¬ bined with practically all of the oxidizable min erals that were near enough to the surface of the earth to be accessible to it, and the present supply of free oxygen in the atmosphere must be regarded as merely the excess of that element that remained unused, after all the possible oxidations had been effected. According to this view, the earth (at least in its more super¬ ficial parts) is a gigantic, burned-out cinder; and this accords with the estimates that chem¬ ists and geologists make, that nearly one-half of the weight of the earth's crust consists of oxygen. It is likely that in past ages, and particularly in the carboniferous period when the vegetation that gave rise to our modern coal fields was flourishing, the quantity of carbon dioxide present in the atmosphere was consider¬ ably greater than at the present time. Part • of this gas was absorbed by plants, its carbon being stored in the coal beds and its oxygen returned to the air; but it is likely that by far the greater portion combined with lime and other similar earths to produce the present vast deposits of limestone and other carbonated min¬ erals and rocks. At the present day, carbon dioxide is being absorbed from the atmosphere by plants, and returned to it again bv animals, and by factories in which coal is burned. We have no means of knowing whether the balance is being preserved, so far as this constituent of the atmosphere is concerned, or not, because the mass of the entire atmosphere is too vast for the composition to be sensibly changed by these causes, since the time when exact analyses became possible.

Galileo observed that water cannot be drawn up by a suction pump, or other equivalent device, to a greater distance than about 34 feet. He did not succeed in explaining th*e existence of this limiting height, but his friend and amanu¬ ensis, Torricelli, who succeeded him as profes¬ sor at Florence, afterward made the shrewd guess that water rises in such a pump for the reason that the atmosphere exerts a certain pres¬ sure upon all terrestrial objects, and that when a portion of this pressure is removed from the water in the suction tube of the pump, it is the pressure of the atmosphere upon the water external to the pump that causes the water in the pump-tube to rise; and he saw that if that were the case, it would follow that a pump could only draw® water up to the particular height at which the pressure due to the water-

column so (<drawn up® would precisely balance that of the atmosphere. The limit of 34 feet corresponds (as is easily shown by a simple calculation) to a pressure of about 15 pounds to the square

inch; and hence Torricelli inferred that the atmosphere exerts a pressure of that amount upon all objects. Mediating upon this hypothesis, it occurred to him that if his explan¬ ation were indeed correct, the atmosphere would be able to raise mercury (which is about 14 times as heavy as water) to only about one- lourteenth of the height to which it can raise water. He accordingly (in 1643) procured a glass tube some 35 inches long, and closed at one end. Placing it with the open end up¬ ward, he filled it with mercury. He then cov¬ ered the open end to prevent the escape of the mercury and inverted the tube so that its mouth dipped into a basin also filled with mercury. Upon uncovering the open end of the tube, he was gratified to see that the mercury in the tube at once sank until its upper surface stood at about 30 inches above that in the basin. This experiment proved that the atmosphere exerts a pressure equal to that due to a column of mer¬ cury 30 inches high ; or, in other words, equal to about 14.7 pounds per square inch. Additional proofs were soon given, also. Thus Pascal sug¬ gested that if the explanation were true, the pressure ought to be less at the top of a moun¬ tain, than in a lower place ; because the moun¬ tain projects up into the atmosphere so far that there is a sensibly smaller height of air above it than there is above a point in a valley. The experiment was actually carried out by M. Perrier, who carried an apparatus like Tor¬ ricelli's (now known as a ˆbarometer®) to the summit of a mountain in Auvergne called the Puv de Dome, and found at the top of this mountain (which is 4,800 feet high) the atmos¬ phere could sustain only about 27 inches of mercury, although after returning to the plains below, the full height of 30 inches was again observed. Shortly afterward (in 1650) the air-pump was invented by Guericke, and the pressure of the atmosphere was demonstrated beyond any doubt whatever, by numerous direct experiments.

The pressure of the atmosphere varies some¬ what from day to day, and even from hour to hour, as well as with the latitude and with the height above the sea. For scientific purposes the normal atmospheric pressure is now gen¬ erally taken to be equal to the pressure due to a column of pure mercury, 760 millimetres (29.921 2 inches) high, at the level of the sea, in latitude 45° ; the mercury being at the tem¬ perature 32° F. The pressure so defined is called an ˆatmosphere® ; or, more briefly and conveniently, an ((atmo.® The ˆatmosphere® of pressure, as so defined, is nearly equal to a pressure of 1,000,000 dynes per square centi¬ metre, and it has therefore been proposed to take 1,000,000 dynes per square centimetre as the standard atmosphere of pressure, calling it an <(absolute atmosphere,® because .the dyne is a unit in the <(absolute system® of units. This

proposal has not yet been adopted by physi¬ cists to any great extent. See Units.

Knowing the pressure exerted by the atmos¬ phere upon each square inch of the earth's surface to be about 14.7 pounds, and knowing the dimensions of the earth, it is not difficult to calculate the total weight of the entire atmos-

phere. The calculation, when performed, shows that the mass of the atmosphere is about 1/1, 000, 000th of that of the whole earth.

If the atmosphere were of uniform density, it would be easy to calculate the height to which it extends. We should only have to divide the pressure upon one square inch of the earth's surface by the weight of a cubic inch of the air, and the quotient would be the height of the atmosphere, in inches. Thus a cubic inch of air, at a pressure of 30 inches of mercury and at the temperature of freezing water, weighs about 0.000749 of an. ounce; and as a column of mercury 30 inches high exerts a static pressure of about 235.8 ounces, it fol¬ lows that if the atmosphere were homogeneous (that is, of uniform density throughout), its height would be about 253.8 -4- 0.000749 — 314,000 inches, or 4.97 miles, when the air has a temperature of 32° F., and the barometric pressure is 30 inches. The height so calcu¬ lated is convenient for use in certain physical computations, and is called the <(height of the homogeneous atmosphere.® If we turn from this problem to the more difficult one of de¬ termining the actual height of the atmosphere, we find that no satisfactory results can be given. As we go up, the strata become rarer and rarer, for the reason that the lower layers are weighed down and compressed by those above, and at increasing heights there is less and less air above, to exert this compression. At great heights the atmosphere becomes more and more attenuated, and thins out by in¬ sensible gradations into a perfect vacuum. There is no definite boundary, immediately below which there is an atmosphere, and im¬ mediately above which there is none. Glaisher and Coxwell, in their famous balloon ascension of 5 Sept. 1862, attained an actual elevation of over 29,000 feet, and observed a barometric height of 9.5 inches (corrected) ; but it is certain that the atmosphere extends far higher than this. Some estimates, based on the cal¬ culated heights of shooting stars when they first become luminous, place the limit at which the atmosphere has a density sufficient to pro¬ duce any observable effects at about 200 miles; but,

as has been pointed out above, all esti¬ mates of this kind are necessarily indefinite and unsatisfying. (For some of the questions raised in connection with the limits of the atmosphere, see Gases, Kinetic Theory of).

The atmosphere, as might be expected from its relatively great depth, exhibits an absorp¬ tion spectrum (see Spectroscope), and this varies to a certain extent from time to time. A portion of this absorption spectrum is due to the presence of water vapor, and the <(rain bands® in the spectrum have been utilized to a limited extent (though not very generally) in connection with weather predictions. It is also known that the atmosphere is less trans¬ parent to the rays at the blue end of the spectrum than to those in the middle and toward the red end. The experiments of Prof. S. P. Langley, on the expedition of the United States Signal Service to Mount Whitney, demonstrated that this selective absorption is so great that the sun would appear distinctly bluish, instead of white or yellowish as it does under actual conditions, if we could see it from a point outside of our

own atmosphere. Consult Langley, Re¬ searches on Solar Heat> (1884).

Little is yet known concerning the electrical phenomena of the atmosphere. In clear, calm weather, the atmosphere appears to be always positively electrified, with respect to the earth, and the difference in potential increases greatly during snowstorms and high winds. In thun¬ der storms it is subject to sudden and violent oscillations, as might be expected. Many the¬ ories have been proposed to account for the electrification so observed, particularly for the enormously high potentials that are in evidence during thunder storms ; but none has yet met with general acceptance. It was formerly thought that the evaporation and condensation of water had much to do with it, but no ex¬ perimental evidence has been adduced to justify this hypothesis, although physicists have given it the most careful attention. Bartoli and Pet- tinelli made exhaustive experiments in connec¬ tion with it, both with water and with organic compounds ; but always without obtaining any favorable results. Kelvin, MacLean and Gall observed electrification when dry air bubbled through a liquid, the air being electrified nega¬ tively in the case of pure water, and positively in the . case of sulphuric acid or salt water. Apparently these are all friction phenomena, and it is not certain that they have any bearing on the electrical phenomena of the atmosphere. We know, from numerous experiments, that dust facilitates the condensation of aqueous vapor, and numerous authorities have en¬ deavored to trace a similar connection between dust and the development of high

electric po¬ tentials in the atmosphere. No certain results have been attained, however, as may be judged from the fact that in the 12 years immediately preceding 1902, no less than 25 new thunder¬ storm theories were proposed, 6 of these being published during the year 1895. See also Meteorology; Wind.

ATMOSPHERIC ENGINE, an early form of pumping engine, invented by Papin in 1695 and subsequently improved by Newcomen and Watt. The steam cylinder is vertical and sin¬ gle acting, the piston being alternately forced upward by steam, and downward by the pres¬ sure of the atmosphere,

ATMOSPHERIC LINE. See Indicator.

ATOKA, Okla., town and county-seat of Atoka County, on the Missouri, Kansas and Texas Railroad, 110 miles southeast of Okla¬ homa City, and on the Muddy Boggy River. It contains three banks, five churches, good schools, a stave factor}', wagon factory, bottling works, cotton gins, planing mill, steam laundry and an ice plant. Lumbering and farming are the principal interests. The town has an elec¬ tric-lighting plant and a water works system. Pop. 2,000.

ATOLL, a-tol', the Polynesian name for coral islands of the ringed type enclosing a lagoon in the centre. They are found chiefly in the Pacific in archipelagos, and occasionally are of large size. Suadiva Atoll is 44 miles by 34, and Rimsky 54 by 20. See Coral Islands.

ATOMIC THEORY, in chemistry, the theory whose fundamental doctrine is that all matter is composed of ultramicroscopic par¬ ticles, separated by spaces either entirely des¬ titute of matter, or at least containing it in a

very attenuated state. Such a theory was taught by Lucretius and other ancient philoso¬ phers, but the views of these early writers were necessarily vague and indefinite, and the atomic theory, as held by chemists of to-day, is gen¬ erally attributed to the English scientist, John Dalton. In the early part of the 19th century Dalton called attention to the fact that when substances combined chemically they do so in certain definite proportions. His reasoning was something like this : In 100 pounds of carbon monoxide there are 42.9 pounds of carbon, and 57.1 pounds of oxygen. In the same weight of carbon dioxide there are 27.3 pounds of carbon, and 72.7 pounds of oxygen.

These are merely experimental facts, obtainable by direct analy¬ sis, and they involve no hypothesis whatever. No particular relations are discernable among the numbers stated above ; but Dalton dis¬ covered that if the same facts are stated in a different way, a very remarkable relation ap¬ pears. Thus, suppose we calculate what weight of oxygen is combined with each pound of car¬ bon in the two gases. In carbon monoxide we find that there are 57.1 42.9— 1.33 pounds of

oxygen to each pound of carbon, and in carbon dioxide we find that there are 72.7 -P 27.3 — 2.66 pounds of oxygen to each pound of carbon. One of these numbers being exactly twice the other, we conclude that carbon can unite with oxygen in two proportions, the quantity of oxy¬ gen per unit weight of carbon being twice as great in one case as in the other. Dalton ob¬ served similar relations among other com¬ pounds, — in fact, his theory first occurred to him while he was studying the simpler com¬ pounds of carbon and hydrogen ; and after turning the matter over in his mind he came to the conclusion that the facts can best be ex¬ plained by assuming that matter consists of exceedingly minute, indivisible particles or atoms, each of which has a definite weight. When two bodies combine chemically, he con¬ ceived their atoms to come together in pairs, or in threes, or fours, according to the com¬ pound formed ; and he devised symbols to rep¬ resent the various elementary bodies and their compounds. Thus oxygen was represented by a circle with a white centre, hydrogen by a circle with a dot in the centre, nitrogen by a circle crossed by a vertical straight line, and carbon by a solid black circle. His notation has no advantages .over the one now in com¬ mon use, and hence, in what follows, we shall adopt the modern symbols. As water was the only compound of oxygen and hydrogen that Dalton knew, he naturally represented it by the symbol OH, considering that in it the particles of oxygen and hydrogen are united in pairs. Taking the weight of the hydrogen atom as unity, it follows that the weight of the oxygen atom must be 8, if Dalton's view of the compo¬ sition of water is correct ; for experiment shows that in a given mass of water there is eight times as much oxygen, by weight, as there is hydrogen. Carbon monoxide was rep¬ resented by the symbol OC, and since for each unit of its oxygen (by weight) this gas con¬ tains three-fourths of a unit of carbon, it fol¬ lows that the atomic weight of carbon is three-fourths of that of oxygen. Hence the weight of the carbon atom is 6, the weight of the hydrogen atom being arbitrarily taken, as before, as 1. Carbon dioxide was rep¬

resented by the symbol OCO. Ammonia gas, being the only compound of hydrogen and nitrogen known to Dalton, was represented by the

simple symbol NH; and since experi¬ ment shows that ammonia gas contains (by weight) 4% times as much nitrogen as hydro¬ gen, the atomic weight of nitrogen must be 4%, or 4.67. In presenting the foregoing sketch of Dalton's views, use has been made of better experimental data than were available in his time, in order that the relation of his system of atomic weights to the modern system may be more clearly seen. A few of his actual determinations of atomic weights, from the imperfect data that he had, are given in the accompanying table. These were published in

Element	Atomic Weight
Hydrogen	1 .0
N itrogen	4.2
Carbon	4.3
Phosphorus	7.2
Oxygen	5.5

1805, and his general theory of chemical com¬ pounds was given in the first volume of his (New System of Chemical Philosophy, > pub¬ lished in 1808. All subsequent researches have tended to confirm Dalton's fundamental con¬ ception, that matter is discontinuous in its ulti¬ mate nature, and consists of discrete atoms which come together in definite groups when chemical combination occurs. And we agree with him, to-day, in the belief that the so-called (<atomic weights" of substances are really the true relative weights of their atoms; the weight of the hydrogen atom being taken as unity. Soon after Dalton's theory had been announced, it was observed that there are simple volumetric relations among gases when they combine. Thus it was noticed that two volumes of hydro¬ gen combine with one volume of

oxygen to form water; that one volume of hydrogen combines with one volume of chlorine to form two vol¬ umes of hydrochloric acid gas ; and so on. This being the fact, it was suggested by Avogadro in 1811, and independently by Ampere in 1813, that all gases, when under the same conditions of temperature and pressure, contain the same number of constituent particles per unit of volume. This principle, known as ((Avogadro's Law,® has been of the great¬ est service to chemistry. Its truth was long questioned, but as it has led to re¬ sults of great value, and has been found to be in conformity with all other known facts of chemistry, it is now accepted without reserve as a fundamental principle of nature. More¬ over, the kinetic theory of gases has shown that it is a mathematical necessity, if gases are admitted to consist of elastic particles, flying about through . space, and colliding with one another, and with the walls of their containing vessels. (See Gases, Kinetic Theory of). But if Avogadro's law be admitted to be a fact of nature, it becomes necessary, at once, to make an important modification in Dalton's theory. For it is plain that if one cubic inch of hydrogen, containing (say) n atoms, combines with one cubic inch of chlorine, also containing n atoms, to produce two cubic inches of hydro¬ chloric acid gas, containing n constituent parti¬ cles altogether, then the number of such particles

in each cubic inch of the hydrochloric acid gas is only w -t 2 ; whereas Avogadro's law requires us to admit the existence of n particles per cubic inch , in the compound gas as well as in each of its constituents. It follows, therefore, that when the H and the Cl combine, their ulti¬ mate particles do not simply unite in pairs. There is no way to explain the observed facts, consistently with Avogadro's law, unless we as¬ sume that the ultimate particles of H and Cl are both compound, and that when these gases com¬ bine, their particles split in two, half a particle of the one combining with half a particle of the other, to produce a whole particle of HC1. In other words, Avogadro's law compels us to admit that the little corpuscles of which mat¬ ter is composed, and which we have heretofore called atoms, are really (in some cases, at least) systems composed of still smaller bodies. To distinguish between the two kinds of parti¬ cles — namely, between the systems and their component bodies — it therefore becomes neces¬ sary to introduce a new term. The systems are called ˆmolecules® (literally, ((tiny masses®), and their constituent parts are still called <(atoms.® To put the case in another way, the smallest parts into which a given substance can be conceived to be divided,

without changing its chemical character, are called ˆmolecules® ; while (<atom® is reserved for the smallest por¬ tion of a substance that can enter into a chemical combination. A molecule is a system of atoms capable of independent existence; and an atom is one of the parts into which the molecule of a substance divides, as a prelimi¬ nary to entering into a chemical combination.

We have but little information, up to the present time, concerning the number of atoms entering into the molecules of the different ele¬ ments. The molecules of cadmium, mercury, zinc and indium are believed to be monatomic, at least when those bodies are in the gaseous state; so that in these cases there is no differ¬ ence between a molecule and an atom. The same is apparently true of argon, helium, neon, krypton and xenon. Hydrogen, nitrogen, oxygen, selenium and tellurium are believed to be diatomic ; that is, their molecules are believed to contain two atoms each. Phos¬ phorus and arsenic are believed to be tetratomic, their molecules containing four atoms each. Chlorine, bromine and iodine are diatomic at temperatures below 1100° F., but above

1100° their molecules are believed (by some authorities) to break up into single atoms, so that at about 2200° F. two-thirds of the little particles present in these substances are free atoms, while the remaining one-third continue to exist as diatomic molecules. Sul¬ phur is hexatomic at 900° F., but its molecules break up somewhat at higher temperatures, and are practically all diatomic above 1500°. Ac¬ cording to this view of the case, if H stands for the atom of hydrogen and Cl for the atom of chlorine, what happens when a molecule of one of these gases combines with a molecule of the other is not simply H + Cl — HC1, because the molecule of hydrogen must be represented by H2 and that of chlorine by Cl2. Hence the process of combination consists of two parts, the first of which is

H2 + Cl2 = H + H + C1 + C1

Molecule Molecule Atoms of Atoms of of hydrogen of chlorine hydrogen chlorine

The atoms of hydrogen and chlorine, thus set free, then combine to form hydrochloric acid.

It is then written as follows :

FI + H + Cl + Cl = HC1 + HC1 ;

or we may write the whole operation in the fol¬ lowing simple

manner :

$H2 + C12 = 2HC1$

Dalton, assuming that the formula of am¬ monia is NH, and knowing by experiment that the weight of the nitrogen present is 4.67 times as great as the weight of the hydrogen, would conclude that the atomic weight of nitrogen is 4.67 ; but since experiment shows that when ammonia gas is separated into its constituent elements, two volumes of the ammonia yield one volume of nitrogen and three volumes of hydro¬ gen, Avogadro's law requires us to conclude that the true formula for ammonia is NH2; and hence we must take 3 X 4.67 = 14 as the atomic weight of- nitrogen. This example will suffice to show how Avogadro's law obliged chemists to modify the atomic weights that would be ob¬ tained by the methods known to Dalton. Di¬ rect analysis of compounds of an element whose atomic weight is desired will give either that atomic, weight itself, or some simple multiple or submultiple of it; but to decide between these several multiples (as for example between 4.67 and 14, in the case cited above), it is necessary to have recourse to Avogadro's law, or to some other equally general principle. Unfortunately Avogadro's law cannot always be applied to the determination of atomic weights, because it frequently happens that no compound of the element under examination can be obtained in the gaseous condition, or that the gaseous com¬ pounds that can be obtained are unsatisfactory, for one reason or another, and not adapted to the determination of the particular multiple that should be selected as the atomic weight of the element. In such cases recourse may be had to the law of Dulong and Petit, or to the Ape¬ riodic law® of Meyer and Mendeleeff. In 1819 two distinguished French physicists, MM. Du¬ long and Petit, announced that the specific heats of 13 elements upon which they had made care¬ ful experiments are inversely proportional to the respective atomic weights of those elements. In other words, that the product of the specific heat and the atomic weight (which product is called the <(atomic heat®) is the same for all of them. This remarkable generalization did not meet with universal and immediate acceptance, be¬ cause it failed in numerous cases unless the atomic weights of the corresponding elements were changed somewhat from the values that had been previously assigned to them from purely chemical considerations. Thus in the cases of bismuth, platinum, silver and cobalt, Dulong and Petit substituted multiples or sub¬ multiples of the atomic weights then in use ; and other changes were also made. Moreover, the law could not possibly be exact, because the specific heats of bodies are not constant, but vary with the temperature, and sometimes to a considerable extent. Subsequent experi¬ menters have paid great

attention to Dulong and Petit’s law, however, and now that the atomic weights of the more familiar elements have been pretty well determined in one way and another, the law is found to be surprisingly near to the truth, and most of the changes for

which they contended, in connection with previ¬ ously accepted atomic weights, have since been made. A list of 10 elements whose specific heats have been well determined are presented in the table, to illustrate the degree of accuracy

Element

Atomic

weight

Specific

heat

Product' (“Atomic heat ”)

Lithium .

1.

0.941

6.6

Aluminum .

1.

0.214

5.8

Potassium .

1.

2. 166

6.5

Copper .

1.

0.0952

6.0

Silver .

1.

0.0570

6.1

Antimony .

1.

0 . 0508

6.1

Tungsten .

1.

0.0334

6.1

Gold .

1.

0.0324

6.4

Bismuth .

1.

0.0308

6.4

Uranium .

1.

0.0277

6.6

with which a proposed element may be ex¬ pected to conform to it. The atomic weights in the table range from 7 to 238, and yet when we multiply each one by the corresponding specific heat, we find that the product (or <(atomic heat®) remains constant, or nearly so. In some cases (notably for boron, silicon and carbon), a large deviation from the law is observed; but these exceptions cannot be considered in the present place. As an example of the use of Dulong and Petit's law, the case of silver may be cited. Previous to the publication of that law; the atomic weight of silver had been taken at 215. Dulong and Petit pointed out that if this value were retained, the product of the atomic weight and the specific heat greatly ex¬ ceeded the value 6, to which many of the other elements approximated. They therefore pro¬ posed to halve the then accepted atomic weight of this element, and to make (of course) a corresponding change in the formulas of all compounds of silver. Regnault confirmed their experiments, and repeated their demand that the atomic weight be halved. But Berzelius, then the greatest living authority on such mat¬ ters, refused to consent to the change, on the ground that silver and sodium compounds are isomorphous (see Isomorphism), and that the analogy between the formulas of their corre¬ sponding compounds would be destroyed, if the atomic weight of silver were halved, while that of sodium was left unchanged. Regnault then determined the specific heat of metallic sodium, and showed that the atomic weight of that element should also be halved, in order for it to conform to Dulong and Petit's law. Berzelius' objection thus lost its force, and the atomic weights of both silver and sodium were ultimately halved, by universal consent. The Aperiodic law,® already referred to, cannot ˆe adequately treated in this place (see Periodic Law) ; but it may be 'said that when the known elements are arranged in the order of their atomic weights, it is found that certain attributes recur in a remarkable Aperiodic® manner, as we pass from one end of the array to the other. This fact is of great assistance in the determination of atomic weights, because any great error in the assignment of the atomic weight of an element would throw that ele¬ ment among others with which it would have relations entirely out of harmony with analo¬ gous relations

prevailing in other parts of the

array. This aperiodic® classification is so powerful and far-reaching that the existence of new and previously unsuspected elements has been predicted by it, and afterward verified (in some cases) by the actual discovery of the elements themselves. The gas (< argon® (q.v.) affords an interesting case of the determination of an atomic weight by indirect means. Argon has resisted all attempts to make it combine with other substances, and hence it has been impossible, thus far, to analyze any of its com¬ pounds. Its density was found, by direct ex¬ periment, to be about 20 times as great as that of hydrogen. Now if, as Avogadro's law states, a cubic inch of argon contains just as many molecules as a cubic inch of hydrogen (under the same conditions of temperature and pressure), then it follows that a molecule of argon weighs 20 times as much as a mole¬ cule of hydrogen, or 40 times as much as an atom of hydrogen. To find the weight of an atom of argon we therefore merely have to divide 40 by the number of atoms that there are in its molecule. For an explanation of the method by which the number of atoms in the molecule of such a gas is obtained, we must refer to the article Gases, Kinetic Theory of; it will suffice, in the present place, to state that it was found that argon is monatomic, its molecule containing but a single atom. There¬ fore the conclusion was, that the atomic weight of argon is about 40. The Aperiodic law® was not of any great service in this case, because the properties of the new gas proved to be so unlike those of any previously known substance that its proner place in the general scheme could not be even guessed until its atomic weight had been determined. The subsequent discovery of helium and the other inert gases of the same group showed, however, that the atomic weight already assigned to argon is in reasonably good accordance with the periodic law.

Chemists educated in recent years can hardly conceive the confusion that prevailed 60 years or so ago, while the principles that have been outlined above were struggling for recognition and universal adoption. There was no agreement as to what atomic weights or what formulas should be used. Mendeleeff says. ((Some took 0 = 8 and others 0 = 16. Water in the first case would be HO and hydro¬ gen peroxide HO-, and in the second case (as is now generally accepted) water would be H2O and hydrogen peroxide H2O2 or HO. Discus¬ sion and confusion were reigning. In 1860 the chemists of the whole world met at Carlsruhe for the purpose of arriving at some agreement on the subject. There was great difference of opinion, and a conditional agreement (or com¬ promise) was proposed and defended with the greatest acumen by the ranks of science. A conditional agreement was not arrived at, and ought not to have been ; but instead of it, truth, in

the form of the law of Avogadro-Gerhardt, received by means of the congress a wider de¬ velopment, and soon afterward conquered all minds. Then the new so-called Gerhardt atomic weights established themselves, and in the seventies they had already become gen¬ erally used. As soon as a few of the atomic weights had been determined with some little degree of precision, it became evident that they

came nearer to exact integers than one would naturally expect them to, judging from the theory of probability. As early as 1815, Prout made the assumption (since known as ((Prout's Hypothesis®) that the true values of these atomic weights are really integral numbers ; and he drew the inference that all elements are composed of hydrogen. Thus nitrogen, whose atomic weight is almost exactly 14, he believed to contain 14 times as many atoms to the molecule as hydrogen contains, and he be¬ lieved the fundamental atom to be the same in each case. There is nothing about this assump¬ tion which conflicts with what has been said above about nitrogen being a diatomic gas ; for all that Avogadro's law positively shows is that when a molecule of that gas divides, it splits into halves, and therefore contains an even number of atoms. In the absence of any evidence to the contrary we assume it to be simply diatomic, although we must always re¬ member that future research may require us to admit it to be tetratomic, hexatomic, or even more complex. Prout's hypothesis has provoked a great deal of discussion, and since it was first proposed it has been attacked and defended by many distinguished chemists; and although it is in decided disfavor at present, we can hardly yet say that it has been finally laid to rest. One can scarcely glance at a table of atomic weights (such as that here presented) without noting the tendency shown by these atomic weights to approach integral values. Of course there are numerous conspicuous excep¬ tions — chlorine, for example — but the fact that many of the atomic weights are nearly in¬ tegral demands some sort of an explanation. What that explanation may ultimately prove to be, we cannot now guess ; but it is possible that it will be found in the development of the re¬ markable <(corpuscular hypothesis® of Prof. J. J. Thomson. (See Electron.) The atomic weight of oxygen was long thought to be pre¬ cisely 16; very careful experiments then indi¬ cated that 15.96 is a closer approximation to the real fact ; and it has recently been ascer¬ tained that 15.88 is a still better approximation. It is a matter of choice what element is taken as having the atomic weight unity, hydrogen having been chosen for this purpose merely be¬ cause it is

the lightest element known. For many purposes it would be convenient if the atomic weight of oxygen were precisely 16; but this value is now known to be incompatible with the assumption that the atomic weight of hydrogen is 1. Chemists have therefore been in the habit, in recent years, of multiplying all the atomic weights, as deduced on the hypothe¬ sis that H = l, by a constant number, so de¬ termined as to make the atomic weight of oxygen come precisely 16. It happens that the multiplier required for this purpose is 1.008, which is therefore the atomic weight that must be assigned to hydrogen, if we are to adopt a scale on which the atomic weight of oxygen is to be precisely 16. A majority of the chemists of the world now use this modified scale, on which the atomic weight of hydrogen is taken as 1.008; and the scale so established is known as the ˆInternational® scale of atomic weights. The values of the atomic weights on this scale, according to the latest official revision (that of 1917) are given in the accompanying table.

Table of Atomic Weights

Element

Sym¬

bol

Atomic

weight

Element

Sym¬

bol

Atomic

weight

Aluminum . . .

A1

27.1

Neodymium.. .

Nd

144.3

Antimony . . .

Sb

120.2

Neon .

Ne

20.2

Argon .

A

39.88

Nickel. . . .

Ni

58.68

Arsenic .

As

74.96

Niton (radium

Barium .

Ba

137.37

emanation)..

Nt

222.4

Bismuth .

Bi

208.0

Nitrogen . .

N

14.01

Boron .

B

11.0

Osmium

Os

190.9

Bromine .

Br

79.92

Oxygen

o

16.00

Cadmium ....

Cd

112.40

Palladium .

Pd

106.7

Caesium .

Cs

132.81

Phosphorus . . .

P

31.04

Calcium .

Ca

40.07

Platinum ....

Pt

195.2

Carbon .

C

12.005

Potassium . . .

K

39.10

Cerium .

Ce

140.25

Praseodymium

Pr

140.9

Chlorine .

Cl

35.46

Radium .

Ra

226.0

Chromium . . .

Cr

52.0

Rhodium .

Rh

102.9

Cobalt .

Co

58.97

Rubidium ....

Rb

85.45

Columbium . .

Cb

93.1

Ruthenium . . .

Ru

101.7

Copper .

Cu

63.57

Samarium ....

Sa

150.4

Dysprosium. .

Dv

162 . 5

Scandium ....

Sc

44.1

Erbium .

Er

167.7

Selenium .

Se

79.2

Europium. . .

Eu

152.0

Silicon .

Si

28.3

Fluorine .

F

19.0

Silver .

Ag

107.88

Gadolinium . .

Gd

157.3

Sodium .

Na

23.00

Gallium .

Ga

69.9

Strontium ....

Sr

87.63

Germanium . .

Ge

72.5

Sulphur .

s

32.06

Glucinum. . . .

G1

9.1

Tantalum ....

Ta

181.5

Gold .

Au

197.2

Tellurium ....

Te

127.5

Helium .

He

4.00

Terbium .

Tb

159.2

Holmium ....

Ho

163.5

Thallium .

T1

204.0

Hydrogen. . . .

H

1.008

Thorium .

Th

232.4

Indium .

In

114.8

Thulium .

Tm

168.5

Iodine .

i

126.92

Tin .

Sn

118.7

Iridium .

Ir

193.1

Titanium .

Ti

48.1

Iron .

Fe

55.84

Tungsten .

W

184.0

Krypton .

Kr

82.92

Uranium .

U

238.2

Lanthanum . .

La

139.0

Vanadium ....

V

51.0

Lead .

Pb

207.20

Xenon .

Xe

130.2

Lithium .

Li

6.94

Ytterbium (neo

Lutecium ....

Lu

175.0

ytterbium) .

Yb

173.5

Magnesium. .

Mg

24.32

Y ttrium .

Yt

88.7

Manganese. . .

Mn

54.93

Zinc .

Zn

65.37

Mercury .

Hg

200 6

Zirconium . .

Zr

90.6

Molybdenum

Mo

96.0

The many questions that suggest themselves as to the size and physical nature of atoms be¬ long properly to the domain of physics, and are discussed under Brownian Movement, Electron, and Molecular Theory. The day will doubtless come when the physicist and the chemist will find some common ground for the discussion of the nature of atoms and mole¬ cules; but at present these two sciences deal with such widely different classes of phenomena that no such common ground can be clearly dis¬ cerned. The atom and the molecule of the physicist appear to be hardly capable of pos¬ sessing the properties that the chemist demands ; but this difficulty may one day be overcome. See Chemistry; Electron; Molecular Theory; Gases, Kinetic Theory of; Valency; Spectroscope; Periodic Law.

A. D. Risteen.

ATOMICITY. See Valency.

ATOMIZER. See Internal Combustion Engine.

ATONEMENT. The Atonement is the caption under which Christian theology intro¬ duces the discussion of the application of the merits of the life and death of Christ to the reconciliation of fallen man to his Creator, as well as of the acceptance thereof by the Di¬ vinity. It expresses the crowning effect of the incarnation. It is, in this sense, an attempt at an explanation of the coming of the Redeemer. In a general way it means compensation, res-

toration, expiation, satisfaction, ransom. It is a word made up etymologically of at and one, and suggests that two who were divided have become one again. It embraces all that the Saviour accomplished to nullify the effects of sin. The atonement is considered to have re¬ paired the consequences of the primal trans¬ gression, all the moral consequences, say some, say most of the authorities. As to the physical outcome of the rebellion in Eden, it claims no change save that, through it, man has been enabled to bear patiently and meritoriously all the ills of existence and to wrest from what is evil a good that worketh unto satisfaction. The atonement idea is coexistent with what, in order to avoid conflict with those ,who think otherwise, may be called Biblical humanity ; that is, the race whose chronicle is found in the pages of Scripture. It has no meaning for those who reject the inspiration of Holy Writ or for those whose beliefs are antagonistic to Christianity. With these, if there be any atone¬ ment at all, it lies in an evolution, by virtue of which man develops from worse to better and in the ((process of the suns® reaches, un¬ aided, to a deliverance and a perfection far surpassing even the dreams of Christianity. The subject is a vast one. It has many and far-reaching ramifications which are constantly in contact with every issue of soteriological study. To confine it within the limits of an encyclopedic article necessarily cramps it and scarcely makes for completeness. All that can be done is to present its general features, the basis on which it rests, and some of the opin¬ ions which deserve attention in the different stages of development incidental to its growth. The fact upon which the doctrine reposes is that narrated in Genesis iii, wherein the pre¬ varication of the first couple is said to draw on them and posterity the curse of the Al¬ mighty, which He tempers with the promise of a Redeemer to come. This violation of God's command, while it rendered Adam and Eve criminal and placed them under a ban, was at the same time an insult outraging, as much as anything finite could, the infinite perfections. Thus a condition was brought about which consigned man to punishment and left an af¬ front against the Creator to be, in some way or other, atoned for. In this plight the whole race wras involved and became ostracized from God. All humanity was confronted by a God whose infinite justice called for an indemnity of some kind as a reparation for the indignity offered to His perfections, by a penal sentence to be endured, by the loss of innocence, by the unbridling of concupiscence and by a slavery which reduced it to the thrall of the prince of the powers of darkness. Immediately is per¬ ceived the gaping breach which the atonement had to bridge over. Could the restoration be achieved by man himself and alone, or by en¬ tire humanity? The general answer is a nega¬ tive. It is clear from the attitude into which man was forced by his sin what the questions

are which in this discussion call for a reply. The views entertained by theologians are not marked by very harmonious notes. There is a very great discrepancy of opinion. Like other doctrines, that of the atonement did not come into existence full grown. It was not formu¬ lated in the beginning. Hints of its nature are found in the New Testament. By Christians

up to the time of the Reformation it was re¬ ceived from individual teachers, by whom, as by the laity, it was instinctively grasped, though scarcely expressed, and thus in many forms traversed the duration of nearly 15 centuries. Whenever, during all that period, it was treated by the fathers and doctors and other writers, there was unanimity on this one point: that the atonement was effected by the incar¬ nate Son of God and that the satisfaction was complete and answered all the exactions of a just Deity, while it simply deluged man with a sea of spiritual blessings. Their contention, summed up, was that it was in the absolute power of God to pardon man without any atonement, without sending His Christ. In His wisdom, however, consulting not only the great wrong perpetrated against Him, but the wel¬ fare of His creatures, He decreed the incar¬ nation of His divine Son, the second person of the Blessed Trinity. That Son incarnated was both God and man, possessing two natures in one person. This person was divine. As all acts are attributable to the personality of the individual, it followed that the acts of the God-man were divine, and so, whether proceed¬ ing -from the human nature or not, they were infinite in value. It was necessary for an atone¬ ment act to have infinity, because sin, though committed by a finite agent, was in a measure infinite, since its malice was directed toward a being infinite in nature. Theologians made the distinction that sin was finite subjectively, but objectively infinite. The divinity of the person made the atonement secure on the side of the Father. Man was doubly privileged. The Redemption of Christ obtained for him, through grace which had its efficacy in the blood of the Saviour, the remission of sin, and strengthened him against his own weakness, his own passion and the wiles of the enemy from whose thraldom he had been rescued. In a word, the insult to the Father was wiped out; man was restored to the old friendship, was endowed with the means of justification and sanctification and his feet put on a path to the vision of God, in the enjoyment of which sin becomes an impossibility and happiness is supreme. With very few exceptions this, more or less completely, was the form the atonement took in the thoughts of the large majority of teachers of the Church for a decade and half of centuries. They labored to hold up the dig¬ nity and liberality of the atonement. The Atoner was Christ, and He atoned through His sac¬ rifice on the cross

in a manner ample beyond all human reckoning. But the atonement was not a thing of Christianity only; its effects reached back to the whole past of man, for the Lamb who atoned was (<slain from the founda¬ tion of the world.® They argued that the re¬ demption was universal as to time- and place and for all the generations of man. All the peoples before Christ came within its pale. No man, however incult, fell outside of the plan of redemption. Everyone everywhere could find its blessings within his reach. It wrought from alpha to omega on the race. Not the chosen people only, but the Gentiles as well participated in its benefits. It was taught in the period under reflexion that just as soon as the Redeemer was foretold to Adam and Eve the atonement began to energize in some inexplicable manner, but always with a view

to the merits of Christ, who was to come in the fullness of time and pay the ransom. The concession of the Creator in granting a Re¬ deemer who was to make plenary atonement for every man until the passing away of the race was, before the incarnation, a promissory note — if it may be allowed to use the term — a prom¬ issory note of salvation accepted and honored by the Maker, who knew that at the appointed time a priceless amount would be -stored up for its redemption. The atonement idea, that is, the necessity of making amends to a Ruler whose mandates had been and were being vio¬ lated, prevailed everywhere in the ancient world and was not confined to the descendants of Abraham. Sacrifices, propitiatory and ex¬ piatory, so common among the ancient idolators, are evidence sufficient. Among them was an uppermost thought that reconciliation with God or with the gods could not be brought about by individual efforts alone. The sacrifices of Israel emphasize the essence of all atonement. A victim was always called for. Something outside of the transgressor had to be offered to effect the lifting of the ban. That blood offerings, or others, were ineffective, save in¬ directly and by a mysterious connection with the oblation of Christ, is admitted throughout the extent of ante-Reform tradition. In the Jewish mind the concept of sacrifice in a mul¬ titude of cases connoted effusion of blood. The Hebrews were instructed that transgressions placed on the back of the victim died with the victim. This only in a measure, for it does not appear that they professed that after the death of the victim the guilt of the sacrificers was canceled without any further act or co¬ operation on their part. Repentance was nec¬ essary and each had to do his utmost to share by individual action in the redeeming work of

the sacrificial object. The vexed subject of imputation (q.v.) recurs frequently but can¬ not be touched here. The religion of the Jews was distinguished by the number and variety of its sacrifices. But atonement was ever be¬ fore their eyes. Yom hakkippurim, or Day of Atonement, is another proof. It was a penitential occasion. Its austerity was rigor¬ ous. From the evening of the 9th to the even¬ ing of the 10th of the seventh month no bodily labor could be done, no food taken under pen¬ alty of death. All the ritual was carried out by the high priest, who offered sacrifices for the sins of himself, of the priesthood and of the people. For the typical meaning of these ceremonies see Heb. viii-x, and for a descrip¬ tion of the solemnity cf. Lev. xvi. These types ceased with the advent of Christ. Mention has already been made of the gradual develop¬ ment of the doctrine of atonement. From the death of the Saviour it was admitted that <(Je-sus died, the just for the unjust, to redeem mankind from the bondage of corruption and to restore the broken connection between heaven and earth.® Different ways of looking at this fundamental axiom of Christianity in gen¬ eral have suggested various explanations. The conditions of the dispute led to many questions which relate to the incarnation. The one thing the teaching Church held to was that Christ as man is the first and supreme mediator be¬ tween God and man (1 Tim. ii, 5). Because as man He was a created being He is below God, but is above all creatures by reason

of the plenitude of His grace and glory. As man he offered to God a satisfaction so singu¬ larly adequate that by it was destroyed (<the handwriting of the decree® so adverse to us, and by it also man was endowed with all that is requisite to be in friendly association with God, by grace in the present and by glory in the future. Others, ministerially or otherwise, may co-operate in uniting God and man, but Christ is the chief and first and literally the only mediator (Billot).

The doctrine of the incarnation in its en¬ tirety illumines this subject, but of it and of other cognate subjects, such as justification and original sin, notice cannot be taken here. The atonement, as such, has not been treated spe¬ cifically by early writers, and it would be diffi¬ cult to put one's finger on any dogmatic decree in which it is definitely formulated. Just as from definitions here and there spread over the volume of authoritative teaching the na¬ ture of the atonement is elicited, so from the utterances of ecclesiastical writers one is able to reach a conclusion in harmony with the af¬ firmation of tradition. The view still claiming attention bases itself on Scripture. Texts there¬ from are not necessary for the present writing; they embrace the prophetic language of the Old and the literal language of the New Tes¬ tament. The Apostolic Fathers, from Clement to

Polycarp, are satisfied with stating the fun¬ damental idea that (<Christ died for us® and for our sakes. Irenaeus and Origen insist that a price had to be paid to Satan because Satan had gained a rightful mastery over and own¬ ership of men, for which the only equivalent was the blood of Jesus. This view was never universal, but now and again it is brought for¬ ward, even up to the time of Peter Lombard. The Fathers and writers from Origen to An¬ selm wrote more systematically on nearly every topic, but were unanimous in maintaining that the death of Christ was the sacrifice unique and par excellence and amply satisfactory. Some do, others do not, endeavor to explain whether and why this sacrifice was imperative. This is true of the Church East and West, Greek and Latin. Two ideas are prominent : the infinite value of the human acts of Christ, and the need of grace for human weakness. More stress is placed on the incarnation than on its concom¬ itant effecting of the atonement. <(The work of mediation was summed up but not exhausted in the dying. He was a priest and a sacrifice from the beginning, and is and always will be. The imitability of Christ's career was not confined to the death on the cross, but as well to the whole existence® (Newman).

Ocasionally a peculiar view would startle the world, but without changing the generally accepted opinion. Anselm (1033) in his (Cur Deus homo5 vigorously opposes the view of Origen and others concerning the so-called bar¬ gain by which the Almighty, through Christ, purchased back the souls of men from the grasp of Satan. Then came the age of the Schoolmen. It has been the custom to look upon the-e men as triflers and hair splitters, but what Huxley says of Saint Thomas is, with modification, applicable to many of these very imperfectly known and much abused investi¬ gators : (fHis marvelous grasp and subtlety of intellect seem to me to be almost without a parallel® (Science and Morals). They all united

in declaring that Christ by His sacrifice was the Atoner. They differ in their explanation of some points connected with the incarnation which are irrelevant here. They are broad and moderate in their views. Christ not only freed us from sin, says Aquinas, but won for us grace and glory, and it was fitting that by death He should overcome the power of death, but His death need not have been a violent one. Over the question whether the incarnation was an absolute necessity or only something con¬ gruous, they run through every note of the gamut of argument. Duns Scotus is one of the principal figures in the

discussion. Among other views he maintains that a mere man conceived without sin, or a good angel, could have made satisfaction for the entire race had it pleased God to accept it. Express treatises on the atonement cannot be found. It is al¬ ways treated as an adjunct of the incarnation. There have been many pious and devotional essays on this topic. Since the days of the scholastics all Catholic analysis of the atone¬ ment can be traced back to them or to the Fathers and doctors. The Reform opens with the 15th century of modern times, and those leaders only who have left an indelible impress upon their followers will receive attention. Arians, and those who reject the divinity of Christ directly or by implication, fall outside this inquiry.

An insistent tenet of the Reformers is, that Christ reconciled God to us, whereas the Tri¬ dentine Council teaches that He reconciled us to God. The Divinity by the very force of the divine perfections, Catholics hold, remained in itself unchanged. The fall affected man, that is, man by his transgression placed himself vol¬ untarily under the ban of infinite justice and willingly subjected himself to all the conse¬ quences of his disobedience. Man alone changed. God's attitude was always the same. In one of his bulls Leo X (1520) condemned 41 propositions of Luther, some of which in one way or another refer to the doctrine of the atonement. In the sixth session of the Council of Trent the decrees on justification, on the advent of Christ, etc., (Dec. Concil. Trid.) set forth a basis for views on the Atonement which are in opposition to those of Luther and others. Luther denies the supernatural character of man's original sanctity. God, according to Lu¬ ther, planted in the very essence of human nature the capabilities and the acts of virtue. Hence no freedom of will. Sin is of the es¬ sence of man. Man is wholly evil. Calvin asserts that everything coming from man's cor¬ rupt nature is damnable and so can in no way co-operate in the atonement. It must all occur outside of himself. He contributes nothing. He is justified; he is reconciled to God, or God is reconciled to him through faith in the merits of Christ, whose obedience becomes man's obedience and whose righteousness be¬ comes man's justification. In this way the Cre¬ ator remits sin, reputes man just and rewards him with eternal life. Christ made satisfaction for sinners in two ways : by fulfilling the law in their place and by enduring the curse and pen¬ alty of the law. Everything in the atonement be¬ comes vicarious. Another person is substituted for the debtor and the criminal. These doc¬ trines are gathered from the Epistles of Saint Paul. Only the bare statement has been here

presented of the doctrine of the Reformers. A review of the reasons advanced to sustain this teaching would repay the student. Those who came after Luther and Calvin and Me- lancthon modified in a lesser or

greater degree this teaching and modified the idea of trans¬ ference as atonement and demanded at least some co-operation, on the part of the sinner. Imputation soon became the great battleground of controversy. Investigation will reveal that in the Protestant churches there has been a recoil from the positive utterances of the Re¬ formers. The disparity existing between the above and what can be gleaned from the early and modern history of the Catholjc Church is undoubtedly marked. So much so that Pusey in his introductory essay to (Essays on the Reunion of Christendom y observes: (<The Lu¬ theran and the Catholic belief are as like two different religions as any can be, wherein the be¬ lief as to the adorable Trinity and the incarna¬ tion is the same. The whole doctrine of the ap¬ plication of the merits of Christ to fallen man and the condition of man in consequence of the fall is radically different.® In fact, the difference is so radical that there is no possi¬ bility of confounding one with the other. All Protestant theology from the rise of that re¬ ligion is a literature which is within the reach of any one to consult, and further quotations or references are unnecessary. <(Just as the justice of man binds the judge to punish the criminal, so is some penalty exacted from man by virtue of the same attribute, which, of course, is more perfect in the divinity. It is not the spirit of vengeance which animates God. In spite of the transgression God's love remains as it was in the beginning, without diminution or alteration of any kind. The Son of man died for all men sufficiently, for the elect efficiently. Satisfaction is required of man. But that satisfaction is amply made by man by believing, who thus becomes one with the Redeemer and shares with Him in the re¬ demption He wrought as the Head of the Re¬ deemed. This is enough to excite love and repentance and the striving after holiness.®

Everything quoted above, though taken from different writers, expresses the view of the Atonement as held by Protestant ex¬ pounders.

In later years, both in Germany and else¬ where, the theology outside of the Catholic Church, while apparently concordant with the opinion of the necessity of man's co-operation, harks back, consciously or unconsciously, to the belief of Luther and his immediate disciples that Christ atoned fully, and so fully that the sinner need only by some interior act appropriate to himself the work already done by the Saviour. Where there is any insistence that man must of himself do something positive, in so much is that insistence at variance with the thought that in the beginning of the Reformation was spread broadcast among the adherents of the New Religion. Might there not be drawn a distinction between atonement and salvation? The

atonement would mean that Christ had done all that was necessary to reconcile man with God, but there could be no salvation un¬ less man turned to God through the path of the. atonement and by individual repentance and satisfaction so comported himself as to bring by voluntary acts his life into entire harmony

with the will of his Creator. No solution of the evidently complicated nature of the atone¬ ment will compel conviction which does not answer adequately the following questions : What is the relation of the atonement to an offended God? What was His acceptance of the sacrifice? How far did that sacrifice in itself go toward bringing God and man to¬ gether? Was it alone enough to liberate man so absolutely that after the death of the victim no more was expected on his part? How were the outraged excellences of the Godhead — His justice, His mercy, His love — compensated for the injury done them by sin? Did that injury really affect the divine nature? It may be ad¬ vanced here that in every theory which pos¬ sesses any serious claim to assent the Su¬ preme Being remained unimpaired in the beauty of His perfection, and it was due to the in¬ finite justice of God to demand a congruous if not a condign reparation. What part does Satan play in the plan of redemption? Has a solution been presented? Is it and will it al¬ ways be an impenetrable mystery? *It is a mat¬ ter so significant for Christians that they have the right to expect from some form of Chris¬ tianity a clear exposition based on Scripture and authoritative teaching. For Christians it means salvation, regarding which certainty is security and doubt a calamity.

Thus much for Christianity, which empha¬ sizes the necessity of an atonement. All Chris¬ tians admit Christ as the fountain head of all reconciliation of man with God. But the world is far from being entirely or even largely Christian. In the world to-day there are about 1,500,000,000 human souls, of which number only a little over 400,000,000 have received the religion of Christ. Half of these, it is com¬ puted, are Catholics, the remainder are Prot¬ estants or Catholics of some kind or other, but divided from the See of Rome. The rest of the race is either Jewish or Mohammedan or belongs to some Oriental form of worship or is out and out heathen. Will Christianity as¬ sume the responsibility of stating that beyond its pale the atonement does not reach and that therefore for the pagan there is hope neither here nor hereafter? Some mention has already been made of the Jews and their manner of atonement. Their views have

crystallized into the shape which their orthodox members adopt to-day and which they base upon certain books of the Old Testament, upon their Talmud and their Targum. It differs in no way materially from the teachings of Moses and the Law and the Prophets. They lived in the past as they are living now in the hope of a great Deliverer to whom every act of worship bore and bears reference. In some way or other these typical ceremonies, it is said, influenced Jehovah to make them the promise: ((I will be merciful to their iniquities, and their sins I will remember no more" (Hebrews viii, 12). The space of this article is inadequate to include even the most summary account of the atonement idea as it was understood by the nations outside of the chosen people. Research has made it ad¬ missible that everywhere there have been re¬ ligious beliefs, opinions and practices pointing to the acknowledgment of a Supreme Being and judgment to come and a reward or punishment in a life beyond this. With this are apparently

connected sacrifices which no matter how ac¬ companied by fanaticism and superstition arc an attestation of a homage paid to a deity, a homage of praise, or petition, or thanksgiving or of supplication for pardon — a homage which was inspired by an underlying sentiment of the need of appeasing some offended divin¬ ity. Yet it is not easy to trace this need in those religions which are so widespread in the Levant and farthest East and proclaim as fundamental Fatalism, Metempsychosis and Pantheism. The investigation of the subject of atonement as advanced by the followers of Christ, by those followers who profess that Jesus was the Son of God, that is, was Divine, among other questions ' inevitably suggests the question of the possibility of salvation for all individuals of the race whose creed negatives Christianity altogether. Some reply, adequate or otherwise, may be found in the dogma that (<Christ died for all men,® whence the inference is deducible that even those who never heard of the Redeemer, or the atonement, cannot but be affected by that death. How? is a large thesis. That the problem has been approached by hon¬ est and able thinkers is plain to the readers of history. In the Christian world there is no small number who deny the primal fall and hence see nothing urgent in the discussion of the atonement. The Messiah has not yet reached this earth say the Jews, Christ was not God, say the Arians, there is no God, say the Atheists, if there be He is unknowable, say the Agnostics. For all these the atonement has very slight, if any, significance. Teachers of note advance the theory, basing it on Scrip¬ ture, that the first tradition of a redeemer to come and who was to atone was carried by the earlier peoples as they grew and scattered and populated the earth. The Jewish idea brought by the Israelites in their wanderings and cap¬

tivities, and assimilated by the tribes and na¬ tions among whom they dwelt, was in the lapse of time weakened or metamorphosed, or adapted to pagan beliefs and so corrupted. ((The only theory which accounts for all these facts,® says Rawlinson, (<is that of a primeval revelation variously corrupted through the manifold and multiform deterioration of human nature, in different races and places.®

Bibliography. — Various commentaries on the Fourth Gospel and the Epistles of Saint Paul; cCanones Concil. Trident. ' ; Luther's (de Servo Arbitrio) ; (Two Catechisms, ' etc.; Augsburg Confession; Melancthon's (Loci Theologici' ; Mohler's (Symbolism' ; Oxenham's (The Catholic Doctrine of the Atonement' ; Jowett, B., (Essay on Atonement and Satis¬ faction' ; Coleridge, (Aids to Reflection' ; Bishop Forbes, (Thirty-nine Articles.' Consult also Clarke, (Outline of Christian Theology' (New York 1897) ; Burton, J. M. P., and Smith, G. B., (Biblical Ideas of the Atonement' (Chi¬ cago 1909) ; Dale, <The Atonement' (London 1885) ; Sabatier Auguste, (The Doctrine of the Atonement and its Historical Evolution' (New York 1904) ; Stevens, (The Christian Doctrine of Salvation' (ib. 1905) ; Tymms, (The Chris¬ tian Idea of the Atonement' (ib. 1904) ; (The Atonement in Modern Religious Thought' (ib.

1901).

Patrick A. Halpin,

Late Professor of Metaphysics and Ethics, New Rochelle College.

ATOSSA, the daughter of Cyrus, 530 b.c. She was successively married to Cambyses, Smerdis, one of the Magi, and Darius, son of Hydaspes, the last of whom she incited to in¬ vade Greece. It is given in one account that she was killed by her son, Xerxes. The word served as a poetical name given by Pope, in his c Moral Essays, > to Sarah, Duchess of Marlborough.

ATRATO, a-tra'to, river of Colombia, of note, because it has repeatedly been made to bear a part in schemes for a ship-canal across the Isthmus of Panama. Rising on the western Cordillera at an altitude of 10,560 feet above sea-level, it. runs 305 miles north¬ west through low, swampy country and falls by several mouths, interrupted by bars, into the Gulf of Darien. It is navigable by steamers for fully 250 miles, being 750 to 1,000 feet wide, and 8 to 70 feet deep. A route, sur¬

veyed by the United States government in 1871, proposed to connect the Atrato and the San Juan, flowing into the Pacific, by a canal 48 miles long. At the Paris International Con¬ gress (1879), that route was, with various others, discussed and rejected in favor of De Lesseps' line from Limon to Panama. Gold- dust is found in and about the Atrato.

ATRAULI, town of India, in the north¬ west provinces. It is clean, well built and has a good trade.

ATREBATES, a-treb'a-tez, or at're-ba'tez, the ancient inhabitants of that part of Gallia Belgica afterward called Artois. A colony of them settled in Britain, in a part of Berkshire and Wiltshire.

ATREK, a-trek', river of Asia, forming the boundary between Persia and the Russian Transcaspian territory, and flowing into the Caspian. It takes its rise in the northeastern part of the country, in the neighborhood of Kuh Rizeh Mountain, which attains an eleva¬ tion of 9,700 feet. The general course of the stream is westward. Its length is over 300 miles.

ATREUS, a'troos, in Greek legend, the son of Pelops and Hippodamia. He and his brother, Thyestes, murdered their half-brother, Chrysippus, from jealousy of the affection en¬ tertained for him by their father. Thereupon they fled to Eurystheus, with whose daughter, Aerope, Atreus united himself, and after the death of his father-in-law became King of Mycenae. Thyestes had two sons by the wife of his brother, and was banished by Atreus. Thirsting for revenge, Thyestes conveyed away secretly a son of his brother, and insti¬ gated him to murder his own father. This design was discovered, and the youth, whom Atreus thought to be the son of his brother, was put to death. Too late did the unhappy father perceive his mistake. A horrible re¬ venge was necessary to give him consolation. He pretended to be reconciled to Thyestes, and invited him with his two sons to a feast, and after he had caused the latter to be secretly slain he placed a dish made of their flesh before Thyestes. When the father had finished eating Atreus brought the bones of his sons and showed him the dreadful revenge which he had taken. Atreus (or his son Pleisthenes) was the father of Agamemnon and Menelaus, who are hence called the

Atridae, Atrides (the singular) being often distinctively applied to Agamemnon.

ATREUS, Treasury of, a subterranean building at Mycenae, so styled by Pausanias and frequently referred to as (<the tomb of

Agamemnon.)) It is a vaulted tomb resem¬ bling a bee-hive in construction, its arch being composed of projecting horizontal courses of stone narrowing as the top is approached. It contains a circular chamber 50 feet wide with a smaller square one adjoining.

ATRI, a' tre, Italy, the ancient Adria; a town of the province of Teramo, 14 miles southeast of the city of Teramo, on the Brindisi Railroad. There are some ruins of ancient walls and buildings. The cathedral is interesting for its frescoes, and a 15th-century painting of the Madonna worshipping the child. It manufactures silk, soap and licorice. Pop. 14,043.

ATRIPLEX, a genas of herbs or shrubs of the family ChenopodiacecF, consisting of about 250 species* widely distributed in temperate and tropical regions, usually along sea-coasts or in alkaline soil. Not less than 100 species occur in the United States, chiefly in the western part, where some of them, especially the shrubby species (generally known as salt¬ bush, shad-scale, or incorrectly as sage-brush), are often very abundant, forming the most conspicuous feature of the vegetation. They are important as being valuable for forage for stock, particularly sheep. Attempts have been made to grow some of the species, especially Australian ones, for forage in the southwestern United States, but without much success. A. hortensis, orach, is sometimes cultivated for its leaves which are used like spinach.

ATRIUM, the entrance hall and most im¬ portant apartment in ancient Roman houses. It was usually ornamented with statues and various family relics, and in the roof there was an opening called the compluvium, toward which the roof sloped so as to throw the rain-water into a cistern in the floor known as the impluvium. In this room the nuptial couch was placed, and here the matron with the women of the household sat and spun. It was also used as a reception room for visitors and clients. As the Roman home became more sumptuous several small rooms were added around the atrium. Its form also changed. First came the atrium testudinatum with solid roof, followed by the Tuscan type which long remained popular. Its roof sloped inward as stated above. Later columns were added to support the roof and in the Augustan period a real colonnade was added. During the empire the atria were profusely decorated with fres¬ coes and sculptures. Several well-preserved types are to be seen at Pompeii. In mediaeval times, till the 12th century, the name was given to a covered court, somewhat on the model of the ancient atrium, constructed in front of the principal doors of an edifice. Later the cloister at the side of the church, for the use of the monks, took the place of the atrium.

ATROPA, a genus of plants of the natural order Solcinacece. Its best known species is probably A. belladonna. See Belladonna.

ATROPATENTE, Persia, a province of the ancient kingdom of Armenia, of which it formed a part from 149 b.c. to 428 a.d. It is

now a province of Persia, known as Azerbai¬ jan, or Adarbaijan, the principal city being Tabriz. Ihe name was derived from one of the governors of Alexander the Great, who governed the district in 328 b.c. The second largest city in the province, Urumiah, on the shores of a lake of the same name, figured largely in ancient history.

ATROPHY, a term denoting a diminution in the size of the organs, or tissues that make up the body. It is part of the physiological process in its simpler forms, as many parts of the body atrophy and become of secondary service in adult life; the thymus gland and umbilical vessels being examples. It may also be a symptom of disease, particularly in affec¬ tions of the nervous system in which the trophic fibres of an . organ are involved. It may also indicate a perverted state of nutri¬ tion. See Nutrition.

ATROPINE, a crystalline alkaloid ob¬ tained from the deadly nightshade. Its chemical formula is C17H23NO3. The plant con¬ tains the alkaloid hyoscyamine, which, by the addition of potash to the juice, is converted into atropine. The atropine is extracted by shaking the alkaline liquid with chloroform. The layer of chloroform is evaporated, leav¬ ing a residue which is extracted by means of dilute sulphuric acid and precipitating with potassium carbonate. The alkaloid is re¬ crystallized from alcohol. Atropine itself is insoluble in water, but its sulphate is readily soluble. It is extremely poisonous. Large doses cause delirium, convulsions, and finally stupor and death. It is employed for several purposes in medicine, to relieve pain or spasm, and to arrest excessive sweats. The physio¬ logical action of atropine is chiefly exerted on the nervous system. It is a strong stimulant, particularly of the motor and respiratory centres, and paralyzes the end filaments of many nerves, particularly those that supply the secretory glands, the involuntary muscles and the heart. Its chief poisonous symptoms are, in the stage of excitement, dryness of the mouth and pharynx, with anaesthesia, a hot dry skin, dilatation of the pupil with blurred vision, due to paralysis, extreme restlessness, due to the motor excitation, a noisy, busy and incoherent brain action,

perhaps a delirium, quickened pulse, quickened respiration. This stage may pass into one of depression in which the patient becomes comatose, the pulse and respiration become slowed and death results from asphyxia. Treatment of the poisoning should include prompt washing of the stomach, emetics being of no service because of the anaesthesia, artificial respiration, infusions of hot coffee, and general supportive measures. See Belladonna ; Solanaceje.

ATROPOS, at'ro-pos, the eldest of the Fates, who cuts the thread of human life with her shears. In art she is often repre¬ sented with a cutting instrument, a sundial or a pair of scales.

ATSUTA, at-soo'ta, Japan, a town in the southern part of Honishu, practically a suburb of Nagoya, with which it is connected by rail. It contains a number of Shintoese temples, in one of which the sword forming part of the Japanese imperial reealia, is kept. Pop. 24,491.

ATTACHE, a'ta'sha', a military, naval or subordinate member of the diplomatic service attached to an embassy or legation. Modern usage in effect restricts the term to subordinate officers of an embassy or legation. Military and naval attaches are officers of those services accompanying their country’s minister, detailed especially to observe movements of interest to the military or naval administration of their own country.

ATTACHMENT, in law, a taking of a person, goods or estate by virtue of a writ or precept. It is distinguished from an arrest by proceeding out of a higher court by pre¬ cept or writ, whereas the latter proceeds out of an inferior court by precept only. An arrest lies only against the body of a person, whereas an attachment lies often against the goods only, and sometimes against the body and goods. It differs from a distress in that an attachment does not extend to lands, while a distress cannot touch the body. In the United States attachment may be defined as the taking into the custody of the law the person or property of one already before the court, or whom it is sought to bring before the court; also a writ for this purpose. To some extent it is of the nature of a criminal process. In some States a plaintiff can at the beginning of an action to recover money attach the property of the defendant as a security for the payment of the judgment expected to be recovered; and in case of recovery the prop¬ erty is applied in satisfaction of the judgment. But the more usual rule is that there can be no seizure of property, except in specified cases, till the rights of the parties have been settled by judgment of the court. The exceptions are chiefly in cases where the defendant is a non¬ resident or a fraudulent debtor, or is attempt¬ ing to conceal or remove his

property. In some States, attachments are distinguished as foreign and domestic — the former issued against a non-resident having property within the jurisdiction of the State, the latter against a resident in the State; jurisdiction over the person or property being necessary for an attachment. An attachment issued tinder a State law not adopted by Congress, or by a rule of court, cannot be sustained in a United States court. Consult Drake, (Treatise on the Law of Suits by Attachment in the United States > (Boston 1891). Consult also works referred to under Execution.

ATTACK, a term denoting the opening act of hostility by a force seeking to dislodge an enemy from its position. It is considered more advantageous to offer than to await attack, even in a defensive war. The historic forms of attack are: (1) The parallel; (2) The form in which both the wings attack and the centre is kept back; (3) The form in which the centre is pushed forward and the wings kept back; (4) The famous oblique mode, dating at least from Epaminondas, and employed by Frederick the Great, where one wing advances to engage, while the other is kept back, and occupies the attention of the enemv by pretending an attack. Napoleon pre¬ ferred to mass heavy columns against an enemy's centre. The forms of attack have changed with the weapons used. In the days of the pike, heavy masses were the rule, but the use of the musket led to an extended battle

front to give effect to the fire. The advent of magazine rifles, machine and rapid-fire guns, breech-loading field and horse artillery guns, smokeless powder, etc., has reduced the methods of attack to a practical science. See Tactics.

ATTAINDER, the legal consequence of a sentence of death or outlawry pronounced against a person for treason or felony, the per¬ son being said to be attainted. It resulted in forfeiture of estate and ˆcorruption of blood, ® rendering the party incapable of in¬ heriting property or transmitting it to heirs ; but these results now no longer follow. For¬ merly persons were often subjected to at¬ tainder by a special bill or act passed in Parliament. In the United States, the Federal Constitution declares that ((No bill of attainder shall be passed, and no attainder of treason, in consequence of a judicial sentence, shall work corruption of blood or forfeiture except during the life of the person attainted.® Similar provisions have been inserted in the Consti¬ tutions of several States, while in others all forfeitures of property have been abolished.

Consult Blackstone, ; and Stephen, (New Commentaries on the Laws of England) (London 1903).

ATTAINT, a writ at common law against a jury for a false verdict. It was a proceeding of the nature of an appeal from a judgment entered upon- the verdict of a jury. When such a writ was issued a special jury of 24 persons was summoned to pass upon the ver¬ dict of the first jury. It was abolished in England in 1825 except as to jurors guilty of embracery. See Attainder.

ATTALEA, a genus of about 20 species of mostly tall, smooth-stemmed tropical Ameri¬ can palms with large pinnate leaves sometimes used for thatch, mats, hats, etc., and with nut fruits enclosed in a fibrous husk. A. funifera, the piassaba palm of the coast provinces of southern Brazil, yields a cordage of great strength and durability in sea water. Its fruits (coquilla nuts) are as large as ostrich eggs and are used like vegetable ivory (see Veg¬ etable Ivory). The piassaba palm of northern Brazil is a different species. It furnishes a fibre which is exported. A. excelsa and A. speciosa furnish nuts which are burned in rubber-making to dry and color the rubber obtained from Siphonia elastica. A. cornpta, the pindova or indaja palm, a handsome species with a wide-spreading crown, yields edible fruits as large as goose eggs. A. cohune, indigenous to Honduras, supplies a fruit from which the oil is extracted for soap-making at home and abroad. Several species are culti- cated in greenhouses, but are generally con¬ sidered too slow of growth from seed to be satisfactory.

ATT ALIA, the ancient name of the modern Adali, a city on the south coast of Asia Minor, above the head of the Gulf of Adalia. Attalus II of Pergamum founded it in the 2d century b.c. During the height of Roman colonial expansion it was an im¬ portant seaport, being on the main highway between the northwestern provinces of Asia Minor and the south coast. Reference is made to it in the Bible; it was from this port that Paul sailed to Antioch in Syria after his first missionary journey (Acts xiv, 25).

ATTALUS, the uncle of Cleopatra, wife of Philip II of Macedon. He served as gen¬ eral in Philip's armies. He opposed Alex¬ ander after Philip's death and was put to death by order of the former.

ATTALUS, the names of three kings of ancient Pergamus, 241-133 B.C., the last of whom bequeathed his kingdom to the Romans. All were munificent patrons of art and litera¬ ture.

ATTALUS, Flavius Priscus, prefect of Rome under Honorius and

Emperor of the East for one year, 409-10. He was proclaimed by Alaric and his Goths who set up Attalus at Ravenna. The latter ordered Honorius to leave the throne, retire and cut off his feet. Alaric soon failed to support Attalus and he was deposed. He was again put forward as Emperor by Ataulphus in 414, but was taken prisoner by Honorius. Honorius cut off his thumb and forefinger and banished him to the island of Lipari.

ATTAR, at-tar', Ferid Eddin, celebrated Persian poet: b. near Nishapur 1119; d. about 1229 (?). The son of a spicer, he followed his father's trade (whence his surname of At¬ tar), but afterward became a dervish and one of the greatest mystics of Persia. He is said to have been killed by a Mongol soldier dur¬ ing the invasion by Jenghiz Khan. Of his ex¬ tant political works the most famous are (The Book of Council,) a series of didactic poems on ethics; (The Parliament of Birds) (1184-87). His principal work in prose is (Biographies of the Saints. >

ATTAR, or OTTO, OF ROSES, a per¬ fume extracted from rose petals. It is a vola¬ tile oil, of soft consistency, nearly colorless, and deposits a crystallizable substance partially soluble in alcohol. The best article is prepared at Ghazipoor in Hindustan ; but is apt to be much adulterated with sandalwood and other oils. The whole country, for many miles around Ghazipoor, is a garden of roses, and in the spring of the year presents a most beauti¬ ful picture of red and green. The roses are used both for rose water and the oil of roses. The latter is obtained from the rose water by setting it out during the night in large open vessels, and early in the morning skimming off the essential oil, which floats at the top. The rose water after the removal of the oil is not so highly valued as before. Attar is also im¬ ported from Bulgaria, Persia, Syria and Tur¬ key. In these countries the attar is obtained by distilling the rose petals with about twice their weight of water, the distillate being then ex¬ posed in open vessels to the cool night air and skimmed off with a feather in the morning. By weight, one part oil is obtained from 3,000 parts of rose petals. About 20,000 acres are devoted to rose culture in Bulgaria, the annual harvest yielding about 45,000,000 pounds of roses or 8,000,000,000 roses. A one-acre gar¬ den under favorable conditions produces 2,000 to 2,500 pounds of roses, from which 10 to 15 ounces of attar of roses may be distilled. Gen¬ erally 180 to 200 pounds of roses will produce 1 ounce of attar, there being about 200 roses to the pound. The average price, prior to the war, was $12 per ounce. Attar of roses is commonly adulterated with spermaceti and a volatile oil. which appears to be derived from one or more species of Andropoqon, and which

is called oil of ginger-grass, or oil of geranium. Pure attar of rose, carefully distilled, is at first colorless, but speedily becomes yellowish. It congeals below 80° ; melts at 84°. At 57°, 1,000 alcohol dissolve 7*4 oil, and at 72°, 33 oil. Specific gravity 872. Formula, C23H23O3. Many attempts have been made to discover some chemical reaction which would reveal the falsification of attar with geranium oil, but hitherto mostly in vain. It is much used for manufacturing hair oil, lavender water and other perfumes. Solid oil of roses (rose cam¬ phor, stearoptene of oil of roses) has no odor, is insoluble in alcohol, but soluble in ether. Car¬ bon and hydrogen are its constituents. The liquid oil of roses (rhodineal, eleoptene of oil of roses) is very fragrant and is composed of carbon, hydrogen and oxygen. See Per¬ fumery.

ATTAVANTE, at'ta-van'ta, Marco, an Italian painter: b. Florence 1452; d. about 1508 or later. He was especially famous for his illuminations, in which class of art he is considered to have been the best of his period. He was also a miniaturist of the highest rank. Among his patrons were most of the great nobles and potentates of the time, including Matthias Corvinus, King of Hungary, the Medici, the Duke Federigo di Urbino and the Dom of Florence. Much of his work, especially his illuminations, is still preserved in the col¬ lections of Europe, the best of which is in the manuscripts of Marcianus Capella (Mar¬ cus collection in Venice), in a Bible in the Vatican Library and in a Bible of seven vol¬ umes in the Belem Monastery in Portugal. Consult article ((Attavante” in Bradley’s (Dictionary of Miniaturists) (London 1887) and Meyer and Thiemes, (Allegemeines Lexi¬ con der bildenen Kiinstler) (Vol. II, Leipzig

1908).

ATTEMPT, in criminal law an endeavor to accomplish a crime carried beyond mere preparation, but falling short of the execution of the ultimate design in any part of it. 5 Cush. Mass. 367. To constitute an attempt, there must be an intent to commit some act which would be indictable, if done, either from its own character or that of its natural and probable consequences. In some States an at¬ tempt to commit a crime is defined by statute. The statute in. New York is substantially simi¬ lar to that of other States. The Penal Code of New York, § 34, provides that (<An act, done with intent to commit a crime, and tending but failing to effect its commission, is an attempt to commit that crime.” See Criminal Law, and consult works there referred to.

ATTENTION, a familiar mental state, variously defined as (<The act of holding a presentation before the mind" (Baldwin) ; ((Conation in so far as it finds satisfaction in the fuller presentation of its object, without actual change in the object" (Stout) ; (<A pur¬ poseful volition, suffused with peculiar feelings of effort or strain and accompanied by a changed condition of the field of discriminative consciousness, as respects intensity, content and clearness" (Ladd). Titchener emphasizes the part played in attention by the clearness of the presented object. This clearness is dependent on the duration, intensity, extension, quality, temporal relations, movement, novelty and familiarity of the stimulus, on the accommoda¬

tion of the organs of sense for its reception, and in certain cases on the sudden removal of a stimulus to which we have grown accustomed. Titchener interprets clearness as an inde¬ pendent attribute of sensation. While it is universally recognized that attention admits of degrees, and that at the same time as we focus our attention on certain things other things are in what may be termed our peripheral conscious¬ ness, there is a considerable amount of diversity of opinion as to the precise nature of the rela¬ tion between the centre of consciousness and its periphery. For a detailed discussion of the laws of attention, consult Titchener, lec¬ tures on the Elementary Psychology of Feeling and Attention) (New York 1908). See Con¬ sciousness.

ATTERBOM, at'ter-bom, Peter Daniel Amadeus, Swedish poet : b. Asbo, East Goth¬ land, 19 Jan. 1790; d. Upsala, 21 July 1855. Having visited Germany and Italy in 1817-19, he formed ties of friendship with Schelling and Thorwaldsen ; became instructor to Crown Prince Oscar, in 1820, and professor at the university in Upsala in 1828. He was unques¬ tionably the foremost among the lyric poets of the romantic school in Sweden. His most cele¬ brated work is (The Isle of Blessedness) (1823), a romantic drama in the manner of Tieck; but he also wrote (The Flowers, y a cycle of lyrics; (The Blue Bird,* a play; and (Swedish Seers and Poets, y a volume of criti¬ cism. His (Collected Poems) appeared in 1854-63 and his (Works > in 1870. Atterbom early came under German influence and founded the Aurora League which helped to liberate Swedish literature from French academic tradition.

ATTERBURY, Francis, English prelate: b. Middleton Keynes, England, 6 March 1662 ; d. Paris, 15 Feb. 1732. He distinguished him¬ self at the university as a classical scholar, and gave proofs of an elegant taste for poetry. In 1687 he took his degree of M.A. ; is thought to have assisted his pupil, Boyle, in his famous controversy with Bentley

on the Epistles of Phalaris. Taking orders in 1691 he settled in London, where he became chaplain to William and Mary, preacher of Bridewell, and lecturer of Saint Bride's, and soon became distinguished by the spirit and elegance of his pulpit com¬ positions, but not without incurring opposition, on the score of their tendency and doctrine, from Hoadly and others. Soon after the ac¬ cession of Queen Anne he was made dean, of Carlisle, and besides his dispute with Hoadly on the subject of passive obedience, he aided in the defense of the famous Sacheverell, and wrote (A Representation of the Present State of Religion, y deemed too violent to be presented to the Queen, although privately circulated. In 1712 he was made dean of Christ Church, and in 1713 bishop of Rochester and dean of West¬ minster. The death of the Queen, in 1714, put an end to his hopes of further advance¬ ment; for the new king treated him with great coolness. Atterbury not only refused to sign the loyal declaration of the bishops in the re¬ bellion of 1715. but suspended a clergyman for lending his church for the performance of di¬ vine service to the Dutch troops brought over to act against the rebels. Not content with a constitutional opposition, he entered into a cor¬ respondence with the Pretender's party, was

apprehended in August 1 722, and committed to the Tower ; and in the March following a bill was brought into the House of Commons for the infliction of pains and penalties. This meas¬ ure met with considerable opposition in the House of Lords, and was resisted by the bishop, who maintained his innocence with his usual acuteness and dexterity. His guilt, however, has been tolerably well proved by documents since published. He was deprived of his dig¬ nities, and outlawed, and went to Paris, where he chiefly occupied himself in study, and in correspondence with men of letters. But even here, in 1725, he was actively engaged in fomenting discontent in the Highlands of Scot¬ land. As a composer of sermons he still re¬ tains' a great portion of his original reputation. His letters, also, are extremely easy and ele¬ gant ; but, as a critic and a controversialist, he is deemed rather dexterous and popular than accurate and profound. Consult the edited by F. Williams (ib.

1869).

ATTERBURY, William Wallace, Ameri¬ can railroad official : b. New Albany, Ind., 31 Jan. 1866. He began his railroad career as an

apprentice in the Altoona shops of the Pennsyl¬ vania Railroad, after graduating from Yale University, in 1886. By 1896 he had risen to be general superintendent of motor power on the Pennsylvania lines east of Pittsburgh and Erie. In 1903 he became general manager of these same lines. In 1909 he was made 5th vice- president of the Pennsylvania Railroad cor¬ poration and transportation manager. Since 1912 he has been vice-president.

ATTERIDGE, Andrew Hilliard, English journalist and author: b. Liverpool, England. He was educated at London University, Stony-hurst College and Louvain University. He be¬ came assistant editor of the Month, London, qualified as a specialist in military and naval subjects. He did special work in introducing cyclist infantry in the army and was a member of the staff of General Maurice in the first great cyclist manoeuvres held in England. He was correspondent of the London Daily Chronicle at the manoeuvres of the French, German and British armies; was war correspondent in the Dongola campaign of 1896, receiving a medal and clasp for the battle of Firket. He was military editor during the South African War and thereafter was for three years associated with an engineering firm, designing and build¬ ing the experimental submarine Volta and carrying out experimental trials on the east coast of England. lie has published ‘Towards Khartoum *(1897) ; (A Popular History of the Boer War* (1901); ‘Napoleon's Brothers> (1909) ; Modern Battles from Alma to Mukden *(1910) ; (The First Phase of the Great War* (1914) ; (The British Army of Todav) (1915) ; ‘The German Army in War *(1915) ; ‘The Second Phase of the Great War> (1915); ‘The World-Wide War* (1915). He is a contributor to various periodicals and to ‘The Catholic Encyclopedia. *

ATTERSEE, or KAMMERSEE, Aus¬ tria, the largest lake in upper Austria. It is about 11 miles in length and in places attains a width of about two miles, its height above sea- level being 1,525 feet. The shores are rough

and mountainous and extremely picturesque. Near the south end of the lake are the summer resorts Unterach and Weissenbach; on the north shore is the market town Schorfling, above which rises an ancient ruined castle and through which passes the railroad. Since 1869 the lake has been navigated by a small steamer.

ATTESTATION, the verification of an instrument, as a will, by the signature of a per¬ son or persons to a memorandum stating that it was executed in his or their presence. The purpose of the attestation is to furnish a record of the names of disinterested persons who were present at the execution of the document in order that they may later,

if necessary, appear as competent witnesses to testify as to the attendant circumstances. In many States two attesting witnesses only are required to wills devising land, but in some States three are necessary. At common law deeds do not re¬ quire attestation, but this has been modified largely by statute. See Will.

ATTFIELD, John, English chemist: b. Hertfordshire 1835; d. 1911. From 1862 to 1896 he was professor of practical chemistry to the Pharmaceutical Society. He was one of the originators of the British Pharmaceutical Conferences. He is the author of ‘ Chemistry — General, Medical and Pharmaceutical* (19th ed., 1906) ; (Water and Water Supplies) (three editions).

ATTIC, pertaining to Attica or to Athens. Elegant ; classical ; poignant ; characterized by keen intellect, delicate wit, sound judgment and expressive brevity; as, the Attic Muse. Attic dialect was the most refined and polished of all the dialects of ancient Greece; and in it wrote Solon, the lawgiver; Thucydides and Xeno¬ phon, the historians ; Aristophanes, the comic poet; Plato and Aristotle, the philosophers, and Demosthenes, the orator. When, after the Macedonian conquest, Greek became the lan¬ guage of literature and diplomacy in most parts of the civilized world, the Attic came to be that dialect of the Greek tongue which was gen¬ erally adopted.

ATTIC MUSE, The, a title which has

sometimes been applied to Xenophon because of the flowery style which is sometimes char¬ acteristic of his writing.

ATTIC ORDER, in architecture, a low order, commonly used over a principal order, never with columns, but usually with antre or small pilasters. It is employed to decorate the iagade of a story of little height, terminating the upper part of a building; and it doubtless derives its name from its resemblance in pro¬ portioned height and concealed roof to some of the buildings of Greece. In all the best ex¬ amples, and especially in the remains of antiq¬ uity at Rome, the attic is decorated with a molded base and cornice; often with pilasters and figures, as in the Arch of Constantine. In modern architecture, the proportions of the Attic order have never been subject to fixed rules, and their good effect is entirely depend¬ ent on the taste and feeling of the architect. Attic base: The base of a column, consisting of an upper and lower torus, a scotia and fillets between them. Attic story: A term fre¬ quently applied to the upper story of a house, when the ceiling is square with the sides, to distinguish it from a garret.

ATTIC SALT, a term which is sometimes applied to the style of a piece of writing, to define a certain vigor, or keenness, which was supposed to be peculiar to the Athenians, as a contrast to the Acetum Italicum, or heavier style of the Romans.

ATTICA, a state of ancient Greece, whose capital, Athens, was once the first city in the world. It is a peninsula, united, toward the north, with Bceotia, toward the west, in some degree, with Megaris, and extends far into the fiEgean Sea at Cape Sunium (now Cape Colonna). The unfruitfulness of its soil pro¬ tected it against foreign invaders, and the Athenians boasted of their ancient and un¬ mingled race. The earliest inhabitants of Attica lived in a savage manner until the time of Cecrops, who came 1550 b.c. with a colony from Sais, at the mouth of the Nile, to Attica, and is acknowledged as their first real king. One of Cecrops' descendants founded 11 other cities, which in after-times made war upon each other. Theseus compelled these cities to unite, and to give to Cecropia, now called Athens, as the capital city of the whole country, the supreme power over the confederacy. He founded the great feast called the pcmathencea, watched over the administration of the laws, commanded the army, divided the whole people into three classes — noblemen, husbandmen and mechan¬ ics. He embellished and enlarged Athens, and invited foreigners to people the country. After the death of Codrus, 1068 b.c., the monarchical form of government, which had continued 487 years from the time of Cecrops, was abolished. An archon, chosen for life, possessed the regal power. After 316 years the term of office of the archons was limited to 10 years, and 70 years later to one year, and their number was increased to nine. A regular code of laws was now needed. The archon Draco was commis¬ sioned to draw one up ; but his severity dis¬ gusted the minds of the people, and 594 b.c Solon introduced a milder code and a better constitution. He provided that the form of government should continue democratic, and that a senate of 400 members, chosen from the people, should administer the government. Pisistratus, a man of talents, boldness and am¬ bition, put himself at the head of the poorer classes, and made himself master of the su¬ preme power in Athens. His government was splendid and beneficent, but his two sons could not maintain it. Clisthenes, a friend of the people, exerted himself to prevent future abuses by some changes in the laws of Solon. He di¬ vided the people into 10 classes, and made the senate consist of 500 persons. Attica was al- read\r highly cultivated ; the vintage and har¬ vest, like all the labors of this gay

people, were celebrated with dance and song, with feasts and sacrifices. Then came the splendid era of the Persian War, which elevated Athens to the summit of fame. Miltiades at Marathon, and Themistocles at Salamis, conquered the Per¬ sians by land and by sea. The freedom of Greece escaped the dangers which had threat¬ ened it; the rights of the people were enlarged; the archons and other magistrates were chosen from all classes without distinction. The period from the Persian War to the time of Alexander (500 b.c. to 336) was most remarkable for the development of the Athenian constitution. Ac¬ cording to Bdckh's (The Public Economy of

Athens, } Attica contained, together with the islands of Salamis and Helena, a territory of 847 square miles, with 500,000 inhabitants, 365,000 of whom were slaves. Cimon and Pericles (444 b.c.) introduced the highest ele¬ gance into Athens, but the latter laid the foun¬ dation for the future corruption of manners, and for the gradual overthrow of the state. Under him began the Peloponnesian War, which ended with the conquest of Athens by the Lacedaemonians. A more dangerous enemy rose in the north — Philip of Macedon. Athens, together with the other states of Greece, became dependent on the Macedonians. When they suffered themselves to be misled to support Mithridates against the Romans, they drew upon themselves the vengeance of Rome. Sulla captured the city, and left it only an appear¬ ance of liberty, which it retained until the time of Vespasian. This Emperor formally changed it into a Roman province. After the division of the Roman empire, Attica belonged to the empire of the East. In 396 a.d., it was con¬ quered by Alaric the Goth, and the country de¬ vastated. Attica, along with the ancient Bceotia, now forms a nome or province (Attike and Viotia) of the kingdom. See Athens. Con¬ sult Frazer, J. G., (Pausanias' Description of Greece) (new ed., London 1910) ; Gardner, E. A., (Ancient Athens *(New York 1902) ; Kau- pert and Curtins, (Karten von Attika* (Berlin 1897) ; Leake, (The Topography of Athens and the Demi of Attica) (London 1841) ; Words¬ worth, Chr., (Athens and Attica) (id. 1869).

ATTICA, Ind., city in Fountain County, on the Wabash River and Wabash and the Chicago & Eastern railroads, 21 miles south¬ west of Lafayette. It has numerous manu¬ factories of proprietary medicines, bricks, etc., and contains churches, schools, banks and a public library. Attica was settled in 1827 and was incorporated in 1867. It was chartered in 1905 as a city, is governed by a mayor, chosen for four years, and a council. The city owns and operates the electric lighting plant. Pop.

(1920) 3,392.

ATTICUS, Titus Pomponius, a noble Roman, the intimate friend of Cicero : b. 109 b.c. ; d. 32 b.c. The Pomponian family, from which he originated, was one of the most dis¬ tinguished of the equites, and derived its origin from Numa Pompilius. When he attained maturity, the republic was disturbed by the factions of Cinna and Sulla. His brother, Sul- picius, the tribune of the people, being killed, he thought himself not safe in Rome, for which reason he removed, with his fortune, to Athens, where he devoted himself -to science. His bene¬ fits to the city were so great, that he gained the affections of the people in the highest degree, and acquired so thorough a knowledge of Greek, that he could not be distinguished from a native Athenian. When quiet was restored in Rome he returned and inherited from his uncle 10,000,000 sesterces ($500,000). His sister married the brother of Cicero. Caesar treated him with the greatest regard, though he was known as a friend of Pompey. After the death of Caesar, he lived in friendship with Brutus, without, however, offending Antony. In 32 b.c. being seized with an illness deemed incurable he starved himself to death. He wrote several works, including a history of Cicero's consul¬ ship, but none of his writings have been pre-

served. There is a life by Nepos and Cicero's (Epistles to Atticus) give many facts concern¬ ing him.

ATTICUS HERODES, Tiberius Clau¬ dius, a wealthy Athenian : b. about 104 a.d. ; d. about 180. He received a careful education under the most distinguished masters of the time, and specially devoted himself to the study of oratory, to excel in which seems to have been the ruling motive of his life, ultimately attaining to great celebrity as a speaker and as a teacher of rhetoric. Among his pupils were Marcus Aurelius and Lucius Verus. He was highly esteemed by the Antonines, particu¬ larly by Aurelius, and received many marks of favor, among others the archonship at Athens and the consulate at Rome. Atticus is prin¬ cipally celebrated, however, for the vast sums he expended on public purposes. He built a great race-course at Athens and a great musical theatre, called the Odeum, and which still ex¬ ists. He also built a theatre at Corinth, a stadium at Delphi and baths at Thermopylae. He withdrew from Athens, and resided at his villa near Marathon, where he died about 180 a.d. None of his writings are extant.

ATTILA, at'ti-la (in German, Etzel), the son of Mundzuk, a Hun of

royal descent, who followed his uncle, Roas, in 434, and shared the supreme authority with his brother, Bleda. These two leaders of the barbarians, who had settled in Scythia and Hungary, threatened the Eastern empire, and twice compelled Theo¬ dosius II to purchase an inglorious peace. The Huns themselves esteemed Attila their bravest warrior and most skilful general. Their re¬ gard for his person soon amounted to super¬ stitious reverence, and being now sole master of a warlike people, his unbounded ambition made him the terror of all nations; and he became, as he called himself, the scourge which God had chosen to chastise the human race. In a short time he extended his dominion over all the people of Germany and Scythia, and the eastern and western emperors paid him tribute. The Vandals, the Ostrogoths, the Gepidae and a part of the Franks united under his banners. Hearing a rumor of the riches and power of Persia, he directed his march thither, but was defeated on the plains of Armenia, and drew back to satisfy his desire of plunder in the do¬ minions of the Emperor of the East. He easily found a nretext for war, for all states which promised him a rich booty were his natural enemies, and all princes whom he hoped to conquer had broken alliances. The Emperor Theodosius collected an army to oppose his progress ; but in thr£e bloody battles fortune declared herself for the barbarians. Constanti¬ nople was indebted to the strength of its walls, and to the ignorance of the enemy in the art of besieging, for its preservation. Thrace, Mace¬ donia and Greece, all submitted to the savage robber, who destroyed 70 flourishing cities. Theodosius was at the mercy of the victor, and was obliged to purchase a peace. Attila now directed his eyes to Gaul. With an immense army he passed the Rhine, the Moselle and the Seine, came to the Loire, and sat down under the walls of Orleans. The inhabitants of this city, encouraged by their bishop, Agnan (Anianus), repelled the first attack of the bar¬ barians, and the united forces of the Romans, under their general, yEtius,- and of the Visi¬

goths, under their King, Theodoric, compelled Attila to raise the siege. He retreated to Champagne, and waited for the enemy in the plains of Chalons. The two armies soon ap¬ proached each other. Attila, anxious for the event of the battle, consulted the soothsayers, who assured him of a defeat. He concealed his alarm, rode through the ranks of his warriors, reminded them of their deeds, spoke of his joy at the prospect of a battle, and at the thought that their valor was to be rewarded. Inflamed by his speech, and by the presence of their leader, the Huns were impatient for battle. At length the ranks of the Romans and Goths were broken through, and Attila was already sure of the victory, when the Gothic prince, Thorismond, the son of

Theodoric, poured down from the neighboring height upon the Huns. Attila, pressed on all sides, escaped with difficulty to his camp. This was perhaps the bloodiest battle which had been fought in Eu¬ rope until the great conflict of 1914; for ac¬ cording to contemporary historians, 106,000 dead bodies covered the field of battle. Attila caused all his camp equipage and treasures to be brought together into a heap, in order to burn himself with them, in case he should be reduced to extremities. But the enemy were contented with collecting their forces during the night, and having paid the last honors to the dead body of King Theodoric (Dietrich), which they discovered with difficulty, they saluted his son, Thorismond, king upon the field of battle. Thus Attila escaped, but the Franks pursued him till he had passed the Rhine. He now demanded Honoria, the sister of Valentinian III, in marriage, and conquered and destroyed Aquileia, Padua, Vicenza, Verona, Bergamo, and laid waste the plains of Lom¬ bardy. The inhabitants fled to the Alps, to the Apennines and to the small islands in the shal¬ lows (lagoons) of the Adriatic Sea, where they built Venice. -The Emperor had no army to oppose him ; the Roman people and senate had recourse to tears and supplications. Pope Leo I went with the Roman ambassadors to the en¬ emy's camp and succeeded in obtaining a peace. Attila went back to Hungary. The Romans looked upon their preservation as a miracle, and the old chronicles relate that the threats of Saint Peter and Saint Paul had terrified Attila — a legend which the art of Raphael and Alghardi has immortalized. Not having ob¬ tained Honoria for a wife, Attila would a second time have demanded her, sword in hand, if the beautiful Ildico had not been added to his numerous wives, with whom he solemnly united himself (453). On this occasion he gave himself up to all the extravagance of debauch¬ ery; but on the other day after the marriage, the servants and warriors, impatient to salute their master, thronged into the tent ; they found Ildico veiled, sitting by the cold corpse of her husband. During the night he had died of a hemorrhage. The news of his death spread sorrow and terror in the army. His body was enclosed in three coffins — the first was of gold, the second of silver and the third of iron. The captives who had made the grave were strangled. The description that Jornandes has left us of this barbarian king reminds us of his Kalmuck-Tartar origin. He had a large head, a flat nose, broad shoulders, and a short and ill-formed body. Consult Cambridge Mediaeval

History> (Vol. I, New York 1911); Gibbon, (Decline and Fall of the

Roman Empire) (Lon¬ don 1854-55); Thierry, (Histoire d'Attila) (Paris 1874).

ATTIREST, a-te-ra, Jean Denis, French painter: b. Dole, Franche-Comte, 1702; d. P eking, China, 1768. He first studied painting in Rome, then, at the age of 30, joined the Jesuits, by whom he was sent as a missionary to China. Here he attracted the attention of the Chinese Emperor, Lien Lung, who made him his court painter. Together with three other Jesuit mis¬ sionaries, Damascenus, Sichelbarth and Cas- tiglione, he executed 16 great historical paint¬ ings, illustrating the military campaigns of the Emperor against the Tartars. These were re¬ produced in France under the direction of Cochin in the form of engravings, but the plates were sent to the Emperor of China, only two sets of prints being retained; one for the royal family and another for the National Library. So potent was his influence as a painter in China that he founded a European school of painting among the Chinese. In 1754 he was honored by the Emperor with the offer of the title of mandarin, but this he refused.

ATTIS. See Atys.

ATTLEBORO, Mass., town in Bristol County, 30 miles southwest of Boston, and 12 miles from Providence. It has good railroad connections, contains national banks, newspa¬ per offices, several churches and a system of graded schools. The town is the seat of several important industries, the chief of which is the manufacture of jewelry and electro-plate. There are also manufactories of cotton, woolen and knit goods, and of boots and shoes. The United States census of 1914 reported 151 manufacturing establishments of factory grade, employing 6,950 persons, of whom 6,058 were wage earners, receiving $3,518,000 annually in wages. The capital invested aggregated $15,- 656,000, and the value of the year's output was $13,947,000 ; of this, $6,568,000 was added by manufacture. The government is administered by annual town meetings ; and the waterworks are owned and operated by the municipality. The town was settled in 1669 and was origin¬ ally a part of Rehoboth. It derived its name from Attleborough, England, and was incorpo¬ rated as a town in 1694. Consult J. Dogget, (A Sketch of the History of Attleborough* (Bos¬ ton 1894). Pop. (1910) 16,215; (1920) 19,731.

ATTOCK, at-tok', India, a town and fort of the Punjab, on the east bank of the Indus. Attock stands below the fort, established by the Emperor Akbar in 1581, to defend the passage of the river. The great railway bridge across the Indus here was opened in 1883. It has. five arches 130 feet high, and renders continuous the railway connection

between Calcutta and Peshawur (1,600 miles). The situation of At¬ tock is important, whether in a commercial or in a military view. It is at the head of the steamboat navigation of the Indus, being 940 miles from its mouth. Taxila, where the Macedonians crossed the Indus, has been iden¬ tified with Attock. Pop. about 3,000-

ATTORNEY (attornatus, in Latin), a person appointed to do something for and in the stead and name of another. A public at¬ torney or attorney at law is a person quali¬

fied to appear for another before a court of law to prosecute or defend any action on behalf of his client. The term was formerly applied especially to those practising before the su¬ preme courts of common law at Westminster, and corresponded to the term solicitor used in regard to the courts of chancery. As an attorney was almost invariably a solicitor, the two terms came to be generally regarded as synonymous. By the Judicature Act of 1873 all persons prac¬ tising before the supreme courts at Westmin¬ ster are now called solicitors. Attorneys or solicitors do not plead or argue in court on be¬ half of their clients, this being the part of the barristers or counsel : their special functions may be defined to be, to institute actions on be¬ half of their clients and take necessary steps for defending them, to furnish counsel with necessary materials to enable them to get up their pleadings, to practise conveyancing, to prepare legal deeds and instruments of all kinds, and generally to advise with and act for their clients in all matters connected with law. An attorney, whether private or public, may have general powers to act for another ; or his power may be special and limited to a particu¬ lar act or acts. In Scotland there is no class of practitioners of the law who take the name of attorneys. A special attorney is appointed by a deed called a power or letter of attor¬ ney, and the deed of which he is appointed specifies the acts he is authorized to perform. It is a commission, to the extent of which only he can bind his principal. As far as the acts of the attorney, in the name of the principal, are authprized by his power, his acts are those of his principal. But if he goes beyond his au¬ thority, his acts will bind himself only ; and he must indemnify any one to whom, without au- . thority, he represents himself as an attorney of another, and who contracts with him, or other¬ wise puts confidence in him, as being such at¬ torney. Consult Weeks, (Treatises on Attor¬ neys and Counselors at Law* (San Francisco 1892). See Agent.

ATTORNEY, Power of, which may be limited or general. A general power of attor¬ ney is an instrument by which one person con¬ fers on another person full and unlimited au¬ thority to act as his

representative or agent. A limited power of attorney specifies the special business on which the agent is authorized to act. Under the law a power of attorney cannot be extended to a third person, without such action being provided for in the instrument itself. The death of the principal, the person who grants the power of attorney, renders it at once void. See Attorney.

ATTORNEY AT LAW, an officer of a court of justice employed by a party in a cause to manage it for him. Appearance by attorney has been allowed in England from the time of the earliest records of the courts of that coun¬ try. Such appearances were first allowed in France by letters patent of Philip le Bel 1290 a.d. No one can, by consent, be the attorney of both the litigating parties in the same action or suit. The agreement of an attorney at law, within the scope of his employment, in general, binds his client (1 Salk. 86) as to amend the record, to refer a cause, not to sue out a writ of error, to strike out a non pros, to waive a judg¬ ment by default, etc. The principal duties of

an attorney are to be true to the court and to his client, to attend to the business of his client with prudence, skill and honesty (4 Burr. 2061, 72 Ga. 83) ; to keep his client informed as to the state of his business, and to keep his secrets confided to him as such, and an attorney is privileged from disclosing such secrets when called as a witness (16 N. Y. 180, 29 Vt. 701). An attorney is allowed considerable freedom of speech, and, ordinarily, is not liable for the use of false, defamatory or malicious language, provided it was material to the issues raised by the pleadings (Hastings v. Lusk, 22 Wend. N. Y. 410). He is liable, however, if his language is defamatory, if it can be shown that it was not relevant to the issues, and was used for the purpose of injuring the character of his adversary (1 Barn. & C. 258).

ATTORNEY-GENERAL, the official legal adviser of a nation or state and the head of its legal department.

Attorney-General of the United States.

— In the United States the office of Attorney- General was created by the Judiciary Act of 1789; from the beginning this officer was a member of the cabinet, appointed by the Presi¬ dent, and under the

provisions of the Act of Congress of 19 Jan. 1866, he is fourth in suc¬ cession, after the Vice-President, to the office of President should a vacancy occur in that office. He is required by statute to give his advice and opinion upon questions of law when required by the President, and, upon request, to give his opinion to the head of any executive department on any question of law arising in his department and to interpret for the depart¬ ment heads the statutes under which they act ; but while he may furnish information to Con¬ gress, he does not render opinions to that body or any of its committees. He passes on the ' validity of the title to public lands purchased for the erection of public buildings by the United States ; he exercises general superin¬ tendence and direction over attorneys and mar¬ shals of all the districts of the United States and Territories as to the manner of discharg¬ ing their respective duties and over the govern¬ ment penal and reformatory institutions, also advising the President regarding pardon mat¬ ters. Before signing certain classes of bills the President usually consults the Attorney- General and also confers with him regarding the appointment of judges and officers of the courts. To him are referred questions involv¬ ing the interpretation of the Constitution and any opinions rendered by his subordinates re¬ garding matters of minor importance are sub¬ ject to his approval. He does not determine questions of fact nor pass upon questions in ‘ controversy before the courts; he does not answer hypothetical questions nor are his de¬ cisions subject to review. The published opinions of the Attorney-General have come to be regarded almost as authoritative as court decisions and constitute a body of precedents that have assumed a quasi- judicial character.

As the government’s chief advocate the Attorney-General conducts and argues all cases in which the United States is concerned, when¬ ever he deems that the interests of the country require his personal attention; he appears at times in the Supreme Court, but rarely in the inferior courts. If the United States should

have an interest in a suit between States, he may appear in order to introduce evidence or argument but not in a manner to make the national government a party to such suit. While suits may not as a matter of right be instituted qgainst the United States, certain classes of claims may be prosecuted in special courts created for that purpose or by laws regarding minor claims, and the Attorney-General exer¬ cises general jurisdiction over such courts.

The State Attorney-General. — In a few States the attorney-general is appointed by the governor or by joint ballot of both branches of the legislature, but in most of the States he is elected by popular vote. The

term of office varies from one to four years, the tendency being toward the longer period, but in some cases the term of attorney-general does not coincide with that of the governor. He may be removed by impeachment or in a few cases by special process, as in New York, where on the recommendation of the governor he may be removed by a two-thirds vote of the senate; but nowhere can he be removed save for cause and on the preferring of charges, against which he shall be given an opportunity to defend himself.

As a rule all the powers and duties of the attorney-generals are not enumerated and defined by the statutes of the various States and, therefore, so far as applicable to our altered situation, jurisprudence and system of government, they are clothed with the common- law powers of the attorney-generals of Eng¬ land. The attorney-general is required, upon request, to render to the governor, legislature, department heads and other State officers; opinions upon questions of law pertaining to their work. He prosecutes offenders against State laws and defends State officers if they be sued in their official capacity ; he also ap¬ pears in Federal and State courts on behalf of the State in any case in which it may be interested or to which it is a party. He may also serve on various State boards. Owing to the confusion arising from the employment of special counsel by State boards and commis¬ sioners, many States have prohibited this and require that the attorney-general shall conduct all the legal work of the State or at least have general supervision over it. In New York, however, irrespective of the attorney-general, the governor may appoint a person to investi¬ gate any State department or institution.

The Local Prosecuting Attorney.— In each county or local district into which a State may be divided for this purpose is an officer called the district attorney, prosecuting attor¬ ney or State's attorney, who has charge of the State's legal business in that locality. He is elected by the people of this county or district usually for a term of two or four years, and mav be removed from office only after the com¬ pletion of certain judicial or quasi- judicial pro¬ ceedings. In New York and Minnesota he may be removed by the governor alone after hav¬ ing had the opportunity of defending himself against the charges preferred. The governor's power is executive and not reviewable by the courts. In some States quo warranto proceed¬ ings may be instituted in the State Supreme Court by the attorney-general. The district attorney is required to advise county officials

upon legal questions concerning their official duties, and to advise the grand jury; he ex¬ amines witnesses, draws up indictments and prosecutes all actions, civil and criminal, in the Count}" Courts in which either the State or county may be interested or a party. While the State attorney-general may advise the prose¬ cuting attorneys as to their duties, he seldom possesses p«ower of actual direction over them and is often embarrassed by a difference of opinion as to the enforcement of State laws in local districts. In some States there is no rem¬ edy, but in New York prosecuting attorneys may be removed from office, and in Pennsyl¬ vania these officials may be superseded by offi¬ cers of central appointment and control. See also Court; Judiciary; Law, Administrative; Law, Criminal.

The British Attorney-General. — In Eng¬ land the Attorney-General is appointed by letters patent and holds office during the King's pleasure. He is the chief law officer of the Crown, and ex officio the leader of the bar hav¬ ing precedence in all courts and in the House of Lords even of the lord advocate. The At¬ torney-General and Solicitor-General are mem¬ bers of the House of Commons, and also of the ministry, usually being chosen from the party in power, save, perhaps, in the case of a coali¬ tion ministry. In Scotland (where he is called lord advocate), Ireland and almost all the colonies, there are attorney-generals in self- governing colonies ; they are appointed by the colonial administrations and in the Crown col¬ onies by royal warrant. The duchies of Corn¬ wall and Lancaster have attorney-generals who manage legal affairs in those localities. The most important duties of the British Attor¬ ney-General are to exhibit informations and prosecute for the Crown in matters criminal, and to file bills in the exchequer in any manner concerning the King's revenue. The Attorney- General of England has the power (1) to pros¬ ecute all actions necessary for the protection and defense of the property and revenues of the Crown; (2) by information to bring certain classes of persons accused of crimes and mis¬ demeanors to trial; (3) by (< scire facias 11 to re¬ voke and annul grants made by the Crown improperly, or when forfeited by the grantee thereof ; (4) by information, to recover money or other chattels or damages for wrongs com¬ mitted on the land, or other possessions of the Crown; (5) by writ of quo warranto, to de¬ termine the right of him who claims or usurps any office, franchise or liberty, and to vacate the charter, or annul the existence of a corpora¬ tion for violations of its charter, or for omit¬ ting to exercise its corporate powers ; (6) by writ of mandamus to compel the admission of an officer duly chosen to his office, and to com¬ pel his restoration when illegally ousted; (7) by information to chancery, to enforce trusts, and to prevent public

‘nuisances, and the abuse of trust powers; (8) by proceedings in rem, to recover property to which the Crown may be entitled, by forfeiture for treason, and property for which there is no other legal owner, such as wrecks, treasure trove, etc. ; (9) and in certain cases, by information in chancery, for the pro¬ tection of the rights of lunatics and others who are under the protection of the Crown.

Bibliography. — Finley, J. H., and Sander¬ son, J. F., (The American Executive and Exec¬

utive Methods) (New York 1908) ; Fairlie, J. A., (The National Administration of the United States1 (New York 1905) and (Local Govern¬ ment of Counties, Towns and Villages) (New York 1906) ; Learned, H. B., (The Attorney- General and the Cabinet1 (in The Nation, Vol. XCI. pp. 260-61, 22 Sept. 1910).

Irving E. Rines.

ATTORNMENT, a formal recognition by a tenant, of the grantee of the freehold as. his landlord. Formerly this assent was manifested by words, bv agreement in writing, by the pay¬ ment of rent or of a nominal sum. Without such attornment the grantee was not entitled to the rents of the tenant, and could not en¬ force against the tenant any covenant or con¬ dition of the tenancy. In the course of time the law was so modified as to dispense with attornment in ordinary cases of conveyance, such conveyance being regarded effectual from its date, the tenant becoming the tenant of the grantee according to the terms of the existing lease. The tenant, however, is not liable on the obligations of his lease to the new owner until notified of the conveyance. Consult Kent, Commentaries on American Law1 (Boston 1896) ; Taylor, (Treatise on the American Law of Landlord and Tenant1 (9th ed., Boston 1904) ; Tiffany, (The Law of Landlord and Tenant1 (Saint Paul 1910).

ATTRACTION, in physics, any force acting between two bodies, which tends to bring them nearer together, or to oppose their further separation. All attractions can be divided into two classes: (1) Those which act at sensible distances, such as gravity and magnetism, and (2) those which exert measurable effects only when the bodies are exceedingly close together. Cohesion and molecular forces are examples of the second class. See Cohesion ; Electricity ; Ether; Gravitation; Magnetism; Molecular Theory; Surface Tension.

ATTRIBUTE, in philosophy, a quality or property of a substance, such as whiteness or hardness. A substance is known to us only as a

congeries of attributes. In the fine arts an attribute is a symbol regularly accompanying and characterizing some personage. Thus the caduceus, purse, winged hat and sandals are attributes of Mercury, the trampled dragon an attribute of Saint George, the keys of Saint Peter, etc.

ATTRITION, a disposition of the soul which consists in sorrow for sin springing from a salutary fear of its consequences. Theolo¬ gians of the Catholic Church teach that such sorrow joined to the absolution of the priest in the Sacrament of Penance is sufficient for the remission of sin, although the penitent is coun¬ seled to strive for the more perfect sorrow (contrition), which has for its motive the love of God. See Contrition.

ATTU, or ATTOO, one of the islands of the Aleutian group, being the outermost of the chain, therefore the most westerly point of United States home territory. It is extremely rugged and rocky, its highest elevation being over 3,000 feet above sea-level. The population is about 400, all of which are natives. Some excavations have been carried on in the island which have resulted in throwing some light on the movements of the early races that are sup¬ posed to have migrated from Asia to America.

ATTUCKS, Crispus, the first man to fall in the Boston Massacre, 5 March 1770. He was born in Framingham, Mass., either of an Indian or Negro mother, in about 1720. A statue to his memory has been erected on Bos¬ ton Common. The accounts vary as to his par¬ ticipation in the disturbance, some stating that he was a mere spectator, others that he was one of the chief rioters. Consult (American Historical Record5 (1872) and Kidder, his¬ tory of the Boston Massacre 5 (Albany 1870).

ATWATER, Wilbur Olin, American chemist: b. Johnsburg, N. Y., 3 May 1844; d. Middletown, Conn., 22 Sept. 1907. He was graduated at Wesleyan University in 1865; made a special study of chemistry in the Sheffield Scientific School of Yale and the uni¬ versities of Leipzig and Berlin. He was successively professor of chemistry in East Tennessee University, Maine State College and Wesleyan University. He was director of the Connecticut Agricultural Experiment Station, 1875-77, and was appointed director of the Storrs (Conn.) Experiment Station in 1887. He was connected for several years with the United States

Department of Agriculture; pub¬ lished a large number of papers on chemical and allied subjects; and after 1894 gave much attention to nutrition investigations. He wrote extensively on agricultural and physiological chemistry, including (An Experimental Enquiry Regarding the Nutritive Value of Alcohol5 and several bulletins of the office of experi¬ ment stations of the United States Department of Agriculture.

ATWILL, Edward Robert, American bishop: b. Red Hook, N. Y., 18 Jan. 1840; d. 1911. He was graduated from Columbia University in 1862, and at the General Theo¬ logical Seminary, 1864. He was rector of Saint Paul's Church, Burlington, Vt., 1867-80; of Trinity Parish, Toledo, Ohio, 1881-90; and was consecrated first Protestant Episcopal bishop of west Missouri, 14 Oct. 1890.

ATWOOD, Charles B., American archi¬ tect: b. Millbury, Mass., 18 May 1849; d. Chi¬ cago, 19 Dec. 1895. He studied at the Harvard Scientific School, and opened an office in 1872. Within three years he received prizes for de¬ signs for the San Francisco city hall, the Connecticut State capitol, the courthouse in Springfield, Mass., and a commission to build the Holyoke, Mass., city hall. Removing to New York in 1875, he designed residences for W. H. Vanderbilt, Elliot F. Shepard and W. D. Sloane, and interior decorations for the houses of Mrs. Mark Hopkins in San Francisco and Great Barrington, Mass. In 1884 he gained the first prize for a design for the Boston Public Library, and later a prize of $5,000 for plans for a new city hall in New York city. From 1891-93 he was associated with D. H. Burnham in planning the World's Fair buildings in Chi¬ cago. The art building (now the Columbian Museum), peristyle, service building and many minor features were from his designs. He was a close student of his art, and a marvelous draughtsman, using his left hand with sureness and rapidity. D. H. Burnham said of him, <(He was of an honorable, charitable disposition, but like most great artists, a mere child in the practical things of life.®

ATWOOD, George, an eminent English mathematician: b. London 1746; d. 11 July 1807.

He was graduated at Trinity College, Cam¬ bridge, in 1769, where he was also fellow and tutor. He was elected to the Royal Society in 1776. Through the aid of William Pitt he secured a position in the customs service, where he made several important calculations in con¬ nection with the revenue. In 1774 he published (Treatise on the Rectilinear Motion and Rota¬ tion of Bodies; with a Description of Original Experiments relative to that Subject5 —a work remarkable

for its perspicuity and the extensive information which it affords. About the same time he made public an (Analysis of a Course of Lectures on the Principles of Natural Phi¬ losophy, } read at the University of Cambridge, which is not less valuable than the preceding. He published a dissertation on the Construc¬ tion and Properties of Arches 5 (1801), and

several other valuable treatises relating to mathematics and mechanical science. He in¬ vented a machine still used in physical lecture- rooms, which affords great facilities for verify¬ ing the laws of falling bodies. See Atwood's Machine.

ATWOOD, Isaac Morgan, American Universalist clergyman, editor and educator : b. Pembroke, N. Y., 24 March 1838; d. Wash¬ ington, D. C., 26 Oct. 1917. Educated in com¬ mon schools and academies he was ordained to the Universalist ministry in 1860. He held pastorates in Churchville, Clifton Springs and Watertown, N. Y. ; in Portland, Me., and in Brockton, Chelsea and Cambridge, Mass. He became editor of the Boston Universalist in 1867; of the Christian Leader in New York in 1872; was associate editor of the Universalist Leader, Boston, 1874-1909; and one of the con¬ tributors to the Independent for several years. Elected president of the Canton Theological School, 1879; he was appointed general super¬ intendent of the Universalist Church in 1899; general secretary in 1905 ; became minister of the Canton Universalist Church and professor of systematic theology in the theological de¬ partment of Saint Lawrence University in 1911. Author of (Have We Outgrown Christianity?5 (1870); (Glance at Religious Progress in a Hundred Years) ; (Latest Word of Universal- ism) (1879); (Walks About Zion5 (1880);

(Episcopacy5 (1885); (Manual of Revelation5 (1893); (System of Christian Doctrines5 (1900) ; and also a great many encyclopedic articles. He received the following degrees : A.M., Saint Lawrence University, 1869; D.D., Tufts College, 1879; LL.D., Buchtel College,

1.

ATWOOD, Julius Walter, American

clergyman: b. Salisbury, Vt., 27 June 1857. He was graduated from the Episcopal Theological School at Cambridge and in 1883 was ordained priest of the Protestant Episcopal -Church, after which, until 1907, he was rector at Ipswich, Mass., Providence, R. I., and Phoenix, Ariz. At the end of that period he became arch¬ deacon of the diocese of Arizona, and was con¬ secrated bishop in 1911. He is the author of

(The Spiritual Influence of John Greenleaf Whittier5 (1893).

ATWOOD, Melville, Anglo -American geologist: b. Prescott Hall, England, 31 July 1812; d. Berkeley, Cal., 25 April 1898. 'He studied lithology, microscopy and geology early in life, and. engaged in gold and diamond min¬ ing in Brazil, In 1843 he made a discovery that

greatly enhanced the value of zinc ore. After coming to the United States, in 1852, he in¬ vented the blanket system of amalgamation. He also established the value of the famous Comstock silver lode, by an assay of minerals in that region.

ATWOOD'S MACHINE, an instrument

devised by George Atwood, an English phys¬ icist, for illustrating the principles governing the motion of falling bodies, and described by him in a book published in 1784. It consists essentially of a light wheel or pulley, over which a thin, flexible cord passes. A mass of matter is attached to each end of the cord, and the experiment consists in observing the velocity acquired by the system at the end of a given time. The mass to be moved is evidently the sum of the two masses attached to the ends of the cord (assuming that the wheel is light enough to be disregarded) ; and the force tending to set the system in motion is the difference of the weights of the two masses. By making these masses nearly equal, the mo¬ tion can be made slow enough to be conveniently studied. The intensity of gravity can be de¬ termined by the aid of this machine, with suffi¬ cient accuracy for class-room purposes, and it is an admirable device for illustrating the laws of uniformly accelerated motion.

ATYS, a'tis, or ATTIS. (1) The favor¬ ite of Cybele, who, having broken the vow of chastity which he made to the goddess, castrated himself, as a punishment for his crime. Con¬ sult Frazer, J. G., (Adonis, Attis, Osiris' (Lon¬ don 1906), and Showerman, (Great Mother of the Gods' (Madison, Wis., 1901). (2) A son

of Croesus, King of Lydia — an affecting ex¬ ample of filial love. He was dumb, but, seeing a soldier in a battle who had raised a sword against his father, he exerted himself so much that the bands of his tongue gave way, and he cried out, (<Soldier, kill not Croesus !"

AUBANEL, o-ba-nel', The'odore, French poet, sometimes called (<The Petrarch of France": b. 1829; d. 1886. He was the son of a printer of Avignon, and for years followed his father's profession. He devoted his life to the restoration of the troubadour literature. He was a collaborator of Mistral, Roumanille and other felibres. His drama, cLou Pan don Pecat,' wˆas successfully staged in 1878 at Montpellier.

AUBE, Jean Paul, French sculptor: b. Longwy, Meurthe-et-Moselle, 1837. He studied art at the Beaux-Arts, under Duret and the elder Dauban. His works are found in many of the public places of the city of Paris. Among the more important ones are (Bailly,' a bronze statue in the Luxembourg Gardens; (Gam- betta,' in the Place du Carrousel, Paris; (General Joubert a Rivoli,' at Bourges and < France and Russia,' a decoration, in the Lux¬ embourg.

AUBE, ob, a French department, formed out of the south of Champagne and a small portion of Burgundy; area, 2,351 square miles. The north and northwest districts are very bleak, bare of trees, and almost destitute of vegetation ; the southern districts are remark¬ ably fertile. Grain, hemp, vegetables and wine are produced in large quantities. The forests, which are extensive, furnish much fuel for the supply of Paris. The chief manufactures are

wrorsted and hosiery. Troyes is the capital. Pop. (1911) 240,755.

AUBENAS, ob'nas', France, town in the department of Ardeche, 19 miles southwest of Privas. It is beautifully situated on the right bank of the Ardeche, but its streets generally are crooked and narrow. It has a castle of the 16th century, now occupied by several of the public institutions of the town. These include a tribunal and chamber of commerce, and a con¬ ditioning-house for silk. Iron and coal mines are worked in the vicinity. As the centre of the silk trade of southern France Aubenas is a place of considerable traffic. It has also a large silk spinning and weaving industry, and carries on tanning and various minor industries to¬ gether with trade in silk. The district is rich in plantations of mulberries and olives. Pop. about 4,000.

AUBER, o-bar, Daniel Frangois Esprit,

French composer: b. Caen 1782; d. Paris 1871. His father was a violinist of some note, and also dealt in prints. He sent his son to England to learn the trade; but the latter's love for music triumphed and he returned to Paris in 1804, and attracted considerable attention

through several musical compositions. He came under the notice of Cherubini, who gave him instruc¬ tion in composition. His (Le sejour militaire' appeared in 1813 but met an unfavorable recep¬ tion. (Le testament et les billet-doux' (1819) was equally unsuccessful, but (La bergere chatelaine' (1820), a comic opera, was well received, established his fame, which he sus¬ tained in the 40 other works which appeared in rapid succession until his death. Among these the most noteworthy were (Le magon' (1825) ; (La muette de Portici' (1828), his most serious opera and perhaps his greatest; (Fra Diavolo' (1830); (Le philtre' (1831); (Le cheval de bronze' (1835) ; (Le domino noir' (1837); (Le lac des fees' (1839); Wes dia- mants de la couronne' (1841). In 1829 he suc¬ ceeded Gossec at the Academy, wras appointed director of the Conservatory in 1842, and court chapel master to Napoleon III in 1857. He is regarded as the founder of French grand opera. For polish, melody, brilliant orchestration and formal structure his work stands among the greatest. Consult Kohut, A., (Auber' (Leipzig 1895) ; and Malherbe, C., (Auber, biographie critique' (Paris 1911).

AUBER, Harriet, English poetess and hymnwriter: b. London, 4 Oct. 1774; d. Hod- dlesdon, 20 Jan. 1862. She led a very quiet life. She published (The Spirit of the Psalms' (1829). Some 25 of her hymns from this book have been more or less in use. When Charles H. Spurg on compiled (Our Own Hymnbook' (1866) he included 20 hymns written bv Miss Auber. Three are included in the edition of the (Methodist Hymnal' in present use. The best known of her hymns is the one beginning <(Hasten Lord, the glorious time, When beneath Messiah's swray." Another w-idely used hymn by Miss Auber begins (<Our blest Redeemer ere he breathed."

AUBERGE ROUGE, L', 16 barzh-roozh (((The Red Inn"), a romance published by Bal¬ zac in 1831, appearing first in the Revue de Paris. The narrator of the story is in love with the daughter of a man whom he knows to have committed a murder for robbery and from

which he has acquired a considerable fortune. Unable to settle the doubts in his own con¬ science as to whether he should marry the girl and so come into the possession of the ill-gotten money, he invites 17 of his friends to dinner, representing all classes of social opinion, tells them the story and asks them to vote on the question. The vote is almost a tie, nine being against the marriage. Nevertheless he marries

the girl.

AUBERLEN, ou-ber-len, Karl August, German theologian : b. Fellbach, near Stutt¬ gart, 1824; d. Basel, Switzerland, 1864. He studied at Tubingen, where he was strongly influenced by the teachings of Ferdinand Chris¬ tian von Baur, whose pupil he was. Later in life he held views of a more conservative nature than those of Baur's Tubingen school. In 1851 he was appointed professor of theology at Basel. His chief work is (Die Theosophie Otingers nach ihren Grundzugen) (2d ed., Basel 1856). His other important works are (Der Prophet Daniel und die Offenbarung Johannis* (1874), and (Die gottliche Offenbarung) (1864).

AUBERT, obar', Jean Louis, Abbe, French writer: b. Paris 1731; d. there, 10 Nov. 1814. He first attracted attention by his (Fables, } which were published in the Mer- cure de France and brought forth high praise from Voltaire. From 1773 to 1784 he was pro¬ fessor of French literature in the Royal Col¬ lege, during which period he was also managing editor of the Gazette de France. At one time he was the official censor of the government. A collection of his works appeared under the title (Fables et ceuvres diverses) (1775).

AUBERT, Louis Frangois Marie, French

composer: b. Parame, 15 Feb. 1877. Already at an early age he showed indications of musi¬ cal talent and at the age of nine he was studying at the Paris Conservatory under Diemer and Faure. He has composed various collections of songs, a fantasie for piano and orchestra (1901) and the opera (La Foret Bleue) (1906), which was produced by the Boston Opera Company in America in 1913.

AUBERVILLIERS, o'bar've'ya', France, city in the department of Seine, on the canal Saint Denis, two miles from the right bank of the Seine, and one mile north of the fortifica¬ tions of Paris. Its manufactures include card¬ board, glue, oils, colors, fertilizers, chemical products, perfumery, etc. During the Middle Ages and till modern times Aubervilliers was the resort of pilgrims, who came to pay honor to Notre Dame des Vcrtus. In 1814 the locality was the scene of a stubborn combat between the French and the Allies. Pop. about 33,000.

AUBIGNAC, 6-be-nyak, Francois Hed- elin, Abbe n', French dramatist: b. Paris, 4 Aug. 1604; d. 25 July 1676. He was the tutor of Richelieu's nephew and was later made abbe of Aubignac, under which name he became more generally known. His chief works are a tragedy in prose,

<Zenobie,) and (Pratique du theatre* (1657), in which he, for the first time, codified the laws of dramatic' method and con¬ struction. He is chiefly remembered as the first to raise the question as to the authorship of the poems of Homer.

AUBIGNE, D’, J. H. M. See D’Au- BIGNE, J. H. M.

AUBIGNE, d'be-nya', Theodore Agrippa

d’, French soldier and author: b. Saint Maury (Saintonge), 8 Feb. 1552; d. Geneva, 29 April 1630. Early in life he embraced the Huguenot cause, was condemned to death but escaped and was sent by his guardian to Geneva for safety. In 1567 he enlisted under Conde. He fought under King Henry IV, King of France, who made him a gentleman of his bedchamber ; but when the King, thinking it necessary, favored the Roman Catholics more than the Protestants, Aubigne expressed his displeasure with little reserve, and lost the favor of Henry. He now retired to Geneva, where he devoted himself to literary pursuits. He produced much of value to literature and to the history of his time. He wrote a valuable (Histoire Universelle, from 1550 to 1601 > (3 vols. folio), the first volume of which was ordered to be burned by the Parliament of Paris. . A volume of sonnets and other poems, under the title (Le Prin- temps, *also bears his name. The group of satirical poems (Les tragiques) (1616) is his greatest work. It contains sombre descrip¬ tions of the religious warfare of the time. His complete works were edited by Reaume and Caussade (6 vols., 1873-93), the by Lalanne (1857) and Reade (1872) ; (L’His- toire universelle) by Ruble (1897). Consult Guizot, G., (Agrippa d’ Aubigne* (Paris 1890) ; Macdowell, (Henry of Guiso and Other Por¬ traits *(New York 1898) ; Morillot, (Discours sur la vie et les ceuvres d’ Agrippa d’Aubigne* (Paris 1885) ; Rocherlave, (Agrippa d’Au¬ bigne* (Paris 1910).

AUBLET, d-bla', Albert, French painter: b. Paris 1851. He studied historical painting under Gerome; won a first-class medal in the Paris Exposition of 1889, and the decoration of the Legion of Honor in 1890. His first great painting was (The Wash-room of the Re¬ serves in the Cherbourg Barracks, * exhibited in the Salon of 1879, and probably his most celebrated one is the (Meeting of Henri III and the Due de Guise,* shown in the Salon of 1880. He is a chevalier of the Legion of Honor.

AUBREY, a'bri, John, English antiquary : b. Easton Pierse 1626; d. 1697. He published little, but left large collections of manuscripts, which have been used by subsequent writers. He collected materials for the (Monasticon Angelicanum, *and afforded important assist¬ ance*

to Wood, the Oxford antiquary. His (Miscellanies (1696) contains a great deal of curious and interesting information, but also displays much credulity and superstition. An¬ other work of his was published in 1719 under the title of the (Natural History and Antiqui¬ ties of the County of Surrey.* In 1898 ap¬ peared a work by him entitled (Brief Lives Chiefly of Contemporaries, 5 edited by. Andrew Clark. Consult biography by J. Britton (Lon¬ don 1845) and essay by Masson in British Quarterly Review (Vol. XXIV, London 1857).

AUBRIOT, o'bre-6, Hugues, a mayor of Paris, who figures frequently in French history. He was born in Dijon and died about 1382. He is first heard of as treasurer under Charles V. In 1364 he became mayor and governor of Paris. Under his administration some of the greatest public works were initiated. He laid

the cornerstone ot the Bastile and he was responsible for the building of the Pont Saint- Michel, Le Petit Chatelet and the completion of some of the most important fortifications of the city. Later he is heard of as being accused of heresy and was confined in his own bastile. His sculptural likeness may be found to-day on the fagade of the Hotel de Ville of Paris. Consult Eugene Deprez, (Hugo Aubriot, Praepositus Parisiensis et Urfanus Praetor, 1367-81 > (Paris 1902).

AUBRY, o'bre', Charles Marie Barbe An¬ toine, French jurist: b. Zabern, Alsace, 20 June 1803; d. Paris, 13 March 1883. In 1870 he was assistant judge of the tribunal at Strass- burg. In 1872 he became councillor of the Court of Cassation in Paris, a position he held until 1878. In that same year he was made a com¬ mander of the Legion of Honor. Aside from his writings on jurisprudence, which rank very high, he made a translation of Goethe's (Faust. * His chief work is (Cours de droit civil frangais d'apres la methode de Zachariae5 (8 vols., Paris

1869-76).

AUBRY DE MONTDIDIER, moii-de' deja, French knight under Charles V, supposed to have been murdered by Richard de Macaire in 1371. The story is that the assassin was sus¬ pected on account of the fierce animosity the dog of the murdered man showed toward him and that the King ordered him to engage in a combat with the animal. The result was that the dog killed the man, becoming famous as <(Aubry's

Dog,® under which title the story became a popular play. Other versions were dramatized, though always with the same gen¬ eral features, one of these plays, a popular melodrama, being presented as late as 1816. This last play was translated into German and presented in Vienna and Berlin and appeared at the Weimar Theatre in 1817, of which Goethe was manager, the leading role being played by a large 'poodle.

AUBURN, Ala., town in Lee County, 60 miles northeast of Montgomery, on the Western of Alabama Railroad. The Alabama Poly¬ technic Institute, founded 1872, is located here. There is a Carnegie library. Pop. (1920) 2,143,

AUBURN, Cal., city and county-seat of Placer County, situated on the Southern Pacific Railroad, 36 miles east of Sacramento. It was first settled in 1849 and was incorporated as a city in 1888. It is the seat of the Sierra Normal College. Gold and quartz is found in the vicinity and there are many quartz ' mills. The leading industries are mining, fruit-growing and farming. Pop. (1920) 2,289.

AUBURN, Ind., city and county-seat of De Kalb County, situated on branches of the Lake Shore & M. S. and the Baltimore & O. railroads, 22 miles north of Fort Wayne. It has a thriving trade in grain, live stock, etc., and its chief manufactures are furniture, carriages, automobiles, gas engines, windmills and stoves. Auburn was first settled in 1833, became a borough in 1836 and a city in 1900. The mayor and other officials are elected biennially. The buildings of note are the city hall, the Y. M. C. A. Building, the Eckhart public library and the county buildings. The waterworks and electric plant are owned and operated by the municipality. Pop. (1920) 4,650.

AUBURN, Me., a city and county-seat of Androscoggin County, on the west bank of the Androscoggin River, on the line of the Maine C. and Grand Trunk railroads, 34 miles north of Portland. The city is one of the most beauti¬ ful in the State. It rises westerly from the river in almost amphitheatre form, culminating in beautiful heights known as the Western Prom¬ enade. These heights are terraced by broad, handsome avenues, upon which, overlooking the city, are elegant residences with spacious and well-kept grounds. The view from the summit of these heights is one of the most striking in Maine. The beautiful Androscoggin River, with its waterfall grand and picturesque, flows through the valley below, the two thriving cities of Auburn and Lewiston on either bank, while broad and fertile fields dotted with comfortable farm homes stretch to the north and east. Taylor Pond and Lake Auburn lie to the west and are justly considered

among the most beautiful lakes of Maine. The territory of the city covers an area of 65.4 square miles.

History. — ■ Auburn is an old town and has an interesting history. Its territory is a part of a large tract of land, originally known as Bakerstown, granted by the general court of Massachusetts in 1765. It was settled as early as 1786 and Auburn was incorporated as a town in 1842, and as a city in 1869.

Industries. — Its largest single industry is the manufacture of boots and shoes, and in this branch of manufacture it is one of the fore¬ most cities in the country. Its industries in¬ clude cotton mill, last, box and carriage fac¬ tories, machine shops, shoe findings, dairy products, beef and packing houses, marble and foundry products, lumber, shuttles and spools. The United States census of manufactures for 1914 recorded 84 establishments of factory grade, employing 5,247 persons, of whom 4,811 were wage earners, receiving $2,855,000 an¬ nually in wages. The capital invested aggre¬ gated $6,020,000, and the year's output was valued at $13,840,000; of this $5,154,000 was added by manufacture.

Banks. — There are two national banks and two savings banks located here. The capital stock of the two national banks is $350,000; surplus, $138,378. The deposits in the savings banks, about $2,500,000.

Government. — The commission form of government has been put in operation and has proved much more satisfactory than the old form of municipal government with a mayor, a board of aldermen and a board of common councilmen. The city owns its waterworks. The assessed valuation of the real and personal property according to latest obtainable reports is $11,026,007; rate of taxation 20 mills; bonded debt $462,700; floating debt $46,500.

Churches and Schools. — The city has nine churches, one of them organized as early as 1807, supported by the following denomina¬ tions : Baptist, Free Baptist, Universalist, Epis¬ copal, Methodist, Congregational and Catholic. The city has a school population of about 5,000. School accommodations are furnished absolutely free from the kindergarten to the completion of the high school course. Excellent buildings, commodious, well appointed and equipped with modern improvements are distributed over the city sufficient for the full accommodation of

all the pupils in the primary, intermediate, grammar and high school grades. At the head of the public school system stands the Edward Little High School, a noted institution having its origin in the old Lewiston Falls Academy, incorporated in 1834. In addition to the public schools there is a Catholic parochial school of 564 scholars, supported solely by the Catholic portion of the population. There is also an excellent free public library. The city, generally speaking, is thriving and prosperous. Its popu¬ lation is composed largely of skilled workmen who own their own homes and are permanent residents. The streets are wide and well paved, regularly laid out, and in the residential sections adorned with beautiful shade trees. There is an excellent and extensive electric street rail¬ way, two large and centrally located hotels, a beautiful public park, a handsome and com¬ modious set of county buildings in which are located the Supreme Court rooms and all the county offices, and the railroad facilities and connections with all parts of the country are of the best. The city is connected with the city of Lewiston (q.v.), located immediately across the river, by four large iron bridges, and the two cities are so closely related socially and in a business way that they form practically one community and are known as the Twin Cities of Maine. Pop. (1842, at the time of its incor¬ poration as a town) about 2,000; (1869, at the time of its incorporation as a city) 6,169;

(1910) 15,064; (1920) 16,985.

AUBURN, N. Y., city and county-seat of Cayuga County, on Owasco River, the outlet of Owasco Lake, and on the New York Cen¬ tral, Lehigh Valley, and Central New York Southern steam railroads, 25 miles southwest of Syracuse. Interurbau trolley lines connect with Rochester and Syracuse, and local trolley lines with the beautiful Owasco Lake and picturesque neighborhood. Auburn was first settled in 1793 by Col. John Hardenbergh, and was called Hardenbergh's Corners ; in 1805 the name was changed to Auburn, and it was selected as the county-seat; in 1815 it was incorporated as a village and in 1848 became a city. Auburn was the home of the late William H. Seward, and the Seward mansion is one of the city's at¬ tractions. The city is situated in the heart of the Empire State lake country. One can leave Auburn every morning during a vacation period and visit a different lake each day, and return to the city before nightfall. Owasco Lake, the nearest and most accessible of the lakes, is a picturesque expanse of water, two miles from the city, 12 miles long. In the vicinity are excellent State roads with ample and up-to-date garage *and hotel accommodations. It is a beautiful summering place, where

fishing, boat¬ ing, yachting, bathing, canoeing and sports at the lake are the favorite amusements. There is the Burtis Auditorium seating about 3,000 people for indoor entertainment, and a number of other theatres. There are two country clubs, one city club and numerous fraternal organ¬ izations that own their own buildings. Auburn is a shopping centre with modern stores and is an industrial centre with 174 factories, employ¬ ing 8,110 people. The largest industry is a manufactory of agricultural implements which exports its goods to every part of the world ; other industries of almost equal importance are

carpet, rug and shoe factories, woolen mills, cordage, twine and rope works ; the Diesel oil and steam engines, and auto appliances are made here. The United States census of manu¬ factures for 1914 recorded 123 establishments of factory grade, employing 6,627 persons of whom 5,769 were wage earners, receiving $3,578,000 annually in wages. The capital in¬ vested was $23,129,000, and the value of the year's output was $16,686,000; of this $6,896,000 was the value added by manufacture. The city has a progressive Chamber of Commerce, two savings banks, two private banks, two national banks and one trust company. The city con¬ tains a number of unusually fine private homes with attractive grounds, including Italian and English gardens ; fine public and private build¬ ings; churches of practically all denominations; a municipal and general hospital; courthouse; United States government building; State ar¬ mory, which is the headquarters of Company M of the National Guard; State prison; two libraries, and a fine Woman's Educational and Industrial Union building, one of the largest and best equipped in the United States; there are 12 up-to-date public schools and one high school ; there are four Roman Catholic parish schools. Auburn is also the seat of the Auburn Theological Seminary (Presbyterian), which, with its fine buildings, the Welch Memorial, and Dodge Library, Morgan Hall and Willard Chapel, and the Silliman Club House, forms another interesting feature of the city. The seminary maintains a summer school for lay¬ men as well as the regular student's theological course during the remainder of the year. The city maintains a first-class paid fire department, and the municipality owns and operates its own waterworks. Pop. (1910) 34,668 ; (1920) ; 36,192.

AUBURN, Neb., city and county-seat of Nemaha County, situated on the Nemaha River and on the Missouri P. and the Chicago, B. & Q. railroads, 65 miles south of Omaha. It was first settled in 1861, became' a borough in 1884 and a city in 1890. It is in a rich agricultural region and has large fruit packing and canning plants and a flour min. The waterworks and lighting system are owned by the

city. Pop.

(1920) 2,863.

AUBURN THEOLOGICAL SEMI- NARY, a Presbyterian institution in Auburn, N. Y. ; founded in 1818 by the Synod of Geneva, incorporated in 1820. The course, designed primarily for college graduates, is for three years. At the close of 1915 it had 12 professors and instructors, 64 students, 36,315 volumes in the library, grounds and buildings valued at $300,000; endowment, $790,000; productive funds, $793,770; income, $43,279. Its graduates then numbered 1,778.

AUBUSSON, Pierre d', French crusader and grand master of the Order of Saint John of Jerusalem: b. 1423; d. 1503. As a mere boy he fought against the Turks in Hungary, under Duke Albert of Austria. After campaigning against the Swiss in 1444 he went to Rhodes and became a member of the Order of Saint John, where he distinguished himself in fighting the Saracens. In 1476 he was elected grand master and four years later he defended Rhodes successfully against an attack delivered by the Turks under the personal command of Moham¬ med II. In 1489 the Pope rewarded him by,

making him a cardinal, not only on account of his military feats, but because of his endeavors to organize a powerful league of all the Chris¬ tian nations against the Turks, for which he was often called (<the Shield of the Church. ® Consult Bounhours, (Historic de Pierre d'Au- busson^ (The Hague 1793), and Streck, (Pierre d'AubussoiP (Chemnitz 1872).

AUBUSSON, o'bti'soiT, France, capital of the arrondissement of the same name in the department of Creuse. It is situated on the Creuse River, on the Orleans Railroad, and is especially noted for the carpets manufactured in its factories. Pop. (1911) 7,211.

AUBUSSON TAPESTRY. See Tapes¬ tries.

AUCASSIN AND NICOLETTE, one of

the earliest and by far the best of the efforts of French creative fancy to imitate the Oriental and Latin tales that had won public favor in translations, belongs probably to the 12th cen¬ tury and illustrates a type of story-telling that grew in favor up to the 15th century, with

pro¬ gressive elimination of the lively verses that are here interspersed in the prose. The story re¬ counts the fresh, though not altogether inno¬ cent, love of Aucassin, son of the French Count of Beaucaire, for Nicolette, captive daughter of a king of Carthage. The author who is un¬ known seems to have had democratic sym¬ pathies that distinguish him from his fellow raconteurs and associate him politically with such writers of the 13th century as Rutebceuf and Jean de Meung. The pitiful lot of serfs under landlord oppression stirs him to a palpi¬ tating sympathy. On the other hand there is a daintiness in the description of Nicolette as, greatly daring in her girlish love, she makes her way by an improvised cord from her chamber window, through darkness and brambles, to the tower where Aucassin lay prisoner. ((She felt that the old woman who was with her slept. She put on a dress of silk cloth that she had, very good. She took sheets and towels and knotted them together and made a cord as long as she could and she tied it to the pillar of the window and on it slid down toward the garden. She held her robe with one hand before and the other behind. And she tore herself on the brambles that were great over the grass and she went along the garden. Her blond hair was in little curls and her eyes were bright and smil¬ ing, her face regular, her nose slender and well placed, her lips redder than cherry or rose in summer and teeth small and white. . . . And she had a slender waist that you could clasp in your two hands, and the daisy flowers that she bent with the toes of her feet so that they lay low under the daintiness of her feet were just black beside her feet and her legs, so pure white was that girl.® There is no other French prose to rival this for more than two centuries. There is a beautiful translation by A. Lang.

Benjamin W. Wells.

AUCH, osh, France, capital of the depart¬ ment of Gers, 55 miles west of Toulouse. It consists of a lower and upper town united in several places by flights of steps. The streets generally are steep and narrow. It is the seat of an archbishop, a prefect, and has a Court of Assizes, and has tribunals of first instance and of commerce, a lycee, training-colleges and a

lunatic asylum. The manufactures include agricultural implements, leather, vinegar, plaited sandals, and there is a trade in brandy, wine, cattle, poultry and wool ; there are quarries of building-stone in the neighborhood. Pop. about

9,000.

AUCHMUTY, ok-mu-ti or a-mu-ti, Sir Samuel, British soldier, son of

the Rev. Dr. Samuel Auchmuty: b. New York 1756; d. Ireland, 11 Aug. 1822. He graduated from Kings, now Columbia, College, in New York city, in 1775, after which he entered the British army and fought against the Continentals, notably at White Plains and in the battle of Brooklyn. After the termination of British operations in America, he went to India, in 1783, where he served until 1796. In February, 1807, he was in command of the British forces which stormed the South American city, Mon¬ tevideo. He was now promoted to the rank of major-general and for the next three years was commander-in-chief of the British forces in Madras, during which period he commanded operations against the Java Settlements. Just before his death he was commander-in-chief of the British army in Ireland.

AUCHTERARDER, ouh'ter-ar-der, Perth¬ shire, Scotland, the village in which orig¬ inated the popular agitation that lead to the disruption in the Church of Scotland and to the establishment of the Free Church. It was the centre of a thriving textile industry, to which has since been added the manufacture of agricultural implements. Pop. (1911) 3,175. Consult (The Auchterarder Case) (Edinburgh

1842).

AUCKLAND, George Eden, Earl of, governor-general of India, son of William Eden, Lord Auckland: b. 25 Aug. 1784; d. 1 Jan. 1849. He was called to the bar in 1809; in 1814 he succeeded his father as Lord Auck¬ land. In 1833 he was appointed president of the Board of Trade and master of the mint, under Earl Grey's administration. These offices he held, with the exception of a few months, during which he was First Lord of the Ad¬ miralty, until 1835, when he was appointed governor-general of India, on which occasion he was made a Knight of the Grand Cross of the Bath, being created earl in 1839. In 1841 he returned to England. In 1846 he again became First Lord of the Admiralty, which office he held until his death.

AUCKLAND, William Eden, Lord, Eng¬ lish statesman: b. 1744; d. 28 May 1814. He was educated at Eton and Oxford and called to the bar in 1768. Four years later he was appointed Under-Secretary of State and one of the directors of Greenwich Hospital. In 1778 he was nominated, with the Earl of Carlisle and Governor Johnstone, a commissioner to treat with the insurgent American colonists, but this mission was not attended with suc¬ cess. In 1785 he was sent as minister plenipo¬ tentiary to the court of France, where he con¬ cluded a commercial treaty with that country in the following year. In 1788 he was sent as Ambassador to Spain and on his return, Octo¬ ber, 1789, he was created an Irish peer as Baron Auckland, being

created a British baron four years later. In 1790 he became Ambassador to Holland. From 1798 to 1801 he was joint Postmaster-General. Among his writings are

(The Principles of Penal Law *(1772) ; Re¬ marks on the Apparent Circumstances of the War* (1795) ; (Speech in Support of the Union with Ireland* (1800).

AUCKLAND, New Zealand, a province forming the northern part of North Island, and with an area of 25,746 square miles. Auckland, a city and capital of the province, and formerly capital of New Zealand, is situated on the northeast coast of North Island at the mouth of an arm of Hauraki Gulf, 1,350 miles from Sydney, Australia. It stands upon a cluster of extinct volcanoes. In the city and its suburbs there are evidences of as many as 63 points of eruption, making the narrow ithmus a fruitful field for the study of volcanic formations. It has two excellent harbors, one at Waitemata and one six miles distant at Manukan on the opposite side of the isthmus. The former is one of the finest in New Zealand. There are numerous wharves and two graving docks, one of which, the Calliope dock, opened in 1887, is one of the largest in the south seas, admitting 10,000-ton steamers. Connected by steamer with Australia, South Africa, Great Britain, San Francisco and the Pacific Islands and by rail with the chief towns of the island, the city has a large and increasing trade, valued at about $40,000,000 annually; 361 vessels of 856,317 tons burden entered and 241 of 554,815 tons cleared the port in 1913. The site is fine and there are numerous handsome public buildings, including churches, fine schools, an excellent public library containing the Grey collection of manuscripts, a museum and the Auckland Uni¬ versity College. Chief manufacturing interests are ship-building yards, sugar refineries, rope factories, boiler works, etc. Its lumber in¬ dustry, taking advantage of the wide rivers down which logs can be floated, is a very pros¬ perous one, as is also its trade in Kauri gum. The government is municipal. For the year 1917, the municipal electric plant showed a good increase, selling 1,872,938 units valued at $75,- 168, as compared with 1,601,292 units, value $63,795, for 1916. There is a United States con¬ sulate here. Pop. (1911) with suburbs, 102,676;

(1913) 113,334.

AUCKLAND ISLANDS, a group of islands in the Pacific Ocean, 200

miles to the south of New Zealand, lat. 50' 31" S., long. 166' 19" E. The largest island is about 30 miles long by 15 broad, and is covered with dense vegetation. They were discovered in 1806, and settled in 1849 by the British. At present they are almost entirely uninhabited, and serve as a station for whaling ships. The New Zealand government maintains a station on the largest island as a haven for shipwrecked sailors.

AUCTION and AUCTIONEER. An

auction is a public sale of property to the highest bidder. It is not material how the sale is conducted, whether by public outcry or other manner. The essential part is the selection of a purchaser from a number of bidders. Cata¬ logues describing the property are usually printed, the terms of the sale are also usually stated in the catalogue. Auctions are generally conducted by persons licensed for that purpose. Bidders may be employed by the owner of the property, if it be done bona-fide and to prevent a sacrifice of the property under a given price, but where the bidding is fictitious and by com¬

bination with the owner to mislead the judg¬ ment or inflame the zeal of others, it would be a fraudulent and void sale. Unfair conduct on the part of the purchas-er will void the sale. Misdescription of property sold will void the sale if it is material. An auctioneer cannot bid for himself ; he cannot deny his principal's title; he cannot sell at private sale; he has ordinarily the power to collect the purchase price of goods sold from the buyer. The auctioneer must use ordinary care and skill in the discharge of his duties, and like other agents he must obey the instructions he receives from the owner of property sent him for sale. An auctioneer, according to the weight of authority, who sells stolen property is liable to the owner, notwith¬ standing that the goods were sold by him, and the proceeds paid over to the thief without notice of the felony. An auctioneer is also liable for want of care of the goods while in his possession. The auctioneer has a lien upon the goods for the charges of the sale, and for his commission. He is the agent of the seller, and, for the same purposes, of the buyer. Con¬ sult Bateman, (Treatise on the Law of Auc- tions) (7th ed., London 1895.)

AUCTION BRIDGE. See Bridge.

AUCUBA, a'ku-ba, a genus containing three species, of which A. japonica is the best known. They belong to the Cornacecc family. The species mentioned is a dioecious evergreen laurel-like shrub of many varieties, native of China and Japan, largely planted on lawns and in

shrubberies. It withstands the dust, smoke and gases of cities remarkably well, but is not hardy in the Northern States. The plants bear purple flowers in summer and are particularly beautiful when bearing their scarlet berries wrhich ripen in early spring. They are easily propagated by seed, or by green wood cuttings, and succeed in half shade where the soil is good, friable, moist, but well-drained.

AUDZE'US (Syrian Udo), the founder of a religious sect called Audians, which held an¬ thropomorphic views, and was established under the following circumstances: Audius (b. at the end of 3d century ; d. 370) was a Mesopotamian, of singular purity and severity of character. He became disgusted with the Syrian clergy, and on expressing his opinion with more firm¬ ness than discretion, was excommunicated ; when a considerable number of sympathizers gathered around him and constituted themselves into a church. But this sect could not long withstand the persecutions to which it was ex¬ posed, and died almost at the same time as its founder, who passed the latter part of his life in exile in Scythia, where he converted many pagans to Christianity by the force of his teachings, and the moral beauty of his ascetic life.

AUDE; od, a maritime department in the south of France; area, 2.433 square miles. It is mainly covered by hills belonging to the Pyrenees or the Cevennes, and is traversed by a valley drained by the Aude. The loftier dis¬ tricts are bleak and unproductive; the others tolerably fertile, yielding good crops of grain. Its capital is Carcassonne. Pop. about 311,000.

AUDE, a river of France, which rises in the ˆ east Pyrenees, in the department of Pyrenees Orientales, and after a course of

nearly 130 miles, falls into the Mediterranean. It receives several affluents, of which the principal is the Orbieu.

AUDEBERT, od-bar', Jean Baptiste,

French naturalist and engraver: b. Rochefort 1759; d. 1800. The first work was (Histoire Natu relic des Singes, des Makis, et des Galeopitheques) (1800), in which he shows himself an able draughtsman, engraver and writer. Natural history was greatly benefited by his work, the splendor of which was astonishing. His ‘Histoire des Colibris, des Oiseaux-Mouches, des Jacamars, et des

Promerops> (1802), is esteemed the most complete work that has appeared in this depart¬ ment. Fifteen copies were struck off with golden letters. He changed the color of his impressions in different ways to increase the splendor of the patterns.

AUDHUMLA, ou-dhoom'-la, a cow in Scandinavian mythology: she licked away the frosts in the spring, she breathed warmth into the icy abyss and brought forth Buri, father of Borr, who was the father of Odin. Upon her milk subsisted the giant Ymir.

AUDIFFRET-PASQUIER, ode-fra'pas- kya', Edme Armand Gaston, Due d', French statesman: b. Paris 1823; d. 1905. He was president of the National Assembly in 1875. He was president of the Senate 1876-79. He was elected to the French Academy in 1878.

AUDIOMETER, for the measurement of hearing, an instrument devised by Professor Hughes, the English inventor of the micro¬ phone. Among its constituent parts are an induction coil, a microphone key and a tele¬ phone. The audiometer has been materially modified, and is now principally used for obtaining a balance of induction from two electric coils acting upon a third. A scale is provided to show the extent of the movement. A varying or interrupted current being passed through the two outer coils, the preponderating current will produce the most induction if the central coil is equidistant. It can always be moved to such a point that there will be no inductive effect, one counteracting the other. Thus its position measures the relative induc¬ tion. A telephone is in circuit with the inter¬ mediate coil and is used to determine when its position is such that no current is induced in it.

AUDIPHONE, an invention to assist the hearing of partially deaf persons in whom the auditory nerve is not entirely destroyed. The instrument, made of a thin sheet of ebonite rub¬ ber or hard vulcanite, is about the size of a palm leaf fan, with a handle and strings at¬ tached to bend it into a curving form, and a small clamp for fixing the string at the handles. The audiphone is pressed by the person using it against his upper front teeth, with the convex side outward; when so placed it communicates the vibrations caused by musical sounds or ar¬ ticulate speech to the teeth and bones of the skull, thence to the organs of hearing. For different sounds it requires to be focused to different degrees of convexity. A simple strip of fine glazed mill-board has been recommended by some experimenters as cheaper and equally serviceable; and birch wood veneer has been used with success for the same purpose. The

ear trumpet and modern electric devices have to a great extent

supplanted the audiphone.

AUDIT, a term denoting an examination into accounts or dealings with money or prop¬ erty, along with vouchers or other documents connected therewith, especially by proper officers, or persons appointed for the purpose. Also the occasion of receiving the rents from tenants on an estate.

AUDITING. See Accounting. AUDITION. See Ear; Hearing.

AUDITOR. Term now commonly applied to expert accountants who examine and state the accounts of government departments, cor¬ porations, etc. An auditor is an officer of the government, whose duty it is to examine the accounts of officers wffio have received and dis¬ bursed public moneys by lawful authority. In practice an auditor is an officer of the court, assigned to state the items of debit and credit between the parties' in a suit where accounts are in question, and exhibit the balance. They may be appointed either by courts of law or equity. They are appointed at common law in actions of account, and in many of the States in other actions, under statutory regulations. The auditor's report must state a special ac¬ count, 4 Yeates, Penn. 514, giving items allowed and disallowed, 5 Vt. 70, but it is sufficient if it refer to the account, and it is their duty to report exceptions to their decisions of questions taken before them to the court, and exceptions must be taken before them, 4 Cranch, U. S. 308; 22 Bart. N. Y. 39; unless apparent on the face of the report. The report of the auditor as to facts is final in some of the States, unless impeached for fraud, misconduct or very evident error. When the report is set aside in whole or in part, it may be referred back or may be rectified by the court, or accepted if the party in favor of wffiom the wˆrong decision is made remits the item.

Treasury Auditors. — In the United States Treasury Department there are six auditors, one for this department itself while the others audit the accounts of the Army, Interior, Post-office, War and State and other departments. These auditors decide whether accounts against the government are submitted in the proper form, but if differences of opinion arise appeal may be made to the Comptroller of the Treasury.

State Auditors.— Most of the State Con¬ stitutions provide for auditors who shall audit the public accounts and perform whatever other duties are prescribed by the statutes. These officers are usually elected, in New Jersey, Tennessee and Virginia the election being by joint ballot of the legislature. In Colorado, Oklahoma and Pennsylvania two successive terms are prohibited. z -Often the auditor is a member of the State executive boards, such as the board of taxes, etc.

Local Auditors.— In Indiana, Iowra, Min¬ nesota, Ohio and South Dakota the county auditors are elective and in about one-third of the States the county auditors are regular county officers. County auditors also are found regularly in California, Mississippi, Nevada, Newr Jersey, South Carolina and Washington, and such officials may be found also in the larger counties of Kansas, Michigan, New' York, Pennsylvania and Utah. It is the duty

of these auditors to keep accounts of receipts and expenditures, to issue warrants for the expenditures of the county, to prepare tax lists, and sometimes to assess property for purposes of taxation. In some States the county clerks act as accountants and auditors and in several States the county commissioners or board of supervisors audit the accounts. In New England the boards of selectmen usually examine town and township accounts, while in the Middle Atlantic and North Central States this work is performed by the town boards. In Kansas, Minnesota, Nebraska, North Dakota, Ohio, South Dakota, Wyoming, and partially in Massachusetts and New York, a centralized system of auditing county and town accounts has been put into operation. Consult Beard, C. A., (American Government and Politics) (New York 1911), and (American City Government* (New York 1912) ; Fairlie, J. A., (Local Government in Counties, Towns and Villages) (New York 1906) ; Hart, A. B., (Actual Government (New York 1908) ; Renick, E. I., Control of National Expenditures, * in Political Science Quarterly, Vol. VI, pp. 248-81 (1891) ; Thorpe, F. N., (Federal and State Constitutions) (Washington 1909). For the law as to auditors in England consult Pixley, Auditors: their Duties and Responsibilities) ' (London 1896).

AUDITORY CANAL. See Ear.

AUDITORY, or EIGHTH, NERVE,

the nerve of hearing, and of the sense of posi¬ tion. It has its origin in two distinct portions of the ear, in reality being two distinct nerves, the cochlear and the vestibular, both of which are sensory in their function. The cochlear nerve originates in the cells of the organ of Corti in the cochlea of the ear, and is the one that ca.rries sound impressions into the brain. The vestibular nerve has its origin in the semi¬ circular canals and is the nerve that conveys the sense of localization of position. Both of these nerves soon join and run together in the internal meatus, where they lie in the same sheath for some distance with the seventh or facial nerve. They enter the medulla, the coch¬ lear nerves forming the acoustic striae on the floor of the fourth ventricle, and end about the superior olivary body and the nucleus of the trapezium. From here the fibres enter the fillet and end about the auditory centre in the brain in the second temporal convolution. Dis¬ ease here causes auditory aphasia. The fibres of the vestibular branch end in the nuclei of Deiters and Bechterew in the medulla, and then further fibres pass for the most part into the cerebellum. Disease here causes cerebellar ataxia. See Ataxia; Aphasia; Ear; Equi¬ librium ; Hearing.

AUDLEY, Sir James, one of the original knights of the Order of the Garter: b. 1316; d. 1369. He was in the suite of Edward III and the Black Prince in France, and in 1350 distinguished himself in the naval engagement with the Spaniards at Sluys. He was so con¬ spicuously brave at the battle of Poictiers that the Prince retained him as his own knight and conferred on him an annual revenue of 500 marks, which he immediately gave over to his squires. This generosity so pleased the Prince that he immediately conferred a further an¬ nuity of 600 marks on Audley. He also ac¬

companied the Black Prince to Spain and in 1369 the office of seneschal of Poitou was con¬ ferred on him. He took part in the capture of La Roche sur Yon, in Poitou, in the same year, dying some months later. When Edward III founded the Order of the Garter, in 1344, Audley was one of the first honored.

AUDLEY, a manufacturing town in Staf¬ fordshire, England. It has a church dating from the time of Edward II. Pop. 14,776.

AUDLEY OF WALDEN, Thomas,

Baron, English Lord Chancellor in the reign of Henry VIII: b. 1488; d. 1544. In 1529 he was speaker of the famous Long Parliament. In 1532

he was knighted and made Keeper of the Great Seal, becoming Lord Chancellor in the following year. In this office he succeeded Sir Thomas More, at whose trial he was pre¬ siding judge. He was also presiding judge at the trials of the supposed accomplices of Anne Boleyn, when the King wished to rid himself of that Queen, and of the paramour of Cath¬ erine Howard. He figures throughout English history of that period as the accomplice of Henry VIII in all his foulest deeds.

AUDOUARD, o'dowar', Olympe, French writer: b. 1830; d. 1890. She was married to a notary in Marseilles, but soon after divorced. She traveled in Egypt, Turkey and Russia; and having conducted various journals in Paris since 1860, made a successful lecture tour through the United States in 1868-69. After her return she became interested in spiritualism. She was an ardent advocate of woman's rights. Among her novels and books of travel may be mentioned (How Men Love) (1861) ; (The Mysteries of the Seraglio and of the Turkish Harems) (1863) ; (The Mysteries of Egypt Lffiveiled *(1865); (War to Man* (1865); (Across America* (1869-71) ; Parisian Sil¬ houettes } (1883).

AUDOUIN, o'dooaii', Jean Victor,

French naturalist: b. Paris 1797; d. 1841. He was professor of entomology in the Paris Nat¬ ural History Museum and was the founder and first president of the Entomological Society. He wrote much respecting the injuries done by insects to vine and silk culture. He contributed the part on insects in Cuvier's (Regol Animal.)

AUDRAN, 6-dran', Edmond, French

composer: b. Lyons 1842; d. 1891. He studied music in Paris and in 1861 became choral di¬ rector at Saint Joseph's Church, Marseilles. In 1881 he returned to Paris and collaborated with Chivol and Duru in comic operas. He com¬ posed several comic operas which were exceed¬ ingly popular, among them (La Mascotte *(1881); Olivette: Le Grand Mogol* (1884): (Miss Helyett *(1890) ; (La Poupee.*

AUDRAN, o-dran', Gerard, French en¬ graver: b. Lyons 1640; d. Paris 1703. He studied under his father and uncle and after three years at Rome under Maratti, where he acquired a high reputation by his engraving of Pope Clement IX, was recalled to France by Colbert, and appointed engraver to Louis XIV. Here he engraved the works of Lebrun, illus¬ trating the battles of Alexander, and many paintings by Raphael. Titian, Domenichino, Poussin and others. He reproduced Mignard's decorations of the ceiling of the royal apart¬ ment at

Versailles, and the cupola of the

Church of Val de Grace. He wrote 'Les pro¬ portions du corps humain) (1683). His nephews, Benoit (b. 1661, d. 1721) and Jean (b. 1667, d. 1756), were also engravers.

AUDREY, Saint. See Ethelreda, Saint.

AUDREY, a'dri, (1) a shepherdess in Shakespeare's comedy 'As You Like ItP (2) A character in Jonson’s comedy 'A Tale of a Tub.)

AUDSLEY, George Ashdown, Scottish- American architect : b. Elgin, Scotland, 6 Sept. 1838. He established himself in the United States in 1892, and subsequently became promi¬ nent both as an architect and author. In col¬ laboration with his brother, William J. A. Audsley, he was author of several works — on illuminating, decorating, Christian symbol¬ ism, etc., and, individually, published (Keramic Art of Japan) ; 'Ornamental Art of Japan > ; (The Art of Chromolithography,) etc.

AUDUBON, a'du-bon, John James Fou- gere, American naturalist : b. Les Cayes, Santo Domingo, now Haiti, 26 April 1785 ; d. New York, 27 Jan. 1851. His father was an adventurer and his mother a Creole. At an early age he showed an absorbing interest in all living things, especially birds, a fondness which remained with him throughout his life. He was a keen and sympathetic observer, rather than a trained specialist either in science or art. He was educated in France and studied drawing for some time under the great artist, David, but in 1798 he returned to America and took possession of a farm owned by his father on the Perkiomen River, near Philadelphia. Here, in 1808, he married Lucy Bakewell, the daughter of an English neighbor; with her he moved to Kentucky and subsequently to Louisiana, meeting in both places with financial misadventures due to his inadaptability to at¬ tend properly to trade, which left him so poor that he was obliged to paint portraits and teach dancing and fencing. From his boyhood, how¬ ever, in all fortunes, he had spent much time in sketching birds and studying their habits, and in 1826 he found means to take these sketches to England, where he elaborated them into the great series which made him famous and re¬ lieved his pecuniary troubles. From 1827-38 he published a series of 1,065 colored figures of American birds in a work, (The Birds of America,) which still holds its place as one of the most attractive and beautiful ornithologies of the world. No

reading matter accom¬ panied these plates, but later in 1831-39 five volumes were issued under the title 'Ornitho¬ logical Biography, *the technical part of which was by William McGillivray. Many editions and reprints were issued later, of which the most important was the octavo edition of 1844. In 1830 he returned to America to travel for new material and, in 1831, began the publica¬ tion of his 'Ornithological Biography,* in five volumes. In 1842, after 12 }rears spent chiefly in explorations, he bought a home on the Hud¬ son River at a spot considerably north of New York city at that time, but now within the city limits and known as Audubon Park; here his two sons, Victor Gifford and John Wopdhouse Audubon, also lived with their families. In 1843 the naturalist took another long journey, going to the Missouri River region. After 1844 he devoted himself with Dr. John Bachman

(q.v.) and his sons, to a new publication, 'The Quadrupeds of America. * After 1847 his health began to fail and he gradually lost the use of his mind. He was buried in Trinity Cemetery, New York. The full details of his life may be found in 'Audubon and His Journals, *by his granddaughter, Maria R. Au¬ dubon, with zoological and other notes by El¬ liott Coues (1897), and in an earlier biography by Lucy Audubon, as well as in 'The Life and Adventures of J. J. Audubon, the Naturalist,* by Robert Buchanan (1869). His latest biog¬ rapher is Francis Hobart Herrick, who has compiled a very excellent work, 'Audubon the Naturalist, * from a mass of documents in the possession of an old notary in Coueron, France (2 vols., New York 1917).

AUDUBON SOCIETIES are organiza¬ tions of bird-lovers who work to educate public opinion to a proper appreciation and protection of bird life. The term "Audubon Society" was coined by George Bird Grinnell (q.v.) in 1886, and an organization for the protection of birds at that time started by him attained a member¬ ship of 48,862. It was later discontinued, but the name and plan survived. In 1895 Audubon societies were organized in Massachusetts and Pennsylvania, and during the next few years bird-lovers in many other States followed suit. The national committee of Audubon societies was organized at a meeting held in Washington in 1902 ; and 1905 saw the organization of the National Association of Audubon Societies for the Protection of Wild Birds and Animals, with William Dutcher as president and T. Gil¬ bert Pearson as secretary and financial agent. The generosity of Mr. Albert Willcox provided financial support of the undertaking at this pe¬ riod (more than $331,072 in 1905 and 1906), and at the end of 1906 the Association had an interest-bearing endowment fund of more than $336,000 and an income from other sources of approximately $9,000. In May 1910, the Audu¬ bon bill to prohibit the sale of the feathers of native birds in the State of New York was

en¬ acted. A similar law has since that time been enacted in about 12 other States. Many laws for the establishment of game commissions and game warden forces, or prohibiting the sale of game, owe their existence to Audubon society activities; and from the beginning the educa¬ tional side of Audubon work has been prom¬ inent. Up to 1 July 1915 the Association had enrolled as Junior Audubon members 373,153 school children, and had given systematic in¬ struction in bird lore to them and to 18,966 teachers. Hundreds of articles bearing on the economic value of birds to mankind have been published in school journals, in various literary magazines and in newspapers throughout the country. A force of six or seven lecturers is maintained, who give illustrated addresses be¬ fore audiences of school children and to women's clubs, granges and other organizations. A system of courses in bird study is given by the association's special corps of lecturers at many different State summer schools for teachers.

In 1914 the Association began its department of applied ornithology. This is a special work to encourage the people generally to attract birds about their homes by artificial means, and to induce those favorably situated to engage in the propagation of wild ducks and other game

birds. Bulletins and lectures bearing on this point are destined to produce a decided in¬ fluence on popular sentiment.

The National Association of Audubon So¬ cieties is to-day a strong, far-reaching institu¬ tion. While engaging actively in preserving wild life, it recognizes fully the claims of the sportsman, and has no fight with the man who legally kills game birds and game animals. In summer it guards, by means of paid wardens, virtually every important colony of sea-birds on the Atlantic and Gulf coasts of the United States, as well as on many lakes of the interior. It owns or leases many islands where ducks and sea-birds breed. It originated the system of Federal bird reservations, and co-operates financially with the government in protecting them. It oublishes and distributes annually over 6,000,000 pages of bird-protective litera¬ ture, and the home office has become a general clearing house for all kinds of information in reference to the study and conservation of wild birds and animals. The Association makes ex¬ penditures every year for the protection of. big game, for feeding game birds and song birds in

winter, and in prosecuting violators of the law. The Association collected over $90,000 for the bird-protective cause in 1914, and the friends of the organization speak with pride of the fact that only 7 per cent of the income is being expended for administrative salaries.

AUE, Hartmann von, German poet: b. 1170; d. about 1215. He was of humble birth, being the vassal of the Lofd of Aue, who took him with him in one of the crusades, either in 1189 or 1197. Very little is known of his life. Of his works is undoubtedly the best (2d ed. in High German, Halle 1855). In this epic poem, of some 10,000 lines, the Arthurian legends are first introduced into Germany. Next in importance is his (Gregorius von Stein, ' the material of which is drawn from French romance (Berlin 1838). His most popular work was (Der arme Heinrich,' his one work which is based on German folk lore (published by the Grimm Brothers, Berlin 1815). Many editions of his works have been published in German. Consult Cassel, (Die Symbolik des Blutes und der arme Heinrich des Hartmann von Aue) (Berlin 1882).

AUE, Saxony, Germany, city in Zwickau, on the Zwickau-Schwarzenberg Railroad, near the juncture of the Mulde and the Schwarz- wasscr rivers. It is a busy industrial centre, manufacturing paints, metal ware goods, tex¬ tiles, furniture, paper, . tobacco pipes, etc. It is the seat of the District Court, has five public buildings and its population is about 20,000.

AUENBRUGGER VON AUENBRUG,

ow"en-brug'er fon ow'en-brug, Leopold, Aus¬ trian physician: b. Gratz 1722; d. Vienna 1809. As early as 1754 he had discovered the method of studying internal diseases (percussion) which made him famous; but not until after seven years of experiments and verification did he publish his treatise, entitled Unventum Novum ex Percussione Thoracis Humani In- terni Pectoris Morbos DetegendP (1761). The book marks an epoch in the modern history of medicine, but attracted scant attention until it was translated and illustrated by Corvisart in 1808. He also published two treatises on in¬ sanity.

AUER, Alois, Ritter von Welsbach, Austrian printer: b. Weis 1813; d. 1869. He was trained as a compositor and in his leisure moments acquired several languages, becoming a professor of Italian in the Gymnasium of Linz. In 1839 he set out on a tour of Germany, Switzerland, France and England, collecting material for his art. From 1841 to 1868 he was at the head of the imperial printing office at Vienna. He made many typographical dis¬ coveries and published

(Die Sprachenhalle oder das Vaterunser in 608 Sprachen' (1844) ; and (Das Vaterunser in 206 Sprachen) (1847) ; (Die Buchschriften des Mittelalters) (1852); (Geschichte der K.-K. Hof-und Stadts- druckerei in Wien) (1851).

AUER, Leopold, Hungarian violinist : b. Veszprim, Hungary, 28 May 1845. His first musical training was gained in Pesth; in 1858 he studied in the Vienna Conservatory and later was a pupil of Joachim in Hanover. In 1863 he was concert master in Diisseldorf. In 1868 he was appointed soloist of the imperial orchestra in St. Petersburg, where he was pro¬ fessor in the conservatory. By this time he was becoming known as one of the world's greatest violin soloists. In 1895 he was raised to the rank of a hereditary noble. He is also famous as a teacher, among his pupils being Elman and Zimbalist.

AUERBACH, ow'er-baH, Berthold, Ger¬ man novelist: b. Nordstetten, Wiirtemberg, 28 Feb. 1812; d. Cannes, France, 8 Feb. 1882. He began to write while a student in Heidelberg and under the pseudonym (<Theobald Chauber" produced a (Biography of Frederick theGreat) (1834-36). He was the founder of the modern German ˆtendency novel,® in which fiction is used to influence public opinion on social, political and religious questions. Auerbach was an admirer of Spinoza, and the latter's philosophy is evident in his novels. A series of novels, from the history of Judaism, under the collective title (The Ghetto,' of which (Spi- noza) (1837) and (Poet and Merchant (1839) were printed in separate editions, was followed by a translation of Spinoza, with a critical biography (1841). (Black Forest Village Stories 5 (1843), was received with universal favor, translated into nearlv all European lan¬ guages and established his fame. To this class of tales belong also (The Professor's Lad\r) (1847); c Little Barefoot' (1856); Jo¬ seph in the Snow) (1860) ; (Edelweiss 5 (1861) ; (After Thirty Years *(1876). His first effort in the field of the novel, (New Life) (1851), met with little favor; but (On the Heights' (1865) constituted the crowning success of his literary career. It was followed by (The Villa on the Rhine' (1868) ; (Waldfried, a Family History* (1874); and (The Head Forester' (1879). His last years, were embittered by the growth of anti-Semitism in Germany. His (On the Heights' is still popular. His works appeared in 18 volumes in 1892-95. See Auf der Hohe. Consult Bettelheim, A., (B. Auerbach, der

Mann, sein Werk *(1907) ; Lasker, E., (Ber¬ thold Auerbach, ein Gedenkblatt* (1882), and Zabel, (Berthold Auerbach' (Berlin 1882).

AUERBACH, Henry: b. 1482, at a place of the same name in Bavaria, the builder of the Auerbach court and cellar at Leipzig, men¬ tioned

in Goethe's (Faust.' The building was

erected in 1530, and tradition reports that five years after Dr. Faust was seen riding out of it on a barrel of wine. This tale Goethe has made use of in his famous poem.

AUERLITE, a rare North Carolina min¬ eral, remarkably rich in thoria, named after Dr. Carl Auer von Welsbach, the inventor of the Welsbach incandescent gas mantel. It was originally described as a hydrous silico-phos- phate of thorium, ThCh.fSiOj. &P2O5) +2H20. It occurs in yellowish, zircon-like crystals of resinous lustre and having a hardness of 2.5 to 3 and a specific gravity to 4.1 to 4.7.

AUERSPERG, Adolf Wilhelm Daniel,

Prince, brother of Prince Karlos Auersperg, Austrian statesman: b. 21 July 1821; d. 5 Jan. 1885. From 1841 until 1860 he served in the army, attaining the rank of major of dragoons, in the regiment of Prince Eugene. In 1867 he began his political career as a member of the Bohemian Diet, where he represented the landed proprietors in the Liberal party. In the following year he became a life member of the upper chamber of the Austrian Reichs- rath. In 1870 he became governor of Salzburg, and was head of the Austrian ministry in the year following. With the authority that this office gave him he was very active in effecting electoral reforms, especially in the matter of securing direct representation in the lower chamber of the Reichsrath. He was also instru¬ mental in bringing about closer relations with Hungary.

AUERSPERG, ow'er-spern, Anton Alex¬ ander, Count of, Austrian poet and statesman, wrote under the name Anastasius Grim: b. Laibach, Carnolia, 11 April 1806; d. Gras, 12 Sept. 1876. Studied engineering in Graz, but later took up philosophy and law in the Uni¬ versity of Vienna. In 1848 he was elected to the German preliminary Parliament, and later became a member of the National As¬ sembly in Frankfurt. In 1861, under the min¬ istry of Schmerling, he was created a life member of the Austrian upper house, where he became prominent as a Liberal. Already as a youth his poetry had been attracting atten¬ tion, his first works being of a political nature. His best known, non-political poem was (Der letzte Ritter' (1830), written in the metre of the <(Nibelungenlied," and eulogizing Maxi¬ milian I. Among his

other noteworthy works are (Die Niebelungen im Frack' (1843) ; (Der Pfaff vom Kahlenberg) (1850) ; (Volkslieder aus Krain' (1850); (Robin Hood' (1864). His collected works were edited by L. A. Frankl (5 vols., Berlin 1877).

AUERSTADT, ow'er-stet, Saxony, a vil¬ lage famous for the great battle which took place there 14 Oct. 1806, between the French under Davoust, and the Prussian army under Duke Charles of Brunswick, which ended in a great victory for the former. The Prussians, who numbered 48,000, left nearly half of their men dead or wounded on the ground, while the French (30,000) escaped with a loss of only 7,000. Napoleon made Davoust Duke of Auer- stadt. The village lies 25 miles northeast of Weimar. Consult Lettow-Vorbeck, (Der Krieg von 1806 und 1807) (Vol. I, Jena und Auer- stiidt, Berlin 1891).

AUF DER HOHE, (On the Heights' (1865) reflects a period of constitutional po¬

litical conflict in Germany, and is the most widely known of Auerbach's novels. The cen¬ tral figure is a king whose self-confident indi¬ viduality comes in conflict with his love of popular freedom. Anticipating the ((superman)> of later writers, he feels that his nature is cast in too large a mold to be confined by consti¬ tutional restraints or ethical conventions. In conflict with a lnajority of the elected repre¬ sentatives of the people over some ecclesiastical question, he dissolves the assembly in his im¬ patience of any outer control. The same char¬ acteristics are manifesting themselves mean¬ time in his domestic life. Flis queen is a gentle lady of domestic instincts. He loves her, yet finds in the forceful, energetic Countess Irma, one of her ladies in waiting, a spirit so answer¬ ing to his own that they join to transgress, he the bond of marriage, she of loyalty to her queen. Atonement comes first to Irma, who withdraws from the court into solitude, recog¬ nizing that one who would live a life of nature may not claim the protection of the social order. Thus the king is brought to realize that life for its full unfolding depends not only on following the law of nature or the law of cus¬ tom, but in the co-ordination of them, when man of his own free will yields obedience to law. He dismisses his autocratic counsellors and bows to the will of his people. The stress of this psychic drama is relieved by scenes be¬ tween the queen and Wallpurga, the little prince's peasant nurse, who passes, as does her husband, through a conflict parallel to that of Irma and the king, though both are saved from straying by their unsophistocated respect for the folic-ways. The contrast between court and peasant life is a primary interest in (On the Heights.' There are translations by S. A. Stern and others.

Benjamtn W. Wells.

AUFFENBERG, ouf'-en-berH, Joseph, Baron von, German dramatist: b. Freiburg, 25 Aug. 1798; d. there, 25 Dec. 1857. After studying law in the Freiburg University, he en¬ tered the army, where he attained the rank of lieutenant of the horse guards. Several years afterward he became president of the commit¬ tee of the Court Theatre at Karlsruhe. Among his more important productions are (1823); (Ludwig XI in Peronne' ; (Die Fili¬ buster' ; UConich Erich' ; (Das Opfer des Themistokles' ; (Fergus Maclvor' ; (Das Nord- licht von Kasan.' His collected works were published at Wiesbaden in 1855 in 22 volumes. Consult Stahl, (Joseph von Auffenberg' (Ham¬ burg and Leipzig 1910).

AUFRECHT, ouf'reHt, Theodor, Ger¬ man Oriental scholar: b. Leschnitz, 7 Jan. 1822; d. 1907. Graduating from the University of Berlin, he immediately became interested in Oriental research. When only 25 years of age he published a treatise on Sanskrit (Bonn 1847). With Kirchhoff he collaborated in the publication of (Die umbrischen Denkmaler' (1849-51). In 1862 he was appointed professor of Sanskrit at the University of Edinburgh, but in 1875 returned to Bonn. Among his works are an edition of the (Rigsveda,' ren¬ dered into Roman letters (Bonn 1877) ; (Aita- reya Brahmana' (1879) ; (Catalogus Cata- logorum,' an alphabetical register of Sanskrit works and authors (Leipzig 1896-1903).

AUGEAN (a'je-an) CODEX (Codex Au- giensis), a noted Greek and Latin manuscript of the Epistles of Saint Paul, supposed to have been written in the 9th century, and so called from Angia Major, the name of a mon¬ astery at Rheinau. After passing through sev¬ eral hands it came, in 1718, to Dr. Bentley, who purchased it for 250 Dutch florins. It is now in the library of Trinity College, Cambridge. This manuscript is written in uncial letters, and without accents; not contimia serie, as is com¬ mon with the more ancient copies, but with in¬ tervals between the words, and a dot at the end of each. The Greek text is written in cap¬ itals, the Latin in Anglo-Saxon letters ; hence it is tolerably clear that it must have been written in the west of Europe, where that for¬ mation of the Latin letters, usually called Anglo-Saxon, was in general use between the 7th and 12th centuries.

AUGEAS, in Greek legend, a king of Elis, famed for his stable, which

contained 3,000 oxen and had not been cleaned for 30 years. Hercules was desired to clear the filth away in one day, and Augeas promised if he performed it to give him a tenth part of the cattle. This task Hercules is said to have executed by turning the river Alpheus, or as some say, the Peneus, through the stable, which immediately carried away the dung and filth. Augeas re¬ fused to perform his engagement. Upon this a war ensued and Hercules conquered Elis and put Augeas to death.

AUGER-SHELL, a common designation of the spiral gastropod mollusks of the Tere- boida family. The shells are slender and taper¬ ing, sometimes ending in a sharp point and are usually decorated with brown, orange and red spots or patches. More than 200 species are known, all inhabitants of tropical waters, where they occur from the shallow waters of the shore to very great depths.

AUGEREAU, ozh-ro', Pierre Francois Charles, Duke of Castiglione, a marshal of France: b. Paris, 1757; d. 12 June 1816. He came of humble parentage, served for _ some time in the French carabineers and later joined the Neapolitan armv. He remained in the lat¬ ter service until 1787, when he became a fenc¬ ing master at Naples. In 1792 he, with all other French residents, was banished from Naples and at once joined the French Revo¬ lutionary army. He distinguished himself in 1794 as general of brigade in the army of the Pyrenees, and in 1796 as general of division in the army of Italy. He made himself master, 16 April, of the intrenched camp of the Pied¬ montese at Ceva, afterward of that at Casale ; threw himself on the bridge of Lodi, and car¬ ried it with the enemy's intrenchments.ˆ 1 August he came to the assistance of Massena ; maintained during a whole day a most obstinate struggle against a superior number of troops and took the village of Castiglione, from which he derived his ducal title. In the battle of Ar- cole, when the French columns wavered, Augereau seized a standard, rushed upon the enemy and gained the victory. The directory bestowed this standard on him 29 Jan. 1797. In 1799 he was chosen a member of the Council of Five Hundred, and therefore resigned his command. He then obtained from the consul Bonaparte the command of the army in Hol¬

land. Being superseded in October 1801, he remained without employment till 1803, when he was appointed to lead the army collected at Bayonne against Portugal. When this enter¬ prise failed he went back to Paris, and 19 May 1804 was named marshal of the empire, and grand officer of the Legion of Honor. In July of this year the King of Spain sent him the order of Charles III. He contributed to the successes which gave birth to the peace of Pressburg, and in

March 1806, had possession of Wetziar and the country around, until, in the autumn of this year, a new war called him to Prussia. Early in 1811 Napoleon gave him the command of a corps in the army of Spain. After the entrance of the allies into France, he made submission to Louis XVIII, who made him a peer. Napeoleon, on his landing in 1815, declared him a traitor. Augereau expressed himself in his favor, but took no active part in the new order. After the King's return he took his place again in the chamber of peers.

AUGIER, o-zhya', Guillaume Victor Emile, French dramatist: b. Valence, 17 Sept. 1820; d. Croissy, 25 Oct. 1889. He was well educated and prepared for the bar. He was the grandson of Pigault Lebrun, and from him inherited a bent for literature. In 1844 he wrote a two-act play in verse, (La Cigue, *which enjoyed considerable success at the Odeon. Thereafter his career was decided and at regular intervals for many years, alone or in collaboration with others — Sandeau, La- biche, Foussier — plays were produced which raised the drama to a realistic life and to a truer morality than it had known since Moliere. (L'Aventuriere) (1868) was the first o^ his im¬ portant works and in it there is apparent a deviation from the romantic models of the earlier years of the century. (Gabrielle) (1849) champions the average conventional. (Diane* (1852) and (La pierre de touche) (1853) show a tendency to get away from the sensationalism of the romanticists. (Le fils de Giboyer) (1862) was regarded as an attack on the Cler¬ ical party and was only brought out by the direct intervention of the Emperor. With Sandeau he produced (Le gendre de M. Poir¬ ier * (1854), thought by many the greatest

French drama of the 19th century. (Ceinture doree' (1855) was a satire on the conven¬ tional marriage and was the forerunner of a series of social satires of which (Les effrontes *(1861) was perhaps the most noteworthy. (Le mariage d'Olympe* (1855) shows the cour¬ tesan as she is and without the glamour with which she was surrounded by the romanticists. In JLes lionnes pauvres) (1858) appears Augier's greatest female character, Seraphine. <Maitre Guerin *(1864) presents a fine study of the tricky country lawyer. In 1873 appeared <Jean de Thommeray.* While patriotic it is a trifle prosaic and its success was medi¬ ocre. (Madame Caverlet *(1876) deals with divorce and (Les Fourchambault* (1879) is also a problem play. Augier was not a mere preacher, but a moralist, with a sane outlook on life. His dramas are not dependent merely on plot for their interest, but rather in the de¬ lineation and evolution of the characters intro¬ duced. See Lf. Gendre de M. Poirier; Le Fils de Gtboyer. Consult Doumic, (Portraits d' ecrivains* (Paris 1894) ; Gaillard, (Emile Au¬ gier et la comedie sociale) (Paris 1910) ; La-

cour, ‘Trois theatres* (ib. 1880) ; Matthews, (French Dramatists) (New York 1881) ; Pari- got, (Emile Augier) (Paris 1890) ; Wells, (Modern French Literature * (Boston 1899).

AUGITE. See Pyroxene.

AUGSBURG, owgz'burg, Bavaria, city and capital of the government districts of Suabia and Neuberg, 35 miles northwest of Munich. It is situated on a point of land formed by the junction of the Lech and the Wertach. The town has a mediaeval appear¬ ance, there being very many buildings extant of the period from the 15th to the 17th centuries. It contains several churches, rich in architectural beauty and in artistic asso¬ ciations. These churches are rich in metal¬ work, stained glass windows, etc., the cathedral containing several altar pieces by Holbein the Elder. The Rathaus is notable for its Golden Hall. Other noteworthy buildings are the former palace of the prince-bishops, the royal picture gallery, the city library, etc. Augsburg has large cotton and woolen mills, machine shops, and manufactures acetylene gas, chemicals, paper, jewelry and leather. The city was founded by Augustus in 12 b.c. The Huns devastated it in the 5th century, Charlemagne in the 8th and Welf in the 11th. In 1276 it received its freedom and at the time of the Reformation was one of the most flourish¬ ing cities of Europe. Its trade at this time was very great and a great number of merchant princes were numbered among its citizens. It also became distinguished as an art centre, and was represented in this field by the Holbeins, Altdorfer and Burgkmair. Several Diets were held here and it was prominent in the Reforma¬ tion. Much of its prosperity was destroyed dur¬ ing the Thirty Years’ War. It lost its freedom with the fall of the German empire in 1806, and was joined to Bavaria. Pop. (1910) 102,487. Consult <Die Chroniken der schwabis- chen Stadte, Augsburg) (Leipzig 1896) ; Lewis (<Roman Antiquities of Augsburg and Ratis- bon** (in Archceological Journal, Vol. XLVIII, London 1891) ; Werner, (Geschichte der Stadt Augsburg) (Augsburg 1900).

AUGSBURG, League of, a league con¬ cluded at Augsburg, 9 July 1686, for the main¬ tenance of the treaties of Munster and Nimeguen, and the truce of Ratisbon, and to resist the encroachments of France. The con¬ tracting parties were the Emperor Leopold I, the Kings of Spain and Sweden, the Electors of Saxony and Bavaria, and the circles of Suabia, Franconia, upper Saxony and Bavaria.

AUGSBURG CONFESSION, a docu¬ ment adopted by the Protestants in 1530 as a declaration of faith. Charles V, on his acces¬ sion to the throne of Germany (1520), found his new dominion the theatre of religious dis¬ sensions. The insurrection in Castile, and the war with France and Italy, called Charles into Spain, diverting his attention from the Lutheran schism. The Diet of Spires (1529) had issued a decree for the purpose of conciliating the Lutherans to the proposed Roman Catholic re¬ form, and uniting them against the Sacra- mentarians and Anabaptists. At this juncture, Charles returned, and the German princes and estates were summoned to convene in Diet at Augsburg in June. The summons was con¬ ciliatory, and called for aid against the Turks,

making no reference to the religious difficulties of the kingdom, further than to promise at no distinct time a speedy adjustment of them. On the 25th of the month, a confession, pre¬ pared by Melanchthon, and approved by Luther, was presented and read by Dr. Christian Bayer in the Diet. This confession is said to have been prepared on the basis of the Swabach and Torgau articles, although these had been drawn up (1528-29) in the attempt to unite with the Zwinglians, and the object of the present confession was to become reconciled to the Roman Catholic reform party. A copy of the confession, in German and Latin, was de¬ livered to Charles. Two days after the reading of the confession, it was delivered to the Roman Catholic theologians for a reply. The reply was read in the Diet on 3 August following, and called forth from Melanchthon a defense (Apo¬ logia Confessionis) , which was afterward en¬ larged and published in Latin, and then in German. The object of the Augsburg Confes¬ sion was not attained, and the edict of the Emperor (22 September) gave the Lutherans until the following April to bring themselves into conformity with the requirements of the Church, and required their co-operation with the throne against the Zwinglians and Anabaptists. The Augsburg confession and Melanchthon's defense were generally cir¬ culated in western Europe, and became a sort of rallying point among the reformers. Con¬ sult Jacobs, (The Book of Concord) (Phila¬ delphia 1882)and Schaff (Creeds of Christen- dom) (New York 1884).

AUGSBURG SEMINARY, an educa¬ tional institution in Minneapolis, Minn., under the auspices of the Lutheran Church. It was organized in 1869 and reported in 1915 : Profes¬ sors, 9; students, 154; grounds and buildings valued at $120,000; income, $19,000; graduates, 393 from theological department; 247 from college.

AUGUR, Christopher Colon, American military officer: b. New York,

10 July 1821; d. Washington, 16 Jan. 1898. He was graduated at the United States Military Academy in 1843; became major of the 13th United States Infantry in 1861 ; colonel of the 12th Infantry in 1866; brigadier-general, United States army, 4 March 1869; major-general in the volunteer service in 1862 ; mustered out of that service in 1866; and was retired in the regular army, 16 July 1885. He commanded a division in the battle of Cedar Mountain, being severely wounded. Consult Augur, E. P., (The Augur Family) (Middletown 1904).

AUGUR, Hezekiah, American sculptor: b. New Haven, Conn., 21 Feb. 1791 ; d. 10 Jan. 1858. He was the son of a carpenter and early developed a talent for wood carving. He be¬ came successively a cobbler, grocery clerk and merchant, ˆephthah and His Daughter,) in the Trumbull gallery at Yale, is the most im¬ portant of his works. In addition to his skill as a sculptor, he possessed much mechanical genius, inventing among other machines one for carving wood.

AUGURIES AND AUSPICES, the re¬ plies of the augurs, a celebrated college of diviners in ancient Rome. Their function was to determine, reveal and interpret the will of the gods towards men in regard to some

definite matter or course of action already determined or in progress. This they deter¬ mined from the occurrence of certain signs, connected with thunder and lightning; the flight and cries of birds; the feeding of the sacred chickens ; the action of certain quadrupeds or serpents ; accidents, such as spilling the salt, stumbling of a horse, etc. The answers of the augurs and the signs were called auguries ; bird-predictions were called auspices. Nothing was undertaken without the advice of the augurs, and by the words (<alio die® (<(meet on another day®), they could dissolve the assembly of the people and annul decrees passed at the meet¬ ing. Taking the auspices in regard to state action gradually degenerated into a mere religious fiction, used by the ruling powers to promote or thwart action, according to their desires. Consult Bouche-Leclerq, (Histoire de la divination dans l'antiquite* (Paris 1881-82) ; and articles <(Augures® and (<Auspicium® in Pauly- Waissow, (Realencyklopadie der klas-sischen AltertumswissenschafD (Stuttgart

1896).

AUGURS. See Auguries and Auspices.

AUGUST, ou'gust, the name of many princes of the German principalities: (1) August Wilhelm, Prince of Prussia, brother of Frederick the Great and general in the Prus¬ sian army: b. Berlin, 9 Aug. 1722; d. 12 June 1758. He took an active part in the Silesian campaign, and distinguished himself at the battle of Hohenfriedberg (in June 1745), but owing to the fatal retreat of Zittau, in 1756, he incurred the displeasure of his brother, and withdrew from the army. This conflict between the two brothers led to a correspondence, which was published in 1769. (2) August Emil

Leopold, Duke of Saxe-Gotha and Altenburg, successor to the throne, 20 April 1804. He was twice married, and the first marriage left him issue, one daughter, who became the reigning Duchess of Saxe-Coburg, and died in 1822. By the second marriage he had no children, and on his death he was succeeded on the throne by his brother, Frederick IV, with whose decease, 11 Feb. 1825, the line of Saxe-Gotha became extinct. Duke August Emil Leopold was a favorite of Napoleon, and his duchy enjoyed perfect immunity from the burdens of French invasions and French wars. He was a man of taste and considerable literary talent. (3) August Friedrich Wilhelm Hein¬ rich, Prince of Prussia: b. 19 Sept. 1790; d. 19 July 1843, in Bromberg; the son of Prince August Ferdinand, the brother of Frederick the Great, who died in 1813. He was considered one of the richest men in Prussia, and left various children by morganatic marriages. He took an active part in the campaign against Napoleon in 1806, by whom he was taken prisoner, and de¬ tained in Paris until after the Peace of Tilsit. On his return to Prussia in 1813, he resumed his duties in the Prussian army, fought at Dres¬ den, Ulm and Leipzig, distinguished himself during the campaign of 1814, on various occa¬ sions, and bore throughout his life the character of a gallant soldier and an upright man. (4) August Paul Friedrich. Grand Duke of Olden¬ burg: b. 1783; d. 27 Feb. 1853; mounted the throne 21 May 1829, under the title of grand duke, which had been conferred upon his fam¬ ily by the Congress of Vienna; but of which

his father had never availed himself. When Oldenburg was invaded by the French, in 1811, he accompanied his father to Russia, where his younger brother (b. 1784, d. 1812) was married to the Grand Duchess Catharine. He distin¬ guished himself in the Russian War, and in 1813 was appointed governor of Revel. His reign, after his return to Oldenburg, was marked by political and material progress. In 1830 he

con¬ cluded a treaty with Prussia for the annexation of Birkenfeld to the Prussian-Hessian Zollve- rein, and a reciprocal treaty of navigation. In 1836 he prevailed upon Hanover and Bruns¬ wick to make satisfactory arrangements for the regulation of excise duties. In 1831 he laid the foundation for a constitution of Oldenburg, which was ratified in 1848, and which, although modified in 1852, still secures much civil and re¬ ligious freedom to the people. In 1817 he married the Princess Adelaide of Anhalt-Bern- burg, who died in 1820, leaving him two daugh¬ ters, Frederica and Amalie; the latter, in 1830, married King Otho of Greece. In 1825 he mar¬ ried the sister of his first wife, Ida, who died in 1828, having borne him a son. In 1831 he mar¬ ried, for the third time, Cecilia, youngest daugh¬ ter of the former King of Sweden, Gustavus Adolphus IV, who died in 1844, leaving a son. He was succeeded by his first son, Nicholas Frederick Peter, Grand Duke of Oldenburg.

AUGUST, the eighth month of our year, named by the Roman Emperor Augustus after himself, being associated with several of his vic¬ tories and other fortunate events. Before this it was called Sextilis or the sixth month (count¬ ing from March). July had been named for Julius Caesar, and the Senate, to gratify Augus¬ tus, decreed that August should have equal length, taking a day from February.

AUGUSTA, ou'giis-te, a title first given to his wife Livia, after the death of Augustus, according to the will of the Emperor. It was afterward conferred by Claudius on Agrippina (51 a.d.), and by Nero on his wife, Poppaea, as well as her daughter (64 a.d.). Eventually it became a common title of the mother, wife, sis¬ ter or daughter of an emperor.

AUGUSTA, Marie Luise Katharina, a

Queen of Prussia, and Empress of Germany: b. 1811; d. 1890. She was the daughter of Charles Frederick, Grand Duke of Saxe- Weimar, and was educated at the Weimar court where she made the acquaintance of Goethe. In 1829 she married William, then Crown Prince of Prussia, afterward Emperor of Germany.

AUGUSTA VICTORIA, former German

Empress, Queen of Prussia, eldest daughter of Frederick, Duke of Schleswig-Holstein-Son- derburg-Augustenburg and of Princess Adel- heid of Hohenlohe-Langenburg : b. castle of Dolzig, 28 Oct. 1858; d. Doom, Holland, 11 April 1921. On 27 Feb. 1881 she married Prince Wil¬ liam of Prussia, afterward William II of Ger¬ many. She was the

author of one book, <Erin- nerungsb latter an die PalastinafahrD (1898), which is an account of her observations during a journey through Palestine in 1898. Consult E. Evers' (Auguste Viktoria) (3d ed., 1897).

AUGUSTA, Ga., the fourth city of the State in population and wealth. It is the capital of Richmond County, and at the head of naviga-

tion on the Savannah River, 231 miles by water above its mouth. It is 132 miles by rail from Savannah, 1 7 1 miles east of Atlanta and 137 miles northwest of Charleston. There is an electric line to Aiken, which eventually is to be extended to Columbia. Two foot bridges and two railroad bridges span the river, which is about 300 yards wide. It lies about 150 feet above sea-level, has an even temperature and dry, invigorating atmosphere very different from most riverside cities, being indeed a well- known health resort for pulmonary invalids, particularly its suburb Summerville, on the Sand Hills 400 feet above it. It is laid out in broad rectangular streets, many of them beautifully shaded, and with a good electric car service; and has several parks, of which the chief are May Park of about 11 acres and Allen Park of 19 acres. The courthouse is in a park containing a granite monument to the Georgia signers of the Declaration of In¬ dependence; while on Broad street, the prin¬ cipal thoroughfare of the city, is a noble mon¬ ument to the Confederate dead with marble statues of Generals Lee, Jackson, Walker and Cobb, and crowned with one of a private sol¬ dier, heroic size. The cemetery and fair grounds are also suburban attractions.

Manufactures. — The power is chiefly de¬ rived from a dam across the river seven miles above the city (enlarged from a smaller one in 1875, at a cost of about $1,000,000), 150 feet wide at top, 106 at bottom and 11 feet deep; turning a part of the river into a canal afford¬ ing 14,000 horse-power, sold to industries at $5.50 per horse-power per annum, with a work¬ ing day of 16 hours. Also 31,000 additional horse-power is derived from an electric power plant recently completed costing $2,250,000. To protect the city from overflows from the river a levee was built in 1915, upon which about $3,000,000 was expended. A barge line has been established for the carriage of freight by the river, thus giving an all-water route to and from Eastern markets, together with the lowest freight rate. Augusta is one of the chief seats of cotton manufacture in the South. Eli

Whitney's cotton gin was invented on a farm on the outskirts, and the first working gin was set up in the city. There are 13 cotton mills with offices in the city, having a capital of nearly $6,000,000, operating 329,740 spindles, and 19,360 looms and employing some 8,000 hands. Of over $10,000,000 capital invested in Georgia cotton manufacturing, fully a third is in Augusta. There are also six large cotton seed oil mills and a bleachery. Of other manufactures, the chief are of lumber and wood products, bricks and tile drain pipe from the fine clays in the vicinity, flour, and iron goods. There are 371 manufacturing estab¬ lishments, with $11,066,000 capital and 5,073 employees, paying $2,153,000 for wages and $6,602,000 for materials, and having a total output valued at $10,456,000. The increase within the past few years, however, has been very large; and it is proposed to utilize the river still more for electric power, the present manufactories practically exhausting the direct water power. The river at Augusta is from five to seven feet deep the year round, and fair-sized passenger and freight steamers make . semi¬ weekly trips to Savannah. Augusta is the largest inland cotton market in the South; and

it has also a large shipping trade in lumber, fruit and vegetables. Its annual trade exceeds $80,000,000, its cotton receipts amounting to 550,000 bales. The water supply is derived from the Savannah River and is unlimited. The city abounds in educational and charitable institutions. Most notable among the former is the Georgia Medical College, a branch of the State University at Athens ; there are also Richmond Academy, which has recently been put tinder the care of the State University, Saint Mary's and Sacred Heart (Roman Catholic) academies, Paine's Institute for Colored Students, and high schools for white and colored youth. There are two public li¬ braries, an orphan asylum, two public hospitals (white and colored), a juvenile reformatory, and the Louise King Home. A United States arsenal, a Masonic temple, an Odd Fellows' hall, a Chamber of Commerce and a cotton exchange are also prominent buildings. The city has three daily and several weekly news¬ papers. The assessed property valuation ex¬ ceeds $26,000,000, and the bonded debt is about $2,000,000. There are two national and several State banks of which the total capital surplus and undivided profits aggregate about $5,000,- 000; total deposits about $10,000,000. Augusta is on the line of many railroads, among them the Central of Georgia, the Charleston & West Carolina, the South Carolina & Georgia, the Southern, etc. Its original charter was ob¬ tained in 1798, and revised 1882; the mayor is elected for three years, and a city council, consisting of 18 members, is also elected for three years, one-third being elected each year. The board

of education is elected by the people. All other offices are appointive by the council, save that the mayor appoints the super¬ intendent of canal and waterworks, and of streets and drains

Population (1920) 52,548. It suffers in

the census from having suburbs, North Au¬ gusta, across the river in South Carolina ; Summerville, and others not counted in ; and claims about 75,000.

History. — Augusta was founded in 1736 by Gen. James Edward Oglethorpe (q.v.), the founder of Georgia, and named after the Prin¬ cess Augusta of Saxony, who married Freder¬ ick, Prince of Wales, in that year, and became the mother of George III. All through its early period it was the chief trading station in Georgia, and a very important military post ; especially notable as the seat of conferences and treaties with the Southern Indians, who under the treaties of 1763 and 1773 ceded large tracts of land to the whites ; the latter, how¬ ever, had to occupy much of it at the same risk of Indian warfare as before. In 1778 it was made the State capital, and remained such till 1798. The building of the Georgia Railroad in the middle of the 19th century was a heavy blow to its prosperity for a time, carrying trade over now routes ; but its natural advan¬ tages enabled it to recover itself.

The Southern Confederacy's powder works were located at Augusta, and their tall chim¬ ney still stands to mark the site.

AUGUSTA, Maine, city, county-seat of Kennebec County and capital of the State, on the Kennebec River, 40 miles above its mouth, at the head of tidal navigation, and on the Maine Central Railroad, 63 miles northeast of

Portland. It is situated on both sides of the Kennebec, mainly on the right or west bank, and some portion of it, including much of the residential section, occupies an elevation con¬ siderably above the river, along which the principal business part of the city extends. The Augusta, Winthrop & Gardiner Electric Railway connects the city with neighboring places, and its water communications afford excellent facilities for travel and trade. The State Capitol is a handsome granite building, for which the stone was quarried from the surrounding hills. It stands on high ground overlooking a wide extent of pleasant

country. Among other noteworthy buildings are those of the Maine Insane Hospital, the City Hos¬ pital, the public library, the county buildings and the United States arsenal. The churches include those of the Congregationalists, Epis¬ copalians, Free Baptists, Colonist Baptists, Christians, Universalists, Unitarians, Metho¬ dists, Roman Catholics and the People's Church. The public schools include all grades from the primary to the high school. In the capitol are the State library, a notable collec¬ tion of portraits of American statesmen, and in the rotunda, an impressive array of the Civil War battle flags of Maine soldiers. In the principal park is a soldiers and sailors' monument. Augusta, by reason of its rail¬ road and river facilities, is the trade centre of a large region, and the water-power furnished by the Kennebec, across which, just above the city, extends a dam nearly 1,000 feet in length affords abundant means for manufacturing. The cotton factories here employ about 1,100 persons; shoe manufactory, 300; pulp mill, 250; lumber mill, 100; sash and blind factory, 75; and besides various smaller establishments the city has publishing houses in which some 400 persons are employed. The United States census of manufactures for 1914 reported 39 establishments of factory grade, employing 2,379 persons, of whom 2,231 were wage earners, receiving $1,071,000 annually in wages. The aggregate capital invested was $5,069,000, and the year's output was valued at $4,918,000: of this, $1,938,000 was the value added by man¬ ufacture. There are two national banks in the city, with a combined capital of $350,000, a trust company having a capital of $100,000, and two savings banks. The deposits of these institutions aggregate $11,000,000. The city is governed by a mayor and a city council, a body consisting of boards of aldermen and common council, elected by the people. Augusta was first permanently settled in 1754 by colonists from Massachusetts ; was incorporated under the name of Hallowed in 1771 ; and upon the setting off of Hallowed in 1797 became a sepa¬ rate town. In 1831 it became the capital of the State, and has been the scene of many im¬ portant political events. It received a city charter in 1849. Its population in 1900 was 11,683; in 1910 it was 13,211; in 1914, 14,000. The employees of the cotton factories are mostly French Canadians, the other inhabit¬ ants chiefly natives. Consult North, (History of Augusta) (1870).

AUGUSTA, the name of many ancient European towns, as Augusta Trevirorum, now Treves; Augusta Taurinorum, now Turin; Augusta Vindelicorum, now Augsburg, etc.

AUGUSTA, a city of Sicily. See Agosta.

AUGUSTA HISTORIA, a series of Ro¬ man biographies of the

emperors from the ac¬ cession of Hadrian to the death of Carinus, the predecessor of Diocletian, a period cover¬ ing 167 years. The writers included in this collection are six in number, namely, .ZElius Spartianus, Julius Capitolinus, .TElius Lamprid- ius, Vulcatius Gallicanus, Trebellius Pollio, and Flavius Vopiscus.

AUGUSTALIA (Augustales ludi), games that were celebrated, not only in Rome, but wherever Roman authority was maintained, in honor of Emperor Augustus. They took place on 23 September, the birthday of Au¬ gustus, and on 1 August and during a period from 3 to 12 October.

AUGUSTAN AGE, the Latin literary epoch of the reign of the Emperor Augustus Caesar. During this period Horace, Ovid, Vir¬ gil, Tibullus, and other writers flourished; also great patrons of literature like Maecenas. The poets of the Augustan Age are noted for their pure Latinity. The name is applied in England to the reign of Queen Anne (1702- 14). By far its foremost name is Isaac New¬ ton, while of commanders is first, John Churchill (Duke of Marlborough). The poets were Congreve, Garth, Gay, Parnell, Philips, Pope, Prior, Rowe and Swift. The other authors were Addison, Barnes, George Bull, Anthony Collins, Jeremy Collier, Roger Cotes, Defoe, Dodwell, Flamsteed, George Hickes, Dr. John Jeffery, John Norris, Ray, South, Steele, etc. Wren, Archibald Pitcairne and Sir Cloudesley Shovel also lived in this reign.

AUGUSTANA COLLEGE AND THEO¬ LOGICAL SEMINARY, institution in Rock Island, Ill., organized at Chicago in 1860 un¬ der the auspices of the Lutheran Church; re¬ moved to Paxton, Ill., in 1863, and to its pres¬ ent site in 1875. It is coeducational except in the theological department. In 1917 it had over 40 professors; 630 students; volumes in the library, 20,000.

AUGUSTINE, Saint (Aurelius Augus¬ tinus), one of the most renowned fathers of the Christian Church: b. Tagaste, in Numidia, 13 Nov. 354; d. Hippo, north Africa, 28 Aug. 430. His father, Patricius, was a pagan, his mother, Monica, a Christian. He has re¬ lated his own early life in the work to which he gave the title of Confessions. *His mother instructed him in Christianity, but for many years this faith had little influence on his life. In youth and early manhood he was addicted to excessive sensuality, which he bitterly re¬ gretted in after life; when quite young he became father of an illegitimate son. He was intended for the profesion of rhetori¬ cian, and was sent to Carthage to study with this object in view. Cicero's work, 'Hortensius,* which has not come down to our times first led him to speculative studies, and he now became a

member of the sect of the Manichteans. He was one of their dis¬ ciples for nine years but after having obtained a full knowledge of their doctrine, he found it unsatisfactory and left them. In '383 he left Africa for Rome, and after a short stay there proceeded to Milan, where he was in¬ vited as a teacher of rhetoric. Saint Ambrose

was bishop of this city, and his eloquent dis¬ courses, combined with the study of the Scrip¬ tures, converted Augustine to the orthodox faith, and wrought an entire change in his life and character. His conversion appears to have taken place in 386. He now retired into solitude, and prepared himself for baptism, which he received in the 33d year of his life, together with his son Adeodatus, from the hands of Ambrose, his mother being then with him. Returning to Africa, he sold his estate, and gave the proceeds to the poor, retaining only enough to support him in a moderate manner. For three years he lived a retired life, devoting himself to religious duties, and to the composition of several treatises. Chanc¬ ing on one occasion to be present in the church at Hippo, the bishop, who was a very old man, signified a desire to consecrate a priest to assist and succeed him. At the desire of the people Augustine entered upon the holy office, preached with extraordinary success, and in a few years became bishop of Hippo. The re¬ mainder of his life was occupied with his ecclesiastical labors, and with various controver¬ sies in which he warmly engaged, such as those with the Donatists, the Manichaeans, and more especially the Pelagians, concerning the doc¬ trines of free-will, grace and predestination. Augustine maintained the necessity of divine grace in determining man's moral acts to sal¬ vation, and he supported the doctrine of pre¬ destination, including election and reprobation, but always allowing for free-will and for the merit of the individual. His authority has al¬ ways been very influential in the Roman Cath¬ olic Church, and his view upon any doctrinal matter has at all times carried great weight and is constantly cited in controverted ques¬ tions. He died at Hippo, while the town was besieged by the Vandals. There have been more learned fathers of the Church, but none have ever more powerfully touched the human heart, and warmed it toward religion. Painters have, therefore, given him for a symbol a flaming heart. His writings (which are in Latin) are very numerous. The most cele¬ brated are his (Confessions) (belonging to the year 397), his 'De Civitate Dei) (On the City of God), a work on the Christian Church, his treatise on the Trinity, 'Christian Doctrine' ; 'Nature and Graced (Grace and Free-Will'; 'Immortality of

the Soul,' and his (Letters.' ' His works have been published at Paris in 22 vol¬ umes, and an English translation in 15 volumes has appeared at Edinburgh, edited by Dr.. Mar¬ cus Dods. The standard edition is that issued by the Vienna Academy in its 'Corpus Scrip- torum Ecclesiasticorum Latinorum.' Most of Augustine's important works may be found in Schaff, P., 'Nicene and Post-Nicene Fathers' (New York 1888). Consult Smith and Wace, (Dictionary of Christian Biography' (London 1887) ; Neander, Church History' ; Milman, 'Latin Christianity' ; Farrar, 'Lives of the Fathers' ; Harnack, (History of Dogma,' Eng. trans. (Vol. V, Boston 1898) ; Cunningham, 'Saint Austin and his Place in the History of Christian Thought' (London 1885); Allen, A. V. G., Continuity of Christian Thought' (Boston 1894), an unfavorable view of Augus¬ tine, etc. Two monastic bodies, the Augustin- ian Canons, or Black Canons, and the Augns- t'.nian Hermits (q.v.), claim to derive their

origin from Saint Augustine. There are sev¬ eral translations of 'The Confessions,' e.g., by W. G. T. Shedd (Andover 1860) and C. Bigg (London 1900). See also Hitchcock, F. R. M., 'Saint Augustine's Treatise on the City of God' (London 1900).

AUGUSTINE, or AUSTIN, Saint, the first archbishop of Canterbury: d. 26 May 604. While prior of the Benedictine monastery of Saint Andrew at Rome he was selected by Pope Gregory I, together with other monks, to con¬ vert the Anglo-Saxons to Christianity, and establish the authority of the Roman See in. Britain. Arriving at Aix-en-Provenqe, they heard various reports about the savage nature of the Britons, and hesitated before proceed¬ ing further. Augustine went to Rome to seek permission to turn back, but Pope Gregory prevailed on him to continue, and asked the Frankish clergy to assist the enterprise. There¬ fore in the spring of 597 the missionaries landed on the Island of Thanet and were kindly received by Ethelbert, King of Kent, whose wife Bertha was already a Christian. The conversion of the King speedily followed, contributing greatly to the success of Augus¬ tine's work; large numbers of persons were converted and baptized, and it was soon mani¬ fest that a new influence for good had come into the lives of the Anglo-Saxons. In ac¬ knowledgment of his success, the Pope di¬ rected Augustine in 597 to go to Arles, where he was consecrated archbishop of Canterbury and metropolitan of England. On his return he at once informed the Pope of his success, sending a presbyter and a monk to Rome for that purpose and also to obtain instructions concerning other questions with regard to the propagating of the faith. The" answers of Gregory to the archbishop's

inquiries are fine examples of tact, good sense and judgment in dealing with the problems confronting the early missionaries, and instead of destroying the heathen temples they were converted into Christian churches. Saint Augustine was a zealous missionary of the Church and labored with untiring energy to extend the authority of the Church and to convert the ancient Brit¬ ons, whom the English had driven into the mountains of Wales. In this, however, he was only partially successful, some of the British bishops refusing to acknowledge his authority and to unite with the English Church. Augustine died in Canterbury perhaps in 604, though the year is uncertain and is placed by some as late as 613, and his body was removed to the Cathedral of Canterbury in 1091. The 1300th anniversary of Augustine's landing was celebrated in 1897, when several biographical volumes appeared — by E. W. Benson, Father Brou, S. J., G. F. Browne and W. E. Collins. Consult also Bede, 'Historia Ecclesiastica Gentis Anglorum' ; Cooke, J. A., 'Early Churches in Great Britain Prior to the Coming of Augustine' (London 1897) ; Mason, 'The Mission of Saint Augustine to England' (Cambridge 1897) ; and Stanley, 'Historical Memorials of Canterbury' (New York 1892).

AUGUSTINIANISM, the svstem of phi¬ losophy and theology taught by Saint Augus¬ tine. In order to reach a just estimate of the teachings of Augustine, we must remember that we are not dealing with a philosopher simply, or with a theologian simply, but with

one whose nature combined in a marked de¬ gree the philosophical and theological strains together. He was both philosopher and theo¬ logian. These elements are so mixed in him at times as to reciprocally reinforce one another, but again so disparate as to cause irreconcil¬ able inconsistencies and bold contradictions. There is a most excellent analysis of this ex¬ ceedingly complex nature by Teuffel in his (History of Roman Literature, } remarkable alike for its comprehensiveness and brevity. ((Augustine combined in his character qualities seemingly opposite : an abundant imagination, and penetrating intellectual vigor, a passion¬ ate want of regard and affectionate tender¬ ness, a tender heart and zealotism, a blind be¬ lief in superior authority and originality of thought, zeal for unity of the Church and in¬ dividual piety, romanticism and scholasticism, mysticism and sophistry, poetical talent and philosophical genius, rhetorical pathos and grammatical pedantry — himself a pyschological mystery.® With this portrait of his per¬ sonality before us, let us

examine his teachings. For him, the source of all truth is to be found in the interpretation of the inner experience. His philosophy is primarily anthropocentric. In consciousness lies the assurance of the real¬ ity of one's own being. This is the earnest and the warrant of all reality. Without this central and elemental knowledge all other knowledge would be vague and illusory. This assurance is given even in the very act of questioning it ; for, as Augustine insists, the simple fact that I am conscious of doubting, even the doubting of my own reality, is in it¬ self an indication that I the doubter am. Man cannot escape himself. Such an analysis of the implications of self-consciousness forms a striking anticipation of Descartes' famous Cogito ergo sum.

With the reality of human personality firmly established upon a basis which even the most searching scepticism is unable to shake, but on the contrary the rather confirms, Augustine proceeds through a profound analysis of the human reason to disclose abundant intimations of a divine reason, and therefore of a divine being. For in his subtle examination of the processes of reason, he points out that these processes are ever working toward one and the same end, — the constructing of a body of knowledge consisting of truths universally valid, that is truths which hold not merely for the individual but which necessarily hold for all individuals, under all circumstances and at all times. They become, moreover, the norm or standard for all our thinking and their sway embraces the complete range of all hu¬ man activity. These truths are so universal, so complete, so commanding as to indicate a one¬ ness of origin which can be nothing less than that of an eternal mind. Moreover, the eter¬ nal mind must be an eternal personality. The universal truths, therefore, which lie at the basis of all thought, of all being, of all desire, and all activity are according to Augustine ideas in God. In regarding the Absolute as not merely the sum total and unification of all truth, the unum, verum bonum, but also a liv¬ ing personality, the divine Logos, we recog¬ nize the marks of the religious teacher, and in this respect Augustinianism is to be re¬ garded as a significant advance beyond the

doctrines of Neo-Platonism. From this expo¬ sition, it should not be inferred, however, that in the Augustinian psychology, the primary, or the sole, basis of our conscious life is knowl¬ edge. On the contrary it is quite evident throughout the works of Augustine that he exalts the will above knowledge. He finds in consciousness three elements, memoria, intel- lectus, voluntas. Of these memoria is equiva¬ lent to a reproducible idea (Vorstellung) , an idea which, moreover, carries with it the war¬ rant of the reality which underlies it as its ground; intellectus is the judgment; and voluntas of course, the will. The three

form a psychological trinity corresponding to the trinity which is manifested in the unity of the divine nature. Both in God and man, the will is supreme. O nines nihil aliud quam voluntates sunt.

Certain difficulties emerge at this point in the exposition of the Augustinian system ow¬ ing to the shifting of the point of view. The philosopher gives way to the theologian. Au¬ gustine's philosophy is essentially anthropo¬ centric ; his theology, theocentric. And in dis¬ cussing the relations which obtain between God and man Augustine naturally subordi¬ nates the human to the divine, so much so indeed that the Augustinian system is severely criticised because, as it is alleged, it leads logically to a pantheism which wripes out the individuality and responsibility of man. For Augustine insists that to appreciate divine truth and the will of God for man there is need of an inner spiritual illumination, and that such an illumination comes only to the soul in which faith resides, and that faith is the gift of divine grace. Faith, therefore, must precede knowdedge, that is, knowledge of things divine and knowledge of things as they are. Insight may be regarded as the fruitage, but faith is the root of knowledge. There is a grave difficulty at this point in reconciling such a doctrine with Augustine's fundamental posi¬ tion wffiich puts supreme emphasis upon the dignity and worth of man's inner nature, and the trustworthiness of that inner guiding light. It can only be said by way of explanation that in the one the theologian, and in the other, the philosopher, speaks.

Moreover, in this view of the human con¬ sciousness the primacv of the will is in a large measure denied by the insistence that man is wholly dependent upon divine grace in order to exercise his will aright. He alone is free, says Augustine, whose will has been touched by the divine will, and whose desires and activities are found wholly in accord with the will of God. The natural, man is not free unless emanci¬ pated by divine grace ; for Adam, the represen¬ tative of humanity, the federal head of the race, abused his natural freedom of will and in his fall has left as an inheritance' to the race the tendency to sin. And the most sig¬ nificant consequence of sin is the bondage of the will, which divine grace alone can over¬ come. Augustine, therefore, seems to solve the problem of free will and predestination by denying to man a real freedom. He indulges in many subtle distinctions as to the various kinds of grace. There is, for instance, the pre- venient grace, also the supporting grace, ac¬ tive grace, and grace bestowing the gift of perseverance which seals all previous effects.

AUGUSTINIANS

No distinction, however, is drawn which re¬ lieves the system from the criticism already mentioned of minimizing the autonomy of the human will.

This position of Augustine naturally raises the question as to how the evil in the world can be reconciled with the idea of divine power and divine goodness. For if God alone is free, He alone is responsible ; and man should not be held accountable for that which he unaided is unable to prevent. Such a criticism Augus¬ tine meets by the statement that the evil in the world is after all not a real evil ; it is not a causa efficiens, but merely a causa deficiens , in fact only an incausale. Such an explana¬ tion, however, is not satisfactory and does not squarely meet the difficulty of the problem which the common experience of humanity all too unhappily emphasizes.

Augustine's type of mind is essentially that of a great systematizer of doctrine. He could rest content with no form of knowledge unless it could be reduced to a schema in which part fitted to part in an exact and inflexible manner. Augustine's system has been criticized for this very reason that its lines are hard and fast, yielding at no point the full rigor of its inex¬ orable doctrines. But while in a certain sense such criticism is justified, there was, in addi¬ tion to this pronounced synoptical tendency of thought, an equally profound strain of senti¬ ment and feeling. Augustine was essentially human, and wont to be moved by the passions and aspirations common to man. Within the very body of this system of doctrine, and its closely concatenated dogmas, it is possible to discover a deep underlying current of mysti¬ cism, which may be traced no doubt to its source in Neo-Platonism, — a mysticism mani¬ festing itself in tha-t compulsion of the soul, to long for communion with God, and to behold Him face to face. It is this intensely human strain, this mystical element, which relieves the Augustinian system as a system from its more severe and sombre features. The great system builder after all subordinates the system to that which is the ground of the system. Not in the processes of reason, but in a direct and immediate consciousness of God, does he find the ultimate certitude. Nothing can more beautifully or more adequately express this mystical strain in Augustine's nature than those words which embody both a philosophy and a creed: (<Thou hast made me for thyself and my heart is restless until it finds rest in thee.®

Bibliography.— Heurt, (Problems of the Age With Studies in Saint Augustine on Kindred Topics> (1903); McCabe, (Saint Augustine and His Age} (1903); Schaff, < Saint Augustine, Library of the Nicene and

Post-Nicene Fathers) (Vol. I, pp. 1-25, New York 1888) ; Donier, (Augustinus) (Berlin 1872) ; Lingard, (Antiquities of the Anglo- Saxon Church > (2d ed., 1902).

John Grier Hibben, President of Princeton University.

AUGUSTINIANS. The name of about 60 different monastic bodies in the Roman Catholic Church, all of which deduce their community rules from the sermons or writings of Saint Augustine, bishop of Hippo. The chief of these were the “Hermits of Saint Au¬ gustine,® or Begging Hermits; the ((Friars Preachers,® or Dominicans; the “Knight Tem¬

plars,® the Premonstratensians and the “Canons Regular.®

Hermits of Saint Augustine (calced), brotherhood of churchmen, devoted to the spread throughout Christendom of the prin¬ ciples of the higher life, of religion as well as earthly science, and searchers, too, after peace of the spirit, established in the 4th cen¬ tury at Tagaste in Africa. Up to the 13th cen¬ tury Augustinians were engaged mainly in the practices of ascetic life, a course of seclu¬ sion, or retirement, from the bustle and troubles of worldly affairs in trade, politics, commerce. As hermits, at first they lived, some alone in their cells in out-of-the-way places in forest and mountain, others in community- groups outside of towns. Here their life was passed in quiet, in contemplation, study, prayer, copying manuscripts and manual toil, as farm and garden work, reclaiming waste lands, dig¬ ging canals for irrigation and drainage. Emi¬ nent among them in this peaceful era were two reformers of their brotherhood, famed in hagi¬ ography, who by centralizing the energies of their followers on set lines of work sought to render their societies more potent factors for the common good, as adepts in intellectual, ar¬ tistic and more industrial spheres. William of Aquitaine, a dweller in a monastery of the Tuscan hills, and John Bonus, The Good, of Mantua, a one-time strolling player by profes¬ sion, now penitent, who by their wonderful powers of nature and grace employed in the service of their respective communities, reached high rank in the world of saintly heroism in southern Europe, in France and Italy, then in the north, in Germany and Eng¬ land, wherein were founded congregations under their rule. Spreading thence throughout the various quarters of Christendom, especially in w.estern Europe, their followers settled in Spain, Portugal, Belgium and Ireland, where they established houses of their brotherhood in the principal cities and towns of the then civilized world. In 1256, in pursuance of the designs of his predecessors in the papal chair, Alexander IV moved to ensure the complete union of all

the different congregations of Augustinians in Europe, succeeded finally in merging their several branch orders into one body politic and social under the leadership of Lanfranc Septala, of noble Milanese birth, the first superior-general of the Augustinian Her¬ mits, chosen thereto in the first general chapter of the brethren at Rome in the above year. Nor were the successors of Alexander slow in their recognition of the powers of this new association. To them were entrusted several places of honor in the pontifical court, among them the offices of apostolic confessor, of li¬ brarian, papal sacristan, the latter subsequently declared by Sixtus IV as of perpetual right of the Augustinians. Not long after they were entrusted with the collection of papal revenues in many countries, and even charged by some of the republics of Italy with the handling of state funds.

In the Middle Ages as in later days many of this brotherhood won fame in the higher realms of life, by their gifts of spirit in science and art, as saints, writers, masters in theology, Scripture-study, philosophy, history, law, an¬ tiquities, letters and poetry. Celebrated as teachers in schools of their order as well as

outside were such masters as Egidius Colonna of Rome, known as the “Fundamental Doctor® ; then Augustine of Ancona, who won renown in scholastic theology: John Capgrave in history; Onuphrius Panvinio in antiquities ; Luis de Leon in theology and poetry; John Laurence Berti in history; John Baptist Cotta in poetry; John Michael Cavalieri in liturgy, and lately Augustine Ciasca in Oriental languages. Em¬ inent for their supernatural gifts, many of the most singular character, were Nicholas of Tol- entine, “wonder-worker of. the Church,® so styled by Pope Eugene IV ; Clare of Monte- falco, the stigmatized, in whose heart were dis¬ covered the insignia of Christ’s passion; Rita of Cascia, ecstatic, known as “the saint of the impossible® ; Thomas of Villanova, almsgiver of Spain, and John de Schagun, reformer of the clergy of that country. The Augustinians are of prominence from the 16th century especially in various mission fields in Mahometan and heathen countries ; in Asia, in China, India, Persia, Japan and the Philippines; in Africa, in Zanzibar, Mozambique and the Guineas ; then in America, both North and South, and Australia. In later times during the closing years of the 18th century, was established the first English-speaking branch of the Augustin¬ ians in the United States, where, in 1796, a house of that brotherhood was opened in Phil¬ adelphia by two members of Irish blood — Dr. Matthew Carr and

John Rosseter — the latter said to have been formerly an officer under Rochambeau. Such was the genesis of the calced communities. In the United States their aim chiefly has been mission work among the faithful in pulpit and school. Offshoots from Philadelphia, now thriving in the United States as well as in Cuba and the Philippines, are some 23 convents and houses of the order, as mission-centres, with more than 100 members in residence or in study-houses in Europe. Furthermore attached to every central establish¬ ment the Augustinians have charge of various guilds, or societies, devoted to such aims as religion, social improvement, beneficence in the promotion of good works in the several fields of charity, patriotism, letters and science.

The Canons Regular or Austin Canons trace their descent as an order from the 11th century. Their rules were scarcely more rigid than that of the secular clergy and were far less severe than that of monks. They were all in sacred orders (ordained clergy) and thus differed from the monks who included in their number many lay brothers. The canons lived together and had a common refectory. From their long black hoods they were popularly called Black Canons. They established themselves in Eng¬ land about the beginning of the 12th century and had over 160 monasteries there at the time of the dissolution of the latter by Henry VIII. Ireland had over 200 establishments of this order and several nunneries, while Scotland had about 25 monasteries of which the earliest was at Scone. The abuses which crept into the various orders in the 14th and 1 5th centuries led to several new or reformed Augustinian bodies, among which was the Saxon congrega¬ tion to which Luther belonged. Shortly after the revolution of 1789 the order was entirely suppressed in France, Spain and Portugal, and in parts of Italy and Germany. It is at present strongest in the two Americas. For the other

divisions — Dominicans, Knight Templars and Premonstratensians see special articles under those heads and consult Allin, ‘The Augustin¬ ian Revolution in Theology0 (London 1911); Clark, ‘Customs of the Augustinian Canons) (Cambridge 1897) ; ‘Observances at the Augus¬ tinian Priories of Saint Giles and Saint An¬ drews at Barnwell, Cambridge (London 1897).

AUGUSTOWO, ou'gus-to'vo, Russian Poland, city in the government of Suwalki, sit¬ uated on a large lake on the Netta River, a tributary of the Bug. It is situated at one ter¬ minus of the Augustowo Canal, which connects the Netta with the Niemen River. Its principal industries are its river and lake fisheries and textile manufactories. It is also the centre of quite an extensive cattle and lumber trade. Pop.

about 15,000.

AUGUSTULUS, Romulus, the son of Orestes, a general of the Roman Emperor Julius Nepos. Orestes deposed the Emperor and placed his son upon the throne in 475. In the following year Odoacer, a commander of the German forces in the Roman service, re¬ volted, put Orestes to death, obliged Augustu- lus to resign and thus put an end to the Roman empire in the west. Augustulus, being of too little importance to be put to death, was sent to a villa near Naples, with a yearly pension of 6,000 gold solidi. The rest of his life was passed in obscurity. The Emperor's name was originally Romulus Augustus, but the Romans changed the latter into the diminutive form Augustulus, out of contempt for his character.

AUGUSTUS, Gaius Julius Caesar Octa- vianus, originally called Gaius Octavius, the celebrated Roman Emperor: b. 23 Sept. 63 b.c.; d. Nola, 19 Aug. 14 a.d. He was the son of Gains Octavius and Atia, a daughter of Julia, the sister of Julius Caesar. The Octavian fam¬ ily originated at Velitrae, in the country of the Volscians. The father of Octavius had risen to the rank of senator, and had gone to Mace¬ donia, after being chosen praetor, where he was a civil and military officer. Octavius lost his father when young, but was carefully brought up by his mother and L. Marcius Philippus, the second husband of Atia. His talents gained him the regard of his great-uncle, Julius Caesar, who declared himself willing to adopt him as his son in case he himself should remain with¬ out children. Octavius was studying under the renowned orator Apollodorus wrhen he received the news of the tragic death of his uncle and of his having adopted him as his son. Notwith¬ standing the anxiety of his friends, he went to Italy, and on landing at Brundusium, deputies from the veterans collected there came to him. Conducted in triumph to the city and saluted as the heir and avenger of Caesar, he made his adoption publicly known and took the name of his uncle, adding to it that of Octavianus. He then advanced to Rome, where there were now two parties, that of the republicans, who had killed Caesar, and that of Antony and Lepidus, who, under the pretense of avenging him, strove to establish their own authority. Oc¬ tavianus addressed himself first to Cicero, at Cumae, being desirous to gain over this great orator, and from thence he went to Rome, where the greater part of the magistrates, sol¬ diers and citizens came to meet him, Antony alone paying no attention to his return. After

Octavianus had caused his adoption to be con¬ firmed in the most solemn manner, he went to Antony and demanded of him the inheritance left him in order to pay the legacies mentioned in his uncle's will. Antony at first haughtily refused to acknowledge his claims, but changed his attitude when he found the influence of Oc¬ tavianus continually increasing, and his own proportionally diminishing. There could be no real union, however, between two equally am¬ bitious rivals. In their hearts they cherished reciprocal hatred and jealousy; and their en¬ mity was so little a secret that Octavianus was accused of having wished to get Antony mur¬ dered. He afterward, when Antony, together with Lepidus, entered Italy at the head of a powerful army, united with him, and a trium¬ virate was formed by the three generals, who defeated the republican army under Brutus and Cassius, at Philippi in Macedonia (42 b.c.). After his return to Rome he satisfied the de¬ mands of his soldiers by dividing among them confiscated lands. This division caused great disturbances. In the midst of the stormy scenes which convulsed Italy, he was obliged to contend with Fulvia, whose daughter, Clodia, he had rejected, and with Lucius, the brother- in-law of Antony. After several battles, Lucius threw himself into the city of Perusia, where he was soon after obliged to surrender. The city was given up to be plundered, and 300 sen¬ ators were condemned to death. After the re¬ turn of Antony an end was put to the proscrip¬ tions. Octavianus allowed such of the pro¬ scribed persons as had escaped death by flight, and whom he no longer feared, to return. There were still some disturbances in Gaufi and the naval war with Sextus Pompeius continued for several years. By a skilful course of conduct he brought about the defeat of Pompeius and reduced Lepidus to a nullity, thus leaving An¬ tony alone as his rival. The empire was now divided between him and Antony ; but while the former, in the east, gave himself up to a life of luxury, the young Octavius pursued his plan of making himself sole master of the world. He especially strove to obtain the love of the people. He displayed mildness and magnanimity, without the appearance of striv¬ ing after the highest power, and declared him¬ self ready to lay down his power when Antony should return from the war against the Par- thians. He appeared rather to permit than to wish himself to be appointed perpetual tribune — an office which gave him supreme power. The more he advanced in the affections of the people the more openly did he declare himself against Antony.

By making public a will, wherein his rival appointed his sons by Cleopatra his heirs, he stirred up the ill-will of the Romans against him. Availing himself of this feeling, Octa¬ vianus declared war

against the Queen of Egypt and led a considerable force, both by sea and land, to the Ambracian Gulf. Here his admiral Vipsanius Agrippa gained the naval victory of Actium (q.v.), which made Octavianus master of the world, 31 b.c. He pursued his rival to Egypt, and ended the war,. after rejecting the proposal of Antony to decide their differences by a personal combat. Cleopatra and Antony having killed themselves, Octavianus caused them to be buried with imposing ceremonies. A son of Antony and Fulvia was sacrificed to

ensure his safety, and Caesarion, a son of Caesar and Cleopatra, shared the same fate. All the other relations of Antony remained uninjured, and Octavianus, on the whole, used his power with moderation. He spent two years in the East, in order to arrange the affairs of Egypt, Greece, Syria, Asia Minor and the islands. On his return to Rome he celebrated a triumph for three days in succession, and (29 b.c.) closed the temple of Janus — for the third time since the foundation of Rome. Freed from his rivals and enemies, and master of the world, he is said to have been undecided as to how he should exercise his power, or whether he should even retain it. He first set about correcting the abuses which had prevailed during the civil war, established a general peace, ejected un¬ worthy members from the Senate, restored ruined temples and built new ones.

At the end of his seventh consulship, he en¬ tered the Senate house, and declared his resolu¬ tion to lay down his power. The Senate, aston¬ ished at his moderation, besought him to retain it. He yielded to their pressing entreaties, and continued to govern through them. He now obtained the surname of Augustus, which marked the dignity of his person and rank, and united, by degrees, in himself, the offices of imperator, or commander-in-chief by sea and land, with power to make war and peace ; of proconsul over all the provinces ; of perpetual tribune of the people, which rendered his per¬ son inviolable, and gave him the power of in¬ terrupting public proceedings ; and, in fine, of censor, and pontifex maximus, or controller of all religious matters. The laws themselves were subject to him, and the observance of them depended upon his will. It was the spirit of his policv to retain old names and forms, but he steadfastly refused to assume the title of dictator, which latterly had become especially odious. He conducted many wars in Africa, Asia, and particularly in Gaul and Spain, where he triumphed over the Cantabrians after a severe struggle. His arms subjected Aquitania, Pannonia, Dalmatia and Illyria, and held the Dacians, Numidians and Ethiopians in check. He concluded a treaty with the Parthians, by which they gave up Armenia, and restored the eagles taken from Crassus and Antony. At the foot of the Alps he erected monuments of

his triumphs over the mountaineers, the proud re¬ mains of which are yet to be seen at Susa and Aosta. After he had established peace through¬ out the empire, he again closed the temple of Janus. But this peace was interrupted, 9 a.d., by the defeat of Varus, who lost three legions in an engagement with the Germans, under Arminius, and killed himself in despair. The information of this misfortune greatly agitated Augustus. He let his beard and hair grow, and often cried out in the deepest grief, ((0 Varus, restore me my legions P Meanwhile the Germans were held in check bv Tiberius. Dur¬ ing the peace, Augustus had issued many use¬ ful decrees, and abolished abuses in the gov¬ ernment. He gave a new form to the Senate, employed himself in improving the manners of the people, particularly by promoting mar¬ riage, enacted laws for the suppression of luxur}', introduced discipline into the armies, and order into the games of the circus. He adorned Rome in such a manner that it was truly said, ftHe found it of brick, and left it

of marble.® He made journeys, as Velleius says, everywhere, to increase the blessings of peace; he went to Sicily and Greece, Asia Minor, Syria, Gaul, etc. ; in several places he founded cities and colonies. The people erected altars to him, and, by a decree of the Senate, the month Sextilis was called August. The de¬ bauchery of his daughter Julia gave him great pain, and he showed himself more severe against those who destroyed the honor of his family, than against those who threatened his life. History says that, in his old age, he was ruled by his wife, Livia, the only person, per¬ haps, whom he truly loved. He had no sons, and lost by death his sister's son, Marcellus, and his daughter's sons, Gaius and Lucius, whom he had appointed his successors. Also, Drusus, his son-in-law, whom he loved, died early; and Tiberius, the brother of the latter, whom he hated, on account of his bad qualities, alone survived.

These numerous calamities, together with his continually increasing infirmities, gave him a strong desire of repose. He undertook a journey to Campania, from whose purer air he hoped for relief ; but disease fixed upon him, and he died, in the 79th year of his age, and 45th of his reign. When he felt his death ap¬ proaching he is said to have called for a mirror, arranged his hair, and demanded of the by¬ standers, <(Have I played my part well?® and, an answer being returned in the affirmative, <(Then,® added he, using the form of the players, (<farewell, and applaud® (valete , et plaudite). If this last

passage in the life of Augustus is true, it is certainly indicative of his character, his policy, and even of his for¬ tune. He conquered Brutus by means of Antony, and Antony by means of Agrippa. He several times changed his party, but never his purposes, and knew how to cause power to be offered, and pressed upon him, while it was, in fact, the object of all his exertions. It can¬ not be denied that he used his power with wis¬ dom, and became the benefactor of his coun¬ try, which he had previously plunged into the horrors of civil war. His taste and active mind led him to favor and protect the learned; and he even exercised the art of the poet him¬ self ; so that he was not unworthy of giving his name to an age distinguished for intellectual creations. His death plunged the empire into the greatest grief. He was numbered among the gods, and temples and altars were erected to him. Consult Beule, (Auguste, sa famille et ses amis *(Paris 1867) ; Boissier, (La religion romaine* (1883) ; Gardthausen, (Augustus und seine Zeit *(Leipzig 1891) ; Firth, J. B., Au¬ gustus Caesar* (New York 1903) ; Schuck- burg, Augustus* (1903).

AUGUSTUS I,- Elector of Saxony: b. Freiburg 1526; d. 1586. He spent some time at Prague in his youth, and became a close friend of Maximilian, afterward the Emperor Maximilian II. He married the daughter of Christian III of Denmark who was very popu¬ lar. In 1553 Augustus succeeded his brother Maurice as Elector. At first he favored the Calvinists, but later adopted Lutheranism. His internal administration was remarkable for many beneficent reforms in jurisprudence and finance. He also aided education, manufactures and commerce. He ordered that every newly- wedded couple should plant two fruit trees

within the year following their marriage. He greatly beautified Dresden, his capital and founded the library there. He married for the second time a few weeks before his death. Consult Falke, (Geschichte des Kurfiirsten August von Sachsen* (Leipzig 1868).

AUGUSTUS II, Frederick («The Strong®), Elector of Saxony and King of Po¬ land, second son of John George III, Elector of Saxony: b. Dresden 1670; d. 1 Feb. 1733. He was noted for his activity. In 1695 he be¬ came Elector and in 1696 was candidate for the vacant Polish throne. The French Ambassador and the nobles supported the Prince of Conti, but Augustus by accept¬ ance of the Roman Catholic faith, by bribery and intimidation secured the elec¬ tion, 27 June 1697. Early in his reign, a treaty was made between Denmark, Poland and Russia against Charles XII of Sweden, for the conquest of Livonia. But Charles, after hav¬ ing defeated the Danes and the Russians, turned toward Poland. Thus began the celebrated Northern War, which lasted

20 years. Charles gained a complete victory, 20 July 1702, and on 1 May 1703, the Saxon army was defeated again at Pultusk. The Diet assembled at Warsaw de¬ clared Augustus, 14 Feb. 1704, incapable of wearing the crown of Poland, and Stanislaus Lesczinsky, Waywode of Posen, was chosen king, 12 July 1704. Charles victorious on every side, advanced into Saxony, and Augustus found himself obliged to negotiate a secret peace, at Altranstadt, 24 Sept. 1706.

He now devoted himself to the domestic af¬ fairs of Saxony. His love of splendor involved him in many expenses, by which the finances of his kingdom were disordered. In 1709, after the defeat of Charles at Pultowa, the Poles re¬ called Augustus, who united himself anew with Peter the Great. A confederation was now formed in Poland against the Saxon troops, by the party of Stanislaus, in the belief that Augustus was aiming at absolute power. The Saxons were attacked and obliged to surrender. At length, through the mediation of Peter, an arrangement was concluded at Warsaw, 1717, between Au¬ gustus and the Polish leaders. The Saxon troops were removed from the kingdom, and Augustus agreed not to maintain more than 17,000 soldiers in Poland, who were to be under the Polish authorities. The last years of his reign were characterized by boundless luxury and corruption of manners. He was not dis¬ liked by his subjects, and filled with dignity' his station among the European powers. In his character generous ideas were united with despotic feelings, a taste for pleasure with the cares of ambition, and the restlessness of a war¬ like spirit with the effeminacy of a luxurious life. By his mistresses he had many children. The Countess of Konigsmark bore him the cel¬ ebrated Maurice of Saxony. He left an only son who succeeded him. Consult Desroches de Parthenay, (Histoire de Pologne sous le roi Auguste* (The Hague 1734).

AUGUSTUS III, Frederick, Elector of Saxony and King of Poland, son of Augustus II: b. Dresden 1696; d. there, 5 Oct. 1763. He succeeded his father as Elector in 1733. A part of the Polish nobility chose Augustus king; and in 1736 he was first generally recognized as

such by the Congress assembled at Warsaw to conclude a peace. Although without the great and amiable qualities of his father, in other re¬ spects he closely followed his example, distin¬ guishing himself by the splendor of his feasts and the extravagance of his court. His system of politics consisted in entire dependence upon Russia. He

preferred Dresden to Warsaw, and through his long absence from Poland the gov¬ ernment sank into entire inactivity. When Frederick attacked Saxony itself in 1745, Au¬ gustus deserted his capital, and preserved his pictures and porcelain, but lost the archives of the state, which fell into the hands of the victors. By the peace of Dresden, 25 Dec. 1745, he was reinstated in the possession of Saxony, in the next year. In 1756 he saw himself in¬ volved anew in a war against Prussia, and fled to 'Konigstein, and afterward to Poland. His authority in this country had always been incon¬ siderable, and after the loss of Saxony, became still more insignificant. The accession of Cath¬ arine to the Russian throne was a source of disquietude, for she sought to deprive the Saxon princes, who were allies of France, of the Polish thrones. The peace of Hubertsberg was hardly concluded when Augustus returned from Warsaw to Dresden, where he died. His son, Frederick Christian, succeeded him as Elector of Saxony, and Stanislaus Poniatowsky as King of Poland. Consult Ruthiere, (Histoire de l'anarchie de Pologne) (Paris 1819).

AUGUSTUS, Apotheosis of, a celebrated cameo, cut out of sardonyx, nearly a foot in diameter. It is the largest work of its kind. It contains 26 figures, formerly supposed to represent Joseph leading a procession through Egypt. It is now one of the gems of the Cabinet des Medailles et Antiques in Paris.

AUGUSTUS, Arch of, a triumphal arch erected in the Roman Forum in honor of Augustus, about 20 b.c. Destroyed in 1540, its foundations were discovered in 1888. Consult Hiilsen-Carter, (The Roman Forum } (Rome

1906).

AUGUSTUS, Forum of, the Imperial

forum built by Augustus at Rome. Portions of its walls still remain, with ruins of the temple of Mars Ultor, which was built in the centre in .commemoration of the battle of Philippi and the retribution brought by Augustus on the murderers of Caesar. Consult Platner, (The Topography and Monuments of Ancient Rome) (New York 1911).

AUGUSTUS, Mausoleum of, a circular structure of huge diameter (280 feet), built of white marble and covered by a mound of earth, on which were planted evergreen trees. At the summit of the mound, among the shrubbery, was placed a colossal bronze statue of Au¬ gustus, who had caused the mausoleum to be built, 28 b.c. On each side of the portal stood an obelisk, still preserved in the Piazza del'

Esquilino and the Piazza del Quirinale. Within were interred the great Romans honored by the Emperor, the first being young Marcellus and the last Nerva, 98 a.d. Later the structure was allowed to fall into ruins, was for a time used as a bull ring and a circus and now only the brick shell is visible.

AUK, ak, a diving sea-fowl of the family Alcidcu found in the northern regions, the term covering guillemots, murres, lomvias, puffins

and others. They are thick-set birds, seldom more than a foot long, which move about with difficulty on land, from the fact that their legs are set very far back, giving them an erect, penguin-like attitude. In color they are dark brown, black or lead-color above, and white be¬ neath, except in the breeding season, when bright colors and ornamental plumes tempora¬ rily appear on the males of some species. The wing-feathers are so short as to be of little service for flight, and the wings are more used as aids in swimming under water, where they pursue fishes with great speed. The bill is much compressed, but in the breeding season, among the puffins, which show the most marked compression of bill at other times, the bills increase in size and develop orna¬ mental appendages which disappear as the moulting season comes on. The most important north Atlantic auks are the now-extinct great auk (plautus impennis) which was as large as a goose and within historic times abounded as far south as the Hebrides (see Garefowl) ; the little auk (Alle allc), not larger than a robin and very abun¬ dant, sometimes in winter coming as far south as New York and the Great Lakes (see Dove- kie) ; and the razor-billed auk (Alca torda), which has a bill of remarkable length and sharpness, and which breeds even as far south as the Maine coast (see Murrelet; Puffin; Razor-Bill). The auk lays only a single large egg, which, as no nest is prepared, the parents care for by holding upon the top of their webbed feet and between their thighs. These eggs are a staple food for the natives of the Arctic regions, as are the birds, also. They are taken in summer and preserved for winter use, as in the autumn the auks migrate from the frozen coasts and spend the winter in the open spaces of the sea. Consult American and British ornithologies; and Grieve, (The Great Auk> (London 1885) ; Stejneger, bul¬ letin of the United States National Museum No. 29) (1885) ; (Harriman Alaska Expedition) (Vol. II, New York 1902); Selous, bird Watching) (London 1901).

AULARD, o'lar', Frangois Victor Al¬ phonse, French historian: b. Montbron, Charente, 1849. He is considered one of the best authorities on the French Revolution, of which subject he was professor at the Sorbonne. Among his many works are (Les orateurs de

l’assemblee constituante) (1882); (Le culte de la raison et le culte de l’etre supreme) (1892). He also edited <La societe des Jacobins) (6 vols., 1889-97).

AULD LANG SYNE, aid lang sin, a song attributed to Burns, who added a couple of stanzas to a poem known to have existed in 1600 and set to an old Lowland air by George Thompson. Consult Grove, (Dictionary of Music and Musicians* (New York 1910).

AULD LICHT IDYLLS, aid licht i'dills, a work by James M. Barrie. It is a series of 12 sketches of life in Glen Quharity and Thrums. In all of them the same characters appear.

AULD ROBIN GRAY, a famous Scottish ballad by Lady Anne Barnard, published anonymously in 1772, but unacknowledged till 1825. She afterward wrote a sequel to the ballad.

AULIC COUNCIL, one of the two high¬ est courts of the Holy Roman empire (Reichshofrath), the other being the court of the Imperial Chamber (Reichskammergericht). It was at first a paid Council of the Emperor, and was reorganized 1497 by Maximilian I, who set it up as a rival to the Imperial Cham¬ ber, which the Diet had forced upon him. At first its main functions appear to have been in regard to the business administration of the crownlands and the empire in general, and so to facilitate and expedite the decisions of the Im¬ perial Chamber. In the course of time other functions devolved upon it and it received a fixed constitution in 1559. Its powers were greatly limited by the Peace of Westphalia in 1648, but six years later it was formally consti¬ tuted as one of the two supreme courts of the empire, the equal of the Imperial Chamber, and the highest Court of Appeals in the empire. In this form it consisted of a president, vice-presi¬ dent, a vice-chancellor and 18 councillors, all of whom were selected and paid by the Em¬ peror, except the vice-chancellor, who was ap¬ pointed by the Elector of Mainz. Its seat was at the Imperial residence, Vienna. It had jurisdiction in all matters concerning the re¬ served rights of the Emperor, all questions of appeal on the part of the states from decisions in minor courts, and whatever concerned the Imperial jurisdiction in Italy. It was dissolved on the death of the Emperor, and had to be re¬ instituted by his successor. Six of the council¬ lors were Protestants, who could thus exercise an effective veto and preserve religious parity. The council ceased to exist on the fall of the Holy

Roman empire in 1806. The title is now applied in Germany in a general sense to the chief council of any department, political, ad¬ ministrative judicial or military. Consult Herschenhahn, (Geschichte des kaiserlichen Reichshofraths) (Mannheim 1793).

AULICH, ou'liH, Ludwig, Hungarian

general: b. Presburg 1792; d. Arad, 6 Oct. 1849. When the Hungarian Revolution of 1848 broke out Aulich was lieutenant-colonel in an Aus¬ trian regiment, which afterward took up the Hungarian cause. He was later made general of the 2d Hungarian army corps, in which capacity he was an important factor in the vic¬ tories over Prince Windischgratz. After the evacuation of Pesth by the Imperial troops in 1849, Aulich made his triumphant entry into that capital, and was received with enthusiasm by the people. In his famous proclamation of Godollo, Kossuth paid also an appropriate homage to Aulich's gallantry. Subsequently, when Gorgey was forced to renounce either the army or the Minister of War, he took the lat¬ ter alternative, and Aulich was appointed his successor. But although he might have used his authority as Minister of War to frustrate Gorgey's negotiations with the Russians, he actually assisted Gorgey to bring these negotia¬ tions to a successful close. He was then de¬ livered over to Austria by the Russians, and, in company with 12 others, perished on the gal¬ lows.

AULIS, in ancient Greece, a seaport in Boeotia, on the strait called Euripus, between Boeotia and Euboea, noted chiefly for its temple of Artemis, and as the scene of the sacrifice of Iphigenia, and as the gathering place of the Greek fleet before the Trojan War.

AULLAGAS, oul-la'gas, a salt lake in

Bolivia, which receives the surplus waters of Lake Titicaca through the Rio Desaguadero, and has only one perceptible, insignificant out¬ let. The disposition of its superfluous water is, therefore, still a matter of uncertainty.

AULNEAU DE LA TOUCHE, alW de-la-toozh, Jeanne Pierre, Jesuit martyr: b. France 1705. In 1735 he was sent as missionary to the Indians at the Lake of the Woods. In the following year he set out with a party of Frenchmen for Mackinac, but the whole party was surprised and massacred by Sioux on the 8th of June at Massacre Island, Lake of the Woods.

AULULARIA (from Aulula, a pot), a comedy by Plautus. Euclion, an

old miser, is the principal character.

AUMALE, 6-mar, Henri Eugene Philippe Louis d'Orleans, Duke of, 4th son of King

Louis Philippe of France: b. Paris, 16 Jan. 1822; d. Zucco, Sicily, 7 May 1897. He en¬ tered the military service at the age of 17, and distinguished himself by his bravery. At the age of 20, he was promoted to the rank of brigadier-general, and was sent to Algeria, in October 1842. Entrusted with the command of the district of Medeah, he attacked the smala of Abd el Kader with such impetuosity that in less than two hours the emir's troops were entirely routed. As a reward, Aumale was made lieutenant-general and commander of the province of Constantine. In 1847, the young prince, but 25 years old, was en¬ trusted with the general governorship of Algeria, which was taken from the hands of Marshal Bugeaud. This appointment was not approved either by the army or the French nation, and it was the oc¬ casion for loud complaints against the ambition of the King, who was concentrating the direc¬ tion of the whole military service in the hands of his sons. After the revolution of 1848, he went to England, where he devoted his atten¬ tion to literary pursuits. In 1870 he was re¬ fused permission to enter the French army, but in the following year he was elected to the Assembly from Oise and took his seat. In 1873 he was general of division and presided at the trial of Bazaine. In 1886 he was debarred from the army under the Expulsion Act and with¬ drew to England. He bequeathed the Chateau of Chantilly to the Institut de France. In 1889 the decree of banishment against him was re¬ voked. His latest years were passed in Sicily. He wrote (Les institutions militaires de la France *(1867); (Histoire des Princes de Conde* (1869) and (Lettre sur Thistoire de France) (1861), which attracted wide notice because of its attacks upon Napoleon III and the Prince Imperial.

AUMALE, o'mal', France, a town 35 miles northeast of Rouen, which has given titles to several notables in French history: Jean d'Ar- court, 8th Count cTAumale, fought at Agin- court, and defeated the English at Gravelle (1423). Claude II, Due d'Aumale, one of the chief instigators of the Massacre of Saint Bartholomew, was killed 1573. Charles de Lorraine, Due d'Aumale, was an ardent parti¬ san of the League in the politico-religious French wars of the 16th century. Glass and steel are manufactured in the modern town.

Pop. (1911) 2,412. Consult Semichon, (His- toire de la ville d'Aumale) (Paris 1862).

AUMONT, o-mon', the name of one of the great historical families of France. The first Aumont mentioned in history is Jean III, Sire d Aumont, who, in 1328, took part in the bat¬ tle of Cassel, and served under Philip de Valois, on many other important occasions. A more distinguished member of the family was Jean d' Aumont : b. 1522; d. 1595. He was on the battlefield almost from his cradle to his grave, and served under six kings: Francis I, Henry II, Francis II, Charles IX, Henry III and Henry IV. Antoine d' Aumont: b. 1601; d. 1669 ; served with distinction under Louis XIV, and in 1662 was appointed governor of Paris. Louis Marie Victor d' Aumont and de Roche, baron: b. 1632; d. 1704; took an active part in the war in Flanders under Louis XIV, was governor of Boulogne and the Boulonnois, and member of the Academy of Inscriptions and Belles-lettres. Jacques, duc d'Aumont: b. 1732; d. 1799; was the commandant of the national guard, on 5 Oct. 1789, when Louis XVI was forcibly taken away from Versailles. Louis Marie Celeste de Vienne, duc d'Au- mont : b. 1762; d. 1831; served in Germany, Spain and Sweden, until the restoration, when he was appointed lieutenant-general. He made himself very useful to the cause of royalty in suppressing the troubles in Normandy, and in 1815 wras created peer of France, and raised to the office of first chamberlain. He was one of the most prominent men at the courts of Louis XVIII and Charles X, but he exchanged poli¬ tics for theatres, and became the chief director of the comic opera.

AUNGERVILLE, an'ger-vil, Richard, known as Richard de Bury (from his birth¬ place, Bury Saint Edmunds), an English states¬ man, bibliographer and correspondent of Pe¬ trarch : b. 1281 ; d. 1345. He was educated at Oxford. He entered the order of Benedic¬ tine monks, and became tutor to the Prince of Wales, afterward Edward III. Promoted to several offices of dignity, he ultimately became bishop of Durham (1333) and Lord Chancellor of England. He made the acquaintance of many of the eminent men of the day, and was a diligent collector of books. He was the author of 'Philobiblon,* (Epistolse Familiar- iumP including letters to Petrarch, etc. (See Philobiblon). Consult Boardman, (Richard de Bury> (Bangor 1902) ; Dutt, (Bury St. Edmunds > (London 1907) ; Kitchin, (ib. 1911).

AURA. See Epilepsy.

AURAMINE. See Coal Tar Colors.

AURANGABAD, ou-run'ga-bad\ India, town 175 miles from Bombay,

and on the Kuam River, a small tributary of the Godavery. It is surrounded by walls with semi-circular towers at the different angles, and contains a ruined palace of Aurungzˆebe and a mausoleum erected to the memory of his favorite wife. A mile to the west of the town are cantonments for cavalry, infantry and artillery. Aurangabad was founded early in the 1 7th century, and rose to be a considerable trading centre, but its commercial importance decreased when Hyderabad became the capital of the Nizam. In late years the trade has revived considerably,

and embraces wheat, cotton and manufactured goods. Pop. about 25,000.

AURANTIA. See Coal Tar Colors. *

AURATES. See Auric Acid.

AURAY, a' ra', France, town in the de¬ partment of Morbihan, near the mouth of the Auray River, in Brittany, 12 miles west of Vannes. Its port is frequented by coasting and fishing vessels. Auray is one of the chief centres in France for oyster-breeding, and carries on boat-building and sardine-fishing. The principal buildings are the church of Saint Esprit, the Renaissance church of Saint Gildas and, at a short distance from the town, the Carthusian monastery, now a deaf and dumb institute. Adjoining it is a small chapel in which are preserved the bones of the Royalists captured by the Republicans in a battle here in 1795. In the neighborhood is the church of Sainte Anne d' Auray, one' of the principal places of pilgrimage in Brittany. Pop. about 5,000.

AURBACHER, owr'ba-Her, Ludwig, German author: b. 1784; d. 1847; well remem¬ bered by his <Volksbiichlein) (1827-29) ; a col¬ lection of popular tales, ranking among the best productions of this kind in German liter¬ ature.

AURELIA. See Jellyfish.

AURELIAN, Lucius Domitius Aure- lianus, one of the later emperors of Rome: b. about 212; d. 275. He was the son of a peasant of Illyricum, and rose to the highest rank in the army, and even to the consulate ; which good fortune was increased by a wealthy marriage. Claudius II, on his death-bed, in 270, recommended Aurelian to the choice of the troops of Illyricum, who readily acceded to his wishes. He delivered Italy from the barbarians, reduced Tetricus, who had been unwillingly made to assume the purple in Gaul, and con¬ quered the famous

Zenobia, Queen of Palmyra. Aurelian followed up his victories by the ref¬ ormation of abuses, and the restoration throughout the empire of order and regularity, but tarnished his good intentions by the general severity of his measures, and the sacrifice of the senatorial order to his slightest suspicions. He had planned a great expedition against Persia, and was waiting in Thrace for an op¬ portunity to cross the straits, when he lost his life by assassination, the result of a conspiracy excited by a secretary whom he intended to call to account for peculation. Aurelian was a wise, able and active prince, and well deserved the title given him by the Senate of <(Restorer of the Roman Empire.® Consult (Cambridge Me¬ diaeval History* (Vol. I, New York 1911) and Homs, L., (Le regne de 1'empereur Aurelien)

(1904).

AURELIAN, a historical novel by Wil¬ liam Ware, an American author born in 1797. It was first published in 1838 under the title (Probus, *and was a sequel to (Letters of Lucius M. Piso,* published the year before; and like that novel, written in the form of letters. The full title is (Aurelian; or, Rome in the Third Century. In Letters of Lucius M. Piso, from Rome, to Fausta, the daughter of Gracchus at Palmyra.) The novel presents a singularly faithful picture of the Rome of the second half of the 3d century.

AURELIAN WALL, a wall around Rome, built mostly by the Emperor Aurelian, but . completed in the reign of Probus. It was almost 12 miles long, and 54 feet high, enclosing an area of 5,000 square miles, and marking the boundaries of Rome in the time of Aurelian. The wall was built in great haste as a defense against the barbarians, and includes the remains of house- and garden-walls, some with statues in their niches. A covered way near the base of the wall was provided with loopholes toward the outer side and arcade on the inner. Tow¬ ers, 380 in number, connected this way with the battlements above. A large part of the wall is still well preserved. Much has been learned from the stamped bricks used in its construc¬ tion, and from the statues and frescoes on the walls of houses filled in instead of being de¬ molished in the hurry of building. Consult Lanciani, (Anc.ient Rome* (New York 1900) and Platner, (Topography and Monuments of Ancient Rome) (Boston 1911).

AURELIUS ANTONINUS, Marcus.

See Marcus Aurelius Antoninus.

AURELIUS VICTOR, Sextus, Roman historian of the 4th century whose (History of the Caesars > is a collection of biographical sketches of the emperors from Augustus to Constantine. In this work he states that Julian appointed him governor of a division of the province of Pannonia and also that he was made city prefect by Theodosius. He is identified as the Aurelius Victor who with Valentinian was consul in 373 a.d.

AURELLE DE PALADINES, d-rel-de- pa-la-den', Louis Jean Baptiste d\ French soldier: b. Malegieux, Lozere, 9 Jan. 1804; d. Versailles, 17 Dec. 1877. Entering the army in 1824, he served throughout the Algerian and Crimean campaigns, becoming a general of division in 1855. He did not participate in the Franco-Prussian War until after the battle of Sedan, when he received a command and drove the Prussian General Von der Tann- Rathsamhausen from Orleans, thus winning the first French victor}1- of the war. His later operations were not so successful, however, as he was beaten by the army of the Grand Duke of Mecklenburg at Artenay, whereupon he was relieved of his command. During the days of the Commune he was in command of the Na¬ tional Guard in the department of the Seine. After the war, in 1875, he was elected to the French Senate for life. He is the author of (Campagne de 1870-71 ; la premiere armee de la Loire* (1872).

AURENGZEBE, a'reng-zeb\ See Au-

RUNGZEBE.

AUREOLA, or AUREOLE, in paint¬ ings, an illumination surrounding a holy per¬ son, as Christ, a saint or a martyr, intended to represent a luminous cloud or haze emanating from him. It is generally of an oval shape, but may be nearly or quite circular, and differs from the nimbus surrounding the heads of sacred personages in being an emanation of light from the .whole body. The aureole did not come into favor until after the 8th century and was abandoned by most painters of the Renaissance in the 15th century. It was used around figures of Christ, the Trinity and the Virgin Mary.

AUREOSIN. See Coal Tar Colors.

AUREUS, a're-us, or AUREUS NUM- MUS, the earliest gold coin of Rome, coined 207 b.c., in the second Punic War. It weighed 2 denarii, and 1 quinarius, and was worth 25 denarii, or 100 sesterces. In modern terms, its average weight was 121 grains and its value was

about $500. In later times it was called solidus, but had diminished in value. Consult Hill, G. F., (Handbook of Greek and Roman Coins) (London 1899).

AURIC ACID. Trioxide of gold, Au203, does not combine with acids to form salts, but a hydrated form of the oxide, A112O3.H2O, is known, which unites with bases to form salts. From this acid-like property, the hydrated ox¬ ide has been called (<auric acid.® Compounds of auric acid with bases are called (<aurates.® Aurate of potassium, A1i2O3.K2O.3H2O, is a crystalline substance, readily dissolving in water with the formation of an alkaline solu¬ tion. When digested with ammonium sulphate, it yields an aurate of ammonia of undetermined composition, called ˆfulminating gold.® This substance, yellowish-brown in color when in the solid form, decomposes explosively upon per¬ cussion, or when heated to 212° F.

AURICH, oifiriH, Germany, town in the province of Hanover, 18 miles northwest of Emden. It has a palace, two churches, a gym¬ nasium and four libraries. There are breweries and small manufactories of paper and tobacco. It is built in Dutch style, and lies in a sandy but fertile plain, surrounded by pleasant prome¬ nades which have taken the place of the old fortifications. Pop. about 6,000.

AURICHALCITE (-kal'-), a native basic carbonate of copper and zinc, usually occurring in beautiful bright blue or green, pearly in¬ crustations, composed of ill-defined crystals or scales. Its hardness is 2, and its specific gravity about 3.6. It has been found in Greece, Italy, England and various other European countries, and in fine specimens at Morenci in Arizona, Magdalena in New Mexico, in Colorado, Mon¬ tana, Utah and elsewhere.

AURICLE. See Ear.

AURICLES OF THE HEART. See

Heart; Circulation.

AURICULA, a hardy perennial herb, Primula auricula, of the family Primulacece, found in the mountainous parts of central Europe. The wild plant has an umbel of small yellow flowers on a short stalk, which rises from a rosette of basal leaves. By selection a very large number of varieties have been pro¬ duced ˆ These have long stalks and very di¬ versely colored, fragant, large flowers, for which the plant is widely cultivated in Europe. In the United States the plant is mostly con¬ fined to greenhouses. It is propagated by means of seeds and

offsets, and succeeds best on rich, light, loamy soil.

AURICULAR CONFESSION. See Con¬ fession ; Penance; Sacraments

AURIFABER, the Latinized name of Johann Goldschmidt, one of Luther's friends: b. 1519; d. Erfurt 1579. He became pastor at Erfurt in 1566. He collected the unpublished manuscripts of Luther, and edited the

AURIGA, in astronomy, the Wagoner, a constellation of the northern hemisphere, con¬ taining as its chief luminary Capella, a star of the first magnitude. In 1892 a new star was discovered in the foot of Auriga. At its bright¬ est it showed as a star of the fourth magnitude and remained visible to the naked eye for about a month, afterward becoming rapidly invisible. After several months it again reached the tenth magnitude, but its spectrum had undergone a great change, having become assimilated to the nebular type. It has since resumed its stellar character and is of the thirteenth magnitude.

AURILLAC, o're-yak', France, a town 272 miles south of Paris, capital of the department of Cantal (Auvergne), on the Jordanne. It is noted for its ancient buildings, among which are the church of Notre Dame, constructed in the 13th century, and the castle of Saint Stephen. It has manufactures of jewelry, cop¬ per, kettles, paper, woolen stuffs and carpets. It is said to owe its origin to a Benedictine monastery founded in the 9th century by Saint Geraud. The town was besieged several times by the English in the 14th and 15th centuries and it suffered in the religious wars of the fol¬ lowing century. It is the birthplace of Pope Sylvester II and also of the infamous Carrier of the French Revolution. Pop. (1911) 18,036.

AURIN, or AURINE, $C_{19}H_{14}O_3$. A coloring substance used in the manufacture of lacquers. It is obtained by the action of sulphuric and oxalic acids on carbolic acid at 130°-150° C. It is little used as a dye because of the diffi¬ culty of fixing it. Its solution in alkali has a beautiful red color.

AURINGER, Obadiah Cyrus, American author and clergyman: b. 4 June 1849, at Glens Falls, N. Y. Educated in public schools and by private tutors, he contributed literature to papers and magazines of

United States from the age of 18. Entered the United States Marine Corps Tune 1871 ; and served in the tropics on the flagship Worcester till August 1875. Engaged in agriculture for some years, studied theology and was ordained to the- Presbyterian ministry in 1890. He served churches at Northwood, N. Y. (1890-93) ; Troy, N. Y. (1893-99) ; Forestport, N. Y., till 1912. He is the author of several volumes of verse, including (Scythe and Sword) (1887), (The Heart of the Golden PoenP (1890), (1896), friend¬ ship's Crown of Verse, 5 (The Lover's Tragedy) (1898), (William McKinley MemoriaP (1906), (Eagle's Bride) (1911). In prose he has con¬ tributed a sketch of Edward Eggleston to (Authors at Home5 series; and numerous papers on American archaeology to State pub¬ lications. His latest work is an historical play <Thistledown.)

AURISPA, 011-re-spa, Giovanni, Italian scholar: b. Noto, Sicily, 1369; d. Ferrara 1460. He went to Constantinople in 1418 for the purpose of studying Greek. On his return some years later he brought with him many valuable manuscripts, among them some of the writings of Pindar, Sophocles, Plato and Callimachus. For a while he taught Greek literature at Bologna. After a short period as teacher in Florence he removed to Ferrara. In 1438 he was invited by the Emperor of Byzantium, John Palaeologus to attend the

council called by the Pope Eugene IV at Basel. The result was that he became the Pope's secretary, in 1441, and remained in this office for six years. Many of his translations are to be found in manuscript, in the libraries of Europe, but only the following have been pub¬ lished: Hierocles' (Liber in Pythagorse Aurea Carmina, Latinitate Donatus5 (Padua 1474) ; (Philisci Consolotoria5 (Paris 1510). Con¬ sult Voight's (Die Wiederbelebung des klassis- chen Alterthums5 (Vol. I, Berlin 1893).

AUROCHS, a'roks, the European bison (Bosbonasus , or Bison euro pans) called by Germans <(wisent® and in the Slavonic lan¬ guages ˆsubr® or (<suber.® This great bison stands six feet or more in height at the shoul¬ der, and closely resembles the American bison or ˆbuffalo® (q.v.) ; it is believed, indeed, that the American animal descended from the an¬ cestral race of aurochs. When the Romans spread northward into Europe they found these and other oxen in the forests wherever they went, and even down in the days of Charlemagne they were spread over Germany and were beasts of chase. They have steadily diminished, however, until now they, exist only as a _ single herd in the royal forest-preserves of Bielovege, in Lithuania, which in 1899 num¬ bered 700 while a few hundred roam in the Caucasian Mountains. The name <(aurochs® is also applied

sometimes to the urns, the ancient wild ox of Europe (Bos primigenius) , the supposed ancestor of our domestic cattle. See Bison.

AURORA, Ill., city, Kane County, on Fox River, and on the C., B. & Q., the C. & N. W., the E. J. & E., and the C. M. & G. railroads. Is the hub of electric interurban lines ex¬ tending in all directions to Chicago, to Elgin and Dundee, to DeKalb, Yorkville, and Morris and Joliet. It was founded in 1834 by Joseph and Samuel McCarty; at first there were two incorporated villages, one on each side of the river, until 1840, they were made one municipality and organized as a city. Aurora is an important manufacturing city, having a variety of extensive establish¬ ments; these include the shops of the Chicago, Burlington & Quincy Railroad, cotton mills, wheeled scraper factory, railroad dump cars, racing sulky, paint, door hangers, chemical supplies, wrappers, shirts, corsets, steel cabi¬ nets and shelving, flour, mattresses, roofing, silverware, lithographing, cooperage, fertilizer, toilet articles, binder board, automatic tools, stoves and ranges, brick, brushes, typewriter supplies, conveying machinery, gravel plants, condensed milk, acetylene gas, woodworking machinery, pumps, motorcycles, grindstones, paper boxes, gas mantles, millwork, well ma- chiner}'. There are several foundries and machine shops, and a large number of small manufactories. The United States census of manufactures for 1914 recorded 140 industrial establishments of factory grade, employing 5,497 persons, of whom 4,778 were wage earners, receiving $3,033,000 annually in wages. The aggregate capital employed was $14,806,- 000, and the year's output was valued at $10,- 789,000; of this, $5,530,000 was added by manufacture. There are five national banks and one State bank. The citv has 43 churches, a good system of public schools, including two high schools, the East

High School and the West High School, and a public library, a building for which was presented by Andrew Carnegie. It is also the seat of the Advent Christian Col¬ lege, and of the Jennings Seminary for young women. There are fine buildings owned by the Y. M. C. A. and the Y. W. C. A., a city hospi¬ tal and Saint Joseph and Saint Charles hospi¬ tals, and a new State armory. The govern¬ ment is vested in a mayor and city council of 14, seven of which are selected each year, for a term of two years. The water and electric lighting plants are owned and operated by the city. Aurora was the first city in the world to light its streets by electricity. Pop. (1900) 24,147; (1910) 29,807, an increase of 23.4 per cent; (1916) 36,000.

AURORA, Ind., a city in Dearborn County, on the Ohio River, C., C., C. & St. L. and the B. & O. S. W. railroads, 29 miles southwest of Cincinnati, Ohio, with which it has regular steamboat connection. There are extensive car and machine shops here, and manufactories of furniture, wheels, tools, barrels, buggies, coffins, brick and flour. It has also a large grain and hay trade. There is a public library and a fine public park. Aurora was settled in 1819 and chartered as a city in 1848. Pop.

(1920) 4,299.

AURORA, Mo., -city in Lawrence County, situated on the St. L. & S. F. and St. L„ I. M. & S. railroads, 30 miles southwest of Spring- field, 18 miles northeast of Pierce City. The chief industries are fruit growing, lead and zinc mining and farming. There are also flour mills, foundries and machine shops, marble works and a canning factory. Aurora has two banks with $75,000 capital. The city has adopted the commission form of govern¬ ment, and is supplied with water from dams in the White River. Pop. 4,148.

AURORA, Neb., city, county-seat of Hamilton County, on the Burlington and Missouri River Railroad, 105 miles southwest of Omaha. Though extensive brick yards and flour mills are operated in the town, it is mainly a stock raising and farming centre. The community owns its own waterworks. Pop. 2,630.

AURORA, N. Y., village in Cayuga County, situated on Cayuga Lake, 25 miles northwest of Ithaca, on the Lehigh Valley Railroad. It is the centre of an agricultural region, and is a residential town and favorite summer resort. It is the seat of Wells College for Women, the Wall court School for Girls and the Somes School for Boys. Aurora is two miles south of the site of the Jesuit mis¬ sion to the Cayuga Indians, started in 1656, and was settled in 1789. The government is by town-meeting, held every two years to elect officers. Pop. (1920) 416.

AURORA (Greek, Eos'), in mythology, daughter of Hyperion and Theia, and sister of Helios and Selene. She is goddess of the dawn; rises from the ocean, drawn by the celestial horses, Lampus and Phsethon, and with rosy fingers raises the veil of night, shedding light upon the world. She was the wife of the Titan Astrseus. Boreas, Notus, Hesperus and Zephyrus, and the other stars were her children. In art she appears as

present at the death and burial of Memnon, as carrying away her favorites, as a goddess of light rising from the sea in a chariot with

winged horses.

AURORA, a famous painting by Guido Reni, on the ceiling of the Casino Rospigliosi in Rome. Aurora precedes the sun god and strews flowers in his path. The fresco is remarkable for its coloring and is the painter's greatest work.

AURORA BOREALIS (French, anrore boreale; German, Nordlicht), the northern light. An illumination in the sky, seen often- est north of middle latitudes in the northern hemisphere, and south of them in the southern hemisphere. In our hemisphere it is generally visible in the north, and has, therefore, been called the Aurora Borealis. In the southern hemisphere it is called the Aurora Australis.

The frequency with which it- is seen varies with the latitude of the place. It is compara¬ tively rare within 45° of the equator, but be¬ comes more frequent toward the north up to the latitudes of about 60°, where it sometimes becomes almost a nightly occurrence. Nearer the pole it again becomes less frequent. We shall first describe it as it is commonly seen in our own latitudes. The first noticeable phenomenon commonly occurs after the end of twilight, when the northern sky near the horizon will be seen illuminated with a light somewhat like that of the dawn. Careful examination will show, however, that the il¬ lumination is in the form of a broad arch, highest near the magnetic north, and reaching the horizon in the northeast and northwest directions. Presently beams of light are seen crossing this arch with a quivering or flicker¬ ing motion and shooting toward the zenith. Each beam constantly varies in brightness and seemingly fades away to give place to another.

In more northern latitudes, say north of 45° or 50°, these beams form the most brilliant feature of the aurora. Sometimes they are arranged in curved, wavy lines like the slats of a window shade flying in the wind, giving the appearance of a scroll in the process of being unrolled. In the case of a very brilliant aurora the beams may cover almost or quite the entire sky. In this case they will be seen to converge toward a point commonly not far from the zenith. The appearance presented by the beams grows out of the direction in which they are seen and from the laws of perspective. Long-repeated observations show that the rays are really parallel to the direction of the dipping, needle, or to the lines of the earth's magnetic force. In the latitudes which we have mentioned, the dip is commonly more than 60°, increasing to 90° at the magnetic pole; hence when a great number of beams, all parallel to each other, are viewed, from a point on the earth's surface under the region in which they are found, they

all seem to con¬ verge according to the laws of perspective, loward that part of the skv to which the upper (south) pole of a dipping needle is directed. If the parallelism to the magnetic lines is ex¬ act, the direction of this point should be the same as that of the compass needle itself. It is still an open question where the parallelism is exact. Manv observations seem to show a deviation of 10° or more, but the determina-

tion of the exact centre of convergence is diffi¬ cult unless the rays are so numerous as to cover a large part of the sky, and it is not certain that the deviation may not be due to errors of estimation.

The Nature of the Auroral Light. — As

a general, perhaps universal, rule, the rays or beams which we have described have a slightly yellowish tinge. When their light is analyzed with the spectroscope, many lines, in one case nearly 150, have been found in the spectrum. Of these the brightest and most constant is in the yellowish green part of the spectrum, hav¬ ing a wave length of 557. This line is char¬ acteristic of the aurora, and is almost certainly due to krypton. Several of the others have been identified with the lines of oxygen and of nitrogen, a result which might have been ex¬ pected since it is practically certain that the aurora is due to an electrical discharge in or through our atmosphere.

The light of an aurora does not proceed wholly from the beams. Very irregular sheets of light, having the appearance of thin lumi¬ nous clouds, are often seen. These are of various colors, red being especially frequent. The appearance is then that of a red cloud illuminated by the rays of the sun sometime after the latter has set. The light can, how¬ ever, be easily distinguished from that of a cloud by its diffused character and the ab¬ sence of any definite outline. The height of the region in which the auroras are formed has never been definitely determined. The most important question is, whether the height is, in any case, above the upper limit of the atmosphere. This question is all the more difficult in that this limit is in itself an uncertain quantity. Observations of shooting stars show that these objects become visible at a height of about 100 miles above the earth's surface. The limit of the atmosphere must therefore be as high as this, and may be much higher. The difficulty of making observations upon the same auroral beams, at one moment, at different points of the region from which

they are visible, is such that no exact deter¬ mination of the height of a beam has ever been made. There is some reason to believe that the height may sometimes range from 100 to 150 miles, but there is no reason to believe that a beam is ever seen above the possible limit of the atmosphere. It might be supposed that by laying off a suitable base line on the earth, from the extremities of which the alti¬ tudes of selected portions of the light are measured, the heights might be determined in a very simple manner, and indeed in the older meteorologies results of observations made in this way are frequently stated. But it is now regarded as certain that such figures can claim but little accuracy. If the base is a long one, as is necessary in measuring the greater heights, it is very uncertain whether the two observers are measuring to the same region of illumina¬ tion, beside which the very rapid motions of such regions in auroral display introduce a further element of uncertainty.

The lower limit of the aurora cannot be said to have yet been accurately determined but it is probable that this must in some cases be placed within a mile or two of the earth's surface, if, indeed, it does not sometimes ex¬ tend almost to the ground itself. Trustworthy

observers have in some cases seen the beams between their own positions and a nearby mountain, or below the clouds, while careful measurements of the heights of low lying auroras have been secured. It is also very fre¬ quently observed in countries where auroras are numerous that the phenomenon is accom¬ panied by a crackling sound, somewhat resem¬ bling the rustling of silk or straw, or the electrical sputterings accompanying wireless messages. Such sounds have been described in the Arctic regions as regularly increasing and decreasing in intensity as the brightness of the aurora waxed and waned. In such cases the aurora must have been very near the ground ; it is not to be expected that any sound can be detected in lower latitudes, where the aurora occurs at a far greater altitude.

Cause of the Aurora. — Science has not been able to determine as yet with certainty and precision the cause of this very common phenomenon. When the luminous effect pro¬ duced by the passage of electricity through the highly rarefied air of a vacuum tube was first observed, its resemblance to the aurora led to the view that the latter was produced by electric currents in the upper regions of the atmosphere. Although it is not impossible that such currents may be associated with the aurora, they do not adequately explain its light, and are apparently inadequate to explain its rays. Yet there is no doubt that the aurora is associated in some way with the magnetism of the earth. The coinci¬ dence of the rays of the aurora with the

direc¬ tion of the magnetic needle is one proof of this relation ; another proof is found in the rela¬ tion of the aurora to magnetic storms. The general rule is, that a very brilliant aurora is associated with such a storm, disturbing the magnetic needle not only at the point where the aurora is visible, but perhaps over the whole earth. Earth currents so strong that from time to time a line of telegraph may be run by them are also occasional accompaniments of a bril¬ liant aurora, but although the intimate connec¬ tion of the two phenomena is so well estab¬ lished, the exact relationship is yet to be worked out. In recent years Arrhenius has propounded a theory, based on the very probable fact that the sun emits a flood of corpuscles of a nature similar to that of the mysterious rays known as X-rays, cathode rays, electrons, etc., the investi¬ gation of which has occupied so large a place in recent physics. His theory is, that these cor¬ puscles on approaching the earth are acted on in the direction of the lines of its magnetic force round which they describe helices. While nothing as yet has been found to disprove this theory, it is one which still needs much prov¬ ing. What can be said with reasonable prob¬ ability is that the aurora is caused by irregular emanations of corpuscles from the sun, which are stopped in the upper regions of our atmos¬ phere.

Periodicity of the Aurora. — Records of auroras extending back two centuries or more show that they have been much more numerous at some periods than at others. Sometimes it has been suoposed that they have been more numerous at intervals of 33 or some fixed number of yfears, but this has not yet been proved, nor has any law been determined by which we can definitely say at what times they appear in the greatest number. But several

periods are observed which show that the ap¬ pearance of the aurora is in some way con¬ nected with the sun. The first instance of this is the fact that they are more numerous when the spots of the sun are more numerous. As there is an 11-year period in the spots on the sun, so there is a corresponding period in the aurora. There is also a semi-annual period in the frequency of the aurora, the greatest number being observed in March and Septem¬ ber and the smallest in June and December. Arrhenius has connected this with the fact that in March and September the earth is over the region of the sun’s surface in which spots are more numerous. Statistics also show that there are

more auroras in the northern hemisphere when the moon is south of the equator than when she is north. This, how¬ ever, is not proved to be a general law. There is also an observed period of 25.93 days in the frequency of the aurora. This is so near the time of the sun's rotation that it may be con¬ nected with the latter. Consult Angot, (The Aurora) (International Scientific Series).

Simon Newcomb.

Revised by Eric Doolittle, Director Flower Astronomical 0 bserva t o ry .

AURORA LEIGH. 'Aurora Leigh, > a narrative poem or "novel,® as Mrs. Browning herself termed it, was begun in Italy, and com¬ pleted in London in 1856. This romantic auto¬ biography in blank verse tells, in nine books, the story of its half-English, half-Italian heroine ; of her struggles to live by and for her art; and of the final triumph of her love for her cousin, the reformer Romney Leigh.

As a novel, 'Aurora Leigh) was immedi¬ ately and enormously popular. But the poem holds other appeals to modern readers. Those who find its action undramatic, its characters unconvincing, its scenes unreal, its style too often that of rhetoric, not of poetry, will still turn to it as an inexhaustible mirror of its age. For in it lives mid-Victorian England: its complacent wealth and appalling poverty; its ladies of fashion and its prostitutes; its Fourierists and its Christian Socialists. It is in depicting the failure of Romney's reforms that Mrs. Browning voices the conviction that gives the poem its theme :

" 'Tis impossible

To get at men excepting through their souls.

And poets get directlier at the soul

Than any of your economists."

And some readers will prize 'Aurora Leigh *as the record of the heart and mind of Eliza¬ beth Barrett Browning: her keen satire on the English social order; her fearless sympathy with its victims; her recognition of the poet as the true interpreter of modern life; her exaltation of the creative power of love. Such readers will find in 'Aurora Leigh,* the poem into which Mrs. Browning's "highest convictions upon Life and Art have entered,® the record of a woman greater than her poem. For full bibliography, see 'The Cambridge History of English Literature *(Vol. XIII, Ch. 3). Con¬ sult also Montegut, Smile, 'Ecrivains modernes de l'Angleterre) (Deuxieme*

seriej Paris 1889) ; Texte, Joseph, 'Etudes de litterature euro- peenne (Paris 1898).

Frances Wentworth Cutler.

AURUNGZEBE, a'rung-zeb', the last im¬ portant emperor of Hindustan, of the Mogul dynasty: b. 22 Oct. 1618; d. Ahmednuggur, 21 Feb. 1707. He was the son of Shah Jehan, and properly named Mohammed, but received from his grandfather that of Aurungzebe (Ornament of the Throne), by which he is known to his¬ tory. Aurungzebe, in 1658, was crowned sole monarch of the great Mogul empire. Consult Stanley Lane-Poole, 'Aurungzib *(London 1893) ; Sarkan, T. N., 'Anecdotes of Aurang- zib) (ib. 1812) ; id., 'History of Aurangzib* (ib. 1913).

AUS DEM LEBEN EINES TAUGE- NICHTS (1826) ("Out of the Life of a Good- for-Nothing®), by Josef Freiherr von Eich- endorff is one of the most pleasing products of German romanticism, a story of perennial charm. The hero, whose name, oddly enough, is never disclosed, listens dreamily to the melody of his father's mill-wheel, but he hears rather the call of the open road, and with naive recklessness he simply wanders forth from the humdrum and the every-day on a quest for the unknown, his only luggage being his violin. The story is the record of his diverting and highly romantic adventures. His attitude as a traveler may well be described in the words of another wanderer with whom he journeys for a time : "When we start out in the morning, the finest thing about it is that we have no idea what chimney is smoking for us that day, or what good fortune may be ours before night¬ fall.® But, unlike various other stories of romantic wandering, Tieck's 'Franz Stern- balds Wanderungen,* for example, Eichendorff's tale has a genuine plot upon which a substan¬ tial part of the interest depends. As a late product of the romantic era, the story lacks the earlier vagueness, mysticism or morbidity of the school ; it is an unsurpassed example of romantic "Wanderlust,® and it illustrates as well the characteristic turning of northern eyes toward the colorful lands of the south, for the hero seeks the road to Italy and finds it. Eichendorff's talent was essentially lyric, and his little story is flooded with lyric feeling; in it, indeed, several of his most charming lyrics are embedded; for example: Wem Gott will rechte Gunst erweisen, den schickt er in die weite Welt ("When God a special favor granteth, He sends one roaming through the world®, or, Wer in die Fremde will wandern ("Who in distant lands would wander®). Con¬ sult trans. by C. G. Leland, 'Memoirs of a Good- for- Nothing) (New York 1866), and by Mrs. A. L. Wister, 'Leaves from the Life of a Good-for-Nothing) (Philadelphia 1889).

Harvey \V. Thayer.

AUSABLE (o-sab'l) CHASM, a pictur¬ esque and popular American summer resort, in New York State, 12 miles from Plattsburg and one mile from Keeseville. It is an isolated for¬ mation, wholly independent of, and discon¬ nected from, any other similar panorama. At the beginning of the chasm, the river is hemmed into a channel not more than 10 feet wide by walls of rock from 100 to 200 feet high. Lower down the walls gradually spread apart till in some places there is a distance between them of 50 feet, and then extend with sharp turns and occasional enlargements for nearly two miles. Lateral fissures, narrow and deep, pro-

ject from the main ravine at nearly right an¬ gles, and through one of these a staircase of over 200 feet reaches to the abyss. The walls are formed of laminae of sandstone, laid in precise and regular order, and their crevices are filled with a thick growth of hardy pines and cedars. The trip through the chasm may be made in a small boat or on foot. For the accommodation of tourists, stone walks with substantial iron railings and firm bridges have been constructed.

AUSCULTATION, a method of ex¬ amining the body by means of the sounds given to the ear. The naked ear may be used, or instruments, such as the stethoscope (q.v.), or the phoneidoscope, be employed. The natural sounds may be alone investigated, as in listening to the breathing sounds, or the heart sounds, or the organ, or that portion contiguous or re¬ mote from the organs, may be tapped, or per¬ cussed, to determine variations in the res¬ onance. All of the parts of the body may be investigated by these means. Auscul¬ tation is probably, next to inspection, the oldest mode of investigation. Hip¬ pocrates II used it extensively, but it was not until Laennec, in 1816, gave his demonstra¬ tions that the method came to be recognized as one of the most important in the diagnosis of diseased conditions. Early views had it that the sounds produced were capable of directly revealing the nature of disease and Skoda first demonstrated that they were only manifestations of peculiar physical states of the body. Con¬ sult Butler, diagnostics of Internal Medicine) (1901); Cabot, (Physical Diagnosis > (New York 1912) ; Le Fevre, (Physical Diagnosis) (ib. 1905) ; Sahli, dntersuchungsmethodenP See Percussion.

AUSGLEICH (ous'-gliH) OF 1867, The,

a compact by which was created the present close union between Austria and Hungary ; the Austro-Hungarian monarchy. According to the provisions of this document, the two monarchies have, first of all, a common ruler, the emperor of Austria being also the Apostolic King of Hungary. He is crowned both at Vienna and Buda-Pesth. Aside from that, the agreement extends to a common administration for certain matters of state; a customs union, a joint commercial policy, a uniform system of coinage and weights and measures, as well as a joint control of industrial monopolies and the railways. In foreign affairs the two nations have only one policy, as well _ as one financial policy. In military organiza¬ tion they are practically one state. Each nation has an independent Parliament, but the two ministries are controlled by a third body, a joint Parliament, known as the Delegations. This body is made up of representatives of both governments, each delegation numbering 60 members, elected by their respective Parlia¬ ments. They meet alternately each year in Vienna and Buda-Pesth, though much of their business is carried on by correspondence. The various provisions of the Ausgleich are re¬ newable every 10 years. In 1897 the agree¬ ment regarding the customs union failed of re¬ newal, and was later replaced by a reciprocity treaty. The last general renewal was in 1907.

AUSONIA, a poetical synonym for Italy; so used by Virgil and other Roman poets.

AUSONIUS DECIMUS MAGNUS, the

most distinguished Roman poet of the 4th cen¬ tury a.d. : b. Burdigala (Bordeaux) about 310; d. about 392. He studied under several dis¬ tinguished masters, and became at last pro¬ fessor of rhetoric in his native city, whence his fame extended through the whole empire. Valentinian entrusted to him the education of his son, Gratian, and appointed him afterward quaestor and praetorian prefect. After Gratian had ascended the throne he showed himself not less grateful to his preceptor. About the year 379 he appointed him consul in Gaul. After the death of Gratian, Ausonius lived upon an estate at Bordeaux, devoted to literary pursuits. As. Valentinian was of the Christian religion, it is probable that Ausonius was so, too ; and many of his writings confirm this conjecture. Critics are not unanimous on the subject of his poetical merits. He is undeniably learned and ingenious, but his style and versification have the blemishes of the age, and his Latin is im¬ pure. His epigrams, idyls, eclogues, letters in verse, etc., are extant. The best edition is that of (Peiper) (Leipzig 1886). Consult De- lachaux, A., (La latinite d'Ausone) (Lausanne 1909) ; Dill, (Roman Society > (London 1899) ; Mackail, (Latin Literature> (New

York 1896).

AUSPERG, Karlos, Prince. Austrian statesman: b. 1 May 1814; d. 1890. After a long service in the army he became a member of the upper chamber of the Austrian Reichsrath. Later he became president of the Austrian House of Peers, where he used all his influence against the Clericals. In 1868 he presided over the ministry and strongly sup¬ ported the Liberal Cabinet, at the head of which was his younger brother Adolf.

AUSPICES. See Auguries and Auspices.

AUSTEN, Jane, English novelist: b. Steventon, Hampshire, 16 Dec. 1775; d. Win¬ chester, 18 July 1817. Miss Austen was the daughter of the Rev. George Austen, 'rector of Steventon and Deane, and Cassandra Leigh Austen, daughter of the Rev. Thomas Leigh and niece of Theophilus Leigh, for many years master of Balliol College, Oxford. Jane was the youngest of seven children, of whom others besides herself, particularly Admiral Francis William Austen, became distinguished. Until 1801 she lived at Steventon. Her life here was quiet, domestic and moderately studious. Much of her spare time she spent in writing, chiefly for her own amusement. In 1801 the family removed to Bath, whence Miss Austen made visits to Lyme, Southampton and other places in the south of England. Her father died in 1805, and in 1809 she settled at Chawton, in Hampshire, where she remained until within two months of her death. In May 1817, after some months of ailing health, she went to Winchester for treatment, and there died in the following July.

Miss Austen began writing stories at an early age, and before 16 is said to have com¬ posed good-humored nonsense. The first of her extant novels, (Pride and Prejudice, > was written between October 1796 and August 1797. Before that she had written (Eleanor and Marianne, > which, in 1797-98, she altered into the present (Sense and Sensibility.* Her third novel, (Northanger Abbey,) belongs to 1798. The first of these novels to be published was

(Sense and Sensibility,3 in 1811. Two years later (Pride and Prejudice,3 which had been re¬ fused by a publisher in her father's lifetime, made its appearance. (Northanger Abbey3 had an even

longer period of darkness ; in 1803 it had been sold to a publisher for £10, but the publisher, after keeping it 10 years or more, sold it back to the family, by whom it was issued in 1818, the year after the author's death. In 1804, Miss Austen began (The Watsons,3 but never finished it, and until 1811 apparently did comparatively little writing. Between that year and 1816, however, she wrote (Mansfield Park,3 (Emma 3 and (Persuasion, 3 published respectively in 1814, 1816 and 1818. There is also an unfinished story, (Lady Susan.3

The novels were not especially popular in the author's lifetime, though Scott and Macaulay (a little later) paid sincere and high tribute to their excellence. To-day they are regarded as among the best novels in the lan¬ guage and are probably as widely read as those of any first-rate woman novelist in English. The reason for their high place appears to lie in Miss Austen's skill as a story-teller and a drawer of character. The people she deals with are chiefly from the higher middle classes in the English country, and she rarely goes above or below them. In a time, that of the Napoleonic wars, when there was every tempta¬ tion, to write battle stories and heroics, Miss Austen kept her eye on the life that she knew, and had nothing to do with spectacular means of arousing interest. The aspect of the few warriors and seamen who come into her pages is domestic rather than martial. Nor is there any very serious adventure of any sort ; the worst that happens is an elopement, or when a heroine slips down stairs and is stunned. Her people are quite unintellectual and in no wise grand or heroic. On the whole, her material is less startling than that of any English novelist, but the picture which she gives is unsurpassed in the perfection of truth, humor and vivacity. As a story-teller, she has, in point of technical construction, no superior. Her plots are not elaborate and there is no conspicuous wealth of invention ; in all her six novels the plot turns on an elopement or a hidden engagement ; but, granting this, the construction of (Pride and Prejudice,3 <Emma) and (Mansfield Park3 is not to be bettered. They are models of their class of story telling. As an artist in character drawing, Miss Austen has contributed to the gallery of familiar persons such figures as Miss Bates, Mr. Woodhouse, Mrs. Bennet, Mrs. Nor¬ ris and a number of others, all of whom arc brilliant, though occasionally exaggerated, creations. All her important characters are strongly individual, and are so firmly drawn that there is no tendency to confuse them as types or as persons.

(Pride and Prejudice) is usually regarded as the best of the novels in point of liveliness of style, neatness of structure and vigor of substance. This position would be disputed by admirers of the more intricate <Emma) and the more intricate and gloomy (Mansfield

Park,3 both of which probably surpass (Pride and Prejudice) in maturity and variety of char¬ acterization. (Northanger Abbey) is less ambitious than either of the preceding; it is a very vivacious burlesque, with a charming moral. The other two novels, (Sense and

Sensibility3 and ˆPersuasion,3 are usually thought to be inferior. See Pride and Preju¬ dice; Arrow Maker, The; Emma; Mansfield Park.

Bibliography. — Excellent editions of the novels of Jane Austen are easily to be had. The principal life is the Rev. J. E. Austen Leigh's (Memoir of Jane Austen3 (London 1870). There is also a life by Goldwin Smith in the (Great Writers3 series (New York 1890). The place of Jane Austen in literature is treated in such literary histories as Mrs. Oliphant's (Literary History of the 19th Century3 and W. L. Cross's (The Development of the English Novel.3 W. D. Howells, in (The Heroines of English Novels3 (1901) and (Criticism and Fiction3 (1891) pays very high tribute to Miss Austen as an artist and as a creator of char¬ acter. Recent works are Constance Hill's (Jane Austen: Her Home and Her Friends3 (New York 1902) ; Mitton, G. E., (Jane Austen and Her Times3 (London 1905) ; Austen-Leigh, (Jane Austen: Her Life and Letters: A Family Record3 (New York 1913) and Cornish, in (English Men of Letter Series3 (New York

1913).

William T. Brewster, Professor of English, Columbia University.

AUSTEN, Peter Townsend, American

chemist: b. Clifton, S. I., N. Y., 10 Sept. 1852; d. 1907. He was educated at Columbia Univer¬ sity, School of Mines, and in Germany and Switzerland. In 1876, he was appointed in¬ structor of chemistry at Dartmouth; in 1877. professor of chemistry at Rutgers. From 1887 to 1893 he was engaged in industrial work, and 1893-98 was professor of chemistry at Brook¬ lyn Polytechnic Institute. He invented several useful manufacturing processes ; wrote a num¬ ber of valuable papers, and translated Pinner's (Repetitorium der organischen Chemie3 under the title (An Introduction to the Study of Organic Chemistry,3 and published the volume (Kurze Einleitung zu den Nitro-Verbindungen3 (Leipzig 1876).

AUSTERLITZ, ous'ter-lets, Moravia, a town on the Littawa, 13 miles southeast of Briinn. In the vicinity, on 2 Dec. 1805, was fought the famous battle between the French army of 80,000 men, commanded by Napoleon, and the combined Russian and Austrian armies,

numbering 84,000, under their respective em¬ perors ; in which the former achieved a signal victory. According to Alison, the allies lost 30,000 in killed, wounded and prisoners, and the French, 12,000. The battle was followed by an armistice, the terms of which were dictated by Napoleon; and immediately after, on 26 Decem¬ ber, by the Treaty of Presburg, which disas¬ trously affected Austria. The battle of Auster- litz is sometimes called <(The Battle of the Three Emperors.33 The present town has a population of about 4,000.

AUSTERLITZ, The Sun of, a term given to any favorable omen, in allusion to the bril¬ liant appearance of the sun just before the bat¬ tle of Austerlitz, and which Napoleon accepted as a token of coming victory.

AUSTIN, Saint. See Augustine, Saint.

AUSTIN, Alfred, poet laureate of Eng¬ land, critic and journalist: b. Headinglv, near Leeds, 30 May 1835; d. Kent, 2 June 1913. He

was the son of a wool merchant, educated at Stoneyhurst, Oscott and London University; called to the bar in 1857. After his father's death he abandoned the law and devoted him¬ self to study and travel, and in 1864 he pub¬ lished his first success, (The Season; a Satire, *after Byron. He had, however, written vol¬ umes of verse earlier. He ran for Parliament in 1865, but was defeated. In 1867 he joined the staff of the Standard, at that time one of the most influential London dailies, which ceased publication 16 March 1916. For this paper he wrote many Headers, reviews and biographies, and so stamped his personality and opinions upon that journal that it was humorously called (<The Daily Alfred Austin.® Sent abroad, he did good work as special correspondent at the Vatican Council, the Prussian headquarters in the Franco-German War (1870), and the Berlin Congress (1878). He was editor of the Na¬ tional Review, 1883-93. His appointment as poet laureate in succession to Lord Tennyson, but nearly four years after the latter's death, was the cause of much surprise and comment. It was known that Swinburne, Browning and William Morris — his greatest contemporaries — were out of the running owing to their pro¬ nounced radical tendencies, and his chief com¬ petitors were Lewis Morris and Sir Edwin Arnold. Austin could by no stretch of imag¬ ination be called a great poet; yet he performed his official work satisfactorily, though both his poetry and his criticism were decidedly con¬ servative and conventional. Perhaps his most attractive work was done in*

his pleasant books of garden life, of which (In Veronica's Garden was the most conspicuous. Some of his other works are (The Human Tragedy) (1862) ; <The Golden Age: a Satire) (1871) ; (The Tower of Babel, *a drama (1874) ; Savon¬ arolaˆ a tragedy (1881) ; (The Garden that I Love) ; (In Lamia's Winter Quarters) ; (Haunts of Ancient Peace) (1902) ; and (A Lesson in Harmony1* (1904). In December 1899, he pub¬ lished a war poem, (To Arms* ! and in May 1900, one on the relief of Mafeking. In 1865 Austin married Miss Hester Mulock, who survived him, but left no children. His successor in the poet laureateship is Mr. Robert Bridges (q.v.).

AUSTIN, George Lowell, American phy¬ sician and writer: b. Massachusetts 1849; d. 1893. Among his numerous works are (Perils of American Women *; (Water- Analysis*

(1882); (Under the Tide*; (Life of Franz Schubert*; (Popular History of Massachu¬ setts*; <Life of Wendell Phillips* (1888).

AUSTIN, Henry, American lawyer and legal writer : b. Boston, Mass., 21 Dec. 1858. He has been a commissioner of insolvency for six vears and is an associate justice of the munic¬ ipal court of Boston (West Roxbury district). He is the author of (American Farm and Game Laws *; (American Fish and Game Laws* ;

(Liquor Law in New England.*

AUSTIN, Jane (Goodwin), American novelist: b. Worcester, Mass., 25 Feb. 1831; d. Boston, 30 March 1894. Her works include (Fairy Dreams *(1860); (Moonfolk* (1874); (Mrs. Beauchamp Brown *(1880) ; (A Name¬ less Nobleman* (1881); (The Desmond Hun¬ dred *(1882); (Nantucket Scraps* (1882);

(Standish of Standish *(1889); (Betty Alden*

voi.. 2 — 36

(1891); and (David Alden's Daughter and Other Stories* (1892).

AUSTIN, John, the most distinguished of English writers on jurisprudence: b. Creeling Mill, Suffolk, 3 March 1790; d. Weybridge, Surrey, 1 Dec. 1859. He entered the army in 1806 and served as a subaltern in Sicily and elsewhere until 1811, when he resigned his com¬ mission, returned to London, and took up the study of law. In 1818 he was called to the bar, and in 1820 married Miss Sarah Taylor of Norwich, a talented woman, to whose devo¬ tion and purpose Austin's success is in great part due. He removed to Westminster, where he became the intimate of some of the greatest minds of England, among others, of Jeremy Bentham and John Stuart Mill. His weak con¬ stitution coupled with a lack of courage hindered his success at the bar despite his great natural gifts and adequate legal knowledge. He retired from practice in 1825 and in the following year was appointed to the chair of jurisprudence in the newly-founded University of London. Jurisprudence had not yet received its due share of scientific study and as a science was neglected; hence Austin's efforts in this direction received scant recognition and his work may be classed a failure. The better to qualify himself for his task he spent some time at Bonn in reading and study under Niebuhr, Brandis, Arndt, Welcker and others who at that time made Bonn the chief seat of juristic learn¬ ing in Europe. Austin returned to his class¬ room early in 1828 but his earnestness coupled with his precise and accurate definitions and classifications evoked scant enthusiasm among his students, whose number gradually dwindled until in 1832 he was obliged to resign his post. In this same year he published cThe Province of Jurisprudence Determined, *a work that placed its author in the foremost rank of writers on this subject. It was little appreciated by the public, however, and Austin was not en¬ couraged to undertake other works of the kind. In the course of the following years he served on several royal commissions, one of which in 1836 took him to Malta. But here his health broke down, and on returning to England he was ordered abroad by his physicians. He re¬ mained on the continent until the troubles of 1848 in Europe drove him back to England, where he settled at Weybridge, residing there until his death. His widow issued a second edition of (The Province of Jurisprudence* in 1861, and in her introductions gives a pathetic account of Austin's life struggle. In 1863 she collected and arranged for publication his lectures on the principles of jurisprudence, which were issued under the title (Lectures on

Jurisprudence, Being the Sequel to The Province of Jurisprudence Determined.* Austin's fame rests on these lectures, which are remarkable for the clearness and penetration of their analysis of legal conceptions. Austin is the first systematic writer on law in the Eng¬ lish language. His work revolutionized the science of jurisprudence and exerted a wide influence on the legal thought of the last half of the 19th century. In the 20th century this influence appears to be on the wane owing to the larger conception of human society now possible and the historical spirit which has so moulded the thought of our day. For a defense

of Austin's theories consult Holland, Thomas E., (Elements of Jurisprudence5 (1900) and Brown, W. Jethro, (The Austinian Theory of Law) (Boston 1910). For the opposite view consult the works of Sir Henry S. Main, es¬ pecially (Early Law and Custom5 (London 1883) ; and (Early History of Institutions) (ib. 1875). Consult also Mill, John Stuart dissertations and Discussions) (4 vols., Lon¬ don 1875). See Jurisprudence; Law.

AUSTIN, Jonathan Loring, secretary and treasurer of Massachusetts: b. Boston, 2 Jan. 1748; d. 10 May 1826. He was graduated at Harvard in 1766, engaged in trade at Ports¬ mouth, N. H., and in 1775 entered the army. For a time he was secretary of the Massachu¬ setts Board of War and in 1777 was sent to Paris to announce to Franklin Burgoyne's surrender at Saratoga. He remained two years in Paris as Dr. Franklin's secretary. He also spent some time in England as agent of Dr. Franklin. On his return in May 1779, he was liberally rewarded by Congress. In 1780, in his passage to Spain as agent of the State, he was taken and carried to England. He afterward held the offices of State secretary and treasurer in Massachusetts, and died universally re¬ spected. His son, James Trecothic: b. Bos¬ ton, 7 Jan. 1784, studied law, rose in the profession, and was attorney-general of the State from 1832 to 1843.

AUSTIN, Mary Hunter, American author and playwright : b. Carlinville, Ill., 9 Sept. 1868. She was graduated from Blackburn University, after which she spent 17 years in acquainting herself with the life of the Indians in the Mo¬ have Desert. This experience has furnished her the material for most of her works, which are (The Land of Little Rain5 (1903) ; (The Basket Woman5 (1904) ; (Isidro5 (1905) ; (The Flock5 (1906) ; (Santa Lucia5 (1908) ; (Lost Borders5 (1909) ;

(Christ in Italy5 (1912) ; (The Lovely Lady5 (1913). In 1911 she had produced a play, (The Arrowmaker,5 at the New Theatre, in New York city; Wire, 5 a drama; Wove and the Soul-Maker5 (1914); (The Man Jesus5 (1915).

AUSTIN, Moses, an American who ob¬ tained the first grant from the Mexican govern¬ ment for the formation of an American colony in Texas: b. Durham, Conn.; d. January 1821. He forwarded to the commandant-general at Monterey an application for permission to colo¬ nize 300 families in some part of Texas. The application was successful, and the enterprise prosecuted by his son, Stephen F. Austin (q.v.).

AUSTIN, O scar Phelps, American statis¬ tician : b. Illinois. At the age of 12 he removed with his parents to Nebraska, where he re¬ mained until manhood. Engaged in journalism in Chicago and Cincinnati and Washington, serving as correspondent for newspapers in New York, Chicago and other cities. Appointed Chief of Bureau of Statistics, United States Treasury Department in 1898; resigned 1914 and became statistician of the National City Bank of New York. He is the author of (Uncle Sam's Secrets5 ; (Uncle Sam's Soldiers,5 and other publications for the instruction of youth in national and in¬ ternational affairs; (Economics of World Trade5; territorial Expansion of the United

States5 ; also of official monographs Com¬ mercial China5 ; Commercial Japan5 ; Com¬ mercial Africa5 ; (Russia and the Trans-Siberian Railway5 ; (American Commerce5 ; Commercial Alaska5 ; (Submarine and Land Telegraphs of the World5 ; Colonies of the World and Their Government5 ; Colonial Ad¬ ministration5 ; etc. He is secretary of the National Geographic Society; was lecturer on international trade and commercial geography in the George Washington University, 1904 to 1914, and before trade bodies in many cities ; honorary degree M.A. from George Washing¬ ton University; visited 20 principal countries in commercial studies.

AUSTIN, Sarah Taylor, English writer, wife of John Austin: b. Norwich 1793; d. London, August 1867. She was a member of a family distinguished for its literary and scientific attainments. She spent a long period of travel abroad, mainly in Germany, where she attained a wide knowledge of the German language and literature. Most of her works are translations from the German, the first of which was Che Travels of a German Prince in England5 (London 1832). Then followed Characteristics of Goethe,5 by Falk (1833); Che Story Without an End,5 by Carove (1834) ; and (History of the Popes,5 by

Ranke (1840). Among her original works are Considerations on National Education5 (1839); Cetters on Girls' Schools5 (1857). Her daughter Lucie married Sir Alexander Duff-Gordon.

AUSTIN, Stephen Fuller, American pioneer: b. Wythe Co., Va., 1792; d. 27 Dec. 1836. He was a son of Moses Austin. He followed up the grant for a colony in Texas previously issued to his father. By it he was clothed with almost absolute power over the colonists, and only obliged to report to the captain-general. He founded what is now the city of Austin, the capital of Texas. The colony prospered, and, being accompanied by a considerable number of similar associations, promoted an influx of Americans to such an extent that they met 1 March 1833, without the concurrence of the Mexican population, in a convention to form a constitution for the as yet Mexican state of Texas. Austin was one of the delegates chosen to carry the result of their deliberations to the central govern¬ ment at Mexico, and obtain its ratification. The delays and frequent revolutions at Mexico leading him to despair of ever bringing his commission to a close, he addressed a letter, 2 Oct. 1833, to the municipality of Bexar, and through them to the people of Texas, recom¬ mending a union of all the municipalities to provide against the consequences of a probable refusal of their applications b}ˆ organizing a state under the Acta constitutiva of 7 May 1824. This letter 'was considered treasonable, and Austin was arrested and held as a hostage for the good behavior of Texas. There he was detained until September 1835. He was appointed a commissioner to the United States in November 1835. This was before the Texan declaration of independence ; and it was not till after his arrival at New Orleans, and the information of the union of Santa Anna with the federal party for the invasion of Texas, that he was brought to the point of recom-

mending such a measure. He acted with prudence and patience, and was successful in preparing for the independence and annexation of the new republic. He was a candidate for the presidency, but. was defeated by Samuel Houston, who appointed Austin his Secretary of State. The latter, however, died suddenly on 27 December of the same year. He is looked upon as one of the most eminent and honor¬ able of the founders of Texan prosperity. Consult Wooten, (History of Texas) (2 vols., Dallas 1899) ; and Yoakum, (History of Texas) (New York 1856).

AUSTIN, William, American author: b. Massachusetts 1778; d. 1841; remembered for his striking and original tale, (Peter Rugg, the Missing Man, } in effect a New England variant of the Wandering Jew legend. Other works were (Letters from London) (1804) ; (An Essay on the Human Character of Jesus Christ* (1807). Consult (Literarv Papers of William Austin, 5 with biographical sketch (Boston 1870).

AUSTIN, Minn., city and county-seat of Mower County, situated on Red Cedar River, and on the Chicago G. W. and the Chicago, M. & St. P. railroads, 100 miles south of Saint Paul. It is the centre of a fertile agricultural region, producing live stock, corn, barley, flax and grass seeds, and has a large export trade, as well as a variety of manufacturing estab¬ lishments including a meat-packing factory, flour mills, cement works, railroad shops, brick and tile works, creamery, foundry, machine and steel works, roller mills, broom and brush factories, etc. It is the seat of the Southern Minnesota Normal College, and has several fine public buildings, among them a Carnegie library, county courthouse, State armory, post- office, central high school, and Saint Augus¬ tine's Roman Catholic Church and Methodist Episcopal Church. Austin was first settled in 1854, incorporated as a village in 1868 and chartered as a city in 1873. The present gov¬ ernment, vested in a mayor, elected biennially, and a city council, is under a charter adopted in 1903. The waterworks and electric-light plant are owned by the municipality. Pop.

(1920) 10,118.

AUSTIN, Texas, city, the capital, and county-seat of Travis County, situated on the Colorado River. It was settled in 1836, it was first called Waterloo, but in 1837, after the Texas Revolution, incorporated and renamed after Stephen F. Austin, the Father of Texas, and the county was named after William B. Travis who was killed at the Alamo. It was made the capital of the State in 1839 and has remained such since the admission of Texas to the United States. The first free school in the State was established here in 1871. Area is 16 square miles. Altitude ranges from 650 to 850 feet. It is 81 miles north-northeast of San Antonio by the International & G. N. Railroad, 166 miles west by north of Houston, and 205 miles northwest of Galveston by the same, and the Houston & Texas Central Rail¬ road; and on the Austin and N. W. Railroad; and on the Missouri, K. & T. Railroad. The city is beautifully located, 60 feet above the river, which here flows through very attractive scenery, is navigable for small river steamers in the winter and is spanned by two inde¬

structible bridges. An immense dam, 1,275 feet long, 67 feet above

bed rock, the twelfth longest in the world, was completed in 1916, for water supply and power. This dam creates a lake 29 miles long, known as Lake Austin, which is a favorite resort for fishing, hunting and health-seeking parties. This lake was made famous by two international regattas.

Stansbury of Australia won the championship of the world on this lake. There are in¬ numerable mountain streams flowing into the lake from the surrounding hills and moun¬ tains. The power house generates 6,000 horse¬ power. Much work is being done to construct beautiful drives on both sides of the lake. There is an inexhaustible supply of the best mineral water to be found, analysis is identical to the water of Carlsbad. There are 115

factories in this city, both large and small. These produce lumber, iron goods, flour and leather goods. There are oil refineries, com¬ presses, candy factory, gins and other similar factories. There is a very large export trade in agricultural products and live stock, hides, wool, cotton and grain. Austin is also the

wholesale supply centre for a great district in provisions, dry goods, drugs, agricultural im¬ plements, ranching supplies, etc. The ship¬ ment of canned goods is increasing very

rapidly. One of the largest canneries in the South is located in Austin. From one to three carloads of products are shipped from this plant every day. Austin is the largest pro¬ ducing and shipping point for spinach in the nation. The largest silk farm in America is located here. The city is well built with wide and well-shaded streets. There are about 18 miles of paved streets. Every section of the city is supplied with artificial gas, electric lights and pure water. The sewerage system is complete in every section of the city. There are 21 miles of street railway. The most prominent building is the capitol, which is the largest State building in the United States. It is built of granite and cost $3,500,000. Austin is the educational centre of the State with the State University and its many build¬ ings, accommodating the literary, law, educa¬ tional, extension and many other departments. There is also the Blind Institute, Deaf and Dumb Institute and the Insane Asylum. There are a number of other homes and schools such as the State Confederate Home, Saint Edward's College, Tillotson College for the Colored Pupils, Saint Mary's Academy, Texas Wesley¬ an College, Presbyterian Theological Seminary, one business college and a number of other schools. There are two high schools and 10 ward schools. The State land office and the county courthouse are prominent build¬ ings. The post-office receipts in 1916 were

$183,054.02. There are four banks and one trust company. The bank clearings for 1916 were $134,447,420.01. There are three hospi¬ tals and eight hotels. Value of building per¬ mits in 1916 was $1,845,099. Austin is the second city in the United States to have the commission form of government. The city owns its own waterworks and electric plant. Pop. (1920) 34,876.

AUSTIN FRIARS, an old monastery, built by the Earl of Hereford and Essex in 1253 and which still stands in Broad street, London.

After the abolition of the monasteries by Henry VIII, Austin Friars became a place of worship for the Dutch residents of London, which it has remained until this day.

AUSTRALASIA, as'tral-a'shia, a geograph¬ ical term of loose application, but usually re¬ garded by British geographers as comprehend¬ ing the continental island of Australia and an unascertained number of other islands, some of them very little known, lying between long. 110° and 180° E., and stretching from Papua or New Guinea, the farthest northern island of the division, to lat. 50° S. Besides the great island of Australia, it thus includes Tasmania, New Zealand, the Loyalty Islands (New Cale¬ donia, etc.), Norfolk Island, New Hebrides, Solomon Islands, New Ireland (Neu-Mecklen- burg), New Britain (Neu-Pommern), Admiralty Islands and New Guinea, besides numerous other islands and island groups. The island of Timor and those lying west of it, though coming within the general boundary above indicated, belong to the Eastern or In¬ dian Archipelago, called also Malaysia. Australasia is estimated to have an area of 3,- 740,000 English square miles, and a population of 6,400,000. It forms one of three portions into which some geographers have divided Oceania, the other two being Malaysia and Poly¬ nesia. In America the term is generally limited to Australia, Tasmania and New Zealand. Con¬ sult A. R. Wallace, (Australasia.)

~ AUSTRALIA, formerly known as New Holland, the world’s largest island and only sea-girt continent, lies between the Indian and Pacific oceans, to the southeast of Asia. It is separated from New Guinea on the north by Torres Strait, and from Tasmania, on the south by Bass Strait. The Tropic of Capri¬ corn divides it into two unequal parts. In the present article Australia, its geography, his¬ torical and political development, commerce and industry, social life, etc., are dealt with

under the following heads :

1. Area and Divisions 7. Municipal and Local Gov”

2. The Aborigines ernment

3. Discovery and Early His- 8. Education

tory 9. Literature

1. Political History 10. Religion

2. The Commonwealth, its 11. Industries and Commerce

Constitution, Govern- 12. Finance

ment and Administra- 13. Railways and Transpor-

tive Department tation

1. The States, their Consti- 14. The Labor Party

tutions and Govern- 15. Social Conditions

mental Departments 16. Military and Naval De¬

fense

1. AREAS AND DIVISIONS. Aus¬ tralia, the largest island in the world, is of con¬ tinental dimensions, with an area of approxi¬ mately 2,946,691 square miles. The smaller island, Tasmania, which is now included in the general term ((Australia,® as well as in the fed¬ eral Commonwealth, and has an expanse of 26,215 square miles, is 150 miles south of Aus¬ tralia. The total area of the federated states is thus 2,962.906 square miles. This does not in¬ clude British New Guinea, a territory of about 90,540 square miles, which is practically under the direction of the Commonwealth. The area of the respective states is — Western Australia, 975,876 square miles ; South Australia, 380,070 square miles ; Queensland, 668,497 square miles ; New South Wales, 309,175 square miles; Vic¬ toria, 87,884 square miles: Tasmania, 26,215

square miles. The Northern Territory, which now is under the Commonwealth government, is 523,620 square miles. With the exception of a small space in the northwest part of the con¬ tinent the whole of the land has been more or less explored and mapped and a

fairly accu¬ rate idea may be formed of its physical features, though new facts are naturally frequently dis¬ closed with the gradual advance of settlement over a sparsely populated country. Population of the island, exclusive of aborigines, estimated for 1915 was 5,000,000. The coast-line of Aus¬ tralia is somewhat less than 8,000 miles. Its widest part from east to west is 2,400 miles, and its deepest from north to south nearly 2,000 miles. The configuration of the island in places is so irregular that political terminology of some of the states is misleading. Victoria, for example, is more southerly than South Australia.

Geology. — The east coast of Australia is mostly rugged and rocky, and fringed with many islets. Part of the south coast is low and sandy, but on other portions are bold cliffs ris¬ ing several hundred feet sheer from the sea. The north and west coasts are generally de¬ pressed and scenically uninteresting, with mo¬ notonous sandhills. The interior, so far as explored, is largely composed of rocky tracts and sandy plains with little or no surface water, though thousands of artesian bores have re¬ vealed the presence of underground currents, which fertilize the soil, and transform deserts into highly productive areas. The whole con¬ tinent is an irregular plain with high ridges in the east, and a marked depression in the centre, in some parts beneath sea-level. The base of the table-land is granite, which appears on the surface on the southern and western sides. Si¬ lurian rocks are prominent in South Australia, where unmistakable marks of glacial action have recently been discovered. In the south¬ east and east the rocks are volcanic, Silurian, carbonaceous and carboniferous ; the coal de¬ posits on the eastern and parts of the western coasts are extensive, and brown coal has been found in South Australia, but at too great depths to be profitably worked, at a long dis¬ tance from the seaboard.

Minerals, etc — West of the Dividing Range are extensive plains largely used for pastoral and for agricultural purposes. The comparatively dry and scrub, or saltbush-cov¬ ered lands in the interior, are in many cases richly mineralized, and succeeding years show that they deserve less and less their old des¬ ignation of “desert.® On one of such “deserts® is situated the famous Broken Hill silver mine

in New South Wales, and on others the cele¬

brated Coolgardie and Kalgoorlie gold mines in Western Australia. In various parts of Aus¬ tralia and Tasmania are found, often in pay¬ able quantities (besides the royal metals and coal), tin, as well as

nearly all the minor min¬ erals and precious stones; while on the north¬ eastern, northwestern and northern coasts are probably the most extensive and productive

pearl-shelling waters known. It has been

shown, too, that the monotonous and extensive mallee country everywhere yields profitable returns when farmed under mixed cultivation and grazing systems ; while some varieties of the mallee itself contain water-yielding roofs

long used by the aborigines and capable of sus¬ taining the life of lost travelers.

Mountains. — There is no active volcano in the Commonwealth but some craters show signs of only recent extinction and of intermittent previous eruptions. A mountain range varying from 100 to 200 miles in width outlines the eastern and southern border of the continent ; and, broadly speaking, all the rivers of Southern Australia take their rise in this Great Dividing Range. The Australian Alps, in the southeast part of the Dividing Range, contain the highest mountain summits in Australia — Kosciusko (N.S.W.), 7,308 feet; Mount Bogong (Vic.), 6,508. These are the most elevated points on the continent. In Queensland peaks in the Be- lenden Ker Range rise to 5,400 feet, and in other parts of the state are several eminences of about 4,000 feet. In South Australia the loftiest range is the Flinders — Mounts Remarkable and Brown, 3,100 feet each; and the principal eleva¬ tion in the Gawler Range in the northwestern interior is about 2,000 feet. In Western Aus¬ tralia Mount William (3,000 feet) in the Darl¬ ing Range, and Ellen's Peak (3,420 feet), are the loftiest. Tasmania is very mountainous — highest peaks, Cradle Mountain 5,069 feet, and Ben Lomond 5,010 feet.

Rivers and Lakes. — The Australian

ftFather of Waters® is the river Murray, which with its chief tributary, the Darling, flows 2,400 miles before reaching the Southern Ocean on the South Australian coast, and with its Queensland extensions has in favorable seasons a mgth of about 3,000 miles navigable by small sˆamers. It is under agreement between the riparian states (South Australia, Victoria and New South Wales), now being looked to to im¬ prove navigation, and also to provide water ˆr irrigation. In the

Northern Territory, as well as elsewhere, some of the rivers are of large volume, and are navigable for compara¬ tively short distances. On the east coast are the Hunter, Clarence, Brisbane, Fitzroy and Burdekin ; on the west the Swan, Murchison, iscoyne, Ashburton and De Grey; on the

th the Fitzroy, Victoria, Flinders and

cchell. A considerable river on the interior .3 Cooper's Creek, or the Barcoo, which falls into Lake Eyre, one of a group of lakes on the south side of the continent having no outlet, and, accordingly, salt. The principal of these are lakes Eyre, Torrens and Gairdner, all of which vary in size and saltiness according to the season. Another large salt lake of little depth, Lake Amadeus, lies a little west of the centre of Australia. Various others of less magnitude are scattered over the interior.

Rainfall. — Speaking generally, wherever the land is elevated the rainfall is good. It varies from about 70 inches annually in the tropical zone to three or four inches or even less, in the arid interior regions, and in the southern part to about 40 inches. The fall diminishes in close relation to the decline in the elevation of the land, allowing for coastal in¬ fluence in the south, and tropical or sub-tropical conditions in the north.

Climate. — The climate of Australia is gen¬ erally temperate, and in summer hot and dry, especially in the southern and central parts, but very healthy. In the tropical portions heavy rains fall and in most of the coast districts

there is a sufficiency of moisture but in portions of the interior the heat and drought are some¬ times extreme. The air is, however, so ex¬ hilarating that even 120° F. of shade heat in Australia is less oppressive than 90° in London, Paris or New York, and cases of sunstroke are rare. This dry-hot atmosphere is especially recommended by medical men as an essential for sanitoria for sufferers from lung disease, and among the artesian waters in some of the arid country are highly mineralized springs with valuable medicinal properties. The dangers ot drought, too, are being largely reduced by the rapid extension of the artesian boring area. At Melbourne (Vic.) the mean temperature is about 57°; Sydney (N.S.W.), about 63; Ade¬ laide (S.A.), 61; Perth (W.A.), 64; Brisbane (Q.), 68; and Port Darwin (N.T.), 82 (tropi¬ cal) ; Hobart (Tas.), 55. In the mountainous and more temperate parts of Australia snow falls in winter (June, July and August), and long remains unmelted on

portions of the Great Dividing Range, as well as in Tasmania. Prac¬ tically, however, at no time of the year is it possible to skate on ice in any division of the Commonwealth. Australia is essentially a warm country throughout, but the winters are keen and bracing.

Fauna (extinct). — The distinguishing fea¬ tures of the extinct fauna (of which most in¬ teresting discoveries have been made) are specially worthy of note. In the mammalian class the great majority are marsupials, though the dingo and the whale (non-marsupial) are also found in a fossil state. Fossil remains of birds, reptiles (such as crocodile, monitor), turtles and fishes, have also been unearthed, some in the banks of the rivers in the interior. This indicates that the ancient vertebrate fauna of Australia was very similar to what it is now. The preponderant type of mammal was mar¬ supial. In most respects, however, the species and even the genera were different, and many (such as diprotodon, nototherium, and the giant kangaroo) were much larger animals and of a more generalized type than exist at present. One living; type (a wombat) is precisely of the same species as is found in a fossil condition. Regarding the probable cause of the destruc¬ tion of the extinct animals, it is impossible to give a general statement applicable to such a wide-stretching country as Australia, any more than such a statement could be applied to other countries where there has been a wholesale dis¬ appearance of once numerous groups. Changes of climate or physical conditions rendering the country or district unsuitable for their main¬ tenance ; over-specialization in structure caus¬ ing the types to be incapable of adapting them¬ selves to changed conditions ; not impossibly the ravages of infectious or parasitic diseases — all these have had their effect. As a prob¬ able explanation in the special case of the Lake Callabonna fossils (a remarkable discovery in South Australia) the following occurs in (The Physical Features of Lake Callabonna and the Account of the Discovery *by Professor Stir¬ ling (director of the South Australian Mu¬ seum), which was published in the (Memoirs of the Royal Society* : <(The facts that the bones of individuals are often unbroken, close together and frequently in their proper relative positions — the attitude of many of the bodies

and the character of the matrix in which they are imbedded — negative any theory that they have been carried thither by floods. The likeli¬ hood, rather, is that they met their death by being entombed in the effort to reach food and water. . . . The accumulation of so many

bodies in one locality points to the fact of their assemblage around one of the last remaining oases in the region of desiccation which suc¬ ceeded an antecedent condition of plenteous rains and abundant waters.® An identical ex¬ planation has been suggested by Daintree in his (Notes on the Geology of the Colony of Queensland.5 Among the extinct fauna the most remarkable of the mammals is the Dip-rotodon australis; size 10 to 11 feet in length, five and one-half to six feet in height. Of the birds, the most noteworthy is Genyornis newtoni, a large bird with bones as big and massive as the elephant-footed moa of New Zealand, and the Aepyornis of Madagascar. It stood about six and one-half feet high, but is remarkable mostly for its massiveness. The deposit of this treasure trove of natural his¬ tory at Callabonna is large and valuable, but (so far as the ground has been explored) it does not equal the immense deposits in certain places of fossil mammals and reptiles in the United States of America. Still, only one area of limited extent in Lake Callabonna has been exploited. Owing to the superior resources of the United States, and the greater generosity displayed there in this direction, much more systematic search has been undertaken both in that country and in South America than in Australia; but the possibilities are cherished of further revelations of the highest importance in this branch of research in the Common¬ wealth.

Fauna (existing). — To the northwest of Australia between the Dutch-Javanese islands of Lombok and Bali runs the Lombok Strait, which curiously marks a dividing line between the fauna and the flora of Asia and those of Australia. The channel is narrow, if very deep, and the Asiastic birds might easily fly across it in one direction and the Australian in another. So might a natural growth of plants be en¬ couraged by the agency of wind and feathered carriers of seed; but none of these things has happened to any extent; the individuality of the relative fauna and flora has been strongly pre¬ served. A number of the birds in Australia, however, migrate from one part of the Com¬ monwealth to others with the changes of the seasons, and some pass to and from the con¬ tinent of Asia — e.g., the sandpiper or sharp¬ tailed stint, that each season comes from Siberia, a distance of 10,000 miles. As already indicated, the existing fauna does not differ widely (except in proportions) from the ex¬ tinct; and the forms observed in some instances are exceedingly interesting, if not bizarre. The (<Bunyip® of the aborigines' legends (a monster that lurked in certain rivers and creeks and swamps) has never yet been proved to be other than fabulous. Much speculation and some mystery, however, surround the occasionally recurring visitations of plagues of rats in the far-northerly country, and of mice in the more southerly or

agricultural areas. At periods of several years the rodents suddenly appear in vast numbers, and as suddenly disappear after doing, in some cases, much damage. The

locust or grasshopper plague, which at one time was much feared, is now almost unknown. In a generalization, Australia may claim to be free from all animals that attack man, except in exceedingly rare instances when a large kan¬ garoo may be brought to bay, and in frenzy of fear strive to defend itself almost invariably vainly. Introduced animals, such as the rabbit and the fox, the sparrow, the starling and other old-world birds, as well as the snail, multiply literally by millions, and become a scourge to sheep raisers, farmers and gardeners. The im¬ ported dog running wild has sometimes been confused with the aboriginal dingo (canis dingo) (q.v.) or <(warrigal® (native name), a predatory animal, the wolf of Australia, that has caused heavy losses among sheep and lambs, which he destroys in mere wantoness. The dingo never barks, but howls dismally in the bush at night. Kangaroos once abounded virtually all over Australia, and varied in size from the (<old man® of six feet to the most minute specimens, including the wallabies and kangaroo rats. The most interesting example is the tree kangaroo, discovered in Queensland about 100 years after and not far from the spot (Endeavour River), wdiere the first kangaroo (Macropus major) was found by Captain Cook, the great navigator, in 1770. In particularly the southern and western parts of Australia is seen a small <(native bear,® that inhabits trees, and, in Tasmania, the ((Tasmanian devil® (sarco philus ursinus), fierce and (like the dingo) untamable, and the ((Tasmanian tiger® (Thylacinus cynoccphalus) are the principal examples of fauna. The numbers of these latter, like those of the kangaroos and the opos¬ sum, have been largely reduced through indis¬ criminate slaughter with the advance of settle¬ ment ; but recent legislation for the protection of the kangaroo (the skin of which is valuable for export) has stayed the race toward destruc¬ tion. The wombat (Phascolomys) is a curious, burrowing, land animal, resembling in some re¬ spects the platypus and kindred creatures ; but the most extraordinary is the platypus itself (ornithorhynchus anatinus), an amphibious ani¬ mal that forms a connecting link between the mammals, birds and reptiles. Of the birds the emu (Dromaius novae hollandice) is from five to six feet high, and ranks next to the African ostrich, which it resembles in its habits; its numbers, as with the kangaroo, have been greatly reduced as settlement has progressed. The cassowary (Casuarius australis) is small, and not nearly 'so widely diffused as the emu ; and the native companion or Australian crane (G rus australasianus) is still slightly smaller than the cassowary, and an

exceedingly graceful bird of somewhat eccentric habit. The black swan (Cygnus atratus) is scarcely so large as the white swan of the northern hemisphere, but is a beautiful bird. Strange in its habits is the satin bower-bird (P tilonorhynchus holosericeus) that forms for itself a playground or bower in which it sports with a miscellaneous collection of bright objects. Altogether about 750 species of birds have been found, mostly in northeast Australia (which has been chiefly explored), but some of them are gradually becoming ex¬ tinct. The old idea that Australian birds are songless is only relatively true. The flute-like note of the magpie or shrike is one of the most mellifluously melodious sounds in nature, and

has been declared to surpass that of the night¬ ingale. The reptiles are numerous. The largest of the snakes is the carpet snake (Morelia variegata) , non-venomous, with an average length of about seven or eight feet, but with authenticated specimens up to 15 feet and even more ; its habits are generally similar to the python's. Of the five principal poisonous rep¬ tiles the most deadly is the death adder (about three feet). Not more than 12 or 15 fatal cases of snakebite occur annually throughout Aus¬ tralia, but this comparative immunity is due partly to the prompt application of effective remedies. The white ant is common in the northern part of the Commonwealth, and is very destructive to wooden buildings in the early stages of settlement; its nests of mud and clay, generally with angles pointing north and south, range from 20 feet in height downward. The seas abound in numerous varieties of fish. In the period of pioneer settlement the Aus¬ tralian whaling grounds were very productive, and still are occasionally exploited with profit. Sharks are exceedingly numerous. The largest, the white pointer or white shark (Car char odon rondeletii), to the length of 16 feet and over has been caught, and attended by the pilot-fish (Naucrates ductor) it preys upon man as well as upon denizens of the deep. Deaths through sharks are rarer even than those from snake¬ bite, but* this is to a large extent due to the precautions taken in bathing in the seas. The crocodiles or alligators, as they are popu¬ larly called (Crocodilus Porcatus and Phyllas johnsonii — a small variety), are plentiful in the tropical and sub-tropical zone on the north¬ east, northwest and north coasts ; they vary from about 20 feet (an unusual length) to five or six feet. In common with the shark the larger alligator sometimes attacks human be¬ ings, but the aborigines evidently stand in little fear of it. In the warmer waters is found the dugong (Halicora australis) , from whose

habits and structure doubtless originated the fables concerning the mermaid. Seals are still seen on the remote parts of the coast and the southern islands. The most noteworthy is the sea bear (Otaria cinerea) of about seven feet in length, that is more prized for its oil than for its skin. In the northern waters turtles, the edible green (Chelone Mydas), and the shell-yielding hawkbill (Chelone imbricata) varieties are very numerous, and attain to a large size. The trepa'ng or beche-de-mer is found, with the mother-of-pearl oyster — large (Meleagrina margaritfera) and small (Melea- grina radiata). The former frequently yield fine pearls, some single specimens of which have been sold for thousands, and many for hundreds, of pounds. The edible rock oyster is widely represented, and the mangrove tree¬ climbing fish (periophthalmus) abounds par¬ ticularly in the northern waters.

Flora. — In a concise description the Aus¬ tralian flora may be said to possess peculiarities which distinguish it unmistakably. Many of its most striking features bear a natural relation to the general dryness and greatly differing con¬ ditions of the climate, owing to the vast area of the Commonwealth. The trees and bushes have mostly a scanty foliage, with little surface for evaporation, or thick leathery leaves well fitted to retain moisture. Nearly all are evergreen,

but the effect upon the landscape is rather monotonous. The most extensively spread types of vegetation are the various kinds of gumtree (Eucalyptus) , the shea-oak (Casua- rina), the acacia or wattle, the grass tree (Xan- thorrhcea) , many varieties of the Proteacece, a few baobab trees, and very many ferns and tree-ferns. Of the gumtree there are more than 150 species, nearly all valuable for timber, and for their essential oils, which possess im¬ portant medicinal properties. The wattle or acacia includes about 300 species, some of which also yield good timber or bark for tanning. The most beautiful, the most fragrant and the most useful in these latter respects is the golden wattle (Acacia dealbata). Palms (of which there are at least 24 species, all, except the cocoa-palm, peculiar to Australia) are mostly confined to the northern and eastern coasts. The mallee scrub is formed by a dwarf eucalyp¬ tus, and the mulga scrub by a thorny acacia. A plant which covers large areas in the arid regions is the spinifex or porcupine grass (coarse and spiny), which renders traveling difficult, and is uneatable by any animal. Other expansive tracts are occupied by useful herbs and fodder bushes. Foremost among those stands the salt-bush (Atriplex mummularia, order Chenopodiacece) , an exceedingly hardy plant, upon which the sheep and other animals thrive, and which has strong drought-resisting powers. Beautiful flowering plants, especially in Western Australia, are almost innumerable. Australia also possesses many turf-forming

grasses, particularly the kangaroo grass (An- thistiria australis), which survives in even a protracted rainless period. The native fruits, including the native cherry (Exocarpus cupres- siformis), the nut of which grows partially out¬ side of the, fruit proper, are few and of little practical worth, and the plants yielding roots used as food are not of much economic value; but exotic fruits and vegetables grow every¬ where in unstinted abundance, and some of the cherished garden blooms of the older countries flourish so riotously as to become a pest in Australia. The vine and the olive thrive better than in the country of their origin, and enor¬ mous quantities of wine and oil are produced and exported. The cereals of Europe and maize are extensively cultivated, and large tracts of country, particularly in Queensland, are under the sugar cane, the pineapple, the cocoanut and other tropical exotics.

Bibliography. — Geography. — Agassiz, A Visit to the Great Barrier Reef of Australia . . . 1896) (Cambridge, Mass., 1898) ; Bar¬ ton, Australian Physiography) (Brisbane 1895) ; Bonwick, (Climate and Health in Aus¬ tralia5 (London 1886) ; Cox, (Water Supply of Australia) (1901) ; Gregory, (Climate of Australia) (1904) ; Jack, Artesian Waters) (1902) ; Kent, (The Great Barrier Reef of Aus- tralia) (London 1893) ; Ranken, (The Federal Geography of British Australasia) (Sydney 1891), and (The Dominion of Australia5 (Lon¬ don 1874) ; Reclus, (The Earth and Its Inhab¬ itants, Oceanica5 (New York 1890) ; Taylor, (Geography of New South Wales5 (Sydney 1898) ; Thomson, (The Physical Geography of Australia5 in (Smithsonian Report5 of 1896, (Washington, D. C., 1898) ; Trollope, Aus¬ tralia and New Zealand5 (Leipzig 1873) ; Wall,

(Physical Geography of Australia' (Melbourne 1883). Geology. — Ball, (Geological Survey' (1903) ; Brown, (Geological Reports) (1908) ; Clarke, (Sedimentary Formations of New South Wales) (Sydney 1878) ; Curran, (Geology of Sydney and the Blue Mountains' ; Darwin, (Geological Observations) (London 1876) ; Egremont, (The Desert of Australia) (1909) ; Etheridge and Jack, (Geology and Palaeon¬ tology of Queensland) (Brisbane 1892) ; How- chin, Volcanoes5 (1901) ; i.d., (Geology of the Mount Lofty Ranges 5 (1904) ; Johnston, Geol¬ ogy of Tasmania' (Hobart 1888) ; McCoy, (Palaeontology of Victoria) (Melbourne 1874) ; Maitland, (Geological Features of West Aus¬ tralia' (1904) ; Mawson, (Geological Features of Eyre Peninsula) (1907) ; Stirling, Aborig¬ inal Rocks' (1902) ; Tate, (A Century of

Geo¬ logical Progress in Australia1 *(Adelaide 1893). Flora and Fauna. — Aflalo, (Natural History of Australia> (London 1896) ; Bentham and Muel¬ ler, (Flora Australiensis) (London 1863-78) ; Brown, (Miscellaneous Botanical Works) (Lon¬ don 1866-67) ; Cook, (Handbook of Australian Fungi' (London 1892) ; Fitzgerald, Australian Orchids1* (Sydney 1870-90) ; Flower and Lydekker, (Mammals, Living and Extinct' (London 1891) ; Gould, (The Mammals of Aus¬ tralˆ (London 1863), and (The Birds of Australia> (7 vols., London 1848) ; Guilfoyle, Australian Botany) (Melbourne 1884) ; Heil- prin, (The Geographical and Geological Distri¬ bution of Animals ' (London 1887) ; Kent, (The Naturalists of Australia) (London 1897) ; Ivrefft, (The Smiles of Australia) (Sydney 1869) ; Maiden, (Useful Native Plants of Aus¬ tralia' (Sydney 1889) ; Ogilvy, (Catalogue of Australian . Mammals) (Sydne3r 1892); Schom- burgh, (Flora of South Australia) (Adelaide 1875) ; Stirling, (Notes on Fossil Plants) (1902) ; Tenison-Woods, (The Fish and Fish¬ eries of New South Wales) (Sydney 1883) ; Turner, Australian Grasses' (Sydney 1895) ; Wallace, (The Geographical Distribution of Animals' (London 1876) ; Lucas and Le Souef, (The Animals of Australia' (1909). See Gen¬ eral Bibliography.

William John Sowden,

Fait or of South Australian Register.

1. THE ABORIGINES.— The aborigines of Australia are fast dying out — slain by civ¬ ilization through interference with the game that they formerly hunted and lived on, added to the influence of the white man's diseases and vices. It has always been impossible to number the aborigines with any certainty on account of the immense territory over which they were scattered, and of the nomadic habits of the people — habits which quite unfitted them for any sustained industrial work; but, accord¬ ing to the most trustworthy estimates which cart be obtained, only about 80,000 of the blacks (including half-castes) now remain upon a territory of nearly 3,000,000 square miles. Certainly this is nearly four times the number of Maories who are left in New Zealand, but the territorial and other conditions are so es¬ sentially different in the two countries that comparisons are practically valueless. It is assumed that the representatives of the Aus¬ tralian aborigines are distributed in these pro¬ portions in the respective states: Western

Australia, 26,000; South Australia and the Northern Territory, 29,896; Queensland, 20,000; New South Wales, 4,716; and Victoria, 269. In

Tasmania the last pure-bred aborigine died in 1877 ; but a few half-castes remain. Even on the Australian continent the sight of a full-blooded black near to a centre of settlement is very rare ; and probably during the next 20 years the few survivors of the original owners of the soil will be found in only the remote districts.

Treatment of the Aborigines. — Although

the racial antipathies and collisions due to the seizure by superior races of the lands of in¬ ferior peoples have been at least as marked in Australia as elsewhere, and although the treat¬ ment of the aborigines by many of the pioneer settlers did not err on the side of scrupulous humaneness, the governments, as such, have done a good deal to mitigate the sufferings of the unfortunate people, the dealing with whom was more difficult than it would have been if the vast majority of them had not in hopeless indolence always manifested an unconquerable repugnance to systematic labor or anything like sustained industry. The policy shown toward them might well have reflected — and in some cases it has done so — the fact that the con¬ quest of the natives in Australia has been ex¬ ceedingly easy owing to their utterly disorgan¬ ized condition and their almost complete help¬ lessness. These defects were in contrast to the valor, the country-love and the mental alert¬ ness of the colored inhabitants whom the early white settlers found in New Zealand. As a rule the Australian aborigine — while in good districts physically stalwart and strong — was not of a ferocious or blood-thirstily aggressive nature ; and in most cases when numbers of them have attacked a few isolated European settlers or travelers, the cause has been either a lack of firmness or judicious care on the part of the persons molested, or else revenge for wrongs inflicted upon the natives by other white men, mostly in the shape of interference with the black women, or by way of reprisals for the killing of cattle, the intrusion of which upon their former hunting grounds the blacks naturally connected with the gradual disappear¬ ance of the indigenous game.

All the state governments have enacted, and so far as possible enforced, laws for the protec¬ tion of the blacks — laws in some instances pro¬ viding for them special reserves within which the Europeans must not kill game or depasture stock; prohibiting the supply of intoxicating liquor or opium to the aborigines, and defend¬ ing them against anything like enslavement or other ill-usage. During many years past at least a yearty — and in bad seasons a more fre¬ quent — distribution of flour, tobacco, blankets and other useful articles has been made by the governments among the natives ; and the state- aided efforts have been liberally supplemented by the

benefactions of private persons and phil¬ anthropic institutions, especially in relation to education, spiritual and otherwise, by mission¬ aries who have established aboriginal stations. In the latest year for which statistics are avail¬ able the purely governmental expenditure amounted annually (with allowances for en¬ dowed lands) to £20,000 in New South Wales, £16,000 in Queensland, including the Northern

t/jno$ apnjijv'jˆ

won: gynjijvT ?.

. u

< <

<Cd.«3

m J>k

Q I

Dh2 H ˆ <

in

£

<

-i in

w<3

Copyright by Rand McNally & Company

Territory £14,000 in South Australia, £4,000 in Victoriaand £24,000 in Western Australia.

Origin and Characteristics. — The origin of the aboriginal tribes of Australia has been a theme of much controversy ; and the space available here is not adequate for even an enumeration of the many theories — including one comprehending an invasion by representa¬

tives of the Lost Tribes of Israel — advanced by various differing authorities. This seems to be a problem insoluble. In such circum¬ stances sufficient must be the statement that there is a fair consensus of opinion to the ef¬ fect that the native black races, as they were found by the European pioneers, had apparently been substantially affected (especially in the northern areas, which were for many centuries visited periodically by Malay proas in search of pearl shell, trepang and other products) by strains of blood introduced from beyond the island continent. A judicious balance of the evidence adduced by the most trustworthy ethnographers tends to the conclusion that the two points whence Australia benefited or other¬ wise by migration of fauna and flora, as well as ethnologically, were the group culminating in New Guinea on the one hand, and on the other in the chain of islands and peninsulas touching Australia on the northwest. Certain plants and animals came from Asia to Australia, and it is held to be extremely probable that the ancestors of the Australian native tribes (who differ somewhat from those of Tasmania) crossed over to Australia from those two points. The native population is declared to be an admix¬ ture of at least two distinct elements. The skin of the one was a true yellow, and that of the other was a velvety black. The hair varies from straight to woolly, and the face and skull also have material dissimilarities. The nose assumes various grades, from the flat negro to the arched Jewish, and these contrasted types are believed to be due to the immigration of Malays and Papuans as indicated.

One reason why the black had no means of sea navigation was that ((the negroid blood in his veins fetters the Australian so firmly to the soil® ; and another was that unkindly nature made the pressure of food requirements so heavy that the black was forced to be a wan¬ derer, and had little time for anything else than the sustaining of bare life. As, however, this judgment reflects disparagingly upon the natural resources of the land, it is important to add that on their advent xMistralia's <(Pilgrim Fathers® surprised the black inhabitants in a state of the most primitive savagery. There was not anywhere the remotest sign of any cul¬ tivation of the soil, or of the slightest attempt at tillage, or the thrift or providence which stores food for emergencies. Neither had the natives made — though they possessed roughly hewn bark or log canoes — any effort to clothe themselves, or — apart from miserable hovels constructed of rank grass or reeds, or boughs or bark of trees — to provide shelter from the cold of winter or the heat of summer. They had no written language, unless one may in¬ clude in that characterization such crudely artistic representations as were inscribed on rocks or in

caverns. Some of these, like the message sticks sent from one part of the coun¬ try to another, are ideagraphic — or picture¬ writing — but none was at any rate unmistak¬

ably idealistic. Though most of the tribes paid deference to their (<medicine men® or sages — mostly the older members of the tribal camps, who were always well treated by the younger blacks — they possessed practically no concep¬ tion of abstractions. In this respect they were, while less provident than the ants, essentially untutored children of nature — almost as much so as the dogs and the lower animals. They were endowed with instinct rather than with in¬ tuition. No bloodhound ever displayed keener sight or scent than the Australian black track¬ ers, whose power in following a trail seems almost miraculous.

On the other hand, a close study of the aborigines reveals curious anomalies. Speaking generally the natives rise and fall in mental and physical superiority in exact harmony with the fertility or otherwise of the territory over which they roamed. Some of them had scarcely reached the low stage of intelligence associated with the Stone Age, others rapidly acquired education under European teachers, and in the wilds had constructed the boomerang which, with its marvelous power, of returning to the thrower, has long puzzled even the most pro¬ found scientific experimenters. Among the highest-class natives, too, the character of their spears and other weapons indicated the posses¬ sion of no little constructive skill, as well as undoubted patience and perseverance on the part of the makers. Where an aboriginal popu¬ lation is divided into hundreds, and probably thousands, of tribes, all mutually independent and mutually hostile, and distinguished usually by arbitrarily marked rings of exclusiveness, and each tribe speaking a dialect of its own, it is impossible to write with exactitude concern¬ ing their customs. One must not, therefore, at¬ tempt to explain why the tribal boundaries should in some cases be defined by geometrical devices ; why in tribal territories here and there circumcision should be practised, and on ad¬ joining areas not observed; why some natives should exchange salutes similar to Masonic signs, and others be unaware of the meaning of this interchange, but be familiar with a some¬ what intricate code of smoke signals; why some should be cannibals and others should not be; why the superstitious ceremonies should vary so widely; and yet why the main idea of the native <(corroboree® or dance should be ap¬ parently almost everywhere the same or closely similar.

What seems to be certain is that the wild aborigines have no religion properly so called — no impelling attraction toward or trust in a God

of Love, but a wholesome fear of ((Mool- darbie® or the devil, whom all tribes sedulously seek to propitiate — some even by periodical human sacrifices, and the dread of whom as a spirit walking in the darkness keeps them shrinking in their camps until the break of day. Very extensively diffused also is the belief that nobody can die a natural death, but must be the victim of a maleficent influence or the evil eye. Equally widespread is the aspiration among the aborigines that after death they may ((jump up a white fellow® — a notion said, perhaps fancifully, to have originated in the general custom of smoking the corpses of the dead, with the result that the peeling outer cuticle revealed the white dermis or true skin. Some tribes are prudishly modest in their rela-

tions with their women, others are as flagrantly immoral. The language of some seems to be little better than mere gibberish, while concern¬ ing that of others one of the Jesuit mission¬ aries has written that in its construction it is most ingenious, and curious in its form, indi¬ cating high intelligence and suggestive of the Hebrew. Many of the natives are musical, but their musical instruments are of the crudest character, made chiefly of hollowed wood or grasses, or bamboos. At the age of puberty youths of both sexes are formally initiated by peculiar, jealously preserved, and often inde¬ scribable ceremonies, into the respective secrets of manhood and womanhood, but even the old men and women of the tribes who perform these rites — which include the knocking out of some of the young men's teeth and certain genital mutilations — seem to have no clear and coherent idea of their import.

Bibliography. — Basedoe, (Anthropological Notes on South Australia) (1903) ; Curr, cThe Australian Race : Its Origin, Languages, Cus¬ toms, etc.5 (4 vols., Melbourne 1886-87) ; Daw¬ son, (Australian .Aborigines5 (Melbourne 1881) ; Howitt, (Two Legions of Lake Eyre Tribes) (1903); Gill, (Anthropological Notes) (1908) ; Lumholtz, (Among Cannibals) (Lon¬ don 1890) ; Matthew, (Eaglehawk and Crow) (London 1889) ; id., (Notes on the Arranda Tribe5 (1907) ; id., (Aboriginals of Australia5 (1906); id., (Aboriginal Tribes5 (1905); id., (Ethnological Notes on the Aboriginal Tribes of the Northern Territory5 (1901) ; id., lan¬ guage of the Native Tribes5 (1902); Roth, Queensland Aborigines5 (Brisbane 1897) ; id., lighting Weapons5 (1909) ; id., (Initiation Ceremonies of the Aborigines5 (1909); Smith, (Aborigines of Victoria5 (London 1878) ; Spencer and Gillen, (Native

Tribes of Central Australia5 (London 1904) ; Wallace, Austral¬ asia5 (1893). See General Bibliography.

William John Sowden, Editor of South Australian Register.

1. DISCOVERY AND EARLY HIS¬ TORY. The discover}'- and the early history of Australia have been the themes of much dis¬ cussion, but one conclusion admitted by all dis¬ putants is that the really pioneer navigation which resulted in the finding of the great island continent of the Southern Seas was not con¬ ducted by the British who now occupy the ter¬ ritory that was originally called Terra Incog¬ nita, and then New Holland. British enterprise, however, built a structure of colonization upon the site disclosed by the investigations of the people of other nations ; and nearly all the def¬ inite surveying of the Australasian seas has been done by the sailors of Britain.

The later days of the time in which Aus¬ tralia was still unknown were the days when the Portuguese, the Spaniards and the Dutch roamed the oceans as intrepid searchers for new sensations rather than in the hope of ter¬ ritorial aggrandisement. Though anything like the exact year in which Australia was first sighted is doubtful, records show that between 1531 and 1542 the Portuguese declared the ex¬ istence of a land which they styled ((Great Java,55 and which corresponded with the north¬ ern parts of what is now the Australian Com¬ monwealth. The most authentic available data indicate that the first European who saw the

land was a Portuguese named Manoel Godhino de Eredia, who sighted it in 1601. By common consent, however, it has been conceded, as a starting point for Australian history, that Luis Vaez de Torres, who had been second in com¬ mand of the De Quiros (Spanish) expedition, saw and sailed close to the Australian coastline in 1606; and that he was navigating in the neighborhood of New Guinea to the east of Cape York Peninsula at about the same time when a Dutch mariner was similarly engaged to the west of the peninsula. Yet centuries elapsed before any attempt was made to settle the newly-found continent, though meanwhile it was more than once passed and even circum¬ navigated. After 1619, when the Dutch expedi¬ tion under de Houtmann anchored off the Abrolhos Reef on northwest Australia, that part of the continent was repeatedly visited during the earlier half of the 1 7th century, and well-verified history shows that in 1656 a Dutch ship was wrecked in the vicinity of the Abrol¬ hos Group — fragments of the cargo are even now washed up occasionally by the sea or found in the guano deposits. Toward the end of 1642 Abel

Jansen Tasman, a Dutch naviga¬ tor, discovered and landed on Tasmania, and named it Van Diemen's Land (a title which it continued to bear until 1854). In 1688 William Dampier, a freebooter, was the first English man to set foot on Australia — at King Sound on the northwest coast. This same Dampier on a subsequent voyage took Alexander Selkirk (Defoe's <(Robinson Crusoe55) off the island of Juan Fernandez, on which the man had disem¬ barked some time before. Still, curiously enough, Australia was not annexed on behalf of any nation until the last third of the 18th century. In 1768 Lieut. James Cook set out from England in a crazy ship, the Endeavour, in charge of an expedition appointed to observe at Tahiti the transit of Venus. Steering thence westward, he made an examination of New Zealand, came on 19 April 1770, upon the east coast of Australia and anchored in Botany Bay. Later he proceeded northerly along the coast; and, after the Endeavour had in June struck upon a coral reef and well-nigh foun¬ dered near to the present Queensland port of Cairns,ˆ he continued his journey until on 21 Aug. 1770, he hoisted the colors of England on the north Australian peninsula of Cape York, and thus formally took possession of the whole eastern part of Australia.

But settlers did not follow closely upon the heels of the navigators, and 18 years had passed before, on 18 Jan. 1788, a British convict ex¬ pedition with 1,030 persons, of whom 750 were under penal servitude and banishment, reached Botany Bay. On 26 January (now celebrated as Australian Foundation Day) the expedition landed, displayed its national colors with due pomp and circumstances, and so inaugurated European settlement in the (<Great Land of the Southern Cross,55 which was, however, even thus late imperfectly known even in outline, and was comnrehended under the general title of New South Wales, now applied to one of the territorially smallest states of Australia. With the occupation of the country further ex¬ ploration by land and by sea proceeded apace. In 1798 Dr. Bass and Captain Flinders (who afterward achieved immortal renown as a great navigator in association with Sir Tohn

ABORIGINAL AUSTRALIAN AND AUSTRALASIAN ART

1-5 Clubs from the Marquesas Islands 2,9 Carving from Hervey Islands

3 Shell Ornament from the Solomon Islands 4, 7, 14 Carved work from New Guinea 5, 11, 13 Obsidian Lances

6 Australian Carving 8 Steering Oar, from New Zealand 10 New Zealand Pipe 12 Australian Carved Ornament 16 Carved Shield from New Guinea

/

■ 1 1 ■ BWBWWP . | •>

•

.

■

.

■

Franklin, the Arctic hero) demonstrated by sailing around Tasmania that that country was veritably an island, and not a portion of the Australian continent, as had been supposed. In 1802, having been provided by the British Ad¬ miralty with a scarcely seaworthy vessel, the Investigator , Captain Flinders surveyed the larger part of the southern coast of Australia, from west to east, and forestalled a French ex¬ pedition which had been sent out under Cap¬ tain Baudin in the ship Le Geograplie, for pur¬ poses similar to those Flinders had in view.

The course of further marine exploration need not be further pursued ; for the initial work had been accomplished. In 1803 the first colonization settlement was begun in Van Die¬ men's Land (Tasmania). In 1804 an unsuc¬ cessful attempt was made by Col. David Col¬ lins, first governor of Tasmania, to found an¬ other convict colony in the now prosperous state of Victoria, which, however, from that time remained for 30 years with only one white man in it — a deserted convict named William Buckley, who dwelt among the aborigines until the year 1834, when real occupation was started, 10 years subsequent to the founding of Queensland, five years after that of Western Australia, and two years before that of South Australia.

During all the intervening time the explora¬ tion of the interior of the continent, mainly from Sydney, had been steadily progressing. First the disclosing of a means of passing be¬ yond the Blue Mountains in 1813 showed (by Blaxland) a way out of what had been re¬ garded as an impasse preventing access from the coastal fringe to the expansive

interior ter¬ ritories which represented the Mystery Land of the early colonists. In 1824 Hume discov¬ ered the upper Murray, the head of the great Australian Mississippi. Following the course of that river in 1828, Capt. Charles Sturt added to the geographies of the period the name of its tributary, the Darling; and in 1830 he made, with almost sensational intrepidity, a journey down the Murrav to its junction with the sea not far from Adelaide (the present capital of South Australia). In many directions other explorers were contemporaneously (and subse¬ quently) causing the wilderness of the Terra Incognita of the Portuguese to yield up its secrets, but only two of the dauntless explorers who have laid mankind under obligation to them for all generations need be particularly mentioned here. One of these was Ludwig Leichhardt, who started out from the east in 1848, and (with all the members of his party) apparently disappeared mysteriously and abso¬ lutely from the face of the earth; for no sign or trace of the expedition has ever since been seen or heard of. The other was John Mc¬ Douall Stuart, who, after having been repeat¬ edly baffled, succeeded at last in crossing the continent from south to north, and on 24 July 1862, laved his hands in the waters of the In¬ dian Ocean, and hoisted the British flag on the northern shores of Australia. And now in this year of 1918 practically all the blank spaces in the Commonwealth may have been filled in by the cartographer, and Australia has no further laurels of fame to offer as worthy guerdons to brave and daring explorers by land or by sea.

Bibliography. — Calvert, (Discovery of Australia) (London 1893), and (Exploration of

Australia *(London 1895) ; Collingridge, (The Discovery of Australia* (Sydney 1895) ; id., (Early Discovery of Australia *(1911) ; Favenc, (History of Australia Exploration from 1 788— 1888* (London 1892) ; Finney, (History of the Australian Colonies *(Sydney 1901) ; Giles, (Australia Twice Traversed* (London 1889) ; Grey, Two Expeditions of Discovery in North¬ western and Western Australia *(London 1841), and (Early Voyages to Terra Australis,* Hakluyt Society (London 1859) ; Grimm, (Discovery and Exploration of Australia *(Melbourne 1888) ; Howlitt, (History of Dis¬ covery in Australia, Tasmania and New Zealand from the Earliest Times* (London 1865) ; Parkes, (Fifty Years in the Making of Australian History *(London 1892) ; Rusden, (History of Australia* (Melbourne 1897) ; G. F. Scott, <The Romance of Australian Explor¬ ing* (London 1899). See General Bibliography.

William John Sow den. Editor of South Australian Register.

1. POLITICAL HISTORY. Beginnings of Colonial Self-Government.

— It was a

maxim of the common law that, if an un¬ inhabited country were discovered and peo¬ pled by British subjects, they were supposed to possess themselves of it for the benefit of their sovereign, and that such of the laws of England as were applicable and necessary to their situation and the conditions of an infant colony were immediately in force; that wherever an Englishman went he carried with him as much of English law and liberty as the nature of his circumstances required. It was recognized that Englishmen carried their po¬ litical birthright with them over the broad sur¬ face of the earth; that the charters of freedom for which their ancestors fought were not left behind, but accompanied them to their new homes beyond the seas.

The colonial legislatures of Newfoundland and Jamaica were established not by British statutes, but by royal commissions under the great seal accompanied by royal instructions. Local self-government in Australia did not, however, originate in the exercise of the pre¬ rogatives of the Crown, as it did in the case of some of the early North American and West Indian colonies. From the very first it was founded upon, as it was subsequently devel¬ oped and built up by, statutory authority.

NEW SOUTH WALES THE FIRST ORIGINAL COLONY.

Foundation. — In 1784 the British Parlia¬ ment passed the statute of 24 Geo. Ill, c, 56, entitled ((An Act for the effectual transporta¬ tion of felons and other offenders, and to au¬ thorize the removal of prisoners in certain cases, and for other purposes therein men¬ tioned. **This law empowered the King, with the advice of the Privy Council, to appoint places to which felons might be transferred. By an order in council bearing date 6 Dec. 1786, His Majesty's <(territory of New South Wales, situated on the east part of New Hol¬ land,** was appointed a place for the reception of persons within the meaning of the act.

By letters patent and commission dated 2 April 1787, Capt. Arthur Philip was appointed governor of the territory. The limits of his authority extended from Cape York on the north to the southern extremity of the coast of the continent and inland and westward as

far as the 135th meridian, which was afterward extended to the 129th

meridian east longitude. The governor was empowered to make orders for the good government of the settlement.

By the Act of 27 Geo. Ill, c. 2, the King was authorized to establish a Court of Crim¬ inal Jurisdiction on the eastern coast of New South Wales. Such was the legal authority under which, on 26 Jan. 1788, a penal settle¬ ment was established at Sydney Cove. In was not at first intended to be a colony, or planta¬ tion, for the purposes of trade and cultivation, within the ordinary meaning of those terms.

The First Constitutional Charter. — The temporary Act 4 Geo. IV, c. 96 (1823), which became law during the governorship of Sir Thomas Brisbane, was the first legislation passed by the Imperial Parliament conferring anything like the rudiments of local self-gov¬ ernment on the New South Wales communit}". A council of five persons was appointed having limited legislative powers. On 17 May 1824, a Charter of Justice, creating a Supreme Court, was promulgated.

The Second Constitutional Charter. — The

Act of 9 Geo. IV, c. 83 (25 July 1828), passed during the governorship of Lieutenant-General Sir Ralph Darling, was the second Constitu¬ tional Charter of Australia. Courts of Crim¬ inal and Civil Jurisdiction, coupled with trial by jury, were organized. The laws and statutes in force within the realm of England, so far as applicable, were applied to the administration of justice in New South Wales and Van Die¬ men's Land. The Crown was authorized to constitute in New South Wales and Van Die¬ men's Land, respectively, an Advisory Council to consist of such persons residing in the said colonies respectively, not exceeding 15, and not less than 10, as the King might be pleased to nominate.

The Third Constitutional Charter. — The

third charter regulating the government of New South Wales was the Act 5 and 6 Vic., c. 76 (30 July 1842), passed during the governorship of Sir George Gipps. This act established for the first time in Australia a legislature, partly, but not wholly, representative in its character. It enacted that there should be within the colony of New South Wales a Legislative Council consisting of 36 members, 12 of whom were to be appointed by the Crown, and 24 were to be elected by the inhabitants of the colony having certain property qualifications. The governor, with the advice of the Council, was authorized to make laws for the peace, welfare and good government of the colony, provided that such laws were not repugnant to the laws of England ; nor were they to

inter¬ fere with the sale or occupation of the waste lands of the Crown. Bills imposing duties of customs had to be reserved fo the Queen's as¬ sent. This act did not . grant to New South Wales the system known as ˆResponsible Gov¬ ernment.® The governor presided over and managed all the public departments. It con¬ tained, however, the feeble germs whence has since sprung the splendid fabric of parliamen¬ tary institutions in Australia. It was the first concession made by enlightened British states¬ men to the growing wealth and importance of the Australian colonies.

The new Council was opened by Sir George Gipps on 1 Aug. 1843.

The Fourth Constitutional Charter. — The

next important charter granted to Australia was 13 and 14 Vic., c. 59 (5 Aug. 1850, entitled ((An Act for the better government of Her Majesty's Australian Colonies,® and commonly known as the Australian Colonies Government Act. The bill, of which this act was the out¬ come, was first introduced into the House of Commons in June 1849. The two main objects of the act were the separation of the Port Phil¬ lip District from New South Wales, and the es¬ tablishment in all the colonies of an improved system of provincial government. The Legis¬ lative Council, erected in New South Wales by the Act of 1842 was not materially disturbed. Its powers were in some respects increased, and the franchise on which its representative members were elected was liberalized.

The New Constitution. — A new election of members of the Legislative Council of New South Wales on the liberalized franchise then took place. The new council complained that the Act 13 and 14 Vic., c. 59, did not place the control of revenue taxation, and the waste lands of the Crown in the colonial legislature, and a full - measure of local self-government in a Constitution similar in outline to that of Can¬ ada ■was applied for.

In 1852 gold was discovered in New South Wales and Victoria, which caused a great in¬ flux of immigrants into these colonies. In a despatch addressed to Governor Fitzroy, dated 15 Dec. 1852, Sir John Packington, Secretary of State for the Colonies, stated that Her Majesty's government had been greatly in¬ fluenced by considerations arising from the ex¬ traordinary discoveries of gold in the Aus¬ tralian colonies, which had imparted new. and unforeseen features to their political and social positions. It was the wish, therefore, of Her Majesty's government that there should be es¬ tablished in each colony a new legislature con¬ sisting of a Legislative Council

nominated by the Crown, and an elective House chosen by qualified inhabitants. To such legislatures it was proposed to give general powers including that of dealing with the waste lands of the Crown.

Upon the receipt of this despatch the Legis¬ lative Council of New South Wales, under the authority conferred by 13 and 14 Vic., c. 59, s. 32, appointed a select committee to draw up a constitution establishing a bicameral legislature, having increased powers and functions. A constitution was accordingly drawn up. It pro¬ vided that, in place of the Legislative Council then existing, there should be a Legislative Council and a Legislative Assembly, and that Her Majesty should have power by and with the advice and consen of the said Council and assembly, to make laws for the (<peace, welfare and good government of the said colony in all cases whatsoever.® The members of the Coun¬ cil were to be nominated by the governor with the advice of the Executive Council. The first nominees were to hold their seats for five years only. The members of the Assembly were to be chosen by male electors having certain residen¬ tial and property qualifications. An Assembly once constituted was to continue for five years unless dissolved bv the governor. The new legislature was endowed with full power to deal with the waste lands of the Crown and to impose duties or customs.

On 21 Dec. 1853, the new Constitution was

adopted and transmitted to the Secretary of State for the Colonies. In an amended shape it was made a schedule to a bill introduced into the Imperial Parliament, entitled <(A Bill to enable Her Majesty to assent to a bill as amended by the legislature of New South Wales to confer a Constitution on New South Wales.® The bill was passed by Parliament and received the royal assent on 16 July 1855. Its number is 18 and 19 Vic., c. 54. The act conferring a constitution on Victoria was assented to on the same day. The constitutions were then trans¬ mitted to the respective colonies, accompanied by explanatory despatches from the Secretary of State, Lord John Russell, in which the gov¬ ernors were instructed as to the introduction of responsible government.

Responsible Government. — That great change in the colonial system of administration known as ((The Introduction of Responsible Government® — that is of ministers appointed by and responsible to

the governor, but consti¬ tutionally and practically responsible to Parlia¬ ment — is said by some authorities to have been effected solely by despatches from the Secre¬ tary of State to colonial governors. These despatches described the circumstances in which the Crown, through the governor for the time being, would exercise its right of displacing one set of public servants and of appointing others in their places — that no change would be made so long as those public servants, being ministers in charge of departments, possessed the confidence of the local legislature. In the body of the Constitution Act of New South Wales (and this remark applies equally to that of Victoria) the words ˆresponsible ministers® do not occur. Were it not for a marginal note to one of the sections, not even a hint would have been given on its face of the important change it was intended to effect.

Other constitutional jurists, however, affirm that section 37 of the Constitution Act of New South Wales, and the corresponding section of that of Victoria, contains provisions which as¬ sume if they do not originate some plan of ministerial and responsible government. Both those sections declared that appointments of all public offices shall be vested in the governor with the advice of the Executive Council, ((ex- cept the appointment of officers liable to retire from office on political grounds which appoint¬ ments shall be vested in the governor alone.® The Constitution Acts of South _ Australia, Queensland and Western Australia contain substantially similar sections. But section 18 of the Constitution Act of Victoria and section 32 of the act of South Australia went much further in the direction of expressly recogniz¬ ing and introducing responsible government. Those sections enacted that a certain number of officers of the governments in those colonies for the time being should be members of the legislature created by the new constitutions. On 22 May 1856, the first Parliament of New South Wales under the new Constitution was opened by Sir William T. Denison. The first responsible ministry had Mr. Alexander Don¬ aldson as Colonial Secretary and Premier.

Administration and Legislation.— With the establishment of responsible government in New South Wales the initial pulsations of po¬ litical life in Australia may fairly be said to date their beginnings. The governor of the

colony was the representative of the Crown, but he was no longer his own Prime Minister. In 1859 a new Parliament was elected under the provisions of an Act to Amend the Con¬ stitution, introduced and passed by the advice of the • Cowper administration, providing for in¬ creased electoral representation, vote by ballot and manhood suffrage

which in later years was developed into (<one man one vote,® and finally into ((one adult one vote.®

In 1860 the Robertson Ministry introduced two land bills, one providing for the alienation and the other for the pastoral occupation of Crown lands. The main principles of these bills were free selection — before survey, which constituted the battle-cry of the land reformers, In 1861 the bills were again introduced into the Assembly, Mr. Robertson resigned his seat in the Assembly and was appointed a member of the Council in order to pilot the bills through that chamber. Both bills were again passed by the Assembly and sent to the Council. In order to counteract and overcome the opposi¬ tion in the Council it was decided to swamp that chamber by the appointment of 21 members. A parliamentary crisis was thus brought about. A majority of the old members withdrew from the chamber, thus leaving it without a quorum and the fresh nominees could not be sworn in. The term of office of the first members of the Council was limited to five years, which was then about to expire. The Council was recon¬ structed by the appointment of 27 life members on 24 June 1861 ; Wentworth being appointed the first president. In 1862 the Crown land alienation bill and the Crown land occupation bill were passed by both Houses. A Chinese immigration restriction bill, embodying the main provisions of Victorian legislation, was also passed.

In 1863 Messrs. Dailey and Parkes returned to the colony from England, where they had been sent on a mission to promote emigration to New South Wales. From this time on Mr. Parkes became a prominent figure in the po¬ litical world of New South Wales. He was closely identified with the cause of free trade. In 1868 Mr. Parkes resigned and temporarily withdrew from public life. The most notable public events of this period were the with¬ drawal of the British troops from New South Wales and Victoria, and the successful trans¬ mission of the first through cable message from Australia to England.

In 1872 the Martin-Robertson Ministry was defeated. Mr. Parkes having returned to the House was entrusted with the task of forming a ministry. He retained the premiership until 1875, when his government was defeated on the motion by Mr. Robertson. The Robertson Ministry remained in office until 17 Dec. 1877, when Mr. Parkes formed another ministry which had but a short reign. A political duel went on between Mr. Parkes and Mr. Robert¬ son for a considerable time, but was at last terminated by a coalition of the two leaders who, in December 1878, formed a ministry which lasted until January 1883. In 1881 a Chinese immigration restriction act was passed imposing severe penalties on Chinese entering the colony

without payment of a poll tax of £10. An act was passed legalizing trade unions. The Federal Council of Australia was created

on 28 Nov. 1883. A rich silver field was dis¬ covered at Broken Hill (1883).

The Land Bill of 1882 was the rock on which the Parkes-Robertson Ministry was wrecked. A general election resulted in Mr. (afterward Sir) Alexander Stuart coming to power wliich he held until October 1885. In 1888 another Chinese Restriction Act was passed. The poll tax was raised to £100 per head. Chinese were not permitted to engage in mining and they were not qualified to be naturalized. A tonnage limitation was imposed on vessels bringing Chinese to New South Wales; they were not allowed to bring more than one Chinese pas¬ senger to every 300 tons.

In February 1890, a Federal Conference, presided over by Sir Henry Parkes, was held in Melbourne, at which it was resolved that a National Australian Convention should be held to draft a constitution for the federation of the Australian colonies. In March 1891, the Con¬ vention was held in Sydney and a draft con¬ stitution was adopted. In October 1891, the last Parkes Ministry was defeated, being suc¬ ceeded by that of Sir George Dibbs. In 1893 an Electoral Bill was passed embodying the prin¬ ciple of <(one man one vote.®

In August 1894, the Dibbs' Ministry, which had introduced protection in a modified form, gave way to a free trade ministry formed by George H. Reid. A new tariff on free trade lines, a land tax, an income tax, and homestead bills were passed under his leadership. Early in 1895 Mr. Reid attended a conference of premiers at Hobart at which the draft of an Enabling Bill to be introduced into the legis¬ lature of each colony, providing for the election directly by the people of each colony of 10 rep¬ resentatives to attend a Federal Convention to frame a constitution for the federation of the colonies, to be afterward submitted to a referendum of the people of each colony, was adopted. Subsequently the Parliament of New South Wales, as well as the Parliaments of the other colonies, passed identical bills for the aforesaid purpose. It was under the authority of this legislation that the Commonwealth Con¬ stitution was afterward framed and adopted. In 1897 an Immigration Restriction Act, based on the Natal Act, imposing an education test in order to exclude colored aliens, was

passed. Legislation on similar lines was adopted in sev¬ eral other colonies.

On 13 Sept. 1899, the Reid Ministry was de¬ feated and Sir William Lyne formed a govern¬ ment which succeeded in passing the Early Closing Act, the Navigation Act, the Old Age Pension Act, and the Women's Franchise Act. In March 1901, Sir William Lyne retired in order to take office as a Commonwealth Min¬ ister. The ministry formed by Mr. (after¬ ward Sir) John See succeeded it. One of the most important measures passed through its instrumentality was the Industrial Arbitration Act (1901) ; under which the principle of' com¬ pulsory arbitration and settlement of industrial disputes was established. A short-lived Wad¬ dell Ministry was followed by one formed by Mr. Joseph Hector Carruthers, who resigned on account of ill health and was succeeded by Mr. Wade who held office until October 1910 when he was defeated and Mr. McGowen be¬ came Premier until 30 June 1913 when he re¬

signed and was succeeded by, Mr. W. A. Hol¬ man who is still in office November 1916.

VICTORIA AN OFF-SHOOT OF NEW SOUTH WALES.

Separation. — By Act 13 and 14 Vic., c. 59 (5 Aug. 1850), the district of Port Phillip, bounded on the north and northeast by a straight line drawn from Cape Howe to the nearest source of the river Murray, and thence by the course of that river to the eastern boundary of the colony of South Australia, was separated from the colony of New South Wales, ceased to return members to the Legis¬ lative Council of such colony, and was erected into and thenceforth formed a separate colony, ((to be known and designated as the colony of Victoria.® A Legislative Council was created in and for the new colony having powers and functions similar to those of the newly-organ¬ ized Council of New South Wales. On 1 July 1851, writs for the election of 20 elective mem¬ bers for the Legislative Council of Victoria were issued ; 10 were nominated by the Crown. Mr. Latrobe was appointed lieutenant-gov¬ ernor. In this manner the colony of Victoria was called into existence and received the first impulse of an autonomous political life. The new Council was convened for the despatch of business in November 1851, at about the time when gold was being discovered in fabulous quantities in the famous goldfields of Ballarat and Bendigo. The official members were : Mr. W. Lonsdale, Colonial Secretary; Mr. (after¬ ward Sir) W. F. Stawell, Attorney-General ; Mr. (afterward Sir) Redmond Barry, Solici¬ tor-General ; C. H. Ebden, Auditor-General ; and R. W. Pohlman, Chairman of the Court of

Requests. J. F. Palmer was elected speaker.

The New Constitution. — A new constitution drawn on the same lines, and passed in the same manner as that of New South Wales, was assented to by Her Majesty on 16 July 1855. The only substantial difference between the two bicameral legislatures was that while the Legislative Council of New South Wales was composed of members nominated by the Crown the. members of the Legislative Council of Vic¬ toria were elected by residential inhabitants having high property qualifications.

Responsible Government. — The premier of the first responsible government was W. C. Haines. The first election for the Legislative Assembly took place in the spring of 1856. The first ministry resigned on the passing of an unfavorable resolution upon the subject of the estimates, in March 1859. Sir John O'Shan- nassy, the mover of the resolution, then be¬ came Premier.

Administration and Legislation. — Among the problems which soon engaged the attention of the newly-creatcd Parliament of Victoria were those of constitutional reform, manhood suffrage, land and mining legislation, agri¬ culture, protection, and free trade, inter-colo¬ nial relations, public works, railways, tele¬ graphs, water supply, immigration, Chinese im¬ migration restriction, naval and military de¬ fense and education.

Among the first administrations which held office in Victoria were those of which William Clark Haines was Premier in 1855-57; 1857-58; Mr. (afterward Sir) Tohn O'Shannassy, Pre¬ mier, 1857; 1858-59; 1861-63 ; Wm. Nicholson,

Premier, 1859-60; Richard Heales, Premier,

1860-61.

In the early days of the goldfields great dis¬ content existed because of the heavy license fee of 30 shillings per month which every digger was required to pay. In November 1854, the tyrannical policy of the government culminated in an open insurrection which broke out at Ballarat. A flag of revolt, having the emblem of the Southern Cross, was hoisted over a barricade known as the ((Eureka Stock¬ ade.® By command of Governor Sir Charles Hotham a force of British troops

was sent to Ballarat to storm the stockade. Many lives were lost. After this tragic period, — the first and only bloodshed in Australia in the name and for the cause of political freedom, — the grievances of the diggers were redressed.

In 1855 the Legislative Council of the newly-created colony of Victoria led the way in the passage of a number of laws intended to restrict Chinese immigration, which com¬ menced in 1854, when the fame of the gold diggings of Victoria began to attract thousands of Chinamen to that colony. The Victorian Council passed a bill, which was assented to by the governor, <(to make provision for cer¬ tain immigrants.® The substance of the law was that no ship should bring to a Victorian port more passengers, being Chinese immi¬ grants, than in the proportion of one person to every 10 tons of the tonnage of such ship, under a penalty of £10 for each passenger in excess of such proportion. On the arrival of a ship in any port of Victoria with Chinese immigrants on board, the master was required to pay to the collector of customs a tax of £10 for every such immigrant. The money so collected was to be invested by the govern¬ ment to form a fund for the relief, support and maintenance of such immigrants. Pro¬ vision was made for the registration _of such immigrants, on their arrival in any district or place to which they proceeded. _ This and other Immigration Acts were consolidated in 1865.

Another notable measure passed by the first Legislative Council of Victoria was a bill adopting ((vote by ballot;® this was the first measure in the history of parliamentary gov¬ ernment in which this method was made legal.

The first important bill was introduced by James Service as Commissioner of Crown Lands and Surveys in the Nicholson govern¬ ment, on 30 Nov. 1859. The chief feature in this bill was that of free selection for settle¬ ment and agriculture over all the waste land of the colony, subject to certain conditions with respect to lands not yet surveyed. The bill was passed by the Assembly but was rejected by the Council.

The period from 1863 to J866 wras memor¬ able in the history of Victoria. It began in a conflict between the parties representing Pro¬ tection and Free Trade. It then developed into a struggle between the two Houses for financial supremacy, and in its third and last stage it became a contest between the Legislative As¬ sembly and the Crown. The first McCulloch Ministry took office in June 1863; it remained in power until 6 May 1868. One of its first proposals was a bill imposing numerous cus¬ toms duties of a protective character. It was passed by

the Lower House and rejected by the Council. It was then reintroduced tacked on to

the Appropriation Bill. The Council again re¬ jected it, and a deadlock ensued. The govern¬ ment in the meantime collected duties on the authority of the Assembly alone. Funds not having been voted for payment of the public service the government borrowed money to the amount of £40,000 from the London Char¬ tered bank which then sued the government for money lent. The government confessed judgment. The Supreme Court pronounced the collection of customs duties on the resolution of the Assembly to be illegal. It also held that confessed judgments against the Crown were illegal. A tariff, separated from the Appropri¬ ation Bill, was again passed by the Assembly and again thrown out by the Council. The ministry resigned. Mr. Fellows formed a gov¬ ernment which, however, could not carry on. Mr. McCulloch returned to office and the Tariff Bill was again passed by the Assembly, and again sent up to the Council. The preamble of the bill asserting the exclusive right of the Assembly to grant money and taxes was event¬ ually withdrawn, and the bill was passed.

The second McCulloch Ministry was de¬ feated on 20 Sept. 1869. It was followed by an administration formed by John Alexander McPherson which remained in office for six months. It was displaced on 9 April 1870, by Sir James McCulloch, who, on 19 June 1871, was defeated on his property tax proposals. Charles Gavan Duffy then formed a ministry which successfully proposed and carried a pro¬ tectionist tariff. The Duffy Ministry was de¬ feated on 10 June 1872. The governor re¬ fused a dissolution and Tames Goodall Francis became Premier. The first Mining on Private Property Bill was carried in the Assembly by 43 votes to 3, but was rejected by the Upper House. A bill to regulate mines, in order to prevent mining accidents, and to protect miners, was passed.

In 1875 the Kerferd government introduced a bill imposing certain duties on wines and spirits. The tariff proposals were carried by a majority of one. This the government ac¬ cepted as an adverse vote and applied for a dissolution, which the governor refused. On 7 Aug. 1875, Graham Berry formed his first ministry, but he was defeated on 20 Oct. 1875. Sir James McCulloch's fourth and last govern¬ ment then came into power. Its accession marked the beginning of a stormy and momen¬ tous political period. The Berry party raised a ((stone wall® of obstruction, and the McCulloch party retaliated by passing .standing orders to restrict and limit debate, which became known as the ((Ironhand® and the (<Gag.® The McCul¬ loch Ministry became

very unpopular through¬ out the country. At a general election held on 11 May 1877, an immense majority was returned against the government. Mr. Berry then formed his second ministry. The principal planks in its program were, a land tax to ((burst up the large estates,® and payment of members. A Land Tax Bill was introduced and passed. Pro¬ vision for the payment of members, to the amount of £300 per year, was made in the Ap¬ propriation Bill. In that form it was sent to the Council where it was rejected on the ground that it was a Hack.® Then ensued the historic deadlock of 1877-78. No money having been voted to pay the public servants the govern¬ ment on 8 Jan. 1878, ordered the dismissal of

all heads of departments, County Court judges, police magistrates and other public officers. This proceeding caused a great sensation, and by the opponents of the ministry it was de¬ nounced as ˆrevolutionary.ˆ Shortly after¬ ward a compromise was arrived at : payment of members was passed in a separate bill and the Appropriation Bill without the obnoxious <(tack}) was carried. The Berry party then de¬ voted their attention to the question of consti¬ tutional reform. A bill was passed through the Assembly providing for the adoption of a method of referendum to settle disputes be¬ tween the two Houses. It was rejected by the Council. A deputation, or embassy, consisting of the Premier and Professor Pearson, was sent to England to interview the Secretary of State for the Colonies, who was asked to set¬ tle the constitutional difficulty in Victoria. Sir Michael Hicks-Beach gave a very guarded reply stating that the Imperial Parliament would never alter the Constitution of the colony at the instance of one House only.

In 1879 the Parliament of Victoria again re¬ sorted to legislation in order to arrest the in¬ flux of Chinese. Vessels were not allowed to introduce into any Victorian port more than one Chinaman per 100 tons of tonnage, and a poll tax of £10 was imposed on each immigrant on his landing. In April 1888, a Chinaman, Chun Toy, arrived in the port of Melbourne on board the British ship Afghan. The collector of cus¬ toms considered that the Afghan had brought a larger number of Chinese than was allowed by law; he refused to allow any of them to land, or to accept the poll tax of £10 each. Chun Toy brought an action against the collector in the Supreme Court of Victoria, which decided that the action of the government in preventing the landing of the Chinese prepared to pay the pre¬ scribed poll tax was illegal. The Victorian government appealed from this decision to the Privy Council

which reversed the judgment of the Victorian court, and held (1) that the col¬ lector of customs was under no legal obliga¬ tion to accept payment whether tendered by the master on behalf of any such immigrant, or tendered by or for any individual immigrant ; (2) that, apart from the act, an alien has not a legal right, enforceable by action, to enter Brit¬ ish territory.

After an appeal to the constituencies in March 1880, Berry resigned, and James Service then formed a ministry. He introduced a meas¬ ure to amend the Constitution, which upon a division was lost by two votes. Parliament was dissolved and a general election was held in June 1880, which resulted in the Berry party being returned to office with a substantial ma¬ jority. The principal work done by the third Berry Ministry was the carrying of a bill to amend the constitution of the Legislative Coun¬ cil by reducing the qualification of electors and of members. A bill was also passed making permanent provision for payment of members. In July 1881, the third Berry Ministry was suc¬ ceeded by one formed by Sir Bryan O'Loughlin. The O'Loughlin ministry lost office in March 1883, when a coalition ministry under Service and Berry was formed. Under this govern¬ ment, acts were passed for the abolition of po¬ litical control of the government railways by placing them under the management of three independent commissioners, and for the aboli¬

tion of patronage in the public service. During his premiership, Service took great interest in the question of Australian Federation, and through his instrumentality a convention was held in Sydney at which a scheme for the es¬ tablishment of a Lcderal Council was adopted.

The Service-Berry Ministry was followed in February 1886, by the Gillies-Deakin combina¬ tion. In 1888 another Chinese Immigration Restriction Act was passed providing that no vessel should enter any Victorian port having on board more than one Chinaman for every 500 tons of the tonnage of such vessel. Any Chinese who should enter Victoria by land, without first obtaining a permit in writing, from some person to be appointed by the gov¬ ernor in Council, was declared guilty of an offense against the act, and made liable on con¬ viction to a penalty of not less than £5 nor more than £20 and also, upon the warrant of the commissioner of trade and customs, to be re¬ moved or deported to the colony from whence he came.

On 5 Nov. 1890, the Gillies-Deakin Ministry was succeeded by a ministry formed by James Munro, who in his turn gave place in February 1892, to one formed by William Shiels. The careers of the

Shiels Ministry, the Patterson Ministry and the early part of that of the Turner Ministry, which came into office on 27 Sept. 1894, were comparatively uneventful. In February 1895, Sir George Turner was as¬ sociated with Reid and other premiers in a conference held at Hobart at which a Federal Enabling Bill was drafted. The first Turner Ministry was defeated in December 1899. Allen McLean's Ministry held office for a little over 11 months; during which time several con¬ tingents were sent from Victoria to assist the British army in South Africa. On 15 Nov. 1900 Sir George Turner again became Premier in time to make arrangements for the establish¬ ment of the Commonwealth. An Old Age Pen¬ sion Act was passed, also bills protecting the rights and interests of Victorian public serv¬ ants. In the beginning of 1901 Sir George Tur¬ ner resigned the premiership and accepted office as Treasurer in the first Federal Cabinet. Sir Alexander Peacock became head of the new government. On 3 June 1902, the Peacock Ministry was displaced on a no-confidence mo¬ tion by Mr. (now Sir) W. H. Irvine. During the career of the Irvine Ministry a railway strike occurred in Victoria which resulted in an act being passed for the separate represen¬ tation in Parliament of railway and other public servants. On the retirement of Irvine he was succeeded by Thomas Bent who resigned and was succeeded by John Murray, who held office until Majr 1912, when he was succeeded by Mr. W. A. Watt, who resigned on 9 Dec. 1913. When Mr. G. A. Elmslie formed a labor ministry which was defeated by Mr. Watt- who again resumed office 22 Dec. 1913. Mr. Watt resigned to enter the Federal Parliament in June 1914 and was succeeded by Sir A. J. Pea¬ cock, who still holds office (November 1916).

TASMANIA AN OFF-SHOOT OF NEW SOUTH WALES.

Separation.— By the Act 4 Geo. IV, c. 96 (19 July 1823), the Crown was empowered to separate Van Diemen's Land from New South Wales, and erect it into a separate colony which then received a lieutenant-governor, an Execu¬ tive Council and a small Legislative Council,

Consisting of seven members. By Act 13 and 14 Vic., c. 59, s. 7, it was provided that the legislature already existing in Van Diemen's Land might establish within the colony a Legis¬ lative Council to consist of not more than 24 members, of whom one-third should be nomi¬ nated by Her Majesty and the remainder elected bv qualified inhabitants of

the colony. Under the authority of this law a new Legislative Council was called into existence having pow¬ ers and functions similar to the Legislative Council of New South Wales.

The New Constitution. — During the gov¬ ernorship of Sir William Denison the new Legislative Council of Van Diemen's Land under the powers conferred by 13 and 14 Vic., c. 59, s. 32, drafted a constitution for the es¬ tablishment of a bicameral legislature in Van Diemen's Land composed of a Legislative Coun¬ cil of 15 members elected by the qualified in¬ habitants, and a House of Assembly of 30 members elected on a more popular franchise than that of the Council. The bill so drawn was passed by the Legislative Council and reserved by the lieutenant-governor for the Royal as¬ sent. It became law on 24 Oct. 1856; the first Parliament being opened on 2 Dec. 1856. Sir Henry E. F. Young was appointed the first governor-in-chief of the colony under the new system of responsible government. The first premier was William T. N. Champ. In the year 1853, upon the cessation of transportation, the name of the island was changed from that of Van Diemen's Land to Tasmania.

Administration and Legislation. — Upon the cessation of transportation and the grant of responsible government to Tasmania a new life and destiny was imparted to the struggling community. Between 1855 and 1872 there was substantial improvement and progress in the position and prospects of the island, marked by the development of the interior, the. con¬ struction of roads and tramways, the initiation of railway and telegraphic communication, the expansion of the agricultural and pastoral in¬ dustries, the division of the colony into munic¬ ipalities, the laying of a submarine cable be¬ tween Tasmania and the mainland, the discovery of tin at Mount Bischoff and other places, gold in the quartz reefs at Brandy Creek and sub¬ sequently of silver and lead at Zeehan, and gold and copper at Mount Lyell. The west coast be¬ came famous by the opening up of some of the richest silver lead mines in the world ; coal seams were opened at Hastings, Langlock and Ivanhoe.

In February 1894, while the Dobson. Min¬ istry was in office, the necessity of financial re¬ form became a burning question. Financial proposals were submitted by the government. A bill to authorize a graduated land tax was submitted to the Assembly and rejected; conse¬ quently Dobson and his colleagues resigned in April 1894, and Sir Edward Braddon formed a ministry. An income tax was passed, to¬ gether with a land tax imposing one penny per pound on the capital value of all land in the colony. This general tax was adopted as a sort of a compromise instead of the proposed tax on the unimproved

capital value of the land which was at first submitted and rejected.

In Februarv 1895, a conference of premiers was held at Hobart at which the draft of a Federal Enabling Bill was adopted. At a gen- voj.. 2 — 37

eral election held in 1897, a system of voting based upon Hare's preferential method was used for the first time. During the year a Federal referendum was held at which a large majority of votes was given in favor of the Federal Con¬ stitution. In 1899 the Braddon Ministry was defeated and it was succeeded by one formed by Sir Niel Elliot Lewis on 12 Oct 1899, who retained office until 8 April 1903. On 9 April 1903, William Bispham Propsting became Pre¬ mier, and on 12 July 1904 he was succeeded by John William Evans, who resigned and was succeeded by Sir Niel Elliot Lewis, who held office until June 1912 when he was succeeded by Mr. A. E. Solomon who was defeated by Mr. John Earle in April 1914, who held office until April 1916 when he was succeeded by Mr. W. H. Lee.

QUEENSLAND AN OFF-SHOOT OF NEW SOUTH

WALES.

Separation. — On 6 June 1850, letters patent were issued erecting the Moreton Bay district into a separate colony, under the name of Queensland, and appointing Sir George Fergu¬ son Bowen to be captain-general and governor- in-chief thereof. The boundary of the new colony was defined as a line commencing on the sea coast at Point Danger, in latitude about 28° 8' S., running westward along the Mac-

pherson and Dividing Ranges and the Duma- resq River, to the McIntyre River, thence by the 29th parallel of S. latitude to the 141st meridian of E. longitude from the 29th to the 26th parallel, and thence the 138th meridian north to the Gulf of Carpentaria, together with all the adjacent islands, their members and ap¬ purtenances in the Pacific Ocean. The gover¬ nor was authorized to appoint an Executive Council to advise and assist him in the govern¬ ment of Queensland. The Constitution of Queensland was embodied in an Order in Coun¬ cil bearing the same date, as the letters patent.

The New Constitution. — The Order in Council provided that there should be within the colony of Queensland a Legislative Council and a Legislative Assembly, with the advice and consent of which Her Majesty should have power to make laws for the peace, welfare and

good government of the colony in all cases whatsoever. In its main outlines the Constitu¬ tion of Queensland was almost a replica of that of New South Wales. The first Parliament under the new Constitution was convened for the despatch of business on 29 May 1859.

Administration and Legislation. — Public events in Queensland became clustered around and associated with the following prominent men who held office as Premiers between 1859 and 1899 : Robert G. Herbert, Arthur Mac- Alister, Robert MacKenzie, Charles Lillev, Arthur Palmer, George Thorn, John Douglas, Thomas Mclllwraith, Samuel Griffith, Boyd D. Morehead, Hugh Muir Nelson, Thomas J. Byrnes and James R. Dickson.

From the date of separation Queensland began to advance with rapid strides, and it soon occupied a prominent position in the Australian group. Between 1861 and 1871, under a policy of assisted immigration, the population largely increased and the resources of the country were developed in the direction of pastoral and agri¬ cultural pursuits., gold and silver mining, sugar and cotton growing. Cotton growing was stim-

ulated by bounties. The pastoral industry was promoted ; railway construction was com¬ menced ; state aid to religion was withdrawn and a system of primary and secondary educa¬ tion was initiated. Queensland was found to be particularly suitable for sugar growing and a demand for cheap labor quickly sprang up. In course of time shiploads of South Sea Islanders were introduced by the sugar planters and it was soon found necessary for the legis¬ lature to interfere.

A financial crisis occurred in 1865, which in 1866 resulted in a change of ministry. The first MacAlister Ministry had a short term of office. Herbert was again called to the helm of affairs but in a few months he was again displaced. The second MacAlister Ministry lasted for 12 months and eight days. It secured the passing of an important measure dealing with the cultivation and occupation of Crown lands. It was followed by the MacKenzie Min¬ istry and the Lilley Ministry. The MacKenzie Ministry of 1867 introduced and passed a Crown Land Act which gave greater facilities for set¬ tlement. The Lilley Ministry of 1868 passed acts relating to the civil service, court proced¬ ure, and electoral laws. The Lilley Ministry was followed by the Palmer Ministry which lasted from 3 Jan. 1870 to 8 June 1874. In 1875

during the reign of the third MacAlister administration a State Education Act was passed which embodied the principles of free, secular and compulsory education. A complete measure of local government was passed in 1878, under the rule of the Douglas administra¬ tion. In the same year the first act to restrict Chinese immigration into Queensland became law.

In 1879, Mr. (afterward Sir) Thomas Mc- Ulwraith formed his first government. On 4 April 1883, he made a dramatic and sensa¬ tional attempt to annex Newr Guinea, directing H. M. Chester, at Thursday Island, to cross Torres Straits and on behalf of Her Majesty's government in Queensland to hoist the British flag and proclaim the annexation to that colony of that part of the island not claimed by the Dutch. This act was repudiated by Lord Derby, who, however, on 10 Oct. 1884 declared a British protectorate over the southern part of the island ; Germany seized the remainder.

In November 1883, Mclllwraith was de¬ feated and Mr. (afterward Sir) Samuel Grif¬ fith succeeded him. During his term of office a convention of Australian representatives was held in Sydney, at which a scheme for the es¬ tablishment of a Federal Council of Australasia, drafted by Griffith, was adopted and it after¬ ward became law by Imperial legislation. A Crown Lands Act was passed by the Griffith administration in 1884. _ It encouraged Crown tenants to improve their holdings, facilitated bona-fide settlement and discouraged the spec¬ ulative acquisition of land. The first Griffith Ministry was succeeded (13 June 1888) by the second Mclllwraith government, which had only a brief tenure of office, being on 20 Nov. 1888, supplanted by the Morehcad Ministry which lasted until 7 Aug. 1890. The second Grif¬ fith Ministry was then formed. In April 1891, Griffith took an active part in a Federal con¬ vention held in Sydney at which a draft con¬ stitution for the union of the Australian colonies was adopted.

The Kanaka labor question became important about this time and the Griffith Ministry advised the reintroduction of Polynesian laborers. On 14 April 1892, the Pacific Laborers' Extension Bill was passed, notwithstanding strong objec¬ tions urged against the introduction of colored races into Queensland. On 11 Jan. 1893, Grif¬ fith was appointed chief justice. Mr. (after¬ ward Sir) Hugh Muir Nelson occupied the post of acting Chief Secretary pending the ar¬ rival from England of Sir Thomas Mclllwraith who, on 27 March, became Premier of his third and last administration. In October follow¬ ing he resigned the premiership in which he was succeeded by Sir Hugh Muir Nelson. In 1894 the great strike of shearers occurred in Queensland,

leading to a reign of lawlessness which resulted in the passage of the Peace Preservation Act. In 1896 a Meat and Dairy Produce Act was passed which gave a stimulus to the primary industries. Increased facilities for land settlement w'ere offered.

On 13 April 1898, Sir Hugh Nelson resigned the premiership and was appointed president of the Legislative Council. The task of form¬ ing a new government was entrusted to T. J. Byrnes who gave promise of a brilliant political career which was cut short by his death at the early age of 36, after five months of office. Mr. (afterward Sir) James R. Dickson then be¬ came Premier. He was an ardent Federalist and exercised the power of his influence in favor of Queensland joining the Common¬ wealth which was then on the eve of being established. He represented Queensland at a conference of premiers at which the Constitu¬ tion, as adopted by the Convention, was slightly modified. In September 1899 the Constitution was submitted to the people of Queensland by a referendum and was approved by a large ma¬ jority. In December 1899, a Labor Ministry was formed by Anderson Dawson ; it lasted six days and R. Philp, a former colleague of Dick¬ son, then formed a ministry. Philp held office until 17 Sept. 1903. The Labor party, having in the meantime increased in members and in¬ fluence, became sufficiently strong to take a share in the executive government of the country, and accordingly Arthur Morgan vacated the speaker's chair and formed a Liberal Labor government in which the Liberals and Laborites were equally represented. In January 1906, Morgan resigned the premier¬ ship and became vice-president of the Execu¬ tive Council, William Kidston, leader of the Labor party, becoming Premier, a position he held until February 1911, when he was suc¬ ceeded by Mr. D. F. Denham, who held office until 1 June 1915, when he was defeated by Mr. T. J. Ryan who formed a labor govern¬ ment.

WESTERN AUSTRALIA THE SECOND ORIGINAL

COLONY.

Foundation. — The first Imperial Act ap¬ plicable to Western Australia was 10 Geo. IV, c. 22 (1829). It was entitled <(An Act to Provide Until the 31st Day of December 1834, For the Government of His Majesty's Settle¬ ments in Western Australia on the Western Coast of New Holland.® It will be noticed that the name <(Australia® first suggested for the continent in 1814 by Matthew Flinders is here used and for the first time mentioned by

an Imperial Act. By that act the king, with the advice of the Privy Council, was empow¬ ered to authorize any three or more persons resident within the settlements to make, ordain and constitute laws, institutions and ordinances for the peace, order and good government of His Majesty's subjects and others within the settlement.

A Representative Legislature. — Under the Act 13 and 14 Vic., c. 59 (5 Aug. 1850), Western Australia was granted a Legislative Council, consisting of 26 members, nine of whom were nominated by the Crown and 17 were elected by qualified inhabitants. Three years afterward an agitation was commenced in favor of responsible government as it existed in the eastern colonies. In 1874, a draft of a Constitutional Bill was sent to the Sec¬ retary of State, who, however, decided that the colony was not yet ripe for the change.

•The New Constitution. — The movement was not successful until July 1890, when a new Constitution was passed by the Imperial Parlia¬ ment, being embodied in the Act 53 and 54 Vic., c. 26. It created a bicameral legislature con¬ sisting of a nominee Council and an elective Assembly to make laws in and for Western Australia, and along with it responsible gov¬ ernment was introduced. The first Premier was Sir John Forrest.

Administration and Legislation. — The dis¬ covery of goldfields and a rapid influx of popu¬ lation were factors which largely contributed toward the success of the constitutional move¬ ment. The new Parliament was called upon to pass legislation relating to gold mining, land settlement, railway construction and water sup¬ ply. Under the old regime a railway 243 miles long had been constructed on the land grant system between Beverly and Albany. Under the terms of the contract, payment was made at the rate of 12,000 acres for every mile of completed road. The lands selected in payment were situated within a belt of 40 miles on each side of the line; half the frontage to the rail¬ way was reserved to the government. In 1896 the government acquired this private land-grant railway, the purchase price being £1,100,000. The Perth waterworks constructed by the Perth Water Supply Company were taken over by the government at a cost of £220,000. Among the lines of railways which greatly as¬ sisted in the development of the interior were the lines to Kalgoorlie, Menzies and Kanowna, penetrating into the heart of the eastern gold¬ fields. A gigantic scheme of water supply for the conveyance of water through pipes by pumping from station to station, from the Mundaring Reservoir to Coolgardie and Kalgoorlie, a distance of 330 miles at a

cost of £2,500,000, was inaugurated, ; nd afterward successfully completed.

In 1897-99 the question of federation came into prominence. The attitude of the Forrest government toward the new constitution was not favorable whilst on the gold-fields there was a strong movement in favor of the bill backed up by threats of separation. This led to a change of attitude on the part of the government, and at the test referendum that followed a majority of electors voted in favor of Federal union.

In 1899 an Electoral Bill was passed which conferred the political franchise on adult

women; it was exercised for the first time on the occasion of the Federal referendum.

Sir John Forrest retired from state politics in February 1901, and G. Throssell succeeded him as Premier. The Throssell Ministry was defeated at a general election held the same year. George Leake then formed a ministry which was short-lived, as also was another formed by Alfred Edwards Morgans. On 23 Dec. 1901 Leake formed his second ministry and held office until his death on 24 June 1902. He was succeeded in the premiership by Walter H. James on 1 July 1902. The only notable matters of legislation passed in this period of short-lived ministries were the Arbitration and Conciliation Act and the Workmen's Com¬ pensation Act. On 10 Aug. 1904 James was de¬ feated and a Labor ministry was formed by Henry Daglish. It remained in office until 25 Aug. 1905 when it was displaced — partly by dissension within the ranks of the Labor party, and ostensibly on the question of purchasing and resuming possession of the Midland Rail¬ way. On 25 Aug. 1905 Cornthwaite Hector Rason became Premier of a Liberal adminis¬ tration, pledged to oppose the extreme policy of the Labor party. He secured a dissolution and went to the country from which he returned with a strong working majority. He resigned in May 1906, to accept the position of agent- general in London and Mr. (now Sir) Newton James Moore became Premier and he held office until September 1910 when he was suc¬ ceeded by Mr. Frank Wilson who was defeated by the Labor party in October 1911 and Mr. John Scadden became Premier, until July 1916 when he was defeated by Mr. Frank Wilson.

SOUTH AUSTRALIA THE THIRD ORIGINAL COLONY.

Foundation. — This province was originally carved out of that part of

the colony of New South Wales lying between the meridians 132° and 141° E. longitude, bounded on the north by the 26° parallel of S. latitude and on the south by the Southern Ocean. This region was never occupied, or settled, by the New South Wales government. On 15 Aug. 1834, the Act 4 and 5 Wm. IV, c. 95, entitled <(An Act to empower His Majesty to erect South Aus¬ tralia into a British Possession or Province, and to provide for the Colonization Thereof® was passed. It did not purport to separate the territory from New South Wales; it seemed to contemplate the whole of that part of the con¬ tinent as not being subject to any prior statutory authority. It empowered the King to appoint a governor and colonization commissioners, who were to have the control of the Crown lands, with power to survey and sell the same, and to employ a portion of the money so derived in conducting the immigration of laborers from Great Britain. In the exercise of these powers the province was erected; a governor, a judge, seven commissioners and other officials were appointed. The governor, with the concurrence of the chief justice, the colonial secretary and advocate-general, or tv-o of them, was authorized to make laws and impose taxes. Captain (afterward Sir) John K. Hindmarsh was appointed the first governor.

On 28 Dec. 1836, Governor Hindmarsh ar¬ rived at Glenelg and proclaimed the establish¬ ment of the government. He was succeeded on 12 Oct. 1838, by Governor Gawler, during

whose term of office the settlement became in¬ volved in debt to the extent of £281,842. Gaw- ler was recalled (May 1841), and a radical change was made in the government of the colony; the office of Colonization Commission in London was abolished ; South Australia was made a Crown colony, the government was vested in the Secretary of States for the Colonies. Captain (afterward Sir) George Grey was appointed governor, and almost abso¬ lute power was entrusted to him.

In 1842 the Act 5 and 6 Vic., c. 61, entitled ((An Act to provide for the better government of South Australia® was passed. Under it a nominated Legislative Council, consisting of the governor and seven other persons resident in the colony, was created, having power to make laws for its government. On 25 Oct. 1845, Cap¬ tain Grey was transferred to New Zealand, and Lieutenant-Colonel Robe acted as governor for a short time. His successor was Sir Henry Fox Young, to

whom the colony was indebted for an extensive main road system, and the insti¬ tution of local government in the shape of district councils.

A Representative Council. — Under the Act 13 and 14 Vic., c. 59 (5 Aug. 1850), the Legisla¬ tive Council then established in South Australia was authorized to establish another Legislative Council consisting of not more than 24 mem¬ bers, one-third of whom were to be appointed by the Crown and the remainder were to be elected by the qualified inhabitants. This new Council was authorized to make laws for the peace, order and good government of the province and to impose rates and taxes. On 21 July 1851, this Council consisting of 24 mem¬ bers was duly constituted.

The New Constitution. — In 1853 the Legis¬ lative Council of South Australia, in pursuance of powers conferred by section 32 of the Act 13 and 14 Vic., c. 59, passed a bill to establish a bicameral legislature for South Australia, consisting of a Legislative Council and a House of Assembly. This bill was reserved for the Queen's assent but it was disallowed. Subse¬ quently a second bill to create a bicameral leg¬ islature was introduced in the Council and passed. It provided for the creation of two elective Houses to take the place of the Council created by the Act 13 and 14 Vic., c. 59. This bill eventually received the Royal assent, and is sometimes called the ˆConstitution Act® of South Australia. It contained provisions and machinery somewhat similar to the Constitu¬ tion Act of Victoria. The suffrage for the Assembly was manhood coupled with registra¬ tion and residence. Both Houses were chosen by ballot which was adopted on the motion of Francis S. Dutton, afterward Premier.

Responsible Government. — The election of members of the two new Houses took place in March 1857. The first session of the new Parliament commenced on 22 April 1857, during the governorship of Sir Richard Graves Mc¬ Donnell. The first Premier was B. T. Finniss.

Administration and Legislation. — Among the public men of South Australia, who, in the early history of the colony under responsible government, took an active and prominent part in the great business of administration and legis¬ lation were the following who held office as Premiers from 1856 to 1870; Lieutenant- Colonel Boyd Travers Finniss, John Baker,

Robert Richard Torrens, Richard Davies Han¬ son, Thomas Reynolds, George Marsden Water- house, Francis Stokes Dutton, Henry Ayers, John Hart, Arthur Blyth and Henry Bull Templar Strangways.

Mr. (afterward Sir) R. R. Torrens took office in 1857. His name has become famous by association with an act simplifying the transfer, conveyance and registration of land. Torrens was the originator of the plan; it was based on practical knowledge obtained by him as collector of customs, but he was assisted by the legal knowledge of Dr. Hubbe. The Torrens' Land Act system was afterward adopted by all the other Australian colonics. In 1861 a strip of territory lying between^ latitude 129° and 132° E. longitude and south of the 26° S. latitude known as ((No Man's Land® was added to South Australia.

Sir Dominic Daly succeeded Sir Richard G. MacDonnell on 4 March 1862. In March 1863 an intercolonial conference was held in Mel¬ bourne at which the majority of the Australian colonies were represented. This conference was originated in a suggestion made by Sir Dominic Daly. It was resolved that it was desirable to settle the basis for a uniform tariff for the Australian colonies. No practical results followed the conference, but it foreshadowed the necessity of some form of Federal Union. In the same year the Northern Territory was added to South Australia by letters patent.

In 1868-69, a ministry, of which Henry B. Templar Strangways was Premier, held office. Its career was distinguished by the passing of a Land Act which was intended to promote settlement and prevent the monopolization of the large tracts of land by land sharks and dummies. Sale of land by auction was limited. Land was sold to bona-fide selectors on credit, the payments being allowed to extend over a period of four years, and no selector was al¬ lowed to take up more than 640 acres.

The great overland telegraph line from Port Augusta to Port Darwin, the construction of which was prosecuted during the premierships of Strangways, John Hart and Sir Arthur Blyth, was completed on 2 Aug. 1872. In 1875-76 a strong administration formed by Mr. (afterward Sir) James Penn Boucaut, was in power; it introduced a policy of internal de¬ velopment, public works and railways. It was proposed that a loan of £3,000,000 should be raised, coupled with increased taxation, stamp tax and probate duties. This scheme was passed by the Assembly and rejected by the Council. Mr. (afterward Sir) John Colton formed a ministry which adopted Boucaut's policy and carried his scheme of public works and railways without the increased taxation. In 1877 Boucaut's second ministry was in office, and during that year the overland telegraph line between Adelaide and Perth was com¬ pleted.

The second Boucaut Ministry was succeeded by administrations of

which the following were Premiers from 1878 to 1916: William Mor¬ gan, John Cox Bray, John Colton, John W. Downer, Thomas Playford, John Alexander Cockburn, Frederick William Holder, C. C. Kingston, Vaibeu Louis Solomon, J. G. Jenkins, Richard Butler, Thomas Price, A. H. Peake, John Verran and Crawford Vaughan.

In 1886 the jubilee of South Australia was

celebrated. C. C. Kingston came into power in 1893. A Crown Lands Consolidation Act was passed by his ministry which restricted the sale of Crown lands by auction, introducing a system of leasing country lands, coupled with the right of purchase and provided perpetual leases for agricultural purposes. Small blocks not exceeding the unimproved value of £100 were thrown open for lease on the application of workingmen. Personal residence on a block was necessary, either by the lessee or by his wife or children. The rent of each lease was notified in the Gazette. These lots were not subject to a revaluation, but were liable to land tax. In 1894 a bill was passed conferring the franchise on women. In order to give en¬ couragement and to grant assistance to the farmers an Advance to Farmers' Act was passed in 1896, under which a state bank has been established in South Australia with power to grant loans to farmers at a low rate of inter¬ est with extended time for repayment of the principal.

On 25 April 1896, a general election was held in South Australia at which women exer¬ cised their right to vote; about 66 per cent of the women whose names were enrolled recorded their vote. On 22 Jan. 1897, Sir Samuel J. Way, chief justice of South Australia, was appointed a member of the Judicial Committee of the Privy Council. On 22 March the Federal Convention held its first session at Adelaide, at which the first preliminary draft was pre¬ pared. Mr. Kingston being defeated 1 Dec. 1899, resigned, and V. L. Solomon formed a ministry which was defeated on 7 December. F. W. Holder then became Premier. An Early Closing Act and a Workmen's Compensation Act were passed. In May 1901, Holder re¬ signed in order to accept office in the Federal Parliament. He was succeeded in the premier¬ ship by J. G. Jenkins, who held office in the Playford, Kingston and Holder cabinets. He undertook the difficult task of carrying consti¬ tutional amendments rendered necessary by the adoption of the Federal Constitution trans¬ ferring certain powers, functions and depart¬ ments from the state to the Federal govern¬

ment. He succeeded in carrying a measure re¬ ducing the number of responsible ministers, re¬ ducing the number of members of the Assem¬ bly from 54 to 42, and reducing the number of the Council from 24 to 18. He resigned on 1 March 1905, and accepted the appointment of agent-general for South Australia in Lon¬ don. A ministry of which Richard Butler was Premier then took office. A general election took place in May at which Butler's party was defeated and on '20 July he resigned, and was succeeded as Premier by Thomas Price who died in 1909 and was succeeded by A. H. Peake whose party was defeated at the elections in April 1910 by the Labor party, and its leader, T. Verran, became Premier in June 1910, and held office until 17 Feb. 1912, when he was defeated by Mr. A. H. Peake who held office until 3 April 1915, when he was defeated by the Labor party and Mr. Crawford Vaughan became Pre¬ mier.

Bibliography. — Australia, General. — Arthur, Australia and the Empire5 (1906) ; Chapman, Parliamentary Government for Australian Colonies5 (1854); Martin, Australian Essays, Political, Etc.5 (1857) ; Labillier, Constitution

of Australian Colonies5 (1870); Ranken, 'Dominion of Australia5 (1874) ; Clarke, (His¬ tory of Australia and Tasmania5 (1877) ; Blair, 'History of Australia5 (1878); Douglas, (An Australian NatioiP (1880) ; Blair, Cyclopaedia of Australia5 (1881) ; Allen, 'History of Australia5 (1882) ; Rusden, (History of Aus¬ tralia5 (1883) ; Sutherland, (History of Aus¬ tralia5 (1883) ; Forbes, Present and Future of Australian Colonies5 (1883) ; Service, Ped- eration of Australia5 (1884) ; Carnarvon, An¬ nexation and Federation in Australia5 (1884) ; Parkes, Australia and the Imperial Connec¬ tions5 (1884) ; Parkes, (The Australian Em¬ pire5 (1884); Hodgson, Cur Australian Colonies5 (1885) ; Froude, 'Oceana5 (1886) ; Garran, Picturesque Atlas of Australia5 (1886); Martin, Australia and the Empire5 (1889); Hopkins, Australia; Progress, Peo¬ ple, and Politics5 (1889) ; Duffy, 'Road to Federation5 (1890); Dilke, Problems of Greater Britain5 (1890) ; Reid, Commonwealth of Australia5 (1891) ; Willoughby, Australian Federation5 (1891) ; Clarke, Australia and the Imperial Connection5 (1891) ; Braddon, Australia; Its Progress and Resources5 (1892); Tregerthen, Australian Common¬ wealth5 (1893) ; Baker, Che Executive in a Federation5 (1897); Way, (Observations on Draft Commonwealth Bill5 (1900) ; Butter- worth, Annotated Constitution of the Common¬ wealth5 (1901) ; Finney, 'History of Australian Colonies5 (1901) ; Cockburn, Australian Fed¬ eration5 (1901) ; Jose, Australia and New Zea¬ land5 (1901) ; Quick and Garran, Constitu¬ tion of the Australian Commonwealth5 (1901) ; Barton, (Troubles of Australian Federation5 (1901) ; Rowland, Australian Federation, His¬

tory, Character and Possibilities5 (1901): Posnett, Pederal Constitution of Australia5 (1901); Cockburn, Australia's First Federal Parliament5 (1901) ; Hogan, Pirst Steps of the New Commonwealth5 (1901); Clark, 'Studies in Australian Constitutional Law5 (1901) ; Moore, Constitution of Common¬ wealth of Australia5 (1902) ; Cockburn, 'Sphere of State Activity in Australia5 (1902) ; Teece, Comparison between the Federal Constitution of Canada and Australia5 (1902) ; Reeves, 'State Experiments in Australia and New Zea¬ land5 (1902) ; Kirwin, 'Three Years of Aus¬ tralian Federation5 (1904) ; Taylor, Australia of To-Day5 (1906); Wise, Australia and Its Critics5 (1905).

New South Wales. — Martin, 'History of New South Wales5 (1836) ; Burton, Constitu¬ tion of Government of New South Wales5 (1840) ; Brain, 'History of New South Wales5 (1846) ; Martin, 'History of New South Wales5 (1853) ; Lang, 'Historical Account of New South Wales5 (1875); Garran, 'New South Wales5 (1884) ; Oliver, Constitution of New South Wales5 (1884) ; Morris and Byron, Progress of New South Wales5 (1886) ; Gane, 'New South Wales and Victoria5 (1885) ; Buchanan, 'Hundred Years' Progress, New South Wales5 (1888) ; Barton, 'History of New South Wales5 (1889) and (1894) ; Cogh- lan, 'Wealth and Progress of New South Wales5 (1893) : Hutchinson, 'New. South Wales5 (1896) ; Britton and Bladen, 'Historical Records, New South Wales5 (1898); Bonwick, New South Wales5 (1900); Coghlan, 'Twenty Years' Progress in New South Wales5 (1905).

Queensland. — Boyd, .'Queensland' (1882); Coote, 'History of Queensland (1882); Blakeney, 'Form of Government in Queens¬ land' (1883) ; Taylor, Queensland the North¬ ern State) (1905) ; Thomas, (Queensland) (1904) ; Thomson, (Material Progress of Queensland' (1903) ; Wolsey, <Queensland) (1908) ; Trail, 'Historical Sketch of Queens- land) (1886) ; Weeden, Queensland; Past and Present' (1897); Dicken, Queensland' (1900).

South Australia. — Baker, (Notes on the Constitution of South Australia' (1901) ; Mar¬ tin, (History of South Australia' (1836) and (1853) ; Angas, (South Australia Illustrated' (1847); Duncan, 'Colony of South Australia' (1850); Forster, 'South Australia; Progress and Prosperity' (1860) ; Harcus, 'South Aus¬ tralia; History and Progress' (1876); Stow, 'South Australia; History, etc.' (1883) ; Fin- niss, (Constitutional History of South Australia' (1886) ; Gill, (Bibliography of South Australia' (1886) ; Hodder, 'History of South Australia'

(1893); Blackmore, ‘Law of Constitution of South Australia’ (1894) ; Bedford, ‘ South Australian Settlement’ (1902); Whitington, ‘South Australia’ (1903); Vivienne, (Sunny South Australia’ (1908).

Tasmania. — Gregory, ‘Features of Geogra¬ phy of Tasmania’ (1902); Parker, ‘Van Die- man’s Land’ (1834) ; Martin, (History of Van Diemen’s Land’ (1839) and (1853) ; Bonwick, ‘Tasmania’ (1888) ; Braddon, ‘History of Tas¬ mania’ (1891) ; Walker, ‘Early History of Tas¬ mania’ (1895); Mill, ‘Tasmania’ (1899); Levy, ‘Tasmania’ (1900).

Victoria. — Bent, (Trend of Victorian Prog¬ ress’ (1907) ; Brassey, (Victoria as I left It’ (1901) ; Bedford, (Victorian Settlement and History’ (1901); Martin, (Victoria, Its His¬ tory and Conditions’ (1853) ; Duffy, (Land Law of Victoria’ (1862) ; Westgarth, his¬ tory of Victoria’ (1864) ; Duffy, ‘Political His¬ tory of Victoria’ (1876) ; FitzGibbon, ‘Party Government in Victoria’ (1878) ; Hodder, Constitutional Difficulties in Victoria’ (1879) ; Walch, (Victoria’ (1880); Carlisle, Constitu¬ tion of Victoria’ (1884); MacFie, (Victoria, Its History and Prospects’ (1888) ; Jenks, (The Government of Victoria’ (1891) ; Dyer, ‘Victoria and Its Resources’ (1893) ; Dow, ‘An Australian Colony’ (1898) ; Clarke, Vic¬ toria and Her Resources’ (1899).

West Australia. — Martin, ‘History of West Australia’ (1836); Knight, ‘History and Prog¬ ress of West Australia’ (1870) ; Le Froy, ‘West Australia, Past and Present’ (1901) ; Broome, ‘Western Australia’ (1885); Bonwick, ‘Western Australia’ (1888) ; Hart, ‘Western Australia’ (1893) ; Calvert, ‘Western Australia; History and Progress’ (1894) ; Robinson, ‘Western Australia; Present and Future’ (1896); Robinson, ‘Western Australia’ (1900).

Sir John Quick,

Postmaster-General in Deakin’s Common¬ wealth Government, 2 June 1909 to 29 April 1910; Joint Author of ‘ Constitution of Aus¬ tralian Commonwealthˆ .

1. THE COMMONWEALTH, ITS CONSTITUTION, GOVERNMENT AND ADMINISTRATIVE DEPARTMENT. The Beginning of the Federal Movement Toward Political Union. — Under the Acts of 63 and 64 Vic., c. 12 (1900) known as the

“Commonwealth of Australia Constitution Act,” the people of New South Wales, Victoria, South Australia, Queensland, Tasmania and Western Australia were united in a Federal Commonwealth under the

name of The Com¬ monwealth of Australia; and the old colonies, under the name of states, were declared to be parts of the Commonwealth. This great act marked the completion and consummation of a movement in favor of Australian federation, which extended over a period of nearly 60 years.

In 1847, Earl Grey, Secretary of Statp for the Colonies, proposed to create a separate legislature in and for Australia in which all the colonies then in existence should be rep¬ resented, and which should have power to make laws in matters of common concern. In 1849, the Privy Council proposed that there should be a General Assembly having power to deal with custom duties, postal matters and to create a Supreme Court of Appeal. In 1853 a committee of the Legislative Council of New South Wales recommended the establishment of a General Assembly. All these proposals, however, were regarded as premature. The following is a summary of other unsuccessful efforts in the same direction; (1857) a select committee of the Victorian Legislative Assem¬ bly agreed that “the time for union had come” ; in the same year a select committee of the New South Wales Parliament passed a similar reso¬ lution; (1860) a select committee of the Vic¬ torian Assembly recommended negotiation ; (1862) the Colonial Secretary of South Aus¬ tralia commenced correspondence with other colonies urging that a uniform tariff was indis¬ pensable ; (1863) tariff conference in Mel¬

bourne; (1865) inter-colonial conference at Sydney resulting in agreement by which the Murray border was made free of fiscal restric¬ tion; (1867) inter-colonial conference in Mel¬ bourne in reference to ocean postal service to Australia at which Sir Henry Parkes said: “the time has arrived when the colonies should he united”; (1880) inter-colonial conference in Melbourne at which a resolution was passed that “a Federal Council was needed to deal with the question of inter-colonial interest” ; (1883) inter-colonial conference at Sydney at which the necessity of a Federal Council was affirmed, and at which a draft bill was adopted which afterward became law (this council, however, was not a success as only three of the colonies joined it); (1890) Federal conference in Melbourne convened by Sir Henry Parkes at which resolutions were passed affirming the necessity for an early con¬ vention of the representatives of all the colonies to prepare a scheme for a Federal constitution.

Convention of 1891, — On 22 March 1891, the first Federal convention was held in Sydney at which all the Australasian colonies, including New Zealand, were represented by seven delegates chosen

by the Parliament of each colony. A constitution was drafted and adopted by the convention, but no practical ac¬ tion was taken to give it effect. In January 1895, a conference of premiers was held at Hobart, at which all the Australasian colonies were represented. It was resolved that “A con¬ vention consisting of 10 representatives from each colony, directly chosen by the electors, be.

charged with the duty to frame a constitution; that the constitution so framed be submitted to the electors for acceptance or rejection by direct vote.® Five of the six colonies, viz., New South Wales, Victoria, South Australia, Tas¬ mania and Western Australia elected 10 rep¬ resentatives. Queensland did not take part in the convention which met in Adelaide in March 1897. C. C. Kingston, then Premier of South Australia, was elected president of the conven¬ tion, which afterward sat in Sydney and Mel¬ bourne. A constitution was drafted, subse¬ quently submitted to the people of the various colonies, and ratified, Queensland coming in at the last moment. The constitution so drafted and ratified by the people of Australia was afterward embodied in an Imperial Act, came into force and the Commonwealth was pro¬ claimed.

The Federal Constitution. — The Federal Constitution came into force and the Australian colonies were united on 1 Jan. 1901. By this Constitution instrument a new Parliament was called into existence, as well as a new executive, and a new judiciary. The union of people and states, so organized and constituted, in many respects resembles that of the United States of America. The new form of government has been created for special and limited purposes to deal with matters of common Australian in¬ terests. The power and authority of the Fed¬ eral Parliament, and Federal government, are limited and restricted to such powers and au¬ thorities as have been expressly taken from the state, or such new powers as are specified and particularized in the instrument. The gov¬ ernments and Parliaments of the states have the same legislative and executive scope as before — save as to matters delegated to the Federal authority. In this respect the Australian Con¬ stitution differs from that of Canada, which limits and defines the power of the province and confers upon the Dominion Parliament all the residue of sovereign power.

Executive Department of the Common¬ wealth. — The executive power of the Common¬ wealth is vested in the king, and exercised by

the governor-general as the king's represen¬ tative. It includes the maintenance of the con¬ stitution and the execution of the laws of the Commonwealth. There is an Executive Coun¬ cil to advise the governor-general in regard to the government of the Commonwealth. The governor-general can appoint ministers to pre¬ side over the several departments. No minister can hold office longer than three months, unless he be a member of the Senate or of the House of Representatives. There can be no more than seven ministers in office at the same time. The sum of £12,000 per annum is appropriated to be divided among ministers by themselves.

Immediately upon the establishment of the Commonwealth the departments of customs and excise in all states were by operation of law taken from the states and transferred to the Commonwealth. By proclamation later on the departments of post-offices, telegraphs and tele¬ phones, naval and military defense were taken from the states and vested in the Common¬ wealth. Four new Federal departments were also created by proclamation, viz., the Depart¬ ment of External Affairs, - the Department of Home Affairs, the Department of the Treasury and the Department of the Attorney-General.

Legislative Department of the Common¬ wealth. — The legislative power of the Com¬ monwealth is vested in a Federal Parliament consisting of the King, or Queen, of the United Kingdom, the Senate and the House of Rep¬ resentatives. The Senate consists of represen¬ tatives from each of the six states directly chosen by the people of each state voting as one electorate ; each state is entitled to six senators. Senators are chosen for six years, one-half retiring every three years. The House of Representatives is composed of members directly chosen by the electors of the Common¬ wealth ; the total number of such members must be as nearly as practicable twice the number of the senators. The Senate is called the State House, the House of Representatives is called the National Chamber, in which the people of each state are represented according to popula¬ tion, save and except that no state is to have less than five members. In the first Parliament, New South Wales sent 26 members to the House of Representatives, Victoria sent 23, Queensland sent 9, South Australia sent 7, Western Australia and Tasmania sent 5 each. The House of Representatives continues to exist for a period of three years from the first meeting, unless sooner dissolved by the gov¬ ernor-general. In case of a deadlock between the two Houses extending over a certain time the governor-general may under certain con¬ ditions and circumstances dissolve both Houses and send them to the people; after such a double dissolution a joint sitting of both Houses of the newly-elected members must be held at which they deliberate and vote upon

the proposed law in dispute.

The Federal Parliament can make laws re¬ specting trade and commerce taxation, bounties, borrowing, postal and telegraphic matters, naval and military defense, light houses, fisheries, census, currency, interstate insurance, weights and measures, negotiable instruments, bank¬ ruptcy, copyrights, patents, naturalization, foreign co-operations, marriage and divorce, old age pensions, service and execution of process, immigration, influx of criminals, ex¬ ternal affairs, relations of the Commonwealth with the islands of the Pacific, acquisition of property for Federal purposes, control of rail¬ ways for naval and military transport, acquisi¬ tion of state railways with the consent of such state, construction of railways through a state with the consent of such state, conciliation and arbitration for the settlement of interstate in¬ dustrial disputes, seat of government of the Commonwealth and departments of the public service.

On 1 Tan. 1911 <(The Northern Territory® of Australia which had previously belonged to the state of South Australia was transferred to the Commonwealth government. This is an area of 523,620 square miles with a white popu¬ lation of only about 2,000.

Judicial Department of the Common¬ wealth. — The judicial power of the Common¬ wealth is vested in a High Court consisting of a chief justice and not less than two other justices. The High Court has appellate and original jurisdiction. It has jurisdiction to hear appeals from all other Federal courts, or courts exercising Federal jurisdiction, and from

the Supreme Courts of states in the exercise of jurisdiction conferred by state laws. The High Court must be regarded as a Federal Court of Appeal, and a National Court of Appeal, and as such it holds a wider jurisdictional area than its great exemplar, the Supreme Court of the United States of America, which cannot enter¬ tain appeals from state courts in cases not in¬ volving Federal issues. The act confers a new right of appeal from the Supreme Courts of states in state law cases, but it does not abolish the existing right of appeal in those cases to the Privy Council. The latter right still re¬ mains. The High Court, though a general Court of Appeal for Australia, is not the sole or exclusive, but a concurrent Court of Ap¬ peal in state law cases. Parties to cases de¬ cided by the Supreme Courts of state on mat¬ ters of state law

have, therefore, an alternative right of appeal, either to the Privy Council direct or to the High Court.

The judgments of the High Court are de¬ clared by the Constitution to be final and con¬ clusive. This negatives the right of litigants in the High Court to appeal to the Privy Coun¬ cil as a matter of right. The appeal as a matter of right has been taken away, but the Constitu¬ tion has left unimpaired any right the King may be pleased to exercise by virtue of his preroga¬ tive to grant special leave of appeal from the High Court to His Majesty in Council. To this reservation of the prerogative to grant leave there is, however, a most important ex¬ ception. No appeal can be permitted to the King in Council from a decision of the High Courts upon any question as to the limits inter se of the constitutional powers of the Common¬ wealth and those of any state, or states, or as to the limits inter se of the constitutional powers of any two or more states unless the High Court shall certify that question is one which ought to be determined by His Majesty in Council. The High Court has original juris¬ diction to decide all matters arising under any treaty, all matters affecting Consuls, all mat¬ ters in which the Commonwealth is a party, all matters between states or between residents of different states in any matters arising under the Constitution or involving its interpretation.

For several courts of the states have been vested with Federal jurisdiction to deal with matters arising under the Constitution, or in¬ volving its interpretation, and in matters of any laws made by the Federal jurisdiction. In sec¬ tion 101 of the Commonwealth Constitution provision is made for the appointment of an interstate commission. In December 1912 the Fisher government passed the Interstate Com¬ mission Act and in August 1913 the Cook gov¬ ernment appointed three commissioners to carry out the provisions of the act. The first duty entrusted to them was .that they should investi¬ gate and report as soon as practicable upon the following matters: (a) Any industries now in urgent need of tariff assistance; (b) anom¬ alies in the existing Tariff Acts which are either technical in character or are due to, or arise from, the incidence of taxation; (c) the lessening where consistent with the general policy of the Tariff Acts of the cost of the ordinary necessities of life, without injury to the workers engaged in any useful industry.

Finance and Trade.— During the first 10 years after the establishment of the Common¬

wealth, the Federal government had only a limited use of the revenue derived from cus¬ toms and excise duties. It could only use for Federal

purposes one-fourth of the total of the net sum so collected. The remaining three-fourths had to be paid to the several states according to the following method of distribu¬ tion, viz., each state was credited with the whole of the revenue collected in it and each state was debited: (a) with departmental expenditure

actually incurred in such state; and (b) with a proportion on a population basis of the other expenditure of the Commonwealth. The Com¬ monwealth paid to each state monthly the balance in favor of each state. Upon the im¬ position of uniform customs duties in October 1901, trade, commerce and intercourse, between the states, whether by land or by sea became absolutely free.

Relations of States to the Commonwealth and the Crown. — The relations of the Aus¬ tralian states to the Commonwealth and to the Crown were authoritively expounded by the Secretary of State, Mr. Chamberlain, in the despatch dated 15 April 1903, directed to the lieutenant-governor of South Australia in reference to the case of the Dutch ship Vondel. The owners of this ship complained to the British Government that the state gov¬ ernment of South Australia had declined to arrest the crew of the ship while she was in South Australian waters. The Secretary of States brought the complaint under the notice of the governor-general of Australia. The Federal government forwarded the papers to the state government desiring them to furnish a report on the case. The state government re¬ fused to report to the Federal Government on the ground that the latter had no jurisdiction in the matter. The constitutional issues raised by the action of the South Australian govern¬ ment were dealt with at length in Mr. Chamber¬ lain's despatch. (<So far as other communities in the empire or foreign nations are concerned, the people of Australia form one political com¬ munity for which the government of the Com¬ monwealth alone can speak, and for everything affecting external states or communities which takes place within its boundaries, that govern¬ ment is responsible. The distribution of powers between Federal and state authorities is a matter of purely internal concern of which no external country or community can take cognizance. It is to the Commonwealth and to the Commonwealth alone that, through the Im¬ perial government, they must look for remedy or relief for any action affecting them done within the bounds of the Commonwealth, whether it is the act of a private individual, of a state official, or of a state government. The Commonwealth is, through His Majesty's government, just as responsible for any action of South Australia affecting an external com¬ munity as the United States of America are for the action of Louisiana or any other State of the Union. The Crown undoubtedly remains part of the Constitution of

the state of South Australia, and in matters affecting it in that capacity, the proper channel of communication is between the Secretary of State and the state governor. But in matters affecting the Crown in its capacitv as the central authority of the empire, the Secretary of State can, since the people of Australia have become one political

community, look only to the governor-general as the representative of the Crown in that com¬ munity. The view of your ministers would, if adopted, reduce the Commonwealth to the posi¬ tion of a Federal league, not a federation, and appears to me to be entirely opposed not only to the spirit but to the letter of the act.®

Administration and Legislation. — The first Federal government was formed by Mr. (afterward Sir) Edmund Burton. The princi¬ pal measures passed by the 1st Parliament were as follows: A uniform Tariff Act, an act to restrict immigration by the imposition of an educational test for the purpose of excluding colored races and to exclude laborers coming to Australia under contract of service ; an act to abolish Kanaka labor in connection with sugar growing, and to encourage the use of white labor by granting a bonus of £2 per ton on sugar so produced ; an act establishing a uniform suffrage for both the Senate and the House of Representatives; a naval agreement with the Admiralty under which the Common¬ wealth undertook to pay £200,000 per year for 10 years toward the maintenance of a naval force on the Australian station ; an act to organize the High Court, of which Sir Samuel Griffith was appointed chief justice, Sir Ed¬ mund Barton and R. E. O'Connor, justices.

An administration formed by Alfred Deakin came into office on 24 Sept. 1903. The 1st Parliament was dissolved on 23 November, and the 2d Parliament was convened for business on 2 March 1904. The Deakin Minis¬ try was defeated on 26 April by an amendment to the Conciliation and Arbitration Bill pro¬ posed by the Labor party extending it to state railway servants. J. C. Watson then formed a Labor ministry. On 17 August an adverse amendment to the Constitution and Arbitra¬ tion Bill, limiting the principle of pref¬ erence to unionists, was carried against the Labor ministry and they resigned. G. H. Reid, leader of the Free Trade party, next formed a government in combination with a number of Protectionists. Parlia¬ ment reassembled on 26 July 1905 when the Reid Ministry was

defeated. Deakin formed his second ministry, receiving support of Labor party. Among the measures passed were a Commerce Act, Sugar Bonus Extension Act and a Trade Marks Act — the latter legalizing the (<Union Label.® Acts were also passed modi¬ fying educational tests and the contract labor clauses of the Immigration Act. In November 1908 Deakin was defeated and Fisher, a mem¬ ber of the Labor party, formed a ministry which was defeated by Deakin in June 1909. Deakin was again defeated in April 1910, Fisher becoming Premier. Fisher was defeated 20 June 1913 and the Hon. Joseph Cook became Premier. He was defeated 17 Sept. 1914 and the Rt. Hon. Andrew Fisher again became Premier, a position he held until 27 Oct. 1915, when he resigned to accept the office of High Commissioner for Australia in London. The Hon. W. M. Hughes then became Premier and is still in office (November 1917).

Bibliography. — Brown, (Australia and the War' (1915) ; Butterworth, Annotated Con¬ stitution of the Australian Commonwealth (1901) ; Coghlan, 'Progress of Australasia in the 19th Century' (1903); Cook, Australian Federation (1901); Finney, 'History of the

Australian Colonies) (1901) ; Gisborne, 'Mon¬ roe Doctrine of Australia' (1907) ; Reeves, 'State Experiments, Australia and New Zea¬ land' (1902) ; Rowland, 'The New Nation'

(1903).

Sir John Quick,

Postmaster-General in Deakin's Common¬ wealth Government 2 Jane 1909 to 29 April 1910, Joint Author of ' Constitution of Australian Commonwealth .'

1. THE STATES, THEIR CONSTITU¬ TIONS AND GOVERNMENTAL DE¬ PARTMENTS. Colonies Transformed Into States. — Under the Constitution of the Com¬ monwealth Act, the colonies of New South Wales, Victoria, Tasmania, Queensland, West¬ ern Australia and South Australia have been converted into states of the Federal Union, and certain legislative, executive and judicial powers formerly vested in colonial authorities have been transferred to the Commonwealth.

Executive Departments of States. — In each state there is a governor representing the King, and he is the head of the executive as well as a branch of the legislature. In the administration of public affairs the

governor is assisted and advised by responsible ministers who preside over the public departments and generally have seats in the legislature.

In New South Wales the governor receives a salary of £5,000. There are seven respon¬ sible ministers, among whom the public depart¬ ments are distributed as follows, viz.: (1) premier and treasurer ; (2) chief secretary; (3) attorney-general and minister of justice; (4) lands; (5) public instruction; (6) lands and agriculture; (7) the minister for labor and in¬ dustry and mines. The sum of £10,400 is ap¬ propriated for payment of ministers in such proportions as may be arranged among them¬ selves.

The governor of Victoria receives a salary of £5,000; the various public departments are presided over and distributed among ministers as follows, viz.: (1) premier, treasurer and minister of railways; (2) chief secretary and minister of labor; (3) attorney-general and minister of justice; (4) lands; (5) public in¬ structions; (6) works; (7) mines and forests; (8) water supply and irrigation. Two ministers must sit in the Council. The aggregate amount of salary payable among ministers is £8,400 per year. A minister being a member of one house may attend the other house by its permission, and speak upon and explain bills relating to his department.

In Queensland the governor's salary is £3,000. There are seven salaried ministers among whom the offices are distributed as fol¬ lows, viz.: (1) premier, chief secretary and secretary for railways; (2) treasurer; (3) home secretary; (4) secretary for agriculture and public works; (5) attorney-general, secre¬ tary of mines; (6) secretary of lands; (7) pub¬ lic instruction. The aggregate amount of salary payable among ministers is £8,300 per year.

The governor of Tasmania receives a salary of £2,750. Ministerial offices are distributed as follows, viz.: (1) premier and chief secretary; ('^) attorney-general; (3) treasurer and lands ; (4) mines and works. The aggregate amount of salary payable among ministers is £3,200 per year.

In South Australia the governor's salary is £4,000. There were formerly six responsible ministers, but by the Constitutional Amendment Act of South Australia (1901), the number was reduced to

four, and the aggregate salary divisible among them is £4,000 per year. By an act passed in 1913 the number of ministers was raised to six and salaries to £5,000. The offices at present are distributed among them as follows, viz.: (1) premier and treasurer; (2) attorney-general; (3) chief secretary; (4) lands and agriculture; (5) public works; (6) imlustry and mines.

The governor of Western Australia receives a salary of £4,000. There are six ministers holding offices as follows, viz.: (1) premier and treasurer; (2) attorney-general and education; (3) colonial secretary; (4) works and indus¬ try! (5) mines and water supply; (6) lands and agriculture. The aggregate amount of salary payable among ministers 'is £6,200 per year.

Legislative Departments of States. — The state Parliaments have no longer any control over customs, excise, post-offices, telegraphs, telephones, navy and military defenses.

The Parliament of New South Wales, like that of every Australian state, consists of a Legislative Council and a Legislative Assembly. The Council is still a nominated body as it was at the beginning of responsible government, being composed of 56 life members. There were before Federation 125 members of the Assembly; in 1901 that number was reduced to 90 as one of the results of the transfer of certain powers and functions to the Common¬ wealth government. Plural voting was abol¬ ished in 1893. Manhood suffrage, established in 1858, was in 1903 superseded by adult suf¬ frage; that is to say, ((onc adult person one voteA Since 1899, each member of the As¬ sembly receives the sum of £300 per year in reimbursement of his expenses together with a free railway pass. Members of the Council receive free railway passes but no payment. The Assembly is a triennial chamber, but it may be at any time dissolved by the Governor. Elections are conducted by ballot ; this being the method of election of members in all the Australian states.

By the Constitutional Amendment Act (1903), the Legislative Council of Victoria consists of 34 members, one of whom is directly elected by, and represents, the public and rail¬ way servants: the others are elected by quali¬ fied voters of whom there are three classes, viz.: (1) owners of freehold land of the an¬ nual value of £10; (2) rate-paying occupiers of land of the annual value of £15; (3) uni¬ versity and professional men. The property qualifications of a member of the Council were formerly ownership of freehold land of the annual value of £100; that has been reduced to £50. The tenure of a seat in the Council is six years, one-half the members retiring every three years.

In the event of a deadlock be¬ tween the two Houses on matters of ordinary legislation (constitutional alterations being ex¬ cepted), the governor mav, subject to certain conditions, dissolve both Houses. The council has power by message to the Assemblv to sug¬ gest amendments in the Appropriation Bill. Manhood suffrage coupled with ((no olural vot- ing" is the franchise for the Assembly in addi¬ tion to which, however, every owner of free¬

hold land of the capital value of £100, and of the annual value of £5 is entitled to be regis¬ tered for, and to record his vote in every electoral district in which such land is situated ; the act abolishing plural voting prohibiting him, however, from voting more than once on the same day. There are 65 members of the As¬ sembly. Public and railway officers are unable to vote in and for ordinary electorates; instead of which they are allowed to choose three special members to represent them in the As¬ sembly. Members of this House receive £300 per year, and a free railway pass. Legislative councillors receive free railway passes but no payment. The Assembly is a triennial chamber, but it may be dissolved by the governor at any time. Every elector is qualified to be chosen as a member.

In Tasmania the Legislative Council con¬ sists of 18 members elected by resident inhabit¬ ants possessed either of freehold land of the annual value of £20, leasehold of the annual value of £40, or having university or profes¬ sional qualification (Constitutional Amend¬ ment Act, 1901). The Assembly consists of 30 members elected by adult suffrage coupled with residential qualification. Members of both chambers receive an honorarium of £100 each, subject to their attending a certain number of days per session. An act to confer the fran¬ chise on women was passed in 1904.

In Queensland the Legislative Council, like that of New South Wales, is a nominated body consisting of 40 members ; they are appointed by the governor in council, and subject to cer¬ tain attendance each session they hold their seats for life; they receive no payment, but are entitled to free railway passes. The Assembly consists of 72 members elected practically by manhood suffrage; but owners of freehold land of the value of £100, and household occupiers of the annual value of £10, are entitled to vote in every electoral district in which they have that property qualification. The Assembly exists for three }Tears unless previously dissolved, and its members receive a remuneration of £300 per 3'ear, and free railway passes, and allowances for traveling expenses. Every elector is quali¬ fied to be chosen a member.

In Western Australia the Legislative Council consists of 30 members elected by adult per¬ sons having as a qualification, either, freehold lands of the capital value of £100, or leasehold of the annual value of £25, or being Crown lessees or licensees of land of the annual value of £10. The tenure of seats is six years; one- third retiring every two years (Constitution Act, 1890). The Assembly consists of 50 mem¬ bers elected by adult persons being residents of an electorate, but persons having freehold land of the capital value of £50, or leasehold land of the annual value of £10, are entitled to vote in any district in which they hold the property qualification. The Assembly,' like other popular chambers of Australia, is a trien¬ nial House. A bill conferring the franchise on women was passed in the year 1899.

Under the provisions of the Constitutional Amendment Act (1901), the number of mem¬ bers of the Legislative Council of South Aus¬ tralia was reduced from 24 to 18. Under earlier acts the members are elected by adults of both sexes, having as a property qualification either a freehold estate of the capital value of £50, or

a leasehold of the annual value of £20 with three years to run, or being the occupiers of dwelling-houses of the annual value of £25. Members of the Council hold their scats for six years, one-half retiring every three years; unless the chamber is sooner dissolved by the governor ; which can be done in cases of dis¬ putes, or deadlocks between the two chambers extending over a certain time. By the Consti¬ tutional Amendment Act of (1901) the number of members of

the Assembly was reduced from 54 to 42. By an act passed in 1913 the num¬ ber in the upper House was increased to 20 and in the lower House to 46. The Assembly is a triennial chamber, unless previously dissolved. In the event of a deadlock between the two Houses in reference to a proposed law it is within the power of the governor to dissolve them both, subject to the following limitations, viz.: (1) It must have been passed by the As¬ sembly and rejected by the council in one ses¬ sion ; (2) it must have been, after a general election, passed a second time by an absolute majority of the whole number of members of the Assembly and a second time rejected by the Council. Members of both Houses are entitled to receive £200 per annum each and free passes over government railways.

Judicial Departments of States. — The Su¬ preme Court of New South Wales is consti¬ tuted under Act 4 Geo. IV, c. 96, and 9 Geo. IV, c. 83. It consists of a chief justice and six other justices. It has unlimited civil and criminal jurisdiction. Circuit districts and Cir¬ cuit Courts are established to try civil actions and determine crimes and misdemeanors. The Supreme Court has appellate jurisdiction to hear appeals from all inferior courts. There are seven District Courts having jurisdiction in personal actions not exceeding £200 and a lim¬ ited criminal jurisdiction. Courts of Petty Ses¬ sions having summary jurisdiction to deal with minor offenses and a limited civil jurisdiction presided over by a stipendary magistrate, or by two or more justices, exist in all cities, towns and centres of population.

There is a Supreme Court in and for Vic¬ toria, constituted tinder the authority of the Constitution. It consists of a chief justice and four justices. It is unlimited in civil jurisdic¬ tion as well as jurisdiction to try crimes and misdemeanors; as a full court it has appellate jurisdiction from all inferior tribunals. Courts of General Sessions of the Peace having Juris¬ diction to inquire into a limited class of indict¬ able offenses and to hear appeals from Courts of Petty Sessions exist in certain proclaimed districts. Wardens Courts and Courts of Mines exist for hearing mining disputes; County Courts having authority to decide all personal actions up to the amount of £500; Courts of Petty Sessions having summary ju¬ risdiction in minor criminal matters and civil jurisdiction up to the amount of £50.

The Supreme Court of Tasmania consists of a chief justice and two puisne judges; it has both original and appellate jurisdiction in common law, equity, ecclesiastical and crimi¬ nal matters. Local courts can deal with civil matters, some up to £100, and others up to £50. Justices in Petty Sessions can make con¬ victions and orders in minor or criminal mat¬ ters.

The Supreme Court of Queensland may be

composed of not less than four, and not more than five, judges. It has the same jurisdiction as the Superior Courts of Common Law, and the High Court of Chancery, in England ; it also possesses ecclesiastical and criminal juris¬ diction. An appeal lies to the full court from all inferior courts. District Courts are vested with a limited civil and criminal jurisdiction. Courts of Petty Sessions and Small Debt Courts exercise a limited authority in specified civil and criminal matters. Wardens Courts are constituted to deal with mining disputes.

The Supreme Court of Western Australia was established by Royal Charter in 1861, and the main provisions relating to its constitution and jurisdiction are contained in the Supreme Court Act (1880). It has jurisdiction in com¬ mon law, equity, ecclesiastical and criminal matters. Local courts similar to those in some of the other Australian states can decide small debt cases. Justices in Courts of Petty Session can summarily convict, imprison or fine per¬ sons guilty of minor offenses. Wardens Courts have authorit}' to deal with mining cases.

The Supreme Court of South Australia is composed of a chief justice and two other puisne judges. Its jurisdiction extends to all matters of law and equity. It has also juris¬ diction in crimes and misdemeanors. It is the court of appeal from the decisions of all in¬ ferior courts. South Australian local courts are to some extent analogous to the District Courts and County Courts of other states. Some of these courts have jurisdiction in civil matters up to the amount of £490; other local courts are limited to actions where the debt or damage claimed is no more than £20.

Bibliography. — See article Australia — Political History.

Sir John Quick,

Postmaster-General in Deakin’s Common¬ wealth Government, 2 June 1909 to 29 April 1910, Joint Author of (Constitution of Australian Commonwealth) .

1. MUNICIPAL AND LOCAL GOV¬ ERNMENT. Introductory and General. —

The organization of municipal government in Australia is modeled largely on the English sys¬ tem and is composed of mayors, aldermen and councillors in the chief cities and large towns, with district or shire councils, local or divisional boards (the nomenclature varies in the different states) presided over by elected chairmen or presidents in

the small towns or villages, and outlying districts where settlement is sparse. All of these are creations of statute deriving their authority, power and duties from the Par¬ liaments of the various states. No salaries are paid to the mayors who in the capital and most of the larger towns are voted an annual allow¬ ance by the councils for entertaining and keep¬ ing up the traditional dignities of the office. In Melbourne the vote is £1,500, in Sydney and Adelaide £1,000. The mayor has no direct power of veto over the council's actions. He represents the city as a whole and presides over the council and undertakes only those duties which devolve naturally on the leading officer of a city. The paid officials are non¬ partisan appointed bv the councils, and form a permanent staff holding their positions, during good behavior; the head of which (as in Eng¬ land) in the cities is the town clerk. The terms municipal and local government are inter-

changeable as applying to (a) the cities and the larger towns of the Commonwealth, of which the capitals are types, and (b) to the smaller towns and outlying districts which are simply microcosms like unto the larger bodies but with functions of a more prosaic and limited character conditioned mostly by population. In fact it may be taken as axiomatic that when the government of the cities is understood everything of importance to the student is known about municipal and local government in the Commonwealth of the newest of the nations.

Nominations for municipal offices usually require the signatures of proposer, seconder and candidate. In Melbourne 10 ratepayers' signatures are required together with a de¬ posit of £10. Secret voting, or voting by bal¬ lot as it is styled, is the universal system, which had its origin many years ago in Australia and has since found world-wide acceptance.

Generally speaking adult owners and occu¬ piers of real estate assessed for taxation who have paid their rates, whether residents or non¬ residents, are entitled to vote in the cities of Australia. Aliens are barred in some cities and women are not yet universally welcomed to the council chambers although they may vote.

The councils of the capital cities are single chambers, aldermen and councillors sitting to¬ gether, presided over by the mayor. Except in the Federal government, and in the state Par¬ liaments where it is universal, the bicameral system of government as it exists in some

American cities is unknown in Australia.

The Origin of Local Government. — The beginning of municipal government in Aus¬ tralia dates back to 1839 when the first munic¬ ipal law (based on the English statute of 1835) was passed in the state of South Aus¬ tralia and put into operation in 1840 in the city of Adelaide whose virgin soil was surveyed in 1836. The parent city of Sydney, the capi¬ tal of New South Wales, established in 1788, was incorporated in 1842. Melbourne, the chief city of the state of Victoria, originated as a small settlement in 1835 and was incorporated in 1842 by the legislature of New South Wales of which state it then formed an integral por¬ tion. The other capital cities are : Brisbane (Queensland), founded 1826, incorporated 1859; Perth (West Australia), founded 1829, incorporated 1871 ; Hobart (Tasmania), founded 1804, incorporated 1857.

Local Government in New South Wales. — The city council of Sydney is composed of 24 aldermen, one of whom is elected by the council annually to be lord mayor. Two aider- men for each of the 12 wards are elected by ballot by the ratepayers every two years. Plural voting obtains, based on assessment values, up to four votes. Owners, leaseholders, occupiers and lodgers are entitled to vote. Accounts are audited by state government inspectors. As¬ sessments are based on rental values of im¬ proved property.

The condition of local government in this state is admittedly unsatisfactory. In the metropolitan area the agitation for a <(Greater Sydney® is still proceeding by which its advo¬ cates hope that the city council will absorb the small surrounding suburban local governing bodies, of whom there are no less than 41, each

with its own separate mayor, council, officered staff and administration.

The number of municipalities in New South Wales is only 188, covering an area of 1,810,912 acres with an annual value for assessment pur¬ poses of £10,309,655 and a very large area still remains under the control of the state govern¬ ment which is now considering proposals to extend the system of local government by the creation of shire councils and new municipali¬ ties, allowing such bodies to levy their rates on the unimproved capital value of the land in¬ stead of on the annual value of improved prop¬ erty.

Besides the municipalities there are boards and trusts composed of members appointed by the state government and members appointed

by various municipal bodies, which are estab¬ lished for the benefit of districts covering areas of two or more ordinary municipalities and are empowered to construct and supervise water¬ works, drainage works and similar undertak¬ ings with power to raise money by the sale of debenture stock and levy rates on the assessed value of benefited properties. In New South Wales there are the metropolitan board of water supply and sewerage, various harbor trusts, country water trusts and the metropoli¬ tan fire brigades board, on which latter repre¬ sentatives of the fire insurance companies sit who contribute to the upkeep of the brigades.

Local Government in Victoria. — The city council of Melbourne consists of 28 members (seven aldermen and 21 councillors) presided over by the lord mayor who is elected annually by the council. Three councillors are elected for each of the seven wards of the city, one being chosen annually by plural voting for a period of three years. The aldermen are ap¬ pointed by the council and hold office for four years. Residence within seven miles of the city and minimum rating of £10 qualifies for a vote which slides upward to three votes on a £150 assessment.

This state has had a comprehensive system of local government in force for many years which divides it into cities, towns, boroughs and shires; the councillors are elected by the ratepayers, and the mayors of cities, towns and boroughs, and presidents of shires by the coun¬ cillors. The total area under local control is 87,302 square miles, onlv 582 square miles re¬ maining outside of local government.

Melbourne and 22 suburban municipalities constitute the metropolitan area, and thoughtful students of local government look forward to the time when all or most of these will be amalgamated with the city. A royal commis¬ sion has taken most exhaustive evidence pro and con during the past three years but so far has not submitted its report.

Other governing bodies outside, yet dove¬ tailing in with the municipal councils and the state government in Victoria, are the metro¬ politan fire brigades board, the Melbourne har¬ bor trust, the tramway trust consisting of repre¬ sentatives of the Melbourne city council and 11 other suburban municipalities, the metropoli¬ tan board of works controlling water supplies, sewerage and drainage and various other water¬ works, irrigation and water supply trusts under quasi-local and quasi-state government control.

Local Government in South Australia. — The council of the city of

Adelaide consists of

AUSTRALIA

1 King William Street, Adelaide

2 General Postoffice, Adelaide

AUSTRALIA

1 Customs House, Brisbane

2 School of Mines, Adelaide

the mayor, six aldermen and 12 councillors. All of them including the mayor are elected by the ratepayers. The mayor and aldermen hold office for one and three years respectively ; the councillors (two for each of the six wards) hold office for two years. At each annual elec¬ tion the mayor, two aldermen and six coun¬ cillors are balloted for. Plural voting obtains for mayor and aldermen, the system allowing a citizen one vote in each ward where he has property assessed. The state is divided for local government purposes into municipal and district councils. Aldermen may be elected to suburban councils in addition to councillors after a poll of the ratepayers has been taken approving such a proposition, followed by a proclamation by the state governor, and it is worthy of note that the chairmen of the dis¬ trict councils are elected not by the ratepayers but by the members of the councils. The an¬ nual assessed value of property in municipalities is £2,661,238. There are no boards or trusts (other than the fire brigades board) of any im¬ portance, but very extensive powers are vested in corporate bodies who may raise loans for the construction and working of tramways, ferries, jetties, waterworks, gas works, electric-light works, baths and washhouses, abattoirs, markets ; and make and provide pleasure grounds, libraries, museums, hospitals and asylums.

Local Government in Queensland. — The

city council of Brisbane comprises 14 members who are styled aldermen, one of whom is elect¬ ed annually to be mayor. The capital value of land is assessed here and not the rental value. The owner or occupier has from one to three votes according to valuation. If, however, the property is valued at less than £120, only the occupier

has a vote.

A general system of local government was started in 1878 and revised in 1902. Local areas are divided into cities, towns and shires. Members of councils are styled aldermen in cities and towns and councillors in the shires. Aldermen and councillors are elected by rate¬ payers in each area, but all mayors of cities and towns and chairmen of shires are chosen by the members of the councils. The total area controlled by local bodies is 668,252 square miles, leaving only 245 square miles unincor¬ porated.

In Queensland the water supply construction work is undertaken by the state government and when complete is handed over to the local authorities with attendant liabilities, which be¬ come a debt due from the local authority to the state government which must be repaid in in¬ stalments. There are a few bridge boards and harbor boards in various districts

Local Government in West Australia and Tasmania. — The city of Perth — the capital of West Australia — is governed by a mayor and 15 councillors, all of whom are elected by the ratepayers. For ward elections there are two classes of voters and for general municipal elections four. The local governing bodies in West Australia are termed municipalities, water boards, road boards and health boards ; the latter may be established within or without municipal boundaries. Members of boards are elected by ratepayers and the chairmen by the members.

In Hobart — the capital city of the island

state of Tasmania — the council consists of nine aldermen, one of whom is elected bv the mem¬ bers to be mayor. The aldermen are elected by plural voting with a minimum qualification of £8 annual value, the scale being from one to seven votes, according to assessed value of property.

Tasmania has its outlying districts governed by town boards and road trusts. The rate¬ payers in these districts elect their representa¬ tives who are termed ˆcouncillors® and these councillors elect their chairman who is styled (< warden.®

Powers and Duties of the City Councils.

— The functions of the city councils are legisla¬ tive as well as administrative. They are em¬ powered under statutes granted by the state Parliaments to make by-laws for the suppres¬ sion of nuisances

for all matters of minutiae relating to good rule and government, and affecting the comfort, convenience and welfare of their inhabitants. They may levy rates to cover the cost of general administration and raise loans (under certain restrictions) when necessary for public works. Properties ex¬ empted from payment of rates are Federal and state government buildings (including state schools), charitable and benevolent institutions, churches, chapels and buildings used exclusively for public worship, and buildings privately owned which are used exclusively as schools. They are charged with the control of traffic, the testing of weights and measures, the con¬ struction and maintenance of roads, bridges and footways, the care and management of parks and recreation grounds, public baths, street lighting, sheep and cattle markets, meat, produce and fish markets, abattoirs, the collec¬ tion and disposal of garbage, trade refuse, and they may and do hold large properties in real estate. They supervise the erection and con¬ struction of buildings and in some cities have jurisdiction over theatres, music halls and places of public entertainment as to fireproof materials and means of exit. They regulate sky signs and scaffolding and in most cities license cars, cabs and conveyances plying for hire.

Public Health and Sanitary Functions. —

The city councils are constituted as boards of health and are responsible in their areas for the proper administration of the various public health acts to the state boards of health or government commissioners as the case may be. They inspect and license private hospitals and maternity homes and employ medical officers of health and staffs of inspectors (male and female) whose duties are to look after the adulteration of food and to have the oversight of food supplies (particularly meat, milk and bread), inspection of common lodging-houses, dairies, milkshops and dairy cattle; noxious trades and businesses, abatement of common nuisances and smoke nuisances ; to prevent spitting in the streets and in public vehicles ; to inspect restaurants, fish shops, butcher shops and all premises where food is prepared or consumed ; to prevent overcrowding of prem¬ ises ; and to attend to matters of isolation, dis¬ infection and hospital accommodation for in¬ fectious diseases and fevers.

Notification of disease is generally compul¬ sory under penalty. Medical practitioners, heads of families and relatives are all liable for

neglect. In compulsory notification of pulmon¬ ary tuberculosis (consumption) the state of South Australia has led the way, and the diffi¬ culties and dangers feared by some medical men have been found to be mythical and non¬ existent.

Budget Items and Flotation of Loans. —

The chief sources of municipal revenue are income from rates, rents from real estate, mar¬ ket dues, fines, penalties and license fees.

The rates levied in the city of Adelaide may be taken as typical of Australia and are as fol¬ lows : General purposes, rate, one shilling in the pound ; street lighting, rate, three pence ; parks and gardens, rate, one halfpenny; rate for sinking funds (loans), one halfpenny; rate for police purposes, two pence ; and a sanitary rate of three pence. To which must be added a water and sewerage rate of one shilling and six¬ pence in the pound (levied by the state govern¬ ment), making a total of three shillings and three pence to be paid by the citizens, which in comparison with the rates charged in London and most of the large populous cities of Great Britain is an exceedingly light impost.

The expenditure budgets of the cities con¬ tain as principal items : Road and footway maintenance, upkeep of parks and gardens, baths, markets and kindred establishments, sal¬ aries and wages. Day labor invariably obtains except on new construction work. The wage of the ordinary unskilled municipal laborer is on an average of 8/6 per day — in some cities slightly higher.

Loans are mostly raised by the sale of debenture stock, redeemable at due dates, al¬ though in some instances the state government advances money and becomes the creditor of the local authority. In Sydney and Melbourne, bills are passed by the state Parliaments author¬ izing those cities to float loans for street con¬ struction work, establishment of electric light, erection of markets, etc. In Victoria, outside the capital, the limit of indebtedness for mu¬ nicipalities is fixed at 10 times the amount of annual income; the establishment of a sinking fund is obligatory with an annual appropriation of not less than 2 per cent of the amount of the debt. A law similar in many respects ex¬ ists in Western Australia. A referendum of any proposed loan may be demanded in Victoria and the consent of the state governor is re¬ quired in Western Australia.

In New South Wales municipalities may borrow on debentures, with the sanction of the state governor, any sum not exceeding the total

estimated amount of revenue for an ensuing five years.

In South Australia the consent of the rate¬ payers is required preparatory to floating any loan, the maximum indebtedness of a munici¬ pality is fixed, sinking funds are compulsory, and where the loan is to be applied to works of a non-revenue producing character, a rate must be struck to provide sinking fund and interest.

Statistics of the Metropolitan Cities. — In any survey of the progress of modern civiliza¬ tion the concentration of population in cities is the most startling fact. It is a world-wide movement and is nowhere more strikingly ex¬ emplified than in the cities of Australia. The progress of the chief cities has been remarkable and has no parallel among the cities of the old world. Even in the United States the rise of

the great cities has been accompanied by a corresponding increase in the rural population, but in Australia (perhaps for the first time in history) is presented the spectacle of magnifi¬ cent cities growing with marvelous rapidity and embracing within their limits one-third or more of the population of the states of which they are the seat of government.

The population and annual assessment value for rating purposes of the metropolitan areas are illustrated in the following table.

Annual value Population State. 1913. 1913.

Sydney . £5,669,670 725,400

Melbourne . 4,489,181 651,000

Brisbane . 1,167,135 151,000

Adelaide . 1,201,996 201,000

Perth . ' 378,266 121,000

Hobart . 175,194 40,000

City Functions Controlled by the States.

— The police, although supervising traffic and administering city bylaws and regulations, are controlled and paid by the state governments with the one exception of South Australia where the city and all other municipal corporations are compelled to contribute a moiety of the cost in each district. Education is invariably state con¬

trolled although private schools exist. The care of the poor is attended to by the states side by side with religious and philanthropic institu¬ tions. Prisons, asylums and hospitals are under the charge of the central governments, although the local authorities are compelled to pay for the accommodation in some states of indigent cases of infectious disease. The cities generally take no share in the management of public libraries, museums, technical schools and art galleries which exist in every capital. Tele¬ graphs and telephones are entirely controlled by the Federal government. Tramways (street railways) are in the hands of the state govern¬ ment in New South Wales and in the other capitals are owned and operated by private companies, under charters granted by the state Parliament. Provision is, however, made in some states, notably in Melbourne and Perth, for the metropolitan municipalities eventually taking them over. Gas works and supplies are mostly owned_ and operated by private com¬ panies. Electric lighting is owned and operated municipally in Melbourne and Sydney. In Ade¬ laide the private company's existing rights ex¬ pired in 1908. Fire brigades are managed by boards, with municipal representation upon them. Water and sewerage are managed either by state government departments or quasi¬ government boards.

The Municipal Outlook for the Future. —

The municipal limits of the capital cities of Australia by no means correspond to their social, industrial and economic boundaries; as municipal centres they are the ˆpulses® which contain only a fraction of the population of the metropolitan areas and are only just now wak¬ ing up to the necessity of bringing into being comprehensive Greater Sydneys, Greater Bris- banes, Greater Melbournes and Greater Ade¬ laides. The same sociological forces are at work in Australia as in America, Great Britain and the continent of Europe, where enlarge¬ ment of areas and greater cities have been dom¬ inant planks in municipal platforms for years. We may therefore expect similar results to fol-

low in Australia as have been achieved else¬ where in the cotirse of the next decade.

Some small effort in this direction has al¬ ready been accomplished, notably in Brisbane and Melbourne by the recent absorption of one or

two adjacent suburbs, but the movement generally can hardly be said to have yet passed much beyond the embryonic stage.

In the metropolitan areas of Sydney, Mel¬ bourne and Adelaide there are respectively 41, 22 and 19 municipal governing bodies with be¬ wildering codes of bylaws and methods of ad¬ ministration, and it has been well said that on the score of economy alone the arrangement is an absurdity which tolerates within a 10-mile radius of the centres such an enormous num¬ ber of local governing bodies — each separate, distinct and independent of the other — to man¬ age the affairs of from 160,000 to half a million of people with, of course, 'as many staffs of municipal officers, all working in isolation, and often unable to agree about matters of vital concern to all. Experience has shown that occa¬ sional conferences are at best but an inadequate substitute for a permanent body with a fair representation of all interests and smoothly working machinery. W hether reform takes the shape of federation or unification, whether it comes with a rush or gradually, as the dwellers outside the city bounds awaken to the advan¬ tages of co-operative effort — come it must, in order to permit the carrying out of work at present impracticable, such as the control and working of tramways, gas and electric light con¬ cerns and kindred undertakings. With the example of the London County Council before us it is obvious that it pays to concentrate as much as possible the municipal work of cities in one central body. Lord Roseberry has said that ((the larger the sense of municipal responsi¬ bility which prevails the more it reacts on the community itself. And men outside the munici¬ pality, or who have hitherto held aloof from municipal government when they see the higher aims of which the municipality is capable, when they see the wider work that lies before it, when they see the incomparable practical pur¬ poses to which the municipality may lend its great powrer, are not inclined any longer to hold aloof.- ® The broad policy of the London county council is proof of this where the finest intel¬ lects in England take their share of the wˆork in common with those who are attracted to the Council of the Nation at Westminster.

Notwithstanding its shortcomings the de¬ velopment of municipal government in Aus¬ tralia exhibits an upward and progressive tendency. The cities have always been free from that gross corruption which has been such a marked feature and has wrought such per¬ nicious results in some other countries. Mu¬ nicipal government in Australia stands for probity and purity and as a recent Australian writer in (The Annals 5 of the American Acad¬ emy has put it : <(We are undoubtedly further advanced to-day than we were 20 years ago, and we may reasonably hope that the silent evolution which is

working out its eternal pur¬ poses in the social, as truly as in the physical world, will equip us for the achievement of higher things in the future.® Consult Ellery, (Health Ministration of the Health Act) (1907), and Murdock, (The Australian Citizen5 (1912).

See also General Bibliography under Australia — Political History.

T. G. Ellery,

Town Clerk of Melbourne , Victoria.

1. EDUCATION. Formed, like the United States, by the union of previously autonomous communities, the Commonwealth of Australia has followed the example of the United States in the distribution of powers between the Federal and state authority. That is to say none but enumerated powers have been conferred upon the Commonwealth, and all unenumerated powers remain in the hands of the originating states. Thus education, not being among the enumerated powers, is re¬ tained, as in the case of America, by the individual states. Every man, and in recent years, every woman, possesses, after regis¬ tration, a parliamentary franchise, and it is customary to subject knotty public questions to a direct referendum to the people of a state. Such a degree of democracy could exist only in a highly enlightened community. Elementary education, therefore, being essen¬ tial for the exercise of the duties of citizen¬ ship which are imposed upon all, is compub sory, and the corollary follows that it is in almost every case free; otherwise the school fees would amount to a poll tax on children, which in a country crying out for population is the most undesirable of imposts. Being for the benefit of all and not of any sect, state education is secular; and this not from any disregard for religion, but because ex¬ perience has proved that when the state con¬ cerns itself with dogma, strife rather than religious amity is produced. Education was in the early days of each colony left to private enterprise. Before long, howrever, it was recognized consciously by some and in¬ stinctively in the majority, that a function so essential to the general welfare must be re¬ garded as a duty of the state. So it came to pass that education was one of the first mat¬ ters of public concern to be included in the ever-widening of the sphere of state activity which is the most characteristic movement of the present age. Primary education is ac¬ cordingly throughout Australia undertaken by the several governments.

There is a general resemblance in the con¬ ditions which those who settle in new countries are called upon to face. The prob¬ lems of education in Australia are very sim¬ ilar to those in America. The circulars of information issued by the bureau in Wash¬ ington have been of the greatest assistance to the educational departments in Australia, and several useful reforms have derived their in¬ spiration from this source. The laws relating to education in the Australian states, as might naturally be expected in adjacent communities springing from the same stock, bear a strong family likeness ; but as considerable intervals intervened between the dates of colonization, and as the science of education was steadily progressive, the system adopted by each state was colored with the viewTs_ which obtained at the date of its foundation. The older colonies had, therefore, a more difficult task in bringing the laws into conformity wfith improved methods than those which at a later period wrere established on ground unen¬ cumbered. All have, however, now come into

a fairly uniform line. The sequence of evolu¬ tion has been the same, although the suc¬ cessive steps taken were independent and not simultaneous. In the beginning of each colony the first schools wrere established by the churches, aided by government grants. Soon, however, state non-sectarian schools were es¬ tablished and the subsidies to private schools ceased. The state schools were in the first instance placed under the control of a Board of Education appointed by the government ; but the basic British idea of responsibility to Parliament asserted itself, and a cabinet minister -was vested with the powers previously exercised by the board. The Minister of Education or of Public Instruction, as he is sometimes termed, appoints and dismisses teachers and officers, arranges the curriculum and controls the whole department. Regula¬ tions framed by him and approved by the governor in Council acquire the force of law after they have been laid before Parliament. This centralized administration is mitigated, and to some extent, assimilated to local con¬ ditions, through the agency of district inspec¬ tors and local boards of advice. - The funds necessary for education are derived from the general revenue. From time to time attempts have been made to place a portion, at least, of the burden upon the local rates, but it is felt that the cost of a system designed for the benefit of the public at large should be met from a source to which, either directly or through the customs, all contribute. In New South Wales and Tasmania fees are still levied, but in the former these amount to only a fraction of the whole expenditure, and

are about to be abolished ; and in the latter there are free schools in the large towns. The net yearly cost to the states of primary in¬ struction per scholar in average attendance, excluding the cost of school premises, varies from £4.6.5 to £7.8.1', the average of all six states being £6.8.9.

The statutory school age is in New South Wales and Western Australia from 6 to 14 years; in Victoria from 6 to 13; in Queens¬ land from 6 to 12; in South Australia and Tasmania from 7 to 13. Pupils under the maximum age are exempted from further at¬ tendance if on examination they pass a pre¬ scribed standard. Attendance is required in New South Wales on 70 days, and in Queens¬ land on 60 days in each half year; in South Australia on 35 days in each quarter, and in central districts on 8 out of 10 school sessions in each week ; in Victoria on 75 per vent of the days in each quarter; in Western Au¬ stralia and in Tasmania on every day on which the school is open. As a rule, children under the age of nine, living within a radius of two miles by road from a state school, and those between nine and the maximum age living within a radius of three miles, come under the laws relating to compulsory attendance. Truant officers and in some cases the police are employed to enforce the law. Prosecu¬ tion and punishment of the parents of de¬ faulting children is when necessary resorted to without hesitation.

State schools in Australia come under the category of public, provisional, half-time and special. In most of the states a public school may be established if an average attendance

of 20 can be maintained. The buildings are provided by the department. In Queensland an average attendance of 30 is required, and the locality has to contribute one-fifth of the cost of erection and maintenance of the build¬ ing. Where the average attendance is under 20, but over 12, the school is termed provi¬ sional. In sparsely populated districts half¬ time and special schools or itinerant teachers are provided. The policy of concentration of attendance has been largely carried out, chil¬ dren are carried free to and from school over the state railways in New South Wales and in Tasmania. In Victoria they are carried at reduced rates. It is not unusual to see a passenger train stop at cross roads to pick up a group of children on their way to or from school. In many cases it is found to be more economical to make an allowance to parents for the conveyance of children to a school than to bring a school to the children. More¬ over, better schools can be provided and higher standards maintained under the ˆconveyances system which there is a disposition to extend. The schools will then still better serve the purpose of central or

consolidated schools. The average attendance of pupils at the state schools is at the rate of about 62 per school, 30 per teacher, and 11.51 per cent of the population; the average enrolment being 15.59 per cent.

Normal schools are provided for the train¬ ing of teachers, and are usually recruited from those who have served for four years as pupil teachers. In South Australia a six-year course has been arranged for the training of teachers ; two years are spent in study com¬ bined with a certain amount of practical work; two years in teaching in the schools, and the final two years at the university. During the term of training the students receive a maintenance allowance from £30 to £80. The schools are classified according to the number of the children in average at¬ tendance, and progressive grades of certifi¬ cates are awarded to teachers which qualify them for appointments in the public schools. Uncertificated teachers are frequently em¬ ployed in the provisional schools. In all the states with the exception of New South Wales, there is a preponderance of female teachers. The salaries of male head teachers range upwards to £450, and of female head teachers to £360. Alale assistants receive from £60 to £262, and female assistants from £50 to £216. The salaries of provisional teachers run from £66 to £140. Payment by results has proved unsatisfactory in operation and has been practically abandoned. The system of inspection is less mechanical than formerly and several of the states exempt schools of recognized excellence from detailed exam¬ ination, leaving the promotion of the scholars in the hands of the head teacher. Boards of Advice visit, inspect and report upon the schools in their district, are authorized to expend small sums on the school buildings, arrange for the use of the buildings out of school hours, and take part in the adminis¬ tration of the compulsory clauses of the Edu¬ cation Acts. The Boards of Advice are hon¬ orary. In some cases they are nominated by the executive, in others they are wholly or partly elective. Xu Queensland there is usually

a committee for each school. In no case, however, has the theoretically desirable asso¬ ciation of the official with a public body on each plane been achieved, viz., a school com¬ mittee acting with the teacher, correlated with a Board of Advice co-operating with the district inspector, and a Central Council stimulating, assisting, and, if need be, acting as a check upon the Minister. Education falls short of its object if the department does not carry parents and the locality

along with it. The schools, when the public sympa¬ thizes with their work, exercise a vitalizing and elevating influence on the whole neigh¬ borhood. There is no caste system in Aus¬ tralia. The state schools are intended to meet the requirements of rich and poor alike; it is not uncommon to see the child of a cabinet minister or of a wealthy citizen imbibing the elements of knowledge by the side of the child of an artisan or laborer.

The education in the state schools is prac¬ tical and is now designed as a preparation for the actual requirements of modern life rather than for the conditions that obtained in the Middle Ages. The pupil is led by carefully graded steps from the known to the unknown; from the particular to the general; from the concrete to the abstract; (<from the microcosm of the school to the microcosm of the Universe.®

The tendency is to subordinate theory to practice. Language is taught before gram¬ mar ; religious conduct precedes dogma. Kindergarten methods, local geography, na¬ ture study, drawing, clay modelling and man¬ ual training are taking the place of purely literary studies. History as now taught in Australia is less concerned than formerly with the character of mediaeval kings, it is studied more with the view of inculcating patriotism, civic duties and responsibilities. Since the contingents from Australia bore arms with comrades from the mother coun¬ try and the cementing power of kindred blood shed in common cause has been real¬ ized, the Union Jack is saluted in the schools of the Commonwealth as is the Star Span¬ gled Banner in those of the United States. Arbor Day was instituted in the schools of South Australia in 1887 and the celebration has become general throughout the states. On this day the ordinary school work is sus¬ pended. The children assemble in the morn¬ ing and in the presence of the mayor or chairman of the Board of Advice and other visitors, plant trees with some ceremony. After a few speeches and some words as to the care of trees and their usefulness, the school is dismissed and the rest of the day is enjoyed as a holiday. All new country schools in South Australia are surrounded by a reserve of several acres. Some of the schools adopt practical agriculture as a form of manual training, and in all the states teachers are encouraged to make, with the aid of the children, gardens around their schools.

In some of the states there are manual training centres at which pupils drawn from the surrounding schools receive instruction from special teachers. In South Australia the ordinary teachers are encouraged to qual¬ ify themselves in this branch of education.

Ihe greatest latitude is given as to the form of the instruction; for that subject is taught best in which the teacher feels the deepest interest. Chip-carving, joinery, brush-mak¬ ing, book-binding and wire work are among the subjects taken up in the various schools. Domestic economy and cookery are taught to girls in most of the states. Calisthenic class exercises to a musical accompaniment are commonly adopted as an attractive form of physical training. The pupils are taught by drill to move in masses and the order is occasionally given for fire parade. The Cadet Corps are under military supervision. Rifles are supplied to the boys, but they have to provide themselves with an inexpensive uni¬ form. Swimming is taught in some of the schools. The teaching of singing by the tonic sol fa method is a prominent feature. The principles of morality are sedulously instilled and good manners cultivated. Special atten¬ tion is given to temperance lessons in almost all the states.

The average minimum time devoted to secular instruction is four and one-half hours each day. This stipulated condition being fulfilled certain facilities are provided for imparting religious instruction. In New South Wales and Western Australia the word (<secular® is held to include religious teaching of a general as distinguished from that of a dogmatic character; and the teachers, in the performance of the ordinary day's duty, give Scripture lessons based on those issued by the Commissioners for National Education in Ireland. In South Australia, if the par¬ ents at any school so desire, teachers may be required to read without note or comment a portion of Scripture for a quarter of an hour before ordinary work begins. In Victoria and Queensland no teacher is allowed to give other than secular instruction in a school building. In Victoria, Queensland and South Australia the buildings may be used for any approved purpose out of school hours. The regulation in Victoria states that half an hour mav be set apart in one or two school days in each week for religious instruction by per¬ sons other than state school teachers. Such classes must, however, be held either from 9.15 to 9.45 a.m., or from 3.30 to 4 p.m. No substituted secular instruction is to be given to the children who do not attend these classes. In New South Wales and Tas¬ mania one hour a day may be set apart for the use of visiting clergymen or teachers of religion. The time, if not used for this pur¬ pose, is devoted to ordinary instruction. In Western Australia half an hour at any time in each day is available for special teachers of religion, subject to as little interference as possible with the ordinary work of the school. In none of the states is a child re¬ quired to attend any religious lessons with¬ out the parents' consent. In South Australia the desire to arrive at a settlement of the vexed question of religious

teaching in state schools led to the following resolution being carried in the House of Assembly 16 Dec. 1895 : <(That in the opinion of this House a poll of electors should be taken on the follow¬ ing questions: Do you favor: (1) The con¬ tinuance of the present system of education in state schools? (2) The introduction of

Scriptural instruction in state schools during school hours? (3) The payment of a capi¬ tation grant to denominational schools for secular results ?}>

The poll was taken at the general election in April 1896, and resulted in the following answers: Question No. 1: Yes, 51,681; no, 17,819. Question No. 2: Yes, 10,280; no,

34,834. Question No. 3: Yes, 13,349; no,

42,007. Informal, 12,830. The referendum

thus initiated has since been adopted for the solution of various questions in Australia.

Secular education does not satisfy the re¬ quirements of the Roman Catholic Church,

which, therefore, in populous centres, main¬ tains separate schools. In some of the states private schools are officially inspected. There are but few evening schools; little public re¬ quirement in this direction has so far been manifest. But continuation schools have been fairly successful in Western Australia.

Although, as has been seen above, primary education is chiefly a state function, this is not the case with secondary education. With few exceptions the secondary and high schools for both sexes are private or denomi¬ national establishments. The higher classes, however, in the state schools include subjects usually . regarded as secondary. Provision is made by means of exhibitions, scholarships, etc., to enable bright and successful pupils from the state schools to continue their as¬ cent, free of charge, up the educational lad¬ der, through the high schools and at the uni¬ versities. In New South Wales children who reach the highest class in the public schools may receive advanced instruction including Latin and French for 3d. a week, and the department maintains four high schools, two for girls and two for

boys. The Sydney grammar school receives an annual grant from the state, as does also the high school in Perth. Queensland liberally subsidizes secondary schools. In South Australia there is an advanced school for girls which, al¬ though a state institution, is .largely supported by fees. There is also in Adelaide a second¬ ary state school 'for boys which is prepara¬ tory for the School of Mines and Industries and the Agricultural College. The distinc¬ tive feature of this school is that only half of each day is spent in the class rooms, dur¬ ing the other half the pupils receive practical instruction in the garden, the laboratory and the workshop. In Victoria extra and ad¬ vanced subjects are taught in many of the public schools for a small fee. The Chambers of Commerce, the Bankers' Institute and the Incorporated Institute of Accountants hold periodic examinations in commercial and al¬ lied subjects which have a stimulating effect on this branch of education. There are pri¬ vate schools in each of the capitals which provide a commercial curriculum. Technical education, being a special need in' a new country whose resources are only partially developed, is largely undertaken by the state. In the cities and in many of the towns, schools of design, schools of mines and in¬ dustries, technological museums and work¬ ingmen's colleges abound. There are also numerous agricultural colleges. In several of the states technical schools have been built and equipped by private munificence.

In the capitals are art galleries containing many works by famous modern artists and sculptors. In connection with these are fine art schools where instruction in painting, sculpture, art, needlework and allied subjects reaches a high standard. These are as a rule controlled by boards, in some cases partly appointed by the government and partly elected. The Universit}-' of Sydney was es¬ tablished in 1852 and that of Melbourne in 1855. South Australia followed in 1874 the example thus set and Tasmania founded a university in 1890, and recently Western Aus¬ tralia has established a university. These universities are supported by grants from the public chest, by public and private endow¬ ments and by fees. The Australian univer¬ sities do not confer degrees in divinity; otherwise they resemble and are in no way inferior to those of the Old World. The universities in Adelaide and Melbourne grant degrees in music and each has a fully equipped conservatorium of music. In all the universities women are admitted to de¬ grees and to the full privileges of graduates. The universities of Sydney, Melbourne and Adelaide grant degrees in medicine to both sexes. Consult Anderson, (System of Educa¬ tion } (1901); BarfT, (The Lffiiversity of Syd¬ ney > (1914), and Peacoek, (System of Educa¬ tion (1901).

John Alexander Cockburn, Formerly Minister of Education in South Australia.

1. LITERATURE. Australian literature may be said to be a thing of the last half cen¬ tury. Previous to that writers were busy in Australia, but most of them were either of foreign birth or produced work that can scarcely, by any stretch of courtesy, be called literature. Even when writers of Australian birth, education and sympathies began to write, they practically always kept their faces turned toward London; for few native publishers cared to encourage native writers who had not first secured the approbation of some* English pub¬ lisher. This condition of literary affairs was quite natural given the conditions existing in Australia practically up to the close of the 19th century. The island continent was divided into seven distinct parts, which, far from being united in national sentiment, were cut asunder from one another as completely as though they had been separate political entities, as, to all intents and purposes, they were. This provin¬ cial spirit killed all national sentiment, without which a national literature is impossible. The educational system of the country was prac¬ tically in the hands of foreign-born, and all the educational and literary influences at work in the various states _ of the island were European. So the writers of Australia but feebly echoed the voices of the master singers from the home land. Naturally such writers, foreign-born and educated, failed to feel, think and express themselves as Australians; nor could they have well been expected to when the natives failed to do so themselves.

But the growth of population, the increase of interstate communication, the drawing closer together of the separate state entities following the establishment of the Common¬ wealth, and the gradual increase in the powers

of the Federal legislature, coupled with the rapidly expanding interests of the country as a whole, all tended to create a sense of nation¬ ality which is sensibly reflected in the younger Australian writers. Provincialism exists still; but it is a provincialism from which all the bitterness of past local rivalries has disappeared. The localism has come already, in a few short years, to accentuate only the local color that marks each individualistic writer and to give a variety to

Australian literature and journal¬ istic work that has served to call the attention of the English-speaking world to the best of it for the past 20 years. Australian critics have strongly condemned this spirit of localism without apparently realizing that it is distinctly a different localism from that of the past, and that its leading note is more national than local. It is the same localism that animates Scott and Dickens and the brilliant younger literary lights of Scotland whose strongly reflected localism is their chief charm.

The early history of Australia was not favorable to literary development. The island was long used as a penal colony by Great Britain. Many of the convicts escaping, over¬ ran the southern part. This population was increased by sheep farmers and a few settlers on the coast who grouped themselves in small towns and villages around the ports. These settlements being all separated from one an¬ other they had no community of interests. The discovery of gold in 1851 attracted to the island a horde of adventurers who, while they added practically nothing to the national feeling, were the means of attracting attention to the country itself ; and the following 10 years saw a very large increase in population throughout the southern and southeastern coast country. Many of the adventurers brought to Australia by the gold rush were educated men ; and to some of these we owe the first serious attempts at literature in Australia, if we except a few local writers whose work is generally of a very poor character. The best of these was Barron Field who published at Sydney, in 1819, (First Fruits of Australian Poetry, > and Lionel Michael, whose (Songs without Music) was issued in 1857. Among other writers of this earlier literary period who sing in uncertain tones are J. D. Lang, Henry Parkes and W. C. Wentworth, the best of whom is Wentworth whose Austral¬ asia) is well known in Australia.

The real active, interesting, hopeful period of Australian literature began with Adam Lindsey Gordon (1833-72), who, though born in the Azores, came to South Australia, a young Oxford graduate in 1853. His father, an army officer, was of a literary turn of mind, and the boy, who was early well versed in the classics, was widely read in English literature before he left the university. He was an ardent ad¬ mirer of Byron, whom he had already success¬ fully imitated. In Australia Gordon was two years on the mounted police ; and the seven fol¬ lowing years he was a horse dealer and breaker and became champion steeplechase rider of the island. He was by temperament a man of ac¬ tion, and the more popular of his poems abound in movement, in the action of the life he led, which he liked for its activity and hated on ac¬ count of its lack of social advantages and in¬ tellectual surroundings and opportunities. A

legacy of £7,000 suddenly changed Gordon's life and surroundings and he became a member of the state legislature, where success came to him as a poet and cross-country rider. But the legacy was lost in speculation and with it went Gordon's business interests and his social posi¬ tion. In ill health and out of work he took his own life when apparently on the verge of ma¬ terial success. Gordon is the greatest of the Australian poets. His verse is spontaneous, musical, refined and natural. He has such a sensitive ear he rarely strikes a discordant note and he has the genuine gift of melodic form. His temperament is always superior to his sur¬ roundings and his literary touch is certain and self-possessed yet accompanied with emotional strength and restrained passion. But he is strongly touched with classical fatalism and sombre clouds ever hang over him constantly. His work naturally divides itself into three classes : Poems of action ; strange, music-haunted poems of fatalism and brooding fancy ; and poems blending action with his mood of brooding melancholy, in which he attains his highest note. Three volumes of poems, (Sea- Spray and Smoke-Drift) and and (Leaves from an Australian Forest.) Like that of Gordon his verse is strikingly spontaneous and natural. Alfred Domett (1811-87), Premier of New Zealand, who, in (Ranolf and Amohia) (1872) goes to the Maori for his subject and the in¬ spiration for a forceful narrative poem, was highly praised by Longfellow, Tennyson and Browning. Charles Harpur (1812-68) has pub¬ lished several volumes of poems in which he sings, in a melancholic minor note touched with weird fancy upon which the bushland has placed its hand, the life of the back country in which his early manhood was passed. He is known as the bush poet. James Brunton Stephens (1835 —), who published (Convict Once) in London in 1871, was better known, until recently, than Gordon or Kendall, though he is inferior to them. He was quite a prolific writer. George Gordon McCrae (1833 —) who wrote original, though rather unfinished, poems, on native Australian legends and stories ; Alex- ander-Sutherland (1852 —), D. B. W. Sladen (1856—), W. P. Reeves (1857 —) Victor Daley (1858-1905), A. B. Patterson (1864—),

Bernard O'Dowd (1866 -) Will Ogilvie

(1869 -), Roderick Quinn (1869 -), Edwin

J. Brady (1869 -) are among the best known

of Australian poets after those already men¬ tioned. Daley was a somewhat restless jour¬ nalist who wrote much in both prose and verse for Melbourne, Sydney and other papers. He is idealistic, dreamily sensuous, suggesting often more than he says. He has been

successful in picturesque, romantic poetry, love verse and humorous fancies. His work is cosmopolitan in tone and subject and occupies a high place

among writers of imaginative literature in Australia ; for he is imaginative rather than realistic and has many and varied strings to his lute. cAt Dawn and Dusk) (1897) contains much of his best work, the greater part of which is still scattered through the files of many papers. Brady wrote songs of the sea with a swing to them that is distinctively Australian. Patterson shares with Henry Lawson the first place as popular poet to-day in Australia. Both are successful novelists as well as poets. Law- son especially is very versatile and always sug¬ gestive of Australia. There is scarcely a type or feature or class in the life of the Common¬ wealth of which he has not written. He looks upon the humorous side of life and he has given us a view of Australia distinct from that presented by other writers. His work is un¬ even ; but it contains much that is excellent, while most of it is passable. His most charac¬ teristic book is c While the Billy Boils.) Charles Allen Sherard ((A Daughter of the South, > 1889), J. B. O'Hara ((Songs of the South, } 1891), E. B. Loughran ((Neath Austral Skies,) 1894), Edward Dyson ((Rhymes from the Mines, } 1896), William Gay Q Sonnets, > 1896) and other poems, Melville Whyte, Kenneth MacKenzie, Patrick Maloney and Robert Rich¬ ardson have also contributed to the making of the literary activity which began with the open¬ ing of the present century and still continues unabated in Australia.

One of the noticeable features of the pres¬ ent day literary movement in Australia is the prominent part being played in it by* women writers. Louise Mack, a journalist, magazine writer and critic of note, is the leading spirit in this movement of the Australian woman toward literature. She has created a school of her own, distinctly feminine, and she has found scores of imitators, all of them inferior to herself in talent, imagination and vivacity. But Miss Mack seems to be growing out of her own school, which is not of the best, into bet¬ ter things and leaving the field to her followers and imitators, who appear unable to follow her. She gives signs of ridding herself of her news¬ paper mannerisms and giving rein to her in¬ nate delicacy, tenderness, artistic restraint and real strength of subtle imagination. (Dreams in Flower, > her volume of published verse, though uneven in execution, is, at times, touched with an inspiration that promises well

for the future. Among the two score or more of women in active literary life in Australia, Ethel Castilla, Jessie MacKay, Ethel Turner, Inez K. Hyland, Dora Wilcox Henly, Florence Gay and Dorothea MacKellar are most worthy of mention. All of them have done good work in some one field or another. Miss Turner has also written good juvenile stories.

At the head of the younger school of novel¬ ists in Australia is Arthur Hoey Davis ((Steele RuddQ who has, for several years, been one of the most discussed men in literary life in any country. He has broken away from the literary traditions of Australia so effectively that he has raised up an army of imitators. He writes vividly of the interior sections of the country where man fights an uneven fight against nature. He is a humorist and he lays the local color on with a strong brush. He treats, in a somewhat fantastic manner, but with notice¬ able individuality of style, a crowded gallery of

native characters and types. He publishes a magazine of his own which has helped largely to increase his influence over the younger lit¬ erary generation of the Commonwealth. The great charge laid at his door is that his pre¬ tended realism is the creation of his own vivid imagination and that he gives an untrue picture of Australian life and characters. Be this as it may, he has wakened literature and pulled it out of the rut in which it had gone since the days of Gordon, and he has turned the attention of native literary men to the great wealth of literary material at home, more full of interest, life and originality than any field heretofore entered in Australia during the pres¬ ent century. Prose, like verse, in Australia, has gone through a long apprenticeship of imita¬ tion and worshipping at foreign literary shrines. From 1840 to 1860 Australia went through a literary phase somewhat like the American dime noAˆel, Indian and Wild West literature. Its literary aspirants for prose honors were, for the most part, but little superior to the writers of this American dime novel output. In Australia, however, they dignified the period with the name of school. This school helped to quicken the imagination and to create an interest in Australia, if not in things Australian. It dealt, in its first phase, with escaped convicts, immigrants with a shady past, bushrangers, gold diggers, highwaymen and the other picturesque and lawless characters who then made up a fair part of the life of the island. Henry Kingsley, an Englishman and brother of Charles Kingsley, after several years' residence in Australia, published, in 1859, (The Recollections of Geoffrey Hamlyn, } which is credited with having had a strong salutary influence upon Australian fiction. L. B. Farjeon (1896), Walter Jeffrey ((By Reef and Palm, *1896, (Pacific Tales,* (Chi 1 d Life in the South¬ ern Seas, *1897, and (The Mutineer,*

1899) are the legitimate forerunners of the modern Aus¬ tralian school of fiction headed by Davis, who has put on the appearance, at least, of making true and realistic pictures of representative life in the interior of Queensland. He has done Australian literature the great service of rid¬ ding it of the crudities and questionable pic-

Rotti I.

Bathtjkst ˆ Island \ C. Fourcroy l £ ■/W yj

Bynot fJa/\, Port I’att'rL Point Hlaz)(I Feuon Ih. ?l C- Ford A ˆ

<7/are»cfl

V*,,- J;

| Capo Arnhem

Caledon

Mud Day

C1CERTON I.

1/?Groote

•/Eylandt

’CL Creek

Creeks'

)& Bay J *

pA>rt *»

[nwwwff , irw" Cambridge- 2£«

WfnimfM VS1'*

l*? Maria L

-ˆ©vTSib Edward ˆ '/lo < &V ande _JT ˆ%ˆ3nndj

Loichhnrdta \/ But

VjOHT

MT, HORACE

c. Levc<i"0

Carnot Bo't > f (

V /-v <lr

Broome

Roebuck Buyjjˆ

„,.,u. TreviUc J

ran ye Day d> Lagrange

C. Bo*»vil» ˆ

Hlekca

Spring

DRTHERN : TERRI TOR

/ PoweUi Creek 0 ˆEva Downs ' Anthony Lego*

- ○ Vto

Fitzroy

jVV *Georgetown*" J)

, a. L

vˆ:Z \ co- ˆy1&ndlmr5(

Gilbertonˆ%'. oTnfvi

SWsJWi

_ Polygonum ˆ-ˆSwam.o c

Hinchinbrook I.

PeiaSw* .

'if| sj\ .t*ft

■ Katnilero;

Qjtennanie Creek

\Taldoea ’oYt Bowen

joatma Spring

Soria Spring

PffSalt Sea |

e»Lady Edith Lagoon. Florence Spring - "I Sait

StagE,

Austral Downs 3uNV Lake Nash Sta.

Spring

v* p •> iflifili

; Golddie:ld

^•ifcAjCangˆJl |0/NuUa*\n« ftu PovreUlnna ^°°l

■

s&tgjk

-o

’ SsfpiˆMS —

,5TVST^^eT * >

West LelcUhifrdt SE

Spring

Waterloo . Wells

Spring

Helena Spring

jSontu

BaRR°vV 1 ®

TiiEvrnord 1.

vTreefc'N

Satrve 'W ell •

MT. hEUOwINfV

■mistol

Lake MacDonald

CapoiJa

Yuraourracoo*] LaAs Caroline

° Wgledoun Wetland. '! * Arrilal“h

KW'fTTMfiW &S?k

k iMonkWˆ / SjBj

PJ >) i.{8psk.

k cˆur™y* sf ,s>i

tr r VoolieVˆ

Aurdah -/"*« <V (fc ˆ

/, JJ 9 y K„br.!i/Thfe«

'l ironung.-ˆ I

;i5“- wt uy

Cho«{' /

ˆTftf « T

Pr-tj ˆ t

Buzoea Crave

G I BS 0 N S

Lake Amadeus

A* Engoordina

Annaivdalei

SUTHEHLANO

rANGE>\;

MugOPˆ

Sable roo

Adaval'e/ [

Jr&ifclem

millierrV o /

ˆSf'/roii Cr '.

~u&abah7*

S3?*

Uhl. f .

Oodnadatta o*'(¥«#ui Algcbuckina\°

i °Ub,e ˆiand I Bautin

' DRlUtg j

J'Sb*ne

iSn.2?®**0** I

rs®iorp

i ck

A;y

Vhrloj ˆ-y'

'rgominduh)

CJavertoJ

tic " '

BalUnyoo

’Warrim

^°Morrvi > a 3ait i

Valgoo Coorang0(

'Gcr*^

^ /Alton U

Vusion i

[faina

Lake Woorong o £, Lake Phillipeon

j Barrin

Zjandaring

antgrg ^ /Croomhalia

Omura

■ilpaymkai

RICHARDS DESERT

'uincif > nn

ifton

*°«JTarv /8

Lukr Harris'

frrabrif^

Ari»i(Jah

JJorcla

juris*

Coymbra C=»

v. Lake hjverara

Eucla

Lake

Coican

VfanG*

[amble'.j,

fri Augusta (

ilmingtc

OuBdfo®!p(0ˆ«Aorˆ p E BT cw--; ypev e

,u»« s*® ■

iiraphe La u

■ uui»d*iUpˆ P / -

findes

Lake Gillee,

Jre EYRE./ Talln *•

'PENINSULA-

P Elliston rfr‘~r

L-tO" s

Tanclvu Lake /

(clijtSfˆainJo Wej'

ˆHofuburpi,

Jˆnieston-n 'laa8touo I

Suit Lab?*

He«<) B' oktn B

V -„ s v o N E y

5Sf“iu

SHollongong

ia run I Kerry

entworth 9 Euston.

riMi

ˆ pKNyˆTˆˆ1,

sSsˆ

yj £75 TRALIAN

. C Doubtful hi.

°“V

r[n ,

.. 8alt Lake® ■HopetounQ Iiu

1 11 1,.. H I \ V '~J>v 7 , B

{y I 1 ˆ•JV A1I)|| ry ?

iff§S

rNorndjnhn h«'ˆl rcnolaˆtawell' OoIe™iDeAr"*'

Longitude Eust from Greenwich.

AUSTRALIA

SCALES

Statute Miles, 240 = 1 Inch.

100 200 300 400

hiloniolres, 3S6 — 1 Inrli.

200 300 400 500 600 700

Rand, McNally Si Co.’ *N*w 11 x 14 Map of A ust/nlia. Copyright by Bund. McNally Si Co.

’ v,.

Si ■ 0

Sorth'V»*C“"

Clofttes [/- pt. AndeW

Ci ParquW r-

Cuvier

C*P*

liEBNl* ^ ■"

ponRE \ } vameJn?^.-, Wiˆd KitiC

- MT GASC$W Nungamarra

UoRjii!" ®“ oPeaˆBia b

B,“" &»»> p«*“9W.i yjrR- 1/ \v Tp.'>*

ˆPcb?,ou6ˆ

. I3a«/

*” h.| SV0 * ^ ^

U Lakr _

*** PwA R L

' TJ A“«S „ 1 -A iJˆˆTTT't ;

r-ˆˆrnfcoo .y&SˆLakcAv* ˆ0/ ˆ U Kˆˆ Lake Baron Mutter J

- ; y VICTORIA j

f’ftate fo*»y o f S f ff 7 « . .ˆ5

P f-riS:-*- ' I< ^ L K#n..»n» , V»/f e/

sl». . \ ^ - — tTL, .a'Rv«: ai a ^ ' -

^fo\Marcbaga« . ; vCt? i0. .0 \

a SO ^'7 Oxfor<1 N«8

^ I Shelburne Bay ^

7>c“P»Grtn7m„

1 >7 /Temple Bay ^

i-ujinm rointbv 0«V '

j/ r O ^i/O / L10-! .

Poi-a Head aJ g Di^„oa ^ ~

X, ^ u R A i

. ci/AA- o'r-r |3(^oa ^0w"TRt"

c^/vta^W^ k^-| /tiTrfe^U^-

Pehem-'s Group 1 V irt lb I. HR

uni. IfalPP Plael,A ■M.AjX &C»P» Rafterj ^

Head C.p, Bedfcj “

WelleslIv Is. / -i5

JVroRNiNQTOx r<vO / Lu k i in t0"c ' S i t -, ^

F Ar^r“ * -n« »-'« Beep.

/j)L^n t,. S^X «‘rt or ^

T^^-V///iv)nr oAA. r^y^‘n,0,V(S> Ab,I^ton v\'^<AU , dGernldton

■0/~\ / N H Cha^^/\fT^~T^^V>C>' \’UCoolgarraoA J oub,e Point _ •• UXDEn" Reef«

w«»a Bark .': W.u,. iet

C^i

....•' Iraoo reei.

TkEi;

Ihlet

Nd Reefs

! '7,i

■ kBi

K «Ecr

Reef

Cato

SoDd7 Cam,

at% Point

Ufir

Ar Has

dv l

poitit

r/Jj 'r_7£’Vnn8 Head

V ■Atr??p# Swok y

ˆWS H4htonˆ

SU >J"il huxAAiS* iˆrl &uPhm,

TERRiron/ JˆMfewan Bay Moruyn > Mor-taqo, j.

JoAla

'"Po/.lrf a

e“P« How.

Bloltcs PolutV-ˆ ■ - p-~-__iS'E,»I,ERS I./

Hunter's Is. r.b™«>™ f. yˆ\RAˆ~r~

_ - C. Grim?£.R<,“«iN» I. &a°lrp ° " s*H>‘t

r. j n Barker i.

Gr / n. i~C> Portland

40

350

AUSTRALIA

RELIGION (10)

597

tures which the previous native novelists were but too prone to present.

Mrs. G. F. Cross (Ada Cambridge 1854 -),

though not a native of Australia, has so identi¬ fied herself with its literary life that she may justly lay claim to being its greatest woman story teller. She has close upon a score of novels to her credit. They are cosmopolitan in subject and vigorous in treatment. In the 'Three Miss Kings) she depicts vividly life in the bush country. Mrs. Campbell Praed

(1851 -) has been even more prolific than

Mrs. Cross, her published novels being well over a score. Though she has been, in a sense, popular, here stories, owing to their extreme pessimism, are not pleasant ; but they show power of character delineation and character painting; and her facility of invention seldom limps. Mrs. Aeneas Gunn has lately achieved an international reputation as a novelist and her works have become popular in the United States, England and Canada. One of her most characteristic novels is (We of the Never Never.)

Bibliography. — (An Austral Garden) ;

(Australian Ballads •* (in Canterbury Poets, London 1885-90) ; (An Anthology of Aus¬ tralian Verse) (Melbourne 1913) ; Buchanan, Alfred, (The Real Australia) (London 1907), which contains chapters on literature ; Byrne,

(Australian Writers y (London 1896) ; Gay, Florence, (In Praise of Australia) (London 1912) ; Martin, beginnings of an Australian Literature) (London 1899) ; Sladen, (Australian Poets, 1788-1888, an Anthology) (New York 1890) ; Stevens, Bertram, ed., (An Anthology of Australian Verse) (Sydney 1905) ; Turner and Sutherland, development of Australian Literature-* (New York 1898).

J. H. Cornyn,

Editorial Staff of The Americana.

1. RELIGION. There is no established Church in Australia. All religions are now on an equal footing so far as the governments are concerned; grants in aid were formerly given by the leading religious bodies, but one by one the states relinquished the practice. South Australia led the way in this abolition in 1851, a few years after the foundation of the colony. Queensland, in 1860, shortly after the assem¬ bling of its 1st Parliament, limited future pay¬ ments to the clergy actually in receipt of grants; New South Wales followed suit in 1862 and Victoria in 1875. Western Australia voted periodical subsidies until 1895, when future annual payments were commuted by the distri¬ bution of two grants of £17,715 each in that and the following year among the Tknglicans, Roman Catholics, Wesleyans and Presbyterians, which are the only denominations that have received state aid in recognition of their religious work. The members of these four Churches constitute the great bulk of the population and their rela¬ tive numerical strength has remained almost constant for the last 30 years. The Common¬ wealth is debarred from legislating in respect to religion. Clause 116 of the Constitution Act provides that : <(The Commonwealth shall not make any law for establishing any religion, or for imposing any religious observance, or for prohibiting the free exercise of any religion, and no religious test shall be required as a qualification for any office or public trust under

the Commonwealth.® In the convention vhich framed the Federal instrument after long and earnest debate the words Hiumbly relying on the blessing of Almighty God® were inserted in the Preamble to the Act in recognition of the deeply religious sentiment of the people. At the census of 1911 the numbers of adherents of the various denominations in the Australian Commonwealth were given as follows :

Church of England . 1,710,443

Roman Catholic . . . 92 1 , 425

Presbyterian . . 558 1 336

Methodist . 547,806

Baptist . 97,074

Congregational . 74 , 046

Lutheran . 72,395

Salvation Army . 26,6t5

Various other Christian denominations . 266,224

Total . 4,274,414

Non-Christian religion . 36 , 785

Indefinite . 14,673

No religion . 10,000

Declined to state . 83 , COO

Australia was originally included for ecclesi¬ astical purposes in the province of Canterbury and up to the year 1836 was attached as an archdeaconry to the diocese of Calcutta. For 15 years after the foundation of New South Wales the only denomination recognized by the government or possessing a minister was the Church of England. There is now a general Synod of this Church which meets every five years under the presidency of the archbishop of Sydney, who has the title of primate of Aus¬ tralia, although each state preserves its auton¬ omy in church affairs. Melbourne and Brisbane also have archbishops. There are six dioceses in New South Wales; five in Victoria; four in Queensland, together with that of New Guinea; and two in Western Australia. There is also the diocese of Adelaide in South Australia and of Tasmania. The Roman Catholic Church occupies, so far as numbers are concerned, the second place in each of the states, with the exception of South Australia, where the Metho¬ dists are numerically stronger. Its organiza¬ tion in Australia as elsewhere is superb. At the head of the Church stands the archbishop of Sidney. There are archbishops in Mel¬ bourne, Brisbane, Adelaide and Hobart, and 14 bishops in the six states. Until 1834 Australia, so far as the Roman Catholic Church is con¬ cerned, was under the bishop of Mauritius.

Sydney was in that year constituted a see ; eight years later the prelate was invested with the title of (<Archbishop of Sydney and Vicar Apostolic of New Holland.® In 1885 the arch¬ bishop of Sydney was created a cardinal and placed at the head of the Roman Catholic Church throughout Australasia. In 1876 Mel¬ bourne was made an archidocese as were also Adelaide and Brisbane in 1887, and Hobart a year late. The cathedrals of Saint Mary in Sydney and Saint Patrick in Melbourne are especially magnificent structures. The Roman Catholic Church takes a prominent part in furthering social and industrial legislation and in temperance work. The Wesleyan Methodist Church was established in New South Wales in 1812, at a class meeting attended by 12 per¬ sons. Up to 1855 this Church was regarded as a mission, but in that year it was constituted an affiliated conference. In 1873 the Austral¬ asian Wesleyan Church was raised to the rank of an independent conference. On 1 Jan. 1902,

the Wesleyan Methodist, the Primitive Metho¬ dist and the United Methodist Free Churches of Australia and New Zealand were united under the name of the Methodist Church of Australasia. In South Australia this Church includes 25 per cent of the whole population and throughout Australia its members form a compact, enlightened and progressive body, which has exercised a preponderating influence in promoting temperance legislation and meas¬ ures tending toward a higher plane of morality. The Presbyterians erected in 1810 one of the first places of worship in New South Wales. The Presbyterian Churches in all the states arc united under the title of the Presbyterian Church of Australia in a General Assembly which meets every year in the capital cities in rotation. The Church in each state, however, acts independently in local administration and is autonomous so far as property is concerned. There is a Union of the Congregational Churches in each state federalized in the Con¬ gregational Union of Australasia. Thus per¬ vading the Churches and leading to interstate Unions is witnessed the same synthetic spirit which was materialized in Australian Federa¬ tion. By this means strength is acquired with¬ out the sacrifice of local liberty, for a Federal union combines firmness with flexibility.

The youngest and one of the most active religious bodies in Australia is the Salvation Army. It started in South Australia in 1880 and two years later officers were sent from Adelaide to organize forces in Victoria, New South Wales and Tasmania, and in 1886 to

1. INDUSTRIES AND COMMERCE.

Manufactories. — For many years Australia relied chiefly on its raw products for its wealth, but recently steady progress has been made with its manufacturing industries, and at the present time over 250,000 men and more than 82,000 women find employment in what are ordinarily termed factories, as well as a large number of others in smaller establish¬ ments.

The most rapid increase in the manufactur¬ ing industry has taken place during the past few years — in fact between 1894 and 1917 the hands employed increased from 133,- 631 to 320,922, an increase of nearly 10,000 per annum, as compared with an increase of only 2,800 per year during the 10 years previous to 1894, the growth of the factory employees being proportionately far greater than that of the population.

As regards the manufacturing industry gen¬ erally, the population of the continent is at present hardly sufficient to maintain a large manufacturing population, while its distance from other market places is at some disad¬ vantage as regards the export of manufactured products. The total horse-power of machin¬ ery used in the factories amounts to over 440,- 000, the increased use of electricity in recent years being accountable for a rapid addition in such power.

The following table shows the number of establishments and the hands employed in each state of the Commonwealth in factories and works employing four hands and over :

New South

South

West

1915

"Wales

Victoria

Queensland

Australia

Australia

Tasmania

Establishments .

5,268

5,413

1,838

1,323

1,301

623

Employees .

116,462

113,834

42 , 363

26,874

10,981

9,784

Queensland; operations in Western Australia were commenced in 1891. At first the officers of the Army met with much ridicule and some ill-treatment but the earnest and effective man¬ ner in which they grappled with the problems of social reform soon reconciled the public to their methods. Persecution gave way to popu¬ larity, and the work of the Army is now ap¬ plauded by all classes. The Prison Gate Brig¬ ade reclaims many criminals, and does such good service in diminishing crime that several of the state governments give a grant in aid of its operations. The headquarters of the Army are in Melbourne and the officer com¬ manding in Australia has the rank of a com¬ missioner. There are colonels and brigadiers in each state.

The several churches in Australia are ani¬ mated by those friendly and tolerant sentiments which are the natural offspring of freedom. An interchange of pulpits is not infrequent. On Empire day in 1906 a special service was ar¬ ranged at Saint Paul's Cathedral, Melbourne, in which the president of the Methodist Con¬ ference and the minister

of the principal Pres¬ byterian Church took part.

John Alexander Cockburn, Formerly Minister of Education in South Australia.

In Queensland the two principal manufac¬ turing industries are sugar refining and meat preserving, and of the total number of people employed, about 12 per cent find employment in these two industries.

The total output of all factories in Australia, exclusive of those engaged in the production of butter, cheese and bacon, figures of which are included in the pastoral industry, amounts to £166,405,923, of which £99,778,884 represents the value of material and fuel used, and about £66,627,039 the value added in the process of treatment.

The following table gives the class of in¬ dustries which give employment to people in the Commonwealth :

Hands

Class of Industry employed

Treating raw material the product of pastoral

pursuits . 9 , 495

Oils and fats, animal, vegetable, etc . 2,091

Processes in stone, clay, glass, etc . 13,794

Working in wood . 31 , 646

Metal works, machinery, etc . 68,839

Connected with food and drink, etc . 49,882

Clothing and textile fabrics and materials . 84,237

Books, paper, printing and engraving . 26,013

Other industries . 51,104

Total . 337,101

Tanning, fell-mongering and wool scouring afford the largest amount of employment among the industries in class 1, and this can be readily understood, seeing that the pastoral industry is still the greatest in the Commonwealth.

In class 2 the manufacture of soap and candles is increasing rapidly.

In class 3 the manufacture of bricks and tiles is the most important, about 65 per cent of those engaged in this class being employed in that industry.

In class 4 it can be readily understood that with the immense forests of valuable timber, the saw mill is the most important of wood¬ working establishments, and about 70 per cent of those employed in that section are in saw mills.

Class 5 included a great number of persons employed in the engineering works of the re¬ spective state government railway and tramway workshops. Also workers in smelting establish¬ ments for the extraction of ore, though these employed in quartz batteries are not classified as factor}' hands in Australia. There are sev¬ eral important establishments for the manu¬ facture of agricultural implements, and at Gawler, in South Australia, and in Melbourne, the capital of Victoria, important agricultural implement works have been founded. To an Australian firm is due the credit of inventing that great labor-saving appliance, the (<Complete Harvester.ˆ

In industries connected with food and drink, butter, cheese, meat preserving, sugar mills and breweries employ a great number of hands, while flour mills, aerated water factories, bis¬ cuits and other articles required for local con¬ sumption also employ a great number of persons.

Factories connected with clothing and tex¬ tile fabrics offer more employment than any other section, and here the females employed largely outnumber the males. Victoria shows the greatest development in this industry, and during the last few years the manufacture of wool has made considerable progress in the various states.

Speaking of wages generally, Australia pays its employees high wages compared to other countries, while the genial climate and general healthy conditions of life make living cheap compared to other countries of the world.

During the last few years a system of in¬ dustrial legislation has come into force in most of the states, which brings about better con¬ ditions

of work, cleanliness, air space, sanita¬ tion, etc. Australian factories, as a rule, are well built and roomy. The day's work is gen¬ erally limited to eight hours with extra pay¬ ment for overtime in cases of need. Wages boards have also been appointed for many of the principal industries, and to prevent strikes and lock-outs courts of conciliation and arbi¬ tration have been established.

Taking the Commonwealth as a whole, the latest records show that in industries controlled by wages boards the average earnings of male workers, 21 years old and upward, is £ 2 15s. 7d. per week, and of females, £1 7s. 5d. per week, the average wage in industries not so regulated being about 2/ per week less.

Pastoral Industry. — The pastoral industry plays the most important part in the resources

and wealth of Australia. At the close of 1915 Australia had 69,693,375 sheep, 9,993,743 cattle, 5,392,566 horses and 758,962 pigs.

Nothing is more marvelous than the prog¬ ress of the pastoral industry. In the year 1800 there were only 6,124 sheep, 1,044 head of cattle, 203 horses and 4,017 pigs in the whole of Aus¬ tralia, but it is since 1850 that the greatest progress has been made, and from that date the value of the wool alone which has been exported has amount to £880,000,000 sterling.

The first sheep imported were from the Cape of Good Hope, and in 1823 and 1825 further lots of Spanish sheep were introduced. In some respects the climate of Australia changed and improved the character of the Spanish fleece. The wool became softer and more elastic and increased considerably in length. The average weight of a fleece has increased remarkably, and while in 1861 the average weight of a New South Wales fleece was only 3.28 pounds per sheep, the present average weight is 7.3 pounds.

In recent years there has been a tendency to divide the sheep into smaller flocks. In New South Wales for instance there are 17,361 sheep owners as compared with 14,033 10 years pre¬ vious, while the average size of a flock is now 1,650 as against 4,050 at a former period. Of the total number of the sheep in Australia about 95 per cent are merinos. On the coastal dis¬ tricts, however, where merino sheep do not do so well, the rearing of cross-bred and long wool sheep is increasing and these are specially valu¬ able for the meat they produce. It is interesting to note that at the present time Australia carries one-fifth of the total sheep in the world.

The export of wool brings an immense amount of money to the Commonwealth and in 1913 returns for the Commonwealth were £26,277,000.

The production of wool for the fiscal year ending 30 June 1916 was large and the prices set new records for Australasia. The number of bales exported from the different states of the Commonwealth was as follows: New South Wales, 840,515; Victoria, 342,476; Queens¬ land, 258,122; South Australia, 92,654; Western Australia, 73,564; and Tasmania, 11,928. Ship¬ ments from New Zealand amounted to 510,656 bales, making a total for Australasia of 2,129,- 915 bales, against 2,137,702 bales for 1914-15. There was a decrease of more than 12,000,000 sheep in the Australasian flocks during the year. The gross proceeds from the sale of wool in Australia and New Zealand were $145,525,537, an average of $80.50 per bale, in 1915-16, com¬ pared with $96,077,100, an average of $62.19 per bale, in 1914-15. The average is the highest yet realized in the colonial market. When the British government took over the remaining Australian wool clip in November 1916, there was doubt whether the high prices would be maintained, but the reports of the appraisers allayed this. The value of Australian wool purchased by Great Britain exceeded $100,000,- 000. Although the removal of the embargo per¬ mitted shipments of burry wools to America, it developed that the demands from Great Britain required practically the entire clip.

Cattle.— Owing to the more profitable char¬ acter of sheep farming, cattle breeding in the Australian states is, with the exception of Queensland, second to that of sheep. The fol-

lowing table shows the number of cattle in the various states at the end of 1916:

State

New South Wales . 2 , 405 , 000

Victoria . 1 . 043 , 604

Queensland . 4,780,893

South Australia . 226,565

West Australia . 821,048

Tasmania . 169,575

Northern Territory . 483,961

Total

9,930,646

Horses. — Considerable attention has been paid to the breeding of horses and at an early period the stock of colonial-bred horses was improved by the importation of Arabian and other breeds. The following table shows the number of horses in the different states in 1916:

State

New South Wales

Victoria .

Queensland .

South Australia. . West Australia . .

Tasmania .

Federal Territory

720,000

493,779

686,871

253,333

163,006

41,422

19,957

Total

2,378,368

There is a considerable demand in India for Australian horses and as a rule between 6,000 and 7,000 are exported annually to India, valued at from £80,000 to £85,000.

Angora Goats. — Considerable attention has been given during the last few years, especially in Queensland and New South Wales, to the production of mohair and considerable numbers of pure-bred angoras have been imported from the United States. The goat thrives admirably in the warm dry climate of Australia and it seems likely that in the near future the export of mohair will show considerable increase. At the present time there are about 262,000 goats depastured in Australia.

Camels. — In some of the states camels are employed for the carriage of wool and other produce. In the Commonwealth as a whole the number of camels is more than 10,000.

Pastoral Returns. — The annual return from the pastoral pursuits in 1915 was £60,265,- 000, of which total sheep contributed about 58 per cent. The greater part of the sheep in¬ dustry is, of course, the return from wool and skins. The value of wool consumed locally is not more than £250,000.

Frozen Meats. — A rapid increase in live stock in Australia in favorable seasons makes the question of disposing of the surplus material of serious consequence. In 1882 the first ship¬ ment of frozen mutton from Australia to Great Britain was tried. In 1916 £9,116,663 worth of frozen meat, including £1,270,707 worth of frozen mutton and £724,624 worth of hares and rabbits were exported from Australia over sea.

Queensland exports large quantities of chilled and frozen beef, the total amounting to about £1,000.000 worth annually. Much of this is sent to the other states and is not included in the oversea exports. New South Wales exports chiefly frozen mutton, which varies in value from about £200,000 to £500,000 annually. Vic¬ toria also exports large quantities of frozen mutton and beef, while South Australian lambs are highly prized in the British markets. The .export of canned meat was valued at £500,955.

Dairy Farming. — The introduction of the

factories system at convenient centres in Aus¬ tralia has caused rapid extension in this indus¬ try. Immense quantities of butter are now exported to Great Britain, in 1916 the export amounting to £1,11

7,629 sterling. The total amount of the dairy products of Australia for 1916 was valued at £21,562,000.

Forestry. — Australia is chiefly famous for its hardwood timbers, the export of which is now a considerable industry. In 1916 the total exports from Australia amounted to £396,337, of which West Australia exported the greater part. The present annual value of the timber industry of the Commonwealth, that is of the rough tim¬ ber as it leaves the forest saw mills, is about £3,000,000 sterling. In West Australia alone the forests of marketable timbers are estimated to cover about 21,000,000 acres. The governments of all the states have a number of reserves where the young timber is conserved so that the source of supply can be maintained.

Jarrah is the chief timber exported, its prin¬ cipal use being for wood-blocks, piles, railway sleepers, etc. The wattle tree grows well in most parts of Australia, from the bark of which large quantities of tanning material are pro¬ duced. There are various species of eucalyptus from which is distilled the famous eucalyptus oil which has a considerable value for medicinal purposes. Some of the fine-grained woods are also very beautiful and much used for decora¬ tive purposes. The karri is probably the finest tree of the Australian forests, and sometimes run to over 30 feet in circumference at three feet from the ground and up to 150 feet from the ground to the first branch. Other prime timbers are ironbark, tallow wood, spotted gum, grey box, mahogany, blackbutt, etc. Besides hard woods there are beautiful cabinet woods, viz., cedar, rosewood, redbean, silky oak, black- wood, etc.

Agriculture. — Judging by the experience of the past 30 years, Australia appears to be on the threshold of vast agricultural developments. Up to 1871 only 2,345,922 acres were under crop in the Commonwealth, but in 1916 this had in¬ creased to 15,651,974 acres. Of the cultivated land 90 per cent lies within the borders of New South Wales, Victoria and South Australia. The following table shows the area cultivated in the various states :

State

New South Wales

Victoria .

Queensland . .

South Australia . . West Australia . . . Tasmania. .....

Federal Territory

Acres, 1915

4,808,627 7,070,000 650,000 4,612,274 1,867,547 333,334 5,143

Total

19,346,925

As in most new countries where the pioneer farmer needs a quick return from his land, wheat is the principal crop and nearly 67 per cent of the cultivated land is sown to wheat. The area under wheat for grain in the various states in 1916 was as follows :

State Acres

New South Wales . ’ . . 2,758,024

Victoria . . 3, 680, 000

Queensland . 93,703

South Australia . . 2 , 502 , 630

West Australia . 1,734,117

Tasmania . 48,642

Total

10,817,116

In 1915 the yield of wheat for the Common¬ wealth amounted to 125,000,000 bushels. The other crops of most importance are hay, oats and maize.

The Commonwealth requires about 30,000,000 bushels of wheat annually for home consump¬ tion and seed and a production of 125,000,000 leaves about 95,000,000 bushels annually for export.

The average yield of wheat in Australia may be taken at about 10 bushels per acre. This appears low judging by the standard of many

other countries, but a bare statement of average is misleading, as in Australia the cost of pro¬ duction is relatively very low. In ordinary districts the expenses of ploughing, seed and sowing and harvesting the wheat amounts to from 15/ to 20/ per acre, so that a yield of 10 bushels at 3/ a bushel means a return of from 10/ to 15/ an acre out of which to pay the other expenses.

In South Australia the conditions of cultiva¬ tion are even more favorable than the above indicates, and with a smaller yield, wheat grow¬ ing is bound to be very profitable'. The present comparatively low yields are largely due to the fact that immense areas are put under crops by individual farmers. In consequence, the culti¬ vation and harvesting methods are not carried out so thoroughly as in older countries of the w'orld. With smaller areas and better farming, far higher averages will, it is believed, be ob¬ tained in the future. The following tables show the average area and yield of some of the other principal crops :

West Australia and South Australia. By sink¬ ing artesian bores supplies of w ater are brought to the surface from underground sources which exist in the Tertiary drifts and the Cretaceous beds.

In New South Wales one of these wells has a daily flow of 1,750,000 gallons, the depth of the bore being 2,029 feet. Over 50 artesian bores have been successfully sunk in South Australia, the greatest daily flow amounting to 1,200,000 gallons. These bores give excellent water for stock purposes and are also used in many cases for irrigating crops.

Mineral Resources. — Most metals of eco¬ nomic value are found in Australia. Gold is found in all the states and in 1823 the first dis¬ covery of the precious metal was made. In 1851 and 1852 important discoveries were made in New South Wales, Victoria, South Australia and Tasmania and attracted a rush of popula¬ tion. A little later gold was found in Queens¬ land and the last of the states in which exten¬ sive deposits were found was West Australia. So important did these deposits prove that in 1905 the output of West Australia was more than equal to all the other Australian states together.

The following table shows the gold won in Australia up to the end of 1915 and the return for the year 1915 :

Total Yield, 1915

£ Ounces

Total . 572,487,653 8,270,339

Silver. — Australia is rich in silver and it is.

Acres, 1915-16

Maize

Oats

Hay

Potatoes

Sugar cane

Vines

Total for Commonwealth .

339,781

724,576

3,530, 180

148,328

164,449

60,985

Agricultural Production

Maize

Oats

Hay

Potatoes

Sugar cane

Wine

1912-13

Total for Commonwealth .

Bushels

8,445,561

Bushels

16,603,281

Tons

5,620,311

Tons

357,614

Tons

1,310,264

Gallons

2.875,300

Large areas are also under orchards in the various states of the Commonwealth, the total being 216,000 acres. Victoria heads the list with 67,000; New South Wales 51,000, and South Australia 24,000. The export of apples, oranges and dried fruits to Great Britain has been commenced and promises to develop into an important industry.

All the governments give considerable at¬ tention to agricultural education and have estab¬ lished agricultural colleges and experimental farms where practical and scientific agriculture is taught.

In most of the states also arrangements are made by the government to advance money to assist farmers at low rates of interest.

Irrigation. — The necessity for providing water for stock and irrigation in the dry parts of Australia induced the respective governments to spend a good deal of money on water con¬ servation and artesian boring. Cretaceous beds extend over large areas of New South Wales,

found in all the states either alone or in the form of sulphides, chloride, bromide, iodide, chloro-bromide of silver and antimonial and arsenical ores and argentiferous lead ores. In the latter the largest

deposits of metal are found.

Prior to 1882 the output of silver in Aus¬ tralia was small, but with the opening up of the Barrier mines at Broken Hill, close to the boundary of New South Wales and South Australia, rapid advances took place. The fol¬ lowing table shows the output of silver and silver lead in Australia up to the close of 1915 and for the year 1915 :

Silver and silver-lead £ £

Total . 82,266,333 3,514,254

Copper. — The production of copper in Aus¬ tralia in 1915 amounted to £3,035,890.

Tin is also found in payable quantities in many parts of Australia, the production in 1915

amounting to £806,641. Iron is distributed throughout the Commonwealth and at Lithgow, in New South Wales, where iron and coal de¬ posits lie alongside each other, a commencement has been made to smelt the ore. Tasmania has enormous deposits situated near the Blyth River. Other minerals widely diffused throughout Aus¬ tralia are antimony, bismuth, manganese, plati¬ num, tellurium, lead, wolfram and a number of earth colors. The annual production of such other minerals amounts to about £1,000,000.

Coal. — Coal was first discovered in New South Wales in 1797. Since that time it has been proved that nature has bountifully sup¬ plied Australia with mineral fuel. Black coal forms one of the principal mineral resources of New South Wales. The total output of coal in 1915 reached £4,277,592.

Brown coal or lignite occurs principally in Victoria but it is much inferior to the black coal. Good coal has been found in West Australia, while in Queensland the extent of the coal fields is practically unlimited — over 24,000 square miles of coal measures having already been explored. Tasmania also has important carboniferous formations.

Marble of high quality is found in many parts of Australia, while the finest opal known is obtained in the Upper Cretaceous formation near

Wilcannia, New South Wales. The out¬ put of opals from Australia up to 1913 amounts to £1,534,895. Other gemstones, including emeralds, sapphires, rubies, etc., are found in various parts, while diamonds are found in New South Wales, Victoria, Queensland and South Australia, though only in the first named are the diamond drifts worked commercially.

Commerce. — The external trade of Aus¬ tralia is increasing rapidly as the following table shows :

Year	Imports	Exports	Total trade
1861 .	£17,562,960	£17,399,656	£34,962,616
1881 .	29,031,131	27,528,58 3	56,559,714
1901 .	42, 433, SI 1	49,696,172	92,129,983
1905 .	38,407,579	56,750,347	95,157,926

1908 . 49,786,798 64,311,058 114,097,856

1913 . 79,749,000 78,572,000 58,321,000

1914 . 70,693,200 62,855,200 133,548,400

1915 . 67,640,000 61,280,000 128,920,000

1916 . 79,740,000 81,720,000 161,480,000

The external trade of the Commonwealth amounts to £32.19 per head of population, which is nearly four times that of the United States and considerably greater than that of the United Kingdom.

Of the total trade 52 per cent in 1913 was with Great Britain, 12 per cent with other parts of the British empire and 36 per cent with foreign countries. The trade of Australia shows a considerable diversion in recent years from Britain to foreign countries. In fact nearly one-third of imported goods are now of non-British origin as compared to one-fourth a few years ago, and of the exports over two-fifths are sent to non-British countries compared with one-tenth in 1885. The chief cause of this is the establishment of direct and rapid com¬ munication between Germany, France, Belgium, Japan and the United States with Australia.

In the exports the same tendency is notice¬ able, in 20 years the percentage to Great Britain having fallen from 74.91 per cent to 44.30 while exports to foreign countries have increased to 43.67 per cent.

Shipping. — In 1913 the total number of ves¬ sels in the oversea trade entering and clearing Commonwealth ports was 3,985, of 10,601,948 tons.

Since 1904 Australian shipping has increased considerably, both in the total tonnage entered and cleared and the number of vessels engaged in oversea commerce. This progress has not been so great, however, as to materially alter the balance of trade. Australia being chiefly an agricultural country, no great or sudden rise in its exports is to be expected. Yet, were it not for this fact, the general rise in shipping — and especially the increase in the number of vessels clearing and entering in recent ' years — would be but normal and in keeping with the country's general advance.

Bibliography. — Ball, (Notes on Tin, Cop¬ per and Silver1 (1904); id., (Iron, Copper and Manganese Ore' (1904) ; id., (Gold and Other

Minerals 1 (1905) ; Basedoe, (Catalogue of Min¬ erals in the Museum of South America1 (1907) ; Benson, (Fruits of Queensland1 (1906); Bir- fitt, (History of the Founding of the Wool Industry) (1907); Bottomly, (Cotton Growing in Australia) (1905) ; Boyd, (Cotton Culture) (1904) ; Brown, (White Range Gold Mines) (1902) ; Cameron, (Wolfram Mining in Queens¬ landˆ (1904) ; id., (Recent Mining Develop- ments) (1903) ; Clarke, Australian Mining and Metallurgy1 (1904) ; Curie, (Gold Mines of the World) (1905) ; Coventry, Anthracite Coal1 (1904); Dashwood, (Pcarl Industry) (1902); Evans, (The Sugar Industry) (1909); Fergus- son, (The Cocoanut Palm1 (1904); Gisborne, Apple Industry of Tasmania1 (1905) ; id., Commerce and Industry1 (1911); Holteze, {The Northern Territory and Tropical Agri¬ culture1 (1902) ; Jenkins, (Report on Cotton Growing in Northern Territory 1 (1906) ; Lance, Australia as a Food Producing Country1 (1904) ; McLaren, (Mining and Milling Prog¬ ress1 (1901) ; Morgan, (Trade and Industry of Australia1 (1909) ; Neville, Cultivation of To¬ bacco1 (1906) ; Simpson, (Minerals of Economic Value1 (1905).

Sir Timothy Augustine Coghlan,

Agent-General for New South Wales.

1. FINANCE. In matters of finance, as well as in many other things, Australia presents a most interesting field for study. Sprung from a splendid body of pioneers, who had been brave and enterprising enough to quit the old home-land, with all its tender associations, the colonists have wrought wonders. Untram¬ meled by any undue preference for the old ways and with ample scope for bold, not to say audacious, experimenting, the spirit of enter¬ prise, inherent from their fathers strong in them, the second generations of the settlers, who are the Australians of to-day, have striven to put into practice, and by no means without success, some theories which have elsewhere remained merely theories. In their systems of land settlements, their state ownership of ' such undertakings as railways, tramways, water works, etc., and in schemes of taxation, to say nothing of other matters of finance, they have sometimes dis¬ carded precedent and have no reason to be ashamed of the results which they have to show for their enterprise and fearlessness. Compli¬ cated as are, in some respects, Australian ques¬ tions, through the existence, at one and the

same time, of a dual citizenship, every person owing allegiance to his own individual state and also to the broader Commonwealth gov¬ ernment, a very little care will enable a com¬ plete view to be taken of Australian finance, including both those figures relating to the Commonwealth, or national, and to the state or provincial governments. The 5,000,000 peo¬ ple of the Commonwealth occupying the great island continent of Australia and the adjacent small one of Tasmania, with an area in all, or as nearly as possible, 3,000,000 square miles, having, for national purposes, united under the Commonwealth Constitution Act, are still, in respect of all but certain specified matters, citi¬ zens of one or other of the six states of New South Wales, Victoria, Queensland, South Aus¬ tralia, Western Australia and Tasmania. So far as their finances are concerned it is neces¬ sary to remember that to the Commonwealth are assigned very large powers of taxation, which, however, up to 1914 were only exercised in respect of customs and excise, the whole revenue from which is collected by the Com¬ monwealth, the balance, after meeting its own necessaries, was handed over to the states, in proportion to the amount of the duties de¬ rived in each state. In 1910 arrangements were made with the states in lieu of the above provision that 25/ per head of the population should be returned to the states. The Com¬ monwealth controls all posts, telegraph and telephones, as well as all military and naval defenses, and also several other important de¬ partments of state, but the finances and statis¬ tics are unaffected by these matters, as in the case of all of them where there is a Common¬ wealth control, state control ceases. In taxa¬ tion, however, if it were attempted to show the total for Australia by adding to the total for the Commonwealth those for the states, the result would be wrong; just as would be any attempt to get the total revenue and expendi¬ ture for Australia by adding Commonwealth totals to those of all the states, because of the portion of the customs, and excise revenue which, being first collected by the Common¬ wealth, is afterward paid over to the states and so would appear twice in the totals.

In this statement care will be taken to show all the figures once, without any duplication whatever. The figures given will, unless other¬ wise stated, be from the latest volume pub¬ lished by the Commonwealth government statis¬ tician, Mr. G. H. Knibbs, C.M.G.

The customs and excise revenue for the year ending 30 June 1914 was collected under the following heads :

Customs

Stimulants . £2,810,222

N arcotics . 1,175,404

.Sugar . ; . 209,375

Agricultural products and groceries . 1,002,363

Apparel and textiles . 2,514,170

Metals and machinery . 1,672,125

Oils, paint and varnish . 310,847

Earthenware, etc . 426,134

Drugs and chemicals . 122, 960

Wood, wicker and cane . 555 , 843

Jewelry and fancy goods . 272,214

Leather and rubber . 470,382

Paper and stationery . 234,504

Vehicles . 343,633

Musical instruments . 166,059

Miscellaneous . 330,548

Other receipts . '. . 35,954

Total customs . £12,652,737

Excise

Stimulants . £1,213,749

Tobacco . 927,293

Sugar . 179,149

M iscellaneous . 5,142

Total excise . £2,325,333

Total customs and excise . £14,978,070

The Commonwealth up to 1910 had no rev¬ enue from any other form of taxation besides customs and excise. A land tax was then imposed which in 1914 brought into the revenue £1,609,836. The total revenue, including postal, patents, trade marks, coinage, etc., amounted in 1914 to £21,741,775. A progressive income tax was passed in 1915 to meet war expendi¬ ture. This is as high as 5/ in the pound on incomes of £6,500 or over ; an excess tax on profits has also been imposed.

The Commonwealth was to a large extent a tax-gatherer for the states up to 1910, the Con¬ stitution requiring it for the first 10 years at least to return to the states or to pay on their behalf, as interest or principal on state loans, not less than three-fourths of the total in¬ come from customs and excise. This pro¬ vision was adopted in order to avoid dislocation of the state finances through the transfer of this revenue from the states to the Common¬ wealth, and also to restrain the Common¬ wealth Parliament from mopping up all the revenue from customs and excise by launching out on new and costly enterprises which might leave the states in an awkward financial posi¬ tion. The Commonwealth Parliament as it has set its face sternly against borrowing, even for public works, pays for all that is necessary out of surplus revenue. It is proposed in in¬ fluential circles to federalize the state loans to such an extent as would finally absorb the rev¬ enue now returned year by year to the states, so as to remove the present interdependence of Commonwealth and state finance. The expend¬ iture of the Commonwealth is narrowed down to a very few items. We have the cost of the departments transferred from the states to the Commonwealth and now controlled by it, such as the customs and excise, posts, tele¬ graphs and telephones, military and naval de¬ fenses, etc. To these are added the cost of the Commonwealth machinery of government, in¬ cluding the departments of the governor-gen¬ eral, the ministers of state, and the legisla¬ ture, together with the judiciary. The outlay on public works and buildings for the year 1914 was £2,576,000 and the total expenditure was £15,458,776.

The revenue and expenditure of all the states forming the Commonwealth for the year ending 30 June 1914 was as follows: Revenue. £47,269,039; expenditure, £46,551,907. Nearly one-half of the total revenue of the state is derived from ((public works.® This represents the earnings of the railways, tramways, harbor works and

water works, together with other les¬ ser undertakings, the construction of which has been the main factor in building up what at first sight appears to be the huge debt of Aus¬ tralia. It may, however, be noted that the public works not only aid very greatly in the development of the vast areas of the unoccu¬ pied Crown lands in Australia, but they also produce a large annual revenue, which may

well be set off against the annual interest charge, as the value of these permanent assets are set off against the debts themselves. The works include nearly 18,000 miles of rail¬ ways, which cost £177,000,000 up to the end of 1914, the latest year for which the details are obtainable, and for that year they earned, over and above working expenses and upkeep, the sum of £6,887,000 toward interest on the loans raised to pay for them. As the country through which they pass develops their earnings must increase. The item land sales and rents is much lower than in the past years, as the present policy of all the states is to encourage settlement by leasing land on very long leases, with or without right of purchase, so as to assist people with little capital, rather than to sell land for cash. In many cases the purchase money is spread over as many as 20 years, all payments going off the purchase money, so as to aid would-be cultivators who are short of funds to make a start. The provision of such conveniences as roads, bridges and school- houses absorb practically all the proceeds from the land for several years after it is first leased, so that the states are by no means living on their capital. The lands which once returned no revenue at all are, by these means, being gradually developed and made to produce load¬ ing for the railways and business for the har¬ bors as well as assets and income taxable by the treasurers. The taxation differs in the several states, though most of them now levy on the estates of deceased persons in propor¬ tion to the size of the bequests left and to the degree of relationship between the testator and the legatee, the larger bequest and the more distant relation paying the higher rate. There are also, in most states, taxes on income and on <(unimproved land values® that is to say on the capital value of land less the value of improvements thereon. The principle of pro¬ gression in taxation is recognized in the Com¬ monwealth and the different states, not only in succession duties, but in income and also in land values taxation. The usual distinction is ob¬ served between income derived from personal exertion, and therefore dependent upon the life and health of the earner, and that derived from investments or property, which is independent of personal effort. The rate of tax is

higher on the income from property than upon the produce of personal exertion. There is, too, the further graduation according to the amount of the income. The land values taxa¬ tion levied in the Commonwealth and in the states is on the value of the land after deduct¬ ing the value of improvements thereon. It is, therefore, much heavier on city and suburban than on country land, area for area. There is also an extra tax of 20 per cent on the first tax if the owner of the land be not resident in the state. The miscellaneous receipts call for no special remark. The total revenue looks very large, but it needs to be remembered that altogether apart from the postal and telegraphic receipts, which appear not in the state, but in the Commonwealth accounts, as do also all figures relating to military and naval defense nearly one-half of the total is for services rendered to the people by means of public works, and altogether outside the functions (ordinary) of government, as commonly under¬ stood. On this account it cannot be said that

Australians are burdened by the contributions they make to revenue, even though they pay in all, to Commonwealth and states, £9 to £12 per head per annum. The further taxation levied by local governing bodies for purely local expenditure, such as road maintenance and sanitation, is not large. The figures for Western Australia are abnormal on account of the rapid development of the gold fields and the resulting preponderance of highly paid adult males in the population, consuming highly dutiable goods. The expenditure of the states would be absurdly high were it not for the fact that it includes, to the extent of 56 per cent of the whole, provision for the working of the railway and the payment of interest and the repayment of debts. These charges are not in any true sense ((costs of government.® They must be considered in relation to special income appearing on the other side of the account. That 7 per cent of the expenditure is for education is indicative of the general trend of affairs in Australia and of the high ideals cherished. Of course it needs to be remembered that at the present stage settlement is sparsely spread over a huge territory, and that the costs of administration would be slightly increased, if at all, if there were three or four times the number of people on the land that there are to-day, while the revenue would be largely multiplied. It is area rather than population which, under cer¬ tain circumstances, determines expenditure, and these circumstances exist in many parts of Australia to-day. The Australian of the present is fully determined not to allow

extravagance in public expenditure, and no blunder in public life is more speedily punished by the electors. The expenditure of the states of course includes all the cost of legislative machinery, with the salary

of the state

governors, and the members of the state Parliaments, and also all the charges con¬ nected with the administration of all the de¬ partments, such as police, public health and education, together with the oversight of an elaborate system of local government, and each state in its turn deals with a wide area of purely local concerns. Australia indeed possesses all the concomitants of a highly organized political and social organism, and believes that it gets a full return for its public expenditure. The exceedingly close approxima¬ tion of expenditure to revenue results from a disposition, whenever anv considerable surplus appears in the accounts for any year, to devise further public conveniences which may be provided for the future, and so the surplus is absorbed. There is no general desire to show large surpluses nor is there much effort to reduce taxation, which is not felt to be burden¬ some, but rather to add to the facilities afforded for trade, and for the occupation and develop¬ ment of the country and of its industries. These ends are being achieved, and the cost of them is not grudged by those who have to find the money, and who reap the gain.

The debts of Australia have mostly been incurred by the states; until recently the Com¬ monwealth carefully avoided any line of policy which would involve it in any necessity for em¬ barking on a borrowing policy, on its own account. Indeed, as has already been sug¬ gested, the Commonwealth Parliament deter-

mined to construct all such public works as post-offices, fortifications, etc., out of revenue. It has taken over from the states all the customs houses, post-offices, naval and military defenses, stores, etc., which were the property of the states, prior to the establishment of the Commonwealth, and will ultimately have to recoup the states for them, either by taking over states' debts to an account equivalent to their value, or in some other way, which must almost of necessity involve the Commonwealth in a debt. There are further schemes in con¬ templation for the transfer of state obliga¬ tions on certain terms to the Commonwealth, besides which there are proposals under con¬ sideration for the construction of trunk lines of railway across the continent of Australia ; the line from South Australia to Western Australia has been approved and is in course of construction. All the states have some provision of the nature of a sinking fund for the

ultimate extinction of the debts and in several cases stock is from time to time pur¬ chased and canceled out of funds set apart for purposes of redemption. None of these funds have, however, as yet assumed propor¬ tions sufficiently large to modify materially the facts as to the total debts. The debt of Australia up to 1915 in no case represented the cost of the war. The whole of it had been incurred with a view to the development of the vast resources of the continent and for practically the whole of it there are very valuable permanent assets. Of the total debt of the Australian states for 1914 £317,598,788 — - £177,000,000 was spent on railways and tram¬ ways, on water supplies and sewerage, on harbors, rivers and navigation ; and for public works and buildings about £75,000,000 has been spent, besides other sums for telegraphs, tele¬ phones, defense and other items. The net revenue produced by these works aggregated, in the year under review, over and above work¬ ing expenses and maintenance, nearly 3 per cent on their cost. It should also be remarked that the year 1914 for which the figures are given was not a normal year, the effects of the previous year's drought having by no means passed away. The revenue from this source could be increased to an amount suf¬ ficient to meet in full the interest charge, if it were desired to do so, but the charges for railage and harbor dues and water supplies, etc., are all kept down with a view to the encouragement of settlement and of produc¬ tion, it being recognized that the direct return received from the enterprises is by no means the sum of their earnings, as they produce through the resulting prosperity of the people, a very large indirect return through the customs house, and in many other ways. It is the general prosperity rather than the direct revenue which is the primary objective for the time being. Meantime the works are permanent assets of constantly increasing value and revenue earning power. As has often been pointed out, Australia could, by sale of her railways, harbor works and water services, im¬ mensely reduce her public indebtedness, for the undertakings would sell readily for what they cost, but she would be poorer, rather than richer, by the transaction at once, to say nothing of the folly of such a policy from the point of view of the future. There is, further, one

great asset of Australia which cannot be over¬ looked in any consideration of her financial position, and that is her unalienated land. In four out of the six states the areas are very large and the values vary very widely accord¬ ing to climate and other conditions.

It is necessary to bear in mind that the public indebtedness of the Australian states was not contracted against their specific security, but against the public credit of each generally, so that there is behind it, not only the public estate in the shape of the land and works of every

kind, but also the whole taxing power of the respective governments. In view of this it must be manifest that the securities are absolutely ((gilt edged.®

The extent of the financial operations con¬ ducted within the Commonwealth will appear from the sworn returns of the banks other than the Commonwealth Bank, doing business there for the year 1914. The totals were : Notes in circulation not bearing interest, £306,809 ; bills in circulation not bearing in¬ terest, £1,089,548; deposits not bearing in¬ terest £70,195,462; deposits bearing interest, £93,659,093 ; balances due to other banks, £2,750,788; total liabilities, £168,001,700. The assets are shown as follows: Coin, £35,585,924; bullion, £1,024,100; landed property, £4,592,951; debts due to banks from other banks, includ¬ ing notes and bills discounted, £115,509,000; balances due from other banks, including notes and bills of other banks, £16,186,000; total as¬ sets, £175,449,306. Besides the joint-stock banks whose returns have just been quoted, there are numerous investment companies carrying on business in the Commonwealth, such as savings banks, land, building and investment, trading and commercial companies, complete returns of whose business are not available. For the savings banks, which are under govern¬ ment supervision, the following figures will be suggestive: Number of depositors, 2,108,000, or over 40 per cent of the whole population.

Amount of deposit at close of 1914, over

$400,000,000, or $80 per head of the whole

population, and $200 per depositor. The volume of business done in the Commonwealth by the various life assurance offices is very large as the figures quoted below will show, and there are also a number of friendly benefit societies, whose roll of membership is indicative of the widespread practice of habits of thrift and

self-help. Industrial life assurance is also widel}'- availed of by persons who are not able to afford large premiums for life assurance of other types. The receipts and expenditure of the 17 life assurance institutions for the year were, receipts £6,000,000, expenditure £3,950,000. The average amount of life assurance per head of the population was £25. There are 477,000 members of the friendly societies, and their funds amount to £6,237,000.

Commonwealth Bank of Australia. — The Commonwealth Bank of Australia is the only state-owned bank in the British empire. It has had

a most rapid growth and remarkable progress. The Commonwealth Bank Act was passed in 1911. On 15 July 1912 the act was brought into force by proclamation and sav¬ ings bank business was commenced on that date. Every post-office throughout the whole of the Commonwealth of the rank of a money- order-office is an agency of the Savings Bank

Department of the Commonwealth of Australia, and at present there are 2,700 such agencies in addition to the six central offices, one in each of the state capitals.

General banking business was commenced in January 1913, and the expansion of business in the general as well as the Savings Bank Department has been phenomenal.

The outbreak of the European War in August 1914 found the Commonwealth Bank in a strong position, prepared to meet generally any emergencies which might arise, either in Australia or concerning Australian affairs in London, and an important part has been taken by the bank in the finance of Australia. Amongst the many matters of war finance which, the bank has handled, the one which has brought it most before the public has been the Commonwealth war loans, the flota¬ tion of which was placed in the hands of the bank by the Federal Treasurer. Until the first Commonwrealth war loan was issued in July 1915, no financial operations on a large scale had been carried out in Australia, and the issue of a loan for such a huge sum as £5,000,000 was, to a considerable extent, an experiment. Complete arrangements were made by the Commonwealth Bank with all the private banks, states savings banks and money-order offices throughout Australia to receive applications, and the loan was kept before the public in such an energetic manner that over £13,000,000 was subscribed in Australia. Since then two further loans have been issued. Each flotation has been carried out in the same energetic manner and the results of the three issues may be summarised as follows: First issue subscribers, 18,748; amount applied for, £13,389,440. Second issue subscribers, 28.945 ; amount applied for, £21,655,680. Third issue subscribers, 81,727; amount applied for, £22,276,200. The Common¬ wealth Bank acts as bankers in London to the governments of the Commonwealth of Aus¬ tralia, of South Australia, Tasmania, and mostly to the Western Australian government.

In October 1915 the bank floated successfully in London a loan of £2,000,000 for the South Australian Government, and toward the end of June 1916 the first issue of £4,000,000 was made by the Bank of London, on behalf of the government of the Commonwealth of Australia. In view of the fact that exchequer bonds, treasury bills, war certificates and French loans, all bearing interest at 5 per cent or over, were being offered by the Imperial and French governments at the same time, the launching of this loan was an event of con¬ siderable interest in the world of finance, and its success showed the confidence felt in the future of the Australian Commonwealth.

The Bank's Progress. — The progress of the bank may be demonstrated by the following fig¬ ures. The deposits in the General Banking Department as well as the Savings Bank De¬ partment as under: June 1913, £5,055,381; June 1916, £41,732,116.

The figures of the profit and loss account are significant, it being borne in mind that the first half-year showed a debit balance of £46,636, owing to expenses of establishing and equipping branches throughout the Common¬ wealth. Since then the following profits have been made: December 1913, £1,547; June

1914, £8,093; December 1914, £13,428; June 1915, £25,788; December 1915, £50,949; June 1916, £93,898.

Savings Bank Department. — The com¬ parative figures in this department indicate the steady increase in the support given in this institution — June 1913, depositors, 85,858; de¬ posits, £2,694,774; June 1914, depositors, 143,786; deposits £4,645,268; June 1915, depositors, 210,- 361; deposits, £7,420,647 ; June 1916, depositors, 278,536; deposits, £9,477,895.

It will thus appear that as regards the public wealth, the private wealth and the annual prod¬ uct of labor and capital in Australia there are abundant evidences of soundness and of prog¬ ress, and that Australia may fearlessly chal¬ lenge comparison with any other part of the world. At the same time the magnitude of her undeveloped resources points unerringly to a future which shall outshine both the past and the present. Consult Carroll, (The Agri¬ cultural Bank* (1914) ; McCarthy, (Banking in Australia) (1912).

Sir F. W. Holder,

Speaker House of Representatives, Common¬ wealth Parliament 1901-09.

Hon. J. G. Jenkins,

Premier South Australia 1901-05, Financial Advisor to South Australian Government 1905-08, Hon. Treasurer Imperial Council of Commerce.

1. RAILWAYS AND TRANSPORTA¬ TION. The great problem which Australia has had to face in the development of her vast territory has been one of means of communi¬ cation. Living on an island so large that it has been rated as an additional continent un¬ like any other in its makeup, a land of vast plains bounded and crossed at frequent inter¬ vals by stretches of hill country, devoid, for the most part, of extensive river systems, and beset by hostile native tribes, the people of Aus¬ tralia have been called upon to face conditions such as never confronted the upbuilders of any other continent. In both the Americas vast river systems have stretched forth the hands of the temptress to those adventurous and daring- spirits for whom the unknown ever holds an attraction. Australia has had her explorers, but their pathway has been constantly beset by many and great difficulties. They have had to battle with heat, wind, apparently intermi¬ nable stretches of sand and prevailing tropical diseases, all forming a foreground to the con¬ stant hostility of the natives and working in conjunction with a still more terrible enemy, thirst. These same enemies have continued to oppose every step taken in the direction of the establishment of ways of communication by the government of the various states of Australia, upon whom has fallen, for the most part, a task which, in most other countries of recent development, has been undertaken and carried through by private enterprise. Naturally, therefore, Australia's communication has been largely by way of the sea and this, in turn, has developed her coast lands at the ex¬ pense of her vast interior regions, most of which still remain partially or altogether un¬ settled and unspanned by railways and other highways, byways or trails. Most of the 22,000 miles of railways of government and private ownership of Australia are situated in the south, southeast and southwest, in the states

of New South Wales, Victoria, Western Aus¬ tralia and Queensland. A line planned to cross the centre of the island from north to south is partially constructed, most of the finished part being in the south,

though the Federal government has lately completed 200 miles of track from Port Darwin to Catherine, in North¬ ern Territory. The present plan is to continue this latter road through Queensland to make connection with the state road running out of Brisbane westward, and to extend another branch southward to Oodnadatta, the northern end of the state railway system of South Aus¬ tralia. But all this railway construction, en¬ couraging though it may be, is but a compara¬ tively small part of the railway facilities de¬ manded by Australia's vast territorial expanse. When the comparatively level nature of her territory is taken into consideration, Australia has made less progress in railway construction than many other countries with fewer facilities and needs for ways of communication. This is due to the fact that railway construction on the island continent has been almost alto¬ gether in the hands of the various states of the Commonwealth, who early developed rival interests which reached a point where the wel¬ fare of the country as a whole was forgotten in the antagonism of state against state. In the early days of Australia's development, the various states were so effectually separated from one another that they formed, for all practical purposes, separate political entities : and even when the Federal government began to exert itself for greater Federal unity and the subjection of state interests to those of the island as a whole, the states continued to develop a policy of commercial rivalry which strongly approached antagonism and formed a barrier to the political unity of the Common¬ wealth. This policy of localism runs through¬ out the history of the railroad promotion and construction of Australia. Owing to this politi¬ cal isolation of the states of the Union, and the consequent weakness of the Federal govern¬ ment and its comparative poverty, practically all the railway construction undertaken in Aus¬ tralia for public uses has been done by the various states. As the states voted the money for the building and maintenance of all new railways, this part of the nation's development became strongly subject to local politics. Each member of the local legislature, in conjunction with the local politicians, found it to his inter¬ est to secure railway concessions for his own particular district; and the local districts ob¬ jected strongly to voting money for the exten¬ sion of railways into other districts where the population was nil or too sparse to force the attention of the state legislature. The result was that scores of comparatively short lines were built at the state's charge as feeding lines to the more populous centres. Most of these ended, as a noted Australian writer has said, ˆnowhere.® This policy, or want of policy, was bad enough, but the commercial rivalry and jealousy of the various states forming the Commonwealth intensified the situation by ceaseless and tireless efforts to divert trade from its natural

channels in what were consid¬ ered state interests, rights and necessities. Thus even after railway lines had been extended practically across state, they were not allowed to be continued to the border of the neighbor¬

ing state lest the government of that state should make railway connection therewith and thus be in a position to divert trade to its own capital, seaport or other important com¬ mercial centre. The railways of the various states established cut rates lower and more demoralizing than were probably ever put into effect in any other country. By this means the trade of interior towns and districts was di¬ verted from its natural market often less than a score of miles away, and carried across state by rail to the state capital or seaport. In sup¬ port of this restrictive policy, Australia, with scores of the finest natural ports in the world, remained with her waterfront comparatively undeveloped, because each state seemed to think that trade could be better controlled for local interests by having it go through one great port. So strong was this feeling of localism that even the state ports were, to a certain extent, jealous of commercial rivals; and thus, when one port succeeded in getting the lead of all the others in the state, it was able to maintain this lead through its political and

commercial importance.

Though the Federal government is empow¬ ered to construct railways for the Common¬ wealth, it can do so only after receiving the consent of each state through which the rail¬ way line has to pass, and the localism and

jealousy of the states have in many cases pre¬ vented the construction of Federal railway lines. South Australia held up, for a consider¬ able time, in order to secure special state con¬ cessions, the projected Federal railway laid

out across the centre of the island from east to west; and other Federal railway projects

have met similar difficulties. The plan to unify the railway system of Australia met for years with strong opposition from local state inter¬ ests. The result of this short-sighted policy is that not only have state interests suffered, but the development of vast fertile regions of the interior has been retarded and their settle¬ ment discouraged to such an extent that the more populous centres of the island went so far as to persistently misrepresent the conditions for agricultural

development obtaining in in¬ terior districts. Through these misrepresenta¬ tions the outside world was long led to look upon Australia as a land of great deserts bordered by a fertile belt running round the coast of the island. This misrepresentation gave the death blow temporarily to the up¬ building of a great railway system which would undoubtedlv have opened up and developed the rich interior districts of the island and solved the question of attracting immigrants. Owing to the early developed and long continued in¬ tense localism, Australia has become an ardent advocate of state-owmed railways; but as the railways were, for the most part, under the control of the states, whose local antagonism was well known, it became very difficult for these local entities to secure foreign capital for the building of roads which, in many cases ((began nowhere and ended nowhere. The states were generally disinclined to take risks by extending existing railways or build¬ ing new ones into sparsely settled or unpopu¬ lated districts ; and they were equally unwilling to encourage or even allow exploiting com¬ panies to take risks in railway extension where they declined to do so themselves ; and even to

the few companies to whom concessions were granted, for special local or industrial reasons, to construct private railways, they refused to grant concessions of vacant lands. Thus one of the greatest incentives of modern times to the development of unpopulated districts has been legislated out of existence in Australia.

The control of harbors, rivers, telegraphs and telephones came naturally under the gov¬ ernment of the individual states. The incon¬ venience of this condition of affairs was early seen and the six distinct state postal and tele¬ graph departments were taken over by the Federal executive in 1901 and amalgamated, and the administration placed in the hands of a Postmaster-General ; a cabinet minister and a secretary for each state acting under the Post¬ master-General. But notwithstanding the fact that the Federal legislature was thus put in control of the postal and telegraph business of the Commonwealth the localism of the states made it necessary to retain, for a time, existing postal rates, which the states were unwilling to give up. The Postal and Tele¬ graph Rates Act of 1 Nov. 1902 provided for uniform charges in all states for the conveyance by post of newspapers and the transmission of telegrams, but it was not until 1910 that uniform postage rates became part of the law of the Commonwealth under the Postal Rates Act which became effective 1 May 1911. The passage of

this act and the good results to local and Federal business interests which re¬ sulted therefrom did probably more than any one other factor to uniform the sentiment throughout Australia in favor of a united rail¬ way policy. This unity of sentiment was heightened by Australia's very active participa¬ tion in the European War which gave the Federal executive an influence over the states of the Commonwealth which it had never be¬ fore possessed, and tended very strongly to increase the feeling of nationality throughout the land and the subjection of local interests to the welfare of the island as a whole. Burn¬ ing questions which have long stirred up state rivalries, such as riparian rights, seem in a fair way to be settled amicably in the interest of the common weal. This latter question, at one time, seriously threatened to affect trans¬ portation of river, railway and port. South Australia greatly feared that the deflection of the waters of the rivers Darling and Murray by riparian landowners for irrigation and other purposes would so lower the water in these rivers as to kill the river trade to the railways and the coast from the towns along the banks within state territory. This bitter¬ ness of feeling over state water rights exerted a very strong influence upon the railway policies of the four interested states, South Australia, on the one hand, and New South Wales, Victoria and, incidentally, Queensland, on the other, by accentuating their desire to each thwart the commercial schemes of its rival states by preventing their making use of the railways within its own boundaries under conditions favorable to their commercial ambi¬ tions. According to Federal law preferential rates in the various states had to be approved by an interstate commission ; but the states easily found a way to avoid the provisions of this law, which was somewhat weak-kneed in its provisions and still more so in its enforce¬

ment. Lately, however, sentiment has turned strongly in favor of the enforcement of this and other laws for the development of the interests of the Commonwealth and the up¬ building of a truly national spirit in commercial as well as in other respects.

The first short railway was opened in Aus¬ tralia in 1855, but building did not become active until 1875, and then only in sections of the southeast of the island. In 1855 Australia possessed 23 lines of railway; in 1861, 243; in 1871, 1,042; in 1881, 4,192; in 1891, 10,123; in 1901, 13,551; in 1910, 17,421; in 1912, 18,677. The mileage of railways increased more slowly in Australia during war years than in normal times preceding the outbreak of the European strife. During the fiscal year ending 30 June 1916, the government lines open for traffic were increased by 676 miles, while private lines actually decreased 33 miles. During the pre¬ vious year the increase

in the mileage of the government lines was 1,735 miles and that of the private lines 146 miles. At the close of the fiscal year ending 30 June 1915, the railway mileage of the several states was as follows : New South Wales, 4,134; Victoria, 3,848; Queensland, 4,839; South Australia, 2,168; North Territory, 145; Western Australia, 3,332; and Tasmania, 533 miles. The cost of con¬ struction of these various state lines was in round numbers: New South Wales, $267,500,000 ; Victoria, $229,000,000 ; Queens¬ land, $138,500,000; South Australia, $5,000,000; Western Australia, $66,000,000; Tasmania, $21,000,000. At the close of the fiscal year ending 30 June 1917, Australia possessed about 22,000 miles of government and privately owned railways.

The highest earnings of the government roads were during the fiscal year 1913-14, when they reached $33,640,920. The highest earnings of the several states were as follows: New South Wales (1915-16), $11,296,700; South Australia (1912-13), $3,960,900; Tasmania

(1912-13), $534,600; Queensland (1914-15),

$6,936,800.

Australia has at last awakened to the neces¬ sity of interstate railway and other means of communication, and Sydney, Melbourne and Adelaide are now connected by a main inter¬ state line 1,790 miles in length and, in Western Australia, a system of trunk lines is in a fair way to connect the state ports with most of the important agricultural, pastoral and mining districts by means of an extensive system of branch lines. The latest movement to unify the transportation facilities of the southern half of the Australian continent from east to west coasts has resulted in the connecting of the various state lines and the construction of a Federal government trunk line known as the Transcontinental or Port Augusta-Kal- goorlie Railway linking the eastern and south¬ ern roads with the western, by means' of a line 1,052 miles in length skirting the Great Australian Bight. By means of this line the state roads of Western Australia, Victoria, New South Wales and Queensland have been linked together so as to constitute a means of traffic across Australia from the Indian to the Pacific oceans. This line, or union of lines, is a curious combination which well illustrates the difficulties to be overcome in the upbuilding

of a truly national system of railways in Australia. Over 2,000 miles constituting the part from Brisbane to Port Augusta, by way of Sydney, Melbourne and Adelaide, is composed of various state lines. The next link in the chain, from Port Augusta to Kalgoorlie, over 1,000 miles, is a Federal line, while the remain¬ ing part, from Kalgoorlie to Perth, 370 miles, is under state control. The Federal part of this transcontinental line was begun at Port Augusta in September 1912 and finished five years later. The estimated cost to the Commonwealth was originally $20,228,230; but before the road was completed there had been expended upon it about $34,000,000. This in¬ creased cost was due largely to the increase in the value of materials of all kinds, the ad¬ vance in wages and the alteration in the original plans for the betterment of the road in general.

In Tasmania the principal towns are con¬ nected by a system of lines with branches reach¬ ing out to the mining districts, more especially in the west of the island.

Of the 1,755 miles of privately owned rail¬ way lines in the Commonwealth on 30 June 1915, only 944 were available for general traffic, to a greater or less extent, while 811 miles were used for special purposes.

Australia is subject to a great yearly rush of business when wool, live sheep and mutton are hurried to port. The one-door policy of each state invited congestion of traffic. This congestion was increased by the want of system in the construction of the railways of the country which prevented the use of the rolling stock to anything like its full capacity ; for the east was cut off from the west and, as we have seen, one state from another. Another great difficulty, which still exists, was the many railway gauges in use throughout the Common¬ wealth. In New South Wales practically all the railway is standard gauge ; in Victoria most of the track is 5 feet 3 inches ; in Queensland and South Australia and Western Australia it is 3 feet 6 inches. These various gauges have formed one of the greatest stumbling blocks in the way of the unification of the railway system of the Commonwealth and a strong barrier to cheap interstate traffic. In 1912 there were in Australia 4,222 miles of 5 feet 2 inches gauge; 4,013 of 4 feet 8J/2 inches; 10,099 of 3 feet 6 inches; 122 of 2 feet 6 inches; 221 of 2 feet; and 18 of 1 foot 8 inches. The natural result of these railway conditions is that every¬ where in Australia, except where preferential rates are made to promote local aims, freight rates are high, often running from 6 to 10 times what they are for similar distances in the United States. A considerable part of these high rates is to be charged up to frequent handling and transshipment of goods en route between

points in different states, and even be¬ tween different points within the same state when roads of different gauges have to be used for the same shipment. Freight rates have im¬ proved lately owing to the opening of inter¬ state communication in the south and east ; but there is urgent call for a still greater improvement.

In the various states of the Commonwealth the railways are grouped for convenience of administration and management into the fol¬ lowing divisions or systems: New South Wales, Northern, North Coast, Western, Southern,

South Coast and Suburban lines ; Victoria, Southeastern, Eastern, Northeastern, West¬ ern and Southeastern, and Suburban; Queens¬ land, Southern, Central and Northern divisions: South Australia, Midland, Northern, Southern, Southeastern, Port Broughton and Western systems ˆWestern Australia, Eastern, East Gold¬ fields, Southwestern, Great Southern, North¬ ern, Hopetoun-Rovensthorp railways. Tas¬ mania's railway system is arranged in 12 divi¬ sions following the names of the railways, each of which is under a separate management. For the administration of its railways each state has its own laws, customs and regulations. The Federal government has also railway lines in South Australia and in the Northern Territory. In New South Wales the management of the state railways is in the hands of a chief com¬ missioner, who has an official commissioner for railways and another for tramways ; Vic¬ toria has three railway commissioners ; Queens¬ land, South Australia, Western Australia and Tasmania one commissioner each; while the railways of the Northern Territory are admin¬ istered by the government of the Common¬ wealth. The private roads which, naturally, are administered by their owners, are engaged for the most part, in the carrying of coal, ores, stone, sand, gravel, firewood timber, sugar, farm produce and occasionally passen¬ gers.

Shipping and Navigation. — Regular steam¬ ship communication between Australia and Europe was established in 1852 by the Penin¬ sular and Oriental Company by way of Singa¬ pore to Sydney via Adelaide and Melbourne. Owing to the Crimean War this service was suspended in 1854, to be resumed two years later by the same company in conjunction with the Royal Mail Company. In 1869 the Union Pacific Steamship Company and the Pacific Steamship Company opened a line of commu¬ nication between Sydney and San Francisco via Auckland. For this service a subvention of £37, 000 per annum was paid by the state governments of New South Wales and New

Zealand. About this time subsidized French and German mail service was established and later lines were put into commission via Van¬ couver and via the Suez Canal. Canada, Aus¬ tralia and Great Britain entered into an agree¬ ment for an inter-British line and great in¬ crease in speed and efficiency was the result of this agreement, not only via Canada but, as a natural result, via San Francisco. This again acted on the home ports which were forced to increase their facilities for communication with one another. Numerous other steamship lines, local and inter-continental, have since been established, so that Australia is now well connected by water with all the great maritime countries of the globe.

Submarine Cables.— The- question of the connection of Australia by cable with Europe was brought up in Great Britain and Australia in 1853, but it was not until 1871 that the dream was realized and London was connected by wire with Port Darwin, and the following year, via this latter port, with Adelaide at a cost of £500,000. Tasmania had already been connected with the mainland in 1869. In 1909 two cables were laid to connect Tasmania with Victoria (390 miles). In 1901 a direct cable was laid to Great Britain via the Cape of Good

Hope and another across the Pacific, the fol¬ lowing year, from Adelaide to Canada, thus linking up the chief British possessions and touching only British territory. As early as 1876 New Zealand had already been joined with Australia by cable covering 1,191 miles. Numerous other cables have been constructed to connect the island with outside points or the various seaport cities of Australia with one another. These cables are connected with a very extensive telegraph system traversing the island from north to south and from east to west and reaching out to practically all the cities, towns and villages of the island. Wire¬ less telegraph stations are in operation in all the state capitals and larger cities of the Commonwealth.

Postal Rates. — According to the Postal Rates Act of 1910 the rate on letters, letter cards and post cards anywhere within the Com¬ monwealth is 2 cents per ounce ; printed papers 1 cent per 2 ounces ; domestic books and magazines 1 cent per 8 ounces ; foreign books and magazines 1 cent per 4 ounces ; commercial papers, patterns, samples and mer¬ chandise 2 cents per 2 ounces ; newspapers is¬ sued from the office of the publisher or vender or returned by the agent or dealer

2 cents per 20 ounces ; all other newspapers 1 cent each for weight of 10 ounces or under. Ordinary letters of a private or semi-private nature are 5 cents per half ounce for countries outside the British empire and 2 cents per half ounce for countries within the empire.

J. H. Cornyn,

Professor of English, JJniversidad National, Mexico.

1. THE LABOR PARTY. The Aus¬ tralian Labor party has its genesis in the great maritime strike of 1890. It is true that spasmodic attempts had been made during earlier years to procure direct parliamentary representation for working-class-interests, and in two or three isolated instances men had been returned to one or other of the colonial Parlia¬ ments. Nothing, however, in the nature of an extended or sustained effort had been attempted prior to the great strike. For some years before 1890 the trades unions generally had been gain¬ ing in strength and influence and had won many concessions from the employers in regard to wages and working conditions ; but the sea¬ faring classes had not participated in these ad¬ vantages in anything like equal degree. A crisis was reached when the marine officers, who had been for years overworked and under¬ paid, decided to form a union and affiliate with the other labor organizations. The shipowners demanded, as a preliminary to the discussion of grievances, that the officers should dissociate themselves from the labor unions; but fearing this would leave them at the mercy of the em¬ ployers, the officers refused to acquiesce, and a strike was precipitated. In sympathy with the officers, the seamen and longshoremen around the coast ceased work and as the employers continued obdurate the trouble extended until the strike included many unions wholly uncon¬ nected with shipping. <(Freedom of Contract® — an equivalent of the American ((open shop® — became the war-cry of the employers, and prac¬ tically the whole community took sides with one

party or the other. After a struggle lasting some three months, during which trade was paralyzed, much bad blood created and both sides financially injured, the men acknowledged defeat. Apart from the cost to the combatants themselves the public had suffered severely, and when the smoke of battle had cleared away there was a general desire expressed to find some way of avoiding similar conflicts in the future. A royal commission was appointed by the government of New South Wales, and served some good purpose in ascertaining clearly the

grievances of the men ; but it achieved little of a practical nature beyond suggesting the creation of an arbitration court to which disputes could be voluntarily referred. The press, while mostly taking the employers' view upon the points at issue, concurred in advising the unions to rely upon legislation to remedy their legitimate grievances, and this advice was taken seriously try the men when they emerged from the conflict — defeated, but grimly deter¬ mined to retrieve their lost influence.

While the effects of the strike had been felt all through Australia, the battle had raged most fiercely along the eastern seaboard, where population is greatest, and therefore the colonies mostly affected were those of New South Wales, Victoria, _ Queensland and South Aus¬ tralia. It was in these colonies, then, where the cry arose for a more equitable distribution of political power and a greater consideration of labor interests. This demand was ac¬ centuated by the political conditions existing at the time. From the granting of self-govern¬ ment the Parliaments of the various colonies had included many men who fought strenuously for the people's interests, and who deserve the whole-hearted gratitude of the reformers of to-day; but in spite of their efforts matters political were so backward in 1890 that there was an urgent need of a fresh impulse. While manhood suffrage had been nominally secured, plural voting obtained in all the colonies except South Australia; factory legislation was either non-existent or so inefficient as to be practically useless; except in Victoria, nothing had been done to protect those working in dangerous oc¬ cupations, such as mining; the question of em¬ ployers' liability was in a very unsatisfactory state; hours of employment were unregulated, and sweating was rampant; and many other social questions were carefully avoided. In addition, and perhaps most important, there was' no method by which public opinion could find expression in an authoritative manner with regard to the merits of labor disputes. Briefly, the complaint of the unionists and their sympathizers was that working-class interests had been neglected, as should perhaps have been expected from Parliaments made up for the most part of the wealthier classes or their representatives.

With a view to altering this state of affairs for the better, the unions decided upon political organization; but, recognizing that no purely class effort could be permanently successful, they called upon radicals generally to assist them in the work of reform. On this wider basis leagues connected with, but independent of, the unions were formed, and programs embracing the legislation immediately desired were speedily adopted. Necessarily these dif-

fercd with the circumstances existing in the various colonies, but in the main they were markedly similar. In all, the central idea was to form a new party, working independently of those already existing, and prepared, until strong enough to take office, to accept instal¬ ments from either of the older parties. Taking the platform adopted in New South Wales as typical, the aims of the new party were stated as being: (<(1) To secure for the wealth-pro¬ ducers of this colony such legislation as will advance their interests, by the return to Parlia¬ ment of candidates pledged to uphold the plat¬ form of this league: (2) to secure the due enrolment of all members of the league who may be entitled to a vote in any electorate: (3) to bring all electors who are in favor of demo¬ cratic and progressive legislation under one common banner, and to organize thoroughly such voters with a view to concerted and effec¬ tive action at all Parliamentary elections in the future.®

The platform adopted ran as follows :

1 . Electoral reform — to provide for the abolition of

plural voting; the abolition of money deposits in Parliamentary elections; the extension of the franchise to seamen, shearers, and general laborers by the registration of votes; the extension of the franchise to policemen and soldiers; the abolition of the six months' residence clause as a qualification for the exercise of the franchise; the establishment of single member electorates and equal electoral districts on an adult population basis; the holding of all Parliamentary elections on one day — that a public holiday; and that all public houses shall be ' closed during the hours of polling.

1. Free, compulsory, and technical education — higher

as well as elementary — to be extended to all.

1. Eight hours to be the legal maximum working day in

all occupations.

1. A Workshops and Factories Act to provide for the

prohibition of the sweating system; the supervision of land, boilers, and machinery; and the appoint¬ ment of representative working men

as inspectors.

1. An amendment of the Mining Act — to provide for

all applications for mineral leases being summarily dealt with by the local wardens; the strict enforce¬ ment of labor conditions on such leases; the abolition of the leasing system on all new gold fields; the right to mine on private property; the greater pro¬ tection of persons engaged in the mining industry; and that all inspectors shall hold certificates of competency.

1. The extension to seamen of the benefits of the Employers'

Liability Act.

1. The repeal of the Masters and Servants Act and the

Agreements Validating Act.

1. The amendment of the Master and Apprentices Act

and the Trades Union Act.

1. The establishment of a Department of Labor; a National

Bank; and a national system of water conservation and irrigation.

1. Election of magistrates.

2. Local government and decentralization; the extension

of principle of the Government acting as an employer, through the medium of local self-governing bodies; and the abolition of our present unjust method of raising municipal revenue by the taxation of improve¬ ments effected by labor.

1. The federation of the Australian colonies on a national

as opposed to an imperial basis; the abolition of the present Defense Force, and the establishment of our military system upon a purely voluntary basis.

1. The recognition in our legislative enactments of the

natural and inalienable rights of the whole com¬ munity to the land — upon which all must live and from which by labor all wealth is produced — by the taxation of that value which accrues to land from

the presence and needs of the community, irrespective of improvements effected by human exertion; and the absolute and indefeasible right of property on the part of all Crown tenants in improvements effected on their holdings.

1. The execution of all Government contracts in the

colony.

1. The stamping of all Chinese-made furniture.

2. Any measure which will secure to the wage-earner a fair and equitable return for his or her labor.

On these lines the Labor party entered the political arena in the four eastern colonies. The first skirmish occurred in South Australia, when the new party succeeded in returning three workingmen to the Legislative Council (the Second Chamber) in spite of a restricted fran¬ chise. This happened early in 1891, and in the middle of that year the first real trial of strength for control of the popular chamber took place. This was in New South Wales where, notwithstanding the existence of plural voting, the Laborites captured some 36 seats out of 141. In 1892, Victoria followed the example of the older colony by returning a small con¬ tingent of Labor members, and in 1893, both Queensland and South Australia elected parties of greater proportionate strength on the Labor ticket.

With the first Labor successes the wildest views were expressed by critics on both sides — the Conservatives prophesying utter ruin for the community, and many Labor supporters ex¬ pecting that the millenium would arrive in short order. Needless to say, both proved wrong. In the first place it was soon found that a pro¬ portion of those returned as Laborites were so only in name, and had no conception of the sentiment responsible for the movement. These quickly dropped out or were pushed aside. Then, as might have been expected in a party hur¬ riedly organized, there arose internal dissen¬ sions of such a character as to seriously threaten, in one or two of the colonies, the future of the movement. As matters settled down, however, the need for cohesion was em¬ phasized and with the recognition of that fact better work resulted. Looked at broadly, the first Labor contingents did excellent work, which served to encourage the party's supporters to renewed efforts, and as a result the parties in the various colonies have been increasingly strengthened at each successive election. This steady growth has not been confined to those colonies where political organization was first entered upon, but has extended also to West

Australia and Tasmania. At the present time (1916) Labor Premiers are at the head of governments in New South Wales, Queens¬ land and South Australia, while in Victoria and West Australia the Labor parties consti¬ tute the direct opposition, with the reversion of office. Until an election in 1916 the Labor party had been in power for some time in Tas¬ mania and in Western Australia.

The Labor party has, during its 25 years of existence, succeeded in gaining a majority in the Australian Parliaments with the exception of Victoria. Its influence is not to be gauged solely by its numerical strength. In most of the colonies its appearance galvanized the older parties into some appreciation of the need for social legislation. Old-time politicians suddenly manifested a tender regard for the interests of the working classes, and vied with each other in propounding schemes for the amelioration of their condition. The democratization of those outside its ranks is among the most noticeable gains of the Labor party, and has resulted in many useful reforms being brought about.

In New South Wales there has thus been secured during the party's existence and since their assumption of office a liberal Electoral Act, abolishing plural voting; an act to allow mining on private property; land and income

taxes, adjusting taxation more equitably; a Coal Mines Regulation Act; a Workshops and Factories Act ; an amending Land Act to per¬ mit of perpetual leasing in lieu of outright sale ; an act to restrict the admission of colored immi¬ grants; an important Navigation Act; an Early Closing Act, applying to shops; an Old Age Pensions Act ; an act to nationalize the private wharves of Sydney ; the Miners' Accident Re¬ lief Act, designed for the relief and mainte¬ nance of injured miners and their dependents; the much-discussed Industrial Arbitration Act, prohibiting strikes and insisting upon the refer¬ ence of disputes to the decision of a judicial body, the Women's Franchise Act and several other acts in connection with industrial matters.

In South Australia education has been made free; the state has established a successful Produce Export Department; the nucleus of a state bank has been formed, providing cheap loans to settlers ; workmen have been assisted to take up land ; adult suffrage has been passed ; factory legislation and early closing of shops secured ; wages

have been protected against liens ; private estates have been resumed and cut up for settlement, and other practical measures made law.

In Victoria the party's influence has secured, among other things, improved factory legisla¬ tion, providing for boards to fix minimum wages; compulsory early closing of shops; abo¬ lition of plural voting; resumption of land for closer settlement, and cheap money for farmers on the credit fancier system; minimum wrage on government contracts; state supervision of dairies; prohibition of secret trade commis¬ sions ; pure food laws ; exemption of tools of trade and furniture to the value of £20 from distraint for rent.

In Queensland legislation has been passed providing for the early closing of shops; adult suffrage and equal voting power; workers' com¬ pensation ; state supervision of exports ; cheap advances to settlers, and the readjustment of taxation in favor of the poorer classes.

In West Australia the record includes adult suffrage, with electorates, approaching equality; factory laws and early closing of shops; com¬ pulsory arbitration in industrial disputes ; pro¬ hibition of secret commissions in trade, and minimum wages on government contracts.

With the inauguration of Federation in 1901 a new phase was entered upon as a number of the most important governmental functions were transferred from state to Federal control ; and the Labor political organization throughout Australia agreed to a common platform upon wrhich to contest the first Commonwealth elec¬ tions. It ran as follows:

1. Electoral Law, providing for one adult one vote.

2. Total exclusion of colored and other undesirable races.

3. Old-Age Pensions.

4. The Constitution to be amended to provide for: (a)

The Initiative and Referendum for the alteration of the Constitution; (b) the substitution of the National Referendum for the double dissolution in the settlement of deadlocks between the two Houses.

At the first Federal elections, held in 1901, the Labor party returned eight members out of 36 in the Senate and 16 out of 75 in the House of Representatives. Three years later, at the elections of 1903, the numbers were increased to 14 in the Senate and 22 in the House of

Representatives. Since then the number in both Houses has so increased that a large majority of the members are Labor representatives. In

the 1st Parliament it found a fairly progres¬ sive government in office, with a program in¬ cluding several planks of the Labor platform, and some of these found expression in legisla¬ tion. Naturally much time was occupied in passing necessary machinery measures, and the tariff discussion alone took up nearly 18 months. But time was found to pass adult suffrage and a liberal electoral law. The restriction, amount¬ ing practically to exclusion, of colored immi¬ gration was secured, and provision made for the cessation of the traffic in Kanaka labor. In the Public Service Act a clause was inserted providing for a minimum wage of £110 yearly for adults of three years' service. When the tariff wras being considered, the Labor party, though assuming no party attitude on protec¬ tion or free trade, led the way in abolishing or reducing revenue taxes through the customs, and later it headed a successful resistance to the proposal to enter upon a borrowing policy.

At the second general election the Labor party increased its strength at the expense of both the Protectionists and Free Traders, with the result that when the Parliament met it con¬ tained three parties nearly equal in numbers. The Protectionist government resigned through suffering defeat on an important phase of the Industrial Arbitration Bill, and a Labor gov¬ ernment took office. After a few months it was also defeated on one of the principles of the same measure, and was succeeded by a coali¬ tion ministry representing Free Traders and Protectionists. This government passed • the Arbitration Bill through its remaining stages, but on again meeting Parliament was in turn defeated by a combination of Protectionists with the Labor party. Since then measures have been passed to prohibit false trade descriptions ; to render illegal the acceptance of secret trade commissions ; to allow of the protection of union trade-marks in common with those of the trading community; and dealing with other matters of importance.

In touching thus sketchily upon the work of the various Parliaments of Australia since the Labor party has arisen, the writer attempts to do no more than indicate the trend of legisla¬ tion as affecting the working classes and bear¬ ing upon social problems generally. In both the state and Federal Parliaments, during the time covered, many other important laws have been passed, and in regard to these the Laborites have borne their share of the work involved. It is, however, to the Labor party that credit is mainly due for the quickening of the public conscience which has resulted in so many amel¬ iorative measures

being passed in a compara¬ tively short period.

The Labor party has been accused of con¬ cerning itself only with the interests of the working classes ; but gradually it is being recog¬ nized that the term t(Labor)) includes brain as well as hand workers, and all sympathizers are welcomed as members of the political organi¬ zations. The Labor parties in Parliament in¬ clude a fair sprinkling of professional and business men, who in any narrow' interpreta¬ tion would be excluded. There is no doubt that much of the success so far achieved is due to the recognition of the fact that the in¬ terests of all producers are identical and that justice must be extended to all equally.

Much has been said about the socialism of

the Australian Labor party, and it is alluded to by some as a recent development. That is not so, as there has been no change, except per¬ haps in form, in the aims and program as first put forward. Leaving aside the fact that nearly every plank of the original platform was broadly socialistic in its interference with in¬ dividualism, distinct aspirations toward collect¬ ivism were voiced in the first declarations of the party. In Queensland this took the most pronounced form, where as early as 1890 the council of the Australian Labor Federation, having decided upon political action, put for¬ ward as its aim ((The nationalization of all sources of wealth and all means of producing and exchanging wealth.® This was a declara¬ tion for complete socialism, but the organiza¬ tions in the other colonies refused to go that distance. The New South Wales League in 1890 adopted a proposal for “the extension of the principle of the government acting as an employer, through the medium of local self- governing bodies,® and thus committed itself to socialistic ideals. In some of the other colonies declarations of prihciple were considered un¬ necessary, and the platforms contained no direct mention of socialism, though many of the de¬ tailed proposals were of a socialistic character. Later on, the Queensland organization dropped for a time any direct reference to socialism, but continued its propaganda on collective lines. In 1897 New South Wales adopted as a plank of its platform “the nationalization of the means of production, distribution and ex¬ change,® and that remained on the program until 1905, when it was struck out. At the same conference a statement of the local party’s objective was agreed to, which has since been adopted by an

Australian conference as the ob¬ jective of the Federal Labor party, and may be here quoted: (((1) The cultivation of an Aus¬ tralian sentiment, based upon the maintenance of racial purity and the development in Aus¬ tralia of an enlightened and self-reliant com¬ munity. (2) The securing of the full results of their industry to all producers by the collec¬ tive ownership of monopolies and the exten¬ sion of the industrial and economic functions of the state and municipality.®

The dropping of the “whole hog® plank in favor of this statement of aims was looked upon as a retrograde step by the more ardent socialists in the movement ; but it appears to have been dictated by common sense. The plat¬ form is theoretically a program for realiza¬ tion when the party gets a majority, and it is clearly impracticable to attempt to carry out any complete scheme of socialism to-day. Recognizing this, the party declares its belief in socialistic principles, and adjusts its pro¬ gram so that every step taken will be in consonance with that ideal. This is shown in the platform for the Federal elections at the end of 1906, which was as follows:

1. Maintenance of a white Australia.

2. Nationalization of monopolies.

3. Old-age pensions.

4. Tariff referendum.

5. Progressive tax on unimproved land values.

6. Restriction of public borrowing.

7. Navigation laws (provision for manning, etc.)

8. Citizen defense force.

9. Arbitration act amendment (ensuring effectiveness).

10. Commonwealth bank of deposit and issue and life and

fire insurance department.

1. Uniform industrial legislation; amendment of constitu¬

tion to provide for same.

1. Civil equality of men and women.

Since this platform was put forward, <(White Australia® has been maintained, ((01d Age Pen¬ sions® have been adopted, a “Progressive Land Tax® has been passed, “Navigation Laws® and laws to provide for “Citizen Defense Forces® have also been passed. Amendments to the “Arbitration Acts,® “Uniform Industrial Legis¬ lation® and a “Commonwealth Bank of Deposit and Issue® (see Finance) have also been en¬ acted.

This platform insists that monopolies shall be nationalized, as constituting a public danger, and the Labor party expresses its disbelief in the efficacy of measures designed to merely regulate modern trusts. Under its objective the party will embrace every opportunity of ex¬ tending the functions of collective authority where it is shown to be practicable and of value to the community. From this statement of the position it will be seen that the Labor party is undoubtedly socialistic, but it does not pro¬ pose to plunge Australia suddenly into any ex¬ periment of a wholesale character. The people have control in respect of each successive step, and may be relied upon to call a halt if at any stage failure is experienced.

Two proposed laws for the alteration of the constitutional powers of the Common¬ wealth in regard to industries and business were submitted to the people by referendum for acceptance or rejection in April 1911. The first proposal was to amend the Constitution Act so as to give the Commonwealth government in¬ creased powers to deal with trade and com¬ merce, corporations, industrial matters and trusts and monopolies. The second proposal was to empower the Commonwealth govern¬ ment to make laws with respect to monopolies; both of these proposals were rejected by popu¬ lar vote. They were again submitted to the vote at the general elections in May 1913, and again rejected.

On the whole, the Labor party throughout Australia has given a much needed impetus to social legislation ; and, in reply to those who urge that its objects and methods are opposed to the welfare of the community, it points to the fact that since its appearance in Australian politics wealth has found a wider distribution ; hours have been shortened and wages raised in many occupations ; sweating has been mini¬ mized; and that, though much remains to be done, the people enjoy greater prosperity than before the advent of the new political force.

Bibliography. — (The Labor Party and In¬ dustrial Legislation (1912); Cutback, (White Australia Question5 (1909) ; Hirsh, (Democracy of Socialism5 (1901); Lush, (Chinese Expul¬ sion in Australia5 (1902) ;

Parker, (Australia for the White Man5 (1901) ; Reeves, (The Aus¬ tralian Labor Ministry5 (1904).

J. C. Watson, Premier of Australia, 1904.

1. SOCIAL CONDITIONS. The social conditions of a country _ may be considered from different points of view. They might be considered from the general welfare of the peo¬ ple, or from what is known as social distinction in society. This last aspect of the question could be disposed of in a few words so far as Australia is concerned. The people mostly be¬ long to the great class of honest industry in one form or another. The large majority are, if necessity requires, willing to undertake al-

most any kind of work, while those who are wealthy, with but few exceptions, prefer use¬ ful or philanthropic employment to a life of idle dissipation.

The common weal of the people is indicated by the fact that in no country is there less real poverty than in Australia, or better and more systematic organization for dealing with those few persons who are in need of temporary assistance. No one is ever knowingly allowed to suffer for want of food. The state does not consider it to be its duty to find employment for those who may be out of work, but in the interest of humanity it always provides food for those in want of it.

It has been said that the happiest people are those who can live upon the products of their own country. Australia offers greater possibil¬ ities for such happiness than almost any other land. Cattle and sheep, pigs and poultry, all kinds of grain, vegetables of every variety, and nearly all known fruits are easily produced by properly applied industry.

Primary Productions. — Lord Sydenham, G.C.M.G., who was governor of Victoria for some years, after his return from Australia said ((It may be taken as certain that where the averages from primary production stand high the country is a good one.® This dictum has such a direct bearing upon the condition of the people that the comparisons become im¬ portant. According to population the primary production in Australia is greater than in Can¬ ada, 50 per cent greater than in the United States, twice as great as in France, three times as great as in England and over four times as great as in Russia.

The productive nature of the soil and cli¬ mate has a great deal to do with the fact that a greater number of people in Australia, in proportion to its population, enjoy more of the comforts and pleasures of life than is the case in maity other parts of the world. The people as a whole are better housed, fed and clothed than the residents of most other countries. Cheap houses and discomforts are to be found in Australia as elsewhere, but even in the cities there is a lack of the poor shanties and tene-' ments which are so noticeable in many large cities in Europe, Asia and America.

Educational Advantages. — No one question has a more important or direct bearing upon the social conditions of the people than that of edu¬ cation. No country has better . facilities, and but few as good, and with the exception of some parts of America, Australia affords as good an opportunity for secondary and advanced education at a moderate cost as any other country.

Generally speaking, the system of public edu¬ cation is free, compulsory and secular, the whole expense being met out of the general revenue. The greatest care is taken to provide schools in every part of the country as well as in the thickly populated cities, and in some of the thinly settled districts, schools of from 10 to 15 children are established. Fortunately, Australia's educational advancement has not been delayed by sectarian interference. There it is generally considered that a country's ad¬ vancement rests on the education of its people, and that as national education is a national gain, the nation's treasury should meet the bill. Efforts have been made from time to time by

zealous propounders of sectarian beliefs to incorporate religious instruction with the Edu¬ cation Acts of the different states, but the majority of the people are strongly opposed to any form of state aid to religion. They feel that in the bitter strife for sectarian su¬ premacy the efficiency of the schools would be¬ come impaired and the practical education of the children neglected. A large majority of parents take advantage of the public schools for their children, but for those who object, either from class prejudice or religious scruples, good private schools are available.

The technical schools, colleges and universi¬ ties afford ample facilities for higher educa¬ tion. The Australian universities stand high in the educational world. By bequests, endow¬ ments and grants of land they have been en¬ abled to provide splendid buildings and appli¬ ances, and to procure able and learned pro¬ fessors. The degrees conferred are recognized and respected in other lands. No one

need leave Australia to become well versed in music, med¬ icine, literature, law or science. The technical schools have been especially valuable from a mining point of view, and many of those who have received their instruction there are now holding important positions on mining fields in Australia and other countries. Nearly 1,300 public libraries with 2,000,000 volumes of valu¬ able literature are a great help to those who have passed on beyond school life. In all the principal cities there are public museums and art galleries, which are largely patronized, and have an elevating and refining influence. See article Education.

Religious Instruction. — The secular and non-sectari nature of the public schools does not imply that the religious instruction of the people is neglected. Churches of every known denomination are well supported. Sunday schools, Christian endeavor societies and young men's and young women's Christian Associa¬ tions are well attended, and all doing good work, while the Salvation Army has its branches stretching over every part of the land, and is to be commended for its tireless endeavors to re¬ claim the drunkard, lift up the oppressed and to bring back to the paths of virtue and truth those who have strayed or fallen by the way- side. Temperance organizations of various kinds have manv members, and are a powerful factor in preserving the better, simpler and purer life of the community. See Australia — Religion.

Government Institutions. — The govern¬ ments of the different states look after the poor, the sick and the afflicted. They have destitute homes where the aged are properly housed, fed and cared for. They have hospitals for the sick, where those who cannot afford to pay are nursed and attended equally with those who can. Asylums for the insane, sanatoriums for the consumptive, and homes for incurables and schools for the blind, deaf and dumb are either supported or subsidized by the govern¬ ments. Genuine workingmen, if unable to ob¬ tain employment, are allowed to do certain work to pay for the food which is provided for them and their families. Such relief is of a temporary character until more permanent em¬ ployment is secured.

Benefit societies and insurance companies have been established in every state, and num-

her their members by many thousands. These have a marked effect in

encouraging provident habits, and, with the temperance societies, are valuable aids in teaching frugality and modera¬ tion, which are notable characteristics in the Australians.

Old-age pensions were formerly provided by some of the states, but a system of old-age pensions is now the law for the whole Common¬ wealth.

Outdoor Life. — For those who are fond of an outdoor life Australia is an ideal coun¬ try. The climate is such that one can practically spend the whole year in the open air. The ad¬ vantages of fresh air have been wisely con¬ sidered by those who had to do with laying out cities and towns, as well as those connected with the government of the country. Wide streets, squares and parks are to be found in and adjacent to all the cities, while large tracts of land have been reserved as national parks within a few miles of the centres of population.

This affords every opportunity for outdoor sport of all kinds. Rowing, football, cricket, lacrosse, golf, baseball and almost all other out¬ side games have numerous patrons. In fact, games and sport are carried on so extensively that tourists have criticized Australians for in¬ dulging so much in them. Numerous holidays, reasonable hours for work, and long, fine days offer every inducement. Australians arc de¬ cidedly a sport-loving people. The Melbourne Cup is one of the world's greatest racing events and the Flemington grounds with their commodious stands and extensive lawns arc unsurpassed in any part of the world. The roads are so well made that motoring and cycling are greatly indulged in. Many resi¬ dents own motors, and during the last few years money has become so plentiful that vehicles for pleasure have been purchased in large numbers.

Wealth of the People. — It is not generally known that the Australians are the richest people in the world, except the residents of England, and a good many of these draw their incomes from Australian investments. Dur¬ ing the year (1914) Australia exported produce of a greater value than ever before. The dis¬ tribution of wealth is more general than in most other parts of the world. Over 30 per cent of the adult population are possessors of property, while in England only about 12 per cent of the adult population enjoy that privi¬ lege. There are 2,108,000 depositors in the sav¬ ings bank, being over 40 per cent of the entire population, and they have to their credit over | 400,000,000, an average of about $200 for each depositor.

Laws and Socialism. — 'Taking an active and responsible part in the management of na¬ tional affairs has a moderating effect upon most

politicians, and to a large degree they have recognized the responsibility of office and en¬ deavored to safeguard the country's interest.

The voice of the people can be made fully known through the ballot-box. The judgment of the public may not always be considered the wisest for the country's advancement, but when the error is discovered the same power that caused it can apply the remedy. The Austra¬ lian Commonwealth franchise is the broadest and most liberal possible. Everyone over the age of 21 (except criminals and lunatics) has

the right to vote. In some of the state elections as well, women have the privilege There were many strongly opposed to woman's franchise. All the arguments about taking her from her home, destroying her womanly instincts, caus¬ ing her to neglect her proper duties, etc., were indulged in. After the law was passed how¬ ever, those who previously opposed it quickly realized (especially if they were parliamentary candidates) that woman was highly intelligent and that it was her duty in the interest of the country to vote.

Australia's socialism has grown with her people. It has not meant the destruction of private property. The state railways, harbors, waterworks, telegraphs, telephones, wharves, exporting departments, public schools, and other undertakings, have naturally followed one after the other, and have not been a hardship to the capitalists, but have rather been the means of allowing them to invest their money in other undertakings and thereby assist in opening up the pastoral, agricultural and mining industries.

Many of Australia's laws have been passed on the belief that the government could under¬ take certain things for the assistance of the people at less expense than this assistance could be carried out privately. National credit, as a rule, is much better than individual credit. Money can be borrowed by the state and lent to producers on better terms than it can be bor¬ rowed by private people for that purpose. Under certain laws the well-to-do pastoralists, as well as the poorer producer, can be assisted. It is necessary to understand Australian life to realize the need for assistance to pastoralists. The governments own most of the lands ; hun¬ dreds of miles of which are let on lease to pastoralists. Wire netting has been found to be the most effective means of protecting the sheep from wild dogs, and of keeping the rab¬ bits down. For the lessee on his own account to undertake to fence his leasehold would mean an expense which would be a heavy burden upon him, and prevent the use of his capital for other . improvements ; so by combining with adjoining lessees they

form a vermin trust, and apply to the government for miles of wire netting; this is supplied upon the joint security of the lessees and they repay the government, with interest, in instalments extending over a number of years. Large sums have been lent in this way, but little if any loss has oc¬ curred and it has been the means of stocking much land that would otherwise have remained idle. The governments also assist the farmers by loans from state banks at low interest, a long term of years being allowed for repay¬ ments. Blockers, who only have a few acres, are also assisted, and under certain conditions they borrow from the government to help build their houses and carry out other improvements. All these loans are only granted on business principles, after the officers of the land depart¬ ments have made full inquiries as to necessary security. The governments also largely assist in exporting produce and finding outside markets. This business is conducted on com¬ mercial lines, certain charges being made for the storage, freezing and work done. If the producer is in need of ready money before his goods are disposed of an advance is made by the government. All this may be considered socialistic; however upon a moment's reflection

it will be seen that it is only an assistance to further stimulate individual enterprise and effort. It has carried many a struggling pro¬ ducer over early years of hardship, and prob¬ ably saved his property for his family when under other circumstances it might have gone into the hands of the mortgagee.

Charges, Rates, Taxes.— Railway charges are, if anything, less than on the roads owned and worked by private companies in other countries. The conveniences for traveling are good. The government control of waterworks and sewage systems for the large cities has proved economical and satisfactory. The land tax is not heavy enough to be burdensome. Municipal and local rates are low in compari¬ son with England. The total rates in the Aus¬ tralian cities, including water rates, on prop¬ erty worth $500 per annum, would be from $50 to $100, while in and around London it would be from $150 to $300.

Employer and Employee. — The relations

between the employer and the employee are generally harmonious; occasionally disputes may arise but they are nearly always settled without those long strikes which result in heavy loss to both resisting

forces and engender so much bitterness of feeling. The employers as a rule pay good wages, the hours worked are short and the emplo3rees are provided with favorable sanitary and safety conditions. Being thus satisfied that their treatment is just, they in their turn do their best to give full value in their work for the wages they receive.

Literature, Art and Song. — According to Mi'. Coghlan, who is a statistical authority, Aus¬ tralia has as large a number of first-class news¬ papers, considering its population, as any other country in the world, while in the matter of letter-writing the only two countries that sur¬ pass it are the United States and England.

That Australians have a taste for literature cannot be denied ; what they read may not al¬ ways be of the highest standard, and what they write may sometimes lack artistic finish, but one must recollect that theirs is comparatively a new country. Its real growth has taken place during the last 50 years. Other countries have not risen rapidly to literary fame. The first settlements of America were made two centu¬ ries before the world had the benefit of Irving, Longfellow, Emerson or Lowell. England's men of letters were not numerous or renowned until many generations had passed away.

While in literature Australia may not up to the present have produced writers of marked distinction, yet there are those of more or less note whose productions are of no small merit, and who have thrown the bright sunshine and free life into their work. The same may be said of art. While no one person stands out as a producer of highly valuable pictures there are several who have the true artist's spirit and have made creditable displays at the Royal Academy in London and the Salons of Paris. But when one considers musical artists, Austra¬ lia has no need to feel ashamed. With the climatic conditions it naturally follows that those who are musically inclined have suc¬ ceeded; and to-day, in proportion to her popu¬ lation, Australia is stated to have more prominent musical talent of world-wide repu¬ tation than any other English-speaking country.

Taking the residents of Australia as a whole

they are a happ}', prosperous and contented people. They have of course the political and theological differences which are common to all nations. The leaders of public thought en¬ deavor to convince by reason not by force. Occasional dissatisfaction is expressed. It is questionable, all things considered, whether any country in the world is more congenial as a place of residence for the following reasons: The death-rate is lower, the primary production is greater, the wages

are higher, the standard of living is better, the houses are more substantial, and surrounded with more land, the hours of labor are shorter, telegraphic communication is cheaper, the weather is brighter, the laws more liberal, the wealth more evenly distributed and class distinctions fewer than in almost any other country.

Besides all this, Australia, in the matter of language, is more English than England or America. One can hear more foreign lan¬ guages spoken in New York or London in a day than could be heard in Australia in a year. Consult Taylor, (Australia of To-Day) (1906) and Moore, Australian Literature and ArD

(1913).

•John G. Jenkins,

Agent-General for South Australia, 1905-08, and Premier , 1901-05.

1. MILITARY AND NAVAL DE¬ FENSE. Up to 1870 Australian defense con¬ sisted of a small garrison of British troops. These were placed in the principal cities as a kind of guard. The withdrawal of the last Imperial regiment in 1870, and the effect of the Franco-Prussian War and other European and Asiatic disturbances, led to the establishment of a colonial system of defense. The system was voluntary; men willingly came forward, gave their time and service, the governments pro¬ viding them with arms and accoutrements and in many cases uniforms.

In 1880 experts from the Imperial army ad¬ vised that a “Militia® or partially paid system should be substituted for the voluntas system. This was adopted about 1884. The expenditure to the colonies was increased by this system, but the general efficiency was very much greater. In most of the large schools cadet corps were established where the boys were given a regular course of drilling. The strength of the mili¬ tary forces in the different states prior to Fed¬ eration was based upon population and amounted in all exclusive of rifle clubs to about

28,000.

Under the Constitution of the Common¬ wealth Act of 1900 the complete control of the defenses was transferred from the states to the Commonwealth. Under the Minister of Defense a general officer was appointed who organized and took charge of the land forces until 1905 when a Council of Defense was ap¬ pointed to deal generally

with questions - of policy, and a military board to which the ad¬ ministration of the forces was entrusted. The Commonwealth was divided into six military districts generally corresponding to the bound¬ aries of the six states. The main portion of the land forces is made up by the Citizen soldiers or militia. Over 600 professional soldiers were engaged as expert instructors spread over all the principal places in the Com¬ monwealth. For defending the leading ports

and manning the forts permanent troops of Royal Australian garrison artillery are sta¬ tioned.

The defense of Australia at present is pre¬ scribed by the Defense Acts and amendments from 1903 to 1914. In the Act of 1909 provi¬ sion is made for compulsory military and naval training with the necessary regulations as re¬ gards exemption, registration and enrolment. Since then further acts have been passed ex¬ tending the provisions, removing difficulties and providing necessary machinery. The geographi¬ cal position of Australia instilled in the minds of the people the necessity for greater security than they felt they could depend upon in a purely voluntary system. Leading statesmen of all parties recognized the danger and the system of compulsory training above referred to was the result.

By the acts passed in 1903 and 1904 all male inhabitants in Australia between the ages of 18 and 60 were made liable for home service in time of war. It was felt that to call out men for home defense who never had been trained would not be effective, so the Compulsory Act to provide for universal liability to train in time of peace was passed, and it is worth not¬ ing that this was the first act ever passed in any English-speaking country which compels all youths to undergo a system of military training. On 1 Jan. 1911 the Compulsory Act was put in force. All male inhabitants who are British subjects and have lived in Australia for six months are liable to service. The train¬ ing is as follows: (a) From 12 to 14 years of age in the Junior Cadets; (b) From 14 to 18 years of age in the Senior Cadets; (c) From 18 to 26 years of age in the Citizen Forces.

Before the Act of 1909 came into operation, at the request of the Commonwealth govern¬ ment, Lord Kitchener visited Australia and in¬ spected the military forces, the forts and various defense works,

and those in course of erection. He made a comprehensive report upon the whole scheme of land defense: this scheme was based upon the Commonwealth De¬ fense Acts of 1903-09, but necessitated further amendments to those acts. The organization is based upon the following considerations : (a) The members available; (b) The length of service demanded; (c) The proportion of the various arms required.

Junior Cadets. — ’The training for Junior Cadets, which lasts for two years, consists of 90 hours each year and begins on 1 July in the year in which the cadet reaches the age of 12. This training is especially aimed at the development of the physique of the cadet. It consists principally of physical training for at least 15 minutes on each school day, and elementary marching drill. The following sub¬ jects are also taught: Miniature rifle shooting, swimming, running exercises in organized games and first aid. The Junior Cadets do not wear uniforms. A special staff of instructors is maintained by the government and many classes for the instruction of school teachers arc held throughout the country. The teachers then instruct the boys and the inspectors of the schools supervise the training and inspect the boys on behalf of the military authorities.

Senior Cadets.— The training of Senior Cadets, which lasts for four years, commences on 1 July in the year in which the cadet

reaches the age of 14. It consists of at least 40 drills each year, of which four are classed as whole days, 12 as half days, the remainder being night drills of not less than one hour. The four years’ training comprises marching, handling of arms, musketry, physical drill, first aid, guards and sentries, technical training as a company in elementary field work and ele¬ mentary battalion drill.

Adult Forces. — Training in the Citizen Forces, which covers a period of eight years, begins on 1 July of the year in which he reaches the age of 18 years. The work consists of training continuously in camp for 17 days in the case of the naval forces, artillery and en¬ gineer arms, and eight days for other arms and eight days’ home training for all arms. The total service is 25 days per annum. Persons, if by their religion they are not allowed to carry arms, as far as possible are allotted to duties of non-combatant character such as stretcher bearers, or as members of the Army Medical Corps, necessary proof being required to secure exemption. Heavy penalties are provided by act for evasion or prevention from service. Efficient parades must be attended and a stand¬ ard of efficiency attained by all the trainees each year.

Pay . — All members of the militia are pro¬ vided with certain payment. Citizen soldiers who enlisted voluntarily under the old system have the same rate of pay as formerly, the basis being 8/- per day for gunners, sappers or privates. Under the compulsory system they receive 3/- per day during the first year and 4/- per day during the following years of their training. Non-commissioned officers and of¬ ficers are paid as follows: Corporals, 9/- per day; Sergeants, 10/- and 11/- per day; Lieu¬ tenants, 15/— per day; Captains, 22/6 per day; Majors, 30/- per day; Lieutenant-Colonels, 37/6 per day; Colonels, 45/- per day; mounted officers also receive horse allowance.

Uniforms are provided free for use on drills and parades, but are not permitted to be worn when the cadets or soldiers are not on duty. The Citizen soldiers have rifles issued to them, but the arms for the Senior Cadets are kept at local depots and issued as required for musketry practice and drill. An allowance of free ammu¬ nition is provided to encourage rifle shooting. The Commonwealth government has estab¬ lished factories for the manufacture of all mili¬ tary equipments.

In addition to those who are undergoing regular training there are nearly 1,200 rifle clubs in Australia with a membership of about 50,000. An annual course of musketry is fired by these members but they do not undergo any systematic course of training. It is estimated that 60 per cent of the members of these rifle clubs are fit for active service.

A Royal Military College was established in 1911. The ordinary college course lasts for four years and when completed those who have passed through go for a period on duty to Eng¬ land or India, after which they are appointed to positions on the staff or with the permanent troops in Australia or New Zealand. During the European War, which commenced in Au¬ gust 1914, the course at the Military College has been temporarily modified. No fees are charged for instruction and maintenance, each staff cadet being credited to meet necessary expenses

of uniforms, hooks, instruments, etc., with an allowance of 5/6 per day. Both educational and military work are comprised in the course of instruction. Cadets are prepared for engi¬ neer, artillery, light horse and infantry work.

The working of the compulsory training system is proving most successful. The num¬ ber in training in 1914 was Citizen soldiers, 51,000; Senior Cadets, 87,000; Junior Cadets, 50,000; nearly 200,000 in all in actual training. G. H. Knibbs, Esq., C.M.G., the Common¬ wealth statistician (to whose works the writer of this article is greatly indebted), deals with the success of the Australian system. <(The scheme both before its inception and since its successful inauguration has had the support of leading statesmen of all political views as well as the vast majority of the citizens of the Commonwealth. In general the trainees are alert and well disciplined while on parade, and their interest and enthusiasm is shown by the large number of candidates seeking promotion at competitive examinations after courses of lectures, demonstrations and special parades. A great deal of voluntary service is rendered in all branches of the service and the rifle clubs of the Citizen Units are well patronized. Many of the regiments have athletic, gymnastic and swimming clubs and sports meetings are fre¬ quently held. Moreover, a marked improve¬ ment has become apparent in the general con¬ duct and bearing of the youths of Australia, and it is claimed that this is the effect of the system of universal training. As a result of enquiries made in 1914, the police authorities in all the states concurred in the opinion that the behavior of the youths who are subject to the training is vastly improved. It is stated that both mentally and morally as well as physically the benefits are very definite and that C(the principal effects of a beneficial nature are in¬ creased self-respect, diminution of juvenile cigarette smoking, and generally a tendency toward a sense of responsibility and a desire to become good citizens.®

Naval Defense. — 'Prior to the Federation of the Australian states the naval defense was chiefly provided by a British squadron located in Australian waters with Sydney as its base, Australia and New Zealand providing a por¬ tion of the expense to the British government. In addition to this the states had provided at their own expense several small vessels, gun¬ boats, etc. After the Commonwealth was established it was considered that Australia should take a greater part in naval defense so it was decided in 1909 to create an Australian naval force to replace the squadron previously maintained under the agreement with the British government. The Australian govern¬ ment invited Admiral Sir Reginald Henderson to visit Australia and advise on naval matters generally. His scheme has been princinallv adopted. It provides for 52 vessels and 15,000 men. Expenditure on construction works ex¬ tending over 20 years £40,000,000 with an ulti¬ mate annual naval vote of nearly £5,000,000. The 52 vessels would consist of 8 armored cruisers, 10 protected cruisers, 18

destroyers, 12 submarines, 3 depot ships, 1 fleet repair ship. Six naval bases and 11 sub-bases were recom¬ mended. The Australian navy in April 1915 consisted all told of about 20 vessels varying in size from a gunboat of 360 tons to the

battle cruiser of 19,200 tons, aggregating about 60,000 tons or an average of 3,000 tons per vessel.

In the great war the Australian navy by its prompt and effective action rendered valuable service in clearing the islands of the Pacific of German ships. The most spectacular feat was the destruction of the commerce raider Emden by the light cruiser Sydney, after the former had destroyed, principally in the Indian Ocean, 21 British vessels valued between two and one- half and three million pounds.

The Australian forces rendered valuable aid also in the campaigns in Egypt, Mesopotamia, Gallipoli, Macedonia, and the western front. An army of about 300,000 was raised, the ma¬ jority of whom saw actual service with the British and French forces, and much of the credit for the prompt way in which they adapted themselves to modern warfare is un¬ doubtedly due to the national system of com¬ pulsory training in Australia. That the quality of the troops was of the best was evidenced bv the frequency with which they were mentioned in dispatches. See War, European.

Bibliography. — Beaumont, (Naval Defense of Australia) (1901) ; De Thierry, (The Naval and Military Forces *(1914); Edmund, (The Australian Fleet* (1911); Foster, (The De¬ fense of Australia) (1908); Hvthe, { Australia and Imperial Defense) (1913).

Hon'. J. G. Jenkins,

Minister of Defense, South Australia, 1899 to 1901, Premier 1901 to 1905, Agent-General 1905-08, Hon. Treasurer Australian War Contingent Association.

AUSTRALIA, South, one of the original states in the Commonwealth of Australia. It occupies the middle of Australia, and at first, as the colony of South Australia, extended be¬ tween long. 132° and 141° E., and from South¬ ern Ocean to lat. 26° N., having then an area of about 300,000 square miles. In 1861 a dis¬ trict lying to the west of the colony was added to it, so that its western boundary was shifted to the meridian of 129°. In 1863 it received in addition the country between its northern boundary and the opposite coast (this portion being now known as the Northern Territory), so that South Australia

now possesses a terri¬ tory extending across Australia, and occupying an area estimated at 903,690 square miles. It is bounded on the east by Victoria,. New South Wales and Queensland; on the west by West Australia. Its greatest length from north to south is 1,850 miles, and its width 650 miles. The south coast, for the first 120 miles east of where it begins at Port Eucla, is backed by steep limestone ranges from 400 to 600 feet in height, but as a whole the coast is low and desolate-looking. In a straight line from Port Eucla on the west to Cape Northumberland, near the boundary of Victoria, the distance is 850 miles, but the coast-line between these points extends to nearly twice that distance, owing to the indentations of Spencer Gulf and the Gulf of Saint Vincent. Opposite the latter is Kangaroo Island, the largest island on the Australian coast, excepting Tasmania. The coast of the Northern Territory is thickly strewn with islands, three of which are of large size. There are also some excellent ports, one of these, Port Darwin, where the overland tele¬ graph and the cable from Batavia and the East

meet, being among the finest harbors in Aus¬ tralia. On the eastern side of the Gulf of Saint Vincent lie the most populous portions of the state, and here is situated Adelaide, the state capital, with a population in 1911 of

189,646.

The interior formation of South Australia widely differs from that of the most eastern states. The mountains here run from the sea to the interior, ending somewhat abruptly among the lakes. The principal chain, the Mount Loftv Range, begins at Cape Jervis, and follows the shore of the Gulf of Saint Vincent past Adelaide, meeting at the head of the gulf, the ridges forming the backbone of Yorke Peninsula. The range still running north is called Flinders Range, and ends in a wide mass of mountain 3,000 feet high, separating the lakes Torrens, Eyre, Frome and Blanche. All these so-called lakes are huge expanses of salt water swamp and mud. On the west of Spen¬ cer Gulf is Eyre Peninsula, through the heart of which runs the Gawler Range, attaining an elevation of 2,000 feet, and ending on the shores of another series of lakes of the same character as Lake Torrens. The principal summits of the Mount Lofty Range are Razor-back, in lati¬ tude 33° 20', and immediately north of it Mount Bryan, close to which’ is the celebrated Burra- Burra copper mine. The highest peaks of the

Flinders Range are Mount Remarkable. 3,179 feet, Brown 3,174 feet, and Arden 3,000 feet. None of the peaks in the Gawler Range attain more than a moderate elevation. On the left bank of the Murray, and near its mouth, a range of moderately elevated heights proceed south-southeast, skirting the coast to its ex¬ tremity near Cape Northumberland. Through¬ out these ranges the existence of volcanic agency at a former period is everywhere ap¬ parent. The Warburton Range and the Stuart ranges lie beyond and to the north and west of the lakes; further north on the Tropic of Capricorn are the MacDonnell ranges, rising to a height of 4,000 feet, from which the ex¬ treme western affluents of the Lake Eyre River system take their rise. The other portions of the territory to the north and west are almost level, and consist of either waterless plains or plains of sandstone boulders, with desert grass and spinifex.

Among the mountains east of Gulf of Saint Vincent, primitive limestone, often in the form of a beautiful white marble, is very abundant. There are indications of a large variety of min¬ erals throughout the state, but copper is the only one that has been met with in large quan¬ tities. The total mineral production to the end of 1907 was valued at £913,863, of which £714,525 represented copper and £36,602 repre¬ sented gold. In 1913 the total mineral produc¬ tion was £584,458. In the Northern Territory gold has also been found over a considerable tract of country, and good progress has been made in mining while other minerals are known to exist. Almost the only stream within the state proper, which deserves the name of river, is the Murray, which enters the colony on the east in latitude 34°. and flows first circuitously west and then south, into the extensive lagoon called Lake Alexandria, communicating with the sea by a narrow opening. During the rainy season it is navigable by steamers through its whole course within the state, and for 1,500

miles in New South Wales. In the Northern Territory the Roper River is a fine large stream, navigable for sea-going vessels for 100 miles from its mouth in the Gulf of Carpen¬ taria ; the Victoria is also navigable. The climate of South Australia proper greatly re¬ sembles that of Sicily and Naples. During nine months of the year it is agreeable, the dis¬ agreeable portion of the year being the three summer months of December, January and February, when the natural heat of the season is greatly increased by hot winds from the interior. What is called winter would be con¬ sidered in England merely a wet autumn. There are no epidemic diseases. Scrofulous and tubercular diseases are rare, but diseases of the eyes are common in summer, being either occasioned bv the impalpable dust floating in the atmosphere, or by exposure to the night air after the glare of the

sun.

South Australia produces nearly all the fruits and vegetables that are cultivated in Europe as well as others, but in temperate regions is chiefly distinguished as a wheat and grape-growing country. Besides supplying its own wants, it sends large quantities of wheat to the neighboring states and to Europe, where ˆAdelaide® wheat is held in high estimation. The area under wheat is about 2,190,782 acres. The quantity produced varies greatly with the season, but the average production is six bushels per acre. The area under vineyards is gradually extending, and now approaches 25,000 acres. In 1912 the total area under cultivation was about 3,000,000 acres, of which 107,881 acres were in oats; 40,643 acres in barley; 23,214 acres in fruits; 521,182 acres in hay and 7,412 acres in potatoes. Brandy is pro¬ duced as well as wine. Hop-growing is attract¬ ing some attention, and the olive is also culti¬ vated. The chief exports are wool, wheat, Hour, copper and copper ore, skins, etc. The trade of a large part of New South Wales passes through South Australia. The revenue in 1912 was £4,450,739, the expenditures being the same. The length of railways in 1912 was 2,168 miles. There is a complete system of telegraphs, besides the great line from Adelaide across the continent to Port Darwin, a distance of 2,000 miles, which is almost completed. The public debt of the state is £31,118,574 and has been mostly incurred for reproductive public works. In 1912 there were 768 schools, 1,473 teachers and 58,273 pupils. The total population in 1914 was 438,173, not including aborigines. See Australia' — Political History; Aus¬ tralian Federation.

AUSTRALIA, West, one of the original states in the Commonwealth of Australia. It includes that portion of Australia west of long. 129° E., and is bounded, east by South Aus¬ tralia, and northwest and south by the Indian Ocean. It lies between the parallels of 13° 30' and 35° 8' S. ; greatest length, 1,450 miles north to south; greatest breadth, 850 miles; area, 975,920 square miles. The coast-line measures about 3,000 miles', and except on the south is indented by numerous bays, creeks and estua¬ ries. The coast is fringed bv many islands, but none of any importance. The principal inlets are Cambridge Gulf, Admiralty Gulf, York Sound, Collier Bay, King Sound, Roebuck Bay, Exmouth Gulf, Shark Bay, Geographe Bay and King George Sound, the last the most

important as having Albany on its shore, the port of call for the European mail steamers. The chief rivers are the Ord and Fitzroy on the north, De Grey, Ashburton, Fortescue, Gas- coign, Murchison, Greenough, Swan and Black¬ wood on the west. The Swan River is im¬ portant as Perth, the capital, is situated on its banks. Some of the rivers within the tropics are large and navigable, but few of the others run all the year, and fewer still are navigable even for boats to any great distance. The interior was till recent years not well known, but at present there is little territory which has not been explored. The country is chiefly an alternation of ridges and hollows, sandy, without grass, and clothed with bushes and scrubby timber, without the trace of a water-course. The really settled and occupied portion of the state forms only a mere fraction of its whole area. The population is mostly collected in the southwest corner, where the first settlements were made, and around the recently discovered gold reefs. Scattered settle¬ ments stud the coast at various points. On the west coast are extensive banks covered with the pearl oyster, which give employment to a fleet of boats. The Kimberley district in the north is a region of great promise; it com¬ prises 20,000,000 acres of well-watered land intersected by the Fitzroy River and other large streams, and is said to be admirably adapted for pastoral purposes, besides having a Urge area suitable for the cultivation of sugar, coffee and rice. The greater part of the sea¬ board, except along the Australian bight, is separated from the interior by a low range of hills running parallel to it, and covered with forests. The fertile land exists in patches, and some of it is of a very rich character. The principal crops are wheat, barley, hay and potatoes; the vine is also successfully culti¬ vated, and excellent wine is made in the colony. The area under cultivation comprises about 1,072,000 acres, of which wheat occupies 612,104 acres, hay 344,032 acres, oats 77,488 acres and fruit 18,194 acres. An available area of 1,000 square miles is covered with jarrah forests. The jarrah is a species of eucalyptus (E . marginata) ; its timber is in great request for railway sleepers, for building purposes, and especially for marine constructions, having the valuable property of resisting the attacks of the white ant on land and the ship worm at sea. Considerable areas in the southwest are covered with karri (E . diversicolor) . There are also numerous forests of sandalwood trees, the timber of which is exported in large quantities, chieflv to China for incense purposes. Flowers and fruits from all quarters of the globe grow luxuriantly. Among the fruits successfully cul¬ tivated are apples, pears, oranges, peaches, plums, apricots, figs, almonds, bananas, olives, etc. English vegetables may be profitably cul¬ tivated at almost all seasons. Bees thrive and produce abundant stores of honey.

The mineral resources of the state are not yet fully known. Gold has been discovered in large quantities, and West Australia is now the chief gold-producing state of Australia, the Coolgardie gold fields being among the most productive. Its gold production to 1908 amounted to 20,011,698 fine ounces, valued at £85,004,290. In 1908 it was 1,647,912 fine ounces and valued at £6,999,885. But in 1913 its total

product of minerals was only £5,760,207, from which it is obvious that the production of gold has declined. Lead and copper exists abun¬ dantly, and several mines are in operation. Iron ore might be raised in almost inexhaustible quantities, and tin also exists. The gold dis¬ coveries have formed an epoch in the history of the state, and trade and population have re¬ cently increased very rapidly. Besides gold the exports include wool, jarrah and karri timber, sandalwood, pearls, pearl shells, tin ore, skins, etc. The revenue has grown enormously. In 1881 it was £206,205; in 1891, £497,670; and in 1912 it was £3,966,673, the expenditures being £4,101,082. The public debt in 1912 was £23,364,790.. There were, in 1914, about 2,967 miles of railway open. The principal towns are Perth, the capital, with a population in 1911 of 106,792. Freemantle is the port of entry. The population of the whole state in 1914 was 323,952. In 1912 there were 536 schools, 1,189 teachers and 38,184 pupils. The first part of the state settled was the southwest corner, long known as the Swan River Settlement, estab¬ lished in 1829. From 1850 to 1868 it was a place for the transportation of convicts. In 1890 the state received a system of responsible govern¬ ment similar to that prevailing in the other colonies of Australia.* See Australia — Political History.

AUSTRALIAN ALPS, a range of moun¬ tains in the southeast of Australia, extending over a length of about 400 miles. The highest peaks are in New South Wales, and the highest, according to Lendenfeld, is Mount Townshend (7,353 feet), belonging to a group which he calls the Kosciusko group. The peaks next in height belong to the Bogong group in Victoria, and the west of the Mitta Mitta, the highest of which is Mount Bogong (6,508 feet). They do not reach the snow line, though snow lies in the higher valleys all the summer. Geologically, the Australian Alps are composed mainly of very ancient metamorphic rocks, which have been worn down in the course of ages to table¬ lands, and which slope down rather steeply on all sides. Volcanic rocks cover the table-land to the south of Mount Bogong.

AUSTRALIAN BALLOT. See Ballot. AUSTRALIAN FEDERATION, the

political union of the five Australian colonies, together with Tasmania.

The first convention looking to this end was held at Hobart in Jan¬ uary 1886. The colonies represented were Victoria, Queensland, Tasmania, Western Aus¬ tralia and Fiji. Another conference took place in 1891, at Sydney, New South Wales, attended by delegates from each of the colonies. A plan of Federal government was proposed, re¬ sembling in many of its features that of the United States. A draft bill to constitute the Commonwealth of Australia was adopted by the convention, and it was agreed to submit it ta the approval of the individual legislatures of the several colonies. This bill met with success in the lower branch of but one colonial legislature — that of Victoria. In January 1895 there was a conference of premiers of five colonies at Hobart, and the Legislative Assembly of New South Wales passed a Federal Enabling Act in November of that year, and notice of motion was given in other legislatures to bring in a similar bill. The first practical step was taken

in 1898. A convention of representatives of New South Wales, Victoria, Tasmania, South Australia and Western Australia succeeded in drafting a Constitution, which was submitted to the popular vote of each of those colonies in June. The Constitution provided for a gover¬ nor-general, appointed by the Crown; a Federal Parliament, composed of the Crown, repre¬ sented by the governor-general, a Senate and a House of Representatives. The powers of the Parliament were set forth in 39 articles, and covered - trade with other countries, taxation, coinage, weights and measures, foreign corpora¬ tions, pensions, arbitration, etc. Free trade be¬ tween the states was recognized. By the terms of the plebiscite, an affirmative vote of sub¬ stantially one-third of the electors of New South Wales, and of one-fifth of the electors of each of the other colonies, was required to adopt this Constitution. But the election returns in June were fatal to the scheme. While the majorities in the four lesser colonies were overwhelmingly in favor of the Constitution, the requisite affirmative vote in New South Wales was not obtained.

On 2 Feb. 1899, a unanimous agreement was reached by the colonial premiers in conference at Melbourne, regarding the unsettled questions referred to them by the colonial legislatures, thus insuring the success of the Federation proj¬ ect. In 1900, a bill making Federation effective was introduced into Parliament, at London, and passed, the only amendment offered having ref¬ erence to the royal prerogative. On 1 Jan. 1901 the Australian Commonwealth was pro¬

claimed. So similar in character is the Con¬ stitution of the Australian Commonwealth to that of the United States that there can be no doubt that the former is modeled very largely after the latter. This is especially obvious in the matter of states' rights. Evidently there is in Australia that same tendency toward local autonomy that is here represented by the prin¬ ciples of Thomas Jefferson.

The Australian Constitution provides for a Parliament very similar to the United States Congress, comprising a Senate and a House of Representatives. In place of the President there is the governor-general, appointed from London, who has the power to summons, to prorogue or to dissolve Parliament, though it must meet every year. There are six senators from each of the six states, elected by the peo¬ ple for a term of six years each. The repre¬ sentatives are elected for terms of three years, also by direct ballot, and it is so arranged that they shall always number twice as many as the senators. By a majority vote Parliament may increase or decrease either chamber, though it may not interfere with the proportion of any state's representation in the House without that state's consent.

Although the principle of states' rights is fundamental, the Australian Parliament has a wider scope of legislative activity than has the Congress of the United States. It has the power to legislate on marriage, divorce, bank¬ ruptcy and incorporation of commercial enter¬ prises. It has the power to levy taxes, direct or indirect; it may regulate foreign or inter¬ state commerce, may enforce arbitration in dis¬ putes between states or industrial organiza¬ tions ; the Federal government may carry on banking, insurance, may establish old-age pen¬

sions, has control and may acquire the tele¬ graphs, telephone systems, the railroads, etc. And where state laws come in conflict with Federal laws, the former are void. Legislation may originate in either House, but money bills must originate only in the House of Representa¬ tives. The Senate may reject a House bill, but it may not amend it. Should the Senate per¬ sist in rejecting certain legislation passed by the House, and thus cause a deadlock, Parlia¬ ment automatically dissolves and a new election takes place.

The judicial power of the Federation is represented by the High Court of Appeals, corresponding to the Supreme Court of the United States. This court hears appeals from the state Supreme Courts or the minor Federal courts. An appeal from the High Court may, however, be carried to London in matters not involving the Constitution. It was at first in¬ tended to limit this right of interference on the part of the

home government to matters affect¬ ing other parts of the British empire, but cer¬ tain compromises were made on both sides. On the whole, however, the Australian Federal government is practically independent, and the power of the home government and the gover¬ nor-general is limited almost entirely to the veto.

On 9 May 1901 the 1st Parliament opened in Melbourne, which was made the temporary capital. The Earl of Hopetoun was appointed the first governor-general. The following year he resigned and was replaced by Baron Tenny¬ son, who was replaced by Baron Northcote in 1904. In 1908 the latter gave place to the Earl of Dudley. Ronald Munro-Ferguson was ap¬ pointed governor-general in May 1914. He is assisted by a cabinet of seven members, ap¬ pointed by himself.

On 5 Dec. 1910 New South Wales agreed to cede to the new Federal government 912 square miles of territory in the Yass-Canberra district, which is to be a Federal district, cor¬ responding to the District of Columbia in the United States. In 1913 work was begun on the building of the capital for the Federal government; this city is to be known as Can¬ berra (q.v.). At present the population of the whole Federal district is only 2,868. In 1915 the customs revenue of the Australian Federal government was £11,702,000. Consult Quick, ‘The Annotated Constitution of the Australian Commonwealth* (Sydney 1901) ; Turner, ‘First Decade of the Australian Common- wealth) (New York 1911).

AUSTRASIA, as-tra'shia (the East King¬ dom), the name given, under the Merovingians, to the eastern possessions of the Franks, em¬ bracing Lorraine, Belgium and the right bank of the Rhine. These districts, thickly inhabited by Franks, were of great importance at the time of the rise of the Frankish power.

AUSTRIA, a country of Central Europe, a republic since 12 Nov. 1918.

Boundaries. — According to the Treaty of Saint Germain, signed 10 Sept. 1919, the bound¬ aries of Austria were expressly defined as fol¬ lows : to the west and south the old boundary between Austria and Switzerland and Liechten¬ stein, to the south with Italy from the Gruben Joch, between Nanders and Reschen ; from this point eastward to a fixed point on the road to the

north of the Scheidegg top ; viience east to Ivlopaier Spitz ; still

eastward to the summit of Dreiherrn Spitz, the watershed between the basins ©f the Inn to the north and the Adige (Etsch) to the south; thence south by southeast to Marchinkele ; thence to the watershed between the basins of the Drave to the east and the Adige to the west ; thence southeastward to Helm Spitz; thence to a line crossing the Drave between Winnbach and Armbach ; thence east- southeast to Osternig, about 7 miles northwest of Tarvis ; the watershed between the Drave basin to the north and to the south the basins successively of the Sextenbach, the Piave, and the Tagliamento ; thence east-southeast to a fixed point one and one-half miles west of Thorl; the watershed between the Gail and the Gailitz ; thence east to Pec, a line fixed crossing the Gailitz south of Thorl and passing through Cabin Berg. On the south and north of the Klagenfurt area, a plebiscite was ordered. The vote was in favor of the district remaining in Austria.

With Hungary the boundary runs from the three-boundary-point northeast to a point about 4% miles north-northeast of Szentgotthard ; thence by a ground line passing through Janke, then west of the Radkersburg-Szentgotthard road and east of Nagyfalva, Nemetlak and Rabakeresztur ; thence northward to a fixed point about one-half mile west of Antonienhof ; thence by a fixed ground line passing west of Wiist-Sommerein and Kr. Tahrndorf and east of Andau, Nikelsdorf and Kittsee.

With the Serbo-Croat-Slovene state the boundary line begins at Huhner-Kogel running eastward along the watershed between the Drave and the Saggan to the Mur ; thence five miles down this river to below Radkersburg where the old boundary between Austria and Hungary meets the river ; thence northeast to a fixed point east of Toka; thence north to the Danube on a line passing between Bonisfalva and Gedondvar.

With Czecho-Slovakia the boundary runs from the three-frontier point to the old frontier of 1867 between Austria and Hungary, then by a fixed ground line crossing the Kittsee-Pressburg read about V/z miles north of Kittsee; thence northward to a fixed point on the Danube about three miles above the Pressburg bridge; thence by a fixed ground line following the old frontier of 1867 between Austria and Hungary; thence southward to Gelsenberg; thence by a fixed ground line passing east of the Rotten- schachen-Zuggers road ; thence southward and then west-northwest to a point on the old Lower Austria-Bohemian frontier about 250 yards north of the point where it cuts the Gratzen-Weitra road; thence by a fixed ground line passing be¬ tween Zuggers and Breitensee, then through the most southeasterly point of the railroad bridge over the Tainsitz, then

passing through Grund- b'ihel, north of Hohenberg, and Lagerbere; thence southwest the old Lower Austria-Bo¬ hemian boundary; then northwestward to the old boundary between Upper Austria and Bo¬ hemia to its point of iunction with the frontier. The boundary with Germany remains unaltered.

These well-defined boundaries thus include in the new republic of Austria the former Aus¬ trian provinces of Upper Austria, Lower Aus¬ tria, Salzburg, North Tyrol, Carinthia, Styria, German West Hungary, and Vorarlberg.

Area and Population. — The area of the re¬ public is 32,516 square miles, with a population of 6,412,430. The area and population of the provinces according to the census of 31 Jan. 1920 are as follows :

Province

Area

square

miles

Population (Census 1920)

Males

Females

Total

Lower Austria .

7,573

1,567,509

1,745,646

3,313,155

Vienna .

107

851,793

990,212

1,842, 005

Upper Austria .

4,625

414,589

442 , 645

857,234

Salzburg .

2,761

103,818

110,059

213,877

Styria .

6,294

461 , 168

485,553

946,721

Carinthia .

3,682

143,790

153,467

297,257

Tyrol .

4,786

149,102

157,051

306,153

Vorarlberg .

1,004

64,502

68,531

133,033

West Hungary. . . .

1,684

165,378

179,622

345 , 000

Total .

32,516

3,069,856

3,342,574

6,412,430

The principal towns, with their populations, are: Vienna, 2,149,800; Graz, 156,500; Linz, 70,090; Innsbruck, 57,300; Salzburg, 37,300; Wiener Neustadt, 34,200.

Religion. — Absolute religious liberty is one of the fundamental laws of the republic. It is guaranteed by article 63 of the Treaty of Saint Germain. There are in Austria, 5,980,000 Ro¬ man Catholics, 165,000 Protestants of all de¬ nominations, 190,000 Jews, and ‘ 19,000 of no snecified religious belief.

Education. — The primary education field is taken care of bv the elementary schools, while for secondary, higher and technical

education there are Gymnasia and Realschulen, colleges and universities, technical high schools, mining high schools, veterinary high schools, and sundry special schools.

Education is compulsory between the ages of 6 and 14. There are in the republic 4,763 ele¬ mentary schools, with 30,451 teachers and 913,999 pupils. There are 73 Gymnasia with 20,955 pupils and 38 Realschulen with 14,632 pupils. There are technical high schools at Vienna and Graz, and there are four universities maintained by the state — Vienna, Graz, Salzburg and Innsbruck.

Commerce and Industry. — Agriculture is the main occupation of the inhabitants of the republic. Lumber and forestry are also of con¬ siderable importance. About 2,000,000 tons of lignite are produced annually and about an equal amount of iron ore. The production of pig iron is close to 500,000 tons. Copper, lead and zinc are mined also.

Among the principal manufacturing indus¬ tries are piano-making, automobile manufacture, and textiles.

Public Finance. — The public debt of Austria is 83,279,000,000 kronen, requiring 3,400,000,000 kronen as annual interest, of which 141,000,000 kronen is for interest on pre-war debts. In the budget for 1920-21 the estimated revenue amounted to 6,295,000,000 kronen, and the esti¬ mated expenditure to 16,873,000,000 kronen. The currency is for the most part paper and is greatly depreciated.

Army and Navy. — The breakup of the em¬ pire in 1918 involved the collapse of the old military system. In January 1919, the Austrian government organized a Volkswehr (Home De-

Breslau

Volbjnskly

Kreˆuzbarg

X/G’Inuchnli

f ClieumˆX

ˆZwlclijm _J

CJo Vladimir

Hrlublcszow

Erfurt

Krasnyslaw

Hlachherg

lOpatow’

RudoI*t*dtˆ

Saalfeld'

KUlce

Jzestochowa,

\Waldenburj

° Jnoow

o Zaniosc

Sandomiert i Nndbrzezicˆ Subo*V

WC iKS (5 > w — o,. . , 1 s VVV/ˆZX'X— rt „ . ˆw»ckaib oGal

N *ilr ~

foudnJtzX)\

Annabel

’Hohenelfci

Chmielnlk

ixtokow

Jlˆrschnltzj

Ostrog

' N ciart

Koinot

gtaszow

Truutenf

Tomasxowo

f^jmscnini ,•

^ d Konlgtnhof „

iJungbiintlau ,1 X XX?A*]G I X 7 AJoRefatadfcr^

ly-PodebrodZ;

Radzlecboi

/-^w^awarusk* «

- ○ ' 1 X. K etnionka

Lubaczow < glr»uaiilo«»>* \Magierow0 \ — olZolklr

. ~ Ku\ikowjp___

iSchlair

Scbweinfurt

iemmyNy^yodeisam'

-<p^'^J^Karl8bad^^

o R.reio«net8

^Leobscbut MS! srsdor.f m> <•

ranzen!

mm*/ 'He

^/Olbersdorf

,yurbe.V"“

Radoinjsl£

' KladnS" — W' ^r^7S~^y*/S\ /fHjRAGUEjryy?-^ k

-'X'iXiAGj _ KoUn

OtTftu ^o/TKiittenbeiBo

'enfurL/n

fcourir

1 dispute) b-Croat-!

'Radio"

yljG|rQllch EngeUhorg

SchbˆergRi'rcudenthtjcN ˆW'-’JLnndakron f v_ '^—ˆVHohenstodi '•UK i ^“•ˆASterabot Man rise a sX 9 * /

, Trubau 6ˆ]““ / *adrelfendorf wToimut* A oBoskowitz / 1 .Blansko

V Rojtllcn;

Oswiecime

Lr-ˆ

Tˆir.lul.ifz,

farienbad

fl.u»ice

jidowa

by tl ovene

Zborow ˆ

ls\4iiN

iJOWtt

;hnia

Ska"“ˆ/.ve\CtJ X K al w arˆ« °Sucbof Kaa

czyc® ff

Brzozow

Czaslau

'achau

Bielitz

- ○ ˆ Mosclsk*

o Mzaukowicoˆ Dobromil jh W,

WBiecz

\V loach imXX

5 Deut3cb\ˆ! > 1

Wuˆrod IpJiˆ ,r PilgramPolna'oyv'Xk-

f Niirschan

H. *yd

Pribram 7 ˆ |re*uitz£j* ° Blatna;

~ˆ>!0 SˆS Gorlice

Meclna--ˆS (if °ˆ0Pˆo "'//,

ˆ.eu SandeˆWˆ) Zllllgrudx Du'1/kttc (

oBartfeld \J

, Art(lyublau A JJomonna <4.

Sisbim U“

In — A ˆ 1 *nw . \

Eperjc* IJ

\T c9cb'eni

o Solcan / Miihlhausen)

Fuij(j,|

;ania

!I“berg)'

_ / Jabluuk.i

Wall Meacriucl

WbcUhAˆ j ˆ

•Bochin,

'andorf.

Prerau

lyKljittau \

?!! onizd|(; w Ulj6ˆ

RhiiftonVˆˆ

ˆV°ˆ

C-'/'ˆyjn terberg

liSrfWSs,

|s\Uoln

Tlschnowit* ˆ

x/4

,KoritBchauˆ®?**§ˆdl j

/ y/Ung-Hradisci

‘vshTˆS

"/jTj 1 ruSSndx ˆ*C

imung Miii-7 /.

ˆNaTgv 1

1 ciaenbi

,imec

R.itislmn

iˆgensburg)

ln,\°, =rfw.»iCf. .t-™ A

n any' c\ | Loranitz q jVrineritz'

\ / aSWtJlEl.Uo(n , M.'

ˆBurtSa.

(SuchentlialyV

d*ˆ\ Thaya

ˆMgdowj# Gwˆraˆ'emUDd,,nerh‘’f Z wottl 9-

'W -W-ˆ V Bolccho* e>'

fi*£/ A I KaluBy-ˆ.

.f' / 5°UnaP>8tanl8lˆ

4f J, Tuchlk , 1 0$ - |-

/ Perch insko°- ˆJ*v

Vu»«™ y oPorohj.

:r f -I

•

r oOkbrniezo lˆy /,S'

/ ˆ v'

I' ■•" 1 w I ˆ’ccze

■

y '

Auaterlit*

imania. a,' divided

'fltSko, JVaaff ITuMAA' Sient A — 1; «MHFZNA 'Znib \araiya <iK.

,G?"rba

IU, "‘/in

Grafenau'

, Preyungn *'V,

Krutnau

.Sibbtanczˆ

anta (ˆjw)

fyhcfau o' "%$oUnH*i

) 'Schmollnitaˆ Q*bo* Nd Rosenau

tuben<

frentachln

-Neusohl

,— — "ˆlAindenbtMi

Zellerndorf _ j

Iggenburg sMlstelhacl

° Eotzi sniatjn

Polena

3/Ungvafe?"

rtf

Passau

Torna

ribaiyl ~7"ˆˆnBralja 'Jjhelˆ

e I /{ Sarospatak,

(• J, ' L Jtf t

<r - horror < (t Tolcn'a//a/J

yrfagy Tapolcaal Ludan'

aonlgsbergyfo

Jol8vaJ?p>y Rima Sz°tnl

ˆERNOWlTZ

/ ■iftlWeN

lˆremnit*

Schardi

vˆAot'? r Durukrutr'WJ< ˆ yˆStockerau M I y— yˆtiKprneubur*ˆ A

MpnˆScB

Muhtdorf

rch\ WeUsenbach SOttenachlag1 l,'rf5gˆ'-<Gai8bacˆ ° 8tf(Mauthausen •%,.}/

Tuilu 5 A' \A Floriasdo?

_y~ˆVv*kki» V(ar»l»

Kikamai J?55SJ - Vˆ"

Potrou*

yyˆozerod'

Marchegf

-<ˆI'llorlasdo\t

f Vienna-;

L |A<«"y ifif'rvl 'SZk&f

mstm

,v r;t„B<rˆc

XPerjesgˆSfxWˆ

/ v Hartbergo Vtˆ Frohnlciten S\ ˆ ˆ

'Pochlarn1

irjnn"bjSisUolczˆ (Emod;

.ltfalva

ittighofem

“\fTut Megyei\

(TaraczJ

Tokay

Bruck

WfilnR = a

Gyarmot

Radauta

Rosenheim

’ozsonjT"\

ˆ-■Sorn nxi’

- tuiiiau** -v

fUKOWlN

1jdu|N'ftn’a3,

nr PXTj Feherto y,ˆsa;iany o-

Haidu Bbezormeny K,18 * Nagy Karoly

einctl , ~ f Ronaˆ1ˆ _

09 Medgy.es, bAkna Sugitag. „

SzinycrYarolja \U V*

v_vNagy Bnnya, K ˆL- V,

[Gaming,

'id ®TRlau9UV"%,ˆUolA

ˆ Ei

ˆ 1 ' T?'V ˆVorderˆX. J Rt .'Ml,

is.1- oi°w°jZ c

ftieuliausel

Great\

kScHUTT

Salzbui

W\, *x*-zs

"Winw-'V'eriVclet'P \,ˆ Me y°ap EnpolnaO — ˆ-sRuzer

_L± —

X | Jasz Apatl . <%-Rako$ Eercsˆt m fig jnSZ 3ˆvi

yUJa8zˆad\any'

julbclul kaden0 L Goil

Eu fstein

RimpoR*uK

Wi,

|ˆ\ k /M

J UiVaroB A

Vriszyirod ˆ-yP|,||r ˆ ,

fi, Mre VjlCi«BaB

Kun Hegyos I tci-y'Tlajdu Szobo8zloL/ˆ/ ,

y's^Kendeie«^_^CRy8j^,k Ladany ^ 1

X/'K i s -U j 9zall aa S^S

_ jrok Szt iv/iklbs

fezajol Tur.keff,^*1 Gj > Vrtnat V Ue]

S»..J f "'Bb sx^ndte;

Bu'pAH'.sr|

\0 Maiton»n»»r^fxE

/F

jxclszeg

(Gy ot) *7Szemere .f* | l Kis.BeA

' pRomana .

Vaszaro s > " -

Rii*UuW

PSchiitz)

,»nnabarg

Bruck

Nagy Kata/ JWonor

lBetlen.

Mezolakt

M*h Vij Dc^iagjaro?? r» j '

m vXznmos UjvaT.

K. Vi

'/ ' *f*»'

X*

Klauseuljii'-fc-l

ˆ .

ˆFelviuciX—: XW

,X: ˆStraasburg

y ˆ o

'Yarad Pu8p«kl % \ GrosH'Viirdein

Rerlosj

Hi?8eldorf

Ag X J?nushaza r ' pT

ˆX)r“taX V > Sur / / Kornicnd //-~l':irK.lcza,

O?o > ˆs4r~) , > h

r~ ' P Zalft / \ _ /jVii

Nora pKfrazegl.

Blertln

iFranzenaˆcj

-Sc bee

Komad’n

Briien

ˆGlenchcnbergc

azalonta'i

Meregyo

/ˆTTSz.trvaso i K . ' M arton \

\ t'sabiA

Uongrad\

«0 r V

»0ro3haza-rT

I Mpdszent

/ MeioUegyc«ityi

2f. Belcn|

Foldvar\ YjS XFdldp Szallasˆ /

Xfiˆ TT

ˆTTntaj/V1-1* Koi°b

'oVadkert \ ˆ KalocsaV Kl»«lek PFaiez VlJalaa

lankovaczo | Sz*15’

-KiBSzallML g" LaKkiijr \ nˆc

W nskeX-ˆOyX) — ■ — ■ Bacs A\maS/ rSzat

'rafcnsteinXˆ

Tamasi1

yˆ GyulaX. KelcgybazaVo

ˆBalaton St J / ' X , ? Somogj LeDdva ?"Klfl Komarom J.ctenyek-'Nagy Kanizsa

'Smˆy Szobyˆli-ˆ

Xf. ' Nagy Atad kKZokBQJ J I ,tosg0

Koprelnltˆ%k ˆ a?) V Abi

Wue'".),:

J, Uomborar\° Szegszaruˆ C"

yH\lSattaezek (

[Funfkirchem

\ (Pecs), b

ivalese|

‘HiYaskoh- ; ˆBorSyˆebeS'

'W oil an

tSr < »«

sSˆid5g.li

Arke*i®D Rarot

’elluno

XtX

Rndna Li)

Xrlsburc

fehervar.

!yosa > v

• rapina

Kis K-apus/ Muhiˆˆ K /

Zlatoro

ˆteinbruefr

Xp > ~Licbt«wal(

I Czokonya |

I Szt. Lbrineiy

Barca— ˆSzˆ ’ yCj. V alstlbV

,Sormons

GriuUaˆl

Budinsclna ,

• Gjurgjevao

elo - '^o Verocsed

. Bolovar (Vlrorltiea)

lDic„ _ . Quvopolje

lorˆ7nj

OOber

-Zabok-

ftlohaci

Riidolfskverthl

,C A RsN tl O L Aˆ->i

L-ASf. Peter ˆJˆksˆTutV * W0'? f A iReituiittˆ JaBka' ˆljeˆD„rBˆ ' dGottschee (

;herneinkyY QˆU JjAJtenruatke VT1

■ Arsiarc 'Schio

Agram-

pˆeantav5\ , Zontft/ B“' AdU jopolya. V. iFeketeheny! j

“v Nagy Rikiml% p Sient Andraa

X— -tSiXXX

mazelloTeinesˆiˆˆDyf ˆ — -X

- %6-Vo-

Rffsci.-A

-v Pb« (Vrida llunyudo

09 ' / J

Poninibik

,o Szlainlilce

LZombor ‘

vVillany

Lagos 1 /

' ‘rt'nzaVY ■rona \ 'Z

'Gr. Gorlca

Slatina

Jocin

VMestre/x

iTorolc Becse, YKumantˆ

Zsebely

BrosiovikcH

Pirarioj \ C.8alvorefr* Cittanuova'3

Daruvar Kara*K \ Kiitrevo

HEszoky

(OsjekJ/-

,I.0k7Bo':

duMTaˆsruip1 BnVlV«».,X _

jnerbaseˆˆfX ˆ Tomerin jKagr R r,{ Bec%ereV

■PctrinNˆn

Lupenjf

tKarlatadt H i v*

lugaresa |

ajdobr »Vi’V’£’r

G ampul ung(

hnya) J. 1

'Tereg§vfˆ

Dcnta

sNovBka

Rimu'uˆ

*°v4ro

Vrpolje

Glina

XfuiK!

Modrus*

Vukorar

Mirandolj

V Oraviczabat yaXlˆ!

XT-\pVion(F ohCrlrn/ploiii) ,J

Es®Tn3

"Uj Moldova; v« v .Alt Orsovaˆ J ■ˆˆcradina

Roviˆnolt

HignaS

PolaJ

(upuii.ld)

a*_nrmn

' N.Mlena

8aasuolo (/

I Iv*. \AUbunar;

: u u\JVt ib loszodoy

,rkulc8furdo'

ˆ oOtocwfe. ˆ Xt'azba ˆ < ˆ.ˆolny Kasin \ / f!,’, ˆ °Qbrn)' r»Mˆ,c B»Bi?h iCS\ J fcCariupago ˆ'At

(X f/', oGoepic f X

Ruma

wenova

A

l \,Cˆ Brcka 3GraAnlda"" ySoraja Tazlaˆ ' .i'd'v XXX y Doiuja

’erciorova

C. Promootorea X

’Krupa o Starimajaan \/ Prnjavor o\Sanaklmo8t

lElenak

Mol do’

iBanjaluka

iemendria

Petrorac' ˆ r

Obrenovac

Luasln piccolo*

.Rarenna

Tuzla

iPiatra

Zepce,

VrandukoT

P&l&nka

,fabolj

Prbmpda

Zvornik' \t eKladanj Vbjbb rVlwenica0.

Radujevac (

Mei.aDa 1,

rGabela atkovic j

E ˆRrftB

Rraguyevats J yA.

•brovazl

Busovaci

LuiVoa ow Gkchha

AUSTRIA-HUNGARY

ˆoCevljanovic

J agodina'

Paracin

Sarajevo

Rogatlca '

La costa 1

Melrpa

Babinopolie

SCALES

Statute Miles, G3 =1 Inch,

Cacaa X. Kraljovo

I.VCDRONATA i:

Prozor,

bobonloo 'Pj-X p.fl

'Risauoˆ

ZjhU.V 1 Caporesto*

Gorazda,

, Alekamac,

Krusevac*

-Rakltni

COiNTIMATION OF

DALAMATIA VS» HERZEGOVINA

ON SAME SCALE.

la.inica

Kilometres, 101 ~ 1 Inch.

0 10 20 30 40 80 60 70 80 90 100

Mokro

IpaiefcN

iTsˆoslarˆ

Neroei

hiFiwA:

Rand McNally k Co.'s New 11 x 14 Map ot Austria-Hungary. Copyright by Rand McNally A Co.

w1' .

Lesina

bkutarl

/ S) \Afy Hn

Longitude Kast from GreonwichlU (|NifcLXˆ

AUSTRIA-HUNGARY

623

fense) which by August 1919 had grown to 180,000 men. Under the

terms of the Treaty of Saint Germain, compulsory military service was abolished in Austria, and her military forces limited to 30,000 men and officers. The armed lorces may not include military or naval air forces and no dirigibles are to be kept. The Austro-Hungarian navy has ceased to exist, having been handed over to the Entente at the close of the war. The new republic has a few monitors and gunboats on the Danube.

Constitution and Government. — On 15 Feb. 1920 a draft constitution was published, accord¬ ing to which it was proposed to make Austria a federal republic. It provides for two legislative authorities, a federal diet and a federal council. The president of the diet is to be president of the confederation. Provincial diets after the old model are to have jurisdiction in their respective territories.

History. — The republic was proclaimed 12 Nov. 1918. The povernment was vested in a national assembly which enacted legislation and appointed a temporary cabinet. Elections to the national constitutional assembly were held 16 Feb. 1919 and resulted in the return of 72 Social Democrats, 69 Christian Socialists, 26 German Nationalists and three members of other parties. On 17 Oct. 1919 the constituent assem¬ bly appointed a ministry with Dr. Karl Renner as State Chancellor and Minister of Foreign Affairs. The national flag is made up of three horizontal stripes, top and bottom red and the centre white.

For the history, topography, commerce, etc., of Austria as part of the dual monarchy see article following on Austria-Hungary

Bibliography. — Treaty of Peace between the Allied and Associated Powers and Austria (Vol. 28, infra) ; (Oesterreichische Statistic (Annual, Vienna) ; Hainisch, M., (Wirtschaft- liche Verhaltnisse Deutsch-Oesterreichs) (Mu¬ nich 1920) ; Pirker, Paul, (Das Vorarlberg) (Feldkirch 1919) ; Pribram, A. F., (Politische Geheimvertrage Oesterreich-Ungarns von 1879- 1914) (Vol. 1, Vienna and Leipzig 1920) ; Steed, Henry W., (The Hapsburg Monarchy 5 (New ed., London 1919).

AUSTRIA-HUNGARY (Oesterreich-Un- garn), officially designated The Austro-Hun¬ garian- Monarchy, a former empire of central Europe, consisting of two semi-independent countries, each according to the Ausgleich or Compromise of 1867 having its own Constitu¬ tion, a limited monarchy and separate Parlia¬ ment, but each united in the conduct of foreign affairs and in the establishment of . a common army and navy under one ruler: ((His Apostolic Majesty the Emperor

of Austria and the King of Hungary.

Area and Divisions. — Until its dissolution in 1918 the Austrian empire extended from about lat. 42° to 51° 45', and from long. 8° 30' to 26° 30' E. ; with a total area of 240,000 square miles. Its greatest length from east to west was about 860 miles; its greatest breadth about 400 miles. It was bounded south by Montenegro, Serbia, Rumania, the Adriatic Sea and the king¬ dom of Italy; west by Switzerland, Bavaria and Saxony; north by Prussia and Russian Poland; and east bv Russia and Rumania. On the shores of the Adriatic along the coasts of Dalmatia,

Croatia, Istria, etc., lay its only sea frontage, which, compared to the size of the monarchy, was of insignificant extent. Besides being di¬ vided into the two great divisions above men¬ tioned, the Austro-Hungarian monarchy was further divided into a number of governments or provinces. The following table exhibits the name and area of these governments, with their population in 1900 and 1910:

Divisions.

Area in sq. m.

Popula¬ tion, Dec. 31,

1.

Popula¬

tion,

Dec. 31,

1.

A u stria n Provin c es —

Lower Austria .

7,654

3,100,493

3,531 ,814

Upper Austria .

4,631

810,246

853,006

Salzburg .

2,767

192,763

214,737

Styria .

8,670

1,356,494

1 ,444,157

Carinthia .

4,005

367,337

396,200

Carniola .

3,856

508,150

525,995

Coast land .

3,084

756,546

893 , 797

Tyrol and Vorarlberg.

11,324

981,989

1,092,021

Bohemia .

20,060

6,318,697

6,769,548

Moravia .

8,583

2,437,706

2,622,271

Silesia .

1 ,987

680,422

756,949

Galicia .

30,307

7,315,816

8,025,675

Bukowina .

4,035

730,195

800,098

Dalmatia .

4,940

593 , 783

645,666

115.903

26,150,597

28,571,934

Hungary

Hungary and Tran-

j sylvania .

109,188

16,838,255

18,264.533

Croatia and Slavonia.

16,421

2,416,304

2,621,954

125,609

19,254,559

20,886,487

Bosnia .

16,239.4

1,348,581

1,631,006

Herzegovina .

3,528.5

219,511

267,038

Military .

22,944

33,758

19,767.9

1,591,036

1,931,802

Empire .

261,279.9

46,996,192

51,390,223

Natural Features. — Although presenting every variety of surface the prevailing character of the former Austrian dominions is mountain¬ ous, there being few districts where mountains are not found; while the plains do not occupy more than a fifth part of the whole superficies. The loftiest ranges, and the most extensively ramified, are found in Tyrol, Styria, Illyria and the southern parts of Austria proper. In some of these regions the scenery is bold and roman¬ tic, and has been considered equal to that of Switzerland. The most extensive tracts of low or flat land occur in Slavonia and the southeast and central parts of Hungary; much of this level land is remarkably fertile, but it is met at various points by vast morasses and arid steppes. The principal valleys are found in Tyrol, Salzburg, Styria and Illyria. Extensive plains stretch along the courses of the rivers, particularly the Danube, the Theiss and the March. The principal rivers of Austria are the Danube, the Elbe, the Save, the Drave, the Waag, the March, the Inn, the Teiss or Theiss and the Maros. The Danube for upward of 800 miles is navigable for ciuite large vessels throughout the whole former Austrian terri¬ tory ; while all the others, most of them tribu¬ taries of the Danube, are navigable for vessels of small size. All the rivers abound in fish. The lakes are numerous and often picturesque,

although those in the lowlands, particularly in the plains of Hungary, are rather marshes than lakes. Austria lies between the isotherms, of 60° and 50°, and has a climate nearly as various as its surface. The northern regions, between

the 49th and 51st degrees of north latitude, have an average temperature resembling that of the north of France. Between lat. 46° and 49° the heat is considerable ; and between 42° and 46°, which comprised the whole of south Austria, it is still greater ; the winter lasting two or three months only, and being, in general, extremely mild. The principal products of the north are wheat, barley, oats and rye which are so plentiful that the greater part of them is exported abroad ; in the centre, vines and maize are added ; and in the south, olives. The productive capabilities of the soil have under¬ gone considerable development in recent dec¬ ades. The wines of Austria are inferior on the whole, with exception of a few choice kinds, including the well-known Tokay. A- great por¬ tion of the worst wine is made into brandy. The produce of wine annually reached over 240,000,000 gallons, of which Hungary yielded by far the largest proportion. The forests cover 69,000 square miles, or one-third of the produc¬ tive soil of the former empire, and yield timber of excellent quality, adapted for all purposes. Wild deer, wild swine, chamois, foxes, lynxes and a species of small black bear, are found in many districts, the fox and lynx being particu¬ larly abundant. Herds of a native breed of horses, of small size, roam wild over the plains of Hungary. All the domestic animals of Eng¬ land are known throughout the region. A large portion of the countries which composed the Austrian empire was at one time submerged by the sea, particularly Hungary, where the gen¬ eral appearance of its vast plains, the nature of their soil, and, above all, the occurrence of fossil sea shells, leave no room to doubt the former dominion of the ocean. Throughout all Austria the Tertiary, formation prevails, with a margin of the Secondary formation, stretching to a greater or lesser extent into the surrounding countries, and diversified by patches of igneous rocks of the Tertiary and Alluvial epochs. In mineral productions Austria is very rich, possessing, with the excep¬ tion of platinum, all the metals, particularly gold, silver, iron, copper, lead, zinc, quicksilver, coal and salt. The total annual value of the mineral products of the territory formerly in the Austrian empire is estimated at upward of

$74,288,500.

Manufactures and Commerce. — Before the War of 1914-18 manufactures were in the most flourishing condition in Bohemia, Moravia, Silesia and Lower Austria; less so in the eastern provinces, and insignificant in Dalmatia, Buko- wina and the military frontiers. The total money value of manufactured products amounted to at least $500,000,000, the value of agricultural products to more than $1,000,000,000. As regards the individual branches of manufacture, there were machines produced yearly to the value of $20,000,000 to $25,000,000, and the supply about equalled the demand. In the manufacture of musical and scientific instruments Austria held, and still holds, a high position ; those of Vi¬ enna being celebrated. The manufacture of stoneware and chinaware was and is very ex¬ tensive, being valued at about $12,500,000 yearly. The glass manufacture was one of the oldest and most highly developed branches of industry in Austria. The manu¬ factories, about 200 in number, were spread over the entire monarchy, but were most numerous in

Bohemia, where glass and glassware of every kind are produced. The yearly value of this class of manufactures was estimated at about $12,500,000, of which a very considerable quan¬ tity was exported. The manufacture of metal goods is carried on to a great extent, being valued at about $50,000,000; and some of the iron and steel goods, such as scythes and reaping hooks, had a world-wide reputation. The manu¬ facture of gold and silver plate and jewelry was also important, and the articles of Vienna work¬ manship competed successfully with the French. The- production of chemicals reached the amount of $25,000,000, and about covered the home de¬ mand. As regards articles of food, the sugar from beets had an annual value of about $60,- 000,000; of beer the production was $20,000,000 in value, the number of breweries over 2,000; spirits were distilled to the value of $20,000,000. The manufacture of tobacco was a state monop¬ oly, and was carried on in 38, mostly large, es¬ tablishments. Of textile industries, the silk manufacture, since the loss of the Lombardo- Venetian provinces, had become greatly limited. The manufactures of woolen, hemp and flax were among the oldest and most important of the state. The first gave employment to about 400,000 persons, and turned out about $70,000,000 worth of goods yearly, of which a considerable proportion was annually exported. In the whole monarchy there were about 650,000 spindles and 65,000 looms employed in woolen weaving. The linen manufacture (including also hemp and jute) gave employment to a greater number of persons than any other branch of industry (many of them in their homes), and produced goods to a greater value. The chief seats of the manu¬

facture were Bohemia, Moravia and Silesia. The annual produce of the cotton manufacture was next in value to that of woolens. Although about 2,400,000 spindles were in activity, cotton yarn had to be imported. On the other hand, however, excellent cotton cloths were exported. Tanning was carried on to the greatest extent in Moravia, Lower Austria and Bohemia. The manufacture of leather goods, however, was very large, and in the production of gloves (in Vienna and Prague) Austria stood next to France. AJ- together the manufacture of leather and leather goods employed about 200.000 persons and pro¬ duced goods to about $50,000,000 yearly.

In addition to the general import and export trade, Austria carried on, — 'Partly' from its cen¬ tral position, in the continent of Europe, and partly from its numerous navigable streams, ex¬ cellent roads and railway system, — • a very con¬ siderable amount of business in the transit of goods through her territory to other countries. In the years just prior to the war the total annual value of the imports into Austria-Hun- gary was, in round numbers, $730,500,030, while the value of the exports reached $591,000,000. The principal imports were raw cotton, wool, cotton and woolen yarn, silk and silk goods, coffee, tobacco leaf., furs and hides, leather, machinery, locomotives, etc., hardware and clocks, books, newspapers, maps, grain and cattle. Wood formed the chief article of export, next came sugar, cattle, grain, leather and leather wares (including gloves), hardware, egˆs, coal and coke, woolen manufactures, glass and glass¬ ware, paper and paperwares, wool, malt, wooden, goods, hides, etc. Nearly one-half of the com¬ merce of Austria was carried on with Germany,

tiie next places being occupied by Great Britain, .iiaiy, Russia and the United States. Including fishing vessels and small craft, Austria-Hungary, 111 U13, had 17,297 vessels of all sizes, with a tonnage of 610,541, and employing 48,698 men. 1 he principal ports of the empire were Trieste, Tola and hiume. In 1913 there were 27,845 miles of railway open for traffic in the empire, of which 14,512 were in Austria, and 13,333 in Hungary.

Money, Weights and Measures. — On 1 Jan. 1900 a new monetary system went into eiiect, the coinage being changed from a silver to a gold basis, and the standard coin and money of account being the crown (equal to 20.3 cents in United States gold). Practically the chief medium of exchange was banknotes, of various denominations. The

Austrian centner, the weight by which all large quantities are rated was and is 123ˆ4 pounds avoirdupois. I lie metze, the largest dry measure— 1.7 of a bushel, or somewhat less than the fourth part of an English imperial quarter, nine metzen making two quarters nearly. The eimer, the most generally used liquid measure, is equal to 14.94 English wine gallons. The Vienna foot is equal to 12.45 inches English. The joch of land is 1.43 English acre.

Population. — None of the European states, with the exception of Russia, exhibits such a diversity of race and language among their population as did the Austrian empire. The Slavs, who amounted to about 19,000,000, or 45 per cent of the total population, were the chief of the component nationalities of the monarchy in point of numbers, forming the great mass of the population of Bohemia, Moravia, Carniola, Galicia, Dalmatia, the kingdom of Croatia and Slavonia, and southern Hungary, and half the population of Silesia and Bukowina. This pre¬ ponderance, however, is only apparent, as none of the other races are split no into so many branches differing so greatly from each other in language, religion, civilization, manners and customs. These branches are the North Slavic Czechs, Moravians and Slovaks, the Ruthenians and Poles and the South Slavic Slovenians, Croats, Serbs and Bulgarians. The Germans, about 10,570,000 in number, were scattered over the whole monarchy and formed almost the sole population of the archduchy of Austria, Salz¬ burg, the greatest portion of Styria and Carin- thia, almost the whole of Tyrol and Voralberg, considerable portions of Bohemia and Moravia, the whole of the west of Silesia, etc. ; and they were also numerous in Hungary and Transylva¬ nia. The Magyars or Hungarians (7,440,000 in number, or about 16 per cent of the total popu¬ lation) forme,d the great bulk of the inhabitants of the kingdom of Hungary and of the eastern portion of Transylvania. To the Italic or west¬ ern Romanic stock belonged the inhabitants of south Tyrol and parts of the coast lands and Dalmatia, numbering about 700,000 in all. A considerable portion of the southeast of the empire was occupied by members of the Ruma¬ nian (or eastern Romanic) stock, who num¬ bered altogether about 2,800,000, and formed more than half the population of Transylvania, besides being spread over the southeastern parts of Hungary, Bukowina and part of Croatia and Slavonia. The number of Tews was also very considerable (above 2,258,000), especially in Ga¬ licia, Hungary, Bohemia and Moravia. There

were also several other races whose numbers are small, such as the

Gypsies (95,000), who were most numerous in Hungary and Transylvania, and the Albanians in Dalmatia and neighboring regions. The population was thickest in lower Austria, Bohemia, Silesia and Moravia; thin¬ nest in Salzburg. Generally speaking, it de¬ creased in density from west to east.

Religion. — The state religion of Austria was the Roman Catholic, and next in numbers was the Greek Church. Calvinism and Lutheranism were also professed by a large body of the peo¬ ple; the former mostly in Hungary and Tran¬ sylvania, the latter in the German provinces and in Galicia. _ The civil power exercised su¬ preme control in all ecclesiastical matters, the Emperor being, in everything but name, head of the. Church ; and as no sentence of excommuni¬ cation, or other ecclesiastical edict, might be is¬ sued ˆ without the sanction of the Crown, the Pope's direct authority in Austria was somewhat limited. In 1910 there were in the Austrian portion of the monarchy 22,530,169 Roman Catholics, 3,41 7,223 Greek Catholics united to the Roman Church, 666,458 non-united, 430,900 Protestants and 1,313,687 Jews. In Hungary and Transylvania there were 9,010,305 Roman Catholics, 2,097,916 Greek united and 2,333,979 non-united, 1,306,384 Protestants and 911,227 Jews.

Education. — The intellectual culture of the people was at very different stages of advance¬ ment among the different races. It was highest in the German provinces and lowest in the east. In Upper and Lower Austria, Salsburg, Tyrol, Moravia, Silesia and Bohemia, almost all the children of suitable age were in attendance on the public schools ; while in Bukowina only about 3d, and in Galicia about 59, per cent of them were at the schools. The educational system was entirely remodeled. The elemen¬ tary schools, or those in which the common branches are taught, were designated national schools or schools for the people (Volksschu - Jen), and there children had to attend from the end of their 6th to the end of their 14th (m some provinces only their 12th) year. A higher class of elementary schools were known as town schools (Biirgerschulen) , in which a su¬ perior education might be obtained. For the training of instructors for the people's schools, there were 43 normal schools for male teachers and 26 for female. As secondary schools or institutions of a more advanced grade, there were the gymnasia and the ˆreal-schools,ˆ as they were called. The gymnasia resembled the best sort of our grammar schools, being intended chiefly to prepare pupils for the universities, great attention being paid in them to the classical languages and history, universal and literary. In the real-schools a more practical end was kept in view, and modern lan¬ guages and physical science formed the ground¬ work of the educational course. A complete course in a

gymnasium extended over four years, in a real-school either three or four. There were also schools of an intermediate stamp known as ˆreal-gymnasia.® The higher educa¬ tion was provided for by the universities, the polytechnic institutes and the various institutions in which particular subjects were taught. There were 11 universities in the monarchy, namely, in Vienna, Prague (two — a German and a Bo¬ hemian), Pesth, Gratz, Cracow, Lemberg, Inns-

bruck, Klausenburg, Agram and Czernowitz. Most of these had four faculties — Catholic theology, law and politics, medicine and philoso¬ phy. There were also several technical high schools in which mathematics, physics and nat¬ ural science were the chief objects of study. Besides these there were theological institutions ; schools for jurisprudence and philosophy; schools of commerce, industrial arts, agricul¬ ture, arboriculture and mining; military schools, naval schools, art schools, conservatories of music, etc. The principal libraries were the royal library at Vienna, and the university libraries of Vienna and Prague.

Constitution, Revenue. — As already men¬ tioned, the Austrian dominions consisted of a German or Slavo-Germanic or Cisleithan em¬ pire, and a Transleithan or Hungarian kingdom, each with its own Parliament, ministers and government as established by the Pragmatic Sanction of 6 Dec. 1724. The same hereditary sovereign ruled over both, and they had a com¬ mon army and navy, and a common Parliament known as the Delegations. The Delegations consisted of 120 members, one-half of whom were chosen by and represented the legislature of German-Austria, and the other half that of Hungary, the upper house of each legislature re¬ turning 20 and the lower house 40 deputies. In all matters affecting the common affairs of the monarchy the Delegations had a decisive vote, and their resolutions did not require the confirmation of the representative assemblies in which they had their source. The Delega¬ tions met alternately in Vienna and Budapest. Their ordinary mode of procedure was to sit and vote in two chambers, the 60 deputies of Cisleithan Austria forming the one, and the 60 of Hungary the other. But if no agree¬ ment could be arrived at in this manner, the two bodies met together and without further debate gave their final vote, which was binding for the whole empire. The jurisdiction of the Delegations extended specially to all matters affecting foreign affairs, war and finance. The Constitution of German-Austria was finally es¬ tablished

in December 1867. The provinces had each a diet or legislature of their own for pro¬ vincial affairs, these diets being 16 in number, one each for Bohemia, Dalmatia, Galicia, Upper Austria, Lower Austria, Salzburg, Styria, Car- inthia, Carniola, Bukowina, Moravia, Silesia, Tyrol, Vorarlberg, Gorz and Gradisca and Istria, the municipal council of Trieste having similar functions. The provincial diets were composed of the archbishops and bishops, the rectors of the universities, the representatives of the great estates, of towns, of boards of commerce, of rural communes, etc. The laws passed in these diets had reference to provincial taxation, agri¬ cultural, educational and other matters. The national Parliament or legislature of German-Austria, called the Reichsrath (or council of the realm), consisted of an upper house or House of Lords (Herrnhous) , and a lower house or House of Deputies (Abgeordnetcnhaus) . The former was composed of princes of the Impe¬ rial family, of nobles whose families had a hereditary right to this dignitv, of the arch¬ bishops, the bishops of princely rank, and of a certain number of life members nominated by the Emperor. The lower houses consisted of 853 members, elected by all citizens above 24 possessing a small propertv qualification. The

rights belonging to the Reichsrath were: con¬ sent to all laws relating to military service; co¬ operation in the legislation on commercial mat¬ ters, customs, railways, etc. ; and examination of the estimates of the income and expenditure of the state, and other financial matters. The Constitution of Hungary, including also Croa¬ tia, Slavonia and Transylvania, dated from the foundation of the kingdom, or about 895 a.d. It rested upon a number of statutes published at long intervals, the principal of these being the Bulla Aurea or Golden Bull of Andrew II, granted in 1222, by which the government was defined as an aristocratic monarchy. The legis¬ lative power was vested in the King and the Par¬ liament (Reichstag) conjointly. The latter con¬ sisted of an upper house or House of Magnates, and of a lower house or House of Representa¬ tives. The House of Magnates consisted of the archdukes of the Imperial family who had at¬ tained their majoritv, 54 ecclesiastical dignita¬ ries, 151 counts and 36 barons as hereditary members, 84 life members nominated by the sovereign, or elected by the chamber, etc. The lower house (of 453 members) was composed of elected representatives. The Hungarian Reichstag corresponded to the Reichsrath of the Cisleithan provinces, and accordingly only dealt with such matters as were common to the provinces belonging to the Hungarian Crown. Transylvania was, so far as legislation and ad¬ ministration were concerned, entirely incorpo¬ rated with Hungary. Croatia and Slavonia, however, had a Landtag or diet of their own, which like the provincial diets of the Cisleithan portion of the empire

consisted of only one chamber, and which was competent to deal with all matters belonging to the interior administra¬ tion of the provinces, with religion and educa¬ tion, and with the administration of justice. Fiume, which was formerly associated with Croatia and Slavonia, and subject to the Land- tag of these provinces in August 1870, was put directly under the central Hungarian govern¬ ment.

There being three distinct parliaments in the empire, there were also three budgets, namely, that for the whole empire, that for Cisleithan and that for Transleithan Austria. In the budget for 1910 the revenue of Austria was $599,098,400; of Hungary $414,909,800; the ex¬ penditure of Austria was $580,272,800; of Hun¬ gary $380,333,200. A small portion of the im¬ perial revenue of Austria was derived from cus¬ toms and other sources, and the remainder was made up by the two divisions of the empire, 70 per cent thereof being contributed by Aus¬ tria and 30 per cent by Hungary.

Army. — Military service was obligatory on all citizens capable of bearing arms who had at¬ tained the age of 20. and lasted up to the age of 42, either in the active army, in the landwehr or the landsturm. The period of service in the active army was 12 years, of which three were passed in the line, seven in the reserve and two in the landwehr. In 1914 the standing army numbered 430,417 men (including 32,398 offi¬ cers) on the peace footing, and 1,826,940 men and 45,238 officers on the war footing. The landsturm raised the total to over 6,000,000.

Navy.— On account of the development of the Italian navy, Austria found it necessary for her self-defense to have a fleet of her own. Besides a flotilla of monitors for the Danube,

the Austrian navy, in 1914, comprised 4 dread¬ noughts, 12 pre-dreadnoughts, 3 armored cruisers, 9 cruisers and torpedo-cruisers, 3 tor¬ pedo gunboats, 18 destroyers, 63 torpedo boats and 11 submarines.

Judiciary. — The courts of first instance comprised 940 Bezirksgerichte, County Courts, and 71 Landes und Krcisgerichte , Provincial and District Courts; Geschtvorenengerichte, or Jury Courts, being connected with the latter. These courts acted as courts of inquiry and had summary jurisdiction. The courts of second in¬

stance, or courts of appeal from the lower courts, having the supervision of the criminal courts, comprised nine OberlandesgericJite, or higher provincial courts. There were also spe¬ cial tribunals for military, revenue, shipping and other matters, including four industrial courts and three commercial courts. The Obcrste Gcrichts und Kassationshof, Supreme Court of Justice and Court of Cassation at Vienna, was the final court of appeal. The High Court of Administrative Affairs decided dif¬ ferences between private individuals and public officials, and the Reichsgerichte, or Court of the Empire, the conflicts of law and jurisdiction between different authorities.

Racial Complexion. — Austria was, prior to 1918, what Metternich with less truth called Italy, little more than a geographical expres¬ sion. Three bonds united its discordant na¬ tionalities — the throne, the Reichrath and the army. There was nothing really Austrian in Austria, no specific Austria interests, no Aus¬ trian language, or literature, or patriotism, no Austrian nationality, no Austrian standard of civilization; nothing except the Emperor, the army and the forum of the Reichrath that the races shared in common. The Germans formed a compact entity bv themselves in Upper and Lower Austria and in the former duchy of Salzburg. In Bohemia this element was out¬ numbered by the Czechs in the ratio of 3 to 5. Altogether the German-speaking subjects were about a third of the population of Old Austria — some 10,750,000 out of 28,572,000. The Czechs in Bohemia. Moravia and Silesia numbered roughly 5,000,000. In Galicia some 4,000,000 Poles held down a trifle over 3,000,000 Ruthenians. The Serbs, Croats and the Slove¬ nians, known under the collective name of Jugoslavs (i. e., South Slavs), numbered

roughly 6,000,000 and constituted the bulk of the population of the former provinces of Bos¬ nia, Herzegovina, Dalmatia and the Dalmatian Archipelago, Croatia and Slavonia, . including Fiume and the Merjumwije, Baranja, Backa, Banat, Istriu, the Quarnero Isles, Carniola, Gor- ica, Southern Carinthia, Southern Styria and some districts of the southwestern part of for¬ mer Hungary, while nearly 1,000,000 Italians inhabited the Tyrol. None of these races could be said to represent Austria, though all of them claimed to, and their mutual wranglings, strug¬ gles to realize themselves, to elbow out their neighbors and seize an incontestable ascendency, formed the background, and. at times something more, of Austrian politics in the decades pre¬ ceding the Great War. But for the dashing tenacity of the Magyars, Hungary might have become as heterogeneous as her former partner in the dual monarchy. The Magyars numbered only 7,500,000 out of nearly 20,886,500, but they

are a race with the fierce hardihood and deter¬ mination of the Teutonic stock and a grace and fascination that are neither Latin nor Celtic, but distinctly their own. From the time that the two nations entered into a partnership agreement as coequal and sovereign states, the Magyars devoted all their brilliant energies and the immense force of a concentrated one-ideal- ness to making themselves paramount through¬ out the southern half of the realm. They re¬ volted against being Germanized, but saw no inconsistency in their insisting .that the Ser¬ bians, Croats, Rumanians and Slovenes should be Magyarized ; and they pursued the task with unsparing persistency just saved from relent¬ lessness by their genius for wise compromise. The schools proved a much more effective in¬ strument in the development of a national feel¬ ing and the Magyars thoroughly worked them to that end. Like the Russians and Americans, but unlike the English, the Magyars recognized that where there is difference of speech .there will be difference of sentiment, of heart, of in¬ terests, and at a pinch perhaps of loyalty, and accordingly refused to make the preservation of dialects an object of government. As late as the middle of the 19th century the Hunga¬ rian nobles spoke German and a demotic Latin in their homes and diets. By the time of the Revolution of 1918 the native tongue obtained, among all classes.

In Austria, as in Spain, the factory was placed some distance behind the barracks as an element of national welfare, and a contemptuous bureaucracy shackled trade with a hundred en¬ tangling regulations. The Magyars, on the other hand, were as attentive to commerce as to their racial position. Perhaps there is no country in which the state, as such, has done more for industrial development. Before the war the really vital domestic problems of Hun¬ gary were, indeed, no longer racial, and as freedom of worship was the law, they had never been acutely religious. But in the rise of what is called Agrarian Socialism there arose something that severely tested Magyar states¬ manship. The Magyars were the backbone of the Dual Monarchy. Against the rising tide of Pan-Slavism they presented a compact and un¬ bending front. Together with the former Ger¬ man Empire they might be considered the out¬ posts of Europe against Slav aggression; and even in the domestic affairs of the monarchy their unbreakable unity as a political force made their influence well-nigh decisive. The Ausgleich of 1867, — ’the partnership agreement between the two halves of the realm — pre¬ scribed that matters of common concern, such as foreign affairs, diplomatic representation and naval and military matters, should be ar¬ ranged by 60 delegates from each country, meeting twice a year. Of this body of 120, the Hungarians had 55 delegates and as a conse¬ quence in the long run the Hungarian view

was fairly sure to carry the day. Each renewal of the Ausgleich brought substantial modifications in favor of Hungary, and the centre of grav¬ ity, in fact, shifted from Vienna to Budapest.

History of the Country till the Year 982. — [After the Romans had vanquished the Nori- cans, 33 a.d., and gained possession of the Dan¬ ube, the country north of the Danube, extending to the borders of Bohemia and Moravia, be-

longed to the kingdom of the Marcomanni and Quadi ; a part of lower Austria and Styria, with Vienna (Vindobona), a municipal city of the Roman empire, belonged to upper Pannonia ; the rest of the country, with Carinthia and a part of Carniola, formed a portion of Noricum. Gorz belonged to the Roman province of Uly- ricum, and Tyrol to Rhaetia. These limits be¬ came confused by the irruptions of the West-Goths, who spread over the upper Pannonia and Noricum but recognized the Roman su¬ premacy as early as 380 a.d. The Boii, Vandals, Heruli, Rugii, Goths, Huns, Lombards and Avars, in the course of the 5th and 6th cen¬ turies, successively occupied the country. But after the year 568, when the Lombards had established their power in upper Italy, the river Ens formed the boundary line between the German tribe of Bajuvarii, the proprietors of the territory above the Ens, and the Avars, who had removed from the east to the banks of that stream. In 611 the Wendi, a Slavonic tribe, appeared on the Murr, Drave and Save. In 788 the duchy of Bavaria was dissolved, and the Avars passed over the Ens and invaded the counties of the Franks in the Bavarian terri¬ tory. In 791 Charlemagne forced them to re¬ tire to the Raab, and united the territory extending from the Ens to the junction of the Raab with the Danube (the territory below the Ens) with Germany, under the name of Avaria, or the Eastern Mark (Marchia Orientalis), or Austria; and in the 10th century (in a docu¬ ment of Otho III 996) it was called Ostirrichi, equivalent to the modern Oesterreich. Many colonists, particularly from Bavaria, were sent by Charlemagne into the new province, and a margrave was appointed to administer the gov¬ ernment. The archbishop of Salzburg was at the head of ecclesiastical affairs. After its separation from Verdun, in 843, Avaria formed the east boundary of the German empire. On the invasion of Germany by the Hungarians, in 900, Avaria fell into their hands, and was held by them till 955, when the Emperor Otho I, in consequence of the victory of Augsburg, reunited a great part of this province to the empire. By the power and address of

its mar¬ graves the whole country was joined again with Germany, and in 1043, under the Emperor Henry III and the Margrave Albert I (the Victorious), its limits were extended to the Leitha.

Austria under the House of Bamberg till 1282. — Otho II transferred in 976 the Austrian margraviate to his faithful adherent Leopold I, who was, according to tradition, a descend¬ ant of the house of Count Adelbert Badenburg, who became famous by his victories over the Madyors, and perished in 994. From that year to 1156 the margraviate of Austria was heredi¬ tary in the family of the counts of Badenburg (Bamberg) ; the succession, however, was not regulated by primogeniture, but by the will of the Emperor. In ancient documents mention is made of the estates of Austria in the year 1096. After Henry the Proud (Duke of Bavaria and Saxony) was put under the ban of the empire, Leopold V, Margrave of Austria, received the duchy of Bavaria in 1138 from the Emperor Conrad. But when the Margrave Henry, son of Leopold, under the title of J a-so-mir-Gott (Yes-so-me-God) , had again ceded it, in 1156, to Henry the Lion, the boundaries of Austria

were extended so as to include the territory above the Ens, and the whole was created a duchy with certain privileges. Under this duke the court resided at Vienna. Duke Leo¬ pold VI, the son of Henry, received the duchy of Styria in 1192 as a fief from the Emperor Henry VI, it having been added to the empire by Otho I, in 955, by his victory over the Hun¬ garians. It was this prince who imprisoned Richard Coeur de Lion, King of England. Duke Leopold VII, the youngest son of the former, erected a palace within the city of Vienna, which was long occupied by the Austrian mon- archs, under the name of the old castle. Leo¬ pold VII, called the Glorious, established the hospital of the Holy Cross, made Vienna, which had adopted a municipal constitution in 1198, a staple town, and granted 30,000 marks of silver for the promotion of trade and commerce. In 1229 he purchased a part of Carniola from the ecclesiastical principalˆ of Freisingen for 1,650 marks, and left the country in a flourishing con¬ dition to the youngest of his three sons, Fred¬ erick II, surnamed the Warrior. In 1236 this prince was put under the ban of the empire, on account of his joining the alliance of the cities of Lombardy against the Emperor Frederick II ; and Otho, Duke of Bavaria, seized upon his territory above the Ens as far as Lintz. The rest of the country was granted, as a fief by the Emperor to a margrave, and Vienna became an imperial city.

During the Emperor’s campaign in Italy Duke Frederick recovered the principal part of his lands, and his rights were confirmed by the

Emperor at Verona, 1245. The rights of Vienna as an imperial city were abolished, and Fred¬ erick was to be called king, as sovereign of Austria and Styria ; but all his expectations of empire were disappointed by his death in the battle of the Leitha against Bela IV, King of Hungary, 15 July 1246, in the 35th year of his age. Thus the male line of the house of Bam¬ berg became extinct. The period from 1246 to 1282 is styled the Austrian interregnum. The Emperor Frederick II declared Austria and Styria a vacant fief, the hereditary property of the German emperors, and sent a governor to Vienna, the privileges of which, as an imperial city, were once more renewed. But the female relations of the deceased Duke Frederick, his sister Margaret (widow of the Emperor Henry VI), and his niece Gertrude, by the persuasion of Pope Innocent IV, in 1248, laid claim to the inheritance of their brother. The Margrave Hermann, with the aid of the Pope and a strong party, made himself master of Vienna, and of several Austrian cities. In Styria he was op¬ posed by the governor Meinhard, Count of Gorz. But Hermann died in 1250, and his son Frederick, who was afterward beheaded in 1268, at Naples, with Conradin of Suabia, was then only a year old. The whole country was dis¬ tracted by various parties, and the Emperor Conrad IV was prevented, by disputes with his neighbors, from turning his attention to Aus¬ tria. In 1251 the states of Austria and Styria determined to appoint one of the sons of the second Sister of Frederick the Warrior, Con- stantia (widow of the Margrave Henry the Illustrious), to the office of duke. The deputies were on the way to Misnia when they were persuaded by King Wenceslaus, on their en¬ trance into Prague, to declare his son Ottocar

Duke of Austria and Styria, who made every effort to support his appointment by arms, money, and especially by his marriage with the Empress widow Margaret. Ottocar wrested Styria from Bela, King of Hungary, by his victory of July 1260, in the Marchfiefd; and in 1262 forced the Emperor Richard to invest him with both duchies. Soon after, by the will of his uncle Ulrich, the last Duke of Carinthia and Friuli (who died 1296), Ottocar became master of Carinthia, a part of Carniola con¬ nected with it, the kingdom of Istria and a part of Friuli. Bur his arrogance soon caused his fall. In 1272 he refused to acknowledge Count Rudolph of Hapsburg emperor, and was obliged to defend himself against Rudolph. After an unsuccessful war he was forced to cede all of his Austrian possessions in Novem¬ ber 1276. In 1277 he attempted to recover these territories, but, in the battle of the

Marchfield, 26 Aug. 1278, he was slain, and his son Wences- laus was obliged to renounce all claim to them, in order to preserve his hereditary estates. The Emperor Rudolph remained three years in Vienna, and then appointed his eldest son Al¬ bert governor. But having succeeded in gain¬ ing the Consent of the Electors of Saxony and Brandenburg, of the three ecclesiastical electors and of the Count-Palatine of the Rhine, he granted the duchies of Austria and Styria, with the province of Carinthia, to his two sons, Al¬ bert and Rodolph, 27 Dec. 1280.

Austria under the House of Hapsburg. — I. From 1282 to 1526. Albert and Rodolph transferred Carinthia to Meinhard, Count of Tyrol, father-in-law to Albert. In 1283 they concluded a treaty, by which Albert was made sole possessor of Austria, Styria and Carniola. Vienna having again renounced its privileges as an Imperial city, was made the residence of the court, and the successors of Rodolph, from this time, assumed Austria as the family title. The introduction of the Hapsburg dynasty was the foundation of the future greatness of Aus¬ tria. The despotic Albert was assailed by Hun¬ gary and Bavaria and in 1298 he won the Roman crown in an engagement with Adolphus of Nassau. After this he undertook the conquest of Switzerland; but was assassinated 1 May 1308, at Rheinfelden, by his nephew, John of Suabia, from whom he had basely withheld his hereditary estates. The inheritance of John now fell to the five sons of the murdered Albert — Frederick, surnamed the Fair, Leo¬ pold, Henry, Albert and Otho. They were forced to purchase of the Emperor Henry VII the investiture of their paternal estates (con¬ sisting, in 1308, of 26,572 square miles) for 20,000 marks of silver. Under their father, in 1301, the margraviate of Suabia was added to the territories of Austria, and the contest with Bavaria ended in Austria obtaining Neuberg. On the contrary, the attempt of Duke Leopold, in 1315, to recover the forest towns of Switzer¬ land, which had been lost under Albert, was frustrated by the valor of the troops of the Swiss confederacy in the battle of Morgarten. In 1314 his brother Frederick, chosen Emperor of Germany by the electors, was conquered by his rival, the Emperor Louis (of Bavaria), in 1322, at Miihldorf, and was his prisoner for two years and a half in the castle of Trausnitz. The "dispute with the house of Luxemberg, in Bohemia, and with Pope John XXII induced

the Emperor, in 1325, to liberate his captive. Upon this the latter renounced all share in the government, and pledged himself to surrender all the Imperial domains which were still in the possession of Austria. But Leopold con¬ sidered the agreement derogatory to his dignity and continued the war against Louis. Fred¬ erick, therefore, again surrendered himself a prisoner in Munich. Moved by his faithful

ad¬ herence to his word, Louis concluded a friendly compact with Frederick, and made preparations for their common government, 7 Sept. 1325. These preparations, however, were never car¬ ried into execution ; for the agreement had been concluded without the consent of the electors. Leopold died in 1326, and Henry of Austria' in 1327 ; Frederick also died without children, 13 Jan. 1330, after which his brothers, Albert II and Otho, came to a reconciliation with the Emperor Louis. After the death of their uncle, Henry, Margrave of Tyrol and Duke of Ca¬ rinthia (the father of Margaret Maultasch), they persuaded the Emperor to grant them the investiture of Tyrol and Carinthia, in May 1335; they ceded Tyrol, however, to John, King of Bohemia, by the treaty of 9 Oct. 1356, in behalf of his son John Henry, or rather of his wife, Margaret Maultasch. In 1344, after the death of Otho and his sons, Albert II, called the Wise, united all his Austrian territories, which, by his marriage with the daughter of the last Count of Pfirt, had been augmented by the es¬ tates of her father in 1324, and by the Kyburg estates in Burgundy in 1326. Of the four sons of Albert II (Rodolph, Albert, Leopold and Frederick), Rodolph II (IV) completed the church of Saint Stephen's and laid the founda¬ tion of the University of Vienna. He died in Milan in 1365, without children, a short time after his youngest brother, Frederick. In 1379 the two surviving brothers divided the kingdom, so that Albert III (with the Queue) became master of Austria, and gave the other terri¬ tories to his brother, Leopold III, the Pious. Leopold had made repeated attempts to gain the Hapsburg possessions in Switzerland and extended the territory of his realm to a con¬ siderable degree, having purchased, among other minor provinces, the county of Feld-kirche, Bludenz, Hohenberg, upper and lower Suabia and, 1382, Trieste. He was killed 9 July 1386, on the field of Sempach, where he lost the battle, in consequence of the valor of Winkelried, and Albert administered the gov¬ ernment of the estates of his brother's minor sons. Margaret Maultasch ceded Tyrol to him on the death of Meinhard, her only son, who was married to the sister of Albert. She re¬ tained nothing but a few castles and 6,000 marks of gold. Her claims to Bavaria also she renounced in consideration of receiving Schard- ing and three Tyrolese cities, Kitzbuhel, Ballen- berg and Kuff stein, and 116,000 florins of gold. In 1365 Leopold III had bought the claims of the Count of Feldkirch for 36.000 florins; for 55,000 florins Austria received Brisgau from the Count of Fiirstenberg, with the cities of Neuberg. Old Brisach, Kentzingen and Billin- gen. The remainder of Carniola and the Windisch Mark, after the death of the last Count of Gorz, were ptirchased, together with the county of Pludentz, from the Count of Wer- denberg. and the possessions of the Count of Hogenberg, for 66,000 florins; and the city of

Trieste was acquired in 1380 by aiding in the war between Hungary and Venice. Moreover, the two governments of upper and lower Suabia were pledged for 40,000 llorins by the King of Rome, Wenceslaus, to Duke Leopold. The Austrian and Styrian lines, founded by Albert III and Leopold III, his brother, continued for 78 years. In 1395, when Albert III died, his only son, Albert IV, wTas in Palestine. On his return he determined to take vengeance on Procopius, Margrave of Moravia, for his hostile conduct ; but he was poisoned in 1404 at Znaym. His young son and successor, Albert V, was declared of age in 1410; and being the son-in- law of the Emperor Sigismund, he united the • crowns of Hungary and Bohemia in 1437, and connected them with that of Germany in 1438. But in the following year the young prince died. His posthumous son, Ladislaus, was the last of the Austrian line of Albert, and its pos¬ sessions devolved on the Styrian line, 1457.

From this time the house of Austria has furnished an unbroken succession of German emperors. Hungary and Bohemia were lost for a time by the death of Albert V, and, after the unhappy contests with the Swiss, under Frederick III, the remains of the Hapsburg estates in Switzerland. But several territories were gained ; and, to increase the rising splen¬ dor of the family, the Emperor conferred upon the country the rank of an archduchy. The dispute which broke out between Frederick and his brothers Albert and Sigismund, relating to the divisions of their paternal inheritance, ended with the death of Albert in December 1464. In the course of the troubles which resulted from this quarrel the Emperor was besieged in the citadel of Vienna by the citizens, wTho favored the cause of the murdered prince. Sigismund now succeeded to his portion of the estate of Ladislaus and Frederick became sole ruler of all Austria. His son Maximilian, by his marriage with Mary, the surviving daughter of Charles the Bold, united the Netherlands to the Austrian dominions. But it cost Maxi¬ milian much anxiety and toil to maintain his powrer in this new province, which he adminis¬ tered as the guardian of his son Philip. After the death of his father, 19 Aug. 1493, he was made Emperor of Germany, and transferred to his son Philip the government of the Nether¬ lands. Maximilian I added to his paternal in¬ heritance all Tyrol, and several other terri¬ tories, particularly some belonging to Bavaria. He also acquired for his family new claims to Hungary and Bohemia. During his reign Vienna became the great metropolis of the arts and sciences in the German empire. The mar¬ riage of his son

Philip to Joanna of Spain raised the house of Hapsburg to the throne of Spain and the Indies. But Philip died in 1506, 13 years before his father, and the death of Maximilian, which happened 12 Jan. 1519, was followed by the union of Spain and Austria ; his grandson (the eldest son of Philip), Charles I, King of Spain (see Charles V), was elected Emperor of Germany. In the Treaty of Worms, 28 April 1521, and of Ghent, 7 May 1540, he ceded to his brother Ferdinand all his hereditary estates in Germany, and re¬ tained for himself the kingdom of the Nether¬ lands. The house of Austria was now the pro¬ prietor of a tract of country in Europe com¬ prising 360.230 square miles. The Emperor

Charles V immediately increased the number of provinces in the Netherlands to 17, and confirmed their union with the German states, which had been concluded by his grandfather, under the title of the circle of Burgundy. In 1526 Austria was recognized as a European monarchy.

II. From 1526 to 1740. Ferdinand I, by his marriage with Anna, the sister of Louis II, King of Hungary, who was killed in 1526 in the battle of Mohacs, acquired the kingdoms of Hungary and Bohemia, with Moravia, Silesia and Lusatia, the appendages of Bohemia. Bo¬ hemia rejoiced to hail Ferdinand its King. Not¬ withstanding the divided opinions of the nobles, and the rising fortune of his adversary, John von Zapolya (see Hungary), he was raised to the throne of Hungary 26 Nov. 1526, by the Hungarian Diet, and was crowned 5 Nov. 1527. But Zapolya resorted for assistance to the Sul¬ tan, Soliman II, who appeared in 1529 at the gates of Vienna. The capital was rescued from ruin solely by the Count of Salem, general of the Austrian army, and the Imperial forces com¬ pelled Soliman to retreat. In 1535 a treaty was made by which John von Zapolya was allowed to retain the royal title and half of Hungary, and his posterity were to be entitled to nothing but Transylvania. But after the death of John new disputes arose, in which Soliman was again involved, and Ferdinand maintained the possession of lower Hungary only by paying the warlike Sultan the sum of 30,000 ducats annually. This took place in 1562. Ferdinand was equally unsuccessful in the duchy of Wiirtemberg. This province had been taken from the restless Duke Ulrich by the Suabian confederacy, and sold to the Emperor Charles V ; and when his estates wrere divided it fell to Ferdinand. Philip, Landgrave of Hesse, the friend of Duke Ulrich, took advantage of the opportunity offered him by the embarrassment of Ferdinand in the Hungarian War. With the aid of France he conquered Wiirtemberg; but France ceded it again to Ulrich in the Treaty of Baden, in Bohemia, concluded 20 June 1534 on condition that the province

should still be a fief of Austria, and after the extinction of the male line of the Duke that it should revert to that country. Ferdinand received also the Imperial crown in 1556, when his brother Charles laid by the sceptre for a cowl. He died 25 July 1564, with the fame of an able prince, leaving three sons and 10 daughters. According to the directions given in his will, the three brothers divided the patrimony, so that Maximilian II, the eldest son, who succeeded his father as Emperor, obtained Austria, Hungary and Bo¬ hemia; Ferdinand, the second son, received Ty¬ rol and Hither Austria ; and Charles, the third, became master of Stvria, Carinthia, Carniola and Gorz. But in 1595, after the death of the Archduke Ferdinand, the husband of Philip¬ pine Welser, the fair maid of Ausburg, his sons Andrew (cardinal and bishop of Constance and Brixen, and governor of the Netherlands for Spain) and Charles (Margrave of Burgau) were declared incompetent to succeed their father, and his possessions reverted to his rela¬ tions. In Hungary the Emperor Maximilian met with far better fortune than his father had done. The death of Soliman at Szigeth in 1566 was followed by a peace, and in 1572 Maximilian crowned his eldest son, Rodolph, King of Hun-

gary ; he was afterward crowned King of Bo¬ hemia, and was elected King of Rome. In his attempts to add the Polish crown to his Aus¬ trian dominions he was equally unsuccessful with his fourth son, Maximilian, who engaged in a similar enterprise after the decease of Stephenˆ Bathori in 1587. Maximilian died 12 Oct. 1576, and Rodolph, the eldest of his five sons, succeeded to the Imperial throne. The most remarkable events by which his reign is distinguished are the war against Turkey and Transylvania, the persecutions of the Protes¬ tants, who were all driven from his dominions, and the circumstances which obliged him to cede Hungary in 1608, and Bohemia and his hereditary estates in Austria in 1611, to his brother Matthias. From this time we may date the successful exertions of the Austrian sov¬ ereigns to put down the restless spirit of the nation, and to keep the people in a state of abject submission. Matthias, who succeeded Maximilian on the Imperial throne, concluded a peace for 20 years with the Turks; but he was disturbed by the Bohemians, who took up arms in defense of their religious rights. Alatthias died 20 March 1619, before the negotiations for a compromise were completed. The Bohemians refused to acknowledge his successor, Ferdi¬ nand II, and chose Frederick V, the head of the Protestant League, and elector of the palatinate, for their king. After the battle of

Prague, 1620, Bohemia submitted to the authority of Ferdinand. He immediately applied himself to eradicate Protestantism out of Bohemia proper and Moravia. At the same time he deprived Bohemia of the right of choosing her king, and of her other privileges. He erected a Catholic court of reform, and thus led to the emigration of thousands of the inhabitants. This large exodus of inhabitants did much to retard the growth of Bohemia. In fact the religious wars waged upon Bohemian soil for so long a time, dating back to the first out¬ breaks of the Hussites, with the subsequent agitations and conflicts consequent upon the Reformation, long and seriously hampered that state's general development up to modern times. The Austrian states also favoring, in general, the Protestant religion, were compelled by Fer¬ dinand to swear allegiance to him, and Luther¬ anism was strictly forbidden in all the Austrian dominions. The province of Hungary, which revolted under Bethlem Gabor, Prince of Transylvania, was, after a long struggle, sub¬ dued. This religious war dispeopled, impov¬ erished and paralyzed the energies of the most fertile provinces of the house of Austria. Dur¬ ing the reign of Ferdinand III, the successor of Ferdinand II (1637-57), Austria was con¬ stantly the theatre of war.

In the midst of these troubles Ferdinand ceded Lusatia to Saxony at the peace of Prague, concluded in 1635; and when the war was ended he ceded Alsace to France, at the peace of Westphalia in 1648. The Emperor Leopold I, son and successor of Ferdinand III, was victorious through the talents of his min¬ ister Eugene, in two wars with Turkey ; and Vienna was delivered by John Sobieski and the Germans under Karl von Lotharingien from the attacks of Kara Mustapha in 1683. Tn 1687 he changed Hungary into a hereditary kingdom, and joined to it the territory of Transylvania, which had been governed by dis¬

tinct princes. Thanks to the victories of Prince Eugene of Savoy, Leopold succeeded in concluding a permanent peace at Carlovitz in 1699. Moreover, he restored to Hungary the country lying between the Danube and the Theiss. It was now the chief aim of Leopold to secure to Charles, his second son, the inher¬ itance of the Spanish monarchy, then in the hands of Charles II, King of Spain, who had no children ; but his own indecision, and the policy of France, induced Charles II to appoint Philippe dAnjou, the grandson of Louis XIV, his successor. Thus began the war of the Spanish Succession (see Succession Wars) in 1701. Leopold died 5 May 1705, before it was terminated. Emperor Joseph I, his successor and eldest son, continued the war, but died without children, 17 April 1711. His brother Charles, the destined King of Spain, immedi¬ ately hastened from Barcelona to his hereditary states, to take upon him the administration

of the government. He was elected emperor 24 December of the same year; but was obliged to accede to the peace of Utrecht, concluded by his allies at Rastadt and Baden in 1714. By this treaty Austria received the Netherlands, Milan, Mantua, Naples and Sardinia. In 1720 Sicily was given to Austria in exchange for Sardinia. The duchy of Mantua, occupied by Joseph in 1708, was now made an Austrian fief, because it had formed an alliance with France prejudicial to the interests of Germany. This monarchy now embraced 191,621 square miles. Its annual income was between 13,000,000 and 14,000,000 florins, and its army consisted of 130,000 men; but its power was weakened by new wars with Spain and France. In the peace concluded at Vienna 1735 and 1738, Charles VI was forced to cede Naples and Sicily to Don Carlos, the Infante of Spain, and to the King of Sardinia a part of Milan, for which he re¬ ceived only a part of Parma and Piacenza. In the next year, by the peace of Belgrade, he lost nearly all of the fruits of Eugene's victories, even the province of Temeswar; for he was obliged to transfer to the Porte, Belgrade, Servia and all the possessions of Austria in Wallachia and Bosnia. To all this Charles VI willingly acceded in order to secure the suc¬ cession of his daughter, Maria Theresa, by the Pragmatic Sanction. This law of inheritance was passed 1713-19, and acknowledged one after another by all the European powers.

Austria under the House of Hapsburg- Lorraine. — By the death of Charles VI, 20 Oct. 1740, the male line of the Austrian house of Hapsburg became extinct ; and Maria Theresa having married Stephen, Duke of Lor¬ raine. ascended the Austrian throne. On every side her claims were disputed, and rival claims set up. A violent war began in which she had no protector but England. Frederick II of Prussia subdued Silesia; the Elector of Bavaria was crowned in Lintz and Prague, and in 1742 chosen emperor under the name of Charles VII. Hungary alone suoported the Queen. But in the peace of Breslau, concluded 4 Tune 1742, she was obliged to cede to Prussia, Silesia and Glatz, with the exception oj Teschen, Ja.getrt- dorf and Troppau. Frederick II, by assisting the party of Charles VII, soon renewed the war. But Charles died 20 Jan. 1745, and the husband of Theresa was crowned Emperor of Germany under the title of Francis I. A second treaty

of peace, concluded 25 Dec. 1745, confirmed to Frederick the possession of Silesia. By the peace of Aix-la-Chapelle, 18 Oct. 1748,

Austria was obliged to cede the duchies of Parma, Pia¬ cenza and Guastalla to Philip, Infante of Spain, and several districts of Milan to Sardinia. The Austrian monarchy was now firmly established; and it was the first wish of Maria Theresa to recover Silesia. With this object in view she formed an alliance with France, Russia, Saxony and Sweden. This was the origin of the Seven Years' War; but, by the peace of Hubertsbcrg, 1763, Prussia retained Silesia, and Austria had sacrificed her blood and treasures in vain. The first paper money was now issued in Austria, called state obligations, and the Emperor Fran¬ cis erected a bank to exchange them. After his death, 18 Aug. 1765, Joseph II, his eldest son, was appointed colleague with his mother in the government of his hereditary states, and elected Emperor of Germany. To prevent the extinction of the male line of her family Maria Theresa now established two collateral lines; the house of Tuscany, in her second son, Peter Leopold ; and the house of Este, in the person of the Archduke Ferdinand. For these separa¬ tions Maria Theresa indemnified the country by the confiscation of several cities, formerly pledged to Poland by Hungary, without paying the sum for which they stood pledged; by ob¬ taining Galicia and Lodomera in the first profligate division of the kingdom of Poland in 1772; and by the capture of Bukowina, which was ceded by the Porte in 1777. In the peace of Teschen, 13 May 1779, Austria received Inn- viertel, and the vacant county of Hohenembs in Suabia, the county of Falkenstein, and the Sua- bian territories of Tettnang and Argen; and thus at the death of the Empress, 28 Nov. 1780, Austria contained 234,684 square miles ; it had lost 16,366 square miles, and gained 34,301. The population was estimated at 24,000,000 ; but the public debt also had increased to 160,000,000 florins. The administration of the Empress was distinguished by substantial improvements in connection with government, agriculture, trade and commerce, the education of the people, the promotion of the arts and sciences and of re¬ ligion. The foreign relations of the kingdom also, even those with the Roman court, were happily conducted by the talents of her minis¬ ter, Kaunitz.

Her successor, Joseph II, was active and restless; impartial, but too often rash and vio¬ lent. While a colleague with his mother in the government he diminished the expenses of the state, and introduced a new system in the payment of pensions and of officers. But after the death of his mother all his activity and tal¬ ent as a sovereign was fully developed. As severe to the military as to the civil officers, he adhered, however, to liberal principles. The censorship of the press was reformed; the Prot¬ estants received full toleration, and the rights of citizenship; the Jews were treated with kind¬ ness ; 900 convents

and religious establishments were abolished, and even the visit of Pius VI made no alteration in Joseph's system of refor¬ mation. The system of education he subjected to revision and improvement ; and he tried to foster manufactures by duties on foreign goods. But his zeal excited the opposition of the ene¬ mies of improvement. The low countries re¬ volted, and his vexation probably led him to

attempt the exchange of the Netherlands, un¬ der the title of the kingdom of Austria, lor the palatinate of Bavaria under an elector. But the project was frustrated by the constancy and firmness of the next magnate, the Duke of Deux-Ponts, and by the German league con¬ cluded by Frederick II. Joseph was equally unsuccessful in the war of 1788 against the Porte. His exertions in the field de¬ stroyed his health; and grief at the rebellious disposition of his hereditary states accelerated his death, which happened 20 Feb. 1790. Joseph II was succeeded by his eldest brother, Leopold II. By his moderation and firmness he quelled the turbulent spirit of the Netherlands, and restored tranquillity to Hungary. The Treaty of Reichenbach with Prussia, 27 July 1790, and the Treaty of Sistova,

4 Aug. 1791, led to a peace with the Porte. The unhappy fate of his sister and her husband, Louis XVI of France, induced him to form an alliance with Prussia, but he died 1 March 1792, before the revolutionary war broke out. Soon after the accession of his son, Francis II, to the throne, and before he was elected Ger¬ man Emperor, France declared war against him as King of Hungary and Bohemia. In the first articles of peace, dated at Campo Formio, 17 Oct. 1797, Austria lost Lombardy and the Netherlands, and received as a compensation the largest part of the Venetian territory; two years previous, in 1795, in the third division of Poland, the Austrian dominions had been en¬ larged by the addition of west Galicia. In the beginning of the year 1799, the Emperor Fran¬ cis, in alliance with Russia, renewed the war with France. But Napoleon extorted the peace of Luneville, 9 Feb. 1801, and Francis acceded to it, without the consent of England. By the conditions of the treaty he was to cede the county of Falkenstein and the Frickthal. Fer¬ dinand, Grand Duke of Tuscany, at the same time renounced his claim to this province and received in return for it Salzburg and Berch- tesgaden, with a part of the territory of Passau, and was afterward made master of the largest part of Eichstadt, and honored with the title of elector. Austria obtained the Tyrolese arch¬ bishoprics, Trent and Brixen, and, notwith¬ standing its cessions of territory to France, had gained, including its acquisitions in Poland, 9,580 square miles ; this made the whole extent 253,770 square miles. The public debt had also increased to 1,220,000,000 florins.

The first consul of France now caused him¬ self to be proclaimed emperor; and 11 Aug. 1804, Francis declared himself hereditary Em¬ peror of Austria, and united the Austrian states under the name of the Empire of Austria. Im¬ mediately after this important act he took arms once more with his allies, Russia and Great Britain, against the government of France. The war of 1805 was terminated by the peace of Presburg (26 Dec. 1805). By the conditions if the treaty Francis was obliged to cede to France the remaining provinces of Italy; to the King of Bavaria, Burgau, Eichstadt, a part of Passau, all Tyrol, Vorarlberg, Hohenembs, Rothenfels, Tettnang, Argen and Lindau ; to the King of Wiirtemberg the five towns lying on the Danube, the county of Hohenberg, the landgraviate of Nellenburg, Altdorf and a part of Brisgau ; and to the Grand Duke of Baden the remainder of Brisgau, Ortenau, Constance

and the commandery of Meinau. He received, in return, Salzburg and Berchtesgaden ; the Elector of Salzburg was compensated by the province of Wurzburg; and the dignity of grand master of the Teutonic order was made hereditary in the house of Austria. Thus ended a. war which cost the Austrian monarchy, be¬ sides the territories just enumerated, 90,000,000 florins, which were carried away by the French I rom Vienna, and 800,000,000 for the other ex¬ penses of the war; of which Francis paid a large proportion from his private purse. After the formation of the Confederation of the Rhine (12 July 1806) Francis was forced to resign his dignity as Emperor of Germany (6 Aug. 1806), which had been in his family more than 500 years. The old German, or Holy Roman Empire thus came to an end, and Fran¬ cis had now only the title of Francis I, Em¬ peror of Austria. In 1809 he resolved on a new war with France, aided by Great Britain, which did nothing more than furnish some pecuniary assistance and made a useless attack on Wal- cheren. Austria fought courageously, but in vain. The peace of Vienna (14 Oct. 1809) cost the monarchy 42,380 square miles of territory, 3,500,000 subjects and more than 11,000,000 florins of revenue. The public debt was also increased to 1,200,000,000 florins, and all the paper money in circulation was estimated at

950,000,000.

Napoleon, after tearing from the Austrian monarchy its fairest provinces — the duchy of Salzburg, with Berchtesgaden, Innviertel,

west¬ ern Haus ruckviertel, Carniola and Gorz, Trieste, the circle of Villach, a large part of Croatia, Istria, a part of the Grisons, the Bo¬ hemian territories in Saxony, all west Galicia, the circle of Zamoski in east Galicia, Cracow, with half the salt works of Wieliczka, the circle of Tarnopol and many other territories which were given to Russia — formed a personal con¬ nection with the ancient family of Hapsburg, by his marriage with Maria Louisa, daughter of the Emperor of Austria, and (14 March 1812) concluded an alliance with the Emperor Francis against Russia. But the Emperor of France was repulsed on his invasion of this country; Prus¬ sia rose up against him ; and after the Congress of Prague had separated without accomplish¬ ing anything, Francis, 12 Aug. 1813, declared war against France, and formed an alliance, 9 Sept. 1813, at Teplitz, with Great Britain, Rus¬ sia, Prussia and Sweden, against his son-in-law. In the battle of Leipsic, the Austrian troops took an honorable part. The firmness with which the Emperor signed the act of proscrip¬ tion against his son-in-law, and fixed the fate of his daughter and her infant, excited general respect. He signed the same act against Na¬ poleon a second time, when he returned from Elba. He also opposed Murat in Italy. Yet the Austrian Cabinet endeavored to provide for young Napoleon in the settlement of the affairs of France. By the Congress of Vienna, 1814 — 15, Austria gained the portion of Italy which is usually known as Lombardy and Venetia, and recovered, together with Dalmatia, the heredi¬ tary territories which it had been obliged to cede. The former Grand Duke of Wurzburg, on the contrary, ceded his territory to Bavaria, and again took possession of Tuscany. The final act resulting from the congress was signed in 1820. In 1821 liberal movements in Italy were

put down. The July revolution of 1830, in France, caused warlike preparations to be made ; but after Great Britain had acknowledged the new government Austria acknowledged it also. Insurrections which took place in Modena, Parma and the Papal states, 1831-32, were suppressed without much difficulty. In the Lon¬ don conference relative to the affairs of Bel¬ gium Austria took an active share ; but in proportion as Great Britain and France became more closely united, Austria entered into more intimate relations with Russia and Prussia. In the. Polish insurrection Austria ultimately gave indications of a strong leaning in 'favor of Rus¬ sia. The death of the Emperor Francis I, 2 March 1835, and the accession of Ferdinand I made little change in the Austrian system of government. Metternich still continued at the head of affairs and to foster the reactionary policy. . In 1846 the failure of the Polish in¬ surrection had led to the incorporation of Cra¬ cow with Austria., but discontent with the government very

widely prevailed in the empire. In Italy, the declarations of Pio Nono in favor of reform, and the concessions into which most of the other governments of the Italian Penin¬ sula had. been hurried, increased the difficulties of Austria. In Hungary the constitutional op¬ position became stronger and stronger, and latterly, under the guidance of Kossuth and other popular agitators, assumed the form of a great constitutional movement. In 1848 the ex¬ pulsion of Louis Philippe shook all Europe to its foundations. Metternich found it impossible any longer to guide the ship of state, and the government found itself compelled to grant a free press, and allow the citizens freely to arm themselves. The popular movement made great progress in Hungary; and in Italy a formidable insurrection broke out, threatening the very existence of the Austrian power in the penin¬ sula. In the very centre of the empire, in Vienna itself, the insurrection made, equal progress, and the royal family, no longer in safety, removed to Innsbruck. The Austrian monarch}' appeared now to be hanging by a thread. The Hungarian Diet declared itself permanent, under the presidency of Kossuth. Various ministerial changes took place, and at last the Emperor abdicated in favor of his nephew, Francis Joseph. More vigorous meas¬ ures were now adopted, and Austria, strongly aided by the forces of Russia, who feared a revolution within her own borders, succeeded in suppressing the Hungarian insurrection. Hay-nau, on the occasion, rendered himself notorious by his severity, and Hungary underwent the fate of a conquered country. The year 1855 is memorable in Austrian history for the conclu¬ sion of a concordat with the Pope which put the educational and ecclesiastical affairs of the empire entirely into the hands of the Papal see. It established an ecclesiastical censorship of the press, and placed all schools, even private schools, under surveillance of the bishops; it proclaimed the complete independence of the bishops in relation to the civil government, so that all decrees proceeding from Rome might be published without obtaining the royal placet, and it authorized the bishops to convoke the provincial councils and diocesan synods without the consent of the civil authority. In 1859 the hostile intentions of France and Sardinia against the possessions of Austria in Italy be-

came so evident that she declared war by send¬ ing an army across the Ticino, but after dis¬ astrous defeats at Magenta and Solferino she was compelled to cede Milan and the northwest portion of Lombardy to the Sardinian King. In 1864 she joined with Prussia and the other

German states in the spoliation of Denmark, but a dispute about the conquered provinces of Schleswig-Holstein involved her in a war with her allies (1866), while at the same time Italy renewed her attempts for the recovery of Venice. Austria had accordingly to show front both in the north and in the south. The south¬ ern army under Archduke Albert fought suc¬ cessfully, defeating the Italians under Victor Emanuel at Custozza, 24 June, and driving them back across the Mincio, but the fortune of the northern army under General Benedck was very different. On 3 July Benedek was com¬ pletely defeated by the Prussian forces at Koniggratz (Sadowa) in Bohemia, and the road to Vienna lay open to the victors. Francis Joseph now ceded Venetia to Napoleon III, and claimed his intervention to assist in procuring a peace, evidently wishing to make a separate treaty with Italy, so as to be at liberty to em¬ ploy the southern army against Prussia. This design did not succeed, however. Both Italy and Prussia were willing to accept the media¬ tion of Napoleon, but Italy would not hear of a separate arrangement and continued the war. On 20 July Admiral Tegetthoff defeated the Italian fleet near the Dalmatian island Lissa : but, on the other hand, the Prussians continued to advance into Austria and threatened Vienna. Francis Joseph accordingly saw himself obliged to conclude a peace with Prussia 23 August, and a little later peace was concluded with Italy also, 3 October. The result of the war was the cession of Venetia through France to Italy, and the withdrawal of Austria from all interference in the affairs of Germany. See Seven Weeks' War.

After 1866 Austria was occupied chiefly with the internal affairs of the empire. The first aim of the government was to restore the Constitu¬ tion of the state, which had been established in February 1861, but which had been suspended since 1865 owing to the demand of Hungary for self-government. As Austrian statesmen were anxious for a settlement of the dispute, the Hungarian demands were finally agreed to, and the empire of Austria divided into two parts, the one made up of the Cisleithan or Slavonic-German provinces, the other of the Transleithan provinces, the latter forming to¬ gether the kingdom of Hungary. These two divisions of the empire were to be entirely in¬ dependent, except in matters of diplomacy and military and naval matters — to some extent also in matters of finance. This settlement was consummated by the coronation of the Emperor Francis Joseph I as King of Hungary, which took nlace at Pesth-Ofen, on 8 June 1867. Dur¬ ing the session of the Reichsrath, that is, the Diet of the Cisleithan provinces, held in the same year, the important question of the con¬ cordat of 1855 came up for discussion. The Liberal majority in the Diet were desirous of seeing it entirely repealed, but as they

fully recognized the insuperable obstacles in the way of this step, they were content to proceed by separate enactments intended to weaken the power that had been gained to the Papal see

by the concordat. With this end in view three measures were brought forward, one for the re-establishment of civil marriage, one for the emancipation of the schools from the domina¬ tion of the Church and one for the placing of the different creeds on a footing of equality. Before 25 May 1868, all these measures had passed through both houses of the Diet, and on that day they received the imperial sanction. These laws were declared by the Pope to be ˆabominable,® as well as null and void. Further enactments having in view the weakening of the power of the papal see in the state were passed in 1874 and were condemned by the Pope in the severest terms. The fact of the Austro-Hungarian dominions comprising so many different nationalities with different lan¬ guages has always given the government much trouble, both in the management of the internal affairs and in regard to external matters. In the Eastern question, for instance, the course of Austria was hampered by the sympathy shown by the Magyars for the Turks, while her Slav subjects were naturally more favorable to Russia, Serbia and Montenegro. Previous to the outbreak of hostilities between Russia and Turkey she joined with the other powers in remonstrance with Turkey, but as to the actual struggle remained neutral. At the close of the war in the middle of 1878 Austria took part in the Congress of Berlin, where the settlement of the Eastern question was arranged, and by this congress it was decided that the provinces of Bosnia and Herzegovina should in future be administered by Austria-Hungary instead of Turkey.

The occupation of Bosnia and Herzegovina, however, was not accomplished without a fierce struggle, and simply added new factors to the incessant internal friction which continued be¬ tween the different nationalities and political factions of the empire. This was not dimin¬ ished by the final act. of annexation, 13 Oct. 1908. In 1907, following two years of per¬ sistent agitation throughout the empire, the law of general manhood suffrage was passed,- and resulted, in ensuing elections, in the accession of a great number of socialistic members to both Parliaments and the common Delegations. While internal turmoil did not abate, Austrian external policy was also disturbed by the re¬ sults of the Balkan Wars of 1912 and 1913, the defeat of Turkey and Bulgaria, and the in¬ creased influence of Russia as the «big brother® of the Slav nationalities. The trend of events culminated in a crisis when on a visit to Bosnia, the Crown-Prince Ferdinand and his consort were assassinated at Sarajevo by two Austrian subjects of Serbian extraction 28 June 1914. The war which

followed resulted in the annihi¬ lation of the Dual Monarchy. Charles, the last Hapsburg Emperor, abdicated 12 Nov. 1918 and the Treaty of St. Germain of 1919 effectually broke up Austria-Hungary into a number of small states. See Austria ; Czecho-Slovakia ; Jugoslavia; Hungary; Italy; Austria-Hun¬ gary and the War ; and War, European.

Bibliography.— Apponyi, A., . (Die recht- liche Natur der Beziehungen zwischen Oster- reich und Un?am) (Vienna 1911) ; Colquhoun, A. R. and E., cThe Whirlpool of Europe *(London 1907) ; Drage, G., (Austria-Hungary* (London 1909) ; Gribble, F., <The Life of the Emperor Francis Joseph* (London 1913) ;

Krones, (f-Tandbuch deˆ Geschichte Oster- reichs' (Berlin 1876-70) ; Leipnik, F. L, (The Foreign Policy of Austria-Hungary, 1866- 1915' (London 1915) ; Lichnovski, (Geschichte des Hanses Habsburg bis zum Tod Kaiser Max¬ imilians P (8 vols., Vienna 1836-44) ; Mailatb,

(Geschichte des osterreichischen Kaiserstaatcs' (Hamburg 1834) ; Seton- Watson, R. W., (The Southern Slav Question and the Hapsburg Monarchy } (London 1911) ; Steed, H. WT, (The Hapsburg Monarchy' (London 1914) ; Schneller, (Staatengeschichte des Kaiserthums Osterreich' (4 vols., Graz 1817-19) ; Springer,

(Geschichte Osterreichs seit dem Wiener Frie- den' (Leipzig 1864-65) ; Schmit Ritten von Tavera, ˆibliographie zur Geschichte des oster¬ reichischen Kaiserstaatcs' (Vienna 1858) ; Wurzbach, QBibliographisches Lexikon des Kaisertums Osterreich' (60 vols., Vienna 1857— 92). Publications by the Imperial and Royal Academy of Sciences at Vienna relative to the historical monuments are chiefly the following: (Fontes rerum Austriacarum' (from 1849 to date) ; (Archiv fur Kunde osterreichischer Ge- schichtsquellen' ; (Archiv fiir osterreichische Geschichte' ; (Mitteilungen des Instituts fiir osterreichische Geschichtsforschung,' etc.

Charles Leonard-Stuart. Revised and supplemented by Dr. W. M. Petro-

VITCH.

AUSTRIA-HUNGARY, Diplomatic Re¬ lations. Austria, declining in European in¬ fluence and pecuniary resources at the time of the American Revolution, had little trade at¬ tractions for the United

States, except through the city of Ostend. Her answer to Arthur Lee and to William Lee gave evidence that she would probably be the last European power to recognize American independence; but in 1781 she joined Russia in a proposal for mediation which accepted by Congress led to negotiations resulting in peace with independence. She attracted very little attention in the United States before the meetings of the Vienna Con¬ gress. The American government declined an invitation to participate in the meetings of the Holy Alliance, but in 1823 Monroe appointed a confidential agent to observe and report its activities. Commercial intercourse, insignifi¬ cant at first, increased after the close of the Napoleonic wars and in 1829 resulted in the negotiation of a treaty of commerce and navigation.

Regular diplomatic relations began with the American appointment of Nathaniel Niles as agent (in 1837) to procure a modification of duties and restrictions on the importation of American tobacco, and the Austrian appoint¬ ment of Baron de Mareschal as Envoy Extraor¬ dinary and Minister Plenipotentiary in 1838. A treaty relating to property and consular juris¬ diction was negotiated in 1848, followed by a treaty of extradition in 1856. Under the stimulus of democratic expansion and <(mani- fest destiny® at the middle of the century, the ITnited States exhibited a deep sympathy for Hungary (in her unsuccessful struggle against Austria and Russia) which induced the American government in 1849 to send an agent, A. Dudley Mann, with a view to the recognition of the Hungarian republic, and led Congress in 1849, after Hungary was crushed, to offer an asylum to Kossuth and his fellow exiles and to give a public reception to Kossuth

on his visit to Washington. The Mann mission, when it became known, was the subject of a strong protest of Austria through her charge-d'affaires, M. Huclsemann, to whom Webster made a vigorous and spirited reply and who temporarily withdrew from Washington soon after the Kossuth craze.

In 1853 new friction arose in the case of Martin Ivoszta, a Hungarian refugee to the United States, who, having returned to Europe after declaring his intention to become an American citizen, had been seized in a Turkish port by an Austrian cruiser. His forcible re¬ lease from the vessel by Captain Ingraham of the United States war vessel brought from HueLsemann a demand for reparation and dis¬ avowal which Secretary Marcy refused to give. At the close of a diplomatic warfare, Austria surrendered her claim to jurisdiction over Koszta who returned to the United States with the understanding that Austria could proceed against him in case he should ever return to Turkey. Apparently friendly to the United States at the opening of the

secession struggle, Austria never accorded belligerent rights to the Confederates. In the summer of 1863 Motley reported that1 she was recruiting troops to accompany Maximilian to Mexico and sub¬ mitted to the Austrian government some un¬ authorized views in regard to the Mexican question for which Seward censured him. At the close of the war, however (in 1867), Motley was instructed to warn Austria not to send volunteers to replace the French troops in Mexico, and when he hesitated to act Seward disapproved his delay and effectively directed him to file a protest at once and to withdraw from Vienna in case the departure of the troops was permitted.

Since the Civil War, questions relating to naturalization and expatriation have been the most prominent and most persistent. Although the naturalization convention of 1870 with Austria-Hungary recognizes the right of citi¬ zens or subjects of one country to become citizens or subjects of the other after an un¬ interrupted residence of five years, its inter¬ pretation has frequently been a subject of diplomatic discussion in connection with the arrest of persons who, born in Austria or Hungary, had emigrated to the United States before the performance of their military serv¬ ice, and often to escape it, and after meeting the requirements for American citizenship had returned to their native land to reside per¬ manently, enjoying all the privileges of the government without sharing its burdens and responsibilities, and perhaps creating discord and loudly boasting of their immunity from military service. The Austro-Hungarian gov¬ ernment, claiming that the citizenship of many such pseudo-Americans had been obtained in fraudem legis, or that it had never been com¬ pleted, summoned them to military duty; in case of their refusal to serve, it arrested them ; and, in some instances of ostentatious evasion, while feeling bound by treaty stipulations, it resorted to expulsion from the country under a law of 1871, asserting that the presence of the persons expelled exerted a pernicious in¬ fluence in the community of their origin and that the treaty of 1870 gave American citizens no right to permanent residence in the country. The earlier friction arising from such cases

greatly decreased by 1900, however, as a result of the steady progress made toward their satis¬ factory settlement through more precise infor¬ mation. Arrests became more infrequent. On the representations of the American legation in worthy cases the Austrian government ob¬ served treaty provisions in the larger number of

arrests of American naturalized citizens for alleged evasion of military service and released them from military obligations. Representa¬ tions against expulsion were made only when its adoption appeared unduly onerous. In November 1899, on the ground that so many Austro-Hungarians had taken advantage of treaty stipulations to become nominally citi¬ zens of the United States with the sole object of living in their native country in defiance of its military laws, the Austrian legation at Washington renewed a proposal (which had been offered as early as 1883 as a result of the military law of 1882) for a modification of the naturalization treaty of 1870 by which the American government would no longer feel obliged to extend protection to mala-fide citizens, and the Austrian government would no longer feel compelled to expel them. The American Department of State which in reply to similar prior proposals had admitted that this abuse of treaty stipulations should be dis¬ continued, and still admitted that there were <(doiibtless grave abuses of the privileges of naturalization,® declined to accept the proposal for amendments which would have annulled beneficial treaty provisions preventing the sub¬ jection of bona-fide naturalized citizens to mili¬ tary service. In June 1896, the Austro-Hun¬ garian legation at Washington suggested the necessity of using a form of naturalization oath which should ((mention the fact of the existence of separate Austrian and Hungarian citizenship.® Among other questions affecting diplomatic relations since 1870, Austrian tariffs and trade restrictions (especially on meats and fruits) stand first. Trade relations were improved by the reciprocity arrangement of 1892, but ob¬ structions to American imports still threatened to provoke retaliatory inspection of Austrian imports into the United States.

Still other questions arose. In 1885 Austria objected to the appointment of A. M. Keeley as American Minister at Vienna on the double ground of his want of political tact and his Jewess wife — neither of which appeared valid to the American State Department. In 1891 there was considerable correspondence relating to the question of preventing the emigration of defective, dependent and delinquent classes.

Although Austria sympathized with Spain in the Spanish-American War, her authorities at Trieste gave a friendly reception to Admiral Dewey in 1899. In 1909 she agreed to an arbi¬ tration treaty with the United States.

The American government, when it de¬ clared war against Germany in the spring of 1917, hoped to avoid the necessity of a declara¬ tion against Austria-Hungary, Germany's ally; but, by the conditions of the

war, it finally, in the following December, found it necessary to declare war against Austria-Hungary also.

James M. Callahan,

Professor of History and Political Science, West Virgina University.

AUSTRIA-HUNGARY AND THE WAR. The position of the Dual Monarchy

in regard to the European War will long re¬ main a controversial topic for historians to debate. Whatever light the future may throw upon the subject, it is at least now possible to point definitely to the Austro-Hungarian ultimatum to Serbia on 23 July 1914 as the direct or immediate cause of the great con¬ flagration. It is equally established that the grounds for the ultimatum were furnished by the assassination of the Archduke Francis Ferdinand and his wife at Serajevo, the cap¬ ital of the Austrian province of Bosnia, on 28 June 1914. The Austrian government charged that the crime had been instigated in Serbia and by Serbian officials. A storm of anti- Serbian feeling swept over Austria and Hun¬ gary; the members of the Serb party in the Provincial Council of Croatia were assailed by their colleagues with cries of <(Serbian as¬ sassins,® while excited mobs in Vienna threat¬ ened the Serbian legation. The Austrian press demanded the punishment of Serbia. On 23 July the Austro-Hungarian government pre¬ sented the ultimatum to Serbia. Thus it may be said that the war took its rise from the murder of an archduke and the indignation of Austria against Serbia, where the plot was al¬ leged to have been hatched. These antecedent conditions do not, however, explain how a purely local quarrel came to embroil the whole world. So far as the two original belligerents — Austria-Hungary and Serbia — are con¬ cerned, the following review of their past re¬ lations will serve to show that the Serajevo tragedy was but the culminating point — the last straw — that brought a long-standing quarrel to a head.

The Austrian defeat by Prussia at Sadowa in 1866 compelled the house of Hapsburg to seek a new centre of gravity in the southeast. The German victories over France in 1870 and 1871 placed the Austrian dream of revenge beyond hope of fulfilment. But meantime, be¬ tween Sadowa and Sedan, Austria had ad¬ mitted Hungary to full partnership in the Monarchy with a view to a fresh struggle against the German empire. When, after the Franco-German War, the Emperor Francis Joseph realized the necessity of admitting also his Slav subjects to partnership in the Mon¬ archy, he found in the existence of the Dual System an insuperable obstacle to his scheme. Geographically

hemmed in by Slav popula¬ tions, Hungary had always pursued a strongly anti-Slav policy, working on the principle that the Slavs, and particularly the Serbo-Croa- tians, both in the Monarchy and in the king¬ dom of Serbia, must be kept in a state of sub¬ jection. Under the Hungaro-Croatian settle¬ ment of 1868, which resulted from the Dual System, the inhabitants of Croatia-Slavonia, constitutionally subjects of the Hungarian crown, were oppressed and their development impeded, while continual discord was fomented and encouraged between the Croatian, or Ro¬ man Catholic branch of the Southern Slav race, and the Serbo, or Orthodox branch. The occupation of Bosnia-Herzegovina (q.v.) in 1878 formed part of the policy of ruling the Southern Slav race and of keeping the various branches divided in order to rule them the more effectively. At the same time Aus¬ tro-Hungarian diplomacy sought to gain con¬ trol over the kingdom of Serbia, which for

many years stood practically under Austrian tutelage. After the defeat of Serbia by Bul¬ garia in 1885, Austria intervened as a pro¬ tector to check the Bulgarian advance. Not until after the expulsion of King Milan (q.v.) in 1899 did Serbia begin to emancipate her¬ self from Austrian control. The young King Alexander showed a disposition to turn toward Russia, but his unfortunate marriage made him unpopular and led to his murder on 11 June 1903. The accession of Peter Kara-georgevitch promised more friendly relations between Serbia and Austria, but trouble arose in 1905 when Serbia concluded a customs union with Bulgaria. This prospect of eco¬ nomic union between two Balkan Slav states was so distasteful to Austria-Hungary that the government immediately declared a tariff war against Serbia and excluded all her cat¬ tle and agricultural produce. Serbia resisted the attack to the best of her ability and suc¬ ceeded in finding new markets in France, Eng¬ land and Egypt. From this tariff war, which lasted several years, dates the growth of the Serbian spirit of economic and political inde¬ pendence and the accentuation of Serbian re¬ sentment against Austria-Hungary.

Under Russian guidance a conciliatory spirit was meanwhile spreading among the Southern Slavs of the Dual Monarchy. At a conference held in Fiume October 1905 a reso¬ lution was adopted that ended the old feud between Roman Catholic Croatians and Ortho¬ dox Serbs. Regarding this reconciliation as a conspiracy rather than a spontaneous move¬ ment, the Hungaro-Croatian authorities in 1907

arrested 53 Southern Slavs, who were accused of high treason on the strength of denunciations by an agent provocateur. The trial of these individuals at Agram developed into a judicial scandal; it lasted two years and ended in acquittal of the defendants. In 1908 Baron Aehrenthal (q.v.) utilized an alleged Pan-Serb conspiracy as a pretext for annexing Bosnia and Herzegovina (q.v.). The annex¬ ation aroused the deepest indignation in Ser¬ bia, where hopes of adding the two provinces to the kingdom had long been entertained. These aspirations were based upon the fact that the population of the provinces is entirely Serb, though divided by religion into Roman Catholic, Orthodox and Mohammedans. The Bosnia-Herzegovina coup brought Austria no practical advantage ; the provinces were her own to all intents and purposes, and few seri¬ ously believed or even wished that they would ever be handed back to Turkey or be per¬ mitted to fall to Serbia. What the event did, however, was to draw upon Austria the hos¬ tility of Russia and Serbia and to teach the smaller Balkan states that they could achieve their national aims only by united action and in disregard of the Great Powers. Accord¬ ingly, they formed a new and formidable pow¬ er bordering on Austria-Hungary and looking forward to the acquisition of provinces in that empire inhabited by people of their race. Austria-Hungary thus became exposed to a double menace: besides that of the ((Italia Ir¬ redenta® of the Trentino and Trieste, the pros¬ pect of a “Slavonia Irredenta® in Croatia, Dalmatia, Bosnia, Herzegovina, Istria, Car- niola and Carinthia and a ((Rumania Irredenta® in Transylvania and Bukovina. Even her

naval power in the Adriatic was imperilled by her abandonment (at the time of the an¬ nexation) of the Sanjak of Novi Bazar, which barred the access of Serbia to that sea, and Serbia’s claim to an Adriatic port, now that the way was open to her, brought Austria-Hungary to the verge of a war with her and her protector, Russia, already in 1909.

The members of the Serbo-Croatian coali¬ tion in the Diet of Agram, the capital of Croatia, prosecuted an Austrian semi-official writer, the historian Dr. Friedjung, in De¬ cember 1909 for libel. Friedjung had laid charges of treasonable commerce with Serbia against the members, who proved, at the trial, that the historian had based his accusations on forged documents which had been supplied to him by the Austrian Foreign Office. These documents, tending to prove a Pan-Serbian conspiracy against Austria-Hungary, had been forged by an individual who was in the em¬ ploy of the Austrian legation at Belgrade. The Serbian government prosecuted the for¬ ger, who received 15 years’ imprisonment. In course of time a strong sympathy

with Ser¬ bia became general among the Southern Slavs of the Monarchy. When the Balkan League (q.v.) was formed in 1912 against Turkey, it was understood to be directed in almost equal measure against .Austria-Hungary, which country was suspected of harboring a design to humiliate Serbia and reduce her to her for¬ mer position of dependence. The murdered Archduke Francis Ferdinand was regarded as the head of the anti-Serbian military and clerical party in Austria. He had fully esti¬ mated the vital importance of the Southern Slav question for Austria;' he wished to upset the Dual System, which he regarded as the main obstacle to proper treatment of the Aus¬ tro-Hungarian Southern Slavs, and at the same time to find a Roman Catholic “Croa- tian,® as opposed to a Serb Orthodox, solution for the problem. On the outbreak of the Bal¬ kan War (q.v.) in October 1912, the military party in Austria desired armed intervention against Serbia. Their wish was overruled, mainly because it was expected that the Turks would defeat the Serbians and that Austria would then be able to intervene again, as in 1885, save Serbia from ruin and re-establish political control over the kingdom. Contrary to expectations, however, it was the Turks who were defeated, a circumstance that was deeply deplored in Vienna, while the ensuing quarrels between the Balkan allies over the division of the spoils were heartily encouraged by Austrian diplomacy. The second Balkan War was directly due to the influence of Aus¬ tro-Hungarian diplomacy upon King Ferdi¬ nand of Bulgaria, who undertook to crush Serbia but was himself defeated. During the peace conference held in London in the winter of 1913 and in the ambassadorial conferences that accompanied it, Austria-Hungary and her allies successfully exerted their influence to prevent Serbia from acquiring a port on the Adriatic. At that time the Serbian Premier, M. Pashitch, made overtures for a direct set¬ tlement to Count Berchtold (q.v.). He of¬ fered considerable economic and financial concessions to Austria-Hungary and begged Count Berchtold to use his influence to secure satisfaction for the legitimate aspirations of

Serbia to a commercial port. He offered bind¬ ing guarantees that this port would be purely commercial and urged that friendship would be sealed between the two countries by such a proof of Austro-Hungarian good will. These overtures were summarily rejected. Austria- Hungary was the only great power that had any vital interest in the Balkan question, and it was no doubt her grave concern that her neighbor Serbia should not become too strong. Influential persons in the empire

came to the conclusion that the only effectual way of se¬ curing this object was to compel Serbia to submit to Austrian dictation bv force of arms. This process was seriously under consideration in 1913, but Count Berchtold, supported by the Emperor, held that this would be too risky a policy, as it might not only involve a war with Serbia and her allies, but also with Russia. He therefore hit upon the idea of creating a buffer state of Albania, whose harbors on the coast would be open to Serbia for purposes of trade only. But Russia insisted that some compensation should be made to Serbia for the Albanian territories she had conquered in the Balkan War and would now have to surrender again. At the time Russia had a large army on the Galician frontier, which compelled Austria to retain her troops there. Negotiations between the Emperor and the Tsar led to an agreement whereby Serbia re¬ ceived the principal Albanian towns on her frontier, Ipek, Prizrend, Dibra and Diakova. Thus was the spectre of a European war re¬ moved in 1913. But not for long. The Sera- jevo assassinations in 1914 fanned the slum¬ bering embers of animosity once more into flame. It was imffiediately realized by those acquainted with the past history that Austria- Hungary might take advantage of the murder as a reasonable excuse for invading Serbia, and that, if the struggle could be localized, it might well end in the annihilation of Serbia. But success in this direction would not have brought the Dual Monarchy a solution of the Southern Slav problem, for though conquest might indeed bring Serbia under Austro-Hungarian domination, it would have tended to unite within the Monarchy all the branches of the Southern Slav race and raised in an acute form the question of the stability of the Dual System, that legacy of Sadowa which was the primary cause of the ill-treatment and disaffection of the Southern Slavs within the Austrian empire and of the perpetual agita¬ tions and plottings of the other Slavs outside.

The ultimatum presented at Belgrade on 23 July demanded a reply before 6 p.m. on the 25th. It stated that athe history of recent years has shown the existence in Serbia of a subversive movement with the object of de¬ taching a part of Austria-Hungary from the Monarchy — a movement which had its birth under the eyes of the Serbian government, and was carried out by a series of acts of terrorism, outrages and murders.® The Ser¬ bian government had “done nothing to repress the movement® ; it had permitted ((the crim¬ inal machinations of various societies and as¬ sociations,® had <(tolerated apologies for the perpetrators of outrages and the participation of Serbian officers and civil officials in the movement,® and had permitted all the mani¬ festations which have incited the Serbian peo¬

ple to hatred of the Monarchy and contempt of its institutions.® The assassinations had been traced to Belgrade, and it was therefore impossible for the Austro-Hungarian govern¬ ment ((to pursue any longer the attitude of expectant forbearance which it had main¬ tained for years in face of the machinations started in Belgrade and thence propagated to the territories of the Monarchy.® The Ser¬ bian government was demanded to publish a declaration on the front page of the Official Journal for 26 July to the effect that <(it con¬ demns the movement whose final aim is to detach from the Austro-Hungarian Monarchy territories belonging to it,® and that it (<regrets that Serbian officers and civil functionaries have participated in the movement and there¬ by compromised the neighborly relations to which Serbia was solemnly pledged by its declaration of 31 March 1909.® The following categorical demands were also made:

1. The suppression of all publications inciting to hatred and contempt of the Austro-Hungarian Monarchy or whose tendency is directed against its territorial integrity.

2. Immediate dissolution of the society Naradna Obrana and confiscation of all its means of propaganda; also of all other societies with the same objects.

3. Elimination from public instruction in Serbia of every¬ thing serving to foment the propaganda against Austria- Hungary.

4 Removal from the service of all officers and civil functionaries guilty of such propaganda whose names and acts shall be communicated by the Austro-Hungarian government to that of Serbia.

1. Representatives of thi Austro-Hungarian government to be accepted by Serbia for the purpose of collaborating in the suppression of the above propaganda.

2. Judicial proceedings to be taken against accessories to the plot of 28 June who are on Serbian territory, and delegates of the Austro-Hungarian government to take part in the in¬ vestigation relating thereto.

3. The immediate arrest of Major Jankasitch and the Serbian state functionary, Ciganovitch, who were found to be implicated in the plot at the official inquiry at Serajevo.

4. The prevention by effective measures of the co-operation of the Serbian authorities in the illicit traffic in arms and explosives across the frontier, and the dismissal and severe punishment of

the officials of the frontier service who had facilitated the passage of the frontier for the perpetrators of the outrage.

5. Explanation of the utterances of high Serbian officials, both in Serbia and abroad, who notwithstanding their official position did not hesitate after the crime of 28 June to express themselves in terms of hostility to the Austro- Hungarian government.

6. Notification to the Austro-Hungarian government without delay of the execution of the measures comprised under the preceding heads.

The feverish activity occasioned by the Austrian Note among the chancelleries of Europe, the exchange of telegrams and result¬ ant consultations and negotiations between the Powers, will be found under War, European : Diplomatic History. The Serbian reply, de¬ livered within the stipulated time, accepted ((in principle,® but with certain reservations, nearly all the Austrian demands. Serbia protested, however, against the claim that Austro-Hun¬ garian officials should take part in the judicial inquiry on Serbian territory and in the sup¬ pression of propaganda, and suggested that the matter should be settled by arbitration. The reply was deemed unsatisfactory; Aus¬ tria declared war on Serbia 28 July 1914 and opened hostilities on the 29th by bombarding Belgrade. The Austrian case for commencing the war was published in a manifesto by the late Emperor Francis Joseph, dated Ischl, 28 July: ((To my peoples! It was my fervent wish to consecrate the years which, by the grace of God, still remain to me, to the works of peace and to protect my peoples from the heavy

sacrifices and burdens of war. . . . The in¬ trigues of a malevolent opponent compel me, in the defense of the honor of my Monarchy, for the protection of its dignity and its posi¬ tion as a Power, for the security of its pos¬ sessions, to grasp the sword after long years of peace. With a quickly forgetful ingrati¬ tude,ˆ the kingdom of Serbia, * which, from the first beginnings of its independence as a state until quite recently, had been supported and assisted by my ancestors, has for years trodden the path of open hostility to Austria- Hungary. When, after three decades of iruitful work for peace in Bosnia and Herze¬ govina, I extended my sovereign rights to those lands, my decree called forth in the kingdom of Serbia, whose rights were in

nowise injured, outbreaks of unrestrained pas¬ sion and the bitterest hate. My government at that time employed the handsome privi¬ leges of the stronger, and with extreme con¬ sideration and leniency only requested Serbia to reduce her army to a peace footing and to promise that, for the future, she would tread the path of peace and friendship. Guided by the same spirit of moderation, my govern¬ ment, when Serbia, two years ago, was em¬ broiled in a struggle with the Turkish empire, restricted its action to the defense of the most serious and vital interests of the Monarchy. It was to this attitude that Serbia primarily owed the attainment of the objects of that war. The hope that the Serbian kingdom would appreciate the patience and love of peace of my government and would keep its word has not been fulfilled. The flame of its hatred for myself and my house has blazed ever higher; the design to tear from us by force inseparable portions of Austria-Hungary has been made manifest with less and less disguise. A criminal propaganda has extend¬ ed over the frontier with the object of de¬ stroying the foundations of state order in the southeastern part of the Monarchy ; of mak¬ ing the people to whom 1, in my paternal af¬ fection, extended my full confidence, waver in their loyalty to the ruling house and to the Fatherland; of leading astray its grow¬ ing youth and inciting it to mischievous deeds of madness and high treason. A series of murderous attacks, an organized, carefully-prepared and well-carried-out conspiracy, whose fruitful success wounded me and my loyal peoples to the heart, forms a visible bloody track of those secret machinations which were operated and directed in Serbia. A halt must be called to these intolerable pro¬ ceedings and an end must be put to the inces¬ sant provocations of Serbia. The honor and dignity of my Monarchy must be preserved unimpaired. ... In vain did my government make a last attempt to accomplish this object by peaceful means and to induce Serbia, by means of a grave warning, to desist. Serbia has rejected the just and moderate demands of my government and refused to conform to those* obligations, the fulfilment of which forms the natural and necessary foundations of peace in the life of peoples and states. I must therefore proceed by force of arms to secure those indispensable pledges which alone can insure tranquillity to my states within and durable peace abroad.® Finally, the Emperor declared that (<in this solemn hour I am fully

conscious of the whole significance of my resolve and my responsibility before the Al¬ mighty® ; that he had (<examined and weighed everything,® and with a serene conscience would (<set out on the path to which duty points.®

It is important to record that Count Berch- told strove up to the last for a pacific issue. He repeatedly asked the Emperor to be re¬ lieved

of his post and only remained at the Foreign Office to carry out a policy distasteful to him out of loyalty to his Imperial master. On 31 July, three days after he had launched the fateful declaration of war, Count Berch- told announced in London and Paris that he would consent to submit to mediation the points in the Note to Serbia which seemed in¬ compatible with the maintenance of Serbian independence, but the matter had by that time passed into the hands of Germany and the Austro-Hungarian leaders and could not be pursued diplomatically any further. Russia would not permit Serbia to be crushed and supported the proposal of Sir Edward Grey (q.v.) for a conference. Germany rejected that proposal, favored localizing the dispute and upheld the stand taken by Austria-Hun¬ gary. Germany had further issued a general warning on 26 July that she would not toler¬ ate interference with the Austrian resolve to punish Serbia, and demanded of Russia the immediate cessation of a reported mobiliza¬ tion. This was followed by a German declara¬ tion of war against Russia on 1 Aug. 1914; against France, 3 August; and against Belgium, 4 August. On the last-named date came the British ultimatum regarding the neutrality of Belgium, and by 11 o'clock in the evening Great Britain was also a belligerent. Holland, Bel¬ gium and Switzerland had meanwhile mobil¬ ized to defend their neutrality. Austria de¬ clared war on Russia 6 August ; Montenegro on Austria 7 August; France declared war on Aus¬ tria 10 August, and Great Britain on 13 Au¬ gust. Then followed the Austrian declara¬ tion of war on Japan, 27 August; on Belgium, 28 August ; Italy turned against her former ally on 23 May 1915; Rumania declared war on Austria 27 Aug. 1916, and the United States on 7 Dec. 1917. During the progress of the war the venerable Emperor Francis Joseph I died in his 86th year and the 68th year of his reign, on 21 Nov. 1916. He was succeeded by his grandnephew under the title of Charles I (q.'v.). Consult Steed, W., (What is Austria ?> (Edinburgh Review, October 1917).

See Aehrenthal, Baron; Balkan League; Balkan Wars; Berchtold, Count; Bosnia; Eastern Question; France and the War; Germany and the War; Great Britain and the War; Montenegro; Russia; Serbia; War, European.

Henri F. Klein,

Editorial Staff of The Americana.

AUSTRIAN SUCCESSION. See Suc¬

cession Wars.

AUTHORS, American, Society of, an or¬ ganization founded in New York in 1892, and incorporated in 1895, having for its objects the promotion of a professional spirit among authors and a better understanding between authors and their publishers, and, in general, the

protection of literary property and the advance¬ ment of the interests of American authors and literature. All persons engaged in literary pur¬ suits are eligible to membership. The Society has a pension fund for members who may be¬ come needy.

AUTHORS, British, Society of, an asso¬ ciation of authors formed in London in 1883, for social and business purposes. It has a gov¬ erning committee of 30 members; maintains an attractive clubroom and publishes a periodical called The Author.

AUTHORS, French, Society of, an or¬ ganization founded in Paris in 1837, for the protection of authors in their rights, and open to any man of letters. It is governed by an elective committee of 24 members and has a pension fund which provides for aid in work, for sickness and in old age. Besides publishing a journal, the Chronique, the Society has re¬ covered a large sum of money from pirating publishers.

AUTHORS' CLUB, an American organiza¬ tion founded in New York in 1882, and incor¬ porated in 1887. It is governed by an executive committee without a president. Any person who is the author of a published book proper to literature, or of creditable literary work equiv¬ alent to such a book, is eligible to membership. The Club holds meetings semi-monthly, and gives Saturday receptions for ladies in the win¬ ter season. It has a library consisting of the publications of its members and another devoted to literary biography.

AUTHORS' LEAGUE OF AMERICA, The, Inc., wras organized as a protective asso¬ ciation for all persons producing copyrightable material, or in the words of the League con¬ stitution <(all persons actually engaged in lit¬ erary, dramatic, musical or artistic composition. }> It is the object of the League to supply its members with full information as to the busi¬ ness side of their work and to assist them in safeguarding and maintaining their rights. In somewhat over three years the membership had grown to 1,300 and is at present

steadily in¬ creasing. The income of the League is derived entirely from membership dues. The member¬ ship is divided into three classes : Life mem¬ bership, regular membership, associate member¬ ship. The latter class is restricted to publishers, editors, agents and others who are not directly engaged in writing or other artistic production.

AUTO-DA-FE, ou'to da fa (Portuguese, act of faith), the solemn public act that from 1481 to 1810 was performed in Spain and Portugal at the execution of those condemned to death by the Inquisition. It took the form of a procession through the chief streets of the city or town to the church where a sermon was preached on the true faith, after which, the condemned were turned over to the secular power. The procession was usually witnessed by multitudes, many believing that it was an act of merit to assist at such a function, others in fear of the terrible Inquisition lent their presence as a matter of expediency. The pro¬ cession was led by the Dominicans, who were long among the chief inquisitors ; they were followed by those who were condemned only to perform public penance. A great cross separated these from those condemned to

death. The latter were clad in a garment called the san benito, a kind of shirt inscribed with the crimes of the victim and painted with infernal symbols. They wore also a pointed cap on the head. Next came effigies of the fugitives and the bones of dead culprits. The rear was brought up by numerous priests and monks. The most elaborate Auto-da-fe was that of Madrid in 1680 under Charles II. The system persisted down to the end of the first decade of the 19th century, and five years longer in America, the last recorded event of this kind taking place in Mexico as late as 1815. For the crimes, mode of execution, num¬ ber of victims, etc., see general article In¬ quisition.

AUTO-INTOXICATION. This term signifies poisoning from substances which are formed within the body. These substances may be the normal products of metabolism which are normally changed to inert or harm¬ less bodies in the chemistry of the different or¬ gans, or are eliminated by the proper elimina¬ tive organs, or they may be the product of bac¬ teria or of bacterial action upon decomposable or fermentable material which is found by the bacteria of the alimentary canal in the stomach or intestines. These substances are absorbed from the gastro-intestinal canal and passing into the blood are conveyed to various parts of the body and produce their characteristic symp¬ toms. This can readily be understood when we realize that a very considerable portion of the food material which is taken into the body is not acted upon by the digestive secretions and decomposes or

ferments, especially when acted upon in the intestines by putrefactive anaerobes.

Of the substances which are normally formed and which if retained would produce auto-intoxication, carbonic acid is one of the most familiar examples. It is a product of metabolism, it is absorbed into the blood, car¬ ried to the lungs and oxidized, or, if it is re¬ tained in the blood and the blood remains un¬ oxidized, auto-intoxication from its influence is the result. Urea is another product of meta¬ bolism which it is the function of the kidneys to excrete with the urine. If the kidney func¬ tion is inefficient and enough of the urea is re¬ tained within the blood, convulsions, coma and death will be the result of the auto-intoxication.

Bacterial fermentations, including the fa¬ miliar yeast fermentation, have as their prod¬ ucts > alcohol and such acids as lactic, formic, butric, acetic and succinic. These are carbo-hy¬ drate fermentations which usually take place in the stomach and small intestine and with them may come both absorption and the forma¬ tion of gases in the stomach and intestines, also well-known and very common gastric and gen¬ eral disorders.

The proteid fermentations usually take place from the undigested material which has accumu¬ lated in the large intestine, yielding mercaptans, amido-acids and aromatic bodies like indol, phenyl and skatol. These may be absorbed and perhaps changed and eliminated, or, if they are carried into the blood in excess, may produce auto-intoxication.

The body may be protected from the bad effect of these poisonous products by chemical changes which they undergo while passing

through the liver or by the action of anti¬ bodies which are present in the blood to de¬ stroy them and which may even be increased in numbers and consequently in anti-toxic ac¬ tion by the presence of these poisonous sub¬ stances. Sometimes great harm comes to the liver while it is attempting to dispose of these substances and this result may not only follow from proteid decomposition but from the in¬ judicious use of anaesthetics, causing an in¬ hibition of metabolism and incomplete combus¬ tion of fats.

Auto-intoxication is very apt to occur with such diseases as chronic

nephritis, cholangitis, gall-stones, hepatic cancer, with some forms of appendicitis and in connection with intestinal parasites. It is also present in diabetes, perni¬ cious anaemia, myxoedema, acromegaly, Addi¬ son's disease and gout. It is the very common condition with those who consume more pro¬ teid food than their metabolic capacity will dispose of. With such people the characteristic symptoms are persistent frontal headache, muddy or sallow complexion, dizziness, nausea, a constant feeling of inertness, constipation al¬ ternating with diarrhoea, flatulence, indigestion, insomnia, melancholia and many other things that are distressing. In treating this condition it is especially necessary to insist on simple diet with little proteid, plenty of milk and a mini¬ mum of sugar and fat.

AUTO SUGGESTION. See Hypnotism.

AUTOCHTHONES, a Greek word equivalent to the more familiar Latin ˆin¬ digence? meaning the aboriginal inhabitants of a country. It was especially applied to the ancient Athenians by themselves, to distinguish themselves from later immigrants or their de¬ scendants, with much the same pride that an American points to his descent from pre¬ revolutionary stock. The word is frequently used in English as a synonym of ˆaborigine.®

AUTOCHTHONOUS, a term in botany, zoology and palaeontology used to indicate such plants, animals or fossils as are indigenous to the places where they are found. The term is opposed to ˆnaturalized,® which indicates that the plants, etc., are not indigenous to the places where they are found but have been transferred thither by some agency.

AUTOCRACY, a form of government in which power is invested in a single person ; a government in which the sovereign unites in himself the legislative and the executive powers of the state, and thus rules uncon¬ trolled. The word is therefore synonymous with supremacy, or uncontrolled authority. Nearly all eastern governments are of this form. Among European rulers the late Tsars of Russia alone bore the title of Autocrat, thus signifying their constitutional absolute¬ ness. The Imperial German government is in many respects autocratic;* although the Em¬ peror is not strictly an autocrat, yet the power vested in him is not ((derived from the consent of the governed,® which is essential in the case of democracy or popular government. Many of the dictators in the republics of Latin- America were real autocrats, having arrogated to themselves the control of all branches of government despite the democratic constitu¬ tions which they were supposed to uphold. Kant uses the word autocracy in philosophy, vol.

to denote the mastery of the reason over the rebellious propensities — the self-government of the soul. See Government.

AUTOCRAT OF THE BREAKFAST TABLE, The, a noted work by Oliver Wendell Holmes, consisting of imaginary conversations around a boarding-house table. The characters are introduced to the reader as the Autocrat, the Schoolmistress, the Old Gentleman Oppo¬ site, the Young Man Called John, the Land¬ lady, the Landlady's Daughter, the Poor Rela¬ tion and the Divinity Student. It is the most popular of Dr. Holmes' books ; and in none of them are his ease of style, his wit, his humor, his kindly sympathy and love of humanity more clearly shown. It was first published seri¬ ally in the Atlantic Monthly in 1857-58 and ap¬ peared in book form in 1858.

AUTOGENOUS PLUMBING AP¬ PARATUS. The purpose of this apparatus is to provide, by means, of the reaction between oil of vitriol, water and zinc, a supply of hydrogen gas, and, after mixing it with air, to burn the mixture at the end of a blowpipe nozzle, and, by means of flexible rubber tubing, apply the flame readily to the work in hand. By its aid lead sheets, pipes, etc., may be joined together by melting the points of junction, without the use of solder or flux. It can also be used for soldering, brazing and annealing; in fact, for any purpose requiring an intense heat locally applied. It consists of a rectangular box di¬ vided into two closed compartments. The upper one is an acid chamber, opening at the top, and a pipe connects it with the bottom of the lower compartment. The lower compartment is the zinc and gas chamber, having a pipe near its top to convey the gas generated into a purifier arranged in the space between the upper and lower compartments. This space also contains the opening into the lower com¬ partment, through which the zinc is inserted. The dilute acid runs down the pipe from the upper chamber into and up through the zinc in the lower chamber, in the upper part of which the gas collects, and passes out by a bent pipe into the bottom of the purifier. The purifier is a box intended to collect any drips which may pass over with the gas. From its upper part a pipe conveys the gas to the bottom of a second purifier, filled with water, through which the gas rises and passes to the blowpipe. The water removes any sulphurous acid gas or other impurities that may pass over with the hy¬ drogen gas.

The rear end of the blowpipe is divided(into two branches. To one of these the tube* conveying the hydrogen is attached, and to the other a tube conveying air driven in by a bel¬ lows. The hydrogen and air

combine and mix in the blowpipe, and flow out of its nozzle, when the mixture is ignited for application of the flame to the work. Lead sheets may be joined edge to edge or by a lap. In the former case lead straps are melted along the joint to perfect and strengthen it. The apparatus is used when lining pickling vats, covering floors with lead, etc. ; also for annealing the serrated wires for friction primers.

In and near the larger cities, where com¬ pressed gasses may be bought in portable cylin¬ ders, the hydrogen-making apparatus may be dispensed with, and the oxy-hydrogen blowpipe

substituted. In the latter case coal gas or blau-gas may effectively take the place of the pure hydrogen. The gasses from the portable cylinders are very easily conducted to even the most contracted localities by the simple length¬ ening of the rubber conducting tubes. Consult Clarke, J. W., (Modern Plumbing Practice J (London 1914).

AUTOGRAPH, an inscription made by hand, but commonly meaning the signature of a person in his own handwriting. Apparently there is nothing in which one's personality is so inherent as in his handwriting, for the law recognizes the fact that one person cannot suc¬ cessfully counterfeit another's autograph. This is probably the reason why the accumulation of autographs of famous men has been one of the favorite pursuits of collectors from the most ancient times. It is recorded that one of the Egyptian Pharoahs paid high prices to the Greeks for the autographs of Sophocles, Eurip¬ ides and others of their noted countrymen. The Greeks and Romans were also voracious collectors of such souvenirs, one of the Roman emperors having even the autographs of Chi¬ nese scholars. In the British Museum there is one collection which was begun as far back as the 14th century. It is an established fact that in the early Middle Ages there were man¬ ufactured in Germany books of blank pages which were sold to travelers that they might obtain the signatures of prominent people in other countries. In the British Museum is such an album dated 1554. It is only within comparatively recent times, however, that the collection of autographs has been commercial¬ ized. The buying and selling of signatures has become an international industry, or business, in which experts may command very high sal¬ aries. The value of an autograph depends, not only on the fame of the writer, but upon the rarity of his

autographs and its condition. Naturally, if it is accompanied by a letter also in his handwriting, the value is many times in¬ creased. The most valuable collection of American autographs is in the New York Pub¬ lic Library; it includes the best set of the signers of "the Constitution, among which is the autograph of Thomas Lynch, which once brought $5,000 at a sale. Among the most high- priced autographs are those of Raphael, the younger Bach, Charlotte Corday, Sir Francis Drake, Thomas More and Milton. Of the signers of the Constitution the rarest auto¬ graphs are those of Lynch. Gwinnett,. Hart, Morton, Heywood and Middleton. It is esti¬ mated that a set of autograph letters of the signers of the Constitution in good condition . would be worth about $25,000.

AUTOLYCUS, a Greek mathematician and astronomer of Pitane in vEolia, who lived about 330 b.c., the author of two extant works on astronomy; one on the revolution of the spheres and the other on the rising and setting of the fixed stars. These works have been translated into Latin by Hultsch (Leipzig

1885).

AUTOLYCUS, character in Shakespeare's (Winter's Tale) (q.v.), a roguish thief who provides the comedy element in the play. He is obviously suggested by the Autolycus of Greek mythology, the son of Mercury and

Philonis, who dwelt on Parnassus and was cele¬ brated as a stealer of cattle.

AUTOMATIC BLOCK SIGNALS. See

Block Signal System.

AUTOMATIC SPRINKLERS. See Fire

Protection.

AUTOMATISM, in animals the power of movement or of action without any stimulus independent of that arising in the protoplasm of cells and tissues. Thus Descartes regarded ani¬ mals (other than man) as ˆautomata,)) and de¬ clared that they act independently of any voli¬ tion or instinctive or intellectual power or fac¬ ulty; in other words, that their so-called mental acts are involuntary and mechanical — that they may be compared to machines. In physiology while automatism is apparently the result of the internal conditions of the living body, yet strictly speaking, says Loeb, no animal move¬ ments

are exclusively determined by internal conditions. The co-ordinated character of automatic movements has often been ex¬ plained by a <(centre of co-ordination,)} which is supposed to keep a kind of police watch on the different elements and see that they move in the right order. <(But,)) he adds, (fobserva- tions on the lower animals show that the co¬ ordination of automatic movements is caused by the fact that the element which beats most quickly forces the others to beat in its own rhythmA The swarm-spores of algae, which possess no ganglion cells, show spontaneity equal to that of animals having ganglion cells, and he concludes that automatism is due to a chemical cause; that is, the pressure or ab¬ sence of certain ions, or, in other words, to the chemical constitution of the protoplasm. Consult Carpenter, W. B., (Mental Physiology) (Boston 1891) ; Loeb, (Physiology of the Brain) (1901).

AUTOMATON, a mechanical contrivance whose actions are arranged to correspond to those of a human being. Friar Bacon had the reputation of having constructed a brazen head wli.ch spoke, and Regiomontanus an iron fly, which, after making the tour of the room, re¬ turned to its master. Albertus Magnus is said to have spent 30 years in constructing a human figure which advanced to the door when any¬ one knocjked, opened it and saluted the visitor. In the water-clock presented to Charlemagne by Harun al-Rashid, 12 doors in the dial opened respectively at the hour which they rep¬ resented ; they continued open till noon, when 12 knights issued out on horseback, paraded round the dial, and then returning, shut them¬ selves in again. Camus constructed an in¬ genious toy for Louis XIV, consisting of a carriage drawn by two horses, containing a lit¬ tle figure of a lady with a coachman and at¬ tendants. The coachman cracked his whip, the horses moved their legs naturally, and when the carriage arrived opposite the King's seat it stopped ; the page stepped down and opened the door; the lady alighted and presented a peti¬ tion to Louis. The flute-players, the tambour- player and the wonderful duck of Vaucanson are celebrated for the' astonishing ingenuity dis¬ played in their construction. Among the most remarkable automata are the whist-playing and other figures designed by Maskelyne in 1875. Consult Brewster, (Letters on Natural Magic) (London 1834) ; Houdin, (Secrets of Conjur-

ing) ; and (Memoirs of Houdin> (ib. 1891); Ozanam, (Mathematical Recreations* (ib. 1854).

AUTOMEDON, son of Dioreus, who went to the Trojan War with 10 ships. Later he became the friend and charioteer of Achilles, alter whose death he served his son Pyrrhus in the same capacity, as described in Homer's

AUTOMEDON, two epigrammatists of ancient Greece. One was a native of Cyzicus, the other was an 2Etolian. Except that one is supposed to have lived in the time of Nerva, nothing is known- of their lives.

AUTOMOBILE. A vehicle adapted for performing transportation work over ordinary roads by means of an engine forming a struc¬ tural part of it, or by means of a source of power, such as an electric storage battery, in¬ stalled within it. S3'nonymous terms are motor vehicle, self-propelled vehicle, horseless car¬ riage or vehicle, motor car. Terms denoting special varieties are steam vehicle, gasoline vehicle, electric vehicle, motor truck, electric truck and other compound terms of similar general character. The word is now used more commonly as an adjective than as a noun; as a verb it is used in the participle form "automo- biling,® meaning traveling by means of an auto¬ mobile, but in this sense "motoring® is pre¬ ferred.

The history of the origin of the automobile records a large number of attempts at produc¬ ing vehicles of this class, but not until 1895 did the manufacture of automobiles begin to assume the character of a regular industry. Since then the number of automobiles in use has increased at a rapidly progressive rate. In 1899 the United States ha#d about 3,700, mostly steam carriages and "runabouts,® but including perhaps 300 gasoline motor cars and 500 elec¬ tric carriages, cabs and trucks. In 1903 the number had risen to about 11,000, mostly gaso¬ line motor cars, and in 1916 to 1,200,000, includ¬ ing about 32,000 electric carriages and 13,000 electric trucks.

In France and England there were in 1899 about 3,000 automobiles, nearly all gasoline motor cars, and in 1903 the number in all of Europe was estimated at 28,000. In 1914 the total had reached over 600,000 gasoline motor vehicles, of which nearly one-half were in Great Britain, to which should be added a few thou¬ sands of steam carriages, steam trucks and electric vehicles, the latter mostly in Germany. These figures include all vehicles registered, new and old. The yearly production shows a still higher rate of progressivity, but the figures cannot be traced readily or accurately.

France, England and Germairy divide the European production in the order named, Aus¬ tria and Italy following with considerably smaller

shares. Other statistics and some his¬ torical data are given under Automobile In¬ dustry.

By far the larger number of ail automobiles in use are employed for the transportation of persons but the percentage used mainly for the transportation of goods is steadily increasing. Classifying by the nature of the power source, a decided majority of all automobiles derive power from an automobile engine, often desig¬ nated as an “automobile motor,® which is an engine of the internal-combustion type (see

Internal Combustion Engines) and is usually operated with gasoline as the fuel, although less volatile hydrocarbon fluids, such as benzol, al¬ cohol, kerosene and melted naphthalene may be used conditionally, especially benzol, which is employed regularly in Europe for motor trucks and omnibuses. From these facts it follows that the automobile intended for the transportation of persons and driven by means of gasoline burned in an auto¬ mobile engine is the dominant type. It is to this type that the word automobile is applied without the use of additional qualifying terms. Motor car, car, motor, gasoline car, as well as other terms implying nothing to the contrary, are also usually meant to designate this type only. Gasoline motor trucks and delivery wag¬ ons are variations of it, differing mainly in the dimensions of machine parts and in the ar¬ rangements of the vehicle bodies for the carry¬ ing of loads. Motorcycles (q.v.) would come under the same classification as the dominant type if they had not by common consent, due to their origin and peculiarities as bicycles with a motor equipment, been placed in a separate class. After those mentioned, other varieties of automobiles follow, in point of number of them in use, in this order : Electric trucks and delivery wagons, electric carriages and cabs, steam trucks (mainly in Great Britain), steam carriages.

As at least 95 per cent of all automobiles are operated by means of an internal-combus¬ tion engine, burning a fluid hydrocarbon fuel and probably 90 per cent of these are used for the transportation of persons and constitute the dominant type of automobile, there is good reason for the popular usage in accordance with which the word “automobile,® when used as a noun, refers to this dominant type only. Going a step further in order to avoid all con¬ fusion of terms, the word “automobile® is used in the following only as an adjective, and the dominant type is designated as a motor car, while trucks and wagons of the same general type (using the same type of engine, especially) are mentioned as motor trucks and motor wag¬ ons, and all other motor vehicles by their more specific names. The division of

the very large subject comes then, so far as mechanical con¬ struction is concerned, under the following heads: (1) Motor cars, (2) Motor wagons, (3) Motor trucks, (4) Electric trucks and wag¬ ons, (5) Electric carriages, (6) Steam trucks and (7) Steam carriages. But not even this division can be strictly adhered to on account of intermediate construction types and the in¬ creasing number of special classes of vehicles in which the purpose and the special equipment adopted for serving it are of greater interest than the automobile mechanism which they share, in the essentials, with many other motor vehicles. Special constructions, among which may be mentioned motor omnibuses, fire de¬ partment vehicles (see Aire Engine), and army vehicles (see Army Transportation; Automobiles in War) are the most important, are treated mainly under special captions. Tractors and motor ploughs, while in part an outgrowth of the automobile movement and industry, arc treated quite separately under Tractors.

Every motor vehicle manufactured for the

market has so far been made in three structural divisions, (1) the chassis, comprising a frame carrying the whole power equipment, the actu¬ ating and control mechanism, the vehicle springs and axles and the wheels ; (2} the vehicle body or carriage work, comprising all parts of the structural unit which is mounted upon the chassis frame for the purpose of carrying the load of persons or goods in a suitable manner, and (3) the accessories, comprising a number of detached or readily detachable devices serv¬ ing secondary purposes. Rubber tires, lamps, speed-recorders, tops, carburetors, lubricators, fenders, motor-starters, air-pumps, lifting- jacks — are commonly mentioned as accessories. But tires, electric lamps, lubricators, carburet¬ ors and motor-starters operate in organic con¬ nection with the engine or vehicle mechanism as a whole, and the classification is only one of convenience to indicate that these units are often manufactured separately.

developed from a rectangular sash made by riveting industrial angle iron side members to transverse angle iron girders or from a wooden frame of the same simple conformation. The arrangements and proportions of the vehicle body, springs, fenders and even of the power equipment and transmission elements were made to suit this form. The modern frame be¬ gan its evolution when, about the year

1900, large strips of sheet steel were first shaped for this purpose in hydraulic presses. By degrees it has become practicable to bend the sheet steel in all three directions. Nearly all the side reaches of frames are of [section. Most of the frames are contracted at the front to allow a large turning angle for the front wheels and many are also bent upward at the rear to make room for spring and axle movements. Re¬ cently, by using straight but converging side memliers, as in Fig. 1, cost is saved and such frames readily meet varying design require-

Fig. 1. — Chassis (1917) for light-weight 6-cylinder Motor Car. Frame reaches straight and converging. Springs directly under them. No torsion rods or driving-struts. Running-boards and fenders omitted.

Motor Cars. — The motor car chassis (Figs. 1 and 2) comprises a frame, a power equipment, means for power transmission from engine to road wheels, axles, vehicle springs, means for transmitting a driving-thrust from the road wheels to the vehicle frame, a steering gear, a system of brakes, road wheels and tires. In nearly all motor cars the means for trans¬ mitting power from the engine to road wheels are purely mechanical, but in a minority these means are electrical. In a still smaller . minor¬ ity of cases they are hydraulic, which, however, is only a special form of mechanical transmis¬ sion. Nearly all engines are kept from reach¬ ing inadmissible temperatures by the circula¬ tion of water which in turn is cooled by air, but in some instances the engine is cooled di¬ rectly by air. In nearly all motor cars the engine power is transmitted to the rear road wheels only, and the front road wheels are rotated by the push from the rear wheels against the vehicle frame and are utilized for steering, but in a few instances the front wheels are driven from the engine and steered as well, or all four wheels are driven and steered. These variations in construction are indicated when a motor car is referred to as a “gas-elec¬ tric® car, a “hydraulic-transmission® car or truck, an “air-cooled® car, a “front-drive® car, cab or truck, a “four-wheel-drive® vehicle.

The Frame. — The motor car frame has been

ments by compromise. Large vehicle manu¬ facturers, however, have the frames designed throughout to suit the rest of their construction after the latter has been determined. In a few instances steps and running-boards are in¬ corporated in the frame to strengthen it with¬ out adding weight. Practically all frames are now hot-pressed and hot-riveted. The riveting formerly done by a hammering process is now often accomplished by pressure, with less noise and more rapidly. The strength of the frames depends not only on design and dimensions, but

largely upon the skillful shaping of the dies in which they are hydraulically pressed.

The Power Equipment. — The arrangements for fuel supply, the automobile engine and the means for starting and controlling the engine constitute the power equipment. The fuel tank, made of sheet copper or plated sheet steel, is either suspended at the rear end of the frame (Figs. 1 and 2) or supported over a transverse member of the frame underneath the driver's seat. In the first case its position is low, and a light pressure is maintained over the fuel in the tank by means of a small air pump operated optionally from the engine or by hand, in order to make sure that the fuel will be piped to the engine as needed in whatever position the car stands or moves. In the other case the fuel is fed naturally by gravity from the tank to the float-chamber of the carburetor, Tut the flow

is less, active when the car goes uphill than when it moves on the level or downhill. To combine the advantages of both methods, a system is now frequently used by which a small

Fig. 2. — Elaborate 6-cylinder Motor Car Chassis with running-boards. Fenders omitted. Numerals and inscrip¬

tions indicate parts requiring lubrication.

auxiliary tank is placed near the engine and higher than the carburetor, supplying the latter by a gravity flow with practically unvarying head of pressure while the auxiliary tank is supplied from the main tank at the rear by

suction from the intake manifold of the engine. Fig. 3 shows the latter arrangement. Formerly pressure above the fluid in the main tank at the rear was often maintained by piping a portion of the exhaust gas from the engine into the tank. The fuel piping should have few joints, no sharp downward or upward bends where impurities may settle or air bubbles may lodge. The automobile engine may be considered as a development of the gas engine, which was the first internal-combustion engine, so called, when it made its first appearance, to distinguish its nature from that of steam engines. The fuel is burned inside of the cylinders which are util¬ ized for transforming the expansion of gases into mechanical movement, instead of outside of them. Gas engines, stationary and marine hydrocarbon (gasoline or

oil) engines, Diesel engines and automobile engines are the four large varieties of the internal-combustion type and each of them has characteristics which overshadow their similarity on the point men¬ tioned. In France and Germany the automobile engine is rarely mentioned as an internal-com¬ bustion engine, this distinction from steam en¬ gines being apparently considered superfluous.

Fig. 3. — Fuel Feed by “ vacuum ” Relay Tank near and

above Engine.

The German term Verbrennungsmaschine is a simplification. The term “explosion engine® (French: Motenr a explosion) , an equivalent, for internal-combustion engine, is now seldom used. (See Internal-Combustion Engine; Automobile Engine). The typical automobile engine is operated with gasoline as fuel, the equivalent of which is called petrol (pet-rol) in Great Britain, Benzin in Germany and es¬ sence de petrole (or more commonly essence only) in France.

It has four cylinders usually bored in a single iron casting and is bolted to an aluminum crank casing and mounted to stand lengthwise and upright in the front portion of the auto¬ mobile frame. Four pistons connect by con¬ necting-rods,® without crossheads, with a crank¬ shaft machined from a single drop-forging. It draws a spray of fuel, fuel-vapor and air through a carburetor (q.v.) by means of the suction caused by downward strokes of the pistons, admits the mixture to the cylinders by poppet valves which are opened mechanically and closed by valve springs, ignites the mixture with a spark generated by means of a. magneto (q.v.) or other electrical machine at the in-

terior terminals of a spark plug (or ((sparking plug®) screwed into the head of each cylinder, expels burnt gases by poppet valves which are opened mechanically and closed by springs. It has one camshaft geared to open, and hold open, both intake and exhaust valves at the proper periods. It detonates and burns an ex¬ plosive gas mixture at every fourth piston stroke in each cylinder. The rear end of the crankshaft carries a small flywheel which is arranged to be used as one member of the coupling between the engine and the power transmission mechanism, and to which is also frequently applied the effort by which the en¬ gine is started, unless this is done by hand

power by applying a crank to the front end of the crankshaft. The upper portion of each cylinder is cast with hollow walls forming a water jacket, and the water jackets are placed in a water circulation circuit by piping to the upper and lower portions of a ˆradiator® which is mounted upright and transversely at the front end of the automobile frame. Between the radiator and the camshaft gearing, in front of the foremost cylinder, a rotary fan is operated by gearing or belting to increase the flow of air in the interstices of the radiator structure. A centrifugal pump gear-driven in the lower branch of the water circuit often assists in ef¬ fecting the circulation. External piping gathers the exhaust from the cylinders and is continued rearward underneath the frame, supported at an intermediate point in a muffler or silencer where the flow of hot exhaust gases, already cooled somewhat on the way, is further baffled and cooled before it is allowed to reach the atmosphere. Of the descriptive statements here made not a single one holds true for all auto¬ mobile engines. Those which come nearest to representing universal practice refer to the use of a carburetor operated by suction from the engine and to the ignition of the fuel mixture by means of an electrically generated spark. The world-wide demand for an automobile en¬ gine in which liquid fuels less volatile and costly than gasoline may be used with equal facility already foreshadows the eventual dis¬ appearance of the carburetor operated by engine suction, a more positive and more accurately predetermined preliminary action upon the less volatile fuels being required to make them readily inflammable in the c} dinders when the engine is cold and under other adverse condi¬ tions of operation, as are bound to obtain in practice occasionally.

Fig. 4 shows a typical automobile engine equipment. With regard to the very numerous variations in design and details of construction see Automobile Engine; Aeroplane; Motor Boat.

The equipment for the starting and control of automobile engines has undergone a continu¬ ous development ; the control mostly through the improvement of carburetors, the starting mainly since 1910 and in conjunction with the gradual adoption of electric lighting for auto¬ mobiles, the practicability of electric light¬ ing for vehicles being in turn determined by the perfecting of Tungsten filaments for electric incandescent lamps, as the older filaments were unable to withstand shocks and vibration long enough. The improve¬ ment of carburetors has had three main

objects: To obtain the best and most economical mixture at all degrees of throttling, to permit the use of benzol and of the gasoline of higher specific gravity which in the course of the years has become the only

kind available in large quantities in the market, and to make it possible to accelerate an engine rapidly. The method adopted has been singularly restricted to modifying the channels through which suc¬ tion from the engine reaches a carburetor and the atmosphere, separate mechanical means for varying the fuel feed rate being rarely tried. Details of this development, by which remark¬ able results have been accomplished by a very difficult route, are given under Automobile Engine.

For many years, starting of the automobile engine was accomplished universally by turning a crank applied to the free end of the crank¬ shaft — nearly always at the front of the motor car, and this is still the method employed in cars of limited pretensions to luxurious equip¬ ment as well as in most motor wagons and trucks. This crank grips only in one direction of rotation and has an automatic spring release. In some cases a special safety clutch is inter¬ posed to protect the operator against reverse rotation of the crank, as may occur if ignition of a fuel charge takes place prematurely in one or more of the engine cylinders. They are similar to those used for hoists and other ma¬ chinery subject to reverse movements, but are losing importance for automobiles with the gen¬ eral introduction of engine-starter devices.

As the operation of a starting crank involves a physical effort which can become onerous in cold weather or when carburetion and ignition are not in perfect order, and is on the whole inelegant and inconvenient, many methods for starting the engine have been tried (see Auto¬ mobile Engine). The simplest of these is em¬ ployed in practice in conjunction with a starting- crank equipment and consists in turning the timing-lever of the ignition equipriicnt, thereby producing sparks which may ignite explosive charges remaining in one or two of the cyl¬ inders after the last previous operation of the engine. But this method is not dependable. The more radical and reliable methods consist in (1) a mechanical connection enabling the driver to turn the engine shaft without leaving his seat, . (2) arrangements for storing com¬ pressed air and by its release turning the crank¬ shaft, and (3) arrangements for turning the crankshaft (often from. the rim of the flywheel) by means of a small electric motor receiving current from an electric storage battery which has previously been charged from the engine by means of a generator or from an independ¬ ent source of current. The compressed-air engine-starter arrangement is used mostly in France but is giving way to the electric method. Fig. 5 shows a diagram of one of the many electrical arrangements, which additionally sup¬ ply current for electric lamps.

Power Transmission — The typical mechan¬ ical power transmission

mechanism of a motor car comprises the clutch, the gearset, the drive shaft with universal joints, a bevel gear and a differential gear mounted at the middle of the rear axle and keyed to wheelshafts which are again keyed at their outer ends to the hubs of the road wheels. A transmission set less used

for motor cars but more for motor wagons' and trucks comprises the clutch, the gearset, the bevel gear and differential on a transverse countershaft near the middle of the vehicle, a

Fig. 5. — Diagram showing an arrangement of electric wiring for obtaining ignition of fuel charges, lighting of vehicle by incandescent lamps, operation of electric alarms and starting of the engine by the co-ordinated operation of a generator, a magneto, a storage battery and a dry cell battery.

sprocket pinion at each end of the countershaft, a chain from each pinion to a sprocket wheel on each road wheel. In motor trucks a worm gearset often takes the place of the bevel gear- set, being better adapted for effecting a large reduction of the rotary speed of the wheel- shafts, while less suitable for motor cars, caus¬ ing more resistance against coasting and other movements of the vehicle for which engine power is not applied. Other variations, known as internal gear drive and compound rear axle gear reduction, are referred to under Motor Trucks. All other methods for transmitting the power are exceptional.

The clutch may be of the friction cone type, the brake type or the plate type, the latter hav¬ ing few or many plates which may be lubricated

Fig. 6. — Sheet steel cone clutch for light car.

Or dry. Types rarely employed are the hydrau¬ lic and the pneumatic.

Fig. 6 shows a cone clutch arranged to cen¬ tre itself automatically in the flywheel.

The brake type, which is rare, is similar to rear wheel brakes, comprising either two semi¬ circular segments arranged to be expanded against the flywheel rim or a steel band con¬ tractible on a drum secured to the face of the flywheel. It is mostly used in Europe,

especially in German cars.

Fig. 7 shows a plate clutch with one plate. Fig. 8 one with many, half of which are secured to rotate with the flywheel of the engine and the alternate ones with the clutch shaft. The plates in clutches operating without lubricant

Fig. 8. — A multiple-plate clutch.

are generally made of other, materials than steel or bronze, or alternate plates arc of metal and the intervening plates of composition material.

Frequently the clutch as well as the gearset is so encased as to form a rigid unit with the

engine (Fig. 9), and the enlarged ((unit power plant® so formed is then often mounted in the automobile frame with support at only three

Fig. 9. — A six-cylinder unit power plant.

points (or four points of which two are very close together), with the object of preventing any twisting or other deformation of the frame,

Fig. 10. — Transmission showing operation of clutch, reverse

and brake pedals.

which may be caused by the roughness of roads, from reaching and affecting the alignment of engine, clutch and gear shafts. If this means

Fig. 11. — Transmission showing gears in mesh.

(also serving to exclude dust) is not adopted, a universal joint is interposed between the clutch and the gearbox.

Figs. 10, 11 and 12 show the unit power plant and the equivalent for clutch and gearset used in the most popular small motor car con¬ struction. It operates with a planetary gear and provides one radical gear reduction for use at the starting of the car, for reversing and for conditions requiring a maximum of driving power (torque) at the road wheel rims. For all other conditions the rotary speed of the engine is

continued without reduction to the

Fig. 12. — Thermo-syphon cooling system.

bevel gear on the rear axle, where it is reduced in the proportion of one to four, approximately. With this important exception the typical gear- set follows more or less closely the design shown in Fig. 13, representing a gearbox (and clutch) with three forward gearspeeds and a reverse. For many large motor cars and heavy motor trucks four forward gearspeeds are used.

The methods by which gears are shifted have undergone considerable change in recent years. The shifting lever and quadrant which were formerly on the outside of the motor car body are now inside of it as shown in Fig. 14, the change being a result of the general adop¬ tion of (<left side drive,® or changing the driver's

Fig. 13. — Typical 3-speed gearset (with one-plate clutch in front and transmission brake at the rear). Operating levers, at top, shown in part only.

seat from the right to the left side of the vehicle. A long development in control of gear- shifting, from "progressive® to "selective® is described in most books on the subject but is passing into the remoter sphere of mechanical history. Similarly the gradual improvement in shifting forks and jaw clutches in the gearbox. A very recent development is. a construction by which all gear wheels remain in mesh, excepting the reverse, the main object being to reduce

the amount of skill required for smooth and silent operation, all clash of gear wheels being avoided. The latest omnibuses in Paris are equipped with gearboxes of this type.

Fig. 14. — Cab of a Motor Car, showing inside driving con¬ trol (" left side drive") and the Instrument Board.

To have spur gears operate silently the first requirement is the accurate involute cut of the gear teeth, perfected by grinding and polish, and great improvement in milling machines has been necessary to effect the smooth running and small wear of the gears with which the motoring public is now familiar. Another re¬ quirement relates to the circumferential speed

Fig. 15. — Front view of aluminum gearbox mounted sepa¬

rately in vehicle frame.

of the gear wheels, which should be. as small as possible to reduce the humming noise of the mesh. To reduce the diameters of the gears accordingly and yet have the teeth (whose di¬

mensions are reduced in the same proportion) strong enough, the use of very strong alloy steel in gears has been necessary, calling for a specific development of metallurgical science and the exercise of painstaking judgment. For, if the gear teeth are made too small, the pressure upon lubricants becomes so large as to squeeze them out, thereby increasing friction and wear, and if the teeth are broadened to avoid this consequence the movements of the shifting forks needed for changing gear become larger than desirable, the gearbox longer and heavier, the shafts more subject to vibration.

Mainly in England the use of silent chains (q.v.) in gearboxes has been resorted to for overcoming these difficulties. Resonance of the aluminum box containing the gears is also to be avoided, so the material is thickened and the shaft bearings in its walls are made as long and large, to postpone wear and looseness, as other dimensions permit. The exterior of an

Fig. 16. — Universal joint formed of leather and metal discs.

aluminum gearbox mounted separately in the frame is shown in front view in Fig. 15.

The relations existing in the matters of fuel economy, gear speeds and gear ratio, con¬ venience in driving, vehicle weight, the special qualities of the engine which are indicated by its power and torque curves, form a subject on which the opinions of engineers differ, not so much with regard to the mechanical results of a given set of conditions as with regard to the question of what results are most desirable. The answer varies greatly with the purpose of the vehicle. And thus a great variety of en¬ gines are in use, weighing from 15 down to five pounds per horse-power, having a maximum speed from 800 up to 4,000 revolutions per minute and from one to 12 cylinders. The gearbox arrangements vary accordingly. As a rule, the larger the range and resources of the engine, the smaller and simpler the gearbox can be, for given working conditions.

Universal joints, drive shafts, bevel gears and differential gears, of which typical examples are included in preceding illustrations, are

me¬ chanical units known in many applications out¬ side of motor cars, but in these they reach their most refined development. Universal joints formed of leather disks on the plan shown in Fig. 16 have been widely tried, with the object of securing silence and avoiding lubrication and wear, as well as the exuding of oil or grease liable to occur in these members if they are entirely metallic, but these substitute arrange¬ ments have not proved durable or adapted for

Fig. 18. — Typical ordinary bevel gear mounted on casing of differential gear.

and conveniently, differential Rears have been invented in which the differentiating movement is braked by hydraulic or mechanical friction or arranged with helical gears whose diameters

manufacture on a large scale and are now seldom used.

Bevel gears have been so refined that their mechanical efficiency reaches 95 to 96 per cent

Fig. 17. — Spiral bevel gear wheel with driving-pinion.

when new, and spiral bevel gears of the type shown in Fig. 17, which are gaining rapidly in favor for high-class construction, are almost silent in operation.

The differential (typical bevel gear with differential, Fig. 18), whose function is to allow one driving wheel to rotate more rapidly than the other, as is necessary when the motor car turns, causes an unsuitable action when one of the driving wheels is in a slippery place in the road, so that it can be spun around rapidly with less resistance than required for starting its mate. The engine then drives this wheel alone and traction is lost. A remedy used little for motor cars but widely for motor trucks — and obligatory for European army trucks — consists in a locking device by which the differential can be made inoperative. To accomplish the same purpose more completely

and pitch are so chosen that they can be oper¬ ated in one direction but much less readily in the other. Fig. 19 shows a sketch of a differential of this nature which is not yet standard but is not uncommonly preferred to the normal type, especially for motor trucks.

The lubrication of the transmission elements, of springs and shackles, of the steering gear, the wheel bearings, etc., is not yet developed to a system. In nearly all motor cars each casing and bearing must be watched separately and provided with lubricant separately and at irregular intervals. In the isolated instances where a system has been established, it begins with the engine. As it is recognized that the durability of the mechanical construction de¬ pends greatly upon having lubrication attended to unfailingly, and as constant (but in practice always irregular) attention to lubricating in¬ volves a large share in the work of caring for a motor car, a universal development toward an almost automatic and complete system of motor car lubrication, now barely inaugurated, is widely expected. The difficulties lie mainly in rendering it unfailing, so that no false security, with the attending instances of seri¬ ous damage to parts, may be the result.

While the worm gear sets and internal-gear drives are occasionally used for motor cars, their use for motor trucks and electric vehicles is more common.

Transmission by chain drive from a coun¬ tershaft is typical for motor wagons and motor trucks and is referred to under these heads below, but it is also still used in a few high¬ speed motor cars, especially in Germany, hav¬ ing survived from the time, before 1905, when it was the most widely used transmission system for motor vehicles of all classes. It does not differ in principle from the chain drive used for bicycles.

Electric transmission from an automobile engine has been frequently tried for motor cars and motor trucks but has never gained adoption for regular and extensive manufac¬ ture. As it admits of dispensing with the shift¬ ing of gears and can easily be adapted to the driving of all four wheels, however, it is con¬ stantly taken up again, in one place or another, when developments or discoveries in electric, science or machinery seem to promise new and superior results. As the features of greatest special interest in these vehicles are electrical and no type of motor car or. motor truck with electric transmission is yet widely established industrially, descriptions of the most recently developed systems of this order (represented in the United States by the Entz transmission, in England by the gas-electric omnibuses operated mainly in Manchester, and on the continent by the Balachowski & Caire gas-electric trucks) are given under Electric Vehicles.

Hydraulic transmissions exist sporadically in experimental motor cars

and are used -in a few motor truck constructions, such as the Manly (American-La France) in the United States, the Hele-Shaw in England, the Hugo Lentz in Germanv and France, and the im¬ proved Janney-Williams (Delaunay-Belleville) in France. As they are not yet important in the automobile industry and the principles employed in them are similar to those applied more extensively and typically for hydraulic marine steering gears and other hydraulic machinery,

llG. 19. Differential gear designed to insure traction on slippery roads. Mostly used for motor trucks.

descriptions of hydraulic transmissions are Riven under Hydraulic Engine; Hydraulic Machinery; Hydraulic Transmission, etc.

Vehicle Springs. — No adequate understand¬ ing of the requirements in vehicle springs for motor cars can be gained without a compre¬ hensive study including not only spring mate¬ rials apd spring design but also the relations of the spring action to the auxiliary action obtained from resilient wheel tires, to the length of the wheelbase of the vehicle (the dis¬ tance between axles), to the distribution of weight between axles, to the average and maxi¬ mum speeds required of the car, to the nature of the roads over which it is most likely to travel and to several minor factors. On the whole experimentation has dictated the develop¬ ment, and all ˆspringing® is a compromise among more or less conflicting requirements. As the object of ˆspringing® in general is to permit the wheels and axles to bounce over the inequalities of a road surface without com¬ municating severe shocks or much up-and-down movement to the vehicle frame and body, and the springs for this purpose should be as flex¬ ible as practicable, and as, on the other hand, very flexible springs oscillate with great ampli¬ tude after a shock, and such oscillations in turn are liable to react upon the frame and body, the technical effort in spring design is largely concentrated upon the problem of moderating the rebounds and oscillations of vehicle springs which are flexible and lively. Flexibility, life and strength are combined in the springs by using special alloy steel for the spring leaves, by having each spring made of many thin leaves rather than a smaller number of thick ones (this permitting a reduction of their length) and often by using springs which do not only bend but also rock around a pivot near their middle (cantilever springs). The nature of the cantilever spring, being .a tvpe almost exclusively used for motor cars, is illustrated in Fig. 20.

The use of coil springs in lieu of leaf springs has often been attempted but has never yet become general, except for auxiliary purposes, mainly because this type of spring does not in itself possess lateral stability and therefore must be specially braced to prevent the motor car body and frame from swaying from side to side. The means adopted for moderating rebound and oscillations take the form of aux¬ iliary devices which can be coil springs whose periods of oscillation differ from those of the leaf springs and thereby break up the harmonic sequence of movements, but usually they are based on mechanical or hydraulic friction and are called rebound checks or shock

absorbers. But for motor cars intended for speeds higher than 20 miles per hour satisfac¬ tory results, securing both comfort for occu¬ pants and safety for the vehicle structure, are not considered to be obtained without the addi¬ tional equipment of pneumatic tires for the vehicle wheels.

Most of the elements in the springing of motor cars are also used for other classes of motor vehicles and in part for ordinary horse- drawn carriages and for railway cars and coaches. To avoid repetition more detailed information will therefore be found under Vehicle Springs ; Springs ; Rebound Checks ; Shock Absorbers; Rubber Tires.

Rear Axles are built up from cast and pressed steel sections on the plan typically shown in Fig. 21. The many variations and

Fig. 21. — One side of typical rear axle, with brake drum (on the wheel) and brake-operating bars.

the distinction between axles with ˆfloating® and ˆsemi-floating® wheel shafts are elucidated in textbooks. Both types give excellent results when materials and other mechanical details, such as bearings and the provisions for lubri¬ cation, are suitable. Front axles are drop-forged from one piece of steel into shapes such as shown with steering knuckles and drag- link added in Fig. 22. The two types indicated in Fig. 23 represent preferred American and European practice, respectively, in front axles.

To convey the driving- thrust from the rear axle of a motor car to its frame it was up to about 1912 universally considered neces¬ sary to employ thrust rods, often termed radius rods, extending from the axle

to some portion of the frame near its middle, and in the power transmission system a detail of kindred nature is a torsion rod or tube serving to prevent the power thrust upon the teeth of bevel gears from skewing the axle and causing uneven riding of the frame and body on the springs. Torsion rods or bars are still generally used, and in many cases the thrust rods and the torsion rods are combined in the form of a tubular casing for the drive shaft, forking into two branches at the front end. Figs. 2 and

Fig. 22. — Typical front axle, with steering knuckles and

drag link.

24 show typical constructions for these pur¬ poses. In recent years, however, it has been found practicable to transmit the driving effort

through the vehicle springs, and to omit special braces for absorbing torque reaction, in which case the construction may be such as shown in Figs. 2 and 20. For small cars equipped with cross springs only, a pair of radius rods con¬ verging toward a transverse girder at the mid¬ dle of the frame is generally employed for the front axle as well as for the rear.

The Steering Gear of motor cars typically comprises the arrangement shown in Fig. 25 by which the front wheels are turned by turning a nearly vertical pivot pin forged in one piece with the wheel spindle, the turning movement being transmitted from the wheel most directly actuated to its mate by a transverse drag-link connecting the pivot pins and provided with adjustment screws and nuts to secure parallel¬ ism of the wheels for driving straight ahead. The nature of the linkage (known as the Ack-

Fig. 24. — Combined torsion tube and driving strut (show¬ ing also spherical universal joint and rear end of gearbox).

erman steering system and invented for use with ordinary vehicles more than 100 years ago) causes the wheels to diverge a trifle forwardly when turned — and the more the more they are turned — with the object of mak¬ ing one wheel turn a shorter curve than the other, as required. In some cases the pivot pin is formed upon the axle end and the knuckle in one piece with the wheel spindle. (Fig. 23).

The operating mechanism, as shown in Fig. 25, actuates a wormwheel (or a sector of a wormwheel) by means of a worm with treble or quadruple thread of about 30 to 45 degrees pitch, and the steering arm keyed to the worm- wheel or sector is thereby turned forward or

backward, its lower end describing a short

arc. This end is jointed as in Fig. 26 with the rear end of a lengthwise steering rod whose front end is jointed to a short crank arm on the pivot pin or knuckle. This mechan¬

ism is reversible, as the worm and sector are kept well lubricated within the sub¬ stantial casing enclosing them, and the wheels can readily be turned by applying force against them for that purpose. But in some motor cars, and in a majority of heavy motor trucks and other motor vehicles, a square screwthread takes the place of the worm, and a large nut is moved obliquely up and down to actuate the steering arm. This arrangement is only semi-reversible, or it may be irreversible if the screwthread is of low pitch. Jolts re¬ ceived on the sides of the front wheels on rough roads are with this construction trans¬ mitted only in slight degree to the driver's hands, but the violence of stresses to which the mechanism is subjected from wheel rim to steering gear is correspondingly greater. These stresses are absorbed to some extent in the buffer springs with which the joints of the steering rod are provided.

In some types of motor cars and in< very many motor trucks the steering linkage is ar¬ ranged crosswise of the vehicle, which arrange¬ ment is modified in several ways and can have the advantage, if the front vehicle springs must be of high camber, that the steering action is then less influenced by oscillations of these springs than when the steering rod runs length¬ wise.

Fig. 26. — Buffer joint between steering arm and steering rod.

Fifth-wheel steering, as standardized for vehicles drawn by animals, is scarcely ever used for motor vehicles of any class, excepting only a few, mostly electric, in which a fore¬

carriage containing the whole power mechanism forms a separate unit coupled to the rest of the vehicle.

Brakes. — The typical system of brakes for motor cars consists of service brakes operated by a pedal and emergency brakes operated by a lever at the right side of the driver's seat. The lever can be locked in any position given it by means of a pawl acting against a notched quadrant secured to the car frame, and the emergency brakes can

therefore be used to hold a car on a hill unattended. Linked rods, in¬ cluding an eoualizer bar (shown in Fig. 2), transmit movements of brake pedal and lever, separately, to brakes acting on drums secured to the driving wheels. Usually (Fig. 27) the service brakes are brake shoes (faced with friction fabric) which are forced by the turn¬ ing of a cam against the inside of the drum, and the emergency brakes are steel bands lined with special brake-surfacing material, which are contracted by a similar cam action against the outside of the drum. To permit the cooling of the drum, the latter is in some cases widened and the emergency brakes are made like the service brakes and act side by side with them, both sets on the inside of the drums. In many European cars and some American ones, the service brake is single and is mounted upon the transmission as in Fig. 13, usually upon the gear shaft just behind the gearbox and in front of the universal joint connecting with the drive shaft. In connection with this con¬ struction, the emergency brakes are expansion brakes in the rear wheel drums. The use of brakes on all four wheels is practised on a

Fig. 27. — Brake drum with service brake interiorly and emergency brake exteriorly.

few makes of cars in England and occasionally on a racing car, the systems used in each case being described in the larger textbooks on automobile construction. Hydraulic brakes are used for some heavy motor trucks, largely with a view to the operation of such vehicles on long declivities. For motor cars, hydraulic, pneumatic and electric brakes are in a state of development. Patented systems exist for utilizing the engine as a brake by omitting fuel-charging and ignition and making the pis¬ tons work against air charges in the cylinders. But these have not been widelv adopted, per¬ haps mainly for not being subject to finely graduated control of the braking effect.

Wheels. — ’The wheels of motor cars are either wood wheels or wire wheels, the wood wheel being a development of ordinary vehicle

wheels and the wire wheel of bicycle wheels, and in either case the hub is adapted to be mounted on ball bearings or roller bearings, and the rim is arranged to receive a pneumatic rubber tire. For construction details of wheels, wheel bearings, wheel rims (now usually readily demountable and called demountable rims,® a corruption of French demontable), and pnuematic tires, see Wheels;

Bearings, Anti¬ friction ; Rubber Tires.

Motor Car Bodies. — The technical develop¬ ment and construction of carriage bodies has undergone radical changes in its adaptation to the automobile . and to mass-manufacturing methods. Wood, steel and aluminum are all largely used for the framework and panels of the bodies, with a growing preference for sheet metal work. The painting which was at first a laborious and time-consuming art is turned more and more into spraying and dipping proc¬ esses followed by rapid artificial drying by hot air, taking place while the bodies are carried on conveyor belts from one end of a long build¬ ing to another, and the atmosphere in the build¬ ing is carefully filtered to exclude dust. Fenc¬ ers and engine hoods are often made as special¬ ties at outside factories.

A general view of mechanism and arrange¬ ment of an elaborately designed motor car of the ((touring car® class is given in Fig. 28.

Motor Wagons. — The chassis of motor wagons are frequently almost identical with chassis made for motor cars of the same manu¬ facture. But large numbers are especially de¬ signed for delivery of merchandise and express wagon work, _ and in many of these chassis power transmission is of the chain-drive type, the vehicle springs are less flexible than for motor cars of comparable size, and wheels are larger and are shod with solid rubber instead of pneumatic tires. For technical details, see Sprockets; Sprocket Chains; Silent Chains.

Motor Trucks. — The principal differences in the construction of chassis for motor trucks and those for motor cars are the following,

speaking in general and with reference to the preceding account of common motor car con¬ struction : The engine is heavier, slower and larger, the maximum engine speed rarely ex¬ ceeding 1,500 revolutions per minute and fre¬ quently not reaching half of that figure. The general type of engine is shown in Fig. 29. Self-starting and electric lighting equipments are usually omitted, though provision is often made for fitting them afterward at the pur¬ chaser's option. The frame is usually made of industrial iron shapes but especially designed pressed-steel frames are gradually displacing the cheaper construction. The frame projects from one to three feet in front of the front axle and as far to the rear of the rear axle as necessary for providing load space. In heavy trucks from three-fourths to eight-ninths of the load is carried over the rear axle. (By this system the cost of production can be some¬ what reduced, as the front portions of trucks of different load capacities can be made nearly alike, but the

better *manufacturing practice tends toward providing* a complete individual design for each size of truck). As a heavily loaded platform demands a broad support on the vehicle springs, these are generally of the semi-elliptic or platform type at the rear and are often supplemented by overload springs (see Vehicle Springs) which come into action only when full load is carried or severe shocks are received on the road. Rebound checks and shock absorbers are rarely used. Instead of ball bearings or roller bearings in the wheel hubs, parallel bearings are quite generally used, especially in Europe ; in England often with floating bushings and special provisions for keeping lubricant from leaking out. Each rear wheel is usually shod with two solid rubber tires, side by side, known as twin tires ; each front wheel with a single solid rubber tire. Pneumatic tires in front or on all four wheels are used only for delicate loads, such as pianos, dynamite, glass, crockery.

The transmission system for motor trucks

Fig. 28. — General arrangement of an elaborately built “touring car” with 12-cylinder engine (V-type), approximately

as it would be shown by a lengthwise cut through the vehicle.

• ‘

is sometimes the same as that described as typi¬ cal for motor cars, blit recently worm gear sets are taking the place of bevel gear sets, allow¬ ing more gear reduction for a given road clear¬ ance under the middle of the rear axle and being credited also with silent running and,

Fig. 30. — Worm gear for rear axle drive in motor trucks.

for heavy work, with greater durability. Fig. 30 shows the nature of a worm gear as used in motor trucks. The worm may be either above or below the worm wheel. Further de¬ tails are given under Gears and Wheel Gear¬ ing. Reliable lubrication, accurate alignment

and suitable end-thrust bearings are conditions for the successful use of worm gears in motor vehicle driving systems. A general view of chassis and body arrangements of a motor truck with worm drive is given in Fig. 31.

Another variation of the ordinary shaft drive transmission which is commonly em¬ ployed in motor trucks is known as the internal- gear drive, of which an example is shown in \ Fig. 32. A variation less commonly yet not I infrequently used is the compound rear axle gear by which two pairs of spur wheels trans¬ mit the rotary movement from bevel gear and differential to the wheel shafts within the rear axle housing, in order to effect a reduction of speed. But chain drive, without casing for the chain, is still the type of transmission most numerously represented in this class of vehicles, the general construction of it being the same as for motor wagons. Radius rods for transmit¬ ting the driving thrust to the truck frame are always used with this drive and are arranged to be lengthened or shortened by a screwthread adjustment in order to adjust the distance be¬ tween sprocket wheels and thereby compensate for wear of the chain. Roller chains are gen¬ erally used. See Sprocket Chains.

Fig. 31. — Chassis and body arrangements of motor truck with worm drive. Shown as cut through lengthwise.

The remaining classes of automobile vehicles, which are dealt with in other articles, are the following: Electric trucks and wagons (see Electric Vehicles) ; electric carriages (see

to ignorance of suitable methods for varying the fuel feed and, in lesser degree to ignition, by hot tube or defective electric apparatus. Unreliability at any speed, due to poor cast-

Electric Vehicles) ; steam trucks (see Steam Vehicles) ; steam carriages (see Steam Ve¬ hicles).

Marius C. Krarup.

AUTOMOBILE ENGINE. Historically and mechanically the automobile engine is de¬ rived from the stationary and marine gasoline engines developed before 1890. (See special article on Internal Combustion Engine). These were either 4-cycle or 2-cycle engines, and automobile engines were developed on both plans, though very unequally. Gottlieb Daim¬ ler and Karl Benz selected the 4-cycle type for the small and experimental vehicles built by them in 1884, 1885 and 1886, from which the first automobile constructors in France received their inspirations, and when France soon after¬ ward took a decided lead in production and design the 2-cycle engine was neglected by the

majority of engineers in the matter of develop¬ ing it for vehicle wrork. It continued in favor for small motor boats in England and America, received the benefits of the rapid improvements in materials and production methods extending to all classes of hydrocarbon engines, and every now and then it has been taken up for use in automobiles. But in nearly every instance of this sort it was eventually abandoned again, falling behind the 4-cycle type, to whose im¬ provement by far the larger resources were devoted. The common prototype of the class of engine primarily to be considered is thus the single-cylinder, 4-cycle engine described and illustrated under Gasoline Engine, Sta¬ tionary* By taking note of the deficiencies for vehicle work which cropped out from the moment it was applied for this new purpose and by following the efforts made for remov¬ ing these shortcomings, one arrives at length to any and all of the types now in use, each type representing originally some variation in judgment with regard to the relative import¬ ance of different requirements or the means for meeting them. In the prototype of auto¬ mobile engines the following shortcomings were immediately apparent : The great weight, due to thick castings, large flywheel, large water tank and water supply. Violent shaking and vibration, due to single-cylinder design and un¬ balanced mass of piston, connecting-rod and crankarms and crankpin of the engine shaft. Failure to operate at more than one speed, due

ings, wrong composition and weak compression of the explosive charges, overheating, failing lubrication. Small and irregular power develop¬ ment, due to overheating, low maximum speed, small valve ports and gas conduits, poor com¬ position of fuel mixture. Noise and odor of ex¬ haust, due to single-cylinder design, incomplete combustion of explosive mixture and unsuitable mufflers. Noise of engine and cam gears, due to unbalanced mass of rotating and reciprocat¬ ing parts, poor design and cut of the gears.

As the construction having these faults rep¬ resented the best knowledge of its day, it could be improved only by degrees, in the measure as knowledge grew among designers and skill and production facilities were developed in the industries supplying new materials and machin¬ ery. When one fault was alleviated another one was often aggravated by the remedy. Sav¬ ing weight by using a smaller flywheel, for example, made shaking and vibrations worse and starting of the engine more laborious and uncertain. Reduction of the water supply made overheating — with dwindling of power and seiz¬ ure of pistons — for a long period a most com¬ mon trouble, and while radiators were at once devised to take care of excess heat the im¬ provements in carburetors and ignition, result¬ ing in more

power and higher speed kept the generation of surplus heat ahead of the radia¬ tor improvements and other improvements for checking it. In more recent days, larger valve ports and lengthened piston stroke doubled and trebled the engine speed and power that could be obtained from a cylinder of a given bore, but resulted also in the return of vibration and difficulties in effecting ignition and lubrication rapidly enough, and these reverting troubles had to be remedied in turn by further lighten¬ ing and finer balancing of reciprocating parts as well as by subtle changes in valve and cam shapes and settings, so as to get combustion started and finished to best advantage, before a practical gain in engine values could be re¬ alized from the increased speed and power. To be able to operate this improved engine slowly and with small fuel charges as well as rapidly and . with full charges is still an object to be realized in the same degree that was attained in the heavier, larger and slower engines which preceded them in the evolution.

These instances of correlation among

merits and defects — out of many that could be mentioned — are characteristic of the auto¬ mobile engine as an organism in which success or failure comes from harmonious interaction among all mechanical features as much as from the design and peculiarities of any of them. Carburation, fuel induction, ignition, compres¬ sion, combustion and expansion and even lubri¬ cation — all important and complicated func¬ tions — must in the highest type of engine often be performed several thousand times each min¬ ute and each time in a preconceived manner and in minutely regulated time and spac.e rela¬ tions of one to another, these relations varying moreover according to the engine speed.

Evolution of the automobile engine has for the reasons implied in these facts been a rapid succession of compromises among conflicting factors. Many advance steps have at first been too boldly conceived and had to be retraced to wait for related improvements not yet ripe, at the time, for mechanical realization.

The modern single-cylinder motorcycle en¬ gine (see Motorcycle) cooled directly by the atmosphere represents the simplest engine unit in which every unsuitable feature of the sta¬ tionary gasoline engine prototype has been changed in kind or degree to gain reliability and meet the requirements for vehicle work on essentially the same plan that has been followed for automobile engines, although the urgent need of lightness has here caused the adoption of cooling by air instead of by water and has reduced the number of cylinders, in most cases, to one or two.

For automobile engines, on the other hand, cooling by water was originally found so much easier to manage that its cost, weight and encumbrance were almost universally accepted as a lesser evil than the unreliability thought to be inseparable from cooling by air alone, and only one American manufacturer of motor cars now employs the latter system, using forced air draft for each cylinder. As a small cylinder is more easily cooled than a large one (having a larger surface to which the cooling medium can be applied in proportion to its volume and capacity for heat generation), and as 6, 8 and 12-cylinder motors with small cylinders are gain¬ ing in favor, while

aluminum is also coming into use as an engine material for pistons and cylinders and is more readily cooled than iron, having much greater conductivity (see Heat), the possibility of a much wider adop¬ tion of air cooling is not excluded, especially in conjunction with a moderation of engine speed; for example, for light vehicles for which the smallest practicable dimensions of a four or six cylinder engine give an abundance of power without pushing the engine speed to the attain¬ able maximum.

Among the features in the original engine, of which no trace is left in the modern designs shown in the accompanying illus¬ trations, the surface-evaporation carburetor, the automatic inlet valve, the hit-and-miss speed control acting by blocking the ex¬ haust, and the hot-tube ignition were those which were mostly, responsible for the

immense difficulties in utilizing the engine with equal facility for different vehicle speeds, different loads and different road grades. To change the constant-speed engine into a source of variable power, with the amount of power vol. 2 — 42

and the rate of its delivery — the torque and angular speed of the crankshaft — under the required instantaneous control, it was first of all necessary to revolutionize the carburetor. As the engine is the heart of the motor car, so the carburetor is the soul of the engine. Theories on the necessity for complete evapora¬ tion delayed the advent of the float chamber and the jet. Years followed, during which the Krebs diaphragm or a sliding sleeve was em¬ ployed to secure approximately the same com¬ position of the explosive mixture at one engine speed as at another, the spray from the jet in conjunction with a butterfly valve in the induction 'pipe having already made it possible to vary the engine speed considerably. But moving parts wore at their bearings, so that adjustments did not stay true, and much finer control was wanted. The whole subsequent de¬ velopment of carburetor mechanics has been divided between the two objects of securing this fine control for all desired degrees of engine power and speed (high engine speed with low torque being as frequently wanted on hard and level roads as maximum torque at low speed to turn the crest of a hill without gear change) and of reconciling it with the constantly de¬ creasing volatility of the fuel obtainable in the market. Increasing number of cylinders in the engines, all to be supplied from the same carburetor, and rapidly increasing maximum speed of the engines due to other advancement in the construction, made the task an unceasing one. Hereto came a demand for rapid accelera¬ tion or ˆpick-up,® also to be complied with. The expedients adopted may be classified in groups mechanically, but are so variously modified and combined in

the several hundreds of carburet¬ ors manufactured for the market that no single scientific principle has been demonstrated as governing the control of carburation when it is undertaken on the basis of a spray- jet from which a variable air current must siphon the fuel. As the volume of the liquid gasoline should be only about one eight-thousandth part of the volume of air with which it is mixed in atomized or vaporized form, the vari¬ able features in the control cannot suc¬ cessfully be applied directly to the flow of the liquid, such as by having the throt¬ tle reduce or enlarge the apertures of the jet, but must be applied to the air, its course and its velocity, and the air current, so varied on one plan or another which has been found suitable, must cause the discharge of liquid to be varied in proportion to the volume of air used. The greatest difficulty arises from the fact that an air current of doubled volume siphons much more than double the amount of fuel from an ordinary tubular jet, and com¬ pensation for the excessive siphoning action must be made. Also, when the air current is strong, with the throttle open, and the engine cylinders are filled up completely by the suction stroke, the compression of the charge becomes greater than if the cylinder is only partly filled, and to realize the best fuel economy, the highly compressed fuel mixture should be leaner than one less compressed. To compensate for this factor special devices are sometimes employed which admit air above the throttle to thin the gas mixture at the engine speeds giving the highest torque. The expedients which are nor¬ mal features in the carburetors are exemplified

on the constructions shown in Figs. 1, 2, 3 and 4, and are briefly explained in the captions for each of them. In order to produce a notice¬ ably rapid acceleration it has recently become a somewhat general practice to have a plunger connected with the throttle or accelerator lever

with poppet valves are of the L-head, the T-head or the top-valve type. The questions involved in the designer's choice among these, aside from cost of construction and commercial expediency, have changed in the course of years. Sound cylinder castings were hard to obtain

Fig. 1. — Sectional views of widely used carburetor of French design in two patterns; one with horizontal delivery pipe (to the left in illustration) and adapted to be mounted high on block-cast engine, avoiding exposure of pipe and condensation of fuel vapor; other with

vertical delivery pipe, as used for engines providing heating by water or exhaust gas of the conduits. Larger scale view (to the right) of auxiliary jet for “ idling ” engine and fuel reserve for rapid acceleration. Main jet in choke-tube has central channel fed with fuel through duct J from float chamber, and annular channel fed through same duct that feeds auxiliary jet S. Latter connects with atmosphere at top and when engine is operated with throttle flop open fuel in auxiliary jet drops low and suction pulls air into annular channel of main jet, mixing with the fuel and keeping proportions in fuel mixture correct. When throttle is closed, suction from cylinder acts close to aperture of auxiliary jet and draws a relatively rich mixture, as required for “ idling.”

in such manner that for a moment after the throttle has been opened to cause acceleration an additional ail current is sent from the plunger pot through or past the jet, to produce an action which is at once as strong as that which the same throttle opening otherwise gradually causes by increasing the engine speed.

for many years, with intricate coring for water jackets, except in symmetrical shapes, and this factor gave the preference to the T-head type before the top-valve type was known. It is now seldom used, the art of casting having advanced, bringing the functional factors of the engine into relatively greater importance.

Fig. 2. — Sectional views of carburetor of German design. At left, the pattern having float chamber BB surrounding the choke-tube (venturi-tube); in middle, larger scale view of oblique jet (cc) dipping into fuel supply at lower end adapted for drawing air at upper end to mix in form of air bubbles with spray of fuel at dd when throttle is open (it is shown closed). At right, same carburetor with float chamber at the side, as preferable if used for heavy fuels requiring adjustment of the float to raise level of fuel and bring it nearer to spray apertures dd.

The arrangement of valves and valve-actuat¬ ing mechanicism largely determines the dimen¬ sions of valves that can be used for a cylinder of a given bore, and thereby the maximum engine speed under load. According to what arrangement is adopted, automobile engines

These functional requirements are (1) compact combustion chamber with a minimum of wall area to get . rapid ignition and inflammation from a centralˆ located spark plug and full benefit of gas expansion against the piston before cooling can take place in appreciable

degree; (2) large valves and direct passages for fuel charges and exhaust -gases, these being the main factors in ((volumetric efficiency® which is the ability of the engine to take in and discharge gas with a minimum of skin friction and vortex action; (3) minimum weight of valve mechanism, to reduce vibration and

Fig. 3. — Modern American carburetor of design including unusual features. Auxiliary air supplied through ports un¬ covered at high engine speed by tubular piston P moving in cylinder C having upper and lower ports. “ Metering pin” M attached to piston P by ball at its upper end but free to move upward as gasoline is drawn up around it from main jet J, the discharge aperture in which is regulated by the position of metering pin in it. Hot air hose A. Series of holes B admit main supply of air to cylinder C, the air passing through annular channel around spray- jet H. Lever L furnishes adjustment to conform with size and design of engine by raising or lowering jet H, thereby changing its relation to metering pin.

noise ; (4) accessibility of valves and valve

seats, to facilitate inspection and repair; (5) minimum formation and ready removal of carbon deposits, the latter being due mostly to residues from incomplete combustion of lubri¬ cating oil on the cylinder walls; and (6) re¬ liable lubrication of the valve actuating mechanism.

Left

Fig. 5. — Left and right side views of 6-cylinder

In the quest for a small engine with a high maximum power and a wide range of speed these factors are all of importance, and it is usually admitted that the top-valve type, with the camshaft located on top of the cylinders, admits of the highest power development, closely followed however by the L-type ar¬ ranged with the intake valve in the wing and the exhaust valve in the top and operated by a rocker arm. In all cases the possibility exists of obtaining equal maximum power and greater ˆflexibility® in operation from a slightly larger 'and heavier engine with relatively smaller valves. The valve timing can be made nearly correct throughout the smaller range of engine speeds. Thus the L-type with both intake and exhaust valves in the wing (and each of them

Fig. 4. — Widely used American carburetor with dash control

therefore rather small) is commonly employed. A modern instance of the T-type, with two cam¬ shafts, for a 6-cylinder engine of high class and cost is shown in Fig. 5, the valve tappet rods being encased by means of aluminum covers on both sides. Though little used now, this type can have large valves and high speed.

Fig. 6 shows a sectional view of a 4-cylinder L-type engine, all cylinders cast in one block, as now usually done. Fig. 7 shows a 4-cylinder top-valve engine with details of mechanism in Fig. 8. Fig. 9 an 8-cylinder engine. To make

Right

ir-cast, high class automobile engine of T-type.

the power impulses follow one another at equal intervals, one row of cylinders in this engine forms a right angle with the other. In 12-cylinder engines of the same type, which are also used, this angle is reduced to 60 degrees,

Fig. 6. — Four-cylinder, L-type engine, block-cast.

whereby the engine becomes narrower and more easily disposed of under the hood, the parts are more accessible, while the great ad¬ vancement in the utilization of automatic machinery in the production of engine parts makes the difference in cost less than it could have been a few years ago. A tendency is thereby established toward the use of many small cylinders rather than fewer and larger ones. The crankshaft of a multicylinder engine fully balanced by counterweights at every point to obviate vibration in the last degree is, how¬ ever, a complicated forging. The ability to produce such shafts by drop-forging from one piece of steel has been developed mainly in the United States, while on the other hand the art of producing complicated and yet sound cylin¬ der castings was first developed in Ger¬ many, France and Belgium. In the beginning of the industry, cylinder heads were cast sepa¬ rately from the cylinders and were bolted on.

Fig. 7. — Four-cylinder, top-valve racing engine.

The gasket used at the joint frequently leaked after much exposure to heat, and the practice of casting all in one block was universally

adopted. Lately, however, a return to separate

casting of cylinder heads is noticed, this being due to considerations of cost, of new valve arrangements, better gasket materials and cheaper and more convenient repairs.

Fig. 10 shows an engine of the sleeve-valve type; in this case having two sleeves for oper¬ ating the intake and the exhaust by the succes¬ sive covering and uncovering of valve ports in the upper portions of the cylinder walls. First proposed in 1906 as an adjunct of an automobile exhibition in Chicago, this engine was subse¬ quently perfected in England and France and is now widely used. The silence of its opera¬ tion stimulated designers of poppet valve en¬ gines to the improvements by which the latter have also been made silent, mainly by better gears for camshaft, pump, magneto and fan and by the boxing of valve mechanism.

Another type of sleeve-valve engine, with a single sleeve, is also in successful use, in Eng¬ land, where it is made. Many efforts have been made to produce automobile engines with ro¬ tary valves, usually arranged in the nature of a valve tube placed horizontally through the heads of the engine cylinders and arranged to open and close the ports in the cylinder heads by rotation and periodic registry with ports

Fig. 8. — Details of a top-valve mechanism.

in the tube; but only one rotary valve engine is in practical use and has a vertical rotating sleeve at the top of each cylinder. It is of Italian manufacture.

By looking over Figs. 6 to 10 one notices in all of them a number of features adapted for removing the shortcomings of the stationary engine. The castings are thin, reducing weight and permitting the heat to escape to the cooling water with the required rapidity. Normally a centrifugal pump is employed to drive the heated water from around the combustion chamber and the valves into the top portion of the. radiator and further into the finely sub¬ divided ducts in the latter, where it is exposed to. the cooling effect of the atmosphere, the air being drawn rapidly through the interstices, partly by movement of the vehicle and nartly by the suction from a fan placed immediately behind the radiator structure. This is either tubular or cellular, the former being more ro¬ bust and the latter more finely subdivided. Often no centrifugal circulation pump is used and the water is circulated by reason of its

Fig. 9. — Cross-section and longitudinal section of 8-cylinder engine of V-type.

own variations of temperature, this ((thermo- syphon® system to be effective requiring a con¬ siderable difference in height between the top of the engine and the top of the radiator, on the same principle that makes a high chimney create a stronger draft than a low one.

The ignition has kept pace with the increas¬ ing demands made upon it. So long as engine speeds were low, a primary or small storage battery produced a current whose voltage was raised by means of an induction coil with trembler. The magneto gradually took the place of this equipment, being adapted for pro¬ ducing a spark more promptly and always ready to work when mechanically actuated from the engine. Recently the employment of engine starters requiring the use of a storage battery has rendered it possible to dispense with the magneto for ignition, and improved induction coil devices are often used instead of it. See Ignition; Magneto

Fig. 11 shows an example of the aluminum crankcase in which the shaft and the connect¬ ing-rod knuckles turn and whose lower portion,

known as the sump, is usually removable and serves as a reservoir for lubricating oil. The usual system is to lubricate the pistons and cylinder walls by splash ; that is, by the oil splashed from a shallow tray placed over the sump by the rapid rotation of the connecting rod ends, which are often provided with small scoops for this purpose. The bearings of the shaft are oiled from a gear pump operated in the lowest part of the sump, the oil being either forced through a continuous duct in the shaft and crankarms and pins or through a pipe above the shaft bearings, whence it is fed to the latter by gravitation.

Pistons and connecting-rods are made as light as possible, the latter either of alloy steel or of aluminum. A steel piston lightened by per¬ forations in its skirt is shown in Fig. 12. Pis¬ tons and cylinders of aluminum are the excep¬ tion but are not uncommon, although this metal expands and contracts about three times as much as iron or steel by changes of tempera¬ ture. Aluminum cylinders are so far normally lined with thin steel.

Mufflers or silencers for reducing the noise of the exhaust gases

formerly consumed an appreciable amount of power by hindering the escape of the gas — sometimes one to two horse-power — and by the back pressure and re¬ tarding of the flow contributed greatly to over¬ heating of the engine. The improved construc¬ tions, while regulating, cooling and contracting the gases, create less resistance than would be encountered if the gas were released at its first temperature and sped directly against the atmosphere. Yet in most racing machines it is so released, perhaps with an eye to the spec¬ tacular effect.

The sum of the development of the automo¬ bile engine from its stationary prototype has been that of transforming an engine capable only of turning its crankshaft over with a cer¬ tain power and at a certain speed into one whose power may be varied from 100 to 3 per cent of its maximum while its speed is varied from 100 to 10 per cent, all by the effortless shifting of air currents in a car¬ buretor to change the rate of fuel and air feed and an accompanying regulation of the spark by which the fuel gas is ignited.

For further facts and details of automobile

engines in their great diversity of design it is necessary to consult some of the numerous treatises and textbooks on this large and intri¬ cate subj ect.

The improvements gradually introduced in automobile engines have reacted strongly upon

Fig. 11. — Six-cylinder aluminum crankcase, with oil sump

shown separately.

stationary and marine engines, to the effect that engines of the automobile type are now frequently used for stationary and marine work. In the measure as manufacture of automobile engines on a large scale has reduced their cost, engines for motor boats are becoming very simi¬ lar to those used for motor trucks in the sizes below 60 horse-powers, and engines for racing boats similar to those for racing cars. The larger boat motor engines are however influ¬ enced to some degree by Diesel engine de¬ sign. To maintain a distinction between the automobile engine and small stationary and ma¬ rine engines of the most advanced type, it may be said that for the latter the weight of the en¬

gine is relatively unimportant while robustness, low cost and suitability for operating with kero¬ sene as fuel are important, and their makers therefore usually follow the continuous develop¬ ment of the automobile engine only to the point where weight reduction becomes costly and

where the high engine speed becomes useless or harmful for their purposes. It is to be said, however, that such are the recognized merits of the automobile type of engine and so greatly is its cost reduced by large manufacture and its operation simplified that means are found more and more for employing it without altera¬ tion in stationary and marine service, especially by gearing down the speed and utilizing irre¬ versible worm gearine to protect the light¬ weight engine from injurous shocks incidental to their work, such as may be sustained in marine work, for example, by the impact ol waves on propeller blades.

In the matter of operating automobile en¬ gines with kerosene or other heavy fuels it is found that the lengthening of the piston stroke — the maximum being now about six inches — and the heating of the carburetor and air intakes greatly facilitate the use of the heavy fuels, including alcohol mixtures, after the cold engine has been started on gasoline, but it still remains doubtful if the heavier fuels can ever be used exclusively and under all circumstances of climate and temperature so long as the fuel mixture is introduced by means of the suction stroke of the piston causing an air current that merely siphons the fuel from a jet. Develop¬ ments for making the automobile engine one adapted for many sorts of fuel still belong in the main to the future.

Marius C. Krarup.

AUTOMOBILE INDUSTRY. Though

small and of doubtful stability until about the year 1903, the automobile industry has not only grown to be the first in financial magnitude among all the industries in the United States which turn out finished products, and to a simi¬ lar position in the leading European countries, but has exerted the strongest formative and stimulating influence in several other metal¬ working industries and arts which were laid under contribution for materials and parts and driven to efforts the results of which were found so widely applicable as to be at once exploited eagerly and broadly in many other directions, to the effect of greatly increasing and improv¬ ing the world's productive facilities in all com¬ modities adapted to be made by automatic machinery wholly or in part. These influences, and

especially the widening of the use of jigs, working-jigs, gauges, machine tools and special¬ ized machinery, have been incalculable. They have revolutionized all previous methods in factory organization and have established a new standard for industrial accuracy as well as for the physical testing of materials.

In securing accuracy in the new sense, -uni¬ formity in results and method in producing them take precedence over painstaking measure¬ ment; specific gauges take the place of adjust¬ able instruments, and the need of subsequent fitting, previously the pride of skilled mechanics, becomes a fault.

In these respects the automobile industry has followed in the footprints of the bicycle industry, which however was not of sufficient magnitude or industrial scope to make the whole technical world take note and follow, besides representing an earlier stage of the develop¬ ment. It has fallen to the lot of the automobile industry to work wonders, because science and art and finance were ready to be lavish with all their untried resources when this new com-

modity of high price — the automobile — cap¬ tivated the spirit of the age and promised to repay amply for all that might be spent on perfecting it, offering the first large opportunity of this order, and one which has proved even larger than the most far-sighted could have anticipated 20 years ago. Constantly stimulat¬ ing initiative and enterprise in new directions, the successes of the automobile industry have inaugurated a new epoch in civilization : The Age of Motors. On land, on sea and in the atmosphere, in mines, in fisheries and on the farm, in sports and in utilitarian pursuits, in the rapid transportation of persons and mail as in the slower transport of heavy goods, for the requirements of peace as for the destruc¬ tive activities of war, the engines, the super¬ steels and the production methods introduced through the automobile industry have become indispensable.

The historical background of the automobile industry is, rightly seen, nothing less compre¬ hensive than the entire scientific, technical, in¬ dustrial and commercial development following in the wake of the steam engine, Bessemer steel, cpal oil, electro-magnetism, metallurgical and organic chemistry, but it is customary to point to early efforts for producing road ve¬ hicles driven by steam engines as the historical element of the automobile industry, A cur¬ rently

accepted list includes the following as the more important among these efforts :

N. J. Cugnot's steam tractor, built 1769, intended for hauling artillery.

Richard Trevithick of England developed steam engine ; built steam coaches 1801-03.

Oliver Evans of Philadelphia improved steam engines 1784, built vehicle 1804.

William Henry James, water tube boiler in 1823, vehicle seating 20 in 1824, another in 1829.

Pecqueur, 1828, built vehicle with rotary steam engine, chain drive, differential gear and Ackerman steering system (same as now used).

Golds worth Gurney, 1825-30, Walter Han¬ cock, 1830-36, F. Hills, and others in England built many steam vehicles, mostly coaches, which ran for thousands of miles without decisive failures but were hard on roads. In response to public opinion Parliament stopped the devel¬ opment bv taxation.

In the United States steam road vehicles were built in 1825 by Thomas Blanchard at Springfield, Mass.; by J. K. Fisher of New York in 1840 and 1853; by Richard Dudgeon of New York in 1857 and 1859.

S. H. Roper of Roxbury, Mass., about 1870 developed steam vehicles, tricycles, with fireflue boilers, which were used successfully and were improved bv his sons and others. And the steam plant in these vehicles, much lighter than any previously produced and much more easily started, with gasoline as fuel, formed the tech¬ nical foundation for the steam carriages and runabouts of which several thousands were made from 1898 to 1903 and used both here and in Europe. With regard to this manufac¬ ture and its continuation at the present day, see Steam Vehicle.

The actual beginning of the gasoline engine automobile is traced to the. formulation of the 4-cycle gasoline engine principle by Beau de Rochas and the Belgian inventor, Jean Joseph Etienne Lenoir and to the exhibition of an engine of this type by Lenoir in Paris in 1878.

Gottlieb Daimler of Stuttgart, Germany, by devising a cam system for co-ordinating two cylinders to operate together and by replacing open flame ignition, as used for the first gas and gasoline engines, by hot tube ignition, was enabled to construct the first gasoline engine

automobile, a tricycle, and to earn the appella¬ tion of <(the father of the automobile.® The claim for priority he shares with Karl Benz of Mannheim, Germany. Both produced primitive butˆ operative gasoline automobiles in 1884, 1885 and 1886. Maybach (after Daimler's death in 1900 the leading engineer of the German Daimler company) several years later, about 1897 or 1898, devised the spray-jet carburetor and thereafter the development of automobile construction and the automobile industry pro¬ gressed rapidly, though with periods of stagna¬ tion in improvements and with numerous ups and downs among the rank and file of manu¬ facturers.

With regard to the share of electric auto¬ mobiles in the history and the subsequent devel¬ opment, see Electric Vehicle. The great part played by the closely related rubber tire indus¬ try which rivals the parent industry in value of annual output is referred to under Rubber and Rubber Tires.

In a general way the automobile industry is divided into four branches : Manufacture of complete vehicles, manufacture of component parts, manufacture of accessories and manufac¬ ture of carriage work and vehicle bodies. The last-mentioned branch has been taken over to a considerable extent by the concerns which built vehicles or carriages before the advent of the automobile. The division lines are vague. Many firms whose main product is motor cars make also motor wagons and motor trucks. A considerable number make only commercial motor vehicles and constitute what is often looked upon as a separate motor truck industry and have associations and trade journals apart from the rest. But the Society of. Automobile Engineers, which is widely recognized as hav- iing the common technical interests of the in¬ dustry in charge, draws its membership from all branches and is extending its activities to matters related to the technics and production of motor boats, aeroplanes, tractors and self-propelled farm machines. Its most important work has consisted in the establishment of standards in construction elements, being the selection of a limited variety of dimensions and shapes in raw materials as indispensable to meet the needs of the designers in the automo¬ bile industry and, coupled herewith, uniting the producers of the materials in an understanding with the designers to the effect that minimum delay and lowest cost are secured on both sides by avoiding departures from the selections made, these being subject to revision, however, from year to year. The value of this ((standard- ization® work for expediting and cheapening production, without interfering greatly with the freedom in new design or the advancement of merits in construction, has been recognized also outside of the United States.

Several large concerns manufacture within their own establishments and from raw mate¬ rials the frames, axles, gears, clutches, shafts, springs, wheels, carriage bodies, as well as en¬ gines and carburetors which enter into their

completed vehicles, but a much larger number furnish the desired designs to manufacturers of component parts, especially the frames, axles, springs and wheels, and have them made to their order, sometimes under supervision by their inspectors. Many other automobile manu¬ facturers adopt their design to a comprehensive selection of the components which the manu¬ facturers of the latter have designed and pro¬ duced for the market in general and with a view to the needs which, in their opinion, the builders of automobiles have in common. About 50 firms make a specialty of producing engines for the industry. Large manufacturers of complete automobiles have been started on the plan of obtaining all but a few characteristic parts and features from the auxiliary branches of the industry and, in the measure as commer¬ cial success was attained, have enlarged the scope of their individual design and production, finally controlling them in all the essentials.

The manufacturers of components, on the other hand, were usually engaged in forms of metal or steel manufacture having nothing to do with automobiles before they entered this field and, while many of them still continue such unrelated manufacture in other lines, the largest and most successful ones among them have as a rule confined themselves more and

more to automobile products and turn these out in ever-increasing quantity. An exception in this respect is the manufacture of electric generators, motors and storage batteries, which remains almost a separate industry with its most important interests in other directions.

From the beginning the American automobile industry adopted the plan of making and selling complete vehicles to the public, while European manufacturers produced only a chassis and left it to the customer, to have a carriage body fitted to it by a carriage builder of the cus¬ tomer's owji choosing. The American plan was later extended to embrace also the equip¬ ment with accessories, such as lamps, odom¬ eters, cyclometers, horns or other signal devices, windshield, shock absorbers, storage battery. Finally, an engine-starter equipment

is now frequently also included in the outfit to which the selling price applies, and in some instances an engine-driven air-compressor to facilitate the inflation of tires. The European industry follows slowly in adopting these practices. Most of the smaller accessories continue to be made by specialty manufacturers who sell in large lots to the car makers and in ' smaller lots to the retail trade.

Motor wagons and motor trucks did not be¬ gin to be made on a large scale until automobile

PRESENT MAGNITUDE OF THE AUTOMOBILE INDUSTRY Compiled by Alfred Reeves, General Manager of the National Automobile Chamber of Commerce Motor Car Manufacturers Automobile Exports

Motor vehicle manufacturers in United

States . 550

Commercial vehicle manufacturers . 372

Passenger vehicle manufacturers . 238

States in which factories are located . 32

Capital invested . $736,000,000

Workers employed . 280 , 000

Wages and salaries paid during fiscal year

ended 30 June 1917 . $275,000,000

Motor vehicles produced in last fiscal year. 1 ,806, 194

Passenger cars produced . 1 , 693 , 994

Commercial cars produced . 112, 200

Wholesale value of vehicles produced during

last fiscal year . $917,470,938

Paid for parts and materials by automobile

manufacturers during last fiscal year. . . . $480,000,000

Production passenger cars in calendar year

1917 . 1,795,840

Production commercial cars in calendar year

1917 . 181,348

Average price of passenger cars produced in

1917 . $720

Body, Parts and Accessory Makers

Number of concerns manufacturing some

article used in in auto trade. 6,789

Body, parts and accessory makers in United

States . 1 , 080

Capital invested by body, parts and acces¬ sory makers . $336,000,000

Workers employed by body, parts and ac¬ cessory makers, 320,000; workers' wages

paid yearly at $900 per man . $288,000,000

Automobile tires manufactured during fiscal

year ended 30 June 1917 . 18,000,000

Value of tires manufactured in last fiscal

year . $450,000,000

Dealers, Garages, Etc.

Total dealers, garages, repair shops, etc., in

United States . 46,000

Automobile and truck dealers in United

States . 27,000

Garages . 25,500

Automobile repair shops . . 13 , 500

Tire vulcanizers . . . 12,000

Automobile supply houses . . ; . 2 , 550

Jobbers of automobile supplies . 282

Capital invested by dealers, garages, etc.,

estimated at $4,000 each . $184,000,000

Workers employed, estimated average of

five each . 230,000

Wages paid, estimated at $800 per man. . . . $184,000,00G

Value of automobiles, trucks, engines, tires and parts exported year ended 30 June

1917 . $133,411,217

Number of passenger automobiles exported

last fiscal year . 54,834

Value of passenger cars exported . $48,620,928

Number of commercial cars exported last

fiscal year . 15,977

Value of commercial cars exported . $42,337,315

Value of automobile engines, tires, and

parts exported last fiscal year . $42,452,974

Motor Vehicles in Use

Motor vehicles registered in United States. . 4,842 , 139

Motor vehicles in New York State . 418,000

Motor trucks in use in United States . 435,000

Tons of goods hauled yearly by trucks

(estimated) . 1,200,000, 000

Cost of haulage by motor trucks at 18c per

ton-mile . $1,080,000,000

Cost of haulage on basis of 24c per ton-

mile by horse and wagon . $ 1 , 440 , 000 , 000

Value of passenger service at railroad rate

of 2c per mile . $1,152,600,000

Number of persons in United States to one

motor car . 24

Number of persons to one motor car in 11

Middle West States . 17

Number of persons to one motor car in 11

Eastern States . 26

Percentage of cars sold to farmers in 1917

(estimated) . 40

Number of automobiles in United States to

each mile of public road . 1.72

Number of automobiles in United States to

each mile of surfaced road . 14.77

Number of automobiles in United States

for each square mile . 1.4

Automobiles in use in all countries outside

of the United States 1 Jan. 1917 . 719,246

Automobiles in use in Europe 1 Jan. 1917.. . 437,558

Automobiles in use in Canada 1 Jan. 1917.. . 118,086

Automobiles in use in South America 1 Jan.

1. . . 39,188

Automobiles in use in Australasia and

Oceanica 1 Jan., 1917 . 55,340

Horses in the United States . 24,000,000

Acres of land required to sustain horses .... 120, 000 , 000

Horses displaced by motor trucks in use

(estimated), . 2,000,000

construction was far enough advanced to make the business world feel assured that they were suited for performing commercial transporta¬ tion work more economically, in most lines of business, than it could be done by the old system. But since about 1908 the number of trucks and delivery wagons has increased very rapidly, while the number of manufacturers solely pro¬ ducing commercial motor vehicles has fluctu¬ ated notably from year to year, the difficulties in the design and production of durable vehicles of this class having been underrated.

The accompanying statistical tables and data give an idea of the magnitude which the in¬ dustry has reached in the United States, but the war in Europe prevents the presentation of comparable data from the French, British, Ger¬ man, Austrian and Italian industries.

American Production of Automobiles for the Fiscal Year Ending 30 June 1916

[Compiled by the National Automobile Chamber of Commerce]

Number

Retail price

Passenger vehicles .

1,227,533

75,867

$912 , 060, 829 157,060,790

Commercial vehicles .

U 303, 400

1,069, 121,619

Out of this number of passenger vehicles more than 500,000 small cars representing a retail price of about $218,000,000 were made by one manufacturing company employing 31,000 men. This leaves the rest of the production of passenger vehicles at 727,533 and their sell¬ ing price at $794,060,829. The average price of American automobiles, excepting one make, was thus slightly more than $1,000 between 30 June 1915 and 30 Tune 1916.

Data on the increase of production of five- year periods, some figures on electric vehicles and on exports, showing especially the influence of the European War on exports of commercial motor vehicles (to be used as war trucks) are compiled mainly from United States census reports as follows :

Motor Vehicle Production Reported by United States Bureau of Census

Year

1904

1909

1914

Total number of cars produced

Electric carriages .

Electric comm, vehicles ....

21,692

1,425

214

126,593

3,826

493

573,114

4,715

The N. A. C. C. reports additionally that in 1912 there were produced 1,351 and in 1913 no less than 2,736 electric commercial vehicles.

The value of the exports in 1913 and 1914 was about one-twenty-eighth of the value of the domestic trade and in 1915-16 had risen to one-tenth of the domestic trade, although the latter had more than doubled in the same period. The distribution among the principal countries is shown in the following table :

AUTOMOBILE INSURANCE. A con¬ tract of indefnnity (1) against loss or expense by reason of the liability imposed by law upon owners or users of automobiles, for bodily injuries, including death, suffered by any per¬ son as the result of the ownership, maintenance or use of such automobiles; (2) against loss or damage by fire, theft or robbery, or trans¬ portation of automobiles; (3) against loss or expense by reason of the liability of owners of automobiles for damage to or destruction of property of others, except while in charge of the assured; (4) against loss' by reason of the damage to or destruction of automobiles of the assured caused solely by collision with another object, either moving or stationery, ex¬ cept loss or damage by fire; or by striking any portion of the roadbed; or by striking steam or street railroad rails or ties.

Automobile insurance is divided into two principal classes : First, insurance of cars of the private and pleasure type ; and second, of public vehicles, taxicabs and livery vehicles in gen¬ eral ; commercial vehicles for transportation or delivery of goods or merchandise ; cars used for demonstrating, testing and similar pur¬ poses by manufacturers, sales agencies, garages and service stations.

The premium charge for liability insurance in the case of private and pleasure cars is based upon the insurable horse-power, which is deter¬ mined by a standard recognized formula of rating; the premium charge for public and livery vehicles is based upon the carrying capac¬ ity of the vehicle or is a fixed sum per car ; the premium charge for commercial cars is based on the nature of the assured’s

business ; the premium charge for cars used for demonstrat¬ ing and testing and by garages, sales agencies and service stations is based upon the pay roll of all employees, including executive officers and office force, or on the number of chauffeurs named in the policy, or upon the number of cars specifically insured by manufacturer's number. In every case, the amount of premium is dependent upon the locality where the cars are principally maintained and used. The premium charged in the case of fire, theft and transportation insurance of automobiles is based upon the original list price as well as the year of model of the car, and the rate of premium increases with the age of the car and decreases as the list price becomes higher. A small in¬ crease in rate is also made for cars bought sec¬ ond hand in place of new. The amount of insurance granted is likewise dependent upon the list price and year of model and varies from 100 per cent of the actual cost of the car plus the equipment, in the case of new cars, to less than 25 per cent of the cost of cars more than five years old.

Automobile liability insurance has been writ-

United States Exports of Motor Vehicles to Principal Countries at War for the Fiscal

Years 1916 and 1917, Ending 30 June Each Year

Year

France .

1916

1917

No. Value

7,768 $19,137,904

18,428 26,147,882

none none

5,177 15,686,874

2,673 3,402,422

5,496 7,170,518

No. Value 1

5,631 $14,691,460

7,797 18,508,442

none none

2,513 6,371,982

5,094 5,227,081

11,083 10,436,460

Great Britain (in Europe) .

Germany .

Russia (in Europe) .

Other Europe .

Asia (mainly Vladivostok), in 1916 .

Marius C. Krarup.

ten for only 10 years in this country, but in that comparatively short period,* the business has grown rapidly and has reached substantial proportions. A few companies only ventured into this field of underwriting at first, and for two or three years the business was confined to the larger organizations, but as the demand developed, and the field for this form of pro¬ tection broadened, other companies essayed the business, until at the close of the year 1916, 43 companies were insuring under a single pol¬ icy against liability for loss of life or personal injury; against liability for property damage; and against loss or damage resulting from collision. The premiums received and losses paid are unfortunately not available, for the reason that automobile liability is included un¬ der the general heading of liability insurance, in the statements and reports of casualty com¬ panies, and no separation is made by any ot the companies of the figures pertaining to the automobile business alone, excepting in the single case of

property damage premiums and losses that are reported together with an allied branch of insurance, known as Teams Property Damage. Some idea, however, of the volume of business transacted annually by these com¬ panies may be gained when it is known that during the year 1916, the premiums received for automobile and teams property damage amounted to $9,558,590 and losses paid to $3,853,763. As these figures represent only a relatively small percentage of automobile liability premiums and losses, it is easily conceivable that the volume of such business will in a few years exceed most other forms of liability insurance.

Automobile fire insurance covers the haz¬ ards of (1) fire, from external causes, self¬ ignition, explosion or lightning; (2) transporta¬ tion; (3) theft; (4) property damage (5) collision damage. Ninety-five companies trans¬ acted this kind of insurance during 1916, whereas several years ago such insurance was entirely unknown in this country. An innova¬ tion was introduced within the last few years by the issue of a (< joint® policy, consisting on one side of a contract of fire insurance, by some well-known company, and of liability insurance, by some equally prominent company, on the other side. The main advantage claimed for this dual contract was that complete coverage was thereby afforded in one policy, but the plan did not meet with unqualified success, and the greater part of the business is now written in separate policies. The fire insurance policy usually includes fire and theft and collision damage and the liability policy covers personal injuries and property damage. In 1918 the National Automobile Underwriters' Association recommended that fire and theft motor insur¬ ance be included in one policy, with a distinc¬ tion in rates, and providing that only half the insured value shall be recovered in case of theft, but not affecting the fire insurance for which full value is assured.

The rapid growth of automobile fire insur¬ ance and the great possibilities for its future development are best indicated by the results achieved by the companies in 1916, which show net premiums received $17,320,342; net losses incurred $7,829,369. These figures, taken to¬ gether with the automobile business transacted by the casualty companies during the year, in¬

dicate a total volume of premiums received exceeding $50,000,000, and of losses incurred of over $22,000,000.

Edwin W. De Leon.

AUTOMOBILE TORPEDO. The self- propelling torpedo, invented and

constructed by Whitehead in 1870, did not show its potential power until 1877, in the war between Chile and Peru. Despite numerous and important im¬ provements, it was considered even up to the opening of the Russo-Japanese War a weapon of uncertain value. Since that date, however, the opinion of experts has been changed. The first experiments show that the essential qual¬ ity to develop was speed, and the efforts were largely along that line for a time. Then on account of the continually greater resistance of the armor of ships it was necessary to increase the explosive charge. Then the de¬ velopment of rapid-fire guns made it more difficult for the torpedo boats to approach their adversaries and greater radius of action was necessary in the torpedoes themselves. The different demands led to gradual increase in ihe calibre of the projectile, but here the ques¬ tion of weight came as a determining factor. It is necessary not to exceed the weight or dimensions that can easily be handled. Next there was the use of compressed air for motive power. It has been through the combination of all these factors by dint of an enormous amount of ingenious invention and adaptation that the modern torpedo has been possible. See Torpedo and Whitehead Torpedo.

AUTOMOBILES IN WAR. Previous to

the breaking out of the European War in 1914 the potential value of the automobile in mili¬ tary operations had been recognized by army men, and its use had been tested in manoeuvres, sometimes to the complete exclusion of horse- drawn equipment. In England a certain type of military automobile had been decided upon by the authorities, and in order to have a large number at hand in case of hostilities, the approved design received a subsidy. This type of vehicle, however, did not find favor with the British commercial public, and few of them entered into general use. In France, a similar forward-looking provision had been made for a supply of automobiles which could be com¬ mandeered for military purposes in time of need, but no special design was insisted on. Any automobile which would meet certain re¬ quirements as to performance received the sub¬ sidy. When the war broke out England found that there was no appreciable stock of the military automobile to be taken for service, and all kinds of motor vehicles were commandeered, and did measurably good work. The French had a very considerable number of approved machines at their disposal. But within a very few weeks after the war had actually started both the English and French governments were buying largely the regular stock American commercial automobile trucks. And these, with some minor modifications, have withstood suc¬ cessfully the vicissitudes of the most rigorous use. Of course, special service demanded special vehicles, and these had to be specially constructed.

The Germans on the other hand were well prepared with an almost innumerable fleet of standardized motor vehicles of every descrip-

tion. Many months before war was actually declared German automobile owners were noti¬ fied by the authorities to send their machines to designated shops, where holes were bored in frames, and lugs bolted on. When the mobilization occurred every type of machine had its special attachments ready to be put in¬ stantly into place. The invading troops were rushed into Belgium and France in squadrons ol motor vehicles at a speed three times faster than any recorded in military annals. Perhaps the most sensational feat of the war has been the transport of the 60,000 troops from Paris overnight to the flank of von Kluck's advanc¬ ing army on the Marne. It was accomplished by thousands of motor cars of all descriptions from the city buses to the motorcycle which could carry only one. Another emergency use of unspecialized automobiles in war was the endless chain of 4,000 cars of all sorts which connected the battlefield of Verdun with the railroad station at Bar-le-Duc, 30 miles away, for a space of three months while a railroad was being built. This heterogeneous procession of cars 60 feet apart, and moving at the con¬ stant rate of three feet per second, carried in the needed supplies of every sort and brought out the wounded.

During the punitive expedition of the United States troops into Mexico whole regiments with their supplies and equipment were moved at a speed of 125 miles per day, four times faster than would have been possible with horses.

On 1 July 1916 it was estimated that on the western battle front the British and French troops had in action about 60,000 automobile vehicles, of which number nearly 25,000 were of American manufacture. Experience with so many machines of so many different types soon led to a decision as to the chief requirements of the war automobile. The machine which has proved most effective has been the 3f4-ton truck of French make, and the 3-ton truck of American make. The weight of these machines is about 6,000 pounds. They are of the platform type, the floor 138 inches by 67 inches, with removable sides 24 inches high. The engine most in favor is of 4 cylinders, averaging about 3.9-inch bore and 5.7-inch stroke, housed under a hood. Gasoline is considered the only dependable fuel. Every variety of drive has been represented, but no superiority has been

shown by any par¬ ticular design. The large-diameter vertical- tube radiator was most successful, the honey¬ comb type being pronounced a failure. The pump circulation system was definitely proved superior to other systems. Mechanical self¬ starters were not demanded. The splash system of lubrication won out over the forced circu¬ lation method, chiefly because the pump in the latter system was free to pick up and send on to the bearings any kind of harmful dirt which might happen to get into the oil chamber. Ignition by high-tension magneto fulfilled all requirements. Four-speed gears were found necessary to meet working conditions, and the French constant-mesh gears were the only ones quite satisfactorjr. Where the truck was obliged to travel off the roads and over rough ground, chain-driven wheels were employed ; in extreme cases caterpillar track bands were attached. One of the most radical alterations was the spoked wheel made of steel in place of the

artillery type of wooden wheel. For lighter cars the steel disc wheel with solid rubber tires was found dependable. The tires adopted after much experience were 36 inches by 6 inches for the front wheels, and dual rear wheels with tires 40 inches by 5 inches. The driver's seat was fitted with a separate closed hood, generally of canvas, but sometimes of wood. The . bodies were fitted with heavy hoops and canvas tops, the front and rear hoops being strong enough to carry a load of 650 pounds each, and the middle hoop a double burden. The object thus attained was the conveyance of wounded soldiers on slung stretchers on the return trips from the battle front.

For the hauling of field pieces the truck with 4-wheel drive was employed. This was heavily, built, with a capacity of 12 tons generally with two trailers carrying ammuni¬ tion and supplies. A few of these had 6- cylinder engines, but the 4-cylinder type predominated, and was favored. The engines were generally of 4*4-inch bore and 6-inch stroke. These heavy trucks are capable of transporting a 75-millimetre gun, and in the French service* the trucks were fitted with jacks to take the weight off the wheels when the gun was fired. For hauling the heavy artillery, the 14-inch and 16-inch guns, the motor used was of the simple traction type with road wheels of large diameter driven by internal gearing. The caterpillar tractor of the agriculturist operated at a slow speed was found more expeditious and certain in the long run than any other machine. These heavy tractors hauled loads up to 30 tons distributed over two or three trailers, one or more of which might be dropped on grades or where the going was very heavy. One of the recorded accom¬ plishments of an American-built tractor of this type was the transportation of a 20-ton gun 29 feet long a distance of 11 miles in \l/2 hours. The muzzle end of the gun was supported by a

trailer. For armored cars carrying machine guns representatives of nearly every type of motor vehicle have been employed, from the motorcycle with a sidecar to the big 12-ton truck carrying four machine guns and a field piece. The more common adaptation was based on a powerful 4-cylinder touring car upon which was built up a single compartment of steel plates about one-third of an inch thick, sometimes with a turret, and generally equipped with a wire-cutting device. The plating covered the engine and radiator, and the wheels were of the steel disc type, with solid rubber tires. These cars were supplied with flanged metal rims which could be quickly adjusted for travel at high speed on railroad tracks. Trailers were used behind nearly all cars, a favorite type be¬ ing the two-wheeled float with canvas top. These were often fitted with seats to carry a large number of men, and operated up to a speed of 35 miles per hour. The so-called ˆtanks'® of the British army are agricultural tractors of caterpillar model encased in half¬ inch steel armor. They weighed 15 tons and had engines of 120 horse-power.

Owing to the wide variation in construction of the many makes of motor vehicles in use on the Franco-British battle front, it was a hope¬ less task to attempt to supply parts to repair a damaged car, and in case of a breakdown the

car was simply abandoned for a new one. The loss was estimated at between 60 and 70 per cent of the car fleet, owing in part to the load¬ ing far beyond the burden which the cars were planned to carry. On the German front the cars were largely standardized, and rescue cars loaded with parts cruised about gathering up and repairing even the abandoned cars of the enemy. Some of these rescue cars were fitted up as machine shops, with trailers carrying supplies and parts. Others were derrick cars which lifted the broken-down car to the deck of a trailer and took it to a repair shop in the rear.

Specialized automobile machines appeared in large numbers as the war grew older. Among these were motor plows of 200 horse-power which dug trenches three feet deep faster than could be done by 100 men; roller tractors which not only smoothed newly made roads, but drew a train of loaded trailers behind; observation cars fitted with extension ladders to be run up high into the air; field laundries; sterilizing chambers for clothing; X-ray laboratories; per¬ ambulating bath-houses ; and even traveling theatres for the diversion of the

wounded. One of the more interesting emergency uses of com¬ mercial cars was the conversion of the London buses into refrigerator transfer cars for fresh beef. Another was the fitting up of a motor¬ cycle with a side car with a complete wireless outfit.

In the United States regular army service there are battle cars fitted with rapid-fire guns; tank cars for gasoline, oil and water ; anti¬ aircraft cars with guns mounted; 4-ton trucks carrying a 3-inch field gun with caisson — not mounted on the truck, however, as with the French 75's; a machine shop for repairs in the field; and a coffee percolator mounted as a two-wheeled trailer. These are, of course, in addition to the customary ambulances, field kitchens, etc., in general use in all military establishments.

Actual experience in the European War has proved that with the aid of the automobile in all its forms a whole army with its supplies and field equipment can be advanced at the rate of 30 miles per day, and a retreat can be con¬ ducted at the rate of 50 miles per day.

AUTOMORPHISM. This word is used by Spencer for the use we make of ourselves and our conduct as norms in the judgment of others. There is much in the experience of others that is not directly available to us. John Smith can give me a clear idea of the internal structure of his experience — he can tell me when two things appear of the same or of dif¬ ferent colors, when he judges one thing better than another, or he can give me an analysis of his emotional life, but whether red really is to him the same color that it is to me, how he feels when he gives his moral assent, or whether his anger and my anger are qualitatively identi¬ cal — all these things and many more are a sealed book to me. The only way in which I can fill in the outline which I obtain by conversa¬ tion and observation is from the stuff of my own mental life. All knowledge of the mind of another, then, in so far as it is a knowledge of its intrinsic quality rather than of its structure, involves the use of automorphism.

AUTONOMY, the self-government of a state. This power may reside within limited bodies of the same people, such as parishes, corporations, religious sects. These districts or communities may be autonomous, if not absolutely, yet within certain defined limits. They may be said to enjoy a partial, limited or local autonomy. Autonomy is often used to designate the characteristic of the political condition of ancient Greece, where every city or town community claimed the right of inde¬ pendent sovereign action. Recently the word is more specifically used of territories or prov¬ inces, which, while subject in some matter to a higher sovereignty, are autonomous in other

respects. The self-government enjoyed by the British colonies may be described as a modified form of autonomy.

AUTOPLATE, a machine for making and finishing curved stereotype printing plates for use in printing newspapers, invented by H. A. Wise Wood of New York, and first put into use upon the New York Herald. This machine, after a flexible papier-mache matrix, made from a type page, is inserted therein, proceeds to cast printing plates weighing about 50 pounds each, at the rate of four a minute, and to dress their edges and inner surfaces and prepare them for attachment to the printing cylinders, and this is done automatically — all within the compass of one machine. Previous to the advent of the autoplate such work had invariably been done by hand-worked devices, with which the fastest rate of production attainable was at the rate of slightly less than one plate per minute. So great a change did this invention make in the work of stereotyping upon the larger news¬ papers that not only was the machine generally adopted, but in every case the hand apparatus were entirely dispensed with, and sole depend¬ ence placed upon the autoplate.

AUTOPSY, meaning strictly to observe directly with the eyres, but more commonly ap¬ plied to the close examination of a dead body to determine the cause of death. The autopsy is usually performed byr the coroner in cases where death from poisoning is suspected, in which the contents and condition of the stomach are examined and subject to chemical analysis.

AUTOSSEE, Battle of, in the War of 1812. While Jackson was fighting the battles of Tal- lahatchee and Talladega in Alabama, the Georgians sent a force of 940 militia and 300 friendly Creeks under Brig.-Gen. John Floyd into the heart of the Creek country. On 29 Nov. 1813 Floyd drew up his troops in battle order in front of the Indian encampment at Autossee on the Tallapoosa near Tuckaubatchee and though the Indians occupied a strong posi¬ tion, a well-directed artillery fire and a desperate bayonet charge soon drove them out with a loss of about 200 killed, while Floyd lost only 11 killed and 54 wounded. Floyd then retired to Fort Mitchell on the Chattahoochee where he remained until the battle of Tuckaubatchee (q.v.). Consult Adams, <United States) (Vol. VII, pp. 241-43) ; Brackenridge, H. M., his¬ tory of the Late War' (p. 191) ; Fay, H. A., (Official Accounts) (pp. 161-65) ; Pickett, (History of Alabama) (Vol. II, p. 300) ; Miller, (Bench and Bar of Georgia) (Vol. I, App.).

AUTRAN, o-tran', Joseph, French poet: b. Marseilles, June 1813; d. there, 6 March 1877.

His verse is admired for its purity of form and refined sentiment. He attracted attention in 1832 with an ode to Lamartine, (The De¬ parture for the East. } His works include (The Sea,} poems (1835) ; (Milianah,) an epic (1842) ; ˆ Rural Life* (1856) ; and (The Daugh¬ ter of vEschylusR drama (1848), which won a prize from the French Academy. In 1868 he was elected member of the Academy. His works were collected and published (8 vols., Paris 1881).

AUTREFOIS CONVICT, o'tr-fwa' kon- ve, in criminal pleading, a plea made by a de¬ fendant indicted for a crime or misdemeanor, that he has formerly been tried and convicted of the same. This plea is similar in form as the plea of autrefois acquit, and is based upon the same general principle, to wit : that no man’s life or liberty shall be twice put in jeopardy for the same offense. A plea of autrefois convict, which shows that th'e judg¬ ment on the former indictment has been re¬ versed for error in the judgment, is not a good bar to another indictment for the same offense. But a prior conviction before a justice of the peace, and a performance of the sentence pur¬ suant to the judgment, constitute a bar to an indictment for the same offense, although the complaint on which the judgment proceeded was so defective that his judgment might have been reversed for error. The New York Code of Criminal Procedure, § 9, expressly prohibits a second prosecution for the same crime. At common law it is necessary, according to the weight of authority in a majority of the United States, to specially plead former conviction or acquittal. In many of the States, however, by statute, the plea of autrefois acquit may be taken advantage of under the plea of not guilty. The statute adopted in New York is similar in its terms to that of many other States. It is provided by the New York Code of Crim¬ inal Procedure, § 322, that a plea of former judgment of conviction or acquittal of the crime charged may be pleaded with or without the plea of not guilty. Consult Blackstone, (Commentaries) and the authorities referred to under Criminal Law.

AUTUMN, the season of the year which follows summer and precedes winter. Astro¬ nomically, it is considered to extend from the autumnal equinox, 22 September, in which the sun enters Libra, to the winter solstice, 22 De¬ cember, in which it enters Capricorn. In popular speech it includes in America the months of September, October and November, and in England August, September and October. In the southern hemisphere the seasons are, of course, reversed, and autumn extends from 22 March to 22 June.

AUTUN, o-ten, France (ancient Bibract e), a town in the department of Saone-et-Loire, of considerable interest both from its antiquities and from its modern edifices. Of the former the more remarkable are two Roman gates of exquisite workmanship and in good preserva¬ tion, the ruins of an amphitheatre and of sev¬ eral temples ; of the latter the most conspicu¬ ous is the cathedral of Saint Lazare, a Gothic structure of the 11th century. In Roman times it contained a famous school of rhetoric. The town contains a college, several museums and a library. It is an important manufacturing

centre. Cloth, carpets, furniture, leather, paper and machinery are the principal articles of manufacture. Consult Lewis, (The Antiquities of Autun* (in Archceological Journal, Vol. XI, London 1883). Pop. (1911) 15,498.

AUTUNITE, a beautiful canary-yellow mineral, occurring in thin, tabular crystals of orthorhombic symmetry, but closely approach¬ ing the tetragonal mineral torbernite in form. Both of these minerals are hydrous phosphates of uranium, but while calcium is an essential constituent of autunite, whose formula is Ca(U02)2P20s + 8H20, it is replaced by copper in torbernite, which is further distinguished bv its green color. Autunite has eminent basal cleavage, resulting in a pearly lustre on the basal plane, while on the edges of the crystal the lustre approaches adamantine. It has a hardness of 2 to 2.5 and a specific gravity of about 3.12. Some autunite is beautifully fluor¬ escent. Its name is derived from its most noted locality, Autun, France, where it is found in closely aggregated masses of crystals. Other noteworthy occurrences are in Cornwall, Eng¬ land, in Saxony, North Carolina and South Dakota.

AUVERGNE, ovarn', France, a province of central France, now included in the depart¬ ments Cantal, Puy-de-Dome and Haute Loire. The mountains of Auvergne are the highest in the interior of France, the highest of them, Puy-de-Dome, being 4,805 feet above the sea. It is entirely composed of volcanic matter, and has a regular crater 1,000 feet in circumference, and 300 feet deep. The whole of the cones present the same general character — well-de¬ fined craters enclosed by regular cones, on whose sides the lava currents may be traced as easily as on those of Vesuvius. The inhabit¬ ants are a simple and laborious people and are accustomed to emigrate each year after the harvest in large numbers to the neighboring regions, or to flock to the great industrial centres of France in search of employment, re¬ turning to their homes with their earnings in spring. The region was inhabited in ancient times by the powerful tribe of the Arverni, who ruled over a large part of Aquitania. In the Middle Ages Auvergne was

a county. It was permanently united with the French crown in

1.

AUVERGNE, Mountains of, a branch of the Cevennes, chiefly situated in the depart¬ ments of Puy-de-Dome and Cantal (France). The most important peaks are Puy-de-Sancy (6,185 feet), Plomb du Cantal and Puy-de- Dome.

AUWERS, ou'vers, Arthur, German astronomer: b. Gottingen, 12 Sept. 1838. He be¬ came assistant in the observatory at Konigs- berg in 1859, and at Gotha in 1862; in 1866 was made a member of the Berlin Academy and as¬ tronomer to it. In 1878 he was made permanent secretary of the section on physics and mathe¬ matics of the Academy. In his capacity of president of the Astronomical Society he was conspicuously identified with the preparation of the great co-operative catalogue of over 100,000 stars. He was also on the editorial staff of the Vierteljahrsschrift of the German Astronomical Society. He did important work in connec¬ tion with the Venus transits of 1874 and 1882.

Other important services were the completion of Herschcl's nebular observation, heliometric investigations in stellar astronomy, observa¬ tions of the proper motion of fixed stars. For his services to astronomy he was made a foreign member of the Academy of Sciences at Washington, from which he also received the Watson gold medal. Among his works are (Neue Reduktion der Bradieyschen Beobachtungen 1750— 62} (1882-1903) and

(Katalog von 9,789 Sternen) (1896). In 1903 appeared cVierzehn unbekannt gebliebene lvonigsberger Zonen und Catalog von 1309 darin beobachteten sternen fiir das Aequinoc- tium 1825. •*

AUX CAYES, o-ka', Haiti, a seaport town situated on the southwest coast of the island, about 85 miles west of Jacmel. It has an excellent harbor, a good export trade and is the seat of an American consular agent. Pop. about 25,000.

AUXANOMETER, an instrument for recording the growth of plants during intervals too short for direct measurement. A simple form often used consists of a light, well-bal¬ anced lever, the fulcrum of which is so placed that the length of the long arm is a multiple of that of the

short arm. To the latter a thread from the growing plant is attached. The long arm traverses a graduated arc from which its movement may be read, the growth of the plant being magnified in the ratio of the long arm to the short. A more elaborate instrument has been devised consisting of a wheel with fine bearings and a well-balanced rim grooved to receive a thread. The hub carries a smaller wheel wTith a grooved rim, whose diameter is one-tenth or one-twentieth that of the larger. The wheel is placed on a stand and the plant placed beneath it. A silk thread is attached to the plant, carried over the smaller rim and weighted sufficiently to rotate the hub as the plant grows. A thread is also placed on the larger rim with a counterweight at one end and a marker at the other. A recording apparatus made of a cylinder bearing smoked paper is driven by clockwork and the marker is placed so as to bear against the paper. Other methods of driving the cylinder are in use, of which one of the best is that in which the cylinder is re¬ leased at regular intervals and allowed to rotate a short distance. The cylinder release is per¬ formed by means of an electro-magnet, the cir¬ cuit being made by a clock at the proper in¬ tervals.

AUXERRE, o-zar, France, capital of the department of Yonne, 90 miles southeast of Paris, on the Yonne. It is irregularly built on the slope of a hill and its streets are narrow. It contains an episcopal palace, now the residence of the prefecture, also the 13th century cathe¬ dral of Saint Etienne, one of the most imposing Gothic structures in France. Other noteworthy churches are those of Saint Germain and Saint Pierre. The towrn was formerly surrounded by walls but these have been converted into boulevards. A hospital rests on the site of the ancient abbey of Saint Germain and there are a college, a museum of antiquities and a botanic garden. Calico, serge, woolens, leather, earthenware and wine are manufactured and there is considerable trade in these products and also in timber and charcoal. The Yonne

is navigable from here and barges transport quantities of Burgundy wines to Paris. Auxere was flourishing even in the pre-Roman days. It successfully resisted Attila and was taken by Clovis from the Romans. Later it formed part of the kingdom of Burgundy, was taken by the English in 1359, but was retaken by the re¬ nowned Du Guesclin. It was united to France by Louis XI. It was bombarded by the Ger¬ mans in 1870. It is the birthplace of Jacques Amyot, who became bishop of the see and who is best known for his translation of Plutarch. Consult Freeman, (Sens and Auxerre} (in Archceological Journal, Vol. XXXIX, London 1882). Pop. (1911) 21,929.

AUXONNE, o-sun' (Latin Asona or Aus- sonct), France, a town 18 miles east-southeast of Dijon, on the left bank of the Saone, here

crossed by a beautiful bridge of 23 arches. Auxonne is well built, the seat of a court of commerce, and has a communal college, and a public library containing 4,000 volumes ; a castle, an arsenal and a cannon foundry. Cloth, plaster of Paris, bricks, leather, etc., are manu¬ factured here and there is a large trade in grain, lumber and vegetables. Pop. (1911)

6,303.

AUZOUT, 6-zoo', Adrian, French mathe¬ matician: d. 1691, inventor of the micrometer still in use among astronomers to measure the apparent diameter of celestial bodies. He was the first who thought of applying the telescope to the astronomical quadrant.

AUZOUX, Theodore Louis, French sur¬ geon: b. Saint Aubin d'Ecroville, Cure, 1797 ; d. 1880. He was the inventor, or the first to make those life-size and accurately colored anatomical models which are now used univer¬ sally all over the world in medical colleges and schools of anatomy.

AVA, a'va, or AUNGWA, a town in Asia, the former capital of Ava or Birmah, on the Irrawaddy. It has a circuit of about five miles, and consists of an inner and an outer town, each surrounded by a brick wall. The city was reduced to ruins by an earthquake in 1839. Several Buddhist temples with gilded domes are the sole remains of its former glory. Con¬ sult Grant, Two Years in Ava} (London 1827). The present population is small.

AVA, ARVA, YAVA or KAVA (Piper methystieum) , a plant of the natural order Piperacece, possessing narcotic properties. It is a shrubby plant, with heart-shaped acumi¬ nate leaves, and very short, solitary, axillary spikes of flowers. It is a native of many of the South Sea Islands where the inhabitants intoxi¬ cate themselves with a fermented liquor pre¬ pared from the upper portion of the root and the base of the stem. The rhizone is thick, woody, rugged and aromatic. The intoxicating liquor is prepared by macerating it in water. The narcotic property is ascribed to an acrid resin, kawine, present in the root. The taste is unpleasant to those unaccustomed to it, and has been likened to that of rhubarb and mag¬ nesia. The intoxication is not like that pro¬ duced by ardent spirits, but rather a stupefac¬ tion like that caused by opium. It is succeeded by a copious perspiration. The habitual use of ava causes a whitish scurf on the skin, which, among the heathen Tahitians, was

reckoned a badge of nobility, the common peo¬ ple not having the means of indulgence req¬ uisite to produce it. Ava is, like cocaine, a local anaesthetic.

AVADHUTA, a'va-d'-hoo'ta, a member ol a mendicant sect in southern India addicted to self-torture. They abandon all worldly re¬ straints and religious observances and have their passions under complete control.

AVAL ISLANDS. See Bahrein.

AVALANCHE, a mass of snow or ice which slides down steep mountain slopes. On lofty' mountains snow would accumulate in¬ definitely if the excess were not removed by sudden falls or by glaciers which bring it into the valleys, where it melts. Avalanches may occur at any season of the. year, but they are most frequent in early spring after the snow has begun to melt from the sun's rays. The water which collects beneath the snow bank loosens it from the ground, and the whole mass may then be precipitated to the base of the mountain. Such avalanches occur regularly in the Alps, where they are known as grundla- winen. Another type (staub lawmen) occurring in the winter season is characterized by the dry and finely divided condition of the snow, and results from the overloading of the snow- fields. A third class is the ice-avalanche, oc¬ curring along the course of glaciers. Ava¬ lanches are often very destructive, sweeping away trees, houses and everything in their path. Their destructive effects are greatly increased by the wind-blasts which accompany them. Those occurring in winter usually cause the greatest loss of life, as they develop suddenly and without warning; those that take place in spring generally follow a definite path and are more or less regular in their occurrence. The planting of forests on the high slopes some¬ times affords protection from avalanches, but when this is not feasible, stone structures are employed.

AVALLENAU, a legendary poem, by some believed to have been written by Merlin. The theme is based on an old tradition, or folk¬ lore tale, to the effect that a band of knights were transformed into spirits in the Wood of Celyddon. The name probably has a common origin with Avalon (q.v.), which was the paradise of the heathen Celts.

AVALON, Cal, a summer resort on Santa Catalina Island, one of the ((tent cities55 peculiar to California, made possible by the long dry seasons. Instead of the seaside cot¬ tages familiar in other climates,

the dwellings are entirely of canvas, some of them being quite elaborate, with many rooms, running water, etc. Lighting, water, a sewage system and other conveniences are provided as in other communities. During the summer months the population of Avalon sometimes ex¬ ceeds 40,000, dwindling to less than 1,000 dur¬ ing the -winter.

AVALON, Pa, borough of Allegheny County, five miles west of Pittsburgh, on the Ohio River, and on the Pittsburgh, Fort.Wavne and Chicago Railroad. It is a residential suburb of Pittsburgh. Pop. 4,317.

AVALON, the legendary elysium of King Arthur, being his abode after disappearing from the haunts of men ; called also Avilion.

The name is also identified with Glastonbury, and has been given to a peninsula of New¬ foundland. Avalon appears to have been the Celtic paradise. The origin of the name is doubtful. Consult Rhys, J, (Studies in the Arthurian Legend) (Oxford 1891) ; and Meyer and Nutt, (Voyage of Bran5 (2 vols, London

1897).

AVALOS, a'va-los', the name of a noble Neapolitan family, which included Ferdinand D'Avalos, Marquis de Pescara: b. Naples 1490; d. 30 Nov. 1525. He served with distinc¬ tion in the army of Charles V, and was taken prisoner by the French at the battle of Ravenna in 1512. He beguiled the hours of captivity by writing a (Dialogue of Love,5 which he dedi¬ cated to his wife, the beautiful and accomplished Vittoria Colonna. He soon recovered his liber¬ ty,. and subsequently displayed extraordinary ability in the wars of Charles V, notably at Pavia in 1525, where he was severely wounded.

AVANCINI, Nicholas, an ascetic writer of the Society of Jesus: b. 1612; d. 1686. His little book of meditations on the life and doc¬ trine of Jesus Christ which has been translated into several languages and is widely used to-day by members of clergy first appeared in Vienna in 1665. By reason of its arrangement, its scrip¬ tural sources, its pithy suggestiveness and its practical character, Cardinal Gibbons states that it has been his Vade Mecum, his book of meditations during all the years of his ministry.

AVARE, L', la-var' (The Miser), the title of one of the most famous of Moliere's prose comedies, first produced 9 Sept. 1668. It is founded on the (Aulularia) of Plautus, and was paraphased by Fielding in his comedy of 'The Miser. 5 Harpagon is a sexagenarian mi¬ ser who incarnates the spirit of avarice and has determined to marry a young woman named Mariane, but ultimately prefers his gold to matrimony.

AVARS, a'varz, or AVARES, a nation of Mongolian or Turkish origin, which at an early period migrated to the regions around the Don, the Caspian Sea and the Volga. They served in Justinian's army, and later made themselves masters of Dalmatia, pressed into Thuringia and Italy, where they fought with the Franks and Lombards, and extended their dominion over the Slavonians dwelling on the Danube and farther north, as well as over the Bul¬ garians on the Black Sea. In 640 they were driven out of Dalmatia and confined to Pan- nonia. They were at length overcome by Charlemagne, and after 827 disappear from history; but the valley of Erlav, a small tributary of the Danube in Lower Aus¬ tria, was called the Hand of the Avars® as late as the 10th century. The name is also borne by a tribe estimated to number upward of 100,000, now living in the Caucasus Mountains, noted for their struggle with Russia, in which they were led by Schamyl (q.v.). They are followers of Islam and have a written language with Arabic characters. Consult Deniker, (Races of Man5 (1900) ; and Keane, ˆEthnology5 (London 1896).

AVARY, Myrta Lockett, American writer and sociologist : b. Halifax, Va. For several years she was an editorial writer on various publications, then became interested in settle-

ment work. She is the author of (Dixie After the War* (1906) ; (Joel Chandler Harris and His Home) (1913); (Letters and Recollections of Alexander H. Stephens^ (edited 1910).

AVATAR, av'a-tar', in Hindu mythology, an incarnation of the Deity. Ten avatars are peculiarly distinguished, and four of them are the subjects of Purdnas, or sacred poems. These 10 are among the incarnations of Vishnu, the supreme God. The Matsya avatar was the de¬ scent of the Deity in the form of a fish; Kach- yapa or Kurma, in that of a tortoise; Varaha, as a boar; Nara-sinha, as a monster, half man, half lion; Vamana, as a dwarf ; Parasurama, as the son of Jamadagni. All these took place in the Satya Yuga, or Golden Age. The seventh incarnation was in the form of the four sons of King Dasaratha, under the names of Rama, Lakshmana, Bharata and Satrughna, in order to destroy certain demons that infested the earth. The achievements of Rama form the subject of the celebrated epic called the Rama- yana. The eighth avatar of Vishnu, in the form of Krishna, is the best known of all, from the fact that it forms the subject of the great Sanskrit epic poem, the Mahahbarata. Its ob¬ ject was to relieve the earth from the Daityas, and the wicked men who oppressed it. The ninth was in the form of Buddha. The Kalki, or tenth avatar, is yet to come at the end of the Kali Yuga , or the Iron Age. See Vishnu.

AVATCHA, a-va'cha, a volcano and bay in Kamchatka in lat. 53° 18' N. and long. 158° 47' E. The volcano, 9,000 feet high, was last active in 1855. The largest crater is several hundred yards in circumference. The town of Petropavlovsk is situated on the bay.

AVE-LALLEMANT, a'va'lal'man', Fried- erich Christian Benedict, German crim¬ inologist : b. Liibeck, 23 May 1809 ; d. Berlin 1892. After graduating from Jena, he began practising law in his native town. From 1851 to 1868 he was a police magistrate. His most important work is (Das deutsche GaunertunP (4 vols., Leipzig 1858-62). It consists of a de¬ tailed history of crime and its punishment in Germany and includes a dictionary of the slang words used among criminals. He is also the author of some fiction, most of it

being in the nature of detective stories.

AVE-LALLEMANT, Robert Christian Berthold, brother of Fricderich Christian Benedict Ave-Lallemant, German physician and writer: b. Liibeck, 25 July 1812; d. there, 13 Oct. 1884. For the greater part of his life he was a practising physician in Rio de Janeiro, Brazil. He is the author of (Reise durch Sud- brasilien) (2 vols., 1859) ; (Reise durch Nord- brasilien) (2 vols., 1860) ; (Fata Morgana) (1872); (Wanderungen durch die Pflanzemvelt der Tropen) (1880).

AVE MARIA, a 'va ma-re'a (Latin ; hail Mary, from avere) ; among the Roman Catho¬ lics the beginning of a prayer to the Virgin, whence the whole prayer is called Ave Maria. It is the beginning of the salutation which the angel addressed to the Virgin, as he announced to her that she should be the mother of the Saviour and the address to her of her cousin Elizabeth (Luke i, 28, 42; <(Hail, highly favored, the Lord is with thee blessed are thou among women®). See Rosary.

AVEBURY, a'ber-i, 1st baron. See Lub- rock, John.

AVEBURY, England, village in Wiltshire, noted for its Druidical temple, which originally consisted of a larger outer circle of 100 stones, from 15 to 17 feet high, and about 40 feet in circumference, surrounded by a broad ditch and lofty rampart, and enclosing two smaller circles. On the neighboring downs are numerous bar- rows or artificial tumuli, one of which, called Silbury Hill, rises to the height of 130 feet, with a circumference of 2,027 feet at the base, covering an area of more than five acres. Sir John Lubbock the scientist selected his title of Lord Avebury from the name of this village.

AVEIRO, a-ve-e-roo, Portugal, a seaport and the capital of an administrative district, on the Vouga, and the Lisbon-Oporto Railway. Aveiro is built on the southern shore of a marshy lagoon, containing many small islands, and measuring about 15 miles from north to south, with an average breadth of about one miles. The Barra Nova, an artificial canal about 33 feet deep, constructed 1801-08, gives access to the Atlantic Ocean. The local in¬ dustries include the preparation of sea-salt, the catching and curing of fish, especially sardines and oysters, and the gathering of aquatic plants. There is also a brisk trade in wine, oil and fruit; while the Aveiro district contains copper and lead mines, beside much good pasture land. Pop. 10,000.

AVELING, Francis Arthur Powell,

Canadian clergyman and author: b. Saint Catherine’s, Ontario, 1875.

He was educated at Iveble College, Oxford, the Canadian College, Rome, and at Louvain Univer¬ sity. Becoming a convert to the Roman Catholic faith in 1896 he was ordained to the priesthood in 1899 and became first rector of the Cathedral Choir School at Westminster. He was also appointed lecturer in analytical psychology at University College, London, and after the outbreak of the great war became chaplain of the forces. He is a fellow of Louvain University; extern examiner in philosophy, National University of Ireland, and lecturer in pedagogical methods, London County Council. He has published xThe Phi¬ losophers of the Smoking Room) ; (The God of Philosophy) ; (On the Consciousness of the Universal and the Individual > ; etc. He is a contributor to the Dublin Revieiv, the American Catholic Quarterly Review, the Review Neo- Scholastique, the Nineteenth Century, Journal of Psychology, etc.

AVELLANEDA, a-va'lya-na'da, Alfonso Fernandes de, the pseudonym of the writer of a sequel to (Don Quixote, > issued prior to the sequel by Cervantes. The real name of the author is not known but the work has been ascribed to about a dozen different writers. See Don Quixote.

AVELLANEDA, Nicholas, Argentine statesman: b. Tucuman, 1 Oct. 1836; d. 26 Dec. 1885. He was professor of political economy in the University of Buenos Aires ; Minister of Public Instruction in 1868-74, and President of the republic in 1874-86. He published several historical and economical works.

AVELLANEDA Y ARTEAGA, a-va'lva- na'da e ar'ta-ii'ga, Gertrudis Gomez de, Spanish

poet, dramatist and novelist: b. Puerto Principe, Cuba, 23 March 1814; d. Madrid, 2 Feb. 1873. Under the pseudonym Peregrina she contributed to Andalusian journals many (Lyric Poems) (1851-54), and afterward wrote a series of spirited novels: (Two Women,5 (The Baroness de 'Joux,5 (Dolores, 5 and others. She gained still higher distinction with the tragedies (Al¬ fonso Munio,5 the hero of which was her own ancestor, and (The Prince of Vianna.5 Her later compositions had a tone of melancholy; among these are Biblical dramas, as (SauP and (Balthasar 5 ; the spiritual song, (At the Cross, 5 and (The Last Ascent of My Harp> (1850). In the later years of her life she composed 16 plays which still have a place on the Spanish stage. She is without a rival of her sex among Spanish writers of the

19th century. Some critics hold that she was second only to Chris¬ tina Rossetti among modern poetesses. Her (Alvas literarias) begun to appear at Madrid in 1869 but only five volumes have been issued. See Sab (or Espatilino).

AVELLINO, a'vel-le'no, Francesco Maria, Italian archaeologist: b. Naples, 14 Aug. 1788; d. 10 Jan. 1850. He was at first professor of Greek literature at the University of Naples, during which period he was also the tutor of the children of Murat. In 1820 he became pro¬ fessor of political economy at the same insti¬ tution. In 1839 he became director of the Real Museo Borbonico, of whose vast coin collections he had previously prepared a valuable catalogue. He was also the founder of the journal Bolle- tino Archeologico. His chief works are col¬ lected under the title (Opuscoli diversi5 (Naples 1831-36, 3 vols.).

AVELLINO, a town in Italy, 29 miles east of Naples. It has a square adorned with an obelisk, and possesses several agreeable promenades. Avellino has several fine monu¬ ments, an academy and a theatre. Cloths, hats, shoes and chairs are manufactured. Chestnuts and hazel nuts have been gathered in the vicin¬ ity since Pliny's day. The ruins of ancient Abellinum are about three miles distant and here also is the famous convent of Monte Vergine, which is visited annually by tens of thousands of pilgrims. Pop. (1911) 23,926.

AVEMPACE, avam-pa-tha, Ibn Bajja,

Arabic poet and philosopher : b. Saragossa, Spain, about the end of the 11th century; d. Fez, 1138. At first he held high office in his native city, but finally lost his position on ac¬ count of his liberal attitude in regard to re¬ ligion. After residing at various times in Se¬ ville and Granada, he finally arrived in Fez, where he became court physician to the Sultan. He died from poison administered by a jealous rival for the favor of the Sultan. Avempace belonged to that broad school of Arabic phi¬ losophy which ignored the letter of the Koran. Beside his commentaries on Aristotle, he made known the Peripatetic school of philosophy in Spain. He also wrote several works on medi¬ cine and music and composed many. original poems. Consult Brockelmann, (Geschichte der arabischen Litteratur5 (Weimar 1899).

AVENA. See Oats.

AVENARIUS, Ferdinand, German poet

and critic, nephew of Richard Wagner: b. Berlin, 20 Dec. 1856. After

studying at the

universities of Leipzig and Zurich, he founded the art journal Kumstwart, which finally be¬ came the leading publication of its kind in Germany. He was also the editor of a col¬ lection of reproductions of works of art. His critical works are (Deutsche Lyrik der Gegen-wart5 (2d ed., 1884) ; (Max Klinger's Griffel- kunst5 (2d ed., 1907) ; {Balladen Buch5 (1907 and 1910) ; (Das froliche Buch aus deutscher Dichter und maler Kunst gesammelt5 (1910). His poetical works are the idyl (Die Kinder von WohldorP (6th ed., 1910) ; (10th ed., 1910).

AVENARIUS, Richard, German philos¬ opher: b. Paris 1843; d. Zurich 1896. He studied philosophy at the universities of Zurich, Berlin and Leipzig, and from 1877 to his death was professor of philosophy at Zurich. He wrote on Spinoza's pantheism, published a theory of experience and con¬ tributed many papers to magazines and reviews, upon philosophical subjects. He also wrote (Kritik der reinen Erfahrung) (2 vols., Leip¬ zig 1889, 1907). Consult Bush, W. T., .(Ave-narius and the Standpoint of Pure Experience> (New York 1905) ; and Ewald, O., (Richard Avenarius als Begriinder des Empiriokriti-zismus) (Berlin 1905).

AVENCHES, a-vansh', Switzerland, a town in the canton of Vaud, seven miles north¬ west of Friburg. It is the ancient Aventicum, capital of Helvetia under Roman rule, and is noted for its Roman relics, notably the ruins of an amphitheatre, and a Corinthian column belonging to a temple of Apollo. This column, celebrated by Byron in (Childe Harold) (3d canto, 65th line), is known as Le Cicognier, from the fact that for centuries storks have used it as a nesting place. In Roman times it was a city of 20,000 inhabitants. Avenches is the German Wiflisburg (castle of Wiflis, a count of Burgundy of the 7th century). The castle is built on the site of the Roman Capitol, and there is a museum in the amphitheatre. The population now is about 2,000.

AVENEL, Mary, a character appearing in Scott's novels, (The Monastery5 and (The Abbot.5

AVENGER OF BLOOD, among prim¬ itive peoples the next of kin to a murdered man, upon whom was laid the duty of aveng¬ ing the crime by killing the murderer. In this custom may be detected the source of the system of criminal law. Primitive law is con¬ cerned solely with crimes of violence — homi¬ cides, wounding and robbery. The

punish¬ ment is left to the injured party or to his kins¬ man. In course of time the right of the kins¬ man was limited by the doctrine of sanctuary, and by the institution of the wergild, whereby a money payment was made to the avenger of blood in commutation of the natural penalty of the crime. Among the Arabs these prim¬ itive customs survive and the hereditary feuds of families, clans and tribes in semi-barbarous countries are survivals of this same institution.

AVENTINE, the southernmost of the seven hills of Rome, on the left bank of the Tiber, between the river and the Caelian hill. The Circus Maximus lay to the northeast of the Aventine, between it and the Palatine, and

the baths of Caracalla were on the southeast. Servius Tullius included it in the city and it was settled by the plebs in 455 b.c. Consult Platner, (Topography and Movements of Ancient Rome) (New York 1911).

AVENTINUS, the name taken by Johann Turmair, Bavarian historian: b. Abensberg, 4 July 1477 ; d. Regensburg, 9 Jan. 1534. He studied at Ingolstadt, Vienna, Cracow and Paris, and in 1509 was appointed tutor to Louis and Ernest, the two younger sons of Albert the Wise, the late Duke of Bavaria-Munich. Encouraged by William IV, Duke of Bavaria, he began to write the (An- nalcs BojorunP about 1517, and finishing this book in 1521, undertook a German version of it, which he completed some years later. He assisted to found the Sodalitas littcraria Angilostadensis, under the auspices of which several old manuscripts were brought to light. The (Annales) deals with the history of Bavaria in conjunction with general history from the earliest times to 1460. He took immense pains with his work, and to some degree anticipated the modern scientific method of writing his¬ tory. Aventinus, who has been called the <(Bavarian Plerodotus,ˆ wrote other books of minor importance.

AVENTURINE. See Quartz.

AVENZOAR, a'ven-zo'ar, or more cor¬ rectly, ABU-MERWAN-MOHAMMED- BEN-ABDALMALEC-BEN-ZOHAR, Ara¬ bian physician of the 12th century: b. Seville, Spain, about 1072; d. Morocco 1162. He be¬ came eminent in his profession, traveled much, and passed through many adventures, among which was a long imprisonment at

Seville. He had the care of a hospital, and composed a work entitled (A1 TheiserP containing a com¬ pendium of medical practice, and including many facts and observations not found in the preceding writers, which was probably the result of his own experience. He was an advocate of the experimental method, had a remarkable knowledge of anatomy and tried many experiments. He introduced a silver tube for the introduction of food into the stomach. He influenced Averroes, who at¬ tended some of his lectures. His work, (The Method of Preparing Medicines and Diet) was translated into Hebrew (1280) and into Latin (1490). The report of his having lived to the age of 135 is probably an error- arising from his having been confounded with his son, of the same name and profession, Avho lived at Morocco, and was the author of a treatise on the regimen of health.

AVERAGE, in maritime law, is general, particular or petty. General average (also called gross) consists of expense purposely incurred, sacrifice made or damage sustained for the common safety of the vessel, freight and cargo, or the two of them, at risk, and is to be contributed for by the several interests in the proportion of their respective values exposed to the common danger, and ultimately surviving, including the amount of expense, sacrifice or damage so incurred in the con¬ tributory value. Indemnity for general av¬ erage loss is ordinarily stipulated for in policies against the risks in navigation, sub¬ ject, however, to divers modifications and con¬ ditions. Under maritime policies in the usual

form, insurers are liable for the contributions, for loss by jettison of cargo, sacrifice of cables, anchors, sails, boats, delay for the purpose of refitting, voluntary stranding, etc. Average particular (also called partial loss) is a loss on the ship, cargo or freight, to be borne by the owner of the subject on which it happens, and is so called in distinction from general average, and, if not total, it is also called a partial loss. It is insured against in marine policies in the usual forms on ship, cargo or freight, when the action of peril is extraor¬ dinary, and the damage is not mere wear or tear, and on the ship covers loss by sails split or blown away, masts sprung, machinery of steamship disabled, planks started, change of shape by strain, loss of boat, breaking of sheathing or upper works or timbers, damage by collision or stranding, by lightning or fire, or in defense against pirates or enemies, or by hostile or piratical plunder. Petty average con¬ sists of small charges formerly assessed upon the cargo, to wit : anchorage, pilotage, beacon¬ age, towage, quarantine, etc. See Marine Insurance.

• AVERCHENKO, Arkadi Timofeye'vich,

a-ver-chen'ko, Russian humorist writer : b. 1881. He was the son of a merchant. He started on his career with a position in the office of some works of mines. In 1907 he edited the periodical Shtnik and since 1908 has been editing Satirikon (formerly Strekoza). He contributed to the collection and to the periodicals Zhournal dlya Vsiekh, Zriteli and others. His works are often published under the pseudonym Ave. Part of his hu- moristical tales have been edited in the col¬ lection (Vesyeluiya UstritzuP (Happy Oysters) (,6th ed., 1911) ; (Tales) (1910) ; (Little Hares on the WalP (1910).

AVERELL, William Woods, American

military' officer: b. Cameron, N. Y., 5 Nov. 1832; d. Bath, N. Y., 3 Feb. 1900. He was educated at West Point, and was graduated there in 1855, and served on the frontier, and in several Indian campaigns till the beginning of the Civil War, when he was appointed colonel of the 3d Pennsylvania Cavalry, and assigned to the command of the cavalry defenses of Washington. During the war he distinguished himself on numerous occasions as a cavalry raider and commander, and at its close was brevetted major-general of vol¬ unteers. In 1863-64 on his raids, he fought numerous skirmishes, destroyed many miles of railroad, captured great quantities of sup¬ plies and in various ways greatly hampered the Confederates and aided the Federal com¬ mands in carrying out their plans of cam¬ paign. He resigned from the regular army while holding the rank of captain, in 1865, and, under an act of Congress, was reappointed captain in August 1888, and was placed on the retired list in the same month. He was United States Consul-General at Montreal in 1866-69. He invented a system of asphalt pavement now quite generally adopted and the Averell insulating conduits for wires and conductors and a method of making cast steel direct from the iron ore in one operation.

AVERNUS, a-ver'nus, a small circular lake, now called Lago d'Averno, in Campania, Italy, between the ancient Cumae and Puteoli,

It is surrounded by hills of a moderate height, which used to be covered with immense woods, while the atmosphere was charged with un¬ healthful mephitic effluvia, and it occupies the crater of an extinct volcano. By ancient Greek writers, subsequent to Homer, it

was fabled to be the entrance to the infernal regions, and to have been the place where Ulysses entered in his visit to the shades. It was also thought that the Cimmerians of Homer dwelt on the banks of this lake. The sibyl of Cumae is said to have had her grotto here, and Virgil repre¬ sents her as. guiding ./Eneas when he made his descent (<(facilis descensus Averno ®) to the infernal regions at this place. The lake is about a mile and a half in circumference. Agrippa caused the woods to be thinned and made the lake a naval headquarters, known as Portus Julius. He had it connected by canal with Lacus Lucrinus and Cocceius constructed a famous tunnel to Cumae through the mountain.

AVERROES, av-er-ros' (corrupted from Ebn or Ibn Roshcl), a renowmed Arabian phi¬ losopher: b. Cordova, Spain, 1126; d. about 1198. He studied theology and philosophy under Tofail and medicine under Ibn Zuhr at Cordova. In 1169 he became a cadi or judge first in Seville and afterward in Cordova. He was accused of rejecting the established re¬ ligion, and in consequence deprived of his offices, and tied to Fez. Here he was con¬ demned by a spiritual court to recant and undergo a public penance. Upon this he went back to his own country, but was latterly restored to his dignities in Morocco. Averroes regarded Aristotle as the greatest of all philos¬ ophers, and explained his writings, with only a slight deviation from his views. Besides commentaries on Aristotle and other philo¬ sophical works he wrote also a compendium of physic, called (Colliget) (a corruption of the Arabic Uvulliyat,' or summary), and treatises on jurisprudence, astronomy, grammar, etc. His commentaries upon Aristotle, in a Latin translation, were repeatedly printed at Venice in the 15th and 16th centuries. His (Colliget) also was early translated into Latin, and several times printed. Consult Brockelmann, (Geschichte der arabischen LitteratuU (Vol. I, Weimar 1899) ; De Boor, c History of Philosophy in Islam) (Leyden 1903) ; Renan, (Averroes et l'averroisme) (Paris 1860) ; Muller, (Philosophic und Theologie von Aver- roes) (1875).

AVERS A, a-ve r'sa, Italy, a town 12 miles north of Naples, on a plain covered with vines and orange trees. It is the seat of a bishop, and is famed for a kind of almond-cake, called torrone, in great demand at Naples. It con¬ tains a cathedral and monasteries, an insane asylum and a foundling institution. It is also famed for asprino, a sparkling white wine, and for oil, fruit and silk. Nearby is the ancient Atella, whence came the coarse farces called Atellance fabulee. The modern town was founded by the Normans in 1029. Pop.

(1911) 23,203.

AVERY, Elroy McKendree, American waiter: b. Erie, Mich.. 1844. He served in the Federal army during the Civil War, and has since been prominent in educational matters. Among his many published works are text¬

books in physics and chemistry, (Words Cor¬ rectly Spoken' (1887); (A Popular History of the United States, and Its People) (12 vols.) ; (The Town Meeting' (1904).

AVERY, Samuel Putnam, American art expert: b. New York, 17 March 1822; d. there, 12 Aug. 1904. After having studied en¬ graving he began business as an art dealer in 1865. Two years later he was appointed commissioner in charge of the American art department at the Paris Exposition. He was one of the founders and for a long time a trustee of the New York Metropolitan Museum of Art (q.v.). He is also the founder of the Avery Architectural Library at Columbia University, which he gave as a memorial to his son, Henry Ogden Avery. Avery Hall, erected on the campus of Columbia University in 1912, is a memorial to both father and son.

AVERY'S GORES, the name of several tracts of land in Vermont, granted to Samuel Avery in 1791. One of them is in Addison County, nearly on the summit of the Green Mountains, now forming a part of Granville.

AVES, a'vas, or BIRD ISLANDS, a

group of small islands belonging to Venezuela, valuable for their deposits of guano.

AVES, a'vez, the class of vertebrated ani¬ mals which contains the birds. They have been defined by Dr. Gadow as <(oviparous, warm-blooded, amniotic vertebrates, which have their anterior extremities transformed into wings.® The metacarpus and fingers carry feathers or quills ; there is an intertarsal joint, and the feet have not more than four toes, of which the first is the hallux. See Birds.

AVESNES, a-van, France, the capital of an arrondissement in the department of Nord, on the Helpe, 28 miles southeast of Valen¬ ciennes. The town is the seat of a sub-prefect, and has a tribunal of first instance, a chamber of commerce and a communal college. The chief industry of the town is wool-spinning, and there is trade in wood. It was founded in the 11th century, and formed a countship which in the 15th century passed to the house of Burgundy. In 1477 it was destroyed by Louis XI. In 1659 it came into the possession of the

French, and was fortified by Vauban. It was captured by the Prussians in 1815. Pop. about 6,000.

AVESTA, or ZEND-AVESTA, the Bible of Zoroaster, the sacred book of ancient Iran, and holy scripture of the modern Parsis. The exact meaning of the name (<A vesta® is not cer¬ tain ; it may perhaps signify Haw,® (<text,® or, more doubtfully, <(wisdom,® ((revelation.® The modern familiar designation of the book as Zend-Avesta is not strictly accurate; if used at all. it should rather be Avesta-Zend, like <(Bible and Commentary,® as sand signifies .ˆex¬ planation,® <(c.Qmmentary,® and Avesta u Zand is employed in some Persian allusions to the Zoroastrian scriptures as a designation denoting the text of the Avesta accompanied by the Pahlavi version or interpretation. The story of the recovery of the Avesta, or rather the dis¬ covery of the Avesta, bv the enthusiastic young French scholar, Anquetil du Perron, who was the first to open to the western world the an¬ cient records of Zoroastrianism, reads almost like a romance. Du Perron's own account of

his departure for India in 1754, of his experi¬ ences with the dasturs (or priests) during a seven years' residence among theni, of his various difficulties and annoyances, setbacks and successes, is entertainingly presented in the introductory volume of his work (Zend- Avesta, Ouvrage de Zoroastre> (1771). This was the first translation of the ancient Persian books published in a European language. Its appearance formed one of those epochs which are marked by an addition to the literary, re¬ ligious or philosophical wealth of our time ; a new contribution was added to the riches of the West from the treasures of the East. The field thus thrown open, although worked imper¬ fectly at first, has yielded abundant harvests to the hands of later gleaners. With the growth of knowledge of the language of the sacred texts, we have now a clear idea also of the history of Zoroastrian literature, and of the changes and chances through which with vary¬ ing fortunes the scriptures have passed. The original Zoroastrian Avesta, according to tradi¬ tion, was in itself a literature of vast dimen¬ sions. Pliny, in his (Natural History, > speaks of 2,000,000 verses of Zoroaster; to which may be added the Persian assertion, preserved through Mohammedan writers, that the original copy of the scriptures was written upon 12,000 parchments, with gold illuminated letters, and was deposited in the library at Persepolis. But what was the fate of this archetype? Parsi tradition has an answer.

Alexander the Great, — (<the accursed Iskander,® as he is called, — is responsible for its destruction. At the request of the beautiful Thais, as the story goes, he allowed the palace of Persepolis to be burned, and the precious treasure perished in the flames. Whatever view we may take of the different sides of this story, one thing can¬ not be denied : the invasion of Alexander and the subjugation of Iran caused, indirectly or directly, certain religious decadence which fol¬ lowed upon the disruption of the Persian em¬ pire, and was answerable for the fact that a great part of the scriptures was forgotten or fell into disuse. Zoroastrian tradition, found in Pahlavi sources, lays at the doors of the Greeks the loss of another copy of the original ancient texts that existed at Samarkand before Alexander's invasion ; but has it any account to give of copies of the prophet's works which Semistic writers say were translated into nearly a dozen different languages. One of these versions was perhaps Greek, as the Pahlavi accounts state, for it is generally ac¬ knowledged that in the 4th century b.c. the philosopher Theopompus spent much time in giving in his own tongue the contents of the sacred Magian books.

Tradition is unanimous on one point at least : it is that the original Avesta comprised 21 Nasks, or books, a statement which there is no good reason to doubt. The same tradition wffiich was acquainted with the general charac¬ ter of those Nasks professes also to tell ex¬ actly how many of them survived the inroad of Alexander; for although the sacred text it¬ self was destroyed, its contents were lost only in part, the priests preserving large portions of the precious scriptures. These met with many vicissitudes in the five centuries that intervened between the conquest of Alexander and the great restoration of Zoroastrianism in the 3d

century of our era, under the Sassanian dynasty. At this period all obtainable Zoroastrian scrip¬ tures were collected, the compilation was codi¬ fied, and a detailed notice made of the contents of each of the original Nasks, comprising in all some 825 chapters, compared with the portions then surviving. The original Avesta was, it would appear, a sort of encyclopedic wrork; not of religion alone, but of useful knowledge relating to law, to the arts, science, the professions, and to every-day life. If wre may judge from the existing table of contents of these Nasks, the zealous Sassanians, even in the time of the collecting (226-380 a.d.), were able to restore but a fragment of the archetype, perhaps a fourth part of the original Avesta. Nor was this remnant destined to es¬ cape misfortune. The Mohammedan invasion, in the 7th century of our era, added a final and crushing blow. Much of the religion that might otherwise have been handed down to us, despite (<the accursed Iskander's® conquest, now

perished through the sword and the Koran. Its loss, we must remember, is in part compensated by the Pahlavi religious literature of Sassanian days.

Fragmentary and disjointed as are the rem¬ nants of the Avesta, we are fortunate in pos¬ sessing even this moiety of the Bible of Zoro¬ aster, whose compass is about one-tenth that of our own sacred book. A grouping of the existing texts is here presented: (1) Yasna (including. Gathas) ; (2) Visperad ; (3) Yashts; (4) Vendidad (Videvdat) ; (5) Minor Texts; (6) Fragments.

Even these texts no single manuscript in our time contains complete. The present col¬ lection is made by combining various Avestan codexes. In spite of the great antiquity of the literature, all the existing manuscripts are com¬ paratively young. None is older than the 13th century of our own era, while the direct historv of only one or two can be followed back to about the 10th century. This mere external circum¬ stance has of course no bearing on the actual early age of the Zoroastrian scriptures. It must be kept in mind that Zoroaster lived at least six centuries before the birth of Christ.

Among the six divisions of our present Avesta, the Yasna, Visperad and Vendidad are closely connected. They are employed in the daily ritual, and they are also accompanied by a version or interpretation in the Pahlavi lan¬ guage, which serves at the same time as a sort of commentary. The three divisions are often found combined into a sort of prayer-book, called Vendidad-Sadah (Vendidad Pure" ; that is, Avesta text without the Pahlavi rendering. The. chapters in this case are arranged with special reference to liturgical usage.

Some idea of the character of the Avesta as it now exists may be derived from the fol¬ lowing sketch of its contents and from the illus¬ trative selections presented :

Yasna (sacrifice worship), the chief litur¬ gical work of the sacred canon. It consists mainly of ascriptions of praise and of prayer, and corresponds nearly to our idea of a prayer- book. The Yasna comprises 72 chapters; these fall into three nearly equal parts.

The greater part of the Yasna book is of a liturgic or ritualistic nature, and need not here be further described. Special mention, how¬ ever, must be made of the middle section con-

sisting of <(the Five Gathas" (hymns, psalms), a division containing the 17 sacred psalms, say¬ ings, sermons or teachings of Zoroaster him¬ self. These Gathas, all composed in verse that resembles the metres of the Veda, form the oldest part of the entire canon of the Avesta. In them the prophet of the new faith is speaking with the fervor of the Psalmist of the Bible. In them we feel the thrill of ardor that characterizes a new and struggling reli¬ gious band ; we are warmed by the burning zeal of the preacher of a church militant. Now, however, comes a cry of despondency, a moment of faint-heartedness at the present triumph of evil, at the success of the wicked and the misery of the righteous ; but this gives way to a clarion burst of hopefulness, the trumpet note of a prophet filled with the promise of ultimate victory, the triumph of good over evil. The end of the world cannot be far away ; the final overthrow of Ahriman (Anra Mainyu) by Ormazd (Ahura Mazda) is assured ; the establishment of a new order of things is certain ; at the founding of this ((king- dom® the resurrection of the dead will take place and the life eternal will be entered upon.

The Visperad (all the masters) is a short collection of prosaic invocations and laudations of sacred things. Its 24 sections form a supple¬ ment to the Yasna. Whatever interest this di¬ version of the Avesta possesses lies entirely on the side of the ritual, and not in the field of literature. In this respect it differs widely from the book of the Yashts, which is next to be mentioned.

Yashts (worship by prayers and ascriptions of praise) form a poetical book of 21 hymns, in which the angels of the religion, (serves to throw light on many of the events portrayed in them, or allusions that would otherwise be obscure. All the longer Yashts are in verse, and some of them have poetic merit.

Vendidad, or more correctly Videvdat, (Law against the Demons) is a priestly code com¬ prising 22 chapters and somewhat resembles the Biblical Pentateuch. It consists morally, of purificatory rules to be observed for removing defilement, especially the pollution incurred through coming into contact with dead matter. It contains likewise some old myths, legends and beliefs.

Minor Texts, as a section of the Avesta, form a small group of liturgical texts contain¬ ing brief prayers, litanies and blessings to be recited daily or repeated on special occasions.

Fragments of other portions of the Avesta arc preserved, like Lrpatistan, Nirangistdn and Aogemadacca, and among them is a

noteworthy one from the original Hadhokht Nask describ¬ ing the fates of the soul after death.

There are several translations of the Avesta. The best (except for the Gathas, where the translation is weak) is the French version by Darmesteter, (Le Zend Avesta,' published in

the (Annales du Musee Guimet) (Paris 1892— 93). An English rendering by Darmesteter and Mills is contained in the (Sacred Books of the East' (Vols. IV, XXIII, XXXI). To be con¬ sulted also is the German translation of the Gathas by Bartholomae (Strassburg 1905), forming the basis of the English version by Moulton, (Early Zoroastrianism' (pp. 341-90, London 1913) ; likewise F. Wolff, (Avesta iiversetzt' (Strassburg 1910) ; and an Italian translation of the Vendidad by Cannizzaro, (I1 Vendidad' (Messina 1916).

A. V. W. Jackson,

Professor of Indo-Iranian Languages, Colum¬ bia University.

AVEYRON, a'va-ron', . France, a depart¬ ment in the south. It is extremely mountain¬ ous, and is traversed by five considerable rivers, the Aveyron, after which the department is named, the Viaur, the Truyere, the Lot and the Tarn. Of these, the only one navigable within the department is the Lot. It is only in the west that plains of any considerable extent are found. Agriculture is in a very defective state, north of the Lot, only rye and oats are grown, but considerable attention is paid to sheep¬ breeding. Cheese of an excellent quality is made and exported in large quantities. Avey¬ ron possesses valuable coal, iron and copper mines, besides other minerals. Other leading industries include the manufacture of woolen goods, leather and machinery. Pop. (1911) 369,448. Capital, Rodez.

AVEZAC DE CASTERA MACAYA, aV-zak ma-ki-ya, Marie Armand Pascal d’, French geographer: b. Tarbes, 18 April 1800; d. 14 Jan. 1875. He began practising law in Paris. He soon gave up this profession for a position in the Ministry of Marine, but soon devoted himself entirely to his favorite study, being especially interested in Africa and the early discoveries on the American continent. He was six times president of the Geographical Society of Paris and one of the founders of the Ethnological Society of Paris. His chief works are (Essais historiques sur le Bigorre' (1823); (Etudes de geographic critique sur

l’Afrique septenrionale' (1837) ; (Esquisse generate de l’Afrique et

l'Afrique ancienne' (1844) ; Hies de TAfrique' (1848) ; (Les "lies fantistiques de l'Ocean occidental au moyen- age' (1845); (Notice sur le pays et le peuple de Yebous' (1845); <Les voyages d'Americ Vespuce' (1860) ; (Le livre de Fernand Colombe' (1873).

AVEZZANO, a'vet-sa'no, Giuseppe, Ital¬ ian adventurer: b. Chieri, Piedmont, 1789; d. Rome, 25 Dec. 1879. Entering the army in 1805, he fought under Napoleon and in 1814 was made a lieutenant in the Sardinian army. For complicity in the rising of 1821 he was con¬ demned to death, but managed to escape to Spain, where he enlisted under the Constitu¬ tionalist flag. He was finally captured by the French, who exiled him to America. Arriv¬ ing in Mexico he settled in Tampico and en¬ gaged in business. Presently his military ex¬ periences gained him a commission in the Mexican army. In 1848 he returned to Italy. Here he was Minister of War of the Roman Republic in 1849. After the collapse of the re¬ public a few months later he returned to the

United States, where he again engaged in busi¬ ness. Later he joined Garibaldi's expedition, and fought under him at Volturno. Later he was a radical deputy in the new Italian Parlia¬ ment. Before his death he became one of the most active leaders of the Irredentists.

AVIARY, a house or enclosure, larger than an ordinary cage, for living birds. Out- of-door aviaries are common in the warm coun¬ tries of southeastern Europe and in Asia, and are also quite numerous in England. The free¬ dom of motion possible for a bird in a good- sized aviary helps to keep them in good condi¬ tion, and many species which are unable to bear the close confinement of a cage flourish in the larger enclosures. In a climate like that of the United States, where extremes of temperature are great, outdoor aviaries are uncommon ex¬ cept in zoological gardens. In the New York Zoological Park is an aviary built in 1900, measuring 153 feet long, 72 feet wide and 55 feet high ; at present this is the largest in the world. It is a wire cage, in the shape of a pointed arch, supported by steel frames. It stands among trees, and several are enclosed by it. Game birds, herons and other large species live in this aviary, and many smaller species, which would suffer out of doors in win¬ ter, dwell there during the summer months. See Cage-Birds.

AVIATION. See Aeronautics, History of.

AVIATION SICKNESS. The effect of this sickness is noticed upon the pilots of aero¬ planes when flying very high, and when mount¬ ing or coming down quickly. When mounting in the air breathing becomes shorter when at 5,000 feet height, and this effect is more notice- aide than with ordinary balloons. The heart is noticed to beat faster, but generally there are no palpitations, and there is only a nervous sensation, due to anxiety and the emptiness of space. Buzzing in the ears is noticed only at a greater height, about 6,000 feet. When flying at 3,500 feet, and especially above 5,000 feet, the reflex movements of the system have a greater amplitude. This appears to be due to a combination of causes, such as cold, a more rapid breathing, quicker heart-beats, the effect of sunlight and troubles of hearing, to which we must add nervous tension and fatigue. One curious effect is a great tendency to sleep, and this is so strong that the eyes sometimes close, in spite of all efforts to keep them open.

AVICENNA (Abu ‘Ali al-Husain ibn Abdallah ibn Sina), Arabian philosopher and physician: b. Afskena, near Bokhara, 980; d. Hamadan 1037. His precocity was extraor¬ dinary, at ten he knew the Koran by rote ; also much Arabic poetry. He learned the rudi¬ ments of medicine, arithmetic and geometry from wandering teachers. At seventeen he received a court appointment as physician to the amir, and had access to the library of the Samanids. The dynasty of the latter ended in 1004 and thereafter Avicenna led a very ardu¬ ous life, wandering from place to place. Finally at Jorgan, near the Caspian Sea, he met with a friend, who secured him a dwelling in which he lectured on logic and astronomy. Later he was imprisoned under Taga Addaula, but es¬ caped and fled to Ispahan, where he was wel¬

comed by the prince. His later years were spent in the service of Abu Ya ‘far ‘Ala Ad¬ daula, to whom he acted as physician and literary adviser, and whom he accompanied even on his campaigns. His greatest work is the (Canon of Medicine, *based on the Greek med¬ ical works. It was long used as a textbook both in the Orient and Occident, and is still highly prized in the former; an Arabic edition of it was published at Rome in 1593, and a Hebrew version at Naples in 1491. About 100 treatises are ascribed to Avicenna. Scarcely any science was left untouched by him. Among his med¬ ical works translated into Latin are <Medica-menta Cordialia,* (Canticum de Medicina) and ˆTractatus de Syrupo Acetoso. *He followed Aristotle in philosophy. In this field his (Logic) and (Metaphysics* have gone through several editions. Consult Brockelmann, beschichte der arabischen Litteratur *(Weimar 1899) ; Carra de Vaux, <Avicenne) (Vol. I, Paris 1900) ; Ibn Khallikan, bibliographical Dic¬ tionary } (Stone trans., 1842) ; Wiistenfeld, (Geschichte der arabischen Aerzte* (1840).

AVID, Sir John, Canadian banker: b. Longueuil, Quebec province, 15 Nov. 1855. He was educated at Toronto Model School, took up railway wrork before entering the banking profession; was appointed superintendent of the Central Western branches of the Canadian Bank of Commerce in 1908, assistant general manager in 1911, manager in 1915 and was knighted in 1917.

AVIGNON, a've-nyon' (ancient Avenio), France, city, capital of the department Y'au- cluse, on the left bank of the Rhone 30 miles from the Mediterranean. It consists generally of large antique houses, in narrow, crooked, dirty streets. The principal objects of interest are the large and very ancient cathedral ; the papal palace, with lofty massive walls and strong towers, and the chamber of the Inquisi¬ tion. The Musee Calvet contains Roman and other antiquities and a famous picture gallery. The public library contains 140,000 printed vol¬ umes and 32,000 manuscripts. The silk manu¬ facture is the principal source of employment at Avignon, and the rearing of silkworms is carried on extensiveljr in the district. The city has also manufactories of velvet, woolen and other goods, hats, jewelry, etc., with silk dye-works, paper-mills, tanneries, agricultural imple¬ ments, tin, copper, hardware, chemicals and oil works, etc., and a trade in wine, brandy, iron, cotton, wool, grain and other articles, of which it is the entrepot for Lower Dauphine, Provence and all Languedoc. Here Petrarch lived sev¬ eral years ; here he saw his Laura, who formed the subject of his most beautiful verses, and whose tomb is still to be found in the Fran¬ ciscan Church. The fountain of Vaucluse is five leagues from Avignon. It belonged to the papal see from 1348 to 1791, and from March 1309 to September 1376 seven Popes in suc¬ cession, from Clemens V to Gregory XI, were compelled to reside in this city. The Catholic historians commonly call this period the Baby¬ lonish captivity of the Popes. It is the chief centre of the Felibrige Brotherhood, organized about 70 years ago to promote the revival of the Provencal language and literature. Consult Muntz, (La cour pontificate d' Avignon) (in Re¬ vue des questions historiques, Paris 1899) ;

O'Kay, (Story of Avignon* (London 1911) ; Peujon, (Avignon; la ville et le palais des papes> (Avignon 1905). Pop. (1911) 49,314.

AVILA, a'vˆ-la, Gil Gonzalez d\ Spanish antiquary and biographer: b. Avila 1577 ; d. 1658. He was made historiographer of Castile in 1612, and of the Indies in 1641. Most valuable works: (Teatro de las

Grandezas de Madrid *(1623) ; and (Teatro eclesiastico de la primitiva iglesia de las Indias Occidentales) 0 655); (Teatro eclesiastico de las ciudades e iglesias catedrales de Espaha) (Salamanca 1618) ; (Teatro eclesiastico de las iglesias de Espana* (2 vols., Madrid 1656).

AVILA, Juan d\ celebrated Spanish preacher, commonly called the (<Apostle of An- dalusia** : b. Almodavar del Catnpo 1500; d. at Montilla 1569. His missionary labors in Anda¬ lusia were prosecuted with singular success, until he arrived at the age of 50, when, with a wornout constitution, he was obliged to desist. His (Spiritual Letters) have been translated into most European languages.

AVILA., Spain, a province bounded on the north by Valladolid, east by Segovia and Madrid, south by Toledo and Caceres and west by Salamanca. It has an area of 2,570 square miles. Avila is naturally divided into two sec¬ tions, differing completely in soil, climate, pro¬ ductions and social economy. The northern portion is generally level; the soil is of indif¬ ferent quality, strong and marly in a few places, but rock in all the valleys of the Sierra de Avila, and the climate has extremes of heat and cold. The population of this part is mainly agricultural. The southern division is one mass of rugged granitic sierras, interspersed with valleys abounding in rich vegetation. In this region stock-breeding is an imp’orta'nt in¬ dustry. The mountains contain silver, copper, lead, iron and coal, but their mineral wealth has been exaggerated and mining has been practically abandoned. Quarries of fine marble and jasper exist in the district of Arenas. Except Avila, the capital, there are no import¬ ant towns. The principal production is the wool of the merino sheep. Olives, chestnuts and grapes are grown, and silk worms are kept. There is little trade and the manufactures are few, consisting chiefly of copper utensils, lime, soap, cloth, paper and combs. Pop. of province 200,000.

AVILA, Spain, city and capital of the province of Avila, a modern division of Old Castile. It was once one of the richest towns of Spain. A university founded here in 1482 by Ferdinand and Isabella continued its exist¬ ence until the beginning of the 19th century. In 1917 it is still, architecturally, a mediaeval town, preserving unaltered man}' of the build¬ ings that were new in the 12th century and the splendid walls built in the last few years of the 11th. Excellent examples of Romanesque are the churches of San Vincente and San Pedro. The west porch of the former is one of the most important creations of mediaeval art in all Spain. Also very noteworthy is the cathedral, exceedingly Spanish in its pictur¬ esque variety (or lack of unity), and with much interesting sculpture, from the 13th cen¬ tury to the Renaissance.. This granite-gray city surrounded by beautiful,

rugged country,

recalls most vividly the great saint of Avila. Santa Teresa, who lived here many uneventful years in the 16th century before starting on her* career as a reformer. At the. present time the principal employment in the town is spinning. Pop. about 12,500.

AVILA Y ZUNIGA, a've-la e thoo'nye-ga, Don Luis d\ Spanish general, diplomatist and historian; a favorite of Charles V : b. 1500; d. 1564. He was in high favor with the Em¬ peror, accompanied the latter to Africa and was his ambassador to the Popes* Paul IV and Pius IV. His (Comentarios de la guerra de Alemaiia, hecho por Carlos V en 1546 y 1 547 * is a valuable if partial record of Charles' War in Germany. It has been translated into several languages.

AVILES, a-ve-las, Pedro Menendez d',

Spanish seaman and founder of Saint Augus¬ tine, Florida: b. Aviles, Asturias, 15 Feb. 1519; d. 17 Sept. 1574. At the age of 14 he ran away to sea, and was engaged till he was 30 in a life of adventure as a corsair. In 1549 he was appointed to command the convoy which guarded ships in the American trade, and executed this commission with great efficiency. He was later engaged in transporting war sup¬ plies to the low countries during the war with France. The French Huguenots having estab¬ lished a colony in Florida, in territory which was claimed by Spain on the grounds of prior discovery and settlement, it was decided to remove this menace to the Gulf trade of Spain and Pedro Menendez was commissioned in 1565 to undertake the task. He reduced the French colony and hanged the French prisoners, whom he regarded as heretics. He discovered and named the bay of Saint Augustine and established on the site of the French colony another which he called San Mateo. He re¬ mained in Florida till 1567, busy with his colony. His letters prove him to have been a pious and high-minded officer, who never im¬ agined that he could be supposed by any honest man to have gone too far in massacring the Frenchmen.

AVISON, Charles, English composer: b. Newcastle-on-Tyne 1710; d. 1770. He attained his musical training in Italy, after which he was an organist for some years. In his (Essay on Musical Expression *(1752) he attracted some attention by comparing the French and Italian composers with the Germans, to the disadvantage of the latter. His concerts and sonatas attained great popularity in his time. Browning refers to him in his (Parleyings with Certain People.*

AVITUS, Marcus Maecilius, an emperor of the West. He belonged to a Gaulish family in Auvergne, and gained the favor of Con¬ stantins, the colleague of Plonorius, and of Theodoric, King of the Visigoths. He served with distinction under 2£tius, became prefect of Gaul, and concluded a favorable treaty with the Goths. He afterward retired into private life until the invasion of Attila, when . he induced the Goths to join the Romans against the common enemy. Avitus was proclaimed emperor in 455, took for his colleague Mar- cianus, and died the year following.

AVITUS, Saint, bishop of Vienne in Bur¬ gundy from 490 until his death, in 523. He was the leading champion of his day in the

conflict with Arianism and Semi-Pelagianism. A signal victory in a public disputation gained • for him the esteem and confidence of King Gnndobald, whose son Sigismund he received into the Catholic Church and who was after¬ ward canonized as a saint. His writings have given him a prominent place in early Bur¬ gundian-Roman literature. His chief work is a didactic poem in five books, entitled (De Spiritalis Historise Gestis, > and deals with such subjects as the origin of the world, original sin, etc. Another poem in praise of chastity, while inferior in literary merit to the work just mentioned, contains much of value from a historical standpoint. Consult Binding, (Geschichte des burgundischen Konigreichs) (Leipzig 1868) ; Frantz, P. N., (Avitus von Vienne alo hierarch und politiker) (Greifs- wald 1908) ; Goelzer, Henri, (La latin de Saint Avit, eveque de Vienne) (Paris 1909).

AVIZ, a'vesh, Order of, a Portuguese order of knighthood, created in 1147 by Al- phonso I. The knights were then called Knights of Evora, but took their present title, in 1287, from their gallant defense of the fortress of Aviz against the Moors. The order was changed from an ecclesiastical to a civil institution in 1789. Membership was given as a reward of merit for marked service to Portugal. In 1823 the order was extended to Brazil and soon became recognized as a national order there. During the empire the emperor was the grand master.

AVLONA, av-lo'na, or VALONA, a sea¬ port in Albania, protected by the island of Sasseno, the ancient Saso. It carried on con¬ siderable trade with Brindisi, etc. The Chris¬ tian inhabitants, chiefly Italians, are engaged in commerce, exporting oil, wool, salt, pitch, and

especially come 40,000 tortoise shells yearly. The inhabitants are employed in the manufacture of arms and woolen fabrics. Valonia, a material exported to England for tanning, is the pericarp of an acorn grown nearby. Up to 1691 the town belonged to the Venetians. In 1913 it was made the seat of government of the new principality of Albania. It was taken by the Austrians in the great war which began in 1914. Pop. about 6,500.

AVOCA, Pa., borough in Luzerne County, 10 miles northeast of Wilkesbarre, on the Central of New Jersey, the Delaware and Hudson, the Lehigh Valley and the Erie rail¬ roads. It is in the centre of the mining re¬ gions and most of its inhabitants are engaged in that industry. Some silk mills are also in operation in the town. Pop. 4,634.

AVOCADO (av'o-ka'do) PEAR, a tropical

fruit. See Alligator Pear.

AVOCET, a shore-bird of the limicoline genus Recurvirostra, remarkable for its very slender beak, which curves upward toward the end like a cobbler's awl. It is a near relative of the stilt sandpiper, and various species occur throughout the world. The North American species, Recurvirostra americana is found in summer throughout the temperate parts of the country, migrating to the tropics in winter. It is about 17 inches in length, brownish-black above and white below, with the head, neck and chest light cinnamon. Its general habits are those of sandpipers. It is common in the Western States where it is

shot as game. Consult Cones, (Birds of the Northwest (Washington 1874).

AVOGADRO, Amadeo, Conte di Quad- regna, Italian physicist and discoverer of the rule in chemistry which bears his name : b. Turin, 9 June 1776; d. July 1856. In 1820 he was a professor of physics in his native city. He has published much matter on physics, but the one work which made him famous and in which was set forth his rule was (Essai d'une maniere de determiner les masses relatives des molecules elementaires des corps, et les pro¬ portions selon lesquelles elles entrent dans les combinasions> (1811).

AVOGADRO'S HYPOTHESIS. This

is the hypothesis given by Avogadro in 1811 to the effect that the number of molecules in a volume v of gas at temperature t and pressure p is independent of the nature of the gas. Though it is sometimes called Avo¬ gadro's rule or Avogadro's law, it is strictly

speaking neither a rule nor a law, but a hy¬ pothesis to explain the simple relation of pro¬ portionality between the densities of gases and their combining weights. Though Dalton denied the truth of this hypothesis, he saw before the work of Avogadro that it was the consequence of the generally recognized chemical facts. In the early history of this hypothesis much confusion arose for want of a sufficiently clear understanding of the relation between atoms and molecules. Cer¬ tain vapors which were formerly supposed to form exceptions to Avogadro's hypothesis, such as those of ammonium chloride and phosphorus pentachloride, have been shown to be dissociated by heat into mixtures, and not to be true vapors at all.

AVOIRDUPOIS, av'er-du-poiz' (French avoir du poids, to have weight), a system of weights and measures in which a pound con¬ tains 7,000 grains or 16 ounces, while a pound troy contains 5,760 grains or 12 ounces. All larger and coarser commodities are weighed by avoirdupois weight. The avoirdupois ounce is less than the troy ounce in proportion of 72 to 79. Avoirdupois is the weight used in the United States, where generally the hundred weight contains only 100 pounds' and the ton, 2,000 pounds.

AVON, a'von, the name of several rivers in England, the most important of which are the following: (1) The Upper Avon, rising in Leicestershire, runs southwest, and falls into the Severn at Tewkesbury. Stratford-on- Avon, a town on this river, is the birthplace of Shakespeare; (2) the Lower Avon, which rises near Tetbury, in Gloucestershire, and falls into the Severn northwest of Bristol, being navigable as far as Bath; (3) in Monmouth¬ shire ; (4) in Wiltshire and Hampshire, enters the English Channel at Christchurch Bay, in the latter county.

AVON, N. Y., village in Livingston County, 20 miles southwest of Rochester, on the Genesee River, and on the Erie Railroad. It has mineral springs, corn and pea canning establishments, and a bean-shipping plant. The waterworks are owned by the village. Pop.

2,053.

AVON, The. See Wasp, Reindeer, Avon

AND CASTTLLIAN.

AVONDALE, a former suburb of Birm¬ ingham, Ala., with which it is now incorporated. It was settled in 1884 and has cotton gins and manufactories of building materials.

AVONDALE, Scotland, a parish in the county of Lanark. At the battle of Drum- clog, fought near this place 1 June 1679, Grahame of Claverhouse, the famous Viscount Dundee, was defeated by the forces of the Scottish Covenant. A graphic description of this battle is found in Sir Walter Scott's (01d Mortality. >

AVRANCHES, a-vransh', France (the Roman A brine a), town of La Manche depart¬ ment, about three miles from the Atlantic, and 30 miles east of Saint Malo. It is pleasantly situated on a hill the summit of which was crowned by a magnificent cathedral, built in the 11th century, and destroyed at the revolu¬ tion in 1790. In this cathedral Henry II did penance before two of the Pope's legates for the murder of Thomas a Becket. One of its bishops was the celebrated Huet, author of the (Demonstratio Evangelical The manu¬ factures are chiefly lace, white thread and wax candles, and there is some trade in agri¬ cultural produce. Pop. 7,200.

AVULSION (Latin, avulsio, a tearing off), a term in law denoting the sudden trans¬ fer by natural causes of a portion of one man's land to that of another, as when the course of a river is suddenly changed and former boundaries altered. It differs from accretion, which describes a gradual addition to the property of a riparian owner by the action of the water. See Alluvion.

AWAJI, a-wa'je, one of the islands of Japan, situated between the main island and Sikokee. Its area is 218 square miles. Pop.

189,000.

AWARD is the judgment or decision of arbitrators or referees, on a matter submitted to them. The award should be consonant with and follow the submission, to be binding. _ It must be final and certain. It must be possible to be performed, and must not direct anything illegal to be done. At common law an award could be oral or written, but in some of the States an award to be valid must be in writ¬ ing. The New York Code of Civil Procedure provides that an award to be valid must be in writing.

A WAT A (a-wa'ta) WARE, a yellow faience called ˆegg-ware® by the Japanese, manufactured in the village of Awata, a sub¬ urb of Kioto, and largely purchased in the United States.

AWE, a, a narrow Scottish lake in Argyll¬ shire, about 23 miles long, and communicating bv the river Awe with Loch Etive. It is of great depth, has sloping and well-cultivated shores, terminated by ranges of lofty moun¬ tains, among which that of Ben Cruachan, ris¬ ing to a height of 3,670 feet, at its northern extremity is most conspicuous. A number of islets are scattered over its surface, and on two of them are some beautiful ruins.

AXAYACAT, a'cha-ya-kat', or AXAYA- CATL, a Mexican fly, the eggs of which, deposited abundantly on rushes and flags, are collected and sold as a species of caviare. The use of these as an article of diet was

learned by the Spanish settlers from their predecessors, the native Indian Mexicans, who called the dish ahuauhti.

AXAYACATL, a'cha-ya-ka't'l, a Mexican emperor : d. about 1477. He was the father of Montezuma, whom Cortez conquered, and reigned 14 years. He was already famous as a warrior when he became Emperor of the Aztecs, and inaugurated his reign by a suc¬ cessful expedition against Tehuantepec and in 1467 conquered anew the cities of Cotasta and Tochtepec. A little later he repelled the tribes who strove to get possession of the Mexican capital and maintained a vigorous warfare against his neighbors. The palace of Axa- yacatl, a gigantic pile of stone buildings, be¬ came a barracks of the Spaniards. His treas¬ ures were discovered by Cortez within a con¬ cealed door and the chronicler of the con¬ quest exclaims that <(it seemed as if all the riches in the world were in that room.® They consisted of gold and silver in bars and in the ore, many jewels of value and numerous rich and beautiful articles of curious work¬ manship, as imitations of birds, insects or flowers.

AXE (apparently an original Aryan word), a long-handled tool for wood-cutting. Its essential feature is the helve, though a cer¬ tain shape is imposed by the nature of its service. The chipped flint of the oldest Stone Age was a tool of all work, to crush, dig or cut (rather, bruise off), as occasion demand¬ ed, and was too heavy and shapeless to be used except by hand. As soon as one was shaped and sharpened to admit of tying a handle to it for a heavier stroke, the axe came into being and was probably the earliest implement thus differentiated. So natural a device was separately invented by each race early in its history and made of the material at hand : flint in England and America ; whin- stone or granite in Ireland and by the lake dwellers of the Continent; bone by the Ameri¬ can Indians and Eskimos ; while stone axes are still used by some of the South Sea Island¬ ers. In all these cases and until the use of metal, the handle was secured with a

thong, as piercing with an eye was impracticable. The first copper and bronze f(celts® were made in the same way. But when casting had become familiar, it was seen that there was no difficulty in casting a hole to thrust the handle in, making a much surer and heavier stroke ; and with this (<eye® the modern axe appeared. The bronze axe was lightened and better shaped, and in its turn displaced by iron, for which, with the progress of invention, has been substituted an iron butt inset with a steel cutting part. The old hand forges have for some generations been replaced by ini- mense establishments with developed machin¬ ery. The American process consists of cutting the biftt from a piece of white-hot iron, punching the eye, then reheating and shaping it by pressure between concave dies ; again heating, cutting in the edge _ a groove, into which the arched steel edge-piece is set, then welding the two and drawing out the axe to a proper edge by trip-hammers at a white heat. The next process is hammering off the im¬ plement by a combination of hand and ma¬ chine work and restoring the shape lost in

drawing out. It is then ground to symmetry, hung on a revolving table in a furnace and heated over a small coal fire, at a peculiar red heat, determined by the eye ; cooled in brine and then in fresh water and removed to another furnace, where it receives the last temper. It is next polished to a finish that shows every flaw and enables it to resist rust and enter wood easily; then stamped, the head painted to prevent rust, weighed, labeled and packed for sale.

AXEL, or ABSALON, Danish prelate, archbishop of Lund: b. near Soroe, Zealand, 1128; d. 1201. His family name was Axel. In 1157 he was chosen bishop of Roeskilde or Rothschild. In that age warlike pursuits were not deemed inconsistent with the clerical office, and Absalon was a renowned warrior by sea and land, as well as a zealous ecclesias¬ tic, his avowed principle being that (<both swords, the spiritual and the temporal, were intrusted to the clergy.® To his exertions as statesman and soldier Waldemar was largely indebted for the independence and consolida¬ tion of his kingdom.

AXEL AND VALBORG, a tragedy in five acts by Oehlenschlager, was written in Paris in 1808 and printed in Copenhagen in 1810, latest English translation by F. S. Kolle. The story is taken from the best known of the Danish romantic ballads. The last verse Oehlenschlager used as a motto :

May God forsake the wicked wretch Who two like these would pai t
When glows a warm and mutual love In young and virtuous heart

The ballad was well known throughout the Scandinavian countries long before Oehlenschlager's time. In Holberg's (Peder Paars,* the bailiff's wife was almost drowned in a flood of tears because parts of it had been read to her.

The whole action of the drama takes place in the famous Trondhjem Cathedral, in Nor¬ way, during the reign of Haakon Herdebred. Axel and Valborg are cousins who love each other. In spite of the pope's dispensation removing the legal impediment, a scheming monk prevents their marriage. In this trag- edv of a Northern woman's true and constant devotion the beauty of the ballad is brought to its full fruition. In its simplicity, its pa¬ thos and tragic ending, it makes an almost overwhelming impression on the spectator. (Compare Bjornson's (The Fisher Maiden*)•

In his own generation Oehlenschlager's • drama was the most favored and admired of all his writings. Through it, the romantic- sentimental style of poetry gained general favor. When Baggesen, beginning his review in a critical and hostile spirit, reached the famous lines spoken by the pure and innocent Valborg, as she crowns her lover's initials with flowers : ((I bid thee, my love, good morn¬ ing, ® he was absolutely carried away and praised the work in the highest terms.

Gisle Bothne,

AXELSEN, a powerful Danish familv who flourished in the latter half of the 1 5th century and the members of which figured in the wars of Christian I and John IV of Den¬ mark, and Karl Knutsen and Eric the Pom¬ eranian, kings of Sweden. Peter Axelsen was

the head of the family. Of his nine sons, the eldest, Olaf, made himself master of Goth¬ land; the second, Iver, retained that posses¬ sion and became a corsair; the third, Eric, was governor of Stockholm ; and the fourth, Aage, became a Danish councillor of state.

AXHOLME, an island in Lincolnshire, England, formed by the rivers Trent, Don, Idle and Vicardyke. Epworth, the home of the Wesleys, is the principal parish. Its area is 47,000 acres. The soil is exceedingly fertile.

AXIL, in botany, the angle between the upper side of a leaf and the stem or branch from which it grows. Buds usually grow out from the stem in axils of leaves and this posi¬ tion is naturally termed axillary.

In anatom¬ ical terminology, the axilla is the armpit.

AXIM, a-sheng', or ax'im, an important station and port on the African Gold Coast, near the mouth of the Ancobrah River, 70 miles west of Cape Coast Castle. Inland from Axim, in the basin of that river, and in the district between it and the Prah, gold-mining operations have been carried on on a large scale. It was built by the Portuguese, and its harbor is the best on the Gold Coast. The town is picturesque, and is an important point because of large exports of mahogany. In 1642 it was taken by the Dutch, who in 1872 ceded it, with the whole of their possessions in Guinea, to the English. Pop. 2,189.

_ AXINITE (Greek, «like an axe»), a mineral usually occurring in broad, acute-edged triclinic crystals, suggestive, in shape, of an axe. It has a glassy lustre, brown or yellow in color, and is translucent and strongly pleochroic. It has a hardness of 6.5 to 7, and a specific gravity of about 3.28. Its exact composition is still doubtful, but it may be described as a calcium and aluminum borosilicate, containing also varying amounts of manganese and iron. Its most important deposits are in Dauphine, France, Mount Skopi, Switzerland, in Japan and in the United States near Bethlehem, Pa., and at Franklin Furnace, N. J.

AXIN'OMAN'CY, a mode of divination much practised by the ancient Greeks, particu¬ larly with the view of discovering the perpe¬ trators of great crimes. An axe poised upon a stake was supposed to move so as to indicate the guilty person; or the names of suspected persons being pronounced, the motion of the axe at a particular name was accepted as a sign of guilt. Another method of axinomancy was by watching the movements of an agate placed upon a red-hot axe.

AXIOM (an assumption), a universal proposition, which the understanding must per¬ ceive to be true as soon as it perceives the meaning of the words, though it cannot be proved. It is, therefore, called a self-evident truth. In mathematics, axioms are those propo¬ sitions which are assumed without proof, as be¬ ing in themselves independent of proof, and which are made the basis of all the subsequent reasoning. Euclid has assumed 15 axioms as the basis of geometry. Among these are : <(The whole is greater than its part® ; (<Things that arc equal to the same thing are equal to one another®; ((Magnitudes which coincide, that is, which exactly fill the same space, are equal to

one another in every respect.® Bacon calls axiom a general principle, obtained by experi¬ ment and observation, from which we may safely proceed to reason in all other instances; and Newton gives the name of axiom to the laws of motion, which, of course, are ascer¬ tained by the investigation of nature ; he also terms axioms those general experimental truths or facts which form the groundwork of the science of optics.

AXIS (in crystallography). See Crystal.

AXIS (Latin, of unknown origin), a white-spotted deer (Axis axis) of India and the East Indies, known locally among the Hin¬ dus as (<chitra,® among the English as the (<hog- deer.® It resembles the European fallow deer in size and color, and as it is easily domesti¬ cated, is a favorite in European parks. The slender, sharp-pointed horns are not palmated and only a little branched, while the female is hornless. It is timid and usually goes in small herds, in which females largely predominate. It lives in thick jungles near water, and usually feeds in the night. Colored plates, illustrating its varieties, are given in Lydekker's (Deer of All Lands } (1898).

AXMINSTER, England, market town of Devonshire, 24 miles east of Exeter, on the side of a hill above the river Axe. The parish church, a very ancient edifice, contains some interesting antique monuments. Axminster was formerly celebrated for its woolen cloth and carpet manufactures, and gave name to a spe¬ cial make of carpet having a thick, soft pile, now made in Salisbury. Brushes are made here, and there are flour and other mills. Pop. 3,000.

AXOLOTL, ax'o-lot'l (Mex, «play in the water®), a larval salamander regarded as edible. They are numerous in the lakes about the City of Mexico, are six to 10 inches long, and are prepared by either roasting or boiling and eaten with vinegar or cayenne pepper. The most extraordinary thing about them, however, is the fact that they are the young of a species of terrestrial salamander (Amblystoma tigrinum), well known all over the warmer parts of the United States and Mexico, which in these lakes never transform into adults, but remain per¬ manently in the larval condition, yet become sexually mature when about six months old, so that they are able to breed. This astonishing fact was long unknown. The axolotl has bushy, external gills similar to those which per¬ manently characterize the mud-puppy. It was regarded as a distinct animal, and named Siredon lichenoides. The discovery of the truth was made accidentally in Paris in 1865, when some axolotls in an aquarium in the Tardin des Plantes lost their gills and were transformed into perfected amblystomas. A lady, studying in

the University of Freiburg, Frl. Marie von Chauvin, then undertook a series of careful experiments with other captives, and worked out the complete history of meta¬ morphosis, which is dependent (at least in Europe) on a very narrow set of favorable circumstances, but differs in no essential degree from that of other salamanders (q.v.). Why the change never takes place in the. Mexican lakes is unexplained. The theories in regard to it, and the detailed history of the observa¬

tions above mentioned, are given by Gadow in (Amphibia and Reptiles* (1901), with many references to other books and periodicals.

AXON, that part of the nerve cell that carries the nervous impulses, the axis cylinder process or the nerve fibre proper. See Nerve Cell; Nerve Fibre.

AXUM, ax-oom', a town in Abyssinia, capital of the province of Tigre, once the capi¬ tal of a powerful Ethiopian kingdom, and at one time the great depot of the ivory trade in' the Red Sea. The importance of this city and its kings was first made known to us by a stone (Axumitic marble) with a Greek inscription, first explained by Salt, who discovered it, and afterward by Buttmann and Niebuhr. The in¬ terest in this inscription was increased by the explanation which it afforded of the second half of the Adulian marble. Axum, the place where it was found, still exhibits many remains of its former greatness. Among its ruins are shown the royal throne, and groups of obelisks, originally 55 in number, one of which Salt de¬ clared to be the most beautiful that he had seen. Pop. 5,000. Consult Bent, (The Sacred City of the Ethiopians *(1893) ; Glaser, (Die Abessinier in Arabien und Afrika* (Munich 1895) ; Momm¬ sen, T., (Provinces of the Roman Empire) (New York 1886).

AYACUCHO, a'ya-koo'cho, Peru, the name of a department and also of the depart¬ mental capital. The department has an area of about 18,185 square miles, and it is traversed by both chains of the Cordilleras and watered by numerous rivers. It produces cereals, maize, potatoes and a little coffee, sugar, cotton, etc. Cattle and hardy sheep are bred exten¬ sively. The provinces are: Lucanas (rich in silver), Ayacucho, Cangallo, Huanta, La Mar and Parinacochas. The capital, situated on the main road from Lima to Cuzco, has a cathedral and about 20 churches. It was founded by Pizarro in 1539, and long known as Huamanga. A battle that took place here was one of the most celebrated in the history of South Amer¬ ica, having been decisive of the independence of upper and lower Peru. (See Ayacucho, Bat¬ tle of.) Pop. of town 22,000; of the depart¬ ment, in 1916, about 227,000.

AYACUCHO, a'ya-koo'cho The Battle

of, a decisive engagement in the South Amer¬ ican struggle for liberty; was fought on 9 Dec. 1824, at and near the Peruvian town of that name. On the one side was the Spanish viceroy of Peru with nearly all that remained of the Spanish power in its last stronghold upon the continent; on the other General Sucre, second in command to Bolivar (the latter not being present), with Colombian troops, and Peru¬ vians led by General Lamar. The viceroy wTas taken prisoner; the utter defeat of his army made possible the independence of Bolivia (realized the following year), and strengthened the republican governments in all the neighbor¬ ing states.

AYALA, a-va'la, Adelardo Lopez de,

Spanish dramatist: b. Gaudalcanal, Badajoz, March 1820; d. 30 Dec. 1879. After studying law in Seville, he went to Madrid, where he devoted himself entirely to poetry and speedily won national fame. His first drama, (A States- man) (1851), met with immediate success a: :1

was followed in the same year by (Thc Two Noblemen) and (Penalty and Pardon. ' To the modern comedy of manners, his specific do¬ main, he first contributed (The Glass Roof,' and in 1861 attained to wide reputation with Percentages Of his other works the most noteworthy are (The Modern Don Juan' (1863) ; and Ponsuelo1* (1878), a drama.

AYALA, Lopez de, Spanish historian and poet: b. 1332; d. 1407. He was a prominent statesman and warrior during the reigns of the Castilian kings Pedro the Cruel, Henry II, John I and Henry III, and is known as the author of a (Chronicle of the Kings of Castilleˆ (his contemporaries), in which the crimes of Pedro the Cruel are detailed and drawn in colors said to be sometimes overcharged.

AYAMONTE, a'ya-mon'ta, Spain, seaport town, near the mouth of the Guadiana, which here forms the boundary between Spain and Portugal. It is picturesquely situated on the slope and at the foot of a hill. The upper part of the town consists of narrow and irregular streets; those of the lower part are regular and wide. There are three

public squares. The principal occupation of the inhabitants is fish¬ ing, shipbuilding and coast trading. Pop. (1910)

9,471.

AYE-AYE, ai'ai' (native Malagasy name; from its cry), a lemur (Daubentonia mada- gascarensis) , about the size of a rabbit, and with teeth like a bat. It is small and brownish, with a long bushy tail. Arboreal and nocturnal in habits, it lives in bamboo jungles, feeding on vegetables and the larvae of certain borers. Its feet, as well as its hands, have opposable thumbs, and exceedingly long, naked, flexible-fingers armed with pointed nails, suitable for extracting grubs out of deep crevices. Consult Baron, Proceedings Zoological Society > (Lon¬ don 1882) ; Lydekker, (Mostly Mammals) (London 1903) ; Ingersoll, E., (Life of Mam¬ mals > (New York 1906).

AYESHA, a-ye'sha, the daughter of Abu- Bekr and favorite wife of Mohammed: b. 610 or 611 ; d. 677 or 678. After Mohammed]s death she opposed the succession of Ali, raised an army against him, and was taken prisoner, but dismissed with that spirit of chivalry which had already arisen among the Arabians.

AYLESBURY, alz'ber-i, England, market town in Buckinghamshire, 38 miles northwest of London, in the centre of the fertile valley of Aylesbury. There are many old houses, irregu¬ larly but picturesquely built. The parish church of Saint Mary's is a fine early English edifice, and there are various other places of worship; a county-hall, market-house, clock tower and corn exchange. There are also baths, a large county hospital, and the only convict prison for women in England. The chief industries are printing, making condensed milk and poultry¬ raising for the London market, Aylesbury ducks being widely known, and there are sev¬ eral breweries and flour-mille. Aylesbury is very ancient, having been taken from the Britons by the Saxons in 571. Pop. (1911) 11,048.

AYLESFORD, alz'ferd, England, town in Kent, three miles from Maidstone, and 39 miles southeast of London. Remarkable ancient re¬ mains occur here, comprising an extensive cromlech, or burying place, known as Kit's

Coity, and, in the neighboring chalk hills, large circular sepulchral pits. Pop. (1911) 2,569.

AYLESWORTH , Sir Allen Bristol, Ca¬ nadian statesman : b. Newburgh, Ontario, 27 Nov. 1854. He graduated at Toronto

University in 1874, became a barrister in 1878, and K.C. in 1889. He was returned as a Liberal to the Dominion House of Commons in 1905, occupy¬ ing the portfolio of postmaster-general in Laurier's cabinet, 1905-06, and minister of justice 1906-11, when he retired from political life. A member of the Alaskan Boundary Com¬ mission in 1903, he dissented from and refused to sign the award, which he subjected to a searching criticism. He was British agent be¬ fore The Hague Tribunal in the fisheries ref¬ erence of 1910, and was created K.C.M.G. in

1.

AYLLON, I-lyon, Lucas Vasquez de,

Spanish adventurer: b. about 1475; d. 1526, who, in 1509, occupied the position of consul at the Supreme Court of Saint Domingo, and was subsequently employed by Fernando Cortes on a mission to Velasquez. In 1520, he joined an expedition to Florida, treacherously captured a great number of natives, and proposed to found a new colony, but was unsuccessful, and is supposed to have lost his life while engaged in a second expedition to Florida.

AYLMER, two lakes in Canada; one, north of Great Slave Lake, is about 50 miles in length and half as wide, the other lies about 70 miles south of Quebec, in Wolfe County, at the headwaters of the Saint Francis River.

AYLMER, al'mer, John, English prelate: b. Norfolk 1521 ; d. 1594. He was tutor to Lady Jane Grey. On the accession of Mary, he was forced to leave his country, but when Queen Elizabeth came to the throne he returned to England; and in 1576 was made bishop of London. He wrote a powerful reply to the (Mon¬ strous Regiment of Women' by John Knox.

AYLMER, Matthew Whitworth, 5th

Baron: b. 1775; d. 1850. He entered the army in 1787, serving in the West Indies, in Holland, and in the Peninsula under the Duke of Wel¬ lington. He was governor-in-chief of Canada,

1830-35.

AYLOFFE, a'lof, Sir Joseph, an English antiquary: b. about 1709; d. 1781. He was one of the first council of the Society of An¬ tiquaries, a commissioner for the preservation of state papers, and author and editor of sev¬ eral works, of which the best known is his (Calendars

of the Ancient Charters, > etc. .

AYMARAS, i'ma-raz', an Indian race of Bolivia and Peru, speaking a language akin to the Quichua. They are physically character¬ ized by great chest development, caused by the rarefied air of the region they inhabit.

AYMON, a'mon, the surname of - four brothers, called respectively Alard, Richard, Guiscard and Renaud, sons of Aymon or Hai- mon, Count of Dordogne, who figure among the most illustrious heroes of the chivalric poetry of the Middle Ages ; their historic existence was considered problematical until M. Longnon in 1879 established the fact that the Aymons lived in the first half of the 8th century. Their career furnished rich material to the romantic narratives of the age of Charles

Martel. A novel, entitled (The Four Aymon Brothers, } by Huon de Villeneuve, a French poet of the 13th century, details very minutely their exploits, and Ariosto conferred a poetical immortality on the family by the publication of his (Roland,* in which Renaud, the bravest of the four brothers, plays continually the most distinguished part.

AYOUBITES, or AYYUBITES, the

Saracenic dynasty founded by Saladin, which in Egypt supplanted the Fatimite caliphs, about 1171 a.d. Several of the descendants of Saladin, known as Ayoubites, afterward ruled in Egypt, Syria, Armenia and Arabia Felix. In the 13th century their power was destroyed by the Mamelukes.

AYR, ar, Scotland, town on the river Ayr, 34 miles southwest of Glasgow. The principal streets of modern Ayr are spacious and well paved, and many of the buildings hand¬ some. The most important edifices are several churches of various denominations; the town- hall and connected offices, in great part com¬ pleted in 1881, surmounted by a fine spire of older date, 226 feet high; the county build¬ ings ; the academy, a celebrated educational in¬ stitute, the buildings of which are handsome and commodious; the Wallace tower, 115 feet high on the site of a more ancient tower; the free library ; the railway station and hotel ; a hos¬ pital, etc. There is a handsome esplanade along the sea front 1,500 yards long. Two bridges connect Ayr with

Newton and Wallacetown, incorporated in the burgh. One of these, opened in 1879, occupies the place of the ((New Brig® of Burns' (Brigs of Ayr, * the ((Auld Brig® (built 1252) being still serviceable for foot traf¬ fic. There is now also a third bridge farther up the river, besides the railway bridge. Ayr exports manufactured goods, iron, coal, whet¬ stones, etc. ; and imports iron-ore, grain, tim¬ ber, slates, bricks, etc. The harbor lies within the mouth of the river, and is enclosed and pro¬ tected by a north and a south pier and a break¬ water; there being also a wet dock and a slip dock. Shipbuilding is carried on, also tanning, boot and shoe making, the manufacture of car¬ pets, lace curtains, etc. The poet Burns was born in a house which stands within one and one-half miles of the town, between it and the church of Alloway (((Alloway's auld haunted kirk®), and a monument erected to his memory stands on a height between the church and the bridge over the Doon. Pop. 33,000.

AYR, a river of Ayrshire, Scotland, which after a course westward of 18 miles, finally loses itself in the Firth of Clyde below the town of Ayr.

AYRER, i'rer, Jacob, German dramatist: b. Nuremberg about 1560; d. there, 26 March 1605. Between 1595 and 1605 he wrote more than 100 plays, of which the (Opus Theatricum* (Nuremberg 1618) contains 30 tragedies and comedies, and 36 Shrovetide plays and vaude¬ villes. In his dramas the influence of the Eng¬ lish stage is apparent.

AYRES, arz, Alfred. See Osmun, Thomas Ermbley.

AYRES, Anne, American author: b. Eng¬ land 1816: d. February 1896. She was the first member of an American sisterhood in

the Protestant Episcopal Church. She wrote (Evangelical Sisterhood) (1867) ; and (Life of Augustus Muhlenberg.*

AYRES, Brown, American educator : b. Memphis, Tenn., 25 May 1856; d. 28 Jan. 1919. His earlier education was attained in private schools, after which he studied engineering, graduating from Stevens Institute of Technol¬ ogy. In 1880 he was appointed professor of physics at Tulane University, where he remained for 24 years, acting at times as dean of the Col¬ lege of Technology and president pro tempore. In 1904 he became president of the University of Tennessee. In 1910 he was president of the National Association of State Universities.

AYRES, Leonard Porter, American edu¬ cator: b. Niantic, Conn., 15

Sept. 1879. He studied at Harvard and Columbia Universities, then, in 1902, went to Porto Rico as one of the first American teachers. Here he became, first, superintendent of schools in the districts of Caguas and San Juan, then general superintend¬ ent of all the schools in Porto Rico. In 1908 he became connected with the work of the Sage Foundation, becoming chairman of the com¬ mittee in charge of the problem of backward children. He is the author of (A Course of Study for the Schools of San Juan* (1905);

(Medical Inspection of Schools * (with Luther

H. Gulick, 1908) ; (Laggards in Our Schools> (1909-13) ; (Open Air Schools *(1910) ; (Seven Great Foundations* (1911) ; (The Public Schools of Springfield, I11P (1914) ; (The Measurement of Spelling Ability J (1915);

(School Building and Equipment (1915) ;

(Summary of the School Survey of Cleveland, Ohio> (1916).

AYRES, Romeyn Beck, American sol¬ dier : b. East Creek, Montgomery County, N. Y., 20 Dec. 1825; d. 1888. Graduating from West Point in 1847, he entered the artillery arm of the service in time to participate in the Mexican War. When the Civil War broke out he was a captain and as such took part in the first battle of Bull Run. From October 1861 to November 1862 he was chief of artillery under Gen. W. F. Smith. He was with the army of the Potomac in the Peninsular cam¬ paign ; afterward he saw fighting in the battles of South Mountain, Antietam, Fredericksburg, Chancellorsville and Gettysburg, being a divi¬ sion commander in this last engagement. In August 1863 he was ordered to New York with command to assist in the suppression of the draft riots. At the end of the war he was breveted brigadier-general and major-general in the regular service, serving as lieutenant- colonel and colonel in the regular establishment until his death.

AYRSHIRE, Scotland, an extensive mar¬ itime county about 60 miles in length, with a breadth varying from 10 to 26 miles. Its coast line is about 75 miles in length, has several excellent harbors. The singular rock off the coast, known by the name of Ailsa Craig, be¬ longs to the county, as also do one or two other islets. The surface has no great elevations, the highest summits varying from about 1,200 to

I, 900 feet. The principal streams are the Ayr, Stinchar, Girvan, Doon, Irvine and Garnock. The mineral riches are very considerable. Coal is

abundant, especially in the middle and north-

ern parts of the county, and there are over 100 collieries. Extensive seams also of blackband ironstone exist, and are now being actively worked, Ayrshire having become the great seat of the iron manufactures of Scotland next to Lanarkshire. Graphite is found in some lo¬ calities; and lead, antimony and copper. Limestone and freestone abound. Mill¬ stones, of coarse granite, much esteemed for their hardness and durability, are quarried near the north coast, in the district of Cunning¬ ham. The native sheep are bred in great num¬ bers; their wool is coarse and scanty, but the flesh is excellent. The horses of Ayrshire are of superior breed, being hardy, strong and of large size. The woolen manufactures are ex¬ tensive, particularly carpets, bonnets and wor¬ sted shawls, which are produced in great quan¬ tities. There are valuable fisheries and ship yards on the coast. On the coast is the ancient castle of Turnberry, in which Robert Bruce, King of Scotland, is said to have been born, and where he is known to have spent many of his youthful years. It was here that a fire, acci¬ dentally kindled, was mistaken by Bruce for an appointed signal, and caused him to cross the sea from the island of Arran opposite to at¬ tempt the deliverance of his country. Of the ecclesiastical ruins the most interesting is the abbey of Crossragruel, founded in 1244. The chief towns are Ayr, Kilmarnock, Irvine, Ste- venston, Dundonald, Troon, Saltcoats, Largs and Ardrossan. Pop. (1911) 268,337. Consult Paterson, (History of Ayrshire* (1866).

AYRTON, ar-ton, William Edward, Eng¬ lish electrician and inventor: b. London 1847; died 1908. He entered the Indian telegraph service, having studied electrical engineering with Prof. William Thomson; became electrical superintendent and introduced throughout India the system of determining the position of a fault by electrically testing one end of a line. In 1873-79 he was professor of natural philos¬ ophy and telegraphy at the Imperial College of Engineering in Japan; in 1879 became professor of applied physics in London Technical College, and, in 1884, chief professor of physics at the Central Institute, South Kensington. He was elected president of the Institute of Electrical Engineering in 1892. With Professor Perry, he invented the ammeter, voltmeter, electric power meter, ohmmeter and dispersion-photom¬ eter; and, with Professors Jenkins and Perry, the system of telpherage. He was a volumi¬ nous writer and widely known for his Prac¬ tical Electricity* (new ed. 1911).

AYSCUE, as'ku, Sir George, English ad¬ miral who lived during the 17th centurv and died in 1671. He was knighted by Charles I and attained his first command in 1646. Dur¬ ing the English Civil War the navy had largely maintained an attitude of neutrality, but in 1648 the greater part of the British fleet sailed for Holland. Those ships that remained and sup¬ ported the Parliamentary cause did so largely through the persuasions of Ayscue, for which Parliament appointed him admiral. He then sailed to Barbadoes, and after a hard battle captured it from the loyalist governor. Later followed some severe naval engagements with the Dutch fleets under Tromp and Ruyter. In 1666 Ayscue's flagship was beached during an engagement and the admiral himself was taken

prisoner and brought to Holland. The follow¬ ing year he was allowed to return to England.

AYTOUN, a'toon, Sir Robert, Scottish poet: b. 1570; d. London, February 1638, and studied at Saint Andrews. Of Norman descent, his family name was De Vescy; one of his an¬ cestors received from King Robert Bruce the lands of Aytoun, in Berwickshire, and changed his name to that of the estate. Sir Robert addressed an elegant panegyric in Latin verse to King James on his accession to the crown of England, which had, no doubt, some influence in securing to the author the favor of that monarch. He was at a later period of his life honored with the appointment of secretary to Henrietta Maria, Queen of Charles I. During his residence abroad, as well as at the court of England, he lived in intimacy with, and secured the esteem of, the most eminent persons of his time. The poems of Sir Robert Aytoun, for the first time published together in the Miscel¬ lany of the Bannatyne Club, are few in number, but are distinguished by some elegance of dic¬ tion, though he never claimed to be a poet. Several of his Latin poems are preserved in the work called (Delitiae Poetarum Scotorum. *Dr. C. Rogers, whose first edition of Aytoun's poems appeared in 1844, without any authority included (Auld Lang Syne* and Raleigh's (Sweet Empress. *

AYTOUN, William Edmondstoune, a

descendant of the foregoing, Scottish poet and prose writer : b. Edinburgh 1813 ; d. Blackhills, Elgin, 4 Aug. 1865. He studied at the Univer¬ sity of Edinburgh and passed as advocate in 1840. His first independent work was the 'Life and Times of Richard P (1840). In 1848 he published a collection of ballads en¬ titled (Lays of the Scottish Cavaliers,) which has continued to be the most popular of all his works, and has passed through numerous edi¬ tions. It was

followed in 1854 by (Firmilian, a Spasmodic Tragedy *; in 1856 by the poem of (Bothwell* ; and in subsequent years by the novel called (Norman Sinclair, *and various other original works. In 1858 he issued a criti¬ cal and annotated edition of the (Ballads of Scotland.* The translation of the poems and ballads of Goethe which he undertook in con¬ junction with Theodore Martin was less suc¬ cessful than some of his other works. In 1845 he was appointed professor of rhetoric and English literature in the University of Edin¬ burgh — a position which he held till his death. In 1854 he became editor of Blackwood' s Magazine. His biography was written by Sir Theodore Martin, 1867.

AYUB KHAN, I-yoob'kan, an Afghan prince, youngest son of Shere Ali : b. about 1855. After the abdication of his brother Yakub he declared himself openly against the English. On 27 July 1880 he met General Burrows at Kushk-i-Nakhud and severely defeated him, then laid siege to Kandahar. On 1 September General Roberts, who had hurried up from Kabul by forced marches, attacked Ayub's forces and scattered them, Ayub and what was left of his army falling back on Herat. The following year he succeeded in taking Kanda¬ har, but the new Ameer, Abd-ur-Rahman, was finally able to overcome him. For a while he was an exile in Persia. In 1887 he organized a

conspiracy to capture Herat, which failed. He finally gave himself up to the British who sent him, a state prisoner, to the Punjab.

AYUNTAMIENTO, a-yoon'ia-myan'to, the name given in Spain to municipal councils. Firmly established during the struggles with the Moors, the ayuntamientos acquired great in¬ fluence and political power, the nobility being admitted to them without their class privileges. The Cortes, in 1812, adopted the leading features of the former system. On the return of Ferdi¬ nand VII, the ayuntamientos were abolished, but restored in 1837. The ayuntamientos were empowered to make up the lists of electors and jurors, to organize the national guards, to com¬ mand the police within their own bounds, to di¬ rect the appointment and raising of taxes and to manage the funds of the commune. The municipal law of 1870 deprived them of all po¬ litical authority, and regulated them as adminis¬ trative bodies, subject in certain respects to the authorities of the provinces, the law courts and the Cortes.

AZAIS, a'za-is, Pierre Hyacinthe, French philosopher: b. Soreze 1766;

d. Paris 1845. He spent his early years as a teacher and a vil¬ lage organist. At the outbreak of the Revolu¬ tion be viewed it with favor, but was soon dis¬ gusted at the violence of its methods. A critical pamphlet drew upon him the hatred of the revolutionists, and it was not until 1806 that he was able to settle in Paris. In 1809 he published his great work (Des Compensations dans les destinees humainesR which pleased Napoleon so much that he made its author professor at Saint Cyr. In 1811 he became in¬ spector of the public library at Avignon, and from 1812 to 1815 he held the same position at Nancy. The Restoration government at first suspected him as a Bonapartist, but at length granted him a pension. From that time he occupied himself in lecturing and in the pub¬ lication of philosophical works. In the (Com¬ pensations > he sought to prove that, on the whole, happiness and misery are equally balanced, and therefore that men should accept the government which is given them rather than risk - the horrors of revolution. His other works are 'Systeme universeP (1812) ; 'Du Sort de l'homme) (1820) 'De la phrenologie, du rnagnetisme, et de la folie) (1843).

AZALEA, a genus of about 25 species of shrubs of the family Ericciccce, natives of the northern hemisphere, principally of east¬ ern Asia and North America. By some botanists the genus is united with Rhododen¬ dron (q.v.), as may be seen below. The species have deciduous leaves and showy, often fragrant flowers, usually in terminal umbel¬ like clusters. They are commonly divided into two groups : the Indian azaleas and the hardy deciduous azaleas, including the Ghent hybrid forms. The Indian azaleas, mostly imported from Holland and forced in green¬ houses, are propagated by grafts or cuttings, rarely by seeds. They are planted in loose, moderately fertile soil ; sheltered from the sun and watered freely during the summer; re¬ potted in early autumn ; and, by special atten¬ tion, brought into flower as desired from late autumn until early summer. The leading species of the group is A. indico, of which two varieties, amcena and kcemsferi are fairly hardy

as far north as New Jersey. The members of the hardy group need some protection in the north and in exposed situations to prevent in¬ jury to the flower-buds due to sudden varia¬ tions of temperature. Named horticultural varieties are usually propagated by grafts or by cuttings. Seedlings are often grown for their own merits, but are generally used for stocks upon which to graft choicer varieties. The following are among the best known species of this group: A. nudiflora, pinxter- flower, found from Canada to the Gulf of Mexico, has pink, white or sometimes purple flowers in mid-spring; A. calendulacea, found from New York to Georgia, has large orange- or

flame-colored, particularly handsome blossoms in late spring; A. occidentalis, a California species, bears fragrant, white, pink¬ ish flowers in early summer; A. arborescens, found in the Alleghany Mountains, has frag¬ rant white or pink flowers in June; A. viscosa, clammy azalea or white swamp honeysuckle, is found in swamps from maritime Canada to Florida and westward to Arkansas, and bears fragrant white or pink flowers in June or July. Among the Asiatic members of this group the best known are probably: A. mollis, A. rhombica and A. ponlica. Consult Halliday, 'Treatise on the Propagation and Cultivation of Azalea Indica* ; Van Geert, 'Iconographie des AzaleesP

AZAMGARH, India, a city and district in the Gorakhpur division of the United Provinces. The city is situated on the river Tons, and has a railway station, and a popula¬ tion of about 19,000. The district has an area of 2,207 square miles. The slope of the land is from northwest to southeast. The soil is fertile, and very highly cultivated, bearing magnificent crops of rice, sugar-cane and indigo. There are several indigo factories. In 1857 it became a centre of mutiny, and the scene of fighting between the Gurkhas and the rebels, and was not finally cleared until October 1858 by Colonel Kelly. Pop. 1,500,000.

AZAN' (Arabic for "announcement®), the call or summons to public prayers proclaimed by the muezzin (crier) from the mosque twice daily in all Mohammedan countries.

AZANCHEV'SKY, Michael von, Russian

composer: b. Moscow 1839; d. 24 Jan. 1881. His first musical training was attained at Leipzig, under Richter and Hauptmann. In 1870 he became director of the Conservatory at Petrograd, which position he held for six years. Among his many works the most notable are a (Fest Polonaiseˆ for two piano¬ fortes; a concert overture and a sonata in B Minor.

AZARA, atha'ra, Jose Nicholas de,

Spanish diplomat : b. Barbunales, Aragon, 1731 ; d. Paris, 26 Jan. 1804. After graduat¬ ing from Salamanca he was appointed, first resident, then envoy for Spain at the Vatican. Here he attained a very powerful influence, which he used against the Jesuits, until they were suppressed in 1773, and in working for the election of Pope Pius VI. It was in Rome that he acquired a deep enthusiasm for art, in which he was one of the best connoisseurs, Consult Paul Besques' (La premiere ambas- sade de Don Jose Nicolas de Azara a Paris) (in Bulletin

hispanique, Vol. Ill, 1901).

088

AZARIAH — AZEVEDO

AZARIAH, the name of various person¬ ages mentioned in the Bible, no less than 24 of them being referred to. (1) The son of Oded, a prophet (2 Chron. xv, 1-8). (2)

Azariah, also called Abednego, one of three who were thrown into a fiery furnace (Dan. i, 11). (3) One referred to by the- Assyrian

King Tiglath-pileser IV in an inscription, wdio was long believed to be the same King of Judah knowm as Uzziah. At least four high priests are referred to by this name.

AZARIAS, Brother (Patrick Francis Mullany), b. 29 June 1847, near Killenaule, Tipperary, Ireland; d. 20 Aug. 1893, Platts¬ burgh, N. Y. (Cliff Haven). His father emigrated to the United States in 1851, leav¬ ing Patrick, his eldest son, in Ireland a few years on account of his health. At Deerfield, N. Y., near Utica, he attended the public school and later the Christian Brothers' Academy in Utica. At 14 he decided to become a Brother, and on 29 June 1862, Patrick Mullany received the black habit and wrhite collar of a Christian Brother, and henceforth became known to the world as Brother Azarias. At 17 he was put in charge of a large class ; and at 19 he was professor of mathematics in Rock Hill College, near Baltimore, Md. Ten years later he was made head of the college. His first book, (An Essay Contributing to a Philosophy of Literature) (1874), won him the respect of scholars. His philosophical articles on liter¬ ature, published in various magazines, were well received, and he was soon in demand as a lecturer before educational bodies, Catholic and non-Catholic. When in the 80's he wrent to Europe, he found friends everywhere; scholars who had read his books, men like Cardinal Newman greeted him as a friend. He was a promoter of the Catholic Summer School of America and of several other edu¬ cational movements. After finishing his course of lectures at the Catholic Summer School at Cliff Haven, 1893, he was too ill to go home or to any of the other meetings where he wras expected. His last days were spent in ((Blue Point Hotel,® near the Summer School grounds. His published works are (Aristotle and the Christian Church) ; (Books and Reading5 ; (Culture of Spiritual Sense) ; development of English Literature) ; de¬ velopment of Old English Thought5 ; (Essays Educational'; (Essays Miscellaneous5; (Es¬ says Philosophical5 ;

(Mary, Queen of May5 ; (Mary, Queen of May and Essays5 ; (Phases of Thought and Criticism5 ; (Philosophy of Literature5 ; (Psychological Aspects of Educa¬ tion.5

AZAZEL, az'a-zel, the chief of the angels who married human beings and begat of them wicked men (Lev. xvi, 8, 10, 26). It is also a name which occurs in connection with the services on the Day of the Atonement, in which the high priest had all the sins of Israel confessed over the head of a goat and then had it cast over a cliff, a rite which is sup¬ posed to have been the survival of an old demon worship, which was modified by the Jews.

AZEGLIO, ad-za'lyd, Massimo Taparelli, Marquis d', Italian author, artist, diplomatist and statesman: b. Turin, 15 Oct. 1798; d. 16 Jan. 1866. In 1816 he accompanied his father to

Rome, and there occupied his time principally writh painting and music. He wras already fa¬ vorably known as a painter, when, in 1830, he went to Milan, married the daughter of Manzoni, the great novelist, and wrote sev¬ eral romances. The earliest of these, <Et-tore Fieramosca,5 was received with great enthusiasm. His next romance, (Niccolo de Lapi,5 became equally popular, and is esteemed by Italian critics the best historical novel in any language. Deeply imbued with the spirit of Italian nationality, in 1842 Azeglio made a tour through the provinces of Italy, awakening the revolutionary spirit which troubled the last years of Gregory XVI. After the Revolution of 1848 he supported the cause of the King of Piedmont, and, at the head of the Papal troops, fought against the Austrians at Vicenza, where he wˆas wounded. In 1849 Victor Emmanuel appointed him president of the cabinet of min¬ isters, an office which he resigned in 1852 to his political adversary, Count Cavour. In 1859, after the peace of Villafranca, he undertook a confidential mission as Ambassador extraordi¬ nary to England; and was aftenvard appointed governor of the city of Milan. For biographies see Boccardo, (Nuova Encyclopedia Italiana5 ; Camerini (Turin 1861) ; Morozzo (Florence

1884).

AZERBAIJAN, a'zer-bi-jan', Persia, the northwestern and most important province of Persia. It is bounded on the north by the Aras, on the east by the Caspian Sea, Gilan and Khamseh, on the south by Kurdistan, and wrest by Asiatic Turkey. Its area is 32,000 square miles. The land is very fertile, the orchards and gardens yield delicious fruits of almost every description, and great quantities, dried, are exported to Russia. Provisions are cheap and abundant, but there is a

lack of forests and timber trees. Lead, copper, sulphur, orpiment, also lignite, are found; also a kind of varie¬ gated translucent marble knowm as Tabriz marble. The climate is healthy, not hot in sum¬ mer, and cold in winter. The revenue amounts to about $1,000,000 annually. The province is divided into a number of administrative dis¬ tricts, each with a hakim, governor, -under the governor-general, who is a responsible minister appointed by the Shah. Pop. about 2,000,000, comprising various races, as Persians proper, Turks, Kurds, Syrians, Armenians.

AZEVEDO, a-za-va'do, Manoel Antonio Alvares de, Brazilian poet: b. Sao Paulo, 12 Sept. 1831 ; d. 25 April 1852. He studied law in his native town and practised there. His (Obras,5 or collected works, were published the year after his death, a more complete collec¬ tion, (Obras completas,5 appearing 10 vears later (1863). The fifth edition of one volume of poems published in his lifetime appeared in 1884, under the title (Lyra dos vinte annos.5 He also wrote some minor prose works ; the dramatic sketches ((Bohemios55 ; «Marcario55 ; ((Noite na taverna.55

AZEVEDO E CASTRO, Joao Paulino

D , Roman Catholic missionary bishop : b. Lages, Island of Pico, Azores, 4 Feb. 1852. He was educated at the National Lyceum, Horta, Azores, and at the Seminary and University of Coimbra, Portugal. He was ordained priest in 1879, was successively professor of philosophy, theology, Church history, canon law (1879-1902)

and rector 1888-1902 of the Angra Seminary, Azores. He also served as episcopal deputy to. Portugal and held various other diocesan ap¬ pointments. In 1902 he became bishop of Macao, China. From 1902 to 1910 he was one of the chancellors of the Privy Council of the King of Portugal. As bishop he has built numerous churches and schools and has in¬ troduced new religious orders into his diocese and founded a college for girls at Malacca. As member of the government council he defeated the scheme for the granting of a gambling monopoly designed to make Macao the Monte Carlo of the Far East. He visited Europe in 1907 to arrange with the Pope and the French and Portuguese governments matters connected with the change of ecclesiastical jurisdiction in Hainan and Shin Hing.

AZEVEDO Y ZUNIGA, Gaspard de,

Count of Monterey, Spanish colonial governor : b. 1540; d. 1606. He was viceroy of Mexico and Peru from 1595 to 1603, during which period.he explored the Pacific coast of North America and founded Monterey, on Monterey Bay, Cali¬ fornia. Many Spanish-Californian families claim to be his descendants. Many of the land claims which caused so much litigation after the American occupation were based on his grants.

AZIMUTH, in astronomy, the arc of the horizon comprehended between the meridian of the observer and the vertical circle passing through the star. It is easterly if the star is observed before, westerly if after, and zero if at the time of culmination. It is usual to con¬ nect with the quadrant a graduated, horizontal circle, called the azimuth circle.

AZIO, Greece, a village on the Gulf of Arta, in the district and promontory of the same name. A German archaeologist, Dr. Erlinger, succeeded, in 1857, after several years' investi¬ gation, in ascertaining the position of the camps of Antony and Augustus, precisely as it was on the eve of the battle of Actium. He found the camp of the latter surrounded by a cincture of redoubts about 5 miles in extent, which were constructed in stone, and protected by a ditch. In advance of the camp were external works, consisting of several small observation forts, one of them serving as a telegraph for commu¬ nicating with the fleet. In the ruins of one of these forts was discovered a tablet in steel, on which signals are traced, resembling somewhat those of the aerial telegraphs.

AZGAR TAWARIK, or TUAREG, an

African tribe of the Berber class, who inhab¬ it the desert country between Ghat on the north and the tracts of the Kelowi Tuaregs on the south, between lat. 21° and 26° N. They were first visited and made known to the European world by the British central African expedition of Barth, Overweg and Richardson. The country in the north is a barren plain, with scarcely any vegetation, and with isolated gran¬ ite peaks, and few or no animals. The south¬ ern portion bordering on the Kelowi Tuarges, is the uninhabited central region of the great desert. The Tuarges do not belong to the negro race. They are fanatical Mohammedans in religion, hating both Pagan and Christian. They are monogamists. They are. a warlike artistrocracy divided into five tiyusi , or clans, * vol. 2 — 44

and subdivided into 30 divisions or fayas, each of which has a separate chief. See Tuaregs.

AZMARI, the name applied to certain vagrant beggars in Abyssinia, part of whom form the music bands of the Abyssinian army, while the rest exercise their musical voices in the street, especially on religious holidays.

AZO, Porzio, or AZZO, or AZZOLINUS, Portius, an Italian lawyer : d. about 1230. He lectured on jurisprudence at Bologna with such success that the college could not contain all his auditors, so that he had to take to the public square. His writings on Roman law super¬ seded all those of his predecessors.

AZOBENZENE. See Benzene.

AZOC COLORS. See Coal Tar Colors.

AZOIC, a name formerly given to the earliest geological period, before the appear¬ ance of life on the earth. It includes the oldest rocks, mostly granites, gneisses and schists, in which there are no traces of organic remains. The term has been variously employed to in¬ dicate rocks of Archean and Algonkian age, but has now fallen into disuse in the United States.

AZORES, a-zorz, or WESTERN IS¬ LANDS, a Portuguese archipelago, in the mid- Atlantic, between lat. 36° 55' and 39° 5f7 N. and between long. 25° 10' and 31° 16' W. Stretching over a distance of 400 miles, their nine islands are divided into three distinct groups — Sta. Maria and Sao Miguel in the southeast; Terceira, Sao Jorce, Pico, Graciosa and Fayal in he middle, and Flores and Corvo in the northwest. Of these, Flores lies 1,176 miles west of Cape Rocca in Portugal, 1,484 miles southwest of Falmouth and 1,708 miles east-southeast of Halifax. In 1431—53 the Azores were taken possession of by the Portu¬ guese. They were at that time uninhabited; but that they had been visited by the Cartha¬ ginians is proved by Punic coins found on Corvo. They seem to have been known to the Arabian geographer Edrisi in the 12th century; and they are marked distinctly on a map of 1351. The Portuguese colonists called the whole group Azores, from af or or azor, a hawk; and they named two individual islands, Corvo and Sao Jorge, from Corvi Marini and San Zorze, which, according to a map of 1375, had been previously seen in the western ocean. In 1466 Alfonso V made a life grant of the island of Fayal to his aunt, the Duchess of Burgundy, and from this circumstance many settlers mi¬ grated thither from Flanders.

The total area of the group is 922 square miles, and the population about 242,613 (ac¬ cording to official reports before emigration had reduced the aggregate about 8,000). The area, population and maximum altitude of the different islands are as follows: Sta. Maria (38 square miles; 5,880; 1,889 feet); Sa5 Mi¬ guel (299 square miles; 107,000; 3,854 feet); Terceira (166 square miles; 45,391 ; 3,435 feet) ; Graciosa (24 square miles; 8,718); Sao Jorge (91 square miles; 18,000); Pico (174 square miles; 27,904; 7,613 feet); Fayal (69 square miles; 26,264) ; Flores (54 square miles; 10,700; 3,087 feet); Corvo (7 square miles; 1,000). The capital is Angra (Angra do Heroismo, population 10,057) in Terceira; but Ponta Delgada, in Sao Miguel in a larger town, with 16,179 inhabitants. The Azores are of volcanic

origin, and with the exception of Corvo, Flores and Graciosa, are still liable to eruptions and violent earthquakes, the worst of 21 shocks since 1444 having been those of 1591, 1638, 1719 and 1841. Hot mineral springs are numerous; and the baths of Furnas, in Sao Miguel, are much resorted to by invalids. The coast is generally steep and rugged ; the interior abounds in ravines and mountains. Perhaps the greatest want of the group is a good harbor. The Azores are regarded as a province, not a colony, of Portugal, and as belonging to Europe. They comprise three ˆdistricts® of the republic and are part of the ecclesiastical province of Lisbon. For their defense they have two line regiments of infantry and two battalions of garrison artillery.

AZOTE, a name formerly given to nitro¬ gen; hence substances containing nitrogen and forming a part of the structure of plants and animals are known as azotized bodies. Such are albumen, fibrine, casein, gelatine, urea, kreatin, etc.

AZOTINE, a substance procured by de¬ composing wool by the action of steam at 150° C. under a pressure of five atmospheres ; the product, afterward dried by evaporation, con¬ tains nitrogen completely soluble in water. Azotine is mixed with dried blood for a fer¬ tilizer.

AZOTH, an elixir concocted by Paracel¬ sus, which his adherents regarded as a pan¬ acea for all spiritual and bodily ills, the <(tinc- ture of life.®

AZOTURIA, or AZOTEMIA, also known as hemoglobinemia, a disease peculiar to horses, of which the chief symptoms are paralysis of the

hind legs and a deep darkening of the urine to a coffee color. It usually occurs from too sudden a rest after heavy exertion or labor, without a corresponding change in rations. The disease is often mis¬ taken for spinal meningitis or colic. There are several causes ascribed to it, the most likely theory being that of auto-intoxication. It is believed that in the muscles which have been heavily exerted some disturbance is formed which exerts a toxic action with a too abrupt period of rest, the formation of this substance being assisted by heavy diet. Cases arc often fatal. Bleeding is one of the remedies pre¬ scribed, which seems at least to give relief. This should be followed by an injection of a normal salt solution, the administration of cathartics, cardiac stimulants, potassium iodide, fomentations of warm water over the loins, electricity to the affected muscles. But far better is prevention; reduction of rations when the animal ceases its regular work, or keeping in pasture.

AZOV, a-zof', Russia, a fortified town in the south of Russia, on the Don, seven miles from its mouth. The sand and mud deposited by the river have choked up the port, so that its trade and shipping have dwindled away, and the inhabitants depend mostly on fish-curing. Still an active trade in grain provides an outlet for the southeastern region of Russia. Azov was built nine miles from the site of the ancient Greek colony of Tana'is; and when, in the 13th century, it was taken possession of by the Genoese, they altered its name to Tana.

They were driven out of it by Timur (Tamer¬ lane) in 1392. In 1471 it was taken by the •Turks, and in 1696 by Peter the Great; and it was finally ceded to Russia in 1774. In 1855 it was bombarded and greatly damaged by an allied English and French squadron.

AZOV, Sea of (the ancient Palus Mseotis), an arm of the Black Sea, with which it is con¬ nected by the Strait of Kertch or Yenikale. Its greatest length is 226 miles and widest breadth 110 miles, with a superficial area of nearly 15,000 miles. To the northeast it narrows into the Gulf of Taganrog, formerly called the Gulf of Azov. The southwestern shore is formed by the ((Spit® or Tongue of Arabat — a strip of land, mud and sand 70 miles long and varying from 1,000 yards to 2ˆ4 miles in breadth. Be¬ hind or inside this strip, and bordering on the Crimean Peninsula, lies the Sivash or <(Putrid Sea,® which connects with the Sea of Azov through the narrow Strait of Genichesk. The odor arising from the decayed vegetation of the marshes and a kind of gas-oil is most unpleas¬ ant and unhealthy. Whereas the water in the Sea of Azov is not very salty — in the Gulf of Taganrog it is even potable — that of the Sivash contains more salt than perhaps any other sea. This salt is extracted in large quan¬ tities

(over 1,000,000 tons per annum) and forms an important industry. Shortly before the outbreak of the European War the Russian government began the task of piercing the Perekop Isthmus, which, when completed, will give the Putrid Sea an outlet into the Black Sea and thereby convert the Crimean Pen¬ insula into an island. This may not improbably produce a wholesome change in the atmosphere. In 1835 the Russians constructed a highway along the Spit of Arabat, since when a con¬ siderable population and numerous buildings have sprung up. The ruins of an old Tartar fort, captured by the Russians in 1771, still remain at Arabat, a village where the Spit attaches to the Crimea in the south. The Sea of Azov is very shallow and navigation is difficult in parts. The waters abound with fish. Violent storms occur, at times lowering the water level by five feet. There is reason to believe that, thousands of years ago, it was connected with the Caspian Sea. The river Don flows into the Gulf of Taganrog. Of the few scattered islands the largest is Biryutch.

AZPEITIA, ath-pa'e-tya, a town in Spain, 18 miles . southwest of San Sebastian. A mile from it is the famous convent of Loyola, now converted into a museum and built by the Ro¬ man architect, Fontana, in 1683. It includes the tower of the Santa Casa, in which Saint Ig¬ natius of Loyola, the founder of the Society of Jesus, was born in 1491. Here every year in July a great festival is held in his honor, to which pilgrims flock from all quarters. Pop. about 7,000.

AZRAEL, az'ra-el, in Mohammedan my¬ thology, the angel of death.

AZREK, the principal stream of Abys¬ sinia, which, after a winding course through Abyssinia and Sennaar, falls into the Nile above Gerri.

AZTEC CLUB, an organization formed to preserve the memories of the war in Mexico, established in Mexico in 1847.

AZTEC CONFEDERACY. The name Aztecs (properly Aztecas) is currently used for all the Nahua (q.v.) tribes in Mexico at the time of the Spanish conquest. It belongs at most only to the seven more closely cognate tribes which occupied the valley of Mexico, and is by some restricted to the one tribe which built 1 enochtitlan, or Mexico City, and is so used for convenience here. The name is from the unidentified place (generally assumed as northward) whence they came, Aztlan, vari¬ ously interpreted as <(heron place, ® “heron-

clan place,® ((white place® and ((seacoast® ; the best opinion makes it Jalisco or Michoacan, on the west coast of Mexico. Apparently some time from the 9th to the 11th century they invaded the plateau of Anahuac (“waterside,® lake district), where tribes of the same stock were already living, and took possession of several commanding points; the chief pueblo being that of the Aztecs or Toltecs at Tollan (now Tula), some 40 miles north of Mexico City, a leading pass from the north into the valley of Mexico. Driven from this by the warfare of the other natives the Aztecs moved south into the valley, and established them¬ selves in the salt marshes where the outlet of lakes Chaleo and Xochimilico flows into Lake Tezcuco, or Texcoco, amid which in 1325 (the first absolutely sure date in their history) they built Tenochtitlan, now the City of Mexico. They converted it by dikes and causeways into an island, and gradually made it another Venice, a stone town intersected with canals, the strongest position in Mexico. For more than a century, however, they were tributary to the great pueblo of Azcaputzalco, near them on the western shore of the lake. Gradually they formed a stable military organization and more stable civil society ; in 1375 they elected their first “chief of men,® war chief and priest in one — Acamapichtli, often styled in books “the founder of the Mexican empire® ; and under the fourth chief, Izcoatzin, allied themselves with Tezcuco on the eastern lake shore. The two destroyed Azcaputzalco about 1430 and deported the surviving inhabitants to Tlacopan, near Mexico, which was made tributary to the latter. Tenochtitlan, Tezcuco and Tlacopan then formed a league (the Aztec Confederacy, for¬ merly termed the “Aztec empire®), purely for plunder and tribute, not at all for government or incorporation. The tribute was not only of food and similar supplies, a certain amount of land being cultivated for the benefit of the con¬ federacy, but what was still more coveted, human victims for their gods, to be afterward eaten by themselves; sometimes of warriors for raids on others. The spoil was divided into five parts, Tenochtitlan and Tezcuco each taking two and Tlacopan one. In less than a century of life, this league made some 30 pueblo towns tributary, principally to the east toward the gulf and southeast toward the Isthmus of Tehuantepec — a range of 8,000 or 10,000 square miles out of the 767,097 in the present Mexico. Even this was in no sense a military occupation of the country, much less the foun¬ dation of a state. Within a few dozen miles were great independent pueblos such as Cholula and Tlascala, the latter a strong and warlike settlement of some 30,000 people, who waged war to the knife with the Aztec Confederacy, defeated their plundering assaults again and

again, and aided other pueblos in resistance. Montezuma (q.v.), who

acceded 1502, was heavily defeated by them and by the towns in Michoacan, but won success on the gulf coast; and when the Spaniards came, the southern Mexican Peninsula was a mass of seething sav¬ age hatreds and feuds, no two tribes of the natives having any community of feeling or interest that could prompt them to unite with one another rather than with the foreigner. See Cortes; Mexico; Montezuma.

The Aztec tribe was divided into 20 clans or calpullis, each clan occupying several con¬ tiguous communal houses, each of which held several hundred persons ; besides a clan office building where assemblies were held and strangers entertained. It was governed by an elected council, with a civil and a military head as in Rome, the latter being also constable. Each clan had its special rites, priests and tem¬ ple. It was divided into four phratries, each having among other duties that of exacting compensation for murders, and each ward had its own precinct, constituting four wards or quarters of the town, its arsenal and its cap¬ tain. These captains were called “darthouse- man,® “man-slasher,® “bloodshedder® and “chief of the eagle and cactus,® the latter being chief executioner, and not eligible for the chieftain¬ ship of the tribe. The supreme government of the Aztecs was by a council of 20, one from each clan, who must not be a sachem, but a member of the clan council ; he was called the “speaker,® and the tribal council the “speech- place® (parliament, literally). It met every 10 days at least, and oftener if called together. Once in 80 days there was a special session at¬ tended by all the leading clan and phratry offi¬ cials and priests, to reconsider unpopular de¬ cisions. The tribe, too, had a dual executive, civil and religious : a sachem who was civil magistrate and chief judge; and a war chief called “chief of men,® and who exercised also some priestly functions, though there was a high priest. He was originally chief only of the Aztecs ; but about 1430 (probably on oc¬ casion of the destruction of Azcaputzalco), was made chief of the confederate army. He was elected by the tribal council and the clan war chiefs and leading priests, and could be de¬ posed by them. His official residence was in the tribal office. From the time of the first chief, Acamapichtli, the office remained in a single family, like the old Aryan kingship.

The social and religious organization was a peculiar mixture of the lowest barbarism and the beginnings of civilization. There was no private property in land or dwellings ; each man could keep a garden plot for his use, but it was his no longer than he used it. Family life had emerged from savage promiscuity; de¬ scent was- reckoned in the male line, marital infidelity was punished, and remaining unmar¬ ried was not permitted except by special dis¬ pensation, — contumacy

being punished by be¬ ing made an outcast, a serf if a man and a prostitute if a woman. Slavery had thus began in a small way; but the habitual use of pris¬ oners of war as slaves had not, it being pref¬ erable to sacrifice and eat them. Agriculture was still primitive; but irrigation was practised to some extent, and horticulture was beginning to develop. The roads were only narrow trails ; but they facilitated collection of tribute, and

served military and trading purposes as well. The houses were generally of adobe brick, but many of the great pueblos were of stone, so that the towns looked like castellated cities. There were tessellated marble floors, finely worked and colored tapestries, and beautiful feather-work, vases, goblets and censers of fine marbles and precious metals exquisitely wrought. There were regular weekly markets, which, though trade was by barter, indicated a large development of personal property and of superfluity above subsistence. There were elaborate pleasure-grounds, menageries, and aviaries, baths and fountains and pleasure per¬ formances of dramas and singers, acrobats and jugglers. Yet the people were cannibals, and their religion was of the most hideous charac¬ ter, albeit with regularly organized priesthood and temples and altars. Consule Biart, L., (The Aztecs: Their History, Manners and Customs> (Chicago 1905) ; Joyce, T. A., (Mexican Archae- ology) (New York and London 1914) ; Taft, G. E., (Chimalman) (New York 1916).

Marrion Wilcox.

AZTEC TREASURE-HOUSE, The, a

romance by Thomas A. Janvier. It purports to be a narration of the thrilling adventures of a certain Prof. Thomas Palgrave, Ph.D., an archaeologist who goes to Mexico to dis¬ cover, if possible, remains of the early Aztec civilization.

AZTECS. See Aztec Confederacy.

AZUAY, a-thoo-i', a province in the mountainous southwestern part of Ecuador, with an area of about 11,150 square miles. The cinchona tree is found here in abundance and the high plains near the Peruvian bound¬ ary are well adapted to agriculture. The in¬ habitants, of this province as a whole, includ¬ ing the large Indian element, have long been known for their skill in weaving, lace-making and the potter’s

art. The provincial capital, Cuenca, is locally famous as a centre of lit¬ erary activity in the republic. Azuay's climate, throughout the regions that have an elevation of 8,000 to 9,000 feet above sea-level, is ex¬ cellent. Pop. about 132,400. See articles Cuenca and Ecuador.

AZULAI , a'zoo- li, Hayim David, 18th

century Jewish bibliographer: b. Jerusalem. His life was mainly spent at Leghorn. Of his numerous works, the best known is (Shem- ha-GedolinP (the names of the great), a bib¬ liography containing the names of over 1,300 Jewish authors and more than 2,200 of their works.

AZULEJO, a'thoo-la'ho*, a word derived from the Spanish word "azul,® meaning blue, and applied to a kind of glazed tile manu¬ factured by the Moors in Spain and used in wall decoration. The art of making these tiles was inherited by the Spaniards, some of the patterns or designs used to-day being the same as those employed by the Moors.

AZUNI, ad-zoo'ne, Domenico Alberto,

Italian jurist: b. Sassari, Sardinia, 1749; d. 23 Jan. 1827. He became judge of the tribunal of commerce at Nice and in 1795 published a work in which he endeavored to reduce mari¬ time laws to fixed principles and which ap¬ peared in French in 1805, under the title of

(Droit Maritime de f Europe. * Napoleon ap¬ pointed him one of the commissioners for compiling the new commercial code.

AZURE, the heraldic term for the color blue, represented in engraving by horizontal lines.

AZURINE, a species of European roach, blue in color.

AZURITE, one of the commonest ores of copper, a basic copper carbonate, having the formula 2CuC03.Cu(0H)2. Its hardness is 3.5 to 4 and specific gravity about 3.8. It is a mineral of rare beauty, its usual color being a rich Prussian to azure blue, from which fact its name is derived. Its color is, however, often so dark as to appear nearly black, this frequently being true of its crystallized forms. These are very varied and complex and belong to the monoclinic system. They are often transparent and have a most brilliant vitreous to adamantine lustre and are beautifully stri¬ ated, while their frequent association with bright green malachite adds much to the beau¬ ty of the specimens. These two minerals sometimes occur in stalactitic

forms, the one encircling the other. Such specimens have been extensively cut and polished in cross sections and worked up for various orna¬ mental purposes. The finest material of this kind comes from Morenci, Ariz., this locality also yielding exceptionally fine crystallized specimens rivaling those from its other most celebrated localities, Bisbee, Ariz., Siberia, and Chessy, France. Its occurrence at the latter locality, which has been famous for many years, has led to the frequent use of the name “chessylite® for azurite, especially in Europe. Many other localities yield choice specimens, the copper mines of the western portion of the United States being especially celebrated. In New Mexico curious pseudomorphs of na¬ tive copper after azurite “balls® occur in large numbers, while pseudomorphs of malachite after azurite are very common.

AZYMITES (Lat. azymus, unleavened), a term applied by the Eastern to the Western Church because the latter used unleavened bread in the administration of the Eucharist. In the Western Church the point has never been regarded as of vital importance. The matter was considered at the Council of Flor¬ ence (1439). The Western Church called the Greek schismatics Pro-zymites.

AZZARKAL, az'ar-kal', Arabian mathe¬ matician and astronomer : b. Cordova in the first half of the 11th century. He was royal astronomer of Al-Mamoun, King of Toledo. He invented divers instruments for making observations, constructed a water-clock of extraordinary dimensions, as well as a plani¬ sphere and an astrolabe, upon new principles.

AZZUBEYDI, a'zoo-bi'de, Mohammed Ibn el Hasan, Arabian lexicographer : b. Se¬ ville 927 ; d. 982. He was cadi of Seville and preceptor of Hischeam, son and heir of the Sultan. He wrote an abridgment of the great biography of the Spanish grammarians, by Khalil ; a treatise on grammar and a work upon the character of the syntax of the Ara¬ bic language.

-
-

■

'

-

■-

•

i

■

■ i hi*

Vol. 3, B TO BIRD'S FOOT

Americana

I

1

II

p

1

i

I

I

|

I

4

I

I

A

1

1

THE

ENCYCLOPEDIA

AMERICANA

JT

Ijb^t

UrIVEESAL

JtffOWLEDGEj

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK CHICAGO

I

|

I

i

I

1

I

I

1

1

1

i

I

I

§

I

I

I

b

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. a LYON COMPANY, ALBANY, NEW YORK

JAN 18 1922

A 6 54 317

/H)

J

PARTIAL LIST OF CONTRIBUTORS TO VOLUME III

ABBOTT, ALEXANDER C., M.D., Sc.D.

Bacteriologist, University of Pennsylvania

BACTERIA

BACTERIOLOGY

ALEXIS, JOSEPH, A.B., A.M.

Professor of Germanic Languages and Literature, University of Nebraska

BANKRUPTCY, A

BEACHAM, ROBERT J.

Secretary, Baltimore Merchants and Manufacturers Association

BALTIMORE, MD.

BERRY, GEORGE R., Ph.D., D.D.

Professor of Hermeneutics and Old Testament His¬ tory and Theology, Colgate University

BIBLICAL CRITICISM

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

BAB BALLADS, THE BAGEHOT, WALTER BARRY LYNDON

BURLESON, ALBERT S.

Former Postmaster-General, United States

BANKS, POSTAL SAVINGS

CAIRNS, WILLIAM B., Ph.D.

Assistant Professor American Literature, Uni¬ versity of Wisconsin

BACKLOG STUDIES

COUMBE, CLEMENT W.

Technical Art Expert

BASILICA

BARDS

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Philosophy, Cornell University

BERGSONISM

DARTON, NELSON H.

United States Geological Survey

BAD LANDS

DEL MAR, ALEXANDER

Author “ History of Monetary Systems,” *etc.*

BANKS AND BANKING — ORIGIN AND DEVELOPMENT BARCELONA, BANK OF

DOLE, NATHAN HASKELL, A.B.

Editor “ Tolstoy’s Collected Works ”

BALMONT, KONSTANTIN DMITRIYE-VITCH

DOUGLAS, D. S.

Editorial Staff of The Americana, Toronto

BEACONSFIELD

DRURY, WELLS

Secretary, Berkeley Chamber of Commerce

BERKELEY, CAL.

ECCLES, F. Y., A.M.

Litterateur, London, Eng.

BALZAC, HONORS DE

EGGERT, CARL E., B.Ph., Ph D.

Assistant Professor of German, University of Mich¬ igan

BERNHARDI, FRIEDRICH VON

ESCHER, FRANKLIN

Lecturer on Foreign Exchanges

BANKS AND BANKING — FOREIGN EXCHANGE

BANKING, INVESTMENT

FERRIS, RICHARD, C.E., D.Sc.

Editorial Staff of The Americana

BIMETALLISM

FINCK, HENRY T., A.B.

Musical Critic, “Evening Post,” New York

BACH, JOHANN SEBASTIAN BEETHOVEN, LUDWIG VON

GLENN, MARIAN R.

Formerly Librarian of the American Bankers Asso¬ ciation

BANKERS’ ASSOCIATIONS IN THE UNITED STATES

GOVE, AARON, LL.D.

Representative of the Beet Sugar Industry in the Arid States

BEET SUGAR

HALPIN, PATRICK A., Ph.D.

Late Professor of Ethics, New Rochehe College

BENEDICT XV, GIACOMO DELLA CHIESA

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

BIBLE IN SPAIN, THE BIOGRAPHIA LITERARIA

HERRICK, CLAY

Author of “ Trust Companies ”

BANKS AND BANKING— TRUST COM¬ PANY

HIRSCHBERG, E., Ph.D.

Director of Statistical Bureau of Berlin

BERLIN, GERMANY

INGERSOLL, ERNEST

Naturalist and Author

BASS, CULTURE OF

BIOLOGY

BIRDS

BIRDS, FOSSIL BIRDS, NESTS OF BIRDS, PROTECTION OF

Contributors to Volume III — Continued

INGERSOLL, HELEN

Naturalist

BEACH PLANTS

BIRDS, PLANTS ATTRACTIVE TO

ISAACS, LEWIS M., Ph B., LL.B.

Musical Critic and Composer

BARBER OF SEVILLE, THE (Opera)

KLEIN, HENRI F.

Librarian “London Times,” 1898-1905; Editorial Staff “London Standard,” 1905-15; and Staff of The Americana

BALKAN LEAGUE BALKAN PENINSULA BALKAN WARS BELGIUM

BELGIUM AND THE WAR

KNIFFIN, WILLIAM H., JR.

Vice-President, Bank of Rockville Centre; formerly Secretary Savings Bank Section, American Bank¬ ers’ Association

BANKS AND BANKING — COMMER¬ CIAL PAPER BANKS, SAVINGS

KRAPP, GEORGE P., Ph.D.

Instructor in English, Columbia University

BEDE

LANMAN, CHARLES ROCKWELL, Ph.D.

Professor of Sanskrit, Harvard University

BIDPAI

LAWRENCE, WILLIAM W., Ph.D., Litt.D.

Professor of English, Columbia University

BATTLE OF MALDON, THE BEOWULF

LEONARD-STUART, CHARLES, B.A.

HENRI F. KLEIN

Staff Editors, The Americana

BAVARIA

LIVINGSTON, ARTHUR

Professor of Romance Languages, Western Uni¬ versity, London, Ont.

BETROTHED, THE

MACGREGOR, T. D.

Vice-President, Edwin Bird Wilson, Inc.

BANK AND TRUST COMPANY ADVER¬ TISING

McDonnell, John b.

Editorial Staff, The Americana

BALUCHISTAN

NEILSON, WILLIAM A., Ph.D.

Professor of English, Harvard University

BALLAD

PAINE, WILLIS S., A.B., LL.D.

Author Paine's " Banking Laws "

BANK SUPERVISION

PILLSBURY, WALTER B., Ph.D.

Professor of Psychology, University of Michigan

BEHAVIOR AND BEHAVIORISM

REIHL, CHARLES W.

Former Bank and Clearing House Examiner

BANK ORGANIZATION AND MAN¬ AGEMENT

RINES, GEORGE EDWIN

Editor of " The Foundation Library "; Coeditor of " The Encyclopedia of Latin America "; Managing Editor of " The German Classics "; " The South in the Building of the Nation," *etc.*

BANCROFT, GEORGE BEECHER, HENRY WARD BEECHER, LYMAN

ROBERTS, GEORGE E.

First Vice-President, National City Bank, New York

BANKS AND BANKING — WORLD SYS¬ TEMS — TYPES

ROBINSON, FRED N., Ph.D.

Professor of English, Harvard University

BACON, FRANCIS

ROOT, E. R.

Author of " A, B, C of Bee Culture " and Editor of " Gleanings in Bee Culture "

BEE-KEEPING

SHOREY, PAUL, Ph.D., LL.D.

Head of Greek Department, University of Chicago

BIRDS, THE

SLOSSON, GEORGE F.

American Billiard Expert

BILLIARDS

SMITH, WILLIAM BENJAMIN, Ph.D., LL.D.

Emeritus Professor of Philosophy, Tulane University

BIBLE, THE

BIBLE, HISTORY OF OLD TESTAMENT INTERPRETATION

BIBLE, HISTORY OF NEW TESTA¬ MENT INTERPRETATION

BIBLE, VERSIONS OF THE

BIBLICAL ARCHAEOLOGY, OLD TESTAMENT

BIBLICAL ARCHAEOLOGY, NEW TESTAMENT

SPRAGUE, OLIVER M. W., Ph D.

Professor of Banking and Finance, Harvard Uni¬ versity

BANKS, THE FUNCTIONS OF

THORNDIKE, ASHLEY H., L.H.D., Ph.D.

Professor of English, Columbia University

BEAUMONT AND FLETCHER

Contributors to Volume III — Continued

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

BARRACK-ROOM BALLADS BIGLOW PAPERS, THE

UNDERHILL, JOHN GARRETT, Ph.D.

Author of “ Spanish Literature in the England of the Tudors.”

BENAVENTE Y MARTINEZ, JACINTO,

VAN DOREN, CARL, Ph.D.

Associate Professor of English, Columbia University

BARCHESTER TOWERS

VANDERLIP, FRANK A., A.M., LL.D.

Former President, National City Bank, New York

BANKING, INTERNATIONAL

VEDDER, HENRY CLAY, D.D.

Professor of Church History, Crozer Theological Seminary

BAPTISTS

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature,” *etc.*

BARBER OF SEVILLE, THE

WHITFORD, NOBLE E.

Senior Assistant Engineer, Department of State Engineers

BARGE CANAL, NEW YORK STATE

WILCOX, MARRION, A.M., LL.B.

. Coeditor “ Encyclopedia of Latin America ”

BAHAMAS, THE, or THE BAHAMA ISLANDS

BALBOA, VASCO NUˆEZ BIBLIOGRAPHY

WILLIS, H. PARKER

Secretary, Federal Reserve Board, Washington

BANKS AND BANKING — FEDERAL RESERVE SYSTEM

WRIGHT, HENRY W., Ph.D.

Professor of Philosophy, Lake Forest College

BERKELEY, GEORGE

WOLFE, O. HOWARD

Cashier, Philadelphia National Bank; formerly Sec¬ retary Clearing House Section, American Bankers Association

BANKS AND BANKING — THE CLEAR¬ ING HOUSE

YOUNGMAN, ELMER H.

Editor, ‘‘The Bankers’ Magazine ’

BANK NOTE ISSUES

BANKING IN THE UNITED STATES

BANK DEPOSITS, GUARANTY OF

BANKING SYSTEM, NATIONAL

BANKS, PRIVATE

BANKING SYSTEM, STATE

KEY TO PRONUNCIATION.

a

a

a or a

a

a

a

ch

e

e or e

e

e

e

ff

g

gw

h

far, father fate, hate at, fat air, care ado, sofa all, fall choose, church eel, we bed, end

her, over: also Fr. e, as in de ; cu, as in neuf ; and oeu, as in boeuf, coeur; Ger. o (or oe), as in okonomie.

befall, elope

agent, trident

off, trough

gas, get

anguish, guava

hat, hot

h or h Ger. ch, as in nicht, wacht hw what

i file, ice

i or 1 him, it

i between e and i, mostly in

Oriental final syllables, as, Ferid-ud-din

j gem, genius

kw quaint, quite

n Fr. nasal m or n, as in embon¬

point, Jean, temps

n

•

ng

nk

6

o or 6

A

o

6

o

oi

6 or oo ou or ow

s

sh

th

fh

u

u or u

u

ii

v

y

z

zh

‘(prime),

Span, h, as in canon (can’yon), pihon (pen’yon)

mingle, singing

bank, ink

no, open not, on corn, nor atom, symbol book, look

oil, soil ; also Ger. eu, as in bentel

fool, rule

allow, bowsprit

satisfy, sauce

show, sure

thick, thin

father, thither

mute, use

but, us

pull, put

between u and e, as in Fr. sur, Ger. Muller

of, very

(consonantal) yes, young pleasant, rose azure, pleasure

“(secondary) accents, to indicate syllabic stress

Bthe second character in our alphabet, holds the same relative place in a the alphabet of all European lan-7 guages except the Russian and two or three others, as Serbian and Bulgarian : in these alphabets the symbol B holds the third place, yet it stands not for our mute B but for a labial (not denti-labial) V or W ; while in the second place stands a modified form of B with the same phonetic value as our B. The Russian alphabet is derived from the scheme of the monk Cyril, one of the first evangelists of Bulgaria, who translated into the language of the Slavonians parts of the Bible. To do this it was necessary to con¬ trive new characters for designation of sounds alien to the Greek language and to modify existing Greek characters. But as in his time, — the 9th century,— and at a much earlier date, the current phonetic value of B was, as it still is, labial V, Cyril retained the symbol B as representing that V sound, while for the mute labial B he devised the symbol b. With this exception the character B has from im¬ memorial time held the second place in the alphabets of all the Aryan languages of Europe, as well as in Hebrew and Aramaic, Phoenician, Arabic and Coptic. The most ancient form of this symbol, both in Greek and Latin, was B, with two angular loops, which were afterward rounded. The most ancient form of the symbol B among the Phoenicians was not unlike the Arabic figure 9, namely, ff. The Greeks not only added a second loop but they reversed the position of the looo by setting it on

the right of the up¬ right stem ; and they similarly transposed the loop of the Phoenician sign q which they made P (rho, our R). The difference be¬ tween the two labials B and P is that P is an absolute mute, in pronouncing which the voice is completely obstructed before the lips are drawn apart, while B is sonant, though the lips be still compressed : in the effort to pronounce B the voice is heard even before the lips are parted; but in pronouncing P no sound is heard while the lips are compressed; and when they are opened there is emission of breath but no voice. B and P substitute each other in words common to two or more languages and in transmutations of words within one language. Examples : Latin pila is English and German ball. Bretzel is com¬ monly pronounced pretzel ; but it is of the same origin as the English word bracelet, from Latin brachiale, an armlet, bracelet ; vol. 3 — l

and bretzel means also handcuffs. B is nearly allied also to F, Th, V and W ; thus beech (German bnche) is represented in Greek by phegos and in Latin by fagus; whale is from the same source as Greek phalaina and Latin balcena; habere in Latin becomes in French avoir; caballus, Latin, is French cheval; Ger¬ man Liebe, English love; Latin labium, French levre. V and B are little discriminated in Spanish and we have in one of the epigrams of Martial proof that in his day natives of Vasconia (Navarre) pronounced B as V and vice-versa when he wittily scores the bibu¬ lous habits of that people by saying that for them not without reason vivere (to live) is bibere (to drink) : so that one of that nature might say vivimus ut bibamus, and the mean¬ ing would be either, we live to drink or we drink to live. In the Roman catacombs in sepulchral inscriptions of the 2d and 3d cen¬ turies of our era, vixit (lived), is in very many instances written bixit; and the name of a virgin martyr of that age is written Bibiana and that form is retained in the Roman martyrology instead of the correct form Viviana.

B is used also as a symbol and in abbre¬ viations. In chemistry B stands for boron, one of the elements. In music B denotes the seventh or leading tone of the diatonic scale of C. In nautical charts b signifies a <(blue sky.® In academic degrees B. is an abbrevia¬ tion of Baccalaureus, Bachelor. See Grimm's Law; Philology; Phonetics. Con¬ sult Petrie, (The Formation of the Alphabet (London 1912) ; Prou, (Manuel de paleog-raohie) (3d ed., Paris 1910) and Thompson, E. M., Hntroduction to Greek and Latin Palaeography1* (Oxford 1912).

B. A. C., the abbreviation used by astron¬ omers in referring to (The

Catalogue of Stars of the British Association for the Advance¬ ment of Science,* by Francis Baily, London,

BAADER, ba'der, Benedict Franz Xaver von, German Roman Catholic theologian and philosopher: b. Munich, 27 March 1765; d. there, 21 May 1841. He was the third son of the court physician to the Elector of Bavaria. He studied medicine at Ingolstadt and Vienna, and was graduated in 1784. He assisted his father in medicine, but soon gave up its practice to study engineering in the mining regions. He resided in England in 1 791—96, and there be¬ came acquainted with rationalistic philosophy,

which did not appeal to him. He became deeply interested in the religious speculations of Eck-hart, Saint Martin and Bohme, and was the intimate of Jacobi, and, for a time, of Schelling. He was appointed consulting engineer of the Bavarian mines in 1796 and soon after won a prize for his discovery that Glauber's salt might be substituted for potash in the manufacture of glass. For his valuable services he was en¬ nobled in 1813, and was superintendent of mines in 1817-20. His (Fermenta Cognitionis) (1822-25) combats modern philosophy and ad¬ vocates that of Bohme. Baader became pro¬ fessor of philosophy and speculative theology in the new University of Munich in 1826. In 1838 his opposition to Roman Catholic inter¬ ference in civil matters led to his interdiction preventing him from lecturing, again. He severely criticised the papacy and advocated its abolition, but recanted before his death. He is considered the greatest speculative Roman Catholic theologian of modern times and his influence has exceeded the bounds of his Church. His works, together with a biography by F. Hoffman, were published at Leipzig (16 vols., 1851-60). Consult Claason, J., (Franz von Baader's Leben und theosophische Werke als Inbegriff christlicher Philosophic: Vollstandiger, wortgetreuer Auszug in geordneten Einzelsatzen) (Stuttgart 1886-87) ; Welzer and Welte, <Kirchenlexikon) (Vol. I, Freiburg

1877).

BAAL, ba-al, a primitive title of divinities which is found among all branches of the Semitic race, originally signifying ˆowner® or “possessor.® In its primary sense the husband was the “baal® of the wife, the “proprietor,® the “baal® of his field. As a title of divinity its application is entirely secondary, the <(baal® in this sense having the same meaning as the other, and probably the possessor also of some attribute. Baals were as numerous as the ob¬ jects or places or cities which they inhabited. There were baals of springs, trees, animals, mountains, stones and sanctuaries, as well as celestial baals, baals of the sky, of one or other of the heavenly bodies, or of some atmospheric phenomenon. The belief was strong among all Semitic races, as among all primitive and ancient peoples, that every natural object that could do something, or was supposed to be able to do something, should be reverenced as divine. In Canaan and Phoenicia, in Syria and south Arabia, in Asia Minor and Mesopotamia, and also among the Greeks and Romans baal-cults sprang up. Mythologists and students of comparative religions were for long inclined to the view that “Baal® is identical with the sun-god — the Bel or Belas of the Babylonians and Assyrians. According to Hastings’ dictionary of Religion and Ethics, > while it is admitted that the sun was worshipped as a baal, identi¬ fication of baal as the sun-god <(is without scientific foundation.® ((Except in late theo¬ logical abstraction, there is no such thing as a god Baal.®

After the Israelites had been brought out of Egypt, and had conquered Canaan, the rural districts were chiefly occupied by the invaders, and the cities remained in the hands of the original inhabitants. In process of time race assimilation began, and with it the taking over of the local baals or gods. The domestication

of baal-worship among the inhabitants is at¬ tested by the frequency with which the word baal appears as a component part of the names of towns and cities, as Baalath, Baal-meon, Baol-peor and Baal-tamar. Concurrently with Yahweh, the national god, the local baals were worshipped; indeed Yahweh appears to have been worshipped as a baal. The national unity was thus endangered, the people splitting up into small communities and worshipping the local deities. The rapid development of the Philistine power awakened consciousness of this peril; the absorption of baal-worship in that of Yahweh began. When

King Ahab established the worship of his wife's deity, Melkart, the baal of Tyre, Elijah took issue, thundered his denunciations of the worship of Yahweh and Melkart as mutually exclusive, and sought to free the former of its foreign ele¬ ments and accretions. The Old Testament re¬ cords the history of the chosen people as a series of baclcslidings to the local baals of the land, alternating with penitences and return to the worship of Yahweh. The prophets of the 8th and 7th centuries continued Elijah's work of purging, Jerusalem became the recognized sole sanctuary for the worship of Yahweh, and during the Persian period baal worship dis¬ appeared.

Mythologists who regarded Baal as synony¬ mous with the sun-god, associated his worship as having prevailed through ancient Scandi¬ navia, and it is supposed to have been general in the British Isles. In Ireland and in some parts of Scotland Beltain (1 May O. S.) was one of the festival days. In the former country fires were made early on the tops of the hills, and all cattle were made to pass through them. This fumigation was supposed to guard them against disease for that year. In Sir John Sinclair's Statistical Account of Scotland) he describes the ceremonies observed in that country.

BAALBEK, bal'bek, a ruined city in Sy¬ ria, on the lower slope of the Antilibanus, 3,839 feet above sea-level, 40 miles from Damascus, famous for its magnificent ruins. Irregular in form, and encompassed by a wall two miles in circumference, it was once the most magnificent of Syrian cities, and is the Heliopolis of the Graeco-Roman world. Of its ruins, the chief is the temple of the Sun, built either by Anto-nius Pius or by Septimius Severus ; a rectangu¬ lar building 290 by 160 feet. Some of the blocks used in its construction are 60 feet long by 13 thick; and its 54 columns, of which six are still standing, were 72 feet high and 22 in circumference. Near it is a temple of Jupiter, of smaller size, though still larger than the Parthenon at Athens, which has been described as <(at once the most perfect and the most mag¬ nificent monument of ancient art in Syria.® Standing in the village of Baalbek — now a cluster of mean dwellings — 300 yards from the other buildings, is a circular temple containing six columns in the mixed Ionian and Grecian style. The quarries from which the temples were reared are in the immediate vicinity. Originally a centre of the sun-worship, it became a. Roman colony under Julius Caesar, was gar¬ risoned by Augustus and under Trajan ac¬ quired renown as the seat of an oracle. Under Constantine its temples became churches, but

after being sacked by the Arabs in 748, and more completely pillaged by Tamerlane in 1401, it sank into hopeless decay. The work of de¬ struction was completed by an earthquake in 1759. The Prussian government began im¬ portant excavations in 1902. Consult Baedeker, ‘Syria and Palestine1 ; Frauberger, ‘Die Akrop-olis von Baalbek1 (1802) ; Murray’s hand¬ book to Syria and Palestine1 ; Buchstein, in ‘jahrbuch des deutschen Archaeologischen In-stituts1 (Berlin 1902) ; ‘Fuhrer durch die Rupinen von Baalbek1 (Berlin 1905) ; Thomp¬ son, W. M., (The Land and the Book1 (Vol. Ill, New York 1886) ; Wood and Dawkins, ‘The Ruins of Baalbek1 (London 1757).

BAANITES, ba-a-nlts. See Religious

Sects.

BAAR, bar, a plateau in Germany, in Baden and Wiirttemberg, formerly constituting a county of the Fiirstenberg principality. It contains the sources of the Danube.

BAB BALLADS, The. The (Bab Bal¬ lads1 by W. S. Gilbert, the most famous of British light opera librettists, is one of, the most popular collections of humorous and gently satiric verses in the English language. At first published in the sixties in Fun and col¬ lected from time to time in book form with additions, the ballads in their final editions con¬ tain also many of the songs from such well-known operas as ‘Pinafore,1 ‘The Gondolier1 and ‘The Mikado.1 About, 170 titles comprise the collection, which is also enlivened by Gil¬ bert’s humorous drawings.

In general the humor of the ballads lies in odd and nonsensical situations and is enhanced by an unfailing wit and a buoyant mastery of rhyme and meter. Good examples are such masterpieces as ‘General John,1 ‘Ferdinando and Elvira,1 ‘Lorenzo de Lardi,1 ‘Babette’s Love1 and the well-known ‘Yarn of the Nancy Bell.1 In addition to these, many of the bal¬ lads are also satirical in a very mild and good-humored way. “His foe was folly and his weapon wit,11 reads the inscription on the memorial to Gilbert, and a large number of follies, affectations and oddities current among his countrymen are handled

in light nonsensical vein, but never with ridicule or indignation. Characteristic of this group are ‘The English¬ men,1 ‘The Disagreeable Man,1 ‘Bob Polter,1 ‘The ˆEsthete,1 ‘To the Terrestrial Globe1 and ‘Etiquette.1 The mildly satirical turn is per¬ haps best illustrated in the well-known first lord’s song from ‘Pinafore,1 “When I was a lad I served a term,11 but the satirical touch, as well as the purely humorous attitude, is in nearly all the poems.

William T. Brewster, Professor of English, Columbia University.

BAB-EL-MANDEB, bab el-man’deb (Ar¬ abic, the gate of tears, so called from the danger arising to small vessels from strong currents), the name of the strait between Arabia and the continent of Africa, by which the Red Sea is connected with the Gulf of Adˆn and the Indian Ocean. The Arabian Peninsula here throws out a cape, bearing. the same name as the strait, rising to the height of 865 feet. About 20 miles distant stands the wall-like coast of Africa, rising in Ras-es- Sean to the height of over 400 feet. Within

the strait, but nearer to Arabia, lies the bare, rocky island of Perim, since 1857 occupied by the British as a fort; its guns commanded the entrance to the Red Sea. The strait on the east side of this island is called the Little Strait, and that on the west the Great Strait.

BABA, ba’ba (the old), in Slavonic my¬ thology, a thunder-witch (the devil’s grand¬ mother), represented as a little, ugly old woman, with a monstrous nose, long teeth and disheveled hair, flying through the sky in an iron. cauldron. By the Czechs she is called now the iron, now the golden, Baba. It is also a Turkish word signifying father, originating, like our word papa, in the first efforts of chil¬ dren to speak. In Persia and Turkey it is prefixed as a title of honor to the names of ecclesiastics of distinction, especially of such as devote themselves to an ascetic life; it is often affixed in courtesy, also, to the names of other persons, as Ali-Baba. A cape near the northwest point of Asia Minor is known as Baba.

BABA BUDAN, ba’ba boo’dan, a spur of the West Ghats, Mysore, India, extending east for 15 miles, leaving a narrow opening at its west end for the passage of the Bhadra, and then south in an unbroken line for 20 miles, enclosing between itself and the main chain of the Ghats a rich, but unhealthy, valley. To this spur belong three peaks above 6,000 feet high, among these Mulaina-giri, 6,317 feet, the highest, in the West Ghats. On the slopes of Kalhatti, one of these peaks, is a hill

station, a resort of Europeans during the heat. Coffee was first planted in India on another part of this spur toward the close of the 17th century, by a Mohammedan saint named Baba Budan.

BABADAGH, ba'ba-da.H', Rumania, town in the district of Tultcha, in the Dobrudja, 31 miles southwest of Ismail. It is situated in a marshy district and has considerable commerce with the ports of the Euxine through the port of Kara-Herman. Sheep are raised in the district and the wool trade is considerable. The town was founded by Bajazet. I, who peopled it with Tatars and named it after a saint, to whose tomb in the neighborhood pilgrims flock annually. Pop. about 3,000.

BABBAGE, Charles, English mathema¬ tician and inventor of a calculating machine : b. near Teignmouth, England, 26 Dec. 1792; d. 18 Oct. 1871. He was graduated at Peterhouse College, Cambridge. Being in posses¬ sion of an independent fortune, Babbage was in a position to devote all his time and ener¬ gies to his favorite studies — mathematics and mechanics. In 1822 we find him broaching the idea of a difference engine, by which in¬ tricate arithmetical calculations could be cor¬ rectly and rapidly performed. Through the recommendation of the Royal Society he re¬ ceived, in 1823, a grant from the government of £1,500 for the construction of such a ma¬ chine. After a series of experiments lasting eight years and an expenditure of £17 000 (£6,000 of which was sunk by the originator of the scheme, the balance voted by the gov¬ ernment), Babbage abandoned the undertak¬ ing in favor of a much more comnlicated work, an analytical engine, worked with cards

like the Jacquard loom. The government, alarmed at the probable demands, refused to support Babbage in his new adventure, and as a quarrel ensued with his engineer, who withdrew his tools, the pet project was never completed. The machine, along with some 400 or 500 plans, was presented in 1843 to King's College Museum, London. Among the many treatises he published on subjects connected with mathematics and mechanics, the most valuable and interesting are (On the Economv of Machinery and Manufactures) ; (The De¬ cline of

Science) ; and an autobiographic sketch, (Passages in the Life of a Philoso¬ pher. } In 1828 he was appointed Lucasian professor of mathematics in his university, an office he held for 11 years without, however, delivering lectures. He was one of the found¬ ers of the Royal Astronomical and Statistical Societies.

BABBITT, Irving, American educator : b. Dayton, Ohio, 2 Aug. 1865. He was grad¬ uated at Harvard University in 1889 and studied in Paris in 1891-92. He was instruc¬ tor in romance languages at Williams Col¬ lege 1893-94 and in the latter year was ap¬ pointed instructor in French at Harvard, be¬ coming assistant professor in 1902 and pro¬ fessor in 1912. He is a member of the Mod¬ ern Language Association and has published (Literature and the American College) (1908); (The New Laocoon) (1910); (The Masters of Modern French CriticisnP (1912). He edited Taine's 'Introduction a l'histoire de la litterature anglaise) (1898) ; Renan's (Souvenirs d'enfance et de jeunesse) (1902) ; Voltaire's <Zadig) (1905) ; and Racine's <Phedre) (1910). He is a frequent contribu¬ tor to magazines and reviews on literary topics.

BABBITT, Isaac, American inventor: b. Taunton, Mass., 26 July 1799; d. 26 May 1862. He learned the goldsmith's trade; early be¬ came interested in the production of alloys ; and in 1824 manufactured the first britannia ware in the United States. In 1839 he dis¬ covered the well-known anti-friction metal which bears his name, Babbitt metal (q.v.). For this discovery the Massachusetts Chari¬ table Mechanics' Association awarded him a gold medal in 1841 and subsequently Congress voted him $20,000. Babbitt founded the well-known soap works bearing his name.

BABBITT METAL, an alloy of copper, tin and antimony, invented and patented in 1839, by Isaac Babbitt (q.v.) of Boston. It is soft and nearly -white and is widely used as an anti-friction metal. The proportions of the constituent metals vary considerably in modern practice. Babbitt's original alloy con¬ tained 24 parts of tin, 4 parts of copper and 8 parts of antimony. Many engineers prefer a larger proportion of tin and the following mixture is recommended as giving a tough and very serviceable metal : Tin, 96 parts ; copper, 4 parts ; antimony, 8 parts. Lead is also added in many cases on account of its cheapness. In small amounts it is not usually objectionable, but the Babbitt metal that is sold in the market, ready-mixed, usually con¬ tains a considerably larger proportion of lead than its price would indicate. The alloy is usually melted and run, while fluid, directly

into the bearings on which it is to be used, a space from an eighth to half an inch thick being left for it between the box and the shaft that is to be supported.

BABCOCK, Earle Jay, American educa¬ tor: b. Saint Charles, Minn., 11 June 1865. After considerable work, with the United States Geological Survey he was appointed in 1902 director of the State School of Mines of North Dakota, professor of chemistry and geology and in 1898 dean of the College of Mining Engineering, University of North Dakota. He is the author of many special scientific articles and of geological reports.

BABCOCK, James Francis, American chemist: b. Boston, 23 Feb. 1844; d. Dor¬ chester, Mass., 20 July 1897. He studied at Lawrence Scientific School and became an analytical chemist and chemical expert. Lie was State assayer and inspector of liquors in Massachusetts, 1875-85, and city inspector of milk in Boston, 1885-89. While State as¬ sayer he brought about the insertion in the liquor statutes of the definition of the term intoxicating liquor,® known as the 3-per-cent limit. He is the inventor of the fire extin¬ guisher which bears his name; a popular lec¬ turer on scientific subjects; appeared as an expert chemical witness in important trials; and published several reports on sanitation and the chemistry of food.

BABCOCK, Maltbie Davenport, Ameri¬ can Presbyterian clergyman: b. Syracuse, N. Y., 3 Aug. 1858; d. Naples, Italy, 18 May 1901. He was graduated at Syracuse Uni¬ versity in 1879 and Auburn Theological Sem¬ inary in 1883. He filled most successful and popular pastorates at Lockport, N. Y., Balti¬ more, Md., and at the Brick Presbyterian Church in New York. While on a visit to the Levant in 1901 he was seized with the Mediterranean fever and died in the Inter¬ national Hospital at Naples. A posthumous volume of his prose and verse, edited by his wife, appeared in 1901, entitled ‘Thoughts for EveryDay Living) (New York 1901). Con¬ sult his life by Robinson (New York 1904) and Stone, ‘Footsteps in a Parish) (ib. 1908).

BABCOCK, Orville E., American mili¬ tary officer: b. Franklin, Vt., 25 Dec. 1835; drowned at Mosquito Inlet, Fla., 2 June 1884. He served with distinction in the Civil War, was a member of General Grant’s staff and was made a brigadier-general of the regular army at the close of the war for “gallant and meri¬ torious service.® When Grant was elected President, Babcock became his private secre¬ tary, and the superintending engineer of sev¬ eral important public works. He was indicted in 1876 for taking part in revenue frauds, but on his trial was acquitted.

BABCOCK, Stephen Moulton, American educator: b. Bridgewater, N. Y., 22 Oct. 1843. He was graduated at Tufts College in 1866; studied at Rensselaer Polytechnic Institute, Cor¬ nell University and Gottingen, Germany, where he received the degree Ph.D. in 1879; and LL.D. at Tufts 1901 ; instructor at Cornell 1875-77 and 1881-82; chief chemist to the New \ork Agricultural Experiment Station 1882-88; professor of agricultural chemistry, and chief chemist at the Agricultural Experiment Station,

University of Wisconsin, 1888-1913 ; emeritus professor University of Wisconsin, since 1913. Assistant director Wisconsin Agricultural Ex¬ periment Station 1900-13. He has given special attention to the chemistry of milk and its prod¬ ucts, and has contributed many articles re¬ lating to dairy problems to the annual re¬ ports of the New York and Wisconsin Agri¬ cultural Experiment Stations ; was awarded the Grand Prize at the Paris Exposition in 1900 and also at the Saint Louis Exposition in 1904, for the milk test that bears his name. He is joint author with G. C. Caldwell of (A Man¬ ual of Qualitative Chemical Analysis.5

BABCOCK, Washington Irving, American naval architect ; b. Stonington, Conn., 26 Sept. 1858; d. 10 Aug. 1917. He was graduated at the Brooklyn Polytechnic Institute in 1876, and at Rensselaer Polytechnic Institute in 1878. He was employed at the Roach Shipyard, Chester, Pa., in 1878-85, with the Providence and Ston¬ ington Steamship Company, New York, in 1885— 87 ; was superintendent of the Union Dry Dock Company, Buffalo, N. Y., in 1887-89 ; manager of the Chicago Shipbuilding Company, in 1889-99, becoming president of the latter in 1900. He was a member of societies of naval architects at home and abroad, and also of several clubs of professional engineers and marine architects.

BABCOCK, Winnifred Eaton (((Onoto Watanna55), American author: b. Nagasaki, Japan, 1879. She was educated at Montreal, Canada, and at Columbia University, New York. In 1901 she was married to Bertrand W. Bab¬ cock. Since 1893 she has written many short stories

for leading magazines. Her first story, (A Poor Devil,) appeared as a serial in the Metropolitan Magazine of Montreal. She went to the West Indies in 1895 and worked as gen¬ eral writer and reporter on the Jamaica News Letter. Her first Japanese stories and a serial, (The Old Jinrikisha,5 appeared in Conkey's Magazine in 1895. She also contributed serials and short stories to the Women's Home Com¬ panion; Good Housekeeping ; The Eclectic; The Ladies' Home Journal; Saturday Evening Post, *etc.* Her published volumes include (Miss Nume of Japan) (1899) ; <A Japanese Nightin¬ gale5 (1901) ; (Wooing of Wistaria5 (1902) ; (Heart of Hyacinth5 (1903); /Daughters of Nijo) (1904) ; (Love of Azalea5 (1904) ; (A Japanese Blossom5 (1906) ; (Diary of Delia5 0908); (Tama5 (1910); (The Honorable Miss Moonlight5 (1912) ; (Chinese-Japanese Cook-Book5 (1914), with Sara Bosse.

BABEL, Tower of, the name of a structure in the Plain of Shinar, Mesopotamia. Accord¬ ing to the 11th chapter of Genesis, it was begun by the descendants of Noah subsequent to the deluge, but not allowed to proceed to comple¬ tion. It has commonly been identified with the great temple of Belus or Bel, one of the chief edifices in Babylon, and the huge mound called Birs Nimrud is generally regarded as its site, though another mound, which to this day bears the name of Babil, has been assigned by some as its site. Babel means literally <(gate of God.55 The meaning (<confusion55 assigned to it in the Bible really belongs to a word of similar form. See Babylon.

BABENBERG, ba'ben-berg, a princely Franconian family, whose castle occupied the

site of the later Bamberg Cathedral in northern Bavaria. They were most prominent in the wars of the 10th century. The Austrian dynasty of 976-1246 was formerly believed to be sprung from them.

BABER, ba'ber (or ((The Tiger55), the his¬ torical surname of Zehir-ed-din-Mohammed, the conqueror of Hindustan and founder of the so-called Mogul dynasty: b. 14 Feb. 1483; d. 26 Dec. 1530. Baber was of mixed Turkish and Mongol origin, but in feeling as in personal characteristics he was a Tatar (Turk), and often in his memoirs speaks most contemptu¬ ously of Mongols or Moguls. Yet Hindu ig¬ norance has designated the throne which he established in India as that of the Great Mogul. At the age of 12, on his father's death, he as¬ cended the insecure throne of Ferghana in Turkestan; soon after he was attacked on all sides by his uncles and other neighboring princes, which

obliged him, in his turn, to as¬ sume the aggressive. Accordingly, at the age of 15, Baber seized on Samarcand, the capital of Timour, but, while thus engaged, a revolu¬ tion at home deprived him of his sovereignty. After many years of an adventurous and romantic career, he raised an army, entered Hindustan, and was met by Ibrahim, the ruling Sultan of that country. The two armies fought the battle of Paniput, which decided the fate of India, on 21 April 1526. Baber, with his army of 12,000 men, completely overthrew that of Ibrahim, numbering 100,000, and entered Delhi in triumph. Difficulties and fresh foes had still to be encountered and mastered but in the battle of Sakri, in February 1527, Baber utterly defeated the opposing Hindu princes, and then proclaimed himself Padishah, or Emperor of Hindustan. Brilliant as a military leader, he was also an enlightened ruler, in¬ troduced important reforms in his dominions and had a taste for science and art. Consult his own (Memoirs 5 translated by Leyden and Erskine (London 1844), and (Lives5 by Calde¬ cott (London 1844) and Lane-Poole (London

1899).

BABES IN THE WOOD, a nursery tale and ballad of unknown origin, found in Percy's (Reliques5 and other collections. Two children are left to perish in the forest by a relative who hopes to profit by their death. See Chil¬ dren in the Wood.

BABEUF, ba-bef', or BABCEUF, Fran¬ cois Noel, French communist, who called him¬ self Caius Gracchus: b. Saint-Quentin 1760; d. 28 May 1797. He founded in Paris a journal called the Tribune of the People (1794), in which he advocated his system of communism, known as Babceuvism, and contemplating abso¬ lute equality and community of property. His followers were called Babceuvists. Betrayed in a conspiracy against the Directory, aiming to put his theories into practice he was guillotined in Paris. His principal works were (Perpetual Register of the Survey of Lands5 (1780), and (Of the System of Population5 (1794). Con¬ sult Advielle, (Histoire de Babeuf et du Babou-visme5 (Paris 1884).

BABI, ba'be, the name of a modern Persian sect, derived from the title, Bab-ed-Din (gate

of the faith), assumed by its founder, Mirza Ali Mohammed, a native of Shiraz, who in 1843 undertook to establish a new religion from a mixture of Mohammedan, Christian, Jewish and Parsee elements. His controversies with the mollahs shortly led to his confinement to his own house, where he formulated his doc¬ trines, privately instructed his disciples and increased his pretensions. The sect soon be¬ came numerous; but on the accession of Nasir-ed-Din in 1848, apprehending persecution, they took up arms, proclaiming the advent of the Bab as universal sovereign. The insurgents were reduced by famine, and most of them executed (1849-50). The Bab had held aloof from the revolt, but was arrested and put to death, after a long imprisonment, in 1850. His successor was recognized in the youthful son of the governor of Teheran, who retired to Bagdad, where he afterward lived quietly. An attempt of three believers to assassinate the Shah, in 1852, led to a persecution of the sect; numbers were tortured and burned, among them Gurred-ul-Ain. Babism is at present widely diffused in Persia ; its members live in apparent conformity to orthodox Mohammedanism, but privately holding to Bab's doctrines, which are contained in an Arabic treatise, ˆiyan* (the exposition), written by the founder himself. They form essentially a system of Pantheism, with Gnostic and Buddhistic additions. All beings are emanations from the Deity, by whom they will ultimately be reabsorbed. Babism enjoins few prayers, and those only on fixed occasions ; encourages hospitality and charity ; prohibits polygamy, concubinage and divorce ; discourages asceticism and mendicancy ; and directs women to discard the veil, and share as equals in the intercourse of social life. (See Bahism). Consult Andreas, <Die Babis in Persien* (Leipzig 1896) ; Browne, (A Travel¬ er's Narrative, } Written to Illustrate the Epi¬ sode of the Bab (Cambridge 1892) ; Beha-Ullah, Wes Preceptes du Behaisme) (Paris 1906) ; Huart, (La religion de Bab> (ib., 1889) ; Dreyfus, (Essai sur le Behaisme) (ib., 1909) ; Mirza Huseyn, (Le Beyan arabe le livre sacre du Babysme) (Paris 1905) ; Phelps, Wife and Teachings of Abbas EffendP (New York 1903).

BABINGTON, Anthony, English Roman

Catholic conspirator : b. Dethick, Derbyshire, 1561 ; d. 20 Sept. 1586. His father died when he was 10 years of age, leaving him ample estates. He founded in 1580 a society for the protection of the Jesuit

missionaries in Eng¬ land, and served for a time as page to Mary Queen of Scots, then a prisoner in England. With Ballard, a Jesuit, and other Catholic emissaries, he formed, in 1586, a plot for the murder of Queen Elizabeth, the rescue of Mary and the re-establishment of the Catholic re¬ ligion in England. In the working out of the plot Babington behaved with indiscretion prompted by his vanity; he sent letters to Mary, and in reply the imprisoned Queen approved of the plot. Walsingham, Elizabeth's secretary, by means of his spies, had all the correspond¬ ence of the conspirators intercepted, copied and sent on to their destinations. Then at the right moment the conspirators were arrested and brought to trial, and among others Babing¬ ton was executed. Babington's correspondence with Mary in the subsequent trial of that Prin¬

cess, directly led to her execution in February

BABINGTON, Churchill, English philol¬ ogist: b. Leicestershire, 11 March 1821; d. 1,2 Jan. 1889. He was educated at Saint John's College, Cambridge, and was Disney professor of archaeology there in 1865-80, and was rector of Cockfield, Suffolk, from 1866 until his death. He was a botanist and ornithologist of high repute, wrote also on archaeology and numis¬ matics, and contributed largely to Smith's (Dictionary of Christian Antiquities.)

BABINGTONITE, a native, anhydrous silicate of calcium, iron and manganese, asso¬ ciated with an iron silicate having the composi¬ tion Fe2(Si03)3. It is greenish-black in color, with a vitreous lustre, and crystallizes in the triclinic system. It occurs in Norway, Italy, and the British Isles, and in the United States has been found at Gouverneur, N. Y., and at Athol, Mass. Its hardness varies from 5.5 to 6, and it has a specific gravity of about 3.36. The mineral was named after Dr. William Bab¬ ington.

BABIRUSSA, bab'i-roo'sa, a wild hog of the East Indies, remarkable for the long, ex¬ posed, canine teeth of the male. The upper tusks, instead of growing downward in the usual way, turn and grow upward through the skin on each side of the snout and curve back¬ ward until, in old animals, they may be 8 or 10 inches long, and reach nearly to the eye. These hogs, which inhabit Celebes and Borneo, are almost hairless, long-legged and active, and feed upon fallen fruits instead of rooting in the ground. One cannot see that the great tusks are of any present use, but Wallace sug¬ gests that they were useful to the ancestors of these pigs under different conditions, and were then kept worn down by service.

BABISM, bab'izm. See Babi.

BABOO, ba'boo, or BABU, a Hindu title of respect equivalent to Sir or Mr. It is usually given to wealthy and educated native gentle¬ men, especially when of the mercantile class.

BABOON, bab-oon', a large, long-haired, terrestrial monkey of Africa or Arabia, be¬ longing to the genus Cynocephalus, of the fam¬ ily Cercopithecidcu. All are of large size, have elongated, bluht muzzles, with nostrils at the extreme end, and great canine teeth which together give the face, when seen in profile, a dog-like aspect. The naked parts of the face, as well as the great callosities upon the but¬

tocks, are often brilliantly colored. Some also have shaggy manes, and all add to their re¬ pulsive appearance a fierceness of disposition which makes them more feared than perhaps is necessary, for they rarely, if ever, have attacked human beings. All of the species go about in troops under the guidance and protection of several old males. They are rare in wooded regions, preferring rocky and bushy districts, like those in northern Africa, in Arabia and in southeastern Africa. As their fore and hind limbs are of nearly equal length, and very stout, they go mostly on all fours, galloping swiftly and climbing rocks with agility. They climb trees with greater difficulty, and generally keep on the ground away from forest regions. Their food is principally vegetable — fruits, berries, young sprouts, *etc.* ; but they also eat

BABOONS

1 Bearded Ape (Cynocephalus silenus)

2 Chacma (Cynocephalus porcarius)

3 Tufted Baboon (Cynopithecus niger)

4 Hamadryad (Cynocephalus hamadryas)

5 Gelada (Cynocephalus gelada)

6 Mandrill (Cynocephalus mormon)

insects, worms, snails and such young birds or small animals as they are able to catch. They do great damage to the plantations of the native Africans, ruthlessly spoiling much more than they are able to

eat. The ancient Egyptians seem to have trained them to pick fruits, but within recent times their confine¬ ment in menageries, where they live and breed well, is the extent of their domestication. There is nothing attractive about any of them, either in appearance or disposition.

Among the best known is the great Arabian or sacred baboon, or hamadryad (Cynoccphalus hamadryas) , the one represented upon Egyptian monuments, and venerated by the primitive Egyptians. It is supposed that their habits of noisy activity at sunrise, as though adoring the sun-god, is the basis of this very ancient form of worship. Mummies of baboons are com¬ monly found in tombs in the Nile Valley: and the species itself is still abundant from the Sudan to southern Arabia. It is. ashy gray in color, and has a heavy mane. The great baboon of south Africa, common in the wilder moun¬ tains of Cape Colony, is the chacma (Cynoce-phaliis porcarius) , which is dark-brown and has long hair but no mane, and a tail about half the length of the body, terminated by long, black tufts. This is the one most commonly seen in menageries. The mandril (Cynoce - phalus mormon) is still larger, exceeding a mastiff in size. It has short legs, a mere stump of a tail and an enormous head, with a crest of greenish hair upon the forehead, and a beard which is orange-yellow; while the naked parts of the face consist mainly of a huge nose, light-blue in color, the skin of which is folded into ridges. The naked buttocks are bright scarlet. This ugly brute is one of the most ferocious and justly dreaded animals of the Kongo forests. In the same region lives a second similar species called the drill (Cynoce - phalus leucophceus) , which differs mainly in lacking the bright colors and ribs of the nose of the mandril. Several other baboons live in west Africa, but are not well known, although one reddish-brown species, the Guinea baboon (Cynocephalus sphinx) is commonly seen in the hands of showmen. A large monkey of southern Abyssinia, looking like a black, clipped French poodle, is substantially a true baboon, although it belongs to another genus; it is the gelada (T hero pith ecus gelada). Consult (Cassell's Natural History,) Vol. I (1885) ; Elliot, <A Review of the Primates) (New York 1913).

BABRIUS, a Greek fabulist whose fables in verse are variously referred to the time immediately preceding the Augustan Age, and to the 3d century of our eraj his name also shows variants, as Babrias, Gabrius. Till 1842 only a few fragments of Babrius were known to be extant ; but in that year, in the Laura of Mount Athos, was discovered a manuscript con¬ taining 123 of his fables, now in the British Museum. In 1846 Sir George Cornewall Lewis published them together with the pre-existing fragments, and in 1859 or 1860 appeared a good English

version by James Davies. Others, evidently from the same hand, were discovered by Knoll in 1877, and by Van Assendelft in 1891. The fables have also been edited by W. G. Rutherford (London 1883) and by Crusius (Leipzig 1897). Consult Conington, Miscel¬

laneous Writings* (Vol. II, London 1872) ; and Fusci, (Babriano) (1901).

BABSON, Roger Ward, American statis¬ tician: b. Gloucester, Mass., 6 July 1875. He was educated at the Massachusetts Institute of Technology. He founded the Babson Statistical Organization of which he became president. It has branch offices in New York, Philadel¬ phia, Chicago and London. He is publisher of Moody's Manual of Railroad and Corpora¬ tion Securities, > vice-president of the Gloucester Safe Deposit and Trust Company, and lecturer on statistics and economics at the Massa¬ chusetts Institute of Technology. He is special writer for the Curtis Publishing Com¬ pany, the New York Times and other periodi¬ cals. He has published (Business Barometers) (1909) ; (Selected Investments) (1911) ; (Bonds and Stocks) (1912) ; Commercial Paper* (1912), with Ralph May; (The Future of the Working Classes*. (1913). He is a fellow of the Royal Statistical Society of London and member of the executive committee of the American Economic Association.

BABUYANES, ba'boo-yan'ez, or MAD-JICOSIMA ISLANDS, a number of islands lying about 30 miles north of Luzon, and gen¬ erally considered the most northern of the Philippines. The chief islands are Kamiguin, area 65 square miles ; Babuyan Claro, 38 square miles; Calayan, 30 square miles; Fuga, 21 square miles ; and Dalupiri, 20 square miles. Pop. about 12,000.

BABYLANS or BABYLLUS, Saint, a

bishop of Antioch between 237 and 250. He declined to admit to public worship the Em¬ peror Philip, who had murdered his brother Gordianus in order to gain the throne. In the Roman calendar his day is celebrated on 24 January; in the Greek on 4 September.

BABYLON. See Babylonia.

BABYLON, N. Y, village in Suffolk County, Long Island, 37 miles east of New York on Great South Bay, here crossed by steam ferry to Fire Island and Oak Island Beach, and on the Lojng Island Railroad; popular as a summer resort on account of its fine beach, and as a

rendezvous for sportsmen by reason of its opportunities for fishing. The surrounding region is adapted to general farm¬ ing. Pop. 2,650.

BABYLONIA. Discoveries of the recent decades seem to confirm the idea that Babylonia was the cradle of civilization. The country, which is nearly enclosed by the Tigris and Euphrates from Bagdad to the Persian Gulf, is bounded on the north by Mesopotamia ; on the east by the plain of Elam ; on the south by the Persian Gulf ; and on the west by the Arabian desert. It constitutes the largest portion of the country now known as (<Iraq el Arabia A considerable part of this alluvial plain has been made through deposits by the river. This land¬ making process continues at the present time at the rate of about 70 feet per year.

At one time the plain was covered with a com¬ plicated network of canals which carried agri¬ cultural prosperity to every part of the land. The neglect of these has changed the condi¬ tions of the country so completely that instead of a fertility which was once the wonder of the

ancient world, a cheerless waste now greets the eyes. Some months of the year the country is partially covered with swamps and marshes, v/ hile the remaining portion is a desolate plain.

Here and there throughout the land are to be seen mounds of debris, every one of which covers the remains of a long forgotten civiliza¬ tion. About the middle of the last century a number of English explorers, Loftus, Layard and Taylor, visited the ruins of some of the important cities. Through their tentative in¬ vestigations Niffer (Nippur), Warka (Uruk or Erech), Senkera (Larsa), Muqayyar (Ur), Abu Shahrain (Eridu), besides Babylon, Bor-sippa and other cities were located. A few decades later Rassam, also an Englishman, dis¬ covered that the ruins known as Abu-Habba represented the ancient Sippara ; and decided definitely also that Tell-Ibrahim was Kutha (Cutha). The ancient names of most of these cities were known through the Old Testament. For excavations see Assyriology.

The earliest inhabitants of the country, which was known in the early period as Shumer (Biblical Shinar), are called Sumerians.

These Sumerians spoke an agglutinative tongue which belongs to that great unclassifi-able group of languages known as Turanian. Clay was principally used as their writing material. The impression made by the stylus upon the soft clay has the appearance of a wedge, for which the Latin word cuneus is used; hence cuneiform writing. See Assyri¬ ology.

Through other sources, particularly the Babylonian duplicates found in Asurbanipal's library at Nineveh, considerable is known con¬ cerning the literature of the Babylonians. Notably might be mentioned the Creation and Gilgamesh epics, the Deluge story, which re¬ semble the Biblical accounts ; Ishtar's descent into Hades; the Etana legend; Adapa and the South Wind, *etc.* Here properly should be mentioned also the codes of laws upon which the decisions of the kings and judges were made, particularly the code of Hammurabi (Amraphel, Gen. xiv), discovered by the French, in Susa, under de Morgan. It consists of 282 laws written on a stela which stands over seven feet high. This had been carried away by the old national enemy of Babylonia, the Elamites. Very extensive also is the knowl¬ edge of the customs and manners of the people gained through the thousands of contract tablets dated in the reigns of kings of all periods. Practically every kind of legal and domestic contract imaginable, mortgages, deeds of sale, promissory notes, guarantees, etc., the archives of business firms, notably the Egibi House of Babylon, and the Murashu Sons of Nippur, have been found. Most valuable for the decipherment of the inscriptions have been the syllabaries, or sign lists, in which the different values of characters are given. Commentaries; lists of gods, names, places, temples, animals, stones, *etc.* ; incantations, hymns, penitential psalms, prayers, are included among the tablets discovered.

The earliest inscriptions reveal a polytheism in a developed state. Most of the gods have Sumerian as well as Semitic names. Until the religion of the Sumerians, or of the Semites, prior to their, occupation of this country is better known, it will be impossible to ascertain

with which people the different gods and religious conceptions originated. The pantheon, which was practically different in every period of Babylonian history, is exceedingly large. Some of the gods mentioned most frequently in the inscriptions are : Anu, Bel and Ea,

the important triad of the early period; Merodach, Shamash, Sin, Ishtar, Nergal, Nebo, Nusku, Ninib, Gula, *etc.*

Each city had its temple, which was dedi¬ cated to some particular god; for example, Ekur, at Nippur, was sacred to Bel ; Esagila, in Babylon, to Merodach. In addition to the patron deity, shrines to other gods were found in each sanctuary. At Nippur, besides Bel, 24 other gods were worshipped, for whom shrines were set up within the temple precincts. Through the researches of Professor Hilprecht in the trenches at Nippur, and in connection with the inscriptions discovered, the real conception of a Babylonian temple and its tower is made known for the first time. The temple had an inner and outer court, both of which were nearly square, the latter being somewhat smaller than the former. The prominent fea¬ ture of the temple architecture was the ziggurat, or storied-tower, which occupied nearly one-third of the area of the inner court. In close proximity to the tower stood the temple proper, where the sacrifices were offered. The ziggurat consisted of quadrangular platforms, one super¬ imposed upon the other, on the top of which was to be found the shrine. The number of plat¬ forms varied according to the period and ability of the builder. In the 3d millennium b.c. the number generally appears to have been three. The ziggurat had its origin in the earliest pre-Semitic period, when it was regarded as the tomb of the god. At that time it was the central feature of a fire-necropole, or cemetery. The Sumerians cremated their dead. In an early stratum at Nippur one of their crema¬ toriums was found. The remains of the in¬ cineration were placed in jars, thousands of which were found buried around the ziggurat. It is not known what the Semites did with their dead, but when they became the dominant peo¬ ple of the land the conception of the temple and ziggurat seems to have been changed, for there¬ after no burials are found within the courts of the temple.

In their cosmology the Semitic Babylonian conception of the earth was a mountain over which the god Bel ruled. This they believed extended down into Ea's region (subterranean waters), and also that it reached up unto that of Anu (Heaven). They regarded the zig¬ gurat as symbolical of the earth, the dominion of Bel. In their inscriptions, therefore, con¬ cerning the building or restorations of these towers, the following expression is repeatedly found: (<I laid the foundations of the ziggurat in that breast of the earth and built it up so that its head was in the heavens® (compare the story of Babel, Gen. xi), thus showing that the ziggurat was a representation of Bel's kingdom, the earth.

In connection with the temple library at Nip¬ pur a school or

department of instruction was found. Within its rooms were discovered text¬ books, and exercises of the students. At Sipara a school similar in character was also found. The complete excavation of all important Baby¬ lonian cities will doubtless bring to light a

Upper — Excavating the entrance of the Temple of Bel, at Nippur, 4500 B. C, Lower — Mounds covering the Temple of Bel

Upper — Excavating around the Ziggurrat of the Temple of Bel to virgin soil, 6500 B. C.

Lower — Excavations in the Temple area. Pavement of Ur-Gur, 2700 B. C. Pre-Sargonic strata in the foreground

temple, a library and a school in each. On history see Assyriology.

Bibliography. — (More detailed Bibliog¬

raphy under Assyriology).

History. — Maspero : I (The Dawn of Civ¬ ilization ; II. (The Struggle of Nations) ; III. (The Passing of the Empires* ; Rogers, (History of Babylonia and Assyria* (6th ed., 1915) ; King, L. W., (A History of Sumer and Okkad) (1910) ; also (A History of Baby¬ lon (1915).

Explorations. — Hilprecht, Explorations in Bible Lands During the 19th Century) (1903) ; Works of John P. Peters, R. Zehnpfund, R. Koldewey, M. J. de Morgan.

Relation to the Old Testament. — (Die Keilinschriften und das Alte Testament* (3te Aufl., 1901-03) ; Price, (The Monuments and the Old Testament (6th ed., 1909) ; McCurdy, (His¬ tory, Prophecy and the Monuments* (1894— 1901) ; Jeremias, A., (Das Alte Testament im Lichte des Alten Orients) (2te Aufl., 1906).

Religion. — Sayce, (History of the Baby¬ lonian and Egyptian Religion (1902) ; Jastrow, M., Jr., (Religion of Babylonia and Assyria) (1898) ; new revised and greatly en¬ larged edition in German (1905-12).

Translations. — Schrader (editor), (Keilin-schriftliche Bibliothek> (6 vols., 1889) ; Har¬ per (editor), (Assyrian and Babylonian Literature) (1901). Also many translations of in¬ dividual inscriptions in works of more or less technical character.

BABYLONIAN EXILE, or CAPTIV¬ ITY. It seems to have been part of the state¬ craft of the ancient Assyrians to remove the people of conquered nations and plant them in unoccupied parts of the dominion, as far dis¬ tant as possible from the home country of the victims. This custom grew out of civil and geographical conditions. The degree of na¬ tional intercourse requisite for maintaining a proper ascendency over the subjugated nation could not be maintained if they were allowed to remain in their own land. Consequently, deportation was necessary — a process which has come to be designated in our language by the word captivity. Anciently, deported na¬ tions were not treated with that cruelty we are in the habit of associating with the captive. The captivity of the Jews, who are more espe¬ cially to be treated in this article, demands the preceding remarks in order to aid in a proper understanding of the frequent notices we find in the Scriptures of the consequence to which these people attained in their foreign residences.

There are two Babylonish captivities of the Jews, having their beginning at different times, although their endings were synchronous. In the civil dissensions following the death of Saul and culminating at the death of Solomon, the tribes north of the mountains of Ephraim and those east of Jordan separated from the rest, leaving Judah and Benjamin in the nat¬ urally fortified province of the south. To the north of the revolted tribes lay the kingdom of Syria, then powerful and extensive. Syria had an old feud with Israel ever since David had made Damascus, the Syrian capital, tribu¬ tary

to himself. Rezon had regained the city under Solomon, but was (<an adversary to Israel all the days of Solomon. ** The attention of Syria was now turned to the defenseless condition of the revolted tribes. They had no

longer the fortifications and fastnesses from which David had sallied forth to the northern plains at the foot of the Anti-Lebanon. Judah had, meanwhile, made a treaty, in the reign of Asa, her third King, with the Syrian power, who, by his counsel and stratagem, had been induced to break a former league with Israel (I Kings xv). Judah also, fearing inroads from the north, had built two new fortifica¬ tions in the passes of Benjamin (Geba and Mizpah), and used all her arts to keep herself in favor with Syria and on the other hand turned her pampered ally against the revolted and unprotected tribes at the north. Israel, tired at length of the continual exposures to Syrian invasion and exasperated at the im¬ munity and prosperity of the rival Judah, formed a conspiracy with Syria (during the reign of Pekah in Israel and Ahaz in Judah) against her southern antagonist. In the emer¬ gency Judah appealed to the Assyrian power and Tiglath Pileser came against Israel (733), carried captive a portion of its inhabitants, and then marched upon Syria, slew its king, sub¬ dued its capital and absorbed it into the Assy¬ rian empire, from which it reappears only in the time of Alexander the Great. The suc¬ cessor of Pileser, exasperated by an attempted conspiracy of Hoshea with the King of Egypt, took Samaria and subdued Israel to a tributary relation, taking away to Babylon the people whom Pileser had left in the first deportation. Thus was accomplished the first captivity of the numerically most powerful branch of the divided house of Israel (721 b.c.). They were first in the subjugation to foreign power from purely geographical considerations.

A little more than a hundred years after, Judah, from her mountain fastnesses, fol¬ lowed Israel into the Assyrian empire, in the second great Babylonish captivity. Disregard¬ ing some chronological differences, Judah seems to have been progressively carried into captiv¬ ity, like Israel, by at least two, and perhaps three, successive deportations. The first was 598 b.c., and was probably made with the direct object of colonizing the city of Nineveh, which the Assyrian monarch was then endeavoring to restore. The second was in the reign of Zedekiah. Judah had for three successive reigns been heavily tributary to Assyria. Zede¬ kiah rebelled against the tribute and, like Israel, further exasperated her master by call¬ ing upon Egypt in her extremity. In revenge, Nebuchadnezzar burnt the temple and city, put

out the eyes of Zedekiah and led away the people to Babylon, and so ended the Jewish kingdom (588 b.c.). When, 70 years after the second captivity, the permission to re¬ turn was given, only a very small part of the Jewish people were in a condition to desire a removal, having become thoroughly naturalized in their foreign dwellings; and even if they had desired it, it would have been only a return to a Medo-Persian satrapy, not to the glory of their ancient kingdom and temple-worship. See Daniel; Ezekiel; Ezra; Jews.

The term ((Babylonish Captivity® is. fre¬ quently applied by writers of Church history to the residence of the Popes at Avignon for nearly 70 years.

Bibliography. — Ewald, (The History of Is¬ rael, } translated by Martineau, Vols. IV, V (4th ed., London 1878-86) ; Cheyne, (Jewish

Life after the Exile) (New York 1899) ; Kent, (A History of the Jewish People) (New York 1899) ; Torrey, (Ezra Studies } (Chicago

1910).

BACA, The Valley of, a vale through which the pilgrims had to pass on the way to Zion (Ps. 84—6). It has been variously identi¬ fied with the Valley of Acher, the Valley of Re-phain and with a Sinaitic valley of a similar name. It is also said to have been the last station on the caravan route from the north to Jerusalem. Biblical criticism is uncertain as to whether the Valley of Baca is a real place or only used as an emblem of life intended to teach the lesson that perseverance and trust not only overcome difficulties but turn them into blessings.

BACACAY, ba-ka'ki, Philippines, a town in the province of Albay, Luzon island. It is sit¬ uated on the Gulf of Albay. Pop. about 15,000.

BACALAO, ba'ka-la'o. See Cod.

BACARRA, ba-kar'ra, Philippines, a town of Luzon in the province of Ilocos Norte. Pop. 14,800.

BACCANARISTS. See Jesuits.

BACCARAT, ba-ka-ra', a town of France, in the department of Meurthe-et-Moselle, 16 miles by rail southeast of Luneville, having the most important plate glass works in France, established here in 1765. Pop. (1911) 7,277.

BACCARAT, a game of Italian origin played with ordinary playing cards ; very sim¬ ple in details and freer from complications than most games at cards. Any number of players may participate and as many packs of cards may be used as necessary, the number being increased to correspond with the number of players. The member of the party selected to act as banker deals out the cards from a box, after they have been shuffled. The face cards in all countries except America, where the face cards and tens have no value and the naturals are 8 and 9, count 10 and the others according to the numbers of their spots. After the bets have been made, the banker deals two cards to each of the players, including himself, but the other players must receive their cards before the banker is served. The aim of play¬ ers is to make the numbers 9, 19, 29, or as nearly those as possible, as 8, 18 and 28. Any player is at liberty either to <(stand® or to be ˆcontent® with the two cards at first dealt or to call for more, at the risk of exceeding 29, when his stake is forfeited to the dealer. If, after the first distribution of two cards to each, any player has a ˆnatural,® — that is, a sum making, or next in value, 19, — -he declares it wins and the banker pays all who hold superior hands to his own and claims from those hold¬ ing inferior hands. The players stake their money separately, there being, in fact, as many separate games in progress as there are play¬ ers and the spectators may wager their money on any one of them, all of which must be ac¬ cepted by the banker. Prior to the banker making a start, he names the amount of the bank. Any one sitting down at the table has the right to call the whole of the bank, select¬ ing the left or the right on which to pick up the cards. Previous to the banker dealing the cards, it is the duty of two croupiers, one on the right and the other on the left, to count

up the stakes deposited on either side and then make up the bank. Thus the banker knows, to the smallest coin, the exact amount of his liabilities.

BACCHANALIA, bak'ka-na'li-a, feasts in honor of Bacchus, or Dionysos, characterized by licentiousness and revelry and celebrated in ancient Athens. In the processions were bands of Bacchantes of both sexes, who wandered about rioting and dancing. They were clothed in fawn skins, crowned with ivy and bore in their hands thyrsi, that is, spears entwined with ivy, or having a pine cone stuck on the point. These feasts passed from the Greeks to the Romans, who celebrated them with still greater dissoluteness till the Senate abolished them, 186 b.c. See Bacchus.

BACCHANTE, bak-kan'te, a person taking part in revels in honor of Bacchus. The name of several British warships.

BACCHIGLIONE, bak'ke-lyo'ne, a river of northern Italy. It rises in the Alps, passes through the towns of Vicenza and Padua and enters the Adriatic near Chioggia after a course of about 90 miles.

BACCHUS, bak'kus, or DIONYSOS, the

god of wine. His history is one of the most perplexing in the Greek mythology. Semele was pregnant with him by Zeus, but became a victim of the craft of Hera. Zeus hastened to save the unborn fruit of his embrace and con¬ cealed it till mature in his own thigh. He afterward committed the infant to Hermes, wrho carried him to the nymphs of Nysa in India, where he grew and prospered. His teacher was Silenus, afterward his constant companion.

In the vales of Nysa Bacchus invented the preparation of a beverage from grapes and taught the planting of vines. To spread the knowledge of his invention he traveled over almost the whole known world and received in every quarter divine honors. Drawn by lions he began his march, which resembled a triumphal pomp, with a great suite of men and women, Sileni, Satyrs and Msenades. Inspired by the presence of the god, rejoicing, brandish¬ ing the thyrsus and crowned with vines and ivy, they danced around him, shouting aEvoe! EleleusP) over hill and valley, accompanied by the tones of Phrygian flutes and timbrels. The Thebans wrould not acknowledge his divinity and Pentheus armed himself against him. Bacchus resolved to punish the crime and in¬ spired the women with a fury which drove them from their dwellings to wander on Mount Cithseron. Pentheus himself was torn in pieces by his own mother and her sisters, to whom he appeared a wild beast. Bacchus punished the daughters of Mynias, who derided his feasts, with frenzy and transformation. At Naxos some Tuscan sailors attempted to carry him off to Italy, supposing him from his purple robe to be the son of a king. They fettered him; but

the fetters fell off, vines and ivy en¬ twined the vessel and kept it fixed in the midst of the sea: the god transformed himself to a lion and the seamen, seized with madness, leaped into the waves, where they were changed into dolphins. On the other hand, he rewarded such as received him hospitably and rendered him worship, as, for instance, Midas, who re¬ stored to him the faithful Silenus.

BACCHUS AND ARIADNE — BACH

11

His love was shared by several ; but Ariadne, whom he found deserted upon Naxos, alone was elevated to the dignity of a wife and became a sharer of his immortality. To confer the same favor on his mother, Semele, he descended into the realms of Pluto and con¬ ducted her to Olympus, where she was hence¬ forth called Thyone. In the dreadful war with the giants he fought heroically and saved the gods from impending ruin. During the re¬ joicing for victory Zeus joyfully cried to him, i(Evan, evoe!» (Well done, my son!), with which words Bacchus was afterward usually saluted. We find him represented with the round, soft and graceful form of a maiden rather than that of a young man. An orna¬ ment peculiar to him is the tiara. His long waving hair is gathered behind in a knot and wreathed with sprigs of ivy and vine leaves. He is usually naked ; sometimes he has an ample mantle hung negligently round his shoulders ; sometimes a fawn skin hangs across his breast. The earlier bearded Bacchus is properly of Indian or Egyptian origin. His head is sometimes shown with small horns (the symbol of invincible force). In his hand is borne a thyrsus, or a drinking cup. The bull, panther, ass and goat were symbolically associated with this god.

The feasts consecrated to Bacchus were termed Bacchanalia, Dionysia, or in general Orgia. They were celebrated with peculiar solemnity in Athens, where the years were uni¬ versally reckoned by them and during their continuance the least violence toward a citizen was a capital crime. The great Dionysia were celebrated in spring. The most important part of the celebration was a procession represent¬ ing the triumph of Bacchus. This was com¬ posed of a train of Bacchantes of both sexes, who were masked, clothed in fawn skins, crowned with

ivy and bore in their hands drinking cups and rods entwined with ivy (thyrsi). Amidst this mad crowd marched in beautiful order the delegated bodies of the phratria (corporations of citizens). They bore upon their heads consecrated baskets, which contained first-fruits of every kind, cakes of different shape and various mysterious sym¬ bols. This procession was usually in the night-time. The day was devoted to spectacles and other recreations. At a very early hour they went to the theatre of Bacchus, where musical or dramatical performances were ex¬ hibited. Thespis, known as the inventor of tragedy, is said to have introduced into the Bacchic performance an actor who carried on a dialogue with the coryphceus (leader) regard¬ ing the myths narrated of Bacchus or some other divinity. The chorus, surrounding its leader, stood on the steps of the altar of Bac¬ chus, while the actor occupied a table. Some regard this as the origin of the stage. The vintage festivals in rural districts were cele¬ brated by Bacchic processions, ruder in form than those of Athens, but characterized by the same wild license and ribaldry. Coarse ridi¬ cule of individuals was a marked feature of these occasions. In the course of time the mysteries celebrated became occasions for in¬ toxication and gross licentiousness. The Bac¬ chanalia were introduced into Rome about 200 b.c. and at first were celebrated by. women only. Later men were admitted, evening cele¬

brations introduced and celebrations held fre¬ quently instead of only three days in the year as at first. Gross immoralities were practised and finally in 186 b.c. the Senate ordered the arrest of the priests and forbade further meet¬ ings in Italy. Consult <Senatus Consultum de Bacchanalibus) in (Corpus Inscriptionum Latinarum) ; Frazer, <The Golden Bough) (1913); Farnell, (Cults of the Greek States) (Vol. V, Oxford 1910) ; Gruppe, O., (Griechische Mythologie und Religionsgeschichte) (Vol. II 1907).

BACCHUS AND ARIADNE, a painting by Titian (1523). It is founded on the Greek story of the marriage of Dionysius to the wife of Theseus. It represents Ariadne in a back¬ ground of sedge and ocean turning away as the leopard-drawn chariot descends, bearing the god and surrounded by satyrs. The pic¬ ture hangs in the National Gallery, London.

BACCHYLIDES, bak-kil'I-dez, Greek poet who flourished about 470 b.c. ; a native of Iulis, a town on the Island of Ceos. He was a nephew of the still more famous lyric poet Simonides, with whom he remained for some time at the court of Hiero I in Sicily. He traveled also in the Peloponnesus and is said to have been a rival of Pindar. Until recently

this poet was known to the modern world only in fragments of beautiful versification. In 1895, however, a well preserved text was dis¬ covered and published and Bacchylides has now taken permanent place as a master of Greek verse. He was master of a style at once per¬ spicuous and simple, tasteful in expression and with an artist's eye for picturesque detail. An English translation of the poems edited by F. G. Kenyon appeared in 1897. Consult also Sir R. Jebb's edition, with introduction, notes, translation and bibliography (1905).

BACCI'OCCHI, ba-chy'ok'ke, Felice Pas-quale, Corsican captain : b. Corsica, 18 May 1762; d. Bologna, 27 April 1841. In 1797 he married Maria Elisa Bonaparte. In 1805, when Napoleon made his sister Princess of Lucca and Piombino, Bacciocchi was crowned with his wife. After the Emperor's fall he lived quietly and in reduced circumstances at Bo¬ logna.

BACCIOCCHI, Maria Anna Elisa Bona¬ parte, the eldest sister of Napoleon Bonaparte: b. Ajaccio, Corsica, 1777; d. 7 Aug. 1820. She married Felice Bacciocchi and was created by her brother in 1805 Princess of Lucca, Piom¬ bino Massa and Carrara and in 1809 Grand Duchess of Tuscany. She shared her brother's fall and spent her last years in Austria, dying on her estate near Trieste. Her only son died in 1833 and her only daughter, the Countess Camerata, in 1869.

BACH, ban, Alexander, Baron, Austrian statesman: b. Loosdorf, 4 Jan. 1813; d. 15 Nov. 1892. He was Minister of Justice during the troublous period in 1848; of the Interior in 1849-59 ; and subsequently Ambassador to Rome. In 1855 he negotiated the concordat between Austria and the Roman Church. In 1859-67 he was Ambassador at Rome. As a minister he was an opponent of liberalism and in favor of a strong centralizing policy.

BACHj Heinrich, German musician : b. 16 Sept. 1615; d. 10 July 1691. He was the father

of Johann Christoph and Johann Michael Bach ; organist at Arnstadt.

BACH, Johann Christian, German musi¬ cian: b. Erfurt 1640; d. 1682. He was a son of Johannes Bach, the great uncle of Johann Sebastian Bach.

BACH, Johann Christian, German musi¬ cian: b. Leipzig 1735; d. 1782. He was a son of Johann Sebastian Bach and was organist in the Cathedral of Milan 1760-62. From the latter year he resided in London and became music master to the Queen. From his resi¬ dences at Milan and London he is called <(the Milanese® and ftthe English® Bach. The ele¬ gance and brilliancy of his pianoforte com¬ positions made him the favorite of amateurs in that instrument ; but only in his masses and Te Deums are to be heard echoes of the musi¬ cal genius of his family. Consult M. Schwartz, (Johann Christian Bach) (Leipzig 1900).

BACH, Johann Christoph Friedrich, Ger¬ man musician: b. Leipzig 1732; d. 1795. He was a son of Johann Sebastian Bach and was for a long period music master to Count Schaumburg at Biickeburg.

BACH, Johann Michael, German com¬ poser and instrument-maker; b. 1648; d. 1694. He was a son of Heinrich Bach and the father-in-law of Johann Sebastian Bach.

BACH, Johann Sebastian, German musi¬ cian and composer : b. Eisenach, 21 March 1685; d. Leipzig, 28 July 1750. Bach was the most profound and original musical thinker the world has ever seen. He is the master of mas¬ ters ; from him most of the great composers have drawn inspiration. When Mozart heard one of his pieces at Leipzig, in 1788, he ex¬ claimed : ((Thank Heaven ! here at last is some¬ thing new that I can learn fronW <(Not Bach (brook) but (Ocean > should be his name,® Beethoven exclaimed. Mendelssohn made en¬ thusiastic efforts to revive the interest in Bach. Schumann helped to found the Bach Society and urged students, if they would become thorough musicians, to make Bach their daily bread. Chopin confessed that before giving a concert he locked himself up a fortnight with nothing but Bach to play. Franz devoted a great part of his life to adapting this master's works for use in modern concert halls. Liszt and Rubinstein adored and played him. Wag¬ ner, as he grew older, played Bach more and more ; his vocal compositions he pronounced the most perfect ever written ; and he said that the proper interpretation of them was the noblest task of contemporary musicians. The only dissenting voice in this chorus of praise was that of Berlioz; but, as Saint-Saens (one of the principal worshipers) has pointed out, this was due solely to the fact that Berlioz was not familiar with the works of Bach. His pre¬ eminence is the more

remarkable when we re¬ member that he was born as early as 1685 ; but it seems perhaps a trifling less astonishing when we bear in mind that Johann Sebastian inher¬ ited the accumulated musical gifts of a long line of ancestors. ˆThroughout six genera¬ tions,® says Forkel, <(there were hardly two or three members of this family who did not inherit a natural talent for music, and make the cultivation of this art the principal occupa¬ tion of their life.® For more than a century

there were so many representatives of this widely-scattered family that in one place, at any rate (Erfurt), town musicians came to be called ((Bachs,® even when that family did not happen to be represented among them. After the cul¬ mination had been reached, however, in Johann Sebastian, the family-tree soon withered, al¬ though some of his sons play a quite consider¬ able role in musical history.

At the age of 10, Johann Sebastian was left an orphan, in care of his older brother, John Christoph, who appears to have been jealous of the boy's musical gifts. Christoph had got to¬ gether a collection of the best German organ music of the time, which Sebastian was very eager to get at and study. Denied access to it, he managed to smuggle it into the garret, where, for six months, he busied himself mak¬ ing a copy of it on moonlit nights. But the brother at last discovered his secret and took away from him both the copy and the original. This is only one instance of many showing how Sebastian was determined to educate him¬ self in face of all obstacles. Several times he went on foot to Hamburg — a distance of 25 miles — to hear the famous organist Reinken ; subsequently he made a similar trip to hear the illustrious organist Buxtehude at Liibeck. This happened when he himself was already busy as organist and choirmaster at Arnstadt. Previ¬ ously to that he had, as a boy, helped to support himself by joining a choir of boys who sang at funerals and weddings, as well as in church and in the street. He missed no chance to practise on the violin, the organ and the piano — or, rather, the harpsichord and clavichord, which were the predecessors of the pianoforte. To these tasks and in his efforts at composition, he often devoted whole nights. He got his first salaried position (as violinist) in 1703 at Wei¬ mar, but left this post after a few months for that of organist at Arnstadt. It was thence that he made the trip (a foot tour of over 200 miles) to Liibeck, already referred to, to hear Buxtehude. He had obtained a four weeks' leave of absence, but was so delighted with his opportunities for improvement at Liibeck that he remained four months, until per¬ emptorily called back. The church consistory of

Arnstadt took this occasion to reprimand him, not only for prolonging his leave of ab¬ sence, but for neglecting rehearsals, going to a wine cellar during the sermon, allowing a strange maiden to make music in the choir, and for (<having made extraordinary variations in the chorals, and intermixing many strange sounds, so that thereby the congregation were confounded.® Yet, with all his faults, they loved him still and allowed him to remain at his post, till he left of his own accord, having secured a position as organist at Muhlhausen. Here, too, however, he did not remain long, as still better opportunities presented themselves to him at Weimar, where the Duke Wilhelm Ernst had his court. This duke was deeply interested in the religion of the German Protestant Church and was glad to avail himself of the services of Bach, who. was destined to become the chief representative of the music of that church, as Palestrina was of the Catholic Church. Here Bach remained nine years, during which time he wrote many of his master works for organ and church choir. In 1717 he accepted a posi¬ tion in Kothen which involved a complete

change in his activity, Instead of having an organ and choir to occupy his time he had the duty, as Kapellmeister, of writing and rehears¬ ing works for the orchestra as a whole or for groups of orchestral instruments (chamber music). In 1720 he was a candidate for the post of organist at the Jacobi Kirche in Ham¬ burg; but, although he was at this time already famous as an organist, he failed to get the place, an obscure young man having secured it after paying $1,000 for the office. Three years later Bach became the cantor of the Thomas-schule at Leipzig and director of the music in the two principal churches; this position he held 27 years, till his death, 28 July 1750, at the age of 65.

Bach was twice married and became the father of 20 children; five sons and five daugh¬ ters died before him, while six sons and four daughters survived him. His first wife was also a Bach — a cousin; she died in 1720, while he was on a concert tour. Eighteen months after her death he married a girl of 21 who was also musical ; yet none of

the 13 children by this second marriage attained as high a rank as some of the seven by the first wife. The sec¬ ond wife helped him copy his MSS. (which he was constantly revising) and in course of time her handwriting came to resemble his so closely that the two were hard to distinguish. In no way did Bach differ more widely from his great contemporary, Handel, than in his family life ; Handel died a bachelor. There were times when Bach found it difficult to bear the material burden of his large family, but he was not so poor in his lifetime as is usually supposed. His income from various sources was, it is true, only about $500 at the best ; but the purchasing power of that sum was equal to $3,000 in our day. It was after his death that the pinch of poverty was felt; his widow died in an almshouse; he himself was buried in a pauper's grave. For more than a century no one knew the exact place of this grave ; the circumstances of its discovery read like a de*- tective story. Some years ago it became neces¬ sary to rebuild the old Johannis Church in Leipzig, and, in connection with this, to remove the bones from that part of the adjoining cem¬ etery in which Bach was believed to have been buried. The director of the archives, Wust-mann, took this opportunity to search for Bach's grave. He had found in the books of the Johannis Hospital an item stating that $4 had been paid for Johann Sebastian Bach's oak coffin, which gave him his principal clue, for oak coffins were seldom used in those days. Near the place where Bach was believed to have been buried he found two oak coffins, one containing the remains of a young woman, the other the bones of a man, whose skull was so unique as to arouse the suspicion at once that it was Bach's. It was placed in the hands of the famous anatomist, Professor His, who, after a long series of comparative investiga¬ tions, came to the conclusion that there could be no doubt whatever that the skull was Bach's. He embodied his argument in a brochure, "Forschungen fiber Bach's Grab-statte und Gebeine.®, The fact that Bach's con¬ temporaries thus took no note of his burial place is convincing evidence that they never dreamed he was destined to rank as the greatest of all musical geniuses. Further evidence of this lies

in the circumstance that he really brought about his death by his efforts to save some of his unappreciated MSS. from destruction by en¬ graving them on copper plates. This led to serious trouble with his eyes ; two operations by an English surgeon were followed by total blindness, which made it impossible for him to complete his great work, <(The Art of Fugue.® He dictated for its final number a choral, (<When we were overwhelmed by Woe,® and died not long afterward.

The thematic catalogue of his works con¬ tains 1,110 instrumental and 1,936 vocal num¬ bers. All of them combined probably never brought him in as much as the $1,175 paid at a Berlin auction sale a few years ago for three of his MSS. Until 1829, when Mendelssohn, after overcoming a good deal of opposition, suc¬ ceeded in producing the wonderful (Saint Mat¬ thew's Passion) in Berlin, for the first time since its composer's death, the great Leipzig Cantor was looked on, in Mendelssohn's words, as ((a mere old-fashioned big-wig stuffed with learning.® That work opened the eyes of the musicians to their colossal stupidity, and from that year to the present time Bach's fame has been growing in a steady crescendo. In 1851 a Bach Society was formed at Leipzig for the printing of a monumental edition of Bach's works by Breitkopf and Hartel. For nearly half a century (up to 1896) a huge folio vol¬ ume was issued every year, and after its com¬ pletion the Bach Society began to make efforts for multiplying performances of these works, the majority of which constitute even now an unsurveyed Klondike. Bach himself does not appear to have been chagrined by the neglect of his works during his lifetime. ((We find in him,® writes Abdy Williams, ((little of that de¬ sire for applause, for recognition, which is usu¬ ally one of the strongest motives in an artist. He was content to labor as few men have labored, in a remote corner of Germany, simply for art and art alone.® To cite Bach's own words: <(The sole object of all music should be the glory of God and pleasant recreation.® At the same time, it is obvious that he would have been gratified if he had won, as composer, some of the honors which fell to him abun¬ dantly as player. Of the esteem in which he was held as organist and clavichordist, two anec¬ dotes give the best illustration. In 1717, while on one of his concert tours, he happened to be in Dresden at the same time as the famous French organist and harpsichord player Marchand. The Dresdeners thought this was a good chance for an international contest, and Bach was induced to offer the Frenchman a challenge. It was accepted and all the details had been arranged ; but when the hour arrived .there was no Marchand. He had taken ((French leave® that morning on the fast coach ! Many years later, in 1747, Bach accepted a repeatedly given invitation to visit Frederick the Great at Potsdam. The King was delighted to see him. Without allowing him to take off his traveling clothes, he made him improvise on all the pianos and organs in his palace, and again and again he exclaimed : <(There is only one Bach !®

It has been said of Bach that music owes almost as much to him as a religion does to its founder. This is true especially of two branches — the organ and choral music. Both as a writer for the organ and a

player he has had no equal,

The best account of this phase of his art is con¬ tained in Pirro's (Bach, the Organist, and his Works for the Organ } ; the author's aim being to make it easier to play Bach <(in the Bach spirit.® He refers to the great composer as ((the man who suddenly surpassed all that had been done before him while at the same time anticipating all that was to be written in the future.® The organ works are contained in Vols. XV. XVII, XXXVIII and XL of the Breitkopf and Hartel edition. Some of them are best known to music lovers through their superb arrangements for pianoforte by Liszt, Busoni and others. Quite as striking is Bach's pre-eminence in choral music. The vocal works make up more than 30 volumes ; among them there are four of chamber music with voice, nine of passions, oratorios and masses; and no fewer than 17 of church cantatas. It is known that he wrote five complete sets of these can¬ tatas for all the Sundays and holidays in the year; probably there were about 350 in all, but of those only about 200 have been preserved. The greatest choral works in existence are Bach's (Saint Matthew Passion) and his Mass in B minor. Schumann preferred the (Saint John Passion) even to the Saint Matthew. Three other passions written by Bach are lost. Concerning this class of works Wagner ex¬ claimed: ((What opulence, what fullness of art, what power, clearness, and withal simple purity, speak to us from these unrivalled masterworks !® They are made up of arias, recita¬ tives, chorals and other choruses, beside the instrumental accompaniment. The arias are sometimes embroidered after the fashion of the time, but usually they are simple, chaste and delightfully melodious. Indeed, Bach was so full of melody that it overflows into his recitatives, which are, at the same time, often highly dramatic and emotional, foreshadowing Wag¬ ner's. If Bach had written operas they would have been more dramatic than Handel's ; but the opera was (apart from the Lied , or lyric art song, which had not yet been created), the one form of music which Bach avoided. As for the choruses in his works, they are of in¬ comparable grandeur, and at the same time of great difficulty. All the parts are melodious ; indeed there is in these

works little practical difference between the chorus singers and the soloists. Many of the choruses are stately chorals — the hymns introduced into the Church by Luther and perfected by Bach. These were sung by the trained choir, the harmonies being too elaborate for the congregation. In his own churches Bach found the means of execution lamentably inadequate. The singers and stu¬ dents could barely master the technique ; of the inner spirit they had no conception.

Of Bach's orchestral scores, also, it may be said that all the players are, in turn, soloists. His harmony is ((a manifold melody® ; it forms the bridge between the mediaeval polyphonic and the modern harmonic styles. In his or¬ chestral accompaniments, a favorite device is an obligato part for some string or wind instru¬ ment playing a duet with the solo voice. His works for orchestral instruments alone com¬ prise three overtures and six concertos. Among his compositions for violin there are three suites and three sonatas that are unique, inas¬ much as they have no pianoforte accompani¬ ment but are complete in themselves, the poly¬

phonic or harmonic accompaniment being played together with the melody by the violin¬ ist; for the violoncello, also, there are six son¬ atas and suites of this kind. While it is true that in all of his works the organ style prevails more or less, there is nevertheless a keen in¬ stinct (far ahead of the time in which he lived) for what is idiomatic, or peculiar to each in¬ strument. This is particularly true in regard to the pianoforte compositions. In these, Bach is more modern than Haydn, Mozart or even Beethoven. While wxiting for the imperfect clavichords and harpsichords of his time he had in his mind a prophetic vision of the modern grand piano; on that alone can justice be done to his superb compositions of this class. His preludes and fugues, his inventions, suites, toccatas, fantasias, etc., are the fountain head of modern music. Of special importance is the (Well-tempered Clavichord, J a collection of 48 preludes and fugues, two in each key, arranged in the order of chromatic ascent. Hans von Billow called this (<the Old Testament in music.® It is indispensable to every student; but it is infinitely more than a group of studies. ((We find these fugues,® wrote Rubinstein, (<of a re¬ ligious, heroic, melancholy, grand, serious char¬ acter ; in one respect only are they alike — in their beauty ! And then the preludes, whose charm, variety, perfection and splendor are simply incomparable ! That the same composer who wrote those organ compositions of over¬ whelming grandeur could also write such de¬ lightfully humorous gavottes, bourrees, gigues,

such melancholy sarabandes, short piano pieces of such charming simplicity, transcends belief. These remarks refer to his instrumental works alone, but if we do add to them his gigantic vocal compositions, we are led to the conclu¬ sion that the time will come when it will be said of Bach as of Homer: (This was not written by one man but by several. } ® Rubin¬ stein's reference to the gavottes, etc., calls at¬ tention to the fact that Bach was not above writing dance music; a great deal of it, in fact. He also did much to improve the technique of pianoforte playing, especially in the matter of fingering (use of thumbs). He would have been the first to adopt all modern improve¬ ments, and in playing him, therefore, the pedal, for instance, should be used as freely as in play¬ ing Chopin. And while it was not customary in Bach's day to write expression marks, it is idiotic to suppose that he played his pieces with¬ out changes in loudness and pace. Here students should follow the guidance of Liszt and Bulow. The more Bach's works are studied from this point of view, the more does he seem a modern romanticist, and his works music of the future, even more than music of the past. Mendelssohn all his life furthered the cause of Bach and. his* efforts resulted in the erection of the first statue of the Altmeister, as Bach has been affectionately called, at Leip¬ zig in 1842. In 1884 a fine bronze statue was erected at Eisenach, and in 1900 a full-sized bronze statue was unveiled with imposing cere¬ monies in Leipzig. In addition to the 60 vol¬ umes of Bach published by Hartel and Haupt¬ mann, new volumes have been published an¬ nually since 1904 by the Neue Bach Gesellschaft, appearing as the (Bach Jahrbuch.* In 1907 the Bach birthplace at Eisenach was

opened as a Bach Museum. There are now Bach societies in several countries.

Bibliography. — Spitta's <Bach,) in 2 vols. (English by Bell &

Maitland, London 1899) is the most elaborate and authoritative work. Of the shorter books the most serviceable is that by Abdy Williams, which also contains a classified list of Bach's works and a bibliog¬ raphy. Consult also Parry, (The Evolution of the Art of Music> and (Johann Sebastian Bach) (New York 1909) ; Apthorp, (Musicians and Music Lovers) ; Franz, R., (Gesammelte Schriften fiber die Wiederbelebung Bach'scher und Handel'scher Werke) (Leipzig 1910) ; Wolfrum, Ph., (Johann Sebastian Bach) (2 vols., Leipzig 1910) ; Schweitzer, A., (J. S. Bach, le musicien-poete) (ib. 1905), and Vol. IV of the (Oxford History of Music) ; (The Age of Bach and Handel > by Fuller Maitland.

Henry T. Finck,

Musical Critic , Evening Post, New York.

BACH, Karl Philipp Emanuel, German musician: b. Weimar, 14 March 1714; d. 14 Dec. 1788. He was the son of Johann Sebastian Bach and was court musician in the service of Frederick the Great in 1746-68, afterward hold¬ ing an appointment at Hamburg. He wrote on the theory of piano playing and was a volumi¬ nous composer of Passion music, pianoforte compositions and of two oratorios, one (Israel in the Wilderness.)

BACH, Wilhelm Friedemann, known as the ˆHalle® Bach, German composer and musi¬ cian: b. Weimar, 22 Nov. 1710; d. Berlin, 1 July 1784. He was the oldest of the sons of Johann Sebastian Bach, from whom he received his training, and who regarded him as the most brilliant of all his children. He was organist of Saint Sophia, Dresden, from 1733 to 1747, and of Saint Mary's, Halle, from 1747 to 1764. His irregular habits and addiction to drink led to his dismissal, and he never afterward ob¬ tained a position, but wandered from city to city and died in squalor in Berlin. He wrote several works for piano, containing concertos, sonatas, a suite of fantasias; these were edited by Riemann. An organ concerto and fugue were edited by Stradal. All his works show an extraordinary talent.

BACH FESTIVAL, the annual musical festivals held at Bethlehem, Pa., and resem¬ bling in a degree the performances at Bayreuth and Oberammergau. The festival arose in con¬ nection with the Moravian church of Bethle¬ hem, the liturgy of which has a strong musical tendency. Early in its history Bethlehem had an orchestra, probably the first in America, and in its churches were employed flutes, horns, violas and trombones, which undoubtedly orig¬ inated and led up to the gala performances of the present day. Its resemblance to Oberam¬

mergau is in its religious character, the Protest¬ ant sentiment of which finds its best expression in the music of Bach. In 1901 Bach's (Christ¬ mas Oratorio) was performed for the first time in America in its entirety. Under the direction of J. Frederick Wolle others of Baches greatest works have been presented. The choir consists of 110 members, with a separate chorus of 100 boys, and an orchestra of 60 instrumentalists. From 1906 to 1912 annual Bach festivals were given at Berkeley, Cal., by Mr. Wolle, but on

his return to Bethlehem in the latter year the festivals were resumed at Bethlehem, Pa.

BACHARACH, baH'a-raH, Germany, a town on the Rhine, 12 miles south of Coblenz. The vicinity produces excellent wine, which was once highly esteemed as annual tribute by Em¬ peror Wenzel and the Pope. The view from the ruins of the castle is one of the finest on the Rhine. Pop. about 1,900.

BACHE, bach, Alexander Dallas, Ameri¬ can scientist: b. Philadelphia, Pa., 19 July 1806; d. 17 Feb. 1867. He was a grandson of Ben¬ jamin Franklin, and was graduated at the United States Military Academy, at the head of his class, in 1825; became professor of natural philosophy and chemistry at the University of Pennsylvania 1828-37 ; was the organizer and first president of the trustees of Girard College, 1836, where he established a magnetical and meteorological observatory; he bore a prominent part in developing the system of free education in Philadelphia, and was appointed superintend¬ ent of the United States Coast Survey in 1843. In the last office he performed services of last¬ ing and invaluable character. He was regent of the Smithsonian Institution in 1846-67 ; an active member of the United States Sanitary Commis¬ sion during the Civil War, and president of the National Academy of Sciences in 1863, to which he bequeathed $42,000 for scientific research. Besides a long series of notable annual reports of the United States Coast Survey, he published a report on (Education in Europe* (1839), and Observations at the Magnetic and Meteorolog¬ ical Observatory at the Girard College) (3

vols., 1840-47).

BACHE, George M., American naval offi¬ cer: b. in the District of Columbia, 12 Nov. 1840; d. 11 Feb. 1896. He was graduated at the United States Naval Academy, in 1861, and commanded the ironclad Cincinnati in the vari¬ ous engagements on the Mississippi River, un¬

til she was sunk by the Vicksburg batteries, 22 May 1863. He was highly commended by Ad¬ miral Porter, General Sherman and Secretary Welles for his conduct in the last engagement. Subsequently, he took part in both attacks on Fort Fisher, and, in the second one, 15 Jan. 1865, led the naval assault on the fort. He retired with the rank of commander, 5 April

, BACHE, Hartman, American military en¬ gineer: b. Philadelphia, Pa., 3 Sept. 1798; d. 8 Oct. 1872. He entered the United States Topographical Corps ; and for 47 years was constantly employed on surveys and on works of hydrography and civil engineering. On 13 March 1865 he was appointed brigadier-general, and 7 March 1867 was retired. His most not¬ able achievements were the building of the Delaware breakwater and the application of iron-screw piles for the foundation of light¬ houses upon sandy shoals and coral reefs.

BACHE, Sarah, American philanthropist : b. Philadelphia, Pa., 11 Sept. 1744; d. 5 Oct. 1808. She was the only daughter of Benjamin Franklin, and the wife of Richard Bache. Dur¬ ing the Revolutionary War she organized and became chiej of a band of patriotic ladies who made clothing for the soldiers, and in other ways relieved their sufferings, especially during the severe winter of 1780.

BACHE, Walter, English pianist: b. Bir¬ mingham, 19 June 1842; d. London, 26 March 1888. In 1858 he studied music in the Leipzig Conservatorium under Hauptmann, Richter, Plaidy and Moscheles. In 1862 he went to Rome, and from that time till 1865, when he returned to London, studied with Liszt, of whose style and compositions he became an ardent admirer and advocate. In London he instituted annual concerts, at which he put for¬ ward Liszt's music, and lived long enough to see the indifference of the public toward his master change to open admiration. For several years Bache was professor of the pianoforte at the Royal Academy of Music, and it was mainly due to his efforts that the Liszt scholar¬ ship was established in that institution.

BACHELDER, Nahum Josiah, American politician : b. Andover, N. H., 3 Sept. 1854. Educated at Franklin Academy, Taunton Hill School, Andover, he became a prominent farmer; was nominated by the

Republicans and elected governor of New Hampshire in 1902. He was master National Grange, 1905-11, and received degrees from Dartmouth and New Hampshire Colleges.

BACHELET, bash'la, Jean Louis Theo¬ dore, French historian: b. Pissy-Poville, Seine-Inferieure, 1820; d. 1879. He was educated at the Ecole Normale, and after serving as pro¬ fessor of history in various institutions, in¬ cluding the Rouen Lyceum, he became librarian of Rouen. His publications include (La guerre de cent ans) (1852) ; (Cours d'histoire) (3 vols., 1868-75) ; (Dictionnaire generale de bi¬ ographic et d'histoire,* with C. Dezobry (12th ed:, 1902); (Dictionnaire generale des lettres, des beaux-arts, des sciences morales et politiques) (7th ed., 1902).

BACHELLER, Addison Irving, American

novelist: b. Pierpont, N. Y., 26 Sept. 1859. He was graduated at the Saint Lawrence Univer¬ sity in 1882 ; 1882-83 was a member of the staff of the Daily Hotel Reporter of New York city and in 1884 became a reporter for the Brooklyn Times. In the latter year he estab¬ lished the Bacheller Syndicate for the purpose of supplying literary matter to periodicals and for 14 years was a director of that syndicate. He was for a short time editor of The Po'cket Magazine, and subsequently joined the editorial staff of the New York World, but remained in that capacity for a short time only. His novels, the scenes of which are laid in northern New York, include (The Master of Silence* (1890) ; <Eben Holden* (1900); <D'ri and I* (1901); (Darrel of the Blessed Isles* (1903) ; (Virgil-ius* (1904) ; (Silas Strong* (1906) ; (Eben Holden's Last Day a-Fishing* (1906) ; (The Hand-Made Gentleman* (1907) ; (The Mas¬ ter* (1908); (In Various Moods* (1908);

(Keeping Up With Lizzie* (1910) ; (Charge It* (1911) ; (The Turning of Griggsby* (1912); (The Marryers* (1914); <The Light in the Clearing* (1916).

BACHELOR, a term anciently applied to a person in the first or probationary stage of knighthood who had not yet raised his standard in the field. A knight bachelor is one who has been raised to the dignity of a knight without being made a member of any of the orders of chivalry such as the Garter or the Thistle. The

title <(Sir** of a knight bachelor is not hereditary. It also, denotes a person who has taken the first degree in the liberal arts and sciences,

or in divinity, law or medicine, at a college or university; or a man of any age who has not been married, the most usual meaning of the term. Taken as a class in a community, bache¬ lors have, from the earliest times, been the subjects of much and varied legislation. In nearly every country, at some period in its history, penalties have been imposed upon male celibates through the legislative branch of the government, the general basis for such legis¬ lation being the principle that the citizen was under moral obligation to the state to rear up a family of legitimate children, at least should he be capable, morally, physically and finan¬ cially. The old Jewish command to ((be fruitful and multiply** was faithfully carried out by the Hebrews who regarded marriage as a duty.

In such nations as Sparta, where individual interests were always subservient to those of the state, the laws were more severe, and criminal proceedings were instituted, under the laws of Lycurgus, both against those who for any unreasonable excuse failed to marry, and against those who through marriage in late life made probable children of unhealthy con¬ stitution. At Athens, though formerly regarded as a crime by the laws of Solon, celibacy was not severely punished, and later, though the practice was discouraged, interference with the inclinations of individuals in this respect grad¬ ually became of little practical value, and the laws finally fell into disuse.

In Rome, the imposition of heavy penalties upon male celibates was instituted at a very early period, and later even women were sub¬ jected to the same rigid laws. According to the Lex Julia et Papia Poppcca, penalties were im¬ posed on those who failed to marry after a certain ageˆ and an unmarried person could not come into possession of a legacy un¬ less he be married within a hundred days after the testator's death. The provisions of the law allowed widows a year in which to comply, and divorced women six months from the date of divorce, but these pe¬ riods were later changed and extended to two years, a year and six months, respectively. This law did not apply, however, to men above 60 years of age, and women above 50 years. In cases of childless persons (males from 25 to 60 years of age, and females from 20 to 50 years) who should become beneficiaries under a legacy, one-half of the value of such legacy was for¬ feited. In later years, especially in England, France and the United States, taxes upon bachelors have been proposed more for pur¬ poses of state revenue than to compel marriage, but though such legislation has been pushed in some instances with great vigor, the success of the movement has not been marked.

BACHELOR, a local name in the Missis¬ sippi Valley for the small

bass, more usually called crappie (q.v.).

BACHELOR'S BUTTON, the double yel¬ low buttercup (Ranunculus acris). Similar forms, as R. aconitifolius, are often called white bachelor's buttons. The name is also given to Centaur ea cyanus (see Cornflower) and to Gomphrena globosa.

BACHER, biiH'er, Wilhelm, Jewish theo¬ logian and Orientalist : b. Lipto-Szent-Miklos, Hungary, 1850; d. 1913. He was educated in the universities of Budapest and Breslau and at the Jewish Theological Seminary of Breslau. He was appointed professor in 1877 and in 1912 director of the rabbinical public schools of Budapest. He published (Nizamis Leben und Werke) (1872) ; (Die Agada der Babylonischen AmoraeH (1878) ; (Die Agada der Sannaiten) (2 vols., 1889-90) ; (Die Agada der Palastinensischen AmoraeU (3 vols., 1892-99) ; (Die Anfange der Hebraischen Grammatik) (1895); Ein Herbaisches Worterbuch aus dem Vierzehnten Jahrbundert) (1900) ; (Die Agada der Tannaiten und Amoraer; Bibektellenregis-ter) (1902) ; (Aus dem Worterbuche Tanchum Jeruschalemis) (1903).

BACHIAN, or BATJAN, bach-yan', one of the Molucca Islands, immediately south of the equator, and southwest of Gilolo ; area, 914 square miles. It is ruled by a committee of native chiefs under the Dutch, and has a pop¬ ulation of about 13,000.

BACHMAN, ba'man, John, American cler¬ gyman and naturalist : b. Dutchess County, N. Y, 4 Feb. 1790; d. 25 Feb. 1874. He became pastor of a Lutheran church in Charleston, S. C., and published, among other works, Charac¬ teristics of Genera and Species as Applicable to the Doctrine of the Unity of the Human Race) (1854). He is best known by reason of his association with Audubon in the making of the (Quadrupeds of North America, > he writing the principal part of the text, which Audubon and his sons illustrated.

BACHMUT, or BAKHMUT, bach-moot', Russia, a town of the government of Ekaterinoslav, with a trade in cattle and tallow. It has

coal mines and salt wells, and soda is ex¬ tensively manufactured. Pop. 19,500.

BACHTOLD, Jakob, German literary historian: b. Schleitheim, Switzerland, 1848; d. Zurich 1897. He was educated at Heidelberg and later studied at Munich, Tubingen, Paris and London, and in 1872 became an instructor in the Solothurn Gymnasium. He was ap¬ pointed professor of the German language and literature at Zurich in 1888. His most import¬ ant works are (Geschichte der deutschen Litteratur in der Schweiz y (1887-92) ; (Deutsche Handschriften aus dem Britischen Mu¬ seumˆ (1873) ; (Gottfried Kellers Leben) (3 vols., 1894—97). He also edited Goethe's (Gotz von Berlichingen) (1882) (Iphigenia) (1883) ; (Dichtung und WahrheiD (1890-91). With Vetter he edited the (Bibliothek alterer Schrift-werke der deutschen Schweiz und ihres Grenz-gebietesP Vetter published (Kleine Schriften von Jakob BachtokP (1899).

BACILLUS. See Bacteria.

BACK, Sir George, English explorer: b. Stockport, 6 Nov. 1796; d. London, 23 June 1878. He entered the British navy in 1808, and in 1817 was in the expedition to Spitzbergen. He accompanied Sir John Franklin to the Arctic regions in 1819 and again in 1825, and in 1833 led a party in search of Sir John Ross, then in the Arctic Ocean, and in 1836, in com¬ mand of the Terror, made his last trip to the north. The Geographical Society awarded him a gold medal in 1837, and in 1839 he was vol. 3—2

knighted. He became admiral in 1867. Among his works are (A Narrative of the Arctic Land Expedition > (1836) ; a (Narrative of the Expe¬ dition in Her Majesty's Ship Terror > (1838).

BACK BAY, a fashionable residential dis¬ trict in Boston, made by filling in an enlarge¬ ment of the Charles River, formerly called the Back Bay. See Boston.

BACK LAND, name applied to the region around the Arctic Circle, in British North America. It was explored by Captain Back in 1831.

BACK-STAFF, an instrument invented by Captain Davies, about a.d. 1590, for taking the altitude of the sun at sea. It consisted of two concentric arcs and three vanes. The arc of the longer radius was 30°, and that of the shorter one 60° ; thus both together constituted 90°. It is now obsolete, being superseded by the sextant.

BACKBITE, Sir Benjamin, an evil-minded, sharp-tongued character in Sheridan's comedy, (School for Scandal.)

BACKER, Jakob, Dutch painter: b. Haer-lingen 1608; d. 1651. He was a pupil of Lam¬ bert Jakobsz at Leuwarden and later of Rem¬ brandt at Amsterdam. His work shows the influence of the latter. His greatest master¬ pieces are (Lady Regents of the Amsterdam Orphan Asylum, > still in place, and the (Guild of Archers* in the Amsterdam Town Hall.

BACKGAMMON is a game in which two opposing players move symbolic men into or out of each other's territory on a board, ac¬ cording as they are respectively entitled to do so by the throw of dice. Without question a game of that nature was played among the Aztecs of Mexico centuries before the landing of Cortez, and it is probable that it was brought from Asia to the Pacific coast by the original immigrants. Francisco Lopez de Gomara de¬ scribed it in 1552, and Joan de Torquemada in 1616 gave additional details of the game, men¬ tioning that the little stones of each contestant varied in color. The Iroquois Indians had a dice game of a somewhat similar sort. Modern backgammon is played by two players who have between them a board, each side of which has alternate black and white angular marks projecting like rays from the rim. Each player has 15 flat tablets (similar to those with which drafts is played) called men. One player's men are black, the others are white. Each player has a dice box for his own use but the two dice are used alternately by them both. Each die has a number on each face numbered from one spot to six. Each player throws the dice in turn on to the centre of the board : and moves two men, one man according to the dis¬ tance indicated by one of the dice and the other according to the number on the second dice. So the game proceeds in the usual manner, the players throwing and moving their men alter¬ nately into and out of each other's territory, until one player has carried all the men from the opposite home (or inner table) into the outer table : and thence into his own outer table and finally into his own home or inner table. The simplest textbook on the subject is that of A. Howard Cady. Consult also Pardon -and Anderson, (Backgammon and Draughts-* (New York 1889).

BACKHAUS, Wilhelm, famous German pianist : b. Leipzig, 26 March 1884. When seven years of age, he received regular piano instruction from A. Reckendorf. He also spent four years (1894-98) at the Leipzig Conserva¬ tory, during which period he continued his studies with Reckendorf. He also studied for a time at Frankfurt under Eugen d'Albert, and began his concert career in 1900, when his success was immediate and complete. He won immediate recognition in England and in 1905 was appointed professor of piano at the Royal College of Music, Manchester. He won the Rubinstein Prize in the same year and there¬ after gave all his time to concert tours. He visited America in 1912 and received generous recognition. He is ranked among the most artistic of living pianists.

BACKHUYSEN, bak'hoi-zen, or BAKHUYSEN, Ludolf, celebrated painter of the Dutch school, particularly in sea pieces : b. Emden, 18 Dec. 1631 ; d. 1709. His most famous picture is a sea piece which the burgo¬ masters of Amsterdam commissioned him to paint as a present to Louis XIV, and which is still at Paris.

BACKLOG STUDIES, by Charles Dudley Warner, was first published in book form in 1872, though most of the papers had already appeared in Scribner's Monthly. The title Studies55 may be misleading, since the pleasant, informal personal essays touch but lightly on any question of literature, art or politics, and do not go deeply into the philosophy of life. They celebrate, as a sort of central theme the joys of the open fire, and they call up for brief comment many of the things that might be dis¬ cussed by an intelligent family group about the hearth — contemporary fashions in church and in domestic architecture, the ways and the whims of reformers, the influence of cos¬ tume on acting, *etc.* Some, though not usually the best, parts are in the form of conversa¬ tions in which The Mistress, The Fire-Tender, Our Next Door Neighbor, The Young Lady who is Staying with Us, and others take part; but usually the author speaks in his character as an alert and slightly whimsical New Eng¬ lander. To readers of American essays the book naturally calls to mind the (Breakfast-Table) series by Dr. Holmes, and less forcibly the lighter writings of Donald G. Mitchell. Notwithstanding a strong protest in one of the studies against the comparative method in criti¬ cism, it may be said that these papers, though sometimes almost over-clever, are less brilliant and less urbane than the <(Autocrat of the Breakfast-Table,5 and are freer from excess of sentiment than the (Reveries' of a Bache¬ lor.5

William B. Cairns.

BACKLUND, Johan Oskar, Swedish as¬ tronomer: b. Lenghem 1846. In 1875 he was appointed lecturer at the University of Upsala, and became assistant at the Stockholm Obser¬ vatory 1876, and in the same year observator at the Dorpat Observatory. Later he became adjunct-astronomer at the Pulkowa Observa¬ tory, Russia, and in 1895 was appointed direc¬ tor there. His investigations have been chiefly concerned with the progressive decrease in the period of Encke's comet, and in this connec¬ tion he has formulated his well-known <(theory

of disturbances.® He has published Observa¬ tions de Pulkowa5 (1888) ; and (The Develop¬ ment of Celestial Mechanics during the Nine¬ teenth Century5 (1906).

BACKUS, Azil, first president of Hamilton College, Clinton, N. Y. : b. Norwich, Conn., 13 Oct. 1765; d. 9 Dec. 1817. After graduation at Yale in 1787, he served the church at Bethle¬ hem, Conn., until he became president of Ham¬ ilton College in 1812.

BACKUS, Isaac, Baptist clergyman and author: b. Norwich, Conn., 9 Jan. 1724; d. 20 Nov. 1806. He was ordained in 1748 and be¬ came pastor of a Congregational church in Middleborough, Mass. Some of his congrega¬ tion sympathizing with the Baptists he united with them and formed a Baptist church in 1756. Throughout his life he was a persistent advocate of the widest religious freedom, hold¬ ing open communion for many years. For 34 years he was a trustee of the present Brown University, then Rhode Island College. As a delegate to the convention that adopted the Federal Constitution, he voted in its favor. Of his numerous writings the most important is (A History of New England with Special Ref¬ erence to the Baptists5 (3 vols., 1777-96; new ed. by D. Weston, 2 vols., 1871), a partisan but valuable work. His (History of Middleborough5 is in Massachusetts Historical Society Collec¬ tions (Vol. Ill, 1st Series, 1794; repr. 1810).

BACKUS, Truman Jay, American educa¬ tor: b. Milan, N. Y., 11 Feb. 1842; was grad¬ uated at the University of Rochester in 1864; was professor of English literature at Vas-sar College, 1867-83 ; then became president of the Packer Collegiate Institute in Brooklyn, N. Y. After going to Brooklyn, he served on several State commissions. His publications in¬ clude (Great English Writers,5 (Outlines of English Literature,5 and a revised edition of Shaw's (History of English

Literature.5

BACLER D'ALBE, ba'klar', dalb', Louis Albert Ghislain, Baron, French artist, soldier and military cartographer: b. 1762; d. 1824. He served in all of Napoleon's campaigns and at¬ tained the rank of brigadier-general. Two cel¬ ebrated paintings by him, (The Battle of Ar¬ eola,5 and (The Battle of Rivoli,5 are in the gallery of Versailles. He published (Carte du theatre de la guerre en Italie5 (54 parts, 1802) ; and (Souvenirs pittoresques contenant la campagne d'Espagne5 (1824), and among other works a series of fine lithographic views.

BACON, Albion Fellows, American social reformer: b. Evansville, Ind., 1865; sister of Annie Fellows Johnston (q.v.). She married Hilary E. Bacon, of Evansville, in 1888. She early became noted as an organizer and leader of men's circles of <(Friendly Visitors55; was leader of the Flower Mission for five years, and organizer of the Anti-Tuberculosis League, Monday Night Club, Working Girls' Associa¬ tion; director of the National Housing Asso¬ ciation ; and closely connected with the District Nurse Circle, Civic Improvement Society, State Federation of Women's Clubs and other similar organizations. She became noted as the author and leading advocate of the State tenement law of 1909, and is known as a lecturer and writer on tenement reforms. Author of (Songs Ysame5 (with her sister, Annie Fellows Johns-

ton, 1897) ; 'What Bad Housing Means to the Community* ; (The Awakening of the State*

(1911).

BACON, Alice Mabel, American educator : b. New Haven, Conn., 26 Feb. 1858; d. 2 May 1918; educated privately and took the Harvard examinations in 1881 ; taught at the Hampton Normal and Agricultural Institute in 1883-88, and in Tokio, Japan, in 1888-89; returned to the Hampton Institute in 1889, and founded the Dixie

Hospital for training colored nurses in 1890. She published (Japanese Girls and Women, *Japanese Interior,* 'In the Land of the Gods) (1905), *etc.*

BACON, Augustus Octavius, American legislator : b. Bryan County, Ga., 20 Oct. 1839 ; d. Washington, D. C., 14 Feb. 1914. He was graduated from the University of Georgia in 1859, from the law department of the University in 1860; entered the army of the Confederate States at the beginning of the Civil War, and was adjutant of the 9th Georgia regiment in the Army of Northern Virginia, and later pro¬ moted captain and assigned to general staff duty ; and in 1866 began the practice of law at Macon, Ga. In 1880 he was president of the State Democratic convention, and in 1884 a delegate from the State at large to the na¬ tional Democratic convention. He was a mem¬ ber of the Georgia house of representatives in 1871-82, 1892 and 1893, and for the greater part of the time its speaker. Elected to the United States Senate in November 1894, he was reelected in 1900, 1907 and 1913 — the last time by direct popular vote. Upon the death of Vice-President Sherman he was, al¬ ternately with Senator Gallinger, president pro tempore of the Senate, in which capacity he presided at the impeachment proceedings against Judge Archbold in 1912. In 1913 he was chair¬ man of the Senate committee on foreign re¬ lations, where his conservative attitude toward Mexico was effective in delaying radical action by Congress. He was a trustee of the Univer¬ sity of Georgia and a regent of the Smithson¬ ian Institution.

BACON, Benjamin Wisner, American theologian: b. Litchfield, Conn., 15 Jan. 1860; studied in Germany and Switzerland; and was graduated at Yale College in 1881 ; held several important Congregational pastorates ; and in 1896 became professor of New Testa¬ ment criticism and exegesis in Yale University. Author of 'Genesis of Genesis) (1891) ; 'Triple Tradition of the Exodus) (1894) ; 'Introduction to the New Testament* (1900) ; (The Ser¬ mon on the Mount) (1902) ; (The Story of Saint PauP (1904) ; beginning of Gospel Story* (1909) ; (Founding of the Church*

(1909); Commentary on Galatians) (1909); 'The Fourth Gospel in Research and Debate* (1909) ; (Jesus the Son of God* (1911) ; tak¬ ing of the New Testament* (1912) ; 'Theodore T. Munger, New England Minister* (1913) ; Christianity Old and New* (1913).

BACON, Delia Salter, American author: b. Tallmadge, Ohio, 2 Feb. 1811 ; d. 2 Sept. 1859. She was prominent in her day as a teacher, and wrote several stories, but is now remembered as an insistent

advocate of the theory that the plays of Shakespeare were written by her name¬ sake, Lord Bacon. She did not originate the idea, but was the first to give it any currency, in

her ‘Philosophy of the Plays of Shakespeare Unfolded* (1857). The book had the honor of a preface from the pen of Nathaniel Hawthorne, and the theory was accepted by a few persons in both England and the United States. I. Don¬ nelly (q.v.) and others wasted not a little in¬ genious reasoning in its advocacy.

BACON, Edwin Munroe, American author : b. Providence, R. I., 20 Oct. 1844; d. 24 Feb. 1916. After an academic education, he was on the staff of several Boston papers; and wrote ‘King’s Handbook of Boston*; ‘Boston Illus¬ trated* ; ‘Historic Pilgrimages in New Eng¬ land* ; ‘Literary Pilgrimages in New England* ; ‘Boston of To-day*; ‘Bacon’s Dictionary of Boston* ; ‘Walks and Rides in the Country Round About Boston* ; ‘Walks on the North Shore*; ‘Massachusetts Bay* (1903); ‘Yester¬ days in Journalism* ; ‘Direct Election and Law Making by Popular Vote,* *etc.*

BACON, Francis, English statesman, phi¬ losopher and essayist: b. London, 22 Jan. 1561; d. Highgate, London, 9 April 1626. Bacon was commonly called Lord Bacon in accordance with long literary tradition, though his exact titles in the peerage were Baron Verulam and Vis¬ count Saint Alban. He was the youngest of eight children of Sir Nicholas Bacon, the Lord Keeper, six of whom were by a former mar¬ riage. His mother was Ann, daughter of Sir Anthony Cooke, and her sister married Sir William Cecil (Lord Burghley). The family thus stood in a position of exceptional influence at the court of Elizabeth, but Bacon profited little by the fact in his official career. He entered Trinity College, Cambridge, in 1573 and was admitted to Gray’s Inn in 1575. In 1576 he went to France as a member of the embassy of Sir Amias Paulet, and remained there until the death of his father in 1579. It then became necessary for him to return to England and take up his legal studies with a view to pro¬ fessional practice. In 1582 he was admitted to the bar. Already before this time he had entertained hopes of a political career and had made unsuccessful appeals to Lord Burghley for support; and in 1584, being elected to Par¬ liament from Melcombe Regis, he began a long and conspicuous service in the House of Com¬ mons. He produced at once a political docu¬ ment, entitled ‘A Letter of Advice to Queen Elizabeth,* in which the religious situation, and particularly the Catholic question, was discussed with wisdom and moderation. In 1589 he wrote a second paper, ‘An

Advertisement Concerning the Controversies of the Church of England,* reiterating his policy of moderation with more especial reference to Puritanism. Bacon's nat¬ ural instinct, in both religious and political controversies, was conciliatory, and he exerted himself in favor of moderate measures through¬ out Elizabeth's reign and after the accession of James. He manifested also, at the beginning of his career, some power of acting with disinter¬ ested independence, — a capacity which was less evidently displayed in his later life. In 1593 he led the opposition of the Commons to the proposal of the Lords for a joint settlement of a question involving subsidies and thus falling within the prerogatives of the lower House. In his prolonged resistance to the subsidy legis¬ lation he earned the disfavor of both Burghley and the Crown. His opposition, which was ap-20

parcnlly conscientious, may have been the cause of his failure to obtain the vacant attorney-generalship in 1594 and the solicitor-generalship in 1595, though in the former instance his claim was urged by Essex and in the latter by both Essex and Burghley. The attorney-generalship was given to Sir Edward Coke, who was re¬ peatedly a rival and enemy of Bacon's in later years.

Bacon's association with Essex, which con¬ stituted one of the most important of his per¬ sonal relations, began in 1591. He attached himself to the rising young nobleman in the hope of obtaining political advancement. But it is not necessary to deny him all sentiment of personal attachment or all real belief in the availability of Essex for the public servicd. He received from Essex earnest patronage, as has been already shown, and when recommendations failed, Essex gave his follower a valuable estate by way of consolation. In 1597 Essex tried to arrange a marriage between Bacon and Lady Hatton, but Coke again proved a successful rival. Bacon, on his side, undertook to advise Essex and to manage his career at court. In 1598 he appears to have urged him (though he afterward denied it) to attempt the suppression of Tyrone's Irish rebellion, — an undertaking which led to the dismissal of Essex from office in disgrace. Bacon's conduct in the investiga¬ tion is hard to trace, but he may perhaps be granted to have acted in the interests of Essex, though he was formally one of his prosecutors. Later, however, in 1601, when Essex rebelled openly against the throne, Bacon helped to secure his conviction, and

after his execution prepared the official declaration of his treasons. For this active, and apparently unnecessary, participation in the prosecution of his friend Bacon has probably received more blame than for any other act of his life. It may be urged in extenuation that Essex was actually a dan¬ gerous person to the state, and that Bacon steadily warned him that he would not prefer the claims of friendship to the public good. It is true, too, that Bacon's position was difficult as between such a reckless friend and the jealous and imperious queen whose favor he desired both for his friend's interest and his own. Yet in the last analysis there is little defense to be made for Bacon's willingness to profit by the ruin of Essex.

After the accession of James I Bacon con¬ tinued his active service in Parliament. He published papers on the religious situation and on the union of the English and Scottish crowns, and he served on a commission to ar¬ range the terms of the union. In 1603 he was knighted, and in 1604 given a pension of £60. In 1605 he offered to King James the very important treatise on the Advancement of Learning, > which will be more particularly dis¬ cussed below among Bacon's writings. In 1606 he married Alice Barnham, a London alder¬ man's daughter, who brought him a substantial dowry. He had no children. Little is known of his domestic life except that it ended un¬ pleasantly. In his last will he revoked <(for just and grave causes® such provisions as he had made earlier for his wife's benefit. In June 1607, Bacon's long deferred advancement came and he was made Solicitor-General. At this period the unfortunate estrangement be¬ tween the King and the Commons was steadily

progressing, and Bacon, who clearly saw the danger that attended upon this breach of sympathy, took an earnest part in the struggle. Quite apart from his personal aims, he seems to have been genuinely distrustful of the gov¬ ernmental capacity of the Commons and con¬ sequently to have espoused the cause of the monarchy, becoming, as he described himself, a ˆperemptory royalist.® His policy was doomed to failure; but it is only just to recog¬ nize that it had elements of moderation and statesmanship, contemplating to be sure the royal prerogative, yet aiming at religious tolera¬ tion, the amelioration of the lot of the humbler classes, and a friendly relation with Parliament. After the death of Salisbury in 1612 he under¬ took to manage the King's interests, and in the Parliament of 1614 he continued his efforts to reconcile the Crown and the people by the policy to which in (Commentary > he gives the name (<e Gemino.® But his attempt was unsuccessful ; the Parliament was dissolved, and the King and the

people took different courses. From this time forth Bacon seems on the whole to have relinquished his higher political aims and to have given himself over to the struggle for per¬ sonal advancement. In politics, as in friend¬ ship, he was incapable of serious self-sacrifice; or at least he always persuaded himself that he could best serve the public good by having due regard to his own interests.

In 1613 he had been promoted to the at¬ torney-generalship. In 1615 he prosecuted Baron St. John for denouncing benevolences, and in the same year he consented to the torture of Edmund Peacham, who was charged with hav¬ ing written a treasonable sermon. He came in the latter case into conflict with his old enemy, Coke, who denied Peacham's guilt, and who also objected to the separate consultation of the judges by the Attorney-General. In 1617 Bacon helped to secure Coke's removal from the King's Bench for insufficient subserviency to the Crown. Coke's personal independence throughout the controversy has been often praised, and stands in favorable contrast with Bacon's self-seeking policy. At the same time it should be remembered that there was in¬ volved a real issue between the legal and the political powers, and that Bacon, in resisting Coke's effort to make the court an arbiter of the. Constitution, was fighting for the principle which actually prevailed, though under changed conditions, in English government.

Bacon took part in 1616 in the prosecution of the Earl of Somerset for the murder of Sir Thomas Overbury, and after Somerset's fall he attached himself with ardor to George Villiers, the King's new favorite, in whom he seemed, along with many others, to be for the time genuinely deceived. Through Villiers (after¬ ward Earl and Duke of Buckingham) Bacon received a succession of royal favors. In 1616 he was made Privy Councillor, in 1617 Lord Keeper and in 1618 Lord Chancellor. In July 1618 he was elevated to the peerage as Baron Verulam, and in 1621 he was made Viscount St. Alban. But his adherence to Bucking¬ ham, who was growing steadily unpopular, led at last to disaster. In 1621 the Commons, led by Coke, would have called Bacon to account for defending Buckingham's increase of monopoly patents, if the King had not inter¬ fered. Thereupon they sent to the Lords a

formal accusation that Bacon had taken bribes from suitors in his court. Bacon at first treated the charges with unconcern. Then, when he found that the Lords meant to investigate them seriously, he collapsed and offered no defense. He was fined £40,000, imprisoned and banished from Parliament and the court. In June 1621, he was released from the Tower, and retired to his family residence at Gorham-bury; and in September of the same year the King pardoned him, though without restoring him to Parliament and the court. Bacon begged both James and Charles without avail for a further remission of his penalty. While admitting the justice of his condemnation, he protested that there had been no j uster judge in England for 50 years ; and there is of course an important difference between corruption and perversion of justice. Although he constantly accepted gifts from suitors while their cases were pending, it does not appear that he ever perverted justice for money, and some of the cases urged against him were those in which the suitors had lost after giving him gifts. But this record is not so clear in cases where Buckingham interposed to ask favor for his friends, and in at least one instance he allowed a decision of his court to be practically set aside at that favorite's request.

Forbidden to re-enter the field of politics, Bacon devoted the last years of his life to the literary and scientific labors which had always divided his time and which he had professed to regard as his real and proper work; and he met his death as a result of a scientific experi¬ ment. In March 1626, he caught cold while stuffing a fowl with snow in order to observe the effects of refrigeration on the preservation of meat. On 9 April he died of what is now known as bronchitis at the house of Lord Arundel, where he had been carried at the time of his attack. He was buried in Saint Michael's Church, Saint Albans.

Bacon's Writings. — From early youth, if tradition can be trusted, Bacon showed extraor¬ dinary mental powers and a keen interest in philosophical pursuits.. Throughout his life his labors in authorship kept pace closely with his political work, and prone as he was to yield to the temptations of wealth and power, he seems really to have accorded the first place in life to what he called his <(contemplative aims.® His strictly philosophical writings may, therefore, properly

claim first attention among his works. At the age of 23 he produced an essay which bore the ambitious title, ‘The Greatest Birth of Time, or the Great Renewal of the Empire of Man Over the Universe. > The work is now lost, but the title shows that the young author had already conceived some no¬ tion of a <(great instauration.® The (Partus Masculus Temporis) (“The Male Birth of Time®), a fragment which is also of early date, is perhaps a modification of previous work. It contains little more than an attack on the false fancies (((idols®) of the older philosophies, and is Bacon’s first plea for a rational union be¬ tween the mind of man and the universe. The Conference of Pleasure) (written for Essex in 1592), (Gesta GrayorunP (1594), and the ‘Device on the Queen’s Day* (1595) are not primarily philosophical works, but they contain many expressions of Bacon’s intellectual ideals; and in the ‘Gesta Grayorum* there is an elabo¬

rate proposal for the endowment of libraries, museums and establishments of research. ‘Valerius Terminus, of the Interpretation of Nature, with the Annotations of Hermes Stella) (written about 1603) is a fragmentary treatise anticipating some of the most familiar matter in the later philosophical works. In it Bacon defends the study of science from the charge of impiety, urges the importance of an encyclopedic survey of human knowledge, and mentions for the first time (though without ex¬ plaining them) the four classes of “idols® which were afterward discussed in the ‘Novum OrganumP In 1605 Bacon presented to King James an English treatise of enduring value, ‘The Advancement of Learning.) This was a splendid attempt to defend and magnify the pur¬ suit of learning and then to survey the existing state of human knowledge. Part of the argu¬ ment of the first part has lost its cogency, or even its relevancy, to-day. But in breadth of view and fertility of suggestion the work is extraordinary. As a statement of intellectual ideals, and a program, or even a prophecy, of their accomplishment, it stands among the most significant productions of the Renaissance. When Bacon sketched a few years later the plan of his ‘Great Instauration,* he designated the ‘Advancement of Learning,* as a temporary fill¬ ing of the first place on the “partitiones scien-tiarum,® and in his last years he made a greatly amplified Latin translation of it (‘De Aug¬ ments et Dignitate Scientiae*) to be incor¬ porated in the great work. In 1606-07 he pub¬ lished the ‘Outline and Argument *(‘Delineatio et Argumentum*) of the second part of the Installation, giving a brief general account of his new induction. In 1607 the ‘Cogitata et Visa de Interpretatione Naturae, sive de Scientia Operativa) were published as an introduction to some investigations on motion. The ‘Cogitata) cover most of the

ground afterward traversed in the first book of the ‘Novum OrganumP The ‘Redargutio PhilosophiarumP (1609), one of the best specimens of Bacon’s Latin style, contains an imaginary speech of a French philosopher to his disciples, and sets forth anew the author’s ideas about the fruitlessness of the older philoso¬ phies. The ‘De Sapientia Veterum,* though it lies outside the immediate scheme of the ‘Instauration) and might perhaps be mentioned rather among Bacon’s literary works, is a very characteristic production containing an expo¬ sition of his theory of ancient mythology as an allegorical embodiment of moral and scientific wisdom. This primitive wisdom he was fond of extolling to the disparagement of the later philosophy of Aristotle, against which he was in revolt. In 1611 and 1612 fall a number of scientific treatises of less importance. Not until 1620, after his long struggle to political power and on the eve of his fall, did Bacon publish the ‘Novum Organum,* though much of its material had been anticipated in his earlier writings. Prefixed to the work is a “distributio operis® for the whole ‘Instaura-tionP which was planned to contain the fol¬ lowing parts: 1. Partitiones Scientiarum (rep¬ resented temporarily by the English ‘Advance¬ ment of Learning*) ; 2. Novum Organum (the new instrument of inductive method) ; 3. Phe¬ nomena Universi; 4. Scala Intellectus (by which fanciful title he meant to indicate the operation of the new method in passing gradu-22

ally from less general to more general principles <(per scalam veram®) ; 5. Prodromi Philosophise Secundae (to contain such tentative discoveries as Bacon had made without using the new method) ; 6. Philosophia Secunda, sive Scientia Activa (a final embodiment of the results of the new philosophy). The first book of the (Novum OrganunV was still introductory in character, discussing the uselessness of the older philoso¬ phies, the traditional errors of mankind, and the grounds of hope in the future of science. Ba¬ con’s optimistic devotion to science has been not ineptly compared with that of the young Renan. His classification of the ((idols® (phantasms or delusions) of the tribe, the cave, the market¬ place and the theatre, has become a literary commonplace. In the second book the new induction itself is finally expounded and illus¬ trated by a study of the nature of heat. The exposition is incomplete and falls short, as in the nature of things it was bound to, of what Bacon himself apparently hoped to achieve, namely, a mechanical method of invention. Ba¬ con

never pursued the theory further, and in his later works he turned from the new method, or instrument, toward other parts of his great scheme. The (Parasceve ad Historian! Natura-lem) (1620) is a brief and incomplete prepara¬ tion for the third part of the Instauration, and was followed in 1622 by the (Natural and Ex¬ perimental History for the Foundations of Phi¬ losophy, or Phenomena of the Universe, being the Third Part of the Great Instauration.) This treatise which was to take up winds, density and rarity, gravity, sympathy and antipathy of things, and a variety of other topics, was also left in a fragmentary state. In 1623 appeared the <De AugmentisP which was to supersede the English Advancement of Learning> as the first portion of the Instauration. Probably about 1624 Bacon wrote the (Sylva SylvarunV (pub¬ lish in 1627), an ill-classified collection of materials for natural history. Its contents be¬ long in considerable degree to the realm of folk¬ lore and superstition, and Bacon's detractors have found in the work some of their best grounds of attack on his character as a man of science. It was his belief, however, stated in the Advancement of Learning,) that a collec¬ tion and comparison even of the erroneous opinions of mankind might give useful guidance in the pursuit of truth. Under the titles (Scala Intellectus) and (Prodromi sive Anticipationes Philosophise SecundS Bacon wrote at a later, but uncertain, date two mere prefaces which filled the fourth and fifth gaps in the (Instaura-tionP They were his last philosophical writ¬ ings.

Bacon's position in the history of science and of philosophy has been very differently esti¬ mated. He constructed no philosophical system, and one would search his writings in vain for much discussion of the great problems which have divided the schools of metaphysics since Descartes. As a man of science his shortcom¬ ings are still more notable. He was commonly unsuccessful in his own investigations and ill-informed about the best work of his contem¬ poraries. He was hardly possessed at all of what is now understood by the scientific mind. Yet there is much justification for the tradi¬ tional view of him as the father of modern philosophy and the primary instigator of modern scientific progress. If not the originator, he

made himself at least the leading exponent of the revolt against the Aristotelian, or more properly the scholastic, tradition, and he pro¬ foundly influenced the English realists of the next generations. In ethics his distinction be¬ tween ˆindividual or self-good® and ((good of communion® points forward to the doctrine of the later utilitarians. And science certainly owed him a large debt for the

formulation and urgent presentation of the (<new induction.® No one, of course, will maintain that Bacon in¬ vented induction. Macaulay, in his familiar account of the plain man and the minced pies, has made some sport of his claims to originality in this matter. But a more judicious estimate would recognize the high and lasting educa¬ tional value of the (Novum OrganumP And Bacon's broad outlook and fertile imagination enabled him to lay down the lines of scientific progress and to win recruits for the work. He furnished his followers not only with an im¬ proved method, but also with a more vital aim — that of practical service. In his revolt against Aristotle and the schoolmen he con¬ stantly dwelt upon the fruitlessness of the earlier philosophies, and one of the most elo¬ quent passages in the Advancement of Learning) sets forth the ideal of human service as the goal of scientific effort. This aim has come to be called Baconian, so much so that Bacon is often charged with having ignored or denied the more purely intellectual purposes. But the charge is extreme. He thought it wise, in view of the sentiment of his time, to emphasize par¬ ticularly the practical aim ; but he recognized veritas and a tilitas ((Novum Organum) I, Ap. 124) as co-ordinate ends of study. Finally, in spite of his deficiencies in investigation, Bacon made some noteworthy discoveries in pure science. His explanation of heat as a mode of motion is quoted by Tyndall as a striking an¬ ticipation of the modern doctrine. On the whole, however, it was as a prophet or leader, rather than as a productive scholar, that Bacon served learning best.

By far the greater part of Bacon's writings (apart from his state papers, legal works and copious personal memoranda) dealt with phi¬ losophy and science, and bore directly or indi¬ rectly upon the construction of the (Great In¬ stauration.) Some of his more important state papers have been already mentioned in the ac¬ count of his life. His strictly professional writings (treatises on English law) will be found in the seventh volume of the Spedding and Ellis edition of his collected works. His personal memoranda, which permit an intimate view of his life and character, are published in Spedding's (Letters and Life1* (the highly characteristic (Commentarius SolutusP of the year 1608, in the fourth volume). Besides all these productions of his scholarship and his professional life he made eminent contribu¬ tions to history and to pure letters. His his¬ tory of Henry VIP (1621), which has been accepted by later scholars as essentially sound, ranks with the best historical writing of its age in England. Bacon wrote also a memorial of Elizabeth ((In Felicem Memoriam Elizabeths (1607); another of Henry, Prince of Wales, who died in 1612, and fragments on the reign of Henry VIII and on the accession of James I.

In pure literature Bacon's reputation rests chiefly on three works: the Advancement of Learning) (which has been already discussed), the Assays* and the (New Atlantis.* The first two of these, curiously enough, he trans¬ lated, or had translated, into Latin in order to secure them a wider and more permanent public. The (New Atlantis* (first published by Rawley in 1627, but probably written between 1622 and

1624) , is a fragmentary sketch of an ideal com¬ monwealth, and in particular of an ideal ((palace of invention® called ((Solomon's House,® — a great establishment of scientific research such as Bacon longed to see founded. The book, which expresses the idealistic spirit of the Renaissance, shows Bacon at his best. The description of Solomon's house is said to have led to the establishment of the Royal Society. The Assays,* which were designed to (<come home to men's business and bosoms,® are better known than anything else that Bacon wrote. They deal with many subjects and are char¬ acterized by ripe reflection and consummate mastery of style. Bacon had them in hand dur¬ ing the greater part of his mature life. He published the first edition in 1597, and twice re¬ vised and enlarged the collection (in 1612 and

1625) . The title is supposed to have been sug¬ gested by the <Essais) of Montaigne, and there are occasional resemblances between the two works in subject matter; but Bacon was not largely indebted to any source, and his concep¬ tion of the essay was totally different from the personal and leisurely discourses of Montaigne. <(Brief thoughts, set down rather significantly than curiously,® was his own characterization of them in the dedication of the second edition ; and although some of the later essays contain passages of adorned and sustained eloquence such as were lacking in the earlier ones, the general type was maintained to the end.

A small number of religious works, in ele¬ vated thought and style, remain to be men¬ tioned: the (Meditationes Sacrse* (published in 1597), the (Confession of Faith* (written be¬ fore 1603), several

prayers, and Bacon's only accredited verse, (A Translation of Certain Psalms into English Verse) (1624). A poem on (The Worlds — <(The world's a bubble, and the life of man less than a span,® — is some¬ times ascribed to him, but is of doubtful author¬ ship. See Essays of Bacon.

Bibliography. — The dates of Bacon's chief works have been mentioned in the body of the article. The standard collected edition is that of Spedding, Ellis and Heath (London 1857— 59). Single works have in several cases been published separately with more elaborate anno¬ tation ; among the best of such editions being the (Novum Organum* by T. Fowler (Oxford 1878), the Advancement of Learning> by W. A. Wright (Oxford 1896), the < Essays *by Archbishop Whately (London 1856), E. A. Ab¬ bott (London 1896) and S. H. Reynolds (Ox¬ ford 1890), and the (New Atlantis* by G. C. Moore Smith (Cambridge 1900). A useful reprint of the three editions of the <Essays> has been published by Edward Arber, English Reprints, No. 27 (1871). For the life of Bacon the great source of original materials is Spedding's Aetters and Life of Bacon1* (7 vols., 1861). A brief digest of the material was is¬ sued in two volumes, (The Life and Times of Francis Bacon) (Leipzig 1878). Short biog¬

raphies of value have been written by R. W. Church, (Francis Bacon) (London 1884). Thomas Fowler, (Francis Bacon* (New York 1881), E. A. Abbott, (Francis Bacon, an Ac¬ count of His Life and Works* (London 1885), S. R. Gardiner (in the dictionary of National Biography*), and John Nichol, (Francis Bacon, His Life and Philosophy* (London 1898-99). Macaulay's essay on Bacon furnishes a brilliant though by no means just or satisfactory esti¬ mate of the man and his work. On Bacon's philosophical doctrines and influence one should consult, besides the standard histories of phi¬ losophy, Ellis's general introduction to the phil¬ osophical works, Kuno Fischer's (Francis Bacon of Verulam: Realistic Philosophy and Its Age* (Engl, translation by John Oxenford 1857), Fowler's elaborate commentary on the (Novum Organum* and his (Francis Bacon.* The history of Bacon's reputation and influence is treated with some fullness in Dr. Fowler's in¬ troduction to the (Novum Organum.* An idea of the arguments of Bacon's adverse critics can be derived from Joseph de Maistre, (Examen de la Philosophic de Bacon* (Paris 1836), Sir David Brewster, (Memoirs of the Life, Writ¬ ings, and Discourses of Sir Isaac Newton* (Edinburgh 1855), and Justus von Liebig, (Ueber Francis Bacon von Verulam und die Methode der Naturforschung* (Munich 1863) More recent studies are: Booth, W. S., (Some Acrostic

Signatures of Francis Bacon* (Bos¬ ton 1909) and Cunningham, G. C., Aid Bacon Die in 1626?* (Baconiana, series 3, London

1916).

Fred N. Robinson,

Professor of English, Harvard University.

BACON, Henry, American architect : b. Watseka, Ill., 28 Nov. 1866. He was graduated at the University of Illinois in 1888, where he won the Rotch traveling scholarship, under which he spent two years in study in Europe. From 1888 to 1897, with the exception of 1890-91, he was with the firm of McKim, Mead and White. In 1897 he helped form the firm of Brite and Bacon. Since 1903 he has practised alone. He has designed several important buildings and was the winner in the competi¬ tion for the Lincoln Memorial at Washington in 1913. He is a fellow of the American In¬ stitute of Architects and member of the National Institute of Arts and Letters.

BACON, John, English sculptor: b. Lon¬ don 1740; d. 4 Aug. 1799. In early life he was employed in modelling small porcelain orna¬ ments, and while yet an apprentice he formed a project for making statues of artificial stone. In 1763 he began to work in marble; and shortly afterward invented an instrument for transferring the form of the model to the marble. In 1768 he became a student of the Royal Academy, and next year he obtained the first gold medal for sculpture given by that society; the following year he was chosen an associate, and in 1778 made a full member. His chief works are two groups for the interior of the Royal Academy, the statue of Judge Blackstone for All Souls' College, Oxford ; an¬ other of Henry VI for Eton College ; the monument of Lord Chatham in Westminster Abbey; and the statues of Dr. Johnson and the philanthropist Howard in Saint Paul's Cathe¬ dral,

BACON, John Edmund, American lawyer: b. Edgefield, S. C., 3 March 1832; d. Columbia, S. G, 19 Feb. • 1897. He was graduated at South Carolina College, 1851 ; Litchfield (Conn.) Law School, and admitted to the bar, 1854. He was secretary of the United States legation at Saint Petersburg, and married a daughter of ex-Governor Pickens, then Minister to Russia. He resigned in 1860, entered the Confederate army, and rose to the rank of major. He was one of the negotiators for the restoration of South Carolina to the Union, 1866; and to him was chiefly due the reopening of South Carolina College by act of the legisla¬ ture in 1873. In 1886 he was appointed charge d'affaires in Uruguay and Paraguay.

BACON, John Mackenzie, English clergy¬ man and scientist: b. 1846; d. 1904. He was educated at Trinity College, Cambridge, and entered the ministry of the Church of England in 1870. In 1889 his publication, (The Curse of Conventionalism: a Remonstrance by a Priest of the Church of England,5 caused widespread opposition and led to his retirement from the ministry. He at once entered on the study of astronomy and aeronautics. He led two eclipse expeditions of the British Astronomical Asso¬ ciation — that to Buxar, India, in 1898, and that to Wadesboro, N. C., in 1900. He made a record voyage in English ballooning in 1899. He demonstrated that sound travels more rapidly downward than upward, and that the ocean floor is visible from great heights and can be photographed. His (By Land and Sky) (1900) contains accounts of his ballooning in¬ vestigations and the results of his experiments in acoustics, meteorology and other subjects. He published also (The Dominion of the Air5

(1902).

BACON, John Mosby, American military officer: b. Kentucky, 17 April 1844; d. Portland, Ore., 19 March 1913. He served in the Union army through the Civil War; was appointed captain in the 9th United States Cavalry, in 1866, and colonel of the 8th Cavalry in 1897. On 4 May 1898, he was appointed brigadier-general of volunteers and placed in command of the Department of Dakota. Subsequently, he was assigned to duty in Cuba, till 8 May 1899. He was retired in 1902.

BACON, Josephine Dodge Daskam,

American author: b. Stamford, Conn., 17 Feb. 1876. She was graduated at Smith College, A.B., 1898, being class orator on graduation, and while in college was editor-in-chief of the Smith

College Monthly. Since graduation has been continuously occupied with literature as contributor of stories and poems to magazines, and as author of books: (Sister's Vocation, and Other Stories) (1900); (Smith College Stories) (1900) ; (The Imp and the AngeP (1901); (Fables for the Fair5 (1901); (Whom the Gods Destroyed) (1902); (Poems) (1903);

(Middle-Aged Love Stories) (1903); (Memoirs of a Baby5 (1904) ; (Domestic Adventures5 (1907); (Ten to Seventeen5 (1907); (An Idyll of All Fools' Day5 (1908) ; (Margarite's Soul5 (1909); (In the Border Country5 (1909); (The Biography of a Bov5 (1910) ; (While Caroline was Growing5 (1911) ; (The Inherit¬ ance5 (1912); (The Strange Case of Dr. Stanchon5 (1913); (To-day's Daughter5 (1914);

(Open Market5 (1915). She also compiled (Best Nonsense Verse5 (1901).

BACON, Leonard, American clergyman: b. Detroit, Mich., 19 Feb. 1802; d. 24 Dec. 1881. He was graduated at Yale in 1820, and studied theology at Andover, Mass. In 1825 he became pastor of the First Congregational Church in New Haven, a post which he held officially, though not always actively, until his death. He was professor of didactic theology in Yale (1866-71). He was throughout his life an ac¬ tive opponent of slavery. In 1847 he joined with Drs. Storrs and Thompson to found the New York Independent, in the joint editorship of which he continued for 16 years. Besides a vast number of reviews and pamphlets, he published (Views and Reviews5 (1840); Slavery Discussed in Occasional Essays5 (1846); and (Genesis of the New England Churches.5

BACON, Leonard Woolsey, American

clergyman: b. New Haven, Conn., 1830; d. 1907. A son of Leonard Bacon, he was grad¬ uated at Yale in 1850, and was successively pastor of Congregational churches in Litch¬ field, Conn., Brooklyn, N. Y., and Stamford, Conn. He spent several years in Europe, and was engaged in Geneva as a student, preacher and writer. He returned to America in 1878, and from that year until 1882 was pastor of the Park Congregational Church of Norwich, Conn., and subsequently of other Congrega¬ tional and Presbyterian churches. He edited Luther's (Deutsche geistliche Lieder5 (New York 1883), and published CA Life Worth Living: Life of Emily Bliss Gould5 (1878); Urenics and Polemics, with Sundry Essays in Church History5 (1898) ; (History of

Amer¬ ican Christianity5 (1898); (Young People's

Societies,5 with C. A. Northrup (1900); <The Congregationalists5 (1904).

BACON, Nathaniel, American insurrec¬ tionary leader: b. Friston Hall, Suffolk, Eng¬ land, 2 Jan. 1642; d. 26 Oct. 1676. His great¬ grandfather was cousin to Lord Bacon; his mother, a Brooke, was daughter of a Suffolk knight. He entered Saint Catherine's College, Cambridge, in 1660; took M.A. 1667; studied law at Gray's Inn, London, and traveled on the Continent. He found life too straitened in England on the income his father allowed him, and the latter gave him £1,800 outright to emi¬ grate to Virginia, where his cousin, Nicholas Bacon, had been living since 1650. He arrived in the latter part of 1673 with a young wife, daughter of Sir Edward Duke, and soon became a member of the governor's council, as was his cousin ; and settled on a plantation some 20 miles below Richmond, on the James, called ((Curle's Wharf.55 He also had another on a part of the site of Richmond, the attack on which by the Indians was part of the raid that brought on the imbroglio known as "Bacon's Rebellion,55 which see for his career and fate.

BACON, Str Nicholas, English statesman and father of Francis Bacon: b. Chislehurst, 1509; d. 1579. He was graduated at Corpus Christi College, Cambridge, in 1527, and was called to the bar in 1533. He received a large property from confiscated monastery lands and was appointed attorney to the Court of Wards and Liveries. He stood in high favor with Edward VI, and although he was a stanch

Protestant, was not persecuted and even re¬ tained his office of attorney during the reign ol Mary. From 1558 to 1579 he was Lord High Chancellor and Keeper of the Great Seal under Elizabeth. By virtue of his office he presided over Elizabeth's first Parliament. He took a prominent part in the debates preceding the Act of Supremacy. He generally supported the policies of Cecil, his brother-in-law, al¬ though at times in favor of a stronger Prot¬ estant policy. His able

qualities as a states¬ man were invaluable at the critical period in English history when Elizabeth succeeded to the throne.

BACON, Robert, American diplomat: b. Boston, Mass., 5 July 1860; d. 29 May 1919. He was graduated at Harvard in 1880, and soon after entered the banking firm of Lee, Higginson & Company of Boston; from 1883 to 1894 he was a member of the firm of E. Rol¬ lins Morse & Brother and of J. P. Morgan & Company from 1894 to 1903, when he re¬ tired from active business life. He had been long a close student of foreign affairs and in 1905 was appointed first assistant Secretary of State under Elihu Root. When the latter entered the Senate in 1909 Mr. Bacon became Secretary of State, and in the same year was named by President Taft Ambassador to France, serving from 1909 to 1912. He was a member of the board of overseers of Harvard University, 1889-1901 and 1902-08, and was made a fellow of the University in 1912.

BACON, Roger, English monk and philos¬ opher: b. near Ilchester about 1214; d. 1294. Fie first entered the University of Oxford, and afterward went to that of Paris, where he seems to have distinguished himself much by successful study and teaching, and received the degree of doctor of theology. About 1250 he returned to England, where he entered the order of Franciscans, fixed his abode at Ox¬ ford, and devoted himself to his studies in natural philosophy, chiefly in alchemy, chem¬ istry and optics. Means were furnished him by generous friends of science, whose contri¬ butions enabled him to purchase books, to pre¬ pare instruments and to make the necessary experiments. In examining the secrets of nature he made discoveries and deducted re¬ sults which appeared so extraordinary to the ignorant, that they were believed to be works of magic and he was brought under suspicion as a dealer in the black art. There is clear evidence in his writings that he accepted the Aristotelian theory of stellar influence on the minds and wills of men, not indeed directly, but through the medium of the body. Such views brought him into conflict with the teach¬ ings of the Church on free will, and in 1257 he was sent to Paris, where he was kept in con¬ finement for 10 years. In 1267 Bacon wrote a work under the title of (Opus Majus,J — see article following — giving a connected view of the different branches of human knowledge, supplemented soon after by two other works, namely, (Opus Secundum) and <Opus TertiumP Under Clement's successor, Nicholas III, the general of the Franciscans, Jerome of Ascoli, declared himself against Bacon, forbade the reading of his writings, and issued an order for his imprisonment, which was confirmed by the Pope. This new confinement lasted from 1278-92; and when Jerome of Ascoli was elected Pope, under the name of

Nicholas IV, Bacon vainly endeavored to convince him of the in¬ nocence and utility of his labors, by sending him a treatise (On the Means of Avoiding the Infirmities of Old AgeP After the death of Nicholas IV he regained his liberty, and re¬ turned to Oxford, where he wrote a Com¬ pendium of Theology) (1292).

Though an extraordinary man, Bacon was a child of his age, and not free from current errors. He believed in the philosopher's stone and in astrology. There are to be found in his writings new and ingenious views on optics ; for example, on the refraction of light, on the apparent magnitude of objects, on the magnified appearance of the sun and moon when in the horizon, *etc.* He describes very exactly the nature and effects of convex and concave lenses, and speaks of their application to the purposes of reading, and of viewing distant objects, both terrestrial and celestial; and it is easy to prove from his writings that he was either the inventor or improver of the tele¬ scope. He also gives descriptions of the camera obscura, and of the burning-glass. He also made several medical discoveries. The dis¬ covery of gunpowder has been attributed to him. His writings contain the chemical for¬ mula for it, but it is generally supposed that he obtained it from the Arabs, from whose writ¬ ings he derived other suggestions. He was acquainted with geography and astronomy, dis¬ covered the errors of the calendar and their causes, and made a corrected calendar. In moral philosophy, also, Bacon laid down some excellent precepts. His principal works, edited by Professor Brewer, were published in his (Opera Inedita) (1859).

BACON, Roger, his Opus Majus (1267 a.d.). Newly edited and published with intro¬ duction and full English analysis of the Latin text, by J. H. Bridges (2 vols., 1897). An ade¬ quate publication after 630 years of one of the most remarkable productions of the human mind. The work is an exhortation addressed to Pope Clement urging him to initiate a re¬ form of Christian education in order to estab¬ lish the ascendency of the Roman Catholic Church over all nations and religions of the world. Its central theme was the consolidation of the Roman Catholic faith as the supreme agency for the civilization of mankind. Its author wished to see recognition of (<all the sciences, }) since all are part of one and the same complete wisdom. He first gave experi¬ ment the distinct and supreme place which was later revived by Descartes, and carried out in modern science. He formed a clear conception of chemistry, in his day not yet separated from alchemy; and of a science of living things, as resulting with chemistry from physics. In the part of his work dealing with moral philosophy, Bacon makes the first attempt ever made at the comparative study of the religions of the world. His protests against the intellectual prejudices

of the time, his forecasts of an age of industry and invention, the prominence given to experi¬ ment, alike as to the test of received opinion and the guide to new fields of discovery, render comparison with Francis Bacon unavoidable. In wealth of words, in brilliancy of imagina¬ tion, Francis Bacon was immeasurably his

superior. But Roger Bacon had the sounder estimate and the firmer grasp of that com¬ bination of deductive with inductive method which marks the scientific discovery.

BA-CON, Philippine Islands, a town in the province of Albay, Island of Luzon. Pop. about 14,540.

BACON, the name given the sides of a pig which have been cured or preserved by salting with salt and saltpetre, and afterward drying with or without wood smoke. By the old proc¬ ess of rubbing in the saline mixture, the curing occupied from three to four months. The method now adopted on a larger scale is to place the prepared flitches in a fluid pickle. The pickling, drying and smoking now occupy not more than six weeks. Bacon may be called the poor as well as the rich man's food. By the former it is prized as a necessary of life; by the latter, for its exquisite flavor. The nitrogenous, or flesh-forming, matter in bacon is small, one pound yielding less than one ounce of dry, muscular substance, while the amount of carbon compounds, or heat givers, is large, exceeding 60 per cent. Its digestibility, how¬ ever, owing to the large proportion of fat it contains, is not less than that of beef or mutton.

BACON BEETLE (Dermestes lardarius). an insect, the larva of which destroys bacon, lard and furs.

BACONIAN PHILOSOPHY, the induc¬ tive philosophy of which it is sometimes said that Lord Bacon (q.v.) was the founder. This, however, is an exaggerated statement. What Lord Bacon did for this mode of ratiocination was to elucidate and systematize it ; to point out its great value, and to bring it prominently before men's notice; lending it the

support of his great name at a time when most of his contemporaries were satisfied with the barren logic of the schools. The triumphs of modern science have arisen from a resolute adherence on the part of its votaries to the Baconian method of inquiry.

BACON'S REBELLION, in Virginia,

1676. The English Navigation Acts of 1651 and 1660, restricting colonial trade to English ves¬ sels, had produced universal distress in Vir¬ ginia, forcing it to buy and sell to the home monopolists at their own price; tobacco, not only the chief produce, but the chief currency, became almost worthless. In 1667 the smaller landholders were reported on the brink of re¬ bellion, and in 1673 there were meetings to refuse payment of taxes. Meantime the corrupt civil service of the colony, place-hunters sent over by Charles II to be rid of them, were plundering the planters by means of the export dues, in collusion with the governor, Sir Wil¬ liam Berkeley (q.v.) ; and the latter was fat¬ tening on a fur trade with the Indians. To save himself from the opposition of criticism of the masses whom he hated and despised, and to perpetuate the oligarchy of the small group of rich planters who formed his coun¬ cil, he kept his legislature of 1662, — strongly royalist from the enthusiasm of the Restora¬ tion, — in office till 1676 by annual adjournments without new elections ; he had also abolished universal suffrage and substituted a property qualification. This built up a strong opposition, including some of the most solid citizens. In

1675 a terrible Indian war broke out, wrapping the frontier in fire and blood; 36 whites were murdered in one day of January 1676. Berke¬ ley, implored to protect the settlements, ordered out a force under Sir Henry Chicheley, then suddenly dissolved it, recalled Chicheley's com¬ mission and refused to do anything more till the assembly met in March. The result was frightful: within 17 days 60 of the 71 planta¬ tions in Rappahannock parish were destroyed, and by the time of the March meeting, over 300 victims had perished, a large part by fiend¬ ish tortures. Even then, under Berkeley's orders, the <(Long Assembly® (so called in allusion to the Long Parliament) merely com¬ mitted another outrage : instead of authoriz¬ ing an army, they authorized frontier forts, to have a garrison of 500 soldiers (from the sea¬ board counties, not the frontier one which suf¬ fered from the Indians, and hated the gover¬ nor). No attack on the Indians was to be per¬ mitted except under specific orders from the governor. Two million pounds of tobacco more were added to their taxes for this mock¬ ery of protection, and most of that was em¬ bezzled and the

forts built so as to be worth¬ less even for the little service they could do. The people petitioned for leave to form expe¬ ditions at their own charge under any leader Berkeley might appoint ; he forbade any further petitions of the sort under heavy penalties. It was the universal belief that his one solicitude was to save his Indian trade monopoly from harm. Finally the people of Charles City County petitioned once more for leave, in face of actual ravages then going on ; and once more the obstinate and avaricious old man refused it. Men could bear no more ; they raised 300 volunteers on their own risk and by acclamation placed at their head Nathaniel Bacon (q.v.), a young planter recently from England, and one of the governor's council. He accepted it and wrote to Berkeley for a commission ; Berkeley returned an evasive answer and Bacon started on his expedition without it. Berkeley hearing of it sent an order for the company to disperse; all but a few, however, kept on and dispersed the In¬ dians. Berkeley collected a troop of horse¬ men, and set out to arrest Bacon, when he heard that the colony was all in revolt behind him ; and he hurried back to Jamestown, dissolved his 14-year-old assembly and issued writs for a new one. Despite his suffrage restriction, there was a very heavy majority against him; Bacon being one of the new members. As the latter approached Jamestown, he was arrested and brought before Berkeley, who, in view of the uprising, did not dare proceed to extremi¬ ties, but paroled him, and on Bacon's making submission for attacking the Indians without license allowed him to' take his seat, with a tacit agreement to give him his commission to finish the Indian war. The new legislature, besides restoring universal suffrage and making other reforms very distasteful to Berkeley, provided for raising an army of 1,000 men for Indian service. But Bacon, still refused the commis¬ sion, and privately warned that his life was in danger, fled, shortly returned with 600 men, and forced Berkeley to sign his commission as major-general for the Indian campaign, and also a memorial to the King in his favor and

reciting the colonial grievances. This latter was sent off with a secret note from Berkeley, disavowing it. Bacon within a month had nearly

put down the Indian outbreak, especially by a crushing victory at Bloody Run (near Richmond), when he heard that the governor had proclaimed him and his party rebels, and to escape popular wrath had fled across the peninsula to Accomac. Bacon marched back to Middle Plantation (the site of Williamsburg), launched' a manifesto against Berkeley, and drew around him a gathering of some promi¬ nent men and a vast number of penniless ones (for the movement was largely a democratic revolt against an overweening aristocracy). They agreed to stand by him even against a royal army; feeling that they were compro¬ mised beyond retreat at best, and hoping to hold out till the King could be correctly informed and pardon them. Bacon carried on the Indian campaign till September, thoroughly stamping out the danger to the colony ; meantime sending an expedition to capture Berkeley, which was itself captured. Berkeley gathered about 1,000 militia by promising them the confiscated estates of the rebels, and reoccupied James¬ town ; Bacon marched against him, drove him to Accomac once more, and burnt Jamestown to the ground. But he had taken malaria there, and whle invading Gloucester County to attack Major Brent was stricken down, and died 26 October. The rebellion at once collapsed, and Berkeley wreaked a frightful vengeance upon Bacon's adherents. See Berkeley, Sir Wil¬ liam. For authorities, besides new documents published in Virginia Magazine of History (1893-98), consult the Century Magazine , Vol. XL, under ((Under Nathaniel Bacon,® by Ed¬ ward Eggleston; and John Fiske's (Old Vir¬ ginia and Her Neighborsˆ (Vol. II, 1897).

BACOOR, ba'kd-or', Philippine Islands, a town of the province of Cavite, on the island of Luzon. Pop. about 12,600.

BACSANYI, bo'chan-ye, Janos, Hungarian poet: b. Tapolcza, 11 May 1763; d. 12 May 1845. His first work, published in 1785, pro¬ cured him an appointment in a public office, but a liberal poem cost him this in 1793, as well as his liberty the year after. Some of his finest elegies were composed in prison. In 1796 he went to Vienna, and there he married a few years later the German poet, Gabrielle Baumgarten — an unhappy match. In 1809, Bacsanyi fell under suspicion of translating Napoleon's proclamation to the Hungarians, and was afterward obliged to take refuge in Paris. After the Peace of Paris he lived at Linz, where he died. His collected poems appeared at Budapest in 1827.

BACTERIA. Literally the word bacte¬ rium, bacteria being its plural, means a tiny rod or stick. As understood, however, by biologists, bacteria constitute a genus of lowly organized microscopic plants having forms other than that indicated by the literal meaning of the

word. Briefly defined, bacteria are unicellular vegeta¬ bles that multiply by the simple process, of transverse division — they are, therefore, schizo-mycetes. In size they are all of microscopic dimensions requiring in most cases to be magni¬ fied from 600 to 1,000 diameters before becom¬ ing visible and even then they appear in many

instances as scarcely more than tiny points. As encountered in nature they assume a variety of forms which may be conveniently arranged into three principal groups, namely : the spheri¬ cal, the rod-like and the spiral. To the spheri¬ cal forms the name cocci or micrococci (coccus , singular) is given, and, according to the man¬ ner in which these tiny spheres develop and their progeny adhere to one another they are further severally designated as staphylococci, that is, cocci clustering irregularly together like grapes in a bunch; streptococci, that is, cocci adhering together like beads or pearls in a strand; diplo-cocci, that is, cocci occurring in pairs ; tetracocci, that is, cocci clustered in fours, *etc.*

To the rod-like group — that is, those which are straight, having one diameter longer than another — the designation bacilli (bacillus , sin¬ gular) is given. While the structure and mode of multiplication of many of the bacilli is as simple as is that of the micrococci — that is, one cell divides into two, two into four, and so on ad infinitum, without variation it is neverthe¬ less in the group of bacilli that we encounter a number of species provided by nature with a more highly organized and complicated means for propagation and perpetuation. It is here that we encounter species in the course of whose life cycle there develops within each rod a single tiny, oval, highly resistant body, a spore as it is called, which may be fairly com¬ pared to the seeds of higher plants and which, like the seed, may be gathered and kept for almost indefinite periods, without losing their power of germination. Since such spores of bacteria are markedly tenacious of life even under the most unfavorable of circumstances it is obvious that the power to form spores is an important provision for the preservation of the species. It is of passing interest to know that the ability to form spores is possessed by some, but not many of the disease-producing bacteria, a fact that serves to explain in part the difficulties experienced by the sanitarian in eliminating certain types of infection; for it must be remembered that the infective species capable of entering the spore stage are by vir¬ tue of that property much less vulnerable to the action of disinfectants and disinfecting proc¬ esses than are the species not so endowed.

The spiral forms, spirilla, as they are called, comprise those bacteria having one or more curves in their long axis, that is, those that are twisted like a corkscrew. They are sometimes seen as homogeneous, long spiral threads with-out_segmentations, while again they may con¬ sist of short curved segments adhering end to end. Spore formation is not a characteristic of the spiral bacteria.

In structure bacteria are non-nucleated masses of protoplasm surrounded by an en¬ veloping zone appearing in some instances to be but a condensation of the central protoplasm, while in others it partakes somewhat of the nature of mucin. Many of the bacteria exhibit no evidence of independent mobility, while others, by virtue of special locomotive, appara¬ tus (flagella) move themselves about in fluids in a most energetic manner. As their structure is exceedingly simple, in so far as formed ele¬ ments are concerned, their mode of nutrition is, physically speaking, correspondingly simple

— that is, the nourishment is absorbed and their waste products discharged directly through their enveloping membranes by the process of osmosis. This being the case it is obvious that bacteria can multiply and perform their physi¬ ological functions only under conditions of moisture. Unlike the more highly organized plants bacteria are apparently without special provisions for gaseous exchange, that is, they are devoid of chlorophyl. They obtain their oxygen as such from the free air or from easily decomposable oxygen compounds. In the course of his early investigations in this field Pasteur discovered a group of bacteria that have ever proven to be of the greatest interest

— a group that, paradoxical as it may seem, not only does not require free oxygen for its life processes but to the growth of which free oxygen is actually prohibitive. To these species he gave the designation anaerobic to distinguish them from the majority, the corobic varieties, to which free oxygen is essential. In their rela¬ tions to higher life bacteria may be regarded as allies or as enemies, according to the nature of the species under consideration. Contrary to

notions that have been more or less prevalent the majority of bacteria have nothing to do with disease production. Their natural role is that of scavengers. They are concerned in nature's great laboratory, the soil, in working over dead organic matters into forms appro¬ priate to the nourishment of growing vegeta¬ tion. Since in the course of this conversion dead bodies that would otherwise encumber the earth are caused to disappear they must from both the aesthetic and economic standpoints be regarded as, in the main, benefactors. In this group of saprophytic bacteria, as they are called, that is, those that live on dead matters, we encounter species of the greatest interest and importance. It is here that we perceive the omnipresent forms concerned in the reduction of dead animal and vegetable tissues into such simple forms as carbon dioxide, ammonia and water to be used by higher plants. It is in this group that we find the ever-present nitrifying, denitrifying and nitrogen fixing species — that is, those peculiar ferments that assist the legu¬ minous plants in assimilating free atmospheric nitrogen ; those that oxidize the ammonia of decomposition to the nitrous and nitric acids so essential to plant life, and those that, by their reducing function, reverse this phenomenon ; those that convert the objectionable organic matter of sewage and polluted waters into an inert inorganic form and those that, through their specific activities, supply, where circum¬ stances are favorable, the entire commercial world with its supply of saltpetre.

The saprophytic group also comprehends man}/ species used in the arts and industries — such, for instance, as those concerned in the production of certain organic acids ; those em¬ ployed in the manufacture of indigo by the fermentation process and in the preparation of hemp; and those utilized in the manufacture of cheese and butter. In the study of this large group one constantly encounters other species presenting most engaging characteristics — some of these, the chromogenic varieties, have the property of producing during the course of their growth pigments of great beauty — bril¬ liant reds, delicate pinks, rich purples, yellows

ranging from the palest lemon to the deepest orange, are those most often encountered. In another group, the photogenic, we meet with species having the emission of light as their most singular peculiarity. When growing these forms glow with a peculiar phosphores¬ cence, and it is significant to note that these luminous varieties have been most frequently encountered in the sea and upon articles from the sea. The evil odors of putrefaction are the results of saprophytic bacterial development. In the parasitic group of bacteria we encounter those

species that exist always at the expense of a living host, either animal or vegetable, and in doing so not only appropriate materials necessary to life, but give off in return waste products that may act as direct poison to the host. Fortunately this is a much smaller group than is the saprophytic mentioned above. In no particulars, save for their ability to exist at the expense of a living host and cause disease, are the disease-producing bacteria distinguishable from the innocent varieties. The essential dif¬ ference between the disease-producing and the innocent bacteria species is that the former possess as their most striking physiological peculiarity the power of elaborating poisons, toxins, technically speaking, that have a direct destructive action upon the tissues of their host. In some cases the poisons may properly be re¬ garded as secretions of the bacteria, and, under artificial conditions of cultivation, may easily be separated from the living bacteria elaborat¬ ing them. This is especially true of the poisons of diphtheria and tetanus or lock-jaw. When thus separated such poisons, entirely independ¬ ent of the living bacteria, retain the specific property of causing the symptoms and many of the pathological changes that characterize the growth of the living bacteria in the tissues. In other cases the poisons cannot be so readily separated ; they appear to be an integral con¬ stituent of the protoplasm of which the bacteria are composed. This is especially the case with the toxins of bacillus typhosus, bacillus dysen¬ teric? and spirillum cholera ? Asiaticce — the or¬ ganisms concerned in the causation of typhoid fever, epidemic dysentery and Asiatic cholera, respectively. In the case of still other patho¬ genic species there is little doubt that specific intoxicants are in one way or another elabo¬ rated during infection, but as yet they have not been satisfactorily demonstrated. Nevertheless, it may be said that, in general, infection by bacteria is to-day regarded as essentially a chemical phenomenon — that is, as a reaction between the poisons elaborated by the bacteria and the tissues with which they come in con¬ tact ; the result of the reaction being the partial or complete death of the host in which the phenomenon is in operation. See Bacteriology.

Bibliography.— Newman, < Bacteria* ; Lip-man, (Bacteria in Relation to Country Life) ; Slater and Spitta, (An Atlas of Bacteriology) ; Woodhead, G. Sims, (Bacteria and Their Products.*

A. C. Abbott,

Bacteriologist, University of Pennsylvania.

BACTERICIDE, any agent capable of killing bacteria. The older terms, antiseptic, germicide, etc., cover too broad a field, and the word

bactericidal has come to mean something more definite and exact than the older terms.

Heat is one of the best bactericidal agents. Cold is not bactericidal. Even the lowest tempera¬ tures do not destroy the life of bacteria. Cer¬ tain metallic salts, carbolic acid and chlorine are the bactericidal agents most in use. The aldehydes, formaldehydes, benzyaldehydes are also efficient. See Antiseptic; Germicides.

BACTERIOLOGY. Though generally considered a modern science, and perhaps prop¬ erly as regards certain of its most important developmental aspects, bacteriology in reality dates from the observations of the Dutch inves¬ tigator Leeuwenhoek in the latter part of the 17th century. With simple lenses ground by himself, Leeuwenhoek discovered in the mouth, in the excreta, in water and in other matters examined by him, the presence of countless bodies of smaller dimensions than anything hitherto seen. These Animalcules,® as he called them, were often observed to move themselves about in a remarkably energetic manner, and, judging from his text and illustra¬ tions, they were doubtless the bodies we now recognize as bacteria. Leeuwenhoek's observa¬ tions were immediately seized upon by the philosophers of the day as offering an explana¬ tion for many hitherto unexplained phenomena. So general became the belief in a casual rela¬ tion between the Animalcules® and all manner of disease conditions that for a time, we are told, there prevailed almost a ((germ mania.®

To the investigators of the time the question of greatest fascination in connection with this newly-discovered world was as to its origin. Many believed and stoutly maintained that the Animalcules® were the products of metamor¬ phosis of either living or dead tissues of more highly organized beings ; others that they arose de novo in ((putrescent atmospheres® ; many suspected them of spontaneous generation in some other mysterious way ; while a few main¬ tained, on experimental evidence, that they were probably the descendants of pre-existing crea¬ tures of the same kind. Singular as it may seem it

took nearly two centuries to close finally that debate and to prove that the dictum of Harvey 0 omnc vivum ex ovo)} or better, its appropriate modification C(omne vivum ex vivo ® was as ap¬ plicable to the microscopic as to the world of higher beings. In its modern aspect bacteriol¬ ogy dates from the epoch-making investigations especially of Koch and of Pasteur conducted during the 8th decade of the 19th century. During that period observations were made and methods of work devised that went far toward starting the subject on its career as a science. In the study of bacteria, as of all other forms of life, it is essential to a correct interpretation of form and physiological function that the ob¬ servations be made upon isolated species. Prior to the period mentioned this was not possible, for the methods in vogue were insuffi¬ cient for the separation of these minute crea¬ tures from one another. For the development of the science probably the most important step was, therefore, the introduction by Koch of trustworthy methods for the separation of individual bacterial species from mixtures of them, and for the more or less complete de¬ termination of their specific morphological and physiological peculiarities; that is, for the isolation and study of bacteria in ((pure cultiva¬ tion,® as it is technically called. Up to the time

of Koch's classical research upon the methods of investigating bacteria, their study had been conducted in fluid materials; that is, in infu¬ sions of either vegetable or animal matters, in which most bacterial species develop with re¬ markable activity. Since many totally distinct species are indistinguishable from one another by their size, shape and general appearance, it was obviously impossible, by the older methods of study, either to be certain if one were deal¬ ing with one or more species in the fluids in which they were growing, or to separate the one from the other in case of confusion. Koch appreciated this defect and suggested the use of solid materials as culture media, hoping thereby to reproduce the conditions so often seen when such organic matters as bread, potato, cheese, etc., become moldy on exposure to air. Here one sees the mold not always as an inextricable mixture of different species, but often as sharply isolated islands of beginning growth — as mold colonies — so to speak. These, on examination, are usually found to consist of single species, and on a slice of moistened bread one may often observe several colonies of distinct species growing side by side without, for a time at least, encroaching one upon another. By appropriate methods it is easily possible to transplant such colonies, free from admixture with other forms, and study them as (<pure cultures.® But such sub¬ stances as bread, potato, etc., are not in general as wrell adapted to the study of

bacteria as to that of molds. Appreciating this Koch demon¬ strated that the addition of gelatin to the in¬ fusions that had been employed for the success¬ ful cultivation of bacteria converted them into practically solid culture media without robbing them of any of their useful properties ; and that by the appropriate employment of such solid media it was easilv possible to separate as pure cultures the individual species composing the mixtures of bacteria that one desired to analyze. Thus, for example, if a tube of gela¬ tinized beef tea, freed from all living bacteria by heat, be gently warmed until liquified, and be then inoculated with a mixture of several spe¬ cies of bacteria, growth at once begins and if left in the test-tube progresses in about the same manner as if the beef tea did not contain gelatin; but if while still warm and fluid the contents of the tube be poured out upon a flat, cold surface, the increased area causes the bacteria to become more widely separated from one another and the lower temperature results in the solidification of the gelatin, so that each bacterium is fixed in its new position. It at once begins to germinate, and presently a Aolony® results; the surface ultimately becom¬ ing studded with such colonies. As the colo¬ nies from the different species differ from one another in many ways — in outline, texture, color, effect of their growth on the gelatin, *etc.* — it is easily possible, after a little practice, to distinguish them by the naked eye, and by transplanting them to tubes of sterile culture media to study them without the disturbing presence of other species; that is, in pure culture.

The introduction of this method for the isolation and study of bacterial species in pure cultivation certainly constitutes the most im¬ portant stimulus to the development of modern

bacteriology. By it results were placed upon a more secure basis than ever before, and a con¬ fidence in the work such as had never existed was awakened in the minds of all students of the subject.

The studies that had been made by Pasteur upon fermentation ; upon the souring of wines ; upon the maladies of silk worms, and upon certain fatal epizootics of fowls and domestic cattle ; together with

Koch's fundamental studies upon the infections of wounds and the appropriate methods of analyzing them were rich in suggestion to the pioneers in this new field. Within a comparatively brief period af¬ ter the adoption of the new methods our knowl¬ edge of the 'exciting causes of many hitherto obscure diseases was greatly extended; it was shown to be possible to determine the modes of their transmission and the channels through which infection occurred. The conditions most favorable to the successful action of a host of substances employed for the purpose of disin¬ fection wrere accurately determined. And early in the work observations were made that indi¬ cated the possibility of successful vaccination against disease through the use of attenuated (weakened) living cultures of specific disease-producing bacteria. One of the most important outgrowths of modern bacteriology has resulted from its application to the problems of the sani¬ tary engineer. As a result of these studies we know that sewage, polluted waters and polluted soils tend naturally to revert to a state of purity if their pollution be checked and that this pro¬ gressive purification is due in large part to the activities of the bacteria located within them. It has been found that by the appropriate ad¬ justment of conditions the normal activity of the bacteria may be so greatly accentuated as to constitute them the most important factors in the purification of polluted waters and sewage. The utilization of these facts is conspicuously illustrated in the purification of water by the process of natural sand filtration and in the purification of sewage by irrigation ; by the sep¬ tic tank process, *etc.* In these methods liv¬ ing bacteria and other living microscopic organ¬ isms, and they alone, are the instruments through which the results are attained. The sand grains in the filters and the particles of soil in the irrigation fields serve only as objects to which the micro-organisms can attach them¬ selves and multiply. By the normal life proc¬ esses of the bacteria the polluting organic matters in the fluids to be purified are used up and inert matters given off as a result. .

In the study of agricultural phenomena from the bacteriological standpoint knowledge has been equally extended. At one time it was taught that atmospheric nitrogen — represent¬ ing roughly 80 per cent of the air by volume — was of no direct biological significance. This view has in late years been entirely revised. We have learned that the leguminous plants when assisted, symbiotically, by certain soil bacteria, are enabled to make up their nitrogen deficit in large part from the free nitrogen of the air; a fact that sheds important light upon the signifi¬ cance of plants of this type in the practice of "rotation of crops.® Under normal conditions instead of impoverishing the soil, the legumens — clover, peas, beans, *etc.* —

with the aid of the bacteria attached to their roots, may actually enrich it. The application of bacteriological

methods to the study of dairy processes has re¬ vealed the interesting fact that the delicate flavors to which butters and cheeses owe their commercial value are directly due to the prod¬ ucts of growth of certain species or groups of species of bacteria and more highly organized molds. A number of such species have been isolated and are kept in pure cultivation — so that by purposely inoculating the fresh cream with them butter of uniform flavor may with comparative ease be produced.

Probably the most important results of ap¬ plied bacteriology are those in connection with preventive medicine. Early in the course of the work it was discovered by Pasteur that certain virulent pathogenic bacteria when kept under particular conditions gradually lost their dis¬ ease-producing power, wholly or in part, with¬ out their other life properties being conspicu¬ ously disturbed. If injected into animals when in this attenuated state the result was a mild, temporary and modified form of infection usu¬ ally followed by recovery. With recovery the animals so treated were immune from the ac¬ tivities of the fully virulent bacteria of the same species ; in other words, they had been protected from the fatal injection by vaccination with an attenuated species. The subsequent develop¬ ments growing out of this observation have re¬ sulted in the annual saving of millions of money through the successful vaccination of sheep, horses and bovines against the fatal infection known as splenic fever or anthrax, and, though less successful, of other domestic animals against other infections also. In the closer analysis of the means by which infective bac¬ teria cause disease it soon became evident that it is through the elaboration of specific poisons ; sometimes easily separated from the bacteria, at others so intimately associated with the bac¬ terial tissues as to make their separation diffi¬ cult or impossible. The question arose as to the effect of the poisons, separated from the living bacteria, upon the animals susceptible to infec¬ tion by the bacteria themselves, and it was found that fatal intoxications often accom¬ panied by the same constitutional symptoms and pathological lesions followed the use of the poisons, just as they would follow inoculations by the bacteria by which they were produced. In pursuance of this topic it was discovered that if very small, only mildly intoxicating, doses of these specific poisons of bacterial origin were repeatedly injected into susceptible animals, after a while the latter acquired not only a sort of tolerance to them, but a tolerance that was accompanied

by the presence in the circu¬ lating blood of an antidote for these poisons — an “antitoxin,® as it is called. This reaction has been shown to be possible for a number of specific infections, and in the case of diphtheria has met with such practical success as to be deservedly regarded as the triumph of modern medicine.

Bibliography. — Abbott, Principles of Bacteriology* (Philadelphia . 1909) ; Ball, Es¬ sentials of Bacteriology* (ib. 1913) ; Fliigge, (Die Mikroorganismen* ; Friedlander, (Mi-kroskopische Technik* (Berlin 1900) ; Koch, (Zur Untersuchung von pathenogenen Organismen) (1881) ; id., (Untersuchungen fiber die Aetiologie der Wundinfections-Krankheiten* ; Leeuwenhoek, Antonio von, (Arcana Naturae* (1695) ; Loffler, (Vorlesungen fiber die ge-

schichtliche Entwickelung der Lehre von den Bakterien) ; Mallory and Wright, (Pathological Technique) (Philadelphia 1913) ; Mason, (Water Supply from the Sanitary Standpoint’ ; (Metchnikoff, (LTmmunite dans les maladies infectieuses) (1901) ; Muir and Ritchie, (Manual of Bacteriology’ (New York 1913) ; Newman,

(Bacteriology and the Public Health’ (Phila¬ delphia 1904) ; Park, (Bacteriology in Medicine and Surgery’ ; Reckets and Dick, (Infection, Immunity and Serum Therapy’ ; Russel, (Out¬ lines of Dairy Bacteriology’ (1899) ; Sternberg,

(Bacteriology’ (New York 1901) ; Thoma, (Lehrbuch der pathologischen Anatomie’ (trans. by Bruce, London 1896) ; Tyndall, (Essays on the Floating Matter in the Air’ ; Vallery-Radot, (Life of Pasteur’ ; Zinsser, ˆInfection and Re¬ sistance’ (New York 1914).

Alexander C. Abbott, Bacteriologist, University of Pennsylvania.

BACTERIOLYTIC, an agent capable of destroying bacteria and usually applied to some product of the human body or of an animal body, notably blood serum, which when in¬ jected into an animal is capable of destroying some form of micro-organism in that animal. The

production of specific bacteriolytic sera is one of the great advances in modern medicine and its extension promises much hope for the future treatment of many of the bacterial dis¬ eases. Bacteriolytic sera have been made for a number of micro-organisms. See Immunity.

BACTERIUM, a genus of bacteria of the family Bacillariacece, characterized by rod¬ shaped forms and absence of flagella. They are thus non-motile. A large number of patho¬ genic bacteria belong to this genus. See Bac¬ teria ; Bacillus.

BACTRIAN CAMEL. See Camel.

BACTRIANA, bak-tn-a'na, or BACTRIA,

a country of the ancient Persian empire, lying north of the Hindu Kush Mountains on the upper Oxus. It corresponded almost with the modern Balkh in Afghanistan. Here many scholars locate the original home of the Aryan or Indo-European family of nations. Its cap¬ ital, Bactra, or Zariaspa, was also the cradle of the Zoroastrian religion. Originally a pow¬ erful kingdom, it maintained its independence until its subjugation by Cyrus about 540 B.C., when it became a satrapy of the Persian em¬ pire. It was included in the conquests of Alexander and formed a part of the kingdom of the Seleucidae until the foundation, about 256 b.c., by Diodotus, of the Greek kingdom of Bactria, which extended to the Indus and which, after a long struggle, was overthrown by the Parthians. Numerous coins with Greek legends have been found in the topes or burial places to the northeast of Kabul.

BACTRIS, a genus of American palms, numbering more than 50 species. The genus is of commercial importance, a tough thread used for net weaving being made from the fibres of Badris acanthocarpa, and walking-sticks ate manufactured from the long, slender stems of Badris maraja. The fruit of the lat¬ ter is considered a delicacy.

BACTRITES, bak-tri'tez, a genus of fossil ammonites, with a straight shell and indented, but not ramified, septa. The genus ranges from the lower Silurian to the Devonian.

BACTRUS, the ancient name of a river in the khanat of Balkh, Afghan Turkestan, upon which Bactria was situated.

BACULITES, bak'u-li'tez, a genus of fossil ammonites, characteristic of chalk formations, having a straight, tapering shell.

BACUP, bak'up, England, town of Lanca¬ shire, 18 miles north from Manchester. There are a number of churches, chapels and schools, a mechanics' institute, courthouse, market-hall, large co-operative stores, *etc.* The chief manufacturing establishments are connected with cotton spinning and power-loom weaving; there are also iron and brass foundries and machine-shops, dyeworks, etc., and in the neighborhood coal-pits and vast stone quar¬ ries. Its charter of incorporation was granted in 1882 and since that time great improvements have been made in its condition and appear¬ ance. It has a sewage farm for the utilization of town refuse. Pop. about 22,500.

BAD LANDS, a name applied to portions of the arid regions of the west, which present wide areas of hills and ridges of moderate height, bare of sod and intricately broken by numerous gullies and ravines. The principal areas are in the western Dakotas and central Wyoming and smaller examples of bad-land topography are of frequent occurrence in the arid regions in various portions of the world. In the Big Bad Lands of western South Dakota, east of the Black Hills, there is an area of about 2,000 square miles which consists largely of bad lands occupying extensive basins cut in a plateau along the White and Cheyenne rivers. They present wonderfully weird scenery, but are rarely visited by the average sightseer. An extensive area in the valley of the Little Missouri River . is crossed by the Northern Pacific Railroad in the vicinity of Medora and many bad-land features are visible near the railroad. Typical bad lands present ridges and mesas from 200 to 400 feet high in greater part, eroded into fantastic shapes and cut by ravines and gullies into an endless variety of rugged buttresses and pinnacles. The mate¬ rials are mainly light-colored, sandy clays and soft sandstones in nearly horizontal strata and their bare slopes are dazzling in the bright sunlight. Most bad land regions were table¬ lands originally and areas of the old surface remain in level-topped, grass-covered mesas of various sizes, with bad land slopes extending to flat-bottomed valleys of greater or less width. Bad lands exhibit clearly the close re¬ lations of topographic form to rock texture, the homogeneous clays being carved into regu¬ lar slopes in which sandstone layers give rise to benches or protect columns and pinnacles of clay. Bad lands are developed in soft rocks where a region has been so uplifted that there is rapid erosion, under arid or semi-arid climatic conditions. The occasional rains cut gullies which eventually are deepened into ravines and, as the rocks are soft, the erosion progresses more rapidly than vegetation can establish itself. In regions of abundant rain¬ fall, vegetation is so vigorous that it usually forms a protective mantle on all but the steeper slopes, but in arid

lands a thin sod is the principal growth and it is quickly removed by the rapid run-off of the torrential rains. . The Big Bad Lands of South Dakota have yielded

large numbers of fossil animals of late Eocene age, which have made the region famous as a collecting ground.

N. H. Darton,

United States Geological Survey.

BADAGRI, ba'da-gre, or BADAGRY, a

seaport of southern Nigeria, British West Africa. Early in its history it was a noted slave mart, contained important manufac¬ tories, and had a population of 10,000. It was from this place that, in 1825, Clapperton and Lander started to explore the African interior.

BADAJOZ, ba'da-hoth', the capital of the Spanish province of Badajoz, on the left bank of the Guadiana, which is crossed by a granite bridge of 28 arches. It is a bishop's see and has an interesting cathedral begun in the mid¬ dle of the 13th century, its choir richly and fine¬ ly carved in the Renaissance style. The city, which is only five miles from the Portuguese boundary, is a place of great strength, as be¬ fits its stormy history, and with its walls, bastions and forts, presents a noble front. Alfonso IX took it from the Moors in 1235 and it was besieged by the Portuguese in 1660 and 1705. During the Peninsular War Bada¬ joz was besieged by Marshal Soult and taken by him in March 1911 as the result of treach¬ ery. British forces twice unsuccessfully at¬ tempted its recapture on 5 and 29 May 1811; it was besieged by Wellingtbn on 16 March and taken 6 April 1812. An abortive revolu¬ tionary rising took place here in 1812. Bada¬ joz was the birthplace of Morales the painter. Pop. 35,039.

BADAKHSHAN, ba'dakhshan', a province of Afghanistan. It has the Oxus on the north and the Hindu Kush on the south ; and has lofty

mountains and fertile valleys ; the chief town is Faizabad. There are lapis lazuli and ruby mines. The inhabitants — Tajiks and Turks — profess Mohammedanism. Pop. 100,-

000.

BADALONA, ba’da-lo’na, Spain, seaport on the Mediterranean, five miles from Barce¬ lona. It is situated in a fertile region which produces grain, oranges and a great variety of vegetables. The town has experienced rapid industrial growth and manufactures wine. There are, besides, shipyards, sugar and petro¬ leum refineries and glass works, the latter the largest in Spain. A considerable coastwise trade is carried on. Pop. 20,957.

BADDECK’, a fishing village and summer resort on Cape Breton Island.

BADDERLOCKS (alaria esculenta), an olive-colored sea weed which grows on rocks in deep water on the shores of Europe and Iceland. It has a short cylindrical stem with lateral spore-bearing process and a membra¬ nous olive-green frond of 2 to 12 feet long, with a stout midrib. This midrib, together with the fruits, is eaten by the inhabitants of the sea coasts of Iceland, Denmark, Scotland, Ireland, etc., and is said to be the best of the esculent algae <(when eaten raw.® The name is supposed to be a corruption of balder-locks.

BADEAU, ba-do’, Adam, American mil¬ itary officer: b. New York. 29 Dec. 1831; d. 19 March 1895 ; was educated at private schools. He served with gallantry in the Union army during the Civil War; was on the staff of Gen¬

eral Sherman in 1862-63 and secretary to Gen¬ eral Grant in 1864-69; and in the latter year was retired with the rank of captain in the regular army and of brevet brigadier-general of volun¬ teers and was appointed secretary of legation in London. He was consul-general in Lon¬ don, 1870-81, and during this period was given leave of absence to accompany General Grant on his tour around the world (1877-78). In 1882-84 he was consul-general in Havana. Af¬ ter the death of General Grant he brought suit against his heirs for payment of services ren¬ dered in the preparation of General Grant’s (Memoirs, *which was satisfactorily settled out of court. His publications include (The Vagabond* (New York 1889) ; (Military His¬ tory of Ulysses S. Grant-* (3 vols., 1867-81) ; Conspiracy; A Cuban Romance1* (1885);

(Aristocracy in England* (1886); and (Grant in Peace* (1886).

BADEN, ba’den, a component state of the German republic. The Rhine

separates it from Alsace on the east and Wurttemberg bounds it on the west. It has an area of 5,823 square miles, with a population of 2,142,833 in 1910. The country is mountainous, being traversed by the lofty plateau of the Schwarzwald, or Black Forest, which attains its highest point in the Feldberg (4,904 feet). The nucleus of this plateau consists of gneiss and granite. In the north it sinks down toward the Oden-wald, which is, however, of different geological structure, being composed for the most part of red sandstone. The whole of Baden, except a small portion in the southeast, in which the Danube takes its rise, belongs to the basin of the Rhine, which bounds it on the south and west. Numerous tributaries of the Rhine in¬ tersect it, the chief being the Neckar. Lakes are numerous and include a considerable part of the lake of Constance. The climate varies much. The hilly parts, especially in the east, are cold and have a long winter, while the val¬ ley of the Rhine enjoys the finest climate of Germany. The principal minerals worked are coal, salt, iron, zinc and nickel. The number of mineral springs is remarkably great and of these not a few are of great celebrity. The vegetation is peculiarly rich and there are mag¬ nificent forests. The cereals comprise wheat, oats, barley and rye. Potatoes, hemp, tobacco, wine and sugar beet are largely produced. Several of the wines, both white and red, rank in the first class. Baden has long been famous for its fruits also. Of the total area, 42 per cent is under cultivation, 37 per cent under forest and 17 per cent under meadows and pas¬ tures. The farms are mostly quite small. The manufactures are important. Among them are textiles, tobacco and cigars, chemicals, ma¬ chinery, pottery ware, jewelry (especially at Pforzheim), wooden clocks, confined chiefly to the districts of the Black Forest, musical boxes and other musical toys. The mineral production is comparatively unimportant ; the chief products are salt and building stone. The capital is Karlsruhe (pop. 135,000), about five miles from the Rhine; the other chief towns are Mannheim, Freiburg-im-Breisgau, with a Roman Catholic university, Baden and Heidel¬ berg. Heidelberg has a university (Protes¬ tant), founded in 1386, the oldest in all the German states. The railways have a length of 1,450 miles and are nearly all state property.

BADLANDS

Typical views in Big Badlands of South Dakota, showing pinnacles of hard clay capped by sandstone, the sodless slopes, and in the distance a remnant of the original plateau out of which the Badlands are eroded

In the time of the -Roman empire, southern Baden belonged to the Roman province of Rffietia. Under the old German empire it was a margravate, which in 1533 was divided into Baden-Baden and Baden-Durlach, but reunited in 1771. The title of grand duke was conferred by Napoleon in 1806 and in the same year Baden was extended to its present limits. The Constitution dates from 22 Aug. 1818 and was modified in 1904. Baden entered the North German Confederation for the founding of the German empire by treaty of 15 Nov. 1870. The Constitution of the Republic was deter¬ mined by the National Assembly which met 15 Jan. 1919. The executive power is vested in the state president, the legislative in a house of leg¬ islature (Landtag), the members of which are elected for four years by adult suffrage, male and female, over 21 years of age. Qualified elec¬ tors over 25 years of age are eligible as members. There is generally one member allocated for each 10,000 voters. The revenue is mainly de¬ rived from taxes on land and incomes and the produce of crownlands, forests and mines. The revenue in 1919 was $69,686,540. Baden sends three members to the German Reic'nsrat,. or Federal Council, and 14 deputies to the Reich¬ stag. Two-thirds of the population are Roman Catholics, the rest Protestant. See War, European.

BADEN, Switzerland, town in the canton of Aargau. The town (Ober-Baden, or Ba-den-im-Aargau) is 12 miles northeast of Aarau, on the left bank of the Limmat. It has a townhall, a handsome Roman Catholic church, a convent, monastery, hospital, etc., and is celebrated for hot sulphurous baths, em¬ ployed in treatment of gout, rheumatism and cutaneous diseases. The hottest springs have a temperature of 116° F. The Romans were well acquainted with the baths here ; and be¬ tween the 15th and 18th centuries they were the most celebrated in Europe. Pop. about 8,500.

BADEN-BADEN (anciently, Civitas Aurelia Aquensis), Germany, town and wa¬ tering-place in the state of Baden, 18 miles south-southwest of Karlsruhe. The old¬ er part of the town is built on a spur of the Black Forest, overhanging the valley of the little stream Oosbach. The houses here are in general old and high ; the streets mostly nar¬ row and crooked and nearly all steep. The new and larger portion of the town lies below and is rich in fine hotels, elegant villas and handsome private dwellings. The edifices most deserving of notice are the New Palace, standing on an isolated height above the town and surrounded by fine gardens; the town 01-parish church, containing the tombs of 14 mar¬ graves of Baden; the Protestant church, the English church and the new townhall. Ba¬ den has been celebrated from remote antiquity for its thermal baths, which made it a favorite resort of the Romans. The season lasts from 1 May to 31 October and 70,000 visitors ar¬ rive annually. Pop. 22,066.

BADEN-BEI-WIEN, ba'den-bi-ven, Aus¬ tria, a watering place about 15 miles south-southwest of Vienna. It was the Aquae Pan-noniae, or Cethiae of the Romans and is still famous for its warm mineral springs, which are frequented during the season by from 12,- 000 to 15,000 persons, chiefly from the Aus-vol. 3 — 3

trian capital. The town has the usual acces¬ sories of a fashionable watering resort — large bathing establishments, kursaal, trink-halle, summer theatre, *etc.* In the neighbor¬ hood are numerous villas belonging to the Aus¬ trian nobility and some interesting ruins. It became a city in 1840. About four miles from Baden is Meierling, a royal hunting lodge (now a convent), where Crown Prince Ru¬ dolph of Austria met his tragic death in 1889. The season is from July to September. Pop.

19,073.

BADEN-POWELL, ba'den-po'el, Sir George Smyth, English politician and political writer: b. Oxford, 24 Dec. 1847; d. 20 Nov. 1898. He was official inquirer for the British government on several important questions, notably on the Bering Sea dispute; was a member 'of the joint commission in Washing¬ ton in 1892 and advised in the conduct and preparation of the case before the Bering Sea arbitration tribunal. He was author of (New Homes for the Old Country) (1872), a store¬ house of information about Australia; Pro¬ tection and Bad Times)

(1879) ; (State Aid and State Interference) (1882) ; (The Truth About Home Rule) (1888) ; (The Land Sys¬ tems of India) (1892) ; *etc.* He was a mem¬ ber of Parliament for Liverpool from 1885 till his death.

BADEN-POWELL, Sir Robert Stephen¬ son Smyth, British military officer : b. London, 22 Feb. 1857 ; was educated at the Charterhouse School; joined the 13th Hussars in 1876; was adjutant in India, Afghanistan and South Africa; assistant military secretary on the staff in South Africa in 188/-89 ; took part in the operations in Zululand, for which he was high¬ ly commended, in 1888; assistant military sec¬ retary in Malta in 1890-93 ; on special service in Ashanti, commanding the native levies, 1895, for which he was brevetted lieutenant-colonel ; chief staff officer in the Matabeleland campaign, for which he was brevetted colonel and became lieutenant-colonel, commanding the 5th Dragoon Guards in 1897. In the war in South Africa in 1899-1900, he signally dis¬ tinguished himself by his grand defense of Maf eking, Cape Province, holding the town with a small force against repeated attacks, un¬ der an almost continuous bombardment, from 15 Oct. 1899 until relieved on 16 May 1900. In recognition of this heroic defense the Queen promoted Baden-Powell to be a major-general. He founded the Boy Scouts organization in 1908. His literary works include Reconnais¬ sance and Scouting* (1890) ; (Cavalry In¬

struction (1895) ; (The Downfall of Prem-peh} (1896) ; (The Matebele Campaign (1896); (Scouting for Boys) (1908); (My Adventures as a Spy* (1915) ; Undian Reminiscences) (1915).

BADENI, ba'den-e, Casimir Felix, Count, Austrian statesman: b. Poland, 14 Oct. 1846; d. Vienna, 9 July 1909. His father, though poor, was a man of intellect and was made a count by the King of Poland just before the birth of Casimir. He also fell heir to a for¬ tune and his two sons received a university education. Casimir entered the Austrian civil service ; became district chief at Zolkiew in 1871; Minister of the Interior in 1873; govern¬ or of Galicia in 1888; and Prime Minister of

Austria-Hungary, 15 Sept. 1895. In April 1897, because of inability to maintain a Lib¬ eral majority in the newly-elected Reichsrath, he resigned with his cabinet, but the Emperor declined to accept his resignation and he re¬ mained in office until 28 November, when he again resigned and a new cabinet was organ¬ ized. The principal feature of his administra¬ tion and the one which not only led to his re¬ tirement from politics but to a long period of political agitation was his introduction of what is known as the ˆlanguage ordinance,® which allowed the official use of the Czech language in Bohemia and Moravia. This measure alienated the Germans and provoked a racial conflict of a most bitter character between them and the Czechs.

BADENWEILER, ba'den-vi-ler, Ger¬ many, watering place in the state of Baden, near Miilheim. Its mineral springs are now rated among the indifferent waters and it is of interest chiefly for the ruins of Roman baths that were discovered in 1847. The foundation of the town is referred to the time of Hadrian and the remains of the vapor baths, of which there are excellent specimens, are supposed to be of the same period. The ruins show a division for men and for women, each having a large outer court opening into a dressing-room ; there is the hot-air bath, the warm bath and the cold bath. The walls and steps are in their original position. The whole structure is 318 feet by 90 feet. There are beautiful promenades and numerous villas in the vicinity and the town contains a grand-ducal palace dating from the 16th century.

BADGE, a distinctive device, emblem, mark, honorary decoration or special cogni¬ zance used originally to identify a knight or distinguish his followers, now worn as a sign of office or licensed employment, as a token of membership in some society or generally as a mark showing the relation of the wearer to any person, occupation or order.

BADGER, George Edmund, American statesman: b. Newbern, N. C., 13 April 1795; d. 13 April 1866; was graduated at Yale Col¬ lege in 1813 ; became a lawyer at Raleigh ; and was judge of the North Carolina Superior Court in 1820-25. He was appointed Secre¬ tary of the Navy 14 March 1841, resigning after the death of President Harrison, and was elected to the United States Senate in 1846 and 1848. In 1853 he was nominated for jus¬ tice of the United States Supreme Court, but was not confirmed. He served in the State convention called to pass on the question of secession, although opposed to such measure, and after making a strong speech in defense of the Union, was afterward known as a mem¬ ber of the Conservative party.

BADGER, Joseph, American clergyman, one of the earliest

missionaries to the country northwest of the Ohio River: b. Wilbraham, Mass., 28 Feb. 1757; d. 5 May 1846. He re¬ ceived his early instruction chiefly from his parents and at the age of 18 joined the Revo¬ lutionary army. He remained in service for four years, then determined to obtain an edu¬ cation and engage in the Christian ministry. Entered Yale College in 1781, where he main¬ tained himself and his scholarship by alter¬ nately studying and teaching. He remained

a few years in Connecticut, then in 1800 was selected by the missionary society of that State to visit the unsettled parts of Ohio. His work took him from settlement to settlement, often more than a day's journey apart, through a country where there were no roads and across rivers without bridges. During the War of 1812 he was appointed by General Harrison chaplain to the army in that district and his knowledge of the country was of great service to that commander-in-chief ; but he resumed his missionary functions at the close of the war and continued them till 1835, when he re¬ tired and lived with his only daughter. Dur¬ ing the latter years of his life he received a pension from the United States government.

BADGER, Oscar L., American naval of¬ ficer : b. Windham, Conn., 12 Aug. 1823 ; d. 20 June 1899; entered the United States navy 9 Sept. 1841 ; became lieutenant-commander 16 July 1862 ; commander 25 July 1866; cap¬ tain 25 Nov. 1872; commodore 15 Nov. 1881; and was retired 12 Aug. 1885. He served on the steamer Mississippi during the Mexican War, taking part in the attack on Alvarado, 1846; led the party that attacked and destroyed the village of Vutia, Fiji Islands, while on the sloop John Adams, 1855-56; and in the Civil War commanded the Anacostia of the Poto¬ mac flotilla, 1861-62 and the ironclads Patapsco and Montauk , in the operations in Charles¬ ton harbor in 1863 ; and while acting fleet captain on the flagship Weehawken was se¬ verely wounded during the attack on Fort Sumter, 1 Sept. 1863.

BADGER, a stout, burrowing, carnivorous mammal of the fur-bearing sub-family Melina in the family Must elides, related to the skunks and weasels, species of which inhabit various parts of the northern hemisphere. Badgers have short legs, elongated feet with powerful toes adapted to digging, heavy jaws with big teeth and great strength, courage and cunning. They wear coats of thick fur usually grizzled in brown and gray, the face is striped and the paws are blackish. The fur is of considerable value and the hairs are used in artists' brushes. The

American badger (Taxidea americana) was formerly distributed all over the western part of the United States from the prairie districts of Ohio and Wisconsin to the Pacific coast, but has been exterminated by civilization east of the dry plains, where it is still numerous although not often seen, because it rarely comes abroad except in the night. It dwells in deep burrows which it digs for it¬ self and feeds upon gophers, ground-squirrels, such ground-building birds and their eggs and young as it is able to catch and, in times of scarcity, upon small reptiles and insects. Bad¬ gers abound in the vicinity of prairie-dog towns, whose underground homes they can enter or dig out without difficulty. This spe¬ cies is found as far north as Hudson Bay and south to central Mexico, where the local varie¬ ty is called (<tejon.® When by rare chance a badger is surprised during the day too far away from his hole to escape into it before being observed, he squats down, withdrawing nose and feet beneath his body, and remains ab¬ solutely still, when his grizzled back looks so much like a mere hillock of earth that he is likely to escape being seen altogether. The ex-

traordinary breadth and fatness of his form is one of his strongest characteristics. During the coldest part of the winter he retires to his den and passes the time when no food is to be had in deep sleep. The best account of this ani¬ mal is to be found in Dr. Cories' (Furbearing Animals) (Washington 1877). Consult also Ingersoll, Ernest, (Wild Neighbors5 (New York 1897) and Seton, (Life Histories of Northern Animals 5 (New York 1909). The European badger (Meles taxus) is very similar in general appearance but differs in anatomical details. Its general habits and food are like those of the American badger except that in the absence of open plains it dwells in wooded regions and has a fondness for honey, digging it out of the nests of bumblebees and others which make their homes in the ground. This is the animal formerly used in the cruel sport of badger-baiting. A captive badger was placed in an overturned barrel or some similar place, and dogs were set upon it for the amusement of seeing the fighting that resulted. It required a powerful and active dog to overcome the little animal. Frequently, however, the badger was given no fair chance, but was compelled to face in the open two or three dogs. From this un¬ manly sport is derived the verb (<to badger.® Many references are to be found in early Eng¬ lish literature to this amusement, and to the

animal itself under the old terms <(grey® and (<brock,® the latter still in common use in north¬ ern England and Scotland (Celt, broc, badger). Various closely related species and varieties of the badger are to be found in northern Asia, and other relatives exist in India, Malay Islands and Africa. For these see Sand-badger; Honey Badger; Ratel; Teledu. Consult Johnston, (British Mammals5 (London 1903).

BADGER STATE, a nickname given to the State of Wisconsin.

BADGHIS, bad-gez', a region north of Herat, comprising the country between the Mur-ghab and the Harirud rivers, as far north as the edge of the desert. It lies just to the south of the former boundary line between Afghanistan and the Russian territories, as defined in 1887.

BADGLEY, Sidney Rose, Canadian architect : b. near Kingston, Ontario, 28 May 1850. He studied architecture in Toronto, and, after practising some time in Saint Catharines, established himself in Cleveland, Ohio. He has made a specialty of the architecture of churches and public buildings, and has planned and erected churches in almost all parts of Canada and the United States, and, among other struc¬ tures, the Massey Hall, Toronto; the Slocum Library and Perkins Observatory, in Ohio ; Wesleyan University, in Delaware; and the Medical College, Cleveland. He published an Architectural Souvenir5 (1896).

BADHAM, Charles, English educator: b. Ludlow, 18 July 1813; d. 26 Feb. 1884; was con¬ sidered one of the most eminent classical scholars of his day; and after serving for sev¬ eral years as headmaster of King Edward Vi's Grammar School at Louth, he became professor of classics and logic in the University of Sydney, Australia, 1867. While in Sydney he established a system of teaching by corre¬ spondence, similar to the present university ex¬ tension scheme. He published a number of

works on Greek classics, and (Criticism Applied to Shakespeare5 (1846).

BADIA Y LEBLICH, ba-dCa e la-bleclF, Domingo, Spanish traveler: b. 1766; d. 1818; he visited in 1803 and the four following years the Mohammedan countries bordering on the Mediterranean. During the whole of his tour he professed to be a Mussulman, and traveled under the denomination of ((Ali Bey el Abbassi.® He was. so skilful in carrying out his part that he deceived Moslem rulers and scholars, and

was at one time in great favor in the court of Morocco. It is now admitted that he was em¬ ployed as a political agent by the Spanish gov¬ ernment at the instigation of Napoleon. His pe¬ culiar situation and religious profession gave him opportunities for making many observations which could not occur to other travelers, and he published an account of his travels, with the title (Voyages d'Ali Bei en Afrique et en Asie pendant les annees 1803-07. 5

BADINGUET, ba'daii-ga', afterward Ra-dot, a Moor, as whom Napoleon III masquer¬ aded to escape from the fortress of Ham in 1846; afterward a nickname for Napoleon III. He died in 1883.

BADIUS, ba'de-us, French printer and writer: b. 1462; d. 1535. About 1500 he founded his printing establishment at Paris, and pub¬ lished a number of the classics. He annotated these himself and wrote also a life of (Thomas a Kempis.5

BADLAM, Stephen, American military officer: b; Milton, Mass., 25 March 1748; d. 24 Aug. 1815 ; entered the Revolutionary army in 1775 ; became commander of the artillery in the department of Canada. On the announcement of the adoption of the Declaration of Independ¬ ence, he took possession of the heights oppo¬ site Ticonderoga and named the place Mount Independence. Subsequently he rendered good service at Fort Stanwix, and in 1799 was made brigadier-general.

BADMAN, The Life and Death of Mr.,

an allegory by John Bunyan, published in 1680. It gives a vivid picture of the life of the com¬ mon people during the time of Charles II.

BADMINTON. The game now called Badminton is in reality a modification of the very ancient game of battledore and shuttle¬ cock; but it is played on a court 44 feet long by 20 wide over a net strung across the centre not less than 18 inches deep, with its lower edge five feet from the ground. The bat is strong, like a racquet bat, and weighs about five ounces. The shuttlecock is feathered after the old fashion and weighs from 73 to 85 grains. The service line is drawn six and one-half feet from the net on either side. A line drawn down the centre, joining the service and base lines, forms two courts at each end. The game can be played by two or four, six or eight players. Each striker scores, or is penalized, according to the result of the rules.

BADOC, ba-dok', Philippine Islands, a town of the province of Ilicos

Norte, on the island of Luzon. It is situated near the coast, about 22 miles south of Laoag. Pop. 12,564.

BADOGLIO, Pietro, Italian soldier: b. Piedmont 1871. A skilled artillery officer, he served in the Tripolitan campaign and in the

European War distinguished himself on various occasions by his resourcefulness at critical moments on the battlefield. The Italian re¬ verses in the great Austro-German drive during October and November 1917 led to a redistri¬ bution of commands in the Italian army. Gen¬ eral Cadorna was replaced by Gen. Armando Diaz, to whose staff General Badoglio and General Giardina were attached.

BADOURA, ba-doo'ra, the daughter of the King of China, who falls in love with the sleeping prince in the story of Prince Cama-ralzaman, in the (Arabian Nights' Enter¬ tainment. }

BADRINATH, ba'dri-nath', a peak of the main Himalayan Range, in Garhwal district of the United Provinces, India; 23,210 feet above the sea. On one of its shoulders, at an eleva¬ tion of 10,400 feet, stands a celebrated temple of Vishnu, which some years attracts as many as 50,000 pilgrims.

BADRULBADUR, Princess, ba-drool'ba-door', the wife of Aladdin, in the (Arabian Nights' Entertainment,* story of Aladdin and the lamp.

B.3EBIA GENS, be'bi-a jenz, a plebeian clan of ancient Rome. The first member of the family to obtain the consulship was Cn. Baebius Tamphilus (182 b.c.). The other distinguished ones are known under their family names, Dives, Herennius, Sulca, *etc.*

BAEDEKER, bad'e-ker, Karl, German publisher : b. 1801 ; d. 1859. His father estab¬ lished a printing and bookselling business in Essen in 1797. Karl set up in Coblenz in 1827. With Murray's handbooks as a model, he be¬ gan the issue of guidebooks, the first being one on the Rhine, followed in 1839 by works on Holland and Belgium. The firm

removed to Leipzig in 1872 : in 1861 translations of the series began to appear in English, and they are also published in French. The name Baedeker is now a synonym for guidebooks.

BAEKELAND, ba'ke-land, Leo Hendrik,

Belgian-American chemist: b. Ghent, 14 Nov. 1863. He was educated at the University of Ghent, where he was graduated in 1882. Later he studied electro-chemistry at the Polytech-nicum, Charlottenburg, Germany. He taught for several years at the University of Ghent and at the Normal School of Science of Bruges. He came to the United States in 1889 and in 1893 founded the Nepcra Chemical Company for the manufacture of photographic papers of his invention, including the well-known Velox paper. In 1899 he disposed of his holdings to the Eastman Company and has since engaged in research engineering. His best known inven¬ tion is bakelite, a chemical synthesis from car¬ bolic acid and formaldehyde, and used as a sub¬ stitute for hard rubber and amber. He has patented in the United States and abroad many inventions on the subjects of organic chemistry, electric insulation, synthetic resins, plastics, lacquers and varnishes, *etc.* He was awarded the Nichols medal in 1909, and the Willard Gibbs medal in 1913 by the American Chemical Society. In 1910 he was awarded the John Scott medal of the Franklin Institute, in 1914 the Chandler medal, Columbia University and

in 1916 the Perkin medal for industrial chemical research. He was president of the American Electro-chemical Society in 1909 and of the American Institute of Chemical Engineers in 1912. He contributes to numerous publications on professional topics.

BAELE, bii-a'le, an African tribe dwelling northeast of Lake Tchad. It is nomadic, half¬ heathen and half-Mohammedan, and owns large herds of cattle, camels, goats and sheep.

BAENA, ba-a'na, Antonio, Portuguese-Brazilian historian and geographer : b. Portugal about 1795; d. 28 March 1850; was an officer in the Portuguese, afterward in the Brazilian, army. He studied the geography and history of the Amazon Valley. His principal works were (The Ages of Para* (1838), a historic compend stopping in 1823, and (Chorographic Essay on the Province of Para* (1839), a geograph¬ ical and statistical work, giving the details of •explorations made by himself. These are still standard authorities on that region.

BAENA, ba-a'na, Spain, town in province of Andalusia, 32 miles southeast from Cordova, on the Marbella. It has manufactures of tex¬ tiles, soap and flour, and horse-breeding is of importance. Large quantities of grain, oil, esparto, fruit and wine are exported. There are a number of interesting Roman remains. Pop.

14,730.

BAER, bar, George Frederick, American

lawyer and capitalist : b. Somerset County, Pa., 26 Sept. 1842; d. 26 April 1914. He was edu¬ cated at Franklin and Marshall College, served throughout the Civil War, and was admitted to the bar in 1864, becoming soon after the con¬ fidential legal adviser to J. Pierpont Morgan. He was counsel, and director and president, successively, of the Philadelphia and Reading Railroad Company after 1870, and reorganized the company in 1893. He became president of the Philadelphia and Reading Coal and Iron Company, and of the Central Railroad of New Jersey. He led the operators in the anthracite coal strike of 1902. Because of his attitude at this time he aroused great animosity among American labor leaders and many social re¬ formers. He was often referred to as <(Divine Right** Baer because of his statement that ftThe rights and interests of the laboring man will be protected and cared for — not by the labor agitators, but by the Christian men to whom God in His infinite wisdom has given the control of the property interests of the country.®

BAER, Karl Ernst von, Russian natu¬ ralist: b. Piep, Esthonia, 29 Feb. 1792; d. 28 Nov. 1876; was professor of zoology at Konigsberg (1819), and librarian of the Academy of Sciences at Saint Petersburg (1834). His principal works were (History of the Evolu¬ tion of Animals) (2 vols., 1828-37), and (Re¬ searches into the Development of Fishes) (1835). He is one of the founders of the modern science of embryology, and his writings are distinguished for their philosophical teachings.

BAER, William Jacob, American artist : b. Cincinnati, Ohio, 29 Jan. 1860. He was a student of the Munich Royal Academy, 1885-92,

receiving four medals, while one of his works was purchased by the directors of the Academy. He was awarded 1st class medal for miniatures, New \ ork, 1897; 1st class medal Paris Exposi¬ tion, 1900; 1st class medal, Buffalo Exposition, 1901 ; Charleston Exposition, 1902. He was made president of the American Society Min¬ iature Painters; A.N.A. (1913), and received a BOW medal at the Panama Pacific Exposition, 1915. Among the most admired of his pictures are (Aurora> ; <Summer) ; <Daphne> ; and <Pri-maveraP

BAERT or BART, Jean, French sailor: b. Dunkirk 1650; d. 1702. He raised himself, under Louis XIV, to the rank of commodore, and made the French navy what it was, at that time. The Dutch, English and Spanish called him the <(French Devil.® Bart brought into port a number of Dutch and English vessels, burned others, landed at Newcastle and laid waste the neighboring country. In 1694, when there was a scarcity of corn in France, he succeeded several times, notwithstanding the watchfulness of the English, in bringing into the harbor of Dunkirk ships loaded with this article. Once he delivered a number of such vessels, in the boldest manner, from the Dutch, into whose hands they had fallen, and received, in consequence, letters of nobility. In 1695 he was taken prisoner by the English and brought to Plymouth, but managed to make his escape. In 1696 he met the Dutch fleet from the Baltic and captured the escort with 40 ships ; but on his return to Dunkirk 13 Dutch ships of the line appeared, and to avoid a very unequal combat he was obliged to burn the greater part of his captures. From the Peace of Ryswick to the breaking out of the war of the Spanish succession he lived at Dunkirk. There is al¬ ways a warship in the French navy bearing the name Jean Bart.

BAETHGEN, bet'gen, Friedrich, German theologian : b. Lachem 1849 ; d. 1905. He was educated at Gottingen, Kiel and Berlin, and held professorships at Kiel, Halle and Greifswald. In 1895 he was called to the chair of Old Testament exegesis and Semitic languages at the University of Berlin. He published (Untersuchungen fiber die Psalmen der Peschita) (1878); (Evangelienfragmcnte) (1885); (Die Psalmen iibersetzt und erklarD (1892).

BZETICA, be'ti-ka, the central division of ancient Spain under Roman rule, famed for its fertility, its mines of iron, gold and silver, and its delightful climate. These advantages gave rise to a number of fabulous stories, which made it the home of Geryon, an assailant of Hercules,

and placed there the Elysian Fields. It passed into the hands of the Vandals, and was the first province conquered by the Moors.

BAEYER, bl'er, Adolph von, a pioneer of German chemistry: b. Berlin, 31 Oct. 1835; d. Munich, 24 Aug. 1917. A pupil of Bunsen at Heidelberg, he spent some years in Berlin as a private tutor, where he came under the in¬ fluence of A. W. von Hoffmann, whose pupil, Sir W. H. Perkin, discovered mauve, the first aniline dye. In 1872 Baeyer was appointed professor of chemistry and director of the new chemical laboratories in Strassburg, where many famous chemists studied, such as Emil Fischer, C. Graebe and C. Liebermann — the

discoverers of synthetic madder (or alizarine), which effectually killed the French madder in¬ dustry. In 1875 he succeeded to Liebig's chair in Munich, where he built the new Chemischcs Institut, in which two generations of organic chemists of all nationalities have received their training. Baeyer was one of the fathers of modern organic chemistry, much of which rests on the foundations laid by himself and the many distinguished chemists trained under his guidance. In the technical world he helped in a marked degree to build up the position which Germany held before 1914 in the chemical industry. His name is inseparably associated with the artificial production of indigo, on which he began his researches in 1865. His patents were acquired in 1880 by the Badische Anilin und Soda Fabrik and the Hoechst Farbwerke, which concerns carried out conjoint research for 18 years, spending about $5,000,000 on the problem. Two satisfactory processes were finally developed for the manufacture of indigo from coal-tar products, one starting from naphthalene and the other from benzene via aniline. Baeyer was awarded the Davy medal of the Royal Society (England) in 1881 for his researches in indigo and received the Nobel prize for chemistry in 1905. His works were published at Brunswick (2 vols., 1905).

BAEYER, Johann Jakob, Prussian soldier and geometrician: b. JVliiggelsheim, 5 Nov. 1 794 ; d. September 1885; was an army volun¬ teer in the War of Liberation, and became a lieutenant-general in 1858. He had charge of a number of geodetic surveys ; was elected presi¬ dent of the Geodetic Institute in Berlin in 1870; and was the author of numerous treatises on the refraction of light in the atmosphere, the size and form of the earth, *etc.*

BAEZ, ba'ath, Buenaventura, Dominican statesman: b. Azua, Haiti, about 1810; d. 21 March 1884; aided in the establishment of the

Dominican Republic ; was its President in 1849-53; was then expelled by Santa Ana and went to New York; was recalled in 1856 on the expulsion of Santa Ana, and again elected President; and was reelected President in 1865 and 1868. During his last term he signed treaties with the United States (29 Nov. 1869) for the annexation of Santo Domingo to the United States, and for the cession of Samana Bay. The treaties failed of ratification in the United States Senate, and caused the downfall of Baez.

BAEZA, ba-a'tha, Spain, town of Andalu¬ sia. 22 miles east-northeast from Jaen. It is pleasantly situated on a height amid rich and well-watered plains, and from a distance pre¬ sents a very striking appearance with its old walls, churches and steep-roofed houses. It has several good streets and three squares, one of which is lined by a range of porticoes. The principal edifices are the cathedral, the old Aliatares tower, the townhall with a fine faqade, and an old monastery, now a theatre. The leading products are barley, wheat, veg¬ etables and oil, and there are manufactories of spirits, soap and leather. Many cattle are raised in the district. Pop. 15,843.

BAFFIN, William, English navigator: b. about 1584: d. 23 May 1622. He visited west Greenland as a pilot in 1612, again in 1615, and

made voyages to Spitzbergen in 1613 and 1614. In 1615 he ascertained the limits of that vast inlet of the sea since distinguished by the ap¬ pellation of Baffin Bay, and also discovered and named Smith's Sound, Lancaster Sound, *etc.* In 1617-22 he was in the employment of the East India Company, and on board vessels belonging to them in the Indian seas. He was killed at the siege of Ormuz, on the Persian Gulf.

BAFFIN BAY, an inland sea or gulf in North America, part of the extensive strait that separates Greenland from Baffin Land. It is 800 miles long, with an average breadth of 280 miles. Depth, 200 to 1,480 fathoms. The tides do not rise more than 10 feet. The surface of the sea is covered with ice during the greater part of the year, which

extends from shore to shore in winter, though possess¬ ing a slow, southward movement. In spring and summer the great mass, known as the middle ice, begins to move less slowly south¬ ward, leaving navigable passages and occasional channels, or crossings, between the coasts. The coasts are mountainous, barren and deeply in¬ dented with gulfs. Whale and seal fishing is followed. This sea was discovered by the Eng¬ lish navigator, Baffin (q.v.), in 1615, while in search of the Northwest Passage.

BAFFIN LAND, a barren island west of Greenland, in the Canadian district of Franklin. Approximate area, 240,000 square miles : the fourth largest island in the world. It is about 1,000 miles in length, the breadth varying from 200 to 500 miles. The eastern side is crowned by an ice-capped plateau, from 5,000 to 8,000 feet high. Bernhard Hantzsch, a German scientist, died here in June 1911 while on an exploring expedition, and his account with maps was published in 1913.

BAFULABE, ba'fu-lab, a town of the French Sudan, at the junction of two head-streams of the Senegal, connected by railway with Kayes on that river.

BAGAMOYO, ba'ga-mo'yo, Tanganyika Territory, a seaport and commercial centre op¬ posite Zanzibar, and north of Dar-es-Salaam. It has few stone houses, as the natives, who constitute the bulk of the population, live mostly in huts. Though it has no harbor and its coast is often swept by hurricanes, it has a considerable trade in ivory, copra, caoutchouc, *etc.* It has a fort, government house, custom¬ house, post-office and telegraph building station, government school and a park, with a monument to the troops who fell during an uprising of the natives in 1889. The climate is unhealthful for Europeans. It passed to the British with German East Africa in 1918. Pop. about 25,000.

BAGASSE, ba-gas', the name given to sugar cane in its dry, crushed state, as delivered from the mill, and after the main portion of its juice has been expressed; used as fuel in the sugar factory, and called also cane trash.

BAGATELLE, bag'a-tel', a table ball game of the class of billiards, played on a table semi¬ circular at the top end. The tables vary from 6 to 7 feet in length and are usually about 3 feet 6 inches wide. The game is played by two or more, one against the other. There are nine balls, eight white and one black, and nine holes

sunk in the far end of the table in a diamond shape, numbered respectively 1, 2, 3, 4, 5, 6, 7,

8, 9.

• •

• • •

• •

*

The black ball is placed on a spot * in front of the foremost hole. The player then takes one of the white balls, and placing it writhin a balk line at the lower end of the table, strikes it with the cue in such a manner that it strikes the black ball; both balls go on their courses and fall, or not, into one or other of the open cups. Whichever cup the black ball falls into counts double the number of points normally allotted to it. Then the player, in like manner, plays the remaining seven balls up the table. For so many cups as he fills he counts up his dots, and that is his score. The highest wins. In France and England the bagatelle balls are four red, four white and one black.

BAGAUDZE, or BAGAUDI, a body of Gallic insurrectionists of the rural class, who revolted against the Romans 270 a.d., headed by one Victoria, called by the soldiers Mother of Legions. Claudius temporarily quelled them, and Aurelian, by a remission of their taxes in arrears, and by granting them a general amnesty, made peace with them. Under Dio¬ cletian, 280 a.d., they rose again, and their two leaders assumed the title of emperor; but they were soon compelled to capitulate, though they retreated to an island formed by the confluence of the Marne and Seine, and made a desperate stand for the victory. The place of this sanguinary contest was long known as the Fosses des Bagaudcs. From this period, the Bagaudse may be considered as gradually trans¬ forming their activity into a kind of brigandage, which infested the forests and fastnesses of Gaul until the end of the Western empire.

BAGBY, George William, American physician and humorist : b. Buckingham County, Va., 13 Aug. 1828; d. 29 Nov. 1883; educated at Delaware College; wrote under the pseudonym, Mozis Addums. He was editor of the Lynch¬ burg Express (1853), and Southern Literary Messenger ˆ(1859) ; State librarian of Virginia (1870-78), and

contributor to various maga¬ zines. He wrote (John M. Daniel's Latchkey) (1868) ; (What I Did With My Fifty Millions* (1875); and (Meekins' Twinses) (1877). His works were collected in three volumes (Rich¬ mond 1886). Consult Trent, W. P., < Southern Writers* (New York 1905).

BAGDAD, Mesopotamia, capital of the dis¬ trict of Bagdad, situated on the Tigris. The old Bagdad, the residence of the caliphs, said to have had 2,000,000 inhabitants, was situated on the western bank of the river and was one of the most magnificent cities of the Mohammedan world. The modern city lies mostly on the eastern bank of the river and is surrounded with a brick wall about six miles in circuit, partly in a ruinous condition, and with a ditch from five to six fathoms deep, intended to be filled with water from the Tigris. The houses, mostly built of brick, are but one story high, the streets unpaved, and so narrow that two horsemen can scarcely ride abreast. The houses

of the wealthy are distinguished by a better architecture. Of the mosques, about 100 in number, only a few attract much notice, and many are in ruins. Their architecture is in general inferior to that of other Mohammedan cities, but they have a gaudy appearance from the glazed tiles covering their domes and min¬ arets, and arranged in a kind of mosaic work in various colors. In the vicinity are situated tombs held in high reverence by the natives and visited annually by thousands of pilgrims. The bazaars are spacious and well stocked with goods. That built by Daoud Pasha still ranks as one of the most splendid in the world. Bag¬ dad long commanded a large part of the traffic between Europe on the one hand, and Persia and India on the other. The Persian and In¬ dian trade is still considerable, as also that with Europe, a large portion of it being carried on by steamers up and down the river. The trade with Europe was formerly more largely by land, passing through the Syrian Desert to Damascus, or by way of Armenia northward. Since the opening of the Suez Canal the sea routes are of far more importance. The traffic from India has declined

somewhat, but, owing to develop¬ ment of railway facilities, it is the mart through which pass the imports and exports of Mesopo¬ tamia. Wool is the chief export to Europe, others being wheat, gum, galls, dates, horses, various Oriental fabrics, skins, tragacanth, feathers and leather articles. Imports include iron and copper, suga.- and coffee. There are numerous manufactures of copper utensils, cloth and felts, *etc.* The heat of the summer is oppressive in Bagdad, but the winter is cold enough to make a fire necessary. The climate is on the whole agreeable and healthful, though sometimes the plague prevails. Bagdad is in¬ habited by Turks, Arabs, Persians, Kurds, Armenians, Jews and a small number of Chris¬ tians. The Turks compose three-fourths of the whole population. The Jews are confined to a certain district of the city, and are in a very oppressed condition. The population of the city, according to the most recent estimate, amounts to between 175,000 and 200,000.

Bagdad was founded in 762 by the Caliph Almanzor, and was raised to a high degree of splendor in the 9th century by the famous Harun al-Rashid, who figures so often in the (Arabian Nights. } It then became the chief city in the Moslem world and a great centre of culture and learning, but at present its high schools or medresses are few in number, and its importance rests solely on its commerce. In the 13th century it was stormed by Hulagu (Holagou), grandson of Genghis-Khan, who caused the reigning caliph to be slain and over¬ threw the caliphate. The descendants of the conqueror were expelled in 1392 by Tamerlane. In the 15th century Shah Ismael, the first sovereign of Persia of the house of Sofi, took possession of the city. From that time it was a perpetual subject of contest in the wars be¬ tween the Turks and Persians. After a memorable siege in 1638 it was conquered by the Turkish Emperor, Murad IV, and Nadir Shah endeavored in vain, in the 18th century, to wrest it from the Turks.

Early in 1917 British forces, advancing up the Tigris, took Kut and pushed on toward Bagdad. On 10 March the last Turkish position south of the city was attacked, and that night

the Turks evacuated the city, which at daybreak of˜ the 11th was occupied by the British. See War, European; Turkish Campaign.

BAGDAD RAILWAY, Asiatic Turkey, an enterprise of international importance in which is bound up the future political control of large regions in Asia Minor, Mesopotamia and the Persian Gulf. The line over 1,400 miles long, extending from Konieh on the existing Anato¬

lian Railway through the Taurus range, and by way of the valley of the Euphrates, Nisibin, Mosul, Kerkuk, the Tigris, Bagdad, Kerbela and Nejef is projected eventually to reach Basra on the Persian Gulf, thus establishing through connection from Europe. Engineered by Baron Marschall von Bieberstein, the German diplo¬ mat, on 27 Sept, and 4 Oct. 1888, the first Ger¬ man company obtained power to exploit the Haidar-Pasha-Ismidt Railway by the concession for 99 years of a railway to run from Ismidt to Angora. This was financed by the Anatolian Railway, backed by the Deutsche Bank. On 15 Feb. 1893 the company was authorized to ex¬ tend the railway from Ismidt to Konieh. This work covering the first 535 kilometres of the Bagdad Railway was completed in 1896. Early in October 1898, Kaiser William II vis¬ ited the Sultan at Constantinople, and ob¬ tained the promise of a concession for a rail¬ road from Konieh to the Persian Gulf. Negotiations and surveys led in November 1899 to an irade approving of the German offers and to the convention of 16 Jan. 1902, which, definitely revised and brought up to date 5 March 1903, formed the charter of the enter¬ prise. The <(Societe Ottomane des Chemins-de-Fer de Baghdadˆ was established with a capital of $3,000,000, of which only the half was actually paid up. The company acted as broker between the Turkish government, which bor¬ rowed the sums necessary for the construction of railways, and the European capitalists. A series of complicated arrangements between the two parties had to be adapted to circum¬ stances from year to year. The entire network of railways from Konieh to Basra was divided into sections of 200 kilometres each. But this was found impracticable and the sections had to be built of unequal lengths. The Ottoman government and the railway company concluded separate agreements for each section, the dif¬ ferent financial and technical problems being regulated by such agreements. The first section of 200 kilometres from Konieh to Eregli, regu¬ lated by one of the conventions signed 5 March 1903, was completed and ready for service Oc¬ tober 1904. The second section of about 840 kilometres from Eregli to El Hejef through the Taurus range, was financed by the agreement of 2 June 1908. For some years technical and financial obstacles prevented its completion, and work owing to great tunneling difficulties was suspended May 1914, the railhead ending at Dorak. A convention signed at Constanti¬ nople 20 March 1911 provided for the building of the third section of about 600 kilometres from El Helif to Bagdad. Of the 1,509 miles from Konia to Bagdad, 1,117 miles are already working. Also the 75 miles from Bagdad to Samara and sections of narrow gauge built dur¬ ing the war, totalling 345 miles.

BAGEHOT, baj'ot, Walter, English econ¬ omist, journalist and critic :

b. Langport, Somer-

setshire, England 3 Feb. 1826; d. Langport, 24 March 1877. His father, Thomas Watson Bagehot, was vice-rchairman of the Somersetshire bank, founded by Samuel Stuckey in the 18th century. His mother, a niece of Stuckey, a woman of much character and lively mind, had, through an earlier marriage, been brought into an excellent intellectual atmosphere from which, says Hutton, ((she greatly profited.® Bagehot, a boy of naturally keen mind and with a habit of reading, was educated with much good judg¬ ment. He first attended school in Bristol, whence, in 1842, he entered University College, London, graduating B.A., in 1846, and M.A., with much honor in philosophy and political economy, in 1848. He was also distinguished as a mathematician and was widely read in poetry, metaphysics and history. Then he took to reading law, but, though very fond of the study and though called to the bar in 1852, he never practised. Instead he entered the bank¬ ing business under his father in Langport. He had previously, in 1851, spent some time in Paris during the exciting days of the coup d'etat of Napoleon III. His first essays in journalism were accounts of the affairs of France contributed to a little weekly news¬ paper, the Inquirer. Herein Bagehot astounded his friends by a somewhat youthfully cynical support of the cause of Napoleon, on the para¬ doxical ground that the French were too clever to be successful as a self-governing people. Stupidity, according to his views at that time, was, says Hutton, essential to political freedom.

While in business, Bagehot contributed to re¬ views, — first to the Prospective Review and after 1855 to the National Review, — various biographical and critical articles. These, and also several sketches originally published as (Estimates of Some Englishmen and Scotch¬ men (1858), were collected after his death in 'Literary Studies) (2 vols., 1878), and 'Biographical Studies} (1880). In time they ex¬ tend from 1852 to Bagehot's death. The essays <(which best represent his peculiar genius® (Hutton) are 'The First Edinburgh Review¬ ers,) (

Hartley Coleridge, y and (Bishop Butler, > but such essays as those on Gibbon, Shelley, Clough, Dickens and Wordsworth, Tennyson and Browning, are among the most vigorous pieces of English criticism. All are distin¬ guished by a dash and keenness of phrase and an uncommon faculty for sane and broad gen¬ eralization.

In 1858 Bagehot married Miss Wilson, eld¬ est daughter of the Right Hon. James Wilson, who had founded the London Economist during the anti-corn law agitation to represent free-trade sentiment. In 1860 Bagehot became edi¬ tor, and there remained till his death. His practical knowledge of men, his great experience in business and extensive studies enabled him to win success in this field, and also to write the books on which his fame as an economist chiefly rests. These are (The English Consti¬ tution) (1867), which is extensively used as a textbook and has been translated into French, German and Italian; ‘Physics and Politics) (1872), which has been even more widely trans¬ lated; and (Lombard Street* (1873), a study of the money market. Besides the books already named there appeared after Bagehot’s death ‘ Economic Studies,* a collection of earlier work, and (The Depreciation of Silver.* Bage¬

hot’s counsel was much sought for in financial and economic questions. He tried on several occasions, with honesty rather than zeal, to be elected to Parliament, but never succeeded.

Bagehot, both as a student of institutions and of men, is entitled to high rank. To this study he brought, in spite of some natural prejudice in favor of the institutions and men of his native land, a mind of thoroughly scien¬ tific bent and much detachment. As a student he is interested in fundamental questions rather than in minutiae. His broadest book, (Physics and Politics, *is an example of this, and may be regarded as an exposition of his main methods and interests. It is an attempt to show how the principle of the survival of the fittest applies to the formation of states. The thesis is that in earliest times and even down nearly to the present, the people who had the faculty of organization and obedience, whether in family, tribe or nation, were bound to prevail over those less organized, and that hence obedience to laws or rulers of whatever sort was neces¬ sary to political success, until the habit of legality became ingrained. Hence the nation with the best military power could seize the best parts of the earth. If, however, the proc¬ ess stopped with organization, the nation would in time present a case of arrested de¬ velopment, and would no longer progress ; for the principle of variation, or originality, is also necessary to complete progress. The best in¬ strument*

for the cultivation of variation is free discussion. Hence arises the explanation of the fact that the western nations of Europe are far in advance of the rest of the world, in that they have tempered the rule of custom with discussion, which has historically .been prac¬ tically limited to peoples of Greek and Ger¬ manic origin.. And in general, on the other hand, discussion is useful in checking the im¬ pulse to hasty action, a relic of primitive civilizations. Bagehot's other longer works are really exemplifications of this principle : <The English Constitution is substantially an examination of the means of discussion in Eng¬ land and a comparison of it with that in other states; (Lombard Street is an analysis of one of the phenomena of variation with a view to expounding and criticising it as an efficient means of progress.

Bagehot's criticism of literature is likewise distinguished by breadth and a fondness for the analysis of causes. It is the criticism, not of taste or of morals, of the beautiful or the good and bad, but of types. The manner in which the mind of his author worked, the type of per¬ son he was, are the fundamental questions of interest with Bagehot. The title, for example, of his excellent essay on certain famous poets illustrates this: "Wordsworth, Tennyson and Browning; or, Pure, Ornate and Grotesque Art in English Poetry.® These poets are treated as examples of the three different types of mind and expression named in the title. Dickens is an example of the (<irregular® genius, Hartley Coleridge of the whimsical and wayward mind with a gift for self-revelation, Shakespeare, among other attributes, of the experiencing mind. Bagehot's criticism is, in all these essays, never formal or academic, but is based on a wide practical knowledge of men. His point of view he maintains with great consistency, but always enlivens his criticism with such an

abundance of keen and witty observations that his criticism is unsurpassed in vigor and is never dull. He, however, founded no school as certain other critics have done ; for his criticism is essentially that of a lively personality and the impressionism of a scientific and detached mind.

Bibliography. — The chief authority for Bagehot, besides his own work, is R. H. Hut¬ ton, (Memoir) prefixed to (Liberty Studies, > and (Dictionary of National Biography.*

William T. Brewster,

Professor of English, Columbia University.

BAGGAGE, probably from the old French word bague, meaning bundle. As ordinarily used it includes trunks, valises, portmanteaus, etc., which a traveler carries with him on a journey. In a military sense the word includes tents, furniture, utensils, *etc.*

BAGGARA, bag'ga-ra, an Arabic-speaking Hamitic tribe of the upper Nile Valley. They occupy this valley as far east as the territory of their neighboring negro tribesmen, the Shil-luk. They are nomads, Egyptian soldiers, hunters, *etc.*

BAGGESEN, bag'ge-sen, Jens, Danish poet, who also wrote much in German : b. Kor-sor, 15 Feb. 1764; d. Hamburg, 3 Oct. 1826. His (Comic Tales, 5 which appeared in 1785 had an instantaneous success ; but an opera he produced four years later was a fiasco, and in disgust he left Denmark. He returned in 1791, but shortly withdrew, and spent a wandering life on the Continent for the next 20 years. His work was conservative in its form, and he was intensely jealous of the reception accorded to the romantic poems of Oehlenschlager. He possessed great sensibility and imagination, and his works are said to present a singular mixture of contradictory qualities. His best productions are his smaller poems and songs, several of which are very popular with his countrymen. The <Labyrinth) (2 vols., 1792-93), a poem descriptive of his travels, is perhaps his most famous work. His Danish works were pub¬ lished in 1827-32.

BAGHELKHAND, ba-gel-kund', India, a tract of country comprising the native states of Rewah, Nagode, Maihar, Sowahal and eight of lesser importance, under the governor-generars agent for central India ; area, 14,706 square miles; pop. 1,772,574.

BAGHERIA, ba'ga:re'a, or BAGARIA,

Sicily, town in the province of Palermo, eight miles east by south of the city of Palermo by rail. It is beautifully situated at the base of the isthmus which separates the Bay of Palermo from that of Termini and is surrounded by groups of palatial villas of the Sicilian nobility. Among them are the Villa Palagonia, celebrated by Goethe, and the Villa Valguarnera, which has one of the most beautiful prospects in

Sicily. Pop. 21,212.

BAGIMONT'S, baj 'i-monts, ROLL, a rent-roll of Scotland made up in 1275 by Baia-mund or Boiamond de Vicci, vulgarly called Bagimont, who was sent from Rome by the Pope, in the reign of Alexander III, to collect the tithe of all the Church livings in Scotland for an expedition to the Holy Land. The Scot¬ tish clergy opposed its imposition ; but their objections were repelled; and it remained the statutory valuation, according to which the

benefices were taxed, till the Reformation. A copy of it as it existed in the reign of James V (1513-42) is in the Advocates' Library, Edin¬ burgh. Consult publications of the Switees Society, Vol. XII, and Statuta Ecclesise Scoti-canse (Bannatyne Club, 1866).

BAGINSKY, ba-gen'ski, Adolf, German physician : b. Ratibor 1843. He was educated at Berlin and at Vienna. From 1881 to 1892 he was privatdocent on children's diseases at the University of Berlin, and in 1892 became ex¬ traordinary professor at that institution. In 1880 he founded and became coeditor of the Archiv fiir Kinderheilkunde. In 1890 he be¬ came director of the Kaiser-und Kaiserin-Friedrich Krankenhaus at Berlin, an institu¬ tion devoted principally to the treatment of the infectious diseases of children. He has published (Handbuch der Schulhygiene) (3d ed., 1898-1900) ; (Lehrbuch der Kinderkrank-heiten* (8th ed., 1905) ; (Pflege des gesunden und kranken Kindes) (3d ed., 1885) ; (Das Leben des Weibes) (3d ed., 1885) ; (Die An-tipyrese im Kindesalter* (1901); (Sauglings-krankenpflege und Sauglingskrankheiten* (1906) ; cDie Kinderaussage vor Gericht*

(1910).

BAGIRMI, ba-ger'me, Africa, a Moham¬ medan negro state, situated partly between Bornu and Wadai, to the southwest of Lake Tchad, and watered by the Shari, which falls into Lake Tchad, and by its tributaries. It has an area of about 65,000 square miles, and about 1,000,000 inhabitants; but both its area and population fluctuate according as it encroaches on or is encroached on by its neighbors. The whole country is a plain 900 feet above the level of the sea, well suited for the cultivation of sorghum, which is accordingly the principal breadstuff. Sesame, beans, cotton and indigo are also

cultivated. The government is an ab¬ solute monarchy, but the ruler pays tribute to Wadai. An armed force, estimated at over 10,000, is maintained. The prevailing religion is Islam, which was introduced in the 16th century. Bagirmi was formerly included in one state with Bornu and Wadai. An in¬ exhaustible supply of slaves is found in the heathen negro states to the south, at the expense of whom also Bagirmi, when pressed by its Mohammedan neighbors, extends its ter¬ ritory. By Great Britain and Germany Bagirmi has latterly been recognized as within the French sphere of influence, and in 1897 a treaty was concluded between the French government and the Sultan. There is a French resident in Chekna, the capital. The former capital, Mas-senya, was destroyed in 1898. At the end of 1899 Rabah, a usurper of Bornu, invaded the state, but was speedily defeated by the French troops. His sons continued the contest, but by May 1901, the country was completely pacified.

BAGLEY, Worth, American naval officer: b. Raleigh, N. C., 6 April 1874; d. 11 May 1898. He was graduated at the United States Naval Academy in 1895; promoted to ensign 1 July 1897, and was detailed as inspector to the new torpedo-boat Winslow, in November following. This boat went into commission the next month, and he was appointed her exec¬ utive officer. In April 1898 the Winslow was assigned to the American fleet off the coast of Cuba, and on 9 May, while on blockading duty

at the harbor of Cardenas, with the Wilmington and Hudson, drew the fire of several Spanish coast-guard vessels. All the American vessels escaped untouched. Two days afterward the three vessels undertook to force an entrance into the harbor, when they were fired on by Spanish gunboats. The Winsloiv was disabled, and with difficulty was drawn out of the range of the enemy's guns. The Wilmington then silenced the Spanish fire, and as the action closed, Ensign Bagley and four sailors on the Winslow were instantly killed by a shell, he being the first American naval officer to fall in the war with Spain.

BAGLIONI, ba-lyo'ne, a historical family of Perugia in Italy. Perugia

contained two parties — an aristocratic and a democratic one. The Baglioni belonged to the former. In the 12th century Ludovico Baglioni was appointed imperial vicar of Perugia by Frederic Barbarossa, who styles Baglioni his relative, as coming, like himself, from the ducal house of Swabia. In 1393, 70 Perugian gentlemen, and among them two Baglionis, were killed in a street fight by the populace, and the whole aristocratic party was expelled from the city. Braccio Baglioni, in the service of the Pope, defeated Francisco Sforza, near Lodi, in 1453, and was made lord of Spello by Sixtus IV. Gian Paolo Baglioni began life as a condottiere; then availing himself of the dissensions of his native state he obtained supreme power over it and made alliance with Pandolfo Pe-trucci, ruler of Sienna. He was driven out of Perugia by Caesar Borgia in 1502. Returning in 1503, after the death of Alexander VI, he was banished again, in 1506, by Julius II. He then entered the service of the Venetians in the war of the league of Cambray. He re¬ sumed his old position as ruler of Perugia in 1513. Here he created so much scandal that Leo X, who at first passed over his usurpa¬ tion, summoned him to Rome, threw him into the castle of Saint Angelo, had him tried and he was beheaded at Rome in 1520. Malatesta and Orazio, his sons, recovered possession of Perugia after the death of Leo. Orazio turned condottiere in the service of France, and was killed in the Neapolitan expedition of 1528. Malatesta remained in Perugia until 1529, when he was driven out by the Papal and Imperial troops. He died at Perugia in December 1531. In the 16th century Astorre Baglioni served Charles V in Italy and on the coast of Tunis, and rose high in the favor of Pope Paul III, who restored to him his paternal estates. He then entered the Venetian service, and was governor of Famagosta in Cyprus when the Turks besieged it in 1570. After a brave de¬ fense he was obliged to capitulate on condition of being sent home to Venice with his gar¬ rison. But Mustapha Pasha, disregarding the terms, caused Baglioni and the other Venetian officers to be beheaded.

Another family of the name Baglioni, be¬ longing to Florence, produced several sculptors and architects during the 15th and 16th cen¬ turies. Giovanni Bagliont, a native of Rome, was a celebrated art historian and painter.

BAGNACAVALLO, ba'nya-ka-val'lo, Bar¬ tolomeo Ramenghi, Italian painter: b. 1484; d. 1542; called Bagnacavallo from the village where he was born. At Rome he was a pupil

of Raphael and assisted in decorating the gal¬ lery of the Vatican. His

best works are dis¬ putation of Saint Augustine) and (A Madonna and Child, > both in Bologna.

BAGNERES-DE-BIGORRE, ba'nyar' de be-gor', France (anciently Aquensis Vicus, Aquce Bigerronum) , celebrated watering-place in the department of Hautes-Pyrenees, capital of the arrondissement of the same name, at the entrance of the valley of Campan, on the left bank of the Adour, 13 miles south-southeast from Tarbes. Its site is one of the most ro¬ mantic in the Pyrenees. Well-cultivated slopes surround it on all sides, and are terminated in the distance by a mountain range, the most conspicuous summit in which is the Pic du Midi. The town is well built and contains sev¬ eral good squares and numerous spacious, hand¬ some streets. There are about 30 mineral springs of varied temperature and of different chemical composition, 'each of which is consid¬ ered a specific for different diseases. Bagneres owes its chief celebrity to its baths, which are sulphurous and saline. There are 10 bathing establishments, of which the principal, known as the Fracasti, is very complete, and is the largest and most handsome building of the town. It stands at one of its extremities, im¬ mediately under Mount Olivet, and is ap¬ proached by a long avenue of poplars winding through a verdant valley. About 25,000 or 30,000 invalids and tourists visit the place annually. It is a centre for winter sports, and many fetes are arranged each year. The inhabitants de¬ pend chiefly on the baths, almost every house receiving lodgers ; but the manufactures are of some importance. The chief of these are a kind of crape and a fine woolen gauze woven into shawls and scarfs. There are marble quarries in the neighborhood, from which come a high grade of table tops and chimndy pieces. The springs here were known to and used by the Romans, and various ancient remains are still in existence. Pop. 8,455.

BAGNERES-DE-LUCHON, ba'nyar' de lu-shon, France, town in the department of Haute-Garonne, one of the principal watering-places of the Pyrenees, having sulphurous thermal waters said to be beneficial in rheumatic and gouty complaints, nervous ailments, skin diseases, etc., and used chiefly as baths. It is divided into an old and a new town, situated in the picturesque valley of Luchon, surrounded by hills covered with wood. The new town has fine streets and promenades, and several villas and gardens. The main street forms a splendid avenue, at the west end of which the large bathing establishment is placed. There is also a large and splendid casino building of recent erection, comprising a theatre, concert and ball rooms, etc., and containing a large-scale model of the Pyrenees, giving an excellent idea of the configuration of the range. The neighborhood exhibits some of the most inter¬ esting scenery of the Pyrenees. Visitors num¬

ber from 30,000 to 40,000 annually, and are most numerous in the months of July and August. Bagneres-de-Luchon has 48 mineral springs of varied temperature and composition. It is the Thermae Lixonienses of the Romans, and for many centuries was practically deserted. Megret d'Etigny had the waters analyz-ed in 1751, and at once drew attention to their prop-BAGNES — BAGRATION

erties. As a resort, however, it dates from the early years of the 19th century. Resident pop. 3,415.

BAGNES, ban', or BAZNE, Val de, Swit¬ zerland, picturesque valley in the canton of Valais. It is watered by the Dranse, a tribu¬ tary of the Rhone, and is surrounded by mountains, of which the highest peaks are Grand Combin, 14,164 feet, and Mont Gele, 11,000 feet. There are glaciers in the valley, and waterfalls abound along the river, which has sometimes overflowed and inflicted con¬ siderable damage. Chable, the chief town of the valley, is often called Bagnes.

BAGNES, the convict prisons of France. Until 1748 serious crimes were punished by terms of service in the galleys; after which convicts were employed in hard labor in arsenals and similar public works. The name Bagnes (ˆbaths®) is supposed to have come from the fact that the slave prisons at Con¬ stantinople were adjacent to the baths of the Seraglio. In 1792 the sufferings of the convicts were mitigated and the name <(travaux publiques® substituted for the hated term ((galeres.® Until 1832 criminals continued to be branded with a hot iron. The treatment of convicts at the bagnes was always cruel ; men were chained in couples ; their food was poor, and they were herded together at night like cattle. The latest establishments of the type were at Toulon, Rochefort and Brest, Toulon not being finally emptied until 1870, although these prisons had been abolished in 1854. Con¬ sult Zaccone, (Histoire des bagnes) (Paris 1875), also Victor Hugo's (Les miserablesP

BAGOT, Sir Charles, British diplomatist: b. 23 Sept. 1781 ; d. Kingston, Canada, 19 May 1843. He was the second son of William, 1st Baron Bagot of Bagots Bromley. In 1807 he was appointed UnderSecretary of State for Foreign Affairs in the Canning administration; in 1814, Minister to France; in 1815 Minister to the

United States, securing by his diplomacy the neutralization of the Great Lakes ; in 1820, Ambassador at Saint Petersburg; and in 1824, Ambassador at The Hague. On the death of Lord Sydenham in 1841 he was made governor-in-chief of the Canadas, which office he held till his death.

BAGOT, Richard, English bishop, brother of the preceding: b. 22 Nov. 1782; d. 15 May 1854. In 1829 he was appointed bishop of Ox¬ ford, and in 1845 he was translated to the bishopric of Bath and Wells; During the Trac-tarian controversy he was violently assailed for his alleged Puseyite sympathies, and for his in¬ duction of the Rev. M. Bennett into the living of Frome. This had such an effect on Bishop Bagot that his intellect became disturbed.

BAGPIPE, a well known wind instrument, of high antiquity among various nations, and so long a favorite with the natives of the High¬ lands of Scotland that it may now be considered as their national instrument. The peculiarity of the bagpipe consists in the fact that the air producing the music is collected into a leathern bag, from which it is forcibly pressed into the pipes by the arm of the performer. The chanter, a pipe into which is inserted a reed for the production of the sounds by the action of the

air from the bag, is perforated with holes like the German flute, which are stopped with the fingers. The other parts of the instrument, in the common Highland form, are three tubes or drones, which are also furnished with reeds. Two of the drones are in unison with D on the chanter, which corresponds with the lowest note of the German flute. The third drone, which is the longest, is an octave lower. The tuning of the bagpipe is accomplished by lengthening or shortening the tubes or drones, as may be required. Its compass is from the G of the treble stave to the A above it, but its scale is imperfect. The Highland bagpipe is a power¬ ful instrument, and calls for great exertion of the lungs, the air being forced into the bag by a pipe held between the lips. The Irish bagpipe is smaller, softer in its notes, and is always played with bellows that force the air into the bag. It has a number of keys on the chanter and drones, and is a much more perfect instru¬ ment musically than the Highland. A Low¬ land Scotch form of the bagpipe is also played with bellows. It is not known when the bagpipe first found its way into Scotland, but it is prob¬ able that the Norsemen first introduced it into the Hebrides, which islands they long possessed. In England it was common from Anglo-Saxon times, and is familiarly referred to by Chaucer and Shakespeare. The bagpipe

is indeed of very ancient origin, as representations of it are to be found on Grecian and Roman sculptures; and it has long been well known among various east¬ ern nations. In Italy to this day, or at least in certain parts of it, the bagpipe (cornamusa) is still a popular instrument among the peasantry, but the Italian form of it is more simple than the Highland and Irish.

BAGRATIDZE, bag-ra'ti-de, or BAGRA-TIANS, a line of kings and princes of Armenia that ruled in that country from the year 885 to the 11th century. After the seizure of Asia Minor by the Seljuks, some of the princes re¬ tained power as independent lords, holding the possession of mountain fastnesses. The dynasty ended with Leo IV, who was assassinated in

1342.

BAGRATION, ba-gra'te-on', Peter, Prince, Russian general, of the Georgian Bagradite family: b. 1765; d. 7 Oct. 1812. He entered the Russian army in 1782 as a common soldier ; and in a long military career rose to the highest grades, and gained a place among those Russian generals the most cele¬ brated for their stubborn, unyielding bravery. Having been created a lieutenant-general, he commanded the vanguard of the Austrian army at Austerlitz, under Prince Lichtenstein. In the Prussian campaign of 1807, his resistance made the battle of Eylau so terrible that even Napoleon shuddered at its bloody results. The same is said of him at the battle of Friedland. In 1808 he made a daring march across the frozen Gulf of Finland, overrunning western Bothnia and the Aland Isles; in 1809 he fought at Silistria, and destroyed the Turkish force brought up from Adrianople to relieve that fortress. In 1812 he fought an unsuccessful battle with Davoust at Mohileff, but succeeded, nevertheless, in joining the Russian main army. He was mortally wounded at the battle of Mo-jaisk, or Borodino, 7 Sept. 1812, just a month before he died.

BAGSHAW, Edward, English author: date of birth unknown ; d. 1662. He espoused at first the cause of the Puritans, but later be¬ came a Royalist, and sat in the Parliament that Charles I convened at Oxford; was taken prisoner by the Parliamentary army, and dur¬ ing his detention composed various books, the most important of which is (The Right of the Crown of England as Established by Law.*

BAGSHOT HEATH, a level tract in England, now used as a field for military ma¬ noeuvres. It is famous as the site of many highway robberies in the 18th century.

BAGSTOCK, Major Joe, an apoplectic, gluttonous character in Dickens' novel, Tom-bey and Son.*

BAGWORM, or BASKETWORM, a

common caterpillar of a moth (Thyriadopteryx ephemertzformis) , found in large numbers throughout the northern part of the United States. The male has a dark body and light wings, but the egg-laying female is wingless. The larva lies head downward in a sac or case covered with bits of leaves (so that it looks like a basket), where it finally transforms, the wormlike female remaining in its case, while the male flies sluggishly about, and may be known by its hairy body and small transparent wings. When the young hatch (in May), they crawl on a leaf, gnawing little bits from the surface and fastening them together with a thread. They present a comical sight when the baskets are partly completed, walking about, tail in the air, with the body hidden in the case. As they grow older the body is entirely pro¬ tected by the sac, which they drag about when in motion. These insects frequent the trees in city parks, especially junipers, in great numbers, and are apt to be detrimental to foliage unless destroyed by scraping off the cocoons. Certain small species occur on the orange in Florida, and others in the tropics. See Fagotworm.

BAHADUR, ba-ha'door (((Valiant®), the last Great Mogul from the house of Tamerlane: b. 1767 ; d. 1862. When the British captured Delhi, he was taken prisoner, and sent to Rangoon. He was also a poet and wrote a number of songs.

BAHAISM, a religious movement started by Mirza Ali Mahomet (1819-50) in Persia about the middle of the 19th century. He preached that the Mohammedan religion had become corrupt and needed reformation, that the clergy were ignorant and vicious, that the Koran was not the final revelation, but that a new prophet was to come in the near future who should preach a new gospel to a new gen¬ eration, which should conform to the needs of modern scientific knowledge and social ten¬ dencies and should, therefore, be greater than any previous revelation made to any people at any time. He also proclaimed the spiritual equality of women with men. As his gospel appealed powerfully to the down-trodden masses, his success was immediate and so great that the Mohammedan priesthood became alarmed ; and they used their influence with the government to have the daring preacher arrested on the charge of hostility to state and religion. Ali Mahomet, who had taken the religious name of "Bab® (the door or gate), foretold his own death at the hands of the authorities, but, at the

same time, he comforted his followers with the assurance that another and greater than he would soon appear to carry on his work. After a mock trial, in which the mullahs of the Mohammedan Church did the prosecution, he was condemned and shot on the public square at Tabriz, July 1850. The immortality of the soul and the omnipotent love of God extended to every creature upon earth constitute the foundation of Bahai theology; but it reaches out and attempts to reform institutions of all kinds, including those of the state. It teaches that loyalty is due to institutions, causes and religious creeds only so long as they represent the cause of humanity and the progress and evolution of the race. While Bahaism pro¬ claims no loyalty to any selfish or outworn creeds and organizations, its prophet issued a stern warning against mistaking the obstructive and destructive for the constructive. He held out the hand of friendship to all creeds, all religions, all societies and all governments, proclaiming, at the same time, the necessity of a get-together movement for the regeneration of the race and of its institutions and beliefs. He foretold the coming of a new special order in which the development of spiritualized man was to be the primary purpose and all its ten¬ dencies essentially creative. The Bahar Church possesses no ecclesiastical organization ; it works socially and practically, through a popu¬ larly elected “house of justice,® for the spirit¬ ual, social and moral betterment of humanity, irrespective of creed, race or social standing, But this “house of justice® has no inherent authority, since it is purely an advisory body in matters of doubt or urgency. Bahaism is, in no sense, destructive. It countenances all existing creeds, churches, societies, institutions and governments ; but urges their reformation. It would work through them, patiently en¬ deavoring to apply the golden rule for their betterment and final perfection. To this end each Bahai temple should have attached to it a college, a hospital, hospice and other social features which should be run as model institu¬ tions. It insists upon the sanctity of the indi¬ vidual and the spiritual and social equality of all. In this sense, it proclaims all men (and women) born free and equal, with the personal right and duty to disallow any vicarious spiritual agency. Each individual constitutes a divine creation not impeached, denied or hum¬ bled by special privileges of any other human being. Self-expression is the supreme privilege and obligation of life; and this is afforded by life itself in the means for beautiful expression, noble conduct and great and inspiring art. The inability to recognize this is a sign of spiritual insufficency; for Bahaism proclaims spiritual development as the supreme purpose and obli¬ gation of life. The state, as well as the indi¬ vidual, should experience spiritual

growth, for without spiritual activity even social effort is sterile and self-destructive. Legislation not de¬ rived from religious vision, laws not founded upon unselfish wisdom, obstruct our social evo¬ lution ; this is why social evolution moves so slowly. According to Bahaism there is no essential virtue in poverty nor essential evil in great wealth. Wealth used for the spiritual development of the possessor and the better¬ ment of humanity is an exceedingly good thing,

as i.re also the arts, sciences and forces of legitimate, healthful pleasure which feed the growth of the spiritual soul; for the one great thing in life is to submit all one's activities, talents and possessions to the spiritual agency, thus transferring the centre of consciousness from self to an outside point and thus chang¬ ing egotism into service and creating the utmost sympathy for others, sundering every tie inher¬ ently selfish, destructive or useless. The be¬ lievers in Bahaism are enjoined not to with¬ draw from present religious organizations but to stay in their midst, reinterpreting their functions in the light of social evolution and endeavoring to vitalize their activity and re¬ move their prejudice and ignorance which are walling them off from social unity. As citizens they are bound to obey the laws of the land while endeavoring to improve them. They should labor to unite minor organizations to make them efficient so that their influence may eventually become world-wide. Therefore duty imposes upon the believer in Bahaism the study of social problems, advanced ideas in science, economics and government, and the creation in his own mind of a living social ideal, a divine civilization. Social ethics should pos¬ sess the same foundations as personal morality and spirituality, for Bahaism makes the same appeal to the institution that Christ made to the individual, to put aside self in the interest of love of one's neighbor. Therefore churches should lay aside sectarianism and denominationalism.

Bahaism appealing through its gospel of equality, fraternity and service, to the masses of down-trodden Asia, has spread with wonder¬ ful rapidity over Persia, India, Turkey and southern Russia. Most of its

converts have been made among Mohammedans. In Persia alone there are said to be nearly 2,000,000 of the Bahai faith, which numbers several mil¬ lions more in the other countries mentioned together with the Mohammedan states of northern Africa. Today Bahaism has its converts, its societies and its missionaries in almost every civilized country on the globe, including the United States, which has some two score centres of propaganda, proclaiming the doctrine that men should draw together for social and spiritual good and that there is little hope for the race so long as its members con¬ tinue to live apart from one another, separated through fear, jealousy, shame or social inequal¬ ity; for every personality overlaps every other personality, thus teaching that the one great, all-compelling aim and object of fife is unity.

Bibliography. — Brown, E. G., (A Trav¬ eller's Narrative) (Cambridge 1891), (The Per¬ sian Revolution of 1905-09) (Cambridge 1910) ; Dreyfus, Hippolyte, (The Universal Religion > (London 1909) ; Barney, L. C., <Some Answered Questions* (London 1908) ; Mirza Abdul Fazl, (The Bahai Proofs) (New York 1902) ; Remey, C. M., (The Bahai Movement * and Observa¬ tions of a Bahai Travelled (Washington, D. C., 1914) ; (Bahaism the Modern Social Re¬ ligion (New York 1913). See Mirza Hussin Ali; also Abdul Baha.

BAHAMA BANK, Great and Little,

shoals among the West India Islands; the former between 22° and 26° N., 75° and 79° W., having south and west the Bahama old and new

channels. On it are the islands of Providence, Andros and Exuma. The Little Bank, north¬ west of the foregoing, between 26° and 27° N., 77° and 79° W., has on it the Great Bahama and Abaco islands.

BAHAMA CHANNEL, Old and New,

two channels of the West Indies; the former separates the Great Bahama Bank and Cuba; the latter, also called the Gulf of Florida, is be¬ tween the Great and Little Bahama Banks and Florida, and forms a part of the channel of the great Gulf Stream, which flows here at the rate of from two to five miles an hour.

BAHAMAS, The, or THE BAHAMA ISLANDS, were formerly known as the Lucayos, from the name of a tribe of aborigi¬ nes inhabiting them at the time of their dis¬ covery by Columbus in 1492. The scene of the first landing was an island on the outer or Atlantic side of this group

to which Columbus gave the name San Salvador. By the natives that island was called Guanahani, and it is now known as Watling Island. The total habitable area of the islands is small, but the extent of the group, including cays and rocks rising from banks near the surface of the water, is very great — nearly six degrees of latitude, and more than six degrees of longitude. Stretch¬ ing through a total distance of 780 miles, these islands and banks form a barrier between the Atlantic and the eastern entrance to the Gulf of Mexico. To reach the Florida Strait, a large vessel must follow one of three channels : the Old Bahama, north of Cuba; the Florida or the Providence. The last passes through the group above Nassau, the capital and only important city, an attractive place with about 12,554 inhabitants.

The researches of Professor Agassiz have shown that the Bahamas are essentially different in geological formation from the Greater and Lesser Antilles, being wind-blown piles of shell and coral sand, — ■ once much more extensive than now,— whose areas have been restricted by a general regional subsidence of some 300 feet, so that much of their former surface now occurs as shallow banks beneath the water. Mr. Robert T. Hill says : <(The islands are merely the exposed tips of the great submerged ridge, having an outline and configuration which would be crudely comparable to the island of Cuba if the latter were so submerged that its highest points merely reached the sur¬ face.® Their total area is 4,40314 square miles.

The Indian population having been carried away to the pearl fisheries of Panama, or to labor in the fields and mines of other Spanish colonies, the Bahamas remained deserted un¬ til, in 1629, an English settlement was begun in the island of New Providence. Twelve years later, Spain asserted her claim, based upon discovery without occupation. The Eng¬ lish were expelled, but again attempted col¬ onization ; and Charles II, in 1680, actually granted the islands to six English noblemen and gentlemen. Early in the 18th century New Providence was twice raided by French and Spanish forces ; and again it became a desert. Buccaneers of all nations made themselves at home, and held undisputed possession, until another English settlement was planted in 1718, and British troops were assigned to its defense. Tory emigrants from the English colonies on

the mainland at the time of the Revolution introduced slave labor and the cultivation of cotton — which did not thrive. New Prov¬ idence was captured and held for a short time by the Americans under Commodore Hopkins in 1776; six years later it fell into the hands of the governor of Cuba, but was retaken by the loyalist Colonel Deveaux before 12 months had passed. The rights of the old lord pro¬ prietors were purchased in 1787, the Bahamas becoming a possession of the British Crown, administered by a colonial government.

During the Civil War in the United States an enormous blockade-running trade swelled the imports of the islands from a little more than $1,000,000 to upward of $26,000,000; the exports from about $800,000 to more than $23,000,000 — a period of prosperity both brief and unique. Violent storms and droughts have more than once brought ruin to the natural industries; the cultivation of small fruits, vege¬ tables, oranges, pineapples, cocoanuts, etc., has been carried on at a disadvantage, owing to the tariff laws of the United States and the re¬ moteness of other markets. Other forms of agriculture have been attempted, with moderate success. Sponge-fishing is carried on exten¬ sively. At the eastern end of the group are the Turks and Caicos islands, which were sep¬ arated politically from the Bahamas and made a dependency of Jamaica in 1848. Grand Turk is the capital and there the chief executive of¬ ficer, or commissioner, resides. From these islands 1,500,000 bushels of salt are exported annually and a large number of sponges are also gathered and exported. The total value of imports to all the islands is about $825,000, the United States supplying nearly three-fourths of that amount. Besides Turks and Caicos, the principal inhabited islands are New Providence, with about 15,000 inhabitants, Abaco, Harbor Island, Eleuthera, Inagua, May-aguana, Ragged Island, Rum Cay, Exuma, Long Island, Long Cay, the Biminis, Grand Baha¬ ma, Crooked, Acklin, Cat, Watling, Berry and Andros Islands. The inhabitants of Great Abaco are chiefly descendants of the American Tories, referred to above. Harbor Island has about 2,000 inhabitants, who are descendants of the buccaneers. Largest and most densely wooded are the Andros Islands.

From November to May the temperature ranges between 60° and 75° F. ; in the summer months it varies from 75° to 85°. The climate, though subject to greater extremes of heat and cold than that of other groups in the West Indies, is agreeable and health-giving; and Nassau is a favorite resort for tourists in winter. The population (about

58,175) in¬ cludes a large proportion of negroes, the nat¬ ural increase among the descendants of former slaves being greater than among the descend¬ ants of the white settlers. There is little im¬ migration. Good schools are maintained by the government and by the Church of England. The administration of the islands is conducted by a governor, an executive council, the repre¬ sentative assembly and a legislative council.

((Though the first discovered of the West Indies, }) wrote Ober, <(the Bahamas were among the last, with a few exceptions, to become per¬ manently settled, and even to-day little is known of the more remote islands, since very few of them are reached by steamers, connection be¬

tween the northern and southern being kept up by sailing vessels only. As they are almost uniformly level, the highest elevation not ex¬ ceeding 300 feet, they do not display that va¬ ried vegetation to be seen in the Greater and Lesser Antilles, where the mountain-sides are clothed with extensive tropical forests. Still, the Bahama flora embraces more than 100 na¬ tive flowers and a variety of woods useful in the arts and materia rnedica, besides many de¬ licious fruits known to dwellers in the tropical zone.®

Steamers of the Ward Line (New York and Cuba Mail Steamship Company) leave New York every other Friday for Nassau, returning one week later; and during three months (about 1 January to 1 April), a steamer of the Penin¬ sular and Occidental Steamship Company plies weekly between Miami, Fla. and Nassau, Bahamas.

Bibliography. — Aspinall, A. E., (Pocket

Guide to the West Indies > (Chicago and New York 1914) and (The British West Indies* (London 1912) ; Hill, R. T., (Cuba and Porto Rico, with the other islands of the West In-dies) (New York 1898) ; Ober, F. A., (Guidc to the West Indies) (New York 1908).

Marrion Wilcox.

BAHAR, ba-har', province and town in In¬ dia. See Behar.

BAHAR, or BARRE, the name of certain

weights used in several places in the East Indies. They have been distinguished as the great bahar , with which are weighed pepper,

cloves, nutmegs, ginger, *etc.* ; and the little bahar , used to weigh quicksilver, vermilion, ivory, silk, *etc.* But this weight varies much in different parts of the East, being in some places not much above 400 pounds, in others considerably over 500.

BAHAWALPUR, ba-ha'wal-poor', India, town and capital of a state of the same name in the Punjab, two miles from the Sutlej. It is surrounded by a mud wall and contains the extensive palace of the Nawab, a vast square pile with towers at the corners. It has under¬ ground rooms, which afford a more comfortable temperature in the warm season than the upper rooms. Silk goods are manufactured, also tur¬ bans, chintzes and other cottons, and the imme¬ diate neighborhood is remarkably fertile, pro¬ ducing grain, sugar, indigo, tobacco, with an abundance of mangoes, oranges, apples and other fruits. Pop. (1911) 18,716. The state has an area of 17,285 square miles, of which 10,000 is desert, the only cultivated lands lying along the Indus and Sutlej. Cultivation largely depends upon irrigation, which has been con¬ siderably extended in recent times, with a great increase to the state revenue. The chief crops are cereals, cotton and indigo. Beasts of chase, such as tigers and boars, abound; domestic ani¬ mals, camels, kine, buffaloes, goats and sheep are raised. The exports are cotton, sugar, in¬ digo, hides, drugs, dyestuffs and wool. Baha-walpur is traversed by the Punjab Railway. For external commerce it is favorably placed. It stands at the junction of three routes from the east, southeast and south ; while, toward the north, the Hindu merchants have dealings with. Bokhara and even with Astrakhan. The polit¬ ical relations between the British government and the state are regulated by a treaty con-BAHIA — BAHR

eluded in 1838. No tribute is exacted from the Nawab. Pop. 780,641.

BAHIA, Brazil, a state of that republic, bounded on the north by the states of Sergipe, Alagoas, Pernambuco and Piauhy, on the east by the Atlantic Ocean and Sergipe, on the south by Espiritu Santo and Minas Geraes, and on the west by Pernambuco, Piauhy, Goyaz and Minas Geraes. The larger part of the state is mountainous. The rivers form two sys¬ tems — the first composed of tributaries to the Sao Francisco and the second of those streams making their way directly to the At¬ lantic Ocean. The most noteworthy single feature in the coast-line is

the great bay ((of all the saints,® on the northeastern side of which was established, by Tomas de Souza in 1549 the capital of the state. See Bahia (the city), and Brazil.

BAHIA, ba-e'a or SAO SALVADOR DA BAHIA, so named because it is situated on a large harbor or bay, ranks as the third in population and importance among the cities of Brazil. (See Rio de Janeiro). It lies about 740 miles north of Rio, in lat. 13° 1' S., and long 38° 32' W. Amerigo Vespucci visited this port on his voyage of exploration in 1503. Before 1763 Bahia was the capital of Brazil, and in the 16th century it was the scene of frequent conflicts between the Portuguese and the forces of other European nations. (See Brazil). At present it is the capital of the state of Bahia (area 164,643 square miles and pop. about 3,000,000), which has great natural resources in its mines and forests, as well as in fertile lands devoted largely to the cultivation of sugar-cane. The location of the city is picturesque, its upper portion being built on high ground several hundred feet above the sea-level. On the upper terraces stand churches, the cathedral, convents, a great theatre, the mint and the governor's palace. Below, border¬ ing the port, which has a fine lighthouse and is defended by several forts, are docks and warehouses where the products of the country, — coffee, sugar, cotton, dyewoods, tobacco (ex¬ cellent cigars), rum, hides, horns and tallow, — are collected, to be shipped to all parts of the world. Bahia has a public library, which was founded in 1811 ; its manufactures have received attention in recent years, and formerly it was the headquarters of the diamond trade, before the mines of South Africa and southern Brazil were developed. The author of (Brazil and the Brazilians) (New York 1914), G. J. Bruce, says in regard to the bay — which, from the bar at the entrance to its head, is 43 miles long and about 40 broad at its widest part — that it is one of the safest harbors in the world, though the entrance looks dangerous and ex¬ tremely forbidding. Berthing accommodation at the wharves is only provided for the smaller vessels. Steamers of large tonnage anchor out in the bay. A French company has works for the improvement of the port well advanced. Bahia is the starting point for several coasting lines, as well as for trading services to the Sao Francisco River regions. <(The great feature of the city,® he observes, ((is the number of churches, 365, one for every day in the year.® The city's population is somewhat more than 280,000, with an annual increase of nearly 6,000.

BAHIA BLANCA, Argentina, an import¬ ant seaport, as well as a commercial and administrative centre, in the province of Buenos

Aires. The city is well built and is provided with a good water supply, and with electric light and tramway service. It is the headquarters of judicature for the southern part of the republic. (See Argentina). The real harbor of Bahia Blanca is Puerto Belgrano, which has several miles of anchorage. Ad¬ joining this are the national dockyards, known as Puerto Militar. Close by is the village of Punta Alta and the naval hospital. Adjacent towns are Puerto Ingeniero White (the ter¬ minus of the Great Southern Railway) and Puerto Galvan, terminus of the Buenos Aires and Pacific Railway. Combined populations of the whole group of towns, 76,000.

BAHIA HONDA, ba-e'a on'da, Cuba, sea¬ port on the coast of the Gulf of Mexico, and lying on a small bay, bearing the same name, which affords one of the best harbors on the island. The town and bay are about 50 miles west of Havana, being commanded by a small fort. There are mines of coal and copper in the vicinity. A short distance to the south are the sulphur springs of Aguacate. Sugar and tobacco are cultivated to a considerable extent in the vicinity. Pop. Bahia Honda and Agua¬ cate, about 1,300.

BAHNASA or BEHNESA. See Oxy—

RHYNCHUS.

BAHR, Hermann, Austrian author and journalist: b. Linz 1863. He studied in Vienna, Gratz, Czernowitz and Berlin, devoting special attention to philosophy, political economy and law. In 1890 he became associate editor of Berliner Frcie Biihne, and later became asso¬ ciate editor and critic of the Deutsche Zeitung. In 1894 he began publication of Die Zeit, and was also editor of the Neue Wiener Tagblatt and the Oesterreichische V olkszeitung. He was appointed manager of the Berlin Deutsches Theater in 1906. His critical works include (Zur Kritik der Moderne* (1890) ; (Die Ueber-windung des Naturalismus> (1891); (Neue Studien) (1891) ; <Bildung) (1900) ; (Secession) (1900) ; (Premieren) (1902) ; and (Dialog vom Tragischen) (1903). His plays are (Die neuen Menschen) (1887) ; (Die Mutter) (1891) ; (Die hausliche Frau) (1893) ; (Der AposteP (1901) ; (Der Krampus> (1902) ; (Der Meister) (1904) ; <Sanna) (1905) ; <Die Andere> (1905) ; (Das KonzerH (1909) ; (Die Kinder) (1911) ; (Das Prinzip) (1912). He has written the fol¬ lowing novels: (Die gute Schule) (1890); <Dora) (1893) ; (Neben der Liebe) (1893) ; and (Stimmen des Bluts) (1909). Another work, (Die Einsichtslosigkeit des Herrn Schaffle) (1886) is of a political nature; he published also a volume of (Essays> (1912).

BAHR, bar, Johann Christian Felix, Ger¬ man philologist: b. Darmstadt, 13 June 1798; d. 29 Nov. 1872. Educated at Heidelberg Gym¬ nasium and University, of which last he became ordinary professor of classical philology in 1823. His chief work is his (History of Ro¬ man Literature* (1828; 4th ed., 1868-70), which is noted for its clearness and comprehensive¬ ness. Three supplements to this work deal with the (Christian Poets and Historians of Rome' (1836) ; the (Christian-Roman Theology*

(1837) ; and the (History of Roman Literature in the Carlovingian Period) (1840). His edi¬ tion of <Herodotus) (2d ed., 1855-61) is also noteworthy.

BAHR, an Arabic word signifying sea or large river ; as in Bahr-el-Huleh, the Lake Merom in Palestine; Bahr-el-Abiad, the White Nile, Bahr-el-Azrek, the Blue Nile, which to¬ gether unite at Khartum.

BAHR-EL-GHAZAL, bar'el-ga-zal' (Ga¬ zelle River), name of two rivers in central Africa: one flows from Lake Tchad through a desert region; the other is formed by the union of several streams near the Kongo Free State, and flows eastward through a very swampy region, and shortly after leaving Lake No unites with the Bahr-el-Jebel to form the White Nile. Its banks are apt to be very indefinite owing to inundations. In 1869 Schweinfurth explored the greater part of its basin. The head of steam navigation on the river is Meshra-er-Rek. The basin of these two rivers is a province of the same name. A settled government was established there on behalf of Egypt in 1878, but the Mahdist rebellion temporarily severed its connection with that country. Since the re¬ conquest of the Egyptian Sudan by the British and Egyptian forces under Kitchener, however, the Bahr-el-Ghazal has been again brought under a settled administration. It is said to be rich in ivory, rubber and timber, and suited for cotton growing. The

Ubangi district of the French Kongo lies to the west of the Bahr-el-Ghazal.

BAHR YUSUF, bar yoo'suf, or BAHR EL YUSUF, an artificial irrigation channel from the left bank of the Nile below Sint, to the Fayum, 270 miles long. According to . Coptic traditions it was constructed during Joseph's administration.

BAHRAICH, ba-rich', India, capital of Bahraich district, Faizabad division, in the united provinces of Agra and Oudh, and 65 miles northeast of Lucknow. The town is in a flourishing state; it is drained and lighted, and carries on a good local trade. It is situated on the junction line from Gonda to Basti, and began to flourish when the railway was built. It manufactures fireworks and native cloth. The chief edifice of interest is the shrine of Musand, a warrior and saint of the 11th cen¬ tury, which attracts both Hindu and Moham¬ medan pilgrims to the number of 150,000 an¬ nually. The American Methodist mission has a station and a school here. Pop. 26,907.

BAHRAL, ba'ral, or BUHREL, a wild

sheep (Ovis nahura) of the high plains of Tibet, which resembles a goat in appearance, although it has no beard. The rams carry large flattened and nearly smooth horns, which curve outward and backward, but do not curl. The general color is brown, becoming gray in win¬ ter, while the abdomen and insides of the legs and tail are white; a stripe along the sides and on each side of the face, throat and the front of the legs are black, interrupted by white patches at the knees and above the hoofs. The females are plainer and have small horns. This animal, which is a favorite object of sport in Tibet, passes its whole time above the limit of forest growth, and clambers about the rocks in the manner of a goat rather than of a sheep.

It is believed that these animals, which are often kept captive by the mountaineers, have in¬ fluenced the Asiatic races of domestic sheep. Consult Lydekker, (Royal Natural History) (Vol. II, London 1895).

BAHRDT, bart, Karl Friedrich, German theologian : b. Bischofswerda, Saxony, 25 Aug. 1741 ; d. Halle, 23 April 1792; studied in Schulpforte and Leipzig, where he first showed his great talents. In 1766 he was appointed pro¬ fessor in the University of Leipzig. His works and his talents as a preacher met with accept¬ ance, but in consequence of immoral conduct he was obliged to quit that city in 1768. From this

time he led an unsettled life. He was suc¬ cessively professor of theology and preacher in Erfurt (where he was made doctor of theol¬ ogy) , in Giessen, Switzerland, and in Diirk-heim, but was obliged to leave each of these places on account of his severe attacks on the clergy and the heterodox views manifested in his writings and sermons, as well as on account of his irregular life. The Aulic Council de¬ clared him disqualified to preach or to publish unless he would revoke the religious principles advanced in his works. In 1779 he went to Halle, where he published his creed. It is thoroughly deistical, denying the miracles, and not insisting on the immortality of the soul. He lectured in Halle, but soon became involved in difficulties with the clergy; upon which he left the city, and established, in a neighboring vineyard, a tavern, where he had many cus¬ tomers, whose vitiated tastes and depraved habits he made no scruple of gratifying. Ulti¬ mately, in consequence of two works which he wrote, the patience of government was ex¬ hausted. He was brought to trial, condemned and confined in the fortress of Magdeburg. Here he wrote his life. At the end of a year, having regained his liberty, he again opened his tavern at Halle, where he died.

BAHREIN, ba-ran', or AVAL ISLANDS,

a group of eight islands lying on the south side of the Persian Gulf, since 1867 under protec¬ tion of British Indian government. The prin¬ cipal island, usually called Bahrein, is about 27 miles in length and 10 in breadth. It is in general very flat and low, a mere shoal hardly 20 feet above sea-level ; though in the centre there are hills 400 feet high. The soil is not fertile except in some places, and is often cul¬ tivated by means of irrigation. Excellent dates are produced. A fine breed of donkeys is raised. Pearl-fishing is the most important industry, over 1,000 boats, each manned by from eight to 60 men, engaging in operations off the shore. There are thousands of conical mound-tombs in the interior. The inhabitants are a mixed race. The capital and commercial centre is Manameh or Manama ; pop. 35,000. The island of Moharrek, separated from Bahrein by a strait two miles broad and only about three feet deep at ebb, is much smaller, but contains a town called also Moharrek, and has a popula¬ tion of 25,000. The islands are governed by a sheikh. The total population is estimated at

110,000.

BAHURIM, the place where Michal was parted from her husband,

Phaltiel, as she was being taken back to David at Hebron. It is also the village in which Shimei lived and from which he came out to curse David when fleeing

irom Jerus toward Jordan. In this village Jonathan and Ahimraz took refuge when carry¬ ing news to David from Jerus. There they hid themselves in a well, thus eluding the servants of Absalom who had been sent to cap¬ ture them. Tradition identifies Bahurim with Almon, the modern Almet, about four miles northeast of Jerus and one mile from Amata near the southern boundary of Benjamin.

BAI2E, bi'e, Italy, a place where wealthy Romans had their summer homes, the favorite abode of the dancing-girls and the buffoons. It is now deserted, and interesting to the stranger only for the ruins of old baths, which are shown as temples, and for the remains of former palaces, visible beneath the waves of the sea. Baise owes its fame to its hot baths and its situation on a most charming bay, secured by surrounding hills from the violence of the winds. The life of the Romans there was par¬ ticularly luxurious and dissolute. It has now entirely lost its ancient position of importance. Recently it has attained some importance as a naval station. It was situated to the west of Puteoli, the modern Pozzuoli, and about 12 miles from Naples. It is now known as Baja.

BAIDYABATI, bad'ya-ba'te, a town of Bengal, situated on the river Hugh, about 15 miles from Calcutta, with an important market for jute and other produce,

BAIF, ba-e, Jean Antoine de, French poet: b. 1532; d. 1589; one of the literary league known as the ˆPleiade,® and the chief advocate of its plan of reducing French poetry to the metres of the classic tongues; also a spelling reformer, in favor of the phonetic system. Flis most

meritorious works were translations of Greek and Roman dramas.

BAIKAL, bi-kal', Russia-in-Asia, a lake of Siberia, 360 miles long from southwest to northeast, and from 20 to 53 in breadth, in¬ terspersed with islands. It has a shore line of 1,220 miles; long. 104° to 110° E. ; lat. 51° 20' to 55° 20' N. It contains seals and many fish, particularly sturgeons and pikes. In the en¬ virons are several sulphurous springs, and in one part, near the mouth of the river Barguzin, it discharges a kind of pitch which the inhabit¬ ants purify. The water is sweet, transparent and appears at a distance green, like the sea. It receives the waters of the upper Angara, Selinga, Barguzin and other rivers; but the lower Angara is the only one by which it seems to discharge its waters. It. is enclosed by rug¬ ged mountains, and the scenery is unusually magnificent. In summer the lake is navigated by steamboats, but it is frozen from November to April, and trade is carried on over the ice. It has several islands, the largest of which is Olkhon. Baikal forms an important link in the chain of communications between Russia and China and has several commercial ports, the most important being Lisvinichnoe, whence the Angara carries its waters to the Yenisei. The Trans-Siberian Railway passes around its southern end. Its sturgeon, salmon and fresh¬ water seal fisheries are valuable, and large quantities of other fish are also taken. A peculiar fish, called the golomynka, which is almost one mass of fat, yielding train oil, was at one time caught in immense numbers, but is now rather scarce. Besides the Russians set-vol. 3 — 4

tied on the banks of the Selenga and Angara, the shores of Lake Baikal are also inhabited by tribes of the Buriats and Tunguses.

BAIKIE, ba'ki, William Balfour, English naturalist and traveler: b. Kirkwall, Orkney, 1825 ; d. Sierra Leone, 12 Dec. 1864. He studied medicine at Edinburgh, and after receiving his degree entered the royal navy as assistant sur¬ geon. He served in the Mediterranean, was assistant surgeon at Haslar Hospital in 1851— 54>. and was then appointed surgeon and natu¬ ralist to the Niger expedition, which was about to start for the exploration of this river. The death of the captain of the exploring vessel, the Pleiad, left him in chief command, and he suc¬ ceeded in reaching a point 250 miles higher up the river than had previously been attained. On a second expedition he was able to establish a settlement at the confluence of the Niger and Benue, and in a few years did much to spread civilization among the natives of the neighbor¬ ing regions. Baikie translated the (Book of Common Prayer) and the <Psalms) into Haussa. He was author of Observations on the

Haussa and Fufulde Languages,5 and joint author with R. Heddle of (Mammalia and Birds Observed on the Orkney Islands.5

BAIKTASHI, bik-ta'she. See Dervish.

BAIL, in law, is the delivery of a person to another for keeping, and is generally used in reference to one arrested, or committed to prison, upon a criminal process, such person being said to be bailed when he is delivered to another (or is supposed to be so, but is simply set free from custody), who becomes his surety (to a greater or less amount according to the crime with which he is charged) for his ap¬ pearance at court to take his trial. The per¬ son who thus becomes surety is said to become bail, and the amount itself is also called bail. Bail may generally be granted except in the case of murder. The word is not used as a plural. When the punishment by the law of the United States is death, bail can be taken only by the Supreme Court, or by a judge of a District Court of the United States. The pro¬ ceedings attendant on giving bail are substan¬ tially the same in England and in all States of the United States. An application is made to the proper officer, and the bond or the names of the bail proposed filed in the proper office and notice is given to the opposite party, who must except within a limited time, or the bail justify and are approved. If exception is taken, notice is given, a hearing takes place, the bail must justify, and will then be approved unless the other party oppose successfully; in which case other bail must be added or substituted. A formal application is in many cases dispensed with, but a notification is given at the time of filing to the opposite party, and unless excep¬ tions are made and notice given within a limited time, the bail justify and are approved. A bail piece at present generally signifies a warrant issued to the surety upon which he may arrest the person for 'whom bail has been taken. Straw bail signifies bail offered by persons not possessing the necessary qualifications, but are willing to swear that they do possess them. The statutes of the States usually require persons giving bail to be possessed of real estate or property not easily removable from the juris-50

diction of the court. Consult Beach, 'Treatise on the Modern Practice in Equity5 (Cincinnati 1894) ; Daniell, E. R., 'Pleading and Practice of the High Court of Chancery) (6th Amer. ed., 3 vols., Boston 1894) ;

Stringer, F. A., (A B C Guide to the Practice of the Supreme Court 5 (London 1903) ; Tidd, (Practice of the Court of King's Bench) (4th Amer. ed., Phila¬ delphia 1856).

BAILEN, bi-lan', Spain, town of the prov¬ ince of Jaen, 20 miles north of Jaen. Galena and zinc blende are mined in the neighborhood. Here in July 1808 the French general, Dupont, surrendered 18,000 men to the Spaniards under Castanos. Pop. (1910) 8,334. Consult Galdo's "Bailen55 in (Episodios nacionales) (Vol. II, Madrid 1882).

BAILEY, Florence Augusta Merriam,

American author : b. Locust Grove, N. Y., 8 Aug. 1863. She was graduated at Smith Col¬ lege in 1886, and began writing of bird life in the manner of John Burroughs. Her published works include 'Birds Through an Opera Glass) (1889) ; (My Summer in a Mormon Village5 (1895) ; (ABirding on a Bronco5 (1896) ; (Birds of Village and Field5 (1898) ; 'Hand¬ book of Birds of Western United States5

(1902).

BAILEY, Gamaliel, American journalist: b. Mount Holly, N. J., 3 Dec. 1807; d. 5 June 1859. He was graduated at the Jefferson Medi¬ cal College, Philadelphia, in 1827, and for sev¬ eral months, after 1829, was editor of the Methodist Protestant at Baltimore; with J. G. Birney he founded the anti-slavery journal, the Cincinnati Philanthropist (1836), the office of which was destroyed by a mob, though it con-inued to be published till 1847 ; after 1843 was also editor of a daily paper, The Herald. He established the well-known anti-slavery newspaper, the Washington National Era (1847), which reached a wide circulation, ex¬ erted a powerful influence and was one of the most important organs of the Abolition move¬ ment. It numbered among its regular contrib¬ utors Mrs. Stowe, Whittier, Amos A. Phelps and Mrs. Southworth, and in it in 1852 the famous novel, 'Uncle Tom's Cabin,5 first ap¬ peared. Consult the article (<A Pioneer Editor55 in The Atlantic Monthly (Vol. XVII, Boston

1866).

BAILEY, Jacob Whitman, American sci¬ entist : b. Auburn, Mass., 29 April 1811; d. 26 Feb. 1857 ; was graduated at the United States Military Academy in 1832; and from 1834 till his death was professor

of chemistry, miner¬ alogy and geology at the Military Academy. He was the inventor of the Bailey indicator and of many improvements in the microscope, in the use of which he achieved high distinction ; and he is regarded as the pioneer in microscopic investigation. He was president of the Ameri¬ can Association for the Advancement of Science in 1857 ; and was author of numer¬ ous papers on the results of his researches, the most important of which was a volume of 'Microscopical Sketches,5 containing over 3,000 original figures. He made a large collection of algae and of microscopic objects, which he be¬ queathed to the Boston Society of Natural History. A biographical sketch appeared in the

American Journal of Science and Arts (Vol. XXV, New Haven 1847).

BAILEY, James Montgomery, American humorist: b. Albany, N. Y., 25 Sept. 1841; d. 4 March 1894. He received a common-school education, and learned the trade of carpenter, which he practised at Danbury, Conn., in 1860-61, writing occasional pieces for the news¬ papers. He served in the 1 7th Connecticut regiment during the Civil War; returned to Danbury, founded the Danbury News in 1870, for which he wrote numerous humorous sketches of commonplace happenings. He gained a national reputation as the "Danbury News Man55 and made his paper known throughout the country. He wrote 'Life in Danbury5 (Boston 1873) ; 'Danbury News Man's Almanac5 (1873) ; 'They All Do It5 (1877) ; 'The Danbury Boom5 (1880) ; 'Eng¬ land from a Back Window5 (1878) ; 'Mr. Phillips's Goneness5 (1879), *etc.*

BAILEY, Joseph, American military offi¬ cer : b. Salem, Ohio, 28 April 1827 ; d. 21 March 1867 ; entered the Union army as a private in 1861, and signally distinguished himself in the Red River campaign under Gen. N. P. Banks, in 1864 by building a dam and deepening the water in the channel, which enabled Admiral Porter's Mississippi flotilla to pass the Red River rapids in safety and to escape the perilous situation. For this engineering feat, Bailey, who before entering the army was a plain farmer, was brevetted brigadier-general, pro¬ moted colonel, voted the thanks of Congress, and presented by the officers of the fleet with a sword and a purse of $3,000. Subsequently, he was promoted to full brigadier-general, and was engaged on engineering duty till his resig¬ nation 7 July 1865. He was killed, while acting as sheriff, by two desperadoes in Missouri.

BAILEY, Joseph Weldon, American sen¬ ator for Texas : b. Copiah

County, Miss., 6 Oct. 1863. He studied for the legal profession, was graduated as a lawyer in 1883, and, entering politics, in 1884 served as a district elector on the Cleveland and Hendricks ticket. The fol¬ lowing year he removed to Gainesville, Tex., and in 1888 served as elector for the State at large on the Democratic ticket. He was elected to the 52d, 53d, 54th, 55th and 56th Congresses, and was the Democratic nominee for speaker of the House of Representatives on the organ¬ ization of the 56th Congress, 15 March 1897. He was chosen to succeed the Hon. Horace Chilton, United States senator for Texas, 23 Jan. 1901, and was reelected 22 Jan. 1907. He resigned his seat in the Senate 3 Jan. 1913 and resumed the practice of law.

BAILEY, Liberty Hyde, American horti¬ culturist : b. South Haven, Mich., 15 March 1858; was graduated at the Michigan Agricul¬ tural College in 1882; M.S., 1886; was assistant to Dr. Asa Gray at Harvard University in 1882-83; professor of horticulture in Cornell University, 1888-1903; in 1903 was appointed director of the College of Agriculture at Cor¬ nell, and retired 1913, with the degree of LL.D. from the University of Wisconsin and Alfred University. He was an associate editor of the revised edition of Johnson's 'Universal Cyclo¬ pedia5 (1892-96) ; editor of 'American Garden-

ing) ; editor of 'Cyclopedia of American Horti¬ culture' (1900-02); 'Cyclopedia of American Agriculture' (1907-09) ; 'Standard Cyclo¬ pedia of Horticulture' (1914-16) ; also editor of the 'Rural Science Series,' the 'Rural Manual Series,' the 'Rural Text Book Series) ; and others. He has published a number of technical and also popular works, including 'Annals of Horticulture' ; 'Evolution of Our Native Fruits) ; 'Survival of the Unlike) ; 'Principles of Fruit Growing' ; 'Nursery-Book' ; 'Pruning-Book' ; Forcing-Book' ; 'Principles of Agriculture' ; 'Principles of Vegetable-Farm¬ ing' ; 'Plant-Breeding' ; several botanies, 'Manual of Gardening'; 'Farm and Garden Rule-Book' ; 'The Training of Farmers) ; 'The State and the Farmer' ; 'The Country Life Movement ; 'Outlook to Nature' ; 'Nature Study Idea' ; 'The Holy Earth' ; 'New York State Problems) (Vols. I and II) and others. He was

Vietchian Medalist of the Royal So¬ ciety (London) ; fellow American Academy of Arts and Sciences ; member American Philo¬ sophical Society; chairman of Roosevelt's Com¬ mission on Country Life, 1908.

BAILEY, Loring Woart, American chem¬ ist and geologist: b. West Point, N. Y., 28 Sept. 1839. He was graduated at Harvard in 1859, and in 1861 was appointed professor of chemistry and natural science in the University of New Brunswick, Fredericton, N. B., retiring under Carnegie Foundation in 1906. He has also been connected with the geological survey of Can¬ ada. Besides his official reports he has pub¬ lished 'New Species of Microscopical Organism from the Para River, South America) (1861) ; 'Mines and Minerals of New Brunswick' (1864) ; 'Geology of Southern New Bruns¬ wick' (1865) ; 'Elementary Natural History'

(1887).

BAILEY, Nathaniel (or Nathan), Eng¬ lish lexicographer: d. 1742. He was the author of an English dictionary, the best before that of Dr. Johnson. The first edition appeared in 1721 under the title of 'An Universal Etymo¬ logical English Dictionary,' by N. Bailey; and it was soon republished in an enlarged form. Altogether some 30 editions of it appeared up to 1802. Dr. Johnson made use of an inter¬ leaved copy of it when drawing up his own dictionary. Bailey also published a spelling-book; 'All the Familiar Colloquies of Erasmus, Translated' ; 'The Antiquities of London and Westminster' ; 'Dictionarium Domesticum,' *etc.*

BAILEY, Philip James, English poet: b. Nottingham, 22 April 1816; d. 6 Sept. 1902. He was educated first in his native city and after¬ ward at Glasgow University; was called to the bar, but never practised. His best known poem, 'Festus,' was first published in 1839, and passed through a very large number of editions, both in Great Britain and the United States. He is author of a few other poems and of one prose work; among the former are 'The Age' (1858), a satire, and 'The Angel World' (1850) ; 'The Mystic' (1855) and 'The Universal Hymn,' now incorporated with 'Festus.'

BAILEY, Samuel, English banker and writer on political and mental philosophy : b. Sheffield 1791 ; d. 18 Ian. 1870. His first work was a volume of 'Essays on the Formation

and Publication of Opinions' (1821), in which he ably defended the proposition that a man's opinions are independent of his will. His 'Essays on the Pursuit of Truth and on the Progress of Knowledge' (1829) are only less valuable. His many controversial books on questions of political economy are already al¬ most forgotten, though these, as well as his pamphlets and treatises on political representa¬ tion, primogeniture and the like, are charac¬ terized alike by terse exposition and vigorous style. Not less interesting are his 'Review of Berkeley's Theory of Vision' (1842) ; 'The¬ ory of Reasoning' (1851) ; and 'Letters on the Philosophy of the Human Mind' (1855— 63). The third series of the last contains an able defense of utilitarianism, in which the author avows himself a thorough determinist.

BAILEY, Solon Irving, American astron¬ omer: b. Lisbon, N. H., 29 Dec. 1854. He was graduated from Boston University, 1881 ; and Harvard (A.M.), 1887. In 1889 he was sent to Peru to determine the best location for a southern station of the Harvard Observatory. Arequipa was selected, an observatory built, and as associate professor of astronomy Pro¬ fessor Bailey had charge of the work there for 10 years. In 1893 he established a meteorological station on the summit of El Misti, by far the highest scientific station in the world, at an elevation of 19,000 feet. In 1913 he became Phillips professor of astron¬ omy at the Peruvian station and in 1908 he visited south Africa where he conducted astro¬ nomical observations on an elevated plateau in the northern part of the Cape Colony. His scientific writing's have been issued in the 'An¬ nals of Harvard College Observatory.'

BAILEY, Theodorus, American naval of¬ ficer : b. Chateauguay, N. Y., 12 April 1805 ; d. 10 Feb. 1877 ; entered the navy in 1818; served on the western coast of Mexico during the Mexican War; commanded the frigate Colo¬ rado, of the western Gulf blocking squadron, in 1861-62 ; and in the last year commanded the right column of Admiral Farragut's squad¬ ron in the passage of Forts Saint Philip and Jackson and led the fleet at the capture of the Chalmette batteries and the city of New Or¬ leans. In 1862-65 he commanded the east Gulf blockading squadron. He was commis¬ sioned rear-admiral and retired in 1866.

BAILEY, Vernon, American scientist: b. Manchester, Mich., 21 June 1863; received a university education and is chief field natural¬ ist of the United States Biological Survey. Among his publications are 'Spermophiles of Mississippi Valley' (1893) ; 'Revisions of Voles of the Genus Evotomys and Genus Mi¬ cro tits' *; 'Cotton Rats of the Genus Sigmodon* ; 'Pocket Gophers of the Genus Tliowomys ' (1915); 'Biological Survey of Texas'; 'Life and Crop Zones of New Mexico' ;

‘Mammals of District of Columbia,’ etc., and numerous other papers on natural history subjects.-

BAILEY, William Whitman, American botanist: b. West Point, N. Y., 22 Feb. 1843; d, Providence, R. I., 20 Feb. 1914. He was edu¬ cated at Brown and Harvard universities, having been a pupil of Prof. Asa. Gray. In 1867 he was botanist of the United States Geological Survey of the 40th parallel. He was instructor in botany at Brown Uni-

versity 1877-81 ; professor 1881-1906; and from 1906 till his death, emeritus professor. He published (Botanical Collector’s Handbooks (1881) ; (Among Rhode Island Wild Flowers } (1885) ; (New England Wild Flowers) (1897) ; <Botanizing) (1899) ; (Poems) (1910) ; and was a member of many scientific societies.

BAILEY, Willis Joshua, American states¬ man : b. Carroll County, Ill., 12 Oct. 1854. He was graduated at the University of Illinois, 1879, and received the degree of LL.D. from this University in 1904. From 1879 to 1888 he was engaged in farming and stock-raising in Nemaha County, Kan. He was elected in the latter year to the Kansas house of rep¬ resentatives ; was president of the Republican State League 1893 ; became a member of the Kansas State Board of Agriculture in 1895 ; was elected member of the 56th Congress (1899-1901); governor of Kansas 1903-05; is vice-president and manager of the Exchange National Bank of Atchison, Kan., since 1 March 1907.

BAILIFF, a name which was introduced into England with William I and came to be applied to various officials representing or act¬ ing for the King. He is essentially a person entrusted by a superior with power of super¬ intendence. In the United States the word bailiff has no precise meaning. The term is most frequently used to denote a court officer whose duty it is to take charge of juries and wait upon the court. In England, an officer appointed for the administration of justice in a certain bailiwick or district. The sheriff is the King’s bailiff, whose business it is to pre¬ serve the rights of the King within his <(bailiwick® or county. (1) The governor of a cas¬ tle belonging to

the King. (2) In the Channel Islands the first civil officer on each island. (3) A sheriff's officer. Bailiffs are either bail¬ iffs of hundreds or special bailiffs, (a) Bail¬ iffs of hundreds are officers appointed by the sheriff over the districts so called, to collect fines, summon juries, to attend the judges and justices at the assizes and quarter sessions and to execute writs and process, (b) Special bail¬ iffs are men appointed for their adroitness and dexterity in hunting and seizing persons liable to arrest. They assist the bailiffs of hundreds in important work for which the latter have no natural aptitude or acquired skill. Special bailiffs being compelled to enter into an obli¬ gation for the proper discharge of their duty are sometimes called bound bailiffs, a term which the common people have corrupted into a more homely appellation. Consult Blackstone's (Commentaries, > Vol. I, chap. 9.

BAILIWICK, the jurisdiction of a bailiff, from bailie and wick (vicus), a town or vil¬ lage. In the United States it generally refers to a county, or in a jocular way is applied to any territory or place in which a person has authority.

BAILLARGEON, ba'yar'zhon', Charles Frangois, Canadian prelate: b. He aux Grues, Que., 1798; d. 1870. He was consecrat¬ ed bishop of Tloa and coadjutor to Archbishop Turgeon of Quebec, 23 Feb. 1851 ; was admin¬ istrator of the diocese in 1855; and archbishop in 1867.

BAILLARGER, ba'yar-zha', Jules Ga¬ briel, French physician: b. 1809; d. 1891. He

made a specialty of mental and nervous dis¬ eases and in 1843 joined with Longet and Ce¬ rise to establish a review especially devoted to these subjects, known as the <Annales Medic o-psychologiques du Systeme Nerveux? In 1849 he received the medal of the Legion of Honor for his valuable services during the cholera outbreak of that year; in 1842 he received a prize from the Academy of Music for his es¬ say on (Des Hallucinations. >

BAILLET, ba-ya', Adrien, French writer: b. Neuville 1649; d. 21 Jan. 1706. He was or¬ dained priest in 1675 and his love for learning was so intense that after discharging for five years the duties of a parish priest, he accepted the position of librarian to Lamoignon, presi¬ dent of Parliament. His first publication was entitled (Judgments of the Learned upon the Principal Works of Authors, > a book of criti¬ cisms which taught better rules than it illus¬ trated. He also produced

a book on (Devo¬ tion to the Holy Virgin) ; (The Lives of the Saints) (3 vols., 1701) ; (Life of Descartes) (2 vols., 1691) ; (Des satires personelles) (2 vols., 1689).

BAILLEUL, ba-yel', France, town in the department of the Nord, near the Belgian frontier, about 19 miles northwest of Lille. It has manufactures of woolen and cotton stuffs, lace, leather, *etc.* Pop. (1911) 13,251. A village of the same name in the department of Orne gave its name to the Baliol family.

BAILLIE, Lady Grizel, Scottish poet: b. Redbraes Castle, 25 Dec. 1665; d. 6 Dec. 1746; daughter of the 1st earl of Marchmont (Sir Patrick Hume) ; married George Baillie in 1692 ; published a large number of songs in Ramsay's <Miscellany) and other collections; the best known is (Were na My Heart Licht, I wad DeeP

BAILLIE, Harry, the proprietor of the Tabard Inn, who acts as chairman of the meet¬ ing of the pilgrims in Chaucer's (Canterbury Tales. >

BAILLIE, Joanna, Scottish author : b. Bothwell, near Glasgow, 11 Sept. 1762; d. 23 Feb. 1851. She removed in early life to Lon¬ don, where in 1798 she published the first vol¬ ume of her well-known (Plays on the Pas¬ sions,) in which she attempted to delineate the stronger passions by making each passion the subject of a tragedy and a comedy. These plays were not well adapted for the stage, but gave Miss Baillie a very extended reputation. Her first volume was followed by a second in 1802, a third (of miscellaneous plays) in 1804, and a fourth in 1812. Other plays appeared in 1836 and a complete edition of her whole dramatic works in 1850. The only plays per¬ formed on the stage were a tragedy entitled the (Family Legend, > which was brought out at the Edinburgh Theatre in 1810 under the patronage of Sir Walter Scott and had a run of 14 nights, and one of the plays on the pas¬ sions entitled (De Montfort,* which was brought out by John Kemble and played for 11 nights, though an attempt to revive it at a later period failed. Miss Baillie also wrote songs and miscellaneous poems. All her pro¬ ductions are full of genius. The language is simple and forcible, the female portraits are particularly beautiful and great knowledge of the human heart is displayed in the delinea-BAILLIE — BAILMENT

tions of character. She was an intimate friend of Sir Walter Scott, who greatly admired hˆr writings, and her home was frequented by many of the prominent authors of the day.

BAILLIE, Matthew, Scottish physician and anatomist : b. Lanarkshire, Scotland, 27 Oct. 1761; d. 23 Sept. 1823; brother of Joanna Baillie ; educated at the universities of Glasgow and Oxford. While at Oxford he beeran his medical and anatomical studies under his ma¬ ternal uncles, the celebrated William and John Hunter, then lecturers in London. In 1787 he was elected one of the physicians of Saint George's Hospital and held that office for 13 years. In 1789 he took the degree of M.D. and was admitted a fellow of the Royal Col¬ lege of Physicians. Pie very soon stood at the head of his profession and in 1810 was made physician to the King by George III. He published (The Morbid Anatomy of Some of the Most Important Parts of the Human Body) ; wrote eleven essays in the (Transac~ tions) of the Society for the Promotion of Medical and Chirurgical Knowledge, and seven papers in the (Medical Transactions, 5 published by the London College of Physicians.

BAILLIE, Robert, Scottish Presbyterian clergyman: b. Glasgow 1599; d. 1662; educated at the University of Glasgow. In 1638 he sat in that famous general assembly which met in Glasgow to protest against the thrusting of Episcopacy on an unwilling people. In 1649 he was chosen by the Church to proceed to Holland and to invite Charles II to accept the covenant and crown of Scotland. He per¬ formed his mission skilfully; and, after the Restoration, through Lauderdale's influence, he was made principal of Glasgow University.

BAILLIE, Robert, of Jerviswood, Scot¬ tish patriot of the reign of Charles II : d. 24 Dec. 1684. He first came into notice in 1676 through his rescue of a brother-in-law, the Rev. Mr. Kirkton, from the clutches of Arch¬ bishop Sharp's principal informer. In 1683 he took a prominent part in a scheme of emi¬ gration to South Carolina, as he saw no other refuge from the degrading tyranny of the government. About the same time he corre¬ sponded with Monmouth's supporters in Lon¬ don, Russell and Sidney and subsequently re¬ paired there to concert measures for securing adequate reforms. On the discovery of the Ryehouse nlot, he was arrested and sent to Scotland. Accused of conspiring against the King's life and of hostility to monarchical government, he was tried at Edinburgh and condemned to death upon evidence at once insignificant and illegal. The sentence was carried into execution on the very day that it was passed.

BAILLOT, ba-yc/, Pierre Marie Frangois de Sales, French violinist: b. Passy 1771 ; d. Paris, 15 Sept. 1842. He was a professor in the conservatory at Paris ; traveled extensively in Russia, Belgium, Holland and England. He was the last of the old classic al Paris school of violin players and unexcelled as an inter¬ preter of chamber music.

BAILLY, ba-ye', Antoine Nicolas, French architect: b. 6 j'une 1810; d. 1 Tan. 1892; was appointed to an office under the city govern¬ ment of Paris in 1834; in 1844 was made archi¬

tect to the French government and received the cross of the Legion of Honor in 1853. He was first president of the Societe des Artistes Frangaises. The Lycee Saint Louis, Moliere fountain and the Tribunal of Commerce in Paris and the reconstruction of the Cathedral of Digne are examples of his work.

BAILLY, Jean Sylvain, French astrono¬ mer, statesman and historian: b. Paris, 15 Sept. 1736; d. 12 Nov. 1793. Leaving the art of painting, to which he was educated, he pursued poetry and belles-lettres until his ac¬ quaintance with Lacaille, when he turned his attention to astronomy and calculated the orbit of the comet of 1759. In 1763 he was admitted to the Academy of Sciences ; in 1766 he pub¬ lished his treatise on Jupiter's satellites, which also contains a history of that section of as¬ tronomy. In 1771 he published a valuable and interesting treatise on the light of the satel¬ lites. Later he wrote also a history of astron¬ omy. In 1784 he was chosen secretary of the Academy, also admitted to the French Acad¬ emy and the next year admitted to the Acad¬ emy of Inscriptions; a rare thing for one per¬ son to belong to the three academies. He es¬ poused the Democratic cause in the Revolution, was elected from Paris, in 1789, 1st deputy of the tiers etat, and was chosen president of the assembly. In July 1789 he was mayor of Paris and discharged his duties during 26 months of a most trying and dangerous period with great firmness and wisdom. Losing his popularity by repressing rioting and other crimes and defending the Queen, he gave up public life and lived in retirement till seized by the Jacobins and brought to Paris, where he was condemned as a conspirator and exe¬ cuted. Several posthumous works of his have appeared; the most noted are an (Essay on the Origin of Fables and . Ancient Religions,5 and his (Memoirs of an Eyewitness from April to October 1 789. > Consult his biography by Arago (1854) and Nourrisson, (Trois Revo-lutionaires; Turgot, Necker, Badly5 (1885).

BAILMENT, in law, is the delivery of a chattel or thing to another to

keep, either for the use of the bailor or person delivering, or for that of the bailee or person to whom it is delivered. A bailment always supposes the subject to be delivered only for a limited time, at the expiration of which it must be redelivered to the bailor; and the material inquiries incases of bailment relate to the degree of responsi¬ bility of the bailee in regard to the safe-keeping and redeliverv of the subject of the bailment. This responsibility will depend, in some degree, upon the contract on which the bailment is made. If a thing is delivered to the bailee to keep without any advantage or use to himself, or any compensation, but merely for the benefit of the bailor, he is answerable only for gross negligence; but if the bailment is for the mutual benefit of both parties, the thing must be kept with the ordinary and usual care which a pru¬ dent man takes of his own goods ; but if it be delivered for the benefit of the bailee only, he must exercise strict care in keeping it, and will be answerable for slight negligence. A special agreement is made in many cases of borrowing or hiring, specifying the risks assumed bv the borrower or hirer; and in such case his obliga¬ tions will be determined by his stipulations. So

important is possession at the common law that the ownership of a bailed article is deemed to be divided between the bailor and the bailee, the latter being said to have the (<special prop¬ erty55 in the bailed article, the former the (<general property.55 At common law it is the bailee and not the owner who is entitled to maintain the ordinary actions, such as trespass, trover and replevin, for an interference with the bailed article while in his possession, but in case of a permanent injury to it, the bailor may institute an action to protect his general property in¬ terest therein. Innkeepers and common carriers are at common law absolutely liable for the safe return of goods entrusted to them, but modifications by statute now permit the inn¬ keeper, by providing a safe deposit and giving proper notice, to limit his liability to that of an ordinary bailee, while common carriers, by proper notice or by reasonable special contract, may only be held responsible for losses and injuries resulting from

their own or their serv¬ ants' negligence. In New York losses result¬ ing from the carrier's own negligence are not to be redeemed by him, and he is only liable for wilful wrongdoing. The contract of a car¬ rier of passengers is not a contract of bailment. Consult Beal, (Law of Bailments) (London 1900) ; Schouler, (Treatise on the Law of Bail¬ ments5 (3d ed., Boston 1897) ; Story, (Commentaries on the Law of Bailments) (9th ed., Boston 1878).

BAILY, Edward Hodges, English sculp¬ tor: b. Bristol, 10 March 1788; d. 22 May 1867. He was brought up with a view to a mercantile career, but ere long gained considerable suc¬ cess as a modeler in wax. He became a pupil of Flaxman in 1807, gained the Academy gold medal in 1811 for his (Hercules Restoring Al-cestis to Admetus,5 and was elected a member of the Royal Academy in 1821. His principal works are (Eve at the Fountain5 ; (Eve Listen¬ ing to the Voice5; (Maternal Affection5; (Girl Preparing for the Bath5 ; (The Graces5 ; *etc.* The bas-reliefs on the south side of the Marble Arch, Hyde Park; the statue of Nelson on the Trafalgar Square monument, and many statues of distinguished men, were executed by him.

BAILY, Francis, English astronomer: b. Newbury, in Berkshire, 1774; d. 1844. Entered a London house of business, and traveled two years in America, the literary outcome of which was his curious (Journal of a Town in the Un¬ settled Parts of North America in 1796 and 1 797, 5 published in 1856; then settled in London as a stockbroker and published several works on the doctrine of life annuities and insurance. On retiring from business with an ample for¬ tune in 1825 he turned his attention particularly to astronomy, and became one of the founders of the Astronomical Society; improved the nautical almanac, and investigated and described the phenomenon called Baily's beads (q.v.). Besides many astronomical papers he wrote a cLife of Flamsteed.5

BAILY'S BEADS, a phenomenon attend¬ ing eclipses of the sun, the unobscured edge of which appears discontinuous and broken im¬ mediately before and after the moment of com¬ plete obscuration. It is classed as an effect of irradiation and defraction.

BAIN, Alexander, Scottish electrician : b. Watten, Caithness, 1810; d. 1877. After serv¬

ing an apprenticeship to a clockmaker in Wick, he went to London, and began a series of elec¬ trical experiments in 1837 ; invented

electric fire-alarm and sounding-apparatus, and the automatic chemical telegraph, by which high speed telegraphy was for the first time made possible.

BAINBRIDGE, John, English astronomer and mathematician : b. Ashby-de-la-Zouch, in Leicestershire, 1582; d. 1643. He studied at Cambridge ; set up a grammar school in his native place, and at the same time practised physic, devoting his leisure to the science of mathematics. Llis description of the Cornel of 16185 was the means of introducing him to Sir Henry Savile, who had founded an as¬ tronomical lecture at Oxford, and who in 1619 appointed Dr. Bainbridge to the professorship. He died while engaged in publishing corrected editions of the works of the ancient astrono¬ mers, an undertaking which was one of the duties enjoined on him as Savilian professor. His other published works are (Procli Sphaera et Ptolemsei de Hypothesibus Planetarum,5 to¬ gether with (Ptolemaei Canon Regnorum5 (1620); and (Canicularia : A Treatise on the Dog Star5 (1648).

BAINBRIDGE, William, American naval officer: b. Princeton, N. J., 7 May 1774; d. 28 July 1833. He entered the merchant service at the age of 15 and became captain within four years. In 1796, while commander of the Hope he defeated an English schooner, whose captain had tried to impress some of the Hope's crew. In 1798, when the United States navy was or¬ ganized, he was made lieutenant and given com¬ mand of the schooner Retaliation. He was captured by the French and kept a prisoner for several months, and on his return to the United States made a report which led to the passage of the Retaliation Act of 1798 against French subjects captured on the high seas; was placed in command of the Norfolk and subsequently appointed to the command of the frigate George Washington, which was ordered to take tribute to Algiers. The Dey of Algiers demanded that Bainbridge convey an Algerian ambassador and valuable presents to Constantinople, and Bain¬ bridge was forced to comply to avoid war and the destruction of the unprotected trade in the Mediterranean. The United States government fully approved the course he had pursued. He was soon employed in the Mediterranean again in command of the frigate Essex, and after¬ ward upon the declaration of war against the United States by Tripoli, was appointed to the frigate Philadelphia, one of the vessels of the squadron sent against that power, under the command of Commodore Edward Preble. On 26 Aug. 1803, he captured the Moorish frigate Meshboa, but was himself taken prisoner with his officers and men in October of that year. While pursuing one of the enemy's vessels, the Philadelphia ran aground ; every possible effort was made to float her, but she was

soon .sur¬ rounded by gunboats from Tripoli, about three miles distant, and Captain Bainbridge was com¬ pelled to surrender, having first taken such measures as it was thought would ensure the final loss of the ship. He remained with his associate prisoners in Tripoli until the conclu¬ sion of peace, which took place 3 June 1805. On his return a court of inquiry for the loss

of the Philadelphia gave him honorable acquit¬ tal. His next service afloat was in the War of 1812, when he was appointed, with the rank of commodore, to the command of a squadron, consisting of the Constitution (his flagship), Essex and Hornet, and sailed from Boston 25 October for a cruise. On 26 December off San Salvador, while separated from the rest of his squadron, it was his good fortune to fall in with and capture H. B. M. frigate Java. In 1815 he was appointed to the command of a squadron of 20 sail, intended to act against Al¬ giers, then at war with us, but peace was con¬ cluded before it reached the Mediterranean. In 1819 he again commanded in the Mediter¬ ranean, and returned from this, his last service afloat, in 1821. From this time until his death he was almost constantly employed in import¬ ant shore service, commanding at different times the navy yards at Boston and Philadel¬ phia, and holding the position of president of the board of navy commissioners from 1832 to 1833. As an officer he had few superiors. Though ardent in his temperament, he was cool in danger, and always had the confidence of those under his command. His system of dis¬ cipline, though rigid, was always consistent and just, and he was remarkable for paying the greatest attention to the formation of his young officers. Consult Cooper, (Lives of Distin¬ guished American Naval Officers > (2 vols., Au¬ burn 1846) ; Harris, (Life of Bainbridge> (Philadelphia 1837).

BAINBRIDGE, Ga., town and county-seat of Decatur County, situated on the Flint River, 236 miles west of Savannah on the At¬ lantic Coast Line and the Georgia, Florida and Alabama railroads. It is in a cotton and to¬ bacco region, and has various manufactures, turpentine distilleries, lumber mills, *etc.* It is the seat of the Georgia Southern

Military College. Pop. 4,217.

BAINBRIDGE, N. Y., village of Che¬ nango County, 35 miles northeast of Bingham¬ ton, on the Delaware and Hudson Railroad, and on the Susquehanna. It contains a town hall and a high school, and has a silk mill, condensed milk factory, sugar of milk factory and cheese and cream separator factories. The First National Bank has a capital of $50,000, with surplus and profits amounting to $70,000. The village's taxable property is valued at $465,362. The village officers are elected an¬ nually. The administration expenses are from $5,000 to $6,000 annually,, and are raised by a direct tax. Pop. 1,200.

BAINES, Edward, English publicist: b. Walton-le-Dale 1774; d. 1848. He became a printer's apprentice at Preston and later at Leeds. In 1801 he became proprietor of the Leeds Mercury, which he made one of the great¬ est of the provincial journals. He was the confidant and adviser of many parliamentary leaders and in 1834 succeeded Macaulay as mem¬ ber for Leeds. He remained in Parliament until 1841. He was an independent Liberal, advocat¬ ing the separation of Church and state, the reform of factory laws, and opposing govern¬ mental interference in education. He wrote (History of the County Palatine and Duchy of Lancaster and (History of the Reign of George IIP (4 vols., 1823). Consult his <Life) by his son (1861).

BAINES, Sir Edward, English politician: b. 1800; d. 1890. He was the son of Edward Baines (q.v.) ; was elected to Parliament in 1859, and, like his father, championed various reforms. He opposed Church tests in the uni¬ versities, advocated the disestablishment of the Irish Church, and in 1861 and 1864 presented bills for extending the electoral franchise. He published a (Life) of his father (1861) and a (History of the Cotton Manufacture in Great Britain > (1835), beside other works.

BAINES, Thomas, English artist and ex¬ plorer; b. King's Lynn, Norfolk, 1822; d. Dur¬ ban, Natal, 1875. In 1842 he went to Cape Colony, whence he accompanied the British army in the Kaffir War (1848-51) as artist. He afterward went with Gregory's party to explore northwest Australia ; with Livingston to the Zambesi ; with Chapman's expedition to the Victoria Falls; and finally headed an expedi¬ tion to the gold fields of Tati. Everywhere he made large numbers of sketches. A handsome folio of colored lithographs from his drawings at Victoria Falls was published in 1865. His last journey among the Kaffirs was very care¬ fully mapped out and sketched. His writings are

(Explorations in Southwestern Africa) (1864); (The Gold Regions of Southeastern Africa > (1877).

BAINI, ba-e'ne, Giuseppe, Italian musi¬ cian: b. Rome 1775; d. 1844. He was director of the Pope's choir from 1814 till his death. The severe gravity and profound science of his compositions contrasted strongly with the careless style and shallow dilettanteism of most of his compeers ; but it was by his historical researches that Baini secured for himself a prominent place in musical literature. His (Miserere) for 10 voices was the only work of the 19th century deemed worthy of performance in the Sistine Chapel. His principal works and that on which his fame chiefly rests is his life of Palestrina, (Memorie storico-critiche della vita e delle opere di Giovanni Pierluigi da Palestrina) (2 vols., Rome 1828; German trans. by Kandler 1834).

BAIRAKTAR, bi'rak-tar' (more correctly Bairak-dar), signifying ˆstandard-bearer,® the title of the Grand Vizier Mustapha : b. 1755; d. 15 Nov. 1808. When he was pasha of Rust-chuk in 1806 he fought with some success against the Russians, and after the revolt of the Janissaries in 1807, by which Selim III was deposed from the throne in favor of Mustapha IV, he marched his troops to Constantinople, deposed Mustapha IV, and proclaimed the brother of this prince, Mahmoud II, Sultan on 28 July 1808. Bairaktar was now appointed grand vizier, and endeavored to carry out Selim's reforms, and to strengthen the regular army. His chief object was the annihilation of the Janissaries; but they rebelled, and, with the support of the fleet, attacked the seraglio 15 Nov. 1808, and demanded the restoration of Mustapha IV. Bairaktar defended himself bravely; but when he saw that flames threat¬ ened to destroy the palace, he strangled Mus¬ tapha, threw his head to the besiegers, and killed himself.

BAIRAM, or BEIRAM, bi'ram, two Mo¬ hammedan feasts, one immediately following the Ramazan or Lent (a month of fasting), and

lasting three days. This feast begins, like the Ramazan, as soon as the new moon is an¬ nounced by the persons appointed for that pur¬

pose, and during the course of 32 years makes a complete circuit of all the months and sea¬ sons, since the Turks reckon by lunar years. It is the custom at this feast for inferiors to make presents to their superiors, a custom for¬ merly extended even to the Europeans. Seventy days after this first or lesser Bairam begins a second — the greater (Kurban) Bairam. They are the two most important feasts whose cele¬ bration is prescribed by the Mohammedan re¬ ligion.

BAIRD, Absalom, American soldier : b. Washington, Pa., 20 Aug. 1824; d. near Relay, Md., 14 June 1905. He was graduated from the United States Military Academy and as¬ signed to the artillery in 1849. He was com¬ missioned brigadier-general of volunteers 1862, and brevetted major-general four months later for his conduct in the Atlanta campaign. On 13 March 1865 he was brevetted major-general, United States army, for meritorious services in the field during the war. He was continuously in the field from the Manassas campaign, in 1861, till after the surrender of General Johnston's army in 1865. He was staff inspector-general from 1885 to 1888 when he retired.

BAIRD, Andrew Wilson, English mili¬ tary engineer : b. Aberdeen, Scotland, 26 April 1842 ; d. 2 April 1908. He became a colonel in the Royal Engineers Corps in 1863 ; was special assistant engineer of the harbor defenses of Bombay in 1864; assistant field engineer of the Abyssinian expedition in 1868, and for nearly 20 years thereafter was employed on the great trigonometrical survey of India. His services were rewarded with numerous official com¬ mendations, medals and decorations ; and he published a number of important works on his labors in India.

BAIRD, Charles Washington, American historian and religious writer, son of Robert Baird: b. Princeton, N. J., 28 Aug. 1828; d. 10 Feb. 1887. He was a graduate of Union The¬ ological Seminary, and pastor in Brooklyn in 1859, and in Rye, N. Y., 1861. Besides works on the Presbyterian liturgies (which he was the first to collect and investigate) and local histories, he wrote 'Plistory of the Huguenot Emigration to America > (2 vols., 1885), a work especially interesting to tile genealogist.

BAIRD, Sir David, British general: b. Newbyth, Scotland, 6 Dec. 1757 ; d. 29 Aug. 1829. He entered the English army in 1772, and going to India distinguished himself at a disastrous engagement at Perambocum, 10 Sept. 1780, in which the small British force engaged was nearly cut to pieces after sur¬ rendering. His life was spared, but he was kept prisoner for four years. He attained the rank of major in 1787, and in October 1789 ob¬ tained leave of absence

and returned to Great Britain. In 1791 he joined the army under Cornwallis, and as commander of a brigade of Sepoys he was present at the siege of Seringapatam, in 1791 and 1792; and likewise at the storming of Tippoo Saib's lines in the island of Seringapatam. In 1793 he commanded a brigade of Europeans, and was present at the

siege of Pondicherry. On 9 May 1799, he com¬ manded the storming party at the assault of Seringapatam ; when, in requital of his bril¬ liant services he was presented by the army, through the commander-in-chief, with the state sword of Tippoo Saib. In 1800 he had a com¬ mand in Egypt, and with the increased rank of lieutenant-general commanded an expedition which sailed in October 1805, for the Cape of Good Hope, where he defeated the Dutch army and received the surrender of the colony. After a short period of service in Ireland Sir David sailed in command of an armament of 10,000 men for Corunna to assist Sir John Moore. Moore was killed in the battle of Co¬ runna and Sir David succeeded to the chief command. He was created a baronet in 1809. In 1814 he was promoted to the rank of gen¬ eral, and in 1819 became governor of Kinsale, next year commander of the forces in Ireland and in 1827 governor of Fort George in Scot¬ land. Consult Hook, 'Life of Sir David Baird*

(1832).

BAIRD, George Washington, American naval officer: b. Washington, D. C., 22 April 1843. He received a public school and aca¬ demic education and was appointed third as¬ sistant engineer 'in the United States navy in 1862. He was promoted through grades and retired with rank of rear-admiral in 1905. He is president of the Washington Board of Edu¬ cation and is a member of several engineering societies.

BAIRD, Henry Carey, American publish¬ er: b. Bridesburg, Pa., 10 Sept. 1825; d. 31 Dec. 1912. He was a member of the publishing firm of Carey & Baird from 1845 to 1849, when he organized the firm of Henry Carey Baird and Company. He took an interest in politics first as a Whig and later a Republican. He was leader of the Greenback party in 1875, and by it was nominated for State treasurer of Pennsylvania and for mayor of Philadelphia. He declined the former nomination. He was an advocate of free silver and a protective tariff. He published pamphlets and contribu¬ tions to works of reference and to periodicals on banking and other economic subjects.

BAIRD, Henry Martyn, American author and educator: b. Philadelphia, Pa., 17 Jan. 1832; d. Yonkers, N. Y., 11 Nov. 1906. He was graduated from New York University in 1850, and later took a course in theology at Union and Princeton. In 1859 he was appointed pro¬ fessor of the Greek languages and literature in the New York University. In 1906 he be¬ came a pensioner under the Carnegie fund. He was widely known for his researches in the history of French Protestantism, of which his works, given below, form the best succinct ac¬ count from 1512 to 1802. He wrote 'History of the Rise of the Huguenots *(1879-1907) ; 'The Pluguenots and Henry of Navarre > (1886) ; and 'The Huguenots and the Revoca¬ tion of the Edict of Nantes) (1895) ; 'Theo¬ dore Beza, the Counsellor of the French Reformation (1899).*

BAIRD, Julian William, American chem¬ ist: b. Battle Creek, Mich., 14 Feb. 1859. He was graduated from the University of Michigan in 1882; was instructor in chemistry and in charge of the qualitative analysis and assaying

in Lehigh University, 1883-86; and became pro¬ fessor of analytical and organic chemistry in the Massachusetts College of Pharmacy, Bos¬ ton, in 1886, and its dean in 1887.

BAIRD, Robert, American clergyman and author: b. Fayette County, Pa., 6 Oct. 1798; d. Yonkers, N. Y., 15 March 1863. He was grad¬ uated from Jefferson College in 1818, and at Princeton Theological Seminary in 1822. He spent several years in Europe, engaged in tem¬ perance work and in the revival of evangelical Protestantism. He published (History of the Waldenses, Albigenses and VaudoisP (History of the Temperance Societies) (1836); "Re¬ ligion in America > (1844) ; 'Protestantism in Italy J (1845), *etc.* He was corresponding secre¬ tary of the American and Foreign Christian Union (1849-55, 1861-63). Consult his life by Henry M. Baird.

BAIRD, Spencer Fullerton, American naturalist: b. Reading, Pa., 3 Feb. 1823; d. Woods Hole, Mass., 19 Aug. 1887. He was graduated from Dickinson College in 1840, and in 1842 studied at the College of

Physicians and Surgeons in New York city. He was the intimate of Audubon and Agassiz and aided in their work. He became professor of natural sciences at Dickinson College, Carlisle, Pa., 1845 ; assistant secretary Smithsonian Institu¬ tion, 1850; United States commissioner of fish and fisheries, 1871 ; secretary of the Smith¬ sonian Institution, 1878; and founder of the National Museum. Among his more important works are a ‘Catalogue of North American Reptiles* (1853) ; ‘Birds of North America) (with Cassin and Lawrence, 1860) ; ‘Mammals of North America) (1858) ; ‘History of North American Birds) (with Brewer and Ridgeway, 1874-84), *etc.* His work had a beneficent influence on natural history in the United States. He trained a great number of men who have attained great fame in various departments of scientific and economic natural history. A complete bibliography of his works and papers to 1882 was compiled by G. Brown Goode and published as ‘Bulletin No. 20 of the United States National Museum) (Washington 1883). It contains 1,063 titles, and other works ap¬ peared from his pen from that time until his death five years later.

BAIRD LECTURES. In 1871 James Baird, the Scottish ironmaster, founded the Baird Lectures, for the defense of orthodox religious teaching. Two years later he made a gift of £500,000 to the Established Church of Scotland for the Baird Trust (<to assist in providing the means of meeting and at least, as far as possible, promoting the mitigation of spiritual destitution among the population of Scotland.® The gift was well intended, but it was hampered by conditions distasteful to the more liberal members of the establishment ; and for this reason it was bitterly attacked by several of the foremost religious journals of England and Scotland and the secular Scot¬ tish press took a prominent and critical part in the discussion.

BAIREUTH. See Bayreuth.

BAITER, bi’ter, Johann Georg, Swiss philologist: b. Zurich, 31 May 1801; d. 10 Oct. 1877. He was professor in the University of Zurich, and for three periods, the last from

1849 to 1865, director in the gymnasium there. He published, alone and with others, various editions of the classics, ‘Panegyrics of Socra¬ tes, > ‘Ciceronis ScholistseP ‘Oratores AtticP (1838-50), *etc.* His title to distinction lay in his skill in textual criticism.

BAIUS, or DE BAY, Michael, Belgian theologian: b. 1513, at Melin, near Ath, in Hainaut ; educated at Louvain, he was appointed professor of Scripture at this university in 1562, and was sent by the King of Spain (Charles V) to the Council of Trent, where he arrived when it was nearly over. Baius was one of the greatest theologians of the Roman Catholic Church in the 16th century. He founded systematic theology directly upon the Bible and the Christian fathers, leaving the scholastic method. He studied specially the writings of Saint Augustine and had his own interpretations of that father. The doctrines that the human will, when left to itself, could only sin; that even the mother of Jesus was not free from hereditary and actual sin; that every action which did not proceed from pure love of God was sinful.; and that no penance* was effectual for the justification of the sinner, but everything was to be attributed solely to the grace of God, through Christ, caused the superior of the Franciscan Order in Belgium to submit 18 of his propositions to the Sorbonne in Paris. The Sorbonne faculty con¬ demned three of the propositions as false and 13 as contrary to Catholic teaching. Baius disavowed the condemned sentences, claiming that some of them had not been taught by him and that others had been presented incorrectly. After his return from Trent, he published theses which contained doctrines that were rejected by the Spanish and Italian universi¬ ties to which they had been submitted. Finally 76 sentences taken from his works were con¬ demned by Pius V in 1567 and some dispute arising about the meaning of this bull, it was confirmed by Gregory XIII and entrusted to the Jesuit Cardinal Toletus to deliver to Baius. Baius submitted ; yet the opposition still con¬ tinued, as did also his defense of some of his interpretations of Augustine in his lectures: and as the theological faculty at Louvain was entirely in his favor, he not only remained in the quiet possession of his dignities, but was also appointed dean of Saint Peter's in 1575, and in 1578 chancellor of the university. He died in 1589, and left the reputation of great learning, pure morals and a rare modesty. His interpretations of Augustine, which were called Baianism, were adopted by the Jansen-ists and were defended by them against their Jesuit opponents. His doctrine of pure undi¬ vided love to God has also been adopted by the Quietists. His writings, mostly polemical, were published at Cologne (4to 1696). Con¬ sult Duchesne, 'Histoire du BayanisrrP ; Lin-senmann, 'Bayus und die Grundlegung des JansenismusP

BAJA, bo'yo, a Hungarian market town situated near the Danube, 90 miles south of Budapest. It has important manufactures of alcohol and shoes, is celebrated for its annual swine fair and has a considerable trade in grain and wine. Pop. about 21,000.

BAJADA DEL PARANA, ba-ha’da del pa’ra-na’. Sec Parana.

BAJAZET, ba’zha-za’, I, or BAYAZID I,

a Turkish sultan: b. 1347; d. 1403. In 1389 he succeeded his father, Murad of Amurath, who fell in the battle of Kosovo against the Ser¬ bians, and caused his brother Jacob, his rival for the throne, to be strangled. He made great and rapid conquests, in three years conquering Bulgaria, part of Serbia, Macedonia, Thessaly, and subduing the states of Asia Minor. From the rapidity of his conquests, he was called Ilderim (ˆLightning®). In order to save Con¬ stantinople, blockaded by Bajazet, King Sigismund of Hungary (afterward Emperor of Germany) assembled a great army, but Baja¬ zet met them at Nicopolis on the Danube and obtained a decisive victory over the allied Hun¬ garians, Poles and French, 28 Sept. 1396. He would probably have now overturned the whole Greek empire if Timur had not overrun Asia Minor in 1400 and defeated him in 1402 in a battle near Angora. He himself fell into the power of the conqueror and died in Timur’s camp, in Caramania. He was succeeded by his sons Soliman I, Musa and Mohammed I, the last named becoming sole ruler in 1413. *Bajazet’s reign was marked by great corrup¬ tion in high and low places. Consult Gibbon, (Decline and Fall of the Roman Empire) (London 1900), and Lane-Poole, (Turkey > (New York 1889).

BAJAZET or BAYAZID II, Sultan of the Ottoman empire: b. 1447; d. 1513. He was the son of Sultan Mohammed II, the con¬ queror of Constantinople. He became Sultan in 1481, and was continually engaged in wars with Poland, Venice, Persia and Egypt. He suffered several serious reverses, but managed to strengthen the Ottoman power in Europe. His last years were embittered by disputes among his sons in regard to the succession. In 1512 he abdicated in favor of his son Selim, and died soon after near Adrianople. He was a lover of luxury, but also a patron of learn¬ ing and the arts, and built several splendid mosques in Constantinople and elsewhere.

BAJAZET, Mosque of, a mosque at Con¬ stantinople, built in 1505 by Bajazet II. It is one of the finest specimens of Mohammedan architecture, and displays excellent proportions and great richness of detail in decoration. There are four Persian doorways and an octag¬ onal fountain in the centre of the court.

BAJOCCO, bayok'ko, or BAIOCCO, a

papal state copper coin, whose value is about one cent. A Neapolitan coin, value about 83 cents, was also called Bajocco in Sicily.

BAJURA, ba-joo'ra, the banner of Mo¬ hammed.

BAJZA, boi'zo, Joseph, Hungarian poet and critic: b. Sziicsi, 31 Jan. 1804; d. Pesch, 3 March 1858. He devoted himself to history, and edited a historical Library) (1843ˆ45) and the hew Plutarch > (1845-47). He exerted a strong and salutary influence on Hungarian literature in history, in the development of a national drama, and, — in the conduct of two journals, — in establishing sound canons of literary taste. He also ranks among the best lyric poets of Hungary. His <Poems) ap¬ peared in 1835, and his Collected Works) in

BAKACS, bd'koch, Thomas, Hungarian statesman, son of a peasant: b. about the

middle of the 1 5th century; d. 1521. He held several bishoprics in succession, became chan¬ cellor of the kingdom, and finally cardinal-archbishop of Hungary. He preached a cru¬ sade against the Turks; but his army of peas¬ ants and vagabonds turned their arms against the nobility, and a fierce civil war ensued, which ended in the final defeat of the insur¬ gents by John Zapolya.

BAKAIRI, ba-ka-i-re, or BACCAH1RY,

a Caribbean tribe of central Brazil, remarkable for their light complexion. The men have as¬ sembly houses, where they spend most of their time, which women are forbidden to enter.

BAKAU, Rumania, the capital of the dis¬ trict of the same name in Moldavia, on the Bistritz, 188 miles north of Bucharest, with which it is connected by rail. It contains a gym¬ nasium and has a considerable trade in the agricultural products of the district. Pop. 16,- 187, about one-fourth of which are Jews.

BAKE, ba'ke, Jan, Dutch philologist : b. Leyden, 1 Sept. 1787; d. 26 March 1864. From 1817-57 he was professor of Greek and Roman literature at the University of Leyden. Here he edited and published valuable editions of Posidonius, and of the astronomer Cleomedes, and assisted in the large and original work en¬ titled (Bibliotheca Critica NovaP He pub¬ lished a series of philological articles, edited some of the works of Cicero and wrote an ex¬ cellent essay upon the Greek tragedians.

BAKEL, French West Africa, fortified town and capital of the arrondissement of the same name Jn the colony of Senegal, on the Senegal River. It came into the possession of France in 1820, and was of great strategic im¬ portance in the struggles with the natives. It is now a great trade centre and the meeting place of caravans from the upper Senegal basin and the Niger. Dates, beeves, gold dust and ivory are the principal articles of trade. In the rainy season it is connected directly by a water route with Saint Louis on the coast. Pop. 1,760.

BAKER, Alfred, Canadian educator : b. Toronto. He was graduated B.A. at Toronto University in 1869, and after holding high school and other appointments became mathe¬ matical tutor in University College in 1875, registrar of Toronto University in 1881, pro¬ fessor of mathematics in 1887, and dean of the Faculty of Arts in 1912. He has published two works on geometry, edited treatises on trigo¬ nometry and mechanics and was president of the Royal Society of Canada 1915-16.

BAKER, Sir Benjamin, English engineer : b. near Bath 1840; d. Pangbourne, Berkshire, 19 May 1907. He joined the staff of Sir John Fowler in 1861, becoming his partner in 1875. In 1877 he superintended the removal of Cleo¬ patra's Needle from Egypt to London and was consulting engineer in the construction of the Assouan dam. He was brought into con¬ sultation in connection with the design of the Saint Louis bridge across the Mississippi, and on the threatened inundation of the first tunnel across the Hudson he designed a pneumatic shield 2,000 feet in length which enabled the work to be successfully accomplished (1889-

91). In conjunction with Sir John Fowler he planned the bridge over the Firth of Forth. He was created K.C.M.G. in 1890. He wrote (Long Span Iron Bridges,* Suspension Versus Cantilever Bridges,* (The Strength of Beams) and transportation and Re-erection of Cleo¬ patra's Needled

BAKER, Charles Fuller, American zool¬ ogist: b. Lansing, Mich., 22 March 1872. He was graduated at the Michigan Agricultural College in 1892, and for several years taught biological subjects in various secondary schools. From 1904 to 1907 he was chief of the depart¬ ment of botany at the Cuban Agronomical Sta¬ tion, in 1907-08 curator of the botanical garden and herbarium at the Museu Goeldi, Para, Brazil. From 1909 to 1912 he was professor of biology at Pomona College, Claremont, Cal., in the latter year he was appointed professor of agronomy at the University of the Philippines. He had charge of the Colorado zoological and forestry exhibit at the Chicago

Exposition of 1893, and in 1897-98 was zoologist and asso¬ ciate botanist to the Alabama Biological Sur¬ vey. He was botanist to the H. H. Smith ex¬ ploring expedition in the Santa Marta Moun¬ tains, Colombia, 1898-99, and has himself con¬ ducted field explorations in several Western States and in Brazil, Cuba and Nicaragua. He published Unvertebrata Paciflca) and is co¬ author of (Economic Plants of the World. *

BAKER, Charles Whiting, American civil engineer: b. Johnson, Yt., 17 Jan. 1865. He was graduated at the engineering department of the University of Vermont, became manag¬ ing editor of Engineering News in 1887 and its editor-in-chief since 1895. In the 28 years of his connection with this journal its circulation has increased tenfold. He published in 1889 in Putnam's (Questions of the Day* series, a study of the trusts and of competition, entitled (Monopolies and the People, * of which three editions were printed. Many measures advo¬ cated in this book have in recent years been enacted into law. He is a member of the American Society of Mechanical Engineers and since 1913 has been one of the commissioners of the Palisades Interstate Park of New York and New Jersey.

BAKER, Daniel, American clergyman and author: b. Midway, Ga., 17 Aug. 1791; d. Aus¬ tin, Tex., 10 Dec. 1857. He gained such a reputation as an effective preacher that his services were in demand as a revivalist. After 1830 he continued as an evangelist, traveling in the South, and at last settled in Austin, Texas, where he founded a college and became its first president. His published works include (A Scriptural View of Baptism,* (An Affec¬ tionate Address to Mothers, and one to Fathers,* (Baptism in a Nutshell,* (Revival Sermons.-* Consult (Memoirs) edited by his son (Philadelphia 1859).

BAKER, David (Augustine), Benedictine ascetical writer: b. 1575; d. 1641. The most original and ablest spiritual writer among English Catholics during the first half of the 17th century. Having finished his studies at Oxf)rd he devoted himself to law at Lincoln's Inn and later at Inner Temple. In his 40th year he became a convert to the Catholic faith,

and a few years later was ordained priest and was subsequently received into the Benedictine Order by the Italian fathers in England. Dug-dale and Dodsworth are indebted to his his¬ torical labors for much of the data found in their monumental works. It was Father Baker who discovered that the old English Benedic¬ tine monastery of

Saint Peter at Westminster was legally continued in the person of an old priest, Dorn Robert (Sigebert) Buckley, who had suffered 44 years' imprisonment for refus¬ ing the oath of supremacy. By this sole sur¬ vivor David Baker was professed into the monastery of Westminster, and thus be¬ came one of the first three priests to form the connecting link between the old and the new congregation in England. It was as spiritual director at Douai and Cambrai that he composed his admirable treatises on the spiritual life. Consult Wood, (Athense Oxon-iensis* ; Taunton, (English Black Monks of Saint Benedict* ; (Dictionary of National Biog¬ raphy* (Vol. Ill, London 1885).

BAKER, Edward Dickinson, American soldier and politician : b. London, England, 24 Feb. 1811; d. 21 Oct. 1861. He came to the United States in 1816, was elected to the Il¬ linois legislature in 1837, became a State sena¬ tor in 1840, and was sent to Congress in 1844. He served under General Scott in the war with Mexico and commanded a brigade at the battle of Cerro Gordo, and was elected United States senator from Oregon in 1860. He entered the Federal army at the outbreak of the Civil War and was killed at the battle of Ball's Bluff while leading a charge. Consult Glazier, William, (Heroes of Three Wars* (1880).

BAKER, Frank, American zoologist: b. Pulaski, N. Y., 22 Aug. 1841 ; d. 30 Sept. 1918. He was professor of anatomy at Georgetown University after 1883, and superintendent of the National Zoological Park in Washington, D. C. ; assistant superintendent of United States life saving service 1899-90. He was a Fellow of the American Association for the Advancement of Science, and a member of the Washington Academy of Sciences and the Anthropological and the Biological Societies, all in Washington. He received the degree of LL.D. from George¬ town in 1914. He contributed articles to the (Reference Handbook of Medical Sciences,* was a coeditor of (Billings Medical Dic¬ tionary* and the (Standard Dictionary.* From 1890 to 1897 he was editor of the American Anthropologist.

BAKER, Frank Collins, American zoolo¬ gist: b. Warren, R. I., 14 Dec. 1867. He was educated at Brown University and at the Philadelphia Academy of Natural Sciences. The latter institution sent him to Mexico with an exploring expedition in 1890. In 1891-92 he was invertebrate zoologist of Ward's Natural Science Establishment and secretary of the Rochester Academy of Sciences. In the latter year he became curator of zoology of the Field Columbian Museum of Chicago, and in 1894 curator of the Chicago Academy of Sciences. He has published (A Naturalist in Mexico* (1895) ; (Mollusca of the Chicago Area* (1898-1902); Shells of Land and Water* (1903); (The Lynmoeidae of

ica) (1911), and contributions to zoological journals, principally on mollusca.

BAKER, George Pierce, American scholar and educator: b. Providence, R. I., 4 April 1866. He was graduated at Harvard in 1887, and in the following year was appointed instructor in English at that institution, becoming successively instructor in forensics 18S9, assistant professor of English 1895, and professor of English 1905. He established and conducted a department of criticism and dramatic writing at Harvard. He has published (The Principles of Argumenta¬ tion } (1895-1905) ; (The Development of

Shakespeare as a Dramatist5 (1907), and edited (Specimens of Argumentation5 (1893) ; (The Forms of Public Address5 (1904) ; (Some Un¬ published Correspondence of David Garrick5 (1907) ; (The Correspondence of Charles Dickens and Maria Beadnell5 (1913), also va¬ rious Elizabethan plays. In 1907-08 he was Hyde lecturer at the Sorbonne, Paris.

BAKER, Henry, English naturalist and poet: b. May 1698; d. 25 Nov. 1774. Appren¬ ticed to a bookseller, he afterward devoted his attention to developing an improved system of education for the education of deaf-mutes, and thus amassed a fortune. He was associated with Defoe in the publication of the Univer¬ sal Spectator5 (1728). In 1744 he obtained the Copley medal for his microscopical discov¬ eries on crystallization. He wrote (The Micro¬ scope Made Easy,5 Employment for the Microscope,5 many scientific papers and sev¬ eral poetical works.

BAKER, Sir Henry Williams, English hymn writer: b. London, 27 May 1821 ; d. Monkland, 12 Feb. 1877. He was educated at Trin¬ ity College, Cambridge, and in 1851 was pre¬ sented to the vicarage of Monkland near Leo¬ minster. He succeeded his father as 3d baronet in 1859. In 1852 he wrote his first hymn, (Oh, what if we are Christ's.5

Two others appeared in 1861 : Eraise, O Praise Our Lord and King5 and (There Is a Blessed Home.5 He is chiefly known as the promoter and editor of (Hymns Ancient and Modern,5 first published in 1861. To it he contributed many original hymns as well as several translations of Latin hymns. Strong objection was made to Baker's hymn addressed to the Virgin Mary, (Shall We Not Love Thee, Mother Dear?5 Baker held the doctrine of the celibacy of the clergy. He published also (Daily Prayers for the Use of Those Who Have to Work Hard,5 and a (Daily Text-book5 for the same class, and some pamphlets on religious subjects. Consult the Literary Churchman (24 Feb. 1877).

BAKER, Herbert Brereton, English chem¬ ist : b. Blackburn, about 1857. He was edu¬ cated at the Manchester Grammar School and at Balliol College, Oxford, where he was a demonstrator in chemistry in 1883-85. He was head of the science department of Dulwich Col¬ lege 1885-1902, and headmaster of Alleyn's School, Dulwich, in 1902-03. He became a Fellow of the Royal Society in 1902, and in 1912 was appointed professor of chemistry in the Imperial College of Science and Technol¬ ogy, London. He has published (Combustion in Dried Oxygen5 (1885) ; (Action of Light on Silver Chloride5 (1892); Hnfluence of Moisture on Chemical Action5 (1894) ; (Dry¬

ing of Ammonia and Hydrogen Chloride5 (1898) ; (Vapor Density of Dried Mercurious Chloride5 (1900); (Union of Hydrogen5 (1902); and, in conjunction with Professor Dixon, (The Chemical Inactivity of Roentgen Rays5 (1896) ; (Gaseous Nitrogen Trioxide,5 with Mrs. Baker (1907).

BAKER, Ira Osborn, American educator: b. Linton, Ind., 23 Sept. 1853. He became pro¬ fessor of civil engineering in the University of Illinois in 1880; is the author of Eevelling5 (1886) ; Engineers' Surveying Instruments5 (1892) ; (Treatise on Masonry Construction5 (1889-1909) ; Eurability of Brick Pavements5 (1893) ; (Treatise on Roads and Pavements5 (1903-13). Member American Society of Civil Engineers, Western Society of Engineers, So¬ ciety for Promotion of Engineering Education.

BAKER, James Heaton, American soldier : b. Monroe, Ohio, 6 May 1829 ; d. 27 May 1913. He was educated at Ohio Wesleyan University. He was secretary of State of Ohio in 1854-56, and of Minnesota in 1857-61, when he joined the army as colonel of the 10th Minnesota Volunteer Infantry. He was mustered out of the service in 1865 with

the rank of brigadier-general. Afterward he was commissioner of pensions under President Grant, was surveyor-general of Minnesota 1875-79, and State rail¬ road commissioner 1881-86. In 1879 he became proprietor of two Republican newspapers which he combined under the name of the Mankato Free Press. He wrote Eake Superior5 (1879) and (The Sources of the Mississippi5 (1887), both in the (Collections of the Minnesota His¬ torical Society5 ; also (The Lives of the Gov¬ ernors of Minnesota5 (1908).

BAKER, James Hutchins, American uni¬ versity president : b. Harmony, Me., 13 Oct. 1848. He was principal of the Denver High School 1875-92; president of University of Colorado 1892-1914, and since the last named date president emeritus. His publications in¬ clude Elementary Psycholog}'5 (1890) ; Edu¬ cation and Life,5 (American Problems5 (1907) ; Educational Aims and Civic Needs5 (1915).

BAKER, John Gilbert, English botanist : b. Guisborough, Yorkshire, 13 Jan. 1834, and was appointed assistant curator at the herba¬ rium at Kew in 1866 and was keeper 1890-99. He was gold medalist of the Linnean Society for 1899, and obtained the Veitch gold medal for horticulture in 1907. He is the author of works on the flora of North Yorkshire, the English Lake District, and the Mauritius, of handbooks on ferns, and (with Sir W. J. Hooker) of <(Synopsis Filicum.55

BAKER, Moses Nelson, American sani¬ tary engineer and editor: b. Enosburg, Vt., 26 Jan. 1864. Associate editor and editor Engi¬ neering Nezvs (1887) ; editor (Manual American Waterworks5 (1888-97) ; author various books on water and sewage treatment, and numerous encyclopedia articles on municipal engineering, health and sanitation and government. A mem¬ ber board of health, Montclair, N. T., from 1895 and its president 1904—15; vice-president New Jersey State Department of Health 1915; chairman executive committee National Municipal League 1913.

BAKER, Newton Diehl, American states¬ man: b. Martinsburg, W. Va., 3 Dec. 1871.

He was graduated at Johns Hopkins University in 1892 and received the degree of LL.B. at W ashington and Lee University in 1894. In 1896-97 he served in the capacity of private secretary to Postmaster-General Wilson and in the latter year established a law practice at Martinsburg, W. Va. From 1902 to 1912 he was city solicitor of Cleveland, Ohio, and was elected mayor of that city in 1912, and re¬ elected in 1914. On 7 March 1916 he was ap¬ pointed Secretary of War by President Wilson.

BAKER, Osmon Cleander, American cler¬ gyman : b. Marlow, N. H., 30 July 1812; d. 20 Dec. 1871. He was educated at Wesleyan Uni¬ versity; spent several years in teaching, and was one of the founders of the system of Methodist Episcopal theological schools. He was professor in the Biblical Institute in Con¬ cord, N. H., 1847-52, and in the last named year was elected a bishop. His work, (GuideBook in the Administration of Discipline of the Methodist Episcopal Church) (1855), is a standard authority.

BAKER, Ray Stannard, American author and journalist: b. Lansing, Mich., 17 April 1870. He was graduated at the Michigan Agri¬ cultural College in 1889, and later took a par¬ tial law course and studies in literature at the University of Michigan. He was reporter and sub-editor of the Chicago Record 1892-97, man¬ aging editor of McClure's Syndicate 1897-98, and associate editor of McClure's Magazine 1899-1905. From 1906 to 1915 he was one of the editors of the American Magazine. He has contributed to several magazines many articles on social and economic subjects. His published volumes include (Boys' Book of Inventions) (1899); (Our New Prosperity) (1900); (Seen in Germany1* (1901); (Second Boys' Book of Inventions) (1903); following the Color Line> (1908) ; (New Ideals in Healing) (1909); (The Spiritual Unrest* (1910).

BAKER, Sir Richard, English historian : b. Kent 1568; d. 1645. He was educated at Oxford, and knighted in 1603 by James I ; in 1620 he filled the office of high sheriff of Ox¬ fordshire. Shortly afterward he was thrown into Fleet Prison because of having given se¬ curity for a debt contracted by his wife's fam¬ ily, which he was unable to pay. During his imprisonment he wrote (Chronicle of the Kings of England,* first published in 1643, and afterward continued by Edward Phillips, the nephew of Milton, and others, a work popular at the time, but not of permanent value. He died in prison.

BAKER, Sir Samuel White, English ex¬ plorer and author: b. London, 8

June 1821; d. 30 Dec. 1893. He was trained as an engineer, and at the age of 24 went to Ceylon, where he founded an agricultural settlement at Nu-wara Eliya in 1847. In the early part of 1861, accompanied by his wife, he set out for Africa on a journey of exploration. When he had ascended the Nile as far as Gondokoro he met Speke and Grant returning after their discov¬ ery of the Victoria Nyanza Lake, and learned from them that another large lake in the dis¬ trict had been spoken of by the natives. This lake he determined to discover, and after many adventures he and his wife beheld the Albert Nyanza, on 14 March 1864. On his re¬

turn home he was received with great honor and was knighted. In 1869 he returned to Africa as head of an expedition sent by the Khedive of Egypt to suppress the slave trade, and to annex and open up to trade a large part of the newly-explored country, being raised to the dignity of pasha. Returning in 1873, he was succeeded by the celebrated Gor¬ don. In 1879 he explored the island of Cyprus and subsequently traveled in Asia and America. His writings include (The Rifle and the Hound in CeyloiP (1854) ; (Eight Years' Wan¬ derings in Ceylon > (1855) ; <The Albert Ny-anza) (1866) ; (The Nile Tributaries of Abyssinia) (1867); Usmailia, a Narrative of the Expedition to Central Africa* (1874); < Cy¬ prus as I saw It in 1879* ; (Wild Beasts and Their Ways* (1890); (True Tales for My Grandsons) (1883) ; also (Cast up by the Sea, 5 a story published in 1869.

BAKER, Thomas, English antiquary: b. 1656; d. 1740. His Reflections on Learning* H709-10) went through seven editions. He left in manuscript 42 folio volumes of an (Athense Cantabrigiensis,* from which a (His¬ tory of St. John's College) was edited by Pro¬ fessor Mayor. The former was published in 1867, and the latter in 1869. Consult Horace Walpole, (Works, *ii, 339; (Dict. of National Biography* (London 1885).

BAKER, Valentine, English military offi¬ cer, also known as Baker Pasha : b. 1825 ; d. Tel-el-Kebir 1887. He was a brother of Sir Samuel White Baker. For his services in the Crimean War he was made colonel of the 10th Hussars. His career was clouded in 1875 by an insult to a young woman, for which he was imprisoned. In the Russo-Turkish War of 1877 he was in the Turkish service, and subse¬ quently served in Egypt. He wrote (Clouds in the East) (1876) ; and (The War in Bulgaria-*

(1879).

BAKER, William Mumford, American novelist and clergyman : b. Washington, D. C., 27 June 1825; d. South Boston, Mass., 20 Aug. 1883. He was graduated at Princeton 1846, and held Presbyterian pastorates in Texas for 15 years, when he returned to the North and accepted a charge in South Boston. As a writer, one of his most important books was (Inside: A Chronicle of Secession* (1866), secretly written during the war, and giving an illuminating picture of Southern sentiment. Other works are (Life and Labors of Rev. D. Baker * (1858) ; (The Ten Thenopanies>

(1883). His novels, several of which appeared serially, include (Mose Evans* (1874) ; bar¬ ter Quarterman) (1876) ; (Colonel Dunwoodie) (1878) ; (The Virginians in Texas) (1878) ; (His Majesty Myself* (1879); and its sequel, (The Making of a Man* (1884) ; (Blessed Saint Certainty* (1881).

BAKER, Mount, an occasionally active volcano in Whatcom County, Wash., belonging to the Cascade Range ; elevation, 10,827 feet.

BAKER AND THE BAKER'S WIFE, The, names popularly given to Louis XVI of France, and Marie Antoinette, because they gave bread to the starving mob at Versailles on 6 Oct. 1789.

BAKER, Oregon, city and county-seat of Baker County, situated on the east fork of

the Powder River, 360 miles east of Port¬ land, on the Oregon Railroad. It is the centre of an extensive farming, gold-mining and stock-raising region, and has a considerable ex¬ port trade. It is governed by a mayor, bien¬ nially elected, and a city council, and operates the water works. It was settled in 1860, incor¬ porated in 1872 and has lately adopted the commission form of municipal government. Pop. 7,729.

BAKER UNIVERSITY, situated at Bald¬ win, Kan., a coeducational institution. It was founded in 1858 under the auspices of the Methodist Episcopal Church. The departments include the College of Liberal Arts, academy, musical conservatory, public speaking, fine arts, household arts, preparatory professional courses and summer school. There are 32 pro¬ fessors and instructors and 515 students. Its library contains 14,000 volumes, and the grounds and buildings are valued at $80,000; graduates, 1,200; productive funds, $50,000; in¬ come, $40,000.

BAKER'S ANTELOPE, a large antelope (Hippotragus Bakeri) of equatorial Africa, discovered by Sir Samuel Baker. It is pale brownish-red with black stripes on the shoul¬ ders and has massive horns.

BAKER'S DOZEN, a familiar phrase sup¬ posed to have originated in an old practice of bakers who, when a heavy penalty was inflicted for short weight, used to give a surplus num¬ ber of loaves, called the inbread or make¬ weight, to avoid all risk of incurring the fine. Until at least quite recently it still was the custom in Great Britain. Thirteen, therefore, became a baker's dozen, and 13 also is as¬ sumed to be the number of witches who sat down together at dinner on the Lord's Day, even as it was the number who were at that last Passover supper which immediately pre¬ ceded the betrayal of Christ. Thirteen was also called the ((devil's dozen.®

BAKERSFIELD, Cal., town and county-seat of Kern County, on the Kern River and on the Southern Pacific Railroad, 168 miles northwest of Los Angeles. Settled in 1872 in the centre of an oil and mineral and of a stock-raising and fruit-growing region, it has a good trade and active manufacturing inter¬ ests. The United States census of manufac¬ tures for 1914 reported 51 industrial establish¬ ments of factory grade, employing 1,046 per¬ sons, of whom 895 were wage earners, receiving annually $879,000 in wages. The capital in¬ vested aggregated $2,749,000, and the year's output was valued at $2,928,000; of this, $1,305,- 000 was the value added by manufacture. The city has adopted the commission-manager plan of the commission form of government. Pop.

(1920) 8,638.

BAKEWELL, ROBERT, English agri¬ culturist: b. 1725; d. 1795. He succeeded his father in 1760 as occupier of the Dishley farm in Leicestershire, and then began experi¬ ments for the improvement of

cattle (introduc¬ ing the celebrated long-horned breed), and also of horses, pigs and sheep. He also intro¬ duced into English agriculture the practice of flooding meadows. Lie never contributed any¬ thing to literature, but Arthur Young, in his

annals of agriculture, fully described and praised his plans and improvements.

BAKEWELL, England, an ancient town of Derbyshire, on the Wye, 25 miles northwest of Derby. It is situated in a picturesque region, remarkable for its scenic beauty ; con¬ tains chalybeate springs and warm baths, a museum and a fine old Gothic church. Ark¬ wright first established cotton mills here, and in the neighborhood are black-marble and lime¬ stone quarries and coal and zinc mines. The town suffered severely from a visitation of the plague in the 17th century. Pop. 3,078.

BAKHMUT, bakh-moot'. See Bachmut.

BAKHTCHISSARAI, bak'che-sa-ri',

Ukraine, the capital of the district of Taurida; situated on the Tchoorook, 15 miles south¬ west of Simferopol. It consists of a single street, built along the banks of the Tchoorook and lined in Oriental fashion with bazaars and workshops. It contains also several mosques, whose tall minarets rise high above the neigh¬ boring houses. Here also is the ancient palace of the khans who ruled over the Tauridian state before the rise of Russian power. In one of the old Jewish synagogues a parchment roll of the Bible — the most ancient, accord¬ ing to some Hebrew scholars — was discovered. It is now in the Imperial Library. The prin¬ cipal articles of manufacture are the well-known red and yellow morocco leather, fur coats, boots and shoes, and cutlery. The town is a mart for the products of the neighboring country, such as tobacco, flax, grain, and espe¬ cially fruits. Its population, principally Mo¬ hammedans, number about 13,000, including 3,000 Christians, 1,000 Jews and some Greeks.

BAKHTEGAN, bakk-te-gan, a salt lake in Persia, 47 miles east of Shiraz ; 74 miles long and from 4 to 13 miles wide. Large quantities of salt are gathered from its basin during the summer drought.

BAKHTIARI, bakh'te-a're. (1) A range of mountains in the province of Bakhtiari in Persia extending parallel to the Arva and Lar-istan ranges. (2) A half-civilized nomadic tribe living in the above mountains,

estimated to number about 200,000.

BAKHUIZEN, bak'-hoi-zen, Van Den Brink, Reinier Cornells, Dutch historian : b. Amsterdam, 28 Feb. 1810; d. The Hague, 15 July 1865. In 1854 he was appointed keeper of the state archives, and was long connected with Gids, an important monthly publication. His principal works are (Vondel met Roskam en RommelpoL (latest ed., 1891) ; Wariee Lectiones ex Historia Philosophise Antiquse> (1842) ; <Laretraite de Charles Quint) (1842) ; (Het huwelijk van Prins Willem met Anna van Saksen) (1853) ; Het Rijksarchief > (1857) ; (Cartons voor de geschiedenis van den neder-landsche Vrijheidsoorlog) (1860-77).

BAKHUYSEN, Ludolf, Dutch marine painter: b. Emden 1631; d. 1708. He was for a time a clerk and teacher at Amsterdam. He studied painting under Aldert van Everdingen and Heinrich Dubbels, and soon came to be regarded as one of the greatest marine painters of the time. He depicted stormy seas in con¬ trast to his rival Wilhelm van der Velde, who depicted the sea in its calm moods. He often risked his life and the lives of his companions

in the quest of subjects for his pictures. He did not excel in coloring, but succeeded in catching the spirit of the sea in its wilder as¬ pects. Numerous examples of his work are extant. One, depicting a coast scene, is in the Amsterdam Museum; his (Rough Sea at the Mouth of the Maas} hangs in the Louvre, and two of his pictures are in the Museum at The Hague. Seven of his works are preserved in the National Gallery, London. He made sev¬ eral drawings of vessels for Peter the Great, who was his pupil for a time. Late in life he began etching on copper. He also painted several portraits. Consult Van der Willigen, (Les artistes de Haarlem. >

BAKI, ba'ke, the greatest lyric poet of Tur¬ key; d. about 1600. His (Divan> contains almost exclusively odes in praise of the Sultan.

BAKING MACHINERY. See Bread and Bread-making.

BAKING POWDER, a chemical prepara¬ tion used in the place of yeast to give light¬ ness to bread and other similar articles of diet. Yeast induces a kind of fermentation, accom¬ panied by the generation of bubbles of the gas known to chemists as carbon dioxide; and it is the development of these bubbles within the dough that causes it to swell

(or ˆrise®) and become light. When baking powder is used in the place of yeast, the action is similar, ex¬ cept that the gas is generated by direct chem¬ ical action, instead of by fermentation. The best baking powders contain bicarbonate of soda or bicarbonate of ammonia as their alka¬ line constituent, intimately mixed with tartaric or phosphoric acid, or an acid tartrate or phos¬ phate. So long as the powder is kept dry, its acid and alkaline constituents do not combine with each other; but when moistened, combina¬ tion takes place, and carbon dioxide is gener¬ ated, just as in the case of yeast. Owing to the cost of tartrates and phosphates, alum is not infrequently used as the acid constituent in the cheaper powders ; but health authorities almost universally condemn this substitution.

BAKKEBAKKE, bak'ke-bak'ke, a tribe of African pigmies dwelling in the French Kongo territory.

BAKONYWALD, bo'kon-y'-valt, a moun¬ tain range in Hungary, between the Raab and Lake Balaton, separating the great and little Hungarian plains. Average elevation, 2,000 feet. It is covered with forests on the most of which large herds of swine are fed. There are fine quarries of marble in the mountains.

BAKSHEESH, bak-shesh', or BAK¬ SHISH, an Eastern word, denoting a present or gratuity. In Egypt and other parts of the Turkish empire the traveler has scarcely set foot on shore before clamors for baksheesh, on the most frivolous pretexts, or in simple beggary, without pretext at all, assail his ears from every quarter. Baksheesh is the. first Arabic word with which he becomes acquainted, and he acquires it unwillingly.

BAKST, Leon Nikolajewitsch, Russian decorative designer: b. Petrograd .1886.. He was of Jewish parentage and studied in the Petrograd Academy of Arts and under the patronage of a Russian Grand Duchess con¬ tinued his studies in Paris. On his return to Russia he settled in Moscow, where he painted

genre scenes of Russian life. The authorities were displeased with his intruding of political conditions , into his paintings and he withdrew to Paris in 1906, where he soon acquired a great reputation as a designer of stage settings. His principal efforts in this field are the set¬ tings for (Cleopatra) and (Schaherazade> for the Russian ballet

(1909). These were fol¬ lowed by the designs for Salome5 ; Narcis¬ sus, Daphnis and Chloe) ; (A Faun's After¬ noonˆ in Greek settings ; (The Blue God, > (Ana-mese and Javanese settings; (Thamar,* Trans¬ caucasian and Chinese; (The Butterflies, } and (The CarnivaP ; the settings for Wolf-Fer- rari's opera, (The Secret of Suzanne* ; and for D'Annunzio's (La Pisanelle) and (Saint Se-bastienP The ballet for his latest production, (The Orientale,* was given in New York in 1914, where an exhibition of his principal de¬ signs and drawings was held in 1913-14, being shown later in other American cities.

BAKU, Azerbaijan republic, on the west coast of the Caspian Sea. The rocky penin¬ sula upon which it is built and the islands in the bay are composed of Tertiary strata, abounding in fossil shells. Through these strata numerous springs of naphtha and petro¬ leum issue, together with streams of inflam¬ mable gas, and eruptions of mud from so-called mud volcanoes. These phenomena give to the region the name of the Field of Fire, and formerly made Baku the sacred city of the Guebres or Fire Worshippers. Naphtha is so abundant as to be an article of commerce. The chief product of the region, however, is petro¬ leum. Over 500 oil wells are operated, produc¬ ing large quantities of petroleum, much of which is carried by pipes directly to the re¬ fineries. Baku has a large trade, exporting besides the oil, grain, salt, *etc.* It has grown very rapidly in recent years, its prosperity being due to the petroleum industry which is chiefly in the hands of foreign capitalists. It has several shipbuilding yards. Along the south side of the city a new quay has been con¬ structed; on this are erected modern stores and bazaars. The older portion has winding, narrow streets and here also are some remains of the palace of the khans, and the mosques of the shah, erected in 1078. The climate is mild; the harbor having been frozen over but once in 80 years. There are also tobacco fac¬ tories and chemical works. The position of Baku makes it the market-place for the Russo-Persian trade. Cotton, rice, silk, wine, dried fruits and walnut wood pass through from Persia to Russia and western Europe, in ex¬ change for goods of Russian manufacture. The population is mostly Tatar, and constitutes the laboring and small trading elements ; Russians fill financial, commercial and official posts ; Armenians are among the leading merchants. Baku was in Persian hands from 1509 to 1723; in the latter year it was taken bv the Russians, who restored it to the Persians in 1735. In 1806 it again came into possession of Russia and has since remained under her rule. In 1901 it was the scene of a great conflagration, and in 1905 sanguinary conflicts took place here between the Armenian and Tatar elements. The oil industry suffered great damage, the losses reaching into the tens of millions, of rubles. The commercial and industrial

of the town were almost obliterated. Pop. (1910) 217,900. Consult Henry, (Baku: An Eventful History* (1906) ; Louis, ((The Baku Petroleum District® in Engineering Magazine (No. XV, New York 1898) ; Marvin, (The Region of Eternal Fire1* (new ed., London

1891).

BAKUBA, ba-koo-ba, a Bantu-speaking people of the Kasai district of the Belgian Kongo. They are related to the Baluba, and are often referred to under the name <(Bushongo.® They are noted among all the Kongo peoples for their highly-developed artistic sense, which finds expression in admirable wood-carvings, decorated goblets toilet boxes, drums, etc., and in the plush-like pile cloth woven of raffia-palm fibre by the men and deco¬ rated with designs sewed on by the women. Early travelers have described this people briefly, and they have been lately studied by Frobenius, Torday and Joyce. Consult Torday and Joyce, (Les Bushongos5 (Publications of the Tervueren Museum, Belgium, 1911), and Johnston, Sir Harry, (George Grenfell and the Congo.)

BAKUNIN, ba-koon'yen, Michel, Russian anarchist: b. 1814; d. Berne, 13 Jan. 1876. He served in the Imperial guard 1832-38. In 1841-43 he was in Germany, engaged in philo¬ sophical study. In 1843, he went to Paris, and entered into relations with the Polish exiles, and shortly afterward to Switzerland, where he participated actively in various socialist and communist associations. The Russian gov¬ ernment in 1847 ordered him to return home ; but he refused, and his estate was confiscated. In the same year during the excitement pro¬ duced in Paris by the question of parliamentary reform, he made a speech invoking the fusion of Poles and Russians, for the better and easier revolutionizing of Russia, on account of which the Russian government demanded his expul¬ sion from France. For the next two

years he was active in the revolutionary movement at Berlin, at Prague and at Dresden. He was thrice condemned to death for his participa¬ tion in the revolutionary movement at Dres¬ den ; a second time on being turned over to the Austrians ; and a third time on being handed over to the Russian authorities. The sentence was commuted to penal servitude, and he was sent to Siberia in 1855. In I860, he escaped in an American ship to Japan, and from there went by way of the United States to London. Here he joined the work of the revolutionary socialist movement under Marx and Engels, and in 1869 founded the Social Democratic Alliance, which later joined the International Workingmen's Association. His views were thoroughly anarchistic and when he tried to impose them upon the association he was expelled by The Hague Congress in 1872. He took part in the rising at Lyons in 1870. . In 1873 Bakunin stopped active work and lived for the rest of his life in Switzer¬ land. Consult for his writings, Nettlan's, (Biographie de l'anarchie1* (Paris 1897).

BAKWIRI, ba-kwe' -re, a Bantu-speaking tribe of Kamerun, west Africa. They are of medium height, well proportioned and with regular features. Drum signaling is much used, and by it news is rapidly conveyed to long dis¬

tances. Witchcraft and sacrifices still prevail and cannibalism was practised formerly.

BALA, ba-la, a very ancient town of north Wales, at the north end of the Bala Lake, famous for the manufacture of knitted stock¬ ings, and gloves of strong and soft texture. At the south end of the town is a large arti¬ ficial mound, supposed to be of Roman origin. This mound was occupied by the Welsh as a fort in early days to prevent the incursions of the English.

BALA BEDS (also known as the Caradoc group), a local deposit in north Wales, near Bala, which form the upper group in the Lower Silurian of Murchison (now known as Ordovi¬ cian). The group in the type locality consists of two limestones, separated by about 1,400 feet of sandy and slaty rocks, with many lava flows. The lower limestone, called the Bala limestone, is about 25 feet thick. The grapto-lites are the dominant fossils of the group.

BALAAM, a Biblical personage, the son of Beor, and a prophet of Pethor by the Eu¬ phrates. The children of Israel had reached, in their journey, the plains of Moab. Balak, the King, terrified at seeing so

great a host in¬ vading his territory, sent, therefore, to Balaam, a well-known prophet and soothsayer, to come and curse these hosts for him, so that, perad-venture, he might then smite them and drive them out of the land. Balaam, warned of God in the night, refused to go with the messen¬ gers, and sent them away. Balak sent yet others. He at first also refused them, but in the morning he went, with the divine injunc¬ tion to speak what the Lord should tell him. The angel of the Lord met him in the way, gave the ass he rode a vision in three several instances, and each time Balaam angrily smote the beast for her involuntary manifestations of terror. After the third beating an interlo¬ cution ensued between the ass and the master, when the Lord opened the eyes of Balaam, and seeing the angel, he conversed with him in¬ stead of the ass. As the result of the conver¬ sation, Balaam was permitted to go on, and the charge repeated to speak only that which the Lord should tell him. Coming unto Balak, he infprmed him that he could only speak that which God shall put into his mouth. Balaam refused to curse Israel, but pronounced a bless¬ ing upon them, in the three several places to which Balak brought him in the vain hope of securing his purpose. This is the Old Testa¬ ment history of the transaction, given in Num¬ bers xxii-xxiv. In Numbers xxxi, 8-16, and Joshua xiii, 22, Balaam is mentioned as advis¬ ing Balak to lead the children of Israel into idolatry, which, according to his directions, they did, and hence arose a war with Moab.

BALACHONG, an Oriental condiment, composed of small fishes or shrimps, pounded up with salt and spices and then dried.

BALiENA, the genus including the Green¬ land or right wrhale, type of the family Balce-nidce, or whalebone whales. Hence baleen-whalebone.

BALZENICEPS (<(whale-head®), a genus of African wading birds belonging to the region of the upper Nile, intermediate between the herons and storks, and characterized by an ‘enormous bill, broad and swollen, giving the

only known species (B . rex), also called shoe-bird. It feeds on fishes, water-snakes, carrion etc., and makes its nest in reeds or grass ad¬ joining water. The bill is yellow, blotched with dark brown, the general color of the plumage dusky gray, the head, neck and breast slaty, the legs blackish.

BALAGUER, ba-la-gar', Victor, Spanish writer: b. Barcelona, 11 Dec. 1824; d. Madrid, 14 } an. 1901. He became keeper of the archives at Barcelona, professor of history in the university there ; and was an active Liberal politician and, in 1888, chief of the council on the Philippine Islands. He wrote (The Trouba¬ dours of Montserrat > (1850) ; Political and Literary History of the Troubadours > (1878—80) ; (Poems) (1874) ; (Don Juan de Serra-valle) (5th ed. 1875), *etc.*

BALAHISSAR, ba'la-his-sar', Turkey-in- Asia. A village in the southwestern part of the province of Angora, Asia Minor. It is on the site of the ancient Pessinus, famous for its worship of Cybele. Among fragments of mar¬ ble columns, friezes, etc., rise the ruins of her gorgeous temple, and remains of a theatre in partial preservation, a castle and a circus. The people of Siorihissar use this region as a quarry, and the ancient ruins are fast disap¬ pearing.

BALAK (((making waste or empty®), King of Moab, who, according to a story in Numbers xxii-xxiv, hired the prophet Balaam to come and curse the Israelites before their entry into Canaan. Balaam tried to carry out Balak's wishes, but by divine inspiration, he pronounced a blessing instead of a curse and foretold the increase in the multitudes of the Israelites and the power of their King. See Balaam.

BALAKIREV, Mily Alexeievich, Russian composer: b. Nizhni Novgorod, 13 Dec. 1837 O. S. (25 Dec. N. S.) ; d. 30 May 1910. He be¬ gan studying natural science at Kazan, but, hav¬ ing learned the rudiments of music from his mother and displaying considerable aptitude, he was taken in hand by Ubilishev, author of a (Life of Mozart,* who taught him the classical masterpieces and something of instrumentation. In 1855 he appeared in Saint Petersburg (Petrograd) as a pianist and created a sensation with his first compositions. Balakirev speedily became the acknowledged leader of the young Rus¬ sian composers, headed by a remarkable set of quasi-amateurs who styled themselves the (<Five Neo-Russian innovators,® a coterie united in friendly rivalry and patriotic ambi¬ tion, consisting of Balakirev, Musorgsky, Cui, Rimsky-Korsakov and Prince Alexander Boro-dine. Their musical philosophy was summed up in their phrase ((Russian music for the Russians.® They studied ecclesiastical melodies, folk-songs and dances, investigated the various Oriental

elements permeating Russian art, and strove for novelty in harmonization, melody and piquancy of orchestral effect. The in¬ fluence of Glinka (q.v.) and Dargomishky per¬ vaded their development in one direction ; that of Berlioz, Schumann and Liszt in another. From this ensemble they created a new art-ideal which became the model of the whole so-called ((neo-Russian School.® Balakirev was the soul of the movement, the teacher of his colleagues, the critical analyst of the masters, the Luther VOL. 3 — 5

of the musical reformation in Russia. He com¬ posed orchestral pieces in the manner of Berlioz and Liszt, and pianoforte pieces in a manner of his own — of which the Oriental fantasia ((Is-lamey® is the most ingenious. In 1862 he founded the Music Free School, and conducted its concerts for a number of years; from 1867 to 1870 he also conducted the symphony con¬ certs of the Imperial Russian Musical Society. Among his works the finest are the orchestral fantasia Tamara and the symphony in C major. He collected and recorded a great num¬ ber of Russian folk-songs. He first became known outside of his own country in 1867, when he conducted Glinka's (<Ruslan and Lyndmila® in Prague. All his early companies made their mark : Musorgsky wrote some wild, eccentric songs ; the truculent Cui produced eight operas, 160 songs and a number of piano pieces; Boro-dine left symphonies, orchestral sketches, string quartets and a dozen songs ; and Rimsky-Korsakov wrote about 12 operas, many songs, piano concertos, and published a collec¬ tion of folk-songs. Consult Cui, (La musique en Russie) (Paris 1880) ; Grove's dictionary - of Music) ; (Oxford History of Music> ; Pou-gin, (Essai historique sur la musique en Russie* (Turin 1897) ; Riemann, H., (Musik-Lexikon) (Leipzig 1909 and 1915).

BALAKLAVA, ba-la-kla va, or BALA¬ CLAVA, Russia, a small seaport in the Crimea, eight miles south-southeast of Sebastopol. It consists for the most part of houses perched upon heights, and it has an old castle, built by the Genoese who were expelled in the 15th century by the Turks. On the acquisition of the Crimea by Catherine II of Russia it was made a military station. The harbor has a very nar¬ row entrance, and, though deep, is not capacious. In 1854 Balaklava became the prin¬ cipal landing-place of the British after the bat¬ tle of the Alma. The battle of Balaklava fought 25 Oct. 1854, when the Russians in over¬ whelming force were repulsed by a small body of British troops, is one of the most heroic achievements of modern times, the <(charge of the light brigade® being the most glorious in¬ cident in the conflict. To-day, in spite of its harbor, the town has a population of

only about 1,500, mostly Greek fishermen. The surround¬ ing country is devoted to grape growing. Con¬ sult Kinglake, (Invasion of the Crimea) ; Paˆet, (The Light Cavalry Brigade in the Crimea. *

BALALAIKA, or Balaboika, ba-la-li'ka, the national Russian musical instrument. It has the form of a three-stringed guitar, with a triangular sounding board and a finger-board, made generally of pine wood. Six almond-shaped holes on the surface of the sounding board, tending concentrically to form a star, resemble somewhat the S' s on the sound box of the violin. In accordance with the investi¬ gation of Professor Pyetuhov and Steinberg, made at the Imperial Conservatory of Music in Petrograd, the fundamental tone of the sound¬ ing board is C flat but as the instrument is made most frequently by unskilful hands it is ex¬ tremely hard to standardize the fundamental tone as has been the case also with the violin. The first two strings are in unison and the third is their quint. W. W. Andreyev in recent years greatly improved the tone of the instru¬ ment and organized an orchestra of 30 of these

instruments, which he took on tours through Europe and America, meeting everywhere with great success.

BALAMBAN, ba-lam'ban, Philippine Is¬ lands, a small town on the west coast of Cebu, on Tanon Strait. It was occupied by a garrison of United States infantry after a battle with Filipino insurgents early in January 1900. It has a native population of some thousands, and a public school in which English is taught. It has a well-sheltered harbor, an active coast trade and a population of about 13,000.

BALAN, ba-lan. (1) A French poem, an early version of ˆierabras,* of which there wras also an English version, (The Sowdan of Babylon. } (2) The brother of Balin, in

Arthurian legends.

BALANCE (Latin, bis, "twice,® and lanx, a "dish,® or <(pan®), an instrument for deter¬ mining the mass' of a body by comparison with

a series, of other bodies (called “weights®) whose masses are known. The term is often applied, though somewhat incorrectly, to the familiar instruments in which the weight of a body is determined by observing the extension that it can produce when acting upon a spring whose extensibility has been previously deter¬ mined by direct experiments with known weights. The ((spring balance® is useful in the ordinary affairs of life, wrhere high precision is not essential ; but it is seldom employed in accurate scientific work, since it is liable to errors that cannot be eliminated or allowed for — errors that are small enough to be neglected in commercial transactions, but quite intolerable in refined laboratory work.

The <(lever balance® consists essentially of a lever (q.v.) having arms of known lengths. The mass to be determined is suspended at the extremity of one of the arms, and the known masses (or weights) are suspended from the extremity of the other one, their number and size being varied until, after repeated trials, a perfect equilibrium, or ((balance,® is attained. If the two arms of the lever are equal, the mass of the body under examination is then equal to the sum of the masses of the weights that are balanced against it. In many cases (for example, in the familiar <(platform scales®) the arms of the lever are intentionally made very unequal, the object to be weighed being suspended from the short arm of the lever, while the weights are suspended from the long arm. To determine the mass of the object it is then necessary to multiply the sum of the masses of the weights by the ratio of the long arm to the short one; but in practical work this calculation does not need to be performed, because the instrument is graduated by the maker so that all necessary allowance for the difference in the arms has been made, and th° readings give the corrected mass directly. In many cases the balances (or “scales®) used in commerce are constructed so that equilibrium is attained by varying the length of the lever-arm rather than by varying the load at the extremity of that arm ; but the fundamental principles involved are the same in all cases, and are set forth in deta:3 in the arti< le Lever (q.v.).

In the “precision balance® of the chemist

and physicist, the lever (called the “beam®) consists of a light, but strong and rigid frame¬ work, usually made of brass or bronze, and having a shape somewhat like that shown in Fig. 1. It is supported by means of a wedge-shaped piece of steel, technically known as a “knife-edge,® which is hardened and ground to a sharp and accurately

straight edge, and which rests, when the balance is in use, upon a flat slab of agate, or other hard, smooth substance, in such a manner as to leave the beam free to tip one way or the other, with practically no frictional resistance. (The agate slab is sug¬

gested bv the dotted contour, k, in the figure ; the pillar that supports k being omitted for the sake of clearness). Knife-edges similar to the central one, but with their edges directed up¬ ward instead of downward, are provided at the respective ends of the beam (as shown at A and B) for the support of the pans (only one of which is shown) in which the masses to be compared are placed. The three knife-edges, A, B and C, must be made with great care, and must be set in position so that they shall be accurately parallel to one another. They must, moreover, have their edges all in the same plane, so that a straight line joining any two points in the edges of A and B will like¬ wise pass through the edge of C. The two arms of the beam should also be precisely equal, so that C is exactly half way between A and B. P is a pointer whose free end travels over a graduated scale, so as to indicate the extent of the oscillations of the beam as it swings to and fro on the central knife-edge C. When the beam is horizontal, its centre of gravity (G in Fig. 2) should lie in the same

a ,

lc

G-'g

Fig. 2.

vertical line, ab, with the central knife-edge. Whether this condition is fulfilled or not is easily shown by removing the scalepans and allowing the beam to come to rest. It can only be in equilibrium when its centre of gravity is directly below the knife-edge C ; so that if it comes to rest in a horizontal position it is evident that the condition specified above is sensibly realized. If, on the other hand, the beam, when freed from the pans, comes to rest

with its right-hand end lower than the left-hand one, it is evident that the centre of gravity of the beam is too far to the right, as is indi¬ cated by the point g. The better makes of balance are provided with an adjustment to correct an error of this sort. This adjustment may take the form of a fine screw-thread carry¬ ing a nut, as suggested at E. If the nut be caused to approach B, the centre of gravity of the beam (considering the nut as a part of the beam) will thereby be shifted toward the left, and after a number of trials the point g may be made to coincide with G, so that the beam, when free from the pans, comes to rest in a perfectly horizontal position. If it does not re¬ main horizontal when the pans are suspended in their proper places, then it follows that one of the pans is heavier than the other ; this defect is easily remedied by the use of a light counter¬ poise in connection with the lighter pan, or by removing a small portion of the material of the heavier one.

The centre of gravity of the beam being properly adjusted, and the equality of the two pans being assured, it is evident that the beam will set itself in a horizontal position when the pans are empty. The balance may still be de¬ fective, however, through the arms not being of precisely equal length. The equality of the arms may be tested in the following manner : Let a mass, P, be placed in one of the pans, and suppose that w is the mass that has to be placed in the other pan in order to secure a perfect balance. Let L be the length of the arm from which P is suspended, and l be the length of the arm from which w is suspended, as indicated in

Fig. 3.

Fig. 3. Then, by the principle of the lever, we have —

P X L = wX /.

Next, let P be placed in the other pan, con¬ nected with the arm whose length is /, and let W be the mass that must be suspended from the arm of length L, in order to secure a per¬ fect balance. We then have the equation — PXl = WXl.

Now, if P be eliminated between these two equations, we have the relation —

L -r- /= Vw -5-W ;

and since W and w are both known, it follows that the ratio of the two arms of the balance is also known. If this ratio does not come out sensibly equal to unity, its value may be care¬ fully determined, and allowance made for the inequality of the arms after a weighing has been performed. The effect of inequality in the arms may also be eliminated by a double weighing, such as has been supposed to be performed, above. For if we eliminate L (instead of P) from the foregoing equations, we find —

P = VW X w;

that is, the true weight is the geometric mean between W and w. In practice the arms of a

good balance are so nearly equal that the simple arithmetic mean of W and w is a sufficiently close approximation to the geometric mean re¬ quired by theory.

The sensitiveness of a balance depends largely upon the position of the centre of grav¬ ity of the beam relatively to the central knife-edge. Thus, if the arms of the balance are precisely equal, and the beam hangs perfectly horizontal with a weight P in each pan, the angle x, through which the beam turns when the weight in the left-hand pan is increased to P + p, may be taken as a measure of the sen¬ sitiveness of the balance. Let S be the weight of the beam itself, and let the centre of gravity of the beam be at a distance, h, below the central knife-edge when the beam is horizontal. Then, if x is the angle that the beam makes with the horizontal when it comes to rest with P + p in the left-hand pan and P in the right-hand pan, the theory of the lever gives the equa¬ tion (see Fig. 4) —

(P--p).L. cos x — P.L. cos x + h.S. sin x. from which we easily obtain —

LX p

tan x — - .

hXS

Fig. 4.

It is evident that x will be increased as h is decreased, so that the sensitiveness of the bal¬ ance becomes greater the nearer the centre of gravity of the beam is caused to approach to the centre of support. The balance should be provided with a thread and nut, D (see Fig. 1), to facilitate the vertical adjustment of the centre of gravity, in the same way that E is used in adjusting the horizontal position of that point. The centre of gravity of the beam must always remain below the centre of support, be¬ cause when it is above that point the beam is unstable, and when it coincides with the centre of support the instrument will remain in equi¬ librium in any position. When a balance is made very sensitive, by bringing the centre of gravity close to the point of support or by in¬ creasing the length of the arms of the beam, the period of oscillation of the beam grows very long, so that the instrument is tedious to use. The experienced chemist or physicist therefore selects a balance whose sensitiveness and period of oscillation can be best adapted to the work he has in hand.

The ((precision balance® is a delicate instru¬ ment, and should be kept in a glass case, for protection, when not in actual use. The weigh¬ ings are also performed with the balance en¬ closed in like manner, in order to avoid error from the effect of air-currents upon the beam. The knife-edges should be kept away from

their bearings, and provision is always made for raising the pans from the ends of the beam, and the beam itself from the central support, by means of a system of stops and levers (not here shown) actuated by a conveniently situated lever or wheel. The beam and pans should al¬ ways be raised in this manner when changing the weights in the pans, in order to avoid giv¬ ing the least shock to the knife-edges ; for when these are dulled or otherwise injured the ac¬ curacy and sensitiveness

of the balance are materially lessened.

Weighings may be effected by two general methods. In the first method the position of the pointer, P (in Fig. 1), is noted on the scale at its extremity when the balance is at rest with the pans empty. The position so recorded is called the <(zero® of the balance. The object to be weighed is then placed in one of the pans, and weights are added to the other pan until the balance will come to rest with its pointer at the same spot, or zero, as before. The weighing is then complete.

In the second method of conducting the ex¬ periment (known as the (<method by oscilla¬ tions®) the balance is not brought to rest at all, the necessary readings being taken while the beam is oscillating. The zero reading of the pointer is first obtained (with the pans empty) in the following manner : The empty balance is allowed to oscillate freely for a short time, and then the position attained by the pointer at one of its extreme positions toward the right is noted. The reading of the next following ex¬ treme position to the left is then taken, and so on, observing the positions attained at the alter¬ nate right and left swings, just as the pointer pauses and begins to return toward the mean position. The last reading is taken on the same side as the first, so that there is an odd num¬ ber of observations on one side of the zero, and an even number on the other side. The read¬ ings on the right are then averaged together, and those on the left are also averaged in the same way; after which the mean reading on the right is averaged with the mean reading on the left, and the result is taken as the position of the zero of the balance. The object to be weighed is then placed in one pan, and the weights in the other, the process of guess and trial being followed here just as in the preced¬ ing method until an almost exact balance has been attained. The method of oscillations, with alternate readings to the right and left, is next repeated in precisely the same manner as when the pans were empty, and the reading obtained by the final averaging of these observations is taken as the reading of the balance for the loads that are in the pans at the time. A very small weight is next added to one of the pans, and the oscillations are again observed, under the new conditions, precisely as before. The weight of the object under examination can then be determined by simple proportion. Thus, sup¬ pose that the original zero reading of the pointer, with the pans empty, was 11.6. The object to be weighed being placed in one pan, and weights having a combined mass of W in the other, let the reading of the pointer (as de¬ duced from the oscillations) be 10.4. The small mass, w, being then added to W , let the final reading of the pointer be 12.2. The following facts are now known : With empty pans the pointer reads

11.6. With the unknown mass

(which may be denoted by P) in one pan, and a mass, W , in the other, the pointer reads 10.4. Finally, with P in one pan and WVw in the other,' the pointer reads 12.2. The mass w has displaced the reading of the pointer by 1.8 divi¬ sions. If it be assumed that a mass a', when added to IV, would have made the reading of the pointer precisely 11.6, as it was with the empty pans, we have the additional fact that a mass x would alter the reading of the pointer by 1.2 divisions. Hence the simple proportion —

x : w : : 1.2 : 1.8;

2w

whence x — - , and therefore the concluded

3

2w

mass of P is W + - .

3

The method of oscillations is favored by many physicists, in the belief that a better value of the zero of the balance can be obtained by studying the free swings in this way than by allowing the instrument to come to rest. In¬ stead of adding very small weights to secure the last adjustments, the ((rider® is often used. This consists of a tiny weight made of wire, and suspended on the beam of the balance, as indi¬ cated at R in Fig. 1. The beam is graduated when a rider is to be used, and the final step in the weighing consists in observing what posi¬ tion the rider must have in order to make the balance perfect. The effect of moving the rider one division on the beam being known by previous experiment, the correction to be ap¬ plied for any given position of the rider is easily calculated. Obviously the rider can be

used with equal advantage whether the weigh¬ ing is conducted by the method of oscillations or not.

The weights used in connection with preci¬ sion balances must be accurately compared among themselves if refined work is to be done, and a table of corrections prepared, by means of which the proper allowances may be readily found, for any minute inconsistencies that may exist among them. Reference must be made to the standard works on experimental physics for the details of the process by which these corrections are obtained. Crookes' classical paper on the atomic weight of thallium) Philo¬ sophical Transactions) (1873, p. 277), may also be consulted with advantage, as it contains full details on ihis point, as well as on many others in connection with accurate weighing. For fur¬ ther information on the theory and use of the precision balance consult Stewart & Gee, Wes¬ sons on Elementary Practical Physics) (Vol. I, London 1889) ; and Glazebrook & Shaw, Practical Physics > (New York 1893). Much advanced information may also be had in the (Travaux et memoires) of the International Bureau of Weights and Measures). Consult also Braver, Pie Construction der Waage) (3d ed., Leipzig 1906) ; Felgentraeger, (Theorie, Konstruktion und Gebrauch der feineren Hebel-wage) (Berlin 1907) ; Gerland and Traumiiller, (Geschichte der physikalischen Experimen-tirkunsC ; Kohlrausch, Pehrbuch der prati-schen Physik) (Leipzig 1905) ; Sokeland, <(Ancient Desemers or Steelyards,® in (Smithsonian Annual Report for 1900) (Washington 1901). See also Chronometer: Induction Balance; Torsion Balance.

BALANCE OF POWER

BALANCE OF POWER, is the system by which greater states are withheld from ab¬ sorbing smaller ones. Vattel, in (Law of Nations, } thus defines it: <(By this balance is to be understood such a disposition of things, as that no one potentate or state shall be able ab¬ solutely to predominate and prescribe to the others.)J The system of the balance of power is entirely the outgrowth of the modern politi¬ cal system of Europe, as it began to shape itself in the 15th century; not that it was entirely un¬ known to the ancients before the

irresistible progress of Roman arms put any idea of balance out of the question, but these early efforts after the balance of power were not sustained for a sufficiently long period, from generation to generation, from century to century. They were too transitory and casual to entitle them to be elevated into a system. They must be regarded as approaches and tentatives, interesting, but in the end fugitive and unsuccessful. During the latest centuries of the Middle Ages, the kings of France and the emperors of Germany were too much engaged in their domestic struggles with their great vassals to spare the concen¬ trated attention and energy upon international affairs necessary to originate and sustain a sys¬ tem of balance in Christian Europe. In Italy, then so far in advance of the rest of Europe in intellectual, social, and political development, the princes, podestas and republics of that penin¬ sula, from an early period of the 15th century, had built up the institution of an equilibrium for their mutual regulation. But this was too local and on too small a scale to be deemed the parent of our modern system. Not until Louis XI of France had repressed the dukes of Bur¬ gundy and Brittany; not until Ferdinand of Castile and Aragon had united almost the whole of modern Spain under his sway ; not until Maximilian in Germany and Henry VII in England and Ireland had consolidated the monarchical authority, was the time ripe for the application of this idea. The invasion of Italy by Charles VIII of France, and his claim to the kingdom of Naples, in 1494 gave rise to the first great European combination of other¬ wise hostile powers for the repression of the ambition of one. Almost all the Italian states Maximilian, the German Emperor, and Ferdi¬ nand of Aragon, suspended their animosities, and drove the French out of Italy. The Em¬ peror Charles V of Germany, Spain, Burgundy, the Netherlands, and a vast transatlantic empire. 1519-56, caused the jealousy of Europe. Francis I of France actually went so far as to ally himself with the Sultan, Solyman the Magnifi¬ cent, against Charles. The Turks at one end of Europe, the kings of France and England at the other, and the opposition of the Protestant princes in the centre, prevented Charles from realizing his ambitious schemes. The misfor¬ tunes of Philip II, the son of Charles V, in the Dutch Netherlands and in the expeditions against England and the English power in Ire¬ land, effectually dissipated the fears Europe entertained concerning the overgrown power of the Spanish branch of the house of Hapsburg. The idea of a European equilibrium had now become sufficiently definite for Henry IV of France to propose to Elizabeth of England, at the commencement of the 1 7th century, a scheme for a federative congress, whose pur¬ pose it should be to maintain the peace of

Europe in the same manner as the great powers did until recently. The idea was impracticable m those days, and was entirely abandoned, even as a project, on the assassination of that liberal and high-minded prince. The next potentate whose power gave general alarm and caused a coalition against him in the general interest was the Emperor Ferdinand II of Germany (reigned 1619-37). Gustavus Adolphus, of Sweden, appealing to the Protestant princes of Germany, subsidized by Richelieu, the French minister, and supplied with men by England and the United Provinces of the Netherlands, achieved the task of humbling the power of the house of Austria. After the death of Gustavus, Oxenstiern of Sweden and Richelieu of France together forced upon the German Emperor the celebrated Treaty of Westphalia (1648), which relieved Europe from the fear of the house of Austria, and put an end to the Thirty Years' War. The next general danger came from France. The invasion by Louis of the Dutch Netherlands (1672) brought about a coalition of Holland, the Emperor of Germany, the Elector of Brandenburg and the King of Spain, against the French King. William, Prince of Orange, was the hero of this war; but the Peace of Nimeguen (1678) sealed the supremacy of Louis XIV. The will of the King of Spain nominating the second son of the French Dau¬ phin as his successor (1700), thus putting the powerful monarchies of France and Spain into the same hands and utterly destroying the European equilibrium, created the grand alliance and the war of the Spanish succession. The Emperor of Germany, the Duke of Savoy, the King of England, and the States-General of the United Provinces, united in this grand al¬ liance. The King of Portugal afterward joined the anti-French confederacy. Marlbor¬ ough and Prince Eugene of Savoy were the great military leaders in behalf of the balance of power. The Peace of Utrecht (1713), by which the union of the French and Spanish crowns was prevented, and the territorial con¬ quests of France almost wholly surrendered, re-established the influence of the equilibrium doctrine, and secured Europe from danger on this side until the era of the French republic. The Empress Elizabeth was the first Russian potentate who took part in wars in which she had only a remote general interest. Prussia and Russia celebrated their entry into the rank of first-class powers by dealing the most ter¬ rible blow to the balance of power which it has ever suffered. The first partition of Poland (1771-72) is admitted by every writer on this subject to be at war with the fundamental prin¬ ciples on which the equilibrium rests. The achievement of American independence (1783), though not generally reckoned by European writers as belonging to the history of the inter¬ national balance, may well be included therein, inasmuch as it put a check to the growth of British colonial power and British naval pre¬ ponderance. At the

Congress of Vienna (1814-15), it was the leading wish of Lord Castlereagh, the British plenipotentiary, to re¬ store the kingdom of Poland as included in the European equilibrium, in which he was sec¬ onded by Metternich for Austria and Talleyrand for the French legitimate sovereign, but opposed by the representatives of the Russian and Prus¬ sian monarchies. The return of Napoleon

from Elba put an end to this difference, and in the renewed conferences after the battle of Waterloo, the western powers did not insist upon the point. From 1815 to 1853, the world was substantially preserved from any war of importance by the five great powers who then presided over the destinies of Europe, namely, France, Great Britain, Russia, Austria and Prussia. In 1853, the invasion of the trans-Danubian provinces of the Turkish empire by a Russian army was declared by a congress of the great powers at Vienna to be a breach of the political equilibrium. In this declaration France, Great Britain, Austria and Prussia agreed. An Anglo-French alliance was made (1854) to repel the aggression, and the confederation of Turkey, Great Britain and France was rein¬ forced by the King of Sardinia in the spring of the year 1855. After a war of three campaigns, the Treaty of Paris was signed (30 March 1856), by which Russia abandoned her claims, and the principle of the balance of power was anew vindicated. The Congress of Berlin in 1878, acting in the interests of the balance of power, deprived Russia of many benefits gained through the Treaty of San Stefano. Within a generation, the principle of nationalism has arisen in opposition to that of the balance of power. This is exhibited in United Italy, United Germany and the spread of the Pan-Slavism in Russia, but as a set-off to this may be men¬ tioned the extension of European influence in Asia and Africa as regards colonization and trade. Thus the balance of power has become a world question and such nations as Germany and Italy are desirous of acquiring colonies to balance the colonial possessions of Russia and England. The sudden rise to power of the Slavic race as a result of the Balkan War in 1912-13 threatened seriously to complicate European policies regarding the maintenance of the balance of power, but when

the disagree¬ ment among the Balkan States resulted in war among themselves the fears of a Slavic pre¬ ponderance were seen to have been unwar¬ ranted. Numerous international conferences and congresses have been called for the pur¬ pose of maintaining the balance of power and these gatherings have set up and removed rulers, have decided boundary controversies, have settled political relations and have passed upon questions of international justice, often without even requesting the attendance or con¬ sulting the wishes of those most affected by their action. The World War of 1914-18 over¬ threw the European balance and the League of Nations was an apparent attempt' of the victors to revive it in altered form.

BALANCE OF TRADE. The so-called balance of trade is a theory arising from the apparent relation of exports to imports. The protectionist school of political economy holds that excess of exports over imports constitutes what is termed a ((favorable balance,® which must be returned to us in gold and silver, this being the profit to the nation on its foreign trade. According to this theory the one desir¬ able thing in foreign commerce is the exporta¬ tion of merchandise. It should be said that all protectionists do not share in a belief in this theory.

In a great measure and in its more exag¬ gerated form, this doctrine is a survival of the

old mercantile theory which down to the time of Adam Smith controlled most of the legisla¬ tion relating to commerce, and which held that gold and silver were the only wealth. It still retains a firm hold on the popular mind, but it may be said that the full weight of the teach¬ ings of orthodox political economy is against the notion that excess of exports constitutes a favorable balance.

The argument of the latter is that if the theory is true there cannot be too great an ex¬ cess of exports, and that our imports should therefore consist only of gold and silver. In this ˆreduction to absurdity® (since a country has no more need of an excessive supply of the metals than of any other commodity) the free-trade school of political economy rejects the conclusions based upon the apparent excess of exports over imports.

Opponents of the theory hold that such trade as exists between two countries, exclusive of what is paid as interest, rent or tribute, must show a mutual profit, and represent to each a corresponding excess of

the value of importa¬ tion. For illustration : A commodity costing in one country $75 will be bought in another for $100, in exchange for a commodity costing $75 in the country of its exportation and $100 in the importing country, such difference rep¬ resenting the degree of desirability of these particular commodities to each country. It will be observed that this precisely reverses the <(balance of trade® theory.

Countries may be able to show a favorable balance from two causes, neither of which con¬ tributes to their prosperity. It may result from an actual drain, as in the case of Ireland, which used to be sapped of its wealth by absentee landlords, and in India, where the same phenomenon is caused by a similar drain in the form of tribute, official salaries spent outside the country, pensions, *etc.* But in these in¬ stances it is clear that there is a condition un¬ profitable to both countries. Or, on the other hand, it may result, as in the United States, which has the same favorable balance, by rea¬ son of the large sums annually paid as interest on loans that entered originally into railroad building, industrial improvements, *etc.* Most of the royal families of Europe, not to mention less exalted individuals, draw large dividends from American investments. Money spent by American tourists abroad helps to swell this favorable balance.

For proof that this theory has no such rela¬ tion to national prosperity as its friends con¬ ceive, its opponents point to England, whose commercial greatness is rivalled by the United States alone, and which has a prevailing (<unfavorable® balance, because she has been the money-lender of the world, and her excess of imports represents the return received by her people for moneys invested in foreign lands.

It is impossible to account for the growing increase of American export balance wholly on the explanation that such excess is rent or in¬ terest upon loans. Much of such excess is in¬ deed fictitious, and is to be accounted for by undervaluation of imports and overvaluation of exports. In the latter case there is a strong in¬ ducement to overvalue, in order to conceal the fact that many of our exporters are selling goods cheaper abroad than at home. The in-

ducement to undervalue imports is quite as strong. In short, customs statistics, with every desire on the part of the Treasury Department to be accurate, are of necessity unreliable. See Political Economy; Free Trade; Protection. Consult Bastable, C. F., (Theory of Interna¬ tional Trade> (4th ed„ 1903) ; Goschen, G. J., 'Theory of the Foreign Exchanges) (3d ed., 1896) ; Paish, George, (Trade Balance of the United States) (in Reports5 of the National Monetary Commission, Sen. Doc. 579, 1910).

BALANCE SHEET. See Bookkeeping.

BALANCED BOWLDERS. See Rocking Stones.

BALANCING OF ENGINES. See Ap¬ plied Mechanics.

BALANGA, ba-lan'ga, Philippine Islands, capital of the province of Bataan, on the island of Luzon, and on the west coast of Manila Bay, 34 miles northwest of Manila. The town is well built, contains a government house, city hall and prison. It is a telegraph station and owing to its shore location is a place of con¬ siderable importance. Pop. about 7,500.

BALANOGLOS'SUS, a wormlike marine animal, the chief representative of the most primitive class of chordate animals, Entero-pneusta or Adelocephala. This remarkable creature, the type of its class, combines char¬ acters peculiar to itself, with features remind¬ ing us of the nemerteans, annelids, tunicates and the vertebrate omphioxus, while its free-swimming larva was originally supposed to be a young echinoderm. From the fact that the central nervous system lies above a notochord, Bateson placed it next to the vertebrates.

One American species, Balanoglossus anran-tiacus, is a long, cylindrical, soft, fleshy worm, footless, without bristles, but with a large, soft, whitish tongue-shaped proboscis in front aris¬ ing dorsally within the edge of the collar sur¬ rounding the mouth. The surface of the body is ciliated. At the beginning of the digestive canal is a series of sac-like folds of which the upper or dorsal portion is respiratory and sep¬ arated by a constriction from the lower, which is digestive, and leads directly to the intestine behind. This pharyngeal respiratory portion of the digestive canal has on each side, in each segment, a dorsal sac, the two communicating along the median line of the body. The dorsal respiratory sacs each bear in their walls a delicate chitinous gill-support or arch. Be¬ tween the gill-arches, forming numerous lamelke, are a series of slits leading on each side to openings (spiracles) situated dorsally. The water passes through the

mouth into each gill-sac, and out by the spiracles. The nervous system lies above a short sac regarded as a notochord. There is a dorsal blood vessel, which sends branches to the respiratory sacs, and a ventral vessel. The worm lives in sand at low-water mark from Cape Ann to Charles¬ ton, S. C., also in the Mediterranean.

The life-history of this worm is most inter¬ esting. The young, originally described under the name of Tornaria, was supposed to be an echinoderm larva, though it resembles the lar¬ val Gephyrca and Annelida. It is a transparent, surface-swimming, minute, ciliated, slender, somewhat bell-shaped form, with black eye-specks. When transforming to the worm con¬

dition, a pair of gills arise on sac-like out¬ growths of the oesophagus, and afterward three additional pairs, with their external slits, arise, somewhat as in ascidians. The entire Tornaria directly transforms into the worm, the transi¬ tional period being very short. The body lengthens, the collar and proboscis develop, afterward the body lengthens, the end tapering and becoming much coiled. Consult Agassiz, A., (The History of Balanoglossus and Tornaria) ((Memoirs of the American Academy of Arts and Sciences,* Vol. IX, Boston 1873) ; (The Later Stages in the Development of Balanoglossus Kowalevskii, etc.* (Quarterly Journal of the Microscopical Society, London

1885-86).

BALANUS (((acorn-shells**), a genus of sessile cirripeds, family Balanidce, of which col¬ onies are to be found on rocks at low water, on submerged timbers, crustaceans, shells of mollusks, *etc.* They differ from barnacles in having a symmetrical shell and being destitute of a flexible stalk. The shell consists of six plates with an operculum of four valves. They pass through a larval state in which they are not fixed, moving by means of swimming-feet which disappear in the final state. All the Balanidce are hermaphrodites. A South Amer¬ ican species (B. psittacus) is eaten on the coast of Chile, the B. tintinnabulum by the Chinese. The old Roman epicures esteemed the larger species.

BALAO, ba-la'o, a West Indian name, among Spanish-speaking fishermen, for the half-beaks.

BALARD, ba-lar', Antoine Jerome,

French chemist: b. Montpellier 1802; d. Paris 1876. He was professor of chemistry at the College de France, Paris, and discoverer of bromine; also of a process of extracting sul¬ phate of soda directly from sea-water. In 1868 he was made Inspector-General of Superior Instruction.

BALAS RUBY, a variety of ruby spinel.

BALASHOV, bal-a-shof', Russia, a town in the government of Saratov, situated on the Don, 170 miles west of the city of Saratov. It has a considerable export trade of grain, *etc.* Pop. about 13,000.

BALASORE, bal-a-sor', India, a city of Bengal, capital of the district of Balasore. It is situated near the coast and has dry docks and a considerable coasting trade which con¬ sists principally of exports of rice and salt, and imports of oil, metal and cloth. The town has been the seat, successively, of Portuguese, DiHch and Danish factories. In 1846 the Danes sold their interest in the place to the English. Pop. 21,363.

BALATA, bal'a-ta, a rubber-like exudate derived from the milky juice of Mimusops balata and M. schomburgkii. The gum is used widely in the arts, and is sometimes confused with gum chicle; from which much of the chewing-gum of commerce is derived.

BALATE, ba-la'ta, the Philippine name for a kind of trepang (Holothuria atra).

BALATON, bo'15-ton, or PLATTEN SEE, a lake in the southwest of Hungary, 55 miles southwest of Budapest, extending from lat. 46° 45' to 47° 5' N.f and from long.. 17° 14'

to 18° 10' E. ; area about 400 square miles, including the marshy shores. It receives the waters of more than 30 small streams. It dis¬ charges through the Kapos River, the Kapos Canal and the Sio, which empties into the Sarviz, an affluent of the Danube. The Balaton is

constantly in a state of motion, sufficient to cause waves. Its waters are perfectly trans¬ parent and abound with fine fish, notably one called fogas, a variety of perch frequently 20 pounds in weight, and with delicious flesh of snowy whiteness. Another kind, resembling the herring, swarm in the lake during the winter in such shoals that fishermen some¬ times haul 50 cartloads from under the ice in a single day. The northern bank is bounded by vine-clad hills, and the southern bank is low. The average depth of the lake is about 25 feet, although a depth of over 100 feet is found near Tihany. It is the largest lake in Hungary.

BALAUANG, ba-lou-ang',, Philippines, a town in the province of La Union, Luzon, north of San Fernando.

BALAU'STION'S ADVENTURES, a

poem by Robert Browning, describing a Greek girl of Rhodes. (Aristophanes' Apology* is a continuation of this poem.

BALAWAT, ba-la-wat', Turkey-in-Asia, a ruined city 10 miles from Nimrud. It is the site of the ancient Imgur Bel, a fortified place built by Asurnazirpal II (885-860 b.c.) and his son, Shalmaneser II (860-825 b.c.). The latter began the construction of a fine palace which was completed by his successor. Excavations there have resulted in the finding of the ruins of the palace of Shalmaneser II. The bronze gates that opened into the vestibule of this palace are especially interesting and valuable, and have been placed in the British Museum.

BALAYAN, ba-la'yan, Philippines, a town of Batangas province, Luzon, situated on the Gulf of Balavan, 30 miles northwest of the town of Batangas. It has a good harbor, and vessels have made the town a base of supplies. The inhabitants are engaged in fishing, cattle raising, agriculture and coast trade. Pop. about 25,000.

BALBEC. See Baalbek.

BALBI, bal'be, Adriano, Italian geogra¬ pher: b. Venice, 25 April 1782; d. Padua, 14 March 1848. In 1808 his first work on geog¬ raphy procured his appointment as professor of that science in the College of San Michele, at Omrano, and in 1811 he became professor of natural philosophy in the Lyceum at Farino. He went in 1820 to Portugal, where he had free access to the government archives, and from the documents he collected composed two inter¬ esting works entitled (Essai statistique sur le royaume de Portugal et d' Algarve,* and (Varietes politiques et statistiques de la monarchic portugaise,* which

he published at Paris in 1822. Four years later he produced the first part of his (Atlas ethnographique du globed a work of superior arrangement, in which he spread before the French public the result of the researches and disquisitions of the German philologists. He published afterward, in concert with several scientific men, statistical tables of Russia, France, the Netherlands; and (Abrege de geographic,* a summary of geo¬ graphical science which appeared in 1832 and was translated into nearly all the European lan¬

guages. His works show a great amount of knowledge, thorough research and skilful ar¬ rangement of material; but being utterly de¬ ficient in style, the}ˆ are heavy and of difficult reading ; however, they may always be ad¬ vantageously and safely consulted.

BALBI, Gasparo, Venetian dealer in pre¬ cious stones, who lived in 16th century. He traveled first to Aleppo and thence down the Euphrates and Tigris to the Malabar coast, sailing finally for Pegu, where he remained two years. His (Viaggio all' Indie Orientalip published after his return to Venice in 1590. contains the earliest account of India beyond the Ganges. He is on the whole very reliable in his accounts of what came under his own observation ; but there appears to have been no limit to his credulity at second-hand.

BALBI, Giovanni, called De Janua or Januensis, from his birthplace, Genoa, a Do¬ minican friar, who lived toward the end of the 13th century. He composed a kind of encyclo¬ pedia, which he called the (Catholicon.* This book owes its celebrity principally to the fact that it has become one of the earliest monu¬ ments of the art of printing. The original edi¬ tion is to be found under the title, (Summa Grammaticalis valde Notabilis quae Catholicon Nominatur* (Moguntiae, per Johannem Faus-tum, 1460, fob). It was reprinted at Augs¬ burg, 1469 and 1472, by Schoeffer; at Nurem¬ berg, 1483, by Koburger; at Venice, 1487, re¬ vised and improved, by Pietro Gilles.

BALBINUS, Decimus Caelius, Roman

senator and poet. After the death of the two Gordiani, killed by the soldiers of Maximinus, he was elected emperor by the Senate, concur¬ rently with Clodius Pupienus Maximus, in .opposition to the usurper Maximinus. ' The two emperors reigned little more than one year, and were assassinated by their soldiers 238 a.d.

BALBO, bal'bo, Cesare, Count, Italian statesman and author: b. Turin,

21 Nov. 1789; d. 3 June 1853. Through the favor of the Emperor he served in various capacities under the Napoleonic empire. After the downfall of Napoleon became secretary of the Sardinian Ambassador in London until the outbreak of the Sardinian revolution in 1821, when he returned to his native town in order to de¬ vote himself to literary pursuits. His reputa¬ tion was not firmly established, however, until the year 1821, when his (Speranze d'ltalia* made its appearance. His appeal in favor of national independence found a powerful echo in the popular heart, and paved the way for the revolution in which he was destined to play a prominent part as a champion of the Mod¬ erate party. His next work, (History of Italy, from the Beginning to 1814* (Bastia 1849), was not only inspired by the same patriotic spirit, but also distinguished by historical merit. But although in 1848 and 1849 he had strenu¬ ously opposed the Democratic party and un¬ waveringly adhered to a more conservative policy, he' threw the entire weight of his politi¬ cal influence into the scale of patriotism as soon as the war against Austria began. He supported the different cabinets which gov¬ erned Sardinia after the promulgation of the Constitution of 4 March 1848, and, though for a very short time, was president of the first.

lie was ardently attached to the house of Savoy; but the resurrected Italy for which he yearned was a kind of theocracy under the papal supremacy. His select works, edited by F. Nicolini, began issuing at Bari in 1913. Consult the (Lives) by Ricotti (1856) and Vismara (1882).

BALBOA., bal-bo'a, Vasco Nunez, the

discoverer of the Pacific Ocean: b. Jerez de los Caballeros, Spain, 1475; d. 1517. At the age of 25 he went to America to seek his fortune, joining the expedition of Rodrigo de Bastidas (see Central America), and returned to Espanola (Haiti), after exploring with Bas¬ tidas a part of the southwestern coast of the Caribbean Sea. At the town of Salvatierra in Espanola he became a planter, but with such indifferent success that, when he resolved to attach himself to Alonzo de Ojeda's new colony on the mainland of South America, he found

difficulty in escaping from his creditors. To elude their vigilance, he hid in a large cask, and thus was carried from his plantation to the landing, and thence on board one of Ojeda's vessels, as a part of the cargo. It is probable that when he emerged from his place of con¬ cealment he would have been handed over to the authorities on shore if the expedition had not stood in need of every available fighting-man. Admitted to membership reluctantly, and as a common soldier, Balboa showed his talent for leadership when the undertaking seemed on the point of failure. He suggested trans¬ ferring the colony to Darien, describing the more favorable conditions there, as he had seen them on his previous voyage. His advice was taken, and the name Antigua (Santa Maria de la Antigua del Darien) was given to the new settlement. Here the Spaniards were somewhat more successful and Balboa assumed command.

In the year 1513 he received a letter from a commissioner whom he had sent to Spain, in¬ forming him that he might expect to be sum¬ moned to court to answer grave charges. Re¬ solving to win back the royal favor by some striking service, he selected 190 men, the best of his soldiers, and with these and 1,000 native warriors and carriers, and a pack of blood¬ hounds, sailed from Antigua, 1 Sept. 1513, fol¬ lowing the Darien coast westward until he reached a point opposite the Gulf of San Miguel. This gulf extends far into the south coast from the Pacific, narrowing the isthmus to a width of 50 miles. Accurate information in regard to the southern coast, the ocean that lay beyond, and the superior civilization of the Incas of Peru, whose country was to be reached by way of this ocean, had been obtained from the Indians, especially through Balboa's fa¬ vorite Indian mistress, Fulvia.

The march began 6 September. On the 24th reaching an elevated plateau, the Spaniards re¬ pulsed an attack by 1,000 Indians and found supplies in the village of Quarequa. The fol¬ lowing day, 25 Sept. 1513, Balboa gained the summit of a mountain from which the wa¬ ters of Mar del Sur (southern sea) were visi¬ ble. The name, Pacific, was not applied to this ocean until seven years later, when it was be¬ stowed by Magellan. On 29 September Balboa took formal possession of the <(Southern Sea}) by marching into the water, and, in the names

-BALCH

of the King and Queen of Castile, claiming "these seas and lands. »

The warning .received from the Spanish court was justified in the event. Balboa had already been superseded by Pedro Arias Davila (Pedrarias). The reward of the former was an empty title of Adelantado del Mar del Sur, and the appointment as Governor of Panama, Coyba and the lands of the Southern Sea (the Pacific) which he had discovered; while on shore he was made the subordinate of his rival and bitter enemy, Governor Pedrarias. He led many successful expeditions, but these only aroused the jealousy and hatred of Pedrarias Davila. The Spanish government tried in vain to mediate between them and Balboa's marriage with the daughter of Pedra¬ rias was arranged; but on an occasion of dis¬ pute which arose, Balboa was induced to de¬ liver himself up, was accused of rebellion and on the trumped-up evidence of Garabito, a false friend, was convicted and beheaded.

Marrion Wilcox.

BALBRIGGAN, Ireland, a watering place in County Dublin, 21 miles north of Dublin. It is a seat of linen, cotton, calico and stock¬ ing manufactures. The cotton stockings made here are remarkable for fineness of texture and beauty of open work. Many women are em¬ ployed in embroidering muslin. Pop. 2,273.

BALBUS, Lucius Cornelius, Roman offi¬ cer, sometimes surnamed Major, to distinguish him from his nephew (see below); b. Gades, Iberia, in the 1st century b.c. He served his first campaign under Q. Metellus Pius and Pompey. For his conduct in this war the privileges of a Roman citizen were conferred on him, his brother and his nephews. In 72 b.c. Balbus removed to Rome, and soon became an intimate friend of Caesar. He was consul in 40 b.c., and is supposed to have been the first, adopted citizen to fill that office. He wrote a diary in which he described the chief events in his own and Caesar's life.

BALBUS, Lucius Cornelius (Minor), nephew of the above, a Roman officer, who in acknowledgement of a victory gained in Africa was awarded the honor of a triumph, the first ever paid to one not born in Rome.

BALCH, Emily Greene, American econ¬ omist and author: b. Jamaica Plain, Mass., 8 Jan. 1867. She was graduated at Bryn Mawr in 1889, and in 1890-91 studied political econ¬ omy in Paris, later she took special work at the University of Chicago, and at Berlin in 1895-96. She was connected with Denison House, a college settlement in Boston, and was active also in child welfare work. She became connected with the economics department of Wellesley College in

1896, and was appointed professor of political economy and political and social science in 1913. She was a member of the Massachusetts State Commission on In¬ dustrial Education 1908-09, member of the State Commission on Immigration 1913-14, and member of the city planning board of Boston since 1914. In 1915 she was a delegate to the International Congress of Women at The Hague, and delegate from this Congress to the Scandinavian and Russian governments. She has published (Public Assistance of the Poor in France) (1893); (Our Slavic Fellow-Citizens) (1910); (Women at The Hague) (1915).

BALCH, George Beall, American rear-admiral: b. Tennessee, 3 Jan. 1821; d. 16 April 1908. Appointed to the navy 1837, he was promoted passed midshipman 1843, and served through the Mexican War. He was with Com¬ modore Conner's squadron in the first attack on Alvarado, with the mosquito fleet under Commodore Tatnall, and at the bombardment and surrender of Vera Cruz. As a lieutenant on the Plymouth he was with the Asiatic squad¬ ron 1851-55, and received a wound in a fight between the rebels and imperialists at Shang¬ hai. During the Civil War he commanded the Pocahontas and Pawnee, taking part in nu¬ merous engagements with the Confederate bat¬ teries, chiefly in South Carolina. He became captain, 25 July 1866; commodore, 13 Aug. 1872; rear-admiral, 5 June 1878; and retired in

1883.

BALCH, Thomas Willing, American lawyer : b. Philadelphia about 1870. He was graduated at Harvard in 1890, and from the law school of the University of Pennsylvania in 1895, and has since practised his profession in Philadelphia. He has written much on international law, including (Some Facts about Alsace and Lorraine) (1895); (The Alabama Arbitration (1900) ; (The Alaska-Canadian Frontier) (1902); (The Alaska Frontier* (1903) ; (L'evolution de l'arbitrage interna¬ tional (1908) ; (La question des pecheries de l'Atlantique* (1909) ; (The Arctic and Antarctic Regions and the Law of Nations) (1910); (La baie d'Hudson, est-elle une mer libre ou une mer fermee?* (1911, Eng. trans., 1912). He is a member of the International Law As¬ sociation, the American Philosophical Society, the American Antiquarian Society, *etc.*

BALCONY, a gallery or framework of wood, iron or stone, projecting from the front of a house, generally on a level with the floors of rooms, and supported on cantilevers or brackets, and sometimes on columns of wood or stone. Balconies are often surrounded by iron railings or stone balustrades. The etymol¬ ogy of the word has been frequently traced to the Greek to throw. This rests upon the presumption that balconies were built orig¬ inally for purposes of defense, the enemy being attacked with missiles thrown upon him from the balcony. The Latin word is balcus or pal-cus, the Italian batcone , also balco or palco, the Turkish bala-khanch, the German balcon. The use of balconies is comparatively modern, al¬ though there is no doubt about their existence in times of antiquity. Winckelmann, the Ger¬ man art writer, refers to the fact that in Greece every private dwelling-house had contrivances which, although then designated under different terms, would be called balconies in our day. In Spain, Italy and South America, they are used for sitting, walking and chatting, in warm summer evenings ; but they are less common in northern countries, where the nature of the climate does not call for such romantic con¬ trivances. They are, however, often used as miniature gardens for potted plants. Upon Boccaccio and Bandello, the great Italian novelists of the 16th century, the poetical util¬ ity of balconies was not lost, and entertaining balcony scenes abound in their stories. Shakes¬ peare took his plot of Romeo and Juliet from one of Bandello's novels, and the balcony scene

exhibits, with that power of genius of which the great English dramatist alone was capable, the beauty of a balcony when two young lovers like Juliet and Romeo make it the scene of their passion.

In modern theatres the term is applied to the first or second gallery or tier of seats above the pit.

BALD CYPRESS. See Cypress.

BALD EAGLE, the American white-headed eagle. See Eagle.

BALD MOUNTAIN, the name of several eminences in the United States, of whii h the following are the principal: (1) In Colorado, height, 11,493 feet; (2) in California, 8,295 feet; (3) in Utah, 11,975 feet; (4) in Wyoming, in the Wind River Range, 10,760 feet; and (5) in North Carolina, 5,550 feet. The last named was the cause of much excitement in May 1878, because of inexplicable rumblings which lasted for about two weeks. The mountain shook as if in the throes of an earthquake, immense trees and rocks were hurled down its sides, and for a time fears were entertained lest a volcanic eruption should follow'. A subsequent exam¬ ination showred that a large section of the mountain had been split asunder, but no fur¬ ther disturbance occurred.

BALDACHIN, bal'da-chin, originally the rich silks and brocades in the form of a canopy or umbrella-like covering, such as wrere used in the East over the heads of dignitaries on cere¬ monial occasions. The word itself is derived from baldacco, the Italian name of Bagdad, where the fabrics were manufactured. The baldachin was in general use among the By¬ zantine and Mohammedan rulers and their higher functionaries, and were introduced into Europe through the Crusades and also through the commerce of Italy with Constantinople and the near East. The canopy was supported on four poles and was carried over the heads of civil and religious dignitaries in all processions. It is still used in the processions of the Catholic and Greek Churches. Later the baldachin be¬ came . a fixed covering in royal throne rooms and in papal and episcopal halls, and over episcopal thrones in cathedrals, and since the Renaissance the term has been applied to per¬ manent structures of marble or metal over altars, tombs, *etc.* A famous example is the bronze baldachin by Bernini over the high altar of Saint Peter's in Rome. A copy of this may be seen over the altar of the Cathedral of Saint Jacques, Montreal, Canada. In these the draped canopies are imitated in the metal, thus distin¬ guishing the baldachin from the ciborium, in which the treatment is purely architectural.

BALDE, Jakob, bal'da, ya'cob, German Latin poet: b. Ensisheim, Alsace, 1604; d. Neuburg, on the Danube, 1668. He entered the Jesuit order in 1624, was court-chaplain to the Prince Elector of Bavaria, Maximilian I (1638), afterward (1654) in a similar capacity at Neuburg. He distinguished himself by the excel¬ lence of his Latin poetry. Herder called atten¬ tion to the beauty and genius of his lyrical productions, many of which he translated. Con¬ sult biographies by J. Bach (Freiburg 1904) and G. Eitner (Breslau 1863).

BALDER, bal'der, or BALDUR, in Norse mythology a divinity, represented as the son of

Odin and Frigga, beautiful, wise, amiable and beloved by all the gods. His mother took an oath from every creature, and even from every inanimate object, that they would not harm Balder, but omitted the mistletoe. Balder was therefore deemed invulnerable, and the other gods in sport flung stones and shot arrows at him without harming him. But the evil god, Loki, fashioned an arrow from the mistletoe and got Balder' s blind brother Hoder to shoot it, himself guiding his aim. Balder fell dead, pierced to the heart, to the deep grief of all the gods. He is believed to be a personification of the brightness and beneficence of the sun.

BALDERSTONE, bal'der-stcm, Caleb, the

old butler of the master of Ravenswood, in Scott's (Bride of LammermoorP

BALDI, bal'de, Bernardino, Italian scholar and poet : b. 1553; d. 1617. He was an accom¬ plished linguist and a very prolific writer, and was abbot of Guastalla for 25 years. Among his numerous works are (Cronica dei mate-matici>; (La nautical a poem on navigation; an Arabic grammar; and a translation of the (Targum of OnkelosB

BALDNESS. Under the title Alopecia the general types of baldness have been con¬ sidered. Premature alopecia, or the general affection

of the young and middle-aged, de¬ serves greater consideration. Alopecia pre¬ senilis, or premature baldness, is recognized as of two distinct varieties, the idiopathic and the symptomatic. In the idiopathic variety that oc¬ curs before the age of 45 there does not seem to be any disease of the scalp or of the general nutrition to explain it. It is a gradual and pro¬ gressive loss of hair, thinner and thinner hairs replacing those that have fallen out, until the follicle will not produce hair. It is usually symmetrical, beginning at the tonsure or run¬ ning back from the temples. The skin is usual¬ ly left thin and hard.

In the symptomatic form some general dis¬ order or a definite disease of the scalp is the cause. This latter is usually a scaly dandruff; the general causes may be syphilis, tuberculosis, fevers or local destructive conditions. Dan¬ druff is the most frequent accompaniment and cause of baldness. Dandruff is really at least three different diseases of the skin, but the general character is that of a general seborrheal dermatitis; that is, a mild inflamma¬ tion with excessive fatty secretions. This is frequently due to digestive disturbances, and is closely dependent upon the general health of the entire body. The hair falls out as in the idiopathic form. The dandruff usually con¬ tinues until the hair is gone, and then ceases, Treatment should be begun early, particu¬ larly in those whose families have tended to baldness. The details of treatment require pro¬ fessional advice. The large number of hair-tonics in the market speaks well for the general inutility of all of them. Cleanliness, frequent dry-brushings, and shampoos once in every two or three weeks, are safe measures, and tend to keep up the general hygiene of the scalp. Chloral, ointment of mercury, cantharides, sul¬ phur, tar and resorcin are successful in some cases in checking baldness. Consult Jackson,

(Diseases of the Skin) (1900) ; Jackson and McMurty, (A Treatise on Diseases of the Hair} (Philadelphia 1912) ; Joseph, (Lehrbuch der

haarkrankheiten> (Leipzig 1910). See Dan¬ druff.

BA.LDO, Monte, a mountain group 45 miles in length, on the borders of south Tyrol and the province of Verona, and separating ˆthe lake of Garda from the valley of the Adige. Altissimo di Nago (6,970 feet), commanding an extensive panorama comprising a great part of north Italy, and Monte Maggiore (7,280 feet) are the principal peaks.

BALDOVINETTI, bal'do-ve-net'te, Alessio, Florentine artist : b. 1427 ;

d. 1499. Few of his works remain except a (Nativity } in the Church of the Annunziata, and two altar-pieces in the gallery of the Uffizi and the Academy of Arts, Florence. One of the masters of the early Florentine Renaissance, he painted his land¬ scapes with meticulous care; but his figure painting is somewhat mechanical. He did ex¬ cellent work in the restoration of mosaics. He spent 16 years in painting the frescoes in the Church of Santa Trinita; but these suffered destruction in 1700. Consult biographies by Pierotti (Lucca 1868) and Londi (Florence

1907).

BALDPATE, or BALDHEAD, the name of several different birds having a white head, as an eagle, one of the widgeons, a kind of domestic pigeon, a West Indian dove, a fruit-crow, *etc.*

BALDRIC, bal'drik, a belt or sash worn over the right or left shoulder diagonally across the body, often highly decorated and enriched with gems, and used not only to sustain the sword, dagger or horn, but also for purposes of ornament and as a military or heraldic symbol. The fashion of wearing a baldric appears to have reached its height in the 15th century. In the United States it now forms a part of the uniform of Knights Templar and other fra¬ ternal organizations, though it is still in use in European royal courts to indicate certain orders.

BALDUCCI, bal-do'che, Francesco, lead¬ ing Italian Anacreontic poet : b. Palermo ; d. Rome 1642. He wrote (Sicilian Songs } in the Sicilian dialect, *etc.*

BALDUNG, baPdung, Hans, or Hans Grim, German painter and wood engraver : b. Suabia 1470; d. Strassburg 1522. His work, though inferior to Diirer's, possessed many of the same characteristics, and on this account he has been sometimes considered a pupil of the Nuremberg master. His principal paintings are the series of panels (of the date of 1516) over the altar in Freiburg Cathedral; others of his works are to be found at Berlin, Colmar and Basel. His numerous and often fantastic en¬ gravings have the monogram H. and B., with a small G. in the centre of the H.

BALDWIN, the name of several members of the house of Flanders, who reigned as kings of Jerusalem during the period of the Crusades. Baldwin I : b. 1058; d. Egypt 1118. He became King of Jerusalem in 1100. He was a brother of Godfrey of Bouillon, took part in the 1st

crusade, retired to Edessa at the request of its Christian inhabitants, and became soon after Count of Edessa. He was defeated by a force from Egypt in 1102, and made some conquests, including Acre, Caesarea and Sidon. Baldwin II (<(du BourgM) : d. 21 Aug. 1131. He was a

cousin of Baldwin I, whom he succeeded as Count of Edessa, and in 1118 as King of Jeru¬ salem. He reigned until 1131. He took Tyre in 1124, with the aid of the Venetians. He was captured by the Turks, who held him captive for six months. He resigned the crown before his death to his son-in-law, Fulk of Anjou, who reigned until 1142. Baldwin III: b. 1129; d. Syria, 10 Feb. 1162. He was the son of Fulk of Anjou, whom he succeeded as King of Jeru¬ salem in 1142. Tradition regards him as a model of crusading chivalry. Edessa was lost during his reign. He inflicted several defeats on Nureddin, Sultan of Aleppo. He was held in high esteem even by his enemies and it is said that Saracens served under him. He sought to improve the external and internal defenses of his kingdom, which attained its highest power during his reign. His Queen was Theodora, daughter of the Greek Emperor Manuel. He was succeeded by his brother Amalric, who died in 1173. Baldwin IV ((<the Leper®), the son and successor of Amalric, reigned until 1183. Raymond, Count of Tripoli, governed the kingdom for him, as he was lep¬ rous. Baldwin V, the son of Sibylla, sister of Baldwin IV, was called to the throne at the age of five. He died in 1186, and Jerusalem was taken by Saladin the following year. See Crusades and consult the works there referred to. Consult also Cox, (History of the Crusades) (New York 1889), and Gibbon, Edward, (Decline and Fall of the Roman Empire. }

BALDWIN I, the first Latin Emperor of Constantinople, son of Baldwin VIII, Count of Flanders and Hainault : b. Valenciennes 1170. In 1200 he joined the Crusaders with his brother, Thierry, and in 1202 aided the Venetians in their attack upon Constantinople, of which city he was crowned emperor 9 May 1204. Next year a revolt took place, the Greeks captured Adrianople, and Baldwin was taken prisoner by the

King of Bulgaria, dying, it is said, in cap¬ tivity in 1206. He was much esteemed by the Greeks for his charity, temperance and justice.

BALDWIN II, the last Frank Emperor of Constantinople: b. 1217; d. 1273. He was the son of Pierre de Courtenay, and succeeded his brother Robert in 1228. He was twice besieged in his imperial city, and, being too weak to de¬ fend his dominions, repaired to Italy to seek aid from the Pope. At the court of France Baldwin was favorably received by the King, Saint Louis, to whom he presented a crown of thorns which was held by all Christendom to be the genuine relic. Baldwin in 1239 set out for Constantinople with a body of Crusaders, who, however, soon quitted him and took the route to Palestine. He succeeded, ultimately, in rais¬ ing new forces in the west, and regained his capital ; but in 1261 one of the generals of Michael Palaeologus, ruler of Nicaea, invested it and entered Constantinople on the 29th of July. Baldwin fled to Sicily, where he died in ob¬ scurity. With him terminated the Latin empire in the east.

BALDWIN, Abraham, American states¬ man: b. Guilford, Conn., 6 Nov. 1754; d. 1807. He was graduated at Yale 1772, and was tutor there, 1775-79. During the American Revolu¬ tion he was a chaplain in the army and, at the suggestion of General Greene, settled in Savan¬ nah, Ga., 1784, where he was admitted to the

bar. His efforts as a member of the legislature secured a charter and endowment for the Uni¬ versity of Georgia, which was established ac¬ cording to his own plans and ideas, and of which he became president (1786-1801). He took part in the Constitutional Convention of 1787; was a delegate to the Continental Con¬ gress 1785-88; member of the House of Repre¬ sentatives 1789-99; United States senator from 1799 until his death.

BALDWIN, Charles H., American naval officer: b. New York city, 3 Sept. 1822; d. 17 Nov. 1888. He entered the navy as a midship¬ man in 1839. Serving on the frigate Congress during the war with Mexico, he figured in sev¬ eral sharp encounters near Mazatlan. He com¬ manded the steamer Clifton at the passage of Forts Jackson and Saint Philip in 1862, and at the first attack on Vicksburg. He became rear-admiral in 1883 in command of the Mediter¬ ranean squadron, and retired in 1884.

BALDWIN, Charles Sears, American author and educator: b. New York, 21 March 1867. He was graduated at Columbia Univer¬ sity in 1888.

He was assistant tutor and in¬ structor in English at Columbia 1891-94, in¬ structor in rhetoric 1895. In 1895-98 he was instructor in rhetoric at Yale, assistant profes¬ sor 1898-1909 and professor in 1910-11, when he returned to Columbia as professor of rhetoric and English composition. He has published (The Inflections and Syntax of the Morte d'Arthur of Sir Thomas Malory) (1894) ; specimens of Prose Description (1895) ; (De Quincey's Revolt of the Tartars) (1896) ; (The Expository Paragraph and Sentence) (1897) ; (A College Manual of Rhetoric) (1902; 4th ed. rev., 1905) ; (American Short Stories } (1904; Ger. ed., 1911) ; (How to Write, a Handbook Based on the English Bible) (1905); Run¬ yan's Pilgrim's Progress> (1905); (De Quin¬ cey's Joan of Arc and English Mail Coach) (1906) ; (Essays out of Hours) (1907) ; (Writ¬ ing and Speaking* (1909) ; Composition, Oral and V ritten* (1909); (Introduction to English Medieval Literature) (1913), also essays and reviews.

BALDWIN, Evelyn Briggs, Arctic ex¬ plorer: b. Springfield, Mo., 22 July 1862. He was graduated from Northwestern College, Naperville, Ill., and engaged chiefly in teaching until 1892, when he entered the United States Weather Bureau service. He is now an in¬ spector-at-large of the signal corps of the United States army. He accompanied, as meteorologist, Peary's North Greenland expedi¬ tion 1893-94; joined the Wellman Polar expedi¬ tion, 1898-99, as second in command, built Fort McKinley, and discovered Graham Bell Land. Securing the cooperation of Mr. William Zieg¬ ler of New York he organized and commanded the Baldwin-Ziegler expedition of 1901 for the discovery of the North Pole. The expedition reached Franz-Joseph Land and after depositing several caches of provisions returned in 1902. He has written (The Search for the North Pole,* (Auroral Observations, Franz-Joseph Land,* (Meteorological Reports of the North Greenland Expedition* (1893-94), and mete¬ orological publications in government reports.

BALDWIN, Frank Dwight, major-gen¬ eral United States army: b. Manchester, Mich.,

26 June 1842. He entered the United States volunteer army as second lieuten¬ ant of Michigan horse guards, 19 Sept. 1861, engaging at this time upon a long and brilliant military career, in the course of which he served in many battles of the Civil War and was prominent in the long-continued Indian troubles which followed later. He was brevetted captain for gallantry against Indians in Texas, 30 Aug. 1874; and in 1899 was pro¬ moted lieutenant-colonel, 4th infantry. From this period he was continually engaged in giierilla warfare in the Philippines until re¬ lieved from further duty 22 Feb. 1903, and transferred to command of the department of the Colorado. Fie was retired from active service 26 June 1906 by operation of law, at which time he was in command of southwest¬ ern military division with headquarters at Oklahoma City, Okla. He was nominated ma¬ jor-general United States army (retired), 4 March 1915. He received the degree of LL.D. from Hillsdale College, Michigan.

BALDWIN, James, American author and educator: b. Westfield, Ind., 15 Dec. 1841. Largely self-taught, Hon. Ph.D., De Pauw Uni¬ versity, 1884. Began teaching in 1865 and was 18 years superintendent of city graded schools in Indiana. He filled an editorial position with Harper & Bros., New York (1887-93), when he became editor of schoolbooks for the Ameri¬ can Book Company. He wrote (The Story of Siegfried) (1882); (The Book Lover5 (1884); (01d Greek Stories5 (1895) ; (The Horse Fair5 (1896) ; (Discovery of the Old Northwest5 (1901); (The Sampo5 (1912); and more than 50 other volumes. His books are known and read in every part of the world and are used in the schools of China, Japan and the Philip¬ pines, many million copies having been sold. More than half of the school readers used in the United States were produced under his editorship, or were written by him.

BALDWIN, James Mark, American psy¬ chologist and philosopher : b. Columbia, S. C., 12 Jan. 1861. He studied at the universities of Princeton, Leipzig, Berlin and Tubingen; was instructor of German and French (1886-87) ; professor of philosophy in Lake Forest Univer¬ sity (1887-89) and in the University of Toronto (1889-93) ; professor of psychology (1893-1903); Johns Hopkins (1903-09); National University of Mexico (1915). He was Herbert Spencer lecturer at Oxford; Harvard lecturer (1915-16). He holds the honorary degrees of D.Sci. from Oxford and Geneva, and LL.D. from Glasgow and South Carolina universities. He was vice-president of the International Con¬ gress of Psychology (London 1892) ; president of Criminal Anthropology at Geneva in 1896 ; president of the American Psychological Asso¬ ciation (1897-98); judge of award at the World's Columbian Exposition (1893) ; was awarded a gold mark by the Royal Academy of Arts and Sciences of Denmark for the best work on the

general topic of social ethics ; and was elected member of the Institut Inter¬ national de Sociologie in 1898. He was also president of the International Congress of Psy¬ chology at Geneva in 1909; member of the Japanese Academy at Tokio; of Italian and British sociological societies; of Belgian and Dutch pedagogical societies, and of the Institute

of France, succeeding William James in 1909. YVith J. McK. Cattell he founded the Psycho¬ logical Review in 1894 and was editor-in-chief of the (Dictionary of Philosophy and Psychol¬ ogy- ' In addition to many contributions to various learned journals, Professor Baldwin is author of (German Psychology of To-Day5 (trans. 1886); (A Handbook of Psychology5 (2 vols., 1889-91) ; (Elements of Psychology5 (1893) ; (Mental Development in the Child and Race5 (1895, 3d ed., 1906) ; (Social and Ethical Interpretations in Mental Development5 (1897 • 4th ed., 1906) ; (The Story of the Mind5 (1898) ; (Fragments in Philosophy and Science5 (1902); development and Evolution5 (1902); thought and Things, or Genetic Logic5 (3 vols., 1906-11; (Darwin and the Humanities5 (1909) ; (The Individual and Society5 (1910) ; (History oi Psychology5 (1912). As editor he has published (Dictionary of Philosophy and Psychology5 (3 vols., 1901-05).

BALDWIN, Maurice Scollard, Canadian clergyman: b. Toronto, 21 June 1836; d. 1904. He was graduated at Trinity College in that city 1862; became rector of Saint Luke's Church in Montreal; was dean of Montreal 1882-83; and bishop of LIuron 1883-1904.

BALDWTN, Robert, Canadian statesman : b. Toronto, 12 May 1804; d. there, 9 Dec. 1858. He began to practise law in 1825, and four years later became a member of the assembly of upper Canada. He was solicitor-general for upper Canada in 1841 in the first ministry under the Union, and was joint-premier in the La Fontaine-Baldwin administrations of 1842-43 and 1848-51.

BALDWIN, Simeon Eben, American jurist: b. New Haven, Conn., 5 Feb. 1840. He is a great-grandson of Roger Sherman, a signer of the Declaration of Independence, and great-great-grandson of President Clap, of Yale. His father was a United States senator and gov¬ ernor of Connecticut. Judge Baldwin was grad¬ uated from Yale 1861, and Harvard Law Schools. Settling in New Haven he rapidly acquired a large general practice, in which he continued until 1893. Since 1872 he has held a professorship in the Yale Law School. From 1893 to

1907 he was an associate justice of the Connecticut Supreme Court of Errors; from 1907-10, chief justice; from 1911 to 1915 gov¬ ernor of Connecticut. As a legal writer he has a wide reputation in the United States and abroad through his contributions to leading law journals. He is the author of (Digest of Con¬ necticut Reports5 (2 vols., 1871-82; revision, 2 vols., 1900) ; (Illustrated Cases on Railroad Law5; (Modern Political Institutions5 (1899); (Two Centuries' Growth of American Law5 (co-author, 1901) ; (American Railroad Law5 (1904); (The American Judiciary5 (1905);

(Education in Its Relation to Citizenship5 (1912) ; and a member of several learned soci¬ eties of much importance, both in the United States and abroad.

BALDWIN, Stephen Livingston, Amer¬ ican missionary: b. 1835; d. Brooklyn, N. Y., 1902. Graduated at Concord Biblical Institute 1858. He went to China as a missionary under the auspices of the Methodist Episcopal Church, and on his return to the United States he held several pastorates, and was for the last 14

years of his life recording secretary of the Mis¬ sionary Society of the Methodist Episcopal Church. While in China he translated a large part of the Bible into Chinese, and, it is said, printed the first copy of the Bible in that lan¬ guage. He was the author of (Foreign Mis¬ sions of the Protestant Churches) (New York 1900) and was one of the authors of (The Picket Line of Missions5 (New York 1897).

BALDWIN, William Henry, American capitalist and philanthropist : b. Boston, Mass.,

5 Feb. 1863; d. Locust Valley, L. I., 2 Jan. 1905. He was graduated from Harvard College in 1885 and studied for a year at the Harvard Law School. Entering the Omaha auditor's office of the Union Pacific Railway as a clerk, in less than a year he was promoted general traffic manager at Omaha ; in 1888 became as¬ sistant general freight agent for the Union Pacific; in 1889-90 he was president of the Montana

Union Railroad ; and in 1890 was elected assistant vice-president of the Union Pacific. In 1891 he entered the service of the Flint & Pere Marquette Railroad as general manager ; in 1894 became third vice-president of the Southern Railway, and in 1895 second vice-president and general traffic manager of the same road. In 1896 he was chosen presi¬ dent of the Long Island Railroad; his adminis¬ tration was particularly efficient and marked by a rapid growth of the road and the completion of a number of improvements. He was actively interested in reform movements in New York city, serving as chairman of the Committee of Fifteen appointed in 1900. He was also a leader in the Southern educational movement, being president of the General Education Board, a member of the Southern Education Board, and a trustee of Tuskegee Institute.

BALDWIN CITY, Kan., town of Douglas County, 15 miles south of Lawrence, on the Atchison, Topeka & Santa Fe Railroad. It is the seat of Baker University, founded in 1858. It is situated near the battlefield of Black Jack, the scene of the first conflict in the slavery troubles before the Civil War. Baldwin City was settled in 1853 and incorporated in 1859. The government is vested in a mayor, chosen for one year, and a city council. The water works and electric light plant are municipally owned. Pop. 1,450.

BALDWINSVILLE, N. Y, village of Onondaga County, 12 miles northwest of Syra¬ cuse, on the Delaware, Lackawanna & Western Railroad, and on the Barge Canal and Seneca River. It has manufactories of machines, springs, knives and paper. It is situated in a fertile agricultural region, producing corn, dairy products, grain, hay and tobacco. Natural gas abounds in the neighborhood and the water power available renders electric power for man¬ ufacturing and lighting at low rates. The vil¬ lage contains a fine high school building and owns the water plant. Pop. 3,099.

BALE, John, an English ecclesiastic: b. Suffolk 1495; d. Canterbury 1563. Although educated a Roman Catholic, he became a Protestant and had to take refuge in the Netherlands. On the accession of Edward VI he returned to England, was presented to the living of Bishop's Stoke, Southampton, and soon after was nominated bishop of Ossory in

Ireland. Here, on preaching the reformed re¬ ligion, popular fury reached such a pitch that in one tumult five of his domestics were mur¬ dered in his presence. On the accession of Mary he lay some

time concealed in Dublin. After enduring many hardships he was enabled to reach Switzerland, where he remained till the death of Mary. On his return to England he contented himself, till his death, with the calm enjoyment of a prebendal stall at Can¬ terbury. He was so bitter a controversialist that he earned the title of ((Bilious Bale.55 The only work which has given him distinction among authors is his (Scriptorum Illustrium Majoris Britaniae Catalogus5 ; or (An Account of the Lives of Eminent Writers of Britain.5 This account, which, according to the title, commences with Japhet, the son of Noah, reaches to the year 1557, at which time the author was an exile on the Continent. It is compiled from various writers, but chiefly from

the antiquary Leland.

*

BALE, bal, the French version of Basel (q.v.).

BALEARIC (bal-e-ar'Tk) CRANE. See

Crane.

BALEARIC ISLANDS, a group of four large and 11 small islands southeast of Spain, including Majorca, Minorca, Iviza and Formentera. They are inhabited by a Spanish race similar to the Catalans. Fruit, wine, grain and fish are the principal products and shoemaking is an important industry. The popular derivation of the ancient name Baleares (Greek ballein , to throw), has reference to the repute of the inhabitants for their skill in slinging, in which they distinguished them¬ selves both in the army of Hannibal and under the Romans, by whom the islands were an¬ nexed in 123 b.c. After being taken by the Vandals under Genseric in 423 a.d., and in the 8th century by the Moors, they were taken by James I, King of Aragon, 1220-32, and consti¬ tuted a kingdom which in 1349 was united to Spain. The islands now form a Spanish prov¬ ince, with an area of 1,935 square miles. Con¬ sult Vuillier, (The Forgotten Isles5 (New York 1896). Pop. 326,023.

A

BALECHOU, ba-la-shoo, Jean Jacques Nicolas, celebrated French engraver: b. Arles 1715; d. Avignon, 18 Aug. 1765. His full-length portrait of Augustus, King of Poland, has been proclaimed the masterpiece of its kind in the 18th century. But Balechou dis¬ honestly sold the best proofs for his own benefit and was consequently expelled from the Academy of Fine Arts.

BALEEN'. See Whalebone.

BALEEN WHALES, the group of whales whose mouths are furnished with a growth of baleen or whalebone (q.v.). They form a suborder Mysticcti of the Cetacea, which in¬ cludes the families Balcenopteridce, or rorquals, and Balcenidcu, the right whales. These whales are known in all oceans and form an import¬ ant object of the chase. See Humpback; Right Whale; Rorqual; Whale; *etc.*

BALER, Philippines, a town in the north¬ east part of Luzon. The population is under 3,000, mainly natives. The most conspicuous edifice is a native Catholic church. The town is noted for the heroic defense of a Spanish

garrison in 1899, during a siege by the Fili¬ pinos, lasting 11 months. The Spaniards were commanded by Lieut. Saturnino Martin Cerezo, who refused to surrender the town, even when directed to do so by his superiors in Manila. He entrenched himself in the church and hero¬ ically resisted the besiegers until his supplies gave out, when he surrendered with all the honors of war, 2 July 1899. Baler was occu¬ pied by the American troops and garrisoned with two companies of the 34th Volunteer In¬ fantry, under Major Shunk, in 1900.

.BALESTIER, bal-es-ter', Charles Wol¬ cott, American journalist, author and pub¬ lisher: b. Rochester, N. Y., 13 Dec. 1861; d. 6 Dec. 1891. He studied at Cornell University and the University of Virginia. He was edi¬ tor of Tid-Bits, a humorous weekly. In 1889 he became junior partner of the publishing firm of Heinemann & Balestier of London and Leipzig. His writings, which deal largely with frontier life in Colorado, include (The Naulahka,* written in collaboration with Rudyard Kipling, his brother-in-law; (Benefits Forgot* (1892) and a (Life of James G. Blaine) (1884); (A Patent Philtre* (1884); (A Fair Device) (1884) ; (A Victorious De¬ feat J (1886) ; (A Common Story* (1891).

BALESTRA, ba-les'tra, Antonio, an Italian painter: b. Verona 1666; d.

there, 21 April 1740. He became a pupil of Balucci in Venice and subsequently studied in Rome un¬ der Carlo Maratti. He executed the (Defeat of the Giants,* which took the prize at the Academy of Saint Luke in 1694. In 1695 he left Rome for Venice, where he became the head of a school and counted many distin¬ guished names among his pupils. His works are found in many of the galleries and churches of northern Italy. Among his paint¬ ings are (Saint Theresa,* at Bergamo, a (Vir¬ gin,* at Mantua, and a portrait of himself, at Florence. He was among the last of the Vene¬ tian school of artists.

BALFE, balf, Michael William, British composer: b. Dublin, 15 May 1808; d. 20 Oct. 1870. He received his first instructions in music from his father and Charles Horn In his 7th year he performed one of Viotti's concertos before the public; at 16 he performed the part of Caspar in (Der Freischiitz) at Drury Lane. In 1825 he went to Italy, wrote the music for a ballet, (La Perouse,* for the Scala at Naples, and in the following year fulfilled an engage¬ ment to sing at the Theatre des Italiens, Paris, with moderate success. He returned to Italy, and at Palermo (1830) his first opera, (I Rivali,* was produced. For five years, with somewhat careless haste, he continued singing and com¬ posing sundry operas for the Italian stage, which are now forgotten. In 1835 he came to England and had his (Siege of Rochelle) brought out at Drury Lane. It hit the popular taste and was quickly followed by others equally successful in this respect. Part of this success was no doubt due to the great artistes who took the leading characters, Malibran, Grisi, La-blache, Rubini and other stars of that time; but the works had high merits of their own, being marked by brilliancy, melody and fertility of invention. In 1846 he was appointed con¬ ductor of the Italian opera at Her Majesty's Theatre, London. If Balfe was wanting in

depth and dramatic force, he had a very thor¬ ough knowledge of effects and command of orchestral resources; and his compositions, are distinguished by fluency, facility and melodic power. His operas continue popular in England and elsewhere, among the chief being (The Bohemian GirP (the most popular of all) ; (The Rose of Castile* ; (The Daughter of Saint Mark* ; and (Satanella.* His posthumous opera, (The Talisman,* was brought out in London in June 1874, with great success.

BALFOUR, S ir Andrew, Scottish botanist and physician: b. Fifeshire 1630; d. 1694. After completing his studies at Saint Andrews and London, and traveling on the Continent he settled in Edinburgh,

where he planned, with Sir Robert Sibbald, the Royal College of Phy¬ sicians, and was elected its first president. Shortly before his death he laid the foundation of a hospital in Edinburgh, which, though at first narrow and confined, expanded into the Royal Infirmary. His familiar <Letters) were published in 1700.

BALFOUR, Arthur James, English states¬ man : b. Scotland (son of James Maitland Bal¬ four of Whittinghame, Haddingtonshire, and a daughter of the 2d Marquis of Salisbury), 25 July 1848. He was educated at Eton and Trinity College, Cambridge, where he took his M.A. degree in 1873. He entered the House of Commons in 1874 as member for Hertford, which constituency he represented until 1885. He acted as private secretary to his uncle, the Marquis of Salisbury, at the Foreign Office 1878-80, and accompanied him to Berlin in the negotiations leading up to the Berlin Treaty. He was president of the Local Government Board of 1885-86, was secretary for Scotland 1886-87, and secretary for Ireland 1887-91. His selection by his uncle for the difficult and thankless position of Irish Secretary *was regarded as an altogether mistaken choice, and was hailed by the Irish Na¬ tionalists with derision, the current opinion then being that he was an indolent, cultured man of fashion who was quite out of his sphere in public life. No idea could have been more mistaken. At the Irish Office he showed that, though far from robust physically, he possessed nerves of iron ; the continuous contest of wits that went on between him and the Irish mem¬ bers on the floor of the House appeared to act as a tonic to him ; and he developed a debating talent that presently brought him into front rank in public life. He administered the re¬ pressive Crimes Act with a vigor that engen¬ dered an embittered opposition ; and he suc¬ ceeded in passing several ameliorative measures which later culminated in the Land Purchase Act of 1904. So strongly did he increase his hold on his party during his tenure of the Irish Office that, on the retirement of Mr. W. H. Smith, Mr. Balfour was called on to succeed him as First Lord of the Treasury and leader of the House of Commons. He led the opposition during the Liberal administration of 1892-95. On the return of the Unionist party to power in 1895 he resumed his former place in the government. On the resignation of Lord Salis¬ bury in Julv 1902 he succeeded to the premier¬ ship. As Premier he carried through the com¬ prehensive Education Act of 1902 and the Irish Land Act of 1904 and he created the Commit-80

tee of National Defense. He was singularly unfortunate in the period of his premiership. The South African War had just concluded, and inquiry showed contract irregularities on a large scale. In 1903 he was confronted with a grave and unexpected crisis in the Unionist party, when Joseph Chamberlain resigned as Colonial Secretary in order to conduct a tariff campaign in the country which aimed at colonial preference and the reversal of the British free trade fiscal policy. Mr. Balfour, desirous of pre¬ serving the party unity, took a middle course, declaring that he regarded free trade not as a principle but as a matter of expediency. Many of the free traders took alarm and withdrew their support, and lively controversies were en¬ gaged in, especially by the opposition, as to whether Mr. Balfour was or was not a free trader. His position of open-mindedness Mr. Balfour defended throughout the long financial controversies with unshaken serenity of temper and superb dialectical skill. But his government was wrecked on the fiscal issue ; in an appeal to the country in January 1906 the Unionist party was <(snowed under,® and Mr. Balfour lost the seat he had held in East Manchester since 1885. He was immediately thereafter returned for the City of London. In the succeeding sessions he led an attenuated body of followers com¬ posed of not more than one-fourth of the mem¬ bership of the. whole House; but by common consent in no Parliament did he give greater proofs of the personal hold he possesses over the House of Commons. In 1911 he resigned from the leadership of the opposition and was succeeded by Mr. Bonar Law. In June 1915 he was one of the <(elder statesmen® who were invited to join the National Ministry formed by Mr. Asquith at that time, and succeeded Mr. Winston Churchill as First Lord of the Ad¬ miralty. On the reorganization of the coalition cabinet in 1916, with Lloyd George as Premier, Mr. Balfour assumed the portfolio of Minister, of Foreign Affairs and in April-May 1917 visited America as head of the British Commis¬ sion to the United States. In 1919 he was made president of the council. Possessed of a re¬ markable charm of manner, and seeking in music and golf solace and recreation, no man in British politics approaches him not only in sheer debating skill, but in the art of clothing his most impromptu utterances in almost perfect literary form. He has also the unique power of raising every debate in which he takes part to a higher plane of discus¬ sion, and this has made him the exponent of the general mind of the House on many im¬ portant occasions. Mr. Balfour is distinguished as a thinker as well as a politician, was a mem¬ ber of the Gold and Silver Commission of 1887-88, and was president of the British Association in 1904. His wTorks include (A Defence of Philosophic Doubt) (1879)

; (Essays and Addresses) (1893; new ed., enlarged, 1905); (The Foundations of Belief* (1895) ; (Insular Free Trade) (1903) ; <Criticism and Beauty> (Ronanes Lecture, 1909) ; (Theism and Human¬ ism* (Gifford Lectures, 1914; 1915).

BALFOUR, Francis Maitland, embryol¬ ogist: brother of the foregoing, b. 10 Nov. 18151. He studied at Harrow and Trinity Col¬ lege, Cambridge. Articles on his special study gained him a high reputation while still an un¬

dergraduate, and after further work at Naples he published in 1874, in conjunction with Dr. M. Foster, Elements of Embryology,* a valu¬ able contribution to the literature of biology. He was elected a fellow of his college; fellow and member of the council of the Royal So¬ ciety; lecturer on, and finally, in 1882, professor of animal morphology at Cambridge, a chair specially instituted for him. The promise of his great work, Comparative Embryology) (1880-81) remained unfulfilled, as 19 July 1882 he was killed by a fall on Mont Blanc.

BALFOUR, Gerald William, English statesman: b. 1853 (brother to the two preced¬ ing). He was educated at Eton and Trinity Col¬ lege, Cambridge, entered Parliament in 1885, and was chief secretary for Ireland in the Unionist ministry from 1895-1900 ; president of the Board of Trade, 1900-05 ; and president of the Local Government Board, 1905-06. He piloted the Irish Local Government Bill of 1898 through the House of Commons.

BALFOUR, Sir Isaac Bayley, Scottish botanist : b. Edinburgh, 31 March 1853. He was professor of botany in the University of Glas¬ gow 1879-84, at Oxford University 1884-88, and since 1888 at the University of Edinburgh. He explored the island of Socotra in 1880 in behalf of the British Association and of the Royal Society of Edinburgh. He is King's botanist in Scotland and keeper of the Royal Botanic Garden in Edinburgh. He was knighted in 1920.

BALFOUR, Sir James, (Lord Pitten-dreich), Scottish judge, and a conspicuous actor in the civil wars which ended in the dethrone¬ ment of Mary, Queen of Scots : b. Fifeshire, Scotland, about the beginning of the 16th cen¬ tury; d. 1583. He espoused the Protestant cause, and in 1547, for his share in the con¬ spiracy against Cardinal Beaton, he was, with Knox and other reformers, condemned to the galleys. In 1549 he was released, having ab¬ jured his heresies, and

returned to Scotland. His abilities and tact gained him appointments and he was high in office on the arrival of Marg¬ in Scotland, and was with the Queen at Holy-rood on the night of Rizzio's assassination. He is believed to have drafted the bond in the murder of Lord Darnley, Mary's husband, but contrived to divert suspicion from himself. In 1567 he was appointed captain of Edinburgh castle. A change in Balfour's convictions (if any he had) was forced upon him, for he saw that a powerful party had been formed against Mary and the advantages of an alliance with them overcame all scruples. He held the castle of Edinburgh against the Queen, and was the means of delivering up Mary's letters into the hands of her enemies. He afterward surrendered the castle for various considera¬ tions. On the breaking out of the civil war Bal¬ four sided with the regent, Murray, and was with the regent's army at the battle of Lang-side, but after Mary's imprisonment in England he took part in conspiracies for her restoration, although professing adherence to the regents Murray and Morton. His last public act was furnishing the evidence of Morton's guilt in the murder of Darnley, for which Morton was con¬ demned and executed. His flexibility of adapta¬ tion was remarkable, and it was shown in the facility with which he changed sides. He has been described as the ((most corrupt man of his

age." (Practicks of Scots Law,} the earliest textbook of-Scots law, attributed to him, con¬ tinued to be used and consulted in manuscript for nearly a century until it was supplanted by the institutes of Lord StairP

BALFOUR, John (of Kinlock), one of the chief actors in the assassination of Arch¬ bishop Sharp in 1679, for which his estate was forfeited and a price set on his head. He fought at Drumclog and Bothwell Bridge, and is said afterward to have escaped to Holland. According to one account he died on a home¬ ward voyage to Scotland ; by another he never left the country, but settled in the parish of Roseneath, Dumbartonshire, under the name of Salter. He is erroneously described by Scott in (01d Mortality) as <(Balfour of

Burley," quite a different personage. The Lord Balfour of Burleigh, who succeeded to the title in 1663, spent his youth in France and died in 1688. The title exists to-day.

BALFRUSH, bal-froosh', or BARFU-RUSH (« mart of burdens"), a town in the Persian province of Mazanderan, on the river Bhawal, 12 miles from the Caspian Sea. Bal-frush is a centre of trade between Russia and Persia, exporting large quantities of silk, rice and cotton, while the Russians supply iron and naphtha. It has excellent bazaars, numerous caravanserai, and several Mohammedan col¬ leges. Pop. about 50,000.

BALG, balg, Gerhard Hubert, American philologist : b. Efferen, near Cologne, Rhenish Prussia, 11 Nov. 1852. He was graduated from the University of Wisconsin. He has trans¬ lated W. Braunes' (Gothic Grammar, with Selections and Glossary > (1883) ; edited (The First Germanic Bible, and Other Remains of the Gothic Language with Introduction and Glossary* (1891) ; and compiled (A Compara¬ tive Glossary of the Gothic Language, with Especial Reference to English and German> (1887-89). He received his doctor's degree at the University of Middlebury (1883) and was one of the editors of the Standard Dictionary* where he was engaged on the etymology of Romanic words from a to g.

BALI, ba'le, or BALLY, an island of the Indian Archipelago, Dutch East Indies, and ly¬ ing east of Java, to which it physically belongs. Its greatest length is 85 miles ; breadth, 55 miles ; area about 2,095 square miles. It consists of a series of volcanic mountains, with alluvial plains, of which the loftiest, Agoong (10,497 feet), became active in 1843 after a long period of quiescence. None of the rivers are navi¬ gable. Principal products, rice, cocoa, coffee, indigo, cotton, *etc.* The inhabitants physically and linguistically are akin to the Javanese, are skilful agriculturalists and artisans, and excel in sculpture and in the working of gold and iron. The prevailing religion is Brahmanism of an ancient type. Suttee, or the burning of widows, was long practised. Bali is divided into eight provinces under native rajahs, and forms one colony with Lombok, the united pop¬ ulation being estimated (1913) at 1,207,310. The capital is Buleleng. The island was visited by a diastrous earthquake in January 1917.

BALIKESRI, ba-le-kes're, BALU-KIS- SAR, or BALIK-SHEHR, Turkey-in-Asia. town of Anatolia, 75 miles southwest from

Brusa. It was built of unburnt bricks and con¬ tains the tomb of a celebrated Mohammedan saint and a manufactory of felt cloth for mili¬ tary clothing. It is the seat of an annual fair, visited by over 30,000 people. It has consider¬ able trade in silk fabrics, grain, opium, and the region abounds in minerals. Pop. over 25,000.

BALILING, or BULELENG, a district of the island of Bali, Dutch East Indies. The exports are rice and bullocks, and the chief trade is with the Bughis of Celebes. In 1847 the Dutch were signally defeated in an attack upon the fort of Djaga Raga in this district.

BALIOL, ba'li-ol, Edward, King of Scot¬ land, son of John Baliol of Scotland; d. Don¬ caster 1367. In 1332, at the head of the barons who had been dispossessed by Bruce, and in opposition to Bruce's son, David II, then a minor, he made a successful invasion of Scot¬ land and on 24 September of that year was crowned King of Scotland at Scone. Having privately rendered homage to Edward III of England, he was routed by a party of Scottish nobles and dispossessed of his crown after a reign of three months. He regained it the next year as an instrument and vassal of Edward. In 1356 he surrendered the kingdom to Edward in return for a pension. He was the last of the Baliols.

BALIOL, or BALLIOL, John, father of King John Baliol, an English baron in the reign of Henry III : d. 1269. In 1263 he laid the foundation of Balliol College (q.v.), Ox¬ ford, which was completed by his widow, Devorguila or Devorgilla. She was daughter and coheiress of Alan of Galloway, a great baron of Scotland, by Margaret, eldest daugh¬ ter of David, Earl of ' Huntington, brother of William the Lion. It was on the strength of this genealogy that his son, John Baliol, was, on the adjudication of Edward I of England, declared rightful King of Scotland.

BALIOL, or BALLIOL, John, King of Scotland: b. about 1249; d. 1315. On the death of Princess Margaret of Norway, grandchild of Alexander III, in 1290, Baliol claimed the vacant throne by virtue of his de¬ scent from David, Earl of Huntington, brother to William the Lion, King of Scotland. Robert Bruce (grandfather of the King) opposed Baliol ; but Edward I's decision was in favor of Baliol, who did homage to him for the king¬ dom, 20 Nov. 1292, and was crowned at Scone on the 30th of the same month. Irritated by Edward's harsh exercise of authority, Baliol concluded a treaty with France, then at war with England ; but, after Scotland had been overrun by Edward, he did homage to Edward at Montrose 10 July 1296. Fie was sent with

his son to the Tower, but, by the intercession of the Pope in 1299, obtained liberty to retire to his Norman estates, where he died. He was de¬ risively nicknamed by the Scots <(Toom Tabard" (Empty Jacket).

BALIOL, Martha Bethune, the imaginary narrator of several of Sir Walter Scott's (Chronicles of the CanongateP

BALIOL COLLEGE. See Balliol Col¬ lege.

BALISARDA, ba-le-sar'da, a magic sword in Ariosto's (Orlando Furioso,) stolen from

Orlando by Brunello, and afterward given to Rogero.

BALISAUR, bal-T-sa'oor (Hindu, balloo-soor), the sand-badger of India, called by Hin¬ dus the pig-like badger or <(sand-hog,® on ac¬ count of its long snout. See Sand-Badger.

BALISTA, or BALLISTA, a machine used in military operations by the ancients for hurling heavy missiles, thus serving in some de¬ gree the purpose of the modern cannon. The motive power appears to have been obtained by the torsion of ropes, fibres, catgut or hair. They are said to have sometimes had an effec¬ tive range of a quarter of a mile, and to have thrown stones weighing as much as 300 pounds. Balistce differed from catapult ce, in that the lat¬ ter were used for throwing darts.

BALIZE, ba-lez'. See Belize.

BALKAN LEAGUE, an alliance formed in the summer of 1912 between Bulgaria, Serbia, Greece and Montenegro for the purpose of tak¬ ing j-oint diplomatic and military action against Turkey and which led to the Balkan wars (q.v.) in 1912 and 1913. The root of the trouble lay in Macedonia (q.v.), where the long-misruled and tortured inhabitants appealed to the peo¬ ples of the now liberated and united neighbor¬

ing states to rescue them from the oppression of the Turk. At the beginning of 1912 the con¬ dition of Macedonia pointed to an approaching crisis. For some years the revolutionaries had their headquarters in Bulgaria, but had sus¬ pended their operations in 1909 on the deposi¬ tion of Abdul Hamid II (q.v.), trusting to Young Turk promises of reform. But in the autumn of 1911 their activities were resumed, the leaders declaring that <(compared with the last four years of the Hamidian regime, when European control existed and the country en¬ joyed a certain financial autonomy, the condi¬ tion of the people is infinitely worse and their sufferings have increased.® The revolutionary organization in Macedonia had also ceased its propaganda for a time on the strength of Young Turk promises. It had resumed operations already in 1910 in consequence of the pan-Islamic tendencies of the Turkish government, and a number of small bands were formed by the secret committees which succeeded the Bul¬ garian ˆconstitutional clubs® under the name of the (<Macedonian Internal Organization.® In December 1911 an attempt to blow up a crowded mosque at Ishtib (Macedonia) on a market day when the town was full of peasants, many of them Bulgarians, excited the Mohammedan population to retaliatory measures. In the riot some 200 Bulgarians were killed or wounded, and from that day forward a campaign of out¬ rage and counter-outrage was carried on with appalling savagery by Mohammedan and Bul¬ garian murder bands. The leaders of the In¬ ternal Organization refused to negotiate with the Turkish government, declaring their resolve to continue the revolutionary activity until their object was achieved — autonomy for Macedonia through international European intervention. The Organization sent delegates to the Euro¬ pean capitals to enlist the sympathy and aid of the powers. They asked that the administra¬ tion of Macedonia should be placed under the direct control of the great powers, with a Christian governor-general.

On the eve of the general elections (March 1912) the Turkish government sent a special commission headed by the Minister of the In¬ terior, Hajji Adil Bey, to inquire into the griev¬ ances of Albania and Macedonia and to sug¬ gest measures for their alleviation. Laden with an elaborate program of reforms, the commis¬ sion returned to Constantinople toward the end of June. The report submitted by Hajji Adil Bey led Sir Edward Grey (15 July) to state that ((the declarations made by the Turkish Minister of the Interior … and the request of the Turkish government for the loan of five additional British officers … and for two additional French officers for service in the Ottoman gendarmerie indicate that the Sublime Porte realized the need of

reforms in the ad¬ ministration of the European provinces of the Empire, and are determined to take the neces¬ sary measures to introduce them.® In August the 25th anniversary of King Ferdinand's arrival in Bulgaria was celebrated with great rejoicings in the ancient capital of Tirnovo, when the tragedy of Ishtib in the previous De¬ cember was repeated on a larger scale at Kotchana, 20 miles northwest of Ishtib. A bomb thrown in the market place with the object of provoking reprisals which should attract the attention of Europe was followed by a mas¬ sacre of Bulgarians. Almost simultaneously a massacre of Christians b}ˆ Turkish troops took place at Berane on the Montenegrin frontier. Turkish soldiers also assisted in the other two butcheries. These atrocities sent a thrill of horror through Europe and tended considerably to swell the wave of patriotism in Bulgaria occasioned by the d)'nastic festivities. Public indignation was aroused in Montenegro, and both peoples clamored for war. The Turkish government proclaimed a state of siege at Kotchana and ordered the immediate court-martial of the officials implicated in the mas¬ sacre. But the mischief had been done ; Bul¬ garia, Serbia, Greece and Montenegro started mobilizing.

The inner history of the Balkan League pre¬ sents a curious tangle. The most remarkable circumstance about it is, for the student of Balkan affairs, the fact that the various states were able to come to any agreement at all. The idea of a Balkan League was no novelty; at¬ tempts _ in that direction had been in the air from time to time since long before the Russo-Turkish War of 1877. It emanated from Ser¬ bia, and was favorably discussed between Rumania and Bulgaria after the close of the war in 1878, revived in Greece in 1891, and opposed by Bulgaria, which country reopened the proposal herself in 1897. Jealousy and mis¬ trust among the Balkan states kept them apart, while the long struggle of underground in¬ trigues between Austria and Russia for pre¬ dominance in the peninsula only tended to increase the volume of mutual suspicions. Bul¬ garian sentiment was divided between Russia and Austria ; Serbia leaned toward Russia and had numerous grievances against Austria, over the annexation of Bosnia and Herzegovina (q.v.) and the prohibitive tariffs against Ser¬ bian Jive stock ; Rumania had a grudge against Russia because that power had deprived her of Bessarabia, and another versus Austria on ac¬ count of the Rumanian districts of Transyl-BALKAN LEAGUE

vania ; and Greece feared the Russian aspira¬ tions to Constantinople. Bulgaria and Greece suspected each other because of the old eccle¬ siastical quarrel over the Patriarchate and the Exarchate, and the perpetual rivalries between their respective komitadjis in Macedonia. Bul¬ garia had not trusted Serbia since their war in 1885, and looked askance on Rumania because of the Dobrudja (q.v.) and its Bulgarian pop¬ ulation. Even the Serbs and Montenegrins, though blood-brothers, were not on the best of terms with each other. In addition to this, all of them had reason to fear the Austro-Ger- man Drang nach Osten, which threatened to put an end to their national existence. The only possible bond that could unite them was their common hatred of the Turk, who system¬ atically and indiscriminately ill-treated Bulgars, Serbs, Greeks and Kutzo-Vlachs (Rumanians) in Macedonia. That hate united and led them to victory. On the morrow of their triumph, jealousy stepped in and separated them again; the Balkan League died a premature death and bequeathed to its partners a legacy of bitter hatred that was soon to prove disastrous to all.

It appears that the prime movers in the formation of the Balkan League were the King of Bulgaria and the Greek Premier, M. Venize-los, who came to an understanding in the spring of 1912. But in May Bulgaria and Serbia privately shared Macedonia between themselves, the former to take central Macedonia with Monastic and Okhrida, and the latter the north¬ ern or Old Serbian portion, leaving the re¬ mainder to be decided upon by Russia at a later date. The arrangement between Bulgaria and Greece was at first of a purely defensive nature against a Turkish attack upon either, which leads to the conclusion that Greece was to be left outside when, if ever, it came to a division of any spoils of war. Curiously enough, the Turkish government was at the same time engineering an absolute alliance with Greece, a project that was suddenly wrecked by the Kotchana and Berane massacres. Apparently unacquainted with the Serbo-Bulgarian compact and its intentions, Greece found herself called upon at a few days' notice to decide whether she should throw in her lot with or against Turkey. Bulgaria and Serbia notified Greece of their resolve to declare war against Turkey in the event of their demands being rejected. Their determination was encouraged by the fact that Turkey had the Italian war on hand at the moment, and was decidedly getting the worst of it. The great powers realized that trouble was brewing, and the "European Concert" was hastily convoked to avert it. dhey had every reason to fear the Balkan nightmare on account of the possibilities it opened for a general European conflagration. On 14 Aug. 1912 Count Berchtold (q.v.) announced that he was about to engage in conversation with the great powers with a view ((to co-

ordinate the several efforts made by the powers in the interest of Balkan peace and of the status quo? He in¬ sisted upon ((the expedience of giving to the Porte organized European encouragement and to the Balkan peoples equally organized advice to be patient and not to thwart Turkish pur¬ poses." This time, however, the inharmonious European Concert was doomed to failure; its diplomatic pressure and threats, more or less

successful in the past, were now unheeded. Russia was known to be in sympathy with the Balkan states, and behind the coming struggle loomed the mighty spectre of the conflicting policies of Teuton and Slav. The integrity of the -Turkish empire was vital to Austro-German ambitions, hence the fervid insistence of the ((status quo." Promises of reforms were forthcoming, but the Balkan Allies were too well acquainted with the temporising quality of Turkish promises ; they demanded that the powers should guarantee autonomy for Mace¬ donia, and that they themselves should be in¬ cluded as administrators. On 28 Sept. 1912 they announced that the Balkan League was an ac¬ complished fact ; the alliance was signed on the 30th and immediate mobilization ordered. Mon¬ tenegro declared war on Turkey 8 October and invaded Albania ; on the 13th Bulgaria, Serbia and Greece delivered their ultimatum to Tur¬ key at the same time rejecting all outside ad¬ vice and assistance. Europe stood amazed; the "Concert" played its strongest notes, which were not even listened to in the Balkans ; show¬ ers of threats and protests failed to move the Allies who for years had watched with painful self-control the ghastly sufferings of their com¬ patriots under Turkish misrule. As already mentioned, Turkey and Italy were at war over Tripoli (q.v., also Turco-Italian War). To all appearances, Italy would be an ally of the Balkan League. Her fleet kept the best Turk¬ ish troops locked up in Tripoli and commanded the western waters of the peninsula, including the direct sea route from Smyrna to Salonica. Clearly the moment seemed propitious for the Allies. But another surprise burst upon Europe when Turkey suddenly made peace with Italy and declared war on Bulgaria and Serbia on 17 October, hoping to frighten Greece and detach her from the Allies ; but the Greek government declared war on Turkey the next day, which completed the necessary formalities. The course of the campaign is related under Bal¬ kan Wars (q.v.).

It only remains here to trace the short career and ultimate fate of the Balkan League. After the remarkable military successes of the Allies over the Turks during October and November, an armistice was signed

with cer¬ tain conditions on the 3d of December and peace negotiations opened between the belliger¬ ents on the 16th in London. After an abortive session lasting till 29 Jan. 1913, the Balkan Allies broke off the negotiations and hostilities were resumed on 3 February. Contrary to European expectations, the Turk was defeated all along the line ; the Allies had forced him back almost to the gates of his capital, and to save him from extinction in Europe the Triple Alliance (q.v.) insisted on peace. The Treaty of London (30 May 1913) ended the war and delimitated the new frontiers. But a quarrel had meanwhile broken out between Bulgaria and Serbia over the spoils. There had been small encounters between them for months, which drove Serbia and Greece to form an alliance against Bulgaria. Early in the morning of June 30 the Bulgarians violently attacked the Serbians. Within a week Bulgaria found herself attacked on four sides, by Serbs, Greeks, Turks and a new arrival on the scene — Ru¬ mania. Hopelessly defeated, Bulgaria had to surrender and agree to the terms of the Treaty

of Bucharest (10 Aug. 1913), by which she gained far less than she might have done had she been less irreconcilable in spirit and held together with her Allies. Thus the Balkan League lived barely a year; could it have been maintained or reconstituted, Germany would never have reached Constantinople in the greater war that was to follow exactly a year later. Perhaps, even, that war would not have happened, for, with Bulgaria on the side of Serbia, Montenegro, Rumania and Greece, an impassable barrier would have been laid in the path of the Austro-German Allies to the south¬ east, a barrier that would have effectually ob¬ literated any possibility of Turkey joining hands with her Teutonic patrons. For bibliog¬ raphy consult works under Balkan Peninsula and Balkan Wars. Henri F. Klein,

Editorial Staff of The Americana.

BALKAN, bal-kan’, or bal’kan, MOUN¬ TAINS (anciently called Hcemus), a lofty and rugged mountain range, extending from Cape Emineh Burun on the Black Sea, in eastern Roumelia, in a westerly

direction to the borders of Serbia, and forming the southern boundary of the basin of the Danube. In the west it is connected with the much ramified mountain-system of the southeastern peninsula of Europe. Its length is over 200 miles ; the average eleva¬ tion is about 3,000 feet, but the group of the Khoja Balkans in the west have a mean height of 6,500 feet. Crystalline schists alternate with limestone ridges. The highest summit is Jum-rukchal, 7,786 feet. The Balkan forms the watershed between the streams flowing north¬ ward into the Danube, and those flowing south¬ ward to the 2Egean. The chief of the latter is the Maritza. The range which has a gradual descent on the north, where it is bordered by a broad zone of partially folded chains of sedementary rock, presents on the south a some¬ what steep escarpment, and has always been considered the greatest natural bulwark of the Ottoman empire against enemies on the Euro¬ pean frontiers. Yet in the Russo-Turkish War of 1877-78 the Russian troops managed to cross it without any great difficulty, although they had to encounter a stubborn resistance at Shipka Pass (4,370 feet). Here a Turkish army of 32,000 men surrendered to the Rus¬ sians. The range is crossed by some 30 passes. The whole of the southeastern peninsula of Europe is known as the Balkan Peninsula. Copper, iron and lead are the chief minerals. See Balkan Peninsula.

BALKAN PENINSULA, a convenient geographical term applied to the easternmost of the three great peninsulas of southern Europe, of which the others are the Pyrenean or Iberian Peninsula (Spain and Portugal), and the Apennine Peninsula (Italy). In all three cases the names are derived from mountain ranges. But whereas the Pyrenees and Apennines separate their respective peninsulas from central Europe, the Balkan range offers no such dis¬ tinctive geographical division. The Balkans are a continuation of the Carpathians, pierced by the Danube at the Iron gate, where the former frontiers of Hungary, Serbia and Rumania met. The name Balkan is apparently of Slavonic origin, but the Bulgarians, to whose country the range is mainly limited, use the term Stara Planina. Extending from the river Timok

(Serbia) in the west through the heart of Bul¬ garia to the Black Sea, a distance of 375 miles, the Balkans form a line of demarcation for less than half of the northern limits of the penin¬ sula. Assuming that rivers also form a natural boundary, the Balkan Peninsula ends on the right bank of the Danube and its tributaries, the Save and the Una ; its western limit is near Fiume on the Adriatic, extending down the Ionian Sea to Cape Matapan; on the east it is bounded by the 2Egean Sea, the Sea of Mar¬ mora and the Black Sea, and by the

Mediterranean in the south. Though pop¬ ularly included within this area, Rumania is not, strictly speaking, a Balkan state. Excluding that country, the area of the peninsula in square miles is 187,764, divided as follows after the redistribution of territories consequent upon the Balkan Wars of 1912-13 : Bulgaria, 43,310 square miles; Serbia, 33,891; Greece, 41,933; Turkey (including the vilayet of Constantinople), 10,882; Montenegro, 5,603; Albania, about 11,000; Bosnia and Herzegovina, 19,768; Croatia and Slavonia, 16,421; Dalmatia, 4,956 square miles. If that portion of Rumania within the parallel of 45° north is included, an area of about 25,000 square miles would be added. No other district in Europe is so richly provided as the Balkan Peninsula with gulfs and excellent harbors of commercial and naval strategic value. An archipelago of numberless islands, the Cyclades and Sporades of ancient fame, forms a continuous bridge between the Balkan Peninsula and Asia Minor. The Black Sea is connected with the Sea of Marmora through the Bosphorus, a channel about 20 miles long, and so narrow that Constantinople, at the southwest extremity of the Thracian Bosphorus, is but one mile distant from the Asiatic city of Scutari, eastward across the Bosphorus. The Sea of Marmora is linked with the TEgean by the Dardanelles with an average width of between three and four miles. The Balkan Mountains extend in a varied formation from the Adriatic to the Euxine, breaking up in their advance eastward into sev¬ eral parallel chains with many more or less strong spurs north and south; several ranges extend southward almost to the TEgean : the Perim Dagh and the ancient Rhodope Moun¬ tains of Despoto Dagh. They are frequently broken by defiles or passes of different de¬ grees of serviceableness as routes. The princi¬ pal passes are the Nadir-Derbend, Karnabad, the Basardshik-Sophia, the Trajan, Rosalitha and Shipka, the latter famed by the heroic struggles between the Russians and Turks in 1877 and and 1878. The principal range of the Balkans is thus divided into several sections, like the Etropol, Khoja and Shipka Balkans, and formed the boundary between Bulgaria and Rumelia before the two were united. The main elevation of the chain is from 4,000 to 5,000 feet, but it rises much higher in various parts, the loftiest elevation of 9,700 feet above sea-level being reached by Mount Scardus in the Char Dagh. The Balkans are rich in minerals, especially rock salt, lead, iron-ore, copper, sil¬ ver, but the treasures of the soil are yet very imperfectly known in spite of the geological re¬ searches, undertaken by German, French and other travelers and scientists. The mountains are mostly of a granite formation, but the mountain system is very complicated, and its

N

＞ngitude/ East from Greenwich o’-sˆ

\ /

We BOSPORUS

‘ Kadautz | sV

HKOW.IN/S

Byelttjr

Scale of Miles.

Dcbrecxen

Dubosutry

MT. PlETROSb’^^D?

iwvs? j

rSajiyortyˆ1

Kishinev’

<0 wrfd

.oDamteaeacmK 5 “

«? xr Vui1’

Apiopanaˆ J-‘ *

‘Haros Vusaruely

0«lCS>«V:

IpoVtb&H?

WantstesohiX

I*. \KPodu y

*r fuWui0 \i

Akkra**”

Bariaig

i Tutor

>Nekor«echi ˆiTeouct z flMastak

ˆP»ncVjuc M M n

» ˆj?Gdob« j

anrSrt.

, imtaUjr)g

iiistndl

lrgc». r t Peoheft

Haider j’aat ;rikoi Kadi|kuii

Kronstadt

gpTggjmflka

y0,/&£&KSH’

it harm

l Siriain*

iyi >$

So

,« £Palarlage

SEA OF MARMORA

-”lirallft;

* Muftiu/ >cr>Yank» . Viziruˆ]

Dudescu I

[San Stofauo

Macin

-v

1 Doftana’ Teankului

JLcfrt

nˆPuclˆJˆh if

I FiiipeScEde 1

[TirgoviniW.

erseez

Jiuluii

fDanu\

t -fftUl®*

,Grindu

‘ jTuahadagh0

llarsoja 1

Si.M

T’CPIoesei %y NJoˆ’\l\LJ Ureichem j

Pitesei

l radiate

W *U“S’A

‘A Dragasani)

nlJq

ˆoRacari \

‘erciorovi

ˆoJk

{ Turnu Severini

“•@4’

Jtiver ‘K

AiinlelcL

-s.

*Tantelunoi

fCiulnUi

IPotkovi

‘si wx ‘

. AVo joy|\ 7?.

Rogova

ittpalanka

jOblieeci BudcschLy-Ulmu

Teteect

ˆCalara»<

Batina

■TVCrsilova/

iamare — xˆ. /

Radovan 3 |Cbetateiiˆ3 9 >rBallesbcb’

Raduj i\ NeoAt fej LISAC. ffiOT./x

Jonstantza

iCuracalu’

LutgUD

mitetfl

oRaupUk

Jagodioa’

.Alexandria vˆQciurgiu

Krushova*

I’a rac InVyeNVˆ *»J

UiJKlieknk ° Bn

X. Vjetovo

Cmurfak\,

Razgrad

B°‘0,’*n *Mabaleta*1ˆ ~ˆr / Dubnikˆ .ˆPlev

. I van j i eyf i’j k’

udenitza

Nova Vai Kˆy«poiy«f

Brdarevo <f

|ˆS

MIZUF

“7,107

BGornja

Studena

AL.ipruvicapˆv < V vica

A*“1’#1 - % <£?,’ It’.y .iMOMton

gfc*omMˆ*‘«S.JUfcT«cveiir

gXx.SUrJi‘2W§taito«’, < > |

y xLvvb >,3q%;S£K’Js

» SO FI A > 7 Kovm.Io1’/.ˆˆ,

1/” Koi

Pixi W uplje^^Tˆ

ˆKuraumlijaˆ PeceojayolP ?»,• / Leskovac I

Pirol

ˆ Kosiat

’upauj N

’* ’Blejojwlleˆ * ˆKolashinj

Turaki

Izvor

Osmai

“Gradeo

«PrI»htinh; Gblan Z’

SUven

J-wSfiSi,

R3CE.JI

ˆca ‘ jukfflT Petncevol \L&vˆ° j yj

lagxuriste Storo Novoeelo

,8timlia

(akovai

‘Stara-

: Varoa’b

Prizren \ ˆ.FU.tCfianˆ

iRJkASˆlftflNA Ba9Jf

/Rkdno o tKarabdx*

/MabaleOl. |)-KavrfjdS Karabunar Kˆludzh*. a .Seimen ˆ

_ˆ/Clrpan

[PPOPOLIS

• Vjotrenˆiv’

rathopolU

Antlvnrlj

Dnieigno

oKratow Umanovo Kanioaltza.

•erustlca Bo®

1 Stooimukaa-JeileS

-Trnovc

Dletovo o sˆ～～’

IKoohana® ˆ

r.{ulˆ“VˆVini Lu/y＞Uiuv i, r °l. F

,%r

J J ‘“6r.oiiASLvr)K»d»I’i»Wl«

.L x! Poddˆwb

ˆ Perlcpo ＞cgj＞tino ‘\ˆ＝fttru*jaˆ

Kavadartsi vi\Vˆs -

J J < * Mlro«t,5TN ‘ I ˆ(s/0 Kbnovo \

Haskovo o

EJieehe

jChvolna

SelenikoTON

PROCLAIIˆ0

k >_ˆ Cape Rudoui

P«OTECTOh

(iaj > o EaTf

’ *» Cape LagblCˆy

JUNE, 191 7 > T

ivelflkoo

‘Srs®4,ivv

LT hi iˆAehinetbey?ˆ

/Ha’skoi ‘Hafsa B

•ihra *

oTurie e _ >

A Krushevo’

ivrokopˆ;

ˆTirana

Kiicbuk

‘Klrli

v iN opfa2Sˆu

HˆUtetratl* N

Wynbovo Kavala

‘ravishta,. cr-v

X\ V

ORendinˆ1*. °V l.

Ltbrasht

‘Cborlu

irhiseaS

Skntavi

Radoviˆˆy

Okhrittink

ˆ Lii lce 0 APogratetflv

|BIˆnaat-ir(

ˆRodooto

Pacieo /

Olenae

Kukush VO-O Nlgrita0

Punta Sam ana ,

RrimlUi

TO. ITA&ˆj

_ ˆ 1 ossa >

Marmora

Jthasos 1.

SAMOtHRAKI

x* yf Paˆarudhl® fliayrot tLO (lalatai8ta,,r(i//,Uieriso8 °

VˆI > olij;ro« (Jv,;

CA KA88ANt > BA O

o/ Saros

OmlUpˆ

> Madania

K 11b ura -*■ k 0Fraab <

Brusa

ˆRaryes

Otrnnto

Kale-1 Sultaniye

IMBROS ri

Samarina , Grevena0

Kbimarraˆ

Palerm.

IT. ATHOS

£ OtIIOnoˆ;

liskata

l’latiun-1 1 a

!apo Drepanon

fANATO

-v§.P»m % sscrˆi,%>

Tˆ’.Vtapelakla Paliuri %

MJ \KlSSAVOS <

.«• >0,408

ikrlMBˆ10 x tv ,. Corfu

\Z agora

Pelaconkhi I.

ˆ\ > rgaliuti

LemniU

Karusad <

Adramytij7 -T,.

Baliko.ri’ ,

kˆylvania claimed by ftimania, also parf of11 lˆat ceded, djˆontier with Serbia b e iriochn e d . , —

etetern Thrace, tcˆ be Recicled byA AllW[dVl)n®

ˆCyPbi l iataj° Pl“a(

v, 3 ˆAidonat‘9’i °pˆ.’

S* O.RliUnrukia, p\ niopdi os Mygari tl oC’ Vulgarello% SkulikMJa0ˆ \ *0»w* < Aruf

Ka3tru9jkia*\ ,b ,,G rt

\ pVpoinlLknoi]

Preveza feXp t’-?

{)haciostrati I.

liiiˆ0PalaBaas/

p 6jwo |

[aktanl l U\ \Uuh>,^ Pbar^alos p k ‘ \ Halmyros oS .

burn a V.-. “ffeiTMintsela

r

5 p’ja-,1.. , (*

>GuRa I.

Pergiiuia

MlTXXBNK

cr-^u^w warui

1 E G

Leuka? LEUKAi/T • i (8a.\ta Mau*’ ^ HagioA PetroaA I C. Dukatir I PbisknrdocH? J Afyrfo B«i/*L I

Cephaloma

I Lixourlon /{ ;

Ikyros T

HnnhsA

Alafchcltr

Smyrna

hi AC A I

iVnthy

Kino I.

‘TtlRKEYˆ

‘ U,S OSo

I’m “““x ”

Rato Achaia Zali’holf 0ˆ® irfe-

-Semea®- — j

T”fO a-UtiilaO /Sapbiko « t

r f4”C* < U» V. lArgos

iVTrlpoliaarx ‘ ir%ia!‘l”i« W. “L

x, C. Kalogria. 1 A rgostolion (Araxtt*)

Livailn Bay

,Amaru8i(

tP c. Sklnari. uiareni

Lecbalrii«iv Gastoune. o Amalias

vPyrgos

Samos I.

VA°Vv WAkobos 1. e 1

leos cˆPyrgSvˆˆTENOS I- ˆ ˆ f ˆllerniniiAPˆ 0

P SYROSˆp0ti9ˆ, < ˆlyK0N0S j

YJ3 L A -D E S» >

Q pr,aalkL/ri/%°aS «

SiniNos ˆ/WL

Apolloola'y* AntipaROR

ˆ — ˆEaatro < ˆp0lykandro

Polykandros l.

RkThera

ˆuke

' Sokia)

3 TyZ.mteAky 1 ZANTE iSv AˆwakoloV

r Agnilnltzi

t 7 C. Marat nia

Parxos I

S !KI PHoS 1

Kalimno I.

yy Amoroos

‘A norgos

ythVlcˆ,> ;

fra-tf V

to S 0/ 3

Cervi 1.ˆ , Lagonia/y. Cerigo/1.

Monemvasia Pharakloo ˆ■Neapollj \JCupc Mall*

Melos I

iapme 1,

RHODES

ISLAND

.SANTORIN l.eq5ˆ‘PyrB08

‘Knpsalion

Cerigotto I.

iSCARPANTO

(Kerf«)

ˆB’.W/AWpili

■»V I Kancajh krotiri

CRETE

C. Stnvrog

Du I.

OtUTANDU 1 Malta ,

‘Cantlia

igalokoatron)

Kaatcli

Kanrn ‘ -＞\

Fort j Army rod - ˆ

h 1 11 a 6 Ah cs’-’.*j

l -Spbakia

ASHUT

Sldero i Salmone

lodelos

[ˆ1 ˆ

Mostar/ˆ ‘rp

L* I tA \

o

Metkovlc O

ˆ -MUifo o oWm

,, 1 rtu»

ROUMANIA,

SERBIA, BULGARIA, MONTENEGRO, ALBANIA, GREECE AND TURKEY IN EUROPE Scales.

Statute Miles, 75 = 1 Ineta.

gMOjOSQIOˆJOjiO 70 80_g0_100_lO 180 f 90 140 ISO

Kiloiuelres. 121 = 1 lucli.

STR,V*U “■* JL ˆ7d“rvif\ 1ˆV»“ ?‘nk 1 0 v 0

O «S A * Gortinl y - t

NaaariaoF |k»| WˆLaimˆia ˆˆ\Bikbia «

Methonoik ’i ij G. “f

8. PISMZA Kotyne

Kasasa. I Mtutsenia CaV6 Pyrgos1

ice

y Allied and sociated powers.

Band McNally & Co.'S New 11 z 14 Mop of Roumania, Serrla, Bulgaria, Montenegro, Albania and Turkey in Europe. Copyright by Rand McNally & Co.

"-rapetra ˆ

Cape Lithinoa (Theodia)

Gaidaronibi

26° Kophomsi

343

/

BALKAN PENINSULA

85

geological and geostratic connections are hard to determine. There are numerous thermal and sulphurous springs, some of which are re¬ nowned and utilized as sanitary watering places. The mountains form the watershed separating the tributaries of the lower Danube and those of the Vardar and Maritza rivers, or, in other words, the watershed between the Black Sea and the zEgean. On account of the broken and irregular character of the peninsula the rivers are short and little navigable. Albania, sepa¬ rated from Montenegro and Novibazar by the north Albanian Alps, is a mass of parallel mountain ranges, irregularly transversed by the winding rivers, Boyana, Drin, Loum, Vo'iutza and Arta, which flow into the Adriatic and Ionian seas. In Scutari, Monastir and Salonica there are a number of large and deep lakes, pre-eminently those of Scutari, Ochrida, Janina, Prespa and Kastoria. The climate of the penin¬ sula is exceedingly varied ; it is rigorous with heavy snowfalls in the north and the central plateau between Serajevo (Bosnia) and Sofia (Bulgaria), and the tableland of Janina, but becomes mild and sunny toward the south and east, tempered by the breezes of the Afgean. There is hardly any country in the world in¬ habited by such a number of different peoples as the Balkan Peninsula. Surviving there are all the races recorded at the beginning of his¬ tory, with their national languages and distinct racial consciousness. They do not form, how> ever, the whole people, or even the great majority of their particular race in any one district, but are intermingled and live side by side, without ever blending together, so that the process of disentangling their various and conflicting aspirations, tendencies and racial as well as religious distinctions, is well-nigh im¬ possible. The majority are Slavs, comprising the Bulgarians in the east and centre, the Serbs and Croats in the west, and, in the ex¬ treme northwest, between Trieste and Laibach, the Slovenes; these compose the southern branch of the Slavonic race. The other inhabit¬ ants of the peninsula are the Albanians in the west, the Greeks in the south, the Turks in the southeast and the Rumanians to the north. In southern Bulgaria (ancient Thrace) and Mace¬ donia, there may be found a Greek, a Bulgarian, a Turkish, an Albanian village, side by side. The Greeks or Byzantines, the Daco-Ruma- nians, who speak a distinctly Romance or neo-Latin language, and proudly derive their origin from the legionaries of Emperor Trajanus sta¬ tioned in Dacia, yet undoubtedly from Dacian or Thracian mothers, — and the Albanians of Illyrian stock are the most ancient historic races of the Balkans. The Slavs are late¬ comers by migration and conquest. They be¬ came neither Greek nor Roman in speech or customs, political character or national pro¬ clivities, but remained distinctive in language and racial characteristics. Between the Danube and the /Egean Sea the whole of

the eastern part of (he Balkan Peninsula was known as Thracia ; the western part as Illyricum and the lower basin of the Vardar River as Mace¬ donia, some centuries before the Christian era. At periods historically well determined* after the Gothic invaders in those regions had been defeated or absorbed or started on their world¬ stirring career, after the Turanian Avars had lost their overwhelming power, the Slavic tribes

moved in great numbers into central and southeastern Europe. About 630 a.d. the Croats began to occupy the present Croatia, Slavonia, northern Bosnia. In 640 the Serbians of the same race and language conquered the Avars and peopled Serbia, South Bosnia, Dalmatia; Montenegro, whose inhabitants are pure Serbs in blood and language, only deriving their name from their national hero, Ivo the Black (Tsernoi), who gave the name of Tsernagora (Montenegro) to those desert rocks, a safe retreat to the Serbians, after their defeat at Kossovo in 1389 inflicted by the Turks. The ethnic situation of to-day dates from that epoch. The origin of the Bulgarians is not quite clear. They appear ‘to be of Finnish-Ugrian stock, and therefore related to the Turks and the Hungarians, but were Slavic-ized early in history. The great apostles of the Slavs, Methodius and Cyrillus, themselves Bul¬ garians, even brought Byzantine culture and the Greek-orthodox religion to the other Slavic races on the peninsula. The battle of Kossovo, already mentioned, made an end to the inde¬ pendence of the highly developed Slavic states, and with the fall of Constantinople in 1453, the last bulwark of the crumbling Byzantine empire, the Turkish or, more correctly, Osmanli sway over the entire Balkan Peninsula became a reality. Four centuries of racial strife be¬ tween the Turkish conquerors and the various Greek, Rumanian and Slavic races under their sway resulted in the formation of the Danube states and the Hellenic kingdom, more or less according to races and nationalities, so far as this was possible at all in the case of peoples which are at least as far removed in sympathy and political aspirations from one another as they are from the Turks. The racial antago¬ nisms were always grievously accentuated in the attempted solutions of racial, political and religious problems. While the ancient history of the Balkan Peninsula is bound up with that of the Roman and Byzantine empires, the Middle Ages reveal an unbroken series of in¬ vasions and wars for a period of almost a thousand years up to 1453. Within a century of their appearance in the Balkan Peninsula, the Osmanlis had established the most civilized and best ordered state of their time. But succeeding generations of the Osmanli ˆTurks® lost the virtues of their ancestors, and retained only their capacity for

governing under mili¬ tary law. They never learned to rule as civil¬ ians nor forgot how to rule as soldiers. Dur¬ ing the 28 years of his life after the capture of Constantinople, Mohammed II annexed the whole Balkan Peninsula except the inaccess¬ ible Black Mountain (Montenegro), the Alba¬ nian highlands, and the then Hungarian fort¬ ress of Belgrade. That enlightened monarch showed marked favor to Christians and be¬ stowed the higher offices of state upon them; he encouraged literature, art and commerce. The Venetians held a virtual monopoly of the Euxine (Black Sea) and Htgean trade, while both in Asia and Europe the social condition of the peasantry wras better at the time under Osmanli rule than feudal Christendom. . The Ottoman army had the best reputation in the world; it was the first to introduce efficient commissariat and medical services, and adven¬ turers from all parts of Europe flocked to learn the art of war from the Turks. But

the three immediate successors of Mohammed II sowed the seeds of decay and disruption by misrule and oppression, while a revival of the dormant crusading spirit of Europe only served to reawaken the slumbering fanaticism that characterized the early followers of the Prophet.

Yet the Ottoman empire continued to grow in territory and splendor, attaining the zenith of its glory in the reign of Suliman the Mag¬ nificent (1520-66). At the battle of Mohacs (1526) he conquered Hungary, and three years later stood at the gates of Vienna. It was at Mohacs again that the tables were reversed 161 years later against Suliman II by the Austrians under Charles of Lorraine. That decisive vic¬ tory pushed the Turks back upon the Balkan Peninsula and drove the first nail into the coffin of Turkish dominion in Europe. During the 17th century Russia and the kingdom of Poland also joined the ranks of Turkey's enemies in coalition with Austria, Tuscany, Venice, Malta and the papal forces. The treaties of Carlo-witz and Constantinople (1699-1700) brought about a rearrangement of territories and fron¬ tiers by which Turkish power in Europe re¬ ceived a severe check.

The wars conducted by Austria and Russia against Turkey during the 18th century, followed in 1799 by the alliance between Turkey, Russia and Great Britain against Napoleon, kept the Ottoman rulers and statesmen preoccupied with international affairs and permitted the development of revolutionary aspirations among the subject races of the Bal¬ kan Peninsula. The 19th century witnessed remarkable political changes in that stormy region. By a course of wars, revolutions, brig¬ andage and appalling atrocities the grip of the Turk was gradually loosened through the inter¬ vention of the powers. Greece was the first to break away in 1829 ; the Berlin Congress (1878) erected Rumania, Bulgaria, Serbia and Monte¬ negro into semi-independent states under a shadowy suzerainty of the Sultan. The history of these events is related under the headings of the various countries. The Balkan Wars (q.v.) formed what may be the last act but one in the 400 years' struggle to expel the Turk from Europe. The Balkan Peninsula has played a tremendous part in the world's history, and has well earned the various uncompliment¬ ary titles applied to it, such as the "slaughter¬ house,® the "cock-pit,® the <(bug-bear® and the ((powder magazine® of Europe. For many cen¬ turies not a year has passed without bloodshed somewhere on its soil. The scene of many bril¬ liant exploits and unexcelled horrors, it arrayed nation against nation, caused innumerable wars and was finally to be the cradle of the greatest conflict of all time. See War, European. Also Albania; Dardanelles; Greece; Monte¬ negro; Serbia; Turkey; Eastern Question.

Bibliography. — Baer, J. and Company, (Balkan Peninsula and Greek Archipelago5 (Frankfurt 1910) ; Baker, G., (The Passing of the Turkish Empire in Europe5 (London 1912) ; Bamberg, F., 'Geschichte der orientalischen Angelegenheit5 (Berlin 1892) ; Barkley, H. C., 'Between the Danube and the Black Sea5 (Lon¬ don 1876); Brailsford, N. H., 'Macedonia: Its Races and Their Future) (London 1906) ; Braun, F., 'Der Neue Balkan1* (Weimar 1913) ; Cambon, V.,(Autour des Balkans5 (Paris 1890);

Crawfurd, H., 'The Balkan Cockpit5 (London 1915) ; De Windt, H., (Through Savage Eu¬ rope5 (London 1907) ; Driault, E., 'La ques¬ tion d'Orient depuis son origine5 (Paris 1898) ; Durham, Mary E., 'The Burden of the Balkans' (London 1905); Eliot, Sir C. ('Odysseus5), 'Turkey in Europe5 (London 1902 and 1908) ; Forbes, Toynbee, Mitrany and Hogarth, 'The Balkans5 (Oxford 1915) ; Freeman, E. A., 'The Ottoman Power in Europe5 (London 1877) ; Hamard, P. J., 'Par dela l'Adriatique et les Balkans5 (Paris 1890) ; Herbert, W. V., 'By-

Paths in the Balkans5 (London 1906) ; Hichens, R., ‘The Near East’ (London 1913) ; Hogarth, D. G., ‘The Nearer East: A Geography’ (New York 1902) ; Holland, T. E., ‘The European Concert in the Eastern Question5 (Oxford 1897 4 ; Huhn, Major A. von, ‘The Struggle of the Balkans for National Independence5 (Lon¬ don 1886) ; Jaekel, B., ‘The Land of the Tamed Turk: The Balkan States of To-day5 (Boston

1910) ; Joanne, T., ‘Etats du Danube et des Balkans5 (Paris 1895) ; Kanitz, F., ‘Donau-Bulgarien und der Balkan5 (Leipzig 1875) ; Lamouche, L., ‘La Peninsule balkanique5 (Paris 1899) ; Landemont, Comte de, ‘L’Europe et la politique orientale 1878-19125 (Paris 1913) ; Laveleye, E. de, ‘La peninsule des Balkans’ (Brussels 1886) ; Le Jean, G., ‘Ethnographic de la Turquie d’Europe5 (Gotha 1861) ; Loiseau, Ch., ‘Le Balkan Slave5 (Paris 1898) ;• Lukach, H. C., ‘The Fringe of the East5 (London 1913) ; Lyde, L. W., and A. F. Mockler-Ferry- man, ‘A Military Geography of the Balkan Peninsula5 (London 1905) ; MacColl, M., ‘The Sultan and the Powers5 (London 1896) ; Mac¬ kenzie, Lady, and Irby, A. P., ‘Travels in the Slavonic Provinces of Turkey5 (London 1866) ; Miller, W.. ‘The Balkans5 (‘Story of the Na¬ tions5) ; also ‘Travels and Politics in the Near East5 (London 1898) ; and ‘The Ottoman Em¬ pire, 1801— 1913 5 (London 1913) ; Millet, R., ‘Souvenir des Balkans5 (Paris 1891) ; Minchin, J. G. C., ‘The Growth of Freedom in the Bal¬ kan Peninsula5 (London 1886) ; Murray, W. S., ‘The Making of the Balkan States5 (London 1912) ; Muzet, A., ‘Aux pays balkaniques5 (Paris 1912) ; Newbigin, M. I., ‘Geographical Aspects of Balkan Problems5 (London 1915) ; Rankin, R., ‘The Inner History of the Balkan War5 (London 1914) ; Rosny, L. de, ‘Les popu¬ lations danubiennes5 (Paris 1885) ; Rufifer, E., ‘Die Balkanhalbinsel und ihre Volker5 (Baut¬ zen, Saxony, 1869) ; Singleton, Esther, ‘Turkey and the Balkan States5 (New York 1908) ; Sloane, W. M., ‘The Balkans : A Laboratory of History5 (New York 1914) ; Smith, A. D. H., ‘Fighting the Turk in the Balkans5 (New York 1908) ; Sonnichsen, A., ‘Confessions of a Macedonian Bandit5 (New York 1910) ; Spen¬ cer, Capt. E., ‘Travels in European Turkey in 18505 (London 1851) ; Trevor, R., ‘My Balkan Tour5 (New York 1911) ; Upward, A., ‘The East End of Europe5 (London 1908) ; Verney, N., and Dambmann, G., ‘Les puissances etran-geres dans le Levant5 (Paris 1900) ; Villari, L., ‘The Balkan Question5 (London 1905) ; Wirtli, A., ‘Der Balkan5 (Stuttgart 1914) ; Woods, H. C, ‘Washed by Four Seas5 (London 1908) ; and ‘The Danger Zone of Europe5 (London

1911) ; Wyon, R., ‘The Balkans from Within5 (New York 1904) ; Yovanovitch, V., ‘An Eng¬ lish Bibliography on the Near Eastern Ques-

tion, 1481-1 906 } (Belgrade 1909) ; Zinkeisen, J. W., ‘ Geschichte des osmanischen Reichs in Eu¬ rope (Gotha 1863). A most valuable work is the ‘Report of the International Committee to Inquire into the Causes and Effects of the Bal¬ kan W ars, } issued by the Carnegie Endowment for International Peace (Oxford and Wash¬ ington 1914). Consult also bibliographies under Balkan Wars and the various countries of the peninsula.

Henri F. Klein,

Librarian London Times, 1898-1905; Editorial Staff London Standard, 1905-15.

BALKAN WARS, a series of conflicts fought in the Balkan Peninsula (q.v.) during 1912 and 1913. They fall into three distinct divisions: (1) The war of the Balkan League (q.v.), composed of Bulgaria, Serbia, Greece and Montenegro, against Turkey, in which the Allies conquered Macedonia, Albania and the greater part of Thrace, terminat¬ ing with the armistice of December 1912; (2) the continuance of the war by Greece and the resumption of hostilities by her Allies in February 1913, after the failure of the London negotiations; (3) the second war, which followed the collapse of the Balkan League in June 1913, when Serbia, Greece and Montenegro were arrayed against their quondam ally, Bulgaria; the re-entrance of Turkey and the intervention of Rumania. The avowed ob¬ ject of the Balkan League was the emancipation of Macedonia from Ottoman dominion and the forcible expulsion of Turkey from eastern Eu¬ rope. Ever since the Treaty of Berlin in 1878 the Christian population of Macedonia — mainly Bulgars, Greeks and Serbs — had been promised reforms by both the European Concert and by successive Turkish governments. By the Treaty of San Stefano (3 March 1878) which Russia forced upon Turkey at the point of the sword, Macedonia was handed over to Bulgaria, but the arrangement was abrogated four months later at Berlin and the territory restored to Turkey, the powers pledging themselves to supervise the introduction of reforms. For 34 years the powers had tinkered at the problem, and for 31 years of that

period Abdul Hamid II (q.v.) had pursued an unwavering policy of promises and evasions. Hope dawned momen¬ tarily on the horizon when the Turkish revolu¬ tion of 1908-09 ended with the victory of the Young Turkey party, the downfall of Abdul Hamid and the accession of Reshad Effendi as Mohammed V. But although the new ruler expressed his satisfaction at being the first sul¬ tan of a regime of liberty and told his Parlia¬ ment that <(the safety and happiness of the country depend on the constant and serious ap¬ plication of the constitutional regime,® which was <(in conformity with the Sacred Law as with the principles of civilization,® it soon be¬ came apparent that the more Turkish govern¬ ment changed the more it was the same thing. Toward the end of 1909 steps were taken to (<pacify® Macedonia. In the process of pacifi¬ cation the Turkish commander entrusted with the task, Torgut Pasha, accounted for 12,000 prisoners, 5,000 killed and wounded, 2,000 refugees in Bulgaria and over 1,600 homeless refugees scattered among the hills. The Young Turk government, the ˆCommittee of Union and Progress,® adopted a ˆnationalizing® pro¬

gram that consisted mainly of stamping out all racial and religious sentiments differing from undiluted Turkish citizenship. This ruth¬ less policy led the Balkan states to sink their quarrels and to unite for common action against the oppressor. But the motives actuating the Balkan League were not entirely altruistic : there were rich prizes to be gained if the ven¬ ture should prove successful.

In the meantime the Turco-Italian War (q.v.) had broken out in the fall of 1911. A succession of defeats was suffered by the Turk¬ ish armies, seriously weakening the resources and organization of the Turkish empire and undermining what little influence it still pos¬ sessed in its European provinces. The moment for action in order to bring about the liberation of Macedonia, Albania and the other parts of European Turkey had apparently arrived with the most favorable conditions.

In March 1912 a secret treaty of alliance was signed between Bulgaria and Serbia against Turkey, stipulating military cooperation be¬ tween the two states on a fairly extensive basis and providing for the division of whatever ter¬ ritory might accrue as the result of a possible — and successful — war. A similar treaty against Turkey was signed between Bulgaria and Greece in September 1912, except that no provision was made for possible future gains. Montenegro and Serbia, too, had arrived at an understand¬ ing, and finally these diplomatic

arrangements were so co-ordinated that they permitted of concerted military action on the parts of Bul¬ garia, Serbia, Greece and Montenegro as against the hereditary enemy, Turkey.

As early as 5 Aug. 1912, engagements be¬ tween isolated detachments of Montenegrins and Turks had broken out, and on 8 August the Turkish minister to Montenegro left Cettigne, the capital. The situation had now become so threatening that Count Berchtold, the Austro-Hungarian Foreign Minister, extended an invi¬ tation on the 16th to the European Powers to join in ˆconversations® regarding the Balkan problem. France, Germany and Great Britain accepted immediately, but it was too late. The Balkan states proceeded with their military preparations, and on 30 September the four members of the Balkan League ordered a gen¬ eral mobilization of their forces. But the Turkish government was not unprepared. For some time previously large bodies of troops had been collecting in Thrace, ostensibly for ((ma-neuvres.® Turkey followed with a mobiliza¬ tion order on 1 Oct. 1912, ait the same time confiscating about 150 Greek boats which were then in various Turkish ports. An attempt to avert war, made by Premier (afterward Presi¬ dent) Poincare of France by suggesting a joint intervention by Russia and Austria-Hun¬ gary proved unsuccessful. Montenegro, being practically always under arms, was the first to complete mobilization, on 7 Oct. 1912, and on the next day declared war on Turkey. It is generally believed that this step was taken without consulting the other allies. The Black Mountaineers forcibly occuoied the Mojkovatz district, which, though assigned to them by an agreement of the previous year, had remained in the occupation of the Turks. A general con¬ flagration was now inevitable, for not only the Allies, but the Turkish government also, had rejected the mediatory proposals of the

powers. The Grand Vizier had informed the latter that Turkey would not tolerate foreign intervention in her internal affairs, but offered, at the eleventh hour, to revive the Law of the Vilayets framed 1880 by an international com¬ mission, but never carried out. The Allies re¬

jected the offer as insincere and demanded guarantees, which were not forthcoming. On 13 Oct. 1912 Bulgaria, Serbia and Greece pre¬ sented a joint ultimatum to the Porte, demand¬ ing reforms in Macedonia within six months and immediate demobilization of the Turkish armies in the Balkans. These demands were refused on the 17th; to the great surprise of Europe, Turkey had made peace with Italy on the 15th, and now not only declined to negoti¬ ate further with the Allies, but declared war on Bulgaria and Serbia. In the case of Greece, Turkey attempted to win this country over, but met with a refusal followed, the same day, 17 October, by a declaration of war on the part of Greece against Turkey.

At the beginning of the war the Bulgarian forces consisted of eight regular divisions, one cavalry division and numerous reserve organi¬ zations. Their total strength was approximately 340,000 men and 800 guns, divided into three armies under Generals Kutincheff, Ivanoff and Dmitrieff. The supreme command was in the hands of General Savoff. The Serbian forces consisted of four armies, totaling about 250,- 000 men and 450 guns. They were commanded by the Crown Prince and Generals Putnik, Stefanovitch, Yankovitch and Zikhovitch. Greece had put in the field about 150,000 men, commanded by the Crown Prince and Generals Danglis and Sapuntsakis. Prince Danilo was in chief command of the Montenegrin forces, consisting of some 30,000 men in three groups. Against this total of over 750,000 men Turkey mobilized three armies and a number of smaller organizations amounting to about 450,000 men and more than 600 guns. They were directed by Abdullah Pasha, Zekki Pasha, Hassan Tahsin Pasha, Essad Pasha, Hassan Riza Pasha and Ali Riza Pasha, with Nazim Pasha in supreme command. Greece and Bulgaria were the only countries of the Balkan League possessing naval forces, the former one modern cruiser, 21 torpedo boats and one submarine ; the latter six torpedo boats.

The first successes over the Turks were gained by the Montenegrins. They attacked on 9 Oct. 1912 near Podgoritza and captured the Planinitza and Detchitch mountains. The Bulgarian advance began immediately war had been declared. By 19 October the Second army had occupied Mustapha Pasha on the Turco-Bulgarian frontier, and from there proceeded to close in against Adrianople from the north and west. The First and Third armies ad¬ vanced against the fortress of Kirk Kilisse northeast of Adrianople. The Turks attempted to oppose this advance with a force of 70,000 men and a very sanguinary battle was fought north and northwest of Kirk Kilisse 22-24 October. On the latter date Kirk Kilisse fell to the Bulgarians with large booty and the Turks were forced to retreat in disorder. Thev finally established

themselves on a forti¬ fied line of about 20 miles between Bunar-Hissar in the north and Lule Burgas in the south. This was later shifted so that the right wing rested on Visa instead of Bunar Hissar.

The Bulgarians followed and attacked on 29 Oct. 1912. In position, guns, equipment and moral the Bulgarians had the advantage over their opponents. The battle lasted for three days. Though making a valiant stand the Turks were forced back everywhere; by 4 November they had fallen back to a new line with Chorlu as its centre. But the Bulgarian advance was irresistible and this position had to be aban¬ doned by the Turks on 7 November. Realizing the danger of Constantinople being threatened the Turkish government had already, on 3 November, appealed to the European Powers for mediation. The Turks meanwhile re¬ treated within the so-called Chataldja lines, a series of strongly fortified positions running about 20 miles west of Constantinople, from the Sea of Marmora to the Black Sea along a chain of heights. It was not till 13 November that the Turkish retreat and establishment at Chataldja was completed. The Bulgars had apparently stretched their resources to the ut¬ most in driving the Turks back thus far, as they made no further move of importance for several days. This brief respite enabled the Turks to reorganize and strengthen their weak¬ ened ranks by reinforcements from their Asi¬ atic armies, but a serious outbreak of cholera among the troops served to hinder the measures of reconstruction. On the 17th the First and Third Bulgarian armies began an attack on the Turkish lines. In some instances the at¬ tack succeeded, but the natural strength of the position plus the assistance rendered by the Turkish fleet on the southern flank was more than the Bulgarians could overcome. The latter therefore withdrew their forces to the west of Chataldja village and contented them¬ selves with making impossible any Turkish advance.

The Second Bulgarian army which at the beginning of the war had advanced against Adrianople attacked this city on 22 and 23 Oct. 1912, but had been unable to carry any of the important defensive works. The right wing of the First Bulgarian army, however, was pushed on 23 October to the Tunja Valley north of Adrianople; by the 29th its left wing had reached the Maritza Valley south of Adri¬ anople. The fortress was now completely surrounded. Still another Bulgar force had crossed the Rhodope Range and inflicted a de¬ feat on the Turks at Kirjali on 20 October. Part of this force then advanced and joined the other Bulgarian troops before Adrianople. A special division under General Todoroff in the meantime had invaded

Macedonia along the Struma and Mesta vallies, captured the Kresna defile and occupied Buk on the Salonica-Dedeagatch Railroad. This move com¬ pletely severed the western from the eastern Turkish army. General Todoroff then advanced on Demir Hissar and from there to Salonica ; on his arrival, however, that city had already canitulated to the Greeks. Other detachments of his forces occupied Kavalla 15 November and Serres on the 20th. After the victory at Kiri ali the Bulgars pursued the Turks in the direction of Jumuljina, captured this town on 22 November and finally forced the Turks who had made a stand north of the village of Mer-hanli to surrender on 27 November, taking 12,000 prisoners.

The siege of Adrianople in the meantime

had been carried on without any definite re¬ sults. Almost 50,000 men of the First and Second Serbian armies had joined the Bulgars in the beginning of November 1912, but even the combined forces still possessed insufficient artillery to compel surrender. Every attempt of the Turks to break out, however, was re¬ pelled. Coincident with these Bulgarian suc¬ cesses were equally important successes on the part of the Serbian armies. On 19 Oct. 1912 they crossed the frontier and after a two days' battle inflicted a severe defeat on the Turks near Kumanovo on 24 Nov. 1912. Stra-zim was occupied on the 22d, Kratovo on the 26th, and on the same day Uskub was aban¬ doned by the Turks, who were so demoralized that they left behind some 120 guns and large quantities of stores and munitions. Both the Third and Fourth Serbian armies had been equally successful. Mitrovitza and Prishtina were taken on 22 Oct. 1912, Novi Bazar on 27 October, Plevlje on the 28th and Nova Varosh on 5 November. After the fall of Uskub the Serbians pushed the Turks further back toward Monastir. Doiran was taken on 5 November and Salonica, already in the hands of the Greeks, was entered by the Serbs 911 the 8th. Perlepe, on the road to Monastir, was occupied 6 November after a two days' battle. Two divisions of General Yankovitch's army were dispatched in the middle of Novem¬ ber across the snow-covered mountains to¬ ward

the Adriatic Sea. They captured Alessio 18 November and reached Durazzo on the 28th (1912). Five divisions of the First Serbian army supported by other detachments resumed their attacks on the Turks in the vicinity of Monastir. After a battle lasting four days the Turks were completely routed and Mon¬ astir was occupied by the Serbs. Most of the Turkish troops were either killed or captured, and only small bodies succeeded in escaping toward the south.

The Montenegrin forces throughout Octo¬ ber and November 1912 were chiefly occupied in operations in northern Albania which finally resulted in the complete investment of Scutari. Although the Turkish troops caught there were prevented from breaking out, the artillery at the disposal of the besiegers was too feeble to reduce the place. During seven weeks of the war the Montenegrins, though fighting with great valor and determination, and de¬ feating the Turks in almost every encounter, only succeeded in capturing Tuzi (14 October), Berane (16 October), Ipek (31 October), and the insignificant harbor of San Giovanni di Medusa (16 November). When in the middle of November Serbian detachments appeared in central Albania a Montenegrin brigade was sent south to co-operate with them, but before the end of the month was recalled to assist in the siege of Scutari. Hence, when the armistice was signed, Scutari, the objective of the whole Montenegrin campaign, still re¬ mained in the hands of its Turkish garrison.

The Greeks, from the commencement of the war, had made the capture of Salonica their chief aim. Crossing the frontier on 18 Oct. 1912, they captured Elassona on the 19th, decisively defeated the Turks on the 22d at the Sarantoporos Defile, captured Serfije on the 23d and Verria on 29th. As the Greeks approached nearer and nearer to Salonica the

Turks made one more attempt to make a stand along the line between Yenidje Vardar and Plati bridge. But the effort proved fruitless, and on 8 Nov. 1912, Hassan Tahsin Pasha saw himself compelled to surrender Salonica with its garrison of about 30,000 Turkish troops to the Greek Crown Prince. Five Greek divisions were now detached to assist the Serbian troops fighting near Monastir, where they arrived in time to capture large numbers of Turks who had attempted to flee southward after their defeat before Monastir. During December the main army of the Greeks advanced toward Janina after beating the Turks at the Sangoni Pass. Previous to this the western Greek army had come up from the south by way of Arta, captured Prevesa, a small fortress, on 4

Novem¬ ber, Mount Metsovo on the 14th, and reached the vicinity of Janina on 28 Nov. 1912. Throughout December 1912 the Greeks unsuc¬ cessfully endeavored to capture this town, though they had no difficulty in repulsing every attempt of the Turks who assumed the offen¬ sive.

Naval operations during October, November and December 1912 were restricted chiefly to the Greek fleet. Wherever opportunity offered Greek destroyers assisted their military forces. The main body of the fleet, however, was oc¬ cupied with the blockade of the Dardanelles and with the capture of the islands of Lemnos, Thasos, Imbros, Samothrace, Tenedos, Ikara, Psara, Chios and Mitylene. The Turkish fleet was primarily engaged with transporting rein¬ forcements from Asia to Europe. It also at¬ tempted, with more or less success, to blockade the Bulgarian coast on the Black Sea. In November it was of considerable value in de¬ fending the Chataldja lines. One Turkish cruiser was seriously damaged on 21 November before Varna by a Bulgarian torpedo and an¬ other was sunk by a Greek torpedo boat on 31 October in the harbor of Salonica.

The Turkish appeal to the powers for me¬ diation (3 November) met with no favorable response. On 13 Nov. 1912 Turkey approached Bulgaria for the purpose of opening peace ne¬ gotiations. For approximately a week military operations were more or less suspended but when on 21 November Turkey declined to ac¬ cept the conditions demanded by Bulgaria and her allies hostilities were reopened. Neverthe¬ less, representatives of the belligerents contin¬ ued to meet a few days later before the Cha¬ taldja lines, and on 3 Dec. 1912 an armistice was signed between Turkey and Bulgaria, Serbia and Montenegro. Greece alone declined to be a party to this arrangement As a result representatives of the four parties to the armis¬ tice met in London, 16 Dec. 1912, to consider the possibility, in the presence of the ambassadors of the Great Powers, of a settlement of the Balkan question. Sir Edward (now Viscount) Grey, the British Foreign Minister, presided at the conference. Bulgaria demanded Adrianople ; Greece insisted on the cession of all the 2Egean Islands ; and all the Allies demanded an indemnity from Turkey. The Turkish emis¬ saries rejected all of these demands, and on 6 Jan. 1913 the Allies withdrew from the nego¬ tiations. In order to avoid if possible the re¬ sumption of hostilities which threatened more and more to involve all Europe, the powers

combined in a note to Turkey advising the ces¬ sion of Adrianople and suggesting that the set¬ tlement of all the other questions be left in the hands of the powers. The utter impossibility of returning to the status quo ante was voiced by Mr. Asquith : <(The map of eastern Europe has to be recast… . Upon one thing I be¬ lieve the general opinion of Europe will be unanimous — that the victors are not to be robbed of the fruits which have cost them so dear" (9 Nov. 1912). By 22 Jan. 1913 appear¬ ances indicated that Turkey would yield to the inevitable, but on the next day a revolution suddenly broke out in Constantinople. Nazim Pasha, Minister for War, was assassinated, and hostilities were resumed a week later.

The position of Turkey was indeed desper¬ ate. Of all its former great possessions in Eu¬ rope nothing was left beyond the small stretch of land between the Bosporus and the Oha-taldja lines, and the three fortresses of Adrian¬ ople, Janina and Scutari. These latter were so closely invested by the superior forces of the Balkan Allies that all hope of escape for them seemed to be cut off. Every attempt to push back the invaders over the Chataldja lines was repulsed, a fact that was not sufficiently coun¬ terbalanced by the strength shown by the Turkish lines which held firm against every Bulgarian assault. On 6 March 1913 Janina surrendered to the Greeks with its garrison of 30,000 men. The Turkish position at Adrian¬ ople became more and more untenable ; famine and lack of ammunition gradually weakened the resistance in the last and most important Turkish stronghold west of the Chataldja lines. Bulgars and Serbs made a series of de¬ termined assaults on the fortress; on 9 March two important forts were stormed and finally, on 26 March, Shukri Pasha, in command at Adrianople, had no other alternative than to capitulate with 33,000 men.

In the meantime the Montenegrins had valiantly continued their attacks on Scutari. They found, however, that in their operations in Albania they had to contend not only with Turkish resistance, but also with the conflicting interests of Serbia supported by Russia and of Italy supported by Austria-PIungary. These powers arrived at an understanding over the future of Albania and, on 20 Dec. 1912, had announced their acceptance of the principle of Albanian autonomy and of Serbian right to free commercial access to the sea. To deter¬

mine the frontiers of the new state to every¬ one's satisfaction was more difficult. But an agreement was finally reached on 26 March 1913. Serbia received some of the Albanian territory adjacent to Montenegro and Scutari was to become part and parcel of the new state. Both of these arrangements were considered by Montenegro unjust; the little mountain state flatly refused to acquiesce in the arrangement in spite of immense pressure brought to bear by all the European Powers, in spite of the withdrawal of such Serbian forces as assisted in the siege of Scutari, and even in defiance of an actual blockade of the Montenegrin coast instituted by all the powers except Russia, in April 1913. Montenegro's persistence had its reward in the capitulation of Essad Pasha and Scutari on 22 April 1913. • However, she was to enjoy the fruit of her victory but a short

time. Austria-Hungary and .Italy made such strong representations that the agreement of 26 March should be fulfilled, that Russia, in view of a possible intervention by these two powers, exerted powerful pressure on Monte¬ negro to evacuate Scutari. This was done on 14 May 1913, and Scutari was occupied by sailors from the international fleet.

Contemporaneously with the events just de¬ scribed, the European Powers were exerting themselves to bring about peace, not, it must be confessed, in the interests of either Turkey or her enemies. Excepting Germany, who had other objects in view, not a single European country regarded the expulsion of the Turk with anything but satisfaction. The great dan¬ ger, however, lay in a possible conflict among the powers themselves, according to which side they favored. What centuries of great wars and diplomacy had failed to achieve had been accomplished by the little Balkan states in a few weeks; the Turk had been brought to his knees. Hence the powers had persuaded, first Turkey, on 1 March 1913, and then the Allies on the 15th, to accept their mediation. An armistice was signed between Turkey on the one part, and Bulgaria, Serbia and Greece on the other, at Bulair on 19 April 1913. With the fall of Scutari three days later, Montenegro also became a party to the armistice. Wnen the Montenegrins had evacuated Scutari the way to a peace conference lay clear. Repre¬ sentatives from all the nations involved met again in London 21 May 1913. Representatives of the Powers, Great Britain, France, Russia, Austria-Hungary, Germany and Italy were also present and hastened the proceedings to such an extent that as early as 30 May the Treaty of London was signed by all the belligerents. It provided that the Turkish possessions in Europe should be bounded in the west by a line

drawn from Midia on the Black Sea to Enos on the yEgean Sea, the details to be ar¬ ranged by an international commission ; that the powers were to determine ‘the boundaries of the newly-created state of Albania and the future status of the 2Egean Islands ; that Crete was to be ceded by Turkey to Greece; and that all financial questions were to be settled by an international commission to meet as soon as possible at Paris.

Unfortunately, the Treaty of London did not decide what was, to the victorious allies, the most vital point of all : the division of the territory wrested from the Turk. Even before that treaty had been signed, ill-feeling of the strongest kind had sprung up between Bul¬ garia and Serbia, and Bulgaria and Greece. Secret treaties which had been signed before the outbreak of the war were denounced as void owing to ((changed conditions.” The mil¬ itary forces of each separate country, both during the armistice and the session of the peace conference, were quietly engaged in oc¬ cupying as large sections of territory from which the Turks had been driven as they could cover. Recriminations of every type, not un¬ mixed with physical violence, were indulged in by the former allies. The natives were the greatest sufferers; Serbians slaughtered Bul¬ garian civilians by the thousand and Bulgarian troops butchered Serbian civilians. Military collisions occurred frequently during March,

April andˆ May. Further trouble was fast brewing. The powers demanded, 6 June 1913, that the Balkan states demobilize ; they refused. On the 10th Serbia demanded from Bulgaria a revision of the ante-bellum treaty of alliance. Russia threw her moral influence on the side of Serbia, while Austria-Hungary was clearly more friendly to Bulgaria. The latter country refused to revise the treaty, and on 22 June the Serbian Minister left Sofia.

The alliance was thus dissolved ; Thrace and Macedonia were again to be devastated by the very warriors who claimed to have been fight¬ ing for the regeneration of both. Hostilities began on 30 June 1913; Serbs and Bulgars met at Slatovo in a three-days’ unofficial battle ;

eight days later Serbia, Greece and Monte¬ negro declared war on Bulgaria. Meanwhile there had arisen a new adversary whom Bul¬ garia had to face, Rumania. This most north¬ ern of the Balkan states which had so far re¬ mained neutral announced to Bulgaria that she required certain guarantees of compensation if she were to maintain her neutrality in a new Balkan war. The demand was not met promptly enough, and early in July 1913 Rumania ordered a general military mobilization. On the 10th she also declared war on Bulgaria, who was now pressed from all sides. Rumania invaded Bulgaria from the north, occupied Turtukai and Baltchick and began to advance against Sofia. In the southwest the Greeks seized the railroad between Doiran and Dedeagatch and were marching up the Struma Valley en route for Sofia. In the west the Serbs and Monte¬ negrins were advancing against Kotchana and Kustendil, with Sofia also as their ultimate objective. Turkey, too, now became active again. The Bulgarians had naturally been com¬ pelled to withdraw their troops still lying be¬ fore the Chataldja lines. The astonished Turks immediately advanced under Enver Bey against Adrianople and calmly reoccupied the city with¬ out opposition, 22 July 1913.

The Rumanians were now only 20 miles from Sofia; the Greeks and Serbs not much further away; fighting desperately, the Bulgars found themselves in an iron ring growing ever smaller. Recognizing the hopelessness of re¬ sisting the combination against him, King Fer¬ dinand yielded. His request for mercy was favorably received by his opponents, and dele¬ gates from all belligerents met at Bucharest 29 July 1913. It was fortunate that this third Balkan war came to a quick end, for all of the combatants had displayed the most wanton ferocity and committed unspeakable atrocities. The peace meeting resulted in a treaty signed 10 Aug. 1913, by which Rumania kept the two towns she had taken from Bulgaria, and terri¬ tory amounting in all to 2,969 square miles, with a population of 273,000. Serbia deprived Bul¬ garia of Kotchana, Ishtib and Radovishta ; Greece took away Salonica, Doiran, Demir His-sar, Seres, Drama and Kavala ; Monastir also became Serbian while Greece retained Vodena and Fiorina. Serbia rewarded Montenegro by giving her Plevlje, Byelopolye, Ipek and Diakova.

In settling her boundary disputes with Turkey, Bulgaria also lost as a result of the third Balkan war. Turkey absolutely refused to evacuate the territory which she had re¬

occupied during July 1913, or to live up to the Treaty of London.

None of the powers seemed to insist that she should do so, and Bulgaria was not in a position to fight it out with Turkey. Finally on 29 Sept. 1913, the Treaty of Constantinople fixed the frontiers so that the Enos-Midia line of the other treaty acquired such a spinal curvature that it re¬ tained for Turkey Demotika, Adrianople and Kirk Kilissc. As the last of this series of treaties Greece and Turkey signed the Treaty of Athens on 27 Nov. 1913, by which the va¬ rious religious, racial and financial questions arising from the war were settled. The fate of the newly-created state of Albania had also been settled by the powers ; its boundaries had been agreed upon and an international com¬ mission, located at Valona, assumed its gov¬ ernment on 1 Oct. 1913. Later in the month they selected a German prince, William of Wied, and appointed him <(Mpret of Albania.® See Balkan League; Albania; Bulgaria; Serbia, *etc.*

Bibliography. — Ashmead-Bartlett, E., <Writh the Turks in Thrac.e) (London 1913) ; Baker, B. G., (The Passing of the Turkish Empire in Europe) (Philadelphia 1913) ; Baldwin, H. F., (A War Photographer in Thrace5 (London

1913) ; (Balkan War Drama) (Special Corre¬ spondent, London 1913) ; ((Balkanicus,55 (The Aspirations of Bulgaria) (London 1915) ; (Balkanicus,5 (Les Serbes et les Bulgares dans la guerre balkanique) (Coulommiers 1914) ; Barby, H., (La guerre Serbo-bulgare5 (Paris

1914) ; Boucabrille, B. P. L., (La guerre inter-balkanique) (Paris 1914) ; also (La guerre Turco-Balkanique, 1912 } (Paris 1913) ; Bonn, M. J., (Die Balkanfrage) (Munich 1914) ; Breitner, B., (Kriegstagebuch : Balkankrieg) (Vienna 1913) ; Bresnitz von Sydacoff, P. F., (Aus den Geheimnissen des Balkan Krieges5 (Leipzig 1914) ; Brown, R. A., (The Operations of the Balkan Armies) (U. S. Cavalry Assoc. Journal, 1913, Vol. XXIII) ; Buxton, Noel, (Writh the Bulgarian Staff5 (New York 1913) ; Campbell, C., (The Balkan War Drama5 (New York 1913) ; Carnegie Endowment for Inter¬ national Peace, (Nationalism and War in the Near East5 (New York and London 1915) ; also (Report of the International Commission of Inquiry on the Balkan Wars, 1912—13 5 (Washington 1914) ; Cassavetti, D. J., (Hellas and the Balkan Wars5 (New York 1914) ; Cas-tellini, G., (I popoli balcanici nell' anno della guerra osservati da un Italiano5 (Milan 1913) ; Christoff, P., (Journal du siege d'Adrianople5 (Paris 1914) ; Cirilli, G., (Journal du siege d'Adrianople5 (Paris 1913) ; Denis, E., (La grande Serbie5 (Paris 1915) ; Diete, A. von, (Taktische Schilderungen von Episoden aus den Balkan Kriegen5 (Vienna 1914) ; Dugard, H., . (Histoire de la guerre contre. les Turcs, 1912—1913 5 (Paris 1913) ; Duncan-Johnstone, A., (With the British Red Cross in Turkey5 (London 1913) ; Durham, Miss

E., (The Strug¬ gle for Scutari5 (London 1914) ; Egli, K., <Drei Monate vor Skutari5 (Berne 1913) ; Fabius, J., (Met Bulgarien en Montenegijnen5 (Utrecht 1913) ; Farnsworth, H. W., (The Log of a would-be war correspondent5 (New York 1913) ; Freytag, G., (Karte des Kriegs-schaup- latzes auf der Balkan-Halbinsel5 (Vienna 1912) ; Gibbs, P., and Grant, B., (Adventures of

War with Cross and Crescent5 (London 1912) ; Guyon, B., (Balcanica5 (Milan 1916) ; Hano-teaux, G., (La guerre des Balkans et 1' Europe 5 (Paris) ; Hemberger, A., (Illustrierte Geschichte des Balkankrieges5 (Vienna 1913) ; Hochwaechter, G. von, (Mit den Timken in der Front im Stabe Mahmud Muchtar Paschas5 (Berlin 1913) ; Howell, P., (The Campaign in Thrace5 (London 1913) ; Hutchison, T. S., (An American Soldier under the Greek Flag at Bazania5 (Nashville 1913) ; Immanuel, F., (Der Balkankrieg5 (Berlin 1913—14) ; Izzet-Fuad Pasha, (Paroles du vaincu5 (Paris 1913) ; James, L., (With the Conquered Turk5 (Bos¬ ton 1913) ; Kessler, O., (Der Balkanbrand5 (Leipzig 1913) ; Kutschbach, A., (Die Serben im Balkan Krieg 1912-1913 und im Ivriege gegen die Bulgaren5 (Stuttgart 1913) ; Laurent, O., (La guerre en Bulgarie et en Turquie5 (Paris 1914) ; Leboucq, C. F., (Un an de cauchemar balkanique5 (Paris 1914) ; (Les cruautes bulgares en Macedoine orientale et en Thrace5 (Athens 1914) ; Loti, Pierre, (Turquie agoni-sante5 (Paris 1913) ; Mach, R. von, (Briefe aus dcm Balkan Kriege5 (Berlin 1913) ; Meyer, Alfred, (Der Balkan Krieg5 (Berlin 1913— 14) ; Miletitch, L., (Atrocites grecques en Macedoine pendant la guerre greco-bulgare5 (Sophia 1913) ; Mirande, H. and Oliver L., (Sut la bataille5 (Paris 1913) ; Mukhtar Pasha, (Meine Fuhrung im Balkan Kriege, 19125 (Ber¬ lin 1913) ; Nikolaides, K., (Griechenlands An¬ ted an den Balkankriegen5 (Vienna 1914) ; Pennenrun, A. de, (Feuilles de route bulgares5 (Paris) ; also (La guerre des Balkans en 19125 (Paris 1913) ; and (Quarante jours de guerre dans les Balkans5 (Paris 1914) ; Piarron de Mondesir, J. F. L., (Siege et prise d'Adrianople5 (Paris 1914) ; Pickthall, M., (With the Turk in Wartime5 (London 1914) ; Price, W. H. C., (The Balkan Cockpit5 (London 1914) ; Puaux, R., (De Sofia a Tchataldja5

(Paris 1913) ; Ran¬ kin, R., (The Inner History of the Balkan War5 (London 1914) ; Remond, G., (Avec les vaincus5 (Paris 1913) ; Ripert d'Alanzier, P. de, (Sur les pas des allies5 (Paris 1914) ; Rohde, Hans, (Die Ereignisse zur See und das Zusammenwirken von Heer und Flotte im Balkankriege5 (Berlin 1914) ; also (Die Opera-tionen an den Dardanellen im Balkankriege5 (Berlin 1914) ; Schurman, J. G., (The Balkan Wars5 (Princeton 1914) ; Selim Bey, (Carnet de campagne d'un officier turc5 (Paris 1913) ; Sloane, W. M., (The Balkans5 (New York 1914) ; Tharaud, J., (La bataille a Scutari d'Al— banie5 (Paris 1913) ; Trapmann, Capt. A. H., (The Greeks Triumphant5 (London 1915) ; Velhagen and Klasing, (Kriegskarte der Balkan Halbinsel5 (Leipzig 1913) ; Vischer, Dr. A., (An der serbischen Front5 (Basel 1913) ; Wag¬ ner, H., (With the Victorious Bulgarians5 (Boston 1913) ; Wright, H. C. S., (Two Years under the Crescent5 (London 1913).

Henri F. Kletn,

Librarian London Times, 1898-1905; Editorial Staff London Standard, 1905-15.

BALKH, balkh, Afghan Turkestan, a dis¬ trict corresponding to ancient Bactria, and is bounded on the north by the river Oxus, on the east by Badakhshan, on the south by the Hindu Kush and west by the desert. Its length is 250 miles; its breadth 120. Its situa¬

tion was once important during the overland commerce between India and eastern Europe before the sea route by the Cape of Good Hope was followed. The soil has the general char¬ acteristics of a desert land ; only a few parts are made fertile by artificial irrigation ; and such are the vicissitudes of climate that where grapes and apricots ripen in summer and the mulberry-tree permits the cultivation of silk, in winter the frost is intense and the snow lies deep on the ground. The natives are Uzbegs, whose character differs in different districts, from plunderers of caravans to tillers of the soil and artisans.

BALKH, Afghan Turkestan, the capital of the district of the same name, situated in a district intersected by canals and ditches. It is surrounded by a mud wall ; but though bear¬ ing the imposing title of <(Mother of Cities,55 it has not in recent times had any of the grandeur of ancient Bactria, on the site of which it is built. It was twice destroyed by Genghis Khan and Timur. A terrible out¬ break of cholera in 1877 caused the capital of Afghanistan Turkestan to be transferred to Mazar, west of Balkh; since which Balkh has been an

insignificant village. It contains a mosque, a citadel and several half-ruined schools. It is reputed to have been «at one time the centre of the Zoroastrian religion. There is a new town of the same name a short distance to the north of Balkh. Pop. about

8,000.

BALKHASH, bal-kash', a great inland lake on the eastern border of Russian Central Asia. Lying about 780 feet above sea-level, it extends 323 miles west-southwest ; its breadth at the west end is over 50 miles ; at the east from nine to four miles; the area is 8,600 square miles. The water is clear but intensely salt. Its principal feeder is the river Ili. The northern edge is well defined ; but the south shores of the lake are labyrinths of islands, peninsulas, low sandhills and strips of shallow water. Here grow masses of enormously tall reeds in which wild swine shelter. To the south, stretching toward the base of the Ala-tau Mountains, is a vast steppe almost devoid of vegetation. Balkhash seems to have at one time included in its immense area the smaller lakes Sossik-kul and Ala-kul, now far to the southeast.

BALKIS, the Arabian name of the Queen of Sheba who visited Solomon. She is the central figure of innumerable Eastern legends and tales.

BALL, Elmer Darwin, American entomol¬ ogist: b. Athens, Vt., 21 Sept. 1870. He was educated at Iowa State College and the Ohio State University. In 1895—97 he was assistant in zoology and entomology in Iowa State Col¬ lege ; in 1898-1902 associate professor of zool¬ ogy and entomology at the Colorado Agricul¬ tural College. From 1902 to 1907 he held the same chairs at the Utah Agricultural College and in the latter year was appointed director of the Utah Experiment Station. In 1909 he became director of the School of Agriculture of the Utah Agricultural College and in 1910 was president of the Utah Academy of Sci¬ ence. He is a member of the Entomological

Society of America and many similar learned bodies. He has written numerous systematic and life-history studies of Cercopidce Jassidcc and Fulgoridce, economic studies of the codling moth, grasshoppers and sugar-beat leaf hopper, causing ((curly leaf® ; also studies on poultry¬ breeding.

BALL, John, English priest of the 14th century. He was a disciple of Wycliffe, upon whose religious doctrines he engrafted some political theories resembling the Hiberty, equal¬ ity and fraternity® of later ages. He was sev¬ eral times imprisoned for his indiscreet utter¬ ances and twice excommunicated. He was in¬ timately concerned in the Wat Tyler insurrec¬ tion of 1381 and for his part in the affair was hanged, drawn and quartered at Saint Albans, 15 July 1381, the King witnessing the execu¬ tion. Consult Morris, (The Dream of John Ball5 und dictionary of National Biography) (London 1885).

BALL, Sir Robert Stawell, distinguished English astronomer: b. Dublin, 1 July 1840; d. Cambridge, 25 Nov. 1913. In 1865 he was appointed Lord Rosse's astronomer at Parsons-town. While there he discovered four spiral nebulae. He held many posts in connection with astronomy and mathematics, including those of professor of applied mathematics and mechanism at the Royal College of Science for Ireland; Andrews professor of astronomy in the University of Dublin ; astronomer-royal of Ireland from 1874 to 1898 and was engaged in measuring the distances of the stars from the earth. Meanwhile he wrote an important work on the mathematical theory of screws, a subject which he popularized at the British Association meeting of 1887 in an address en¬ titled (<A Dynamical Parable.® Ball had a hap¬ py gift of simplicity and could make abstruse problems not only comprehensible but even in¬ teresting to young people. He was Lowdean professor of astronomy and geometry in the University of Cambridge and director of the Cambridge Observatory after 1892. The Royal Society elected him a fellow in 1873 and in 1886 he was knighted. His works include (The Story of the Heavens5 (1885) ; (Time and Tide) (1889); (Star-Land> (1889); <The Story of the Sun) (1893); (Great Astron¬ omers5 (1895); (The Earth's Beginning> (1901); (Popular Guide to the Heavens) (1905) ; *etc.*

BALL, Thomas, American sculptor : b. Charlestown, Mass., 6 March 1819; d. Mont¬ clair, N. J., 1911. He was the son of a house-painter and undertook the support of the fam¬ ily on the early death of his father. He se¬ cured employment as a boy-of-all-work at the New England Museum, Boston, where his as¬ sociations turned him to art and led him to study and practise portrait-painting. He also tried his hand at sculpture, his first attempt in this direction being a bust of

Jenny Lind. A life-size bust of Daniel Webster brought him great success and enabled him to leave in 1854 for Florence, where he studied two years. Soon after his return to Boston he began work on the celebrated equestrian statue of Wash¬ ington, which was unveiled in 1869. It was the first equestrian statue in New England and perhaps the best so far produced. He re¬

turned to blorence in 1865 and resided there for several years. His later works include Edwin Forrest as (Coriolanus) (1867), now in the Actors' Home, Philadelphia; Eve Stepping into Life) ; (La Petite Pensee5 ; (Saint John the Evangelist. > Of his larger works the most important are his Emancipation Group5 in Washington (unveiled 1875), a bronze repre¬ sentation of Lincoln freeing a kneeling slave; the Webster statue in Central Park, New York; the statue of Josiah Quincy before the City Hall, Boston ; the Washington monument at Methuen, Mass. He published an autobiog¬ raphy, (My Three-Score Years and Ten) (1891). Consult also Taft, (History of Amer¬ ican Sculpture5 (New York 1903).

BALL, Walter William Rouse, English mathematician b. 1850. He received his edu¬ cation at Trinity College, Cambridge, and at University College, London. He became lec¬ turer at Trinity College, Cambridge, in 1878, was appointed director of mathematical studies in 1891 and senior tutor and chairman of the college educational committee. He was the representative of the University of Cambridge on the borough council in 1905. He is a mem¬ ber of the governing bodies of Westminster School and the Cambridge Perse School. He has examined on various occasions in the Tri¬ pos and other examinations and has served on numerous boards and syndicates. He is owner of the largest collection in Great Britain of portraits of mathematicians. His publications include (A History of Mathematics5 ; (The Genesis and History of Newton's Principia5 (1893) ; (The Student's Guide to the Bar5 (7th ed., 1904) ; Eistory of Trinity College, Cambridge5 (1906) ; (History of the First Trinity Boat Club5 (1908) ; (Short Account of the History of Mathematics5 (5th ed., 1912) ; Mathematical Recreations and Essays5 (5th ed., 1912) ; (Records of Admission to Trinity College, 1546—1900 5 ; and various memoirs in mathematical journals.

BALL, as an article of ammunition, see Gunnery; Ordnance; Projectiles; Shot.

In connection with sports and games the ball in various sizes has been

in universal mage since ancient times. The Greeks re¬ garded ball-games as of much value in adding grace to the figure and giving elasticity to the muscles of the body and the Romans also played a game of ball in connection with their baths for the same purpose. Several of the games then played resembled modern handball, football and polo. Modern tennis and rackets undoubtedly had their beginnings in the jen-de-paume of the Middle Ages and lacrosse was originally played by the North American In¬ dians, though the historical data concerning these and other games are meagre and new customs and rules have so changed games that their true history cannot be told with exact¬ ness. Of varieties of balls for use in the dif¬ ferent sports there are many. The baseball is made of a sphere of rubber, 2l/2 ounces in weight, which is wound with yarn and cov¬ ered with leather. The basketball is an in¬ flated rubber ball, enclosed in leather and from 30 to 32 inches in diameter. The tennis ball is of rubber covered with white flannel, about 2V2 inches in diameter and 2 ounces in weight. The lacrosse ball is made of india-rubber and

is 8 or 9 inches in diameter. _ The polo ball is of wood and 4 or 5 inches in diameter. The football is a prolate spheroid in shape and consists of a rubber bladder encased in a leather cover. Billiard balls are of ivory and from 2t66 to 2x7g-inches in size. See Base¬ ball; Football; Basketball; Lawn Tennis; Rackets; Cricket; Handball; Lacrosse; Polo ; Billiards ; *Etc.*

BALL BEARINGS. See Bearings, Anti-Friction.

BALL CLAY. See Clay.

BALL COCK, a self-acting stop-cock, opened and shut by means of a hollow metallic sphere attached to the end of a lever con¬ nected with the cock. Its use is principally to regulate the supply of water to cisterns. The ball floats by reason of its buoyancy and ris¬ ing and sinking as the water rises and sinks, shuts oft the water in the one case and lets it on in the other.

BALL FLOWER, an architectural orna¬ ment resembling a ball placed in a circular flowrer, the three petals of which form a cup around it ; usually inserted in a hollow mould¬ ing and generally characteristic of the Dec¬ orated Gothic style of the 14th century.

BALL NOZZLE. See Hydrodynamics.

BALL AND SOCKET, a joint used in machinery and piping. It consists of a spheri¬ cal end of a rod or pipe fitting into a hollow sphere of the same size on a like piece. The object of this joint is to provide a close, mov¬ able connection and to prevent leakage in pipes. Suspended gas chandeliers are usually fitted with this movement.

BALLAD, a short narrative poem in stan¬ zas, originally intended for singing. The name, which is derived from the Latin ballare, to dance, is frequently used very loosely and ap¬ plied to a variety of songs and verse-tales with no real bond of association. But in the stricter sense it belongs to a comparatively small body of anonymous traditional poetry, the produc¬ tion of which has practically ceased in English-speaking countries, though literary imitations of the type are still composed. Its most char¬ acteristic quality is impersonality. Not only is the author unknown, but in the pure ballad there is no trace of his individuality. . The material of the poem is usually popular in ori¬ gin and the sentiment and point of view are those, not of a single person, but of the whole people. <(People,® in the sense here used, has reference not to the lower classes but to so¬ ciety in a period when in the matter of cul¬ ture the community was homogeneous. Thus the origins of the kind of poetry of which the ballad is a survival are to be looked for in a comparatively primitive stage of society, be¬ fore the <(poetry of art® came into existence, when the tribal community could still express itself in simultaneous utterances accompanying the rhythmic movements of dance or march.

This view of the origin of ballad poetry is not universally accepted. Over against it there is placed the apparently simpler theory that the ballads are the production of minstrels, from the 1 5th century down, who derived from ro¬

mances and other sources in artificial litera¬ ture stories which they threw into crude stan¬ zas, to chant sometimes in the houses of the great, sometimes at fairs and other popular gatherings. But the objections to this view are serious. First, minstrel ballads such as are here described were manufactured and still exist in abundant

broadsides and chap-books, but they are universally lacking in pre¬ cisely those qualities of impersonality and un¬ consciousness which constitute at once the mark and the charm of the true popular ballad. Second, the minstrel theory ignores the exist¬ ence of a large mass of ethnological evidence, showing the indubitable and well-nigh univer¬ sal existence of the practice of communal song and the development in this song of a narrative element. Third, it is a matter of definite proof that the genuine ballads which have been collected during the last two cen¬ turies have come, with rare exceptions, not from the mouths or wallets of minstrels, but from humble unprofessional people, ((the spin¬ sters and the knitters in the sun,® who have in so many branches of folklore proved the best conservators of the heritage of the peo¬ ple. A minstrel's addition to his stock of an occasional piece of more or less degraded pop¬ ular verse in no wise overthrows the signifi¬ cance of this fact. There is no reason to be¬ lieve that, in the centuries before ballad-col¬ lecting began, the medium of transmission was substantially different.

The argument on the other side has al¬ ready been partly indicated. First, there ex¬ ists the evidence of the widespread practice of accompanying communal activity — in la¬ bor, ceremonial or festal dance — -with rhyth¬ mic utterances; the gradual, growth of these utterances in definiteness of form ; the prac¬ tice of making them the medium of narrating some episode known to all — e.g., the story of some great deed accomplished by the hero whose death is being lamented, or the manner of the victory which is being celebrated, or some ludicrous incident in the season's labor happily finished, — the contribution of a new line or stanza now by this, now by that mem¬ ber of the dancing throug; the recurrent re¬ frain sung by all; the final creation of a nar¬ rative song for which no one individual is re¬ sponsible, but which is the expression of the thought and feeling of all. Second, the un¬ individual element is intensified by the method of transmission. Before any extant ballad came into the form in which we find it, it had been handed down from mouth to mouth through many generations, modified endlessly in detail, but by this very process losing what¬ ever individual elements might at any stage appear in it, and keeping, with what¬ ever change of matter or modernization of dia¬ lect, just those qualities of impersonality and unconsciousness of literary effect wrhich have been noted as its characteristic traits. Third, the theory suggested by these facts receives corroboration from the refrain and from the characteristic narrative method of the ballad, the so-called <(incremental repetition.® The phrase is used to describe the method of tell¬ ing a story by the repetition in a set of stanzas of the same words with just enough change to advance the

narrative one step. Thus the mo-BALLAD

tive for the murder of the Bonnie Earl of Murray is gradually insinuated by this method in these stanzas :

He was a braw gallant,

And he. rid at the ring;

And the bonny Earl of Murray, .

Oh he might have been a kingl

He was a braw gallant,

And he played at the ba;

And the bonny Earl of Murray Was the flower amang them a'.

He was a braw gallant,

And he played at the glove;

And the bonny Earl of Murray,

Oh he was the Queen's lovel

A moment's reflection will show how suit¬ able such a device is to communal improvisa¬ tion and how naturally it is derived from it. As for the refrain, the part played by the crowd in the singing of it does not need to be argued.

It is not implied that all ballads showing incremental repetition and preserving refrains were thus composed by a throng. For most, perhaps for all, of our extant ballads it is probably safe to assume a single original au¬ thor, whose name and circumstances are now hopelessly lost, but who first gave each ballad a definite form. But even when making this assumption, we must bear in mind the fact that he worked after models which went back ultimately to communal products, that he worked in a period when it was still possible to compose in the communal spirit, that he used for the most part

popular material and, finally, that his product has been transmitted orally through generations who altered and modified till whatever of personal existed in the first form has been obliterated. Thus, if the famous phrase, (<das Volk dichtet,® can¬ not be used of the ballads we read to-dav in the sense in which it was true of the earliest communal chants, it still holds to this extent that, in so far as a given specimen approaches the pure ballad type, it fails to exhibit the marks of any handiwork but that of the folk.

The ballad thus stands at the remote end of that line of development at the hither end of which we find the modern subjective lyric such as the sonnet. The curve which lies be¬ tween shows the tendency running through the history of poetry to have been to empha¬ size more and more the individuality of the author, to relegate the people more and more to the place of mere audience. We are pre¬ pared to find, then, many features in the his¬ tory of ballads highly dissimilar and even con¬ tradictory to those of modern literature. Thus the life of a modern poem begins when it is committed to paper : a ballad then begins to die. It lives only while it is still being trans¬ mitted orally from generation to generation, receiving from each its stamp. A modern poem has one authentic text : a ballad may have many texts, varying in number with the extent of territory over which it was sung, but no single authoritative text. A modern poem avoids explicit borrowing; the ballad absorbs and assimilates freely numbers of ˆcommonplaces,® — phrases, lines and even sets of stanzas that appear with equal appropriate¬ ness in half a dozen different ballads and are

the exclusive property of none. Such are the formulas for sending a messenger,

O whaur will I get a bonny boy, etc.;

for ordering a horse,

L . O saddle me the black, the black,

O saddle me the br own ;

for describing a journey,

They hadna' gaen a mile, a mile,

A mile but barely three;

for concluding a romantic tragedy,

The tane was burned in Mary's kirk The tither in Mary's quire,

And out of the ane there grew a birk.

And out of the ither a brier, *etc.*

A modern poet seeks novelty of epithet : the ballad clings to the traditional description ; the gold is red, the lady is fair, her dress is grass-green, her hair is yellow, her tears are salt, the moon's light is clear, the porter is proud, brothers are bold, a bower is ((bigly,® and so on.

Equally characteristic is the treatment of incident and plot in the ballad. There is sel¬ dom any introduction : we plunge at once into the midst of the action. The stanzas leap from peak to peak of the narrative, with no attempt to supply the less important links, yet seldom with any real sacrifice of clearness. The events in the uncontaminated ballad are unmoralized and unsentimentalized; the bald fact is left without comment or criticism from the singer. Conscious figures of speech are rare and the background is seldom filled in. Thus the gen¬ eral result is that of rapidity of motion, direct¬ ness and unconsciousness of effect, an absence of artistic suggestion. Whenever we find a moral drawn or a dwelling on the pathetic, in¬ terpolation by a modern would-be artist is to be suspected.

From what has been said of origins, it is clear that little can be guessed as to the date of composition of ballads. Some, notably those simple, highly typical stories like (The Twa Sisters, > written in a two-line stanza with a refrain, with stress upon situation rather than upon succession of events, may in some form be of almost any age. Others have an upper limit of date fixed by the historical event which occasionally forms the basis of the plot. The dates of ballad manuscripts, which are, of course, an entirely different thing, and a date of death rather than of birth, are more easily fixed. The earliest is <Judas) (No. 23 in Child's collection) from a 13th century MS. ; the next (Riddles Wisely Expounded) (Child, 1) about 1445; a little later, (Robin Hood and the Monk* (Child, 119), (St. Stephen and Herod) (Child, 22), and (Robyn and Gandelyn* (Child, 115) ; two exist in copies of about 1500; two others about 1550. Less than a dozen are preserved in MSS. before 1600. The most im¬ portant single MS. is the Folio which Bishop Percy used as a basis for his famous <(Reliques of Ancient English Poetry,® and it is in a handwriting of about 1650. A

few appear in early printed forms. (A Lytell Geste of Robyn Hode> was printed about 1500, and broadside versions, usually in very degraded form, ap¬ peared frequently in the 17th and 18th cen¬ turies. The most important sources after the Percy Folio are the collections made directly from the mouths of the people, such as those of David Herd (1776), Mrs. Brown of Falk¬ land (1783-1801), Sir Walter Scott (1783-1830), C. K. Sharpe (c . 1823), Motherwell

(1825-2 7), Kinloch (1826), Buchan (1828), MacMath and Child (second half of the 19th century).

Ballads on historical occurrences apart, most of the plots belong to the mass of folk-tale which is the exclusive possession of no one nation or language. Many ballads tell stories, versions of which are found in almost every known tongue. The explanation of this world¬ wide diffusion of story-material is one of the standing problems of folklore ; but whatever theory of its cause be adopted, the fact that it is largely from this international treasury that the ballads derive their plots is a strong reason for regarding them as essentially ˆpopular® in mat¬ ter as well as in manner.

Turning now to the nature of these stories, we find that by far the largest class is concerned with romantic love and its consequences. Many are tragic, the interference of fathers, mothers or brothers being perhaps the commonest cause of the fatal issue. Both in these and in the romantic ballads with happy endings the sym¬ pathy of the audience with the lovers is in general assumed, and in cases of illicit love no moral judgment is passed or suggested. Some of the best are ballads of wat by land or sea; and the irregular warfare of the Borderland between England and Scotland has given birth to a number justly famous. The largest group connected with a single personality is that of the Robin Hood ballads. Of these, some like (A Lytell Geste5 and (Robin Hood and the Monk) represent not only the finest of the out¬ law group, but rank with the best of all ballads. The later members of this group, however, show serious deterioration, and they finally sink into the degradation of broadsides manufactured by

printers' hacks. The (Geste) itself is of especial interest as showing a significant stage in the process by which ballads are combined in the formation of the popular epic. In it four or more distinguishab*3 ballad plots are woven to¬ gether to form a miniature epic, the interweav¬ ing being clearly the work of a conscious artist who at the same time was in full sympathy with the popular spirit. The supernatural also plays an important part in the ballads, and it is possi¬ ble to gather from them much information as to popular belief on such themes as fairies, witches, the return of the dead, transformation by enchantment and the like.

The number of extant ballads in English may be gathered from the great final collection of Professor Child. Here, ignoring variants, we have 305, most of which are popular in the sense which has been defined, i.e., they fulfil these conditions, that even if written each by an individual author, that author belonged to the people, drew his material from the common stock of folk-tales, wrote in the popular spirit, and used the traditional method, had his product accepted by the folk and passed on and modified by them through centuries of oral transmission. Some few such as (The Boy and the Mantle, > (King Arthur and King Cornwall, > and (The Marriage of Sir Gawain,* are closely associated with metri¬ cal romances, and are usually regarded as writ¬ ten by minstrels for more courtly audiences, but are yet enough in the popular style to justify their inclusion as ballads. More are traditional ballads corrupted for the printing press and represented by broadside versions

because no purer form has survived. And in the case of almost every ballad surviving in several versions, some versions show a higher degree of purity from literary editing than others.

The localities from which the ballads have been gathered are widely scattered, versions of several having been picked up in America. But Scotland claims about two-thirds of the whole.

Spain possesses the richest ballad literature of all Latin peoples. The Serbians still main¬ tain in popular use ballads of a primitive kind, which have long since disappeared in other Occidental nations more under the influence of modern civilization. In Germany the oldest extant ballad, the (Hildbrandslied) dates from the 8th century. Ballad literature flourished there, reaching its highest point about the year 1300 and lasting until the 16th century, when a rapid decline set in. It was revived during the 19th century and aroused great literary

interest.

Bibliography. — The completion of F. J. Child's exhaustive < English and Scottish Popu¬ lar Ballads) (5 vols., Boston 1882-98), with its bibliographies and full account of the sources, makes unnecessary a list of previous less com¬ prehensive collections. Every known version of every extant ballad in any English dialect was intended to be included by the editor, and little or nothing has escaped him. The introductions give an account of parallels and analogues throughout the world. An abridged collection has been edited by H. C. Sargent and G. L. Kittredge (1 vol., Boston 1904). On the ques¬ tion of origins, consult F. B. Gummere, (01d English Ballads) (Boston 1894) ; (The Popular BalladL (New York 1907) ; (Democracy and Poetry) (ib. 1911) ; (The Beginnings of Poetry > (ib. 1904) ; (The Popular Ballad) (Boston 1907) ; T. F. Henderson's edition of Scott's (Minstrelsy of the Scottish Border) (Edinburgh 1902) and his (Scottish Vernacular Literature) (Chap, xi, London 1898) and Courthope's (History of English Poetry) (Vol. I). An excellent condensed statement of the whole matter by G. L. Kittredge forms the introduction to the one-volume edition of Child's collection. American ballads were col¬ lected by J. A. Lomax in the volume (Cowboy Songs) (New York 1911). Of Spanish ballads the best collections are Marin, (Cantos popolares espanoles > (5 vols., Madrid 1883) ; (Bibli-oteoa de las tradiciones popolares) (11 vols., Seville 1883). Consult also Bohl von Faber, (Floresta de rimas antiguas Castellanas) (3 vols., Hamburg 1825) ; Balaguer, (Historia de los Trovadores) (Madrid 1888) ; Lockhart, (Ancient Spanish Ballads) (London 1823) ; Fitzmaurice Kelly, (History of Spanish Literature) (New York 1898). For the Serbian con¬ sult Bowring, (Serbian Popular Poetry) (Lon¬ don 1827) ; Kapper, (Volkslieder der Serben) (Leipzig 1853) ; Krauss, (Sagen und Marchen der Siidslaven > (Leipzig 1884). For the Ger¬ man consult Uhland, (Alte hoch und nieder-deutsche Volkslieder) (4 vols., 3d ed., Leipzig 1892) ; Robertson, (History of German Literature) (Edinburgh 1902) ; Scherer, (Die schonsten deutschen Volkslieder) (Leipzig 1868) ; Vogt and Koch, (Geschichte der deutscher Litteratur) (2 vols., ib. 1904).

William A. Neilson,

Professor of English, Harvard University.

BALLAD. In music, this term has been used at different periods to designate various musical forms. At first ballads were princi¬ pally literary compositions recited by minstrels with improvised accompaniment on some in¬ strument, usually the harp. This is especially the case with the old ballads of Scotland, Eng¬ land, Spain and Scandinavia. In Italy preced¬ ing the growth of instrumental music the ballad appears to have been a dance song, and the same is true of the ballads of France and Ger¬ many which reached a high degree of artistic elegance in the 13th century. In the 15th cen¬ tury the ballad divided honors with the ron¬ deau as the popular form of song with musical accompaniment. The decline of the ballad set in about the close of the 16th century, its form becoming more and more simple, and returning to the plain strophic folk song, and even de¬ generating into the cheap, trivial song sung in the streets. The modern ballad is not a re¬ vival of the older form. It is now the title of purely instrumental works for piano or or¬ chestra. Consult Riemann, H., (Handbuch der Musikgeschichte) (Leipzig 1906).

BALLAD OPERA, a form of operetta which had a great vogue in England in the 18th century, and in which the usual method of writing music to the words was reversed. Well-known popular airs were pieced together and new words were written to the music. Spoken dialogue was interspersed. The most popular work of this genre was (The Beggar's Opera) of John Gay, produced in London in 1727. See Opera. Consult Sarrazin, G., (John Gay's Singspiele> (Weimar 1898).

BALLAGH, James Curtis, American edu¬ cator and historian :»b. Brownsburg, Va., about 1866. In 1888 he was graduated at the Univer¬ sity of Virginia and in 1895 received the degree of D.Ph. at Johns Hopkins. In 1891 he was ap¬ pointed assistant professor in biology at Tu-lane, and in 1895 assistant instructor and asso¬ ciate in history at Johns Hopkins; in 1905; he became associate professor of American history at the same institution and professor in 1911; since 1913 he has been assistant professor and professor of political science at the University of Pennsylvania. In 1906 he received the degree of LL.D. from the University of Pennsylvania. Dr. Ballagh has published (White Servitude in the Colony of Virginia* (1895); (H.istory of Slavery in Virginia* (1902) ; (American For¬ eign Policy in the

Orient) (1915) ; also numer¬ ous articles in reviews and encyclopedias. He edited Southern Economic History) (Vols. V and VI in (The South in the Building of the Nation,) 1910) ; (The Letters of Richard Henry Lee* (Vol. I, 1762-78; Vol. II, 1779-94, 1911).

BALLAGH, James H., American mission¬ ary in Japan: b. 1837 and still in active serv¬ ice. He was graduated at Rutgers College in 1857 and New Brunswick Seminary in 1860. He sailed for Japan in 1861, the voyage occupy¬ ing four months. He was a fluent speaker of Japanese, Christian worker and evangelist among the people, active correspondent of American journals, translator of the Heidel¬ berg Catechism and founder of the first Prot¬ estant Christian Church in Japan in 1872 at Yokohama, on Perry's treaty ground. His two daughters and granddaughters are or have been in missionary work, and, with an infant vol. 3 — 7

born 1916, show four generations of Americans in Japan. His wife, Margaret Tate Kinnear, d. 1907, author of (Glimpses of Old Japan, 1861-1866) (1908), was the first person to

demonstrate the capability of the Japanese voice to master the Occidental musical scale and to begin the culture of foreign music ; whence by evolution have come the triumphs of to-day. He is the father of James Curtis Ballagh (q.v.), author and historian. Consult (The Christian Movement in Japan * (an annual volume, 1904, et seq.).

BALLAGI, Maurice, or Moritz, Bloch, a

Hungarian philologist and Protestant theo¬ logical author, most widely known for his grammars and dictionaries of the Hungarian language: b. Inocz, of Jewish parents, 18 March 1815; d. 1 Sept. 1891. He was educated at Budapest and Paris; was converted to Protes¬ tantism in 1843; studied theology at Tubingen; and was professor of theology at Szarvas from 1844 to 1848 and from 1851 to 1855, and at Budapest from 1855 to 1878. His first large work was the translation of the Bible into the Hungarian language for the purpose of Mag-yarizing the Jews, but of this work only the Pentateuch and the book of Joshua were pub¬ lished (Budapest 1840-43). The most import¬ ant of his philological works are (Ausfuhr-liche theoretischpraktische Grammatik der ungarischen Sprache) (1843; 8th ed., 1881); (Vollstandiges Worterbuch der ungarischen und deutschen Sprache* (2 vols., 1854-57; 6th ed., 1890) ; (Sammlung der magyarischen

Sprachworter* (2 vols., 1850; 2d ed., 1855).

BALLANTINE, James, Scottish artist and poet: b. Edinburgh, 11 June 1808; d. 18 Dec. 1877. He was brought up as a house painter, but afterward learned drawing under Sir Wil¬ liam Allen and was one of the first to revive the art of glass-painting. He was commis¬ sioned to execute the stained-glass windows for the House of Lords, and in .1845 published a treatise on glass-staining, which was translated into German. Two prose volumes, (The Gaberlunzie's Wallet) (1843), and (The Miller of Deanhaugh) (1845), contain some of his best-known songs and ballads in the vernacu¬ lar. He was author of <Poems) (1856 and 1865) ; (One Hundred Songs with Music) (1865) ; (Life of David Roberts, R.A.* 1866), and (Lilias Lee* (1871).

BALLANTINE, William Gay, American educator : b. Washington, D. C., 7 Dec. 1848. He was graduated at Marietta College 1868, and at the Union Theological Seminary 1872; studied in Leipzig; was attached to the Amer¬ ican Palestine Exploring Expedition of 1873 ; professor of chemistry and natural science in Ripon College 1874-76; assistant professor of Greek in the University of Indiana 1876-78; professor, Greek and Hebrew, Oberlin Theo¬ logical Seminary 1878-81 ; president of Ober¬ lin College 1891-96; and since 1897 professor of the Bible in International Y. M. C. A. Col¬ lege, Springfield, Mass. Author of (Inductive Logics

BALLANTYNE, Charles Colquhoun,

Canadian manufacturer and statesman : b. Colquhoun, Ont., 9 Aug. 1857. He was edu¬ cated at Colquhoun and Montreal. He became while still a young man managing director of

the Sherwin-Williams Paint Company, Mon¬ treal, and was one of its

purchasers in 1911. He was some time mayor of Westmount. Although never actively identified with party politics, he has always been regarded as a Liberal, but de¬ clared his opposition to the Taft-Fielding reci¬ procity agreement of 1911. During the Euro¬ pean War he raised a battalion for overseas service. On 3 Oct. 1917 he joined the Union government of Sir Robert Borden as Minister of Public Works, but a week later took over the portfolio of marine and fisheries.

BALLANTYNE, James, Scottish printer: b. Kelso 1772; d. Edinburgh 1833. Successively a solicitor and a printer in his native town, at the suggestion of Sir Walter Scott he removed to Edinburgh, where the high perfection to which he had brought the art of printing, and his connection with Scott, whose works he printed, secured him a large trade. The firm of James Ballantyne & Company, included Scott, James Ballantyne and his brother John (who died in 1821). For many years he conducted the Edinburgh Weekly Journal. His firm was involved in the bankruptcy of Constable & Company, by which Scott's fortunes were wrecked, but Ballantyne was continued by the creditors' trustee in the literary management of the printing-house. He survived Scott only about four months.

BALLANTYNE, James Robert, Scottish Orientalist : b. Kelso, Scotland, 1813 ; d. 1864. After receiving an education at Haileybury College he was sent to India, where he was placed in charge of the Sanskrit College at Benares. His aim, steadily pursued during his residence in India, was to aid in establishing more intelligent relations between Indian and European thought. On his return to England he was made librarian of the East India office. Among his writings are (The Practical Oriental Interpreted (1843); (Catechism of Sanskrit Grammar > ; (Synopsis of Science in Sanskrit and English, reconciled with the Truths to be found in the Nyaya Philosophy-* (1856); Christianity Contrasted with Hindu Phi¬ losophy > (1859).

BALLARAT, or BALLAARAT, Aus¬ tralia, town in the state of Victoria, the chief centre of the gold-mining industry of the colony, and the place next in importance to Melbourne, from which it is distant west-north¬ west 74 miles by rail. It owes its present im¬ portance and prosperity to its being the centre of one of the richest gold-yielding districts of the world. It consists of two distinct munici¬ palities, Ballarat West and Ballarat East, which are separated by Yarrowee Creek. The town is well lighted with gas, abundantly supplied with water and contains many handsome public edifices, among which may be mentioned the city hall, council chamber, two town halls, a spacious hospital, an orphan asylum, a benevo¬ lent asylum, two

cathedrals, botanical gardens and an excellent school of mines. Its chief in¬ dustries are those of the gold mines, iron foundries, woolen and flour mills, breweries and distilleries. Its establishment and rise date from the discovery of gold in 1851. The larg¬ est gold nuggets ever unearthed were discov¬ ered here. Ballarat East and Ballarat West have been distinct municipalities since 1855,

and in 1870 the latter was proclaimed a city. Pop. 42,403.

BALLAST. (1) Heavy matter, as stone, sand, iron or water placed in the bottom of a ship or other vessel, to sink it in the water to such a depth as to enable it to carry sufficient sail without oversetting. (2) The sand placed in bags in the car of a balloon to steady it and to enable the aeronaut to lighten the balloon by throwing part of it out. (3) The material used to fill up the space between the rails on a rail¬ way in order to make it firm and solid.

BALLENTYNE, or BALLENDEN, John, Scottish poet and translator of Boece's (Latin History, > and of the first five books of Livy into the vernacular language of his time : b. Lothian toward the close of the 15th cen¬ tury; said to have died at Rome 1550. He was in the service of James V from the King's earliest years, and at his request he translated Boece's (History, > which had been published at Paris in 1526, the translation being printed in 1536. It is so much a free translation as to be almost an original work. As a reward he was made archdeacon of Moray and a canon of Ross. He was a bitter opponent of the Reformation.

BALLENY, balla'ne, ISLANDS, a

group of five small volcanic islands discovered by Balleny in the Antarctic Ocean in 1839, nearly on the Antarctic Circle. One of the islands, Young Island, contains a ver)ˆ lofty mountain, about 12,000 feet high. ,

BALLESTEROS, bal-yes-ta'ros, Don Francisco, Spanish general: b. Saragossa 1770; d. Paris, 22 June 1832. He first served in Catalonia against the French during the campaigns of 1792 and 1795, and was appointed to a captaincy. Discharged in 1804 on account of embezzlement, he was nevertheless entrusted by the all-powerful Godoy, (<prince of the peace, with one of the most productive offices in the custom-house, the direction of the res-guardo at Oviedo. When the French army in¬ vaded Spain in 1808 Ballesteros was promoted to

a colonelcy by the provincial junta of As¬ turias and joined the Castilian army under Castanos and Black. The regency of Cadiz pro¬ moted him to the rank of lieutenant-general and put him in command of the army of Anda¬ lusia. He had then to fight against some of the most skilful chiefs of the French army, and succeeded in avoiding their pursuit by peculiar tactics. When Wellington in 1812 took over the general command of all the armies in the Peninsula, Ballesteros showed such violent op¬ position that he was arrested for treason and sent as a prisoner to Ceuta. A few months later he was restored to liberty but was not al¬ lowed to re-enter the military service. On the return of Ferdinand VII to Spain Ballesteros evinced such devotion to monarchical principles that he was appointed Secretary of War, but was soon dismissed and sent to Valladolid, where he was placed under the strictest sur¬ veillance. When the struggle between the roy¬ alists and the constitutionalists commenced he managed so artfully that each party thought Ballesteros was acting in concert with it. Commissioned by the chiefs of the latter to obtain the assent of the King to the Constitu¬ tion, he succeeded beyond their anticipations

and became a member of the council of state, while he was at the same time admitted in the communeros association. This double-dealing seemed to be perfectly successful, for in 1823, on the entry of the French into Spain, he was appointed to the command of the army ; but instead of showing fight he concluded a capitu¬ lation with the Duke of Angouleme, which be¬ came the occasion of accusations of such a char¬ acter that Ballesteros thought it imprudent to stay any longer in his own country and took refuge in France, where he died a forgotten exile.

BALLESTREM, bal'les-stram, Franz Xaver, Count von, German statesman : b. Plawniowitz, in upper Silesia, 1834; d. 1910. Entering the Prussian army he served during the Austro-Prussian War of 1866 and the Franco-Prussian War of 1870-71. At the close of the latter he was elected to the Reich¬ stag, where he soon became prominent in the Centre party. Pius IX appointed him a papal chamberlain for his

activity in the Kulturkampf and he was first vice-president of the lower House, 1890-93.

BALLET, bal'la', or bal'let (from bal; from the French bailer, and the Italian ball are, to dance), a kind of dance now usually constitut¬ ing an interlude in a theatrical performance. In its widest sense a ballet is the representa¬ tion of a series of passionate actions and feel¬ ings by means of gestures and dancing. In a more confined sense we call ballets musical pieces, the object of which is to represent, by mimic movements and dances, actions, charac¬ ters, sentiments, passions and feelings, in which several dancers perform together. Ac¬ cording to the analogy of lyrical poetry those which rather represent feelings may be called lyrical ballets ; those which imitate actions, dramatic ballets. The lyrical and dramatic ballets, together, constitute the higher art of dancing, in opposition to the lower, the aim of which is only social pleasure. Dramatic ballets are classed as historical, the subject of which is a real event ; mythological, in which the sub¬ ject is some fabulous action; and poetical, founded on poetical fiction, to which belong also the allegorical, necessarily the most imper¬ fect. A ballet is usually divided into several acts, each of which has several entrees. An entree, in a ballet, consists of one or several quadrilles of dancers, who, by their steps, ges¬ tures and attitudes, represent a certain part of the action. In criticising a ballet we must consider, first, the choice of the subject, which must have unity of action or of passion, and be capable of being represented in an intelligible manner by means of mimic movements and dancing; secondly, the plan and execution of the single parts, which must have due propor¬ tion to each other; and, finally, the music and decorations, which must supply whatever danc¬ ing cannot bring before the eye. The ballet is an invention of modern times. Baltazarini, director of music to Catherine de Medici, probably gave its form to the regular ballet, though pantomimic dances were not unknown to the ancients. The ballet owes much to the French, and particularly to Noverre. During the early 19th century the French and Italian schools were in their heyday but since 1850 have been eclipsed by the Russians who under

Petipas, Fokine, and more recently Bakst, have evolved a school uniting the romanticism of the old-time ballet fairy lore with a genuinely modern realism. Anna Pavlowa was developed in this school and is regarded the equal of Taglioni, Cerito and Ellsler, the greatest danseuses of the French and Italian schools of the first half of the last century. Consult Castil-Blaze, (La danse et les ballets) (Paris 1832) ; Flitch, (Modern Dancers and Dancing) (London 1912) ;

Menestrier, (Des ballets anciens et modernes) (Paris 1682) ; Noverre, ((Lettres sur la danse et les ballets) (1760; 1807) ; Pougin, A., (Dictionnaire historique du theatre* (Paris 1885) ; Voss, (Der Tanz und seine Geschichte* (Berlin 1868). See Opera.

BALLIET, bal'li-et, Thomas M., Ameri¬ can educator : b. 1 March 1852. He was edu¬ cated at Franklin and Marshall College (Lan¬ caster, Pa.) and at Yale University; was ap¬ pointed superintendent of public schools in Springfield, Mass., and also became associate editor of the Pedagogical Seminary. He was elected dean of the School of Pedagogy of New York University, which post he holds at present. His published writings include (Some New Phases of Educational Thought^

BALLIN, Albert, director-general of the Hamburg-Amerika line : b. Hamburg 1857 ; d. 9 Nov. 1918. After receiving a good com¬ mercial education he went to England and resided there several years, studying the British mercantile marine and acquiring a thorough knowledge of the language. After 1886 he acted as head of the great Hamburg-Amerika steam¬ ship line, and it was mainly due to his perse¬ verance and organizing skill that his com¬ pany succeeded in surpassing all its rivals in the variety and extent of its maritime opera¬ tions. When he joined the firm, its capital was $3,750,000; at the outbreak of the European War it was $37,500,000. Whereas in the early years of his administration its gross profits were $625,000, in 1913 its gross profits ap¬ proached $15,000,000, while the company's pennant floated from the mastheads of 180 ves¬ sels. From a total tonnage of 60,000 for the whole fleet 25 years before, one single vessel in 1913, the Imperator, had alone a tonnage of 50,000. Though of humble origin Herr Ballin was one of the intimates of the Kaiser, who admired his extraordinary talents and frequently sought his counsel when matters relating to the extension of German commercial affairs were in question. He was often called one of the real makers of modern Germany, and so highly prized were the services he rendered to his country that the Kaiser was stated to have offered him on more than one occasion a portfolio in his cabinet. A modest and retiring man of small stature and unob¬ trusive bearing. Herr Ballin was essentially a man of peace ; he was never included in the ((jingo® ranks of his countrymen. He was credited with having exerted all his influence with the Kaiser to yield to the United States demands on the submarine question in order to avoid a rupture with this country. He foresaw and dreaded that which eventually came to pass — the seizure of all the valuable German vessels interned in American ports. In December 1915 he published an article in the Vossische Zeitung in which he repeated the

German slogan that the war was all for the advantage of the world on the other side of the ocean (the United States), and to <(the delight of the yellow race® (Japan). His assertion that Germany was fighting for a free pathway over both land and water was less convincing, from the fact that the actual free¬ dom of the seas existing before the war had enabled him unmolested to build up a gigantic shipping concern.

BALLIN, Hugo, American artist: b. New York, 7 March 1879. He studied at the Art Students' League, New York, and in Rome and Florence. While in Italy he studied mural decoration with Robert Blum. He returned to the United States and established his practice in New York. His work shows a notable ability in the field of decorative painting. His principal works are (Susanna's Bath) ; (The Lute Player } ; (Three Women Dancing about Cupid,) which won the Shaw prize in 1905. He won the Clarke prize in 1906 with (Mother and Child. > Another notable work is his (Portative Organ.) He was awarded the Hallgarten prize and the Isidor gold medal in 1907. His work has been reproduced in the Critic, the Century and the Kunst und Kunstlerwerke of Vienna. His works are to be found in the executive chamber of the Capitol at Madison, Wis., in the home of Oliver Gould Jennings, New York, and E. D. Brandyce of Boston. He is also represented in the National Museum, Washington, D. C., the Montclair Museum, N. J., and the Ann Mary Memorial, Rhode Island, and in many private collections. He is an associate of the National Academy since 1905, is member of the Architectural League, the Society of Mural Decorators, the National Institute of Arts and Letters and the American Water Color Society.

BALLINGER, Richard Achilles, Ameri¬ can lawyer and public official : b. Boonesboro, Iowa, 9 July 1858. He was educated at the University of Kansas and Washburn College, Topeka, and was graduated at Williams College in 1884. He was admitted to the bar in 1886, practised in, and was city attorney of, Kanka¬ kee, Ill., and New Decatur, Ala.; and at Port Townsend, Wash., 1889-97. He was United States court commissioner 1890-92, judge of the Superior Court,

Jefferson County, Wash., 1894—97. In the latter year he began the practice of law in Seattle and from 1904 to 1906 was mayor of that city. During the next two years he was commissioner of the General Land Office in Washington, and from 1909 to 1911 was Secretary of the Interior in President Taft's Cabinet. His opposition to a radical con¬ servation policy led to a bitter conflict with Gifford Pinchot, the chief, forester, and a Congressional inquiry was instituted into his administration of Alaskan coal lands, in which he was completely exonerated. After his resig¬ nation as Secretary of the Interior he resumed the practice of law in Seattle. He has pub¬ lished (Ballinger on Community Property > (1895); and (Bal1inger's Annotated Codes and Statutes of Washington (1897).

BALLINGER, Tex., city and county-seat of Runnels County, 225 miles west of Fort Worth, on the Colorado River, and on the Abi¬ lene and Southern, the Gulf, Colorado and Santa Fe railroads. It is situated in a rich agricul¬

tural region, producing corn, cotton, fruit, peanuts, wheat, etc., and has flour and cotton¬ seed-oil mills. The city contains a Carnegie library, two theatres, several parks and a lake. The water works are municipally owned. An irrigation system has been constructed recently on the Colorado River at this point. Pop.

3,536.

BALLIOL (bal'yol) COLLEGE, Oxford, an important college founded between 1263 and 1268 by John Balliol. The original foun¬ dation consisted of 16 poor scholars, and the revenue for their maintenance amounted for many years to only 8d. per week for each. From 1340 to 1830 the college was greatly en¬ riched by various benefactions. The Society consists of a master, 13 fellows and 24 scholars. The master and fellows enjoy the privilege of electing their own visitor. In 1887 Balliol Col¬ lege absorbed New Inn Hall. John Wyclif was master of this college in 1361 ; among its scholars have been John Evelyn, Bradley the astronomer, Matthew Arnold, Swinburne, Arch¬ bishops Tait and Temple, H. H. Asquith and Lord Edward Grey. The Snell exhibitions for students of Glasgow University attract an¬ nually to this college a few distinguished Scot¬ tish students.

BALLISTIC GALVANOMETER, a

galvanometer (q.v.) designed or used for the measurement of electric currents of very short duration. It does not necessarily differ in any essential particular from other galvanometers, except that the natural period of oscillation of its needle must be long in comparison with the duration of the transient currents that are to be measured. If C is the intensity of the cur¬ rent that is to be measured, and t is the time during which it passes, the general theory of the instrument is as follows : The magnetic moment tending to deflect the needle is propor¬ tional to C , and the angular velocity that such a magnetic moment can produce when acting upon a freely suspended body like the needle is proportional to t. Hence the angular velocity actually communicated to the needle is propor¬ tional both to C and to t ; or, in other words, it is proportional to the product of Ct. But an electric ˆcurrent® (such as is here denoted by C) is defined as the quantity of electricity pass¬ ing per second; and hence Ct is the quantity of electricity passing in the time t. The angular velocity actually communicated to the needle (which is inferred by observing the extent of the swing) is therefore proportional to the total quantity of electricity passed through the gal¬ vanometer during the short time t, and not to the intensity of the current. This constitutes the chief peculiarity of the instrument. The ballistic galvanometer measures the total quan¬ tity of electricity passed through the instrument, and its readings are in coulombs ; while other galvanometers measure the intensity of the cur¬ rent passing, and their readings are in amperes. If the needle of the instrument moves sensibly during the passage of the current, the magnetic movement exerted upon the needle will also vary, even though the current itself remains constant. It is for this reason that the period of free swing of the needle must be long if the instrument is to be used ballistically.

BALLISTIC PENDULUM. This device, first used in 1740, measures the velocity of projectiles and the resistance of the air. If such a pendulum, being at rest, is struck by a body of known weight, and the vibration, which it makes after the blow, is known, the velocity of the striking body may thence be determined. The quantity of motion of

the body before im¬ pact is equal to that of the pendulum and body after impact. It consists essentially of a strong, large pendulum, which has its axis of suspen¬ sion secured, and a core or block at its lower part. The projectile is fixed into this core and remains there, causing the pendulum at the same time to swing through a certain angle (a) with the vertical ; this is measured by a slider which is pushed along a fixed arc. It is an established fact that the centres of percussion and oscillation are coincident, and the centre of oscillation is readily found by causing the pendulum to vibrate through a small arc; and observing the period (T) taken to perform a

number of vibrations (»), then — gives the

n

time (t) of a single vibration with con¬ siderable accuracy. The length of the cor¬ responding simple pendulum (/), the distance of the centre of oscillation or percussion from the axis of suspension is then known from the

formula, t= x y” / . If the distance of the

g

centre of the core from the axis of suspension is exactly equal to /, the instrument is in adjustment; but if this is not the case, weights must be pushed up or down the pendulum by trial and error, till the time of oscillation is found to be correct.

BALLISTICS. The name /ballistics9 ap¬ plies to that division of mechanics which treats of the motion of projectiles.

This subject has engaged the attention of mathematicians and scientists for centuries, and approximate determinations of physical rela¬ tions have been assumed as fundamental laws, and elaborate tables calculated on various hypotheses. A resume of these contributions to the science will be found under the caption Gunnery, to which the reader is referred.

As a basis for the simple general discussion of both exterior and interior ballistics, certain general hypotheses, justified by present knowl¬ edge derived from careful experiments in each case, will be made. These are :

1. The motion of a projectile in the bore of a gun is such that the velocity, v, when the projectile has traveled a distance u along the

bore is given by the relation

au

V = T~\ -

b - J— u

This relation is derived from the records of measurements of time of recoil of a free car¬ riage, measured by a tuning fork scoring on a blackened ribbon. In all cases the velocity is duplicated by a relation of this form with a fidelity as remarkable as will be found in the case of any accepted experimental law con¬ nected with explosives.

2. The motion of a projectile in air is, at any point x,y, of its path or trajectory affected by two forces ; namely, the force of gravity acting vertically downward with an accelera¬

tion g feet per second, and the resistance of the air, acting in direct opposition to the mo¬ tion of the projectile in its path. Experiment shows that the retardation due to air resistance is given by an expression of the form

F (v) r C

in which

F (v) is dependent on the velocity, v, alone, and increases with it ; and C is given by the formula

r _ w

C c ‘ id2

in which

is the density of an atmosphere assumed as standard,

d is the mean density of the air in the par¬ ticular case under consideration,

w the weight of the projectile in pounds, d the calibre of the projectile in inches; that is, the diameter of the projectile,

i the ˆcoefficient of form® of the projectile, C the ((ballistic coefficient® of the projectile. The value of i is given by the formula

4w-1

n being the radius of the arc with which the ogive or head surface is generated, the radius being measured in calibres, i is unity for n — 2, which is the standard for ballistic tables. Recent developments point to a value n = 7 for projectiles of the future; this gives i = 0.56, thus practically halving the retardation, or doubling the ballistic efficiency of a projectile otherwise the same.

With these hypotheses, exterior and interior ballistics may be satisfactorily discussed and practical problems may be readily solved.

Interior Ballistics. — If v be the velocity, in feet per second, corresponding to a travel, u inches, along the bore, of a projectile of mass m and weight, w pounds ; propelled by a charge, o pounds of powder, fired in a powder chamber of volume, c’ cubic inches; the cross section of the bore being a square inches; the total length of the rifled bore being U, and the total volume of the bore and chamber combined being C, the following relations obtain

<x U = C — c’

cP - 12 m v

12 —

dv

du

a2 bu

g (b + u)3 P being the pressure in pounds per square inch for travel u.

The maximum pressure occurs when

b

for which

ii

— 16 ap =

= u

via

For infinite travel

v

a

and hence

1

E & =d. via 2

2

represents the total energy of the powder charge pertaining to the translation of the projectile; and, as the powder charge is increased, the waste energy (that is, that used in doing work other than conferring velocity on the projectile) remaining approximately the same, while the total energy increases, it is seen that the efficiency per pound of powder should increase with the charge, other conditions remaining the same. Accordingly it would appear that

should increase with the powder charge ; or, more strictly, with the powder charge per unit of chamber-volume. . In metric units this ratio of powder charge to chamber is expressed by dividing the weight of the pow'der charge by the volume of the chamber; but, as our units are not so related, this ratio, called the ((density of loading® is defined as the ratio of the weight of the powder charge to a volume of water which will exactly fill the powder chamber ; and, as one pound of water occupies 27.68 cubic inches, the density of loading is

Accordingly,

E =

A =

27.68 £ c’

1

2

= E o

E0, being the value of E for a density of load¬ ing unity, serves as a measure of the quality of the powder as to force or potential, q being a small fraction.

It is readily seen that the space in the powder chamber, c\ unoccupied by the powder substance and known as the (<initial air space,® is

in which 3 is the density of the powder sub¬ stance, or its (<specific gravity,® as it is other¬ wise called. The value of 3 for all powders is about 1.6, being given for smokeless (nitro¬ cellulose) powders, as

<1=1.644 — .012/*

*

by Colonel Kisnemsky, h being the content of moisture, expressed as a percentage.

When the projectile has advanced along the bore a distance u0, the volume of travel, c iio, corresponding to which is the initial air space, one <(expansion® is said to have occurred.

The travel to maximum pressure is generally accepted as proportional to the travel, u0, corre¬ sponding to the initial air space and called the (<reduced length of the initial air space.®

The value of — or of b will then contain

a factor

or

1 wv 2 j j i {

T T i “w)

in which k lies between zero and unity. Since b is inversely proportional to the maximum pressure it follows that, if we are to consider pressures on the base of the bore (the ones measured), the factor

1 + k—

w

will occur in the denominator of b. Hence b will be of the form

The quantity Q, constant for a given gun, powder and projectile, is found by experiment to be of the form

The exponent r is nearly constant and has a mean value ˆ for widely varying conditions.

The coefficient S has a value dependent on the form and size of the grains and on the inherent speed of combustion of the substance of the powder. The value of b, then, takes the form

The value of the constants entering a and b are found from the values of a and b for firings conducted with charges of various weights. The data from such firings should always include

1. The muzzle velocity, V

2. The maximum pressure, p

3. The length of the rifled bore, U

4. The weight of the projectile, w

5. The weight of the powder charge, «

6. The volume of the chamber, c

7. The total volume of the bore, C

8. The description of the powder including the composition, content of moisture, grains, *etc.*

Then

b+ U

■p _ \6 m a2

9 <x ‘ b or

A_ 16 U

(C-c’) p = — ma* —

9 b

As the pressure on the base of the bore is actually moving the mass of the projectile with a velocity v and the mass of the powder charge with a velocity less than that of the projectile, it is doing work represented by

1 wv 2 1

2”7 + ˆ

6)

- • KV 2

g

and

16 / b y b P (C-c’)

9 \ U + / U ‘ mV 2

so that

BALLISTICS

103

and

(L , ! \2= 9 p(C-c’) b _ 9. p (C-c’) ‘ j

\ *16 mF2 ‘ U 32’ wi F2 ‘ t*

2

• _ , m F2

The ratio of P (C-c) to — ˆ — is that of the

work done by a constant pressure equal to the maximum pressure acting over a path equal to the total travel of the projectile, to the actual work done in conferring energy of translation on the projectile over the same path. That is, it is the ratio of the maximum pressure to the mean effective pressure represented by the

energy

yfflF2

which is the muzzle energy.

Representing the mean effective pressure by p, and the velocity corresponding to a constant

pressure equalling the maximum pressure by V , this ratio is

so that

p _ 2 p (C-c

p mV 2

~yi = F2

‘) m v 2 (v \

~ = *mV2* \V/

2 P(C-c’)

m

and

/ b . \2 9 (V\b / 3 F\ 2 6

(U + 1) “ 32 \ v) U 2 \ 8 ‘ v) ’ U

Placing

i=,2. L

h 8 V

so that

in which

L1 —

_9 P(C-c’)

32 mV2

m

w

g

it follows that

U

whence

and

jj = L2—\—^/L2(L2-2)

b = U (l2— 1— V L2 (U-2)) a = V (l2 — \J L,2 (. U-2))

Thus b and a are readily calculated for each shot fired. The values of a 2 and of b are calcu¬ lated and recorded together with the data for the shot, the charge being varied.

To find the constants:

2 go

and, E being calculated for each shot, E0 and q are found from the relation

log E = log Eo+ q log A

By plotting this relation on cross-section paper log Eo is found to be the value of log E corre¬ sponding to A = 1 for which log A = 0. Then

log q — (log E — log Eo) -5-log A

by which means values of log q are found for different values of log A, and a mean value of log q is taken.

As ˆregards b

so that

and

<y

* w _ f^\3E ft — A\

5 \w \ *M*

The values of the second member are known for each value of o, the value of ˆ being about 1.6, but for nitrocellulose powders it is more exactly given by the formula involving the content of moisture. For powders used in the United States its mean value is about 1.584, corresponding to about 5 per cent moisture and volatiles. As the grain diminishes in size the percentage of moisture is less. The values of

$ are plotted as a function of s and if the graph be produced to a point corre¬ sponding to o = o the value of y is the ordinate

at that point. Both this graph and the preceding one should be generally taken as straight lines. Having drawn the straight line and knowing the

o

value of S at any point the value of K~ and

hence of * is easily found and the inverse problem is completely solved.

The value of 5 is dependent on the least dimension of the grain, called the (<web thick¬ ness,® since when this is burned through, the grain is either completely consumed or else dis¬ integrated. As grains, in the United States service, are of nitrocellulose powder and of a standard pattern, it is clear that the value of S' depends on the web thickness alone except that the content of moisture affects Eo and also S, and it will cause considerable variations in these, corresponding to variations in moisture.

This method permits the experimental de¬ termination of the powder characteristics Eo and S and the quantity

This latter is of considerable importance, as it is a measure of the work done on the gases themselves in giving to them a motion of trans¬ lation and also in disturbing the mass of gas. This latter action may involve a great deal of energy and depends, to a large extent, on the shape of the chamber. Accordingly, « may have a value much

greater than unity and its value has a decided bearing on the shape of the chamber, and consequently is important in the design of a gun. The pressures and velocities at any point of the bore may be

readily calculated, thus furnishing valuable data for gun design. Muzzle velocities and maximum pressures may be easily calculated for given conditions of loading. The direct problem is thus completely solved.

This method has been used with great suc¬ cess in the Coast Artillery Service of the United States Army, and a similar method is used at the School of Application at Fofitaine-bleau.

The method is originally due to Captain Leduc, of the French Artillery, though the details of the method as here given have been developed in this country.

Exterior Ballistics. — A projectile in flight describes a curve called its trajectory. This trajectory is a curve of which the vertical height is related to the horizontal distance traveled in a manner dependent on the cir¬ cumstances of its motion. The origin is usually taken as the muzzle of the gun ; the horizontal distance to any point on the trajectory being represented by x and the height above the origin by y, both in feet. The velocity in its path of the projectile at this point is repre¬ sented by v, the inclination of the path to the horizontal by dt the time of flight from the origin to (x,y) by t. The curve (due to the action of gravity) is convex upwards and has a maximum ordinate or greatest height repre¬ sented by y0, corresponding to a horizontal distance or range Xo.

At this point the inclination is zero. At the origin x and y are zero, d is represented by </>, v by V ; t is zero. The point at which the projectile again finds itself at the level of the gun is called the <(point of fall.®

The law of motion already presumed gives the following relations :

d2x d (v cos 6) — F (v) Q

= — it — =— ˆcosS

d2y d (v sin d) — F (v) .

dt 5 = - *di*— = —sme-S—

From these

d (v cos 0) v F (v) Je = gC

v d 0 dt

— g cos 0

dt =— sec Odd g

dx=v cos 6 dt — - odd

g

2

dy = v sin 0 dt= ZZJL Q tan 0 d 6

g

As the trajectory is a curve of relation be¬ tween x and y, so that

y< =f(x)

it is readily shown from the above relations that

dy Q

y = rx = Une

..ˆd2y_ — g

y dx 2 v 2 cos2 0

d3y — 2 y”2 F (v)

y dX 3 g ° V 1 -f-y/2 C

_ —2g F (v) v 4 cos3 d ‘ C

It is thus clear that, with a known relation between v and F (v) the trajectory may be, theoretically at least, completely defined in terms of x, y, and constants. On the other hand, if the form of the trajectory is completely de¬ fined, F (v) in its relation to v will be deter¬ mined. There are thus two ways of approach¬ ing the subject, and the problems involved in the two cases are known as the ˆdirect® and the ˆinverse® problems. The direct problem is based on values of F (v) derived from firings through screens, the time of passage being elec¬ trically recorded, and the rate of loss of ve¬ locity thus found. Determinations of F (v) in various countries differ considerably; and ex¬ perimental firings have recently been conducted to further define the law. These firings are all made almost horizontally and the effect of the inclination of the projectile on its presenta¬ tion to the air is thus not experimentally known. It is certain, however, that in high angle fire (as with mortars, regarding which many data are available), the air resistance is greatly in¬ creased, — in many cases almost doubled, and that this effect increases with the inclination. The inverse problem, therefore, is one of great importance for several reasons, among which is the fact that a great mass of data is avail¬ able, and the additional facts that such data pro¬ ceeded from actual practical firings and that conclusions deduced by proper methods from such data must duplicate the results obtained in practice.

The theoretical treatment of the subject, however, affords a safe guide

in the process of solving the inverse problem and gives a clear indication of the form of the equation of the trajectory. Upon supposing that there is no air resistance a limiting form is secured, affording a minimum number of terms of the expression for y in terms of x. This is the condition in vacuo.

The equation immediately takes the form

and

y = x tan ˆ —

gx 2

2 V2 cos2 <p

r = tan » = tan $ -

y 2 V2 cos2 <j>

y’” = s 0

for this condition.

From the equations of motion in air it is clear that any one of the variables x, y, t, d may be expressed in terms of any other of them and hence every one of these may be expressed in terms of x. As complete integration is not

always feasible, it follows that in the general case the variable in question will be expressed in terms of ascending powers of x. The equa¬ tion of the trajectory, then, takes the general form

y = x tan 1 + ax+bxl+elc\

%= tan ♦ ~ 2FWt{ 1 + 4 ax+2hxl + “c}

% = 2 7W « | 1 +3«*+6ˆ2 + etc |

li> = 2V?co4]3<I+ 12i,x+e,<;[

whence

tan 0= tan ˆ 1 + ax + 2bx2--etc [2 V2 cos2 <t>\ 2)

V2 cos2 0

— - —a = 1 +3ax+6&x2-|-e/c

z;2 COS2 V

FJv)

C

V 4 cos3 0 2 F2 cos20

3a -f-12 bx-- etc

By this means a set of actual firings may be used to determine the law of motion of the projectile since the muzzle velocity, V, the angle of departure, <t>, and the values of y and x for the point of impact are measured.

The value of F(v) is readily placed in the form

FJv) ±(v*co£ff\ i a+ibx+e(c t cos g v2 C 2 \ F2cos 2</>/ (J

3 (a--4bx--etc } „

2 1 a--2 > axJr6bx2--etc f COS

Now, cos 0 is readily expressed in terms of x, since tan 8 is so expressed, and

1

cos 8

ˆ 1 -j-tan2 8

F (v) .

Hence - is directly expressed as a function v 2 C

of X.

When x becomes zero v—V, and 8 = < pf and hence

3

2 a

FV

V2 C sec < p

or

2 F (F) cos <j> a~ T * F2 ‘ C

Hence

_ . 1 -(-4 — - x -{-etc a ,

F (v) „ V2 _ a cosa.cos0

v2 X /^ (F) 1 +3ax+6bx2+etc ‘

On taking successive derivatives with respect to x, and noting the relations of v and 8 to x, the values of b and subsequent coefficients are determined in terms of F(V), V, and the suc¬ cessive derivatives of F(V) with respect to V. It is quite clear that <P will invariably enter each value. This method is general, and finds useful application both in the case of high power guns with small values of <t> and in the case of howitzers and mortars, since the ve¬ locity v, the angle 8, and all other elements

may be directly found. The value of t is given by the relation,

Vt costy—J 4 (i --2>ax--bbx2--etc)dx

Whence

Vt cos <p

x

:l+-£-ax - a2)x2-f -etc

Where the value of <P is large the solution of the inverse problem is practically essential, in the light of recent ballistic firings. Where the angle </> is less than 15°, however, a method due to the eminent Italian authority, Siacci, greatly simplifies the problem and permits very satisfactory discussion of the trajectories of direct-fire guns. An auxiliary variable known as the “pseudo-velocity,® is characteristic of

his method. Its value is given by the equation

u — v cos 8 sec <f>

In connection with this he assumes the relation

F (y) — /? F (u) cos2 0 sec 0

in which /3 is a quantity which, for direct fire, is very nearly unity. Its values are usually tabulated with the values of <j> and X as arguments.

Wherever Siacci's method is used the value of C will be understood to include the factor (3 in its denominator. With these modifications the following relations are found:

du cos2 <t>

u F (u) gC

dt — — C sec <p

d tan 8

du

F{u)

dx = — C

udu

Fju)

dy-

udu

~Fju)

tan <f> —

2 cos2 </>

(«)-(F)

in which

Placing

t / \ Cu — 2 gdu

1 (M) = J . wir

5

rl ■ > -/.”

— udu

— du

TW

A ˆ I ˆ S (u)

the solution of the problem appears in the equations

y = x tan <P —

C 2

tan 8 = tan 0 —

2cos2 </> C

\A (u) — l S («)—

-A (F)

S(V)

j/ («)-/ no |

■/ 00

2 cos2 </>

t = C sec <P | T (u) — T (V) J-x — C {s (u) — S (F) J-

It is clear from the above that the value of

1

F(u)

is more convenient than that of F(n). Such a \alue may be found in ascending powers of u

beginning with a term involving or in other words

u2

F(u)

may be determined by a series the first term of which is a constant; and the other terms involve regularly ascending powers of u. With complete and absolutely satisfactory data the curve of these values may be found and the direct problem for direct fire is completely solved when is known.

One of the most recent available experimen¬ tal determinations of F (v) is that of the Gavre Commission, and certain broad characteristics are noted. They are :

1. Between zero and 800 feet per second F (v) is roughly proportional to v2.

2. Between 800 and 1,600 feet per second it is roughly proportional to v*.

3. Between 1,600 and 3,600 feet per second it is roughly proportional to v%.

These three classes correspond respectively to the fire of

1. Howitzers and mortars

2. Field guns

3. Seacoast guns

In these three cases the character of F(v) is such that it may be represented, for certain purposes, by

F(v) = Bv n

in which B and n are constants. In such cases the equation of Siacci's trajectory is

y — x tan <p — in which

gx*

2 F2cos2 <f>

1 --ax -\~bx2 +cv3 Fete >

a-

2 BV ~ — 0 — w-2

3 C

b =

c =

4— n (BV

IT \~C~

(4 -n) (6-2 n) (BV

n-2ˆj

30

(¥■■ >)

etc.

4

For the values n—4 and n = ˆthe equations

take the simple forms :

1. For n—4

y = x tan tp —

gx2

2 V2 cos2 < p

BV2 \ C x)

4

2. For n— •y

y = x tan (f> —

gx2

2 V2 cos2 </>

-2 /.

B V ‘ -i

C x)

The first is a cubic parabola and the second an hyperbola. As these two values of n mark extreme limits of its average values these two trajectories may be regarded as limiting ones between which all others will lie.

Placing

gX

F2sin20

= M

and placing y = 0 in each of the two cases, the value of Xo, for the summit is given by

Xo

X

Xn

X

VM2 + 3(-M) -M

1

for n = 4

1 +\/M At the point of fall y = 0 and For n—4

2 3

tan w

— for n =

V2 sin2 <p - — 2_ X

~~ M ˆ 3 Vn-2C

gX

tan (p

= 2 — M

For n = ‘ gX

V2 sin2 <t> tan ˆ

tan <j>

= M = 1 ~ M

Fbv

X n-2 C

Differential formulae for range changes give the following relations for all values of n :

dX X

-(

2 — w + n

tan

tan

4\dV

u) V

1

tan 0\ dC tan to) C

+

tan (p d sin2 <p tan to sin2 <p

Placing n— 4 and n— -j in this equation to—

tan <b

gether with the corresponding values of

the following limiting values are found For n= 4

tan to

dX 2MdX 1 dsm2<p 1 -M dC

X ~2~M 0 A + 2-M sin 2 <p +2 -M°~C

4

For n—

dX 4M +2 dV d sm2 <p

For values of M at intervals of these

coefficients, represented in order by Q} R and S, show the following values :

n — 4

n =

4

3

M

Q

R

S

Q

R

S

%

.500

.600

.400

1.111

.333

.667

%

.667

.667

.333

1.333

.500

.500

%

1.000

.750

.250

1.556

.667

.333

%

1.429

.857

.143

1.778

.833

.167

1

2.000

1.000

.000

2.000

1.000

.000

This shows that there is a wide difference in

coefficients in the interpolation formulae, and . , , tan <p

that the value of . u should be found be¬

fore using these formulae except in making the corrections in the original ranges, when the value of n may be assumed as indicated for the general class of firings to which it be¬ longs and the coefficients Q, R and S found by interpolation for the value of M under

BALLON D'ESSAI — BALLOT

107

consideration. The corrections may be subse¬ quently recalculated. In correcting the data of firings, corrections for wind are also needed. The correction in feet for a wind in the plane of fire is

dX n

tan <j> tan w

7

W T’

4

in which n is the exponent of v in the expres¬ sion

Bvn

W the wind velocity in miles per hour, if it is in the plane of fire ; otherwise W is the com¬ ponent of the wind in the plane of fire, and T the time of flight in seconds.

Deflections in degrees due to cross-wind and drift, also in degrees, are given by the formulae

V T cos <p }

5

Drift = ˆ 1 — -ˆi + « j sec <p

in which W is the cross-wind component in miles per hour, k. a coefficient having a value 0.75 for direct fire and 0.80 for high angle and curved fire, and n1 the number of calibres that the projectile passes over in making one turn around its axis due to the action of the rifling.

In the solution of the inverse problem cor¬ rections should first be made for all slight variations in conditions from the mean con¬ ditions existing at the time of the experiments ; so that for each group of shots fired the ranges will be reduced to a common value of </>, and the whole series to a common muzzle velocity and ballistic coefficient.

Alston Hamilton, Fort Monroe, Virginia.

Wind deflection =

84 W

V cos (j >

BALLON D'ESSAI (Fr., a trial ballon), in diplomatic language denotes an effort to see ((which way the wind blows.® Ballons d'essai are usually launched unofficially to test public opinion ; a (<feeler® or <(kite.®

BALLOON. A lighter-than-air vehicle for rising into the atmosphere and traveling through it. It consists essentially of a bag-like re¬ ceptacle of air-tight material filled with hydro¬ gen, coal-gas or other gaseous material lighter than air, of such bulk when distended as shall displace a mass of air of greater weight. To this gas-bag is attached a basket or <(car® to accommodate the passengers, if any, and the recording instruments. A free balloon floats in the air whither the wind carries it, or it may be driven in a desired direction by suitable screw-propellers. A captive balloon is attached by cable to an anchorage on the ground. Small toy balloons, six feet high by three feet across, are made of paper and the air within them rarified by the heat from a wad of asbestos saturated with alcohol or other inflammable fluid, fixed on cross wires at the centre of a wide mouth. They rise to the height of nearly a mile and in a still atmosphere travel several miles before coming to earth. See Aeronaut¬ ics, History of.

BALLOT (Hittle ball®) : essentially, a se¬ cret as distinguished from an open vote, to se¬ cure the voter from previous intimidation or subsequent revenge. Recent methods of ballot-reform, therefore, are only devices to obtain

the result inherent in its very nature, a non¬ secret ballot being a contradiction in terms and the same as viva voce voting. The various forms of ballot reduce to two in essence : bal¬ lots themselves indicating choice, — as colored balls, printed tickets or mechanical

devices showing names, — and depositories indicating the choice. The former is universal in modern times and most general in ancient.

History. — • The ballot must be nearly as old as the practice of voting by unprotected bodies of citizens ; but our first knowledge of it is in classic Greece, where the dikasts (popular courts and juries) voted ((yes® or ((no® by balls of stone or metal (white or unpierced meaning acquittal, black or pierced indicating condem¬ nation), by marked shells (ostrakoi , whence <(ostracism® or banishment of an unpopular leader), or by olive leaves (((petalism®) . In the assemblies the common voting was by show of hands, to secure public responsibility; in cases of privilege or ostracism it was by ballot. In Rome the first ballot law (though far from the first balloting) was the Gabinian, 139 b.c., and the machinery is very modern : tabellce, or tickets, with candidates' names, or <(yes® and ((no® ballots for changes in the laws ; boxes, in¬ spectors and check-lists ; but in case of a tie the candidates drew lots. In the mediaeval • republics the ballot was a regular machinery ; but it has been bitterly fought and slow of in¬ troduction in all non-republican countries, the governments and the privileged classes being loath to weaken their power of dragooning their officials or the lower classes into obedience. In Scotland it was used in 1662 under the name of (<billeting,® to banish political opponents (os¬ tracism) ; but the English government disal¬ lowed the act. In England it was first put for¬ ward to protect members of Parliament against government revenge for voting against its bills, not the electors against the classes which fur¬ nished the members of Parliament; in 1710 the House of Commons passed a ballot law, but the Lords threw it out.

In the modern world the American colonies of England were by far the first to make the ballot (voting ((by papers®) the foundation of the government system; they used it from the first, and it was made obligatory in several of the State Constitutions adopted in 1776. New York, with its great landed aristocracy, was slower, using it only for the governor and lieutenant-governor in 1778, and not extending it to the legislature till 1787. The Southern States held to the viva voce system for many years after, and Kentucky till 1891, its Constitu¬ tion providing for it, though the United States statutes compelled it to use written or printed ballots for Congressional elections. All the State Constitutions now provide for elections by ballot.

In Great Britain it was not only fought by the privileged classes as overthrowing their leadership of the tenants and artisans, but by a large part even of the Liberals as undermining the manliness of the English character. The vanguard of the movement were the Bentha¬

mites, and it stood foremost in the program of reform put forward by the more radical Whigs early in the 19th century. It was in the first draft of the Reform Bill of 1832; in 1833 Grote the historian introduced it, and re-

peated the attempt every year till 1839 with a fresh speech of immense force and learning. It was supported by Macaulay with his usual effectiveness, but was sneered at by so good a Liberal as Sydney Smith, and heartily sup¬ ported by none but the Chartists, whose support alone would have killed it. They made it one of the ((six points® of their (<People's Charter.® In 1851 it was carried in the Commons by 51 majority against Lord John Russell and his Liberal government, but went no further. In 1869 it was tried at Manchester as a test, and worked well ; was adopted at school-board elec¬ tions in 1870 ; and the same year a select com¬ mittee of the House, headed by Lord Harting-ton, reported in its favor as a means of lessen¬ ing corruption, "treating,® and intimidation. In 1872 Mr. W. E. Forster's Ballot Act made printed ballots compulsory at all national and municipal elections except those of university candidates for Parliament. This put an end to the drunken riots attending the previous public nominations at the hustings, so keenly satirized by Dickens and others.

In France, Spain, Belgium, Switzerland and Cisleithan Austria the ballot is now used; in Hungary it was formerly employed in all elec¬ tions, but in 1874 was restricted to municipal councils.

Ballot Secrecy. — The interest of govern¬ ments and privileged classes in aristocratic countries to defeat the secrecy of the ballot is replaced in democratic ones, of which the United States is chief, by the interest of party managers, who wish either to prevent inde¬ pendent voting through fear of loss of em¬ ployment or favor or to make sure of purchased votes being given as promised; they have there¬ fore devised various methods of evading the nominal secrecy of the vote, such as ordering the voter to write his name or some understood sign on the ballot before depositing it, holding it in sight of the party

watcher while casting it, having a ((friend® accompany him to the polls on pretense of his illiteracy and inability to go through the legal forms without help, *etc.* These enforce as constant a struggle from the guardians of political honesty to circumvent them : the first has been stopped by throwing out as illegal all ballots with distinguishing marks on them ; the second by compelling them to be cast in sealed official envelopes, and by forbidding any but the official registrars to come within a certain distance of the polls for any purpose but to vote, and later by providing booths in which each voter prepares his ballot in privacy; the third is practically confined to certain States and cities with a large percentage of real illiteracy under which the feigned article can cover itself and cannot well be directly reached by law, but only by the vigilance of each party in exposing the fraudulent practices of the other. The ballot itself also has brought in many frauds for which the viva voce system gave no opportunity, which are reducible to three kinds : (1) Counterfeiting, either by print¬ ing the name of one party over the candidates of another, or by substituting one or more names on the opposite party's ticket; (2) "stuffing® the ballot-box by folding two or more ballots, all but one being sometimes of tissue paper, to look like one ; (3) "repeating,® one man voting at different polling-places more than

once or at the same one under different names. The first must be defeated by party vigilance ; the second is used only where one party has the control of ballot inspection, though the law usually provides that both the chief parties shall have a share in this ; the third and second are punishable by law.

Another evil, as diminishing individual re¬ sponsibility for votes and building up unprin¬ cipled and corrupt party dominance though not direct fraud like the others, is the "party bal¬ lot.® This is due to the great multiplication of candidates to be voted for at one time, and the consequent cost of printing and distributing the ballots to voters, which has led to the aban¬ donment of the candidates themselves doing this work, and the forming of party organiza¬ tions for it, which, in return for their efforts, insist on subservience and are apt to have slight scruples about gaining their ends. All these evils together — the misuse of ballot methods to pervert their intent, the only partial secrecy and the supremacy of party in the voting — have lacterly built up a great body of opinion that some better methods should be devised, the general movement being known as ((ballot re¬ form.®

Australian Ballot. — The Australian or official ballot was first used

and developed in South Australia, and after its introduction in the United States in 1888 soon replaced the party ballot in many States. Its essential feature is that all candidates in the field for any office shall be placed on one ballot and the voter compelled to indicate his preference by a mark opposite the name of one. The ballot is official, compiled, printed and placed in the poll¬ ing places under the direction of public officials and at public expense. Under the "Australian plan® the voter is compelled to think personally of each candidate, which invites independence of judgment, breaks down the tyranny of the party vote and instils some intelligence into the <(brute vote,® even though the name of the party of each candidate be added. The first Australian Ballot Law in the United States was enacted by Kentucky in 1888, but the law ap¬ plied only to the election of certain officials of Louisville. In the same year Massachusetts passed a law which became effective the next year providing for the use of this ballot in State elections. Since that time every State in the Union, save Georgia and Louisiana, has adopted some form of the Australian ballot.

Some of the modifications have been im¬ portant, due chiefly to struggles of the local organizations either to defeat the secrecy of the ballot and keep account of the purchased votes, or to prevent "scratching® and ensure the vot¬ ing of "straight tickets.® In short this would emasculate the system of its vital principle. Fully 90 per cent of the States have provided for an official "blanket ballot,® wherein, in one arrangement or another, are given the names of all candidates who have been duly nominated by the various parties or organizations of voters for the offices 'to be filled at the ap¬ proaching elections. There are a few excep¬ tions, however. While Missouri and New Mexico provide the official ballots at public ex¬ pense, a separate ballot is required for each party. In Georgia and South Carolina the preparation and distribution of the ballots are

left entirely to the voters, and in the former it is not even required that the ballots be uni-fo rm in size, shape or color.

Forms. — More than 40 States have adopted the official (<blanket ballot® but their methods of arranging the names of the candidates on the ballot vary considerably. In 31 States the bal¬ lot has a party column, the candidates of each party being arranged vertically under the name of the party, and in all but 12 States the column is headed by the party emblem. This was done on the nominal ground that the illiterate voters and a large part of those not technically such do not wish to vote anything but the ˆstraight party ticket® and should not be hindered in their choice, much less deprived of it. Hence in all but two of the party column States (Iowa and Montana) provision is made so that the voter may easily vote <(straight® — usually by marking a cross (X)tm the square or circle under the party name or emblem at the head of the column which the illiterate voter can be taught to recognize. If a voter desire to ((scratch® the ticket (for instance, if he wish to vote for the Republican candidate for governor, the Democratic candidate for lieutenant-gover¬ nor and the Progressive candidate for comp¬ troller) he either marks a cross (X) in the circle at the head of one party column and then an X after each candidate not on his party ticket ; or he omits the cross in the top circle altogether and marks a cross after the name of every candidate for whom he wishes to vote. The ˆMassachusetts® or ((ofhce-group® form of ballot is used in 14 States. On this ballot the names of all candidates for each office (usually in alphabetical order) are grouped together, each name being accompanied by the name of the party nominating him. While the obvious intent of this is to compel the voter to think, Colorado, Nebraska and Pennsylvania, though using the form, have adopted devices making especially easy the voting of a straight party ticket. States which use the Massachusetts form of ballot provide that the name of no candidate for a single office shall be used more than once upon the ballot and in these States this provision works no hardship ; but this limi¬ tation is found in 14 States which have the <(party column® ballot and the effect is to dis¬ courage fusion in nominations.

Dangers and Problems. — As stated above, the ballot itself has not rid the political system of its many attendant evils. The rapidity with which the Australian ballot was adopted was due to the fact that the politicians believed they could appropriate it to serve their own pur¬ poses ; and that they have done so shows that good government depends primarily on the in¬ telligence, honor and integrity of the voter and not on the devices that are placed at hand for his use. Undoubtedly there are less open in¬ timidation and coercion and the voting places are not so often the scenes of riot and dis¬ order, but the complexity of ballot legislation has been used by party organizations

to their own good advantage. The politician prefers the (<party column® ballot since he can easily teach the illiterate element among the voters to look for the party emblem and make his cross in the circle provided, which of course entails the minimum of thought and effort. With most of the newer voting devices, an effort to scratch

the ticket is very liable to render the ballot void and for this reason, if for no other, inde¬ pendent voting is usually light. Party organi¬ zation also receives a legal sanction from the Australian ballot and in some States the party leaders thereby are given great oower in de¬ termining those to receive party recognition either as candidates or voters. Often too the number of votes cast by political groups at some elections is insufficient to meet the pro¬ hibitive legal requirements, and thus, though they have the promise of effective leadership, their names would not appear on succeeding ballots.

In numerous places the ballots have assumed immense proportions, that used in New York city election of 1909 being 15 inches wide and 46 inches long and containing 18 party columns (although 13 of these were entitled ((Independent Nominations®) besides one blank column for the voter to insert the names of those for whom he desired to vote. Several of the columns contained the names of candidates for all 21 offices to be filled, while some contained the name of the mayoralty candidate only and one party had made no nominations but held its place on the ballot because at the preceding election it had polled sufficient votes to meet the legal requirements.

Several States have been experimenting for some time with various forms of ballots, Wis¬ consin using a coupon ballot, while in Cam¬ bridge, Mass., and Grand Junction, Col., a preferential ballot has been used so that a voter could express a ((first choice,® <(second choice ® and <(other choices.® In the Oregon primary elections a candidate may place after his name a concise statement of his principles. The initiative and referendum in many States are making the ballots still more complex and confusing. In 1912 the Oregon ballot con¬ tained the names of 177 nominees for 44 National, State, and local offices, besides 37 legislative projects, 14 of which involved amendments to the State Constitution. In many States voting machines (q.v.) are used.

Short Ballot. — It is apparent that some method must be adopted to make the ballot short and simple and a,lso to keep the processes determining its content and arrangement under the control of the voters and not of irrespon¬ sible party managers. It is inevitable that

blind voting will occur when the ballot contains, as in some instances, 500 names.

As regards the use of the short ballot in cities, the question of government by commis¬ sion is involved. Under this form of govern¬ ment the mayor and a large council of numerous divided powers are replaced by a small com¬ mission. In New Jersey it would apply to county and State. There a small commission having the power of county management is proving its efficiency. The voters of the State elect a governor and a bicameral legislature but do not vote for any other State officer, not even the lieutenant-governor. Thus the re¬ sponsibility for good administration is central¬ ized in one man instead of being scattered among a number of elected department heads with divided and conflicting powers. Hence the advocates of the short ballot urge that it be adopted so as to remove all minor offices and some important ones from the ballot, with

the object of increasing the accountability of the few men who are elected and also of rais¬ ing the standard of intelligence of the popular vote. See Elections ; Electoral Votes ; Elec¬ toral Qualifications ; Electors ; Political Science; Suffrage; Naturalization; Woman Suffrage; Primary, Direct; Commission Gov¬ ernment; United States — Beginnings of Party Organization; Initiative and Refer¬ endum ; Corrupt Practices Acts ; Vote, Vot¬ ers, Voting ; Legislative Reform.

Bibliography. — Consult Allen, P. L., bal¬ lot Laws) (in Political Science Quarterly, Vol. XXI, pp. 38-58, 1906) ; Beard, C. A., (The Bal¬ lot's Burden* (in Political Science Quarterly, Vol. XXIV, p. 598, 1909) ; Bryce, James, American Commonwealth* (Vol. II, 4th ed., 1910) ; Childs, R. S., (Short Ballot Principles) (1911) ; Jones, C. L., (Readings on Parties and Elections* (1912) ; Ludington, A. C., Ameri¬ can Ballot Laws, 1888-1910* (in New York State Library Bulletin, 1911) ; McCrary, G. W., American Law of Elections* (4th ed., 1897) ; Mechem, T. R., (Law of Public Offices and Officers) (1890) ; Ostrogorski, M., (Democracy and the Organization of Political Parties

(1902) ; Reinsch, P. S., (Readings on American State Government (1911) ; Throop, M. H., (Law Relating to Public Offices (1892); and articles in American Political Science Review and Proceedings of the American Political Science Association (passim).

BALLOU, Hosea, American clergyman and author : b. Richmond, N. H., 30 April 1771 ; d. Boston, Mass., 7 June 1852. His boyhood was spent in the greatest poverty, but at 21 he began to preach, having adopted the Universalist doctrines. He was successively pastor of congregations in Dana, Mass.; Barnard, Vt. ; Portsmouth, N. H., and Boston, Mass., in which latter place he held his pastorate for more than 35 years. He founded the Universalist Maga¬ zine, subsequently called The Universalist Ex¬ positor, and again the Universalist Quarterly Review. He was active in the organization of the Universalist denomination, and helped greatly to extend its work and influence. A voluminous writer, his chief works are (Notes on the Parables* (1804) ; (Lecture Sermons* (1831) ; Examination of the Doctrine of Future Retribution* (1834), his most important contribution to theological literature. His pub¬ lished works would make more than a hundred 12mo volumes. For an account of his life con¬ sult the biographies by O. F. Safford (Boston 1889) and T. Whittemore (4 vols., ib. 1855). Consult also Adams, J. C., (Hosea Ballou and the Gospel Renaissance of the Nineteenth Cen¬ tury* (Chicago 1903).

BALLOU, Maturin Murray, American journalist, son of Hosea Ballou: b. Boston, 14 April 1820; d. 27 March 1895. Besides editing Ballou's Pictorial, The Flag of Our Union, Ballou's Monthly, etc., and making a valuable compilation of quotations, he wrote (History of Cuba* (1854) ; (Biography of Hosea Bal¬ lou,* (Life Work of Hosea Ballou.* Becoming in later life an extensive traveler, he wrote a number of books of travel, including <Due West,* <Due South* (1885) ; <Due North,* (Under the Southern Cross,* (Footprints of Travel,* *etc.* In 1872 he became one of the

founders and the editor-in-chief of the Boston Globe.

BALL'S BLUFF, Va., a point on the Po¬ tomac River, about 33 miles above Washington, where the bank rises about 150 feet above the level of the river. It is noted as the scene of a battle between a Union force under Col. Ed¬ ward D. Baker, and a Confederate force under the command of General Evans, 21 Oct. 1861. The battle resulted in the serious defeat of the Union force and the death of Coloner Baker.

BALLSTON SPA, N. Y., county-seat of Saratoga County, on the Delaware & Hudson Railroad, seven miles southwest of Saratoga Springs. It has some reputation as a summer and health resort and is noted for its mineral springs, which rank among the best acidulous chalybeate springs in the country. The water flows from a depth of 650 feet through a tube bored into the solid rock, and is highly effer¬ vescent. The village has a county courthouse, fair grounds and track, the Saratoga County almshouse and hospital, and the Spa sanitorium. The industries include a large tannery, foun¬ dries and machine shops, a shirt waist and tex¬ tile factory, extensive pulp and paper mills, and agricultural implement factories. It has two National banks, several churches, public high school and daily and weekly newspapers. Settled in 1787, it was incorporated in 1807. Town meetings are held every two years and charter elections annually. The board of edu¬ cation, the village president and the board of trustees are chosen b}' popular vote. The water¬ works are owned by the town. Pop. (1920) 4,103.

BALLYMENA, Ireland, a market town in County Antrim, on the river Braid, 33 miles northwest of Belfast. It has a cotton-spinning mill, a distillery, numerous bleaching-grounds, a church, chapel, large public schools, several branch banks and a United States consular agency. It is an important railway centre. Pop. 11,381.

BALM (Melissa officinalis) , a perennial herb of the family Menthacece, native of south¬ ern Europe, cultivated for culinary use and found wild as an escape in many countries. It attains a height of about 18 inches, is much branched, has ovate leaves and whorls of white oi yellowish axillary flowers rich in nectar, for which the plant is sometimes cultivated as bee-forage. Its foliage, which has a lemon-like odor and slightly aromatic taste, is used to flavor wine and to a small extent in domestic medicine. Some other members of the Men¬ thacece are called balm — for instance: Bastard balm (Melittis melissophyllum) , a handsome plant, often dried for its long-enduring frag¬ rance; Moldavian balm (Dracocephalum mol-davica), a Siberian annual of less pleasant qualities than true balm, largely used in Ger¬ many for flavoring. Horse balm (Collinsonia canadensis) and tea balm (Monarda didyma) are American species of little importance. For cultivation see Herbs (Culinary) .

BALM OF GILEAD, a* liquid resinous balsam highly reputed in the East since Bible times for its fragrance and supposed medicinal properties, believed to be derived from Commi¬ phora opobalsamum, a small Abyssinian and Arabian tree. Balm of Mecca, or opobalsam, is a specially high grade of balm of Gilead ob-

tained from incisions in the bark. The wood and fruit are boiled to obtain the inferior grades. The balm of Gilead of the United States is a variety of poplar (Populus balsami-fera, var. candicans). See Poplar.

BALMACEDA, bal-ma-sa'da, Jose Manuel,

Chilean statesman: b. Santiago 1838; d. 18 Sept. 1891 by suicide. He was educated at the Semi-nario Conciliar in Santiago ; early became noted as an orator, urging radical reforms in the Con¬ stitution of 1833; and was a founder of the Re¬ form Club in 1868. As deputy for five terms, 1870-85, he urged the separation of church and state and became the leader of the Progressives. He was Chilean Minister at Buenos Aires in the early part of the Chile-Peruvian War, 1879— 83, and secured the neutrality of Argentina. In 1882 he was made Minister of the Interior, and introduced liberalizing bills, as for civil mar¬ riage, *etc.* In 1885 he was elected senator and appointed Minister of Foreign Affairs. Elected President in 1886, he carried out large schemes of reform and democratization ; popular educa¬ tion was extended, civil marriage carried in 1888, railroads and other internal improvements forwarded. But both his measures and men in¬ volved war against the clerical oligarchy which not only ruled the state but monopolized the offices, and possessed the bulk of the property and influence ; and when he tried to prevent the ruin of his work by ˆinfluencing® the election of a like successor, his opponents blocked the ad¬ ministration. He appointed a ministry of his own stripe and dissolved Congress, virtually making himself dictator; but the Congressional-ists, having the naval officers on their side, be¬ gan war f Jan. 1891, secured the nitrate prov¬ inces, and, using their revenues to buy the best arms and munitions, utterly routed Balma-ceda's forces in a decisive battle near Valpa¬ raiso, 7 August. He took refuge in the Argentine legation at Santiago, and died there a few weeks later.

BALME, bam, Col de, an Alpine pass, forming the boundary between Savoy and the Valais, 7,218 feet above sea-level. It is much visited, and has a travelers' refuge.

BALMERINO, bal-mer-e'no, Arthur El-phinstone, Lord, Scottish Jacobite: b. 1688; d. 1746. He took part in the rebellion of 1715, and fought at Sheriffmuir. Having joined the Young Pretender in 1745, he was taken prisoner at Culloden, tried at Westminster, found guilty and beheaded. His title was from Balmerino, in Fife.

BALMES, bal'mez, Jaime Luciano, Span¬ ish priest and author : b. Catalonia, 28 Aug. 1810; d. 9 July 1848. His works include (Protestantism Compared with Catholicism in Its Relation to European Civilization } (3 vols., 1848) ; (Filosofia Fundamentalˆ (Letters to a Sceptic on Religious Matters.)

BALMONT, Konstantin Dmitriyevitch,

Russian poet: b. on his father's estate, near the village of Gumnishtche, in the government of Vladimir, 15 June 1867. His education was much interrupted: he was expelled from the seventh class of the Gymnasium, being suspected of secret political activity. He later attended the University of Moscow, intending to pre¬ pare himself for the profession of the law; but again he was implicated as one of the

leaders in student uprisings. He was arrested and expelled from the city. He traveled ex¬ tensively in southern Russia, Turkey and western Europe, where he attained consider¬ able familiarity with English and German. On his return to Russia he devoted himself to literary pursuits, and he has translated many of the poems of Shelley, Poe, Ibsen and other European writers. In 1894 appeared his first volume of-poems, (Under Northern Skies. } This was followed at intervals of two years by a second and third volume ; then in 1904 by a fourth collection, entitled (Let us be like the Sunˆ Many of his lyrics were set to music by the later Russian composers. The Yiddish monthly Die Zukunft charged him with having several times changed his political views; but he was regarded as one of the leaders of the modern Russian thought. He wrote many patri¬ otic songs and other lyrics. His rather un¬ satisfactory ((Hymn of Free Russia® (Himn Syobodnoi Rossiya), occasioned by the Revolu¬ tion of 1905 and set to music by Rakhmaninot has carried his name all over the world. This hymn was accepted by the men of the Revolu¬ tion of 1917. The metre corresponds to the familiar English hymn, ((From Greenland's Icy Mountains,® and the three stanzas literally translated are as follows :

1. Hail Russia — Free land! — Free Element

— Destined to be great !

2. Mighty realm — Boundless ocean ! — Glory to those that fought for freedom — That dis¬ pelled the mist !

3. Forests, fields and meadows — ‘And

steppes and seas! — We are free and happy,

— The dawn glows for us all !

4. Same as stanza 1.

Balmont also translated Shelley, Edgar Allan Poe, Ibsen, Hoffmann and Hauptmann, but as an original poet he is reckoned as one of the most notable in recent times.

Nathan Haskell Dole.

BALMORAL (bal-mor’al) CASTLE, the

favorite Highland residence of the late Queen Victoria, beautifully situated on the south bank of the Dee, 48 miles west of Aberdeen, and in the county of the same name. The site on which it stands is almost completely hemmed in by majestic mountains, and the views from the castle are magnificent. Balmoral was originally a shooting-lodge of the Earl of Fife, but was leased to, and greatly enlarged by, a brother of the Earl of Aberdeen, and in 1848 the reversion of the lease was purchased by Prince Albert. The accommodation furnished by the old build¬ ing was very inadequate, and accordingly, the property having been purchased in 1852, the present mansion was erected shortly afterward. It underwent some enlargement in 1888. It is built of gray granite, in the Scottish baronial style, and has a massive and imposing appear¬ ance in the distance. It consists of two blocks connected by wings, and has a massive tower 80 feet high, with a turret of 20 feet high. The estate, which was the Queen’s private propertv, comprises some 40,000 acres, three-fourths be¬ ing deer-forest.

BALNAVES, bal-nav’es, Henry, Scottish reformer: b. Kirkcaldy 1520; d. 1579. He was educated at Saint Andrews, and though at first a Roman Catholic he became a Protestant, and made open profession of his faith in 1542; join-

mg the English against Governor Arran. He was accused of connection with the conspiracy to murder Cardinal Beaton, and was declared a traitor and excommunicated. In 1547 he was one of the prisoners taken in the Castle of Saint Andrews and exiled to France, where he wrote his (Confession of Faiths Recalled in 1559, he busily engaged in the establishment of the reformed faith, assisted in revising the (Book of Discipline,5 and accompanied Murray to England in connection with Darnley's murder.

BALNEOLOGY. See Baths; Hydrop¬ athy ; Hydrotherapy.

BALSA, bal'sa, a kind of raft or float, of the nature of a catamaran (q.v.), used on the coasts and rivers of Peru and in other parts of South America for fishing, for landing goods and passengers through a heavy surf and for ether purposes where buoyancy is chiefly needed. It is sometimes formed of two in¬ flated hides connected by a sort of platform on which the fisherman, passengers or goods are placed; and sometimes of a very light wood.

BALSAM (Jmpatiens balsamind), an East Indian herb of the natural order Geraniacete, cultivated in gardens for more than 300 years. The plant is an erect free-branching annual sometimes 30 inches tall ; bears axillary, di¬ versely tinted yellow, white or red single or often double flowers, the latter of which are called camellia-flowered varieties. The plant is a general favorite of easiest culture.

BALSAMO, Joseph. See Cagliostro.

BALSAMODENDRON, bM-sa-mo-den'- dron, a genus of trees or bushes of the order Amyridacea, species of which yield such balsamic or resinous substances as balm of Gilead, bdellium, myrrh, *etc.* See Balsams.

BALSAMS, mixtures of resins in volatile oils, the term, however, being popularly ap¬ plied to any aromatic compound with volatile oils. Balsams are very widely distributed throughout the plant kingdom. They are par¬ ticularly abundant in the members of the pine family. The araucarias yield a copal that is almost a pure resin; many species of pine yield turpentine and resin ; Canada balsam is derived from Abies balsamea; the balsam-like sandarach is from a cypress. The

Hamamelis family gives balsam of styrax and balsam of copaiba is derived from a large number of the legumes and from the Diptero^carpece. Styrax benzoin is from the Storax family. The resins and balsams of commerce are very closely allied. They may be divided into three groups : gum resins, such as asafeetida and ammonia-cum ; balsams, and resins, such as turpentine, resin, copaiba, mastic, elemi, copal, dammar and sandarach and the balsams and resins that contain cinnamic or benzoic acids, from which they derive their aromatic odor. It is to this latter group that the word balsam is popularly applied. These are balsam of tolu, balsam of Peru, storax benzoin, dragon's-blood and xanthorrhea resin.

These various bodies are for the most part secreted in special passages in the plants. Sometimes they are formed in the leaves, but for the most part the resinous solution collects in specially designed portions of the stem, usually in the woody portion. It is obtained in

a variety of ways from simple incision to boil¬ ing chips of the wood with water.

In medicine most of these bodies are active. They are energetic oxidizers, — hence the tradi¬ tions about ozone and pure air in pine-clad hills, — and several of the hydrocarbons in the vola¬ tile oils are stimulating to the skin and mucous membranes, turpentine being an excellent exam¬ ple. It is an excellent external antiseptic, and manifests similar properties on the respiratory, intestinal and genito-urinary tracts. Those resinous or balsamic mixtures containing cin¬ namic and benzoic acids — notably balsam of tolu (from Toluifera pereirce) and balsam of Peru (from Tolaifera balsamum) possess similar antiseptic and stimulating properties. They are more powerful in proportion to the aromatic acids contained. Balsam of storax is derived from a tree, Liqnidambar styraciflua. It has similar properties to the balsam of Peru

The chrism (see Sacraments) used L consecration and sacramental services should be made of balsam from Syria or Mecca; when this is difficult to obtain, balsams from Brazil or Peru are used.

BALTA, bal' ta, Jose, Peruvian statesman : b. Lima 1816; d. 26 July 1872. He retired from the army with the rank of colonel in 1855; was Minister of War in 1865 ; one of the leaders in the. insurrection which overthrew the unconsti¬ tutional President, Prado, in 1868; and was President of Peru, 186&-72. He was murdered in a military mutiny in

Lima.

BALTARD, bal-tar, Louis Pierre, French architect and engraver: b. Paris, 9 July 1765; d. 22 Jan. 1846. He was appointed architect of the Pantheon and of the Paris prisons, and de¬ signed the chapels of the houses of detention of Saint Lazare and Saint Pelagie. The great hall of justice in Lyons, founded in 1834, was devised and almost completed by him. He also acquired fame as an engraver and as the author of many superb works descriptive of monu¬ ments and illustrated by his own plates. Among his most notable works in this line are {Paris and Its Monuments5 ; (La Colonne de la Grande Armee5 ; and illustrations in Denon's (Egypt.5

BALTARD, Victor, French architect: b. Paris, 19 June 1805; d. 14 Jan. 1874. He was son of Louis Pierre Baltard, and became gov¬ ernment architect of France and a member of the Academy of Fine Arts. He built the church of Saint Augustine and other beautiful edifices, and was author of (Monographic de la Villa Melius) (1847) ; and other works.

BALTHAZAR, bal-tha'zar, (1) one of the wise men of the East wrho came to worship Jesus at Bethlehem. (2) A character in Eich-berg's opera, (The Doctor of Alcantara.) (3)

Chaucer's name for Belshazzar in (The Monk's Tale.5 (4) The name assumed by Portia in Shakespeare's (Merchant of Venice5 ; also the name of minor characters in several of Shakes¬ peare's plays.

BALTIC (bal'tic) AND NORTH SEA CANAL, or KAISER WILHELM CANAL.

See Canals.

BALTIC, Battle of the, a poem by Thomas Campbell, celebrating the victory of Lord Nel¬ son over the Danish fleet, 2 April 1801. In his¬ tory this action is generally known as the battle of Copenhagen.

BALTIC PROVINCES (in Russia), a term formerly given to the five Russian govern¬ ments bordering on the Baltic, namely, Courland, Livonia, Esthonia, Petrograd and Fin¬ land ; in a restricted sense it often designates the first three. The Baltic provinces once be¬ longed to Sweden, except Courland, which was a dependency of Poland. They came into the possession of Russia partly in the beginning of the 18th century, through the conquests of Peter the Great, partly under Alexander in 1809. Peter the Great conceded to the provinces their own administration and guaranteed the inhabitants freedom of conscience. These rights were confirmed anew in 1856, but in spite of this a systematic attempt was made by the Russian government, especially since 1880, to assimilate the provinces with the rest of the empire. The Greek Church endeavored to proselytize the people, the Russian language was substituted for the German in the schools and courts and the press was subjected to censor¬ ship. These measures aroused great discontent and the autumn of 1905 witnessed the outbreak of a formidable revolutionary movement among the Lettish and Esthonian peasantry, directed against both the German landowners and the Russian government. A borderland between the Germanic and Slavonic areas, they have been a frequent cause of difficulty between Ger¬ many and Russia, and during the great European War were the scene of many land and naval conflicts (see War, European). The bulk of the population is composed of Esths and Letts — the former a Finnish race, the latter akin to the Lithuanians. The higher classes, nobility and burghers, are Germans, who constitute about 7*4 per cent of the total population. The inhabitants are nearly all Protestants. Although the soil is not very fertile, agriculture is in a flourishing condition, owing to the improved methods of cultivation and a generally higher intelligence of the peo¬ ple. Commerce and manufactures are also highly developed, favored by the proximity of the Baltic. Esthonia, Finland, Latvia (Livonia), became independent republics at the close of the European War.

BALTIC SEA, an enclosure of the North Sea with which it is connected by the Skager¬ rack and Kattegat. It washes the coasts of Denmark, Germany, Courland, Livonia and parts of Russia and of Sweden, and ex¬ tends to lat. 65° 30’ N. It is nearly 930 miles long, from 50 to 425 broad, and its superficial extent, together with the contents of the gulfs of Bothnia and Finland, amounts to 160,000 square miles. Its generally small breadth ; its depth, amounting on an average to from 40 to 50 fathoms, but in many places hardly half so much; its shallowness toward the Prussian shores, and the rugged nature of the Swedish coasts, where deepest water is sounded (1,542 feet south of Stockholm) ; but above all, the sudden and frequent changes of the

wind, ac¬ companied by violent storms (especially from the east), render this sea dangerous for navi¬ gators, although its waves are less powerful than those of the North Sea. A chain of islands separates the southern part from the northern, or the Gulf of Bothnia. In the north¬ east the Gulf of Finland stretches eastward and separates the province of Finland from vol. 3 — 8.

Esthonia. A third gulf is that of Riga or Livonia. The Kurisches Half and the Frisches Haff are inlets or lagoons on the Prussian coast. The water of the Baltic is colder and clearer than that of the ocean; it contains a smaller proportion of salt, and ice obstructs the navigation three or four months in the year. The ebb and flow of the tide are inconsiderable, as is the case in other inland seas, the difference between high-water and low-water mark being only about a foot; yet the water rises and falls from time to time, probably owing to the vary¬ ing rainfall and evaporation. In stormy weather amber is often found on the coasts of Prussia and Courland, which the waves wash upon the shore. It forms the drainage basis for a great part of northern Europe. Among rivers that empty into it are the Neva, Dwina, Oder, Vistula, Niemen and a number of Swedish rivers. Between the Kattegat and Baltic are the large Danish islands Zealand and Funen ; others in the sea itself are Samsoe, Moen, Bornholm, Langeland, Laaland, which belong to Denmark; the Swedish islands — Gottland and Oeland (besides Hveen in the sound, with the ruins of Oranienburg, the ob¬ servatory built by Tycho Brahe) ; Rugen, be¬ longing to Prussia; the Aland Islands at the entrance of the Gulf of Bothnia belong to Fin¬ land, and Dagoe, together with Oesel, on the coast of Livonia, belong to Esthonia. The Sound, the Great and the Little Belt lead from the Kattegat into the Baltic. The Baltic and North Sea are now connected by the great ship canal constructed between Brunsbiittel, near the mouth of the Elbe, to Holtenan, near Kiel, a dis¬ tance of 61 miles, and opened in 1895. The canal is a work of the German government, and is intended for the use of war-vessels as well as trading-ships, many of which, bound to or from Baltic ports, are able to effect a saving on the voyage of over 500 miles by means of this waterway. The chief seaports of the Baltic are Petrograd, Kronstadt, Riga, Reval, Narva, Libau, Helsingfors, Stockholm, Gefle, Karls-krona, Malmo, Memel, Konigsberg, Danzig, Stettin, Liibeck and Kiel and Copenhagen. Dur¬ ing the great international European War, the Baltic Sea was an active field of naval and mili¬ tary operations. See War, European.

BALTIMORE, Md., the chief city of the State, the 7th in population of the United States, and the commercial head of the Atlantic seaboard

south of New York; on the Pennsyl¬ vania (P., B. & W.), Baltimore and Ohio, West¬ ern Maryland, Northern Central and other rail¬ roads ; 38 miles northeast of Washington, 97 southwest of Philadelphia.

Topography. — The city is admirably sit¬ uated at the head of tidewater on an arm of the great Chesapeake Bay, in former times known as ((Patapsco Bay,® 12 miles long by an average of 3 miles wide, forking at the peninsula on which Fort McHenry stands, and creating the landlocked harbor known as the Northwest Branch. This celebrated harbor is noted for the ease with which ships of great burden may be docked or moored at any stage of the tide, the tidal movement being only from one foot to one foot six inches. The ship channel from this inner harbor to the sea has been for many years of sufficient depth to permit the passage of

ships drawing 35 feet of water and over to the docks and elevators of the Baltimore and Ohio Railroad on the southern side as you enter, and the Pennsylvania Railroad system on the eastern side of the harbor. South of the above mentioned peninsula is another wide fork of the greater harbor, known as the Middle Branch, on which are located the great termi¬ nals of the Western Maryland Railroad; this again forks, receiving the waters of the small Patapsco River and Gwynn's Falls, on either hand. Through the centre of the city flows a stream which, rising some distance north of the inner harbor, has its fountain-head at springs which flow 500,000 gallons per day. It is known as ((Jones Falls,® after David Jones, who built himself a house on its banks about 1680. On its banks are located the union sta¬ tion of the Pennsylvania Railroad Company, whose grounds bordering on the stream are embellished with tasteful gardens, and the city has beautified the other shore by constructing ˆsunken® gardens. The land area of the city in 1888 was 13,202 acres, of property annexed in 1888 was 16,939 acres, of the harbor 1,507 acres. In 1918 an annexation act increased the city's area to over 90 square miles.

Transportation. — Baltimore has a very modern and excellent street car service ; it can boast of the fact that it had the first electric street

railway and the first electric elevated railway in the world. The street railways have 404.5 miles of rails now being operated on the streets and suburban points within the radius of its operations. The Delaware and Chesa¬ peake Ship Canal, across the narrow strip of Delaware, gives it a direct water outlet to Philadelphia. The Baltimore and Ohio Railroad system (q.v.) follows almost without change the route of the old national pike, which extended from Baltimore to Saint Louis; it was the first road to the Atlantic seacoast and the corner¬ stone was laid 4 July 1828. The facilities pro¬ vided by this road are the great terminals lo¬ cated at Locust Point, consisting of freight sheds, elevators, and the proper loading docks with a water depth of 35 feet, connecting with the ship channel to the sea of the same depth. Within recent years an immigration pier and necessary buildings have been erected.

The terminals of the Pennsylvania Railroad are on the eastern or opposite side of the harbor from the Baltimore and Ohio terminals. They have the same depth of water in the freight slips and have direct communication with the 35-foot channel. The principal road of this system passing through this city is the Phila¬ delphia, Baltimore and Washington Railroad, and its branches. Running a little west of south from this city is still another important feeder, the old Baltimore and Potomac Railroad, so called prior to recent consolidation, which passes through Washington, terminates at Quantico, Va., branching at Bowie, Md. The Merchants and Manufacturers' Association had much to do with the introduction of another great railway system into this city, in the mat¬ ter of the sale of the city's interest in the Western Maryland Railroad to what was known as the ((Fuller Syndicate® together with the purchase of the Pittsburgh and West Vir¬ ginia Central and the acquisition of the Wabash system. The Baltimore and Potomac

has a tunnel 7,400 feet long through the west side of the city; the Northern Central one 3,500 feet long through the northeast; the Baltimore and Ohio one \2A miles long through the city north to south. The Baltimore and Ohio road draws its trains through by electric motors. Seventeen foreign steamship lines use the docks and piers of the Baltimore and Ohio Railroad or the Pennsylvania Railroad Com¬ pany. These lines run to Europe and South America and other ports. Besides these there are steamship lines to Boston, Providence, New York, Wilmington, N. C., Charleston, Savannah, New Orleans, etc.; and steamboat lines to Philadelphia, Washington, Norfolk, Richmond, Georgetown, Chester, Galveston, Jacksonville, Havana,

Cuba, and to points on the Chesapeake Bay and its tributaries.

Shipping, Commerce, Manufactures, Trade. — At the port of Baltimore, in the coast¬ wise trade for the district of Maryland, 1,939 vessels were documented in a recent year. This port district includes Crisfield, Annapolis, Washington, D. C., and Alex¬ andria, Va. — more than the number of vessels documented at any other Atlantic seaoort, ex¬ cept New York. In addition to these vessels, nearly all the vessels documented at Virginia and North Carolina ports trade on the Chesa¬ peake Bay, making a total (estimated by the collector of the port of Baltimore) of about 4,000 documented vessels trading on the Chesa¬ peake Bay. Most of these vessels, of course, trade at Baltimore. Baltimore has 18 miles of water front suitable for docking purposes (in¬ cluding 6ˆ4 miles in the main inner harbor, 3ˆ4 miles on the Middle Branch within technical city limits, and at least 8 miles more adjacent to the city limits). It has 160 wharves in the main harbor, with 145,700 feet — say 27ˆ4 miles — of frontage of wharf room. Adding this amount of wharf frontage to the other water front of the Patapsco River and its tributaries, the total is 120 miles of water front, developed and undeveloped. Of this wharf¬ age the city owns 13 piers, with a wharf frontage of 26,385 feet — five miles. Baltimore has spent $6,161,000 on municipal docks, and has available $5,000,000 more for extending the system. Baltimore's business operations ag¬ gregate more than $1,000,000,000, manufactures leading. Total annual value of manufactures, shown by figures assembled recently, exceeds $400,000,000. The largest single interest is clothing at $44,500,000. Copper, tin and sheet iron products come next at $32,000,000. Fertilizer, which is fourth, shows the largest rate of increase. The total is now $16,- 000,000. Baltimore stands first in the manufac¬ ture of cotton duck, straw hats, men's clothing, fertilizers, copper, tin and sheet iron products, canning and preserving oysters, and as a banana market.

There are over a thousand wholesale and jobbing houses in Baltimore. Two hundred of these firms carry over 300,000 accounts in the South alone. A fair minimum estimate of the amount of Baltimore capital invested in South¬ ern States below the Potomac is $200,000,000. Baltimore's jobbing trade, not including the commission business, reaches $250,000,000. The leading items are dry goods and notions, mil¬ linery, clothing, boots and shoes, hats and caps,

\pAkk\;

VjU&ERVOl.

Map of the Main Portion of

BALTIMORE.

EXPLANATION:

Railroads -

v Street Car Lines _

o Piltesvillo

JOHN HOPKINS ˆ UNIVERSITY /

r30ih

‘~Dˆad ‘IPllsdaled£ >

SHEEP PEi

iWalbrool

Herrin;

Owynnsi

iFtederlcV Ro»c \Z- — ˆCarroll. -“Clˆudon Pitltj

VlLClai

‘Clartutontfˆp ; w Ml-Wi’Alifi:

Colette Cr. 3§S? > ttoo c? SrhSt-. Hob* n a*

.LaaadowffiSfc. >

/ ClitlOld

•VV’-hTtelock

Losˆnioj

□in

‘M(Ro)

C

fNEir

ederal

-3Iyuˆ tL

’AahTamf -

‘A vc

OTOO

lOOODfJfi

•fflfl. CEN. [EIGHT [OEPOI

ft.” Vernon1

SMDIPQBU

ijhllft llopktllA

■-Edmondsen

\mm

□a mo cigri 8011

‘ o □ ~3 a □

sropnncf

ill ˆ r. — i ˆaiHuau

r

HlIOTDif

I r4- ˆ-Wr-iAr-iSataloga j — i j|St4

_T ayett«

ˆsssaasesBˆi

sgˆ°nnmnnai

flˆyjDyojQi

I Baltimore i

sworn

pMOiiO

Str-PauUi

MOUNT

CLARE

ffliromaaB

mgm

pfMHEigˆinp’

xx \M n l ˆ br n n n r, i ilnnnn

STA»

ˆ□q*PtlaDfD{iDEk«

Li ’ ‘ WK% h

3L ■ m?

EDERAlJ HILL |JT PaIIK p

!hurcb»

laiSfflf

I “Y niH r - S ＝|l4 ± 32 I 45

Rocklandˆ Xot/son pJi

Rodgers Ebrge

,u,rvs jyr VrfShoppa rd SorremotW’j Briehtyside Lake RolandXvA. - /
<

Lake Roland S , ,

[Homelands . I

Jo Fullerton s o y» gOv’.-i lea Hamilton | /

ˆQuni

1

„ -x a Fci\iki j q*g) ˆ

Stone JIouse>j Kwajftffc 4 Ft. or Jp, - ˆ

Xove IgVvW-‘oklyn

CurtrtJliiyVfe(5u;ˆ.s-Bmj | ©A /l

or S. Kt* -

lawklnB PU ‘»

-ˆdylburnˆ

Tl

>\

Melvale

lias I o Gomans wNotrp Rarne’v oRnland Park P. < ˆEvergreen

° X * Garden ville

Lake

MontebeUoi

J 1 1

VH* RtVednlc

Clifton

01..

Union Depo

if “ “V:,«Voi

Orangev;ik

HitfHVanutawu

ru„ ,

pa rrovxtJ Point Jc.

Catoliis -

yilli

Baltimore

Orange Grove \) s. Ha let ho ip

>\‘ineyard (. Nˆs-Glenartney | VTV \V i nans A valoD’CSavˆTT

K«ai iyˆ bL

I V.

Turn

aumental

ˆ—iˆPi|niphi “eyj c

Patapseo /

/ wLinthicum

- ■ - 1 f . ‘/‘il, 1 1 ,lr*v’ ˆ

ElkKiJgt

ShipleˆJ/’ t

\l\VooJl.wn TJs.glil; ‘ \WeUhnm x

OUTLINE MAP OF

BALTIMORE.

Portion Shown on 3VfAi > 3Tap in Solid Color.

S Solley 0

- .’S’rtWr—i r—iiri -i i— 1’n n n n r

1

Woomniooffopt-,

m isjfi a Diintiqjo aa yti ana

CARROLL

PARK

Seale ol* Statute .Mile*.

ˆi

Scale of Kilometres.

50(lm

Hand, AlcNoily it Uo. ‘• New 11 I 14 of the Ham Portion of Baltin Coovrlˆbv h— Hood. H’-NallvJ < V

616 c

BALTIMORE, MD

1 Washington Monument

2 Johns Hopkins Hospital

1 Cathedral 2 Battle Monument

I

BALTIMORE, MD.

BALTIMORE

115

drugs, groceries and food products, all of which show large increases over 1910. In addi¬ tion to the annual jobbing trade of $250,000,000 are the grain trade and shipping figures of over $100,000,000 and the commission business of over $100,000,000. The average freight received and distributed at Baltimore by railroad and boat lines annually is over 48,000,000 tons. Baltimore's receipts in a recent year were 90,171,602 bushels of grain and 1,808,672 barrels of flour, which, together with hay, straw and mill feed handled, aggregated 72,423 tons. Baltimore's imports for a calendar year were $38,941,666; exports, $308,975,629. Baltimore's banking resources are $296,858,616, not including bonding or credit companies. Baltimore's annual bank clearings are $2,206,338,952. Its national bank deposits in 10 years increased 47.9 per cent. The bank clearings

in 10 years increased 72 per cent. Post-office receipts annually aggregate $2,-

993,388.

Modern Improvements. — In 1904 Balti¬ more had a fire which up to that time, with the exception of the big Chicago fire, was the most destructive conflagration that ever visited an American city. It destroyed most of the business district, burned over 140 acres of busi¬ ness block and entailed a loss of $125,000,000 or practically one-fifth of the wealth of the community. At first the blow was staggering, but the people responded to the situation with great courage and went so far as to decline the hundreds of thousands of dollars offered, much of it in actual cash, that poured in from other cities. Baltimore's citizens decided over night not only to rebuild but to take their losses and do their construction on their own resources.

Until that time the growth of the city had been along conservative lines. A sentimental as well as an actual connection with the great Southern trade gave it a constant and substan¬ tial increase and made its development steady and assured. But the fire stirred it as it had never been affected before and all at once the fine enterprise and broad ideas of its people found an awakening. A Burnt District Com¬ mission was created, and to this Commission were entrusted extensive and almost autocratic powers. The results were wider streets with reduced grades, the wonderful dock system and improvements of similar kinds that under nor¬ mal conditions could not have been secured in half a century. After 12 years, practically every trace of the fire had been obliterated. The business district has risen from its ashes into what the building inspectors pronounce the best built and most substantial business section that can be found in any city in America. _ Bal¬ timore to-day presents a unique superiority in its equipment for the handling of the great business which has been coming to it in con¬ stantly increasing volume, while as a city of homes Baltimore has always enjoyed the most enviable reputation. Confined by no limits, her expansion has widened the area of her private residences without increasing the difficulties of business, but facilitating them by modern and up-to-date street car and motor bus systems.

Public Buildings. — First in municipal im¬ portance, though possibly not in the cost or beauty of design, is the city hall, built of Mary¬ land white marble, the style of architecture being the Renaissance. Cost of construction,

$2,27 1,135.64; cost of furnishing, $104,264.79. The new courthouse is 200 feet front by 325 feet depth. The material is white Maryland marble, and the architectural style is a free Renaissance treatment of the Ionic order. The cost of this building completed was $2,753,-003.18. The post-office, located opposite the courthouse is also a recent erection, Italian in general treatment. The building contains the United States and District Courts. The cost was $2,011,835. The custom-house cost over $1,500,000, the style of architecture is Classic and was built of Maryland granite.

Educational Institutions, Art Galleries, Libraries, *etc.* — The Maryland Institute of Art and Design, which was for many years in the heart of the commercial centre of the city, was incorporated in 1826. The library contains 20,000 volumes relating to the arts and sciences. The new home of this school is located on Mount Royal avenue. It has been most liber¬ ally endowed by the Jenkins family of Balti¬ more and Andrew Carnegie. The Academy of Sciences, located in the fine old mansion of ex-Governor and ex-Senator Thomas Swann, on West Franklin street, contains a large collec¬ tion of the bird life of this country, and a large collection of Indian remains. The Peabody Institute, a white marble building standing within the shadow of the Washington mon¬ ument, is a donation from the philanthropist, George Peabody (q.v.). It contains a large reference library, an academy of music and a gallery of art. The entire building is 170 by 150 feet. The library room accommodates about 300,000 volumes. The Walters Art Gal¬ lery, located within 100 yards of the last named institution, contains the finest private collec¬ tion of paintings and ceramics in the United States, and also a special collection of ancient arms and armor and lacquer work of the Jap¬ anese. In the same block, southeast of the original gallery and on the corner of Centre street and Washington Place, there has been erected an art gallery for the Walters Collec¬ tion of Old Masters, purchased by Mr. Henry Walters, at a cost of $1,000,000. The Enoch Pratt Free Libraries, of which the city has 17, were the free gift of Enoch Pratt (q.v.). The central library is located on West Mulberry street near the centre of the city. It has 16 branch libraries. Other libraries are the Maryland Historical, the Peabody refer¬ ence library, those of the Maryland Institute, the Maryland Episcopal Diocese, the Bar Asso¬ ciation, the Archbishop's, Odd Fellows, New Mercantile, Baltimore and Ohio Employees' Free Circulating and others.

The history of Baltimore's development in other than material and industrial affairs has been most remarkable in the educational field.

Baltimore is to-day one of the greatest educa¬ tional centres of the country. The Johns Hop¬ kins University (q.v.) has attained the front rank among the higher institutions of learning. Goucher College has made Baltimore the centre for collegiate instruction of women.

The old Johns Hopkins University made no pretensions in the way of architecture. The new home of this great school leaves nothing to be desired. Placed at an elevation of some 300 feet and occupying the estate of one of the Carroll family, known as <(Homewood Park,ˆ

it overlooks the city and harbor. On North Broadway, facing the west, stands the group of buildings of the Johns Hopkins Hospital. The architectural appearance of the central group of buildings is majestic, standing 114 feet above tide. The cost of the original buildings was $2,250,000, which has been very largely added to since the founding. Other medical schools are those of the University of Maryland (1807), and the Baltimore Medical College. The oldest dental college in the world is the Baltimore College of Dentistry and Surgery, chartered 1839. The chief law school is that of the University of Maryland.

The Woman's College (Methodist Episcopal, 1888) now known as Goucher College, is an¬ other institution of which the citizens are proud. The buildings are throughout in the Romanesque style, of the Lombard variety, with adaptations from that order to which Vitruvius gave the name Tuscan. They are built of dark undressed granite and are sur¬ mounted by roofs of Roman-red tiles. The church is the most southern member of the group of buildings, its massive tower the most conspicuous object in the northern part of the city. This tower is almost an exact counter¬ part of a campanile to be seen just outside of the city of Ravenna, Italy. There are also many other colleges and preparatory schools of good rank, making the city a leading educa¬ tional centre. Among these are Morgan Col¬ lege (Methodist Episcopal, 1876) ; Baltimore City College; Bryn Mawr School (1885): Baltimore Polytechnic Institute, and four Roman Catholic institutions — -Saint Mary's (Seminary of Saint Sulpice, 1791) ; Loyola (1852), under Jesuit management; Notre Dame of Maryland (1873); Saint

Joseph's (1888). The public school system has 108 schools, 2,064 teachers, and 84,000 pupils, and about $2,000,000 is annually expended in its support. The first manual-training schools for white or colored pupils were established here. There is also a State Normal School and an institution for training colored teachers.

Clubs. — Baltimore cannot be called a club city; however, the time-honored Maryland Club is a great social organization occupying a superb new building on Charles and Eager streets. There are also the younger Baltimore Club, on Charles street, opposite, composed largely of the sons of members of the Mary¬ land Club; the University Club; the Catholic Club ; the Charcoal Club ; Baltimore Athletic Club; Automobile Club; Germania Club, for German merchants ; the Merchants' Club ; and the Phoenix Club and Clover Club, both Jewish organizations.

Charitable Institutions. — The city has a body of gentlemen, known as supervisors of city charities, who serve without pay, and who look into every form of charity and direct to a large extent its distribution. There is also a State board of charities, lion-paid. Among the institutions to aid suffering humanity are Johns Hopkins Hospital (already mentioned) ; Mary¬ land Hospital for the Insane ; Female House of Refuge; Springfield State Hospital; House of Refuge (male) ; Aged Men's Home; All Saints Home for Children; Augusburg Home; Balti¬ more Association for the Improvement of the Condition of the Children of the Poor; Balti¬ more Orphan Asylum (more than 100 years

old); Boys' Home Society; Briska Help Asso¬ ciation ; Charity Organization Society ; Chris¬ tian Tribune Home for Young Ladies; Dolan Children's Aid Society ; Egenton Female Orphan Asylum and School; Female Christian Home; and Free Summer Excursion Society. The various charitable institutions are too numer¬ ous to mention all by name, but among them are the blind asylum, a fine white marble build¬ ing; and the city almshouse, accommodating 1,300 inmates.

Churches. — There are some 489 church buildings in the city, many of great beauty both externally and internally ; notably the First Presbyterian Church on Madison street, with its wonderful Gothic spire 300 feet high; the Mount Vernon Methodist Episcopal Church within the shadow of the Washington monu¬ ment, and the Roman Catholic Cathedral com¬ menced in 1800. The style and decorations of the last named are of the Grecian-Ionic order. The great dome is

207 feet in circumference internally, and 231 feet externally. The side aisles in the church are terminated by two pictures. That on the right is the ((Desccnt from the Cross,® painted by Pauline Guerin — a present from Louis XVI to the archbishop — and that on the left, <(Saint Louis Burying His Officers and Soldiers Slain Before Acre,® the work of Steuben and presented by King Charles X of France. There are also the state¬ ly Methodist church described with the Goucher College ; the beautiful white marble synagogue, Oheb Shalom, on Eutaw Place, oriental in style, and a short distance away the great Har Sinai temple on Bolton street, and the Byzantine temple on Madison avenue. The Episcopalians have many fine churches, among them Saint Paul's on Charles street and Grace Church on Monument street. The initial work on the Episcopal Cathedral, Saint Paul and University Parkway, has been completed and the Pro-Cathedral is in use. The following is a list of the churches of the various denomina¬ tions : Baptist, 59; Christian Science, 2; Con¬ gregational, 4; Disciples of Christ, 7; Evan¬ gelical Association, 4; Evangelical Lutheran, 57; Friends, 2; Orthodox, 2; Independent Roman Catholics, 1 ; Independent German, 1 ; Jewish synagogues, 22; Methodists of various kinds and color, 119; New Jerusalem, 1; Ark of the Covenant, 1 ; Presbyterian, 33 ; Protes¬ tant Episcopal, 45; Reformed Church, 14; Re¬ formed Episcopal, 3 ; Roman Catholic, 55 ; Seventh Day Adventists, 2 ; Swedenborgian, 3 ; Union Evangelical, 3; Unitarian, 1; United Brethren in Christ, 7; Universalist, 1.

Monuments and Statues. — The first monu¬ ment erected in Baltimore was in memory of Christopher Columbus and was dedicated 12 Oct. 1792, the 300th anniversary of his landing. It stands in the grounds of the Ready Asylum on North avenue. One of the grandest monu¬ ments in the world stands at the intersection of Mount Vernon and Monument squares — the Washington monument, the erection of which was conceived in the year 1809, the de¬ sign furnished by Robert Miffs, and the corner¬ stone laid on 4 July 1815. It rises above these squares about 200 feet and is of the Greek Doric inspiration. The erection of this monu¬ ment, the first to be erected by any city in memory of Washington, is what gave Balti¬ more her designation as <(The Monumental

City.*’ The figure of Washington is by Causici. The next in importance is the ((Baltimore Monument,® known as the ((Battle Monument.® It was erected to the memory of those who fell at the battle of North Point in 1814 and is the work of Maximilian Godefroy. It is 52ˆ2 feet high. The principal column represents a fasces upon the bands of which are placed in bronze letters the names of those who fell, the whole being crowned by a female representing the city, holding in her hand a wreath of laurels, capellano. The Thomas Wildey monument on North Broadway is ded¬ icated to him as the founder of the Order of Odd Fellows and may be described as a Gre¬ cian Doric column 52 feet high, on which stands a figure of Charity. Other monuments are the Wells and McComas monument at Ashland square ; that on Federal Hill erected to the gallant soldier Armistead, who defended Fort McHenry at the same time, 1814; the new Armistead monument at Fort McHenry; and the Francis Scott Key monument at Eutaw Place and Louvale street; the monument to the Marylanders who fell in Mexico, located in Mount Royal avenue ; the monument at the intersection of Mount Royal avenue and Cathedral street, recording the deeds of the Maryland Line, the only troops who fought from Bunker Hill to Savannah during the Revolution ; and the monument, by Ruck-stuhl, erected by the Daughters of the Con¬ federacy, to the Confederate soldiers of the State. Mr. William T. Walters has given the city the famous bronzes of Barye, including the great lion and the masterful bronze by Dubois, ((Military Courage® ; the sitting statue of Chief Justice of the United States, Roger Brooke Taney (q.v.) in his official robes; and the equestrian statue of John Eager Howard (q.v.).

Parks and Streets. — The beautiful Druid Hill Park consists of 674.16 acres. Other parks are Clifton Park, 267.26 acres; Clifton Lake, 44 acres ; Patterson Park, 128.44 acres ; Carroll Park, 176.44 acres; Riverside Park, 17.02 acres; Federal Hill Park, 8.02 acres; Wyman Park, 198.39 acres; Swann Park, 11.31 acres; Latrobe Park, 13.80 acres; Gwynn’s Falls, 374.19 acres; Venable Park, 60.81 acres; New Reservoir Park, 92.65 acres; Herring Run Park, 164.61 acres, besides 32 small squares dispersed all over the city, making a grand to¬ tal of about 2,277.34 acres. In natural beauty Druid Hill Park is unsurpassed by any in the world. It is filled with springs of pure water, some of which are medicinal. A great arti¬ ficial lake, a part of the city’s waterworks, with a depth of more than 80 feet, occupies many acres and around it has been constructed a fine drive. Near the head of this lake on the driveway stands the colossal statue of the Scottish hero, Sir William Wallace. In the rear of this is the full-length marble statue of Washington, executed by Bartholomew. A short distance from the

latter is a costly and graceful pedestal surmounted by a life-size figure of Christopher Columbus by Achijle Canessa. Patterson Park, on the eastern rim of the city, contains 128.44 acres, overlooks the harbor and still retains some of the earthworks thrown up by the American army in the de¬ fense of the city 1812-14, some of the guns being still in position. Necessarily a city is

judged by what it does to advance its own facilities. According to this standard, Balti¬ more stands out conspicuously. Within the past few years engineers and municipal experts from every point of the world have been visit¬ ing the city to inspect its new sewerage. This system is the finest ever attempted and cost in the neighborhood of $25,000,000. Many Bal¬ timoreans think their largest gain from the fire was the new dock system. Previous to the fire the city owned very little wharf prop¬ erty. Since the fire the municipality has ac¬ quired all of the harbor front burned in the fire and it has been erecting the best system of docks that can be found along the Atlantic coast. The development of its suburbs in¬ cludes Roland Park and Builford, pronounced by experts to be the finest examples of suburb¬ an development in the world. Baltimore's as¬ sessable basis for taxation grew from $402,- 816,097 in 1901 to $915,433,444 in 1914, an in¬ crease of $512,617,247. The total mileage of streets and alleys in the city is 581.93, of which 324 miles are paved with the most modern im¬ proved paving, and all cobblestone paving is being replaced by the same.

Water and Fire Departments. — The city owns its waterworks system, which is self-sustaining — 777 miles of water mains in the city. The water supply has its source in the Gunpowder River, average daily flow 413,- 338,092 gallons. The service has two impound¬ ing reservoirs — Lock Raven on the Gunpow¬ der River, capacity 2,270,000,000 gallons, and Lake Roland in the bed of Jones' Falls, capac¬ ity 200,000,000 gallons. The department has two stand pipes with a maximum capacity of 530,000 gallons. It has a magnificent filtration system. The expenses of the fire department are about $1,145,114 per annum. Equipment — 40 engine companies, 19 truck companies, 2 hose companies, 2 water tower companies, and 2 fireboats. In the business district, Baltimore has one of the best high-pressure wafer systems to be found in America.

Government. — • The charter provides that wthe executive power of the mayor and city council of Baltimore shall be vested in the mayor, the departments, sub-departments and municipal officers not

embraced in a depart¬ ment herein provided for, and such special commissioners or boards as may hereafter be provided for by laws, or ordinances not incon¬ sistent with this article.® The mayor holds office for four years ; he has a veto which can be overridden by a three-fourths vote of the council, which is composed of two branches; the lower of 24 members, one from each ward; the upper of nine members, each from two con¬ tiguous wards. The bulk of the city officers are appointed by the mayor with the consent of the higher branch. The council has the right to appoint the city register and public printer; and the comptroller and surveyor are elected by popular vote. The principal city officials are the comptroller (head of depart¬ ment of finance); city register; board of esti¬ mates; commissioners of finance; city collec¬ tor; collector of water rents and licenses. The chief departments are public safety (fire, health, buildings and street cleaning), public improvements, parks and squares, education, charities and corrections and review and as¬ sessments.

BALTIMORE

Population.— The city stands eighth in population among the cities of the United States the growth being as follows: (1775) 5,934; (1790, first United States census) 15,530;

(1800) 26,514;. (1810) 46,454; (1820) 62,738; (1830) 80,620; (1840) 102,513; (1850) 169,- 054; (1860) 212,418; (1870) 262.854; (1880) 332,313; (1890) 434,439; (1900) 508,957; (1910)

558,485; (1920) 733,826. A large percentage of the increase in population was due to the annex¬ ation of adjacent territory under a bill passed by the Legislature of Maryland in 1918. The territory annexed included the thickly populated suburbs of Highlandtown and Canton.

History. — The first settlement of land in¬ cluded in the present site of Baltimore was made in 1662. Charles II was King of Eng¬ land and Charles Calvert governor of the province. The English people had been mak¬ ing history very fast and among their most brilliant

achievements was the planting of suc¬ cessful colonies in various parts of the world, notably the Virginia colony, the Massachusetts plantations and the province of Maryland, founded in 1534. So that the first actual set¬ tlement on land within the present city limits was made only 28 years after the landing of the first colonists at Saint Mary's. During the 17th century we find statute books bur¬ dened with many laws creating town after town on paper, as many as 33 having been created, three of them being within the bound¬ ary of what was then called Baltimore County. By the act of the general assembly of 1706 a town was to be established on Whetstone Neck or the Patapsco River. No name was given to the town in the act. Another town, called Baltimore, was located near the mouth of the Bush River on its eastern side. This town is shown in the map made by Augustus Herrman, the Bohemian, in 1670, and some 14 years after the actual founding of the present city the general assembly ordered another Baltimore to be laid out on Indian River in Worcester County. Nothing was ever done in regard to this last town, the county surveyor refusing to proceed with the work.

Then came the true founding of the city of Baltimore by the passage of an act entitled (<An act for erecting a town on the north side of Patapsco, in Baltimore county, and for laying out in lots of 60 acres of land in and about the place where one John Flemming now lives.® (1729, chap. 12). About two years after the founding of Baltimore town an act was passed entitled ((An act for erect¬ ing a town on a creek, divided on the east from the town lately laid out in Baltimore county, called (Baltimore Town,5 on the land whereon Edward Fell keeps a store.® (1732, chap. 14). The next step for the enlargement of the original town was the passage by the general assembly of the Act of 1745 (chap. 9), 15 years after the founding. This act was passed on the joint petition of the inhabitants of Baltimore and Jones' Town, that the two towns be incorporated into one entire town and for the future be called and known by the name Baltimore Town and by no other name. The town was again enlarged two years later by the Act of 1747 (chap. 21), on peti¬ tion of the inhabitants by the addition of 18 acres, which were not included in Jones' Town nor in Baltimore Town. Tn 1765 another

addition to the town was made on petition of Cornelius Howard and other persons, consist¬ ing of 35 acres on the west and south sides of the town. The town was again enlarged by the Act of June 1773 by the addition of 80 acres on the east and southeast.

The Revolution brought it prosperity by crippling its rivals and it was a great seat of privateering. For about two months in 1776-77 Congress held session in one of its taverns, having fled from Philadelphia in fear of the English. About this period the energy and resources of a couple of immigrant Scotch-Irishmen, the brothers John and Henry Steven¬ son, began to push the place forward ; new stage and packet lines were established, the roads improved and turnpikes laid out and Jones' Falls diked and part of its course filled in. The European wars of the French Revolution and later threw a large part of the world's carrying-trade, till Napoleon's downfall, into American hands; the (<Baltimorc clippers® were famous everywhere. In 1792 a large body of French refugees from Haiti came in. On 31 Dec. 1796, the old settlement of Fell's Point was united with it and it re¬ ceived a city charter, it having previously been governed from Annapolis. In the War of 1812 it again became a seat of privateers, in revenge for which the British attempted its capture in 1814, but the attack was repulsed 12 Sep¬ tember. To it we owe the ((Star-Spangled Banner® (see Key, Francis Scott) and the Battle Monument. The end of the Napoleonic wars in 1815, restoring to England her old carrying-trade, was a heavy blow to Balti¬ more. In 1828 the public-school system was established. In 1860 all three anti-Republican parties held their national conventions there ; and on the outbreak of the Civil War the Union troops passing through there were mobbed by the citizens and the first blood of the war was shed in its streets, 19 April 1861. On 23 May Federal Hill was occupied by a Union force and the city remained under mar¬ tial law till the end of the war. The conven¬ tion of 1864, which renominated Lincoln, was held here. In 1888 <(The Annex® was annexed to the city, extending its limits two miles north and west and nearly doubling its size. Since 1890 Walbrook has also been annexed.

The National Democratic Convention of 1912, which nominated Wilson and Marshall for President and Vice-President, was held in Baltimore. The first mercantile submarine to cross the Atlantic Ocean — a German boat car¬ rying a cargo of merchandise — evaded the British and French blockade during the great European War, and entered the port of Balti¬ more 9 July 1916. See Deutschland. Consult Love, (Baltimore: The Old Town and the Modern City) (Baltimore 1895) ; Thomas, (The City Government of Baltimore) (in (Johns Hopkins University Studiesˆ 1896).

Robert J. Beachman,

Secretary Merchants and Manufacturers Asso¬ ciation.

BALTIMORE, Barons of, or LORDS BALTIMORE. See Baltimore Family ; Colonial Government, Proprietary.

BALTIMORE, Md., Attack on (War of 1812). When the British had burned Wash¬ ington they reembarked on their ships and sailed for the mouth of the Patapsco to at-

tack Baltimore. The approach to the city by water was defended bv Fort McHenry with a garrison of 1,000 troops under Lieut.-Col. George Armistead, and to the right of the fort two batteries (Fort Covington and City Battery) were erected to prevent an attack from the rear. The total number of troops in Baltimore was 13,888 officers and men un¬ der the supreme command of Senator Samuel Smith (q.v.), whereas the British numbered not more than 5,000. On 12 Sept. 1814 General Ross began the march toward the city while the fleet sailed to attack the forts, but on strik¬ ing the American advance of 3,200 troops un¬ der Brig.-Gen. John Strieker, Ross was killed, Col. Arthur Broke succeeding to the command. A hot battle then ensued but after a gallant resistance Strieker retired with a loss of 24 killed, 139 wounded and 50 prisoners, whereas the British lost 46 killed and 273 wounded. On 13 September Broke resumed the march, but on viewing the American defenses decided to wait until the fleet had silenced the forts. About sunrise of the 13th five bomb vessels began to bombard Fort McHenry from a dis¬ tance of two miles. The heavier British ships could not approach within range owing to the shallowness of the river and those of the lighter ships that did approach were driven off quickly. During the day and following night 1,500 shells were thrown into the fort with comparatively little injury and the loss of only four men killed and 24 wounded. Ac¬ cordingly Admiral Cochrane and Colonel Broke decided the capture of the town would be too costly and retreated to the lower Ches¬ apeake. On 19 September Cochrane sailed for Halifax and on 14 October the troops were transported to Jamaica, later to participate in the battle of New Orleans. Francis Scott Key witnessed the bombardment from the British admiral's ship, whither he had gone to obtain the release of some friends, and when

at dawn he saw the flag still floating over the fort he wrote (The Sfar-Spangled Banner.* Consult (American State Papers, Military Affairs) (Vol. I, p. 591) ; Adams, Henry, (The United States) (Vol. VIII, pp. 166-73) ; Brackenridge. H. M., (History of

the Late War) (pp. 265-73) ; Glieg, G. R., (Campaigns of the British Armv at Washing¬ ton and New Orleans) (pp. 170-98) ; James, William, (Military Occurrences) (Vol. II, pp. 308-24) ; Lossing, (War of 1812) (pp. 949-57) ; Scharf, J. T., (History of Maryland* (Vol. Ill, pp. 99-137) ; Wiley and Rines, (The United States) (Vol. IV, pp. 33-36).

BALTIMORE, Woman's College of. See

Goucher College.

BALTIMORE FAMILY, founders and proprietors of Maryland, consisted of seven suc¬ cessive lords of the barony of Baltimore in the Irish peerage, and a cadet who was governor

has been added.

George Calvert, the 1st lord : b. Kipling, near Bolton Castle, Yorkshire, about 1580; d. 15 April 1632. He was graduated at Trinity Col¬ lege, Oxford, 1597; traveled abroad, and after his return became secretary to Sir Robert Cecil (afterward Lord Salisbury), clerk of the Crown of Ireland, 1606, and clerk of the Coun¬ cil, 1608. He assisted James in his contro¬ versial writings, had charge of the Spanish and

Italian correspondence during the Secretary of State s absence in 1613, was on a committee to investigate Irish Catholic grievances the same year, was knighted 1617, and in 1619 was made Secretay of State by Buckingham's favor. He represented Yorkshire jointly with Sir Thomas Wentworth (afterward Lord Strafford) in the Parliament of 1621, and in the stormy times that followed was a mediator between Parlia¬ ment and King, with the usual fate of being thought a spy by the one and lukewarm by the other. The French Ambassador styled him an honest, sensible, well-intentioned man and zealous patriot, and therefore without influence. He had principal charge of the foreign negotia¬ tions while James was chasing the will-o'-the-wisp of the Spanish marriage and making Eng¬ land a nullity in the Thirty Years' War; Cal¬ vert's later Catholicism made him suspected as favoring the latter policy, but in fact he wished a more energetic one. On 14 Jan. 1624 he was one of the nine councillors who opposed a breach with Spain. In January 1625 he an¬ nounced himself a Roman Catholic; his

con¬ version is credited to Gondomar, the famous Spanish Ambassador, and Lord Arundel of Wardour, his son's father-in-law. On 12 Feb¬ ruary he resigned his office and was given the barony of Baltimore: which, as James hated ˆapostasy,® measures his esteem for Calvert. On the accession of Charles I, in 1625, Balti¬ more refused, from conscientious scruples, to take the oath of supremacy and abjuration, and Charles gave him a handsome letter to the Lord Deputy of Ireland. In 1627 he was summoned to court to consult on the peace with Spain, but thenceforth took no part in public business, de¬ voting himself to colonization. Already in 1621-22 he had planted a colony in Newfound¬ land, chartered in 1623 as Avalon ; in 1627 and 1628-29 he visited it, but the severe climate dis¬ appointed him and he begged for a grant in a milder one. Without waiting for a reply he at¬ tempted to explore Virginia for a settlement; but the Jamestown officials of the old Virginia company refused permission unless he would take the oath above. The region satisfied his ideal, however, and he persisted in asking a grant there against the dissuasions of Charles, who finally assigned him a northeastern tract, now the States of Maryland and Delaware; but the same interests delayed the proceedings, and before the charter was signed, 20 June 1632, Baltimore died. The usual assumption that he intended the colony for a Roman Catholic es¬ tablishment is refuted by the fact that the charter established the Church of England and did not even specify toleration for other creeds, which was not made a provision of law till 1649, though of course intended, and proclaimed at once on the establishment of the colony. Baltimore thought — wrongly, as it turned out — that the proprietary's power and the religion of the chosen colonists would prevent the perse¬ cution of his own faith, and had neither wish nor power to persecute others. That he meant it as an asylum and breeding-ground for his religion is a matter of course. It was also to be a feudal aristocracy, but with an assembly of freemen whose consent was necessary to the validity of laws. In a word, Baltimore was a conservative of high principles and moderate temper.

BALTIMORE FAMILY

Cecilius or Cecil Calvert, the 2d lord: b. about 1605; d. 30 Nov. 1675.

He married Anne Howard, daughter of Lord Arundel of Wardour (after whom Anne Arundel County of Maryland is named), about 1623. The charter of Maryland granted to his father was transferred to him as heritor; but he never visited it during the 43 years of his life there¬ after, sending deputies in his place, and manag¬ ing its business and political affairs judiciously from England, settling disputes of natives or colonists sensibly and placably, and esteemed a worthy successor to his father. Down to the civil war of 1642 he had little to do but sup¬ port his brother, Leonard, as governor; but his policy then became difficult. He tried to steer a middle course, and avoid either for himself or the colony any pronounced declaration of sympathies or allegiance which might expose it to confiscation ; but Ingle's upset of the colonial government (see Leonard Calvert), and the Parliamentary triumphs at home, showed him at last that this could not be main¬ tained, and that with the Puritans at the head, the Roman Catholic supremacy, though used only to preserve themselves from persecution, must be given up. On 9 June 1647 Leonard died, after appointing as his provisional suc¬ cessor an ardent churchman and loyalist, Thomas Green ; but Lord Baltimore in 1648 appointed Capt. William Stone and had him settle some 500 Puritans, harried b}' the Vir¬ ginia Cavaliers, in Maryland. When the news of the King's death arrived, Green, in Stone's absence, proclaimed Charles II King, as did Virginia; on which William Claiborne (q.v., and below), the treasurer of Virginia, joined the Parliamentary party, obtained a commission to reduce the two rebellious provinces, and, after overthrowing the Virginia government, forced Governor Stone to renounce his allegiance to Lord Baltimore and give it to the (<keepers of the liberties of England.® When Cromwell dispersed the Long Parliament Stone repudiated the agreement ; Claiborne marched against him, deposed him and appointed a Puri¬ tan government which at once most ungrate¬ fully disfranchised all Catholics and repealed the Colonial Toleration Act of 1649. In January 1654 Cromwell himself intervened, and forbade the Virginia authorities to molest Lord Balti¬ more or his officers in Maryland. Baltimore thereupon ordered Stone to overturn the Puritan government, but Stone's force was de¬ feated and himself captured. Baltimore, how¬ ever, kept his favor with the Puritan adminis¬ tration ; the commissioners of plantation de¬ cided that the province was his, and in 1658 it was restored to him. Claiborne's influence was at an end, and Baltimore had no further troubles over Maryland.

Leonard Calvert, younger brother of Cecilius, was sent out by the latter as first gov¬ ernor of the new colony: b. about 1606; d. June 1647. He set sail 22 Nov. 1633, in the Ark and the Dove, with about

200 Roman Catholic set¬ tlers of good families; arrived 24 Feb. 1634, at Point Comfort, landed 25 March on an island in the Potomac, which they named Saint Clem¬ ent's, and founded on the site of an abandoned Indian village a town, Saint Manx's, long since deserted. He met an Englishman, Capt. Henry Fleet, who had lived some years among the

Indians and helped him to gain their consent to the settlement. But he found Kent Island in the Chesapeake, the great island opposite Annapolis, settled by one William Claiborne (q.v.), under a grant from the dissolved Vir¬ ginia company, effectively enough to have a representative in the Virginia legislature. Cal¬ vert claimed right of property and political jurisdiction over the island, Claiborne denied both, and Virginia upheld him; and the war¬ fare that ensued embroiled the two colonies for many years, complicating itself with the issue of Churchmen against Catholics, then (bv the oddest irony of fate) with Cavaliers in Vir¬ ginia against the Puritans who had overborne the Catholics in Maryland, and finally with a rankling boundary dispute. Claiborne poisoned the Indians' minds against the Marylanders as a set of treacherous Spaniards ; Calvert sent an expedition against him, which captured two boats, with mutual loss of life, in April and May 1635. Claiborne had further losses, and became bankrupt, but in 1637 bought of the In¬ dians Palmer's Island, at the head of Chesa¬ peake Bay, as beyond Baltimore's grant, and petitioned for an injunction against Baltimore's interfering with him. The commissioners of plantation refused him the grant, despite his purchase, on the ground that he had only a trading license. Meantime Kent Island con¬ tinued insubordinate, and Calvert had to make an expedition against it in person, reducing it and occupying Palmer's Island also, and captur¬ ing one of Claiborne's lieutenants, who was put to death for piracy and murder in the former troubles. Calvert now undertook to introduce the feudal system contemplated by his father's charter; but as the freemen's consent was neces¬ sary to this, and they refused to give it to their own abasement, the scheme was blocked and in fact never carried out. The civil war of 1642 having broken out, cautious steering was needed to avoid risking confiscation from one side or the other, and Calvert went to England to consult his brother, leaving one Brent as deputy, who brought on the very catastrophe dreaded, by seizing a Parliamentary vessel and imprisoning the captain, Richard Ingle. Ingle escaped, obtained letters of marque from Parlia¬ ment, allied himself with Claiborne, who had been made the treasurer of Virginia for life by the King, but had no politics except for his own hand, and by the time Calvert returned

with a new commission in 1644 had possession of the colony and was plundering right and left. Cal¬ vert, in an attempt at repossession, was defeated and fled to Virginia, which had remained loyal to the King, and appealed to the colonial gov¬ ernment for help ; they refused to give it ; finally he got a force together, and in December 1646 returned and drove Ingle out — one of the fly¬ ing rebels, however, carrying off all the early records of the colony, which have never re¬ appeared. He died the next year, leaving an unfortunate provisional appointment of a suc¬ cessor, which made even worse trouble for the colony than the last deputy.

John, the 3d lord; Charles, the 4th; Bene¬ dict, the 5th; Charles, the 6th; and Frederick, the 7th and last, complete the roll. Frederick was a foolish and worthless rake, and perhaps worse. Born in 1731, he died 14 Sept. 1771, leav¬ ing no legitimate heirs, but apparently a natural

brood of some ability. The proprietary rights in Maryland were bequeathed to a child, Henry Harford, but four years later were rendered worthless by the Revolution.

Bibliography. — dictionary National Biog¬ raphy) (London) ; Browne, W. H., (George Calvert and Cecil Calvert, Lords Baltimore* (New York 1890); Hall. C. C,, (The Lords Baltimore* (Baltimore 1905) ; Kennedy, J. P., discourses on the Life of George Caivert* (Baltimore 1845).

BALTIMORE AND OHIO RAIL¬ ROAD, The. History. — The fact that the only use of rails for locomotion in 1827 on either side of the Atlantic was for coal carry¬ ing, renders the more remarkable the action of the coterie of merchants and bankers of Balti¬ more, gathering at Philip Thomas' house on the evening of 18 February of that year, in de¬ ciding to proceed forthwith to build a railroad for general purposes. The Ohio, at Wheeling, was made the objective point; the intervening Blue Ridge and Allegheny Mountains evidently suggesting no difficulties that could not be sur¬ mounted. But a week elapsed from the time of the initial meeting to the second, at which

the committee appointed at the first reported the resolution, namely : <(That immediate ap¬ plication be made to the Legislature of Mary¬ land for an act incorporating a joint stock company to be styled the Baltimore and Ohio Railroad Company, and clothing such company with all powers necessary for the construction of a railroad with two or more sets of rails from the City of Baltimore to the Ohio River.® The capital stock was fixed at $5,000,000.

The Baltimore and Ohio's charter, granted of date 28 Feb. 1827, was the first anywhere coming into existence defining and authorizing procedure to completion. Under it the Balti¬ more and Ohio Railroad Company is still act¬ ing, it being the only enactment of the charac¬ ter of the pioneer days of the railroad in the United States or Europe remaining operative; the B. & O. being the single railroad company of those times yet retaining, unchanged, its original name and organization.

On 23 April 1827 the Baltimore and Ohio Railroad Company was formally organized, Philip E. Thomas elected president and George Brown treasurer. Preparations were immediately inaugurated to secure a survey of the proposed line, the measures to which end were begun on 2 July. In this the United States government authorities were induced to co-operate to the extent of relieving Col. Stephen H. Long, of the Topographical Corps, from his regular duties, who, with Jonathan Knight, a Quaker civil engineer of repute, forthwith proceeded with the actual work, the date of its formal commencement being 20 November. On 5 April 1828 they submitted the result of their labor to that period; and the line west to the Patapsco and thence via its valley to Point of Rocks on the Potomac was decided upon as the first section to be under¬ taken.

But persistent, bitter and vehement opposi¬ tion by the canal authorities was encountered and this was even carried to legislative cham¬ bers and the courts, but despite this trouble

and a few adverse decisions by the courts, the Baltimore and Ohio pushed on from Baltimore west, and three miles were completed and ex¬ perimented upon early in 1829. On 22 May 1830 the first section of the Baltimore and Ohio — that from Baltimore to Ellicott City, a dis¬ tance of 14 miles — was formally opened for public use. Horse-power was the standard means of locomotion pending development of the locomotive to a more assuring stage than then reached anywhere from whence reliable information could be obtained. (See Locomo¬

tive, The). ((Brigades of cars® were an¬ nounced to run three times each way daily, the fare named at 25 cents and business commenced in earnest. This was four months in advance of the formal opening of the Liverpool and Manchester, the first railway abroad for gen¬ eral purposes, its date being 15 Sept. 1830.

Many difficult problems in the mechanics of railroading were decisively solved. Car wheels were first made with the flange on the inside edge, but their causing so many derailments and so frequently breaking led to the change of the flange to the outer edge. But this in¬ creased the difficulty on the curves and the conical flange was invented. The anti-friction box on the axles and the practice of placing on the outside instead of the inside of the wheels were both first introduced by Winans ; as was also the eight-wheel car. When the main line of the Baltimore and Ohio was com¬ pleted its roadbed embodied the highest en¬ gineering skill of the period in the traversing of mountain ranges ; was the longest continuous railroad in the world, with the greatest bridges, trestles and tunnels. Its track construction throughout, and especially its manner of meet¬ ing the curvature and providing against slides from the environing mountain sides, were les¬ sons in line construction and operation availed of by the whole world.

The Baltimore and Ohio was completed to Frederick, 61 miles, 1 Dec. 1831 ; to Point of Rocks, 69 miles, 1 April 1832 ; and to Harper's Ferry, 81 miles, 1 Dec. 1834. The initial move toward Washington was the letting of the con¬ tract in May 1833 for the construction of the Thomas Viaduct spanning the Patapsco at Re¬ lay. This remarkable granite structure, de¬ signed and erected under the personal super¬ vision of Benjamin H. Latrobe, was built for the carrying of six-or seven-ton engines draw¬ ing from 15-to 20-ton trains, and meets with equal safety the demand of 170-ton locomotives at the head of 12-to 15-hundred ton trains. It was the marvel in the world's railway circles when constructed. The longest, highest and generally most imposing railroad crossing known, it was the first on a curve and regarded, therefore, as the boldest of departures from the rule.

Two years were required to complete the Washington branch, and it was not until 25 Aug. 1835 that the echoes of the national cap¬ ital resounded back the locomotive's shrill awakening. With the opening of the branch, the railway postal service came into being, its earliest form the boarded-up end of a baggage car, the two keys of which were held by the postmasters of Washington and Baltimore.

The declaration of the first railroad dividend in history, a semi-annual of the Baltimore and Ohio, was made simultaneously with the open¬ ing of the Washington branch, and the securi¬ ties of the latter were the first of American railway issues marketed abroad.

The greatest of eventualities, however, with which the Washington branch's history is linked was the birth of the telegraph. ((What Hath God Wrought,® the first four words transmitted by wire over a public line, were sent from Baltimore to Washington via the roadbed of the Baltimore and Ohio branch.

Hancock, 123 miles from Baltimore, was reached by the Baltimore and Ohio on 1 June 1842; Cumberland, 178 miles, on 5 Nov. 1842; Piedmont, 206 miles, on 21 July 1851 ; Fair¬ mont, 302 miles, on 22 June 1852; and the last spike, finishing the great undertaking from Bal¬ timore to Wheeling, 379 miles, was driven on 24 Dec. 1852. The formal opening of the road was marked by a notable demonstration 10 Jan. 1853. There being no rail connection beyond, and the prospects bright for Cincinnati and Louisville business in the one direction and Pittsburgh in the other, a company was organ¬ ized and a daily steamboat service established ˆsuperior to anything floating upon western waters.®

With the completion of the Parkersburg branch from Grafton — or the mouth of Three Forks, as it was then known — to Parkersburg, 1 May 1857, the Ohio was reached at another point, and a very important one, as through rail connection had been perfected thence to Cincinnati, 10 days before, 20 April. The opening of the Parkersburg bridge, 7 Jan. 1871, was the last link in the continuous rail from the Chesapeake to the Mississippi.

The old Marietta and Cincinnati, the Ohio and Mississippi and other railways, once sep¬ arately conducted companies, long since became component parts of the Baltimore and Ohio system, which, since the finishing of the Chi¬ cago division, 10 Nov. 1874, has been among the foremost in the metropolis of the northwest, as, through being the pioneer into Cincinnati and Saint Louis from the East, it has ever been in those centres.

At Pittsburgh, as well, the Baltimore and Ohio's position is a commanding one. Reaching the great central point from Cumberland in July 1860, later building and acquisitions led to radiating lines to Cleveland, Chicago, Cincin¬ nati, Wheeling and other points of traffic con¬ centration. Eastward from Baltimore the con¬ struction of the extension to Philadelphia and its opening, 19 Sept. 1886, together with secu¬ rity holdings in lines through to New York assured important place among the railways centring in the country's leading city.

Mileage. — On 30 June 1915 the Baltimore and Ohio Railroad proper consisted of the fol¬ lowing lines :

DIVISION	MILES
New York District	5.35
Main Line District	1,189.08
Wheeling District	1,103.00
Pittsburgh District	1,252.49
Southwestern District	985 . 35
	4,535.27

By divisions this mileage is as follows :

MILES	TOTAL
New York District	5.35
New York Division	5.35
Main Line District	1,189.08
Philadelphia Diyision	119.31

Baltimore Division . 238.30

Cumberland Division . 292.90

Shenandoah Division . 114.37

Monongah Division . 424.20

Wheeling District . 1,103.00

Wheeling Division . 217.42

Ohio River Division . 231.64

Cleveland Division . 223.92

Newark Division . *. . 430.02

Pittsburgh District . 1,252.49

Connellsville Division . 348.31

Pittsburgh Division . . 342 . 50

New Castle Division . 277.73

Chicago Division . 283 . 95

Southwestern District . 985.35

Ohio Division . 335.14

Indiana Division . 255.49

Illinois Division . 394.72

Grand total for entire B. & O. System 4,535.27

Equipment. — The total equipment for the entire system, valued at $93,908,383.33, as of 30 June 1915, was as follows:

rolling stock

Locomotives and Spare Tenders . 2,399

Passenger Cars . 1,261

Freight Cars . .’ . 86,097

Service Cars . 3,172

MARINE

Steam Lighters and Tugs . 14

Barges, Floats and Scows . 121

Traffic Statistics. — For the year ending 30 June 1915 the total number of tons of freight carried by the B. & O. system was 64,375,595. The total ton mileage was 12,970,894,074. The number of passengers carried was 20,581,992, or 714,368,423 passengers one mile. The freight earnings for the B. & O. lines were $70,780,- 808.51 and the passenger earnings were $14,-

059,940.41.

Finances. — The general income account of the Baltimore and Ohio Railroad Company for the year ending 30 June 1915 was as follows:

Gross earnings . $91,815,797.34

Operating expenses . 63,925, 507 . 74

N et earnings from operations . $27, 890 ,289.60

Other income . 5,260,847.77

$33, 151,137.37

Total payments, including dividends . 32,379,663.51

Surplus . $771,473.86

The capital stock (preferred and common) outstanding on 30 June 1915 was $210,811,- 885.17; the funded debt was $398,799,159.81; the total capital liabilities $609,611,044.98. The capital assets of the company were $620,109,- 759.23, consisting of the following: Cost of road, including bonds and stocks held by trus¬ tees, $441,810,562.45; real estate, $6,667,735.88 ; equipment, $93,708,383.33. The company also owned bonds and stocks of railroad and other corporations to the value of $77,923,077.57.

BALTIMORE ORIOLE. See Oriole.

BALTISTAN, bal -te-stan', or LITTLE TIBET, an elevated plateau through which the upper Indus flows. It lies below the Kara-Koram Mountains and the Himalayas, with a mean elevation of 11,000 feet, and contains the nameless peak marked K2, 28,278 feet high, next to Everest, the highest on the globe. It is politically a province of Kashmir.

BALTZER, Johann Baptista, German theologian: b. Andernach 1803; d. 1871. He

was educated at the University of Bonn, was ordained to the priesthood in 1829, and in the following year became professor of theology at Breslau. He was an enthusiastic follower of Georg Hermes in the latter's effort to effect a reconciliation of Roman Catholic teaching with the newer German philosophy. In 1839 he broke away from this connection and became a fol¬ lower of Anton Gunther. When Gunther came under the ban of the Church Baltzer submitted, but he was soon involved in other difficulties with the ecclesiastical authorities and these dif¬ ferences led to his suspension in 1862. He opposed the promulgation of papal infallibility and became an ardent promoter of the Old Catholic movement. He wrote (Die biblische Schopfungsgeschichte) (2 vols., 1867-73) and (Ueber die Anfange der Organismen) (4th ed., 1869). Consult the biographical sketches by

Friedberg (Leipzig 1873) and by Melzer (Bonn 1877), both in favor of Baltzer's attitude, and Franz (Berlin 1873), representing the opposite side.

BALTZER, Wilhelm Eduard, German theologian : b. Hohenleine 1814 ; d. Grotzingen 1887. He was educated at Leipzig and Halle, and was ordained to the Lutheran ministry. His liberal views led to his being looked on with disfavor, and in 1847 he founded a free church of his own and soon became the leader of the movement known as the ((Freie Ge-meinden,® or free religious communities which arose in opposition to dogmatic and traditional theology. Baltzer was the leader of the move¬ ment until 1881, when he retired to Grotzingen, and spent his remaining years in the promotion of vegetarianism. He wrote (Alte und neue Weltanschauung) (4 vols., 1850-59) ; ˆott, Welt, und MensctP (1869) ; (Vegetarisches

Kochbuch) (14th ed., 1900).

BALUCHI, ba-loo'che, the language of Baluchistan, one of the Iranian group of lan¬ guages. There are two dialects, the north Baluchi and the south Baluchi, or Maprani ; the latter shows more ancient features.

BALUCHISTAN, ba-loo'che-stan', a country in the south of Asia, lying between Persia and the valley of the Indus, having the former on the west, Afghanistan and the North¬ west Frontier province on the north, Sindh, the Punjab and part of the Frontier province on the east and the Arabian Sea on the south ; area, about 134,638 square miles. It is wholly under British influence and partly under British rule, an area of 9,096 square miles forming part of the Indian empire; the rest of the country is divided into Agency territories under British control (about 45,132 square miles), and the native states of Kalat and Las Belas. The general surface of Baluchistan is rugged and mountainous, with some extensive intervals of barren sandy deserts. In the case of the prin¬ cipal ranges, the general parallelism and uni¬ formity of their formation are somewhat re¬ markable, one system having an inclination from north to south, another from east to west. Many of these mountains are of great height and are covered with snow. There are several broad and high tablelands, extremely cold in winter and extremely hot in summer. Makran in the south, the ancient Gedrosia, is one of the hottest regions of the globe. Some of the

mountain chains are of compact limestone, en¬ closing marine shells and corals identical with similar objects picked up on the sea-shores at

this day. Excepting fragments of quartz found in Lus, primary formations have not been ob¬ served in any part of the Baluchistan Moun¬ tains. The mineral wealth of the country is believed to be considerable, but is almost un¬ developed; lead, iron, many kinds of mineral salts, coal, asbestos, chromite and oil have been found. Throughout Baluchistan there is a great deficiency of water, particularly in summer. In the northeast part are the rivers Bolan and Mula, the courses of which form the celebrated passes bearing their names, leading from the valley of the Indus to Baluchistan and Afghan¬ istan. In the south are the Hingol and the Dasht which flow into the Arabian Sea. The coast has a length of about 600 miles ; it is very little indented and has no good harbors. The soil is not in general fertile, but by patient in¬ dustry the plains and valleys can be made pro¬ ductive in wheat, barley and millet. The other chief crops are rice, maize and potatoes. Vege¬ tables are abundant, and excellent fruits are produced in the gardens and orchards in the neighborhood of the towns. Panjgur in Makran is celebrated for its dates. Fine camels are bred in large numbers.

The inhabitants are composed of numerous races, the chief of which are the Baluchis or Baloch, the Pathan and the Brahuis, different in their languages, figures and manners, and each subdivided into a number of minor tribes. The Baluchis are of Arabian, Dravidian and Persian stock, and though essentially robbers and raiders have many fine characteristics. The Brahuis are less addicted to predatory violence Both races are hospitable, brave and capable of enduring much fatigue. Many of them live in rude tents made of black felt or coarse cloth of goat's or camel's hair stretched over a frame of wickerwork. Both Baluchis and Brahuis are Mohammedans of the Sunnite creed. Both are less violent and bloodthirsty than the Pathan. The Baluchi language resembles the modern Persian, the Brahui presents many points of agreement with the Hindu. The manufactures are mostly confined to coarse fabrics, a few matchlocks and other weapons, and iron work for agricultural purposes. Leather work and pottery are manufactured in certain parts and the Brahui women do excellent needlework. Overland trade with India is carried on by the Sindh-Pishin Railway and camel caravans, the chief exports being mustard, rope, raw wool and food grains. The chief exports by sea are dates, matting and dried fish. The Khan, so far as his rule extends, has unlimited power over life, person and property. He usually resides at Kalat, and his rule is almost confined to the country around it. Quetta is the largest town. It is occupied by a British garrison and strongly fortified. Southern Baluchistan was the ancient Gedrosia, described by Arrian, the historian of Alexander the Great. The country was ruled by

Hindu princes until the end of the 17th cen¬ tury when it was subdued by the Brahuis under their leader, Kumbar, who had been summoned to assist the Hindu rulers against turbulent tribesmen. A descendant of Kumbar, Nasir Khan, was confirmed in his authority over numerous tribal chiefs by the celebrated Nadir

Shah, ruler of Persia, who overran Baluchistan during his invasion of Hindustan in the middle of the 18th century, and as Khan of Kalat, Nasir proved himself the ablest ruler who ever governed the country. On his death in 1795 he left it in a fairly prosperous condition but it suffered later from intestine wars and its boundaries have been curtailed. In 1839 when the British were advancing toward Afghanistan the treacherous conduct of the Khan led to the capture of Kalat by General Willshire. In 1854 a treaty was executed between the British gov¬ ernment and Nasir Khan II under which he received a yearly subsidy of 50,000 rupees which was later raised to 100,000 rupees. British resi¬ dents were appointed to the court of the Khan but the country was considered independent until 1877 when the cantonment of Quetta, now the headquarters of the administration and ter¬ minus of the Indian railway system, was occu¬ pied by British troops. In 1879 the district was taken over by the administration on behalf of the Khan and in 1883 was made over to the British by the Khan together with the district of Bolan on payment of an annual quit-rent. Other districts have also been assigned to Great Britain and go to make up British Baluchistan (about 9,096 square miles), administered by a chief commissioner under the governor-general of India. Other territories under British con¬ trol have an area of about 45,132 square miles. Kalat and Las Belas, formerly a fief of the Khan of Kalat, are under the control of a British political agent in Kalat. Their combined area is 80,410 square miles. There are 832 miles of metaled and partly metaled roads in the whole of Baluchistan. In 1917 there were 782,648 Mohammedans, 37,602 Hindus, 8,390 Sikhs and 5,085 Christians. In 1916 there were 73 govern¬ ment and aided and unaided schools with 3,263 pupils and 70 private schools with 865 pupils.

Bibliography. — Consult the annual adminis¬ tration reports of the Baluchistan Agency (Calcutta) ; also Hughes, A. W., (The Country of Baluchistan5 (London 1877) ; MacGregor, C, (Wanderings in Baluchistan5 (London 1882) ; Oliver, E. E., < Across the Border or Pathan and Baluch5 (London 1891) ; Holdich, Sir T. H., <The Indian Borderland5 (London 1901); id., (The Gates of India5 (London 1910) ; Dames, (The Baloch Race5 (Asiatic So¬ ciety Monographs, Vol. IV, London 1904).

John B. McDonnell, Editorial Staff of The Americana.

BALUCKI, ba-loots'ke, Michael. Polish author, known under the pseudonym Eli pi do n : b. Cracow, 29 Sept. 1837; d. 1901. As a story¬ teller he had shining gifts — a brilliant style, free and spontaneous humor — and in both novel and comedies held up to a genial ridi¬ cule the shortcomings and prejudices of Polish society. Among his principal works of interest may be mentioned (Thc Awakening5 (1863) ; <The Young and the Old5 (1866) ; (Life Among Ruins5 (1870); <The Jewess5 (1871); (ForSins Not Committed5 (1879); <250, 0005 (1883). The best among his comedies are <The Chase After a Man5 (1869); <The Emancipated5 (1873);

< Amateur Theatre5 (1879) ; <The Town Coun¬ cil5 (1880); <The Open House5 (1883); <Miss Valerie5 (1891); <The Burgomaster of Pipi-dowka5 (1894).

BALUSTER, or BALLISTER, a kind of short column, sometimes in the form of an ancient bow, sometimes made after the model of Greek and Roman columns, employed in the construction of balustrades.

BALUSTRADE, a series of balusters sur¬ mounted by a rail, and placed as an ornament on large buildings, above the cornice, or as a protection to enclose bridges, stairs, balconies, altars and the like.

BALUZE, ba-liiz, Etienne, French scholar and historian: b. Tulle, 24 Dec. 1630; d. Paris, 28 July 1718. He early acquired distinction by his varied and thorough knowledge, and was called to Paris by the celebrated Colbert, who commissioned him to make up his private li-brarjL In 1707 he was appointed to the super-visorship of the royal college, and dismissed from that office in 1709, being suspected of having in his <Histoire Genealogique de la Maison d'Auvergne, designedly established, by documentary evidence, that the princes of Bouil¬ lon were descended from the ancient dukes of Guienne, counts

of Auvergne, and therefore owed no allegiance to the king of France. Such an offense could not be forgiven; and Baluze, deprived of nearly all his income, was compelled to reside successively at Rouen, Blois, Tours and Orleans, and not until after the conclusion of the Peace of Utrecht was he permitted to return to Paris. He was of the most amiable temper, and his wit was equal to his cheerful¬ ness.

BALVANY, the Magyar name for idol, found in mediaeval Latin documents of Hun¬ gary, and also in Hungarian geography, ap¬ plied to various heights which were the last strongholds of paganism in the 11th century.

BALVAS, Antonio, Spanish poet: b. Sego¬ via in the middle of the 16th century; d. 1629. He wrote <E1 poeta Castellano5 (1627), a work highly praised by Lopez de Vega.

BALY, William, English physician : b : King's Lynn 1814; killed in a railway accident near Wimbledon, 28 Jan. 1861. He studied at University College and Saint Bartholomew's Hospital, London, in Paris, at Heidelberg and Berlin, where he received his M.D. degree in 1836. He commenced practice in London, and in 1840 was appointed physician to Millbank penitentiary, where he attained a reputation as an expert in the hygiene of prisons, on dysen¬ tery and cholera. He was appointed lecturer at Saint Bartholomew's Hospital ; became a fellow of the Royal Society in 1847 ; in 1859 was chosen as one of the physicians to the royal family, and later became censor to the College of Physicians and Crown representative in the Medical Council. He wrote < Diseases of Prisons5 ; <Gulstonian Lectures on Dysentery5 (1847); translated from the German Muller's < Elements of Physiology5 and < Recent Ad¬ vances in the Physiology of Motion, the Senses, Generation and Development5 ; and, with Gull, wrote < Epidemic Cholera5 (1854).

BALZAC, bal'zak' Honore de, French

novelist: b. Tours, 16 May 1799; d. Paris, 17 Aug. 1850. His family was of no account, and the aristocratic «de55 (adopted perhaps in good faith) dates from 1830 or thereabouts. The surname itself seems to have been properly

spelled Balsa, or Balsas, the first to alter it being the novelist's father, whose parents were peasants in Languedoc. Little is known of the elder Balzac's career, except that he was at one time a lawyer and later an officer in the com¬ missariat ; he married past middle age, and at the time of Honore's birth filled certain mu¬ nicipal offices in the city of Tours. He is rep¬ resented as a man of whimsical character, caustic but indulgent, with a wonderful memory, and full of schemes for making millions and reaching the age of 100. His wife, whose name was Sallambier, had good looks and a fortune ; she is said to have been pious and imaginative, and devoted to her children's welfare, but by no means outwardly tender to them. At any rate Honore and his favorite sister Laure (afterward Madame Surville), if not her two younger children also, were brought up very strictly.

He was sent to school early with the Ora-torians of Vendome and was as miserable there as his Louis Lambert. All he learned was by desultory reading, and that in books too deep for his age. His masters thought him dull and lazy, and his absent-mindedness having devel¬ oped into a sort of daze, he was withdrawn by his parents and became a day-scholar for a time at the College de Tours. Neither there nor at a boarding-school in Paris, to which city the family removed in 1814, was he by any means a brilliant pupil ; and at home not only his talents but the ambition to write which had already seized upon him remained quite unsuspected. In 1816 he was put into a lawyer's office and 18 months later began to work with a notary, both his chiefs being intimate friends of the family; at the same time he attended various lectures at the Sorbonne, and was becoming familiar with the great writers of his country. His mind was made up to devote himself to literature, when in 1819, M. de Balzac, who had recently lost money in speculation and was about to retire, an¬ nounced to Honore that his friend the notary offered to take him into partnership with the prospect of succeeding to his practice. Honore resisted, and begged for a chance to show his literary gift; after some discussion his father gave him his way and, while the family made its own home at Villeparisis, he was installed in an attic near the Arsenal Library on a two years' trial of his powers, with an allowance barely sufficient to keep him from starving. Here in cold and hunger and solitude, but sup¬ ported by his unconquerable gaiety and self-confidence, he set to work first on two tales which were soon to be finished, then a comedy, lastly a tragedy in verse, c Cromwell, > which he firmly believed to be a masterpiece. He brought it home with him in the spring of 1820; the

family yawned when he read it, and a friend to whose judgment this first composition was submitted, Andrieux, the academician and pro¬ fessor, recommended the young man to try his hand at anything in the world but literature. He had only spent 15 months of his probation, but his mother insisted that he should now live at home; privations had already told upon his vigor, and he was obliged to recruit in Touraine before settling down at Villeparisis. There, nothing discouraged, in the next five years he wrote, with different collaborators, no less than 31 volumes of fiction, and found publishers for

them. Of the entire worthlessness of this early work he was perfectly aware; it appeared un¬ der various pseudonyms ((Horace de Saint-AubiiP was the favorite), and when long after¬ ward in great distress for money he allowed it to be republished, he would never acknowledge the paternity.

It was at this time that he became acquainted with the Berny family, then resident at Ville¬ parisis, and formed with Madame de Berny — a woman more than 20 years older than himself — a close friendship which lasted until her death in 1836, and to which he owed perhaps the most generous and disinterested sympathy that he ever received from man or woman.

In 1824, determined to win his independence, young Balzac returned to Paris and set up business as a publisher on borrowed capital. He had a great scheme — the first of many — for making a fortune by bringing out one-volume editions of the French classics, and began with Moliere and La Fontaine ; but chiefly for want of proper advertising the ven¬ ture failed. He next became a printer, having induced his father to advance him the sum nec¬ essary to buy the stock and a printer's license, and seeing a type-foundry offered at a bargain he presently acquired that also. It was a most disastrous speculation ; bankruptcy was only averted by the help of his mother and of *Mme.* de Berny, and this was the beginning of his lifelong indebtedness.

Before his business was wound up Balzac was already at work, in a room in the Rue de Tournon, upon the first novel to which he signed his name. (Les Chouans) was finished during a visit to Fourgeres, in the district which is the scene of the historical events it describes, and published in 1829 with some success. The rather cynical manual called (La Physiologie du Mariage) followed; then a number of shorter

stories, and, in 1831, (La Peau de Cliagrin) — with which book his reputation became fairly established. Publishers and editors now sought for his work, and the curiosity and interest his writings already excited are attested by the anonymous correspondence which began at this time to pour in upon him. It was in this way that in 1830, he made the acquaintance of two women, the Marchioness de Castries and *Mme.* Hanska, whose names cannot be omitted from any account of his life. For *Mme.* Castries Balzac conceived a transient, but certainly strong passion, which seems to have only grati¬ fied the vanity of a rather heartless but very intelligent great lady ; she made a plaything of him ; but he owed to her his most genuine in¬ sight into the manners, traditions and ideals of the close society of the Faubourg Saint-Ger¬ main. Her portrait, it is conjectured, may be found in (La Duchesse de LangeaisP *Mme.* Hanska, a Polish lady of noble birth, married to a Russian in the Ukraine, was the object of his deepest and most enduring affection, and finally became his wife. His letters to this ((Etrangerew have in recent years been pub¬ lished; they are discreet, frequent and volumi¬ nous, for these friends or lovers were seldom together, even after the death of M. Hanska, until the last two years of Balzac's life. His biographers have little tenderness for *Mme.* Hanska ; hers was certainly an inexpansive nature; her love for her only child, the Countess

Anna (afterward *Mme.* Mniszech), seems to have almost excluded other affections ; she cared excessively for her rank and her comfort; tor¬ tured the great man by long deferring to fulfil her secret engagement with him, and in his last illness appears to have shown herself incredibly callous. *Mme.* Honore de Balzac lived until

1882.

Balzac's story, from 1830 onward, is mainly the story of his herculean industry; and the most memorable dates in his life are doubtless those of the production of such masterpieces as (Louis Lambert) (1832), (Le Medecin de Campagneˆ and (Eugenie Grandet) (1833), (La Recherche de l'Absolu) and (Le Pere Goriot) (1834), (Cesar Birotteau) (1837), illusions Perdues) (1835ˆ11), (Les Paysans) (1844-45), (La Cousine Bette) (1846), (Le Cousin Pons) (1847). Between 1830 and 1842 he wrote no less than 79 novels, besides much other literary work. After that date his literary activity slackened somewhat as his health began to fail. But during a considerable number of years, for long intervals together, he never worked less than 12 hours each day, often worked for 15 hours, or even for 20 at a stretch, supporting himself on a lean diet in which fruit was al¬ ways an important element, and drinking as much coffee as the philosopher Kant. But he was never out of harness, even during his fre¬ quent absences from Paris — whether staying with friends in the French provinces, or art collecting in the north of Italy, or mine-pros¬ pecting in Sardinia (one of his most extraordi¬ nary ventures), or visiting *Mme.* Hanska at Geneva, Vienna, Berlin or Saint Petersburg. These travels, a short-lived journalistic enter¬ prise — La Chronique de Paris — several excur¬ sions into drama, more than one attempt to force the doors of the French Academy, and many quarrels with the press — a lawsuit with the Revue de Paris made some stir in 1836 — are the chief outward events of Balzac's ma¬ turity. Throughout his career the money ques¬ tion is distressingly prominent, and the history of Balzac's liabilities is long and queer and complicated. The sums he made by his pen were very considerable; but his optimism was at least as great as his acquisitive faculty. No man was more capable of penurious living; none loved luxury better; but decent comfort and regularity were beneath or beyond him. Spells of asceticism were succeeded by fits of extravagance : the story of his suburban prop¬ erty Les Jardies, of his famous walking-stick, of the financier Goujon's house in the Rue Fortunee (now the Rue Balzac), which he bought for his future wife and spent half a mil¬ lion in filling with works of art — the very works described in (Le Cousin Pons} — bal¬ ances the story of his sacrifices, privations and his games of hide-and-seek with creditors. He was a born speculator; he was also the most generous of men, and sometimes unfortunate in the objects of his generosity.

The strain entailed by Balzac's way of living and by his constant mental agitation was such as no constitution — and his was

extraordinarily robust — could resist very long. From 1842, or thereabouts, he began to suffer from time to time with heart and lung troubles, and from 1845 onward he was rarely well. It was during his second stay at Vierzschovnian, *Mme.*

Hanska's property in the Ukraine, that his health began to give serious anxiety. For a time he improved; but the climate, the uncer¬ tainty in which he was kept as to the reward of his long devotion, certain material obstacles to his marriage, the necessity of conducting his literary and other transactions by proxy, the anxieties of the political situation in France, misunderstandings with members of his own family, and the effort to force himself to work when work was beyond his failing physical powers, all hastened his end. His marriage was solemnized at last in Marcfi 1850, at Berditchef, in Poland; rather more than two months later Balzac arrived in Paris with his bride. He was a dying man, though he clung almost to the last to the hope of living to finish {The Human Comedy, } and extinguish what was left of his debts. Victor Hugo was among those who vis¬ ited his deathbed, and the same great poet it was who paid a splendid tribute to his friend and peer at the graveside in Pere Lachaise. Occurring in the midst of a grave political crisis, his death was less noticed than might have been expected ; but though widely read and fervently admired among his contempo¬ raries — more especially perhaps in foreign countries — it wanted at least another genera¬ tion to assure his fame; nor (thanks to a com¬ bative spirit and an ingenuous vanity) did he lack enemies ; though the mere dedications of his novels are enough to show that his friends were among the elect of his age, and it is im¬ possible to read his correspondence without a feeling of respect, and even of affection, for a personality so rich, so valiant, so tenacious and so kindly.

It is best, in so slight an estimate of Balzac's colossal achievement as can be attempted here, to leave out of account not only the worthless fiction of his nonage but also his plays, of which only one, ˆercadetp first called (Le Faiseur,) and produced with considerable changes after its author's death, can be said to have won or deserved success. An exceptional place belongs to the (Merry Tales, } not so much in virtue of their notorious, guileless and jovial salacity as because, while the form is more essentia) there than in anything else he wrote, they are among the very few skilful pastiches in literature — for the lapses they contain from either the language or the atmosphere of the early French Renaissance are astonishingly few — in which the mere erudition does not replace or over¬ shadow other merits. They are

memorable for their genuine zest, inventive vigor and shrewd humanity.

Balzac's glory, of course, is that unfinished series of masterpieces called (The Human Comedy, > which it is necessary to consider as one work in order to appreciate the audacity and breadth and steadiness of aim which are essential titles to his rank, not merely as the father of the modern novel and the supreme master of the craft, but as a genius of the uni¬ versal order. In its most obvious bearing, it is an imaginative reconstruction of French society in every part and aspect, with all the vicissitudes and variations that affected it between the Revolution and the middle of Louis Philippe's reign : an heroical design, less comprehensive in regard to time and space than that of the Waverley novels, but more consistently and co-

herently executed out of more copious material. The picturesque, however, was subordinate to the philosophical interest, as he conceived it, of Balzac's undertaking. He intended his work for nothing less than a natural history of civilized man, which should illustrate the war between the passions of the individual and the social instinct or the common interest, the differentia¬ tion of types by the action of gregarious life, the reflection of personality in matter and the stamp of habits and calling upon character. The theory outlined by Buffon and bequeathed by Geoffroy Saint Hilaire to the first evolution¬ ists, which supposes a single original pattern of organic creation varied by the mere efforts of environment, fascinated Balzac by a partly chimerical but, at any rate, suggestive analogy with human existence. (<Does not society,® he asked in his general preface of 1842, "make of man, according to the sphere in which his ac¬ tivity develops, as many different men as there are species in zoology ?® This conception is enough to explain one great characteristic of his novels — the importance attributed in them to atmosphere, to local influences, to material conditions, to all that the elder novelists had regarded as accidental and accessory. It is Balzac who set the example of bestowing as much care upon things as upon men in works of

fiction. The description of streets, houses, furniture and works of art, of implements and equipages, of dress and pastimes, of customs and offices, business and procedure and, in par¬ ticular, of all that pertains to money, is through¬ out (The Human Comedy, > not only exact and elaborate (sometimes to the point of tedious¬ ness and disproportion), but above all signifi¬ cant. Sechard's printing-press and Gaudissart's advertisements, the laboratory of Balthazar Claes, the aroma of Maman Vauquer's dining¬ room, are part and parcel of those famous per¬ sonages.

The French imagination had tended for some time to desert that psychology in ahstracto which had been at once the glory and the limi¬ tation of the great classical authors, and to pay more attention to the setting and the back¬ ground of fictitious characters. Diderot par¬ ticularly, who on several grounds might be called a herald of Balzac (and resembled him in vitality, variety of knowledge, fertility, hasty and unequal execution), had done much to carry into pure literature a spirit of curiosity about .the common things of life, a new multiplicity of interests and concern for reality, and some of the results of natural science. But the ro¬ mantic contemporaries of Balzac, most of whom were irresistibly allured by the prestige of the old and the distant, used the extension of imagi¬ native matter to enhance the picturesque value of descriptions, rather than to enrich the defi¬ nition of human types ; for their interest in characters is generally insufficient, being de¬ pendent upon an introspection distorted as often as not by a morbid vanity. Balzac is unique in this, that with a searching modernity of out¬ look which omits none of the sensible elements of life from his imaginary world, he is yet essentially the restorer of the old, patient, con¬ structive psychology and of the drama of in¬ ternal action. It is remarkable how much of the spirit of the grand siccle survives in his work; how much of La Bruyere in the brilliant

pages of moral analysis, of Corneille in some of his heroes of the will, of Moliere in the smiling sanity of his attitude toward a neces¬ sarily imperfect society, of Racine in the sym¬ pathetic presentment of absolute passions and their victims! Balzac's personages — even the secondary figures — are at once individuals and types. They live with the intense life of living men and women ; and we accept them as great moral symbols. They are highly differentiated, particularized with an unsurpassable sureness of detail; but they are also, one and all, in¬ formed by an idea — so that, though there is only one Goriot, he sums up all the tragedy of a primal affection run to seed and

despitefully entreated ; and there is only one Baron Hulot, but he contains all the shame of elderly profli¬ gacy, bringing disaster on whole families; and Cesar Birotteau is inimitable, but he stands for all that is sterling as well as all that is ridicu¬ lous in the middle class.

In the vitality of his creatures Balzac is not inferior to Shakespeare himself. But we be¬ lieve not only in the people he made, but in the whole world of (The Human Comedy, } and accept it as a rival of reality. This mastery of illusion, the very highest virtue in a writer of fiction, does not depend upon veracity or exacti¬ tude of detail (a test which upon the whole he sustains triumphantly), but is simply the power to imagine strongly. It is true that in this case a system of composition which discarded chap¬ ters, or rather made of each novel (by the con¬ tinual reappearance of old friends among the characters) a chapter in the whole work, is a powerful help to illusion; so of course are the accumulation of circumstances, and especially perhaps the variety and distribution of interests, in which Balzac's astonishing invention seems to play the part of chance.

The work of Balzac displays at one view the whole capacity of the form of literature called fiction, its scope and possibility of content. The ordinary tone of the French novel had once been heroic and pastoral ; then it had tended to caricature and to the parodying of court memoirs ; and later the ideal had been to amuse one class by showing the manners of another. The picturesque romance had been succeeded by "realistic® satires upon society and, with the advent of the philosophes, the novel became a pamphlet, a vehicle of moral or political doc¬ trines. Perhaps all these phases are repre¬ sented in (La Comedie Humaine) ; the novel according to Balzac is simply a universal instru¬ ment like Homer's epic or Shakespeare's drama. The ineffaceable mark of his achieve¬ ment upon his successors is that, since Balzac, the novel in France is not a toy but a serious art. Balzac indeed would not have been con¬ tent with the qualification ; half the preface already referred to is an apology for the novel considered as a work of science and a means of propaganda, and to him — to his precept rather than to his practice — must be traced the arro¬ gant pretensions of some modern writers of fiction, their sermons and sociology and what Flaubert so disdainfully called their manic de conclave. A work of imagination does not need the protection of a political creed or a scientific hypothesis ; it is Balzac's weakest side that, while he sinks what we call his personality almost always, he frequently obtrudes fallible

opinions — matter for argument — into the do¬ main of the imagination. His royalism is an interesting fact, but in his novels it is irrele¬ vant; the same is true of many of his political prophecies. It should be added that he seldom intervenes directly in the discussion of scien¬ tific theories (which hold a somewhat important place in his novels), though with characteristic credulity he identifies himself expressly with the speculations of the phrenologists ! There was a mystic in Balzac, and that section of his work, Philosophical Studies, } which deals with the solitary adventures of the mind in regions beyond the world of sense, is strangely original and fascinating.

He was, in some degree reluctantly, an artist — a prodigious though an imperfect artist. His defects of form have been exaggerated. His style, like Saint-Simon's, is vigorous and vivid in default of correctness, and full of for¬ tunate phrases ; but he was wanting in the sense of idiom, and the effort to condense his thought often produced a clumsy syntax and obscurity. Haste no doubt accounts for some base coin¬ age, repetition and inadequate expressions. As of other writers of his stature it may be said of him that his fecundity was necessarily waste¬ ful, so that a part of his work is greater than the whole. This exuberance, a certain worship of the excessive, a stupendous confidence for which no design is too large, and a preference for the expressive over the symmetrical, for color over draughtsmanship, are characteris¬ tics which he shares with several great French¬ men of his generation — the generation con¬ ceived in camps and lulled by the guns of Austerlitz, which grew up haunted by a vision of heroical accomplishment. Honore de Balzac stands beside Victor Hugo and Jules Michelet and Hector Berlioz and Eugene Delacroix — a giant among giants, a perennial force among the intellectual forces of the world. See Pere Goriot; Eugenie Grandet; Cesar Birotteau; Magic Skin, The.

Bibliography. — The best edition of the com¬ plete works of Honore de Balzac is the (Edition Definitive* (in 24 volumes, Paris 1869-76).

Uniform with it are the letters to *Mme.* Hanska, (Lettres a l'Etrangere,* posthumously published in 1899. There exist numerous English trans¬ lations of individual novels. Prof. G. Saints-bury is the general editor of a complete Eng¬ lish translation of a (Human Comedy,* by various hands, in 40 volumes (London 1895— 98). The letters to *Mme.* Hanska have been translated by D. F. Hannigan — (Love Letters of Balzac) (London 1901). Among biograph¬ ical and critical studies of Balzac the more valuable are the following: L. Gozlau, (Balzac chez luP (1862) ; E. Bire, <Balzac) (1897) ; Le Breton, (Balzac, l'homme et l'ceuvre) (1905); F. Brunetiere; (H. de Balzac) ; Vicomte Spoet-boerch de Louvenjoul, (Histoire des oeuvres de Balzac) (1880) ; (La genese d'un roman de Balzac) — • (Les Paysans* (1901); (Un pays perdu d'H. de Balzac) (1903). The short life of her brother by *Mme.* Surville (Laure de Balzac), first published in 1858, is included in the volume of the (Edition Definitive* contain¬ ing Balzac's general correspondence. In Eng¬ lish Mr. Frederick Wadmore has written a (Life o'f Balzac) ; and a better-informed study by Miss M. F. Sandars appeared in 1904. Con¬

sult also Chapman, J. J., (Great Genius-* — in¬ cluding Euripides, Shakespeare, Balzac (New York 1915) ; Faguet, E., (Balzac) (Paris 1913, and trans. with notes Boston 1914) ; Gillette, F. B., (Title Index to the Works of Honore de Balzac) (Boston 1909) ; James, H., (Notes on Novelists) (New York 1914) ; Lilly, W. S.,

(Balzac Re-Read) (Nineteenth Century and After , New York 1916).

F. Y. Eccles.

BALZAC, Jean Louis Guez de, French essayist and letter writer: b. Angouleme 1597; d. 18 Feb. 1654. In his youth he was secretary to Cardinal La Valette at Rome. He returned to Paris, devoted himself to literature, and un¬ der Richelieu became councillor and histori¬ ographer of France, and was one of the most influential members of the Academy from its foundation, likewise a sort of oracle of the Hotel Rambouillet. His influence on French prose is ranked with that of Malherbe on poetry. Besides his (Letters* (1624), which are elaborate epistles with a definite attempt at style, he wrote (The Prince* (1631), a glorifi¬ cation of absolute monarchy; (The Dotard) (1648); (The Christian Socrates> (1652); and (Aristippus) (1658) ; the latter intended to por¬ tray the ideal statesman. His (Letters* were edited by Larroque (1874).

BALZANI, bal -tsa’-ne, Ugo, Count, Italian historian: b. Rome, 6 Nov. 1847. He received his education at the university of his native city. He soon became distinguished as a bril¬ liant scholar in his chosen field of history and received many honors at home and abroad. He is president of the Reale Societa romana di storia patria, member of the Reale Accademia dei Lincei and of the Instituto Storico Italiano. He received the honorary degree of Litt.D. from the University of Oxford and was elected a corresponding fellow of the British Academy. His publications include (Le cronache Italiane nel Medio Evo,* (I1 Regesto di Farfa di Gregorio di Catino* (1879) ; (The Popes and the Hohenstaufen* ; (I1 (<Chronicon Farfense*** ; (Sisto V* ; (Early Chroniclers of Italy> (1883) ; besides many contributions to the transactions of the various institutions, Italian and foreign, of which he is a member.

BALZICO, bal-tse’ko, Alfonso, the most prominent Italian sculptor of his time : b. at Cava di Tirreni, near Salerno, 1825 ; d. 1901. He received his early art education at the Academy of Naples, finishing his studies iri Rome. For his royal patron, Victor Emmanuel I, whose capital was then at Turin, he produced his masterpiece in 1867, the equestrian statue in bronze of Duke Ferdinand of Genoa. His subsequent life was spent in Rome, which had become the national capital. His nude Cleo¬ patra* received the gold medal at Paris in 1900, and among his other works are (John the Bap¬ tistˆ (The Free,* the marble monument of (Bellini,* the musical composer, and (Victor Emmanuel) in bronze, the two latter in Naples.

BAMBARRA, bam-bar’ra, west Africa, a negro kingdom, lying at the point where 5° W. long, and 12° N. lat. cross. It was first vis¬ ited by Mungo Park. In the east the country is flat and swampy; but in the west there are low chains of granite hills. The climate in some parts is intensely hot, but generally healthful.

HONORE DE BALZAC

BAMBERG

BAMBOO

The land is well watered and fertile. The rainy season is from June to November. Cotton, maize, yams, corn, rice and many kinds of fruit are raised. The principal towns are Sego, Sansandin, Yamina and Bammako. Many local merchants are very wealthy, and a quite exten¬ sive trade is carried on, the natives working articles in gold, ivory and iron. In 1881 a treaty with the Sultan of Sego opened up the country to French traders. The region is a part of the French West African colony of upper Sen¬ egal and Niger. The inhabitants are heathens of mixed negro and Falah blood and belong to the Mandingo family. They number about 2,000,000, are a mild and industrious people, but, despite the fertile soil and their thrifty habits, they have been reduced to the direst poverty by their Mohammedan oppressors, the Toucouleurs.

BAMBERG, bam'berg, Bavaria, town in upper Franconia, on the navigable Regnitz (which here divides into two), three miles above its junction with the Main, partly on a plain, partly on hills, amid vineyards and gar¬ dens, and 30 miles north of Nuremberg. Its chief edifice is the Roman Catholic Cathedral, built in the 12th century, and forming one of the finest examples of the transition from the Romanesque to the Gothic style, with four towers, a noteworthy portal and interesting sculptures and monuments. Other buildings include the old palace or residence ; another palace, formerly occupied by King Otto of Greece; the former castle of the prince-bishops of Bamberg, *etc.* The educational institutions include a college or lyceum, an old and a new gymnasium, a Roman Catholic seminary, an observatory, *etc.* There is a library containing 300,000 volumes, with valuable manuscripts and early printed books. There are manufactures of cotton and woolens, besides other industries, such as market-gardening and seed-growing, brewing, *etc.* The industries consist chiefly of the manufacture of beer, cotton, woolens, gloves, furniture, musical instruments, shoes and leather goods, tobacco, sugar, starch, *etc.* The city's government is in the hands of a municipal council of 42 members and an execu¬ tive board of 19, elected by the former. The United States is represented by a resident consul. Pop. 48,063.

BAMBERGER, bam'berg-er, Heinrich von, Austrian pathologist: b. Prague, 1822; d. 1888. He was gfaduated in medicine in 1847, and became professor of special pathology and therapeutics, first in the University of Wurz¬ burg, and in 1872 in the University of Vienna. Of his numerous publications, two have been held in particularly high

esteem, (On the Dis¬ eases of the Chylopoietic System5 (1855), and (Treatise on Diseases of the Heart5 (1857).

BAMBERGER, Ludwig, German states¬ man: b. Mainz 1823; d. 1899. Born of Jewish parents, he was educated at Giessen, Heidel¬ berg and Gottingen ; took part in the revolu¬ tion of 1849, condemned to death, went into exile and returned on the amnesty of 1866, and was a member of the German Reichstag 1873-80. He was an advocate of free trade, and on account of his opposition to Bismarck's economic policy, he left the National Liberal party and joined the (<Secessionists,55 a group which later became a part of the German Lib-vol. 3 — 9

eral party. His publications include (Monsieur de Bismarck5 (ol which there is an English translation) ; <The Five Milliards5 ; (Ge rmany and Socialism5, and a volume of reminiscences.

BAMBINO, bam-be'no (Ital., ((child55), the figure of our Saviour represented as an infant in swaddling clothes. The (Santissimo Bam¬ bino5 in the Church of Ara Coeli at Rome, a richly decorated figure carved in wood, is specially venerated and is often the object of impressive religious demonstrations.

BAMBOCCIADES, bam-boch-i-adz', paint¬ ings generally grotesque, of common, rustic or low life. The name is derived from the nick¬ name of Peter Van Laer, a Dutch painter of the 17th century, who, on account of his de¬ formity, was called bamboccio (cripple). Teniers is the great master of this style.

BAMBOO, the common name of more than 200 species of about 20 genera of peren¬ nial, mostly tree-like, tropical and subtropical grasses unevenly distributed throughout the world, but more abundant in southern Asia, where 160 or more species are found from sea-level to altitudes of 10,000 feet or slightly more in the Himalayas; and next most plentiful in America, where there are about 70 species, some of which reach elevations of 15,000 feet in the Andes. Occasional specimens of the larger species attain a height of 120 feet and a girth of three feet. From the jointed root-stock the numerous jointed, usually straight and erect, but sometimes crooked or creeping stems grow without branches until the full height is reached, when a more or less dense thicket of horizontal limbs is developed, and the great panicles of flowers appear.

The number of uses to which these plants are put rivals that of the palms. In fact the various species can be utilized for man's every purpose. The light, elastic hard stems, hollow or slightly pithy, except at the points, which have strong partitions, are used for bridges, masts, poles, joists, fishing-rods, etc.; when the partitions are removed, for waterpipes ; when sawed in sections, for pails (the natural parti¬ tions serving as bottoms), cooking-utensils, life-preservers, bows, arrows, quivers, walking-canes, flutes and smoking-pipes ; when split, for nets, hats, fishing-rods, wickerwork and um¬ brellas. Parts of the leaves of some species are used for paper-making, thatch and hats ; the young shoots of some are used as food, either boiled or pickled; the seeds, for food and for making a kind of beer; some of the spiny spe-, cies are planted as hedges for defense against foes, animal and human.

Some species yield ((Indian honey55 (so called by the Greeks), the air-dried saccharine exuda¬ tions from the nodes. Sometimes this sub¬ stance is called tabaris or tabasheer (q.v.), which is properly a phosphorescent substance obtained from other species and from related grasses. Many of the species are of exceed¬ ingly rapid growth ; even in greenhouses speci¬ mens have been known to attain a height of 20 feet in two months or even less time. In arid climates the bamboos are often of great value, since they are among the few plants that will grow in such places. Many species are culti¬ vated for ornament, not only in warm coun¬ tries, but in greenhouses. Some species thrive in climates where the thermometer does

not fall much below the freezing-point. In general the hardy species do best in deep, rich soil and warm situations protected from severe winter winds. The roots should be given a protective mulch of litter in autumn, and this should be allowed to remain during the sum¬ mer as a moisture conserver. For an account of ornamental bamboo culture in greenhouses and out of doors, and of the ornamental species grown in America, consult Bailey, (Standard Cyclopedia of Horticulture. }

BAMBOO RAT, a name given to several species of mole-rats, of the

genus Rhizomys, found in the bamboo jungles of India.

BAMBOROUGH (bam'bur-o) CASTLE, an ancient English castle on the coast of North¬ umberland, formerly with its connected estate the property of the Forsters, and forfeited to the Crown in 1715, both being purchased by Lord Crewe, bishop of Durham, and be¬ queathed by him for charitable purposes.

BAMBOUK, barn-book', or BAMBUK,

west Africa region in the French colony of Senegal, between the Faleme and Senegal rivers, between lat. 12° 30' and 14° 30' N. ; long. 10° 30' to 12° 15' W., and estimated to be about 140 miles in length by 80 to 100 in breadth. Besides the Senegal, its tributaries, the Faleme and the Bating (or upper Senegal), form its natural boundaries. A considerable part is somewhat rugged, though not very elevated, the highest points seldom exceeding 600 feet. The valleys and plains are remarkably fertile. The baobab, calabash, tamarind, with a variety of acacias and palms, reach the utmost limit of their fruitfulness; maize, millet, cotton and a multitude of leguminous plants grow almost without culture, and rice is produced in the lowlands, which are subject to inundation. Its unhealthiness, however, makes it almost unin¬ habitable by Europeans. The animals comprise lions and elephants, wild cattle, crocodiles, *etc.* Gold is found in abundance. It is carelessly worked, and is given to traders in exchange for salt, an article in great demand, and various other goods. Bambouk is more sparsely in¬ habited than formerly. The natives are Mandingoes and form a considerable number of communities or confederations more or less hostile to each other. They ostensibly profess Islam, but practically they are pagans and of a very ferocious disposition. The country has latterly been fully explored by the French, who 'are developing its resources and have con¬ structed a railway along the Senegal from

Kayes to Bafulabe. In the 1 5th century the Portuguese, allured by the fame of its gold, invaded Bambouk, but ultimately perished al¬ most to a man, partly through intestine dis¬ sensions and debauchery, and partly by the

weapons of the natives. It has been under

French protection since 1858. Pop. about

800,000.

BAMIAN, ba-me-an', a valley and pass of Afghanistan, the latter at an elevation of 8,496 feet, the only known pass over the Hindu Kush for artillery and heavy transport. The valley is one of the chief centres of Buddhist wor¬ ship and contains two remarkable colossal statues and other ancient monuments.

BAMMAKO, ba-ma'ko. See Bambarra.

BAMPTON LECTURES, a course of lec¬ tures established by John Bampton, canon of Salisbury, who bequeathed certain property to the University of Oxford for the endowment of eight annual divinity lectures to be annually delivered. The subjects prescribed are the Con¬ firmation of the Christian faith and the confuta¬ tion of all heretics and schismatics ; the divine authority of the Scriptures; the authority of the primitive Fathers in matters of Christian faith and practice ; the divinity of Christ ; the divinity of the Holy Ghost; the Apostles' and Nicene creeds. The lecturer must have taken the degree of M.A. at Oxford or Cambridge, and the same person may not lecture twice. The first course of lectures was delivered in 1780, and they have been delivered every year since, with the exception of 1834, 1835 and 1841. A list of the lectures will be found in the yearly (Historical Register of the University of Oxford.*

BAN, ban, Matija, Slav poet: b. Dubrov¬ nik, Ragusa, 1818; d. 1903. He received a good education in his native place, including a thorough knowledge of French and Italian. He traveled extensively in the Balkans, and in 1844 became tutor to the daughters of Prince Alexander Karageorgevitch at Belgrade. He was editor and publisher of the literary-scien¬ tific periodical Dubrovnik in the city of the same name in 1849-53. In 1854 he became in¬ structor in French and Italian in the Belgrade Lyceum, but the adverse criticism on his ode addressed to the Sultan obliged him to resign this post and he thereafter devoted himself to literary pursuits and travel. His works include the Italian lyrics, (I1 terremoto di Ragusa* ; (I1 Moscovito) ; ˆadimiro*; (The Woman's Educator* (3 vols., Belgrade 1847), written for the young princesses to whom he was tutor; a drama, (Mejrima) ; (Various Songs) (1853), and the tragedies (Dobvilo et Milenka) ; (Tsar Lazar* ; (The Death of Prince Dobroslav) ; Jan Hus) (1884) ; (Martha the Statholder; or, The Fall of Novgorod the Great* (1881).

BAN, the title of the governors of certain military districts in the

former kingdom of Hun¬ gary, corresponding to the German title of mar¬ grave. The ban was nominated by the king, ren¬ dered an oath to the Diet, and once had very extensive powers, exercising an almost absolute authority in the political, judicial and military affairs of his district. The progress of Turkish conquests after the unfortunate battle of Mohacs in the 16th century extinguished the most of the banats, and there remained in 1918 only the banat of Temesvar, the ban of which was the third great dignitary of the Hungarian king¬ dom and bore the title of ban of Croatia.

In Teutonic history the ban was an edict of interdiction or proscription: thus, to put a prince under a ban of the empire was to divest him of his dignities and to interdict all inter¬ course and all offices of humanity with the offender. Sometimes whole cities have been put under the ban ; that is, deprived of their rights and privileges.

BANA, ba'na, in Hindu mythology, a thou¬ sand-armed demon or giant who was the enemy of Vishnu, but the friend of Siva.

BANAK, or BANNOCK, an Indian tribe of Idaho. Its territory formerly extended over

southern Idaho and eastern Oregon ; but the tribe is now concentrated on the Fort Hall and Lemhi reservations, Idaho. Those of the latter reservation are confederated with the Shoshone.

BANANA, ba-na'na, an island in west Africa, north of the mouth of the Kongo; also a seaport of the Kongo Free State, situated on the island. A few years ago the town was an important commercial station, but after the building of the railroad from Matada, and the establishment of an ocean steamship line direct to that place, Banana began to decline, and at last lost all its trading importance when the extensive Dutch firms formerly established there removed their headquarters to Kabinda and Kisanga, in Portuguese territory.

BANANA. A well-known, edible fruit produced by herbaceous plants of the same name, belonging to the genus Musa and sub¬ genus Evmusa. More than 60 species have been described, but four species are of special importance. Musa sapientium, which includes the majority of the bananas grown in the west¬ ern hemisphere; Musa cavendishii, which is the species grown in the Canary Islands and in southern China, and Musa acuminata*, the ban¬ ana of the East Indies and Malay Archipelago. Here also should be mentioned Musa paradis-iaca, the plant commonly known as the plan¬ tain and differing from the banana in taste and in composition.

The banana is supposed to be a native of the East Indies or Malay Archipelago, but was early introduced either by accident or design into the tropical regions surrounding the Car¬ ibbean Sea, and the fruit is now grown in large quantities in Central America, some portions of South America and the West Indies, and these regions constitute the main producing centres for the American trade and for a portion of the European trade. The banana is also an im¬ portant crop in the Canary Islands, from which large numbers are shipped to the British Isles. It grows abundantly through the Pacific islands, the Malay region and the East Indies, and together with the plantain constitutes one of the main starchy foods of enormous popula¬ tions in all these countries. The bananas of American commerce are largely of the ((Groa Michel® type, as it is called, a variety of Musa sapientium, which produces a firm and finely flavored fruit with good shipping qualities. Red bananas are also grown in considerable quantities. Bananas form one of the principal articles of export from Costa Rica, Guatemala, Honduras, northern Panama, northern Colom¬ bia and from the island of Jamaica. Nicara¬ gua, Mexico and Cuba also export bananas in large quantities. The total number exported from these regions amounts to from 40,000,000 to 50,000,000 bunches annually.

Cultivation. — Bananas are cultivated on a large scale in all these countries, differences in the methods of cultivation depending upon the soil and climatic conditions. In Central Amer¬ ica a new plantation is usually developed from virgin forest in the river valley or coastal plain areas by first clearing out the undergrowth, lining and planting the bits or portions of root stalk used as seed, then felling the forest, which in these climates, with abundant rainfall, quickly undergoes decomposition, adding to the humus content of the soil. In the course of a

Few months the young banana plants will be several feet high and by that time the smaller twigs and branches will have broken down almost completely. Clearing the underbrush and growth of grass, weeds, etc., is then done and in a few months more the banana plants will have reached almost their full height and size and occasional cleaning will keep down the excess of wild growths. The banana plant is characterized by an underground root stalk on which occur buds or eyes, which grow out and up, thus forming a new aerial portion or sucker. Once the plantation is started, therefore, the continued development of these buds produces an over-supply of plants so that the weaker and less desirable ones are pruned out. In the course of time there results, therefore, a large mat of plants surrounding the spot where the single bit was planted. The banana plant does not possess a true stem above the ground, but the pseudo-stem consists of the basal por¬ tions of the leaf stalks, which overlap one another and are tightly pressed together, so that a trunk of from 8 to 15 inches in diam¬ eter when matured is produced. When the plant is fully matured, a bud forms in the root stalk, grows up through the centre of this mass of leaf stalks and finally emerges from the centre of the crown, this emergence being known as the ((shooting.® The bud gradually unfolds and a large number of clusters of flowers open up. Each of these clusters is protected in the bud by a thick overlapping bract. Only the upper clusters of flowers are fertilized and produce fruit, the lower ones withering and falling away. The number of clusters developing fruit is variable, generally running from 6 to 15. Each cluster is known as a hand and the individual fruits as fingers. When the fruit is approaching full develop¬ ment cutting takes place, as the fruit is never allowed to ripen on the plant. The bunch of fruit is removed and the plant which produced it is cut down to the ground, as each plant produces but a single bunch. By a proper selection and pruning of suckers the cultiva¬ tions are, therefore, kept in almost continual production over a series of years.

The Fruit. — The fruit has a very agreeable flavor and taste and contains a large amount of starch and sugar, and is, therefore, of great value from the food standpoint. Analysis of the banana shows on the average 75.3 per cent of water, 1.3 per cent protein, 0.6 per cent fat, 22 per cent carbohydrate and 0.8 per cent ash. Analysis of the ash shows a high percentage of alkaline salts, so that from the food stand¬ point it is an extremely valuable food, espe¬ cially for the production of quick energy. In calories the banana yields about 460 per pound, or approximately the same as green corn and higher than any other fresh fruit. Compared with potatoes, the analysis is nearly the same, being somewhat higher in fat and lower in protein, also slightly higher in

carbohydrate. In calories the potato yields 385 per pound and the banana 460. Aside from use of the fruit in the raw condition, it may be used to advantage as a cooked vegetable.

Other Uses of the Plant. — The tree of the fruit-producing banana of commerce contains a certain amount of fibre which might possibly be utilized in the production of paper and

twine, although up to the present time this has never been developed commercially. The Musa textilis of the Philippines, a closely re¬ lated species, constitutes the main source of the hemp used for cordage and in certain in¬ stances the thin leaf blades are used for wrap¬ ping purposes.

BANANA-BIRDS, any of several small West Indian insect and honey-eating birds that frequent the banana groves, especially the banana-quit (Certhiola flavcola) of Jamaica, whose pretty ways are described at length by Gosse in his books on the natural history of that island. One species (C . bahamensis) occa¬ sionally visits Florida. All these birds are brilliantly plumaged, usually rich blue with yellow markings, and represent the sun-birds (q.v.) of the Eastern tropics.

BANANA-FISH. See Lady-fish.

BANANAL, ba-na-nal', also called Santa Anna, an island in Brazil, formed by the river Araguaya, in the province of Goyaz. Its length is 200 miles, breadth 35 miles. It is covered with dense forests, and has in its middle an extensive lake. Soil, fertile. Also the name of several small villages in Brazil.

BANAS, ba-niis', a common name for rivers in India. The most important are: (1) a river of Shutia Nagpur, Bengal, having a northwest course of about 70 miles and fall¬ ing into the Sone, near Rampur; (2) a river which rises in the Aravulli Mountains, and, after a southwest course of 180 miles, is lost in the Runn of Cutch ; (3) a river of Rajputana, also rising in the Aravulli Mountains, flowing northeast

through Mewar for 120 miles, then southeast and falling into the Chambal, after a total course of 300 miles.

BANAT, Rumania; Banat, term applied to any district ruled by a ban (q.v.). A large and fertile region, consisting of the counties of Temesvar, Torontal and Krasso-Szoreny; principal town, Temesvar. The Banat is one of the most fertile and best cultivated districts of Rumania. Owing to its mild climate and rich soil, abundant crops of grain and fruits are raised, while the mountains contain rich mineral deposits, especially coal. Among its numerous mineral springs, the best known are those of Mehadia, in Krasso-Szoreny County. The district, which from 1652 to 1716 was under Turkish dominion, became uninhabited and covered with forest and marshes, but was reclaimed under Maria Theresa, who drained the land by means of canals and by free grants of land induced a considerable immigration from Germany, Turkey and Serbia, thereby laying the foundations of its present prosperity. In 1779 it was united with Hungary. It was formed into an Austrian crownland in 1849 but was restored to Hungary in 1860. It was ceded to Rumania at the close of the World War.

BANBRIDGE, Ireland, a market town in County Down, 22 miles southwest of Belfast, situated on the Bann. It has an Episcopal church in the Gothic style, and several other churches. It is a thriving seat of linen manu¬ facture in all its stages, from the preparation of the soil for the flax seed to the finishing of the finest linen. Miles of bleaching-greens exist in the vicinity, while there are numerous factories along the Bann. Pop. 5,101.

BANBURY, England, a municipal bor¬ ough and parish of Oxfordshire, on the river Cherwell and the Oxford Canal, 22 miles north of Oxford and 86 northwest of London by rail. Its strong castle, built about 1125, was demol¬ ished during the Great Rebellion, when Ban¬ bury was noted for Puritanical zeal. In 1469 the Yorkists were defeated in the vicinity. The town is still famous for its cakes and ale, as in Ben Jonson's day; and it manufactures web¬ bing, agricultural implements and rope. Among the buildings are the parish church (1797) and the town hall (1854). Pop. 13,458.

BANC (Lat. Bancus, Ger. Bank, a bench), legally a seat or bench of justice, and in this sense has given rise to the expression in courts of common law, ((sitting in banc,® or in banco — that is, sitting together on the bench of the respective courts.

BANCA, ban'ka, BANKA, or BANGKA,

an island of the Malay Archipelago, Dutch East Indies, between Sumatra and Borneo ; area, 4,446 square miles. Long and narrow in outline, and hilly in the north and south, the greater part of the area is heavily timbered. The climate is moist and unhealthful for Euro¬ peans, the rainfall averaging annually 120 inches. It is celebrated for its excellent tin, obtained in black alluvium in the north end of the island, about 25 feet below the surface, and of which the annual yield is as high as 20,000 tons. These mines are a government monopoly. Banca likewise yields iron, copper, lead, tim¬ ber, sago, pepper, nutmegs, benzoin, *etc.* The population was estimated in 1913 at 113,653, of which less than 300 are Europeans and 35,000 Chinese.

BANCA, a boat used in the Philippines, made from a single log and furnished with an out-rigger.

BANCO, a term designating the money in which the banks of some countries keep or kept their accounts in contradistinction to the cur¬ rent money of the place, which might vary in value or consist of light and foreign coins. The term was applied to the Hamburg bank accounts before the adoption (in 1873) of the new German coinage. The mark banco had a value of 35.43 cents, but there was no corre¬ sponding coin.

BANCROFT, Aaron, Unitarian clergy¬ man: b. Reading, Mass., 10 Nov. 1755; d. 19 Aug. 1839. He was graduated at Harvard in 1778; became pastor in Worcester in 1785, where he remained nearly 50 years. Besides a great number of sermons, his works include a (Life of George Washington (1807). He was the father of the historian, George Bancroft.

BANCROFT, Cecil Franklin Patch, edu¬ cator: b. New Ipswich, N. H., 25 Nov. 1839; d. Andover, Mass., 4 Oct, 1901. He was grad¬ uated at Dartmouth in 1860; at Andover Theological Seminary in 1867, and at the University of Halle, Germany. He was or¬ dained to the Congregational ministry in 1867, but never held a pastorate. In 1873 he was made principal of Phillips Academy, Andover, Mass., and from that time sent more boys to colleges and scientific schools than any other American secondary school teacher, lie

frequently contributed religious and educa¬ tional articles to periodicals.

BANCROFT, Edward, American natural¬ ist and chemist: b. Westfield, Mass., 1744; d. 1820. In his youth he went to Guiana and there practised medicine. He afterward re¬ sided in England where he gained the friend¬ ship of Franklin, whose influence obtained for him a place on the staff of the Monthly Review. He published several strong articles in defense of American rights and in vindication of Franklin's connection with the (Hutchinson Papers* episode. He was charged with arson in 1777, and was obliged to flee to Paris, where the American Commissioners employed him as a spy. It has been often charged, and without much foundation, that he obtained some information from his former teacher, Silas Deane, and sold it to the British govern¬ ment. In 1769 he published (Natural History of Guiana*, and in 1794 Experimental Re¬ searches Concerning the Philosophy of Per¬ manent Colors,* the first of a series on colors and calico printing. Parliament in 1785 granted him special rights for the importation and use of a certain kind of oak bark in calico printing. Consult Wharton, diplomatic Cor¬ respondence of the American Revolution* (Washington 1889).

BANCROFT, George, American historian: b. Worcester, Mass., 3 Oct. 1800; d. Washing¬ ton, D. C., 17 Jan. 1891. He was the son of Rev. Aaron Bancroft (q.v.), a Unitarian clergyman, and Lucretia Chandler Bancroft. He fitted for college at Phillips Academy, Exe¬ ter, N. H., entered Harvard College at the age of 13, and was graduated before reaching his 17th birthday. Edward Everett, then professor of Greek, having proposed that some young graduate of promise be sent to Germany for purposes of study in order that he might after¬ ward become one of the corps of instructors, Bancroft was chosen, and in the summer of 1818 went to Gottingen, where two years later he received his degree of Ph.D. At Gottingen he studied German literature under Benecke ; Italian and French literature under Artaud and Bunsen; Oriental languages and New Testa¬ ment Greek under Eichhorn ; natural history under Blumenbach ; and the antiquities and literature of Greece and Rome under Dissen, an enthusiastic admirer of Plato, with whom he went through a thorough course of Greek philosophy. But his chief attention was given to history, which he studied under Heeren, the greatest historical critic of that day, and one of the most scientific of all historians. In choosing this special

branch, Bancroft gave as a reason his desire to see if facts would not clear up theories and assist in getting out the true one. For a time he also studied at Ber¬ lin, where he was warmly received by the lead¬ ers in the academic world, notably Wolf, the editor of Homer; Schleiermacher and Hegel, to whom he brought tidings of their fame in the New World. In an extended tour through Germany and other countries he met Goethe at Jena, studied for a time with Schlosser at Heidelberg, formed an acquaintance with Manzoni at Milan and a life friendship with Chev¬ alier Bunsen at Rome, where he also met Nie¬ buhr. At Paris he was kindly received by Cousin, Benjamin Constant and Alexander von

Humboldt. Returning to America in 1822 he served for a year as tutor in Greek at Har¬ vard. In 1823, in conjunction with J. G. Cogs¬ well, he established the famous Round Hill School at Northampton, Mass., a preparatory school far in advance of its time as to systems of study and classbooks. The teachers were good, the instruction inspiring and the students led a happy, healthy life, but the undertaking proved a failure financially. Bancroft with¬ drew in 1830, and Cogswell two years later. Many of their students afterward became men of national reputation or prominence, among them being J. L. Motley, Ellery Channing, G. E. Ellis and Theodore Sedgwick. Hence¬ forward his career is best separated into po¬ litical and literary. During the Round Hill years he had cut loose from the political tradi¬ tions of the Harvard circle. In a public speech in 1826 he had avowed his principles to be for universal suffrage and uncompromising democ¬ racy, and at once became foremost in the coun¬ cils of the Democratic party, though twice de¬ clining nomination or election to the State leg¬ islature. Van Buren appointed him collector of the port of Boston (1838-41) and his ad¬ ministration of the office won the praise of his political opponents. While collector he ap¬ pointed Nathaniel Hawthorne and Orestes Brownson to offices within his jurisdiction. In 1844 he was defeated as the Democratic candi¬ date for governor of Massachusetts, although he received more votes than any previous can¬ didate of his party. In 1845 he became Secre¬ tary of the Navy under Polk. It was he who planned and established the Naval Academy at Annapolis, Md. ; he gave the first order to take possession of California ; and while Acting Secretary of War ordered General Taylor to march into Texas, thus ultimately leading to the annexation of that State. During 1846-49 he was Minister-plenipotentiary to Great Britain and there successfully urged upon the British ministry the necessity of adopting more liberal navigation laws. His reputation as a man of letters put the manuscript treasures of the great English

families at his disposal and he combined his public duties with ardent his¬ torical researches. From 1849 to 1867 he lived in New York city, absorbed in literary work. During the Civil War he was a patriotic War Democrat and delivered a powerful speech ef¬ fectually demolishing the Constitutional plea for slavery. Before both Houses of Congress he delivered a masterly eulogy on Lincoln. Ap¬ pointed Minister to Prussia in 1867 he achieved a diplomatic triumph in bringing about the adoption of treaties in which England and Ger¬ many finally recognized the right of expatria¬ tion and abandoned their doctrine of (<once a citizen, always a citizen.® In the northwest boundary treaty, negotiated by Polk, there was an ambiguity concerning a portion of the line. It was decided to submit the point to the Ger¬ man Emperor for arbitration. Bancroft pre¬ pared the whole American argument and the reply to the case of the British. The decision was unreservedly in favor of the United States.

His first publication was a volume of <Poems> (1823), all European in theme. This was followed by books for the use of his stu¬ dents, translations of Heeren's 'Politics of An¬ cient Grecce) (1824) and Jacobs' 'Latin Read-

er) (1825). His first article in the North American Review appeared in October 1823, and was a notice of Schiller's (Minor Poems-* with numerous translations. Thenceforward he wrote in almost every volume, but always on classical or German themes, until in Jan¬ uary 1831, he took up (The Bank of the United States,* and in October 1835 (The Documen¬ tary History of the American Revolution.* The two latter indicate the direction his historical studies had taken. Then came the beginnings of his great (History of the United States,* the work which gave him his greatest fame. The first volume appeared in 1834, the second in 1837, the third in 1840, the fourth in 1852, the fifth in 1853 and so onward to the tenth in 1874. The earlier volumes were received with enthusiasm in America, pirated in England, translated into Danish, Italian, German and French, both with and without the author's permission. The 15th edition of Vols. I— III was

issued in 1853. The design of the work was as deliberate as Gibbon's, and almost as vast and, like Gibbon, Bancroft lived to see his work accomplished. The history of the United States from 1492 to 1789 is treated in three parts. The first deals with (Colonial History, 1492-1748.* The second part, (The American Revolution, 1748-82,* is divided into four epochs called respectively: (Overthrow of the European Colonial System, 1748-63* ; (How Great Britain Estranged America, 1763-74* ; (America Declares Itself Independent, 1774-75* ; and (The Independence of America Ac¬ knowledged, 1776-82.* The last part, though published as a separate work, entitled his¬ tory of the Formation of the Constitution, 1782-89,* is really a continuation of the his¬ tory.* The work is still the most popular and widely read of the larger American histories. Bancroft's materials and facilities for writing it were better and more extensive than any other writer on our Anglo-American history has enjoyed. His private collection of manu¬ scripts and documents, original and copies (now in the New York Public Library), was by far the finest of his day in private hands, and su¬ perior to most institutional collections. His merits as a historian are positive and incon¬ testable. For his subject he had a boundless and untiring enthusiasm, and he was permeated with that democratic spirit without which the history of the United States cannot be ade¬ quately written. Though his early style is justly open to the charge of being pompous, in¬ flated and over-ornamented, it is essentially picturesque, and the earlier defects were greatly remedied by his successive revisions of the work. His command of his resources was mas¬ terly, and a far from favorable critic candidly admits that ((one must follow him minutely through the history of the war for independ¬ ence to appreciate in full the consummate grasp of a mind which can deploy military events in a narrative as a general deploys brigades in a field. Add to this the capacity for occa¬ sional maxims in the highest degree profound and lucid, and you certainly combine in one man some of the greatest qualities of the his¬ torian.** It has been said that he made no ef¬ fort to avail himself of the materials and re¬ sults of other investigators, but nowhere does he claim finality for his work, and his later

years were chiefly occupied in weaving into his narrative what he and no one else had. In 1876 he issued a Centenary edition in six vol¬ umes, upon which he had spent a solidˆyear in revision. Again (New York 1884-87) he published what he termed the ((author's last re¬ vision** in six volumes large octavo. In this he made considerable changes in arrangement and the subdivisions, all tending to a better order¬ ing of the narrative. There were frequent omissions and

condensations, and many repeti¬ tions and redundancies were cast out. These final changes have, in the judgment of good scholars, better fitted the work for permanent favor. It will remain necessary to the student until another historian, with equal or better facilities, shall rewrite the story in a way to gain wider sympathy. Present tendencies and methods in historical study and writing give little evidence that such another will soon arise. His lesser works include (Poems* (1823) ; lit¬ erary and Historical Miscellanies* (1855) ; (Memorial Address on the Life of Lincoln* (1866); (JosePh Reed: a Historical Essay* (1867) ; (A Plea for the Constitution of the United States Wounded in the House of Its Guardians* (1886) ; (Necessity, Reality and

Promise of the Progress of the Human Race* (1854) ; < Oration, 4 July 1826, Northampton, Mass.* ; (Oration Before the Democracy of Springfield, Mass., 4 July 1836* ; (Address at Hartford, Conn., 18 Feb. 1840* ; (History of the Formation of the Constitution of the United States* (1882)); (Oration Delivered at the Commemoration, in Washington, of the Death of Andrew Jackson, 27 June 1845.* To the (American Encyclopaedia* he contributed the article on Jonathan Edwards. Consult Green, (George Bancroft* (1891) ; Wallis, (Mr. Ban¬ croft as a Historian* (1896) ; West, (George Bancroft* (1900) ; Higginson, T. W., George Bancroft in (Carlyle's Laugh, and Other Sur¬ prises* (Boston 1909) ; Howe, M. A. DeW., (The Life and Letters of George Bancroft* (New York 1908) ; (Report of Committte Charged with Placing the Memorial to Mark the Birthplace of George Bancroft* (Proceed¬ ings of the Worcester Society of Antiquity, Vol. XVII, pp. 269-292 Worcester, Mass., 1901) ; (Oliver Hazard Perry and the Battle of Lake Erie* (Rhode Island Education Depart¬ ment, Newport 1912) ; Stippel, H. C., (A Bibli¬ ography of Books and Pamphlets by George Bancroft* (On Howe's (Life and Letters* of Bancroft, mentioned above, New York 1908) ; Bassett, John Spencer, <The Middle Group of American Historians* (New York 1916).

George Edwin Rines.

BANCROFT, Hubert Howe, American

historian: b. Granville, Ohio, 5 May 1832; d. Walnut Creek, Cal., 2 March 1918. He worked on his father's farm and attended the academy until 16, when he entered as clerk a bookstore in Buffalo whose proprietor three years later sent him with a stock of books to open business in San Francisco where he ar¬ rived in March 1852. While building up a large bookselling and publishing business the young man became interested in gathering ma¬ terial for the history of this new and fascinat¬ ing land, until his collections reached

60,000 books, maps and MSS., when he erected for it a library building on Valencia street. Here it

remained until it passed into the possession of the University of California at Berkeley. Am¬ bitious at length to reduce this vast wealth of material to forms of practical utility, Mr. Ban¬ croft put at work a dozen men to classify and extract the essential facts of history and de¬ velopment and place the results in his hands in proper form for writing a series of histories covering the western half of North America, from Alaska to Panama, as he had planned. This work covered a period of 30 years, and the result was the publication of the following series: (Native Races of the Pacific States5 (5 vols.) ; (History of Central America) (3 vols.) ; 'History of Mexico) (6 vols.) ; 'North Mexican States) (2 vols.) ; (California) (7 vols.) ; 'Arizona and New Mexico5 (1 vol.) ; 'Utah and Nevada) (1 vol.) ; (Colorado and Wyoming5 (1 vol.) ; (Northwest Coast 5 (2

vols.) ; <Oregon) (2 vols.) ; (Washington, Idaho and Montana5 (1 vol.) ; (British Colum¬ bia5 (1 vol.) ; ' Alaska5 (1 vol.) ; California Pastoral5 (1 vol.) ; California Inter Pocula5 (1 vol.); (Popular Tribunals5 (2 vols.) ; 'Essays5 (1 vol.) ; Citerary Industries5 (1 vol.). Other and later works are Cook of the Fair,5 Cook of Wealth5 (1910) ; Cesources of Mex¬ ico,5 and (The New Pacific5'; Come Cities and San Francisco5 (1907); (Retrospection, Per¬ sonal and Political5 (1912).

BANCROFT, Marie Effie Wilton, Lady, English actress : b. Doncaster 1839 ; d. Folke¬ stone, England, 22 May 1921. She was a daugh¬ ter of Robert Pleydell Wilton. She first ap¬ peared in London 15 Sept. 1856 at the Lyceum, as the boy in Celphegor.5 She was very pop¬ ular in several boy characters, in burlesques at various theatres, and as Pippo in the (Maid and the Magpie5 at the Strand Theatre. She remained at the Strand until 1865, when with Ii. J. Byron she began the memorable manage¬ ment of the old Prince of Wales' Theatre with the production of the Robertson comedies. She secured Squire Bancroft as leading actor and the house soon became noted for its realistic presentation of the social life of the day. Among the successes

of those years were (So¬ ciety5 (1865); ‘Ours5 (1866); (Caste5 (1867); day 5 (1868); ‘School5 (1869), and ‘M. P.5 (1870). Miss Wilton became Mrs. Bancroft in 1867 and regularly took the leading feminine roles. Among the prominent actors presented at this theatre during the management of Mrs. Bancroft and Mr. Byron were Coghlan, Hare, the Kendals and Ellen Terry. They migrated to the Haymarket in 1880, and continued the production of modern comedy. Mr. and Mrs. Bancroft retired from the stage in 1885 and rarely appeared thereafter, a noteworthy oc¬ casion was the revival of ‘Diplomacy5 in 1893 at the Garrick. Mrs. Bancroft is joint-author of ‘Mr. and Mrs. Bancroft On and Off the Stage5 (1888) ; and sole author of ‘A River¬ side Story5 (1890) ; ‘My Daughter5 (1892) ; ‘A Dream5 (1903) ; ‘The Shadow of Neeme5 (1912), and with Mr. Bancroft, ‘The Ban¬ crofts: Recollections of Sixty Years5 (1909).

BANCROFT, Richard, English divine: b. Farnworth, Lancashire, 1544; d. 12 Nov. 1610. He was graduated at Cambridge University, where he received the degree of M.A. in 1570. He was ordained soon afterward and was ap¬ pointed chaplain to the bishop of Ely, and in

1575 became rector of Teversham, Cambridge. In 1584 he was appointed rector of Saint An¬ drew’s, Holborn, where his great abilities and zeal as a champion of the Church led to his rapid promotion. He became treasurer of Saint Paul’s Cathedral in 1585, and the fol¬ lowing year became a member of the ecclesias¬ tical commission. On 9 Feb. 1589 he preached at Paul’s Cross a sermon which was in sub¬ stance a passionate attack on the Puritans, an assertion of the divine right of bishops, and urged the theory of the apostolic succession. In 1597 he was consecrated bishop of London and was present at the death of Queen Eliza¬ beth. He took a prominent part in the con¬ ference of prelates and Presbyterian divines, held at Hampton Court in 1604, and in the same year became president of the Canterbury Convocation, at which he presented and caused to be passed a book of canons aimed at Puri¬ tanism and which forced many clergymen to give up their livings. It was set aside by Par¬ liament two months later. In November 1604, he became archbishop of Canterbury, in which capacity he continued to show the same zeal and severity as before in suppressing heresy and schism. He involved himself in a struggle to make the ecclesiastical courts independent of the law by speciously magnifying the royal authority over them. In the last few months of his life he took part in the discussion about the consecration of Scottish bishops, and ad¬ vised their consecration by bishops of the Eng¬ lish Church. By this act

were laid the foundations of the Scottish Episcopal Church. Bancroft was “chief overseer55 of the author¬ ized version of the Bible. While Bancroft’s character was defective, by his intemperate zeal, the Anglican Church owes its present consti¬ tution and firm position in the state largely to his labors. Consult Usher, ‘The Reconstruc¬ tion of the English Church5 (New York 1910).

BANCROFT, Sir Squire, English actor: b. London, 4 May 1841. He was educated at private schools in England and France, and first appeared on the stage at Birmingham in 1861. He acted afterward in Dublin and at leading provincial theatres with all the prom¬ inent stars of the stage. He became leading man at the Prince of Wales’ Theatre in 1865, in association with Effie Wilton, whom he mar¬ ried in 1867. For 20 years he was manager of the Prince of Wales’ and Haymarket the¬ atres, during which the modern revival of the stage was started. He retired from the man¬ agement in 1885. He acted afterward with Irving in ‘The Dead Heart5 (1889) at the Lyceum, and in ‘Diplomacy5 at the Garrick in 1893. In 1897 he was knighted by Queen Victoria for notable services to his profession. He has devoted much time to “reading55 for hospitals throughout the country, and is a member of Lord Chamberlain’s advisory board for the licensing of plays. Consult ‘Mr. and Mrs. Bancroft On and Off the Stage, Written by Themselves5 (1888) ; and ‘The Bancrofts: Recollections of Sixty Years5

(1909).

BANCROFT, Wilder Dwight, American chemist: b. Middletown, R. I., 1 Oct. 1867. He was educated at Harvard and abroad, and obtained the degree of Ph.D. at Leipzig in 1892. He was instructor of chemistry at Harvard

1894-95; was appointed assistant professor of chemistry at Cornell in 1895, becoming full professor in 1903. In 1896 he founded the Journal of Physical Chemistry and became its editor. In 1905 he was chosen president of the American Electro-Chemical Society, and in 1910 of the American Chemical Society. He is a member of the Washington Academy of Sciences and of the Franklin Institute. Be¬ sides numerous articles in scientific journalsˆ he has published (The Phase Rule) (1897).

BANCROFT, William Amos, American

street railway president : b. Groton, Mass., 26 April 1855. He was graduated from Harvard in 1878, elected mayor of Cambridge in 1893 and four times reelected. He has held other public positions and has been trustee or di¬ rector in many educational and financial insti¬ tutions. He has been president of the Boston Elevated Railway Company since 1899 ; private to colonel, 5th Massachusetts Volunteer Militia; brigadier-general, United States Volunteers, Spanish War; chairman Republican State con¬ vention (1893) ; overseer, Harvard (1893— 1905), and trustee, Phillips-Exeter Academy, Exeter, N. H., since 1902.

BAND, in architecture, any flat fascia or ornament which is continued horizontally along a wall, or by which a building is encircled. Bands often consist of foliage, quatrefoils or of simple bricks. Band of a shaft is the mold¬ ing or suits of moldings by which the pillars and shafts are encircled in Gothic architecture. Several bands are often placed at equal dis¬ tances on the body of the shaft, when it is long, in which case they are known as shaft-rings.

As vestment, bands are linen pendants from the neck, forming part of clerical, legal and academic costume. It is a moot question whether they are a survival of the amice or immediate descendants of the wide falling col¬ lar which was a part of the ordinary civilian dress in the reign of James I. In the Angli¬ can Church they are seldom worn, except by ultra-low churchmen, but they are in common use with Presbyterian ministers (ordained ministers as distinguished from licentiates). Foreign Catholic ecclesiastics wear black bands with a narrow white border.

In music, a number of trained musicians in a regiment, intended to march in front of the soldiers and play instruments, so as to en¬ able them to keep step as they move forward ; also any similarly organized company of musi¬ cians, though unconnected with the army; an orchestra. The word is also applied to the subdivisions of an orchestra,

as string-band, wind-band, *etc.* Until the 12th century there was no regular organization of the wandering or roving musicians, but early in the 13th cen¬ tury bands of pipers and trumpeters were formed, and later guilds were developed for the protection of the musicians. These guilds were subjected to and influenced by the peculiar restrictions defining the social status of every calling during the Middle Ages. It was not until the 18th century, however, that instrumental music had developed into the groups we know to-day. The full orchestra, combining every element and vehicle of musi¬ cal expression, appealed to those of cultured musical taste ; the brass band was suited to church and community music; and the military

band appealed to the people at large. See Band, Military.

The modern so-called concert military band is a development of the brass band, giving special prominence to the wind-band. In many band compositions the strings are not used at all, the wind instruments being depended on for the interpretation of the piece. In order to secure the desired tone and color, new in¬ struments have been invented and introduced. The concert military band has reached its greatest development in the United States, where it appears to have evolved from the In¬ dependence Day concerts held annually on Bos¬ ton Common. These celebrations brought into prominence as a bandmaster Patrick Sarsfield Gilmore. The concert type has been further developed since his time by D. W. Reeves, Victor Herbert and John Philip Sousa. Sousa's organization is regarded as the highest type of concert military band. Its members are very carefully selected. It is modeled on the celebrated band of the French Garde Republicaine.

BAND, Military, an organized body of musicians in the army service. In all countries bands are organized and maintained in each infantrv regiment, 'or battalion if the latter is the unit. The strength of these bands and the number and nature of their instruments vary considerably, as also do the rank and status of the bandmaster. Bands in the United States army are recruited generally for that specific purpose, the members being enlisted men, usu¬ ally 28 in number. Instruments are supplied by the Quartermaster's Department, and a school for army bands is maintained at Gov¬ ernor's Island, N. Y. Bandmasters in Eng¬ land are specially trained at Kneller Hall, re¬ ceive extra pay and are recruited from boys from military institutions, schools and training ships. The leading military bands of Europe are the Royal Artillery, Royal Marine and Guards' Band, of England; the Ivaiser-Franz Grenadier Band, of Germany; the Guides' Band, of

Belgium; the Garde Republicaine Band, of France; the Imperial Guards Band, of Austria; the Ottoman Palace Band, of Turkey; the Bersaglieri Band, of Italy; the Czar's Reg¬ iment of Guards Band, of Russia. Consult (United States Army Regulations > for compo¬ sition and equipment of United States army bands. For band instrumentation consult Clappe, A. A., (The Wind Band and Its Instruments) (New York 1911). Consult also Grove, dictionary of Music) (London 1903) ; Rode, (Musikalisches Konversations-Lexicon) (Berlin 1877).

BAND-FISH, a genus in the family Cepolidce, having the body much elongated and compressed, and is covered by very small scales. The dorsal fin is very long and con¬ sists like the anal of soft rays. The tail verte¬ brae are very numerous, and the whole struc¬ ture of the body exhibits unusual delicacy, so that specimens are seldom obtained in an un¬ injured state. All the species inhabit quiet depths and are unable to contend with waves and currents. The snake-like form and the beauty of their colors make them objects of great interest. One species, the red band-fish (C. ruhescens), not uncommon in the Medi¬ terranean, is occasionally cast ashore* by storms

on the British coasts. It is about 15 inches long. Its brilliant appearance, when seen mov¬ ing in the water, has suggested the names of fire-flame and red ribbon, by which it is known at Nice. The home of the genus is in Japanese waters. See Oar-fish.

BAND-MEETINGS. In early Metho¬ dism Wesley encouraged the system of bands. These consisted of not more than five or six persons of similar circumstances in life, and to some extent of similar taste, who met to¬ gether to converse freely touching their Chris¬ tian experience and their habits of life. The examination of personal character was very strict, and the intention was to promote a more holy and useful life. Each band met weekly for its own religious services ; but they also occasionally met in general band-meeting. Band meetings, however, were not enjoined as a rule of discipline, and they were not at any time generally observed. In 1812 the Wesleyan con¬ ference endeavored to revive and extend their mission. In

America these meetings were never organized to any great extent ; they were held in a few of the cities and of the larger towns, but at present they are almost unknown.

BAND SAW BLADES. Owing to the increased value of timber in America more and more attention has been paid to the eco¬ nomical conversion thereof into the sawn prod¬ uct ready for market. The methods in use a few years ago were found to be wasteful and usually crude, and the product turned out of but an indifferent quality so far as sawing was concerned.

The attention of the operator being directed to band saw blades, these have come into quite general use for various purposes. A test of the band saw blade has proven its advantages to be so great that it has displaced not only the small scroll or <(j igJ> saws for bracket sawing and ornamental scroll and curved work, but has also displaced reciprocating saws and cir¬ cular saws for heavier work.

A band saw consists of a thin band or rib¬ bon of steel with teeth cut in one edge, the two ends being welded together, making it contin¬ uous. When in use it is mounted on two wheels like a belt and made to travel at a rapid rate of speed by revolving one of the wheels. For scroll work its advantage over the recipro¬ cating and jig saw lies mainly in the increased and uniform speed at which the saw blade travels which enables the operator to better control the work in hand and to feed the mate¬ rial toward the saw constantly, and thus to turn out more and better work than would be possible with a reciprocating saw cutting on the downward stroke only. Its narrower kerf also is more economical of lumber, particularly in resawing.

In sawing logs the advantage of a band saw as compared with a reciprocating saw may be judged when we state that the band saw blade travels at the rate of from 8,000 to 10,000 feet per minute, whereas a reciprocating saw mak¬ ing 200 strokes of 18 inches to the minute would only have a cutting speed of 300 feet per minute. The band saw traveling more than 20 times as fast as the reciprocating saw will nat-urallv perform nearly or quite as much work as 20 reciprocating saws. The single recipro¬ cating saw, because of its limited capacity, was

succeeded by what is termed in the United States a gang, in Europe, a log frame, and in Canada a gate. The gang saw mill for log sawing consists of a sufficient number of re¬ ciprocating saws placed side by

side in a frame to saw completely at the one operation an en¬ tire log. The advantage of the band log mill over the gang lies in its adaptability to the saw¬ ing of each log to the best advantage; as but one cut is made at a time, and as the face of the log is exposed to the view of the sawyer, he can judge through what portion of the log the next cut should be made to yield the best results. The circular saw turns out nearly or quite as much product as the band saw, but as it requires a much larger kerf, is far more wasteful and the finish given to the wood by the band saw is much superior. The success of the band saw is due, first, to the skill of the saw maker in turning out saw blades of a tem¬ per at once hard and tough, to retain a good cutting edge and at the same time flexible enough to pass over the wheels without crack¬ ing; second, to the skill of the saw filer in “fitting® his saws. Band saws require to be “tensioned® from time to time when in use, due to the fact that the saw stretches on the cutting edge by the continuous strain on the teeth. By the word “tensioning® is meant the expanding of the central portion and back of the saw blade either by the use of a hammer and anvil or by what are termed “stretching rolls.®

The use of the band saw has brought forth an extensive line of saw fitting tools such as saw “swages® which are designed to expand the points of the teeth, “pressure side dressers® or “tooth formers® or “shapers® which are in¬ tended to give form to the swaged points of the teeth, automatic saw sharpeners, *etc.* With the use of these improved appliances it was found that thinner and thinner band saw blades could be used, and for “resawing® purposes, that is, the sawing of planks and boards into two or more thinner pieces, this is especially desirable. The plank or boards to be resawn are fed to the saw by means of rollers. Saws as thin as .02 of an inch in thickness are suc¬ cessfully used. Such saws remove a kerf of practically one thirty-second of an inch. In log mills the band saw blades are usually 12 inches in width and 49 feet long, of 14 gauge, and with teeth three-fourths of an inch long, and spaced ljkt inches from point to point. The size of the gullet (between the teeth) must be abundantly large to hold all the sawdust gath¬ ered during transit through the largest diame¬ ter of log to be cut. Too small a gullet causes chattering of the saw. The strain put upon the saw is as much as the metal will bear and re¬ main elastic, the object being to have the cut¬ ting edge rigid, and yet the band as a whole able to adjust the shock of a sudden obstacle, like a hard knot. For sawing very hard wood the teeth are shorter and spaced one-third more to the foot and have very little set. For cut¬ ting white pine and similar woods the gauges recommended for all widths of saw are as fol¬ lows : Bands up to 14 feet long, 22

gauge; from 15 to 17 feet, 21 gauge; from 18 to 20 feet, 20 gauge; from 21 to 24 feet, 19 gauge; from 25 to 30 feet, 18 gauge. For hard woods, like oak and beech, the thickness should be increased

one number on each length quoted, and the teeth spaced closer. For cutting metal the thickness is increased three numbers in the gauge and the teeth spaced about 20 points to the inch, with little or no set. Consult Grim-shaw, R., (Saw Filing and Management (New York 1901) ; Johnson, C. L.. <The Shw Diction¬ ary) (Seattle 1909).

BANDA ISLANDS, Dutch East Indies, a group belonging to Holland, in the Indian Archipelago, south of Ceram ; the largest, Great Banda, being 12 miles long by two broad, while Goenong Api is an active volcano nearly 8,000 feet high. They have a rich soil admirably adapted for the cultivation of the nutmeg, which is their chief product, others being cocoanuts and sago. The total area of the group is about 19 square miles and the capital of the group is Banda, the seat of the assistant resi¬ dent. It is well fortified and has a good har¬ bor. Tatti wood is grown on the island of Rosingen. Pop. about 9,500, of whom less than 600 are Europeans. The islands were discov¬ ered in 1512 by the Portuguese, who were dis¬ possessed by the Dutch in the 17th century.

BANDA ORIENTAL, ban'da o-re-en-tal, the name formerly given to that region east of the lower part of the Uruguay River, which is now included in the republic of Uruguay. See Uruguay — History.

BANDAGE, a surgical wrapper applied to some part of the body. Bandages are employed for a variety of purposes. One of their chief uses is to secure dressings or splints. Another is to give support to a limb or to restrain its movements, or to exert pressure upon it so as to aid in restraining bleeding at some point ; or a bandage may be used to promote healing, as in the case of ulcers, or to aid in the removal of swelling. In these latter cases the bandage must be applied with a considerable degree of tightness, and great care must be exercised that it be evenly put on, and that the tightness with which it is drawn does

not give rise to disturb¬ ances of the circulation by undue and irregular pressure. Suppose, for instance, the arm is being bandaged from the hand well up over the upper arm. The arteries which carry the blood down the limb are for the most part deeply seated and well protected by muscles, so that they are practically unaffected by any ordinary degree of pressure on the surface. But many of the veins which carry the blood back to the heart up the limb run immediately under the skin, and will be pressed upon considerably by a bandage applied round the arm. If the ban¬ dage is made too tight at the elbow, say, the veins will be compressed and the blood will flow less easily along them at that point than it does lower down where the pressure is less. The consequence will be that the blood will be hin¬ dered in passing up from the hand; and as blood is all the time being carried down to the hand in the arteries, which are unaffected, the veins in the forearm and hand will become swollen and gorged with blood. The pressure of blood in the veins will become so great that fluid will be pressed out of the finer vessels into the surrounding tissues, and the hand will become swollen, puffy and dropsical, while much pain will be experienced. If the tight turns of the hr. r dam? are now loosened the

veins will again offer a free passage to the blood and the swelling and pain will gradually subside. The proper method in such a case is not necessarily to bandage loosely, but to ban¬ dage uniformly, beginning with the requisite de¬ gree of tightness at the very extremity of the limb and continuing evenly and regularly up¬ ward. A general rule in bandaging a limb, then, is: Never let the bandage be tighter up the limb than it is at the extremity; apply it firmly and evenly at the extremity and carry it up uniformly. To this may be added, as a second rule, that if a bandage requires to be tightly applied in the course of a limb it must be begun at the extremity. It is specially neces¬ sary to follow these rules when the bandage is applied to secure a splint, since it must be tight enough to keep the splint in accurate position, or to keep a pad firmly applied over a wound for the arrest of bleeding. Bandages usually consist of strips of unbleached or bleached calico, linen, flannel, muslin, *etc.* Elastic ban¬ dages and india-rubber bandages are also in use for particular cases. The material should be torn into strips of the requisite breadth and the bandages should have no hem or edging, as this would prevent them stretching equally in all directions. The strips should be rolled un for use into firm rollers, a roller bandage being usually six yards long, though often more. They are of different breadth, most commonly 2/2 or 3j4 inches. For the chest and abdomen the breadth should be inches

; for the fin¬ gers three-quarters of an inch. The triangular bandage (Esmarch's) is of all others the one made use of for rendering temporary aid in cases of accident, and, through the training af¬ forded by ((first aid to the injured® associations, is now familiar to almost everyone. The ban¬ dage is made of a square yard of linen or calico halved diagonally, each half having of course two sides 36 inches in length, with a base of fully 50 inches. When it is desired to exert very considerable pressure upon a part for a length of time, or when it is desired to keep a limb or a joint motionless for some time, this may be done without the use of splints by stif¬ fening the bandages with starch or plaster of paris.

BANDAI-SAN, ban'di-san', Japan, a vol¬ cano on the island of Nippon, 140 miles north of Tokio. Its summit consists of several peaks, the highest of which is 6,035 feet above the ocean and 4,000 feet above the surrounding plain. On 15 July 1888 there was a terrible ex¬ plosion of steam which blew out a side of the mountain, making a crater more than a mile in width and haying precipitous walls on three sides. The debris of broken rock and dust poured down the slope and over an area of 27 square miles, killing 461 persons and covering a number of villages.

BANDAJAN, a pass over a range of the Himalayas, in Cashmere, 14,854 feet above sea-level.

BANDANA, a cotton handkerchief, having a dark ground of turkey-red, blue or purple, variegated with simple patterns of white or bright yellow, their bright colors making them a favorite head-covering for Southern negro women. Originally manufactured in the East Indies, the beauty and durability of their colors

caused such a demand that the manufacture of them was established

elsewhere. The process is first to dye the cloth a dark color, commonly turkey-red, which serves as a ground. The white spots constituting the pattern are after¬ ward produced by discharging the color with a solution of chlorine. In order to confine the discharging fluid to the exact points to be oper¬ ated upon, the pattern is cut out in leaden plates, upon which the fluid will not act, and as many handkerchiefs or pieces of cloth as are to be operated upon are enclosed between pairs of these patterns and subjected to enormous pressure, the discharging fluid being run in at the top and prevented by the pressure from spreading, so that the pattern is brought out clean on the spots subjected to the action of the fluid.

BANDE NOIRE, band nwar, an appella¬ tion given during the French Revolution to companies of capitalists and speculators who bought up the forfeited estates of the Church and nobility. They were considered by many as hordes of vandals bound to destroy the monu¬ ments which kings, nobles and religious orders had erected all over France; and thence the scornful denomination, which was continued nearly up to 1830. But while the Bande Noire removed some castles and monasteries which ought to have been preserved as relics of art and religion, they did much toward the pros¬ perity of the country by improving unproduc¬ tive lands and disseminating among the people landed property which previously was concen¬ trated in the hands of privileged classes. The term was originally applied to a body of Ger¬ man soldiers who were employed in the Italian wars by Louis XII of France, and who received the name from carrying black colors after the death of a favorite commander. The appella¬ tion was also assumed for the same cause by different Italian and French troops in the 16th century.

BANDED PEAK, or MOUNT HES¬ PERUS, a summit of the San Juan Mountains, in southern Colorado ; altitude, 12,860 feet.

BANDELIER, ban-de-ler, Adolph Francis Alphonse, American archaeologist : b. Berne, 6 Aug. 1840; d. Madrid, 19 March 1914. Settled early in the United States, where he did im¬ portant work under the direction of the Archae¬ ological Institute of America. His studies were chiefly among the Indians of New Mex¬ ico and Arizona, Central America, South Amer¬ ica and Mexico. Returning to New York in 1903 he was engaged for the remainder of his life in preparation of works on the history and archaeology of Spanish America. He is also the author of (Art of War and Mode of War¬ fare } (1877) ; (Social Organization and Gov¬ ernment of Ancient Mexicans* (1878) ; ‘Ten¬ ure of Lands and Inheritances of Ancient Mex¬ icans* (1878) ; (An Archaeological Tour into Mexico) (1885) ; a novel of Pueblo Indian

life (The Delight Makers* ; <The Gilded Man and Other Pictures of the Spanish Occupancy of America) (1893). He contributed over 60 ar¬ ticles to the (Catholic Encyclopedia,* *etc.*

BANDELLO, ban-del'o, Matteo, Italian novelist: b. Castelnuovo about 1480; d. 1561. He studied at Rome and Naples and applied himself almost exclusively to polite literature.

In his youth, he was a Dominican monk, and was entrusted with the education of the cele¬ brated Lucrezia Gonzaga. After the battle of Pavia he was banished from Italy as a parti¬ san of the French, and Henry II of France gave him in 1550 the bishopric of Agen. He left the administration of his diocese to the bishop of Grasse, and employed himself, at the advanced age of 70, in the completion of his novels, of which he published three volumes in 1554; a fourth was published in 1573, after his death, which took place in 1561. He also published some poems. His novels are in the style of Boccaccio and are characterized by even greater license. His stories, together with the introductory notes, afford a valuable insight into the social customs of his age. Byron, Lope de Vega and Massinger availed them¬ selves of much of his material. Consult Masi, E., (Matteo Bandello o vita italiana in un novelliere del' 50(P (Bologna 1900). Bandello's tales were edited by J. Payne (London 1890), and the <Novelle) by Brognoligo (6 vols., Bari 1910-12).

BANDERAS, Rio de, a river of Mexico, on the east coast; so called (river of flags) because when discovered in 1518 by Juan de Grijalva, the natives waved white flags at the end of their spears in token of friendship.

BANDETTINI, ban-det-te'ne, Teresa, Italian poet : b. Lucca, 12 Aug. 1763; d. 1837. Beginning life as a danseuse, she discovered her poetic talent as if by accident, and came to be known and honored in most parts of her country. She was especially gifted in improvis¬ ing verse. She was called the Amarilla Etrusca. Of her finished poems there remain (La Morte de Adanoide) ; (I1 Polidoro* ; (La Rosmunda) ; and some shorter pieces.

BANDICOOT. (1) A large dark-colored rat (Nesokia bandicota) of southern India and Ceylon, where it is known as the ˆpig-rat® on account of the taste of its flesh, which is a fa¬ vorite article of food among the natives of the dry hilly districts it frequents. As its food is chiefly grain and roots it does much harm to gardens ; and it is also

destructive to poultry. It has the habit of storing rice in its under¬ ground nests against the famine of the dry sea¬ son. (2) In Australia, a small marsupial with long, narrow head and muzzle belonging to the family Pcramelidcr. Many species are scattered throughout Australasia. They live in warm nests underground, and feed upon insects, worms and vegetable food. The hare-like marsupials of the closely allied genus Perogale are known as rabbit-bandicoots, and, like the other, frequently injure vegetable gardens. Consult Gould, (Mammals of Australia) (Lon¬ don 1863).

BANDIERA, ban-di-a'ra, Attilio and Emilio, two brothers of a Venetian family, lieutenants in the Austrian navy, who attempted a rising in favor of Italian independence in 1843. The attempt was a failure, and they fled to Corfu; but, misled by false information, they ventured to land in Calabria with 20 com¬ panions, believing that their appearance would be the signal for a general insurrection. One of their accomplices had betrayed them, and the party was captured at once by the Neapoli¬ tan police. Attilio and Emilio were shot, along

with seven of their comrades, in the public square of Cosenza, 25 July 1844.

BANDINELLI, ban-de-nel'-le, Baccio, or Bartolommeo, Italian sculptor : b. Florence 1493, the son of a goldsmith; d. 1 560. He learned his art under the sculptor Rustici, but modeled his style after that of Michelangelo, whom he vainly attempted to rival and whom he hated with lifelong hatred. He was patron¬ ized by the Medici, and in honor of the pres¬ ence of Leo X in Florence he executed the model of a colossal statue of Hercules which was intended to surpass the David of Michel¬ angelo. Another work of his was an inferior copy of the Laocoon group for Francis I. He produced also Hercules and Cacus (at Flor¬ ence), a somewhat heavy work, 88 figures of apostles, prophets and saints in the choir of the cathedral at Florence, a Bacchus, an Adam and Eve in the Bargello, *etc.*

BANDIT (It. bandito), originally an exile, banished man or outlaw; and

hence, as per¬ sons outlawed frequently adopted the profes¬ sion of brigand or highwayman, the word came to be synonymous with brigand. Of all Euro¬ pean countries Italy has perhaps been most infested with banditti. They used to form a kind of society of themselves, subjected to strict law's, and living in open or secret war with the civil authorities. Peter the Calabrian, the most terrible among these robbers, in 1812 named himself, in imitation of the titles of Napoleon, ((emperor of the mountains,® <(king of the woods,® <(protector of the conscribed,® and <(mediator of the highways from Florence to Naples.® The government of Ferdinand I wras compelled to make a compact with this bandit. One of the robbers entered the royal service as a captain in 1818 and engaged to take captive his former comrades. Subsequently adventurers of all kinds united with them. The Austrian troops which occupied Naples were obliged to send large detachments to repress them. The bandits used to exact from stran¬ gers and natives a sum of money for protection, and give them in return a letter of security. In Sicily the Prince of Villa Franca declared himself, from political and other views, the protector of bandits ; he gave them a livery and treated them with much confidence, which they never abused. Banditti are still active in Italy, Sicily, Turkey and elsewhere.

BANDOLIER, a large leathern belt or baldrick, to which were attached a bag for balls and a number of pipes or cases of wood or metal covered with leather, each containing a charge of gunpowder. It was wrorn by ancient musketeers, and hung from the left shoulder under the right arm with the ball bag at the lower extremity, and the pipes sus¬ pended on either side. The name is now given to a similar belt in whi'ch cartridges are carried.

BANDON, Ore., citv in Coos County, at the mouth of the Coquille River, and 90 miles directly southwest of Eugene. Its manufactures include woolen goods, lumber, shooks, butter, cheese, condensed milk, railroad ties, poles and matchwood. It has two banks and an assessed valuation of $843,893. There are two schools embracing grades and high school. The prin¬ cipal buildings are the twro local banks, schools, post-office, hotels, restaurants and hospitals.

Bandon has also a shipyard and is a coast guard station. Pop. (1920) 1,440.

BANDON, a river of Ireland which rises in the Carberry Mountains, and at its mouth forms the harbor of Kinsale. Spenser de¬ scribes it as

ftthe pleasant Bandon, crowned by many a wood.® It has a course of 40 miles, for 15 of which it is navigable to Innishannon, four miles below Bandon.

BANEBERRY. See Acivea.

BANER, ba-nar', Johan Gustafsson, Swed¬ ish general in the Thirty Years' War: b. 1596; cl. 1641. He made his first campaigns in Poland and Russia, and accompanied Gustavus Adol¬ phus, who held him in high esteem, to Germany. After the death of Gustavus in 1632 he had the chief command of the Swedish army, and in 1634 invaded Bohemia, defeated the Saxons at Wittstock, 24 Sept. 1636, and took Torgau. He ravaged Saxony again in 1639, gained another victory at Chemnitz, and in 1640 defeated Pic-colomini. In January 1641 he very nearly took Ratisbon by surprise.

BANEZ, Dominic, theologian: b. 1528 in

the Spanish province of Biscaya ; d. 1604 at Medina del Campo. He made rapid progress in philosophy and theology at the University of Salamanca, where he had as teachers the famous Melchior Cano and Peter and Dom¬ inic Soto. In 1581 he wˆas appointed professor in this university, which was then dividing the honors and prestige of the Sorbonne. He w'as recognized as one of the clearest and most acute interpreters of the <Summa) of Saint Thomas, and his chief works were commen¬ taries on the same. He took a prominent part in the controversy on divine grace, predestina¬ tion, etc., in which he opposed the theories of Molina. For several years he acted as con¬ fessor to Saint Theresa, and at his command she wrote her spiritual treatise, (Camino de perfeccion.5

BANFF, bamf, Canada, popular pleasure resort in southwestern Alberta, on the Bow River and on the Canadian Pacific Railroad. It is picturesquely situated amid the scenery of the Rocky Mountains, and contains a boil¬ ing sulphur spring, swimming baths, a sanitorium and a fine hotel. These are all situated within the area of the Rocky Mountain Na¬ tional Park of Canada. Consult (Banff in the Canadian Rockies > (Montreal 1900).

BANFF, Scotland, seaport and county towm of Banffshire, at the mouth of the Deveron, 50 miles northwest of Aberdeen, on the Great North of Scotland Railroad. The town is well built, has clean, well-paved streets and contains Banff Castle, an academy, town hall, a museum and several libraries. In the neigh-hood to the south is Duff House and park, the seat of the late Duke of Fife, who in 1906

presented the house and the portion of the park surrounding it (about 140 acres) to the towns of Banff and Macduff. There is a seven-arch bridge over the Deveron, uniting Banff with the seaport of Macduff. The prin¬ cipal manufactures are beer, leather, woolens and iron goods. Agricultural products, grain, cattle, salmon and herrings are exported. The « government is vested in a provost and coun¬ cil ; and Banff, with Macduff, Elgin, Cullen, Inverarie, Kin tore and Peterhead returns one

member to Parliament. Banff is a place of great antiquity, its first charter having been granted by Malcolm IV in 1163, and further privileges were conferred by Robert Bruce in 1324 and Robert II in 1372. Archbishop James Sharp was born here in 1618. Consult Cra-mond, (The Annals of Banff > (Aberdeen 1893). Pop. 3,821.

BANFFSHIRE, Scotland, a county in the north, bounded on the north by the Moray Firth, on the west by the county of Elgin and part of Inverness, on the south and east by the county of Aberdeen. The soil is for the most part a rich loam or deep clay. The principal rivers are the Spey and Deveron, with the Isla, a tributary of the former, and the Avon and Fiddich of the latter ; besides which there are many other main and tributary streams. The mountains rise in altitude as they recede from the sea, the most celebrated being Cairngorm, which is 4,095 feet high. The principal crops are barley, oats, turnips and potatoes, little wheat being raised. Special attention is paid to the cultivation of turnips, the chief object of the farmer being the rearing and feeding of cattle. The total area of Banffshire is 410,000 acres. Nearly two-fifths of the total surface is under cultivation, and about one-fifth is oc¬ cupied by woods and plantations. Since about the middle of the 19th century large tracts of formerly waste land have been reclaimed. Fishing is a staple industry. The salmon caught in the Spey and Deveron constitute an im¬ portant article of traffic, the

valued rental of the Duke of Richmond's salmon fishings in the former being over $60,000 a year. Banffshire possesses several woolen factories, tanneries, rope and sail works, shipbuilding yards, brew¬ eries, lime works and many distilleries, the whiskey being generally known under the name of Glenlivet, after a glen in the county. Among the natural productions limestone is the most prevalent. Serpentine also abounds in several places, especially at Portsoy, where it is known as (<Portsoy marble® ; it is wrought into vases and other ornaments. Ironstone and manga¬ nese also occur, and Scotch topazes or cairn¬ gorm stones are found on the mountains in the south of the county. The chief towns and villages are Banff, Macduff, Keith and Buckie. Pop. 61,402.

BANFFY, Baron Desiderius, Hungarian

statesman : b. Kolozsvar, Hungary, 1844 ; d. Budapest, 23 May 1911. He went into politics as a partisan of Koloman Tisza, who gave him an official post in 1875. In 1883 he was ap¬ pointed administrator of the Bistritz-Naszod district, where he actively pursuedˆ the policy of Magyarising the non-Magyar inhabitants. He became president of the lower House of the Hungarian Reichstag in 1892 and Prime Minister in 1895. In that capacity he secured the passage of the civil marriage and divorce bills in the face of violent clerical opposition, and renewed the Ausgleich with Austria, but it was not ratified by the Austrian legisla¬ ture; and, as he had meanwhile won a gen¬ eral election by official pressure unparalleled even in Hungary, he encountered still more strenuous opposition and was replaced by Herr von Szell in 1899. Most of Banffy's followers were defeated in the 1901 elections; but he returned to public life in 1903 and took a very

active part, as an extreme Nationalist, in com¬ bating Count Tisza during the latter's premier¬ ship in 1904—06. The elections of 1906 left him with only 11 followers, most of them more or less independent, and from then till his death he took but little part in politics.

BANG, a drink. See Bangue.

BANG, bang, Bernhard Laurits Frederik,

Danish scientist : b. 1848. He is professor of pathology and therapy in the Royal Veteri¬ nary and Agricultural College, Copenhagen. He has made extensive researches in veterinary science, especially in regard

to contagious abor¬ tion and tuberculosis. In 1892 he originated his method of eradicating tuberculosis from dairy herds by isolating mildly affected ani¬ mals and artificially feeding their calves with milk free from tubercle bacilli. The results have been favorable in Denmark, Norway and Sweden. In 1896 Bang, in conjunction with Stribolt, discovered the cause of contagious abortion in cattle, and has since devoted much study to its treatment and the possibility of immunizing herds. He has published many articles on professional topics in the leading veterinary and other scientific journals of the world.

BANG, Hermann Joachim, Danish novel¬ ist: b. on the island of Seeland 1857; d. 1912. Bang first came into literary notice about 1879, since which time he has published a num¬ ber of novels and some poems. (Hopeless Generations) (Haablose Sloegter) ; (Eccentric Tales* (Excentriske Noveller) ; (Under the Yoke) (Under Aaget) ; (Ten Years) (Ti Aar) ; and (By the Roadside* (Ved Veien), are the titles of some of them. The last named is considered the masterpiece. A collection of his works, edited by Etta Federn, has been pub¬ lished in German (1910).

BANG, Peder Georg, Danish jurist and statesman: b. Copenhagen 1797; d. 1861. He became professor of law at the University of Copenhagen in 1830 and took an active interest in politics, holding several offices in his native city and becoming several times Minister of Agriculture and Minister of the Interior. In 1854 he became Prime Minister, and later was Supreme Court justice. He published (Lare-bog i de til den romerske privat Ret hen-horende Disciplined (2 vols., 1833-35), and (Systematisk Fremstilling af den danske Pro-cesmaade*, with J. C. Larsen (5 vols., 1841-43).

BANGALORE, ban-ga-ldr’, Hindustan, a fortified town in the native state of Mysore, 70 miles northeast of Seringapatam. It stands on a plateau 3,000 feet above sea-level, and is divided into two parts, the old native town and the cantonments. The chief buildings are the government house (where the British resi¬ dent lives), and the new public offices, the pal¬ ace of the maharajah, the central jail, *etc.* There is a fine public pleasure-garden. In the old town stands the fort, reconstructed by Hyder Ali in 1761 and captured by Lord Corn¬ wallis in 1791. Latterly the town has greatly prospered. There are manufactures of silks, cotton cloth, carpets, *etc.* Bangalore is noted for its salubrity. There are a number of Euro¬ pean educational institutions, and the chief, the high school of the province, is well at¬ tended. The military cantonment, housing a

large British and native force, is to the north-cast. Pop. 189,485.

BANGE, banzh, Valerand de, French artil¬ lery colonel; b. Balignicourt 1833. In 1873, as director of the atelier-de-precision in the Cen¬ tral Depot at Paris, he reconstructed both the light and heavy field pieces of the day, and his models were adopted by the French army in 1879. In 1884 he was the successful com¬ petitor with Krupp for the contract to supply field pieces to the Serbian government. In 1882-89 he was director of the Cail corpora¬ tion, whose establishments at Denain, Douai and Grenelle he converted into ordnance fac¬ tories. His gun has been preferred also by England, Sweden and Italy. In 1885 at the Antwerp Exposition he made a gun,

35 feet long, from which were fired two pro¬ jectiles of 1,320 pounds, employing charges of 440 pounds of powder, and with a range of about 12 miles. The gun burst at the third discharge. He was the first to employ effect¬ ively the screw principle in the mechanism of the breech block, and his gas check, which prevents the escape of gases, is now generally used in all guns of the screw breech-block type. See Ordnance. Consult Hennebert, (L'Artillerie Krupp et l'artillerie de Bange* (1886).

BANGKOK, or BANKOK, Siam, capital of the kingdom, extending for three or four miles on both sides of the Menam, which falls into the Gulf of Siam about 15 miles below. It consists of three parts — the town proper, the floating town and the royal palace. The town proper occupies an island seven or eight miles in circuit, and is surrounded with walls and bastions ; situated in the midst of gardens and luxuriant foliage, it presents a very picturesque appearance. The floating town consists of wooden houses erected on bamboo rafts moored to the bank in rows eight or more deep The palace, occupying an island in the river, is surrounded by high walls. Though the gen¬

eral character of the buildings is not imposing, numerous temples, glittering with gilding and terminating in lofty spires, are seen in many quarters. The approach to Bangkok by the Menam, which can be navigated by ships of 350 tons' burden (large sea-going ships anchor at Paknam, below the bar at the mouth of the river), is exceedingly beautiful. As the town is neared, numerous temples present themselves, and floating houses become common, and finally the whole city, with its rich gardens and shin¬ ing temples and palaces, bursts full upon the view. The royal palaces, noblemen's houses, monasteries and dwellings of Europeans are of stone, and much modern improvement has re¬ sulted in the extension of well laid-out streets, lined by brick houses, electrically lighted, and traversed by electric street railroads. Four lines of steam railroad connect with the prov¬ inces. The circumference of the walls of Bangkok, which are 15 to 30 feet high and 12 broad, is about 6 miles. Bangkok is the con¬ stant residence of the king. The palace is surrounded by high walls and is nearly a mile in circumference. It includes temples, public offices, accommodation for officials and for some thousand soldiers, with their necessary equipments, a theatre, apartments for a crowd of female attendants and several Buddhist temples or chapels. Several of the famous

white elephants are kept in the courtyard of the palace. Throughout the interior are dis¬ tributed the most costly articles in gold, silver and precious stones. The temples of Bangkok are innumerable, and decorated in the most-gorgeous style, the Siamese taking a pride in lavishing their wealth on them. In the neigh¬ borhood of Bangkok are iron mines and for¬ ests of teakwood. The trade, both inland and foreign, is very extensive. The foreign trade of Siam centres in Bangkok and is mainly in the hands of the Europeans and Chinese. The chief exports, rice, sugar, pepper, cardamoms, sesame, hides, fine wroods, ivory, feathers and edible birds' nests, have reached a total annual value of over $21,000,000. The imports are tea, manufactured silks, and piece goods, opium, hardware, machinery and glasswares, valued annually at over $16,800,000. The United States has a resident consular agent. The population is about 500,000, nearly half of whom are Chinese, the others including Bur¬ mese, Annamese > Cambodians, Malays, Eura¬ sians and Europeans. Bangkok was an unimportant river village prior to 1769, when it was selected by King Paya Tak for his capital.

BANGOR, Ireland, seaport town, county Down, situated on an acclivity on the south side of Belfast Lough, four miles northwest of

Donaghadee and 12 miles east of Belfast. It consists of three principal and several smaller streets, and has an Episcopal church, a Meth¬ odist and a Roman Catholic chapel, and two Presbyterian churches; an endowed school, six national schools, a Protestant hall and a branch of the Belfast Bank. The male population is chiefly employed in seafaring pursuits, the females in hand-sewing in all its branches. It has manufactures of embroidered muslins and linen goods. Bangor is a favorite bathing resort. Bangor Abbey, a free school, taught by the monks, was founded by Saint Congall in 555 a.d., and had 3,000 students in the 9th century, when it was destroyed by the Danes. The parish church now occupies the site. Con¬ sult Healy, (Ireland's Ancient Schools and Scholars) (1890).

BANGOR, Me., the chief city of eastern Maine, is a port of entry and the seat of Penob¬ scot County. The city is on the west bank of the Penobscot River, across its affluent the Kenduskeag, and at the head of navigation, about 28 miles from Penobscot Bay. It is on the Maine Central, Bangor & Aroostook and several other railroads, with steam knd electric lines radiating in all directions ; is on the main line from Boston to Saint John and Halifax, and also has direct steamship connection with Bos¬ ton, being the terminus of the Bangor Division of the Eastern Steamship Company. Bangor is 76 miles northeast of Augusta, 137 miles north¬ east of Portland and 246 miles from Boston. Pop. (1920) 25,978.

Trade and Commerce. — Situated near the geographical centre of Maine and at the head of navigation on the largest river of the State, Bangor occupies a highly favored position and one destined to be even more commanding with the growth and development of the expansive territory north and east and tributary to her. As the shire town of Penobscot County, as

the trade centre and shipping point of a large and rich agricultural section and for many thriving industrial communities; as a point of convergence for numerous important railway and steamship lines, and a consequent tarrying place for great numbers of tourists, sportsmen

and commercial travelers ; these together with the busy commerce of its port, the metropoli¬ tan character of its hotels and the compact¬ ness of its business section, give to the city a much more populous appearance than the given figures would indicate. Bangor has a fine harbor, easily accessible for vessels of large size. Although nearly 30 miles from the bay and 60 miles from the ocean, the tide rises about 17 feet, and there is a sufficient depth of water to float the largest of ocean steamships. The Penobscot River, whose waters unite with those of the bay of the same name, is a noble water highway, rising 300 miles away amid the mountains and forests of north¬ western Maine. In the 8,200 square miles drained by the Penobscot there are 1,604 tribu¬ tary streams indicated on the State map, and 467 lakes and ponds. Bangor is one of the greatest lumber markets in the North, there being tributary to the city the great forests of spruce traversed by the Penobscot and down which the logs are floated ; and has every sort of manufactory of wood and allied products, — saw, planing, wood pulp, and molding mills ; factories of furniture, carriages, trunks, valises, agricultural implements, boots, shoes and moc¬ casins, clothing, dairy products, etc., with iron foundries, machine shops, shipyards, flour mills and pork-packing establishments. Ice-cutting is also an important industry, Penobscot ice being exceptionally pure.

Manufactures and Industries. — • Bangor's manufacturing establishments number in the vicinity of 300, embracing about 100 different kinds of industries and employing several thousand hands. These figures are, however, inadequate to correctly portray the city's manu¬ facturing interests, as many of the important establishments are outside the city's limits. Therefore, while the manufactures of these mills are purely Bangor products, the plants themselves and most of the employees belong properly to other towns. In recent years pulp and paper manufacturing has made great ad¬ vance and numerous pulp and paper mills are now in operation along the Penobscot, from those of the Eastern Manufacturing Com¬ pany at South Brewer to the immense plant of the Great Northern Paper Company at Milli-nocket.

In recent years diversified manufactures have been multiplying and many and varied are the products of these establishments. Here is located a trunk manufacturing establish¬ ment which shipped recently a whole train¬ load of trunks, the largest shipment of trunks ever made by one manufacturer in this country or the world. There are located here great woodworking plants from whence go all over the country the finest designs in interior decora¬ tions and architectural woodworking. The United States census of 1914 recorded 122 manufacturing establishments employing 1,614 persons, of whom

1,200 were wage earners, receiving $734,000 annually in wages. The cap¬ ital engaged aggregated $3,450,000. _ and the value of the year's output was $3,557,000; of

this, $1,605,000 was the value added by manu¬ facture.

Bangor is a trade centre for eight counties, and is connected with their principal places by steam or electric roads, or by water communica¬ tion.

Banks, *etc.* — Bangor has three national banks, two savings banks, two trust and bank¬ ing companies, two loan and building associa¬ tions and two marine insurance companies. There are two daily papers and several weekly and monthly publications. There is a Chamber of Commerce with attractive rooms at the city hall. The Kenduskeag, flowing through the centre of the city, is spanned by several bridges, and the city is connected with Brewer across the Penobscot by a bridge 1,300 feet long. A dam across the Penobscot just above the city furnishes water supply and power, the. city owning both its waterworks and municipal lighting plant. The assessed property valua¬ tion of Bangor is $24,000,000.

Buildings, *etc.* — The city has a fine granite custom-house and post-office, the county court¬ house which is a credit to the great county of Penobscot, of which Bangor is the shire town. Bangor's city hall — the Hersey memorial build¬ ing — is an imposing edifice which reflects credit upon the city. Bangor suffered a $4,000,- 000 conflagration in 1911 but the city has wholly recovered and the new buildings are modern and substantial structures. The Bangor public library is one of the foremost institu¬ tions of its kind. The Bangor Auditorium Association has erected the largest building of its kind in the State, and here each fall are held the eastern Maine musical festivals. The Eastern Maine General Hospital is one of the important institutions here and Bangor is also the home of the Bangor State Hospital for the Insane. The Bangor Theological Seminary is a time-honored institution of learning, and only nine miles away, in the town of Orono, is the University of Maine, the law school of whicE is located in Bangor.

Government. — Bangor received a city char¬ ter 12 Feb. 1834. The city seal is typical, the rising sun in the background illustrating the Sunrise State, and the spruce tree in the centre portraying the great lumber interests, while in the immediate foreground are gear wheel, anchor and plow, emblematic of manufactures, commerce and

agriculture. The government is vested in a mayor, who is elected annually, and a council divided into two chambers. The city has seven wards, and one alderman and three councilmen are chosen annually from each ward, the city government comprising the mayor, seven aldermen and 21 councilmen. Most of the appointments and administration offices are subject to the control of the mayor and city council.

History. — Bangor's present site was in the early days the camping-ground of the Tarra-tines, a famous tribe of Indians. It was in 1769 that Jacob Buswell, Bangor's first white settler, came here from Massachusetts. Pie was a hunter and boatbuilder, and established his home near the site of Saint John's Roman Catholic Church. The place was for a time known as Kadesquit, afterward as Condeskeag, and later as Kenduskeag. The locality had been visited by the French as early as 1605, and was one of the many places identified with the mythical

Norumbega. Kenduskeag plantation was only a small hamlet at the time of the Revolution and during the time when the British had con¬ trol of the river the hardships were severe. At the instigation of Rev. Seth Noble, Bangor's first clergyman, the name of Kenduskeag was finally' abandoned and Sunbury adopted. With the growth of the place the people became im¬ patient of the plantation organization and dele¬ gated Parson Noble to proceed to the General Court at Boston and secure an act of incorpora¬ tion. Minister Noble was a great lover of music, and the hymn tune of Bangor was such a favorite with him that that name was substi¬ tuted for Sunbury and the act incorporating the town of Bangor was passed 25 Feb. 1791.

Bangor early gave attention to the matter of improving her transportation facilities, and she had her railroad when most of the proud cities of to-day knew nothing of such things. As early as 1836 her enterprising citizens built a railroad to Old Town, a dozen miles up the river, with a view of aiding the development of her natural resources; and this, one of the ear¬ liest railroads in America, prospered for nearly a third of a century. Not only did the city have one of the first railroads in the country but the pioneer iron steamship constructed in America was built to run to this port and bore the name Bangor. She was built in 1845 on the Delaware, her owners being the Bangor Steam Navigation Company of Maine, and she was designed for passenger and freight service between Boston and Bangor. Within recent years, through the enterprise of some of Bangor's public-spirited men, Aroostook County has been brought into direct railroad commu¬ nication with Bangor through the construction of the Bangor & Aroostook Railroad, this sys¬ tem having numerous branches to important points in northern Maine, it having also ab¬ sorbed the Bangor & Piscataquis Railroad. In recent years there has been no more important railroad enterprise inauguated in New England than that of the Bangor & Aroostook, and under its enterprising and progressive management it has become a potential factor in the develop¬ ment of Bangor and the immense territory stretching to the northward. Bangor business men, ever alert to adopt, the newest methods, inaugurated in' this city the first electric rail¬ road in Maine and more recently electric roads have been constructed reaching Hampden and South

Brewer on the south and Old Town and Charleston on the north. These electric lines bring Bangor and the territory immediately con¬ tiguous into close touch, and the benefits accru¬ ing therefrom are far-reaching.

Located as the city is, on the west bank of the imperial Penobscot, at its junction with the less pretentious Kenduskeag, the business is largely in the valley, while the surrounding heights afford picturesque sites for residences. The diversified aspect is heightened by the wealth of trees along the residential streets, and few . localities are to be found with greater scenic attractions. From the highlands over¬ looking the city the view is particularly fine, the mountains which fill the eastern horizon making a fitting background to the picture. The Kenduskeag has, through much of its course, very precipitous banks, a notable illustration being the historic Lover's Leap, a mile above

the city; and along this picturesque stream are innumerable gems of scenic beauty.

Bangor enjoys the unique distinction of being the only place of its size on the globe where salmon fly-fishing can be successfully practised within the city's limits, and in one season a Bangor lumber manufacturer brought to the gaff and successfully landed 27 salmon, aggregating 500 pounds in weight. The Bangor salmon pool, whence are taken all the salmon caught with a fly on the Penobscot, is situated about a mile above the city and just below the falls that span the river at the Bangor water¬ works dam.

Bangor is the home of many sportsmen and is the headquarters in this section for sports¬ men's supplies of all descriptions. Nearly all the parties of sportsmen who in the season visit the great wilderness of northern and eastern Maine make this their rendezvous and procure their outfits here. Moose and deer are multi¬ plying rapidlv as the result of wise game laws, and Maine is truly the sportsmen's paradise.

Population. — In the year 1800 the popula¬ tion of Bangor was 277. From 1830 to 1834 Bangor expanded rapidly and when in the latter year a city charter was adopted the popu¬ lation was about 8,000. The census for 1900 gave Bangor a population of 21,850; the popu¬ lation in 1920 was 25,978, and with the towns immediately environing, including the city of Brewer across the river, about 50,000.

BANGOR, North Wales, episcopal city and parliamentary borough, in Carnarvonshire, near the northern entrance to the Menai Strait, nine miles northeast of Carnarvon and 60 miles west of Chester. It consists chiefly of one principal street about a mile in length, nestling in a narrow valley, but there is also a higher and more modern quarter called Upper Bangor, overlooking the strait. Two miles to the west the Menai suspension bridge and Stephenson's famous Britannia tubular bridge one mile to the south span the Menai Strait. The principal public buildings are the cathedral, the bishop's palace, deanery house, University College of North Wales, training college for teachers, *etc.* Bangor is the oldest bishopric of Wales, hav¬ ing been founded by Saint Deiniol in 550 a.d. He built a ˆcathedral, which the Saxons demol¬ ished in 1071, and the new edifice, completed in 1102, was destroyed by fire in 1402. The pres¬ ent structure was in building in 1496-1532; it is of cruciform design, 214 by 60 feet, and has a tower 60 feet in height. Modern improve¬ ments have been freely introduced. There are plants for gas and electric lighting and a free public library. There are numerous educational institutions, including the University College of North Wales. Independent, Baptist and Normal colleges. The municipality was incorporated in 1883. The chief local trade is through the Pen-rhyn slate quarries, in which 3,000 wage earners are employed. The annual fairs are thronged with buyers and sellers. The fact that the har¬ bor is not suited to large vessels makes the UadfC) by sea of small proportions. Pop. about

BANGOR, Pa., borough of Northampton County, 15 miles north of Easton; on the Ban¬ gor and Portland and New Jersey Central rail¬ ways. There are numerous slate-quarries, silk mills, machine shops, and the products of the

slate-mills, etc., find an extensive market. Ban¬ gor was settled in 1760 and incorporated in 1875. Pop. 5,369.

BANGOR THEOLOGICAL SEMINARY

(Congregational). Originated with the Society for Theological

Education, which was estab¬ lished in Portland in 1811 and chartered in 1812. The seminary was chartered by the legis¬ lature of Massachusetts, of which Maine was then a province, 25 Feb. 1814; opened at Hampden in 1816; removed to Bangor in 1819, and graduated its first class 2 Aug. 1820. It was founded to provide an educated ministry for northern New England, then frontier country and being rapidly settled. It was first formed on the plan of the English Dissenters' schools with two years' classical and two years' theological instruction. In 1827 it was reorgan¬ ized on the American plan of a three years' theological course. It is governed by an inde¬ pendent board of trustees, having only a friendly though close relationship with the Congregational churches. It has a faculty of five and a librarian, besides a varying number of lecturers. It has real estate valued at $100,- 000, about $300,000 worth of productive endow¬ ment, including about $60,000 of scholarship funds, and $10,000 as fund for the board lec¬ tureship, the latter providing two courses of lectures on scientific and cultural subjects each year. An annual event of wide influence is Convocation Week,® consisting of four courses of five lectures by the foremost men of affairs, and free to the public. The seminary is open to students of any denomination and is largely patronized by other than Congregationalists. In the first 100 years of its history, just clos¬ ing, it has graduated 935 men, educated for a year or more 320 others, furnished a very large proportion of the Congregational ministers now or in the past active in Maine, sent scores of ministers to the churches outside Maine and many missionaries to all quarters of the globe.

BANGORIAN CONTROVERSY, a con¬ troversy stirred up by a sermon preached be¬ fore George I in 1717, by Dr. Hoadly, bishop of Bangor, from the text "My kingdom is not of this wdrld" — in which the bishop contended in the most pronounced manner for the spirit¬ ual nature of Christ's kingdom. The contro¬ versy was carried on with great heat for many years and resulted in an enormous col¬ lection of pamphlets. See Hoadly, Benjamin.

BANGS, John Kendrick, American humor¬ ist and editor: b. Yonkers, N. Y., 27 May 1862. He was one of the founders of Life , and has long been famed for his light verse and humor¬ ous stories, among which may be mentioned < Coffee and Repartee' (1886) ; (New Waggings of Old Tales, ' with F. D. Sherman (1887) ; 'The Idiot' (1895); (Mr. Bonaparte of Corsi¬ ca' (1895); (Water Ghost and Other Stories,' (The Mantel-Piece Minstrels,' (The Bicyclers and Other Farces,' 'A Houseboat on the Styx,' and (A Rebellious Heroine' (1896) ; 'The Pur¬ suit of the Houseboat' (1897); 'Enchanted Typewriter' (1899); 'Uncle Sam, Trustee) (1902) ; 'Andiron Tales ' (1908) ; (The Foot¬ hills of

Parnassus) (1914) ; and ‘Lady Teazle,’ a musical comedy version of ‘The School for Scandal.’ He became editor of Harper’s Weekly in 1900, of the Metropolitan Magazine

in 1903 and of Puck in 1904. See Letters to Dead Authors.

BANGS, Lemuel Bolton, American physi¬ cian: b. New York, 9 Aug. 1842; d. New York, 7 Oct. 1914. He was graduated from the Col¬ lege of Physicians and Surgeons in 1872 ; was professor of genito-urinary diseases in the Post-Graduate Medical School and Hospital of New York, and later at Bellevue Hospital Med¬ ical College, and was consulting surgeon to va¬ rious hospitals in New York. He was presi¬ dent of the American Association of Genito¬ urinary Surgeons (1895), and editor of the ‘American TextBook of Genito-Urinary Dis¬ eases,’ *etc.*

BANGS, Nathan, American clergyman and author: b. Stratford, Conn., 2 May 1778; d. New York, 3 May 1862. He entered the Methodist ministry in 1801, preached for some years in Canada and removed to New York in 1810. In 1820 he became head of the Metho¬ dist Book Concern, which he reorganized thor¬ oughly, paying off its debts, extending its busi¬ ness and putting it on a paying basis. He was also charged with the censorship of all its pub¬ lications. In 1829 he declined the bishopric of Canada. He edited the Christian Advocate and the Methodist Magazine ; was founder and sec¬ retary of the Methodist Missionary Society; president of Wesleyan University, Middletown, Conn., in 1841 ; and in pastoral work from 1842 until his retirement in 1852. His chief work was (A History of the Methodist Episcopal Church, 1776-1840’ (4 vols., 1839-12) ; others are ‘Errors of Hopkinsianism’ (1815) ; ‘Pre¬ destination Examined’ (1817) ; ‘Original Church of Christ’ (1836) ; ‘State and Responsibilities of the Methodist Episcopal Church’ (1850). Consult his life by A. Stevens (New York

1863).

BANGUE, or BANG, a drink much used throughout the East as a means of intoxication, prepared from the dried leaves of the Indian hemp, which are also called by this name. See Hashish.

BANGUED, ban-gad', Philippines, the cap¬ ital of the province of Abra, Luzon, 236 miles north of Manila. Pop. about 13,500.

BANGWEOLO, bang'we-6'16 (also called Bemba), a great central African lake, discov¬ ered by Livingstone in 1868, which is 150 miles long by 75 wide, and 3,700 feet above the sea. The Chambeze, which flows into it, and the Luapula, which issues from it, constitute the head-stream of the Kongo. The shores are flat, and parts of the lake are mere marsh. In the northwestern part are four large islands inhabited by the Mboghwa, a race of fishermen and herdsmen. On its southern shore Living¬ stone died.

BANIAN, or BANYAN (from Sanskrit hanij, a merchant), the name commonly given by Europeans to Hindu merchants, brokers, etc., in Bengal and western Hindustan. They are often men of great wealth and carry on most extensive dealings, their operations extending as far as the borders of _ the Russian and Chinese territories, the Persian Gulf and east¬ ern Africa. They are great travelers and have counting-houses in almost every trading town of importance in Asia. English sailors call

banian days those days on which they have no flesh meat. Probably the name has a reference to the habits of this class; because, before peo¬ ple were acquainted with the abstinence of all the Hindus, it was thought to be confined to the Banians.

BANIAN TREE. See Banyan.

BANXM, ba'mm, John, Irish writer: b. 1798; d. 1842. He early exhibited a taste for literature, and before his 20th year wrote a play called (Damon and Pythias, 1 which was afterward performed at Covent Garden. His fame rests on his novels, in which his brother Michael (q.v.) collaborated, and particularly on the cO'Hara Tales,1 in which Irish life in all its features is admirably portrayed.

BANIM, Michael, Irish novelist: b. Kil¬ kenny, 5 Aug. 1796; d.

Booterstown, 30 Aug. 1874. He claimed to have written 13 out of the 24 books of fiction confusedly associated with the names of John and Michael Banim, and called himself the author of (Crohoore of the Bill Hook,' one of the most popular of the (O'Hara Tales> ; (The Ghost Hunter) (1833) ; (Father Connell1 (1842), and (The Town of the Cascades1 (2 vols., 1864).

BANISPIMENT (the act of putting under ban, proclamation, as an outlaw), a technical term in Scotch criminal law for the punish¬ ment of sending out of the country under pen¬ alties against return. This punishment was formerly much used in various forms — for example, banishment to the plantations or col¬ onies; to England (even after the Union); from a particular county in Scotland, *etc.* Sometimes capital punishment was commuted to banishment for service in a foreign \yar. The old Scotch doom of deportation was grad¬ ually merged in transportation under various British statutes.

<(Banishment is sometimes used iq the sense of expulsion or deportation by the political au¬ thority on the ground of expediency, as well as in the sense of transportation or exile by way of punishment for crimed 3 Am. & Eng. Enc. Law (2d ed.) 770. The United States Supreme Court decided in the case of Fong Yue Ting v. United States, 149 U. S. 698, that the right to exclude or to compel aliens, or any class of aliens, absolutely or upon certain con¬ ditions, in war or in peace, is an inherent and inalienable right of every sovereign and inde¬ pendent nation. The idea of banishment occurs in the ostracism and petalism of Greece, and the relegation, exile and deportation of Rome. It was generally accompanied by for¬ feiture of civil rights. In England, voluntary banishment was called abjuration. Banishment still obtains in Turkey, while the Russian sys¬ tem of banishment to Siberia is well known.

BANISTER, John, Anglo-American scien¬ tist : b. England; d. 1692. He settled in the West Indies, and later in Virginia, in the vicin¬ ity of Jamesburg, where he devoted himself to the study of botany. He was a contributor of a catalogue of Virginia plants to Ray's (His¬ tory of Plants, 1 in 1660. The genus Banisteria was named in his honor. His publications in¬ clude Observations on the Natural Produc¬ tions of Jamaica) ; (The Insects of Virginia1 ; 1 Curiosities in Virginia.1 *etc.*

BANISTER, John, son of the preceding: b. Virginia; d. 1787. He was educated in Eng¬ land and studied law there; became colonel in the Virginia militia; was a member of the Virginia assembly, and

prominent in the patri¬ otic conventions of the Revolutionary period; was a representative from Virginia in the Con¬ tinental Congress in 1778-79, and one of the signers of the Articles of Confederation.

BANJARMASSIN, ban-jar-mas'sen, Bor¬ neo, a town near the southeastern angle of the island, under the government of the Dutch, on an arm of the Banjar, about 14 miles above its mouth. Owing to the marshy ground and fre¬ quent inundations of the river the houses are built on piles, and many of them on rafts, the front next the river being used as a shop or stall on which wares are exposed for sale. On market days the water is covered with skiffs, having a single individual in each, moving about selling vegetables, *etc.* The people are con¬ tinually on the river, all necessaries being pur¬ chased at these floating markets, and all busi¬ ness being done on the water. In every respect it is a floating town, possessing neither carriages nor horses ; the only animals kept being pigs, goats, ducks, geese and fowls. The houses of the European functionaries, the government buildings, and the fort, are built partly of stone and partly of wood. The Fort Tatas is sur¬ rounded with palisades, and contains the resi¬ dent's house, the magazines and barracks. Ex¬ ports are pepper, benzoin, bezoar, rattans, dragon's blood, birds' nests, iron and straw mats very artistically made ; and imports rice, salt, sugar, opium, coral, Chinese porcelain, silk, cutlery, gunpowder, *etc.* Pop. about 53,000.

BANJO (a negro corruption of bandore, Italian, pandora, from Greek pandoura, a three¬ stringed instrument), the favorite musical in¬ strument of the negroes of the Southern States, and now widely popular elsewhere. It is five-stringed, has a body like a tambourine, covered with vellum or parchment strained to drumhead tension by adjustable clamps set close around the hoop, and a fretted neck like a guitar. The back is open. The strings pass from a tail piece over a low bridge similar to a violin bridge and thence to the tuning pegs. The banjo is played by stopping the strings with the fingers of the left hand and plucking or striking them with the fingers of the right. The upper or octave string, however, is never stopped. This string is 16 inches long, the tuning peg being part way up the neck. The other four strings are 24 inches long. When in position for playing the octave string is held uppermost. It is tuned to E'. Next to it is the lowest toned string, tuned to A, and the other three strings rising in tone, E°, G°, and B°. The music for the banjo is written on the treble clef — an octave above the tones as played. In some countries a 6-string banjo is in use, and there is also a 9-string instrument of the same class.

BANK, Banks, Bankers. The term bank and its derivatives does not

occur in classi¬ cal Latin. It first appears in low Latin about the beginning of the 13th century, when it seems to have been brought into Italy by the Norsemen and where it displaced the Roman mensa, as applied to the bench, table, counter,

or counting-table, or board upon which the dealer in money sorted and counted his coins. The Greek words for a banker or dealer in moneys were trapezeta and collybista, both of w:hich wˆere adopted by Roman writers. The Romans, in successive ages, had various terms for what would now be called a banker or bankers ; and it is under these heads that in¬ formation must now be sought concerning their rise and development. These Roman terms were mensarius, a sorter and counter of coins; nummularius, a money changer; jeenator, a lender of money on interest; negotiator, a lender of money in the provinces, where the usury laws did not prevail. Camsor nummul¬ arius also appears in some works.

The counting-table is still employed, chiefly in national mints. It consists of a wooden board with a hundred or a thousand circular holes, cavities or depressions, suitable to the size of the coins to be counted. A large heap of such coins is thrown upon the board, one end of the board is then raised so as to form an incline, when the holes are at once filled; the surplus coins roll off ; and thus the counting of a thousand coins is done in a moment.

It is perhaps owing to the absence of the term ((bank® or banker in classical works that banks are commonly supposed to be of mediaeval or modern origin. This is so far from the truth lhat the necessity for their adoption has re¬ sulted in their establishment in all ages and countries wrhere the government was sufficiently powerful to protect their funds from pillage and sufficiently just to permit and protect the exercise of their necessary and lawful func¬ tions. The earliest governments of this char¬ acter were pontifical, the sovereign being both king and high priest ; for example, the Brahminical sovereigns of India. In the (<Gentoo,® or Brahminical code, a translation of which, Governor Warren Hastings presented to the East India Company, there

occur allusions to Bundhoos, or bankers, and to lenders of money other than pawnbrokers, coupled with the names of several sorts of money — : gold, silver, copper and cowrie shells. The governor al¬ ludes to this code as of ((the remotest antiq¬ uity,® which is evidently true as to some parts of it, while other parts are as evidently mediaeval. One of its provisions, a peculiar one, occurs also in the Athenian and Byzantine codes, though which of them was borrowed from the other is difficult to decide. Says the Gentoo Code, iii, 3, ((If a man hath borrowed money from another upon agreement for a low rate of interest and afterward, though at his own option consents to an increased rate of interest, the former agreement shall be ob¬ served,® or held good, by the magistrate.. The corresponding Greek rule will be found in our article on Byzantium, Bank of.

Until the capture of Constantinople by the Latin forces in 1204, the prerogative of coin¬ ing gold, a heritage from the ordinances of Augustus, was enjoyed exclusively by the Basileus and respected by the various princes of Christendom. As a matter of fact there were no gold coins struck in Christian Europe be¬ tween Charlemagne and the fall of the ((Greek® empire; the only coins of that metal (barring a few modern counterfeits) being the bezants (and their parts) of Constantinople and the dinars, etc., of Saracenic mintage. As the

principal transactions of commerce were valued in gold* coins, there existed no encouragement to establish a bank until the gold prerogative o.f the Basileus was destroyed and local coin¬ age of gold was permissible. Hence such coinages, together with the establishment of banks of exchange and deposit, and transfer, as well as the open use of bills of exchange, warrants, checks, transferable bank receipts, etc., may all wfith confidence be dated from 1204, or such other local date as coincided with it, bearing in mind that the 2Era Hispanica used in some of the Christian kingdoms of Spain, began 38 b.c., and the 2Era Augusta, used in other states, both in Spain and elsewrhere, be¬ gan 15 b.c. The earliest gold coins of Christian Europe after the fall of Constantinople wrere struck in 10 different principalities between that date and 1257, when Venice struck its first sequin. Among the earliest banks were those of Venice, 1252 (from 1157 to 1252 it was a chamber of loans, not yet a bank) ; Delft, 1313 ; Calais, 1329; Geneva, 1346; Florence, 1350; and Barcelona, 1401. For the industrial history of the world's great banks see articles in this Encyclopedia as follows: Ancient banks: Amsterdam, Bank of; Barcelona, Bank of; Byzantium, Bank of; Fuggers, Bank of the; Genoa, Bank of; Hamburg, Bank of; Medici, Bank of the; Nuremberg, Bank of; Stock¬ holm, Bank of; Tyre,

Bank of; Venice, Bank of. Modern banks: Deutsche Bank; Diskonto-Gesellschaft ; Dresdener Bank; England, Bank of; France, Bank of; Italy, Bank of; National City Bank of New York. See also Banks and Banking.

BANK OF AMSTERDAM. See Amster¬ dam, Bank of; Banks and Banking — Origin and Development of Banking (article 1).

BANK OF BARCELONA. See Barce¬ lona, Bank of; Banks and Banking — Origin and Development of Banking (article 1).

BANK CHECKS. See Banks and Bank¬ ing — 'Commercial Paper (article 17).

BANK CURRENCY. See Currency.

BANK DEPOSITS. See Banks and Banking— - Guaranty of Bank Deposits (article 20).

BANK OF ENGLAND. See England, Bank of.

BANK OF FRANCE. See France, Bank of.

BANK HOLIDAYS, days during which banks are legally closed. In the United States they are: 1 January, or New Year's Day, a legal or bank holiday in all the States except Arkansas, Delaware, Georgia, Kentucky, Maine, Massachusetts, New Hampshire, Rhode Island, and North and South Carolina. Fourth of July, Independence Day and 25 December, Christmas Day, are bank holidays in all the States and Territories of the Union. Thanks¬ giving Day and public fast days appointed by the President of the United States are also legal, or bank, holidays. Twelfth of February, the anniversary of the birth of Abraham Lincoln, is a legal holiday in nine States. February 22, the anniversary of the birth of Washington, is a legal holiday in all the States save Arkansas, Iowa and Mississippi. The first Monday in September Labor Day, is a holiday in nearly all the States. January 9,

anniversary of the battle of New Orleans, and Fireman's Day, 4 March, are legal holidays in Louisiana. Good Friday is a legal holiday in Florida, Louisiana, Minnesota and Pennsyl¬ vania; and Shrove Tuesday in Louisiana and Alabama. Decoration Day (North) and Me¬ morial Day (South) are observed in the several States.

In England and Ireland the bank holidays are: Good Friday, Easter Monday, the Monday in Whitsun week, called Whit Monday, the first Monday in August, and 26 December, called Boxing Day. In Scotland: (1) New Year's Day; (2) the first Monday in May; (3) the first Monday in August; (4) Christmas Dav.

When one of these holidays falls on Sun¬ day it is observed on the following day, and a note or check becoming due on a holiday or a Sunday is payable on the first business day following.

BANK OF NORTH AMERICA. See

Banking in the United States.

BANK NOTE ISSUES. See Banks and Banking — Bank Note Issues (article 19).

BANK-SWALLOW, a small swallow, familiar not only in all parts of America, but in most other countries, for its habit of breed¬ ing in colonies in holes in sandbanks. It is sooty black above, and white on the under surface of the body, with a dusky band across the breast. This swallow comes from its winter home in the tropics, among the earliest birds of spring, and spreads northward even to the borders of the Arctic Ocean. Many, however, remain within the United States, where companies of them seek the banks of streams or exposed cliffs of sand, and bore in close proximity a great number of tunnels, which may be seven or eight feet deep. The bill and feet are both exceedingly weak, yet with these feeble tools each pair, working alternately and with great diligence, complete their excavation in a surprisingly short time. The same bank will be occupied year after year. The inner extremity of the tunnel is furnished with a nest of dry grass and feathers, and there are laid in June four or five pure white eggs. The tunnels are used as roosting places at night by both sexes, and when the young are hatched they will scramble to the mouth of the burrow and may be seen sitting there some days before they obtain strength and courage to launch forth upon their wings. These swallows feed entirely upon small insects caught in the air, and the sight of a crowd of them darting about the neighborhood of their homes, with a constant twittering, is a familiar sight of our country districts. The

English sparrows trouble them greatly by seizing upon their burrows and dragging out the furniture; and snakes and mice sometimes enter the holes, but against most enemies these swallows are well protected. Our common species (Clivicola riparia) is also numerous throughout Europe and Asia. Very similar species inhabit the Oriental region and Africa. These birds are well described in all standard works of ornithol¬ ogy, and some special information may be obtained in the (Monograph of the Hirun-dinidae) by Sharpe and Wyatt (1885-94) ; and in (Bird Watching, 5 by Edmund Selous (1901). See Swallow.

BANKRUPT, a term derived generally from Italian, banco, a bench, and Latin, rup-lus, broken, in allusion to the benches formerly used by the money-lenders in Italy, which were broken in case of their failure. The word in its most general sense signifies an insolvent person, but more strictly an insolvent mer¬ chant.

There is perhaps no branch of legislation more difficult, and at the same time more im¬ portant, than that which defines the relations of debtors and creditors. One of the first objects of all laws, after the protection of the person, is the enforcement of the obligation of contracts, and among all the contracts made in a community those imposing the obligation to pay money constitute the most numerous class. Some of the first questions in legislation are : By what means shall this obligation be en¬ forced and by what penalties shall the breach of it be punished? In many communities, es¬ pecially in the earlier stages of civilization, the breach of such a contract or obligation is re¬ garded as a crime, and the insolvent debtor is treated as a criminal. The ancient laws upon this subject in England so regard the insolvent trader. The early laws of the Romans and Athenians authorized the most rigorous meas¬ ures for procuring satisfaction of a debt, even permitting the sale of the debtor into slavery for this purpose. The Battas of Sumatra still, it is reported, sell not only the debtor but also his family for the benefit of the creditor. But as civilization advances the laws put a more mild construction upon the debtor's failure to fulfil his contract, and, with certain qualifica¬ tions, and under certain restrictions, attribute it to misfortune, and, on giving up ,his property to be divided among his creditors, discharge him from all further liability.

The power of making bankrupt laws in the United States was, by the Constitution, con¬ ferred on Congress, which alone had the power to make a bankrupt law applicable to, and bind¬ ing upon, all creditors in the United States, and for all descriptions of debts. This power was

first exercised by Congress in 1800, by the en¬ actment of a bankrupt law limited to five years, and which expired by its own limitation. This act was modeled upon the English statutes of bankruptcy existing at the time, and, like them, was applicable to no debtors except merchants. Both by the English statutes and the French Code, persons capable of becoming bankrupts are such as fall under the general description of merchants, which the French describe as commergants.

A statute in the reign of George III, re¬ lating to bankrupts in Scotland, describes a person capable of becoming such to be one who (<either for himself, or as an agent for others, seeks his living by buying and selling, or by the workmanship of goods or commodities® ; an English statute of the reign of George IV, embodying the previous acts and judicial de¬ cisions on this subject, enumerates particularly the descriptions of persons who are to be con¬ sidered merchants and capable of becoming bankrupts. See Bankruptcy Laws.

BANKRUPTCY, A, by Bjornstjerne Bjornson. The appearance of Bjornson's (Bankruptcy) in 1875 marks a new departure in Norwegian literature. For the first time

money oecomcs the subject of a poetical pro¬ duction, a theme which had previously seemed altogether too prosaic for real poetry, but which Bjornson handles with daring skill. He deals with the financial situation of a modern busi¬ ness man and does not disdain figuring out his assets and his liabilities. The play is, further¬ more, significant because of the fact that it introduces for the first time the modern cul¬ tured Norwegian home. There had been some portrayals of home life previous to this but only glimpses or at most a picture of home chilled by the iron determination of a Brand. In (Bankruptcy } home takes its place upon the stage in all its fullness of meaning, with its joys and with its sorrows. The theme of the play is a business man's obligation to his fellow-men whose moneys are entrusted to his care. In how far may he risk the funds at his dis¬ posal ? Has he the right to do business in such a way that his ventures if unsuccessful vill mean losses to his fellows? The spirit 01 the play is to the contrary, and

Bjornson shows admirably how miserable is the life of a man who tries to avoid fundamental moral law. He shows the baneful influence exerted on the man's family and home. The success of (Bankruptcy) was spontaneous. The pictures are simply and naturally drawn, and they made an irresistible appeal to the common man. This was no doubt partly due to the sound humor pervading the work. Consult Henrik Jaeger, Hllustreret norsk literaturhistorie) (Vol. II, pp. 589-639 and 711-768) ; Georg Brandes, (Det Moderne Gjennembruds Maend) (pp. 1-69, tr. by Mary Morison in a volume entitled (Henrik Ibsen, Bjornstjerne Bjornson: Critical Studies.* By George Brandes, 1899).

Joseph Alexis,

Professor of Germanic Languages and Litera¬ tures , University of Nebraska.

BANKRUPTCY LAWS. When a person is unable to pay his debts in full, the law of civilized countries adopts some means of satis¬ fying the creditors, as far as they can be satis¬ fied, out of the debtor's estate, and relieving the debtor himself from pressure which, by his own efforts, he would not be likely to over¬ come. The debtor having been declared a bankrupt, his property vests in his creditors for the purpose of being divided ratably among them, and consequently he starts anew, entirely relieved from the obligations thus partially sat¬ isfied. In general terms this is the process of bankruptcy as observed in modern societies. The law of bankruptcy is, in fact, a modern creation slowly evolved out of the Criminal Code in answer to the necessities of a widely spread industrial life.

The early law of Rome, while prohibiting contracts of usury, gave the legal creditors the savage remedy of dividing the carcass of their debtor or selling him and his family into slav¬ ery. The Lex Poetelia (about 326 b.c.) enabled a debtor who could swear to being worth as much as he owed to save his freedom by re¬ signing his property; and many years after¬ ward the legislation of Julius Caesar established the cessio bonorum as an available remedy for all honest insolvents. The bankrupt law was slowly developed in England. The first Eng¬ lish statute on bankruptcy (34 and 35 Henry VIII, c. 4) was directed against fraudulent

debtors, and gave power to the lord chancellor and other high officers to seize their estates and divide them among their creditors. In Eng¬ land, before 1841, only a tradesman could be a bankrupt. T he

distinction was then abolished. It was abolished in the United States in 1869. In the United States, Congress alone has power to pass a bankrupt law which shall have author¬ ity throughout the country. The several States may enact such statutes when there is no law of Congress in operation. The first general bankrupt act in the United States was passed in 1800 and was repealed in 1803. In 1841 an¬ other law was put in operation, with a special view of meeting the urgent needs of debtors who had been ruined by the commercial revul¬ sion of 1837-38, and who could receive no ef¬ fectual relief from local laws. This act was repealed in 13 months, but in the meantime a large number of cases had been disposed of, amounting to 3,250 in Massachusetts alone. An¬ other bankrupt law was passed which took ef¬ fect 1 June 1867. It was framed with great care by a committee of the House of Represen¬ tatives, of which Mr. Jenckes was the chairman and chief working member. Its authors hoped that it would form a permanent addition to the jurisprudence of the country, but it was re¬ pealed within a few years.

An act <(to establish a uniform system of bankruptcy throughout the United States,® was passed by both Houses of the 55th Congress, and by the approval of President McKinley be¬ came a law on 1 July 1898. The question had been brought before Congress for several years, the issue not being between the political par¬ ties, but on the method of legislation, one side favoring the creditor and the other the debtor class. The Nelson bankruptcy bill, which at the first, or special, session of the 55th Congress passed the Senate, failed to receive the consent of the House. The new law was a compromise between the Nelson bill, calculated chiefly to benefit debtors, and the Torrey bill, designed to guard the interests of both creditors and debtors. The adoption of the bill which be¬ came a law was mainly through the long-con¬ tinued efforts of Senator Hoar (Rep. Mass.), aided especially by Senator Nelson (Rep., Minn.), and Representative George W. Ray (Rep., N. Y.). A conference between the two Houses was held, which reached an agreement on 15 June, the report being adopted by the House, 28 June, by a vote of 133 to 53; present and not voting, 24. All the votes against the bill came from the South and the far West. Slight changes to correct defects in this act have since been made through three supplemen¬ tary acts approved 5 Feb. 1903, 15 June 1906 and 25 June 1910, and further supplemented by rulings of the Supreme Court, as to matters of practice, and by official forms of the same court.

The provisions under which a man can be thrown into bankruptcy against his will are as follows: (1) where a man has disposed of his property with intent to defraud; (2) where he has disposed of his

property to one or more creditors to give a preference to them; (3) where he has given a preference through legal proceedings; (4) where a man has made a voluntary assignment for the benefit of his creditors generally; (5) where a man admits in writing that he is a bankrupt. The last two

provisions are practically voluntary proceed¬ ings. Under the common law a man is con¬ sidered insolvent when he cannot pay his debts when they are due ; under the new law he is deemed insolvent only when his property, fairly valued, is insufficient to pay his debts. Only two offenses are cited under the new law ; one when property is hidden away after proceed¬ ings in bankruptcy have been begun, and the other when perjury is discovered. Discharges are to be denied in only two cases ; one, in which either of the offenses detailed has been committed, and the other, when it is shown that fraudulent books have been kept. The term of imprisonment for either of these of¬ fenses is not to exceed two years.

The law provides a complete system throughout the United States, and for its ad¬ ministration by the United States courts in place of the different systems formerly in ex¬ istence in the various States administered by State courts. In bankruptcy proceedings a bankrupt debtor may turn over all his property to the court, to be administered for the benefit of his creditors, and then get a complete dis¬ charge from his debts. A bankrupt may of his own motion offer to surrender his property to the administration of the United States court and ask for his discharge in voluntary bank¬ ruptcy, or creditors may apply to the court to compel a bankrupt to turn over his property to be administered under the act for the benefit of the creditors in involuntary bankruptcy. The bankrupt who has turned over all his prop¬ erty and conformed to the provisions of the acts is entitled to a judgment of court discharg¬ ing him from any future liability to his cred¬ itors. The State laws relating to insolvency are not affected by this law, but remain in full force and effect.

Extended powers are given by the law for the taking possession and

the administration of the assets, among others, to allow and dis¬ allow all claims against bankrupt estates ; ap¬ point receivers and take the necessary measures for the preservation and charge of the property of a bankrupt; to arraign, try and punish bank¬ rupts, officers and other persons, and the agents, officers and members of the board of directors or trustees, or other similar bodies or corpo¬ rations for violation of the act; to authorize the business of the bankrupt to be conducted for limited periods ; to cause the assets to be collected and reduced to money and distributed, and substantially determine all controversies in relation thereto; to enforce obedience to lawful orders by fine or imprisonment ; and to extra¬ dite bankrupts from one district to another. As all questions, both of law and fact, in rela¬ tion to the property of the rights of the various parties, must be decided in the bankruptcy pro¬ ceeding, it is provided that referees be ap¬ pointed, who are charged with the duty of hearing the allegations and testimony of all parties, and deciding all such questions as may arise. Each case, as it comes up, is assigned to some referee, whose duty it is to adjudicate and pass upon all such questions arising therein in the first instance, the right being reserved to any parties to appeal from the decision of the referee to the United States District Court. The duties of the referee are substantially of a judi¬ cial character, and he occupies much the posi¬ tion of a judge of primary resort, subject to an

appeal of the court, and is required to take the same oath of office as that prescribed for judges of the United States courts.

Provision is made in the act for allowing bankrupts to compromise or settle with their creditors by proceedings known as composi¬ tion proceedings, whereby, if a bankrupt and a majority of his creditors agree upon some basis of settlement, the same, if approved by the court, shall become binding upon all cred¬ itors. The decision of the question as to the approval of compositions and granting dis¬ charges to a bankrupt from his debts is speci¬ fically reserved by the act to the judges of the United States courts ; but the court, by virtue of its general powers, may refer such matters to the referee to take testimony and report to the court his opinion thereon. The aim of the act has been to make the expense of the pro¬ ceedings depend largely upon the amount of the property involved, and the compensation of the referee is fixed substantially at 1 per cent on the amount distributed to the creditors in ordinary cases, where the assets are distributed by the court, and one-half of 1 per cent in composition cases, and the trustees who have charge of the actual management of

the bank¬ rupts' property receive as compensation such commissions on accounts paid out by them as dividends as the court may allow, not to ex¬ ceed, however, 3 per cent on the first $5,000, 2 per cent on the second $5,000, and 1 per cent on all sums in excess of $10,000.

Bibliography. — Brandenburg, (Law of Bankruptcy) (3d ed., Chicago 1903) ; Collier, (Law and Practice in Bankruptcy* (9th ed., Albany 1912) ; Brandenberg, E. C., (Law of Bankruptcy) (3d ed., 1913).

BANKS, a nautical term applied to shelv¬ ing elevations in the sea or the bed of a river, rising to or near the surface, composed of sand, mud or gravel. When tolerably smooth at the top they constitute shallows, shoals and flats; but when rocky become reefs, ridges, keys, *etc.* A good chart always defines them, indicating whether they are sands or rocky.

BANKS, Sir Joseph, English naturalist: b. London, 4 Jan. 1743; d. Islesworth, 19 June 1820. At Oxford he began to study botany and ether branches of natural history, to which his attention had already been turned from about the age of 14. He formed a volunteer class in the university and brought Mr. Lyons from Cambridge to teach it. In May 1766 he was chosen a member of the Royal Society, and in the following summer he went to Newfound¬ land and proceeded to Hudson Bay to collect plants. In 1768 he, with Dr. Solander, a pupil of Linnaeus and assistant librarian at the British Museum, accompanied Cook on his voyage of discovery, Banks being appointed naturalist to the expedition. In an expedition into the interior of the desolate Tierra del Fuego, for the purpose of examining the country, the two naturalists narrowly escaped perishing with cold. Banks procured the in¬ troduction of the bread-fruit tree into the West Indies, and he wrote the botanical observa¬ tions in the account of Cook's voyages. In 1772 he visited Iceland with Dr. Solander, in order to make himself acquainted with its natural productions. During this voyage the Hebrides were examined, and the columnar

stratification of the rocks surrounding the caves of Staffa was made

known to naturalists for the first time. Banks became president of the Royal Society in 1777. In 1781 he was made a baronet. The French chose him a member of the National Institute in 1802, be¬ cause to his intercession they owed the recovery of the papers of La Peyrouse relating to his voyage, which had fallen into the hands of the British. His library and his collections in natural history are celebrated. Besides other contributions he wrote (A Short Account of the Causes of the Blight, the Mildew, and the Rust in Coro' (1805). In accordance with a contingent beouest his collections were added to the British Museum. The genus Banksia, of the natural order Proteacece, was named in honor of him by the younger Linnaeus.

BANKS, Louis Albert, American clergy¬ man and author: b. Corvallis, Ore., 12 Nov. 1855. He was educated at Philomath College and at Boston University. He entered the Methodist Episcopal ministry in 1879 ; was pastor of the Independence Avenue Church, Kansas City, in 1909-11 and since then has been engaged as evangelist in union evangelistic campaigns. He was the Prohibition candidate for governor of Massachusetts in 1893. Among his numerous writings are (The People's Christ' (1891); (The White Slaves) (1892);

(Anecdotes and Morals ' (1894) ; (Honeycomb of Life) (1895); 'Christ and His Friends' (1896) ; 'Live Boys in Oregon' (1897); (My Young Man' (1899); 'Chats With Young Christians' (1900) ; 'The Great Saints of the Bible' (1901) ; 'Youth of Famous Americans' (1902); 'Soul-Winning Stories' (1903) ; 'The Religious Life of Famous Americans' (1904); 'Spurgeon's Illustrative Anecdotes' (1906) ; 'Sermons Which Have Won Souls' '(1908); 'The Problems of Youth' (1909); 'The World's Childhood' (1910) ; 'The Great Themes of the Bible' (1911); 'A Summer in Peter's Garden' (1913); etc., *etc.*

BANKS, Nathaniel Prentiss, American soldier and statesman : b. Waltham, Mass., 30 Jan. 1816; d. there 1 Sept. 1894. Entirely self-taught, he worked himself up from the position of bobbin-boy in a cotton factory to the editor¬ ship of a weekly newspaper. He read law, was admitted to the bar, and began to practise, but soon became active in politics. Elected to the Massachusetts legislature in 1849, he became speaker in 1851—52. In 1853 he was president of the Massachusetts Constitutional Convention, and the same year was elected to Congress as a Coalition Democrat. The session which be¬ gan 3 Dec. 1855, was memorable for its bitter speakership contest, the candidates being Banks and William Aiken, a large slaveholder of South Carolina. The contest lasted two months, the President's message being withheld, and all legislative business blocked. The ser¬ geant-at-arms borrowed $20,000 from a Phila¬ delphia bank in order

to make advances to needy members of both parties. On the 133d ballot 2 Feb. 1856, Mr. Banks was elected. None of his decisions while speaker were ever reversed by the House. He was governor .of Massachusetts, 1857-59. In 1861 President Lin¬ coln appointed him major-general of volunteers. He conducted active operations in the Shenan¬ doah Valley and fought with credit at Win¬

chester and Cedar Mountain. In cooperation with Admirals Farragut and Porter he in¬ vested Port Hudson and unsuccessfully at¬ tempted to carry it by assault. In 1864, much against his judgment, he was placed in com¬ mand of the Red River Expedition, which re¬ sulted most disastrously for the Federal forces. Banks was widely censured and soon relieved of his command. General Grant, years later, in his 'Memoirs' furnished a full vindication of Banks by giving the name of the superior officer responsible for the expedition. From 1866 to 1876 General Banks represented his old district in Congress, and was prominent as chairman of the Committee on Foreign Relations. Fie was United States marshal for Massachusetts, 1879-88. In 1891 Congress bestowed on him an annual pension of $1,200, a severe mental disorder having come upon him.

BANKS, Thomas, English sculptor: b. Lambeth, 29 Dec.. 1735; d. 2 Feb. 1805. He studied sculpture in the Royal Academy, and was sent as one of its students, to Italy. Here he executed several excellent pieces, particularly a bas-relief representing Caractacus and his family before Claudius, and a Cupid catching a butterfly. Among other works executed by him was a colossal statue showing Achilles enraged for the loss of Briseis, now in the entrance hall af the Royal Academy. He was also the sculptor of the admired monument of Sir Eyre Coote in Westminster Abbey, and of those of Dr. Watts and Wffiollett. He was elected a member of the Royal Academy in 1785.

BANKS, Sir William Mitchell, Scottish surgeon and anatomist : b. Edinburgh 1842 ; d. 1904. He was graduated at Edinburgh Uni¬ versity in 1864, was appointed demonstrator of anatomy in the University of Glasgow, and later was consulting and operating surgeon at Liver¬ pool. He originated the modern method of operating for cancer of the breast. He reorgan¬ ized the Liverpool Medical School and founded University College, where he was for a time professor of anatomy. He was chosen first president of the Liverpool Biological Society in 1886. In 1897 he delivered the address in sur¬ gery before the British Medical Association at Montreal. He published numerous papers and addresses.

BANKS LAND, an island in the Arctic Ocean, discovered by Parry in 1819, explored by McClure in 1850, and named by him Baring Island. It is separated by Banks Strait from Melville Island, lying to the northwest, and by Prince of Whales Strait from Prince Albert Land, lying eastward.

BANKS AND BANKING. This depart¬ ment has been developed to give a concise digest of banking, finance, money, history of banking, *etc.* It is subdivided as follows :

1. Origin and Development

of Banking.

2. The Functions of Banks.

3. World Systems — Types.

4. International Banking.

5. Foreign Exchange.

6. Investment Banking.

7. The Clearing House. .

8. Banking in the United

States.

9. The National Banking

System.

10. State Banking System.

11. Private Banks.

12. Federal Reserve System.

13. Savings Banks.

14. Postal Savings Banks.

15. Bank Organization and

Management.

16. Bank Supervision.

17. Commercial Paper.

18. Bank and Trust Com¬

pany Advertising.

19. Bank Note Issues.

20. Guaranty of Bank De¬

posits.

21. Trust Companies.

22. Bankers' Associations in

the United States,

BANKS AND BANKING — ORIGIN AND DEVELOPMENT, ETC. (1)

1. ORIGIN AND DEVELOPMENT OF BANKING. Bank (from the mediaeval bancus and banco, the ancient name having been fiscum , a purse for money. (Cicero, Verr. 2). Bancus or banco is commonly traced to the bench whereon money-changers sat, when bank¬ ing merely consisted in the purchase and sale of uncurrent coins, but as shown in Madox's (History of the Exchequer, 5 this is erroneous. Bancus or banco relates only to the Justices' Bench to which, in the 12th century in England, common causes, "Common Pleas,® began to be removed from the King's Bench to local courts. The point is important, because it disposes of the fable that banks owe their origin to the money changers of the Dark Ages. Primarily a bank or fisc

means a place of deposit for money, open to the public. Banks can be traced back to Rome, Greece, Egypt, Babylon, indeed to every country which issued money susceptible of being counted, and whose government was sufficiently powerful to protect their funds from pillage and sufficiently just to permit the exer¬ cise by the bankers of their useful and lawful functions. The word bundhoo, a bank, is even used in the Code of Menu (p. 10), but the date is uncertain.

The earliest settled and permanent govern¬ ments were pontifical, the sovereign being both king and high priest. Hence the earliest banks in the Occident were the national temples, such as Delphi and Delos in Greece, whose activities in this respect date back to the earliest use of coined money. This money they received on deposit and loaned out at rates of interest vary¬ ing from 10 to 30 per cent per annum.

Following the temple banks, perhaps coeval with them, were those private bankers whom we first hear of in Babylon, tempo Nebu¬ chadnezzar, under the title of <(Egibi and Sons,® about 600 b.c. (Cuneiform inscription). The state bank at Ilion, mentioned by Boeckh, as paying 10 per cent to depositors for money for the public service, must be dated about the 3d or 2d century b.c. About the same period Theocritus, whose <(Idylls® date 260 b.c., men¬ tions a banker at Alexandria, by name Caicus, who paid interest on deposits withdrawable at pleasure of the depositor, and payable not only in business hours, but at anv time of day or night. (Epit, XXI, iii). Livy (VII. 21), mentions bankers (argentarii) in Rome, 354 b.c. Tacitus and Suetonius both allude to banks in Rome during the reigns of Augustus and Tiberius. Adam (Rom. Ant.) cites numerous instances of private banks and bank¬ ing terms and incidents during the early em¬ pire, such as the deposit and withdrawal of money, payment of interest, checks or orders for payment, acceptances, bankers' books of ac¬ count kept by double entry, transfers of ac¬ counts, loans, *etc.* Of late years an iron safe deposit has been dug up of the time of Hadrian, attached to which is a body of regulations, very similar to those now in vogue. It would ap¬ pear that the emperors had become the sole bankers of the empire. Following the method which he adopted with respect to the pontifical, censorial, tribunitial, consular and other powers of the state, Augustus absorbed the most im¬ portant financial powers into his own person, becoming himself essentially a corporation sole; for of this character was the office inherited

and administered by his official successors. The public treasury was called ALrarium, the im¬ perial treasury (practically, the national

bank), the Fiscum. It received and paid out deposits of money, it loaned money at interest, it ac¬ cepted heritages (some persons bequeathed their entire fortunes to it), and it devoted large, funds to public purposes.

The functions performed at Rome by the Imperial fisc were permitted to be exercised in the provinces by the Proconsular fiscs, until the weakening of the Central power and en¬ croachments of the Proconsular agents broke down the entire structure of Roman authority. Lampridinus makes some allusion to bankers in the reign of Alexander Severus ; afterward, all mention of banks or bankers ceases for a long period.

In the reign of Alexander Severus the fiscal laws and system of the empire underwent a radical change, yet the evidences of it, as re¬ vealed by inscriptions recovered in recent times, are scattered over several centuries ; chiefly the 3d, 4th and 5th. The public treasury and Im¬ perial fisc came to be identical ; a change traced to Aurelian. The Lord Treasurer, Sacrarum Largitionum, managed all public funds; while the imperial demesnes and privy purse were committed to the Comes rerum privatarum, both of them being endowed with sacerdotal titles. (Bury, I, 44). The interdiction against the taking of interest for money which these changes involved began a new period in the history of banks. The capital of the empire had been transferred to Byzantium (Constanti¬ nople), so that Europe, formerly within easy reach, was now far removed from the court. What the government denied, private interest afforded; the Jews braved its displeasure and its penalties by providing a means to relieve the necessities of the poor: a species of poverty banks, or lending houses, first mentioned by Prudentius, as having been established in Italy about a.d. 400. For a period of two or three centuries during the Dark Ages these establish¬ ments appear to have been the only means of procuring loans of money.

About the 8th century the poverty banks were taken over by fraternities of monks and confirmed by the Popes as monies pietatis ; the right to exact collateral security and to charge interest being affirmed by several pontiffs, es¬ pecially Pius II and Sixtus IV. After the fall of Constantinople in 1204 the monks were superseded in this lucrative business by the Lombard goldsmiths and money changers, whose various names of Bardis, Corsini, etc., neither shielded them from popular aversion, nor prevented them from driving a lucrative trade. So influential did they become, that in 1311 one of their number, Raoul the goldsmith, was ennobled by his patron, Louis X ; the first instance of the sort known to history. In 1313 there was a

<(Lombard® bank at Delft, and in 1320 another one at (probably) Calais, which latter loaned 5,000 marks (about 16.000 gold dollars) to Edward III of England. The banks of Geneva, 1345, and of Florence, circ. 1350, were probably an evolution from the Lombard goldsmiths, just as the latter were evolved from the montes pietatis and these again from the poverty banks of the Jews.

For the first time in 400 years, a circum-

stance entirely overlooked in works of refer¬ ence, Christian gold coins now began to be struck in Europe outside of Constantinople, where the privilege had ever been jealously guarded by the Basileus. This had much to do with the progress of banks, for it provided a more portable and reliable money than the heterogeneous and often debased and degraded silver coins of the various principalities and kingdoms which had been erected upon the ruins of the empire. The first Christian gold coins of western Europe were the augustals of Frederick II, 1225, followed by the ducats of Portugal, same year, the pavilions and agnels of Louis IX of France, the ducats of Florence and Genoa, 1253, and the sequins or ducats of Venice, 1276. Consult Del Mar, (Science of Money,) p. 74.

Confining the term bank to its more modern sense, what may be regarded as one of the earliest, perhaps the earliest, Christian institu¬ tion of this character, was the Bank of Barce¬ lona, 1401. As the operations of this bank had a bearing upon the affairs of America, they claim especial interest. <fIn Spain, by the ordinance of Valencia, made by King John, who conquered the kingdom of Aragon, it is ex¬ pressly provided that reals shall only be coined in Valencia and that the minters shall be supervised by two well-known citizens ; so that no fraud shall be committed as to material or weightˆ (Grimaudet, (Law of Payment,) New York edition, p. 14). The coin referred to is the familiar Spanish real de plata, of eight to the dollar. This coin was lawful money in the United States down to 1853 and till recently was known to New York tradesmen as a ((shilling® and throughout the Southern States and California, as the c<bit.>:> The coinage super¬

vision ordered by King John (father of Ferdi¬ nand, in whose reign Columbus discovered America), was afterward extended to Barce¬ lona, where it furnished the basis for the ex¬ tensive dealings of its bank in the exchange of full-weighted reals and reals de a ocho (dollar pieces of eight reals) for the heterogeneous coins which llowed from all parts of Europe into that great commercial emporium ; among them the coinages of Moslem Spain (Granada).

From Barcelona King John's test of the coins, called in England (,The Trial of the Pyx,}) was carried from Spain into the Spanish-American mints of Mexico and t'eru and adopted by the United States government from the period of its inception. This supervision and testing of the coins is still conducted in the American mints under a commission of civilians appointed by the Secretary of the Treasury. It constitutes the groundwork and basis of honest money and banking.

The Bank of Barcelona also received on de¬ posit and disbursed the revenues, or part of them, of the four great ecclesiastico-military orders and kept the accounts of about a dozen other orders of knighthood, like those of Calatrava, Saint James, Golden Fleece, Saint George, etc., some of which were ecclesiastical and some merely chivalrous. The royal treasure, formerly deposited in the castle of Segovia, is believed to have been removed to the Bank of Barcelona, because the Contador-General is known to have drawn some of his warrants for public expenses upon that institu¬

tion. In 1480 Isabella, holding court at Toledo, signed a decree which greatly affected the bank. To support the government of Castile Henry IV had issued certain cedulas or certificates of annuities assigned on the public rents, and these by purchase had become the property of the nobles, who in turn had borrowed money on them from the bank. Isabella's decree, de¬ nouncing and annulling these certificates — vir¬ tually an act of repudiation — was entrusted for execution to her confessor, Ferdinand de Talavera, who performed his task with such fidelity that it ˆsaved® 30,000,000 maravedis annually to the Crown (Prescott). If the bank survived the depletion of its resources in 1480, it could scarcely have weathered the civil war of 1517-22, during which period of turbulence the bank, despairing of a return to pea'ce and security, appears to have quietly discharged its obligations, wound up its affairs and honorably dissolved.

Between the Bank of Barcelona (barring the ((Bank,:> of Saint George at Genoa, 1407), that is to say between 1401 and the formation of the

Bank of Amsterdam, 1607, works of refer¬ ence will be searched in vain for any notice of a public feank in Europe. The significant absence of a bank in any kingdom or principality of the civilized world for an interval of over 200 years, is not even commented upon. The so-called Bank of Venice, which is assigned to the year 1157, was no«t a public bank until 1619, when it was reorganized as the Banco di Rialto, which converted it into a public bank of deposit-and-withdrawal. Meanwhile the Bank of Venice was merely a Chamber of Loans (Camera degli Imprestigi) into which patriotic capital was invited to assist the government of Venice. Even had it been a public bank it was not in a position to exercise the proper func¬ tions of a European bank, namely, the agglom¬ eration of private capital, to be distributed in loans helpful to European commerce and enter¬ prise. How could a Venetian bank promote or assist the trade of Spain, France, England, the Netherlands or Germany? It could not, and in fact it did not do anything of the sort. Be¬ tween the dissolution of the Bank of Barce¬ lona, rather between the date when its com¬ mercial activities ceased, about 1522, and the Bank of Amsterdam, 1607, and Hamburg, 1619, an entire century elapsed. What institution of security and commercial credit or convenience filled the void?

This interval witnessed the greatest of all commercial events, the discovery, conquest and colonization of America, the abstraction and removal of its enormous treasures in gold and silver, their coinage into money, the opening to plunder and afterward to commerce of India, China and Japan, the consolidation of the German empire, the rise of prices and the progress of the Reformation. Where are the institutions into whose hands these conquered treasures might be placed, to whom could the impatient European commerce of this period apply for assistance? There seems but one reply. .... .

Charles I, King of Spain and sovereign of America, elected Emperor of Germany as Charles V, in 1519, having been assisted to this elevation by the banking house of the Fuggers of Augsburg, turned over to them the entire

banking business of his extensive empire. He assigned (farmed) to them the monopoly of quicksilver (Almaden mines of Spain), the Guadalcanal silver mines and virtual control of many of the mines in America. He transferred to them the vast accounts and balances of the military and episcopal orders. He even granted to them the royal and imperial prerogative of coinage (1534). They conducted the mints of Valencia, Augsburg, Weissenhorn (Bavaria), and other places. They even were privileged to stamp their names and titles upon the golden florins, for example, Ant. Fngger D. in Weis¬ senhorn, 1530-60. For upwards of a century, such of the American treasure as escaped cap¬ ture by the English, Dutch and French cruisers passed through their hands, leaving them a fortune estimated at 60,000,000 florins or ducats, say $150,000,000. They became bishops, barons, dukes, even princes, and their house survives to the present day. Such was the bank of the 16th century.

Beyond the jurisdiction of England, France, the Netherlands and some of the Italian repub¬ lics, the sole assistance which commerce en¬ joyed from the vast stores of the precious metals which flowed into Europe durfttg this period came from or through the house of Fuggers. It was not until the reign of Charles II, 1665, some say Charles III, that Spain was enabled to establish a public bank for the con¬ venience of the public : that of San Carlos. Meanwhile the Inquisition, by burning or ban¬ ishing the Moors and Jews, had so thoroughly destroyed her domestic industry that it im¬ parted to this little known institution but a feeble existence. To American readers it is only known through the pages of Blanqui.

Mention has already been made of the banks of Amsterdam and Hamburg. Between them came the Bank of Middleberg, 1616, and after them the banks of Rotterdam, 1635, and the Swedish Riksbank of 1656. All of these insti¬ tutions were of Protestant origin, opposed to the Catholic house of Fugger, which after the Peace of Westphalia in 1648 lost much of its imperial support and influence.

These northern institutions became the effective promoters of that enormous expansion of commerce, industry and the arts, which be¬ stowed upon the 17th century the name of the Halcyon Age. They promoted and supported the English and Dutch East and West India companies, the African Company and the numerous other cosmopolitan enterprises of a marvelous period; and they imparted to the commerce of the British, French, Dutch and Scandinavian ports an impetus which they have ever since retained. Until 1656, when the Riksbank of Sweden issued circulating notes, their functions consisted almost solely of re¬ ceiving funds on deposit for safety, and loaning

them out upon commercial or governmental bills of exchange, promissory notes or bonds. Some of them were endowed with special privi¬ leges or monopolies, as the banks of Amster¬ dam, England and France (Comptoir des Escomptes). All of them were of great service to commerce, indeed the Bank of Amsterdam went so far, in its secret loans to the Dutch East India Company, that it became insolvent about 1760 and was liquidated in 1819.

Meanwhile a new empire had arisen beyond

the Atlantic, whose growing commerce de¬ manded the convenience and assistance of pub¬ lic commercial banks. ((In 1652 the province of Massachusetts found it necessary (for it was no mere act of wantonness or of profit-seeking by the colony), to defy the Royal authority by erecting a Mint and striking Pine-Tree shillings. The origin of this silver is not known. In 1662 some of the silver smuggled out of Mexico or captured from the Spanish galleons, found its way to the Chesapeake and was coined in Maryland.® These events presaged a bank. In 1680 a bank was established for the convenience of planters in South Carolina, which William Paterson, afterward promoter of the Bank of England, now fresh from the Darien colony on the Isthmus of Panama, is said to have investi¬ gated. Five or six years later, 1686, John Blackwell and his coadjutors united to estab¬ lish a bank of issue in Boston, also in defiance of British authority; and on 3 Feb. 1690, the colony of Massachusetts issued its own bills of credit. It has been suggested that these bills were to pay off the soldiers in the Phips cam¬ paign to Quebec, whereas in fact the notes were issued before the Phips expedition was resolved upon. One of these notes is still in existence. (A copy will be found in Del Mar's (History of Money in America, > p. 79). On 2 July 1692, the colonial government of Massachusetts made these notes legal tenders for the payment of all debts and obligations, except those which had been contracted in special moneys. The amount of the notes outstanding was between £30,000 and £40,000.

The pressing necessity for circulating money and the creation of banks, two subjects unavoid¬ ably connected for sustaining and developing the exchanges and commerce of the British-American colonies, manifested itself almost at the outset of their settlement; and had no little to do with their subsequent revolt from royal authority. The position of the Crown, as laid down in the celebrated case of the Mixt Moneys, 1604, was that the creation and issuance of money was a royal prerogative, which could not lawfully be exercised by any

other power than the King; a prerogative not delegated to the colonies. Hence, whatever coins, or sub¬ stitutes for coins, were needed for their ex¬ changes, |iad to come from England. Such, too, had been the position of the Spanish Crown ; yet the necessities of Hispaniola, Puerto Rico and other Spanish possessions in America, had compelled their inhabitants, so early as 1586, to employ leather moneys in their dealings. Con¬ sult Lewes, Robert, (Map of Commerce, > Lon¬ don 1711, p. 16.

Strengthened by this example, the attitude of the British colonies was laid down in 1665 no less positively than the Mixt Moneys de¬ cision. <(They say,® writes a commissioner of Massachusetts, <(that so long as they pay (to the Crown) a fifth of the gold and silver (found or captured), according to the terms of the Charter, they are not obliged to the King, except by civility.® (Sir J. R. Seeley, Expan¬ sion of England,) Norman Angell, citante, p. 376). Such became their justification for the Pine Tree coinage, for John Blackwell's bank and for colonial bills of credit.

The subsequent institution of American

colonial banks and issues of money are treated under appropriate heads.

Bibliography. — Adam, Alexander, (Roman Antiquities5 (London 1814) ; Anderson, Adam, (History of Commerce5 (London 1787) ; Aris¬ totle, 'Economics5 (London 1870) ; Bastiat, Frederick, 'Harmonies of Political Economy5 (London 1860) ; Bayle, Peter, 'Historical Dictionary5 (London 1741) ; Blanqui, J. A., 'History of Political Economy5 (New York 1880) ; Boeckh, Augustus, 'Public Economy of the Athenians5 (London 1857) ; Boisard, J., 'Traite des Monoyes5 (Paris 1711) ; Budelio, V. R., 'De Monetis et re Numaria5 (Col. Agripp., 1591) ; Bury, J. B., 'Later Roman Em¬ pire5 (London 1889) ; Calcott, M., 'History of Spain5 (London 1840); Carr, T. S., 'Roman Antiquities5 (London 1836) ; Cicero, 'De Officiis5 (Londini 1761) ; D'Avenant, Sir Charles, 'Trade5 (London 1690) ; Davies, Sir

John, ‘Case of the Mixt Moneys in Ireland5 (London 1674) ; Del Mar, Alexander, ‘Works5 (New York 1904) ; Drake, Edward Cavendish, ‘Voyages and Travels5 (London 1768) ; Grimaudet, Frangois, ‘Law of Payment5 (New York 1900) ; Hazlitt, W. C., ‘Coins of Europe5 (London 1893) ; Humboldt, Baron Alexander von, ‘Fluctuations of Gold5 (New York 1900) ; Lover (pseudonym), ‘Money the Sinews of Trade5 (Boston 1731) ; Madox, Thomas, ‘History of the Exchequer5 (London 1769) ; Menu (Menoo), ‘Hindu Code5 (ed. N. B. Halhed, London 1776) ; Moulton, H. G., ‘Prin¬ ciples of Money and Banking5 (New York 1916) ; Mun, Thomas, ‘England’s Treasure5 (London 1664) ; Necker, James (Baron), ‘Finances of France5 (London’ 1785) ; Postleth-wayt, Malachi, ‘Encyclopedia of Commerce5 (London 1750) ; Prescott, William H., ‘Ferdi¬ nand and Isabella5 and ‘Conquest of Mexico5 (London 1854) ; Raynal, W. T. (Abbe), ‘His¬ tory of the East and West Indies5 (London 1783) ; Reich, Emil, ‘Llistory of Civilization5 (Cincinnati 1867) ; Lewes, Robert, ‘Map of Commerce5 (London 1711) ; Schoenhof, J., ‘Money and Prices5 (New York 1896) ; Sue¬ tonius, Propertius, Prudentius and Lampridinus (ed. Nisard, Paris 1845) ; Theocritus (ed. in Valpy, London 1821); Thornton, Henry, ‘In¬ quiry into Credit5 (London and Philadelphia 1807) ; Turgot, A. R., ‘Wealth5 (London 1775) ; Yarranton, Andrew, ‘England’s Improvement by Sea and Land5 (London 1677) ; Zimmer¬ man, E. A. W., ‘Present State of Europe5 (London 1787).

Alexander Del Mar, Author ‘ History of Monetary Systems?

2. THE FUNCTIONS OF BANKS. The

functions of banks may conveniently be divided into those relating to loans and investments, and those relating to money and the substitutes for coined money provided by banks. Savings banks, the simplest class of banking institu¬ tions, are entirely concerned with the first of these functions. The inducement of the interest return brings to them deposits, most of which remain undisturbed for long periods. Safety of principal and the income yield are there¬ fore the considerations which determine the character of the investments of savings banks. State and municipal bonds, the bonds of estab¬ lished public service corporations with a good dividend record and real estate mortgage loans

meet these requirements and make up the bulk of the investments of this class of banks. Through the facilities wdiich they supply, thrift is. encouraged and much income wTich other¬ wise might be wasted is

made available to in¬ crease the total capital of the community.

Loans and Investments. — Income yield and safety are quite as important for other banks, but they must be sought in a narrower investment field. With them the quality of liquidness is also essential, since most of the funds which they employ are payable on de¬ mand, and large and unexpected payments must frequently be made. The deposits of these banks, commonly known as commercial or credit banks, consist mainly of cash resources wdiich are being currently used for business purposes, or for personal expenditure. They are therefore subject to continued change, being constantly drawn upon by their owners. To meet this situation the funds of commercial banks must, in large measure, be employed in those investments which can quickly be con¬ verted into cash. In other words, they must be liquid.

Securities for which there is a broad mar¬ ket, such as most of those which are listed on stock exchanges, meet this requirement of liquidness. A far more important avenue for the employment of the funds of commercial banks, however, arises from the demand for short periods of time which comes to the banks from everyone engaged in active business. Working capital requirements in many lines of business vary with the seasons, and in every line of business with the volume of dealings. In satisfying these requirements the banks secure investments ideally suited to their own needs. At the same time a valuable service is rendered to the community. Capital is econ¬ omized. It is not necessary for each business to supply itself permanently with sufficient capital to take care of its maximum require¬ ments. The supply of capital is also made more elastic, and finally the trained foresight of the banker is exercised in selecting from the mass of would-be borrowers those who have mani¬ fested capacity to employ capital wisely and effectively.

Commercial banks, including the banking departments of trust companies, unlike savings banks, do not limit their loans and other invest¬ ments to the funds received from depositors and shareholders. They lend their credit and thus create a large part of the funds utilized by borrowers. They are able to do this be¬ cause they provide more or less generally acceptable substitutes for coined money. The bank note, the promise of a bank to pay money on demand, is obviously a credit instrument wdiich is a substitute for money. But partly because of legislation limiting the power to issue notes, and even more because the check has been found more convenient for most purposes, the bank note has become a subordinate and rather special means of extending credit.

Credit. — Banks, of course, do not extend credit directly by issuing checks, since the check is an order on a bank to pay money, not its promise to pay money. Such orders are based upon obligations to pay money recorded on the books of the banks, and known as de¬ posits. Clearly, a bank cannot lend its already existing obligations to pay money on demand.

It may indeed happen that a bank receives, let us say, $1,000 in money from a depositor, and is on that account in position to lend more than might otherwise be advisable; but even here it is not the deposit which it lends but either the $1,000 or (and this is far more likely) a new right to draw $1,000, both transactions — the receipt of the thousand dollars and the loan of the thousand dollars — creating absolutely simi¬ lar deposit obligations.

It is the general use of the check that makes it possible for banks to create deposits through their lending operations. If borrowers made all payments with money, it would be necessary for them to withdraw the proceeds of their loans from the banks in the form of money. The business of commercial banks, like that of savings banks, would then be limited to the funds received from depositors and shareholders, and possibly some slight amount in addition thereto, since borrowers would presumably not immediately draw out the entire proceeds of their loans.

It may, however, be objected that even though the borrower does use checks, the bank will be obliged to make payment almost as speedily as if money were used. Checks do not circulate indefinitely ; they are quickly pre¬ sented for payment over the counter, or by other banks in which they have been deposited. Assuming that a bank were abruptly to double its deposit obligations by granting many new loans, it would unquestionably be confronted almost at once with heavy demands for pay¬ ment of the largely increased number of checks that would certainly be drawn upon it. If, however, and this is the usual case, all the banks of a locality increase their loans at the same time with a consequent expansion of de¬ posits, each bank will have a

greater number of checks drawn upon it, but it will also receive from its depositors a greater number of checks drawn on the other banks. There would be a greater number of checks drawn, but not a correspondingly greater amount of cash needed in making settlements between the banks. This increase in loans, if made by the banks of a single locality, would probably lead to in¬ creased purchases from producers elsewhere, thus occasioning a balance of indebtedness against the local banks. Sooner or later cur¬ rency would have to be shipped to the banks in other parts of the country, and this would soon prevent further expansion and might make contraction necessary; but again, if expansion of ban*, loans were country wide, this diffi¬ culty would not be experienced unless gold ex¬ ports were stimulated, and even this contin¬ gency would not present itself if the expansion of credit were world-wide.

The general expansion of credit cannot con¬ tinue indefinitely. An increasing volume of checks like an increase in the quantity of money has the same tendency to bring about an advance in prices. Rapidly rising prices invariably stimulate unhealthy business activ¬ ities. Sooner or later the expansion of credit is checked by the deterioration in the average quality of the loans of the banks; failures become more numerous; confidence, not only in the future of business, but also in the banks, is weakened ; a crisis breaks out followed by a period of depression ; the volume of credit is then reduced through a slackening in the de¬

mand for loans, and through the liquidation of loans previously made.

However universal the use of checks may become, the individual bank does not on that account cease to be subject to constant demands for cash. A bank can exert no control ove~ the use its depositors make of their accounts from day to day; checks deposited with it never exactly balance checks presented for payment ; there will be wide variation, some¬ times favorable, sometimes unfavorable. In the latter contingency reliance may be placed upon a speedy change in favor of the bank. More positive action is, however, certain to become necessary from time to time in the experience of every bank. The requirements of depositors will occasionally result in a suc¬ cession of unfavorable balances, and further, every bank must face the possibility that un¬ founded rumors may subject it to a run. It is imperative, therefore, that a bank be able to pay large amounts of money on demand, and also be in position quickly to replenish depleted reserves. Its assets, or at least a con¬ siderable portion of

them, must be of such a character that they can be quickly converted into money. To serve this purpose the same degree of liquidness in all assets is not a requisite. Immediate conversion into cash of a portion of the assets of a bank will ordinarily serve for the building up of reserve depleted on account of unusually large requirements on the part of depositors, and the gradual con¬ version of the remaining assets is all that can be deemed necessary for exceptional contin¬ gencies. Experience shows that a bank, all of whose assets can be converted into cash within a few months without loss, is altogether un¬ likely to be disturbed by lack of confidence, and should it be subjected to unfounded rumors, no difficulty is experienced in secur¬ ing the necessary funds from other banks.

Central Banks. — In the development of commercial banking in most countries, there has been a distinct tendency toward the estab¬ lishment of a special class of institutions, the primary function of which is to enable other banks to convert their assets into cash in periods of stress. These special banks, com¬ monly known as central banks, maintain them¬ selves in ordinary times in a position of great strength. They endeavor to exercise a re¬ straining influence during periods of rapid credit expansion, but when the emergency pre¬ sents itself grant loans freely. The Bank of England is the oldest and most famous insti¬ tution of this kind. The very great advantages secured through its operations and those of similar institutions in other European countries led to the establishment in the United States of the Federal Reserve Banks in 1914. See Federal Reserve System ; Federal Farm Loan Act; Land Credit.

The bank notes which these institutions issue are as serviceable and acceptable for all domestic purposes as coined money. In many countries they are a legal tender. Consequently these central banks are able to supply the other banks with such amounts of cash as they may need to meet even the most severe contin¬ gencies. The banks are thus relieved of the necessity of resorting to general loan contrac¬ tion, a method of strengthening themselves which cannot be carried far without involving

the business community in serious financial difficulties.

Oliver M. W. Sprague, Professor Banking and Finance, Harvard

University.

3. WORLD SYSTEMS — TYPES. The

banking institutions of Europe, with the in¬ crease of capital, the development of industry and the growth of international relations, have naturally conformed to these influences, with the result that there is an approximation every¬ where to certain standards or types for the different classes of banking operations. Such differences in organization and practice as re¬ main are not fundamental, and afford little occasion for comparison or argument as to their advantages or desirability, but are ex¬ plained by their origin and the established customs of the people.

Central Banks of Issue. — In every country there is now a central bank, which is recognized to be the head of the system, and is charged with certain responsibilities. It is the fiscal agent of the government and the custodian of treasury funds ; it issues the paper currency, carries the gold reserve and holds a dominat¬ ing position in the foreign exchanges and the domestic credit situation. It is the final de¬ pository of the other banks of the country, and as a bank of rediscount, with the power of note-issue, it is expected to have at all times a reserve of available credit which will be used as needed for the support of the banking and general business situation. This reserve of credit is maintained by judicious use of the discount rate, which is raised and lowered to control the demand for credit. In all European countries judgment has been given in favor of confiding the power of note-issue to a single bank, but in Great Britain, Germany and Italy a few banks which were in possession of the right of note-issue when the present system was determined upon were allowed to retain a restricted right.

These central banks, by reason of the pe¬ culiar responsibilities with which they are charged, are required to confine their credit operations in the main to short commercial loans, usually not exceeding four months, which facilitate current trade and industry. Bills of exchange, arising out of specific transactions, and financing the movement of commodities to market, constitute the principal class of invest¬ ments. Loans to the government, however, are authorized, and advances upon

government se¬ curities and other approved collateral are made at a higher rate of interest and in limited amount. Nothing but gold and short commer¬ cial bills are considered a proper cover for note-issues.

The capital of these central. banks, with the exception of the Russian Imperial Bank, is sup¬ plied by private shareholders, but in many cases the executive officers, and in the case of the Reichsbank the executive board, are named by the government. The Bank of England which is the oldest of the great banks, and which led in the demonstration of the most important functions of a central institution, is a com¬ pletely private institution in its organization, but its policy is none the less governed by a sense of public responsibility. All of these institutions are bound to safeguard and pro¬

mote the public interest, as their first con¬ sideration.

The most noteworthy difference in the operations of these banks has been in the management of the note issues. The Bank of England is authorized to issue notes to the amount of £18,450,000 upon the security of government bonds and other securities in its possession, but all issues in excess of this must be fully covered by gold in its vaults. This requirement, which was imposed upon it by the Act of 1844, was prompted by a belief that excessive note issues had promoted over-ex- tensions of credit, the exportation of gold and the recurrence of financial crises. The effect was to make the note-issue absolutely fixed save as the stock of gold in the bank was increased or decreased. This restraint upon issues occasioned less inconveniences in Eng¬ land than it would have caused on the Continent, for the reason that even before 1844 the bank check had become to a great extent in England a substitute for the bank note. With the growth of the joint-stock banks the custom of keeping bank accounts and making payments by check has been steadily spreading, while on the Continent it remains the general custom to make payments in currency. The restriction of the Act of 1844 not only failed to prevent the recurrence of crises in England, but it actually hampered the bank in dealing with them to such an extent that in 1847, 1857 and 1866, when confronted by emergencies of this character, the Ministry requested the bank to disregard the provisions of the law, and Parliament in each instance afterward gave its approval by passing an act of indemnity. The situation upon each of these occasions was that public confidence in the general state of credit, and in the condition of certain private banking insti¬ tutions, was shaken, but there was no want of confidence in the Bank of England. The latter, by disregarding

the law, and issuing its own notes to the banks and firms which were able to give security, relieved the pressure and stopped the panic. This demonstration of the effectiveness of flexible note-issues under the control of a strong central banking institution has had a powerful influence in shaping the banking systems of other countries. In Eng¬ land no immediate change in the Bank Act was made, but an important change was made in the management of the bank. It was dis¬ covered that by raising the discount rate the tendency to over-expansion could be checked and the gold reserve of the bank increased, thus permitting an enlargement of credits, either by deposit accounts or note issues. Since 1866 this knowledge has been used so skilfully that the arguments in favor of a liberalization of note-issues have not been pressed. In 1914, however, following the outbreak of the European War, Parliament passed an act giv¬ ing the Ministry authority to permit the Bank to issue notes without the statutory reserve.

The statutes governing the Bank of France fix a maximum limit upon its issues, but this has always been high enough to give practical freedom to the management, which within the limit named is without restraint. The framers of the law governing the Reichsbank intro¬ duced a novel feature, which has been since adopted in many countries, including the United States. This is a provision levying a

tax upon issues in excess of a named amount, which is assumed to be sufficient for normal requirements. This is accompanied, however, by another provision, requiring that at all times a minimum reserve of 33ˆ per cent against outstanding notes shall be maintained. The German tax upon excess issues is 5 per cent ; in the United States, in applying the plan to the Federal Reserve banks, the tax is a pro¬ gressive one, increasing as the percentage of reserve diminishes.

In all of the countries where the central banks are owned by private shareholders, the profits are divided with the Treasury or there are other compensations to the Treasury for the charter privileges.

Commercial Banks and Discount Houses.

— In all countries the bulk of the banking busi¬ ness with the public is transacted by what are commonly called ((joint-stock)) banks, although the distinction between these banks and the central banks is not in the fact that they are joint-stock corporations but in their more private character. In England there must be included in any study of the commercial credit system, the discount houses or bill brokers, and the accepting houses which are auxiliaries of the banking system. These are specialists in credit, and intermediaries between the bor¬ rowers and the banks, although the discount houses accept deposits and pay interest on them. They borrow largely from the banks, and their chief function is to specialize in the several lines of trade. By doing this, and en¬ dorsing the paper they handle, they raise this paper to a higher grade of credit, which will command a lower rate of interest. In this difference between the rate which this paper would have to bear without their endorsement and the rate at which they place it with the banks, they find their compensation. The ac¬ cepting houses perform a similar function in a different manner. It has long been the cus¬ tom for the seller of goods to draw a draft on the buyer, payable at some date agreed upon in the future, which the buyer ˆaccepts® as soon as it is presented by writing the word ˆaccepted® across its face and signing his name thereunder. The draft when assigned by the drawer becomes two-name commercial paper, and is usually sold on the market. Evidently much depends upon the character of the names, and if the buyer is not well known he can afford to pay a commission to a house of high standing which will accept for him. This custom developed gradually, first within a trade where the houses knew each other, until it became a regular business. Back of these dis¬ count houses and accepting houses are the joint-stock banks, which are usually in the market for high-class paper, and back of all is the Bank of England, which is under obliga¬ tion to always buy paper at some rate. When the war broke out, and paralysis fell upon credit, so important was it deemed that the fluidity of bills should be maintained, that the government stepped into the situation and guaranteed the Bank of England against loss in the purchase of pre-war bills.

The joint-stock banks of Great Britain carry the current accounts of merchants and manufacturers, although the Bank of England also does to some extent a general banking business. These banks lend to their customers

and buy bills in the open market. They also lend upon collateral, and in recent years the practice has developed among them of accept¬ ing bills for houses with whose affairs they are familiar. This shows how the functions of the banks, the discount houses and acceptance houses overlap and dovetail, and how sharp is the competition in the credit field.

The joint-stock banks of Great Britain are organized under the General Companies Act. There are no requirements as to reserves or regulating the character of the business. The practices of the banks have been established by the lessons of experience and the teachings and writings of men recognized as authorities. It has become an accepted doctrine that bank investments must be of a temporary and liquid character, and that banks shall not take a proprietary interest in any business.

On the Continent, as in England, the joint-stock banks other than the central banks are organized under the general incorporation acts, and are quite free as to the character of busi¬ ness they may do. There are no requirements as to reserves and, in most countries, no gov¬ ernmental inspection or supervision. The joint-stock banks of Germany have developed their business on broader lines than perhaps any other corporate banking institutions, and with practically the freedom of private banking houses. This has been due largely to the rapid development of German industry and overseas trade since 1880, and the demands wdiich have fallen upon the banks in connection with it. The need for capital to finance growing and profitable industries has been before their eyes, and they have gone further than British banks are accustomed to go in supplying capital which could not be readily withdrawn. In doing this they have considered it advisable, instead of restricting their interests to loans, to take at times proprietary interests, evidenced by stock and to be represented in the directorate of such companies. They have organized companies to take over private business, and reorganized companies to increase their capital, offering the bonds and shares to the public over their counters, through their branches and upon the stock exchanges. The stock exchanges are for the most part controlled by the banks, and most of the transactions are through the banks. The head of the leading German joint-stock bank stated to the American Monetary Commission in 1908 that that bank had 50 members of the Berlin Stock Exchange to attend to its busi¬ ness. All of this is different from banking in England, and, as to relations with the stock exchange, from banking in the United States, but it is not so different as possibly at first sight appears from common banking practice in America, so far as capital advances are con¬ cerned. It is common knowledge that the

banks of this country, particularly in the smaller towns, have had a large part of their assets in the form of loans which represent fixed in¬ vestments. The country has been growing rapidly, every branch of industry has required more capital and the only source of supply has been the local credit institutions. As a result few American banks outside of the large cities would stand the theoretical test as to liquid conditions any better probably than the German joint-stock banks, and many of them not so

well. l he American banks, however, have been prevented by law from taking proprietary interests. The German policy cannot be com¬ mended as a scientific policy, but, although there have been disasters from it, on the whole it probably has met the conditions existing in Germany, and promoted the development of industries more effectually than a more rigid system of banking would have done. The Ger¬ man banks which have come through the ex¬ perience have been managed with great ability, have prudently built up large capitals, and in years immediately preceding they were in a condition as to liquid assets that was scarcely open to criticism. In an article writ¬ ten for the National Monetary Commission in 1908, Herr Mueller, a director of the Dresden Bank, and who served upon the Imperial Com¬ mission to consider a revision of the law regulating the Reichsbank, stated that in most of great German banks the principle was ad¬ hered to of not allowing the total amount of tied-up assets, such as bank gites and other fixed investments and interests, to exceed the bank's own paid-up capital, plus the capital accumulations which in the United States are called surplus and undivided profits. The great capital of these banks permits them even then to have large fixed investments.

In France there has not been the pressure for capital for industrial purposes which there has been in Germany, and the joint-stock banks or credit societies, as they are called, have con¬ fined themselves closely to the financing of current trade. In other countries of Europe the practice varies, and everywhere there is almost complete freedom

from legal restraints.

Investment and Mortgage Banks. — The Credit Mobilier, founded in France in 1852, was the original of a type of investment banks. It sold its own debentures or collateral bonds against holdings in its own possession of various securities which it was a master spirit in promoting. It had a successful career for a time, but after about 15 years was forced into liquidation as the result of heavy losses. The type of the Credit Mobilier, the name of which signifies a mobilizing of credit, has been followed to some extent in many countries, but its mistakes have been a warning against the policy of using such an organization to pro¬ mote new enterprises. The English investment companies issue their own debentures based upon securities which they have purchased, but their purchases are confined to the issues of established enterprises.

The mortgage banks of Europe are organ¬ ized upon the above principle. The Credit Foncier, which has almost a monoply of the land mortgage business of France, is a semi¬ public institution, the capital being supplied by private shareholders, although originally the government gave it a subsidy. The governor and two sub-governors are appointed by the government. It is allowed to receive a limited amount of deposits and these are invested in commercial bills, but its principal business is lending upon mortgage, accepting either urban or rural estate as security. Against these mortgages in its own possession it issues bonds. These are issued in series without date for pay¬ ment, but are called yearly as the amortization payments allow. They are called by a lottery

and prizes are given with the drawings, the first prize being as much as 150,000 francs. This lottery feature is a factor in the distri¬ bution of the bonds, and accounts for the low-rate of interest, usually 3 per cent, w-hich they bear.

In Germany there are about 40 mortgage banks which pursue a similar business but the bulk of their loans are upon urban property. These banks are required by law to deposit their mortgages with a state comptroller, who then gives permission for the issuance of bonds against them. These banks operate upon an exceedingly small margin, the difference be¬ tween the rate received upon mortgages and the rate paid upon bonds being only about one-fourth of 1 per cent.

Besides these joint-stock mortgage banks, there are the Landschaften,

or mutual credit associations, w7hich receive mortgages from their members and, holding them as security, issue their own bonds to the borrower which he may negotiate upon the investment market. This system was established by Frederick the Great in 1769, and originally designed for the benefit of the large estate-holders only, but it has been developed to include a branch for small properties, and also provide subsidiary companies which write insurance and grant temporary credits to members.

Mutual Banks and Co-operative Societies. — These are known in all the countries of Europe, but are most highly developed in Ger¬ many, where they are the common source of banking accommodations for small tradesmen and farmers. The Schulze-Delitzsch societies, so called for the founder and fhe town in which the first one was established, constitute the leading system. They receive deposits and pay interest upon them, and make short loans upon the promissory notes of members. They extend personal credit only to members but they may receive deposits from others and employ their surplus funds outside the membership. At their inception they wrere purely mutual societies with unlimited liability for the members, the theory of their organization being similar to that of the mutual insurance societies, or orders, now prevalent in many countries. The unlimited liability of all members helped them to get deposits, but wˆas a deterrent to member¬ ship for those wrho did not want to borrow. Later, societies were organized which issued shares and in which the liability of shareholders was limited in various degrees. It might be double the par value of the stock, or greater, as determined by each society for itself. The so¬ cieties are independent in their management, but have an association and a central clearing agency. The Schulze-Delitzsch societies do practically a commercial banking business. The Raiffeisen societies are upon much the same plan, and lend money upon several years' time, but the membership is chiefly among farmers. There is a central bank in Berlin for these societies, to which the state of Prussia has sub¬ scribed a capital of 50,000,000 marks. It is strictly a state institution. There are similar societies in other states of Germany. The total membership wdthin the empire is nearly 2,- 000,000; paid-in capital and surplus funds, ap¬ proximately 350,000,000 marks ; deposits, about 2,335,000,000 marks. The Schulze-Delitzsch

and Raiffeisen systems have an extensive de¬ velopment in Austria.

In France the Credit Agricole Mutuel rep¬ resents a development of the Raiffeisen idea. Small local societies had been doing business with moderate success, but the movement was given recognition and encouragement in 1897, when, upon a renewal of the charter of the Bank of France, a gratuitous loan of 40,000,000 francs, and also a certain share in the annual earnings of that institution, was exacted from it and diverted to the use of the agricultural banks. The law provided for the organization of district banks, which lend the available funds to the local societies, the distribution be¬ ing made by a committee of public men, in¬ cluding the governor of the Bank of France. The peculiarity of the system seems to be that it depends chiefly upon the funds received from the Bank of France, which it is allowed to use gratuitously. These funds are loaned below the ordinary market rate, but as they are limited in amount the growth of the system is restricted. It lends only to provide temporary credit to farmers.

There are mutual credit associations in Russia, of limited liability, whose capital is created by the payment on the part of each member of a sum equal to one-tenth of the credit granted them. Associations of this kind may be established by the Zemstvos. In 1907, the sum total of these loans and discounts was approximately 245,000,000 rubles. A project is pending for the establishment of a central bank for these associations. See Co-operative Bank¬ ing; Federal Farm Loan Act; Land Credit.

Savings Banks, Municipal, Postal, Private. — A system of municipal savings banks has its most important development in Germany and Russia. In both countries the banks are public institutions, supported by the credit of the municipalities and conducted under their super¬ vision. The profits go to the surplus fund of the banks, or may be in part expended for pub¬ lic purposes, such as the support of hospitals, parks, *etc.* In Russia the municipal banks do a general banking business and also lend money on real estate security, but in Germany the in¬ vestments are confined to trustee securities, as fixed by law, and to the purchase of a limited amount of commercial bills.

The municipal savings bank is to be found in other countries of Europe, and there are also stock company savings banks, but they are

without special features. Mutual societies sup¬ ply, to a great extent, the facilities for saving. Postal savings banks have been established in many countries, Germany being an exception, due to its high development of the municipal savings banks.

Public Loan Banks. — In France, in 1830 and in 1848, in Prussia in 1848, 1866 and in 1870, and in the German empire in 1914, the governments resorted to the establishment of public loan banks or, more properly, loan offices, as a means of facilitating in an emergency the flotation of public loans. The function of these banks was to serve in a subsidiary capacity to the central banks, by making loans upon col¬ lateral security. In Germany, in 1914, one of these banks was established in every city where there was a branch of the Reichsbank. They were authorized to make loans upon collateral

or goods, and, in doing so, to issue notes to the maximum aggregate of 3,000,000,000 marks. These notes were not legal tender but were ac¬ ceptable at the Reichsbank and made good as basis for note-issues by the latter. It was an emergency measure, designed to aid in mobiliz¬ ing the financial resources of the nation. These banks are known as ˆDarlehnskassenA

Bibliography. — Conant, Charles A., Mod¬ ern Banks of Issue) (New York 1915) ; Dun¬ bar, Charles F., (The Theory and History of Banking* (New York 1909) ; Publications of National Monetarv Commission (Washington

1910).

George E. Roberts,

First Vice-President, National City Bank, New York.

4. INTERNATIONAL BANKING. Prior

to the enactment of the Federal Reserve Law (q.v.) under which National banks have obtained authority to establish branches in foreign countries, international banking upon the part of the-United States had been mainly confined to investment banking, and efforts to place American securities in Great Britain and the countries of western Europe. The most ambitious effort to enter the commercial field had been made by the International Bank¬ ing Corporation, chartered in

1902 by the State of Connecticut, which began business with a paid-up capital of $3,000,000 and surplus fund of $3,000,000. It had at that time 15 offices abroad, most of them in Asiatic countries.

The Need of Foreign Banking Facilities. — Although the slow development of American banking operations in the foreign field may be attributed in part to the fact that the national banking system, to which most of our large banking institutions in the past have belonged, until recently made no provision for such ex¬ tension, it is also true that there has been little inclination among American bankers to so ex¬ tend their business. The fact that branch bank¬ ing has had small development within the United States will partially explain the seeming lack of interest in branches abroad. The com¬ paratively few branch establishments that are maintained in this country, with few exceptions, are located in the same city with the head office, and the great bulk of the banking business is done by independent, locally owned, institutions which have but a single office. Our, people have been inexperienced in branch banking, and not accustomed to entrusting large powers to scattered officials at great distances.

The chief explanation, however, for the in¬ difference of American bankers to international opportunities is to be found in the same general situation which accounts for the slow develop¬ ment of American interest in foreign invest¬ ments and foreign trade, to-wit : the all-absorb¬ ing needs and attractions of the home field. There has been no inducement for banking capi¬ tal to go from the United States to other fields for the mere profits of commercial banking. All foreign fields are already occupied by domestic banking institutions, which are likely to have the preference for purely domestic busi¬ ness, and by British or European banking cor¬ porations which are more or less allied with other important investments in the same countries, and with interests that are active in trade with these countries. It has been evident

that American banks abroad would have little reason for their

existence unless they were serviceable to American trade and American capital in the same manner that British and German banks have been serviceable to the trade and investments of those countries.

With the development of this country, the growth of its industries and the accumulation of capital, the attitude of its people toward trade and investments abroad has been chang¬ ing. Our exports no longer consist almost ex¬ clusively of natural and crude products. The United States has become the leading producer and a heavy exporter of steel and machinery, and is rapidly increasing its exports of a great variety of manufactures. At this stage bank¬ ing facilities abroad become a factor in the development. If American banks in foreign countries require for their prosperity that there shall be American trade with those countries, so does American trade have need for an ex¬ tension of its own banking facilities.

The services which a banker can render for his client in foreign countries are in most par¬ ticulars the same that he renders at home, but obviously there is greater dependence upon them abroad than at home, and there are special services incidental to the fact that goods are delivered and collections are made in foreign countries. The distances are great, mails are slow and cables costly ; the habits and customs of the people are different, trade conditions are different, the language is usually different, and the chances of misunderstandings and dis¬ agreements are more numerous than in trade at home. There is great help to the exporting house in having an interested representative on the ground where deliveries and collections are made, and next in efficiency to his own ex¬ clusive agent is the branch office of an Ameri¬ can bank. Collections may be, indeed, made through a domestic bank, or through a branch office of one of the European banks, but it is not to be expected that these institutions will feel the same interest in promoting the trade that will be felt by an American bank, which realizes that its own future is involved in the development of American trade. It is more than possible that the interests of the American exporter may clash with the interests of older and closer clients of a European bank, and in such instances the invoices and terms of impor¬ tant transactions may become known to com¬ petitors. In any event, there is a lack of the alert, interested attention that arises from a vital common interest, and from the direct con¬ nection through the home bank. There is likely to be a clearer presentation of the exporter's case through the latter channel.

One of the most important services that a bank can render is that of supplying informa¬ tion relative to credits. In many countries this information is difficult to obtain, and those who have it give it up

with reluctance, especially in reply to written inquiries. Replies are vague, elusive and unsatisfactory. It cannot be ex¬ pected that this class of information will be given frankly and accurately by mail to strang¬ ers. No other source can be so trustworthy as a locally established bank which is linked up in every interest with the trade which it _ is serving. Credits are changing constantly; in¬ formation which is good at one time may be misleading a few months later; the exporter in vol. 3 — ll

another country requires an allied advisor upon the spot who will not wait for inquiries but volunteers his counsel. Moreover, he wants a banker with a knowledge of the credits who will give him assistance in carrying them. In short, he wants the service which his own banker is accustomed to render at home ex¬ tended to the foreign trade.

The service of the American branch bank does not end with attention to business placed in its hands ; it is equally interested in creating new business. It makes itself familiar with all lines of trade ; it studies the import and ex¬ port trade of the country in which it is located, with a view to developing trade with its home country; it takes note of opportunities and re¬ ports them to the home institution, which places the information where it will be likely to promote action.

The import trade of growing or developing countries consists to a great extent of equip¬ ment and construction materials, for use in new works designed to increase the production of the country, or to improve its facilities for handling the products. These purchases rep¬ resent investments rather than consumption, and very often they represent an investment of foreign capital, as in the construction of railways and other public utilities, or manu¬ facturing plants. The investments of Great Britain and Germany in South America are very large, and they have been made usually by sending out machinery and equipment which were the product of their home shops. Their manufacture supplied work for the home people and when converted into investments abroad they not only yield good returns but they create new demands for repairs, replacements, ex¬ tensions, *etc.*

These investments abroad have not in years past been attractive to the people of the United States, because there were abundant opportu¬ nities, as good as any in the world, for similar investments at home. No other country wras growing so fast in population as the United States, and so long as there were extensive natural resources to be opened up here it was doubtful policy to place investments abroad.

But the United States is no longer a new coun¬ try ; the main railway lines have been con¬ structed, every section of the country is under¬ going development, the more easily tilled lands are now under cultivation, the timber lands have advanced greatly in value, the mineral resources are being worked. Both population and wealth are increasing rapidly, but the country has reached the stage where raw ma¬ terials, once cheap, are becoming dear and affecting the cost of manufactures and the cost of living. The manufacturing industries are affected both by the increasing cost of raw materials and by the increasing cost of food, clothing and other necessities which affect wages. Already the United States has become one of the principal importing nations of wool and hides, and it is probable that our consump¬ tion of these articles will steadily increase faster than the home supply. We are also con¬ sumers in vast quantities of many articles which we do not produce at all, among which are coffee, rubber and tin, which are obtainable in South America. In short, we have reached the point in our own development where we can advantageously spare some of our capital

to develop the dormant resources of countries not so far advanced as ourselves. There will be an economic gain to ourselves and to the world community in doing so, just as there was an economic gain to New England and the United States from the use of New England capital for the development of the Western States of this country. This investment of United States capital in other countries will be guided and stimulated by the development of international banking facilities with headquar¬ ters in this country.

Short Loan and Commercial Bills. —

There is yet another class of international banking which is comparatively new in this country but which is developing, and that is the class of banking which has made London the chief market of the world for short loans and commercial bills. Here again the defects of our national banking in the past have mili¬ tated against us, National banks not being per¬ mitted to accept drafts for future payment. Even

our own foreign trade, both exports and imports, has been financed through bills upon London. Most of the time there has been no real loss to this country by this process, because it has been possible to carry the drafts at a lower rate of interest in London than in New York. In the future, however, this situation is likely to be different, not so much because of a probable change in the London situation as because of the changes effected here by the Federal Reserve system. In the past the finan¬ cial banking reserves of the United States have been kept in the large National banks of New York city, which, by custom and as a result of competitive conditions, paid a uniform rate of 2 per cent upon them. This interest bur¬ den made it incumbent upon them to keep the funds employed upon the most favorable terms possible, and this employment was commonly found in loans on stock exchange collateral. The Federal Reserve system transfers the banking reserves to the Federal Reserve banks, and forbids their employment in loans upon stocks or bonds. They can only be used in rediscounting paper arising out of commercial transactions. Coincident with the creation of this great fund, restricted to commercial paper, has come permission for National banks to accept paper arising out of international trade, a permission which extends not only to our trade with other countries but to trade between all countries. These acceptances are the most desirable paper available for the Federal Re¬ serve banks, and as they pay no interest on de¬ posits, and large earnings with them are subor¬ dinated to the policy of having liquid assets and developing a great discount market, it may be expected that the rate on this class of paper

will hereafter be as low in New York as in any market of the world. The availability of the New York market for trade bills ultimately payable elsewhere will of course be affected by other factors as well as the discount rate, and particularly by the general position of New York in the world's exchanges, but it is and can be confidently predicted that with the re¬ sources of the Federal Reserve system behind it, and with the United States developing as a creditor country, New York in the future will play a much more important part in interna¬ tional banking than in the past.

As a result of the European War, and the closing of European markets to foreign loans, an important aggregate of loans to foreign governments has been made in the American market. Since there is reason to believe that capital will continue to accumulate rapidly in the United States, and there will be less differ¬ ence in interest rates between New York and European markets than in the past, it is prob¬

able that New York will continue to be a fac¬ tor in transactions of this class. The develop¬ ment of any country in international banking is dependent finally upon the relations of its people to international affairs. There must be an important body of traders and investors with international interests and cosmopolitan views. See Co-operative Banking ; Federal Reserve System (article 12) ; Foreign Ex¬ change (article 15) ; World Systems (ar¬ ticle 3).

Frank A. Vanderlip, President National City Bank, New York.

5. FOREIGN EXCHANGE. Foreign

exchange may best be described as the system by which payments are made between countries having different monetary systems. The terms ˆExchange® and (<Foreign Exchange® are also used as meaning the drafts drawn by merchants and bankers resident in one country upon merchants and bankers resident in another.

Origin. — Concerning the origin of the foreign exchange system as it exists at present there is a good deal of doubt. The best opinion is that the system as we now have it came into existence early in the Middle Ages as a result of the commercial dealings between the north¬ ern Italian republics and the Levant. Venetian merchants, for instance, purchasing goods in Alexandria, found that on account of the prev¬ alence of piracy in the Mediterranean payment for such goods in gold was extremely haz¬ ardous. It being the case that the merchants of Alexandria were also purchasers of goods in Venice, a system was devised whereby, instead of actual gold being shipped back and forth, merchants in Venice having money owed to them from Alexandria were able to receive it from other merchants in Venice who had pay¬ ments to make in Alexandria. Gradually it came about, as a result of these arrangements, that Alexandria kept balances in Venice and vice-versa. Payments instead of being made by means of actual gold shipments came gradually to be paid by drafts drawn on such balances.

The Principle Stated — A clear under¬ standing of the basic principle underlying foreign exchange transactions may probably best be had from consideration of an actual international transaction. A merchant in Mem¬ phis, Tenn., we will say, has sold a hundred bales of cotton to a spinner in Liverpool, England. For the merchant in Memphis the important thing is to realize upon his sale, at the earliest possible opportunity, United States currency, or credit at bank. This payment he can receive in two ways. Either he can draw a draft upon the buyer of the goods in Liver¬ pool in sterling (the currency of the buyer) and

sell such draft in Memphis or New York at the current rate of exchange for American dollars, or (2) the buyer of the cotton in Liver¬ pool can send to the merchant in Memphis a draft drawn on some point in the United States

and payable in United States currency. Which¬ ever way the transaction is arranged, the de¬ sired result will be obtained that the seller of the goods in Memphis immediately receives payment in bankable funds.

The banking machinery requisite for the conversion of sterling drafts drawn, for in¬ stance, in Memphis, into United States dol¬ lars, or for the furnishing of drafts drawn in sterling to American merchants who have pay¬ ments to make abroad, is relatively simple. It consists simply of a number of banks and bankers with the necessary facilities for pur¬ chasing the drafts drawn on foreign points in foreign currencies offered them, and for selling to their clients such drafts drawn on foreign points in foreign currencies as may be desired. It must, however, be clearly understood that the foreign exchange banker is not merely a broker in bills, buying bills from parties who have them to sell and selling the same bills to other parties who want to buy them. Having bought exchange drawn in a foreign currency on a foreign point, the foreign exchange banker does not resell those same bills, but instead sells a draft made by himself upon his correspondent bank abroad. The balance abroad out of which these bankers' drafts are paid is being continu¬ ally replenished by remittances from this side, of foreign exchange which the banker buys in the regular course of business.

The foreign exchange banker, in other words, maintains a depositary abroad with whom he deposits the bills of exchange he buys and upon whom he draws the drafts which he sells his clients. Daily these balances are being drawn upon and replenished. At all times they are maintained at a certain point, that, of course, depending upon the standing of the banker and the extent of the foreign exchange business in which he is engaged. Some foreign exchange bankers carry balances

at only one or two of the more important foreign money centres. Others carry balances at as many as 20 or 30 foreign points.

As a result of the arrangements they have with their foreign correspondents and the bal¬ ances they carry abroad, foreign exchange bankers at primary points are always in a posi¬ tion to buy any exchange which may be offered them, and to sell any exchange which may be required. A large packing house in Chicago, for instance, may have made a shipment of meat to Amsterdam and as a result be offering, its drafts drawn in guilders at 15 days' sight upon the buyer of the goods in Holland, or upon some Dutch bank designated by him. Of these drafts the packer, if his standing is good, will have no difficulty in disposing at whatever happens to be the current rate of exchange at the time for bills of this character. Some banker will readily take them off his hands, knowing that he, the banker, can send the bills to his correspondent bank in Amsterdam for credit of his account, later drawing his own bills upon the balance thus created. Very pos-siblv at the time that, he buys the bills drawn against the meat shipment, the foreign ex¬ change banker knows of a place where he can sell drafts drawn by himself at a rate of ex¬ change which will show him a profit, on the transaction. Nor does it make any difference whether the drafts he buys are drawn against

meat or wheat or copper or whether they are payable at sight or at 15 days' sight or at 90 days' sight. All is grist that comes to the foreign exchange banker's mill. His ac¬ count with his foreign correspondent is a melt¬ ing pot into which he can put bills of exchange of every variety, the whole appearing after col¬ lection and discount as a cash balance upon which he can draw his own drafts.

The profit made by the foreign exchange banker comes from the fact that he can regu¬ larly secure a better rate of exchange for the drafts drawn by himself, which he sells to his clients, than he has to pay for the mercantile bills of exchange which he buys from other clients and with which he is continually re¬ plenishing his balance abroad. Between bank¬ ers' bills and mercantile bills, however good the latter may be, there is always a difference in the rate of exchange. Between the bill drawn by the banker of good standing and the mer¬ chant of good standing this difference is com¬ paratively slight, but as between the bill of the banker and the merchant whose paper is not so well known, although it may be perfectly good, there is a very considerable difference in the rate. It is just here that the foreign exchange banker makes the bulk of his profits. The bill of this mercantile house he

knows is perfectly good, but because the paper is not particularly well known it does not perhaps command the full market price. This paper the banker buys knowing that it is good and that it will be paid upon maturity, and against this paper he sells his own bills at a considerably higher rate of exchange.

Aside from the trading on rates described above, there are, of course, great speculative possibilities in the foreign exchange market for those who choose to take them up. By buying bills, for instance, and accumulating a large balance abroad without selling his own drafts against such balance, the banker puts himself in a position where he will greatly profit through any rise in rates which may take place — or vice-versa. Foreign exchange bankers, too, sell exchange for future delivery and con¬ tract to purchase drafts at fixed times in the future, at rates which they figure will show them a profit. These, of course, are only one or two examples. The opportunities for specu¬ lative operations in foreign exchange are prac¬ tically unlimited.

The par of exchange between two countries having different monetary standards as, for instance, Great Britain with the pound sterling and the United States with the dollar, is the price of the gold unit of one country expressed in the currency of the other. In a new gold pound sterling (sovereign), for instance, there is an amount of gold which, at any sub-Treas- ury in the United States, is worth $4.8665. This sum is, therefore, the par of exchange between Great Britain and the United States.

From this par of exchange the rate fluctuates upward and downward, according to the supply and demand. If American merchants or bank¬ ers have large payments to make on the. other side and drafts drawn in foreign currencies are in great demand, it naturally follows that the price in dollars which must be paid for each pound sterling, mark or franc, as the case mav be, will increase (that the rate of exchange will

rise). If, on the other hand, a large amount of drafts drawn on foreign points in foreign currencies are being offered for sale to bankers

engaged in the foreign exchange business, it stands to reason that less American dollars will be paid for each pound sterling, mark or franc, as the case may be (that the rate of exchange will decline).

The principal influences having a tendency to cause the rate of exchange at any given point to rise are as follows :

Heavy Imports of Merchandise. — Mer¬ chandise imported must be paid for — usually by means of a draft drawn in the currency of the country from which the goods are coming. If, thus, imports run heavy, there is necessarily a big demand for drafts to send over to the shippers from whom the goods are coming. The natural effect is to cause a rise in the rate at which bankers are willing to sell such drafts.

Heavy Imports of Securities. — Exactly as merchandise imported into the country must be paid for, so securities imported into the country must be paid for. The moment a market be¬ gins to repurchase on a large scale its securities held abroad, or to purchase foreign securities, there is set up a strong demand for bills of exchange drawn on the market where the buy¬ ing is being done to settle for these securities. A time when New York, for example, is buying stocks heavily in London, is apt to be a time when the demand for sterling drafts is so great as to give the sterling exchange market a strong upward tendency.

A Decline in Money Rates Below the Level Prevailing at Other Important Foreign Centres. — As money rates decline there is a strong tendency for capital to seek points at which a better rate is offered for its use. Trans¬ fer of capital can be effected only through re¬ mittances of exchange to points where the capital is to be employed. A period of ex¬ tremely low money rates at a point like New York, for example, with London offering a better rate for capital, is likely to be a time when there is a big demand for bills of ex¬ change with which to make remittances to London.

The principal influences tending to cause a decline at any given point in exchange rates are as follows :

Heavy Exports of Merchandise. — Pay¬ ment for merchandise exported from the United States is made largely by drafts drawn in the currency of the country to which the goods are shipped, upon the buyer of the goods or upon some bank abroad designated by him. A time when merchandise is moving freely out of the country is a time when a large amount of such drafts are being offered to foreign exchange bankers. The result is, naturally, to cause a decline in the

rate which bankers are willing to pay for such drafts.

Heavy Exports of Securities. — Securities shipped out of the country, as is the case with merchandise, are generally paid for by means of a draft drawn by the seller upon the buyer. A time when, for any reason, large amounts of stocks or bonds are being shipped out is, nat¬ urally, a time when large amounts of exchange are being drawn and offered, with a consequent decline in the rate of exchange.

A Rise in the Rate for Money Above That

Prevailing at Other Primary Points Abroad. — Just as banking capital tends to flow out of a market where the money rate is declining, so it tends to flow into a market where the money rate is rising. Let money rates at New York, for instance, rise considerably above those pre¬ vailing in London or Paris, and immediately foreign capital begins to flow this way and American bankers begin to recall to this market for their own use a substantial part of the funds they have been carrying abroad. This recalling of balances is effected by drawing drafts on cor¬ respondents abroad and by offering these drafts for sale in this market, the effect being to lower the rate of exchange.

There is, however, a limit beyond which, under normal circumstances, the rate of ex¬ change between two countries having the gold standard cannot rise, and a limit beyond which it cannot fall.

The extent to which the exchange can rise is limited by the point at which it becomes cheaper for parties, having payments to make abroad, to send the actual gold than to send a banker's bill drawn in the currency of the place where the payment is to be made. If, for in¬ stance, a merchant in the United States having a payment to make in Great Britain finds that each pound sterling of the draft he wants to buy will cost him $4.89, he can go to any United States sub-Treasury, purchase the exact amount of gold which when laid down abroad will yield one pound sterling, and send it to the other side at a total cost to him of considerably less than $4.89. The American merchant's idea being to discharge his obligation abroad with the least possible expenditure of American dol¬ lars, he will elect to send the actual gold rather than to purchase and send a banker's draft.

The extent to which the exchange can fall at a point like New York, for instance, is lim¬ ited by the point at which a new gold sovereign laid down in New York yields net a greater amount of dollars and

cents than each pound sterling of a prime banker's draft drawn on London would yield. A New York bank, for example, has money on deposit in London which it wishes to withdraw to New York. It will sell its drafts only down to the point at which that process yields more dollars than if gold were imported. Below that point the rate of exchange cannot fall.

The above, however, applies only where there is a free interchange of gold between markets. If for any reason the natural flow of gold one way or the other is obstructed or restricted, exchange may rise far above or fall far below what would be the normal gold export or gold import point. By interfering with the natural outflow of gold from London through raising the discount rate and through buying up all available supplies of gold bullion in the market, the Bank of England, for instance, has on nu¬ merous occasions brought about a condition where the rate of exchange in New York on London fell far below the gold import point without any gold being shipped to the United States. . Similarly the. rate of exchange both at Berlin and at Paris not infrequently rises far above the point at which gold can be profit¬ ably exported for the simple reason that, through, the interference of the governmental authorities, no gold for export can be obtained.

Under such circumstances those who have re¬ mittances to make can make them only by means of bills of exchange and must pay whatever price is asked.

Gold exports and imports, it must be borne in mind, are exclusively in the hands of the bankers because it is only the banker who has the facilities necessary for dealing in bullion. Upon the exchange rate rising, for instance, to the gold export point, the shipments of gold which take place are not made by merchants but by bankers who through thus replenishing their balances abroad keep themselves in a position to sell to merchants the needed bills of ex¬ change. The rate on London at New York, for example, rises to $4.88, at which rate conditions at the time happen to be such that a remittance made in the form of gold and a remittance made by means of a bill of

exchange cost the sender exactly the same amount of dollars and cents. At this point bankers will begin to ship gold knowing well that they will be able to sell their drafts against the balances thus created at a slightly higher rate than $4.88, for the simple reason that merchants, having no facilities for handling bullion, are willing to pay, say, a quar¬ ter of a cent in the pound sterling in order to avoid the necessity of having to ship the actual gold themselves. The rise in the exchange to the gold export point thus means the shipping of gold on the part of bankers, and the consequent creation of a fresh supply of bills of exchange out of which mercantile needs are satisfied.

What has been said above applies only to the exchange relationship between countries having the gold standard or the gold exchange standard, i.e., where the government, as in the case of the Philippines or in India, guarantees a gold value to the silver medium of exchange. Where the exchange relationship is between a country on the gold standard and a country on the silver standard, the dominant factor in the rate of exchange is the price of silver. A rise in the price of silver in China, for instance, overshadows everything else as an influence upon the rate of exchange on London, and in¬ variably causes a fall in the price at which the pound sterling will exchange for the local silver currency. Conversely a fall in silver invariably brings about a rise in the exchange.

Bibliography. — Barbour, D. M., ˆStandard of Value) (New York 1912) ; Escher, F., (Foreign Exchange Explained) (New York 1917) ; Goschen, G. J., (Theory of Foreign Exchange) (London 1894) ; Margraff, A. W., in¬ ternational Exchange) (ib. 1912) ; Withers, H., (Money Changing) (London 1913).

Franklin Escher, Lecturer on Foreigti Exchanges.

6. INVESTMENT BANKING. Invest¬ ment banking is the system by which invest¬ ment capital is made available, (1) for the uses of industrial enterprise; (2) for civil loans, i.e., loans to municipalities, states and countries. An enterprise is in need of capital, or a state or county, for instance, needs, money for the construction of roads or public buildings. It is the function of the investment banker to stand between his clients who have money to lend and the corporation or municipality which wants to borrow, and to see that the needed capital is provided.

The whole system of investment banking as constituted to-day

presupposes the ability on the part of those engaged in it to draw capital from their clients for whatever purpose re¬ quired. The X Y Z Railroad, we will say, which operates a system of electric lines, de¬ cides to spend a million dollars on certain im¬ provements which, it feels, will greatly increase its revenue. The road not having that much free cash on hand appeals to some investment banking house for the money, offering to pay for it such-and-such a rate of interest and, as security, to give to the lenders a mortgage on the property to be acquired. This proposition having been made, the investment banker pro¬ ceeds to make an independent examination, and, his engineers having satisfied themselves as to the safety and productivity of the loan, in¬ forms the railroad that he stands ready to ad¬ vance the capital required — in other words, that he will purchase from them at a certain price such-and-such an amount of bonds or stock issued under such-and-such conditions.

It is not, of course, his own money which the investment banker figures on advancing. Familiarity with the markets, the price of cap¬ ital and the standing of the concern which wants to borrow enables him to estimate at just about what price he will be. able to dis¬ pose of the securities to be issued. For a cer¬ tain type of stock or bond issued by a certain type of borrower, he knows his clientage will be willing to pay just about such-and-such a price. He figures, for instance, that, counting, all costs of retailing, he will be able to parcel out a million dollars' worth of high grade bonds at a net price to him of 98. A price somewhere between 90 and 95 would, therefore, be about 'what he would offer the railroad for the bonds. The difference between what he paid for the bonds and what he got for them by distribut¬ ing them among his clients would constitute his net profit on the transaction.

In theory, a corporation wanting to borrow money by selling new securities advertises in the investment market for bids and sells the securities to the highest bidder. In practice, nearly every large railroad or industrial con¬ cern has its own bankers to whom the business is invariably given. For this there is good reason. The investment house which is going to interest its clients largely in the securities of a corporation assumes a certain moral obli¬ gation. To be safe, in other words, the banker has got to be close to the property he is financ¬ ing and to remain close to it and in close touch . with its affairs. He cannot, therefore, spread his efforts in too many directions. Gradually, in consequence, each investment banking house gathers around itself a certain number of en¬ terprises with whose affairs it is particularly familiar and whose securities it becomes par¬ ticularly fitted to handle.

The methods by which the investment bank¬ ing house, having purchased and paid for a block of new securities, proceeds to distribute these securities and thus reimburse itself, vary according to the nature and size of the issue. If the issue is a very large one, the chances are that the bonds will be resold not to the individual investment public direct, but rather to a syndicate of smaller investment houses, by whom the final distribution will be effected. If, on the other hand, the issue is a moderate

one in size, the chances are against its passing through any other bankers' hands. The house purchasing the bonds in that case is far more likely to offer the bonds direct to its own clients.

There are a number of ways in which this is done. Circularizing and direct personal salesmanship are the two most important. Every investment banking house of any ac¬ count has a large list of actual and prospective clients. To this list (which in the case of some of the larger houses runs up to 20,000 or even 30,000 names) the new securities are offered. By no means, however, is the offer¬ ing necessarily limited to the existing list. Advertising, both in newspapers and maga¬ zines, to-day plays an important part in in¬ vestment banking. Through it countless new names are each year added to investment bankers' lists and through it vast amounts of new securities are each year being actually sold.

In the investment banking business the day of large profits is a thing of the past. It used to be the case that, for the banker bringing out the securities even of a corporation of established credit, there was a profit running often in excess of 10 per cent. The establish¬ ment of public service commissions all over the country and the greater degree of super¬ vision now exercised by the Interstate Com¬ merce Commission over the railroads' finances has put a stop to that. Industrial and manu¬ facturing concerns, not being subject to such supervision, are in some instances still being made to pay heavily for their money, but even here the profits of the investment banker are nothing like what they used to be.

Investment banking is by no means to be , confused with promotion — that is to say the providing of capital for new and untried en¬ terprise. To the investment banker of reputa¬ tion and who is in the business to stay, the primary consideration is by no means the amount of the profit he is going to make, but rather the safety and desirability of the in¬ vestment he is offering his clients. A clientele financially strong, and which can be relied up¬ on at the banker's suggestion to absorb any issue of securities offered, is an asset which can be acquired only by years of careful, pa¬ tient and intelligent effort. The true invest¬ ment banker, having established such an out¬ let for any new securities he may want to handle, takes the greatest care that no securi¬ ties reach clients which may impair their opin¬ ion of his own integrity and judgment.

Bibliography. — Chamberlain, L., (The Work of a Bond House) (New York 1912) ; Escher, F., (Practical Investing) (New York 1914) ; Lownhaupt, F., investment Bonds) (New York 1908).

Franklin Escher.

7. THE CLEARING HOUSE. The prin¬ ciple of offset — the application of credits to debits and the settlement of any balance remain¬ ing— as applied to banking is defined as the clearing principle. Economically it is an evolu¬ tion of the ancient system of barter by which goods were exchanged for goods, the trade being made even by giving something ((to boot® ; that is, to equalize any difference in the value of the goods exchanged. In money exchanges this principle is not involved since the amount of

money given can always be made to equalize the value of the goods taken. As soon as nego¬ tiable instruments or substitutes for value are employed, this inequality of exchange must again be provided for as is the case with origi¬ nal barter, except that money instead of some other commodity is used to make the trade equal.

History. — • The clearing principle now in operation between and among banks must have been employed as early as the general introduc¬ tion of bills of exchange into the commercial world. The origin of the first clearing house in the modern sense is, however, clouded in some obscurity. London claims the distinction of having the original bank clearing house, which was organized about the year 1773. It was the custom of the early London banks to send mes¬ sengers from one to the other, presenting checks and other bills

payable at their respective coun¬ ters for payment in money. Two of these mes¬ sengers, so the legend goes, formed the habit of meeting daily at a convenient coffee-house where they would exchange their items, paying the difference with cash which they had brought along for the purpose. Although this plan saved considerable time and the handling of much money, the characteristic dislike of the conserva¬ tive English banker for anything varying from established custom asserted itself and the offending clerks who had thus violated prece¬ dent were properly disciplined. The merits of the idea having finally prevailed, the London Bankers' Clearing House was established and is said to be the first such exchange conducted in a building set aside exclusively for that purpose.

Owing to the unsettled state of finance and the lack of a coherent banking system, it was not until 1853 that the first clearing house was established in the United States, the New York Clearing House having been founded in that year. Albert Gallatin, an eminent financier, had proposed such an organization man)' years earlier, but without success. Following the ex¬ ample of New York similar associations were formed in other large cities and immediately after the National Bank Act had taxed State bank note issues out of existence (1863-64), the deposit-and-check system of banking brought into general use so large an increase of personal checks that clearing houses multi¬ plied very rapidly. The so-called Suffolk system used by the Boston banks from 1818 to 1864 was a clearing plan adopted to facilitate the exchange and redemption of New England State bank notes, but its functions and methods were not those of the true clearing house in the generally accepted meaning of the term.

The Work of the Clearing House. — Th' clearing house is a plan, rather than a tangible entity, although in one sense the term is used to designate the building in which the actual exchanges take place, and in another the volun¬ tary association of the banks which comprise the membership. As between any two banks, there will be a simple offset of checks which each holds against the other, payment of the difference or balance being either deferred and included in the following day's transactions or else settled daily in cash. When three or more banks are involved, and the offset is accom¬ plished through a clearing house, the operation

of exchange is identical, except that each mem¬ ber bank assumes in accounting that all checks payable by its neighbors are drawn upon but one fictitious institution — the clearing house — and the bank in turn receives all checks on itself from the same source. This result is accom¬ plished by putting all checks on each other member of the clearing house in separate pack¬ ages, listing each total on the credit side of a sheet opposite the name or clearing house num¬ ber of the bank on which they are drawn. The grand total is then recorded on the bank's books as <(Exchanges for the Clearing House.®

At a fixed time all the banks meet at the clearing house through their representatives, who exchange the packages, one clerk moving around the outside of a series of desks, each of which is occupied by another clerk from the bank whose clearing house number is shown on a brass plate. This clerk records in the debit column the amount of each package of checks received from the distributing messen¬ gers. The result is that while each messenger has come to the clearing house with checks on every other member, he returns with checks on his own bank only, and this without having made a visit to each institution. The difference between the total amount brought to and taken away from the clearing house is the balance, and since the mere exchange of the items does not alter the sum of them, the total debit bal¬ ances due to the clearing house by the members who have brought less than they have received must equal the sum of the credit balances which the clearing house owes the members who have brought more than they have received. This casting of total debit and credit balances is done by the manager of the clearing house and is the proof of the correctness of the exchange. With the exception of the manager, who may be an officer of one of the member banks, all the clerical work at the clearing house is done by the bank clerks who make the exchanges. The exchange of the packages and the sub¬ sequent accounting consumes very little time, 10 to 15 minutes being sufficient to list the totals and strike the balances.

A few hours are allowed the banks after the exchange has taken place for the settlement of balances. The general hour for the ex¬ change is 10 a.m. and at noon all debtor banks must pay their balances in acceptable funds to the manager of the clearing house. At 1 o'clock all creditor banks send to the clearing house and receive payment for their credit balances. Unpaid items are accounted for directly be¬ tween the two banks involved and are not re¬ turned through the

clearing house. The clearing house acts merely as the agent for the debtor banks and is not liable in any way for the payment or genuineness of the checks which have been exchanged. Thus in a few minutes' time vast numbers of checks representing mil¬ lions of dollars are presented and later settled for with very little actual money being neces¬ sary. The ratio of balances to clearings de¬ pends upon the relative size of the banks making the exchanges and as a general average for all clearing houses it may be set down at about 10 per cent. In New York city, which has the most notable clearing house in the country, the average extending over a period of years is less than 5 per cent.

Various methods are used in settling bal¬ ances, the object being to avoid as far as pos¬ sible the use of money. Thus drafts may be used by the debtors which the manager of the clearing house deposits with one member, draw¬ ing his own drafts against this deposit in favor of the creditor banks. In many clearing houses actual currency is used, but in others, gold and other money is deposited in the vaults of the clearing house and certificates similar in nature to warehouse receipts are issued in denomina¬ tions of $5,000 or more. By using these certifi¬ cates, which cannot be negotiated except by member banks, counting and recounting large sums of money is avoided, nor is there danger of loss in carrying the money through the streets.

In acting as clearing houses for their mem¬ bers as the Federal Reserve banks are required to do under the terms of the Federal Reserve Act, the same accounting principles are em¬ ployed, with due allowance for the fact that the member banks are separated within their own districts by at least one day's mail time from their clearing house, in this instance the Reserve Bank. The checks are sent by mail instead of by messenger as in the case of a local clearing house and the balances are ad¬ justed by debits and credits to accounts with the Reserve Bank.

The 12 Federal Reserve banks also use the clearing principle in making settlement with each other through the operations of a Gold Settlement Fund held at Washington under the supervision of the Federal Reserve Board. Each reserve bank keeps a portion of its gold reserve in the form of United States gold cer¬ tificates on deposit in the Settlement Fund. Once a week each reserve bank telegraphs the amount owing by it to every other reserve bank. These totals are then offset and the balances are adjusted by debits and credits in the fund. Settlements representing the exchange transac¬ tions between the

different sections of the country are thus effected by a change in owner¬ ship of the gold which is not in any physical way disturbed. Before the establishment of this National Clearing House it was necessary to transfer large amounts of gold and currency from one section of the country to the other as the trade balance varied in accordance with the seasons.

Government. — In order that the transac¬ tions of the clearing house may be properly con¬ ducted, certain regulations are adopted. Rules govern the nature of items which may be passed through the exchanges, how they shall be en¬ dorsed, the hour of clearing and settlement; fines are imposed for lateness or errors; and the kinds of money which may be used in paying debit balances are agreed upon. This necessity for regulation has led to further clearing house development in which the banks act as an asso¬ ciation for uniformity and the common good. Many clearing houses receive out of town checks from their members and make collection. In this way better terms and quicker returns can be secured than if each bank acted inde¬ pendently. Country checks handled by a clear¬ ing house are collected and not cleared. The clearing house in this case operates as the agent of all its members and deals with the out-of- town banks much as the member banks do in

collecting checks through individual arrange¬ ment with their country correspondents.

Several of the larger clearing house associa¬ tions employ their own examiners who work independently of State or Federal officials. These local examiners not only make the usual audit and examination of the cash and books of the member banks, but they also make a careful investigation of the banks' loans and discounts from the viewpoint of the credit risk. In this way each member bank is assured that other banks in the city are being carefully managed and in position to secure expert advice if it is needed. The records of the clearing house ex¬ aminer are confidential and cannot be secured by any of the banks. All detail reports are given to the officers and directors of the

bank examined and their attention is called to any assets which are of questionable value. The judgment of the clearing house examiner is usually to be depended upon in this connection, since indirectly he represents the combined credit skill of the officers of all the banks which he investigates. It is a matter of record that no depositor has lost a dollar through the fail¬ ure of a bank subject to clearing house exam¬ inations. This system of examination was first adopted by the Chicago Clearing House in 1906.

It is expected that many of the activities of clearing houses in the United States will grad¬ ually give way in favor of the Reserve banks as these institutions develop in their super¬ visory capacity. The clearing function, however, for which all clearing houses are primarily established, is of sufficient importance in bank¬ ing to insure the continued existence of bank clearing houses under any present or future banking system.

Bibliography. — Cannon, James G., (Clear¬ ing Houses> (New York 1905) ; Hallock, James C., (Clearing Out-of-Town Checks) (Saint

Louis 1903) ; American Bankers Association, New York, General Reference Library.

O. Howard Wolfe,

Cashier Philadelphia National Bank; formerly

Secretary Clearing House Section, American

Bankers Association.

8. BANKING IN THE UNITED STATES. Prior to the adoption of the Con¬ stitution in 1787 there was but little banking done, because one of the chief elements of that business — a sound and stable monetary system — was lacking, the Continental currency having depreciated to the point of practical worth¬ lessness. With the enactment of the law of 2 April 1792, establishing a mint and regulating the coins of the United States, a new situation was created. The Constitution itself prohibited the States from coining money, emitting bills of credit and from making anything but gold and silver coin a tender in payment of debts. Upon Congress was conferred, by the same in¬ strument, sole authority to coin money and to regulate the value thereof.

Early Banking in the United States. — The first banks in the United States owed their origin to Robert Morris and Alexander Hamilton. As early as 1763 Morris had con¬ ceived the plan for establishing a bank

to as¬ sist in developing American trade, and in 1779 Hamilton had proposed the organization of “The Company of the Bank of the United States. ® .Before their plans were put into

execution, however, a bank was organized, con¬ ceived in a patriotic spirit, but destined to be short-lived.

In 1780, moved by the distressing situation in which Washington’s army was then placed, Thomas Paine, who was a clerk in the assem¬ bly of Pennsylvania, wrote to Mr. Blair Mc-Cleriachan, suggesting a subscription to support the army with necessaries, and enclosed $500. At a meeting in Philadelphia on 7 June 1780 subscriptions amounting to £400 in specie and £103,360 in Continental money were raised. On 17 June another meeting was held, and it was resolved to increase the subscription to £300,000 Pennsylvania currency, and the full amount was soon subscribed by 92 persons, Robert Morris and Blair McClenachan each subscribing £10,000. This association was called the Pennsylvania Bank. In the preamble to the resolutions of Congress accepting this patriotic offer of assistance it was recited that the subscribers had “established a bank for the sole purpose of obtaining and transporting the said supplies with the greater facility and des¬ patch. And, whereas, on the one hand, the associators, animated to this laudable exertion by a desire to relieve the public necessities, mean not to derive from it the least pecuniary advantage,® *etc.*

The directors were authorized to borrow money on the credit of the bank and to issue notes bearing 6 per cent interest. All the money borrowed or received from Congress was to be used for purchasing supplies for the Continental army and otherwise aiding the patriots. Congress, it was expected, would reimburse the bank for these expenditures. The bank commenced business 17 July 1780 and continued open for about a year and a half. Its affairs were finally wound up in the latter part of 1784. This bank was of great assist¬ ance in procuring supplies for the army that could not have been procured otherwise with¬ out the greatest difficulty. It furnished the army 3,000,000 rations and 300 barrels of rum.

The first bank, as we have seen, had its origin in patriotic impulses, and its establish¬ ment appears to have been due to the sugges¬ tion of Thomas Paine.

This institution was not a modern commer¬ cial bank, however, and it was reserved for Morris and Hamilton to become the founders of the

bank whose career was to be perpetuated and that was to live in the history of the coun¬ try as the first regularly incorporated commer¬ cial bank. Like its predecessor, it was estab¬ lished to aid the cause of American independ¬ ence. Years after its president, writing to the Comptroller of the Currency, referred to this fact by saying: “This bank was created avow¬ edly to aid the United States.®

Early in 1780 Hamilton wrote to Morris strongly urging the establishment of a national bank as one of the steps necessary to put the country on a sound financial footing and to aid in carrying on the war. Hamilton was then but 23 years old, but his views revealed the possession of unusual financial talents which were to win him distinction in later years. His purpose in forming the bank was to unite the moneyed classes in the support of the government credit. The bank was to be a great trad¬ ing and banking corporation in private hands, but backed and partly controlled by the gov-

BANKS

Courtesy The Gorham Co.

1 Bank of Toronto, Toronto, Canada. (Carrere & Hastings, Archts.)

2 First National Bank, Richmond, Va. (Clinton, Russell and A. C. Bossom, Archts.)

BANKS

~;>v’ ‘—n-.h’

MM

SPfj

pI3pf

||]r PH

IJBIIl “assi.

Courtesy The Gorham Co-

1 National City Bank, New York

2 Bankers Trust Co., New York. (Montague Flagg, Archt.)

BANKS

.. ■ ■■]

.

SIS HI

, •-

i.iiiii’’4*

safes

■■

►

Jt

Safi****”?

r* ‘

hr-/#®*#/*1* ‘rt’A-/ /■■. a—

Courtesy The Gorham Co*

1 First National Bank, Youngstown, O. (Albert Kahn, Archt.)

2 Second National Bank, Boston, Mass. (Parker, Thomas and Rice, Archts.)

BANKS

Courtesy The Gorham Co.

1 First National Bank of Denver, Denver, Colo. (Weary & Alford Co.. Archts.)

2 United States Trust Co., Washington, D. C. (B. Stanley Simmons, Archt.)

ernment. Hamilton's suggestions were re¬ newed in later letters to James Duane, a mem¬ ber of Congress from New York, and to Isaac Sears of New York. To the latter Hamilton wrote : (<We must have a bank on the true principles of a bank.* In the spring of 1781 he again wrote to Robert Morris renewing his suggestions for a national bank. Morris was then Superintendent of Finance, having been elected to that position 20 Feb. 1781. Hamilton favored a bank with a capital of not less than $3,000,000. Morris, while coinciding with his views in the main, thought a more modestly capitalized institution would better meet the requirements of the times. He accordingly drew up a plan which he presented to Con¬ gress on 17 May 1781. It provided for the establishment of the Bank of North America, for which a subscription of $400,000 was to be raised, payable in gold or silver. Its bank notes, payable on demand, were to be receivable for duties

and taxes in every State. The plan having been approved by Congress, the Super¬ intendent of Finance published it on 28 May, accompanied by an address, in which he said :

<(A depreciating paper currency has unhap¬ pily been the source of infinite private mischief, numberless frauds and the greatest distress. The national calamities have moved with an equal pace, and the public credit has received the deepest injury. The exigencies of the United States require an anticipation of our revenue ; while at the same time, there is not such confidence established as will call out, for that purpose, the funds of individual citizens. The use, then, of a bank, is to aid the Gov¬ ernment by their moneys and credit, for which they will have every proper reward and secu¬ rity, to gain from individuals that credit which property, abilities and integrity never failed to command, to supply the last of that paper money which, becoming more and more useless, calls every day more loudly for its final re¬ demption, and to give a new spring to com¬ merce, in the moment when, on the removal of all its restrictions, the citizens of America shall enjoy and possess that freedom for which they contend.*

The facts above referred to in regard to the depreciation of the paper currency are sub¬ stantiated from the following extracts from a newspaper of that period:

((The Congress is finally bankrupt. Last night a large body of the inhabitants, wilh paper dollars in their hats, by way of cockades, paraded the streets of Philadelphia, carrying colors flying, with a dog tarred, and instead of the usual appendage and ornaments of feath¬ ers, his back was covered with the Congress paper dollars. This example was directly fol¬ lowed by the jailer, who refused accepting the bills in purchase of a glass of rum, and after¬ wards by the traders of the city, who shut up their shops, declining to sell any more goods but for gold and silver.*

The purchasing power of government paper was at an end, and Congress turned to a bank, organized on a specie basis, for relief from the evils of a depreciated currency.

On 1 Nov. 1781 the Bank of North America was organized, Thomas Willing being chosen president, and a few days later Tench Francis was elected cashier. It began business 7 Jan.

1782, and has continued from that time until the present, a worthy

memorial to the genius and wisdom of its founders, an honor to the city of Philadelphia and always a strong sup¬ porter of the public credit.

The Bank of North America had a charter from the Federal Congress and from the States of Delaware and Pennsylvania. In 1864 it entered the national banking system. In view of its age, and other circumstances connected with its history, it was permitted to retain its original title. All other national banks are required to have the word (<National* as a part of their name.

In the early financial history of the United States no two names occupy a more dis¬ tinguished place than those of Morris and Hamilton. The contributions of the former to relieve the sufferings of the patriots attest alike his patriotism and humanity, and he also pos¬ sessed financial genius of a high order.

Alexander Plamilton, as the first Secretary of the Treasury under the Federal Constitu¬ tion, laid the foundations of our financial sys¬ tem and firmly established the public credit. On his accession to this high office it was to be expected that he would soon attempt to carry into effect his views in regard to a government bank.

Hamilton's first aim was to strengthen the Federal Union, and one of his plans for doing this was to put the public credit beyond ques¬ tion and thus gain confidence for the new government. He favored the payment of the foreign and domestic debt and the assumption of the State debts by the Federal government. The first proposition was readily agreed to, the latter was carried with some difficulty, and the proposal to assume the State debts was at first defeated, but was afterward carried by an alliance formed between Hamilton and Jeffer¬ son, by which Hamilton agreed to use his in¬ fluence to secure the permanent location of the capital on the Potomac in return for Jeffer¬ son's assistance in getting votes in Congress for the debt assumption plan. This compact was effectual. Hamilton did not consider the location of the capital as a question involving any essential principle, while he regarded the financial policy he had marked out as being necessary to the welfare of the country. Jef¬ ferson and he were both members of the cab¬ inet, and the differences which were to divide them in later years had not yet developed.

The Bank of New York, located in New York city, is another historic institution. It commenced business on 9 June 1784. The con¬ stitution of the bank, which was written by Alexander Hamilton, provided that the capital stock should consist of $500,000 gold or silver. Though the

bank commenced business in 1784 it did not get a charter from the New York legislature until 21 March 1791.

The Massachusetts Bank was incorporated at Boston 7 Feb. 1784 and commenced business on 5 July of that year, $253,500 of its capital of $300,000 being paid in.

The incorporation of these banks marks the change from the period of depreciated Continental and State currency to a system of bank notes redeemable in specie. This is the beginning of an important epoch in American banking history.

BANKS AND BANKING — BANKING IN THE UNITED STATES (8)

FIRST BANK OF THE UNITED STATES

Hamilton as Secretary of the Treasury proposed a national bank in his report for 1790. Contrasting the superiority of the pro¬ posed bank to an emission of United States notes, Hamilton pointed out that the right to issue paper of this character was <(so certain of being abused that the wisdom of the gov¬ ernment will be shown in never trusting itself with the use of so seducing and dangerous an experiment.®

The proposed plan was arranged under 24 heads. The capital of the proposed bank was fixed at $10,000,000; one-fourth of all the pri¬ vate and corporate subscriptions was to be paid in gold and silver and three-fourths in United States stock bearing 6 per cent interest. Two million dollars were to be subscribed by the United States, a loan of equal amount being made in return by the bank, which was to be reimbursed in 10 equal annual instalments in money or in the bonds of the government in a manner similar to that pursued by the Brit¬ ish government upon the organization of the Bank of England; or, as Mr. Hamilton de¬ scribed the operation, by <(borrowing with one hand what is lent with the other.® The board of directors of the bank was to consist of 25 persons, not more than three-fourths of them to be eligible for re-election in the next suc¬ ceeding year. The bank had authority to loan on real estate security, but could only hold such real estate as was requisite for the erec¬ tion of suitable banking houses or

should be conveyed to it in satisfaction of mortgages or judgments. No stockholder, unless a citizen of the United States, could be a director and the directors were to give their services with¬ out compensation. The bills and notes of the bank were made receivable in payment of all debts to the United States. The total amount of debts which the corporation might at any time owe in any way, except for moneys ac¬ tually deposited in the bank for safe-keeping, was never to exceed $10,000,000 and if this limit was exceeded the directors under whose administration the excess might occur were to be personally liable for the amount. The cor¬ poration was allowed to sell the evidences of the public debt subscribed to its stock, but was not to purchase any public debt whatever. Notes were allowed to be issued, payable to any person or persons, assignable and nego¬ tiable, or to bearer assignable by delivery. The directors were permitted to establish of¬ fices for discount and deposit only, wherever they should think fit in the United States. A report of the condition of the bank was to be furnished whenever the Secretary of the Treas¬ ury required it, but not oftener than once a week. The charter was to expire 4 March

1811.

Although the bill for chartering the bank was opposed by Madison and Jefferson, as well as by Randolph, the Attorney-General, Hamil¬ ton's wishes prevailed and the bill for chartering the bank became a law 25 Feb. 1791.

Operation of the Bank. — The bank went into operation very soon after the act author¬ izing it became a law, and before the govern¬ ment subscription of $2,000,000 was paid; a dividend of 4 per cent was declared in July 1792. The manner of paying the government subscription was as follows: The President

drew bills of exchange on Holland, where money borrowed in that country under the laws of 4 and 12 Aug. 1790, was lying available. These were handed to the bank and the latter issued $2,000,000 in its stock. Immediately the bank loaned $2,000,000 in its own bills to the Treasury and received $2,000,000 of United States stocks bearing 6 per cent interest, and payable in 10 equal annual instalments begin¬ ning in 1793. The bank was very well managed and was of great benefit to the government and the people at large. It assisted the Treasury with loans whenever called on and it forced the State banks to keep their issues within reason¬ able bounds. It received and disbursed more than $100,000,000 of public moneys without the loss of a dollar.

Under the requirement that a report of the condition of the bank should be furnished to the Secretary whenever required by him, but not oftener than once a week, the Treasury records do not show that any formal reports were ever made to the department. The only balanced statements to be found showing the condition of the bank are two, which are con¬ tained in letters of Albert Gallatin, Secretary of the Treasury, communicated to Congress on 2 March 1809 and 24 Jan. 1811, respectively. The reports are as follows :

FIRST BANK OF UNITED STATES - STATEMENT OF CONDITION

Resources January, 1809

Loans and discounts . $15,000,000

United States 6 per cent.

stock . 2,230,000

Other United States indebt¬ edness .

Due from other banks . 800 , 000

Real estate . . 480 , 000

Notes of other banks on hand .

Specie . 5 , 000 , 000

January, 181 1

$14,578,294

2,750,000

57,046

894,145

500,653

393,341

5,009,567

Liabilities

Capital stock .

Undivided surplus .

Circulating notes outstanc

Individual deposits .

United States deposits…

Due to other banks .

Unpaid drafts outstanding . .

$23,510,000

$24,183,046

$10,000,000

$10,000,000

510,000

509,678

? 4,500,000

5,037,125

8,500, 000

5,900,423

1,929,999

634,348

171,473

$23,510,000

$24,183,046

The average dividends of the bank from its organization to March 1809 were at the rate of 8V2 per cent per annum. The 5,000 shares of $400 each owned by the United States were disposed of in the years 1796 to 1802 at a con¬ siderable profit, 2,220 shares having been sold in the last-mentioned year at a premium of 45 per cent. According to the treasury records the government subscription, with the addition of

the interest which was paid by the United States on stock issued for it, amounted to $3,200,000, while there was received by the treasury in dividends and from the sale of the bank stock at various times $3,773,580, the profit realized by the government being $573,- 580, or nearly 28.7 per cent upon the original investment.

In addition to the Act of December 1791, chartering the bank, four supplementary acts were passed by Congress in reference to it: one on 2 March 1781, which varied the manner in which the capital stock was to be subscribed for and paid in ; two passed in 1798 and 1807, respectively, having reference to

counterfeiting its notes and papers or otherwise defrauding it; and one in 1804 permitting the establishment of offices of deposit and discount in the Territories and dependencies.

Application for a renewal of the charter of the bank was made in 1808. Secretary Gallatin, in his annual report for 1809, favored the re¬ newal, with certain modifications, but after a protracted debate in both Houses of Congress the application of the bank was rejected.

The banking house and most of the assets of the Bank of the United States, including over $5,000,000 in specie, were purchased by Stephen Girard, of Philadelphia, who at once started the Girard Bank, which, converted to a National bank in 1865, continues to this day. The purchase and transfer came about in this way. In 1810 Girard had large balances with the Barings, amounting to £116,701. In 1811 the indebtedness of that firm to him was nearly £200,000. The difficulties in trade with the Con¬ tinent were great and the Barings were in danger. Mr. Girard sent two agents to London to do what they could to withdraw the amount due and transmit it to America. Part of the funds were invested in goods and part in Amer¬ ican 6 per cent stocks and United States Bank shares, then at about $430% (£98 10s.) per share. The Barings, it will be remembered, had purchased a large amount of the bank stock from the United States government in 1804. The stock Girard had purchased gave him a large interest in the bank ; and, in the spring of 1812, he found by consultation with George Simpson, the cashier of the old institution, that the bank building and cashier’s house could be purchased for $120,000, less than one-third

of its cost. The purchase was made, the property was transferred to Girard, and his new bank commenced operations on 12 May 1812, with $1,200,000 capital, which was afterward in¬ creased to $1,300,000.

Much of the business of the Bank of the United States was transferred to Girard's Bank, together with $5,000,000 in specie. The officers and employees of the old bank were retained at the same salaries. Girard bought the stock expecting the charter of the Bank of the United States to be renewed. If this had occurred he would have made a fortune by the rise in stock. But, as it was, he saved himself by the purchase of the old bank. He did not use the old circu¬ lating notes, but paid out notes of State banks till his own were printed, which bore the de¬ vice of a ship under full sail and an American eagle.

The stockholders of the Bank of the United States received, on the final winding up of the institution, $434 per share, which, with divi¬ dends averaging about 8 per cent per annum, made it no bad investment. Many, however, had bought and sold at much higher rates some years previous to the expiration of its charter. The United States government sold to the Bar¬ ings for a premium of 45 per cent in 1802, or $580 per share.

In view of the success of the bank, it is in¬ teresting to quote some of the expressions in regard to it, appearing in the debates in Con¬ gress. Mr. Boyd considered the bank "a great swindle® ; Mr. Desha referred to the recharter proposed as one to (<foster a viper in the bosom of our country®; Air. Wright said the charter

was "a cancer upon the body politic.® In the press it was referred to as (<an hydra,® "a cer-berus,® a "gorgon,® a "vulture" and a "viper.® These expressions typify the prejudice then existing, and which still exists, in this country against concentrated banking power, and all the denunciations above quoted can be matched from debates and newspaper articles on banking at the present day.

SECOND BANK OF THE UNITED STATES.

Early in 1814 proposals were made to or¬ ganize a national bank, and on 10 February of that year a bill was introduced in the House for the incorporation of such an institution with a capital of $30,000,000, but the bill failed, and other attempts were unsuccessful also, until finally a bill based upon the suggestions of Mr. Dallas, the Secretary of the

Treasury, be¬ came a law by the signature of President Madi¬ son 10 April 1816.

Mr. Dallas on 6 Dec. 1815, sent to the speaker of the House a proposition relating to the national circulating medium. He consid¬ ered four questions : Whether it was practicable to renew the circulation of gold and silver coins ; whether the State banks could be suc¬ cessfully employed to furnish a uniform cur¬ rency; whether a national bank would be more advantageously employed for the purpose; and, last, whether the government itself could sup¬ ply and maintain a paper medium of exchange. In regard to the State banks, while acknowledg¬ ing the valuable services and liberality of some of them, he said : "The truth is, that the char¬ ter restrictions of some of the banks, the mutual relation and dependence of the banks of the same State, and even of the banks of the differ¬ ent States, and the duty which the directors of each bank conceive they owe to their immediate constituents upon points of security or emolu¬ ment, interpose an insuperable obstacle to any voluntary arrangement upon national considera¬ tions alone for the establishment of a national medium through the agency of the State banks.® He concluded against the possibility of specie alone, against government issues, and finally that a national bank was the best and perhaps the only resource. At the request of the Na¬ tional Currency Committee of the House, Air. Dallas, on 24 Dec. 1815, enclosed an outline of a plan for a national bank. He proposed now a bank for 20 years with a capital of $35,000,000, $7,000,000 of which was to be subscribed by the government. This might be augmented to $50,000,000 by Congress, the increase to be di¬ vided among the States. It was to be located in Philadelphia, and could establish branches -or employ State banks as branches. It was to pay specie at all times, and not to suspend without authority of Congress. In lieu of the loan, it was to pay the government a bonus of $1,500,000.

A bill was introduced embodying Mr. Dal¬ las' suggestions on 26 Feb. 1816. The debate was chiefly upon a motion to reduce the capital to $20,000,000. In this debate Mr. Clay spoke in favor of the bank. Two reasons he gave for changing his position were that, in 1811, when he voted against the recharter of the old bank, he was instructed by the legislature of his State to do so, and at that time he did not deem a national bank as necessary in a consti¬ tutional sense. He then relied upon the State banks as being able to meet all the wants of

the government financially ; it now appeared that the general government could no longer depend upon them. A national bank seemed to him now not only necessary, but indispensable. At one time Philadelphia was struck out and New York selected as the principal seat of the bank by a vote of 70 to 64, but this was re¬ considered and Philadelphia replaced. The bill finally passed the House without important amendment, on 14 March 1816, by a vote of 80 to 71. It was introduced in the Senate on 22 March and passed on 3 April with one or two amendments that, when the bill came to the House next day, Mr. Calhoun pronounced to be slight. Upon 5 April they were concurred in and on 10 April the bill received President Madison's signature.

Provisions of the Charter. — • The charter was limited to 20 years, expiring on 3 March 1836. The capital was fixed at $35,000,000, $7,000,000 of which was to be subscribed by the government, payable in coin or in stock of the United States, bearing interest at 5 per cent and redeemable at the pleasure of the govern¬ ment. The remaining stock was to be sub¬ scribed for by individuals and corporations, one-fourth being payable in coin and three-fourths in coin or in the funded debt of the United States. Five of the directors were to be appointed by the President, and all of them were required to be resident citizens of the United States, and to serve without compen¬ sation. The amount of the indebtedness, ex¬ clusive of deposits, was not to exceed the cap¬ ital of the bank. The directors were empow¬ ered to establish branches, and the notes of the bank, payable on demand, were receivable in all payments to the United States. The penalty for refusing to pay its notes or deposits in coin, on demand, was 12 per cent per annum until fully paid. The bank was required to give the necessary facilities, without charge, for trans¬ ferring the funds of the government to differ¬ ent portions of the Union and for negotiating public loans. The moneys of the government were to be deposited in the bank and its branches, unless the Secretary of the Treasury should otherwise direct. No notes were to be issued of a less denomination than $5, and all notes smaller than $100 were to be made payable on demand. The bank was not directly or indirectly to deal in anything except bills of exchange, gold or silver bullion, goods pledged for money lent, or in the sale of goods really and truly pledged for loans, or of the proceeds of its lands. No other bank was to be established by

authority of Congress during the continuance of the corporation, except such as might be organized in the District of Columbia with an aggregate capital not ex-/ ceeding $6,000,000; and, in consideration of all the grants of the charter, the bank was to pay to the United States a bonus of $1,500,000 in three annual instalments.

Mr. Dallas, whose first plan for a national bank was so unceremoniously rejected, was ap¬ pointed Secretary of the Treasury by Mr. Mad¬ ison in February 1814. His predecessor, Mr. Gallatin, who had been appointed Commis¬ sioner to Russia to negotiate a treaty of peace and commerce with Great Britain and treaty of commerce with Russia, left the country in May 1813, and the Treasury without a head.

In June the Senate refused to confirm Mr. Gallatin as commissioner, and Madison still regarded him, though absent, as head of the Treasury. Under these circumstances Mr. Mason moved a resolution in the Senate on 24 Jan. 1814, declaring the secretaryship of the Treasury vacant, but the subject was postponed inasmuch as it was authoritatively announced that the President would appoint a secretary in a few days, which promise was fulfilled.

The Bank Commences Business. — Section 22 of its charter required the bank to com¬ mence operations by the first Monday in April 1817. The bank went into operation on 7 Jan. 1817. This was at the worst stage of the monetary troubles, beginning with the suspen¬ sion of specie payments in 1814 and continuing until the general crash in 1819 and 1820. At this time lands and agricultural products had fallen to one-half the prices which were readily obtainable in 1808 and 1810, and to one-third of the value they possessed when the excessive indebtedness of the people was incurred — namely, during the inflation years of the State banks. The contraction of the circulation and the general failures of the State banks began in 1818. The second United States Bank, therefore, came into existence on the very verge of a great monetary crisis. When it commenced business the first instalment of capital, amounting to $1,400,000 in specie and $7,000,000 in United States stocks, had been paid. The subscription had been opened 7 July 1816. The payment of the second instal¬ ment of capital became due on 7 Jan. 1817. The law required this to be paid $10 in specie and $25 in United States stock or specie. It appears, however, that instead of requiring the stockholders to pay in this instalment from outside sources, the bank on 7 January began to discount the notes of stockholders upon the pledge of their stock to

the amount required to pay the specie part, and in some cases to the full amount of both specie and United States stock required to make up the whole instal¬ ment. After a time discounts were made to the full value of the stock, which enabled the stockholders not only to pay up in full, but even to draw out what they had first advanced. The discounts were made in the bank's bills, which were considered equal to specie. Of the $28,000,000 capital subscribed by individuals $7,000,000 was to have been paid in specie and $21,000,000 in United States stock. The bank appears to have actually received nearly $2,000,- 000 in specie and $13,872,610 in public stocks. The difference represents about the amount made up by stocks. The bank, therefore, was forced to import the coin it needed, and up to November 1818, had thus acquired $7,311,750 in specie at an expense of $525,297.

Speculation in Bank's Stock.— The direct¬ ors of the new institution appear to have made every effort to boom the stock in the market. Not only did they ˆfacilitate® the payments of the instalments by discounting to the full amount of the stock, but they also encouraged trading in stock by authorizing the renewal of stock notes as they fell due and by permitting the purchaser to substitute his note, secured by the purchased stock, for that of the previous holder. Further than this, they soon began to authorize discounts on pledge of stock to its

full market value. One could purchase bank shares without the advance of a cent. It was only necessary to apply for a loan upon the security of the shares to be bought, and pay for the stock with the proceeds. When the price of shares rose sufficiently a sale could be made and the difference pocketed. It appears that the president, William Jones, and a number of directors and officers, especially those con¬ nected with the Baltimore branch, had direct personal interest in these transactions, which they did not pretend to conceal, but considered as lawful private concerns. The stock rose as high as $156 per share in August 1818, but soon after fell to about $110. While there were no doubt gross irregularities in its management, for which the bank was soon to suffer, it did much good even under these disadvantages. It received upon deposit from the United States Treasury the notes of State banks, and in re¬ turn furnished a uniform currency. It trans¬ ferred funds whenever needed, and the amount

paid in in United States stocks had its effect in enhancing the credit of the government loans. It exerted sufficient influence upon the currency to make itself very unpopular with the State banks during the financial crisis of 1818, al¬ though those even who were hostile to it ad¬ mitted its policy toward the State institutions had been marked by great consideration and lenity. In fact, on this point its enemies were obliged to fall back on the charge that by this very lenity and consideration it had led the State banks to unduly extend their business, had drawn them into temptation and made them unfit to meet the financial storm. It did not accustom the local banks to pay specie soon enough, and by putting off the evil day found them unprepared at last. Up to August 1818 the bank redeemed its notes, both of the parent bank or its branches, at any of its offices where they might be presented, but after that date redeemed its bills only at the office which put them in circulation. This change was made because the bills were largely used for purposes of remittance, and in the localities where a sound local currency was most needed the bills were gathered up and sent off, leaving the field to the inferior State bank circulation. A more important reason was that the change enabled the bank to realize a profit by the sale of its drafts. This change was persevered in and afterward afforded the basis of President Jackson's assertion that the bank did not fur¬ nish a uniform currency.

Although some losses were sustained by the Baltimore branch of the bank, the institution went along without encountering any particular political hostility until 1829, when President Jackson in his annual message to Congress raised the question of the constitutionality of the bank, claiming at the same time that (<it has failed in the great end of establishing a uniform and sound currency.** He suggested that if a national bank was necessary one might be de¬ vised founded upon the credit of the govern¬ ment and its revenues, thus avoiding the ques¬ tion of constitutionality.

At the beginning of the administration of General Jackson, says Mr. Parton, the Bank of the United States was a truly imposing institution. Its capital was $35,000,000. The public money deposited in its vaults averaged

six or seven millions ; its private deposits six millions more ; its circulation twelve millions ; its discounts more than forty millions a year ; its annual profits more than three millions. Its capital was, therefore, about one-quarter, and its loans, circulation and deposits

about one-fifth of the whole amount held and issued by all the banks of the country. Besides the parent bank at Philadelphia, with its marble palace and 100 clerks, there were 25 branches in the towns and cities of the Union, each of which had its president, cashier and board of directors. The employees of the bank were more than 500 in number, all men of standing and influence, all liberally salaried. In every State of the Union and in many foreign nations of the globe were stockholders of the Bank of the United States. One-fifth of the stock was owned by foreigners. One-tenth of its stock was held by women, orphans and trustees of charity funds. Its bank notes were as good as gold in every part of the country. From Maine to Georgia, from Georgia to Astoria, a man could travel and pass these notes at every point without discount, and it is said that in London, Paris, Rome, Cairo, Calcutta, Saint Petersburg and other prominent cities, the notes of the Bank of the United States were within a frac¬ tion more or a fraction less than their value at home, according to the current rate of ex¬ change. They could actually be sold at a pre¬ mium at the remotest commercial centres. It was not uncommon for the stock of the bank to be sold at a premium of 40 per cent. The directors of the bank were 25 in number, of whom five were appointed by the President of the United States. The bank and its branches received and disbursed the entire revenue of the nation.

The first real attack upon the second Bank of the United States originated in a political controversy. Jeremiah Mason had been elected president of the branch of the bank at Ports¬ mouth, N. H. On his accession to this position he instituted some reforms in the management which rendered him unpopular. This gave to Levi Woodbury, a political antagonist, an op¬ portunity to demand his removal. The charges against Mason and others of like nature affect¬ ing the branches in Kentucky and Louisiana were transmitted by Secretary Ingham to Nicholas Biddle, president of the bank. The attacks upon Mason and the Portsmouth branch continued and grew more violent, and the political hostility of President Jackson was increasing. In his message for 1831 he again called the attention of Congress to the question of recharter. A bill with this object in view passed both Houses of Congress in the follow¬ ing year, but was vetoed by President Jackson on 10 July.

Jackson's inconsistency in his message and in his veto are thus summed up. In 1829, when the charter had yet seven years to run, he calls attention to the necessity of prompt action as to the recharter in order to avoid precipitancy. In 1830 when the charter had yet six years to run, he advocates timely action. In 1831, there being five years more, he reiterates his previous advice ; but, in his veto in 1832,

when four years only remain to the bank, he says there is no need of haste.

But although the veto was exceedingly vul-

nerable from almost every standpoint, it served its purpose in arousing the popular feeling against the bank and in favor of Jackson. Ben¬ ton, who in the Senate defended the veto against the attacks of Webster, Clay, Calhoun and Ewing, voiced the whole spirit of the party he represented when he said :

«You may continue to be for a bank and for Jackson, but you cannot be for this bank and for Jackson. The bank is now the open, as it has long been the secret, enemy of Jackson. The war is now upon Jackson, and if he is defeated all the rest will fall an easy prey. What individual could stand in the States against the power of that bank, and that bank flushed with a victory over the conqueror of the conquerors of Bonaparte? The whole Gov¬ ernment will fall into the hands of the moneyed power. An oligarchy would be immediately es¬ tablished, and that oligarchy in a few genera¬ tions would ripen into a monarchy.®

The bill for the recharter could not secure the necessary two-thirds vote for the passage over the veto. Nor did the supporters of the bank fully realize, even then, the effect of the President's opposition. They • thought the people would be disgusted at Jackson's un¬ reasonable attitude. Nicholas Biddle wrote to Clay that he was delighted with the veto. The campaign of 1832 was fought on the bank issue. It was the hero of New Orleans against the <(monster monopoly.® It was Jackson like a hero of romance fighting against w01d Nick's Money® and ((Clay's Rags.® The bank, having foolishly gone into politics, was defeated and Jackson again elected. The support of the people was at once claimed for all past and future warfare on the bank, and the result of the election sealed its doom. The attack prom¬ ised on the stump began at once.

In his message in 1832, after his re-election in November of that year, the President again fulminates against a recharter of the institution, recommending that the seven millions of stock of the bank held by the United States should be sold, and going further intimates that the United States deposits in the bank were not safe. He either was or affected to be im¬ pressed with the idea that so long as the bank was the holder of the public funds it might use them to corrupt Congress to secure an extension of its existence. In consequence of the message bank stock fell from 112 to 104. A Treasury agent who made an examination of the institu¬ tion reported it solvent and the stock went back to 112. Congress did not coincide with the views expressed by the President, and refusing to sell the bank stock, passed a resolution, by a vote of 110 to 46, of confidence in the safety of the deposits.

The President had made up his mind to cripple the bank by taking away from it the public deposits, and the then Secretary of the Treasury, Mr. Duane, refusing to carry out his wishes, he was superseded by Attorney-General Taney, who on 26 Sept. 1833, issued the order for the removal. In consequence of this act, the following resolution was introduced in the Senate by Mr. Clay: <(That the President, in the late executive proceedings in relation to the public revenue, has assumed on himself authority and power not conferred by the Con¬ stitution and law's but in derogation thereof.®

This, known as the "censure resolution,® was passed by a vote of 26 to 20. On 28 March, 1834, this resolution was expunged from the records of the Senate.

Jackson's opposition, on one ground or an¬ other, continued, and the bank gave up all hopes of obtaining a new lease of life, but on 13 Feb. 1836, 13 days before the expiration of its charter, obtained a charter from the legislature of Pennsylvania. The subsequent career of the bank was short and disastrous. A constantly increasing amount of loans on stocks gradually tied up its resources, so that by 1840 it was found that the assets of the institution con¬ sisted chiefly of all kinds of internal improve¬ ment stocks and bonds as well as of State stocks and bonds and bank stocks.

But the United States was not a loser by the bank's failure.

The $7,000,000 of stock held by the United States, previous to the change to a State char¬ ter, was paid back in full, and the government realized a handsome profit on its investment, as will appear by the

following statement derived

from the records of the Treasury Department:

Bonus paid by bank to the United States. . $1 ,500,000 00

Dividends received from the bank . 7,118,416 29

Proceeds of stock sold and other moneys

received from the bank . 9,424,750 78

Total . $18,043,167 07

Subscription to capital stock paid in United

States. 5 cent bonds . $7 , 000 , 000

Interest paid by United States

on same . 4,950,000

- 11,950,000 00

Profit on investment . $6,093,167 07

The history of the United States Bank under its Pennsylvania charter, subsequent to the crisis of 1837, was a most disastrous one. It sus¬ pended specie payments during the ticklish period from 1837 to 1841 as often as other State banks, and finally went dowrn under circum¬ stances that might, with prudent management, have been turned to a successful result. It made three several assignments in 1841 to secure various liabilities, the last and final assignment being on 4 September of that year.

The final result of the liquidation of the bank was briefly stated in a

letter from Thomas Robins, Esq., then president of the Philadelphia National Bank who wras the last survivor of its numerous assignees :

(< All the circulating notes of the Bank of the United States, together with the deposits, were paid in full, principal and interest, and the accounts of the assignees were finally settled in 1856. There were no funds, and no dividend w'as paid to the stockholders of the bank; the whole twˆenty-eight millions of dollars were a total loss to them.®

Nicholas Biddle was president of the bank from January 1823 to March 1839, being presi¬ dent of the Bank of the United States until its charter expired in 1836, and for the next three years president of the United States Bank of Pennsylvania. At the time of his resignation the shares wrere selling at 111, having in 1837 sold at 137 ; but, in 1843, after the failure, its shares were quoted at 1ˆ per cent.

Both the first and second Banks of the United States were killed by the prejudice against banks, which exists to an even greater

extent to-day. The fall of the latter institution was hastened by bad management.

the specie circular.

The order for the removal of the public deposits from the Bank of the United States was dated 26 Sept. 1833. After this date the money collected from customs and other sources of revenue was no longer paid into the Federal bank, but was deposited with selected State banks, called ((pet banks® by the opponents of the Administration. The payment of the public debt and the great increase in the sales of public lands caused the surplus of rev¬ enue over expenditures to increase in an un¬ precedented manner. The Bank of the United States in its most prosperous days had never had in its vaults much over $8,000,000 of the public moneys at any one time; but by 1 Nov. 1836, 88 JState banks in 24 States with a capital of $77,576,449, held public deposits amounting to $49,377,986. Their ordinary individual de¬ posits at the same time were only a little over $25,000,000. That there was any very clear apprehension of the extent to which this ac¬ cumulation of wealth would take place may be doubted, but it is certain that as early as 1829 there were calculations made upon an

antici¬ pated surplus of revenue as an aid to party advancement, either by means of the bank or in spite of it. The financial stringency of 1834 indicated that the removal of the public funds to the State banks had seriously disturbed the usual course of loans, and the consequent suf¬ fering started a demand for the distribution of the accumulating surplus among the several States. The State banks had thrown their in¬ fluence against the Federal bank in aid of the Administration, and they were allowed to reap their reward by the use of the public moneys entrusted to them as a basis of extending their loans and for enormous issues of their own notes. Banks were started for the sole pur¬ pose of issuing notes that might be turned in at the land offices for public land. Good land office money was the test of the credit of a bank bill. Speculators thus obtained vast tracts of valuable land. The notes appeared to go through the hands of innocent third parties. When the bank failed, as it usually did, the Treasury bore the loss. Even in less flagrant cases the bank credit enabled immense territory to be held for speculation, keeping out actual settlers. Under this stipulation the receipts from the sales of public lands rose from about

$5,000,000 in 1834 to $24,800,000 in 1836. These later receipts were almost altogether in bills of State banks; and thus the consequent difficulty in securing specie, and the losses incurred from bank failures, impelled the President (Jackson) to cause the Secretary of the Treasury to issue, on 11 July 1836, the celebrated specie circular forbidding the receipt of anything but specie in payment of the public lands. He also pocketed a bill passed by Congress to compel the receipt of the notes of specie-paying banks.

INDEPENDENT TREASURY SYSTEM.

Following experiences with the Bank of the United States and the State banks as cus¬ todians of public funds, the Independent Treas¬ ury System, by which the government might take charge of its own funds, came into exist¬ ence by the Act of 4 July 1840, though the law was repealed in the following year, and was not again re-enacted until 6 Aug. 1846. The operations of this law were substantially changed by the National Currency Act of 1863, and the latter in turn by the Federal Reserve Act of 1913.

The method of handling the Treasury re¬ ceipts has been the subject of much criticism. Instead of depositing the public funds in the banks in the ordinary course of business, to be drawn against as needed, it

has long been the practice of the Secretary of the Treasury to make large withdrawals and deposits in bulk. Very often the deposits have been made for the purpose of affording relief to the money mar¬ ket or for assisting in moving the crops and sometimes in the attempt to prevent panic. That the system has worked badly is the belief of those most competent to judge. It has been remedied in part by the Federal Reserve Act (q.v.), but the Secretary of the Treasury is still clothed with large discretionary powers in handling the public funds. Charges have been made at times that the surplus revenues were being employed for the benefit of Wall street speculation, and at others that they were being deposited in banks in certain localities for political effect. Whatever truth there may be in these charges, it is certain that the alternate deposit and withdrawal of large amounts of public funds have exercised an artificial in¬ fluence on the money market. This would be obviated were the receipts of the government deposited in the banks and withdrawn in the ordinary course in accordance with usual busi¬ ness practicq. .

Banking power of the United States, 20 June 1917:

(Money columns in millions.)

Number of banks

Capital paid in

Surplus and profits

Deposits 1

National

bank

circulation

and

Federal

reserve

notes

Total, June 1917

- i. ■ i. - i ■ i !■’ - .

National banks .

Reporting State banks .

Non-reporting private banks 2 .

Total .

Federal reserve banks .

Grand total .

7,604

20,319

2,830

$1 ,082.8

1,191.4

50.0

$1 , 134.9 1,484.8 30.0

$9 ,746.2 16,782.9 450.0

$660 . 4

$12,624.3

19,459.1

530.0

30,753

12

$2,324.2

57.2

$2,649.7

$26,979.1

1,302.0

$660 . 4 500.5

$32,613.4

1,859.7

30,765

$2,381 .4

$2,649.7

$28,281.1

$1,160.9

$34,473.1

1 Includes dividends unpaid, postal savings and United States deposits, but not amounts due to banks, except in case of reserve deposits with Federal reserve banks, which banks are required to maintain in gold and lawful money a reserve of not Jess than 35 per cent against deposits.

- Estimated on basis of capital, etc., of reporting private banks.

Banking Statistics. — Statement of the principal items of resources and liabilities of 27,935 report¬ ing banks, including the Federal reserve banks in the United States and island possessions June 1917:

27,923 reporting banks June 20, 1917

12 Federal reserve banks , June 22, 191 7

Total, 27,935 banks

Resources

Loans and discounts .

Overdrafts .

Investments …

Banking house, furniture and fixtures

Other real estate owned .

Due from banks .

Checks and other cash items .

Exchanges for clearing house .

Cash on hand . .

Other resources .

Total resources .

Liabilities

$20,594,228,088 91 47,199,175 92 8,003,819,982 90 709,065,343 55 153,901,863 77 4,793,167,162 83 272,608,629 09 486,082,803 20

1,502,502,076 06 564,188,012 08

$37,126,763,138 31

$435,287,000 00

‘ i 1 7 j 362 j 000 00

* 198,387,000 00

1,247,698,000 00 908,000 00

$1,999,642,000 00

$21,029,515,088 91 47,199,175 92 8,121,181,982 90 709,065,343 55
153,901,863 77 4,991,554,162 83 272,608,629 09 486,082,803 20
2,750,200,076 06 565,096,012 08

$39, 126,405, 138 31

Capital stock paid in .

Surplus .

Undivided profits .

National bank circulation .

Due to banks .

Federal reserve note circulation

Dividends unpaid .

Deposits .

United States deposits .

Postal-savings deposits .

Notes and bills rediscounted …

Bills payable .

Other liabilities .

Total liabilities .

$2,274,200,153 48 1,945,543,680 73 674,190,643 25 660,431,000 00 3,913,944,423 51

4,585,947 01 26,289,708,159 14 132,965,000 00 101,873,406 56 167,470,882 78 317,853,113 00 643,996,728 85

$37,126,763,138 31

$57,171,000 00

2943,790,000 00 3 500,497,000 00

495,807,000 00

2,377,000 00

$1,999,642,000 00

$2,331,371,153 48 1,945,543,680 73 674,190,643 25 660,431,000 00 4,857,734,423 51 500,497,000 00 4,585,947 01 26,289,708,159 14 628,772,000 00 101,873,406 56 167,470,882 78 317,853,113 00 646,373,728 85

$39,126,405,138 31

1 Uncollected items and due from other Federal reserve banks.

2 Due to members-reserve account, $806,209,000, and collection items, $137,581,000.

3 Includes $766,000 Federal reserve bank notes.

Number of savings banks in the United vStates, number of depositors, amount of savings deposits, average amount due each depositor in the years 1903 to 1917, and average per capita in the United States in the years given —

Year

1903, .

1904 .

1905 .

1906 .

1907 .

1908 .

1909 .

1910 .

1911 .

1912 .

1913 .

1914 .

1915 .

jo., I Mutual savings banks

\ Stock savings banks 1 2 3 . igi7 / Mutual savings banks \ Stock savings banks 1 .

Banks

Depositors

Deposits

Average due each depositor

Average per capita in the United States

1,078

7,035,228

$2,935,204,845

$417 21

$36 52

1,157

7,305,443

3,060,178,611

418 89

37 52

1,237

7,696,229

3,261,236,119

423 74

39 17

1,319

8.027,192

3,482,137,198

433 79

41 13

1,415

8,588,811

3,690,078,945

429 64

42 87

1,453

8,705,848

3,660,553,945

420 47

41 84

1,703

8,831,863

3,713,405,710

420 45

41 75

1,759

9,142,908

4,070,486,246

445 20

45 05

1,884

9,794,647

4,212,583,598

430 09

44 82

1,922

10,010,304

4,451,818,522

444 72

46 53

1,978

10,766,936

4,727,403,950

439 07

48 56

2,100

11,109,499

4,936,591,849

444 35

49 85

2,159

11,285,755

4,997,706,013

442 83

49 91

622

8,592,271

4,186.976,600

487 30

1,242

2,556,121

2 901,610,694

352 72

622

8,935,055

4,422,489,384

494 96

3 1,185

2,431,958

905 , 532 , 890

409 35

1 The relatively small amount of deposits reported for stock savings banks is due to the fact that the returns from many States include this class of banks with commercial banks.

2 Includes time deposits, $9,889,107, and commercial deposits amounting to $47,374,709.

3 69 banks, with deposits aggregating $41,896,000 and depositors numbering 334,970, included with figures for stock savings banks in 1916, are included with statistics for State banks for the current year

for the reason that State banking departments did not compile the returns separately.

Note. — In the assembling of data in relation to savings banks the classification of banks as made by the State banking departments is closely followed, in consequence of which a number of so-called State savings banks, formerly treated by the comptroller of the currency office as savings banks, are now regarded as commercial banks, and the returns therefrom are combined with the latter.

In the foregoing table the figures for 1903 to 1908, inclusive, but not subsequently, include the number of depositors a nd the amount of deposits in the State banks of Illinois having savings departments, but not the number of such banks, by reason of the fact that general returns from these institutions are incorporated in State banks' returns.

The 12 Federal reserve banks opened for business on 16 Nov. 1914. Statements of their assets and liabilities are issued weekly. The consolidated statements of the banks for the stated date in November 1914, 1915, 1916 and 1917 are as follows:

	27 Nov. 1914	26 Nov. 1915	24 Nov. 1916	16 Nov. 1917
Assets				
Gold .	$227,840,000	34,630,000	7,383,000	

$321,068,000

37,212,000

48,973,000

12,919,000

$459,935,000

17,974,000

122,593,000

39,427,000

11,167,000

22,166,000

15,414,000

43,263,000

2,121,000

$1,584,328,000 52,525,000 681,719,000 1 241,906,000

Other lawful money .

Bills discounted and bought .

United States bonds .

One-year treasury notes ….

Municipal warrants .

27,308,000

19,176,000

14,053,000

4,633,000

1,273,000

Federal reserve notes — net . .

Due from Federal reserve banks — net .

All other assets .

165,000

22,111,000

428,544,000

Uncollected items .

Total .

$270,018,000

$485,342,000

$735,060,000

$3,012,406,000

Liabilities

Capital paid in .

$18,050,000

$54,846,000

15,000,000

397,952,000

$55,711,000

26,319,000

637,072,000

$66,691,000

218,887,000

Government deposits .

Member bank deposits — net .

249,268,000

Due to member and non-member banks .

1,501,423,000 2 972,585,000 8,000,000 4,383,000 240,437,000

Federal reserve notes — net .

2,700,000

13,385,000

14,296,000

1,028,000

634,000

Federal reserve bank notes in circulation .

All other liabilities .

4,159,000

Collection items .

Total .

$270,018,000

$485,342,000

$735,060,000

$3,012,406,000

1 United States government long and short term securities. 2 In actual circulation.

Comparative Statement of Resources and Liabilities of All Banks 1914-1917.

The following statement shows the principal items of resources and liabilities of national and other banks (Federal reserve banks not included) for the years 1914 to 1917:

Classification

Resources

Loans and discounts .

Overdrafts .

Bonds stocks and other securities.. Due from other banks and bankers.

Real estate, furniture, etc.1 .

Checks and other cash items 2 … .

Cash on hand .

Other resources .

Total .

Liabilities

Capital stock paid in .

Surplus fund .

Other undivided profits .

Circulation (national banks) .

Dividends unpaid .

Individual deposits …

Postal-savings deposits .

United States deposits .

Due to other banks and bankers… Other liabilities.*. .

Total .

1914 (26,765 banks)

1915 (27,062 banks)

1916 (27,513 banks)

1917 (27,923 banks)

$15,288,357,283 98 51,120,621 58 5,584,924,886 48 2,872,697,225 26 739,679,598 08 520,995,362 02 1,639,219,162 79 274,403,890 77

$15,722,440,177 20 36,232,421 03 5,881,931,375 37 3,233,942,829 39 793,404,941 00 376,875,161 00 1,457,702,138 31 301,600,634 26

$17,811,605,164 40 38,210,536 02 6,796,569,640 68 4,032,125,378 52 826,641,786 73 770,424,724 08 1,486,118,321 95 509,542,144 55

3 $20,594,228,088 91 47,199,175 92 8,003,819,982 90 4,793,167,162 83 862,967,207 32 758,691,432 29 1,502,502,076 06 564, 188,012 08

$26,971,398,030 96

$27,804,129,677 56

$32,271 ,237,696 93

$37,126,763,138 31

$2,132,074,073 20 1,714,486,142 85 562,031,228 82 722,554,719 00 30,133,899 35 18,517,732,879 01 40,245,588 30 66,654,582 55 2,705,075,367 14 480,409,550 74

$2,162,841,369 93 1,732,918,047 19 639,777,329 68 722,703,856 50 4,241,968 34 19,135,380,200 45 59,771,103 54 48,964,257 51 2,783,312,258 52 514,219,285 90

$2,195,101,115 96 1,849,693,074 48 564,337,993 50 676,116,000 00 28,690,888 81 22,773,714,074 98 71,087,526 37 39,457,000 00 3,463,608,916 33 609,431,106 50

$2,274,200,153 48 1,945,543,680 73 674,190,643 25 660,431,000 00 4,585,947 01 26,289,708,159 14 101,873,406 56 132,965,000 00 3,913,944,423 51 1,129,320,724 63

$26,971,398,030 96

$27,804,129,677 56

$32,271 ,237,696 93

$37,126,763,138 31

1 Includes other real estate owned.

Elmer H. Youngman, Editor The Bankers' Magazine.

9. THE NATIONAL BANKING SYS¬ TEM. At the outbreak of the Civil War the statesmen of that epoch were confronted with financial problems of first magnitude. Should they meet them by the usual expedient of re¬ sorting to large issues of paper money or adopt some safer method? In his annual re¬ port for 1861 Secretary Chase declared against the issue of legal-tender paper and proposed a banking system whose principal features would be a circulation of notes bearing a com¬ mon impression and authenticated by a com¬ mon authority; second, the redemption of these notes by the associations and institutions to which they may be delivered for issue ; and, third, the security of that redemption by the

3 Includes rediscounts.

pledge of United States stocks and an ade¬ quate provision of specie. The Secretary de¬ clared that the proposed notes would, in his judgment, (<form the safest currency which this country has ever enjoyed; while their re-ceivability for all government debts, except customs, would make them, wherever payable, of equal value as a currency in every part of the Union. »

The statesmen of the Civil War epoch in formulating the financial policy that was to assist the nation through this perilous period gave full weight to the inborn American pre¬ dilection against concentrated banking power, and instead of establishing a powerful bank of issue, which might have been of inestimable service in steering the lumbering ship of state through the stormy waters, and whose cur-

2 Includes exchanges for clearing house.

rency based upon commercial transactions and gold might have stayed the ruinous rise in prices and vastly reduced the war outlay, de¬ liberately committed the country to a system of small scattered banks and to the shifting sands of government paper currency. The pol¬ icy then decided upon has continued lo domi¬ nate the banking situation for the past 50 years. All attempts to substitute a bank currency for government paper have proved futile.

No subject connected with the Civil War finances has been more fiercely debated than the departure from what many regarded as sound financial policy in refusing to depend upon the banks and in resorting to the issue of legal-tender Treasury notes. Yet the latter policy was not the one originally contemplated by Secretary Chase and others who had the shaping of the finances of the war. Mr. Chase in his report of 1861 had recommended a sys¬ tem of national banks with note issues based upon the public stocks, and Mr. Spaulding had been asked to draw a bill to carry out this recommendation. He fulfilled this duty, but before the measure was introduced in the House it became evident that it could not be enacted in time to be of service to the gov¬ ernment in the dire straits in which it was then placed. A section of Mr. Spaulding's bank bill providing for the incidental issue of Treasury notes was substituted for the banking bill and, in a form slightly altered from the original draft, became a law.

In his introduction to the financial His¬ tory of the War,* p. 1, Mr. Spaulding says:

<(The first material mistake in the manage¬ ment of the finances occurred when Secretary Chase discarded the use of the bank check and the clearing-house in the fall of 1861. This mistake occurred under the following circum¬ stances :

((Two important loan acts were passed at the extra sessions of Congress in July and August 1861. The first act was approved 17 July and the second 5 August. By section six of the last-mentioned act, the Sub-Treasury Act, passed in 1846, was so far suspended as to allow the Secretary of the Treasury (To deposit any of the moneys obtained on any of the loans now authorized by law, to the credit of the Treasurer of the United States, in such solvent specie-paying banks as he may select ; and the said moneys, so deposited, may be withdrawn from such deposit, for deposit with the regular authorized

depositories, or for the payment of public dues, or paid in the redemp¬ tion of the notes authorized to be issued un¬ der this act, or the act to which this is supple¬ mentary, payable on demand, as may seem ex¬ pedient to or be directed by the Secretary of the Treasury. >

<(The primary object, which Mr. Appleton and myself had in view, in preparing this sec¬ tion, was to relax the rigid requirements of the Sub-Treasury Act in regard to the receipt and disbursement of coin and instead of pay¬ ing solely from coin deposits in the Treasury, to allow all the money obtained on these loans to be deposited in solvent banks; the United States Treasurer to draw his checks directly on such deposit banks in payment of war ex¬ penses, which checks would be paid in State bank notes then redeemable on demand in gold, or in the ordinary course of business, to

a large extent, they would pass through the New York Clearing-House and the clearing¬ houses of other cities and be settled and can¬ celled by offset without drawing large amounts of specie. This mode of payment would have enabled the Secretary more easily to effect such loans and make his large disbursements without materially disturbing the coin re¬ serves held by the banks, which were then well protected by these reserves in their vaults.

(<This mode of making the disbursements for the large war expenses was regarded by me at that early period of the war as of vital consequence to the stability of the finances of both government and people ; hence the prepa¬ ration and adoption of the sixth section of the Act of 5 Aug. 1861, giving the Secretary of the Treasury discretionary power to suspend the Sub-Treasury Law in respect to these loans.

(<After the battle of Bull Run, which oc¬ curred on the twenty-first day of July of that year, the necessities of the government in clothing, arming and feeding troops — in provid¬ ing munitions of war and building a navy — became so urgent that the banks in New York, Boston and Philadelphia most patriotically came forward and made arrangements in several negotiations with Secretary Chase to loan the government $150,000,000 under the provisions of the two loan acts passed at the extra session. Of this sum $105,000,000 was apportioned to the associated banks in the City of New York, pay¬ able by instalments. The banks were then in good condition, transacting their business on a specie basis, and paid coin for all

balances at the clearing-house, and redeemed their circu¬ lating notes in coin, and the loan to the gov¬ ernment was made with the expectation that the money would be deposited in the banks, and be checked out under the direction of the Secretary, in pursuance of the sixth section above referred to. The Secretary of the Treasury refused to use the discretionary power conferred upon him by that section, and would not check on the banks for the expenses of the war, so that current bank notes could be paid or balances settled through the clearing-house, but insisted that the banks should pay the money loaned into the Sub-Treasury in gold or gold Treasury notes, and from thence it was distributed for war purposes and scattered in different parts of the country. By far the greater part of this loan was paid in gold coin, taken from the reserves of the banks, commencing on the nineteenth of August 1861. This unnecessary mode of requiring the pay¬ ment of the loans so weakened the banks that it brought on a general suspension of specie payments during the last days of December 1861. Notwithstanding the banks commenced making advances to the government about 19 Aug. 1861, yet none of the securities to be issued by the government for the loans was turned over to them until 14 Jan. 1862.

(<The banks having been committed to mak¬ ing the loans, and having made partial ad¬ vances on account of the same, were obliged to complete the loan notwithstanding the Sec¬ retary of the Treasury deemed it incompatible with his views of duty, and the traditions of the Sub-Treasury Law, to use such banks as disbursing agents of the government even under the extraordinary exigency under which the loans were made. The call upon the banks for

payment into the government depository of the remaining instalments of the loan, either in coin or gold Treasury notes, was persis¬ tently urged by the Secretary until the final closing of the transaction on the third of February, 1862.

“This was the first material mistake of the Secretary of the Treasury, and was the first step in the wrong direction, which combined with other important events, led to the necessity of passing the Legal-Tender Act.

“The Secretary, in breaking the banks, at the same time broke the Sub-Treasury, and both were discredited together.®

Mr. Sherman in his (Recollections, > p. 269, says :

“The Secretary of the Treasury had ample and complete authority given him by the act of July 1861, to borrow* money on the credit of the government, but he could not deal with the system of State banks then existing in the several States. He was forbidden by the Sub-Treasury Act of 1846 to receive notes of State banks, and was required to receive into and pay from the Treasury only the coin of the United States; but by the Act of 5 Aug. 1861, he was permitted to deposit to the credit of the Treasurer of the United States, in such solvent specie-paying banks as he might select, any of the moneys obtained from loans, the money thus deposited to be withdrawn only for transfer to the regularly authorized deposi¬ tories, or for the payment of public dues, in¬ cluding certain notes payable on demand, as he might deem expedient. He had, however, no authority to receive from individuals or banks any money but coin.

“The only coin received from the Boston, New York and Philadelphia banks, in payment of their subscription to the government loans, to the amount of nearly $150,000,000, had to be sent to every point in the United States to meet public obligations, and when thus scattered was not readily returnable to the banks, thus exhausting their resources and their ability to loan again.®

Mr. Sherman is very positive regarding the necessity of the legal tenders as a war measure. In his (Recollections) (p. 281), he makes this statement :

“The Legal-Tender Act, with its provision for coin receipts to pay interest on bonds, whatever may be said to the contrary by theorists, was the only measure that could have enabled the government to carry on suc¬ cessfully the vast operations of the war.®

Hugh McCulloch, the first Comptroller of the Currency and twice Secretary of the Treas¬ ury, in his (Men and Measures of Half a Century* (p. 135), has this to say of the failure of Secretary Chase to make use of bank checks in disbursing government funds :

“For a considerable time, even after the war had begun, the specie standard was main¬ tained, and hopes were indulged that the war might be prosecuted on a specie basis. These hopes were dissipated by the action of Secre¬ tary Chase in his dealings with the New York,

Philadelphia and Boston banks, which had agreed to advance to the government on its 7.3 notes $150,000,000 ($50,000,000 in August, $50,000,000 in October and $50,000,000 in Novem¬ ber, 1861) under the expectation that the Treas¬ ury drafts for the money would be presented

through the clearing-houses and be paid with¬ out large reductions of their coin. The Secre¬ tary did not, however, feel at liberty to meet their expectations, and the drain upon their coin reserve soon became so heavy that they were forced to suspend specie payments. Their suspension was soon followed by the suspen¬ sion of nearly all the banks in the country.®

When Chase, as Spaulding said, broke the banks and the sub-Treasury at the same time and discredited both, an urgent necessity arose for strengthening the weakened credit of the country. It soon became apparent that the issue of legal-tender notes alone would not suffice, as the frightful depreciation of these forced instruments of credit foreshadowed a time when they would approximate the same degree of worthlessness reached by the Con¬ tinental currency in the struggle for independ¬ ence, and made it incumbent upon Mr. Lin¬ coln's financial advisers to devise some efficient means for holding this depreciation in check by a resort to the borrowing powers of the government. The precarious situation in which the country was involved injuriously affected its credit abroad, and made it desirable, if bonds were to be sold in large volume without ruinous depreciation, to create a home demand for them. The device of using the public debt as a basis for currency issued through banks was an old one. It had been proposed by Ham¬ ilton who when asked by Washington, "What is to be done with our terrible debt?® answered, "Bank on it as our only available capital, and the best in the world.® Many of the States had tried the experiment of chartering banks to issue currency against a pledge of State stocks, often with disastrous results.. There were other States — of which New York was a con¬ spicuous example — where the banking laws were good and the banking system sound. It is well known that the law of the State named was relied on largely in framing the act creat¬ ing the national banking system.

More than two years before the bill provid¬ ing for the organization of national banks be¬ came a law, the banks of the country had sus¬ pended specie payment, not to be restored again until 1879. The effect of this suspension was to link the national bank notes to the legal tenders, in which they were redeemable rather than to gold. Of

course, the bank notes were no better and no worse than the money in which they were payable. They were not as good as gold, but neither were the legal-tender- notes, the latter and the bank bills substan¬ tially keeping together as compared with gold.

In reality, though nominally issued by banks and bearing on their face the name of the bank emitting them, the national bank notes are government paper money. They are secured by bonds of the United States, deposited with the Treasurer at Washington, in which city they are redeemed in lawful money, and though the law provides for redemption of the notes at the counters of the issuing banks this is almost totally unknown in practice. They are not redeemed through the clearings as are the notes of the Canadian banks. The govern¬ ment guarantees the payment of the notes, running no risk whatever in so doing, since it always has in hand an amount of its own se¬ curities equal to the face of the notes issued.

Devised as the national banking system

to give the country sound and uniform cur¬ rency and to aid in replenishing the Treas¬ ury, it hardly succeeded in either of these aims. The national bank currency has been of uni¬ form value and a vast improvement on a great deal of the State bank circulation which it dis¬ placed, but it has through its inelasticity de¬ veloped serious defects. In so far as the new banking system was relied on to furnish cur¬ rency during the Civil War, the result was not very satisfactory. When the war closed the national bank notes were in the neighborhood of $100,000,000 in amount — only a small frac¬ tion of the loans placed to carry on the war. Had the channels of circulation not been so well supplied by legal-tender notes, the national bank notes at the close of the war would have been much greater in volume. After the war, when the government was still for a long time heavily in debt, the national banks were of immense help in sustaining the public credit.

But it is as a system of discount and deposit banks that the national

associations have won their greatest success and established them¬ selves firmly in the public confidence. It was, of course, one of the aims of Secretary Chase to supplement the somewhat inharmonious State banking systems then existing with some¬ thing having at least uniform laws to govern them and all watched over from Washington, yet he could hardly have foreseen how surpris¬ ingly large proportions the national banks were to attain through discount and deposit opera¬ tions in the first half-century of their existence.

Marvelous as has been the record of na¬ tional banking growth, it might easily have been much greater had Congress earlier en¬ larged the functions of the banks, thus fore¬ stalling the rapid rise of the trust company and the tremendous accretions of deposits in savings banks.

The history of the national banking system contains few important dates — points that mark any striking growth. There are two ex¬ ceptions to this statement, however. After the original act was passed in 1863, the growth of the banks was slow until the 10 per cent tax was imposed on State bank notes in 1865. But the real impetus to national banking was given in 1900, when the minimum capital was reduced from $50,000 to $25,000, and the issue of circu¬ lation placed upon a somewhat more liberal basis.

Another landmark in the history of the sys¬ tem was the passage of the Federal Reserve Act (q.v.), 23 Dec. 1913. This act changed completely the method of redepositing reserves, provided for rediscounting and accepting and for a system of note issues based on coin and commercial paper. It also made other import¬ ant changes in the Banking Law. Perhaps the strongest feature of the new law was in link¬ ing all the national banks together for their common defense; that is, a centralization of the reserves whereby they become, in a sense, the common property of all the banks so far as relates to their use.

Elements of safety in the national banking system have been the requirement in regard to the actual paying in of capital, the supervision exercised by the government and the admirable features of the law with regard to loans, and the double liability of shareholders. Compared

to the colossal sums handled by tlii’se banks, their losses have been trilling, and they are growing proportionally smaller year by year.

The national banks have furnished a re¬ markably safe and efficient system of banking, and have been factors of immense benefit in local development and in the augmentation of the national wealth and prosperity. If they have fallen short, it has been due to the slow¬ ness of the national legislature in adapting the law to meet changing conditions.

Elmer H. Youngman, Editor The Bankers' Magazine.

10. STATE BANKING SYSTEM.

Banking, in the early history of the United States, was the prerogative of the privileged few. Charters were obtained by subterfuges of one kind or another, by favoritism or by bribery. Familiar examples of the devices em¬ ployed to get banking authority under some other guise are the Chemical Bank of Newr York, chartered as a chemical company; the Manhattan Company Bank, also of New York, chartered as a water company ; and the Wis¬ consin Marine and Fire Insurance Company Bank, whose original business is indicated by the title, the word <(bank® being an after¬ thought.

But with the enactment of the Free Banking Law of New York in 1838, banking by special charter gradually disappeared, for the provi¬ sion of the New York law conferring banking powers on all associations of persons comply¬ ing with the terms of the act was generally copied in the banking legislation of other States, as it was later in the National Banking Act. From being a monopoly enjoyed by only a favored few, banking became so free as to encourage the rapid multiplication of banks until their number has grown to larger propor¬ tions than in any other country. The absolute freedom which was long given to any body of persons complying with the laws in organizing banks has been somewhat restricted in recent years, and the Comptroller of the Currency, in the case of national banks, and the super¬ vising officers of State banks, are generally showing a disposition to discourage the or¬ ganization of banks where they will tend to cause undue competition, and to refuse alto¬ gether applications for authority to organize banks by the professional bank promoter.

While in the early banking history of the country some of the States devised sound bank¬ ing systems, a great many did not. There was, in many localities, a lack of banking capital or of capital of any kind. Attempts were made to remedy this lack of capital by starting banks for issuing notes, a favorite device being to decide on an extensive policy of public im¬ provements, to issue bonds for this purpose, the bonds being purchased by the banks and notes emitted against them.

These efforts nearly all proved disastrous, but the States adhering to sound principles of banking and to correct methods of emitting notes had dif¬ ferent experiences. (See Bank Note Issues, article 19). Indeed, when the national bank¬ ing system came to be established it was based, in important respects, on the banking laws of New York, Massachusetts and other States whose legislation had been wisely planned. In turn, the National Banking Act itself became

the model for banking legislation in many of the States, until to-day, with rare exceptions, the standards of banking as formulated by the banking acts of the various States are sub¬ stantially identical with those of the national banking system. The State banks, in fact, found it advantageous to maintain a position of safety at least approximating that of the national banks, otherwise their growth would have been checked. They could, on the other hand, transact some kinds of business denied their Federal competitors, and this, perhaps, made them better adapted to the needs of rural communities. This difference in the functions of the two classes of banks was greatly modi¬ fied by the Federal Reserve system (q.v.), in¬ augurated in 1913. The State banks outnumber the national banks more than two to one — a fact due partly to the larger capital required of the latter (before 1900 it was fixed at a minimum of $50,000 and is now $25,000) and to other causes.

Massachusetts has no State banks of dis¬ count and deposit; New York has such insti¬ tutions; California and Texas and some other States, in their banking laws, authorize cor¬ porations to transact discount and deposit banking, savings bank business and trust com¬ pany business all under one charter. Substan¬ tially this principle (department-store banking it is sometimes called) has been embodied in the Federal Reserve Act. Prior to the enact¬ ment of the law referred to, relations between National and State banks were generally ami¬ cable, their lines of business diverging con¬ siderably. With the removal of these differ¬ ences, at least to an extent, it becomes a question as to whether the State banks may not find it less easy than heretofore to

com¬ pete with the National institutions.

The distinguishing feature of the banking system of the United States, contrasted with that of nearly all other countries in the world, is that we have a very large number (between 20,000 and 30,000) of small independent banks, locally owned and managed. In the European countries, and in Australia and Canada, there are a few large banks with head offices and numerous branches. In the United States the permission to establish branches of either Na¬ tional or State banks is limited in scope, DUt it has shown a tendency to extension of late years

Elmer H. Youngman, Editor The Bankers' Magazine.

11. PRIVATE BANKS. For the ordi¬ nary functions of deposit and discount the private banker in the United States is being rapidly superseded by institutions organized under State and Federal laws. The private banker might engage in business with little or no capital, and what he had he was at liberty to invest as he chose, and this freedom in the manner of investing his capital extended to the investment of deposits entrusted to his keeping; these he might employ either in his own business or embark them in any enter¬ prise which appealed to his fancy. The incor¬ porated bank, on the other hand, enjoys no such license. It must have a prescribed capi¬ tal, which must be paid up in money, and this capital must be maintained unimpaired; and, in addition, the banking laws generally require

that a definite surplus fund — so much in pro¬ portion to capital — shall be accumulated and maintained. These banks, unlike the private banks, must submit to frequent official visita¬ tion and examination and must make and pub¬ lish detailed reports of condition one or more times a year. Some of the States have found it expedient to prohibit private banking altogether.

As against the objections to private banking as above set forth it may be stated that where the State and national bank stockholders are only liable, in case of insolvency of the bank, for an additional amount equal to their shares, the private banker is liable for the debts of his bank without limitation. (The adoption of the principle of limited liability in England grew out of some disastrous bank failures where the stockholders were heavily assessed, losing in some instances their entire fortunes). Furthermore, the restrictions on the invest¬ ments and operations of incorporated banks, while tending to greater safety,

yet restrain the banks from opportunities of making profits which may be taken advantage of by the shrewd private banker.

Now, as in the earliest days of banking in Europe, some of the greatest transactions of domestic and foreign finance are carried on by private bankers ; but they are not, in the ordinary sense, doing a discount and deposit banking business. They are rather the skilled intermediates of governments and of great corporations, representing their interests among the banks and the investing public, and as such perform a highly useful service. In integrity they compare most favorably with the largest of the incorporated banks, while their operations are not infrequently greater than even the largest of such institutions taken singly. The private banker, in arranging loans for governments and corporations, does not use his own funds, but by his standing and skill is able to mass together the resources of various banks, often in numerous and widely separated localities. He has to do with for¬ eign exchange, the handling of specie on in¬ ternational account and provides the capital for the immense industrial and transportation en¬ terprises which constitute such an important part of the country's business life.

The private banker of to-day is a financial expert without whose service the operations of trade and finance could hardly be carried on, but in performing this service he uses his reputation and skill rather than his own funds or even the funds of others accumulated in his own particular office. He selects, analyzes and classifies the various lines of sound invest¬ ments and brings to their support, not his own funds alone nor yet those of individuals com¬ mitted to his care, but the funds of many groups of investors and of banks that have confidence in his integrity and judgment.

Elmer H. Youngman, Editor The Bankers' Magazine.

12. FEDERAL RESERVE SYSTEM, The. The Federal Reserve Act, passed 23 Dec. 1913, is the underlying measure upon which the Federal Reserve system depends. The system itself consists of (a) the 12 Federal Reserve banks and their branches, situated in districts defined as in the accompanying map;

(b) the national banks which, by the terrns of the law, are required to be stockholders in the Federal Reserve banks; and (c) such State-chartered banking institutions as may comply with the requirements for membership and may apply for and be granted such membership.

The banking system of the United States at the time of the adoption of the Federal Reserve Act included three distinct elements (a) the national banks created under charters granted by the Federal government and num¬ bering some 7,600; (b) the State banks, exist¬ ing under special or general charters granted by the States and rather more numerous than the national banks; and (c) the trust com¬ panies and savings banks also created by the States but doing a broader business than the State banks so-called. Only loose restrictions as to capitalization controlled any of these banks, while their reserves might be kept at home in their own vaults, or partly there and

of quiet it was unable to exert any control over the development of credit or to regulate the country's gold supply, in relation to that of other nations.

Although there had been much discussion of the banking question, no definite legislation designed to improve conditions had been adopted since the Civil War, except only the so-called Aldrich-Vreeland Act of 1908. The (<Gold Standard Act of 1900® had dealt almost entirely with the monetary, and only inci¬ dentally with the banking, problem. In the Aldrich-Vreeland Act, provision was made for informal unions or associations of banks to be known as <(national currency associations® whose function it w*as to issue notes secured by specified collateral on request of their mem¬ bers. Practically no such associations had, however, been organized under the law until after the adoption of the Federal Reserve Act, so that when the latter measure became law

MINNEAPOLIS NL W,S

IOWA

NEBS.

KANSAS

KANS.

TENN

OKLA

(aLANTA

,\ GA.

©DALLAS

partly wfith other banks. Under the National Bank Act, three classes of banks had been created — country, reserve city, and central re¬ serve city; their reserves varying from 15 to 25 per cent. Only central reserve city banks were required to keep all of their reserves in their own vaults. Particular complaint had long been made of the bank currency furnished by National institutions. The banks bought government bonds, deposited them in trust with the Treasurer of the United States, and received from the Comptroller of the Cur¬ rency notes for circulation. These notes were (<inelastic® — i.e., could not be expanded or contracted at will in response to business re¬ quirements, because they depended upon the volume and price of bonds as determining fac¬ tors governing their own amount. Due to lack of elastic currency and to wide diffusion of reserves the banking system was liable to dis¬ order in times of financial pressure. In times

the nation was still on the old basis of bank¬ ing.

The Federal Reserve Act, however, sought not only to provide the improved and respon¬ sive currency w7hich had been called for in the older measures of banking reform, but went much deeper. It recognized that the essential difficulty in American banking lay in its undue decentralization and consequent dissipation of strength. Fundamentally, therefore, it sought to give relief by changing the organization of banking so as to provide for combination of reserves and for joint control of and oversight oyer banking. To this end it provided for dis¬ trict organizations, vTich were essentially to be bankers' banks, dealing chiefly with their own members — the commercial banks of the district.

The number of such districts to be created was ibe subject of much difference of opinion, but ultimately Congress set the number at not

less than eight nor. more than 12, while it placed in the hands of an organization com¬ mittee, consisting of the Secretary of the Treasury, the Secretary of Agriculture and the Comptroller ot the Currency the duty of de¬ termining how many should first be estab¬ lished and of drawing their outlines. This organization committee was, under the act, to establish in each district a Federal Reserve bank to whose capital national banks must become subscribers in an amount in each case not less than 6 per cent of their own capital (3 per cent to be paid in and 3 per cent to be subject to call). Every such Federal Reserve bank was to have a minimum capitalization of $4,000,000 of which one-half was to be paid up.

The central feature of the act was found in the plan it presented for changing the re¬ serve organization of the country. The old reserve requirements were to be abolished, reserves being transferred, during a period of three years, to the new institutions. Event¬ ually they were to be held only in the member banks' own vaults or in the reserve banks. By the Act of 21 June 1917 all reserves were transferred to the reserve banks and cash on hand with members was left to the latter's discretion. It was provided that reserve cred¬ its with reserve banks could be obtained not merely by depositing money, but by discount¬

ing paper of specified kinds with the new in¬ stitutions. The act made full provision for foreign exchange business, clearance of checks, regulation of commercial paper and other es¬ sentials.

It was provided that the governing body of the new system be entitled the Federal Re¬ serve Board and consist of five members (two of them bankers) to be named by the Presi¬ dent and confirmed by the Senate, together with the Comptroller of the Currency and the Secretary of the Treasury ex officio. This body was duly appointed and took office on 10 Aug. 1914. The Secretary of the Treasury had been authorized by the act to name the date for the opening of the banks and after pre¬ liminaries of organization had been com¬ pleted by the Board the Secretary accordingly opened the banks on 16 Nov. 1914. Prior to this date the capital of the banks had been duly paid in, largely in gold, and the transfer of a first instalment of reserves quickly fol¬ lowed. The act had offered to State banks and trust companies the option of member¬ ship, but only a few availed themselves of the opportunity until after the entry of the United States into the European War. The movement then became much more rapid and by the end of 1917 between $4,000,000,000 and $5,000,000,000 of banking assets belonging to State institutions had been brought into the system.

In each Federal Reserve bank the control and operation of the institution is entrusted to a board of directors consisting of nine members. Of these nine, three (((Class A®) are representative of the member banks and three (((Class B®) are business men (non¬ bankers), although chosen by the member banks. In voting for these directors the banks are divided according to capitalization into three groups, so that each group is represented on the Board by one Class A and one Class B director. The remaining directors, three in

number (((Class C®), are chosen by the Fed¬ eral Reserve Board. Each director is chosen for three years and their terms are so ar¬ ranged as to have three such terms expire at the close of each year.

Of the three government directors one, under the law, is designated by the Federal Reserve Board as ˆFederal Reserve Agent® and as chairman of his local board of direc¬ tors. As chairman, he presides over meet¬ ings and as Federal Reserve Agent he dis¬ charges all local duties assigned him by the Board in the operation of the bank. The ac¬ tual management and conduct of the institu¬ tion is left to the Board of Directors which names such executive officers as it sees fit. Of these the chief, corresponding to the pres¬ ident of a commercial

bank, is called <(governor.® Linder his direction there is developed at each bank the usual staff, including admin¬ istrative, accounting and credit officers. The Federal Reserve Agent has a separate depart¬ ment under his own jurisdiction, including one or more assistants and a clerical force. He takes charge of the function of note issue and is entrusted with the custody of commercial paper and gold held to protect notes.

Regulations issued from time to time by the Federal Reserve Board, and binding upon all reserve banks, constitute the operating ba¬ sis of the system and ensure harmony of prac¬ tice. Linder the terms of the act each local board proposes rates of discount which are passed upon by the Federal Reserve Board and go into effect only after being approved by it. Full reports are transmitted daily by each bank and the Board issues a weekly condition report.

Every Federal Reserve bank has its own office arranged much like that of an ordinary bank; and several have purchased or are erecting buildings of their own. Six Fed¬ eral Reserve banks have established branches equipped like a Federal Reserve bank. Some of these are assigned a sub-district or part of the Federal Reserve district, while others have no definite assignment of territory, but are merely offices for the convenience of member banks. The accompanying tabulation shows the location, capital and chief items of resources of the several banks at a recent date.

The outlines of the 12 districts into which the system is divided are presented in the foregoing map which shows the condition at the close of the year 1917. During 1915-16 several changes in boundaries were made by the Board upon petition of member banks and the lines at first drawn by the Organization Committee were accordingly altered ; but none of these changes was of much importance to the general structure of the system.

The earliest work of the Federal Reserve system, like so much of its later opera¬ tions, was of an unexpected nature. The system had not yet been organized when the breaking out of the European War brought unexpected demands to bear upon the country. There was a heavy drain of gold to Europe and Congress hastily revised the Aid-rich- Vreeland Act in an effort to prevent panic. Many currency associations were organized and about $400,000,000 of notes were issued during the autumn. When the reserve banks came into formal existence in November they

BANKS AND BANKING — FEDERAL RESERVE SYSTEM (12)

xH

a

>

o

£

©

to

m

to

W

Z

HH

c n

D

cq

o

M

n

O

J

O

H

<

w

W

5?,

<

pq

a

>

u,

w

to

a

Pi

Cd

J

« o

a ˆ

Q

a o

H to T3

a (3

K ol H to

. 3

a o

o x

H->

B

5 £

< g

«

a

o

to

a

H

a

HX

n

<

2

Q

Z

<

w

a

u

a

q)

o

to

a

Pi

a

o

H

Z

a

a

H

<

H

C/3

i-o o

«T) ^ 00

to ©

xH

t-x -t

x x x a

NO

• ©

©

o. ©

CO

© <n a a © —■ i

co

©

CO

CO

2XF)C

cn cn rCN X

x- >

LO LO

H © © CN

CO

• O

o

CO ©

O © as w t~ a

© X

o

»o

pf

2 00 CN lO

no CO CN

i”- rr

CN

X1 X

Os co ^

*T

*

LO ’T

X

to © pt4 io o

oo a

©

X

2 © to cs

t’- th CN

xh rf

NO

© to

xX O’- xX xX

oi

• co

CO

Ol

PJ4

oo © a r- —h r-

© ©

X

pf

pf

O’ ON lO

-r \o x

«N lO

LO O

© X X

LO

•

©

NO Ol X XH

© LO

o

hJ’ fO

a ©

O

nO

Ol

a

o

• CO

CO

xX

oi p r

CN ˆCO

a ©

XI

xH

2

xX

CO

tX

xX xH

CO

S no oo

xx oo VO

LO X

X

O LO

LO © LO

©

X X

©

• LO

a

vO X X lo CN •

CO ©

©

2 rr 00

Cn lo

CN ’cf

O

o Ol

X x © •

CO

X-CO

• NO

©

CO CN 00 IO CN •

© X

©

zT <N r J OO

co lo

O CN

CN

© X

© X 00 •

CO

xX CO

xP

© a o © to ■

LO Pf

x-1

i-M ► ^ x

„ ^

X X

XXX—

X

X X

—

■x

xxx*

x .

x X

. oi in 04

O 00

On

CO

00 ©

LO Ol xH ■

a

XX CN

CO

Ol

Tf oi Ol CO © •

©

CN

Cfi fO t*S

CO

o

O

xX xX

X

CO

CN

CN

Tf NO

pH IO

r—

xH

rH

xH

T“l

xH

,, 00

a <n Hd<

\Q xx

a ©

tbXfO©

O

© a

LO

LO

©

-H 00 CN

CN •

CN

©

« -H t-aaj

CN CM lO

© 31” J “*

in i~~ in X

CN

Ol nC

a

co rX

a co a

NO •

a a

X

^2 © co

Ht © ©

LO O

▼p

oi O

© © co

Ol

p

X

xX xX

LO

pf pf

H

© ©

LO

*— X ‘ ^ «

« » K

«.

X

X X

xxx

x

X X

*•

x

xxx

X

X ..

tjNtNri

(NO\p

CN

CO

© X

O © aO

00

H Tf4

LO

r^-

CN CO LO

X •

im

XX

Ol

Ol

xX

xX

xX

xx Tf

© x <

y—1

xX

X-”

00 to

a © th

a ©

On

co O’

x a x •

CO

oo a

© ■

©

a -d1 © cn

X1 •

© co

©

XX

a

(J CC (N

XX TfC v-X

sO

cO

© ©

p ’t Ol •

OO

Ol Do

© ■

Ol

N CON

co •

x a

©

XX

CN

_H\00

^ HI/)

o

xH

X o

noon •

xP

cn

o

x ■

oCO 00 00

© •

CO ©

©

CO

03 *” - *■

a ©

o

©

l > * rf

P-00 CN •

Ol

CO xx

o

Ol

co h c0

co •

Xi ©

X

CN

is 1 +

H* ao

X

X

CN

co

CN

CO

LO

— ©

XX

a X*

LO

rf ro ©

Cn

co co

NO

rf4 o»

x 00 X to

00

• 00

X

• X

o

© xX Tf O-NO X

© LO

©

r.‘OrfO

© a x

CN O

<N

p-X

©00 H Ol

Ol

• CN

CN

•©

©

X X O Pf NC XX

xx 00

©

c°.°2

(MHN

V-. co

•< t

xP LO

NCOX

•< t

• t”*

• a

pf

LO NO Pf

© a

xx

Pf

x cn

o- ^

CN

Ol

a

NO iH ^4

©

• Ol

Ol

©

CN xx O

Pf xx

oo to

©

co co

o—

XX

Ol

• xP

xx

c

xX Tf

LO Pf

c

xX

• ^ U-) o

<M x O

CO Cn

CN

00 ©

0C co co •

rj4

xH ©\

o

■ a

LO

XX io © © pf •

oo ©

LO

3 © ©

X' CO C-O

nO nC

CO

CO NO

On CO © •

CN

CN D-

©

• o

©

x* co co a “d < •

LO ©

©

c 3-a x

h* oo r-

© to

NO

X CN

Ox© •

o

iO on

LO

• c

xH

rfCt’rtO •

© ©

xH

lO ?N CN

O LO

r—

D-00

NO Ol XX .

o

X ©

• xX

©

CO CN nO

CO •

(N X*

©

X C‘1

ao 3“

O—

xX

Ol

CO

XX

Ol

CO

— pf

xX

LO

CO

Cfi

1

XX

XH

O oc ©

to co O

X H

a

a x

rONN •

l”-

© pH

©

• co

a

O CN N o •

© co

©

boa a to

3i 00 cc

© CN

CN

Ol X

x ©f- •

©

© CN

CN

• xX

LO

pf o N © N

to ©

LO

c3 X X CO

O* rf

O LO

LO

c ©

x © X .

Ol

a to

LO

• ^

P?

© co X” © r— •

CN LO

Pf

H^UStH

LO Tt1

xH x— (

CN

X NO

xxx •

CN

CN XH

x”

a

oc a © Xi co ■

X CN

a

rjtoe

o ©

xH

xx

X

On xX

xX

— 1 X

LO

CO NO

CN •

CN Xl

OH X

CN

CN

xX

CO

xX

CN xx

CO

O 00 to

C^HCO

CN On

H

X-On

© O* xX nO

X

© X

©

• Pt4

a

CO © CN xx

xx

X CN

©

cd as r < b

ao V x

a tj <

V

LO X

rt4 © xx 00

CO

X X

• o

Pt4

M00NN

© *

CN ©

pf

.XOCNlO

vO co NO

LO X

‘■t

CO X

Ol 0C rf Ol

00

© a

©

• CN

xX

r- © X1

x- ■

© 00

*— x

•. *.

X

x

X x

X X

X

X X

X

X

xxx

X

X X

*

a to x

X CN

xl

CN

X X

© CO

co

xH xX

CO

O

CN pf Tf

© ■

a t”

©

<; -

rH Tf*

©

NO

xX

xX

Ol

Ol

CN

xX

CO

X to

xX

rO lOtˆ

lONTt

© to

LO ©

LO .

NO

• NO

NO

* LO

X

CO © Ol •

r > - Tf

CN CO

X

■ o a ao

ON SO tp*

CO O

©

CO Tt <

D-t’- ©

xX

• X

X

* Ol

Ol

xx 00 CO •

LO NO

X I”

CN

t-G th cO

a ► ~ -

oo in

Cn h

xX

O’ CO

© X ao •

• LO

LO

pt

© CN to •

© co

CN LO

Pf

V \0 C’l H

C X

CN

CO

NO CO

© x x

CO

• CO

CO

©

CO X* © •

LO 1”*

co co

©

LO CO

X

X

CO

co

• Ol

Ol

p*

xX

xP pf

xX

X LO

Pf

xH

030310

co iO co

xH xX

CN

Ol Tt4

© to © X

a

• CN

CN

CO

© CN 00 CN

— Os

CN ©

LO

CO

CD ro PO CN

Cn On xh

o ^

-t

xX xx

oi © co x—

NO

• Ol

Ol

CO

NO X NO © NO ©

CN xx

CO

CO

s. 00

CN On

co no

a

© X

Ox©

a

• NO

O

LO

00 CN xx XX

xX ©

CO ©

pf

LO

~ -

•*

x

X X

XXX

X

• X

X

X

O »H

Ol

oi

© 00 ©

• Tt4

pf4

CN

N CN X

© ©r

©

On iO

’T

CO Ol

©

• oi

Ol

pf

CN ©

h CN

LO

xX

Ol

CN

lO XX IT)

piOO

© ©

NO

CO Ol

LO © CO pf

oi

Tt4 CO

r^-

LO

co a cn ■

X •

© LO

00

00 CN ©

o

O X

x to to x

©

a x

CO

— © © •

© •

co co

OO

GiOCOO

LO O LO

xx Cn

©

C LO

IT) lO

oc

© ©

xX

©

© CN to •

pf •

Ol ©

io

©

aP N CO CO

tflNx

X

a

X ao

oi

©

CN H

CO

co

to © CN •

© •

© t -”

CO

Ph X (N

•■d* in

On

a

Ol Ol

X

LO

LO

LO

©

xX N»

CO •

xX F’*

©

CN

XX

CN

O © CM

(NNO

O’ H

©

X ©

pOX nO

Ol

• Tf4

Tt4

©

a © cn to oo ©

XH ©

©

©

O’ O tx

© a ©

LO CO

On

Ol On

xX 00 T”fH H

©

• co

CO

X

LO NO CN X © pf

X-. CO

X

X

si ˆ x

a © ©

c a

O’

0-xX

a x x ©

CO

• X

X

xX

O a CN CO co CN

CN co

io

CN O 00

© x to

D-CN

o

co no

a x a x

Ol

• LO

LO

X

oo in © a cn *h

LO CN

CN

xx ^-1

Hd <

X

LO LO

©

Ol

• a

©

©

H CN Xi

©

Pf Pf

o

Z < a < b

co

IO

lO

rt4

LO

LO

Ol

xX

X CO

CN

xH

rH O lO OO

NO H o

O-co

©

CN X

© a © •

LO

. ^

xX

NO

X* © r— •

©

© co

SOoin

© CN ©

CN CN

LO

co

X © to •

• X

X

©

X NX ■

X Tf

S 1 ox©

o a ©

ON VO

lO

© ©

X © X •

xX

• ©

©

n-co •

Ot’

oo x

©

o ro

HO’H

LO

CO

00 a < b

-p CN •

Tt4

• LO

LO

CO

LO xx N •

© l’-

LO xx

pqac

ao cn

NO

X (X

• CN

Ol

oH ©

cs ©

t”-

xX

xX

C/D

< D

ce

>

O

lx

G

G

O

C/3

tfi

CD

<V 4-3

Pi

03

to

CS

s

c

Or,-! a)

fSc 5P

-£ 3

S‘4-” S,

o H-> bp

C53

T> tt) u

ego

rt

u « |> O to t>

222

222

GOO

S

J2 “

G

•° £

-£S <1>2

TjPi 3

or; < <+x

* 2 c 2^-2 £h2 2-^ “““ 2 £ 2 H22 go

lx

%> £ s

<D * c/3 c/3

a)

Ih 4-3

2 § o u be S

.— T) cd C +e as

be

■ (D

-3

t/3 a> CD .ii

C/3 4-3

lx

s

CD

E

; e g

• (D is

•‘Vi

. bpt« . g o

.

c/3

a

C/3

CD

>

l—

CD

C/3

«D

lx

O

H

a

I <D

1 &

•ge

H-> ’ —

S x ezs o bo

O M

2 O ‘dPD to to

CQCQ

‘O

c

ol

as

c

o

to

H-> +j

e c

as as

E 6 c c

a u. to

0) OS H-1

> > G poed bO biD ix

lx

GG C/3 C/3 ctf CD <D >

rD 4-> -M P

_ 03 oj

cd,S2 oi

4_> C/3 C/3 Q4

2t3t)‘o

<D <D*^

4f#-g G

222

gg2

cs

C/3

C/3

03

bo

G

cti

CD

13

4-3

o

H

<D

g

1/3

r*

g

oi JO

CD > lx

CD

C/3

<D

tf

ctJ

lx

(D “d CD CXj w

2

2.-S

HJ _

O’O

_, <u

d -M

5 y

o a)

lx

c

<D O

^ c Q£>

CD

• >

. lx

. CD U3 ‘ CD

:oi

03

4-3

03 f

S”S

C/3

03 4ˆ

C 03

22

s m

o

2 TZ)

co C

gp

O

3.

CO

a;

as

ol

C

• 2 T-#

g A M O a to

” H -a <D

•© S © U

2

Hex ko rt O

o’-as

to <

to

<u

o

u

e

o

to

<D

a

o

H

c £■

3-S

c 3

CJ ol

o as OS’S a> |

l I

CD 03

03 24

CD C

i

*So ^ O 1 u Ph C/3 (D

0) lx Q

•v‘73 ^2

^2 S

y> ix

03

^4

C

ct3

X)

CD

>

lx

<D

03

CD

13

in

CD

TJ

03 (D

gPn

<P lx

<D

<Dt

I ex c.o c Oxo e o x

a > <u <U” « o e e ”3 e OOQQUQ

• -H>

. (D

• G

o.y

’p3 Pf

d ˆ

s y

lx.tj

u «

c3 *£c

03

O <D

C G

’3

&|s

03

tf (D 22

ftg 6 « ? o Xu*3

as as

t/i >

s fc g

<»8 8

as

>

M

£

• X

as

a

O

a

bC

2

2

J3

2

c

aˆ

rt

rtpipi >r

po

O

Ph

4-> lx 03 xX T-X DG CD _4-S>

03 0} ■ JG rrX

lx Pi JD 4-3 y

22 e o g as as e3 w HH <

as

cd

o

H

(a) Difference between net amounts due to and net amounts due from other Federal Reserve banks.

found themselves called upon to assist in the operation of retiring these notes — an import¬ ant function, but one that brought little actual profit to them.

Moreover, the abnormal movement of gold out of the country which had occurred during the first days of the European War was fol¬ lowed by an equally abnormal movement of gold into this country. Very great sales of our raw materials and manufactured goods abroad were paid for largely in gold and bank reserves were thus much raised. ‘The change in reserve requirements made by the Federal Reserve Act had also set free a large balance of lending power. Due to those two factors, the demand for accommodation at Federal Reserve banks was not great. It was only af¬ ter the entry of the United States into the European War that they really became active in their rediscount operations. Earnings for the first two years, 1914—15, were only 2.7 per cent above expenses; for 1916 about 5 per cent; but in 1917 they reached about 18 per cent.

The law requires that the Federal Reserve banks, after paying all necessary expenses, to¬ gether with 6 per cent cumulative dividends to their stockholders, shall carry one-half of ex¬ cess profits remaining to their surplus fund until the surplus amounts to 40 per cent of the capital, and shall pay the other half of ex¬ cess profits to the United

States government as a franchise tax, the entire excess profits to be paid to the government after the surplus of a Federal Reserve bank reaches 40 per cent of its capital. The Federal Reserve banks of Boston, New York, Chicago, Atlanta, Rich¬ mond and Minneapolis have paid their divi¬ dends to stockholders to 31 Dec. 1917 and at the same time paid into the treasury of the United States as a franchise tax the sum of $1,134,234.48, the amounts being paid by the banks as follows :

Boston . $75,100 00 Atlanta . $40,000 00

New York . 649,363 57 Richmond . 116,471 73

Chicago . 215,799 18 Minneapolis…. 37,500 00

These banks have also established on their books a surplus fund in amounts equal to the sums paid the government.

It is to be noted, however, that practically since their opening the banks have been sub¬ ject to very abnormal conditions, — first, in consequence of lack of demand and later be¬ cause of the existence of unusual and excep¬ tional demand for accommodation based on a very special kind of paper — that secured by government obligations. The banks have not, therefore, had full opportunity to exert their influence upon the commercial paper of the country or to do more than take the prelim¬ inary steps toward the creation of an open discount market.

It was with a view to the creation of this discount market that the act gave to the Fed¬ eral Reserve Board power to regulate the conditions under which commercial paper should be made and discounted at reserve banks. Pursuant to the permission thus given, the Board early defined the chief types of commercial paper, including the bill of ex¬ change accepted and unaccepted, the promis¬ sory single-name note and the commodity note — with warehouse receipts as collateral. In all

cases the paper was required to be the result ol genuine commercial non-speculative trans¬ actions and to have a specified short maturity. Acting further in accordance with the terms of the law, the Board authorized the Reserve banks to buy discountable paper in the (<open market® — that is, without member bank en¬ dorsement, should they desire.

This open market power was availed of by the Reserve banks during their first two years of slack earnings. They bought widely of acceptances and also of government and municipal obligations and at one time had thus invested more than $200,000,000 as a means of earning needed revenue.

The first two years' development in com¬ mercial paper was, however, notable for the introduction of the acceptance or accepted bill of exchange into American banking practice. Unusual stimulus to our foreign trade gave to the foreign bill or bankers' acceptance in such trade a degree of recognition it could not otherwise have attained. Although only a moderate amount of this paper was obtained by reserve banks, the fact that it had entered the market as a distinct type of paper for gen¬ eral investment was rendered possible by the new system.

The bankers' acceptance may be drawn cither as a foreign or as a domestic bill. No satisfactory data are as yet available concern¬ ing the development of the domestic accept¬ ance, and, whatever the volume in existence may be, it is probably small. The foreign bankers' acceptance has had about two years for development, and we may roughly estimate that at the present time the acceptances of all American banks, whether members of the Fed¬ eral Reserve system or not, are about $250,- 000,000 — $300,000,000. Every member bank has the right to accept such paper up to 50 per cent of its capital stock, and the Federal Reserve Board has granted to banks the power to ac¬ cept up to 100 per cent. While the Federal Reserve Act as originally passed gave to the Federal Reserve Board authority to define com¬ mercial paper eligible for rediscount at Federal Reserve banks, and the Board in its initial stages desired to discriminate in favor of the two-name paper, it never went so far as to commit itself definitely in that way. Single¬ name paper has always formed the bulk of that discounted by the Federal Reserve banks, and this has been apparently the result of necessity. The Federal Reserve Act, however, clearly intended to stimulate the <(bill of exchange® whether that of the commercial enterprise or of the banker, and the Board has, therefore, very properly endeavored by favoring rates and by special regulations to encourage the development both of the commercial bill of exchange (designated by it as the ((trade ac¬ ceptance®) and of the bankers' accepted rtbill of exchange.® The quantity of trade accept¬ ances or commercial bills offering in the New York market has been lately described by a practical banking 'authority very friendly to the acceptance as <(negligible.®

A novel element in the Federal Reserve Act not found in any of the

various banking bills by which it had been preceded was its treatment of the so-called ˆclearing question.® In the past, small banks, the country over, had carried balances with city ˆcorrespondents,®

usually of considerable amount. These city correspondents were frequently members of a local clearing house and here and there coun¬ try clearing houses had been established, but there was no nation-wide system of clearance. The country banks sent such checks on distant points as they might receive to their corre¬ spondents and the latter collected them, cred¬ iting the proceeds to the remitting banks. This was a wasteful and slow method. The Federal Reserve Act sought to substitute the idea of district clearance on the books of each reserve bank and that of national clearance by creating a central clearance system for the 12 reserve banks at Washington.

The national system was first established, each bank depositing $1,000,000 in gold with the Board, which at once placed it with the Treasury for safe-keeping. A set of books was opened in the offices of the Board and on Wednesday night of each week every Federal Reserve bank telegraphs to Washington the amount of its balance in dealings with other reserve banks. A corresponding entry is made in the books and each bank notified on Thursday of the balance remaining to its credit. Billions of dollars of transfers are made in this way without gold shipment and practically without expense.

The introduction of the district clearance plan was not so easy, but by the middle of 1916 every reserve bank under orders from the Board had established a system of prac¬ tically uniform character. Under this plan as modified by the Act of 21 June 1917, banks not members of the Reserve System as well as the regular members may deposit with reserve banks checks on other banks for collection. Such checks are not credited at once, but only after the lapse of a period usually two to four days, estimated to be long enough to permit collection. After that period the proceeds are credited and may be drawn upon. Banks which receive such checks for payment must remit without deduction (at par) or else send actual money, but in the latter case the

Reserve bank pays the cost of shipping the coin or currency in settlement. The member bank which deposits the checks for collection is charged a small fee (lp2-2 cents) per item and may in turn make a moderate charge to its depositor if he desires immediate payment without waiting for the collection of the check to be completed. The district collection sys¬ tem now includes some 16,000 banks, State and National, and is slowly increasing in numbers though it can probably never become complete until the banking system of the country has been entirely unified. Some banks continue to collect through correspondents as heretofore, although the fact that balances with corre¬ spondents no longer (Act of 21 June 1917) count as reserve, has discouraged the practice. The new district system has tended strongly to unify exchange charges and to reduce those that were formerly unduly high, though such charges will persist where competition is absent owing to the fact that given localities contain no banks that are members of the Federal Reserve system. Taken with the gold clearing system at Washington, the district system has, however, immensely improved and simplified exchange conditions the country over.

As seen at an earlier point, the chief trouble currently recognized in the American bank note system prior to the passage of the Federal Reserve Act was “inelasticity.® By this was meant that there was no way of enlarging the circulation except through the purchase and deposit of bonds, or the importation of actual money. Prior to 1908, the national bank notes had so greatly increased in amount as to re¬ quire almost all of the floating or “free® supply of bonds for their protection, except those held by investors ‘and trustees, so that the limit im¬ posed upon their issue was almost absolute. It was currently proposed to relieve the situa¬ tion by extending the kinds of bonds receiv¬ able as deposits to protect note issues and the Aldrich-Vreeland Act had taken steps in that direction. As against this plan or proposal it was pointed out that both the practice of other countries and the general theory of banking indicated that the protection properly to be accorded to notes was identical with that to be given to deposits. The abstract theory of banking, moreover, indicates the liquid short¬ term assets of banks as the safest and best protection for bank liabilities.

This point of view — the so-called “asset currency® theory — was accepted as the basis of the original draft of the Federal Reserve Act. Provision was accordingly made for the issue of notes based on the general assets of the reserve banks ; while it was sought to protect the

old note-issuing banks (the owners of the bonds held to secure the notes) by authorizing the gradual retirement and redemption of the bonds they had purchased. These bonds for the most part bore 2 per cent interest, and as government obligations were then selling on a 3 per cent basis it was ordered that the new refunding bonds should bear 3 per cent.

So-called asset currency has always been the subject of criticism from a certain school of thinkers who have contended that there was serious danger in the use of such paper because of its possible unsoundness. In order to guard against any such danger the Act therefore defined “eligible® paper with great care, placing stress upon the requirements of short maturity and relation to genuine com¬ mercial transactions. Inasmuch as it had been urged by some that the supply of two-name paper available would be too small to serve as a basis for notes it was left to the Federal Reserve Board to determine eligibility of form within the general limits laid down by the Act itself.

The view or theory of currency issue which had been embodied in the original draft of the act was maintained throughout its various changes of form and appears in the final statute. The chief note changes introduced in the course of discussion were as follows: (1) The Federal Reserve notes were made eventual obligations of the government and it was provided that they could be obtained only from the government through the Federal Reserve agent of the bank desiring to issue them; (2) provision was made for a new type of note to be called a “Federal Reserve Bank note® secured by bonds on the same basis as the old national bank notes; (3) the redemption of the bonds held by the national banks was fixed at $25,000,000 a year and the

Federal Reserve Board was authorized to dis¬ tribute this amount of old bonds among the reserve banks. At that rate it would have required about 30 years to retire the national bank notes and issue either Federal Reserve notes or Federal Reserve bank notes in their place. During the first three years’ life of the system, redemptions

proceeded at about this rate, but after the entry of the United States into the European War, 2 per cent bonds fell to a low level and the Reserve Board ceased to call upon reserve banks to take them over at par as before. In the original act of 1913, the outstanding notes had to be covered by gold and paper to 140 per cent of their face but by the act of 21 June 1917, this figure was cut to 100 per cent. Due to this and other causes the issue of Federal Reserve notes rapidly increased during 1917 and at the close of the year was near a billion and a quarter of dollars.

As things stand to-day, therefore, the Fed¬ eral Reserve Act provides an elastic currency, based on business paper, and susceptible of increase as business operations increase and require a larger note issue. Reserve banks discount the paper presented to them by mem¬ ber banks which have themselves discounted it for business men. Such paper may be turned over to the local Federal Reserve agent who will issue an equal amount of notes in exchange. The Federal Reserve bank must, however, carry a gold reserve amounting to 40 per cent of the notes it issues, and of this 40 per cent 5 per cent is deposited with the Treasury as a redemption fund, the other 35 per cent is retained in the Reserve bank's own vaults. The expansive power of the cur¬ rency thus depends on, and is limited by, the gold holdings in the Reserve banks.

Granting the presence of the necessary gold there is no limit to the volume of notes that may be issued except the limit set by the needs of business and the dictates of sound banking. The question whether to call for notes or to take the proceeds of rediscounts in the form of book credit depends on the decision of the member banks. Federal Reserve banks could, however, if they desired issue their notes in exchange for paper bought in the open market with bank endorsements.

The question of foreign banking facilities is dealt with in several ways in the Federal Reserve Act: (1) Federal Reserve banks may established agencies abroad or name agents and correspondents. They have thus designated the Banks of England, France and Italy and others, but thus far operations have been small owing to the War and its effects. (2) Member national banks possessing capitals of $1,000,- 000 or more may apply for, and under speci¬ fied conditions receive, permission to estab¬ lish foreign branches of their own. In this way, a considerable number of branches have been developed in South America. (3) By the act of 7 Sept. 1916, member banks are allowed to subscribe to the capital of banks formed to engage on their behalf in the for¬ eign trade. Several such banks have been in¬ corporated and have begun

business.

The more important step taken in the direc¬ tion of sound foreign trade finance was not, however, one that had to do with the mere establishment of banking machinery but with

the introduction of approved banking methods. Foreign practice had long since recognized the banker's acceptance as the staple method of financing movements of goods. This teaching was embodied in the Reserve Act which pro¬ vided that paper resulting from commercial transactions in foreign trade and of proper maturities might be accepted by national banks to 100 per cent of capital and surplus. Federal Reserve banks were empowered to rediscount or buy such acceptances ; while by later legis¬ lation domestic acceptance paper was given similar privileges up to 50 per cent of capital and surplus. Finally Congress adopted a pro¬ vision permitting national banks to accept drafts, drawn in countries needing a means of remittance to the United States, intended to create a supplv of dollar exchange.

An integral element in most of the plans of recent years for banking reform has been the reorganization of relations between the Treasury of the United States and the banks of the nation. As is well known, the sub-Treasury system (dating from 1846 in its present form) and, requiring the actual hold¬ ing of public funds in cash, is obsolete, being employed by no other country. Deposits of public funds in national banks protected by special security have been made since the Civil War but were only a partial remedy for the evils of the sub-Treasury system. The Federal Reserve Act sought to change the older sys¬ tem by constituting the reserve banks (<fiscal agents,® and making them also depositories, thus permitting the government to do business at and through the reserve banks just as their banking members may.

When the act was passed the balances of the government were small and there was no haste in carrying into effect this phase of the law. Early in 1916, however, the banks were made depositories of all Treasury balances then on deposit with national banks in the cities where the reserve banks were located, other funds outside these cities being kept as before. During 1916 and the beginning of 1917, the Reserve banks thus became habituated to methods of transacting Treasury business, and so made themselves ready for the great and unexpected expansion of their functions in this field which was to follow, when, at the entry of the United States into the European War

in 1917, this small business suddenly as¬ sumed new and important proportions. The Secretary of the Treasury had determined to employ each Federal Reserve bank as the head of a district organization designed for the distribution of the bonds whose sale in unprecedented amounts was necessary to the conduct of the war, and in each Federal Re¬ serve district such an organization was quickly developed about the local reserve bank as a centre.

Local bankers and financiers freely gave of their time and assistance to the furtherance of the work, and in each case the Federal Re¬ serve bank proved an efficient basis of organi¬ zation. The several banks, under instructions issued by the Secretary of the Treasury, re¬ ceived subscriptions to the loan and carried on the immense work of detail resulting there¬ from, besides taking charge of the deposits in banks and general banking relationships grow¬ ing out of the operation.

The Federal Reserve Board itself, besides co-operating closely with the authorities of the Treasury Department in efficiently conducting the loan operations of the Federal Reserve banks, further sought to develop a gen¬ eral policy that would support and aid the banking community at large in taking and dis¬ tributing the new issue of bonds. For this purpose it first established a special rate of 3 per cent per annum for the discount at Federal Reserve banks of the direct 15-day obligations of member banks secured bv_ the temporary certificates of indebtedness which were issued in order to anticipate the proceeds of the sale of the new bonds.

Carrying further this same policy, it later established a per cent rate of discount at Federal Reserve banks intended for the 90-day paper of ordinary bank borrowers, thereby en¬ abling the member banks of the system to ex¬ tend accommodation to bond buyers in the assurance that they would be able to obtain accommodation from the Federal Reserve banks by discounting these notes. In order to aid the customers of banks not members of the Federal Reserve system, it further authorized the member banks to act as agents for non¬ member institutions by rediscounting the notes of bond buyers who

desired to obtain assist¬ ance from their own banks without being obliged to transfer their business to member banks. Savings banks and trust companies were assured that the Board would in every way co-operate with them in avoiding shock or disturbance to existing conditions, and that the Federal Reserve system stood ready to ex¬ tend to them reasonable accommodation in the event of necessity resulting from withdrawals made by depositors in order to purchase or invest in government bonds.

On the night of 2 May the Secretary of the Treasury issued to the press a statement giv¬ ing such details of the first <(Liberty loan® as had been agreed upon up to that time. At the same time he advised the Federal Reserve banks that he had decided to use them as the central agencies for handling the issue. On 10 May the full prospectus was telegraphed the banks to be made public on Monday, 14 May. The subscriptions were to close on 15 June, so that the Federal Reserve banks had but one month in which to perfect an organization for the sale of the propor¬ tion of $2,000,000,000 of bonds allotted to the respective districts, and for the handling of details of the subscriptions. The work¬ ing out in 20 days of a prospectus cover¬ ing so large an issue, without a precedent in this country to guide, and the placing of $2,000,- 000,000 of bonds oversubscribed approximately a billion in a month's time, was a remarkable achievement, but the second loan operation, carried through in October, resulted in the sale of nearly four billions of bonds, the amount offered being three billions, and the total sub¬ scriptions nearly five billions.

Not only was there no disturbance to inter¬ est rates during either loan operation beyond the necessarily gradual increase which follows upon the withdrawal of such great quantities of funds from the market, but the process was accomplished with great technical ease. In former times under the old sub-Treasury system, the withdrawal of subscribed funds in

various parts of the country, or even the op¬ erations incident to the transmission of these funds from one part of the country to another, created unavoidable and serious difficulties, due to shortage or plethora of money at various points, while exchange rates and conditions were seriously disturbed. All this has been avoided through the operation of the central gold settlement fund, conducted under the supervision of the Federal Reserve Board at Washington. By the use of this fund, the thousands of millions of dollars involved in current

government operations have been re¬ ceived in the form of local bank credits, and the proceeds have been transferred to the point where government payments had to be made. As these payments have been effected, local banks at those places have increased their de¬ posits and the proceeds have again been grad¬ ually shifted to different parts of the county where production and manufacture were in progress and where payments for material and labor had eventually to be liquidated.

The Federal Reserve system has thus suc¬ ceeded in its first and most immediate objects — the establishment of a co-operative or cen¬ tralized system of united bank reserves with rediscount arrangements designed for the relief of hard-pressed banks and for the furnishing of an elastic currency. It has further supplied the demand for an efficient and nation-wide system of check collection. The establishment of a genuine discount market is necessarily a much slower process and time will be required for its complete success. The advent of the European War and the entry of the United States into it as a participant have naturally tended to retard the normal development of the system and in some ways to divert it into unexpected channels. The growth and experi¬ ence it is obtaining in the financing of the war will, however, serve it in good stead when the tim~ comes for a more normal development of its powers. Meantime, it has proved itself the country's banking mainstay and support in the necessary operations incident to the financing of the struggle.

FI. Parker Willis,

Secretary Federal Reserve Board, Washington.

13. SAVINGS BANKS. Savings banks are of two kinds, stock and mutual.

Stock banks. — The stock savings bank is to all intents and purposes quite like a bank of discount, having capital stock, and is, there¬ fore, owned and controlled by the stockholders, to whom the profits belong after paying the agreed rate of interest to the depositors. Such banks are to be found largely in the West and South, there being no such institutions in the Eastern States. They are essentially banks of discount with the word ˆsavings® in their title. They transact chiefly a commercial busi¬ ness and carry comparatively few savings ac¬ counts. According to the report of the Comp¬ troller of the Currency, there were 1,529 of these institutions reporting as of 23 June 1915, with canital stock of $92,982,798, loans amount¬ ing to $850,304,207, deposits of $1,047,039,650.93, of which $754,443,330

were savings deposits. The depositors numbered 2,977,968, of which 2,380.496 were savings depositors.

Mutual banks. — The mutual savings bank, with which this article has mainly to do, is of

an entirely different type. It is, as the above term indicates, a mutual institution, without stock and therefore without stockholders, being owned by the depositors collectively and con¬ trolled by a body of trustees who in law rep¬ resent them, but are not elected or appointed by them. The depositors are, in a sense, part¬ ners, in that the profits belong to them and the losses, if any, are legally assessable upon them, the latter process being, however, a rare occurrence.

We can best obtain a clear idea of the sav¬ ings bank by distinguishing it from a bank of discount. The latter is a stock corporation, organized to receive funds on deposit, which it may treat as its own upon the implied agree¬ ment to return the same upon demand. It loans on promissory notes, buys commercial paper, bonds and other securities, issues bank notes and operates quite largely through the checking system, by which the bulk of its funds are dispersed. All the profits belong to the stockholders, upon whom losses fall, should there be any. It is the business man's bank.

The savings bank caters to the small saver. It receives funds on deposit as trustee for the depositor, to invest for his account. It does not, as a rule, make any discounts ; buys no commercial paper; issues no bank notes, and honors checks only when accompanied by the passbook of the depositor. It is permitted to ask notice of withdrawal as a protective meas¬ ure in times of stress, while the bank of dis¬ count must pay on demand or suspend. The contract of the savings bank with the depositor is in essence this : That it will accept the funds

offered for deposit, invest them according to law in certain prescribed securities, repay the same upon notice (which is, as a rule, waived, although in some instances is enforced in very large banks as a daily procedure), apportion the earnings among the depositors after pay¬ ing expenses and establishing a surplus or guaranty fund for their protection against losses. Out of the foregoing comparisons we may evolve the following as a fair definition of a mutual savings bank : <(A savings bank

is a mutual institution conducted for the bene¬ fit of the depositors, without profit to the managers or trustees, for the purpose of re¬ ceiving on deposit, for safe-keeping and invest¬ ment, such sums as shall be offered by the depositors, repaying the principal on demand or upon legal notice, and distributing the earn¬ ings among the depositors as interest-dividends, after paying expenses and setting the remain¬ der aside as a surplus fund for the protection of all.®

The savings bank has well been likened to a reservoir into which pour the little streams for the purpose of combining them into a larger stream for mutual investment purposes. The savings bank makes capitalists by the weld¬ ing power it possesses, making the small sums effective by working them together.

Origin of Savings Banks. — The origin of savings banks is in doubt, there being various claimants for the honor of first conceiving the savings bank idea. Daniel Defoe, of <(Robinson Crusoe® fame, is mentioned as the first to conceive the savings bank, in a plan whereby the government was to receive the deposits of the people. A French writer has asserted that

the idea dates back to one Hugues Delestre in 1610. Such institutions were also formed in Brunswick in 1765; Hamburg in 1778; Berne, Switzerland, in 1787; Basel in 1792; Geneva in 1794. But so far as is known, the savings bank as we know it to-day was the outgrowth of none of these. The movement in England had its inception in the schemes of the Rev. Joseph Smith and Priscilla Wakefield. The former in 1798 conducted a plan whereby it was agreed to receive sums for safe keeping, repaying the same at Christmas-time with a bounty subscribed by his rich parishioners. The deposits could be withdrawn at any time.

Mrs. Wakefield's plan (1799) was a sick and aid society rather than a . bank. The members paid a certain sum per month, according to age,

and received a pension after 60 years of age. Sick and funeral benefits were also paid. There was the ((Sunday Bank® (1808) at Hereford, which was also in the nature of a charity and open Sunday mornings only. Jer¬ emy Bentham established his <(Frugality Bank® in 1797.

It is obvious that none of these plans had in them the true savings bank idea. They were all essentially charities, which the savings bank is not. The first man to conceive the proper idea and work it out to a practical conclusion was the Rev. Henry Duncan, a Scottish clergy¬ man, who in 1810, at Ruthwell, Scotland, estab¬ lished the first savings bank that operated along businesslike lines and depended upon the earning power of the money received on deposit to carry on the bank. It was his con¬ clusion that from the earnings of the bank the depositors should receive their interest and the bank should pay its expenses, the correct savings bank plan. The result of Duncan's practical plan was the Edinburgh Savings Bank, organized in 1814, which is still a prosperous institution. Following Duncan's plan, savings banks soon sprang up all over Europe.

The savings bank movement in this country naturally followed the movement in England and Scotland. It is admitted that during the early part of 1816, almost simultaneously, the movement began in New York, Boston and Philadelphia. Sometime during that year a letter reached Thomas Eddy of New York from a London magistrate named Patrick Colquhoun in which he outlined the English plan of savings banks. The idea also came to the attention of James Savage of Boston and Condy Raguet of Philadelphia. The result of this simultaneous information was the estab¬ lishment of the Philadelphia Saving Fund So¬ ciety, which opened for business 2 Dec. 1816, being the first bank of its kind to receive deposits in this country; the Provident Insti¬ tution for Savings in the Town of Boston, which incorporated 13 Dec. 1816, being the first to receive legislative sanction; and the Bank for Savings in New York, being, it is highly probable, the first to be conceived but the last to open for business owing to the antipathy of the New York legislature toward banks in general. It was chartered 26 March 1819 and opened for business 3 July 1819. The historical sequence is, therefore: New York the first to conceive, Philadelphia the first to receive money on deposit, and Boston the first to become a legal entity.

Organization. — The organization of a mu¬ tual savings bank consists of a body of trus¬ tees, named in the original articles of incorpo¬ ration, the charter being in former days issued by special act of the State legislatures ; but under the free banking idea, the statutes now prescribe the process necessary to organize a savings bank, and any body of men who may care to do so may form a savings bank by complying with the statutory requirements and obtaining the sanction of the State official in charge of banks, usually termed ((Banking Su¬ perintendent,® ((Banking Commissioner,® ((State Auditor,® <(State Bank Examiner,® etc., the dis¬ tinction being in the title and not in the official duties.

Trustees. — 'The trustees are a self-perpet¬ uating body, vacancies being filled by their own votes, and the qualifications are moral rather than financial. Unlike a bank of discount, where stock ownership carries voting power, money power carries no weight with savings bank elections, the trustee being elected for life, the vacancy caused by his death being filled by vote of the survivors.

As a rule these trustees serve without com¬ pensation, even the attendance at board meet¬ ings being without remuneration, except in a few States where the fee is limited to about three dollars. They are permitted to receive fees as appraisers of real estate in making mortgage loans, and as examining members of the board and for other special services, but these fees are in lieu of service and not in payment of their trusteeship.

The duty of the trustee consists in attend¬ ance at board meetings, service on committees, such as real estate valuation committees, ex¬ amining committees, and finance committees, the latter having charge of the investments of the bank. In the early days of the savings bank the trustees also acted as tellers, clerks, *etc.*

The relation of the trustee to the depositor is that of a cestui que trust — one acting for the benefit of another. The relation of the cor¬ poration to the depositor, however, is one of contract.

Accounts. — On the opening of an account, the depositor receives a passbook which not only is evidence of his deposit, but the terms under which it is received, and constitutes the contract between him and the bank. This con¬ tract, briefly stated, is, that the bank will

invest the funds lawfully, manage wisely, repay the same on demand or on a stated notice and use due care in making payments. The contract of the depositor is that he will take good care of the book and promptly inform the bank of its loss, for its protection against wrongful pay¬ ment, and abide by the bylaws, copy, or part, of which is always embodied in the passbook, and the mere acceptance of the book evi¬ dences his compliance with this contract.

Savings bank accounts are of three kinds : (1) single-name accounts, payable to the indi¬ vidual named in the book and at death to his legal representative; (2) the joint account, payable to either of the parties during life, and at death to the survivor; (3) the trust ac¬ count, payable to the trustee during life and at death to the party named as beneficiary.

Bookkeeping. — The bookkeeping of a sav¬

ings bank is simple. A single transaction will indicate its character. Upon making a deposit the depositor signs his name and gives informa¬ tion concerning his age, birthplace, parents, etc., for the purpose of identifying him in future payments. The book is then issued to him and a deposit ticket made out, the name in¬ dexed, and the signature card filed numerically for reference in making payments. Books are always numbered and for every book there is a corresponding ledger account or card. The accounts are kept in groups of one or two thousand or by ledgers for proving purposes. The deposit tickets of the day are sorted ac¬ cording to groups, and entered on a distribution sheet by number and name, with the amount carried to a perforated column at the side. The postings are made directly from the tickets to the card or ledger space. When all postings have been made the proving clerk checks the distribution sheet, from which the stub has been detached, leaving only the num¬ ber and name as a guide. Turning to the num¬ ber he verifies the name and inserts the amount posted for that day. The total amount must agree with the detached stub, thus showing that the right amount has been posted to the right account. Drafts are put through the same process, but in paying, the signature is compared with the one on file and as a rule the test questions are asked, the purpose of this process being to show in a court of law, if necessary, that due care has been used to iden¬ tify the depositor. The savings bank is ab¬ solved, in a measure, from the general rule of forgery. If the bank can show that the de¬ positor has written a signature comparing favorably with the original and answered the test questions properly, it is protected against

wrongful payment. It is obviously impossible for a savings bank to know personally all its depositors, who, being infrequent patrons, are liable to change handwriting, and the test ques¬ tions act as a measure of protection both to the bank and the depositor.

The big events of the savings bank year are : First, the trial balance, which is a total of all the accounts, which must agree with the general books and in well-organized banks are kept absolutely in agreement by these periodic tests, made as a rule quarterly or semi-annually. In a bank where the transactions run into the millions this is no light task. Second, the in¬ terest computations, which involves the labor of ascertaining the periods for which the vari¬ ous deposits are entitled to interest, computing and posting the same to the various accounts within a period of a few weeks.

Interest. — Savings banks as a rule pay in¬ terest from quarterly periods, or from the first of the month following the deposit, allowing a certain number of days' grace; thus, money de¬ posited on or before 10 July and remaining in the bank until 1 January, will draw six months' interest; between 10 July and 3 Octo¬ ber — three months' interest. Some banks pay from the first of each calendar month if the money is on deposit at the close of the interest period.

Investments. — Savings banks are large in¬ vestors in mortgage loans and municipal and railroad bonds. The law as a rule prescribes the character of bonds which may be purchased,

but in all States, government, State, city, town, village and school district bonds are legal in¬ vestments. Railroad securities are legal if they conform to the statutory requirements, which for instance in New York are, that the bonds shall be a first mortgage on the property and that the corporation shall have paid at least 4 per cent dividend on all classes of stock for 10 years preceding the investment. The State laws differ as to the detailed requirements, a review of which would be impossible within the limitations of this article. As a rule the bond and mortgage loan is limited to 60 per cent of the appraised value of the

property and must be a first mortgage. The proportion of mort¬ gage loans to the total assets is generally stipulated in the law, as for instance in New York, not over 65 per cent of the deposits may be loaned on such security.

Postal Savings Banks. — The postal savings bank is in operation in all large countries ex¬ cepting Germany. The system in this country dates from 25 June 1910. The fundamental idea of the postal savings bank is the receipt by the government through the post-offices of deposits, the payment of which is guaranteed by the government. For detailed description see Postal Savings Banks, article 14.

School Savings Banks. — The school sav¬ ings bank in this country is the result of the work of the late John H. Thiry, a Belgian, who in connection with his work as trustee of the public schools of Long Island City became im¬ pressed with the improvidence of the American children and desired in some way to combat the tendency to spend. As a result the first school savings bank was opened in connection with the public schools of the above named place in the late eighties. Mr. Thiry wrote and traveled extensively in connection with his pet scheme, with the result that other banks were formed in various parts of the country after his original plan. For many years, he was the only statistician in the movement, and annually is¬ sued a report giving the growth of the system. It was not until the matter was taken up by the savings bank section of the American Bankers Association in the year 1911 that the movement reached the aggressive stage, and under the en¬ couragement of the bankers has grown to large proportions.

The Woman's Christian Temperance Union, Young. Men's Christian Association and kindred organizations have loaned their support also, the first-mentioned organization being particularly active in spreading the idea. Mrs. S. L. Oberholtzer (q.v.), of Philadelphia, has given much time in promoting the school sav¬ ings bank and has published periodic statistical matter in connection therewith. The school savings bank is as a rule conducted along one of two lines: (1) .Deposits are made through the medium of the teacher who acts as receiv¬ ing agent for the school. Deposits are per¬ mitted as low as one cent, but in some cases stamps are issued for penny deposits until 10 cents has been accumulated on a card. The pupil is given a pass card as a receipt for the deposit. The deposits from each class are turned in to the principal and by him deposited in a saving's bank to the credit of the school savings bank, or himself as trustee. The laws

of several States, notably New York and Massachusetts, have legalized this method of procedure, it being deemed unwise to allow the movement to spread without adequate safe¬ guards as to the disposition of the money re¬ ceived on deposit. When the deposits on the pupil's card reach one dollar or more, the amount is transferred to a regular savings bank account in the depository bank, in the pupil's name. Withdrawals from the general fund and from the pupil's individual accounts are permitted, but not encouraged, the signature of the principal and parent being required for statistical and restrictive reasons.

(2) The second method contemplates using the pupils of the higher grades as the active managers of the bank. Some schools have a regularly organized bank, with president, cashier, clerks, etc., who manage the school bank, receive all deposits, keep all records and render proper reports to a supervising head, usually one of the teachers. One of the most popular plans consists of a duplicate card with amounts printed in multiples of five cents. As deposits are made the cards are placed together and the amount punched out, thus making the two records simultaneously. This plan was de¬ vised by a school principal in Brooklyn and has met with great favor wherever instituted. Large cities like New York and Chicago have taken up the school savings bank plan, the banks co-operating with the school authorities in pro¬ moting the spread of the movement.

According to recent statistics gathered by the savings bank section of the American Bank¬ ers Association, for the Comptroller of the Currency, there were 280 cities operating the school savings bank in one form or another represented by banks in 1,925 schools, having 928,784 pupils enrolled, of which 398,540 were depositors, having to their credit $1,792,640.10.

Bibliography. — Fisk, (The Modern Bank> (Chap. XXXI, New York 1910) ; Keyes, his¬ tory of Savings Banks > (New York 1874) ; Kniffin, W. H., Jr., (The Savings Bank and Its Practical Work) (New York 1912).

William H. Kniffin, Jr.. Vice-President Bank of Rockville Centre, Formerly Secretary Savings Bank Section

American Bankers' Association.

14. POSTAL SAVINGS BANKS. Defi¬ nition. — A governmental

agency, operating through the post-offices, for the encouragement of thrift among the masses of the people by providing widely distributed and convenient de¬ positories wherein small sums may be placed at a comparatively low rate of interest, with the faith and credit of the government pledged to the repayment of principal and interest on demand.

History. — <(The proposition to use post-offices as depositories for savings was first made in England as long ago as 1807. Mr. Whitbread, a member of Parliament, introduced during that year in the House of Commons a bill for the benefit of the working classes, the guiding principle of which was that of self-help. Mr. Whitbread considered it wiser to assist people to advance their own interests than to extend help by the giving of alms. His meritorious scheme, however, was received with almost universal disfavor. The press of the

time ridiculed his ideas and treated them as altogether impracticable and visionary. There were then very few savings banks, only eleven being in existence throughout the civilized world.

((In December, 1838, the practice of trans¬ mitting money by means of postal money orders throughout the United Kingdom was author¬ ized. By that time the advocates of postal sav¬ ings banks had become quite numerous, and they found in the successful workings of the money-order system one of their most telling arguments.

<(It is interesting to note that the plan of postal savings banks which finally was adopted was proposed by one engaged in commercial banking — Charles W. Sikes, a bookkeeper of the (joint-stock) bank of Huddersfield, York¬ shire. He presented his composition on the subject to that eminent statesman, W. E. Glad¬ stone, then Chancellor of the Exchequer. He cited many pertinent facts tending to show the need of postal banks, among them being that, although private savings banks had greatly in¬ creased in number and deposits, they did not come within the reach of the common or most numerous classes of the people. This, he stated, could be done only by the post-offices, which

were accessible to every workman. Mr. Sikes was encouraged, and seconded in his efforts by Mr. Rowland Hill, who had been ap¬ pointed general secretary of the post-office for life in recognition of his valuable services as a postal reformer. Mr. Gladstone also eloquently supported the bill, which became a law in May, 1861, and on 1 September of the same year the British Post-Office Savings Bank came into being.

<(It is well known that Mr. Gladstone was before the English public prominently as a con¬ structive statesman for many years. His opinion of the importance and value of postal savings banks is best given in his own words, uttered in the House of Commons in the year 1888 amid universal applause. He said :

'The post-office savings bank is the most important in¬ stitution which has been created in the last 50 years for the welfare of the people and the State. I consider the act of 1861 which called the institution into existence as the most useful and fruitful of my long career. '

<(Charles Sikes, actively concerned in the adoption by Great Britain of the postal savings bank, was not unrewarded. He was knighted in 1881 upon the recommendation of Mr. Glad¬ stone, then Premier. He was appointed to an important office under the government, and public subcriptions even were made and a valu¬ able gift tendered him in appreciation of his good work.® (United States Senate Report No. 125, 61st Congress, 2d Session).

The Movement for Postal Savings Banks in the United States. — Following the lead of England almost every considerable nation, with the exception of Germany, which has a splendid system of municipal savings banks, established postal savings depositories. The movement for the establishment of postal savings banks in the United States extended over a period of nearly 40 years. The subject was first brought for¬ ward officially in this country by Postmaster-General Creswell in 1871, and met with the im¬ mediate approval of the press and the people. Eight succeeding Postmasters-General recom¬

mended the establishment of such banks and 80 bills were introduced in Congress between 1873 and 1910 to effect the purpose. The bill which eventually became the law was introduced on 26 Jan. 1910, by Senator Thomas H. Carter, of Montana, and was referred to the Committee on Post-Offices and Post Roads, of which Sena¬ tor Carter was a member. It was reported back by the committee on the

following day. The bill with various amendments passed the Senate on 5 March. It was referred to the House of Representatives on 7 March, where it was extensively amended, and was finally passed on 9 June. The Senate concurred in the House amendments on 22 June, and the bill was signed by the President on 25 June.

Principal Features of the Postal Savings Law and Regulations. — • The organic Postal Savings Act of 25 June 1910 created a board of trustees for the control, supervision and administration of the postal savings depository offices designated and established under the provisions of the act, and of the funds received on deposit, consisting of the Postmaster-Gen¬ eral, the Secretary of the Treasury, and the Attorney-General, acting as ex officio. The board was empowered to make all necessary and proper regulations for the receipt, transmit¬ tal, custody, deposit, investment and repayment of the funds deposited at postal savings de¬ pository offices. This provision of the original act was somewdiat modified by the Act of 4 March 1911. As the matter now stands the Postmaster-General is charged wdth the desig¬ nation of post-offices as postal savings deposi¬ tories, the supervision of postal savings busi¬ ness transacted at depository post-offices and the conduct of the central administrative office at Washington. The board of trustees is charged with the management and investment of postal savings funds after they leave the custody of postmasters. The Treasurer of the United States is treasurer of the board of trustees.

Any person 10 years old or over may open a postal sayings account in his or her own name by depositing one or more dollars in any post-office authorized to accept deposits. No per¬ son may at the same time have more than one account either at the same office or at different offices. The account of a married woman is free from any control or interference by her husband. Post-office employees are forbidden to disclose to any person except the depositor the amount of any deposits.

A person may deposit any number of dol¬ lars, and at any time, until the balance to his credit amounts to $1,000, exclusive of accumu¬ lated interest.

Accounts may be opened by the intending depositor in person, or through a representa¬ tive. A person residing at a post-office not au¬ thorized to accept postal savings deposits may open an account at a depository office by mail, through his local postmaster.

After an account has been opened deposits may be made either in person, through a repre¬ sentative, or by mail. Deposits are acknowl¬

edge by certificates, issued in fixed denomina¬ tions which are made out in the name of the depositor and serve as receipts. These certifi¬ cates are not negotiable or transferable.

A depositor may at any time withdraw all oi any part of his deposits, upon demand, from the post-office where the deposits were made. Withdrawals may be made in person, through a representative, or by mail. Postal savings cer¬ tificates bear simple interest at the rate of 2 per cent a year. Interest begins on the first day of the month following. the month in which the certificate is issued and becomes due and payable at the expiration of each full year from the day interest begins as long as the principal remains on deposit. No interest is paid for a fraction of a year.

Amounts less than $1 may be saved by pur¬ chasing postal savings cards and stamps at 10 cents each. A savings card with nine stamps affixed will be accepted as a deposit of $1 either in opening an account or in adding to an existing account, or it may be redeemed in cash.

A depositor may exchange the whole or a part of his deposits for registered or coupon United States postal savings bonds, bearing 2*4 per cent interest, issued in denominations of $20, $100 and $500. When bonds are issued in exchange for postal savings deposits the bal¬ ance to the credit of the depositor is reduced accordingly, and he may make further deposits until his account reaches $1,000.

Postal savings bank funds in most countries are invested in the public debt. In establish¬ ing postal savings depositories in the United States a radical departure was made in this respect. The organic law, as amended by the Act of 18 May 1916, prescribes that the funds received at postal savings depository offices in each city, town, village or other locality shall be deposited, in the order of precedence here¬ inafter specified, in solvent banks located therein, whether organized under National or State laws, and subject to National or State supervision and qpcamination, willing to receive such deposits under

the terms of the act and the regulations made by authority thereof, and the sums deposited shall bear interest at the rate of 2*4 per cent. The law requires that 5 per cent of the postal savings funds shall be withdrawn by the board of trustees and kept with the treasurer in lawful money as a re¬ serve. The word ˆbank® as used in the law includes savings banks and trust companies doing a banking business.

If one or more member banksof the Federal Reserve System exist in any city, town, vil¬ lage or locality where postal savings deposits are made, such deposits are required to be placed in the member banks, provided they qualify to receive them, substantially in propor¬ tion to the capital and surplus of each bank, but if the member banks fail to qualify, then other eligible banks located therein may qual¬ ify. If no bank eligible to qualify exists in any city, town, village or locality, or . if none where such deposits are made will receive them on the terms prescribed, then the funds are deposited under the terms of the act in the bank most convenient to the locality. If no bank in any State or Territory is willing to re¬ ceive the deposits on the terms prescribed, then they are required to be deposited with the treasurer of the board of trustees, and counted as a part of the reserve.

The board of trustees is required to take from the banks such security in public bonds, or other securities, authorized by act of Con¬ gress or supported by the taxing power, as the board may prescribe, approve and deem suf¬ ficient and necessary to insure the safety and prompt payment of such deposits on demand. If at any time the postal savings deposits in any State or Territory exceed the amount which the qualified banks therein are willing to re¬ ceive under the terms of the act, and such ex¬ cess amount is not required to make up the re¬ serve. fund of 5 per cent, the board of trus¬ tees is authorized to invest all or any part of the excess in bonds or other securities of the United States. When, in the judgment of the President, the general welfare and interest of the United States so require, the board of trustees is authorized to invest all or any part of the postal savings funds, except the reserve fund of 5 per cent, in bonds or other securi¬ ties of the United States. The board of trus¬ tees' is authorized to purchase from the holders thereof bonds which have been issued to postal savings depositors in exchange for their de¬ posits. The board of trustees is authorized at any time to dispose of bonds held as postal savings . investments and use the proceeds to meet withdrawals by depositors.

Interest and profit accruing from the de¬ posit or investment of postal savings funds is required to be applied to the payment of inter¬ est due to postal savings depositors, and the excess thereof, if any, is required to be covered into the Treasury of the United States as a part of the postal revenues.

Statistics for United States System. — The postal savings banks were opened in the United States on 3 Jan. 1911, at 48 second-class post-offices, one in each State of the Union. Fol¬ lowing is a statement showing the growth of the system and giving a summary of its transactions at the end of each six months' period :

Period Ending

Number of deposi¬ tories, in¬ cluding branches and

stations

Balance to the credit of depositors

Num¬ ber of depos¬ itors

Average princi¬ pal per depos¬ itor

June 1911 .

400

$677,145

11,918

$56.82

December 1911.

5,132

10,614,676

162,697

65.24

June 1912 .

10,170

20,237,084

243,801

83.01

December 1912.

12,823

28,057,059

302,157

92.86

June 1913 .

12,820

33,818,870

331,006

102 00

December 1913.

10,871

39,749,530

364,286

109.12

June 1914 .

10,347

43,444,271

388,511

111.82

December 1914.

10,346

59,145,289

496,008

119.24

June 1915 .

9,546

65,684,708

525,414

125.02

December 1915 .

9,531

74,349,414

564,887

131.62

June 1916: … .

8,421

86,019,885

602,937

142.67

December 1916.

8,402

112,159,191

661,911

169.45

June 1917 .

7,161

131,954,696

674,728

195.57

Statistics for Foreign Countries. — Follow¬ ing is a statement giving the principal numerical facts in connection with postal savings bank systems of countries other than the United States, as shown by Statistical Abstract of the United States for 1916, based on the official reports of the respective countries.

Country

Date of report

Number of depositors

Deposits

Average

deposit

account

Austria * .

Dec. 31, 1913

2,300,407

$40,297,296

$17.52 67.75 28. 16 9.63 53.21 369 . 06 26. 15 57.07

Relgium 2 . .

Dec. 31, 1912

3,013,296

204, 147,391

Rnlgaria .

Dec. 31, 1911

312,462

8,797,965

T^ervnt. _ . .

Dec. 31, 1914

233,744

2,251,803

France .

Dec. 31, 1914

6,555,992

348,858,018

Tunis . .

Dec. 31, 1914

4,238

1,564,086

TTimvarv 1 .

Dec. 31, 1913

873,780

22,852,522

June 30, 1915

6,295,797

359,315,380

Japan .

June 30, 1916

14,204,531

126,902,319

8.93

Netherlands .

Dec. 31, 1914

1,671,498

74,203,170

44.39

Dutch East Indies .

do.

122,429

3, 829,627

31.28

Dutch Guiana .

do.

10,338

323,511

31 . 29

Roumania 2 .

July 1, 1910

218,690

11,616,820

53.12

F nssia 3 .

June 30, 1916

11,013,000

1,565, 909 , 000

142. 19

Finland .

Dec. 31, 1913

69,535

1,709,448

24 . 58

Sweden . .

Dec. 31, 1914

578,271

12,020,007

20.79

United Kingdom 4 …

Dec. 31, 1914

13,514,814

927,229,857

68 . 61

British India .

Mar. 31, 1916

1,660,424

49,707,248

29 . 94

New Zealand … .

Dec. 31, 1915

509,085

107,872,610

211.82

Canada .

Mar. 31, 1916

173,456

40,008,418

230.65

British South Africa 5 …

1914-1915

260, 164

28,823,428

110.79

British West Indies5 .

1914-1915

97,465

6,438, 165

66.06

British Colonies, n. e. s5 .

- 1914-1915

269,486

14,480,853

53.74

Philippine Islands . .

Dec. 31, 1915

54,434

1,601,795

29.43

1 Exclusive of check department.

2 Covers government savings banks.

3 State, including postal savings banks.

4 Includes 4,017,659 accounts, averaging 51 cents each, which have been dormant for five years or more. 6 Covers government and post-office savings banks.

A. S. Burleson,

Former Postmaster-General, United States.

15. BANK ORGANIZATION AND MANAGEMENT. There are three classes of banks in the United States — National, State and private. The National banks were organized to be strictly commercial banks, but some of them acquired large lines of savings deposits, even though the law did not authorize them to do so. The act of December 1913, however, confirmed their action. By the same act the banks may obtain permission to conduct a trust department. The State banks include four kinds of banks — commercial, savings, trust companies, and the three functions combined in one institution. Private banks, in some of the States where they are allowed to operate, con¬ duct their business apart from legal restriction and protection.

By the average person the National banks are considered the safest and most important. The State banks, as a class, are by many not considered so safe nor so important. The private banks are frequently considered as questionable. Such conclusions, however, are not in accordance with the facts. Whether a bank be a National, a State or private bank is not the vital point; but the character and quality of its management is vital.

National Banks. — The national banking system was organized under the Act of Con¬ gress of 25 Feb. 1863, since which time there have been many amendments to the original act.

A National bank (legally known as a na¬ tional banking association) may be organized by five or more persons. Application must be made

to the Comptroller of the Currency for permission and charter, and the application must state specifically concerning these five points: (1) The name of the association. (2) The place where it is to conduct the banking business, giving names of State, county and city (or town or village). (3) The amount of the

capital and the number of shares. (4) The names and residences of the stockholders, and the number of shares for which each has sub¬ scribed. (5) That application is being made to enable the bank to operate under the National Banking Law with its privileges and ad¬ vantages.

The National Banking Law was originally enacted to make a market for the bonds of the United States government, and though appar¬ ently selfish its provisions accomplished a great benefit for the business public by placing the bank notes on a safe basis, and by driving from the market the ((wild cat® notes. The Act of 30 June 1864 first imposed taxes on circulating notes of State and private banks; and the laws were changed at various times until 3 March 1865, when the tax was made 10 per cent — and it is still the same.

The law could not properly prohibit the issue of circulating notes by State and private banks, because note-issue is an absolute function of a bank, but it could make the issue prohibitive by high taxation — and ‘it did that.

Bank notes are now issued only by National banks, and as security for these the banks must deposit United States government bonds with the Secretary of the Treasury at Washington, D. C., and a cash deposit of 5 per cent of the outstanding notes to provide for their redemp¬ tion. The Federal Reserve notes are issued by the Federal Reserve banks.

National banks are frequently organized by men who make a business of forming such organizations. For this service they charge the stock purchasers, or the organization, a commis¬ sion or percentage. This is equivalent to pay¬ ing a premium on the stock. The organization can, however, be perfected without the aid of a professional organizer, but can seldom be ac¬ complished without involving some legal or organization expenses.

The capital required depends on the size of

the place where the bank is to operate, and ranges from $25,000 to $200,000 or more. If the population of the town is less than 3,000 the capital must be $25,000; if between 3,000 and 6,000 then $50,000 capital will be required; if more than 6,000 and less than 50,000 the capital must be $100,000 and in every place with a population above 50,000 the bank's capital is to be $200,000 or more.

At least 50 per cent of the capital must be paid in before the bank is authorized to open for business, and this must be in cash or its immediate equivalent, not by promissory notes. The balance may be paid in monthly instal¬ ments during the next five months ; but it is advisable to have all paid in before opening for business. No surplus is required by law to be paid in by the subscribers, but it has become the custom for new banks to start with a paid-in surplus and by doing so the new bank re¬ ceives the confidence of the public more quickly. Ten or 25 per cent of the capital should be sufficient, although 100 per cent is paid in on some occasions.

Each stockholder of a National bank is liable to an assessment of 100 per cent of the par value of his stock for the liabilities of the bank. The law reads : ((The shareholder of every national banking association shall be held individually responsible, equally and rat¬ ably, and not one for another, for the contracts, debts, and engagements of such association, to the extent of the amount of their stock therein, at the par value thereof, in addition to the amount invested in such shares. ® The shares of certain State banks entering the National system are exempt from this liability.

State banks can be converted into National banks, and many banks now in the National sys¬ tem were originally organized under State laws. To enter the National system the State bank must comply with practically the same require¬ ments that are imposed on a new organization. There are, however, certain advantages offered to the State banks, but not so many now as in the early days of the operation of the law. These are the advantages : if the bank has branches it may retain them ; the stockholders of such a bank are exempt from the 100 per cent liability on their stock if the capital of the bank is not less than $5,000,000, actually paid in, and if the bank at the time of conver¬ sion has a surplus of 20 per cent of the capital, but the 20 per cent surplus must be maintained.

State Banks. — These are organized under the laws of the States where they are to oper¬ ate, and as the laws of each State differ in some respects it would be impossible in this article to give specific statements regarding the organization requirements of the various States. Forms for application to organize such banks and copies of the laws governing the banks can be obtained from the Banking De¬ partment of any State, or from ‘the Secretary of State, in such States where there is not a banking department.

In many States the laws have been modeled after the National Bank Law, and in some States the laws have been made more advan¬ tageous to the bankers than the national law, and thus give the banks a greater scope in lines of business that rightfully belong to them. If a bank is restricted in the lines of business in

which it can operate it is limited in its earn¬ ing power as well as in its utility to the com¬ munity.

As the National banks were organized orig¬ inally, to serve the Federal government and mercantile interests, so the State banks in many States have laws . that were formed with the purpose of allowing the banks to serve the general public, and because of these laws they are better public utility institutions than the National banks. If a bank is not a public utility institution in its practice, it becomes narrow in its views and unaccommodating to its cus¬ tomers, and so limits its usefulness.

Private Banks are usually organized by one man, but sometimes by several men as a firm. In many States laws have been passed pro¬ hibiting any one doing the business of banking without the Federal or State authority. Such laws were enacted because of men who opened banking offices with the apparent purpose to defraud the public. Their success in their evi¬ dent purpose led the authorities to try to pro¬ tect the innocent public against such men. These laws, however, are a restriction against private business and prevent honest men from going into, the banking business privately, as they can do in any other business. In this respect the laws are unjust. Some of the ver}’ best bank¬ ing institutions in the country are private banks, and some of them have for many years been conducting their business in a manner above reproach and criticism. See Private Banks, article 11.

The Management of Banks is divided into two main departments — supervisory and active. The supervisory is that of the governments,

which consists mainly of periodic examina¬ tions and requests for statements of condition with more or less explanation of the items in¬ cluded in the statements.

Each National bank, according to the law, is required to be examined <(at least twice in each calendar year,® but this law is not fully complied with by the examiners. The Comp¬ troller of the Currency and his assistants are responsible for these examinations. In some cases it is known that more than 12 months have elapsed between the examinations of cer¬ tain banks.

In some States the laws require two exami¬ nations a year, but the makers of the laws, in many States, do not provide sufficient funds for the department having oversight of the work to make the examinations. Both the Na¬ tional and State laws are therefore not com¬ plied with in regard to the governmental super¬ vision. But let it be said to the credit of those in charge of the various departments, that even with their handicaps they have, in quite a few cases, prevented dangerous and questionable practices from arising and continuing in banks that otherwise would almost certainly have resulted in heavy losses to or complete failures of the banks.

The active management of a bank is lodged in its board of directors. The National Bank¬ ing Law requires five or more directors for each bank. The position of director is not simply an honor, or a recognition of success as a business man ; neither is it for the sole purpose of giving the bank prestige by the use of the director's name. The directors are in-

tended to be the real and actual managers of the banks. But here also is failure to comply with legal requirements. Probably not one bank in 10 is really managed by the directors. Experience with failed banks has proved that if the directors had done their legal duty the banks would not have failed.

The directors delegate certain duties to the president, vice-president,

cashier, assistant cashier, treasurer and assistant treasurer, or other officers, and then in too many cases pay no more attention to the details. The men so appointed must be trusted but the trust reposed in them should not lead the directors to allow them to perform their duties without the active supervision of the board or special committees of members of the board.

The president is the head of the bank, rep¬ resenting the directors to the other officers, em¬ ployees and customers of the bank, and on the other hand is their representative to the board.

The vice-president is the assistant of the president, if he has any active duties in the bank, and usually has a certain part of the executive work under his supervision.

The cashier or treasurer has special over¬ sight of the cash resources of the bank and of its records, as well as its staff of employees.

The assistant cashiers and assistant treas¬ urers are to assist in the care of the details of the daily work.

In addition to the different kinds of bank¬ ing institutions mentioned above, as being in the United States, there are two other kinds, the Federal Reserve banks (see Federal Reserve System, article 12) and the Farm Land banks. These have not been dealt with because they are government institu¬ tions and the public has practically no voice in the organization and management of such banks. There are 12 Federal Reserve banks and their purpose is to serve the government and the National banks, and the State banks that join the Federal Reserve system. All member banks must be stockholders and de¬ positors in these banks — they have no choice in the matter. These Federal Reserve banks are to furnish aid in the way of loans of currency to member banks when they need it.

There are to be 12 Farm Land banks. Their purpose is to loan money secured by mortgages on farm lands, and the banks are to issue bonds secured by the mortgages. The interest rate on the bonds is not to exceed 5 per cent. In addition to these banks there are to be National Farm Loan Associations formed by men who will borrow from the banks. These associations are stock companies and each appli¬ cant for a loan must subscribe for stock equal to 5 per cent of the amount of the loan. The par value of the stock is to be five dollars a share.

The Federal Reserve banks are managed by the Federal Reserve Board and the local officers of each bank. The Farm Loan banks are to be

managed by the Farm Loan Board and by the registrars and other officers at the local banks.

The value and utility of these banks have not been demonstrated, and some bankers question both the value and utility of both of these government institutions, while other bankers consider them of great value.

Bibliography. — Knox, John jay, (History of Banking) (New York) ; Reihl, C. W.,

(Literary Remittances by a Banker) (New York 1910) ; Banking Laws of New York, Ohio and Other States; (National Bank Organization > (National City Bank, New York) ; (U. S.

Treasury Department, National Bank AcL (Washington, D. C. 1915).

Charles W. Reihl,

Former Bank and Clearing House Examiner.

16. BANK SUPERVISION. About 1860 it became evident that some means must be adopted for repressing the mixed banking sys¬ tem then in vogue and to provide a uniform and safe system in its stead. Federal enact¬ ment soon provided for a uniform system, and the provisions subjecting National banks to ex¬ amination by representatives of the Comptroller of the Currency increased the safety of the system. In many States the State banks are examined by officials of the State Supervisor of Banking. National banks are examined every six months. The examiner comes un¬ announced and the bank is for the time being under his control. He is obliged to examine the books, verify the cash and examine the investments and securities. The difficultv of passing judgment on the quality of all loans is the loophole through which many impru¬ dent, or worse, operations are carried on despite the vigilance of the -examiners. Private banks are now, in many Statee, subjected to special State supervision.

Benefits of Banking Institutions. — These institutions afford a permanently safe place where the individual may deposit his moneys. And this is much more of a privilege than may appear on the surface. For not only is the secure place of deposit supplied, which other¬ wise would be wanting, but the bank practically insures the safety of the funds committed to it: if in any way” loss is sustained by robbery or fire or by seine other cause, the bank is bound to make good the loss,

and this regard¬ less of the fact that the depositor may not be a profitable customer, as many dealers are not. In fact, the number of depositors who simply use a bank as a convenience, whose deposits are not large and whose multiplicity of small checks are a trouble, as they are the despair of the individual bookkeeper, is legion. Nevertheless the bank takes such accounts, holds the money subject to innumerable little drafts which are made good by new deposits equally numerous and small ; and thus the active little account is maintained from year to year, often only a source of trouble and expense to the bank, which actually receives no adequate return for its services as warden and agent. It is to be noted, too, that in this country the services rendered the individual by the banks differ greatly from those afforded by like corporations in some other countries, notably in France. To cite one instance : In that country every note when due must be paid to the bank officer in hard cash; a check on that or some other bank, duly certified, would not be received. In fact, the bank's messenger visits the payer of the note and demands the payments of the exact amount in cash, or protest and legal proceedings follow.

Relation of Banks to the Community. —

But leaving this phase of the subject, a glance

will show how vital is the relation of a bank to the community doing business with it. In a word, it may be said to receive all the money that comes to that community and to disburse it as desired by the customer. Not only so, but when he cannot command the money re¬ quired to transact his business, the bank may supply the desired amount. Thus it is, estates are cared for, income in the shape of interest is paid, vast sums are committed to its keeping, while by its loans made at times of emergency the bank enables the business of the community to be transacted ; and this principle extended stands for the business of the world. It is easy to see that a misfortune to such an insti¬ tution means a calamity to a community, and a series of them means panic, with its conse¬ quences of impoverishment and distress,

and sometimes ruin to countless thousands. How disaster in this direction has been wrought in the past those familiar with the history of banking in the earlier days, when banks were not subject to the restrictions of the present time, and when the failure of a bank often meant irreparable loss to innocent holders of their circulating notes, are fully aware. But when we go farther and take the most super¬ ficial glance at the great industries of the country, we obtain some conception of what banks and banking mean. Is it too much to say that without credit and banking facilities the unparalleled facilities of our gigantic railway systems, stretching from ocean to ocean and conveying the enormous crops of the country by which we are enabled to feed the world, would be in vain? In the last analysis we shall find that it is not car wheels, but it is money, that moves the great harvests of a continent — as for that matter, of the world. And the money would be lacking but for the banks ; these, and not steam or electricity, stand be¬ tween the nations and starvation.

Safeguarding Depositors. — It would seem that under the circumstances no argument was required to establish not only the necessity for adequate safeguards in the shape of stringent statutes, but that measures should be provided to insure strict conformity on the part of the bank officers and directors to the requirements of the banking laws, thus safeguarding the depositor against abuse of privilege or criminal carelessness. The attainment of this object is sought by the provision in national and State legislation, as the case may be, requiring official examination and the publishing of a statement of a bank's condition from time to time as the authorities may deem expedient. There is but one proper bank supervision, and this includes mental alertness to discover the very best methods for despatching business with celerity, for insuring correctness, for guarding most ef¬ fectually against errors, and to render tamper¬ ing with the books most difficult and detection most easy. It means, too, economy in the use of time — the article which so many squander lavishly as if, like the waters that pass out from between the mute lion lips of the Nile fountains, it was to flow on forever. Super¬ vision means, also, such oversight as makes the manager thoroughly familiar with the business of the bank, so that he can upon occasion com¬ mand the fullest information regarding a new department of the business at a moment's no¬ tice. The years of a banker's work in the dis¬

charge of his heavy responsibilities are not many at the most. From the time he assumes the direction of the affairs of a bank to the time

when his own ledger must be closed, a very few decades intervene. When that time has come and he either passes from all work or puts down his pen and vacates his chair for a younger man, it becomes evident that the super¬ vising banker — be he president, or cashier — whoever he may be and whatever his official designation — should be able to hand over to his successor not only the assets of the bank unimpaired, but an intelligible working system such as will enable the new manager to familiarize himself with the details of the busi¬ ness and discover the exact situation with the least delay. But this can only be accomplished by the inauguration of a system as nearly perfect as may be, which, with its comprehen¬ sive method of safeguarding checks, will re¬ quire of him less devotion to such details as it is the province of his subordinates to super¬ vise. That is to say, the more perfect the system in practice the more time will the manager have for the exercise of his judgment upon the most important questions coming be¬ fore him. It is here that the test of the most efficient bank official lies. Take, for an illus¬ tration, the work of supervising the loans made on real estate.

Expert Examinations. — It has been held, and is indeed held by many knowing no other method, that to ascertain the value of prop¬ erties submitted as collateral for loans recourse must be had to some qualified expert, generally some one engaged in buying and selling real estate. The judgment of such an authority has been, and is, accepted as conclusive on the security offered, and determinative as to whether the report shall be favorable or adverse to the loan. But here the question arises, Who shall guarantee the expert? — for experience has too often shown that his judgment may fail, or it may be discovered that the expert was consciously or unconsciously interested in advising the loan ; the applicant may have been a friend of his, or — and such cases have been — it may be his own device for getting a loan by applying through the concealed interest of another party. But suppose a more excellent way is to be found by which the bank can be rendered reasonably certain as to the value of the property, that a clear title can be given, that it has real existence as described, both as to environment and prospective value ; if he be a wise banker, will he not take advantage of that safer and saner method? And let us sup¬ pose, further, that in this way our banker is kept informed regarding specific localities, as to whether they are advancing or retrograding in value, whether the interest is kept up — is it not clear that a banker who has such expert advice is not only freed from duties that would other¬ wise needlessly weigh upon him, but that his services are to just this extent made more valuable in that with less time expended in searching for details and technicalities he has more time to devote to

other important duties? Needless to say, we are not pleading for a title guarantee company or other corporation ; we only say this — that where the services of these or kindred institutions are warranted hv the business of the bank — and it must be small institutions where the volume of business does

not warrant them — such facilities carrying guarantee of perfect safety should be utilized by the prudent banker.

Systematic Examinations Essential. — But

be supervision ever so thorough, it cannot serve its proper purpose without a system of right ex¬ amination — rather of examinations. Unceas¬ ing watchfulness can only be maintained through proper investigations, not only to detect fraud but errors of judgment. The usual examina¬ tions of books are of but two kinds, those of the directors, and those of the official examiners of the National or State government as the case may be. Of these two methods, that of the directors, when rightly conducted, is most im¬ portant, and for the obvious reason that the directors are better informed as to the value of paper and local securities than the official bank examiner, as a rule, can be. That the examinations made by directors are too often superficial and perfunctory goes without saying. Of course, in the examinations by the directors, the revision of loans is most important, enabling the board as it does, when conducted in a business spirit, to detect improper advances on an insufficient collateral or inadequate endorse¬ ment. It is here the examination should be most thorough, so that the presence of ˆweak® paper, which often becomes such after the loan has been made, may be discovered and rem¬ edied. Obviously in such an examination every piece of paper must be gone over as to time of maturity and collateral, which latter should invariably be produced. Collaterals should all be carefully examined with reference to their proper assignments to the bank, so that there may be no question about its ability to exercise a legal ownership, if necessary. The ticklers, the discount book, and all books pertaining to this most important branch of bank, should be carefully investigated,

and the precise facts ascertained. The liabilities of the bank, its deposits and cash on hand, the character of the depositors and borrowers, the condition of the individual and general ledgers, the bad debts of the bank, including especially notes past due, overdrafts when permitted — all these and more should be investigated by the board, and this without bias to any officer or employee of the bank; all of them who discharge their duties faithfully will be glad of an examination which will result in enhancing the appreciation and increasing the confidence of the board as to the value of their services.

To insure the correctness of balances on the individual ledgers it would be well to render a monthly statement to depositors having active accounts, and to others at short intervals. A reconcilement blank, stating that the balance is correct, should accompany the same, to be signed by the depositor, and an envelope ad¬ dressed to the cashier. If there are errors, the depositor may note them, to the end that they may receive official attention immediately ; these reconcilements to be filed by the auditor and checked back by the examining committee.

Surplus Nominal and Real. — In some in¬ stances it would be advisable for the directors, when making an examination, to employ a trustworthy expert accountant to aid them in their investigations, because such an expert may be able to make a more complete analysis of the condition of the bank than can the directors. Here we venture, in the interests of justice to

all, to express the conviction that while banks may continue to fail, shortly after they have secured a certificate of soundness from the National or State bank examiner — as they have failed in the past — no such failure should take place following a like verdict of a board of directors of a bank, though there have been such cases. The official examiner of the Na¬ tional or State government may not be pre¬ sumed to know the standing of many of the promisors or endorsers of notes. It may be impossible for him to detect worthless paper, though it is supposed to represent thousands upon thousands in value. But no such plea can be accepted for the directors of a bank, some, if not all, of whom should have knowledge of the value of the paper upon which they lend their depositors' money. And what are the directors but trustees of the moneys of others, committed to them in perfect confidence, and to whom no language can too severely be ap¬ plied, who fail to direct? Here it seems proper to emphasize a practice which is becoming far too common in the management of banking

institutions, namely, the practice of carrying on the general ledger a large surplus fund, or undivided profits, through the failure to charge off bad paper which is known to be such. This is a matter to which, in their examination, directors should give their attention, that their bank statement may represent the exact con¬ dition of the institution; just such a statement, in fact, as every right-minded director would furnish were the bank his own property. But let us be just to the directors, many of whom are prominent business men, some of them directors in several other institutions and other¬ wise engaged in business occupations which take all their time, and which make it im¬ possible always for the director to direct and examine, as he would be glad to do. This fact has obtained recognition among leading bankers, who have inaugurated another sys¬ tem of examination, namely, the practice of having the books of the bank examined as often as may be deemed expedient by a com¬ mittee appointed by the president from the competent clerks, including a chairman of con¬ siderable experience. The committee being notified ˆ assemble immediately. Without a moment's warning all the affairs of the bank are put in their hands. They count the cash on hand, examine balances, count all securities, examine and compare the sum total of all dis¬ counted bills and their collaterals, verify all accounts in the ledgers — in short, they rigidly scrutinize the condition of the bank. No one

— no officer even • — • is allowed to make any transaction without the knowledge of the com¬ mittee, who take due account of it. Where, as in the large cities, branch banks exist, the affairs of each branch are also examined in the same manner and at the same moment, that there may be no collusion by shifting of bal¬ ances, borrowing money or securities to make good a deficiency.

How Some Banks Examine Themselves.

— The following from a circular letter, con¬ vening a committee of examination, will give some idea of the character of the work per¬ formed. The first line of the instructions to the committee may read as follows :

On presentation of this order you will at once take charge of the bank, and will not allow

any officer or clerk to do anything without your knowledge.

Then follow specific instructions to the committee : Count the cash in detail.

Examine the cash items, and all items com¬ posing exchanges, and see if any are irregular, and make full returns to the president. Test all discounted bills, their endorsements and col¬ laterals, and prove the amounts and accom¬ panying securities. Check up all the loans. Verify all extensions and balances of ledgers. Prove all certificates of deposit and certified checks as well as all outstanding vouchers. Prove the cashier's account; make a record of all outstanding vouchers and see that all checks drawn on the bank have two signatures. Verify the expense account. Ascertain whether all charges are initialed by an officer. Prove the teller's difference and submit all items to the president. List all amounts due from banks and verify them, noting any irregularity. Re¬ port on amount due from each concern. Scru¬ tinize and report upon clearing-house accounts and margin accounts of the Consolidated, Prod¬ uce and Cotton exchanges. List all dividend checks unpaid. Check off all stocks, bonds and mortgages. Describe all overdrafts, and see whether the books are properly kept. Re¬ port all suspended debts and balances due. Check off, a month back, the discount book and see if all amounts are duly entered. Examine exchange account; see if the entries appear suspiciously low and if there are any debits. Investigate interest account; see if all charges are initialed by an officer. All insurance policies and bonds should be scrutinized and a complete record made of the same. Report on all differences called for on general ledger, and whether they are all known to the officers. State at length your views as to the condition of the bank; report any departure from the method of our system as you understand it. Report any suggestions that may occur in con¬ nection with the method of bookkeeping look¬ ing toward their improvement. Finally state errors made in the methods pursued in the handling of bills discounted, loans or any other detail of the business.

The fact that the bank's investigating com¬ mittee enter into possession and assume entire control of the bank's affairs, which they retain without interference or interruption until they have thoroughly satisfied themselves that the books of the bank are correct and its affairs precisely as represented, affords assurance against fraud and clerical errors. It would seem wise that all banks should cause such

examinations to be held ; where this is not expedient the same methods should be pur¬ sued by the directors. If any illustration were desired showing the necessity for rigid super¬ vision and thorough examination it may be found in the astonishing story which has ap¬ peared in the public journals. The fact is. dis¬ closed that a woman not engaged in business and not known to possess tangible assets was able to obtain from at least one bank, with a reputation for conservatism, loans of four times the capital stock of the institution.

It is a good plan, when an investigation is being made by National or State bank exam¬ iners, to appoint a committee of the clerks to co-operate with such officials for the purpose of verifying the investigation.

A theft which had wide newspaper publicity, both because of the very large sum stolen and the prominence of the bank in the city of New York, was where a receiving teller was found to be the thief, although the directors had abso¬ lute confidence in his integrity. He used part of the receipts of one day to cover the short¬ age of the day preceding.

In one bank two individual bookkeepers were in conspiracy with a dealer. They al¬ lowed the depositors to draw out more money than they had deposited by covering up the defalcations by false entries.

The officer in charge of the exchange de¬ partment in one case entered drafts issued by him for a less amount than the face. To il¬ lustrate: A $5,000 draft was entered by him as $1,000, and, as he had charge of the <(reconcilement," the difference was transferred from one account to another. If a ledger is manip¬ ulated, or a certificate of deposit register fal¬ sified, it is difficult to discover the fraud.

It is a wise proceeding to compel all em¬ ployees to take a vacation without notice each year, so that others may become acquainted with their duties. In this way, sometimes, de¬ falcations have been discovered.

In past experience there has been found no more satisfactory preventive against fraud than the changing of employees, without pre¬ vious notice, for a short time, from one depart¬ ment to another, at least once a year. A con¬ stant inquiry should be made as to the conduct and habits of all persons employed by the bank. Such inquiry may not make a weak man strong, but good resolutions may be

strengthened by the knowledge that the penalty of wrongdoing will be surely and promptly inflicted.

It is only a truism to say that good bank management and thorough examination are wholly impossible in the absence of a definite system, which enters into every phase of in¬ dustry. We find it everywhere. The manu¬ facturer who does not know in detail his stock on hand at any time is in as dangerous a posi¬ tion as an engineer without a steam gauge. His steam may be low — the machinery of his business will suddenly stop. His pressure per¬ haps is high — all his capital tied up in stocks means an explosion — and the receiver gets the pieces.

Necessity of Method — To a right and safe banking system method is a necessary pro¬ tection. Unsystematic banking is not only a paradox, it is a contradiction in terms. Sys¬ tem economizes time, excites invention, ex¬ pands energy, concentrates power and accel¬ erates results. Without system, determination weakens, purpose crumbles, failure is sure. Subtract system from banking and chaos is left. In banking there is no middle ground between order and confusion, between cosmos and chaos. System, applied to banking,, should make it easy for the manager to have its con¬ dition constantly before him. Emphasis has been placed upon the value of examinations conducted by bank clerks. But in view of the close relationship of these institutions to the public welfare and the further fact that they are virtually the creation of the bederal and State laws, it is evident, not only that banks should be examined by officials of the respective governments, but that the examinations should

be of the most searching character. A good bank will court investigation. Whether it is true or not, as a recent writer has said, that ((bank examiners are not called upon to play the detectives,® it

is assuredly true that they should discharge their duties with thorough¬ ness and with a realizing sense of their duty to the public. So far as practicable they must see to it that collusion at the time of examina¬ tion, between teller and discount clerk or other officers, is made impossible, and that neither cash nor vouchers are made to do double duty in the hands of the dishonest, as has been done. It may not be assured that either Na¬ tional or State or directors' examinations will form an infallible guarantee against dishonest practices. But what may justly be expected of these examinations, together with such as the bank officials may themselves institute, is that they will reduce losses through error or fraud to a minimum. No known system affords any guarantee of faultless management ; but the best system rigidly applied will produce the best results possible; and for this the public have a right to look.

Kinds of Bank Examination. — Official bank examination includes that furnished by the Comptroller of the Currency, the Federal Reserve Board in the case of national banks and the supervising officers of State banks i~ the case of State banks ; there is also examina¬ tion in many cities by a clearing-house exam¬ iner, for banks members of the clearing-house association. Besides, special examinations are provided for, as already stated, by committees of directors, these examinations being made in some cases by accountants selected from the bank's staff and in others special experts. A few banks have thought it wise to have ex¬ aminations made on behalf of the stockholders generally, in addition to the examinations made by the directors.

Importance of Examination. — What can be of greater importance than the thorough, systematic, exhaustive and regular examina¬ tion of our great financial institutions — our National and State banks, trust companies and institutions for savings whose capital and de¬ posits are expressed by billions? What can be more essential to the welfare of a commu¬ nity of breadwinners and dependents upon them than the assurance that those institu¬ tions with which are lodged the means for con¬ ducting the vast enterprises of the country and the earnings which have been won by hard labor are conducted in an honest, businesslike way, prepared to meet the demands that may at any time be made upon them? And the key lo such a situation — what is it but such thorough supervision, with rigid examinations, as shall inspire confidence and dissipate alarm in hours of financial stringency and tendency to distrust? A mercantile house may fall and the adverse results mav be partial and reme¬ dial ; but when a great banking institution goes down, credit goes, fortunes disappear, the poor arc left helpless and the tale of suffering is long and grievous.

No banking institution to-day is the right kind which is conducted as such institutions were 65 years ago. In like manner we may believe that in future years new methods, new safeguards, enforced by an impartial, effective system of promotion of the personnel, will

give increased efficiency in bank management, resulting in a greater volume of business, fewer bank failures and heavier balances on the right side of the ledger.

No institution can run itself — except to ruin — least of all a bank. Eternal vigilance is no less the price of liberty than of safe banking; and only those institutions can gain and deserve the public confidence and justify the powers conferred upon them which are managed under a supervision that is searching and thorough, including examinations which are rigid and relentless.

Willis S. Paine, Author Paine's (Banking Laws

17. COMMERCIAL PAPER. The ele¬ ment of credit in the business world arises from twTo fundamental causes: (a) The fact that the merchant and the manufacturer can profitably use more capital than he possesses and can make money by borrowing money ; and (b) if the time of payment is postponed, the buyer can turn goods into money before the agreed time of payment arrives. Therefore, business men must either borrow money to buy goods or postpone the date of payment for goods. Out of the first process arises commer¬ cial paper, and out of the second the ((book account,® now the principal form of credit in this country.

The usual methods of borrowing are: (1) Private loans from relatives and friends; (2) loans made directly to the borrower by the home bank, either in the form of loans on his promissory note, or indirectly in the form of bills receivable discounted; (3) loans in the form of commercial paper, which is a floating debt — borrowings in the open market.

The term commercial paper is, therefore, used to designate those instruments of indebted¬ ness — promissory notes — which are issued by business men for the purpose of obtaining funds in the open market or which are given in settlement of business obligations and sold in the open market. They are to be dis¬ tinguished from the ordinary promissory notes given to settle debts or to obtain money on a deferred payment, in that the transaction is impersonal, and an

intermediary is employed to effect the sale. Legally there is no distinction, both being the same obligation in law.

There are two forms of commercial paper: (1) Single-name paper; (2) double or two-name paper, commonly called ˆreceivables.®

Single-name paper is the sole obligation of the issuer, put out in large denominations (usually $2,500 and $5,000) and sold through the medium of a commercial paper broker to banks and bankers. The proceeds of single¬ name paper are, or are presumed to be, used for the purpose of paying bills promptly in or¬ der to obtain the cash discounts, which are quite generally given for quick settlements.

The two-name paper or the receivable is the note given by the buyer to the seller and by the latter sold in the open market for cash. The payee thus anticipates its due date.

The advantage of single-name paper to the banker lies in the fact that it comes in large and uniform denominations, is of short matu¬ rity and the lender is under no obligation to renew, for he purchases the paper strictly on an impartial and impersonal basis.

The very favorable experience that banks the country over have had with commercial paper and its intrinsic soundness have made these instruments a favored investment in bank¬ ing circles. Inasmuch as a bank must keep its funds invested in order to make money, and yet have them in such form as to be readily convertible into cash to meet the demands of its depositors, a body of liquid assets must be maintained, which will both produce an income and promptly liquidate itself. Commercial paper conforms ideally to this test in that its life is short, and its payment under ordinary conditions certain. Bankers are therefore com¬ ing to look upon their commercial paper as next to cash as a quick asset, treating it as a secondary reserve.

In order to purchase paper of firms in all parts of the country intelligently, as well as to have credit information about their own

cus¬ tomers, banks are now operating well-organized credit departments whose function is to gather and classify credit information bearing on the firms with which they deal and whose paper they buy.

This information consists of the credit statements, usually digested on the bank's own forms, with provision for setting in apposition the various items from year to year for the purpose of indicating the progress of the firm. In addition there are the reports of the great mercantile agencies, Dun and Bradstreet, which give the history and credit standing of the firm, and reports of judgments, liens, trans¬ fers of property, etc., that would affect the credit risk.

To the issuer, the benefit of commercial paper as a borrowing medium lies in the wide and steady market, which the banks of the country afford, the lesser rates of interest obtainable in money centres and the cash dis¬ counts explained below.

The great advantage of single-name paper is due, as above stated, to the fact that the pro¬ ceeds are applied to the payment of bills, which when met within the cash discount period are allowed a deduction. A simple illustration will show the profitableness of such a transaction.

Let us suppose a merchant owes $1,000 for an invoice of goods; the terms are (<2 per cent, 10 days,® which means that if the bill is paid within 10 days of the date of the invoice he can settle for $980. He has no funds, but good credit. He, therefore, makes a promissory note, due let us say in three months, for $1,000, and through the process subsequently described sells the instrument to a bank or banker at the prevailing rate of discount, which would not ordinarily be as high as 6 per cent; but assum¬ ing the latter rate, the discount would be $15, plus the broker's commission, which would still allow a fair margin of profit for him. He has in addition the three months' time in which to turn the stock into money to meet his note. Ordinarily the ((best names® as they are called, meaning the firms in the highest credit stand¬ ing, are able to borrow at from 3 to 4 per cent making the single-name paper a highly profitable method of borrowing.

The <(2 per cent 10 days® discount is equiva¬ lent to 72 per cent a year. The merchant by settling the bill within the discount period has saved $20. If he were to make money as fast

as this process indicates within that period of time, he would have to

employ the fund at the rate of 72 per cent a year; for 2 per cent in 10 days is equivalent to 6 per cent a month.

Single and Two-Name Paper.— Single-name paper is an outgrowth of the Civil War and the Greenback disturbances. Before the war merchants made infrequent trips to the trading centres and stocked up for months ahead, giving notes for their bills with long maturity. Owing to the uncertainty of the amount that would be received for the bill at maturity, due to a depreciating currency, a cus¬ tom soon arose of allowing the buyer a cash concession for prompt payment. But this necessitated borrowing facilities. The home banks being unable to loan in such large amounts, the merchant conceived the idea of making out a statement of his affairs, and sub¬ mitting to bankers in the large cities, with his notes in large and uniform amounts, and pay¬ able at a time when he would be in funds. From the funds so secured he was able to take advantage of these concessions and therefore buy at a reduced price. The plan worked so well that intermediaries sprang up as a natural sequence, to find buyers for such paper and borrowers for banks having funds to invest.

The sole advantage of two-name paper lies in the fact that it carries the-strength of an additional name by endorsement, and is prima facie evidence of a business transaction. This form of paper is not a factor in American business methods, it being the common custom to buy and sell on open book credit, settling the obligations in cash as above stated. In a few lines, such as lumber, musical instruments, agricultural machinery, etc., notes are given in settlement; but this form of paper is greatly in the minority. The cash discount system is so widely adopted and so largely used that it may be said to be the prevailing custom in this country and is the reason for the prevalence of single-name paper.

Selling and Buying. — Both single and two-name paper is sold through the medium of the commercial paper broker, who acts as the go-between between the borrower and the banker. The broker maintains a well-organized credit department, which investigates each concern for whom the broker sells, obtains full infor¬ mation as to its affairs and classifies and ar¬ ranges same for submission to the lender.

The commercial paper broker acts as selling agent only and never guarantees the paper, except as to its authenticity. He is usually a man of high standing, with strong banking con¬ nections, a large and valuable clientele, a name to protect, and therefore uses due care in put¬ ting out paper so that only the risks that are in his judgment strong are offered.

The information submitted consists of a condensed statement showing the various items which constitute the firm's assets and lia¬ bilities in uniform arrangement, as follows : Assets — Cash ; merchandise ; accounts receiv¬ able; bills receivable. These four items con¬ stitute the <(quick assets.® Then follows the fixed assets, such as real estate, furniture and fixtures, patents, investments, good will and other assets. The quick liabilities consists of : Accounts payable and bills payable, the latter term including both the single and double-

name paper ; then follows the other liabilities of the concern, such as mortgages, stock issues and other obligations.

The purpose of the above arrangement is to enable the banker to readily ascertain the ratio between the quick assets and the quick liabili¬ ties, the purpose being to determine the rela¬ tive safety of the credit risk. It is well settled in all credit circles that a firm should have quickly available at least $2 for every $1 of quick debts, thus allowing for a shrinkage of 50 per cent before the other assets would need to be drawn upon to settle the firm's obliga¬ tions. In some lines, such as meats, groceries, etc., where the shrinkage is light and a quick sale possible, a narrower margin is permissible — as low as one and one-half to one ; but in a seasonal or specialty line, such as millinciy or ladies' wear, subject to fashion and change of seasons, a large margin is generally desired.

Having the information classified, the broker submits the same to his clients, who, if in the market and satisfied with the rates, will pur¬ chase the paper on option ; that is to say, with the right to return within a certain time, if upon further investigation it is not desired. The investigation is made through bankers, who have either purchased the paper before and are acquainted with its value, or the home banks, which are fully conversant with the borrower's affairs from close observation. Such refer¬ ences, together with mercantile firms with which the borrower has had business dealings, are furnished on the credit statement. This process is called ˆchecking® the paper.

In purchasing commercial paper the banker is usually concerned about the following points : First, the statement should be recent, not over six months past. Second, it should be an audited statement made by a firm of public accountants, whose sole object is to present a correct statement of fact. Third, the ratio of quick assets to quick liabilities should, as a rule, be at least two to one. Fourth, the char¬ acter of the business. Most bankers prefer staple articles to businesses which cater to fashion or seasonal demands. Fifth, to scatter the risks territorially as well as to the various lines of merchandising. Being satisfied on each of these points, he is in a position to pur¬ chase with intelligence.

It is a rule of banking that a firm should not issue both single and two-name paper, and one of the surest tests is the presence or ab¬ sence of odd cents in the item (<bills payable.® If the item is in an even amount it is good evidence that only single-name paper is issued. If there are odd cents it indicates that the firms' bills receivable have been sold, thus part¬ ing with one of its quickest and best assets, and is a practice that is frowned upon by bankers who know the science of commercial paper.

Under the Federal Reserve Act, commercial paper has been given a new dignity and stand¬ ing in the financial world. The Federal Re¬ serve banks are permitted to rediscount paper that conforms to certain qualifications, the essence of these conditions being that the paper shall arise from a business transaction and be of short maturity. This process enables a bank to cash in its holdings on a few hours' notice, a very marked advantage in periods of unrest. The Federal Reserve banks may in

turn use such paper as the basis of note issues, for as long as the Federal Reserve, bank has $40 in gold for every $100 in paper, it may put out $100 in bank notes, thus making commercial paper the foundation of our circulating cur¬ rency.

Instruments of Credit. — The instruments

of credit in this country are as follows :

1. Negotiable bills of exchange, which are unconditional orders in writing addressed by one person to another, signed by the person giving them, requiring the person to whom the order is addressed to pay on demand or at a fixed or determinable future time a sum cer¬

tain in money to order or to bearer.

2. Negotiable promissory notes, which are unconditional promises in writing, made by one person to another, signed by the maker, en¬ gaging to pay on demand or at a fixed or determinable future time, a sum certain in money to order or to bearer.

3. Bank checks, which are bills of exchange, drawn on a bank and payable on demand.

4. Drafts, which arc bills of exchange, and are subject to the same rules of law as bills of exchange. An able writer has characterized drafts as follows : WA draft is an order in writing for money, drawn upon the custodian of funds belonging to the drawer, or subject to his order. It does not presuppose any other commercial transaction. A bill of exchange is a similar instrument based usually on a sale or purchase of goods. ® In this country the word (<draft® is commonly applied to all instruments of this sort that are payable within the United States, and the term ((bill of exchange® to those payable in foreign countries.

Acceptances. — The term Acceptance® is defined by the Federal Reserve Board as ((a draft or bill of exchange drawn to order, hav¬ ing a definite maturity and payable in dollars, in the United States, the obligation to pay which has been accepted by an acknowledgment written or stamped and signed across the face of the instrument by the party on whom it is drawn ; such agreement to be to the effect that the acceptor will pay at maturity according to the tenor of such draft or bill of exchange without qualifying conditions.®

A bill of exchange is defined by the English Bills of Exchange Act as (<an unconditional order in writing addressed by one person to another, signed by the person giving it, requir¬ ing the person to whom it is addressed to pay on demand or at a fixed or determinable future time, a sum certain in money to or to order of a specified person or to bearer.® An Acceptance® is, therefore, where A commands B to pay to C, or to his order or to bearer, a sum of money absolutely on demand or at a certain future time. A is the drawer, B the drawee and C the payee. If B agrees to comply with the order, he writes the word Accepted® across the face of the instrument and signs his name, together with the date of the acceptance, the date that it is payable and the place where it is to be paid. Upon so signing, B becomes the ac¬ ceptor, and the document is an Acceptance.® The acceptance makes it essentially the prom¬ issory note of the acceptor.

The time bill of exchange, or acceptance, has a fundamental purpose which neither the promissory note nor the commercial draft pos-

sesses. That purpose is to facilitate the mutual offsetting of debts between individuals, as well as nations. Acceptances, or time bills of ex¬ change, pass from hand to hand the same as money. They serve the same purpose as the transfer of gold itself in the cancellation of debts. Abroad they have long been considered as the easiest and cheapest form of credit instruments.

Economists regard acceptances as a sort of special currency. Such leally has been their use for the last two centuries in the Old World, where acceptances have been employed between business houses in the settlement of accounts. They circulate among banks which buy and resell them according to their needs until they are negotiated to the central or government bank of the country.

Briefly stated, the use of the acceptance is as follows : The seller of the goods draws a bill of exchange on the buyer, the buyer ac¬ cepts the instrument and returns it to the seller ; he negotiates it to a bank or sells it in the open market, thereby receiving payment for his goods soon after they are delivered. The buyer has the time between his acceptance and the date of payment to turn the goods into money to meet the obligation when it is due, and the seller has his funds as soon as the goods are accepted.

Acceptances are a new form of credit in¬ strument in American banking and business circles. Prior to the inauguration of the Fed¬ eral Reserve system they were quite unknown, but the Federal Reserve Act has made specific provision for such instruments, and the Federal Reserve Board has issued detailed regulations concerning the issuance and the purchase of such paper. They are fast coming into popular favor, being a form of instrument which is readily discounted at the Federal Reserve banks. In January 1918 acceptances constituted 25.9 per cent of the total earning assets of the Federal Reserve Banks.

The parties to such instruments are :

Drawer. — The party who signs or executes the bill of exchange,

check or draft.

Drawee. — The party to whom the bill of exchange or draft is addressed, and who is ordered to pay it.

Acceptor. — The drawee after he has signi¬ fied or promised to pay the bill of exchange or draft. The promise should be in writing and is usually written across the face of the bill or draft.

Payee. — The party to whom the bill, note, check, draft or other instrument is made payable.

Endorser. — - The payee, bearer or other party who writes his name on the back of the instru¬ ment for the purpose of transferring it.

The terms used in connection with commer¬ cial paper are:

Endorsement. — A technical act of the law merchant, whereby a party writes his name upon a duly executed, negotiable instrument, with or without terms of contract or liability, according to the law merchant.

Endorsee. — The party to whom the endorser transfers the instrument.

Holder. — The party who holds or pos¬ sesses the legal title of the instrument. He may or not be the true (equitable) owner.

Dishonor. — By refusing to promise to pay (accept) or to pay the bill or note it is said to be dishonored.

Protest. — The evidence of dishonor, usu¬ ally made by a notary public, in the shape of a certificate setting forth presentment, refusal and its reason.

Bibliography. — Babson and May, (Com¬ mercial Paper > (Boston 1912) ; Haggerty, (Mercantile Credits) (New York 1914) ; Kniffin, W. H., Jr., Commercial Paper and Analy¬ sis of Credit Statements) (New York 1918), (The Practical Work of a Bank) (Chap. XIII, New York 1916) ; Prendergast, Credit and Its Uses) (New York 1910).

William H. Kniffin, Jr., Vice-President Bank of Rockville Centre; Formerly Secretary Savings Bank Section American Bankers' Association.

18. BANK AND TRUST COMPANY ADVERTISING. Endeavoring, by forceful, well-planned advertising, to secure new depos¬ itors and

customers for a banking institution, or to increase the dealings of present customers with it, is a comparatively recent development of the business, both in the United States and abroad.

Formerly, about the only advertising con¬ sidered proper for a bank and trust company was the publication of its financial statement and a Card® with the names of the manage¬ ment, together with the barest statement of the services rendered b}r the institution. But of late years, partly on account of the great ad¬ vances made in general advertising and partly because of increased competition in the banking business, many institutions have gone into the matter of advertising more fundamentally, either putting that branch of their activities into the hands of agencies specializing in that kind of work, or employing a publicity or ad¬ vertising manager to devote his entire time to the advertising of the institution.

Naturally, it is only the larger banks that can afford such an arrangement. Smaller in¬ stitutions must either turn the work over to one of their officers or employees or make use of the services of some agency supplying a ready-made or specially prepared advertising service for financial institutions.

Banks and trust companies which are most successful in their advertising usually make an annual appropriation in advance to cover all advertising expense, and this item of the budget is subdivided to meet the cost of these various divisions :

Management. — Salary of advertising man¬ ager, if one is employed.

Space. — Newspapers, street cars, billboards, moving picture theatre, *etc.*

Copy. — To pay for the services of an ad¬ vertising writer or for the work of advertising agencies in the preparation of the subject mat¬ ter of the advertising.

Mechanical. — Under this head are included the printing, engraving, lithographing, art work, etc., required in producing the bank's advertis¬ ing matter.

It is difficult to lay down any hard-and-fast rule concerning how much a bank or trust companv can legitimately spend for advertis¬ ing. The trustees of mutual savings institu¬ tions feel that they have no right to spend any

of their depositors' money for this purpose. So they do practically no advertising at all. But other banks are spending a good deal of money in advertising. The sum differs accord¬ ing to the amount of competition, the size of the bank and other local conditions. Investi¬ gation has brought out the fact that the average advertising expenditure probably is about in the proportion of $1 for every $200 of deposits, that is, a bank with $2,000,000 deposits will spend $10,000 a year in advertising.

The facts concerning a banking or fiduciary institution and the services it renders the pub¬ lic that may properly be advertised include capital and surplus, governmental super¬ vision, personnel of directorate and manage¬ ment, physical protection, age and experience, interest on deposits, business or investment counsel, care of property, trusteeships, execu¬ tion of wills, loans, discounts, certificates of deposits, banking by mail, foreign and domestic exchange business information, business refer¬ ences, letters of credit, travelers' checks, col¬ lections, courteous service, the necessity and rewards of thrift, the use of safe deposit boxes, cooperation with the government in war financing, *etc.*

The tried and approved media of bank advertising include daily and weekly news¬ papers, financial journals and magazines, bank directories, street cars, billboards, moving pic¬ ture theatre advertising, personal letters, fac¬ simile letters, booklets, ((house organs® (i.e., little regularly issued papers or magazines, either <(syndicated55 or especially prepared by the bank for free distribution), financial state¬ ment folders, calendars, bank window cards, and a great variety of specialties, novelties or souvenirs.

Of late, a movement has been started toward the co-operative advertising of banks. That is, the banks of a city or county will get together and pool a certain proportion of their advertising appropriations and use the money for a campaign of popular

education in thrift or banking functions. Space is used in local newspapers or other media. In some cases the names of all the banks co-operating in the movement appear in connection with the ad¬ vertising. In others, the articles are not signed but appear as editorial matter.

Banks in some communities have formed banking publicity associations for mutual ben¬ efit, and a Financial Advertisers' Association was established in 1915 as a department of the powerful organization known as the Associated Advertising Clubs of the World.

Bibliography. — Holderness, M. E., (Guide Posts to National Bank Publicity and Business Building5 ; Lewis, E. St. Elmo, financial Ad¬ vertising5 ; MacGregor, T. D., (Pushing Your Business,5 ˆ,000 Points for Financial Adver¬ tising,5 (Bank Advertising Plans,5 (The Book of Thrift5 and (The New Business Depart¬ ment5 ; Morehouse, W. R., (Bank Letters5; Morison, F. R., (Banking Publicity5 ; Rice,

August E., Practical Bank Advertising5 ; ((How to Increase a Bank's Deposits,55 in System M agazine.

T. D. MacGregor,

Vice-President Edwin Bird Wilson, Inc., 14

Wall Street, Nezv York.

19. BANK NOTE ISSUES. In principle a true bank note does not differ from a bank check. The purpose of either is to transfer credit. The granting of credit on the books of the bank precedes the issuing of notes by the bank or the drawing of checks by the depositor; or, at least, the bank-pays out a note in discharge of an obligation of some kind, and this is the usual way in which a depositor employs a check. He may, of course, use it as a means of obtaining currency from the bank for his own needs; but here, again, there has been only a transfer of credit from the bank to the depositor in circulating form. If checks were certified, issued in convenient de¬ nominations and so engraved and printed as not to be easily counterfeited or raised, they would be substantially the same as a bank note, for a certified check becomes an obligation of the certifying bank. But a bank note ought to be somewhat better secured than a check, and for this reason : a check is accepted or not as the person receiving elects ; but a bank note, though not a legal tender, must be taken in the ordinary course of trade by merchants and other business men, who cannot discrim¬

inate between different kinds of money in cir¬ culation. Therefore, the notes should be given some extra security, as a first lien on assets or by a guaranty fund.

Experience in the banking history of the United States and other countries has shown that by employing either of these expedients bank notes can be made safe beyond question. The best provision for current safety, and the best check against inflation, is the test of daily redemption, in the standard metal, applied through the clearings.

If banks in the issue of their notes are left unrestricted beyond the simple safeguards above mentioned, the amount of circulating medium in the shape of bank notes will be determined by the wants of trade — that is, by the requirements of those who deal with the banks. In the larger cities deposit credits to be checked against will best serve ; in the farming communities more currency will be called for. How much currency is needed in any one locality, or whether bank notes or checks are most serviceable, must be left, not to the bank nor to the government, for only the person desiring to use the credit can cor¬ rectly gauge either its degree or kind.

The early banks in the United States were of diverse kinds, but there were two general systems of note issues, one where the notes were based on bonds, the other where the notes were emitted on the general credit of the issuing banks. The latter — as in Indiana, Iowa, Missouri, Kentucky, Louisiana, Virginia, and especially in New England — were good, the notes not only being of great service but proving sound. In other States where bonds and stocks were pledged as security, the notes proved unsatisfactor)ˆ. Generally, in those days, the notes exceeded the deposits in volume. Where, as in New England, under the Suffolk system of redemption, which was a plan whereby the notes were redeemed at Boston through the Suffolk Bank, the notes showed a close correspondence in volume to the de¬ mands of trade. It was found, also, in practice that redemption was an effectual check against

over-issue, and that the banks did not keep the volume of notes up to anywhere near the permissible limit. The experience in New England, as in other sections of the country, established the fact that only simple provisions were necessary to ensure the safety of the notes. Inflation of bank credit — ihat is, the granting of more credit than prudence sanc¬ tions — is possible where the coin reserves are inadequate or the bank management reckless, but inflation of bank notes, under a proper system of redemption, is not easy. Banks can¬ not keep their notes in circulation any longer than they are needed. Every issuing bank receiving the notes of another bank will want to have that note redeemed to make place in the circulation for one of its own notes on which it will make a profit ; moreover, it will want to have the notes of other banks re¬ deemed to replenish its own reserves upon which its credit structure is based. Private holders of the notes will deposit them as re¬ ceived in the course of trade.

Bank notes save the abrasion incident to circulation of coin, and they are more econom¬ ical than gold certificates, for while the latter are issued only against a like equivalent of the standard metal, bank notes may be issued with safety against a much smaller reserve. Credit bank notes also have one immense ad¬ vantage over notes issued against United States bonds, for while the latter represent an in¬ vestment of an equivalent amount of capital, and are therefore a source of expense even when lying idle in the bank's tills, a true bank note while in the possession of the issuing bank represents no more than the cost of the paper and the engraving. When it is paid out, in exchange for the obligation of others, or against checks of depositors, and a reserve set aside against it in the vaults of the issuing bank, it then becomes of value.

The Canadian and Scottish banking systems afford familiar examples of the issue of bank credit notes. From the imposition of the 10 ner cent tax on State bank notes in 1865 bank credit currency has been prohibited in the United States. Prior to the adoption of the Federal Reserve system (q.v.) notes of Na¬ tional banks were issued against a deposit of a like amount of United States bonds. The Federal Reserve Act provides for the issue of notes to member banks against specified com¬ mercial papers, the Federal Reserve banks emit¬ ting the notes to hold a reserve of 40 per cent against them. These notes, however, are not true bank notes, issued by the banks themselves, but obligations of the government, issued only through special institutions under government control.

Elmer H. Youngman, Editor The Bankers' Magazine.

20. GUARANTY OF BANK DE¬ POSITS. This has been effected by legisla¬ tion in some States (Oklahoma, Kansas, Ne¬ braska, Mississippi, South Dakota and Wash¬ ington), and individual banks in some cases have taken out policies of insurance to protect their depositors. (The Attorney-General of the United States has ruled that this is a legal use of the funds of a National bank). The United States Supreme Court, on 3 Jan. 1911, in cases coming before it from Kansas, Okla¬

homa and Nebraska, decided that the bank deposit guaranty laws of those States were not in conflict with any provisions of the Constitu¬ tion of the United States, and the court fur¬ ther laid down the principle that the legislature may not only regulate banking but may prohibit it except under such conditions as it • may prescribe.

In principle, the guaranty or insurance of bank deposits rests upon mutual responsibility. It is objected to on the ground that it tends to place new and perhaps recklessly managed banks on a par, as regards safety, with old-established and carefully managed banks. To this objection the reply is made that there ought to be no degrees of safety in banking, but that all deposits in banks should be made safe beyond question, and that in point of service the old bank will tend to have the advantage anyway through the friendships and connections created by its long existence.

Experience with the laws now in force would seem to indicate that the results depend upon the character and administration of these laws. Some of them have recognized that where joint responsibility is assumed, greater stringency in the regulation of banks is essen¬ tial to, prevent sound and well-managed banks from being called on to pay the losses of those imprudently managed. In Texas, after six years' trial, the Commissioner of Insurance and Banking found that each share of stock of the par value of $100 had paid only three and one-half cents annually for deposit insurance, and he states that among depositors in guaranty fund banks the closing of one of thesfc institu¬ tions creates no more panic than the closing of a grocery store. Some of the other States have had less satisfactory experiences, and the fact that after long agitation but few States have adopted the law, and that it has not yet been applied to the National banks, warrants the conclusion that the experiences thus far have not justified the general extension of the plan.

A safety fund, originally designed to pro¬ tect the noteholders of the

State banks of New York, was later made applicable to the de¬ posits of banks, and the system broke down, chiefly because the fund provided was not large enough to protect both noteholders and depositors.

Through clearing-house examinations of member banks, a qualified form of deposit guaranty has been instituted, although direct responsibility is not assumed. The ability, by careful oversight, to detect banking weakness at its inception, renders a bad bank failure almost impossible. A desire to preserve local banking reputation has sometimes led bankers to unite in the protection of depositors in failed banks — the case of the Walsh bank failures in Chicago being the most familiar example.

Elmer H. Youngman, Editor The Bankers' Magazine.

21. TRUST COMPANY. Definition.—

A corporation authorized by law to act as trus¬ tee, or to accept and execute trusts of various descriptions ; a corporation empowered to act in a fiduciary capacity. This is the primary meaning of the term <(trust company,® and is expressed in the name given to such a company in Australia, — a ˆtrustee company.®

In current usage, the term is applied to any corporation organized under the trust company laws of the several States, whether such cor¬ poration actually undertakes any trust business or not. While these laws invariably grant certain powers to accept and execute trusts, including always the power to act as trustee, they also grant other powers, of considerable variety in the different States, of which more or less limited banking powers are always a part. Except with the oldest companies, the volume of banking business usually exceeds that of trust business ; and it results that to the average person the trust company presents itself as a peculiar kind of bank. In fact many of the smaller and newer trust companies do ' practically no trust business, and their actual functions are those of ordinary banks of de¬ posit and

discount, or of savings banks, or of a combination of the two. On the basis of the business actually transacted, therefore, the trust company may be defined as a financial corporation authorized to exercise both banking and trust functions.

Functions. 1. Trust Functions. — The func¬ tion which gives the trust company its name is that of accepting and executing trusts. In the exercise of this function the trust company performs the same acts and assumes the‘ same responsibilities as an individual acting in like capacity. Trusts are received from natural persons or individuals, from corporations, both public and private, and through appointment or approval of courts of law. It is convenient to consider the trust functions under these heads :

(a) Trusts performed for individuals under private agreement. Most of these trusts in¬ volve acting as trustee or agent, but they are of great variety as to purpose and as to duties required. The most common is that of acting as trustee or agent for the management of property, real or personal. In this capacity the trust company takes entire charge of the property, collects income, collects principal of securities when due, reinvests capital funds if desired. If the property be real it looks after repairs and improvements, keeps the property rented and insured, pays taxes, collects rents. It remits or accumulates income, according to the contract.

It handles the separate estates of married women ; looks after the investment and care of funds of educational or benevolent institu¬ tions; acts as custodian of valuable papers and securities ; handles escrows ; collects income which is receivable at long intervals or at un¬ certain periods and distributes it per contract in monthly instalments ; acts as agent for the payment of such regularly recurring items as insurance premiums, rents, taxes, *etc.* ; looks after property interests of professional men, absentee property owners, women, invalids, the aged and others who, from choice or neces¬ sity, wish to avoid the care of their property either temporarily or permanently. These illus¬ trate some of the many kinds of ˆindividual trusts.®

(b) Trusts received through appointment or approval of the courts. In most States trust companies have a large volume of “probate business,® consisting of the execution of trusts received by appointment of court or by wills of deceased persons, — acting as administrator,

executor, trustee under will, guardian of the property (and in rare instances of the person) of minors, curator or committee for persons of unsound mind, *etc.* As a rule trust com¬ panies are legal depositaries for court funds and for persons acting in fiduciary capacities. Trust companies handle a large amount of (<insolvency business,® acting as assignees, re¬ ceivers and trustees in bankruptcy.

(c) Trusts performed for corporations, private and public. The trust company is prac¬ tically indispensable to the large corporations of to-day, as well as to many of the smaller ones. It acts as trustee under mortgages or deeds of trust securing bond issues, as transfer agent for stock, as registrar for stock or bonds, as custodian or manager of sinking funds, as fiscal or financial agent for various purposes, for States, municipalities, railroad and indus¬ trial and other corporations. It pays bonds, coupons, interest. It may take charge of the disbursement of dividends and interest, attend¬ ing to the publication and mailing of notices, *etc.* For syndicate managers, voting trusts, etc., it issues and collects calls for instalment payments and computes and distributes to the proper parties the amounts of their participa¬ tions in the proceeds. It acts as depositary of cash and securities under varying condi¬ tions; as depositary and trustee for under¬ writing syndicates ; as agent to receive sub¬ scriptions for securities and to deliver same when issued. Its services are often used in corporate financing and reorganization. It may of course perform for corporations trusts of the kinds already described as undertaken for individuals under private agreement.

2. Banking Functions. — Trust companies have always transacted a large amount of sav¬ ings banking business, and years ago became formidable rivals of the savings banks in this field. In more recent years they have invaded the field of commercial banking. While the laws of many States formerly limited their functions in the field of commercial banking, in particular forbidding them to discount com¬ mercial paper, and although they are still so restricted in some States, the tendency in re¬ cent years has been to remove these restrictions and in many States at present they have all the banking powers of ordinary National or State banks, except the right of note-issue.

3. Safe Deposit Business. — Trust com¬ panies very generally maintain safe deposit de¬ partments, in which they rent private boxes for the. safe-keeping of securities, valuable papers, jewelry, etc., and space for the storage of more bulky valuables.

A. Other Functions. — The three classes of functions above described are those most com¬ monly exercised, in varying proportions, by the.

average trust company. Some companies maintain bond or investment departments, for the purchase and sale of high-grade securities. Trust companies in some States formerly transacted fidelity or title insurance business, and a few companies still transact such busi¬ ness ; but the tendency, both in legislation and in business practice, is to leave this field to companies organized for this special purpose. Tn a number of States trust companies transact a real estate agency business. Other functions are sometimes found, the extent of powers

being determined by the laws of the different States.

It should be noted that not all trust com¬ panies undertake all of the functions above enumerated. The functions actually performed by corporations bearing the word “trust® in their titles vary widely. There are some trust companies which devote themselves exclusively to trust business ; there are many which do no trust business, and are in fact commercial banks, or savings banks, or both commercial and savings banks. Others transact trust and savings business, but no commercial banking business. In several of the Southern States there are “trust companies® whose business consists solely of dealing in real estate or in¬ surance or of a combination of the two. There are also some such companies whose business is that of dealers in real estate mortgages or mortgage bonds.

Organization, Regulation and Manage¬ ment. — Trust companies are creatures of State legislation, and are organized under the laws of the State in which they are to be lo¬ cated. Formerly they were chartered in many States only by special act of the legislature and in some States under the general incorporation laws. Most of the States now have general trust company laws, which provide specially for the incorporation, powers, government and regulation of such companies. The general trust company laws in most States contain a number of

provisions intended to safeguard the business. The capital stock required is usually much larger than that specified for banks in the same locality, and it is generally required that trust companies apply a portion of earnings each year to the building up of a surplus until it reaches a certain proportion (frequently 20 per cent) of the capital. In many States stockholders are subject to double liability. Restrictions of various kinds are placed on the making of loans and investments and the investments of the trust department are specially restricted. Adequate reserves are required. Practically all of the States stipu¬ late that trust funds must be kept absolutely separate from those of the company and of other departments, and also that securities be¬ longing to specific estates be so marked and recorded as to clearly designate the owner, so that in case of failure of the company the trust funds would not be affected. Many States forbid the transaction of any trust business until the company has made with State author¬ ities a deposit of cash or securities in certain specified amounts as special security for the faithful performance of its fiduciary obliga¬ tions. Practically all of the States require trust companies to make regular reports to State officials, varying in different States from once to five times each -year; and to submit to examination by State officials, usually once or twice each year.

The internal organization of trust com¬ panies is quite similar to that of ordinary banks, except that the variety of duties under¬ taken necessitates the maintenance of separate departments (required by law in many States) for the transaction of trust, savings, general banking, safe deposit and other lines of busi¬ ness. Subject to the State laws, a trust com¬ pany is governed by by-laws adopted by the stockholders; is under the general direction of

a board of directors ; and is administered by a group of officers whose number and duties are determined by the needs of the business.

In addition to the character of its business in the trust department, the typical trust com¬ pany differs from an ordinary commercial bank in the character of the deposits which it attracts *and in the resulting methods in which it invests the funds received in such deposits. The typical commercial bank handles demand deposit accounts of active business concerns whose funds are in constant use and whose balances fluctuate radically from day to day or week to week. Such a bank must therefore invest its funds in short-time loans so maturing that it will always have ample funds available with which to meet the demands of its de¬ positors, and will be able to reduce the amount of its

outstanding loans on short notice. On the other hand, the typical trust company does not handle deposits of active business concerns. Its deposits are composed of inactive funds, of gradually accumulating savings or of funds set aside for a considerable period for special purposes, the balances of which, as a whole, do not fluctuate greatly, and normally tend to steady increase. These are “time deposits® rather than “demand deposits.® The trust com¬ pany, therefore, need not confine its invest¬ ments to short-time loans, but may place its funds in long-time loans and in certain ap¬ proved classes of securities, — in bonds and in real estate mortgages. Trust funds, as already stated, are kept entirely separate from other funds of the company. Their investment is hedged about with many safeguards required by law, by the b}Uaws of the company and sometimes by the provisions of the trust.

Historical and Statistical. — The first com¬ pany in the United States granted the power to do a trust business was The Farmers’ Fire In¬ surance and Loan Company (now The Farmers’ Loan and Trust Company) of New York city, to which extensive trust powers were granted in 1822. Similar powers were granted to The New York Life Insurance and Trust Company in 1830. Two companies in Philadelphia, — The Pennsylvania Company for Insurance on Lives and Granting Annuities, and The Girard Life Insurance, Annuity and Trust Company (now The Girard Trust Company), — were granted trust powers in 1836. All four are still in ex¬ istence.

As is indicated by the names of these early companies, the trust business was at first closely associated with the insurance business, and was not regarded as of sufficient importance to require separate organizations. A few other companies of the same kind flourished for a time during the next 20 years, but went out of business for various reasons. The first com¬ pany in the country organized to transact ex¬ clusively a trust business -was The United States Trust Company of New York city, in¬ corporated in 1853. The number of companies authorized to exercise trust functions increased slowly down to the time of the Civil War, immediately following which a number of such companies were organized. By 1875 perhaps 50 trust companies were doing business, located in New York, Pennsylvania, New Jersey, Maryland, Illinois, Iowa, Georgia, all the New England States except Maine, and possibly a few other States.

Trust Company Statistics 1875-1915 from the Reports ok the Comptroller ok the Currency

Year

Number

of

companies

reporting

Total

resources

Capital

Surplus

and

undivided

profits

Deposits and due to banks

1875 .

35

$122,890,175

$21,854,020

$7,550,560

$85,147,012

1880 .

30

126,869,673

18,501,876

10,245,051

90,158,637

1900 .

290

1,330,160,343

126,930,845

148,389,339

1,031,735,272

1908 .

842

2,855,638,876

278,408,759

416,039,899

2,029,978,992

1909 .

1079

4,068,534,988

362,763,223

493,382,193

3,112,588,489

1910 .

1091

4,216,850,062

367,333,556

498,166,836

3,260,264,58 2

1911 .

1251

4,665,110,869

385,782,933

538,870,453

3,615,224,149

1912 .

1410

5,107,444,382

418,985,772

560,741,978

3,974,516,696

1913 .

1515

5,123,920, 197

452,386,839

574,369,239

3,867,080,459

1914 .

1564

5,489,531,038

468,201,249

570,407,218

4,281,985,258

1915 .

1664

5,873,120,341

476,806,240

577,393,801

4,602,536,060

Prior to 1875 no statistics regarding trust companies are available, but in that year the Comptroller of the Currency began the publica¬ tion of such statistics in his annual reports. As the trust companies are State institutions and not under the jurisdiction of the comptroller he had no authority to compel the rendering of reports by them, and as a consequence his figures represent only such companies as were willing to report to him. Nevertheless they reveal the relative growth of trust companies from year to year, and in recent years repre¬ sent the great majority of such companies. For the year 1875 he reports 35 trust companies, with total resources of $122,890,175. During the eighties there was a considerable increase in number of companies, and the trust company as an institution began to attract some atten¬ tion, particularly from the banks, which saw danger of competition. In 1890 the comptrol¬ ler's reports showed 149 companies with total resources of $503,801,336. The real develop¬ ment of the trust company began along in the nineties, though the period of most rapid growth did not begin until the first decade of the 20th century. In 1900 the comptroller re¬ ported 290 companies with total resources of $1,330,160,343, an increase in resources in 10 years of 164 per

cent. At the end of the next decade, in 1910, the comptroller's report showed 1,091 companies with total resources of $4,216,- 850,062, an increase during the decade in num¬ ber of companies of 801, or 276 per cent, and in resources of $2,886,689,719, or 217 per cent. The 1915 report shows a further great increase, to 1,664 companies with total resources of $5,- 873,120,341. The table at top of page shows leading figures of the comptroller's reports from 1875 to 1915 inclusive.

Beginning in 1903, The United States Mort¬ gage and Trust Company of New York has

Resources and Liabilities of Trust Companies of the United States, 30 June 1917.

(As reported by The United States Mortgage and Trust Company, New York, 2009 companies reporting).

Resources:

Stocks and bonds . $2 , 032 , 057 , 479 90

Loans, notes and mortgages . 4,779,179,424 30

Cash on hand and in bank . 1 , 606 ,136, 907 89

Real estate, banking house, furniture

and fixtures, and safe deposit vaults. 250,134,182 12 Other resources . 291, 003 , 843 37

Total . $8,958,511,837 58

Liabilities:

Capital . $567,885,547 83

Surplus and undivided profits . 682,519,108 29

Deposits . 7,362,830,982 36

Other liabilities . 345 ,276,199 10

Total . . $8,958,511,837 58

published each year a compilation of trust com¬ pany statistics which include a great majority of the trust companies of the country. For the year 1915 its figures cover reports from 1,777 companies, besides which it lists over 250 com¬ panies from which reports were not received. This indicates that the total number of trust companies in the United States 30 June 1915 was in excess of 2,000. The accompanying tables show the total figures for the 1,777 re¬ porting companies, and the distribution of companies by States.

Distribution of Trust Companies by States 30 June 1917 *

State

No. of companies reporting

Total assets

Alabama .

32

$26,901 .074

40

Arizona .

10

12,504,031

54

Arkansas .

40

29,019,855

25

California .

31

410,194,270

88

Colorado .

20

47,167,271

16

Connecticut .

61

126, 168,891

51

Delaware .

18

34,791 , 128

48

District of Columbia .

6

54.380,105

55

Florida .

14

13,352,595

69

Georgia .

22

38,748,849

32

Idaho .

11

10,058,774

23

Illinois .

67

848,198,899

12

Indiana .

151

150, 140,480

63

Iowa .

88

59,284,857

96

Kansas .

10

5,481,235

44

Kentucky .

56

48,283,403

28

Louisiana .

34

121 .984,757

03

Maine .

47

102,156,238

87

Maryland .

23

123,720,735

77

Massachusetts .

92

601 , 809 , 945

06

Michigan .

9

35 , 355 , 673

09

Minnesota .

15

18,508, 130

85

Mississippi .

19

16,269,653

74

Missouri .

69

182,006,734

40

Montana .

15

33,150,385

29

Nebraska .

16

4,944,501

00

Nevada .

3

4, 106,543

82

New Hampshire .

12

17,421,577

86

New Jersey .

114

399,905,186

91

New Mexico .

11

4,864,828

22

New York .

95 3,

009,970, 109

98

North Carolina .

61

49,028,135

02

North Dakota .

4

1 , 167,211

57

Ohio .

87

551,696,005

79

Oklahoma .

9

2,423,747

80

Oregon . .

6

5 . 425 . 602

74

Pennsylvania .

293 1.219.841.405

19

Rhode Island .

13

174,069,037

34

South Carolina .

19

7,433,874

97

South Dakota .

11

5,115,749

40

Tennessee… .

70

65,488,237

60

Texas .

68

73,177,490

21

Utah .

9

19,989,295

90

Vermont .

36

57,314,227

39

Virginia .

25

29,100,107

40

Washington .

29

49,647,220

94

West Virginia .

23

36,270,727

53

Wisconsin .

14

14,098,651

Wyoming .

8

2,675,400

61

Hawaii .

5

3,698,981

86

Totals . 2009 $8,958,511,837 58

* Compiled from “ Trust Companies of the United States, 1917,” published by the United States Mortgage and Trust Company, New York.

The Federal Reserve Act.— The Federal Reserve Act, as construed by the Federal Re¬ serve Board, directly affects trust companies in two ways : it makes trust companies eligible to membership in the Federal Reserve banks, and it permits National bank members of the Federal Reserve system, — if in conformity with local State laws — to

undertake certain trust functions. Up to the present time few trust companies have joined the Federal Reserve system, largely because that system is designed wholly for commercial banks. Authority to National bank members to exercise trust func¬ tions applies only to those members which are located in States whose laws permit them to exercise such functions. Some of the States grant that permission, while others have dis¬ tinctly refused to do so. If the exercise of trust functions by member banks of the Fed¬ eral Reserve system becomes general, the fact will doubtless have a marked effect upon the growth of trust companies as separate insti¬ tutions.

Clay Herrick,

Author of cTrust Companies B

22. BANKERS' ASSOCIATIONS IN THE UNITED STATES. American Bank¬ ers' Association.— Prior to 1875 there was no national organization of American bankers. In that year the American Bankers' Association was organized at a convention held in Saratoga on 20, 21 and 22 July. By 1916 the Association had become the largest organization of bank¬ ers in the world, with headquarters at 5(Nas¬ sau street, New York. Its membership of 16,000 includes half the total number of banks in the country, and comprises National, State and private banks, trust companies and clearing houses. Annual dues range from $10 to $75 for banks and trust companies according to capital and surplus invested.

The governing body of the Association is the convention, which meets annually. Admin¬ istrative details are in charge of a general sec¬ retary and an executive council composed of members appointed from State bankers' asso¬ ciations on the basis of State representation.

In 1894 the Association began the protection of members against crime and fraud, and de¬ veloped a protective department which works with the W. J. Burns International Detective Agency in the pursuit of offenders against banks. Through its general counsel and a Federal legislative committee, the Association has initiated and promoted laws relating to uniform bills of lading, negotiable instruments, credit practice, currency reform, taxation, the safeguarding of bank depositors and the im¬ proving of banking practice.

The interests of special classes of member banks are in charge of secretaries of a Savings Bank Section, a Trust Company Section, a Na¬ tional Bank Section and a Clearing House Sec¬ tion. Through these

sections the Association has made efforts to standardize banking prac¬ tice and check collection ; has conducted a national thrift campaign; given publicity to the functions of trust companies; collected statis¬ tics of bank transactions ; developed country clearing-house organizations ; improved clear¬ ing-house examinations, and effected closer re¬ lations between the banks and the public. It has also compiled a cipher code; copyrighted vol. 3—14

standard forms of fidelity and bank burglary bonds ; devised a numerical system to facilitate check collection, and perfected the A. B. A travelers' check.

Affiliated with the American Bankers' Asso¬ ciation is the American Institute of Banking, an educational section which, since 1890, has given instruction to bank employees. Courses of study in banking law and practice and in elementary economics are given by correspond¬ ence as well as in local chapters. The mem¬ bers of the Institute number more than 16,000 and its certificate has become the recognized standard of American banking education.

The Association maintains a reference and traveling library service for its members, and keeps records of American experience in money and banking. A monthly publication called the J ournal-Bulletin is issued by a department of public relations, which also acts as a bureau of publicity and edits the printed proceedings of the Association's annual convention.

The Association has always been active in urging currency reform. Since 1906 its efforts in that direction have been expressed through a currency commission, which has worked with other agencies in bringing about and de¬ veloping the Federal Reserve system. The As¬ sociation has also done much for the national development of agriculture through its cur¬ rency commission, which publishes a monthly magazine called the Banker-Farmer. Points of contact with State bankers' associations are maintained through a section known as the Organization of State Secretaries, and through joint efforts in agricultural extension, the re¬ vision of banking legislation, the apprehension of bank criminals, and through cooperation be¬ tween committees.

State Bankers' Associations. — There are 49 State bankers' association, including the District of Columbia. The first to organize was Texas, in 1885; while Illinois, with a mem¬ bership of 1,755, is the largest.

These State organizations have more than 21,000 members, and most of them maintain paid secretaries to further the interests of members through cor¬ respondence, protective features, bond and burglary insurance, group meetings, State con¬ ventions, legislation and the publication of monthly bulletins. Many associations also have paid attorneys, and most of them are active in agricultural and good roads' development.

The Investment Bankers' Association. — The Investment Bankers' Association of Amer¬ ica was organized in New York in 1912, ((in order to promote the general welfare and in¬ fluence of investment banks, or bankers, like¬ wise banking institutions operating bond de¬ partments, and to secure uniformity of action, both in legislation and methods of handling securities." ((Any national or state bank, trust company or private banker, banking firm or corporation, in good standing, having a paid-in capital of $50,000 or more, which makes a prac¬ tice of buying bonds or investment stocks, and publicly offers the same, as dealers therein" is eligible to membership, but (<those who are ex¬ clusively brokers" are not admitted.

The" Association has headquarters at 111 West Monroe street, Chicago. A Bulletin of information is published frequently and the proceedings of the annual convention are

printed. The associated activities of nearly 500 members are carried on through a board of governors which meets quarterly, through a secretary, a legal counsel and committees. The Association is prominent in legislation relating to the issuance, standardization and safeguard¬ ing of securities and the improvement of the ethics of stock and bond trading. It has given special attention to raising the status of munic¬ ipal and other bonds, and to reforms in methods of taxation.

Farm Mortgage Bankers' Association. —

In May 1914 the Farm Mortgage Bankers' As¬ sociation of America

was organized. It has a membership of more than 150 farm mortgage firms operating in 25 agricultural States, rep¬ resenting outstanding farm mortgages of more than $600,000,000. The offices of its secretary-treasurer are at 112 West Adams, street, Chi¬ cago, where a quarterly Bulletin is published. Its convention is held annually. Through a board of governors, committees and the secretary-treasurer, the organization is direct¬ ing special efforts toward the standardization of mortgage forms and uniformity of practice among farm mortgage dealers.

Other Bankers' Associations. — New York State, Massachusetts and Connecticut have sav¬ ings bank associations, while New York, New Jersey and Massachusetts have State-wide trust company associations. In Oklahoma and Kan¬ sas the State banks have separate organizations. Bank examiners are organized into what is known as the National Association of the Su¬ pervisors of State Banks ; there is an Associa¬ tion of Reserve City Bankers ; bank credit men are organized into a Robert Morris Club ; and there are numerous local associations of related banking interests, as well as clubs of city bank¬ ers. The Bankers' Club of America has head¬ quarters in the Equitable building in New York city and limits its resident membership to

1,500.

Marian R. Glenn.

BANNATYNE CLUB, instituted by Sir Walter Scott in 1823. Its object was to print and publish in a uniform maimer rare works of Scottish history, topography, poetry, *etc.*

BANNEKER, Benjamin, American negro mathematician: b. Maryland, 9 Nov. 1731; d. 1806. At the age of 50 he began the study of mathematics for astronomical purposes. He published annually after 1792 an almanac de¬ vised by himself, and aided in determining the boundaries of the District of Columbia.

BANNERET, an abbreviation of knight banneret; a member of an ancient order of knighthood which had the privilege of leading their retainers to battle under their own flag. A banneret was entitled to display a banner instead of a pennon. They ranked as the next order below the Knights of the Garter, only a few official dignitaries intervening. This was not, however, unless they were created by the King on the field of battle, else they ranked after baronets. The order

is now extinct, the last banneret (John Smith) created having been at the battle of Edgehill, in 1642, for gal¬ lantry in rescuing the standard of Charles I.

BANNOCK, a cake once much eaten in Scotland. It was made of oatmeal, barley-meal or peasemeal baked on an iron plate or griddle

over the fire. From a supposed resemblance the turbot is sometimes called in Scotland the bannock-fluke.

BANNOCK. See Banak.

BANNOCKBURN, Scotland, village about two and one-half miles southeast of Stirling, on Bannock Rivulet. Here on 24 Tune 1314 Robert Bruce, with 40,000 Scotch, inflicted a great de¬ feat on Edward II at the head of 60,000 Eng¬ lish troops. The victory was in large measure due to the clever device of Bruce who had caused the ground in front of his position to be undermined in all directions. The English cavalry stumbled onto the hidden pits, were rendered helpless and the army was thrown into confusion. The English are said by his¬ torians to have lost 10,000 to 4,000 of the Scotch. By this victory Bruce made his throne secure and also assured the independence of Scotland. See Scotland — History.

BANNS, the announcement of intended marriage, requiring the hearers to make known any cause why the parties should not be united in matrimony. By the publication of these banns is meant the legal proclamation or notifi¬ cation within the parish, district or chapelry, of the names and descriptions of the persons who intend to be there married; the object being to secure public knowledge of intended marriages, and that all who have objections to the marriage may be enabled to state them in time. If the bridegroom live in a different parish from the bride, the banns must be proclaimed also in that parish, and a certificate of such proclama¬ tion must be produced before the celebration of the marriage. According to the old English canon law, the publication of banns might be made on holidays ; but a change was made to Sundays by Lord Hardwicke's Marriage Act in 1753, and although that act was afterward su¬ perseded by the 4 Geo. IV chap. 76, the regu¬ lation as to Sundays has been since continued. Seven days' notice at least must be given to the clergyman before publication of banns. Banns were customary in various places before they were prescribed by the entire Church in the Fourth Council of Lateran. The Council of Trent ordered pastors to pub¬ lish them at the

principal mass in the parish church, or churches, of the parties, on three successive Sundays or festivals. This publica¬ tion should be made within two months preceding the marriage. For grave reasons the bishop can dispense from this obligation. By the English Prayer Book the announcement is required to be made in the words of the rubric on each of the three Sundays preceding the ceremony. If objections are offered by anyone present, the clergyman cannot proceed further. Except in the Roman Catholic Church the cus¬ tom of thus publishing the banns of marriage is practically obsolete in the United States.

BANQUETS. It was the famous Mr.

Bosw'ell who first defined man as a cooking ani¬ mal, and yet, appropriate as the definition still is, neither mythology' nor tradition offer any clue to aid the student in discovering when it was that the human animal first learned to cook. Of course, it is highly improbable that this secret was known to prehistoric man. In¬ stead of knowing how to cook he undoubtedly ate his food raw, washing it down with pure

cold water from the springs and brooks, and many years must have elapsed before he made the surprising discovery that the foods that satisfied his hunger could be vastly improved in taste if subjected to the influence of heat. All this, however, is little more than mere sur¬ mise for our only knowledge regarding the customs of eating in vogue during the remote past has been obtained from the relics un¬ earthed by archaeology. On walls now ruined and decayed the hand of the ancient painter and sculptor left a record of the customs of his time and from this source the student has been able to gather some little information regarding the gastronomic progress of the human race.

Such records, however valuable they may be in the absence of other facts, are vague and unsatisfactory at best, and so, turning to ancient literature, one finds that the earliest references to food preparation are contained in the Bible. In Genesis, when Abraham bade Sarah make

ready three measures of fine meal that he might be prepared to entertain the angel, the student finds his first direct reference to breadstuffs, and, from that time, the Scriptures often make mention of some foods by means of which the reader may obtain a more or less correct idea of the slow stages by which this branch of the human race progressed from its habits of prim¬ itive simplicity to the stately banquets of King Solomon and the extravagant feasts of Bel¬ shazzar.

As our meagre records show the art of feasting was practically contemporaneous with the Egyptians and the Hebrews it is not im¬ probable that the latter race may have learned the secrets of good living from the former dur¬ ing the time of the captivity, for at the period when both Greek and Roman were still content with the simplest fare the Hebrews had been initiated into the pleasures of the table, a fact which explains the many quaint Biblical warn¬ ings against the sin of gluttony, as in Esdras, where it is said that “the faces of them that have used abstinence shall shine above the stars.®

Among the ancient Jews all festive repasts were held toward the close of the day, after all matters of business had been concluded. If the feast was to be one of great ceremony guests were not only invited long before the occasion, but again, on the day and as near as possible to the hour appointed, servants were sent to their houses to deliver orally the second, or “express® invitation, which announced that the host was now prepared to receive his guests. As this “express® invitation was sent to none but those who had already declared their ac¬ ceptance, honor and propriety required that they answer the summons at once and in person, a fact which explains and justifies the feelings of resentment which were entertained by the mas¬ ter of the house in the parable of the great supper, on which occasion, as will be remem¬ bered, each person invited met the bearer of the “express® with a frivolous apology for his in¬ ability to be present at the least to which he had already accepted an invitation.

Guests at Hebrew banquets were required to bring their cards of invitation and these were presented to servants stationed at the entrance door. Upon being admitted the guests were conducled to the receiving-room where water, oils and perfumes awaited them. If the

host desired to exhibit a great mark ol courtesy he provided each guest with a richly em¬ broidered garment, light and showy and cut in a flowing fashion, which all were required to wear during the feast.

If the banquet was of a private character the master of the house presided, but on oc¬ casions of public festivity a governor of the feast was selected and it was his duty to see that the banquet was not only properly con¬ ducted but that the company present preserved at least a semblance to order. Appointment to this office was always regarded as a great honor, and, among the Greeks and Romans, the position was prized so highly that the choice of-the individual to fill it was often decided by chance, as by the throw of the dice.

The positions of the guests at the tables were not fixed by inviolable rule. Sometimes they selected their own places, while, at other times, they were arranged by seniority of family, or even according to the whim of the host who might desire to assign the most dis¬ tinguished guests to places near his own person. In the earliest days, as is shown by the habits of the ancient Israelites, guests sat cross-legged around a low table and the custom of reclining while eating was not introduced until about the last of the Old Testament days. At least, it was about this time that the Jews adopted this custom, as well as the habit of having but two-thirds of the table spread with a cloth, the portion where the food was to stand being left bare. In ancient Egypt and Persia the tables were arranged along the sides of the room and guests faced the wall.

At this time such articles as spoons, knives and forks were unknown and those who ate obtained the morsel they desired by dipping their slices of bread in the dish before them, folding the piece of meat or other food sub¬ stance within it by the use of the thumb-and two fingers. Later centuries saw the invention of the spoon but many hundred years elapsed before any other substitute for the fingers* was suggested. Naturally the hands became be¬ smeared with grease but they were cleaned by being rubbed on slices of bread, kept for that purpose. This bread was then thrown to the dogs who waited beneath the tables for just such morsels from the feast. If the fingers became too badly soiled, however, servants ap¬ peared with water and assisted the guests to wash by pouring a stream over the hands into a basin.

When the party was a large one it was the custom for two persons to eat from one dish and the host often showed the height of hos¬ pitality by dipping his hand into his own dish, lifting a portion of the food, and offering sop to his guest. To decline such an attention was a breach of etiquette that stamped one as being extremely ill-bred. In order that the hands should be always clean from dirt, however the rabbis enjoined the “first water’ *and the “last water,* * or the washing before and after eating, and, in the case of travelers at least, the “first

water® included the washing of the feet. After the adoption of the reclining posture guests lay with their faces toward the table, the left arm resting upon a cushion and the feet stretched out behind, while during the progress of the banquet both head and feet were fre¬ quently sprinkled with perfume to overcome

any unpleasant odor that might arise from too copious perspiration.

The foods served at these ancient banquets consisted of flesh, fish, fowl, melted butter, bread, honey and fruit, all of which were brought to the table at one time, the service being accomplished by the use of trays, the number and quality of the dishes varying under different circumstances. In ordinary cases the portion of each guest consisted of four or five dishes, but if the guest was a person of great distinction this portion was increased until the dishes became so numerous that they were piled one upon another, completely covering the table. All this food, which was usually pre¬ pared in liquid or with a sauce, as in a stew, had been cut into conveniently small pieces before it was served.

From the earliest days within the recollec¬ tion of history sacrificial occasions have always included a banquet, however crude a festival it may have been, and it was the adoption of this custom that gave a religious as well as a social significance to so many of the Hebrew feasts. As the Lord's Supper of the Christians was de¬ rived from the Passover, so all the great reli¬ gious festivals had, as their accompaniment, a domestic feast. On the occasion of the religious banquets, however, the wine was mixed accord¬ ing to rabbinical regulation, or with three parts water; four brief benedictions being pro¬ nounced over the cup before it was passed by the master of the feast.

The Greeks, like the Persians, began and ended their feasts with libations of wine, and some idea of the nature of an ancient Greek banquet may be obtained from the following curious account of a dinner given by Achilles in honor of Ulysses:

He cast down a great fleshing block in the firelight, and laid thereon a sheep's back and a fat goat's and a great hog's chine, rich with fat. And Automedon held them for him while Achilles carved. Then he sliced well the meat, and pierced it through with spits. Then, when the fire was burned down and the flames waned, he scattered the embers and laid the spits thereupon, after he had sprinkled them With holy salt. Then when he had roasted the meat and apportioned it in platters, Patroklos took bread and dealt it forth in fair baskets, and Achilles dealt the meat: and he sate himself over against godlike Odysseus and bade his comrade Patroklos to sacrifice to the gods, so he cast the first fruits into the fire. Then they put their hands to the good cheer lying before them.

Later, of course, the Greeks became more delicate eaters and vied with the Romans as to the elaborate character of their feasts. Like the Egyptians and Hebrews they reclined at table and their sumptuous repasts were divided into two courses : the first consisting of fish and meat, accompanied by the vegetables and several hors d'oeuvres or entrees, while the second course comprised the pastry, fruits and other kinds of dessert.

As soon as the regular meal was finished the tables were removed and the floor was cleaned of all fragments. Other tables were then brought in by the servants, tables covered with salted cakes, cheeses and other foods provoca¬ tive of thirst, as well as the great mixing bowls, the pitchers of water cooled in snow, and the jugs of unmixed wine, for the Greeks loved to drink heavily after eating, and as they drank, to an accompaniment of music, song and dances, young and handsome slaves garlanded their heads and breasts with twining vines and flowers, not, as has sometimes been said, as a sign of festivity, but because the garlands were

supposed to cool the forehead and counteract the heady effect of the wines.

Like the Hebrews the Greeks obtained their first lessons in cookery from the Egyptians and they soon put them to good account. The Athenians were particularly apt pupils in the kitchen science and they finally came to excel the rest of Greece in gastronomic achievements just as the modern French excel the rest of Europe in this day. An excellent proof of this assertion is to be found in the circumstance that what is regarded as one of the most valuable of the lost works of antiquity is a didactic poem on gastronomy, written by Archestratus,

the intimate friend of one of the sons of Pericles. <(This great writer,® says Athenseus, (<has trav¬ ersed earth and sea to render himself ac¬ quainted with the best things which they pro¬ duced. He did not, during his travels, inquire concerning the manners of nations, as to which it is useless to inform ourselves, since it is im¬ possible to change them ; but he entered the laboratories where the delicacies of the table Were prepared, and he held intercourse with none but those who could advance his pleasure. Flis poem is a treasure of science, ever}' verse is a precept.®

Among the great nations of ancient times the Romans were the last to learn the art of cookery. As late as the year 174 b.c. there were neither cooks nor public bakers in Rome, and the people were satisfied with and asked for nothing better than a kind of porridge made of pulse. This in addition to their vege¬ tables and some leguminous fruits formed their principal articles of diet. The Asiatic wars, however, introduced the Romans to the luxuries of the table and, in a day as it were, Rome, discovering that it had a palate, went mad on the subject of gastronomy. Slaves who could cook, bake or make sweets were brought to Rome in large numbers but, as every man of wealth was eager to purchase them, they brought the highest of prices.

As this was the dawning of the day of Rome's expansion it was not long before her agents began to supply her capital with dainties from all parts of the world. From the far East to the far West whatever seemed delicate of taste or that might help to tempt a nation of palates already craving a new flavor was brought to the cooks in the Roman kitchens. To improve, the quality of his cuisine the Em¬ peror Vitellius, one of the most enormous eat¬ ers the world has ever known, sent his legions to every part of the empire to shoot game for him, while entire fleets were employed in doing nothing but catching the fish that were to grace his table. In fact it seemed as if Rome, so long satisfied with the humblest of fare, could not find a sufficient variety of foods to gratify its desire for novelty.

Even as early as Caesar's time, however, the Roman table was liberally provided with a variety of foods sufficient to satisfy almost any appetite. As an example of a feast given in those days one may take the following menu which was served at a pontifical banquet long before the advent of the golden days of Im¬ perial Rome :

The first course, which was intended to merely whet the appetite, consisted of conger eels, oysters, two kinds of mussels, thrushes

served on asparagus, fat fowls, a ragout of oysters and other shell fish, with black and white marrons. The second course included a variety of shell fish and other marine animals, becaficos, haunches of venison, a wild boar and a pasty of becaficos and other birds. The third, and principal course, comprised the udder of swine, boar's head, a fricassee of fish, a fricas¬ see of sow's udder, ducks of various kinds, roast fowl, with pastry and Picentine bread.

As the years passed Rome experienced no deterioration in its love for the good things of the table. In fact, on the other hand, this pontifical menu was really a meagre bill of fare as compared to those which were afterward prepared by the Roman cooks for the delecta¬ tion of the later Gesars. As an illustration the following description of a banquet in the time of Nero, which is taken from Dean Farrar's (Darkness and Dawn,* is admitted by students to be a vivid but not exaggerated picture of a feast in the days of Imperial Rome. At this banquet, w'hich was prepared under the direc¬ tions of Otho, Nero entertained eight guests. The w7alls of the room ((were inlaid with moth¬ er-of-pearl and slabs of ivory… . The table was of cedar-wood, and it sparkled with gob¬ lets of gold and silver … among which were scattered amber cups… . Although it was winter, garlands of exotic roses were pro¬ vided for every guest, and none but the most youthful and beautiful of Otho's slaves were permitted to wait upon them. The supper was no supper of Trimalchio, with its coarse and heavy gluttonies… . The oysters were from Richborough; the lampreys were from the fish¬ ponds of a senator who was said to have flung into them more than one slave who had of¬ fended him; the mullet came from Tauro-menos ; the milk cheese from Carsina. There were two tiny dishes which represented the last and most extravagant devices of Roman gour¬ mets, the one composed of the tongues .of nightingales, the other of the brains of Samian peacocks and African flamingoes, of which the iridescent and crimson feathers adorned the silver plates on which they lay. Sea and land had been swept with mad prodigality to furnish every luxury. The wines were of the rarest vintages, and whereas four kinds of wine were thought extravagant in the days of Julius Caesar, Otho set 80 different sorts before his guests… . Hot mushrooms alternated with bits of ice.® Perfumes were sprinkled on

the hair and feet of the guests, and the amusements that were provided were dancing by Andalusian girls, dice and gambling. Offerings to the gods were not forgotten, however, and these were thrown into the hearth.

If this was a dainty repast, however, Rome was not always so dainty for the wealthy gour¬ mands were not satisfied with eating well. They wanted to gluttonize, to eat of everything im¬ moderately until they found it impossible to eat any more, when, by resorting to the ever-con- venient feather, they were able to return to the feast and stuff themselves once more. to reple¬ tion. On such occasions the more distinguished the company, the earlier began the banquet and the later it lasted.

Nor did the Roman table ever go dry for the want of rare and choice wines. In Greece the juice of the grape was almost invariably

mixed with water, but Rome wanted no dilu¬ tion of its revelling. Wildly extravagant and prodigal in everything, the Romans made no exception in the case of their drink. The wines that they used were preserved in jars or bot¬ tles of baked clay, and, as they were prized in proportion to their age, each receptacle bore a label on which it was distinctly stated in what consulship the beverage had been made. Many of these wines came from Italy, the Campania being considered the best, but the wines of Greece were also there, side by side with all the drinks that time or money could gather from every part of the world.

The fact that civilization and cookery go hand in hand was never more strikingly illus¬ trated than in the case of the ancient Britons, for, in the earlier days of their history their cuisine was marked by all the limitations of primitive simplicity. The Roman conquest, however, appears to have applied to the kitchens of the country as thoroughly as to the govern¬ ment, for as the Roman conquerors were un¬ willing to eat the crude culinary preparations of the native Briton they proceeded to teach the conquered how to cook for them. Then, too, at about the same time, the appearance of the German immigrants, with their own more wholesome cookery, was not without its good effect, and the transformation in *Mme.* Britannica's methods of cooking may be said to have been almost as wise as it was radical.

The centuries which succeeded the fall of the Roman empire, and which comprised the greater part of the Middle Ages, was as dark a

period for gastronomy as it was for all other arts. For a time it seemed as if man had forgotten how to cook ; as if he had lost his taste for the well-seasoned dishes which had once been his chief delight, and that he had no desire to get it back again. Even Charlemagne, who, according to his Capitularies, took a warm personal interest in his table, was a novice both in the art of cooking and in that of service, for his banquets were barbaric affairs composed of huge roasts of meat dripping from the spit, and other crude features that would have put the ancient Roman gourmets to the blush. Per¬ sonally, too, the great Emperor of the West was extremely abstemious and seldom, even at dinner, permitted himself to be served with more than four dishes.

The reading of the description of Prince John's banquet in Sir Walter Scott's <Ivanhoe) certainly gives the impression that the Nor¬ mans, who appeared two or three centuries later, were justified in priding themselves upon their superior taste and discrimination in mat¬ ters of eating, but even such flashes of light were but faint illuminations for so black a night for art as that of the dark ages.

Highly as the cuisine is esteemed to-day; idolized as it was before the fall of Rome and Greece called a halt upon civilization and placed a check upon progress, it seems somewhat strange that there was no one chronicler of affairs bright enough to detect the fact that the revival in the lost art of cookery had com¬ menced. As the historians of those days dealt in facts, not in manners, however, it is impos¬ sible to state at just what period gastronomy began to be cultivated again, although, of course, it is well known that its revival, like

the revival in learning, was brought about in Italy. According to the best authorities, how¬ ever, it was the merchant-princes of Florence who made the first attempt to improve the cui¬ sine of the country and their experiments met with such success that their efforts were greeted wTith the most heartfelt encouragement by trav¬ elers from foreign countries who were invited to sit at their tables. It was to the Italian cuisine, in fact, that the French owed their in¬ structions in the gastronomic art, for _ when Catherine de Medicis returned to Paris she

carried several professors of the new cookery in her train. The effect of their importation was almost immediately noticeable. They im¬ proved the pot-au-feu; they expounded a new theory of taste ; they expatiated upon the value of sauces, but, and this was more to the pur¬ pose so far as the progress of civilization was concerned, they introduced the art of making ices. Even the 16th century Montaigne, whose life was certainly cast in pleasant places, among the people who composed the best French so¬ ciety, was unable to appreciate the estimate that the Italian cooks of that day had so prop¬ erly put upon their vocation. In one of his contemporaneous, if not somewhat reminiscent studies, he says :

I have seen amongst us one of those artists who had been in the service of Cardinal Caraffa. He discoursed to me of this science de gueule with a gravity and a magisterial air, as if he were speaking of some weighty point of theology. He expounded to me a difference of appetites: that which one has fasting; that which one has after the second or third course; the methods now of satisfying and then of exciting and piquing it; the police of sauces, first in general, and next in particularising the qualities of the ingredients and their effects; the differences of salads according to their seasons; that which should be warmed, that which should be served cold, with the mode of adorning and embellishing them to make them pleasant to the view. He then entered on the order of the service, full of elevated and important considerations —

“ Nec minimo sane discrimine refert

Quo gestu lepores et quo gallina secetur.”

And all this expressed in rich and magnificent terms, in those very terms, indeed, which one employs in treating of the government of an empire. — I well remember my man.

The period which intervened between the arrival of Catherine de Medicis from Italy and the accession of Louis XIV is one concern¬ ing which there is practically no authentic cul¬ inary record, although there is not the slightest reason to doubt that prodigious advances were made by the gastronomic art during that time. In fact, one has but to refer to one of the menus from the table of Louis XIV to realize that cookery had ceased to be an experiment, and it is necessary to go but a step further and compare the foods of Paris in Louis’ time with those in use in other parts of the world, to realize the progress that had been made by the French cooks by the middle of the 16th century. In Paris, for example, the foods were not dissimilar to those

of our own day, to which the following menu of a dinner wrhich was served to Emperor Charles V, by the city of Halle, would certainly be a contrast :

(1) Raisins in malt flour; (2) fried eggs; (3) pancakes; (4) steamed carrots; (5) fried slices of bread; (6) a covered por¬ ridge; (7) a high pasty; (8) a pea-soup with marrow, covered richly with peas and eggs; (9) yellow codfish boiled in butter; (10) earns, boiled; (11) fried fish, with bitter oranges, spiced; (12) sweet pikes; (13) pulverized kernels, with almonds; (14) maize in almonds' milk; (15) fried fish with small olives; (16) cakes; (17) pears and confect.

And during this time England, too, had made some little progress in the improvement of its cuisine, although Henry VIII was one

of the first monarchs who exhibited any liberal¬ ity in rewarding originality in cookery. Henry, however, seemed unable to do enough for those who ministered to the gratification of his ap¬ petite, and on one occasion, he was so much delighted with the flavor of a new pudding that he presented a manor to its inventor.

From the early days when the housewives of Briton had adopted a cuisine which may quite properly be termed an amalgamation of German and Roman cookery England had maintained a position of her own in the world of gastronomy. By no means as ostentatious as the ancient disciples of the art; less dainty, perhaps, than the more modern disciples in the various Euro¬ pean countries, their school of the kitchen was so largely their own that it is not strange that Cardinal Campeggio, one of the legates charged to treat with Henry VIII concerning his di¬ vorce from Catherine, should have been re¬ quested to draw up a report on the state of English cookery as compared with that of I talyˆ and France, by the express desire and for the especial use of his Holiness the Pope.

There are certain historical documents con¬ nected with the Seymour family still on file in London, which throw a most interesting light upon the culinary customs in vogue in England during the reign of the Eighth Henry. They show, for example, the manner in which he wras entertained at Wulfhall on the occasion of his marriage to Jane Seymour. The facts, pre¬ sented in a paper prepared by the Duchess of Somerset, are as follows ;

The king, with his whole household and nobility, arrived at Wulfhall

on Saturday, 9 Aug. 1539. They remained Sunday, Monday and Tuesday. How or where so many were lodged does not appear; but “ covers,” as we should call them, “ messes,” as the book calls them, were laid for two hundred the first day. There are only two meals a day accounted for, and it appears that on Saturdays, as well as on Fridays, no meat was eaten, abstinence from flesh on those days having been ordered by a Royal proclamation, not only for health and discipline, but for the benefit of the commonwealth and the profit of the fishing-trade. The king’s supper on his arrival, therefore, consisted only of fish.

Country places in Wiltshire must have been better supplied with fish than they are now, for the bill of fai;e included pikes, gills, salmon, tenches, lobsters, bream, plaice, trouts, congers, carps, roach, eels, potted sea-fish and salmon pasties, a sack of oysters, salt haberdine (which w’as codfish salted at Aberdeen), soles, and whitings.

The next day being Sunday, there were messes for four hundred, and the provisions amounted to 6 oxen, 2 muttons, 12 meals, 5 cygnets, 21 great capons, 7 good capons, 10 Kentish capons, 3 doxen and 6 coarse capons, 70 pullets, 91 chickens, 38 quails, 9 mews, 6 grets, 2 shields of brawn, 7 swans, 2 cranes, 2 storks, 3 pheasants, 40 partridges, 2 peachicks, 21 snipe, besides larks and brews — whatever they were.

It is scarcely necessary to trace the history of the banquet — which is, of course, but an¬ other name for the history of eating — with more close attention to detail. In contrasting the banquets of other days with those of to-day, however, one is struck by the fact that the modern peoples have also made some consider¬ able improvement in the manner of eating and drinking, for one has but to turn to the menus of meals served at the beginning of the 19th century to find that dinners were not infre¬ quently burdened by 20 or more entrees.

In the last century before the Christian era a stoic, Posidonius of Rhodes, in discussing the methods of cookery, took advantage of the op¬ portunity to preach simplicity. He insisted that man, who had been blessed with good teeth, glands and secretions, a tongue and the usual apparatus for digestion was independent

of the cuisine, and this ancient pagan idea that the object of all repasts should be to take away the desire of eating and to maintain health and vigor has become more acceptable to thought¬ ful people during the past century. To-day our private banquets at least are simplicity itself when compared with those of even a century ago, and while their somewhat monotonous dearth of any entertainment except that of eat¬ ing and drinking, with occasional music, has recently resulted in a sort of mania for the odd and eccentric, it is so obvious that these banquents are based upon the old desire for noto¬ riety, the wish to dazzle which has inspired so many of the world's great feasts since ihe days of King Solomon's entertainment of the Queen of Sheba, that no particular attention is paid to such puerile attempts to provide a novelty.

To obtain a correct idea of the modern ban¬ quet, however, the public banquet conceived and executed in the most perfect taste, it is only necessary to recall the dinner given at Com-piegne by President Loubet of France in honor of the Tsar and Tsarina of Russia. One of the most magnificent and perfectly appointed affairs of modern times, its 500 covers were served at a cost to the French government of something more than $15,000, exclusive of the wines. And as these were the choicest brands and of the most ancient lineage their cost must have been fully as great as that of the dinner itself.

A story is told that upon this occasion the correspondent of one of the great foreign journals interviewed the chef for the purpose of securing some authentic details concerning the dinner. Among other questions he asked : (<And what was the chief novelty of the menu?® Instantly the great man stood upon his dignity and his voice was strong in its wrath as he replied: <(Novelties! I would have you know that on the table of the guests of our country we lay no second editions.® A reply which might have been made by Vatel, the chef who killed himself, being unable to survive the dis¬ honor of the table for which he was respon¬ sible.

In the various descriptions of President Loubet's banquet to the reigning sovereigns of Russia little is said in regard to the decorations or service, the writers confining themselves to the menu, that being the most important feature of the feast. Mention is made, how¬ ever, that the flags, flowers, ribbons and spun-sugar ornaments united in a decorative scheme with effectively beautiful results.

In regard to the menu, however, it is ap¬ parent that it left nothing to

be desired. The soups were clear turtle and Creme du Barry, which gave the guests a choice, after which ((came a wonderful dish of soft roes called, on the bill of fare ˆCaisses de laitances Diep-poiseR and another, (Barbues dorees a la Vatel, 5 served with a remarkable sauce in which a hundred elements harmonized in a perfect whole. Venison with an acid dressing and braised quail, the most delicate bird of the species, a native of the vineyards of central France, followed the entrees. Afterward, in turn came sherbets, granites, etc., succeeded by truffled pheasants with champagne sauce, salad Potel, named for the chef who invented it and similar delicacies.® The triumphal achievement, however, was a savory entremet

which is described as a <(small pudding of as¬ paragus heads served with a cream sauce.® Hothouse fruits, ices, cheese and coffee com¬ prised the final courses of the feast.

One of the exhibits which attracted the most attention at the Paris Exposition of 1900 was a service of Sevres which was admittedly the most beautiful and costly production that the famous potteries had ever attempted. Upon each piece of china was pictured a danseuse, but no two were the same in either pose or type of loveliness. Realizing that the one a hobby® of the Tzarina was her love for beau¬ tiful china, of which she already had a famous collection, including the best specimens of the work of all the great potteries of the world, it was decided to copy this magnificent service in every detail. It was thus used at the ban¬ quet and was afterward presented to the first lady of Russia in the name of President Loubet.

The occasion upon which one nation enter¬ tains the rulers of another nation is an event when, if at any time, even the most ostenta¬ tious display might be regarded as permissible. I f contrasted with the seemly manner of liv¬ ing in vogue among modern diners at ordinary times this banquet of the French President may, in some respects perhaps, have bordered upon-ostentation. When compared to the ex¬ travagant feasts of other days, however, it seems striking in its simplicity, for nothing could have been in greater contrast to the ex¬ travagant luxury of the banquets of the an¬ cients, to. say nothing of that of many more modern rulers, that luxury which precedes, if it does not lead to, decadence.

BANQUETTE, ban-ket', in fortification, the elevation of earth behind a parapet, on which the garrison of a fortress may stand, on the approach of an enemy, in order to fire upon them. Its dimensions vary

and it is fre¬ quently made double ; that is, a second is made still lower.

BANQUO, ban'kwo, a famous Scottish thane of the 11th century. In conjunction with Macbeth, cousin of Duncan, the king, he ob¬ tained a victory over the Danes, who had landed on the Scottish coast. Macbeth, shortly afterward, violently dethroned Duncan and caused him to be secretly assassinated. Banquo, though not an accomplice, was a witness of the crime ; and being subsequently regarded by Macbeth with fear and suspicion, the latter invited him and his son, Fleance, to supper, and hired assassins to attack them on their return home during the darkness of night. Banquo was slain, but the youth made his escape. Shakespeare has interwoven this occurrence with the theme of his tragedy of Macbeth.5

BANSHEE, an imaginary female being supposed by some of the peasantry in Ireland and the Scottish Highlands to wail or shriek near a house when one of the inmates is about to die.

BANTAM, any one of various breeds of diminutive fowls kept for pleasure, and par¬ taking of the characteristics of the several breeds which they imitate in miniature. Thus the game-bantams are miniatures of exhibition game-cocks, and weigh about 22 ounces. The golden and silver Sebright bantams originated in America from a cross between a Polish

fowl and a bantam, and are exceedingly beauti¬ ful in plumage. The rose-comb bantams are little copies of Hamburg fowls, and should be either lustrous black or pure white ; and the cocks have a rose comb square in front, evenly corrugated, and ending in a spike with a slight upward curve. Booted white bantams are those which have their shanks heavily feathered. The Cochin fowl is imitated in all its varieties by a bantam the cock of which weighs about 28 ounces. Most beautiful of all are the Japanese bantams, of which there are several varieties. The typical one is white with the tail black, and composed of long, sickle-like, white feath¬ ers held erect and edged with white.

The wing quills are dark slate color edged with white, so that when the wing is folded it shows only white.

BANTAM, ban-tarn', or ban'tam, a province occupying the whole of the west end of the island of Java, and containing a population of about 520,000. It long formed an independent kingdom governed by its own sultan, but at the beginning of the 19th century was formally incorporated by the Dutch with their other possessions. Rice is now the staple product. Its capital, which bears the same name, was once the principal mart of the Dutch, and was surpassed by few towns of the East in antiquity and celebrity. It is now very much decayed. Bantam is believed to give name to the well-known small but spirited breed of domestic fowl.

BANTAYAN, Philippines, a town on the island of the same name in the province of Cebu, 62 miles north of the town of Cebu. Numerous shoals make navigation difficult. A leper colony inhabits a small island just off shore. Pop. about 14,000.

BANTENG, a wild ox (Bos sondaicus) of the mountain forests of the Malay Peninsula and Archipelago (except Sumatra), which greatly resembles the gaur (q.v.), and is by some considered a variety of that animal. These cattle are exceedingly fierce, and are regarded by sportsmen as among the most dangerous of game. Nevertheless they have been tamed, and when crossed with the domes¬ tic cattle of the region yield a serviceable hy¬ brid.

BANTOCK, Granville, English composer: b. London, 7 Aug. 1868. He was educated in London for the Indian civil service. His love of music caused a change in his plans and he took a preparatory course under Dr. Saunders. In 1889 he entered the Royal Academy of Music, where he was first holder of the Mac-farren scholarship. He toured the world in 1894-95 as conductor of the Gaiety Company, conducting in the principal cities of America and Australia, and editing meanwhile The New Quarterly Musical Review. In 1896 he joined the G. Edwardes' opera company. His London concerts of 1897 attracted wide attention be¬ cause he confined himself exclusively to Eng¬ lish compositions of recent date. He was ap¬ pointed municipal director of music at New Brighton, in 1896, where he established a choral society and orchestra. He was principal of the Birmingham Music School from 1900 to 1907, and conductor of the Liverpool Orchestral Association after 1903. He was appointed

professor of music in Birmingham University in 1908. He is a prolific composer. His chief works are the operas ‘Csedmar’ (1892) ; /The Pearl of Iran’ (1896) ; an oratorio, (Christ in the Wilderness’ (1907) ; the symphonic poems,

(Dante’ (1902); ‘Fifine at the Fair’ (1902); (The Witch of Atlas’ (1903); (Lalla Rookh’ (1903); (Dante and Beatrice’ (1911); vocal works with orchestra, (Wulstan’ (1892); (The Spirit of the Times’ (1904); ‘Sea-Wanderers’ (1905); ‘Omar Khayyam’ (1907); the choral symphony, ‘Atalanta in Calydon’ (1912) ; a string quartet in C minor ; serenade for four horns ; piano works and songs ; and the over¬ tures, ‘The Fire Worshippers’ (1892); ‘Eu¬ gene Aram’ (1895); ‘Saul* (1907); and ‘Overture to a Greek Tragedy’ (1911).

BANTRY, Ireland, a seaport town in county Cork, 56 miles west-southwest of Cork. It consists of four principal streets and a spacious square, but the town generally has a mean appearance. It is a famous summer re¬ sort. It is at the head of Bantry Bay, where in 1796 a French fleet anchored and an abortive attempt was made to land. It has a growing trade in agricultural produce, and fishing is carried on to some extent. Pop. about 3,000.

BANTRY BAY, a deep inlet of Cork County, Ireland, remarkable both for its beauties and for its natural advantages, al¬ though the latter are turned to but little ac¬ count. It is about 25 miles long and from three to five miles wide, and is safe and com¬ modious for vessels of any size, the water being deep close to both shores, with a few rocks or shoals. A French force tried to land here in 1796. The entrance is guarded by Crow Head on the northwest and by Sheep’s Head on the southeast.

BANTU, ban’too, or ba-ntoo, the ethnologi¬ cal name of a virile and prolific group of Af¬ rican races dwelling below lat. 6° N., and in¬ cluding the Kaffirs, Zulus, Bechuanas, the tribes of the Loango, Kongo, etc., but not the Hot¬ tentots. Their birthplace has not been deter¬ mined; but they moved south from central Africa by way of the east coast. The tribal organization is by means of paramount and lesser chiefs, the one military and the other industrial. In the one case the chief is abso¬ lute ruler ; in the other his power is limited and he governs through a council of lesser chiefs and a general assembly of the tribes¬ men. The system of land tenure is on a com¬ munal basis. The tribes occupy settled dwell¬ ings ; certain articles of dress are worn ; and polygamy is recognized. The women perform most of the agricultural labor, and the men are hunters and herdsmen. They are skilful in wood and metal working, weave a coarse cloth from cotton

and are capable workers in pottery. Maize is the staple food. The term is also used to denote the homogeneous fam¬ ily of languages spoken in Africa throughout the vast region lying between Kamerun, Zanzi¬ bar and the Cape of Good Hope, with the ex¬ ception of the Hottentot, Bushmen and Pigmy enclaves. Ba-ntu, in almost all of these lan¬ guages, signifies “the people,” and hence is ap¬ plied to the whole linguistic family. The Bantu family, although divided into hundreds of dialects, is evidently derived from one

mother tongue. Consult Deniker, (Races of Man’ (London 1900).

BANU, ba’noo, or ban’noo, or BANNU, British India, a district in the Punjab; area 3,868 square miles ; pop. over 330,000. It is watered by the Indus, which here, during in¬ undations, becomes a vast body of water many miles wide. Nearly all the inhabitants are Mohammedans. Agriculture thrives, especially in the cultivation of the ordinary cereals, sugar-cane, cotton and various oil seeds.

BANVILLE, baii-vel, Theodore Faullain

de, French poet and novelist: b. Moulins, 14 March 1823; d. Paris, 13 March 1891. He was the son of a naval officer and went early in life to Paris, where he devoted himself exclu¬ sively to literature, contributed to many jour¬ nals and reviews and lived in close friendship with same o£ the foremost artists and men of letters of the day. First known as a poet through two volumes entitled cThe Cariatides’ (18429 and (The Stalactites) (1846), he es¬ tablished his reputation with the (Odes funam-bulesques) (1857), a sort of great lyrical parody published under the pseudonym Bracquemond, which immediately found great favor and was followed by (New Odes funam-bulesques> (1869, afterward reprinted as (Occidentales)) ; (Prussian Idyls’ (1871); (Thirty-six Merry Ballads) (1875), *etc.* As a poet he was one of the most amusing of lyrists, and from his acrobatic feats in differ¬ ent forms of metre has been called (<the king of rimes.® He has also another side. His swinging metres are reminiscent of the ana¬ creontics of Ronsard. His inspiration, how¬ ever, is purely

verbal. His adoption of old forms of verse, such as the ballads, rondeau and rondel, was followed by Austin Dobson and Andrew Lang. As a prose writer he is favorably known by a number of humorous and highly finished tales and sketches like (The Poor Mountebanks' (1853); (The Parisians of Paris' (1866); (Tales for Women' (1881); (The Soul of Paris' (1890), *etc.* Of consid¬ erable literary interest is (My Recollections' (1883). His <(Works" were published (8 vols.) 1873-78, and a posthumous volume, (Dernieres poesies.'

BANYAN, banyan, or ban-yan', or BAN-IANTREE (Ficus Benghalensis) , an East Indian tree of the natural order Urticacece, noted for the roots which descend from the branches and become accessory trunks, thus permitting the original tree to extend over a wide area. In the Calcutta botanical garden one specimen known to be upward of 100 years old has more than 3,000 small trunks, 230 that vary from two to three and one-half feet in di¬ ameter, and a main trunk 13 feet in diameter. Among these trunks 7,000 people could stand. The trees often attain a height of more than 70 feet. The leaves are ovate heart-shaped, five to six inches long; the inconspicuous axil¬ lary flowers are succeeded by cherry-like scar¬ let fruits which are eaten by monkeys. The seeds seldom germinate on the ground, but usually among the leaf bases of palms, the roots descending the palm trunks, embracing and finally killing them. As the banyan ages its original trunk dies and decays, leaving the younger trunks to support the life of the tree.

The Hindus ascribe various medicinal virtues to this tree, which they regard as sacred. Its light porous wood, its juice and its fruit have no important economic uses. Its close rela¬ tive, Ficus indie a, which does not root from the branches, is sometimes erroneously called the banyan-tree.

BANYUMAS, ban-yoo-mas' (Javanese, <(golden water"), Java, a residency and town situated on the south coast of the island. The area of the residency is 2,100 square miles and its population about 1,300,000. The chief culture is rice; but coffee, tea, sugar, indigo, cinnamon and other exotics are produced by corvee labor, as enforced by the Dutch in other parts o_f Java. The town and seat of the resi¬ dency is on the river Seraio, 22 miles inland It has a considerable trade and contains a population of about 6,500.

BANYUWANGY, ban' yoo-waii'ge, Java, the extreme eastern district of

the island, noted for its extensive coffee gardens and for the remarkably pure sulphur obtained from the Goonong-Marapi volcanic mountain. This is also the name of the capital of the district, an important seaport and Dutch military post, on the Strait of Bali, about 550 English miles east-southeast from Batavia. It has an exten¬ sive trade and an estimated population of

9,000.

BANZ, bants, once one of the richest and most famous of the Benedictine monasteries, on the right bank of the Main, three miles below Lichtenfels, Bavaria. Founded in 1071, and destroyed in the Peasants' War in 1525, it was rebuilt and although plundered again in the Thirty Years' War it gradually became* famed for the scientific attainments of its monks. In 1803 it was broken up and its li¬ brary and collections were divided between the Munich museum and other institutions.

BAOBAB, ba'6-bab (Adansonia digitata), a tree belonging to the family Bombacacece , which was named after the naturalist Adanson. It is also called the monkey-bread tree. The leaves are deep green and are divided into five unequal digitate lanceolate leaflets. This tree is a native of western and northern Africa; it is cultivated in many of the warmer parts of the world. It is one of the largest known trees, its trunk being sometimes not less than 30 feet in diameter. In Adanson's account of Senegal some calculations are made regarding the growth of this tree, founded on the evidence of the annular layers. The height of its trunk by no means corresponds with the thickness which it attains. Thus, according to bis calculations, at one year old its diameter is one inch ; and its height five inches ; at 32 years old it has attained a diameter of two feet, while its height is only 22 feet, and so on; till at 1,000 years old the baobab is 14 feet broad and 58 feet high ; and at 5.000 years the growth literally has so outstripped its perpen¬ dicular height that the trunk will be 30 feet in diameter and only 73 feet high. The roots, again, are of a most extraordinary length, so that in a tree with a stem 77 feet in girth the main branch or tap-root measures 110 feet in length. It often happens that the profusion of leaves and of drooping boughs almost hide the stem, and the whole forms a hemispherical

mass of verdure 140 to 150 feet in diameter and 60 to 70 feet high. The wood is pale-col¬ ored, light and soft, so that in Abyssinia the wild bees perforate it and lodge their honey in the hollow, which honey is considered the best in the country. The negroes on the western coast apply the trunks to a very extraordinary purpose. The tree is liable to be attacked by a fungus which, vegetating in the woody part without changing the color or appearance, de¬ stroys life and renders the part so attacked as soft as the pith of trees in general. Such trunks are then hollowed into chambers, and within these are suspended the dead bodies of those to whom are refused the honor of burial. There they become mummies, perfectly dry and well preserved, without further prep¬ aration or embalming, and are known by the name of quiriots. The baobab is emollient and mucilaginous ; the pulverized leaves constitute lalo, a favorite article with the natives, which they mix with their daily food to diminish ex¬ cessive perspiration, and which is even used by Europeans in fevers and diarrhoeas. The flow¬ ers are large, white and handsome ; and in their first expansion bear some resemblance to the white poppy, having snow-white petals and violet-colored stamens. Both flowers and fruit are pendent, and the leaves drop off before the periodical rains come on. The fruit is of an oblong shape, of considerable size, and tastes like gingerbread, with a pleasant acid flavor. The expressed juice, when mixed with sugar, forms a cooling drink much used in putrid fevers; this juice is generally used as a sea¬ soning for corn gruel and other food. The bark furnishes a strong fibre.

BAOUR-LORMIAN, ba-oor-lor-myaii, Louis Pierre Marie Francois, French poet and dramatist: b. Toulouse 1772; d. 1854. He first attracted wide notice through his (Poems of Ossian* (1801), an extremely clever imita¬ tion of Caledonian verse ; and afterward won success with a tragedy, (Omasis, or Joseph in Egypt* (1807). Other. works of his are (Po¬ litical and Moral Vigils* (1811), in the manner of Young; (Duranti or The League in the Province* (1828), a historical novel; and (Legends, Ballads and Fabliaux* (1829). But his best work is probably a poetical translation of the book of Job, completed after he had lost his eyesight.

BAPAUME, ba-pom, France, a town in the department of Pas-de-Calais, 12 miles south of Arras. Here, on 2 and 3 Jan. 1871, took place

two fierce struggles between the French army of the north and the Prussian army of observation; the French being de¬ feated with a loss of over 2,000. Bapaume fell into German hands early in the European War, but was reconquered by the British on 17 March 1917, an event that marked the close of the great battle of the Somme, begun in June 1916. The first to enter the recaptured town were the Australian troops, who cleared the streets and houses of the retreating enemies. The town had suffered severelv; hardly any of the houses were inhabitable. The civilians had left their homes over a year before. In the great offen¬ sive, which began on 21 March 1918, the town again fell to the Germans after very sanguinary fighting.

BAPFIOMET, the name of a mysterious image which the Knights Templars were charged with worshipping when the order was suppressed by Philip IV of France. It is prob¬ ably a corruption of Mahomet, and the charge may have arisen from the circumstance that some of the Templars had gone over to the Moslem faith. According to Von Hammer, the word signifies the baptism of Metis , or fire, and is connected with Gnostic rites. Consult Hallam's (Middle Ages.*

BAPTANODON, an extinct ichthyosaur or fish-lizard of the Jurassic period. Its re¬ mains have been found in the marine Jurassic shales of Wyoming and other Western States, which have hence been called <(Baptanodon Beds.** It is distinguished from the true ich¬ thyosaurus (q.v.) (found only in the Old World) by the form of the paddle-bones, which are rounded instead of polygonal, atid was incorrectly supposed to be toothless, as its name indicates. The skulls are two to three feet long, so that the entire animal probably measured 10 to 15 feet and resembled the ich¬ thyosaurus in proportions and habits.

BAPTISM (from the Greek baptizo, from baptizein , to immerse or dip), the application of water to a person as a sacrament or reli¬ gious rite. It is generally thought to have been usual with the Jews even before Christ, being administered to proselytes, but was probably nothing more than a ceremony of purification. From this baptism, however, that of John the Baptist differed, because he baptized Jews also as a symbol of the necessity of perfect purifi¬ cation from sin. Christ himself never baptized, but directed his disciples to administer this rite to converts (Matt, xxviii, 19) ; and baptism, therefore, became a religious ceremony among Christians, taking rank as a sacrament with all sects which acknowledge sacraments.

In the primitive Church the person to be baptized was immersed in a river or in a vessel, with the words which Christ had ordered, and a new name was generally bestowed at this time further to express the change. Sprinkling, or, as it was termed, clinic baptism, was used only in the case of the sick who could not leave their beds. The Greek Church and vari¬ ous Eastern sects retained the custom of im¬ mersion ; but the Western Church adopted or allowed the mode of baptism by pouring or sprinkling, since continued by most Protestants. This practice can be traced back certainly to the 3d century, before which its existence is disputed. Since the Reformation there have been various Protestant sects, called Baptists, holding that baptism should be administered only by immersion and to those who can make a personal profession of faith.

The Montanists in Africa baptized even the dead, and in Roman Catholic countries the practice of baptizing church bells — a custom of 10th century origin — continues to this day. Being an initiatory rite, baptism is, therefore, administered only once to the same person. The Roman and Greek Catholics consecrate the water of baptism, but Protestants do not. The act of baptism is accompanied only with the formula that the person is baptized in the name of the Father, Son and Holy Ghost; but among most Christians it is preceded by a confession

of faith made by the person to be baptized, if an adult, and by his parents or sponsors if he be a child.

The Roman Catholic form of baptism is far more elaborate than the Protestant. This Church holds that baptism is a sacrament which has the effect to remove in the individual the penal consequences of the sin of Adam, to re¬ store him to a state of . supernatural grace, and to give him a right to the beatific vision of God, remitting all actual sins committed by the in¬ dividual. It also imprints an indelible charac¬ ter, which is both an ornament to the soul and a capacity for receiving the other sacraments. The effect of the sacrament is produced ex opere operato ; that is, by an act of the Holy Ghost infallibly accompanying the performance of the external rite. Bishops, priests and dea¬ cons

are the ordinary ministers of baptism, and all others are forbidden to baptize except in case of necessity. Baptism is, however, valid when duly administered by any person, and any one may lawfully baptize in case of necessity. On the part of children and others who have never attained the use of reason no disposi¬ tions are required. In order to receive the sacrament validly a person who has the use of reason must know what he is doing and intend to receive baptism. In order to receive the grace of the sacrament he must have faith, and, if he has committed mortal sins, repentance ; otherwise the grace of the sacrament remains suspended until he acquires the proper disposi¬ tions. Besides sacramental baptism, called baptismum fluniinis, there are two substitutes which can supply its place, called, in a wide and im¬ proper sense, baptismum sanguinis and baptismum flaminis. The former of these is martyr¬ dom, the second is the desire of baptism, accompanied by faith and perfect contrition or the love of God. These only supply the place of baptism when it cannot be had, and confer sanctifying grace, but not an indelible charac¬ ter. Solemn baptism is accompanied with the application of chrism and holy oil, and several other ceremonies of great antiquity.

BAPTISM FOR THE DEAD, a cus¬ tom mentioned by Saint Paul in 1 Cor. xv, 29. It probably consisted in the vicarious baptism of a living Christian for a catechumen who bad died unbaptized, the latter being thereby accounted as baptized. It is doubtful if the custom was ever widely prevalent, and it seems to have soon died out in the Church, although kept alive by Marcionites and other heretics. It was forbidden by the Synod of Hippo (393). It is observed by the Mormons at the present day.

BAPTISM OF THE DEAD, a supersti¬ tious custom which anciently prevailed among the people of Africa of baptizing the dead. The third council of Carthage (Can. vi) speaks of it as a matter of which ignorant Christians were fond, and forbids ((to believe that the dead can be baptized. 55 Gregory Nazianzenus observes that the same superstitious opinion prevailed among some who delayed to be bap¬ tized. It is also mentioned by Philastrius as the general error of the Montanists, or Cata-phrygians, that they baptized men after death.

BAPTIST CHURCH OF CHRIST, The.

came into separate existence in Tennessee about the beginning of the 19th century as a

reaction against certain features of excessive Calvinism. General redemption and the per¬ severance of the saints form cardinal articles of their belief ; and the washing of feet is by them practised as an ordinance. Congrega¬ tions of the Baptist Church of Christ are found in Tennessee, their chief stronghold, Arkansas, Alabama, Mississippi, Missouri, North Carolina and Texas. In all there are about 150 churches with a total membership of over 8,000.

BAPTIST YOUNG PEOPLE'S UNION OF AMERICA, an association representing many young people's societies connected with the Baptist churches in the United States and Canada, organized June 1891 in Chicago, which place has since been its headquarters. Upon the formation of the Union, as the withdrawal of the Baptist societies was feared by the Christian Endeavor societies, a plan of federa¬ tion was adopted for the establishment of young people's societies over which no consti¬ tution should be required. Conventions are held yearly. Consult Bacon and Northrop, (Young People's Societies5 (New York 1900).

BAPTISTA, John, Carmelite poet : b. Mantua 1448; d. 1516. His poetical writings were well known throughout Europe during his ' lifetime ; their correctness of form and choice Latinity caused them to be used as texts in the schools. His greatest poem is (De Ca-lamitate Temporutn5 ((On the Evil of the Day5), and is divided into three parts.

BAPTISTERY, that part of the church, or a special building in which is administered the sacrament of baptism. In the earliest ages of Christianity the solemn administration of this sacrament was reserved to the bishop, and to the Episcopal church was generally an¬ nexed a special building called the baptistery. As the converts to Christianity increased, it became necessary to set aside for the baptis¬ mal ceremonies a small space within the main building of the various parish churches. The large baptisteries were generally circular or polygonal in form and were placed close to the cathedral church. Many were noted for their beautiful architectural forms. Northern Italy contains many fine examples, notably at Pisa, Parma, Florence, Cremona, Lucca, Siena, Bologna, Ascoli and elsewhere. Many of these are large buildings capable of holding great throngs of people. About the time of the Renaissance separate baptisteries ceased to be erected, baptismal fonts within the chinch tak¬ ing their place.

BAPTISTINES. (1) A religious order of women founded in 1744 in Genoa by Baptista Solimani. Their rule enjoined a strict fast throughout the entire year, the chanting of the office at midnight and

conversation with friends or relatives restricted to three times during the year. (2) A congregation of secular priests founded in 1755 by Dominic Olivieri and placed under the jurisdiction of the ‘Cardinal Prefect of the Propaganda by Pope Benedict XIV. The congregation ceased to exist at the end of the 18th century.

BAPTISTS, the name of a religious body that sprang from the Separatist movement in England. Though there were groups of Ana¬ baptists in England in the 16th century, they

were mostly of Dutch origin and made no per¬ manent impression on the English people. One wing of the English Puritans at length de¬ spaired of reforming the Church of England in accordance with their ideas, and decided that it was their duty to come out of that institution and establish a ((pure church,® i.e., consisting only of the regenerate. These early Separatists grew into the two modern denom¬ inations known as Congregationalists and Baptists.

From about 1593, groups of Separatists gathered in and about Gainsborough, in Lin¬ colnshire. About 1606, persecution drove them to Holland. Part of them, who had met at Scrooby Manor, went to Leyden, whence many afterward became the Pilgrims of the A4ay-flowcr, who established the colony of Plymouth in 1621. The Gainsborough group went to Amsterdam with their “teacher,® the Rev. John Smyth, who had been a clergyman of the Church of England and a lecturer in Lincoln in 1600. Here Smyth first became acquainted with the theology of Arminius, which he soon adopted, and with the Mennonites, whose re¬ jection of infant baptism seemed to him to be according to Scripture. He gave utterance to his new views in a tract called (The Character of the Beast* (1609), and 36 adherents joined him in establishing a new church on the prin¬ ciple of baptizing believers only. Smyth bap¬ tized himself and then his followers, and on this account he is often called the “Se-Baptist.® In 1611 members of this sect returned to Lon¬ don and established a church there ; similar churches were formed in other places, and these General Baptists (so called because they believed in a general or

universal atonement) increased rapidly. In 1644 their opponents esti¬ mated their numbers at 47 churches.

In 1616 a congregation of Separatists was gathered in Southwark, London, by Henry Jacob, a former minister of the Church of England. A peaceable division of this church took piace in 1633, a part going out to estab¬ lish a new church and receiving “a new bap¬ tism,® which probably meant a baptism on pro¬ fession of faith. In 1640 a further division occurred, and some of the new group became convinced that baptism should be immersion ;

• so they sent one of their number, Richard Blunt, to Holland, where he was immersed by a Mennonite minister at Rhynsberg, and on his return the members of this church were all immersed. In a few years this became the established practice of all the Baptist churches. In 1644 seven churches issued a “Confession of faith,® in which baptism was for the first time defined as “dipping or plunging the body under water.® This group of churches became known as Particular Baptists, because they in¬ sisted on the Calvinistic doctrine of an atone¬ ment for the elect only. This distinction of General and Particular Baptists became less significant with . the lapse of time, and ceased altogether with the formal union of the two bodies in 1891. Both groups were one in their advocacy of believers’ baptism and soul lib¬ erty. The Confession of 1644 was the first public document to assert liberty of conscience for all men, as “the tenderest thing unto all conscientious men, and most dear unto them, and without which all other liberties will not

be worth the naming, much less the enjoying.® The Revolution, just then beginning, was their opportunity. Baptists were uniformly on the side of Parliament, and several of them rose to high rank in Cromwell’s army, while their churches grew rapidly.

It was natural that they should experience their full share of persecution after the Res¬ toration, — long imprisonment, heavy fines and even death rewarded their devotion to civil and religious liberty. One of their preachers, John Bunyan (q.v.), was confined 12 years in Bedford jail for the crime of preaching the gospel, and employed his time in writing the immortal allegory of (Pilgrim’s Progress* (q.v.). The Revolution of 1688, and the adop¬ tion of the Toleration Act in the following year, removed from Baptists the worst of their disabilities, but their growth for a time was checked by the influence of Socinianism among the General Baptists and Hyper-Calvinism

among the Particular Baptists. Not until the Wesleyan revival of the 18th century awakened all England to new spiritual life and vigor did Baptists rise to their opportunities. A new era in their history is marked by the life and labors of William Carey (q.v.), who led the way in organizing the English Baptist Missionary So¬ ciety, in 1792, and he became its first mission¬ ary to India. This was the beginning of the great modern missionary movement among English-speaking Christians, with all that move¬ ment has accomplished for the progress of civilization, as well as of Christianity. One of the converts of the Wesleyan revival, Dan Taylor, established the "New Connexion of General Baptists® on an evangelical basis, and this body soon became strong and influential. English Baptists took a prominent part in the important modern Sunday-school movement. One of their number, William Fox (q.v.), be¬ gan, in 1783, the first school for teaching the Bible to children, and secured in 1785 the for¬ mation of the first "Society for Promoting Sunday-schools.® The demand for the Bible promoted by such study caused the formation of the British and Foreign Bible Society (1802), in which a Baptist minister, Rev. Thomas Hughes, was a leader and the first secretary.

The growth of English Baptists went on with rapid acceleration through the 19th cen¬ tury. Some of the best-known preachers of England were of their number — Robert Hall, Charles H. Spurgeon, Alexander Maclaren (qq.v.) The organization of the Baptist Union in 1832 marked a great advance in soli¬ darity, and gradually all the denominational societies have been either absorbed by it or affiliated with it. The Regents Park College (1817) and Spurgeon's Pastor's College (1856) have been followed by other institutions for the training of a ministry for the churches.

The first Baptist church in Wales was formed at Swansea, in 1649, by John Myles, and after the Restoration it emigrated in a body to Massachusetts. Vavasor Powell left the Church of England and became a Baptist about 1655, and aided in establishing some 20 churches in Wales. After the Act of Tolera¬ tion, Welsh Baptists increased rapidly; an as¬ sociation was formed in 1799, and the Baptist Union of Wales in 1867. The churches are

now more numerous than those oi any other denomination save the Wesleyans, and are mostly of the Calvinistic type. In Scotland the beginning of Baptists was still later, the first church having been formed in 1750. Though some preachers of notable power have risen among them, like Archibald McLean and the Haldane brothers, they have never made a con¬ siderable impression on the Scottish people.

From the beginning, the Baptist churches of Great Britain have been divided on the ques¬ tion of communion with other churches. Most of the early Calvinistic churches and part of the General Baptists insisted on “close® com¬ munion, the restriction of the ordinance to the baptized (immersed). Most of the Gen¬ eral Baptists and part of the Calvinistic favored “open® communion, or invitation to the eucharist of all Christian people, whether immersed or not. Many churches followed the “open® communion principle to its logical conclusion and admitted the unbaptized to membership also, thus forming what were known as “mixed® churches. The number of churches adopting the more “liberal® practices has been steadily increasing.

The number of Baptists in Great Britain in the last accessible report (1916) was: England, 1,997 churches, 264,923 members; Wales and Monmouthshire, 940 churches, 124,795 mem¬ bers; Scotland, 151 churches, 21,871 members; besides a few in Ireland, Isle of Man and the Channel Islands, bringing the total to 3,135 churches and 414,925 members.

Baptists in European countries have no historic connection with the Anabaptists of the Reformation period, but began in the 19th century with a mission to France (1832), a church of six members being formed in Paris in 1835. After the Revolution of 1848 there was freedom from persecution and opportunity of growth, and there has been gradual prog¬ ress, though slow. Before the European War, there were 41 churches, with 1,602 members reported. The lack of a school for the train¬ ing of a native ministry has been a great bar to the advance of French Baptists.

In Germany, the Baptist churches were the result of the conversion and labors of John Gerhardt Oncken, a native of Oldenburg (1800), who spent some years in England and was a colporter in his native land of the British Conti¬ nental Societ}’. He came to Baptist views of the Church and its ordinances from independent study of the Scriptures, without knowing that a people existed anywhere who held and prac¬ tised such principles. Professor Barnas Sears, of the Baptist

Theological Seminary at Hamil¬ ton, N. Y. (now the theological department of Colgate University), was pursuing studies in Germany; Oncken became aquainted with him and was by him immersed, together with six others, and the first Baptist church of Ham¬ burg was constituted. For some years Bap¬ tists were severely persecuted, but gradually were granted toleration, and have rapidly in¬ creased, until in 1916 they numbered 232 churches and 44,338 members. They have estab¬ lished missions in the surrounding countries: Austria, Belgium, Bulgaria, Denmark, Russia, Switzerland, which have been very successful. In Russia, especially, the Baptist missions have met with great success among the Stundists (q.v.), a large part of whom have adopted the

Baptist principles. Russian Baptists in 1916 numbered 839 churches and 60,295 members. With the granting of complete toleration in that country, there is every reason to expect that their development will prove remarkable. A Triennial Conference formed in 1849 unites the operations of the German churches and their missions (known since 1855 as the Ger¬ man Baptist Union). A theological school was established at Hamburg in 1880, which has given these churches a well-trained min¬ istry, and this fact has had much to do with their progress.

The Baptists of Sweden owe their origin to Gustaf W. Schroeder, a Swedish sailor, baptized at the Mariner's Baptist Church of New York in 1844, and Frederick O. Nilsson, also a converted sailor, baptized in 1847 by Oncken. The first church was so persecuted that most of them emigrated and settled in Minnesota. In 1861 Captain Schroeder built a meeting-house at Gothenburg, and Nilsson be¬ came its pastor; both were heavily fined for holding a religious service, but toleration was soon granted and several other churches were formed. In 1857, they organized a Conference, and in 1866 the Bethel Theological Seminary was established at Stockholm. American Bap¬ tists assisted in the erection of a new build¬ ing for this school in 1883, as they also did for the German school at Hamburg. Swedish Baptists were the first Christians to establish Sunday schools, Christian Endeavor Societies and other modern activities in their native land. They have also sent out missions to Norway and Finland, which have been very successful. In Sweden there are now 643 churches with 54,584 members; in Norway 39 churches and 3,588 members ; and in Finland 54 churches with 3,179 members.

Baptist missions have been established in other countries : Greece,

Spain, Italy. That in Greece was long ago abandoned, and only a mission in Italy by Southern Baptists is con¬ ducted at present. That began in 1870 in Rome, where a theological school is maintained, and up to the beginning of the European War flourishing missionary work was maintained in many parts of the kingdom. A strong and intelligent native ministry is rapidly develop¬ ing, and with the restoration of peace growth should be steady. There are now 46 churches and 1,362 members. Of all European Baptists it is true that their numbers have been con¬ stantly depleted by emigration, while member¬ ship of churches of the various races in Amer¬ ica has been correspondingly increased. The total numeration of the continental Baptists is : 2,098 churches and 202,682 members.

The first Baptist churches in Canada were the result either of emigration thither from the American colonies, or of missionary labors by American missionaries. From 1798 the formation of churches proceeded in both upper and lower Canada. At an even earlier date, Baptists were found in Nova Scotia, and the church at Horton was organized in 1778. A group of churches in the Ottawa Association were composed mainly of Scotch immigrants and among them were converts of the Hal¬ danes. Since 1846 the Baptist Convention of the Maritime Provinces has directed the activi¬ ties of the churches of Nova Scotia, New Brunswick and Prince Edward's Island; and

in 1888 various former societies were consoli¬ dated into the Baptist Convention of Ontario and Quebec. They maintain home and foreign missions and support their educational insti¬ tutions. Of these the most important are AlcMaster University, at Toronto, founded in 1880, and Acadia College, at YVolfville, N. S. In the great Western provinces of the Domin¬ ion, Canadian Baptists are discovering a fruit¬ ful field for their cultivation. They now num¬ ber: churches, 1,325; members, 137,922.

A Baptist church was organized in Sydney, N. S. W., in 1834, and since that time the work has extended to the principal towns of Australia, and to the adjacent colonies of Eng¬ land, Tasmania and

New Zealand. Besides the work among the white people, a mission is maintained among the Maoris. In the seven Australasian states there are now 344 Baptist churches, with 30,168 members. In other Eng¬ lish colonies, the institutions of religion have uniformly followed the flag and sometimes pre¬ ceded it. A church was formed in south Africa in 1820, which was the precursor of very fruitful labors, so that now there are 131 churches and 18,924 members. A Baptist church was established at Kingston in Jamaica, in 1816, and now in the West Indies there are 379 churches and 53,680 members.

Baptists in the United States. — 1. Before the formation of the General Convention. — Among the early settlers of the American colo¬ nies were some who were called <(Anabaptists, w but the first attempt to organize a church was made in the colony of Rhode Island, soon after its foundation (1638). Roger W illiams (q.v.), an English Puritan, educated at the Univer¬ sity of Cambridge, came to Massachusetts Bay in 1631 and was soon called to be minister of the church at Salem. He taught several things that were regarded as heresies, and was con¬ demned by the Gfcneral Court, 8 Oct. 1635, to be deported to England, chiefly because he denied the authority of the civil magistrate to punish other than civil offenses. He fled from the jurisdiction of the court, purchased some land from the Narragansett Indians and estab¬ lished the colony of Rhode Island, those who settled with him making a compact to obey the laws duly enacted ((only in civil things. » This was the first government in the world to be established on the basis of absolute religious liberty. Williams was joined by some of his Salem church, and from their study of the Scriptures they decided that baptism of in¬ fants is unwarranted. Williams was baptized by one of the number, Ezekiel Holliman, and then baptized the others, thus constituting a church of 12 members (March 1639). It is not quite certain how the baptism was admin¬ istered, but there is no record of a later change from affusion to immersion.

At about the same time a colony was begun at Newport, the leader of which was John Clarke, an English physician of Puritan tenden¬ cies. The church formed by them soon be¬ came, if it was not from the first, a Baptist church (the traditional date is 1644, but the early records have perished). A Welsh Bap¬ tist church emigrated in a body in 1663, and settled first at Rehoboth, then at Swansea. The Puritans looked with little favor on any others who came into their colony, and perse¬ cutions of the Baptists were frequent and

severe. John Clarke and Obadiah Holmes came from the Newport church and held a religious service in a private house at Lynn, for which they were sentenced to pay a heavy fine or be ((well whipped.® A friend paid Clarke's fine, but Holmes was whipped in the streets of Boston, 6 Sept. 1651. A Baptist church was formed in Boston in 1665, and its first minister, Thomas Goold, was several times imprisoned and treated with such severity that his health was undermined and he died in 1675. Other members of this church were likewise treated, and when, in 1678, a small meeting-house was built, by order of the General Court the doors were nailed up. A church formed in Kittery, Me., then part of the Massachusetts colonv. was so harassed that they removed in a body (17 members) to Charleston, S. C., where they established the first Baptist church in the South. Persecution continued until the charter of 1691, which granted <(liberty of conscience to all Christians except Papists.** Churches were gradually formed in the other New England colonies, but at the beginning of the Great Awakening (1740) there were but eight churches in Massachusetts, and hardly as many more in the rest of New England.

Another group of Baptist churches gathered about Philadelphia, the first being formed in 1688 at Pennepek (now within the city limits), while at the same time another church was organized at Middletown, N. J. Within the next decade a number of churches were estab¬ lished in New Jersey and about Philadelphia, which soon came into fraternal relations and held <(general meetings® with each church in turn. Out of this custom grew the first Asso¬ ciation (1707), a delegated body having no legislative or judicial authority over churches or ministers, but having in its care their com¬ mon interests and conducting their missionary and benevolent work. As Baptist churches became more numerous other associations were formed, but the Philadelphia was long the lead¬ ing body and is still one of the most influen¬ tial. The issue of a Confession of Faith in 1742, in the main a readoption of the Eng¬ lish Confession of 1688 (which was essentially the Westminster), determined the theological trend of American Baptists toward Calvinism, rather than Arminianism.

The Baptist churches fully participated in the spiritual results of the Great Awakening (q.v.), and in all the colonies they made rapid advance. In Massachusetts, for example, the number of churches grew in 40 years from 8 to 73, and of members from 200 to over 3,000. In the whole of New England, the increase was tenfold, and even more rapid growth was made in the _ South Atlantic States. Severe persecutions in Virginia did little to retard this advance, and after the Revolution progress was greatly accelerated. From this time puni¬ tive

laws were repealed in all the States, and gradually all forms of religious belief were placed on an equal legal footing. The principle of entire religious liberty, first embodied in law in the colony of Rhode Island, became the accepted principle of the Federal Constitution and was adopted soon in the various State Constitutions. This principle had been advo¬ cated consistently by English Baptists from their beginning, and its incorporation into the fundamental law of the United States has been

followed by practically every American country and is to-day recognized by European jurists and statesmen as the most important contribu¬ tion of modern times to political philosopny and the science of government. In 1906 France became the first European nation to adopt the same principle.

The settlement of the West after the Revolu¬ tion offered a great opportunity to the Baptists. The churches and associations of the older communities sent traveling preachers as mis¬ sionaries among the new settlements. Baptist churches were in many cases the first to be formed in the new States, and in all cases among the first. There are no trustworthy statistics, but an estimate generally accepted is that in 1800 there were 48 associations and 1,200 Baptist churches in all the States, with 100,000 members. The growth of Baptists dur¬ ing this early period far outstripped that of the population.

2. From the Foundation of the General Con¬ vention to the Division of the Denomination. — Up to this time the Baptist churches had little cohesion and no common enterprises. They were now led to unite in the work of foreign missions. In 1810 the American Board of Com¬ missioners for Foreign Missions had been formed, mainly by the Congregational churches of Massachusetts, and had sent several mis¬ sionaries to India, among them Adoniram Jud-son (q.v.) and his wife and Luther Rice. From study of the Scriptures they became convinced that only believers should be baptized, and that the apostolic baptism was immersion. So on their arrival at Calcutta they sought out Eng¬ lish Baptist missionaries and were immersed. This involved severance

of their relations with the Board that had sent them out ; so the Eng¬ lish Baptists assumed temporary support of the Judsons, and Luther Rice returned to interest American Baptists in this missionary enterprise. He quickly found churches in and about Boston to undertake the support of the Judsons; and then undertook a tour of the country and the enlistment in foreign missions of all Baptist churches. His labors were so extensive and successful that a convention of delegates representing Baptists of all States met at Philadelphia in May 1814 and formed the General Convention of the Baptist Denomi¬ nation in the United States for Foreign Missions. For a time the convention carried on home missions also, but in 1832 a separate American Baptist Home Mission Society (q.v.) was formed. A Tract Society begun at Washing¬ ton in 1824 was later removed to Philadelphia and grew into the American Baptist Publica¬ tion Society. These three national societies became the" great bond of unity between the churches — the only bond of unity possible un¬ der the congregational polity of Baptists, which insists on the independence of each church in its own affairs — by promoting cooperation in a common work. More than any other assign¬ able cause, this explains the remarkable growth of Baptists during the next three or four decades.

Next to this, the activity of Baptists in Sunday-school work is the kev to their prog¬ ress. The Sunday schools of Robert Raikes (q.v.) were secular schools; the first real Sun¬ day school, with the Bible as the textbook, was that of William Fox. In 1797 the Second

Baptist Church of Baltimore began such a school and alter 1800 Sunday schools increased rapidly. The progress of missions and Sun¬ day schools caused a great demand for the Bible, both in the English version and in trans¬ lations made by missionaries. This led to local societies for the circulation of the Scrip¬ tures, and at length to a national organization, the American Bible Society, formed in 1816 by representatives of evangelical denomina¬ tions. The refusal by the Society to print versions made by Baptist missionaries caused the holding of a convention in Philadelphia in 1837 and the forming of the American and Foreign Bible Society. A controversy in this body about the translation of the Bible into English was the origin of the American Bible Union, in 1850.

The unanimity of Baptists in these new enterprises was soon impaired. Violent oppo¬ sition was made to the Sunday schools, mis¬ sionary and Bible societies, and even to the Convention, as unscriptural.

Deeper still, as a cause of disunion, was the drift of the ma¬ jority of the churches away from the older extreme Calvinism, to which the minority re¬ mained attached. The result of agitation of these questions was division of the churches, a comparatively small minority withdrawing from cooperation with the others and forming the body since known by the various names of Old School, Primitive or (<Hard ShelD Bap¬ tists. • The churches of this order have shown little capacity of growth in the North, and many of them have become extinct ; but they are numerous and even flourishing in some South¬ ern States, especially in the mountainous parts of Tennessee and Georgia. There was another large secession of Baptists in the South and Southwest as a result of the movement led by Alexander Campbell and others, from 1815 to 1835, resulting in the establishment of the Disciples of Christ (q.v.). This did not se¬ riously affect the Baptists of the Middle and New England States, but they suffered almost equally from the agitation known as the Mil-lerite movement, which was the origin of the Adventists (q.v.).

In spite of all hindrances Baptists increased notably in numbers in the period we are con¬ sidering. They participated in the great re¬ vivals that characterized these years. At the beginning of the century, being one in 14 of the population, they came by 1845 to be one in six, having increased in members from 100,000 to 686,807, and in churches from 1,200 to 8,406.

3. From the Division in 1845 to the For¬ mation of the Northern Baptist Convention , 1907. — The controversy regarding slavery ef¬ fected schisms in nearly every religious body of the United States. From 1825 onward this became a subject of bitter debate everywhere, and could not be kept out of the meetings of religious societies, inasmuch as it was at bot¬ tom an ethical and religious question. Com¬ promises proved unworkable, and in May 1845 a convention representing the Baptist churches of the South met at Augusta, Ga., and formed the Southern Baptist Convention. The com¬ mon missionary enterprises were thencefor¬ ward carried on by various boards elected bv the Convention and responsible to it and

thence to the churches. This has proved to be a very compact, flexible and effective organiza¬ tion, much superior to that of the North. There the old Convention was transformed after the division into the American Baptist Missionary Union, and made an exclusively foreign mis¬ sionary society, and the Home Mission and Publication Society remained entirely inde¬ pendent. Three organizations instead of one proved *to be a complicated and expensive method of doing the business of the churches, besides introducing rivalry and confusion, which became worse rather than better as time went on. The two Bible societies further com¬ plicated matters, and at one time threatened another disruption, but a convention held at Saratoga in 1883 effected a settlement of the Bible question by recommending that the work abroad be done through the Missionary Union and that at home through the Publication Society.

During this third period Baptists have pros¬ pered in all their enterprises, but their most notable advance has been in educational work. They began before the Revolution to establish schools, Brown University having been opened in 1764, and a number of colleges and theo¬ logical schools were founded before 1850. Their combined endowments were small, prob¬ ably less than $500,000, and their students few. There are now (1919) 15 theological schools, with 1,449 students, property valued at over $3, 0(X), 000 and endowments of more . than $6,000,000; 102 institutions of collegiate grade, with 41,030 students, property valued at nearly $39,000,000 and endowments of over $42,000,- 000; besides academies to the number of 118, with 18,019 students, nearly $7,000,000 in prop¬ erty, but with endowments less than $2,000,000 — most of them having none whatever. These statistics do not include institutions like George Washington (formerly Columbian) University and the University of Chicago, founded by Baptists and largely endowed by them, which are not distinctively Baptist. The inclusion of such would about double the figures given above for property and endowment.

During this third period Baptists increased numerically much faster than the population, the latter increasing about three and one-third-fold, while Baptists increased sixfold. The statistics for 1917 report 1,986 associations, 51,248 churches and 6,197,686 members, or one to every 16 of the population, exclusive of the Territories. Of these 2,593,249 are Southern whites and 2,150,929 are negroes. The separate organizations of the latter were formed after the close of the Civil War, their first State convention being in North Carolina, in 1866, and their national convention having been organized in 1880.

The formation of the Northern Baptist Convention in 1907 was the result of agitation for the unifying of the work of Northern Baptists. It is a strictly delegated body from the churches, which elects the officers of the three missionary societies, supervises their work and controls their expenditures. In view of the legal obstacles to actual consolidation, this seems to be the most practicable method of securing unity. An annual budget is voted by the Convention and apportioned to the State conventions, thence to the associations

and finally to each church, which is expected to raise or surpass the sum suggested. The practical efficiency of this scheme has not yet been fully demonstrated. In 1910 the Free Baptists decided to merge their missionary work with-that of the Northern Baptists, which is as near an official union of the two bodies as the Baptist polity admits. The theo¬ logical and other differences between the two bodies long since virtually disappeared.

The advance of home and foreign missions has also been a marked feature of recent years. Until 1859 Baptist foreign missions were prac¬ tically confined to India and China. Since that time missions have been established in every Asiatic country, notably in Japan, and the scope of previous labors has been greatly widened. Since the United States acquired the Philippines a mission has been begun there. An already established African mission was taken over in 1884 and has been vigorously prosecuted. Southern Baptists, besides main¬ taining Asiatic missions, have evangelized some of the countries of South America. In Asia there are now 1,897 Baptist churches, with 213,647 members; in Africa, 131 churches and 18,924 members; and in South America 150 churches and 16,928 members. The contribu¬ tions for missions have doubled thrice, and now amount for Northern Baptists to $1,300,- 000, and for the Southern to nearly $700,000. In home missions, besides the usual evangeliz¬ ing agencies, a very important educational work among the Southern negroes has been conducted since the Civil War; 13 higher schools and 10 secondary schools are now maintained, at a cost of $130,000 a year. The work among foreign populations is also of much significance ; 356 missionaries and four teachers are engaged in it. The annual in¬ come for this work amounts to more than $1,000,000. A similar work is conducted by the Southern Baptists through a Home Mis¬ sion Board, with an expenditure of $387,000. There has been similar expansion in the work of the American Baptist Publication Society, which publishes 58,982,000 copies of Sunday school periodicals annually, and does a gen¬ eral publishing and bookselling business amounting to $321,000

additional. Besides this, it conducts Bible, colportage and mission¬ ary work, with an expenditure of over $600,- 000. The Sunday' School Board of the South¬ ern Baptists carries on similar work, with an¬ nual income of $474,000.

In all comparisons of Baptists with other religious bodies, only communicant members should be reckoned. Every Baptist member is necessarily a communicant, since a cardinal principle of all Baptists is that none should be baptized and become members of the Church except on their personal, intelligent profession of faith. However Baptists may differ on other points, they are a unit on this. They are also one in maintaining that baptism, as commanded by Christ and practised byˆ the apostles, was the immersion of such a pro¬ fessed believer. A third point in which they are united is that the Christian Church is a democracy, in which ((there is neither male nor female,® and that each church is independent of any external authority in its own affairs. From this they draw a corollary, which may

be reckoned a fourth common principle, that church and state should be absolutely sepa¬ rate. With regard to other matters they have differed so widely, that there are still in the United States at least 13 different varieties of Baptists that maintain separate organiza¬ tions. All but one of these, often called by way of distinction the ((regular® Baptists, are comparatively small in numbers, the whole not numbering more than 400,000 members.

The number of Baptists in the world, as reported for 1916, is: 61,335 churches, with 7,200,324 members.

Bibliography. — Vedder, H. C., (A Short History of the Baptists) (Philadelphia 1892; enlarged illustrated ed. 1907) ; Merriam, E. F., c History of American Baptist Missions) (ib. 1900) ; Newman, A. H., (History of the Bap¬ tist Churches in the United States) (New York 1898) ; id., (A Century of Baptist Achievement (Philadelphia 1901) ; Wright, M. E., Mission¬ ary Work of the Southern Baptist Convention (ib. 1902).

Henry Clay Vedder,

Professor of Church History , Crosier Theo¬ logical Seminary.

BAPTISTS, Freewill, originated in New Hampshire in 1780, as a strongly anti-Calvin- istic body. Benjamin Randall, a Congrega¬ tionalism left that body and advocated open communion. He was influenced in this step by the prominence given by the Methodists to various of the ideas advocated by him. Ran¬ dall's first Freewill Baptist Church was in New Durham, N. H. In 1841 the Free-Com- munion Baptists of New York State united with the Freewill Baptists. In 1870 the Free¬ will Baptists numbered about 60,000, and in 1895 over 86,000. For some years past they have been officially known as <(Free Baptists. ® In 1910 the Free Baptists and the Regular Baptists of the United States consolidated their missionary societies and work and made it possible for the local churches to unite, if they saw fit. In 1912 the Free Baptists had still 1,110 churches and over 65,000 adherents. The <(Original Freewill Baptists,® a distinct organization, similar to the General Baptists of England, date their origin from 1729. In 1912 they had 834 churches and over 57,000 members.

BAPTISTS, German Brethren* See Ger¬ man Baptist Brethren.

BAPTISTS, Old School or Primitive.

This body split off from the other Baptist de¬ nominations about 1835, though they them¬ selves claim to be the <(original Baptists.® They are opposed to the strong Calvinistic tendencies exhibited by others of the Baptist denominations, and do not countenance paid ministers, and consequently they do not main¬ tain theological seminaries, schools or col¬ leges. They have gradually lost their hold in the Middle States, where education has spread, but they still hold their own in the mountain¬ ous regions of Georgia, Tennessee and North Carolina. In all thev have nearly 3,000 churches and over 100,000 members.

BAPTISTS, Seventh-Day, who hold that

the command to observe the seventh day, the Jewish Sabbath, is incumbent upon all Chris¬ tians as well as Jews, date the foundation of vol. 3 — 15

their society back to 1676, when the first church of the denomination was opened in London by Francis Bampfield, prebendary of Exeter

Cathedral. Since then various churches professing the same views as Bampfield have come into existence and several of them have disappeared. The original society is still active. The first church of the Seventh-Day Baptists was founded at Newport, R. I., in 1671 by Ste¬ phen Mumford. Although this latter is older than the English by a few years it does not appear that the one grew out of the other. The American society, which has its missionary headquarters at Westerly, R. I., is active in missionary work and maintains a publishing house at Plainfield, N. J. ; an academy at Salem, W. Va., and two colleges, one at Mil-ton, Wis., and the other at Alfred Centre, N. Y. The 96 churches and more than 8,000 members of the American society are scattered over 24 States.

BAPTISTS, Sixth-Principle, believe that the laying-on of hands is an indispensable or¬ dinance of the Church of Christ. They are a survival of the General Baptists who early made their appearance in Connecticut and Rhode Island. In 1917 the Society had less than 1,000 members.

BAPTISTS, Two-Seed-in-the-Spirit, had

their origin in the preaching and ultra-Calvin- istic doctrines of Daniel Parker, a Baptist elder and preacher of Tennessee. Parker, who was ordained in 1806 in Tennessee, became one of the strongest opponents of the organized work of the Church. In 1817 he moved to Illi¬ nois, where he continued his opposition to the work and organization of the regular Church for 19 years. Later he went to Texas. In va¬ rious pamphlets (1826-29) Parker made public some very peculiar theories he held concerning the introduction and perpetuation of evil in the human race. According to these beliefs, God, when He created Adam and Eve, infused into them particles of Himself, thus making them altogether good ; the devil corrupted them by infusing into them particles of him¬ self. Eve, by predestination, brought forth a certain number of good and a certain number of bad offsprings; and all her daughters after her were predestined to do likewise. The atonement, according to Parker, applies only to those born of the good seed, those born of the bad being absolutely lost. This Baptist sect is uncompromisingly opposed to <(all hu¬ man institutions.® They are found in 21 States and have nearly 500 churches and nearly 13,000 members.

BAPTISTS. United, were so-called after the union of the Regular and Separate Bap¬ tists in Kentucky in 1801. They departed, somewhat from the strictly Calvinistic prin¬ ciples laid down by other denominations. The latest census gives the United Baptists 196

churches in Kentucky, Tennessee, Missouri, Alabama and Arkansas with a membership of about 13,000. At one time the Association was much stronger than it is now ; but the union of many of the United Baptist churches with other Baptist denominations weakened them greatly.

BAR. In heraldry, one of the charges known as ordinaries. It is formed by two

horizontal lines passing over the shield and occupying one-fifth of the surface.

In hydrography , a barrier of sand in the channel of a river or along the seacoast. Riv¬ ers are constantly engaged in the transporta¬ tion of sediment seaward, and whenever the current is checked the suspended material sinks and accumulates along the bottom. Bars thus formed may disappear during periods of floods when the water gains increased velocity, and they frequently change their position with slight alterations in the course of the current. Sand¬ bars are also common at the mouths of rivers where the flow of the water, and therefore its transporting power, is lessened before entering the sea. The precipitation of the sediment is assisted in this case by the mingling of the fresh and saline water. The formation of such bars does not differ from that of a delta. The transporting action of currents and waves sometimes builds up a long line of bars or reefs along the seacoast, as is seen on the At¬ lantic and Gulf shores of the United States. See Reef.

In law , a word having several meanings ; thus, it is the term used to signify an enclosure or fixed place in a court of justice where law¬ yers may plead. In English superior courts king's counsel are admitted within the bar; other members of the bar sit or stand outside. A railed-off space within the Houses of Lords and Commons is similarly called the bar. The dock, or enclosed space, where accused persons stand or sit during their trial is also called the bar ; hence the expression ((prisoner at the bar." It has also a general meaning in legal proced¬

ure, signifying something by way of stoppage or prevention. There is also a trial at bar — that is, a trial before the judges of a particular court, who sit together for that purpose in banc. The term is used both in England and the United States as a synonym for the legal profession.

In music, a line drawn vertically across the staff, for the purpose of dividing the music into equal measures of time. The term is very often improperly applied to measures them¬ selves. The quantity of time included between two bars varies as the time is triple or common, the former being equivalent to three crotchets and the latter to four. The thick bar at the end of a piece of music is called the double bar. Bars were first used about the middle of the 15th century. See Measure.

BAR, Karl Ludwig von, German jurist: b. Hanover 1836; d. 21 Aug. 1913. He was trained in the universities of Gottingen and Berlin, and sat in the Reichstag 1890-93. He was a strong advocate of publicity as well as of more humane procedure in all criminal trials. Sometime professor at Gottingen and a member of The Hague tribunal, Dr. Bar ac¬ quired a world-wide reputation as a high au¬ thority on international law and a leading advocate of international arbitration. Import¬ ant works by him are (Das Internationale Privat und StrafrechH (1862) ; (Die Redefrei-heit der Mitglieder gezetzgebender Versamm-lungen) (1868); (Die Lehre vom Kausalzu-sammenhange im Rechte) (1871) ; (Das Deutsche • ReichsgerichH (1875) ; (Staat und Katholische Kirche in Preussen) (1883).

BAR, Ukrainia, a town in the government of Podolia ; so called after the birthplace of its foundress, Bona Sforza, the wife of King Sigismund I of Poland. It is famous as the place where a confederation of the Polish people was held with a view to combating the Russian in¬ fluence and the adherents of Russia in Poland, 29 Feb. 1768. The Russians took Bar by storm on the following 28 May, together with 1,400 men and 20 pieces of cannon. Eleven fairs are annually held here. Leather-dressing, dis¬ tilling, brick-making and a trade in grain are carried on. Pop. about 13,000..

BAR HARBOR, Me., a popular summer resort in Eden township, Hancock County, Me., on the east shore of Mount Desert Island. It is on a branch of the Maine Central Rail¬ road and is also served by steamship lines from New York, Boston, Portland and other Atlan¬ tic coast ports. The ocean here is often too cold for bathing, even in summer, and a large open-air sea-water swimming pool serves as a

substitute. There is a naval coaling station on the north shore of Eastern Bay, and Bar Har¬ bor is frequently the rendezvous in summer of the north Atlantic squadron of the United States navy. It derives its name from a sandy bar which connects Mount Desert with the largest of the Porcupine group. The surround¬ ing scenery is very pleasing, and within a short distance are many points of interest readily accessible to the tourist. Among these are the summit of Green Mountain, Eagle Lake, Mount Newport, Kebo, The Ovens, Great and Schooner Heads, Spouting Horn, Thunder Cave and Eagle Cliff. First discovered by Champlain, Mount -Desert was settled in 1608 by French Jesuits, whose colony was destroyed eight years later by an expedition from Vir¬ ginia. A permanent settlement was effected by the English in 1761. The town of Mount Desert was incorporated in 1789. Since that date the towns of Eden, Cranberry, Tremont and Southwest Harbor have been formed from the original tract. Consult Street, (Mount Desert: A History } (1905). Pop. (1920) 4,441.

BAR-LE-DUC, bar-le-duk, or BAR-SUR- ORNAIN, ba r-siir-ornaii, France, capital of the department of Meuse, 125 miles east by south from Paris. It consists of an upper and a lower town, the former of which commands a fine view. The lower town extends into the valley traversed by the Ornain, here crossed by three stone bridges. The ancient Church of Saint Etienne is of 14th century workmanship; the ruined castle commanded the entrance into Lorraine. The streets are wide and well laid out, but the public buildings are inferior. The chief manufactures are textiles and paper, and there are foundries. The preserved fruits and confectionery, as well as the wines of Bar-le- duc, are in repute. Pop. 17,068.

BAR SHOT, a double-headed shot, made of two half-balls connected by a bar, and formerly used in naval battles for cutting away the masts and rigging of the enemy's ship.

BAR-SUR-AUBE, bar-siir-ob, France, a town 34 miles east of Troyes, in the depart¬ ment of Aube, notable as the scene of a victory of the allied forces commanded by Schwarzenberg over the French, commanded by Macdon¬ ald and Oudinot, 27 Feb. 1814. The council

which decided the plan of campaign of the Allies was held here the day before the battle. It is an ill-built, ancient town, numerous old coins and urns attesting that the Romans must have had a station here. Bar-sur-Aube was destroyed by the Huns in the 5th century, but was rebuilt soon after, when it became a place of commercial importance. A chapel on the bridge over the Aube marks the spot from which the Bastard of Bourbon was hurled into the river by command of Charles VII in 1441. The leading manufactures include leather, flour and agricultural implements, and there is a trade in grain, wine and wool. Pop. 4,533.

BAR-SUR-SEINE, bar-siir-san, France, an ancient town in the department of Aube, pleasantly situated on the left bank of the Seine, 21 miles by rail southeast of Troyes. The river is crossed here by a double bridge. It is notable as the scene of a victory of the allied forces over the French, in March 1814. Pop. about 3,300.

BARABA, ba-ra-ba' or BARABA-TAR- TAR, a steppe of Siberia, in the government of Tomsk, occupying more than 100,000 square miles. Covered with salt lakes and marshes, it was colonized in 1730 by the Russians, who have since cultivated parts of it.

BARABAS, ba-rab'as, the principal person¬ age in Marlowe's tragedy, (The Jew of Malta. }

BARABBAS, the robber released by Pilate at the Passover when Jesus was condemned to death. It was a custom of the Roman govern¬ ment, for the sake of conciliating the Jews, to release one Jewish prisoner, whom they might choose, at the yearly Passover. Pilate desired thus to release Jesus, but the Jews demanded Barabbas (Matt, xxvii, 16-26).

BARABBAS: A DREAM OF THE WORLD'S TRAGEDY, a romance by Marie Corelli. It is the story of the last days of Christ, his betrayal, crucifixion and resurrec¬ tion. The story is dramatically told, florid in style and appeals more to the emotions than to the reason.

BARABINSKI, a Tartar tribe living on the banks of the river Irtish, and engaged in pastoral and agricultural pursuits. Their re¬ ligion is Shamanistic, but Christianity has made some progress among them.

BARABOO, bar'a-boo, Wis., city and county-seat of Sauk County, on the Baraboo River, and the Chicago & N. W. Railroad, 40 miles northwest of Madison and three miles from Devil's Lake. Settled in

1839 in the cen¬ tre of a scenic and agricultural region, it has important manufacturing interests, which are promoted by excellent water power; is a noted fruit centre; and has a national bank, city hall, waterworks, electric light, gas works, daily, weekly and monthly periodicals. It is gov¬ erned, under an incorporation charter of 1882, by a mayor, elected biennially, and a municipal council. Pop. (1920) 5,538.

BARABRA, ba-ra'bra, Africa, a mixed ethnic group — Nubian, Egyptian and Arab — living on both sides of the middle Nile, from Wady Haifa to Assouan. They are about 40,- 000 in number, and are believed to belong to the same stock as the ancient Egyptians.

BARACOA, ba-ra-ko'a, Cuba, a seaport near the eastern end of the island, in the prov¬ ince of Santiago de Cuba, about 90 miles east by north of Santiago. It has a landlocked har¬ bor and exports cocoa, bananas and other tropi¬ cal fruits. The industries include the making of oil from the cocoanut and the manufacture of chocolate. The first settlement of white men on the island of Cuba was made here by Velasquez in 1511. This town was the capital of Cuba from 1518 to 1522. Near it is the mountain noted as the ((Anvil of Baracoa.® In the vicinity Maceo and his men began in 1895 the struggle for Cuban independence. Pop. about 6,000.

BARADA, ba-ra'da, the Abana of the Bible, a river of Syria, rising in the Anti-Libanus and flowing across the plain to the east past Da¬ mascus. It loses itself in a lake called Bahret-el-Ateibeh. Around Damascus its waters are used for irrigation by means of canals.

BARAGA, bar'a-ga, Frederic, Austrian Ro¬ man Catholic prelate and missionary: b. Tref-fen, Carniola, 29 June 1797 ; d. Marquette, Mich., 19 Jan. 1868. He came to the United States in 1830 and spent the rest of his life among the Chippewa and Ottawa Indians in Michigan. His Chippewa grammar (1851) and Chippewa dictionary (1851-53) are of philo¬ logical importance, and he was also the author of a work in German on the (History, Charac¬ ter, Manners and Habits of the North Ameri¬ can Indians) (1837).

BARAGUAY D'HILLIERS, ba-ra-ga-de- ya, Achille, Count, marshal of France: b. Paris 1795; d. 1878. He was the son of Louis Baraguay d'Hilliers (q.v.). In 1830 he took part in the expedition to Algeria, in which his success gained him the confidence of the gov¬ ernment, which created him a lieutenant-gen¬ eral. In 1841 he was made

governor-general of Algeria. On the fall of Louis Philippe in the revolution of 1848 the provisional govern¬ ment appointed him to the command of the military division of Besanqon. He replaced Changarnier in the command of the army of Paris, and concurred in the accomplishment of the coup d'etat on 2 Dec. 1851. In the war with Russia in 1854 Baraguay d'Hilliers was commander-in-chief of the Baltic expedition, and for his services received the dignity of marshal of France, and later was nominated a senator. He took an active part in the cam¬ paign of 1859, when France leagued with Sar¬ dinia to free Italy from Austrian domination.

BARAGUAY D'HILLIERS, Louis,

French general: b. Paris 1764; d. Berlin, 6 Jan. 1813. Receiving an appointment in the army of Italy from Napoleon, he shared all the success of the campaign of 1796-97. Made general of division and commandant of Venice, in 1798, he accompanied the expedition to Egypt ; and afterward successively held ap¬ pointments on the Rhine, in the Tyrol and in Catalonia. He commanded a division in the Russian campaign of 1812, but during the re¬ treat incurred the displeasure of Napoleon and appears to have died from chagrin and dis¬ appointment.

BARAK ((<Lightning Flash®), son of Abi-noam, was the ally of Deborah in the struggle against the Canaanites. He led 10,000 men of

Naphtali and Zebulun in the direction of Mount Tabor while Deborah undertook to at¬ tract Sisera's army toward the same place. Barak routed the Canaanites and pursued them to Harosheth, where he and Deborah sang the (Ode of Triumph. 5 Barak seems to have been a representative Jewish leader of his time. The name Barak is met with in various forms in cognate languages ; Baraous, for example, was the surname of Hamilcar. See Deborah.

BARANOFF, Alexander Andreevich,

Russian explorer and merchant : b. Kargopol 1747 ; d. 16 April 1819. A merchant and manufac¬ turer in Irkutsk, Siberia, in 1780, he became manager of the colony previously founded on Three Saints Bay, Kodiak Island, Alaska, in 1791, but soon afterward taking charge he transferred the trading post to Saint Paul's Harbor, Kodiak Island, and established posts in Cook Inlet and in Prince William Sound. At Vosressensky Harbor, now Resurrection Bay, in 1794, he built the first ship constructed north of Vancouver Island on the northwest coast of America. In 1796 he placed a colony at Yakutat Bay. Upon the organization of the Russian American Company, in 1799, he was made chief manager, and his jurisdiction in¬ cluded all of Alaska, the Aleutian Islands and the Kurile Islands. In this year he established a post at Old Sitka, on the west side of Baranof Island, which was destroyed by the In¬ dians in 1802. In 1804 he drove the Indians from the site of the present town of Sitka, built a fortified post and named it New Arch¬ angel, to which he transferred the headquar¬ ters of the company. During Baranov's ad¬ ministration of the affairs of the company it maintained trading posts only along the south¬ ern part of Alaska, from Sitka to Unalaska, including the Chugatch Gulf (Prince William Sound), and the Gulf of Kenai (Cook Inlet). They traded as far north as the Bristol Bay region and took seals on the Pribylof Islands, but had no settlements north of those places. In 1812 he placed a fort at Ross, near Bodega Bay, California, and also maintained a station on the Farallon Islands for several years. He extended the commerce of the company to the Spanish settlements in California, to the Sand¬ wich (Hawaiian) Islands and to China. His administration of the affairs of the company closed in 1818, and in November of that year sailed for Russia by way of the Cape of Good Hope. The ship was detained at Ba¬ tavia, Java, where Baranoff fell ill of a fever, and a few days after leaving that port he died and was buried in the Straits of Sunda.

BARANOFF ISLAND, the most impor¬ tant of the Alexander Islands, Alaska. It is about 100 miles long and 25 miles broad. On its northwest coast is the town of Sitka. The island derives its name from the Russian trader, Baranoff, who in 1799 took possession of it.

BARANTE, ba -rant, Amable Guillaume Prosper Brugiere, Baron de, French historian and statesman: b. Riom, Auvergne, 10 June 1782; d. 23 Nov. 1866. After filling some sub¬ ordinate offices he was appointed in 1809 pre¬ fect of La Vendee. In this year was pub¬ lished his (Tableau de la Litterature Frangaise

au XVIIIe SieclеP In 1815 Louis XVIII made Barante Secretary of the

Ministry of the Interior, and about the same time he took his seat in the Chamber of Deputies, where he voted with the Moderate Liberals. In 1819 he was raised to the Chamber of Peers. His principal work, (Histoire des Dues de Bour¬ gogne de la Maison de Valois, 1364 — 1477 J (1824-28), secured his election to the Academy in 1828. Between 1830 and 1840 he represented France at Turin and Saint Petersburg, but after the revolution of 1848 he devoted himself en¬ tirely to literary pursuits. Other works of his are (Histoire de la Conventional (1851-53); ˆHistoire du Directoire) (1855) ; (Etudes Historiques et Biographiques) ; (Etudes Litteraires et Historiques> (1858). Consult also (Souvenirs du Baron de Barante5 (1890-99).

BARANTZEVICH, Kazimir Stanislavo¬ vich, Russian man of letters : b. Saint Peters¬ burg 1851. His father was a descendant of a noble Polish family and his mother was French. At the time of the Polish insurrection (1831), Barantzevich's grandfather was hung in the presence of his wife and two sons, but the tradition of revenge was not maintained by either the father of the author or any member of the family. Barantzevich's taste for books was created in him by his own father, who taught him to read and write at the age of five. When the author was eight years old he read eagerly Pushkin's (Syn Otechestva5 ((The Son of the Country5) and under the inspira¬ tion received from that classic wrote, a year later, his first essay, (Pon'atovski,5 glorifying the deeds of a Polish hero who opposed the aggression of the Russian armies. Before he entered the gymnasium he had read a great number of good books in various languages. But the subjects taught in the school inter¬ ested him in a very small degree and he left the classroom in the fourth year. At that time appeared his poem, (Zabytaya Dyerevnya) ((Forsaken Village5), which, although ob¬ viously a mere imitation of Nekrasov, earned for him a remarkable popularity among the peasantry whose close friend he wished to be¬ come despite the tradition of his aristocratic family. When his father died he fell into dire poverty and was obliged to work for his liv¬ ing from morning till late at night. However, despite all these strenuous efforts, he adapted A. Tolstoy's (Prince SerebranyP into a drama (Oprichina5 (Life-Guards) which was pro¬ duced successfully and which brought to the author an honorarium of 600 rubles. When his mother died he saw no obstacle in marry¬ ing his lowly but beautiful fiancee, Dara Niko¬ laevna Alekseeva. This marriage and the birth of a child increased the author's burden and the family was obliged to live in the house of a drunken train conductor. It was here that he wrote (Odin iz nashih starih znako-myh) ((One of our old acquaintances5) • But fame came to him from his novel, (Porvannyia Strunv5 ((Broken Strings5), and almost all first-class magazines urged

him to contribute to their columns, which he did most success¬ fully. In a series of remarkable short stories OUnder Oppression,5 (The Old and the New,5 (Short Stories5) and his separately published novels, (Raba5 UBondmaid5) and (Chuzhak5 ((Stranger5) he has given powerful sketches of

the life of the lowly plebeians which bear the seal of his own struggle in life. The society of Petrograd has not been known to him in¬ timately enough to describe its life with exactitude and his cardinal errors are uni¬ formity of types and absence of intrigue. Man and his soul form the principal subject of his work, and, while his elaboration could be, and often is, surpassed from the artistic point of view, his stories have thrilled and elevated the souls of his readers as much as anything that has been written in Russian in the course of the last century.

BARASINGHA, bar-a-sm'ga. See Swamp-Deer.

BARATARIA, Pirates of, a company of outlaws under the leadership of a notorious bandit, Jean Lafitte, who established their ren¬ dezvous in the Bay of Barataria, 40 miles south of New Orleans. They committed great depredations on English and Spanish shipping, but their colony was broken up in 1814 by a United States naval force. Lafitte and some of his men subsequently served under Jackson in the battle of New Orleans.

BARATARIA BAY, a body of water in the southeastern part of Louisiana, extending north from the Gulf of Mexico, between the parishes of Jefferson and Plaquemine. It is about 15 miles long by six wide, and it and the lagoons branching out of it were rendered no¬ torious about the years 1810-12 as being both the headquarters and rendezvous of the cele¬ brated Lafitte and his buccaneers. See New

Orleans, Campaign and Battle of.

BARATHRON, the name of a deep gorge near Athens, into which criminals condemned to death were thrown. It was originally a quarry, but was enlarged in order to serve for purposes of punishment. Usually persons were thrown into it after execution, but occasionally while living.

BARATIERI, ba-ra-tya're, Oreste, Ital¬ ian general: b. Condino 184i ; d. 1901. He fought under Garibaldi in Sicily in 1860 and joined the regular army in 1866. He was ap¬ pointed in 1891 governor of Eritrea, Italy's new possession on the Abyssinian coastland of Africa. Under the schemes of conquest enter¬ tained by the Italians Baratieri advanced with an army into the highlands of the interior, cap¬ turing Kassala in 1894, and later marching into Tigre, whose prince he twice defeated in Jan¬ uary 1895. King Menelik's forces to the num¬ ber of 100,000 were now sent against Baratieri, who was obliged in consequence to retreat from Adowa, the capital of Tigre, in the direc¬ tion of Adigrat. Demoralization of the Ital¬ ians becoming evident, Baratieri, fearing it might become general and hamper his retreat, determined to risk all on a battle with the Abyssinians, and once more turned his forces on Adowa. On 1 March 1896 the battle was fought near Adowa, the Italians were routed with a loss of 250 officers, 7,000 men and all their artillery. Baratieri was court-martialed and was absolved of criminal responsibility but was censured for his conduct of the cam¬ paign, and left the army. He published his (Memo;re dAfrica 1892-96) in 1897 as a de¬ fense of his method,

BARATYNSKII (properly Boratynskii), Evgenii Abramovich, Russian poet : b. 10 Feb. 1800; d. 29 June 1844. He was educated in the page-corps, from which he was expelled in 1816. Later (1820) he joined an infantry regi¬ ment in Finland, where he became an officer. In 1825 he married, retired from military serv¬ ice and traveled extensively through Germany, France and Italy. He started writing poetry very early in life and had the good fortune to become intimately connected with Pushkin, Gnedich, Pletnevyi and other young and gifted poets whose friendship undoubtedly influenced the development and direction of his talent. His lyric poems soon gained him a prominent place in the number of Pushkin's poetic circle of the so-called ˆromanticists.® In the midst of the savage nature of Finland the romantic nature of the poet grew more powerful, but the predominant quality of his poetry is the elegiac tone, especially in his (Eda) (1826). This poem was soon followed by (Ball,) (Or-gie,* ˆypsy-Girip in which

the poet excels in original simplicity, choice of figures and lively colors, but in which he shows the pow¬ erful influence of Pushkin and Byron. With regard to technique he is a true master of form and rhyme and some enthusiasts have placed him much higher than Pushkin himself as a versifier. But the main characteristic of his poetry is meditation and absence of true emo¬ tion, the chief requisite for a true master¬ piece in lyricism ; in his poetry there is no trace of that sentimentality that is so abun¬ dant in the work of his models. As a thinker he is destitute of the definite and his charac¬ ters are but shadows in a mirror which leave no deep impression despite their exquisite ex¬ terior form. The best of his lyrics are un¬ doubtedly (Finlandˆ (The Last Poet) and (On the Death of Goethe. 5 A collective edition of his works appeared for the first time in 1827 (2d ed., Moscow 1835), from which many Ger¬ man and French translations have been made. Consult (Russki Arkhiv) (1868, pp. 141-47 and 866-72) ; Koenig, (Litterarische Bilder aus RusslandP

BARB, a horse of the Barbary breed, in¬ troduced by the Moors into Spain, and of great speed, endurance and docility. This breed is said to be a variety of the Arabian, and most of the progenitors of the present thoroughbred horse were of the same strain.

BARBACAN, or BARBICAN, a project¬ ing watch tower or other advanced work be¬ fore the gate of a castle or fortified town. The term barbacan was more especially applied to the outwork intended to defend the draw¬ bridge, which in modern fortifications is called the tete du pont. At the castles of Warwick and Alnwick the mediaeval barbacans still re¬ main, but the barbican gate at York is almost entirely of modern construction.

BARBACENA, bar-ba-sa-‘na, Brazil, a flourishing town in the state of Minas-Geraes, 125 miles northwest of Rio de Janeiro. It is situated in the Mantiqueira Mountains, about 3.500 feet above the sea, and the surrounding district produces cane sugar, coffee and grain. The town is a commercial centre, being the outlet for the product of mines iu the district, but much of its importance has been lost with

the development of transportation facilities. Barbacena is noted for its healthfulness and is a nopular resort. Pop. 6,000.

BARBADOS, bar-ba'-doz, an island of the West Indies, lying in the Atlantic Ocean more than 100 miles east of the nearest members of the chain of Lesser Antilles, in lat. 13° 4' N. and long. 59° 37' W. (See Antilles). The entire area of the island available for the pur¬ pose — or 100,000 acres out of a total acreage of 106,470 (about 166 square miles) — is under cultivation. Some of the white inhabitants are of the best English stock, being descendants of early settlers who were closely allied by the bond of blood or ties of friendship with the colonists of Virginia. The only foreign journey ever taken by George W ashington was in 1751 (28 September-22 December), when he visited this island in company with his invalid brother, Lawrence. The rainfall is abundant, and the climate agreeable, thanks to trade-winds blowing steadily across the Atlantic. Barba¬ dos is a colony of England, with its own gov¬ ernor, legislature, *etc.* In addition to many lesser educational institutions, the island has Codrington College, which is affiliated with the University of Durham, England. Its capital, Bridgetown, hot, dusty and commercially active, is also the see of the bishop of Barbados. There is one narrow-gauge railway, and the highwaj'S are excellent. The chief industry is the cultivation of sugar-cane, to which the soil is peculiarly adapted. The successful manu¬ facture of sugar in the island began about the middle of the 17th century. The Sea Island cotton industry was revived in 1902 with suc¬ cess, and the acreage under this form of culti¬ vation amounts to nearly 2,000 acres, from which 900,000 pounds of "lint® are raised. Food supplies are imported largely from the United States, to which country nearly the en¬ tire sugar product is sent. The value of the annual exports is about $4,000,000; of the aver¬ age annual imports about $6,000,000. Like Guadeloupe and its dependencies, and Desirade and Maria Galante, Barbados is a coral island. Its length is 21 miles, and its width 15 miles. The interesting Socket Guide) states that Bar¬ bados is "undoubtedly the healthiest of all the West Indian islands. On the windward side the climate is especially invigorating, and the island is much patronized by residents in neigh¬ boring colonies as a health resort. The birth¬ rate is about 36 and the normal death-rate not more than 26 per thousand.® The island has "representative institutions without responsible government. They date from the royal charter of Charles I, 2 June 1627. Next to the house of commons and the house of assembly in Bermuda, the Barbados house of assembly is the most ancient legislative body in the British dominions. The government now consists of a nominated legislative council, a house of assembly, consisting of 24 members

elected annually by the people ; an executive council, which consists of the governor, the colonial secretary and the attorney-general ex officio, and such other persons as may be nominated by the King; and an executive committee.® Steamships of at least 14 companies serve the island. Ober (see Bibliography) wrote in praise of Codrington College: “This famous university, the only one of its class in the Brit¬

ish West Indies, is situated in Saint John’s parish, 15 miles from Bridgetown.® Founded by Sir Christopher Codrington in 1710 and amply endowed, “no more delightful place can be imagined than this as a retreat for students, with vine-covered corridors opening upon ave¬ nues of tall and stately palms.® Harrington College, founded 23 years later, also does honor to the island.

Spanish discoverers, whose fancy was struck by the beard-like clumps of vines or tendrils hanging from the wild fig trees, named the island Los Barbados (“the bearded® — in plural). They made this immortal observation, but no settlement. The first settlement was made in 1625 by a company of Englishmen. Sir Fred¬ erick Treves (see Bibliography) writes: “It is in Barbados that there will be found the most substantial relics of the old West Indian aristocracy, of the planter prince.® The num¬ ber of inhabitants in recent years has varied between 196,000, or about 1,180 to the square mile, and 171,893, or 1,033 + to the square mile: About 11 per cent Caucasians. No other colony or country, with the possible exception of some of the provinces of China, is more densely populated.

Bibliography. — Aspinall, A. E., (Pocket

Guide to the West Indies 1 (Chicago and New York 1914), and The British West Indies) (London 1912) ; Ober, F. A., (Guide to the West Indies) (New York 1908) ; Treves, F., The Cradle of the Deep} (London 1908). See also article West Indies — Bibliography.

Marrion Wilcox.

BARBADOS CEDAR, a cedar or juniper

(Juniperus barbadensis) . It is found in Florida and the other warm parts of America.

BARBADOS CHERRY, a West Indian shrub or small tree (Malpighia glabra) of the natural order Malpighiacea , with handsome crimson axillary flowers, cultivated to some ex¬ tent in warm countries for its

acid fruit, in¬ ferior to but resembling a white cherry. M. urens also bears an edible but smaller fruit, and is sometimes also called Barbados cherry.

BARBADOS FLOWER FENCE, or BARBADOS PRIDE, the beautiful plant Poinciana pulcherrima. It belongs to the legu¬ minous order, and the suborder Ccesalpiniece. It is a low, spiny tree with an odor like savin. It is a native of the tropics of both hemispheres, and in Barbados especially it is used for fence purposes.

BARBADOS GOOSEBERRY, BLAD APPLE, or LEMON VINE (Pereskia acule-ata), a shrubby, slender, tropical American cactus which bears lemon-yellow, smooth, edible pear-or egg-shaped fruits as large as olives. The species is widely used in green¬ houses as a stock on which to graft other species of. cacti. Its more sturdy relative, P. blco, is similarly used for larger species of cacti.

BARBADOS LEG, a name f requently ap¬ plied to the disease called elephantiasis. It is common in Barbados, and is endemic in many tropical and semi-tropical countries. See Elephantiasis.

BARBADOS LILY, the Amaryllis cques-tris, now called Hippcastrnm equestre, an orna¬ mental plant from the West Indies.

BARBARA, Saint, virgin and martyr much honored in the Greek and Roman Catholic Churches who is supposed to have flourished in the 3d or early part of the 4th century. Her history has been related by various chroniclers, but with so many discrepancies that it is diffi¬ cult to ascertain either the events of her life or the circumstances of her martyrdom. Ac¬ cording to Jacobus de Voragine, the author of the JAurea LegendaC she was born at Heliopo¬ lis, in Egypt, of pagan parents. On arriving at the age of womanhood she was very beautiful, and her father, fearing lest she should be taken from him, confined her in a tower, and in the pictures of this saint the tower is therefore one of her most frequent attributes. In her seclu¬ sion she heard of the preaching of Origen, and wrote to him begging for instruction, where¬

upon he sent one of his disciples who taught and baptized her. On learning this her father was so incensed that he put her to death. Metaphrastes and Mombritius inform us that she was martyred at Heliopolis in the reign of Galerius and their account agrees with the Emperor Basil's Menology and with the Greek Synaxary. Others again hold that she suffered at Nicomedia, in 235, under Maximian I. Her festival occurs 4 December.

BARBARA ALLEN'S CRUELTY, an

old English ballad preserved in Percy's (Re-liquesP While Barbara's lover, Jemmy Groves, was on his deathbed, her only remark to him was, <(Young man, I think you're dying.® For this unnatural composure she subsequently en¬ dured the pangs of remorse.

BARBARA FRIETCHIE, the title of a noted poem by Whittier (1863) founded upon an incident reported to have occurred in Frederick, Md., in the Civil War. Recent in¬ vestigations have thrown some doubt upon the authenticity of the account. A play upon this theme has been written by the late dramatist Clyde Fitch.

BARBARELLI, Giorgio. See Giorgione.

BARBARIAN, a term used by the Greeks to designate a foreigner; one who could not speak Greek. At first the Romans were in¬ cluded by the Greeks under the term barbarian ; but as the inhabitants of the great Italian city gradually gained imperial power, and, more¬ over, began to consider the Greek language a desirable if not even an indispensable part of a liberal education, they were no longer placed in the category of barbarians, nor wˆas their speech deemed barbarous.

BARBAROSSA. See Frederick Barba—

ROSSA.

BARBAROSSA, Arooj, or Horuk, cor¬ sair chieftain, styled "Barbarossa® from his red beard. He was the son of a Greek at Mitylene, and in 1516 assisted Selim, King of Algiers, in driving the Spaniards out of that country. Having taken possession of the capital he put Selim to death and mounted the throne him¬ self. He died in 1518.

BARBAROSSA, Khair-ed-Din, the younger brother and successor of the preceding. He surrendered the sovereignty of Algiers to Selim I, Sultan of Turkey, in exchange for a force of 2,000 janissaries and the title of

dey. He was aftenvard appointed “captain pasha® or high admiral of the Turkish, fleet, conquered

Tunis, and in 1538 gained a victory over the imperial fleet under the command of Andreas Doria in the Bay of Ambracia. He died in

BARBAROUX, biir-ba-roo', Charles Jean Marie, celebrated French revolutionist of the Girondin party: b. Marseilles, 6 March 1767; d. Bordeaux, 25 June 1794. At first an advocate and journalist at Marseilles, he was sent by that city to the Constituent Assembly at Paris. There he opposed the Court party and took part with the minister, Roland, then out of favor. After the events of 10 Aug. 1792 he re¬ turned to his native town, where he was re¬ ceived with enthusiasm, and was soon after chosen delegate to the convention. In the con¬ vention he adhered to the Girondists, and be¬ longed to the party who at the trial of the King voted for an appeal to the people. He boldly opposed the party of Marat and Robespierre, and even directly accused the latter of aiming at the dictatorship ; he was, consequently, in May 1793 proscribed as a royalist and an enemy of the republic. He fled to Calvados, and thence with a few friends to the Gironde, where he wandered about the country, hiding himself as best he could for about 13 months. At last, on the point of being taken, he tried to shoot him¬ self ; but the shot miscarried, and he was guil¬ lotined at Bordeaux. He was one of the great spirits of the Revolution. There was no loftier-minded dreamer in the Girondist ranks ; hardly a nobler head than his fell in that reign of terror.

BARBARY, Africa, a general name for the most northerly portion of the continent, extend¬ ing about 2,600 miles from Egypt to the Atlan¬ tic, with a breadth varying from about 140 to 550 miles ; comprising Morocco, Fez, Algeria, Tunis and Libya (including Tripoli, Barca and Fezzan). Bordered by the Mediterranean on the north, and by the Sahara on the south, the temperature of this region is generally moder¬ ate and remarkably uniform, seldom descend¬ ing to the freezing-point, and seldom coming up to sultry. From March to September is the dry season, when the ground is frequently so parched as to render walking upon it im¬ practicable. From September to March is the wet season, but the rains are moderate, and almost every day affords a respite of sunshine. The soil is fertile, though sandy and light on the coast, the climate healthy, and agricultural productions are various and abundant. The range of production gives a combination of both tropical and temperate fruits. Agricul¬ ture is, nevertheless, greatly neglected, but under European influences has made consider¬ able advance in the present century. For three centuries the inhabitants of the Barbary states rendered themselves the pest of human society by their depredations upon the commerce of the seas until they were finally subdued in the 19th century. See

Barbary Powers, United States Treaties and Wars with the.

History. — Anciently, all Africa was com¬ prehended under two divisions — Egypt and Libya — while Libya wˆas subdivided into northern and southern Libya. North Libya comprised mainly what is now known as the Barbary states. Herodo¬ tus says that in his day northern Libya was inhabited by the indigenous race of Libyans

and by the foreign Phoenicians and Greeks. These latter settled at various points, from Egypt to Carthage, while the indigenous Lib¬ yans occupied from the east to the west, throughout the entire extent. Of the origin of the Libyans, whom Herodotus calls indigenous, we have no trace. Arabian tradition says they colonized Libya from Yemen. The Phoenicians early settled Carthage (869 b.c.) and perhaps the still more western coasts of Mauritania, — at least it appears that Carthage was a powerful state at the invasion of Greece by Xerxes. The Cyrenians, who were Greeks, had colonized at Cyrene, just east of the bay of the Mediterra¬ nean called Syrtis Major (Gulf of Sidra), in what is now known as Barca. West of Car¬ thage lay Numidia and Mauritania, even to the Pillars of Hercules; east of Cyrene was Egypt; while between these two foreign colonies stretched the narrow coast line, from the Major to the Minor Syrtis, known as Emporia. The rapidly growing Carthaginian power soon ex¬ tended colonies along the entire coast from the Pillars of Hercules to Grecian Cyrene. The jealousy of Rome was not long in being awak¬ ened against so threatening a rival. The history of the Punic wars is well known. At the end of 117 years the Carthaginian power was extinguished, Carthage herself in ruins, and Africa a Roman province from Mauritania to Cyrenaica. The more complete subjugation of Numidia was accomplished in the Jugurthine War, and that of Mauritania in the reign of Claudius. Thus the territory of the Barbary states, from independent native sovereignties and foreign colonies, had come into the hands of Rome. About 400 a.d. several Teutonic tribes, overrunning Gaul and crossing the Pyrenees, settled in Spain. When, in 428, Boniface revolted against Honorius, the Van¬ dals crossed the

Fretum Gaditanum into Africa, led by Genseric, drove out the inhabitants, utterly expelled the Roman power from upper Libya, and reigned 100 years. Then came the struggle under Justinian for the re-establish¬ ment of the Roman ascendency. By Belisarius it was conducted to a successful issue, and northern Africa was united to the Eastern em¬ pire. For over 300 years this relation continued until about the middle of the 7th century; the Saracens overran Numidia and Mauritania to the Atlantic, and, notwithstanding the disas¬ trous death of their leader Okba, the sceptre of upper Libya passed again from the hands of Rome into that of Arabia. Fifty years later the conquests of Musa and Tarik were pushed across the straits, and a Saracenic empire es¬ tablished in Spain. But the revolution which brought the Abbasides to the caliphate of Arabia and drove the only surviving caliph of the Ommiades into Spain prepared the way for the independence of the western colonies, and Africa began to throw off the Saracenic yoke f788). A succession of fortunes now attended the states of upper Libya. For eight centuries <hey were alternately tributary and independent, nassing from hand to hand, like the stakes of a faro bank, till in the 16th century the two brothers Barbarossa conquered the whole ter¬ ritory of Numidia and Carthage, and erected the regencies of Algiers and Tunis. A few years later the Turkish Sultan, whose supremacy the younger Barbarossa had acknowledged, erected

the pashalic of Tripoli over the ancient Cy¬ renaica, while in the west there was a gradual consolidation of power into the hands of Mo¬ hammed ben Hamid, and his son, who finally established the dynasty of Sherifs in the empire of Morocco, now divided into two protectorates, the district west of Fez under the protection of Spain, and the district east of Fez under the protection of France, while the French erected, between Morocco and the possessions of the Porte, the regency of Algeria. Tripoli came under the sovereignty of Italy in 1912. The religion of the Barbary states is generally Islamism. The European settlers are of course Christians, or Jews, while the blacks, who are slaves, are pagans. There seem to be at present six races or tribes of men inhabiting the Bar¬ bary states: (1) The Moors. (2) The Arabs. (3) The Berbers, who are indigenous, and from whom the states probably received the appella¬ tion Barbary. (4) The Jews. (5) The Turks. (6) The Blacks. The Arabs call the Barbary states Moghreb (west). The language of the people inland differs from that of Arabia and Syria, though not so much as on the coast. See Algeria; Barca; Fezzan ; Morocco; Tripoli; Tunis. Consult Dumont, P. J., (Thirty-five Years Slavery and Travels in Africa> (London 1819) ; Edwards, A.,

(The Barbary Coast) (New York 1913).

BARBARY APE, or MAGOT, a small

species of ape of the genus Macacus, interest¬ ing as being the only animal of the monkey kind in Europe. It is found on the rock of Gibraltar, where the individuals are few in number; whence it has been concluded by M. de Blainville that they have sprung from domesticated apes escaped from confinement in the houses of Gibraltar. The Barbary magot is a small tailless monkey completely covered with greenish-brown hair. In its wild state it is lively and intelligent, but becomes sullen and intractable in captivity.

BARBARY POWERS, United States Treaties and Wars with the. The four Mo¬ hammedan states of Morocco, Algiers, Tunis and Tripoli, though either independent or nominally tributary to Turkey, were for some three centuries, the 16th to the 19th, a common foe to Mediterranean commerce and travel. Almost their entire subsistence was on the produce of piracy: either the avails of captured stores, the ransoms for prisoners held in slavery or the blackmail paid by other powers for immunity. The large states paid them a regular annual tribute — though by joining forces they could have stopped the piracy at any time, — on the express ground that it gave them the monopoly of Meoiterranean trade against the small ones which could not afford it; and England, which paid about $280,000 a year, deliberately put the price high to pre¬ vent others from bidding up to it. Even these sums bought only temporary truce, as the pirate state lived on depredations, and the tribute had to be supplemented with constant presents and concessions. A part of this tribute was always demanded in armed vessels, ammunition and naval stores, so that the civilized powers furnished the means for plundering themselves. The ransom of cap¬ tives from them was a leading object of public and private charity, and collections were taken

up in churches for this end. In 1786 there were 2,200 Christian captives in Algiers alone. When the United States began to send

vessels to the Mediterranean no longer protected by the English flag, the pirates at once assailed them; and in July 1785, the Algerines captured two vessels and 21 men. Congress appro¬ priated $80,000 in 1784 to buy immunity after the European model ; but it seemed likely to cost nearer $1,000,000, and, reversing 'their usual parts, John Adams preferred to pay as a cheaper resort than fighting, while Jefferson considered fighting both cheaper, more honor¬ able and the preparation for a better future. Morocco, for some reason much the most amenable, signed in 1787 a 50-years' peace with¬ out tribute, though with the understanding of some presents to the Sultan, and kept it, save for a short time in 1803. The Dey of Algiers asked $59,496 for his captives, or over $2,800 each, though the last French captives ransomed had only cost $300, or with costs, $500 ; and the matter hung fire for several years, 11 of the 21 dying before the final ransom of 1795. In 1793, by the carelessness or bad faith of an English consul, the Algerine corsairs gained entrance to the open sea beyond the Strait of Gibraltar, and captured 10 United States ves¬ sels at a blow, the number of our captives in their hands in November being 115. Negotia¬ tions were set on foot, and on 5 Sept. 1795 Congress paid Algiers $992,463.25 for peace and the ransom of all our prisoners — this sum including a 36-gun frigate costing $99,727, and about $100,000 worth of stores and ammu¬ nition. It also engaged to pay $21,600 a year thereafter -in naval stores, $20,000 on presenta¬ tion of a consul, biennial presents of $17,000, and other regular and incidental gifts. In 1798 it sent four armed vessels as arrears. A treaty was made with Tripoli in November 1796, on much the same terms save that there were no ransoms; and one with Tunis, in 1799, for $107,000. The cost of immunities and ran¬ soms in 1802 had been over $2,000,000; and of course even this bought nothing permanent. The Pasha of Tripoli broke the treaty in three years and a half, demanding $225,000 with $25,000 annually, and on refusal declared war, 14 May 1801. A squadron under Commodore Dale was sent to the Mediterranean and blockaded Tripoli, also forcing Algiers and Tunis to think better of their threatened alliance with it and to renew their treaties. Morris succeeded him, but was soon recalled. Preble, who took his place, 1803-04, forced Morocco, which had joined Tripoli, to with¬ draw from the alliance and renew its treaties; carried on a vigorous blockade ; and bom¬ barded Tripoli five times. Barron succeeded Preble, but in the middle of 1805 turned over the command to Rodgers, who at once pre¬ pared for a grand bombardment and assault. The scale was turned, however, by William Eaton (q.v.), who took up the cause of the Pasha's elder brother, Hamet Caramelli, driven from the throne some years before, or¬ ganized at Alexandria a singular rabble of cosmopolites, and after a desperate six weeks'

march across the desert, captured, with the aid of the navy, the seaport of Derne in Barca, several hundred miles east of Tripoli. The Pasha feared an insurrection as well as Rod¬

gers' attack; and hastily signed on 3 June 1805, with Tobias Lear, United States consul-general at Algiers, who had come to Tripoli on purpose, a treaty by which the United States paid $60,000 ransom for the prisoners, left Hamet's supporters to the Pasha's ven¬ geance and Hamet himself to beg the United States for a pension, and allowed the Pasha four years to deliver up Hamet's wife and children. The need and honor of this abject surrender of our government belongs to his¬ torical polemics. The embargo of 1807 pre¬ vented further trouble for some years by an¬ nihilating our commerce; but after its removal in 1810 the depredations were renewed, and in 1812 Algiers was ready for more gratifications. The Dey had received from us $378,363, but made out a case for $27,000 arrears, forced the United States consul to borrow it at usurious rates, and then, ordering him out of the coun¬ try, declared war. The War of 1812, however, having denuded the Mediterranean of our trading-vessels, he captured only one brig and 11 persons; and after the war our naval force under Decatur was turned against Algiers. He found its entire fleet at sea ; captured two and cut off the rest from port; entered the city 30 June 1815, 41 days after sailing; and forced the Dey to sign within three hours, without gift or present, on pain of having his city destroyed and his fleet captured, a treaty abolishing all tribute or presents of any sort thereafter from the United States, delivering up all his cap¬ tives and agreeing that*henceforth prisoners of war should not be made slaves, and paying in¬ demnity for the captured brig. Tunis and Tripoli having allowed English ships to seize American prizes in their harbors, Decatur pro¬ ceeded to both places and forced their rulers to make similar treaties, pay indemnities and re¬ lease all their Christian prisoners of whatever nations. This magnificent action of the United States induced the English government to take similar steps the next year, but Tunis and Tripoli did not abandon piracy till 1819, and Algiers was not finally reduced till 1829 by France. It was the United States which first lifted this incubus of ((Algerine® (as the entire system was compendiously called) piracy and slavery from the Christian world. Consult Schuyler, E., (American Diplomacy) (London 1886) ; Adams, H., (History of the United States, > Vols. I, II, IX (1889-90); Felton, C., (Life of Eaton, } in Sparks, (American Biography* ; Lane-Poole, S. E., (The Story of the Barbary Corsairs * (New York 1896). See Treaties; United States — Diplomacy of the.

BARBASTRO, bar-ba'stro, Spain, city of Aragon, 30 miles east-southeast of Huesca. The city has straight, well-made and paved streets, a cathedral with paintings by Galeran, parish church, college, Latin and three other schools, townhouse, session-house, ecclesiasti¬ cal courthouse, extensive hospital, two prisons, several convents with churches attached, two palaces, a theatre and bull-ring. It also pos¬ sesses philosophical, agricultural, commercial and other literary and beneficent associations. The manufactures of Barbastro have greatly declined, consisting only of hats, hardware, cutlery, shoes and ropes ; while a little trade is carried on in cattle, horses and mules. It is

the terminus of a branch railway line with a junction at Selgna, 12*4 miles distant. Pop. about 7,500.

BARBAULD, Anna Letitia, English writer, daughter of the Rev. John Aikin : b. Ivibworth, Leicestershire, 20 June 1743; d. 9 March 1825. Her earliest production was a small volume of miscellaneous poems, printed in 1773. This was succeeded in the same year by a collection of pieces in prose, published in conjunction with her brother. In 1774 she married the Rev. Rochemont Barbauld. Her (Early Lessons and Hymns for Children,' and various essays and poems, have secured for her a permanent reputation. In 1812 appeared the last of her separate publications, entitled (Eighteen Hundred and Eleven,' a poem of considerable merit ; previous to which she had edited a collection of English novels, with critical and biographical notices. A similar selection followed from the best British essay¬ ists of the reign of Anne, and another from Richardson's manuscript correspondence, with a memoir and critical essay on his life and writings. She will be longest remembered by her beautiful and much-quoted lyric begin¬ ning: ((Life, we have been long together." Consult Aikin, (Works of A. L. Barbauld) ; Ellis's, (Life and Letters of Mrs. Barbauld) (1874); Ritchie, Mrs. Thackeray, (Book of Sibyls' (1883).

BARBAZAN, bar-ba-zoii, Arnauld Guil—

hem, Sire de, French captain, distinguished by Charles VI with the

title of (<Chevalier Sans Reproche," and by Charles VIII with that of ((Restaurateur du Royaume et de la Couronne de France®: b. about the end of the 14th cen- •tury; killed at Bullegneville 1432. He earned the former of his titles, while yet young, by his successful defense of the national honor in a combat fought in 1404 between six French and six English knights, before the Castle of Montendre ; and the latter designation he ac¬ quired by his extraordinary exertions on the side of the Dauphin, at a time when the cause of native royalty, powerless in presence of the Anglo-Burgundian league, boasted few adher¬ ents.

BARBE-MARBOIS, bar-ba-mar-bwa, Frangois, Marquis de, French statesman: b. Metz, 3 Jan. 1745; d. 14 Jan. 1837. After fulfilling diplomatic offices at several German courts he was sent to the United States as consul-general of France. He organized all the French consulates in this country, in which he resided 10 years, and married the daughter of William Moore, governor of Pennsylvania. In 1785 he was appointed by Louis XVI super¬ intendent of Santo Domingo, and introduced many reforms into the administration of jus¬ tice and of finance in that island. He returned to France in 1790 and was again employed in German diplomacy. During the . excitement of the Revolution he was exiled to Guiana as a friend of royalty, but being recalled in 1801 he was made director of the treasury, a title which he soon exchanged for that of minister. In 1803 he was appointed to cede Louisiana to the United States for $10,000,000, but had the skill to obtain the price of $16,000,000, a piece of diplomacy for which he was liberally re¬ warded by Napoleon. In 1813 he entered the Senate, and the next year voted for the for¬

feiture of the Emperor and the re-establish- ment of the Bourbon dynasty. He was well received by Louis XVIII, appointed a peer of France and honorary counsellor of the univer¬ sity, and confirmed in the office of the first president of the court of accounts, which he had formerly held. He was an object of the indignation of Napoleon after his return to France from Elba, and was ordered to leave Paris'. He resumed his offices after the return of the Bourbons, but, moderate in his prin¬ ciples, and an enemy of all reaction, he was not in harmony with the majority of those with whom he associated; and in the Chamber of Peers he succeeded with difficulty in effecting the substitution of banishment for death as a penalty for political offenders. After the revolution of July he exercised the same adulation and took the same oaths of fidelity to Louis Philippe which he had formerly given to Napoleon and the Bourbon princes. The de¬ sire to die first president, which had been the motive of all his flexibility,

proved at last a vain one, and in 1834, he was succeeded in his office, and as a consolation received the por¬ trait of the King, accompanied by an autograph letter. His numerous works contain curious details concerning Santo Domingo, Louisiana and Guiana, which he studied in his exile, and he wrote also upon the treason of Arnold.

BARBECUE, a large gathering of people, generally in the open air, for a social enter¬ tainment or a political rally, the leading feature of which is the roasting of animals whole to furnish the members of the party with food. The word js said to have been employed in Virginia prior to 1700, and the institution of the barbecue is of Southern origin.

BARBEL (Barbus), a genus of fresh¬ water abdominal malacapterygious fishes, of the family Cyprinidcz, or carps, distinguished by the shortness of the dorsal and anal fins, a strong spine replacing the second or third ray of the dorsal, and four fleshy filaments grow¬ ing from the lips, two at the nose and one at each corner of the mouth, and forming the kind of beard to which the genus owes its name. Of the several species, generally named after the country or river where they are found, the European one, common in most of the rivers of its temperate climates, and hence called B. vulgaris, is most deserving of notice. Its average length is from 12 to 18 inches, but individuals have been taken measuring three feet and weighing from 15 to 18 pounds. The head is smooth and oblong, and the upper jaw is much longer than the lower. Its dorsal spine, which is strong and serrated, often inflicts severe wounds on the fishermen and damages their nets. It lives on small fishes, and also on aquatic plants, worms and insects, which it obtains by boring with its barbels into the banks of the stream and turning up the loose soil. Its flesh is very coarse and unpalatable, and at the time of spawning, the roe is dan¬ gerous to eat. Another species, common in the Nile, is described as weighing upward of 70 pounds, and has a flesh which is fine, deli¬ cate and well-flavored. When caught, the fisherman puts an iron through its jaw and fastens it by a short cord to the bank of the river, where it remains alive till required.

BARBER, Edwin Atlee, American archae¬ ologist: b. Baltimore, Md., 13 Aug. 1851. He was graduated at Williston Seminary in 1869, attended Lafayette College 1869-72, afterward received the degrees of A.M. and Ph.D., and was assistant naturalist in the United States Geological Survey in 1874— 75. Director of the Pennsylvania Museum, Philadelphia, since 1901. His writings include a large number of magazine articles: (Genealogies of the Barber and Atlee Families) ; (Pottery and Porcelain of the United States> (1895, 1902, 1909); (Anglo-American Pottery5 (1899-1901) ; (American Glassware, Old and New> (1900) ; (Tulip Ware of the Pennsyl¬ vania-German Potters5 (1903); (Marks of American Potters) (1904) ; (Artificial Soft

Paste Porcelain5 (1907) ; (Salt Glazed Stoneware) (1907) ; (Tin Enameled Pottery5 (1907) ; (Lead Glazed Pottery5 (1908) ; (The Majolica of Mexico5 (1908) ; (Hard Paste Porcelain5 (Oriental), (1910); (The Ceramic Collectors' Glossary5 (1914); (Spanish Porcelains and Terra Cottas5 (1915) ; (Hispano-Moresque Pottery5 (1915). Member of the American Philosophical and many other learned societies.

BARBER, Francis, American soldier: b. Princeton, N. J, 1751; d. Newburgh, N. Y., 11 Feb. 1783. He was graduated at Princeton in 1767, and became principal of a school in Elizabethtown, where Alexander Hamilton was one of his pupils. He was successively major and lieutenant-colonel of the 3d New Jersey artillery, and assistant inspector-general under Baron Steuben. He took part in the battles of Trenton, Princeton, Brandywine and German¬ town, and was severely wounded at Monmouth and in Sullivan's Indian expedition, 1779. He was of the greatest service to Washington in securing intelligence of the enemy's movements and in putting down the mutiny of New Jersey and Pennsylvania troops. In 1781 he com¬ manded a battalion of infantry in Lafayette's Virginia campaign, and was present at Yorktown. He was killed by a falling tree at the close of the war.

BARBER, one who shaves beards and dresses hair. The occupation of barber, is an institution of civilized life, and is only known among those nations that have made a certain progress in civilization. It is referred to by the prophet Ezekiel : ((And thou, son of man, take thee a barber's razor, and cause it to pass upon thine head and upon thy beard.55 (Ezek. v, 1). We do not read of a barber at Rome till about the year 454 of the city; but there, as elsewhere, when once introduced, they be¬ came men of great notoriety, and their shops

were the resort of all the loungers and news¬ mongers in the city. Hence they are alluded to by Horace as most accurately informed in all the minute history, both of families and of the state. But in early times the operations of the barber were not confined, as now, to shaving, hair-dressing and the making of wigs ; but in¬ cluded the dressing of wounds, blood-letting and other surgical operations. It seems that in all countries the art of surgery and the. art of shaving went hand in hand. The title of barber-chi rurgeon, or barber-surgeon, was gen¬ erally applied to barbers. The barbers of London were first incorporated by Edward IV in 1461, and at that time were the only persons who practised surgery. The barbers and the

surgeons were separated, and made two dis¬ tinct corporations — in France, in the time of Louis XIV, and in England in 1745. The sign of the barber-chirurgeon consisted of a striped pole from which was suspended a basin; the fillet round the pole indicating the riband or bandage twisted round the arm previous to blood-letting, and the basin the vessel for re¬ ceiving the blood. This sign has been generally retained by the modern barber. In the United States, however, it is only occasionally that the basin may be seen hanging at the door of a barber's shop. The character of the barber is amusingly illustrated in one of the tales of the (Arabian Nights Entertainments,5 and has been immortalized by Beaumarchais, Mozart and Rossini, under the name of (Figaro.5

BARBER-FISH. See Surgeon-Fish.

BARBER OF SEVILLE, The (Le Barbier de Seville), one of the wittiest of all dramas and most mordant of satirical solvents, was written by Beaumarchais under irritation at speculative misadventures in American trade, in 1772, ready for the stage in 1773 and, after two years of prohibition and intrigue, first acted in February 1775. In its first form it was overloaded with allusions to his personal affairs and was ill-received. Revised on the instant it won on the second night a great success. Sev¬ eral passages then suppressed, because they had been hissed, when inserted nine years later in (The Marriage off Figaro,5 were received with applause. The second title of the Barber, (The Futile Precaution5 points to Fatouville's (La Precaution inutile5 (1692) as the source of its plot. Something was borrowed also from Se-daine's (On ne s'avise jamais de tout.5 But the ex-valet Figaro, the central figure, is Beau¬ marchais' sole creation, a marvelous and half-autobiographic combination of gaiety and phi¬ losophy, disillusioned shrewdness, deep reflec¬ tion and lambent wit. The guardian who

wishes to marry his ward is a stock figure of old comedy. But Bartholo is no commonplace old man nor Rosine the conventional ingenue. Duped Bartholo may be, but he is no unworthy antagonist of the young lover Almaviva and counters well on the devices of Figaro from poipt to point so that the interest rises stead¬ ily to the very denouement. The dialogue throughout sparkles with overflowing wit, un¬ expected turns of phrase, words of double in¬ tent, topsy-turvy application of proverbial wis¬ dom and even quite superfluous jests. The play is still popular in France and in the version given it by Rossini in his opera, (I1 Barbiere di Seviglia5 X 1816) , has an international currency. The best edition of (Le Barbier de Seville5 is in (Theatre de Beaumarchais,5 edited by d'Heyli and Marescot. For its history, autobiographi¬ cal elements in it and contemporary opinion of it consult Lomenie, (Beaumarchais and his Times5 (Vol. 2, pp. 233 f.). For the character of Figaro consult Brunetiere, (f£poques du theatre5 (pp. 297 f .) , and Lintilhac, (Beaumarchais.5 A modern type of Figaro may be seen in Au-gier's c Fils de Giboyer5 (trans. by A. B. Myrick, New York 1905). See Marriage of Figaro, The.

Benjamin W. Wells.

BARBER OF SEVILLE, opera bouffe in two acts by Gioacchimo Rossini (libretto by Stcrbini, founded on Beaumarchais' celebrated

play). First produced in Rome 5 Feb. 1816. The work, destined to become one of the most popular in operatic repertory, was at first a dismal failure, due largely to popular resent¬ ment at the use of a subject, which had al¬ ready been turned to account by other com¬ posers, especially Paisiello, whose setting had been a favorite with the Italian opera public. It was not long, however, before the tables were turned and Paisiello's <Barbiere) was forever barred, in favor of the newcomer. Authorities differ as to the length of time in which the music was written. In any event, the period was not more than three weeks. The fact is significant of Rossini's immense facility of invention. It is said that when one of his contemporaries was told that Rossini had written the music in 13 days, he replied, with a twinkle in

his eye : <(It is quite possible ; he is so lazy.®

The Barber is full of irresistible verve, the music, piquant and graceful, rollicking and glittering in turn. The story is a sort of pro¬ logue to that of Mozart's (Figaro, > but, musi¬ cally, there is little in common between them. Rossini was concerned merely with writing a comic opera which would amuse and charm the senses and he succeeded to perfection. There are 20 distinct musical numbers con¬ nected by recitative in the style so common to Italian opera of that period — ((recitativo secco ® or dry recitative, as it is called. It approxi¬ mates speech more nearly than song, but is con¬ stantly about to break into music. Its mo¬ notonous character is undeniable and it has largely disappeared from operatic writing, sup¬ planted by the more musical song-speech of the modern music drama. Among the indi¬ vidual musical numbers, attention may be focussed on Figaro's buffo aria, Largo al factotum, celebrated the world over, Rosina's cavatina, Una voce poco fa, which has done service for most of the great prima donnas of the 19th century and the ˆcalumny® aria of Don Basilio. For the famous music lesson scene, Rossini wrote a concerted number, but it has been lost — providentially, from the viewpoint of the prima donna, who has thus been able to introduce a show piece of her own choice and so at once to pique the curiosity and astonish the ears of her audience.

The Barber remains in the active repertory of most of the opera companies and bears well its century of life. The first performance in America took place in New York on 17 May 1819, in an English translation under the direc¬ tion of Thomas Phillips; and in 1825 it was produced in the authentic Italian version by Manuel Garcia's Italian Opera Company, which introduced many of the Italian operas to the American public. Adelina Patti was an unfor¬ gettable Rosina. while, in more recent years, Marcella Sembrich found the role a grateful one.

Lewis M. Isaacs.

BARBER POET, The. See Jasmin, Jacques.

BARBERINI, bar-bar-re'ne, celebrated Florentine family which became powerful through Cardinal Maffeo Barberini. who was elected Pope in 1623 as Urban VIII. Few of the Popes have carried nepotism so far as Urban, who, during his reign of 21 years.

seemed intent on only one object, the aggran¬ dizement of his three nephews. Two of them were appointed cardinals, and the third became Prince of Palestrina. The principality of Palestrina continued in the possession of the Colonna branch of the family until 1889, be¬ coming extinct in the male line in that year.

BARBERINI FAUN, a famous piece of Greek sculpture, so called from its having once been in the possession of the Roman family of Barberini. It is now in the Glyptothek at Munich.

BARBERINI PALACE, the residence of the Barberini family in Rome, begun by Pope Urban VIII, its most distinguished member, but not finished till 1640. It contains a famous picture-gallery and a library with over 10,000 volumes and 10,000 manuscripts.

BARBERRY (Berberis) , a genus of about 175 species of shrubs of the family Ber-beridaccce, natives of temperate climates. The yellow flowers are succeeded by red, dark-blue or black fruit which in some species is used for making jellies of beautiful color and distinct flavor; that of some other species is dried and used like raisins. The yellow roots and sometimes the stems of several species are used in dyeing, and the bark of some in tanning. Many of the species are used for ornament and for hedges, but in wheat-growing sections they should not be planted, because they are host-plants for the secidium stage of wheat-rust (Puccinia graminis), which, however, has been known to develop in localities remote from barberry bushes. B. vulgaris and its varieties and B. thunbergii (considered by some botanists a form of vulgaris) are probably the most com¬ mon species planted in America. The former, an American species, is a rather erect shrub about 10 feet tall, with large leaves and racemes of flowers which are followed by red fruits that persist during the winter and even well into the second summer; the latter, a Japanese species, is a low, spreading, graceful shrub with dainty little leaves which become brilliant red in autumn, and with solitary yellow flowers followed by orange-red persistent fruits. The stamens, which in many if not all species are sensitive, spring up when touched. Propaga¬ tion is usually effected by means of seeds or cuttings of green wood, but sometimes by grafts and layers. For description of species cultivated for ornament in America, consult Bailev, (Standard Cvclopedia of Horticulture*

(1914).

BARBERRY BLIGHT or RUST. See

Rusts.

BARBERS' ITCH. Two distinct diseases of the skin are known by this name — one of a parasitic nature, the other not parasitic. In the latter there is an inflammation of the hair follicles characterized by the formation of papules and pustules pierced by hairs. It affects the hairy part of the face and runs a chronic course. It is more inclined to affect the upper lip and upper parts of the face. The more important disease is the Tinea barbee, or parasitic disease. Here the hair follicles are infected by a fungus, the trichophyton. It is a form of ringworm of the beard. It affects the lower part of the face and neck, causing itching, scaly eruptions that secrete a thick

mucus and spread out ring-like from the centre. The disease is always contracted from another person or sometimes from lower ani¬ mals. Uncleanly barbers' implements are the chief agents in its spread. In the early stages — the parasitic form — it is readily curable, but in the chronic stages it may prove very difficult to treat successfully.

BARBERTON, Ohio, city in Summit County, seven miles south from Akron, and 39 miles from Cleveland; on the Erie, the Balti¬ more & Ohio and the Pennsylvania railroads. The town was founded in 1893 by O. C. Barber, president of the Diamond Match Company, whose works are located here. It is known as the <(magic city,® having acquired a popula¬ tion of 10,000 in about 18 years. It is a pro¬ gressive manufacturing centre, having sewer-pipe mills, rubber works, potteries, iron works, paint mills, salt wells, strawboard works and other industries. The United States census of manufactures for 1914 reported 34 industrial establishments of factory grade, employing 3,706 persons, of whom 3,110 were wage earners, receiving $1,734,000 annually in wages. The capital invested aggregated $14,624,000, and the value of the year's output was $8,842,000; of

this, $4,737,000 was the value added by manufacture. The city is governed by a mayor and city council. Pop. (1920) 18,811.

BARBES, Armand, barbes', ar-moiT, French politician and revolutionist: b. island of Guadaloupe 1810; d. 1870. At an early age he was taken to France, and in 1830 went to Paris to attend the law classes, where he had an opportunity of manifesting his political opinions at that period of public excitement. During the whole reign of Louis Philippe he was con¬ stantly engaged in conspiracies. In conse¬ quence of an unsuccessful attempt to over¬ throw the government he was condemned to death, a sentence which was commuted to per¬ petual confinement. The revolution of 1848 restored Barbes to liberty. He then founded a club, which took his name, in which the doc¬ trines of socialism were superseded by re¬ publicanism. After the insurrection of May 1849, Barbes was sentenced to deportation. In 1854 he was again set at liberty, and left France, a voluntary exile.

BARBET, any of the tropical South Ameri¬ can birds of the families Capitonidcc and Buc-conidce, both of which are characterized by prominent bristles about the mouth, which as¬ sist them in catching flying insects. The birds of the former family are more usually called ˆthickheads,® and those of the latter (<puff-birds® (qq.v.).

BARBETTE, bar-bet', the platform or ele¬ vation of earth behind the breastwork of a fortification or an intrenchment, from which artillery may be fired over the parapet. An ascent leads from the interior of the intrench¬ ment to the barbette. When the garrison has much heavy ordnance, or the enemy has opened his trenches, or when it is determined to can¬ nonade the intrenchments of a given point, — as, for example, a bridge or pass, — and the direction of the cannon is not to be materially changed, it is usual, instead of making a barbette, to cut embrasures in the parapet ; on the contrary, firing from the barbette is ex¬ pedient when one expects to be attacked only

by infantry, or wishes to cannonade the whole surrounding country. See Fortification.

BARBETTE GUN. See Ordnance.

BARBETTE TURRET. See Turret.

BARBEY D'AUREVILLY, bar-ba-do-re-ve-ye, Jules, French critic and novelist : b. Saint-Saveur-le-Vicomte, Manche, 2 Nov. 1808; d. Paris,

24 April 1889. As a contributor to the Pays in Paris he created a sensation by the un¬ reserved tone and peculiar style of his literary criticisms. He wrote (On Dandyism and G. BrummeP (1845) ; (The Prophets of the Past> (1851); (Gcethe and DideroD (1880); Polem¬ ics of Yesterday) (1889) ; Nineteenth Cen¬ tury: The Works and the Men* (1861-92). Of his novels the best are (The Bewitched) (1854); and (The Chevalier des Touches)

(1864).

BARBIANO, bar-bya'no, Abrechtda, an Italian military officer, who formed the first regular company of Italian troops organized to resist foreign mercenaries, about 1379. This organization, named the <(Company of Saint George,® proved to be an admirable school, as from its ranks sprang many future officers of renown. He became grand constable of Naples in 1384, and died in 1409.

BARBICAN. See Barbacan.

BARBIE DU BOCAGE, bar-bya-dii-bo- kazh, Jean Denis, distinguished French geo¬ grapher: b. Paris 1760; d. there 1825. He laid the foundation of his fame in 1788 by the pub¬ lication of his beautiful Atlas to the (Voyage du Jeune Anacharsis,* and was appointed in 1792 keeper of the maps of the Royal Library, and in 1809 professor at the Sorbonne. In 1821 he founded the Geographical Society, of which he became president. He was also a member of the Institute. His maps and plans to the (Voyage pittoresque en Grece, de Choiseul Gouffier,* and to the works of Thucydides, Xenophon, etc., exhibit much erudition. He also prepared many modern maps, and pub¬ lished excellent dissertations in various scien¬ tific collections. Although the progress of time has necessarily deprived much of his work of its original value, his labors have not the less given a decided stimulus to the progress of science.

BARBIER, bar-bya, Antoine Alexandre,

French bibliographer: b. Coulommiers 1765; d. 1825. In 1794 he went to Paris, where he was chosen a member of the committee appointed to collect works of literature and art existing in the monasteries, which were then suppressed. This was the cause of his being appointed in 1798 keeper of the library of the Conseil d'Ltat, collected by himself, and when it was trans¬ ported to Fontainebleau in 1807 Napoleon ap¬ pointed him his librarian. On the return of the King he

had the care of his private library. His excellent (Catalogue de la Bibliotheque du Conseil d'Ltat* (1801-03) is now very rare. His (Dictionnaire des ouvrages anonymes et pseudonymes) (1806-09, 4 vols., 3d ed., 1824), is on account of its plan, its accuracy and its fullness (at least in respect to French literature), one of the best works in this branch of bibliography.

BARBIER, Henri Auguste, French poet: b. Paris, 29 April 1805; d. Nice, 12 Feb. 1882. Having written an historical novel (1830) with Royer, depicting French mediaeval society, he

entered his proper sphere, that of poetical satire, in which he obtained a brilliant success with (The Iambes* (1831); (31st ed., 1882), a scries of poignant satires, political and social, lashing the moral depravity of the higher classes, — notably the ignoble scramble for office under the new government, the subject of 'The Quarry,* the most famous among these satires. His next works, (Lamentation) (1833), be¬ wailing the misfortunes of Italy, and (Lazarus * (1837), in which he describes the misery of the English and Irish laborer, show a considerable falling off ; and in those that followed, the poet of 'The Iambes) is scarcely to be recog¬ nized. He was elected to the Academy in 1869.

BARBIER, Paul Jules, a prolific French dramatist: b. Paris, 8 March 1825; d. 1901. Having won success with his first effort, (A Poet* (1847), a drama in verse, he produced (The Shades of Moliere* (1847) ; 'Andre Chenier) (1849); (Willy Nilly,* a comedy (1849) ; and thereafter in collaboration, mostly with Michel Carre, a number of dramas and vaudevilles, also countless librettos for comic operas. After the war of 1870-71 he published 'The Sharpshooter, War Songs) (1871), a collection of patriotic poems; and later two other volumes of lyrics, (The Sheaf* (1882) and 'Faded Flowers) (1890) ; besides 'Plays in Verse* (2 vols., 1879).

BARBIER DE SEVILLE. See Barber of Seville.

BARBIZON, bar-be-zon, France, a village on the skirts of the forest of Fontainebleau, in the department of Seine-et-Marne. Its picturesque situation on the edge of the forest and association have made it a favorite haunt of artists and tourists which has given its name to a school of French landscape painters.

BARBIZON, The Painters of, a group of French painters of animal, landscape and peasant subjects who settled in the village of Barbizon about 1844. While often referred to as the Barbizon school, they did not form a school in the usual sense, but were attracted together by similar aims and principles. These principles may be reduced to the one that each painting be studied directly from nature and express a mood or sentiment of the artist. The result was a grasp on truth and life with a poetic character that gave their work per¬ manency and charm. They are of the Romantic school as applied to the landscape. The dis¬ tinctive note of the school appears in the work of Rousseau and Millet, each of whom made his home in Barbizon. Corot, Diaz, Dupre, Daubigny and Troyon were members of the group. (See articles on these artists). Recog¬ nition of their merit came slowly as a result of the conflicts that existed between the classic and romantic schools in the first half of the 19th century. The painters of Barbizon are among the most important in the history of landscape painting, into which they infused new life; their influence was tremendous not only in Europe but in America. They are well represented in American galleries, such as the Metropolitan Museum of Art, and the Vander¬ bilt collection, New York, and the Shaw col-Ection of Boston. Consult La Farge, 'The Higher Life in Art* (New York 1908) ; Mollet, 'Painters of Barbizon* (London 1895) ; Muther, 'History of Modern Painting* (Lon¬

don 1907) ; Tomson, Arthur, 'Painters of Barbizon* (ib. 1908) ; Thompson, D. C., 'Painters of Barbizon* (ib. 1902) ; Van Dyke, 'Modern French Masters* (New York 1906).

BARBOU, bar'boo, the name of a cele¬ brated French family of printers, the descend¬ ants of John Barbou, of Lyons, who lived in the 16th century. From his press issued the beautiful edition of the works of Clement Marot in 1539. His son, Hugh, removed from Lyons to Limoges, where, among other works, his celebrated edition of 'Cicero's Letters to Atticus* appeared in 1580. Joseph Gerard, a descendant of the same family, settled in Paris, and continued in 1755 the series of

Latin classics in duodecimo, — rivals to the Elzevirs of an earlier date, — which had been begun in 1743, by Coustelier. This series of classics is much prized for its elegance and correctness.

BARBOUR, bar'ber, Erwin Hinckley,

American geologist : b. near Oxford, Ohio. He was assistant palaeontologist in the United States Geological Survey in 1882-88 ; Stone professor of natural history and geology in Iowa College in 1889-91 ; became professor of geology in the University of Nebraska, and acting State geologist in 1891 ; and curator of the Nebraska State Museum since 1891. In 1893 he took charge of the annual Morrill geo¬ logical expeditions, and since then he has also been engaged in the United States Geological and Hydrographic Surveys.

BARBOUR, James, American statesman : b. Orange County, Va., 10 June 1775; d. 8 June 1842. He was admitted to the Bar when 19 years old. He served in the Virginia legis¬ lature 1796-1812, becoming governor of the State in the latter year. Three years later he was elected to the United States Senate. He was Secretary of War 1825-27, and Minister to England 1828-29. In politics he was strongly anti-Democratic. He was chairman of the con¬ vention which nominated Harrison and Tyler for the presidency and vice-presidency.

BARBOUR, John, Scottish poet, of whose life but little is known. He is supposed to have been born about 1316; was educated at Oxford and Paris ; he was archdeacon of Aberdeen from 1357 until his death. He traveled in England in 1357 and in 1368 went to France for scholarly purposes. He was a clerk in the household of Robert II who in 1378 gave him a perpetual annuity of 20s, in¬ creased in 1388 to £10 a year. He died in Aberdeen, 13 March 1395. His great epic, 'The Bruce,* tells the story of Robert Bruce and the battle of Bannockburn. It was written in 1375 and brought him favor from the King. Its style is clear and pure and compares favor¬ ably with contemporary English poets except Chaucer. It is important also as a record of the manners and customs of the time. First printed in Edinburgh in 1571 ; best modern edi¬ tion by Skeat (Early English Text Society, London 1870-89). He also wrote 'Legends of the Saints,* of 33,533 verses; the best modern edition is that by Metcalfe (Scottish Text So¬ ciety, Edinburgh 1896) ; and a fragment on the Trojan War. Consult Horstmann, 'Barbour's Legendensammlung, nebst den Fragmenten seines Trojanenkrieges* (Heilbronn 1882) ; Lang, Andrew, 'History of Scotland* (1900).

23b >

BARBOUR, Philip Pendleton, American jurist: b. Orange County, Va., 25 May 1783; d. 24 Feb. 1841. He studied law at William and Mary College and began to practise in 1802. He led the war party in the Virginia legislature 1812-14, when he was elected to Congress, be¬ coming speaker of the House in 1821. Four years later he was appointed a judge in his native State, returning to Congress in 1827 ; but later resigning through ill-health. He was subsequently appointed a Federal judge, and in 1836 was promoted to the Supreme Court of the United States. In politics he was a Democrat.

BARBOUR, Ralph Henry, American au¬ thor: b. Cambridge, Mass., 13 Nov. 1870. He was educated at the Highland Military Acad¬ emy of Worcester,- Mass. He is well known as a contributor of verse and short stories to magazines under the pen name of ((Richard Stillman Powell, w but has published a number of entertaining boy's stories under his own name. His publications include (The Half¬ back (1899) ; (For the Honor of the SchooP (1900) ; (Captain of the Crew) (1901) ; be¬ hind the Line) (1902) ; (The Land of Joy) (1903); (Weatherby's Inning) (1903); (The Book of School and College Sports) (1904) ; (Four in CampJ (1905) ; (Four Afoot* (1906) ; (Tom, Dick and Harriet) (1907) ; (Forward Pass) (1908) ; * Double Play) (1909) ; (The Golden Heart) (1910) ; (The House in the

Hedge) (1911); (The Harbor of Love) (1912); (Partners Three) (1913) ; (Left End Edwards-* (1914); (Hearts Content* (1915), *etc.*

BARBOURSVILLE, ICy., town and county-seat of Knox County, 185 miles south¬ east of Louisville, on the Cumberland River, and the Louisville & N. Railroad. The chief industries are connected with mining, lumber¬ ing and oil wells. Pop. 2,000.

BARBOURSVILLE, W. Va., town of Cabell County, situated on the Guyandotte River, and on the Chesapeake & O. and Guyan¬ dotte Valley railroads, nine miles east of Hunt¬ ington. It is the seat of Barboursville College, a Methodist institution, and of the Kuhn Me¬ morial Hospital, and is of historic interest as the scene of a Federal victory in the Civil War, 13 July 1861. Pop. about 900.

BARBOX BROTHERS, a short story by Dickens, with a second part known as (Barbox Brothers & Co.*

BARBUDA, bar-boo'da, British West In¬ dies, one of the Leeward Islands, 25 miles north of Antigua. It is of coral formation, has a fertile soil, and produces tobacco, cotton, corn and pepper. There are forts on the west side of the island, and a roadstead, but no port. The population is almost entirely negroes, and numbers about 1,000.

BARBUDO, bar-boo'do, or BARBU, Span¬ ish names in the West Indian region for the strange fishes of the family Polynemidtv. See Mango-Fish.

BARBY, Prussia, a town in the province of Saxonv, on the left bank of the Elbe, 16 miles south-southeast of Magdeburg. It is well built and has an old castle, and manufactures of linen and cotton, soap-works, breweries and distilleries. Pop. 5,292.

BARCA, north Africa, an Italian posses¬ sion, part of Libia Italiana, lying east of

Tripoli, about 500 miles long by 400 miles wide. It forms a portion of the ancient Cyrenaica, in its widest sense, where the Greeks had two flourishing colonies. The Greeks were followed in possession of the country by the Romans, and the monuments of both peoples remain in the ruins of their cities. The sides and sum¬ mits of the hills in the east and north are fertile, and yield abundant crops and excellent pasture. The loftiest heights do not exceed 1,800 feet. Flowering shrubs occur in great variety, including, among others, roses, laurestinas, honeysuckles, *etc.* The Bedouin inhabit¬ ants have numerous camels and other cattle, constituting their principal wealth. Among beasts of prey the most common are hyenas and jackals; noxious insects also abound. There are hardly any permanent streams, most of the watercourses being of the nature of mountain torrents, which lose themselves in the sands of the Libyan Desert. The eastern portion, however, is tolerably well supplied with water by rains and springs. The chief exports of the country consist of grain and cattle, along with ostrich feathers and ivory, brought by caravans from the interior. The sponge fisheries are also important. The chief imports are textiles and drugs. Next to Ben-gazi, the capital, the seaport of Derna is the chief town. Barca used to form a dependency of Tripoli, later a separate province under Turkish dominion. By the Treaty of Quchy, signed by the Turkish and Italian delegates 18 Oct. 1912, it was formally

recognized as a de¬ pendency of Italy; it forms with Tripoli the new Italian colony Libia. The population is variously estimated, but probably does not much exceed 325,000.

BARCAROLLE, bar'ka-rol, a song of the gondoliers at Venice, often composed by them¬ selves, to some simple and pleasing melody, such as may be timed to the stroke of the oar. Such melodies are sometimes introduced into operas, and have been written for the piano.

BARCELLONA, bar-chel-lo'na, Sicily, a town in the province of Messina, situated on the Longano River, 27 miles west of the town of Messina. It is noted for its sulphur baths which are frequented from May to September. The suburb of Pozzo di Gotto is separated from the main town by a small stream, the Fiume di Castro Reale, supposed to be the Longanus of antiquity. Oil, manna, wine and fruit are the most important products. There are fine forests on the near-by mountains. The chief commerce is in oil and fish. Pop. 26,172.

BARCELONA, bar-the-lc/na, Spain, the largest city and second seaport of Spain, 440 miles northeast of Madrid by rail (310 miles direct line). It is the capital of the province of the same name and of the military district of Cata¬ lonia, and is handsomely built, in the shape of a half-moon, on the coast of the Mediter¬ ranean, between the mouths of the Llobregat and the Besos, in the midst of a spacious fer¬ tile valley. It was, even in the Middle Ages, one of the principal commercial places on this sea. On the southwest lies the hill of Mon-juich, with a fort which protects the harbor. Barcelona is divided into the old town, the streets of which, with one or two exceptions, notably the broad Rambla, are narrow and mediaeval but always picturesque and animated ;

and the new city, with wide streets and hand¬ some modern houses. The walls of the old city have been converted into boulevards called rondas. In the suburbs are most of the fac¬ tories. Its manufactures which are the most important in Spain include cottons, silks, woolens, machinery, iron castings, paper, glass, mathematical instruments

chemicals, stoneware and soap. There are also dyeworks, tanner¬ ies, *etc.* Previous to the great war many of the articles needed in commercial production were imported. But as these sources of supply were closed, new industries sprang up ; espe¬ cially to be noted are those of bottle tops, elec¬ tric wire and cable, enameled ironware, hard¬ ware, needles and buttons, galvanized iron and tinware, grindstones and crucibles, emery prod¬ ucts, glass, inks, varnishes, glue, waterproof cloth, *etc.* New establishments also began mak¬ ing rubber articles, straw hats, shirts, neckties, furniture and toys. Forty-six new textile com¬ panies, manufacturing in silk, cotton and wool, have been (1916) begun since the war began, but principally in the knitted goods industries, for which not only the city but the whole dis¬ trict is noted. But perhaps the greatest growth has been in the line of chemical industries, to supply articles formerly imported from Ger¬ many. These include general chemical prod¬ ucts, aniline dyes, drugs and essences, oils and soaps, alcohol, glucose and chemical fer¬ tilizers ; as well as photographic papers and films, carbonic acid gas, liquid lye, cream of tartar and antiseptics. The local tanning in¬ dustry increased largely owing to the war's de¬ mand for leathers, and 12 new tanneries were established to supply this trade. The importa¬ tions of raw cotton into Barcelona for the campaign year 1915-16 was 396,788 bales, of which 314,855 came from the United States. While this supply was 98,744 bales less than the preceding year it was 5,722 bales more than the ante-war period, and for the United States an increase of 38,490 bales over Barcelona's purchases for the year just previous to the war. Of the total supply of cotton which reaches Barcelona about 80 per cent is grown in the United States, 15 per cent in India and 5 per cent in Egypt. Agriculture and the grow¬ ing of fruits and nuts showed a marked in¬ crease in 1915-16. The harbor is spacious, 305 acres and has an entrance 300 yards wide be¬ tween two long piers. The entrance is pro¬ tected by a large mole, which has been recently extended, and there is a large floating dry-dock. The exports consist largely of manu¬ factured goods, wine and brandy, fruit, oil, cork, *etc.* The chief imports are coal, grain, cotton, hemp, foodstuffs, *etc.* In 1910 1,662 ships of 2,463,741 tons burden entered the har¬ bor. The city contains a university founded in 1430, transferred to Cervera in 1714 and re¬ opened here in 1837, now occupying a noble pile of buildings, completed in 1873. It has faculties of law, medicine, -philosophy, natural sciences, ˆmathematics and pharmacy, about 1,900 pupils and a library of 150,000 volumes. Barcelona also contains the archives of the kings of Aragon (nearly 4,000,000 documents), two museums, a palace of fine arts, school of architects and engineers, a foundling hospital, a general hospital, large enough to contain 3,000 sick persons, a deaf-and-dumb institution, a

large arsenal, a cannon foundry, several large

theatres, a bull ring seating 14,500 persons, and a fine Spanish Gothic cathedral dating from the 13th century. It is the seat of a Supreme Court, a bishop and the captain-general of Catalonia, and is altogether a beautiful and agreeable town, with various interesting features and highly picturesque surroundings. Electric lights and electric tramways have been introduced. Barcelona is said to have been founded by the Carthaginians in the 3d century b.c., and was an important city under the Romans, Goths and Moors. It was from the 9th till the 12th century governed by its own counts; but afterward by the marriage of Raymond IV with the daughter of Ramiro II, King of Aragon, it was united with that king¬ dom. In 1640 it withdrew, with all Catalonia, from the Spanish government; and submitted to the French Crown; in 1562 it submitted again to the Spanish government; in 1697 it was taken by the French, but restored to Spain at the Peace of Rvswick. In the War of the Spanish Succession Barcelona took the part of the Archduke Charles; but in 1714 was be¬ sieged by the troops of Philip V, under the command of the Duke of Berwick, and taken after an obstinate resistance. A strong citadel on the east side of the city was then erected to overawe the inhabitants, but was destroyed in 1845. On 16 Feb. 1809, Barcelona was taken by surprise by the French troops under Gen¬ eral Duhesme, and remained in the power of the French till, in 1814, all their troops were recalled from Catalonia to defend their own country. In 1821 the yellow fever carried off 40,000 of the inhabitants. The cityˆ has been the scene of many serious and sanguinary re¬ volts, particularly in 1832, 1836, 1840 and 1841. Latterly, industry and commerce have rapidly increased, the construction of railways contri¬ buting to this result. This city is regarded as the centre of anarchist movements in Spain. It is governed by a council elected for four years by all the citizens over 25 years of age, and presided over by an alcalde chosen by the members among their own number. Pop.

800,000.

BARCELONA, bar-she-lo-na, Venezuela, the capital of a district and of the state of Anzoategui, near the mouth of the Neveri, 16r miles east of Caracas. The surroundir. country is fertile, but the city is hot and un healthy. Cattle, jerked beef, hides, indi” cotton and cacao are the chief exports. TL district, formerly a separate state, has since 1881

formed one of the divisions of the state of Bermudez. The city was founded in 1634 by Juan Urptn, and during the long period of Spanish domination was known by the name of Nueva (New) Barcelona. Pop. about

13,000.

BARCELONA, Bank of. In its more modern sense, that is to say, an institution of deposit, loan, discount, domestic and foreign exchange, etc., open to the commercial public, the Bank of Barcelona must be regarded as the earliest of banks in the European world. As its operation had a bearing upon the affairs of . America they possess especial interest. Primarily this relates to the obrnssa, obrvsum, obrizo, or test or <(trial of the pyx.® In Snain. bv the ordinance of Valencia, made by King John, who conquered the kingdom of Aragon,

it is expressly provided that reals shall only be coined in Valencia, and that the mintners shall be supervised by two well-known citizens, so that no fraud shall be committed as to material or weight. (Grimaudet, (Law of Payment,) p. 14). The coin referred to is the well-known Spanish real de plata, of eight to the dollar. It was lawful money in the United States down to 1853 and is still known to New York trades¬ men as the ˆshilling® and throughout the Southern States and California as the (ˆbit.® The coinage supervision ordered by John of Aragon (father gf Ferdinand, in whose reign Columbus discovered America), was afterward extended to the mint of Barcelona, where the supervisors of the obrizo were nominated by the bank and who thus furnished a secure basis for its extensive dealings in full weighted reals, and reals de d. ocho (dollar pieces of eight reals) which it exchanged for the heterogeneous coins that flowed into its great commercial port from all parts of Europe.

From Barcelona King John’s test of the coins, called in England ((The Trial of the Pyx,® was carried from Spain into the Spanish-American

mints of Mexico and Peru and sub¬ sequently adopted by the United States govern¬ ment. This supervision and testing of the coins is still conducted in the American mints under a commission of civilians appointed by the Secretary of the Treasury.

Upon returning from his momentous voy¬ age of discovery, Columbus appeared before King Ferdinand and Queen Isabella, then hold¬ ing court at Barcelona, and there unfolded to his sovereigns and a brilliant throng of nobles and ecclesiastics the particulars of his wonder¬ ful achievement, exhibiting among other proofs a number of American natives, specimens of their field products and handiwork, and an at¬ tractive show of American gold nuggets.

The second voyage of Columbus, planned upon a royal scale, was especially prepared for the mining of gold, to carry out which object the King had recourse to two financial measures : First, immediate sequestration and sale of the property of heretics ; second, a loan from the Bank of Barcelona. This loan fur¬ nishes an additional point of interest in that institution.

Among its various operations the bank received on deposit and disbursed the revenues, or part of them, of the four great ecclesiastico-military orders, and kept the accounts of about a dozen other orders of knighthood, like those of Calatrava, Saint James, Golden Fleece, Saint George, etc., some of which were ecclesiastical and others chivalrous. The royal treasure which during the reign of Henry IV of Castile was deposited in the castle of Segovia was afterward divided and removed by his step-sister, Queen Isabella, who de¬ posited a portion of it in the Bank of Barce¬ lona; because the Contador-General, or Super¬ intendent of Finances, is known to have drawn for public disbursements upon that institution some of his warrants.

In 1480 Isabella, holding court at Toledo, had signed a decree which greatly affected the Bank of Barcelona. ((To support the govern¬ ment of Castile, Henry IV had issued certain cedillas or certificates of annuities, assigned on the public rentes;® these by purchase had be¬ come the property of the nobles; who in turn

had borrowed money on them from the bank. Isabella's decree denouncing and annulling these certificates — virtually an act of re¬ pudiation — was entrusted for execution to her confessor, Fernando

de Talavera, who per¬ formed his office with such fidelity that it (rsaved® 30,000,000 maravedis annually to the Crown, or three-fourths of the entire revenue. (Prescott, (Ferdinand and Isabella,* I, 299). Little more is heard of the bank after this despoilment. The treasure from America went no longer to Barcelona, but to Seville, where it was consigned to the Casa de Contratacion, or Board of Trade, and thence sent to the mints, of which there were five, each of them situated in a fortified city of the realm.

After the struggle to survive the depletion of its resources in 1480 the bank was hardly in a condition to weather the civil wars which at¬ tended the effort to wrest the crown from Juana and her son Charles. During this period of violence, the old bank, despairing of a re¬ turn to peace and security, appears to have quietly discharged its obligations, wound up its affairs and honorably dissolved. For the history of other ancient banks see Byzan-tum, Bank of; Fuggers, Bank of the; Genoa, Bank of; Medici, Banks of the; Tyre, Bank of; Venice, Bank of.

Alexander Del Mar.

BARCHESTER TOWERS, the second of Anthony Trollope's Chronicles of Barsetshire — (The Warden) (1855), (Barchester Towers* (1857), (Dr. Thorne) (1858), (Framley Par-sonage) (1861), (The Small House at Alling-ton) (1864), (The Last Chronicle of Barset* (1867) — has been on the whole the most popu¬ lar of Trollope's many novels and is thoroughly representative of all his best qualities. He took, he said, great delight in writing the story, as he did with the entire series, which, more than any other section of his work, is full both of gusto and the look of reality. Strangely enough, he had never lived in a cathedral city, except London, and had no intimate knowledge of clerical affairs; the idea of (The Warden,* out of which all the other Barsetshire novels grew, came from a chance visit to Salisbury Close. But imagination so far took the place of experience that Trollope made the Chron¬ icles, on the whole, the most notable represen¬ tation in fiction of the lighter phases of Eng¬ lish ecclesiastical life. The theme of (Barchester Towers) is excellently adapted to Trollope's abilities. A new bishop of Barchester, coming into his diocese with tactless commotion, disturbs the deep calm long estab¬ lished there. The book is an account of the confusions and little wars he causes before the community once more settles back into peace. It would have been easy to be merely farcical, and Mr. Slope, the bishop's chaplain and the villain, comes near to farce; but for all the hurrying and scurrying about, for all the inno¬ cent intrigues and machinations which make up its plot, (Barchester Towers) is very real. It particularly suggests

Hawthorne's comment upon Trollope's books in general: <(They-pre¬ cisely suit my taste, — solid and substantial, written on the strength of beef and through the inspiration of ale, and just as real as if some giant had hewn a great lump out of the

earth and put it under a glass case, with all its inhabitants going about their daily business,' and not suspecting that they were being made a show of. And these books are just as Eng¬ lish as a beefsteak.® (Barchester Towers) is not a book of the spirit, for Trollope cared neither for mysteries nor for doctrines. It is essentially comic but essentially humane, with¬ out sharp satire or caricature. The plot is easy and credible, the good humor unflagging, the style, if not distinguished, yet clear; the set¬ ting and descriptions are always full of truth. The characters, however, give the book its memorable excellence. It is not only that they think, speak and act naturally. They are pre¬ sented with a picturesqueness which never dis¬ torts them and a comic force which but adds to their verisimilitude. Such personages as Bertie Stanhope and Mrs. Proudie, the particu¬ lar triumphs of this novel, may reasonably be mentioned with the immortals.

Carl Van Doren.

BARCLAY, James, Canadian preacher and educator: b. Paisley, Scotland, 19 June 1844. He was licensed by the Paisley Presbytery in 1870 and was minister of Saint Paul's Church, Montreal, from 1883 to 1910. While in Scot¬ land he was frequently summoned to Balmoral to preach before Queen Victoria. He served through the Riel rebellion in the Northwest Territories, in 1885, and, besides being connected with various local institutions, has been presi¬ dent of Trafalgar Institute since its opening.

BARCLAY, John, Scottish poet : b. Pont-a- Mousson, France, 1582; d. 1621. He accom¬ panied his father to England, where he was much noticed by James I, to whom he dedi¬ cated a politico-satirical romance, entitled (Satyrikon,' in Latin, directed against the Jes¬ uits.

He wrote also several other works, among which is a singular romance, in elegant Latin, entitled (Argenis,' which first appeared at Paris in 1621. It is an allegory, of a character similar to that of Satyrikon, and alludes to the political state of Europe, and especially France, during the league. Like the earlier work, it has been several times reprinted, and has also been translated into several of the modern languages, including English.

BARCLAY, John, Scottish clergyman : b. 1734; d. 1798. He was appointed assistant minister at Fettercairn, where he attracted wide attention through his novel doctrines. His ad¬ vocacy of these led to his dismissal by the Presbytery, whose decision was upheld by the General Assembly. Barclay, however, continued to preach in Edinburgh, London and elsewhere. He founded the sect known by his name as Barclayites or Bereans — the latter name being taken from Acts xvii, 2. Barclay was the author of many tracts, pamphlets, etc., includ¬ ing (Without Faith, Without God; or an Ap¬ peal to God Concerning His Own Existence) (1769). (See Bereans). Consult (Works of John Barclay,' edited with memoir (1852).

.BARCLAY, Robert, a member of the Society of Friends: b. 23 Dec. 1648, at Gordons-town, in the county of Moray, of an ancient and honorable family; d. Ury, near Aberdeen, 3 Oct. 1690. The troubles of the country in¬ duced his father, Colonel Barclay, to send him to Paris, to be educated under the care of his

uncle, who was principal of the Scots College in that capital, and who offered to make him his heir if he would become a convert to the Roman Catholic religion. Barclay refused and soon afterward his father sent for him to re¬ turn home; and Colonel Barclay soon after be¬ coming a Quaker, his son followed his example. Uniting all the advantages of solid learning to great natural abilities, he soon distinguished himself by his talents and zeal in the support of his new opinions. His first treatise in sup¬ port of his adopted principles was published at Aberdeen in the year 1670, under the title of (Truth Cleared of Calumnies,' *etc.* To propa¬ gate the doctrines, as well as to maintain the credit he had gained for his sect, he published, in 1675, a regular treatise, in order to explain and defend the system of the Quakers, which production was also very favorably received. These and similar labors involved him in con¬ troversies with the leading members of the Uni¬ versity of Aberdeen, and others ; but he was at the same time busy with his great work in Latin, (An Apology for the True Christian Divinity, as the Same is Preached and Held Forth by

the People in Scorn Called Quakers,' published at Amsterdam in 1676; an English translation appeared later in the same year. He traveled with William Penn and George Foxe through the greater part of England, Hol¬ land and Germany, to spread the opinions of the Quakers. He with other Quakers was im¬ prisoned for five months at Ury because of his beliefs, but enjoyed the royal favor after his release, and in 1683 was made nominal governor of East Jersey under patent to the Society of Friends by the Duke of York. He never came to America, however. His estate remained in the possession of his descendants until 1854. His study remained as he left it for about two centuries when it was pulled down. The last of his productions, in defense of the theory of the Quakers, was a long Latin letter addressed, in 1676, to Adrian de Paets, (On the Possibility and Necessity of an Inward and Immediate Revelation.) It was not published in England until 1686. With few exceptions, both partisans and opponents unite in the profession of great respect for the character and talents of Bar¬ clay. Besides the works already mentioned or alluded to, he wrote (Catechism and Confes¬ sion of Faith' (1673); (Theses Theologise' (1675), of which the Apology was a defense; (The Anarchy of Ranters ' (1676) ; (Universal Love Considered and Established Upon Its Right Foundation' (1677) ; and various replies to the most able opponents of his Apology. In 1692 a collected edition of his works appeared under the title (Truth Triumphant.) It was republished in 1717-18. The 'Apology,' Cate¬ chism, } and (Treatise on Church Government) (formerly called 'The Anarchy of the Ranters') have been issued by the Friends' Book Store (Philadelphia). Consult Armistead, William, (Life of Robert Barclay' (Manchester 1850). See Quakers.

BARCLAY, Robert Heriot, British naval officer: b. Scotland 1785; d. 1837. He served with Nelson at Trafalgar, and lost an arm in the battle. He was sent out to command the British flotilla on the Lakes in 1813, and was defeated by Commodore Perry at the battle of Lake Erie on 10 September of that year. He

was subsequently court-martialed for the loss of his fleet, but was ((fully and honorably ac¬ quitted.®

BARCLAY, Sir Thomas, English jurist: b. Dunfermline, Scotland, 1853. He was edu¬ cated at University College, London, and at the universities of London, Bonn, Paris and Jena. He went to Paris as a correspondent of the 7 imes in 1876. He resigned this post in 1882 to devote himself exclusively to French law practice. Since 1900 he has identified himself with the active agitation for a good under¬ standing with France. He visited the United States in 1903-04, and there stirred up agitation for an Anglo-American treaty of arbitration and conciliation. In 1905, at the invitation of the Associated Chambers of Germany, he visited Berlin and delivered addresses in favor of im¬ proving Anglo-German relations, and in the same year founded the International Brother¬ hood Alliance (Fraternitas Inter Gentes) for the encouragement of personal relations among the laboring classes of different countries. He was knighted in 1904, and became member of Parliament for Blackburn in 1910. He is an officer of the Legion of Honor and Knight of the Order of Leopold. He has published (Problems of International Practice and Diplomacy) (1907) ; (The Turco-ltalian War and Its Problems* (1912) ; (Companies in France'* (2d ed., 1899), and other law books, and the articles on international law in the Encyclo¬ pedia of the Law of England) and the Encyclo¬ pedia Britannica* ; (Thirty Years of Anglo-French Reminiscences) (1914) ; Eaw and Usage of War* (1914), and articles in The Nineteenth Century, *etc.*

BARCLAY DE TOLLY, Michael, Prince,

distinguished Russian general : b. Livonia 1761; d. Insterburg, 14 May 1818. He entered the army at an early age, and his long service as a subordinate in campaigns against the Turks, Swedes and Poles laid the basis of a valuable experience, and served to develop his great natural capacity for command. In 1810 he was made Minister of War. He occupied this position in 1812, when Napoleon invaded Russia, but was soon appointed to the chief command of the army. He adopted a plan of retreat, which was soon seen to be a strict necessity, as the Russian army, officially estimated at more than 500,000, did not greatly exceed 100,000 men. In this difficult campaign Barclay proved no un¬ worthy opponent of Napoleon himself. Not¬ withstanding, the Russians became impatient of a policy which seemed to show no active re¬ sults, while jealousy of the Scottish extraction of Barclay and other causes completed his over¬ throw, and after the capture of Smolensk by the French he was superseded by Kutusoff. Serving under his successor, he commanded the right wing of the Russian army at

the battle of Moscow, maintained his position, and cov¬ ered the retreat of the rest of the army. After the battle of Bautzen, in 1813, at which he again distinguished himself, he was reappointed to the chief command, which he had soon after to resign to Prince Schwarzenberg. He forced the surrender of General Vandamme, who had been detached by Napoleon for some special opera¬ tions, after the battle of Dresden, and took part in the decisive battle of Leipzig. On cross¬ ing the Rhine at the head of the Russian troops

he issued a strict proclamation, forbidding all license on the part of his soldiers, and by the maintenance of an exact discipline he concili¬ ated the French as much as possible to the in¬ vaders. He was made a field-marshal in Paris. In 1815 he commanded a mixed corps of con¬ tinental troops. In this year he received from the Emperor the title of prince, and from Louis XVIII the badge of the Order of Mili¬ tary Merit. The Emperor Alexander caused a statue to be erected to him in one of the prin¬ cipal places of Saint Petersburg.

BARCLAY SOUND, an inlet on the west coast of Vancouver Island. It is some 35 miles in extent and the Alberni Canal continues it yet farther inland. It contains several islands and iron ore is found along its shores.

BAR-COCHEBAS, BAR-COCHAB, or BAR KOKBA, the name given to one Simeon, a celebrated Jewish impostor of the 2d century a.d., who pretended to be the Messiah. He called himself, or was called by his follow¬ ers, Bar-Cochba, meaning Son of the Star, and applied to himself Balaam's prophecy, (<There shall come a star out of Jacob,® *etc.* He obtained the support of the celebrated Rabbi Akiba, and availing himself of the general dissatisfaction produced among the Jews by Hadrian's at¬ tempt to erect a temple to Jupiter on the site of the temple of Jerusalem, raised the standard of revolt, and soon mustered numerous followers. After carrying on a kind of guerilla warfare, he made himself master of Jerusalem about 132, and gained possession of about 50 fortified places. Hadrian, who had at first despised the insurrection, now saw the necessity of acting more vigorously, and sent to Britain for Julius Severus, one of his ablest generals, who, avoid¬ ing a general engagement, gradually made him¬ self master of the different forts which the rebels possessed, and then, though not without great loss, took and destroyed Jerusalem. Bar-cochba retired to a mountain fortress, and perished in the assault of it by the Romans three years after, about 135. Consult Dren-bourg, Eistoire de la Palestine) ; Schlattler, (Geschichte Israels,* and article

<(Bar Kokba** in the (Jewish Encyclopedia. *

BARD, John, American physician : b. near Philadelphia, February 1716; d. 30 March 1799. He was of a family which had fled from France upon the revocation of the edict of Nantes. He practised his profession a f.ew Aears in Philadelphia, but removed to New York in 1746, where he rose to the first rank among physicians. In 1759, the citizens of New York were alarmed by the arrival of a ship, on board which a malignant fever was raging, and Dr. Bard was appointed to take measures to pre¬ vent the disease from spreading. He succeeded in keeping the pestilence within the limits of a temporary hospital, but to guard against similar dangers in future, at his suggestion, Bedloe's Island was purchased, and hospital buildings erected thereon, which were placed under his charge. He continued the practice of his profession to an advanced age, and upon the establishment of the New York Medi¬ cal Society in 1788 was elected its first presi¬ dent.

BARD, Thomas Robert, American politi¬ cian : b. Chambersburg, Pa.. 8 Dec. 1841 ; d.

Hueneme, Cal., 5 March 1915. He engaged in railroading in Maryland 1858-64, when he went to California to attend to the interests of Col. Thomas A. Scott. From this time he resided in Ventura County, engaging in wharving and warehousing, banking, sheep grazing, real estate and petroleum mining. In 1892 he was the only Republican elector for California. He was elected to the United States Senate 7 Feb. 1900 by the unanimous vote of the Republican majority in the legislature and served until

1905.

BARD, Italy, a fortress and village, about 23 miles southeast of Aosta. The fortress, which stands on a huge mass of rock at an elevation of 1,019 feet, has been thrice taken : in 1052 by Duke Amedeus of Savoy; by the French during the War of the Spanish Succes¬ sion in 1704; and in 1800, before the Battle of Marengo, when the troops of Napoleon, hav¬ ing crossed the Saint Bernard, found their further advance into Italy checked here by 400 Austrians, who maintained a stubborn de¬ fense for a week. Ultimately Napoleon con¬ trived to elude the vigilance of the garrison, and passed by a mountain-track during the night.

BARD, a designation applied to the ancient poets of the Celtic tribes, who in battle raised the war-cry, and in peace sang the exploits of their heroes, celebrated the attributes of their gods and chronicled the history of their nation. Their early history is uncertain. Diodorus tells us that the Celts had bards, who sang to musical instruments ; and Strabo testifies that they were treated with respect approaching to veneration. There is a passage in the (Germania} of Tacitus in which a word occurs that some have read as barditus, and translated ((Bard's Song® ; but baritus appears to be the true reading, and the true signification merely ˆWar-cry.®

The first Welsh bards of whom anything is extant are Taliesin, Aneurin and Llywarch Hen, of the 6th century ; but their language is imperfectly understood. From the days of these early representatives of the bards we have nothing further till the middle of the 10th cen¬ tury, when the reputation of the order was in¬ creased under the auspices of Howel Dha. A code of laws was framed by that prince to regulate their duties and fix their privileges. They were distributed into three classes, with a fixed allowance ; degrees of rank were estab¬ lished, and regular prize contests, known as eisteddfods, were instituted. Their order was frequently honored by the admission of princes, among whom was Llewellyn, last King of Wales. The Britons, kept in awe as they were by the Romans, subsequently harassed by the English, and jealous of the attacks, the encroachment, and the neighborhood of aliens, were, on this account, attached to their Celtic manners. This situation and these circum¬ stances inspired them with a proud and ob¬ stinate determination to maintain a national distinction, and preserve their ancient usages, among which the bardic profession is so eminent. Sensible of the influence of their traditional poetry in keeping alive the ideas of military valor and of ancient glory

among the people, Edward I is said to have collected all the Welsh bards, and caused them to be hanged

by martial law as stirrers up of sedition. On this incident is founded Gray's well-known ode (The Bard.* We, however, find them existing at a much later period, but confining themselves to the humble task of compiling private genealo¬ gies. But little is known of the music and meas¬ ures of the bards; their prosody depended much on alliteration; their instruments were the harp, the pipe and the erwth. Attempts have been made in Wales for the revival of bardism, and the Cambrian Society was formed in 1818, for the preservation of the remains of this ancient literature and for the encourage¬ ment of the national muse. Within recent years the eisteddfods have again assumed a national importance. The bardic institution of the Irish bears a strong affinity to that of the Welsh. The professional bardic schools only disappeared at the end of the 18th century. The genealogical sonnets of the Irish bards are still the chief foundations of the ancient history of Ireland. Their songs are strongly marked with the traces of Skaldic imagination, which still appears among the (<tale-tellers,® a sort of poetical historians, supposed to be the descend¬ ants of the bards. There was also evidently a connection of the Welsh with Armorica. Hence, in the early French romances, we often find the scene laid in Wales ; and, on the other hand, many fictions have passed from the Troubadours into the tales of the Welsh. In the Highlands of Scotland bards were in exist¬ ence down to the 1 7th century. Considerable remains of compositions supposed to be those of the old bards are still preserved. Consult Jones, (Relics of the Welsh Bards) (London 1784) ; Stephens, (Literature of the Kymry) (London 1873) ; Hyde, (Literary History of Ireland) (New York 1906) ; Hull, (Irish Literature) (Vol. II, London 1908) ; Walker, (Memoirs of the Irish Bards) (London 1786).

BARDE, Frederick Samuel, American

writer and naturalist: b. Hannibal, Mo., 25 July 1869; d. Guthrie, Okla., 23 July 1916. After receiving an academic education at Sedalia, he began work as a newspaper reporter at that place. In 1894 he joined the staff of the Kan¬ sas City Star and, four years later, was sent as its representative to Guthrie, then the capital of Oklahoma Territory. Reporting legislative sessions, political conventions and statehood gatherings and visiting all parts of the Indian and Oklahoma Territories, his acquaintance with the people and their history and institu¬ tions became very thorough and his remarkable aptitude for discernment and analysis, coupled with his ability as a writer, gave

him a hearing and a measure of influence that is seldom ex¬ erted by an independent writer. Many of his contributions were published in metropolitan papers and magazines in the Eastern cities. He edited and aided in the publication of several books, among them (The Life of Billv Dixon *(buffalo hunter), Gen. J. C. Jamison's (With Walker in Nicaragua) and Doolin's (Outdoor Oklahoma.* For many years an ardent sports¬ man, in his later years he gave up the rod and gun for the camera and became known as one of the most successful wild bird and animal photographers in America. The Oklahoma legislature (1917) made a special appropriation for the purchase of his manuscripts, field-notes, photographs, negatives and other material per-BARDEEN — BARDSTOWN

laming to the history, folklore, fauna and flora of the State, the collection to be deposited with the Oklahoma Historical Society.

BARDEEN, Charles William, American editor and author : b. Groton, Mass., 28 Aug. 1847. He served with the 1st Massachusetts Volunteers in the Civil War, 1862-64, and was graduated at Yale University in 1869. He held several educational positions in the years fol¬ lowing and in 1872 became superintendent of schools at Whitehall, N. Y. He has been editor and publisher of the School Bulletin since 1874. He was placed in charge of the educational publications at the International Congress of 1893, was president of the Educational Press Association of America 1900-06. His published works include (Manual of School Law' (1875) ; 'Some Facts About Our Public School System' (1878); 'Educational Journalism' (1881); 'Teaching as a Business for Men) (1885); 'The Teacher As He Should Be) (1891) ; 'History of Educational Journalism in New York) (1893) ; 'Geography of the Empire State' (1895); 'Problems of City School Management' (1899); 'Dictionary of Educational Biography' (1901) ; 'Educational Journalism for the Past Fifty Years' (1906); 'Fables for Teachers' (1909); 'A Shattered Halo' (1912); 'The Trial Balance' (1913); 'The Girl from Girton' (1913).

BARDELL, Mrs., the obliging landlady of Mr. Pickwick in Dickens' 'Pickwick Papers,' and the heroine of the famous 'Bardell vs. Pickwick' case.

BARDESANES, bar-de-sa'nez, Syrian poet and theologian, who lived in the latter half of the 2d century, in Edessa, and is memorable for the peculiarity of his doctrines, which were taught through 150 hymns ascribed to him and in use in the Church till the 4th century. He considered the evil in the world only an acci¬ dental reaction of matter, and all life as the offspring of male and female 2Eons. From God, the inscrutable Principle of all substances, and from the consort of this first Principle, proceeded Christ, the Son of the Living, and a female Holy Ghost; from these, the spirits or created powers of the four elements; this forming the holy eight, or the godlike fullness, whose visible copies he found in the sun, moon and stars, and therefore attributed to these all the changes of nature and of human destiny. The female Holy Ghost, impregnated by the Son of the Living, was, according to him, the Creator of the world. The human soul, origi¬ nally of the nature of the /Eons, was confined in the material body only as a punishment to its fall, but not subjected to the dominion of the stars. He considered Jesus, the 2Eon, des¬ tined for the salvation of souls, only a feigned man, and his death only a feigned death, but his doctrine the sure means to fill the souls of men with ardent desires for their celestial home, and to lead them back to God, to whom they go immediately after death, and without a resurrection of the earthly body. Bardesanes propagated this doctrine in Syrian hymns, and is the first writer of h}rmns in this language. The Bardesanists did not formally separate themselves from the orthodox Christian Church, and they maintained themselves until t he 5th century. A fragment of the work of

Bardesanes upon destiny is preserved in the Greek language, by Eusebius, 'Pnepar. Evangel.' (lib. vi, cap. 103). He led an irreproachable life. Consult Helgenfeld, 'Bardesanes' (1864).

BARDILI, Christoph Gottfried, German metaphysician: b. Blaubeuren, Wiirtemberg, 28 May 1761 ; d. Stuttgart, 5 June 1808. He was distinguished as a critic and opponent of Kant, and philosophically a forerunner of Schelling and Hegel through his exposition and defense of the reality of pure abstract thought as a ground of concrete thinking and being.

BARDOLPH, Shakespearean character. He is one of the dissolute comrades of Falstaff and appears in the plays 'Henry IV,' parts I and II; 'Henry V'; and Merry Wives of Windsor.'

BARDOWICK, bar'da-vek, Germany, town in Hanover, once . the

commercial centre of northern Germany, but now an insignificant village, famous for the ruins of a one-time magnificent cathedral, dating from before the destruction of the town in 1189. The region is fertile, and the town is a centre for trade in farm products. Pop. 2,200.

BARDS. Spelled variously barde, barding, *etc.* Horse-armor, often wrongly termed caparisons. The latter is the term for rich coverings (housings) spread over the back of horses on ceremonial occasions, whereas the bardings were to protect the war-horse (de¬ strier) in combat. The ancient Dacian mounted spearmen's (cataphracti) horses were entirely covered with scale armor, including head and feet. The Etruscans used a chest protection (plastron) for war-horses; the Persians and Greeks used a horse frontal. A testih'e of leather covering the entire head of the horse was known in very early days in Europe. By the 13th century chain armor (called "trapper of mail") for horses was used in Europe; the leather "breast-piece" is mentioned in 1347. Plate armor for horses was introduced into Europe, piece by piece, in the Middle Ages to become a complete panoply by the middle of the 15th century. The full set (panoply) consisted of chanfron, crinet, peytral, flan-chard, croupiere, tail-guard, rein-guard. The purposes for these different pieces were as follows :

Chanfron (spelled variously chamfron, champfrein, etc.) or frontal, a guard for the forepart of the horse's head (with or without blinkers). Crinet, criniere or crinale, armor for the neck of the horse. Peytral, polytral, poit-rail or poitrinal, a brestplate. Flanchard, armor to protect the flanks. Crupper, or croupiere, a protection for the horse's rear. Tail-guard, a tubular appendix to the croupiere, served to protect the tail. Rein-guard, hinged plates protecting the reins.

The above full panoply became quite general by the middle of the 16th century, but from that time was, piece after piece, discarded till by 1600, horse armor was becoming rare. Armor for the horse's legs was rarely used. In order to reduce the effect of chafing, horse armor was lined wTith leather.

Clement W. Coumbe.

BARDSTOWN, Ky., city and county-seat of Nelson County, 40 miles southeast of Louis¬ ville, on the Louisville and Nashville Railroad.

It is the seat of Bethlehem Academy and of Saint Joseph's College. It contains flour mills, saw mills, chair, broom and concrete works and a barrel factory. The city has a large trade in cattle, grain and hogs. The municipality owns the waterworks and lighting plant. From 1808 to 1841 Bardstown was the seat of a Roman Catholic bishopric, which was transferred to Louisville in the latter year. Pop. (1920)

1,717.

BARDWAN, burd-wan', India, a division

of Bengal, upon the Hugh, about 75 miles from Calcutta. Area, 13,850 square miles ; pop. 8,- 245,000. Apart from its products, rice, grain, hemp, cotton, indigo, etc., it has a noted coal field of about 500 square miles in area, with an annual output of about 500,000 tons. The cap¬ ital of the same name has a population of about 35,000. It is a miserable place — an aggregate of second-rate suburbs — but contains numer¬ ous temples and a large palace.

BAREBONE, or BARBON, Praise-God,

the name of a leather seller in Fleet street in London, well known in his day as a prominent preacher among the Baptists: b. about 1596; d. 1679. He made himself notorious as an en¬ emy of the monarchy and in 1660 on Monk's arrival in London, Barebone, at the head of a numerous mob, presented a petition to Parlia¬ ment against the restoration of the Stuarts. In 1661 he was committed to the Tower and remained for some time in confinement.

BAREBONES PARLIAMENT, a deri¬ sive term applied to the ((Little Parliament® sum¬ moned by Oliver Cromwell 4 July 1653. After the dismissal of the ((Rump,® 20 April 1653, letters were sent out in name of Cromwell and of the Council of the Army to the Con¬ gregational churches in each county, inviting them to nominate fit persons, <(faithful, fearing God and hating covetousness,® to serve in Par¬ liament. These lists were duly sent in, sub¬ jected to scrutiny by the army council and names excluded from or additions made by that body. This Parliament consisted of 140 members — 129 from England, 6 from Ireland and 5 from Scotland; and to it Cromwell made over his dictatorship. This ((Assembly of Nom¬ inees® began by

abolishing the Court of Chancery and was proceeding to abolish tithes when under pressure by the army the majority resigned in a body ; Cromwell dissolved Par¬ liament on 12 December of the same year and immediately thereafter assumed the lord pro¬ tectorate of the kingdom. Its title is taken from one Barebone, a tanner, one of the mem¬ bers for the city of London. Judged by mod¬ ern standards, some of its proposals showed political wisdom : civil marriages and the due registration thereof may be cited as an exam¬ ple. Consult Glass, H. A., (The Barebones Parliament > (London 1899).

BAREFOOTED FRIARS. See Friars.

BAREGE ba-razh, a light, open tissue of silk and worsted or cotton and worsted for women's dresses, originally manufactured near Bareges, France, and in that country known as crepe de barege. The fabric is now chiefly manufactured at Bagneres de Bigorre.

BAREGES (ancient Valletria), France, watering place in the south of France, depart¬ ment of the Hautes-Pyrenees, 22 miles south

from Tarbes, and celebrated for its thermal springs. The springs are considered efficacious for rheumatism, scrofula and old wounds. It is situated in a valley between two perpendicu¬ lar chains of mountains, along with numerous other villages. From June to September it is crowded with patients, and the bath establish¬ ment is a spacious marble building. A military hospital and an ecclesiastical charity hospital are also prominent local institutions. Extreme cold and the danger of frequent avalanches almost depopulate the town in winter.

BAREILLY, ba-ra'le, Hindustan, town in the northwest provinces, capital of a district of the same name, 151 miles east-southeast from Delhi. It has a pleasant and elevated site, and contains one well-built street, an old and a new fort, and cantonments in the environs. The principal manufactures are orna¬ mental furniture, sword-cutlery, gold and silver lace and perfumery. There is a brisk and lucrative commerce in grain, cotton and sugar, the tax on which is the chief source of mu¬ nicipal revenue. On the outbreak of the Indian mutiny the native garrison mutinied and took possession of the place. It was retaken by Lord Clyde in Ma}ˆ 1858. Pop. 129,462.

BARENTZ, William, Dutch navigator: b. about 1560, who discovered Nova Zembla in 1594. While on a third expedition to the same region, in 1596, he discovered Spitzbergen, but had to spend the winter of

1596—97 in Nova Zembla. He and his companions suffered great hardships which led to his death on the home¬ ward journey. Relics of his expedition were discovered undisturbed in 1871.

BARERE DE VIEUZAC, bii-rar-de-vye- zak, Bertrand, French revolutionist and agi¬ tator: b. Tarbes, 10 Sept. 1755; d. 14 Jan. 1841. An advocate of Toulouse, he acted as a deputy in the National Assembly, and was sent by the department of the Hautes-Pyrenees to the Na¬ tional Convention in 1792. He soon became active as a journalist, and attached himself to the Mountain , supporting it with eloquence of such a flowery and poetical style as afterward earned him the name of the ((Anacreon of the guillotine.® He was president of the conven¬ tion when the sentence was passed upon Louis XVI. He rejected the appeal to the people, and gave his vote with these words : ((The law is for death, and I am here only as the organ of the law.® Though a supporter of Robespierre, he concurred in his downfall, yet this did not save him from being impeached and sentenced to transportation. His sentence was not carried into effect, and he shared in the general am¬ nesty of the 18th Brumaire. Elected a deputy during the Hundred Days, he was banished after the second restoration. He went to Brus¬ sels, where he devoted himself to literary work till the revolution of July permitted his return.

BARETTI, ba-ret'te, Giuseppe Marc' An¬ tonio, Italian writer: b. Turin 1719; d. 5 May 1789. In 1751 he took up residence in London. In 1753 he published a dissertation on Italian Poets. } About this time he was introduced to Johnson, then engaged in the compilation of his (Dictionary, > of which Baretti availed him¬ self to compile an Italian and English diction¬ ary in 1760, much more complete than any which had hitherto appeared, and which estab¬ lished his reputation as a scholar. In this year

he visited his native country, and published at \ enice a critical journal, the Frusta Let-teraria, which was soon suppressed. He re¬ turned to England in 1766, and in 1768 pub¬ lished an (Account of the Manners and Customs of Italy.) While defending himself in a

street brawl he mortally wounded one of his assailants, and was tried for murder at the Old Bailey, but acquitted. On this occa¬ sion Johnson, Burke, Goldsmith, Garrick and Reynolds gave testimony to his good character. In 1770 he published his (Journey from London to Genoa through England, Portugal, Spain and France, } and continued to publish intro¬ ductory works for students in the Italian and other modern languages, and superintended an edition of Machiavelli's works. He was the author in all of 36 volumes. His (Opere Scritte in Lingua Italiana) appeared at Milan in six volumes in 1813-18. Baron Pietri Custodi published his (Scritti Scelti, Inediti, o RarP (1822). Consult L. Collison Morley, (G. Baretti, with an Account of His Literary Friends) (London 1909).

BARGE CANAL, The New York State.

The improvement of the New York State canals authorized by a vote of the people in 1903 has become popularly known as the Barge Canal. This phrase is without particular sig¬ nificance in itself, being but the shortened form of ((Thousand-ton barge canal, » the name which was first given, based on the proposed size, but which is now a misnomer, since subsequent legislation has increased the capacity of the canal two or three fold.

The Barge Canal is the improvement of four branches of the State waterway system. These canals had already undergone various enlarge¬ ments, but the Barge Canal is more than an en¬ largement, in several respects it is a radical change in form of construction. Of these changes, three are especially prominent. First, the new canal has no towing-path and conse¬ quently no animal towage. Again, electrically-driven machinery replaces hand-operation. But the greatest change is the substitution of river canalization for independent canals. When the original State canals were built the best practice of the time dictated a channel separated from the natural streams. Canal-builders naturally sought the valleys, but they put their waterways away from and slightly above the stream beds. Modern practice, because of ability to cope with floods, boldly chooses the valley ' bottoms and makes the natural stream into a canal. This procedure has largely changed the locations of canals in New York, in some instances placing the new channel several miles from the old waterway. Briefly to summarize the chief changes — the Barge Canal is a thorough mod¬ ernization in size, construction and equipment.

The four branches improved are: (1) The Erie, or main canal, which stretches across the State from east to west and joins the Hudson River with Lake Erie; (2) the Champlain, which runs northerly from the

eastern terminus of the Erie and enters the head of Lake Cham¬ plain ; (3) the Oswego, which starts north,

midway on the line of the Erie, and reaches Lake Ontario; (4) the Cayuga and Seneca, which leaves the Erie a little to the west of the Oswego junction and extends south, first to Cayuga Lake and then to Seneca Lake.

The Barge Canal, while differing from the earlier canals in many respects, is really but a stage in the development of the State water¬ ways. The original Erie and Champlain canals, completed in 1825 and 1823, respectively, were so successful that a veritable mania for canal¬ building spread over both the State and nation. In New York this agitation resulted in the building of several additional canals and in the enlargement of the original Erie within 11 years after its opening, and a few years later in the enlargement of the three other canals which are now parts of the Barge Canal im¬ provement. This first enlargement was pro¬ tracted through 26 years and even then was not entirely finished. About a decade later a popu¬ lar feeling of opposition to canals became so strong as to bring about, within the next half dozen years, the abandonment of several lateral branches. However, shortly after this the ad¬ verse sentiment gave place to a favorable atti¬ tude and an improvement was undertaken which proved to be the beginning of a reawaken¬ ing of interest in canals that has endured until the present time.

This period of reawakening found its first expression in 1884 in the lengthening of locks. In 1892 came the first official suggestion of an enlargement similar to what has become the Barge Canal. The Constitutional Convention of 1894, recognizing the popular demand for improved canals, included an article in its pro¬ posed amendments whereby such improvement could be authorized. This enlargement, ordered bv the people in 1895 and calling for nine feet depth in the Erie and Oswego canals and seven feet in the Champlain Canal, owing to the ex¬ haustion of funds, was but partially completed.

At the beginning of 1899 the State found itself in a quandary. The old canals were antiquated; the attempted improvement was unavailable without considerable additional outlay. As a result a committee of eminent citizens was appointed, with authority to study the whole situation and in effect to formulate a canal policy for the State. This committee reported to the legislature of 1900, giving rough estimates for completing the attempted enlarge¬ ment and also for making

improvements on lines substantially like those later adopted, and recommending for immediate action the making of careful surveys and estimates for the latter scheme. Almost contemporaneously with the work of this committee, two Federal investiga¬ tions had been in progress — the Deep Water¬ ways survey and a study of relative costs of transportation between lakes and sea by ships and by barges. These investigations produced valuable data and helped mold public sentiment.

The recommended survey was made in 1900, with a report to the legislature in 1901. In¬ ability of canal advocates to concentrate on any one plan delayed legislative action till 1903. Then, after a revision of estimates, the meas¬ ure was referred for a vote at the 1903 fall election. It was carried by a substantial ma¬ jority and authorized the expenditure of $101,- 000,000 for improving the Erie, Champlain and Oswego canals. Plans were begun at once, but the undertaking was so enormous that actual construction did not begin till the spring of 1905. In 1909, after surveys had been made, the Cayuga and Seneca Canal was ordered to

be enlarged to Barge Canal dimensions by a second referendum, which appropriated $7,- 1)00,000. Construction progressed steadily till 1915, when it became necessary to provide $27,000,000 more, for the purpose of complet¬ ing the three canals first undertaken. This was done by another referendum and was necessi¬ tated largely by court awards for damage and property claims and in lesser measure by very greatly increased costs for labor and materials.

To provide suitable terminals for the new canals, a fund of $19,800,000 became available by a vote of the people in 1911. Several years' agitation preceded this action. In 1909 a com¬ mission composed of certain State officials had been appointed to investigate and report on the subject. In 1910 this commission was sent to Europe to study the terminals there.

The Barge Canal may be aptly called Nature's gateway to the heart of

the continent. Nature surely prepared the route. The Hudson, which has a safe and commodious harbor at its mouth, is the only navigable Atlantic sea¬ board river in the United States which cuts the coast range of mountains. In the centre of the State a second range makes way for a valley. At Little Falls a rocky barrier was pierced during the last glacial overflow by the waters of the Great Lakes. Also natural watercourses across the State — one from east to west across the centre, one from the extreme south to the extreme north across the eastern side and one almost across from north to south at the centre — are provisions which man has appreciated and utilized. Westward from the canals the Great Lakes extend a thousand miles inland.

There are 442.6 miles of construction in the new canals. The 358.7 miles of intervening lakes and adjoining rivers make a total of 801.3 miles — the length of the State waterway system of Barge Canal dimensions. Of this whole system about 72 per cent of the length is in river or lake channel. Thus it appears that the Barge Canal is largely a river canalization scheme. A brief description of the route will give force to this statement.

The Hudson River from the ocean to the mouth of the Mohawk is the first link. The bed or valley of the Mohawk is utilized from the Hudson to the old portage near Rome. Then Wood Creek, Oneida Lake, and Oneida, Seneca and Clyde rivers are used, carrying the channel to the western part of the State, where the streams run north and the alignment of the old channel is retained for the new canal. The other branches of the Barge Canal occupy natural streams throughout most of their length, the Champlain branch lying in the canalized Hudson River and Wood Creek, the Oswego branch utilizing Oswego River, and the Cayuga and Seneca Canal occupying the bed of Seneca River. Also Lake Champlain and Onondaga, Cross, Cayuga and Seneca lakes form parts of the waterway system.

There are various <(land lines,® for passing around dams, cutting off bends and other pur¬ poses, and in the western part of the State the new channel is largely a widening and deepening of the old canal.

The dimensions of the Barge Canal are the same for all four branches. Briefly, the mini¬ mum channel jn earth cutting in the independent

or artificial canal, or land line, is 75 feet wide at bottom and 123 to 171 feet at water-surface. In rock cutting, with nearly vertical sides, the width is 94 feet. In river and lake channels the width is from 150

to 200 feet. There is a depth of 12 feet throughout. The actual dimensions vary greatly, but the minimum size is fixed by law. The locks have generally been reported to have a length of from 338 to 343 feet between gates (310 feet available length) and a width of 45 feet. However, from actual measurements after construction it has been found that the largest parallelogram to fit all the locks is limited to 300 feet by 44.44 feet. Boats having ends to conform to a certain rounded head-wall may utilize 10 feet more.

The critical points in supplying water to canals are the summit levels. The new Erie Canal has one summit level — in the vicinity of Rome — and one half-summit — at the Lake Erie end. A glance at the profile will show these summits and how the canal descends from them. The natural flow of the streams which are canalized to form the Barge Canal is in general sufficient to maintain the requisite depth of water in the levels between the locks and also to supply the water required for lockage and incidental operations.

The greatest independent water-supply for the Erie Canal is that for the western section. Fortunately an almost unlimited supply is avail¬ able by tapping the Niagara River. From here it is necessary to carry a continuous supply easterly to the Seneca River. In order to pass this water in requisite volume, the canal bottom on the long levels has been given a proper grade, which provides for carrying at least 1,237 cubic feet per second. It is estimated that this supply is adequate, not only for 10,000,000 tons seasonal traffic, for which the Barge Canal is designed, but also for the maximum traffic which the canal is capable of handling, namely, from 18,500,000 to 20,000,000 tons per season. To furnish the Rome summit level the existing sources of supply are retained and two new reservoirs, Delta and Hinckley, are built. The old Rome level was supplied by an extensive system of reservoirs and feeders, built largely in the Adirondack region. This entire system is retained, together with such portions of the old canal as are needed to bring the waters to the Barge Canal.

The Champlain Canal has a summit level be¬ tween Lake Champlain and the Hudson River. The corresponding summit of the old canal was supplied by a feeder which took its water from the Hudson at Glens Falls. This same Glens Falls feeder, improved, supplies the needs of the northern portion of the new Champlain Canal, while the southern portion lies in the channel of the Hudson.

Seneca and Cayuga lakes, lying at the heads of their respective stretches of the Cayuga and Seneca Canal, form natural reservoirs to supply both this canal and the Erie branch between its junction with

the Cayuga and Seneca Canal and Three River Point.

The Oswego Canal begins at Three River Point. Here Oneida and Seneca rivers unite, bringing their natural flow and also a part of the supplies from the Rome level reservoirs and Lake Erie. As the canal is chiefly in the Oswego River, its needs are amply met.

BARGE CANAL

1 A Barge canal lock. First of the Erie canal, locking up out of the Hudson. Three old locks, used now as a

by-pass, at the right

2 Three of series of 5 locks (lock in view above is first of series) within stretch of lj miles, forming greatest series

of high lift locks in the world; aggregate lift, 169 feet

3 A dam 2,000 feet long for canalizing the lower Mohawk

BARGE CANAL

1

2 3

A dam 1,100 feet long and 100 feet high, forming a reservoir on Mohawk headwaters for Navigation of old-sized boats on typical river canalization Lock and movable dam of bridge type in Mohawk river

supplying canal

BARGE CANAL

1 A guard-gate — a structure placed at points where a break would seriously damage canal or adjacent territory

2 A lighthouse — one of three used for aiding navigation on Oneida lake

3 Barge canal terminal at Albany, ocean schooners and old-sized canal boats lying alongside

BARGE CANAL

Electric equipment oil the canal is of the newest design. In general a hydro-electric power station at each lock supplies the needed energy for lighting and operating. Some stations supply more than one lock, substations being provided where necessary. Gasoline electric stations are used at movable dams, where the head of water needed for developing power is destroyed by the act of raising the dam. i he turbines and generators in each station are in duplicate. Also hand-operating devices are available in case both sets of electric in¬ stallation are disabled.

The Barge Canal locks are built of concrete throughout, both side and cross walls and floor. At a few points, where favorable rock is en¬ countered, the concrete floor has been dispensed with. The lifts range from 6 feet to 40*4 feet. Within each side wall runs a culvert for filling and emptying the lock. The culverts are con¬ nected with ports that open into the chamber at the bottom of the walls. These culverts vary in size, the dimensions being 5 by 7 feet for locks of 12 feet lift or less, 6 by 8 feet for lifts between 12 and 23 feet, and 7 by 9 feet when the lift is 23 feet or more. The lock-gates are of the mitering, girder type, carrying the principal load as beams. They are built of steel, with single skin-plates, but have white oak quoin and toe-posts.

The quoin-post swings on a cast-steel pivot, set in the concrete, and is held at the top by an adjustable anchorage. The bearing is against cast-iron quoin-plates set in the side walls. The lock-gates are each opened and closed by a steel spar equipped with a heavy coil spring to absorb shock and secured to the gate by a bronze pin. This gate spar is also equipped with a rack actuated by a seven-horse-powrer motor acting through a train of gears designed to open or close the gates in about one minute. Movement of the gates is controlled from operating stands, located at each end of each side wall. The valves regulat¬ ing the flow of water to the culverts are sus¬ pended on two chains, which pass over chain wheels near the top of the valve wells to suitable cast-iron counterweights. The chain wheels are mounted on a shaft rotated by a motor operating through a train of gears. The movement of the valves is controlled in a manner similar to the movement of the gates. Electric capstans, one at each end of each lock, are provided to control the movement of boats* along the approach walls and to tow them into and out of the lock chamber.

Reinforced concrete power stations, 20 by 30 feet in plan and about 20 feet high, are, in general, constructed adjacent to the various locks. The hydro-electric power stations, operated by the water in the canal, are each equipped with two vertical-shaft turbines, which in all but a few cases are directly connected to 50-kilowatt vertical-shaft generators,, supplying direct current at 250 volts. The gasoline electric stations are each equipped with two generators directly connected to gasoline engines designed to operate at a speed of 600 revolutions per minute.

New York has recognized the supreme weakness of most American waterways — the lack of terminals and efficient freight-handling machinery — and is supplying these needs in the Barge Canal. However, it was eight years after

the canal was authorized before the terminals were added. But their construction has been pushed with such vigor that they are ready with the opening of the completed canal. These ter¬ minals are located at some 50 cities and vil¬ lages along the canals as well as on some of their connecting natural watercourses. The character of the terminal varies to meet the needs of each particular locality, but in gen¬ eral a terminal consists of a suitable place for dockage, the machinery for handling goods quickly and cheaply, a building for temporary storage and in many places connections with adjacent railways. The purpose of the State is to furnish a place where any shipper or boat¬ man may

have the advantages of efficient ter¬ minal facilities at a reasonable cost. Recent legislation has vested the State Public Service Commission with power to require connections to be built between railroads and canal ter¬ minals, as well as authority to regulate freight rates and control combinations of rail and water routes.

Since the Barge Canal lies so largely in lake and river channel, various aids to navigation are needed, such as lighthouses, range towers, beacons, buoys and markings on bridges. Lights, either fixed, flashing or occulting, are displayed by night. The Federal practice of marking channels has been adopted, but with the interpretation that upstream means proceed¬ ing away from the ocean toward the interior, irrespective of local conditions of actual up¬ stream or downstream. Thus in going westerly from the Hudson on the Erie Canal or in pro¬ ceeding away from the Erie Canal on any of the other canals, red lights are on the right or starboard side of the channel and white lights are on the left or port side. The buoys and beacons which show red lights are painted red, while those which show white lights are painted black, but this latter color will probably be changed to white.

A study of the distribution of population in New York State reveals some important condi¬ tions. It is discovered that within two miles of the State waterways live 73f4 per cent of the people of the State. If the distance is ex¬ tended so as to include the territory within 5, 10 and 20 miles, the percentages are 77, 82 and 87, respectively. Looking from another angle, it appears that within 20 miles lies 46 per cent of the area of the whole State. If lines are drawn on a map — one at 50 and one at 70 miles from the waterways — we find that 71 and 88 per cent, respectively, of the area lie within them. These are the respective distances which motor trucks of 3i and 2 tons' capacity can cover in a day's run, going and returning. This fertile field for motor truck operation in connection with the enlarged canals is full of promise. The importance commercially of the conditions revealed by this study is not gen¬ erally appreciated, but a little consideration will discover what it means to the State and to the country at large that there live within a half-hour's walk of the waterways three-quarters of the population of the State, about 7,000,000 people, or 7 per cent of the whole United States population, whose products and whose supplies may have available a means of cheap transportation.

The Barge Canal is the essential connecting link between two extensive and important waterway systems, which are in part existent and in part only projected. To the west lie the Great Lakes. Four noteworthy canals, to con¬ nect with these lakes, are in a fair way to be built. At the seaboard a project known as the Intracostal canals would give an inside pas¬ sage along a large portion of our Atlantic Coast. The Federal government has made sur¬ veys for most of these canals and some it has already built. Of this whole vast scheme, the mileage now in existence is already great — 1,500 miles in the Lakes and 800 miles in New York waterways. The intracoastal chain would add 1,800 miles and the projects adjacent to the Lakes at least 800 miles more.

At the beginning of the 1918 season, the Federal government, as a war measure, assumed control of the Barge Canal in so far as traffic is concerned.

Certain statistical data follow :

Erie Canal — 340.7 miles long ; 35 locks, 674.45 feet total lockage; 2 guard-locks; 1 terminal lock; 6 junction locks; 4 feeder locks. Cham¬ plain Canal — 62.6 miles long; 11 locks, 168.3 feet total lockage; 2 junction locks. Oswego Canal — 23.8 miles long; 7 locks, 118.6 feet total lockage. Cayuga and Seneca Canal — 92.7 miles long, including Cayuga and Seneca lakes ; 4 locks, 71.0 feet total lockage. Fifty-seven locks, 2 guard-locks and 1 terminal lock, all of Barge Canal dimensions, and 12 smaller locks have been built. Construction has included 30 new dams, 5 old dams with new crests and 5 old dams used without change; also 300 bridges and various other structures, including guard-gates, culverts, spillways, bulkheads, waste-weirs, by-passes, flumes, terminals, gate-houses, power-houses, warehouses, lighthouses and range towers. The total number of all kinds of structures exceeds 700. Some entirely new types of structure, siphon spillways and auto¬ matic crests on dams, have been originated in Barge Canal construction, and some novel and bold adaptations in design have occurred, such as the bridge type of movable dam, the siphon lock, the sector gate and an enormous Taintor gate. The first construction was begun on 24 April 1905 ; the first work on the Erie on 7 June 1905. Many finished portions have been put into use upon completion. The whole canal with full depth, but with isolated parts not yet of full width, is being put into use in 1918. A boat utilizing full

lock dimensions can carry about 3,000 tons, but probably not many boats more than half that capacity will be used.

Noble E. Whitford,

Senior Assistant Engineer, Department of State Engineer.

BARHADAD I, King of Damascus from about 885 to 844 b.c. He was the ally of Asa, King of Judah against Israel and also fought against Ahab. He also campaigned against Shalmanezer III. It is probable that he was murdered by the usurper Hazael (2 Kings viii,

9-15).

BARHADAD II, King of Damascus from 804 to 744 b.c. He was the son of the usurper Hazael. He formed a coalition against Zakir,

but was unsuccessful in the siege of Hazrak, Zakir's capital. Damascus was besieged in 803 and Barhadad was obliged to pay tribute to Adad-nirari IV, King of Assyria.

BARHAM, Richard Harris, English humorous writer: b. Canterbury, 6 Dec. 1788; d. 17 June 1845. Having been ordained a clergyman, he became in 1821 one of the minor canons of Saint Paul's Cathedral. In 1824 he was appointed a priest in ordinary of the chapel-royal, and was shortly afterward pre¬ sented to the rectory of the united parishes of Saint Mary Magdalene and Saint Gregory, London. In 1837, on the starting of Bentley's Miscellany, under the editorship of Charles Dickens, he laid the foundation of his literary fame by the publication in that periodical of the Hngoldsby Legends) — a series of humor¬ ous tales in verse and prose which achieved an immense success, having in a collective form, from 1840 onward, been published over and over again in various editions, with many "legends" added to the original number. His life has been written by his son. See Ingoldsby Legends.

BAR-HEBRZEUS (or Yuhanna Abul-faraj), Syrian bishop and historian: b. Mala-tiah 1226; d. Maragha, 30 July 1286. His father was a Jew by birth and the son became known as Bar-Hebraeus, that is, "son of the Hebrew." His father having moved to Antioch Bar-He¬ braeus completed his education there. He studied Arabic and Syriac, philosophy, theology and medicine, and acquired distinction among his contemporaries. In 1246 he was ordained at Tripolis as Jacobite

bishop of Gubas, near Malatia, and a year later was transferred to the neighboring diocese of Lakabhim, whence in 1253 he passed to be bishop of Aleppo. He was deposed soon after by his superior on ac¬ count of disputes about the patriarchate, and was restored to his sec in 1258. In 1264 he was promoted by the patriarch, Ignatius III, to be maphrian — the next rank below that of patriarch — an office he held until his death. To the modern student Bar-Hebraeus is im¬ portant as a historian. His Syriac 'Chronicle' is made up of three parts. The first is a history of secular events from the Creation to his own time and gives valuable informa- .tion regarding the history of southeastern Europe and western Asia. The second and third parts of the 'Chronicle' deal with the history of the Church. For theologians his 'Ansar Raze' ((Storehouse of Secrets') is of special value as a critical and doctrinal com¬ mentary on the texts of the Scriptures. A full list of his other works and of editions of such of them as have been published is con¬ tained in W. Wright's 'Syriac Literature.' The more important of them are ' Kethabha dhe-Bhabhatha' ('Book of the Pupils of the Eyes'), a treatise on logic or dialectics; 'Hewath Hekhmetha ('Butter of Wisdom'), an exposition of the Aristotelian system of philosophy; 'Sullaka Haunanaya' ('Ascent of the Mind'), a treatise on astronomy and cos¬ mography ; various medical works ; ' Kethabha dhe-Semhe' ('Book of Rays'), a treatise on grammar; ethic works, poems and 'Kethabha dhe-Thunnaye Meghahhekhane' ('Book of Entertaining Stories'), edited with translation

by E. A. Budge (London 1897). The gram¬ matical treatises were edited by Abbe Martin under the title (Oeuvres grammaticales d'Aboul Faradj dit Bar Hebrseus> (2 vols., Paris 1872). The (Chronicle, > the first part, was published by Bruns and Kirsch (Leipzig 1789) and in a superior edition by Bedjan (Paris 1890). The second and third parts were edited by Abbeloos and Lamy (3 vols., Paris and Louvain 1872-77). For the Bible commentary consult Gotts-berger, (Barhebraus und seine Scholien zur Heiligen Schrift) (Freiburg 1900).

BARI, a negro people of Africa, dwelling on both sides of the White Nile. Gondokoro is their chief town. They practise agriculture and cattle-raising. Their country was con¬ quered by Baker Pasha in 1871 for Egypt.

BARI, ba're (ancient Barium), Italy, im¬ portant seaport of southern Italy, in Apulia, capital of the province of Bari delle Puglie, and situated on a promontory of the Adriatic, 69 miles northwest of Brindisi. It was a place of some importance under the Romans, passed from them to the Saracens, and was afterward selected as the seat of government by the Northmen who conquered Apulia. It has been thrice destroyed and rebuilt on the same site. The present town, surrounded by walls and defended by a castle, consists of a poorly-built old town with a better part of more recent date. It is the see of an archbishop and pos¬ sesses a cathedral with a tower 260 feet high, dating from the early half of the 11th century, but largely spoiled by recent alterations. Its dome was renovated in 1905, and other altera¬ tions made. It contains paintings by Paolo Veronese, Tintoretto and Calabrese. The church of San Nicola dates from 1087; and there is also a royal lyceum. Bari manufac¬ tures cotton and linen goods, organs, pianos, hats, soap, glass and liquors, and has a trade in wine, grain, almonds, oil, *etc.* It has regular steamboat communication with Venice, Ancona, Trieste, Brindisi, Genoa and Marseilles. A United States consul is stationed here. Pop.

103,168.

BARIATINSKI, bar-ya-ten'ske, Alexan¬ der Ivanovich, Prince, Russian field-marshal : b 1814; d. Geneva, 9 March 1879. He was educated with the future Tsar Alexander II, and while a young officer in the hussars was trans¬ ferred to the Caucasus, where his successes against the famous Shamyl secured him, in 1852, the rank of lieutenant-general. On the accession of Alexander II he returned to Saint Petersburg, and in 1856 was appointed to the command of the army of the Caucasus. Three successful campaigns were closed by the storm¬ ing of Ghunib and the capture of Shamyl. For these services he was made a field-marshal. His health, however, had broken down, and the remainder of his life was passed chiefly abroad.

BARILI, ba-re'le, Philippines, a town in the province of Cebu, 27 miles from Cebu, its capital. Pop. about 32,000.

BARILLA, ba-re'-ya (Spanish, ((impure soda®), the commercial name

of a crude va¬ riety of soda obtained by burning certain fleshy plants that grow near the ocean and in other salty places. The Salsola soda was largely used for this purpose, and was cultivated in Spain,

Sicily, Sardinia and other places on account of the considerable yield of barilla that it fur¬ nished. The plants were cut in September, dried for about a month, and then burned on an iron grating, beneath which was a pit into which the fused ashes fell. The burning was continued until a ton or two of the ash had accumulated in the pit, after which the product was allowed to cool, and was then broken up and shipped to market. Barilla contains about 20 per cent of soda, the remainder consisting chiefly of chlorides and sulphates of sodium, calcium and aluminum. It was formerly much used in the manufacture of soap, but has now been almost entirely replaced by purer grades of soda, obtained by chemical means from com¬ mon salt. See Kelp.

BARING, the family name of one of the most influential financial establishments in the world, the well-known house of Baring Broth¬ ers & Company. John Baring, the father of the founders, was a German cloth maker who en¬ gaged in business in a small way at Larkbear, Devonshire, England, in the earlier half of the 18th century. His sons, Francis and John, established the firm of Baring Brothers in Lon¬ don in 1770. In November 1890, owing to the collapse of South American securities, the firm was threatened with suspension, and a financial crisis ensued. With liabilities of £20,000,000 and assets of £12,000,000, the position was grave. Goschen, then Chancellor of the Ex¬ chequer, was pressed by the governor of the Bank of England to pledge the national security for £1,000,000, which he refused to do for any private firm; but a timely loan from the Bank of France and the cooperation of the Roths¬ childs and the joint stock banks in raising a guarantee fund of £18,000,000 averted the crisis without government aid or the suspension of the Bank Act. Since that time the bank has been reorganized as a limited banking com¬ pany.

BARING, Alexander. See Ashburton, Alexander Baring, Lord.

BARING, Sir Evelyn. See Cromer, Ev¬ elyn Baring.

BARING, Sir Francis, English banker: b. Larkbear, England, 1740; d. 1810. He obtained a commercial training, founded the great finan¬ cial house of Baring Brothers & Company, became a director of the East India Company, and was created a baronet in 1793. He took an active part in the discussions relative to the Bank Restriction Act of

1797, and at the time of his death was reckoned the first merchant in Europe. His second son, Alexander, became 1st Baron Ashburton (q.v.).

BARING, Sir Francis Thornhill, English banker, son of Sir Thomas: b. 1796; d. 1866. Under successive Whig governments, he was a Lord of the Treasury, Secretary of Treas¬ ury, Chancellor of the Exchequer and First Lord of the Admiralty. He was created Baron . Northbrook in 1866.

BARING, Maurice, English author and journalist: b. 27 April 1874. He was educated at Eton and at Trinity College, Cambridge. He entered the diplomatic service in 1898, was at¬ tache to the British Embassy in Paris 1898— 1900, third secretary to the British Embassy in Copenhagen 1900-02, and was transferred to

Rome in 1902. He was employed in the For¬ eign Office 1903-04, and resigned from the serv¬ ice in the latter year. He acted as war cor¬ respondent for the Morning Post in Manchuria in 1904, in Russia 1905-08, and was special cor¬ respondent for the same journal in Constanti¬ nople in 1909. In 1912 he was correspondent for the London Times in the Balkans, was gazetted temporary lieutenant in the British expeditionary force on the outbreak of the European War in 1914, and was promoted staff lieutenant in 1915. He has written novels, essays, narratives and poems, including (Hildesheim and Quatre Pastiches) (1899) ; (The Black Prince) (1902) ; (Gaston de Foix >

(1903) ; (With the Russians in Manchuria) (1903) ; (Mahasena} (1905) ; ˆesiderio5 (1906) ; (Sonnets and Short Poems) (1906) ; (Thoughts on Art and Life of Leonardo da Vinci* (1906) ; (A Year in Russia) (1907) ; (Proserpine) (1908) ; (Russian Essays and

Stories) (1909) ; (Orpheus in Mayfair* (1909) ; (The Story of Forget Me Not) (1909) ; land¬ marks of Russian Literature) (1910) ; (Dead Letters) (1910) ; (The Glass Mender) (1910) ; diminutive Dramas) (1910) ; Collected Poems) (1911) ; (The Russian People) (1911) ; (The Grey Stocking and Other Plays) (1912) ; (Letters from the Near East) (1913) ; (Pala-mon and Arcite) (1913) ; (What I Saw in Rus-sia) (1913); dost Diaries) (1913); (The Mainsprings of Russia) (1914) ; (An Outline of Russian Literature) (1914) ; (Round the World in Any Number of Days* (1914), and contributions to the principal reviews.

BARING, Thomas, English banker and politician, brother of the first Lord North¬ brook: b. 1799; d. 1873. He devoted himself early to commercial pursuits, and also to poli¬ tics, in which he was a Conservative, thus tak¬ ing the opposite side to his brother. He entered Parliament in 1835, representing the borough of Huntingdon from 1844 till his death.

BARING, Thomas George, 1st Earl of

Northbrook: b. 1826; d. London, Eng., 15 Nov. 1904. He was successively a Lord of the Ad¬ miralty, UnderSecretary of State for India, UnderSecretary of War, governor-general of India (1872-76) and First Lord of the Ad¬ miralty (1880-85), and was created an earl in

BARING-GOULD, Sabine, English cler¬ gyman and novelist: b. Exeter, 28 Jan. 1834. He was graduated from Cambridge in 1856, and from 1881 was rector of Lew-Trenchard in Devon. Among his numerous works are (Iceland: Its Scenes and Sagas) (1864); (The Book of Werewolves) (1865); (Curious Myths of the Middle Ages> (1866-67) ; (Lives of the Saints* (1872-79); (Yorkshire Oddities) (1874) ; (Germany, Past and Present* (1879). Prominent among his novels and other later books are (Mehalah: a Story of the Salt Marshes) (1880) ; (Tohn Herring) (1883— 1913) ; (Red Spider) (1887) ; (Grettis the Out¬ law } (1890) ; (The Broom Squire) (1896) ; (Guavas the Tinner) (1897) ; (Bladys* (1897); (Domitia* (1898); (Pablo the Priest) (1899) ; (A Book of the West* (1899) ; (Furze-Bloom* (1899); (The Crock of Gold* (1899); (Winefred) (1900) ; (A Book of Dartmoor* (1900); (In a Quiet Village* (1900); (Virgin Saints and Martyrs* (1900); The Frobish-ers) ; (A Book of Brittany-* (1901); (Royal Georgie) (1901) ; (Miss Quillet 5 ; (Nebo the Nailer* (1902) ; (Cliff Castles and Cave Dwell¬ ings of Europe* (1911) ; (Village Sermons to Simple Souls) (1912).

BARING ISLAND, an island in the Arctic Archipelago. The name is also given to a bay and strait. They were named by Sir Francis Baring, who was First Lord of the Admiralty at the time of their discovery.

BARINGO, a lake in East Africa, north¬ east of the Victoria Nyanza, about 20 miles long, 200 square miles in area, and between 3,000 and 4,000 feet above sea-level. Though fed by many streams, it has no visible outlet. It contains several small islands and was dis¬ covered by Thomson in 1883.

BARITE, ba'rit (Greek, <(heavy,® in allu¬ sion to its high specific gravity), a mineral hav¬ ing the formula BaSCh, and crystallizing in the orthorhombic system, but also occurring mass¬ ive, and in granular, earthy and stalactitic forms. It is usually white or nearly so, and has a hardness of from 2.5 to 3.5. Its specific gravity ranges from 4.3 to 4.6, and from this circumstance the mineral is often called (<heavy-spar.® Barite was first examined (in 1602) by Casciorolus, a shoemaker of Bologna, who dis¬ covered that it becomes phosphorescent when heated with combustible matter, and gave it the name lapis soils, or <(sun stone.® Barite occurs in many parts of the world, and in large quan¬ tities. The commercial sources are usually residual deposits in clay caused by the differen¬ tial weathering of the

enclosing limestone. It also occurs in veins and as a gangue mineral with metallic ores. In the United States it is found abundantly in many States, notably in Virginia, North Carolina and Missouri. The latter State yields over two-thirds of the total United States production. It constitutes an im¬ portant source of barium compounds and is used largely in the manufacture of white paints. Barite was mined in the United States to the extent of 51,547 tons in 1914. It is rarely found pure, being generally associated with silica, lime, iron and often containing a percent¬ age of galena. See also Barium ; Mineral Production of the United States.

BARITONE, or BARYTONE, a male

voice, whose compass partakes of those of the common bass and the tenor, but does not ex¬ tend so far downward as the one nor to an equal height with the other. Its best tones are from the lower A of the bass clef to the lower E or F in the treble; yet we find Verdi and Meyerbeer exacting G and even A flat from it. This name is also given to the smaller bass saxhorn in B flat or C, used in reed and brass bands.

BARIUM, a metallic element, strongly re¬ sembling calcium in its chemical properties. The mineral barite (q.v.) was the first com¬ pound of barium to be examined. In 1750 Marggraf showed that barite contains sulphu¬ ric acid, and the subsequent labors of Scheele and Gahn proved that it also contains a pre¬ viously unrecognized earth, which Bergmann called terra ponderosa, or (<heavy earth.® In 1779 Gityton de Morveau proposed the name <(barote® (Greek, <(heavy®) for this earth, and Lavoisier modified the word to ((baryta,® in

which form it still survives. Subsequently ba¬ ryta was found to be the oxide of a new metal, which was isolated by electrolysis in 1808 by Berzelius and Pontin, and afterward by Davy, and named “barium.® When absolutely pure, barium is a silver-white metal with the density of 3.78. It is a little harder than lead, melts at 1580° F., and vaporizes

at 1760° F. It oxidizes rapidly in the air, and decomposes water read¬ ily. It is ductile and somewhat malleable. Powdered barium takes fire spontaneously. Its atomic weight is 137.4 (0 = 16), and its chemi¬ cal symbol is Ba. Its specific gravity appears to be between 3.75 and 4.00. Barium occurs in nature in all primary rocks and in some min¬ eral waters. The most common sources of barium compounds are the carbonate and sul¬ phate, which occur native as witherite and barite (qq.v.), respectively. The nitrate is prepared by acting upon the native carbonate with nitric acid. It is a soluble salt, with the formula Ba(N03)2 The nitrate decomposes upon being strongly heated, the nitric acid be¬ ing expelled, while barium monoxide (or baryta), BaO, is left behind as a gray, porous mass, strongly caustic and alkaline. When gently heated in air, barium monoxide takes up another molecule of oxygen and forms the dioxide, Ba02; and on being more strongly heated, the dioxide gives up the extra atom of oxygen again, and returns to the monoxide. It was long ago proposed to make use of this curious property for isolating pure oxygen from the air, by alternately heating the dioxide at a high temperature, and collecting the oxy¬ gen given off as it returns to the monoxide and then submitting it, at a lower temperature, to the action of a current of air until it has again passed into the state of dioxide. It was found, however, that the process would work only for a short time, after which a fresh supply of baryta was required. Recent investigations have gone far toward discovering the cause of this loss of activity, and it is now likely that oxygen will sometime be made on a com¬ mercial scale by this most ingenious process. Baryta absorbs water with considerable evolu¬ tion of heat and the formation of a hydrate, Ba(OH)2, which crystallizes with eight mole¬ cules of water. Barium hydrate is also made, in large quantities and at a low price, at Niagara Falls, by the electrolysis of soluble salts of barium. The hydrate is used in refin¬ ing sugar, being much superior to lime for this purpose. With cane sugar it forms an insoluble compound from which the sugar may after¬ ward be set free by a current of carbon diox¬ ide gas. The hydrate is also likely to be of great use, in the near future, for preventing the formation of boiler scale, _ by precipitating the carbonates and sulphates in the feed water, in the form of insoluble barium compounds. The value of barium hydrate for this purpose has long been known, but until the development of the electrolytic method of manufacturing it, the expense involved was prohibitive. Barium sul¬ phate (barite) is thrown down as a precipitate whenever a soluble barium compound is added to a solution of any sulphate; and for this reason soluble barium salts are much used by the chemist in testing for sulphuric acid and sulphates. The chloride (BaCk) is the salt most common!}’ employed as a reagent for this

purpose. Barium sulphate is one -of the most insoluble salts known. The native sulphate, when ground upv was formerly used to adulter¬ ate white lead. The artificial sulphate was also used for this purpose and is itself used as a paint, under the name of “permanent white,® or blanc fixe. The artificial sulphate is said to be. superior to the natural mineral for use as a paint, as it has more “body.® In ready-mixed paints, white, ground and hydrate barite is em¬ ployed as a pigment. With 30 per cent of zinc sulphate, 70 per cent of barite is mixed to form the white pigment called “lithopone,® which is used extensively as a “flat® wall paint. Barite is also used in the manufacture of glazed and coated paper. When barium sulphate is heated with coal it loses its oxygen, and becomes reduced to the sulphide BaS, a salt which is highly phosphorescent, and is known as Bologna phosphorus. After ex¬ posure to sunlight or to a strong artificial light, barium sulphide shines for hours with a bright, golden light. It is used in the manufacture of luminous paint. The sulphide may be heated in an earthenware retort through which moist carbonic acid gas is being passed, and baryta caustic thus obtained. Barium is readily rec¬ ognized by the spectroscope through a number of characteristic green lines. Its volatile salts communicate a green color to non-luminous flames, and are used (especially the nitrate) in pyrotechny.

In poisoning by the barium salts the symp¬ toms resemble those seen in poisoning by other metals. In the acute forms there is pain and burning in the mouth and stomach, nausea, vomiting and chills. These are followed by diarrhcea, dizziness and chilly feelings. The pulse is slowed, at first large and full, later small and scarcely recognizable. Muscle paral¬ ysis supervenes with dyspnoea, loss of conscious¬ ness, convulsions and death. The remedial treatment consists of prompt washing of the stomach with a solution of Glauber’s salts. This forms the insoluble barium sulphate, which is inert.

Previous to the European War there was no barite industry in the United States. The entire supply was imported from Germany at a price with which the American manufactur¬ ers could not compete, although many attempts were made to do so. Within a few weeks after the war began, an idle plant at Sweetwater, Tenn., had started up, and has been working night and day ever since. Mines are in opera¬ tion in southeastern Missouri, northwestern Georgia, central and western Kentucky, north¬ eastern Alabama, southwestern North Carolina, northwestern South Carolina and southwestern Virginia. The production in 1915 amounted to 108,547 short tons — more than twice the pro¬ duction of 1914. For 1916 the output was double that

of 1915, and reached a value of $1,000,000. Barite mines were opened in 1916 in Colorado, Nevada, California and Alaska. The only deposit of witherite of commercial value known in the United States is in Mari¬ posa County, Cal.

About 10 per cent of the output is used in the manufacture of barium salts — the carbon¬ ate, nitrate, chloride, chlorate, hydrate and binoxide ; all heretofore imported from Germany. Of the barium chemicals the most important is

the binoxide. on account of its use in the prep¬ aration of hydrogen peroxide.

BAR-JESUS, or ELYMAS, a Jewish sor¬ cerer who opposed Paul before Sergius Paulus at Paphos in Cyprus and was smitten with blindness (Acts xiii, 6-12). There is difficulty in regard to his name, as in verse 6 he is called Bar-Jesus and in verse 8 Elymas. By some Elymas is explained by an Arabic root as (<the Wise Man.® Others regard Elymas as his name and Bar-Jesus as a Christian name desig¬ nating him after his conversion to the new reli¬ gion. In regard to the entire story considerable difficulty is experienced in its interpretation. It is closely similar to the story of Simon Magus in Acts viii, and many commentators see in it a defense of Paul against his identification with the Magian then so common among J udaizing Christians. For a full discussion of Bar Jesus and the passage in Acts xiii consult Krenkel, (Josephus und Lucas) (Leipzig 1894).

BARK, the more or less easily separable layers of tissue surrounding the woody cylinder of trees and shrubs ; also, by extension, the analogous part (cortex) of textile plants such as hemp, jute, ramie, flax, etc., and other annual stems. The layers are divided into three groups which may be readily seen in a yearling stem : (1) The phloem, bast, the inner food-conduct¬ ing tissue annually thickened from the cam¬ bium (q.v.) layer which separates it from the wood; (2) the green zone which generally does not increase in thickness but which in young twigs assists in food elaboration (see Photo¬ synthesis) ; (3)

the epidermis or external

layer with contiguous cork cells which increase from the phellogen, or cork cambium, a layer of epidermal or cortical cells. These cork cells, which develop mainly at right angles to the direction of the stem, die and become more or less weather-beaten and seamed from cracking and give the characteristic appearance to tree trunks. Many trees can be identified by their bark alone.

The bark of many trees and shrubs is of economic use mainly in tanning, dyeing, medi¬ cine and cookery. In tanning (q.v.) such barks as are rich in tannic acid are most in demand ; oak, hemlock and chestnut (qq.v.) are general favorites in America and Europe ; eucalyptus and acacia in Australia. Larch and willow bark are used for special work. To obtain these barks the trees are felled after the sap has started to flow in the spring, the rough exterior layers removed, the bark of the trunk and main limbs peeled off in lengths of about two feet with specially made tools; the bark of the smaller branches, in equal lengths, is loosened with mallets and slipped off. After removal the bark is loosely piled in open sheds to dry or stacked on end in the open air, the larger pieces being placed on the outside to protect the smaller inner ones from rain and sun, which together with mildew are the important agencies that may injure the quality of the prod¬ uct. The barks used in medicine, cookery, etc., are treated under individual titles. See Casca-rilla, Cinchona and Cinnamon ; also Cork.

BARK, Peruvian. A bark obtained from several trees belonging to the genus Cinchona, which grow spontaneously in many parts of South America, but more particularly of Peru. The trees somewhat resemble a cherry-tree in

appearance, and have white or pink flowers. This valuable medicine was formerly called Jesuit's Bark, from having been introduced into Europe by the members of that Order settled in South America. They were instructed in its use by the natives of Peru, and it con¬ tinued for many years a source of profit to the Order. Its botanical name was derived from that of the Countess del Chinchon, the lady of a Spanish viceroy, who had been cured by it. The tree from which it is obtained grows abundantly in the forests of Quito and Peru, and the bark is cut by the natives in the months of September, October and November, during which alone the weather is free from rain. The bark is of three kinds — red, yellow and pale, of which the yellow and pale barks are

the stronger in their febrifuge properties. The crown-bark, as the highest-priced is termed, is of a pale yellowish-red. The pale is the origi¬ nal Peruvian cinchona, and is produced by sev¬ eral varieties of the Cinchona officinalis. The red is obtained from the C. succidubra , which grows chiefly in the forests of Ecuador around Chimborazo. The yellow sort is produced by the C. calisaya, and grows in Bolivia and Peru.

The uses of the bark in medicine are too well known to need description ; but the chem¬ ical discoveries in relation to it are deserving of more particular mention. Its medicinal properties were found to depend upon the presence of a substance called quinine. This exists, more or less, in all kinds of Peruvian-bark, but in quantities very unequal in the various kinds. See Quinine.

BARK, or BARQUE, a three-masted ves¬ sel whose foremast and mainmast are square-rigged, but whose mizzenmast has fore-and-aft sails only. The distinction between a bark and a barkentine is that the latter has but one mast square-rigged, the main and mizzen being both rigged fore-and-aft.

BARK-BEETLES, members of the fam¬ ily Scolytidoe, and allied to the weevils. They are of an elongate cylindrical form, truncated before and behind. They mine under the bark of trees, running their winding galleries in every direction, but rarely attack living healthy trees. They are usually brown or black in color. The rounded head does not end in a snout and is deeply sunken in the thorax; the clavate antennae are somewhat elbowed, while the palpi are very short; the elytra are often hollowed at the end, and the short stout legs are toothed on the under side of the femora, and the tarsi are slender and narrow. The eggs are laid in the bark, whence the larvae on being hatched bore straight into the sap wood, or mine between the bark and the sap wood, They are fleshy, cylindrical, footless larvae, wrinkled on the back. When fully grown in the autumn they gnaw an exit for the beetle, taking care to leave a little space closed in front of their burrow to conceal the pupa. The various species of Scolytus, Tomicus and Xyloterus give rise to a disease similar to fireblight, by their ravages beneath the twigs of fruit trees, causing the bark to shrivel and peel off as if a fire had run through the orchard. Xyloterus fuscatus has been found to bore into empty wine casks and spoil them for use. The spruce forests of Maine and other pans of northern New Eng-BARK-LOUSE — BARKER

land have, since 1818, been devastated by Dcndrucotonus piccapcrda of Hopkins. It at¬ tacks and kills vigorous trees in perfect health, the largest and best stands of timber suffering most from its ravages. The estimated number of adults which under favorable conditions may emerge from an average-sized tree is from 5,000 to 7,000. Hopkins estimated that an average of three pairs of beetles to the square foot of bark on 10 to 15 feet of the trunk of an average-sized tree are sufficient to kill it, and that 6,000 beetles breeding in one tree may be sufficient to kill from 20 to 25 more trees. Two other beetles (Polygraphus sufipennis and Tetropium cinnamoptenim) also aid the Deu-drocotonus in killing the spruce. Consult Pack¬ ard, 'Report on the Insects Injurious to Forest and Shade Trees) (1890); Hopkins, 1 Insect Enemies of the Spruce in the Northeast* (Bul¬ letin No. 28, Division of Entomology, United States Department of Agriculture, 1891).

BARK-LOUSE, a hemipterous insect of the scale family (Coccidce) . The bark-lice are very small insects, whose females are wingless, their bodies resembling scales. The females sting the bark of trees with a long slender beak, sucking in the sap, and, when very nu¬ merous, injure or kill the tree. The males have two wings but no beak, and take no food. The apple bark-louse (Mytilaspis pomorum) is destructive to young apple-trees, while in Florida M. gloveri is a pest of the orange, as is also the San Jose scale-insect (q.v.). The cochineal, the mealy-bug of hothouses, and various other coccid insects, belong to this group. See Scale-insects, and the names of various species.

BARKAL, or JEBEL BARKAL, an iso¬ lated sandstone rock, 400 feet high, in Nubia, near the Fourth Cataract of. the Nile. It is nearly perpendicular on all sides, but fully so on the side nearest the Nile. There are some remarkable ruins in the vicinity. Excavations here have revealed inscriptions and archaeolog¬ ical remains of great interest and value, an account of which may be found in Lepsius' ˆenkmaler,* Vol. V.

BARKER, Albert Smith, American naval officer: b. Massachusetts, March 1843; d. 30 Jan. 1916. Graduated at the United States Naval Academy in 1859; served on the frigate Missis¬ sippi in the operations to open the Mississippi River in 1861-63, taking part in the bombardment and passage of Forts Jackson and Saint Philip and the Chalmette batteries, the capture of New Orleans and the attempted passage of Port Hudson, where his vessel was destroyed. He became captain 5 May 1892; commanded the cruiser Newark during the war

with Spain ; subsequently succeeded to the command of the battleship Oregon, which he took to Manila. He became a rear-admiral, and was placed in command of the Norfolk Navy Yard in 1899; and in July 1900 succeeded the late Rear-Admiral Philip as commandant of the Brooklyn Navy Yard. He was appointed commander-in- chief of the north Atlantic fleet (1903-05) ; was retired 31 March 1905. He was the first one in the United States to fire high explosives in shells.

BARKER, Edmund Henry. English philol¬ ogist : b. Hollym, Yorkshire, December 1788; d London, 21 March 1839. He undertook the

labor of reprinting the (Thesaurus Graecus* of H. Stephens, upon which was expended an immense amount of time and money, but owing to severe adverse criticisms, the work did not appear in the form which was originally in¬ tended, or under his name. His first work, (Classical Recreations,* appeared in London, 1812 ; one volume only was published. He also wrote dissertations, essays, efc., for reviews ; a work upon the claims of Sir Philip Francis to the authorship of the Junius letters; a Greek and English dictionary, *etc.* In the latter part of his life he became so reduced through liti¬ gation that he was at one time confined in a debtors' prison, and finally died in an obscure lodging-house in extreme want.

BARKER, George Frederick, American physicist: b. Charlestown, Mass., 14 July 1835 ; d. 1910. He was graduated from Sheffield Scientific School at Yale, 1858, and Albany Medical College, 1863, and taught at Har¬ vard and Yale universities, Wheaton College (Ill.) and Western University of Pennsylvania. From 1873 to 1900 he was professor of physics in the University of Pennsylvania. He became professor emeritus in 1900. He was a United States commissioner at the International Elec¬ trical Exhibition at Paris, 1881, where he re¬ ceived the Legion of Honor decoration, with rank of commander. He frequently served as an expert in patent and other cases, notably as a government expert in the suit against the American Bell Telephone Company and in the Lydia Sherman poisoning case in 1872. He was president of the American Association for the Advancement of Science; president of the American Chemical Society and vice-president of the American Philosophical Society. His publications have chiefly appeared in the Amer¬ ican Journal of Science, American Chemist and Proceedings of the American Philosophical Society. Others are, besides textbooks on chemistry, (Nitrous-Oxide) (1866) ; Correla¬ tion of Vital and Physical Forces) (1871) ; (Progress in Physics) (1892). For several years he contributed to the Smithsonian

reports.

BARKER, Jacob, American financier : b. Swan Island, Me., 7 Dec. 1779; d. Philadelphia, 26 Dec. 1871. He early developed remarkable business ability, settled in New York, and be¬ fore he was 21 owned five trading vessels and controlled a large credit. In 1801 he met with heavy reverses, but obtaining a government contract for supplying oil, made up his losses, and at the outbreak of the War of 1812, under¬ took the raising of a loan of $5,000,000 for the government. He was a founder of Tammany Hall, and a State senator, and established the Exchange Bank in Wall street in 1815 which failed in 1819. His financial methods aroused intense opposition and he was indicted for fraud in 1826 and convicted, but a new trial quashed the indictment. Removing to New Orleans in 1834, he was admitted to the bar and accumulated a large fortune that was mostly lost during the Civil War. He was elected to the United States Senate at the close of the war, but was not allowed to take his seat. In 1867 he was declared bankrupt and during the latter part of his life he lived in Philadelphia with his son, Wharton Barker. He published (The Rebellion: Its Consequences and the Congressional Committee, Denominated

the Reconstruction Committee, with Their Action > (1866). Consult incidents in the Life of Jacob Barker, 1800—1855 } (New York 1855) ; Turner, (The Conspiracy Trials of 1826 and 1827: A Chapter in the Life of Jacob Barker' (Philadelphia 1864) ; (The Speeches of Jacob Barker and His Counsel on the Trials for Con¬ spiracy' (New York 1826) ; and (The Trial of Jacob Barker, Thomas Vermilya and Matthew L. Davis' (ib. 1827).

BARKER, J. Ellis, English author and journalist: b. Cologne, Germany, 9 May 1870. He was educated at Cologne, and after his return to England became known as a contrib¬ utor to the leading reviews and lectured before the Royal United Service Institution, the Med¬ ical Association and the Liberal LInion Club. He has published (The Rise and Decline of the Netherlands' (1906); (British Socialism' (1908); (Modern Germany' (1908; 4th ed., rev. 1912); (Great and Greater

Britain: The Problems of Motherland and Empire' (1910); (Points Against Free Trade' ; (Points for Tariff Reform' ; and numerous contributions to the Nineteenth Century Review , Fortnightly Review, National Review and to the leading London and provincial dailies.

BARKER, Lewellys Franklin, Canadian-American anatomist: b. Norwich, Ont., 1867. He was professor and head of the department of anatomy in the Rush Medical College of University of Chicago, 1900-05, and professor of medicine Johns Hopkins University and chief physician Johns Hopkins Hospital since 1905. He is author of (The Nervous System and Its Constituent Neurones' (1899) ; lab¬ oratory Manual of Human Anatomy' (1904).

BARKER, Thomas Jones, English histori¬ cal portrait painter: b. Bath 1815; d. 1882. He studied his art in Paris under Horace Ver-net, and exhibited regularly at the Salon from 1835 to 1845, and afterwards at the Royal Academy. He was an eyewitness of many episodes of the Franco-Prussian War of 1870, of which he has left several pictures. His most noteworthy works are (The Bride of Death' (1840); (The Meeting of Wellington and Bliicher' (1851) ; (Wellington Crossing the

Pyrenees'; (The Melee — Charge of Cuiras¬ siers and Chasseurs' (1872) ; (Balaklava — One of the Six Hundred' (1874) ; (The Return Through the Valley of Death' (1876).

BARKER, Wharton, American financier

and publicist : b. Philadelphia, 1 May 1846; d. there, 8. April 1921. He was graduated at the University of Pennsylvania in 1866, entered the banking firm of Parker Brothers & Company, in which capacity he became special financial agent of the Russian government. He

supervised the building of four cruisers

for Russia and went to that country to advise concerning the development of coal and iron mining. He obtained valuable rail¬ road and telegraph interests in China, but his concessions in that country were soon with¬ drawn. In 1869 he founded a periodical de¬ voted to political, economic and social condi¬ tions, called the Penn Monthly. He proposed the names of Garfield and Harrison for the presidency, and strenuously opposed a third

term for General Grant. He joined the Popu¬ list party in 1896 and soon gained prominence

in the party, becoming its candidate for the presidency in 1900. He was a member of sev¬ eral learned societies. He had traveled exten¬ sively in the United States, Europe, Chipa, Japan and South America, and was a leading advocate of a commercial union of all Ameri¬ can nations and opponent of all temporary ar¬ bitration treaties.

BARKER'S MILL, a form of waterwheel devised by Dr. Barker, some 300 years ago. It turns about a vertical axis, down which the water that is to operate it flows. At the lower extremity of the vertical axis two or more hollow arms project horizontally, like the spokes of a wheel. Water is discharged tan¬ gentially from the ends of these hollow arms, and by its reaction causes the wheel to rotate. Barker's mill is now used only as a toy, al¬ though a modification of it, invented by White-law, is still used, to some extent, as a source of power in Great Britain, where it is known as the Scotch turbine. See Turbine.

BARKING, England, town in Essex, on the left bank of the Roding, about two miles above its junction with the Thames, and seven miles northeast from London. It has a parish church, a handsome structure, with a lofty tower, and some fine public buildings. There are also the ruins of Barking Abbey, at one time among the wealthiest nunneries of Eng¬ land. Pop. 22,000.

BARKING WOLF, a name in earljr American books for the prairie wolf or coyote, on account of the greater resemblance in its voice to the barking of a dog than to the howl of the wolf. See Coyote.

BARKIS, a rustic figure in Dickens' (David Copperfield.' He proposes to David's nurse, Peggotty, in the since famous phrase ((Barkis is willin'."

BARKLEY, Charles William, navigator : b. 1759; d. North Crescent, Hartford, 1832. He left Ostend for the northwest coast of America in the autumn of 1786 in the Imperial Eagle, and in July of the succeeding year he discovered the long-lost strait of Juan de Fuca, between Vancouver Island and the mainland of the United States, which he charted under the name of the Greek seaman, its first dis¬ coverer. Barkley Sound, Vancouver Island, was also discovered and named by him.

BARLAAM, bar'la-am, Italian theologian : b. Seminaria, Calabria; d. about 1348. He was a monk of Saint Basil, noted for his learning, and particularly for his thorough knowledge of the Greek language. In 1327 he visited Con¬ stantinople, and in 1331 he was appointed

abbot of the convent of Saint Salvator. In 1339 the kings of France and Sicily sent Barlaam in vain to Pope Benedict XII at Avignon, for the purpose of obtaining assistance against the Mohammedans, and of arranging a union be¬ tween the Greek and Latin Churches. Hence¬ forth he was engaged in various religious con¬ troversies, and was defeated in them all. He finallv entered the Roman Catholic Church, and through the influence of his friend, Petrarch, received from Pope Clement VI the bishopric of Geraci.

BARLAAM AND JOSAPHAT, one of

the most popular of early mediaeval romances, formerly supposed to have been written by

Saint John of Damascus, — or Damascenus, as he is sometimes called, — a Syrian monk born about the end of the 7th century. According to the narrative Josaphat was the son of a king of India brought up in magnificent seclusion, to the end that he might know nothing of human misery. Despite his father's care, the knowledge of sickness, poverty and death can¬ not be hidden from him: he is oppressed by the mystery of existence. A Christian hermit, Barlaam, finds his way to him at the risk of life, and succeeds in converting him to Chris¬ tianity. The prince uses his influence to pro¬ mote the new faith among his people. When he has raised his kingdom to high prosperity, he leaves it to spend the remainder of his days as a holy hermit. The story is, with the neces¬ sary changes, substantially the story of Buddha. The correspondences of the two stories are most minute, and even the phraseology, in which some of the details of Josaphat's history are described, is almost a literal rendering of the Sanskrit of the (Lalita Vistaraˆ Even the very word Josaphat or Joasaph (Arabic, Yudasatf) is a corrupt form of Bodisat, or Bodisatva, a common title for the Buddha in the many birth-stories that clustered round the life of the sage. The identity of the stories of Buddha and Josaphat was first recognized by Diogo do Couto (1542-1616), the historian of Portuguese India. In modern times it was noticed by Laboulaye in the Journal des Debats (July 1859). A year later Dr. Felix Liebrecht made

an elaborate treatment of the subject, putting the identity of the stories beyond dis¬ pute. Subsequent researches were made by Max Muller, Zotenberg and others. The origi¬ nal Greek manuscript was first published by M. de Boissonade as a volume of his (Anecdota) (Paris 1832), and translated into German by Liebrecht (Munster 1847). A Latin version was current in the Middle Ages, and about the 15th century began to appear among the works of Saint John Damascenus. But it is no longer ascribed to him. The legend appeared in the (Speculum Historiale) of Vincent of Beauvais, and also in the (Golden Legend) of Jacobus de Veragine. Three poetical versions in French of the 13th century are also extant. There are also Italian and German versions derived from the mediaeval Latin. The Spanish, Polish and Bohemian versions are also from this source. There are also versions in Icelandic, Swedish, Norwegian and even a version in the Tagalog language of the Philippines (Ma¬ nila 1712). The names of Barlaam and Josa¬ phat appear in both the Greek and Roman lists of saints. Their names were inserted by Petrus de Natalibus in his (Catalogus Sanc-torunP (1380) and Cardinal Baronius included them in the official (Martyrologium) authorized by Sixtus V (1585-90) under the date of 27 November. In the Orthodox Eastern Church (<the holy Josaph, son of Abener, King of In¬ dia® is allotted the 26th of August. Thus Gautama the Buddha is officially, albeit un¬ wittingly, recognized as a saint in two great branches of the Christian Church. In Palermo there is a church dedicated to Divo Josaphat. The compilers of the (Gesta Romanorum,* Boccaccio, Gower and Shakespeare have all drawn materials from this romance. Consult Appel, (Gui von Cambrai und Josaphas nach den Handschriften von Paris und Monte Cas-vol. 3 — 17

sino) (Halle 1907) ; Jacobs, Joseph, (Barlaam and Josaphat* (London 1896) ; Liebrecht, (Zur Volkskunde* (Heilbronn 1879) ; Muller, Max, c Selected Essays) (London 1881) ; Zotenberg, H., (Notice sur le livre de Barlaam et Joasaph) (Paris 1886).

BARLAAMITES, in ecclesiastical history, followers of Barlaam, a Latin monk of the 14th century; known chiefly from their con¬ troversy with the Quietist monks of Mount Athos. Consult Gibbon, (Roman Empire.*

BARLZEUS, bar-le'us, or BZERLE, Kaspar van, Dutch historian and learned writer : b. Antwerp, 12 Feb. 1584; d. Amsterdam, 14 Jan. 1648. His <Poems,) mostly Latin, are not forcible, but his (History of Brazil under Maurice of Nassau/* is decidedly so; and he composed

also numerous fine orations, the in¬ fluence he exercised upon contemporary thought being very considerable.

BARLETTA, bar-let'ta, Gabriello, Italian monk : b. perhaps at Barletta, in the kingdom of Naples, in the 15th century. Pie became celebrated at Naples on account of his sermons, in which he mixed sarcasm and the ludicrous with the sacred ; quoting, now Virgil, now Moses ; placing David at the side of Hercule's ; and commencing a sentence in Italian to con¬ tinue it in Latin and end it in Greek. Some¬ times he forgot himself so far as to use ex¬ pressions of which he had not considered the signification, as when he asked by what signs the Samaritan knew Jesus was a Jew. Very serious authors, Niceron and others, have given the response of the preacher, but it cannot be reproduced here. There is under his name a collection of Latin sermons, which have gone through more than 20 editions.

BARLETTA, Italy, seaport town on the west shore of the Adriatic, 33 miles northwest of Bari. In the market-place is a colossal bronze statue, about 18 feet high, supposed to represent the Emperor Heraclius. A statue of the statesman Massimo d'Azeglio, who died in 1866, adorns another square. The cathedral is a fine Byzantine edifice, the nave of which is supported by antique granite columns. There are several other churches, convents for both sexes, an orphan institution, a college founded by Ferdinand IV and a theatre. The harbor is formed by a mole running out from the shore.- It admits of small vessels only, but good anchorage ground is found .in the road¬ stead. Barletta has a considerable trade in grain, wine, almonds and the other productions of the country, which are exported to the dif¬ ferent ports of the Adriatic. Pop. 44,200.

BARLEY (A. S. bacerlic, from bere, barley --leac, a leek, plant) ; genus Hordeum; our fourth most important cereal. It belongs to the Poacece or grass family, and is one of the oldest of the cultivated members of this family. It was cultivated in ancient Egypt (Exod. ix, 31) by the Greeks and Romans. Pliny regarded it as the most ancient food of mankind. It has been found in the lake dwellings of Switzer¬ land in deposits belonging to the Stone Age. Ears of barley are represented plaited in the hair of the goddess Ceres, and are also shown on ancient coins. One of the sacred books of the Chinese claims that it was grown in China 2000 b.c. It grows wild in western Asia, and

this is probably its original home. It is adapted to both warm and cold climates, has a wider range of distribution than any other cereal, be¬ ing grown all over the region embraced in the temperate zones, from Alaska, Iceland and Norway in the north to Algeria, Egypt, India and other subtropical countries. The Nepaul or Himalaya barley is very hardv. producing good crops at an elevation of 14,000 feet above the sea. In Chile and Switzerland it thrives at 5,000 feet, but on the plateaus of Peru it rarely ripens.

Barley is divided into several types, of which the following are recognized: Two-rowed barley, Hordeum distichon; four-rowed barley, H. vulgare, the common barley, bere or bigg; six-rowed barley, H. hexastichon; naked barley, H. distichon nudum, the scales not ad¬ hering to the grain as in other types ; fan, spratt, or Brattledore barley, H. zeocriton, two-rowed with widespreading awns ; this is valued in Germany and is sometimes called German rice. These types are further subdivided into varieties, the most popular for malting belong¬ ing to the two-rowed type. The best known is the Chevalier, which originated in Suffolk, England, in 1819. This variety and selections from it constitute the high-priced barley of California. In Europe the two-rowed t}ˆpe pre¬ dominates. In this country the six-rowred is more common. The four-rowed varieties were formerly used for malting ; they are hardy and productive but coarse, and are being replaced by the two-rowed. In northern latitudes well-drained and fertile medium or rather light soils, particularly those of a calcareous nature, are best. Strong loams, heavy clays and soils rich in humus, produce heavy crops, but of inferior quality. In southern latitudes medium to heavy loams are best. Climate and season are of more importance than soil in determin¬ ing whether the barley will be a good malting variety or nott A rather dry climate suits well. The climate of eastern and southeastern Eng¬ land produces the best malting barley. It may be sown broadcast or drilled, but the latter method is more satisfactory. Fall-sown va¬ rieties are handled like fall-sown wheat, but it is generally sown in the spring after spring-wheat sowing is over. The amount sown varies from two to three bushels per acre. It ger¬ minates quickly, and late spring frosts may injure it. Fertilizers when applied must be evenly distributed or an uneven growth will result. It ripens before spring wheat, and should be fully ripe before it is cut. The color and value of the grain is easily

injured by damp weather. From 30 to 40 bushels of grain and 1,500 to 2,200 pounds of straw is a good yield. Sometimes this yield of grain is doubled. A good malting variety must have quick, high and even germinating power ; the grains must be plump, heavy, thin-husked and uniform in size; of good bright color, not (<steely® or bleached, indicating immaturity when cut, nor musty; must contain a high percentage of starch, mealy not flinty, showing that the starch can be readily transformed during malting. Barley is sometimes attacked by rust and smut, but less so than wheat. (See Wheat). Wireworms are sometimes troublesome. The production of barley in the United States is in¬ creasing. In 1866, 7,916,342 bushels were grown

on 492,532 acres. In 1916, 180,927,000 bushels on 7,674,000 acres. The four leading States in 1916 were California, 33,320,000 bushels ; Min¬ nesota, 26,125,000 bushels; North Dakota, 26,738,000 bushels ; South Dakota, 18,728,000 bushel. The average yield for the year 1916 was 23.6 bushels per acre. The average farm value 88.2c per bushel.

Feeding Value and Uses. — The average percentage composition of barley is, water, 10.9; proteids, 12.4; nitrogen-free extract, chiefly starch, 69.8; ether extract, 1.8; crude fibre, 2 ;7 ; ash, 2.4. Digestion experiments with pigs showed that 80 per cent of the dry matter, 81 per cent of the protein, 87 per cent of the nitro¬ gen-free extract, and 57 per cent of the ether extract were digestible. Barley is chiefly used for malting, for the preparation of spirits, beer and malted foods. It is also employed in do¬ mestic cookery as <(pot or hulled barley® in which only the husks are removed ; ((pearl bar¬ ley® is the grain deprived of husks and pellicle, then ground to a round form and polished; (<patent barley® is flour obtained by grinding pearl barley. It is used in soups, for making demulcent and emollient drinks for invalids and for other purposes. Barley bread is darker in color and less nutritious than that from wheat flour ; it does not contain gluten, but is fairly rich in other proteids.

Barley, or decoctions of it, are used to modify cows' milk for feeding to infants. Bar¬ ley meal and the by-products, barley bean, bar¬ ley feed (from pearled barley), screenings, malt combs and brewers' grains are used as stock feeds. Its use for horse feed in the United States is confined to the Pacific coast. For other stock its use is more general. It may be fed alone or with other grain. Barley hay is grown, the crop being cut before the grain is mature. As a forage crop or pasture it may be grown alone or with peas, vetches or other quick-growing legumes. Barley straw is usually considered as not worth

feeding, but may be used as bedding.

BARLEY BREAK, a game once common and often mentioned by old English writers. It was played by six young people, three of either sex, formed into couples, a young man and a young woman in each, it being decided by lot which individuals were to be paired together. A piece of ground was then divided into three spaces, of which the central one was profanely termed hell. This was assigned to a couple as their appropriate place. The couples who occu¬ pied the other spaces then advanced as near as they dared to the central one to tempt the doomed pair, who with one of their hands locked in that of their partner, endeavored with the other to grasp them and draw them into the central space. If they succeeded, they were then allowed themselves to emerge from it, the couple caught taking their places. That the game might not be too speedily finished, leave was given to the couple in danger of being taken to break hands and individually try to escape, while no such liberty was accorded to those attempting to seize them.

BARLEYCORN, John, a personification of the snirit of barley, or malt liquor. It is commonly used jocularly, and in humorous verse. Dr. Murray's (Dictionary > quotes a title in the Pepysian Library, about 1620, ((A pleas-

ant new ballad … of the bloody murther of Sir John Barleycorn.® Burns' ballad on John Barleycorn is well known.

BARLOW, Joel, American poet and diplo¬ matist : b. Redding, Conn., 24 March 1754; d. near Cracow, Poland, 24 Dec. 1812. In 1774 he was placed at Dartmouth College, New Hamp¬ shire, and after a short residence entered Yale College, New Haven, where he displayed a tal¬ ent for versification, which gained him the friendship of Dr. Dwight, then a tutor there. Barlow, more than once during the vacations of the college, served as a volunteer in the army of the Revolution. In 1778 he applied himself to the study of law, but soon after accepted the position of chaplain in the army, which he held till the close of the

war (1783). During this period his songs and addresses were said to have animated and encouraged the soldiers ; at this time, too, he planned and partly com¬ posed his (Vision of Columbus. y He went to Hartford, where he started a weekly newspa¬ per, continuing at same time the preparation of his poem for the press. It was published in 1787, and some months after in London. To promote the sale of his poem, and that of a new edition of the Psalms adapted by him, Barlow gave up the newspaper and became a book¬ seller. In 1788 we find him in France as agent for speculators in land, called the Scioto (Ohio) Land Company. The Revolution was then in progress, and Barlow went about lecturing and organizing societies in its favor. He went to England in 1791, and was deputed in the fol¬ lowing year by the London Constitutional So¬ ciety to present an address to the French Con¬ vention. In 1795 he was appointed American consul at Algiers, a post he held for only two years. Returning to Paris he made some suc¬ cessful commercial speculations and acquired a considerable fortune. He returned, after an absence of 17 years, to his native country (1805). In 1811 he was appointed Minister-plenipotentiary to France. In the following year, owing to the fatigues and privations of a journey to Wilna to hold a conference with Napoleon, he died at an obscure village near Cracow. His principal poem, the (Columbiad,* has never been popular; it is defective in plan and execution, overloaded with philosophical discussions and political tirades, and disfigured by pedantic and uncouth words of his own coinage. His prose writings bear the stamp of an active and energetic intellect, but lack that ripeness of judgment required by the complex nature of the subjects he examines. Consult Todd, (Life and Letters of Joel Barlow)

(1886).

BARLOW, Peter, English physicist and mathematician: b. Norwich, October 1776; d. 1 March 1862. He was professor of mathe¬ matics in the Royal Military Academy at Woolwich for a period of 40 years. His great¬ est work is the (Mathematical and Philosoph¬ ical Dictionary > (1814). He was also the au¬ thor of an elaborate work on the (Machinery and Manufactures of Great Britain) (1837) ; of a treatise on the (Force and Rapidity of Locomotives } (1838); and of an (Essay on

Magnetic Attraction, } one of the first works in which the phenomena of magnetism were distinctly enunciated. He invented the Bar-low lens.

BARLOW, William Henry, English engi¬ neer: b. 10 May 1812; d. 12 Nov. 1902. He was educated for the engineering profession, in¬ vented the saddleback form of rail which bears his name, and among his more notable achieve¬ ments is the Saint Pancras terminal station in London. He was consulted in regard to the reconstruction of the Tay Bridge after its fall in 1879. In 1876 he visited the United States as one of the judges of the Centennial Commission. He published (Illumination of Lighthouses) ; (Diurnal Electric Tides and

Storms) ; (The Resistance of Flexure in Beams > ; (The Logograph.*

BARLOWE, Arthur, English navigator : b. about 1550; d. about 1620. In 1584 he was sent with Philip Amidas to select a suitable location for Raleigh's proposed American col¬ ony. They explored the coast of North Caro¬ lina and on their return to England Barlowe wrote an enthusiastic description of the at¬ tractions of the land they had visited.

BARLOWS DISEASE. See Scurvy.

BARM. See Yeast.

BARMECIDES, a celebrated Persian family, whose virtues and splendor form a favorite subject for Mohammedan poets and historians. Two eminent members were Khaled-ben-Barmek, Prime Minister of Caliph Abul Abbas Al-Saffah and tutor of the cele¬ brated Harun al-Raschid, and his son Yahya, Grand Vizier of Harun. The expression Barmecides' Feast, meaning a visionary ban¬ quet or make-believe entertainment, originates from a story in the Arabian Nights' Entertain¬ ments, of a wealthy Barmecide, to whom a poor man, Schacabac, had applied for charity. On the latter informing him that he was starving, the Barmecide invited him to dinner ; and calling for a succession of the most sump¬ tuous viands, although none were provided, urged his guest to fall to and enjoy himself, praising the merits of each dish as it was pre¬ tended to arrive on the table. Schacabac, al¬ though suffering all the pangs of hunger, en¬ tered into the humor of his host, de¬ clared his infinite enjoyment of everything set before him and by his patience so won the heart of his eccentric entertainer that the lat¬ ter not only provided for him immediately an actual and plenteous repast, but likewise took him into his house and entrusted him with the management of his affairs.

BARMECIDES' FEAST. See Barme¬ cides.

BARMEN, Germany, city on the Wupper, in the province of Rhenish

Prussia. The town of Barmen is formed by the union of seven villages located in the valley of Barmen, from which it takes its name, and its western border adjoins the city of Elberfeld. It is the seat of the Rhenish Missionary Society, which has here a large seminary. The valley is remarkable for natural beauty. The United States has a resident consul. Barmen contains the principal ribbon manufactories on the. Con¬ tinent and its ribbons are sent into all parts of the world. Next to ribbons the most im¬ portant textile manufactures are zanellas or Indian cloths, satin for lining, and lace. Bar¬ men also possesses numerous large dye works, besides manufactures of chemicals, plated and

other metal wares, buttons, yarns, iron, ma¬ chines, pianos, organs, soap, *etc.* There are also in the valley numerous bleachfields and Turkey-red dye works. The city has six rail¬ way stations and one of its remarkable feat¬ ures is the electric swinging railway over and along the line of the Wupper between Barmen and Sonnborn. Lower Barmen has a mineral spring and a bathing establishment. Pop.

169,214.

BARMOTE COURT (from berg, hill, and mote, meeting), a name given to local courts held in the lead-mining portions of Derbyshire, England. Their purpose is the definition of the ancient rights of the inhabit¬ ants and the settlement of disputes connected therewith. They are of ancient origin, but their scope has been much restricted during the Vic¬ torian period. Consult Bainbridge, (The Law of Mines and Minerals> (5th ed., 1900).

BARN (Saxon, berern, from bere, barley, and ern, a close place or repository). The word seems originally to have denoted a build¬ ing for the storing of grain. In modern times it has a wider significance — all structures of any capacity used on a farm for storing crops and sheltering stock being known as barns. In the changeable climate of

the United States, with its severe winters, protection to cattle becomes an important item in the operations of husbandry, and as our agriculture becomes more highly developed we construct more ex¬ pensive, convenient and useful barns. A well-built barn, embracing all the conveniences needed for the easy and safe storing of crops and the comfort and well-being of farm stock, will always be one of the safest and best in¬ vestments a farmer can make. At one time the barns on many estates were capacious enough to contain all the grain raised on them, but recently the practice of stacking grain has gained ground and it is now considered the better plan — building the grain barn of suffi¬ cient size to contain one or two ricks of grain at a time and all the necessary appurtenances for threshing. The stacked grain is kept in better condition from having a freer circulation of air and being so disposed as to be free from the attacks of vermin. A regular yard is set apart for stacks, elevated platforms are pro¬ vided on which the stacks are built and they are so arranged as to prevent vermin from climbing to them from the ground and so far separated as to leave each stack isolated. Many such conveniences are known to the American farmer. The skeleton barn, a build¬ ing but partially enclosed, spaces being left between the boards for the free ingress of air, with a durable roof and projecting eaves, is most used for grain and for the storing of hay loosely trussed for market. The sheep and stock barns on the continent of Europe are generally of an inferior character and usually serve also as a residence for the fam¬ ily of the servant or foreman of the farm. The sheep and stock barns of the United States are generally commodious structures with wide sheds on each side, in which the animals find shelter and receive their provender, or, when built on a side hill, the cellar is appropriated to this purpose. Sheds also surround the whole yard in many instances, while stacks of the poorer quality of hay and threshed straw

occupy the centre of the yard, their contents being freely used as bedding and partial food for cattle, the greater bulk finding its way into the manure heap. These are both comfortable quarters for the animals and profitable for the farmer. Modifications of th's general plan are made by each farmer according to his means and peculiar ideas. As a general rule, stock barns are found most profitable when they afford the most ample accommodations. The greater the comfort of his animals, the more uniform the profit of the farmer. Great care should be used in the selection of a place for the farm buildings. The barns should be easily reached and so arranged as to admit of the economical disposition of both crops and manures. The soil should be dry and porous or should be thoroughly drained. Ample pro¬ vision

should be made for the saving ‘of ma¬ nures. Side-hill barns afford cellars in which these may be kept without waste, their bulk augmented and those changes produced upon them which are so essential to their highest efficiency. If no good springs, streams or wells can be obtained, cisterns for rain water should be provided. Barns are usually built of wood, some of stone, a few of brick and of concrete or gravel wall. The gravel wall can be made cheaper than stone walls and can be built on farms affording only gravel and small stones of a .quality too poor to build ordinary stone walls. Barn floors are usually of wood ; and when intended for the threshing or handling of grain should be tight and smooth and kept clean. Oak, beech and yellow pine form ex¬ cellent floors. The threshing floors described by Columella were formed by wetting the earth with the lees of oil. mixing in some chaff and ramming the whole down firmly ; chaff was then trodden on the top, and the whole left to dry in the sun. The lees of oil were said to check vegetation, and to drive away vermin. The preparation of corrugated iron, at a comparatively cheap rate of cost, suggests that material as one of the best for a well-built barn. The roof deserves more attention than it usually receives at the hands of the farmer who wishes to be truly economi¬ cal in his expenditure for buildings. Finall)’, let all farmers remember that ventilation is one of the most important things to be secured, especially in stock barns. The plan and con¬ struction of a barn varies with the purposes for which it is used. For detailed plans and internal fixtures for both stock and general barns consult Curtis, (Farm Buildings for Land Owners, Agents, and Tenants* (London 1912) ; Dolve, (Barn Plans,* North Dakota Experiment Station Bulletin 97 (Agricultural College, N. D., 1912) ; Hill, Practical Sugges¬ tions for Farm Buildings,* United States De¬ partment of Agriculture Farmers’ Bulletins 126, 190 and 461 (Washington 1901, 1904 and 1912); McConnel, (Farm Equipment: Build¬ ings and Machinery) (New York 1910) ; Rad¬ ford, (Practical Barn Plans and All Kinds of Farm Buildings) (ib. 1911) ; id., Practical Country Buildings* (Wausau, Wis., 1912) ; Fraser, (Economy of the Round Dairy Barn,* Illinois Experiment Station Bulletin 143 (Ur-bana 1910) ; Ocock, (The King System of Ventilation,) Wisconsin Station Bulletin 250 (Madison 1908) ; Shaw and Jeffery, (College

Farm Buildings, > Michigan Experiment Station Bulletin 250 (East Lansing 1907) ; (Farm Buildings) (Chicago 1907) ; Winder, hand¬ book of Farm Buildings) (London 1908).

BARN OWL, a widespread but rather un¬ common owl (Strix flammed) which seems to be known in all parts of the world, and is everywhere recognizable among other owls by the heart-shaped form of the facial discs, which meet in a point below the beak. These give a very quaint expression, which has led to the soubriquet ((monkey-faced® in the Southern States. It is about 17 inches in length, and its plumage is yellowish-red, irregularly marked with lighter and darker tints. The eyes are small and black and surrounded by cream-col¬ ored discs, bordered with rustred. The legs are long and bear short feathers only. It is more numerous in the southern part of the United States than in the northern portion, and is rarely seen even where many exist, since it is more completely nocturnal in its habits than are most owls. It makes its nest in hollow trees or a niche in some rocky cliff or earthen bank, and occasionally nests in belfries or old walls, as is a common habit in Europe. The nest is composed of straw and feathers and the eggs are white. H. K. Fisher, author of (The Hawks and Owls of the United States) (1893), regards this owl as probably the most bene¬ ficial of its tribe to the agriculturist, because in America, at least, it subsists almost entirely upon the small rodents so injurious to crops. This is especially true in the South, where it subsists on the cotton rat and the many harm¬ ful mice; while in the West, it catches gophers, ground-squirrels and rabbits, so that it is en¬ titled to gratitude and protection. The same beneficent service is reported for it in other parts of the world. The American is regarded by many ornithologists as a separate species, Strix pratincola.

BARN SWALLOW, one of the most fa¬ miliar and widespread of North American swallows (Chelidon erythro g aster) . Its plum¬ age is lustrous blue ; the forehead, chin and throat dull chestnut, bounded by a collar-like band of blue across the chest, below which the plumage is pale reddish-brown. By its deeply forked tail it is readily distinguished from the square-tailed cliff-swallow, which also throngs about barns and often is wrongly termed barn swallow ; but the latter invariably puts its flask-shaped nests under the eaves outside of the structure, while the true barn swallow invaria¬ bly nests inside the building. These birds have remarkable wing power, flying for many miles at a time at the rate of more than a mile a minute, with consummate grace and ease, and catching in the air all their food, which con¬ sists of winged insects, many of which are in¬ jurious or annoying to man, so

that their pres¬ ence is of decided benefit, as well as a pleasant accompaniment of rural life. Before the coun¬ try was densely populated the swallows made their homes in caves, or in niches of rocks, or hollow trees, but ever since the civilization of the country began, these trustful birds have built their nests close to man's habitations, everywhere frequenting barns and outhouses. Their nest is composed of layers of mud, about an inch thick, plentifully mixed with straw, and lined with feathers. They usually rear two

broods a season — the first in May, and the sec¬ ond in July. The eggs are four to six in number, white, with red and purple spots and splashes nearly covering the larger end. When the second brood of young are capable of using their wings, the swallows congregate in flocks of thousands, and migrate southward, travel¬ ing by daylight, instead of at night, as is the custom of most migratory birds. In the north¬ eastern part of the country, the barn swallows have been nearly exterminated by the English sparrow, who seize their nest for their own breeding purposes and destroy their eggs and young in a ruthless way, often, apparently, in a spirit of malicious mischief.

BARNABAS, the surname given by the apostles to Joses, or Joseph, a fellow-laborer of Paul, and, like him, ranked as an apostle. He was a Levite and a native of Cyprus; contributed to the community of goods among the disciples (Acts iv, 36-37) ; was sponsor for Saul, the former persecutor. That he was a man of influence in the early church of Jeru¬ salem is attested by his being commissioned to investigate the church of Antioch. He jour¬ neyed thence to Tarsus, where he joined Saul, with whom he was again sent out upon mis¬ sionary work (Acts xiii, 2). With Paul, he journeyed through Asia Minor, and wound up his missionary tour at Antioch, where both he and Paul became involved in the contentions of the Judaizing Christians regarding circum¬ cision. They submitted the matter to the apos¬ tles and returned to Antioch, where they labored for some time before revisiting the communi¬ ties established during their first tour of Asia Minor. A difference arose between them in re¬ gard to Mark, a nephew of Barnabas, and they separated, Barnabas and Mark going to Cyprus, the native place of the former. From this time the history of Barnabas is obscure. There is men¬ tion of him (1 Cor. ix, 6) as being still actively engaged in missionary work, but it would ap¬ pear that he never rejoined Paul. There are unsupported traditions that he preached in Rome ; that he was founder and first bishop of the church of Milan, and that he suffered martyrdom at Salamis in his native Cyprus. There is an epistle of 21 chapters ascribed to Barnabas by

Tertullian and other early Chris¬ tian writers, but without any support of inter¬ nal evidence. It was probably written in the 2d century by a Gentile who had come under the influence of Alexandrian Judaistic thought. An apocryphal Acts, an apocryphal Gospel also bear his name. Tertullian also ascribes to him the epistle to the Hebrews in the New Testa¬ ment. Consult ˆBarnabas® in Hastings' dic¬ tionary of the Bible > (New York 1898) ; id. in Cheyne, Encyclopaedia Biblica) (ib. 1899) ; Harnack, A., 'Chronologie der altcristlichen LiteratuU (Leipzig 1897) ; Kruger, G., dis¬ tory of Early Christian Literature) (New York 1897) ; Lightfoot, J. B., (Apostolic Fathers) (London 1893).

BARNABAS, Acts, Epistle, and Gospel

of. (1) The (Acts of Barnabas) are clearly apocryphal and of late date. They recount his missionary journeys and his martyrdom in Cyprus. (2) The Epistle of Barnabas) is one of the apocryphal books of the New Testament. At the end of the Codex Sinaiticus of the 4th century, there is an epistle of Barnabas. It

is strongly anti-Jewish in tone, is full of alle¬ gorical interpretations of the Old Testament. It once enjoyed quasi-canonical authority, as is borne out by Eusebius and by the comments of Clement, Origen and other early Christian writers, who also are unanimous in ascribing it to Barnabas, the coworker of Paul. Internal evidence, however, renders this claim impos¬ sible. Its authority was greatest at Alexandria, and it is clearly of Alexandrine origin and was directed, as its opening shows, to some body of Christians in lower Egypt. Its date has been much debated as being from 70 to 130 a.d., but Lightfoot's interpretation of the apoc¬ alyptic passage in chapter iv is really conclu¬ sive for the reign of Vespasian (70-79 a.d.). This epistle is, therefore, the earliest of the Apostolic Fathers and, as such, is of special interest. Its central problem — the relation of Judaism and

Christianity — of the old and new forms of a divine covenant — was one which gave the early Church much trouble, and was one which the Church failed to solve satisfactorily. (3) The existence of a (Gospel of Barnabas) is inferred from references to it in several ancient writings, notably in the (Decretum Gelasii5 (496 a.d.), but we have no knowledge of its contents. There exists, how¬ ever, in a single Italian manuscript, a long gospel with this title, written from a Moham¬ medan standpoint, but embodying Gnostic ele¬ ments. It has been edited, with an English translation by Lonsdale and Ragg (1907), who hold that it was the work of a Christian rene¬ gade to Mohammedanism about the 13th— 16th century. The work is highly imaginative and at times grotesque, but is pervaded with a high ethical enthusiasm. Consult Braunsberger, O., (Dcr Apostel Barnabas, sein Leben und der ihm beigelegte Brief > (Mainz 1876) ; Cunning¬ ham, (Epistle of Barnabas5 (1877) ; Donaldson, J., (The Apostolic Fathers5 ; Lightfoot, J. B., (Apostolic Fathers5 (London 1893) ; Kruger, G., (Early Christian Literature5 (New York 1897) ; Reuss, E., (Theologie chretienne5 ; and articles ((Barnabas55 in Cheyne, Encyclopaedia Biblica5 (New York 1899) ; and Hastings, dictionary of the Bible5 (ib. 1898).

BARNABAS, Cape, a headland of Alaska, which the navigator, Captain Cook, discovered on Saint Barnabas Day.

BARNABITES, a congregation of regular clerics in the Roman Catholic Church, founded in 1532 by three priests — Zaccharia of Cre¬ mona, Ferrari and Morigia of Milan. They were at first called the Regular Clerks of Saint Paul from their first church, Saint Paul's in Milan, which name they exchanged for Barnabites when, in 1545, they were presented with the church of Saint Barnabas in Milan. A new rule was drawn up and approved in 1579. In addition to the three monastic vows, they took a fourth, never to exert themselves for an • office within the congregation or without, and never to accept a dignity out of the con¬ gregation except by special permission of the Pope. Their houses are called colleges. The superior is chosen every third year by a Gen¬ eral Chapter. The lay brothers have to pass through a novitiate of five years. The exten¬ sion has been limited to Italy, Austria, France and Spain. The French Revolution and its sequelae drove them from France and Spain.

They returned to France in 1857, but were again driven out in 1880. Cardinal Lambrus-chini was the most celebrated member of the order in recent times. The order has about 25 houses altogether. . Many

Russians of noble ancestry, who had joined the Church of Rome, have joined the order within the last 20 years.

BARNABY, Sir Nathaniel, English naval architect: b. Chatham 1829; d. London, 15 June 1915. He began his career as an apprentice shipwright in Sheerness dockyard at the age of 14, afterward entering the designing office of the admiralty. In 1872 he became chief naval architect, and from 1875-85 was chief naval constructor to the admiralty. He brought about the substitution of steel for iron in ship¬ building, and the subsidizing of merchant ves¬ sels for use in war. He was created a K.C.B. in 1885.

BARNABY RUDGE, a novel by Charles Dickens, published in 1841. It contains an account of the Gordon riots in London, 2-7 June 1780. The plot is extremely intricate. Some of the most whimsical and amusing of Dickens' character-studies appear in the pages of this novel, while the whole episode of the gathering and march of the mob and the storm¬ ing of Newgate is surpassed in dramatic in¬ tensity by no passage in modern fiction, unless by Dickens' own treatment of the French Rev¬ olution in the (Tale of Two Cities.5

BARNACLE, Lord Decimus Tite, the

name of the nobleman whom Dickens in his (Little Dorrit5 places in charge of the circum¬ locution office.

BARNACLE, a degenerate crustacean of the order Cirripedia, living attached to some foreign object, such as wharf piles, rocks and the bottoms of ships. The barnacles would at first glance hardly be regarded as Crustacea at all, and were considered to be mollusca, until in 1836 Thompson found that the young barna¬ cle was like the larvae of other low Crustacea (Copepoda) . The young barnacle is, as in the common sessile form, a shell-like animal ; the shell composed of several pieces or valves with a multivalve, conical, movable lid, having an opening through which several pairs of long, many-jointed, hairy appendages are thrust, thus creating a current which sets in toward the mouth. The common barnacle. (B alarms balanoides) abounds on every rocky shore from extreme high-water mark to deep water, and the student can, by putting a group of them in sea water, observe the opening and shutting of the valves and the movements of the ap¬ pendages. The structure of the barnacle may best be observed in dissecting a goose-barnacle (Lepas fascicularis) . This barnacle consists of a body (capitulum) and leathery peduncle. There are six pairs of jointed feet, represent¬ ing the feet of the cyclops. The mouth, with ihe upper lip, mandibles, and two pairs of max¬ illae, will be

found in the middle of the shell. A short oesophagus leads to a pouch-like stomach and tubular intestine. This form, like most barnacles, is hermaphroditic, the ovary lying at the bottom of the shell, or, in the pedunculated forms, in the base of the pe¬ duncle, while the male gland is either close to or some distance from the ovary. There is also at the base of the shell, or in the peduncle

when developed, a cement-gland, the secretion of which is for the purpose of attaching the barnacle, when in the <(cypris® stage, to some rock or weed.

While the sexes are generally united in the same individual, in the genera Ibla and Scalpel-linn, besides the normal hermaphroditic form, there are females, and also males called <(com-plementary males,® which are attached parasit-ically both to the females and the hermaphro¬ ditic forms, living just within the valves or fastened to the membranes of the body. These complemental males are degraded, imperfect forms, with sometimes no mouth or digestive canal. The apparent design in nature of their different sexual forms is to effect cross-fertili¬ zation. The eggs pass from the ovaries into the body-cavity, where they are fertilized and remain for some time. They pass through a morula condition, a suppressed gastrula or two¬ layered state, and hatch in a form called a <(Nauplius,® from the fact that the free-swim¬ ming larva of the Entomostraca was at first thought to be an adult Crustacean, and de¬ scribed under the name of Nauplius. A-The Nauplius of the genuine barnacles has three pairs of legs ending in long bristles, with a single eye and a pair of antennae, the body end¬ ing in front in two horns, and posteriorly in a long caudal spine. After swimming about for a while, the Nauplius attaches itself to some object by its antennae, and a strange transfor¬ mation results. The body is enclosed by two sets of valves, appearing as if bivalved, like a cypris ; the peduncle grows out, concealing the rudimentary antennae, and the feet become smaller, and eventually the barnacle shape is attained. The common barnacle (Balanus balanoides) attains its full size, after becoming fixed, in one season ; that is, between April and

November. Consult monographs on the Crus~ tacea by Charles Darwin (London 1851-54) ; (Challenger Reports) (Vol. XXVIII) ; Hoek, (Report on the Cirripedia Collected by H. M. S. Challenged (London 1884) ; Pilsbury, (On the Classification of Scalpelliform Barnacles> in Proceedings of the Philadelphia Academy of Natural Sciences (Philadelphia 1908) ; bar¬ nacles of Japan and Bering Sea) (London 1911) ; Robinson, (Fishes of Fancy 5 (London 1883) ; Mayer, (Sea-Shore Life) (New York 1906) ; Caiman, (Life of Crustacea) (New York

1911).

BARNACLE-EATER. See File Fish.

BARNACLE GOOSE. See Bernacle Goose.

BARNARD, Lady Anne, Scottish poet, author of (Auld Robin Gray) : b. 1750; d. 26 May 1825. She was the. eldest daughter of James Lindsay, 5th Earl of Balcarres, and in 1793 married Andrew Barnard, a son of the bishop of Limerick, and colonial secretary to Lord Macartney at the Cape of Good Hope. There Lady Anne lived till 1807, when, losing her husband, she returned to London, her resi¬ dence till her death. Her famous lyric was written as early as 1772 to be sung to an ancient melody; but she first acknowledged its author¬ ship in 1823 to Sir Walter Scott, who two years later edited it for the Bannatyne Club, with two continuations. Her <Letters> were pub¬ lished in 1901.

BARNARD, Charles, American miscellane¬ ous writer: b. Boston, Mass., 13 Feb. 1838; author of books on horticulture, music, elec¬ tricity and other technical subjects, and since 1869 a contributor to the press on a very great variety of subjects. Was contributing editor to the Century Dictionary regarding <(Tools and Machines.® Author of (The County Fair5 and other plays. Lecturer for board of edu¬ cation, New York, and writer and lecturer on housekeeping efficiency and founder of first housekeeping experiment station. More re¬ cently, lecturer on social and educational sub¬ jects in Pasadena, Cal.

BARNARD, Mrs. Charlotte Alington,

((Claribel,® English composer of songs and ballads; b. 1830; d. Dover 1869. She married in 1854 Charles Barnard, and four years later began to compose. She wrote nearly 100 bal¬ lads between 1858 and 1868 under the pseudo¬ nym of Claribel, many of them becoming

very popular, “Won’t You Tell Me Why, Robin?® and ((Come Back to Erin,® being especially well known. In most cases she wrote the words for her songs, and she w’as also the author of a vol¬ ume of (Thoughts, Verses and Songs.5

BARNARD, Edward Emerson, American astronomer: b. Nashville, Tenn., 16 Dec. 1857. He learned photography in a studio as a boy, and began astronomical studies alone. He studied at the Vanderbilt University and Uni¬ versity of the Pacific, and received degrees from many sources, including those of hon. Sc.D. from Vanderbilt, LL.D., Queens (Can¬ ada). He was in charge of the Vanderbilt University Observatory, 1883-87. He was astron¬ omer in Lick Observatory, California, 1887-95, and then became professor in Chicago Univer¬ sity. His principal discoveries are the fifth satel¬ lite of Jupiter in 1892 and 16 comets. He has made photographs of the Milky Way, the comets, nebulae, *etc.* He is professor of practical as¬ tronomy, Chicago University, and astronomer at Yerkes Observatory, Williams Bay, Wis., since 1895. He accompanied the United States naval total eclipse expedition to Sumatra (1901) ; received the Lalande gold medal of the Paris Academy in 1892, the Arago gold medal in 1893, the Janssen gold medal (1900), the gold medal of the Royal Astronomical Society of Great Britain (1907), and the Janssen prize from the Societe Astronomique de France (1906). He is F.A.A. (vice-presi¬ dent, 1898) Astronomical and Astrophysics Society of America; associate fellow, Ameri¬ can Academy of Arts and Sciences ; fellow of the American Philosophical Society; honor member, Royal Astronomical Society (Can¬ ada) ; former associate and fellow, Royal As¬ tronomical Society; member, Societe Astro¬ nomique de France; and member of the National Academy of Sciences. He published (Micrometrical Observations of Eros made during Opposition of 1900-01 5 (1902).

BARNARD, Frederick Augustus Porter,

American educator : b. Sheffield, Mass., 5 May 1809; d. 27 April 1889. He was graduated at Yale College in 1828; instructor there in 1830; professor of mathematics and natural philoso¬ phy in the University of Alabama, 1837-48, and afterward of chemistry and natural history till 1854; professor of mathematics and astronomy

in the University of Mississippi, 1854—61 ; its president in 1856—58, and its chancellor in 1858-61. He was president of Columbia Col¬ lege, New York, in 1864-88. In 1860, he was appointed a member of the expedition to ob¬ serve the eclipse of the sun in Labrador; was engaged in 1862 in reducing observations of the stars in the southern hemisphere ; had charge of the publication of charts and maps of the United States Coast Survey in 1863; was named one of the original incorporators of the National Acad¬ emy of Sciences in 1863; was one of the United States commissioners to the Paris Exposition in 1867 ; member of the American Philosophical Society, corresponding member of the Royal Society of Liege, and member of many other scientific and literary associations. Among his publications are (Letters on College Government) (1854) ; (Report on Collegiate Educa¬ tion > (1854) ; (Art Culture) (1854) ; (History of the American Coast Survey) (1857); Uni¬ versity Education) (1858) ; (Undulatory The¬

ory of Light) (1862) ; (Machinery and Proc¬ esses of the Industrial Arts, and Apparatus of Exact Science > (1868) ; (Metric System of Weights and Measures) (1871) ; (Recent

Progress of Science, > *etc.* Barnard College, affiliated with Columbia University, was named in his honor.

BARNARD, George Grey, American

sculptor : b. Bellefonte, Pa., 24 May 1863. He studied at the Chicago Art Institute and the Lcole Nationale des Beaux Arts, Paris, 1884—87. He first exhibited at the salon of 1894. In 1900 he received a gold medal at the Paris Exposi¬ tion. Was for many years professor of sculp¬ ture in the Art Students' League, New York city. His chief works, largely symbolical in character, are (Brotherly Loveˆ (The Two

Natures } (in the Metropolitan Museum), (The God Pan) (Central Park), and (The Hewer. } His studio is in Paris.

BARNARD, Henry, American educator : b. Hartford, Conn., 24 Jan. 1811 ; d. 5 July 1900. He was president of the University of Wiscon¬ sin (1856-59), and Saint John's College, An¬ napolis, Md. (1865-66) ; founded the (American Journal of Education* (1855) ; was the first United States commissioner of education (1867-70). Among his numerous writings are (Hints and Methods for Teachers) (1857);

(Pestalozzi and PestalozzianisnP (1861) ; Ger¬ man Educational Reformers) (1862) ; *etc.* In 1886 he began to publish the (American Library of Schools and Education,* a collection of 80*0 of his own writings, reports, *etc.*

BARNARD, John Gross, American mili¬ tary engineer: b. Sheffield, Mass., 19 May 1815; d. 14 May 1882; brother of F. A. P. Barnard (q.v.). He was graduated at the United States Military Academy in 1833; served from 1835 to 1852 on the coast of the Gulf of Mexico ; and was brevetted major in the Mexican War. In the Mexican War he fortified Tampico and became chief of the Tehuantepec Survey. In 1855-56 he was superintendent of the West Point Military Academy. In the Civil War he was successively chief engineer of the depart¬ ment of Washington, chief engineer of the army of the Potomac, and chief engineer of the staff of General Grant. He subsequently had charge of the fortifications of San Fran¬ cisco and New York harbors. His published

works include (Phenomena of the Gyroscope) (1858) ; (I)angers and Defenses of New York) (1859) ; (Notes on SeaCoast Defense) (1861) ; (The Confederate States Army and the Battle of Bull Run' (1862). Consult (Biographical Memoirs of the National Academy of Sciences)

(1905).

BARNARD CASTLE, England, market town of Durham County, on the Tees, 17 miles west of Darlington, on a branch of the North Eastern Railway. It is beautifully situated on the steep left bank of the river, contains a fine townhall, dating from 1747, also a museum and a number of industrial establishments. It has a large grain market. It contains a num¬ ber of interesting ruins, the chief of which is the castle built in the 13th century by Guy Baliol Bernard, an ancestor of John Baliol, King of Scotland. The castle is the principal scene of Walter Scott's (Rokeby.* Pop. 4,757.

BARNARD COLLEGE, the undergradu¬ ate college for women of Columbia University. In 1889 a group of men and women who wished to provide for women in New York city a col¬ lege education fully equal to that offered to men succeeded in obtaining the sanction of the trustees of Columbia for the establishment of an affiliated women's college. A charter was granted by the State of New York, and prom¬

ises of subscriptions for the support of the college during the first four years of its exist¬ ence were secured. Because President Fred¬ erick A. P. Barnard of Columbia College had for many years been an ardent advocate of the admission of women to Columbia, the founders of the new college gave it his name. With seven instructors selected from the teach¬ ing staff of Columbia and with 26 students, Barnard opened in the fall of 1889. In 1900, when the original informal arrangement for instruction had been outgrown, an agreement was made between the trustees of Columbia College and of Barnard College by which Bar¬ nard was incorporated in the educational system of the university. By the provisions of this agreement, the president of Columbia is ex officio president of Barnard. Barnard profess¬ ors are appointed by the university on the nomination of the dean of Barnard with the approval of the president and trustees; in ex¬ change for instruction given by them at Co¬ lumbia, Columbia instructors give courses at Barnard. The graduates of Barnard receive their degrees from Columbia. The University library is open to women on the same terms as to men. Various opportunities in the pro¬ fessional and post-graduate schools of the uni¬ versity have also been opened to Barnard stu¬ dents. On the other hand, Barnard has its separate corporate and financial organization ; it retains its own internal administration, con¬ ducted by the dean and the provost, who are appointed by the president with the ap¬ proval of the trustees of Barnard. Two liberal courses of undergraduate instruction are offered, each of four years' duration — a lit¬ erary course leading to the degree of bachelor of arts and a scientific course leading to the degree of bachelor of science. A general two-year course not leading to a Barnard degree is arranged to give the cultural basis for work in certain professional schools of the university. The college is situated on Broadway between

116th and 120th streets, west of Columbia. Mil-bank quadrangle, the section extending from 116th to 119th street, was given in 1903 by

Mrs.. A. A. Anderson. The buildings include Mil-bank, Fiske and Brinckerhoff halls, the gifts of Mrs. Anderson, Mrs. Josiah T. Fiske and Mrs. Van Wyck Brinckerhoff, respectively, which contain the administrative offices, lecture-rooms and laboratories; Brooks Hall, the hall of resi¬ dence; and a new Students Hall, given by Jacob H. Schiff, which contains the gymnasium, swim¬ ming-pool, reading-room, lunch-room, *etc.* On the Quadrangle are tennis courts and a prac¬ tice field for basketball and athletics. Barnard owned in 1916 equipment, buildings and grounds of an estimated value of over $2,000,000 and held productive funds providing a net income of $60,000. Barnard has about 700 students, a staff of over 80 professors and other officers of instruction, and shares in the services of 23 others who come from Columbia to give courses.

BARNARDO, Thomas John, English philanthropist: b. Ireland 1845; d. London, Eng¬ land, 19 Sept. 1905. He founded the Barnardo Homes for homeless children, his attention being turned in this direction while studying medicine, by the condition of a boy in a ragged school in East London in 1866. Follow¬ ing up the subject, he began to rescue chil¬ dren who found their only shelter at night under archways, or in courts and alleys. These were introduced to his homes, where they received an industrial training, were saved from a possible career of crime, and enabled to achieve an honorable position in life. At the time of his death Dr. Barnardo had under his direction in the United Kingdom and the colonies 112 mission branches and distinct homes dealing with every age and class of needy and destitute childhood, including an im¬ migration depot in Ontario, an industrial farm in Manitoba, a home for babies and a hospital for sick children, while over 60,000 trained and tested boys and girls had passed through his institutions.

BARNATO, BARNEY, or BARNETT,

South African speculator, whose real name is believed to have been Bernard Isaac : b. Lon¬ don, England, about 1845, of Hebrew parents ; d. 14 June 1897. He began business as a dealer in diamonds, and in five years earned enough to buy shares in the Kimberley diamond mines. He established a partnership with Cecil Rhodes, and when, in 1886, gold was discovered, secured possession of a great part of the region. He committed suicide by jumping from the deck of the steamer Scot, bound from Cape Town to Southampton. Consult Isaac's (Life of Bar¬ nett Barnato) (1897).

BARNAUL, bar-noul', Siberia, a mining town in the district of Tomsk, and 230 miles southwest of the town of ffiat name, and 2,046 miles

east-southeast of Moscow, on the Barnaulski, near its junction with the Obi. It is well built, and the streets are regular and spacious. The chief edifices are of wood. There is a mining-school, an observatory, a public library, a museum, a mint, *etc.* Lead is smelted from the mines in the neighbor¬ hood ; there are lime and brick kilns, a mint for copper coins and manufactories. It is the chief town and the administrative seat of

the personal domains of the Tsar in the Altai, and contains the imperial smelting works, the annual output of which exceeds 13,000 pounds of gold and 5,000 pounds of silver (troy). Pop. about 30,000.

BARNAVE, biir-nav, Antoine Pierre Joseph Marie, French orator: b. Grenoble, 1761 ; d. Paris, 29 Nov. 1793. He was chosen a deputy of the tiers etat to the assembly of the States-General, and showed himself an open enemy to the court. The Constituent Assembly appointed him their president in January 1791. After the flight of the King he defended Lafay¬ ette against the charge of being privy to this step, and, upon the arrest of the royal family, was sent, with Petion and Latour-Maubourg, to meet them, and to conduct them to Paris. When the correspondence of the court fell into the hands of the victorious party, 10 Aug. 1792, they pretended to have found documents which showed him to have been secretly connected with it, and he was guillotined. Consult Sal-vandy, Wife of Barnave) ; Lamartine, (History of the Girondists. >

BARNAY, Ludwig, German actor: b. Pesth 1842. He made his first stage appearance at Trautenau in 1860, and thereafter appeared at Pesth, Gratz, Mainz, Vienna, Prague, Riga, Leipzig and Weimar. From 1870 to 1875 he was at the Stadt-Theater of Frankfort-on-the-Main, and from 1875 to 1880 at the Stadt-Theater of Hamburg. He visited London in

1881 as leading actor of the Meiningen Court Company, and came to the United States in

1882 where he had a very successful tour. He managed the Berliner Theater in Berlin 1887-94, and then took up his residence at Wiesbaden. He excels as a tragedian. His principal roles are Essex, Uriel Acosta, Othello, Antony, Tell and Egtnont. He helped organize the stage congress at Weimar in 1871, which led to the formation of the Biihnengenossen-schaft, which has been of great service to members of the German theatrical profession.

BARNBURNERS, a nickname for the progressive section of the New York State Democracy from about 1844 to 1852, which retaliated by calling the other party ((Hunkers.® They were essentially the same party which from 1835 onward had favored extension of the canal system, while their .opponents were the same who wished it restricted to imme¬ diately profitable canals ; but under these names the division was on the slavery question (see Free-Soil Party), in which the Barnburners were the Van Buren or Free-Soil wing. They also stood for the local control by the ((Albany' Regency,® as against the Polk <(machine® which the new administration was trying to build up in New York, and which favored the extension of slavery into the Territories. About 1852 the nicknames changed into ((Softs® and <(Hards,® corresponding with new issues to the later <(Half-breeds® and ((Stalwarts.® The origin of the name is usually derived from the familiar campaign story of the man who burned his barn to free it from rats.

BARNBY, Sir Joseph, English composer and organist: b. York, 12 Aug. 1838; d. London, 28 Jan. 1896. He was chorister in York Min¬ ster ; organist Saint Andrew's, Wells street, London, 1863-71 ; precentor and choirmaster Saint Ann's, Soho, 1871 ; precentor and director

of musical instruction in Eton College, 1875, and head of the Guildhall School of Music in London from 1892. His cantatas of ((Rebekah,® a sacred idyll, and ((The Lord Is King® ; numerous highly interesting services and an¬ thems (such as <(King All Glorious®), for the Church, as well as several secular choruses and songs, rendered him famous both in England and the United States. He was knighted in

1892.

BARNEGAT BAY, a bay on the east coast of New Jersey, about 25 miles in length, and separated from the ocean by Squan and Island beaches. Barnegat Inlet connects it with the Atlantic. On the south side of the inlet is a lighthouse 150 feet high.

BARNES, Albert, American theologian : b. Rome, 1 Dec. 1798; d. Philadelphia, 24 Dec. 1870. Until the age of 17 he was employed by his father, who was a tanner, in his own occu¬ pation. At the age of 22 he graduated at Hamilton College, and after studying theology at Princeton was licensed to preach in 1824, and ordained pastor to the Presbyterian Church of Morristown, N. J., in February 1825. In 1830 he was removed to the pastoral charge of the First Presbyterian Church in Philadelphia, where he remained till his death. He is chiefly known by his (Notes on the New Testament,5 published in 11 volumes between 1832 and 1848; and his (Notes on the Old Testament,5 com¬ pleted in 1870, which are favorite works with Sunday-school teachers and others engaged in biblical tuition. Other works of his are (The Church and Slaved (1857) ; (The Atonement in Its Relations to .Law and Moral Govern¬ ment 5 (1859) ; (Evidences of Christianity }

(1868); (Life at Threescore and Ten5 (1869). He was tried for heresy on account of his belief in unlimited atonement, and though ac¬ quitted, the eventual result of the trial was to divide the Presbyterian body in the United States into the Old and New School branches in 1837.

BARNES, Charles Reid, American botan¬ ist: b. Madison, Ind., 7 Sept. 1858; d. 1910. He was educated at Hanover (Ind.) College, 1877, and pursued graduate studies at Harvard. He held professorships in Purdue University and the University of Wisconsin, 1880-98, and in the latter year became professor of plant physi¬ ology in the University of Chicago. He is the author of (Outllnes of Plant Life) (1900) ; joint author of (Plant Dissection) (1886) ; and (Keys to the Genera and Species of North American Mosses5 (1890-97) ; (Text Book of Botany,5 in collaboration with J. Coulter and H. C. Cowles (1910). He contributed many papers to the Botanical Gazette, of which he was an editor after 1883. He was appointed vice-president of the American Association for the Advancement of Science in 1899 and presi¬ dent of the Botanical Society of America in

1903.

BARNES, Dame Juliana. See Berners, Dame Juliana.

BARNES, Earl, American educator and lecturer: b. Martville, N. Y., 15 July 1861. He was graduated at the Oswego Normal School in 1884, received the degree of A.B. from In¬ diana University in 1889, and that of M.S. from Cornell in 1891. He was professor of Euro¬

pean history at Indiana University, 1890-92, and from then until 1897 professor of education at Stanford University. He has since devoted himself to lecturing and writing. He has pub¬ lished (Studies in Education5 (Vol. I, 1889; Vol. II, 1902) ; (Where Knowledge Fails5 (1911); (Woman in Modern Society5 (1913).

BARNES, Howard Turner, American edu¬ cator: b. Woburn, Mass., 21 July 1873. He went to Canada with his parents in 1879, and was graduated at McGill University in 1893. While doing post-graduate work he alternated his studies with work as demonstrator in the physics department of the university. In 1898 he was awarded the Joule studentship by the Royal Society. After further research work in heat he submitted the results to the Royal So¬ ciety at a special session of that body; these were made the basis of a report to a confer¬ ence of physicists at the Paris Exposition of 1900. In that year he was appointed lecturer in physics at McGill University; became as¬ sistant professor there in 1902, associate pro¬ fessor in 1906 and Macdonald professor of physics in 1908. He has given particular atten¬ tion to the formation of ice in flowing water, and particularly the form of ice known as ((frazil® and anchor ice. Having read a paper on the (Ice Problem in Engineering Work in Canada5 before the British Association for the Advancement of Science in 1907, he subse¬ quently published a work on (Ice Formation and Frazil,5 which is the first authoritative volume on the subject. He has also made im¬ provements in the construction of thermome¬ ters, and has perfected a pyrometer, which is coming into use in the regulation of furnaces and manufactories.

BARNES, James, American soldier: b. Boston, Mass., 1806; d. Springfield, Mass., 12 Feb. 1869. Appointed to West Point from Massachusetts, he was graduated there in 1829, standing fifth in a class which included R. E. Lee, J. E. Johnston and a number of others

who afterward became distinguished. In 1829-30 he was assistant instructor in French at the Military Academy. Resigning from the army after seven years' service, he became a railroad engineer and built, either wholly or in part, the Rome & W., Sacketts' H. & E., the Buffalo, C. & N. Y., the Terre Haute, A. & St. L., and the Potsdam & W. railroads between 1848 and 1857. During the Civil War he was colonel of the 18th Massachusetts Volunteers 1861-62, and brigadier-general of United States Volunteers 1862-65. He was present at the battles of Antietam, Fredericksburg, Chancellorsville and Gettysburg, where he was severely wounded. Exposure and wounds so impaired his constitu¬ tion that he was unable to engage actively in his profession after the war. In 1865 he was brevetted major-general of volunteers for meri¬ torious services.

BARNES, James, American writer for boys : b. Annapolis, 19 Sept. 1866. He was educated in Saint Paul's School, Concord, N. H., and after two years spent as civil engi¬ neer in construction work with the Missouri Pacific Railway, he entered Princeton Univer¬ sity, and was graduated thence in 1891. While there he was editor of the Nassau Literary Magazine. After his graduation he was asso-

dated with Scribner's Magazine ; was assistant editor Harper's Weekly (1894—95) ; special cor¬ respondent of the Outlook during the Boer War, and in 1903 at the Venezuela blockade; and editor of Appleton's Magazine. He is au¬ thor of 'For King or Country) (1895) ; (Naval Actions of 1 812) (1896) ; (A Princetonian)

(1896) ; 'Midshipman Farragut) (1896) ; (A Loyal Traitor) (1897) ; (Commodore Bainbridge) (1897) ; (Yankee Ships and Yankee Sailors' (1898); 'David G. Farragut' (1899); (Drake and His Yeoman' (1899) ; (The Great War Trek' (1901) ; 'With the Flag in the Channel' (1902) ; 'The Giant of Three Wars' (1903) ; (The Unpardonable War' (1904) ; (The Son of Light Horse Harry' (1904) ; 'The Blockade' (1905) ; 'Outside the Law' (1906) ; 'The Clutch of Circumstance' (1908) ; 'Commodore Perry' (1912) ; 'Rifle and Cara¬ van' (1912) ; 'Through Central Africa from Coast to Coast' (1915). In 1913-14 Mr. Barnes

crossed the continent of Africa at the head of an expedition.

BARNES, Joseph K., American surgeon : b. Philadelphia, 21 July 1817; d. Washington, D. C., 5 April 1883. He was educated at Har¬ vard and in the medical department of the University of Pennsylvania; became assistant surgeon in the army in 1840, and served at various posts through the Mexican War. At the beginning of the Civil War he was sum¬ moned from Oregon and assigned to duty in the office of the surgeon-general. In 1863 he was appointed a medical inspector, with the rank of colonel, and in September of the same year was promoted to brigadier-general. In 1865 he was brevetted major-general, United States army. To him was due in great meas¬ ure the efficiency of the medical department during the war. He was surgeon-general of the army from 1864 till 1882, when he was retired. He attended Presidents Lincoln and Garfield on their deathbeds. He founded the Army Medical Museum and the library of the surgeon-general's office.

•. BARNES, Joshua, English classical scholar: b. London, 10 Jan. 1654; d. 3 Aug. 1712. He became Regius professor of Greek at Cambridge in 1695. He published 'Gerania; or, A New Discovery of a Little Sort of Peo¬ ple Called Pygmies' (1675), from which Swift is said to have drawn material for his 'Voy¬ age to Lilliput' .; ' AvTuKonaroTZTpov > (1679), a

paraphrase of the biblical story of Esther; 'History of that Most Victorious Monarch, Edward IIP (1688) ; editions of Euripides (1694) ; of Anacreon (1705) ; of Homer (1711). These editions are no longer used.

BARNES, William, English dialect poet and philologist : b. Rushay, Dorsetshire, 20 March 1801 ; d. 7 Oct. 1886. Of humble birth, he first entered a solicitor's office, then taught a school in Dorchester. He took orders, and became, in 1862, rector of Winterbourne Came in his native county, and died there. He ac¬ quired a knowledge of many languages, and published 'An Anglo-Saxon Delectus' ; 'A Philological Grammar, grounded upon Eng¬ lish' (1854) ; 'Grammar and Glossary of the Dorset Dialect' (1863), etc., but is best known by his 'Poems of Rural Life in the Dorset Dialect' (1844), and 'Poems of Rural Life, in

Common English' (1868). As a philologist, he was distinguished by an intense dislike of Lat¬ inized forms. His dialect poems reveal a high order of genius, placing him in the first flight of English pastoral poets, and have earned for him the title of "The Dorsetshire Burns." A

collected edition of these appeared in 1879, and his 'Life,' edited by his daughter, Lucy Bax¬ ter, was published in London in 1887.

BARNES, William, Jr., American politi¬ cian and publisher: b. Albany, N. Y., 17 Nov. 1866. He was graduated at Harvard Univer¬ sity in 1888, and in 1889 became owner and editor of the Albany Journal. He took an active interest in Republican politics and soon became prominent in that party in New York State. He became a member of the Republi¬ can State Committee in 1892, and was its chair¬ man in 1911-14. He has never held an elective office but virtually directed his party in New York since 1911, when it split into the pro¬ gressive and conservative sections. Barnes led the conservative element at the Chicago con¬ vention (1912) in opposing the candidacy of Theodore Roosevelt for the presidency.

BARNESBORO, Pa., borough of Cam¬ bria County, 40 miles northwest of Altoona, on the Pennsylvania Railroad. It has exten¬ sive coal-mining interests and contains lumber yards, an ice-cream factory, bottling works, a theatre and numerous churches and hotels. The waterworks are borough property. Pop.

3,535.

BARNESVILLE, Ga., town of Pike County, 60 miles southeast of Atlanta, on the Central of Georgia Railroad. It has manufac¬ tories of wagons and buggies and has a large trade in cotton. There is a Carnegie library located here. It is also the seat of Gordon In¬ stitute. Pop. 3,068.

BARNESVILLE, Minn, city in Clay County, in the Red River valley, 24 miles from Moorhead, the county-seat, on the Great North¬ ern Railroad. It has a flour mill, creamery, cigar factory, post office and two banks with aggregate resources of $865,000. The value of the taxable property amounts to $331,357. The city has a fine school building which cost $65,- 000. The city owns the electric-light plant, the waterworks and the telephone system. Pop.

1,550.

BARNESVILLE, Ohio, town in Belmont County, on the B. & O. Railroad, 32 miles west of Wheeling. It is the centre of an extensive tobacco and fruit region and manufactures glass, carwheels, cigars,

bottles, shirts and over¬ alls. It was settled in 1800, and was incor¬ porated in 1836. The government is vested in a mayor, elected biennially, and a council. The waterworks are owned and operated by the city. It has a national bank, schools, churches and several newspapers. Pop. 4,233.

~ BARNET, or HIGH BARNET, England, town in Hertfordshire, 11 miles from London. Near the town is the site, marked by an obelisk, of the famous battle, fought 14 April 1471, between the Yorkists and Lancastrians, in which the latter were routed, and their leader, Warwick, “the king-maker,” slain. Pop. 10,440.

BARNETT, John, English composer: b. Bedford 1802; d. 16 April 1890. He was the

son of a Prussian named Bernhard Beer, who changed his name on settling in England as a jeweler. Barnett sang on the stage of the Lon¬ don Lyceum at the age of 11. His good voice led to his being given a musical education under various masters, and he soon began writing songs and lighter pieces for the stage. In 1834 he published a collection of {Lyrical Illustra¬ tions of the Modern PoetsP His (Mountain Sylph) was accorded a warm welcome when produced at the London Lyceum in 1834 as the first modern English opera. It was fol¬ lowed by another, (Fair Rosamond) in 1837, which was not so successful, and by <Farinelli) in 1839. He was long popular as a singing master at Cheltenham, and published (Systems and Singing-masters > (1842), and (School for the Voice* (1844).

BARNETT, John Francis, English musi¬ cian and composer : b. London, 16 Oct. 1837. He is a nephew of John Barnett. He studied at the Royal Academy of Music and at the Leipzig Conservatory. He performed the con¬ certo in D minor of Mendelssohn at the New Philharmonic Concert of 1852, played at a Gewandhaus Concert at Leipzig in 1861 and at the London Philharmonic Society 1863. He came into notice as a composer with his sym¬ phony in A minor (1864) and followed this with a number of compositions for orchestra,

strings or pianoforte. His cantata, (The An¬ cient Mariner* was produced at Birmingham in 1867, and (Paradise and the Peri) in 1870. His most important work is the oratorio, (The Raising of Lazarus) produced at Hereford in 1876. Many other cantatas, pianoforte pieces, etc., were composed by Em. He is professor at the Royal College of Music and the Guild¬ hall School of Music, and examiner for the Associated Board.

BARNEVELD, N. Y. See Trenton, N. Y.

BARNEVELDT, bar'ne-velt, Jan van Olden, Dutch statesman: b. 1549; d. 13 May 1619. He early showed himself zealous for the independence of the United Provinces, and as advocate-general of the province of Hol¬ land displayed profound views and great skill in business. He preserved his country against the ambition of Leicester; penetrated the secret plans of Maurice of Nassau, whom his fellow-citizens had elevated to the post of stadtholder; and his marked distrust of this prince placed him at the head of the Republican party, which aimed to make the stadtholder subordinate to the legislative power. Spain at that time made proposals for peace through the archduke, gov¬ ernor of the Netherlands. Barneveldt was ap¬ pointed plenipotentiary on this occasion, and evidenced alike the skill of a statesman and the firmness of a republican. Maurice of Nassau, whose interest led him to prefer war, labored to prevent the establishment of peace; and Barneveldt was induced only by the most ur¬ gent solicitations of the states 1o retain the office which had been assigned to him, conclud¬ ing in 1609 an armistice with Spain for the term of 12 years, in which the independence of Holland was acknowledged. His influence now became still greater, and he was more and more an object of jealousy to the house of Nassau. The hostile spirit of the opposite parties in the state was further increased by theological difficulties. In order to prevent a

civil war Barneveldt proposed an ecclesiastical council, which resolved upon a general tolera¬ tion in respect to the points in question. The states acceded at first to this wise measure, but at a later period the Nassau party per¬ suaded them to adopt other views. This party represented the Arminians as secret friends of Spain. Maurice insisted upon a general synod, with a view, as he pretended, of putting an end to all religious quarrels ; but Barneveldt per¬ suaded the states to oppose this measure. Troops were now levied, without the consent of Maurice, to re-establish order in the cities where the Gomarists had excited disturbances. On the other side, the Nassau party redoubled its

attacks upon Barneveldt, who, in answer to them, published that celebrated memorial in which he warns the United Provinces of the danger which threatened them from the other party. Maurice, however, procured the assem¬ bling of a synod at Dort, in 1618, to which almost all the Calvinistic churches of Europe sent deputies. They condemned the Arminians with the most unjust severity, and Maurice was encouraged by their sentence to adopt violent measures. He caused Barneveldt and other leading men of the Arminians to be arrested; and 26 bribed judges condemned to death as a traitor the man to whom his country owed its political existence. The old man of 72 ascended the scaffold, and suffered death with the same firmness which he had evinced under all the circumstances of his life. His two sons formed a conspiracy against the tyrant ; William escaped, but Reinier wras taken and executed. His mother, after his condemnation, threw herself at the feet of Maurice to beg for mercy, and to his question why she hum¬ bled herself thus for the sake of her son when she had not done it for her husband, made the memorable reply : ((1 did not ask pardon for my husband, because he was innocent; I ask it for my son, because he is guilty.® Con¬ sult Motley, 'John of Barneveldt* (1874).

BARNEY, Joshua, American naval officer : b. Baltimore, Md., 6 July 1759; d. 1 Dec. 1818. He was captured by the British in March 1778, but exchanged in August of the same year ; was captured again and held a prisoner till he es¬ caped in 1781. In April 1782, he took the Brit¬ ish ship General Monk , off Cape May; in No¬ vember 1782, he carried dispatches to Dr. Frank¬ lin in France, and brought back a sum of money lent by the French government. In 1794 he went with Monroe to France, and for six years served in the French navy. In 1814 he commanded the fleet stationed in Chesapeake Bay.

BARNFIELD, Richard, English poet : b. Norbury, Shropshire, 1574; d. 1627. His lyrics, 'As It Fell Upon a Day* and (If Music and Sweet Poetry Agree, *wˆere long ascribed to Shakespeare and vrere included in (The Pas¬ sionate Pilgrim* (1599). Barnfield's works

include 'The Affectionate Shepherd) (1594) ; 'Cynthia, with Certain Sonnets and the Legend of Cassandra) (1595) ; 'The Encomion of Lady Pecunia* (1598).

BARNI, bar-ne, Jules Romain, French

scholar and critic: b. Lille. 1 June 1818; d. Mers, 4 July 1878. His efforts to propagate the Kantian philosophy through the medium of 'Observations on the Sense of the Sublime

and Beautiful > (1836) ; (Foundations of Ethical Metaphysic* (1848), and (Kantian Philosophy) (1859), earned him distinction; -as did also, in another, but contiguous field, a (History of Moral and Political Ideas in France in the Eighteenth Century* (1866).

BARNSLEY, England, town in the west riding of Yorkshire, 23 miles south by east of Leeds. It occupies the summits and slopes of two hills and is well built. Among the chief buildings are the public hall, built at a cost of over £26,000, and furnishing accommodations for various societies; the offices of the miners' association, the Beckett Hospital, the County Court, the offices of the Barnsley Banking Com¬ pany, the parish church, Saint George's Church, the Congregational Church, a beautiful edifice and several other places of worship. Its staple industry is the manufacture of linen in a variety of forms, which is carried on to a great ex¬ tent, both hand-looms and power-looms being used ; linens are also printed here in a style similar to the cottons of Lancashire. There are numerous collieries in the neighborhood, among which the Oaks Colliery has been made memorable by several disastrous explosions. The town possesses a beautiful public park containing several monuments. It is on four railway lines and a canal, which facilitates its export of coal, mainly to Hull and London. A United States consul is stationed here.

BARNSTABLE, Mass., town, port of entry and county-seat of Barnstable County, 72 miles southeast of Boston, on the New York, New Haven & Hartford Railroad. Within its corporate limits are 12 villages, several of which, such as Hyannis, Osterville and Cotuit, are well-known summer resorts. The town has several public libraries and a State normal school. Farming, fishing and cranberry culture are the principal industries. The town is gov¬ erned under the town meetings system. Pop.

5,000.

BARNSTAPLE, England, a town in Dev¬ onshire, 34 miles northwest from Exeter, on the right bank of the Taw, here crossed by a hand¬ some bridge of 16 arches. It is locally styled Barum, and among its public edifices are a large 14th century church, a guildhall, and market buildings, the bridge buildings, Albert clock-tower, *etc.* Before the silting of the river Barnstaple was a seaport of some import¬ ance. Its manufactures consist chiefly of pot¬ tery, known as ((Barum ware,® lace, paper, fur¬ niture, toys, leather, gloves and collars ; and ships and boats are built. The trade chiefly depends on the surrounding district. Barnstaple has existed since the reign of Athelstan in the 10th century, who built a castle here. It was incorporated in the reign of Henry I. Previous to 1885 the town returned two mem¬ bers to Parliament. Pop. 14,485.

BARNUM, Frances Courtenay (Baylor),

American novelist : b. Fayetteville, Ark., 1848. She has written (On Both Sides,* an interna¬ tional nove1 (1886) ; (Behind the Blue Ridge* ; (Juan and Juanita,* a story for boys and girls; (Claudia Hyde) (1894) ; (The Ladder of For¬ tune* (1899). She has also been a frequent contributor to magazines, and a writer of short stories. Since her marriage she has lived in Savannah, Ga.

BARNUM, Phineas Taylor, American showman: b. Bethel, Conn., 5 Tuly 1810; d. Bridgeport, 7 April 1891. He was the son of a tavern-keeper and in his boyhood displayed a remarkable propensity for practical jokes upon his father's customers, as well as a decided turn for trade. Having accumulated a small sum of money, he opened a little miscellaneous store. Here he was very successful, and, tak¬ ing advantage of the mania for lotteries which then prevailed throughout the country, he vis¬ ited New York and obtained some insight into their management. Returning to his store, he immediately entered into this business upon a large scale, established agencies in various cities and towns, and realized considerable sums from the immense sales of tickets which he was thus enabled to make. The predominat¬ ing trait in his character would not, however, permit him to settle down as a country store¬ keeper, and we soon hear of him as the editor of the Herald of Freedom, published in Dan¬ bury, Conn. In this undertaking he was also very successful from a pecuniary point of view, but* his

freedom of speech and the boldness of his opinions soon gained him many enemicv and he was several times sued for libel, and once confined in prison for 60 days. In 1834 he removed with his family to New York, hav¬ ing become much reduced in circumstances. Here he tried many ways to obtain a livelihood, but without much success, until 1835, when hearing of Joice Heth, a colored woman, the reputed nurse of George Washington, he vis¬ ited her owners, and becoming satisfied that here was an opportunity of retrieving his broken fortunes, he became her purchaser for the sum of $1,000, which he had obtained from various friends. By widely advertising this curiosity, considerable excitement was created, and the receipts soon amounted to $1,500 per week. This was Barnum's first attempt as a public showman, and finding the business profit¬ able, he collected a small company and trav¬ eled through the country, realizing large sums wherever he halted. In 1836 Joice Heth died, and a post-mortem examination proved her to have been but 75 or 80 years old, instead of 161, which was her reputed age. From 1836 until 1839 Mr. Barnum continued in the exhibit¬ ing business, but was then obliged to return to New York, again reduced to poverty. Fie now barely subsisted by writing occasional articles for Sunday papers, and by petty jobs. In 1841, the establishment known as Scudder's American Museum was announced for sale, and with a boldness almost unparalleled in mercantile transactions, Mr. Barnum negotiated for its purchase ; without owning a dollar, he made satisfactory arrangements with its holders and took possession. Here his fortune turned; at the end of a year he was able to pay all the obligations which he had entered into on ac¬ count of the museum. In 1848 he had added to it two other extensive and valuable collections, beside several minor ones, and single curiosities without number. It now became the most pop¬ ular place of amusement in the United States. In 1842 he heard of Charles S. Stratton, of Bridgeport, then 5 years old, less than 2 feet high and weighing only 16 pounds. The boy became known to the world as Gen. Tom Thumb, and was exhibited in the United States

with astonishing success until 1844, when Mr. Barnum sailed with

him for England. Through¬ out Great Britain he was received with a pop¬ ularity surpassing even that of America, and for four months the receipts averaged $500 per day. Tom Thumb was presented to the royal families of England, France and Belgium, courted and caressed by the nobility and pre¬ sented with costly gifts. In Coventry Barnum purchased the (<Happy Family® of birds and animals, for which he paid $2,500. In 1847 he returned to America, where the ˆGeneral® was again exhibited for a year with increased suc¬ cess, the receipts in the United States and Havana amounting to $150,000. Barnum con¬ ceived the idea of inducing Mile. Jenny Lind to visit America, and entered into an agree¬ ment with her, by which he engaged her to sing in America for 150 nights at $1,000 per night, the expenses of herself and troupe to be defrayed by him. Jenny Lind arrived in New York 1 Sept. 1850. The excitement upon this occasion has perhaps never been equalled in America. She gave her first concert at Castle Garden, and from that time until June 1851, gave 93 concerts, which were a succession of triumphs, the gross receipts for the whole amounting to over $700,000. The tickets were generally sold at auction, the highest price paid for one ticket being in Providence, R. I., namely, $650. He continued before the public with varying success until 1855, when having built himself an extensive villa at Bridgeport, Conn., he retired from business and published his life, giving a full account of the various enterprises in which he had been engaged. He also devoted much of his time to farming, and made many improvements in Bridgeport. Two museums of his were burned in 1865 and 1868, and in 1871 he established ((The Greatest Show on Earth,® a combination of traveling circus and menageries. He was defeated for Con¬ gress in 1866, but was four times a member of the Connecticut legislature. Besides his (Autobiography) (1854), he published (The Hum¬ bugs of the World* (1865), and Struggles and Triumphs* (1869).

BARNWELL, Robert Woodward, Ameri¬ can statesman : b. Beaufort, S. C., 10 Aug. 1801 ; d. 25 Nov. 1882. He was graduated from Harvard University in 1821 ; became a lawyer; was a member of Congress from South Carolina in 1829-33 ; a United States senator from that State, 1850—51 ; commissioner from South Carolina to confer with the Federal government regarding the proposed secession of the State in 1860; member of the Pro¬ visional Confederate Congress, 1861-62; a Con¬ federate senator in 1862-66; and then presi¬ dent of the University of South Carolina (an office he had held in 1835-41) till 1873.

BARNWELL, Robert Woodward, Ameri¬ can bishop of the Episcopal Church : b. Beau¬ fort, S. C., 27 Dec. 1849; d. Selma, Ala., 24 July

1902. He prepared for the Episcopal ministry at the General Theological Seminary in New York, and was rector of Trinity Church, Demopolis, Ala., 1876-80; and of Saint Paul's, Selma, Ala., 1890-1900. In 1900 he was consecrated bishop of Alabama.

BAROCCI, ba-roch'e, or BAROCCIO, Federigo, Italian painter: b. Urbino, 1528; d.

1612. He received instruction from his father, who was a sculptor, and from Battista Franco. He visited Rome, where the genius of Raphael inspired him, and there he painted in fresco and v/as commended by Michelangelo. He spent his life at Urbino, where he executed many paintings, several showing the influence of Correggio. Most of his work is preserved in the churches of Urbino, the most important being his (Saint Sebastian *in the cathedral. On a second visit to Rome he was employed on the decorations of the Belvedere in the Vatican, where jealous rivals tried to poison him. He suffered from the effects of the poison during the rest of his life. His (Burning of Troy) is in the Borghese Palace at Rome. Others are in the Vatican and in the Florentine galleries. His (Christ Crucified,* now in the Genoa cathedral is considered his greatest work. Con¬ sult Krommes, R. H., (Studien zu Federigo Barocci' (Leipzig 1912).

BAROCCO, or BAROQUE, technical term, chiefly applicable to architecture, and household decoration. The term is derived from the Spanish barnieco, a large, irregularly-shaped pearl, and was for a time confined to the jeweler's craft. It indicates the more ex¬ travagant fashions of design that were com¬ mon in the 17th and 18th centuries, chiefly in Italy and France, in which everything is fantastic, grotesque, florid or incongruous — irregular shapes, meaningless forms, and a lack of restraint and simplicity. The style may be said to have begun with Michelangelo, and was continued by Lorenzo Bernini, Carlo Maderno, Della Porta, Fontana, Longhena, Galilei and others. The baroque later developed into the fantastic style of interior detail known as rococo. (See Architecture, History of). Con¬ sult Gurlitt, (Geschichte des Barockstiles in Italien) (Stuttgart 1887), and Ricci, (Baroque Architecture and Sculpture in Italy) (London

1912).

BAROCHE, ba-rosh, Pierre Jules, French

statesman: b. Paris 1802; d. Jersey 1870. In 1847 he was elected member of the Chamber of Deputies for the department of Charente-In- ferieure, where he steadily opposed the minis¬ try of Guizot. He signed the Acte d' Accusa¬ tion, drawn up by Odillon Barrot 23 Feb. 1848, in which they were accused of violating the rights of citizens, and of systematic corrup¬ tion. On 2 Dec. 1851, Baroche was nominated president of the Council of State, an office in which he exhibited much ability and tact, and subsequently filled the offices of Minister of Foreign Affairs (1860), and Minister of Jus¬ tice (1863). He was made a senator in 1864.

BARODA, Hindustan, city in the province of Gujerat, capital of the native state of Baroda, 240 miles north of Bombay, on the left bank of the Viswamitra, here spanned by four stone bridges. The city proper is sur¬ rounded by a wall, outside of which are large suburbs. The houses in general are very mean, but there are several palaces, some handsome houses belonging to the wealthy in¬ habitants, government offices, a high school and numerous temples. Baroda, because of its im¬ portance as a railroad centre between the coast and the interior, has considerable trade in the produce of the surrounding districts, grain, flax, cotton and tobacco. The town has a

BAROMETER

1, 2 Torricelli's Experiment with tube full of Mercury 4 Barometer with bent tube and scale 7 Common Wheel-Barometer or Weather-Glass 9 Aneroid Barometer

3 Barometer in its simplest form 5, 6 Fortin's portable Barometer — structural details 8 Internal structure of same 10 Internal Mechanism of Aneroid

BAROMETER

splendid modern system of waterworks since 1892, supplied from a distance of 18 miles by the artificial lake covering 4.71 square miles. Baroda is the residence of the Ghaekwar, a protected Mahratta prince. Pop. (1911) 99,345. lhe state of Baroda, which has been tributary to Great Britain from 1802, has an area of 8,100 square miles and a population (1911) of 2,-

032,798.

BAROMETER (Greek, Sveight-measure®), an instrument invented by the Italian physicist lorricelli, and used for determining the pres¬ sure of the atmosphere. (For an account of its early history see Atmosphere). In its sim—

Iplest form the mercurial barometer consists essen¬ tially of a vertical glass tube about a yard in length, closed at the top and open at the bottom, and partially filled with mercury, into a vessel of which its lower end also dips. In preparing the in¬ strument for use, the tube is first completely filled with mercury ; but as soon as it is free to do so the column of mercury in the tube sinks (leaving a vacuous space at the top of the tube) until it stands at a height (usually about 30 inches) such that the pressure of the col¬ umn exactly balances that of the atmosphere. A graduated scale of metal or glass is provided, by means of which the differ¬ ence in level between the top of the column and the surface of the mercury in the open vessel (called the ˆcistern®) at the bottom can be measured with precision. In the Fortin instrument (the design commonly adopted for all but the most refined work) the cistern is closed below by a piece of flexible leather, which can be raised or lowered by means of a screw, in order to bring the sur¬ face of the mercury in the cistern to a certain fixed level, before the reading is taken. A pointed index, k, preferably of ivory, projects downward into the cistern from the upper cover, the position of its tip, with respect to the scale on the barometer tube above, being known. The mercury in the cistern being first brought accurately into contact with the ex¬ tremity of k, the position of the upper end of the barometric column is read from the scale. The ((apparent® height of the barometer is then known ; but in order to deduce the ((true®

height, certain corrections must be applied. The most important of these is the correction for temperature. The scale from which the height of the column is read is longer when the tem¬ perature is high than when the temperature is low ; and the mercury in the column is also less dense at higher temperatures than at lower ones. These two sources of error partially compen¬ sate each other; for at a high temperature the reduced density of the mercury tends to make the column stand too high, while the greater length of the scale at such a temperature

tends to make the reading too small. The com¬ pensation is not perfect, however, and when the coefficient of expansion of the scale is known, a table of temperature corrections must be cal¬ culated, to reduce the direct reading to what it would have been if it had been taken at some fixed standard temperature. The temperature of melting ice is adopted, by universal consent, as the standard to which the <(apparent® read¬ ing is to be reduced. Another important cor¬ rection must be applied in order to allow for the variations of gravity with the latitude and elevation of the place of observation. Where gravity is relatively weak, a longer column of mercury will be required to balance a given at¬ mospheric pressure than would be required to balance the same pressure in a region where gravity is stronger. All the barometric read¬ ings taken at the International Bureau of Weights and Measures, near Paris, are reduced to the values they would have if made at the level of the sea, in latitude 45° ; and this prac¬ tice is growing in favor among physicists gen¬ erally. To reduce a barometric reading to sea-level and to latitude 45°, it is merely necessary to multiply the observed height of the column (after applying the correction for temperature) by the expression (1 — .00259 cos L) (1 — .00000006 H), where L is the latitude of the place of observation, and H is its height above the sea, in feet. Several secondary corrections have also to be considered, when great refine¬ ment is desired. Prominent among these is the correction for ˆcapillarity,® which is made necessary by the fact that the mercury does not stand as high in a small barometric tube as it does in a larger one, on account of the surface tension (q.v.) of the liquid. No simple formula for this correction can be given, and it varies somewhat according as the barometer is rising or falling at the time of the observation. Tables for finding the capillary correction are given in Guyot's meteorological and physical tables, published under the direction of the Smith¬ sonian Institution at Washington. An excellent table is also given in Guillaume's (Thermometrie de Precision, > where the elaborate precau¬ tions taken in filling the modern

precision barometer are also described.

The barometer is a simple instrument, and of the greatest use in all kinds of scientific work. The greatest fault of the mercurial in¬ strument is the difficulty of transporting it with¬ out breakage and without destroying the vacuum in the upper part of the tube by the admission of air bubbles. Instruments like the Fortin type may be transported by screwing up the leather bottom until both the cistern and the tube are completely filled with mercury, then revising the barometer, and carrying it to its destination bottom side up. The ((aneroid® barometer, although not nearly so accurate as the mercurial instrument, possesses the advan¬ tage of portability, since, as its name signifies, it does not contain any liquid ; and it is there¬ fore used to a considerable extent in the deter¬ mination of the heights of places above the sea. (See Hypsometry). Various forms of the aneroid exist. One of these consists of a cylindrical metal box, exhausted of air, and having a lid of thin, corrugated metal. The lid, which is highly elastic, yields to every change of atmospheric pressure, and delicate multiply¬ ing levers transmit its motions to an index that

moves over a graduated scale, whose divisions are marked on the dial empirically, by compari¬ son wTith a mercurial barometer. For further information concerning the barometer and its use, consult Stewart and Gee, (Elementary Prac¬ tical Physics) ; Glazebrook and Shaw, Practical Physics) ; Abbe, (Meteorological Apparatus and Methods) ; Guillaume, (Thermometrie de Pre¬ cision. > See also Meteorology.

BAROMETRIC LIGHT, a name some¬ times given to the faint glow (first observed by Jean Picard in 1675) produced in the vacuous space of a mercurial barometer when the in¬ strument is agitated. The light is given off by the mercurial vapor (or other highly attentuated gas) that is present, under the influence of the electricity generated by the friction of the mer¬ cury against the glass. Advantage has been taken of this phenomenon in the construction of “self-acting® Geissler tubes,

the electricity re¬ quired to excite them being generated, when they are inverted or shaken, by the friction of a small quantity of mercury introduced before the exhaustion. No very brilliant results can be obtained in this way, however.

BAROMETZ. See Cibotium.

BARON, ba-ron, Michel, or BOYRON,

French comedian: b. 1653, and long attached to Moliere's company. For nearly 30 years he played with great success, and retired from the stage in 1691 without any apparent reason. In 1720, however, he again returned, and was re¬ ceived with immense enthusiasm, playing, with great success, even the most youthful parts. In 1729 he was taken ill while on the boards, and died shortly after.

BARON. In the feudal system of the Middle Ages, the immediate tenant of any su¬ perior was originally called his baron. In old records the citizens of London are so styled, and the members of the House of Commons, elected by the Cinque-Ports, were called barons. This title was introduced into England by Wil¬ liam the Conquerer to signify an immediate vassal of the Crown, who had a seat and vote in the royal court and tribunals, and subse¬ quently in the Flouse of Peers. It was the second rank of nobility, until dukes and mar¬ quises were created and placed above the earls, and viscounts also set above the barons. It is now the lowest rank of the peerage, and is held by prescription, patent or tenure. The barons were anciently divided into greater barons, or such as held their lands of the king in capite; and lesser barons, such as held their lands of the greater barons by military service. In Ger¬ many the ancient barons of the empire were the immediate vassals of the Crown. They ap¬ peared in the imperial court and diet, and be¬ longed to the high nobility. But these ancient feudatories were early elevated to the rank of counts or princes. A baron of the United King¬ dom has the title of "right honorable lord,® etc., and should be addressed as "my lord® or "your lordship.® His wife claims also the title of "right honorable,® and may be addressed as "madam,® or "your ladyship.® The coronation robes of a baron differ from those of the other peers in having but two rows of spots on the mantle ; and the parliamentary robes, in having but two guards of white fur, with rows of gold lace. The right of wearing a coronet was first

conferred on barons by Charles II. It is adorned with six pearls, set at

equal distances, of which four are usually shown. Until the passing of the Judicial Act of 1873 — under which the Courts of Exchequer were consoli¬ dated in the Supreme Court of Judicature — certain judges in England or Ireland were called barons, the chief baron being president of the Court of Exchequer, the title is thus now ex¬ tinct as applied to the judiciary.

BARONET, the lowest of the hereditary dignities in Great Britain and Ireland, origi¬ nally instituted by James I, 22 May 1611. The first person to receive the honor was Sir •Nicholas Bacon of Redgrave, whose successors in the title have ever since held the rank of premier baronet of the kingdom. Baronets are created by letters patent under the great seal, and the honor is generally given to the grantee and the heirs male of his body lawfully be¬ gotten. though sometimes it is entailed on col¬ laterals and even to heirs female. The order was created nominally to assist in the planta¬ tion of Ulster — all baronets are thus entitled to bear on their coats of arms the “bloody hand® of Ulster — but really in order to raise money for the king, and each baronet, on his creation, was obliged to pay into the treasury a sum amounting to a little less than $5,500. According to the terms of its foundation the dignity could be conferred only on those who had the right by inheritance from at least a grandfather to wear coat-armor, and whose income from lands was not less than $5,000 per annum. In 1622 there were 20,0 baronets in England, this being the number to which the order was originally limited. Charles I and subsequent sovereigns disregarded altogether the original limitation of the number. Pre¬ cedence is given to baronets before all knights, except those of the Garter, bannarets created on the field and privy-councillors. An order of Baronets of Ireland was also instituted by James I, for the same purpose and with the same privileges as the baronets of England. Since the union, in 1801, none have been created otherwise than as baronets of the United King¬ dom. Charles I instituted an order of baronets of Scotland and Nova Scotia in 1625 in ac¬ cordance with the intentions of his father, James I, who had granted (1621) the territory of Acadia to Sir William Alexander, after¬ ward Earl of Stirling, to be held by him as a feudal colony; the number was fixed at 150, and in 10 years 107 were created — 34 baronies in what is now New Brunswick, 15 in Nova Scotia, 15 in Cape Breton and 34 in Anticosti. The colony, theoretically a part of the kingdom of Scotland, was an entire failure, and the ter¬ ritory formally ceded to the French by the Treaty of Breda in 1667. Since the union of the parliaments in 1707 no new baronets spe¬ cially connected with Scotland have been created.

BARONIUS, Caesar, Italian ecclesiastical historian: b. Sora 1538; d. 30

June 1607. He was educated at Naples; in 1557 went to Rome; was one of the first pupils of Saint Philip of Neri, and member of the oratory founded by him; afterward cardinal and librarian of the Vatican Library. He owed these dignities to the services which he rendered the Church by his

edition of the Roman Martyrology, Ecclesiasti¬ cal Annals, } in reply to the Protestant Magde¬ burg Centuries, } comprising valuable docu¬ ments from the papal archives, on which he labored from the year 1580 until his death. They were continued, though with less power, by other writers, of whom Raynaldus takes the first rank. He has been called, after Eusebius, <(the Father of Ecclesiastical History.®

BARONS' WAR, the war carried on for several years by Simon de Montfort and other barons of Henry III against the King, begin¬ ning in 1263. See also Montfort, Simon de.

BARONY, the lordship or fee of a baron, either temporal or spiritual. Originally every peer of superior rank had also a barony an¬ nexed to his other titles. But now the rule is not universal. Baronies in their first creation emanated from the king. Baronies appertain also to bishops, as formerly to abbots, Wil¬ liam the Conquerer having changed the spiritual tenure of frank-almoyn, or free alms, by which they held their lands under the Saxon govern¬ ment, to the Norman or feudal tenure by barony. It was in virtue of this that they ob¬ tained seats in the House of Lords. The word is commonly applied in Ireland to a subdivision of a county.

BAROSCOPE, an instrument for showing that bodies are supported by the buoyancy of air, in the same manner as they are by that of water, though in a much less degree.

BAROTSE, ba-rot'se, a south African people inhabiting a region in the west of Rho¬ desia, extending from the Chode River north¬ ward to the Kabompo. They are a branch of the Bechuanas who have migrated northward, and it would appear that they were long sub¬ ject to a

Basuto tribe called the Makololo. About 1860, however, they threw off the yoke of their oppressors and almost exterminated them, but they still speak the language of the Makololos. From 1890 King Lawanika ac¬ knowledged the virtual supremacy of Great Britain, and in 1898 the British South African Company obtained complete administrative powers. Their country, a treeless alluvial plain called Barokeland or northwestern Rhodesia, was amalgamated 4 May 1911 with northeastern Rhodesia under the title of northern Rhodesia. Area 290,000 square miles. Pop. 870,000, in¬ cluding 2,250 Europeans.

BAROUCHE, a four-wheeled carriage with a falling top. There are usually two in¬ side seats in which four persons can sit.

BARQUESIMETO, bar-ke-se-ma-to, Ven¬ ezuela, city, capital of the state of Lara; is situated in a high plain, on the Bar—

quesimeto River. It was founded by the

Spaniards in 1552. The town is well built, and

has wide streets, and among its prominent buildings are the government palace, barracks, market and cathedral. It is the seat of a college and other educational institutions. It is the centre of a fertile agricultural district and, owing to its excellent transportation facilities, controls important commercial interests. Coffee of excellent quality is grown here, and with cocoa, sugar and rum, forms the principal

article oi trade. It was almost completely de¬ stroyed by the great earthquake of” 1812 and suffered severely during the War of Inde¬ pendence and the later civil wars. From 1830 to 1881 it was the capital of the state of the same name.

BARR, Amelia Edith (Huddleston), American novelist: b. Ulverston, Lancashire, 29 March 1831 ; d. 10 March 1919. Educated at the Glasgow Lligh School, she married Robert Barr in 1850. In 1854 the family moved to Texas and there, in 1867, her husband and three sons died of yellow fever at Galveston. Soon after this event she removed to New York where she began writing for the Christian Union , and other magazines. Her first book, (Romance and Reality* (1872) was the earliest of more than 60 volumes from her pen. She is the author of (Jan Vedder’s Wife* (1885); (A Daughter of Fife) (1885) ; (A Bow of Orange Ribbon* (1886); (A Border Shepherdess) (1887); (Friend

01ivia) (1890) ; (A Sister of Esau) (1891) ; (Remember the Alamo) (1893) ; Pris¬ oners of Conscience* (1897) ; (I, Thou and the Other One) (1899) ; (Trinity Bells) (1899) ; (The Maid of Maiden Lane) (1909) ; (The Lion's Whelp> (1901); (Souls of Passage* (1901) ; Pleet of Clay) (1901) ; <Bernicia) (1895); (The Black Shilleys) (1903); (The Belle of Bowling Green) (1904) ; Master of His Fate) (1901) ; (The Song of a Single Note* (1902) ;' (Cecilia's Lovers) (1905) ; (The Heart of Jessy Laurie* (1907) ; (The Strawberry Handkerchief* (1908) ; (The House on Cherry Street-* (1909); (The Hands of Compulsion (1909) ; (The Reconstructed Marriage) (1910) ; (Sheila Vedder) (1911) ; (A Maid of Old New York* (1911); (A11 the Days of My Life> (1912); Playing with Fire* (1913); (The Winning of Lucia) (1914) ; (The Measure of a Man* (1915) ; Three Score and Ten* (1915), an autobiography; (Joan* (1916); (Christine: A Fife Fisher Girl* (1917).

BARR, James, Canadian author: b. Wal-lacetown, Ontario, 1862. He engaged in journalism in that province, the United States and in London; and under the pen-name of Angus Evan Abbott has contributed much to magazine literature. Among his separate pub¬ lications are (American Humorous Verse> (1891), and the American volume in the (In¬ ternational Humorous Series* (1893), the last containing a biographical index of nearly 200 American and Canadian humorists, and several novels. He is a brother of the late Robert Barr (q.v.)

BARR, Robert, Scottish novelist: b. Glasgow, 16 Sept. 1850; d. 22 Oct. 1912. He spent his childhood in Canada, drifted into journalism and in 1876 joined the staff of De¬ troit Free Press, and wrote under the name of Luke Sharp. He went to London in 1881 and in 1892 founded The Idler with Jerome K. Jerome, but retired in 1895 to devote himself to fiction. He is author of (In a Steamer Chair * (1892) ; (In the Midst of Alarms)

(1894) ; (The Face and the Mask* (1895) ; (One Day's Courtship) (1896) ; (A Woman Intervenes) (1896); (Countess Tekla) (1899); (The Unchanging East) (1900) ; (The Victors) (1901); (A Prince of Good Fellows) (1902);

(The Tempestuous Petticoat (1905-12) ; (Stranleigh's Millions> (1909) ; (The Sword Maker5 (1910) ; (The Palace of Logs5 (1912) ; (The O'Ruddy,5 with Stephen Crane (pos¬ thumous, 1913).

BARRA, a small Mandingo kingdom of western Africa, near the mouth of the Gambia, with an estimated population of 200,000, its men being remarkable for their fine propor¬ tions. The surface, which is fertile, but rather marshy, is well cultivated. The territory is a British protectorate. The English have built the port of Albreda on the south bank, from which considerable trade is carried on. The chief town is Barrinding, where the so-called king resides.

BARRA, Scotland, an island forming part of the Outer Hebrides, Inverness-shire, eight miles long and from two to five wide, and al¬ most entirely composed of gneiss, which on the west coast forms huge rocky barriers. On these the Atlantic, beating with all its force, has hollowed out vast caves and fissures. In the interior not merely the hollows and valleys, but many of the loftiest hills are clothed with fine pasture, on which large herds of cattle and flocks of sheep are reared. The coasts abound with fish, and the island forms a fishing centre of some importance. There are many standing stones and other antiquities. The inhabitants, about 2,500, all speak Gaelic. South of Barra is the islet of Berneray, with the highest light¬ house in Great Britain, 683 feet above high water and visible for 33 miles.

BARRACAN, strictly, a thick, strong fabric made in Persia and Armenia, of camel's hair, but the name has been applied to various wool, flax and cotton stuffs.

BARRACK-ROOM BALLADS. Mr.

Kinling's (Ballads and Barrack-Room Ballads5 (1892) is on the whole a highly original as well as significant volume. Far surpassing his de¬ partmental Ditties,5 it established his fame as a poet, and contains, indeed, those of his poems which, with the ((Recessional55 and a few others, have remained the greatest popular favorites. The collection is made of the Barrack-Room Ballads proper, most of which had already ap¬ peared in the National Observer, edited by W. E. Henley; of othˆr poems which were re¬ printed from Macmillian' s Magazine, The Saint James' Gazette, *etc.* ; and of still others which now were printed for the first time. The 21 Barrack-Room Ballads proper bear somewhat the same relation to (Soldiers Three5 as is borne by (The Departmental Ditties5 to (The Plain Tales from the Hills.5 Written

mainly in Cockney dialect, salted with slang and soldier-lingo, they voice the sentiments and ex¬ periences of ((Tommy Atkins55 as he figures in various parts of the empire. Here the poet's magic has transfigured his material, and has added a new province to poetry. All are sing¬ ing ballads, with catchy choruses and jingling refrains that contribute largely to their spirited effect. Their sentiment ranges through the rollicking fun of ((Oonts5> and <(Fuzzy-Wuzzy,55 the satire of <(Tommy,55 the grim tragedy of ftDanny Deever.55 and the romantic longing of (<Mandalay.55 These five, at least, have been sung throughout the English-speaking world.

The narrative ballads of the collection and

the other poems in ordinary English are as a whole less successful. Though much of their subject matter is fresh, they often follow con¬ ventional and even outworn methods and styles. ((The Ballad of East and West55 which avers that ((the East is East and the West is West, and never the two shall meet,55 rather too strongly suggests Macaulay. The highly-mannered <(English Flag,55 which asks <(What should they know of England who only England know?55 is interesting as perhaps the first of Kipling's poems of imperial sentiment. The poetry of the engine-room, which this poet has since ex¬ tensively cultivated, appears in the ((Clampher-down55 and the ((Bolivar,55 the latter truly ex¬ cellent, and probably the best of the narrative ballads. But more famous, perhaps, is ((Tomlin-son,55 a stinging satire, with its galaxies, comets and suns, its glimpses of heaven and hell, all of which teleological and astronomical acces¬ sories have since figured prominently in Mr. Kipling's verse. Yet, with all its limitations, (Barrack-Room Ballads5 is a brilliant, original and, on the whole, delightful volume, which cannot safely be neglected by any lover of poetry. Criticism has run the gamut from un¬ critical eulogy to hypercritical depreciation. Consult Richard LeGallienne, (Rudyard Kip¬ ling.5 Explanatory notes on the poems are given by Durand, (Handbook to the Works of Rudyard Kipling5 (pp. 26-92).

Marion Tucker.

BARRACKPUR, ba-rak-poor', India, a town and cantonment in Bengal, on the Hugh, 15 miles north of Calcutta and on the East Bengal Railway. In the vicinity is the subur¬ ban residence of the Viceroy of India, within a park four miles in circuit. A Sepoy mutiny, the prelude to the great outbreak at Meerut in May, took place here in February 1857. A mutiny had previously taken place in 1824. Barrackpur is also

known as North Barrackpur to dis¬ tinguish it from South Barrackpur or Agar-para, midway between it and Calcutta. It is the capital of a sub-district which was formed in 1904. Many inhabitants are employed in the mills, which are just outside the towns. From the salubrity of its air Barrackpur is a favorite retreat for Europeans from Calcutta. Pop.

18,000.

BARRACKS, a name originally given to temporary accommodation for troops, but now designating permanent and commodious erec¬ tions, in which troops are lodged. The intro¬ duction of barracks into England was opposed as dangerous to liberty, by estranging the soldier from the citizen, and fitting him to be¬ come a tool of despotism ; but the billeting of soldiers upon citizens had grown to be so bur¬ densome to communities that after the close of the 18th century extensive barracks were built at convenient stations all over the United King¬ dom. Much improvement has been effected in the construction and arrangement of English barracks during the last half-century; and separate quarters are now provided for mar¬ ried soldiers. The construction and repair of barracks is_ part of the duty of the royal engi¬ neers ; their equipment and allotment is en¬ trusted to a barracks section of the army serv¬ ice corps. In the United States the term is officially used to designate important military posts, such as the Columbus Barracks, San

Diego Barracks, Washington Barracks and others.

BARRACOON, a negro barrack or slave depot, formerly plentiful on the coasts of Africa, Cuba and Brazil.

BARRACUDA, bar-ra-koo'da, an oceanic fish of the family Sphyrcenidce, of which about 20 species inhabit the warm seas of the whole world. All are elongate, pike-like fishes, with long, pointed jaws

filled with sharp teeth. They are often of large size, are powerful swimmers, active and voracious, and, like the bluefish, prey upon schools of smaller fishes. Several species occur on the American coasts. The great bar¬ racuda (<picuda,® or <(becuna® (S phyrcena picu-da), is common throughout tne West Indies and northward to South Carolina, and reaches a length of six feet. It is the largest and most voracious of the genus, is as fierce as a shark and is sometimes dangerous to bathers. Other West Indian species are those called gua-guanche and picudilla. These are smaller, as is a third species also, which is common along the Atlantic coast of the United States. Two or three species are found on the Pacific coast from California southward. One of these (S. argentea) is a long and slender species, known as the California (<barracouta,® and highly valued for food. It closely resembles the typi¬ cal European barracuda (S. spet), locally known as <(spet® and (<sennet,® and one of the im¬ portant food fishes of the Mediterranean.

BARRAGE, Tir de (Fr.), curtain fire: in artillery attack against a position, as a trench, the enemy position is first <(prepared,® i.e., heavily bombarded. The cannon range is then extended to behind the trench, a curtain of fire preventing the survivors of the bombardment from retreating, and also preventing reinforce¬ ments from reaching them from the rear. Under cover of the barrage the attacker's in¬ fantry is thrown forward to complete the cap¬ ture of the position.

BARRAMUNDA, bar-ra-mun'da, or BURNETT SALMON, names in Australia for a mudfish (Ceratodus) , remarkable as a survival of the very ancient group Dipnoi. See Lungfish.

BARRANDE, ba-rand, Joachim, French geologist : b. Sangues in the department of Haute Loire, 11 Aug. 1799; d. Vienna, 5 Oct. 1883. His specialty was the Silurian forma¬ tions in Bohemia, his writings including (Systeme silurien du centre de la Boheme5 (1852 and 1887) ; (Colonie dans le bassin silurien de la Boheme5 (1860) ; (Documents sur la faune primordiale et la Systeme Taconique en Amerique) (1861) ; Representation de colonies de la Boheme dans le bassin silurien du nordouest de la France) (1853) ; (Cephalapodes, etudes generales.)

BARRANQUILLA, ba-ran-ke'lya, Colom¬ bia, the chief fluvial port of Colombia and the capital of the department of Atlantico, with its harbor at Puerto Colombia, sometimes called Savanilla. Situated on the Magdalena River, near its mouth, and in 3at. 10° 29' N., Barran-quilla is connected wTith Puerto Colombia by railway. The climate is hot and damp ; never¬ theless it is a busy, well-built city, possessing a covered market, theatre, hospital, five churches, two banks, two large

flour mills and sugar,

chocolate and textile factories, *etc.* The town has electric light and tramways, telephone serv¬ ice and good water supply. Pop. 49,000.

BARRANTES Y MORENO, ba-ran'tas-e-mo-ra'no, Vincente, Spanish writer: b Badajoz, 24 March 1829; d. Pozuelq (Madrid), 16 Oct. 1898. He first studied theology, but in 1848 settled in Madrid to pursue literature; held responsible government offices, and became a member of the Academv in 1872. Among his works are the stories, < Always Late5 (1851) ■ (J nan de Padilla,5 (The Widow of Padilla.5 and a series of historical studies, dealing with local Philippine and Estremaduran topics.

BARRAS, ba-ras, Paul Frangois Jean Nicolas, Comte de, French statesman: b. Fox-Amphoux (Var), 30 June 1755; d. 29 Jan. 1829. When the Revolution broke out he im¬ mediately showed himself an opponent of the court and had a seat in the tiers etat, while his brother was sitting among the nobility. He took part in the attacks upon the Bastile and the Tuileries, was elected a juryman at the tribunal of Orleans, and in September a mem¬ ber of the national convention, where he voted for the death of Louis XVI. Although he had established his reputation as a patriot, yet he was distasteful to Robespierre whom he sus¬ pected as a half-hearted revolutionary, and he resolved to involve him in the great proscription which he then meditated. Barras therefore joined those determined to overthrow Robes¬ pierre, and took an important part in the events of the 9th Thermidor (27 July 1794). He was entrusted with the chief command of the forces of his party, repelled the troops of Henriot, and made himself master of Robespierre. On 4 Feb. 1795 he was elected president of the convention. The 13th Vendemiaire (5 Oct. 1795), when the troops of the sections which favored the royal cause approached the conven¬ tion, Barras for a second time received the chief command of the troops, and employed Bona¬ parte in the adoption of rigorous repressive measures. In his report he attributed the victory to this young general, and procured for him the chief command of the army of the in¬ terior. His important services promoted him to the Directory. Barras soon perceived that Bonaparte would give a decisive superiority to him who should obtain an influence over him; and therefore he displaced Carnot from the War Department and took possession of it himself. This separated them, and Carnot for some time took part with the council, where a party had been formed to restrain the power of the Directory, and

particularly, that of Barras. The rupture could only terminate with the ruin of one of the parties : that of the council fell by the events of the 18th Fructidor (4 Sept. 1797), in which Barras took a leading part. He arranged the marriage of Bonaparte with the widow Beauharnais. From this period he governed absolutely until 13 June 1799, when Sieyes entered the Directory. Nevertheless Barras succeeded in preserving his seat, but he became a victim of the 18th Brumaire when Bonaparte overthrew the Directory by means of the coup d'etat (9 Nov. 1799). He afterward retired to Brussels, where he lived for several years ; but finally received permission to repair to the south of France. His memoirs (in¬ valuable for the inner history of the Revolu-276

tion) were published in French and English

(1895-96).

BARRATRY, a law term applied to (1) the offense committed by the master of a vessel of embezzling or injuring goods committed to his charge for a voyage and against which in¬ surance may be effected. Barratry has also been defined to be an unlawful or fraudulent act, or very gross or culpable negligence, of the master or mariners of a vessel in violation of their duty as such, and directly prejudicial to the owner, and without his consent; (2) the offense of frequently exciting or stirring up law suits or quarrels among one's neighbors or in society generally. An indictment for this offense must charge the offender with being a common barrator, and the proof must show at least three instances of offending. It must be distinguished from ˆmaintenance® — - the officious intermeddling with suits which do not concern the party, by lending personal or other assist¬ ance; and on the other hand from ˆchamperty® an illegal bargain made between one of the parties to a suit and a third party whereby it is agreed that the latter shall share in the proceeds of the action, in return for financial support in its pursuit. An attorney is not liable to indictment for maintaining another in a groundless action. In New York, and in some other States, barratry is defined to be the practice of exciting groundless judicial pro¬ ceedings, and is a misdemeanor.

BARRE, bar, Antoine Joseph le Fevre

de la, French naval officer: b. about 1600; d. 4 May 1688. He was appointed governor of Guiana in 1663, and retook Cayenne from the Dutch. In 1667 he defeated the English in the Antilles, forcing them to raise the blockade of Saint Christopher. In 1682 he was appointed to the governorship of Canada, taking the place of the Count de Frontenac. He was, however, recalled in 1684, for having by his irresolution caused the failure of the expedition to treat with the savages.

BARRE, Isaac, British officer: b. Dublin 1726; d. London, 20 July 1802. He was wounded at Quebec, was beside Wolfe when he fell, and figures in West's picture of (The Death of Wolfed He entered Parliament in 1761, and held office successively under Lord Bute, Pitt, Rockingham and Lord Shelburne. In Pitt's second administration he exposed the corruptions of the ministry, was a strong op¬ ponent of Lord North's ministry and opposed the taxation of America. The town of Barre, Mass., was named in his honor.

BARRE, bar'ra, a group of Arawakan tribes dwelling along the upper Rio Negro in northwestern Brazil and the adjoining districts of Venezuela. They are extremely aggressive, and their language is extending rapidly through¬ out that region.

BARRE, bar're, Mass., town in Worcester County, on the Ware River and on the Boston and Maine and New York Central railroads, 21 miles northwest of Worcester. An institute for feeble-minded children, and the Stetson home for poor boys are established here, and there are cotton, woolen and straw factories, munic¬ ipal waterworks, a library and museum. Barre was settled about 1775 and was named after Col. Isaac Barre (q.v.). Pop. (1920) 3,357.

BARRE, Vt., city in Washington County, on the Central Vermont, the Barre and Chelsea and the Montpelier & W. R. railroads, six miles southeast of Montpelier. Barre has a reputation as one of the most important seats of the granite industry in the United States, engaging 88 of the city's industrial establish¬ ments. It contains, besides granite quarries, several industrial plants connected therewith. The United States census of manufactures for 1914 recorded 110 industrial establishments of factory grade, employing 2,668 persons, of whom 2,357 were wage earners, receiving $1,904,000 in wages annually. The capital invested aggre¬ gated $2,598,000,- and the value of the

year's output was $4,292,000 ; of this, $2,956,000 was the value added by manufacture. There are also a national and two savings banks ; a public library; opera house; Goddard Seminary; a home school for young men and women, with four courses of study; Spaulding High School; Burns Monument ; daily and weekly news¬ papers. It was settled about 1788, organized as a town in 1793 and received a city charter in 1894, under which the government is vested in a mayor elected annually and a city council. The waterworks and sewage system are owned and operated by the city. Pop. (1910) 10,734;

(1920) 10,008.

BARREIRO, ba-ra'e-ro, Juan Baptista Hernandez, Cuban lawyer : b. Havana about 1842. He acquired a liberal education, and amassed large wealth in the practice of his profession. He was professor of Roman law in the University of Havana for 30 years ; and later became dean of the law faculty in the university. In February 1900, while acting as first assistant mayor of Havana, he was ap¬ pointed a member of the new Cuban Civil Cabinet, and given the portfolio of public education.

BARREL, a hollow vessel made of staves, set on end, arranged around a circle, and bound together with hoops. By each stave being made wider in the middle and tapering a little toward the ends, the barrel is of larger diameter, or bulges, in the middle. The bevelled edges of the staves cause them to fit closely togelher, making a tight joint along their length. The ends are-closed by circular heads, the edges made thin to fit into a groove cut to receive them near the ends of the staves, in which they are held fast by driving the hoops upon the swell of the barrel. The con¬ struction of the barrel is ingeniously adapted for combining great strength with lightness. It resists pressure from without by the arched arrangement of the staves; and the hoops secure it from the expansive force of gases often generated in its contents. Its form is the most convenient for transportation, admitting of the vessel being rolled or rapidly swung by hooks placed under the chine or ends of the staves. In the form of kegs, firkins, liquor casks, butts, hogsheads, etc., they are met with everywhere. Yet the Chinese, with all their ingenuity, it is said, have never made a barrel. Formerly barrels were constructed entirely by hand, the cooper shaving the staves with the draw knife, and shaping them by clamps. But machines are now applied to this purpose, by which the work is done much more expedi¬ tiously. See Cooperage.

As a measure of capacity, the barrel is of variable dimensions, differing in size with the materials it is designed to hold. In wine meas¬ ure the barrel must contain 31ˆ2 gallons. A barrel of beer in England is equal to 36ˆ4 im¬ perial gallons. In the United States a barrel of flour must contain 196 pounds; and a barrel of beef or pork, 200 pounds. The measure of capacity called barrel bulk is five cubic feet. Barrel is also used to express any thing long and hollow, as a gun-barrel. It is also applied to the cylinder in a watch, about which ihe spring is coiled ; and in anatomy, to the wcavity of the tympanum" of the ear.

BARREN GROUNDS, the name given to a large tract in the Northwest Territories of Canada, extending northward to the Arctic Ocean between Great Bear and Great Slave lakes and Hudson Bay. It consists largely of swamps, lakes and bar rock, and a compar¬ atively small part of it is yet well known. The vegetation chiefly consists of dwarf birches and willows, mosses and lichens. The animals include the reindeer, musk-ox, beaver, polar bear, wolves, foxes, *etc.*

BARREN ISLAND, a volcanic island in the Andaman Sea, about lat. 12° 15' N. ; long. 93° 54' E. Its diameter is about two miles, with submarine slopes plunging rapidly to a depth of more than 800 fathoms. There is an ancient crater over a mile in diameter, from the centre of which a newer cone rises to a height of 1,015 feet. The volcano was active in 1789 and 1803, but is now dormant. A small island near Coney Island, New York, is also known as Barren Island.

BARREN MEASURES, the name given to certain groups of strata associated with the coal measures, but which contain no workable deposits. In the United States there are two so-called barren stages, a lower intervening between the lower productive and the upper productive measures, and an upper lying at the base of the Permian System.

V

BARRES, ba -res, Maurice, French novel¬ ist: b. Charmes-sur-Moselle, 1862. His earlier writing as exemplified in his (Sous l'oeil des barbares) (1888); (Un homme libre) (.1889); and (Le jardin de Berenice' (1891), is more or less decadent in character, but his later work is much more forceful, and inculcates a healthful spirit of nationalism. (Les deracines' (1897); (L'appel au soldat' (1900); (Leurs figures) (1902); (Au service de l'Allemagne' (1905) ; (Ce que j'ai vu a Rennes > (1904) ; (Le voyage de Sparte' (1906) ; (La maitresse servante) (1911); (En Italie) (1912); and, his autobiographical (Vingt-cinq ar.nees de vie litteraire' (1908) are among the best of his later writings. In 1889 he was elected as a National¬ ist to the Chamber of Deputies. In 1906 he was reelected and was also admitted to membership in the French Academy. Consult Huneker, T. G., Egoists, a book of Supermen ' (New York 1909).

BARRETT, Benjamin Fisk, American Swedenborgian clergyman : b. Dresden, Me., 1808; d. Germantown, Pa., 6 Aug. 1892. He was graduated from Bowdoin College in 1832, and held Swedenborgian pastorates in New York, Cincinnati and Philadelphia. He was a voluminous writer and industrious editor of books and periodicals relating to Sweden-

borgianism. Chief among them are (Life of Swedenborg' (1841); (Letters on the Divine Trinity' (1860; 4th ed., 1873) ; (Catholicity of the New Church' (1863) ; (Episcopalianism) (1871); (N ew View of Hell> (1870; 5th ed, 1886); (Swedenborg and Channing' (1878); (Heaven Revealed' (1885).

BARRETT, Charles Simon, American agriculturist: b. Pike County, Ga, 28 Jan. 1866. He received a normal school education at Bowling Green, Ky, Lebanon, Ohio, and Val¬ paraiso, Ind. He was engaged in general farm¬ ing and teaching until 1903, when he began organizing farmers. In 1905-06 he was presi¬ dent of the Georgia Farmers' Union, and since then has been national president of the banners' Union, which has a membership of 2,500,000 in 31 States. He was a member of Roosevelt's Country Life Commission and was appointed by Governor Hoke Smith to repre¬ sent the State of Georgia at the first governors' conference held in Washington, D. C. He was appointed delegate to the International Agri¬ cultural Institute, Rome, by Secretary of State Bryan. He is editor of the National Field, the official organ of the National Farmers' Union. He is author of (Mission, History and Times of the Farmers' Union' (1909).

BARRETT, George Hooker, American actor: b. Exeter, England, 9 June 1794; d. 5 Sept. 1860. He left England with his mother, an actress of some celebrity, and arrived at Boston in October 1796; he made his first ap¬ pearance the same year in the part of Cora's child, in (Pizarro,' at the age of two years. He commenced playing in New York in 1806, at the Park Theatre, in the part of (Young Norval,' and became manager of the Bowery Theatre, New York, in 1826, in company with E. Gilbert. He afterward visited England, and in 1837 performed at Drury Lane Theatre, London, under the management of Alfred Bunn. He wTas also manager of the Tremont Theatre, Boston, and in 1847 opened the Broad¬ way Theatre, New York, but he did not retire from the stage. His favorite characters were in genteel comedy, but he also acted in farce and low comedy with great success. From his elegance and stateliness he was known by the sobriquet of (<Gentleman George."

BARRETT, John, American diplomat and internationalist: b. Grafton, Vt.. 28 Nov. 1866. Attended Vermont Academy, Saxton's River, Vt. ; Worcester (Mass.) Academy, and was graduated from Dartmouth College, Hanover, N. H., 1889, having in the meantime taken one year's course (1888), at Vanderbilt University, Nashville, Tenn. Professor of English, Hop¬ kins' Academy, Oakland, Cal., 1889-90, and connected with newspapers of San Francisco, Seattle, Tacoma, and Portland, Ore., 1890-94. When assistant editor Evening Telegram, Port¬ land, Ore., he was appointed United States Minister to Siam, 1894, where he settled the famous Cheek case involving several millions of dollars and interpretation of United States treaties in Asia, for which he was specially thanked by the President of the United States. He also made special official visits to Japan, Korea and China, but resigned as Minister in 1898 to go as special correspondent to the Philippines during the Spanish-American War. Appointed delegate United States Second Pan-278

American Conference, Mexico, 1901 ; Commis¬ sioner-General, Saint Louis Exposition, to foreign countries, 1902-03 ; United States Min¬ ister to Argentina, 1903-04 ; United States Min¬ ister to Panama, 1904-05 ; United States Minister to Colombia, 1906. In 1907 was elected by unanimous vote of 21 Ameri¬ can governments Director-General of the Pan-American Union (q.v.), the official inter¬ national

organization maintained in Washing¬ ton b}ˆ the American republics for the develop¬ ment of commerce, friendship and peace. He was elected first honorary member American Asiatic Society, New York, was founder of Pan-American Society of the United States, and has been given special degrees by universi¬ ties in the United States and Latin America for work in behalf of Pan-Americanism. He re¬ signed this position in 1920. Is author of Admiral George Dewey > (1899) ; (Pan-Amer¬ ican Union — Peace, Friendship, Commerce* (1911); (Panama CanaP (1913), also of books on Asiatic and Latin American subjects.

BARRETT, Lawrence, American actor: b. Paterson, N. J., 4 April 1838; d. 21 March 1891. His first appearance on the stage was in 1853, in (The French Spy.) In 1856 he appeared as Sir Thomas Clifford in (The Hunchback* at Chambers Street Theatre, New York, and in 1857 he .supported Burton, Charlotte Cushman, Edwin Booth and other eminent actors. He served as a captain in the 28th Massachusetts Infantry in the early part of the Civil War. Later he acted at Philadelphia, Washington, and at Winter Garden, in New York, where he was engaged by Mr. Booth to play Othello to his Iago. After this he became an associate manager of the Varieties Theatre in New Orleans, where for the first time he played the parts of Richelieu, Plamlet and Shylock. In 1864 he secured (Rosedale* from Lester Wal-lack, and after appearing in its leading char¬ acter at New Orleans, began his first tour as a star actor. In 1867 he played at Maguire's Opera House in San Francisco, and was then manager of the California Theatre till 1870. Late in 1870 he went with Mr. Booth, playing in alternate characters in Booth's Theatre. In 1871-72 he wras manager of the New Varieties Theatre in New Orleans, and in December 1872 acted Cassius to Booth's Brutus in New York. During 1873-74 he made tours through the United States. In 1875 he appeared as Cassius in (Julius Caesar, *in Booth's Theatre, and later as King Lear. He was the first actor to appear as Daniel Druce in the United States in Mr. Gilbert's play. In 1882 he brought out (Francesca da Rimini,* at the Chestnut Street Theatre in Philadelphia. In 1883 this play ran for nine weeks at the Star Theatre, in New York. In 1887 he began his first joint engage¬ ment with Edwin Booth in Buffalo. Mr. Bar¬ rett's last production of a new play was (Guido Ferranti* by Oscar Wilde, brought out in 1890, at the Broadway Theatre, New York. His last appearance was on 18 March 1891, in the char¬ acter of Adrian du Mauprat to the Richelieu of Mr. Booth. He wrote Wife of Edwin Forrest. *

BARRETT, Sir William Fletcher, English scientist: b. Jamaica. West Indies, 10 Feb. 1844. He assisted Professor Tyndall at the Royal Institution, London, 1863-66, and was pro¬

fessor of experimental physics in the Royal Col¬ lege of Science, Dublin, 1873-1910. He was one of the founders of the Society for Psychical Research, and is widely known for his original researches in magnetism and radiant heat. He has published Wessons in Science* (1880) : (Early Chapters in Science * (1899) ; (A Mon¬ ograph on the So-called Divining Rod) (1897, 1900), *etc.* He was knighted in 1912.

BARRETT, Wilson, English dramatist and actor: b. Essex, 18 Feb. 1846; d. London, 22 July 1904. He went upon the stage in 1863. In 1874 he became manager of the Amphi¬ theatre in Leeds, and later lessee of the Grand Theatre in Leeds; in 1879 manager of the Court Theatre, London; and in 1881, of Princess' Theatre, London. He visited the United States in 1886, and, returning to England in 1887, became manager of the Globe Theatre ; re¬ visited the United States in 1888, and again in 1889 ; in 1896 became manager of the Lyric Theatre, London; and in 1899, of the Lyceum. His dramas include (The Sign of the Cross) ; c Pharaoh* ; (Now-a-days* ; (The Daughters of Babylon) ; (In Old New York/ etc.; and he adapted for stage purposes such well-known novels as (The Deemster* ; (The Bondman) ; (The Manxman) ; and (Quo Vadis.*

BARRHEAD, Scotland, manufacturing town of Renfrewshire, seven miles southwest of Glasgow. The chief industries are the printing of cottons, the spinning of cotton yarn, dyeing, bleaching, iron and brass founding, and the making of machinery and sanitary ap¬ pliances. Its engineering and other works com¬ bine with its railway facilities to make it a busy and thriving town. It was founded in 1773. Pop. 10,000.

BARRIAS, ba-re-as, Felix Joseph, French

painter: b. Paris, 13 Sept. 1822; d. 1907; a pupil of Leon Cogniet. His most successful works are (CincinnaUis> (1844); (Sappho) (1847) ; (Death of Chopin) (1885) and his mural decorations in the Hotel du Louvre, the Grand Opera House, the churches of Saint Eustache and La Trinite, Paris, and at Gros-venor House, London. He was awarded the Grand Prix de Rome, 1844; Legion of Honor, 1859; first medal at the Paris Exposition, 1889.

BARRICADE. A hastily improvised ob¬ struction intended to defend streets, bridges and other narrow passages, and to retard the enemy in his movements. Carriages, casks, chests, furniture, beams, chains, and, in short, everything which is at hand, is used for this purpose, either

in defending a town against besiegers, or in suppressing popular tumults.

Barricades have been made use of in street - fights. since the Middle Ages, but they are best known in connection with the insurrections in the city of Paris. As early as 1358 the streets of Paris were barricaded against the Dauphin, afterward Charles V. A more note¬ worthy barricade-fight was that in 1588, when 4,000 Swiss soldiers, marched into Paris by Henry III to overawe the Council of Sixteen, would have been utterly destroyed by the populace, firing from behind barricades, had the court not consented to negotiation ; and the result was that the King fled next day.

The next barricade-fight of importance in Paris was that of 1830, which resulted in the

expulsion of the Bourbons from the throne of France, and the election of the citizen-King, Louis Philippe. During the three days which this revolution lasted, the number of barricades erected across the streets amounted to several thousands. They were formed of the most heterogeneous materials — overturned vehicles, trees, scaffolding-poles, planks, building-mate¬ rials and street paving-stones ; men, women and children taking part in their erection. In February 1848, the insurrection against Louis Philippe commenced with the erection of barri¬ cades ; but the most celebrated and bloody barricade-fight was that between the populace and provisional government, which, commenc¬ ing on the night of the 23 June 1848, lasted throughout the three following days, when the people had to surrender. The national losses by this fight were estimated at 30,000,000 francs; 16,000 persons wrere killed and wounded, and 8,000 taken prisoners. The Emperor Napoleon III so widened and macad¬ amized the principal streets of Paris after he ascended the throne as to render the success¬ ful erection of barricades next to impossible. There was a remarkable barricade-erection in London in 1821. The ministry desired that the body of Queen Caroline should be conveyed out of the country to Germany, for interment, without the populace having the

opportunity of making any demonstration. On the matter be¬ coming known, a vast barricade was erected at the point where the Hampstead road joins the new road; and as nothing but the use of artillery could have forced the way, the officer in charge of the funeral cortege deemed it prudent to change his course and pass through a more central part of the metropolis. During the revolutions of 1848, barricades were suc¬ cessfully carried in Paris, Berlin, Vienna and other places, by abandoning the attack in front and breaking through the houses of contiguous streets, taking their defenders in the rear.

BARRICADES, The Days of the, a phrase employed to denote popular Parisian revolts.

BARRIE, Sir James Matthew, British novelist and dramatist : b. Kirriemuir, Scotland, 9 May 1860. He was graduated at Edinburgh University in 1882. His sketches and stories of country life in Scotland soon brought him to the attention of the British public and within a few years he was the recognized master in his field. He published ‘Auld Licht Idylls) (1888) ; (A Widow in Thrums 5 (1889) ; ‘The Little White Bird* (1892) ; ‘Sentimental Tom¬ my 5 (1892). These four books assured the success attained earlier by his work in papers and periodicals and gained him a vast host of readers. He is unexcelled in his portrayal of Scottish peasant life, with its tricksy wit and overflowing with pathos and the author’s poetic fantasy. Many others in like vein followed such as (My Lady Nicotine) (1890) ; (The Little Minister* (1891) ; ‘Margaret Ogilvy5 (1896); Tommy and GrizeP (1900); (Peter Pan in Kensington Gardens> (1906); ‘Peter and Wendy* (1911). In 1892 he won his first success in another field with his farce, ‘Walker, London.5 This was followed by many other plays, several of which were based on his work in fiction. These include ‘The Professor’s Love Story5 (1895) ; (The Little Minister5 (1897); ‘The Wedding Guest5 (1900); ‘Qual¬

ity Street5 ; ‘The Admirable Crichton5 and ‘Little Mary5 (1903); ‘Peter Pan5 (1904); ‘Alice-Sit-by-the-Fire5 (1905) ; ‘What Every Woman Knows5 (1908); ‘The Legend of Leonora5 ; ‘The Will5 ; ‘The Adored One5 (1913); ‘Half Hours5 (1913); ‘Der Tag5 (1914) ; ‘Rosy Rapture5 (1915). His dramas are apart from the problem tyne of his day, dealing with the comedy of manners and the fantasy in which his humor, satire and engag¬ ing personality have given him a high place. He was made a baronet in 1913. A 10-volume edition of Barrie’s ‘Works5 was issued in Lon¬ don in 1913. (See Little Minister, The.) Con¬ sult Hammerton, A. J., ‘Barrie and his Books5 (New York 1900),

containing a list of articles on Barrie and his work. For bibliography of his work to 1903 consult English Illustrated Magazine (Vol. XXIX, New Series, p. 208).

BARRIE, Canada, town and county-seat of Simcoe County, Ontario, on the Grand Trunk Railway, at the western extremity of Lake Simcoe, 64 miles north-northwest of Toronto. Barrie was founded in 1832 and in¬ corporated in 1871. It is a popular and beau¬ tiful summer resort, and the starting point of the Lake Simcoe steamers. The chief industrial establishments are planing and grist mills, car¬ riage works, breweries, brickyards, engine and boiler works, and wicker works. The water¬ works and electric-light plant are owned by the corporation. In 1896 Allandale, a railway centre, was annexed to the town, and the Grand Trunk Railway has here a large roundhouse, machine shops, etc, A United States consular agent is stationed here. Pop. (1911) 6,420.

BARRIER REEF, The Great, a coral reef or line of reefs extending for 1,260 miles off the northeast coast of Australia, at a mean dis¬ tance from land of 30 miles. It has a breadth varying from 10 to 90 miles, though little of it rests above water level. The channel sepa¬ rating it from the mainland rarely exceeds 250 feet in depth, but on its outer slope the reef rises precipitously from a great depth, no bot¬ tom having been found at some places with a line of 285 fathoms.

BARRIER TREATY. When, by the Peace of Utrecht in 1715, the Spanish Nether¬ lands were ceded to Austria, this cession was agreed to by the Dutch, who had conquered these provinces in alliance with England, only on condition that they should have the right (in order to secure their borders and give them a barrier against their powerful neighbor, France) to garrison several fortresses of the country, and that Austria should engage to pay yearly to Holland $350,000 for the sup¬ port of these garrisons. The treaty which was concluded between Austria, England and Hol¬ land was called the Barrier Treaty. In 1781 the Emperor Joseph II declared it void.

BARRIERS, Battle of the, an engage¬ ment between the French and the Allies in front of Paris, March 1814, in which the former were defeated. Its immediate result was the abdication of Napoleon.

BARRILI, bar-re'le, Antonio Giulio,

Italian novelist: b. Savona, 14 Dec. 1836; d. 1909. Engaging in journalism at 18, he assumed the management of II Movimento in 1860, and became proprietor and editor of II Caffaro in

Genoa in 1872. He took part in the campaigns of 1859 and 1866 (with Garibaldi in Tyrol) and in the Roman expedition of 1867, and sat in the Chamber of Deputies in 1876-79. He was one of the most prolific writers of modern Italy, and among his numerous stories are (Elm Tree and Ivy > (1868) ; <The Vale of 01ives> (1871) ; (As in a Dream, > (The Devil’s Portrait (1882) ; (The Eleventh Commandment, } (A Whimsical Wooing. > He has published several volumes of criticism, among which may be named (I1 Rinnovamento Litterario Italiano) (1890).

BARRING-OUT, a practice once common in some English schools and rendered familiar to many from forming the subject of one of the tales in Miss Edgeworth’s (Parent Assist¬ ant.-* It generally took place a few days before the holidays, when the boys barred the doors of the school and defied the masters from the windows. It was commonly understood that the pupils might dictate terms as to holidays for the ensuing year if they could prevent the masters’ entrance for three successive days. The origin of the practice is not known ; but its observance is enjoined in the statutes of Wit-ton School, Cheshire, founded in 1588, by Sir John Deane.

BARRINGTON, Daines, English lawyer, antiquary and naturalist : b. 1727 ; d. 14 March 1800. After preparatory studies at Oxford and the Inner Temple, he was called to the bar. He was successively appointed a Welsh judge (1757), recorder of Bristol (1764) and second justice of Chester (1778-85). His publications were numerous, but his name is now best known as a correspondent of White of Selborne, whose famous letters on natural history he is said to have suggested. He was an eager, curi¬ ous antiquary, uncritical and the subject of many hoaxes.

BARRINGTON, George, Irishman, noted author and thief, whose real name was Waldron : b. 1755 ; d. about 1840. His most notable act of thieving was the robbing of a Russian prince in Covent Carden Theatre. Pie took from him a gold snuff-box said to be worth $150,000; but, as the prince refused to prosecute, he was dismissed

from trial. In 1790 he was sentenced to seven years' penal servitude at Botany Bay; but having given information of an intended mutiny of the other convicts on the voyage, at the end of two years he was dis¬ charged, on the first warrant of emancipation ever issued. He was made superintendent of convicts, and later high constable at Paramatta. He was a wit, and of some literary genius : one couplet in a prologue he wrote for Young's play (Revenge, } produced by the convicts on the opening of the Sydney Theatre, remains an en¬ during classic :

"True patriots we; for be it understood,

We left our country for our country's good."

He wrote also (Voyage to Botany Bay} (1801) ; (History of New South Wales* (1802) ; his¬ tory of New Holland,* i.e., Australia (1808).

BARRINGTON, John Shute, English lawyer and theologian ; b. London 1678 ; d Becket, Berkshire, 14 Dec. 1734. From 1715 to 1723 he was a member of the House of Com¬ mons and was created first Viscount Barring¬ ton in 1720. He was a disciple and friend of Locke, a friendship which is thought to have

been brought about by the publication of his (Barrington's) work, (The Interests of Eng¬ land, J *etc.* He was devoted, to theology and wrote extensively in that science. His chief works have been collected under the title (The Theological Works of the First Viscount Bar¬ rington.)

BARRIOS, bar're-os, Gerardo, Central American statesman: b. about 1810; d. 1865. He became President of Salvador in 1860. During his administration, education, commerce and public works progressed remarkably, his presi¬ dential management being unusually liberal. He was deposed by Duenas as the outcome of the war with Guatemala, and, while endeavoring to bring about a revolution in order to become President again, was captured and executed.

BARRIOS, Justo Rufino, son of the fore¬ going, Guatemalan statesman, of Spanish-Indian blood: b. San Lorenzo, Guatemala, 17 July 1835; d. Chalchuapa, 2 April 1885. He was educated for the law, but the political punish¬ ment of his father led him to become a guer¬ rilla revolutionist, and finally chief lieutenant of Garcia Granados, who by his help ousted Vicente Cerna (the decisive battle being fought 29 June 1871) and became President, Barrios being commander-in-

chief. The revolution was a democratic and anti-clerical one, and the new government began by expelling the Jesuits; to which Barrios added the suppression of reli¬ gious orders during an acting presidency, and after he had, on 4 June 1873, succeeded Grana¬ dos as President. There had been incessant re¬ volts of the reactionists, which shortly after his accession he quelled once for all, establishing a system of terrorism and espionage which at least gave the country quiet and enabled him to carry out his wonderful reforms and improve¬ ments. He maintained internal peace and supremacy in Central America by a thorough system of militia drill for all but the pure-blooded Indians ; keeping an army of some 30,000 men in constant reserve, with 3,000 to 4,000 in the capital, which he made one of the best ordered cities of Spanish America. He organized the postal and telegraphic service on the reports of men sent to examine the United States systems. He built the first telegraph and the first railroad in Guatemala, and started a line to the coast, compelling every citizen earning over $8 a month to hold stock in it; constructed street railway lines in the capital ; improved the roads and built solid bridges. He remodeled the educational system, estab¬ lished collegiate institutes, normal and indus¬ trial schools, and made knowledge of French and English a condition of license to practise law or medicine. He built two modern peniten¬ tiaries. In a word, he transformed Guatemala into one of the most habitable and progressive countries south of the United States. But the foremost purpose of his life was to form Cen¬ tral America into one united state, for power and prosperity and the ending of the miserable wars that wasted its vitality. On 15 Jan. 1876 he assembled a diet from all the states in Guatemala city to frame a plan of consolida¬ tion ; but as it could not agree upon one, he therefore determined to set up governments in the other states favorable to his plans. Hon¬ duras was racked by a civil war and offered no difficulties, Salvador was too small to resist the

union of the two, and thenceforward till 1884 Barrios disposed of the resources of all three republics. On 1 March 1880, the first Constitu¬ tion of Guatemala went into operation, and Barrios was reelected for a

six-year term. On 24 Feb. 1883 he issued a circular to the Liberal party, pledging himself to effect the unification only by peaceful means and with the consent of all the republics. In March 1884 he called a meeting of five delegates from each republic, but Costa Rica and Nicaragua still held back. Finally, on 28 Feb. 1885, he, with his assembly, issued a decree proclaiming the union of the five states, relying on Honduras and Salvador to help him put down resistance in the others. But the President of Salvador refused to em¬ ploy force, and on Barrios persisting, joined Nicaragua and Costa Rica in a league to resist him, appealing to Mexico and the United States for help. President Diaz of Mexico remon¬ strated with Barrios, and the United States viewed the movement with disfavor; but on the Salvadorean troops, which expected Mexican help, invading Guatemala, Barrios drove them back into Salvador, and while entering Chalchuapa was struck down by a sharpshooter's bullet. His widow removed to New York, and his son became a cadet in the United States army.

BARRISTER, in England, an advocate or pleader, who has been admitted by one of the Inns of Court, namely, the Inner Temple, Mid¬ dle Temple, Lincoln's Inn or Gray's Inn to plead at the bar. Before a student can be ad¬ mitted to the bar he must have been a member of one of those societies and have kept 12 terms there by dining sufficiently often in the hall of the society to which he belongs, and must also pass a public examination. The ex¬ aminations, which had dwindled into mere forms, have in recent years been made more stringent. Barristers are sometimes called utter or outer barristers, to distinguish them from queen's (or king's) counsel, who sit within the bar in the courts, and are distin¬ guished by a silk gown. Barristers are also spoken of as counsel, as in the phrase ((opinion of counsel,® that is a written opinion obtained from a barrister before whom the facts of a case have been laid. The duties of a barrister are nominally honorary, and he can maintain no action for his fees. Yet there are few higher-paid professions than that of a successful bar¬ rister. It is the barristers who speak before all the higher courts, being instructed in regard to the facts of the case they have in hand by means of the brief wdiich they receive from the solicitor engaging their services. In the United States there is no distinct order of counsel corresponding to the English barrister, the same person performing the duties of attornev, solicitor, counsel or advocate. See also Advo¬ cate.

BARRON, James, American naval officer: b. Virginia 1769; d. 21 April 185L He entered the navy in 1798, and commanded the Chesa¬ peake in 1807, when it was attacked by the British ship Leopard as a result of his refusal to allow the Chesapeake to be searched for de¬ serters. The Chesapeake, which was quite un¬ prepared, discharged one gun

previous to strik¬ ing her colors. She was captured and three alleged deserters were found. Barron was

court-martialed for neglect of duty, though only partially to blame for the surrender of his ves¬ sel, and suspended for five years. The court closed its finding on the subject of the personal conduct of the accused, in the following lan¬ guage: ((No transposition of the specifications, or any other modification of the charges them¬ selves, would alter the opinion of the court as to the firmness and courage of the accused ; the evidence on this point is clear and satisfactory.® Such was the fate of Commodore Barron, but it is more than probable that under the state of public feeling, demanding a victim, those who were really responsible for the inefficiency of the Chesapeake escaped unpunished. Upon his restoration, as the outcome of a long corre¬ spondence with his personal enemy, Commo¬ dore Decatur, a duel was fought and Decatur was killed. Barron became senior officer in the navy in 1839, though never again in active service and never regained full public esteem. See Chesapeake and Leopard.

BARRON, Samuel, American naval of-ofificer: b. Hampton, Va., 1763; d. 29 Oct. 1810. In 1805 he commanded a squadron of 10 ves¬ sels in the expedition against Tripoli. On his return to the United States he was appointed commandant of the Gosport navy yard, but died immediately aftenvard.

BARROS, bar-ros, Arana Diego, Chilean scholar and historian : b. Santiago, 16 Aug. 1830. Ill-health obliging him to give up legal studies, he early devoted himself entirely to his¬ torical and literary pursuits, and soon became an authority on the history of his native coun¬ try. The favor with which his historical sketch of the campaigns of 1818-21 was received en¬ couraged him to begin an extensive (History of Chilean Independence > (1854-58). He spent several years investigating the government archives and private libraries of South America and Europe in search of material bearing on the history of South America. In Simancas he dis¬ covered the manuscript of the (Puren Indom-itoC an historical poem on the Araucanian War, and published an edition of it at Leipzig in 1860. His chief works in addition to the above are (Vida y viajes de Hernando de Magallanes) (1864) ; (Histoire de la guerre du Pacifique) (1881), written by order of the government; and his monumental (Historia general de Chile} (12 vols., 1884—93).

BARROS, Joao de, eminent Portuguese historian: b. Vizeu 1496; d.

Pombal 1570. His first work, an historical romance, entitled the (Emperor ClarimondC appeared in 1520. Bar-ros presented it to the King, who urged him to undertake the history of the Portuguese in In¬ dia, which was issued 1552-62. King John III appointed Barros governor of the Portuguese settlements in Guinea, and afterward general agent for these colonies, in which capacities he proved a capable and clean administrator. In 1530 he presented Barros with the province of Maranham in Brazil for the purpose of coloni¬ zation. Barros lost a great part of his fortune bv the enterprise and returned the province to the King, who indemnified him for his losses. His work (L'Azia PortuguezaC is much ad¬ mired for its style, erudition and orderly ar¬ rangement; but he lacked the critical faculty necessary to place personalities and events in their true perspective. He wrote besides a

moral dialogue, (Rhopicancuma,) in which he shows the pernicious consequences of accom¬ modating principles to circumstances ; but this work was prohibited by the Inquisition. He wrote also a dialogue on false modesty, and a Portuguese grammar, the first ever published.

BARROSA, or BOROSA, Spain, a village near the southwest coast of Andalusia, 16 miles southeast of Cadiz. On a knoll to the east of it a battle was fought in 1811, in which the British under General Graham, when aban¬ doned by the Spaniards, defeated a superior French force under Victor.

BARROT, ba-ro, Camille Hyacinthe Odilon, French statesman: b. Villefort, Lozere, 19 July 1791; d. Bougival, near Paris, 6 Aug. 1873. At 19 he pleaded before the ordinary tribunals, and at 23, by a special dispensation, before the Court of Cassation, Paris, and early acquired a high reputation for eloquence. In the political arena his oratory soon made him one of the most influential leaders of the liberal opposition. He became president of the (<Aide-toi55 Society in 1830, and at the July revolution in that year was one of three commissioners ap¬ pointed to conduct the dethroned Charles X to Cherbourg, on his way to England. Return¬ ing, he was appointed prefect of the department

of the Seine and member of the Council of State, but in a few months resigned his offices to lead the opposition to Casimir Perier and the reactionary ministers who followed him. He supported Thiers from his accession to office in March 1840, to his fg.ll in October, when he resumed his opposition to the ministry of Guizot. He took a conspicuous part in the reform movement of 1847, and spoke eloquently at several of the provincial reform banquets which led to the revolution of February 1848. Made president by Thiers in his short-lived ministry, he advised the King to withdraw his troops and thus remove the last obstacle to the downfall of his throne. In the last sitting of the Chamber of Deputies he supported the claim of the Comte de Paris to the throne and the regency of the Duchess of Orleans. The February revolution considerably abated his ardor for public liberty. He held office for some time under the presidency of Louis Napoleon, but retired from active political life after the coup d'etat, 2 Dec. 1851, and accepted no office under the Second Empire. In July 1872 he was made a councillor of state and vice-president of the council, 6 Aug. 1873. His (Memoires Posthumes) appeared at Paris

(1875-76).

BARROW, or BARROWE, Henry, Eng¬ lish ecclesiastical reformer, often considered as one of the founders of Congregationalism: d. 1593. He was a member of Gray's Inn, London, in 1576 and there became interested in the writ¬ ings of Thomas Browne, the founder of the Brownists. On account of his advocacy of church reform he was imprisoned and with his coreformer, Greenwood, was hanged at Ty¬ burn. He was the author of (Brief Discourse of the False Church) (1590). See Dexter,

(Congregationalism of the Last Three Hundred Years) (1880) ; dictionary of National Biog¬ raphy5 (London 1885 —).

BARROW, Isaac, English mathematician and theologian: b. London 1630; d. May 1677.

At the Charterhouse, where he was educated, he was chiefly remarkable for fighting and neglect of study, but being removed to a school at Felsted, in Essex, he began to show some earnest of his future great reputation. He was subsequently entered a pensioner of Trinity College, Cambridge, in 1643, of which he was chosen a scholar

in 1647. Finding that opinions in church and state opposite to his own now prevailed, he proceeded some length in the study of anatomy, botany and chemistry, with a view to the medical profession. He, however, changed his mind, and to the study of divinity joined that of mathematics and astronomy. In 1652 he graduated M.A. at Oxford, and being disappointed in his endeavor to obtain the Greek professorship at Cambridge in 1654, en¬ gaged in a scheme of foreign travel. He set out in 1655, and during his absence his first work, an edition of Euclid's Elements,5 was published at Cambridge. He visited France and Italy, where he embarked for Smyrna, and from Smyrna he proceeded to Constantinople, returning in 1659 by way of Germany and Hol¬ land, and was soon after ordained by Bishop Brownrigg. In 1660 he was elected Greek pro¬ fessor at the University of Cambridge; in 1662 professor of geometry in Gresham College; and in 1663 the Royal Society elected him a mem¬ ber of that body in the first choice after their incorporation. The same year he was appointed the first Lucasian professor of mathematics at Cambridge. In 1669, on a conscientious prin¬ ciple of duty, he determined to give up mathe¬ matics and adhere exclusively to divinity. Ac¬ cordingly. after publishing his celebrated (Lectiones Opticse,5 he resigned his chair to the great Newton. In 1673 the King nominated him to the membership of Trinity College, ob¬ serving that he had bestowed it on the best scholar in England. He had before this refused a living, given him with a view to secure his services as a tutor to the son of the gentleman who had it to bestow, because he deemed such a contract simoniacal ; and he now, with similar conscientiousness, had a clause in his patent of master allowing him to marry erased, because incompatible with the intentions of the founder. In 1675 he was chosen vice-chancellor of the University of Cambridge ; but the credit and utility expected from his labors were frustrated by his untimely death.

The works of Barrow, both mathematical and theological, are of the highest class. Of the former the following are the principal : (Euclidis Elementa5 (1655); (Euclidis Data5 (1657) ; (Lectiones Opticas5 (1669) ; (Lectiones Geometricae5 (1676); (Archimedis Opera5 (1675); (Apollonii Conicorum, lib. iv5 ; (Theo-dosii Sphericorum, lib. iii, novo methodo illustrata et succincte demonstrata5 (1675) ; (Lectio in qua Theoremata Archimedis de Sphaera et Cylindro per Methodum Indivisibilium Inves-tigata5 (1678) ; (Mathematicae Lectiones5 (1683). All his English works are theological; they were left in manuscript, and published by Dr. Tillotson (1685). (Isaaci Barrow Opus-cula5 appeared in 1697. As a mathematician, especially in the higher geometry, Barrow was deemed inferior only to Newton; as a divine he was singularly distinguished for depth and copiousness of

thought. A fine specimen of his characteristic copiousness is quoted by Addison from his sermon on (Vain and Idle Talking,5

in which the various forms and guises of wit,

a faculty for which Dr. Barrow was himself celebrated, — are enumerated with a felicity of expression which it would be difficult to parallel.

BARROW, Sir John, eminent English traveler and geographer : b. near Ulverston, Lancashire, 1764; d. 23 Nov. 1848. When 14 years old he entered an iron foundry in Liver¬ pool as timekeeper. Two years afterward he gave up this situation and made a voyage in a whaler to Greenland. He was subsequently employed as a teacher of mathematics in a school at Greenwich, and in that capacity at¬ tracted the attention of Sir George Staunton, who appointed him nominally comptroller of the household to Lord Macartney in his em¬ bassy to China in 1792, though his real employ¬ ment was to take charge of the philosophical instruments carried out as presents to the Chinese Emperor. Of this journey he afterward published an account under the title of (Travels in China > (1804). On Lord Macartney being appointed governor of the Cape of Good Hope in 1797, he made Mr. Barrow his private sec¬ retary; and on quitting the Cape in 1798 left him auditor-general of public accounts. Dur¬ ing his residence there he made several journeys into the interior of south Africa, and on his return to England published an account of them under the title of (Travels in Southern Africa.) in 1804 Barrow was appointed second secretary to the admiralty which post, with a brief in¬ terval, he occupied continuously for 40 years. The duties of this post he discharged with the most exemplary industry and activity, and he took an ardent interest in promoting geographi¬ cal and scientific discovery, and more especially the expeditions to the Arctic Seas. His leisure hours were employed in literary work, and the numerous volumes published by him attest the profitable use he made of his time. These in¬ clude, in addition to the books of travel already mentioned, the (Life of Earl Macartney) ; Wife of Lord Anson) ; Wife

of Lord Howe) ; (Voyages of Discovery and Research within the Arctic Regions) ; Autobiographical Memoir) (1847). In 1835 he was created a baronet. He originated the Royal Geographical Society in 1830 and was its vice-president at the time of his death. Barrow Strait, Cape Barrow and Point Barrow, in the Arctic regions, were named in his honor.

BARROW, a navigable river of Ireland, province of Leinster. Its course is generally southward, and after about 900 miles it joins the Suir to form the estuary called Waterford Harbor. It is navigable for vessels of 200 tons to New Ross, 25 miles from the sea, and for barges to Athy in Kildare County, where it is joined by a branch of the Grand Canal.

BARROW, the name which was given to three prominent localities of the Arctic region, in honor of Sir John Barrow. (1) Point Barrow, on the north coast of Alaska, in lat. 71° 23' N., and long. 156° 3P W., long considered as the most northerly spot on the American mainland. (2) Cape Barrow, on the coast of Canada, or Coronation Gulf, is in lat. 68° N., long. Ill0 W. (3) Barrow Strait, the earliest of Parry's discoveries, leading to the west out of Lancaster Sound, which Parry's immediate predecessor, Captain, afterward Sir John, Ross, had pronounced to be landlocked in that direc¬

tion. Besides its main course to Melville Sound, Barrow Strait throws off Prince Re¬ gent's Inlet to the south and Wellington Chan¬ nel to the north. The passage averages about 50 miles in breadth, extending nearly along the parallel of 74° N., from 85° to 100° W.

BARROW, an artificial mound or tumulus of stones or earth, piled up over the remains of the dead. Such erections were frequently made in ancient times in our own land, and they are met with also in many other countries both in the Old and New World. In Scotland they are called cairns. When opened they are often found to contain stone cysts, calcined bones, *etc.* Burial in barrows, commencing amid the mists of remote antiquity, seems to have been practiced as late as the 8th century a.d. One of the finest barrows in the world is Silbury Hill, Wiltshire, near Marlborough. It is 170 feet in perpendicular height, 316 along the slope, and covers about five acres of ground. See also Mound Builders.

BARROW-IN-FURNESS, England, sea¬ port, parliamentary and county borough, in the district of Furness, situated opposite to and including the island of Walney, Lancashire, 50 miles northwest of Liverpool. In

the middle of the 19th century it was a fishing village with 300 inhabitants; in 1911 its popula¬ tion was 63,770. This extraordinary prosperity is due to the working of the rich mines of red hematite iron-ore which abound in the district, and to the extension of the railway to Barrow, by which its excellent natural position and capabilities of development as a seaport have been taken advantage of. There are now four docks completed, and the depth of water is suf¬ ficient to admit the largest ships at present afloat. Much timber is imported from the north of Europe and from Canada and Nor¬ way, large numbers of cattle are brought from Belfast, preserved provisions are brought from the United States, and an extensive trade is done in grain and flour. Iron-ore and pig-iron are largely shipped from the port. There is a large passenger traffic with the Isle of Man and Belfast. The chief industrial occupations are the manufacture of iron and Bessemer steel, shipbuilding, iron-founding, rolling stock, and the making of ropes, sails, bricks, and large jute works, paper-pulp works and salt works have been established. Barrow owes a great deal of its prosperity to the discovery of the Bessemer process of steel-making and to the fact that the hematite ores of the district are specially adapted to this process. Messrs. Vick¬ ers, Sons & Maxim, Limited, employ thou¬ sands of hands, and have built some of the largest merchant and war-vessels afloat. They also manufacture ordnance and armor plate. The town is laid out on a regular plan, mostly in rectangles, is substantially built and well drained and supplied with gas, water and elec¬ tricity. It contains a free public library, work¬ men's institute and a townhall, built at a cost of over £60,000. The Redistribution Act of 1885 erected it into a parliamentary borough, returning one member. The interesting ruins of Furness Abbey, which was founded in 1127, lie within two miles of the town. Consult Rich¬ ardson, (Furness, Past and Present > (1880).

BARROWS, David Prescott, American ethnologist and educator: b. Chicago, 27 June

1873. He was graduated at Pomona College, Claremont, Cal., in 1894,

and later studied at the universities of California, Columbia and Chicago. He became superintendent of schools at Manila, P. I., in 1900, chief of the Bureau of Non-Christian Tribes 1901 and director of edu¬ cation in the Philippine Islands 1903-09. He was appointed professor of education and dean of the Graduate School of the University of California in 1910 and in the following year became professor of political science at that institution. Pie has published (The Ethno-Botany of the Coahuila Indians) (1900) ; *A History of the Philippines) (1903) ; (A Decade of American Government in the Philippines J (1915) ; also reports on ethnology of the Phil¬ ippines and six reports on the progress of edu¬ cation in the Philippines.

BARROWS, Elijah Porter, American clergyman and educator : b. Mansfield, Conn., 1807 ; d. 1888. He was professor of sacred lit¬ erature in Western Reserve College, Ohio, 1837-52, and of Hebrew in Andover Theologi¬ cal Seminary, 1853-66. In 1872 he became pro¬ fessor of Hebrew at Oberlin College, Ohio. Besides many contributions to the (Bibliotheca Sacra, } he published Companion to the Bible } (1867) ; (Sacred Geography and Antiquities } (1872) ; (Manners and Customs of the Jews)

(1884).

BARROWS, (Katharine) Isabel Hayes,

American editor and penologist : b. Irasburg, Vt., 17 April 1845; d. 25 Oct. 1913. She was graduated at the Adams Academy, Derry, N. H., in 1862, and afterward studied medicine in New York, where she received the degree of M.D. She also spent two years in study at Leipzig and Vienna. She was married to Wil¬ liam Wilberforce Chapin in 1863. He died in 1865 and in 1867 she was married to Samuel June Barrows. She was employed as a stenog¬ rapher by the Department of State at Wash¬ ington, being the first woman to hold such a position. She edited for 20 years the (Proceedings) of the National Conference of Charities and Corrections, and was for about 16 years assistant editor of the Christian Register. She was also phonographic secretary to the National Prison Association and to the Lake Mohonk conferences, to each of which she rendered invaluable services. She also contributed fre¬ quently to The Independent, The Outlook, The Survey and other periodicals. She published (The Shaybacks in Camp,* with S. J. Barrows; (A Sunny Life: The Biography of Samuel June Barrows* (1913).

BARROWS, John Henry, American edu¬ cator: b. Medina, Mich., 11 July 1847 ; d. Oberlin, Ohio, 3. June 1902. He was graduated at Olivet College in 1867; subsequently studied in Yale College, Union and Andover Theological Sem¬ inaries and at Gottingen; was pastor of the First Presbyterian Church, in Chicago, for 14 years; organized and was president of the World's Parliament of Religions at the World's Columbian Exposition in Chicago in 1893. He delivered a course of lectures on Christianity in the principal universities in India, under the patronage of the University of Chicago, 1896— 97, and became president of Oberlin College in 1898. He published (The Gospels are True Histories) (1891) ; (Life of Henry Ward Beecher) (1893) ; Christianity the World Re¬

ligion* ; (The World Pilgrimage) ; (History of the Parliament of Religions* (1893) ; (The Christian Conquest of Asia) (1899). Consult the biography by M. E. Barrows (New York 1905).

BARROWS, Samuel June, American cler¬ gyman and author: b. New York, 26 May 1845; d. 1909. After a varied early career he became private secretary to William H. Seward in 1867, went to Utah in 1870 with Chaplain New¬ man of the United States Senate, and re¬ ported the debate with the Mormons. He was graduated at Harvard Divinity School in 1875, and while an undergraduate accompanied as correspondent of the New York Tribune General Stanley's Yellowstone expedition in 1873, and General Custer's Black Hills expe¬ dition in 1874, taking part in the battle of the Big Horn. He was pastor of the First Unitarian Church, Dorchester, Mass., 1876-81 ; editor of the Christian Register (1881-97) ; secretary of the United States delegation to the International Prison Congress, Paris, 1895, and United States representative on the Interna¬ tional Prison Commission, 1896. In 1897 he was elected to Congress from the 10th Massa¬ chusetts district. He wrote (The Doom of the Majority of Mankind> (1883) ; (The Shay¬ backs in Camp,* in collaboration with Isabel H. Barrows (1887) ; (A Baptist Meeting House) (1885) ; (Isles and Shrines of Greece* (1898).

BARRUNDIA, bar-roon'de-a, Jose Fran¬ cisco, Central American statesman : b. Guate¬ mala 1779; d. New York, 4 Aug. 1854. He was sentenced to death for treason in 1813, but escaped, and became leader of the Revolution¬ ary party in 1819. In 1823-24, as a member of the Constitutional Convention of Central America, he brought forward the decree for the abolition of slavery. He became President of the Central American republic in 1829, retain¬ ing office for over a

year, and in 1852 was again elected President. He came to the United States in 1854, as Minister from Honduras, to propose the annexation of that territory to the United States, but died suddenly before any¬ thing was accomplished.

BARRY, Alfred, English prelate : b. Lon¬ don, 15 Jan. 1826; d. 1 April 1910. He was a son of the architect Sir Charles Barry, and was educated at Cambridge. He was headmaster of Leeds grammar-school, 1854-62; principal of Cheltenham College, 1862-68, and of King's College, London, 1868-83. He was canon of Worcester, 1871-81, of Westminster 1881-84. He became bishop of Sydney and primate of Australia in 1884, but resigned his see in 1889 and returning to England was rector of Saint James, Piccadilly, London, 1895-1900, and canon of Saint George's, Windsor, 1901-10. He has published (Introduction to the Old Testament) (1856) ; (Life of Sir C. Barry *(1867) ; (Boyle Lectures* (1876-78) ; Christianity and Social¬ ismˆ (1890); England's Mission to India* (1895) ; (Hulsean Lectures* (1895) ; (Do We Believe?* (1908). He was a brother of Sir John Wolfe-Barry.

BARRY, Sir Charles, distinguished Eng¬ lish architect: b. London, 23 May 1795; d. 12 May 1860. At a very early age he displayed a taste for drawing and design, and while a youth exhibited at the Royal Academy. Hav¬ ing resolved to devote his energies to architec¬ ture, he employed the little means left him in

visiting Italy, Greece and the East. He left England in 1817, and remained abroad upward of three years. After his return he entered on his professional career. He executed numerous important buildings, such as the Travelers' and Reform Clubhouses, London; King Edward's School, Birmingham, *etc.* ; and in 1836 was appointed architect of the new Houses of Par¬ liament at Westminster. On this building his fame as an architect rests, and with its execu¬ tion he was employed almost unintermittently to the day of his death, extending over a period of more than 24 years. In 1852 he received the honor of knighthood. He had been admitted a Royal Academician in 1841. As an architect he

belonged to the eclectic school, and adopted indifferently the Gothic or classic styles ac-according as he might be required or circum¬ stances rendered it expedient. Consult his (Life and Works, > by his son.

BARRY, Edward Middleton, English architect, third son of Sir Charles Barry (q.v.) : b. 1830; d. 1880. He had already distinguished himself in his profession, and succeeding to his father's business, completed his great work, the Houses of Parliament. He designed a large number of buildings, many of them of national importance, such as the Covent Garden Theatre, the opera house at Malta and the New National Gallery in London. He was elected a Royal Academician in 1869, and in 1873 succeeded Sir G. G. Scott as professor of architecture in the Academy.

BARRY, Elizabeth, English actress : b. 1658; d. London, 7 Nov. 1713. She was said to be the daughter of Colonel Barry, a prominent royalist in the civil war.' She made her debut on the stage under the patronage of the Earl of Rochester ; and her first performance is said to have been witnessed by Charles II and the Duke and Duchess of York. Her reputa¬ tion was won chiefly in the line of tragedy, in the roles of Monimia in 'The Orphan* and Belvidera in (Venice Preserved.* She was known as (<the great Mrs. Barry® ; and is said to have created over 100 roles. Consult Galt, (Lives of the Players) (1831) ; and Baker, 'English Actors from Shakespeare to Macready)

(1879).

BARRY, James, Irish painter and writer on his art: b. Cork, 11 Oct. 1741; d. 22 Feb. 1806. By one of his first paintings in oil, (The Conversion of Saint Patrick, *exhibited at Dublin, he attracted the attention of Burke, who carried him, in his 23d year, to London. The brothers Burke provided him with the means for visiting Paris and Rome, whence he went to Florence, Bologna and Naples. He remained about four years in Italy, returning in 1770. Having exhibited some important pic¬ tures he was elected an associate of the Royal Academy in 1772 and a full academician the following year. In 1777-83 he executed his chief work, the six paintings illustrating the development of (Human Culture* which adorn the great hall of the Society of Arts. In 1775 he published (An Inquiry into the Real or Imaginary Obstructions to the Increase of the Arts in England.* He was appointed profes¬ sor of painting in the Academy in 1782; but in 1799, after he had alienated the respect of his fellow-academicians by his peculiar man¬ ners and by his savage

attacks upon them, he

was expelled on the occasion of a violent pam¬ phlet issued by him under the title of a ‘Let¬ ter to the Society of Dilettanti. * He was dis¬ tinguished more by vigor of conception than by accuracy of execution and his paintings have not maintained their reputation.

BARRY, John, the first American commo¬ dore: b. Wexford, Ireland, 1745; d. Philadel¬ phia, 13 Sept. 1803. He early displayed a great partiality for the sea and at the age of 11 adopted America as his home and made a number of voyages in merchant ships until the commencement of the Revolution. He at once embraced the cause of the colonies, offered his services and was one of the first officers com¬ missioned by Congress in the naval service. After a successful cruise in the Lexington, he was transferred, in the latter part of 1776, to the Effingham, one of three large frigates built in Philadelphia. When the American vessels of war were lying near Whitehill, whither they had been sent when the city and the forts of the river had fallen into the power of the British, Commodore Barry conceived the dar¬ ing plan of annoying the enemy by means of small boats, properly armed, which being sta¬ tioned down the river and bay might intercept supplies and in case of danger take refuge in the creeks. He accordingly manned the boats of the frigates, descended the river with muf¬ fled oars under cover of the night and ap¬ peared unexpectedly before the city. He ef¬ fected his object by intercepting a large stock of provisions and capturing several vessels laden with military’ munitions and valuable stores for the British officers. He was after¬ ward transferred to the Alliance, a frigate of 36 guns, which was placed under his orders. The Alliance sailed from Boston 25 Dec. 1781 with the Marquis de la Fayette and Count de Noailles on board, who were proceed¬ ing to France on public business. During the rest of the war Barry served with credit to himself and benefit to his country and after the cessation of hostilities was appointed to super¬ intend the building of the frigate United States in Philadelphia, which was designed for his command. He retained the command of the United States until she was laid up in ordinary.

BARRY, John Arthur, Australian journal¬ ist and novelist: b. Torquay, Devon, England, 1850; d. 23 Sept. 1911. He entered the British merchant service at the age of 14; was in the Australian gold fields in 1870 and later became a stock drover in Queensland and New South Wales. From 1877 to 1880 he returned to sea¬ faring life; after which he began to write for Australian, English, and American magazines

and newspapers while he carried on the busi¬ ness of stock drover and manager. In 1896 he joined the staff in Sydney of the Town and Country Journal, which he left in 1900 to be¬ come editorial writer on the Evening News. Among his published works are ‘Steve Brown’s Bunyip) (1893); (In the Great Deep* (1895); (The Luck of the Native BonP (1898) ; (A Son of the Sea) (1899) ; ‘Against the Tides of Fate) (1899) ; ‘Red Lion and Blue Staff (1902) ; ‘Old and New Sydney > (1903) ; and ‘Sea Yarns* (1910).

BARRY, John Daniel, American journalist and author: b Boston. 31 Dec. 1866. He was graduated at Harvard University in 1888. Since

graduation he has devoted himself to journal¬ ism, writing novels and plays and lecturing on social and literary subjects. He was for a time dramatic critic for Harpers Weekly and later for Colliers. He was appointed instruc¬ tor in diction and interpretation at the Ameri¬ can Academy of Dramatic Arts and lecturer for the New York city Board of Education. He has written a daily essay for the San Francisco Bulletin since 1910. His published works in¬ clude (The Princess Margaret,* (The Intri¬ guersˆ (Mademoiselle Blanche,* ‘A Daugh¬ ter of Thespis,* (The Congressman’s Wife* (1903); (Our Best Society) (1905); ‘Intima¬ tions,* essays; <Outlands,) a volume of short stories (1914) ; (The City of Domes, *an illus¬ trated description of the Panama-Pacific Ex¬ position (1915); ‘Reactions,* a volume of es¬ says (1915).

BARRY, Sir John Wolfe-Wolfe, English engineer of eminence, youngest son of Sir Charles Barry : b. London, 7 Dec. 1836. He built the present Blackfriars Bridge in London, the Tower Bridge, the Barry Dock at Cardiff, Immingham Dock, New Alexandria Docks, Newport, Natal Harbor, and planned the rail¬ way in Argentina from Buenos Aires to San Rosario. He has published (Railway Appliances) (1876) ; (Lectures on Railways and Locomotives) (1862) ; (The Tower Bridge* (1894) ; ‘Barry Genealogy in England and Wales.*

BARRY, Martin, English physiologist : b. Fratton, Hampshire, 1802; d. Beccles, Suffolk, April 1855. He studied at the medical schools of

London and at several on the Continent and took his degree of M.D. in Edinburgh in 1833. He wrote much on physiological sub¬ jects and especially on animal development and embryology. In 1843 he made the discov¬ ery of the presence of spermatazoa within the ovum, which he communicated to the Royal Society. His means being ample, he gave his professional services largely to the poor.

BARRY, Spranger, Irish actor, the great rival of Garrick: b. Dublin 1719; d. London, 10 Jan. 1777. He was brought up as a silver¬ smith ; but was attracted to the stage. He first appeared (1744) at the Theatre Royal, Smock alley, Dublin; and in 1746 was engaged at Drury Lane, London, as alternate to Garrick in 'Hamlet* and (Macbeth. > Having aroused Garrick's jealousy by his success as Romeo, he was engaged (1750) at Covent Garden, where his supremacy in (Romeo and J nliet > was gen¬ erally conceded. He spent 1754-66 trying to found a theatre at Dublin. In 1767 he reap¬ peared at London in the part of Othello. From 1774 till his death he acted at Covent Garden. Consult Pollock, 'Actors and Actresses of Great Britain) (1886).

BARRY, Thomas Henry, American sol¬ dier: b. New York, 13 Oct. 1855; d. Washington, D. C., 30 Dec. 1919. He was graduated at West Point, 1877, and passed through the various grades to brigadier-general, United States volunteers, 18 June 1900. From August 1898 to February 1900 he was adjutant-general of the 8th army corps in the Philippines and became chief of staff, division of the Philip¬ pines, 1900-01; brigadier-general, 1903; major-

general, 1908; commanded in Cuba, 1907-09; and 1910-12 was superintendent of the United States Military Academy.

BARRY, William Farquhar, American military officer: b. New York, 18 Aug. 1818; d. 18 July 1879. He first saw active service in the Florida War (1852-53) and in the Mex¬ ican War acted as aide-de-camp to General Worth. At the outbreak of the Civil War he was made chief of artillery and organized the artillery of the Army of the Potomac. He subsequently became chief of artillery to Sher¬ man and took part in the march to the sea. In 1865 he was brevetted major-general. In 1867 he had charge of the Artillery School at Fort Monroe. He was part author with J. G. Barnard of (Engineer and Artillery Operations of the Army of the Potomac, 1861-62,* and of 'Tactics for the Field Artillery of the United States.*

BARRY, William Francis, English Cath¬ olic clergyman and author: b.

London, 21 April 1849. From Oscott he passed to the English College at Rome, where he had Car¬ dinals Franzelin and Tarquini for masters in divinity. He was ordained in Rome, where he witnessed the sittings of the Vatican Council and the entry of the Italian troops by the Porta Pia. A vice-presidency of Birmingham Sem¬ inary was folloVed by his appointment to the chair of divinity at Oscott ; later he was en¬ gaged in mission work at Wolverhampton and his subsequent charge at Dorchester gave him such leisure for literary labors as freed him from giving up to a parish talents that were meant for mankind. *Dr. Barry has lectured in America and at the Royal Institution and was the deliverer of the centenary address on Edmund Burke, both in Dublin and London, in 1897. His first novel, 'The New Antigone,* was published anonymously in 1887 and its success has since been repeated by 'The Place of Dreams) ; 'The Two Standards* ; and 'Arden Massiter. *He contributed 'A His¬ tory of the Papal Monarchy* to the 'Stories of the Nations) series, and has written studies of Newman and Renan. In 'Heralds of Re¬ volt he has collected some of his essays; while his 'Tradition of Scripture* and other works have been translated into various lan¬ guages. He is, perhaps, the most brilliant Quarterly reviewer and Dublin reviewer of his generation. In 1907 he became canon of Bir¬ mingham and is now' rector of Saint Peter's, Leamington.

BARRY, William Taylor, American states¬ man : b. Lunenburg, Va., 5 Feb. 1784; d. Liver¬ pool, England, 30 Aug. 1835. He was graduated at William and Mary College (1803), and was soon after admitted to the bar. In 1810 he became a member of Congress from Kentucky. He served in the War of 1812; and from 1814-16 wTas United States senator from Ken¬ tucky. In 1828 he wras appointed Postmaster-General under Jackson; and was on his way abroad as Minister to Spain at the time of his death. He was the first Postmaster-General w'ho had a seat in the Cabinet.

BARRY, an urban district and seaport of south Wales, county of Glamorgan, on the British Channel, eight miles southwest of Car¬ diff. It has been practically brought into ex-

istence by the construction (1884-89) of a dock of 70 acres area here, between Barry Island and the mainland, at a cost of about £850,000, the entrance being between two breakwaters re¬ spectively 2,600 and 700 feet in length. Barry possesses churches and chapels, market-hall, public-hall, seamen's institute, etc., and carries on a large export trade in coal. As a munici¬ pality it is markedly progressive. Pop. (1911)

33,763.

BARRY CORNWALL. See Proctor, Bryan Waller.

BARRY LYNDON, The Memoirs of.

(Barry Lyndon,5 which began in the January number, 1844, of Fraser's, is perhaps the most important of the works of Thackeray before the publication of the great masterpieces be¬ ginning with (Vanity Fair,5 in 1847, which brought Thackeray his great renown. The theme of (Barry Lyndon) is the adventures of a thorough scoundrel and blackguard, who readily adapts himself to a life of courtly and variegated rascality and finally ends in destitu¬ tion. In this respect it belongs to the class of which Fielding's Jonathan Wild) is one of the best examples. Barry Lyndon, as the title implies, tells his own story and in whatever situation, whether breaking his wife's heart, gambling on a large or small scale, or engag¬ ing in any of his countless villainies, is al¬ ways treating himself as if he were a gentle¬ man and as if whatever he were doing were in the highest degree <(genteel.5> The charac¬ ter is thoroughly well-sustained, from this point of view, throughout the large variety of adventures. In workmanship the novel, though comparatively short, is regarded as one of the most consistent and pointed stories that Thackeray ever wrote. Thackeray's chief motive .is largely satirical. He probably had in mind certain stories, like (Eugene Aram5 and (Paul Clifford5 of Bulwer-Lytton, which, according to Thackeray's view, held up as heroic types really detestable characters. Barry is one of these pseudo-heroes far more villainous than most. Trollope's Wife of Thackeray) (in the (English Men of Letters Series5) gives a good short account of (Barry Lyndon 5 among Thackeray's works.

William T. Brewster.

BARRYMORE, Ethel (Mrs. Russell Griswold Colt), American actress: b. Phila¬ delphia, 15 A. 1879. She was educated at the Convent of Notre Dame, Philadelphia. She made her debut in John Drew's company in

1896. She came into general notice in Clyde Fitch's (Captain Jinks5 in 1900, played Pris¬ cilla in (Secret Service,5 London, where she appeared also in (Cynthia5 in 1904. She starred in (A Doll's House5 in 1905, and in Barrie's (Alice-Sit-by-the-Fire5 (1906), played Mrs. Jones in (The Silver Box5 in 1907, Zoe Blundell in (Mid-Channel 5 in 1910, and Stella Ballantyne in (The Witness for the Defense5 in 1911. In 1912 she appeared in Barrie's (The Twelve-Pound Look,5 and in Chambers' (Tante5 in

1913.

BARRYMORE, Maurice (Herbert Blythe), American actor: b. India 1847; d. Amityville, L. I., 25 March 1905. He was edu¬ cated at Cambridge. Having gone upon the stage he came to America and made his first appearance in 1875. Since then he has been

most of the time in this country, acting as lead¬ ing man with Modjeska, Mrs. Langtry, Mrs. Bernard Beere and Olga Nethersole. He has also written several plays, among them (Nad-jeska.5

BARSABAS, the son of Alpheus, brother of James the Less and of Jude, and one of the candidates nominated for the apostolical office left vacant by the treaphery and suicide of Judas. According to tradition he was afterward appointed bishop of Eleutheropolis, a town of Palestine, about 20 miles from Jerusalem, and suffered martyrdom. Another Barsabas, surnamed Judas, and supposed to be the brother of the above, is mentioned in the Acts as one of the companions of Paul and Barnabas when they went to preach the gospel at Antioch. He is supposed to have returned to Jerusalem, and died at a very advanced age.

BARSUMA, or BARSUMAS, Nestorian bishop who flourished in the 5th century. He became bishop of Nisibis and metropolitan in 435. He established a theological school which sent out many missionaries, and is regarded as the founder of the Nestorian faith in Persia and eastern Asia.

BARTAS, bar-ta, Guillaume de Salluste

du, French soldier, diplomatist, and man of letters: b. Montfort 1544; d. 1590 of wounds received at the battle of Ivry. His chief poem, (The Divine Week,5 gives an account of the creation, and is said to have had considerable influence on Milton's (Paradise Lost.5 Thirty editions of the work passed through the press in six years. Joshua Sylvester (1563-1618) translated into English (Du Bartas, His Divine Weeks and Works5 (1598). Mrs. Anne Bradstreet, the earliest American woman of letters, was an ardent admirer of his strained pedantic style and modeled her own verse upon it.

BARTENSTEIN, bar'ten-stm, Treaty of,

a treaty between Prussia and Russia against France, concluded at Bartenstein, Prussia, 26 April 1807, soon after the battle of Eylau. The objects of the alliance were to re-establish Prus¬ sia within the limits of 1805 ; to dissolve the Rhine Confederation; to restore Tyrol and Venice to Austria ; to secure the cooperation of England and Sweden ; to aggrandize Han¬ over at the expense of France; to restore the House of Orange; and to obtain from France indemnities to the kings of Sardinia and Naples. The terms of this alliance are chiefly important for their similarity to the terms offered Napo¬ leon at Prague (1813). The town of Barten¬ stein is situated in east Prussia, on the Alle, 35 miles south of Konigsberg. There are manu¬ factures of stoves and wagons, machine shops, iron foundries, breweries and saw mills, and considerable trade in grain. Pop. (1910) 7,343.

BARTER, a term used in commerce and political economy to express the exchange of one commodity for another, as contrasted with the sale of commodities for money. It is simply a primitive form of exchange carried on in countries in which the use of money has not yet been introduced, or is not prevalent. It was an economic stage through which all com¬ munities must have passed, ivven yet in many rude countries barter is very common ; and Eu¬ ropean travelers find it convenient to take with them weapons, tools and ornaments to exchange with the natives for their commodities. In civ-

ilized communities barter is a very exceptional thing, having been superseded by the use of money in various forms.

In law, barter, or exchange, as it is now more generally called in law books, is a con¬ tract for transferring property, the considera¬ tion being some other commodity; or it may be described as a contract for the exchange of two subjects or commodities. It thus differs from sale, which is a contract for the trans¬ ference of property in consideration of a price in money. See also Sale.

BARTFELD, bart'felt, Czechoslovakia, a town 156 miles northeast of Budapest, on a rising ground near the banks of the Tepla and Lauka. It

is one of the oldest towns in Hungary, and is well built ; has several Roman Catholic churches, a Lutheran church and school, a Franciscan monastery, military academy, hos¬ pital, theatre, paper-mills, potteries, *etc.* Some acidulous chalybeate springs and baths, near the town, are much frequented. The trade in wine, hemp, linen cloth and woolen yarn is consider¬ able. Pop. 6,000, mostly Slovaks.

BARTH, Heinrich, distinguished geogra¬ pher and African traveler : b. Hamburg, 16 Feb. 1821; d. 25 Nov. 1865. He received his education partly in his native town and partly at the Uni¬ versity of Berlin, and having determined to explore all the countries bordering on the Medi¬ terranean, set out with this intention in the beginning of 1845. After his return in the end of 1847 he wrote an account of his travels, which he published with the title (Wander-ungen durch die Kiistenlander des Mittelmeeres) (Berlin 1849). In less than two years after his return from his first travels he was invited by the English government to join Dr. Overweg in accompanying the expedition that was about to proceed under James Richardson to central Africa. The expedition having landed at Tripoli in the end of 1849, set out thence for the interior of Africa in February 1850. His explorations, which extended over an area of about 2,000,000 square miles, from Tripoli in the north to Adamawa in the south, and from Baghirmi in the east to Timbuctoo in the west, an area hitherto almost entirely unknown, were continued for more than five years, in spite of the death both of Richardson and Overweg, and he did not return to Tripoli till the autumn of 1855. The chief geographical results of these travels consist in the light they throw on the true nature of the Desert of Sahara, in show¬ ing that the eastern upper branch of the Niger, the Benuwe, is not connected with Lake Chad, and in the determination of the course of the Niger between Say and Timbuctoo. The result of these travels, entitled (Travels and Discov¬ eries in North and Central Africa,) was pub¬ lished in English (1857-58). Immediately after its publication he set out upon a new series of travels through Greece, Turkey, Asia Minor and other countries bordering on the Mediterranean, the last of which occupied the summer of 1865. Besides the works mentioned, he published (Sammlung und Verarbeitung Central-afrikan- ischer Vokabularien> (1862-66) ; (Reise von Trapezunt durch die nordliche Halfte Klein-asiens nach Scutari) (1860) ; (Reise quer durch das Innere der Europaischen TiirkeP (1864).

BARTH, or BART, Jean, French seaman: b. Dunkirk, 20 Oct. 1651 ; d. there, 27 April

1702. He was the son of a fisherman, and at an early age evinced a love of adventure, which led him to follow the sea. He entered the Dutch navy, but on the outbreak of the war between France and Holland, 1672, he entered the service of France, and commanded a priva¬ teer. In this position opportunities soon oc¬ curred for distinguishing himself, and his name became known to Louis XIV, who commis¬ sioned him to cruise in the Mediterranean. His bravery soon raised him in the favor of the King, and he was appointed captain of the squadron in 1697. On one occasion, a famine existing in France, Barth recaptured from the Dutch 100 sail of vessels, loaded with grain. At another time when Dunkirk was blockaded, taking advantage of a fog, he sailed through the English and Dutch fleets and destroyed 86 merchantmen; then making a descent near New¬ castle, Northumberland, he destroyed 200 houses, and returned safely with property valued at 500,000 crowns. He was on one occasion made prisoner by a superior English force, and taken to Plymouth, but succeeded in escaping in a fishing boat. Barth was rough in manners, and entirely uneducated ; indeed, he could with diffi¬ culty scrawl his own name ; but he was as simple-minded and honest as he was brave. A statue to his memory, by David d' Angers, was erected at Dunkirk in 1845. See Badin, (Jean BarD (1867) ; Landelle, (Jean Bart et son fils)

(1874).

BARTH, Paul, German sociologist : b. Baruthe, Silesia, 1 Aug. 1858. He is a pro¬ fessor in the University of Leipzig and in addi¬ tion to his much-valued (Philosophic der Geschichte als Sociologies the first volume of which was published in 1897, is the author of (Geschichtsphilosophie Hegels und die Hegelianer bis auf Marx und Hartmann*' (T890) ; (Beweggrunde des sittlichen Handelns* (1899); (Tiberius Gracchus1* (2d ed., 1893); (Erziehungs-und Unterrichtslehre* (1906) ; (Geschichte der Erziehung in Sociologischer und geistesgeschichtlicher Beleuchtung* (1911).

BARTH, Theodor, German journalist and politician: b. Duderstadt 1844; d. 1909. He studied law at the universities of Heidelberg, Leipzig and Berlin, and in 1871 established his practice at Bremen. He was a magistrate in Bremerhaven for four years and after¬ ward until 1883 was secretary of the Chamber of Commerce in that city. He was elected to the Reichstag as Liberal Unionist member from Gotha in 1881 and later represented other dis¬ tricts until 1898. He founded Die Nation in Berlin in 1883 and remained its editor until it ceased publication in 1907. He was an advocate of free trade and opposed the

protectionist pol¬ icy of Bismarck and the Junkers. In 1898 he joined the Deutschfreisinnig party and became a member c>f the Landtag. He was again in the Reichstag in 1901-03, and was again an opponent of the reactionists in German politics. He vis¬ ited the United States in 1907. He published (Gegen den Staats-sozialismus) (1884) ; (Amer-ikanisches Wirtschaftsleben) (1887) ; (Ameri-kanische Eindriicke* (1896).

BARTH, Germany, a seaport in the prov¬ ince of Pomerania, Prussia, northwest of Stral-sund. Its chief industries are shipbuilding, fish curing and packing, beer brewing, and sugar,

leather and cigar manufactories. There arc also iron foundries, machine works and saw mills. It has a fine harbor and contains a school of navigation and a home for spinsters of high rank, and it has also a good trade in grain and wool. Its church dates from the 13th century.

BARTHEL, Melchior, German sculptor: b. Dresden 1625 ; d. 1672. He studied under his father and under Johann Boehme. He spent many years in Italy, including 17 in Venice, and on his return to Dresden was made court sculptor. His chief works are the tomb of the Doge, Giovanni Pesaro in Santa Maria dei Frari, Venice; the statue of John the Baptist in the Oratory of Santa Maria, Nazareth, and a tomb in the church of SS. Giovanni e Paolo, Venice. There are numerous ivory carvings by him in the Green Vault at Dresden, which are regarded as superior to his larger works.

BARTHELEMY, bar-ta-l'-me, Auguste Marseille, French poet and politician: b. Mar¬ seilles 1796; d. there, 23 Aug. 1867. Educated ac the Jesuit College of Juilly, he went to Paris in 1822, and soon made himself famous by a series of vigorous and pointed political satires in verse, directed against the Bourbons, and full of suggestive regrets for the glories of the empire. In (Napoleon in Egypt} (1828), and still more in his elegy for Napoleon's son, (The Son of the Man) (1829), he spoke out his im¬ perialism more boldly, and the publication of the

latter poem occasioned his imprisonment on the eve of the revolution of July. His libera¬ tion was, of course, immediate; and with his friend Mery, he celebrated the victory of the people in a poem dedicated to the Parisians, entitled (The Insurrection. > During all the changes which followed, Barthelemy was in¬ defatigable as a brilliant versifier on the political events of the day; though in his later years his popularity somewhat declined. He was from the first a warm supporter of the second Na¬ poleonic regime. Some of his sayings are memorable, as the oft-quoted ((L'homme absurde est celui qui ne change jamais.® He died in Marseilles, of which city he was librarian.

BARTHELEMY, Frangois, Marquis de,

French diplomatist: b. Aubagne (Provence), 20 Oct. 1747; d. Paris, 3 April 1830. He was brought up by his uncle, the author of (Anacharsis) ; and the protection of the Duke of Choiseul established him in diplomacy. The Revolution did not hinder his success in life; in 1793 he was Minister plenipotentiary to Switzerland. He successively negotiated the Peace of Basel with Prussia, Spain and the Elector of Hesse, the first treaties concluded by the French re¬ public. This won for him an enviable reputa¬ tion ; but he was especially popular among the Clichyen or Royalist party, by which he was, in 1797, elected member of the Directory; consequently on the Republican coup d'etat of the 18th Fructidor he was ejected from the government, arrested and transported with Pichegru and Ramel to Guiana, whence he es¬ caped to the United States. Shortly afterward he was in England, and after the 18th Brumaire was recalled by the First Consul, who made him a senator. On the establishment of the empire he received the title of count and showed great devotion to Napoleon during the course of his prosperity, but as soon as misfortune threatened Barthelemy sided at once with his enemies. He

was made Minister of State and a marquis by Louis XVIII, and in 1819 proposed the restric¬ tion of the electoral franchise. Consult his <Papiers) (ed. by Kaulek, 4 vols., Paris

1886-88).

BARTHELEMY, Jean Jacques, French antiquarian: b. Cassis, near Marseilles, 20 Jan. 1716; d. 30 April 1795. He received a good edu¬

cation from the fathers of the oratory at Mar¬ seilles, and was about to prepare himself, under the Jesuits, for holy orders, but becoming dis¬ gusted with his teachers declined all offers of clerical promotion, and only accepted the title of abbe in order to show that he belonged to this class. He became deeply interested in the study of Oriental languages and antiquities, and his indefatigable industry and acuteness soon enabled him to communicate to the learned new discoveries in this Oriental study, among which the (Alphabet of Palmyra, y published 1754, holds a principal place. In 1747 he was chosen member of the Academy of Inscriptions at Paris. About this time he became acquainted with the Count Stainville (afterward the minis¬ ter Choiseul), who was on the point of depart¬ ing as Ambassador for Rome, and who invited Barthelemy to accompany him. Having been appointed director of the Cabinet of Medals in 1753, he accepted the offer and went, in 1754, to Rome. He traveled through Italy, collected an¬ tiquities, and occupied himself after his return with learned works and with the arrangement of the cabinet which had been entrusted to his care, and to which he added a great number of costly and rare medals. Among his works none are so distinguished for learning and beauty of description as the (Travels of the Younger Anacharsis in Greece, } on which he had labored 30 years, and which was translated into Eng¬ lish, German and other languages. He himself was modest enough to call this an unwieldy compilation, but all the learned men of France and foreign countries received it with the great¬ est enthusiasm. Barthelemy in his advanced age resolved to compose a complete catalogue of the Royal Cabinet of Medals, but was inter¬ rupted in 1788 by the storms of the Revolution. In 1789 he received a place in the Academie Frangaise. In 1793 he was arrested on a charge of aristocratic leanings, but was soon after set at liberty. When the chief librarian of the National Library, the notorious Carra, was ex¬ ecuted, 31 Oct. 1793, Barthelemy received the offer of his place but declined it.

BARTHELEMY-SAINT-HILAIRE, Jules, French politician and philosopher: b. Paris, 19 Aug. 1805; d. there, 24 Nov. 1895. On completing his studies he received an ap¬ pointment in the Ministry of Finance, being at that time also on the staff of Le Globe news¬ paper. After the revolution of 1830 he founded a journal called Bon Sens, and continued to support the Liberal party in the press. In 1834 he became examiner in French literature at the Ecole Polytechnique, and four years later he was appointed to the chair of Greek and Latin philosophy in the College de France. He played a part on the side of the Moderate party in the revolution of 1848, and was elected to the Constituent Assembly for Seine-et-Oise. The coup d'etat of December

1852 caused him to forsake political life for a considerable time and to resign his professorship. From this retirement he emerged in 1869, the year of his

election as deputy for the first circumscription of Seine-et-Oise. He was shortly afterward sent to the National Assembly as the representa¬ tive of that department, and during the disas¬ trous times of 1870-71 he was closely associated with M. Thiers. In 1875 he became a life senator, and in the Cabinet of M. Jules Ferry, constituted 1880, he was appointed Minister of Foreign Affairs. The chief event of his tenure of this office was the occupation of Tunis. In 1881 he again abandoned public life for study and literary work. His greatest work is his complete French version of Aristotle (1837-93).

BARTHEZ, bar-tas, Paul Joseph, distin¬ guished French physician: b. Montpellier, 11 Dec. 1734; d. 15 Oct. 1806. He was the founder of a medical school at Montpellier which acquired a reputation throughout all Europe. Later he received high honors at the hands of Napoleon. Among his numerous writings may be specially mentioned the (Nouvelle Mecanique des Mouvemens de l'Homme et des Animaux.)

BARTHOLDI, bar'tol'de', Frederic Au¬ guste, distinguished French sculptor: b. Col¬ mar, Alsace, 2 April 1834; d. Paris, 4 Oct. 1904. While a student in painting under the celebrated Ary Scheffer, he showed a greater bent and aptitude for sculpture, and devoted his energies to this branch of art, exhibiting numerous works at the salons. After the Franco-German War of 1870-71, in which he fought on the staff of Garibaldi, he came into prominence by the gigantic (Lion of Belfort* carved out of the red rock on the hill which towers over the Alsatian city and commemorates its celebrated siege and defense. His statue of (Lafayette Arriving in America,) now-in Union Square, New York city, was presented to the metropolis by France as a mark of gratitude to Americans for sympathy and service during the Franco-German War. During the days of the Com¬ mune, when unable to pursue his studio work in Paris, Bartholdi visited the United States, and when arriving in the beautiful harbor of New York, conceived the

idea of the colossal statue of (Liberty Enlightening the Worlds erected on one of the islands of the harbor to welcome with its flaming torch all arrivals in the Land of Liberty. On his return to France he divulged his plan, and a body of distin¬ guished Frenchmen formed a society to carrv out his project. Bartholdi gave 20 years of devoted effort to the work, personally super¬ intending the raising of the subscription of $400,000 with which the French nation gave the statue to the United States. The donations came mainly from the pence of the poor, re¬ quiring in their collection enormous attention to detail, and when subscriptions lagged, Bartholdi pledged his own private fortune to defray the running expenses and practically impoverished himself over the work. Patiently overcoming all difficulties and obstacles, he had the satisfac¬ tion to see the statue, erected on Bedloe's Island, dedicated with imposing ceremonies by President Cleveland 28 Oct. 1886 (see Liberty, Statue of). Bartholdi was a prolific sculptor, and among the more notable of his other works are the figures of Washington and Lafavette on the Place des Etats-Unis in Paris; the Bartholdi fountain of the Botanical Gardens in Washing¬ ton; the bronze group of the (Lyre Among the Berbers, a Souvenir of the Nile,* exhibited at

the Salon of 1857; (Genius in the Talons of Misery,* Salon of 1859; (Portrait of General Schramm, the Modern Martyr *(1864) ; (Por¬ trait of Laboulaye* (1866) ; (The Leisures of Peace) (1868); (Young Alsatian Grane

Grower^ (1869) ; an equestrian statue of Ver-cingetorix (1870) ; portraits of Messieurs Erckmann-Chatrian ; his well-known (Curse of Alsace) (1872); and Switzerland Assuaging the Sorrows of Strassburg, Siege of 1870 ^

(1873).

BARTHOLDY, Jakob Salomo, Germar diplomat: b. 1779; d. 1825. He was of Jewish parentage, and received his education at the University of Halle. He joined the Austria; army and fought against Napoleon, and latci entered the Prussian diplomatic service. He was in Paris with the Allied armies in 1814, and soon after was sent to Rome as Consul-General of Prussia. He was a great patron of the arts, and he had a great influence on the revival of fresco painting. The Berlin Museum of Art secured his remarkable collection of antiques and the frescoes

of his mansion in Rome, the Casa Zuccari, were transferred to the Berlin National Gallery in 1887.

BARTHOLIN, Thomas, Danish physician,

b. Copenhagen, 20 Oct. 1619 ; d. 4 Dec. 1680. After traveling throughout Europe, he became professor of anatomy in the University of Co¬ penhagen, and made several discoveries in this science. He revised his father's <Anatomy) and was a firm believer in Harvey's theory of the circulation of the blood. His son, Kaspar (1654-1704), was a famous anatomist, and his son Thomas (1650-90) was an antiquarian writer whose (Antiquitatum Danicarum Libri Tres) (1689) is of much value.

BARTHOLIN'S GLANDS (named after their discoverer, Kaspar Bartholin) are the vulvo-vaginal glands, two in number, situated inside the vaginal opening. They secrete a mucous secretion and are subject to infection, forming abscesses.

BARTHOLOMAE, bar-to-la-ma, Chris¬ tian, German philologist: b. Bayreuth, 21 June 1855. He was graduated at the Bayreuth Gym¬ nasium in 1872, and afterward studied philology and general philosophy at Munich, Leipzig and Erlangen. In 1874 he returned to Leipzig to devote himself to comparative philology and Oriental studies. He became a professor at Halle in 1879, and in 1885 was nominated to an extra professorship at Munster. In 1898 he was appointed professor of Sanskrit and Indo-Germanic philology at Giessen, and took the same chair at Heidelberg in 1909. He has made several valuable contributions ih the field of Aryan language and literature, including (Das altiranische Verbum* (Munich 1878) ; (Handbuch der altiranische Dialekte) (Leipzig 1883) ; (Arische Forschungen* (3 vols., Halle 1882-87) ; (Studien zur indogermanischen Sprachgeschichte* (Halle 1891); articles in Geiger and Kuhn's (Grundriss der iranischen Philologie) (Strassburg 1896) ; (Altiranisches Worterbuch) (ib. 1904) ; (Die Gathas des Awesta) (1905) ; (Ueber ein Sassanides Recht-buch> (1910).

BARTHOLOME, Paul Albert, French sculptor: b. Thiverval, Seine-et-Oise, 1848. At first, he devoted himself to the study of law, but in 1869 abandoned it for painting, which he

pursued successfully until the death of his wife in 1876. He then retired into seclusion and began to study sculpture without a master. In 1877 he erected a beautiful monument to his wife in the cemetery of Bouillant, Oise, the first example of his sculpture. His next work was the monument (Aux Morts,* designed to represent the grief of humanity for the dead, the model of which was exhibited at the Salon of 1895. At the expense of the state and the city of Paris it was carved in limestone and erected in 1899 at the entrance of Pere Lachaise Cemetery, Paris. It is one of the greatest sculptural monuments of modern times. His other notable works include the bronze (Weep¬ ing Child, > in the Luxembourg; a series of female nudes, including that adorning the foun¬ tain in the Musee des Arts Decoratifs, Paris, (The Secret,* Leipzig, and (Girl Plaiting Her Hair,* in the Albertinum Museum, Dresden. He is represented in the museums of Brussels, Diisseldorf, Dresden, Miihlhausen and Mar¬ seilles, and has carved several beautiful busts and monuments in the Parisian cemeteries. He excels in delineating the nude in the attitude of grief. Consult Demaison, (M. Bartholome et le monument Aux Morts) (Paris 1900.)

BARTHOLOMEW, of the Martyrs, arch¬ bishop of Braga in Portugal: b. 1527; d. 1590. He wrote several treatises on spiritual subjects, was an intimate friend of Saint Charles Bor-romeo, and did for the Church in Portugal what Saint Charles did for religion in Italy. He was one of the most influential members of the Council of Trent, and the enactment of most of the reformatory decrees in that Coun¬ cil was due to his zeal and perseverance. Con¬ sult his (Life* translated by Lady Herbert.

BARTHOLOMEW, Edward Sheffield,

American sculptor : b. Colchester, Conn., 1822 ; d. 2 May 1858. He studied in New York and in Rome, where he lived during the latter part of his life. Among his works are (Blind Homer, Led by His Daughter,* (Eve,* (Youth and Old Age,* (Ganymede and (Evening Star. 5

BARTHOLOMEW, John George, Eng¬ lish geographer : b. Edinburgh, 22 March 1860. He was educated at the Edinburgh High School and University. He was one of the founders of the Royal Scottish Geographical Society in 1884, and has since acted as its sec¬ retary. He introduced the layer system of con¬ tour coloring for

topographical maps. He was appointed geographer and cartographer to the King, and is chief of the Edinburgh Geographi¬ cal Institute. He has published (Survey Atlas of Scotland) (1895-1912) ; < Citizens' Atlas)

(1898-1912); (Atlas of Meteorology) (1899); (Survey Gazetteer of the British Isles) (1904) ; (Survey Atlas of England and Wales) (1903) ; (Atlas of World's Commerce-* (1907) ; (Im¬ perial Indian Gazetteer Atlas* (1908) ; (Atlas of Zoogeography * (1911), and numerous edu¬ cational atlases and special maps.

BARTHOLOMEW, Saint (son of Tol-mai), the apostle, probably the same person as Nathanael, mentioned in the Gospel of Saint John as an upright Israelite, and one of the first disciples of Jesus. The name <(Tholmai** was not a patronymic but a surname given to the apostle, a common practice, owing to the

well-known scarcity of Hebrew family names. He is said to have taught Christianity in the south of Arabia, into which, according to Eusebius, he carried the Gospel of Saint Mat¬ thew in the Hebrew language. Chrysostom mentions that he preached in Armenia and Asia Minor, and tradition tells that he was flayed alive and crucified head downward. His day is the 24th of August.

BARTHOLOMEW, Saint, archbishop of Nakschiwan, (Apostle of Armenia* : b. Bo¬ logna; d. 1333. Having learned of his mis¬ sionary zeal, Pope John XXII consecrated him bishop of Maraga in Armenia. He belonged to the Dominican Order and established a prov¬ ince of the same in Armenia. With the assist¬ ance of confreres he translated into Armenian the Psalter, the Missal, the moral tracts of Saint Augustine and Saint Thomas' four books,

(Contra Gentiles.*

BARTHOLOMEW, Saint, a small island of the Lesser Antilles, French West Indies, 130 miles to the northwest of Guadeloupe, nine square miles in area, and rising to the height of about 1,000 feet. It produces tobacco, sugar, cotton, indigo, cassava, drugs, *etc.* with some excellent woods (including lignum vitae) and limestone. All the fresh water which can be procured is saved in cisterns, as there are no springs. The climate is healthy. The island is encompassed by formidable rocks, which ren¬ der it dangerous of access to shipping. The only town is Gustavia or Saint Bartholomew. It was first colonized by the

French in 1648, was ceded to Sweden in 1784, and again came into possession of France in 1877. Pop. (1911) 2,545. In the south Pacific Ocean are two other islands of the same name.

BARTHOLOMEW, Saint, Massacre of,

the slaughter of French Protestants in Paris and other cities in France on various dates be¬ tween 24 Aug. and 3 Oct. 1572. After the death of Francis II, Catherine de' Medici had assumed the regency for her son, Charles IX, then only 10 years old, and in spite of the opposition of the Guises she issued an edict of toleration in favor of the Protestant party, 1562, which she had favored in many ways. The party of the Guises now persuaded the nation that the Roman Catholic religion was in the greatest danger. Religious dissension grew rife, and each party, Roman Catholic and Huguenot, under pretext of religion, treated the other with cruelty. Prince Conde took up arms ; the Guises had recourse to the Span¬ iards, Conde to the English, for assistance. Both parties were guilty of the most atrocious cruelties, but finally a peace was patched, up. The Queen-mother caused the King, who had entered his 14th year, to be declared of age, that she might govern more absolutely under his name. Duke Francis de Guise had been assassinated by a Huguenot at the siege of Orleans ; but his spirit continued in his family, which considered the Admiral Coligny as the author of his murder. The King had been per¬ suaded that the Huguenots had designs on his life, and had conceived an implacable hatred against them. Meanwhile the court endeavored to gain time, in >order to seize the persons of the prince and the admiral by stratagem, but was disappointed, and hostilities were renewed in 1565, and still again after the Peace of Lon-292

jumeau, 1568, this time with greater cruelty than ever. In the battle of Jarnac, 1569, Conde was made prisoner and shot by Captain de Montesquieu. Coligny collected the remains of the routed army; the young Prince Henry de Bearn (afterward Henry IV, King of Navarre and France), the head of the Protes¬ tant party after the death of Conde, was ap¬ pointed commander-in-chief, and Coligny com¬ manded in the name of the Prince Henry de Conde, who swore to avenge the murder of his father. The advantageous offers of peace at Saint Germain-en-Laye (8 Aug. 1570) satisfied the chiefs of the

Huguenots, particularly Ad¬ miral Coligny, who was wearied with civil war. The King appeared to have entirely disengaged himself from the influence of the Guises and his mother; he invited the old Coligny, the main support of the Huguenots, to his court, and honored him as a father. The sister of the King was married to the Prince de Bearn (18 Aug. 1572) ; this union opened up a field for the most distinguished Huguenots in Paris. Meanwhile the Queen had allied herself to the Guise family, and jealous of the influence of Coligny with the King, determined to have him assassinated. On 22 August a shot from a window wounded the admiral. The King has¬ tened to visit him and swore to punish the author of the villainy; but on the same day he was induced by his mother to believe that the admiral had designs on his life. <(God's death !® he exclaimed : ((kill the Admiral ; and not only him, but all the Huguenots ; let none remain to disturb us P The following night Cather¬ ine held the bloody council which fixed the execution for the night of Saint Bartholomew, 24 Aug. 1572. After the assassination of Coligny a bell from the tower of the royal pal¬ ace at midnight gave to the assembled com¬ panies of 2,000 burghers the signal for the gen¬ eral massacre of the Huguenots. The Prince of Conde and the King of Navarre saved their lives by choosing the mass rather than death, and pretending to embrace the Roman Catholic religion. Roman Catholics as well as Hugue¬ nots fell victims to the political and personal hatred of the slayers. By the King's orders the massacre was extended through the whole kingdom; and if, in some provinces, the offi¬ cers had honor and humanity enough to dis¬ obey the orders to butcher their innocent fel¬ low citizens, yet instruments were alwrays found to continue the bloody work. This horrible slaughter continued over 40 days ; the victims are calculated at from 10,000 to 100,000. The Calvinist martyrology cites 786 names ; 2,000 is the number computed by late historians. At Rome the massacre was given out as a victory over a great Huguenot conspiracy against the King; it was for this reason the Pope ordered the ((Te Deum® to be chanted and a medal struck commemorating the event. Those ot the Huguenots who escaped fled into the mountains and to Rochelle. The Duke of Anjou laid siege to that city but, during the siege, received the news that the Poles had elected him their king. He concluded a treaty, 6 July 1573, and the King granted to the Huguenots the exer¬ cise of their religion in certain towns. (See also Huguenots). Consult Lavisse, (Histoire de France) (Vol. VI, Paris 1904) ; Loughnan, (The Month) (1892) ; White, (The Massacre of Saint Bartholomew) (1867).

BARTHOLOMEW'S HOSPITAL, Saint,

London, England, formerly the priory of Saint Bartholomew, founded in 1123, and made a hos¬ pital by Henry VIII in 1547. It contains 750 beds, and, on an average, 8,000 patients are an¬ nually admitted to the hospital, while about 150,000 out-patients are relieved by it. A large medical college is attached to the institution and a resident college for students.

BARTHOLOMITES. See Basilians.

BARTHOU, bar'-too', Louis, French states¬ man : b. Oloron-Sainte-Marie 1862. He re¬ ceived his education at the Lycee of Pau, en¬ tered public life and held various important government positions. He was several times Minister of Public Works, chief in the cabinet of the Minister of the Interior and Minister of the Interior. In 1913 he became Minister of Justice under the premiership of Aristide Bri-and in President Poincare's first Cabinet. In March of the same year he was appointed Premier with the portfolio of Minister of Pub¬ lic Instruction. He resigned his office the fol¬ lowing December. His publications include (L'action syndicale) (1904) ; and (Life of Mirabeau) (1913).

BARTIMZEUS (son of Timˆus), one of the blind beggars healed by Jesus at the gate of Jericho. He appears to have attracted the attention of the writers of the Gospel narratives from the fact that he was the spokesman of the beggars healed on that occasion and because he addressed Jesus with his Messianic title, (<Thou Son of David.®

BARTIZAN, a battlement on the top of a house or castle; a small overhanging turret projecting from the angle on the top of a tower, or from the parapet or other parts of a building.; or the battlement surrounding a spire or steeple, or the roof of a cathedral or church.

BARTLESVILLE, Okla., city and county-seat of Washington County, on the Atchison, Topeka & Santa Fe, and the Missouri, Kansas & Texas railroads, about 125 miles from Okla¬ homa City. It has a county courthouse, a city hall costing $75,000, Elks Home and a Carnegie library costing $20,000. Bartlesville is the centre of the mid-continent oil field, with 16,000 pro¬ ducing wells, and has important oil interests. Washington County produces about 20,000 bar¬ rels a day, a third of the output of the entire region. There are also deposits of natural gas and zinc ore smelting interests. The annual payroll is $3,500,000. There are four banks with deposits of over $4,000,000. The value of city property as assessed is $7,000,000, and the post-office receipts in 1915 were $40,350. The city has a fine school system, with eight excellent buildings worth $30,000, and more than

2,700 school children. Bartlesville has 12 miles of asphalt and brick pavement, 30 miles of sewers and six miles of street railways. The city adopted the commission form of government in 1910. Pop. (1910) 6,181; (1920) 14,417.

BARTLET, James Vernon, English author and educator: b. Scarborough, 15 Aug. 1863. He was educated at Exeter College, Oxford. After studying for several years under Dr. Fair-bairn and serving as fellow and lecturer he be¬ came first fellow of Mansfield College, and began lecturing on church history with the opening of the college buildings in 1889, re-

maining senior tutor in residence till 1900. He has published (Early Church History > (1894; 1897); (The Apostolic Age) (1900); (Studies in the Synoptic Problem) (1911); Evangelical Christianity) (1912) ; and contributions to re¬ views and works of reference.

BARTLETT, Edwin Julius, American chemist: b. Hudson, Ohio, 16 Feb. 1851. He was graduated A.B., Dartmouth College, 1872; A.M., 1875; M.D., Rush Medical College, 1879; ap¬ pointed associate professor of chemistry at Dartmouth College in 1878 and professor in 1883; is at present head of the department of chemistry. Professor Bartlett is a mem¬ ber of the American Chemical Society, fellow of the A. A. A. S., member of New England Chemical Club, member of the New Hamp¬ shire Historical Society, honorary member of the New Hampshire Medical Society, member of Dartmouth Scientific Association and Dart¬ mouth Graduate Club, moderator of the town of Hanover, 1906-12, and sat in the New Hamp¬ shire legislature, 1913. He has traveled widely in Europe and the Levant, has been expert in many legal cases, and is the author of many papers and addresses on chemical and other subjects.

BARTLETT, Elisha, American physician and author : b. Smithfield, R. I., 1805 ; d. there, 18 July 1855. He was graduated from the med¬ ical department of Brown University in 1826, and delivered the course of lectures on patho¬ logical anatomy at the Berkshire Medical Insti¬

tute in Pittsfield, Mass., in 1832. In 1836 or 1837 he was elected the first mayor of Lowell. He subsequently lectured at Dartmouth College, and in Transylvania University and the univer¬ sities of Maryland and New York. In 1851 he became professor of materia medica and medi¬ cal jurisprudence in the College of Physicians and Surgeons in New York, which place he held until his death. He published (Essay on the Philosophy of Medical Science) (1844) ; (Fevers of the United States) (1850) ; and a volume of poems, entitled (Simple Settings in Verse for Portraits and Pictures in Mr. Dick¬ ens' Gallery) (1855).

BARTLETT, Sir Ellis Ashmead. See

Ash mead-Bartlett.

BARTLETT, Homer Newton, American composer and organist : b. Olive, N. Y., 28 Dec. 1846; d. 1905. He began his public career when nine years of age, and at 10 composed violin music, piano duos, songs and vocal duets. He wrote a large number of anthems, quartets and glees for vocal rendering, and pieces for the flute, stringed instruments and military bands and orchestras. His best compositions include a three-act opera, (La Valliere5 ; a cantata, (The Last Chieftain) ; an oratorio, (Samuel,) *etc.*

BARTLETT, Ichabod, American lawyer: b. Salisbury, N. H,, 1786; d. 19 Oct. 1853. He was graduated at Dartmouth College in 1808, commenced the practice of the law in Durham, but removed to Portsmouth, where his skill and ability soon .commanded success. He is cele¬ brated as an opponent of Webster and Mason. He was frequently a member of the State legis¬ lature, and of the United States House of Rep¬ resentatives for three terms, 1823-29.

BARTLETT, John, American author and publisher: b. Plymouth, Mass., 14 June 1820;

d. Cambridge, Mass., 3 Dec. 1905. He entered the university bookstore, became a publisher in Cambridge in 1836, and senior partner in the house of Little, Brown & Company in 1878. His works include (Familiar Quotations) (1854; 9th ed., 1891) ; (New Method of Chess Nota¬ tion } (1857) ; (The Shakespeare Phrase-Book > (1882) ; (Catalogue of Books on Angling, In¬ cluding Ichthyology, Pisciculture, etcP (1882) ; (The Complete Concordance to Shakespeare's Dramatic Works* (1894) ; and (Poems.*

BARTLETT, John R., American naval officer: b. New York 1843; d.

Saint Louis, 22 Nov. 1904. He was appointed an acting mid¬ shipman in the navy from Rhode Island in 1859; entered the United States Naval Acad¬ emy, where he remained till the beginning of the Civil War, when he was assigned to the West Gulf blockading squadron. He took part in the bombardment and passage of Forts Saint Philip and Jackson, and the Chalmette batteries, and the capture of New Orleans and attack on yicksburg in June 1862. He was promoted lieutenant in 1864; took part in the bombard¬ ment of Fort Fisher in December, and the as¬ sault on its works in January. Subsequently he was on surveying duty in Nicaragua and on the United States Coast Survey; was promoted to captain, 1 July 1892; and retired 12 July 1897. After the declaration of war against Spain, in 1898, he was recalled to active service, and on 9 July succeeded Rear-Admiral Erben as com¬ mander of the auxiliary naval squadron, organized for the protection of the Atlantic coast cities.

BARTLETT, John Russell, American author: b. Providence, R. I., 23 Oct. 1805; d. 28 May 1886. He was educated for a mercan¬ tile career, and after 1837 entered the book¬ importing trade in New York. In 1850 he was appointed one of the commissioners to deter¬ mine the Mexican boundary. In 1855 he was made secretary of State of Rhode Island. He published various valuable records, genealogies, local histories, etc., but his best known work is his dictionary of Americanisms) (1850).

BARTLETT, John Sherren, Anglo-Amer¬ ican journalist, founder of the Albion news¬ paper in New York: b. Dorsetshire, England, 1 790 * d. 24 Aug. 1863. He was educated as a physician in London ; was appointed surgeon in the royal navy in 1812 ; sailed to the West Indies on board the packet Swallow; was captured by the American frigates President and Congress, under Commodore Rodgers, and remained a prisoner at Boston until discharged in 1813. At the close of the war he married a lady of Boston and established himself there as a physician. The Albion commenced by him in New York, 22 June 1822, as an English organ of conservative politics, gained a wide and profitable circulation. Bartlett subsequently commenced one or two other papers of a simi¬ lar character at a cheaper price, and on the beginning of Atlantic steam navigation also established at Liverpool the European, a weeklv compendium of the latest news for American circulation. Owing to the failure of his health, he withdrew from the Albion in 1848. He sub¬ sequently published the Anglo-Saxon, a weekly paper at Boston, which he continued about two years. In 1857 he served as English consul at Baltimore.

BARTLETT, Joseph, American wit, poet and adventurer: b. Plymouth, Mass., 1763; d. Boston, 27 Oct. 1827. He began the study of law at Salem, but soon gave, it up for a voyage to England. Here he pursued the career of an adventurer, gambled, spent, got into prison, wrote a play for his release and went upon the stage himself. From an actor he be¬ came a merchant, and having sailed for America with a large supply of goods on credit, was shipwrecked on Cape Cod. In 1799 he delivered a poem on Physiognomy5 before the Phi Beta Kappa Society of Harvard, satirical and clever, and said to touch upon the traits of individuals at the time. To the edition of this poem, pub¬ lished in 1823, were appended a number of (Aphorisms on Men, Principles and Things,5 the results of his various experience. The same year he delivered a Fourth of July oration at Boston, and afterward recited a poem, entitled the 'New Vicar of Bray,5 which obtained con¬ siderable celebrity. He next attempted the practice of law and of politics in Maine, was elected to the State legislature, and nearly se¬ cured an election to Congress by his active exertions as a speaker and newspaper writer. He then practised law at Portsmouth, N. H., and finally closed his improvident life, a burden to his friends, at Boston. Consult Duyckinck's Cyclopaedia of American Literature.5

BARTLETT, Josiah, American statesman : b. Amesbury, Mass., November 1729 ; d. 19 May 1795. He commenced the practice of medicine in 1750, at Kingston, and established a reputa¬ tion, during the prevalence of the angina ma¬ ligna in 1754, by treatment with Peruvian bark, in opposition to the usage of other physicians. He received several appointments from the royal governor, John Wentworth, but lost them in 1775, for being a zealous Whig. Being chosen delegate to the Continental Congress, he was the first who voted for, and the first, after the President, who signed the Declaration of In¬ dependence, his name being first called as repre¬ sentative of the most easterly province. He ac¬ companied Stark in 1777 to Bennington. He was appointed chief justice of the common pleas in 1779, justice of the Supreme Court in 1784 and chief justice in 1788. He was an active member of the convention called to adopt the Federal Constitution in 1788. In 1790 he was president of New Hampshire, and in 1793 was chosen the first governor under the new

State Consti¬ tution. He was also president of the medical society established in 1791, by his exertions. In all his various offices his duties were ably and faithfully discharged.

BARTLETT, Paul Wayland, American sculptor: b. New Haven, Conn., 1865. He en¬ tered the Lcole des Beaux Arts, Paris, 1880, and won a medal at the Paris Salon of 1887. His principal works are an equestrian statue of General McClellan, (The Dying Lion5 and the (Ghost Dancer,5 in Philadelphia; the equestrian statue of Lafayette in Paris (presented to France by the school children of the United States) ; a statue of Gen. Joseph Warren in Boston; a statue of Benjamin Franklin at Waterbury, Conn.; statues of Columbus and Michelangelo in the Library of Congress; 'The Bear Tamer,5 in the Metropolitan Museum of New York; and the six colossal figures over the central entrance of New York Public Li¬

brary. In 1908 he was appointed officer of the Legion of Honor and was selected as a corre¬ sponding member of the Institute of France. He became director of sculpture in the School of Fine Arts, Glasgow, in 1913.

BARTLETT, Samuel Colcord, American educator: b. Salisbury, N. H., 25 Nov. 1817; d 16 Nov. 1898. He was educated at Dartmouth College, and became a teacher there and at Andover Theological Seminary. He had charge of a church at Monson, Mass. ; subsequently becoming professor of philosophy in Western Reserve University, Ohio. He afterward be¬ came pastor of a church in Manchester, N. H., and later of the New England Church in Chi¬ cago. In 1858 he was made professor of biblical literature in the Chicago Theological Seminary, where he remained until 1873, when he spent a year in travel in the East. In 1877 he became president of Dartmouth College, a post he held until 1892, when he resigned. lie was the author of a number of works, including (From Egypt to Palestine5 (1879) ; (Sketches of Mis¬ sions of the American Board5 ; 'Sources of History in the Pentateuch5 ; and 'The Veracity of the Hexateuch5 ; and also wrote a part of the American edition of (Smith's Dictionary of the Bible.5

BARTLETT, William Francis, American military officer: b. Haverhill, Mass., 6 Jan. 1840; d. 17 Dec. 1876. He was a student at Harvard University at the outbreak of the Civil War, but left to enter the army. He was wounded in the battle of Ball's Bluff, suffering the loss of a leg, but continued in the service; was twice wounded at Port Hudson ; and

in the battles of the Wilderness, while leading the 57th Massachusetts regiment, was again wounded, taken prisoner and sent to Libby Prison. At the close of the war, he was made a major-general of volunteers for distinguished services in the field.

BARTLETT, William Henry, English topographical draughtsman: b. Kentish Town, London, 29 March 1809 ; d. 13 Sept. 1854. He served an apprenticeship with the distinguished architectural antiquary, John Britton, who em¬ ployed him to make drawings for his ‘Cathedral Antiquities5 and ‘Picturesque Antiquities of English Cities. 5 Bartlett subsequently traveled extensively abroad, paying four visits to the United States and Canada, and the works which he published, descriptive of the countries visited by him, obtained great success with the public. They include ‘American Scenery5 (1840) ; ‘Canadian Scenery5 (1842) ; ‘Walks About Jerusalem5 (1844) ; ‘Forty Days in the Desert5 (1848) ; ‘The Nile Boat, or Glimpses of Egypt5 (1849); ‘Footsteps of Our Lord and His Apostles5 (1851) ; ‘The Pilgrim Fathers5 (1853) ; ‘Jerusalem Revisited5 (1855).

BARTLETT, William Holmes Chambers,

American soldier and scientist : b. Lancaster County, Pa., 1809; d. 11 Feb. 1893. He was edu¬ cated at West Point, and as lieutenant of en¬ gineers was assistant professor there, 1827-29. He was engaged on the construction of Fort Monroe and Fort Adams; was assistant engi¬ neer at Washington, 1832-34; and again at West Point as assistant professor, 1834-36. When he resigned his lieutenancy in 1836, he was made full professor of philosophy at West Point, and held this position until he retired in 1871. He

was a member of the Natural Academy of Sciences and other scientific societies, and wrote several scientific books, including (Treatise on Optics* (1839) ; (Synthetical Mechanics) (1850— 58); (Acoustics and Optics5 (1852-59); Ana¬ lytical Mechanics5 (1853-59) ; and (Spherical Astronomy * (1858-59).

BARTLEY, Elias Hudson, American chemist : b. Bartleyville, N. J., 6 Dec. 1849. He was graduated at Cornell University in 1873 ; was an instructor there in 1874-75 ; professor of chemistry at Swarthmore College, 1875-78; lecturer at the Franklin Institute, Philadel¬ phia, in 1877-78. He removed to Brooklyn in 1879; graduated at Long Island College Hos¬ pital in 1879 ; was lecturer there on physiolog¬ ical and practical chemistry in 1880-85 ; and then became professor of chemistry and toxi¬ cology. He was made chief chemist of the health department of Brooklyn in 1882. He is the author of several articles in Wood's (Household Practice of Medicine5 (1885) and of (A TextBook of Medical Chemistry.5

BARTOL, Cyrus Augustus, American Uni¬ tarian clergyman: b. Freeport, Me., 30 April 1813; d. 17 Dec. 1900. He was graduated at Bowdoin College in 1832 and at Cambridge Divinity School in 1835 ; became colleague pas¬ tor with Dr. Charles Lowell of the West Church (Unitarian) in Boston, 1837, and full pastor in 1861. He was a member of the Tran¬ scendental club. His works include dis¬ courses on the Christian Spirit and Life5 (1850) ; discourses on Christian Body and Form5 (1854) ; (Pictures of Europe Framed in Ideas5 (1855) ; distory of the West Church and Its Ministers5 (1858) ; (Church and Congregation* (1858) ; (Word of the Spirit of the Church* (1859) ; (Radical Prob¬ lems* (1872); (The Rising Faith* (1874); (Principles and Portraits* (1880).

BARTOLI, bar'to-le, Adolfo, Italian his¬ torian: b. Fivizzano, 19 Nov. 1833; d. 1894. He has long been a recognized arbiter of taste and the elegancies in connection with his coun¬ try's literature; his (First Two Centuries of Italian Literature* (1870-80) and distory of Italian Literature* (1878-89) being the first histories of Italian literature conceived in a critical spirit. From 1874 till his death he was professor of Italian literature in the Institute of Florence.

BARTOLI, Daniello, a learned Italian Jesuit: b. Ferrara, 12 Feb. 1608; d. Rome, 12 Jan. 1685. He was the author of a celebrated history of the order of the Jesuits, published at Rome in six volumes (1650-73). Bartoli had access to many curious manuscripts in the Vatican, of which he availed himself. This gives to his work peculiar interest and portions of it, as for instance that on Asia, passed through several editions. The first edition of 1667 contains also an interesting account of the mission to Mongolia and a sketch of the life of Father Acquaviva. He also wrote on phys¬ ics and philology. His works are marked by erudition, elegance and purity of style. A new edition of his complete works in 50 volumes appeared at Florence in 1826.

BARTOLI, Pietro Santi, sometimes called Perugio, Italian painter and engraver: b. about 1635; d. Rome 1700. He was a pupil of Nicolas Poussin. His engravings, originally

over 1,000, are scarce and valuable. His skill as a copyist was so great that he could coun¬ terfeit the effects of time on the colors of pictures. The (Admiranda Romanorum Anti-quitatem Vestijia, * a collection of engravings much esteemed archaeologically, is his most important work.

BARTOLINI, bar-to-le'ne, Lorenzo, cele¬ brated Italian sculptor: b. Vernio 1777; d. Florence 1850. In his youth he was a pupil of Desmarets, a French painter, and made consid¬ erable progress ; but the bent of his genius leading him rather to handle the chisel than the brush, he proceeded to Paris and entered in 1797 the studio of the sculptor Lemot. Na¬ poleon entrusted him with a multitude of works, among others a colossal bust of the Em¬ peror placed above the entrance of the French Institute and a magnificent statue of him, which, in consequence of the events of the restoration, was never delivered to government and is now in America. On the fall of the empire he returned to Florence, where he con¬ tinued to exercise his profession. Among his greater works may be mentioned his groups of Charity, and Hercules and Lycas, and the beautiful monument in the cathedral of Lau¬ sanne, Switzerland, erected in memory of Lady Stratford Canning, who died there in 1817. Bartolini ranks next to Canova among modern Italian sculptors. Consult Canova, (Schools and Masters of Sculpture* (1898).

BARTOLOMMEO, bar-td-lom-ma'o*, Fra, or BACCIO DELLA PORTA, Florentine painter: b. Savignano 1469; d. Florence 1517. He learned in Florence the first principles of painting from Cosimo Roselli and acquired a more perfect knowledge of art by studying the works of Leonardo da Vinci. The most im¬ portant of his early productions is the fresco of the Last Judgment, in which he was assisted by his friend Albertinelli. He was an admirer and follower of Savonarola, on whose death, in consequence of a vow made during the peril of persecution, he took the Dominican habit in 1500 and assumed the name of Fra Bartolom¬ meo. For the space of four years he did not touch a pencil and employed it afterward only on devotional subjects. Raphael visited Flor¬ ence in 1504 and gave instructions to Bartol¬ ommeo in perspective, receiving in return his lessons in coloring and handling of drapery. Some years afterward the latter visited Michel¬ angelo and Raphael at Rome. After his re¬ turn to Florence he executed several

religious pictures, among which were a Saint Mark and Saint Sebastian, which are greatly admired. His style is severe and elevated, but very graceful in youthful figures ; his coloring, in vigor and brilliancy, comes near to that of Titian and Giorgione. But he particularly ex¬ cels in drapery, which none before him repre¬ sented with equal truth, fulness and ease. Many of his drawings survive in the print col¬ lections of the Uffizi, Louvre, Munich, British Museum and Weimar Museum. Among his paintings excellent examples are (Christ at Emmaus* (1507) in San Marco; (Madonna with Saints John and Stephen* (1509) and (Saints Mary Magdalen and Catherine* (1509), both in Lucca Cathedral. Others are (The Madonna and Six Saints* (1509) in San Mar¬ co, Florence; (The Betrothal of Saint Cather-296

ine) (1511) in the Louvre; (Madonna della Misericordia> (1515) at Lucca; (Salvator Mundi,5 (Pieta,5 and the famous (Saint Mark,5 all in the Pitti Palace. Consult Jameson, (Memoirs of the Early Italian Painters5 (1887) ; Symonds, (The Renaissance in Italy) (1885) ; Radcliffe, (Schools and Masters of Painting5 (1898) ; Cartwright, (The Painters of Florence5 (1901). Consult also the biog¬ raphies of Frantz (Regensburg 1879), Gruyer (Paris 1886), Knapp (Halle 1903) and Scott (London 1881).

BARTOLOZZI, bar-to-lot'se, Francesco,

Italian engraver: b. Florence, 21 Sept. 1728; d. Lisbon, Portugal, April 1815. He was the son of a goldsmith and studied at the Florentine Academy, where he excelled particularly in anatomy and drawing. In Venice, in Flor¬ ence, Rome and Milan he etched several pieces on sacred subjects and then on the invitation of Dalton, librarian to George III, went to Lon¬ don, where he received great encouragement and accommodated himself entirely to the na¬ tional taste, so as even to work in the popular red dotted manner. His pieces were so uni¬ versally sought for that a complete collection of them was valued at £1,000. He was elected a member of the Royal Academy of Arts in London. After 40 years' residence in London he went to Lisbon to engrave on copper the portrait of the Regent, where he received, in 1807, the Order of Christ, and became director of the National Academy. With accuracy of design he united great delicacy of execution. Among his best engravings is the (Death of Lord

Chatham,5 after Copley, and the (Virgin and Child.5 His works, among which are imi¬ tations in etching of drawings of the great masters, amount to more than 2,000. Consult Brinton, fiBartolozzi and his Pupils in Eng¬ land5 (London 1904) ; Bailly, (Bartolozzi5 (ib. 1907) : <(Bartolozzi and Other Stipple En¬ gravers,55 in (Great Engravers Series5 (ib. 1906) ; Clement, (Painters, Sculptors and En¬ gravers5 (ib. 1899) ; Tuer, (Bartolozzi and His Works5 (ib. 1882).

BARTOLUS, Osso, or BARTOLUS DE SAXOFERRATO, a celebrated Italian ju¬ rist: b. Sasso Ferrato, in the Marches of An¬ cona, about 1313; d. Perugia 1356. He took his degree of LL.D. at Bologna, became professor, first at Pisa and then at Perugia, was ennobled and honored with other dis¬ tinction and privileges by the Emperor Charles IV and not only published many important works such as treatises (On Procedure,5 (On Evidence5 and commentary on the (Code of Justinian,5 but distinguished himself in various other branches of knowledge.

BARTON, Andrew, Scottish naval com¬ mander, who flourished during the reign of James IV and belonged to a family which for two generations had produced able and suc¬ cessful seamen. In 1506 he cleared the Scot¬ tish coasts of the Flemish pirates with which they were infested, and as a proof of the thoroughness of his work, sent the King three barrels full of their heads. In 1508 he was sent to assist Denmark against Liibeck. The damage he inflicted on Portuguese ships en¬ gaged in the English trade aroused great re¬ sentment in England and in an engagement between his ship, the Lion, and two ships

specially fitted out against him, he was killed (2 Aug. 1511).

BARTON, Benjamin Smith, American naturalist: b. Lancaster, Pa., 10 Feb. 1766; d. Philadelphia, 19 Dec. 1815. He studied the natural sciences and medicine in Philadelphia, Edinburgh and London and took his. degree at Gottingen. He practised medicine in Phil¬ adelphia and held successively the chairs of botany and natural history, materia medica. and theory and practice of medicine in the univer¬ sity there. He became president of many learned societies, was a correspondent of Hum¬ boldt, and among other works, wrote (Elements of Botany5 (1812-14) ; Collections for an Es¬ say toward a Materia Medica of the LTnited States5 (3d ed., 1810) ; and (Flora Virginica5

(1812).

BARTON, Bernard, English poet, often styled the Quaker poet: b. London, 31 Jan. 1784; d. 19 Feb. 1849. In 1806 he removed to Woodbridge, in Suffolk, where he entered into a business in coals and corn ; but subsequently gave up his occupation, and in 1810 became clerk in a bank at Woodbridge, a situation which he held till shortly before his death. In 1824 a reading society founded by him at Woodbridge presented him with £1,200, and he afterward received a pension of £100 through Sir Robert Peel. His first appearance as an author was in 1812, when he published a small volume of poems under the title of (Metrical Effusions,5 which led to a correspondence with the poet Southey. This was followed in 1818 by (Poems by an Amateur,5 and in 1820 by a volume entitled simply < Poems, 5 which became popular, and gained him the friendship of Lamb and Byron. Of his other productions the chief were (Napoleon and other Poems5 (1822) ; (Poetic Vigils5 (1824) ; (Devotional Verses5 (1826) ; (A New-Year's Eve, and other Poems5 (1828) ; besides many contributions to the annuals and magazines. His last work was (Household Verses5 (1845). His daugh¬ ter, Lucy, published Selections from the Poems and Letters of Bernard Barton,5 in 1849. His poetry, though deficient in force, is pleas¬ ing, fluent and graceful, animated by a love of nature and by a pure religious spirit. Consult Lucas, (Bernard Barton and His Friends.5

BARTON, Clara, American philanthropist: b. Oxford, Mass., 1821 ; d. 12 April 1912. She early became a teacher and founded at Bor-dentown, N. J., a free school. In 1854 it had grown to 600, when she became a clerk in the patent office in Washington. On the outbreak of the Civil War she resigned her clerkship and became a volunteer nurse in the army hos¬ pitals and on the battlefield. In 1864 she was appointed to the charge of the hospitals at the front of the Army of the James. She was present at several battles, and in 1865 was placed by President Lincoln in charge of the search for missing men of the Union armies, having already devoted much time to that work at her own expense. In connection with this work she identified and marked the graves of more than 12,000 soldiers in the National Cemetery at Andersonville, Ga. On the breaking out of the Franco-Prussian War in 1870, she aided the Grand Duchess of Baden in preparing military hospitals, assisted the Red Cross Society, and, at the request of the authorities, superintended

the distribution of work to the poor of Strassburg in 1871, after the siege, and in 1872 did a like work in Paris. At the close of the war she was decorated with the Golden Cross of Baden and the Iron Cross of Germany. On the organ¬ ization of the American Red Cross Society in 1881 she was made its president, and in that capacity in 1884 had charge of the measures to relieve sufferers from the Mississippi and Ohio floods. In 1883 she was appointed superinten¬ dent of the Reformatory Prison for Women at Sherborn, Mass. In 1884 she was the United States representative at the Red Cross Confer¬ ence in Geneva. It was her suggestion that led to an amendment of the rules of the Red Cross Society permitting relief not only in war but in times of such other calamities as fam¬ ines, floods, earthquakes and pestilence. In 1889 she had charge of movements in behalf of suf¬ ferers from the floods at Johnstown, Pa.; in 1892 distributed relief to the Russian famine sufferers; in 1896 personally directed relief measures at the scenes of the Armenian massa¬ cres ; in 1898, at the request of President Mc¬ Kinley, took relief to the Cuban reconcentrados, and performed field work during the war with Spain ; and in 1900 undertook to direct the re¬ lief of sufferers at Galveston, but broke down physically. She resigned from the Red Cross Society in 1904. She published Hlistory of the Red Cross) (1883) ; (History of the Red Cross in Peace and War) (1898) ; (Story of the Red Cross) (1904) ; (Story of My Childhood)

(1907). Consult Adams and Foster, (Heroines of Modern Progress) (1913).

BARTON, Sir Edmund, Australian jurist: b. Glebe, Sydney, 18 Jan. 1849; d. Sydney, Aus¬ tralia, 4 Jan. 1920. Educated at the Sydney Grammar School and the University of Sydney. He was called to the bar in 1871. He became a member of the legislative council and was speaker of the legislative assembly of New South Wales 1883-87. He was a member of the Fed¬ eral conventions of 1891 and 1897-98. He was leader of the delegation to London with the Australian Commonwealth Bill in 1900. He became first Prime Minister and Minister for Foreign Affairs in the first Federal Cabinet of the new Commonwealth, and retired in 1903 to become puisne judge of the High Court of Australia. Fie was knighted in 1902.

BARTON, Elizabeth, English religious im¬ postor (commonly called the Holy Maid of Kent) : b. about 1506; d. 20 April 1534. She was used as an instrument by the adherents of Queen Catherine to excite the English nation against the proposed divorce of Henry VIII from his first wife, and the apprehended separa¬ tion of the English Church from Rome, with ‘ which the King then threatened the Pope. Her delirious utterances, in a nervous illness, were made use of by the parish priest of Aldington, Richard Maister, and by a canon of Canterbury named Booking, to persuade her that she was a prophetess inspired by God. Among other things she prophesied that Henry, if he per¬ sisted in his purpose of divorce and second marriage, would die a shameful death and be succeeded by Catherine’s daughter. Her rev¬ elations, published and distributed by the monk Dering, produced such a fermentation among the people that Henry ordered the apprehen¬ sion and examination of Elizabeth and her ac¬

complices before the star-chamber. After they had there confessed the imposture they were condemned to make a public confession and to imprisonment; and the Maid, Booking, Maister, Dering and three others were afterward ad¬ judged guilty of high treason for a conspiracy against the King, and executed. The venerable Bishop Fisher and Sir Thomas More were among those accused of holding correspondence with the Holy Maid ; and the former was pro¬ nounced guilty of misprision, or concealment, of treason in consequence.

BARTON, George Aaron, American edu¬ cator and author: b. East Farnham, Quebec, 12 Nov. 1859. He was educated at Haverford College, where he was graduated in 1882, and at Harvard University. He was appointed min¬ ister of the Society of Friends in 1879, was teacher of higher mathematics and classics at the Friends’ School, Providence, 1884-89, and has been professor of biblical literature and Semitic languages at Bryn Mawr College since 1891. In 1902-03 he was director of the Ameri¬ can School of Oriental Study and Research in Palestine. He is a member of the American Oriental Society, the Archaeological Institute of America and many other learned societies, both American and foreign. He has published (A Sketch of Semitic Origins, Social and Religious) (1902); (Roots of Christian Teaching as Found in the Old Testament5 (1902) ; (A Year’s Wandering in Bible Lands) (1904) ; (The Hav¬ erford Librar}’ Collection of Cuneiform Tablets, or Documents from the Temple Archives of Telloh5 (3 parts, 1905-14) ; (The Heart of the Christian Message) (2d ed., 1912) ; (The Origin and Development of. Babylonian Writing) (1913) ; (Sumerian

Business and Administrative Documents from the Earliest Times to the Dynasty of Agade5 (1915); (Archeology and the Bible5 (1916) ; Commentary on Ecclesias¬ tes5 (in The International Critical Commentary, 1908) ; Commentary on Job5 (in (Bible for Home and School,5 1911) ; and contributions to (Encyclopedia Biblica,5 (Jewish Encyclopedia,5 *etc.*

BARTON, George Hunt, American geol¬ ogist: b. Sudbury, Mass., 8 July 1852. He was assistant on Hawaiian Government Survey, 1881-83 ; assistant in geology in the Massachu¬ setts Institute of Technology in 1883-84; then assistant professor of geology there; he also occupied the corresponding chair in Boston Uni¬ versity and the Teachers' School of Science; and was assistant geologist of the United States Geological Survey. In 1896 he was a member of the 6th Peary expedition to Greenland. He is a member of the Boston Society of Natural History, the National Geological Society and the Geological Society of America; director of Teachers' School of Science from 1904; and member of many other posts of technical ob¬ servation. He has traveled extensively in the United States, British America, Hawaii, Newfoundland, Labrador, Greenland and in Europe. He is the author of (Outline of Ele¬ mentary Lithology5 (1900); (Outline of Dy¬ namical and Structural Geology.)

BARTON, William, American military of¬ ficer: b. Warren, R. I., 26 May 1748; d. Providence, R. I., 22 Oct. 1831. He joined the Revolutionary army soon after Bunker Hill, and on the night of 10 July 1777, he per-

formed the exploit which made him famous. Leading a small party of men, in four whale¬ boats, across Narragansett Bay, he surprised and captured the British general, Prescott, at his headquarters, and hurried him away to Washington's camp in New Jersey. Barton received a sword from Congress, and was brevetted colonel. He was afterward a mem¬ ber of the State convention which adopted the Federal Constitution.

BARTON, William Eleazar, American

clergyman and author: b. Sublette, Ill., 28 June 1861. He was graduated at Berea College in 1885 and at Oberlin Theological Seminary in 1890. He was ordained to the Congregational ministry in 1885, and held several pastorates in Tennessee and Ohio, then in Shawmut Congre¬ gational Church, Boston, 1893-99, and since 1899 the First Church of Oak Park, Ill. He was also associate editor of Bibliotheca Sacra, and editor of the pastors' department of the Advance 1904—12, and editor-in-chief since 1913. He has been lecturer on applied theology at the Chicago Theological Seminary since 1911, and on the staff of the Youths' Companion since 1900. He has been delegate to several national Congregational councils. He has written over 40 volumes, including (A Hero in Homespun) (1897) ; (When Boston Braved the King) (1899) ; (What Has Brought Us Out of Egypt* (1900) ; < Jesus of Nazareth) (1904) ; (The History and Religion of the Samaritans* (1906) ; Unto All the World) (1911) ; (Day by Day with Jesus) (1913) ; (The Law of Congregational Usage) (1915).

BARTON, William Paul Crillon, Ameri¬ can botanist: b. Philadelphia, Pa., 17 Nov. 1786; d. 29 Feb. 1856, a nephew of Benjamin Smith Barton (q.v.). He was educated at Princeton College, and in the medical school of the Uni¬ versity of Pennsylvania; was surgeon in the United States navy. He succeeded his uncle as professor of botany in the University of Pennsylvania, and became professor of botany and materia medica in Jefferson Medical Col¬ lege, in 1815. He organized the naval bureau of medicine and surgery of the United States, and was senior surgeon of the navy at the time of his death. He was author of (Flora of North America) (1818-24) ; (Vegetable Ma¬ teria Medica of the United States* (1817-25) ; Compendium Florae Philadelphiae) (1818).

BARTOW, Fla., city and county-seat of Polk County, 45 miles east of Tampa, on the Atlantic Coast Line and Seaboard Air Line railroads. The city's principal features are a Carnegie library, county jail, courthouse, opera house and Summerlin Institute. Phosphate production is a leading industry. Fruit-grow¬ ing is also important. The city has marble works, cigar and concrete factories, bottling works, planing and shingle mills and wagon works. The electric-lighting plant and the waterworks are the property of the municipal¬ ity. Pop. (1920) 4,203.

BARTRAM, John, an eminent American botanist : b. Chester County, Pa., 23 March 1699; d. 22 Sept. 1777. He is frequently called the

Mather of American botany,® and he founded at Kingsessing the first botanical gar¬ den in America. Linnaeus termed him ((the greatest natural botanist in the world.® He

published Observations of the Inhabitants, Climate, Soil, Diverse Productions, Animals, etc., Made in His Travels from Pennsylvania to Lake Ontario,* and a similar volume on eastern Florida (1766). He was in constant correspondence with European botanists, to whom he sent large collections of American plants, and would readily undertake a journey of a hundred miles to see a new plant.

BARTRAM, William, American botanist and ornithologist: b. Kingsessing, Pa., 9 Feb. 1739; d. there, 22 July 1823, a son of John Bartram. He spent five years in the Southern States studying natural history, and published the results in ˆTravels Through North and South Carolina and East and West Florida. * He compiled a list of American birds, which was the best of its kind up to the time of Wilson.

BARTSCH, bartsh, Adam von, Austrian

engraver and art writer: b. Vienna, 17 Aug. 1757; d. there 21 Aug. 1821. At the age of 16 he brought himself into the notice of the Aus¬ trian government by a series of engravings of the gold and silver medals issued during the reign of Maria Theresa, and, in 1781, was ap¬ pointed keeper of the prints of the royal col¬ lection. In 1803 he produced the first volume of his well-known and authoritative work, (Le Peintre-Graveur,* in 21 volumes, giving a de¬ scription of the principal engravers of Europe and criticisms on their works. He etched up¬ ward of 500 pieces, and published several cata¬ logues of works of art.

BARTSCH, Karl Friedrich Adolf Kon¬ rad, German philologist : b. Sprottan, Silesia, 25 Feb. 1832; d. 19 Feb. 1888. He was pro¬ fessor at Rostock, where he established the earliest Germanic seminary in Germany 1858— 71, and for the remainder of his life was head of the department of German and Romance philology at the University of Heidelberg. He was an extremely brilliant, versatile, indus¬ trious scholar whose attention was chiefly given to Middle High German and Provencal poetry, and was an original poet also, publishing a vol¬ ume of lyrics in 1874. Beside an important study of the (Nibelungenlied* (1865), he pub¬ lished (The Song of Roland * (1874) ; a trans¬ lation of Burns (1865) ; and of Dante's (Divina

Commedia) (1867), as well as intro¬ ductions to the study of Provengal and old French, *etc.*

BARU, ba-roo', Philippines, a town of Leyte, 31 miles from the capital of the prov¬ ince, Taclobam. Pop. about 13,000.

BARU (Malay), a woolly .material found at the base of the leaves of a sago palm-tree, sagucrus saccharifer. It is much used in stuff- * ing cushions and calking ships.

BARUCH, ba'ruk (Hebrew, ((the blessed®), the name of several individuals, of whom the most celebrated was the son of Neriah, scribe and assistant to the prophet Jeremiah. The brother of Baruch, Seraiah, was chief cham¬ berlain to King Zedekiah. During the reign of. Jehoiakim, about 607 b.c., Jeremiah while in prison, having been divinely commissioned to put all his prophecies in writing, dictated them to Baruch, who inserted them in a roll, which he was ordered to read both within and at the entrance to the temple. Possibly Baruch was

in doubt about undertaking the task, for the author of the Lamentations ((spake unto Baruch seekest thou great things for thyself? Seek them not… . " Jehoiakim on hearing

its commencement cut it in pieces and threw it into the fire. At the captivity, after the destruction of Jerusalem, Jeremiah and Baruch were permitted to remain in Palestine, but were afterward carried into Egypt 588 r.c. According to Josephus, Baruch resided with Jeremiah at Masphatha when Jerusalem fell 586 b.c. The subsequent life of Baruch is little known. A Hebrew tradition has it that both died in Egypt at about the same time, while yet another story runs that, after the death of Jeremiah, Baruch went to Babylon and died there 574 b.c. One of the apocryphal books bears the name of Baruch. The Council of Trent gave it a place in the canon, but its authenticity was not ad¬ mitted either by the ancient Jews or the early Christian fathers. See Baruch, Books of.

BARUCH, Books of. In the Apocrypha, the book of Baruch may be said to be the only apocryphal book written in the style of the Hebrew prophets. While savoring strongly of an attempt at imitation, and possessing but lit¬ tle originality, it nevertheless contains some striking passages of considerable force. It dis¬ penses advice and consolation to the distressed Israelites in a hopeful and encouraging tone, with a promise for the rebuilding of Jerusalem. An apocryphal letter of the prophet Jeremiah is usually given as chapter 6, addressed to the exiled Jews in Babylon. The book is un¬ doubtedly by more than one author ; the differ¬ ent styles, of which there are four, and the names for God lead to that belief. The early part is supplicatory, and the later, hortatory. Among experts in Bible criticism much diver¬ gence of opinion exists as to authorship and period, part apparently originating from He¬ brew and part bearing the stamp of original Greek. Some commentators believe in a He¬ brew original for both parts, and attribute the Grecisms to a skilful translator; others, again, hold the theory of an Aramaic original up to a certain part, or that the book was entirely composed in Greek. The traditional author¬ ship by Baruch is rarely supported except among Roman Catholic writers. The statement in the Greek Apostolic Constitution , v. 20, that Baruch was read, with Lamentations, in the synagogues on the Day of Atonement, is said to be unsupported by evidence. Baruch was generally regarded as a continuation or appendage to Jeremiah by a large part of the early Christian Church, and writers were natu¬ rally attracted by iii, 37, which they quoted as a prophecy of the Messiah. The book was de¬ clared canonical by the Council of Trent (1545-63), though not without much hesita¬ tion and debate.

The Apocalypse of Baruch is a distinct extra-Biblical work, a 6th century document, written in Syriac, and was discovered about 1866 in the Biblioteca Ambrosiana in Milan by Antonio Ceriani, the famous Italian orientalist. He published translations of the document in Latin and Italian. It contains at the end a letter addressed to the nine and a half tribes of Israel carried into captivity across the Eu¬ phrates. Consult Ceriani, A., (Le edizione e i mss. delle versioni Siriache del Vecchio Testa-

mento> (1869), and Canonical Histories and Apocryphal Legends relating to the New Tes¬ taments (London 1873) ; Charles' (Apocrypha of Baruch' (1896) ; Kneucker, (Das Buch Baruch' (Leipzig 1879) ; Schiirer, (Geschichte des jiidischen Volks im Zeitalter Jesu Christi' (Leipzig 1886); (Dictionary of the Bible) ;

(Catholic Encyclopedia.'

BARUS, Carl, American physicist: b. Cin¬ cinnati, Ohio, 19 Feb. 1856. He studied at Columbia College and the University of Wurz¬ burg; was physicist of the United States Geo¬ logical Survey in 1880-92; professor of meteor¬ ology in the United States Weather Bureau, 1892-93 ; and physicist of the Smithsonian In¬ stitution, in 1893-95. In 1895 he became pro¬ fessor of physics at Brown University. He is a member of the National Academy of Sci¬ ences; was vice-president and chairman of the section of physics in the American Association for the Advancement of Science in 1897 ; and is a corresponding member of the British Asso¬ ciation for the Advancement of Science. He contributes to the American Journal of Science and has written also valuable monographs for the United States Geological Survey. He is an honorary member of the Royal Institute of Great Britain 1899; Rumford medalist, Amer¬ ican Academy of Medicine (1900); presi¬ dent of American Physical Society (1905—10) ; honorary member International Congress of Radiology, as well as of many other scientific memberships, both foreign and domestic. He has put forth many and various professional papers, one of the latest being (Diffusion of Gases Through Liquids' (1913).

BARWELL, Richard, English surgeon: b. 1826; d. January 1917. The oldest "fellow" of the Royal College of Surgeons, Barwell was for 33 years on the active surgical staff of Charing Cross Hospital in London. In the pre¬ antiseptic days he introduced important hygienic reforms in hospital procedure. He interested himself in the ligature of the large blood vessels, at that time a most important question in surgery, and devised a ligature material from the aorta of an ox which, though satisfactory, has been displaced by more modern materials. Barwell was one of the first to treat curvature of the spine by exercises, in place of the heavy spinal supports then in vogue. He made numerous contributions to surgical literature.

BARY, ba're, Heinrich Anton de, German physician and botanist: b. Frankfort-on-the-Main, 26 Jan. 1831 ; d. 19 Jan. 1888. He is noted for his investigations in cryptogamic bot¬ any, and was professor of botany at Freiburg in 1855, at Halle in 1867 and at Strassburg in 1872. Among his works are (Die Mycetozen' (1859) ; (Vergleichende Morphologie und Biologie der Pilze, Mycetozen und Bacterien' (1884) ; (Vorlesungen fiber Bacterien' (1885).

BARYE, ba-re, Antoine Louis, noted French sculptor: b. Paris, 25 Sept. 1795; d. there, 25 June 1875. He studied engraving with Fourrier and a goldsmith named Beinnais ; in 1812 was a topographical engineer

and is supposed to have modeled a number of relief maps now in the French war office. In 1816 he studied drawing with the painter Gros, and sculpture with Basio ; and in 1819 took the second prize for a (Milo di Crotona,' which

was awarded him at a Concours of the Beaux Arts. From 1823 till 1831 he worked under Fauconnier, jeweler to the Duchesse d'Angouleme. In 1831 he exhibited the celebrated (Tiger Devouring a Crocodile,* and was then employed by M. Lefuel to make four groups for the pavilion on the Place du Carrousel. He was an officer of the Legion of Honor, a mem¬ ber of the Institute and a professor of the Jar-din des Plantes. Consult Brownell, (French Art* (1892).

BARYTA, barium monoxide. See Barium.

BARYTES, a common name for Barite (q.v.).

BARYTON (viola di Bardone), a chamber instrument, very popular in the 18th century, but now obsolete. It was somewhat like the viol di gamba in tone, but had a broader finger¬ board, with six or seven gut-strings, while un¬ der the neck there were from 9 to 24 strings of brass wire, which were pinched with the point of the thumb to produce a sound, while the gut-strings were acted on by a bow.

BARYTONE. See Baritone.

BAS, or BATZ, a French island in the de¬ partment of Finisterre, two and one-half miles frorn the coast in the English Channel. Al¬ though but three miles long and two miles wide it is defended by two forts and four batteries. It has a lighthouse at an elevation of 212 feet, and three fishing villages.

BAS-RELIEF, ba're-lef' (in Italian, bas-so-rilievo, or low relief), as applied to sculp¬ ture, a representation of one or more figures, raised on a flat surface or background, in such a manner, however, as that no part of them shall be entirely detached from it. Alto-rilievo, or high

relief, is that in which the figures pro¬ ject half of their apparent circumference from the background. Mezzo-rilievo, or middle re¬ lief, is a third species, between the two. But generally speaking, the first term is made to comprehend both the others. The term itself was invented in Italy about the 11th or 12th century on the arrival of the arts ; for the Greeks called such works simply carved (ana - glypta) ; and to what is now called high relief they only applied the term rounded (toreutike) .

Bas-relief is particularly allied to architec¬ ture and under its dominion, since any consid¬ erable work of this kind must be made for the pediment, frieze or panel of a building, or for some other architectural work, such as a tomb, sarcophagus, pedestal or column. Bas-reliefs seem to have been invented in the earliest ages by the Egyptian people, for very many of their ancient monuments arc covered with them, be¬ ing executed in the same way as the hiero¬ glyphics on their sepulchral chambers, obelisks and temples. This has been finely illustrated by the drawings and models of the tomb of Sethi I, originally discovered near the ancient Thebes by Belzoni, and which has since become .familiar to many persons ; all the walls of that extraordinary excavation being covered with thousands of figures in low relief, colored, and exhibiting the religious and warlike ceremonies of that wonderful people. Bas-reliefs, too, are found in India, decorating the subterraneous temples of Ellora and Elephanta in an aston¬ ishing profusion. The subjects are, of course, sacred, and in the style of drawing resemble

very strongly those of the Egyptian monu¬ ments, but are evidently inferior, having larger heads and disproportioned bodies and limbs. Both these temples have been well illustrated and described by Thomas Daniell, R.A., and Captain Scaley; and for further information their respective works may be consulted. The Persians, too, like other ancient nations, em¬ ployed bas-relief as a figured writing, thereby recording and representing the symbols of the power and energy of the Divinity, their own re¬ ligious ceremonies and warlike achievements. The sculptures still existing on the ruins of the palace of Persepolis and the royal tombs accord in many striking particulars with those taken to England by Belzoni. In both the figures are arranged in lines, either horizontal or per¬ pendicular, to suit the double purpose of deco¬ ration and description. In both of them the natives of Egypt are distinguished by the hood with lappets, the mitre, the full hair artificially curled, the close tunic, the apron of papyrus ; the Hindus, by the necklaces, bracelets and anklets ; the Hebrews, by

their long beards and hair in spiral ringlets, their caps, full tunics, with regular folds and large sleeves ; the Medes, again, by their close tunics ; while the Persians themselves, in many particulars, re¬ semble the Hebrews. The comparison may be easily made by looking over the prints in Sir Robert Ker Porter's (Travels in Persia,* and those in Le Bruyn's <Travels,) and then the engravings of Denon's and Belzoni's large works.

Since it has been well observed that the Greeks commenced in works of art precisely where the Egyptians left off, we find that the early bas-reliefs of Greece resemble pretty accurately those of Egypt. The objects are represented in the same hard and simple man¬ ner, and the marbles taken to England from the temple of Hfgina serve to fill up the his¬ tory of sculpture, in the interval between its first introduction into Greece and its full de¬ velopment under Phidias at Athens, when that glorious work, the Parthenon, was produced under the auspices of Pericles.

. The draperies in these early bas-reliefs are thin and meagre, showing the forms of the body and limbs ; the folds regular, small and distinct, consisting chiefly of perpendicular and zigzag lines. Some of the head-dresses consist of small curls, very like the fashions of barbarous nations ; and in a bronze patera in the British Museum the club of Hercules is ornamented with spiral flutes, like one brought by Captain Cook from the Sandwich Islands.

The best examples of bas-relief now in ex¬ istence are to be found within the walls of the British Museum — those of the Elgin marbles, which are executed in this manner. In the same collection are the tombstones of Xanthippus, and a man curbing a horse, both conjectured to be of the age of Phidias and which formed part of the Townley collec¬ tion. In the collection of the Marquis of Lansdowne is a Greek bas-relief of Calchas, the size of life. At Wilton there is a beautiful representation of the (Death of Meleager, > and a small but curious (Hercules and yEgle* ; a bas-relief composed of mosaic in natural colors which is supposed to be unique. The celebrated Barberini vase, formerly in the possession of the Duke of Portland, is of dark-blue glass,

bearing figures in bas-relief of white enamel or glass of admirable workmanship. Fragments of bas-reliefs of similar materials have been found in the ruin of Caesar's palace at Rome, where they had been fixed in the walls. The two triumphal columns of Trajan and Antonine are covered with bas-reliefs containing several thousand figures (the first, indeed, has 2,500 human figures, according to Vasi), with¬ out reckoning horses, elephants, mules and the implements of war.

BASAITI, ba-sa-e'te, Marco, celebrated painter of Greek extraction : b. Friuli about the middle of the 15th century. He settled in Venice, where several of his paintings, remark¬ able for the brilliancy of their coloring, and distinguished by other excellences, are seen. His masterpiece, now in the Venetian Academy, is (The Calling of St. Andrew and St. PeterP He was the contemporary, and not infrequently the successful rival, of Gian Bellini.

BASALT, a class of rocks belonging to the volcanic series and characterized by augite and plagioclase feldspar as essential constituents, and by iron ores (magnetite and ilmenite) as accessory minerals. Olivine is also present in typical basalts ; among the rarer minerals are orthorhombic pyroxene, black mica, hornblende, quartz, leucite and nepheline. Those varieties which contain notable quantities of olivine are known as olivine basalts, while the presence of leucite and nepheline characterizes the leucite basalts and the nepheline basalts. In texture the basalts vary from a finely crystalline appar¬ ently homogeneous mass to coarsely crystalline aggregates ; but the normal type is a fine¬ grained, black rock, in which olivine is the only mineral that can be recognized without the microscope. The ground mass of the denser varieties contains more or less glass, due to the rapid cooling of the magma from the molten state. Basalts are extremely abundant especially in those regions which have under¬ gone volcanic disturbance within geologically recent times ; in fact most of the volcanoes of the present day erupt basaltic materials. In the United States they occur mostly in the region west of the Mississippi River, where great areas have been flooded by fissure erup¬ tions. The tendency of basalt to assume a col¬ umnar structure often lends a characteristic appearance to scenery, as is illustrated by

the famous Giants > Causeway on the north coast of Ireland.

BASCINET, or BASNET, a light helmet, sometimes with but more frequently without a visor, and worn by knights at times when, though danger was indeed not actually immi¬ nent, it might not have been safe to be alto¬ gether unarmed. It resembled a basin, and hence its name. It was in general use for Eng¬ lish infantry in the reigns of Edward II and III, and Richard II, and is frequently men¬ tioned in Parliamentary and other public records.

BASCOM, Florence, American geologist : b. Williamstown, Mass. She was educated at the University of Wisconsin and Johns Hopkins University, receiving from the first the degree of B.A. and B.L. in 1882, B.S. in 1884, and M.A. in 1887; and from the latter that of Ph.D. in 1892. She was the first woman to

whom Johns Hopkins granted a degree and the first to receive a Ph.D. from any American college. She had much difficulty in securing admission to Johns Hopkins as graduate stu¬ dent, the only concession to her sex being that she might .attend the lectures on geology, and use the laboratory apparatus in that branch. Her thesis on receiving her Ph.D. was on in¬ organic geology, palaeontology and chemistry being minor subjects. Subsequently she en¬ gaged in teaching, was assistant editor of the American Geologist , became professor at Bryn Mawr College, and in 1899 was chosen to super¬ vise the geological survey of Chester County, Pa. She has written many papers for technical journals and been engaged in the preparation of the United States Geological folios which treat of the Piedmont Plateau of Pennsylvania.

BASCOM, Henry Bidleman, American clergyman: b. Hancock, N. Y., 27 May 1796; d. Louisville, Ky., 8 Sept. 1850. He was licensed to preach in 1813, and made chaplain to Con¬ gress in 1823 ; president of Madison College, Pennsylvania (1827-29); agent of the Amer¬ ican Colonization Society (1829-32) ; professor in Augusta College, Kentucky (1832-42), and of the Transylvania University, Kentucky (1842). When the Methodist Episcopal Church was divided in 1844 he went with the Southern por¬ tion of the Church. He was one of the leaders in the debate which led to the division and also became a leader in the organization of the new body. In May 1850 he was made a bishop of the Methodist Episcopal Church South. He was the first editor of Quarterly Review of Louisville, now at Nashville (1846-50). His writings were published in 1856 (4 vols., Nash¬ ville). Consult his

life written by M. M. Henlcle (Nashville 1856).

BASCOM, John, American educator and philosophical writer : b. Geneva, N. Y., 1827 ; d. Williamstown, Mass., 3 Oct. 1911. He was educated at Williams College and became pres¬ ident of the University of Wisconsin 1874-87, and from 1887-1907 professor of political science in Williams College. He wrote a num¬ ber of philosophical works, among them (Philosophy of English Literature) (1874); lectures before the Lowell Institute; Com¬ parative Psychology > (1878) ; (Sociology)

(1887) ; (An Historical Interpretation of Philosophy (1893) ; (Growth of Nationality in the United States) (1899) ; and Cod and His Goodness) (1901).

BASE. In architecture : (a) The part of a column between the bottom of the shaft and the top of the pedestal. In cases in which there is no pedestal, then the base is the part between the bottom of the column and the plinth, (b) A plinth with its moldings consti¬ tuting the lower part (that which slightly pro¬ jects) of the wall of a room.

In botany, a term applied to the part of a leaf adjoining the leaf-stalk, to that portion of a pericarp which adjoins the peduncle, or to anything similarly situated.

In chemistry, a body capable of replacing the hydrogen of an acid so as to produce a new compound called a ˆsalt,® which contains the base and all the elements of the acid ex¬ cept the displaced hydrogen. The name was given by Rouelle in 1744, and is now loosely

used to signify a metal, a salt-forming oxide or hydroxide, or an organic body, such as an alka¬ loid, an amide, an amine, pyridine, quinoline, etc., which is capable of combining with an acid to form a salt. When oxides combine with acids their oxygen unites with the liberated hydro¬ gen of the acid to form water. A .body (like caustic potash KOH), is said to be strongly basic when it forms salts that are

very stable and are not altered by hot or cold water.

In fortification, the exterior side of a poly¬ gon, or the imaginary line connecting the salient angles of two adjacent bastions.

In geometry: (a) The base of an ordinary triangle is its third side, not necessarily the one drawn at the bottom of the diagram, but the one which has not yet been mentioned, while the two others have (Euclid, book I, prop. 4, Enunciation). (b) The base of an isosceles tri¬ angle is the side which is not one of the equal two {Ibid. prop. 5, Enunciation), (c) The base of a parallelogram is the straight line on which in any particular proposition the parallelogram is assumed to stand (Ibid. prop. 35). It also is not necessarily drawn the lowest in the fig¬ ure (Ibid. prop. 47. (d) The base of a cone

is the circle described by that side containing the right angle which revolves (Euclid, book xi, def. 20). (e) The bases of a cylinder are

the circles described by the two rotary opposite sides of the parallelogram, by the revolution of which it is formed (Ibid. def. 23).

In heraldry, the lower part of a shield, or, more specifically, the width of a bar parted off from the lower part of a shield by a horizontal line. It is called also base-bar, baste and plain point ((Glossary of Heraldry*).

In military affairs, see Tactics.

In ordnance, the protuberant rear portion of a gun between the knot of the cascabel and the base-ring.

In sculpture, the pedestal of a statue.

In trigonometry, surveying and map making , a base or base-line is a straight line measured on the ground from the two extremities of which angles will be taken with the view of laying down a triangle or series of triangles, and so mapping out the country to be surveyed.

In zoology, that portion of anything by which it is attached to anything else of higher value or signification (Dana).

BASE HOSPITAL. See EIospitals, Mil¬ itary.

BASEBALL, a popular sport in the United States, of such general interest as to be known as (<the national game.® It had its origin in the old English game of (<rounders,® but developed on American

soil into a very different sport. In Philadelphia an early form was played un¬ der the name of <(town-ball,® and a similar game was known in upper Canada as early as 1838. It was in the neighborhood of New York, however, that baseball received its great¬ est development, regularly organized clubs con¬ testing in the <(Elysian Fields,® at what is now the site of the city of Hoboken, N. J., as early as 1845. It was not until 1857, however, that the baseball convention was held for the pur¬ pose of framing uniform rules out of the va¬ rious methods of each district and club, and in the following May the first <(National Baseball Association® was organized.

The first real series of games played be¬ tween organized clubs was that between teams picked from the various clubs of New York and Brooklyn on the old Fashion racecourse at Flushing, L. I., in 1858, the first authorized code of rules being formulated and published for their direction. From the present view¬ point these rules were crude. For instance, the regulation ball weighed ounces and meas¬ ured 10p2 inches in circumference. It was a lively ball (anticipating by 50 years the latest development of the golf-ball), being made with 2J4 ounces of rubber, covered with yarn and leather. The bat was unlimited as to length, but was decreed not to exceed 2f4 inches in diameter. In the delivery of the ball there was a greater difference than in any other respect as compared with the later development of the game : for the ball could only be pitched ; all throws and jerks being prohibited. The pitcher was at liberty to take any number of steps be¬ fore delivery, and his limit was anywhere be¬ hind a line 12 feet across and 45 feet from the home base. Then, too, he could pitch his ball almost without limitation so long as he pitched <(as near as possible to the home base.®

As then played, none but amateurs partici¬ pated ; indeed, no one could represent his club unless he had been a member for 30 days, and ((money, place or emolument® was a bar. Games were originally played on free grounds, but on the establishment of the Union Ball Ground and the Capitoline Club of Brooklyn in 1863, the admission money went to the proprietor, the players later having a share, and thus was laid the foundation of professional play. So matters drifted for six years, with a gradual tendency to greater restrictions in rules, greater skill in play, and more and more professional¬ ism, until 1869, when for the first time a sal¬ aried team, the ((Red Stockings of Cincinnati,® began a tour of games, and naturally carried everything before them. Through 1869 and up to June 1870, they played without losing a single game.

The delivery of the pitcher had been grad¬ ually developing. As early as 1860 the dis¬ guised underhand throw had come into vogue, and by 1866 Arthur Cummings, of the Excelsior Junior Nine, introduced a curved delivery. With the advent of the swifter-playing profes¬ sional, and the reduced size and weight of the ball, came into necessity, and therefore into use, the various safeguards of padded gloves, catchers' mitts, breast-pads and masks.

By 1871 the game had become so extensive and the professional element so popular that a (<National Association of Professional Baseball Players® was formed, and in 1875 the various club-owners took control of the professional players and organized (<The National League of Professional Ball Clubs,® which continued in undisputed possession of the professional field until 1890, when a rival association, ((The Amer¬ ican League,® was founded. There are several other leagues of minor importance. Baseball naturally found favor in American universities and colleges, but its technique in the early days was crude, even among the best teams. Team play as now interpreted was almost unknown, the hitting was harder and the fielding poorer; the outfielders played much farther afield. As late as the middle sixties scores of 50 runs were not uncommon, and a hard-hitting college

team would make over 100. As late as 1867, when two college nines made, respectively, 13 and 8, it was considered a phenomenon. There is no intercollegiate championship in the ordi¬ nary sense ; each college plays a set of games with other colleges. A full and exact knowl¬ edge of the game can be acquired only by a study of the official rules. Briefly, the game is played between two teams of nine men each, on a field in which a diamond-shape with sides of 90 feet each has been marked out according to certain technical rules, the apices of the angles being the home plate and first, sec¬ ond and third bases, reckoning to the right from the home plate. The pitcher's "box® is situated near the centre of the diamond about 60 feet from the batsman's stand, and from that point the pitcher is required to deliver

balls to the batsman, pitched according to definite rules. The catcher stands behind the batsman ; his principal office is to catch unhit balls and return them to the pitcher, or to throw to the basemen when the batsman is making a run. The fielders are known as the infield , consisting of first, second and third baseman and short¬ stop ; and the outfield , of left, right and centre fielders. The office of the first section is to catch batted or thrown balls and to touch there¬ with the batsman running between bases, or, failing in this, to return the ball to the pitcher ; that of the second section may be stated gen¬ erally as the stopping or catching of batted balls and returning them to the pitcher or throwing them to the basemen for the purpose of putting out running batsmen. The positions and duties of the fielders are defined with strict limitations by the rules. The aim of each team is to make as many runs as possible. To score a run a player must make a complete circuit of the bases, but not necessarily at one hit. With his own hit he may get as far as first base ; then may get to second base while the pitcher is delivering a ball to the second batter, and to the third base on the hit of that man, or even on the hit of the third batsman. When three men are put out, one inning is finished ; and the other team takes its turn, with three men one after the other, and so on until there have been nine innings on each side. A batsman is out who is touched by the ball after leaving one base and before he reaches another, or whose batted ball is caught by one of the fielders be¬ fore it reaches the ground. The batsman is also declared out when hit by a batted ball ; or when being forced to run for a base by reason of all bases being occupied, the ball is held by the fielder at the base for which he is making. The batsman must not step out of his box, and must strike at every ball that crosses <(the plate® on a level between his knees and shoul¬ ders — such are called ((fair balls.® If he fails either to strike at or to hit it counts as a (<strike® against him, and if he fails three times he is out, providing the third ball is caught by the catcher before it reaches the ground. If the pitcher delivers a ball which does not pass over the plate in the defined zone, it is counted as “one ball® in favor of the batsman, and after four such balls he is entitled to go to the first base unmolested. Baseball has been introduced into England, but without much success. In Canada, Australia and Japan it has become popular, while many Chinese also have become expert at the game.

Bibliography.— Camp, W., (Baseball >

(Spalding’s ‘Athletic Library, > New York, current year) ; Claudy, C. H., ‘The Battle of Baseball’ (including “How I Became a Big-League

Pitcher,® by C. Mathewson, New York 1912) ; McGraw, J. J., ‘Scientific Baseball > (Fox’s ‘Athletic Library, > New York 1913); Murnane, T. H., ‘How to Play Baseball* (Spalding’s ‘Athletic Library,* New York 1905) ; Richter, F. C., ‘History and Records of BasebalP (Philadelphia 1914) ; Spalding, A. G., ‘Annual Baseball Guide* (New York) ; Spald¬ ing, A. G., ‘America’s National Game, Historic Facts* (New York 1911).

BASEDOW, ba’ze-do, Johann Bernhard,

often called by himself Bernard von Nordal-bingen, German educator: b. 11 Sept. 1723; d. 25 July 1790. He had in Dessau an institution for education called Philanthropinon. The chief features of Basedow’s system are the cosmopolitan character which he endeavored to instil into his pupils, and the full development of the faculties of the young at which he as¬ pired, in pursuance of the notions of Locke and Rousseau. With Salzmann, Cainpe, etc., he established some good institutions, and de¬ serves special credit for his efforts for the education of the lower classes.

BASEDOW’S DISEASE (also called Graves” and Exophthalmic Goiter), a disorder due to excessive thyroid activity, characterized by rapid and irregular heart-action, large, pro¬ truding eye-balls, swelling of the neck, extreme nervousness and marked muscular tremor. An autonomic and a sympathetic type are recog¬ nizable. The vast majority of the mild cases is due to a faulty handling of the emotions, chiefly bound up in the function of self-pres¬ ervation, but a not inconsiderable group result from acute inflammatory disease of the thyroid, consequent upon an infection. A proper psy¬ chotherapy, psychoanalysis, will relieve the milder and psychogenic cases, which are in the majority. Surgical intervention is necessary in the severe inflammatory types. (See Goiter). Consult Jelliffe and White, ‘Diseases of the Nervous System* (1917) ; Falta, ‘Ductless Gland Diseases* ; Sattler, ‘Die Morbus Base-dowii.*

BASEL, ba’zel, BASLE, or BALE, bal, Switzerland; one of the largest cities in the federation and capital of canton Baselstadt, 43 miles north of Bern. It consists of two parts, situated on opposite sides of the Rhine, and communicating by three bridges. A new gran¬ ite structure since 1905 has replaced the old 13th-century wooden bridge so long a feature of the city, while attractive promenades have been laid out on the site of the mediaeval walls and ramparts. The city is irregularly though fairly well-built, and has an ancient cathedral, or minster, consecrated in 1019, and the re¬ cently restored 16th-century city hall. Among the institutions of the city are the university, founded in

1459; various collections of paint¬ ings, a seminary for missionaries and a Ger¬ man Bible Society. In 1849 a large museum was completed, which contains the university library and all the collections belonging to the town. Its manufactures consist principally of ribbons, silk goods, cotton prints, linen, gloves, leather, jewelry and turnery ware. Its advan¬ tageous position on the Rhine, a little below

the point where it becomes navigable, and at the terminus of the French and German rail¬ ways, has made it a centre of trade and start¬ ing point for travelers in Switzerland. It is the seat of a United States consulate. Basel was formerly a free imperial city, but joined the Swiss Confederacy in 1501. Buxtorf, Wetstein, Hermann, the Bernouillis and Euler were born in Basel. Erasmus also lived there several years and lies buried in the cathedral. Pop. about 133,000.

BASEL, Confession of, a Calvinistic con¬ fession introduced by CEcolampadius at the opening of the Synod of Basel (1531). It was adopted by the Protestants of Basel in 1534. Simple and comparatively moderate in its terms, it occupies an intermediate place between Zwingli and Luther.

BASEL, Council of, a council announced at the Council of Constance, and convoked by Pope Martin V and his successor, Eugenius IV. It commenced its sittings 14 Dec. 1431 under the presidency of the cardinal legate, Juliana Caesarini of Saint Angelo. The objects of its deliberations were to extirpate heresies (that of the Hussites in particular), to unite all Christian nations under the Roman Catholic Church, to put a stop to wars between Chris¬ tian princes and to reform the Church. The Pope, having learned that the Fathers were about to reopen a discussion upon Hussite doc¬ trines already definitely pronounced upon, and also because of the expressed wish of the Greek bishops to reopen negotiations for reunion at a council to be held on Italian soil, instructed the cardinal legate to dissolve the Council. That body opposed the claims of the Pope, with severe animadversions on his neglect of the welfare of the Church, and, notwithstanding his repeated orders to remove to Italy, con¬ tinued

its deliberations under the protection of the Emperor Sigismund, of the German princes and of France.

In order to secure itself against the attacks of Eugenius IV it re-enacted the decrees of the Council of Constance concerning the power of a general council (in matters of faith, of schism and of reformation) to command the Pope, as well as all Christendom, and to punish the disobedience of the clergy, and even of the Pope, by virtue of its judicial character as the representative of the universal Church. It like¬ wise pronounced all the doings and remon¬ strances of the Pope against its proceedings of no force, and began a formal process against him after he had issued a bull for its dissolu¬ tion ; summoned him, term after term, to appear before its tribunal, and exercised as much as possible the papal prerogatives in France and Germany.

Meanwhile it concluded, in the name of the Church, a peace with the Hussites (whose dep¬ uties appeared 6 Jan. 1433, with 300 horse, in Basel), by which the use of the cup in the com¬ munion was granted to them. This peace was ratified 20 Nov. 1433, by the Calixtines, the most powerful and finally prevailing party of the Hussites. The Council deviated on this point, indeed, from the decrees of the Council of Constance, but was obliged to do so in order to assist its most faithful protector, the Em¬ peror Sigismund, to the acquisition of Bohemia by this compromise with the Hussites, who

were not to be subdued by force. Eugenius IV revoked in 1433 his decree of dissolution, and at the 16th session, 5 Feb. 1434, was read a document subscribed to by the Pope, in which it was declared that the Council had been law¬ fully convened. In return the Fathers recalled everything that had been said against the per¬ son of the Pope or the dignity of his office. The Council, proud of its victory over the Pope, then attempted to interfere in the quar¬ rels of the German princes, but was reminded by Sigismund, who protested against its inter¬ meddling in the affairs of the Crown, of its proper point — the reformation of the Church. Toward the limitation of the power of the Pope, a proceeding which naturally evoked papal opposition, it had already made an im¬ portant step by depriving him of the disposal of the prebends of cathedral and collegiate churches, which had been obtained by his pre¬ decessors; by restoring to the chapters the free election of their officers, and by obliging the Pope to confirm them gratuitously. It pro¬ ceeded to the reformation of the clergy by ordaining that the excommunicated should not incur the penalties of their sentence before its publication ; that interdicts should never be

granted at the request of single individuals, and that repeated appeals should not be allowed on account of their complaints (20th session, 22 Jan. 1435) ; that the annates (q.v), the sums paid for the pallia , etc., should be regarded as simoniacal, and should not, under any pretext, be demanded or paid in future ; that the divine service, the mass, and the canonical hours should be regularly observed by the clergy of each class ; that disturbances of public worship should be prevented by a good ecclesiastical police ; that the Feast of Fools and all irrever¬ ent celebrations customary in the Church about Christmas should be abolished (21st session, 9 June 1435).

In the 23d session (25 March 1436) the form of election, the confession of faith and the offi¬ cial oath of each Pope, by which he bound him¬ self to obey the decrees of the Council, and the annual repetition of the same, were provided for; all preferment of the relations of a Pope was forbidden, and the college of cardinals was limited to 24 prelates and doctors of all na¬ tions, who should be elected by the free votes of the college, should be entitled to half of the revenues of the states of the Church, should watch over the Pope and always sign his bulls. They granted him only the right to dispose of the prebends belonging to the diocese of Rome, and abolished the investiture of Church prefer¬ ments in reversion.

In the 26th session it again summoned him to appear, on account of his disobedience of its decrees, declared him guilty of contumacy, and, after Eugenius had opened his counter-synod at Ferrara, decreed his suspension from the papal chair in the 31st session (24 Jan. 1438). In the same session it forbade appeal to Rome without resort to the intermediate jurisdictions, left to the papal disposition but one out of 10 and two out of 50 prebends of a church, and destined the third part of all canonries which might become vacant to men who had taken regular degrees. The removal of Eugenius, however, seemed to be so questionable a pro¬ ceeding that some prelates, who till then had

been the boldest and most influential speakers in the Council (for example, the cardinal legate Juliano, and the great canon Nicholas of

Cusa, archdeacon of Liege, with the most of the Italians), left Basel and went over to the party of Eugenius. The archbishop of Arles, Car¬ dinal Louis Allemand, a man of superior spirit, courage and eloquence, was now made first president of the Council and directed its pro¬ ceedings with much vigor.

Although its number was diminished, its most powerful protector, the Emperor Sigismund, deceased, and its authority doubted by several princes and nations on account of its open rupture with the Pope, yet, in the 33d session (16 May 1439), after violent debates, in which the archbishop of Palermo, Nic. Tu-deschi (known, under the name of Panormita-nus, as the greatest canon of his time), who was the delegate of the King of Aragon and Sicily, took the part of the Pope — it declared Eugenius, on account of his obstinate disobe¬ dience of its decrees, a heretic, and formally deposed him, in the following session, as guilty of simony, perjury, violation of the laws of the Church and bad administration in his office. In the 34th session, June 1439, the Council pro¬ nounced the deposition of Eugene. At this ses¬ sion there were but two representatives of Spain and Italy, and the total number of prelates, including abbots, was 39.

Notwithstanding the plague, then raging in Basel, which continually diminished its number, it proceeded in a regular conclave (17 November of the same year) to elect the Duke Amadeus of Savoy to the papal chair. This prince then lived in retirement at Ripaglia, on the Lake of Geneva, and seemed particularly qualified for the office on account of his piety, his riches and his connections. But Felix V — this was the name he adopted — was acknowledged by only a few princes, cities and universities. The chief powers, France and Germany, assented to the decrees of the Council for the reformation of the Church, but they chose to remain neutral in the contest with Eugenius. Meanwhile he acquired new credit by the union concluded with the Greek deputies at Florence (but after¬ ward rejected by the Greek Church) and the friendship of the Emperor Frederic III. The Council, on the other hand, denounced by Eu¬ genius and deserted by its protectors, gradually declined under its feeble Pope, and, consulting only appearances and the personal safety of its members, held its 45th and last session 16 May 1443, after an inaction of three years inter¬ rupted only by a few insignificant decrees. At this session the place of meeting was changed to Lausanne. Here some of the prelates remained together under the Cardinal Louis Allemand until 1449, when, after the death of Eugenius and the resignation of Felix V, they gladly ac¬ cepted the amnesty offered by the new Pope, Nicholas V, and pronounced the Council closed. The decrees of the Council of Basel are admit¬ ted into none of the Roman or official collec¬ tions,

and by the Roman Church are considered of no authority. They have been regarded, however, as of authority in points of canon law, in France and Germany, as their regula¬ tions for the reformation of the Church were to some extent adopted in both countries, and, as far as they regard clerical discipline, were actually enforced. Some concordats concluded VOL. 3 — 20

at subsequent dates have modified the applica¬ tion of them but never formally and entirely annulled them. The Council of Basel was one of the most important in the history of the Church. The spirit of the councils of Pisa (1409) and of Constance (1414-18) was formu¬ lated in the decrees of Basel, and led to a two¬ fold result : on the one hand the many salutary decrees of reform, on the other the clear ex¬ pression of many dangerous principles in regard to the organization of the Church. Its history has often been misrepresented by historians, some seeing in it only an unhappy tendency from the true centre of unity; others regarding it as a great progressive movement, but for¬ getting that it was simply the growth of an expediency due to exceptional conditions. To know it impartially it must be studied in the original sources. Consult Hardouin, Labbe and Cossart ; Mansi's collection consisting of 31 folios ; Alzog, (Church History > ; Parsons, cStudies in Church History) ; Perouse, G., (Documents inedits relatifs au Concile de Bale* (Bulletin Hist, et Pliilol., year 1905, Nos. 3-4, pp. 364-398, Paris, 1906).

BASEL, Treaties of Peace at, 5 April and 22 July. 1795, between Prussia, Spain and France, in which Prussia and Spain separated themselves from the coalition against France and acknowledged the republic. France re¬ tained the Prussian provinces on the left bank of the Rhine until the general peace, and ac¬ cepted the mediation of Prussia when any Ger¬ man princes wished to conclude separate treaties of peace with it. A secret article was inserted in the treaty, the object of which was to secure compensation to Prussia in case the left bank of the Rhine should remain with France at the general peace. The Landgrave of Hesse-Cassel afterward concluded a treaty with the French republic at Basel 28 Aug. 1795, by which the latter retained possession of the territories of Hesse-Cassel on the left bank of the Rhine until the general peace. By the Peace of Basel all the conquests of France beyond the Pyrenees were restored to Spain, in exchange for which that country ceded to France the Spanish part of the island of San Domingo.

BASEL, University of, situated at Basel, an institution opened in 1460.

After the Refor¬ mation it became strongly Protestant and ex¬ erted a widespread influence in behalf of the new faith. Among its professors were Eras¬ mus, CEcolampadius, Euler and the Bernoullis. It is at present the principal theological school in Switzerland, with departments of medicine, law and philosophy. Its library contains 250,- 000 volumes and 4,000 MSS, chiefly dealing with the Reformation,, besides other valuable collections and museums. There are about 950 students in attendance.

BASELLA, or MALABAR NIGHT¬ SHADE, a monotypic but very variable genus of tropical herbs of the natural order Chenopo-diacecz. B. rubra, a twining annual or biennial plant, native of India, where it is cultivated as a pot herb, is often raised in Europe, and has been introduced into the United States as a substitute for spinach, which it succeeds in sea¬ son (July until frost). It is decidedly mucil¬ aginous when cooked. Sometimes it is used as a greenhouse climber. One variety bears edible tubers, and another furnishes a purple dye.

BASEMENT, in architecture, the base or lowest story of a building. It should have ex¬ ternally an appearance of strength, but its height and proportion to the rest of the edifice are very various, depending on the character of the apartments on the ground floor.

BASEY, ba'sa, Philippines, a town in the province of Samar, on the north shore of San Pedro Bay. It has a population of about

14,000.

BASHAHR, one of the Punjab hill states, on the lower slopes of the Himalayas, tra¬ versed from east to west by the Sutlej ; area, 3,820 square miles. The Rajah and upper classes in the southern parts are Rajputs, and the peo¬ ple generally are of the Hindu race, but their observance of Hinduism is very partial. The government is in the hands of a British resi¬ dent. Pop. over 80,000.

BASH AN, ba'shan or ba-shan' (meaning uncertain, perhaps <(soft, rich soil®), the name in Scripture for a singularly rich tract of coun¬ try lying beyond the Jordan, between Mount Hermon and the land of Gilead. These two regions, Bashan and Gilead, attracted the at¬ tention of those tribes that desired to continue the pastoral life to which they and their fathers had been accustomed, and Gilead was accord¬ ingly divided between Reuben and Gad, while Bashan was given to the half-tribe of Manasseh. Its forests contain magnificent oaks, and the ((strong bulls of Bashan® of ancient times are still represented by vast herds of black cat¬ tle. Bashan had been the kingdom of the Canaanite giant Og, whom Moses destroyed ; and one district of the country, Argob, had at that time 60 fenced cities, with walls, gates and bars, besides many unwalled towns, remains of which are yet to be seen. Among the cities of this region were Edrei, Kenath, Golan and Bozrah. After the captivity it is mentioned as divided into Trachonitis (the ancient Argob), Gaulanitis (Golan), Auranitis (Hauran, men¬ tioned by Ezekiel) and Batansea, or Bashan proper.

BASHAW, Edward, English Non-con¬ formist theologian: d. Newgate 1671. He was imprisoned in Newgate because of his refusal to take the oath of allegiance and supremacy. He is the author of (Antisocinian Disserta¬ tionsˆ and a (Dissertation on Absolute Mon¬ archy. >

BASHFORD, James Whitford, American clergyman and educator: b. Fayette, Wis., 27 May 1849; d. 18 March 1919. He was graduated at the University of Wisconsin in 1873, and at the Boston Theological School in 1876; became instructor of Greek at the University of Wis¬ consin in 1874, and president of the Wesleyan University of Ohio from 1889 until 1904 when he became a bishop of the Methodist Episcopal Church. His works include Science of Reli¬ gion J (1891) ; (God's Missionary Plan for the World) (1907) ; numerous published sermons, and contributons to periodical literature.

BASHI-BAZOUKS, properly BOZOOKS, irregular troops in the pay of the Turkish Sultan. The term means <(light-headed.® They are a wild, turbulent body of men, mostly from Turkey in Asia, and in the duties with which they are entrusted resemble the Cossacks in the former Russian imperial army. In 1876 the

Bashi-Bazouks were guilty of great atrocities in checking a threatened insurrection in the district around Philippopolis in eastern Rumelia, which led to the Russo-Turkish War of 1877-78.

BASHI ISLANDS. See Batan Islands.

BASHKIRS, or BASHKEERS, a tribe of half-civilized people subject to Russia, and in¬ habiting the banks of the Ural and Volga. They are probably descended from the Nogay Tartars and resemble them in their manners. They formerly roamed about, under their own princes, in southern Siberia. To avoid the Siberian khans they settled in their present territory, extended themselves along the Volga and the Ural, and submitted to the Khan of Khazan. At the time when this state was over¬ thrown by Ivan II they voluntarily took refuge under the Russian sceptre; but their frequent revolts long prevented their increase and kept them in a weak condition. They number about 500,000, and inhabit chiefly the governments of Orenburg, Perm and Samara. They are Mo¬ hammedans, and live chiefly by hunting, the breeding of cattle and horses, and keeping of bees. They prepare from mare's and camel's milk a fermented beverage, koumiss, which is their favorite drink. They furnish the Russian army with a body of irregular cavalry.

BASHKIRTSEFF, bash-kert'sef, Marie, ' Russian author: b. Russia 1860; d. of consump¬ tion, Paris 1884. She came of a noble and wealthy family, went to Italy to study singing, and to Paris to study art. Her fame rests on her private journal, > which seems to have been written with ultimate publication in view.

It begins with her 13th year and continues through her later life. According to her own words, it was intended to be <(the transcript of a woman's life.® It appeared in Paris in 1885, and was abridged and translated into English in 1889, and was called by Gladstone <(a book without a parallel.® Like Rousseau's Confessionˆ it claims to be an absolutely candid expression of individual experience. From the age of three years she cherished in¬ ordinate ambition, and felt herself destined to become great as a singer, writer, artist or queen of society. Admiration was essential to her, and she records compliments to her beauty or her erudition with equal pleasure. Her life was a curious mixture of the interests of a pre¬ cocious though attractive society girl with those of a serious student. Her chronic discontent was due to the disproportion between her aspirations and her achievements. She was always self-conscious, and her book reveals her longings, her petty vanities and her childish crudities, as well as her versatile and brilliant talents. Madame de Stael's (Corinne) appears to have been her model.

BASIC SLAG, the slag of refuse matter which is obtained in making basic steel, and which, from the phosphate of lime it contains, is a valuable fertilizer.

BASIC STEEL. See Steel Manufacture.

BASIL (Ociinum) , a genus of fragrant an¬ nual herbs of the family Menthaceoe, natives of warm climates, cultivated for culinary pur¬ poses and for ornament. The species generally raised are sweet basil (O . basilicnm), bush or dwarf basil (O. minimum), (considered by some botanists a form of O. basilicum) , and

tree basil (O. gratissimum) . The name basil is also applied to certain species of several other related genera; for instance, Kcelia and Cala-mintha. For culture and uses, see Herbs (Culinary) .

BASIL, ba'zil or baz'il, Saint, surnamed The Great, bishop of Caesarea, Cappadocia: b. Caesarea, in Cappadocia, probably 329 ; d. 378. He was studying in Athens, and there became the friend of Gregory, afterward Bishop of Nazianzus. He was baptized in 357, and after extensive travels retired to the desert of Pontus and there founded an order of monks named Basilians. He succeeded Eusebius in the see of Caesarea in 370, denounced the apostasy of the Emperor Julian, and by his opposition to Arian doctrines greatly offended the Emperor Valens. The liturgy of Saint Basil — not wholly his — is still used in the Eastern Church, and his rule is still observed in the monastic institutions. In his doctrine he emphasized the trinity rather than the unity of the Godhead, and he declined to admit the claims of the see of Rome to primacy in the Christian Church ; but he stood out as the champion of orthodoxy in the East, and promoted union between the two great branches of the Church. With Greg¬ ory of Nazianzus and his brother Gregory of Nyssa he was founder of what is called the (<Cappadocian theology.® He was a voluminous writer of theological subjects, <(in purity and perspicuity surpassing most of the heathen as well as the Christian writers of his age.® Con¬ sult Murray's dictionary of Christian Biog¬ raphy } (London 1911).

BASIL I, Roman Emperor in the East: b. Macedon, of poor parents, about the beginning of the 9th century; d. 886, from a blow given him by a stag while hunting. In his 25th year he made his way to

Constantinople, and gained the favor of an archimandrite, who procured him service with an officer of the court of the Emperor Michael III. Later he was appointed head-chamberlain to the Emperor. Despite in¬ trigues against him he advanced so rapidly in the Emperor's favor that he was adopted as his colleague. He murdered his chief rival, Bardas, and knowing that Michael had rendered himself odious by his cruelty and debauchery, he headed a body of conspirators and murdered him in his bed in 867, and usurped the throne. Notwith¬ standing his criminal acts, he proved an able and equitable sovereign, paid equal attention to the internal administration and the foreign relations of the empire, and not overlooking even its religious interests, sent an archbishop into Russia and laid the foundation of that ascendency which the Greek Church has so long possessed in that country. He compiled a body of laws called the Basilica, which, aug¬ mented by his son and successor, Leo the Philosopher, were in force till the fall of the empire. Basil I deprived Photius of the see of Constantinople, and restored Ignatius ; but on the death of the latter he recalled Photius. He successfully carried on war with the Sara¬ cens. The versatility, if not the depth of his intellect, is strikingly displayed in his exhorta¬ tions to his son Leo, which are still extant. Consult Vogt, (Basil P (Paris 1908).

BASIL II, Roman Emperor in the East: d. 1025. On the death of his father, the Emperor Romanus the Younger, in 963, he was kept out

of the succession for 12 years by two usurpers; the first, Nicephorus II (Phocus), who died in 969, and the second, Johannes (John) Zimis-ces, who associated Basil and his brother Con¬ stantine with him in the empire in 975, and died the following year, leaving the whole power to Basil although Constantine was still his colleague in name. His reign was almost a continuous warfare, in which the con¬ tending parties seemed to vie with each other in committing deeds of cruelty. In 1014, after a great victory over the Bulgarians, in which he had taken 15,000 prisoners, he had 99 out of every 100 deprived of their eyes and thus sent home. The sight of this horrible cruelty perpetrated on his soldiery caused the death of Samu-el, King of the Bulgarians. The war ended in 1018 by the complete conquest ot Bulgaria.

BASILEAN MANUSCRIPTS, two man¬ uscripts of the Greek New Testament, now in the library of Basel: (1) a nearly complete uncial copy of the Gospels of the 8th century; (2) a cursive copy of the whole New Testa¬ ment except the Apocalypse, of the 10th cen¬ tury. -

BASILIAN, ba-se'le-an, Philippines, the largest island of the Sulu Archipelago. It is of oblong form, about 36 miles long and situ¬ ated south of Mindanao, from which it is separated by a strait nine miles wide. The island is mountainous, and most of it is covered by virgin forests. The soil is rich and pro¬ duces a variety of valuable crops, including cotton, coffee, sugar, chocolate, tobacco, indigo and spices of all sorts. Basilian has about 8,000 inhabitants and three excellent harbors. The name is also applied to the whole group of 34 adjacent islets; total area, 350 square miles. The leading port is Isabella, on Basilian Strait, 580 miles from Manila.

BASILIAN LITURGY, that form for celebrating the eucharist drawn up, toward the close of the 4th century, by Basil the Great, still used in the Greek Church.

BASILIAN MONKS, a monastic order, chiefly belonging to the Greek Church, who strictly follow the rules of Basil, the great Saint Basil (q.v.), who, after visiting the mon¬ asteries of Egypt, Syria and Palestine, induced many to enter the monastic life and even to feund convents. His rule, which was founded in 358, was confirmed by Pope Liberius in 363. In 379 there were at least 80,000 in the eastern monasteries. Many convents were dispersed in the 8th century during the iconoclast persecu¬ tions, and all began to languish about the time of the eastern schism. The order now com¬ prises priests, lay-brothers, cenobites living in community, anchorites in cells and hermits in solitudes. They are governed by an archiman¬ drite who has several convents under his juris¬ diction, and by exarchs deputed by the archi¬ mandrite to visit the convents. The order has developed more extensively in Russia than in other countries. In Austria, Poland and Hun¬ gary there are many communities, known as Ruthenians, in union with the Roman Catholic Church. In Italy also they had convents in Calabria, Sicily and Naples. In Spain they flourished for nearly two centuries until 1835, when they were suppressed. The communities

of Sisters of Saint Basil were founded by Saint Maerina, sister of Saint

Basil. Other communities following the rule of Saint Basil are the Melchites in Libanus; the Bartholomites of the Armenian rites, so called because, after taking refuge in Genoa in 1307, they had pos¬ session of Saint Bartholomew's Church there until 1659.

Saint Basil, in the monastery which he founded near Neocaesarea, set his face against the very ascetic tendencies which had already asserted themselves in monastic life in the Catholic Church. While strongly insisting on fasting and prayer he maintained that neither should be allowed to interfere with work, which should always form an integral part of the life of every monastery. He taught that monas¬ teries should be near towns in order to permit the monks to extend aid to all those who re¬ quired it, which it was the duty and obligation, he asserted, of every monk to give. His pro¬ gram insisted upon common meals, common work and common prayer, the latter seven times a day. Unquestioned obedience to the superior, self-denial, chastity, renouncing of all wealth and property were exacted by Saint Basil of all who entered his monastery. Dur¬ ing his life the members of the order were cenobites, never hermits, for whom he had little respect. So strong became the influence of the Basilians that they practically drove the hermit orders out of Cappadocia and the neigh¬ boring provinces and finally established their order as the all-prevailing form of monasticism throughout the Greek and Slavonic countries. About the beginning of the 9th century Theo¬ dore, abbot of the monastery of Studium, in Constantinople, gave a real constitution and codified laws to the order of the Basilians. These were gradually adopted by all the mon¬ asteries of the order throughout Greece and, later on, by all those in the Slavonic countries. This explains the statement often made that <(The Rules of Basil and the Constitution of Theodore the Sudite, with the Canons of the Councils comprise the greater and most import¬ ant part of the monastic law of the Greek Church.® Theodore made the sphere of action and the aims of the order very definite, dividing the day time between work, reading, liturgical services of the Church and prayer. The work element tended to make the order very popular so that Theodore had in his own monastery over 1,000 monks, many of whom were counted among the most famous copiers of manuscripts in Constantinople, then the most celebrated centre of learning in the East.

The first Russian monastery was founded at Kiev about 1050 by a monk from the great Basilian centre of Mount Athos, in Greece; and in less than a century the order had spread pretty well over the domains of the Tsar, from which it was rapidly extended to all the other Slavonic countries. In Russia there exist to¬ day nearly 500 monasteries, in Turkey over 100, and in all the Slavonic countries

outside Russia probably as many as in Turkey. Among the 4,000,000 people following the Ruthenian rites there are numerous. Basilian monasteries which, while owing allegiance to Rome, follow, in practically every other respect, the rules and ordinances of the Greek Church. All the saints on their calendar are those of the East and not those of the West, and they adhere strictly to

the rules of the order as laid down by Basil and Theodore. Most of the adherents of the Lithuanian faith are to be found in Galicia ; but there are more than half a million of them in Austria, principally in the Polish part. In fact, the order is represented in every part of ancient Poland. In Hungary, where the Basi¬ lian order was once strong, it now has but little influence. The monasteries among the Ar¬ menians are nearly all under the rule of Saint Basil.

BASILICA. The word basilica (meaning a kingly or magnificent building) is of Greek derivation, but the buildings so termed appear to have originated with the Romans. The basilica edifices of the Greeks and Romans were the courts of justice and commercial meeting places of the people. The judicial court was presided over by the archon basileus. As its title describes, it was a building of magnificence comporting with the importance it held in the civic functions. The basilica style of construc¬ tion was that used for the earliest of the churches of the primitive Christians, and it is claimed by some authorities that the first Chris¬ tian worship in public (on Constantine's ac¬ cepting the Christian creed) was held in the pagan basilicas.

The typical basilica was an oblong edifice surrounded by a colonnade (peristyle) and the interior also was divided by rows of columns. Vitruvius says the old Roman basilica was closed in by a wall having a doorway within it, or was freely open like the Greek Colon¬ nades. The interior of the building was di¬ vided lengthways, by two rows of columns, into three naves, the central one being the widest. At one end was the tribunal where the seated judges presided over the public court, and the opposite end was the entrance. The early Christian basilica was planned on the above lines. The interior of the Constantine style of basilica has been described as being divided into the three following open sections or spaces: Starting with the pronaos, destined for the catechumens, next came the chorus, where the choristers, instrumental musicians and exorcists performed their functions. Lastly, beyond, was the sacrarium, where the altar was located, near which the deacons and sub¬ deacons were seated. The abside (apse) or presbyterium held the ordained priests on a semicircular bench (consistorium) interrupted in the middle by a more elevated seat (sug-gestus) reserved for the bishop. The side aisles received the congregation (men at the right, women at the left). Most basilicas had an atrium or narthex (covered vestibule sup¬ ported by columns) as entrance. The early buildings were covered

with a flat, wooden roof.

About the first innovation in basilica struc¬ ture made by the early Christian Church was the extension from the main building of the apsis, usually in semicircular form. The roof over the central nave was also raised a story higher than the side walls (clerestory) , afford¬ ing light from windows in the extended walls. Other excrescences crept in from time to time, such as side chapels for special services, and even towers on the front walls. Some authori¬ ties define the basilica period as from 300 to 800 a.d.

Pagan Basilicas. — Probably the first basil¬ ica was that erected in Rome by Cato Censori¬ ous (184 b.c.) — the basilica Porcia. Other noted ancient pagan basilicas in Rome were : Basilica Sempronia, erected by Tiberius Sem-

/

Fig. 1. — Typical Ground-plan of Grecian or Roman Pagan Basilica.

pronius Gracchus ; basilica Opimii, by Consul Quintus Opimus (151 b.c.), basilica Bvmilia, by ˆEmilius Paulus ; basilica Julia, commenced by Julius Caesar and finished by Augustus (about 25 a.d.). Three moderate-sized basilicas were discovered in Pompeii. Vitruvius wrote a description of the basilica built by him at Favo.

Christian Basilicas. — • Of basilicas that were in ancient Rome we know of : Saint Peter's, Saint Paul's, those of Saint John Lateran, Saint Clement, Sta. Maria in Trastevere and Saint Lawrence. Present existing basilicas in Rome are : Saint Peter's, Saint Paul's, those of Saint John Lateran, Saint Clement, Saints Nereo and Achilleo, Sta. Maria Maggiore, Saint Paul's without the walls (reconstructed 19th century). Other noted basilicas are: Saint Apollinaris in Classe, near Ravenna; Saint Apollinaris in Ravenna; Torcello Cathedral, near Venice; Saint Ambrose, Milan; Saint Res-titua, Naples. In Germany are: The Cathedral at Treves, built about 4th century (has one story and flat

roof) ; Saint Godehard and Saint Michael in Hildesheim ; the Abbey Church in Quedlinburg. In England are, notably : Saint Barnabas at Oxford and Saint James at Leices¬ ter. Saint Jean-Baptiste Church, Lexington ave¬ nue and 76th street, New York city (recently erected), is said to best represent the basilica style of any edifice in the United States.

Bibliography. — Clausse, Gustave, (Les Monuments du Christianisme an Moyen Age, basiliques et mosaiques chretiennes) (Paris 1893) ; Dehiot and Bezold, (Die kirch-liche Baukunst des Abendlandes) (Leipzig 1884) ; Hare, (Walls in Rome) (London 1913); Martigny, (Diction nai re des antiquites chretiennes) (article (Basilique)) ; Pellegrini, A., fBasilica Fulvia* (in (Bollettino dell'Instit. di

Corresp. archeolog. > 1880) ; Quicherat, J., <La Basilique de Fanum, construite par Vitruv) (in ˆMelanges d'archeologie et d'histoireP Paris 1886) ; Richter, (Christliche Architektur und Plastik) (Jena 1872) ; Richter, (Der Ursprung

£o~it

Fig. 2. — Ground-plan of St. Peter's Basilica, Rome.

(1) Neve; (2) Inner Aisle; (3) Outer Aisle for Men; (3a) Outer Aisle for Women; (4) Atrium;

(5) Well; (6) Tribunal or Bema (abside) ; (7) Presbytery; (8) Gospel Ambo; (9) Peristyle.

der abendlandischen Kirchengebaude) (Vienna 1878) ; Wurz, Hermann, (Zur Charakteristik der klassischen Basilica) (Strassburg 1906) ; Zestermann, (Die antiken und christlichen Ba-silicen) (Leipzig 1847) ; Kraus, in (Realen-cyclopadia der christlichen Alterthiimen) (Frei¬ burg 1882), gives a long list of early basilicas outside Rome under article ˆBasilica.®

Clement W. Coumbe.

BASILICA, a code of laws founded on the code of Justinian, supposed to have been named

after the Greek Emperor Basilius I, in whose reign its compilation was begun. It was fin¬ ished by Leo the Philosopher and revised by order of his son Constantine Porphyrogenitus in 945. It consisted of 60 books, but we no longer possess them in a complete form. The principal editions are those of Fabrot (7 vols., Paris 1647), and Heimbach (Vols. I-V, Leip¬ zig 1833-50).

BASILICATA, ba-zil-e-ca'ta, the ancient Lucania, in southern Italy, composed solely of the province of Potenza; so called after the Emperor Basilius II, who reconquered it from the Saracens and Lombards in the 11th century. It is mountainous, several peaks rising to up¬ ward of 4,500 feet (Monte Pollino, 7,375 feet). The Apennines here divide into two parts, which branch off to the east and west. From these the rivers Bradano, Basento, Salandrella, Agri ard Sinni take their source, and after draining this fertile district, fall into the Gulf of Taranto in the Ionian Sea. There are also many lakes, some of volcanic origin. The chief are Mon-ticchio, Pesole, Maorno, and Santa Palagina. The bulk of the people are poor and ignorant, and talk a dialect called basilisco. Its coast line being for the most part marshy, and, as a consequence, unhealthful, the province derives next to no commercial benefit from it. The orange and lemon grow well near the coast. Other products are cotton, flax, silk, honey, wax, licorice, dried fruit, saffron, tobacco, *etc.* Mineral springs are many, chiefly sulphur¬ ous. There are marble quarries at Avig-liano, Latronico, Muro, Lucano and Picerno ; chalk at Mauro Forte and Montemuro ; trans¬ parent quartz at Lagonegro ; tufa at Matera ; and excellent lignite at San Chirico Raparo and Rotonda. Area, 3,845 square miles; pop. about

490,800.

BASILICON, ba-zil'i-kon, a name of sev¬ eral ointments, the chief ingredients of which are wax, pitch, resin and olive oil.

BASILICON DORON (the royal gift), the title of a book written by King

James I in 1599, and printed in Edinburgh in 1603, con¬ taining a collection of precepts on the art of government, and maintaining the claim of the king to be sole head of the Church.

BASILIDES, ba-sil'i-dez, founder of one of the most remarkable sects of ancient Alexan¬ dria. He lived under the reigns of Trajan, Adrian and Antoninus, but the place of his birth, supposed to be in Persia, Syria or Egypt, is unknown. He was well acquainted with Christianity, but, under the pretense of freeing it from corruption, corrupted it still more by mixing it up with the wildest dreams of the Gnostics and peopling the earth and the air with multitudes of aeons. He had numerous followers who spread from Syria and Egypt into Italy, and even as far as France, but they suddenly sank into obscurity and are scarcely heard of after the 4th century.

BASILIO DA GAMA, Jose, Brazilian poet: b. San Jose 1740; d. Lisbon 1795. His principal poem gives a picturesque and romantic account of the bloody wars which the Portuguese waged, in 1756, against the natives of Paraguay. He was a protege of the Brazilian Minister Pombal, who gave him em¬ ployment in his Cabinet. He shared Pombal's

exile, and also dedicated verses to him in token of his gratitude. On his return to Rio de Janeiro he was favorably received by the au¬ thorities and the literary notabilities, and with their cooperation he became one of the foun¬ ders of the first Brazilian Academy. In 1790 he again had to resort to flight, and he suc¬ ceeded in escaping to Lisbon. He was the author of many lyrical pieces and sonnets, and of a poem, 'Quitubia,* written on an African chieftain whose devotion to Portugal engaged the poet's sympathy; but the most abiding monu¬ ment of his genius is his 'Uruguay, } which is still popular wherever the Portuguese language is known.

BASILISCUS, brother of Verina, wife of Leo, Emperor of the East : d. a.d. 477. In his youth he obtained some successes against the Scythians, and in 468, through the influence of his sister, was appointed to command the im¬ mense armament fitted out at Constantinople against Genseric, King of the Vandals in Africa. This expedition consisted of upward of 1,100 vessels, conveying soldiers and sailors to the number of more than 100,000 men, and its equipment is said to have cost about $25,000,000. But this vast fleet, after reaching the coast of Africa in safety, was altogether destroyed or dispersed by Genseric, through the incapacity or treachery of its

leader. Basiliscus escaped to Constantinople, and obtained the pardon of the Emperor only by the earnest intercession of the Empress. After the death of Leo, and of his successor, Leo II, in 474, Basiliscus usurped the imperial throne. But he was un¬ able to sustain himself in this position, and was not long after overthrown and put to death by Zeno, the legitimate heir.

BASILISK, baz'i-lisk, according to Pliny (lib. viii, c. 21), a kind of serpent found in the African deserts, named basiliskos, or little king, because its body was marked with bright spots, and those on the head had the appearance of a crown or diadem. It had a very pointed head, with fiery eyes, and was of a dark color, verging to blackness. All other snakes were said to fly from the sound of its hissing; and instead of trailing along like other serpents the basilisk raised its body nearly erect, and, as it passed along killed the herbs and fruits by its touch, and even by its breath. Yet this monster was destroyed by weasels. If these fables had ref¬ erence to any real animal, it is probable that it was a species somewhat similar to the cobra de copello, or the asp viper. Both are accus¬ tomed to erect a very considerable part of the body, though not to move forward in this way. It is highly probable that the basilisk of the ancients was merely a creature of fiction.

The name is now applied to one of the Cen¬ tral and South American lizards of the family Jguanidce and genus Basiliscus, remarkable for the high and erectile crests which are devel¬ oped along the back and tail of the males. They have long legs and long flexible toes, enabling them to climb trees with great activity. They prefer such trees as overhang the water, into which they plunge at any sign of danger. They feed entirely upon vegetable matter. The best-known species is Basiliscus americanus, which has a length of nearly three feet, three-fifths of which is tail. In color the basilisks are green and brown, with dark cross-bars on the back,

and the crest of the males is red. In early spring they lay about a dozen eggs in a hole among the roots of a tree. See also Iguana.

BASILOSAURUS. See Zeuglodon.

BASIN, in physical geography, the whole tract of country drained by a river and its tributaries. The line dividing one river basin from another is the watershed, and by tracing the various watersheds each country is divided into its constituent basins. The basin of a lake or sea comprises as well all the territory drained by the rivers which run into it. Such hydrographic basins owe their origin either to erosive action or to a depression of the earth's crust. When rivers become established upon a new land surface they proceed to deepen and widen their channels, and in course of time mav appreciably lower the level of the drainage area. Glaciers are also important agents in the establishment of hydrographic basins, as is il¬ lustrated by the numerous rock basins (now occupied by lakes) that were hollowed out by the great ice-sheets that once invaded northern North America and Europe. Other depres¬ sions have been formed by' vertical movements of the strata comprising the earth's crust. The Great Basin lying between the Rocky Moun¬ tains and the coast ranges, and many of the lake basins of central Africa, originated in this way. In geology a basin is the synclinal arrangement of strata so that they dip or are inclined toward a common centre. The Paris Basin and the London Basin are familiar in¬ stances. See River; Lake; Valley, *etc.*

BASINGSTOKE, England, town and parish of Hampshire, situated near the source of the Loddon, 18 miles north-northeast from Winchester. Its streets are well built, paved, and lighted, and the town is amply supplied with water. It has a townhall, containing a spacious corn-market and ballroom. It has also a fine Gothic church, erected in the time of Henry VIII ; several other places of wor¬ ship ; a mechanics' institute, with good library ; and numerous charities. A considerable trade is carried on in corn, coal, timber and malt, and it has manufactures of agricultural imple¬ ments, clothing, malt, liquors, *etc.* In the neigh¬ borhood are the ruins of Basing House, be¬ longing to the Marquis of Winchester, which withstood the forces of the Commonwealth for four years, but was at last taken by Cromwell and burned to the ground in 1645. Pop. 11,540.

BASKERVILLE, Charles, American chemist: b. Noxubee County, Miss., 18 June 1870. In 1886-87 he studied at the University of Mississippi and in 1890 was graduated at the University of Virginia. He also studied at Vanderbilt University and at the University of Berlin. From 1891 to 1904 he was successively instructor, assistant professor and professor of chemistry and director of the chemical labora¬ tory at the University of North Carolina. In 1904 he was appointed professor of chemistry at the College of the City of New York. Professor Baskerville

discovered the chemical elements of carolinium and berzelium and has invented processes for refining oils, *etc.* He has made extensive investigations in the chem¬ istry of anaesthetics and in the applications of radium in medicine. He has written (School Chemistry > (1898) ; (Key to School Chemistry }

(1898) ; (Radium and its Applications in Medi¬ cine ‘ (1909); ‘General Morganic Chemistry! (1909); ‘Laboratory Exercises, > with R. W. Curtis (1909); ‘Progressive Problems in Chemistry, > with W. L. Estabrooke ; ‘Qualita¬ tive Analysis, > with L. J. Curtman ; collaborator in ‘Municipal Chemistry* ; ‘Anesthesia, > with J. T. Gwathmey ; also scientific educational and technological articles in various periodicals.

BASKERVILLE, John, English printer and artist: b. Wolverley, Worcestershire, 1706; d. 1775. Inheriting a small estate, he was brought up to no profession, but, acquiring great skill in penmanship and carving letters on stone, at the age of 20 he settled at Birmingham as a writing-master. He subsequently engaged in the manufacture of japanned works, and in 1750 entered upon his great career as printer and typefounder, in which he displayed extraor¬ dinary ability, as well as in the manufacture of the ink and paper used in his productions. His first great work was an edition of Virgil, in royal quarto, 1756, which was followed by many of the Latin classics, and some English ones, in quarto and smaller sizes. After his death his types and matrices were .sold to Beaumarchais at Paris for £3,700. Baskerville prints are in continuous demand in England to-day.

BASKET, a vessel made of osier twigs or other flexible materials, as rushes, strips of wood, splits of bamboo, rattan, etc., and used for holding and carrying all sorts of commodi¬ ties. The word is of Britanno-Celtic origin and still subsists in the Welsh language in the form B as gawd, from Bcisg, plaiting, network: it was adopted into the Latin language in the 1st cen¬ tury with form little altered — Bascauda. The baskets made in Britain were highly prized by the Romans, and the poets Juvenal and Martial make mention of them as articles of no trifling value. They were evidently regarded as rare exotic curios in Juvenal’s day, for the poet, in drawing an exaggerated picture of the ship¬ wreck in which his friend Catullus threw over¬ board his most cherished possessions, couples Bascaudae (baskets) with articles of chased silver wrought by famous artists (Sat. xii.). And Martial (xiv, 99) makes the British bas¬ ket say of itself : — •

Barbara de pictis veni bascauda Britannis,

Sed me jam mavult dicere Roma suam —

“ The Basket Barbaric, I’m come from the painted Britanni., But Rome now would choose rather to title me Roman.”

In primaeval times basket-making was a branch of the art of weaving, and both of these arts grew out of the still more primi¬ tive one of wattling, first employed in mak¬ ing enclosures. Tylor (‘Early History of Mankind >) notes the existence of wicker¬ weaving among primitive tribes throughout the world. This is the first step in the art of weav¬ ing textile fabrics. It is practised, or rather was practised, by the natives of New Zealand and of northwestern America, and as late as 1856 by an Indian tribe living northwest of Lake Huron. In the lake habitations of Switz¬ erland have been found specimens of wicker¬ weaving work consisting of strands of un¬ twisted fibre, probably hemp, bound together by transverse strands wattled in among them ; and in the ˆame localities have been found speci¬ mens of the same kind of weaving but of a progressively higher and finer type. There is even a genetic relation between the arts of

basket-making and pottery, proved by speci¬ mens of rude pottery found in all quarters of the world: in these are seen the impresses of the basket-work on which the clay was molded and which was burnt away in the kiln. Even after the art of molding the clay without the basket-work frame was invented, the potters seem to have imitated the markings left by it. Among the Indians of the Mississippi Valley along the Gulf, all pottery vessels of large size used to be modeled in baskets of willow or splints, which, being burnt off, their markings remained. Shields of basket-work covered with hide were in use among the Britons at the time of Caesar’s invasion, and similar shields are still employed by primitive peoples wherever they live in savage isolation. Boats, too, of basket-work, with a covering of hide (coracles), were used by the ancient Britons, and boats of the same type were seen by Herodotus (i, 194) navigating the Euphrates. These

were of round form, without distinction of bow and stern, and similar boats are still in use on some rivers in India. On account of its lightness, combined with strength and durability, basket-work is pre¬ ferred to joinery in the manufacture of various commodities, as window-screens, pony-carriage bodies, chairs, tables, *etc.* In South America the natives weave baskets of rushes capable of holding liquids, and those of Tasmania, now extinct, used to weave of leaves water-tight vessels. The material most commonly em¬ ployed in basket-making is the willow or ozier twig, and the production of this material is an important industry in France, German v, Bel¬ gium, Holland and Britain. The product of France and Britain is the most highly esteemed for firmness, toughness and evenness ; that of Germany is reputed inferior to the French; the Dutch product is in least esteem, being soft and pithy. Besides ozier twigs, a great variety of other materials are employed in basket¬ making. In this country coarse, strong baskets are made of shavings or long broad splits of various tough woods. In China and Japan the usual materials are bamboo and rattan, and the Chinese and Japanese excel in the manufacture of wares of these materials, their products be¬ ing unrivaled for fineness, elegance and finish ; and some of their work, as in the encasing of the egg-shell porcelain of the Japanese, is mar¬ velous for the delicacy of the manipulation ; even the examples seen in our marts, of com¬ mon little porcelain saucers so encased in basket-work, are worthy of admiration for painstaking workmanship. The fronds of the Palmyra palm, originally employed in India in making <(Cajan» baskets, now afford a staple material for use in the art throughout the world. So, too, Phormium tenax , native of New Zea¬ land, which yielded to the natives of that coun¬ try their peculiar basket-making material, is now employed in all countries for the same purpose.

Basket-making is one of the simplest of the mechanic arts ; and the workman, in making baskets designed for use, not for ornament or to please the fancy, has no absolute need of tools or apparatus beyond those requisite for cutting the rods and interlacing them — a knife and a bodkin, with a mallet to beat them into place. The process can be learned in principle by inspection of a basket-maker at work in fashioning a basket from the foundation to the

rim. Having provided a sufficient quantity of rods or splints of much greater length than the proposed dimensions of the finished work, he lays a number of them on the floor in paral¬ lel pairs at small intervals in the direction of the longer diameter of the basket ; this is

the woof, so to speak. Then these are crossed at right angles by two of the largest osiers, with their thick ends toward the workman, who sets his foot upon them ; next, each of these is woven alternately over and under the length¬ wise parallel pieces, and thus the parallel pieces are held fast ; this is the ˆslath®- — the founda¬ tion. Now the end of one of the two transverse rods is woven over and under the lengthwise rods all round the bottom till that whole rod is worked in ; and the same is done with the other transverse rod, and then additional long osiers are woven in till the bottom is of the required size. The bottom is now finished and work begins on the superstructure by driving the sharpened large ends of a sufficient number of long, stout osiers between the rods at the bottom from the edge toward the centre; these are the ribs or skeleton, being set up in the di¬ rection of the sides; between these ribs other rods are woven in till the structure reaches the desired height To finish the edge the ends of the ribs are turned down over each other and thus compactly united. A handle is added by forcing two or three sharpened rods of the requisite length down through the weav¬ ing of the sides, close together, and pinning them fast a little below the brim ; the rods are then either bound or plaited in any way the workman chooses.

Our North American Indians were once among the most expert basket-weavers in the world. Now only the older Indians know the art, and certain tribes whose work was incom¬ parably fine and beautiful have already lost it. After much pauperizing under the abominable reservation system, it was decided that the In¬ dians needed an industry to save them from sinking still lower. Lace-making, after Brus¬ sels and French patterns, was first superim¬ posed on a Minnesota reservation, whence it has spread. Now, lace-making, which has been de¬ veloped by the European woman, fits her like a glove; and quite as truly, basket-making fits the Indian like a moccasin. Yet the Indians have succeeded at making lace, for they have remarkable skill with the fingers. An enlight¬ ened administrator of Indian affairs has taken up the task of human development in the right way and has made plans to revive basket¬ making by introducing it into the government Indian schools, where the children, who now know nothing of this beautiful art, may learn from the only masters capable of teaching them — their own people, directed by white teachers who know the needs of the constantly widen¬ ing market. Hundreds of thousands of dollars' worth of baskets are imported from Japan and Germany every year — money which by every right should be earned by our capable and needy Indians ; and better than the money they will earn is the satisfaction of doing what they do with surpassing skill.

BASKETBALL, a distinctly American game. Its history begins in 1891, when a lecturer in psychology at the Young Men's Christian Association Training School, in Springfield, Mass., suggested, as an

exercise of inventiveness, a game that would comply with certain conditions. One of his pupils, James Naismith, tak¬ ing note of the hypothetical conditions indoors — limited area, limited number of contestants, equally applicable to either sex, *etc.* — applied his mind to meet those conditions, and invented ˆbasketball.® It is played on a marked oblong square containing not more than. 3,500 feet of actual playing-space, by teams of five each, known respectively as centre, left and right forwards, and left and right backs. The ball is round and inflated, not less than 30 or more than 32 inches in circumference, and very like that with which ˆAssociation® football is played. The gbals are hammock nets of cord, suspended from metal rings 18 inches in diam¬ eter, and placed 10 feet from the ground, in the centre of the ends of the playing-space. The time of playing, for seniors, is two halves of 20 minutes, with an interval of 10 minutes; and for juniors, two halves of 15 minutes, with a similar interval. No kicking of the ball with the foot, or hitting with the fists, is permitted ; the ball must be held by the hands only. Con¬ sult Naismith and Gulick, (Basket BalP ; (Spalding's Athletic Library* (New York 1894) ; Fisher, H. A. (ed.), Official Collegiate Basket Ball Guide ((Spalding's Athletic Li¬ braˆ,* New York, annual) ; Smith, T. H., Of¬ ficial Basket Ball Guide (Fox's (Athletic Li¬ brary, > New York 1906).

BASKET-FISH, a name given about 1670 by John Winthrop, governor of Connecticut, to the Astrophyton agassizii. It belongs to the group Euryalida, and is allied to the sand-stars, but differs in the arms being much branched and ending in long, slender tendrils which are so much interlaced as to suggest basket-work. It is very large, the disc being two inches across, and the entire animal often a foot in diameter. It lives off the coast of New England in from 10 to 100 fathoms of water. Other names are (<Medusa's-head® and ((Sea-basket.®

BASKETWORM. See Bag-Worm.

BASKETT, James Newton, American zoologist and novelist: b. Nicholas County, Ky., 1 Nov. 1849. He was graduated Ph.B. at University of Missouri 1872, and M.A. in 1893. Later he became well known as a civil engi¬ neer and historian, and as the author of ac¬ counts of Spanish expeditions in the south and southwest of early dates. His papers include the (Route of Cabeza de Vaca) (Texas His¬ torical Society) ; 1 Route of Coronado to Qui-vira) (Report Kansas Historical Society) ; and of numerous contributions in journals and magazines bearing on natural history. He has been a special student of the .divining rod and other subconscious endowments, is a lec¬ turer on many subjects, especially birds, and the author of (The Story of the Birds* (1896) ; (The Story of the Fishes) (1899) ; (The Story of the Reptiles and Amphibians* (1902) ; (At You-All's House) (1898) ; *'As the Light Led* (1900); (Sweetbrier and Thistledown* (1902).

BASKING-FISH, or BASKING-SHARK.

See Shark.

BASLE. See Basel.

BASNAGE, ba-nazh, a family of French Protestants, remarkable for the number of able men and eminent writers whom it has pro¬

duced. 1. Nicolas, who, having espoused the doctrines of the Reformation, was compelled by persecution to take refuge in England, where he became the minister of a congrega¬ tion at Norwich. When, by the accession of Henry IV, a better era began to dawn, he re¬ turned to his country and officiated, till his death, as minister of a church at Carentan.

2. Benjamin, son of the former: b. 1580; d. 1652. He succeeded his father in his charge, and held it for the long period of 51 years. • He long held a prominent place among the re¬ formers of France; presided in the assembly held at Rochelle in 1622 ; undertook the dan¬ gerous task of negotiating for English aid; traveled into Scotland to arouse the Protestant feeling in that country ; and on his return took the lead in the important synods held at Charenton in 1623 and 1631, and at Alengon in 1637. His principal work, entitled (Treatise on the Church,* is a good specimen of his talents. 3. Henri de Franquenay : b. 1615; d. 1695. He was the youngest son of Benjamin, studied for the bar, and as a provincial advocate in Rouen long stood

at the head of his profession. His eloquence, learning and unsullied integrity se¬ cured him the esteem, not only of the Protes¬ tants, whose views he held, but even of those most violently opposed to him. His complete works, confined to juridical subjects, were pub¬ lished at Rouen in two volumes, folio, in 1778. 4. Jacques, eldest son of Henri: b. Rouen 1653; d. 1723. He is the best-known and per¬ haps the ablest member of the family. He studied theology at Geneva and Sedan, and in 1676 became minister of the Protestant Church at Rouen. In 1685 his church having been closed by decree of Louis XIV, he removed to Holland and officiated as minister, first at Rot¬ terdam, and then permanently at The Hague. Among his works may be mentioned (History of the Church,* 2 vols., folio; (History of the Jews,-* 15 vols., 12mo. ; (Annals of the United Provinces,* 2 vols., folio; and (The Holy Com¬ munion. J

BASQUE PROVINCES (Spanish Pro¬ vinces Vascongadas), in northeastern Spain, the three provinces of Alava, Viscaya (Biscay) and Guipuzcoa. These will be found under their separate headings. The total area is 2,739 square miles, and the total population was estimated (31 Dec. 1914) at 706,249. Lying on the northern versant of the Cantabrian Moun¬ tains, these provinces present a reasonable con¬ trast to the arid tableland of Castile, being covered with green all the year round. Bears, chamois, capercailzie and hazel-grouse abound in the waving forests of oak, birch, ash and beech trees ; there are great chestnut and wal¬ nut groves, bountiful orchards, vineyards and luxuriant meadows alternating with fields of maize, rye, potatoes, flax and hemp. Salmon and trout streams race through the verdant mountain glens; from Corunna to the Bidassoa, on the French frontier, the country is dotted with isolated farmsteads, villages consisting of little else besides a church and a tavern, the rest of the houses scattered over a wide area. Though tolerably straight and uniform, the north coast is broken by several small harbors, where much commerce is carried on in small vessels. The Basque provinces are the centre of the iron mining district of Spain, where the

most active extraction of this metal is in prog¬ ress, nearly 6,000,000 tons being produced annually. In the province of Guipuzcoa is the village of Loyola, the birthplace (1491) of Inigo Lopez de Recalde, who became famous as the founder of the Jesuit order under the name of Ignatius of Loyola. In that village, also, the Basques have their sacred tree called the <(Guarnica,® the emblem of their liberties. See Basques.

BASQUES, basks, or BISCAYANS, in

their own language, Euscaldunac; the Spaniards call them ((Vascongados.® A remark¬ able, very ancient race inhabiting both sides of the Pyrenees, the southwest corner of France and the north of Spain. They represent the remnant of a people once spread over the whole of the Iberian Peninsula and southern Gaul in prehistoric times. They are probably the de¬ scendants of the ancient lberi, who occupied Spain before the Celts, though this is by no means a decided point among ethnologists. From the early dawn of history they constituted small republics, ruled by duly elected chiefs and according to special codes (fueros), breathing fierce independence, parochial exclusiveness and stern but patriarchal regulations. The French Basques (Gascons) settled on the north side of the Pyrenees about the end of the 6th cen¬ tury, between the mountains and the Garonne. Under the Carlovingians they elected their own dukes, but after the extinction of that family they fell under the dominion of Aquitania in the 11th century. In 1106 they purchased the Labourd for 3,306 gold florins, and were incor¬ porated with it under France in 1453, by Charles VII, but continued to enjoy certain exemptions from taxes, enlistment in the army, *etc.* Their number is estimated at about 150,000. The ultramontane Basques have not played any im¬ portant part in Spanish history. Their distinct national code has been respected at all times and by every ruler, forming a kind of imperium in imperio with their special parliament, Dis¬ putation Provincial , tariffs, tolls, and, until recent years, even their own army and police. After the close of the second Carlist war in 1876 the powers and privileges of the Basque Dispu-taciones were considerably curtailed by the Spanish government, though the provinces re¬ tained entire control of their municipal affairs. They collect their own taxes and pay an annual tribute to Spain, the amount of which is fixed periodically and generally for 20 years in ad¬ vance. The tribute for the years 1915-16 was fixed at 9,000,000 pesetas ($1,800,000), while the province of Guipuzcoa contributes an addi¬ tional tax of 700,000 pesetas ($120,000). The Basques preserve their ancient language, former manners and customs and their national dances. The rhythm of their music differs altogether from that of other parts of Spain; it

possesses its own essential characteristics, so pronounced that none in Spain can imitate it and few out¬ side can understand. Their national anthem, the <(Guarnica,® named after their sacred tree in Loyola, is said to be capable of rousing the Basque to a fierce degree of patriotism. They make admirable soldiers, especially in guerrilla warfare, to which their native temperament in¬ clines. They furnish a prescribed quota of re¬ cruits to the Spanish army • annually. The people of the Basque provinces and Navarre

were the strongest supporters of the pretender, Don Carlos, and supplied the best leaders in the Carlist wars. In personal appearance the Basques are of medium size, active and athletic ; of fair complexion in general, they bear some resemblance to certain Tartar tribes of the Caucasus. They are faithful and honest, kind and hospitable to strangers. Their mental equipment is said to be somewhat dull, though illiteracy is comparatively rare among them. In his <(Bible in Spain® George Borrow tells us that no people on earth are prouder than the Basques, (<but theirs is a kind of republican pride.® They have no nobility amongst them, and no one will acknowledge a superior. They are good seamen, and were the first Europeans who engaged in the whale fishery, when whales were plentiful in the Bay of Biscay.

The Basques are the (<mystery people® of Europe; much controversy has raged around the question of their origin. The Romans mention a tribe called ((Vascones,® who lived somewhere in the present Basque provinces. Gascones is the same word, the letters b and g being often interchanged. Not all the Basque¬ speaking people are Basques. The old Gascones and the present Bearnais speak a Basque dia¬ lect, but they differ widely from the Spanish Basques. These French people have dark curly hair and brown eyes; they are round-headed and short of stature, whereas the true Basques are long-headed and short-faced, with light hair, and generally blue or gray eyes. They are also taller and high-shouldered. Borrow decided that the Basques were of Mongolian origin. He discovered many Sanskrit roots in their language, but was “inclined to rank the Basque rather amongst the Tartar than the Sanskrit dialects.® Modern scientists, however, have completely discarded Borrow’s theory, and not a few have sought to place the cradle of the Basque race in northern and northeastern Africa, from the similarity of their language to the old Berber and Tuareg languages. In any case it is certain that Basque is neither an Aryan nor Indo-Germanic language ; its af¬ finities with Berberic point to Egypt and to Somaliland. On the other hand, the language of

the old Mediterranean race also has affinities with Basque, and points eastward into Asia Minor. Our whole knowledge of the so-called Basque language being based entirely upon the living Basque dialects, it is probable that the mystery will long remain unsolved. According to some authorities it contains only about 40 foreign words, while others emphatically assert that more than half the words in the whole language are borrowed. The following stanza, (<noted down from recitation® by George Bor¬ row, may serve as an example of Basque poetry :

Ichasoa urac aundi,

Estu ondoric agueri —

Pasaco ninsaqueni andic

Maitea icustea gatic.

This means, “The waters of the sea are vast, and their bottom cannot be seen ; but over them I will pass, that I may behold my love.® As stated above, the Basques call themselves Euscaldunac: eusk = language, sound; al from aldea = part or side; dun=in\ of, plenty; ac — adjectival ending, the c being the sign of the plural. Thus the whole word signifies <(those with a language.® The language itself is called

“Euscara,® and the country Euscallerria, Euska-Herria or Eusquererria, from the word erria, land. The Spanish group of Basque dialects are the Guipuzcoan, upper Navarrese and Biscayan; the French group are the Labourdin, lower Navarrese and Souletin. See Alava ; Biscay ; Basque Provinces ; Guipuzcoa ; Navarre; Spain.

Bibliography. — Aranzadi, T. de, (iExiste una raza Euskara?) (Madrid 1905) ; Borrow, G., (The Bible in Spain) ; Bonaparte, Prince Lucien, (Le verbe Basque en tableaux) (Lon¬ don 1869) ; Gadow, Dr. H., (In Northern Spain) (London 1897) ; Webster, W., (Basque

Legends* (London 1879) ; Vinson, J., (Les Basques) (Paris 1882).

BASRAH. See Bassora.

BASS, Edward, first Protestant Episcopal bishop of Massachusetts : b. Dorchester, Mass., 23 Nov. 1726; d. Newburyport, Mass., 10 Sept. 1803. He was graduated at Harvard in 1744; was ordained in England in 1752; and later be¬ came pastor of the church at Newburyport, Mass. During the Revolution he omitted from the church service all reference to the royal family and the British government. For this he was expelled from the Society for the Prop¬ agation of the Gospel. In 1797 he was conse¬ crated bishop of Massachusetts, and finally also of New Hampshire and Rhode. Island.

BASS, Michael Thomas, English brewer: b. 1799; d. 1884. He became head of the Bur¬ ton brewing firm of Bass & Company upon the death of his father and was a member of Par¬ liament from 1848 to 1883. His benefactions were very numerous, and included the building and endowing of Saint Paul's Church, Burton (the total expenditure on the parish being about $500,000) ; and the establishment of recreation grounds, a free library, and swimming baths for Derby, at a cost of $185,000. Of simple tastes, he more than once declined a baronetcy and a peerage.

BASS, bas (It. basso, deep, low), (1) the lowest male voice, with the average compass of from F to F two octaves above; deep basses exceed this limit downwards and high ones reach higher notes ; (2) the lowest part in the harmony of a musical composition. It is the most important of all the parts, the foundation of the harmony, and the support of the whole composition. Different forms of bass are : Basso concertante, or Basso recitante, the bass of the little chorus; the bass which accompanies the softer parts of a composition, as well as those which employ the whole power of the band. This part is generally taken by the violoncellos. Bass-counter or contra-bass, the under bass; that part which, when there are two basses in a composition, is performed by the double basses, the violoncellos taking the upper bass or basso concertante. Basso ripieno (It.), the bass of the grand chorus; that bass which joins in the full parts of a composition, and, by its depth of tone and energy of stroke, affords a powerful contrast to the lighter and softer passages or movements. Figured bass, a bass which, while a certain chord or harmony is continued by the parts above, moves in notes of the same harmony. Fundamental bass, that bass which forms the tone or natural founda¬ tion of the harmony, and from which that

harmony is derived. Ground bass, a bass which starts with some subject of its own, and con¬ tinues to be repeated throughout the movement, while the upper part or parts pursue a separate air and supply the harmony. Thorough bass, the system in which words are denoted by placing figures over the bass note. Bass clef, the character put at the beginning of the stave, in which the bass or lower notes of the com¬ position are placed, and serving to determine the pitch and names of those notes.

BASS, the name of various trimly shaped, active, gamy fishes of both fresh and salt water, mostly in northern regions. The term was originally applied to the Morone labrax of the west coast of Europe, and was thence trans¬ ferred to many other fishes having a real or fancied likeness to this in appearance and quali¬ ties. This fish represents the sea-perch family, Serranidce , is perch-like in form, usually 12 to 18 inches long, and frequents the shoal shore-waters in great numbers, being noted for its fierceness and voracity. Its flesh is excellent. The same family and genus are represented in North America by many species, of which the nearest relative is the yellow bass (M . inter-rupta) of the southern Mississippi Valley. It is a brassy-yellow with seven very distinct black longitudinal lines, those below the lateral line being interrupted posteriorly, the posterior parts alternating with the anterior. Its body is oblong-ovate with the back much arched. The dorsal fin and anal spines are stout. It is a light fish for its length, ordinarily weighing one to two pounds, but often measuring 12 to 18 inches, and weighing five pounds. It is very game, and is esteemed by some anglers the equal of the black bass in this respect.

In the same family falls the well-known striped bass or <(rock fish® (Roccus lineatus), of the northeastern Atlantic, which approaches the coast and enters fresh water only at spawn¬ ing-time when it ascends the rivers. It was absent from the Pacific coast until planted there artificially, since which it has multiplied from Puget Sound to Lower California. The largest fish are to be found in Chesapeake Bay, where they average from 30 to 50 pounds in weight, and occasionally reach double that. In color they are brassy-olive, the fins and sides rather pale, and the latter marked with seven or eight blackish stripes. The favorite way of fishing for the striped bass is by casting a (<squid® through the surf, using as a bait pieces of clam, shrimp or crab; but they will rise to a fly; and on the Pacific coast are easily lured by a shin¬ ing spoon-bait.

The white bass (R . chrysops) is a near relative of the striped bass, and inhabits the Great Lakes from the Saint Lawrence to Mani¬ toba,

and southward in the Mississippi Valley to Arkansas. Its preference is for still waters, and it is even lighter in weight for length than the yellow bass. It is generally taken with bait, though it will rise to the fly. It is silvery in its color, tinged with golden below, with dusky lines along the sides.

The most important of the American fresh¬ water bass are the black bass — two species of percoid game fishes of the distinctly American family Centrarchidce, which also contains the various sunfish (q.v.). One is the ‘Tig¬ mouthed® and the other the ˆmall-mouthed® black bass. Both were originally confined to

the waters of the upper Mississippi Valley, and Great Lakes region, blit in 1853 they were in¬ troduced into the head waters of the Potomac River, whence they have spread into all the rivers that empty into Chesapeake Bay. More recently bass have been introduced into New England and into many of the far Western States ; as well as transported into England, France, Germany and other countries. The body is oblong, compressed, the back not much elevated, head oblong-conic, lower jaw promi¬ nent, teeth on jaws, vomer and platines in broad villiform bands, the inner depressible, usually no teeth or tongue. Black bass vary greatly in size in different waters. The small¬ mouthed, however, seldom exceeds six pounds in weight, while the large-mouthed, especially in the South, is larger, running as high as 14 pounds. In color both are dull golden-green with a bronze lustre, the scales on the cheeks are more minute than those on the body, and the dorsal fin is deeply notched. In the small-mouthed species (Micropterus dolomieu) the maxillary does not extend beyond the eye, and the scales on the cheek are arranged in 17 rows. In the large-mouthed (M . salmoides) the max¬ illary extends beyond the eye and there are but 10 rows of scales on the cheeks. The lateral line in both is nearly straight, passing from the upper edge of the gill-cover to the centre of the base of the caudal fin. The small-mouthed has the wider range, extending from the Red River of the North to Texas and Mexico. Both va¬ rieties are free, but capricious, biters, and both are

game fighters. They are taken with arti¬ ficial flies, such as the ((Rube Wood,® ((Seth Green,® (<silver doctor,® and <(Parmachenee bell,® as well as by casting with a wide range of natural baits, such as crayfish, minnows, worms and small frogs; or they may be taken by troll¬ ing from a boat, using a stiff rod, especially in lakes, with any standard silver or golden spoon-bait. In some districts the large-mouthed bass is called <(straw® bass ; in others (<slough,® Hake,® ((marsh,® or (<Oswego® bass, or ((green trout,® ((welchman,® *etc.*

Another species deserving mention is the <(rock-bass,® one of the sunfish (Ambloplites rupestris) , found in practically every lake, pond and stream east of the dry plains. It does not usually attain more than half a pound in weight, is easily caught and is the least persistent fighter of any of the family. In color it is mottled-olive or brassy-green. Consult Hen-shall, (Book of the Bass) (1889) ; and Jordan and Evermann, (American Food and Game Fishes5 (New York 1902).

BASS, Culture of. The artificial culture of American bass is of recent growth, owing principally to ignorance of the proper methods. Considerable pond-space is required, certainty that the water is clean and that the temperature is not likely to fall much below 60° F. during the spawning season. Bass will not spawn in water colder than 50°. A good pond an acre in extent ought to yield 50,000 to 75,000 young fish; four or five acres is about the limit in size. Every pond should be of even depth (about three feet) over the greater part, with a deep place (the <(kettle®) near the outlet; on the shallow <(shelf® the fish will nest and may be hatched and cared for. This main, or <(brood® pond, should contain aquatic plants. In addition there should be many separate

small shallow (<fry ponds® for the segregation and rearing of young fish sorted according to age. Wild stock of the large-mouthed black bass may be caught and introduced at any time of the year; but the small-mouthed breeding-stock (to which most of what is to be said applies) must be introduced only in the autumn. They are then supplied from day to day with minnows and crayfish, and also are gradually accustomed to take chopped beef, liver and lungs or other food, but this artificial feeding must be artfully done or it will not succeed.

Bass lay their eggs in May in saucer-like nests constructed of pebbles on the bottom of ponds. These nests are made and kept clean by the male fish, until he can induce a gravid female to deposit her eggs

therein. They are then kept clean and guarded until they hatch. When hatching the young cluster on the nest in a compact mass, but soon begin to rise toward the surface, and at last the male, which has theretofore herded and protected them, drives them into a jungle of water-weeds and abandons them to their fate. They then become the prey not only of every other bass or perch in the pond, but the smaller are killed and eaten by the larger among themselves. Hence very few reach maturity. To avoid this, breeders of small-mouthed bass furnish the pond with a large number of artificial nests, consisting of shallow, open boxes half-filled with sand and pebbles. These are occupied and arranged as nests by the fish. When the fry appear a <(crib® consisting of a framework of iron, covered with cheese-cloth, sufficiently large to enclose the nest-box, and tall enough to reach a little above the surface of the water, is set around the nest and firmly anchored. The next-box is then lifted out, and the fry left to grow within the crib, safe from molestation. Such cribs are also placed around any natural nests found in the pond. These young fish are fed until they have absorbed the yolk-sac, and then are captured in scoop-nests and trans¬ ferred to the proper fry-pond. Artificial nests are not used for the hardier and slower large¬ mouthed bass, but cribs may be placed around their natural nests.

Success in bass-culture depends on a good site and good water for the ponds ; but even more on the proper care and feeding of the young. Full directions in both these particulars are to be found in W. E. Meehan's, (Fish-Cul¬ ture in Ponds5 (New York 1913).

Ernest Ingersoll.

BASS (bas) ROCK, a remarkable trap-rock island, at the mouth of the Firth of Forth, three miles from North Berwick. It is of cir¬ cular shape, about a mile in circumference, and rises precipitously to a height of 350 feet. It is inaccessible except on one flat shelving point on the southeast. Its summit is estimated at about seven acres, and this supports a few sheep, the mutton of which is considered a great delicacy. Solan geese and other seafowl in myriads cover its rocks, and fly around it in clouds. The surrounding water is of great depth on the northeast, but shallow on the south. Among the historical ruins on the island are the remains of a fortalice command¬ ing the landing-place, capable of accommodat¬ ing upward of 100 men, formerly accessible only by ladders or buckets and chains ; and the ruins of a chapel about halfway up the acclivity.

BASS, BAT FISH, BALLOON FISH, ETC

1 Bellows Fish (Centriscus scolopax)

2 Cave Fish (Amblyopsis spelaeus)

3 Bill Fish (Lepidosteus osseus)

4 Balloon Fish (Tetrodon fahaka)

5 Bat Fish (Malthe vespertilio)

6 Skeleton of a Bass (Perea fluviatilis)

The Bass was purchased by the English govern¬ ment in 1671, and its castle, long since de¬ molished, was converted into a state prison in which several eminent Covenanters were con¬ fined. It was the last place in Britain that held out against William III, its small band of gal¬ lant defenders yielding only to starvation. The island anciently belonged to a family of the name of Lauder, whose head was styled Lauder of the Bass.

BASS STRAIT, a channel beset with islands, which separates Australia from Tas¬ mania, 120 miles broad, discovered by George Bass, a surgeon in the British navy, in 1798.

BASS (bas) VIOL, a stringed instrument resembling the violin in form, but much larger. It has four strings and eight stops, which are subdivided into semi-stops, and is played with a bow. See Viol.

BASSANIO, ba-sa'ne-o, the lover of Portia in Shakespeare's (Merchant of Venice.)

BASSANO, bas-sa'no, Hugues Bernard Maret, Due de, French publicist and states¬ man: b. Dijon 1763; d. 1839. On the first out¬ burst of the French Revolution he enthusiasti¬ cally embraced its principles, published the Bulletin de I'Assemblee, and soon after was appointed editor of the Moniteur. He became acquainted with Bonaparte, and was made by him chief of division in the Ministry of Foreign Affairs. In 1811 he was created Duke of Bassano and appointed Minister of Foreign Affairs; and in 1812 he conducted and signed the treaties between France, Austria and Prussia, prepara¬ tory to the fatal expedition to Russia. When the Emperor was sent to Elba in 1814, Bassano retired from public life; but immediately after Napoleon's return he joined him, and was very nearly taken prisoner at Waterloo. On the Emperor's final overthrow Bassano was banished from France, but at the Revolution of July 1830 he was recalled and restored to all his honors. In 1838 he was made Minister of the Interior and president of the council, but the ministry of which he formed a part survived only three days.

BASSANO, Jacopo, (real name Giacomo da Ponte), Italian painter: b. Bassano (whence his surname) 1510; d. 1592. He painted his¬ torical pieces, landscapes, flowers and portraits; among the latter those of the Doge of Venice, of Ariosto, Tasso and other persons of emi¬ nence. Several of his best works are in the churches of Bassano, Venice, Vicenza and other towns of Italy. He left four sons, all painters, of whom Francesco was the most distinguished.

BASSANO, bas-sa'-no, Italy, city in the province of Vicenza, on the Brenta, 30 miles north of Padua (long. 11° 43' E. ; lat. 45° 46' N.). Its 30 churches contain beautiful paint¬ ings. A stone bridge, 182 feet long, unites the town with the large village. Vincantino. Vines and olives are cultivated in the vicinity and there is considerable trade in silk, cloth and leather, oil, wine and asparagus. Its principal manufactures are straw hats, porcelain and wax. Napoleon made Bassano a duchy, with 50,000 francs yearly income, and granted it to his Minister of Foreign Affairs, Maret (see Bas¬ sano, Hugues). Near Bassano, 8 Sept. 1796, Bonaparte defeated the Austrian general Wurmser. Bassano was the birthplace of the

famous printer Mauritius, as well as of the his¬ torical painter Giacomo da Ponte (see Bas¬ sano, Jacopo), and a short distance away lies the village of Possagus, the birthplace of Canova. In the Austro-German invasion of north Italy in November-December 1917, Bas¬ sano was in imminent danger for a few days, the enemy driving on it

from the north and east. The timely arrival of Anglo-French troops improved the shattered morale of the Italians and the Teutonic hosts were halted at the Piave, less than 15 miles distant. See War, European. Pop. (1911) 17,130.

BASSEIN, bas-san', India, a decayed town in the presidency of Bombay, at the south end of a small island of the same name, 28 miles north of Bombay, and separated from the island of Salsette bv a narrow channel. It was forti¬ fied by the Portuguese in 1536, and remained in their possession until captured by the Mahrattas in 1739. During this period it rose to be a fine and wealthy city of over 60,000 in¬ habitants, with many stately buildings, includ¬ ing a cathedral, 5 convents, 13 churches and handsome private residences. Through war, plague and other causes it has decayed until its population had dwindled to 9,598 in 1911. It still exports considerable quantities of rice.

BASSEIN, Burma, town in the Irrawaddy division on the left bank of the Bassein River, one of the mouths of the Irrawaddy, with a suburb on the right bank; lat. 16° 46' N. ; long. 94° 48' E. The English fort with the court¬ houses, treasury, police-office, etc., are on the left bank. In the suburb on the right bank are the rice-mills and store-yards of the principal merchants. Its inland water connection and the opening of a railway in 1903 have enhanced its importance as a centre of commerce. The river is navigable up to the town for ships of the largest burden, and there is a considerable trade in exporting large quantities of rice, and importing coal, salt, cottons, *etc.* The place is of military importance also, as it commands the navigation of the river. It was captured by the British in 1852. It is the seat of a consul of the United States. Pop. 37,081.

BASSELIN, bas-lan, or BACHELIN, bash-lan, Oliver, French poet: b. Val-de-Vire, Normandy, about 1350; d. about 1419. It has been asserted that the vocabulary of theatrical and poetical literature is indebted to him for the word "vaudeville.® He seems to have been a cloth-fuller or presser, much given to versified narration and iteration of convivial themes in rhymed fragments dubbed vanx-de-vire in honor of the poet's birthplace. In the (Book of New Songs and Vaux-de-Vire) (1610) ap¬ pears a collection of these bacchanalian stanzas, the most touching of which is addressed by the singer (To My Nose,* the rubescence thereof being tastefully and exquisitely celebrated.

BASSES-ALPES, biis-alp ("lower Alps®), a department of France, on the Italian border. See Alps.

BASSES-PYRENEES, bas-pe-ra-na (“lower Pyrenees®), a French department bordering on Spain and the Bay of Biscay. See Pyrenees.

BASSET, a game of cards, formerly much played, especially in France. It is very similar to the modern faro. Severe edicts were issued against it by Louis XIV, and it was afterward

played under the name of pour et contre. De Moivre, in his ‘Doctrine of Chances,5 has cal¬ culated many problems connected with this game.

BASSET-HORN, a wooden wind-instru¬ ment (called also Cornet by reason of its curva¬ ture), believed to have been invented in Passau in 1770. It was afterward perfected by Theo¬ dore Lotz in Presburg. It is, properly con¬ sidered, an enlarged clarinet ; and, notwithstand¬ ing the difference of its form, it resembles that, not only in its qualities and tone, but also as regards its intonation, the mode of holding it and fingering; so that every clarinet player can perform on it. Besides the mouthpiece it is formed of five pieces — the head-piece, two middle pieces, the trunk and the bell, the last of which is usually of brass. It differs from the clarinet chiefly in having four additional low keys worked by the thumb of the right hand. Its compass is three and a half octaves, from lower F in the bass to double C of the treble.

BASSET-HOUND, a dog with many hound-like characteristics, somewhat used for rabbit-hunting, clumsy in shape, and allied to the dachshund (q.v.). Its head is as massive and solemn-looking as that of a bloodhound, which it also resembles in the length of its ears. Its body is as bulky as that of a foxhound, to which it is also similar as regards color, hair and form, save that its fore legs are but four inches high and crooked at the knee. Below this point is a wrinkled ankle terminating in a massive paw, each toe of which stands out dis¬ tinctly. Its coat is short, smooth and fine, with the gloss of a thoroughbred race-horse ; and its colors are black and white and tan. In weight it varies from 40 to 45 pounds. It is probably of French origin.

BASSETERRE, bas-tar, West Indies, the name of two towns. (1) The capital of the British West Indian island of Saint Chris¬ topher's, a seaport situated at the mouth of a small river, on the south side of the island, and on the edge of the fertile vale of Basseterre, a tract yielding rich crops of sugar and fruits. The town was destroyed by fire in 1867, but has been rebuilt with better houses and wider streets than before. It is a place of considerable com¬ mercial importance, with a population of about 8,000. (2) The capital of the French West

Indian island of Guadaloupe, situated near the south, end of the island, and consisting of one principal long street stretching along the sea¬ shore. It is defended by Forts Royal and Matilda. The anchorage is unsheltered and exposed to a constant swell. Pop. about 8,000.

BASSETT, James, American missionary: b. Hamilton, Canada, 31 Jan. 1834; d. 1906. He was graduated at Wabash College 1856, and at Lane Theological Seminary 1859; was chaplain in the Union army 1862-63; and later pastor of Presbyterian churches in Newark and Engle¬ wood, N. J. In 1871 he went to Persia as a missionary, and in a short time acquired such a familiarity with the language that he com¬ posed a volume of hymns in Persian (Te¬ heran, J 1875, 1884). Other of his writings are (Among the Turcomans 5 (contributed to the (Leisure Hour,5 1879-80) ; 'Note on the Simnuni Dialects5 ((Journal of the Royal

Asiatic Society,5 1884) ; (Persia, the Land of the Imams5 (1886).

BASSETT, John Spencer, American his¬ torian : b. Tarboro, N. C., 18 Sept. 1867. He was graduated from Trinity College, Durham, N. C., in 1888, and took the degree of Ph.D. at Johns Hopkins University in 1894; was ap¬ pointed professor of history at the first named institution in 1893 and in 1906 became professor of history at Smith College. His writings re¬ late chiefly to North Carolina history and com¬ prise Constitutional Beginnings of North Caro¬ lina 1633-17205 (1894); (Slavery and Servitude in the Colony of North Carolina5 (1899) ;

(Anti-Slavery Leaders of North Carolina5 ; 'Slavery in the State of North Carolina5 ; 'The War of the Regulation5 ; 'The Federalist Sys¬ tem5 (1906) ; Life of Andrew Jackson5 (2 vols., 1911) ; 'A Short History of the United States5 (1913) ; 'The Plain Story of American His¬ tory5 (1916). These works are nearly all in¬ cluded in the 'Johns Hopkins University Studies in Historical and Political Science.5 'The

Middle Group of American Historians5 (New York 1916).

BASSI, bas'se, Laura Maria Caterina, Ital¬ ian philosopher : b. Bologna, 29 Oct. 1711; d. 20 Feb. 1778. She received a doctor's degree as an acknowledgment of her attainments, and de¬ livered public leetures on experimental philoso¬ phy. She also lectured in the Philosophical Col¬ lege, where she was appointed professor. Her correspondence with the most eminent scholars of Europe was very extensive. She married Giuseppe Verrati in 1738 and had several chil¬ dren.

BASSI, bas'se, Ugo, Barnabite monk, and distinguished Italian patriot : b. 1804 at Cento, in the Roman states, of an Italian father and Greek mother. He was much distinguished among the brethren for his extraordinary learn¬ ing and talents. The liberality of his political opinions, however, rendered him obnoxious to the papal court, and he was sent into exile in Sicily, from wrhich he returned on the accession of Pius IX in 1846. On the breaking out of the Lombard revolution in 1848 he greatly dis¬ tinguished himself by his valor in battle and his untiring services in the hospitals. On the capitulation of Treviso he went to Venice, where he fought in the ranks against her Austrian besiegers. Thence he went to Rome and joined Garibaldi's legion as chaplain. On the fall of Rome he was one of those who fol¬ lowed Garibaldi when he made a last attempt to fight his way to Venice, which still held out against the Austrians. The little band was, however, dispersed and cut up by Austrian troops, and Garibaldi himself escaped with great difficulty. Bassi was taken prisoner, carried to Bologna and condemned to death 18 Aug. 1849. He was the author of a work on 'The Church After the Image of Christ,5 and an unfinished poem called 'Constantine, or the Triumph of the Cross.5 His talents were universal. He was an accomplished musician and composer, wrote his own language in remarkable perfec¬ tion, and was a perfect master of Greek, Latin, English and French. He was equally remark¬ able for his personal beauty and his eloquence as an improvisatore, while his memory was so prodigious that he is said to have been capable

of reciting the whole of Dante's (Divina Corn-media. >

BASSOMPIERRE, ba-soii-pe-ar, Frangois (fran-swa) de, marshal of France, one of the most distinguished men of the courts of Henry IV and Louis XIII, descended from a branch of the house of Cleves : b. Lorraine 1579; d. 1646. In his youth he studied philoso¬ phy, jurisprudence, medicine and the military art. After traveling through Italy he appeared at the court of Henry IV, where his taste for splendor, play and gallantry soon made him conspicuous. In 1600 he made his first cam¬ paign against the Duke of Savoy, and fought with equal distinction in the following year against the Turks. His love of France soon called him back; he aspired to the hand of the daughter of the Constable de Montmorency, whose charms had excited the most violent passion in Henry IV. Bassompierre yielded to the solicitations of his King and renounced his intended union with her. In 1622 Louis XIII appointed him marshal of France, and became so much attached to him that Luynes, the declared favorite, alarmed at his growing influence, insisted upon his removal from court. Bassompierre therefore accepted an embassy, and held this position successively in Spain, Switzerland and England. After his return he entered again into the military service and was present at the siege of Rochelle and Montauban. Cardinal Richelieu, who soon after ob¬ tained entire control of the King and the coun¬ try, feared the boldness of Bassompierre and his secret connection with the house of Lor¬ raine ; and the machinations of the latter served him as a pretext for sending Bassompierre, in 1631, to the Bastille, from which he was not released till 1643, after the death of the cardi¬ nal. During his detention he occupied himself with his memoirs (first published at Cologne 1665; and Paris 1877) ; and the history of his embassies in Spain, Switzerland and England, which sheds much light on the events of that time.

BASSOON, a wooden reed instrument which forms the natural bass to the oboe, serv¬ ing as a continuation of its scale downward. The reed is fixed to a crooked mouthpiece issu¬ ing from the side of the bassoon. The holes are partly closed by the fingers, partly by means of keys. It was formerly used as an accom¬ paniment to the oboe, but it is now so far im¬ proved with keys as to be susceptible of being played solo. Its compass is more than three octaves, from low B fiat to A flat in the treble; but its scale is complicated, and much depends upon the player and even upon the individual instrument. It consists of four tubes (besides the mouthpiece) ; bound together somewhat like a fagot. Hence the Italians term it fagotto, and from them the Germans

fagott. It forms, when put together, a continuous tube nearly eight feet long, but as the bore is bent abruptly back on itself its height is only about four feet. In music designed for wind-instruments it often forms the bass. It is capable of very fine and also grotesque effects, and has been much employed by some of the best composers, sometimes as a tenor or even alto instrument.

BASSORA, bas-so'ra, or BASRAH, bas'ra, Turkey in Asia, a city situated between two and three miles on the west side of and on a navi¬

gable canal leading about two miles from the Shat-el-Arab, as the united stream of the Tigris and Euphrates is called, about half way between the Persian Gulf and the junction of the two rivers. Merchants from Arabia, Turkey, Ar¬ menia and Greece, also Jews and Indians, re¬ side here, and it is the station of a United States consul. The Arabs are more numerous than the Turks, and their language is chiefly spoken. The city is surrounded by a wall about 10 miles in circuit, 20 to 25 feet thick. The houses are generally mean, partly constructed of clay, and the bazaars are miserable edifices. A considerable trade is carried on. Mail steamers run between Bombay and Bassora, and there are also other steamers trading here. Dates form the principal export ; camels and horses, galls, gum, carpets, wool and wheat are also exported ; total exports over $5,000,000 an¬ nually. The imports are coffee, rice, spices, textiles, *etc.* The trade of the interior is con¬ ducted by means of caravans. The town is dirty and unhealthy; the environs are very fer¬ tile. The modern Bassora arose in the 1 7 th century, and does not occupy the site of the older town, whose ruins lie about nine miles southwest of it. Turkey entered the war 1 Nov. 1914, and on the 5th Great Britain declared war. A contingent of English and native troops sent by the government of India were already waiting in the Persian Gulf. On 7 November the British landed at Fao, on the Shatt-el-Arab, and occupied the village. Sail¬ ing 30 miles farther up the estuary they dis¬ embarked at Sanijeh, occupied that place and Sahain, and encountered the main Turkish force at Sahil, 14 miles from Basrah, on 17 November. The Turks were routed in a short battle with heavy loss, and on 23 Nov. 1914 the British entered Basrah unopposed. See War, European: Turkish Campaign. Pop. about 80,000. The vilayet of Bassora has an area of 53,580 square miles, and a population of about 600,000.

BASSORA GUM, a gum brought from Bassora; supposed to be derived either from a cactus or a mesembryanthemum.

BASSORIN, a kind of mucilage found in gum tragacanth (sometimes called adraganthin), which forms a jelly with water but does not dissolve in it. A clear, aqueous-looking liquid, apparently of the nature of Bassorin, exists in the large cells of the tubercular roots of some terrestrial orchids of the section Ophyrece. It is formed of minute cells, each with its cyto-blast ; the whole being compactly aggregated in the interior of the parent cell.

BASSVILLE, bas-vel, Nicolas Jean Hugon

de, French journalist and diplomatist. As edi¬ tor of the Mercure National he attracted atten¬ tion to himself and was appointed secretary to the legation at Naples in 1792. Soon after this he was despatched to Rome, where he was killed, in 1793, by the populace for attempting, under orders of the French government, to oblige all French residents to wear the tricolor cockade. The death of Bassville has furnished the subject for many compositions in both prose and verse, in French and Italian.

BASSWOOD, the American linden, or lime-tree (q.v.).

BAST, or BASS, the thin layer of fibrous tissue formed by, but outside the layer of, cam¬ bium (q.v.), or in popular phrase the inner bark of dicotyledonous shrubs and trees. Less fre¬ quently it occurs in the leaves and pith of dicotyledonous herbs and in the stems of cer¬ tain monocotyledonous plants in which it is not easily distinguished from the wood. By ex¬ tension the term is also applied to the phloem portion of the vascular system (q.v.) of flower¬ ing plants and ferns. For the plant, as well as for mercantile purposes, bast is highly import¬ ant, for until it becomes changed into wood, it conducts the elaborated food from the green tissue to regions of use or storage. The bast cells are disposed and developed variously in different plants; occurring in rows, wreaths, more or less spread bundles, or single within the parenchyma. In some plants bast is formed but once, in others every year. Some fibres are simple, others branched ; some primary, others secondary; some ever limber, and some change to

wood. They are most developed toward the outside of the stem. While young they contain a granulary liquid, which disappears by the thickening of their walls. Young, bast cells when treated by a solution of iodine and chloride of zinc become pale blue, the older ones violet, the full-grown pink. Thickened cells are plainly stratified, and their walls often be¬ come contiguous by the disappearance of the cavity. The walls exhibit various designs, spiral or other lines, more or less constantly, accord¬ ing to the species of the plant. By micro¬ scopical examination and chemical analysis the nature of the various fabrics made of bast may be determined. Thomson and F. Baur have thus demonstrated the sheets around Egyptian mummies to be of linen. The degree of con¬ traction, of twisting, the length, density and form of the single cells of the bast vary in different plants. They are veiy long in flax, hemp, in some nettles, spurges, etc., very short in cinchona. Cotton consists of long hairs, and not of bast cells, which it very much resembles otherwise. The bast cells of monocotyledonous plants are mostly lignified. They conduct elaborated food but a short time, become filled with air and thus dead to the plant. The un-lignified are very hygroscopic and often contain chlorophyll. No bast cell has pits, but the coniferae have sieve pores or canals. The uses of bast are manifold. Flax bast is soft, flexible, seldom with swellings ; hemp bast is very long, stiffer and thicker than flax, more stratified; nettle (Urtica dioica) bast resembles cotton, has swellings and is thicker than hemp. Branched and lignified bast cells of great beauty are found in the mangrove tree (Rhizophora mangle) and the secondary ones of Abies pectinata. Among the monocotyledonous bast fibres, those of the New Zealand flax (Phor - mium tcnax) are the most remarkable, being formed in bundles near the margin of leaves. They resemble hemp, are very white, sometimes yellowish, very long, and contain much lignin, in consequence of which they are somewhat stiff, but very tough and fit for stout ropes. In palms a highly developed body of lignified bast surrounds the vascular bundles, while bast bundles are found also in the bark, leaves and interior of the stem. A similar disposition exists in the Draccena reflexa , and in some Aroidece. Everybody knows the tenacity of the

bast of the lime tree, which is hence called basswood. The Chinese grass-cloth is made of Bochmeria nivea or B. tenacissima. Manila hemp comes from Musa textilis; rice bags are made in East India from Antiaris toxicaria. From the use of bast in ancient times for writing upon, the Latin name of bast, liber, has been applied to designate book. See also Fibre; Flax; Hemp; Jute; Ramie.

BAST, in Egyptian mythology, a goddess represented with the head of a cat or lioness. Bubastis, in Egypt, was the city where she held a high place, similar to that of Neith in Sais. Nearly a million Egyptians made annual pil¬ grimages to her shrine. Great numbers of bronze images of Bast were purchased in Bubastis.

BASTAR, a feudatory state of British India, joined with the Chanda district of the Central Provinces. It has an area of 13,062 square miles and a population (1911) of 433,310.

BASTARD, one begotten and born out of lawful wedlock, or born during wedlock where the husband was under the age of puberty, or where the husband had died at such a time that there was no possibility of his being the father, or where there was no possibility of access on the part of the husband on account of his absence from the country, or where the hus¬ band labored under a disability due to some natural infirmity.

The Romans distinguished two kinds of nat¬ ural children — nothi, the issue of concubinage, and spurii, the children of prostitutes ; the former could inherit from the mother, and were entitled to support from the father; the latter had no claims whatever to support. Both were often raised to all the rights of legitimate children by affiliation. The Athenians treated all bastards with extreme rigor. By the laws of Solon, they were denied the rights of citizen¬ ship, and a law of Pericles ordered the sale of 5,000 bastards as slaves. What rendered these regulations more severe was, that not only the issue of concubinage and adultery, but all children whose parents were not both Athe¬ nians, were considered bastards at Athens. Thus Themistocles, whose mother was a native of Halicarnassus, was deemed a bastard. The law, as might be expected, was often set aside by the influence of powerful citizens. Pericles himself had it repealed in favor of his son by Aspasia, after he had lost his legitimate children by the plague. The condition of bastards has been different in various periods of modern history. Among the Goths and Franks, they were permitted to inherit from the father. Thiery, the natural son of Clovis, inherited a share of his father's conquests. William the Conqueror, natural son of Robert I, Duke of Normandy, and of Arlette, daughter of a furrier of Falaise, inherited his father's do¬ minions. He called himself Willehnus, cog-nomcnto Batardus. The celebrated Dunois styled himself, in his letters, the Bastard of Orleans. In Spain, bastards have always been capable of inheriting. The bastardy of Henry of Transtamare did not prevent his accession to the throne of Castile. In France, the con¬ dition of bastards was formerly very different in the different provinces. Since the Revolu¬ tion, it has been regulated in a

uniform manner by the general law of the kingdom. The code

civil thus fixes their rights: If the father or mother leave legitimate descendants, the bastard is entitled to one-third of the portion he would have inherited had he been a lawful child; if the father or mother die without descendants, but leave ascendants, or brothers or sisters, he is then entitled to one-half of such a portion; if the father or mother leave no ascendants or descendants, no brothers or sisters, he is en¬ titled to three-quarters of such a portion; and if the father or mother leave no relations within the degrees of succession, he is entitled to the whole property. These regulations do not apply to the issue of an incestuous or adulterous con¬ nection.

By the common law of England, a child born after marriage, however soon, is legitimate, or at least he is presumed to be so ; for one born in wedlock, and long enough after the marriage to admit of the period of gestation, may still be proved illegitimate, under some circum¬ stances, and this is the general rule in the United States. According to the common law, a bastard is not the heir of any one ; and, on the other hand, his only heirs are his children born in wedlock, and their descendants. According to the Roman law, one born out of wedlock might be legitimated by subsequent marriage and acknowledgment of his parents. In 1236 the English prelates proposed the introduction of the Roman law, in this respect, into Eng¬ land, to which the nobility made the celebrated reply, Nolumns leges Anglice mutare (We are unwilling to change the laws of England). But that law exists in Scotland to-day, 1 hough not in England, Ireland or Wales. Consult Schouler, (Treatise on the Law of Domestic Relations. } See Illegitimacy.

BASTARD BAR, the ordinary name given to the heraldic mark used to indicate illegiti¬ mate descent. Properly speaking, it is not a bar at all, which is a band stretching horizontally across the shield, but a baton sinister ; that is, it stretches diagonally across the shield in the direction of the sinister chief and the dexter base, but is couped or cut short at the ends, so as not to touch the corners of the shield. This

circumstance serves to distinguish the bastard bar from the bend sinister, as well as the fact that the former is only one-fourth of the breadth of the latter. When belonging to the illegitimate descendants of royalty it may be of metal ; but in other cases it must be of color, even when on another color. This mark in heraldry is of comparatively recent origin, bastards in earlier times not having been allowed to bear the arms of their fathers. It cannot be removed until three generations have borne it, and not even then unless replaced by some other mark assigned by the king of arms, or unless the coat is changed. Sometimes permission was granted to a bastard or one of his descendants to bear it dexter instead of sin¬ ister, although he was not allowed to cancel it altogether.

BASTARD OF ORLEANS, the name given to the natural son of Louis, brother of Charles VI of France, Jean Dunois : b. 1402; d. 1468. On account of his exploits in the Hun¬ dred Years' War he was created Count of Orleans.

BASTARNAE, the earliest Teutonic people mentioned in history. They migrated from the

region of the Vistula to the lower Danube about 200 b.c. Consult Keane, (Man: Past and Present* (1899).

BASTIA, Corsica, the former capital of the island, 98 miles northeast of Ajaccio by rail. It is badly built, has narrow streets, a strong citadel near the sea, two harbors, the new and the old, and a fine marine parade, adorned with a marlile statue of Napoleon by Bartolini. The citadel and cathedral are noteworthy. Its public institutions are a lyceum, a library of over 30,000 volumes and fine collections of natural history. The inhabitants carry on a considerable trade in manufactured goods, hides, wines, tobacco, oil, wax candles, liquors and macaroni. Marble quarries, tanyards and dyeworks give employment to many .operatives. It is an important trade centre and exports fruit, vegetables, minerals, fish. The stilettoes manufactured here are held in great esteem by the Italians. In-1745 Bastia was taken by the British, and in 1768 was united with France. On the new division of the French territories (1791) Bastia was made the capital of the de¬ partment of Corsica, of which at present Ajaccio is the capital. Bastia is still, however, the commercial and industrial capital of the island and a United States consul is stationed here. Pop. 29,412.

BASTIAN, Adolf, German traveler and anthropologist: b. Bremen, 26 June 1826; d. 1905. He made extended journeys throughout Australia, Asia, America and west Africa at various periods of his career, and his explora¬ tions were carried on in such widely sundered countries as Yucatan, New Zealand and Persia. At the age of 70 he started on an exploring voyage to the Malay Archipelago. He was pro¬ fessor of ethnology in the University of Berlin, director of the Museum fur Volkerkunde, and in 1901 became editor of the Ethnographisches N otizblatt, published in Berlin. His nearly 60 works deal with the various aspects of an¬ thropology, his range being broad and his services in behalf of science of the greatest value. Among his many volumes may be named (Der Mensch in der Geschichte* (1860) ; cEthnographische Forschungen* (1871-73) ; (Der Buddhismus in seiner Psychologie* (1882) ; (Der Fetisch an der Kiiste Guineas) (1884) ; (Vorgeschichtliche Schopfungslieder* (1893) ; (Die NikronesischenKolonieiP (1899— 1900) ; (Die Volkerkunde und der Volker-verkehr* (1900).

BASTIAN, Henry Charlton, English phy¬ sician and biologist: b. Truro, 26 April 1837. He obtained the degree of M.A. in 1861 from the University of London, graduating subse¬ quently in medicine at the same university. In 1866 was appointed lecturer on pathology and assistant physician in Saint Mary's Hospital, London. In 1867 he became professor of patho¬ logical anatomy in University College, and in 1878 he was also appointed professor of clini¬ cal medicine. In 1887-95 he was professor of the principles and practice of medicine. Apart from numerous contributions to medical and other periodicals, and to Quain's (Dictionary of Medicine,* his works include (The Modes of Origin of Lowest Organisms* (1871); (The Beginnings of Life) (1872) ; (Evolution and the Origin of Life) (1874) ; 'Lectures on Paralysis from Brain Disease) (1875) ; (The Brain as an

Organ of Mind) (1880), which has been trans¬ lated into French and German; (Paralysis: Cerebral, Bulbar and Spinal > (1886) ; (A

Treatise on Aphasia and other Speech Defects) (1898) ; (Studies in

Heterogenesis) (1904) ;

(Nature and Origin of Living Matter* (1905) ; <The Evolution of Life> (1907); <The Origin of Life) (1911). Fie is a recognized authority in the pathology of the nervous system and an advocate of the doctrine of spontaneous genera¬ tion.

BASTIAT, ba'-stya', Frederic, a distin¬ guished French political economist: b. Bayonne, 19 June 1801 ; d. Rome, 24 Dec. 1850. He entered in 1818 the counting-house of his uncle at Bayonne, but he felt no enjoyment in the routine of mercantile life, and in 1825 retired to a property at Mugron, of •which he became possessor on the death of his grandfather. Thus withdrawn from society he devoted himself with eagerness to meditation and study, master¬ ing the English and Italian languages and litera¬ tures, speculating on the problems of philosophy and religion, and digesting the doctrines of Adam Smith and Say, of Charles Cornpte and Dunoyer. His first publication appeared in 1844 under the title (De l'influence des tarifs frangais et anglais sur l'avenir des deux peo¬ ples. > In 1845 he came to Paris in order to su¬ perintend the publication of his (Cobden et la ligue, ou l'agitation anglaise pour la liberte des echanges,* and was very cordially received by the economists of the capital ; from Paris he went to London and Manchester, and made the personal acquaintance of Cobden, Bright and other leaders of the league. When he returned to France he found that his writings had been exerting a powerful influence; and in 1846 he assisted in organizing at Bordeaux the first French Free Trade Association. He wrote in rapid succession a series of brilliant and effec¬ tive pamphlets and essays, showing how social¬ ism was connected with protection, and exposing the delusions on which it rested. While thus occupied he was meditating the composition of a great constructive work, meant to renovate economical science by basing it on the principle that ˆinterests left to themselves tend to har-monioys combinations, and to the progressive preponderance of the general good.® The first volume of this work, (Les Harmonies econo-miques,* was published in the beginning of 1850. He was a member successively of the Constituent and Legislative assemblies. He also published (Propriete et Loi* ; justice et Fraternity ; (Protectionisme et Communisme) ; and many other treatises. The life work of Bastiat, in order to be fairly appreciated, re¬ quires to be considered in three aspects. (1) He was the advocate of free trade, the opponent of protection. The general theory of free trade had, of course, been clearly stated and solidly established before he was born, and his desire to see its principles acted on in France was quickened and confirmed by the agitation of the Anti-Corn-Law League for their realization in England, but as no one denies it to have

been a great merit in Cobden to have seen so dis¬ tinctly and comprehensively the bearing of economical truths which he did not discover, no one should deny it to have been also a great merit in Bastiat. He did far more than merely restate the already familiar truths of

free trade. He showed as no one before him had done how they were applicable in the vari¬ ous spheres of French agriculture, trade and commerce. Now the abstract theory of free trade is of comparatively little value; its elab¬ oration so as to cover details, its concrete ap¬ plication and its varied illustration are equally essential. And in these respects it owes more, perhaps, to Bastiat than to any other economist. In the (Sophismes ficonomiques* we have the completest and most effective, the wisest and the wittiest exposure of protectionism in its principles, reasonings and consequences which exists in any language. (2) He was the op¬ ponent of socialism. In this respect also he had no equal among the economists of France. He alone fought socialism hand to hand, body to body, as it were, not caricaturing it, not de¬ nouncing it, not criticizing under its name some merely abstract theory, but taking it as actually presented by its most popular repre¬ sentatives, considering patiently their proposals and arguments, and proving conclusively that they proceed on false principles, reasoned badly and sought to realize generous aims by foolish and harmful means. Nowhere will rea¬ son find a richer armory of weapons available against socialism than in the pamphlets pub¬ lished by Bastiat between 1848 and 1850. These pamphlets will live, it is to be hoped, at least as long as the errors which they expose. (3) He attempted to expound in an original and independent manner political economy as a science. In combating first the protectionists and afterward the socialists, there gradually rose on his mind a conception which seemed to him to shed a flood of light over the whole of economical doctrine, and, indeed, over the whole theory of society, namely, the harmony of the essential tendencies of human nature. The radi¬ cal error, he became always more convinced both of protectionism and socialism, was the assumption that human interests, if left to them¬ selves, would inevitably prove antagonistic and anti-social, capital robbing labor, manufactures ruining agriculture, the foreigner injuring the native, the consumer the producer, *etc.* ; and the chief weakness of the various schools of po¬ litical economy, he believed he had discovered in their imperfect apprehension of the truth that human interests, when left to themselves, when not arbitrarily and forcibly interfered with, tend to harmonious combination, to the general good. Such was the point of view from

which .bas¬ tiat sought to expound the whole of economical science. The sphere of that science he limited to exchange, and he drew a sharp distinction between utility and value. Political economy he defined as the theory of value, and value as <(the relation of two services exchanged.® The latter definition he deemed of supreme im¬ portance. It appeared to him to correct what was defective or erroneous in the conflicting definitions of value given by Adam Smith, Say, Ricardo, Senior, Storch, etc., to preserve and combine what was true in them, and to afford a basis for a more consistent and developed economical theory than had previously been presented. It has, however, found little accept¬ ance, and Roscher, Cairnes and others seem to have shown it to be ambiguous and misleading. A consequence of it on which he laid great stress was that the gratuitous gifts of nature,

whatever be their utility, arc incapable of ac¬ quiring value — what is gratuitous for man in an isolated state remaining gratuitous in a social condition. Thus, land, according to Bastiat, is as gratuitous to men at the present day as to their first parents, the rent which is paid for it, — its so-called value, — being merely the return for the labor and capital which have been ‘expended on its improvement. In the general opinion of economists he has failed to estab¬ lish this doctrine, failed to show that the pro¬ perties and force of nature cannot be so appro¬ priated as to acquire value. His theory of rent is nearly the same as Carey’s, that is, decidedly anti-Ricardian. His views on the growth of capital and interest, on landed property, com¬ petition, consumption, wages and population, are independent, and, if not unqualifiedly true, at least richly suggestive. His works were pub¬ lished in seven volumes (Paris 1881). Consult Bondurand, (Frederic BastiaD (ib. 1879) ; and Von Leesen, (Frederic BastiaD (Munich 1904). See Economics.

BASTIDE, Jules, French statesman: b. Paris, 21 Nov. 1800; d. 1879. Early a Democrat, he never ceased to labor for the downfall of the Bourbon monarchy, and fought hard in the revolution of July 1830.

He was also opposed to the Orleans monarchy. Condemned to death for his share in the insurrection of 5 June 1832, he escaped from prison and fled to England, where he resided two years. He returned in 1834, and was acquitted. After the death of Armand Carrel he became chief editor of the National newspaper in 1836. This place he re¬ signed in 1846 and founded the Revue Nationale in 1847. He rendered great assistance to Lamartine in the office of the Ministry of Foreign Affairs, and was Minister for Foreign Affairs from 10 May to 20 Dec. 1848. He re¬ tired to private life after the coup d'etat of 1851. He was the author of (La republique frangaise et l'ltalie en 1848) (1858) ; (Guerres de religion en France) (1859).

BASTIEN-LEPAGE, bast-yen'-le-pazh, Jules, French painter: b. Damvilliers, 1 Nov. 1848; d. 10 Dec. 1884. He studied under Cabanel, and early began to attract notice by his impressionist pictures in the Salon. Some of his more important works were (In Spring, > (The First Communion, } (The Shepherds,) (The Potato Harvest,) (The Wheat-field,) (The Beggar, and (Joan of Arc Listening to the Voices.) His most striking portraits were those of his grandfather, his father and mother, Sarah Bernhardt, Andre Theuriet and the Prince of Wales (Edward VII). He was made a chevalier of the Legion of Honor in 1879. Consult Theuriet, (J. Bastien-Lepage, l'homme et 1'artisD (1885).

BASTILLE, bas-tel' (from med. Fr. bastir, to build), the French designation for an armory or fortified building constructed for military purposes. The word is popularly associated with the Bastille, or the state prison and citadel of Paris, built to protect the palace of Charles V against the incursions of the Burgundians, and destroyed by the mob in the beginning of the Revolution in 1789, after an existence of over four centuries. It was founded by Hugues d'Aubriot in 1369, and completed by the addi¬ tion of four towers in 1383.

The building became notorious for imprison¬ ment by lettres de cachet, or secret warrants issued in the name of the king, but the names of the individuals were inserted by the minis¬ ters, who were the depositaries of these letters. Of the origin of this custom we may perhaps find the explanation in Montesquieu's (Esprit des LoisC where it is said, <(Honor is the virtue of monarchies, and often supplies its place.® A nobleman was unwilling to be dishonored by a member of his family. Filial disobedience and unworthy conduct were probably not more uncommon among the nobility of France than elsewhere. But in such cases fathers and re¬ lations often requested

the confinement of the offender until the head of the family should express a wish for his release. At first this privilege was limited to the chief families of the country. The next step was, that the ministers of government considered themselves entitled to the same privileges as heads of families among the nobility. If an offense was committed in their offices or households, which, if known, would have cast a shadow upon the ministers themselves, they arrested, motu proprio, the obnoxious individuals, and often made use of their privilege to put out of sight persons whose honest discharge of duty had excited their displeasure, or who were ac¬ quainted with facts disgraceful to the ministers themselves. It sometimes happened that no further examination of the prisoners was held, and the cause of their detention nowhere re¬ corded. In such cases an individual remained in prison sometimes 30 or 40 years or even till his death, because succeeding officers took it for granted that he had been properly con¬ fined, or that his imprisonment was required for reasons of state. The invention of the lettres de cachet immediately opened the door to the tyranny of ministers and the intrigues of favorites, who supplied themselves with these orders, in order to confine individuals who had become obnoxious to them. These arrests be¬ came continually more arbitrary, and men of the greatest merit were liable to be thrown into prison whenever they happened to displease a minister, a favorite or a mistress. On 14 July 1789 the Bastille was surrounded by a tumultu¬ ous mob, who first attempted to negotiate with the governor, Delaunay, but when these negotia¬ tions failed, began to attack the fortress. For several hours the mob continued their siege without being able to effect anything more than an entrance into the outer court of the Bastille ; but at last the arrival of some of the Royal Guard with a few pieces of artillery forced the governor to let down the second drawbridge and admit the populace. The governor was seized, but on the way to the hotel de ville was torn from his captors and put to death. The next day the destruction of the Bastille began, and a bronze column now marks its site. The event considered by itself was of no great national importance, but it marked the begin¬ ning of the French Revolution.

Much exaggeration took place in relation to the discoveries said to be made in its demolition, especially in relation to one Count de Lorges ; but it is sufficiently established that there was no such person in existence, certainly not in the Bastille. No exaggeration, however, was needed. Seven persons only were found in its cells and dungeons ; one, the Count de

Solage, a prisoner since his 11th year; another, Tavernier, the son of Paris Duverney, who, after 10 years at the Isles Marguerites, had passed 30 years in the Bastille, and who re¬ appeared on his liberation, bewildered, with a broken intellect, like a man awakened from a sleep of 40 years, to a world new compared with that on which he had closed his eyes. Records of horrors even worse than this were found inscribed on the registers of the prison. Two will suffice. They are the names of Father Theodore Fleurand, of Brandenburg, a Capu¬ chin, retained many years on suspicion of be¬ ing a spy ; and of one Lebar, arrested at 76 and dead at 90 years. Nearly 50 years before Cagliostro scrawled on the walls of his cell : (<The Bastille shall be demolished, and the people shall dance on the area where it stood.® This prophecy, at least, of the empiric and impostor, was realized to the letter. It was the Car¬ magnole which they danced about the liberty trees to the tune of the (£a IraP

Bibliography. — Bingham, D. A., (The Bastille) (London 1888) ; Bournon, F., (La Bastille) (Paris 1893) ; Brentano, F. F., (Les lettres de cachet a Paris* (Paris 1904) ; Delort, J., (Histoire de la detention des philosophes a la Bastille) (Paris 1829) ; Lecocq, G., cLa Prise de la Bastille) (1881) ; Ravaisson, F., (Les Archives de la Bastille) (16 vols., Paris 1866—

86).

BASTINADO, a punishment employed by the Turks, which consists of blows upon the back or soles of the feet, applied with a light wooden stick or with a knotted string.

BASTION, a flanking tower in mediaeval fortification, from which archers and war ma¬ chines could direct their projectiles on the storming enemy while he was held in check by the ditch. On the

introduction of artillery into Europe towers were made considerably larger than formerly, and ultimately, in the beginning of the 16th century, the Italian engineers made them polygonal instead of round or square, thus forming a bastion. This is an irregular penta¬ gon, one side of which is turned inward toward the tower, so that the opposite salient angle faces the open field. The two longer sides, en¬ closing the salient angle, are called the faces ; the two shorter ones, connecting them with the town wall or rampart, are called the flanks. The faces are destined to reply to the distant fire of the enemy, the flanks to protect the ditch by their fire. The first Italian bastions still showed their descent from the ancient towers. They kept close to the main walls ; the salient angle was very obtuse, the faces short, and the parapet revetted with masonry to the very top. Bastions are built in very different ways. Some are entirely filled with earth ; some have a void space inside ; some are straight, some curved, some double, some have even three or four flanks, one over the other ; some have faussebrayes, or low ramparts of earth outside ; sometimes they have casemates, des¬ tined for the retreat of the garrison, or for batteries ; sometimes cavaliers or orillons, *etc.* In modern times, among the fortifications built according to the system of bastions, those on the plan of Cormontaigne and the modern French works are considered best adapted for defense. They are spacious ; the flank of the side bulwark, which is perpendicular to the

prolongation of the face of the principal bul¬ wark, is not farther distant than 300 paces from its point; it is also straight, and orillons and other artificial contrivances are banished. See Fortification.

BASTWICK, John, English physician : b. Writtle in Essex 1593; d. 1654. He settled at Colchester, but instead of confining himself to his profession entered keenly into theological controversy, and in 1624 procured the publica¬ tion in Holland of a-treatise which he had writ¬ ten, entitled (Elenchus Religionis Papisticae,* which, as he declares, on the titlepage, he proves to be neither apostolic nor catholic, nay, not even Roman. He afterward published (Flagellum Pontificis et Episcoporum Lati-aliumP which acquired some notoriety as a fer¬ vid attack on Episcopacy in general, and at¬ tracted the attention of the High-Commission Court, who called the author before them, and condemned him to a fine and two years' im¬ prisonment. Bastwick became more zealous than before, however, and published a defense addressed to the English prelates and a new (<litany,® in which his former offenses were boldly repeated. A second sentence mercilessly . condemned him to a much heavier fine, to ex¬ posure to the pillory,

the loss of his ears and imprisonment for life. The ascendency of the Parliament in 1640 procured his freedom; the sentence was formally repealed, and the amount of the fines imposed on him was afterward re¬ funded. He appears to have been a stanch Presbvterian, for in 1648 we find him attacking the Independents.

BASUTOLAND, South Africa, an English Crown colony, lying to the east of the Orange River Colony, and on the northeast of Cape Colony. The Basutos belong chiefly to the great stem of the Bechuanas, out of one of the chief branches of whom, along with the sur¬ vivors of various other Kaffir tribes, they have arisen. Their countenance is better formed than that of the negroes, although they have the flat nose, protruding lips, and woolly hair of the latter. Their figure is slender and well proportioned, the color of their skin a very dark brown, and their disposition cheerful, mild and pacific. Their land, called by them¬ selves Lesuto, is very fertile, and is cultivated with great industry ; but its fertility has long exposed them to the encroachments of their neighbors. Under their chief Moshesh, who died in 1 869, they were raised from a state of utter barbarism to a certain degree of civiliza¬ tion, and the land was thrown open to mis¬ sionaries. Being exposed, however, to constant attacks of their warlike neighbors, Moshesh was at last induced to request the English gov¬ ernment to adopt them as subjects. This was acceded to, and in 1868 Basutoland was declared English territory, being annexed to Cape Colony in 1871. In 1884, however, Basutoland was placed under the direct authority of the home government. Since 1903 Basutoland is a mem¬ ber of the South African Customs Union. The imports consist chiefly of clothing and blankets, agricultural implements, metal products and groceries. The yearly imports average about $1,250,000 and the exports about $1,000,000. Basutoland is administered by a resident commissioner, under the high commissioner of South Africa. It is divided into seven

districts, subdivided into wards adminis¬ tered by hereditary chiefs. The administra¬ tion of justice is also, to a very large extent, in the

hands of native judges. A railway from Maseru connects with the South African rail¬ way system. It has an area of about 10,300 square miles. Pop. (1911) 404,507. Consult Widdicombe, (Fourteen Years in Basutoland) (1892); Barkley, (Among Boers and Basutos) (1900) ; Bryce, impressions of South Africa) (1899) ; Ellenberger, (History of the Basuto >

(1912).

BASVILLE. See Monti, Vincenzo.

BAT, one of a group (order Cheiroptera) of small -mammals adapted to life in the air by the possession of wings formed of a membrane stretched between the greatly prolonged bones of the arm and hand. The general organiza¬ tion of bats allies them to the Insectivora. The bones of the spine, hinder limbs and tail are of a normal character ; the chest is much enlarged to admit of the increased size of the lungs and heart, necessary to the relatively violent exer¬ tion necessary to flight, the breast bone is keeled as in birds, and the muscles of the fore limbs are much enlarged. The fore limbs them¬ selves consist of the normal number and ar¬ rangement of bones, but all. are greatly elon¬ gated, especially those of the fingers, which are so lengthened out as often to be equal to the total length of the spine. The thumb, however, is comparatively small, stands at right angles to the other bones, and terminates in a strong claw of great service in clinging to supports. The whole extent of the arm and hand in the bats is enclosed within a membrane which con¬ sists of leathery skin more or less furry upon the outside, which stretches between the fin¬ gers, arm bones and body, forming an exten¬ sible membrane or parachute, and constituting an effective instrument of flight. In some bats a similar membrane (which is only an extension of the skin and is of double thickness) stretches from the heel of each hind foot, where it is supported by a bony spur, to the tip of the tail, but in many bats the tail is free from any such membrane. The tail is very variable in length, but is never prehensile nor bushy. The hinder limbs of bats are peculiar in being twisted in such a way that the knee bends back¬ ward, making walking very difficult.

The membranous wings of the bat are not only an organ of flight, enabling it to perform feats in the air probably not exceeded by any bird or insect, but are also a means of inform¬ ing the creature as to its surroundings. Bats are mainly nocturnal and their eyes, though highly organized, are very small, embedded in fur and comnaratively

useless in the dark, yet no animal seems more thoroughly wide awake and able to take care of itself, even m almost complete darkness, than this one, which habi¬ tually lives in gloomy caves and seeks its food only after daylight has departed. The ability which it displays in catching its prey by ex¬ traordinary agility in pursuit, and in avoiding obstacles as it darts about among the trees, seem to be due largely to an extreme sensitive¬ ness in the wings. These are not only supplied with a great number of blood vessels and nerves, but their surfaces abound in minute sense-organs, each the terminus of a nerve fibrilla. This armature has evidently arisen as

an added means of information, giving the animal a sense of touch more exquisite than we know of elsewhere in the animal kingdom. The well-known experiments of the Italian Spal¬ lanzani toward the end of the 18th century, which have been verified by more recent in¬ vestigations, make it plain that bats depend very largely upon these sense organs in their wings to guide them in their devious flight through the darkness. It was found that bats whose eyes were sealed up with varnish, or even completely destroyed, made their way with apparent ease not only through dark rooms but in places where strings had been stretched across the path in various directions, and other obstacles had to be avoided. These blinded bats never collided with such obstruc¬ tions, but seemed able to approach a wall at ease, alight upon a perch, or even find a small cavity without apparently searching for it.

For a similar purpose of information many bats are furnished with extraordinary mem¬ branous appendages upon the nostrils and ears, which give to some of them the most grotesque appearance. In the large fruit-eating fox¬ headed bats of the East Indies, which are more nearly diurnal than any others, the ears are of no great size, and the nose is defended only by long hairs about the nostrils and eyelids, but in all the smaller, insect-eating, nocturnal bats, there arise upon the nostrils leaf-like ap¬ pendages, sometimes very large and complicated which resemble the leathery substance of the wings and in such species, the ears are often several times larger in area than all the rest of the face. These great ears must not only col¬ lect sounds far too faint for us to hear, but their membranes are as nervous and sensitive as those of the wings, probably being able to feel degrees of density in the air entirely im¬ perceptible to most other creatures.

Bats are divisible into two groups or sub¬ orders, the Megacheiroptera, and the Microchei¬ roptera. The first group contains

the fruit¬ eating bats whose large size, reddish fur and fox-like head have given them the name of fly¬ ing foxes (q.v.). Their chief distinguishing feature, however, is the fact that the molar teeth are not tubercular but are marked with a longitudinal furrow. They live mainly upon fruit and are confined to the tropics of the Old World, and are all included in a single family, Pteropodidce. The Microcheiroptero have molars with sharp cusps adapted to cut¬ ting and crushing the insects upon which they mainly subsist. This group includes all of the ordinary bats, of which those most familiar in North America and Europe belong to the large and typical family Vespertilionidce, of which nearly 200 species are named. Among the most numerous and widespread of the North Ameri¬ can bats are the large hoary bat (Lasiurus cinereus) of the Northeastern States; but it keeps, to the woods and is not often seen; it migrates to the southern States in winter. It is about 5.50 inches long. Another common bat of the woods is the smaller, silver-haired (Lasionycterus noctivagans) . The red bat (length 4.40 inches) is numerous in the Alleghanian region, inhabiting caves in great com¬ panies ; but the “common® bat of the whole country east of the Rockies is the little, glossy, brown familiar of our homes and gardens, as well as of the woods, which remains with us

the year round, hibernating during cold weather in the hollow trees, caves and crevices about buildings, where they make their home, and whence they emerge at night, to seek their prey about our farmyards and gardens. As the in¬ sects caught are mainly mosquitoes and similar pests, and as they do no harm, they should be encouraged, rather than feared and persecuted. <(Awake at the most,” says Cram, ((some four out of every 24 hours of their drowsy little lives, they never make any nests or even at¬ tempt to fix over the crannies where they hide, and where the little bats are born. These helpless little things are not left at home at the mercy of foraging rats and mice. When the old bat flits off into the twilight, the youngsters often go with her, clinging about her neck… . At times, she deposits them on the branch of a tree, where they hang, sheltered by the leaves.”

The lower Mississippi Valley has a yellow¬ ish bat, called <(big-eared" (Corynorhinus mcicrotis) which differs from the others in that its great ears are joined together by their bases in front.

For a systematic account of the bats of the world consult Dobson, Catalogue of Chirop-tera in the British Museum > (1878), and his subsequent papers, mentioned in Flower's Mammalia5 (1891). For North American forms consult Allen, H., <Bats of North America) (Smithsonian Institution, Washing¬ ton 1893). For habits, etc., consult the writings of Harlan, Audubon, Baird, Godman, Mearns, E. A., Herrick, C. L., Miller, G. S., and especially Merriam, C. H., (Mammals of the Adirondacks' (Linnsean Society New York 1893) ; Stone and Cram, (American Animals) (1902) ; Goose, (A Naturalist's Sojourn in Jamaica) (1851). See also Fox-bat ; Fruit-bat ; Leaf-nosed Bats ; Vampire, and similar titles.

BAT-PARASITES. Besides bugs (see Bed-bug) certain very strangely modified wing¬ less flies are in rare cases found living on bats in Africa and the East Indies. They are some¬ what spider-like, with a narrow eyeless head, though four ocelli are present in some species, which rests on the back of the thorax, while the legs are large, long, and sprawling, ending in large claws. They are only a line or two in length. The larva is, like that of the sheep-tick (q.v.) and horse-fly (Hippobosca) , very peculiar, the maggot being probably nourished in the dilated oviduct of the fly, then attaining its full growth, when it is expelled in the shape of a broad, short puparium, the skin being hardened by the excretion of chitin.

BATABANO, ba-ta-ba-no*', Cuba, town in the province of Havana near the south coast, 37 miles from Havana, by rail. This port is one at which coasting steamers touch, and is the nearest point in Cuba to the Isle of Pines. The natives are engaged in sponge fishing. San Cristobal de la Habana was founded on the site of the modern Batabano by Diego Velasquez in 1514. Pop. about 6,500.

BATAC, ba-tak', or BATAG, Philippines, an island about one and a half miles off the northeast coast of Samar, the most northerly of that portion of the Philippine Islands which goes under the designation of Visaya, or Bisaya. Area, 18 square miles.

BATAC, or BATAG, Philippines, a town of Luzon, the largest in the province of Ilocos

Norte, founded in 1587. It is situated 10 miles south of Laoag and is a flourishing trade centre. Pop. about 19,500.

BATAK, ba'tak, Bulgaria, a district and town southwest of Philippopolis. The region became prominent in European history in the time of the Bulgarian insurrection against Tur¬ key in 1876. In May of that year the villagers of Batak were preparing to take part in the insurrection, when the place was attacked by a force of Bashi-Bazouks under the command of Achmet Agha of Dopat. After a short struggle the village was surrendered and the inhabitants gave up their weapons, on the as¬ surance of the Turkish commander that (fnot a hair of their heads should be touched." On 9 May 1876 the Turks began one of the most cruel massacres recorded in history; the inhab¬ itants of the unfortunate village were butchered and those who took refuge in the church were burned to death by the Turkish soldiers. Mr. Baring, the English commissioner, visiting the place two months later, found but one survivor, an old woman. The Turkish government re¬ warded Achmet with a decoration of honor. t The news of the massacre at Batak and of other (< Bulgarian atrocities" aroused all Europe and furnished Russia with an excellent pretext for declaring war against Turkey in 1877. It suf¬ fered heavily in the war against the Turks in 1912-13 and in the second Balkan War in 1913. See also Bulgaria; San Stefano, Treaty of; Turkey.

BATALEUR, ba-ta-ler', a large, volu¬ minously crested eagle of Africa, named Helotarsus ecaudatus with reference to the unusual shortness of its tail. It has the hand¬ somest plumage of all the eagles, presenting bold contrasts of rich maroon, black and gray, with bronzy reflections from the wings. It feeds mainly on lizards and snakes, attacking the latter, even when venomous, by blows of its powerful beak. Its breeding season, which is at the commencement of the hot weather when other birds are busy at other things, seems to be placed with reference to the greater ease with which snakes can then be captured, when the grass dies down or burns off, exposing them to view.

BATALHA, ba-tal'ya, Portugal, village 69 miles north of Lisbon, famed for its Domini¬ can convent, founded by King John I, in com¬ memoration of a victory over the king of Castile in the year 1385. This convent, one of the most splendid buildings in Europe, is 576 feet long and 443 wide. Its church, in which lie the remains of the founder and the following three kings of the house of Aviz, as well as those of Prince Henry the Navigator, is a beautiful edifice, adorned with many art treasures. Pop. 3,830.

BATAN, ba’tan, Philippines, a province of the island of Luzon, forming the peninsula between the bay of Manila and the China Sea; area, 450 square miles; chief town, Bolanga. It is noted for many excellent varieties of marble, which are extensively used in the churches and public buildings of Manila and other towns of the Philippines. The inhab¬ itants of the towns and coasts of this province are of the Tagalog race, but, besides these, the mountain fastnesses are inhabited by numer¬ ous tribes of Negritos.

BATS

1 Flap-nose Bat (Rhinopoma microphyllum)

2 Pigmy Bat (Vesperugo pipistrellus) (natural size)

3 Water Bat (Vespertilio daubentonii)

4 Horse-shoe Nose Bat (Rhinolophus ferrum-equinum)

BATAN, Philippines, a town on the island of Panay, in the province of Capiz, 21 miles west of Capiz. Pop. (1898) 12,908.

BATAN, or BASHI ISLANDS, Philip¬ pines, a group of small islands in the Chinese Sea, discovered by Dampier in 1687, now a dependency of the Philippines, north of which they are situated, midway between Luzon and Formosa. American control was established over these islands in March 1900, with Teofilo Costillejo as first governor. The Batans are bounded on the north by Bashi Channel, which divides the Philippines from the Japanese insular territory, and have an area of 125 square miles and a population estimated at 9,500. The principal islands in the group are Itbayal, Basay, Saptan and Hujos. Santo

Domingo de Basco, the principal town and port, is about 500 miles from Manila, and has a population of about 3,000. The other towns are San Bartolome de Calayan, San Carlos de Marigatao, San Jose de Ibana, Santa Maria de Mayan and San Vicente de Saptan. Under Spanish rule Santo Domingo was the residence of a political military governor, a judge and an attorney-general.

BATANZEA, or BASHAN, a district of ancient Palestine, corresponding to that now called Hauran. It reached from Mount Her-mon on the north to the brook of Jabbok (the modern Nahr el Zerka) on the south, and from the Jordan on the west to the Geshurite and Maachathite boundaries on the east. Its chief towns were Ashtaroth, Edrei, Golan and Salchah. It was a rich pasture land, famed for its sheep and oxen. In Roman times with Itursea, Gaulanitis Trachonitis and Auranitis, Bataneea formed one of the five divisions of the country. For its part in the history of Israel consult Num. xxi, 33-35; Deut. iii, 1-3; Josh, xiii, 29-31; Amos iv, 1; Ezek. xxxvii, 6; Isa. ii, 13.

BATANGAS, ba-tan'gas, Philippines, a town on the island of Luzon, the capital of the province of the same name, 58 miles south of Manila. It was founded in 1581, and is situated on the large bay of Batangas, open¬ ing into the Strait of Mindoro. It is well built, containing several spacious streets, in which are many elegant mansions. A number of annual expositions are held in the city. The city has an excellent harbor, and prior to the war between the United States and Spain was the seat of a large commerce. The prov¬ ince is one of the richest sugar growing dis¬ tricts in the Philippines ; but the industry is far inferior to its possibilities owing to the lack of proper machinery and modern methods of treatment. There are forests of pine wood on the mountains, and the region is rich in mineral waters. The only important industry is the manufacture of dyestuffs, and silk, abaca and cotton fabrics. It is also notable for its large production of cocoanut oil, the larger part of which is used for domestic pur¬ poses, chiefly lamp oil and lubricating ma¬ chinery. Such of it as is exported to Europe, after being solidified, is manufactured into soap and candles. Pop. 39,358.

BATATAS, ba-ta'tas. See Sweet Potato.

BATAVI, an old German nation which in¬ habited a part of the present Holland, especially the island called Batavia, formed by

that branch of the Rhine which empties itself into the sea near Leyden,

together with the Waal and the Meuse. Their territories, how¬ ever, extended much beyond the Waal. Their bravery was commended by Tacitus. Accord¬ ing to him, they were originally the same as the Catti, a German tribe which had emigrated from their country on account of domestic troubles. This must have happened before the time of Caesar. When Germanicus was about to invade Germany from the sea, he made their island the rendezvous of his fleet. Being subjected by the Romans, they served them with such courage and fidelity as to obtain the title of their friends and brethren. They were exempted from tributes and taxes, and permitted to choose their leaders among them¬ selves. Their cavalry was particularly excel¬ lent. During the reign of Vespasian they re¬ volted, under the command of Civilis, from the Romans, and extorted from them favor¬ able terms of peace. Trajan and Adrian sub¬ jected them again. At the end of the 3d century the Salian Franks obtained possession of the island of Batavia. See Batavian Re¬ public.

BATAVIA, properly the name of the island occupied by the ancient Batavi, became at a later date the Latin name for Holland and the whole kingdom of the Netherlands. The name Batavian Republic (q.v.) was given to the Netherlands on their new organization, 16 May 1795, and they continued to bear it till the establishment of the kingdom of Holland, under Louis Bonaparte, 8 June 1806.

BATAVIA, Java, city and seaport on the north coast of the island, near the west end, and the capital of all the Dutch East Indies; long. 106° 50’ E. ; lat. 6° 8’ S It is situated on a wide, deep bay, in which are interspersed many low, green islets, within which ships find safe anchorage, the roadstead being sheltered from the northwest monsoon. The largest of these islets is Onrust, at which all ships above 300 tons burden have to anchor. The town consists of two portions. The old is situated in a low, marshy plain near the sea, and intersected by the Great River and sundry canals, is exceedingly unhealthy, and subject to an intermittent fever, very fatal to strangers. Much has been done, however, to diminish the unhealthiness by draining the marshes, and letting currents of water into the stagnant canals. The old is still the busi¬ ness quarter and contains the principal ware¬ houses and offices of the Europeans, the Java Bank and the exchange. On the west side of the Great River is the Chinese quarter, in¬ habited entirely by Chinese. Batavia is the chief mart among the islands of the Asiatic Archipelago for the products of the Eastern seas and the manufactures of the West, and its commerce is correspondingly important. The chief products are coffee, sugar, tea, rice, different spices, timber, dyewoods, diamonds, drugs, minerals, *etc.* Batavia was founded by the Dutch in 1619 and attained its greatest prosperity in

the beginning of the 18th century, when it had about 150,000 inhab:tants. The most important edifices are the Stadt-house, Calvinistic, Lutheran and Portuguese churches, some Mohammedan mosques and Chinese temples. Among its educational institutions are a gymnasium, a number of government

and private schools, an orphan asylum, a medical school for natives connected with the military hospital, and a number of scientific societies. Pop. about 140,000, of whom 9,500 are Europeans, 28,000 Chinese and 3,000 Arabs. The inhabitants are chiefly of Malay extrac¬ tion, with a considerable admixture of Chinese, and a small number of Europeans (Dutch, English and Portuguese). A United States consul resides here. See Java.

BATAVIA, Ill., town in Kane County, on the Fox River, and on the Chicago & N. W. and Chicago, B. & Q. railroads, 37 miles west of Chicago. Here is the State Asylum for the Insane. Batavia has fine churches and public schools and a public library. Among the in¬ dustries are stone quarries and foundries, and manufactories of farm implements, wagons, pumps, engines and windmill factories. Batavia was settled in 1834 and incorporated in 1850. It is governed, under a charter of 1902, by a mayor, elected every two years, and a uni¬ cameral council. Pop. 5,000.

BATAVIA, N. Y., town and county-seat of Genesee County, 37 miles east of Buffalo and 33 miles west of Rochester, on Tonawanda Creek, and on the New York Central, the Lehigh Valley and Lake Erie and Western rail¬ roads. It is in an agricultural region; has manufactories of plows, threshers and agricul¬ tural implements, rubber goods, shoes, cut-glass, sheet metal goods, paper-boxes, monuments, electrical equipment, shot-guns, stampings and metal specialties, and there are also flour mills and canning factories. In 1914 there were in operation 57 establishments, employing 2,833 persons, who received $1,733,000 for their serv¬ ices. The capital invested in these enterprises totalled $7,847,000 ; the raw materials used were valued at $2,423,000 and the finished products at $5,340,000. It has three

banks and taxable property valued at $11,252,827. Batavia is the home of individual instruction in public schools, of which there are seven besides one high school. Among the public buildings are the courthouse, county jail, surrogate's office, county clerk's office, Holland Purchase museum and land office, containing interesting historical relics, the State Institution for the Blind and the Dean Richmond Memorial Library. There are daily and weekly newspapers. Batavia has the charter form of government; the water¬ works and electric-light plant are owned by the municipality. A new filtration plant for sewage disposal is about to be constructed. The village was founded in 1811, and first incorporated in 1826. It was the home of William Morgan, made famous through the Anti-Masonic ex¬ citement in 1826. Pop. (1910) 11,613; (1920) 13,541. Consult Seaver, historical Sketch of the Village of Batavia) (Batavia 1849).

BATAVIAN REPUBLIC, the name adopted by the Seven United Provinces of the Netherlands soon after the French Revolution, and acknowledged by the powers of Europe. The whole republic was declared one and in¬ divisible; all members of society were declared equal in the eye of the law, without respect to rank or birth ; all religious societies, acknowl¬ edging a Supreme Being, equally protected by law. Feudality was abolished, all fiefs declared allodial and possessors of lordships to be in¬ demnified. In 1806 the form of government

was changed into that of a kingdom, under the name of Holland; and the Batavian republic fell nominally under the sway of Louis Bona¬ parte as its sovereign, but really under that of his brother Napoleon. See Netherlands.

BATCHELLER, George Sherman, Ameri¬ can jurist: b. Batchellerville, N. Y., 25 July 1837; d. Paris, France, 2 July 1908. He was admitted to the bar in 1858; entered the Union army in 1862 ; was taken prisoner at Harper's Ferry, and exchanged in 1863 ; was then ap¬ pointed deputy provost-marshal-general of the department of the South; and in 1865-70 was inspector-general on the staff of* Governor Fen¬ ton of New York. He was president of the International Tribunal of Egypt 1883-85; assist¬ ant Secretary of the United States Treasury 1889-91 ; United States Minister-resident and Consul-General to Portugal 1891-93 ; and in 1898, again a member of the International Tribunal of Egypt. In May 1902 he was pro¬ moted to the Supreme Court of Appeals. In 1879 King Humbert decorated him with the great cordon of the Order of the Crown of Italy, in recognition of his services as

president of the Universal Postal Congress of 1897.

BATCHELOR, George, American Uni¬ tarian clergyman : b. Southbury, Conn., 18ˆ6. He was secretary of the American Unitarian Association 1893-97, and has since been editor of the Christian Register, published in Boston. He has also been secretary of the National Unitarian Conference 1870-80, and its chairman 1893-94. He is the author of (Social Equi¬ librium. •* During the last 50 years he has served three parishes, in Salem, Mass., Chicago, Ill., and Lowell, Mass. He has given lectures on ethics at the schools of theology at Meadville, Pa., and at Harvard University. In his eightieth year he is on the retired list, but dur¬ ing the last year has contributed articles to The Christian Register, The Harvard Theologi¬ cal Review and The Harvard Graduates ' Maga¬ zine. While a junior in Harvard College h*; spent a winter as acting superintendent of the United States Sanitary Commission at Sheri¬ dan's headquarters at Winchester, Va. In recognition of this service he was made a mem¬ ber of The Union Society of the Civil War and also of The United Military Order of America. In 1911 he was made a doctor of divinity by the Meadville Theological School.

BATCHIAN, bat-shyan', or BATJAN,

one of the Molucca Islands, west of the south¬ ern peninsula of the large island of Halma-hera or Gilolo. Area, 914 square miles; pop. about 13,000. It belongs to the Dutch residency of Ternate, consists of two peninsulas joined by a narrow isthmus, and has many mountains. Batchian produces gold, copper, coal, sago, cocoanut trees, rice, cloves and fine timber.

BATE, William Brimage, American legis¬ lator : b. near Castalian Springs, Term., 7 Oct. 1826; d. Washington, D. C., 9 March 1905. Pie served as a volunteer through the Mexican War; graduated at the Lebanon Law School in 1852; elected attorney-general of the Nashville district in 1854; and was presidential elector in 1860. In the Civil War he rose from private to the rank of major-general in the Confeder¬ ate army, and was three times dangerouslv wounded. He was an elector-at-large for Ten-

nessee on the Democratic ticket in 1876; was elected governor in 1882 and 1884, and a United States senator in 1887, 1893 and 1899.

BATEMAN, Newton, American educator: b. Fairfield, N. J., 27 July 1822; d. Galesburg, Ill., 21 Oct. 1897. He graduated from Illinois College, 1843, and studied at Lane Theological Seminary, but began to teach instead of enter¬ ing the ministry. He was professor of mathe¬ matics at Saint Charles College, 1847-51 ; State superintendent of public instruction, 1858-63; member of the State board of health, 1877-97, and president of Knox College, 1875-93, when ill-health caused his retirement. His official reports are of high value in educational litera¬ ture, and much of the excellence of the Illinois school laws is due to his wisdom and foresight. He published (School Laws of Illinois) (1865, 12th ed., 1866) ; (School Laws and Common School Decisions of the State of Illinois J ; re¬ vised by W. L. Pillsbury (1888).

BATES, Arlo, American author : b. East Machias, Me., 16 Dec. 1850; d. 25 Aug. 1918. Graduated at Bowdoin in 1876, he engaged in literary work in Boston, editing the Sunday Courier, 1880-93; and afterward became pro¬ fessor of English literature in the Massachu¬ setts Institute of Technology. He is author of poems and novels, including (The Pagans) (New York 1884) ; <A Lad's Love,> <The Wheel of Fire) (1885) ; (The Philistines) (1888); (Berries of the Brier* (1886), poems; (Told in the Gate) (1892) ; (Talks on Writing English,) (Talks on the Study of Literature* (1897) ; (The Puritans) (1899) ; (Under the Beech Tree) (1899) ; (Diary of a Saint*

(1902) ; (The Intoxicated Ghost> (1908) ; and an introduction to E. P. Whipple's (Charles Dickens) (1912).

BATES, Barnabas, American clergyman ; an active promoter of cheap postage in the United States: b. Edmonton, England, 1785; d. Boston, Mass., 11 Oct. 1853. He came to Amer¬ ica at an early age, became a Baptist preacher in Rhode Island, and was, for a time, collector of the port of Bristol. In 1825, having become a Unitarian, he established a weekly journal in New York called the Christian Inquirer. During Jackson's administration he received an appointment under Samuel Gouverneur, post¬ master of New York, and for some time per¬ formed the duties of postmaster himself. _ The information gained in this capacity first inter¬ ested him in the question of cheap postage. He investigated the subject for years, wrote, pub¬ lished pamphlets and lectured throughout the country, and finally effected a material

reduc¬ tion in the rates of land postage. He was en¬ deavoring to obtain a corresponding reform in ocean postage at the time of his death.

BATES, Blanche, American actress : b. Portland, Ore., 1873. She made her first ap¬ pearance in 1894 in San Francisco, taking a part in Brander Matthews' one-act play, <This Picture and That.* Her first success was as Mrs. Hillary in (The Senator,) and she has played ihe leading comedy role in (The Last Word,* (The Railroad of Love,* (Transit of Leo) and (The International Match.) Her acting of Nora in (A Doll's House) (the first Ibsen play presented on the Pacific coast) was a distinct artistic triumph. She has also taken

leading parts in (The Charity Ball,* (Sweet Lavender, > <The Dancing Girl,> and others. Her phenomenal success in (The Great Ruby> (1899); as Miladi in (The Three Musketeers) (1899) ; in Long and Belasco's (Darling of the Gods* (1902-03), and (The Girl of the Golden West* (1905) has given her a place of assured prominence on the American stage. Consult Strang, < Famous Actresses of the Day* (Bos¬ ton 1899).

BATES, Charlotte Fiske (Madame A. Rog£), American poet: b. New York, 30 Nov. 1838; d. 1 Sept. 1916. She was educated in Cambridge, Mass. ; assisted Longfellow in com¬ piling (Poems of Places) ; edited the Cam¬ bridge Book of Poetry and Song* (Boston 1882) ; (The Longfellow Birthday Book* ; and (Seven Voices of Sympathy *; contributed to magazines and published (Risks and Other Poems,* a volume of original verse (1879). She married in 1891 M. Adolphe Roge, who died in

1896.

BATES, Edward, American lawyer: b. Belmont, Va., 4 Sept. 1793 ; d. 25 March 1869. Haying settled in Missouri, he served in the legislature and Constitutional Convention, and in Congress in 1827-29. He was Attorney-General of the United States in Lincoln's first administration ; and had been a candidate for the presidential nomination in 1860.

BATES, John Coalter, American military officer : b. Saint Charles County, Mo., 26 Aug. 1842; d. 4 Feb. 1919. He entered the army as a lieutenant in the 11th United States Infantry, 14 May 1861, and served on the staff of General Meade from the battle of Gettysburg to the close of the war. On 4 May 1898 he was ap¬ pointed a brigadier-general of volunteers for the war with Spain, and on 8 July was pro¬ moted to major-general for his services in the Santiago campaign. In February 1899 he was appointed military governor of the province of Santa Clara, Cuba, and in April following, was ordered to duty in the Philippines. In March 1900 he was assigned to the command of the department of southern Luzon, and for his eminent services there and on the Sulu group was promoted major-general., 9 June 1902. In February 1906 he became lieutenant-general succeeding General Chaffee as chief of staff, and in April 1906 he retired.

BATES, Joshua, American financier : b. Weymouth, Mass., 1788; d. 24 Sept. 1864. In 1828 he became a member of the house of Baring Brothers & Company, in London, and subsequently its senior partner. In 1854 he was appointed umpire to the joint British and American Commission for the settlement of claims arising from the War of 1812. He was the principal founder of the Boston Public Library, and in 1852, the first year of its ex¬ istence, he made it a gift of $50,000, and later gave it 30,000 volumes. Its main reading-room is named (<Bates Hall® in his honor.

BATES, Katharine Lee, American poet and educator: b. Falmouth, Mass., 12 Aug. 1859. A.B. Wellesley College', 1880; A.M. 1891 ; Litt.D. Middleburv College, 1914. She was called to the English literature depart¬ ment of Wellesley College, 1885, made asso¬ ciate professor in 1888, professor in 1891. Has edited various English classics, includ-

ing the Heywood volume in the Belles Lettres Series (1916) and written other books on professional lines, as (The English Reli¬ gious Drama) (1893) and (History of Amer¬ ican Literature) (1898) ; has traveled in Europe, Egypt, Palestine, and published sev¬ eral books as fruit of these travels: (Spanish Highways and Byways > (1900) ; (From Gret¬ na Green to Land's End} (1907) ; (In Sunny Spain, a Story) (1913). Her volumes of poetry are (The College BeautifuP (1887) ; (Sunshine) (1890) ; (The Story of Chaucer's Canterbury Pilgrims Retold for Children) (1909); (America the BeautifuP (1911).

BATES, Samuel Penniman, American his¬ torian : b. Mendon, Mass., 29 Jan. 1827; d. 1902. He was principal of Meadville Acad¬ emy, Pa. ; superintendent of schools in Craw¬ ford County, Pa., 1857-60; deputy state super¬ intendent of schools, 1860-66; and Staite his¬ torian, 1866-73. Among his publications are the (Lives of the Governors of Pennsylvania} (1873) ; (Lectures on Mental and Moral Culture) (1859) ; <History of the Battle of Gettysburg) (1878) ; (History of the Battle of Chancellorsville) (1882) ; (History of Col¬ leges in Pennsylvania.)

BATE'S CASE, an English historical inci¬ dent of much significance as marking the opening of the struggle of Parliament with the Stuart kings. John Bate, a London mer¬ chant, having refused to pay certain duties levied without consent of Parliament, was sent to prison by the royal officers. The Commons supported Bate, but the king's authority to levy impositions on exports and imports was sustained by the Court of Ex¬ chequer.

BATES COLLEGE, Lewiston, Me., was opened in 1863 and chartered in 1864. It grew out of Maine State Seminary, a second¬ ary school opened in 1857. The college was founded by its first president, Rev. Oren Burbank Cheney, D.D. (1863-94), and bears the name of its chief benefactor, Benjamin Edward Bates, a merchant of Boston and one of the founders of the city of Lewiston. Bates was the first Eastern college to afford, collegiate education to women and its first woman graduate (1869) became a professor in Vassar College. Bates is undenominational but thoroughly Christian. Its faculty rep¬ resents nine different religious denominations and the leading universities

and colleges of the United States. It places primary stress upon character, does not tolerate hazing and makes abstinence from intoxicating drinks a condition of student membership. Its courses of instruction cover the range of undergrad¬ uate studies as pursued in progressive col¬ leges of to-day. The unusual excellence of its courses in English, including argumenta¬ tion, is indicated by its 30 victories in 38 in¬ tercollegiate debates. Alone among New England colleges, Bates has no secret frater¬ nities. It has chemical, physical and biologi¬ cal laboratories, libraries containing more than 40,000 volumes and a spacious athletic field. Its campus of 45 acres is of rare nat¬ ural beauty and with its 15 buildings (includ¬ ing a chapel, Carnegie science building and library) has a value of $597,000. Its invested funds amount to $930,000. About 43 per cent of its graduates have become 'teachers. For

the last 20 years the number of its graduates at the head of city high schools in New Eng¬ land is believed to have exceeded those of any other college. Bates has 102 scholarships and it so shapes its policy as to help students of small means to meet their own expenses. The college has 34 officers and instructors and 472 students.

BATESVILLE, Ark., city and county-seat of Independence County, on the White River and on a branch of the Saint Louis, I. M. & S. Railroad, 115 miles northeast of Little Rock. It is the seat of Arkansas College, founded 1872, a Presbyterian institution; also of a Masonic Home and School and of an Odd Fellows' Home and School for Widows and Orphans. The river is navigable for steamboats to this point and the United States government has provided, at a cost of over $3,000,000, a system of locks and dams to in¬ sure navigation for 100 miles above the town. It contains immense quarries of marble and other stone in which it carries on a large export trade and has woolen mills, flouring mills, furniture factories, municipal electric lighting and power plants, waterworks, *etc.* Pop. (1920) 4,299.

BATFISH , a sea-fish (Malthc vespertilio) of low organization, constituting the family Malthcidce, allied to the goosefishes (Lo - phiidce), which creeps about the bottom like a huge toad and feeds upon whatever comes within its reach. It is numerous in all warm seas and some related forms inhabit the deeper parts of the ocean. See Goosefish.

BATH. As the most ancient records of the human race refer to the use of the bath it is probably safe to surmise that the prehistoric peoples

early discovered the cleansing effect of water and were eager to enjoy it. To the an¬ cient Egyptians, as to the more modern Mo¬ hammedans, it is a part of their religious service, while among the early Hebrews it was not only one of the first purificative duties but it was positively prescribed by the Mosaic law in certain specified cases of uncleanness. Thus the Jew who had no bath in the court yard of his house, bathed in the streams, or, later, in the mixed, or public bath, while, besides water, bran was often used for ceremonial cleansing, especially by the women, just as the modern Arabs, when unable to obtain water, rub them¬ selves clean with sand. See Ablution.

The earliest and most common form of bathing was, of course, that of swimming in rivers, and bathing in such rivers as the Nile and the Ganges was supposed to possess a re¬ ligious significance which tended to make the practice a very popular one. The use of oils and the greater luxury of perfumes became customary on occasions of sanitary bathing at a very early period. In later times the more wealthy Romans possessed many kinds of oils and pomades which they brought to the baths, that their bodies might be anointed with them, while even the poorest classes rubbed their bodies with flour of lentils after the bath.

The first reference to such a convenience as that of a public bath occurs in the Bible, where it is stated that the bathing spools** were some¬ times sheltered by porticoes, but this was a simple invention when compared to the perfect bathing facilities which were afterward pro-

vided by the Greeks and Romans, while the praise lavished upon the baths of Darius by Alexander the Great indicates that the Persians must also have possessed beautifully appointed bathing facilities.

The public baths, which began to be built in Rome shortly after Clodius had succeeded in supplying the city with water from Praeneste, soon became one of the most popular institu¬ tions of the nation and emperors vied with their predecessors to construct the

largest and most elaborate establishments. As the result, enor¬ mous buildings were erected and these contained not only the bathing apartments but the gym¬ nasia and libraries, or even theatres, and the most able writers of that time admit their in¬ ability to describe the magnificence and luxuri¬ ous appointment of many of these palaces of cleanliness and pleasure. For example, Seneca says, ((To such a pitch of luxury have we come that we are dissatisfied if we do not tread on gems in our baths.® These baths, or thermae, as they were called, contained swimming baths, warm baths, vapor baths and baths of hot and cold air.

Wherever the Romans settled they built pub¬ lic baths, and wherever they found hot springs or natural stufae, they made use of them, thus saving the expense of heating, as at Baiae and Bath. The charge made at a public bath was only a quadraus, or about one-quarter cent.

The delicacy of feeling concerning the bath¬ ing together of sexes which is said to have existed in early times certainly did not extend to the days of the empire, when it was not at all uncommon for men and women to make use of the same bath and it was probably due to this practice that the public baths came to be condemned by the early Christians as places of unbounded license. While admitting the useful¬ ness of the bath from the standpoint of cleanli¬ ness and health, the Church fathers insisted that baths should be taken for such purposes only and not for pleasure. It was at this time when the bath reached the height of luxuriousness; when rich citizens had magnificent private baths of their own attached to their villas, and when elaborate private bathing houses might be had for hire in all the cities; conditions which con¬ tinued until about the 5th century, when the destruction of Rome's water supply by the Huns and the many disasters which accom¬ panied the downfall of the empire tended to turn popular attention from the delights of the thermae. How thoroughly the bath afterward fell into disuse, however, is a matter which historians have been unable to determine. In the East, of course, where the heat and dust make its use obligatory, there has never been any diminution in the practice, and while in Europe, for a time at least, perfumes were used to offset any disagreeable odors that might arise from uncleanliness of the person, this condition could not have existed for many centuries, for, by the latter part of the 12th century, the popularity of the bath had become so well re-established that there was scarcely any large city in Europe which did not possess v/ell-patronized hot-air bathing houses. Again in the 17th century, when the Turkish bath was introduced, there was another revival of interest in the matter of personal cleanliness, and people of all classes flocked to the baths, or Hummans, as they were called, to enjoy the

new luxury that had been imported from the East.

While the Turkish bath, not to mention the Russian and Egyptian baths, are so similar to the hot-air baths of the Romans that many authorities have regarded them as nothing more or less than an outgrowth from the latter, the fact that the principle of the vapor bath has been known to many nations, and has even been found among savages, or races in an early stage of civilization, has led to the more recent and counter theory that the hot-air boxes of the Mexicans, the ((medicine sweats® of the American Indians, the small baths of the an¬ cient inhabitants of Scotland and Ireland, and the larger vapor baths of Japan, like those of Turkey and Russia, are of just as independent origin as those of the more ancient Rome. However that may be it is at least certain that while this luxurious form of bathing was largely responsible for the neglect of the cold bath and the sea-bathing, the virtues of which have been appreciated only within comparatively modern times, it is largely due to the pleasure-able sensations resulting from this form of bath that the various nations of the world have not neglected those principles of cleanliness upon which the good health of a people so vitally depends.

The Cold Bath. — ’The first effect of the cold bath (at a temperature say from 50° to 70°) is to produce a shock to the nerves of the skin. In the case of the cold bath as ordi¬ narily used, the application is short, and the more near to the temperature of 50° F. the water is the shorter it should be. Following the first action is reaction, during which the blood returns to the skin, the blood-vessels of which relax, and a pleasant sensation of glow, spread¬ ing rapidly over the surface, is experienced. This reaction is aided by rapid friction of the skin, as by towels, and if, after drying, the body is quickly clothed and exercise engaged in, the total effect of the bath is stimulating, inducing a feeling not only of warmth but also of vigor. The length of time the cold may be applied without interfering with the setting in of a proper reaction depends on the individual. A mere instant’s immersion is sufficient for some, others can bear several minutes, while some could not bear complete immersion of the body at all, a feeling of coldness and shivering lasting for hours after it. Obviously for such persons the full cold bath is not suitable, and the cold wet towel, cold wet sponge, wet sheet, etc., may be used instead, and may gradually lead up to the full cold plunge, which may thus be made tolerable and enjoyable. The cold bath is not usually suitable for the old and the deli¬ cate. The action of the cold water may be intensified by showering it or spraying it on the body by means of various arrangements of pipes,

etc. The morning or early part of the day is the suitable time for all such kinds of baths. Persons who are thus habituated to the use of cold water are less susceptible to the influence of cold and can stand longer exposure than others. »

Tepid Baths (temperature 85° to 95°) pro¬ duce neither depression nor excitement, and are therefore suited for all. They are the best when prolonged immersion is desired, as in the treatment of chronic skin and nervous diseases.

The Warm Bath (temperature 96° to 104°) is particularly serviceable in removing feelings of fatigue. It should quicken only slightly the circulation, and bring an additional quan¬ tity of blood to the skin. It is by this means that it removes the tired feeling from ex¬ hausted muscles, for it promotes the removal from the tissues of the waste products, which have accumulated during the period of activity, and whose presence in the muscles is the cause of the feeling of weariness. After prolonged labor, or a long fatiguing walk, or prolonged exposure to damp and cold, or after, for ex¬ ample, the exertion of much dancing, nothing is so restorative and refreshing as a warm bath. When employed for such purposes, the person should end with a spray or douche, or simple sponge of tepid water (70°) if he is about to go to bed, or with a warm spray, quickly re¬ duced to cold, before dressing to go out. Warm baths are largely employed in feverish affec¬ tions of children for promoting the action of the skin ; and they are a safe resort in the convulsions of children, cold being at the same time applied to the head.

The Hot Bath (temperature 102° to 110°) acts in a more pronounced way upon the heart and nervous system than the merely warm bath. If very hot it powerfully excites the heart, whose action, indeed, it may stimulate to vio¬ lence. The brain is also influenced by the more copious flow of blood through it, due to the vigorous action of the heart. These effects, however, are largely counterbalanced by the increased flow of blood to the skin. But the prolonged use of hot baths is weakening, and the temporary strain thrown upon the heart and

blood-vessels and brain would be hurtful to many. The bather should be immersed to the chin ; the hair is damped with cold water and a thin cold cloth is wrapped about the head. Cold water may be drunk if desired. The bath should last 20 minutes, or less if oppression is felt. It should conclude, as di¬ rected for warm bath, with tepid douche or sponging, or with warm spray quickly reduced to cold. The hot bath should not be used in the morning or early part of the day, or at any time except before going to bed, unless the person is properly cooled down before dressing and going out.

The Hot-air Bath is one of the most powerful ways of stimulating the activity of the skin. The person, unclothed, is placed in an apartment which is heated by means of fur¬ naces, the air being dry. In a longer or shorter time, according to the heat of the air and the condition of the bather, the perspiration bursts out upon the skin, becoming very copious, so that the whole body is bathed in sweat. A very high temperature may be borne so long as the air is quite dry, for the sweat passes rapidly off from the body in the form of vapor, removing a large quantity of heat, and thus the tempera¬ ture of the body does not rise, unless the air is very hot, when the heat of the body usually increases by two or three degrees. The same high temperature could not be borne if the air were moist, as in the case of a vapor bath, for then the air is saturated or nearly so with moisture and cannot take up more, or can take up very little. Marked oppression, difficulty of breathing, fullness in the head, faintness, etc., would then speedily arise. When the air is

quite dry, however, a high temperature, for ex¬ ample that of 180° F., can usually be endured with ease, and even above 212°. Not only the activity of the skin but the action of the heart and of breathing are greatly increased. It is thus not suited for everyone, certainly not in its full form for anyone with weak heart or vessels and for very full-blooded persons.

The Turkish Bath.— The hot-air bath is usually obtained with other accessories in the form of the Turkish bath. This bath was adopted by the Turks from the Romans, who derived it from the Greeks. The bather enters the dressing-room (Rom. vestiarium) , which is heated to an ordinarily comfortable tempera¬ ture. Beyond this room there are, in the fully-equipped Turkish baths, three rooms, separated from the dressing-room by well-padded doors. The first of these corresponds to the Roman tepidarium, the warm room, in which the tem¬ perature is from 115° to 120°; beyond this and separated from it by heavy

curtains is the hot room, or calidariuni, in which the temperature ranges from 120° to 140° ; and still beyond is the hottest room, called also the flue room, cor¬ responding to the Roman laconicum. Here the temperature is not below 150°, usually 175° to 180°, but may be 200° and upward. Every Turkish bath has at least two rooms beyond the dressing-room, one in which the tempera¬ ture may readily be raised to 140° or thereabout, and one beyond it in which the highest tem¬ peratures may be obtained.

When a full Turkish bath is taken the fol¬ lowing is the usual course : The bather un¬ dresses in one of the curtained recesses of the dressing-room, girds a towel or similar cloth round his loins, and carrying a bath-towel over the arm passes into the warm room. Here he stays only long enough to wet the hair with cold water, and perhaps drink of it, and then passes on through the hot room, into the hottest room. Spreading his towel over a chair he reclines on it, wets his head with cold water, and drinks at his pleasure, but not too copiously, of cold water, which the attendant will bring him. Here he remains five or 10 minutes. By this time the whole body will be bedewed with perspiration ; and the bather passes out info the room next in temperature, the hot room, where he reclines for another 10 or 15 minutes. Then he passes to the warm room, lower in temperature than the former, and here he re¬ clines till the attendant is ready for him, when he proceeds to the washing room. Here he lies on a table and the attendant goes over the whole body, rubbing the surface, and thus re¬ moving all loose effete skin, grasping and kneading the muscles, bending joints and so on. He is then rubbed over with soap, scrubbed and washed down, and lastly douched with warm and then tepid and cold water. From this room the bather passes out quickly, plunges through a cold bath, and regains the dressing-room, where he is quickly dried down with warm dry towels. He is then enveloped in a drv bath-towel, and so attired he lies down on his couch in the dressing-room, covered over with a light rug or blanket, till his skin assumes its natural degree of warmth. When the skin is cool and dry, usually in 15 or 20 minutes, the bather dresses deliberately, and may then go out. The ordinary duration of the full bath, from the flue room to the washing room, is

from 40 minutes to an hour. The full bath, however, is suited chiefly for those accustomed to it, for the healthy and robust.

The vapor bath acts upon the body much as the hot-water bath does, but it acts more powerfully, though the effect of the heat is not so quick since vapor is a slower conductor of heat than water. This bath can, therefore, be borne hotter than a water bath, but the high temperature cannot be borne long, for the vapor does not permit of the loss of heat from the body as hot air does. The temperature of the vapor bath cannot be comfortably endured above 120° F. The vapor bath is characteristic of the Russian baths. It is taken in a chamber fllled with vapor, which is thus not only ap¬ plied to the surface of the body but also inhaled. This makes it still more oppressive. It may be used, however, in a simple form, in which the vapor is not breathed, by the person sitting on a chair, surrounded from the neck downward by blankets, which envelop the chair also and hang to the ground. Under the chair is placed a shallow earthenware or metal dish, containing boiling water to the depth of three or four inches. In the water are placed a couple of red-hot bricks. Or under the chair may be placed a spirit-lamp, supported above it being a shallow pan containing boiling water. Such baths are very useful for catarrh, for rheumatic and neuralgic pains, sciatica, etc., as well as for cases where excessive action of the skin is desired to relieve deeper organs, for example the kidneys. Ten to 15 minutes are long enough for exposure in the vapor bath.

Sea-Bathing. — Ordinary sea-bathing is of course cold, and produces the stimulating effects described in regard to the cold bath. There is besides the additional stimulus due to the salt, so that sea-bathing acts as an invigorating tonic. It is not, however, suited for everyone, and is taken much too indiscriminately. It is also indulged in without due precaution. It is a very common error for persons to remain in the sea too long, the result being shivering, blueness of the skin, difficulty in recovering warmth, headache, *etc.* Persons who are anaemic, — that is, of deficient quality of blood, — ought not to indulge in sea-bathing without advice, and failing advice had better try first a salt-water bath at home. Persons who have suffered from any internal complaint ought also to refrain. The best time for sea-bathing is in the morning. It should never be indulged in immediately after a meal, when the business of digestion is going actively forward. A good time is before lunch or early dinner, for which the brisk walk home after the bath will prove an excellent appetizer. Neither should sea¬ bathing be engaged in immediately after very active exercise, when the body is in

a state of very active perspiration or in a condition of fatigue. At the same time, moderate exercise before the bath is unobjectionable, and the body ought to be comfortably warm. The per¬ son should undress quickly and plunge in bodily, wetting the whole body at once. During the bath exercise should be active, as in continued swimming. Children, because of the little re¬ sisting pow:er of their bodies, are readily de¬ pressed by sea-bathing. They may be gradually accustomed to it ; but they ought not to be forcibly immersed to their aversion and terror. Sea-baths may be imitated at home by the addi¬

tion of common salt or sea salt to water. The benefits of open-air bathing, — sea or river, — are not limited, of course, to the action of the water, but are increased by the action of the fresh air, the respiration of which is stimulated by the bath, and by the exercise in the open air invariably indulged in afterward.

There are many kinds of medicated baths, which have, or are supposed to have, special properties, valuable for diseased conditions, be¬ cause of containing various saline substances dissolved in them. Such baths may be arti¬ ficially prepared by the addition of the salts to the water, or natural mineral waters may be used for the purpose. Mud-baths are recom¬ mended for special reasons.

Various arrangements are employed for ac¬ centuating the effect of the water, whether used hot or cold, or for applying it to particular parts of the body. The spray is one well-known variety of bath. The douche is a jet of water directed upon some part of the body through a ll/2-inch pipe, the force of the water, quantity discharged and temperature being capable of modification. It at first lowers the vitality of the part to which it is applied, but reaction sets in quickly, so that its whole effect is stimulating, quickening tissue change. The douche may be used hot or cold, or one after the other in rapid succession, a change which is most stimu¬ lating of all. In old-standing complaints, thick¬ enings about joints, stiff joints, etc., it is a very useful application. In the case of the descend¬ ing douche, the pipe is 10 to 15 feet above the floor level, and for the horizontal douche the pipe is four feet above floor level. In the former case it is played first on the spine, and then shoulders, hiˆs, arms and legs in succession. At the close it is directed on to the chest and head, the force of the water being broken by the hands. In the latter case the back, chest, arms and legs are douched in the order named, while the patient rubs himself vigorously. Be¬ fore beginning the head is wret with cold water, and is douched last, the force of the water being

broken. The process should last scarcely two minutes.

The sitz-bath or hip-bath is a means of limiting the application of the water to the hips and neighboring parts. The form of the bathing-tub is such that the person has the bath in the sitting posture, the limbs and upper part of the body being out of the bath. The sitz-bath, hot or cold according to circumstances, is in much use for abdominal and liver com¬ plaints, and specially for feminine ailments. Its soothing effects used hot in such disorders are marked. Altogether the use of the bath, in association writh treatment by medicine, is of the highest value in numerous disorders, rheumatic, gouty, digestive, febrile, *etc.* In particular, the Turkish bath, under due super¬ intendence, may produce surprising results, from checking a simple cold upward. See also Hydrotherapy.

BATH, England, city in Somersetshire, 107 miles west of London. It is beautifully sit¬ uated on the Avon, in a narrow valley bound¬ ed on the northeast and southwest bv hills and widening on the northwest into rich and extensive meadows. The Avon is navigable from Bath to Bristol. > Bath is noted for its places of amusement, its fine streets and the

magnificence of its public buildings. The houses are of superior construction, built of freestone, obtained from the hills about the town. The Abbey Church ranks as one of the finest specimens of perpendicular Gothic architecture. The beauty and sheltered char¬ acter of its situation, the mildness of its cli¬ mate and especially the curative efficacy of its hot chalybeate springs have long rendered Bath a favorite fashionable resort. The four principal springs yield no less than 184,000 gallons of water a day; and the baths are both elegant and commodious. The temper¬ ature of the springs varies from 109° to 117° F. They contain carbonic acid, chloride of sodium and of magnesium, sulphate of soda, carbonate and sulphate of lime, *etc.* Bath was founded by the Romans and called by them Aquae Solis (waters of the sun). Among the Roman remains discovered here have been some fine baths. The height of its prosperity was reached,

however, in the 18th century, when Beau Nash was leader of the fashion and master of its ceremonies. Since then, although it still attracts large numbers of visitors, it has become the resort of val¬ etudinarians chiefly. Jointly with Wells it is the head of a diocese and returns two mem¬ bers to the House of Commons. Bath has many handsome public buildings, among them being the Guild Hall, technical schools, an art gallery and reference library, and the Royal Literary and Scientific Institution. There are several fine parks, including the Victoria Park, of about 50 acres, containing a botanical garden and an excellent theatre. It also maintains a museum and public mar¬ kets. Pop. 50,729.

BATH, Me., city, port of entry, and county-seat of Sagadahoc County, on the Kennebec River and the Maine C. Railroad; 12 miles from the ocean and 30 miles south of Augusta and 36 miles northeast of Portland. It is ad¬ mirably situated as a commercial port ; has regular steamboat connections with Boston and Portland ; is principally engaged in shipbuilding, both wood and iron ; and manufactures brass and iron goods, oil cloth, shoes and lumber. The Bath Iron Works built the gunboats Machias and Castine, the ram Katahdin and several of the modern torpedo boats for the United States navy. Bath has a large coastwise and foreign trade in ice, coal, lumber, hay, iron and steel ; and contains four national banks, public library, a costly system of waterworks, and property valued at $7,000,000. Bath dates from a mission settlement of 1660. It was in¬ corporated as the town of Bath in 1781 and received a city charter in 1847, revised in 1899 which provides for a one-year term mayor and a bicameral city council. Pop. (1920) 14,731.

BATH, N. Y., town and county-seat of Steuben County, on. the Cohocton Creek, 36 miles west of Elmira, on the Buffalo branch of the Erie and the Delaware, L. & W. railroads. It is the seat of the New York State Soldiers and Sailors' Home, the Davenport Home for Orphan Girls and Haverling Academy; is prin¬ cipally engaged in agriculture; and manufac¬ tures shoes, harness, window shades, cycles, automobile engines and aeroplanes. Bath was settled in 1793 and incorporated in 1816. Pop.

(1920) 4,795.

BATH, Knights of the, an English order of chivalry established in 1725 by George I. By the book of statutes then prepared, the num¬ ber of knights was fixed at 38, namely, the sovereign and 37 knights

companions. The King allowed the chapel of Henry VII, in Westminster Abbey, to be the chapel of the order. The limits of the order were extended by th-e Prince Regent in 1815, to reward the dis¬ tinguished services of officers during the wars ; and again in 1847, when it was also opened to civilians. It was further enlarged in 1861. It now consists of three classes, each of which is subdivided into (1) military members; (2) civil members, and (3) honorary members, con¬ sisting of foreign princes and officers. The first class consists of Knights Grand Cross (G.C. B.) ; the second of Knights Commanders (K.C.B.) ; and the third of . Companions (C.B.) Mr. James W. Gerard, formerly United States Ambassador to Germany, was decorated by King George with the G.C.B. in 1917. The title of “Sir,® however, can only be assumed after the ceremony of the “accolade® (q.v.) has been performed by the sovereign. The dean of Westminster is dean of the order. The ribbon of the order is crimson, and its motto, “Tria juncta in uno.®

BATH HOUSES, Public. Bathing as serving for cleanliness, health and for pleasure, has been almost instinctively practised by nearly every people. The most ancient records men¬ tion bathing in the rivers Nile and Ganges. From an early period the Jews bathed in run¬ ning water and used hot and cold baths ; so also did the Greeks. The Persians must have had handsomely equipped baths, for Alexander the Great admired the luxury of the bath of Darius. But the baths of the Greeks and prob¬ ably of all Eastern nations were on a small scale as compared with those which eventually sprang up among the Romans.

In early times the Romans used, after exer¬ cise, to throw themselves into the Tiber. Next, when ample supplies of water were brought into the city, large piscina, or cold swimming baths, were constructed, the earliest of which appear to have been the piscina pnblica (312 b.c.) near the Circus Maximus, supplied by the Appian aqueduct, the lavacrum of Agrippina and a bath at the end of the Clivus Capitolinus. Next, small public as well as private baths were built; and with the empire more luxurious forms of bathing were introduced, and warm baths became far more popular than cold baths. Public baths (balnea) were first built in Rome after Clodius brought in the supply of water from Praeneste. After that date, baths began to be common in Rome and in other Italian cities. In fact, private baths gradually came into use, being usually attached to the villas of the wealthy citizens. Maecenas was one of the first who built public baths at his own expense. After this time, each emperor, as he wished to ingratiate himself with the people, lavished the revenues of the state in the construction of enormous buildings, which not only contained suites oi bathing apartments, but included gymnasia, and sometimes even

theatres and libraries. Such establishments went by the name of Therma. The principal thermae were those of Agrippa (21 b.c.), of Nero (65 a.d.), of Titus (81 a.d.) , of Domitian (95 a.d.), of

Caracalla (217 a.d.), and still later those of Diocletian (302 a.d.) and of Constantine (317 a.d.). There are said to have been 850 baths altogether in Rome at one period. The technical skill displayed by the Romans in rendering their walls and the sides of reservoirs impervious to moisture, in conveying and heating water, • and in constructing flues for the conveyance of hot air through the walls, was of the highest order. The Roman baths contained swimming pools, warm baths of hot air and vapor baths. The piscina were often of immense size — that of Diocletian being 200 feet long — and were adorned with beautiful marbles. Wherever the Romans settled, they built public baths, and the ruins of such have been found in all the countries which at any time were subject to the Roman eagles — Gaul (France), Spain, Ger¬ many, England, *etc.* It may be well to point out that none of those public baths was free; on the contrary they were usually patronized only by the upper classes. It has remained for the modern city to adopt free public baths as part of its service to the public.

Although they never wholly gave up cold-water bathing, the Romans practised chiefly warm bathing. This, of course, is more lux¬ urious, but when indulged in to excess is enervating. The unbounded license of the pub¬ lic baths, and their connection with modes of amusement that were condemned, led to their being to a considerable extent proscribed by the early Christians. The early Fathers wrote that bathing might be practised for the sake of cleanliness, but not for pleasure. About the 5th century many of the large thermae in Rome fell into decay. The cutting off of the aqueduct by the Huns, and the gradual decrease in popu¬ lation contributed to this. Public bathing, how¬ ever, was kept up in full vigor in Alexandria and elsewhere. Hot bathing, and especially hot air and vapor baths, were adopted by the Mo¬ hammedans ; and the Arabs brought them with them to Spain.

The Turks at a later time carried them high up the Danube. The Crusaders also contributed to the spread of baths in Europe, and hot vapor baths were especially recommended for the leprosy so prevalent in those days. After the commence¬ ment of the 13th century, there were few large cities in Europe without vapor baths. According to Erasmus, they were common at the time of the Reformation in France, Ger¬ many and Belgium ; they seem to have been a common adjunct to inns. After a time they became less common, but the reason for the decline is not clear.

In England the next revival of baths was at the close of the 17th century, under the Eastern name of hummans , or the Italian name of bagnios. These were avowedly conducted on the principle of the Turkish baths of the present day. But there were several consider¬ able epochs in the history of baths, one in the commencement of the 18th century, when Floyer and others recalled attention to cold bathing, of which the virtues had long been overlooked. In the middle of the century also, Russell and others revived sea bathing in England, and were followed by others on the Continent, until the value of sea bathing became fully appreci¬ ated. Later in the same century, the experi¬ ments of James Currie of the action of the complete or of partial baths on the system in

disease attracted attention ; and though for¬ gotten for a while, they bore abundant fruit in more recent times.

In the 4th decade of the 19th century free cold swimming baths were revived in Germany. In England, since 1842, public swimming baths, besides separate baths, have been supplied to the public at very moderate rates, and floating baths in rivers, always known in some German towns, have become common wherever there are flowing streams. The better supply of cities with water during the 19th century has greatly aided the movement to extend bathing facilities to the public. In 1846, the British Parliament passed the first of a series of acts to encourage the establishment of public baths by the local authorities, but by 1865 only 25 boroughs had cared to provide bathing establishments for their inhabitants. About 1890 the city councils began Jo take up the matter energetically with authorization from Parliament; but it then increased so rapidly that almost every town or borough of 50,000 people now has its public bath open the year round and many smaller communities are similarly equipped. About 50 German cities maintain public baths throughout the year and many of the establishments in the larger cities are models of their

kind in con¬ struction and equipment. On the Continent gen¬ erally and in Scandinavia only the large cities are thus provided; but in Russia they are almost universal in places of any size.

In the United States, though public baths have existed since 1866 until about 1895 in a few water-side cities, they were confined to cold swimming-baths sunk in the sea or river near the shore, and open only during warm weather; of excellent service for the comfort of those not too far off, but too limited in scope to be of the highest value to the general public. Not only were they closed for more than half the year, but to those who must walk more than half or three-quarters of a mile to obtain a bath (their utility being for the poor), their value as refreshment in hot weather was neu¬ tralized by the needful exertion to reach them. Their use, therefore, depended on their dis¬ tribution and relation to the water system. Thus, in Boston, where six were established in 1866, with 300,000 patrons during the first sea¬ son, and extended to 14 in 1897, they were so located on the Charles River, at City Point and on South Bay, that a considerable part of the poorer population were within fairly easy dis¬ tance of them. Only about a dozen United States cities had even these bathing facilities prior to 1895, and the first general movement in favor of year-round hot and cold baths was a reflex from Germany, about 1891. The first city in the United States to establish a free municipal bath supplied with hot and cold water was Chicago, which opened such a bath in 1894. Yonkers was the first city to establish free public baths open all the year. This bath was opened on Labor Day, 1896. Brookline, Mass., established free public baths in 1896, and Boston and Buffalo in 1897. The pioneer in the public bath movement in the country gen¬ erally was Dr. Simon Baruch. It was he who closely investigated the working of the public bath systems in Germany and in other European countries and subsequently advocated, despite the strongest official opposition, the introduc¬ tion of the system into the larger cities of the

United States. In 1890 his plans were adopted by the New York

Association for Improving the Condition of the Poor and the following year this Association's <(People's Bathsw were completed and at once became a great popular success. Shortly afterward the trustees of the Baron de Hirsch Fund erected a public bath on Henry street, New York, and the Demilt Dispensary bath was opened about the same time. In 1895 the Riverside Association opened a public shower bath in West 69th street. Among other efforts by various charitable organizations for the provision of bathing facilities for the masses may be mentioned the floating hospital of the Saint John Guild, the Wayfarers' Lodge and the municipal lodging-house.

In this connection, a word may be said about what are known as (<Mikveh Baths.-** These are very common in New York city and are usually located in the basement of tenements in the crowded sections. They are conducted as commercial enterprises, the charge for a bath usually ranging from 5 to 10 cents. At certain times of the year (e.g., the Passover) the use of these baths is compelled by religious custom for both men and women ; and all women are required to use these pools regularly within seven days after menstruation. The method of using the bath is minutely pre¬ scribed in the Hebrew liturgy. The first compulsory legislation was by New York State in April 1895 (though a bathing and washing association was incorporated there in 1849) ; it obliged all cities of over 50,000 people to establish public baths and comfort stations, kept open the yrar round, with both hot and cold water, and 14 hours a day, and under such conditions as the local board of health judged proper ; river, lake or sea baths not to be deemed a compliance with the act. Cities under 50,000, though not compelled, were permitted to use their funds or credit for the same object. The first city to comply, and perhaps the first in the United States to furnish such con¬ veniences in their full extent, was Yonkers, N. Y., not within the compulsory section. This town opened one on Labor Day, 1896; and an¬ other of brick in 1898, with accommodations for 400 daily baths. Within the act, Buffalo opened its first in 1897 ; Albany, Rochester, Syracuse and Troy have since complied; and in New York the first one, five years after the act was passed, was opened in Rivington street in a closely-packed quarter, during 1900, at a cost of $100,000. It furnishes 3,000 baths a day of 20 minutes each, from 67 spray baths. In 1902 three additional municipal interior baths were contracted for in Manhattan, providing facilities each for 103 persons at one time.

At present New York maintains and operates under the jurisdiction of the borough presi¬ dents free public interior baths, free floating baths and a large public bathing beach at Coney Island. For the use of these baths no charge whatever is made (except at the seaside baths, where

a fee of 10 cents is charged). In Man¬ hattan there are 12 free public interior baths and 11 free floating baths (all of the latter, however, are not put in commission each year). Brooklyn has eight interior baths, a large public bath at the seaside, and in normal years two floating baths. The interior baths are open

daily to the public from 6 a.m. to 10 p.m. and on Sunday from 6 a.m. to 1 p.m. Swimming pools represent a very important and attractive feature of these public baths. In addition the city provides baths in many of its public schools. Almost all of these are of the shower type: At present 67 schools are thus equipped and the High School of Commerce has a swim¬ ming pool as has the College of the City of New York. The seaside public bath at Coney Island is a substantial concrete structure con¬ taining 1,300 individual dressing rooms for women and 700 dressing rooms, each for eight persons, for men. In this manner 7,000 patrons are accommodated at one time. In a recent year (1914) there were over 10,000,000 free baths given by the city of New York in both floating and permanent baths. The average cost per bather during that year was a little over four cents. In Philadelphia the Public Baths Association was organized in 1895 ; but the first to be opened was in 1898, in a crowded quarter between Fourth and Fifth streets. It is a building of 2 54 stories, 40 by 60 feet, constructed of brick and iron, with concrete floors and iron partitions. It cost about $30,000. It was built without a swim¬ ming pool, having only shower baths — a sys¬ tem favored where economy of space and water is essential ; the People's Baths and the Baron de Hirsch Fund Baths in New York adopt the same plan. The Philadelphia establishment has a public laundry in connection with its own suit and towel laundry, where women and men in separate compartments can wash their cloth¬ ing for a small fee, and single men make much use of it to wash their underclothing. Some of the old warm-season baths have since been made permanent, as in Newark, N. J., which so extended two in 1898, and in 1900 voted a third. Boston from 1897 to 1899 increased its public baths to 33 — 14 floating, 10 beach and 9 others; 17 south of the Common and 16 north; and prepared to erect permanent structures in each industrial section of the city. The first of these was opened at Dover street in 1898 — a fine brick and granite structure, with marble partitions and staircases, the whole with land costing $86,000. It has gymnasiums also, and medical directors for each sex to give courses of training, and for cases of accident or sud¬ den illness. The intention is ultimately to make these baths places of public recreation, corre¬ sponding to the summer playgrounds ; thus reaching in the 20th century the point at which the Romans had

arrived in the first. Brookline, adjoining Boston, has a handsomely appointed permanent municipal bath house. The State of Massachusetts has erected several splendid bath houses at the prominent beaches. Pitts¬ burgh, Worcester, Kansas City, Utica, Holyoke, Providence, R. I., and numerous other cities have built substantial public bathing establish¬ ments. Saint Paul, Minn., through the public spirit of Dr. Ohage, a German physician, now has a public playground, pavilion, etc., con¬ nected with permanent bath houses on what was till recently a waste island in the middle of the Mississippi, near the business centre of the city and between two main bridges. Like most of the other bath establishments, it is free, save a small charge for soap and towels; has free instruction in swimming, and is open every

day, including Sundays. The expensive amuse¬ ment grounds at Pulaski Park, Chicago, in¬ clude swimming pools and locker houses that cost $70,000. The deep pool is 40x60 feet and the shallower pool 60x180 feet. The establish¬ ment accommodates 500 bathers an hour. The installation of baths in public schools began in Germany, Gottingen leading the way in 1885 under the headship of the mayor and a pro¬ fessor in the university. In the United States it was first taken up in Boston and suburbs ; in 1900 a number of baths were put into the Paul Revere School in the north end, and in Brookline swimming is a regular part of the school curriculum. But most of the school baths are confined to shower equipments. Many Y. M. C. A. branches, gymnasiums, clubs and hospitals now maintain semi-public bathing establishments, mostly equipped with showers but sometimes with pools.

Designs of modern municipal bath houses are credited mainly to Dr. Munnich, an army surgeon; the late Prof. Oscar Lassar; Good¬ win Brown, a lunacy commissioner, and Dr. Simon Baruch, president of

the American As¬ sociation for Promoting Hygiene and Public Baths. Low fireproof buildings are preferred, with an abundant water supply through a main of at least four and preferably six inches diameter. The water should always be filtered, and the piping exposed. Concrete or brick con¬ struction is preferred, and the pools require excellent workmanship. Their sides are best made of glazed tile or marble. White walls and good light are desirable. The inflow of water to a pool should be such as to change the water in 24 hours. In addition to this regu¬ lar flow, the pool should be wholly emptied once or twice a week. Nude bathing is en¬ couraged, as it assists the bathing masters in excluding the diseased from the pool.

Where funds do not permit complete bath¬ ing establishments, tent baths, supplied with showers, may be utilized, as at Baltimore. Beach baths consist usually of floating plat¬ forms connected with a pier by a bridge. The centre of the platform is opened for the pool, which is separated from the outside water by woodwork. The dressing rooms are on the margins of the platform. Such baths are in increasing use at beaches all over the United States

Bibliography. — Cross, A. W., (Public Baths and Wash-Houses5 ; Gerhard, W. P., (The Progress of the Public Bath Movement in the United States) (1913) ; id., (Public Bath Houses and Swimming Pools5 (in American City , November 1914) ; id., (Modern Baths and Bath Houses 5 (New York 1908) ; Hanger, G. W., (Public Baths in the United States5 (in Public Health Reports, 1 Aug. 1913, Washing¬ ton, D. C.) ; Kelly, R. F. G., (Portable Baths and their Relation to the Public School Sys¬ tem5 (1917) ; Manheimer, W. A., (Essentials of Swimming-Pool Sanitation5 (Washington 1915) ; Moll, A. A., Sanitation of Swimming Pools5 (in American City, April 1913) ; Tol-man, William H., (Public Baths5 (in Yale Re¬ view, May 1897). Consult also (Bulletin 54 5 of the Bureau of Labor, 58th Congress (Washing¬ ton 1903-04).

BATHOLITH, or BATHOLITE, a

large intrusive mass of igneous rock, irregular vol. 3 — 22

in shape, which has melted its way up across the enclosing beds. They differ from laccoliths (q.v.) in not being intruded between, but rather across, the beds. They are usually many miles in extent, and often form the cores of moun¬ tain ranges, as in the case of the Sierra Ne¬ vada. Bodies of the same form, but smaller, are often called stocks or

bosses.

BATHOMETER, an instrument for meas¬ uring the depth of the sea or any large bodv of water without a sounding line, the name being derived from bathos, depth. It was invented by Dr. C. W. Siemens after 1859 as an adjunct to the laying of submarine telegraphic cables, so as to keep a continuous record of the sea depth below a moving ship. The principle of the in¬ strument is based upon the gravitation of the earth, total gravitation being represented by a column of mercury, which rests upon a thin steel diaphragm embossed in such a way that its centre can move within a small range freely up and down under the influence of the mercury column without encountering any frictional re¬ sistance. The column ends in a cup, and mer¬ cury is poured into both cup and pipe up to a certain point, the space above being filled with water, alcohol or a liquid of less density, this latter terminating in a spiral tube laid upon a scale at the top of the instrument. The centre of the diaphragm which supports the column of mercury is carried by two or more carefully tempered steel springs, so adjusted that their elastic pressure balances exactly the dead weight of the column of mercury resting upon the dia¬ phragm, the result being that the diaphragm retains its horizontal position. Inclosed in an air-tight casing closed by a disc of plate glass, the instrument records by an ingenious com¬ pensating arrangement the natural balance of the elastic gravity forces on the scale, from which readings are made. Consult Siemens, (The Bathometer5 (1879).

BATHORY, ba'to-re, or BATTORI, a

celebrated Hungarian family which in the 15th century became divided into two branches, one of which gave Transylvania five princes, and Poland one of its greatest kings.

1. Stephen: b. 1532; d. Grodno, 12 Dec. 1586. He entered the army and so distinguished himself that when the death of John Sigismund Zapolya, nephew of Sigismund II, King of Poland, in 1571, left a vacancy in the sover¬ eignty of Transylvania, Stephen Bathory, with¬ out courting the honor, was unanimously elected. When the throne of Poland became vacant by Henry of Valois quitting the country in order to mount the throne of France, Stephen Bathory was elected to succeed him in 1575, and was crowned along with his Queen, Anne, daughter of Sigismund Augustus, at Cracow, in 1576. He found the kingdom torn asunder by faction, the people enervated by long peace, the treasury exhausted and the army without discipline. He therefore gave his first atten¬ tion to internal improvement, but had no sooner effected it than he determined to recover the Polish territories of

which the Tsar of Mus¬ covy had managed to possess himself by fo¬ menting dissensions. He accordingly declared war against him, beat him at all points and compelled him to accept a disadvantageous peace. Under Stephen Bathory Poland en¬ joyed a comparative tranquillity to which it had

long been a stranger, and he was meditating important constitutional reforms, which prom¬ ised to make that tranquillity permanent, when he died suddenly.

2. Sigismund, nephew of Stephen: b. 1572; d. 1613. He became Voivode or Prince of Transylvania in 1581, but did not assume power till 1588, at the age of 16 years. He shook off the Ottoman yoke, and, by the great talents he displayed, had begun to give hopes of reigning gloriously as an independent sovereign, when, from mere fickleness and eccentricity of char¬ acter, he voluntarily resigned his dominions to the Emperor Rudolph II in return for two prin¬ cipalities in Silesia, a cardinal's hat and a pen¬ sion. With the same fickleness, however, he immediately repented of the act, and, availing himself of an invitation by the Transylvanians, returned, and placed himself under the protec¬ tion of the Porte. The talent which he had displayed, and the good fortune which had fol¬ lowed him in early life, appeared now to have forsaken him; the Imperialists defeated him in every battle, and he was obliged to throw him¬ self on the mercy of the Emperor, who sent him to live out the rest of his days at Prague. Historians attribute inherent insanity to the Bathory family.

BATHS OF AGRIPPA, the earliest of the Roman thermae ; erected by Marcus Agrippa in the reign of Augustus. They stood in the Campus Martius, about 20 feet behind the Pantheon. In 1881, on the removal of some houses, ruins were found of a great hall paved with marble and lined with fluted columns.

BATHS OF CARACALLA, one of the

most magnificent of the Roman thermae, in the southeast part of the

city, in which 2,300 men could bathe at the same time. They were begun in 206 a.d. by Caracalla, and completed by Severus. There were stadia for the athletes, gal¬ leries for the exhibition of paintings and sculp¬ ture, libraries, conversation halls, lecture-rooms, *etc.* The mechanical skill displayed in their construction was very great. The ruins which still remain are among the most remarkable in Rome.

BATHS OF DIOCLETIAN, the most extensive of the Roman thermae ; in the north¬ east part of the city, and covering most of the ground between the Porta Collina and the Porta Viminalis. Over 3,000 persons could bathe in them at the same time. They contained a library, picture-gallery, odeum, *etc.* Michel¬ angelo transformed the great hall of the Tepidarium into a nave for the Church of Saint Marie degli Angeli. One of the laconica (hot rooms) forms the vestibule of the church.

BATHS OF TITUS, a structure on the Esquiline Hill in Rome ; built by the Emperor Titus. Considerable ruins are found northeast of the Coliseum.

BATHSHEBA, bath-she'ba, or bath'she-ba, wife of Uriah, the Hittite, whose story is told in 2 Sam. xi. David committed adultery with her, then caused her husband to be slain, and afterward took her to wife. These sins displeased Jehovah, who sent the prophet Nathan to David with the parable of the ewe lamb. David bitterly repented, but yet was punished. Bathsheba was the mother of Solo¬ mon, whose succession to the throne she took

pains to secure. She is afterward mentioned in the history of Adonijah, in the title of Psalm li, and among the ancestors of Christ (Matt, i, 6).

BATHURST, Allen (Earl), English statesman: b. 1684; d. 1775. He was a zealous opponent of the measures of Sir Robert Wal¬ pole's ministry, and the intimate friend of Bolingbroke, Pope, Addison and other great writers of the time. The earldom was created in 1772.

BATHURST, Henry (2d Earl), son of the preceding, English statesman: b. 1714; d. 1794. In 1771 he was made Lord High Chan¬ cellor of England. He wrote (Theory of Evi¬ dence^ *etc.*

BATHURST, Henry (3d Earl), son of the 2d Earl, English statesman: b. 22 May 1762; d. 1834. In 1807 he became president of the board of trade; in 1809 Secretary for Foreign Affairs, and in 1812 Secretary for the Colonies, a post held by him for 16 years. He was also president of

the council under Wellington,

1828-30.

BATHURST, Africa, town on the island of Saint Mary's, near the mouth of the Gambia, and capital of the British colony, Gambia. The town is exceptionally clean and contains gov¬ ernment houses, barracks and a hospital. Fac¬ ing the river are the stores of the European merchants. There are a number of expert ship¬ builders in Bathurst. Its trade is chiefly in gum, bees'-wax, rice, tobacco, cotton, rubber, fruit, ground-nuts, hides, ivory and gold, bar¬ tered for clothes and cutlery. The population in 1911 numbered about 5,000, including the Jollofs which tribe inhabits the district in the vicinity of the town.

BATHURST, Australia, the principal town in the western district of the colony of New South Wales on the south bank of the Macquarie River, 144 miles west of Sydney, 2,153 feet above sea-level and surrounded by hills. It has wide, well-laid-out streets crossing each other at right angles, with a central square planted with trees. The public buildings in¬ clude the Anglican and Roman Catholic cathe¬ drals and churches for Baptists, Congregationalists, Wesleyans, Presbyterians and others; courthouse, jail and townhall, post and tele¬ graph offices ; a hospital, numerous schools, a school of arts, *etc.* There are several tanneries, a coach factory, railway workshops, breweries and flour mills. Soap, candles, glue, boots and shoes and furniture are also extensively manu¬ factured. The city was founded in 1819 and was the first settlement beyond the Blue Moun¬ tains, which were long believed to be impas¬ sable. In 1851 there were discoveries of gold here and this, with copper and silver, is the chief mineral product. Fine statuary marble is quarried. The whole district is admirably adapted to pastoral pursuits, and about 250,000 acres are under cultivation. Corn, barley, wheat, fruit and tobacco are the chief prod¬ ucts. It is well watered and, being 2,150 feet above sea-level, has a moderate temperature. Pop. (1911) 8,575.

BATHURST INLET, an inlet of the Polar Sea, projecting due south about 75 miles out of Coronation Gulf. It is in a direct line

between the magnetic pole and Great Slave Lake, and about 300 miles from each.

BATHURST ISLAND, the name of two islands: (1) An island off the northeast coast of Australia, just west of Melville Island, and separated from the mainland of Australia by Clarence Strait on the south, and from Melville Island by Apsley Strait; (2) an island in the Arctic Ocean, discovered by Parry in 1819, lying due south of Grinnell Land, and the most eastern of the group called Parry Islands. It is separated from North Somerset on the south by Barrow Strait, and from North Devon on the east by Wellington Channel.

BATHYBIUS, the name given by Hux¬ ley, in 1868, to a supposed organism, a bit of unorganized protoplasm, found at the sea-bot¬ tom at great depth. It was structureless and contained numerous calcareous concretions. Huxley abandoned the idea that it was a living organism. Afterward Bessels gave the name ˆprotobathybius® to a similar slimy moss dredged in Smith's Sound in 92 fathoms, pos¬ sibly the remains of protozoa or sponges. Bathybius was not rediscovered by the Chal¬ lenger expedition, and Sir John Murray sus¬ pected that the substance was only a gelatin¬ ous precipitate of sulphate of lime from sea water mixed with alcohol.

BATHYCLES, Greek artist, supposed to have flourished in the time of Solon, in the 7th century b.c. He was a resident of Magnesia, in Thessaly, on the Mseander, and constructed for the Lacedaemonians the colossal throne of the Amyclaean Apollo, at Amyclae, near Sparta. Quatremere de Quincy, in his (Jupiter Olym-pien,) has given an interesting view of the splendid god and his superb throne, designed from the description of Pausanias.

BATHYMETRY, the art of measuring depths in the sea, especially for the purpose of investigating the vertical range of distribution of plants and animals. An extensive series of such bathymetric measurements was made by H. M. S. Challenger (1872-76), the deepest sounding being 4,575 fathoms. In February 1900 the United States surveying ship Nero re¬ ported that in surveying for a proposed tele¬ graphic cable line between Honolulu and Manila by way of Guam and Yokohama, she encountered the greatest ocean depths on record, two casts showing 5,160 and 5,269 fathoms respectively. See Bathometer.

BATIFFOL, Pierre Henri, French edu¬ cator and writer: b. Toulouse, France, 27 Jan. 1861. He was educated at the Seminary of St. Sulpioe, Paris ; was a pupil of Duchesne in Paris and of De Rossi in Rome. He was or¬ dained priest in 1884 and from 1898 to 1907 was rector of the Catholic University of Toulouse. He has devoted the greater part of his life to the study of ancient Christian literature and was an active opponent of Loisy. He has pub¬ lished (Histoire du Breviaire romaiiP (Paris 1893; new cd., 1911; English trans., London 1898) ; (L'enseigmement de Jesus, } a statement of Catholic doctrine as opposed to Harnack's (L'essence du christ.ianisme) and Loisy's (L'Evangile et l'Eglise) (Paris 1905) ; (L'Eglise naissante et le catholicisme^ outlining the Catholic theory of Christian origins as against Ritschl, Harnack and others (Paris 1908; Eng¬

lish trans., London 1911). This work was com¬ mended by Harnack for its depth of Scholar¬ ship. He was one of the editors of the (Etudes d'histoire des. dogmes et dancienn-e litterature chretienne) and (Tractatus Origenis de Libris Sanctarum ScripturarumP extracts from Hippolytus, Novatian and Origen.

BATISTE, ba-test, a fine, white, very compact linen, distinguished by its delicate, firm and uniform threads from every other linen texture. The name is derived either from the Indian material bastas, or from one of the early manufacturers of it, Baptiste Chambray, who lived in the 13th century, and from whom it was also called the cloth of Chambray, or Cambray; hence the English word cambric.

BATJAN. See Batctiian.

BATLEY, England, municipal and par¬ liamentary borough, in the West Riding of York, eight miles south of Leeds, and just norlh of Dewsbury, with which it is united for parlia¬ mentary purposes. The houses are chiefly of stone, and rather irregularly built. Batley has an ancient parish church in the Early English style, a townhall, a grammar and a technical school, mechanics' institute, *etc.* The princi¬ pal manufactures are heavy woolen cloths, Batley being the chief seat of the manufacture of heavy woolens. There are also iron foun¬ dries, machine-works, collieries, *etc.* The town was incorporated in 1868, and operates its gas and waterworks. It also maintains public baths, markets, a library and a cemetery. Pop. 31,429.

BATNA, bat'na, Algeria, a town of the department of Constantine, situated at the foot of Mount Tugurt, which is covered with fine cedar

wood. The town contains a church and a* mosque, and is an important military and trading post between the Sahara and Tell. Pop. (1911) 8,890.

BATON, bat-on, or bii-ton, a short staff or truncheon, in some cases used as an official badge, as that of a field marshal. The con¬ ductor of an orchestra has a baton for the pur¬ pose of directing the performers as to time, *etc.* In heraldry, what is usually called the bastard bar, or bar sinister, is properly a baton sinister.

BATON ROUGE, bat'on roozh', La., city, parish-seat of East Baton Rouge, and capital of the State. The name is derived from the French, meaning red baton or stick. The city is situated on the eastern bank of the Missis¬ sippi River, 90 miles northwest of New Or¬ leans, and is on the Louisiana Railway and Navigation Company, the New Orleans, Texas and Mexico, the Southern Pacific and the Yazoo and Mississippi Valley railroads. It is picturesquely built on a bluff commanding an excellent view of the surrounding country. The houses are mostly of French and Spanish architecture. The river below the city is bor¬ dered by sugar-cane plantations, orchards of tropical fruits, private gardens and villas. It was the capital of the State from 1847 to 1864, when the seat of government was removed to New Orleans. On 1 March 1882, Baton Rouge was again selected as the capital city. The State capitol building here was completed in 1852 at a cost of $246,000. It was partially burned during the Civil War but was rebuilt in

1882. The Louisiana State University was or¬ ganized here in 1860. The city also contains various State institutions, orphan asylum, peni¬ tentiary, deaf and dumb and blind asylums, State agricultural and mechanical college and agricultural experiment station. There are, among other public buildings, the courthouse, city hall, State capitol,

Hill Memorial Library, Elks' home, post-office, collegiate institute, high school building and a national soldiers' cemetery.

There are varied and extensive manufactur¬ ing interests, including the largest southern re¬ finery of the Standard Oil Company, cotton seed products, lumber, sugar, molasses, brick, artificial ice and agricultural implements. The city has national and State banks, several daily and weekly newspapers. There is a large and growing trade with the surrounding cotton and sugar growing regions, and a flourishing shipping trade is carried on in its excellent harbor. The city has a real property assessed valuation of $2,000,000, actual valuation $3,500,-000, exclusive of the valuable city, parish and State property which is exempt from assess¬ ment. In addition to the above personal as¬ sessed property is $1,000,000, making a total assessment of $3,000,000, real value $5,000,000.

Baton Rouge adopted the commission form of government in 1913. The city was one of the earliest French settlements in Louisiana. A convention which met here 21 Jan. 1861, adopted the Ordinance of Secession on the 26th; the city was taken by the Federal army 7 May 1862. On 5 August the same year a Confeder¬ ate force numbering 5,000 under command of Gen. John C. Breckenridge attacked the Fed¬ eral garrison under Gen. Thomas Williams, but was repulsed after a fierce contest lasting two hours. General Williams was killed and both sides lost heavily. The city was shortly after¬ ward evacuated but a month later was re¬ occupied by the Federal troops who remained until the close of the war. A former govern¬ ment arsenal here was destroyed during the war. Pop. (1920) 21,782.

BATONI, ba-to-'ne, Pompeo Girolamo,

Italian painter: b. Lucca 1708; d. Rome 1787. The manner in which he executed his paintings was peculiar. He covered his sketch with a cloth and began to paint the upper part on the left hand and proceeded gradually toward the right, never uncovering a new place until the first was entirely finished. Boni, who compares him with Mengs, calls the latter the painter of philosophy; the former the painter of nature. Baton! painted many altar-pieces and numer¬ ous portraits, including those of the Emperor Joseph and the Empress Maria Theresa in the imperial gallery. His greatest work is his (Fall of Simon the Sorcerer, } -which was or¬ dered by Cardinal Albani for the church of Saint Peter's at Rome and was intended to be executed in mosaic. His (Magdalene, > in Dresden, and his (Return of the Prodigal Son,* in Vienna, are celebrated.

BATRACHIA, the frogs and toads of the Anura order of Amphibia (q.v.), comprising the Ranidce frogs, the Bufonidce ordinary toads, the Hylidce tree frogs, the Pipidce . Surinam toads and similar reptiles with the distinguish¬ ing characteristic of development from the

tailed and gilled tadpole state to a tailless, but leg-and lung-provided adult condition.

BATT, John Herridge, English Methodist divine: b. Taunton, Somerset, 23 June 1845. He was educated at Shebbear College, North Devon, and at Shireland Hall, Birmingham. He entered the ministry in 1864, was president of the Bible Christian Conference in 1887-88 and delegate to the (Ecumenical Methodist Conference held at Washington, D. C., in 1891 and to that held in London in 1901. In 1900-07 he was Bible Christian editor and has served as secretary of the Bible Christian Examining Committee for 25 years. In 1910-11 he was chairman of the Bristol and South Wales dis¬ trict. He has published (Dwight L. Moody: the Life Work of a Modern Evangelist* ; (Dr. Barnardo, the Foster-Father of Nobody's Children,* *etc.*

BATTA, Sumatra, a district in the northern part of the island, stretching between Sinkell and Tabuyong, on the west and the Bila and the Rakan on the east. Pop. about 300,000.

BATTALION. The unit of organization of troops consisting of several companies, usually four, and so called from being origi¬ nally a body of men arranged for battle. A battalion of infantry is generally divided into an even number of companies and the com¬ panies are equalized by transferring men from the larger to the smaller. In each battalion there is a color-guard, composed of a color-sergeant and seven corporals, which is posted as the left four of the right-centre company. The color-sergeant carries the national color. The regimental color (when present) is car¬ ried by a sergeant, who takes the place of the corporal on the left of the color-sergeant. A battalion of cavalry is usually composed of four companies, but may be composed of a less number or a greater number, not exceed¬ ing seven. The interval between companies in line is eight yards. In whatever direction the battalion faces the companies are desig¬ nated numerically from the right to the left in line and from the head to the rear when in column, first company, second company, and so on. In whatever direction the battalion faces the companies to the right of the centre of the battalion in line constitute the right King ; those to the left of the centre constitute the left wing. If there be an odd number of companies in

line the centre company belongs to the right wing. A battalion of artillery con¬ sists of any number of batteries from two to five. The interval between batteries in line is 28 yards. In horse-batteries the interval is 36 yards. In whatever direction the battalion faces the batteries are designated numerically from the right to the left in line and from the head to the rear when in column, first battery , second battery, and so on. In whatever direc— tion the battalion faces the batteries to the right of the centre of the battalion in line con¬ stitute the right wing; those to the left of the centre constitute the left wing. If there be an odd number of batteries the centre battery al¬ ways belongs to the right wing. Battalion training, the means whereby the smallest num¬ ber of independent units may be organized for manoeuvre and for combat, should be intensive and directed primarily at the instruction of the company officers in the handling of units and

BATRACHLANS AND OTHER AMPHIBIA

mm

Fig. 1 Ringed Siphonops

2 Tree Frog 3 Common Frog

12 Waltel's Salamander

4 Skeleton of Frog 5 Egg-carrying Frog *> fire7b,e"if'})J'rog. 13 Newt 14 Giant Salamander 15 Axolotl — larval stage

7 Toad. 8 Horned Frog 9 Pipa or Surinam Toad 16 Axolotl — perfect animal 17 Araphiuma 18 Proteus

10 Spotted Salamander 19 Siren

sub-units in their mutual relationship and should be mainly concerned with the tactical employment of the fighting power of com¬ panies in mutual support. The battalion com¬ mander should apply in practice the principles of command and tactical leadership, a knowl¬ edge of which he has gained by study and ex¬ perience, and should at times direct, but not command, his battalion in exercises designed to involve specific features of the minor phases of training, the elements of which have pre¬ viously been subjects of drill-ground training. A concrete case should be stated calling for the actual employment of the troops concerned. The strength and character of the opposition to be expected will be controlled by the bat¬ talion commander. Besides the application of appropriate tactical principles adapted to the ground in use, opportunity should be afforded of making incidental and appropriate use of previously acquired knowledge of signaling, of constructing field fortifications or pioneer work, of the passage of obstacles, of screen¬ ing from the observation of air craft, *etc.* The greater the variety of incidents intro¬ duced the more instructive wrill these exercises be.

As the result of trench warfare and inten¬ sive training, the tactics of a battalion in de¬ fense have changed as drastically as in attack. If the enemy now assaults a position he must first pass through the curtain of fire of artil¬ lery. If the range becomes shorter he meets rifle fire and the machine guns, each firing 500 shots a minute. Then at 150 yards from the trench he is met by a second barrage of fire of bombs from the rifle grenades. If there be any survivors they are met at 40 yards by bombs thrown by hand, by close rifle fire and machine guns that spray bullets. If any reach their objective they face bayonets. The whole attack is under a dense white smoke of hun¬ dreds of exploding bombs. Each man has his specified work and his particular weapon, in the use of which he has been found to display a special aptitude. Each man has a responsi¬ bility which never fell to the share of the in¬

dividual infantryman in the old-fashioned at¬ tack. See Army Organization; Tactics, Mil¬ itary; Telegraph Battalions.

BATTENBERG, baten-barg, Alexander,

Prince, Bulgarian ruler: b. 1857; d. 23 Oct. 1893. He was the second son of the morgan¬ atic union between Prince Alexander of Hesse and the Countess von Hauke, who in 1851 re¬ ceived the title of Countess of Battenberg. In 1879 he was chosen Prince of Bulgaria and in 1885, without consulting Russia, proclaimed the union of eastern Rumelia with Bulgaria. This action exasperated both Russia and Ser¬ bia and the latter took up arms against Bul¬ garia but was easily defeated by Alexander in ihe space of two weeks. In August 1886, however, Russian partisans overpowered Alex¬ ander in his palace at Sofia, forced him to ab¬ dicate and carried him off to Reni, in Russian territory. Set free in a few days, he returned; but after a futile attempt to conciliate the Tsar, he abdicated in September, married an actress, and assuming the title of Count Hartenau, re¬ tired to Gratz. See Bulgaria.

BATTENBERG, Plenry Maurice, Prince, brother of the preceding; British soldier: b.

Milan, 5 Oct. 1858; d. 20 Jan. 1896. He was the third son of Prince Alexander of Hesse (see Battenberg, Alexander, above), and in 1885 married the Princess Beatrice of Eng¬ land, youngest daughter of Queen Victoria. He joined the British expedition of 1895 against Ashanti and while on his way home died at sea of a fever contracted during his military service. His youngest son, Prince Maurice, d.ed of wounds received in action 27 Oct. 1914. His daughter, Princess Victoria, married King Alfonso XIII of Spain in 1906. The eldest son, Prince Alexander of Batten¬ berg, changed his name and title by royal con¬ sent (June 1917) to Marquis of Carisbrooke.

BATTENBERG, Louis Alexander, Prince, British admiral : b. Gratz, Austria, 24 May 1854. He was the eldest son of Prince Alexan¬ der of Hesse (see Battenberg, Alexander, above), and in 1884 married the eldest daughter of the Princess Alice Maud Mary, Grand Duchess of Hesse-Darmstadt, and second daughter of Queen Victoria. A naturalized British subject, he entered the navy in 1868, in which his rise was rapid. He was director of naval intelligence, 1902-04, and after holding important commands, was appointed First Sea Lord of the Admiralty in 1912, which post he held at the outbreak of the great

European War. Following a campaign in the Brit¬ ish press against alien enemies resident in Great Britain, he resigned his office on 30 Oct. 1914, on the ground that his birth and parentage somewhat impaired his usefulness. In accepting his resignation, the First Civil Lord of the Admiralty, Mr. Win¬ ston Churchill, paid a high tribute to his serv¬ ices, and especially referred to the provision he had made for the immediate concentration of the Grand Fleet at the opening of the war. In June 1917 his title was changed to Marquis of Milford Haven.

BATTENBERG, Prussia, village in the state of Hesse-Nassau, from which the sons of Prince Alexander of Hesse (see Batten¬ berg, Alexander) derive their title of princes of Battenberg. Before 1866 it belonged to Hesse-Cassel. Pop. about 1,000.

BATTERING RAM (Lat. dries), the earliest, simplest, and, until the improved usage of artillery, the most effective machine for de¬ stroying stone walls and the ordinary defenses of fortified towns. Its primitive form was a huge beam of seasoned and tough wood, hoisted on the shoulders of men, who, running with it at speed, against the obstacle, wall, gate or palisade, made what impression they might against it. The ancients employed two different machines of this kind — the one suspended, and vibrating after the manner of a pendulum, and the other movable on rollers. The swinging ram resembled in magnitude and form the mast of a large vessel, suspended horizontally at its centre of gravity, by chains or cords, from a movable frame. Ligatures of waxed cord sur¬ rounded the beam at short intervals, and cords at the extremity, opposite to the head, served for the purpose of applying human force to give the oscillatory motion. The rolling ram was much the same as the above in its general construction, except that instead of a pendulous motion, it received only a motion of simple alternation, produced by the strength of men

applied to cords passing over pulleys. This construction seems to have been first employed at the siege of Byzantium. These machines were often extremely ponderous. Appian de¬ clares that, at the siege of

Carthage, he saw two rams so colossal that 100 men were em¬ ployed in working each. Vitruvius affirms that the beam was often from 100 to 120 feet in length; and Justus Lipsius describes some as 180 feet long, and two feet four inches in diameter, with an iron head weighing at least a ton and a half. In contrasting the effects of the battering ram with those of the modern artillery, we must not judge of them merely by the measure of their respective momenta. Such a ram as one of those described by Lip¬ sius would weigh more than 45,000 pounds, and its momentum, supposing its velocity be about two yards per second, would be nearly quadruple the momentum of a 40-pound ball moving with a velocity of 1,600 feet per second. But the operation of the two upon a wall would be very different. The ball would probably pene¬ trate the opposing substance, and pursue its way for some distance ; but the efficacy of the ram would depend almostly entirely upon duly apportioning its intervals of oscillation. At first it would produce no obvious effect upon the wall; but the judicious repetition of its blows would, in a short time, give motion to the wall itself. There would first be a barely perceptible tremor, then more extensive vibra¬ tions ; these being evident, the assailants would adjust the oscillations of the ram to that of the wall, till at length a large portion of it, par¬ taking of the vibratory impulse, would, by a well-timed blow, fall to the earth at once. This recorded effect of the ram has nothing analo¬ gous in the results of modern artillery.

BATTERSEA, a metropolitan borough cf London, in Surrey, forming, with Clapham, a parliamentary borough, on the right bank of the Thames, opposite Chelsea, across which there is communication by several bridges. Area, 2,160 acres. There is a fine public park in Battersea, extending over 185 acres, and containing a .subtropical garden of four acres, artificial lakes and other attractions. Clapham and Wandsworth commons are fine areas of unenclosed ground. Battersea and Clapham send two members to Parliament — one for each division. The municipality is most progressive, many of the public utilities, including electricity, being publicly owned. Pop. 167,743. Consult Browning and Kirk, (Early History of Bat¬ tersea, which is reprinted from the collections of the Surrey Archaeological Society (1891); Green and Darner, c Clapham Junction and Its Pepple' (1889) ; Hammond, (Bygone Battersea' (1897); Simmonds, (All About Battersea'

(1882).

BATTERSON, James Goodwin: b. Bloom¬ field, Conn., 23 Feb. 1823;

d. Hartford, Conn., 18 Sept. 1901. He was educated in the public schools of Litchfield, Conn., and in 1845 became an importer of and dealer in granite and marble, with headquarters in Hartford. His business grew into one of the most extensive of its kind in the United States, controlling large granite quarries in Westerly, R. I. He took important contracts for public and private buildings and supplied the stone for the State capitol and Connecticut Mutual buildings in Hartford, the

Mutual Life, Equitable Life Insurance com¬ panies' buildings and Vanderbilt residence in New York. He was the first to use machinery for polishing granite and devised many other improvements. In 1863 he founded the Trav¬ elers' Insurance Company, and was its president until his death. Throughout his life, though never holding political office, he was one of the foremost public figures of his city and State. He was an enthusiastic student of political economy, and wrote numerous articles and pamphlets on the money question. He taught himself Greek and became an acknowledged master of it; and he was equally accomplished in several of the modern European languages, his versatility and capacity for work being ex¬ traordinary. In the last year of his life he wrote a poem of some length, (The Begin¬ nings,' dealing with the origin of the universe and life.

BATTERY, The, a park of 21 acres form¬ ing the southernmost point of New York, occupying the site of the original Dutch forti¬ fications. In the early days of the city the vicinity of the Battery was a very aristocratic quarter, and some of the old houses are still standing. The park now contains the Barge Office and the Aquarium, formerly Castle Gar¬ den (q.v.).

BATTERY. See Electric Battery.

BATTEUX, ba-te, Charles, French schol¬ ar, honorary canon of Rheims. b. Al-land'huy, 1713; d. 14 July 1780. He displayed his gratitude to this city, in which he received his education, by the ode (In Civitatem Remen-sem,' which was much admired. In 1739 he was invited to Paris, where he taught rhetoric in the colleges of Lisieux and Navarre. He was afterward appointed professor of Latin and Greek philosophy at the Royal College. In 1754 he became a member of the Academy of Inscriptions, and in 1761 of the French Acad¬ emy. Batteux left a large number of valuable works. He did much service to literature and the fine arts, by introducing unity and system into the numerous canons of taste, which had gained a standing among the

French by the example of many eminent men, particularly in regard to poetry, and must be regarded as a valuable writer on aesthetics, notwithstanding the higher point of view from which this science is now considered. Some of his most valu¬ able works are (Les Beaux-Arts reduits a un meme principe' (1747) and (Cours de Belles-Lettres ou principes de la litterature' (1774). These works were translated into several other languages.

BATTHYANYI, bot'ya-nye, Kasimir, Count, Hungarian statesman, Minister of For¬ eign Affairs during the Hungarian revolution : b. 4 June 1807; d. Paris, 13 July 1854. From his earliest childhood he took a lively interest in public affairs, and after having, as member of the Hungarian Diet, opposed the Austrian gov¬ ernment, he became at the outbreak of the revolution one of the prominent champions of Hungarian independence, devoting his wealth and influence to the promotion of this cause, and at the same time distinguishing himself on various occasions by his courage and skill on the battlefield. After having officiated as gov¬ ernor of various provinces, he became Minister

of Foreign Affairs, under the administration of Kossuth, and subsequently he shared his exile in Turkey until 1851, when he repaired to Paris, where he died. Although sympathizing with Kossuth in some respects, he differed from him in others, and addressed, in 1851, a series of letters to the London Times, in which he re¬ flected rather severely upon Kossuth's character as statesman and patriot.

BATTHYANYI, Louis, Count, Hungarian patriot: b. Pressburg 1809; d. 6 Oct. 1849. He entered the army as a cadet at the age of 16, and on coming into possession of a large for¬ tune, abandoned a military for a political career, and in process of time attained the rank of leader of the opposition in the Hungarian Diet. Upon the breaking out of the commotions of 1848, Batthyanyi took an active part in pro¬ moting the national cause, and with a company of armed vassals came forward to assist it in the field. On the entry of Windischgratz into Budapest in January 1849, he was arrested in the house of his sister-

in-law, the Countess Karolyi. After being conveyed to various places he was finally brought back to Budapest, tried by court-martial and condemned to be hanged. The execution of this sentence he prevented by inflicting several wounds with a poniard on his neck, and he was accordingly shot.

BATTIAD.3E, a dynasty of Cyrene which reigned from the 7th to the 5th century b.c. The kings of this dynasty were Battus I, the founder of Cyrene ; Arcesilaus I, his son ; Bat¬ tus II, son of Arcesilaus, who greatly increased the power of Cyrene ; Arcesilaus II, son of Battus II; Battus III, son of Arcesilaus II; Arcesilaus III, son of Battus III, who sub¬ mitted to the Persian King; Battus IV, son of Arcesilaus III; Arcesilaus IV, son of Battus IV, the last king of Cyrene, -killed in a revolu¬ tion. He is celebrated in the fourth and fifth Pindaric odes.

BATTIK, an Oriental production of the na¬ tives of the Dutch East Indies, who decorate their clothing with it ; also made in The Hague for local use and export. Upon a piece of linen various designs are outlined with a pencil. When the design is completed, the ornamented parts of the fabric are covered with a liquid which possesses the quality of stiffening after being applied. The parts not ornamented are dyed the desired color. After the entire fabric has been ornamented in this manner, it is boiled in hot water so as to take the hard stuff out of the battik. The dyed parts will then hold the dye and the battik is ready. The Hague people were the first to introduce battik into Europe. It is made on linen, silk, velvet and leather, and is exported to all the principal cities of Europe.

BATTISTI, Cesare, Italian author and patriot: b. Trent, 4 Feb. 1875; d. 13 July 1916. After studying law at Vienna and Gratz, he devoted himself to geographical science at Florence, where he received the Litt.D. degree in 1897. His topographical, geological and lit¬ erary researches concerned always the Trentino, that part of ((Italia irredentaˆ under Austrian rule. His numerous works on these subjects are regarded as standard authorities. An ardent democrat, he fiercely defended the Italian national cause in the Trentino. He had fought in the ranks of the Liberals until

Socialism made its appearance in that part, when he embraced the new creed and became its leading exponent. As editor of the Social¬ ist daily paper II Popolo, and as Socialist dep¬ uty for Trent in the Austrian Parliament, he conducted ihe political campaign in favor of autonomy for the Trentino and the establish¬ ment of an Italian

university in Austria. On various occasions his activities brought him into conflict with the Austrian authorities and also several terms of imprisonment. On the outbreak of the European War Battisti re¬ turned to Italy and advocated Italian interven¬ tion against Austria. This desire being ful¬ filled in May 1915, he entered the Italian army as a private soldier and in due course rose to the rank of captain. During an attack on the Pasubio sector in the Vallarsa on 10 July 1916, in which Battisti commanded a company of the Vicenza Battalion, he was severely wrounded and left on the battlefield, where he was found by the Austrians. On 13 July the Italian pa¬ pers announced that he had been killed in bat¬ tle; the following day a report from Innsbruck stated that he was a prisoner in the hands of the Austrians and would be tried by court-mar¬ tial for high treason. Two days later it was announced that he had been sentenced to death and executed on 13 July. A different complexion was given to the story by Signor Area, an Italian deputy, returned from the front on 17 July. He stated that Battisti, being unable to regain the Italian lines after receiving his wounds, had committed suicide rather than fall into the hands of his enemies. It was then assumed that the Austrians had held a mock trial on the body and afterward hanged it.

BATTLE, George Gordon, American law¬ yer: b. Spring Plantation, Edgecombe County, N. C., 26 Oct. 1868. In 1882-83 he attended the University of North ‘Carolina and in 1886-89 the University of Virginia. He was admitted to the bar in 1891 and began practice in New York City. In 1892-97 he was assistant district at¬ torney of New York County and in 1909 was the Democratic candidate for district attorney. In 1901 he became a member of the firm of Battle & Marshall, afterward O’Gorman, Bat¬ tle & Vandiver. He is a member of the Bar Association of New York City, the Southern Society, the North Carolina Society of New York and of the Virginians.

BATTLE, Kemp Plummer, American edu¬ cator : b. Franklin County, N. C., 19 Dec. 1831; d. 4 Feb. 1919. Graduated at the University of North Carolina, 1849; he received A.B., A.M., LL.D. from Davidson College and from the University of North Carolina. He was a mem¬ ber of the Secession Convention, 1861 ; State treasurer of North Carolina, 1866-68; president of the University of North Carolina, 1876-91 ; resigned to become professor of history, 1891-1907 ; was emeritus professor of history, Uni¬ versity of North Carolina, after 1907. He published (History of the University of North Carolina) ; (History of the Supreme Court of North Carolina) ; (Trials and Judicial Pro¬ ceedings of the New Testament* ; (01d Schools and Teachers of North Carolina* ; and many historical pamphlets.

BATTLE. An encounter between two armies, resulting from an attempt of one of

the armies to attain an object while the other opposes the attempt. This encounter is usually a general action in which all of the divisions of the armies are or may be engaged. Battles are classified as defensive, offensive and mixed. In a purely defensive battle the army selects a position in which to await the enemy and there to give battle with no other end in view than to hold this position and repulse the enemy. In a purely offensive battle an army seeks the enemy and attacks him wherever he is to be found. A mixed battle is a combination of these two. All other things being equal, an offensive battle offers the greatest advantages, as it permits a general to choose his point of attack and gives him time to make all the preparations that he may deem necessary. Not¬ withstanding the practical application of science in warfare, the inventions of airplanes, wireless telegraphy, etc., battles, though planned and fought almost solely on tactical principles, have in many cases important strategical bearings which it is the province of an able general to see and to take advantage of. Skilfully com¬ bined strategical marches, when ably executed, may alone decide the fate of a campaign, with¬ out the necessity of coming into collision with the enemy; but this is a rare case, and a battle is usually the necessary sequence to an import¬ ant strategical movement, and, if well planned and successfully fought, may prove decisive of the war. Military writers designate by orders of battle the general combinations made to attack one or more points of an enemy's posi¬ tion ; while they apply the term line of battle to the disposition of the troops, in their rela¬ tions to each other for mutual cooperation, acting either offensively or defensively. What¬ ever may be the disposition of the troops, the line of battle of any considerable force will present a well-defined centre and two wings ; thus offering to an assailant one or more of these as his point of attack. This has led to dividing orders of battle into several classes, arising from the necessary disposition of the assailing force, as it moves to attack one or more of these points. If an equal effort is made to assail every point

of the enemy's line, the assailing force must necessarily advance on a line parallel to the one assailed, and this therefore has received the name of the parallel order of battle. If the line of the assailing force is sensibly perpendicular to that of the assailed, the disposition is said to be the per¬ pendicular order. If the main attack is made by one wing, the centre and other wing being held back, or refused as it is termed, the posi¬ tions of the lines of the two parties become naturally oblique to each other, and this is termed the oblique order. In like manner the concave order results from an attack by both wings, the centre being refused, and the convex order from refusing the wings and attacking by the centre, *etc.* The order of battle should result from the position in which the enemy's forces are presented for attack; and as these, if skilfully disposed, will be nosted so as to take advantage of the points of vantage which the position they occupy offers, the order of battle for assailing may vary in an infinity of ways. Still it is not to be inferred that one order is not superior to another, or that the choice between them Is one at pleasure. In the parallel order, for example, the opposing forces

being supposed equal in all points, there is no reason why one point of the enemy's line should be forced rather than another, and, therefore, success depends either upon destroying his whole line, or simply pushing it back; as chance alone will determine a break in any part of his line. In the oblique order, on the contrary, one wing being refused, or merely acting as a menace, the other may be strongly re-enforced, so as to overwhelm the wing opposed to it, and, if this succeeds, the assailing army, by its simple onward movement, is gradually brought to gain ground on the enemy's rear, and to threaten his line of retreat. Again, in crossing a river on a bridge, or passing through any other defile to assail an enemy opposing this movement, the order of battle becomes neces¬ sarily convex, the extremity of the defile itself becoming the centre from which the assailing forces radiate, to enlarge their front, while they are obliged to secure the defile on each flank. To lay down rules therefore as to what order of battle should, in every case, be em¬ ployed would be pure pedantry. Talent, skill and experience can alone enable a general to decide this point in any given case. As to the distribution of the troops belonging to the separate fractions of the entire force, as an army corps, a division, etc., the rule is to so distribute them that they shall fight under the immediate eye of their respective commanders and support each other. While engineering sci¬ ence is now applied to the emergencies of mod¬ ern warfare in order to facilitate locomotion and communication, and while the modern battle is largely decided by a

superiority of motor trans¬ ports, transporting men from one part of the battlefield to another, with airmen to guide operations, it must be remembered that even in the highly scientific battle of to-day, with vast and newly-invented war machinery at hand, the infantry is the principal and most important arm, which is charged with the main work on the field of battle and decides the final issue of combat. The role of the infantry, whether offensive or defensive, is the role of the entire force, and the utilization of that arm gives the entire battle its character. The success of the infantry is essential to the success of the combined arms. If the hostile lines are held by good infantry, properly led and supported by proper artillery, fire action alone will not bring about a decision. For this purpose the assault will be necessary. See Advance Guard ; Attack; Outpost; Patrols; Reconnaissance; Strategy; and Tactics.

BATTLE, England, market-town in Sus¬ sex, situated in a valley seven miles northwest of Hastings. The church is ancient, and con¬ tains some fine specimens of painted glass and numerous antique monuments. Battle was long celebrated for the manufacture of gunpowder. The early name of this place was Senlac, and it received its present name from the battle of Hastings which was fought here. In memory of the battle William the Conqueror erected the famous Battle Abbey on the spot where Harold fell. This building, the ruins of which have a circumference of about a mile, has almost en¬ tirely disappeared, but interesting remains of a subsequent building exist, including the gate¬ way, . a beautiful specimen of the decorated English style. One portion of this building

forms a mansion, ihe residence until her death of the Duchess of Cleveland. Consult Walcott, (History of Battle Abbey) (1867) ; Duchess of Cleveland, <The Roll of Battle Abbey > (1889). Pop. 2,996.

BATTLE, Law of, the contest between male animals for possession of the females, among barbarous nations. Among certain tribes of the North American Indians the men wrestled for any women to whom

they were attached. With the Australians the women were the constant cause of war, both between the individuals of the same tribe and between distinct tribes. In mammals the male, says Darwin, appears to win the female much more through the law of battle than through the dis¬ play of his charms. The most timid animals, even the hare, will fight desperately, the duel only ending by the death of one of the par¬ ties. Male moles, squirrels and beavers have been seen fighting for their mate.

BATTLE, Trial by, or Wager of, an ob¬ solete method of deciding cases, whether civil or criminal, by personal combat between the parties or their champions in presence of the court. A woman, a priest, a peer or a person physically incapable of fighting could refuse such a trial. This mode of trial ended in Scot¬ land with the close of the 16th century. Consult Stephen, (History of the Criminal Law of England) (1883) ; Neilson, (Trial by Combat >

(1890).

BATTLE ABOVE THE CLOUDS, The,

the name given to that portion of the battle of Chattanooga fought on Lookout Mountain, Tcnn., 24 Nov. 1863. See Chattanooga, Bat¬ tle of.

BATTLE AXE, a military weapon much used in the early part of the Middle Ages, par¬ ticularly by those who fought on foot. It was not uncommon, however, among the knights, who used also the mace, a species of iron club or hammer. Both are to be seen in the differ¬ ent collections of old arms in Europe. The Greeks and Romans did not employ the battle axe, though it was found among contemporary nations. In fact the axe is one of the earliest weapons, its use as an instrument of domestic industry naturally suggesting its application for purposes of offense; but, at the same time, it has always been abandoned as soon as the art of fencing, attacking and guarding was culti¬ vated ; because the heavier the blow given with this instrument, the more will it expose the fighter. It never would have remained so long in use in the Middle Ages but for the iron ar¬ mor which protected the body from every thing except heavy blows. In England, Ire¬ land and Scotland the battle axe was much employed. At the battle of Bannockburn, King Robert Bruce clave an English champion down to the chin with one blow of his axe. The Lochabcr-axe remained a formidable weapon in the hands of the Highlanders to a recent period and was used by the old city guard of Edinburgh A pole

axe is a long-handled bat¬ tle axe.

BATTLE OF THE BLOODY ANGLE.

Sec Spottsylvania Court House, Battles of.

BATTLE OF THE BOOKS, The, a fa¬ mous work by Jonathan Swift, written in 1697, but remaining in manuscript until 1704. It

was a travesty on the endless controversy over the relative merits of the ancients and mod¬ erns, first raised in France by Perrault. Its immediate cause, however, was the position of Swift's patron, Sir William Temple, as to the genuineness of the < Letters of PhalarisP The work was not taken with entire seriousness by Swift's contemporaries.

BATTLE CREEK, Mich., city of Calhoun County, midway between Detroit and Chicago, located at the junction of the Battle Creek and Kalamazoo rivers and on the main trunk lines of both the Michigan Central and Grand Trunk railways, 48 miles south of Grand Rapids. Battle Creek is in the centre of the best farming district of the State, having with¬ in a radius of 15 miles over 425,000 acres of improved land with $25,000,000 invested in farm properties. Battle Creek is known as a manufacturing centre and has a national repu¬ tation for its cereal foods. There are 176 manu¬ facturing plants employing 6,200 people. Bat¬ tle Creek manufactures threshing machines, traction engines and steam pumps and also printing presses, bread-wrapping machines, gas stoves, fibre boxes, box board paper, wall reg¬ isters, steel paper balers, air compressors, brass and aluminum goods, automatic sealing ma¬ chines, bakers' ovens, hose clamps, high-power drills, electric bath cabinets, candies and cigars. There are several large foundries and one big enameling plant. The weekly payroll is $169,000. The engine and repair shops of the Grand Trunk Railroad are also located in this city and this is a divisional centre of that rail¬ road. Battle Creek has a large sanatorium, with thousands of visitors yearly and nearly 1,000 employees. It is the 9th city in size in the State of Michigan, but the first city in per capita bank deposits, with $13,718,171.22 and the first city in the State in the value of net factory output per capita of population. The city is also a leader in the per capita of savings deposits, there being $484 for every man, woman and child in the city. It is the 4th city in the State in the annual value of manu¬ factured products, having $23,248,000 in 1914. The city is known as a home-owning city, as 72 per cent of the people own their

own homes and 98 per cent are American-born. It has over 50 fraternal societies, a woman's club, a charitable union, a women's league, an asso¬ ciated charities, a Y. W. C. A., a Y. M. C. A., the Athclstan Club, a social organization com¬ posed of 400 business and professional men, and a Chamber of Commerce. There is a public library costing $70,000, a Y. M. C. A. building costing $40,000, both the gifts of the late Charles Willard; a fine city hospital, the gift of John Nichols; to this has been added a fine addition, the gift of the Rogers family. There are 12 schools with 140 teachers, and a $350,000 central high school, the city having invested $1,000,000 in schools without bonding. There is also a Catholic school, Adventist school and two business colleges. 1 here are three daily papers and a number of monthly publications. Battle Creek, so named from a pioneer fight with Indians, was first settled in 1832 by families from New York and New England. It was incorporated as a village in 1850 and as a city in 1859. Since 1913 it is under a commission form of government.

The city owns a $100,000 dual water system, has a paid fire and police department, electric lights and gas plant and two telephone systems. It has an assessed valuation of $37,890,780, 110 miles of streets, 16 miles of paving, 44 miles of sewer, 8ˆ2 miles of street railway. There are nine parks of 102 acres. Adjoining the city is Lake Goguac, surrounded by beau¬ tiful homes and estates. There are 16 lakes in the immediate vicinity that abound with fish, and State highways reach all parts of the county from the city. Battle .Creek stands 3d among the cities of the State in the amount of post-office business. Pop. (1920) 36,164.

BATTLE CREEK SANITARIUM, The,

is a philanthropic and humanitarian institution operating under a perpetual charter which compels the use of all the profits gained to foster the spread of humanitarian work. More than 60 branches of the parent institution have been established in or near large cities in dif¬ ferent parts of the world, under the title of The American Medical

Missionary Associa¬ tion, and each of these branches conducts a life-saving business on Good Samaritan prin¬ ciples. The organization began its work in the year 1866, with almost no capital and only one patient, in a small two-story frame house, in the then small village of Battle Creek, Mich. The incorporators believed that Chris¬ tianity should be expressed in works as much as in faith, in curing the sick and healing the wounded, and thus preparing the unfortunate for the reception of moral and spiritual in¬ spiration.

The Golden Rule is the foundation princi¬ ple of the institution. It has grown from a small beginning to the immense proportions of the present time, with one of its buildings nearly 1,000 feet in length and six stories in height and numerous other buildings radiat¬ ing from the main one and scattered about it in a finely wooded park. Fire destroyed the old building and all its contents, but it was soon rebuilt larger and better than before, and has grown to its present proportions.

BATTLE CRY OF FREEDOM, The, a

patriotic song of the American Civil War by the well-known composer, George Frederick Root (1861).

BATTLE OF DORKING, The, a realis¬ tic, matter-of-fact description of an imaginary invasion of England by a foreign power, by Gen. (then Lieut. -Col.) Sir George Chesney. It appeared anonymously first in Blackwood's Magazine in 1871 and has since been reprinted under the title (The Fall of England.* After the ignominious defeat of the French at Sedan, Chesney foresaw a similar fate for his own country unless it should reorganize its army. In the story fleet and army are scattered when war is declared, but the government has a sublime confidence that British luck and pluck will save the country now as hitherto. To universal surprise and consternation, the hos¬ tile fleet annihilates the available British squadron and the enemy lands on the south coast. Volunteers are called out and respond readily; but ammunition is lacking, the com¬ missariat is unorganized and the men, though brave, have neither discipline nor endurance. The decisive battle is fought at Dorking, the British are routed and England, without other

alternative, is compelled to submit to the humil¬ iating terms of the conqueror.

BATTLE OF THE FROGS AND MICE, The, an ancient Greek mock epic,

written in hexameters. Formerly attributed to Homer. Modern critics are of the opinion that the credit of authorship should be given to Pigres (q.v.). Only 316 lines are now extant.

BATTLE-GROUND, Ind., a town in Tip: pecanoe County, where the famous battle of Tippecanoe was fought between the United States troops under General Harrison and the Indians under Tecumseh and his brother, (<The Prophet,® 7 Nov. 1811.

BATTLE-HYMN OF THE REPUB¬ LIC, American song, by Julia Ward Howe, published in the Atlantic Monthly in 1862, and sung to the air <(John Brown's Body.®

Mine eyes have seen the glory of the coming of the Lord;

He is trampling out the vintage where the grapes of wrath are stored;

He hath loosed the fateful lightning of His terrible swift sword;

His truth is marching on

I have seen Him in the watch-fires of a hundred circling camps;

They have builded Him an altar in the evening dews and damps;

I can read His righteous sentence by the dim and flaring lamps;

His day is marching on.

I have read a fiery gospel, writ in burnished rows of steel:

" As ye deal with my contemners, so with you my grace shall deal;

Let the Hero, born of woman, crush the serpent with his heel, Since God is marching on."

He has sounded forth the trumpet that shall never call retreat; He is sifting out the hearts of men before His judgment seat; Oh, be swift, my soul, to answer Him! be jubilant, my feet! Our God is marching on.

In the beauty of the lilies Christ was born across the sea, With a glory in his bosom that transfigures you and me;

As he died to make men holy, let us die to make men free. While God is marching on.

BATTLE OF THE KEGS, The. See

Hopkinson, Francis.

BATTLE OF MALDON, The. This

fragment, consisting of 325 lines of Anglo-Saxon verse, celebrates anjiistorical occurrence of the year 991. A Viking expedition of con¬ siderable size, including, among other leaders, the celebrated Olaf ‘ Tryggveson, descended up¬ on the east coast of England, and, as the (An¬ glo-Saxon Chronicle) informs us, plundered Ipswich. The Scandinavians then moved down the coast to Essex and landed near Maldon, at the mouth of the river Blackwater. Here they were met by the military forces of Essex under the ealdorman Byrhtnoth. After a spirited struggle, the English were defeated, and Byrhtnoth slain. The <Chronicle) con¬ tinues : ((In this same year it was resolved that tribute should be given, for the first time, to the Danes, for the great terror they occasioned by the seacoast.® To this timid and disas¬ trous policy the poem affords the sharpest con¬ trast ; it is full of the pride and defiance of the warrior, of the undying allegiance of the thane to his lord, and of the necessity for vigorous defense against the common foe. There is much probability that it was designed not only to record a heroic struggle against overwhelming odds, but also to call the Eng¬ lish to a spirited resistance. The piece was nrobably composed not long after the battle.

Although some three centuries later than (Beowulf, > it preserves the technique and the vigor of the older alliterative poetry. The manuscript is no longer extant, but the lines were copied by Hearne, and published at Ox¬ ford in 1726. There is a convenient translation into modern English verse by H. W. Lumsden, printed by Cook and Tinker in translations from Old English Poetry,) but it should be observed that the verse-form does not repro¬ duce that of the original.

William Witherle Lawrence.

BATTLE MONUMENT, a monument in Baltimore, Md., erected in memory of those who fell in defense of the city when it was attacked

by the English forces in September

BATTLE OF THE SALIENT. See

Spottsylvania Court House, Battles of.

BATTLE OF THE SPURS, (1) defeat of the French by the Flemings at Courtrai, 1302; (2) a battle of Guinegate, 16 Aug. 1513, in which the French cavalry were defeated by the forces of Henry VIII of England and the Emperor Maximilian. It was thus named on account of the numberless gilt spurs gathered by the victors.

BATTLEDORE AND SHUTTLE¬ COCK, a popular game invented in the 14th century. The implements are a bat shaped like a tennis racket and strung with gut or covered with parchment, and a shuttlecock consisting of a cork stuck with feathers, which is batted to and fro between the players.

BATTLEFORD, Canada, a town of Sas¬ katchewan province, on the river Battle near its junction with the North Saskatchewan, about 100 miles from Prince Albert. The Riel insurrection began near Battleford. It was the capital of the Northwest Territory, 1876-83. Pop. (1911) 1,335.

BATTLEMENTS, notched or indented parapets used in fortifications. The rising parts are called cops or merlons ; the spaces by which they are separated crenels, embrasures and sometimes loops. The object of the device is to enable the soldier to shelter himself behind the merlon, whilst he shoots through the em¬ brasure. The bas-reliefs of Nineveh and the Egyptian paintings testify to the antiquity of this form of structure. There is no nation by which it has not been adopted.

BATTLESHIP. See Naval Architec¬ ture; Warships, Modern.

BATUM, or BATOUM, (1) a district in Transcaucasia, on the eastern shore of the Black Sea. Area, 2,700 square miles; pop. 185,000. Batum was taken from Turkey in 1878 and an¬ nexed to Russia. By the Brest-Litovsk treaty of 3 March 1918 Russia was obligated to evacu¬ ate the provinces of Batum, Kars and Erivan. Rich in minerals, coal, timber and other nat¬ ural resources, Batum lacks the means of trans¬ portation to develop its industries. Tea, cot¬ ton and silk are produced. (2) The principal town and seaport of the district of Batum. By the Treaty of Berlin it was made a free port, an arrangement

abrogated by Russia in 1886. The terminal of the Baku-Tiflis railway and of the pipe-line from Mikhailov, much of the oil

from Transcaucasia is shipped from this port. Despite obligations to the contrary, the town was strongly fortified by Russia and turned into a naval base. The climate is hot, wet and vari-phle. Palms, oranges and lemons are abundant. Pop. about 45,000. In the rearrangement of frontiers by Peace Conference of 1919, Batum marked the boundary line of Armenia. A Brit¬ ish force occupied the town in December 1918.

BAUCIS, in mythology, a Phrygian wo¬ man, the wife of Philemon. They received Jupiter and Mercury hospitably, after these gods had been denied hospitality in the whole country while traveling in disguise. A deluge destroyed the remainder of the people, but Philemon and Baucis, with their cottage, were saved. They begged the gods to make their cottage a temple, in which they could officiate as priest and priestess, and that they might die together ; which was granted. Philemon and Baucis are, therefore, names often used to in¬ dicate faithful and attached married people. See Philemon.

BAUDELAIRE, bo-d-lar, Charles Pierre,

French poet; b. Paris, 9 April 1821 ; d. 31 Aug. 1867. In early life he resided for some time in the East Indies, and on his return devoted him¬ self to literature. He first gained some repu¬ tation by translations from the works of Edgar Allan Poe, four volumes of which appeared in 1856-65, regarded as masterpieces in their way. A production, however, that caused greater sensation was a collection of poems designated (Les Fleurs du MaP (1857), which had to be expurgated as the result of proceedings on the part of the police authorities. This work gave Baudelaire a high position as a writer of the romantic school, and evidenced at the same time his curious inclination for repulsive sub¬ jects. A work of higher tone was his (Petits Poemes en Prose) ; others being (Les Paradis Artificiels) ; (Opium et HaschiclP ; a mono¬ graph on Theophile Gautier; and (R. Wagner et Tannhauser a Paris. } Apart from his verse however Baudelaire's finest work is contained in his (Little Poems in Prose. } All of these are exquisitely written, and in many of them the beauty of the thought is equal to the beauty of the language. He united a remarkably keen analytical faculty with a powerful, sombre imagination. Brooding melancholy, curiously tinctured with irony inspires the solemn music and dream-like imagery of his best verses.

The writer whom in many respects he resembles most strongly is Edgar Allan Poe. Drink and drugs led to, paralysis and an early death. Con¬ sult James, (French Poets and Novelists> (1884) ; Asselineau, (Charles Baudelaire sa vie et son oeuvre) (1889) ; Symons, A., (Poems in Prose) (London 1905).

BAUDIN, bo-daii, Nicolas, French sea-captain and botanist : b. on the island of Re 1750; d. 16 Sept. 1803. He entered the mer¬ chant navy at an early age, and in 1786 went on a botanical expedition to the Indies, sailing from Leghorn under the Austrian flag, with a vessel under his own command. His collec¬ tions in this expedition, and in a second which he made to the West Indies, were presented by him, on his return to France, to the gov¬ ernment, which promoted him to the rank of captain, and sent him, in 1800, on a scientific

mission to Australia. He failed to penetrate the interior of that country, but made many interesting observations on the coast. Half of his men died of fatigue and exposure, and he himself died at the Isle of France soon after his return. Peron, who accompanied him, wrote an account of the voyage.

BAUDIN DES ARDENNES, bo-dan- daz-ar-den, Charles, French vice-admiral: b. Sedan, 21 July 1784; d. Paris, 7 June 1854. In 1812 he conducted a small fleet safely into the harbor of Saint Tropez, though continually pur¬ sued by English cruisers. In 1816, he resigned and entered the merchant service, but after the July revolution (1830) re-entered the navy. In 1838, he was promoted to the rank of rear-admiral, and received the command of the ex¬ pedition against Mexico. His efforts to effect an amicable settlement with the Mexican gov¬ ernment proving fruitless, he bombarded, 27 Nov. 1838, the fortress of San Juan de Ulloa, which surrendered on the following day. Bau-din treated the inhabitants with great con¬ sideration and permitted 1,000 Mexican soldiers to remain in the city to maintain order, but on the Mexican government sending re-enforce¬ ments, he was compelled to resort again to hostilities, which, on 5 December of the same year, resulted in the disarming of Vera Cruz, in the complete

defeat of the Mexican army and in the restoration of peace between the two countries. On his return to France, he was for a short time Minister of Marine under Louis Philippe. In March 1848 he was appointed commander of the French fleet in the Medi¬ terranean, and remained stationed for some time during the Italian outbreak off the Nea¬ politan and Sicilian coast. In the following year he retired from active service.

BAUDISSIN, bow'dis-sin, Wolf Friedrich Karl, Count von, German litterateur : b. Rant-zau, 30 Jan. 1789; d. Dresden, 4 April 1878. After 1827 he resided at Dresden, where he collaborated with Tieek and Schlegel in a noted translation of Shakespeare. The translations contributed by Baudissin are those of 'Henry VHP ; 'Much Ado About Nothing) ; 'Taming of the Shrew) ; (Comedy of Errors) ; (Measure for Measure) ; 'All's Well that Ends WelP ; 'Antony and Cleopatra) ; 'Troilus and Cressida) ; 'Merry Wives of Windsor3; Move's Labor's LosP ; 'Titus Andronicus3 ; <Othello> ; (King Lear. 3 He published 'Ben Jonson und seine Schule) (1836) ; and translation from Moliere (1865-67).

BAUDISSIN, Wolf Wilhelm, German theologian : b. Sophienhof, Holstein, 26 Sept. 1847. He was professor at Strassburg, 1876-81, at Marburg, 1881-1900, and at Berlin from 1900. His publications comprise 'Translations Antiquse Arabics Libri Jobiquae SupersunP (1870); 'Stuclien zur semitischen Religions-geschichte3 (1870— 78) ; 'Die Geschichte des Alttestamentlichen Priesterthums untersuchP (1889) ; 'August Dillmann3 (1895) ; 'Einleitung in die Bucher des Alten Testamentes) (1901); 'Adonis und Esmun, eine Untersuchung zur Geschichte dcs Glaubens an Auferstehungsgotter und an Heilgotter3 (1911).

BAUDRILLART, bo«-dre-yar, Henri Jo¬ seph Leon, French political economist: b. Paris,

28 Nov. 1821 ; d. there, 24 Jan. 1892. He edited the Constitutionncl and subsequently the Jour¬ nal des Economistcs, and in 1881 was professor in the Ecole des Ponts et Chaussees. He pub¬ lished 'Des rapports de la Morale et de l'Economie Politique3 (1860) ; 'Manuel d'Economie Politique) (1857) ; 'Publicistes Modernes) (1862) ; 'Histoire du Luxe) (1878-80); 'Les Populations Agricoles de la France)

(1880-88).

BAUDRY, bo-dre, Paul, French painter: b. La Roche-sur-Yon, 7 Nov. 1828; d. 17 Jan. 1886. He studied in Paris and Rome. Among his best known works are ‘Punishment of a Vestal Virgin3 (1857), and the ‘Assassination of MaraP (1867). He was for 10 years em¬ ployed in decorating the foyer of the Grand Opera in Paris. His famous ‘Glorification of. the Law3 on the ceiling of the Palace of Jus¬ tice gained him the medal of honor in 1881 and is generally ranked as his masterpiece. He was elected a member of the Academie des Beaux-Arts in 1870.

BAUER, bow’er, Bruno, German philoso¬ pher, historian and Biblical critic of the ra¬ tional school : b. Eisenberg, 6 Sept. 1809 ; d. Berlin, 15 April 1882. Among his works are ‘Critique of the Gospel of John3 (1840); ‘Critique of the Synoptic Gospels3 (1840) ; ‘Plistory of the French Revolution to the Founding of the Republic3 (1847); ‘History of Germany during the French Revolution and the Rule of Napoleon3 (1846); ‘Critique of the Gospels3 (1850—51) ; ‘Critique of the Paul¬ ine Epistles3 (1850) ; ‘Philo, Strauss, Renan and Primitive Christianity 3 (1874) ; ‘Christus und die Casaren,3 in which the foundation of Christianity is attributed to Seneca (1877). His work displays equal learning and industry but his conclusions are far from harmonizing with evangelical thought.

BAUER, Caroline, German actress : b.

Heidelberg, 29 March 1807 ; d. Zurich, 18 Oct. 1878. She made her debut in 1822, and had achieved a brilliant success, in comedy and tragedy alike, when in 1829 she married Prince Leopold, afterward King of the Belgians. Their morganatic union was as brief as it was un¬ happy; in 1831 she returned to the stage, which she quitted only in 1844, on her marriage to a. Polish count. An English translation of her ‘Posthumous Memoirs3 appeared in 1884.

BAUER, Edgar, German publicist, brother of Bruno Bauer: b. Charlottenburg, 7 Oct. 1820; d. Hanover, 18 Aug. 1886. He published various works of an historical and polemical nature, strongly tinctured with radicalism, and spent five years in prison on account of his ‘ Streit der Ivritik mit Kirche und Staat.3 Other books by him are ‘Die Rechte des Herzogtums Holstein3 (1863) ; ‘Die Deutschen und ihre Nachbarn3 (1870).

BAUER, Louis A., American magnetician : b. Cincinnati, Ohio, 28 Jan. 1865. He was as¬ tronomical and magnetic computer for the United

States Coast and Geodetic Survey, 1887-92 ; docent in mathematical physics in the University of Chicago, 1895-96; chief of divi¬ sion of terrestrial magnetism of Maryland Geo¬ logical Survey, 1896-99. He was assistant

professor of mathematics in the University of Cincinnati, 1897-99; chief of division of ter¬ restrial magnetism and inspector of magnetic work, United States Coast and Geodetic Sur¬ vey, 1899-1906; director of the department of terrestrial magnetism, Carnegie Institution 'of W ashington, since 1904; lecturer in terrestrial magnetism, Johns Hopkins University, since 1899. He is an honorary member of the Sociedad Cientifica Antonio Alzate of Mexico, and of the Royal Cornwall Polytechnic Society of England, and a member of the permanent committee on terrestrial magnetism and at¬ mospheric electricity of the International Meteorological Conference; also a member of the American Philosophical Society, American Academy of Arts and Sciences and a corre¬ sponding member of the Gottingen Royal Academy of Sciences and of the Portugal Academy of Sciences. He was awarded the Lagrange prize for his work in terrestrial mag¬ netism by the Belgium Academy of Arts and Sciences in 1910, and the Neumayer gold medal at Berlin in 1913; author of various publica¬ tions bearing chiefly on terrestrial magnetism and cosmical physics. He edits and publishes Terrestrial Magnetism.

BAUER, Wilhelm, German inventor : b. Dillingen 1822; d. Munich, 18 June 1875. He served as an artilleryman during the Schleswig-Holstein War (1848), and, meanwhile, con¬ ceived the plan of a submarine vessel for coast defense. From 1851 to 1855 he vainly sought means from Austria, France and England to complete his experiment, but Russia finally adopted his scheme. He afterward made im¬ provements in torpedoes and in submarine guns.

BAUERLE, boi'er-le, Adolf, Austrian dramatist and novelist: b. Vienna, 9 April 1786; d. Basel, 20 Sept. 1859. He cultivated with much success the field of popular comedy and local farce in Vienna, where, in 1804, he founded the Vienna Theatre-Gazette, until 1847 the most-widely-read paper in the Austrian monarchy, and now a valuable source for the history of the stage in Vienna. Of his numerous plays the following became known also outside of Aus¬ tria : Leopold's Day* (1814); (The

Enchanted Prince) (1818) ; (The Counterfeit Prima Don¬ na* (1818) ; (A Deuce of a Fellow) (1820) ; 'The Friend in Need.* Under the pseudonym Otto Horn he wrote the novels (Therese Krones) (1855) and (Ferdinand Raimund) (1855), full of the personal element and local anecdote.

BAUERNFEIND, bow'ern-fint, Karl Maximilian von, German engineer and geod¬ esist: b. Arzberg, 18 Nov. 1818; d. 1894. He was professor of geodesy and engineering in the engineering school at Munich, and long a director of the Technical School there organ¬ ized according to his plans. He invented the prismatic cross employed in surveying, and named for him, and wrote (Elemente der Ver-messungskunde) (1856-58) ; (Zur Bruckenbau-kunde* (1854) ; (Zur Wasserbaukunde) (1S66).

BAUERNFELD, bow ern-felt, Eduard von, Austrian dramatist: b. Vienna, 13 Jan. 1802; d. Vienna, 9 Aug. 1890. He studied law and entered the government service in 1826, but resigned, after the revolutionary events of

1848, to devote himself exclusively to his lit¬ erary pursuits. A brilliant conversationalist, he soon became a universal favorite in Vienna society. Intimate from childhood with the genial painter, Moritz von Schwind, and the composer, Franz Schubert, he also kept up a lifelong intercourse with Grillparzer. Among his comedies, distinguished for their subtle dia¬ logue and sprightly humor, particularly the descriptions of fashionable society have made his great reputation. The best known and most successful were (Reckless from Love) (1831); (Love's ProtocoP (1831) ; (Confessions) (1834) ; (Domestic and Romantic) (1835) ; (Of Age-* (1846); (Ivrisen) (1851); (Aus der Gesellschaft* (1866). His serious dramas were less popular. His collected works were issued

(1871-73).

BAUHIN, bo-an, Gaspard, Swiss botanist and anatomist: b. Basel 1560; d. 1624. He was at first intended for the Protestant ministry, but having manifested a decided inclination for medicine and botany, was allowed to follow it, and studied first at Basel and then at Padua. After finishing his studies he traveled over many parts of Europe, and in 1580 returned to Basel, bringing with him a reputation which

immediately' secured him the chair of Greek, and in 1589 that of anatomy and botany. His fame rests chiefly on his two works, (Pinax Theatri BotanicP and (Theatrum Anatomicum, BotanicumP Gaspard and his brother, Jean Bauhin, have been happily commemorated by Linnaeus, who gave the name Bauhinia to a genus of plants.

BAUHIN, Jean, an eminent Swiss bota¬ nist : b. Basel 1541 ; d. 1613. He was a brother of Gaspard Bauhin, and distinguished himself by his ardor in natural history pur¬ suits, in prosecuting which he traveled over the greater part of the Alps, Italy and the south of France, preparing materials for a (Historia Universalis Plantarum Nova et Absolutissima,* which occupied the larger portion of his life but was not published till 1650, at Yverdon, 37 years after his death. This work, in which he describes 5,000 plants, divided into 40 classes or books, is considered the first in which an at¬ tempt was made to give a regular form to systematic botany.

BAUHINIA, a genus of about 150 species of tropical trees, shrubs or climbers of the family Ccesalpiniaccce, with beautiful, showy, white to purple blossoms; named in honor of the brothers John and Caspar Bauhin (q.v.). Some species are called mountain ebony from their dark-colored wood; B. racetnosa, the maloo climber, and several other East Indian climbing species are used for making ropes; B. variegata, an Indian species, is used in tan¬ ning, dyeing and medicine, and its flower buds for pickles. In southern Florida and southern California several species are. very popular as ornamental plants, but in greenhouses few suc¬ ceed because of the difficulty of securing a dry enough atmosphere without injury to the plants. B. natalensis, B. variegata and B. corymbosa, probably the most satisfactory greenhouse species, may be treated like oleanders during the winter and planted out of doors in spring.

BAUM, bourn, Friedrich, German military officer in the British service in the Revolution-

ary War. He arrived in Canada in 1776, and in Burgoyne's expedition

acted as lieutenant-colonel of the Brunswick dragoons. He was sent out with 800 men and two pieces of ar¬ tillery on a foraging expedition. Near Ben¬ nington, Vt.; he was attacked by the New Hampshire militia under Stark and utterly de¬ feated. He was killed 16 Aug. 1777.

BAUMANN'S (bou'mans) CAVERN (German, Baumanns Hohle), an interesting natural cavern in the Harz, about five miles from Blankenburg, in a limestone mountain. It consists of six principal apartments, besides many smaller ones, everywhere covered with stalactites. The earthy ingredients of these petrifactions are held in solution by the water which penetrates the rock and deposits a calcareous stone. The name of this cavern is derived from a miner, who entered it in 1672, with the view of finding ore, but lost his way and wandered about for two days before he could find his way out again.

BAUMBACH, boum'baH, Rudolf, German poet : b. Kranichfeld, Saxe-Meiningen, 28 Sept. 1840; d. 22 Sept. 1905. After studying natural science in Wurzburg, Leipzig, Freiburg and Heidelberg, he lived in Austria and then at Trieste, where he devoted himself exclusively to writing. In 1885 he removed to Meiningen. He most successfully cultivated the poetical tale, based upon ancient popular legends. His epics include (Zlatorg,* a Slovenic Alpine leg¬ end (1875, 37th ed., 1892) ; <Horand and Hilda* (1879) ; (Lady Fair) (1881) ; (The Godfather of Deaths (1884) ; (Emperor Max and His Huntsmen) (1888). His lyric collections are (Songs of a Traveling Journeyman* (1878); (Minstrel's Songs1* (1882) ; (From the High¬ way* (1882) ; traveling Songs from the Alps* (1883) ; (Adventures and Pranks Imitated from Old Masters* (1883) ; (Jug and Inkstand* (1887); (Thuringian Songs* (1891). He also published some excellent prose: Palse Gold* (1878), a historical romance of the 1 7th cen¬ tury; (Summer Legends* (1881), a book of

fairy tales; and (Once Upon a Time* (1889).

*

BAUME, bcc-ma', Antoine, distinguished French chemist: b. Senlis, 26 Feb. 1728; d. *15 Oct. 1804. He obtained the professorship of chemistry in the College of Pharmacy at Paris about 1752 ; was admitted a member of the Academy of Sciences, chiefly in return for some excellent memorials communicated to that body; wrote (Elements of Theoretical and Practical Pharmacy,* which went through nine editions in France and was translated into most European

languages, and contributed by his discoveries to numerous important improve¬ ments in the arts, particularly in the manufac¬ ture of sal ammoniac, soap and porcelain, in gilding and the bleaching of silk. His name is familiar from the areometer which he invented and which is still in use.

BAUMGARTEN, boum'gar-ten, Alexander Gottlieb, German philosopher of the school of Wolff: b. Berlin 1714; d. Frankfort-on-theOder 1762. He studied at Halle and was for a time professor-extraordinary there. In 1740 he was made professor of philosophy at Frankfort-on-the-Oder. He is the founder of aesthetics as a science and the inventor of this

name. He derived the rules of art from the works of art and their effects. Hereby he dis¬ tinguished himself advantageously from the theorists of his time. (See ˆEsthetics). His ideas of this science he first developed in his academical discussion, (De Nonnullis ad Poema Pertinentibus* (1735). George Fr. Meier's Principles of all Liberal Sciences* (1748-50) originated from his suggestions. Eight years later, Baumgarten published his (yEsthetica* (1750-58), a work which death prevented him from completing. Consult (Schmidt, Leibnitz und Baumgarten* (Halle 1875).

BAUMGARTEN, Hermann, German his¬ torian: b. 28 April 1825; d. 19 June 1893. He was a professor of history in the University of Strassburg 1872-89, and published (Geschichte Spaniens zur Zeit der franzosischen Revolution* (1861) ; (Geschichte Spaniens vom Ausbruch der franzosischen Revolution bis auf unsere Tage* (1865-71) ; (Karl V und die deutsche Reformation* (1889).

BAUMGARTEN, Moritz Julius Maximil¬ ian Paul Maria, German clergyman and his¬ torian : b. Rittershausen, Germany, 25 July 1860. He was educated at the universities of Bonn, Marburg, Breslau, Strassburg and Ber¬ lin, and at the Accademia dei Nobili Ecclesi-astici, Rome. He began the practice of law in 1885 ; engaged in historical research work in various libraries and archives of Europe in 1887 and in 1888-89 was assistant at the Royal Prussian Historical Station in Rome. He was ordained to the Catholic priesthood in 1894 and held various ecclesiastical offices in Rome. He traveled Europe and the United States in the interests of scientific research ; was presi¬ dent of the seventh section of the second Inter¬ national Congress of Christian Archaeology, Rome 1900; and secretary, of the fifth Inter¬ national Congress of Catholic Scholars, Munich 1900. He is a member of

several scientific and historical societies and has received numerous decorations and medals. He is the author of Pie deutschen Hexenprozesse* (1883) ; Pat das System Kneiff eine soziale Bedeutung?* (1892); (Giovanni Battista de Rossi* (1892); HI dizionario di erudizione storico-ecclesiastica del Moroni ricerche intorno alia proprieta litteraria di esso* (1896) ; Pie Katholische Ivirche in Deutschland, der Schweiz, Luxem¬ burg, und Oesterreich-Ungarn* (1900; rev. ed., 1907) ; (Verfassung und Organization der Kirche* (1906) ; Pie Werke von Henry Charles Lea und verwandte Bucher* (1908); *etc.* He is editor of Pie Katholische Kirche unserer Zeit und ihre Diener* (3 vols., 1899-1901) and a contributor to the Tlteologische Revue, Allgemeines Litteraturblatt, Litterarische Rund¬ schau and an occasional contributor to various scientific periodicals.

BAUMGARTEN-CRUSIUS, Ludwig Friedrich Otto, German Protestant theologian: b. Merseburg, 31 July 1788; d. Jena, 31 May 1843. He studied theology in Leipzig; became the university preacher in 1810 ; was appointed professor of theology at Jena, in 1817; and became widely known as a foremost champion of religious liberty. He was a learned and original thinker, but his writing is often ob¬ scure. His publications include (Introduction to the Study of Dogmatics* (1820) ; < Manual

of Christian Ethics* (1827) ; (Outlines of Bibli¬ cal Iheology* (1828); ‘Outlines of Protestant Dogmatics* (1830); ‘Textbook of the His¬ tory of Doctrines) (1832) ; ‘Schleiermacher, His Method of Thought, and His Value* (1834); ‘Considerations on Certain Writings of Lamennais) (1834), *etc.*

BAUMGARTNER, Alexander, Swiss writer: b. Saint Gall 1841. He became a mem¬ ber of the Society of Jesus in 1860, and after completing his theological studies in England, made a study of Scandinavian literature in Stockholm and Copenhagen. He published ‘Goethe’s Jugend> (1879) ; ‘Longfellow’s Dich-tungen) (1878) ; ‘Calderon, *a festival play (188L); ‘Goethe und Schiller* (1886); ‘Der Alte von Weimar* (1886) ; a translation from the old Icelandic of Eystein

Asgninsson ; and a history in eight volumes of the world's liter¬ ature (1897).

BAUMGARTNER, Andreas von, Aus¬ trian statesman: b. 23 Nov. 1793, at Friedberg in Bohemia ; d. 1865. He was connected for many years with the teaching of mathematics and physics, especially after 1823, at the Uni¬ versity of Vienna, until illness forced him to relinquish his academical pursuits. Subse¬ quently he became connected with the direc¬ tion of the imperial porcelain, tobacco and other manufactures in 1841, with the establishment of electric telegraphs, and at the end of 1847 with the chief management of the construction of railways. After the revolution of 1848 he occupied for a third time a seat in the Austrian Cabinet as Minister of the Mining Department and of Public Works. In May 1851 he became Minister of Finance and Commerce, and in 1855 was made president of the Austrian Academy of Sciences. In 1861 he entered the Plouse of Peers of the Reichsrath. His principal works are on mechanical science applied to arts and industry. His most popular work is the 'Na-turlehre,* which has passed through many edi¬ tions and was a textbook in all the schools of Austria.

BAUR, bour, Ferdinand Christian, one of

the most celebrated theologians of modern Ger¬ many, founder of the "New Tubingen School of Theology® : b. Schmiden, where his father was pastor, 21 June 1792; d. 2 Dec. 1860. At the University of Tubingen, which he entered in 1809, he devoted five years to theological studies, and in 1817 became professor in the seminary at Blaubeuren. While holding this position he published his first work, 'Symbol¬ ism and Mythology, or the Natural Religion of Antiquity* (1824-25), by which his eminent theological abilities were so clearly manifested that in 1826 he received a call to Tubingen as ordinary professor in the evangelical faculty of that university. This position he continued to occupy till his death. His chief works be¬ long to the two departments of the history of the Christian dogmas and New Testament crit¬ icism, in both of which his views have had the most powerful effect upon the theology of the present day. His most important works be¬ longing to the first class are 'The Christian Gnosis, or the Christian Philosophy of Reli¬ gion (1835) ; 'The Christian Doctrine of the Atonement* (1838) ; 'The Christian Doctrine of the Trinity and the Incarnation (1841-43) ;

'Compendium of the History of Christian Dog-mas) (1847). To the

second class belong ‘The So-called Pastoral Epistles of the Apostle Paul 5 (1835) ; ‘Paul the Apostle of Jesus Christ, His Life and Labors, His Epistles and His Teaching) (1845) ; ‘Critical Inquiries Concerning the Canonic Gospels, Their Relation to One An¬ other, Their Origin and Character (1847). He also wrote the ‘History of Christian Doctrine from the Origin of Christianity Down to the End of the 18th Century,* a series of volumes between 1853-63. Consult Nash, H. S., ‘His¬ tory of the Higher Criticism of the New Tes-tamenD (New York 1901).

BAUR, Frederick Wilhelm von, Russian military engineer: b. Hanau, Germany, 1735; d. Saint Petersburg 1783. He early adopted a military life, entered the British service in 1755 and in 1757 he obtained the rank of general and engineerin-chief. Frederick II of Prus¬ sia ennobled him. In 1769 he entered into the service of Catherine II, Empress of Russia, and was employed against the Turks. The Empress had a high notion of his talents, and employed him in making the aqueduct of Tsarskoe-Selo for supplying Moscow with water, and in deep¬ ening the canal near Saint Petersburg, at the end of which he constructed a large harbor, and completed other important undertakings. Baur had for his secretary the celebrated Kot¬ zebue, who directed in his name the German theatre at Saint Petersburg.

BAUR, Gustav Adolf Ludwig, German theologian ; b. Hammelbach 1816 ; d. 1889. He was appointed a professor at Giessen in 1847, and in 1870 at Leipzig. He belonged to the Schleiermacher school and was the author of ‘Grundziige der Homiletik* (1848) ; ‘Boetius und Dante) (1874) ; ‘Die Vorchristliche Erziehung* (1884).

BAUSMAN, Benjamin, American Re¬ formed (German) clergyman: b. Lancaster, Pa., 28 Jan. 1824; d. Reading, Pa., 8 May 1909. He founded Saint Paul’s Reformed Church, Read¬ ing, Pa., 1863, and was its pastor until his death. He published ‘Sinai and Zion* (1860; 7th cd., 1885) ; ‘Wayside Gleanings in Europe® (1876) ; ‘Bible Characters) (1893) ; ‘Catechetics and Catechetical Instruction (1893) ; ‘Precepts and Practice) (1901) ; and edited T he Guardian (1867-82) , and Reformirter Haus-f round (1882).

BAUSSET, bo-sa, Louis Franqois (Cardi¬ nal), French ecclesiastic: b. Pondicherry, In¬ dia, 14 Dec. 1748; d. Paris, 21 June 1824. His father, who held an important position in the French Indies, sent young Bausset to France when he wˆas but 12 years of age. He was educated by the Jesuits, and became bishop of Alais in 1784. Having signed the protest of the French bishops against the civil consti¬ tution of the clergy, he emigrated in 1791, but in the following year returned to France, was soon arrested, and imprisoned in the old Con¬ vent of

Port Royal, where he remained until after the fall of Robespierre. After the restor¬ ation of Louis XVIII, in 1815, he entered the Chamber of Peers; the following year he be¬ came a member of the French Academy; and, in 1817, he received the appointment of cardi¬ nal. He wrote the ‘History of Fenelon*

(1808-09), at the request of the Abbot Emery, who had in his possession the MSS. of the illustrious archbishop of Cambray. The work had great success, and its author was awarded, in 1810, the second decennial prize of the Insti¬ tute, for the best biography. His (History of BossueP (1814) was less favorably received.

BAUTAIN, bo-tan, Louis Eugene Marie,

French philosopher: b. Paris, 17 Feb. 1796; d. 18 Oct. 1867. He entered the Church, and be¬ came a priest in 1828; resigned his professor¬ ship in 1830; and later was suspended as a priest because of his work, (La Morale de l’Evangile comparee a la Morale des Philosophes) ; but was reinstated in 1841. He was made dean of the Faculty of Letters at Strassburg in 1838, and subsequently director of the College of Juilly. At a still later period he was trans¬ ferred to Paris, and made vicar-general of the Metropolitan diocese. He was also appointed a member of the theological faculty of Paris. His writings include (Philosophie-psychologie experimentale* (1839) ; (Philosophie morale) (1842) ; (Philosophie du Christianisme) (1835); (La Religion et la Liberte considerees dans leurs rapports) (1848) ; (La Morale de l’Evangile comparee aux divers systemes de morale) (1855),- *etc.*

BAUTZEN, bout’sen, or BAUDISSIN,

bow’desen, Germany, a manufacturing town in Saxony, noted for its

production of textile fabrics, leather, paper, *etc.* It overlooks the river Spree, 30 miles northeast of Dresden, and is encircled by ancient walls and moat now converted into promenades. The cathedral church of Saint Peter is used by both Protest¬ ants and Roman Catholics, it being divided into two portions for the purpose. The town con¬ tains many schools, a museum, art gallery and three libraries. At Bautzen Napoleon, with 130,000 men, defeated the allied armies of Rus¬ sia and Prussia, 20-21 May 1813. Pop. 32,760.

BAUXITE, or BEAUXITE, bo'zit (from Baux, or Beaux, near Arles, France, where it occurs), a native, hydrated oxide of aluminum, having the formula A1203 2H20. It has a specific gravity of about 2.5, and its hardness ranges from 1 to 3. It occurs massive, in con¬ cretionary grains showing a concentric structure and in clay-like deposits. Sesquioxide of iron is usually present in considerable quantity, — sometimes to the extent of 50 per cent, — part of it replacing aluminum, and part occurring merely as an impurity. Bauxite is found in many parts of the world. One of the most interesting deposits is at Irish Hill, near Larne, county Antrim, Ireland, where it occurs in the iron measures together with lignite. At this place three layers of it are known, having an aggregate thickness of about 50 feet. The finest grade from Irish Hill is almost free from iron, containing as little of that metal as good china clay. Analyses have shown that the color of bauxite is no criterion of the freedom of the mineral from iron, since a white variety containing 3.67 per cent of Fe203 is known, while a certain strongly red variety showed, upon analysis, but 3 75 per cent, and a yellow specimen contained 14.39 per cent. In the Unit¬ ed States bauxite occurs in considerable quanti¬ ties in Saline and Pulaski counties, Ark.,

and in a deposit extending from Calhoun Coun¬ ty, Ala., eastward into Georgia. Bauxite forms the principal ore of the metal aluminum. The American deposits of bauxite are well suited to the production of aluminum, as ore can be had in quantity that contains as little as 1 per cent of iron oxide, and 3 per cent of silica. Bauxite, in some localities, is undoubt¬ edly an alteration product of basaltic rocks, while in other localities (especially in the United States) it has very likely been deposited by hot springs. The deposits of Georgia and Alabama are thought to have resulted from hot springs, the waters of which were ren¬ dered acid by passing through pyritic shales. The sulphuric acid is believed to have reacted with shale beds changing the kaolin to aluminum sulphate. As this passed on upward through limestone beds, the reac¬ tion freed A1203 as follows: AhfSCh) + CaC03 —

3CaS04 + Al203 + 3C02. The gelatinous A1203 was then deposited as bauxite. The Arkansas deposits are believed to be residual from the weathering of syenite. In addition to its use as an ore of aluminum, bauxite forms an important source of alum. Its clay-like form is known as wocheinite, on account of its occurrence at Wochein, in Styria. The world's product of bauxite was in 1910 about 310,000 tons ; 1914 about 350,000 tons; and 1915 something over 500,000 tons; the average value in the United States being about $3 per ton. Of the 1915 production the United States is credited with 297,000 tons ; France, 180,000; United Kingdom, 20,000; Italy, 10,000 ; Japan, 250 ; India, 1 10 ; all other countries, 2,600. Consult Hayes, C. Willard, <Bauxite) (Sixteenth Annual Report of the United States Geological Survey, Part 3, Washington 1896) ; Branner, (The Bauxite Deposits of Arkansas> (Journal of Geology , Vol. V, 1897, p. 263) ; Mead, J. W., (Bauxite Deposits of Arkansas' (Econ. Geol., Vol. X, 1915, p. 28). See Alumi¬ num ; Mineral Production of the United States.

BAVARIA (German, Bayern; French, Baviere), a republic in the south of Germany, the second largest state of the federation, composed of two isolated portions, the larger comprising about twelve-thirteenths of the republic, bounded on the east by Bohemia and Upper Austria ; on the south by Salzburg and the Tyrol ; on the west by Wiirtemberg, Baden, Hesse-Darmstadt and Hesse-Nassau ; and on the north by Hesse-Nassau, Weimar, Meiningen, Reuss, 'Coburg-Gotha and the republic of Saxony. It lies between lat. 47° 16' and 50° 34' N, and long. 8° 59' and 13° 5(T E. The smaller portion, the Pfalz or Palatinate, lies west of the Rhine, which forms its eastern boundary, and is separated from the main body by Wiirtemberg, Baden and Hesse-Darmstadt. It is included between lat. 48° 57' and 49° 50' N., and long. 7° 4' and 8° 31' E. ; and is bounded south by Alsace-Lorraine, west by the Prussian Phine province, and north by Hesse-Darmstadt and the Prussian Rhine prov¬ ince. Bavaria is estimated to contain an area of 30,346 English square miles, and is divided into eight circles (Kreise), which were formerly named after the rivers that watered them ; but an edict of 29 Nov. 1837 gave the circles new names and new boundaries. The following

table shows their names, areas and popula¬ tions :

Circles

Area, Sq. M.

Pop.

1905

Pop.

1910

Oberbayern (upper Bavaria) . .

6,686

1,413,788

1,532,065

Niederbayern (lower Bavaria)..

4,298

707,367

724,331

Pfalz (Palatinate) .

2,372

885 , 833

937,085

Oberpfalz (upper Palatinate)

and Regensburg (Ratisbon)..

3,862

574.693

600,284

Oberfranken (upper Franconia)

2,798

637,700

661,862

Mittelfranken (middle Franconia) .

3,036

868,846

930,868

Unterfranken (lower Franconia) and Aschaffenburg .

3,360

682,532

710,943

Schwaben (Swabia) and Neuburg .

3,934

753,177

789,853

Total .

30,346

6,524,372

6,887,291

The capital is Munich (q.v.), and the other principal cities are Nuremberg, Augsburg, Wurzburg and Regensburg or Ratisbon (qq.v.).

Mountains. — Bavaria is a hilly rather than a mountainous country. A large portion, more especially south of the Danube, is a plateau country of considerable elevation, and, indeed, the whole of the main portion of the kingdom may be described as an upland valley, averag¬ ing about 1,600 feet above the sea-level, inter¬ sected by numerous large streams and ridges of low hills. On all sides it is surrounded by hills of a greater or less altitude, either quite upon the frontier or only at small distances from it. The whole southern frontier is formed by a branch of the Noric Alps, offsets from which project far into the southern plateau of Bavaria, forming the Algauer Alps, the Bava¬ rian Alps and the Salzburger Alps. Besides numerous peaks which these ranges contain, varying from 4,000 to 8,000 feet high, the fol¬ lowing may be named as being above the latter number: The Zugspitze, 9,720 feet; the Watz-mann, 8,900 feet ; the Hochvogel, 8,460 feet ; the Madeler Gabel, 8,650 feet. Passing along the valley of the Inn and across the Danube, we come to the Bohemian frontier, formed by the Bohmerwald Mountains running southeast to northwest and lowering down at the valley of the Eger. The highest peaks in this range are the Rachel, 5,102 feet, and the Arber, 5,185 feet. Crossing the Eger we meet with the Fichtelgebirge, presenting the Schneeberg, 3,455 feet high, and the Ochsenkopf, 3,360 feet. _ West from this range, and along the frontier of the Saxon territories and Hesse-Cassel, run hills of moderate elevation, under various names, Frankenwald,

Rhongebirge, etc., no peaks of which attain an elevation of more than 3,327 feet. The western mountain bound¬ ary of the Bavarian Valley is formed north of the Main by the Spessartwald Range, and in the kingdom of Wiirtemberg by the Alb or Alp. The only noteworthy interior ranges are in the northwest the Stelgerwald; and in the northeast, running in a southwesterly direction from the Fichtelgebirge, the Franconian Jura; a low limestone range, containing numerous re¬ markable stalactitic caves. The Pfalz or Palat¬ inate is traversed by the northern extremity of the Vosges, the highest peak in this locality being the Konigstuhl, 2,162 feet.

Lakes. — The lakes of Bavaria are neither very numerous nor of very great extent, though vol. 3 — 23

many of them present exceedingly picturesque scenery. The larger are all situated on the upper part of the southern plateau; the smaller within the range of the Noric Alps. The most remarkable of the former are, Lake Ammer, about 10 miles long by three and three-quarters broad, 1,736 feet above the sea; Lake Wurm or Starnberg, about 12 miles long by three broad, 1,899 feet; and Lake Chiem, seven miles long by seven and one-half broad, 1,651 feet above the-sea. Of the smaller, the more re¬ markable are Lake Tegern, about three miles long, 2,586 feet; Lake Walchen, 2,597; Konigs-See, five miles long, 1,975 feet; and various others upward of 2,000 feet above the sea-level. Most of the lakes are well supplied with fish.

Rivers. — Bavaria belongs wholly to the basins of the Danube and the Rhine, with the exception of a very small portion in the north¬ east corner, which through the Eger and Thuringian Saale appertains to the basin of the Elbe. The river Danube intersects the main portion of the kingdom west to east nearly in the centre, and before it enters the Austrian dominions at Passau, where it is still 925 feet above the sea, it receives on its righ” bank the rivers Iller, Lech and Isar, which have their sources in the Noric Alps, and the Inn, besides numer¬ ous smaller streams; and on its left bank, the Wornitz, Altmiihl, Nab and Regen, besides other lesser streams. The Main traverses nearly the whole of the northern part of this portion of the kingdom from east to west, and is navigable for steam vessels from Bamberg to the Rhine. It is connected with the Danube by the Ludwigs Canal, the most important in Bavaria. Its principal affluents are the Regnitz and the Saale. In the Palatinate there are no streams of any importance, the Rhine being merely a boundary river. Large tracts of marshy land are characteristics of southern Bavaria.

Climate. — If we except the valley of the Rhine, and the valley of the Main in lower Franconia, Bavaria, even including the Pa¬ latinate, is, in comparison with other German states, a cold country. The average tempera¬ ture of the year is about 47° F. ; winter, 30° ; spring 47° ; summer, 63° ; and autumn, 47°. The rainfall averages from 23.5 inches in the Rhine Palatinate to over 78 inches in southern Bavaria.

Soil, Vegetation, *etc.* — Bavaria is one of the most favored countries in Germany in re¬ spect of the fruitfulness of its soil, due, no doubt, in a considerable degree, to the undulat¬ ing nature of the country, to the numerous streams by which it is watered and to being nearly wholly composed of Jura limestone. In the plains and valleys the soil is capable of pro¬ ducing all kinds of crops, but not till lately were the natural advantages of the country turned to good account. Ignorance and idleness opposed a barrier to improvement, which it took the utmost efforts of an enlightened government, aided by the general spread of education, to remove. Now a spirit of agricultural enter¬ prise pervades the kingdom, many co-operative societies have been formed, improved methods of cultivation have been introduced and large tracts of waste land have been reclaimed and brought under the plow. To the general produc¬ tions of the soil may be added tobacco and

fruit, of which large quantities are grown in the valleys of the Main and the Rhine. In the circles of Mittelfranken and Schwaben-Neu-burg, the hop plant is cultivated to a consider¬ able extent. Nearly one-half of the total area is now under cultivation and one-sixth under grass. In 1912 the areas under the chief crops were : Wheat, 725,937 acres, yielding 489,785 metric tons; rye, 1,417,972 acres, yielding 929,- 644 metric tons ; summer-barley, 903,440 acres, yielding 668,780 metric tons ; oats, 1,267,388 acres, yielding 744,661 metric tons ; potatoes, 927,015 acres, jdelding 4,708,746 metric tons ; hay, 3,208,037 acres yielding 4,883,742 metric tons.

In 1913 there were 43,690 acres, which yielded 6,658 metric tons of hops. The vine is chiefly grown in the circles of Pfalz and

Unterfranken. The latter produces the Franconian wines ; the best wines of the former are pro¬ duced near Deidesheim and Wachenheim. The celebrated Steinwein and Leistenwein are the produce of the southern slope of the Marien-burg, near the town of Wurzburg. In 1912 there were altogether 51,625 acres under vines, yielding 12,652,622 gallons of wine. The for¬ ests of Bavaria, composed chiefly of fir and pine trees, cover nearly a third of its entire surface and yield a large revenue, estimated at about $10,000,000 annually. About 49 per cent belongs to private persons, 34 per cent to the state and the rest chiefly to the communities. Land is rented for grazing and much timber is annually exported, together with potashes, tar, turpentine and other products peculiar to these wooded regions. The principal mineral products are salt, coal and iron. Some of the mining works belong to the state and contrib¬ ute something to the public revenue ; but the minerals are not wrought to the extent they might be. The coal output in 1913 was 1,895,715 metric tons ; iron ore, 450,074 tons ; pig-iron, 195,606 tons; cast-iron wares, 201,050 tons; sulphuric acid, 163,343 tons. The chief salt works are at Rosenheim, Graunstein, Reichenhall and Berchtesgaden. There are celebrated mineral springs at Kissingen and Reichenhall. Plumbago is found in several places and is principally manufactured into pencils. Porce¬ lain clay of the finest quality likewise abounds in some localities, the best being obtained in the district of Wunsiedel on the upper Main. Lithographic stones are another important pro¬ duction. In the breeding of live-stock Bavaria is only excelled by Prussia among the German states. In 1912 the number of horses was 401,- 990; of mules and asses, 700; cattle, 3,560,723; sheep, 474,000; swine, 1,814,418; goats, 315,122; fowls, 10,319,000. Wild fowl are abundant. The wolves and bears with which the forests of Bavaria were at one time infested are nearly extinct.

Manufactures. — The manufactures of Ba¬ varia are singly not very important, being mostly on a small scale and conducted by indi¬ viduals of limited capital. The principal arti¬ cles manufactured are linens, woolens, cottons, silks, leather, paper, glass, earthen, iron and steel ware, jewelry, etc., but the supply of some of these articles is inadequate to the home con¬ sumption. Of leather, paper, glass and iron¬ ware rather large quantities are exported. There are also tobacco and beet-sugar fac¬

tories, tanneries and chemical works. The op¬ tical and mathematical instruments made at Munich are the best on the Continent and are prized accordingly. But the most important branch of manufacture in

Bavaria is the brew¬ ing of beer — the universal and favorite bev¬ erage of the country. The per capita produc¬ tion was about 60 gallons in 1912 ; total amount brewed was 424,605,764 gallons. The amount of alcohol produced was 3,581,028 gallons. The beer, however, is not only consumed in the country of its production, but is sent to all parts of Germany and even as far as America and India. A portion of the industrial popu¬ lation maintain themselves by weaving linen and by the manufacture of articles in wood (some of which are of beautiful workman¬ ship), and by the felling and hewing of timber. Among the exports are corn, timber, wine, cattle, leather, glass, hops, fruit, beer, iron and steel wares, machinery, fancy articles, toys, colors, lucifer matches, stoneware, *etc.* Among the imports are coffee, cacao, tea, cotton, to¬ bacco, drugs, copper, oil, spices, dyestuffs, silk and silk goods, lead, *etc.*

Transportation. — From its position Bava¬ ria enjoys a considerable portion of transit trade, much facilitated by the good roads that traverse the country in all directions. The means of communication are now very com¬ plete. The Danube, the Rhine, the Main, the Regnitz, etc., afford ample scope for inland navigation, besides the Konig Ludwig Canal, which connects the Main near Bamberg with the Altmiihl a short distance above its em¬ bouchure in the Danube, thus establishing direct water communication through the Rhine be¬ tween the North Sea and the Black Sea. The railway system has been carried out on an ex¬ tensive scale. The lines are partly state prop¬ erty, partly private. The number of miles in operation amounted in 1914 to 5,173 miles, of which 5,102 miles were normal gauge and 71 miles narrow gauge. The railway debt was $485,165,320, and the gross receipts from the state railways $77,083,200. The state also pos¬ sesses two canals. Bavaria's foreign trade is embraced in that of the German Customs Union. In 1913 there were 19,626 miles of telegraph lines.

Education and Art. — The department of

education is under the superintendence of the Superior Board of Education and Ecclesiasti¬ cal Affairs. A complete system of inspection is established throughout the country, the re¬ ports of the inspectors including not only the number and proficiency of the scholars, but also the conduct of the teachers, the state of the buildings and the nature and extent of the funds available. It is necessary in Bavaria, before admission can be obtained into any higher school, to have passed a satisfactory examination in the lower school. Not only must all candidates for offices under the state pass examinations, but examinations are held of apprentices in trade who

wish to become masters, and even of the officers in the army on promotion. In 1911-12 there were 7,727 elementary schools, with 19,109 teachers and 1,064,579 pupils; 333 agricultural schools, with 6,847 pupils, besides 442 winter schools, with 1,877 pupils. Attendance at school is com¬ pulsory from 6 to 16 years of age. There are

three universities in Bavaria — two of which (Munich and Wurzburg) are Roman Catho¬ lic and one (Erlangen) Protestant. In 1913-14 the University of Munich had 265 professors and instructors and 6,802 pupils; that of Wurz¬ burg, 101 professors and instructors and 1,515 pupils; and that of Erlangen, 81 professors and instructors and 1,341 pupils. There are also several lycea, 43 gymnasia, numerous Latin, normal and polytechnic schools, besides academies of arts and sciences, fine arts, hor¬ ticulture, *etc.* The capital, Munich (pop. 1915 about 630,000), contains a library of about 1,- 100,000 volumes and 50,000 MSS., several scien¬ tific and literary institutions, academies and national societies, and extensive collections of works of art.

Bavaria enjoys the honor of having origi¬ nated a school of painting of a high order of merit, known as the Nuremberg school, founded about the middle of the 16th century by Albert Diirer (q.v.), a native of that town, whose works are little, if at all, inferior to those of his great Italian contemporaries. Hans Hol¬ bein (q.v.), who excelled Diirer in portrait, though far behind him in historical painting, was also a native of Bavaria, having been born at Augsburg about 1460. To these celebrated names have been added those of the eminent sculptors Kraft and Vischer (qq.v.), both also Bavarians; the former born probably at Nu-remburg about 1450-55 and the latter about 1460. The masterpiece of the latter distin¬ guished artist is the bronze shrine of Saint Sebaldus in Nuremberg, esteemed a marvel of art for beauty of design and delicacy of work¬ manship. The most celebrated of Kraft's works is the remarkable tabernacle in stone affixed against one of the columns of the choir of the church of Saint Lawrence, also in Nuremberg. The restoration of Bavarian pre-eminency in modern

times, in connection with the fine arts, is, in a great measure, if not entirely, owing to Louis I, whose love of art and liberal patron¬ age have rendered the capital one of the most celebrated seats of fine arts in Europe. His grandson, Louis II, was a great patron of music and the protector of Richard Wagner.

Religion. — • The predominant religion is Roman Catholicism, which embraces more than seven-tenths of the population. The remainder are principally Protestants and Jews. In 1910 the Roman Catholics numbered 4,862,233 ; Protestants, 1,942,385 ; Jews, 55,065. The pro¬ portion between Catholics and Protestants has scarcely varied during the last three-quarters of a century. All citizens, whatever their creed, are equally admissible to the same public func¬ tions and employments, and possess the same civil and political rights. The articles of the concordat concluded with the Pope are sub¬ ordinate in their application to the fundamental law of the state. By an ordinance of Louis I females are prohibited from pronouncing any monastic vow until having passed their 33d year. The dioceses of Bavaria comprise two arch¬ bishoprics, Munich and Bamberg; and six bish¬ oprics, Augsburg, Ratisbon, Eichstadt, Passau, Wurzburg and Spires. The salaries formerly were paid by the state. The Protestant Church is under a general consistory and three pro¬ vincial consistories. In Bavaria marriage between individuals having no capital cannot

take place without the consent of the principal persons appointed to superintend the poor in¬ stitutions, who, if they grant such liberty where there are no means of supporting the children that may spring from such marriage, render themselves liable for their maintenance. The law is intended to prevent improvident marriages.

People. — In personal appearance the Bava¬ rians are stout and vigorous, well adapted to bear the fatigues of war, and are generally considered good soldiers. Of a lighter, gayer temperament than the Prussians, they are some¬ times accused of being indolent and somewhat addicted to drinking, but are brave, patriotic and faithful to their word. Their manners and customs toward the close of the 18th century were described as very coarse, and they were said to be deeply imbued with superstitious bigotry; but since the more general diffusion of knowledge a great change for the better has taken place. Many of the peasantry wore long, loose, snuff-colored coats, lined or edged with pink, and studded in front with silver or white metal buttons, thrown open to display a smart waistcoat of various and brilliant colors ; their hats were often ornamented with artificial

flowers. Many of the Bavarian women are handsome, lively and graceful. They dress smartly and display much taste in their attire. Some of them wear black silk handkerchiefs, decorated with flowers or ribbons, tied tightly around their heads; some caps of silver or gold tissue, and all have their hair neatly braided. German is the language spoken, with local peculiarities, but Bavarians have never been conspicuous for the cultivation of their native tongue.

Constitution. — Bavaria became a member of the North German Confederation by the Treaty of Versailles, 23 Nov. 1870, and now forms part of the German republic. It long pos¬ sessed certain special privileges in regard to the administration of the army railways and posts, and the collection of revenue for its separate budget. It was a constitutional monarchy, the crown being hereditary in the male line until the dissolution of the empire. At the outbreak of the Revolution in November 1918 the gov¬ ernment was taken over by a cabinet of which the Independent Socialist, Kurt Eisner, became the head. Eisner's stormy rule came to an end with his assassination in February 1919. The extremists struggled to gain control but by May 1919 the moderates returned to power. On 14 Aug. 1919, a constitution was adopted, establish¬ ing the Free State of Bavaria (Freistaat Bay¬ ern). The constitution vests supreme power in the people. The Diet consists of one chamber, elected for four years on the basis of one mem¬ ber to every 40,000 inhabitants. The Diet at present has 183 members. Suffrage is univer¬ sal, equal, direct, secret and proportional. All citizens of 23 years of age have the suffrage. Supreme executive power is vested in the Min¬ istry as a whole. All privileges of birth or caste have been abolished. There is complete separation of church and state. All religious forms enjoy equal rights and all are free to practice their tenets. The dynasty was deposed 22 Nov. 1918 and Bavaria became a republic. On 30 Nov. 1919 the free state of Coburg de¬ cided to join Bavaria and on 11 March 1920 the

Bavarian Diet passed a bill for the union of the two states. Bavaria is represented in the Reichsrat by seven members, and in the Reichstag

by 48. In regard to local administra¬ tion .the country is divided into nine provinces, or government districts, subdivided into ad¬ ministrative districts. Each government dis¬ trict has a provincial government consisting of two boards, one for the management of the police, schools, etc., and the other for the man¬ agement of financial affairs ; and each has a landrat, consisting of representatives of the districts, towns, clergy, landed nobility and uni¬ versity, if there be one. The budget is voted for two years. The estimates for 1914-15 bal¬ anced at $196,267,182. The total debt for 1911 amounted to $606,820,789, of which $478,328,800 were for railways. The army under the mon¬ archy was raised by conscription — every man being liable to serve from 1 January of the year in which he completed his 20th year — and it formed an independent part of the army of the German empire, namely: 1st, 2d, 3d Bavarian army corps. In the time of peace it was under the command of the king of Bavaria, but in time of war it was placed .under that of the Gertpan Emperor as commander-in-chief of the whole German army. The period of service was two years in the ranks, five in the reserve, five in the Landwehr or second army line, six in the Landsturm for home defense. Under the Treaty of Versailles compulsory service was abolished.

History. — The earliest inhabitants of what is now known as Bavaria were a Celtic tribe who were conquered by the Romans about 15 b.c. The district became part of the Roman provinces of Noricum and Vindelicia, later in¬ corporated with Raetia. After the fall of the Western empire in the 5th century the territory was overrun by various Germanic tribes ; prob¬ ably descendants of the Marcomanni and Quadi ; who were called Boiarii, because they came from Bojerland or Bohemia. These Boiarii soon were made tributary by the Franks, and were ruled over by dukes of the Agilolfing family, probably of Frankish descent, as early as the 6th century. In the 8th century the bishoprics of Salzburg, Freising, Regensburg and Passau were founded or restored. Charle¬ magne made Bavaria a part of his kingdom, and on the death of the monarch the kings of the Franks and Germans governed it by their lieutenants. In 1070 Bavaria passed into the possession of the family of Guelphs, and in 1180 it was transferred by imperial grant to Otho, Count of Wittelsbach. In 1214 the family came into possession of the Rhenish Palatinate, but this was separated from Bavaria in the following century. In 1623 Duke Maximilian of Bavaria received the title of Imperial Elector, and five years later ac¬ quired the upper Palatinate. In 1777, on the extinction of the direct Bavarian line of the Wittelsbach, the succession passed to the Elector Palatin, Charles Theodore, and thus the Pala¬ tine, to which were added the duchies of Juliers and Berg, was reunited to Bavaria. In

1799 the Duke Maximilian Joseph of Zweibriicken came into possession of all the Bavarian territories. The Peace of Luneville (9 Feb. 1801) essen¬ tially affected Bavaria. While it lost the Palat¬ inate and the duchies of Zweibriicken and Julich, it obtained, on the other hand, by an

imperial edict of 1803 an indemnification by which it gained, in addition to the amount lost, a surplus of 2,109 square miles and 216,000 inhabitants.

In 1805 Bavaria, having espoused the side of Napoleon, was raised, by the Treaty of Pressburg, to the rank of a kingdom, with some further accessions of territory, most of which were confirmed by the treaties of 1814 and 1815, by which also a great part of the lands of the Palatinate was restored. In 1818 Bavaria entered on a period of constitutional reform and on 26 May of that year the Constitution was proclaimed. In 1848 the conduct of King Louis I, in maintaining an open liaison with Lola Montez, who became supreme in the state had thoroughly alienated the hearts of his sub¬ jects, and quickened that desire of political change which had previously existed. The people, early in March 1848, demanded immedi¬ ate convocation of the chambers, liberty of the press, public judicial trials; also that electoral reform should be granted, and that the army should take an oath to observe the Constitution. The King having refused to grant these de¬ mands, tumults occurred, and King Louis an¬ nounced his resignation of the sceptre to his son, Maximilian II, under whom the reforms and modifications of the Constitution were carried out. Maximilian died in 1864 and was succeeded by Louis II. In the war of 1866 Ba¬ varia sided with Austria, in consequence of which it was obliged, by the treaty of 22 August in the same year, to cede a small portion of its territory to Prussia, and to pay a war indemnity of $12,150,000. Soon after Bavaria entered into an offensive and defensive alliance with Prus¬ sia, and in 1867 joined the Zollverein under Prussian regulations. In the Franco-German War of 1870-71 Bavaria took a prominent part, and since 1871 it has been one of the constit¬ uent states of the German empire and of the republic, its successor, since 1918. In 1886 King Ludwig II committed suicide through alienation of mind. His brother Otto succeeded, but he being also insane, his uncle, Luitpold, became regent. On 12 Dec. 1912 he was succeeded as regent by his son Louis, who, yielding to popu¬ lar demand, was proclaimed king as Ludwig III, 5 Nov. 1913. On 22 Nov. 1918 the dynasty was deposed. For recent changes see under Constitution above.

Bibliography. — (Beitrage zur Statistik des Konigreichs Bayern > (published by the Statis-tiches Bureau) ; Denk und Weiss, <Unser Bayernland; Vaterlandische Geschichte Volk-stiimlich Dargestellt (Munich 1906) ; Doe-berl, M., (Entwickelungsgeschichte Bayerns) (Munich 1912) ; Gotz, (Geographisch-his- torisches Handbuch von Bayern) (Munich 1895-98) ; Giimbel, W., (Geologie von Bayern) (Cas-sel 1884-94) ; Heigel, K. T., (Die Wittelsbacher) (Munich 1895) ; Haushofen, M., (Oberbayern Miinchen and bayerisches Hochland) in (Land und Leute) (Vol. VI; Bielefield 1910); Huret, J., (En Allemagne, la Baviere et la Saxe* (Paris 1911) ; Kinzel, K., (Das bayerische Hochland mit seinen Konigs-Schlossern und Seen* (Leipsiz 1914) ; Koestler, C., (Handbuch zur Gebiets und Ortskunde des Konigreichs Bayern* (Munich 1895) ; Norman, G., (A Brief History of Bavaria) (Munich 1906) ; Piloty, R., (Verfassungs-kunde des Konigreichs BayenP

(Gotha 1878-99) ; Pohl, C., (Handbuch des Staats und Verwaltungsrecht fiir das Konigreich Bayern > (Munich 1900) ; Poole, A. L.,

(Henry the Lion) (Oxford 1912) ; Reizler, S., ‘Geschichte Bayerns) (Gotha 1878-1914) ; Rheinhardstottner, K., editor, (Forschungen zur Geschichte Bayerns) (Berlin 1893-1908).

Charles Leonard-Stuart.

Henri F. Klein.

BAVIAD AND MˆVIAD, The, two

satires, by William Gifford. It was through these that the author, who later was the first editor of the (Quarterly Review, > became known. (The Baviad) (1792) is an attack on a band of English writers, who had formed themselves into a kind of mutual admiration society. It is an imitation of the first satire of Perseus, and in it the author not only attacks the ((Della Cruscans,® but all who sympathize with them. The

<M3eviad) (1795) is an imita¬ tion of the 10th satire of Horace, and was called forth, the author says, (<by the reappear¬ ance of some of the scattered enemy.®

BAVIECA, ba-wya'ka, the favorite horse of the Cid.

BAVIUS and MiEVIUS, still notorious as two miserable poets and presumptuous critics, satirized by Virgil. The words are often used to signify bad or malevolent poets.

BAWBEE, bor-be' (French, bas billon, How® or ((debased billon®), a coin originally minted in Scotland from an alloy of copper with a very small amount of silver, called bil¬ lon, and having at different times a value vary¬ ing from 1 14 to 3 cents. The coin is no longer issued, but the term is used in Scotland to mean a half-penny (a cent) or a very small value.

BAX, Ernest Belfort, English socialist : b. Leamington, 23 July 1854. He was edu¬ cated in London and Germany; followed journalism in Germany as foreign correspond¬ ent in 1880-81 ; and returning to England, be¬ came one of the founders of the English so¬ cialist movement. In 1885 he aided in starting the Socialist League. He has written a large number of works on socialistic and historical subjects.

BAXTER, James Phinney, American author: b. Gorham, Me., 23 March 1831. A successful merchant and manufacturer, he was six times mayor of Portland, Me., to which he presented the land and building for a public library. He presented also a memorial library and museum to his native town, erected on his father's estate. A devoted student of the history of his native State, he has pub¬ lished (George Cleeve of Casco Bay' (1885) ;

(Journal of Lieutenant W. Digby* (1888) ; (Sir Ferdinando Gorges and His Province of Maine) (1890) ; (The Pioneers of New France in New England* (1894) ; (A Memoir of Jacques Cartier with a New Translation of His Voyages) (1905); (The Greatest of Literary Problems) (1915). He published 20 volumes of (A Docu¬ mentary History of Maine,* and many other historical and literary monographs. He was long the president of the Portland Sav¬ ings Bank, and president and director of other institutions. Initiated, organized and was first president of the Associated Charities of Port¬

land, also the Portland Society of Art; started its first art school in 1884; president of the Maine Historical Society, the Portland Benevo¬

lent Society and the New England Historical Genealogical Society ; a member of the council of the American Antiquarian Society, member of the American Historical Society, Massa¬ chusetts Historical Society the American So¬ ciety of Arts and Sciences, and other literary societies at home and abroad.

BAXTER, Jere, American lawyer: b. Nash¬ ville, Tenn., 11 Feb. 1852. He traveled in Europe, studied law and reported the decisions of the Supreme Court of Tennessee, 9 volumes. He became prominent in railroad enterprises, particularly in schemes devoted to the opening up of the mineral and timber resources of his State. He was president of the Memphis & Charleston Railroad before reaching the age of 30, and he organized and built the Tennessee Central Railroad, of which corporation he was president. He was instrumental in the found¬ ing and extension of industrial towns, and was a member of the Tennessee senate.

BAXTER, Lucy E. (Barnes), English art writer: b. Mere, Wiltshire, about 1835; d. Flor¬ ence, Italy, 10 Nov. 1902. She was the daugh¬ ter of William Barnes, the Dorset poet, and wrote over the pen name of Leader Scott. After her marriage to Mr. S. T. Baxter in 1867, she resided in Italy, where she was made an honorary member of the Accademia delle Belle Arti. She was the author of (The Painter's Ordeal* ; (A Nook in the Apennines) (1879) ; lives of Fra Bartolommeo, Andrea del Sarto, Fra Angelico and Lucadella Robbia; (The Renaissance of Art in Italy * (1882) ;

(Messer Agnolo's Household, a Unique Cento Florentine Story * (1882) ; (Ghiberti and Dona-tello) (1882); (A Bunch of Berries) (1883); (Sculpture, Renaissance and Modern *(1886) ; (Tuscan Studies and Sketches) (1887) ; (Life of William Barnes> (1888); (Vincigliata and Mariano) (1891) ; (The Orti OrcellarP (1893) ; (Echoes of Old Florence* (1894) ; (The Castle of Vincigliata) (1897) ; (The Cathedral Build¬ ers, * her most important work (1899) ; (Filippo di Ser Brunellesco) (1901).

BAXTER, Richard, English divine : b. near Shrewsbury 1615; d. 8 Dec. 1691. After receiving a somewhat desultory and defective education he was sent to London under the patronage of Sir Henry Herbert, master of the revels ; but he soon returned to the country to study divinity, and in 1638 received ordination in the Church of England. In 1640 he refused to take the oath of universal approbation of the doctrine and discipline of the Church of Eng¬ land, usuallv known as the et ccetera oath, and in the following year he became minister at Kidderminster, with the best results to the morality of the town. When

the civil war broke out he sided with the Parliament, and after the battle of Naseby accepted the appoint¬ ment of chaplain to Colonel Whalley's regi¬ ment. He is said to have been, the whole of this time, a friend to the establishment, accord¬ ing to his own notions. In 1647 he retired, in consequence of ill health, from his military chaplainship, and when he recovered preached against the Covenant. He even endeavored to persuade the soldiery not to encounter the Scot¬ tish troops who came into the kingdom with

Charles II, and did not hesitate to express an open dislike to the usurpation of Cromwell. The fact is that Baxter held civil liberty to be of secondary consequence to what he esteemed true religion, and appears, from a sermon preached before Cromwell, to have deemed the toleration of separatists and sectaries the grand evil of his government. After the Restoration he was made one of the King's chaplains and a commissioner of the Savoy Conference to draw up the reformed liturgy. The active persecu¬ tion of the Non-Conformists soon followed; and upon the passing of the act against conventicles he retired, and preached more or less openly as the act was more or less rigidly enforced. After the accession of James II, in 1685, he was arrested for some passages in his Commentary on the New Testament supposed to be hostile to Episcopacy, and was tried for sedition. The violence of Jeffreys, who would hear neither the accused nor his counsel, produced a verdict of guilty on the most frivolous grounds. He was sentenced to two years' imprisonment and a heavy penalty, which, after a short confinement, the King remitted. Henceforward Baxter lived in a retired manner till his death. His wife cheerfully shared all his sufferings on the score of conscience, both in and out of prison. The character of Baxter was formed by his age; his failing was subtle and controversial theol¬ ogy; his excellence, practical piety. In divinity he sought to establish a resting place between strict Calvinism and high-church Arminianism, by the admission of election and the rejection of reprobation. Christ, he considered, died for some especially and for all generally; that is to say, all possess the means of salvation. A body called Baxteriatis long acknowledged these

distinctions; and the Non-Conformist clergy, after the Revolution, were divided between this body, the pure Calvinists, and the high-church, passive-obedient Arminians. Baxter was a voluminous writer; his (Saints' Everlasting Rest,* and the (Call to the Unconverted, *have been extraordinarily popular. In 1830 an edi¬ tion of his Practical Works* appeared in 23 octavo volumes. The chief authority for the facts of his life is the (Reliquiae Baxterianae) of Sylvester, consisting of autobiographical matter. Consult Orme, W., (Life and Times of Richard Baxter) (London 1830) ; Tulloch, J., (English Puritanism and its Leaders* (Lon¬ don 3d ed. 1883).

BAXTER, Robert Dudley, English polit¬ ical economist: b. Doncaster, Yorkshire, 1827; d. May 1875. He was educated at Trinity Col¬ lege, Cambridge, and in 1866 became a member of the Statistical Society of London. He wrote and published (Railway Extension and its Results) (1866) ; (National Income of the United Kingdom* (1868) ; (Taxation of the United Kingdom > (1869) ; { English Parties and Con¬ servatism* (1870) ; (National Debts of the World* (1871), *etc.*

BAXTER, Sylvester, American journalist: b. West Yarmouth, Mass., 6 Feb. 1850. After several years on the Boston Daily Advertiser, beginning in 1871, was long on the staff of the Boston Herald ; was editor of the Mexican Financier, of Outing and of The Automobile, the second motor-vehicle journal started in America; correspondent of Boston Daily Ad¬ vertiser and Boston Herald in Germany, of

Boston Herald and New York Sun in Mexico, of the Outlook in South America. In Boston was active in organizing the metropolitan park system and was secretary of the preliminary Metropolitan Park Commission. His interest in civic improvements led him to organize the Metropolitan Improvement League, of which he has for some years been secretary; this led to the appoinment of the Metropolitan Im¬ provements Commission by State authority and he was its secretary while for two years it studied important problems for Greater Boston. He first suggested the organization of Boston and its suburban communities into a federated metropolis as a Greater Boston, which was realized to the extent of constituting metropoli¬ tan districts for parks, sewerage and water-supply. In 1888-89, as secretary of the Hemen-way Southwestern Archaeological Expedition, he was associated with Frank Hamilton Cush¬ ing in his important explorations in Arizona, representing the expedition at the Americanist Congress in Berlin in 1888. In 1899 he organ¬ ized an expedition to study and place on record as many of the important

examples of post-Columbian architecture in Mexico as might be practicable. The result was an elaborately illustrated work entitled (Spanish-Colonial Architecture in Mexico.* Among his other writings, beside numerous uncollected contribu¬ tions to the leading magazines, including essays, sketches, short stories and poems, are (The Cruise of a Land-Yacht* (a story of travel in Mexico, for boys) ; (Berlin, a Study of Munic¬ ipal Government in Germany,* (The Old New Worlds an account of the work of the Hemen-way expedition's work in Arizona; (Greater Boston,* (01d Marblehead) and (The Quest of the Holy Grail.* Also, in association with Charles Eliot, the greater part of the report of the Metropolitan Park Commission for Bos¬ ton, made in 1893 — regarded as an exception¬ ally important contribution to the literature of public parks.

BAXTERIANS. See Baxter, Richard.

BAY, in architecture, a term used to signify the magnitude of a building. Thus, if a barn consists of a floor and two heads, where they lay corn, they call it a barn of two bays. These bays are from 14 to 20 feet long, and floors from 10 to 12 broad, and usually 20 feet long, which is the breadth of the barn. It is also used to denote the divisions of a church or cathedral from floor to roof, as indicated by the pillars or arches ; as, a church of eight bays.

In botany, the name of several trees and shrubs, as sweet bay (Laurus nobilis) the laurel (q.v.) of the poets, used for crowning heroes in ancient times and for church decoration at the present. It has stiff, dull-green leaves some¬ times used to flavor culinary dishes. Its sweet, fragrant, aromatic, cherry-like, purple fruits are edible. This tree is widely cultivated for orna¬ ment in Europe and America, and is probably the most popular tub-plant used in open-air restaurants, esplanades, etc., on account of its ability to withstand neglect, abuse and shear¬ ing. Several hundred thousand specimens are used annually on the two continents. The bay laurel is better known as the cherry laurel (Prunus laurocerasus) . Its leaves yield prus¬ sic acid, and were at one time extensively used

as a poison. The loblolly bay (Gordonia lisi-anthus), white bay (Magnolia glaucd), and red bay (Per sea carolinensis), are well-known natives of the southeastern United States. The name rose bay is given to divers evergreen rho¬ dodendrons, to oleander and sometimes to Epilobium angustifolium. The California bay-tree is U mbellularia calif ornica. The bay-tree from which bay rum (q.v.) is distilled is Myrcia acris. See Laurel; Magnolia.

In geography, an arm of the sea, extending into the land. It is generally applied to smaller bodies of water than gulfs, of the same general geographical character, though the terms ˆgulf® and <(bay)} are used sometimes interchangeably and much to the confusion of geographical science. The word is of Saxon origin and sig¬ nifies an angle. It should properly be applied only to arms of the sea which are widest at their departure from the main line of sea coast, or mouth, while ˆgulf® should be applied to such bodies of water as the Gulf of California, whose width is nearly the same throughout a great part of their extent.

BAY-BIRDS, or BEACH-BIRDS, a

sportsmen's name, in particular use along the south shore of Long Island, N. Y., for snipe, curlews, sandpipers, avocets and other limicoline birds that frequent the shores and bays of estuaries. Compare Shore-birds.

BAY CITY, Mich., city, county-seat of Bay County, is located on the south bank of the Saginaw River, four miles from its mouth on Saginaw Bay, from which it takes its name, and at the head of deep water navigation. It is 108 miles northwest of Detroit and is con¬ nected with the Michigan Central, Pere Mar¬ quette, Grand Trunk and the Detroit and Macki¬ nac railway systems. It is the principal market town of a large area of the Saginaw Valley and <(Thumb,) region of the lower peninsula, the most fertile section of the State. The river is navigable for the largest lake vessels up to this point. West Bay City, directly across the river, was joined to Bay City 1 April 1905 by a special act of the legislature.

Manufactures. — Bay City is an important manufacturing centre, its principal industries being coal, salt, lumber, sugar, alcohol, beer, machinery and chemicals. It has the only alcohol plant in the State which produces proof alcohol from the refuse molasses, a by-product of the manufacture of beet sugar. Its chemi¬ cal works is one of the largest in the world, producing alkalis, soda ash, salt, *etc.* There are three large beet sugar refineries, two of them being in West Bay City.

Over a dozen coal mines are in operation in the county. It is the port of entry of 150,000,000 feet of lumber, imported annually from Canada, upper Michi¬ gan and the Lake Superior district, which is worked up in over a score of local planing mills, box factories and other woodworking plants. It has one machine shop which is one of the biggest in the country and its woodenware fac¬ tory is the biggest in the world. The United States census of manufactures for 1914 re¬ corded 142 industrial establishments of factory grade within the city limits, employing 4,658 persons, of whom 3,771 are wage earners, re¬ ceiving annually $2,129,000 in wages. The capi¬ tal invested aggregated $10,618,000, and the value of the year's output was $11,119,000: of

this, $4,716,000 was the value added by manu¬ facture.

Trade and Commerce. — The commerce of Bay City has changed in character during re¬ cent years. Up to 25 years ago the sawing of pine lumber was the chief industry along the Saginaw River, but because of the exhaustion of the pine forests, this industry has declined. Instead of exporting lumber, as it formerly did, its shipments amounting to 850,000,000 feet in some years, Bay City now brings in heavy shipments of mixed timbers, which is later ex¬ ported in the form of manufactured articles. Fish, coal, alcohol, salt and sugar also form important items in the total shipments. The annual commerce of the city amounts to about

$50,000,000.

Railroads and Water Communication. —

Bay City is the division headquarters of the Michigan Central Railroad, the Mackinac, Bay City and Detroit, and Bay City and Jackson divisions centring here. It is also the north¬ ern terminal of the C. H. D. and Pere Mar¬ quette system, the northern terminal of the Grand Trunk and the southern terminal of the Detroit and Mackinac Railroad. It has 59 miles of street railways and is connected with Sagi¬ naw, 14 miles to the south, by electric railway. Two routes, one to Lapper, Pontiac and Detroit; and the other to Caro, Cass City, Bad Axe and Harbor Beach ; also a third rail system, going from Bay City directly to Detroit without change.

City and County Government. — Being the county seat, Bay City

contains the county court¬ house and all the county offices, besides a city hall costing $200,000. The charter election is held annually on the first Monday in April. The mayor holds office for two years, the comp¬ troller for four years and the treasurer and recorder for two years. The total expenses of the city during the year ending 1 June 1916 were $560,437. The valuation as assessed for taxation purposes was $26,355,768 in 1916. The public debt of the municipality is $1,281,500, of which $342,500 represents water bonds. The rate of taxation in 1916 was $11.60 on every $1,000 of assessed value.

Banks and Loan Companies. — Bay City has five banking institutions with an aggregate capital of $950,000 and a surplus of $755,000. In 1915 the undivided profits were $183,313, and the deposits amounted to $10,290,929. There are two building loan associations ; the Mutual Building and Loan Association of Bay County (capital $2,000,000) and the Savings, Building and Loan Association of Bay County, capital

$1,000,000).

Education, Religion, *etc.* — There are two high schools in the city and nine other school buildings, employing a superintendent, several •principals and 229 teachers. The school at¬ tendance for 1916 was 13,542. A county normal training school and kindergarten schools are maintained in connection with the public school system. In addition there are the Bay City Business College, the Holy Rosary Academy, the Mercy Hospital Training School for Nurses, the Oral School for the Deaf. There are three libraries, holding a total of nearly 80,000 volumes. Religion and charity in Bay City are represented by its 36 churches and mis¬ sions : 12 private and parochial schools; three

charitable institutions and three hospitals. Bay City has two daily newspapers and several weekly publications.

History. — The first white settler located here in 1831, being

employed by the government to teach the Indians farming, in accordance with a treaty signed with the Chippewas in 1819,* whereby they ceded this territory to the United States. There were two reservations, comprising about 3,000 acres within what is now the corporate limits of the municipality. A large part of this land fell into the hands of one Stephen V. R. Riley who lived with the Indians for many years and married one of their women. In 1836 his son, John Riley, sold a large tract of this land to a company of Detroit merchants, who began laying out a settlement. Six years later these pioneers ac¬ quired from the Saginaw Bay Company that territory which was then known as lower Sagi¬ naw, which considerably enlarged their prop¬ erty. After 1844 the settlement began to de¬ velop rapidly with the growing demand for white pine lumber, which could be had along the river above the settlement in unlimited quantities, then the richest pine forests known in the United States. In 1859 the settlement was incorporated, though it did not receive its city charter until 1865.

Population. — According to the Federal census figures of 1900 the population of Bay City was then 27,628. Five years later fol¬ lowed the consolidation with West Bay City, which then gave the municipality a population estimated at 40,000. In 1920 the census figures showed a population of 47,554.

BAY CITY, Tex., town and county-seat of Matagorda County, 25 miles from the Gulf coast, and 85 miles south by west of Houston, on the Colorado River, and on the Gulf, Colo¬ rado and Santa Fe, the Saint Louis, Browns¬ ville and Mexico, and the Galveston, Harris¬ burg and San Antonio railroads. It is situ¬ ated in a thriving agricultural region, in which the principal crops are cotton, corn, sugar cane, rice and fruit. It has cotton gins, ice-making and dairying establishments, and rice mills. Bay City was settled in 1895. Pop. 3,156.

BAY ISLANDS, Honduras, a group of islands in the Bay of Honduras, 150 miles southeast of Belize, known as Ruatan, Guanaja (or Bonacca), Utilla, Barbareta, Elena, Morat and the Puercos Islands. They were discov¬ ered by Columbus, 30 July 1502, and it was from Guanja that he first sighted the mainland of America. Their ownership was long a matter of dispute between Spain and England, and later between England and the republic of Honduras. In 1852 the group was declared a colony of Great Britain by royal warrant, and this action involved the United States in the dispute, that government claiming that the seizure was a violation of the Clayton-Bulwer treaty (q.v.). Negotiations dragged along slowly for several years, but finally — in 1859 — Great Britain recognized the claim of Hon¬ duras to the

islands. A practical protectorate was, however, maintained by Great Britain over the group, and the inhabitants (who number about 5,000) avowed British allegiance. In 1903 Great Britain formally renounced all juris¬ diction, and title to the Bay Islands is now clearly vested in Honduras.

BAY LAGOON, Philippines, a fresh-water lake in the northern part of Luzon. This lake is connected with Manila Bay by the Pasig River, and from its centre rises a high vol¬ canic island. It is about 20 miles in extent from north to south, and about 47 miles from east to west. In 1899 it was made a naval headquarters for the United States.

BAY PSALM BOOK, the title of the first book published in the American colonies. It was printed by Stephen Daye at Cambridge in 1640, and was the product of the joint Ubors of Revs. Richard Mather, Thomas Wilde and John Eliot. It was revised in 1650 and was long in use in New England.

BAY SAINT LOUIS, Miss., city and county-seat of Hancock County, 55 miles north¬ east of New Orleans, on the Louisville and Nashville Railroad, and on the Jordan river. It is a favorite summer resort and a shell road along the beach is of great interest. It is the seat of Saint Stanislaus College and the Con¬ vent of Saint Joseph. The chief industries are those connected with oyster raising, fishing, fruit-growing and farming. Pop. 3,338.

BAY SALT, the coarse-grained salt found in saltmarshes and along ocean shores, where it is formed by the spontaneous evaporation of sea-water. The name is supposed to refer to the Bay of Biscay, on whose shores extensive deposits of (<bay salt® occur.

BAY STATE, the popular name of Massa¬ chusetts, which prior to the adoption of the United States' Constitution had been known as the Massachusetts Bay Colony.

BAYA, or BAYA SPARROW, a sparrow¬ like weaver-bird (Ploceus philippinus) , which the people of India and the Malay countries often keep about their houses, not only in cages, but as a free pet trained to do a variety of clever tricks, even to find small articles, to carry notes to certain places, and to steal ornaments from the hair of visitors. See Weaver Btrd.

BAYAD, a cat fish, Bagus bayad, a large edible fish found in abundance in the river Nile; distinguished, however from the electric

catfish of the same waters.

BAYADERES, ba-ya-darz, in the East Indies, young girls, from i() to 17 years of age, who are instructed in dancing, singing and acting little plays. They are trained under the care of women, who are experienced in all female arts, and particularly in that of pleasing. These procure from the lowest classes of the people the most beautiful girls, of seven or eight years of age, and instruct them in all the arts of their profession (especially dancing and singing), the object of which is to amuse the rich and minister to their passions. Their presence is considered necessary even at the smallest public entertainments, though they are known to be mere prostitutes. After their 17th year, when their first charms have faded, they retire to a pagoda under the protection of the Brahmins, who scruple not to pocket the gains of their prostitution. This word is from the Portuguese word bailadeira, from bailar, to dance.

BAYAMO, ba-ya'md, Cuba, a town whose name is indissolubly connected with the Ten

\ ears War and the revolution of 1895. Thus the Cuban national air received the name ' Bayamese Hymn.) The republican movement of 1868 originated here and in the neighboring town of Yara; and here General Garcia received the message that Lieutenant Rowan delivered lo him before the War of 1898 between the United States and Spain. Bayamo was founded in the early years of the Spanish conquest. It is situated on the Rio Bayamo, an affluent of the Canto, Cuba's largest river, in the province of Oriente. It is an agricultural and commer¬ cial centre, though formerly its importance was much greater. Pop. about' 4,000.

BAYAMON, Porto Rico, town five miles southwest of San Juan, on the American rail¬ road. It has sugar mills, tobacco factories, watch works, iron foundries, brick and ice works, and an oil refinery. Fruit-growing and sugar cultivation are extensively carried on in the neighborhood. The town has a public school, a college and several

churches. Nearby are the ruins of Pueblo Viejo (Old Town) or Caparra the earliest Spanish settlement in Porto Rico, said to have been founded by Ponce de Leon in 1509. Pop. 5,272; municipal district 29,986.

BAYARD, bi'ard, George Dashiell, Ameri¬ can soldier: b. Seneca Falls, N. Y., 18 Dec. 1835 ; d. 14 Dec. 1862. Passing his boyhood in Iowa, he entered West Point, 1852, and became a cavalry lieutenant ; then captain in August 1861, colonel of volunteers in September, briga¬ dier-general the following April; and after serving in the Shenandoah and northern Vir¬ ginia campaigns, was mortally wounded at Fredericksburg.

BAYARD, James Asheton (1st), Ameri¬ can statesman: b. Philadelphia, 28 July 1767 ; d. 6 Aug. 1815. He was adopted by his uncle, Col. John (q.v.), graduated at Princeton, 1784; studied law, and settled in Wilmington, Del., permanently. In 1796 he was elected (Federal¬ ist) representative in Congress and became the leader of the party in the House, noted as a constitutional lawyer ; and when the peculiar system of presidential elections at that time had tied Jefferson and Burr for the presidency, though Jefferson was the only one really voted for, Bayard threw his vote for Jefferson and elected him as the less obnoxious of the two. John Adams appointed him Minister to France, but he declined. He served in the House till 1803; in 1804 he was elected to the Senate, and held the seat till 1813, voting against the War of 1812. He was made peace commissioner in 1813 by Madison, and, declining the ministry to Russia, was one of those who concluded the Treaty of Ghent, December 1814, but died shortly after his return.

BAYARD, James Asheton (2d), American statesman, son of the foregoing: b. Wilming¬ ton, Del., 15 Nov. 1799; d. there, 13 June 1880. He became a lawyer of high rank in Wilming¬ ton, United States attorney for Delaware under Van Buren, and was elected United States senator, 1851, 1857 and 1863, as a Democrat; but on the last occasion the ˆironclad® oath of allegiance being required of public officers at that time, Mr. Bayard entered a protest against it as a violation of State rights, and resigned

his seat at once on taking it. His successor, George R. Riddle, dying four years later after the war, he accepted an election to fill out his own unexpired term, to March 1869; during most of the time was chairman of the judi¬ ciary committee, and gained an honorable

celeb¬ rity for his punctilious sense of public honor in the matter of the Credit Mobilier (q.v.). His son, Thomas F. (q.v.), was chosen to succeed him by the same legislature which had elected himself, the only instance of the kind in Ameri¬ can history. He lived quietly at Wilmington during the remainder of his life.

BAYARD, John, American patriot : b. Bohemia Manor, Md., 11 Aug. 1738; d. 7 Jan. 1807 (for his descent, see Bayard Family). He was a prominent Philadelphia merchant, member of the Sons of Liberty, and later of the Provincial Congress, 1774-75, and of the Council of Safety; colonel of infantry at the battles of Brandywine, Germantown and Prince¬ ton ; member of the State board of war, and speaker of its house. He furnished arms to Congress and fitted out one of the earliest efficient privateers. In 1785 he was elected to Congress. Somewhat impoverished by his sacrifices in the Revolution, he removed per¬ manently to New Brunswick, N. J., where he was mayor, county judge and leading magnate. He was a firm Federalist, of high character.

BAYARD, Nicholas, American colonial official: b. Alphen, Holland, about 1644; d. New York, 1707. (See Bayard Family). He was double nephew of Peter Stuyvesant, by blood and marriage; became his private secretary and surveyor of the province, secretary of it after the English conquest, and mayor in 1685. He was commander-in-chief of the militia of the province, and one of the three resident coun¬ cillors; and had to flee to Albany for his life on Leisler's usurpation after Andros' overthrow, but was made councillor anew on Leisler's downfall. On Kidd's arrest for piracy in 1699, Bayard, like all Governor Bellomont's officials, was accused of complicity, and visited London to clear himself; but the old hates of the Leisler time pursued him, and on charge of attempt¬ ing to introduce popery, piracy and slavery into New York he was condemned to death for high treason. King William's death intervening, however, he was released and restored to his possessions by an order in council.

BAYARD, ba-yar, Pierre Terrail (Chev¬ alier de), French soldier: b. Chateau Bayard, near Grenoble, about 1475; d. 30 April 1524. He was descended from one of the most noble families in Dauphiny, and at the age of 13 be¬ came page to the Duke of Savoy, at that time an ally of France. Charles VIII, struck by his skill and grace in riding, asked that he be trans¬ ferred to his service, and accordingly, as a preparation to being attached to the royal suite, young Bayard was placed in the household of Paul of Luxembourg, Comte de Ligny, where he was taught all the feats of arms and niceties of chivalry which were then held necessary to constitute a gentleman and a soldier.

His first experience in war was in the wild and daring march of Charles VIII, with a small unsupported army, through the whole length of Italy, to invade the kingdom of Naples, which was won and lost in a few days with equal

ease; and in that campaign, he greatly distin¬ guished himself, taking with his own hand a stand of colors in the battle of Verona. After this, while serving in an invading army in Italy, after a battle fought near Milan, in the heat of pursuit he entered that city pell-mell with the fugitives, and was made prisoner, but, in con¬ sideration of his astonishing valor, was sent back without ransom by Ludovico Sforza, to¬ gether with his horse and arms. In Apulia he defeated a Spanish corps commanded by Alonzo de Soto-Mayor, who broke his parole and slandered Bayard, in return for which the latter challenged and slew him in single combat, and afterward, according to some authorities, cov¬ ered the retreat of the whole French army and defended the bridge over the Liris, now the Garigliano, single-handed against half an army. For this feat he received an augmentation of his armorial bearings, a porcupine bristling with spears, with the motto Vires agminis wins habet.

A real type of the ideal knight-errant of romance, wherever honor was to be won or danger incurred, Bayard was there. Desper¬ ately wounded in the assault of Brescia, he was carried to the house of a nobleman who had fled, abandoning his wife and daughters to the fate which befalls women in a sacked city, and from which the wounded enemy alone preserved them. Half-recovered from his wounds, he joined Gaston de Foix before Ravenna, where with his own hand he took two Spanish stand¬ ards and converted a retreat of the enemy into a rout. In the subsequent wars with Ferdi¬ nand the Catholic of Spain he displayed the same chivalric valor and the same generalship among the Pyrenees which he had displayed in his boyhood among the passes of the Alps and Apennines. In the dark days which clouded the latter years of Louis XII, when Henry VIII brought his English archers to back the Ger¬ man Maximilian in Flanders, and Terouanne

and Tournay went down, with but feeble resist¬ ance, before the allies, Bayard was the same in adverse as he had been in prosperous fortunes. He was forced to surrender at the disgraceful battle of the Spurs, but again his glory to be taken under circumstances of such honor caused King Henry to set him at liberty with his horse and arms, unransomed. It was, however, in his noon of manhood that his glory shone the brightest. When Francis I invaded Italy after his accession to the throne of France, it was Bayard who was the precursor of his march ; who made Prosper Colonna, at the very moment of his belief, that he had ambushed and sur¬ prised him, his prisoner : who, in a word, paved the King's way to the magnificent battle of Marignano. In that tremendous conflict, he per¬ formed prodigies, and contributed more than any or all beside to change what once seemed a lost fight into a victory. At its close his sword conferred the accolade on the shoulder of his King, Francis I, who deemed it honor enough to take knighthood at the hand of such a paladin as Bayard. The fortunes of war, proverbially fickle and changeful, were never more so than at this epoch ; and when, a short time later, Charles V invaded Champagne, his wonderful defense of the open town of Mezieres alone prevented his penetrating to the heart of France, of which, by this exploit, he deserved, as he obtained, the name of savior. His next war was his last. Genoa, ever an

unwilling conquest of the French arms, re¬ volted; and, under the command of Bonnivet, Bayard was sent to reduce the city to obedience and chastise the rebels. In the first instance success attended their advance ; but, after the surrender of Dodi, fortune again changed, and, foot by foot, the French were beaten out of their conquests. In retreating through the Val d'Aosta the French rear was beaten, Bonnivet was severely wounded, and the safety of the army was committed to Bayard, if he per¬ chance might save it. In passing the river Sesia in the presence of a superior enemy, as Bayard was covering the rear and pressing hard upon the Spaniards, who were fast giving way before his impetuous charge, he was shot through the right side by a stone from an arquebus, which shattered his spine. <(Jesu, mY God!® he cried, (<I am a dead man.® And then commanding that he should be placed erect, in a sitting posture, with his back against a tree, with his face to the Spaniards, and the cross¬ hilt of his sword held up as a crucifix before him, he confessed his sins to his esquire, sent his adieux to his King and country, and died in the midst of weeping friends and admiring enemies. With his fall the battle was ended. The French lost everything, — standards, drums, baggage, ordnance, — and their retreat to France became a flight. But there was

most grief that they had lost Bayard. His body remained in the hands of the Spaniards ; but they embalmed and returned it to France unsolicited. A simple bust, with a brief and modest Latin in¬ scription, in the church of the Minorites, in Grenoble, erected in 1823, is the only monu¬ ment to one of the purest and most beautiful characters in mediaeval history, the chevalier sans pcnr et sans reproche.

Bayard's life was written by Symphorien Champier in 1525, and two years later by his secretary, Jacques Joffrey, known as the <(loyal servitor.® Other accounts have been translated by E. Walford (London 1867).

BAYARD, Thomas Francis, American statesman, son of James A. (2d) : b. Wilming¬ ton, Del., 29 Oct. 1828; d. 26 Sept. 1898. He was intended for a business career, and was placed in a New York house, his elder brother being designed to carry on the family succession for public life; but, the latter dying in 1848, Thomas returned to Wilmington, studied law with his father, and was admitted to the bar in 1851. He was appointed United States district attorney, but resigned the next year; removed to Philadelphia 1855 and practised law twro years, then returned permanently to Wilming¬ ton. He and his father were Peace Democrats, unalterably opposed to the war, publicly de¬ nounced it, and gave no help to its prosecution. Elected to the Senate to succeed his father, he took his seat 4 March 1869, and served by suc¬ cessive re-elections till 1885. He was one of the leading Democratic figures, member of the finance, judiciary and other important com¬ mittees, and its president pro tempore in 1881; was on the Electoral Commission of 1876; con¬ tinued to champion the party doctrines and was one of the most prominent candidates for the presidency before both Democratic national conventions of 1880 and 1884. On 4 March 1885 he was appointed Secretary of State in the Cabinet of President Cleveland; and in this

position had his share of important and vexa¬ tious questions, such as the Bering Sea seal-fishery matter, and treaties with Great Britain and Russia. He was United States Ambassador to Great Britain 1893-97, in

Cleveland's second term, the first minister to hold the title of ambassador.

BAYARD FAMILY, a remarkable succes¬ sion of American public leaders, statesmen and jurists, identified for two and a half centuries with the Middle States from New York to Maryland, and for a century and a quarter al¬ most continuously in public service. They descended from a family of French Huguenot refugees, whose ancestor was a Paris theolog¬ ical professor driven to Holland to escape perse¬ cution about 1580. His son Samuel became a wealthy Amsterdam merchant and married the accomplished, energetic and capable sister (Anna) of Peter Stuyvesant, the last governor of the Dutch New Netherlands, who himself married Bayard's equally accomplished sister Judith, a great lady of her time. Samuel died in Holland ; and his widow with her three sons accompanied her brother to Manhattan Island, where she took up an estate of 200 acres, in¬ cluding the site of the Astor Library. Of these sons, Nicholas became secretary of New Netherlands and later of English New York, mayor, commander-in-chief of the colony's militia, and practically the head of the colony — a perilous honor which twice brought him to the verge of destruction. His brother Peter, however, though not personally con¬ spicuous, became the ancestor of the distin¬ guished Bayards of the 18th and 19th centuries. Peter's son Samuel joined the Labadists (see Labadie, Jean), a sect of communists other¬ wise much like the Quakers, and removed to Maryland. Of his grandsons, Col. John was a leading Philadelphia merchant, patriot and soldier, representative in Congress, a county magnate in Maryland till after the Revolution, later judge and Federalist pillar; his son Samuel, lawyer, clerk of the Supreme Court, United States claim agent and judge, was one of the founders of the New York Historical Society and the American Bible Society. Col. John's twin brother, Dr. James A., was father of James A., the noted Federalist statesman of Jefferson's and Madison's time, leader of the Federalists in the House of Representa¬ tives, and the one whose vote gave the presi¬ dency to Jefferson instead of Burr, senator and peace commissioner. The two sons of the latter James A., Richard H. and James A. (2d), were both United States senators of distinction from the State of Delaware, the one a Whig and the other a Democrat — the only instance of the kind in the United States history; the former also chosen chief justice of Delaware. The son of James A. (2), Thomas F., was also senator to succeed his father; so that father, two sons and grandson represented Delaware in the Senate 47 years between 1805 and 1885. Thomas F. was further a member of the Electoral Commission of 1876, and Secretary of State under Cleveland. This unique record of distinguished public position is the more notable that

it has been on the highest plane of public character as well as capacity — con¬ spicuous for dignity, probity and scrupulous sense of those official proprieties which shun

the appearance of evil and therefore bar out its reality.

BAYAZID, or BAYEZEED, Armenia, a town in the district of, and 140 miles south¬ east from, Erzerum, southwest of Mount Ararat, from the base of which it is separated by a lava-covered plain 10 miles wide. It is situated on the declivity of a rugged eminence, the summit of which is fortified and surrounded by a wall and ramparts. The town is in a ruinous state; most of the houses are small and ill built, and the streets are extremely filthy. Besides the extensive palace of the Pasha, the town contains two Christian churches, three mosques and the famous monastery of Kara-Keleeseh, celebrated for its beautiful arch¬ itecture and antiquity. Pop. 5,000.

BAYAZID, ba-ya-zed', I and II. See Bajazet.

BAYBAY, bai'bai, Philippines, a town of the province of Leyte, situated on the west coast, 40 miles southwest of Tanaban. Pop.

17,367.

BAYBERRY. See Candle Berry.

BAYER, bi'er, Gottlieb Siegfried, German philologist, grandson of Johann Bayer: b. Konigsberg 1694; d. Saint Petersburg, 21 Feb. 1738. He displayed from his earliest childhood a singular passion for Chinese and other East¬ ern languages. He studied the Coptic at Ber¬ lin, under La Crosse, Arabic at Halle, under Solomon Negri, and at the same time opened a correspondence with the missionaries in India, in order to obtain more information about the Sanskrit and Hindustani. On the foundation of the academy of sciences in Saint Petersburg in 1726, he became professor of Greek and Roman antiquities. Besides his extraordinary knowledge of languages, Bayer was an eminent historical and archaeological scholar. His mon¬ ument is his work published in 1730, (Museum Sinicum, in quo Sinicae linguae et literaturae ratio explicaturp containing a Chinese gram¬ mar, a grammar of the dialect of Shin-Shu, and many interesting notices on Chinese litera¬ ture.

BAYER, Johann, German astronomer : b. Augsburg 1572; d. 1660. He is celebrated for a large work published in 1603, under the title of ˆranometriaP and republished in 1627 under the title of (Ccelum Stellarum Chris-tianumP which contains a minute description and a catalogue of the constellations. He changed the name because he had withdrawn the heathen names of the constellations, and supplied their names by others taken from the Bible, taking those of the northern constella¬ tions from the New, and those of the southern constellations from the Old Testament, and giving the names of the 12 apostles to the signs of the Zodiac. His letters were adopted by Flamsteed and others, and are now universally used, but the heathen names have kept their ground. He contributed much to the simplifi¬ cation of astronomical science, by avoiding the old, unintelligible nomenclature and by denoting the stars in every constellation by the letters of the Greek alphabet in their order. Baver was also a good student of law and an able the¬ ologian. He was settled as minister over dif¬ ferent parishes, and so zealous in his advocacy of Protestantism that he was called <(Os Pro-364

testantium.® The Emperor Leopold ennobled him.

BAYER, Karl Robert Emerich von, Aus-tro-German novelist, who wrote under the pseudonym of Robert Byr: b. Bregenz, 15 April 1835 ; d. 1902. He was a very popular and exceedingly prolific story-teller, and his volumi¬ nous fiction largely dealing with military life, had a wide circulation. Among his best-known novels are (The Struggle for Life) ; <Masks) ; (A Secret Dispatch* ; (The Road to Fortune) ; (Meadow Maidenhair) ; (The Ironworm.*

BAYEUX, ba-ye, an ancient town of France, department Calvados, 18 miles north¬ west of Caen. It possesses many antique houses of singular appearance, and has a beautiful cathedral dating from the 12th to the 15th century, with a crypt under the choir of several centuries earlier. Its noble portal and three towers render it especially noteworthy. The local industries include the manufacture of porcelain and lace, bonnet-making and cotton spinning. There is a public library

and mu¬ seum, in which one of the most interesting relics of the Middle Ages is preserved. See Bayeux Tapestry.

BAYEUX TAPESTRY, a celebrated piece of mediaeval embroidery of sewed work orig¬ inally found in the cathedral of Bayeux, in the library of which town it is still preserved. The fact that such a tapestry existed was brought to light by M. Lancelot, who communi¬ cated a description of an illuminated drawing of a portion of it to the Academy of Inscrip¬ tions and Belles-lettres in 1724. This led to the discovery of the tapestry itself in 1728, where¬ upon various speculations arose as to its date, its origin and its purport. According to tra¬ dition it is a contemporary representation of the invasion and conquest of England by the Normans, and the discussions upon it have proved that tradition is right. It is thus not only valuable as a relic of the art of the Middle Ages, but it has also great historical value, inasmuch as it supplies several details of the great event which it portrays which are not found in the chroniclers, and also gives us an exact picture of Norman costumes and man¬ ners. It contains 1,512 figures with inscriptions in Latin giving the names and subjects. It was at one time supposed to have been worked by the needle of Matilda, Queen of William the Conqueror, assisted by her attendants, and to have been presented by Odo, bishop of Bayeux, the half-brother of William, to the church in which it was found. But later researches have led to the belief that the tapestry was made to the order of Bishop Odo ; of the actual makers — certainly women — nothing is known. Whether this be so or not, it is regarded as certain that the tapestry is not later than the 11th century. During the French Revolution the tapestry was in great danger of being destroyed. In 1803 it was removed to Paris by order of Napoleon, and wdien he was meditat¬ ing the invasion of Britain he caused it to be carried from town to town and exhibited be¬ tween the acts in the theatres. It was brought back to Bayeux in 1804, when it was placed in the hotel de ville, instead of the cathedral, its former resting-place. The length of the tapestry is 230 feet, and its height 20 inches. It is in an excellent state of preservation.

There are good representations of it produced photographically. In his (Norman Conquest* the late Professor Freeman calls it a contem¬ porary work. Consult J. C. Bruce's (Bayeux Tapestry) (1885) and Marignan's (Tapisserie de Bayeux* (Paris 1902). See Tapestry.

BAYLE, bal, Pierre, French critic and phi¬ losopher, son of a Calvinist minister : b. Carlat. near Foix (Languedoc), 1647; d. Rotterdam, 28

Dec. 1706. At the age of 19 he entered the College of Puylaurens, to finish his studies. All books were eagerly devoured by him; his taste for logic led him particularly to stud}' religious controversies, but Amyot's Plutarch' and (Montaigne* were his favorite works. In Toulouse he studied philosophy with the Jesuits. The arguments of his professors, and still more his friendly discussions with a Catholic priest who dwelt near him, confirmed his doubts of the orthodoxy of Protestantism, so that he re¬ solved to change his religion. His family, how¬ ever, tried all means to regain him, and after 17 months he returned to his old faith. To escape from the punishment of perpetual excommunication which the Roman Catholic Church then pronounced against apostates, he went to Geneva, and thence to Copet, where Count Dohna intrusted him with the education of his sons, where he studied the philosophy of Descartes. But after some years he returned to France and settled in Rouen, where he was employed in teaching. In 1675 he obtained the philosophical chair at Sedan, where he taught with distinction until the suppression of this academy in 1681. He was afterward invited to discharge the same duties at Rotterdam. The appearance of a comet in 1680 induced him to publish, in 1682, his (Pensees Diverses sur la C'omete,) in which he discussed various subjects of metaphysics, morals, theology, history and politics. It was followed by his (Critique Generale de l'Histoire du Calvinisme de Maimbourg.) This work received with equal appro¬ bation by the Catholics and Protestants, and esteemed by Maimbourg himself, excited the jealousy of his colleague, the theologian Jerieu, whose Refutation du P. Maimbourg) had not succeeded, and involved Bayle in many disputes. He afterward undertook a periodical work, (Nouvelles de la Republique des Lettres,) in 16S4. The death of his father and of his two brothers, together with the religious persecu¬ tions in France, induced him to write his (Com-mentaire Philosophique* on the words of the Gospel : <(Compel them to come in" ; which is not equal in merit to his other works. Bayle himself was unwilling to acknowledge it ; but Jurieu, who probably recognized its author by the zeal with which toleration is defended in this work, attacked it with violence, and his influence was sufficient to lead the magistrates of Rotterdam to remove Bayle from the office in 1693. He now devoted all his attention to the composition of his (Dictionnaire Historique et Critique,) which he published in 1695-97. This was the first work which ap¬ peared under his name. Jurieu opposed him anew, and caused the consistory, in which he had the greatest influence, to make a severe attack upon him. Bayle promised to remove everything which the consistory deemed offen¬ sive ; but finding the public had other views, and preferring the satisfaction of his readers to

that of his judges, he left the work, with the exception of a few trifles, unaltered. He found two new enemies in Jacquelot and Le Clerc, who both attacked his religion : others perse¬ cuted him as the enemy of his sect and his new country. The best editions of his (Dictionnaire Historique) are that of 1740, in four volumes folio (Amsterdam and Leyden), and that in 16 volumes, published 1820-24 at Paris. Consult Carzes, A., (P. Bayle, sa vie, ses idees) … (Paris 1905).

BAYLEN, bi-lan', or BAILEN, Spain, a town in the province of Jaen, at the foot of the Sierra Morena, 22 miles north of Jaen. It com¬ mands the road leading from Castile into Andalusia, and derives its celebrity from the events which took place in its vicinity leading to the ((Capitulation of Baylen," signed 20 July 1808, when General Dupont, and about 20,000 French troops under his command, surrendered to the Spaniards on condition of their being conveyed to France by the Spanish govern¬ ment ; but the latter stipulation was not carried into effect. The incapacity of Dupont was mainly instrumental in bringing about this re¬ sult, which inspired the Spaniards with confi¬ dence and was always regarded by Napoleon as the principal source of the French disasters in the Peninsula. Galena and zinc blende are mined in the vicinity. Pop. (1910) 8,334.

BAYLEY, James Roosevelt, American theologian: b. New York, 23 Aug. 1814; d. Newark, N. J.f 3 Oct. 1877. He studied at Trinity College, Hartford, and became a min¬ ister of the Protestant Episcopal Church; but, in 1842, was converted to the Roman Catholic faith ; and, after studying at Paris and Rome, was ordained a priest in 1844. He accepted the chair of belles-lettres at Saint John's College, Fordham, and was its acting president in 1846. After serving as secretary to Archbishop Hughes, he was consecrated the 1st bishop of Newark, N. J., in 1853. In 1872 he became archbishop of Baltimore, Md. He was the founder of Seton Hall College and several other institutions. His

(Pastorals for the Peo-ple) and (History of the Catholic Church on the Island of New York,* are his chief writ¬ ings.

BAYLEY, Richard, American physician : b. Fairfield, Conn., 1745; d. Staten Island, N. Y., 17 Aug. 1801. After studying medicine in England, chiefly in the London hospitals and under Dr. Hunter, he returned to America in 1776 as a surgeon in General Howe's army, but settled in New York the following year. He was the first professor of anatomy in Colum¬ bia College (1792) and for a time health officer of the port of New York, where his vigorous advocacy of proper quarantine laws was finally successful. A careful student of his profession, he suggested a new method of treatment for croup and maintained (1797) that in its origin yellow fever was due to local causes and was not contagious. He published (Cases of the Angina Tracheatis, with the Mode of Cure) (1781) ; 'Essay on the Yellow Fever) (1797) ; (Letters on Yellow Fever) (1798).

BAYLEY, William Shirley, American geol¬ ogist: b. Baltimore, Md., 10 Nov. 1861. He was graduated at Johns Hopkins in 1883 and received the Ph.D. from the same institution in 1886. He became United States geologist

of the bederal Geological Survey and professor of geology at the University of Illinois. For some time he was associate editor of the Amer¬ ican Naturalist, and after its establishment in 1905 was the managing editor of Economic Geology. He was also professor of geology at Colby College. He is the author (with C. R Van Hise) of the (Report on the Geology of the Marquette Iron District of Michigan) ; of the ˆReport on the Geology of the Menominee District, * in the same State, and joint author of reports on other iron-bearing districts of the Lake Superior region. He is author also of (Iron Mines and Mining in New Jersey) and of several textbooks on crystallography and mineralogy and he has been a frequent contrib¬ utor to scientific journals. He is a member of the Phi Beta Kappa, Sigma Xi, Beta Theta Pi and a fellow in several scienitfic societies.

BAYLIES, ba'Hz, Francis, American states¬ man, member of Congress from Massachu¬ setts for several sessions: b. 1784; d. Taunton, Mass., 28 Oct. 1852. In the presidential con¬ test which finally resulted in the election of John Q. Adams, he threw the only electoral vote for Jackson that was given from New England. He was for a short time Minister to Brazil. He published in 1828 a history of the old colony of Plymouth.

BAYLISS, Clara Kern, American author and journalist: b. near Kalamazoo, Mich., 5 March 1848. She published Un Brook and Bayou) (microscopy) ; (Lolami, the Little Cliff-Dweller) (1901) (republished in Lon¬ don) ; 'Lolami in a Tusayan Pueblo) ; (The Evolution of the Boy) (1905) ; 'Two Little Algonkin Lads) (1905); 'Old Man Coyote) ; 'The Song of the Sky-People; (Myths of the Zuani Indians* ; Significance of the Piasau) ; (An Illinois Sun Myth* ; 'Three Philippine Legends* ; 'Indian Mounds of Pike County * ; talks and articles on the sterilization of defec¬ tives and habitual criminals ; and various other scientific archaeological and educational arti¬ cles.

BAYLISS, Sir Wyke, English artist : b. Madeley, 21 Oct. 1835 ; d. London, 6 April 1906. He was educated at the Royal Academy and was president of the Royal Society of British Artists from 1888. His paintings include (La Sainte Chapelle) (1865) ; 'Saint Mark's, Ven-ice) (1880); (Saint Peter's, Rome) (1888); 'The Cathedral, Amiens (1900) ; 'The Golden Duomo, Pisa) (1892), *etc.* His publications include 'The Witness of Art* (1876) ; 'The Enchanted Island) (1888) ; 'The Likeness of Christ Rex Regum * (1898) ; 'Five Great

Painters of the Victorian Era* (1892).

BAYLOR, Frances Courtenay. See

Barnum, F. C. B.

BAYLOR, Robert Emmett Bledsoe,

American lawyer : b. Lincoln County, Ky., 10 May 1793; d. Gay Hill, Tex., 6 Jan. 1874. In the War of 1812 he served under Colonel Bos¬ well and took part in the engagement near Fort Meigs. Admitted to the bar in Kentucky, he later removed to Alamaba (1820), acquired a large practice and became prominent in poli¬ tics, being a representative in Congress, 1829-31. Later he emigrated to Texas, then a repub¬ lic, and was a district judge for 25 years. A loyal member of the Baptist denomination, he

gave largely in money and land to establishing one of its colleges at Independence (1845) and in recognition of his munificence it was named Baylor University (q.v.).

BAYLOR UNIVERSITY, a coeducational institution in Waco, Tex., controlled by the Baptist Church. It was founded in 1845 on a charter granted by the republic of Texas and named for Robert E. Baylor (q.v.). Its first location was in Independence, Tex.; it was provided with a university course in 1851 ; in 1861 President Burleson (who had been its head for 10 years) and the entire faculty re¬ signed and organized a university in Waco, Tex., giving it the name of that city. The two institutions were consolidated in 1868, the earlier one being removed to Waco and Presi¬ dent Burleson continuing at the head of the institution. At the close of 1915 the university reported: Professors and instructors, 84; stu¬ dents, 1,209; volumes in the library, 28,570; grounds and buildings valued at $800,000; pro¬ ductive funds, $263,124; income, $125,461. The university maintains an undergraduate college, a preparatory school, known as Baylor Acad¬ emy, a department of fine arts and a depart¬ ment of medicine and pharmacy at Dallas, Tex.

BAYLY, Ada Ellen, a popular English nov¬ elist, best known as Edna Lyall : b. Brighton, 25 March 1859; d. Eastbourne, 8 Feb. 1903. She has written (Won by Waiting) (1879); Donovan' (1882); (We Two' (1884); 'In the Golden Days' (1885) ; (Knight Errant' (1887) ; 'Autobiography of a Slander' (1887) ;

(Derrick Vaughan, Novelist' (1889) ; 'A Har¬ dy Norseman' (1889) ; 'Doreen' (1894) ; 'How the Children Raised the Wind' (1895) ;

(Autobiography of a Truth' (1896) ; (Wayfar¬ ing Men' (1897); (Hope the Hermit' (1898); (In Spite of All' (1901) ; 'The Hinderers' (1902), *etc.* Although her novels are decidedly romantic, their aim is to depict the develop¬ ment of character.

BAYLY, Lewis, Welsh prelate: d. 26 Oct. 1631. He was the author of 'The Practice of Piety,' a very popular religious book which had great influence on Bunyan. It not only passed through many English editions, but was also translated into the Indian language by John Eliot, and was used by him in his work among the Indians.

BAYLY, Thomas Haynes, English song¬ writer and author: b. Bath, England, 13 Oct. 1797 ; d. London, 22 April 1839. He began the study of law under his father, and later went to Saint Mary Hall, Oxford, in order to prepare for the Church; but abandoned both and de¬ voted

himself to literature. He gained great popularity with some songs, and several dramas and novels by him also hit the public taste. With Henry Bishop he published ‘Melodies of Various Nations.’ Among his songs some of the best-known are ‘Isle of Beauty’ ; ‘The Soldier’s Tear’ ; (We Met — ’twas in a Crowd’ ; and (She Wore a Wreath of Roses.’ His best play is ‘Perfection’ ; among his novels are (The Aylmers’ ; and (A Legend of Killarney.’ (Loves of the Butterflies’ ; and (Songs of the Old Chateau,’ are volumes of songs and bal¬ lads; and his other works include ‘Kindness in Women,’ a collection of tales; Parliamentary

Letters and other Poems,’ and ‘Rough Sketches of Bath.’

BAYLY, Thomas Henry, American states¬ man: b. Accomac County, Va., 1810; d. 22 June 1856. He was admitted to the bar in 1830, and was for several years a member of the general assembly of his State. In 1842 he was elected judge of the Circuit Superior Court of law, an office which he resigned in 1844, when elected a representative in the national Congress ; and by successive re-elections he held the latter po¬ sition till his death. As chairman of the com¬ mittee on ways and means, he was the leader of the House during many sessions, and was highly respected by men of all parties, as well for his urbanity and dignity, as for his ability. The family home in which he died was estab¬ lished by his ancestors from England in 1666, and it is remarkable that he held just the same public offices that had been filled by his father.

BAYNE, Peter, Scottish writer : b. Fod-derty, Scotland, 19 Oct. 1830; d. London, 10 Feb. 1896. He studied theology at Edinburgh and philosophy under Sir William Hamilton, and was editor successively of the Glasgow Commonwealth; Edinburgh Witness; London Dial; and Weekly Review ; and associate editor of the Christian World. He was author of (The Christian Life: Social and Individual’ (1855); (Essays Biographical, Critical, etc.’ (1859) ; ‘Life and Letters of Hugh Miller’ (1871); (Testimony of Christ to Christianity’ (1862); (The Days of Jezebel,’ a drama (1872); (The Chief Actors in the Puritan Revolution’ (1878) ; (Life of Martin Luther’

(1887).

BAYNES, Thomas Spencer, English phi¬ losopher: b. Wellington, Somersetshire, March 1823 ; d. 29 May 1887. He was educated at

Bath, Bristol College, and the University of Edinburgh, . where he became (1851-55) assist¬ ant to Sir William Hamilton, then pro¬ fessor of logic. In 1857 he was appointed ex¬ aminer in logic and mental philosophy in the University of London; became (1857-64) as¬ sistant editor of the Daily News, to which he contributed many noteworthy articles on the American Civil War, and at this time wrote for several literary journals, such as the Athenceum and the Literary Gazette. In 1864 he was elected professor of logic, rhetoric and metaphysics in the University of Saint Andrews. Besides his contributions to reviews he published a translation of the 'Port Royal Logic,' with notes (1851) ; and an 'Essay on the New Analytic of Logical Forms' (1852). He was appointed editor of the ninth edition of the 'Encyclopaedia Britannica' (being subse¬ quently assisted by Prof. Robertson Smith).

BAYOMBONG, bi-yom-bong', Philippines, the capital of the province of Nueva Vizcaya, Luzon, situated on the Magat River. It is the centre of a fertile rice and tobacco region. Pop.

3,691.

BAYONET. A short sword or sharp-pointed weapon (usually triangular in cross-section) fitted on to the muzzle of a musket or similar weapon, so as to give the soldier in¬ creased means of offense and defense. The name is said to be derived from the town of Bayonne in France, where, it is stated, it was first invented in 1640. The first regiment which

appears to have had bayonets attached to their muskets was the Grenadier Guards, as far back as the year 1693. It is stated by Macau¬ lay that in consequence of the awkward mode of attaching the bayonet the English lost the battle of Killiecrankie, as the Highlanders were upon the troops before they could convert their ure-locks into pikes. The bayonets then used were called bayonets-a-manche , and

had handles which fitted into the muzzles of the guns, but at a later date were introduced the bayonets-d- douille or socket-bayonets having sockets which enabled the bayonets so to be used as not to interrupt the firing. The use of pikes went out when that of bayonets came in. It seems very probable that the first bayonet was a dagger, which the musketeer stuck by means of its handle into the muzzle of his weapon to shield him from a cavalry charge, and that the useful¬ ness of the contrivance suggested a permanent arrangement.

Bayonets are now made with great rapidity and the process of manufacture is very simple. Two pieces of metal are first selected, viz., a piece of the best cast steel, 7 inches long by

inch square, and a piece of the best wrought-iron rod, 4 inches long by about 1 inch in thickness. The steel is to form the blade, and the iron the socket-handle. The steel, being properly shaped at one end, is joined to the iron by welding. A forging machine is next em¬ ployed to give a rough outline of the required shape. Then comes the action of a swaging-machine, with dies which come down upon the metal in great force and counter-dies beneath the metal. The metal is then annealed; turned in a cutting-machine to remove a wire-edge thrown up in the act of stamping; cut to a proper length, and the socket-end made square; drilled and bored, to make the socket hollow ; shaped and furrowed along the blade; bent at the neck; hardened and tempered; and finished by a numerous train of minor operations. The bayonet-charge is now one of the most terrible manoeuvers of trained infantry, in which each nation fancies itself to excel all others.

In close-quarter engagements there is no weapon more formidable; from its length and weight the thrust of the bayonet gives a terrible wound, and its force is such that there is great difficulty in parrying the attack. Like other small-arms, it is most serviceable when handled on scientific principles; and the art of using it to advantage is so simple as to be very easily acquired, while the exercise, from the weight of the rifle, admirably aids in developing the muscles of all parts of the body.

A sword-bayonet is quite widely used, es¬ pecially for the short rifles of the light infantry, the carbines of the artillery, *etc.* It is a com¬ pound of the sword and the bayonet, as its name indicates, having a sword-like blade with only one edge, and being capable of being fastened to the muzzle of the gun like the bay¬ onet. Opinions as to the present utility of bay¬ onets differ widely, many authorities consider¬ ing them of little importance. While the result of a battle is often determined by the employment of smokeless powder and long-

range and rapid-firing rifles in surprises and night attacks, the bayonet may be used to advantage, as was frequently proved in the Boer War.

While the infantry soldier relies mainly on fire action to disable the enemy, yet he must be instructed in the use of the rifle and bayonet in hand-to-hand encounters, the object of all such instruction being to teach the soldier how to make effective use of the rifle and bay¬ onet in personal combat; to make him quick and proficient in handling the rifle ; to give him an accurate eye and a steady hand, and to give him confidence in the bayonet in offense and defense.

BAYONNE, ba-yon, France, a cathedral town and a fortress of the first class in the department of the Basses-Pyrenees. It is sit¬ uated at the confluence of the Nive and the Adour, about four miles from the Bay of Bis¬ cay. These rivers form a harbor capable of admitting vessels of considerable size. The har¬ bor is safe and commodious, and has three lighthouses at its entrance. They divide the town into three parts, namely, Great Bayonne on the left bank of the Nive, Little Bayonne between the rivers and Saint Esprit on the right bank of the Adour. A citadel, built by Vauban, on the summit of an eminence in the suburb, commands the harbor and the city. The cathedral is a beautiful building dating from 1213, restored in the 19th century and fur¬ nished with two towers. The arsenal, one of the finest in France, and the mint are among the other buildings of Bayonne. The city has a considerable trade with Spain, Portugal and South America, and masts and other timber for shipbuilding, from the Pyrenees, are exported to Brest and other ports of France. Ships are built, and woolens, chocolate, soap, brandy, leather, linen goods, glass, etc., are manufac¬ tured. Other exports include wine, tars and resins, minerals, grain, chocolate and the famous Bayonne hams. Among the lower class the ancient Biscayan or Basque language is spoken. Catherine de Medici had an important inter¬ view with the Duke of Alva in Bayonne, June 1565, at which it is said the massacre of Saint Bartholomew was arranged. The meeting of Napoleon with the King of Spain, Charles IV, and the Prince of the Asturias, took place here in May 1808, when the latter transferred their rights to the Spanish territories in Europe and India to the French Emperor. Pop. 27,886.

BAYONNE, ba-yon’, N. J., city in Hudson County on New York harbor, the Kill von Kull, and Newark Bay, the Morris Canal and the Central Railroad of New Jersey, seven miles southwest of New York. It was formed by the union of a number of former villages and early Dutch settlements (Pamrapo, Bayonne, Centerville and Bergen Point), and is

prin¬ cipally engaged in coal shipping and the refin¬ ing and exporting of petroleum, the works for the latter being connected by pipe lines with New York, Philadelphia, Baltimore and other cities. Other industries are the manufacture of motor boats, wire, silk, chemicals, ammonia and colors ready mixed paints, electrical and gas engines, structural iron, silk goods, in¬ sulated wire, boiler factories and large smelt¬ ing and refining works. The United States census of manufactures for 1914 recorded 121 industrial establishments of factory grade, em¬ ploying 11,899 persons, of whom 10,149 were wage earners, receiving $6,771,000 annually in wages. The capital invested aggregated $92,-

653,000, and the value of the year's output was $98,208,000; of this, $20,513,000 was the value added by manufacture. The city has adopted the commission form of government. The residential part is very attractive, containing mansions of many New York business men, and the fine Hudson County Boulevard termi¬ nates at Bayonne. The city has an important public library, recreation grounds and bathing establishments. Pop. (1920) 76,754.

BAYONNE, Treaty of, a treaty of peace agreed to 4 May 1808, and signed on the next day, between Napoleon and Charles IV, King of Spain. The latter resigned his kingdom, and Napoleon engaged to maintain its integrity, and to preserve the Roman Catholic religion. His son, Ferdinand VII, confirmed the cession 10 May.

BAYONNE CONFERENCE, a confer¬ ence held at Bayonne, June 1565, between Charles IX of France, the Queen mother, Catherine de Medici, Elizabeth, Queen of Spain, and the Duke of Alva, envoy of Philip II, to arrange plans for the repression of the Hugue¬ nots.

BAYONNE DECREE. On 17 April 1808, Napoleon directed the capture and sale of all vessels entering the ports of Spain, France, Italy and the Hanse towns, under the American flag, and by the provisions of this declaration, known as the Bayonne Decree, France is sup¬ posed to have confiscated more than 300 Amer¬ ican vessels. The decree was

issued ostensibly with the view of helping the United States to enforce the embargo of 1807 and on the pre¬ sumption that all such vessels must be sailing under false colors and thus indirectly benefiting the English cause. See Continental System.

BAYOU, bi'oo, probably a corruption of the French word boyau, a "gut® or "channel.® Its strict signification is a stream which is not fed by springs, but flows from some other stream or from a lake; but it is not infre¬ quently used in America as synonymous with "creek.® The term is very little employed ex¬ cept in the States of Louisiana, Texas and Arkansas.

BAYOU STATE, the name often given to the State of Mississippi.

BAYREUTH, bi-roit, or BAIREUTH,

Bavaria, on the Red Main, 41 miles northeast of Nuremberg, capital city of the government district of Upper Franconia. The principal edifices are the old palace now occupied by public offices, the new palace, with garden and park open to the public ; the opera house, a gymnasium, and the national theatre, con¬ structed after the design of the composer Wag¬ ner. Among the interesting private houses are the Villa Wahnfried, the former residence of Richard Wagner, who is buried in its grounds, and the house of Jean Paul Richter. In the Central Cemetery are the graves of Jean Paul Richter and the composer Franz Liszt. Baireuth has numerous educational and charitable instituti®ns. There are manufactures of cotton and woolen goods, sewing machines, leather, earthenware and agricultural and musical in¬ struments. There are also breweries, distilleries and brick-kilns. This town is popularly known as the mecca of the Wagnerites. In 1872, partly from funds collected from patrons and partly

by the organization of the so-called Wagner societies, there was begun the erection of a theatre for the production of Wagner's works. It was opened in 1876 with a grand perform¬ ance of his (Ring of the NibelungenP and since then music lovers have been attracted to Baireuth from all over the world. The theatre occupies a site on a hill overlooking the town and is reached by a broad avenue of shade trees. In connection with the theatre is a school for the training of voices to participate in the Wagner festivals. Baireuth fell to the Bur-grave of Nuremberg in 1248, and after many vicissitudes was ceded to Bavaria in 1810. Pop. (1910) 34,547.

BAYRHOFFER, bir'hof-fer, Karl The¬ odor, German Hegelian philosopher and radical politician: b. Marburg 1812; d. Jordan, Wis., 3 Feb. 1888. He was professor of philosophy at Marburg, taking the chair in 1845, but in 1846 his radical views caused his expulsion. During the brief rule of liberalism in Hesse he was chosen president of the chamber ; but, in 1853, was forced to flee to the United States. Among other works he wrote (On Catholicism in Germany) ; 'Idea and History of Philoso¬ phyˆ 'Fundamental Problems of Metaphysics,) *etc.*

BAZA, . ba'tha, Spain (ancient Basti), a city in the province of and 53 miles east-northeast from Granada, in a valley north of the Sierra Baza. The environs yield wine and hemp, grain, fruit, oil; sheep, cattle and mules are reared; and there are some manufactures, chiefly of leather pottery, sombreros, and flour and oil mills. Baza is famed in early Spanish history, more especially in that of Granada. In 1489 it was taken from the Moors by the Spaniards, after a siege of nearly seven months. In 1810 the French, under Marshal Soult, here defeated the Spaniards under Generals Blake and Freire. Pop. 15,964.

BAZAINE, ba-zan, Achille Francois,

French military officer: b. Versailles, 13 Feb. 1811; d. 23 Sept. 1888. He entered the army in 1831, served in Algeria, in Spain against the Carlists and in the Crimean War. He joined the Mexican expedition under General Forey, was present at the siege of Puebla, and shortly afterward was the first to enter the City of Mexico. In 1863 he obtained the chief com¬ mand, was made a marshal of France in 1864, and remained in Mexico with the Emperor Maximilian. When Napoleon III abandoned the Emperor, Bazaine tried vainly to persuade him to abdicate the throne voluntarily. In 1870, at the outbreak of the Franco-Prussian War, he commanded the 3d army corps, and capitu¬ lated at Metz, after a seven weeks' siege, with an army of 170,000 men. For this act he w'as tried by court-martial in 1871, found guilty of treason and condemned to death. This sentence was commuted to 20 years' seclusion in the Isle of Saint Marguerite, off the south coast of France, from which he escaped and retired to Spain, where an attempt was made to assassin¬ ate him. His widow', w'ho had clung faithfully to him in his adversity and had plotted success¬ fully for his escape, died in the City of Mexico, 8 Jan. 1900. She was a woman of aristocratic birth and much beauty. See La Brugere, 'L'affaire Bazaine* (1874) ; L'Herisson, (La legende de Metz) (1888).

BAZALGETTE, baz-al-jct', Sir Joseph William, English civil engineer: b. Enfield, England, 1819; d. London, 1 March 1891. As chief engineer of the London board of works he built many miles of sewers and embank¬ ments, three of the Thames bridges and the well-known Thames embankments. He was an expert authority on questions of municipal engineering.

BAZAN, ba-zan, Don Cesar de. See Don

Cesar de Bazan.

BAZAN, ba-than, Emilia Pardo. See Par¬

do Bazan, Emilia.

BAZANCOURT, ba-zan-koor, Cesar (Baron de), French military historian: b. Paris 1810; d. there, 25 Jan. 1865. He was official historiographer to Napoleon III, whom he ac¬ companied in several campaigns. He published (L'expedition de Crimee jusqu'a la prise de Sebastopol > (1856) ; (La campagne d'ltalie de 1859) ; (Les expeditions de Chine et Cochin-chine) (1861-62) ; cHistoire de Sicile sous la domination des Normands) (1846); and the novels (Georges la Montagnard* (1851) ; No¬ blesse oblige) (1851) ; (La Princesse PalliancP

(1852).

BAZANCOURT, Jean Baptiste Marin Antoine Lecat de, French general: b. Val-de- Molle (Oise), 19 March 1767; d. 17 Jan. 1830. He took an active part in the Italian cam¬ paigns; distinguished himself and was wounded at the siege of Saint Jean d'Acre; fought in the battle of Austerlitz, and was a member of the court-martial which, on 21 March 1804, pro¬ nounced the sentence of death upon the Due d'Enghien. In 1806 he was appointed com¬ mander of the Legion of Honor, and in

1808 promoted to the rank of brigadier-general, while in the same year he was created baron of the empire, and went as commander to Ham¬ burg with a mission connected with the conti¬ nental blockade. He withdrew from service in

BAZAR, or BAZAAR, a market-place in the East, the word being Arabic in origin. Some bazars are open, some covered over. As the Orientals live almost entirely out of doors, the bazars of populous cities, besides their mer¬ cantile importance, are of consequence places of social intercourse. In the Oriental tales, — for instance, in the (Arabian Nights,* — the bazars occupy a very conspicuous place. The word bazar has also been imported into Europe, where it is used in much the same sense as in the East. Among English-speaking people it is frequently applied to a temporary sale of fancy goods contributed gratuitously and sold to raise a special fund.

BAZARD, ba-zar, Amand, French socialist: b. Paris 1791; d. 29 July 1832. After the Restoration he helped to found the Revolution¬ ary Society of the ((Amis de la Verite,** and in 1820 an association of French Carbonari. In 1825, impressed with the necessity of a total reconstruction of society, he attached himself to the school of Saint-Simon, and became one of the editors of a journal termed Le Producteur. In 1828 he delivered at Paris a series of lectures, the substance of which was pub¬ lished in the Exposition de la doctrine de Saint-Simon * (1828-30), of which the first part was by Bazard, the second being chiefly the vol. 3 — 24

composition of Enfantin. He and Enfantin be¬ came the acknowledged leaders of the school. After the July Revolution (1830), a larger scope was afforded to the Saint-Simonians. The masses were attracted by the doctrine that all social institutions ought to have for their end the moral, intellectual and physical amelioration of the poor. In a short time, Bazard and his friends had created a new society, living in the midst of the old, with peculiar laws, manners and doctrines. But Bazard's connection with it was of short duration. He differed from En¬ fantin on the doctrine of the emancipation of women, and in 1831 seceded in disgust. His efforts to found a school of his own proved unsuccessful, and, during a heated discussion with his former friend, Enfantin, he was struck with apoplexy, from the effects of which he died.

BAZAS, town in the department of Gironde, . France, on the Beuve, about 33 miles southeast of Bordeaux, with which it is connected by rail. It overlooks the river from a rocky eminence and was once a well

fortified town, the remains of its walls, built in the 13th century, being still visible. In the times of the Romans it was known as Castrum Vasatum. Among its at¬ tractions are a cathedral of Gothic architecture and an old monastery now used as a college. Until 1792 it was the seat of a bishopric. Leather and woolen goods and hats are manu¬ factured here. Pop. (1911) 4,704.

BAZIGARS, ba-ze-garz', a tribe of nomadic Indians dispersed throughout the whole of Hin¬ dustan. They are divided into seven castes ; their chief occupation is that of jugglers, acro¬ bats and tumblers, in which both' males and females are equally skilful. They present many features analogous to the gypsies of Europe.

BAZIN, Rene Frangois, French novelist: b. Angers, 26 Dec. 1853. Graduating from a law college in Paris, he became, in 1878, pro¬ fessor of law at the university in his native city. In 1903 he was elected a member of the French Academy. Reading the works of Capt. Mayne Reid influenced him to become a writer. He ranks as one of the foremost of present-day French novelists, but he has also written many books of travel and observation, one of which, (The Italians of To-day * (1904), has been

widely read among Americans. His novels are (Stephanettey (1884); (Les NoelleD (1890);

(Madame CorentitP (1893) ; (Humble amour* (1894) ; (De toute son ame* (1897) ; (La terre qui meurt* (1899); (Les Oberle* (1901); (Do-natienne) (1903); (L'ame alsacienne* (1903); <L'isolee* (1905); <Le ble qui leve* (1907); (Le mariage de Mademoiselle GimeP (1908; English translation 1913). Among his works of non-fiction are (A l'aventure* (1891) ; (Sicile* (1892); (Terre d'Espagne) (1896); (Croquis de France et d'Orient* (1901) ; Nord-Sud Amerique, Angleterre, Corse, Spitzberg*

(1913).

BAZOCHE, ba-zo'sch, or BASOCHE

(corruption of Basilica), a brotherhood formed by the clerks of the Parliament of Paris at the time it ceased to be the Grand Council of the French king. The government of the order was vested in a chief known as ((le roi de la Bizoche,** who had his retinue after the manner of real kings and maintained a mock court. The organization was divided into chapters, at

the head of each being a captain, who, together with the members of his division, wore a special uniform to distinguish them from the members of the other chapters. Such chapters were also found in other parts of France where local parliaments were maintained. The order was in existence as early as 1303, for in that year King Philip conferred on it the privilege of holding an annual festival at which were presented dramatic performances in which cur¬ rent events were freely satirized. In 1500 the order was granted the permission to hold these performances in the salon of the Royal Palace. The most popular of these farces was a mock trial called ˆPathelin,® which was first presented in 1480. These crude performances had a powerful influence in the latter development of the French stage, the comedies of Moliere being founded on them. On the outbreak of the first agitations that finally had their climax • in the great French Revolution, the guild took an active part in politics. It was finally dis¬ banded by the general decree of 13 Feb. 1791. Consult Fabre's (Etudes historiques sur les Bazoches) (2d ed., Paris 1875).

BAZTAN, baz-tan', or BASTAN, a Pyre¬ nean valley in the extreme north of Spain, hav¬ ing a length of nine miles and an average breadth of four miles. It is inhabited by about 8,000 people, who form, under Spanish super¬ vision, a diminutive republic, at the head of which is the mayor of Elizondo. The citizens of this republic rank with the Spanish nobility and hold special privileges, which were granted them for former services to the Spanish Crown.

BAZZINI, bat-se-ne, Antonio, Italian

musician and composer: b. Brescia 1818; d. 1897. Already at the age of 15 he was an accomplished soloist on the violin, and two years later, at the age of 17, he was director of the choir in one of the largest churches of his native city. Beginning in 1843, he studied for four years at Leipzig, though he had al¬ ready, two years previously, made a concert tour, taking in Germany, France and England. During this period he made the personal ac¬ quaintance of Paganini and was deeply in¬ fluenced by him. Later he devoted himself more to

composition, becoming, first, professor of composition in the Conservatory of Milan, then director. Among his chief compositions are an opera, (Turandot) (produced in 1867), a symphonic poem, (Francesca da RiminP (1890), and five string quartets.

BDELLIUM, del'H-um, an aromatic gum found in different countries, but brought chiefly from Arabia and India. It resembles myrrh in its appearance, and is hence often fraudulently substituted for it. It is obtained from Commi¬ phora mokul and C. agallocha. It has a sweet smell but bitter taste, softens readily between the fingers before the fire and dissolves par¬ tially in alcohol and still more in water. A bet¬ ter variety of bdellium is that produced by the west African C. africana; it is used in plasters. The bdellium mentioned in Scripture, in Hebrew bedholachli, is rendered in the Septuagint of Gen. ii, 12. anthrax (literally, ((burning coalˆ) — the carbuncle, ruby and garnet (Lid¬ dell and Scott), the red sapphire (Dana) ; while in Num. xi, 7, it is translated krystallos — rock crystal. Some modern writers, follow¬

ing the Septuagint translation, make it a min¬ erals, as are the gold and onyx stone with which it is associated in Gen. ii, 12, while the Rabbins Bochart and Gesenius consider that it was a pearl or pearls.

BEACH, Alfred Ely: b. Springfield, Mass., 1 Sept. 1826; d. 1 Jan. 1896. He was a son of Moses Yale Beach, and after receiving an edu¬ cation in the Monson Academy at Monson, Mass., he was associated with his father in the publishing business of the New York Sun. In 1846 he formed a partnership with his lifelong friend and schoolmate, Mr. Orson D. Munn, of Monson, Mass., and purchased the Scientific American from Rufus Porter, combining with the business of publishing that of soliciting pat¬ ents. In 1847 he invented a typewriter which printed raised letters on a strip of paper, in¬ tended for the blind, and was awarded a gold medal at the Crystal Palace Exposition. This machine is noteworthy as the first to cover a principle developed into the modern typewriter, viz., a basket of levers arranged in a circle, and delivering their impression on a common centre. In 1867 he constructed a suspended tube eight feet in diameter by 100 feet long, through which passengers were carried back and forth in a tightly fitting car, as the air was exhausted from or forced into the tube by a rotating fan. He also devised means for trans¬ porting letters through a tube under the street, by which they could be conveyed directly to the post-office when dropped into a street letter¬ box.

His most important invention, — a shield for tunneling under streets or rivers without dis¬ turbing the surface, — w'as made in 1868, and became known as the Beach shield. It resem¬ bled a gigantic hogshead with the heads re¬ moved, the front circular edge being sharp, and the rear end having a thin iron hood. This cylinder is propelled slowly forward through the earth by several hydraulic rams forced out from the rear of the shield, by the operation of a single hydraulic pump, against the completed tunnel in the rear. By this method only the amount of earth to be occupied by the tunnel is excavated. After the shield is forced for¬ ward the hydraulic rams are pushed back, and in the thin hood at the rear a new section of the tunnel is constructed. In 1869, by means of such a shield, Mr. Beach constructed a tun¬ nel nine feet in diameter under Broadway, New York, from the corner of Warren street south to a point opposite the lower side of Murray street, and in 1870 a car was sent to and fro on tracks through this tunnel by pneumatic power — the first underground transit in New York. From 1872 to 1876 Mr. Beach edited an annual publication entitled Science Record, published by the Scientific American. In 1876 he originated the Scientific American Supple¬ ment, devoted to the publication of scientific matters in extenso, taken largely from ex¬ changes and foreign publications. He was also instrumental in beginning the publication of the Scientific American Builders' Monthly.

BEACH, Charles Fisk, American clergy¬ man : b. Hunter, N. Y., 5 Sept. 1827 ; d. 25 May 1908. He studied theology at Auburn Theolog¬ ical Seminary, N. Y., was pastor of Presby¬ terian churches 1854-73, editor and publisher National Presbyterian 1873-95. He studied

law and was admitted to the bar 1896. He pub¬ lished 'The Muzzled 0x> (1866); 'The Chris¬ tian W orker) (1869) ; Commentaries on the Law of Trusts and Trustees) (1897) ; Monop¬ olies and Industrial Trusts) (1898).

BEACH, Charles Fisk, Jr., American legal writer: b. Kentucky, 4 Feb. 1854. He was called to the bar in New York 1881, and prac¬ tised in

that city till 1896, but since the last named date has practised in London and Paris. His especial field is railway and corporation law, and he has published treatises on (Receiv¬ ed (1887); ‘Wills* (1888); ‘Railways* (1890) ; ‘Private Corporations* (1891) ; ‘Mod¬ ern Equity Jurisprudence* (1892) ; ‘Public Corporations* (1893); ‘Modern Equity Prac¬ tice* (1894) ; ‘Injunctions* (1895) ; ‘Insur¬ ance* (1895) ; ‘Contracts* (1897) ; ‘Contribu¬ tory Negligence* (3d ed., 1899).

BEACH, David Nelson, American clergy¬ man: b. Orange, N. J., 30 Nov. 1848; graduated from Yale College 1872, and from Yale Divin¬ ity School 1876. Entering the Congregational ministry he was successively pastor of Congre¬ gational churches in Westerly, R. I., 1876-79; Wakefield, Mass., 1879-84; Cambridge, Mass., 1884-96; Minneapolis (1896-98); Denver from 1899. He was active in banishing the saloon from Cambridge and was prominent in advo¬ cating a modified Norwegian liquor system in Massachusetts. He has written ‘Plain Words on Our Lord’s Work* (1886) ; ‘The Newer Re¬ ligious Thinking* (1893) ; ‘The Intent of Jesus* (18%) ; ‘Statement of Belief* (1897) ; all advocating church unity and rational theology.

BEACH, Frederick Converse, American editor: b. New York, 27 March 1848; d. Strat¬ ford, Conn., 8 June 1918. In 1855 he removed to Stratford, Conn., where he received his edu¬ cation. In 1864, as a pastime, he began the practice of photography with his father, Alfred Ely Beach (q.v.), and continued his interest in the art during his lifetime. In 1866 he suggested to the commissioner of patents the utility and practicability of photo-lithographing the United States patents, a plan which was subsequently adopted. In 1868 he was graduated from the Sheffield Scientific School of Yale University with the degree of Ph.B. In 1869, after en¬ gaging in the business of patent solicitor at Washington, D. C., he returned to New York and was appointed assistant superintendent of the construction of the Beach pneumatic tunnel under Broadway, New York (see Beach, Al¬ fred Ely). Subsequently he took up the manu¬ facture of electrical instruments. In 1877 he entered the office of the Scientific American, assisting his father, and after the latter’s demise He became one of the editors. He made extensive experiments in photography and wrote much relating to the art. In 1884 he founded the Society of Amateur Photographers of New York, the name of which was afterward changed to the Camera Club of New York. In 1885 he assisted in organizing the American Lantern Slide Interchange. In 1889 he was instrumental in establishing a monthly magazine entitled The American Amateur Photographer (now American Photography) . In 1902 he was appointed editor-in-chief of the ‘Encyclopedia Americana,* the first edition of which was pub¬ lished in 1903.

BEACH, Mrs. H. H. A. (Amy Marcy Cheney), American composer: b. Henniker, N. H., 5 Sept. 1867. She studied music from childhood, and made her first appearance in public as a pianist at the Boston Music Hall when 16 years old. She has composed a mass in E flat; 'The Rose of Avontown,* a cantata for female voices; a Gaelic symphony; a sym¬ phony, anthems, songs and compositions for various musical instruments and full orches¬ tras.

BEACH, Harlan Page, American mission¬ ary: b. South Orange, N. J., 4 April 1854. He was graduated at Yale in 1878 and at Andover Theological Seminary in 1883. During 1878-80 he taught at Phillips Andover Academy; in 1883 he went to China as a missionary, remain¬ ing there six years. Soon after his return he became head of the School for Christian Workers, Springfield, Mass., and in 1895 edu¬ cational secretary of the Student Volunteer Movement for Foreign Missions. Since 1906 he has been professor of theory and practice of missions at Yale University. He has con¬ tributed extensively to various periodicals, is advisory editor of The Missionary Review of the World and furnishes the annotations for American missionary literature to the Inter¬ national Review of Missions, Edinburgh. His publications include 'Dawn on the Hills of T'ang* (1898); 'Knights of the Labarum; or Four Typical Missionaries* (1896) ; 'New Tes¬ tament Studies in Missions* (1899) ; 'Geog¬ raphy and Atlas of Protestant Missions* (1902) ; 'Princely Men in the Heavenly Kingdom* (1903) ; 'India and Christian Opportunity*

(1904).

BEACH, Miles, American jurist: b. 1840; d. 1902. He was graduated at Union College, Schenectady, studied law and practised in Troy. When 27 years of age he removed to New York and in 1879 was elected judge of the Court of Common Pleas, holding that office till 1894, when he passed to the bench of the Su¬ preme Court of the State.

BEACH, Moses Sperry, American in¬ ventor and editor : b. Springfield, Mass., 5 Oct. 1822; d. 25 July 1892. He was the son of Moses Yale Beach (q.v.), and in 1845 he mar¬ ried Chloe Buckingham, of Waterbury, Conn., and in the same year became joint proprietor, with George Roberts, of the Boston Daily Times. Soon after this he became associated with his father and brother in the publication of the New York Sun, and acquired the sole ownership of it in 1851, transferring

it in 1868 to Charles A. Dana. It was while he was con¬ ducting the publication of the Sun that He invented and made several important improve¬ ments in printing-presses, which were patented, a few now being in use. Among them were the feeding of roll paper to the press instead of flat sheets, . apparatus for wetting the paper prior to printing and another improvement for cutting off sheets after printing; also a method of adapting newspaper presses to print both sides of the sheet at the same time, as is now customary. In 1867 he visited the Holy Land, on the steamer Quaker City, in company with the distinguished party of which “Mark Twain** was a member, and whose experiences formed the basis of Twain’s book, ‘The Innocents Abroad.* Mr. Beach brought back an olive-372

tree from the Mount of Olives, from which was made a pulpit stand that is at present in Plymouth Church, Brooklyn.

BEACH, Moses Yale, American inventor and publisher: b. Wallingford, Conn., 15 Jan. 1800; d. 17 July 1868. He received a common-school education and before he was 21 married, and with a partner opened a cabinet factory at Northampton, Mass. In 1822 he established himself at Springfield, Mass., where he was very successful. He expended considerable money on a stern-wheel steamboat, the first to ply on the Connecticut River above Hartford. A powder engine intended for its propulsion proved ineffective. In 1829 he obtained an in¬ terest in a paper-mill and removed to Sauger-ties, N. Y., where his inventive faculty produced a rag-cutting machine, which he patented and which is still used in all paper-mills. In 1835 he purchased from his brother-in-law, Benja¬ min Day, the New York Sun, the first penny paper (then a comparatively new sheet), and to Mr. Beach was due the subsequent growth and popularity of that newspaper. In 1846 President Polk sent Mr. Beach on a secret mis¬ sion to Mexico. In 1847 Mr. Beach retired from active business and settled in his native town, where he died.

BEACH, Rex (Ellingwood), American author : b. Atwood, Mich., 1 Sept. 1877. After graduating from Rollins College, Winter Park, Fla., he studied law at the Chicago College of Law. His success as a storywriter, however, diverted him from the legal profession. Among his best known works are cPardners) (1905) ; (The Spoilers) (1906);

(The Barrier) (1907); (The Silver Horde> (1909); (Going Some> (1910); <The Ne'er-do- Well* (1911); (The NeD (1912) ; (The Iron TraiP (1913) ; (The Auction Block* (1914) ; (The Heart of the Sun-set) (1915); (Rainbow's End* (1916); laugh¬ ing Bill PIyde) (1917).

BEACH. See Coast; Dune; Ocean; Lake; Shore; Shore Lines.

BEACH-FLEA, one of a group of small

amphipod Crustaceans (Orchestia agilis) which abound under sea wrack near high-water mark. When the dry weed is lifted they will be seen leaping like fleas, by means of the last three pairs of abdominal legs. They are brown, of the same color as the weed and wet sand beneath, about a quarter of an inch in length or about one-half as large as the larger and more south¬ ern kind of beach-flea (Talorchestia longicor-nis), which is nearly an inch long. Consult Arnold, (Sea Beach at Low Tide.*

BEACH-GRASS. See Ammophila.

BEACH-PEA, a leguminous plant growing on beaches. See also Lathyrus.

BEACH PLANTS. Plants living normally on shores, particularly of the sea, or on the contiguous dunes and marshy strips, are usually characterized by fleshiness, leatheriness, downi¬ ness or dense hairiness. This is true of the maritime members of families otherwise quite different in appearance, and these peculiarities, resembling those of plants living in other saline and arid localities, are devices resulting from adaptation to similar desert conditions, for the beach sands become very hot and naturally re¬ ceive practically no water from either sea or

lai d, and are unable to conserve the rainwater. Thus the strand becomes a strip of desert. The succulence and unctuousness of such common plants as the seaside goldenrod (Solidago) , of the saltmarsh and smooth aster (Aster), of certain huge tropical morning glories (I po¬ me? a) , of the marsh-rosemary (Statice), of the yellow sand-verbena (Abronia) and others, are evidence of efforts on their part to store such water as may fall upon them, in the cells of their swollen tissues, and also to prevent its evaporation through the stomata. Some plants, as the Polygonella and the marsh-samphire (Salicornia) , have further reduced their tran¬ spiring surface by assuming a cylindrical shape with scale-like leaves. Terete also are the bases of the leaves of

the saltwort (Salsola) which are armed, against the attacks of animals wish¬ ing to forage on their juicy foliage, by stout prickles. Many of these fleshy plants also con¬ tain salts in their tissues that are strongly retentive of water ; the saltwort having for¬ merly been burned to obtain soda from its ashes. Others, like some tamarisks, exude salts that form a crust over the stomata pits in the daytime but by attracting dew and the moisture in the air and becoming liquefied furnish a cer¬ tain amount of water at night.

The bearberry (Arctostapliylos) , the bayberry (Myrica) and the beach plum (Primus) exhibit the leathery and pubescent type of foliage calculated to resist drought by restrain¬ ing transpiration by means of the thickened skin and hair. The pale pubescent under-surface of the latter's leaves occurs on plants living near water, and is designed to keep arising moisture from settling in and flooding the stomata.

Velvety pubescence on all surfaces attaining to the same end is present in the marshmallow (Althcea) and the clotbur (Xanthium) . Many of the saltmarsh plants are decidedly hairy, serving the purpose of controlling evaporation and preserving the leaf from too much moisture.

Some of these beach-plants are useful aids in preventing the shifting of sands and dunes, the most important being the coarse grasses, marram (Ammophila) and sea-lyme (Ely mus) , whose tough long roots interweave through the sand, forming a mat that holds it in place. The beach thus reclaimed is gradually settled upon by sundry other sand-binding plants, as the bayberry, bearberry, abronias, beach plums, *etc.* ; and certain trees as the tamarisk, some species of pines and cedars are also found there or may be planted. Consult Marilaun, A. Kerner von, (Natural History of Plants * ; Scribner, F. L., (Sandbinding Grasses) (reprint from Yearbook of Agriculture, 1898), and (Economic Grasses) (United States Division of Agron., Bulletin 14) ; (Stock Ranges of Northwestern California) (Bulletin 12, Bureau of Plant Industry, United States Department of Agriculture).

Helen Ingersoll.

BEACH-PLUM. See Plum. BEACH-ROBIN. See Brant-bird.

BEACHES, Raised, terraced, level stretches of land, consisting of sand and gravel, and lving at a considerable distance above and away from the sea, but bearing sufficient evidences of haying been at one time sea beaches. They are quite common along the coasts of continents in

1 Marsh Aster 3 Goldenrod

2 Sandpaper Plant 4 Marshmallow

the higher latitudes. In California such terraces occur as high as 1,500 feet above the present sea-level, while the coasts of Scotland are marked by a series of terraces succeeding each other at distances of from 10 to 25 feet. That the materials composing the beaches were de¬ posited beneath the sea is proven by the marine character of the fossils which are often found in abundance. The existence of raised beaches is of importance to the geologist, as it affords direct evidence of changes of level between the sea and the land in comparatively recent times, and explains the widespread occurrence of sedi¬ mentary rocks over continental areas. Many large lakes are also fringed by terraces, but in this case they have resulted from a lowering of the water level and not from coastal movements.

BEACHY HEAD, England, a promontory on the coast of Sussex, about three miles south¬ west of Eastbourne; height 532 feet. Here a combined Dutch and English fleet of 57 vessels under Lord Torrington was defeated by a French fleet of 70 ships under Tourville, in 1690. In 1838 a revolving light was erected here, 285 feet above the level of the sea, visible in clear weather from a distance of 28 miles. This was superseded in 1902 by a new light¬ house built in the sea, about 600 feet from the cliff, and 123 feet high.

BEACON, N. Y., city of Dutchess County, on the Hudson River, and the New York Cen¬ tral & Hudson River and the Central New Eng¬ land division of the New York, New Haven & Hartford railroads, 60 miles north of New York city. The city was formed by the merging of the villages of Matteawan and Fishkill Landing; it was incorporated in May 1913, and holds the first charter under the commission form of government granted in New York State. Lying at the foot of Mount Beacon, on the upper margin of the Highlands of the Hud¬ son, and extending westward to the shores of the river itself at the lower end of Newburgh Bay, its scenery is unrivaled. An inclined rail¬ way runs up the western slope to the summit of Mount Beacon, from which a far-famed view of mountain, plain and river is enjoyed, and where a summer colony makes its home. The city of Newburgh across the bay is con¬ nected with Beacon by ferry. Beacon has 11 churches, a hospital, a library, two national banks and two savings banks, and the Sargent Industrial Free School for Girls. The city conducts three grade schools and a high school, paid fire department, municipal water¬ works and a sewage disposal works. The industries of the city are varied and im¬ portant, embracing some of the larger fac¬ tories along the Hudson. They include chiefly wool and straw hats, rubber goods and embroidery, with smaller plants devoted to making tools and other iron products, silk¬ throwing, paper boxes and brick. The United States census of manufactures for 1914 showed 41 establishments of factory grade, employing 2,033 persons, 1,806 being wage earners re¬ ceiving annually $958,000 in wages. The capital invested aggregated $3,849,000, and the year's output was valued at $3,520,000; of this, $1,778,- 000 was the value added by manufacture. There are three newspapers, two daily and one weekly. Pop. (1920) 10,996.

BEACON, a conspicuous mark or signal either used to alarm the country in case of invasion, or as a guide to mariners. The alarm beacon was usually fire placed on the tops of high hills, the flames of which could be seen at a great distance by night, and the smoke by day. They were in great use for rousing the border on an invasion either by Scotch or English. A beacon to mariners is either a land¬ mark erected on an eminence near the shore, or a floating signal moored in shoal water.

BEACON HILL, one of the original three hills of the peninsula of Boston. It is north of Boston Common, and received its name from the fact that the public beacon was fixed upon its summit in the earliest colonial period. It has been much reduced in height, and the State

House now occupies its highest position. Beacon street extends in a westerly direction over the hill, skirting the Common and Public Garden. See Boston.

BEACONSFIELD, bek'ons-feld or be'- kons-feld, Benjamin Disraeli (Earl of), Eng¬ lish statesman: b. 21 Dec. 1804; d. 19 April 1881. He was the eldest son of Isaac D'lsraeli (see D'Israeli, Isaac), the well-known author of the (Curiosities of Literature) ; his mother also being of Jewish race. Little is recorded of his early education, though it is certain he never attended a public school or a university. After the death of his father in 1816, Isaac D'lsraeli abandoned the principles of Judaism; and young Benjamin was in 1817 baptized into the Church of England. He was apprenticed to a firm of attorneys, but did not remain long in this uncongenial occupation. His father's posi¬ tion gained him an easy entrance into society, and before he was 20 he was a frequenter of such salons as those of Lady Blessington, and he became a well known man about town.

In 1826 he published (Vivian Grey,* his first novel, a work which became very popular, and, considering the youth of its author, dis¬ plays remarkable cleverness and knowledge of the world. He now traveled for some time, visiting Italy, Greece, Turkey and Syria and gaining experiences which were afterward re¬ produced in his books. In 1831 another novel, (The Young Duke,* came from his pen. It was followed by (Contarini Fleming) (1832) ; (Alroy) (1833) ; (The Revolutionary Epic* (a poem, 1834) ; (Henrietta Fleming) (1837) ; and (Venetia) (1837). Other writ¬ ings of this period are (A Vindication of the English Constitution* (1834) ; and (Alarcos, a Tragedy* (1839).

His father having acquired a residence near High Wycombe, Buckinghamshire, young Dis¬ raeli attempted to get elected for this borough in 1832. He came forward as a Radical or ˆpeople's® candidate as against the Whigs, and he was supported by the Tories, as well as by Hume and O'Connell, but was defeated. At the general election after the passing of the Reform Bill he again unsuccessfully contested High Wycombe, and the like ill-fortune attended him on another attempt in 1835, as also at Taunton the same year. On the latter occasion he ap¬ peared in the character of a decided Tory, and his change of political opinions naturally oc¬ casioned a good deal of comment. To this period belongs the noted passage of arms be¬ tween him and O'Connell, which was signalized

by a strength of language happily rare between public men in these days.

At last, however, he gained an entrance to the House of Commons, being elected for Maidstone in 1837. His first speech was treated with ridicule; he had to stop abruptly and sit down, but he finished with the prophetic dec¬ laration that the time would come when the House would hear him. In 1839 he married the widow of his colleague in the representa¬ tion of Maidstone, a lady 15 years older than himself. The union was a very happy one. At the general election of 1841 he was sent to Par¬ liament by Shrewsbury. He had now gained some reputation, and for some years he was an enthusiastic supporter of Sir Robert Peel. About this time he became leader of what was known as the ((Young England® party, the most prominent characteristic of which was a sort of sentimental advocacy of feudalism. This spirit showed itself in his two novels of (Con-ingsby; or, The New Generation,* and (Sybil; or, The New Nation,* published respectively in 1844 and 1845.

For some years previous to the downfall of Sir Robert Peel in 1846 he was most persistent and bitter in his hostility to this statesman, whom he had so recently supported, being the advocate of protection against the free-trade policy of Sir Robert. His clever but truculent speeches of this period greatly increased his reputation, and by 1847 he was recognized as one of the leaders of the Tory party. He pur¬ chased the manor of Hughenden in Bucking¬ hamshire, was in the above year elected for this county, and retained his seat till raised to the peerage nearly 30 years later. In 1847 he published his novel of (Tancred; or, The New Crusade,* a somewhat extravagant pro¬ duction containing enigmatic allusions to the great (<Asian mystery.® In 1852 he published ˆord George Bentinck, a Political Biography) of the Protectionist leader in the Com¬ mons.

His first appointment to office was in Feb¬ ruary 1852, when he became Chancellor of the Exchequer under Lord Derby. In December, however, the ministry was defeated, and Mr. Disraeli again became leader of a Conservative Opposition. A keen disappointment was ex¬

perienced on the breakdown of the Aberdeen ministry in 1855, when Lord Derby, who was distrustful of Disraeli, refused to form a min¬ istry. He remained out of office till 1858, when he again became Chancellor of the Exchequer with Lord Derby as his chief. As on the for¬ mer occasion his tenure of office was but short ; a reform bill which he had introduced causing the defeat of the government and their resig¬ nation after an appeal to the country. During the next six years, while the Palmerston gov¬ ernment was in office, Mr. Disraeli led the oppo¬ sition in the lower House with conspicuous ability and courage. He strongly counselled a policy of strict neutrality during the American Civil War. He spoke vigorously against the Reform Bill brought forward in 1866 by the Russell-Gladstone government ; but when, soon after, he came into power along with his chief, Lord Derby, the demand for reform was so urgent that he decided to ((dish the Whigs® and to bring in a reform bill himself. Accord¬ ingly, in August .1867, a measure by which the

parliamentary representation was reformed be¬ came law, being piloted through Parliament by Mr. Disraeli with remarkable tact and dex¬ terity. The Confederation of Canada was also carried through.

In February 1868 he reached the summit of his ambition, becoming Premier on the resigna¬ tion of Lord Derby, but being in a minority after the general election he had to give up office the following December. In 1874 he again became Prime Minister with a strong Conserva¬ tive majority, and he remained in power for six years. This period was marked by his eleva¬ tion to the peerage in 1876 as Earl of Beaconsfield, and by the prominent part he took in re¬ gard to the Eastern Question and the conclu¬ sion of the Treaty of Berlin in 1878, when he visited the German capital. In the spring of 1880 Parliament was rather suddenly dissolved, and, the new Parliament showing an over¬ whelming Liberal majority, he resigned office, though he still retained the leadership of his party. Not long after this the publication of a novel called <Endymion) (1880; his previous one, (Lothair,* had been published 10 years be¬ fore) showed that his intellect was still vig¬ orous. His physical powers, however, were now giving way, and he died after an illness of some weeks' duration, and was buried at Hughenden. His wife, who was created Vis¬ countess Beaconsfield in 1868, died in 1872.

The career of Lord Beaconsfield forms one of the most striking romances of the 19th cen¬ tury. Born of an alien and despised race, and at the outset of his career regarded as a mere man of fashion and

a fop, by his own talents he raised himself to the head of the aristocratic party in English politics, the leadership in which had always been a preserve for mem¬ bers of the patrician caste. Disraeli was pre¬ eminently the architect of his own fortunes, and for the eminence to which he finally attained he had to fight every inch of the ground, and especially against the distrust of his own party which he ˆeducated® in the principles of Tory democracy, much against its own inclinations. He was endowed with great intellectual power, a patience and resourcefulness that were inex¬ haustible, unflinching courage and remarkable tact and ability in the art of managing men. As a House of Commons man he was showy rather than solid, but in wit, sarcasm, epigram and vituperative power he was a master. ((He was one of the three statesmen in the House of Commons of his own generation,® says John Morley, (<who had the gift of large and spacious conception of the place and power of England in the world, and of the policy by which she could maintain it.® ((The faculty of slow, re¬ flective brooding was his, and he often saw deep and far.® Comparison is sometimes made between his legislative output and that of his great rival, Gladstone, which is much larger ; but it must be borne in mind that from 1852 to 1895 the latter was a principal figure on the stage, whereas it was only in the six years be¬ tween 1874 and 1880, when Disraeli was a septuagenarian, that he held office with a solid majority at his back. His novels are open to criticism on many grounds, especially on ac¬ count of the stilted rhetoric which defaces them ; but he had imagination and fancy, wit and epigrammatic power, and is unexcelled as

a portrayer of certain aristocratic types. Their success on publication owed something to the art with which he introduced real personages into them under a more or less penetrable disguise.

Bibliography. — The definitive and final “Life® of Lord Beaconsfield is that now issu¬ ing, based on Disraeli’s letters and papers and other authentic documents. Between 1908-16 four volumes had been issued. The work was placed under the editorship of W. F. Monypenny, whose

death occurred after two vol¬ umes had been published, when the task was taken up by G. E. Buckle. Disraeli's 'Home Letters and Correspondence with His Sister, } with additional letters and notes by his brother Ralph, were reissued in 1887. His ' Speeches, J edited by T. E. Kebbel, were published in 1881. Biographies have been written, among others by G. Brandes ˆtranslated by Sturge, London 1880) ; J. A. Froude (London 1890) ; Theodore Martin (London 1881) ; Wilfrid Meynell (London 1903) ; and an unfriendly one by T. P. O'Connor (revised 1904). Consult also Sir William Fraser's 'Disraeli and His Day} (1891). An appreciation of his powers as a novelist appears in the second series of 'Hours in a Library,) in which the Author, Leslie Stephen, laments "the degradation of a prom¬ ising novelist into a prime minister.®

D. S. Douglas.

BEACONSFIELD, Africa, town of Cape Colony, in Griqualand West, formerly known as Du Toit's Pan. It lies a little to the east of Kimberley, with which it is connected by tram¬ way, and is, like it, an upgrowth of the diamond fields. It is well supplied with churches, schools and hotels. Pop. 14,294.

BEACONSFIELD, England, market-town in Buckinghamshire, 24 miles west by north of London. It is situated on high ground, and its name is supposed to have originated from a beacon once set up there. The remains of Edmund Burke, who resided at Gregories in this parish, are deposited in the parish church ; and the churchyard contains a monument in honor of the poet Waller, to whom the manor belonged, as it still does to his descendants. It gave its name to the title of Benjamin Disraeli, Earl of Beaconsfield. Pop. 2,511.

BEADLE. (1) An officer in an English university, whose chief duty is to walk with a mace in a public procession. The University of Oxford has four and Cambridge two beadles (or bedels), those in the former being attached to each of the faculties of law, medicine, arts and divinity. (2) An inferior parish officer, whose business is generally to execute the or¬ ders of the vestry, by whom he is appointed. These parochial beadles were originally officers given to the rural deans to cite the clergy and church-officers to visitations, and for other purposes. In some parts of Great Britain beadles act as town criers.

BEADS, small perforated ornaments, gen¬ erally of a round shape and made of glass, but also of gold, silver and other metals, paste, coral, gems, *etc.* The use of them as. ornaments belongs to very early times, and this use, still continued, has made them an important article of

trade with savage tribes. Glass beads are supposed to have been manufactured by the Phoenicians more than 3,000 years b.c, Beads

have been found in the ruins of Assyrian temples, also as decorations of Egyptian mum¬ mies, and in the graves of the ancient Greeks, Romans and Britons. The manufacture of glass beads was introduced into modern Europe by the Italians, and in the neighborhood of Venice it is still an important branch of industry. On the island of Murano alone several thousand workmen are employed in this manufacture. Birmingham is the chief seat of the manufac¬ ture of beads in Great Britain. For their use in religion see Rosary.

BEAGLE, a small hunting dog; in general appearance a diminutive fox hound, solidly built, well set upon straight fore legs, with plenty of bone in proportion to its size, good, hard feet and a broad, deep chest with ample lung capacity. It is of good disposition, and clever and industrious in the field. In color and marking it much resembles the fox hound, black, white and tan being the more common colors, and these in more or less solid or pied masses. In its original home, Great Britain, there are both rough and smooth varieties, but the typical American beagle is smooth-haired. Beagles vary in height from 12 to 15 inches, and while excellent trackers are not so fast but that they can be followed on foot, a very com¬ mon sport in Great Britain. Their voices are exceedingly musical and justify the name some¬ times given them of. “buglers.® They are prin¬ cipally used for rabbit-hunting. In former times a very diminutive breed was in favor, according to one authority, no larger than well-grown kittens — so small, in fact, that it is said a whole pack could be carried afield in a pair of panniers slung across a pony’s back.

BEAGLE, The, a small ship of the British navy employed, under the command of Captain (afterward Admiral) Fitzroy, in making sur¬ veys of the coast of Patagonia and other South American shores and waters, and later making a voyage around the world. The expedition, which started from Plymouth 27 Dec. 1831 and returned 2 Oct. 1836, had for its naturalist the famous Charles Darwin. It was on board the Beagle that “the theory of evolution orig¬ inated.®

BEAGLE ISLAND, an island discovered bv Admiral Fitzroy during a voyage in H. M. S. Beagle. The channel of the same name is on the south side of the island of Tierra del Fuego.

BEAK, or BILL, the projecting jaws or snout of a bird or other animal,

when prolonged into an instrument for seizing or penetrating objects, and formed of hard materials, as bone, or covered with a rigid envelope, as of horn or chitin. It is most characteristic of bird;, where it is called “bill® or “neb,® and forms the principal means for obtaining, as well ao devouring food (except in most birds of prey), and where it takes on a great variety of shapes and characteristics adapted to special habits and purposes (see Birds). A more or less similar prolongation of mouth-parts occurs in many other animals, however, and receives a similar name. Among mammals, the duckbill (q.v.) is a conspicuous example of a true mammal with the lips formed into a horny bill much like that of a duck, and similarly used. The turtles have horny, projecting, parrot-like jaws of the same sort; and a curious imitation of this occurs among cephalo.pod mpllusks, The prolonged

jaws of various fishes, as of gars (“billfish®), sturgeons, etc., receive the term (technically rostrum), and these are often bird-like, as in the case of the spoon-billed catfish. The term is also borrowed by entomologists to describe the elongated mouth-parts of many insects, such as blood-sucking flies, juice-sucking plant-bugs, weevils and other forms. The prolonged tubu¬ lar or trough-like parts (canals) of many gas¬ tropod shells protecting the siphon, and the prominent umbos of such bivalve shells as the cockles, clams and fresh-water mussels, are also termed “beaks.®

BEAL, bel, George Lafayette, American

militarv officer: b. Norway, Me., 21 May 1825; d. 11 Dec. 1896. When the Civil War broke out he was captain of the Norway light infantry, and with this company was mustered into the 1st Maine regiment for the three months’ cam¬ paign. At the end of this service he was com¬ missioned colonel of the 19th Maine infantry, which took part in the battles of Cedar Moun¬ tain and Antietam and covered the retreat of General Banks from Winchester to Williams¬ port, Va. He was mustered out with his regi¬ ment in May 1863 ; volunteered again ; was made colonel of the 29th Maine, and promoted to brigadier-

general of volunteers 30 Nov. 1864, for his services in the Red River campaign. On 15 Jan. 1866 he was mustered out of service with the brevet of major-general of volunteers. In 1880-85 he was adjutant-general of Maine, and 1888-94 State treasurer.

BEAL, Samuel, English Orientalist: b. Devonport, 27 Nov. 1825; d. 20 Aug. 1889. He was graduated from Trinity College, Cambridge, in 1847, was head master of Bramham College from 1848 to 1850, and ordained priest in 1852. He entered the navy, acting as chaplain and naval instructor between 1852 and 1877, when he retired. He served in the China War, 1856— 58. On his retirement he was elected professor of Chinese at University College, London, a post he held till his death. His principal work consisted in tracing the early history of Buddhism in original Chinese records. He published (Fah-Hian and Sung-Yun, Buddhist Pilgrims from China to India, 400 a.d.-518) (1869) ; (A Catena of Buddhist Scriptures) (1871); (TheLegendof Sakya Buddha > (1875); (Abstract of Four Lectures on Buddhist Litera¬ ture in China) (1882); (Si-Yu-Ki: or Buddhist Records of the Western World) (translated from the Chinese of Hiuen Tsiang, 1885), and several other books.

BEAL, William James, American botanist : b. Adrian, Mich., 11 March 1833. He was graduated A.B. at the University of Michigan in 1859; A.M., 1862; S.B., Harvard, 1865; M.S., University of Chicago, 1875; (hon. Ph.D., University of Michigan, 1880; D.Sc., Michigan State Agricultural College, 1905). Teacher natural science, Friends' Academy and Howland Institute, Union Springs, N. Y., 1859-68; professor of botany, University of Chicago, 1868-70; lecturer on botany, 1871; professor of botany and horticulture, 1871-81 ; professor of botany and forestry and cu¬ rator of botanical museum, 1882-1903 ; pro¬ fessor of botany, 1903-10; since emeritus professor, Michigan State Agricultural Col¬ lege; director State Forestry Commission, 1883-92. First president Society for the Pro¬

motion of Agricultural Science, 1881-82; Asso¬ ciation Botanists of United States Experiment Stations, 1888; first president Michigan State Academy Science, 1894; president Michigan State Teachers' Association, 1881; member Botanical Society of America ; American Pomology Society; fellow of the American As¬ sociation for the Advancement of Science. He published (The New Botany } (1881) ;

(Grasses of North America) (Vol. I, 1887; Vol. II, 1896) ; (Seed Dispersal) (1898) ; Glos¬ sary of Botanical TermR *etc.*

BEALE, Dorothea, English teacher : b. London, 21 March 1831 ; d. 9 Nov. 1906. She became mathematical tutor in Queen's College in 1849 and later Latin tutor in the school ; and head teacher in the Clergy Daughters' School, Casterton, in 1857. In 1858 she was appointed principal of Cheltenham Ladies' Col¬ lege, the first proprietary girls' school in Eng¬ land, founded four years earlier on a capital of $10,000. When she took up office there were 59 pupils; in 1912 there were 1,000, with 120 teachers. During her term $800,000 had been spent on buildings, and at the close the an¬ nual income was $300,000. Her life was given to the college — to which she bequeathed the residue of her estate, amounting to $250,000 — and she was a pioneer in the higher educa¬ tion of women. Her publications include (Textbook of English and General History> ; (Chronological Maps* ; (Work and Play in Girls' Schools, * *etc.*

BEALE, Edward Fitzgerald, American diplomatist: b. Washington, D. C., 4 Feb. 1822; d. 22 April 1893; graduated at the United States Naval Academy 1842 and at the begin¬ ning of the Mexican War was assigned to duty in California under Commodore Stockton. Af¬ ter the war he resigned his naval commission and was appointed superintendent of Indian affairs for California and New Mexico. He was commissioned brigadier-general in the army by President Pierce. He served in the Union army in the Civil War and at its close engaged in stock-raising in Los Angeles. Cal., till 1876, when President Grant appointed him United States Minister to Austria.

BEALE, Lionel Smith, English physician and biologist: b. London, 5 Feb. 1828; d. 28 March 1906. He was the son of Lionel John Beale, M.R.C.S. He was educated at King's College School and King's College, London. In 1852 he established a laboratory for chemi¬ cal and microscopical studies and in the fol¬ lowing year became professor of physiology and general and morbid anatomy in King's Col¬ lege, London. In the same college he held in succession the professorships of pathology and of the principles and practice of medicine, but in 18% he retired from the latter post. He was a fellow of the Royal Society and for some years acted as treasurer of the Royal Microscopical Society. His published works deal with medical, anatomical, physiological and biological subjects, the microscope, *etc.* Among the most important are (How to Work with the Microscope) ; (Protoplasm; or, Life, Mat¬ ter and Mind* ; (Life and Vital Action in Health and Disease) ; (The Physiological Anatomy and Physiology of Man) (in collab¬ oration with Dr. Todd and Sir W. Bowman) ;

(Disease Germs *; (Life Theories and Religious Thought* ; (The Mystery of Life,* *etc.*

BEALE, Truxton, American diplomat : b. San Francisco, Cal., 6 March 1856. Graduat¬ ing from Pennsylvania Military College in 1874, he studied law at Columbia University and was then admitted to the bar. But instead of practising law, he spent the next 13 years in the management of his father's ranch in California. In 1891 he was sent to Persia as United States Minister. The following year he was sent to Serbia, Rumania and Greece, where he acted as Minister plenipotentiary. From 1894 to 1896 he traveled in eastern Asia, visiting Chinese Turkestan and Siberia. He has been a frequent contributor to the maga¬ zines on international questions. He is the author of (The Man Versus the State) (1916).

BEALL, John Young, Confederate guer¬ rilla: b. Virginia, 1 Jan. 1835; d. 24 Feb. 1865. He was appointed acting master in the Confed¬ erate naval service in 1863. On 19 Sept. 1864 he and a number of followers took passage on the Lake Erie steamer Philo Parsons and at a given signal took possession of the vessel, mak¬ ing prisoners of the crew. They also scuttled another boat, the Island Queen, and tried to wreck a railroad train near Buffalo, N. Y. In spite of a proclamation of Jefferson Davis as¬ suming responsibility for this expedition, Beall was hanged on Governor's Island, N. Y., on the ground that, if acting under orders, he should have shown some badge of authority.

BEAM, in architecture, a long, straight and strong piece of wood, iron or steel, especially one holding an important place in some struc¬ ture and serving for support or consolidation ; often equivalent to girder (q.v.). In a balance it is the part from the ends of which the scales are suspended. In a loom it is a cylindrical piece of wood on which weavers wind the warp before weaving; also the cylinder on which the cloth is rolled as it is woven. In shipbuilding, one of several strong transverse pieces of timber stretching across the ship from one side to the other, to support the decks and retain the sides at their proper distance, with which they are firmly connected by means of strong knees and sometimes of standards. They are sustained at each end by

thick string¬ ers on the ship's side called shelf-pieces. The main-beam is next abaft the mainmast. The greatest beam of all is called the midship beam. A ship is said to be ((on her beam-ends® when she lies entirely on her side, so that the beams are almost at right angles to the surface of the water. An object is said to be <(a-beam® when it is in a line with the beams of the ship and accordingly at right angles to its length.

BEAM ENGINE. See Steam Engine.

BEAM-TREE, White (Pyrns aria), a European and Asiatic tree of the family Mala-cece,' rarely exceeding 50 feet in height, often cultivated in dry and exposed situations for its ornamental leaves, which are bright dark-green above and light beneath ; and for its large ter¬ minal corymbs of flowers which appear in late spring, followed by showy orange-red or scar¬ let, acid and astringent fruits which resemble those of the service-berry and which are used to make a kind of beer. Its hard, fine-grained

wood is made into cog-wheels. It is closely related to the mountain-ash (q.v.).

BEAN, Nehemiah S., American inventor : b. Gilmanton, N. H., 1818; d. 20 July 1896. He learned the machinist's trade, and in the winter of 1857-58 built his first steam fire engine, which he named the Lawrence, and sold it to the city of Boston. In 1859 he took the man¬ agement of the Amoskeag Locomotive Works in Manchester, where he had been employed in 1847-50. During 1859 he built the ((Amoskeag Steam Fire Engine No. 1,® the first of a class of engines which now is used everywhere.

BEAN, Tarleton Hoffman, American ich¬ thyologist: b. Bainbridge, Pa., 8 Oct. 1846; d. 28 Dec. 1916. M.E., State Normal School,

Millersville, Pa., 1866; M.D., Columbian

University, 1876; M.S., Indiana University,

1883. He was curator of the department of fishes, United States National Museum, 1880-95; director of the New York Aquarium, 1895 — 98; and subsequently State fish culturistof New York from 1906. He was editor of the Pro¬ ceedings and Bulletins of the United States National Museum, Washington, 1878-86, and of the ˆReport and Bulletin of the United States Fish Commission,) Washington, 1889—

92; was assistant in charge of the division of fish culture in the. United States Fish Commis¬ sion, 1892-95 ; acting curator of fishes at the American Museum of Natural History, New York, 1897. In 1893 he represented the United States Fish Commission at the World's Colum¬ bian Exposition, and in 1895 at the Atlanta Exposition. In 1899 he was appointed director of forestry and fisheries of the United States Commission to the Paris Exposition of 1900, and chief of the departments of fish, game and forestry at the Saint Louis Exposition, 1902-05. He was made chevalier, Legion of Honor and officer of Merite Agricole, France; knight of the Imperial Order of the Red Eagle, Ger¬ many; Order of the Rising Sun, Japan; mem¬ ber of the American Forestry Association and the American Fisheries Society, also member of the Danish Fisheries Society, and the Bio¬ logical Society of Washington. His publications include (The Fishes of Pennsylvania) (1893) ; (The Salmon and Salmon Fisheries) ; (Oceanic Ichthyology> (with late George Brown Goode) (1896); (The Fishes of Long Island) (1902); (The White World) (part author), (1902) ; (The Food and Game Fishes of New York) (1903) ; (Th£ Basses, Fresh-water and Marine> (part author), (1905) ; (The Fishes of Ber¬ muda > (1906). He also contributed articles to Forest and Stream.

BEAN, a plant of the family Fabacece, or legumes. Originally the smooth kidney-shaped, flat-sided seed of the broad bean, Vicia faba, it is now applied to various genera, usually with a specific epithet, as Lima bean, *etc.*

The broad bean (Vicia faba) is the bean of history. Its origin is doubtful, but it is prob¬ ably a native of southwestern Asia and north¬ ern Africa. It is much grown in Europe, es¬ pecially in England, but the hot dry summers prevent its cultivation in most parts of the United States. It is grown successfully in the maritime provinces of Canada, and in other parts, with corn and sunflowers, to make ensi¬ lage. It is an annual plant, growing from two

to four feet high, erect, 'with thick angular stems ; flowers usually white with black on the wings. The pods, which contain the thick

flat¬ tened seeds, vary from two to four inches up to 18 inches long. The common varieties are the Broad Windsor and Mazayan; they are quite hardy and should be sown early. The soils best suited are heavy loams and clays. The green seeds are eaten as a vegetable, or, if allowed to mature, are ground and used as feed for horses and cattle. The straw is fed to cattle.

The kidney-bean of Europe is known in the United States as the bean, Phaseolus vulgaris; it embraces all the common field, garden, snap and string beans, both bush and climbing. The French know it as the haricot. It is probably a native of South America, and was introduced into Europe during the 16th century. Over 150 varieties are in cultivation ; the growers usually group them into bush-and pole-beans. The bush-beans embrace the (<field beans® grown for dry shelled seeds, also the green-podded and yellow-podded garden, string or snap beans. The pole-beans are usually grown for use while green. Bush-beans do well on a good warm loam. The yellow-podded varieties and pole-beans require a richer soil. They should not be planted until danger from frost is over, and require constant cultivation while growing. Leading field varieties are white marrowfat, navy or pea bean, medium and the kidneys : in string-beans, early Valentine, string¬ less green-pod, refugee, *etc.* : in yellow-podded beans, black wax, golden wax, kidney and white. Consult Bulletins 87 and 115, Cornell Experiment Station. For forcing pole-beans under glass, see Bailey's (Forcing Book* ; Bulle¬ tin 62, New Hampshire Experiment Station.

The Lima bean (P. lunatus) is the most popular pole-bean. It is of South American origin, but is now grown in various parts of this country, most of the seed being raised in California. The short, flat, slightly kidney¬ shaped seeds are enveloped in flat, broad pods. The soy-bean (q.v.) (Glycine hispida) is a

bushy, erect, hairy plant which bears pea-like seeds in small pods. It is a native of China and Japan, where it is largely grown. It is used for forage and soiling. The cowpea (q.v.) (Vigna catjang) is generally used for forage, soiling, hay and green manuring. The scarlet runner (P. multi floras) is a perennial. It is grown largely for ornament, but in England the seeds and pods are eaten as a vegetable. The Adzuki bean (P . radiatus) is a native of Japan, and a recent introduction in America. Consult Bulle¬ tin 32, Kansas Agricultural Experiment Station. The frijole (P. spp) is grown in the Southwest¬ ern States and in Mexico, where it is a staple food.

Other important Oriental beans, but not very common here, are:

Mungo-beans (P. mungo) ; various species of Dolichos, as the asparagus-bean (D. sesquipedalis) ; and the lo¬ cust or carob bean (Ceratonia siliqua), the pods of which are sold by confectioners as Saint John's bread. The sweet pulp which sur¬ rounds the seed is eaten, especially in the Medi¬ terranean. The pods and seeds are ground and used extensively as feed for cattle and other animals. The velvet-bean (species of Mucuna) is often grown for an ornament; also for for¬

age and soil renovation in the southern States. It ripens seed only in the Gulf States. The beans and pods, when ground, are fed to cattle. The cooked green beans have caused illness in those who have eaten them. In 1899, 15,004 acres of green beans were grown, yielding 1,512,642 bushels, or an average of 100.8 bushels per acre. The five leading States in bean cul¬ tivation are New York, New Jersey, Florida, California and Virginia.

Uses and Feeding Values. — The seeds and sometimes the pods are used, either green or dry, as food for man and animals. Some spe¬ cies are grown for forage, hay or green manur¬ ing. Owing to their nitrogen-gathering pro¬ pensities they all aid in soil-renovation.

The average percentage composition is :

Water

Protein

Nitrogen-free

extract

Ether

extract

Ash

Fuel value of one pound

Dry shelled beans…

12 . 6 22 . 5

29.6

1 .83

.51

605 calories

Fresh shelled beans .

58.9

9.4

29.1

0.62

.0

740

Fresh string beans . .

89.2

2.3

7.4

0.30

.8

195

With man, on an average, 90 per cent of the dry matter is digestible; 80 per cent of the pro¬ tein; 96 per cent of the nitrogen-free extract; and 80 per cent of the ether extract. String-beans or green shell beans are usually boiled and served in various ways. In composition they compare favorably with other vegetables. Dry beans are baked with salt pork or beef and used for soups and other dishes. They are a cheap, nutritious food, rich in starch and in the proteid, legumin ; hence they may be used to replace meat in the diet. If the skins are removed they are easier of digestion and are not so liable to cause flatulency; the latter is due to the production of methane by fermentation in the intestines. Shell-and string-beans are preserved by evaporation or canning. String-beans are also preserved with salt. Cooked dry beans are canned. Bean flour consists of beans ground. Bean meal is used in Europe as feed for horses, cattle and hogs. Bean cake is the residue after the oil has been extracted; it is fed to cattle in northern China. Bean curd is eaten by the natives of northern China.

Bean Diseases. — Pod-rust ; anthracnose (Colletotrichum lindeinutliianum) , a fungus which attacks the stems, leaves and fruit. The disease may be carried over in the seed, the affected ones being recognized by the yellow or brown discoloration. A black discoloration with ensuing brittleness marks the progress of the disease on the leaves. The selection of sound seed, immediate removal of infected plants and spraying with Bordeaux mixture are recommended. The bean-rust (Udomyces phaseoli) appears as small brown, nearly circu¬ lar and slightly elevated dots on the leaves. These discharge a brown powder, the spores of the disease. Spraying with Bordeaux mix¬ ture is recommended. Blight (Phytophthora phaseoli) attacks the Lima bean. Spraying with copper compound is recommended. The bean-weevil (Bruchus ohtectus) may injure the beans when stored. After harvesting, treat the seed two or three times, at intervals of three or four weeks, with carbon bisulphide.

Consult De Candolle, (Nativity of the Bean) ; Gray and Trumbull, ((Origin of Cultivated Plants, }) American Journal of Science, XXVI, 130; Bailey, (Standard Cyclopedia of Horti¬ culture.)

BEAN, Saint Ignatius, a seed which yields

strychnin. See Strychnos.

BEAN-GOOSE (Anser segetum), a spe¬ cies of European wild goose, distinguished from the true wild goose (A. ferns) by its com¬ paratively small and short bill, which, as far as the nostril, is black, and above it of a reddish flesh color, whereas that of the gray lag, or true wild goose, is orange-red, with a touch of grayish-white. They feed generally on high grounds, considerably inland, selecting particu¬ larly young wheat, stubbles sown down for grass, and, in spring, fields sown with beans, their fondness for which is supposed to have given them their name. They breed chiefly within the Arctic Circle, but their nests are often found in large numbers in the Hebrides. The bean-goose being rather less in size than the common wild goose, but having the same color, is sometimes provincially called the small gray goose.

BEAN WEEVIL, a beetle, Brunchus ob-tectns, which is smaller than the pea-weevil, measuring .15 of an inch in length. Compared with that insect it is lighter and more uni¬ form in color, being of a tawny gray, with¬ out the white spots so conspicuous in B. pisi. The uniform tawny gray elytra are spotted with a few oblong dark spots, situated be¬ tween the striae, the antennae also differ in having the four basil joints more reddish than in B. pisi, while the terminal joint is red. The legs also are much redder. The eggs are laid on the outside of the bean; the young hatch and bore in, and there may be eight or 10 grubs in a single bean. The chrysalis lies in a cavity in the bean just large enough to receive its body. The best remedy is carefully to examine the beans in the autumn and before sowing time, when the presence of the weevil can be easily detected by the transparent spots made by the larva. These should be burned and such beans as are apparently uninjured should be soaked for a minute in boiling-hot water, so that no beetles be overlooked.

BEAR, or Bere, a species of barley (q.v.).

BEAR FLAG WAR, a rising against the Mexican government in 1846, by a small body of emigrants from the United States who had settled in California, thought to have been in¬ cited by Capt. John C. Fremont (q.v.). He was then commanding a small detachment of Ameri¬ can troops in California and a few Americans having proclaimed a republic in Sonoma and raised a flag on which was a figure of a bear, Fremont joined the insurgents with his troops. The Mexican War began in the following July and the Bear Flag War then became a part of the American scheme for the conquest of California.

BEAR ISLAND. An arctic island in Barents Sea, about 200 miles north-northwest of North Cape, Norway, discovered by Barents (1596). Deserted with the decadence of whaling, it now becomes a land of economic importance, Extensive deposits of low-grade

coal, easily mined, have been found, the strata of the north coast being some six feet thick. The development of the industry has been commenced by a Norwegian corporation, which maintains a permanent colony, with additions in summer. A wireless station is under installa¬ tion, and the construction of port facilities is planned.

BEAR LAKE, Great, a body of water in Canada, so named on account of its situation directly under the Arctic Circle, and therefore under the constellation Ursa Major. It is of very irregular shape, having five arms project¬ ing out of the main body, and its greatest diameter is 150 miles. The principal supply of the lake is Dease River, which enters it from the northeast. Its outlet is on its southwestern extremity, at the bottom of Keith Bay, through Bear Lake River, which empties into Mackenzie River. The surface of Bear Lake is not more than 200 feet above the Arctic Ocean; conse¬ quently its bottom must, like many of the north¬ western lakes, lie considerably below the level of the sea. Great Bear Lake abounds in fish of many varieties, among which the herring-salmon is noted. The second land expedition, under Franklin, in 1825, wintered on the western shore of this lake, near its outlet, where they built Fort Franklin. Dr. Richardson, a mem¬ ber of the expedition, mentions a curious cir¬ cumstance concerning the singing of birds of this lake, that when they first appeared after the long Arctic winter they serenaded their mates at midnight, and were silent during the day. The waters of the lake are so clear that a white substance can be distinctly discerned at the depth of 90 feet. The lake is situated about 250 miles east of the Rocky Mountains, about the same distance south of the Arctic Sea and 400 miles northwest of Slave Lake. It is the basin of a watershed of about 400 miles diameter.

BEAR MOUNTAIN, the designation of a hill some 750 feet in height, situated in the northeastern part of Dauphin County, Pa. In its vicinity are valuable deposits of anthracite coal.

BEAR RIVER, a river in Utah about 400 miles long, which rises in a spur of the Rocky Mountains, about 75 miles east of Great Salt Lake, takes first a northwesterly and then a southeasterly direction, forming nearly a letter V, of which more than half the entire length is in Oregon State, and finally empties into the Great Salt Lake. Its valley is about 6,000 feet above the sea-level. At the bend of the river in Oregon, and about 45 miles from Lewis River, are found the famous Beer and Steam¬ boat springs, which are highly impregnated with magnesia and other mineral substances ; also a geological formation in the vicinity, of Lower Cretaceous (q.v.) age, which carries some coal.

BEAR STATE. A popular nickname for Arkansas.

BEARBERRY, the name applied to the species of Arctostaphylos, a genus of plants belonging to the family Ericacece. It includes the two species, A. uva-ursi and A. alpina, both of which are American. The flowers are rose-colored, the berry of the uva-ursi is red, while that of the other is black. The manzanita of California is A, manzanita or A. pungens, It

reaches a height of 30 feet, and forms dense thickets, impenetrable by man or cattle. By reason of an active glycoside, arbutin, bearberry is a very efficient urinary antiseptic, useful in cystitis, pyelitis and urethritis. The arbutin is decomposed in the urine into hydrochinon and other bodies. Its antiseptic properties are due to the phenol hydrochinon. The extract of the plant is used for dyeing and tanning leather.

BEARD, Daniel Carter, American artist and author: b. Cincinnati, Ohio, 21 June 1850. He received his academic education at Coving¬ ton, Ky., and went to New York in 1878. ˆ He studied at the Art Students' League, New York, 1880-84; and made illustrations for

Harpers', Century, Scribner's, Life, books (of which the most notable is Mark Twain's Connecticut Yankee1), *etc.* He was originator and in¬ structor of the pioneer class in illustration and teacher of animal drawing in the Woman's School of Applied Design, 1893-1900, believed to be the first organized class in animal drawing in the world. He was editor of Recreation, 1905-06 ; became a member of the Flushing board of education and of the Queens Borough library board; vice-president of the Mark Twain Library, of Redding, Conn. ; member of several zoological societies; president of the. Society of Illustrators; president of the Camp Fire Club of America; national scout commissioner of the Boy Scouts of America. An enthusiast in out¬ door life he was the originator and founder of the first boy scout society, from which the English scouts and others were modeled, and be¬ came chief scout of the department of wood¬ craft, Culver (Ind.) Military Academy. Mount Beard, the peak adjoining Mount McKinley, discovered by the Browne and Parker expedi¬ tion, was named after him. He also founded the Dan Beard Outdoor Scout School, with headquarters at Flushing, L. I. Besides his illustrative work he has published Ameri¬ can Boys' Handy Book1 (1882); (Moonlight and Six Feet of Romance1 (1890) ; (Outdoor Handy Book1 (1900) ; 'Jack of All Trades1 (1900); 'Field and Forest Handy Book1 (1906) ; (New Ideas for Out of Doors1 (1906) ; (Dan Beard's Animal Book1 (1907) ; (Boy Pioneers and Sons of Daniel Boone1 (1909) ; 'The Buckskin Book and Buckskin Calendar1 (1911); (Boat Building and Boating1 (1911); 'Shelters, Shacks and Shanties1 (1914) ; (Handicraft and Recreation for Girls1 ; (What a Girl Can Make and Do1 ; 'The American Girls' Handy Book1 ; 'Things Worth Doing and How to Do Them.1

BEARD, James Henry, American painter: b. Buffalo, N. Y., 1814; d. 4 April 1893. He became a portrait painter in Cincinnati, and painted portraits of Henry Clay and other dis¬ tinguished men. In 1846 he exhibited his (Caro¬ lina Emigrants1 at the National Academy in New York, of which he was elected an honorary member in 1848. In 1870 he removed to New York, and in 1872 was elected a full member of the National Academy. Subsequently he devoted himself to animal painting. Among his better known works are (Mutual Friend1 (1875); 'Consultation1 (1877) ; 'Blood Will Tell1 (1877) ; 'Don Quixote and Sancho Panza1 (1878) ; ˆHeirs at Law1 (1880) ; 'Which Has Preemption?1 (1881) ; 'Detected Poacher1 (1884); 'Don't You Come Here1 and 'The

Mississippi Flood1 (1885); 'A Barnyard1 and ('L1 Yer Gimme Some? Say!1 (1886).

BEARD, Richard, American theologian: b. Sumner County, Tenn., 27 Nov. 1799; d. Leb¬ anon, Tenn., 2 Dec. 1880. He was graduated from Cumberland College, Princeton, Ky., in 1832; was professor of languages there, 1832— 38; president 1843-53. In 1854 he was called to the chair of systematic theology in Cumberland University, Lebanon, Tenn., a position held un¬ til his death. He was one of the ablest scholars and most conspicuous figures in the Cumberland Presbyterian Church. He published 'Why I Am a Cumberland Presbyterian1 (1874) ; 'Sys¬ tematic Theology,1 a standard work regarded as the crystallization of the Cumberland Presbyterian form of thought and faith.

BEARD, Thomas Francis, commonly

known as Frank Beard, American artist: b. Cincinnati, 6 Feb. 1842; d. 1905. During the Civil War he served in the 7th Ohio regiment, and acted as a special artist for the Harper publications. As an artist he devoted himself especially to character sketches. From the age of 12 he contributed pictures to the leading American magazines. As a lecturer he had great success before Chautauqua and other audiences. He accompanied his talks by crayon sketches on a blackboard. The title of his first lecture was "Chalk-Talk,11 whence the word originated. In 1881 he occupied the chair of aesthetics at Syracuse University. He published 'The Blackboard in the Sunday-school1 (1880) ; and a number of short stories.

BEARD, William Holbrook, American painter: b. Painesville, Ohio, 13 April 1825; d. New York, 20 Feb. 1900; brother of James H. Beard. He was a traveling portrait painter from 1846 till 1851, when he settled in Buffalo, N. Y. After several years of foreign study and travel he settled in New York in 1860. In 1862 he was elected a member of the National Academy. His works include genre and alle¬ gorical pictures, but he was most popular in painting animals, especially bears, whose ac¬ tions he humanized in a satirical and pleasing manner. He made many studies of decorative architecture. Among his most popular works are 'Power of Death1 (1859) ; 'Bears on a Bender1 (1862) ; 'Bear Dance1 (1865) ; 'March of Silenus1 (1866) ; 'Flaw in the Title1 (1867) ; 'Darwin Expounding his Theories1 and 'Run¬ away Match1 (1876); 'Divorce Court1 (1877); 'Bulls and Bears in Wall Street1 (1879); 'Voices of the Night1 (1880) ; 'Spreading the Alarm1 (1881); 'In the Glen1 (1882); 'Cattle Upon a Thousand Hills1 (1883) ; 'Who's Afraid?1 (1884); 'His Majesty Receives1 and 'Office Seekers1 (1886), *etc.* He published 'Humor in Animals,1 a collection of his sketches (1885).

BEARD, the hair on the chin, cheeks and upper lip of men. It differs from the hair on the head by its greater hardness and its form. The beard begins to grow at the time of pu¬ berty. The connection between the beard and puberty is evident from this, among other cir¬ cumstances, that it never grows in the case of eunuchs who have been such from childhood; but the castration of adults does not cause the loss of the beard. According to Caesar, the Germans thought, and perhaps justly, the late

growth of the beard favorable to the develop¬ ment of all the powers. Blit there are cases in which this circumstance is an indication of feebleness. It frequently takes place in men of tender constitution, whose pale color indi¬ cates little power. The beards of different nations afford an interesting study. Some have hardly any, others a great profusion. The lat¬ ter generally consider it as a great ornament ; the former pluck it out; as, for instance, the American Indians. The character of the beard differs with that of the individual, and, in the case of nations, varies with the climate, food, *etc.* Thus the beard is generally dark, dry, hard and thin in irritable persons of full age ; the same is the case with the inhabitants of hot and dry countries, as the Arabians, Ethiopians, East Indians, Italians, Spaniards. But persons of very mild disposition have a light-colored, thick and slightly curling beard; the same is the case with inhabitants of cold and humid countries, as Holland, Britain, Sweden. The difference of circumstances causes all shades of variety. The nature of the nourishment likewise causes a great variety in the beard. Wholesome, nutritious and digestible food makes the beard soft ; but poor, dry and in¬ digestible food renders it hard and bristly.

In general the beard has been considered with all nations as an ornament and often as a mark of the sage and the priest. Moses for¬ bade the Jews to shave their beards. With the ancient Germans the cutting off another's beard was a high offense : with the East In¬ dians it is severely punished. Even now the beard is regarded as a mark of great dignity among many nations in the East, as the Turks. The

custom of shaving is said to have come into use in modern times during the reigns of Louis XIII and XIV of France, both of whom ascended the throne without a beard. Courtiers and inhabitants of cities then began to shave, in order to look like the king, and as France soon took the lead in all matters of fashion on the Continent of Europe, shaving became gen¬ eral; but it was only from the beginning of the 18th century that shaving off the whole beard became common.

The English clergy by and by, probably in imitation of those of western Europe, began to shave the beard and until the time of William the Norman, the whole of whose army shaved the beard, there prevailed a bearded class and a shaven class, in short, a laity and a clergy, in England. In forbidding the clergy to wear beards Gregory VII (1084) appealed to the custom of antiquity. The higher classes in¬ dulged in the moustache, or the entire beard, from the reign of Edward III down to the 17th century. The beard then gradually de¬ clined and the court of Charles I was the last in which even a small one was cherished. Shaving, among many ancient nations, was the mark of mourning; with others it was the con¬ trary. Plutarch says that Alexander introduced shaving among the Greeks by ordering his sol¬ diers to cut off their beards ; but it appears that this custom had prevailed before among the Macedonians. The Romans began to shave about 296 b.c., when a certain Ticinius Mena, a barber from Sicily, introduced this fashion. Scipio Africanus was the first who shaved ev¬ ery day. The day that a young man first shaved was celebrated and the first hair cut off

was sacrificed to a deity. Hadrian, in order to cover some large warts on his chin, renewed the fashion of long beards ; but it did not last long. In mourning the Romans wore a long beard, sometimes for years. They used scis¬ sors, razors, tweezers, etc., to remove the beard. The public barbers' shops (tonstrince) , where the lower classes went, were much re¬ sorted to; rich people kept a shaver (tonsor) among their slaves. Army regulations gener¬ ally prohibit the wearing of beards, while in the navy beards are permitted. Physicians sug¬ gest that the beard should be suffered to grow on the chin and throat where tendencies to throat disease exist.

BEARD MOSS (usnea barbata), a lichen of gray color. See also Usnea.

BEARDSLEE, Lester Anthony, American naval officer: b. Little Falls, N. Y., 1 Feb. 1838; d. near Augusta, Ga., 11 Nov. 1903. Appointed acting-midshipman 5 March 1850, he served in the East Indies in 1851-55,

participating in one battle and several skirmishes with the Chinese army at Shanghai. Graduating from the Naval Academy 1856, he passed through all grades of the service to rear-admiral 1895 and retired 1 Feb. 1898. During the Civil War he com¬ manded the monitor Nantucket in the attack of the ironclad fleet on the defenses of Charles¬ ton Harbor, 7 April 1863, and captured the Confederate steamer Florida at Bahia, Brazil. In 1870 he took the steam-tug Palos to the East Indies, carrying on her the first United States flag through the Suez Canal. In 1879-80 he discovered, surveyed and named Glacier Bay, Alaska. He was the author of a number of valuable official reports, especially those on (The Strength of Metals, > (Resources of Alas¬ ka* and (Present Condition of Affairs in Ha¬ waii* (1897), published as Senate executive documents; (The Strength of Wrought Iron and Chain Cables) (1880).

BEARDSLEY, Aubrey Vincent, English illustrator: b. Brighton, 8 Aug. 1872; d. Men¬ tone, France, 16 March 1898. He was very pre¬ cocious, drew at four and sold his copied com¬ positions at 11. At the age of 15 he had pro¬ duced a sketchbook of marked originality. He received no special instruction in drawing, but studied prints and drawings in the British Mu¬ seum. He was possessed also of extraordinary musical talent and was partial to Wagner. After leaving school he was placed in an ar¬ chitect's office, which ill-health soon obliged him to leave and accept a clerical position. At this time he was befriended by Burne-Jones who gained him admission to the Westminster Art School. He remained there but a few months. In 1892 he began his illustration of (Le Mort d'Arthur.* These, in the pre-Ra-phaelite style, were followed by others which showed Japanese and French Rococo influences. In 1894-95 he was art editor of the Yellow Book, in which appeared some of his best work. About this time he illustrated the (Bon Mot Library) ; the (Pall Mall Budget,) and Oscar Wilde's (Salome.) In 1896 he illustrated the (Rape of the Lock, *and (L}'sistrata.* To this year also belongs the famous frontispiece, <Volpone,) considered one of the world's greatest pen drawings. Beardsley contracted tuberculosis, embraced the Roman Catholic

faith at Bournemouth in 1897, and visited France in the following year where he died.

Beardsley's style was original and unique in several respects. He ranks high among the illustrators of his time because of his remark¬ able execution, conception and line mastery. Collections of his drawings have been issued under the titles (Book of Fifty Drawings by Aubrey Beardsley, > text by Avmer Vallance (1897); (Second Book of Fifty Drawings> (1899) ; (The Early Work of Aubrey Beardsley) (1899) ; (The Late Work of Aubrey Beardsley } (1901). Letters and poems, etc., in (Under the HilP (1904). Consult the biogra¬ phies by Robert Ross (1908) and Arthur Symonds (1905).

BEARDSLEY, John Davis, American soldier and railway official : b. Woodstock, N. B., 1 Jan. 1837. He engaged in mercantile and lumbering pursuits at Grand Falls. At the outbreak of the Civil War in 1861 he left his lumber mill on the Saint John River to his partner, entered the Maine volunteers and was soon made first lieutenant of the 10th Maine volunteers. He was employed to guard the railroad from Baltimore and Harper's Ferry, was present at the battles of Winchester and Cedar Mountain, being taken prisoner at the latter. After three months in Libby Prison he was exchanged. He was present at Chancellorsville and at Gettysburg and in the fall of 1863 was sent to Tennessee. He was trans¬ ferred to the 29th Maine, who were soon dis¬ patched by sea from New Orleans to Fortress Monroe to reinforce Grant on the Potomac. The destination was changed to Washington and they were up in time to help in repulsing the Confederate general, Early, from the outskirts of the capital. He was' next with Sheridan's corps in the Valley campaign, was promoted major in the 109th regiment in 1864. He resigned in March 1865 to raise a regiment of sharpshooters but before it could be ef¬ fected the collapse of the Confederacy occurred. In 1897 he was appointed by the governor of Maine a commissioner for the erection of monuments at Gettysburg in commemoration of the soldiers of Maine who fell there. After the war he went into business at Richmond, Va., where he continued until 1873, removing thence to Cairo, W. Va. In 1878 he went to Arkansas, where he built a narrow-gauge rail¬ road from Hope to Washington, Ark. In 1882 he changed the gauge of the road and extended it to Nashville. It is known as the Arkansas and Louisiana Railroad. Beardsley sold it to Jay Gould in 1886 and in 1887 began the con¬ struction of the Louisiana and Northwest Rail¬ road from Magnolia, Ark., to Natchitoches, La. This road was sold to a syndicate in 1905. Following this he built an electric system, a light and power plant, an ice plant and an amusement park at Mineral Wells, Tex.

BEARDSLEY, Samuel, American jurist: b. Hoosick, N. Y., 9 Feb. 1790; d. Utica, N. Y., 6 May 1860. On leaving the common school he took up the study of medicine, but aban¬ doned it for law. In 1813 he was a member of the militia that defended Sackett's Harbor. Two years later he was admitted to the bar and became judge-advocate of the militia. In 1823 he was State senator from the fifth district of New York. He was appointed attorney for

the northern district of New York by Presi¬ dent Jackson and was a member of Congress in 1831-36 and 1843-45. From 1836 to 1838 he was attorney-general of the State of New York. He became associate judge of the Su¬ preme Court of New York in 1844 and three years later succeeded Judge Bronson as chief justice. On his retirement he devoted himself to the practice of his profession.

BEARDSTOWN, Ill., city in Cass County, 45 miles northwest of Springfield, on the Illinois River and on the Saint Louis division of the Burlington Railroad which has its re¬ pair and other shops at Beardstown. There are manufactures of flour, lumber and window screens as well as important cooperage works, fishing and ice-packing industries. The city has a fine park, two great bridges across the river, municipal waterworks, a Carnegie li¬ brary, and its city hall is the former courthouse in which in 1854 Abraham Lincoln won the Armstrong murder trial. Named after Thomas Beard, who first settled here in 1820, Beards¬ town was plotted in 1827 and in 1832 was a base of war supplies for the Black Hawk expedi¬ tion against the Indians. It received a city charter in 1896. Pop. (1920) 7,111.

BEARING, in navigation and surveying, signifies the angle made by any given line with a north and south line. The bearing of an ob¬ ject is the direction of a line from the observer to that object.

In architecture, the space between the two fixed extremities of a piece of timber, or be¬ tween one of the extremities and a post or wall placed so as to diminish the unsupported length. Also and commonly used for the dis¬ tance or length which the ends of a piece of timber lie upon, or are inserted into, the walls of piers.

In mechanics, (a) The portion of an axle or shaft in contact with the collar or boxing, (b) The portion of the support on which a gudgeon rests and revolves, (c) One of the pieces resting on the axle and supporting the framework of a carriage, (d) One of the chairs supporting the framework of a railway carriage or truck.

In heraldry, a charge; anything included within the escutcheon. Generally in the plural, as armorial bearings.

BEARINGS, Anti-friction. Anti-friction bearings are bearings involving the principle of rolling friction, as distinguished from sliding friction. An ordinary shaft turning in a plain journal slides around on a layer of some lubri¬ cating substance. If the lubricant is good and properly applied, little energy or power is lost in the heat produced by rubbing friction. If not, then much heat is produced, often to such an extent that the oil or grease is set on fire, dried up, thereby causing a so-called (<hot box® or journal. The starting friction of a plain journal differs very greatly from the friction of motion. The reason is that while at rest under a heavy load, the film of the lubricant is penetrated, and contact of metal with metal is established. To overcome this contact, until the bearing has moved far enough to drag the film of oil between the points of contact again, requires much more power. Careful tests show the coefficient of rest to be from .09 to .13 as compared with .05 to .08 for the co-BEARN

efficient of motion. Bearings involving rolling friction are entirely different in this respect. Slight lubrication, largely to prevent rusting, is needed. Between the shaft and the wheel or other bearing is interposed either a series of balls or rollers of hardened metal, usually steel, or a steel alloy, arranged to revolve be¬ tween the two surfaces.

Ball bearings came into general use with the advent of the modern bicycle ; they have been highly developed in automobile practice, and have come into general use in light machin¬ ery to reduce friction, being markedly superior to plain bearings, especially in case of starting. The balls are made in a great number of sizes, and positioned in bearings in numerous ways. Since small pieces of metal heat and cool rapid¬ ly, it is a difficult matter to temper steel balls exactly as desired. To have a long life each ball must be uniformly hardened as deeply as possible. Much ingenuity has been displayed in securing accurate tempering, and an exceed¬ ingly good average of balls are marketed at surprisingly low cost. In addition to hardness, uniformity

of size and surface polish are essen¬ tial. The only way to know precisely what is the structure and strength of a particular ball is to break it up. However, by microphotog¬ raphy experts are able to judge very accurately the character of balls.

It is apparent that a series of balls, traveling in a circular raceway in a machinery bearing must occasionally strike each other, jam and rub the surfaces in contact in opposite direc¬ tions. Except for this, sliding friction is wholly eliminated in a properly designed ball bearing, and the balls simply roll on the surfaces. To produce a good bearing it is essential that the balls shall be as nearly perfect as can be, and in practice good balls will show variations of only 1-10,000 of an inch in diameter. If the balls in a bearing vary in size, the larger balls must bear nearly all the strains and the sooner crystallize and break. The surfaces against which the balls bear are sometimes flat, but usually at least one surface must be curved to keep the balls in position; often both sur¬ faces are curved. The radius of curvature of the raceway against which the balls bear must always be less than the curvature of the ball, else there will be sliding friction. The less number of balls there are in a bearing the less will be the number of contact points, and the less the friction. But if there is a heavy load to carry, it is necessary to have many balls, and thus distribute the load. It has been demonstrated that the speed of rotation has little effect on the carrying capacity. Marked and numerous variations in speed and load, as in automobile use, reduce the carrying capacity of a ball bearing, hence they are designed with a large margin or surplus of strength. A good ball bearing will have a coefficient of friction of approximately 0.0015.

Ball bearings are made to carry ordinary load or side-friction, to resist end-thrust of a shaft, and sometimes for angular load, the positioning of the bearing surfaces determin¬ ing how they operate. In designing a ball bear¬ ing, the engineer must consider the load or stress to be placed on it constantly, and also in exceptional instances; he must also bear in mind the different speeds of rotation to which it will be subject. If it is a bearing on a vehicle

axle, carrying a wheel, he will fix the inner raceway firmly to the axle, but mount the outer raceway loosely on the wheel with a ˆslip-fit.® By properly shaping his raceway he can make the bearing carry the end-thrust of the axle as well as the supported load.

Designs of ball bearings have been made with alternate small idle

balls between the larger working balls, with a view to reducing back rotation or jamming, but these have not been widely adopted. Another arrangement is to stagger the balls — that is arrange them this

way: o0o0o˚o0o-This is accomplished by build¬ ing parallel raceways that slightly impinge. There are some advantages in such a construc¬ tion.

For heavy loads roller bearings are superior to ball bearings. Hardened steel rollers of uniform size are mounted in a cylindrical case, that positions them so that they are kept slightly apart. They may then be introduced into the journal box by slipping over the shaft. By ex¬ tending the length of the journal box, and using a sufficient number of rollers, almost any load can be carried with a minimum of friction. A 24-inch diameter shaft, provided with a 36-inch journal-box, carrying 38 one-and-a-half inch rolls, was made to carry a load of 575,000 pounds. Since 1900 the use of roller bearings has become very common. Both ball bearings and roller bearings require lubrication, though very much less than plain bearings need. It is a mistake to suppose that they can be run absolutely without oil. It is very necessary that such bearings be kept free from grit or dirt, as these will cut the balls or rollers in a short time.

Other anti-friction bearings are made by the use of anti-friction metals, that is, soft alloys, as babbitt metal, which is placed in the bearing to carry the steel or iron shaft.

BEARN, ba-arn, a former province of France, at the foot of the Pyrenees, with the title of a principality ; about 42 miles long and 36 broad. It now forms part of the department of the Basses-Pyrenees. It belonged, with Navarre, to Henry IV, when he obtained the crown. The plain country is very fertile, and the mountains are covered with fir trees, while within are mines of copper, lead and iron, and the little hills are planted with vines, which yield good wine. Pau is the chief town. There is a peculiar and well-marked dialect, — the Bearnese, — spoken in this district, which has much more affinity with the Spanish than with the French. It contains a certain number of Greek elements, which some believe to have been derived from the ancient Greek colonists established in Gaul. The people have retained many Old World manners, customs and super¬ stitions, as well as their old costume. Consult Bordenare, (Histoire de Bearn et Navarre)

(1873).

BEARS, a family (Ursidce) of large, heavy, long-haired, plantigrade, carnivorous mammals, scattered throughout all the northern hemi¬ sphere and some parts of the tropics. They are absent from Africa (except the Atlas Mountains, which zoologically belong to Europe) and from Australasia. In their structure and dentition they are allied to the dogs on one hand, and to the badgers, weasels,

skunks, *etc.* (Mustelidce) , on the other. The head is broad, and the jaws extended and rather narrow, but not so powerful as those of dogs or hyenas ; while the teeth are complete and large, the molars especially being broad and tuberculous, fitting them well for crushing the vegetable fare so largely eaten by this group. The skeleton is massive; the limbs are of great strength and furnished with long and powerful claws for digging and use in fighting. The whole sole of the foot rests upon the ground, leaving a footprint much resembling that of a man. Ordinarily they move about rather slowly and clumsily, yet all except the heaviest bears climb trees, and the largest scramble over rocks or ice with surprising agility; and all, when urged by rage or fear, can get over the ground at great speed, their gait being a lumbering but effective gallop. Their ears, though small, are highly developed, and their hearing is perhaps of more service to them than is their eyesight; but neither equals in keenness the nose, which seems to be extremely sensitive. In respect to food, bears are truly omnivorous, taking flesh, fish or vegetable materials as circumstances favor. They seize such small animals of the woods as cannot avoid them, and near settle¬ ments raid the herds of swine and flocks of sheep and cattle, especially in search of the young ones. All bears eat fish, and some, like the Polar and the Kadiak bear, live almost wholly upon this diet, catching the fishes clev¬ erly from the shore by a stroke of the paw, or going into the water after them. Reptiles, crabs, crayfish, etc., are eaten also; and insects form a large part of their fare, especially ants and honey-making bees and wasps. They dig up ant hills and overturn rotting logs and stumps for the former, and search out and tear to pieces the combs of the latter, well pro¬ tected against stings by their long hair. They also eat succulent leaves and herbage,

certain roots, fruit, and especially sweet acorns and berries, of which they are exceedingly fond. The Rocky Mountain Indians used to burn over certain tracts of mountain-side annually in order to keep the oaks low and promote the growth of certain berry-bearing bushes in order to attract the bears. They drink a great deal of water, enjoy going into it and will swim long distances.

Bears are nowhere very numerous, each pair or family occupying a district and keeping it fairly well to itself. When, as frequently hap¬ pens, three or four are seen together, they are likely to be old and young of the same family. Their home is usually some cave or crevice among rocks, a hollow tree, a tangle of wind-thrown logs or a dense thicket. There, in the early spring, are born the young, usually two, sometimes four; and in the case of the Arctic species, this often happens under the snow, be¬ fore the female is released from her hiberna¬ tion. The young remain with the mother until fully grown, and when they are little she guards and controls them with great solicitude and will rush at an intruder. At other times bears are rather shy and will usually endeavor to re¬ treat, yet, when brought to bay, fight with great courage and are among the most dangerous animals man can encounter. Their attack is made with both teeth and claw, striking down or clasping the foe in a crushing embrace and

then tearing him with the teeth. They can easily be tamed, however, remain friendly and prove intelligent and docile to a limited ex¬ tent. They submit well to confinement, endure change of climate and breed readily in cap¬ tivity. The close family likeness throughout the group has made their distinction into natural species a matter of much dispute and uncer¬ tainty. Everyone recognizes the great white “Polar® or “ice® bear of the Arctic region (Ursus maritimus) as distinct. Its elongated body, long, pointed head, slender limbs, large, hairy-soled feet, and cream-white coat are quite unlike the features of any other. Large speci¬ mens are nine feet or more in length and have enormous strength. These bears are numerous throughout the icy circumpolar regions, and wander a vast distance away from the coast on the ice, sometimes swimming many miles. They often winter and their young are born on the floes. They live mainly upon seals, young wal¬ ruses and fish, which they scoop out of the surf and from the coast rivers where they come to breed, but in summer obtain various other kinds of food, including marine grass and shore herbage. The writings of Arctic explorers abound in accounts of this widespread species and should be read by those who wish to know more of their habits. .Another subArctic bear that seems undoubtedly distinct is the

glacier or “blue® bear of the Mount Saint Elias Alps on the coast of Alaska, first described by Dali in 1895 and named Ursus emmonsi. It is the smallest of all bears — not larger than a half-grown grizzly, and bluish-black, with a dorsal stripe, the ears and the outer surfaces of the limbs jet black; black and silver is the prevalent color of the sides, neck and rump ; the belly and inside of the legs are white; sides of the nose bright tan color. Very little is known of its habits or of the extent of its lim¬ ited range.

The other American bears, called black, griz¬ zly, cinnamon, Barren-Ground, brown, Kadiak, and so on, are so confusingly alike that some conservative naturalists regard them all as merely varieties of one species, altered by cli¬ mate and food and a tendency to individual variation ; and it has even been said that there was no real specific distinction between them and the Old World bears, which also present differences that blend confusingly together when many specimens are compared. Others regard the differences as not only of specific value, but place some of the forms in separate genera. The latest monographer of the Ameri¬ can Ursidce recognizes no less than eight spe¬ cies on this continent, besides the Polar bear and the spectacled bear of the Andes (Ursus ornatus), which is thought by others to be merely an isolated variety of the black bear that somehow has acquired whitish rings around its eyes. The black bear (Ursus Americanus) is the most widespread of these, being found in all the forested regions of the continent north of Mexico and still remaining wherever a large patch of forest or a range of moun¬ tains or rough hills give it a harbor, whence it may raid the pasture-lots and pig sties of fron¬ tier farmers, especially in early spring when wild food is scarce. Black bears climb trees easily, travel about a great deal and are often captured and tamed. They are timid and

BEARS

1 American Black Bear (Ursus Americanus)

2 Brown Bear (Ursus arctos)

3 Black Bear of the Himalayan Mountains (Ursus torquatus)

4 Malay Bear (Ursus Malayanus)

1 Polar Bear (Ursus maritimus) 2 Grizzly Bear (Ursus horribilis)

BEARS

secretive, and rarely are dangerous unless wounded or cornered and enraged. The color of this bear is properly black, but brown, reddish (((cinnamon®) or even yellowish ex¬ amples are frequently seen. The nose is always tan-colored. In size they average about five feet and never reach the dimensions of a large grizzly. The bears of Florida and of Texas are each regarded by some as separate species, but most naturalists consider them to be merely geographical races. The Barren-Ground bear (Ursus richardsoni) is a large, whitish-brown •species dwelling on the brushy plains north¬ west of Hudson Bay, which there is good rea¬ son to believe is an isolated American race of the European brown bear.

The grizzly bear (Ursus horribilis) of the mountains of western North America is one of the largest, and perhaps the most to be feared, of any of the family. It is found from the Black Hills and the Badlands of Dakota west¬ ward to the Pacific coast, and from Mexico to northern Alaska. A large specimen is nine feet in length and will weigh 1,000 pounds, but the size varies greatly. So does the color, which ranges from reddish-brown to hoary gray. Hence several varieties are recognized by hunt¬ ers, such as <(cinnamons,® ˆsilver-tips® (in which the tips of the hairs are white) and ˆgrizzlies.® The typical form may be described as yellow¬ ish-brown, with a reddish mane, black dorsal stripe and dark-colored legs. In form they are massive, with broad, squarish heads and im¬ mensely muscular bodies. They can-not, or, at any rate, do not, climb trees, but they scramble about the roughest mountains or through a dense forest with surprising agility ‘and can run very rapidly on occasions. They seem rarely, if ever, to hibernate and go about alone or in pairs, eating all sorts of food, but

seizing and pulling down large prey when an opportunity offers. In former days even a bull buffalo was unable always to resist their strength and they constantly attacked them and the deer. At present the cattle and horses upon the ranges in some parts of the West suffer from their ravages. Though so mighty, and when at bay or enraged probably not less dangerous to en¬ counter than a lion or tiger, they will usually avoid and flee from man and do not seem quarrelsome, the tradition of a constant enmity between them and the black bears not finding support in facts. The grizzly is easily the most terrible of the game animals of North America and one of the most formidable in the world; but different bears vary greatly in tempera¬ ment and according to circumstances. The In¬ dians and experienced hunters of the West, however, have learned to hold all of the race in the highest respect. Much the same statement will apply to the Barren-Ground bear, already mentioned, and to the Alaskan bears to be spoken of presently. The grizzly is still to be found throughout most of its range, though no longer numerous except in the wilder parts of the Rocky Mountains, in the northern parts of the Sierra Nevada and in the high mountains northward from Oregon to Alaska, where the largest ones are now to be obtained. The Kadiak bear is a brownish species or variety (Ursus midden dor ffi) dwelling on Kadiak Is¬ land, Alaska, and the neighboring mainland. Specimens of it exceeding in size any other bear

have been obtained, and weighing 1,200 pounds. Whether it will prove to be a distinct species remains to be seen. The same may be said of Dalli or the Sitka bear (Ursus dalli). Both are dark brown or grizzled and difficult to dis¬ tinguish externally from other bears of the north.

The bears of the Old World have been di¬ vided into many species by earlier naturalists, but are now regarded as more nearly connected. The best known is the common brown bear of Europe and Asia (Ursus arctos). It is of large size, reaching about eight feet in length in the bigger European specimens, and is usually of some shade of yellowish-brown, reddish-brown or black but varies greatly. It is exceedingly difficult to distinguish from the American bears and passes by indeterminate variation into the so-called species of Siberia, Japan and the Himalayan region, the differences being such as might come from varying climate and habi¬ tat ; thus those of the high Himalaya are smaller and lighter in color, *etc.* Although long ago extinct in Great Britain, it still lingers in the wilder, more mountainous parts of Europe and is numerous in the forests of Rus¬ sia, the Caucasus, on

the Lebanon range of Asia Minor (where it is called the Syrian bear), in the Atlas Mountains of Morocco and throughout Asia north of the Himalayas. The largest are those of Kamchatka, where they are numerous and bold and live in summer al¬ most wholly on salmon, as do the Kadiak and other Alaskan bears east of Bering Sea. This is the bear most often seen in menageries, where it breeds readily, and is also led about by ((bear-tamers® and taught certain clumsy <(dancing® tricks. The Tibetan or (<blue® bear (Ursus pruinosus) is a little-known species re¬ garded as distinct. Two other quite distinct species of bear belong to the Indo-Malayan region. One is the sloth-bear or honey-bear of India, a large animal which in its jungle home is one of the most dangerous carnivores of the Indian forests, yet is often tamed and led about the country by Hindu jugglers, who called it <(aswail,® *etc.* It is black, unusually shaggy and has a prolonged mobile snout, a very long tongue and no teeth in the front of the mouth (after the milk teeth drop out), making its facial grimaces very comical. Another veoˆ distinctive feature is the large yellowish cres¬ cent on its breast. It is an agile climber and exceedingly fond of robbing the nests of honey-making bees. These facts are recorded in its name (Ursus or Melursus) labiatus.

The Malayan sun bear, or <(bruang® (Ursus, or Helarctos, Malayanus) , is a smaller species inhabiting the forests of the Malayan Peninsula and islands eastward to Borneo. Its coat is short and fine, black in color, marked on the breast with a white or orange crescent, and the lips and tongue are remarkably long and flexi¬ ble. It feeds mainly on ants, which it gathers with its glutinous tongue after digging up their hills, for which its long claws are well fitted.

Fossil bears, commonly called wcave bears,® have been found in the Quaternary bone-brec¬ cia of many caves of Europe, North and South America. Some are closely allied to or iden¬ tical with living species; others, as the Cali¬ fornia and South American cave bears, are referred to a distinct genus, Arctotherium. In

the Tertiary strata of the Old World occur remains of a series of

animals (Amphicyon , Hycenarctos , etc.) which appear to connect the bears with primitive Canidoo, indicating that they are an offshoot of the dog family. See also Cave Bears.

Bibliography. — Consult, in addition to gen¬ eral works mentioned under Mammals and the writings of sportsmen-travelers, Osgood, (North American Fauna) (No. 24 [Alaska] Washing¬ ton 1904) ; Preble, N. A., <Fauna) (No. 27 [Athabaska, Mackenzie region] Washington 1908) ; Seton, (Northern Mammals) (New York 1909) ; Wright, (The Grizzly Bear) (New York 1909) ; Wright, (The Black Bear) (New York 1910).

BEAS, be'as, or BIAS (the ancient Hypha-sis), one of the five great rivers of the Punjab, having its rise at the Ratanki Pass, on the south side of the Santch Mountains, a branch of the Himalaya system, in lat. 32° 2F N., long. 77° 22' E. ; where the former attain an elevation of 13,300 feet. Its entire course is about 290 miles. The Beas has been considered larger than the Sutlej, which it joins 35 miles to the southeast of Amritsar, but it is greatly inferior to that river in the length of its course; and, though they have about the same breadth, the Sutlej has the greater volume of water. The united stream, below the point of junction, is called the Ghara or Gharra.

BEASTS OF PREY, is not a scientific term, but, as in the case of the phrase ((birds of prey,* represents merely the idea of an as¬ semblage of such mammals as prey upon other creatures. The greatest number and most prominent examples belong to the order Car¬ nivora, whose members subsist mainly upon flesh, and some of which, as the cats, bears and wolves, are the most powerful, deadly and dangerous animals of the world. These have acquired bodies with great strength and endur¬ ance in chasing and leaping, seizing and hold¬ ing; teeth adapted to cutting and piercing; sharp, muscular claws, and a high degree of intelligence in the wiles of hunting and of courage and pertinacity in attacking their prey or defending their gains against rivals. Their digestive organs are simplified and adapted to the assimilation of flesh, of which a less quan¬ tity is required than in the case of an animal subsisting on vegetable fare, because it is al¬ ready in a concentrated, partly elaborated form ; but as the obtaining of it is occasional and often interrupted by long intervals, all beasts of prey are likely to kill and eat excessively when opportunity offers, in instinctive prepara¬ tion for a possible fast. To provide against the loss of heat during the periods of famine, rather than as a provision against low temper¬ ature, most beasts of prey are clothed in dense, hairy coats of hair, or Mur.* Not all the beasts of prey belong to the Carnivora, for animals with similar structures and adaptations are to

be found in other orders of mammals whose basal structure is very different. The blood¬ sucking bats, for example, have teeth roughly similar to those of a dog, and some of the apes are savage and powerful and have car-nassial teeth. The most precise parallel, how¬ ever, is found in the predatory marsupials of Australia, such as the Zebra wolf, Tasmanian

devil and several others, which have the equip¬ ment and habits of true beasts of prey.

BEAT, in music, the beating or pulsation resulting from the joint vibrations of two sounds of the same strength, and all but in unison. Also a short shake or transient grace-note struck immediately before the note it is intended to ornament. The Greeks employed the up beat (arsis) to denote the accented, and the down beat (thesis) to signify the unac¬ cented part of the measure, but in modern practice the down beat denotes the accented and the up beat the unaccented.

BEATIFIC VISION, the immediate knowledge of God enjoyed by the angelic soirits and the souls of those who have attained heaven. It is distinguished from the temporal knowledge of God, which the human mind may attain on earth, in that it implies also a visual knowledge. Since such direct knowledge con¬ stitutes perfect bliss, the vision is termed ˆbeatific.* Consult (<Heaven* in (Catholic En¬ cyclopediaˆ

BEATIFICATION, in the Roman Cath¬ olic Church, an act by which the Pope declares a person beatified, or blessed, after his death. It is sometimes the first step to canonization, or the raising of one to the honor and dignity of a saint. Beatification is said by some to have had its origin in the pagan apotheosis, but this is strongly denied by Roman Catholic authorities, who contend that it has its origin in the Catholic doctrine of the veneration, invo cation and intercession of the saints. In the earlier periods of the history of the Church the worship of saints was local, then was passed from one church to another by authority of the bishops. Two classes of persons were thus honored : martyrs and confessors. The first constituted those who had sacrificed their lives for the faith, while the second comprised those who had lived long lives of self-denial and Christian virtue. Toward the close of the 11th century the Pope found it necessary to restrict the power of the bishops in decreeing who should be held up for public veneration and worship, and ordered that such honors should not be accorded until they had been ap¬ proved by a council of the Church. This prac¬ tice was initiated by Urban II. In 1634 Urban VII published a bull

which reserved to the Holy See the sole right of beatification. Beati¬ fication differs from canonization in that it constitutes only a permission to venerate a cer¬ tain person, with restrictions to certain places and to certain liturgical exercises. Outside the boundaries of the places designated it is un¬ lawful to pay reverence to the person beatified, or to celebrate mass with prayers referring to him unless special indult be had. Canonization is universal and also implies a precept. The process by which a person is beatified is long, sometimes requiring over a year. The case is presented to the tribunal in Rome by an official known as postulator. The postulator chooses a vice-postulator, whose function is to promote judicial inquiries outside of Rome. The inqui¬ ries are instituted under the supervision of the local bishops. When completed the results of these inquiries are sent to the Congregation of Rites in Rome. The documents are then trans¬ lated into Italian and a public copy made. After this an advocate of the cause and a Pro-BEATING THE BOUNDS — BEATTIE

moter of the Faith, the latter being sometimes known by the title of ((Devil's Advocate, ® are appointed to prepare briefs for either side of the case. Thus the case passes through many stages attended by deliberations. There must be evidence of virtue to an heroic degree dur¬ ing life, and of the performance of at least two miracles at the intercession of the servant of God in question. Finally the Pope signs the de¬ cree of beatification. This takes place at the Vatican. Consult Camillus Beccari's beatifi¬ cation' in the (Catholic Encyclopedia.* See Canonization.

BEATING THE BOUNDS, a periodical survey or perambulation by which the bound¬ aries of parishes in England are preserved. It is still in some parts the custom that the clergy¬ man of the parish, with the parochial officers and the boys of the parish school, should, on Ascension Day, march to the boundaries, which the boys struck with willow rods. A similar ceremony in Scotland is called riding the marches. In the New England colonies paral¬ lel duties were performed by '^perambulators® and in Virginia by ((processioners.® The cus¬ tom is of Teutonic origin.

BEATITUDE, the Christian term mean¬ ing the highest degree of happiness of which our nature is susceptible and applied particu¬

larly to the state of the elect in heaven. It was a favorite topic of discussion among the scholastic theologians, who divided it into sub¬ jective and objective, perfect and imperfect. Though the state of beatitude be incomprehen¬ sible to us, yet the belief in it is a motive in the present life which begets heroism in the midst of misfortune, and an adherence to virtue in the midst of evils. The Beatitudes is the name given particularly to the nine clauses in Christ's Sermon on the Mount, each beginning blessed be.®

BEATON, David, Scottish prelate and cardinal : b. 1494 ; d. Saint Andrews, 29 May 1546. He studied at Saint Andrews, Glasgow, and Paris, was given the abbacy of Arbroath in 1523 and became lord privy seal in 1528; was for years Scottish resident in France, and in 1537 was consecrated bishop of Mirepoix in that country. Pope Paul III raised him to the cardinalate in 1538, and next year he became primate of Scotland. He had much influence with James V, both of whose marriages he ne¬ gotiated, and after his death (1542) produced an alleged will nominating himself with others regents of the kingdom, but it was set aside and Arran appointed regent ; he then set him¬ self to oppose the English party, to which the Reformers belonged. After the coronation of the infant (1543) Queen Mary, he was made chancellor and became also legate a latere from Rome. He took an active part in the repudia¬ tion of the treaty of marriage between Edward VI of England and the young Queen. He now began to renew the persecution of heretics (1546), which was political as well as reli¬ gious, and among the rest the famous Protestant preacher George Wishart suffered, being strangled and burnt at the stake on the twofold charge of sedition and heresy. But a conspir¬ acy had been formed against him and he was assassinated at his own castle of Saint An¬ drews, the main instrument in the deed being John Leslie, brother to the Earl of Rothes.

He was a man of great ability, but cruel and of immoral life. Recent historical research has, however, somewhat modified the former se¬ vere judgments passed on his character.

BEATRICE, a witty, lively character in Shakespeare's (Much Ado About Nothing,* who marries Benedick by the contrivance of the friends of each.

BEATRICE, Neb., city and county-seat of Gage County, picturesquely located in a fertile agricultural district in the valley of the Big Blue River and on several railroads, 40 miles south of Lincoln, the State

capital. It is the seat of the State Institution for Feeble-Minded Youth; and has a handsome courthouse, United States government building, Holly sys¬ tem of waterworks, electric light and street railway plants, public library, three national banks, excellent water power, flour and planing mills, tile and barbed wire works, creamery, iron foundry and manufactures of gasoline en¬ gines, wind mills and farming implements. Beatrice was founded in 1857 when it became the county seat, was incorporated as a town, 1871, as a city, 1873, and received a new civic charter in 1901. The city is administered by the commission form of government. Pop.

9,356.

BEATRICE CENCI, ba-a-tre'cha chen'che, a 16th century Roman girl whose picture was painted by Guido Reni and whose career is the subject of Shelley's tragedy (The Cenci.*

BEATRICE PORTINARI, ba-a-tre'cha por-te-na're, the Beatrice of Dante's poems : b. about 1266; d. 1290. She was the daughter of a wealthy citizen of Florence, and wife of Simone de Bardi. She was but eight years of age, and Dante nine, when he met her first at the house of her father. He saw her only once or twice and she probably knew little of him. It is even doubtful whether they ever spoke to each other. The story of his love is recounted in the (Vita Nuova,* which was mostly written after her death. In the ((Divina Commedia® it is the spirit of Beatrice who con¬ ducts him through Paradise.

BEATRIX, be-a'triks, ANTELOPE, an

Arabian oryx (Oryx Beatrix), resembling the beisa but without black markings on the haunches. See Oryx.

BEATTIE, ba'te, James, Scotch poet : b. Kincardineshire, 25 Oct. 1735; d. Aberdeen, 18 Aug. 1803. He obtained a scholarship at Aber¬ deen and subsequently became assistant in the Aberdeen grammar school, and married the daughter of the head schoolmaster, Mary Dunn. After this event he began to be distinguished as a writer, and in 1771 commenced the pub¬ lication of his work called the <Minstrel.) This obtained for him the patronage of Lord Errol and caused him to be appointed professor of moral philosophy and logic in Marischal Col¬ lege. In 1765 he published a poem, the (Judg¬ ment of Parish which failed of any celebrity. The work which gained him the greatest fame was an (Essay on the Nature and Immutability of Truth,* in

opposition to sophistry and skep¬ ticism. It was designed as a reply to Hume, and was so much in demand that in four years five large editions were sold ; and it was trans¬ lated into several languages. He was urged by the archbishop of York and the bishop of

London to take orders in the Church of Eng¬ land, a proposal which he declined. While in London he became intimate with Dr. Johnson, Dr. Porteus, Sir Joshua Reynolds, who painted his portrait, and other distinguished characters. In 1783 he published dissertations, Moral and Critical, } and the Evidences of the Christian Religion, y written at the request of the bishop of London. In 1790 he published the first volume, and in 1793 the second, of his Ele¬ ments of Moral Science } ; subjoined to the latter was a dissertation against the slave trade. His two sons predeceased him and his wife became insane.

BEATTY, Sir David, K.C.B., M.V.O., D.S.O., British admiral: b. 1871. He entered the navy in 1884 and first saw active service on the Nile as a lieutenant under Kitchener in 1898, when he distinguished himself as second in command of the gunboat flotilla at the forc¬ ing of the dervishes' batteries at Hafir while exposed to heavy fire. His superior officer be¬ ing wounded, Beatty took command and bom¬ barded the enemy position at Dongola and dis¬ mounted their guns. He was mentioned in despatches and received the D.S.O. ; and was again under fire in the battles of Atbara and Khartum. He was made commander and decorated by the Khedive. In the Boxer re¬ bellion of 1900 he showed exceptional tenacity in endeavoring, with 200 blue-jackets, to cap¬ ture two Chinese guns that were causing con¬ siderable trouble to the forces and inhabitants at Tientsin. Though twice wounded, he re¬ peatedly led his men close up to the guns. He rose to captain in 1900, was made M.V.O. in 1905 and rear-admiral in 1910. In 1912 and 1913 he was naval secretary to the First Lord of the Admiralty, and in the latter year was placed in command of the First Battle Cruiser Squadron. The day before Great Britain de¬ clared war on Germany he was promoted acting vice-admiral. Beatty's first action against the navy created by von Tirpitz took place in the Bight of

Heligoland in the morning of 28 Aug. 1914. German patrols had caused considerable damage to fishing craft in the North Sea and it was decided to undertake an offensive opera¬ tion with a view to check the German raiders. The operation consisted of a scooping move¬ ment, by which submarines and destroyers en¬ tered the Bight and attracted the enemy's fire. The German light cruisers were drawn into the action, and at a prearranged period Beatty ap¬ peared on the scene with his battle cruisers and destroyed as many ships as were unable to escape under the land fortifications. Though about 60 British craft were engaged, only four were hit. The Germans lost three cruisers and two destroyers, while other vessels were dam¬ aged. The British casualties were 32 killed and 52 wounded; about 700 of the German crews perished and 300 were rescued and taken pris¬ oners. On 24 Jan. 1915 Beatty fought an ac¬ tion in the North Sea off the Dogger Bank, in which the Bliicher (German armored cruiser) was sunk and only +wo British vessels were hit. In the battle of Jutland Beatty engaged the German high sea fleet with his cruiser squadron in unequal combat in a desperate ef¬ fort to hold up the enemy until the arrival of Sir John Jellicoe's grand fleet, then about 50 miles away (31 May-1 June 1916). Two of Beatty's battle cruisers, Indefatigable and

Queen Mary, were sunk and he fought with eight capital ships against at least 19 of the combined fleets of von Hipper and von Scheer. On 29 Nov. 1917 Beatty was appointed com¬ mander of the grand fleet in succession to Ad¬ miral Jellicoe, who became First Sea Lord. See Jutland, Battle of.

BEATTY, John, American legislator : b. Bucks County, Pa., 10 Dec. 1749; d. Trenton, N. J., 30 May 1826. He was educated at Princeton and took up the study of medicine with Dr. Rush of Philadelphia. He fought with distinction through the Revolutionary War, reaching the rank of colonel ; was delegate to the Continental Congress in 1783-85; speaker of the House; served in the convention which adopted the Federal Constitution; was a mem¬ ber of Congress in 1793-95; and secretary of State of New Jersey in 1795-1805.

BEAU BRUMMEL. See Brummel, George Bryan.

BEAUCAIRE, bo'car', Monsieur, the

principal figure in a story of the same name by Booth Tarkington (1900), dramatized 1901. Beaucaire is a French prince living incognito in the fashionable society of Bath, England, near the end of

the 18th century.

BEAUCAIRE, France, small, well-built, commercial city, in the department of the Gard, on the Rhone opposite Tarascon, with which it communicates by a fine suspension bridge at the commencement of the Beaucaire and Aigues-Mortes Canal, and connected with sev¬ eral lines of railway. It has a commodious harbor for vessels which come up by a canal communicating with the Mediterranean, seven leagues distant, and thus avoid the sand banks at the mouth of the Rhone ; considerable com¬ merce and some manufactures; but is chiefly famous for its great fair (founded in 1217 by Raymond II, Count of Toulouse), held yearly from 21 to 28 July. In former days, when this fair was free from duties, it was attended by merchants from all parts of Europe, and even from the coast of Africa, with their goods; and almost every kind of article, however rare, was to be purchased here; though silks, wool¬ ens, printed cottons, leather, wool, wine, brandy, olive-oil and fruits were and are the chief ob¬ jects of sale. The numerous imports demanded since 1632, foreign wars and the competition of Marseilles, Lyons and other large places have reduced the traffic of Beaucaire. Pop. about

9,000.

BEAUCHAMP, bo-shan, Alphonse de,

French historian and publicist: b. Monaco 1767 ; d. Paris, 1 June 1832. Under the Directory he had the surveillance of the press, a position which supplied him with materials for his (Histoire de La Vendee et des Chouans) (1806). He contributed to the Moniteur and the Ga¬ zette de France. Among his chief works are the (History of the Conquest of PeriP (1807) ; the ˆHistory of BraziP (1815); and the (Life of Louis XVIIP (1821) ; (Life of Julius Caesar* (1821). The (Memoirs of Fouche* is also with reason ascribed to him.

BEAUCHAMP, bech'am, William Martin,

American clergyman and author: b. Colden-ham, N. Y., 25 March 1830. Ordained in the Protestant Episcopal ministry in 1863, he filled rectorships at Northville, N. Y.. 1863-65 and Baldwin sville, N. Y., 1865-1900. From 1884 to

1916 he was examining chaplain of the diocese of central New York. He is archaeologist of the New York State Museum and member of the American . FolkLore Society, president Syra¬ cuse Clericus, 1905-16, and president of the Onondaga Academy of Science, 1901-02. He made much valuable archaeological research, particularly concerning the Iroquois Indians. He was detailed in 1889 by the United States Bureau of Ethnology to survey the Iroquois territory in New York and Canada, and pre¬ pared a map indicating the location of all the known Indian sites in that region. He has pub¬ lished (The Iroquois Trail; or FootPrints of the Six Nations) (1892) ; (Indian Names in New York) (1893) ; and a valuable series of archaeological studies published as bulletins of the New York State Museum, namely, (Abo¬ riginal Chipped Stone Implements of New York) (1897) ; (Polished Stone Articles used by the New York Aborigines (1897) ; Earth¬ enware of the New York Aborigines (1898); (Aboriginal Occupation of New York) (1900) ; (Horn and Bone Implements of the New York Indians* (1902) ; (Metallic Implements of the New York Indians* (1902) ; (Metallic Orna¬ ments of the New York State Indians* (1903) ; (History of the New York Iroquois) (1905) ; (Perch Lake Mounds) (1905) ; (Aboriginal Use of Wood in New York) (1905); (Civil, Re¬ ligious and Mourning Councils and Ceremonies of Adoption 5 (1907) ; East and Present Syra¬ cuse and Onondaga County* (1908) ; Revo¬ lutionary Soldiers of Onondaga County*

(1912).

BEAUCLERK, bo'klark, Topham, one of

Dr. Johnson's favorite friends: b. December 1739; d. 11 March 1780. He was the only son of Lord Sidney Beauclerk, third son of the first Duke of Saint Albans, and in general appearance much resembled his great-grand¬ father, Charles II. He studied at Oxford, and his conversational talents so much charmed Johnson that when ((The Club® was founded, in 1763, he was one of the nine members who originally formed it. When he went to Italy, in 1762, Johnson wrote to his friend Baretti, warmly commending Beauclerk to his kindness. In 1765 he accompanied Johnson on a visit to Cambridge. A short time

before his death, Johnson said of him: ((He is always ready to talk, and is never exhausted.® During his last illness, Johnson said he would (<walk to the extent of the diameter of the earth to save Beauclerk® ; and when communicating his death to Boswell, he said : (<His wit and his folly, his acuteness and maliciousness, his merriment and reasoning, are now over. Such another will not often be found among mankind.® Con¬ sult Hill, (Dr. Johnson: His Friends and His Critics) (1878).

BEAUFORT, bcFfor, Frangois de Vendome, Due de, French naval officer, grandson of Henry IV: b. Paris, January 1616; d. 15 June 1669. He is peculiarly known by the con¬ spicuous part he took in the civil war of the Fronde. On the accession of Louis XIV, the Queen-regent treated him very favorably, but was soon dissatisfied with his impertinent man¬ ners. Her displeasure threw him on the side of the malcontents, and he became one of the leaders of the Frondeurs. He was extremely popular with the Parisians and was conse¬

quently called le rot des Italics; he exercised a powerful influence on the common people against Cardinal Mazarin, who was twice driven out of France. He was so great a favorite that the public subscribed to pay his debts. In 1664 and 1665 he successfully led attacks against the corsairs of Africa; in 1666 he was at the head of the fleet which was to join the Dutch to make war against England; lastly, in 1669 he went to the assistance of the Venetians, then besieged by the Turks in the island of Candia, fought bravely and was killed in a sally.

BEAUFORT, bu'fert, or bo'fert, Henry, English Cardinal, natural son of John of Gaunt and half-brother of Henry IV, King of Eng¬ land: b. about 1377; d. Winchester, 11 April 1447. He became bishop of Lincoln 1398, whence he was translated to Winchester, and in 1403 was made chancellor. In 1426 he re¬ ceived a cardinal's hat and was appointed legate in Germany. In 1431 he crowned Henry VI in Paris. Shakespeare depicts him in his (Henry VI,) but it is questionable whether the likeness is true to history. Consult Radford, L. B., (Henry Beaufort * (London 1908).

BEAUFORT, Margaret, English countess: b. 1441 ; d. 1509. She was daughter of John, 1st Duke of Somerset, and mother of Henry VII, King of England. She was three times married, namely, to Edward Tudor, Earl of Richmond, in 1455 ; Henry Stafford, son of the Duke of Buckingham, and to Lord Stanley, a minister of Edward IV. In the Wars of the Roses she and her son Henry became more or less

dangerous to the Yorkists and were for a long time in retirement or exile.

BEAUFORT, N. C., city, port of entry and county-seat of Carteret County, at the mouth of Newport River, 167 miles east of Raleigh, on the Norfolk Southern Railroad. The har¬ bor here, defended by Fort Macon, is the finest in the State. Beaufort is a summer resort, has a municipal electric lighting plant, fishing in¬ dustries and manufactures oil. At Cape Look¬ out, 11 miles to the southeast, is a lighthouse 156 feet high. Pop. (1920) 2,968.

BEAUFORT, S. C., town and county-seat of Beaufort County; on the Beaufort River, which connects with the fine harbor of Port Royal Sound, and on the Charleston & W. C. Railroad; 15 miles from the ocean and 80 miles southwest of Charleston. It is midway between Charleston and Savannah ; has an excellent harbor and is the centre of the phosphate and fertilizer trade of the State. It was founded in 1711, and for many years prior to the Civil War was a noted health and pleasure resort, especially for the cotton planters interested in the plantations on the adjoining Sea Islands. It is still a popular summer and winter resort, principally engaged in phosphate mining, and with large exports of cotton, yellow pine and cypress lumber, rice and sweet potatoes. The national cemetery and the ((01d. Fort® are the chief objects of interest. Beaufort was first incorporated in 1803. The town is governed by a commission-manager. Pop. (1920) 2,831.

BEAUFORT SCALE, an instrument for measuring the apparent force of the wind, so called from Admiral Beaufort who introduced il into the English navy about 1805. It is now

in common use among navigators. Thirteen numbers are embraced in the scale, ranging from 0 to 12: 0 = calm; 1-3 = light breeze; 4—5 = moderate wind ; 6-7 = strong wind ;

8-9 = gale ; 10-1 1 = storm ; 12 = hurricane.

BEAUGENCY, bo-zhon-se, France, a town in the department of Loiret, 16 miles southwest of Orleans, on a hill above the Loire, here crossed by a stone bridge of 26 arches. The town was formerly surrounded by a wall flanked by towers and bastions, parts of which still remain. The square donjon tower of Beau-gency, 115 feet high, is a remarkable structure of high antiquity, probably of the 10th or 11th century. A statue of Joan of Arc, unveiled in 1896, commemorates her victory over the English in 1429. The articles manufactured here are principally cloth and leather. There are also some distilleries and a considerable trade in wine. In the Franco-German War General Chanzy was defeated here by the Grand-Duke of Mecklenburg on 7 and 8 Dec. 1870. Pop. 3,500.

BEAUHARNAIS, bo-ar-na, Alexandre,

Vicomte de, French soldier: b. Island of Martinique 1760; d. Paris, 23 July 1794. He served with distinction as major in the French forces under Rochambeau which aided the United States in their Revolutionary War, and married Josephine Tascher de la Pagerie, after¬ ward the first wife of Napoleon. At the break¬ ing out of the French Revolution he was chosen a member of the National Assembly, of which he was for some time president, and which he opened, after the King's departure, with the following words: <(Messieurs , le roi est parti cctte nuit: passons a I'ordre du jour A In 1792 he was general of the army of the Rhine, but retired in 1793 in consequence of the decree removing men of noble birth from the army. He was falsely accused of having promoted the surrender of Mainz, was sentenced to death and guillotined. His children, Eugene and Hortense (q.v.), were adopted by Napoleon on the latter's marriage to Beauharnais' widow.

BEAUHARNAIS, Eugene de, French general: b. Paris, 3 Sept. 1781; d. Munich, 21 Feb. 1824. He was the son of Alexandre Beauharnais, who was guillotined in 1794, and Josephine Tascher de la Pagerie, afterward wife of Napoleon and Empress of France. During the French Revolution Eugene entered the military service, and after his father's death joined Hoche in La Vendee, and subse¬ quently studied for a time in Paris. In 1796 his mother was married to Napoleon Bonaparte, then commander-in-chief of the army of Italy, and Eugene accompanied the great warrior in his campaigns in Italy and Egypt. In 1805 he was created a prince of France and viceroy of Italy, and after the peace of 13 Jan. 1806, mar¬ ried the Princess Augusta Amelia of Bavaria. In 1S07 Napoleon made him Prince of Venice and declared him his heir to the kingdom of Italy. He administered the government of Italy with great prudence and moderation and was much beloved by his subjects. He con¬ ducted himself with great prudence on the

oc¬ casion of the divorce of Napoleon from his mother. In the disastrous retreat from Mos¬ cow he did not desert the wrecks of his di¬ vision for a moment, but shared its toils and dangers with the soldiers, and encouraged

them by his example. To him and to Ney France was indebted for the preservation of the remains of her army during that fatal re¬ treat. On the departure of Napoleon and Murat he was left in the chief command and showed great talent at that dangerous con¬ juncture, and at the battle of Liitzen, 2 May 1813, by surrounding the right wing of the enemy, he decided the fate of the day. Napo¬ leon sent him from Dresden to the defense of Italy, and after the fall of Napoleon he con¬ cluded an armistice with Count Bellegarde, by which he delivered Lombardy and all upper Italy to the Austrians. Eugene then went im¬ mediately to Paris and thence to his father-in-law at Munich. He was at the Congress of Vienna. On the return of Napoleon from Elba he was obliged to leave Vienna and retire to Baireuth. Bv an ordinance of the King of Bavaria, his father-in-law, he was created Duke of Lcuchtenberg, November 1817. The Bavarian principality of Eichstiidt was be¬ stowed upon him and his posterity declared capable of inheriting in case of the failure of the Bavarian line. Prince Eugene, under a simple exterior, concealed a noble character and great talents. Honor, integrity, humanity and love of order and justice were the prin¬ cipal traits of his character. Wise in the coun¬ cil, undaunted in the field and moderate in the exercise of power, he never appeared greater than in the midst of reverses. Consult Au-briet, (Vie politique et militaire d'Eugene Beauharnais, vice-roi d'ltalie, } and Masson, F., (Napoleon et sa famille) (Paris 1900).

BEAUHARNAIS, Frangois, Marquis de, French nobleman: b. La Rochelle, 12 Aug. 1756; d. Paris, 10 June 1819. He violently opposed the motion of his younger brother, the Viscount Alexandre, to take from the King the chief command of the army, and would not listen to any of the amendments proposed, saying, ((// nJy a point d'amendement avec I'honneur A He was called in consequence of this, Le feal Beau¬ harnais sans amendement. In 1792 he formed the project of a new flight of the royal family; but the arrest of his companion, the Baron Chambon, prevented the execution of the plan. He was appointed major-general in the army of the Prince of Conde, and wrote, in 1792, to the president of the National Assembly, pro¬ testing against their unlawful treatment of the King and offering to appear himself among his defenders. When Bonaparte became First

Con¬ sul the Marquis sent him a letter, in which he exhorted him, by the glory which he would gain by such a course, to restore the sceptre to the house of Bourbon. Having at last recognized the Emperor he was sent by him as ambassador to Florence and Madrid; but having afterward fallen into disgrace he was banished.

BEAUHARNAIS, Hortense Eugenie,

wife of Louis Bonaparte and Queen of Hol¬ land: b. Paris, 10 April 1783; d. Arenberg, Switzerland, 3 Oct. 1837. She was the daugh¬ ter of Alexandre Beauharnais and Josephine, afterward wife of Napoleon. She was to ‘have married Desaix; but on 7 Jan. 1802, in com¬ pliance with the wish of Napoleon, became the wife of his younger brother Louis, who also gave up a former attachment for the marriage. The union was not happy and Hortense re¬ turned to Paris and lived a dissolute life there

apart from her husband, who vainly endeavored to procure a divorce. Prominent among her lovers was the Comte de Flahaut, for whom she composed her popular air, <(Partant pour la Syrie?. as he was leaving Paris for Germany, and Admiral Vemel, a Dutch naval officer. The former is believed to have been the father of M. de Moray, universally recognized as the illegitimate half-brother of Napoleon III, whom he greatly aided in becoming emperor ; and to the latter is attributed the paternity of Napoleon III himself. It is known that Louis Bonaparte had a warm dispute with his brother, the Em¬ peror, touching this child, which he averred to be none of his, and that his unwillingness to recognize it as such was only overcome by the most decided measures on the part of Napoleon. The first child of Hortense, Napoleon Charles, died in 1807 at the age of five. After the sep¬ aration of Napoleon and Josephine, Hortense remained on intimate terms with the former. When the Bourbons came back in 1814 she alone of all the Bonaparte family remained in Paris. After the Hundred Days she lived in Augsburg, in Italy, and in Switzerland, de¬ voted to her sons and greatly beloved by the people with whom she came in contact, who found her a kind and gentle benefactress. When her sons

had to flee, after participating in an unsuccessful attempt at revolution in Italy in 1831, she went for a time to Paris and was kindly received by Louis Philippe. She possessed much literary as well as social talent.

BEAULIEU, bo-lye, Jean Pierre, Austrian military officer: b. Namur, 26 Oct. 1725; d. near Linz, Austria, 22 Dec. 1819. He served in the Seven Years' War; was promoted a major-general for his successful operations against the Belgian insurgents in 1789; commanded at Jemappes in 1792; was defeated by Napoleon in 1796, while commander-in-chief of the forces in Italy, in the battles of Montenotte, Mill-esimo, Montesano, Mondovi and Lodi.

BEAULIEU, bu'li, England, village in Hampshire, England, six miles southwest of Southampton. It contains the remains of an abbey founded by King John and much visited by students of mediaeval architecture. Within the limits of Beaulieu Manor exemption from arrest for debt was enjoyed till very recent years.

BEAUMARCHAIS, bo-mar-sha, Pierre Augustin Caron de, French dramatist: b. Paris 1732; d. May 1799. He was the son of a watch¬ maker named Caron who destined him for his trade. He early gave striking proofs of his mechanical and also of his musical talents. He became teacher of the harp to the daughters of Louis XV and was admitted to their society. A handsome man of good address, he was very fortunate in his love affairs and married two wealthy widows in succession. He added to his wealth by successful commercial ventures. He published in 1767 (Eugenie, } and in 1776, Wes Deux Amis) — two dramas of the senti¬ mental bourgeois type, the former of which still holds a place on the stage. But all his theatrical pieces were merely the recreations of a man of affairs bent on making his fortune and desirous at all hazards to keep himself in front of the public. His rise to literary fame was sudden and resulted from his appearance

in a suit for 15,000 livres which he claimed as due to him as surviving partner in a specula¬ tion. He made his appeal to the public in four 'MemoiresP in which humor, serious argu¬ ment, irony and eloquence were combined with dramatic talent, which added much to the gaiety of France and are said to have occasioned pangs of jealous envy in Voltaire. (The Bar¬ ber of Seville,) developed from a comic opera to a comedy in five acts, was given after long delays in 1775, and its abundant gaiety, pointed with wit, fully established its author's fame. By the purchase of official posts he raised himself to the ranks of the nobility. <(Nobody can deny my title to noble rank,® said he,

(<because I hold a receipt for it.® During the American Revolutionary War he acted as an intermediary between the French and Spanish governments and the American insurgents under the firm name of Rodrigue, Hortalez and Company. He built up a great fleet of ships, of which one vessel, the Fier Rodrigue, took part in an en¬ gagement. But this enterprise was by no means profitable : it was only in 1835 that his family leceived from the American government 800,-000 francs for claims which in 1793 had been admitted at 3,000,000. (The Mar¬ riage of Figaro,) a sequel to (The Barber of Seville,) was completed in 1778, but owing to royal opposition it was not permitted to appear until 1784. Its long proscription had whetted the public appetite to see it performed, and so great was the crowd assembled to witness its first representation that three persons were crushed to death. It depicits the resourceful¬ ness with which a daring valet disputes the claim of a libertine lord for the possession of his betrothed. In Figaro the author drew him¬ self. The established order is ridiculed in a brilliant cascade of wit ; the mordant attacks on the nobles and the privileged classes, interpret¬ ing the feelings of the people, excited them so much that Beaumarchais, with Voltaire and Rousseau, may be regarded as one of the au¬ thors of the Revolution. Napoleon's testimony is emphatic on that point. But Beaumarchais wrote with no political end in view. In 1792 he wrote (La Mere CoupableR but never re¬ gained his former fame. His last work was (Mes six EpoquesF in which he relates the dangers to which he was exposed in a revolu¬ tion in which a celebrated name, talent and riches were sufficient causes of proscription. He lost about 1,000,000 livres by his famous edition of the works of Voltaire (1785) and still more at the end of 1792 by his attempt to provide the French army with 60,000 mus¬ kets. During his absence his property was con¬ fiscated, his third wife imprisoned and he classed among the emigres. In 1809 an edition of his works appeared in seven volumes ; a later edition in one volume came out in 1835. Beaumarchais was a singular instance of ver¬ satility of talent, being at once an artist, poli¬ tician, projector, merchant and dramatist. See Marriage of Figaro, The; Barber of Seville, The. Consult Lomenie, (Beaumarchais et son temps* (English translation 1856) ; Beaumar¬ chais et ses oeuvres* (1887) ; (Histoire de Beaumarchais) (1886) ; Lescure, (Eloge de Beaumarchais) (1887); Bonnefou, (Etude sur Beaumarchais* (1887) ; Hallays, <Beaumarchais)

(1897).

BEAUMARIS, bo-mar'is, north Wales, seaport town Isle of Anglesey. It is situated on the west shore of the Menai Strait, near its junction with the Irish Sea, where it expands into a good roadstead called Beaumaris Bay. It consists of several well-paved streets; houses in general good, particularly in the principal street, terminated by the ancient castle of Beau¬ maris, erected by Edward I ; while many mod¬ ern dwellings of very handsome appearance have lately been erected. The chief public buildings, exclusive of the churches, are the townhall, a commodious and handsome edifice; the grammar-school, police office and public library. The chief place of worship is the church of Saint Alary, a spacious and elegant structure in the later style of English archi¬ tecture, with a lofty, square embattled tower; and several chapels. The harbor is safe and commodious and may be entered at any state of the tide. Beaumaris is now a favorite water¬ ing place. It has steamship communication with Liverpool. Pop. 2,231.

BEAUMONT, Sir George Howland, Eng¬ lish art patron : b. Dunmow, Essex, 6 Nov. 1735 ; d. 7 Feb. 1827. He possessed considerable skill as a landscape painter, but was noted more especially as a munificent patron of the arts. The establishment of the National Gallery was mainly owing to his exertions, and 16 of its fine paintings, chiefly landscapes, including one by N. Poussin, three by Claude and the (Blind Fiddler' of Wilkie, were his gifts. Words¬ worth dedicated to him his (Elegiac M usings'

(1830).

BEAUMONT, bo-mon, Gustave Auguste de la Bonniere de, French publicist: b. 16 Feb. 1802; d. Tours, 6 Feb. 1866. He early entered upon the legal profession, and, in 1831, was sent with De Tocqueville to study the penitentiary system of the United States. He was elected deputy in 1839, and, in 1848, vice-president of the Constituent Assembly. He was subsequently Ambassador to Londoft and Vienna. Beaumont first became known as a writer by his publish¬ ing, in conjunction with M. de Tocqueville, (Traite du systeme penitentiaire aux Etats-Unis et de son application a la France' (1832). Among his other works may be named, (AIarie, on l'esclavage aux Etats-Unis'

(1835) — a work somewhat resembling (Uncle Tom's Cabin'; and (L'Irlande sociale, politique, et religieuse' (1839).

BEAUMONT, Sir John, English poet: elder brother of Francis Beaumont: b. Leices¬ tershire 1583; d. 19 April 1627. He studied at Broadgate Hall (now Pembroke College), Ox¬ ford. In 1605 he succeeded to his father's estates on the death of his elder brother. He began writing poetry at a comparatively early age, and in 1602 published anonymously a mock-heroic piece entitled (The Aletamorphosis of Tobacco.' A long poem entitled (The Crown of Thorns' was lost in manuscript form. He was created a baronet in 1626, died the follow¬ ing year and was buried in Westminster Abbey. In 1629 his son, Sir John, published a collec¬ tion of his poems under the title (Bosworth Field, with a Taste of the Variety of other Poems left by Sir John Beaumont.'

BEAUMONT, Joseph, English poet: b. Hadleigh, Suffolk, 13 March 1616; d. 23 Nov.

1699. He was educated at Peterhouse College, Cambridge, where he gained great distinction. Elected a fellow in 1636, he was ejected with others in 1644 owing to royalist sympathies, and while living in retirement wrote (Psyche,' an epic poem (1648). On the restoration of the monarchy he became a royal chaplain, and after a brief term as master of Jesus College he was appointed, in 1663, master of Peterhouse. He received the Regius professorship of divinity at Cambridge in 1674.

BEAUMONT, Joseph, English Wesleyan clergyman : b. Castle Dowington, 19 March 1794; d. Hull, 21 Jan. 1855. He was educated in the Wesleyan school at Kingswood, was con¬ verted there and spent some time in the study of medicine. He soon entered the ministry and in 1813 was received on trial by the con¬ ference. An impediment in his speech greatly hindered his success, but by severe exercise he overcame it and became an effective preacher. For many years he was one of the most popu¬ lar pulpit and platform speakers in Great Britain.

BEAUMONT, William, American surgeon : b. Lebanon, Conn., 1785; d. Saint Louis, 25 April 1853. He is principally noted for his dis¬ coveries regarding the laws of digestion and for his experiments upon the body of Alexis St. Martin. In 1822 Beaumont was stationed at Michillimackinac, Mich. On 6 June, St. Alartin, a young man 18 years

of age, in the service of the American Fur Company, was accidentally shot, receiving the whole charge of a musket in his left side, from a distance of about one yard, carrying with it portions of his clothing and fracturing two ribs, lacerating the lungs and entering the stomach. Notwith¬ standing the severity of the wound, Beaumont undertook his cure, and by careful and con¬ stant treatment and attention the following year found him enjoying good health, with his former strength and spirits. In 1825 Beaumont began a series of experiments upon the stomach of St. Martin, showing its operations, secre¬ tions, the action of the gastric juices, etc.; these experiments he was obliged to discontinue after a few months, but renewed them at various in¬ tervals until his death ; his patient during so many years presenting the remarkable spectacle of a man enjoying good health, appetite and spirits, with an aperture opening into his stom¬ ach two and a half inches in circumference, through which the whole action of the stomach might be observed.

BEAUMONT, Texas, city and county-seat of Jefferson County, situated on the west bank of the Neches River, on the Southern Pacific, Sabine, and East Texas, Gulf, Colorado and Santa Fe, Gulf and Interstate, Kansas City Southern and Beaumont, Sour Lake and West¬ ern railroads, 80 miles northeast of Houston and 22 miles distant from the Gulf of Mexico. Beaumont is an important shipping point, is at the head of tidewater navigation and has a number of important industries, among which are oil refineries, rice mills, stove and iron works and lumber. Oil was discovered in the Beaumont fields in 1901, when there was opened up a series ,of gushers, the most remarkable in the history of the oil industry. That oil was there had long been known and several

men had lost fortunes trying to get at it, but it was not until the wells were sunk on Spindle Top that success came. The structure of Spindle Top appears to be that of a dome with steep sides and rather flat summit. The equip¬ ment of the refineries, the pipe lines and trans¬ portation and storage facilities for this industry alone represent an

investment of over $45,000,- 000. The lumber industry has assumed great proportions, the city being the natural head¬ quarters for this business, and the annual out¬ put now exceeds 360,000,000 feet of yellow pine. The cultivation of rice was begun some years ago ; the belt extending along the coast of Louisiana and Texas produces more rice than is consumed in this country, and the largest rice mill in Texas is located at Beaumont. Among the most notable public buildings are the new Federal courthouse and post-office, costing over $200,000, the Jefferson County courthouse, city hall, Y. M. C. A. building and the Sisters' Hospital. Religious services are held in churches representing nearly all denominations. A theatre has been erected at a cost of about $100,000. There are four banks, with a com¬ bined capital of $600,000 and doing an annual business of $25,000,000. For the public educa¬ tion there are a fine new high school with manual training department and several ward schools. Bell Austin Institute is located there. About 20 miles of street are paved with brick and shell ; a complete sewerage system has been installed; a new waterworks system has been completed at a cost of over $300,000; and there are well-appointed fire and police departments. Beaumont was first settled in 1836, being plot¬ ted by John Grisby, Joseph Pulsifer, Henry Millard and Thomas B. Huling. It was incor¬ porated under the general law in 1881 and granted a special charter in 1889, the affairs of the community now being administered by a mayor and council of six members, elected bi¬ ennially. About 80 per cent of the population are white, Pop. (1920) 40,422.

BEAUMONT AND FLETCHER. Beau¬ mont, Francis, b. 1584; d. 1616; Fletcher, John, b. 1579; d. 1625: English poets and dramatists, well known for their work in collaboration.

Francis Beaumont, third son of Sir Francis Beaumont of Grace Dieu in Leicester, one of the justices of the Common Pleas,, was admitted gentleman commoner at Broadgates Hall, Ox¬ ford, in 1597, and was entered at the Inner Temple, London, 3 Nov. 1600. He married Ur¬ sula, daughter of Henry Isley of Sundridge, Kent, probably in 1613, and left two daughters, one a posthumous child. He was buried in Westminster Abbey.

Tohn Fletcher, son of Richard Fletcher, bishop of London, was entered as a pensioner at Bene't College, Cambridge, 1591. His father, as dean of Peterborough, attended Mary Queen of Scots at Fotheringay, and was later rapidly promoted to the sees of Bristol, Worcester and London. He was a successful courtier and a favorite of the Queen, though he suffered a loss of favor shortly before his death in 1596.

The dramatist received by bequest a share in his father's books, but apparently little other prop¬ erty. He was buried 29 Aug. 1625, in Saint Saviour's, Southwark.

Although the biographical details of the friendship and collaboration of the two dram¬

atists are involved in uncertainty, it seems prob¬ able that Fletcher began writing plays for the London theatres as early as 1604-05, and that his friendship with Beaumont was established by 1607, when both prefixed commendatory verses to Jonson's (Volpone,5 and (The Woman Hater, 5 probably by Beaumont alone, was pub¬ lished. In 1612, in the address to the reader prefixed to the (White Devil,5 Webster praises ((the no less worthy composures of the both worthily excellent Master Beaumont and Master Fletcher,® ranking them on equal terms with such scholars and experienced dramatists as Chapman and Jonson, and apparently above Shakespeare, Dekker and Heywood. Before 1612, the reputation of Beaumont and Fletcher as dramatists must have been well established.

By 1612, indeed, the work of their collabora¬ tion was accomplished, for there is no direct evidence that Beaumont wrote anything for the public stage after that date. The most famous collaboration in the history of English litera¬ ture, therefore, comprises only some half dozen years. During this time the dramatists, we are told, lived as brothers, sharing everything in common ; and so intimate was their associa¬ tion as writers that it is only recently that criticism has been able to separate their shares in the authorship of the plays with any degree of probability. Fletcher's energies seem to have been devoted exclusively to the theatre ; but Beaumont wrote verses to the Countess of Rut¬ land, and elegies on the Lady Markham, Lady Penelope Clifton, and the Countess of Rut¬ land; and also a masque for the Lady Eliza¬ beth's marriage in 1613, performed with great splendor by the gentlemen of the Inner Temple and Gray's Inn. (Salmacis and Hermaphro¬ dites, ' 1602, may possibly have been written by him;, it is so assigned in the entry of 1639 in the Stationer's Register. Eight plays may be assigned to this period before 1612 with consid¬ erable certainty, each being the result of collab¬ oration except where the contrary is indicated : (The Woman Hater) (by Beaumont alone) ; (The Knight of the Burning Pestle) (Beau¬ mont) ; the (Faithful Shepherdess5 (Fletcher) ; (Philaster5 ; (The Coxcomb5 ; (The Maid's Tragedy5 ; (Cupid's Revenge5 ; (A King and No King. 5 Eight other plays may be assigned before 1612 with more or less probability: (The

Woman's Prize5 (Fletcher) ; (Wit at Several Weapons5 (first version) ; (Love's Cure5 ; (Thierry and Theodoret5 ; (Monsieur Thomas5 ; Tour Plays in One5 ; (The Scornful Lady5 ; (The Captain.5

The brief period of their collaboration came at the climax of the astonishingly rapid and varied development of the Elizabethan drama. It was during these years that Jonson and Shakespeare were at their greatest ; but a grow¬ ing critical consciousness among the dramatists themselves and an increasing patronage from the court seemed to promise for the drama a future even greater in achievement than its past. Gentlemen by birth and breeding, at¬ tached to the court rather than the people, Beau¬ mont and Fletcher naturally joined with Jon¬ son in viewing the plays of their predecessors with critical, though doubtless appreciative minds, and in seeking for a more cultivated audience and a more critical art. Their atti¬ tude toward the preceding drama is indicated by their abandonment of several species long

popular but by this time falling under Jonson's attacks. Beaumont and Fletcher in their col¬ laboration made no use of the historical matter of the chronicles or of the methods or specta¬ cles of the chronicle play; nor did they use the story of blood vengeance, which had been pop¬ ularized by Kyd in (The Spanish Tragedy,5 transformed by Shakespeare into <Hamlet,) and was still the prevailing type of tragedy. Some of their earlier plays were experiments that further attest their reforming attitude. Beaumont's Woman Hater> was a comedy in Jonson's manner; and his (Knight of the Burn¬ ing Pestle,5 written under the inspiration of (Don Quixote,5 was a burlesque on contempo¬ rary plays of adventure. Fletcher's (Faithful Shepherdess5 was an attempt to replace the abortive pastorals of earlier playwrights by a genuine and elaborate pastoral tragi-comedy on the model of HI Pastor Fido.5 These plays won the praise of the critical, but even the mani¬ fest genius of the two latter was impotent to avert the disapproval of a public unused to such innovations.

Their other plays, though hardly less novel in character, and affording

full opportunity for the authors' gifts of invention and language succeeded in captivating the public. These suc¬ cesses, the result of a constant attention to theatrical effectiveness, comprised two distinct classes of plays, the comedies and the heroic romances, both immediately popular and both of large influence on the later history of the drama.

Their comedy has its resemblances and con¬ nections with preceding drama y but it is a dis¬ tinct departure from Jonson's comedy of (<hu-rnours,55 and it marks out a line of development that led to the plays of the Restoration. A lively plot, abounding in surprises, combines in a love story the manners of the day and the ex¬ citements of romance, an overflowing wit and no morals. Its full development belongs to Fletcher's later years; (The Scornful Lady5 is perhaps the best representative of the col¬ laboration.

The romances, sometimes tragic and some¬ times tragi-comic, also mark important innova¬ tions. The period immediately preceding them had been distinguished by Shakespeare's trage¬ dies, the prevalence of realistic comedy and the absence of sentimental or romantic comedy or tragi-comedy. The return to romance seems to have been established by (Philaster,5 and resulted in six plays that form the most dis¬ tinctive product of the collaboration.

Other plays of the collaboration and many later written by Fletcher might be grouped with these; but the six plays, (Four Plays in One,5 (Thierry and Theodoret,5 (Philaster,5 (The Maid's Tragedy,5 Cupid's Revenge,5 (A King and No King,5 serve to define the type, and re¬ semble one another so closely in material, con¬ struction, characterization and style that a single analysis will serve for all.

Their plots are usually original, and are ingenious complications of suspense and sur¬ prise. Like most preceding tragedies, they deal with royal or noble persons, foreign local¬ ities, and the plots and passions that convulse kingdoms; but there are no battles or proces¬ sions, and the action is mainly confined to the rooms of the palace or an adjoining forest. A

story of gross sensual passion is usually con¬ trasted with one of idyllic sentiment: and a great variety of incidents are designed to keep the interest at fever heat. A girl disguised as a page is stabbed by the man whom she loves ; a woman accused of adultery defies her ac¬ cusers; the hero is saved from the tyrant by a timely insurrection —

such idyllic or melodra¬ matic material as this is skilfully constructed into a number of telling theatrical situations, leading through a series of surprises to start¬ ling climaxes or catastrophes. In the ingenuity of their structure even more than in the choice of their material, the romances marked a de¬ parture from preceding plays. Their dramatis personae belong to the impossible and romantic situations, and are usually of certain types, — the sentimental or violent hero; his faithful friend, a blunt outspoken soldier; the senti¬ mental heroine, often disguised as a page that she may save the hero ; the evil woman who makes most of the trouble; and the poltroon, usually a comic personage. With the addition of a king, some persons of the court and some from the lower ranks, the cast is complete. Even at their best such plays afford little that is valuable in the revelation of character or the. criticism of life; yet the masterpieces of the class, (Philaster5 and (The Maid's Tragedy,5 take almost if not quite the highest rank after Shakespeare, because of the skill of their invention and the felicities and vigor of their poetry.

Both romances and comedies delighted their own age, and the young authors were quickly established among the poets of highest rank in both critical and popular estimation. There is evidence that their heroic plays suggested Shakespeare's change from tragedy to romance, and that (Philaster5 led somewhat directly to 'Cvmbeline.5 Certainly both comedies and ro¬ mances were much imitated by dramatists of the next 30 years. Their freedom in versifica¬ tion, their emphasis on stage situation rather than interpretation of character, their heedless¬ ness of morality, and their fondness for the abnormal and sensational, all led to the deca¬ dence of the drama ; but much of what is worthy as well as what is unworthy in the drama of the 17th century may be traced back to their initiative. They were ranked above Shakespeare and Jonson by their contemporaries, and their plays remained the favorites of the theatre dur¬ ing the Restoration. By the beginning of the 18th century, pseudo-classicism brought them into disrepute with critics, and a chastened stage condemned their immorality. During the two centuries since they have never recovered their position on the stage, but numerous edi¬ tions of their plays testify to their continued favor with the reading public.

After 1612 Fletcher continued for 13 years to write plays with unabated energy, display¬ ing even greater versatility of invention and wit than when writing with Beaumont, but becom¬ ing more addicted to his mannerisms and more careless of moral decency. About 1613 he seems to have collaborated with Shakespeare on (Henry VIII5 and (The Two Noble Kinsmen,5 and the association with the great master brought forth some of his finest passages. He was,

indeed, frequently engaged in collaborating with various authors, and especiallv with Mas¬ singer. (The Queen of Corinth,5 (The Double

Marriage,3 (The Laws of Candy, 3 ‘The Little French Lawyer, > ‘The False One,> ‘The Prophetess 3 and (The Spanish Curate) are some of the plays most certainly to be ascribed to this partnership, and most typical of the two authors. Fletcher, however, did not require collaboration for stimulus. In ‘Bonduca3 he produced one of the most vivid of our his¬ torical tragedies ; and in a series of romances and comedies, of which (The Little French Lawyer, 3 ‘The Chances,3 (The Wild Goose Chase) and ‘The Loyal Subject3 are among the best, he gave continued evidence of his ex¬ traordinary fertility both as a playwright and as a poet.

Most of the characteristics of these later plays may, however, be traced in the period of Fletcher’s collaboration with Beaumont ; and, though modern criticism has denied to the latter a share in the majority of the plays long pub¬ lished under his name, it is difficult to separate the sentiments and opinions of the two friends or to divide their contribution to the develop¬ ment of the drama.

The following plays were printed separately, many of them several times before 1647, when the first collected edition appeared. The dates are for the first editions. ‘The Woman Hater,) 1607; (The Faithful Shepherdess,3 1609; (?); (The Knight of the Burning Pestle,3 1613; (Cupid’s Revenge,3 1615; (The Scornful Lady,) 1616; (The Maid’s Tragedy,3 1619; (A King and No King, 3 1619; (Philaster,) 1620; (Thierry and Theodoret,3 1621 ; (The Two Noble Kins¬ men,) 1634; ‘The Elder Brother,3 1637; ‘Rollo, or the Bloody Brother,3 1639; ‘Monsieur Thomas,3 1639; ‘Wit Without Money, 3 1639; (The Coronation,) 1640; (The Night Walker,3 1640; ‘Rule a Wife and Have a Wife,3 1640. In 1647 appeared the first folio entitled, “Comedies and Tragedies written by Francis Beau¬ mont and John Fletcher,)) and containing the following plays “never before printed3’ : (The Mad Lover,) (The Spanish Curate,3 ‘The Lit¬ tle French Lawyer,3 (The Custom of the Coun¬ try,) ‘The Noble Gentleman,3 (The Captain,3

‘The Beggar’s Bush,3 (The Coxcomb,3 ‘The False One,3 (The Chances,3 (The Loyal Sub¬ ject,3 (The Laws of Candy,3 (The Lovers’ Progress,3 ‘The Island Princess,3 (The Hu¬ morous Lieutenant,3 (The Nice Valour,3 (The Maid in the Mill,3 (The Prophetess,3 ‘The Tragedy of Bonduca,3 (The Sea Voyage,3 (The Double Marriage,3 ‘The Pilgrim,3 (The Knight of Malta,3 ‘The Woman’s Prize,3 ‘Love’s Cure,3 ‘The Honest Man’s Fortune,3 ‘The Queen of Corinth,3 ‘Woman Pleased,3 (A Wife for a Month,3 (Wit at Several Weapons,3 ‘The Tragedy of Valentian,3 (The Fair Maid of the Inn,3 ‘Love’s Pilgrimage,3 ‘Four Plays in One,3 ‘The Mask of the Inner Temple and Gray’s Inn.3 In 1679 appeared the second folio, containing all the plays of the 1647 folio and the 17 previously published and also ‘The Wild Goose Chase3 (4to 1652). ‘The Faith¬ ful Friends3 and ‘Sir John Van Olden Barna-velt3 remained in manuscript and were not printed until the 19th century. With the ex¬ ception of a few plays already noted as by Beaumont alone, Fletcher seems to have had at least a share in all of these plays and in ‘Henry VIII.3 See Drama; Elizabethan Lit¬ erature — The Drama ; Philaster,

Bibliography. — Collective editions of Beau¬ mont and Fletcher were published in 1711; 1750, edited by Theobald, Seward and Sym-son, 10 vols. ; 1778, 10 vols. ; 1812, ed. Henry Weber, 14 vols.; 1843ˆ46, ed. Alexander Dyce, 11 vols.; and there have been various reprints of these editions. Dyce’s edition has long re¬ mained the standard, and it has hardly been supplanted by the elaborate variorum edition under the editorship of A. R. Waller (1905-10).

The most important of recent critical dis¬ cussions are ‘Francis Beaumont, a Critical Study,3 by G. C. Macaulay (1883) ; ‘The In¬ fluence of Beaumont and Fletcher on Shakes¬ peare3 by A. H. Thorndike (1901) ; ‘The Chronicle of the English Drama,3 by F. G. Fleay (Vol. I, pp. 164—229) ; and articles by Robert Boyle in Englische Studien (1881-87), and by E. F. Oliphant, Englische Studien (1890-92). Separate plays with critical introductions and notes are published in ‘Belles Lettres Series3 (Boston).

Ashley H. Thorndike, Professor of English, Columbia University.

BEAUNE, bon, Florimond de, French mathematician : b. Blois 1601 ; d. there 1652. He materially developed his friend Descartes’ method in geometry and was the first to treat systematically the question of superior roots of numerical equations. What is styled “Beaune’s Problem,33 solved only by Jean Bernouilli, depends on the

determination of a curved line from the property of its tangent. He was the first to treat in a systematic way superior and inferior roots of numerical equations.

BEAUNE, France, a town in the depart¬ ment Cote d'Or, 23 miles south-southwest of Dijon. As early as the 7th century it was a fortress under the name of Belna. It is sur¬ rounded with planted ramparts, which furnish a pleasant promenade, is well built and has a notable church of Notre Dame, dating from the 12th century, and a large hospital founded in 1443 by Nicholas Rollin, chancellor of Philip the Good, Duke of Burgundy. Beaune has also a public library containing over 50,000 volumes with 500 manuscripts, a very fine public garden, a theatre, *etc.* The trade is chiefly in Burgundy wines, to one of which the town gives its name, and in agricultural produce. The manufactures include woolen cloth, cutlery and leather. There is a statue, erected in 1849, to the celebrated mathematician Monge, who was born there. Pop. (1911) 13,409.

BEAUPORT, Canada, parish in Quebec County, on the Saint Lawrence, two miles be¬ low Quebec city and connected with it by the Quebec Railway, Light and Power Company's line. There is a Roman Catholic church, col¬ lege and convent. Saw and grist mills, cement works, manufacture of threshing machines and quarrying are the chief industries. The seign¬ iory of Beauport, granted in 1634 to Robert Giffard, was the first to be established in New France. Pop. of parish about 5,000.

BEAUREGARD, bo re-gard, Pierre Gus¬ tave Toutant, American Confederate general : b. New Orleans, 28 May 1818; d. there, 20 Feb. 1893. After studying military science at West Point he joined the artillery, but was after¬ ward transferred to the engineers. In the Mex-

ican War of 1846-47 he distinguished himself and was promoted major. On the outbreak of the Civil War he resigned in order to enter the Confederate army and was placed in command of the city of Charleston, S. C. On 12 April 1861 he reduced Fort Sumter and later

in the same year led the Confederates to victory in the battle of Bull Run. At the battle of Shiloh in the following year he assumed the command on the death of Gen. A. S. Johnston, but, though very successful on the first day, he was ulti¬ mately compelled to retreat to Corinth, Miss., which he had to evacuate shortly afterward. From September 1862 till April 1864 he de¬ fended Charleston against the siege operations of General Gillmore and Admirals Dupont and Dahlgren. October 1864 he became commander of the military division of the West, in which capacity he strove without success to resist Sherman's victorious advance, and in April 1865 he and J. E. Johnston surrendered. He was afterward a railroad director, adjutant-general of Louisiana and manager of the Lou¬ isiana State lottery. In 1866 the chief command of the Rumanian army was tendered him and in 1869 that of the army of the Khedive of Egypt, both of which he declined. He published (T,he Principles and Maxims of the Art of War* (1863) ; and (Report on the Defense of Charleston > (1864). Consult Roman, (Mili¬

tary Operations of General Beauregard) (New York 1883).

BEAUREPAIRE-ROHAN, bd-r'-par-ro- an, Henriques de, Brazilian geographer of French extraction : b. province of Piauhy, about 1818; d. 1894. He traveled extensively in the region south of Rio de Janeiro, publishing the results of his tour in a volume called (De-scripqao de uma viagem de Cuyaba ao Rio de Janeiro) (1846). The Brazilian government subsequently employed him to gather statistics relating to the interior provinces, and he was at one time lieutenant-general in the Brazilian army. His (Etudios acerca da organizaqao da carta geographica e da historia physica e politica do Brazil } (1877) is a work of great im¬ portance.

BEAUSOBRE, bo-sobr, Isaac de, French Protestant historian: b. Niort in France, 8 March 1659; d. Berlin, 5 June 1738. He was at first intended for the law, but his own in¬ clinations were decidedly in favor of the Church, and in 1683 he became Protestant min¬ ister of Chatillon-sur-Indre. In the persecut¬ ing spirit of the time the church had been closed by fixing the royal seal upon the gate. Beausobre held special services in his own house, and being for this reason obliged to flee, sought an asylum at Rotterdam. Shortly after he became chaplain to the Princess of Dessau and in 1694 was appointed minister to French Protestants at Berlin. He enjoyed much of the favor both of Frederick William I and of the Crown-Prince, afterward Frederick the Great. His most remarkable work is the (Histoire critique de Manichee et du Mani-cheisme) (1734) ; and he also wrote <Histoire de la Reformation* (1785-86).

BEAUTY. See ˆEsthetics; Art.

BEAUTY AND THE BEAST, an ancient

story very evidently a myth of the Sun and the Dawn. In all the variants the hero and the

heroine cannot behold each other without mis¬ fortune. One of the earliest forms of the story is the Vedic myth of (Urvasi and Pururavas.* Another is the Sanskrit Bheki, who marries on condition she shall never see water; thus typi¬ fying the dawn, vanishing in the clouds of sun¬ set. In Greek myths we find a resemblance in some features of (Orpheus and Eurydice) ; and the name of Orpheus in its Sanskrit form of Arbhu, meaning the sun, hints quite plainly at a solar origin of this cycle of tales. A more marked likeness exists in the myth of Eros and Psyche by Apuleius, and in the Scandinavian tale of the (Land East of the Sun and West of the Moon,* related by Morris in (The Earthly Paradise. *More or less striking parallels are seen in the Celtic (Battle of the Birds* ; in the (Soaring Larkp by Grimm; in the Kaffir (Storv of Five Heads) ; in Gaelic, Sicilian and Bengal folklore, and even in as remote a quarter as Chile. The tale is told in Straparola's (Piace-voli notti* (1550); in Madame Villeneuve's (Contes Marines) (1740), and is the basis of Gretry's opera, (Zemise et Azor.*

BEAUVAIS, bo-va (ancient Bratuspan-tium, Bellovacum), France, town, capital of the department of Oise, 41 miles north of Paris, in the old province of lie de France. It stands in a rich valley enclosed by wooded hills, at the confluence of the Avelon with the Therain ; and though poorly built, derives great interest from its antiquity. It existed in the time of the Romans, and in 1472 resisted an army of 80,000 Burgundians under Charles the Bold. 4 he principal edifice is the unfinished cathedral of Saint Pierre, consisting of choir and tran¬ sept. It has the loftiest stone vault in the world and beautifully painted glass executed by the most celebrated masters of the art. The choir was built in 1225-72. The townhouse is the finest modern structure. The principal manufacturing establishment is the Gobelins branch tapestry and carpet manufactory, famed for the beauty of its products and employing about 400 hands ; and there are also manufac¬ tures of woolens, buttons, brushes, gold and silver lace, *etc.* It has also large bleachfields, tanneries and dyeworks. Beauvais is the seat of a bishop and contains a public library of 30,- 000 volumes, a museum, *etc.* Pop. 19,841.

BEAUVAIS TAPESTRY. See Tapes¬ tries.

BEAUVOIS, bo-vwa, Ambrose Joseph Palisot de, French naturalist: b. Arras 1752; d. 1820. _ He visited Africa, the West Indies and America in connection with his favorite pur¬ suits in natural history and was rewarded by the discovery of the jaws and molar teeth of the great mastodon, on the banks of the Ohio. He afterward returned to France and devoted the remainder of his life to the arrangement and publication of his collections. Compara¬ tively few of them had arrived in safety, but out of the wreck he managed to procure mate¬ rials for the important publications on which his fame chiefly rests. The most valuable is his (Flore d'Oware et de Benin.* One of the most curious plants contained in it has been named after him Belvisia.

BEAUX, bo, Cecilia, American artist : b. Philadelphia 1863. She studied under William SaHain and at Paris, She four times gained

the Mary Smith prize of the Pennsylvania Academy of Fine Arts and was awarded the same academy's gold medal and Temple gold medal. She received similar honors from the National Academy of Design, the Philadelphia Art Club, Carnegie Institute and the Paris Exposition of 1900; the Saltus gold medal, 1913; and the medal of honor, Panama, 1915.

BEAUX-ARTS, bo-zar, Academie des.

See Academy of Fine Arts, The.

BEAUX-ARTS ARCHITECTS, Society

of, an association organized in 1902 by the American graduates of the Ecole des Beaux-Arts in Paris. The object of the Society is to afford instruction in architecture in the United States on the same principles as in the Paris institution. In various cities and towns now numbering about 50, local groups of students are organized into schools, the work of which is sustained by contributions from the students themselves. The services of the instructor are generally given free. The work of all the schools is more or less under the general super¬ vision of the committee on education of the Society, which issues schedules guiding the courses. Included are various problems which are worked out by the students competitively, designated under two divisions : Class A and Class B. Four prizes are awarded: the War¬ ren prize, for the best plan of a group of build¬ ings ; the Pupin prize, for the best decoration of scientific appliances ; the Goelet prize, for the best plan of a city block, and the Bacon prize, for the best work done under Class A. Be¬ sides the latter prize, offered by Robert Bacon, he also presents a yearly Paris scholarship, which includes $2,500 in cash to enable the win¬ ner to study for two and a half years in the Ecole des Beaux-Arts in Paris.

BEAUX' STRATAGEM, a well known comedy by the English dramatist, George Farquhar (q.v.).

BEAUXITE. See Bauxite.

BEAVEN, Robert, Canadian statesman : b. Leigh, Staffordshire, England, 28 Jan. 1836. He was educated at the College of Upper Canada, went to California by way of Panama in the early days, and from California went to British Columbia and was successfully engaged in gold mining there for some years. He returned to Toronto and again visited California over the Panama route. Later he removed to Victoria, B. C., and has continued there. He identified himself with the agitation for confederation with the Dominion, took an active part in the organization of the Confederate League and after the consummation of the union in 1871 he was elected member for Victoria; he was reelected until 1894. In 1892, 1893ˆ and 1897 he was mayor of Victoria. In 1872 he was chief commissioner of lands and works in the De Cosmos cabinet and held the office for sev¬ eral years. In 1878 he was appointed Minister of Finance and Agriculture. Later he became Premier and resigned in February 1883 when his government was defeated. While in office he had largely to do with all important ques¬ tions of that day, construction of the Canadian Pacific Railway, the building of the Esquimalt Graving Dock, and the establishment of a free non-sectarian system of education, the Law Stamp Act, the Game Protection Acts 1878-80,

the Amended Ballot Act 1878. As a parliamen¬ tarian, pure and simple, he was very able ; while as an authority on procedure he may be re¬ garded as the equal of any man in Canada.

BEAVEN, Thomas, American Roman Catholic prelate : b. Springfield, Mass., 1849. He was educated at the Jesuit colleges of Holy Cross, Worcester, Mass., and Georgetown, D. C. After holding pastorates at Spencer and Holy¬ oke, Mass., he was consecrated bishop of Springfield in 1892 where his gifts as an organizer and the application of sound business principles to the temporal affairs of the Church have pro¬ duced striking results.

BEAVER, James Addams, American mili¬ tary officer and statesman : b. Millerstown, Pa., 21 Oct. 1837; d. 31 Jan. 1914. He was grad¬ uated at Jefferson College, Canonsburg, Pa., in 1856; and for a time practised law. He served in the Federal army, 1861-64; and was retired with the rank of brigadier-general of volun¬ teers (22 Dec. 1864). He then resumed the practice of law; became major-general of the Pennsylvania State militia; was defeated as Republican candidate for governor in 1882 ; elected in 1887 ; president of the board of trus¬ tees of the Pennsylvania State College ; vice¬ moderator of the Presbyterian General Assem¬ bly in 1888 and 1895, and member of the Presi¬ dent's commission on investigation of the War Department in 1898.

BEAVER, Philip, English naval officer: b. in Lewknor, Oxfordshire, England, 28 Feb. 1766; d. Table Bay, South Africa, 5 April 1813. He served during the American Revolutionary War in the royal navy. After the war he un¬ dertook to establish an agricultural colony on Bulama Island, on the west coast of Africa, and in April 1792 left England with three ships and 275 white colonists, expecting that the latter would not only cultivate the soil, but would do much toward civilizing the negroes. The en¬ terprise proved a failure and he returned to England in 1794. Subsequently he distinguished himself in the naval service.

BEAVER, Pa., borough and county-seat of Beaver County, on the Ohio River, and the Pennsylvania and the Pittsburgh and Lake Erie railroads, 28 miles northwest of Pittsburgh. It has natural gas, abundant water power and municipal waterworks, large coal and oil ship¬ ping interests, a public park, national bank and daily and weekly newspapers and is the seat of Beaver College (Methodist Episcopal), founded 1853. Beaver dates from a settlement of 1790.

The late United States Senator Mat¬ thew S. Quay resided here. Pop. (1920) 4,135.

BEAVER, a large aquatic rodent animal of the northern part of the world named by Linnaeus Castor fiber, and representing the family Castoridce. Some naturalists maintain that the American beaver is specifically differ¬ ent from that of the Old World, and is there¬ fore entitled to its specific name of Castor cana densis. All varieties agree so closely that there is little need of any such classification. It is distinguished from its nearest relatives, the marmots, not only by adaptation to an aquatic life, and the possession of large, fully webbed hind feet, which form the principal instrument for swimming, but especially by its extraor¬ dinary tail, which is exceedingly broad and cov~

ered with a horny integument resembling scales. A large beaver is about two feet in length from the root of the tail to the nose, and the tail will be nearly a foot long. Such a one will weight about 35 pounds. Its flesh is edible, but not particularly good. The fur is exceedingly close and fine, and when freed from the long hairs that are scattered through it and overlie the under coat, forms one of the most valuable furs of commerce and one which figured largely in the early history of North America. It is owing, indeed, to the eagerness with which men have sought for this valuable commodity, going farther and farther into the wilderness in search of the animal, that the beaver has almost disappeared from large re¬ gions where it was once numerous. Originally it was widespread throughout Europe and northern Asia, but became extinct in the British Islands in the 12th century, and it remains else¬ where in Europe only in a few of the wilder streams of Norway and some of the tributaries of the Rhone and the Danube, where it is under royal protection. In some cases colonies of cap¬ tives have re-established themselves in parks, notably that of Lord Bute, in England. It still exists, however, in eastern Siberia, whence a large number of its skins are annually sent to market.

When America was first entered by Euro¬ peans, the beaver was found inhabiting almost all of the woodland streams of the whole north¬ ern continent, from the Arctic Circle down to central Mexico. Its temperament and manner of life made it an easy prey and prevented it from adapting itself to changed conditions as did its neighbor, the muskrat. It rapidly dis¬ appeared, therefore, wherever civilization pro¬ gressed or trapping was systematically carried on, and now no beavers are to be found south of the rivers that flow into Hudson Bay, except in the northern parts of the Rockv Mountains and in a few remote and scattered places like the forests of Maine and the Lake Superior region, where they are more or less protected by law. A few survive, nevertheless, in the wild ranges of the southern Alleghenies and along the borders of Mexico. The principal use to which beaver fur was put was for the making of hats; and it is probable that had not the method of making hat-coverings from silk been discovered, the animal would long ago have become extinct, and also its South American substitute, the coypu or nutria.

The life of the beaver is remarkably inter¬ esting on account of the skilful structures by which it keeps itself surrounded with a suffi¬ cient depth of water, and so maintains access to a continuous supply of food. The food of the beaver consists mainly of the bark of hard¬ wood trees, such as the maple, linden, birch, poplar and the like. It never eats the bark of the coniferous trees, and beavers are not found living in forests composed entirely of conifer¬ ous trees, nor are beavers able to live in a treeless country. They are gregarious and dwell in colonies, which in favorable circumstances may persist for centuries. From time to time a pair of young beavers will wander away from such a colony and seek a new place in which to start afresh. They will choose a sluggish stream in the woods, preferably where the ground is low and level, and there will dig for themselves a burrow in the bank, the entrance of which is

below the surface of the water. The tunnel will lead upward into the earth above the level of high water, and there be enlarged into a chamber in which will be placed a bedding of grass, *etc.* They are likely to make an opening from this chamber into the air, and, as if for defense or concealment, will pile over this open¬ ing a little heap of brush, in which perhaps may be seen the germ of the architectural ability which the species have so highly developed. It is necessary to their scheme of life that the water in the stream should never fall so low in summer as to expose the entrance of the bur¬ row ; moreover, it is necessary that this water should be so deep that in winter the ice

will not freeze to the bottom, but that, on the contrary, there shall remain room enough between the ice and the bed of the creek for them to store there a supply of winter food. In order to maintain this requisite level of water the beav¬ ers throw a dam across the stream below their settlement, holding the water back to a sufficient height. For this purpose they choose a place where the water is not more than feet deep and the bottom is firm, and beginning in the centre of the channel they place there, length¬ wise of the current, a number of long sticks which they hold down by piling upon them mud and stones, moved into place with their dex¬ terous fore feet. They procure these poles by cutting off small trees with their front teeth, which are exceedingly large and strong and are faced with a hard yellow enamel. As the back part of the tooth consists of softer ma¬ terial, it wears away more rapidly, leaving the front with a chisel-like edge, which is always sharp. Standing on their hind feet, they gnaw round and round the stem of a tree until it falls ; and are able to cut down trees 18 inches in diameter, but this is only done in procuring their winter supplies. From its foundation in the centre the dam is carried each way to the shore. As the beavers increase in number and the young ones grow up, they settle in the immediate neighborhood until after a few years a considerable colony will have arisen. During all this time work progresses upon the dam, each beaver gathering driftwood, branches and logs from the shore, stones, mud, pieces of sod and everything available for the purpose, and working it into the structure of the dam. The work is carried on only at night and especially on pleasant moonlight nights, when they seem to be extremely busy from sunset till sunrise. There is no superintendence, but each one pos¬ sessed with an instinct for industry does what¬ ever seems to it best. The result is a mere tangled heap, having a long slope and com¬ paratively tight surface on the upper side, which sometimes in a low, swampy region, will stretch for several hundred feet and hold back a large pond or morass, largely grown up to grass, but having many channels running through it. Meanwhile each family of beavers has erected for itself upon the bank of the pond or upon some islet adjacent to one of the channels, a conical house or lodge, the interior of which may be a room six or seven feet in breadth, which has no opening into the air, but is entered from beneath the water by two channels, one of which is commonly used, while the other forms a means of escape in case of invasion by a mink or some other aquatic enemy. These houses are more solidly constructed than even

the dam; and when frozen in winter are so thick and strong that nothing less than a bear is able to break into them. These houses are largest and strongest in the cold northern regions. During the summer beavers go ashore and obtain from time to time such bark as they want for food, and also feed largely upon the roots and stems of the flags, lilies and other water plants. In winter, however, when the pond is covered with ice and the banks with snow, the beavers would be unable to obtain such food, and to escape starvation are obliged to store in the autumn a sufficient supply to last them through the winter. They do this by felling large trees near the water's edge and cutting them up into such portions as they can manage to roll or drag into the water. These are floated away and sunk at the doors of their houses, where they are weighted or stuck into the mud to prevent their floating away, until a sufficient pile has been procured. Piece by piece this store is taken into the house during the winter, and, the bark having been eaten off, the sticks are thrown out to be used in the spring as material for repairing and extend¬ ing the dam.

It will be apparent that a colony of beavers would soon exhaust the supply of trees bearing edible bark within reach of the shore of their stream, unless they had some means of reach¬ ing new and more distant supplies. In truth, where the banks are steep, this soon happens, and the beavers must then seek a new place. Where the forest is low and level, however, the}r will excavate canals which are gradually extended farther and farther into the woods on each side of the pond, and so enable themselves to reach more and more fresh trees. In some of the swampy forests about the headwaters of the Mississippi, which was perhaps the head¬ quarters of beaver life in this country, these canals have been known to extend several hun¬ dred feet, and in such places colonies of beavers have maintained an existence of more than 200 years. These channels are kept free from weeds and of a proper depth ; and the most important service which the dam renders is to maintain the right level of water in these canals, so that they may always be used as the avenues of the industrious community.

The American beaver seems to have carried its architectural work to a higher degree of perfection than the European beaver was ever known to do, although in Siberia, where simi¬ lar climatic conditions prevail

and it is neces¬ sary for them to erect houses impervious to the great cold and to the attacks of marauding animals, they come near to equalling their American cousins. There is little record of such structures being made primitively . in central Europe, and the beavers now living in the streams of Germany and Austria make few at¬ tempts at either dams or houses but are con¬ tent to dwell in their bank-burrows.

The beaver thrives in confinement and there are colonies in the zoological gardens of the larger cities. In 1913 for the first time beavers bred in their pond in the New York Zoological Park.

The substance called castoreum is obtained from two glandular pouches in the beaver, closely connected with the organs of reproduc¬ tion, and probably of service in attracting the sexes to one another in the rutting season. It

is a secretion having a powerful, peculiar, pun¬ gent odor and was formerly in demand for medical purposes. At present its only use is as a scent-bait for traps. Fossil remains of beavers have been found as far back as the middle of the Tertiary period. Fossils of small¬ sized species with some distinctive peculiarities occur in the Miocene rocks of the western United States; and a huge beaver (Trogon - therium) existed in Europe in the Pliocene age. Consult Harting, (British Animals Extinct within Historic Times' (London 1880) ; Mar¬ tin, H. T., <Castorologia> (Montreal 1892) ; Mills, E. A., (In Beaver WorlcP (Boston 1913) ; Morgan, (The American Beaver and his Works ' (Philadelphia 1868) ; Ingersoll, (Life of Mammal (New York 1907) ; Seton, 'Northern Mammals) (New York 1909).

BEAVER DAM, Wis., city of Dodge County, 64 miles northwest of Milwaukee, situ¬ ated on Beaver Dam Creek, at the outlet of Beaver Lake, and on the Chicago, M. & St. P. and C. N. W. railroads. It is the seat of Wayland Academy, Wagner Musical College and also a business college. It has a public li¬ brary, an armory, opera house, city hall, four ward schools and one high school, three banks and taxable property to the value of $4,868,345, and several parks. It is an agricultural district and has a considerable trade; it is also well pro¬ vided with water power and has numerous man¬ ufacturing interests, including flour and woolen mills, canning factories and breweries, and manufactures of malleable iron ranges, seeding machines, silo, boxes, shoes and machinery, *etc.* Beaver Dam was settled in 1841 and incorpo¬ rated in 1856. The revised charter of 1889 pro¬ vides for a

mayor and a city council, to be elected biennially. Pop. (1920) 7,992.

BEAVER DAMS, Battle of, in the War

of 1812. After the battle of Stony Creek (q.v.) the American army remained inactive some time, but on 23 June 1813 Gen. John P. Boyd (q.v.), then in command at Niagara, sent Col. C. G. Boerstler with 400 or 500 troops and two guns to dislodge a British force at Beaver Dams, about 18 miles from Fort George. On 24 .June Boerstler began the march but when in the woods found himself surrounded by a force of British and Indians, numbering only 200, according to British authorities. Bocrst-ler attempted to retreat but found escape cut off and therefore surrendered his entire force. Practically nothing more was done in this vicin¬ ity for many weeks. Consult 'American State Papers, Military Affairs' (Vol. I, p. 449) ; Adams, Henry, 'The United States) (Vol. VII, pp. 162-63) ; Armstrong, John, 'Notices of the War of 1812> (Vol. I, p. 142) ; Fay, 'Official Accounts) (pn. 112-13) ; Lossing, 'War of 1812) (pp. 619-20) ; Wilev and Rines, 'The United States' (Vol. V, pp. 407-08).

BEAVER FALLS, Pa., city in Beaver County, situated on the west bank of the Beaver River, about five miles from its con¬ fluence with the Ohio River, 31 miles by rail northwest of Pittsburgh, and seven miles north of Beaver, the county-seat, and on branches of the Pittsburgh & L. E. and Pennsylvania rail¬ roads. The water power furnishes excellent facilities for manufactories; there is an abun¬ dant supply of coal and natural gas, and the

manufactures consist of iron bridges, axes, saws, glassware, gas engines, steel products, pottery and automobile accessories. The United States census of manufactures for 1914 recorded 59 industrial establishments of factory grade, employing 2,984 persons, of whom 2,639 were wage earners, receiv¬ ing annually $1,616,000 in wages. The cap¬ ital invested aggregated $9,481,000, and the value of the year's output was $7,963,000: of this $3,741,000 was the value added by manu¬ facture. There are four banks, a Carnegie library,

Providence Hospital and a commodious post-office building. Beaver Falls is also the seat of Geneva College (Reformed Presbyter¬ ian). Religious services are held in 17 church edifices. Beaver Falls was settled about 1800 by a few families of pioneers, and v/as called Brighton until 1868, when it was incorporated as a borough. In 1913 it adopted the commis¬ sion form of government. Until 1868 the town was only a small village, but in that year the Harmony Society bought up nearly the entire tract of land and laid it out into lots, thus starting the growth in population, until it now is the largest town in Beaver County. Pop.

13,000.

BEAVER ISLANDS, a group of islands situated in the north part of Lake Michigan in Charlevoix County, and interesting as the scene of a short-lived Mormon colony. The largest town, Saint James, on Big Beaver Island, was settled in 1847 by James J. Strang, a Mormon elder, driven away from the parent Mormon community because his claims conflicted with those of Brigham Young. In the little colony which he called Saint James, after himself, Strang exercised the authority of king and high priest, and was implicitly obeyed. In 1849 he introduced polygamy, which did not spread rapidly and led to withdrawals and troubles with the “gentiles.® Strang was assassinated in 1856 and the colony dispersed. There are several lighthouses on the island. Pop. of Saint James about 650; of Peane township, 375.

BEAVER STATE, a popular designation of Oregon.

BEAVERBROOK, Sir William Maxwell Aitken, 1st baron, Canadian financier: b. New¬ castle, New Brunswick, 25 May 1879. He is the third son of the Rev. William Aitken, a Presbyterian minister. He received his educa¬ tion at the public school of Newcastle, and afterward took a short course of law at Chat¬ ham ; engaged for a time in insurance work, and became a member of the Montreal Stock Exchange in 1907. He has been an active force in finance, organized a number of business consolidations and established a private bank¬ ing business in 1911. His rise has been meteoric. He is described as a financial genius, and the ablest young man the Canadian finan¬ cial world has seen in many years. In 1910, after his departure from Canada, he was elected Unionist member for Ashton-under-Lyne, in the British House of Commons, which constitu¬ ency he continued to represent until his eleva¬ tion to the peerage in 1917 as Baron Beaver-brook. He was official “eyewitness® with the Canadian Expeditionary

forces during the European War, and is author of (Canada in Flanders> (Vol. I, 1915; Vol. II, 1917).

BEAVERWOOD. See Magnolia.

BEAZLEY, Charles Raymond, English historian and geographer : b. Blackheath, 3 April 1868. Graduating from Oxford, he was appointed to the chair of history at the Uni¬ versity of Birmingham. His first work of im¬ portance was 'The Dawn of Modern Geog¬ raphy > (1897-1906), for which he was awarded the Gill Memorial of the Royal Geographical Society in 1907. In 1908 he lectured at several American universities, being Lowell lecturer in Boston. Aside from his many contributions to leading monthly periodicals, he has written ' James of Aragon } (1890) ; (Henry the Navigator> (1895) ; 'John and Sebastian Cabot) (1898); 'Voyages of Elizabethan Seamen > (1907) ; 'Introduction to Chronicle of Novgorod) (1915).

BEBEERINE, an uncrystallizable basic substance, C19H21NO3, extracted from the bark of the bebeeru or greenheart-tree (Nectandra rodicei), of Guiana. In pharmacy, the sulphate of bebeerine is a valuable medicine, being used, like quinine, as a tonic and febrifuge. Unfor¬ tunately, owing to the supplies of the bark be¬ ing uncertain, the drug is sometimes scarce and difficult to obtain. Bebeerine is thought, by some chemists, to be identical with buxine.

BEBEK, a village on the Bosporus, five miles north of Constantinople, of which city it is a suburb. It stands on the site of ancient Chelae; in the adjoining bay once stood a temple to Diana Dictynna. The picturesque situation of the place and the beauty of the surroundings made Bebek a favorite resort of various sultaps. Selim I built a summer palace on the water-side, known to Europeans as the Palace of Conferences, where ambassadors were received in secret audience. On the top of the hill is the college founded by the late Christopher R. Robert of New York, and named for him Robert College (q.v.).

BEBEL, ba'bel, Ferdinand August, Ger¬ man Socialist leader: b. Deutz-Koeln 22 Feb. 1840; d. Passugg, Switzerland, 14 Aug. 1913. The son of a Prussian-Pole who was a non¬ commissioned officer in the Prussian infantry, Bebel was born in military barracks and ap¬ prenticed as a boy to a wood-turner. Like most German workmen at that time, he traveled ex¬ tensively in search of work. At Salzburg, where he lived for some time, he joined a Roman Catholic workmen's club. When in Tyrol in 1859 he volunteered for service in the war

against Italy, but was rejected; and in his own country lie was rejected likewise as physically unfit for the army. In 1860 he settled in Leipzig as a master turner, making horn buttons, and speedily drifted into the political movements which were then beginning, but as a radical, not a socialist. He fell under the influence of Wilhelm Liebknecht (d. 1900), in 1864, and was converted to the doctrines of Marx (q.v.). In 1867 he was returned to the North German Parliament, and two years later helped to found the German Social Democratic party. In 1870 he spoke in Parliament against the continuance of the war with France and subsequently denounced the annexation of Alsace and Lorraine. He was arrested for high treason, but acquitted; in 1872, however, he was again prosecuted and sentenced to two

years' confinement in a fortress, and this and other terms of imprisonment enabled him to make up for his lack of elementary education. He remained a member of the Reichstag from 1871 till his death, except during 1881-83. In 1874 he took a partner and founded a small button factory, for which he acted as drummer, but in 1889 he gave up his business to devote himself wholly to politics, and from the death of Liebknecht he had been the head of the party, succeeding him also in the editorial chair of V orwacrts, the often-suppressed socialist organ. Bebel was not a pure pacifist ; he admitted that military service was a civic duty. In later years his socialism became more modern. He was unlike the typical demagogue, being small, slight and nervous, but he had an admirable voice and was an exceptionally logical and in¬ cisive orator. Besides his autobiography he wrote (Our Aims> (1874) ; (The German Peasant \Var) (1876) ; (The Life and Theories of Charles Fourier* (1888) ; (Women and

Socialism : The Christian Point of View in the Woman Question* (1893).

BEBEL, Heinrich, German humanist : b. 1472; d. 1518. He was an alumnus of Cracow and Basel universities, and from 1497 profes¬ sor of poetry and rhetoric at Tubingen. His fame rests principally on his (Facetiae* (1506), a curious collection of bits of homely and rather

coarse-grained humor and anecdote, directed mainly against the clergy; and on his (Triumph of Venus,* a keen satire on the depravity of his time.

BEC, a celebrated abbey of France, in Normandy, near Brionne, now represented only by some ruins. Lanfranc and Anselm were both connected with this abbey.

BECCAFICO, bek-a-fe'ko, the Italian name of the small olive-brown garden-warbler (Sylvia hortensis), called in England (<petty-chaps,** which has the habit of pecking holes in the rind of ripening figs and other fruits, in search of small insects. The damage done is very slight. These birds were eaten with much delight by the ancient Romans, and are still in high favor on Grecian, French and Italian tables, especially in Venice. An annual feast made on beccaficos is called Beccaficata. The term is also applied in continental Europe, rather indiscriminately, to different kinds of sylvan warblers when fat and in condition for the table.

BECCAFUMI, Domenico di Pace, bek-ka-foo'me, do'ma-ne'ko, surnamed Mecherino, Italian painter: b. near Siena 1486; d. Siena 1551. As a shepherd boy amusing himself with drawing figures on the sand, he attracted the attention of a wealthy man, from whom he takes the name of Beccafumi, who, discerning his genius, sent him to Siena to study draw¬ ing. He there saw, admired and tried to imi¬ tate the paintings of Perugino, but having heard much of Raphael and Michelangelo, obtained means from his patron to travel to Rome. After much study of the* masterpieces of the Vatican he returned to Siena and en¬ riched its churches and its city with many noble frescoes and painted an altar-piece in the mu¬ seum there. He drew and colored well, pos¬ sessed strong inventive powers, was thoroughly VOL. 3 — 26

acquainted with perspective, and excelled par¬ ticularly in foreshortening, but he was not free from mannerism, and his heads are in general deficient in both dignity and beauty. He was buried with pomp in Siena Cathedral, among some of the finest monuments of his genius. His paintings include (Saint Catherine receiv¬ ing the Stigmata* (Siena), (Madonna and Child* (Berlin), (Marriage of St. Catherine* (Rome), *etc.* He also gained distinction as a sculptor and engraver.

BECCARIA, Cesare Bonesana-, Mar-chese di, bek-ka-re'a, cha'sa're bo-

na-sa'na, mar-ka'se de, Italian author: b. Milan 1735 (or 1738) ; d. 28 Nov. 1794. He was early ex¬ cited by Montesquieu's (Persian Letters,* to the cultivation of his philosophical talents, and was afterward favorably known as a philosophi¬ cal writer by his noble philanthropic (Crimes and Punishments* (1764), and several other works. With the eloquence of true feeling and a lively imagination he opposes capital punish¬ ments and torture. This work led to the estab¬ lishment of more correct principles of penal law, and contributed to excite a general horror against inhuman punishments. He is also known in Italy as the author of a philosophical grammar and theory of style, (Ricerche intorno alia Natura dello Stilo* (Milan 1770), and of several good treatises on style, rhetorical orna¬ ment, etc., contained in the journal II Caffe , edited by him in conjunction with his friends, Visconti, Verri and others. In 1768 a chair of political philosophy was created for him at Milan.

BECCARIA, Giovanni Battista, jo*-va'ne bat-tes'ta, Italian philosopher: b. Mondovi 1716; d. 27 April 1781. He went to Rome in 1732, where he studied, and afterward taught gram¬ mar and rhetoric; at the same time applying himself with success to mathematics. He was appointed professor of philosophy at Palermo, and afterward at Rome. Charles Emmanuel, King of Sardinia, invited him to Turin in 1748, to fill the professorship of natural philosophy at the university there. He paid much attention to the subject of electricity, and published (Natural and Artificial Electricity* (Turin 1735), besides many other valuable works on this subject. In 1759 the King employed him to measure a degree of the meridian in Pied¬ mont.

BECERRA, Gasparo, be-ther'ra, gas-pa'ro, Spanish artist: b. Baeza, Andalusia, 1520; d. Aladrid 1570. He studied for some time in Rome under Michelangelo and others, and on his return became sculptor and painter to Philip II. He adorned the palace of Madrid with sev¬ eral frescoes, and also executed works in sculp¬ ture and architecture.

BECHE, bash, Sir Henry de la, English geologist: b. 1796; d. 1855. He founded the geological survey of Great Britain, which was soon undertaken by the government, De la Beche being appointed director-general. He also founded the Jermyn Street Museum of Economic or Practical Geology, and the School of Mines. His principal works are ˆGeology of Jamaica* ; Classification of European Rocks* ; (Geological Manual* ; Researches in Theoretical Geology* ; (Geology of Cornwall, Devon, and West Somerset,* *etc.*

BECHE-DE-MER, bash-de-mar, the French name for the dried flesh of holothurians. It is largely cured in the South Sea Islands.

BECHER, Johann Joachim, beH'er, yohan yo'a-Him, German chemist : b. Speyer 1635 ; d. 1682. He traveled and resided in various parts of Germany, Holland, Italy, Sweden and Great Britain, investigating Cornish and Scotch mines. He wrote a number of works on chemistry, the chief of which is entitled (Physica Subterranean In it he expounds his views on the composition of inorganic bodies, the constituents of which, according to him, are three earthy principles, the vitrifiable, the combustible and the mercurial. The metals consist of these three earths in dif¬ ferent proportions, and whenever a metal is calcined the combustible and mercurial earths are expelled, and the vitrifiable earth forms the residual calx. When these principles are com¬ bined with water different salts are formed, and a fundamental acid, which exists in all the others. This theory was subsequently developed by Stahl, who, by means of the principle of phlogiston (q.v.), explained not only the calci¬ nation of metals, but the phenomena of com¬ bustion in general.

BECHER, Siegfried, Bohemian statisti¬ cian and economist : b. Plan, Bohemia, 28 Feb. 1806; d. Vienna, 4 March 1873. He studied first in Prague, then in Vienna, then, in 1831, entered the government service, but four years later was appointed professor at the Polytech¬ nic Institute in Vienna. In 1848 he became at¬ tached to the Ministry of Commerce, for which he made a trip of investigation in Ger¬ many and Belgium the following year. Among his important works are (Das osterreichische Miinzwesen von 1524 bis 1838 in historischer, statistischer und legislativer Hinsicht5 (2 vols., Vienna 1838) ; (Statistische Ubersicht des Han¬ dels der osterreichischen Monarchic mit dem Auslande wahrend der Jahre 1829-385 (Stutt¬ gart 1841) ; (Die deutschen Zoll-und Handels-verhaltnisse zur Anbahnung der osterreichisch-deutschen Zoll-und Handelseinigung) (Leipzig 1850) ; <Die Volkswirtschaft5 (Vienna 1853).

BECHSTEIN, Johann Matthaus, bcEi'stin, yo'han ma-ta'oos, German naturalist : b. Waltershausen, Gotha, 1757; d. 1822. He studied

theology for four years at Jena, but never felt in his element unless hunting in the fields or roaming the forest. After teaching for some time he resolved to devote himself to his favorite pursuits, and in 1800 the Duke of Saxe-Meiningen made him director of the Forest Academy of Dreissigacker, in the vicinity of his capital. This academy, under Bechstein's management, became one of the most celebrated establishments of the kind in Germany. His chief work is his (Natural History of Ger¬ many, 5 in four volumes. In Great Britain he is best known by a treatise on singing-birds.

BECHSTEIN, Ludwig, lood'vm, German poet and novelist : b. 1801 ; d. 1860. He is chiefly remembered for (The Legend Treasure and the Legendary Cycles of Thuringia5 (1835— 38); (German Fairy-Tale Book5 (1845, 41st ed., 1893) ; and others. Among his epical poems are (The Children of Haymon5 (1830) ; (The Dance of Death5 (1831) ; (New Natural His¬ tory of Pet Birds5 (1846), a humorous didactic poem; and (Thuringia's Royal House5 (1865).

Of his numerous novels, chiefly historical, the best known is (Journeys of a Musician5

(1836-37).

BECHUANALAND, bet-choo-a'na-land, south Africa, name formerly applied to the region inhabited by the Bechuanas. It included (1) the crown colony of Bechuanaland, with an area 51,524 square miles and a population ol 99,553, annexed to the Cape Colony in 1895, and since 1910 one of the divisions of the province of the Cape of Good Hope in the union of South Africa; (2) the Bechuanaland Pro¬ tectorate (q.v.).

BECHUANALAND PROTECTORATE,

South Africa, the territory lying between the Molopo River on the south and the Zambesi on the north, and extending from the Transvaal province and Matabeleland on the east to (Ger¬ man) southwest Africa. Its area is about 275,- 000 square miles. The country forms portion of an elevated plateau 4,000 to 5,000 feet above the level of the sea, and though so near the tropics, is very healthful for Europeans. In winter there are sharp frosts and some years snow falls. The rains fall in summer, and then only the rivers are full. Cattle rearing and agriculture (production of maize and Kaffir corn) are the

chief industries. Sheep thrive in some parts, but it is not a wheat country on account of the summer rains. The country takes its name from the widely spread race of people called Bechuanas, who belong to the great Kaffir race, and are divided into tribal sections, each of which has a chief. The most important tribes are the Bamangwato (35,000), under the chief Khama, whose capital is Serowe (pop. 17,000), 40 miles west of the railway line at Palapye road; the Bakhatla (11,000) under Lenchwe; the Bakwena (13,000) under Seckhele; the Bangwaketse (18,000) under Gaseitsiwe; the Batawana under Mathibi ; and the Bamaliti (4,500) under Baitlotle, who is acting during the minority of Seboko, the eldest son of the late chief Mokgosi. The country can be reached from Cape Town, Port Elizabeth, Dur¬ ban, Delagoa Bay and Beira, the Rhodesia Rail¬ way's section of the ftCape-to-Cairo55 line traversing the country and passing through Vryburg, Mositlane, Mafekirg, Pusani, Kala-kani, Linchwe, Magalipsi, Palachwe, Tate and Bulmvayo. There are extensive forests to the northeast, and to the west lies the Kalahari desert, which only requires wells dug to make it inhabitable. The province of Stellaland is inhabited principally by Boers. The Bechuanas are a black race possessing a language 'in com¬ mon with the Bantu races of south Africa, ex¬ tending as far north as the equator. Their an¬ cestors are said to have come from the north, and progressing southwest, met the Hottentots from the Cape of Good Hope journeying north. Since 1832 they have been at enmity with the Matabele, and in later years the Transvaal Boers on one pretext or another endeavored to occupy their country. During the native ris¬ ings in 1878 the Bechuanas invaded Griqualand West, and were in turn subdued by British volunteers as far as the Molopo. When the British government withdrew from Bechuana¬ land in 1880, the natives, being helpless, were left to the mercy of the Boers of the Transvaal, whose harsh treatment in 1882 and 1883 led to the Bechuanaland expedition in 1884. At the

beginning of the 19th century the Bechuanas were further in advance in civilization than other nations of south Africa and they are still ahead in this respect. In 1885, the territory was declared to be within the British sphere; in 1889 it was included in the sphere of the British South Africa Company, but was never admin¬ istered by the company ; in 1891 a resident com¬ missioner was appointed, and in 1895, on the annexation of the crown colony of British Bechuanaland to the

Cape of Good Hope, new arrangements were made for the administration of the Protectorate, and special agreements were made in view of the extension of the rail¬ way northward from Mafeking. Each of the chiefs rules his own people as formerly, under the protection of the King, who is represented by a resident commissioner, acting under the high commissioner for South Africa. The headquarters of the administration are in Mafe¬ king, in the Cape province, where there is a reserve for imperial purposes, with ample buildings. There are assistant commissioners at Gaberones in the southern, and Francistown in the northern, portion of the Protectorate. There were 7 European and 37 native schools in operation with government assistance in 1915. The subsidized schools for Europeans are situated at Francistown, Serowe, Megalapwe, and at Lobatsi, Hildarale and Pitsani. The telegraph from the Cape of Good Hope to Rhodesia passes through the Protectorate, and is owned by the British South Africa Company. Pop. 125,350, of whom 1,692 are Europeans. Consult (Annual Report on the Bechuanaland Protectorate) (London) ; MacNab, F., (On Veldt and Farm) (2d ed., London 1900) ; Pas-sarge, (Die Kalahari > (Berlin 1904).

John B. McDonnell.

BECHUANAS, an important tribe of south African negroes, inhabiting Bechuana¬ land. Next to the Kaffirs they are the most significant of the many natrve tribes, politically considered. Though naturally of a peaceful disposition, they are very far advanced in mili¬ tary and civil organization. The cultivation of maize or corn and the herding of cattle are their main occupations, though they are also noted as workers in leather and metals. Their villages are far more advanced structurally than those of the Zulus, their habitations being divided into various rooms and constructed with the object of allowing circulation of air. The various communities, each under the rule of a local chief, are federated into powerful king¬ doms, at the head of which is a king, or supreme chief. In color the Bechuanas are about the complexion of American Indians though con¬ siderably smaller in stature. See Bechuana¬ land.

BECK, Sir Adam, Canadian statesman : b. (of German extraction), Baden, Ontario, 20 June 1857. He was educated at Galt Grammar School ; was mayor of London, Ontario, 1902-04; and has been a member of the Provincial Parliament since 1902, occupying a place in the Whitney cabinet of 1905. He introduced into the legislature the measure for the establish¬ ment of the Hydro-Electric Power Commission of Ontario, of which he has been chairman since its inception. He is a noted breeder of horses. He was knighted in 1914.

BECK, Christian Daniel, German scholar and writer: b. Leipzig, 22 Jan. 1757; d. 13 Dec. 1832. Graduating from the University of Leip¬ zig, he was later appointed professor of the Greek and Latin classics at the same establish¬ ment, assuming also the chair of history in 1819. In that year he also became editor of the Allgemeines Reportorium der neuesten in-und ausldndischen JLitteratur, a position he main¬ tained until his death. He was also the founder of the Philological Society, which in 1809 be¬ came the Philological Seminary.

BECK, James Montgomery, American lawyer: b. Philadelphia, Pa., 9 July 1861. He was graduated at Moravian College, Bethle¬ hem, Pa., 1880; admitted to the bar, 1884; United States attorney for eastern district, Pennsylvania, 1896-1900; assistant attorney-general, United States, 1900-3; member law firm, Shearman & Sterling, New York, 1903-17; Beck, Crawford & Harris, New York, 1917; solicitor-general, United States, 1921—. He has delivered many important ad¬ dresses, especially during the World War. He published (Evidence in the Case) (1914) ; (War and Humanity) (1916) ; (The Reckoning) (1918). He is an officer of the Legion of Honor, France; commander, Order of the Crown, Belgium, and has received the degree of LL.D from Muhlenberg College, University of Pennsylvania and University of Michigan.

BECK, Johann Tobias, German theolo¬ gian: b. Balingen, Wurttemberg, 22 Feb. 1804; d. Tubingen, 28 Dec. 1878. Graduating from the University of Tubingen in 1826, he was ordained a minister, but later accepted an ap¬ pointment as professor of theology at Basel. In 1843 he wrent to Tubingen, where he filled the same position. He was one of the Tubingen faculty who was strongly opposed to the gen¬ eral radical tendency of that university, under the influence of F. C. Baur, the leader of the so-called Tubingen school. Beck was and re¬ mained absolutely orthodox. Among his works are (Einleitung in das System der christlichen Lehre) (2d ed., Stuttgart 1870) ; (Christliche Reden J (1834-70) ; ‘Erklarung der zwei Brief e Pauli an Timotheus) (1879).

BECK, Lewis Caleb, American scientist : b. Schenectady, N. Y., 4 Oct. 1798; d. Albany, N. Y., 20 April 1853. A man of remarkable and wide scientific attainments he graduated at Union College 1817, and

became professor of chemistry and natural history at Rutgers College 1830-37 and 1838-53 ; professor of chem¬ istry and pharmacy at Albany Medical College 1841-53 ; and was also State mineralogist of New York 1835ˆ-1. His publications include (Gazetteer of Illinois and Missouri } (1823); (Salt Springs at Salina) (1826); (Mineralogy of New York* (1842), his most important work; and (Botany of the United States North of Virginia* (1848). Consult Gross, (American Medical Biography.*

BECK, Richard, German geologist : b. Aue, 24 Nov. 1858. After finishing the regular courses at Leipzig and Freiburg, he specialized in natural science. In 1883 he became a mem¬ ber of the geological survey of Saxony. In 1895 he resigned this position to become pro¬ fessor of geology at the Mining Academy of Freiburg. He was by this time becoming

widely known as a specialist on ore deposits, in which department he has made valuable contri¬ butions. His (Lehre von den Erzlagerstatten* (1900) is a standard work which has been translated into most European languages, in¬ cluding an American edition in English (New York 1905). It treats of the physical features and origin of the metalliferous deposits.

BECKE, Friedrich, Austrian mineralogist: b. Prague, 31 Dec. 1855. After studying at Vienna, where he specialized in the natural sciences, he became there a lecturer on geology. In 1882 he was appointed professor at the Uni¬ versity of Czernowitz. Eight years later he received a similar appointment at Prague, but soon after went to Vienna, where he became professor of mineralogy, succeeding Tscher-mak as such, of whose periodical Mineralo-gische und Petrogr aphis che Mittheilungen he became editor. He has published many papers on the science of geology and mineralogy, but he is best known on account of his researches in the field of rock-forming minerals and how they may be determined by means of their light-refractive properties. The results of these studies were published by the Vienna Academy

(1893).

BECKE, George Lewis (Louis Becke), Australian novelist : b. Macquarie, N. S. W., 17 June 1857; d. Sydney, 17 Feb. 1913. He was trader, pilot, labor agent, recruiter for the Kanaka Pacific Islands labor trade, and con¬ tributor to the Australian, English and Ameri¬ can press. Among his numerous works are (By Reef and Palm) (1894); (The Ebbing of the Tide* (1896); (Rodman the Boat-steerer* ; (Edward Barry* ; (Tess, the Trader's Wife) ; (Ridan the Devil*; (Breachley: Black Sheep-* ; (Sketches from Normandy*; (Pacific Tales) (1897) ; (Helen Adair) ; (York the Adven¬ turer* (1901); (Tom Wallis* (1900); <Wild Life in Southern Seas* (1897) ; (Adventures of James Shervinton* ; (The Jalasco Brig*; (By Rock and Pool* ; (Clunkie's Flat* ; (His Native Wife*; (Under Tropic Skies*; (The Adven¬ tures of a Supercargo* ; (The Gerards* ; (Notes from My South-Sea Log* ; (The Tapir of Banderah* (1901). He also wrote in col¬ laboration with Walter J. Jeffery, (The Mutineer* ; (A First Fleet Family* (1896) ; (Admiral Philip* (1899); (The Founder of Australia* ; (The Mystery of the Laughlin Isles* ; and (The Naval Pioneers of Australia.*

BECKENHAM, England, town of Kent, situated southeast of London. It is one of the English municipalities which have experimented in <(municipal socialism,** as it owns its electric lighting plant and public baths, and has charge of the work of a technical institute. It is a residential suburb of London, and its most noteworthy building is the church of Saint George, the tower of which was completed in 1903, and contains bells in memory of Cecil Rhodes. Pop. 31,692.

BECKER, August, German poet and novelist: b. 1828; d. 1891. He was the author of (Young Friedel, the Minstrel* (1854), a lyrical epic; and of the novels (The Rabbi's Bequest* (1866); Proscribed* (1868); <The Carbuncle* (1870) ; (My Sister* (1876), de¬ scriptive of the doings of Lola Montez and the

events of 1848 in Bavaria; Painter Fairbeard' (1878) ; and (The Sexton of Horst* (1889).

BECKER, George Ferdinand, American geologist: b. New York, 5 Jan. 1847; d. 20 April 1919. Graduated at Harvard 1868; was instructor of mining and metallurgy in the University of California in 1875-79; was at¬ tached to the United States Geological Survey in 1879, and was

special agent of the 10th cen¬ sus, 1879-83. He was appointed a special agent to examine into the mineral resources of the Philippine Islands in 1898. His publications include (Geology of the Comstock Lode* ; Statistics and Technology of the Precious Metals* (with S. F. Emmons) ; (Geology of the Quicksilver Deposits of the Pacific Slope* ; (Age of the Earth,* *etc.*

BECKER, Karl, German statistician: b. Strohausen, Oldenburg, 2 Oct. 1823 ; d. 20 June 1896. In 1842 he received a commission in the army, and as such was also instructor in the Oldenburg Military Academy. In 1850 he was on the general staff during the campaign against Denmark. At the close of the war he entered the University of Berlin where he be¬ came interested in statistics. In 1855 he or¬ ganized the statistical bureau of Oldenburg, of which he was director until 1872, when he became chief statistician of the German gov¬ ernment. As such he was editor of the Monatshefte cur Statistik des deutschen Reichs and the Statistischen Jahrbuches. He was also the author of Pur Berechnung von Sterbetafeln an die Bevolkerungstatistik zu stellende Anforderungen * (Berlin 1874).

BECKER, Karl Ferdinand, German phi¬ lologist: b. Lieser, 14 April 1775; d. Offenbach, 5 Sept. 1849. He first studied in the theological seminary at Hildesheim, then entered and was graduated from the University of Gottingen. In 1815 he began practising as a physician at Offenbach, at the same time establishing a private school. It was as instructor in his own school that he first became interested in philology, into which subject he made extensive researches and attempted to establish the theory that speech is an organism subject to the same critical analysis as other natural or¬ ganisms, subject also to the same laws of development. This assumption was later dis¬ credited by Grimm and others, who showed conclusively that the science of philology must be largely based on ethnology and race history. The works of Becker include (Die deutsche Wortbildung* (Frankfort 1824) ; (Organismen der Sprache* (2d ed., Prague 1841) ; <Der deutsche Stil* (Prague 1848).

BECKER, Karl Ferdinand, German organ¬ ist and writer on music: b. Leipzig, 17 July 1804 ; d. there, 26 Oct. 1877. He was a student of Friedrich Schneider, being already an ac¬ complished musician at the age of 14. At the age of 21 he was organist in Saint Peter's Church in his native city. In 1843 he was appointed professor of organ playing at the Leipzig Conservatory, which position he held for 13 years. It is not, however, so much on his talents as a musician that his fame rests as on his works on the theory of music. Among his important works are (Systematisch-chron- ologische Darstellung der musikalischen

Litteratur* (Leipzig 1836) ; (Die Hausmusik in

Deutschland im 16, 17 und 18 JahrhunderC (Leipzig 1840) ; (Lieder und Weisen vergan-gener Jahrhunderte) (2d ed., Leipzig 1852). He was also a collaborator with Schumann in (Neue Zeitschrift fiir Musikfl

BECKER, Karl Friedrich, German his¬ torian: b. Berlin 1777; d. there, 15 March 1806. He studied philosophy and history at Halle, then was for some time a teacher at Kottbus. On account of continued sickness he was un¬ able for long to follow the profession of teach¬ ing, so he gave himself up entirely to historical writing, most of his books being of a popular character. Among his works are cErzahlungen aus der Alten Welt fiir die Jugend) (3 vols., Halle 1801-03) ; ˆWeltgeschichte fur Kinder und KinderlehreD (9 vols., Halle 1801-05). This latter work has been often revised since and many editions have been published.

BECKER, Karl Ludwig Friedrich, Ger¬ man painter : b. Berlin, 18 Dec. 1820 ; d. there, 20 Dec. 1900. His early training was gained in Rome, Paris and Venice, where he studied under such masters as Von Klober and Hess. His first original works were historical and mythological, though in his later paintings it is obvious that he was strongly influenced by the Venetian Renaissance. Among his notable works are (Belisarius Begging) (1850), the frescoes in the Berlin Museum; (The Doge in Council* (1864) ; (Charles V Visiting Titian *(1873) ; lIn the Picture Gallery* (1874) ; (Emperor Maximilian Receiving a Venetian Embassy * (1877).

BECKER, Nikolaus, German poet: b. Bonn, 8 Oct. 1809; d. Hunshovem, 28 Aug. 1845. His early training was in law, and for some years he held a position in a court. He is principally known as the author of the popular song <(Rheinliedes.® The song begins with the words, addressed to the French: (<You should not have it, the free, German Rhine.® So widespread did this refrain become that French poets replied, Alfred de Musset with (<Nous l'avons eu, votre Rhin allemand.® For this song the King of Prussia awarded the poet a

prize of 1,000 thalers. Becker's other poems were published as a collection (Cologne 1841) but none of them attained much popularity and they have not generally been considered of a high order.

BECKER, Oskar, political fanatic : b. Odessa, Russia, 1839; d. Alexandria, Egypt, 1868. In 1861 he attempted, at Baden-Baden, to kill King Wilhelm I of Prussia, by shooting at him with a pistol at a distance of but three paces. The King fortunately escaped with only a slight wound in the neck. Becker's motive for the act was his belief that the King was unable to unite Germany. Though sentenced to 20 years' imprisonment he was pardoned by the King on condition of living out of Germany ever after.

BECKER, Philip Johann, German revolu¬ tionist : b. Frankenthal 1809; d. 1886. Be¬ ginning as a simple workingman, he soon became involved in the radical labor move¬ ments of his time and for his participation in a revolt in 1830 he was imprisoned. He then fled to Switzerland, which was the haven of revolutionary agitators and refugees. He was very prominent in the revolutionary upheavals

that threatened nearly all the European coun¬ tries during 1848. Becker organized, during that year, a body of fighting men with which to support Hecker, who was attempting to precipitate a revolution in Baden. When this failed, Becker led his forces to the support of the revolutionists in Rome and Sicily. This expedition also failed, whereupon he marched into the Palatinate and Baden, where uprisings had taken place, and participated in the thick of the fighting in which he showed him¬ self possessed of not a little military skill. When these violent disturbances had subsided, Becker became attached to the Socialist Inter¬ national and was one of Karl Marx's strongest adherents. He has written (\Yie und Wann?)

(1869).

BECKER, Rudolf Zacharias, German author: b. Erfurt, 9 April 1752; d. 28 March 1822. Pie first became known by an essay on the theme, <(Is it useful to deceive the people?® which gained a prize from the Berlin Academy of Sciences in 1799. His theory was that happi¬ ness depended on the gratification of an innate desire for improvement. In 1782 he took charge of a school at Dessau and published a journal for youth. A work in two volumes, entitled (A Little Book of Needful Help;

or, Instructive Tales of Joy and Sorrow in the Village of Mildheim,* became such a favorite with the public that over 500,000 copies were soon dis¬ posed of. He also produced other works and journals, and the extensive transactions in them led him, in 1797, to set up a publishing and bookselling establishment at Gotha, which is still continued by his son. On 30 Nov. 1811 he was arrested by Davoust on suspicion of con¬ spiring against Napoleon, and was imprisoned at Magdeburg till April 1813. On this impris¬ onment he wrote a book, which still has a historical value.

BECKER, Wilhelm Adolf, German archaeologist: b. Dresden 1796; d. Meissen, 30 Sept. 1846. His early education was planned by his parents with the object of fitting him for a commercial career, but while studying at the University of Leipzig he acquired a strong taste for a life of study. In 1828 he was appointed professor of archaeology at the University of Meissen ; in 1842 he was appointed to the chair of classical archaeology at Leipzig University. In his first two books, (Gallus oder romische Scenen aus der Zeit Augusts* (Leipzig 1838) and (Charicles oder Bilder altgriechische Sitte) (Leipzig 1840) he portrays the daily life of the ancients in the form of romances, plenti¬ fully supplied with footnotes. Both works have been translated into English by Frederick Metcalfe, and each has passed through numer¬ ous editions. His chief work, however, is (Handbuch der romischen Alterthumer* (Leip¬ zig 1843), which he did not live to complete, this being done by Marquardt.

BECKER, Wilhelm Gottlieb, German writer on art antiquities : b. Oberkallenberg, Saxony, 4 Nov. 1753; d. Dresden, 3 Tune 1813. Graduating from the University of Leipzig, he was appointed professor at the Dresden Rit-terakademie in 1782. In 1795 he became di¬ rector of the Dresden Gallery of Antiques and the Coin Cabinet. In 1805 he was also given charge of the famous Green Vault. His chief work is (Taschenbuch zum geselligen Verg-

nfigen* (Leipzig 1791-1814). He was also the author of (Erholungen) (Leipzig 1796-1810) ; <Augusteum) (Dresden 1805-09).

BECKERATH, Hermann von, German statesman : b. Krefeld, Prussia, 13 Dec. 1801 ; d. there, 12 May 1870. His youth was spent in learning the business of banking, after which he became the head of a banking firm which had considerable influence in German financing, especially in the Rhenish provinces. He began his political career by entering the Diet of his native province. In 1847 he served in the Prussian Diet, and the following year went as a deputy to the Frankfort Parliament, where he became one of the firmest advocates of the German confederacy. He became Minister of Finance in the German cabinet organized by the Parliament. When the reactionary Man-teuffel Ministry came into power, he continued as a member of the Prussian Second Chamber and ranged himself steadfastly with the opposi¬ tion. In 1852 he withdrew from politics, but six years later he was again elected to the Second Chamber. His ill-health, however, com¬ pelled him to decline the office. Consult Kop-stadt's biography, (Hermann von BeckeratlP (Brunswick 1875).

BECKERS, Hubert, German philosopher: b. Munich, 4 Nov. 1806; d. 11 March 1889. Graduating from the University of Munich, he was, in 1832, appointed professor of philosophy at the Lyceum at Dillingen. In 1847 he was appointed to the chair of the same subject at the University of Munich. Most of his writings are devoted to expounding the theories of Schelling. These include (Denkrede auf Schelling) (Munich 1855) • (t)ber die Bedeutung der Schellingschen MetaphysflU (Munich 1861) ; (Cantica Spiritulia) (Munich 1845-47) ; (Aphorismen fiber Tod und Unsterblichkeit ' (Munich 1889).

BECKET, Thomas a, archbishop of Can¬ terbury, the Saxon hero, priest and martyr of England in the reign of Henry II : b. London 1119, or, according to some writers, 21 Dec, 1117; d. Canterbury, 29 Dec. 1170. He was the son of Gilbert Becket, a merchant of London. He was first educated by the canons of Mer¬ ton, and continued his studies in the schools of Oxford, London and Paris. On the death of his father he was admitted into the family of. Theobald, archbishop of Canterbury, and, with his permission, went to the Continent for the purpose of studying the civil and canon law. He attended the lectures of Gratian at Bologna, and of another celebrated professor at Auxerre. He won high favor with the King through having obtained from the Pope, while acting as agent for Theobald, letters prohibitory of the crowning of Eustace, the son of Stephen, by which that design was defeated (1152). This service not only raised Becket in the esteem of the archbishop, but in that of King Henry II, and was the foundation of his h:gh fortune. In 1155 he was appointed high-chancellor and preceptor to Prince Henry, and at this time was a complete courtier, conform¬ ing in every respect to the humor of the King. He was, in

fact, his prime companion, had the same hours of eating and going to bed, held splendid levees, and courted popular applause. In 1159 he made a campaign with the King in Toulouse, having in his own pay 700 knights

and 1,200 horsemen ; and it is said he advised Henry to seize the person of Louis, King of France, shut up in Toulouse without an army. This counsel, however, so indicative of a Becket's energy, being too bold for the lay counsellors of one of the boldest monarchs of the age, was declined. In the next year he vis¬ ited Paris to treat of an alliance between the eldest daughter of the King of France and Prince Henry, and returned with the young princess to England. He had not enjoyed the chancellorship more than four years when his patron Theobald died, and King Henry was so far mistaken as to raise his favorite to the primacy, on the pre¬ sumption that he would aid him in those political views, in respect to Church power, which all the sovereigns of the Norman line embraced, and which, in fact, caused a continual struggle in England till its termina¬ tion by Henry VIII. It is narrated that when Henry announced his intention of having Becket promoted to the primacy left vacant by the death of Theobald, Becket prophetically re¬ marked : ((I am certain that if, by God's dis¬ posal, it were to so happen, the love and favor you now bear towards me, would speedily turn into bitterest hatred. »

Becket was consecrated archbishop in 1162, and immediately assumed an austerity of con¬ duct which formed a very natural prelude to the course which he was to follow'. Pope Alex¬ ander III held a general council at Tours in 1163, at which Becket attended and made a formal complaint of the infringements by the laity on the rights and immunities of the Church. On his return to England he began to act in the spirit of this representation, and to prosecute several of the nobility and others holding Church possessions, whom he also pro¬ ceeded to excommunicate. At a council at Woodstock (1163) he successfully opposed the King on a point regarding taxation — the first case of this kind recorded in England. Henry, an able and politic monarch, was anxious to recall certain privileges of the clergy which withdrew them from the jurisdiction of the civil courts ; and it w as not without a violent struggle, and in the interests of peace, that Becket finally acquiesced. The King soon after summoned a convocation or parliament at Clarendon (1164), to the celebrated ((constitu-tions)) of which, although the archbishop swˆore that he would never assent, he at length yielded, but afterward refused to affix his signature, and by way of penance suspended himself from his

archiepiscopal functions till the Pope's absolution could arrive. Finding himself the object of the King's displeasure, he soon after attempted to escape to France; but being inter¬ cepted, Henry, in a parliament at Northampton, charged him with a violation of his allegiance, and all his goods were confiscated. A suit was also commenced against him for money lent him during his chancellorship and for the pro¬ ceeds of the benefices which he had held vacant while in that capacity. In this desperate situation he with great difficulty and danger made his escape to Flanders, and, proceeding to the Pope, at Sens, humbly resigned his arch¬ bishopric, which w'as however restored. He then took up his abode at the abbey of Pontigny, in Normandy, whence he issued expostu-1 a torv letters to the King and bishops of Eng-407

land, in which he excommunicated all violators of the prerogatives of the Church, and included in the censure the principal officers of the Crown. Henry was so exasperated that he banished all his relations and obliged the Cis¬ tercians to send him away from the abbey of Pontigny ; from which he removed, on the recommendation of the King of France, to the abbey of Columbe, and spent four years there in exile.

After much negotiation a sort of reconcilia¬ tion was patched up in 1170, which on the whole was to the advantage of Becket, who, being n°w_ restored to his see with all its former privileges, forthwith prepared to return. Af¬ ter a triumphant entry into Canterbury the young Prince Henry, crowned during the life¬ time of his father, transmitted him an order to restore the suspended and excommunicated prelates, which he refused to do, for the reason that the Pope alone could grant the request, though the latter had authorized him to inflict the censure on them. The prelates immediately appealed to Henry in Normandy, who in a state of extreme exasperation exclaimed, ((YVhat an unhappy prince am I, who have not about me one man of spirit enough to rid me of a single insolent prelate, the perpetual trouble of my life lˆ These rash and too significant words induced four of the attendant barons, Reginald Fitz-Urse, William de Tracy, Hugh de Mor-ville and Richard Breto, to resolve to wipe out the King's reproach. Having laid their plans, they forthwith proceeded to Canterbury, and having formally required the archbishop to re¬ store the suspended prelates, they returned in the evening of the same day (29 Dec. 1170), and, placing soldiers in the

courtyard, rushed with their swords drawn into the cathedral, where the archbishop was at vespers, and, ad¬ vancing toward him, threatened him with death if he still disobeyed the orders of Henry. Becket, without the least token of fear, replied that he was ready to die for the rights of the Church; and magnanimously added, (<I charge you in the name of the Almighty not to hurt any other person here, for none of them have been concerned in the late transactions.*5 The confederates then strove to drag him out of the church, but not being able to do so on account of his resolute deportment, they killed him on the spot with repeated wounds, all which he endured without a groan.

The perpetrators of the deed repented and made pilgrimages to the Holy Land. Henry II did penance at the saint's tomb.

Thus perished Thomas a Becket in his 52d year, a martyr to the cause which he espoused, and a man of unquestionable vigor of intellect. He was canonized two years after his death, and miracles abounded at his tomb. In the reign of Henry III his body wTas taken up and placed in a magnificent shrine erected by Arch¬ bishop Stephen Langton ; and of the popularity of the pilgrimages to his tomb the 'Canterbury Tales5 of Chaucer will prove an enduring testi¬ mony. In September 1538, Henry VIII, who held the veneration with which a Becket was regarded in especial detestation, destroyed the shrine and, on what appears to be good evi¬ dence, had the martyr's bones burned. The names of many churches and hospitals, in order to conform to the royal commands, were changed from Saint Thomas the Martyr to Saint Thomas

the Apostle. Consult for the sources of the life (Materials for the History of Archbishop Becket,* edited for the Rolls Series by Robert¬ son and Sheppard (London 1875-85) ; also (Lives-) by A. E. Abbott (London 1898), W. H. Hutton (ib. 1889), John Morris (2d ed., ib. 1885) and R. A. Thompson (ib. 1889). Ten¬ nyson's drama of ' Becket' has the martyr for its hero; Ward, 'Canterbury Pilgrimages 5 (London 1904).

BECKETT, Arthur William, a, English journalist and novelist: b. Fulham, 25 Oct. 1844; d. London, 14 Jan. 1909. Besides ful¬ filling

other journalistic engagements he was on the staff of Punch 1874-1902,' edited the Sunday Times 1891-95, and the Naval and Mili¬ tary Magazine 1896. In addition to several comedies he published (Comic Guide to the Royal Academy,5 with his brother Gilbert (1863-64); (Fallen Amongst Thieves) (1869); 'Our Holiday in the Highlands) (1874) ; 'The Shadow Witness 5 and (The Doom of Saint Quirec,5 with Burnand (1875-76); 'The Ghost of Grimstone Grange5 (1877) ; 'The Mystery of Mostyn Manor5 (1878); (Traded Out5; 'Hard Luck5 ; (Stone Broke5 ; (Papers from Pump Handle Court, by a Briefless Barrister5 (1884); (Modern Arabian Nights5 (1885); (The Member for Wrottenborough5 (1895); 'Greenroom Recollections5 (1896); 'The Mod¬ ern Adam5 (1899) ; 'London at the End of the Century5 (1900).

BECKFORD, William, English writer, famous in his time for his immense wealth, eccentricities and literary talents : b. Fonthill, 29 Sept. 1759; d. Bath, 2 May 1844. When only 10 years old he was in receipt of an income, through the death of his father, of more than $500,000 a year. Under the direction of Lord Chatham he received a careful education at the hands of tutors, and at an early age gave evi¬ dence of unusual abilities. His first work, a satirical essay entitled 'Biographical Memoirs of Extraordinary Painters,5 in which he ridi¬ culed the English artists of his time, was pub¬ lished before he was 21 years of age. In 1783 he married Lady Margaret Gordon, daughter of the 4th Earl of Aboyne, who died in 1786. One of his daughters married the 10th Duke of Hamilton. He spent most of his time on the Continent; an account of some of his travels he published half a century later with the title 'Italy, with Sketches of Spain and Portugal5 (2 vols., London 1834). He sat in the House of Commons from 1784-94, and from 1806-20, but took no interest in political affairs. Fie went to Portugal in 1794, where he bought an estate in the neighborhood of Cintra, and lived in familiar intercourse with the royal family of Portugal. After the lapse of some years he appeared again in England, and began in 1796 to erect a splendid edifice upon his estate of Fonthill, which he furnished with more than royal luxury, and continually enlarged with new buildings. Here he resided till 1822, when, owing to the loss of two large estates, which had been successfully claimed in chancery by other owners, he was obliged to sell Fonthill for £330,000. He then settled at Bath, where he began to occupy himself anew with building and collecting works of art. His literary fame rests upon his Eastern tale, 'Vathek,5 which he wrote in French, composing it in three days

and two nights, during which he did not take off his clothes. It was published at Lausanne in 1787, and made a remarkable impression upon Byron. See Vat'hek.

BECKHAM, John Crepps Wickliffe,

American statesman : b. Bardstown, Ky., 5 Aug. 1869. He attended school at Roseland Academy, Bardstown, and Central University, Richmond, Ky., receiving degree of LL.D. from the university in 1902 ; served as page in the Kentucky house of representatives in the ses¬ sion of 1881-82 ; in 1888 became principal of the Bardstown public school and taught three years ; studied law and began practice in 1893 ; same year was elected as representative of Nel¬ son County to the general assembly ; served as such in the sessions of 1894, 1896, 1897, 1898 and in the latter session was speaker of the house ; in 1899 was Democratic nominee for lieutenant-governor on the ticket with William Goebel, candidate for governor, and in the contest be¬ fore the general assembly of 1900 was declared elected lieutenant-governor at the same time that Goebel was declared elected governor. Upon the death of Governor Goebel, 3 Feb. 1900, he became governor, and at the special election on 6 Nov. 1900, was elected as the Democratic nominee to fill out the unexpired term of Governor Goebel, ending 8 Dec. 1903 ; in the State primary of 1903 was renominated and in the general election of November 1903 was reelected for a full term, ending 10 Dec. 1907; in the State primary of November 1906 was nominated as the Democratic candidate for the United States Senate, to succeed J. B. Mc¬ Creary, but in the general assembly of 1908 was defeated by W. C. Bradley, the Republican nominee; resumed, in 1908, the practice of law in Frankfort, Ky. ; in the State primary of 1 Aug. 1914 was nominated by the Democratic party for the United States Senate, and in the general election of 3 Nov. 1914 was elected for the term beginning 4 March 1915. At the Demo¬ cratic national conventions at Saint Louis, 1904, Denver, 1908, Baltimore, 1912, he was a delegate from the State at large, and member of the committee on resolutions. His term of service expired 3 March 1921.

BECKMANN, Johann, German writer on agriculture and natural history : b. Hoya, Han¬ over, 4 June 1739; d. Gottingen, 3 Feb. 1811. He studied theology at Gottingen, but soon ap¬ plied himself to natural philosophy and chemis¬ try. For a short time he was professor of natural philosophy and history at a gymnasium in Saint Petersburg. He resigned this, and coming back through Sweden, made the ac¬ quaintance of Linnaeus and was allowed to see how the Swedish mines were worked. Having returned to Gottingen, he was made professor of philosophy there in 1766, and in 1770 ordi¬ nary professor of economy, wdiich office he held for 40 years. He published several scientific works, which once were popular, but the best known of his productions is called Contribu¬ tions to the History of Discovery and Inven¬ tions, } of which several translations have been published in England, where (with corrections and additions extending it to the present time) it continues to be a favorite work.

BECKWITH, Sir George, English military

officer : b. 1753; d. London, 20 March 1823. His scene of action was largely in America — in

the United States and the Vv est Indies. He fought with the English in the American Revo¬ lution in 1 776—82, and was entrusted with im¬ portant diplomatic commissions in 1782-91, as there was then no British Minister in the United States. In 1804 he was made governor of Saint Vincent, and four years later governor of Bar¬ bados. As England was then at war with France he organized an expedition and con¬ quered Martinique, for which he obtained the thanks of the House of Commons. Later (1810) he conquered Guadeloupe, the last possession of the French in that part of the world. When he returned to England, after nine iˆears' serv¬ ice in the West Indies, a set of silver plate was given to him by the legislature of Bar¬ bados, and the King conferred upon him armorial distinction.

BECKWITH, James Carroll, American

portrait painter: b. Hannibal, Mo., 23 Sept. 1852; d. 24 Oct. 1917. He studied painting in Chicago, where his father was a merchant. In the late autumn of 1871 he became a student at the Academy of Design in New York, wrhere he remained, under the direction of Professor Wilmarth, until 1873, when he sailed for Europe and became a pupil of Carolus-Duran, and also at the Ecole des Beaux Arts, under Yvon. In 1878 he returned to New York, and with Wil¬ liam M. Chase opened

the new departments of painting and drawing at the recently established Art Students' League, where, for 18 years, he continued his work as instructor. In 1894 he was elected to the National Academy of De¬ sign, and is a member of the National Institute of Art and Letters. Portrait and genre paint¬ ing gradually absorbed his time and attention, the result of which was that he finally aban¬ doned teaching. He decorated one of the domes of the Manufactures Building at the Columbian Exposition of 1893. Among his best-known portraits are those of General Schofield, Judge Palmer, Colonel Appleton, Mark Twain, and the Ogden and Parish fam¬ ilies. At the Saint Louis Exposition (1904) he exhibited (The Nautilus* and portraits of Mrs. Beckwith and F. H. Hitch. His portraits hang in many private homes as well as in gal¬ leries and institutions throughout the United States; among others, Yale University, Johns Hopkins, West Point Military Academy, the Historical Societies of Massachusetts and New York, the Bar Association of New York, the Union. Union League, City, Racquet and Calu¬ met Clubs of New York. The New York Public Library has a fine collection of his crayon and pencil drawings.

BECKWITH, John Watrus, American

Episcopal bishop: b. Raleigh, N. C., 9 Feb. 1831 ; d. 24 Nov. 1890. He was graduated at Trinity College, Hartford, in 1852; ordained priest in 1855 ; labored in Mississippi and Ala¬ bama till after the close of the Civil War; was then called to the rectorship of Trinity Church, New Orleans; and while there was elected bishop of Georgia, being consecrated in Savan¬ nah, 2 April 1868. He was an eloquent preacher, and published several sermons and addresses.

BECKX, Peter Johann, 22d general of the Jesuits: b. Sichem, near Louvain, in the Flemish province of Brabant, Belgium, 8 Feb. 1795; d. Rome, 4 March 1887. At the age of 24 he. entered the order of the Societv of Tesus.

Upon the Duke Ferdinand of Anhalt-Kothen becoming a convert to Catholicism, he was appointed confessor at the ducal court, where he

continued after the Duke's death with the Duchess Julia. On her removal to Vienna he accompanied her. In 1847 he became prosecutor for the Society in Austria. The following year the Jesuits were expelled from Austria and Beckx returned to Belgium, where he became rector of the Jesuit College at Louvain. Upon the return of the Jesuits to Austria, Father Beckx was made superior of Hungary. On 2 July 1853 he became general of the Order, be¬ ing the successor of Father Roothan. The mar¬ velous success with which the Jesuits estab¬ lished themselves in Austria and even in non-Catholic countries after the middle of the century was largely due to the abilities of Father Beckx as a diplomat. In 1884. when almost 90 years of age, he resigned his office. He was the founder of the Civiltd cattolica in Rome, the chief organ of the Order. He was also the author of the (Month of Mary,* which was widely translated.

BECKY SHARP, the heroine in Thack¬ eray's (Vanity Fair.* She has been accepted as the type of the shrewd, conscienceless adven¬ turess whose sole purpose is to rise in the world and who allows nothing to interfere with it.

BECQUE, Henri Frangois, bek, on-re fran-swa, French dramatist: b. Paris, 9 April 1837 ; d. 1899. He was the pioneer of realism on the Parisian stage producing (The Prodigal Son) (1868); (The Abduction* (1871); <The Ravens* (1882) ; (The Parisian* (1885), *etc.*

BECQUER, Gustavo Adolfo Dominguez,

Spanish poet: b. Seville, 17 Feb. 1836; d. Madrid, 22 Dec. 1870. When he was 10 years of age his father, a well-known painter, Jose Dominguez Becquer, died, leaving the orphan son to the care of a godmother. He was aban¬ doned by his protectress, however, on account of his disinclination to fit himself for any pro¬ fession. At the age of 18 he came to the Spanish capital, where he earned a precarious living for 15 years as a free lance journalist and translator of foreign books. During this period he produced some tales and a number of poems which stand out sharply from his general newspaper and hack work. His col¬ lected works were published after his death in Madrid (1885) with a biographical introduction by Correa. His prose tales and legends were published under the general title (Leyendas espanolas,* and are included in the fifth, en¬ larged edition of his works (3 vols., Madrid 1904). An English translation of the prose stories was made by Cornelia Frances Bates (New York 1909). Consult Mrs. Humphry Ward's article on Becquer in Macmillan's Mag¬ azine (1883) and Olmsted's introduction to his edition of Becquer's (Legends, Tales and Poems* (1907L

BECQUEREL, Alexandre Edmond, bek-rel, a-lex-andr ad-mori, French physicist: b. Paris (son of Antoine Cesar Becquerel, q.v.), 24 March 1820; d. Paris, 13 May 1891. He was decorated with the cross of the Legion of Honor in 1851, and was appointed professor of physics in the Conservatoire des Arts et Metiers in 1853. Besides his conjoint labors with his father

he made important researches on the nature of light and its chemical effects, on phosphores¬ cence, and on the conductivity and magnetic properties of many substances. He wrote (Light, Its Causes and Effects* (1868).

BECQUEREL, Antoine Cesar, French

physicist : b. Chatillon-sur-Loing, 8 March 1788; d. Paris, 18 Jan. 1878. He studied in the Ecole Polytechnique, then, in 1808, entered the engineer corps of the army, with which he saw active service in Spain, under Marshal Suchefi In 1812 he returned to Paris, where he received the appointment of inspector of the Ecole Poly¬ technique, which position he held until 1815, when he devoted himself to private study. In 1837 he became professor of physics at the Musee d'histoire naturelle. Meanwhile he was actively engaged in research work, especially in the field of electricity and magnetism. He in¬ vestigated and experimented in the laws gov¬ erning the production of electricity by chemical action, the result of which was the shattering of Volta's theory of contact. His many dis¬ coveries in this department of science entitle him to be called one of the creators of electro¬ chemistry. He was elected a member of the Paris Academy of Sciences and of the Royal Society of London. Among his chief works are (Traite de l'electricite et du magnetisme* (1855); (Element d'electrochimie* (1843);

(Elements de physique terrestre et de meteor-ologie* (1847) ; (Resume de l'histoire de l'electricite et du magnetisme* (1858). Some of these later works were written in collaboration with his son Alexandre Edmond Becquerel (q.v.).

BECQUEREL, Antoine Henri, French physicist: b. Paris, 15 Dec. 1852; d. there, 25 Aug. 1908 (son of Alexandre Edmond, and grandson of Antoine Cesar Becquerel, qq.v.). Like his distinguished grandfather, he studied at the Ecole Polytechnique, then became professor of physics at the Museum of Natural History in 1878. In 1895 he was appointed pro¬ fessor of the same subject at the Ecole Poly¬ technique. In 1889

he became a member of the Institute. After him have been named the rays radiating from uranium, for the discovery of which he was awarded the Rumford medal of the Royal Society of London. In 1903 he shared the Nobel prize for physics with M. and *Mme.* Curie, awarded them because of their researches in radio-activity. His investigations dealt chiefly with such subjects as the magnetic rotation of polarized light, phosphorescence, the ultra-red rays, light absorption, *etc.*

BECSE, bech'e, Hungary, the name of two towns situated on the river Theiss. Old Becse is on the right bank, 48 miles south of Szegedin. Pop. about 18,870. It has fisheries and flour mills, and carries on an extensive trade in grain. New Becse is on the left bank, five miles east of Old Becse. Pop. about 7,750. It carries on a trade in fruit and an extensive trade in grain.

BECSKEREK, Great and Little, a city and a town in Hungary. The former is in the administrative district of Torontal, of which it is the administrative centre. It is situated on the Bega, 45 miles southwest of Temesvar, the two places being connected by canal. It is the centre of an important grain and cattle region and a silk worm industry. An old castle is an

object of some interest. Pop. (1900) 26,407, about equally divided between Germans, Serbs and Magyars. Little Becskerek, nine miles northwest of Temesvar, is in the administrative district of Temes. Pop. (1900) 3,738.

BED, in modern domestic use, a framework (bedstead) supporting a mattress or cushion, with coverings, oil which to take repose or to sleep. Originally a bed consisted merely of a hollowed-out place in the earth. Then, in the colder climates, the skins of animals were em¬ ployed, not only to render the spot more com¬ fortable, but as covering for the sake of warmth. In the warmer climates dried leaves or rushes or grass was employed for the same purpose, and at the present day there are tribes of savages whose beds still consist of such

primitive arrangements.

Among the Ancients. — With the develop¬ ment of civilization among the ancient peoples came the desire for greater physical comfort, and the bed was naturally one of the first articles of household furniture to be improved upon. The Egyptians were probably the first to discover that greater comfort could be ob¬ tained in a warm climate by a free circulation of the air under the bed. The paintings and inscriptions on the monuments indicate that long before the beginning of recorded history the Egyptians slept on elevated frames, or bed¬ steads, resting on ornamental legs,* which were reached by short steps, the mattress, consisting of dried rushes sewn into cloth coverings, rest¬ ing on an elastic and open wickerwork of palm fibres. And as among peoples in warm climates to-day, the pillow was not soft, but hard, of wood. The prevalence of insects and snakes probably was another reason for the elevation of the bed from the ground.

Later, among the Babylonians and the As¬ syrians, there was a further development of the bed, corresponding to the increase of luxury among the nobility, for the common people still continued to sleep on bundles of rushes or grass, as they have done through all the ages. Here the framework was made of gold and ivory and fine woods and was richly carved and ornamented. Gradually it became a habit to recline on the bed for rest during the day, so that it developed into the divan, where the monarch or noble would sit when listening to matters of state. To this day the throne room of the Turkish Sultan is also known as the Divan. Such references to the bed as may be found in the Bible indicate the importance of the bed in those days, as ((I have decked my bed with coverings of tapestry, with carved works, with fine work of Egypt® (Prov. vii, 16).

Among the Greeks and Romans. — The ancient Greeks had an elegant kind of beds in the form of open couches, the mattresses being stuffed with feathers or wool. These they used during the day too, much as chairs are used at the present time, and even reclined on them while eating. The luxury of the Orient did not develop in Greece to the same extent, for the Asiatics commonly said of the Greeks that they did not know how to sleep comfortably. When the Persian King, Artaxerxes, presented one of his magnificent beds to the Athenian envoy, Timogoras, he sent also an attendant skilled in preparing, it.

The Romans copied their beds largely after

the Greeks, though they added to their com¬ fort by the invention of air cushions. After the downfall of the republic they began add¬ ing the magnificent trappings and luxuries of the ancient Orientals. There were two kinds of beds : the ((lectus tricliniaris,® or couch for re¬ clining on at meals ; and the (<lectus cubicularis,® which was for sleeping on at night. It is also said that it was the Romans who introduced the first beds into England, for when they invaded that country they taught the barbarian natives how to make straw or rush mattresses.

In the Middle Ages. — In the colder cli¬ mate of northern Europe the development of the bed adapted itself also to the question of warmth as well as to comfort. Soft feather pillows came into use and the skins of ani¬ mals gave place to heavy textile materials of wool, though to this day it is not uncommon to find the wealthier classes of northern Russia covering themselves with wolf and bear skins. In Germany large, broad pillows were also used for covering, and are so used to this day. But as modern hygiene has demonstrated that feathers are bad conductors of caloric and do not permit the free radiation of heat from the body, which is essential to health and comfort, feather beds are gradually giving way to mod¬ ern hair mattresses.

Modem Beds. — Modern mattresses are sometimes made of felt, of pure hair, or of alternate layers of hair and cotton, stuffed more or less tightly into a casing of strongly woven material, called ticking. Pillows are made of materials similar to those of the mattresses, and the bed coverings of almost any fabric suited to the taste and purse of the owner, from coarse cotton sheets or blankets to the finest wool or silk. The heavy canopies of the Middle Ages, probably an evolution of the mosquito-netting of the Orient, have also been abolished for hygienic reasons.

The folding bed is a recent development largely peculiar to America, where city apart¬ ments have made space a question of special consideration. They are so arranged that the bottom of the bedstead can be swung upward against the tall headrest and the becl becomes either a dressing table or a bookcase. Truckle, or trundle, beds were formerly used for similar economic reasons and consisted of a low plat¬ form on wheels to admit of its being run under the larger bed by day and was occupied at night by children or servants. Cots are also widely used for the sake of saving space ; they are generally very narrow, have very low head-and foot-rests and during the day may be cov¬ ered over and used for sitting in the place of chairs. There are' also folding cots and lounges, constructed over a box body, wherein the bed¬ ding may be concealed during the day, some¬ times in a

drawer.

Special beds have also been contrived for the use of sick or wounded persons, notably mattresses of material impervious to air or water and filled with either the one or the other.

In French History (see Bed of Justice), the bed of justice was the throne on which, before the Revolution of 1789, the king used to sit when he went to Parliament to look after the affairs of state, the officers of Parlia¬ ment attending him in scarlet robes. As this interference of the king with Parliament was not compatible with free government, ˆsitting

on the bed of justice® came to signify the ex¬ ertion of arbitrary power.

In Law, a divorce from bed and board is the divorce of husband and wife to the extent of separating them for a time, the wife receiv¬ ing support, under the name of alimony, during the severance.

In Mechanics, a bed is the foundation piece of a portipn of anything on which the body of it rests, as the bed-piece of a steam engine ; the lower stone of a grinding-mill ; or the box, body or receptacle of a vehicle.

BED AND BEDDING PLANE. A bed¬ ding plane is a plane of parting in a sedimen¬ tary rock, parallel to the stratification, and along which the rock tends to part more readily than in any other direction. A bed is a unit lying between two successive bedding planes. Laminae are very thin beds. A stratum (q.v.) may consist of one or more beds, but must be of the same kind of rock throughout. Beds of strata may pinch or thin out and disappear in all directions. They are then called lenses or lentils, or are said to be lenticular.

BED CHAMBER, Lords of the, 12 officers in the household of the British sovereign, who act as his personal attendants. When .the sov¬

ereign is a Queen, these officers are the <(ladies of the bed chamber.® It is considered a high honor among the English nobility to be ap¬ pointed to this office. The salary paid to each of these officials is £1,000 a year. All are under the command of the groom of the stole, who attends on the royal personage only on state occasions.

BED OF JUSTICE (Fr. lit de justice), formerly a solemn ceremony in France, in which the king with the princes of the blood royal, the peers, and the officers of the Crown, state and court proceeded to the Parliament, and there, sitting upon the throne (which in the old French language was called lit, because it con¬ sisted of an under cushion, a cushion for the back and two under the elbows), caused those commands and orders which the Parliament did not approve to be registered in his presence. The Parliament had the right of remonstrating in behalf of the nation against the royal com¬ mands and edicts. If the king, however, did not choose to recede from his measures, he first issued a written command (lettres dc jussion) to the Parliament, and if this was not obeyed he held the lit dc justice. The Parliament was then, indeed, obliged to submit, but it after¬ ward commonly made a protest against the pro¬ ceeding. Louis XV held such a lit dc justice in 1763, in order to introduce certain imposts, but on account of the firm resistance of the parliaments was finally obliged to yield. The last lits de justice were held by Louis XVI at Versailles, 6 Aug. 1787.

BED-SORE, an ulcer due to long-continued pressure on certain bony prominences of the body, due to protracted maintenance of the re¬ clining position. The buttocks, shoulder-blades and heels are the most frequently affected sites. In certain diseases, notably in myelitis, or in¬ flammation of the spinal cord, bed-sores may develop very rapidly, within 10 days to two weeks. Here the nerve-fibres governing the tone of the skin are affected. In long-continued diseases, however, necessitating the reclining

posture, bed-sores develop largely from lack of careful nursing. A due amount of attention paid to absolute cleanliness, care for the skin, careful turning, and use of air-cushions or the water-bed, are often effective in preventing them. Alcohol and water, equal parts, is one of the best washes. If ulcers develop in spite of all precautions, they should be surgically treated. Oxide of zinc ointment, balsam of Peru, aristol powder, or bismuth powder, may all be used, alone or in combination.

BEDAMAR, ba-da-mar', a character (a Spaniard of noble birth) in Saint Real's Con¬ juration des Espagnols contre la Republique de VeniseP the source of Otway's (Venice Pre¬ served. }

BEDARD, Pierre Stanislas, French-Canadian publicist : b. at Charlesbourg, near Quebec, 1763; d. 1829. He was educated at the Seminary of Quebec, returned in 1792 to the first legislature of lower Canada, became leader of the opposition, and was the first to demand responsible government. One of the founders of Lc Canadien, established in 1806 as the organ of French-Canadian nationalism, he was, on the seizure of that paper, in 1810, imprisoned and refused a trial. Subsequently he became a judge.

BEDARIEUX, ba-da-re-ii, France, town in the department of Herault on the left bank of the Orb, 18 miles north from Beziers. It is well built and has manufactures of fine and common cloth, woolen stuffs, floss silk, worsted and cotton stockings, hats, soap, olive-oil ; tanneries, dye works, paper and glass works and a brass foundry. It has also a trade in wine and brandy. Pop. 6,186.

BEDBUG, a hemipterous insect (Cimex or Acanthias lectularius) . The body is broad, two and a half lines in length, flat and wingless; it is a rust red color with fine brown hairs. By its shape it is adapted for living in cracks be¬ tween boards in furniture, etc., and by its long, slender beak it sucks the blood of its victim. This insect lays eggs throughout the warmer months of the year, the generations succeeding each other as long as the temperature is high enough. The eggs are oval, white and the young bugs hatch in about eight days, escaping by pushing off a lid at one end of the shell. They are white, transparent, differing from the perfect insect in having a broad, triangular head, and short and thick antennae. A species closely related to the bedbug lives as a parasite on domestic birds, such as the dove. A nest of swallows swarming with alleged bedbugs was once found on a courthouse in Iowa. Trestwood states that the bedbug is 11 weeks in attaining its full size ; it molts about five times. De Geer has kept full-sized individuals in a sealed bottle for more than a year without food. The cockroach is the natural enemy of the bedbug and destroys large numbers, as does also the Reduvius and certain kinds of ants. In Europe a small black ant, Monomor-ium, is said to clear a house of them in a few days. Houses have been cleaned of them after being thoroughly fumigated with brimstone, or by the use of insect powder blown into the cracks and crevices where the}' live. They are also easily destroyed by painting the cracks with corrosive sublimate dissolved in alcohol.

Temporary relief may be had by sprinkling in¬ sect powder over the sheets of the bed one is to occupy. As the bedbug was known to Aristotle, who supposed it arose spontaneously from sweat, it is probable that it originated about the Mediterranean Sea, for it was not known to have occurred in England before the 1 7 th cen¬ tury. Consult Osborn, (Insects Affecting Do¬ mestic Animals) (Department of Agriculture Bulletin) ; Sutherland, H., (The Book of Bugs.5

BEDDARD, Frank Evers, English zoolo¬ gist: b. Dudley, 19 June 1858. He graduated from New College, Oxford. In 1882 he joined the Challenger Expedition Commission on its two-year cruise as naturalist and was assistant editor in the preparation of the reports. He next became examiner in zoology and compara¬ tive anatomy at the University of London and lectured on biology at Guy's Hospital. In 1884 he was appointed prosecutor of the London Zoological Society. He is the author of (Ani¬ mal Coloration) (1892) ; (Monograph on the 01igocfi3eta) (1895); (A Textbook of Zooge¬ ography (1895) ; Structure and Classifica¬ tion of Birds) (1898) ; (Book of Whales) (1900); (Mammalia) (1902); (Earthworms and Their Allies5 (1912).

BEDDED VEIN. See Blanket Vein.

BEDDOES, bed-O'Z, Thomas, English phy¬ sician and author: b. Shiffnal, Shropshire, 13 April 1760; d. 24 Dec. 1808. He distinguished himself both at school and at Oxford by his knowledge of ancient and modern languages and literature. The great discoveries in physics, chemistry and physiology irresistibly attracted him. He continued his studies with success in London and Edinburgh. In his 26th year he took his doctor's degree, afterward visited Paris, and formed an acquaintance with Lavoisier. On his return he was appointed professor of chemistry at Oxford. There he published some excellent chemical treatises and observations on the calculus, scurvy, consump¬ tion, catarrh and fever. Dazzled by the splen¬ did promises of the French Revolution, he offended some of his former admirers, and excited such a clamor against him by the pub¬ lication of his political opinions that he re¬ signed his professorship. He then composed his Observations

on the Nature of Demon¬ strative Evidence,5 in which he endeavored to prove that mathematical reasoning proceeds on the evidence of the senses, and that geometry is founded on experiment. He also published the (History of Isaac Jenkins,5 which was in¬ tended to impress useful moral lessons on the laboring classes in an attractive manner. Af¬ ter his marriage in 1794 he formed the plan of a pneumatic institution for curing diseases, par¬ ticularly consumption, by means of factitious airs or gases. With the assistance of the celebrated Josiah Wedgewood, he succeeded in opening this institution in 1798. As super¬ intendent of the whole, he engaged young Humphry Davy, the foundation of whose future fame was laid here. The chief purpose of the institution, however, was never realized, and Beddoes' zeal gradually relaxed, so that he relinquished it a year before his death. In the last years of his life he acquired considerable reputation by his (Hygeia,5 in three volumes.

BEDDOES, Thomas Lovell, English dramatist and physiologist: b. Clifton, 20 July 1803; d. Basel, 26 Jan. 1849. He published (The Bride's Tragedy5 while an undergraduate at Oxford, and led an eccentric life, ultimately committing suicide. His work was largely fragmentary, but his posthumous (Death's Jest-Book; or, the Fool's Tragedy5 (1850) received the high praise of such judges as Landor and Browning. It was begun in 1825, and occupied him till his death, being mostly written while he was studying medicine in Germany. In 1890 Mr. Gosse edited an edition of his poetical works in two volumes, with a memoir. See Death's Jest-Book.

BEDE, BEDA, or BZEDA, known as

((The Venerable Bede,55 English historian and scholar, was born in 673 in the territory of the double monastery of Wearmouth and Jarrow, in the county of Durham, and died in the monas¬ ter)'- at Jarrow in 735. At the age of seven he was entrusted to Benedict Biscop, abbot of Wearmouth and one of the best equipped schol¬ ars of the age, who, together with Ceolfrith, abbot of Jarrow, directed his education. All the rest of Bede's life was spent in the mon¬ astery of Wearmouth and Jarrow, which was administered as one foundation though the buildings were some miles apart. In his 19th year he was made deacon, and in his 30th year, priest. He never held positions of higher dignity, refusing the office of abbot because its duties would have interfered with his chosen Avork of ˆlearning, teaching and writing.55 Under Bede, Northumbria became one of the great centres of learning in Europe. He him¬ self gave instruction in Latin, Greek,

Hebrew, astronomy, mathematics, grammar, rhetoric and music; in short, in all the subjects which constituted the learning of the Middle Ages. His knowledge was encyclopedic in character, and all, directed tOAvard the service of the Church, is recorded as having been imparted Avith a vivacity and charm that endeared him greatly to his pupils. Besides attending to his monastic duties and his Avork as teacher, Bede Avrote voluminously. In a brief summary of the main events of his life at the conclusion of his (Historia Ecclesiastica,5 finished in 731, he gives a list of his works amounting to nearly 40 titles. His activities did not cease, however, with the completion of his great history, and at the very hour of his death, as is narrated by his pupil, Saint Cuthbert, he was engaged in dictating a translation of the Gospel of Saint John, now unfortunately lost. Cuthbert states that Bede was a lover of Anglo-Saxon poetry, but the only extant writings in the vernacular which can be connected Avith his name are two lines of a poem known as Bede's (Death Song,5 quoted by Cuthbert. The body of his writings consists of exegetical treatises on the books of the Old and New Testaments, and of treatises on scientific, rhetorical and historical subjects, all written in Latin. His reputation as a mathe¬ matician was very great, and for five centuries following his death his works were standard throughout Europe. For modern readers, how¬ ever, Bede's most interesting and important achievements lie in the field of history. His greatest work is his Ecclesiastical History5 (Historia Ecclesiastica Gentis Anglorum) , a history of England from the earliest Roman

occupations to the year 731. It is written in a charmingly simple and pure style, and is re¬ markable for a degree of critical judgment such hs one would not expect in a monk of the 8th century who had never lived outside his monas¬ tery. It was translated into West Saxon by or under the direction of Alfred the Great, and it was largely used for the earlier entries of the (Anglo-Saxon Chronicled It is still the main source of our information concerning England for the period which it covers.

_ Bibliography.— For Bede's works, consult Migne, (Patrologise Cursus Completus* (Vol. 90) ; Giles, (Opera Omnia) (London 1843). The separate edition of the historical Works,* by Plummer (Oxford 1896), contains much valuable material, among other things the letter of Cuthbert narrating Bede's death. The West Saxon translation of the (Historia) is printed in Wiilker, (Bibliothek der Angel-sachsischen Prosa) (Vol. IV, 1899). For esti¬ mates of the character and work of Bede, con¬ sult Bright, (Chapters of Early English Church History *(3d ed., 1897) ; Brooke, Eng¬ lish Literature from the Beginning to the Norman Conquest1* (1898) ; Hunt, (The Eng¬ lish Church from its Foundation to the Nor¬ man Conquest* (1899); the Introduction to Plummer's edition of his (Ecclesiastical His¬ tory.)

George P. Krapp,

Professor of English, Columbia University.

BEDE, Adam. See Adam Bede.

BEDEAU, be-do, Marie Alphonse, French general: b. Vertou, near Nantes, 1804; d. Nan¬ tes 1863. He won his military fame in Algeria, where he was active in the operations against the Algerians and became general of brigade. In 1847 he was for a short time governor of Algeria. He was in Paris at the outbreak of the revolution of 1848, and was subsequently vice-president of the Constituent Assembly and was made vice-president of it, always voting with the Republican party. As he opposed Louis Napoleon, he went into exile after the coup d'etat of December 1851.

BEDEGUAR, bed'e-gar, or SWEET-BRIAR SPONGE, a mossy roundish gall somewhat resembling a chestnut burr in size and form, but generally more or less reddish or purplish. It is caused by a poisonous fluid injected into the plant by a gall-fly (Rhodites rosce), the larvae of which may be found feed¬ ing upon the plant juices. Like many other vegetable substances, it was believed to be use¬ ful in medicine in cases of sleeplessness, diar¬ rhoea, scurvy, stone, worms, *etc.*

BEDEL, be-del', Timothy, American army officer: b. Salem, N. H., about 1740; d. 1787. In the Revolutionary War he was in command of the American force near Montreal, which surrendered without resistance when attacked by Brant's Indians. He was sick at the time, and the surrender was made by the officer sec¬ ond in command, yet Arnold placed the blame on Bedel.

BEDELL, be-del', Frederick, American physicist : b. Brooklyn, N. Y., 12

April 1868. He was graduated at Yale in 1890, and at Cor¬ nell (Ph.D.) in 1892, was assistant professor of physics at the last named, 1892-1904, and professor of applied electricity since that time;

he is editor of The Physical Review. He has established a high reputation for his investiga¬ tions in alternating currents of electricity. Pub¬ lications : /Principles of the Transformed (1896) ; with A. C. Crehore, Alternating Cur¬ rents* (4th ed., 1901) ; (Direct and Alternating Current Manual* (1909) ; and numerous special articles on physics and electricity. He con¬ tributed the electrical definitions in (Webster's Dictionary* and the definitions of electrical units in the (Standard Dictionary.*

BEDELL, Gregory Thurston, American clergyman : b. Hudson, N. Y., 27 Aug. 1817; d. 11 March 1892. In early life he was rector of the Protestant Episcopal Church of the Ascen¬ sion, New York. In 1859 he was consecrated assistant bishop of Ohio, and in 1873 bishop of that State. He wrote (The Divinity of Christ* ; (The Profit of Godliness* ; (The Age of Indif¬ ference* ; (Episcopacy — Fact and Law*; (A Canterbury Pilgrimage* ; (A Votive Pillar* ; (Memorial of Bishop Mcllvaine* ; and Pas¬ toral Theology.*

BEDELL, William, English clergyman : b. Black Notley, Essex, 1570; d. 1642. He studied at Cambridge, became minister of Saint Ed-mundsbury in Suffolk, and in 1604 went to Venice as chaplain to the Ambassador, Sir Henry Wotton. Here he remained for eight years and became intimately acquainted with the celebrated Fra Paolo Sarpi, who taught him Italian and was taught theology in return. While here Bedell translated the English prayer-book into Italian. On his return to England he resumed the duties of his curacy, but left it in 1615 for the living of Horing-sheath. Here he remained for 12 years, and quitted it to become provost of Trinity College, Dublin. He undertook several important re¬ forms, and successfully accomplished them through the admirable manner in which he tempered firmness with prudence. In 1629 he was appointed to the united sees of Kilmore and Ardagh, but thinking the duties of one sufficient, he retained only Kilmore and insisted on resigning Ardagh. He next turned his at¬ tention to the Roman Catholics, and labored assiduously to convert them to Protestantism. He caused the prayer-book to be translated into Irish and read regularly every Sunday in the cathedral. The New Testament had already been translated, but Bedell had the honor of per¬ fecting the boon by procuring the translation of the Old Testament. In 1641, on the break¬ ing out of the rebellion, his house was for some time the only English one in the county of Cavan which remained uninjured; but at last he was so far involved in the common fate that he was carried off to the castle of Clough-boughter, where he was imprisoned with many others, the only exception in his favor being that he was not put in irons. His works are few and of comparatively little importance. His biography was written by Bishop Burnet.

BEDEN, the Arabic name, in Palestine, of the local species of ibex (Capra sinaitica), which ranges throughout Palestine and along both shores of the Red Sea. It varies little from other ibexes except in having the great horns of the bucks more compressed, and the knobs on their front at less regular intervals. The general color is yellowish, with conspicu-

ous dark markings on the front of the fore¬ legs, chest and back. See Ibex.

BEDESMAN (Saxon, bead, a prayer), was a common suffix to the signature at the end of English letters in the 15th and 16th cen¬ turies, and equivalent to petitioner. The Pas-ten letters, 1460-80, furnished many examples. Sir Thomas More, writing to Cardinal Wolsey, styles himself ((Your humble orator and most bounden bedesman. » Margaret Bryan, the gov¬ erness of Princess Elizabeth, signs herself, in writing to a superior, ((Your dayly bede-woman.®

BEDFORD, Gunning, American patriot: b. Philadelphia, Pa., about 1730; d. September 1797. He was a lieutenant in the French war; entered the Revolutionary army with the rank of major; was wounded at White Plains; be¬ came muster-master-general in 1776 ; was a dele¬ gate to the Continental Congress; and was elected governor of Delaware in 1796.

BEDFORD, Gunning, American lawyer: b. Philadelphia, Pa., 1747 ; d. 30 Marcn 1812. He was graduated at Princeton in 1771 ; became a lawyer ; acted for a time as aide-de-camp to General Washington; represented Delaware in the Continental Congress in 1783-86, and be¬ came attorney-general of the State and United States judge for the district of Delaware.

BEDFORD, Gunning S., American physi¬ cian: b. Baltimore 1806; d. New York, 5 Sept. 1870. His uncle, Gunning Bedford, was one of the framers of the Constitution, first attorney-general of Delaware, aide-de-camp to Washing¬ ton, and United States judge for the district of Delaware. The nephew was graduated in 1825 at Mount Saint Mary's College, Emmets-burg, Md. He took his degree in medicine at Rutgers in 1829. The next three years were devoted to study abroad. In 1833 he became professor of obstetrics in Charleston Medical College. He went from there to Albany, N. Y., at the New College foundation. In 1836 he went to New York, and in 1840 founded the University Medical College. In connection writh this institution he founded the

first free ob¬ stetrical clinic in America. His (Clinical Lec¬ tures on the Diseases of Women and Children* (1855), and Principles and Practice of Obstetrics) (4th ed., 1868) were much used as textbooks.

BEDFORD, John Plantagenet (Duke of), regent of France, third son of Henry IV of England: b. 20 June 1389; d. 1435. Shakes¬ peare, who calls him Prince John of Lancaster, introduces him in his plays of Henry IV as distinguishing himself by his youthful courage in the battle of Shrewsbury in 1403, and form¬ ing a kind of moral contrast to his more dissi¬ pated brother, the Prince of Wales. During the reign of Henry V he participated in the fame acquired by the conquest of France; but his talents were fully displayed when, after the death of that King, he became regent of France, having been appointed to this post by Henry in his will. At Verneuil, in 1424, he displayed his military talents ; and the difficulties which he experienced in endeavoring to maintain posses¬ sion of the conquered provinces in France afforded frequent occasion for the manifesta¬ tion of his ability. The greatest blemish in his character is his cruel execution of the Maid of

Orleans in 1431. He survived this event about four years, and dying at Rouen, wras buried in the cathedral of that city.

BEDFORD, John Russell (Duke of), English nobleman: b. 1766; d. 1839. He was versed in literature, fond of science, and a pas¬ sionate lover of agriculture, to the improvement of which he devoted years of his life and the expenditure of vast sums of money. He was the father of the celebrated statesman, Lord John Russell (q.v.)

BEDFORD, Randolph, Australian author and journalist: b. Sydney 28 July 1868. He led a wandering life, which included working as a supercargo on a river steamer, prospector, re¬ porter, journalistic free lance and mining en¬ gineer. In the latter capacity he wandered over most of the countries bordering on the Mediterranean Sea (1901-05). He is a con¬ stant contributor to magazines, review's and newspapers on a wide variety of subjects. Among his published works are (True Eyes) ; (The Whirlwind* (1903); (Snare of Strength'

(1905).

BEDFORD, England, a parliamentary and municipal borough, situated on the Ouse, county town of Bedfordshire, 50 miles northwest of

London. The chief buildings are the law courts, a range of public schools, a large in¬ firmary, county jail, etc., and several churches. The towm is rich in charities and educational institutions. The most prominent of these is the Bedford Charity, embracing grammar and other schools, and richly endowed by Sir William Harpur, a native of the borough, who was lord mayor of London in 1561, and left to the institution lands, now of great value, in the heart of London. There is an extensive man¬ ufactory of agricultural implements, engineer¬ ing works and breweries. It was one of the earliest centres of the lace trade, originally introduced by Huguenot refugees. The first mention of Bedford in history is in the (Anglo-Saxon Chronicle,* in which, as Bedican-fortha, it was the scene of a battle between British and Saxons in 571. It was burnt by the Danes in 1010. John Bunyan was born at Elstow, a nearby village, and it was at Bedford that he lived and preached, the (Pilgrim's Progress* being written during his long incarceration in Bedford jail. John Howard, the philanthropist, founded the Congregational Church which bears his name, and resided in the vicinity. Pop. (1911) 39,183.

BEDFORD, Ind., city and county-seat of Lawrence County, 65 miles southwest of In¬ dianapolis on the Baltimore & O. S. W., the Chicago, Ind. & L., the Bedford & W., the Monon., and the Terre Llaute & S. E. railroads. It has 21 large quarries of building-stone, the working of which is the chief industry, but there are also railroad shops and roundhouses, sawmills and a foundry and machine shop. There are three banks and one trust company, with resources amounting to $350,000; four schools and six churches. The post-office, pub¬ lic library, Elks' home, city hall and court¬ house are fine stone edifices. Taxable prop¬ erty is valued at $5,000,000. Pop. (1910) 8,716;

(1920) 9,076.

BEDFORD, Nova Scotia, a village of Hali¬ fax County, situated at the mouth of the Sack-

villc River, on the Intercolonial Railroad, north of and close by the city of Halifax. Its site is very picturesque, and it is a favorite summer resort.

BEDFORD, Pa., borough and county-seat of Bedford County, situated on a branch of the Juniata River, and on the Pennsylvania and the Huntington & B. T. M. railroads, 94 miles south¬ west of Harrisburg. It is a place of consider¬ able historic interest, as it was for some time an important military post, was once Washing¬ ton's headquarters, and in 1794 the headquar¬ ters of the troops sent to suppress the Whisky Rebellion. Of interest also are the old court¬ house and soldiers' monument. Bedford Springs, a favorite summer resort, is located about a mile from Bedford. The chief industry is the mining and manufacture of iron. There are also flour mills, planing mills and a large peanut factory. Bedford's first charter, granted in 1795, is still in operation, and provides for a mayor, elected every four years, and a borough council. The municipality owns and operates the waterworks. Pop. (1910) 2,235; (1920) 2,330. Consult <History of Bedford and Somerset Counties) (New York 1906).

BEDFORD, Quebec, capital of Missisquoi County, situated near the northern end of Lake Champlain, 60 miles from Montreal, on the Canadian P. Railroad. Its chief manufactures are knitting-needles, stoves and farming imple¬ ments. Pop. 1,432.

BEDFORD CITY, Va., town and county-seat of Bedford County, 10 miles from Peaks of Otter, on the Norfolk & W. Railroad, mid¬ way between Lynchburg and Roanoke. It has a picturesque situation at the base of the Blue Ridge Mountains, with an elevation of over 1,000 feet. It is the seat of the Randolph Macon Academy for Boys (Methodist Episco¬ pal), of the Belmont Seminary (Presbyterian), of the Saint John's Institute for Girls (Epis¬ copal) and of the Jeter Female Institute (Baptist), and has a high school and pub¬ lic schools. Among the public buildings are the courthouse, new post-office and new Na¬ tional Elks Home. There are three banks. It is in a tobacco-growing region, is the centre of the trade for its district and has tobacco and cigar factories and warehouses, as well as sev¬ eral other industries, including a woolen-mill, flouring-mills, planing-mill, tin can factory and asbestos plant. The value of taxable property is $1,423,120. The government is by common council. Receipts for 1915 were $55,187 ; dis¬ bursements, ˆ $55,337. The waterworks and hydro-electric power and light plant are owned by the municipality. Pop. (1920) 3,243.

BEDFORD LEVEL, England, a tract of land, comprising about 400,000

acres in Cam¬ bridge, Norfolk, Suffolk, Huntingdon, North¬ ampton and Lincoln counties, formerly full of fens and marshes and in rainy seasons for the most part under water. It derives its name from Francis, Earl of Bedford, who in the 1 7th century expended large sums of money in at¬ tempting to drain the district. Numerous cuts have been made, intersecting every part, some so large and deep as to serve as navigable canals. In the Isle of Ely two of these cuts, the Old and New Bedford rivers, running nearly parallel to each other, are navigable for over

20 miles. A great part of the level is under cultivation, and produces grain and some other crops in considerable quantities ; but there is still enough fen to form shelter for vast num¬ bers of wild fowl.

BEDFORD MISSAL, a book made for John Plantagenet, Duke of Bedford (q.v.) and his duchess. This rich volume is 11 inches long, 7j/2 broad and 2 thick, bound in crimson velvet, with gold clasps, on which are engraved the arms of Harley, Cavendish and Hollis, quarterly. It is embellished with 59 large miniature paintings, with over 1,000 of a small size ; and among them are to be seen several portraits of persons of eminence. It was pur¬ chased by Edward Harley, Earl of Oxford, from Lady Worsley, great-granddaughter to W. Seymour, 2d Duke of Somerset, who fig¬ ured in the reign of Charles I; and descended from Lord Oxford to his daughter, the Duchess of Portland. In the year 1786, when the collec¬ tion of the Duchess was brought to sale, it was purchased by Mr. Edwards for $1,100, and was sold again at the sale of the collection of that gentleman, in the year 1815, when it brought $3,350, and came into the possession of the Duke of Marlborough. On coming to the ham¬ mer once more it strongly attracted the atten¬ tion of book-collectors and antiquaries, and realized the unprecedented sum of $5,350, being sold at that price (June 1833) to Sir John Tobin of Liverpool. It is now lodged in the collec¬ tion of the British Museum. In a historical point of view it is interesting on account of its pictorial embellishments, some of which have been engraved by Virtue for his portraits to illustrate the (History of England.* For the antiquarian and the student of the fine arts it is one of the most interesting monuments of that age. The antiquarian Gough published a work describing the Bedford Missal. Dibdin, in his (Bibliomania,) gives an account of it.

BEDFORDSHIRE, England, a south-mid¬ land county, surrounded by Huntingdon, Cam¬ bridgeshire, Herts, Buckinghamshire and Not¬ tinghamshire. It is the fourth smallest English county, with an area of

466 square miles. It lies principally in the basin of the river Ouse, which flows through the famous Vale of Bed¬ ford, rich in cornlands. It is mainly flat, varied by a spur of the Chilterns in the south, and by a range of chalk in the northwest. It is the most distinctively agricultural county in England, over 88 per cent of the area being given over to this industry. The lace industry goes back to the time of Catherine of Arragon, and it received marked stimulus from immigra¬ tions of Flemings in the 16th century following the persecutions of the Duke of Alva in the Low Countries, and from Huguenots who fled from France on the revocation of the edict of Nantes. Other industries are the making of straw plait for hats, sedge-mat making and the manufacture of agricultural implements. The county also produces phosphate of lime, fuller's earth, stone and silver sand. The prin¬ cipal proprietor is the Duke of Bedford, whose seat, Woburn Abbey, dates from the beginning of the 18th century. The county is rich in antiquities, which include the Augustinian priory at Dunstable, the church of Elstow near Bed¬ ford and the pre-Norman churches of Clapham and Levington. The county returns two mem-416

bers to Parliament, for the Biggleswade and Luton divisions respectively. Pop. (1911)

144,588.

BEDIVERE, bed'i-ver, Sir, in Arthurian legend, one of King Arthur's most trusted knights. It was Sir Bedivere who cast the sword Excalibur into the lake and carried the dying Arthur to the vessel in which he was borne away to Avalon.

BEDLAM, a corruption of Bethlehem, the name of a religious foundation granted in 1547 by Henry VIII to the corporation of London, and by them applied to the purpose of a hos¬ pital for the insane. The place was originally within the city boundaries, but in 1814 a new building was erected in Saint George's fields, on the south

side of the Thames, which was called New Bethlehem, or vulgarly, Bedlam. The patients, who had been discharged partially cured, and went about begging, were called Bed¬ lam beggars, or Tom-o'-Bedlams. (What a Bedlam > has become a colloquialism to de¬ scribe any noisy meeting.

BEDLINGTON, England, an urban dis¬ trict of Northumberland, on the river Blyth, five miles southeast of Morpeth. It is an im¬ portant coal-mining centre, and has iron works and chain and nail-making. It has an important ecclesiastical building in the church of Saint Cuthbert, of Norman architecture, which was one of the traditional resting-places of the body of the saint in its miraculous pilgrimage from Durham to Lindisfarne. Pop. (1911)

25,440.

BEDLINGTON TERRIERS. See Ter¬ riers.

BEDLOE'S, or LIBERTY, ISLAND, an

island in New York harbor; ceded to the United States government in 1800; the site of Fort Wood, erected in 1841 and mounted with 77 guns. It is now the location of Bartholdi's colossal statue of (Liberty Enlightening the World,) presented by France to the United States. See Liberty, Statue of.

BEDMAR, Alfonso de la Cueva (Mar¬ quis de), Spanish politician and cardinal: b. 1572; d. Oviedo 1655. He was sent in 1607 by Philip III as Ambassador to Venice, and ren¬ dered himself famous by the conspiracy against Venice which St. Real has so well described. Notwithstanding the circumstantiality with which the details are given by St. Real, the very existence of the conspiracy is still con¬ sidered by many a very difficult historical prob¬ lem. The probability is that the conspiracy was real, but that the Senate, satisfied with having discovered it, and not willing to break altogether with Spain, did not think it advisable to give it much publicity. It forms the subject of Otway's tragedy, ˆVenice Preserved.) Bedmar was obliged to save himself by flight to avoid the fury of the populace, but he did not lose the favor either of his own sovereign or of the Pope. By the former he was appointed gov¬ ernor of the Low Countries, where his severity and rigor made him universally detested; and from the latter he received a cardinal's hat.

BEDNUR, bed -noor', or BEDNORE, In¬ dia, decayed city, now a

village, of Mysore, in the midst of a basin in a rugged tableland of the western Ghats, at an elevation of more than 4,000 feet above the sea, 150 miles northwest of

Seringapatam. It was at one time the seat of government of a rajah, and its population ex¬ ceeded 100,000. In 1763 it was taken by Hyder Ali, who pillaged it of property to the estimated value of $60,000,000, and subsequently estab¬ lished an arsenal here, calling it Hydernager (Hyder's town). It was taken by the British under General Matthews in 1783, but soon re¬ taken by Tippoo, at the head of a superior force, when General Matthews and all the prin¬ cipal British officers were put to death. Pop.

1,000.

BEDOTT, Widow, the literary name of Mrs. Francis Miriam Whitcher, author of the once famous (Widow Bedott Papers. >

BEDOUIN, bed'oo-en or bed'oo-in (Arab, bedawi) , the name given to the nomadic Arabs, as distinguished from those settled in towns and villages and engaged in agriculture and manufactures. The Bedouin inhabit the deserts of Arabia and northern Africa, and are lean and short, but very active and capable of en¬ during great fatigue. They live mainly by hunt¬ ing and pastoral occupations, and very little agriculture is carried on. Their food consists mostly of the produce of their herds, and they enjoy excellent health. Their temperament is cheerful, and they are honorable in their deal¬ ings with one another or with guests. Many of them, however, partly support themselves by robbery, but the statements regarding their marauding propensities seem to have been ex¬ aggerated. They live in tents, but frequently when traveling they sleep in the open air. Their religion is professedly Mohammedan, but is of a very simple character. The women grind corn and weave coarse cloths, and many of the tribes barter horses, camels, cattle, etc., for various necessaries such as arms and cloth. Some tribes gain part of their subsistence by escorting travelers, pilgrims, etc., across the deserts. They are monogamous, but divorce is easily obtained and frequent. Though generally very ignorant, they are by no means unintelli¬ gent; and thev possess the lively fancy of most Eastern nations. The head of a tribe is the sheik, and thev have also judges known as cadis. See Burckhardt, (Notes on Bedouins and Waha-bys) (1830) ; Blunt, (Bedouin Tribes of the Euphrates) (1879).

BEDREDDIN HASSAN, bed-red-den

has-san, the hero of the amusing cream tart story in the (Arabian Nights Entertainments.)

BEDSTRAW, Galium, a genus of about 200 annual or perennial herbs with four-angled stems, natives mostly of the colder climates, whether of latitude or altitude, in the northern hemisphere. The species, which are mostly harsh-feeling weeds, are often attractive for their regular whorls of leaves and their pani¬ cles of profuse minute, white, yellow, green or purple blossoms, which in some species are used by florists to add (<misty delicacy and airy grace® to bouquets, especially of sweet peas, and to cover rock-work in and out-of-doors. The two species most cultivated for this purpose are G. mollugo (European) sometimes called baby's breath (see Gypsophila), and G. boreale (American). Yellow bedstraw or cheese ren¬ net (G. vernum), a species with yellow flowers, is used for curdling milk. Its flower sprays yield a yellow dye when boiled in alum solu¬ tions and its roots a red one, said to rival mad-BEE

tier as a wool dye. For this use attempts at cultivation have been made in England. This species, together with G. trifidum and G. boreale, redden the bones and milk of animals' that eat them in quantity. Goose grass or cleavers (G. Aparine), a troublesome weed common to Europe, Asia and America, yields a seed some¬ times used as a substitute for coffee. It is noted for the hooked prickles of its stems, fruits and leaves. In China B. tuberosum is cultivated for its farinaceous tubers. Some species, for instance, G. mollugo and G. rigidum, have been tried in cases of epilepsy and others in cutaneous disorders.

BEE, Bernard E., American Confederate general: b. South Carolina 1824; d. 21 July 1861. Graduating from West Point in 1845, he served in the Mexican War, after which he was assigned to frontier duty in Minnesota and Dakota. On the outbreak of the Civil War he joined the Confederacy and was killed while leading his brigade at the battle of Bull Run.

BEE, Hamilton Prioleau, American Con¬ federate general: b. Charleston, S. C., 1822; d. 1897. In 1839 he acted as representative of

Texas on the commission which defined the boundary line between Texas and the United States, from the Red River to the mouth of the Sabine. In March 1843 he was sent by President Houston of Texas to negotiate with the Comanche Indians, which was finally suc¬ cessful. Later he became secretary of the Sen¬ ate of Texas, but on the outbreak of the Mexi¬ can War he joined General McCulloch's com¬ mand. On the rupture of hostilities between the Confederate States and the United States, he was made a brigadier-general of the provisional army of Texas, joining the Confederate army the year following.

BEE, any hymenopterous insect belonging to the Apoidea group, the <(genus Apis® of Lin¬ naeus. It was formerly, until quite recently, regarded as the single family of Apidae, or by some naturalists as two families, the Apidae and the Andrenidae. The name now is applied to all those Hymenoptera whose tongues are capable of sipping the nectar from flowers, whose head and thorax are covered with a feathery hair and whose hind legs or feet are dilated. They again are subdivided into some 1,500 variations, ranging from the honey bee of highly developed intelligence to the lesser para¬ sitic bee. In the complexity of their social life and the subdivision of their community func¬ tions the honey bees show even a higher order of intelligence than the ants, standing at the head of the whole insect world in this regard. Their habitat comprises the whole world, though they are most numerous in the warm and temperate climates.

Varieties. — According to the researches of a group of modern naturalists, at the head of which was W. H. Ashmead of the United States National Museum, bees are now classified as a superfamily of Apoidse, of the heterophagous Hymenoptera, and are divided into 14 sub¬ divisions, ranking as families. Of these the chief are the true bees (Apidce) and the bum¬ blebees (Bombidce) which alone live in highly organized communities. The rest are of non¬ social habits, each one nesting by itself. These families are the hairy digger bees; the cuckoo

bees, which invade the hives of the social bees ; the small and the large carpenter bees ; the mason bees ; the leaf cutter bees ; the potter bees; the parasitic bees; the burrowing bees and others, including the Prosopidce, the sim¬ plest and the lowest variety, considered the primitive type from which all the other va¬ rieties have evolved. Of

the solitary varieties the Anthophoridce, or hairy digger bees, are the highest forms. They build their nests in the grounds, at the bottom of horizontal bur¬ rows with lateral chambers. In all these forms the individuals are divided sharply into the two sexes, male and female, in which they differ markedly from the social bees.

The Social Bees. — The honeybees and the bumblebees, constituting the varieties which have developed a highly complex communal life, are described by L. O. Howard in the fol¬ lowing words : <(Each species is composed of three classes of individuals — males, females and neuters. They have the power of secreting wax, from which their cells are made and the larvae are fed from time to time by the work¬ ers. The outer side of the dilated tibiae is smooth and in the workers is hollowed into a shining plate for carrying pollen, which is collected by means of the pollen brushes on the basal joint of the hind tarsi. As a general thing the body is covered with hair.® Of the two families constituting the social bees the bumblebees are the lower, who build their hives underground. Unlike the bumblebees, the honeybees form permanent colonies, storing food for consumption during the winter. The population of one community may sometimes number many thousands. In a wild state they usually build their hives in hollow trees or even in open view among the branches. When their propensity to store food, in the form of honey, was first taken advantage of by man is not known, for there are records of bee-keeping among the early Egyptians and certainly it was an active industry among the Greeks.

The Keeping of Bees. — During the long period in which the honeybees have been semi-domesticated, or adapted to the needs of men, several varieties of them have been developed. It is not uncommon for an artificial hive to hold a bee population of 50,000 individuals. These communities are divided into three classes : the drones, or male bees, compara¬ tively few in number; a single individual, a fully developed female, who performs the func¬ tions of a communal mother, laying an unlim¬ ited number of eggs after only one act of fer¬ tilization, commonly called the (<queen® ; and third, forming the great bulk of the hive's pop¬ ulation, the workers, who perform all the labors necessary to the maintenance of the community. Though also known as <(neuters,® they are in fact females whose generative organs are atrophied, though occasionally some of them will lay eggs.

The Queen Bee. — A few days after she has emerged from her cell, and if the weather is fine, the queen bee makes her first and only exit from the hive, except when the period of swarming arrives. She stands

for a few moments at the entrance of the hive, then, with a buzz, flies rapidly upward, followed by the drones, or males. High up in the air the sexual union between the queen and the swiftest and strongest of the male bees takes place. Hardly

has the act been consummated when the father of the coming generation falls back dead in mid-air and drops to the earth, his mission ful¬ filled. Having been fertilized, the queen re¬ turns to the hive and shortly begins the laying of her eggs, sometimes as many as 3,000 or even 4,000 a day. Meanwhile, the other males are quickly killed off by the workers. On her return to the hive the queen is immediately surrounded by from 12 to 15 of the workers who act as her personal attendants, feeding, cleaning and otherwise attending to all her wants, that she may devote all her energies to the important functions of motherhood.

The Eggs. — The queen now begins depos¬ iting her eggs in the waxen walled cells of the comb, of a bluish color and about one-twelfth of an inch in length. Some authorities contend that she can, at will, lay eggs which will hatch out workers or drones, while others are of the opinion that this depends on the kind of food fed by the workers. At any rate, the cells for the eggs of queen bees, workers and drones differ, but never does the mother bee make a mistake in the kind of egg that each cell de¬ mands. In about three days the eggs hatch out and the wormlike larvae appear. For five days they are carefully fed by the attending workers. At the end of that period they have grown so large as to completely fill their cells, whereupon they refuse further nourishment and the workers immediately seal them up in their cells. The little larva then spins itself into a silken covering or cocoon and trans¬ forms itself into a pupa. Thirteen days later the pupa breaks forth from its cell and emerges a perfect bee. Immediately it is waited upon by the attending workers and for several days, until it makes its first flight, it is fed by its nurses. Meanwhile its cell is thoroughly cleaned out and the queen, making her rounds, deposits another egg in it. * The cell in which the coming queen is developing

is larger than the others and oval in shape. On nearing ma¬ turity the mother makes repeated attempts to break it open, to destroy her coming rival, but the attending workers of her retinue crowd around her and thus protect the royal infant.

Swarming. — As the population of the hive increases the queen bee becomes restless, and this growing agitation extends itself to the workers throughout the hive. Then, one fine da)/, the queen rushes forth, as she has done only once before, the centre of the swarming buzzing colony, which throngs out after her. Not far off, on some hanging bough of a tree, she settles and all the swarm settle on her or on each other, hanging in a long, thick bunch. It is then that the experienced apiarist intro¬ duces the swarming bees into their new hive, where they establish themselves anew. Mean¬ while the young left in the old hive continue the routine of the communal life in their turn. Before many weeks there is a swarming from the newer generation ; often there may be three or four swarms in one season from the one hive.

Wintering. — When cold weather begins, the life of the bee community begins to sub¬ side, the steady hum which can be heard throughout the summer from within dies down and the individuals become sluggish and dull. When the first frosts come they find the bees in a state of semi-hibernation, though not so

deep but what they can readily be awakened. A slight jar to the hive, and the low murmur rises and a thermometer placed at the entrance would indicate a steady rise in temperature. During these winter months the life of the hive is in a state of suspension, though occa¬ sionally the queen has been known to lay eggs in this period. For other varieties of bees see Bee-Keeping; Bumblebee; Carpenter Bee; Honeybees; Leaf-cutting Bee; Mason Bee; Stingless Bee; also Insect.

Bibliography. — • Ashmead, Classification of the Bees) (in the “Transactions of the Amer¬ ican Entomological Society,® Philadelphia 1899) ; Cresson, (Synopsis of Families and Genera of the Hymenoptera North of Mexico* (in the “Transactions of the American En¬ tomological Society,® Philadelphia 1887) ; Franklin, H. J., (The Bombida? of the New World) (in the “Transactions of the American Entomological Society,® I and II, 1912 and 1913) ; Maeterlinck, Maurice, (The Life of the Bee* (English translation, New York 1901) ; Snodgrass, (The Anatomy of the Honey Bee) (United States Department of Agriculture, Bureau of Entomology, Bulletin 18).

BEE-BIRDS, birds that devour bees, espe¬ cially the honeybee. Not many birds have this habit, the bees being protected against most birds by their stings. A few flycatching birds, however, have learned how to avoid being stung, and catch not only bees but wasps, take them to a perch and beat them, so as to kill them, and probably get rid of the sting before swallowing them. Notable among these are the European and African bee-eaters (q.v.). The American kingbirds (q.v.) also catch bees, but not as frequently as is popularly supposed, and are known in the Southern States as “bee-martins.®

BEE-EATER, a small, richly plumaged and graceful bird of southern Europe and northern Africa, whose food consists almost wholly of bees and wasps, and which haunts the neighborhood of the hives of honeybees and devours these useful insects in great numbers. The bee-eaters are related to the kingfishers, and like them dig deep nesting-holes in earthen banks, and lay pure white eggs.

Bee on the wing.

BEE-KEEPING.— Few persons who see the little boxes of honey in the market realize the importance and extent oi the bee-keeping industry of this country. Careful estimates, based on United States statis¬ tics, and the output of large factories for the manufacture of bee-hives and honey-boxes, show that at least 125,000,000 pounds of honey is annually produced, making an aggregate of 5,000 car¬ loads, or a train 35 miles long. The aggregate value of this, at. a conservative figure, is $10,- 000,000. When it is remembered that Califor¬ nia alone, in a good year, can produce 500 carloads of honey, and that a good many of the other States produce from 50 to 100 carloads, one can form some idea of the commercial possibilities wrapped up in so small an insect as the bee.

The honey resources of the great West are very largely dependent on alfalfa and mountain

sage. In the North-Central and Eastern States, clover and basswood, in the South-Central,

tupelo, palmetto, cat-claw, mesquite and guajilla.

There are several races of bees — Apis dorsata, or the giant bee of India and the Philippines; A. Indica, of India; A. florca, and A. mellifica. From a commercial standpoint, the last mentioned is by all odds the most im¬ portant. It comprises the black or German bees of this country; the Italians, from the southern part of Italy; the Syrians, of Pales¬ tine; the Cyprians, from the island of Cyprus; the Carniolans, from Austria, and the Tuni¬ sians, from north Africa. But the most import¬ ant of all these varieties is the Italian. They are the most industrious and the gentlest. They, together with the black or German bees and their crosses, incorrectly termed ˆhybrids,® are used most extensively in the United States — in fact, throughout almost all the civilized

Bee on Red Clover.

world.

Three Kinds of Hive Bees. — There are three kinds of bees in the hive; namely, the workers, or undeveloped fe¬ males ; the queen, a fully de¬ veloped female ; and the drone, or the male bee. The queen lays all the eggs of the hive, and may lay as many as 3,000 a day. Notwithstanding there may be from 10,000 to 100,000 bees in a single colony, the queen will be the mother of the whole colony. The drones are incapable of gath-Queen Bee. ering honey, and serve only one purpose — that of fertilizing or fecundating the young queens, which act takes place in the air. The workers gather all the honey and pollen, fill all the combs and rear the young or baby bees. As soon as the mating season is over, the drones

are shoved out of the hives and allowed to starve.

How to Handle Bees. — There is a general impression to the effect that the ordinary honeybees are vicious, even in a towering rage, ready to attack any one who comes near their hives. This is a great mistake. Under certain conditions, when their habits are known, they can be handled almost like kittens ; will permit one to tear their hives apart, rob them of their months and months of hard earnings — the honey and the wax — without even offering to sting. But an inexperienced or awkward per¬ son may infuriate them to fearful vengeance. To bring them into a state of subjection it is only necessary to blow smoke into the entrance and over the combs, when, if the motions about the hive are careful and deliberate, they will offer no attack. Smoke, when intelligently used, disarms opposition, puts the bees in a quiet state and enables their owner to do with them, within reasonable limits, whatsoever he will.

The bee-smoker is simply a small bellows attached to a sort of tin cup having a suitable snout from which the smoke is blown by the ac¬ tion of the bel¬ lows, forcing air through the cup in which there is a slow-burning fuel. Besides the bee-smoker, the bee-keeper gener¬ ally uses a bee-veil made of mos¬ quito netting,

Brussels net or any suitable mate¬ rial, the same fas- ,

tened to the rim of the hat and tucked inside of the coat-collar or under the suspenders. Gloves are sometimes used by very timid per¬ sons or beginners, but as a general thing all work with the bees is performed with the bare hand. Stings are, of course, occasionally re¬ ceived, but beyond a sharp, momentary pain no permanent effect will be felt after the first sea¬ son, for the system of the bee-keeper very soon becomes inoculated so that no swelling takes place. There are many who receive from 10 to 20 stings a day without any ill effects ; but if one will work carefully he will receive almost no stings.

Marketable Products of the Hive. — These are beeswax, comb and extracted honey, propo¬ lis or bee-glue (sometimes used for making shoe polishes) and <(apis mellifica,® a homeo¬ pathic preparation taken from the poison sacs at the root of the stings of bees.

Production of Wax. — Beeswax, which is secreted by the bees and used by them for building their combs, is an important commer¬ cial product and commands a good price in the United States. There are frequently combs to be melted up, and it pays to take care of even scraps of comb and the cappings taken off in extracting. A common

method of tak¬ ing out the wax is to melt the combs in a solar wax-extractor. Various wax-presses are on the market, but if much wax is produced, it is advisable that the bee-keeper make a care¬ ful study of the methods of wax extraction,

as there is usually much wax wasted even after pressing.

Section of Comb Honey.

Comb Honey Production. — Comb honey is usually put up in little square or oblong boxes, of which something like 50,000,000 are made and used in the United States annually. The honey in these boxes retails all the way from 12 to 20 cents. Extracted honey is in the liquid form, thrown from the combs by means of centrifugal force in a honey-extractor, hence the name. There are bee-keepers who make a specialty of producing honey in the comb and others the same product free from the comb. The first mentioned cannot be adulterated or manufactured, newspaper re¬ ports to the contrary. One bee-keeper of con¬ siderable standing and prominence has had a standing offer of $1,000 for a single sample of artificial comb honey so perfect as to deceive the ordinary consumer. Notwithstanding that this offer has been broadly published over the United States for over 20 years, no one has ever claimed it.

It may be well to explain that a partial basis for these canards lies in the fact that beeT keepers use a commercial product known as ((comb foundation,® which is nothing more or less than sheeted wax, about an eighth of an inch thick, embossed on both sides with in¬ dentations having the exact shape and form of the bottom of the cells of honey-comb — hence the name. It is put into the hive, where the bees draw it out into comb. This is as far as the skill of man can go ; hence there is no such thing as artificial comb, much less arti¬ ficial comb honey.

Bee Hive for Comb Honey.

The business of producing comb honey re¬ quires some knowledge of the trade. Hives and

supers require to be specially constructed and so arranged that the little boxes containing strips of comb foundation shall be accessible to the bees where they can construct the founda¬ tion into comb, fill the cells with honey and seal them over. When their owner finds that his little servants are busily at work in the

Comb Honey-Super.

fields ; that the combs are beginning to whiten and to be bulged with honey in what is called the brood-nest, he puts on his honey-boxes in the part of the hive he calls the <(super.® These are allowed to remain on during the height of the honey-flow until they are filled and capped over, when they are removed and others put in their place.

The business of producing extracted (or liquid) honey requires the same intelligent care and attention. Instead of section-boxes, how¬ ever, an extra set of combs, or ˆbrood-frames,® as they are called, is put in the upper story, the same being placed above the lower or brood part of the hive. When these are filled with honey and capped over, they are removed from the hive by first shaking the bees off, taken to the extracting-house and extracted. The thin film of wax covering the comb is shaved off with a thin-bladed knife specially designed for the purpose. After the combs are uncapped, they are put in the honey-extractor and re¬

Honey Extractor.

volved at a high rate of speed. The honey flies out of the comb by

centrifugal force against the sides of the extractor, when the combs are reversed, exposing the other surfaces, which are emptied in a like manner. They are next returned to the hive to be filled by the bees,

when the process may be repeated as long as the season lasts.

Uncapping Can.

Swarming. — At the beginning of or during what is called the honey-flow, when the colony has reached a high state of prosperity and the combs are being filled with honey, a swarm is liable to come forth between the hours of 9 and 3 o'clock. Three-fourths of the bees, in¬ cluding the queen, are pretty sure to come out with a rush, filling the air with thousands and thousands of them. The bees hover about in the air for 15 or 20 minutes, when they will in all probability cluster on some bush or tree. They will wait here for two or three hours, or perhaps as many days, at the end of which time they will take wing again and go direct into some hollow tree or cave where they will take up new quarters and start housekeeping anew. The young bees, with one or more young queens, are left to take care of the old hive.

In ordinary practice it is a custom for the bee-keeper to rehive the swarm by taking the bunch of bees, as soon as it clusters, and putting it into another hive. Or he can, if he chooses, clip the old queen's wings, preventing her flieht with the swarm ; and when the bees come forth she will crawl out of the entrance to be cap¬ tured by her owner, and as soon as her subjects return, which they will do to find their royal mother, they are allowed to go into a new hive on the old stand, while the old hive is carried to another location in the bee-yard.

Prevention of Swarming. — Since crowded and overheated hives are particularly conducive to swarming, this tendency is largely overcome

by giving plenty of ventilation and additional room in the hive. Shade is also a good pre¬ ventive. Frequent examinations of the hive during the swarming season for the purpose of cutting out queen cells is a help, and re¬

queening with young queens early in the sea¬ son generally prevents swarming. A better method, according to some, is to remove brood about swarming time and thus reduce the amount of bees in the hive. There are gener¬ ally colonies in the apiary to which frames of brood can be given to advantage. Various non¬ swarming devices have been invented, including a non-swarming hive so constructed that there is no opportunity for the bees to form a dense cluster.

Robbing. — There are certain times during the season when no nectar is secreted by the flowers. It is during such periods as this that the bees will rob each other if they can or help themselves at candy-stands or to the house¬ wife's fruit-preserves during the canning sea¬ son. When sweets can be obtained in consider¬ able quantity, either from a weak colony unable to defend itself or from man, the bees are apt to become furious and their craze is not unlike that of gold-hunters when gold is discovered in large quantities. There is a rush; and when the sweets are suddenly cut off, the bees are in¬ clined to be cross and to sting. The wise and careful bee-keeper will see to it that the en¬ trances of his weak colonies are properly con¬ tracted so that the sentinels or guards can protect themselves from intrusion from other bees.

Feeding. — The bee-keeper may, perhaps, take all the honey away from his bees, or nearly so, as his honey will bring two or three times as much as any cheap syrup costs him. Some¬ times he finds it profitable to take the honey all away and give them syrup made of granulated sugar. The purpose of this, of course, is to keep them from starving during the time no honey is coming in from natural sources or during the winter.

Transferring. — In increasing the apiary it is sometimes best to buy colonies in box hives on account of their smaller cost, and to trans¬ fer them to hives with movable frames. This should be done as soon as possible, for box-hive colonies are of small value as producers. The best time to transfer is in the spring, when the amount of honey and the population of the colony are at a minimum. Transferring need not be delayed until spring merely because that season is best for the work. It may be done at any time during the active season, but,

when¬ ever possible, during a honey-flow, to prevent robbing.

Uniting. — After the honey-flow, and just before winter comes on, there are liable to be many weak colonies. It is a common practice to put two or more of these together so as to make one strong stock. The combs from two * or three different hives are put into one hive and the bees are confined for several days with wire cloth over the entrance, when they arc allowed to fly. Some of them will return to their old stands but the majority of them will remain. .

Wintering. — Two methods are in vogue in the colder portions of the United States. One is to put the colonies in double-walled hives, packed under chaff cushions, and contracting the entrances down to shut out as much cold as possible. The other is to put the summer hives into a dry, dark cellar as soon as cold weather comes on, leaving them there till spring.

Diseases of Bees. — Bees are subject to dis¬ eases, like all domestic animals, such as dysen¬ tery, paralysis and foul and black brood. Dys¬ entery, as its name signifies, is a sort of bowel trouble due to the retention of the feces for an extended time during winter. If the bees are shut up without a chance for flight (for they never void their feces inside of the hive except when confined), their intestines become dis¬ tended and this finally results in purging. The only remedy is warm weather and a flight. Paralysis is a form of palsy that seems to affect the adult bees. Their bodies become swollen and shiny, the affected individuals crawling out of the entrance and running into the grass to die. The remedy is to sprinkle powdered sul¬ phur over the combs. Foul brood and black brood are germ-diseases that affect bees in the larval or imago state. The little maggots be¬ come brown or black and die, the dead matter finally assuming a sodden, gelatinous or ropy condition. When it attacks a colony, shake the bees into a clean hive and put them on frames of foundation. For three or four days feed them sugar syrup. The old combs, including the frames, must be burned. If the hive has been soiled by the tainted honey or dead matter, it must be scalded out or held over flames for a few seconds.

Any honey taken from the hive may be rendered safe to give to the bees by boiling it for two hours.

A number of insects, birds and mammals must be classed as enemies of bees, but of these the larger wax moth, the lesser wax moth and ants are the only ones of importance. Moth larvae often destroy combs. To prevent this the combs are fumigated with sulphur fumes or bisulphide of carbon in tiers of hives or in tight rooms. In warm climates ants are a seri¬ ous pest. The usual method of keeping them out is to put the Five on a stand, the legs of which rest in vessels containing water or creo¬ sote. Another method is to wrap a tape soaked in corrosive sublimate around the bottom board.

Bibliography. — Root, (A B C of Bee Cul¬ ture1 (1903) ; Miller, (Forty Years Among the Bees1 ; Langstroth, (Thc HoneyBee,1 revised edition (1889) ; Hutchinson, (Advanced Bee Culture1 (1902) ; Cook. (Manual of the Apiary1 (1902); Root, Quinby, (New Bee-keeping1; and the following periodicals: American Bee Journal, published in Chicago, Ill. ; Gleanings in Bee Culture, Medina, Ohio; Bee-keepers' Review, Flint, Mich.; American Bee-keeper, Fort Pierce, Fla. ; Progressive Bee-keeper, Higginsville, Mo.

E. R. Root,

.Author of (A B C of Bee Culture 1 and Editor of (Gleanings in Bee Cultured

BEE-KILLER, one of the robber-flies (q.v.), of the dipterous family Asilidcu, some of which are known to seize with their sharp lancet-shaped beak bumblebees and honeybees and suck their blood* This species Trupanea apivora, the bee-killer, captures the honeybee while on the wing, and one such fly has been known to kill 141 bees in a single day. These flies are stout-bodied, hairy or bristly, with a long abdomen ; the mouth-parts are much de¬ veloped and adapted for piercing. The mag¬ gots live in the soil, preying on the grubs of beetles, or on the roots of plants.

BEE-LARKSPUR. A well-known flow¬ ering plant, Delphinium grandiflorum.

BEE-LINE. The shortest route to any place, that which a bee is assumed to take; though, in fact, it often does differently in its flight through the air.

BEE-LOUSE (Braula coeca), is a parasite on the honeybee, occurring on the thorax es¬ pecially of the queen bee — rarely on the drones. Benton states that he has at one time removed as many as 75 from a queen, though the numbers do not generally exceed a dozen. It is the sole member of a family (Braulidce) of flies closely allied to the horse flies (Hippo - hoscidce) and the bat-ticks (q.v.). The bee-louse is about one-twentieth of an inch in length, entirely without wings, and somewhat spider-like in appearance. On the day the mag¬ got or larva hatches from the egg it sheds its skin and turns to an oval puparium of a dark-brown color. It has frequently been imported to this country on queens with attendant bees but has gained no foothold.

BEE MOTH, or WAX MOTH, a moth belonging to the family Galleridce ; specifically, Galleria mellonella, the larva of which feeds on wax in hives. The worm is yellowish-white with brownish dots. It constructs silken gal¬ leries running through the comb of the bee¬ hive on which it feeds. When about to trans¬ form it spins a thick white cocoon. Two broods of the moth appear, one in the spring, the other in August, and the caterpillars mature in about three weeks. It may become a most troublesome pest in the apiary.

BEE-ORCHIS, the name of a species of orchis, the Ophrys apifera. It is so called be¬ cause a part of the flower resembles a bee. It is large, with the sepals purplish or greenish-white, and the lip brown variegated with yellow.

BEE-TREE, a forest tree inhabited by honey-making bees, which have taken posses¬ sion of some natural hollow and filled it with combs. Such a tree may be found by accident, or by deliberate hunting. Those in search take to the edge of the woods a box of diluted honey, and when they see bees near them, open the bait to which one by one the bees will be at¬ tracted. The direction of their flight is then carefully observed; the bait is moved to an¬ other point, and new observations taken, and the converging lines followed until they inter¬ sect at the tree. As most of these bee-tree colonies are escaped swarms the capture of the bees themselves is more important than merely to get such honey as may be there. The best plan is therefore to climb to the nest, if pos¬ sible, and gather the combs and contents to be let down in a pail or basket, or else saw out the whole section of the tree containing the nest and lower it to the ground. Full direc¬ tions for this complicated proceeding are given by Root, (A B C of Bee Culture1 (1903).

BEEBE, Charles William, American orni¬ thologist : b. Brooklyn, N. Y., 29 July 1877. Graduating from Columbia University, he was, in 1899,

appointed ornithological curator for the New York Zoological Society. As such he founded the collection of living birds at the New York Zoological Gardens, making it one of the best in the world. Later he was at the bead of various scientific expeditions to Nova

Scotia, Florida, Mexico, South America, India and China. In his search for data for a mono¬ graph of pheasants he made a trip costing the Zoological Society over $100,000. He is the author of ‘ Notes on the Psychology of Birds) (1903) ; (Two Bird Lovers in Mexico) (1905) ; (The Bird’ (1906) ; ‘The Log of the Sun’ (1906); (Geographic Variations in Birds with Reference to Humidity) (1907); ‘Ecology of the Adult Hoatzin) (1909) ; ‘An Ornithological Reconnaissance of Northeastern Venezuela) (1909) ; (Our Search for a Wilderness) (1910) ; ‘Racket Formation in the Tail Feathers of the Motmot’ (1910); ‘Monograph of the Pheasants) (1916).

BEECH, a small genus (Fagus) of hand¬ some forest trees of the family Fagaceco. The American beech (Fagus grandifolia) , and the European or common beech (F. sylvatica), are closely similar. They often attain heights ex¬ ceeding 80 feet, and diameters greater than three and one-half feet. The former has smooth, light-gray bark, a broad round head, and leaves which turn yellow before they fall in the autumn ; the latter has dark-gray bark, and has shining leaves which persist during most of the winter. The tree scarcely bears fruit before the 50th year of its age, and then not every year. After the 140th year, the wood-rings become thinner. The tree lives for about 250 years. Some stems are fluted, some even twisted. The roots stretch far away, near to the surface of the soil, partly above it. Young beeches are useful for live hedges, as they bear pruning, and as their branches coalesce by being tied together, or by rubbing each other. Ampu¬ tations of limbs, and deep incisions in the tree, soon become obliterated by the bark. The dead leaves are often used by the poor of Europe for stuffing beds and pillows. Both species yield pleasant, edible, three-angled nuts, usually in pairs in prickly involucres. These nuts are eaten by swine, deer and poultry, and in France, and to some

extent elsewhere, are pressed to extract a mild culinary long-keeping oil. Both species thrive in light, limy loams, upon which formations they often become the leading species of tree, covering large tracts. They do not grow in damp situations. Their reddish-brown, solid, hard but brittle wood makes excellent fuel, and is largely used for making tool handles where bending and twist¬ ing are not expected. The wood is not dur¬ able in contact with soil, but since it is remark¬ ably lasting when immersed in water, it is largely used in dams, water-mills, sluices, *etc.* The wood of the European species is preferred to that of all other species, except walnut, for making shoes (sabots), in France, since it is remarkably resistant to the entrance of water. The bark is sometimes used in tanning. Both species are used in ornamental planting on ac¬ count of their symmetrical forms, the colors of their bark and foliage, which latter is remark¬ ably free from the attacks of disease and insects. The European species has produced a large number of varieties, of which the copper or purple beech is probablv the best known in America. F. sieboldii . a native of eastern Asia, is sometimes planted for ornament. F. betuloi-des, a Terra del Fuegian species, is a striking feature of the winter landscape on account of its evergreen foliage. Its wood is used for

flooring vessels, and is exported to the Falkland Islands and elsewhere for roofing. Blue or water beech, better known as American horn¬ beam (Carpinus amcricana) , is a common tree in damp woods and along streams. It is not a member of this genus. See Hornbeam.

From the wood of the beech an especially pure form of creosote is obtained that is largely employed in the treatment of chronic lung dis¬ orders. See Creosote.

BEECHER, Catherine Esther, American educator and philanthropist, eldest daughter of Lyman Beecher: b. East Hampton, L. I., 6 Sept. 1800; d. Elmira, N. Y., 12 May 1878. Her faith and life were nearly wrecked at 22 by the loss of her betrothed, Prof. A. M. Fisher of Yale, in a shipwreck, and she lived unmarried, plunging into work as a relief ; but she had the Beecher energy which could hardly have re¬ mained quiet in any case. From 1822 to 1832 she managed a girls' school in Hartford, Conn., with remarkable success and repute ; she wrote some of her own classbooks, one on mental and moral philosophy being afterward used in col¬ leges. From 1832 to 1834 she kept a similar school in Cincinnati, in order to be with her father, who was at the head of Lane Seminary; but her health compelled her to abandon it. For the rest of her life she worked with heart and soul to

advance the education of women and girls, physical and social, as well as intellectual and moral, for she believed in the full harmony of all inborn human qualities. She organized a “National Board of Popular Education,® to train women teachers, especially for the South and West, and traveled and wrote extensively in this behalf. As with most persons of much force, she had many “fads® and eccentricities ; but she was a high-minded, accomplished and charming woman, of great wit and executive capacity. Her first work was on the ‘Difficulties of Religion ’ (1836) ; among others were ‘True Remedy for the Wrongs of Women’ (1851) ; ‘Physiology and Calisthenics’ (1856) ; ‘Common Sense Applied to Religion’ (1857); ‘Woman’s Profession as Mother and Educator, with Views in Opposition to Woman Suffrage’ (1871).

BEECHER, Charles, American clergyman, son of Lyman Beecher: b. Litchfield, Conn., 7 Oct. 1815 ; d. Haverhill, Mass., 21 April 1900. He was educated successively at the Boston Latin School, the Lawrence Academy at Groton, Mass., and at Bowdoin College, graduating 1834. He then studied theology under his father at Lane Seminary, Ohio, and in 1844 was ordained pastor of a Congregational church at Fort Wayne, Ind. Leaving there in 1851, he was pas¬ tor in Newark, N. J., till 1854, and in 1857 took charge of a church in Georgetown, Mass. He lived in Florida, 1870-77, and was State superin¬ tendent of public instruction there for two years and was stated supply at Wvsox, Pa., in 1885. His best work was in selection of the music for the famous ‘Plymouth Collection’ of hymns, he having fine musical taste. He wrote ‘The In¬ carnation’ (1849) ; ‘David and His Throne’ (1855); ‘Pen Pictures of the Bible’ (1855); ‘Redeemer and Redeemed’ (1864) ; ‘Spiritual Manifestations’ (1879) ; and ‘Eden Tableau’ (1880). He also edited his father’s autobiogra¬ phy and correspondence (1863).

BEECHER, Charles Emerson, American palaeontologist: b. Dunkirk, N. Y., 9 Oct. 1856;

d. New Haven, Conn., 14 Feb. 1904. He was graduated at the University of Michigan 1878, studied under Prof. James Hall at Albany, N. Y. ; in 1888 was given a position in this depart¬ ment at

Yale; in 1892 was made professor of historical geology; and in 1892 succeeded Prof. O. C. Marsh as professor of palaeontology and curator of the geological collections. He was author of over 50 papers in scientific periodicals, and the proceedings of scientific societies, chief¬ ly on evolution, especially as illustrated by the growth and structure of trilobites, and on the classification of trilobites and brachiopods ; a number of these and similar studies on other organisms were collected as (Studies in Evolu¬ tion > (1901), one of the Yale bicentennial pub¬ lications. He also published a memoir on the Brachiospongidce in the Yale Peabody Museum Memoirs (1889).

BEECHER, Edward, American clergyman, son of Lyman Beecher: b. East Hampton, L. I., 27 Aug. 1803; d. Brooklyn, N. Y., 28 July 1895. Graduating at Yale 1822, he studied theology at Andover and New Haven, and in 1826 was or¬ dained over Park Street Church in Boston; which he left in 1830 to take the presidency of Illinois College, Jacksonville, Ill., a theological school, whence many of Dr. Beecher's pupils went to be pastors and teachers in the new West. He returned to Boston in 1844 as pastor of the Salem Street Church; in 1856 went to the Congregational church at Galesburg, Ill., remaining till 1872, also holding for some years a professorship of exegesis at Chicago Theo¬ logical Seminary. He had been a regular writer for the Christian Union since 1870, and in 1872 retired from the ministry, removed to Brooklyn and devoted himself entirely to writing and missionary work, contributing to the Christian Union, and editing the Congregationalist for six years. Of his books, the two most discussed were (The Conflict of Ages) (1853), and (The Concord of Ages' (1860), a transference into terms of Christian theology of the doctrines of pre-existent and continuously existent souls and the dualism of good and evil, the struggle of the two being prolonged into a future life and good finally triumphant. Besides sermons, etc., he also published a (History of the Alton Riots* (Cincinnati 1837) ; <Baptism) (1850) ; JPapal Conspiracy Exposed* (1855) ; (History of Opin¬ ions on the Scriptural Doctrine of Future Retri¬ bution } (1878).

BEECHER, Henry Ward, American cler¬ gyman, son of Lyman Beecher: b. Litchfield, Conn., 24 June 1813; d. Brooklyn, N. Y., 8 March 1887. He was the offspring of a union which has produced some of the world's great¬ est influences, and in theory ought always to produce them — of a stern, energetic, high-principled father, with a sweet and beauty-loving mother, giving power and continuity to sensibility and sympathetic emotion. Macaulay and Victor Hugo are notable instances in this respect. Beecher had a rather bare, hard childhood, under a father and stepmother who both considered duty and enjoyment hardly compatible. The great genial orator who

shouted down and won over hostile mobs was a shv and sensitive boy; the editor, author and booklover had a wretched memory, disliked study and wanted to go to sea. But the reli¬ gious atmosphere was around him ; ˆconverted'*

in a revival, he decided to train for the min¬ istry, entered the Boston Latin School in 1826, then the Mount Pleasant School at Amherst, graduated from Amherst College in 1834, and began a theological course under his father at Lane Seminary. He revolted at his father's sulphurous theology, however, and for a short time in 1837 was editor of an anti-slavery paper in Cincinnati, fervid love for humanity holding first place with him then as always. Later in the year he took charge of a country church at Lawrenceburg, Ind., and married Eunice White Bullard of West Sutton, Mass., to whom he had been seven years engaged. In 1839 he was called to a church in Indianapolis, then a town of 4,000 people, remaining there eight years and becoming widely known both as a revivalist of great power and as a preacher of delightful humor and originality. In 1847 he was called to Brooklyn to take charge of a new church of nine members, called Plymouth Church. He held this pastorate for 40 years, lacking a few months; and for the most of the time the church was not only a Mecca to the vast class seeking to retain Christianity while forced to discard very much in the way of theology, but the fountain of a stream of in¬ fluence acting powerfully on the moral and social, and sometimes the political, tendencies of the age. He preached on whatever related to the public welfare, probed every evil and championed every reform, especially of intem¬ perance and slavery. His outspoken courage, strength of thought and felicity of expression, his exhaustive wealth of eloquent rhetoric, humor and pathos, dramatic force and apt analogy and illustration, not only drew to hear him one of the largest permanent congregations in the United States — his immense church with its seating capacity of nearly 3,000 being constantly crowded — but made his pulpit one of the most famed and influential of the Eng¬ lish-speaking world ; his utterances forming a basis of action for many. He was not a the¬ ologian in any sense, and his influence rested on his abstinence from credal logic; he was the spokesman of those who fear that if they compute their doctrinal latitude they may dis¬ cover much more than they wish to know, and prefer to keep the fruits of faith by evading exact definition rather than lose them by a rigid self-inquiry. To the orthodox of his day he seemed an underminer ; though to many at the present he seems conservative enough. He believed in the divinity of Christ, in immortal¬ ity, in special providences and miracles, in the Bible as a divine revelation by

fallible human instruments ; he did not believe in eternal pun¬ ishment (which he publicly denied in 1878), election and reprobation, the fall of Adam, the vicarious atonement, or imputed sin and right¬ eousness ; and he declared the orthodox Deity (<barbaric, heinous, hideous.** He gave his whole soul to the work of preaching, often de¬ livering several discourses in a single day; but such was his physical and mental vigor that he accomplished work in several other directions sufficient in each case for an able and lusty man. He was one of the giants in oratory of the anti-slavery time ; and none of the champions of the cause was more hated and reviled than ((the abolitionist Beecher,® whose work was ex¬ celled only by that of his great sister. He left his pulpit in the Fremont campaign to de-HENRY WARD BEECHER

nounce the Kansas crime, joining the Repub¬ lican party on its inception and traveling great distances to speak at its meetings. Yet he was not an abolitionist like Phillips and Garrison; and like Lincoln and the mass of the Repub¬ licans, held that Congress could not interfere with slavery in the South, but only prevent its extension. The Pro-Slavery party drew no fine distinctions, however, and the Northern Demo¬ cratic papers all through this period are filled with denunciation and caricature of him. His series of speeches in England in the fall of 1863 helped to turn the tide of English opinion in favor of the North. The prime element of his success was his enormous physical vitality : he tired out the mobs which attempted to howl him down, by actual bodily endurance and power of lungs, before he began the splendid addresses which made them at least enthusiastic admirers of himself, if not perhaps converted believers in the cause he represented. He had the ((rapture of the strife® which Attila knew: he loved to be the target of a ring of opponents as well as John Quincy Adams, though with¬ out his bitterness, and was as instant and un¬ failing in retort ; a dozen taunts hurled at him in a breath met a dozen crushing but never malicious answers. He was for many years one of the most popular lecturers and. after-dinner speakers in America. Of his set ora¬ tions, those at the Burns centennial of 1859, and by

government request at Fort Sumter, in April 1865, on the anniversary of its capture by the Confederates, are most famous. He occupied several editorial positions : editing the Independent 1861-63; founding the Christian Union , editing it 1870—81 ; was a fertile sketch writer, and wrote a novel and a (Life of Christ.' Besides this, he was an enthusiastic amateur farmer, and loved outdoor nature passionately, as well as art and the drama. His open, im¬ pressible, sensitive nature responded readily to all things that stimulate the intellect, the heart or the soul. He was essentially a man of im¬ pulses and inspirations, trusting to the spon¬ taneous suggestion of the moment, often not even making notes for a sermon, but like all men who make any impress on the world, kept himself filled with material for inspiration to work on, both from books and life. He always lamented that it had not been permitted him to lead a life of scholarship; but in fact he did not lead it because he was not willing to pay the price for it, of abstinence from leadership in the political and social life of the time. He never lacked courage to take a side, right or wrong, and often grieved and alienated large bodies of his friends by doing so when passions were hot. He was a firm adherent of the Seward-Johnson policy of reconstruction in 1866, despite the terrible results to which its prematurity led ; sympathized with the Greeley movement in 1872 ; and braved a threatened disruption of his church in 1884 by voting and speaking for Grover Cleveland. He believed in and advocated free trade and woman suff¬ rage. So brave and impulsive a nature was always shocking the conventions of his order. Naturally, he was forever perpetrating indiscre¬ tions in speech, to the delight of his enemies and the discomfiture of his friends. Tact was unfortunately not a large inheritance of most of Lyman Beecher's children, and the paucity of Henry Ward's share was the cause of many

an inept and unfortunate public utterance; while his fertility of comparisons and analogies often led him into pithy exaggerations and a humorous extravagance of language which his opponents could easily disprove in the letter.

In 1874 Mr. Beecher's former associate and later successor in the editorship of the Inde¬ pendent, Theodore Tilton, charged him with criminal intercourse with Mrs. Tilton. A com¬ mittee of Plymouth Church examined the case and exonerated Mr. Beecher; but Tilton had brought suit for $100,000 against him, and after a six months' trial the jury disagreed, a week's confinement and 12 ballots showing three for the plaintiff and nine for the defendant. The long public scandal seriously affected Beecher's in¬ fluence with the outside public, but

his own con¬ gregation stood loyal to him ; and while his (Life of Christ) was unsalable, and the last two volumes not published till long after his death, his sermons and some of his essays re¬ main popular.

Mr. Beecher's first literary work was done in his Indianapolis pastorate, where he edited an agricultural paper, and wrote for it articles afterward republished as (Fruits, Flowers, and Farming) ; and published his first book, lec¬ tures to Young Men' (1844). For 20 years after coming to Brooklyn he contributed regu¬ larly to the Independent, signing with a (*), whence the two-volume collections of 1855 and 1858 were termed ((Star Papers.® He was also for some time a regular contributor to the New York Ledger of (<Thoughts as They Oc¬ cur,® collected in 1864 as ((Eyes and Ears® ; and wrote serially for it his one novel, <Norwood) (1867). His sermons were reported in full after 1859, and the collected volumes are termed (Plymouth Pulpit. ' A two-volume selection revised by the author was issued by Lyman Ab¬ bott in 1868; other compilations from them are (Life Thoughts) and (Notes from Plymouth Pulpit' (1859); (Pulpit Pungencies' and (Royal Truths' (1866) ; (Morning and Even¬ ing Devotional Exercises' (1870) ; and Com¬ forting Truths' (1884). For some years, also, his prayers, of great charm and high quality as compositions, were taken down by stenographers and a collected volume issued in 1867. Other of his works are: (Freedom and War' (1863) ; (Aids to Prayer' (1864); (Lecture-Room Talks' (1870) ; Wale Lectures on Preaching' (3 vols., 1872-74) ; (Evolution and Religion' (1885). Individual sermons and addresses were published also, such as (The Strike and Its Lessons' (1878); (Doctrinal Beliefs and Un¬ beliefs' (1882); (Wendell Phillips' (1884); (A Circuit of the Continent' (1884). He also edited the famous (Plymouth Collection' of hymns (1855) ; and (Revival Hymns' (1858). His life was written before his death by Lyman Abbott (1883), and Samuel Scoville (1888); see also Autobiographical Reminiscences of Henry Ward Beecher,' by T. J. Ellinwood, who was his private stenographer for 30 years.

Mr. Beecher's wife, Eunice White Bul¬ lard, was born in West Sutton. Mass., 26 Aug. 1812; d. Stamford, Conn., 8 March 1897. She wrote articles for periodicals, some of them afterward collected; also (From Dawm to Day¬ light' (1859), a story of her early married life; (Motherly Talks with Young Housekeepers' (1875); (Letters from Florida' (1878); (Ali Around the House' (1878) ; and (Home'

(1883). Consult Currier, A. H., ‘Nine Great Preachers* (Boston and New York 1912) ; Hillis, N. D., (Lectures and Orations by H. W. Beecher) (New York 1913) and (What the Republic Owes to Henry Ward Beecher * (Homiletic Rev., Vol. 65, pp. 437-43, New York 1913).

George Edwin Rines.

BEECHER, James Chaplin, American clergyman, son of Lyman Beecher : b. Boston, Mass., 8 Jan. 1828; d. Elmira, N. Y., 25 Aug. 1886. He was graduated at Dartmouth 1848, studied theology at Andover and in 1856 was or¬ dained a Congregational clergyman ; thence till 1861 was chaplain of the Seamen’s Bethel in Canton and Hongkong, China. Entering the Civil War as chaplain, he rose to the rank of brevet brigadier-general and subsequently held pastorates in Owego, N. Y., 1867-70, Pough¬ keepsie 1871-73 and Brooklyn 1881-82. After 1884, a sufferer from mental troubles, his last three years were passed in much distress and he finally committed suicide.

BEECHER, Lyman, American theologian : b. New Haven, Conn., 12 Oct. 1775; d. Brook¬ lyn, N. Y., 10 Jan. 1863. He was a blacksmith’s son and himself a blacksmith’s helper and farmer’s lad in boyhood. Entering Yale Col¬ lege at 18, he graduated in 1797, studying also theology under President Dwight till 1798, when he became supply at East Hampton, L. I., and was ordained there 1799, remaining till 1810. His remarkable pulpit oratory gained national repute from a sermon in 1804 on Alex¬ ander Hamilton’s death at Burr’s hands — an occasion which made more than one reputation, all utterances being eagerly scanned from the excitement and party feeling. In 1810 he was called to Litchfield, Conn., the seat of a cele¬ brated law school and other educational insti¬ tutions, at a time when New England was the intellectual autocrat of the country and towns were few and small ; and soon became recog¬ nized not only as the foremost man in the Congregational body, but one of the greatest of American preachers. About 1814 a half-dozen sermons of his against . intemperance, then a common vice among even the clergy, were not only widely read in America and Eng¬ land, but were translated into several foreign languages. He also took a foremost part in organizing Bible and missionary societies, *etc.* ; and his courage, power and

energy made many look to him for guidance and succor in trouble. This came in a flood during the next decade, when the Unitarian movement, under Channing and its other great early leaders, was sweeping the Congregational churches around Boston off their feet, and Mr. Beecher, in 1826, at the urgency of influential clergymen, accepted a call to the Hanover Street Church in Boston to stem the tide, which his polemic ardor per¬ haps aided in doing. In 1832 he accepted the presidency of Lane (Theological) Seminary near Cincinnati, Ohio, which had been endowed on the express condition of his taking charge of it, to strengthen Calvinism in the rapidly-growing West; he remained there till 1852, holding also the chair of sacred theology, and was its titular president till death. He was also pastor of the Second Presbyterian Church in Cincinnati 1832-42. In 1833 the famous phi¬

lanthropist, Arthur Tappan, the chief founder of Lane, sent the students a report of the pro¬ ceedings of the Philadelphia abolition conven¬ tion of that year; the students, partly South¬ ern, at once fell into disputes on the subject of slavery. The trustees vainly tried to check the meetings and discussions ; Kentucky slavehold¬ ers came over and urged violent suppression of these meetings and threatened the destruction of the seminary. The trustees in terror for¬ bade all further discussion of slavery and therefore all the students deserted in a body. The most of the anti-slavery wing refused to return, and their supporters founded Oberlin College; a few came back, and Mr. Beecher and his son-in-law, Calvin E. Stowe, tried for many years to build up the seminary again but in vain. Shortly after this, in 1835, he was tried as a heretic and hypocrite, first before his own church and then before the Presbyterian synod, for his ((moderate Calvinism** ; he was acquit¬ ted, but the Old School and New School con¬ troversy finally split the church in 1838, Mr. Beecher adhering to the New School party. In 1852 he resigned the presidency of Lane and returned to Boston to prepare his works for publication, but was stricken with a slow paraly¬ sis of the brain, which enfeebled his mind for many years before his death. Despite the im¬ pressions of the extreme orthodox party, he was of the firmest doctrinal faith, though his theology was of his own make, and his humor¬ ous audacities of speech often shocked digni¬ fied propriety. His boundless energy, boldness, unconquerable will and personal magnetism were those of a natural leader of men; while his unsurpassed logical power, his intense and compact expression and, above all, his entire sincerity and spirituality of purpose, winged with his racy and picturesque wit, set him above every other American clergyman of his time in popular

influence. Consult his Autobiog¬ raphy and Correspondence, *edited by his son, Charles Beecher (New York 1863) ; 'Collected Works) (3 vols., Boston 1852) ; Hayward, E. F., 'Lyman Beecher* (Boston 1904) ; White, J. C., 'Personal Reminiscences of Lyman Beecher * (New York 1882).

George Edwin Rines.

BEECHER, Thomas Kinnicutt, American clergyman, son of Lyman Beecher : b. Litch¬ field, Conn., 10 Feb. 1824; d. Elmira, N. Y., 14 March 1900. He studied at Illinois College, of which his brother Edward was president, grad¬ uating in 1843. He was principal of a Phila¬ delphia grammar-school 1846-48, of the Hart¬ ford (Conn.) high school till 1852. He then removed to Williamsburg (Brooklyn), N. Y., and founded a Congregational church, which he left two years later for the pastorate of a church in Elmira, N. Y., where he spent the rest of his life, well known as an unsectarian philanthropist and moral teacher, writer and lecturer, editing for many years a weekly de¬ partment in Elmira newspapers to discuss cur¬ rent questions, often with rasping originality and always with independence. , He was nom¬ inated for a variety of offices by nearly every known political party but never elected. He was a chaplain in the Army of the Potomac four months in 1863. In 1870 he published a series of lectures as a book, entitled 'Our Seven Churches* (of Elmira) ; and in 1901 a

posthumous collection of his juvenile stories was issued, (In Tune with the Stars. •*

BEECHER, Willis Judson, American clergyman and author : b. Hampden, Ohio, 29 April 1838; d. 8 May 1912. He was graduated from Hamilton College in 1858 and from Au¬ burn Theological Seminary in 1864, and filled several Presbyterian pastorates. From

1865-69 he was professor of moral sciences and belles-lettres in Knox College, Ill.; from 1871-1908 became professor of the Hebrew language and literature in Auburn Seminary ; in 1902 was Stone lecturer at the Charleston Theological Seminary; and in 1904 was president of the Society of Biblical Literature and Exegesis. He published (Farmer Tompkins and His Bible) (1874) ; (Drill Lessons in Hebrcw)

(1883) ; (Index of Presbyterian Ministers in the United States 1706—1881 J (1883) ; (01d Tes¬ tament Notes) (1897) ; (Prophets and the Promise) (1905) ; (The Dated Events of the Old Testament (1907) ; (The Teaching of Jesus concerning the Future Life) (1908) ; Reasonable Biblical Criticism* (1911) ; and hundreds of articles in newspapers, periodicals, cyclopaedias and reference books.

BEECHER FAMILY, The, an extraordi¬ nary American family of religious and humani¬ tarian leaders, mostly of such salient and frequently eccentric originality, combined with immense energy and independence of thought, that the human race was once said to consist of <(men, women and Beechers.® They were all descendants of Lyman Beecher of New Haven, Conn., himself one of the most notable of them ; a famous clergyman, orator and con-troversalist, who had 13 children, so many of whom rose to national or even international distinction that he was said to be <(the father of more brains than any other man in America.® Eight of them were boys, seven living to ma¬ turity and nearly all of them to extreme old age, all becoming Congregational ministers ; and the greatest, Henry Ward, said of them that <(only one tried to escape the ministry and he did not succeed.® But so great was the intrinsic force of the blood that the daughters were no whit inferior in persistence of energy and originality of ideas; that marriage did not in the least quench their outside work and in¬ fluence, and that one of them has shown the highest creative genius and left the most en¬ during memorials of the entire family. The difference in work and sympathies of father and children resulted from difference of generation rather than of spirit. Lyman Beecher's prob¬ lems were mainly religious. He lived at the threshold of the new material development of the country, when it seemed that the en¬ grossing task was to prevent its relapsing to heathenism ; at the beginning of the great lib¬ eralizing flood of new scientific knowledge, when there seemed a danger of all Christianity being swept away with the cosmology it rested on ; and before the humanitarian questions in this prosperous country had come to the fore. He was nearly 60 when the slavery problem first showed signs of becoming acute; more than 60 when Father Mathew established his first temperance society across the water ; and at no period would he

ever have favored woman suffrage, which even one of his notable daugh¬

ters wrote against. But his influence was in¬ tensely strong in creating the lofty spirit that fed humanitarianism. It is an encouragement to large families, as so often in history, that the greatest of his children were among the younger ones : Mrs. Stowe was the sixth and Henry Ward Beecher seventh, while the most forceful of the others, Isabella (Mrs. Hooker), was the eleventh. In their order, the ones who grew up were Catherine, William Henry, Edward, Mary, George, Harriet, Henry Ward, Charles, Isa¬ bella, Thomas and James. Catherine, robbed of the betrothed of her youth, gave herself to work for her sex, though not with quite the aspirations of most recent women of her type, and perhaps did as much good in training culti¬ vated wives and mothers as if they had re¬ mained unmarried teachers. William Henry was a home missionary and clergyman in Ohio and a clergyman in the East. Edward was a clergyman, editor and theological writer, who tried to pour antique Zoroastrianism into mod¬ ern molds. Mary married in Hartford, Conn., and became the mother of Frederick Beecher Perkins and grandmother of Charlotte Perkins Stetson. George died by accident at 34, while filling a Western pastorate. Harriet, author of (Uncle Tom's Cabin* and of a mass of other works which would give any other author one of the foremost places in American letters, has a secure immortality from her masterpiece. Henry Ward, creator of the greatness of Ply¬ mouth Church, a Moses of liberal Congrega¬ tionalism, anti-slavery and temperance leader, ardent in all work for humanity and the eleva¬ tion of the mass, need not be further charac¬ terized. Charles, clergyman and admirable musician, is gratefully remembered for his work in compiling the (Plymouth Collection* of hymn-tunes. Isabella married John Hooker, a Hartford lawyer fully in sympathy with her, and for many years one of the stanchest cham¬ pions of woman's rights and upholder of all good causes. Thomas, for some 40 years lo¬ cated in Elmira, N. Y., was noted as an able and independent thinker on all public ques¬ tions, which he discussed with ability and high¬ mindedness. James C. was clergyman, soldier and clergyman again, till shadows overclouded his mind and brought on a tragic death. Al¬ together, the family is one of the most useful as well as distinguished of the American in¬ tellectual aristocracy.

BEECHEY, Frederick William, English admiral, the son of Sir William Beechey, the painter: b. London 1796; d. 29 Nov. 1856. He entered the navy at the age of 10, and in 1811 was present in an engagement off Madagascar, in which three French frigates were captured. In 1818

he accompanied Lieutenant (afterward Sir John) Franklin in an expedition to dis¬ cover the northwest passage, and the following year took part in a similar enterprise with Cap¬ tain Parry. In 1821 he was commissioned, with his brother, H. W. Beechey, to examine by land the coasts of north Africa. During the years from 1825 to 1828 he was engaged as commander of the Blossom in another Arctic expedition, by way of the Pacific and Bering Strait. Of this he published an account, (Nar¬ rative of a Voyage to the Pacific and Bering Strait* (1831), and subsequently a description of the botany and zoology of the regions vis-428

ited. In 1854 he was raised to the rank of rear-admiral.

BEECHEY, Sir William, English por¬ trait painter: b. Burford, Oxfordshire, 12 Dec. 1753; d. Hempstead, 28 Jan. 1839. He entered a conveyancer's office, but soon abandoned it and determined to make painting his profes¬ sion. In 1772 he became a student at the Royal Academy. A large equestrian picture of George III secured his election as a Royal Academician and obtained for him the honor of knighthood in 1798. He was afterward con¬ stantly and lucratively employed. He died in 1839 at the advanced age of 86. His portraits (<have maintained a respectable second rank" ; his attitudes and expression are generally good, but marks of carelessness are apparent in some of his latest pictures. Two portraits by him are contained in the Metropolitan Museum of Art in New York.

BEECHING, Henry Charles, English cler¬ gyman and author: b. 15 May 1859. He was educated at Balliol College, Oxford; was rector of Yattendon, Berkshire, 1885-1900; professor of theology at King's College, London, from 1900-03; canon of Westminster 1902-11; and was appointed dean of Durham in 1911. He has published editions of Milton, Vaughan, Daniel, Drayton and several anthologies of verse, and is author of (Seven Sermons to Schoolboys' (1894) ; (In a Garden and Other Poems' (1895) ; (Pages from a Private Diary' (1898) ; Conferences on Books and Men' (1900); Unns of Court Sermons' (1901); Religio Laid' (1902) ; 'Jane Austen' (1902) ; Two Lectures on Poetry' ; 'The Grace of Episcopacy' (1906) ; 'Lectures on the Atone¬ ment' (1907) ; 'Lectures on the Doctrine of Sacraments' (1908) ; (Revision of the Prayer Book' (1910) ; 'Inspiration' (1914) ; (The Li¬

brary of the Cathedral Church of Norwich'

(1915).

BEEF. See Meat Packing; Meats and Meat Production.

BEEF CATTLE. See Cattle.

BEEF-EATER. See Buffalo-bird.

BEEF-EATERS, a popular name for the yeomen of the guard of the sovereign of Great Britain, a body instituted at the coronation of Henry VIII in 1485. There are now 100 in service, and 70 supernumeraries. They are dressed after the fashion of the time of Henry VII. The warders of the Tower of London, who wear a similar uniform, are also so called. See Yeomen of the Guard.

BEEF-TEA, a preparation made from raw-beef and often employed in nursing. It is serv¬ iceable for stimulation or for nourishment largely according to the method of its prepara¬ tion. As usually made, or as prepared from ready-made beef extracts, it has very little food value, but is a strong heart stimulant. When fresh beef is finely chopped and its juice squeezed from it and flavored, to take awˆay the raw taste, the extract obtained is rich in the muscle juices and is highly nutritious. It is often thus prepared for infants and invalids. If, however, the juice thus obtained is mixed with water and the compound is boiled, as is the usual manner, all of the muscle proteids are coagulated, as a scum, and the muscle salts,

or extractives, remain in solution. The nutri¬ tious portions, the scum, are thrown away and the extractives retained in the tea. In this form the nutritive value is slight, unless the coagula¬ ted proteid is retained. Ordinary meat extracts are mixtures of the meat extractives, xanthin, hypoxanthin, creatin, creatinin, *etc.* These are heart tonics but not nourishing. Their use is contraindicated in irritable hearts, in gout, and in any condition in which it is thought that the patient is not breaking dowm the normal amount of proteid matter. Broths are made of other meats.

BEEF-WOOD, a popular name for the wood of several Australian trees of the genus Casuarina (q.v.), which forms the type of a family Casuarinacece . The trees have been com¬ pared to gigantic horse-

tails. They have pend¬ ant leafless branches, and apetalous monoecious flowers, the male ones being in spikes, and the female in heads. The wood is of a reddish color (whence the name), hard, and close-grained, and used chiefly for fine ornamental work.

BEEFSTEAK CLUBS, a term applied to

a number of semi-Bohemian clubs that were a feature of London life during the 18th cen¬ tury. They derived their names from the fact that refreshments were limited to beefsteak and liquors. One of the most famous of these institutions was the <(Sublime Society of Steaks," founded by John Rich in 1735. mana¬ ger of Covent Garden Theatre. Hogarth, Wilkes, Garrick, Dodington and other men more or less famous were members of this club. It was even joined at a later period by the Prince of Wales. It remained in existence until 1867. There is at the present time a Beefsteak Club in London, which w7as founded in 1876. The nearest approach to a similar institution in the United States is the Gridiron Club of Washington, D. C. Consult Arnold's 'Life and Death of the Sublime Society of Steaks' (1871).

BEEHIVE HOUSES, the archaeological

designation given to ancient dwellings of small size and somewhat conical shape, found in Ire¬ land and Scotland. They are formed of long stones without cement, each course overlapping that on wffiich it rests. Sometimes they occur singly, at other times in clusters, and occasion¬ ally have more than one apartment. Some of them arc found near ancient oratories, and were therefore probably priests' dwellings, and certain groups are encircled by a stone wall for defense. They are assigned to various dates between the 7th and the 12th century.

BEEKMANTOWN. See Calciferous.

BEELZEBUB, be-el'ze-bub (Hebrew, <(the god of flies"), a deity of the Moabites or Syrians. This term is applied in the Scriptures to the chief of the evil spirits (Matt, xii, 24; Mark iii, 22, etc.). The correct form is prob¬ ably Beelzebul, but in the Syriac and Vulgate the final letter is b. The alteration in that letter from b to l may have been due to euphonic reasons, or, as has also been maintained, zebu! may have signified "dwelling" or <(dung." In order to conceive how this name came to be given to one of the greatest of the imaginary spirits of evil it must be remembered what a terrible torment insects often are in the East.

We find that almost all nations who believe in evil spirits represent them as the rulers of dis¬ gusting, tormenting or poisonous animals — flies, rats, mice, reptiles, *etc.* The Greeks wor¬ shipped several of their chief deities under the character of protectors against these animals; for instance, Apollo Simintheus, the destroyer of rats. Christ was charged by the Jews with driving out demons by the power of Beelzebub (Matt, xii, 24). Compare 2 Kings i, 2.

BEER, bar, Adolf, Austrian historian and educational reformer: b. Prossnitz, Moravia, 27 Feb. 1831 ; d. 1902. His publications include (History of International Commerce) (1860-64) ; (Holland and the Austrian War of Succes¬ sion (1871) ; (The First Partition of Poland) (1873-74); (The Austrian Commercial Policy in the Nineteenth Century > (1891).

BEER, George Louis, American historical writer: b. Staten Island, N. Y., 26 July 1872; d. New York, 15 March 1920. Graduating from Columbia University in 1892, he engaged in the tobacco business, also delivering lectures on European history at Columbia, as well as writing on similar subjects. He published Commercial Policy of England Toward the American Colonies) (1893) ; (British Colonial Policy, 1754 — 65) (1907) ; (Origins of the British Colonial System, 1578-1660> (1908) ; <01d Colo¬ nial System, 1660— 1754) (1913).

BEER, Michael, German dramatist, brother of the composer Meyerbeer: b. Berlin 1800; d. Munich, 22 March 1833. He became known by five tragedies, of which his (Struen-see,* with overture and incidental music by Meyerbeer, is the best. (The Pariah* (1823), a one-act tragedy praised by Goethe, depicts the status of the Jew in modern Germany. His complete works were published at Leipzig in 1835, and his <Correspondence) in 1837.

BEER, Wilhelm, German astronomer: brother of the preceding: b. 4 Feb. 1797 ; d. 27 March 1850. He was a Berlin banker and in 1849 became a member of the Prussian Diet. His astronomical labors were associated with those of his friend, the astronomer, Madler. He built

an observatory, chiefly devoted to the observation of the planet Mars and the moon. The crowning labor of the two astronomers was a map of the moon, published in 1836, upon which the French Academy bestowed the Lalande prize. His writings include (Der Mond nach seinen komischen und individuellen Ver-haltnissen* (2 vols., 1837) ; and (Die Drei-konigsverfassung in ihrer Gefahr fur Preussen)

(1849).

BEER. See Ale and Beer; Brewing and Malting.

BEERBOHM, Max, English author and caricaturist, half-brother of Sir Beerbohm Tree (q.v.) : b. 24 Aug. 1872. Graduating from Mer¬ ton College, Oxford, he at once embarked on a literary career. His talents soon found him employment on the Harms worth papers, though he also contributed freely to other British pub¬ lications. His cartoons became very popular ; there have been five exhibitions of them since 1901. In 1895 he paid a visit of some months' duration to the United States with Beerbohm Tree, his half-brother, the actor. In 1910 he married an American girl, Florence Khan, of Memphis, Tenn. He has written one novel,

(Zuleika Dobson, * a burlesque of student life at Oxford. His other works between book covers are made up of random contributions to magazines and newspapers, essays, satires, *etc.* They include <More) ; (Yet Again * ; <The Happy Hypocrite) (1900) ; (The Second Child¬ hood of John BulP ; (A Book of Caricatures* ;

(A Christmas Garland.*

BEERNAERT, bar'nart, Auguste Marie

Frangois, Belgian statesman: b. Ostend, 26 July 1829; d. 1912. He began his political ca¬ reer by being elected a member of the Nation¬ al Chamber of Deputies 1874. Ten years la'ter he became a member of the cabinet as Minister of Agriculture, Industry and Art. Not long afterward he became president of the coun¬ cil and Minister of Finance. In 1895 he was elected president of the Chamber of Deputies. He was on two occasions a prominent member of the International Peace Conference; in 1899 and in 1907. In 1909 he was awarded half of the Nobel prize of that year.

writer on mental diseases: b. New Haven, Conn., 30 March 1876. Graduating from the Sheffield Scientific School in 1897, he suddenly lost his reason from over-study and was for some years an inmate of various insane asylums. He was discharged some years later as cured. In 1908 he published a book which attracted country-wide attention, entitled (A Mind that Found Itself ” (2d ed., 1912), a study of his own mind and experiences-during his period of insanity. In 1909 he assisted in the organization of the National Commission for Mental Plygiene, whose purpose is the study of mental disorders and their treatment. Later he helped found the Connecticut Society for Mental Hygiene, of which he was executive secretary. He is also the author of (The Value of Social Service as an Agency in the Preven¬ tion of Nervous and Mental Disorders) and (A Society for Mental Hygiene as an Agency for Social Service and Education.*

BEERS, Ethel Lynn, American poet : b. Goshen, N. Y., 13 Jan. 1827; d. Orange, N. J., 10 Oct. 1879. Her maiden name was Ethelinda Eliot and she was a direct descendant of John Eliot, the apostle to the Indians. Her earlier writings were signed (<Ethel Lynn,® but after her marriage to William H. Beers she wrote under the name by which she is now known. She is chiefly remembered as the author of the war lyric (< All Qui-et Along the Potomac,® sug¬ gested to her by the dispatch from the front so frequently printed in the papers during the early period of the Civil War. It appeared originally in Harper’s Weekly for 30 Nov. 1861, under the caption <(The Picket Guard.® Among her other poems are <(Weighing the Baby®; (<Baby Looking Out for Me® ; ((Which Shall it Be®? Her collected works, under the title (A11 Quiet Along the Potomac and Other Poems) was published on the day of her death.

BEERS, Henry Augustin, American author and educator: b. Buffalo, N. Y., 2 July 1847. He graduated from Yale in 1869; was admitted to the New York bar, 1870; became tutor at Yale, 1871-74, assistant professor,. 1874-80, and professor of English literature in 1880. He has published, among other works: (A Century of American Literature) (1878) ; (Odds and

Ends,* verse (1878) ; (Nathaniel Parker Willis > (1885) ; (Prose Writings of N. P. Willis (1885) ; Che Thankless Muse,} verse (1885) ; (From Chaucer to Tennyson) (1890); (Initial Studies in American Letters) (1891) ; Selec¬ tions from the Prose Writings of Samuel Taylor Coleridge) (1893) ; (A Suburban Pas¬ toral and Other Tales> (1894) ; (The Ways of Yale) (1895) ; (A History of English Roman¬ ticism in the Eighteenth Century* (1899) ; (A History of English Romanticism in the Nine¬ teenth Century) (1901) ; (Points at Issue* (1904) ; (Milton's Tercentenary* (1910) ; Che Ways of Yale,* enlarged edition (1910), and many uncollected contributions in prose and verse to leading reviews and magazines.

BEERS, be'erz, Nathan, American soldier: b. Stratford, Conn., 1753; d. New Haven, 10 Feb. 1849. While still quite young he went with his father to New Haven and was a member of a military company formed there in 1774, which was commanded by Benedict Arnold. Imme¬ diately on the receipt of the news of the battle of Lexington the company was called together by their captain, and Beers with 39 others vol¬ unteered to accompany him to the seat of war. They immediately set out, and, as they passed through Pomfret, were joined by General Put¬ nam. Beers received a lieutenant's commission in the army in 1777, and served until 1783. He afterward engaged in mercantile affairs, and in 1798 was chosen steward of Yale College, a position which he resigned in 1819.

BEERSHEBA, be-er-she'ba (now Bir-es- Seba, <(the well of the oath**), the place where Abraham made a covenant with Abimelech, King of the Philistines, and planted a tamarisk by the well that he dug. The alliance was re¬ newed by Isaac, who, it would appear, dug a second well (Gen. xxvi, 23, 28, 32, 33). Beersheba is often mentioned as the southern boundary of Palestine, or the land of Israel (Judges xv, 1, etc.), and was given to Judah (Jos. xv, 28) and later to Simeon (Jos. xix, 2). Here Samuel's sons were judges (I Sam. viii, 2). It was in the negebh , or (<dry** country and Elijah here slept under the desert broom bush (I Kings xix, 3, 5). It was probably an idolatrous centre in the time of Josiah (II Kings xxiii, 8), and condemned as such (Amos v, 5; viii, 14). It was reoc¬ cupied by descendants of Judah after the cap¬ tivity (Neh. xi, 27, 30). The site, now called Bir es Seba, is at the foot of the Hebron hills, 50 miles southwest of Jerusalem, in the open pastoral plateau, which is covered with grass in spring, and supports flocks of goats and cattle. There are two wells, with a constant supply

of good water even in autumn, cut in rock in the bed of the boundary valley which runs west to Gerar. There is also a third well, now dry. The largest well is over 12 feet in diameter, is lined with masonry to a depth of 28 feet, and has water at 37 feet. The masonry in the 15th course bears an Arabic tablet with a date (505 A.H.) answering to the year 1112 of our era. The second well is five feet in di¬ ameter and 40 feet to the water ; the stones are cut to the arc of the circle. Ruins of a Byzan¬ tine town, or village, including the foundations of a church, exist north of the wells. In Roman days a garrison was stationed here and Beersheba was the seat of a bishopric. The

place gradually declined and was totally de¬ serted toward the end of the 13th century. In modern times a new town has sprung up to the southwest of the ruins of the old. Under Ot¬ toman rule it was the seat of a kaimakam. It has a mosque, a telegraph station and several shops. The population is about 1,600. The town was taken from the Turks by the British on 1 Nov. 1917. (See War, European — Turk¬ ish Campaign). Consult Baedeker, K., Palestine and Syria* (Leipzig 1912).

BEESLY, Edward Spencer, English his¬ torical writer: b. 1831. He was graduated from Wadham College, Oxford, and was later ap¬ pointed professor of Latin at Bedford College, London. From 1860 to 1893 he was professor of history at University College, London. He was also editor of the ((Positivist Review.® In his first work, (Cataline, Clodius and Ti¬ berius } (1878) he makes an effort to rehabilitate the three men whose names form the title of the book. He was also the author of (Queen Elizabeths (1892) ; <A Strong Second Chamber*

(1907).

BEESWAX, a solid fatty substance secreted by bees, and containing in its purified state three chemical principles — myricin, cerin and cero-lein. It is not collected from plants, but elab¬ orated from saccharine food in the body of the bee. It. is used for the manufacture of candles, for modeling, and in many minor processes.

BEET, Joseph Agar, English theologian and author : b. Sheffield, 27 Sept. 1840. Gradu¬ ating from Wesleyan College, Richmond, he engaged in pastoral work, in which he continued for over 20 years. In 1885 he was appointed theological tutor at Wesleyan College, where he remained until 1905. He was also on the faculty of the University

of London, of which he was one of the oldest members. In 1896 he came to the United States and delivered a series of lectures at the University of Chicago, at the summer schools of Chautauqua and at Ocean Grove. In his theological works, two of which have been translated into Japanese and have been used as textbooks in Japan, he attempts to use the methods of science in the discussion of his subjects. His works include Credentials of the Gospel* (1889); (Through Christ to God) (1892); (The New Life of Christ* (1895) ; (The Last Things) (1897— 1913) ; (A Manual of Theology* (1906) ; Church, Churches and Sacraments *(1907) ; Che New Testament: Its Authorship, Date and Worth) (1909); Che Old Testament: Its Contents, Truth and WortlP (1912); (A Key to Unlock the Bible) (reissue, 1913) ; (A Theologian's Workshop, Tools and Method*

(1914).

BEET, William Ernest, English Methodist divine : b. Winchcombe, Gloucestershire, 25 Aug. 1869. He was graduated at London University in 1893, having entered the ministry the previous year. He has been a member of the Connexional Board of Examiners since 1899 and was examiner in classics at Didsbury College in 1909. His publications include Che Trans¬ figuration of Jesus* ; Che Roman See in the First Centuries> ; The Rise of the Papacy. * He is a frequent contributor to periodica/ literature, including the London Quarterly and the Homiletic Reviezv.

BEET (AS. bete ; Lat. beta), Beta vulgaris, a plant of the family Chenopodiacece. There are several forms of the species, mostly bien¬ nials, with stalked, smooth, ovate leaves, with flowers borne on tall leafy stems. The original form, or sea-beet, is found growing wild in sandy soil, near the sea, in Europe and western Asia. It has been in cultivation since 200-300 b.c., and to-day the numerous varieties may be classified under one of five sections, although the divisions are arbitrary and of no great importance.

Garden Beets. — ‘These usually have small tops, with turnip-shaped to tapering roots of medium size, fine-grained, smooth, regular, gen¬ erally red but sometimes yellowish or whitish in color. Among popular varieties are Early Blood, Eclipse, Bassano and Egyptian turnip. The soil best suited is a loose, rich, deep, clean, well-tilled loam. Well-rotted barnyard manure with some potassic fertilizer is often applied. Seed is sown as soon as possible in the spring, for the early crop, with other sowings until June to ensure a succession; in rows, varying from one foot apart, where intensive gardening is practised, to three feet where horse labor is used. The plants are thinned from four to six inches asunder in the rows, care being taken to leave only one plant in a place. Thinning is often done when the young plants are large enough to sell as ˆgreens.® The late crop, if required for winter use, must be stored before frost. Beets are sometimes forced under glass.

Mangold Wurzels or Mangels are a large, coarse form raised for cattle-feeding. Stand¬ ard varieties include Mammoth long red, Golden tankard and Globe. Seed is sown as early as possible in the spring, in rows two to three feet apart, and the plants allowed to stand 12 to 16 inches asunder in the row. To ensure a good crop the land must be in a high state of cultivation and well supplied with plant-food. They may be grown on alkali soils.

Sugar-Beets. — The varieties are rather small-growing, and nearly always yellowish or whitish in color. They contain a high percent¬ age of sugar, which has been increased by selection and cultivation. They are extensively grown in Europe and in the Northern and West¬ ern States. See Beet Sugar.

Chard or Swiss Beets have comparatively large leaves with succulent leaf-stalks, which are cooked and eaten like asparagus. See Chard.

Foliage Beets are grown for ornamental purposes. The luxuriant foliage is of many colors and varied in markings. Brazilian, Chilean, Victoria and Dracaena-leaved are well-known varieties. They may be raised from seed, like other beets, and the roots lifted in fall and kept over winter.

Uses and Feeding Value. — As a vegetable the root of the garden beet is boiled, pickled, and used as a salad; and the tops are boiled as ˆgreens.** They contain on an average 88.5 per cent water; 1.5 per cent protein; 8 per cent nitrogen-free extract; 1 per cent ash; 0.1 per cent ether extract, and 0.9 per cent crude fibre. Mangels are fed to cattle; they contain from 7 per cent to 15 per cent dry matter, of which about 88 per cent is digestible ; an average per¬ centage

composition may be taken as : water, 90.9; protein, 1.4; nitrogen-free extract, 5.5;

ether extract, 0.2; ash, 1.1; crude fibre, 0.9. About 77 per cent of the protein or 96 per cent of the nitrogen-free extract is digestible. The dry matter of mangels and corn silage are of about equal value for feeding, but as the cost of production in mangels is double that in corn, stockmen in the United States have not paid much attention to them.

Enemies. — Beets are sometimes injured by the beet-fly, otherwise they have few insect ene¬ mies. They are sometimes attacked by rust, rot, leaf-spot and scab. Spraying with Bor¬ deaux mixture will prevent the leaf diseases. Scab attacks the root, and as it also attacks the potato these crops should not be grown in succession.

Beet Pulp is a by-product of sugar-beet factories, consisting of sliced sugar-beets after the sugar is removed. It contains about 10 per cent dry matter, the remainder being water, and in the wet condition must be fed at once or held in silos. It may be fed to milch cows, fattening steers and sheep, and ranges in value from half to two-thirds the value of corn silage. Some of the factories have erected sheds and feed large quantities of it to stock with the addition of hay and grain.

BEET SUGAR, the sugar obtained from the beet, similar to cane sugar. The discovery of sugar in the beet was made by a German chemist, Marggraf, as early as 1747. No prac¬ tical results followed his discovery, however, as the cost of obtaining sugar from the beet by laboratory methods was too high as compared with that of cane sugar. Little progress was ac¬ complished until about 50 years later, when an¬ other German chemist, Achard, succeeded in extracting sugar from the beet root on a com¬ paratively large scale. In 1802 a manufactory was in operation in Silesia, in which, under Achard's direction, about 20 quintals of beets were worked up daily, and about five pounds of raw sugar extracted from every quintal. The high price of sugar prevailing at that time all over the European continent by reason of the block¬ ade, and the great interest and favorable atti¬ tude taken by the different continental govern¬ ments toward the new experiment, caused it to be a success for a short time. Napoleon is¬ sued an imperial decree in the early part of his reign, establishing this industry in France, and in 1812 he ordered the building of four factories and placed Chaptal in charge. In 1830 attempts were made in the United States to introduce the cultivation of the sugar-beet. It was

not, however, till 1870 that the first successful beet-sugar factory was built, at Alvarado, Cal.

The Industry in the United States. — The production of sugar-beets and of beet sugar in the United States is now assuming such pro¬ portions that, with the increase of factories and the marked popular interest, it has become one of the leading subjects demanding considera¬ tion from agriculturists. There is probably no other industry in this country that has developed so rapidly and now absorbs so large a share of public attention as that of beet sugar.

Attempts were made to establish the indus¬ try in Massachusetts in 1838. There were also efforts in this direction in Illinois, Wisconsin and California between 1863 and 1876, and much was claimed for the industry at this time by newspaper writers, capitalists and leading

farmers. In California, after a long period of unprofitable production, it achieved its first success in 1879. The failure of these early attempts seems now very natural as we look back over the history of agricultural progress in the United States. The beet-sugar industry belongs to the domain of agriculture, and the problems it presents are agricultural. These early efforts were simply ahead of their time in the course of agricultural development, and they failed in the establishment of the beet-sugar industry for want of the proper methods of farming and the proper conditions underly¬ ing the farming industry.

At the time of the first attempts at sugar-beet production, agriculture comprehended sim¬ ply the primary features. Its products were confined mainly to cereals, forage crops and live stock, and the production and marketing of raw materials was its main object. The farmer in those early days did not concern himself with enterprises dependent on the con¬ centration of efforts in the production of fin¬ ished products. Land could be purchased for a few dollars per acre. If the prospective farmer did not have the money to buy the land he could enter a claim on government land. His whole ambition was to

produce something quickly and pay for the lands and primary im¬ provements. This was accomplished by raising corn, wheat, oats, cattle and hogs. The open public domain offered a free pasture. Gradu¬ ally the Eastern sections became more densely settled, and farm lands became more expensive. Crude production was accomplished more cheaply by the Western farmer. Later, owing to development of transportation facilities, the agriculture of this country had to compete with the cheap labor of Europe. The colonial extension of European countries brought areas into competition with American farms in turn¬ ing out crude products, and with labor much cheaper even than that of Europe. The problem became, how to turn crude material into something that would represent not merely the labor but the skill and ingenuity of the American people, thus supplying our own markets and those of the world with finished products. The American farmers found, as the manufacturers had found before them, that their success depended upon the superior skill and artisan ability of Americans as compared with Europeans and their colonists. ((Necessity is the mother of invention,® and demand and necessity united in the evolution of a new system. This began in the East, working west¬ ward, in the production of butter, cheese, pre¬ pared meats, flour, eggs, poultry, *etc.* Later came the establishment of other industries, working up crude products of the farm into fin¬ ished articles. We became producers of syrups, canned vegetables, canned fruits, etc., until manufacturing re-inf orced farming from ocean to ocean. When all this was accomplished, the time was ripe for the success of the beet-sugar industry.

Industrial Features. — It is one of .the

marked features of American industrial life that the people as a mass have always shown a readiness to forego immediate benefits, and, even at considerable expense to themselves, to encourage industrial development. As a result this country has made a record among the nations of the earth unparalleled in rapid de¬

velopment, accumulation of wealth and hold on the trade of the world.

One of the chief items of cost in the pro¬ duction of anything is labor. In this country it is contended that the laborer is not only en¬ titled to earn a living, but to live comfortably, to be able to educate his family and to acquire a comfortable home. There is no position in life, social, financial or political, to which the laboring man may not aspire. While

this means much for the citizen, it adds materially to the cost of production. This country to-day is the concern of the nations of the earth in being able to maintain a balance of trade in its favor through its agricultural and industrial produc¬ tions, and this balance is constantly increasing. The sugar industry is supported by American enterprise and spirit, and under this American policy it is rapidly assuming a prominent posi¬ tion in the long list of successful industries.

There are two sides to the proposition of establishing a sugar factory in any particular community: (1) That of the farmer, involving agricultural conditions; and (2) that of the manufacturer or those financially interested in the enterprise.

Problems for the Farmer. — The leading difficulties of the farmer may first be noticed. To begin with, he is unacquainted with the methods of cultivating the sugar-beet plant, and his first experience usually proves unsatisfac¬ tory. He is accustomed to certain methods in farming. As a rule he is conservative, and thinks, from his long experience in farming, that he knows how to farm. He undertakes to apply methods successful in the cultivation and production of other crops. He is not in¬ clined to listen to those who are informed in methods applicable to the new crop. Eventu¬ ally he finds out his mistake. He finds that in growing sugar-beets he must apply principles, in many cases, the reverse of those necessary to other crops. For instance, he has been ac¬ customed to growing large ears of corn, large hogs and large steers ; but in the case of sugar-beets he finds that the first question is not one of size, but of quality. He must grow beets of a certain size, purity and sugar content. In order to accomplish this he must give careful attention to the work of preparing the land, planting the seed, bunching, thinning and culti¬ vating. He finds that attention to details counts in results at the harvest in the profits on the crop. He learns that the whole process is a very laborious and expensive one. entirely unlike anything he has attempted before. To be suc¬ cessful he must apply the methods of the gardener to a field crop. He must have a rich soil, and the proper rain conditions at the proper time. These facts can only be learned through experience.

The Question of Labor.— The labor prob¬ lem is important in the cultivation of sugar-beets. At certain stages of their growth they require a considerable amount of labor. This labor is very tiresome. As a rule, the farmer, if he grows beets to any extent, does not have on his farm sufficient labor to do the work of thinning and bunching, hoeing and harvesting the sugar-beets; nor does any farming com¬

munity possess to any considerable extent the labor necessary to grow the beets that a factory will require in a campaign. It will cost about $30 an acre in sections where sugar-beets are

grown under rainy conditions, and about $40 to $45 an acre in sections where beets are grown by irrigation, to cover the cost of seed, prep¬ aration of seed-bed, bunching and thinning, hoeing, cultivating, harvesting and delivering to the factory. These estimates apply to growing sugar-beets when it is properly done. In the farming communities of foreign countries, as a rule, a large amount of suitable labor can be secured in the neighborhood, because these neighborhoods are more thickly settled ; the whole population is willing to do the laborious, tedious work required, and whole families work at it, including the father, mother and children. In this country, as a rule, the farmer, his older sons and hired hands must attend to the out¬ door work. It has been found necessary for sugar-beet growers to resort to the cities and towns for extra labor required. In the cities live many foreigners from Holland, Russia, Sweden and other places, who are-thoroughly familiar with this kind of work. These people are willing to move out into the fields and live in tents ; they make contracts at so much per acre for bunching and thinning, hoeing, weeding and harvesting. Since the agitation and start¬ ing of the beet-sugar industry in this country, foreigners are coming with a view to securing employment of this kind. While the labor question is a serious one, it is one capable of solution by careful and detailed attention.

Problems for the Manufacturer. — The manufacturer or the capitalist who builds a factory finds that he has even more problems to work out than the farmer, and, like the farmer, he usually discovers that he is entering a field that is entirely new to him. Before establishing his plant the prospective manu¬ facturer must investigate certain conditions: (1) The wrater supply, for he must have an abun¬ dant supply of pure water for the use of the factory. (2) The fuel supply, as the factory must be located in a section where cheap fuel can be

secured (the fuel usually used is coal, but on the Pacific coast petroleum is used to a large extent). (3) A market for the product (this factor should be thoroughly canvassed and settled prior to establishing a factory). (4) The supply of lime (the local quarries of lime rock must be investigated to see. if the quality is suitable and the supply sufficient, as a large amount will be required).

The general conditions having been found satis factory, and the factory being built, other problems arise. In the beginning only a limited amount of skilled labor is employed. Eventually every employee of the factory will become skilled in his particular part. After two or three campaigns have passed the factory will have worked out the details of producing the best product at the least cost with the machinery which it has. When this point shall have been reached those interested will be prepared to estimate the cost of production of beet sugar. The difference in cost of production at a new factory and at one operated for a considerable time is much greater than one acquainted with the subject would suppose.

Statistics of the Industry. — The first estab¬ lished successful American beet-sugar factory is located at Alvarado, Cal. It was erected in 1870, but success was not attained until 1879. In 1896 in the United States there were seven factories, which produced 42,000 vol 3 — 28

tons of sugar. Since 1896 the expansion has been rapid and there now (1917) arc 99 factor¬ ies, which in 1915 produced 874,220 tons of white granulated sugar, valued at approximately $97,000,000. Since 1889, the total output has amounted to 7,613,000 tons, of an estimated value of $760,000,000. From 1889 to 1915 $300,000,000 has been paid to farmers for beets and considerably more than that amount for other supplies, labor, *etc.* The industry now employs between 30,000 and 40,000 men and annually disburses $75,000,000, nearly one-half of which is paid to farmers for beets.

The factories as at present located, together with their daily beet-slicing capacity, are as follows: California: Alvarado, 800 tons; Chino, 1,100 tons; Los Alamitos, 800 tons; Bctteravia, 1,000 tons; Oxnard, 3,000 tons; Spreckels, 4,500 tons; Hamilton City, 700 tons; Manteca, 1,200 tons; Visalia, 400 tons; Corcoran, 600 tons; Santa Anna, 600 tons; Huntington Beach, 1,200 tons; Anaheim, 1,200 tons; Dyer, 1,200 tons; Tracy, 600 tons; Colorado: Brighton, 1,000 tons; Grand Junction, 700 tons; Rocky Ford, 1,800 tons; Sugar City, 600 tons; Loveland,

1,920 tons; Greeley, 1.000 tons; Eaton, 1,200 tons; Fort Collins, 2,150 tons; Longmont, 2,350 tons; Windsor, 1,150 tons; Lamar, 500 tons; Sterling, 1,000 tons; Brush, 1,100 tons; Fort Morgan, 1,200 tons; Swink, 1,200 tons; Las Animas, 1,000 tons; Idaho: Idaho Falls, 900 tons; Shelley, 750 tons; Blackfoot, 800 tons; Sugar City, 900 tons; Burley, 600 tons; Twin Falls, 600 tons; Illinois: Riverdale, 500 tons; Indiana: Decatur, 800 tons; Iowa: Mason City, 1,200 tons; Waverly, 500 tons; Kansas: Garden City, 1,000 tons; Michigan: Bay City, 1,500 tons; West Bay City, 900 tons; Holland, 500 tons; Caro, 1,200 tons; Alma, 1,400 tons; Ma¬ rine City, 600 tons ; Lansing, 600 tons ; Bay City (Salzburg), 1,400 tons; Saginaw (Carroll¬ ton), 900 tons; Mount Clemens, 600 tons; Cros-well, 750 tons ; Saint Louis, 600 tons ; Owosso, 1,200 tons; Menominee, 1,200 tons; Blissfield, 868 tons; Sebewaing, 85 tons; Minnesota : Chaska, 800 tons; Montana: Billings, 2,000 tons: Nebraska: Bayard, 1,000 tons; Gering, 1,100 tons; Grand Island, 500 tons; Scotts Bluff, 2,000 tons; Missoula, 1,000 tons; Nevada: Fal¬ lon, 500 tons; Ohio: Fremont, 500 tons; Paulding, 900 tons ; Findlay, 871 tons ; Ottawa, 600 tons; Toledo, 1,100 tons; Oregon: Grant's Pass, 750 tons ; U tah : Brigham City, 500 tons ; Delta, 1,000 tons; Lehi, 1,266 tons; Moroni, 400 tons; Ogden, 1,000 tons; Logan, 600 tons; Gar¬ land, 900 tons; Lewiston, 800 tons; Elsinore, 750 tons ; Payson, 700 tons ; Layton, 700 tons ; Spanish Fork, 1,000 tons ; Smithfield, 500 tons ; West Jordan, 750 tons; Cornish, 600 tons; Washington: North Yakima, 750 tons; Wa¬ verly, 500 tons; Wisconsin : Menominee Falls, 600 tons; Janesville, 700 tons; Chippewa Falls, 600 tons; Madison, 600 tons; Wyoming : Lovell, 600 tons; Sheridan, 900 tons; Worland, 600 tons.

At many other places preliminary organ zations have been formed which are only awaiting developments assuring more settled conditions affecting the sugar industry.

The relative importance of the beet-sugar industry can best be gathered from the follow¬ ing statistics of the sugar production and con¬ sumption of the world. The United States is the world's greatest consumer of sugar. A

compilation by The National City Bank of New York shows that the consumption of sugar in the United States for the fiscal year 1917 was but 82 pounds per capita against 89 pounds in 1914 (the year preceding the war). The total quantity consumed in 1917 was, however, 8,500,000,000 pounds and we also exported 1,250,000,000 pounds, or 25 times as much as in the year before the war.

The bank's compilation shows that the world's sugar production is now about 12 per cent below that of the year preceding the war. Beet-sugar production in Europe has fallen 43 per cent but cane production in the tropics has increased about 25 per cent. The beet-sugar of Europe, which was 18,500,000,000 pounds in the sugar year 1912-13, was but 10,500,000,000 pounds in 1915-17, and the world cane produc¬ tion, which was a little more than 20,000,000,000 pounds in 1912-13 was over 25,000,000,000 pounds in 1916-17; world production of cane and beet sugar in 1913-14 was 42,000,000,000 pounds; in 1916-17, 37,000,000,000 pounds. Beets produced one-half of the world's sugar prior to the war, but in 1916-17 supplied only one-third of the world's total. In the United States and its island possessions there has been a rapid in¬ crease in production. In every one of the sugar areas under the American flag — Porto Rico, Hawaii, the Philippines, and the cane and beet fields of continental United States — there has been a marked increase, the aggregate prod¬ uct of these areas having grown from about 4,000,000,000 pounds in 1912-13 to practically 5,000,000,000 pounds in 1916-17. The share of our consumption drawn from foreign countries has fallen from 75 per cent in 1897 (20 years ago) to 48 per cent in 1917. In consumption of sugar the United States stands at the head of the list of the world countries, our total con¬ sumption being 8,500,000,000 pounds in the fiscal year 1917 against approximately 5,000,000,000 in Germany, 5,000,000,000 in the United Kingdom, and 2,000,000,000 in France, the figures for the European countries being those for normal years. Our per capita consumption, however, is less than that of certain other countries, Denmark's consumption being 93 pounds per capita, England 90, United States 82, Germany 75, Norway and Sweden 60, Netherlands 73. France 40, Russia 30, Spain 15 and Italy 10. About 25 per cent of our consumption is drawn from our own fields, 27 per cent from our islands and 48 per cent from foreign countries, chiefly Cuba. The value of the sugar entering continental United States was, in the fiscal year 1914, $155,000,000 and in 1917 $348,000,000, the average import price per pound (including that from the islands) having been, in 1914, 2.3 cents, and, in 1917, 4.6 cents. Our exports of sugar have grown very rapidly during the war, having been, in

1914, 50,000,000 pounds, in 1915 550,000,000, and in 1917 1,250,000,000 pounds, the value of the exports increasing from less than $2,000,000 in 1914 to over $77,000,000 in 1917. Of the 1,250,000,000 pounds exported in 1917, 450,000,000 went to France, about 1 50,- 000,000 to Great Britain, 50,000,000 to Italy, 250,000,000 to neutral Europe and about 150,- 000,000 pounds to South America. The world's chief producers of cane sugar are Cuba, India, Java, the Hawaiian and Philippine Islands, and Porto Rico ; and the chief producers of beet

sugar are Germany, Russia, Austria-Hungary France and the United States. Cuba, from which we draw our chief imports, is now the world's largest producer, her crop in the sugar year 1916-17 having been 6,730,000,000 pounds; India 5,882,000,000; Java 3,575,000,000; Hawaii 1,288,000,000 and Porto Rico 1,006,000,000 pounds, while Germany's beet-sugar production in 1913— 14 (the latest peace year) was 6,093,000,000, Russia 3,898,000,000, Austria-Hungary, 3,774,000-000, France 1,749,000,000, the United States in 1916-17 1,646,000,000 pounds of beet sugar and 613,000,000 pounds of cane. The world's sugar production, as far as can he statistically stated was in 1870 5,000,000,000 pounds, in 1880 7,000,- 000,000, in 1890 13,000,000,000, in 1900 20,000,-

000,000, in 1910 33,000,000,000, in 1914 42,000,-

000,000, and in 1917 37,000,000,000 pounds, this fall oft" in 1917 being due to a reduction of

product in the beet fields of the European

countries at war. Our own consumption has about kept pace with this rapid growth in world production, since we consumed in 1870 23 per cent of the world's output and in 1917 21 per cent of the world total.

Methods of Growing Sugar-Beets. — It would be quite difficult to give general directions and rules for growing sugar-beets applicable to all localities and conditions. Often expert sugar-beet growers, at public meetings and in the agricultural press, give minute directions covering all the details of this intricate process. Others, each well versed in the process of growfing sugar-beets, get into arguments and disputes as to the right method. In such cases each may be correct in a measure. The oc¬ casion for such disagreements lies in the fact that each person has in mind the right method for a particular locality or set of conditions.

A careful study of the different sections of the United States where sugar-beets are grown will lead to the conclusion that there is no single road to success in growing sugar-beets. Every locality has settled conditions which will materially modify any set of methods that might apply to some other one. There are some settled rules, of course, but it is a fact that the various agricultural districts of this country will have to v'ork out each for itself the right method. The person who argues that the ground must be plowed in the fall in order to receive the benefit of winter frosts is not offering any argument to the Pacific coast, for instance, where many beets are grown, and he who insists that the ground should be rolled in all instances after planting wall hazard the crop if his directions are followed in many parts of Nebraska and other sections where the soil is sandy and there are strong winds. In such cases a smooth surface offers an excellent op¬ portunity for the wind to carry along the sharp grains of sand, cutting off the plants and de¬ stroying the crop.

There can be no general fixed rules applying to the kinds and application of fertilizers. Gen¬ eral principles are all right when accompanied with the underlying reasons, but they must always be modified to meet local conditions.

With the development of the industry in all the sections w'hich have the necessary con¬ ditions, and the acquirement of ample ex¬ perience both by the farmers in the production of beets and by manufacturers in the making

of sugar, there will come many improvements, and eventually a cheapening of production, a result of great importance to all concerned in the success of the industry, because eventually the beet-sugar industry in the United States will have to meet a sharper competition with foreign sugar producers.

There are some things settled, however, about growing sugar-beets. It will generally be conceded that the ground should be plowed deep and manured. Before the seed is planted, the ground must be

thoroughly pulverized by harrowing and by rolling, even if the surface has to be afterward roughened. Advantage must be taken of the general and prevalent rain conditions. The ground must be moist enough to germinate the seed, either by rainfall or irrigation. Rainfall is best when it can be obtained. In some localities either is used, ac¬ cording to circumstances. Seeds are planted at depths of from half an inch to two inches, according to the prevailing conditions in the particular locality. The beets must be planted near enough together to produce a beet of a certain size. This spacing depends, again, upon the locality and the nature and fertility of the soil. The size and quality of the beet depend materially on the right kind of spacing. The beets must be thoroughly cultivated, hoed and hand-weeded, because cultivation tends to con¬ serve the moisture of the soil, and clean fields permit favorable action of sun and air. This close cultivation should be kept up until the beet tops thoroughly shade the ground and reach a size when it would be injurious to operate among them further with a plow and hoe. The beets should be harvested as soon as possible after they are ripe, because then they contain the most sugar and the highest purity. It is evident that the entire crop of beets in the neighborhood of a factory cannot be harvested at once. In many localities some will have to be siloed temporarily in pits in the fields. Har¬ vesting-time will depend a great deal upon cir¬ cumstances connected with the operation of the factory. The sooner the beet is harvested after it is ripe the better, because further rain¬ fall may start a new growth, producing new lateral roots and new leaves, thus greatly reducing the sugar content and purity of the beets.

Benefits to the Farmer. — No statement of facts with reference to any new crop would be complete or would indicate the advisability of its introduction unless it showed the benefits to be derived. Of course, profit and loss in any enterprise is the first consideration.

It has already been stated that it costs about $30 per acre to produce sugar-beets and to market the crop where rain conditions prevail. This is without taking into consideration the rent of the land, but it includes the farmer's time and everything else that enters into the cost of production. The average United States yield during the five-year period 1911-15 was 10.17 tons per acre and the price paid farmers per ton in 1915 was $5.67, thus giving a gross average cash return of $57.66 per acre. To this amount should be added the feeding value of the leaves and tops, usually estimated at $3 per acre, also the value of the increased yield of other crops for three to five years after fol¬ lowing a crop of beets. This increased yield amounts to 25 to 60 per cent and is the great¬

est of all incentives to stimulate beet cul¬ ture. It must be kept in mind that these are averages of gross and net proceeds. It is never very encouraging to consult the average of agricultural crop statistics; indeed, it is often said that ((the average crop does not payT If one should take the figures of the average crop of corn in Iowa, for instance, or the average crop of wheat in Minnesota or Kansas, and compute the proceeds at the average market price, and deduct therefrom the cost of production, the results would show a very small remuneration or an actual loss, quite discouraging to one who has not investigated this subject.

Many growers formerly received as high as $75 and some $100 per acre for their beets, these high results depending upon the superior quality of the land and the superior skill of the one producing the beets. If a farmer has poor land or is an unthrifty farmer, he is not in a position to expect much in planting any kind of crop. These statements are sufficient to give a farmer who is experienced in all other kinds of crops a fair insight into the situation.

Conditions in the sugar marts of the world resulting from the World War have naturally caused a general dislocation in the beet-sugar field also, where unusually high prices obtain, and under present conditions the future can¬ not be forecast with any degree of accuracy, but the outlook for the producer is assuring.

There are indirect benefits in sugar-beet growing that the farmer must take into consid¬ eration, along with the direct, as follows : He learns that sugar-beets are a very valuable crop to grow for his stock. It is estimated that they are worth two-thirds as much for feeding as for production of sugar. They may enter into a food ration for any kind of stock. A normal acre of sugar-beets furnishes about 2,000 pounds of digestible matter in form of the tops and leaves removed before beets are de¬ livered at the factory. An average acre of corn ensilage contains about 3,600 pounds of di¬ gestible matter. Therefore, besides getting a good cash return for his beets the farmer gets from each acre of beets the equivalent of one-half an acre of ensilage.

The high cultivation that must be given to the land through deep plowing, thorough har¬ rowing and constant weeding and cultivating finally makes the land of superior quality for any purpose. It will grow much more and bet¬ ter corn or wheat, and at a less expense, on account of the absence of weeds and grass. Finally, through rotation, other fields are brought under this high state of cultivation, until the

whole farm is at its best condition of soil fertility and productiveness.

The method that has brought this about serves as an object-lesson to the farmer and the farming neighborhood. A better cultiva¬ tion will prevail, and the science of farming will become several degrees higher on account of experience in sugar-beet cultivation.

After the beets are delivered to the fac¬ tory, and the sugar has been extracted, it is found that the pulp (which will amount to 50 per cent in weight of the beets worked) is almost as valuable for feeding purposes as the original beets themselves. It is a very cheap feed and sells for 50 to 75 cents per ton. It enters naturally and profitably into the food

rations of all kinds of stock. It is especially valuable for steers and lambs, but reaches its highest use as animal food when fed to the dairy cow. The farmers in the neighborhood of a beet-sugar factory feed large quantities of it. They appreciate its nutritive and sanitary value. Pulp feeding gives an impetus to animal industry of all kinds. It offers a stimulus to the establishment of butter and cheese fac¬ tories, to the erection of feeding-pens and to the whole stock-feeding industry. Its use is a strong reason for establishing the industry.

The beet-sugar industry opens up at once a large demand for labor, not only in the factory itself, but on the farm. It is one of the things in which the farmer can invest with the assur¬ ance that he has a sure market and a fixed price for his crop to begin with.

Benefits to Other Industries. — The estab¬ lishment of a beet-sugar factory opens up not only a large field for the employment of labor, but also a field for the employment of capital. It becomes at once a market for considerable crude material to be used in conducting the business. First and most important it furnishes a market for the beets. Then the factory is a large consumer of coal, and as the factories are often established in communities having local coal fields they become at once local markets for a local product. The amount of coal neces¬

sary to work up a certain amount of beets is generally computed at about 20 per cent by weight, or, in case of an ordinary factory of 1,000 tons capacity, about 200 tons of coal per day, or 20,000 tons for a full campaign of 100 days. A factory also consumes a large amount of lime rock, which of necessity must also be a local product. It usually consumes lime rock to the extent of about 8 per cent of the crude weight of beets worked, which in the case of a 1,000-ton factory would be 80 tons of lime rock per day, or 8,000 tons for the campaign. It consumes about one-tenth as much coke as lime, or about 1,000 tons d'uring a campaign.

The establishment of a factory in a commu¬ nity necessitates considerable transportation of crude products — beets, coal and lime rock — to the factory, and in carrying the finished prod¬ uct to the market. It stimulates banking and almost all kinds of mercantile business through¬ out the community.

The total expenditure for beets, manufac¬ turing and transportation by the factory is not far from $100 per acre of beets harvested, most of which is disbursed in local channels and which furnishes one of the best means of an intensification of economical activities in rural communities.

The Future of the Industry. — The present consumption of sugar in the United States is 8,500,000,000 pounds of which beet and Louisi¬ ana cane sugar furnish about 25 per cent, 27 per cent comes from our insular possessions and 48 per cent comes from foreign countries, mostly from Cuba.

It has been the ambition of those encourag¬ ing the beet-sugar industry to establish factories enough at least to avoid this foreign importa¬ tion. Making due allowance for failure of fac¬ tories to reach in actual production their full capacity under ideal conditions, it would require 160 factories having a daily capacity of 1,000 tons of beets to produce the sugar imported, or a sufficient number of cane-sugar factories to

produce an equal amount of sugar. To build and equip these factories will require an ex¬ penditure of $250,000,000 in labor, building ma¬ terials and machinery. The annual require¬ ments of these will be as follows:

ANNUAL REQUIREMENTS OF 160 BEET-SUGAR

FACTORIES

Beets required . tons . .

Cost of beets…

Coal required . tons . .

Cost of coal …

Lime rock required . tons . .

Cost of lime rock .

Coke required . tons . .

Cost of coke .

Cost of sugar bags .

Cost of factory labor

16,000,000

$88,000,000

3,200,000

$10,000,000

1,300,000

$3,250,000

130,000

$400,000

$6,000,000

$16,000,000

In addition to the foregoing list large amounts of money have been paid for mill supplies, transportation, *etc.* As working capital to operate these factories $135,000,000 was required. This sum being in use, however, for about four months in the year, the interest charged thereon is equal to an interest charge on $45,000,000 for one year. The above esti¬ mates do not include capital already invested in the business and operations of factories already built, the statement of which is as follows :

PRESENT DEVELOPMENT OF THE BEET-SUGAR

INDUSTRY

Capital invested in factories, equipment, and

grounds . $100, 000 , 000

Beets purchased annually . tons . . 7 , 090 , 000

Cash paid for beets purchased annually . $38,500,090

Coal consumed annually . tons . . 1 , 400 , 000

Cash paid for coal annually … $4, 200,000

Lime rock purchased annually . tons . . 560, 000

Cash paid for lime rock annually . $1 , 300, 000

Coke purchased annually . tons. . 56,000

Cash paid for coke annually . $170,000

Cash paid fcr labor annually . $7,000,000

Operating capital annually employed . $20,000, 000

Also’ there is a considerable amount an¬ nually expended for crude material and various other things. It hardly seems possible that an

industry which affects so many people over such a wide scope of country can fail to re¬ ceive anything but the most friendly, careful and fostering consideration on the part of those who shape industrial affairs.

The immensity of future demands, it seems, answers effectually those who feel that the in¬ dustry might be overdone. Attention should be called to the fact that not only are present demands great, but that the rate of increase of consumption is considerable. According to statistics for the last 19 years, consumption of sugar in the United States has been increas¬ ing at the average rate of about 6]A, per cent annually.

Aaron Gove.

Representative of the Beet Sugar Industry in the Arid States.

BEETHOVEN, ba-to-fen, Ludwig Van,

the greatest orchestral composer of the 19th century: b. Bonn, 16 Dec. 1770; d. Vienna, 26 March 1827. While classed among the German masters, the Dutch Van in his name (which is not a sign of nobility) indicates his descent from a family in the Netherlands, the world's musical centre in the 15th and 16th centuries. This family moved in 1650 from Louvain to Antwerp. Beethoven's grandfather was a bass singer and a conductor; his father was a tenor, who did not lead an exemplary life; his in¬ come was only $150 a year, wherefore it is not

■

- V

&

•y

4*

•r * . /

> , «

* {

•f*i

.V ,

♦ .••

f- ■!>

>■ !,

BEETHOVEN

437

surprising that he eagerly availed himself of his son's musical talent and exploited it. He personally taught Ludwig to play the violin and the clavier, in the hope of making of him a ˆwonder-child® like Mozart. While Ludwig was not remarkably precocious (he even shed tears over his music lessons), he is said to have written a funeral cantata at 11, and in the same year was taken on a concert-tour by his father, who, to make his performances seem more remarkable, represented him as being two years younger. Before he had reached his 12th year the organist Neefe spoke of him as uplaying with force and finish, reading well at sight, and, to sum up all, playing the greater part of Bach's (Well-Tempered Clavier,* a feat which will be understood by the initiated. If he goes on as he began, he will certainly be¬ come a second Mozart.®

Mozart himself appears to have been of this opinion, for when he heard young Beethoven improvise in Vienna he exclaimed to the by¬ standers, ((Iveep your eyes on him ! He will give the world something to talk about!® This was in 1787. Beethoven had been sent to Vienna in the hope that he might be able to take lessons of Mozart ; apparently he did take a few, but the illness of his mother made him hasten back to Bonn. Although Bonn was a small town, it had quite a musical atmosphere, and Beethoven had good opportunities to be¬ come acquainted with the operas and the con¬ cert pieces then in vogue. He was only 13 when he got a position as assistant court organ¬ ist, and subsequently he played the pianoforte accompaniments at the rehearsals of the opera orchestra. He also played the viola. His first salaried position ($63 a year) was as assistant organist under Reicha. The most important occurrence of the Bonn period was the forma¬ tion of an intimate friendship with Count von Waldstein, to whom he subsequently dedicated one of his best sonatas. The Count had promptly recognized his genius, and it was probably owing to his suggestion that the Elector of Cologne, Max Franz, decided to pro¬ vide the young musician with the means for going to Vienna again and there continuing his studies with Haydn, to whom Beethoven had already been introduced when Haydn stopped at Bonn, in 1790, on his way to London. It was in November 1792, nearly a year after Mozart's death, that Beethoven entered Vienna, which was to remain his home till the end of his life. The lessons from Haydn were duly arranged for and the first was given in Haydn's house on 12 December, the payment being eight gro-schen (about 20 cents). But Haydn, like most creators, was not a good teacher and although Beethoven took lessons of him more than a year, he soon began to take his exercises for correction to Schenk before showing them to Haydn. He subsequently took lessons of the pedantic contrapuntist Albrechtsberger, who, however, complained that his pupil was unwill¬ ing to ((do anything in decent style® and had too little respect for rules — this last being a peculiarity which he, fortunately, soon began to manifest in his compositions. To these com¬ positions he wras so lucky as to be able to devote nearly all his time. From his father he re¬ ceived no pecuniary assistance, but there were several sources of income. Prince Lichnowsky

gave him an annual stipend of 600 florins, and when, in 1809, an attempt was made to entice him to Kassel, where a position as Kapell¬ meister was offered him, some of his princely friends gave him an additional annuity of 4,000 florins, to chain him to Vienna. This lasted only till 1811, but at this time he was already deriv¬ ing a

considerable income from the sale of his works. Many of his letters show that he knew how to make a good bargain. Had it not been for a spendthrift nephew, of whom he was very fond, and for whom it was found at the time of his death he had even placed 7,000 florins in the bank, he would have never suffered any finan¬ cial tribulations such as Mozart and Schubert had to endure all their lives.

It was fortunate that the Kassel offer was refused, and that an earlier attempt (in 1796) to win him for Berlin had also led to naught ; for Vienna was the proper place for Beethoven. It was at that time the world's musical centre, owing largely to the unusual interest taken in music by the aristocratic circles. To under¬ stand the significance of this fact we must bear in mind that at that time there were few public concerts; it was the nobility who maintained the orchestras and patronized the great artists, the audiences being invited guests. Beethoven brought with him from Bonn letters of intro¬ duction to leading members of the aristocracy, and thus found himself at once (<in the swim.® He had not yet done anything very remarkable as a composer and was at first admired chiefly for his improvisations on the pianoforte; but gradually a sense of his greatness dawned on his patrons, who bore patiently all his eccentrici¬ ties. While recognizing the advantage of being intimate in the houses of the aristocracy, he never truckled to rank and refused to submit to the intricate and artificial rules of court etiquette. At the same time he expected the aristocrats to behave like ladies and gentlemen ; one day when a young man talked loudly while he was playing, he suddenly stopped and ex¬ claimed : <(I play no longer for such hogs.®

His attitude toward wealth is illustrated by his once sending back his brother's card on which ((Johann van Beethoven, land proprietor® was printed, after writing on the back: <(Ludwig van Beethoven, brain proprietor.®

In the homes of some of his aristocratic friends he gave lessons to the women and girls. He did this unwillingly, looking at the time thus spent as filched from his compositions. He often failed to keep his appointments and was apt to be irascible and bearish ; but his fair pupils were only too glad to put up with all this for the sake of the benefit they got from his lessons. He was, at the same time, a great admirer of women and often in love, although none of his infatuations appears to have lasted more than seven months. He was never married, for al¬ though he repeatedly proposed he was each time refused. These love affairs call for mention .because they had an influence on not a few of his compositions. A well-regulated house¬ hold was a blessing he greatly needed. His eccentric habits were

forever forcing him to change his lodgings and he seldom could keep a servant longer than a few weeks. If his cook brought him a bad egg he threw it at her. He often got angry when the servants laughed at the sight he presented while composing — toss-438

ing his hands about, beating time with his feet, and singing or rather, growling. His rooms pre¬ sented scenes of great disorder. His gastro¬ nomic habits were unwise, and the dyspepsia they gave rise to was responsible for much melancholy and for many of the outbreaks of ill-temper for which he became notorious as he grew older. While naturally of an affectionate disposition (as instanced in his fondness for his nephew) and always fond of jokes, he would, on occasion, insult and abuse his best friends on slight provocation; but these outbursts of irascibility were usually followed by the most abject apologies. He was, in short, like his music, highly emotional and regardless of rules.

The chief cause of his growing moroseness and irritability was the difficulty of hearing which began in 1798 and gradually ended in complete deafness. In 1802 (25 years before his death) he wrote in his last will : (<0 ye, who consider or declare me to be hostile, ob¬ stinate, or misanthropic, what injustice ye do me! Ye know not the secret causes of that which to you wears such an appearance® ; and he proceeds to speak of his hearing, which had been growing more and more defective for six years, and which made him shun people, as he did not wish to say constantly : ftSpeak louder — bawl — for I am deaf.® His last appear¬ ance in public in concerted music was in 1814. Two years later he began to experiment with ear-trumpets, his collection of which is now in the Royal Library of Berlin. His attempts to conduct after this usually led to mortifying and pathetic scenes. The last was in 1824, when, although totally deaf, he insisted on con¬ ducting his ninth symphony ; he could not even hear the applause which followed it. All com¬ munication with him was, in the last years of his life, carried on with the aid of pencil and paper. The autopsy showed that not only were the auditory nerves practically paralyzed, but there were other advanced troubles (the liver was tough as leather and shrunk to half its normal size), which made it remarkable that he should have retained his vitality so long. The immediate causes of death were inflamma¬ tion of the lungs and

dropsy. A week before his death he was still busy with letters and with plans for new compositions, including a tenth symphony, a requiem and music to Faust. He died during a violent thunder and hail storm, about six o'clock on 26 March 1827. The Viennese, who had been neglecting him during the last few years, because of the Rossini furore (in 1823 no operas but Rossini's were sung in Vienna, and the whole musical atmosphere was affected by them), now realized their loss and a crowd of 20,000 persons attended the funeral. He was buried in the Wahringer Fried-hof, but in 1888 his remains were transferred, with those of Schubert, to the Central Ceme¬ tery. Statues of him were erected at Bonn in . 1845, in Vienna in 1880, in Brooklyn in 1894, at Leipzig (Max Klinger) in 1902. In 1815 the freedom of the city of Vienna had been con¬ ferred upon him.

A certain wildness was given to Beethoven's appearance by his long, abundant hair, which was always in a state of disorder. He was strongly built and muscular, but below medium stature, his height being five feet five inches. His small black eyes were bright and piercing,

his forehead broad and high, his complexion ruddy. His friend Schindler wrote that when a musical idea took possession of his mind, ((there was an air of inspiration and dignity in his aspect ; and his diminutive figure seemed to tower to the gigantic proportions of his mind.® Already in Bonn his friends used to note the occasions when he was (<in his raptus .® These moments of inspiration would come to him at any time and anywhere — in his room, in the streets of Vienna, and particularly in the coun¬ try. He was extremely found of nature and country life, and spent his summers in the picturesque regions near Vienna. A sketch book was always in his pocket, and into this he jotted his ideas as they came. Afterward he revised and rerevised these sketches. <(There is hardly a bar in his music,® says Grove, (<of which it may not be said with confidence that it has been rewritten a dozen times. Of the air (0 Hoffnung,> in ˆFidelio,* the sketch books show 18 attempts, and of the concluding chorus 10.® These sketches have been collected by Nottebohm and printed; they give an in¬ teresting and instructive insight into the work¬ shop of genius. Another curious fact regard¬ ing his creative power is that, like Wagner's, it matured slowly. Mendelssohn wrote his best piece, the (Midsummer Night's Dream) overture at the age of 17; Schubert was 18 when he wrote his wonderful ˆrlkingp but Wagner was 28 when he wrote his first really original opera ((The Flying DutchmanO, and Bee¬ thoven 29 when he composed his first symphony, and that

might have been almost as well written by Mozart or Haydn.

It is customary to divide Beethoven's com¬ positions into three groups, following the sug¬ gestions of a Russian, W. von Lenz, who, in 1852, issued a book entitled (Beethoven et ses trois styles. } The first group in which the influence of his predecessors is still more or less obvious includes, among many other things, the first two symphonies, the septet, the first six string quartets, the aria (Ah Perfido,* the song (Adelaide, > etc.; the second, which shows Bee¬ thoven in the full vigor of his manhood, orig¬ inality and creative power, begins after the year 1800, and includes six symphonies, from the third (Eroica) to the eighth, the opera 'FidelioP the violin concerto, the Coriolan overture, the Egmont music, the Rasumovsky quartets, the Kreutzer sonata, the 'cello sonata in A, 14 sonatas for pianoforte, etc.; the third, which begins after a period of great tribulation and depression in his life, includes the last five pianoforte sonatas, the string quartets op. 127, 130, 131, 132, 135, the (Missa solemnisP the ninth symphony, the (Ruins of Athens, > *etc.* Concerning some, at least, of the works of this third period opinion is still divided. There are critics who think that, partly in consequence of his deafness, Beethoven had become garrulous, incoherent and vague, whereas others profess to find in the compositions of this period the highest summit of all musical creativeness.

A better way than Lenz's of considering the achievements of Beethoven's genius is to cast a glance at each class of his compositions by itself. The eminent English critic, Dr. Huef-fer, wrote that (<Beethoven is in music v hat Shakespeare is in poetry, a name before the greatness of which all other names, however

great, seem to dwindle.® This is an exaggera¬ tion. T here is, in reality, only one department of niusic — the symphony — in which Beethoven is incontestably pre-eminent ; in all the others he has his equals, and in some his superiors. In the Lied, or art-song, he is far inferior to Schubert and half a dozen other masters; in the grandeur of choral writing he never equalled Bach and Handel; his (Fidelio) is not

equal to the best operas of Mozart, Weber, Wagner, Gounod, Bizet and Verdi; his piano¬ forte compositions are harmonically less fasci¬ nating, and less idiomatic in style, than Chopin's and Schumann's, and in the realm of chamber music there are works of Haydn, Mozart, Brahms, and particularly Schubert and Schu¬ mann, quite equal to the best of Beethoven's. His weakest works are in the department of vocal music, especially the Lied. He once said to Rochlitz : (<Songs I do not like to write.® He looked on them as bagatelles into which it was hardly worth while to put his best ideas. Hence, among his songs, there are only a few which show his genius to advantage. The best of them are (Adelaide, } (Die Ehre GottesB and (In questa tombaB (Consult Finck's, (Songs and Song Writers, > pp. 28-34). One of the most judicial biographers, Wasielewski, remarks : ((While Beethoven wrote a good deal for the voice, he cannot be considered a vocal composer in the proper sense of the word. Full appreciation of the real nature of the human voice, the subtle knowledge of its resources which we admire in Handel and Mozart, he did not possess. His realm was instrumental music.® Nevertheless, there is much that is of great beauty in his vocal works, which include the opera (FidelioB the oratorio (Christus am OelbergC two masses, a sonata, 66 songs with pianoforte, 18 canons, 7 books of English, Scotch, Irish, Welsh and Italian songs with pianoforte, violin and 'cello, *etc.* He himself considered his second mass — -(Missa solemnis' — his most successful work, but the musical world is much more enamored of his (FidelioB which, while conventional in the first act, rises in the second to such a sublime level of drama¬ tic expressiveness that it is to be much regretted he never found time to execute his other operatic plans, which included a Macbeth, a Faust and an Alexander. The history of tFidelio) and its four overtures is of particular interest, but the limits of space forbid its inser¬ tion.

For pianoforte there are 38 sonatas, 5 con¬ certos, 21 sets of variations, and more than 50 short pieces — bagatelles, rondos, preludes, handlers, *etc.* Hans von Billow spoke of Bach's (Well-Tempered Clavichord) as the Old Testa¬ ment of music and Beethoven's sonatas as the New, <(in both of which we must believe;® and he declared that the mere technical mastery of these sonatas is <(the task of half a lifetime.® They mark a tremendous advance over all his predecessors excepting Bach. In wealth of melodic ideas and rhythmic variety, as well as in structural finish, and especially in emotional expressiveness, they far surpass all previous works of their kind; yet it was not till several decades after the composer's death that they began to be generally appreciated and played in public. The pendulum then swung to the opposite extreme,

and every Beethoven sonata was supposed to be a peerless masterwork

which is far from being true. (Read the ad¬ mirable comments on all these works in chap. VII of J. S. Shedlock's (The Pianoforte Sonata')- In the matter of form Beethoven was by no means the pedant many of his ad¬ mirers would have him. The orthodox sonata is supposed to consist of four movements ; but of his 38 sonatas only 15 have four movements; 11 have 3, and 6 have only 2; moreover, his two-movement sonatas are by no means (<torsos,® as some have foolishly called them ; they include op. 90 and op. Ill, two of his very best works, the op. Ill being, in fact, his last word on the subject.

The chamber music includes 8 trios for piano and 'cello ; 5 trios, 16 quartets and 2 quintets for strings; 10 sonatas for piano with violin, 5 with 'cello, 1 with horn, 3 sextets and 1 septet for string and wind instruments; 2 octets for wind. The quartets have been made tolerably familiar, but among the other works here re¬ ferred to there are many gems of which the public is still unawrare. But it is when we come to the orchestral works — the 11 overtures, and 9 symphonies. — that we see Beethoven in his real grandeur. Of these works Richard Wag¬ ner, who worshipped Beethoven, has written most eloquently (see index to vol. I of Glase-napp's (Wagner EncyclopadieB or to Ellis's translation of Wagner's prose works; Grove's (Beethoven's Nine Symphonies' gives an excel¬ lent analysis for amateurs). Concerning the symphonic works, Wagner wrote: (<He de¬ veloped the symphony to such a fascinating fullness of form and filled this form with such an unheard-of wealth of enchanting melody, that we stand to-day before the Beethoven symphony as before the boundary line of an entirelv new epoch in the history of art ; for with them a phenomenon has appeared in the world, with which the art of no time and no nation has had anything to compare even remotely.® It is not only that Beethoven's symphonies are longer than those of Haydn and Mozart, or broader and richer in melody, more varied in rhythm, and fuller in minute details of elaboration; what particularly distinguishes them is their greater emotionality and more powerful contrasts of moods. On the one side we have (as in the pianoforte sonatas) those soulful, tearful adagios which are a specialty of Beethoven ; on the other the humorous scherzo, which he put in place of the dainty, graceful minuet of his pred¬ ecessors. This symphonic scherzo was really a new thing in music, for while there is much fun in Haydn, it is of a much lighter quality. In Beethoven's there are elements of grimness and the grotesque ; with an undercurrent of melancholy, as in the scherzos of Chopin. In the art of dyeing the music in deeper and

more varied orchestral colors Beethoven's symphonies and overtures also mark a great advance over his predecessors.

While Beethoven stands at the head of com¬ posers of the classical school, an almost equal claim to distinction lies in this that in his works are to be found many of the germs which Weber, Schubert, Mendelssohn, Schumann and others developed into the German romantic school. Among these germs are his inclination to shatter the sonata form (particularly in the last movement of the ninth symphony, which is epoch-making in its bold unconventionality) ; his disposition to allow his ideas to shape the

form in which they are to be uttered; the subjective expressiveness of his music, which has five times as many expression marks as Mozart's; the use of characteristic (realistic) orchestral colors ; his way of playing the pianoforte and conducting an orchestra, with tempo rubato, or frequent modification of pace; and above all, his sanctioning of program music by his (Pastoral Symphony,5 which illus¬ trates episodes in the country — a scene at a brook, the merrymaking of peasants, the song of birds and a thunderstorm. It is also signifi¬ cant of his romantic inclinations that toward the end of his life he conceived a plan of giv¬ ing poetic titles to all his sonatas and even to the separate movements. The (Moonlight sonata,5 it is well to remember, did not get its inappropriate name from him.

Bibliography. — Several books have already been referred to. Of the biographies the best was written in English by the American A. W. Thayer and published, in a German version only (Vols. I-III, Berlin 1866-77; Vols. IV, V, Leipzig 1907-08). Thayer also furnished a useful (Chronologisches Verzeichniss) of Bee¬ thoven's works, of which a complete edition was printed by Breitkopf and Hartel in 1864-67. Another important work in this connection is G. Nottebohm's, (Thematisches Verzeichniss der Werke Beethovens5 (Leipzig 1913). Consult also Bekker, P., Beethoven) (Berlin 1911) ; Kalischer, A. C., (Beethoven und seine Zeitgenossen) (4 vols., Leipzig 1910) ; Kerst, F., (Beethoven im eignen Wort) (Berlin

1904; English trans. by Henry E. Krehbiel, New York 1905) ; Nohl, L., (Beethoven's Leben) (3 vols., Berlin 1867; revised by P. Sakolowski, Berlin 1912) ; Schindler, A., (Biographie von Ludwig van Beethoven5 (Munster 1840) ; Marx, A. B., (Ludwig van Beethoven, Leben und Schaffen5 (2 vols., Berlin 1884) : Wegeler, F. G., and Ries, F., (Biographische Notizen fiber Ludwig van Beethoven5 (Coblentz 1838; reprinted by A. C. Kalischer, Leipzig 1906). For analyses of his sonatas and symphonies consult Grove, G., Beethoven and his Nine Symphonies5 (London 1896) ; Helm, Th., (Beethoven's Streichquartette5 (Leipzig 1910) ; Lenz, W., Beethoven et ses trois styles5 (2 vols., Paris 1855 ; new edition by D. Calvo-coressi, Paris 1909) ; Nesieht, R., (Das goldene Zeitalter der Klaviersonate5 (Cologne 1910) ; Reinecke, C., (Die Beethovenschen Klaviersonaten5 (Leipzig 1897 ; English trans., London 1898) ; Nagel, W., Beethoven und seine Klaviersonaten5 (2 vols., Langensalza 1904). For Beethoven's correspondence con¬ sult the selections by Leichtentritt, H. (Ber¬ lin 1912) ; Leitzmann, A. (Leipzig 1909) ; Sachs, C. (Berlin 1909) ; Thomas-San-Galli, W. A. (Halle 1910) and Kalischer, A. C., Bee¬ thoven's sammtliche Briefe5 (5 vols., Berlin 1908; English trans. by J. S. Shedlock, Lon¬ don 1909) and Prelinger, F., (L. van Bee¬ thoven's sammtliche Briefe und Aufzeichnun-gen5 (4 vols., Vienna 1908). A yearbook en¬ titled Beethoven Forschung has been issued at Vienna since 1911.

Henry T. Finck,

Musical Critic, Evening Post, New York.

BEETLE, an insect of the order Coleoptera. Beetles are distinguished from all other insects by the elytra or thickened fore wings, which

are not actively used in flight, the hind wings being especially adapted for that purpose. The elytra cover and encase, thus protecting, the posterior segments of the thorax and the abdo¬ men. The prothoracic segment is greatly en¬ larged, often exarated in front, to receive the head. These characters are very persistent. There are few aberrant forms and the order is remarkably homogeneous and easily limited. The head is free from the thorax; it is scarcely nar¬ rowed behind, and its position is usually hori¬ zontal. The eyes are usually quite large, and there may be one or two ocelli — not more. The antennae are usually inserted just in front of the eyes, and rarely between them. They are either filiform where the joints are cylindri¬ cal, as in the ground beetles (Carabidce) , not enlarging toward the end, or serrate,

as in the Elateridce, where the joints are triangular and compressed, giving thereby a serrate outline to the inner edge ; or clavate as in the Silphidce, where the enlarged terminal joints give a rounded, club-shaped termination ; or lamellate, when the terminal joints are prolonged inter¬ nally, forming broad, leaf-like expansions, as in the Scarabceidce, while the geniculate antenna is produced when the second and succeeding joints make an angle with the first. The mandibles are always well developed as biting and chewing organs, becoming abnormally en¬ larged in the stag-beetles (Lucanus) , while in certain Scarabceidce they are small and mem¬ branous. The maxillae prepare the food to be crushed by the • mandibles. The greatly en¬ larged prothorax is free and movable.

In the running species, as carabidce, the hind wings being useless are aborted, and very rarely in some tropical Lampyridce and Scara¬ bceidce both pairs of wings are wanting in both sexes, though, as in the glow-worm and some of its allies, the females are apterous. The legs are well developed, as the beetles are among the most powerful running insects, the hinder-most pair of legs becoming oar-like in the swimming Dytiscidce and some Hydrophilidce, while in the Gyrinidce both pairs of hind legs become broad and flat. The number of tarsal joints varies from the normal number five, to four and three joints, the terminal joint as usual being two-clawed. These claws are known to be wanting only in Phanceus, a scarabaeid, and the aberrant family, Stylopidce. According to the number of the tarsal joints the families of the Coleoptera have been grouped into the Pentamera (five-jointed), the Tetramera (four-jointed), the Trimera (three-jointed), and the Heteromera, which are four-jointed in the hind pair, while the first and second pairs are five-jointed. The abdomen, usually partially concealed by the wings, is ses¬ sile, its base broad; in form it is usually some¬ what flattened.

A few genera are capable of producing sounds by rubbing the limbs or elytra over finely wrinkled surfaces, which in Trox are situated on the side of the basal segments of the abdomen, and in Strategics on the tergum of the penultimate segment of the abdomen, while such a surface is found in Higyrus on the surface of the elytra.

The larvae when active and not permanently enclosed (like the curculio) in the substances that form their food, are elongated, flattened, wormlike, with a large head, well-developed

mouth-parts and three pairs of thoracic feet, either horny, or fleshy and retractile, while there is often a single terminal prop-leg on the terminal segment of the body and a lateral horny spine. The!' wood-boring larvae of the Cerambycidce are white, soft and more or less cylindrical, while those of the Curculionidce are footless or nearly so, and resemble those of the gall-flies, both the hymenopterous and the dipterous.

The pupae have free limbs, and are either enclosed in cocoons of earth, or, if wood-borers, in rude cocoons of fine chips and dust, united by threads, or a viscid matter supplied by the insect. None are known to be coarctate, though some Coccincllce transform within the old larva-skin, not rejecting it, as is usual in the group, while other pupae are enclosed in the cases in which the larva lived. In some Staphylinidce the pupa shows a tendency to be¬ come obtected, the limbs being soldered to the body, as if enclosed in a common sheath. Generally, however, the antennae are folded on each side of the clypeus, and the mandibles, maxillae and labial palpi appear as elongated papillae. The wing-pads being small are shaped like those of the adult Meloe, and are laid upon the posterior femora, thus exposing the meso-and meta-thorax to view. The tarsal joints lie parallel on each side of the middle line of the body, the hinder pair not reaching to the tips of the abdomen, which ends in a pair of acute, prolonged, forked, incurved horny hooks, which must aid the pupa in working its way to the surface when about to transform into the beetle.

The number of known living species is be¬ tween 100,000 and 200,000, and over 10,000 spe¬ cies are known to inhabit the United States. About 1,000 fossil species are known.

Coleoptera have been the favorites of ento¬ mologists. They have been studied when in their perfect state more than any other insects, but owing to the difficulty of finding their larvae and carrying them through the successive stages of growth, the early stages of compara¬ tively few species are known. The metamor¬ phoses are complete, and in this respect the beetles are much in advance of the orders of net-veined insects in which the transformations are incomplete. Many beetles, as the species of Cetonia, etc., visit flowers to collect and eat the pollen, and in doing so bring about the fertilization of those

flowers.

Classification. — The systematic arrange¬ ment of the Coleoptera is in an unsettled state. The tiger and ground beetles are generally con¬ sidered to be the “highest® Coleoptera, but in reality they appeared to be allied to what were the more primitive and generalized types, while what are by some authors regarded as the “lowest® beetles, that is, the weevils, are the most specialized or most highlv modified. As all our classifications begin with the more primitive or earliest forms, and end with the most specialized, we should begin with the Carabidce or ground beetles, as being the near¬ est representatives of what are supposed to be the earliest beetles. We would, therefore, adopt provisionally Sharp’s primary divisions of Coleoptera, with some important changes. His first division of series comprises the lamel-licorns (May beetle, etc.), and his second the

Adelphaga or ground beetles. This order should be reversed.

Series 1. Adelphaga (Carabidce of some au¬ thors). Antennae long, slender, filiform; tarsi five-jointed; maxillae highly developed, three-lobed, the outer palpus shaped. (Ground and tiger beetles).

Series 2. Lamellicornia. Antennae short, the terminal joints leaf-like; tarsi five-jointed.

Series 3. Polymorpha. Antennae either club¬ like or serrated, variable in shape, as are the number of joints of the tarsus. (Buprcstidce , spring-beetles, etc., including many families).

Series 4. Heteromera. Front and middle tarsi five-jointed, hind tarsi four-jointed; other characters very variable. Tcnebrionidce, Can-tharidee, or blister-beetles (q.v.), *etc.*

Series 5. Phytophaga. Tarsi four-jointed but with a small additional joint at the base of the fourth joint; sole usually densely pubescent. (Boring or longicorn beetles; Cerambycidce , leaf-beetle, potato beetle).

Series 6. Rhyncophora. (Weevils). Head prolonged in front to form a beak; palpi much reduced; tarsi four-jointed, but with an ad¬ ditional minute joint at the end of the fourth. The term Isomera was applied by Le Conte and Horn to a combination of series 1, 2, 3 and 5.

Phylogeny. — The Coleoptera are supposed by Braver and also

Packard to have descended from some type allied to a Campodea-Yike an¬ cestor. The larvae of the ground beetles are allied by their long legs and biting mouth-parts to the common Campodea-Yike progenitor; they appear to have undergone the least modification from the shape of the primitive coleopterous larva ; the footless grubs of boring beetles, longicorns and weevils, being secondary forms. Thus the Coratidce and next after them the rose-beetles (Staphylinidce) have been regarded as the nearest to the earliest type of beetles.

Fossil Beetles. — The earliest known re¬ mains of Coleoptera are five specimens from the carboniferous strata of Silesia, of which four are wing covers and one is a pronotum ; these have been referred by Karsch to the families Carabidce or Tenebrionidce. In the lower Jurassic, however, comparatively well-preserved remains of six families (Carabidce , Dytiscidcc, Elateridce, Scarabceidce, Ceranioycidce and Chrysomelidce) have been detected, showing that, early in the Mesozoic era, nearly all the principal types of beetles had appeared ; whence we naturally suppose that their an¬ cestors evolved during the Carboniferous period, though their remains have not yet been discovered. During the Tertiary age beetles became more abundant, and a greater number of species belonging to existing genera have been found. The Oligocene fresh-water de¬ posits of Aix and Provence, of Florissant, Colo., contain many kinds of beetles, as also do the Miocene amber of the Baltic coast in Prussia and the lignite of Bohemia, as well as the fresh-water marls of Germany, Utah and Wyoming. Of the weevils 350 Tertiary species have been described, their hard bodies account¬ ing for their preservation.

Bibliography. — The writings of Say, Har¬ ris and others ; especially Le Conte and Horn ; (Rhynchophora of America north of Mexico, } (Classification of the Coleoptera of North America. }

BEETLEHEAD. See Black-bellied Plover.

BEETS, bats, Nicolaus, Dutch poet and writer: b. Haarlem, 13 Sept. 1814; d. 1903. He studied theology at Leyden, and after serving at

Heemstede near Haarlem he was in 1854 ap¬ pointed to the pastorate of Utrecht and in 1874 to the chair of theology there. His poetical works were collected (4 vols., 1873-81). Through the earlier pieces runs a strong vein of misanthropic sentiment due probably to Byron, some of whose works he translated into Dutch (2 vols., 1835-37). His prose writings include (Camera Obscura) (13th ed., 1880), a series of tales and sketches of life and scenery in Hol¬ land, published under the pseudonym of Hilde¬ brand ; they display keen observation and con¬ siderable humor. Besides several critical works, he published in theology notes on the life of Saint Paul (3d ed., 1858), and (Stichtelijke Uren> (new ed., 8 vols., 1872).

BEEVILLE, Tex., town and county-seat of Bee County, 90 miles southeast of San Antonio, on the San Antonio & Aransas Pass, and the Galveston, Harrisburg & San Antonio railroads. The region is well suited to fruit and vegetable cultivation and cotton, honey and live stock are exported in large quantities. The town has a cottonseed-oil mill and a broom factory. In 1912 the commission form of gov¬ ernment was adopted. Pop. 3,269.

BEFANA, ba-fa'na (Italian, Befania, ˆEpiphany*), a figure, generally representing an old woman, which is exhibited in Italy on the day of Epiphany by children, or in shops, etc., where things for children are sold. It symbolizes the ancient woman of Palestine who, saying she would see them on their return, would not leave her household duties to view the Three Kings of the Orient passing on their way to bear their rich offerings to the infant Jesus. Unknown to Befana, they returned in a different direction, and she is supposed to be still fruitlessly waiting for them. Her influence watches over little children who, on the eve of Epiphany, hang their stockings before the hearth-fire, go to bed early and wait to hear the cry (<Ecco la Befana,® when up they jump to find the presents awarded for good behavior during the past 12 months. A stockingful of ashes is the award for bad behavior. The parallel custom in the United States, Great Britain, Germany and Protestant communities generally is obviously the visit of Santa Claus on Christmas Eve. In France the children's (<etrennes® or gifts are distributed on New Year's Eve; in Russia on Twelfth Night, which is also the eve of Epiphany. (See Nicholas, Saint, of Myra). Among the Hebrews at Hannukah or Channukah, the Festival and Dedication of Lights (John x, 22), celebrated 25 December, money is given the children and gifts are exchanged. At Purim — the Feast of Esther (15 Adar — March), a festival of mirth, rejoicing and masquerading, ((salachmonnes,® a dish of swreetmeats including (<humuntash® — a sweet three-cornered seed cake, is sent to the homes and friends and relatives by the hands of servants or

children, who generally receive ((tips.® The poor also during this fes¬ tival are the recipients of generous charity. At the Passover (14 Nisan — April), which in¬ cludes the Fast of the First-Born and the Fes¬

tival of Unleavened Bread, a piece of (‘maz-zoth® or unleavened bread is hidden which it is the privilege of the youngest child to seek. When discovered, the finder can ask any favor or gift from the parent, which is granted.

BEG, or BEY, ba, a title of honor among the Turks, meaning <(lord.® Beg is an inferior title to pasha.

BEGARELLI, ba-ga-rel’le, Antonio, Ital¬ ian designer, styled Antonio of Modena : b. Modena about 1498; d. 1565. By his contem¬ poraries he was considered the greatest de¬ signer of his day. He was a friend of Cor¬ reggio and cooperated with him in decorating the cathedral of Parma, furnishing many of the designs and models for the artist’s pictures. His groups were commonly of life size or heroic, and were greatly admired by Michel¬ angelo. He influenced strongly the succeeding Lombard artists in the matter of design. His (Descent from the Cross,* the most significant of his remaining works, still adorns the church of San Francesco at Modena.

BEGAS, ba’gas, Karl, Prussian painter : b. Heinsberg, near Aix-la-Chapelle, 30 April 1794; d. Berlin, 23 Nov. 1854. He studied first under Philippart, and in Paris under Gros. His first work, a copy of the Madonna della Sedia, attracted the attention of the King of Prussia, who appointed him painter of the Prussian court. His productions comprise historical, genre and portrait paintings, of which the most important are (Henry IV at the Castle of Canossa> ; the ˆSermon on the Mount* ; (Christ on the Mount of Olives *; the (Lorelei* ; and the portraits of Humboldt, Schelling, Ritter, Rauch, Cornelius and Meyerbeer. He was a member of the Berlin Academy of Fine Arts.

BEGAS, Karl, German sculptor (son of the preceding) : b. 1845. He studied in the studio of his brother Reinhold and at the Berlin Academy of Art. Among his most important works are the Franco-Prussian memorial un¬ veiled at Cassel in 1898; the groups in the Berlin (<Siegesallee,® of Margrave Otho IV and Frederick William; the statue of Knobelsdorf in the Berlin Museum ; those of Columbus and Aristotle in the University of Kiel ; of Emperor Wilhelm II in the Hall of Fame at Barmen; and of Empress Auguste Victoria at Urville.

BEGAS, Oskar, German artist (eldest son of Karl Begas (q.v.)) : h. Berlin, 31 July 1828; d. there, 10 Nov. 1883. He received his first tuition in painting from his father, and at the age of 12 could already paint good portraits. In 1852 he won a scholarship at painting, which enabled him to continue his studies in Italy for two years, after which he visited France and England for a period. While in Rome he gained a gold medal with his (Deposition from the Cross,) a life-size canvas, and also the title of official painter in the Prussian Academy. Among his best portraits are those of Peter von Cor¬ nelius (in the Antwerp Museum, 1861), Pauline Lucca, Crown Prince Frederick, General von Moltke (1868) and William I. Of his historical paintings the best is (The Hour of Gossip* (National Gallery, Berlin). He also painted some of the mural decorations in the Berlin Rathaus (1870).

BEGAS, Reinhold, German sculptor (son of Karl Begas and brother of Oskar Begas,

qq.v.) : b. Berlin, 16 July 1831; d. 3 Aug. 1911. It is generally conceded that he was the leading German sculptor of his own period. Beginning his studies in the Berlin Academy, he later studied under Wichmann and Rauch. Earn¬ ing a scholarship from the Berlin Academy through a group he had executed, he went to Rome to finish his training. In 1860, after his return, he was appointed professor of the art school at Weimar, but two years later returned to Rome. As is shown in his later work, while in Rome Begas was strongly influenced by the realism of the Baroque School. His (Pan Con¬ soling a Deserted Nymph' (1857) was one of the first of his works which showed his ten¬ dency toward the portrayal of a live vigor in the cold stone, and it made an immediate im¬ pression on his countrymen, who were growing tired of the softer contours of the classical school. Only two years after this he was com¬ missioned to execute a group surmounting the Berlin Bourse, which was soon followed by the monument to Frederick William III at Cologne; the Schiller monument in Berlin (1871) ; and the Strousberg sepulchral monument (1874) which won the Grand Prize at the Paris Ex¬ position in 1900. This was

the early period of his career, during which he also modelled the busts of many of the German royalties and high officials, including a whole series of the Hohenzollern family. By this time he had been placed in charge of the portrait sculptures of the Berlin arsenal and its Hall of Fame. He was at this time the official sculptor of the Prussian court. Among his other notable works performed during this period are the bronze group ”Germania,” on the Reichstag building; the marble sarcophagus of Frederick II erected in the mausoleum at Potsdam and the colossal <(Fountain of Neptune” (1886), surrounded by allegorical figures of the rivers and sea monsters. By many this latter is considered his masterpiece.

In 1892 Emperor William II, without the formality of an official competition, commis¬ sioned Begas to execute the national monument to William I, and another to Bismarck (1901) in front of the Reichstag building. These were followed by a marble statue of the Emperor himself in the palace at Potsdam (1904). But in general the works which he performed to¬ ward the end of the first and in the beginning of his second periods are considered his best.

BEGBIE, Harold, English author: b. Fornham Saint Martin, Suffolk in 1871. His education was obtained entirely from private tutors and in private schools, at the conclusion of which he immediately embarked on a liter¬ ary career. His books are largely novels, with a strong didactic tendency. Among his more important works are (The Political Struwwel-peter Series’ (1889-1901); ’The Handy Man’ (1900) ; ’The Fall of the Curtain’ (1901) ; ’Master Workers’ (1905) ; (The Priest’ (1906) ; ’The Cage’ (1909) ; ’Broken Earthenware’ (1909, published in America under the title ’Twice Born Men,’ 1910) ; ’Souls in Action’ (1911) ; ’The Ordinary Man and the Extraor¬ dinary Thing’ (1912); ’Other Sheep’ (1912); ’The Rising Dawn’ (1913) ; ’The Proof God’ (1914); ‘The Queen’s Net’ (1915).

BEGBIE, Sir Matthew Baillie, British colonial judge: b. Edinburgh, Scotland, 1819;

d. 1894. He was educated at Cambridge and called to the English bar in 1844. He was ap¬ pointed judge in the colony of British Columbia in 1858; and was chief justice of British Co¬ lumbia, 1870-94.

BEGG, Alexander, Canadian author : b. Quebec, 19 July 1840; d. 1898. He was educated in Aberdeen, Scotland, and in Saint John’s, P. Q. He was the pioneer of Canadian trade (1867) in Manitoba and in

the Northwest Terri¬ tories. During the rebellion of 1869 he advo¬ cated representative government for the people. In 1878-84 he was deputy treasurer of the province of Manitoba. His works include 'Dot it Down'; 'The Creation of Manitoba'; 'A Story of the Saskatchewan' ; 'A Practical Guide to Manitoba' ; 'Ten Years in Winnipeg' ; 'A History of the Northwest' (3 vols.), *etc.*

BEGGAR-MY-NEIGHBOR, a game at cards, usually played by two persons, who share the pack, and, laying their shares face down¬ ward, turn up a card alternately until an honor appears. The honor has to be paid for by the less fortunate player at the rate of four cards for an ace, three for a king, two for a queen and one for a knave; but if in the course of pay¬ ment another honor should be turned up, the late creditor becomes himself a debtor to the amount of its value.

BEGGAR-TICK, a troublesome weed. See Burr Marigold.

BEGGARS, a term first applied to the 300 Protestant deputies under Henri de Brederode and Louis de Nassau, who protested against the establishment of the Inquisition in Holland in April 1566. The Dutch patriots assumed this designation when they rebelled against Spain in

BEGGAR'S LICE, a coarse weed also called Dog's Tongue.

BEGGAR'S OPERA, The, a play by John Gay, which first presented in 1728, excited a "tempest of laughter." Its object was to satirize the predatory habits of "polite" society in thief-infested London, and to hold up to ridicule Italian opera. The chief characters are thieves and bandits. Gay's language often conforms to the coarse taste and low standards of his time ; and the opera, still occasionally sung, now appears in expurgated form. Its best-known number is Macheath's famous song when two of his inamoratas beset him at once :

" How happy could I be with either Were t'other dear charmer away ! "

has become a popular quotation.

Captain Macheath, the hero, the leader of a gang of highwaymen, is loved by the ladies and feared by all but his friends — with whom he shares his booty. Peachum, the "respect¬ able" patron of the gang, and the receiver of stolen goods, betrays his confederates from self-interest. Macheath is married to Polly Peachum, a pretty girl, who really loves her husband, and remains constant under many vicissitudes. Macheath engages to marry others, but this gets him into trouble. Being betrayed, he is lodged in Newgate. His escape, recapture, trial, condemnation to death, and reprieve, form the leading episodes in his dash¬ ing career. After his reprieve he makes lardy acknowledgment of Polly, and promises to re-

main constant to her for the future. Polly is an interesting dramatic character ; at least three actresses attained matrimonial peerages through artistic interpretation of the part.

BEGGARWEED, or TICK TREFOIL

(Meibomia) , a genus of about 170 species, mostly herbs, of the family Fabacece, natives of warm and temperate climates. Some of the species, notably the Florida beggarweed (M. tor-tuosa), are used in Florida and elsewhere as fodder plants and as green manures on light soils. Like the clovers these plants can assimi¬ late free nitrogen from the air. The species mentioned yields heavy crops of highly nutri¬ tive hay which is relished by stock. At the Louisiana Experiment Station six tons of hay per acre is reported. The plant is an annual from three to 10 feet tall, has pinnate leaves, small flowers in racemes, and flat, jointed pods which adhere to clothing and animals by their hooked hairs. The plant has been found to do well in the West Indies and as far north as Virginia. About 10 native species worthy a place in the flower-garden have been offered for sale by dealers in native plants, but not generally by seedsmen. M. gyrans, the tele¬ graph plant, a purple flower perennial, native of southern Asia, is sometimes raised in hot¬ houses on account of the interesting movements of its leaflets when exposed to favorable tem¬ perature and sunshine.

BEGGIATOA, one of the bacteria of the family Beggiatoacece. They are of sanitary interest as indicating the character of the water in which they grow, — it usually contains sulphur, — and their presence in large quantities in a water supply is usually held to mean that the water is contaminated and should be inves¬ tigated. Their growth in natural sulphur waters is to be expected.

BEGGING THE QUESTION, in logic, is the assumption of a proposition which in reality involves the conclusion. Thus, to say that parallel lines will never meet because they are parallel is simply to assume as a fact the very thing you profess to prove. The phrase is a translation of the Latin term, pctitio principii, and was first used by Aristotle.

BEGHARDS, societies of laymen in France, Germany and the Netherlands, first appeared in the 13th century, subsisting mostly by begging, and little esteemed. They disappeared in the latter part of the 14th century. Their history is very obscure.

BˆGIN, ba-ghan, Louis Nazaire, Canadian cardinal: b. Levis, 10 Jan. 1840; educated at the College of Saint Michael de Bellechasse, the Seminary of Quebec, Laval University and the Grand Seminary of Quebec. About the time of his graduation from the last institution its trustees decided to found a theological de¬ partment in connection with Laval University, and it was their wish that the faculty of this theological school should be educated in Rome. Therefore Dr. Begin,

who had been elected a member of the faculty, was sent to Rome in 1863, and remained abroad till 1868. During this time he traveled extensively and studied many branches of theology. On his return to Quebec he was appointed professor of dog¬ matic theology and ecclesiastical history in Laval University and held the chair till 1884.

He became principal of the Laval Normal School in 1885; was appointed bishop of Chi¬ coutimi in 1888; coadjutor to Cardinal Tascher-eau, with the title of archbishop of Cyrene, in 1891 ; in 1894 became administrator of the province of Quebec; and in 1898 archbishop. He was elected to the cardinalate in 1914. His works include (La Primaute et l'Inf aillibilite des Souverains Pontifs,* (La Sainte Ecriture et la regie de foP (1874) ; (Le culte Catho-lique) (1875) ; (Catechisme de controverse) (1902), *etc.*

BEGLERBEG, ba-ler-ba', or more accu¬ rately Beylerbegi, ba-ler ba'e, ˆprince of princes,® or <rlord of lords,® is the title among the Turks given to the governor of certain provinces, but is not very commonly employed at the present day. The governors of Rumili, of Anatolia and of Syria, in particular, have this title. See Beg.

BEGON, Michel, be-gon, me-shel, French administrator: b. Blois, France, 1638; d. Roche¬ fort, 4 March 1710. He was a naval officer, and successively intendant of the French West Indies, of Canada, of Rochefort and La Ro¬ chelle. He is celebrated for his love of science, and the wen-known genus of plants, Begonia, was named in his honor.

B&GON, Michel, French administrator: b. 1674; d. 1740. He was from 1707-10 inspector-general of marines in France; intendant in Canada 1710-26; and subsequently intendant of justice in Normandy.

BEGONIA, a genus of 400 to 500 species of succulent tropical herbs or under-shrubs of the family Begoniacece, most abundant in Mex¬ ico and Central and South America. Since the introduction of the first species (B . nitida) into England in 1777 about 200 species have been utilized by horticulturists, who have pro¬ duced thousands of varieties noted for the superb coloring of either or both their flowers or foliage. In general the plants are charac¬ terized by variable, lop-sided (except in one group), alternate, entire or lobed leaves; axil¬ lary cymes of usually large monoecious flowers, varying in all shades of red, also white and yellow; numerous stamens free or basally united ; two to four styles ; branched or twisted stigmas; and three-winged capsular, often col¬ ored, fruits containing numerous tiny seeds. The cultivated

varieties may be grouped into

(1) summer-flowering or tuberous-rooted, which produce large single and double flowers ;

(2) winter-flowering or fibrous-rooted; (3) semi-tuberous, with peltate leaves ; (4) orna¬ mental-leaved, or rex, Asiatic species and their descendants, with remarkably handsome or striking foliage. There are also hybrids between members of these groups. Each group demands somewhat different cultural treatment, but in general the tuberous sorts are started from seeds, and the tubers thereafter used from year to year; other varieties are usually increased by means of cuttings, either of stem or of the leaf, by various methods almost confined to this group of plants. The varieties are usually easy to cultivate, but some, especially the tuber¬ ous sorts, are somewhat sensitive to dryness of atmosphere and hot sun, which usually accounts for the poor behavior of these plants in houses heated by hot air, steam or hot water. For

description of species grown in America, and tor details of propagation, cultivation, etc., con¬ sult Bailey, (Standard Cyclopaedia of Horticul¬ ture ‘ (New York 1914). Consult also Dry-sander, (The Genus Begonia > (in transac¬ tions of the Linnean Society, J Vol. I, 1789) ; Klatsch, (Begoniaceen-Gattungen und Arten) (12 plates, 1855); De Candolle, <Prodomus> (Vol. XV, 1864) ; Ravenscroft, (Begonia Cul¬ ture for Amateurs) (1894) ; Wynne, tuberous Begonias. >

BEGUINAGES, societies of women, called Beguines, in Holland, Belgium and Germany, not bound by vows; their mode of life, like that of the Beghards (q.v.), neither clerical nor lay. Their principal institution is at Ghent in Belgium.

BEGUINES, beg-en’, BEGUINS, beg-inz,

or BEGUINS, beg-wi-ne, the women who live in communities, the members of which dwell not in one household, as in convents, but in a

group of small cottages surrounded by a wall, with a chapel in the centre. They vow poverty and chastity so long as they remain in the beguinage as their village is called. They are the associations of praying women which arose in the Netherlands in the 13th century, the first being formed at Nivelles, Brabant, in 1226, and spread rapidly in the adjoining coun¬ tries. They said they originated from a cer¬ tain Saint Begga, Duchess of Brabant, in the 7th century; but it is believed that they were founded by Lambert le Begue, a priest of Liege, in the 12th century. Mosheim rejects both statements. Communities were established in Mechlin in 1207, Louvain 1234, Bruges 1244 and Brussels 1245. They used to weave cloth, live together under a directress and leave on being married, or indeed whenever they pleased. During the religious convulsions of the 16th century, and later at the French Revolution, the communities — which had exercised con¬ siderable influence on the religious conscious¬ ness of the urban centres — were suppressed; but a few still exist in some of the Belgian towns, notably at Ghent, which has 1,000 mem¬ bers, also in Germany, and at least in one beguinage in France, where they are renowned as makers of lace, though under different rules from those formerly observed. The corre¬ sponding communities of men were called Beghards, but having developed heretical ten¬ dencies these were suppressed in 1650 by Pope Innocent X.

BEGUM, ba'gum, or NAWAB (a feminine form corresponding to beg, or bey), an Indian title of honor equivalent to princess, conferred on the mothers, sisters or wives of native rulers. The Begum of Oudh is well known in Indian history. The Begum of Bhopal is the regent in behalf of her son, a minor.

BEHAIM, ba'hlm, Martin, a famous cos-mographer: b. Nuremberg about 1430; d. Fayal, 29 July 1506. He is distinguished as one of the most learned mathematicians and astronomers of his age. He was engaged in commerce, and traveled for the purpose of carrying on his business, from 1455 to 1479; but also devoted himself to the study of the mathematical and nautical sciences. He went from Antwerp to Lisbon in 1480, where he was received with marks of distinction. He sailed in the fleet of

Diego Cam on a voyage of discovery (1484-86), . and explored the islands on the coast of Africa as far as the river Zaire. He is also said to have discovered, or at least to have colonized, the island of Fayal, where he re¬ mained for several years, and assisted in the discovery of the other Azores. He was after¬ ward knighted, and returned to his

native country, where he constructed a terrestrial globe in 1492, which bears the marks of the imperfect acquaintance of that age with the true dimensions of the earth. Some ancient Spanish historians assert that he made many discoveries, and that he gave to his friend Columbus the idea of another hemisphere. Robertson (in his (History of America*) and others contradict this statement. It is also re¬ jected by Irving.

BEHAM, ba'ham, Barthel, German painter and engraver: b. Nuremberg 1502; d. Rome 1540. He began his studies under the tuition of Albrecht Diirer and his brother Sebald (q.v.). On account of their revolutionary agi¬ tations he and his brother were banished from Nuremberg in 1525. He settled in Munich, where he became attached to the court of Duke William of Bavaria as official painter.

Many paintings that were formerly ascribed to Beham are now believed to have been painted by others. Yet there remains a large number which can with certainty be accredited to him. Among these are the portraits of Chancellor Eck (1527, Weber Collection, Hamburg) ; Count Palatine Otto Heinrich (1535, Augsburg Gallery) ; (The Miracle of the Cross) (his masterpiece, 1530, Munich), and 17 portraits of Bavarian royal princes and dukes, in the palace of Schleisheim. Of his engravings nearly a hundred are still in existence. Con¬ sult A. Rosenberg's (Sebald und Barthel Beham* (Leipzig 1875).

BEHAM, Hans Sebald, German painter and engraver: b. Nuremberg 1500; d. Frank¬ furt, 22 Nov. 1550. He was, for a time, at least, a pupil of Albrecht Diirer. In 1525 he and his brother Barthel (q.v.) were expelled from their native city on account of their so¬ cialistic doctrines and agitations. After a wandering life of some six years he settled in Frankfort, where he remained for the rest of his life. This marked the beginning of his serious work.

Many of his drawings are in existence and are found in the important German collections. Of all the engravers of his period, he was one of the most industrious, for the most recent catalogue of his works includes 1,074 wood-cuts, 252 copper engravings and 18 etchings. His specialty was large wood-cuts designed for mural decorations. Of these the most notable are (The Fountain of Youth,* (The Military Pageant in Munich) and (The Marching Sol¬ diers.) Each of these is almost a yard in width. Of his many illustrations,, the most famous are those which he designed for the publisher Egenolph in Frankfurt, illustrating the Old Testament (1533). At about that same time he painted the well-known table now in the Louvre.

BEHAR AND ORISSA, province in lower Bengal, British India. It was constituted in 1912 and includes the Behar, Choata-Nagpur,

Turhut, Patna and Orissa divisions and the dis¬ tricts of Purnea, Monghyr, Bhagalpur and the Sonthal Parganas in the Bhagalpur division. It is located in a square area between the Bay of Bengal and the Himalayas. In the north it is low and flat, bordering on the Ganges, while in the southwest rise the tablelands of Nag¬ pur and Orissa. The principal crop is rice; this, together with sugar-cane, corn, indigo and the opium poppy plants, is grown in large quantities. The total area is some 120,000 square miles. In 1911 the population was about 40,000,000, more than the total population of the British Isles themselves. The capital is Patna.

BEHAVIOR AND BEHAVIORISM.

The term behavior was used first to describe the conditions of animal activities, but because of the peculiar relations that exist between the actions of man and animals it has developed into a name for one general explanation of or attitude toward human and animal actions and psychological problems in general. The prob¬ lem as to how the activities of men and of ani¬ mals are related has been discussed from the beginning of thought. For the most part it was assumed that one could know directly the mind of man and that all that remained was to de¬ termine whether and to what degree animals had a similar mind. As there is no direct method of determining whether animals have mental states, the development of scientific analysis compelled the investigator to raise the more definite question of what the criteria of mental activities in animals might be. This again led away from the problem, since an unambiguous answer could not be given to the more general question of what different kinds of acts is the animal capable and what is the explanation of each.

One can trace the gradual development of the notion of behavior as a separate type of organic activity through three stages in the work of the last three decades. The first stage is represented by Loeb, whose

experiments on animals led him to the conclusion that one must distinguish two types of control in the responses of animals. The lower animals re¬ spond as plants respond by heliotropism, geotro-pism, etc., a response that might very easily be reduced to simple mechanical laws, the con¬ traction of the tissue on the side toward the light and its expansion on the opposite side, e.g., would explain positive heliotropism. The movements of higher animals were explained from the more human analogy as due to ((associative memory,® the simplest of the learning processes. Bethe a little later made an attempt to explain all actions of animals in purely mechanical and chemical terms. He asserted that movements similar to those of the amoeba were made by drops of liquids and could be explained by the action of the surface film under different conditions. From experiments on ants he argued that they too were merely reflex machines, guided largely by the chemical excitations that we call odors. Jennings, in a long series of experiments, became convinced that there could be no sharp break in the line of development from lower to higher. In at¬ tempting to repeat Bethe's experiments he found that the reactions of the lowest organ¬ isms were by no means as simple as Bethe had

assumed. Traces of learning, i.e., modification of responses as a result of earlier responses could be detected even in unicellular organ¬ isms. At the same time he believed nothing was to be gained by assuming consciousness as a cause. To all forms of action he applied the term ˆbehavior.®

Behavior, then, is a term that designates the activities of animals as wholes. It distin¬ guishes their movements from the movements of inanimate objects, and at the same time does not make reference to consciousness or to any mental state. Behavior as the action of the whole is not referred to the action of the parts as in physiology. In this way it leaves room for an-explanation of the organism's activity apart from physiology, although the behaviorist assumes that the laws of physiology must hold and be essential for the explanation of the animal's activity. Instead of analyzing the various acts into the mechanical action of the members, behavior is explained by ref¬ erence to the natural endowment of the organ¬ ism through instinct and particular heredity and to its earlier acts caused by forces in the environment. While originally developed as a negative term to show how animal movements were not to be explained, the term has gradu¬ ally taken bn a somewhat positive meaning to designate the explanation of these movements in terms of wider influences. This

comes in part from the success of the psychologist and zoologist in determining the laws of behavior in animals. Within the last quarter of a cen¬ tury the laws of learning, certain of the in¬ stincts and the differential responses to stimuli have been pretty fully determined in many animals ranging from the amoeba to the ape. These together give a fairly satisfactory ex¬ planation of behavior.

Behaviorism as a psychological and philoso¬ phical interpretation of man and mind grew naturally out of the concept of behavior in animals. If one may study the activities of the cat or the ape from the outside, and can by ex¬ periments determine the capacities of the ani¬ mal and how it learns, discriminates between stimuli, and then can explain these capacities in terms of instinct and training, it is easy to take the next step in the assertion that the activities of man are also forms of behavior and can be examined and explained in the same way. They, too, may be treated merely as forms of response to definite stimuli. With that the traditional attempt to understand the lower animals in terms of human characteris¬ tics is reversed, and man's acts are explained in terms of the categories of animal behavior. Man is to be studied as the animal is studied, without any help from the individual under investigation. One discovers what the indi¬ vidual can do under given conditions and from the changes in accomplishment and the ante¬ cedents of the changes develops laws that may explain them. Behaviorism makes no use of introspection and omits all consideration of con¬ sciousness. Several of its exponents go on to deny that consciousness has any existence.

This attitude toward consciousness is in part due to other tendencies that have been active since the beginning of the century. For several reasons the notion of consciousness has been undergoing transformations during

the intervening years. By earlier writers con¬ sciousness was taken for granted as in some way made up of images of the objects thought about, which at the same time were not identical in structure with those things. An image of the object was in consciousness and the sum

total of these images constituted consciousness. C harcot, Galton and others observed that the character of the images was not the same for all individuals, that certain individuals thought largely in terms of one or two senses, others used different senses or combinations of senses in the representation of objects. Still Galton assumed that thoughts were these images and that nothing else except perhaps words could constitute the vehicle of thought. Later work¬ ers, primarily Kiilpe and his followers in Ger¬ many and Woodworth in this country, noticed that there were many cases in which the mental content bore no relation to the thought repre¬ sented and that in other instances no appreci¬ able imagery was present during the thinking process. In the more abstract forms of rea¬ soning, in reaching decisions and even in in¬ itiating movements often no imagery may be detected. In consequence the theory developed that imagery was not essential to thinking and therefore that consciousness either might have no existence or be very different from what it had been assumed to be. The ftNew Realists® (q.v.) also reached the conclusion from more abstract considerations that there could be no distinction between the objective reality and the mental state and prefer to call the common experience objective rather than subjective. Both tendencies prepared the way for behaviorism.

Behaviorism as a purely negative doctrine requires little space for the statement of its theses. As a method of investigation it makes positive contributions as has been seen, but as a system of metaphysics it asserts merely that consciousness does not exist, that one can be¬ come aware of man only from the outside and that it is useless to speculate what goes on inside because there is nothing there. The highest mental operations can be distinguished from the lowest reflex activities only by the complexity of the actions that result, the time that elapses between the stimulus and the re¬ sponse, and by the greater number of stimuli that co-operate in determining the former. As a method behaviorism abandons all attempt to make use of introspection, or to take any account of wˆhat the observer may note of the circumstances that may precede or accompany his action. It replaces these by more careful observation of the slightest movements. Thought is to be examined, not by studying what the individual says but by interpreting the slight unconscious movements of the human larynx. As a metaphysics behaviorism is but another attempt at a complete materialism, a system that has always fascinated certain types of mechanically minded individuals. It dif¬ fers from materialism largely in that the explanations are less detailed, movements are reduced to reflexes and to instinct rather than immediately to chemical and mechanical forces.

That the behaviorists are not altogether satisfied to eliminate consciousness and leave nothing in its stead to account for internal awrareness is admitted, perhaps unwittingly, in

the attempts to identify the sensory excitations from the various muscles of the body with a subjective appreciation of the activities that may be observed from without. The more cognitive processes are in some way related to the ((back-stroke® from the voluntary muscles, the feel¬ ings and emotions to excitations from the vis¬ ceral and other vital organs. Watson identifies thinking with movements of the larnyx, pleas¬ ure and pain with various contractions and relaxations of the sex organs. As neither has any immediate value in the world of behavior, they must have value only for subjective aware¬ ness. Whether consciousness is to be replaced bv kinaesthetic processes, a familiar position, or whether it is merely an inconsistency that has been inadvertently admitted to the system can¬ not at present be determined.

Any judgment that may be passed upon the value of the system must take into considera¬ tion the incomplete development of the formu¬ lations. At present it is still little more than a program. There is much more of prophecy than of statement of results. Behaviorism as a method of psychological investigation offers much of promise. That many of the capacities and accomplishments of the indi¬ vidual can be determined objectively is obvious from the ordinary laboratory procedure and an extension of the method is always welcome. It is also true that many explanations of the phe¬ nomena ordinarily called mental can be derived quite as well from the related physiological and neurological processes as from the obser¬ vation of consciousness. How far this can be extended is always a question that can be answered only by the outcome of the attempts. Statements of results can also be given in terms of behavior, but .whether the present incon¬ sistencies can best be eliminated by giving over the notion of consciousness altogether is not so clear.

Several obvious objections to the statement that consciousness has no existence in any form at once present themselves. First and most apparent is the conviction of many com¬ petent observers that they are actually con¬ scious and that this consciousness takes the form of images. That the behaviorists also feel the necessity of recognizing some process of the kind is evident from the attempt men¬ tioned above to give an internal awareness by means of sensory impulses from muscles and glands. A second objection is that so far they have

made no attempt to explain how the observer interprets the movements that consti¬ tute the behavior of another. Some attempt should be made to account for the way in which behaviorists appreciate the phenomena in question as well as to explain the phenomena themselves. It might be objected, too, that the activities of man are fully explained in terms of physiological processes, i.e., ultimately in chemical and physical terms. In that case be¬ haviorism becomes but a branch of physiology. In fact Bechterew' has developed this point of view in wdiat he calls objective psychology and reduces human activities exclusively to reflexes of various complexities and orders. Behavior¬ ism must steer a narrow course between phy¬ siology on the one side and some sort of psy¬ chologism on the other, if it is to retain an independent position.

While behaviorism as a final metaphysic is at present but a suggestion with many incon¬ sistencies involved in it, it does offer many advantages as a point of approach for psycho¬ logical problems and as a means of defining psychology as a science without presupposing controverted positions. This definition need not exclude the use of introspection, or com¬ pel one to make use of elaborate roundabout methods of determining simple facts. Thus it is certainly much simpler to study reasoning by means of speech than by slight movements of tongue or larnyx. The results are much more certain and easier to interpret. Why speech should not be admitted to be a form of behavior or writing used in place of the laryn-gograph is not apparent from logical considera¬ tions. Stripped of these unessentials, behavior¬ ism is of value as a method and as a slightly different point of view for the interpretation of the relation of mental and physical.

Bibliography. — Angell, (Behavior as a Category of Psychology) (Psychological Re¬

view, XX, 255) ; Bechterew, (Objektive Psy¬ chologies (1913); Bode, Psychology as a Science of Behaviors (Psychological Review, XXI, 46) ; Dunlap, (Thought-Content and Feelings (Psychological Review, XXIII, 49) ; Titchener, (Psychology as the Behaviorist Views Its

(Proceedings American Philosophical Society, Vol. LIII, No. 213) ; Watson, Psychol¬ ogy as the Behaviorist Views ID (Psychological Review, XX, 158); Watson, 'BehavioD (1914, Chaps. 1 and 10) ; Watson, (The Place of the Conditioned-Reflex in PsychologyS (Psycho¬ logical Review, XXIII, 89).

W. B. PlLLSBURY,

Professor of Psychology, University of Michi¬ gan.

BEHEMOTH, the name of an animal de¬ scribed in Job xl, 15, to the end. It is evidently an herbivorous animal ; but commentators and naturalists are not agreed as to the particular species. Bochart, Gesenius and the generality of English commentators think the description most applicable to the hippopotamus ; others think it was the elephant. Nor would it mili¬ tate much against this interpretation that the elephant is not a native of the country in which the scene of the poem is laid. The author of the book of Job, whether Moses or not, may have been familiar with life in Egypt and Arabia, and if so, would naturally introduce scenery and adjuncts Egyptian or Arabian, or both combined; and that the elephant was well known in Egypt is proved not only by the use of ivory in the arts, specimens of which are preserved in abundance, but also by the repre¬ sentation of the animal itself on early Egyptian monuments.

BEHISTUN, ba-his-toon', a mountain near a village of the same name, not far from Ker-manshah, in Persian Kurdistan, celebrated for the sculptures and cuneiform inscriptions cut upon one of its rocky sides, which rises almost perpendicularly to the height of 1,700 feet. These works are about 300 feet from the ground, and were executed by the orders of Darius I, King of Persia. The inscriptions set forth his genealogy, enumerate his 19 victories obtained against the rebels in different prov¬ inces of his empire, and proclaim the final pacifi¬ cation of the latter and his gratitude to God.

The sculptures consist of a large tablet, on which are represented a king with his foot upon a prostrate man, two long-speared warriors behind him, nine captives chained together by the neck before him, and above the whole a mythological figure. The inscriptions are ex¬ ecuted with great neatness, and the whole mon¬ ument is very well preserved, the rock, which had been carefully polished, having been coated with a hard silicious varnish, much harder, in¬ deed, than the limestone beneath. The mountain was well known in ancient times,

being men¬ tioned by Diodorus under the name of Bagis-tanon. The same writer states also that an inscription and figures were engraved upon the rock by the orders of Semiramis, but these, if they ever existed, have now disappeared. Rawlinson was the first to copy and decipher the Behistun inscriptions.

BEHM, bam, Ernst, German geographer and statistician: b. Gotha, 4 Jan. 1830; d. there, 15 March 1884. In 1856 he became Dr. Petermann's chief assistant in editing the famous geographical periodical Mitteilungen, to the editorship of which he succeeded on his chief's death in 1878. In 1866 he founded the Geographisches Jahrbuch. In 1872 he began, in conjunction with H. Wagner, the useful Popu¬ lation of the Earth, } intended as a statistical supplement to the Mitteilungen ; and from 1876 he undertook the statistical department of the (Almanach de Gotha.) His more extended writings of this nature are marked by fullness, accuracy and marked lucidity of arrangement.

BEHN, ban, Aphra, or Aphara, English

novelist and dramatist: b. Wye, Kent, 1640; d. London, 16 April 1689. She was the daughter of John Johnson, a barber; went to Surinam, then an English possession, when she was very young, and remained there some years, during which time she became acquainted with the native prince, Oroonoko, whom she made the subject of a novel, subsequently dramatized by Thomas Southerne. On her return she married Mr. Behn, a London merchant, but was probably a widow when selected by Charles II to acquire intelligence on the Continent during the Dutch War. She took up her residence at Antwerp, and it is said that, by means of one of her admirers, she obtained notice of the intention of the Dutch to sail up the Thames, and trans¬ mitted the news to England. This intelligence being discredited, she returned to England, and devoted herself to intrigue and writing for support. She published three volumes of poems, by Rochester, Etherege, Crisp and others, with some poetry of her own; and wrote 17 plays, the heartless licentiousness of which was dis¬ graceful both to her sex and to the age which tolerated the performance of them. She was also the author of a couple of volumes of novels, and of the celebrated love-letters be¬ tween a nobleman and his sister-in-law (Lord Gray and Lady Henrietta Berkeley). Pope, in his (Character of Women) alludes to Mrs. Behn, under the poetical name of Astrea :

' The stage how loosely does Astrea tread,

Who fairly puts her characters to bed.'

She was buried in the cloisters of Westminster Abbey. An edition of her works was published in London (1872). Consult Anglia for Jan¬ uary 1902.

BEHRENS, ba'rens, Bertha, popular Ger¬ man novelist, who has written over the signa¬ ture, W.ˆHeimburg: b. Thale 1850; d. 1912. She completed (Das Eulenhaus,* a posthumous novel by E. Marlitt, whose successor as con¬ tributor to Die Gartenlaubc she became, and among her own novels may be named (Aus dem Leben meiner alten Freunden* (1878; 12th ed., 1908) ; (Lumpenmullers Lieschen' (1879); (Ihr einziger Bruder) (1882; 15th ed., 1909); <Waldblumen> (1882; 6th ed., 1894); (DazumaP (1887); <Trudchens Heirat) (1884); (Um fremde Schuld) (1895) ; (Antons Erben} (1898); (Sette Oldenroths Liebe) (1902); 'Gesammelte Romane und Novellen) (10 vols., 1894—97) ; (Dr. Danz und seine Frau) (1903) ; (Wie auch wir vergeben) (1907) ; (Ueber steinige Wege) (1908) ; (Der Starkere) (1909) ; (Familie Lorenz) (1910).

BEHRING, ba'ring, Emil Adolf, German physician : b. Hansdorf 1854. He received his education in medical science at Berlin ; became an army surgeon in 1880, and was appointed to the chair of medicine at Halle in 1894. In the following year he received the appointment of director of the Hygienic Institute, Marburg. Behring became known internationally through his discovery of a diphtheria antitoxin. He also made great progress in the study of immunity in tuberculosis and a new diphtheria serum was brought out by him in 1913. He has published (Die Blutserumtherapie) (1892); (Bekampfung der Infektionskrankheiten) (1894) ; (Beitrage zur experimentellen Therapie) (1900). In 1901 he received the Nobel prize in medicine for his discovery of diphtheria serum.

BEHRING, ba'ring or be'ring, Vitus. See

Bering.

BEIGE, a light woolen fabric, made of wool of the natural color ; that

is, neither dyed nor bleached.

BEIJEREN, bi'er-en, Abraham van, Dutch

painter: b. The Hague 1620 or 1621; d. 1674. He studied first in his native city, later at Delft. In spite of the fact that he was one of the foremost genre painters of his time, most of his life was spent in abject poverty. His paintings are almost exclusively still life, his favorite subjects being fish and fruit. His can¬ vases are found in great number in many of the principal European galleries, but he is espe¬ cially well represented in Dresden, Vienna, Ber¬ lin, Stockholm, Petrograd and Lille.

BEIJERLAND, bi'er-lant. Holland, a fer¬ tile island in the Netherland province of South Holland at the mouth of the Maas or Meuse, five miles south of Rotterdam. It is 15ˆ2 miles long and 8l/2 miles wide. It produces great quantities of flax. Pop. 13,300.

P.EILAN, ba-lan', Syria, town on the Gulf of Iscanderoon, near the Beilan Pass, not far from Alexandretta. The town is 1,584 feet above the Mediterranean and is a summer re¬ sort for the foreign colony of Alexandretta. The pass has more than once been of military importance, and in 1832 was the scene of a bat¬ tle between Turks and Egyptians. It is sup¬ posed to be the Pylae Syriae of the ancients and to have been traversed by Alexander and the Crusaders in their marches to the Orient.

BEILSTEIN, bil'stin, Friedrich Konrad,

Russian chemist: b. Saint Petersburg 1838; d. 1905. He acquired his knowledge of chemistry' at Heidelberg, Gottingen, Munich and Paris; in 1860 was made assistant to the celebrated W ohler at Gottingen and six years later was appointed to the chair of chemistry at the Saint Petersburg Institute of Technology. He made extensive original investigations in analytical and organic chemistry. His published works include (Anleitung zur qualitativen chemischen Analyse* (Leipzig 1867) ; (Die chemische Grossindustrie auf der Weltausstellung in Wien 1873) (1873) ; (Handbuch der organischen

Chemie) (1883), a standard work of which five supplementary volumes were issued by the German Chemical Society (1901-06).

BEIRA, ba'ra, Portugal, a province bound¬ ed by the river Douro on the north, by Spain on the east, and by the Tagus and Portuguese Estremadura on the south and by the Atlantic on the west. It was formerly divided into Beira Alta (Upper Beira) and Beira Baixa (Lower Beira). Its extent is 9,208 square miles, and the pop. (1911) 1,626,484. The capital is Coim¬ bra. It is traversed by the Serra d'Estrella, and well watered by the Douro, Tagus, *etc.* With the exception of the coastal strip the soil is rocky. Chestnuts, grain, oil and wine are the principal products of the soil, while coal, iron, marble and salt are mined. Manufactures are at a low ebb, thread-making being about the sole industry at all developed. Commerce is slight, a condition due in great part to in¬ adequate transportation facilities. For purposes of administration the province is subdivided into the districts of Aveiro, Viscu, Coimbra, Guarda and Castello Branco.

BEIRA, Portuguese East Africa, seaport on the coast, at the mouth of the Pungwe River, about 35 miles north of Sofala. It is the near¬ est port to the gold fields of Mashonaland, and a railway through Fontesvilla, Chimoio, Massi-kesse and New Umtali to Salisbury was com¬ pleted in 1899. Beira has a good harbor. A breakwater guards the town from the encroach¬ ments of the river. The principal articles of export are rubber, sugar, tropical fruits, mining products and wax, while cotton manufactures, iron and liquors are among the chief imports. The port, established in 1891, is visited by about 500 vessels annuallyˆ approximating a total tonnage of 1,000,000 tons. Before the war the annual exports amounted to $2,750,000 and the imports to about $3,000,000. Pop. 3,450, of which 750 are whites.

BEIRAM, ba'ram. See Bairam.

BEIRUT, or BEYROUT, be-rut', or ba-root' (ancient Berytus), Syria, a flourishing seaport, 60 miles northwest of Damascus. It stands on a tongue of land projecting into an open bay, and spreading out toward the land into a beautiful plain, backed by the mountains of Lebanon. It consists of the old town, com¬ posed generally of narrow, dirty streets, the residence of tne poorer classes, and the busi¬ ness place of the merchants; and of the new town, which stretches around it. The latter, with its modern houses, carriage roads and gardens, — its churches, colleges, schools and hotels, — has little or nothing of the Oriental in its composition. Beirut has rapidly increased

since 1844 when its population was only 8,000, its rise being largely due to the extension of the silk trade, of which it is the centre. The better protection afforded both to foreigners and na¬ tives by its being the residence of the consuls-general has also contributed to its prosperity. It is the seat of a consulate of the United States. Besides silk its principal exports are olive oil, cereals, sesame seed, tobacco and wool. Ship¬ building is carried on here ; an English company completed waterworks here in 1875 and gas works were built by a French company in 1886. Besides a Scottish school for Jews, there is an American-Syrian mission in Beirut, printing an¬ nually thousands of Arabic Bibles and having a school and hospital connected with it. In ancient times Beirut was a large and important Phoenician city, and under the Romans was long celebrated for its school of jurisprudence. The Byzantine Emperor Theodosius II raised it to the rank of a metropolis. It was destroyed by an earthquake in 551. The Arabs took posses¬ sion of it in 635, and yielded it to Baldwin I, King of Jerusalem, in 1110. Saladin recaptured it from the Christians in 1187 but it soon fell into the hands of the Druses, who maintained their control of it until the last century. It was bombarded and taken by the British on 29 Aug. 1840. There is a railway to Damascus, Aleppo and Tripoli. A pasha, a Greek bishop, a Maro-nite archbishop and a papal delegate are sta¬ tioned here. The population, about 120,000, is composed of 36,000 Mohammedans, 76,000 Christians, 2,500 Jews, 400 Druses and about 4,300 Europeans.

BEISA, bi’sa, a large Abyssinian antelope (Orv. r beisa), differing from the gemsbok prin¬ cipally in lacking the tuft of hair on the throat and by the black patch on the front of the face being completely separated from the cheek stripe. This is probably the animal called oryx by the ancients, and may be the animal from which is derived the legend of the unicorn. Its straight horns (about 36 inches long) when seen in profile might easily appear as one. Herds of beisas are still numerous upon the plains of Somaliland. See also Gemsbok; Oryx.

BEISSEL, bi’sel, Johann Conrad, German mystic: b. Eberbach 1690; d. Ephrata, Pa., 1768. He learned the trade of a baker, also studied music and was a successful violinist. Later he studied theology at Halle, but having been banished in 1720 for his Pietistic opinions he emigrated to Pennsylvania, settling first at Ger¬ mantown and later in Lancaster

County. In 1724 he returned to Germantown and adopted the Dunker faith, but his views as to celibacy and his observance of Saturday as the Sabbath were unacceptable to his neighbors, and he therefore established a sect of Seventh Day Dunkers. He attempted a hermit life, but his fellow' believers gathered about him and in 1735 he founded the famous Settlement of Ephrata, Pa. (q.v.), and remained at its head till his death. At the settlement he practised many of his socialistic and religious theories. He was the author of the earliest volume of German poetrv published in America, (Gottliche Liebes-und Lobestone* (1730), and published several collections of hymns, such as (The Voice of the Lonely and Forsaken Turtle Dove — that is, of the Christian Church; by a Peaceable Pil¬

grim traveling to Tranquil Eternity) (1747); and (Paradisaical Wonder-play > (1766). In the latter are found the (Brother Song0 of the sect with its 215 stanzas, and the (Sister SongJ with 250. He was known at Ephrata as Fried-sarn, and on his tomb may be read the inscrip¬ tion : ((Here rests an outgrowth of the love of God, ˆriedsamP a solitary Brother, afterward a leader, ruler, teacher of the Solitary and the Congregation of Christ in and around Ephrata. * For an account of his life consult (Chronicon Ephratense) (Ephrata 1786) ; Sachse, (German Sectarians of Pennsylvania } (1899-1900).

BEIT-EL-FAKIH, bat-el-fake, Arabia, a town in Yemen, 32 miles south-southeast of Hodeidah, 77 northeast of Mocha and about 20 miles from the Red Sea. It is celebrated for its trade in Mocha coffee, which is chiefly grown in the neighborhood, and of which about 12,000,000 pounds are exported annually. Pop. about 8,000. The word Beit , signifying a house or hut, is prefixed to the name of various other small towns and villages in Arabia.

BEITALLAH, bat-al'la (Ar, «God's Houseˆ), the name of the building in Mecca within whose enclosure the Caaba (q.v.) is lo¬ cated. It is also known as <(the holy house** and <(the old house.**

BEITZKE, bits'ke, Heinrich Ludwig,

German historian: b. Muttrin, 15 Feb. 1798; d. 10 May 1867. His publications include his¬ tory of the German War for FreedonP (1855) ; (History of the Russian War — Year of 1812 J (1856) ; (History of the Year 1815 J (1865), *etc.*

BEJA, ba'zha (anciently Pax Julia), Por¬ tugal, town in the province of

Alemtejo, 85 miles southeast of Lisbon. It stands on a height, surrounded by walls flanked with 40 towers, and is defended by an old fort. It was founded by the Romans, and some Roman remains are still visible. It contains an inter¬ esting mediaeval castle, a cathedral, the notable church of Our Lady of the Conception and a Roman aqueduct. Two fairs are held here an¬ nually. The city has a considerable trade in the cattle and agricultural products of the fertile region adjacent, and there are also tanneries, potteries and oil refineries. Pop. 9,000.

BEJAPUR, be-ja-po-r' (anciently Vijaya-pura, the impregnable city), Hindustan, a town in the Bombay presidency, near the borders of the Nizam's dominions, about 245 miles south¬ east of Bombay and near the right bank of an affluent of the Krishna. For many centuries it was the capital of a rich and powerful king¬ dom, coming under the sway of Hindu and Mussulman alternately. Aurungzebe captured it in 1686 and in the 18th century the Mahrattas seized it. In 1818 the British gave it to the Rajah of Satara. From the great extent of the ruins here it would seem to have been formerly one of the largest cities of India. In its present state it may be described as two towns adjoin¬ ing each other — the fort on the east and the old town on the west. The former, though much less than the latter, has one entire and regular street 50 feet wide and nearly three miles long. Some of the mosques and mauso¬ leums of Bejapur are elaborately elegant, but the prevailing character is solid and massive.

The great dome of Mahomet Shah's tomb is visible far otf. The fretwork on the ceilings and verandahs, the panels covered with passages of the Koran in bas-relief, and the stone trel¬ lises pierced with a mesh-work of Arabic char¬ acters, are all in the richest style of Oriental sculpture. Among the religious structures is a Hindu temple, built in the earliest style of Brahmanical architecture. There are here some guns of enormous size ; one cast in 1549 is the largest piece of brass ordnance extant. Bejapur has become the chief town of Kaladgi district, and some of the old palaces are now used for public purposes.

Pop. (1911) 27,615. Consult Fergusson, (Ancient Architecture in Hindu-staip (1847); Ferguson, (The Study of In¬ dian Architecture) (1867).

BEJAR, ba'jar, Spain, town in the province of Salamanca, 41 miles south of the town of that name, on the Cuerpo de Hombre River, on a plateau 3,150 feet above sea-level. It is an important industrial centre and manufac¬ tures cotton and woolen cloths, yarn, thread, ribbons, soap and bread. There is also a large trade in the products of the region, consisting of chestnuts, grain, vegetables and wine. Bejar is the seat of the Duke of Bejar, whose palace is located here. The town also contains three churches of architectural note. Lord Hill de¬ feated a French force here in 1813. In its vicinity are warm sulphur springs. Pop. 9,209.

BEKE, bek, Charles Tilstone, English traveler: b. Stepney, Middlesex, 10 Oct. 1800; d. Bromley, Kent, 31 July 1874. In his 20th year he entered on a business career and was thus led to visit Italy. On his return he studied law at Lincoln's Inn and in 1834 he followed up several archaeological articles in periodicals by publishing (Origines Biblicae, or Researches in Primeval History^ In 1840 he set out on his first journey to Abyssinia, in which he not only rendered important services to discovery but collected vocabularies of the native dialects. Returning in 1843 he was awarded the gold medals of the Royal Geographical societies of London and Paris, and again engaged in busi¬ ness. He subsequently made several efforts to open up commercial intercourse with Abyssinia, and in 1861-62 he traveled in Syria, Palestine and Egypt. When the news of the detention of several British subjects by the King of Abys¬ sinia arrived in 1864, Beke went out to secure their release, and was temporarily successful, but ultimately King Theodore had to be coerced by war. In the direction of the military opera¬ tions Beke's knowledge of the country proved of the utmost value. In 1870 he was awarded a civil list pension of $500 per annum. In 1873 he set out for Egypt in order to explore the country traversed by the Israelites, and to locate Mount Sinai. His published works comprise (The Sources of the Nile' (1860) ; (The British Captives in Abyssinia* (1865) ; (King Theodore and Mr. Rassam* (1869) ; (The Idol in Horeb) (1871); (Jesus the Messiah* (1872); discov¬ eries of Sinai in Arabia, and of Midian) (1878).

BEKES, ba'kash, or BEKES-CSABA,

cho'bo, Hungary, market town and capital of the county of the same name, at the junction of the Black and White Koros, 41 miles southwest of Grosswardein and 105 miles east-southwest of Budapest,

formerly strongly fortified. There is considerable trade in flax, cattle, wheat, wine

and honey. Linen and hemp fabrics are among the chief manufactures. With the exception of Budapest Bekes has the largest Protestant col¬ ony in Hungary. Of its 42,599 souls, the ma¬ jority profess the Lutheran faith.

BEKKER, bek'ker, Elizabeth, Dutch nov¬ elist: b. Vlissingen, 24 July 1738; d. The Hague, 5 Nov. 1804. She married Adriaan Wolff, a Reformed ˆChurch minister at Beemster, who died in 1777, and she lived afterward in closest friendship with Agathe Deken, who also col¬ laborated in her most important works, (His¬ tory of Sara Burgerhart* (1782); ˆHistory of William Leevend* (1784-85) ; (Letters of Abra¬ ham Blankaart* (1787-89) ; 'Cornelia Wild-schut) (1793-96).

BEKKER, Immanuel, German scholar, dis¬ tinguished by his recensions of the texts of Greek classics: b. Berlin, 21 May 1785; d. there, 7 June 1871. He studied in Halle, and, in 1811, became professor of philology in his native city. The results of his researches in the libraries of France, Italy, England and Germany appear in his numerous recensions of texts derived solely from manuscripts, and independently of printed editions. The writers included in these recensions are Plato, the Attic orators, Aristotle, Thucydides, Theognis, Aristophanes, Sextus Empiricus, as well as Livy and Tacitus. He was also a collaborator of (Corpus Inscriptionum GrsecarumP and edited 25 volumes of the (Corpus Scriptorum Byzantinorum.* He is the author of (Anecdota Graeca* (3 vols., 1814— 21) and (Studies in Old French. * Consult Sandys, (A History of Classical Scholarship) (Vol. Ill, 1908).

BEL, bel, one of the most important gods of the Babylonian nrythology and the Phoeni¬ cian counterpart of Baal ; mentioned in Scrip¬ ture, in Is. xlvi, 1; Jer. i, 2; li, 44; in the Septuagint, in Baruch vi, 40, and in the apocry¬ phal additions to the book of Daniel, as well as by classical authors. See Baal.

BEL AND THE DRAGON, certain apoc¬ ryphal chapters added to the canonical Book of Daniel. The Jews do not consider them part of their Scriptures. They were penned prob¬ ably by an Alexandrian Jew, the language used being not Hebrew or Aramaean, but Greek. The story of Bel and the Dragon consists of two legends recounting (1) how Daniel en¬ lightened Cyrus, represented as having been a devout worshipper

of Bel, by proving that the immense supplies of food laid before the idol were really consumed, not by it or by the in¬ habiting divinity, but by the priests and their families. (2) On Cyrus urging that the dragon, also worshipped, was at least a living god, Daniel poisoned it, for which he was thrown into a lion's den, where the Prophet Plabakkuk fed him. Ultimately he was released, and his persecutors put to death. The above narrative must not be confounded with one called also (Bel and the Dragon,* translated by Fox Talbot from the cuneiform tablets. Mr. Talbot be¬ lieves that the dragon, seven-headed, like the one in Revelation, would, if the tablets were complete, prove the same being that seduced some of the heavenly "gods,® or angels, from their allegiance (Rev. xii, 4; Jude vi), for which he was slain by Bel. The resemblance is not to the apocryphal book now under consid-452

eration, but to the combat between Michael and the Dragon in Rev. xii, 7-17.

BELA, ba'lo, the name of four Hungarian kings of the Arpad dynasty. Bela I, son of Ladislaf, competed for the crown with his brother Andrew, whom he ultimately defeated, and mounted the throne in 1061. He established a coinage and weights and measures. Bela II, surnamed the Blind, because his eyes had been put out in early life by his uncle, succeeded to the throne in 1131, and at first seemed inclined to act with moderation and justice, but the vindictive spirit of his Queen involved him in quarrels with his nobles, and his own intem¬ perate habits brought on a disease which ter¬ minated his life in 1141. Bela III, grandson of Bela II, succeeded, in 1173, and held the reins of government with a strong hand, vigorously correcting the abuses and putting down the tur¬ bulent spirit which the troubles of previous reigns had engendered. He also repelled in¬ cursions of Bohemians, Poles and Austrians, and retaking the towns of which the Venetians had possessed themselves, compelled them to accept of peace in 1189. He died in 1196, and was succeeded by Emeric, one of two sons by his Queen, a sister of Philip Augustus, king of France. Bela IV succeeded his father, Andrew II, in 1235, and was shortly after obliged to collect an army to oppose the Tartars, who had invaded the country. In the battle which en¬ sued he was signally defeated, and obliged to take refuge in Austria, where he was detained prisoner, and

only recovered his liberty by the payment of a large ransom. The Tartars hav¬ ing retired in 1242, Bela regained his throne, and made it his object to repair the results of their invasion. He subsequently established his rule over Bosnia and northern Serbia, and died in 1270.

BELAND, Henri Severin, Canadian physi¬ cian and statesman : b. Louisville, province of Quebec, 11 Oct. 1869. He graduated B.A. at Three Rivers, and took his medical course at Laval University (M.D. 1893), afterward prac¬ tising his profession at New Bedford, Mass. He was returned to the Quebec legislature in 1897 for the county of Beauce, and since 1901 has represented that constituency in the House of Commons in the Liberal interest. In 1909 he was appointed a member of the commission of conservation, and in 1911 was Postmaster-General in the Laurier administration, until the defeat of that administration in the same year. He was in Belgium when the Great War broke out in 1914, joined the Belgian Hospital Corps, served at Liege and the siege of Antwerp, was wounded by shell fire and taken prisoner by the Germans, and held by them as a prisoner of war.

BELARIUS, a character of prominence in Shakespeare's (Cymbeline.' Exiled by King Cymbeline, he carries away with him the two sons of the monarch and rears them as his own.

BELASCO, David, American dramatist: b. San Francisco, Cal., 25 July 1859. He was graduated at Lincoln College in 1875. In 1874 he made his stage debut at the Metropolitan, San Francisco, and for a time was stage man¬ ager of the house and of Baldwin's Grand Opera. His success in adapting plays to the local needs of his community led him to devote himself exclusively to the latter work. In 1880

he produced (Hearts of Oak' and toured the country in it with James A. Hearne. He be¬ came stage manager of the Madison Square Theatre, New York, and later was connected with the Lyceum Theatre. He is now owner and manager of the Belasco Theatre, New York. Of late years he has devoted himself to the betterment of the mechanical details of the stage. Among Mr. Belasco's great successes have been (The Wife) (1887) and Whe Charity BalP (1889), written jointly with H. C. de Mille ; (Lord Chumley,' with E. H. Sothern in the title role (1888); (The Girl I Left Behind Me,' jointly with F. Fyles (1893) ; (The Heart of Maryland,) with Mrs. Leslie Carter in the principal role (1895) ; (Naughty Anthony '

(1899). Among his other plays are cZaza' (1898); (May Blossom) (1894); (Men and Women' (1890); (La Belle Russe' (1882);

(Valerie' (1886); (Du Barry' (1901); <The Darling of the Gods' (1902) ; (Sweet Kittie Bellairs' (1903); (Adrea' (1904); (The Music* Master' (1904); (The Rose of the Rancho' (1905); (The Girl of the Golden West' (1905); (A Grand Army Man' (1907); (The Warrens of Virginia' (1908) ; (The Fighting Hope' (1908) ; (The Easiest Way' (1909) ; (The Lily' (1909) ; (Is Matrimony a Failure?' (1909); (The Concert' (1910); 'Nobody's Widow' (1910); (The Woman' (1911); 'The Return of Peter Grimm' (1911) ; (The Case of Beck}*' (1911); Wears of Discretion' (1912); 'A Good Little Devil' (1912) ; 'The Secret' (1913); (The Phantom Rival' (1914); 'Marie Odile' (1915) ; 'The Boomerang' (1915).

BELBEIS, bel-bas', Egypt, town 20 miles north-northeast of Cairo, near the railway to Suez and on the border of the desert, formerly of some importance as being on the route to the East. The ruins of the ancient Bubastis are in its neighborhood. Pop. about 11,000.

BELCH, Sir Toby, a roistering character in Shakespeare's comedy, 'Twelfth Night.'

BELCHER, Sir Edward, English admiral and hydrographer : b. Halifax, N. S., 1799; d. 18 March 1877. Having taken part as midshipman in the defense of Gaeta and the battle of Al¬ giers, he was in 1819 appointed to the Myrmidon sloop, destined for the African station, and in 1825 became assistant surveyor to the Bering Strait discovery expedition under Captain Beechey. In 1829 he was promoted to the rank of commander, and served on the coast of Africa, and of Portugal, rendering on the latter occasion, valuable services to the British resi¬ dents by protecting their property during the political troubles in Portugal. Subsequently he was engaged for a number of years in a voyage around the world in the surveying vessel, Sul¬ phur. In. 1841 he explored the inlets of the Canton River, and materially assisted in secur¬ ing the triumph of the British army. In ac¬ knowledgment of these services, he was knighted. Afterward he was employed on board of the Samarang, on surveying service in the East Indies, and was severely wounded while assist¬ ing the Rajah of Sarawak, Sir James Brooke, to subdue the pirates of Borneo. From 1852 to 1854 he commanded the expedition in search of Sir John Franklin. On his return to Eng¬ land, he was tried before a court-martial for voluntarily abandoning the ships The case against him, however, was not legally supported,

he was acquitted, and his sword returned to him, but while some of the other officers were commended, his name was passed over in sig¬ nificant silence. In 1872 he became rear-admiral. He published (The Last of the Arctic Voyages5 (1855) ; (Narrative of a Voyage to the East Indies.5

BELCHER, Jonathan, colonial governor of Massachusetts: b. Cambridge, Mass., 8 Jan. 1681 ; d. Elizabethtown, N. J., 31 Aug. 1757. He was graduated at Harvard, in 1699, and spent six years in Europe before returning to Boston, as a merchant. From 1730 to 1741 he was governor of Massachusetts and New Hamp¬ shire, a dispute over his salary causing his removal. In 1747 he was made governor of New Jersey and gave it a successful adminis¬ tration. He enlarged the charter of the Col¬ lege of New Jersey (Princeton) and gave that institution, among other benefactions, his own valuable library. (The Belcher Papers5 were issued by the Massachusetts Historical Society,

BELCHITE, bel-che'ta, Spain, town 22 miles south-southeast of Saragossa, on the Aguas, a tributary of the Ebro, noted as the scene of a victory gained 18 June 1809, by the French, under Suchet, over the Spanish forces under Blake. Belchite has some manufactories of woolens. Pop. 3,333.

BELCIKOWSKI, bel-tse-kov'-ske, Adam, Polish writer: b. Cracow 1839; d. 1909. Grad¬ uating from Cracow University in 1865, he was, in the following year, appointed instructor in Polish literature at the University of War¬ saw. Three years later he was appointed to the same position at Cracow, where he became a member of the Cracow Academy in 1870. His writings are chiefly dramatic and critical. Among his historical dramas are (Adam Tarlo5 (1869) ; (Hunyady5 (1870) ; (Dwaj Radziwil-lowie5 (1871); (Franceska da Rimini5 (1873); (Kmita i Bondarowna5 (1875) ; (Krol Wladys-law Warnenczyk5 (1877). His collected essays appeared in Warsaw (1886) with a biographical introduction by Chmielowski.

BELCOURT, bel' -coor', Napoleon Antoine,

Canadian lawyer and statesman : b. Toronto, 15 Sept. 1860. He was educated at Three Rivers and Laval University, Montreal (master of laws, 1882). He was called to the Quebec bar, 1882, and to that of Ontario 1884. He repre¬ sented the city of Ottawa in the House of Com¬ mons, 1896-1907, and was speaker from 1904 to 1907, when he was nominated to the Senate. A representative French-Canadian, he has written much on social and educational subjects; took a leading part in the bi-lingual controversy, and pleaded the case of French schools of On¬ tario in the appeal before the judicial com¬ mittee of the imperial privy council in 1915.

BELDING, Mich., city in Ionia County, on the Pere Marquette Railroad, 25 miles north¬ east of Grand Rapids and 139 miles northwest from Detroit. It has silk mills, basket, casket and furniture factories, machine shops, paper box factories and other industries. The first silk mill in the West was erected here. Pop.

5,000.

BELEM, or BELEM DO PARA, the of¬ ficial name of the capital of the

Brazilian state of Para (q.v.).

BELEMNITES, a name for straight, sol¬ id, tapering, dart-shaped fossils, popularly known as arrowheads, thunder-bolts, finger-stones, etc., but in reality the internal shell or skeleton of a molluscous animal allied to the squid or sepia, and the type of an extinct fam¬ ily, Bclemnitidce. The name was first applied by Agricola in 1546. The fossil remains of the animal (of which 350 species are known) are met with in rocks ranging from the lower Liassic to the uppermost cretaceous, and are most abundant in Europe, Asia and North America. They vary from one to 15 inches in size ; and are particularly abundant in the strata of the green sand formation in New Jersey. The part preserved, often detached from the loose strata, is a pointed cone of brown color and stony material, resembling in shape the head of a dart or javelin, whence their name. Belemnites are one of the earliest known fossils.

BELERIUM, or BOLERIUM, the an¬ cient appellation of Land's End in Cornwall, England, but the origin of the name is un¬ certain.

BELFAST, Ireland, the chief commercial and manufacturing city of the island, a par¬ liamentary borough and the capital of the prov¬ ince of Ulster, on the river Lagan at the head of Belfast Lough, about 113 miles by rail north of Dublin. It is the terminal station of the Great Northern and the Belfast and County Down railways, the latter, 80 miles of track, connecting with chief points on the seacoast. The greater part of it is built on low alluvial land on the banks of the Lagan, not more than six feet above high-water mark. The country around is extremely beautiful ; the position of the town renders its appearance from a dis¬ tance by no means imposing, but the Lough itself presents a fine scene; and the slopes of the hills that bound it and partly encircle the town are thickly studded with the villas and country houses of the merchants.

Streets and Bridges. — Many old squalid districts have been destroyed to make way for spacious, regular and well-lighted streets, the finest of which is Royal avenue, where numer¬ ous public buildings are situated. An excellent electric tramway service and electric light have been introduced and the sewage system has been improved. There are many handsome houses, but architecturally the city has scarcely kept pace with its commercial prosperity. Four bridges cross the river, one of which, the Queen's Bridge, is an elegant structure of five arches, each of 50 feet span.

Churches, Public and Commercial Build¬ ings, etc.— Many of the churches are handsome buildings. Saint Anne's Cathedral on the site of the oldest Episcopal (Church of Ireland) church had the foundation stone laid in 1899, and was opened for service in 1904; Trinity, a fine specimen of Gothic, and Saint George s, adorned with a beautiful portico, are also de¬ serving of notice among the Episcopal churches. The Presbyterian churches, which outnumber all others in the city, include two fine buildings on Fitzroy avenue and Elmwood avenue. Saint Patrick's serves as the Roman Catholic cathe¬ dral, but is architecturally inferior to Saint Malachy's. The secular buildings include the new city hall, costing $1,800,000; Queen's Uni-

versity, a massive pile in the later Gothic style, with a facade 600 feet in length; the Presby¬ terian Theological College ; the Methodist Col¬ lege, a handsome building erected and endowed in 1868 at a cost of $580,000; the municipal buildings ; the county courthouse ; the commer¬ cial buildings and exchange ; the buildings for the customs and inland revenues; the post-office; the offices of the Ulster Bank, the Bank of Ireland, the Provincial Bank, the Belfast Bank, the National Bank, the Scottish Ami¬ cable, Scottish Provident and North British and Mercantile Assurance companies ; the Grand Opera House ; the Theatre Royal ; the county jail; the Ulster Hall; the Presbyterian As¬ sembly Hall; the Belfast Museum; the Albert Memorial clock tower, 143 feet high, *etc.*

Educational Institutions. — Of the educa¬ tional institutions the most prominent is Queen's University, first opened to students in 1849, and raised to the rank of a university in 1908, with 65 teachers and 550 pupils (1913-14). Candi¬ dates for the ministry of the Presbyterian Church of Ireland receive a training in the General Assembly's Theological College, founded in 1853. The Methodist College and the Campbell College (a secondary school) are important institutions; while the New Mu¬ nicipal Technical Institute and the Royal Acad¬ emy and the Royal Academical Institution also deserve mention. There is a free public library belonging to the city.

Newspapers, Charitable Institutions, Parks.— The chief and oldest newspaper in the Belfast News-Letter, established 1 737. The charitable institutions are very numerous and important. In the city there are six extensive public parks, besides the borough cemetery.

Trade, Manufactures, Shipping, Harbor, *etc.* — Belfast is the centre of the Irish linen trade and manufacture, having within itself the great majority of the spinning-mills and power-loom factories in Ireland, some of them of immense size and of imposing appearance. The spinning of flax and weaving of linen are the staple industries. Linen goods to the value of $68,131,000 were exported from Belfast in 1916. The cotton manufacture, which had decreased considerably, showed a considerable increase, imports of cotton yarn in 1916 being 10,486 tons, compared with 6,222 tons in 1915 and 3,251 tons in 1914. There are two large shipyards, and in their yard and engineering works Messrs. Harland and Wolff employ some 12,000 hands, and have turned out some of the finest vessels afloat, one of their triumphs being the great steamer Olympic, built for the White Star Line. There are also breweries, distilleries, flour-mills, oil-mills, sawmills, foundries, printing and lithographic works, tanyards, chemical works, aerated waterworks, the largest rope works and tobacco factories in Great Britain, felt manufactories, *etc.* The commerce of Belfast surpasses that of any other Irish seaport and is rapidly increasing. By its customs revenue it is the fifth port in the United Kingdom. The port covers an area of over 2,000 acres, including docks, wharves and shipyards. Belfast Lough, which forms the approach by sea, is a fine sheet of water be¬ tween the counties of Down and Antrim, about 14 miles in length and six miles in breadth at the entrance, narrowing toward the city.

The Victoria Channel (300 feet wide) was cut about 1840, and improved in 1882, to accommo¬ date large vessels. New docks have been con¬ structed, giving a total harbor area of over 100 acres. The Alexandra Dock is 852 feet long, and the new graving dock, constructed 1903-10, at a cost of $1,750,000, is the largest in the world. The most important branch of traffic by sea is across the channel. A large fleet of steamers ply regularly between Belfast and London, via Heysham, Plymouth, Bristol, Liv¬ erpool, Holyhead, Fleetwood, Barrow, White¬ haven, Ardrossan, Glasgow, Dublin, Water¬ ford, *etc.* There is also an extensive direct trade with British North America, the Medi¬ terranean, France, Belgium, Holland and the Baltic. In 1786 only 772 vessels (34,287 tons) entered the port; whereas in 1915 the net ton¬ nage of the 9,037 vessels that used the

port was 3,288,600. The exports to the United States alone in 1916 amounted to $19,587,133. The chief exports are linen, whisky, aerated waters, iron ore and cattle; the chief imports grain, cotton, flax, linen yarn, iron, steel, coal, timber, *etc.* In 1916 over 2,639,- 000 tons of goods were brought in and 674,000 tons went out. The customs duties amount to over $15,400,000 per annum, exclu¬ sive of what passes through the Inland Reve¬ nue Department. Much of the inland trade is carried on by the Lagan Navigation, which con¬ nects the town with Lough Neagh; the Ulster Canal, connecting Lough Neagh with Ennis¬ killen; and by systems of railway, namely, the Great Northern, the Belfast and County Down.

History and Administration. — Belfast is comparatively modern. In the 16th century it was merely a fishing village with a fortress; in 1613 it was granted a charter by James I, and about 1637 it obtained the privilege of levying certain duties on goods and became a regular seaport ; but its prosperity subsequently was much impeded by the civil war. Early in the 18th century it was described as a hand¬ some, thriving town, but its period of modern prosperity dates from the introduction of the cotton manufacture in 1777, the establishment of shipbuilding on a large scale in 1791 and the introduction of machinery in the linen in¬ dustry in 1830. In 1888 Belfast became a city; in 1892 the mayor received the title of lord mayor, and in 1896 the city boundaries were extended, the wards were increased from five to 15, and the municipal corporation was made to consist of 15 aldermen instead of 10 and of 45 councillors instead of 30. In 1899 it became a county borough. Belfast has frequently been the scene of riots between the Protestant and Roman Catholic population, the latter of whom are largely outnumbered. The harbor is under the management of an independent board. The city maintains the elementary schools, working¬ men's dwellings, libraries, museums and fire department, and owns the gas and electric-light plants, abattoirs and tramways. Belfast returns four members to Parliament. An American consul is resident here. Total area 16,594 acres. Pop. (1901) 349,180; (1911) 386,947. Consult Benn, G., (History of Belfast* (Belfast 1877) ; Fisher, (Trading Centres of the Em¬ pire: Belfast (London 1901); Young, R. M., historical Notices of Old Belfast* (Belfast

1896,

BELFAST, Me., city and county-seat of Waldo County, at the head of Penobscot Bay, and on the Maine C. Railroad, 30 miles from the ocean, and 132 miles northeast of Portland. It has a fine harbor, a large domestic trade and important manufactures, including iron works, shoe factories, lumber mills and chemical works. The public library contains 5,000 volumes. The city contains also a theatre, opera house and several fine bank buildings. The most notable industry is shipbuilding, begun here in 1793. Belfast was settled in 1770; incorporated as a town and named from Belfast, Ireland, in 1773; was invested by the British in 1815, and was given a city charter in 1853. Government is vested in a mayor, elected annually and a city council of two chambers. Consult Wil¬ liamson, (History of the City of Belfast* (1877). Pop. (1920) 5,083.

BELFORT, bel-for, France, fortified town in the department of Haut Rhin, on the Sa-voureuse, commanding the Trouee de Belfort or pass between the Vosges and Jura Mountains, 47 miles northeast of Besangon. It is well built and has an ancient castle situated on a lofty rock, a fine parish church, barracks, town house, court of primary resort, public library contain¬ ing 20,000 volumes and a communal college. Manufactures — hats, clocks, wax tapers, iron wire, sheet iron, *etc.* There are also breweries, tanneries and iron furnaces. The principal trade is in grain, wine, brandy and liquors. Iron is extensively worked in the neighborhood. Austria ceded Belfort to France in 1648 and it was later fortified by the celebrated Vauban. In 1814 Belfort was besieged by the Allies without success. In the Franco-German War it was invested by the Germans, 3 Nov. 1870, and, after holding out with great bravery, capitulated, 16 Feb. 1871. In recognition of the bravery which the garrison had shown in its defense, it was allowed to march out with full military honors. This defense is commemorated by the huge «Lion of Belfort** in front of the citadel, the work of Bartholdi. Belfort, with the district immediately surrounding it, was the only part of the department of Haut Rhin, which remained to France on the cession of Alsace to Germany, 26 Feb. 1871. Previous to the Great War Bel¬ fort was deemed impregnable because of its extensive system of fortifications. The fate of the Belgian fortresses in the war has, however, caused a revision of this estimate. Pop. 39,371. Consult Bardv, (Etude historique sur Belfort* (Belfort 1900).

BELFRY, a bell-tower or bell-turret. The term was employed in mediaeval siege-craft for a movable wooden tower of several stages employed in attack ; and also for a watch-tower with an alarm bell. A bell-tower may be at¬ tached to another building, or may stand apart ; a bell-turret, usually rises above the roof of a building, and is often placed above the top of the western gable of a church, the terms bell-cote, bell-gable, being also used. The part of a tower containing a bell or bells is also called a belfry. Strictly speaking, belfry is a civil and not an ecclesiastical term : in the Middle Ages the bells in the municipal belfry were employed in calling the citizens to arms or to council, and thus became the symbols of popular freedom. The belfry of Bruges, commenced in 1291, is 353 feet high, and has a celebrated carillon of

bells. It was not till the 14th century that clocks were placed in belfries. The detached bell tower is of frequent occurrence on the con¬ tinent of Europe, and in England the Cathedral of Chichester and a few parish churches pos¬ sess such an adjunct. In the United States such structures are infrequent, but in the town of Waterville, N. Y., is a detached belfry or clock-tower with quarter chimes, and Brown University at Providence has a handsome de¬ tached clock tower erected within its grounds.

BELGiE, a group of German and Celtic tribes who inhabited the country extending from the Atlantic Ocean to the Rhine, and from the Marne and Seine to the southern mouth of the Rhine, which is united with the Meuse. From time to time until the period of Caesar, German nations pushed forward beyond the Rhine, partly expelling the Celts from their seats, partly unit¬ ing with them; and from this union sprang a mixed nation, which, in its language as well as in its manners, resembled the Germans more than the Celts. According to the testimony of Caesar, they were the most valiant of the Gauls. Belgic tribes seem also to have settled in early Britain.

BELGAUM, bel-gam', India, town in the district of Belgaum, Bombay presidency, on the eastern slope of the western Ghats, 2,500 feet above the sea. It consists of a native town, fort and cantonments, and contains the usual courts and offices, two schools for the children of natives of rank and various other schools. In 1818 the fort and town were taken by the British after a gallant resistance by the Peish-wa's forces. The place has progressed under British rule and its citizens have not been back¬ ward in furthering various public enterprises. In 1848 they subscribed a large sum for the bet¬ terment of the means of

communication, of which their community has continued to reap the fruits. From the salubrity of the climate and the purity of the water, Belgaum has been selected as a permanent military station. Bel¬ gaum manufactures cotton cloth and carries on a trade in salt, dried fish, dates, coin, *etc.* Pop. 42,623. Area of district 4,656 square miles; pop. 943,820.

BELGIC CONFESSION, a credal state¬ ment put forth in French in 1561 by Guido de Bres of Brabant and others, and sent to Philip II of Spain to persuade him to tolerate the Calvinistic faith. In 1562 it was published in the vernacular and subsequently in Dutch and German, and was acknowledged by the synods of Antwerp (1566) and Dort (1619). A trans¬ lation appears in Schaff's (Creeds.*

BELGIOJOSO, bel-jo-yo'so, Cristina (Princess of), Italian patriot: b. Milan, 28 June 1808; d. there, 5 July 1871. She took a prominent part in the revolution of 1830 and was exiled by the Austrian government. She lived in Paris for several years and then re¬ turned to Italy in 1847, and in the revolution of 1848 offered her whole fortune to the patriot cause and equipped several hundred volunteers at her own expense. A second exile followed on the occupation of Rome by the French in 1849, but she returned under the amnesty of 1856 and supported the policy of Cavour. She edited periodicals in the interest of Italian lib¬ erty and was the author of several books.

among them 'Souvenirs of Exile) (1850); (History of the House of Savoy > (1860) ; and Reflections on the Actual Condition of Italy y

(1869).

BELGIOJOSO, Italy, town in the province and eight miles southeast of Pavia. It is situ¬ ated in a beautiful and fertile plain between the Po and the Olona, and is well built, con¬ taining a parish and an auxiliary church. The old castle, in which Francis I was temporarily

lodged after being taken prisoner at the battle of Pavia, in 1525, has been converted into a magnificent chateau, surrounded by fine gar¬ dens. Pop. 4,800.

BELGIUM (Flemish, Belgie; French, Bel¬ gique; German, Belgien), a kingdom of Europe, bounded north by Holland, northwest by the North Sea, west and south by France, and east by the duchy of Luxemburg, Rhenish Prussia and Dutch Limburg. Its greatest length, northwest to southeast, is 165 miles; greatest breadth, north to south, 120 miles; area, 11,373 square miles. The country is triangular in shape, having its vertex in the west, the base resting on Germany in the east, the shorter side facing Holland and the sea and the larger forming the frontier of France. For adminis¬ trative purposes Belgium is divided into nine provinces — Brabant, Antwerp, East Flanders, West Flanders, Hainaut, Liege, Limburg, Lux¬ emburg and Namur. Differing little in area, these provinces are arranged to form a com¬ pact and commodious division of the country. Brussels, the capital, is situated in Brabant, which occupies the centre and may be consid¬ ered the metropolitan province. The follow¬ ing table shows the areas of the provinces, with their estimated population, 31 Dec. 1912:

Provinces	Areas in square miles	Population
Antwerp .	1,093	1,004,909
Brabant .	1,268	1,522,941

Flanders, East .

1,158

1,134,079

Flanders, West .

1.249

884,777

Flainaut .

1,437

1,247,042

Liege .

1,117

896,649

Limburg .

931

284,171

Luxemburg .

1,706

232.900

N amur .

1,414

364,319

Total .

11,373

7,571,387

The populations of

the principal

towns in

1912 were:

Brussels .

… 663,647

Seraing .

. 41,833

Antwerp .

… 312,884

Tournai .

37,349

Liege .

. .. 170,634

Courtrai .

. 36,029

Ghent .

. .. 167,477

Alost .

35 , 603

M alines .

. .. 59,735

Saint Nicolas…

35,128

Bruges .

. .. 53,635

Namur .

32,453

Verviers .

… 45 , 964

Charleroi .

29,452

Ostend .

. .. 43,002

Mons .

. 27,805

Louvain .

. .. 42,482

The last census, taken 31 Dec. 1910, placed the population at 7,423,784; the above official estimate reveals an increase of 147,603 in two years. The 1912 figures gave 3,756,872 males; 3,814,505 females. Excluding infants, the cen¬ sus (1910) showed that 2,833,334 spoke only French; 3,220,662 only Flemish; 31,415 only German; 871,288 both French and Flemish; 74,993 both French and German; 8.652 German and Flemish ; and 52,547 who were conversant with all three lan¬ guages. At the same time there were 254,547 foreigners residing in Belgium, distributed as follows: French, 80,765; Dutch, 70,950; Ger¬

mans, 57,010; Luxemburgers, 10,367 ; Russians, 7,491; British, 6,974; Austro-Hungarians, 5,927; Italians, 4,498; Swiss, 2,335, and 8,238 of other nationalities. Statistics of Belgian emigration show 13,492 in 1900; 14,752 in 1904; in 1908 these figures were more than doubled, namely, 32,294; in 1909 there were 38,190 and in 1912 a total of 35,775. The immigration of foreigners into Belgium, on the other hand, exceeded the emigration of the natives to other countries. The latest available figures are : in 1910, 44,950; in 1911, 41,062 ; and 42,980 in 1912. The majority of the population is Roman Catholic, but as no inquiries on the subject of religious belief are made in the census

enumeration, there are no figures available to show the distribution of creeds. The govern¬ ment impartially subsidizes Roman Catholic, Protestant and Jewish places of worship by contributing to the stipends of ministers. So far back as 1831, when religious tolerance was still an almost unknown quantity in Europe, the Belgian Congress made freedom of con¬ science and religious equality fundamental parts of their Constitution. The Belgian pop¬ ulation is the densest in Europe and is com¬ posed of two distinct races — Flemish, who are of German, and Walloons, who are of French extraction. The former, by far the more nu¬ merous, have their principal locality in Flan¬ ders; but also prevail throughout Antwerp, Limburg and part of Brabant. The latter are found chiefly in Hainaut, Liege, Namur and part of Luxemburg. The language of each corresponds with their origin — the Flemings speaking a Germanic dialect and the Walloons a dialect, or rather a corruption, of French, with a considerable infusion of words and phrases from Spanish and other languages. This distinct mixture of races, and the repeated changes of masters to which they have been subjected, have necessarily been very unfavor¬ able to the formation of a national character Still, in some leading features, there is a re¬ markable uniformity in the population. Though the position of the country between France and Germany has made it the battlefield of Europe, the inhabitants show few warlike ten¬ dencies and are unwearied in pursuing arts of peace. The fact bears strong testimony to the patient endurance of the Belgian people, but does not, as the European War has shown, pre¬ clude the courage or the ability to fight when called on. French is the official language of Belgium and in general use among the edu¬ cated classes. Of late years, however, patriotic feelings have acquired new strength; and one of its first manifestations has been an eager desire to cultivate the vernacular Flemish, which differs little from Dutch.

The population generally is industrious and apparently in comfortable circumstances. The far larger proportion of it is rural ; and though landed property is very much subdivided, the Belgians manage, by a happy combination of agricultural with other industrial employments, to derive from their little holdings all the nec¬ essaries and not a few of the comforts of life. It is not to be denied, however, that in some of the provinces, particularly in Flanders, pop¬ ulation, in so far at least as it can be main¬ tained by agricultural resources, had reached its limit and that a deficiency of other employ¬ ment, particularly spinning and hand-loom

uertnonnikoog

Peaxens

ˆtTUhuiion

j Loppera*

Lppingcdam0

‘Warft’uSS

Bxfloˆl

Metalawier.

.Zoutkamj

St. Jacobi

.u’tfibo11

GRONINGEN (

ˆ o Sloetjterjn

. 4-

‘eenrroudj

f 1

Harlingen

Ikrsumj

‘.Hf’berfrurn.rr? Mtcr *)<• Leiji*i

Maruui

Roden

f Y

. ltozumx

DajCockki

Lakkeveen,

Bcetstfcrzwaag

AkkmnY J

yOOTTedljkV’

lorn

/ASSEffl

[cerentctn cahALX

. I

NVoKesrP Vledder,

Work u i

Holder

Huisduinei

llindeloupet

Molkweruoi,

luik’Vy

SlotCQf

Bellrio”

oeiicn i \^° i.,’

h

Ruinen/ Zweuloˆ c ˆ \ /

ˆWlERlNGEN

Otroesluisj

LJ*eu J h

iBarstngcrnom

Calandsooe

Sleen oV

o Dalen Koevordeu

‘lloogeveen

Medemblik

JPettei

Cnmi

‘Rulnerwulc

Vollenhoi

ftOnkel

Enkbuizen

Ubkˆ | Schukl’and 1) Gen; , Ijsselmaul L. K KnmjiW

HiliibII

ieuwWuliin.

OmtneQo

ZJyZcht,

“”/o)vi ‘ a,n ,

srdnkT VT”i1 > v > UP urine rend

*ar”v7s‘ - 1A Cr’Sl) ˆMarkm ˆ laal j / 3ˆMounlckendam

,,/j) ˆˆ/loIWˆdQr p

/ ˆ (f - fAM STERDAM

ˆ Vo Muiden

‘ngW/SloteaX Araateh’eeˆVˆˆ. yAjB\\9gomf o .V /— Vk* Y (“‘Z-, L-fs’Aaism/eer \|0 X //’*\r

ffUWMT _T l]MftLuW4uasC?

/ r-ˆ**jl i i dreeb t| J] Y /

5° DT.bL‘ ‘■-SfESSsJ IjisUrUnll

an r«cWv_|

ˆLˆgccsdV

Elburg Doornspij k ./

NV ˆ Hellendooi

[eertle-7 s

ilnielo oW < *

. Oldenzaal o

\Borne/p

llardervriil

iDlepen v’een

Deve/ntep-ˆcrHolten‘1

icldoo

Vaaasen

Ermelo

° Putten Garderen0

Ischede

l) Ykootwijk t>

‘Barneveld _ Beekbergen’v.

™ Vxu*}

Leiden °

”Xˆ dlAIfan ,

Borkulo

EH

fSteendcrert — ˆ r o Uengelo

Dierea

Root dei

Doeabur’g p/zelhem

. \fbu-tinehe in

Ameqjqgen Kkedoj

r yˆARNHEM,

roMauiiˆsr > — ˆ llul&ae&o

Ke J t e roiuvˆ- - - n

eil 9 oˆ,

.\V > ’ˆb W amel ° Dr utelr > »Y\/*ˆ

/”-eumcl Nlm(,g„ enˆf ’NVii’.-beQ\

_ Boxmeer

‘5\ ˆ§Yvct’hol o B„kel

\AˆB.CA\N t.Tv

Gemert

ludewatar

,\V Inters w i

Duiven

piancn

Buren

,vGendringem

[«o -Asperen ˆGorinchem

rdreebt

ˆXˆˆWˆellevoetˆlulr’ /

ii YG°°“d”‘T atrijitf

. I ˆDlrkalac’Kˆˆˆ NunlaDgdorpJ

|V ! — OoUgensplaatx — 1

Gwe9beck

Almkerk

.Terbeiden!

:ierik£ <

Noordlandˆ

w ■ > Kliindet *4rej, Zevenbergeiwˆ.

, Bergen

St. An nab

iTeterlnRon ? > z — ˆRljei.

[unwndsaT > 7 Qlbneken Qllio it-Kimn / en. Bavel o)

Domburj

Walcheren/^

Miooel^urgc

Flushing/

(VHsaingenr

Tholes' V Tbolen

" XBoitste^

.Oirschot ' n WoeW

Eindhoven^

Hoogeloon /^P

Vccre

Gcldern

Tilburg

oBakel Wmj | \

[eliuund) Bmat \

rr°

-i. DeurnT~~r’J=ˆ —

*° * 8evenuin\

0V M anabree

y V — o

A’.rcen

iKetr

tergen/op 3

‘Esscben*-/’

_Ptontiere*

la Hcˆ Sooth

° Wofensdrecbl*’ r 033«\ridreeht

Ireskensi

, Wuestwertl—’

Brecht

-O .Tiirnho,,ˆ

I A S !’

• [Unrijii*

ElberfehU

BiervlRt

refeld

Valkenswaard’

ernenr.eu -Zaamslag V-Axel I Hulat

AardftVi

0»stuiulle

I^ijtbulzenr

j,ls9eweghe’;

‘•Breedene

CAnaI

‘St.Gilles-

\oWie8ˆ -

\ / ˆSevere ‘ XSt.‘IVicolasj

‘yierXem XˆZoersel ˆˆˆ/cAMPiNg

Herentbalˆ*”

ˆ/Swalcnen M’unchen- ‘RoeVnujnd Gladbach<

Lominel

Selzaete

r°JJaasbr£ciul

p /ˆ‘Bourg

Leopold X Beverloo ierlobh Beerinrei

‘Uelchtereo

!3f«r/0|

Set he

Juokerenˆ’

IHEttT -

.Gentbrugge ˆ ‘Ledeberg x > c

•ebdermdndeT”

Molbelm

Y/ Londerzeel \Wolverthem .

2,onluive(i

Genck \

River

> G«leen

_ (ˆ °Merckept

CF L A N

Lanffhemarek’-‘ Boeslngbe o igbe

MB M

/ˆersebot

Roiselacr

Kesael-Lpoˆ

Mechelen

nbeek

tttsett J

tergueS’

Iasselt

/ >v* Kerkrade /

/ˆ- J #’•/

IkAdmbl *to*

Oulpcnvcr _

Eysden 7ˆ C

Baelegen

(5rde

Herent

fˆv£aeregh(

Harlebcke ,

Sottegem

9 N Snore ˆ/r> Ternatˆ-ˆ

‘Y) / -

LeeuwjSt. PlerreJ AˆGrˆninon‘t |

,£e’uT“ˆ”“Y*s>i

F,,„>,.utp fˆhicnˆr/l

,esc£j |

; Rume/Vftt0ˆ&”’?L<’a,e I |NV\ SoigDieˆ

I H \ A yl / N •• - Ay

Vv i»vp«ti’«lt£Jw0auev»u;cˆops „<t1 Hoi

Hoesscltf

MoorseefeO

Wevelghei

MoimicI

jt. Troitd

f CbnrTnil [jiuwe‘ Mouse ron .Herseaux”

‘irlemoiii

ˆlx»Iaˆ’bapello

ˆ MORESN

Av arnoton Ploegs\teert0 /

Tourcoiuˆ-, Koulmlx !/ ˆntieˆes

Blelbcrn >

ˆ/llll \

y Waterloo] Braine 1’ f

AUeuYr

Hazebrouck

Aubel’

1 > Hannut. Y XVA, / ˆa; Em\hrealnC g,

Her»7ˆ

° i’ / «t* s”*

butbulno Lmut ;

Ittlgnle*

Xitpeu’

Court] St- “Etienne

Limburg

Tbeo’ u/ gpa

■LaGlelzeS

Courcf ll„i VO-ˆ gjtereff

(AMi’mceau) I B

sr.r Saibre

Marcb leunO/ˆ/rAJbi’hnii.iof-‘ 1 ~ ‘

Vedrin

mow Mar(

,Moiet Q /’Obey >c,. OGesves

ˆ.A’l’LustiiYAssesse / ˆjspontin jYˆAnheFY KAVbioant I 1

i6wto

Fratnˆrie* l E3tinnesˆ

‘iMˆbevrono ebe r.

irvauTˆP Fo”eˆ-i

Grnnd IlalleW Soj \

Lierpeuzo v—y

yˆllamolx

‘cioty •’?%&, j j

Heurno

’ mˆT1* Bart? ’vJ „ , \tSep y ˆ w-s v /

uˆ£cr_ˆv»N”805°<l

i* /t?A TennevUles llou_a it\ Jj

i i • ˆ4-YvGrupont Bourcy V#*

.lih .—fcH ‘Jj Mier—rt NoeUleo / S

->c;)

DenainYl

ThuUliesˆ/A j al court] BeAumoot Sirry

ˆS% Maubeuge

r .A n thee

■’lorennee ,4|

liermetono) but Meuse .ij

‘ P Ansereuime

Houjeto

ˆQrfeux ‘•yPhllipperill o ˆoid-ChapeUˆ_

ANTWERP, GHENT, AND THE LOWER SCHELDT,

Koreen

Jliddelburgo

‘Mariemboi

op Zoom

Scheldt

(Schelde)

leer Are”udskerkeˆ> Kruimnt

° ‘ y’ oNismes

yChM’J Oignleso

►Felepne

Baatogndˆ Sibretp. ,r

ˆlˆlifotpignies)

Wardinj’

Tiedinne’r’

Libin y > OponT”

Brekkensˆ

.Kadzand

Aˆ\s Ijzendijkea

“A. 1 Calmptliout

*** / Brecht o

Lillo / \

Cappollen(Brasschhetˆ \ 0 XOostr

lEeckeren/ /

Hornpre

Neu fc bateauˆvdMartelange i o L’cgllse r-‘ˆ, 1

\ 0 Antler —v Gtedk

\ Mel Her A«ert0’ “N^‘l ”AISlmA Conidorf \Habay la Neuvo ly, (N ordingenOrh Lintgen Wasserb/,’/,- *) I ‘yjkA

Elschen Grerenifiacber At

r M

ˆColmar

Hulst /

‘vˆBouihdn/((/(

Sedan •

St. Gilles

i° NVaes o

Mezicrivv

ˆanthoven

Maldigt

Et2i5ˆ

j wf i.‘Iy.iiI’ /

Bell’? j Fontaine \Gerourille

Basse velde^ Ertvelde

Florenrl

lever;

Borgerliout^

•^\ o /

IwSSmXN Bruce h^m

Adegein0

0«dclem

Kecloo

/it Leg< Mesaancy

^LuxEMBbil

[oerbeke

IVirtonv

Waersc\hoot

Beider

Remieb

Contich/o”

Beermen

Tnmhe

Dacknain

Betteml

o/Everghem

Dulfel

Lokeren

Aoltre0

Scale of Miles.

/Mechlin

.ondorzeel

Monnickendairb

Ilpendam1

Goud

Sea

Watergang /

° Broek iip’VVateHand

Landsmeer

/o Het Schouw

Uitdam

NORTH

Zunderdori

Ransdorp j jNieuAvcndam o y d SchellingNvouda

jerdam

v/ Ainste

o Osdorp

De Overtoom ”j.

Light Home *”

\Vat5pgr aa Sm e e r Diemen \

Pampas ˆ

o Sloteu

Light House, i

＞Dienierdan?

Buitenvelderi

Dnivejbdrecht\o

Ouderkerk

ˆORD ER}fPr

from Greenwich.

Longitude Last

mert Sanq

t M

<r cp

e” y

AAISTEHDAAI

AND ITS

ENVIRONS.

Onrust o

Scale of miles.

2 3

NETHERLANDS BELGIUM and LUXEMBURG

SCALES

/ o i ~ ‘ Berrfen0Vj ,kˆ -

AlkuiutrLˆ Berkhout Egmond Ran F.‘tajl

Castri

U

Wijk-anr-Zee eu Duin , . Bevern “Ijmuldenf Bloemendaa! Haairlc ZandvoortiU”

Statute Miles, 25.5 = I Inch

Kilometers, 41 = 1 Inch .

30 40 SO SO >0 _ 80

Noordwijk aan Ze

Band McNally & 0o.’»New 11 x 1 1 Map of Netherlands. Belgium tttLLuxetubUrgl Copyright by Band. McNally & Co.

Katwijk aan Zee/’

RijnsjAir

Wassenrfarˆ

The Hague .

T.ftOH < liiinpfT

Monater/Gˆ Sv\ O U ‘fl Grnvenzundgˆl T > el ft a

EXPLANATORY KEY

y-a Hush van. Hol\and(ˆˆyˆ Scboonboven

3. Moresnet, ceded to ˆelgrium VOO R J E

4. Eupen) To be decided by ouefXrj

5. Malmedy) League of NationS?KREE < ˆˆi

Brouwerrfi*v-frv_N

0

SCHOUWEN

Zeehondenplaatc

N ORTH\iy_/’

SEA Flu,1’i,,l: ˆ

339

BELGIUM

weaving, had placed large numbers on the verge of pauperism.

Physical Features. — The surface of Bel¬ gium may be described as a rugged, inclined plane, elevated in the southeast and sloping gradually toward north and west till it sinks into low plains only a few feet above the sea-level. In some parts the land is even several feet below that level. The coast line is about 42 miles; a frontier of 60 miles faces German territory; 384 miles borders on the northeast of France, and a curve of 80 miles separates Belgium from the grand duchy of Luxemburg. The elevated districts are formed by ramifi¬ cations of the Ardennes, which, entering Bel¬ gium from France, stretch along the south of Namur, occupy the greater part of Luxemburg, and attain their culminating point in the south¬ east of Liege at Stavelot, near Spa, where the height exceeds 2,000 feet. The rocks appear to rest on primary formations; but those which reach the surface generally consist of slate, old red sandstone and mountain limestone. Proceeding northwest; in the direction of the dip, these rocks take a cover and the coal for¬ mation becomes fully developed. This coal field is a continuation of that of the north of France and stretches through Belgium in a northeasterly direction, occupying the greater part of the province of Hainaut and a consid¬ erable part of that of Liege, and skirting the provinces of Namur and Luxemburg. It con¬ tains numerous workable seams of coal and iron. North and west, beyond the limits of this coal field, are deep beds of clay and sand. In parts the clay is suitable for the manufacture of fine pottery; in others, for coarser earthen¬ ware or bricks.

The main streams of Belgium have a northern direction ; and the whole country lies within the basin of the North Sea. In the ele¬ vated and broken surface of' the southeast numerous torrents descend with rapidity; be¬ coming confined within rocky, precipitous and richly-wooded banks, they often furnish en¬ chanting landscapes. Their speed slackens on reaching the lower country and their augment¬ ed volume flows along in a slow, winding course. Only two of them are entitled to the name of rivers — ■ the Meuse and the Scheldt — and their importance is greatly enhanced by numerous tributaries, so that no country in Europe is more lavishly provided with internal water communication. Other navigable streams are the Ambleve, Demer, Dender, Darme, Dyle, Lys, Great Nethe, Little Nethe, Ourthe, Rupel,

Sambre, Yperlee and Yser. Though subject to sudden changes, the climate of Belgium is on the whole temperate and agreeable, resembling that of the same latitudes in England. In the higher regions of Namur and Luxemburg the air is keen, pure and healthy; on the low flats which occur in Flanders and over the reclaimed tracts in Antwerp, a humid and sluggish atmos¬ phere prevails.

Woods and Forests. — Nearly one-fifth of the whole surface of Belgium is covered with wood, though unequally distributed. Whereas East and West Flanders fall far below the aver¬ age amount, Luxemburg and Namur rise far above it. In the two latter are extensive tracts of natural forest, still sheltering wolves and wild boars. They are the remains of the an¬

cient forest of Ardennes which Ctesar de¬ scribed as stretching far out into France from the banks of the Rhine. They yield large quantities of valuable hard wood, principally oak. By the most scientific methods of sylvi¬ culture and unremitting industry the Belgians exploit these natural resources to their fullest capacity. The total value of timber produced annually is about 22,000,000 francs ($4,400,000). The less valuable grades of wood are converted into charcoal and the bark is largely exported to England.

Agriculture. — It would be more appropriate, in describing the trade, commerce and domestic industries of Belgium, to employ the past tense in all verbs. At the present moment, 1917, Belgium is a devastated, war-ravaged land, bleeding under the heel of an invader; her commerce and industries have vanished ; her former prosperity no longer exists : fire, desti¬ tution and starvation have taken its place. The physical — if not the spiritual — activities of Belgium to-day are one with those of Nineveh and Tyre. Hence the following chapters on the life and labor of the Belgian people should be read — for the time being, at least — as a record of things that once were ; of the bright¬ er days before the plow and the artisan's tools yielded to the overwhelming strength of can¬ non and bayonet.

The greater part of Belgium is well adapt¬ ed for agriculture and the inhabitants had so industriously availed themselves of their nat¬ ural advantages that they were regarded as the model farmers of Europe. Those parts where climate and soil were unfavorable for raising crops have been converted into pasturages. Here is raised a hardy breed of horses admir¬ ably adapted for light cavalry and largely ex¬ ported to France for that purpose, while vast herds of swine are fed almost at no

expense on the mast of the forests. No part of the arable soil is allowed to lie waste, but is care¬ fully applied to its appropriate uses. Vineyards adorn the sunny slopes and an inferior kind of tobacco is raised in the Ardennes valleys. In the province of Antwerp and partly in that of Limburg occurs a vast, dreary expanse of moorland waste known as the Campine, com¬ posed mainly of barren sand, and apparently destined to remain forever in its wild, natural state. Yet wherever a patch of more promis¬ ing appearance occurs, the hand of industry has transformed it into corn fields and green pastures. Agricultural colonies, partly free and partly compulsory, have been planted in different parts of the district. The former consist of persons generally in poor circum¬ stances who have voluntarily engaged in re¬ claiming barren tracts as the means of procur¬ ing a maintenance and saving them from the degradation of pauperism. The latter consist of convicts, who, having forfeited their liber¬ ty, give compulsory labor as the penalty of their offenses. By the united exertions of both a wondrous improvement has been made and on parts of this waste some of the finest cattle of the country are raised and much dairy produce of excellent quality is obtained.

Beyond the districts mentioned, there is no part of Belgium in which agriculture does not flourish; but the skill in husbandry is seen at its best in the two Flanders. Its excellence is

due entirely to an innate spirit of economy and industry — an economy which carefully appro¬ priates every gain, however small, and an in¬ dustry which grudges no labor, however great, provided it is possible, by the application of it, to obtain an additional amount of valuable produce. In fact, the Flemish husbandry par¬ takes more of the nature of garden than of field culture. In many of its operations, no doubt, horse labor is employed. The plow and the harrow are in frequent requisition, but the implement on which the greatest dependence is placed is the earliest and simplest of all — the spade. To give full scope for the use of it, the ground is parceled out into small fields of a square form, which have their highest point in the

centre and slope gently from it in all directions toward the sides, where ditches of sufficient size carry off the superfluous wa¬ ter as it filters into them. To promote this filtration the ground is trenched to a uniform depth, so that the slope of the subsoil corre¬ sponds as nearly as possible to that of the sur¬ face. In performing this trenching a consid¬ erable degree of skill and ingenuity is displayed. The performance of the whole at once would be a formidable and not a very efficient process. In a few years a new subsoil would be formed and the trenching would require to be renewed. This is rendered unnecessary in the following manner : The land is laid out in ridges about five feet wide and when the seed is sown it is not covered as usual by the harrow, but by earth dug from the furrows to the depth of two spits and spread evenly over the surface. Bv changing the ridges and throwing the fur¬ row of the previous year into the ridge of the next the whole ground becomes furrow in the course of five successive crops and is conse¬ quently trenched to the depth of about 18 inches. This process of trenching never ceases and is unquestionably one of the most import¬ ant characteristics of the Flemish husbandry.

The only other process particularly deserv¬ ing of notice is the care and skill manifested in securing an adequate supply of manure. Every farm is fully stocked and the cattle, instead of being grazed in the fields, are fed at home, in winter on turnips and other roots and in the summer on green crops carefully arranged so as to come forward in regular suc¬ cession and yield a full supply of rich, succulent food. In addition to this every homestead has a tank, built and generally arched with brick, into which all the liquids of the cattle sheds are conveyed and have their fertilizing proper¬ ties increased by the dissolution of large quan¬ tities of rape cake. This liquid manure is of singular efficacy in promoting the growth of flax, which enters regularly into the Flemish rotation and is perhaps the most valuable crop of all. As this crop is one of the most ex¬ hausting which can be grown and requires the richest manure, while it yields none, the growth of it to any great extent must, without the aid of the tank, have been impossible.

About two-thirds of the whole kingdom is under cultivation and nearly eight-ninths profit¬ ably occupied, leaving only about one-ninth waste. Of this last the far greater part be¬ longs to the comparatively barren districts of the southeast and northeast ; and hence, in the more favored provinces, particularly those of

Brabant, the two Flanders and Hainaut, the quantity of waste is so very small that the whole surface may be regarded as one vast garden. Considerable attention has been paid to the raising of stock and the breeds both of cattle and horses are of a superior description. The horses of Flanders in particular are ad¬ mirably suited for draught and an infusion of their blood has contributed not a little to form the magnificent teams of the London draymen. In general, however, Belgian stock of all kinds is inferior to that of England. Every province has an agricultural commission and a special council to advise the government on all ques¬ tions of national industries.

Mines. — -The mineral riches of Belgium are great and, after agriculture, form the most important of her national interests. They are almost entirely confined to the four provinces of Hainaut, Liege, Namur and Luxemburg, and consist of lead, manganese, calamine or zinc, iron and coal. The lead is wrought to some extent at Vedrin, in Liege; but the quantity obtained forms only a small part of the actual consumption. Manganese, well known for its important bleaching properties, is obtained both in Liege and Namur. The principal field of calamine is at Liege, where it is worked to an extent which not only supplies the home de¬ mand. but leaves a large surplus for export. All these minerals, however, are insignificant compared with those of iron and coal. The former has its seat in the country between the Sambre and the Meuse and also in the province of Liege. The largest quantity of ore is mined in that of Namur. The coal field, already de¬ scribed, has an area of above 500 square miles. The export is about 5,000,000 tons, forming one of the largest and most valuable of all the Belgian exports. Nearly the whole of the coal thus exported is taken by France. There cannot be a doubt that this export adds largely to the national wealth ; but a question has been raised as to the policy of thus lavishly dis¬ posing of a raw material which is absolutely essential to the existence of a manufacturing community, and the quantity of which, though great, is by no means inexhaustible. One ob¬ vious effect of the great foreign demand is to raise the price and thus place some of the most important manufacturing interests of the coun¬ try in an unfavorable position for competing successfully with so formidable a rival as Great Britain. Besides minerals, properly so called. Belgium is abundantly supplied with building stone, pavement, limestone, roofing slate and marble. Of the last, the black marble of Dinant is the most celebrated.

Manufactures. — The industrial products of Belgium are very numerous and the superiority of many of them to those of most other coun¬ tries is confessed. The fine linens of Flanders and lace of Brabant are of European reputa¬ tion. Scarcely less celebrated are the

carpets and porcelain of Totirnay, the cloth of Verviers, the extensive foundries, machine works and other iron and steel establishments of Liege. Seraing and other places. The cotton and woolen manufactures, confined chiefly to Flan¬ ders and the province of Antwerp, have ad¬ vanced greatly. Other manufactures include silks, glass and glassware, hosiery, paper, beet sugar, beer. There were 17 pig-iron works in

operation in 1912; 39 iron manufactories; 29 steel works; besides 89 sugar factories; 21 re¬ fineries and 125 distilleries. There were also over 600 fishing vessels.

Trade and Commerce. — The geographical position, the admirable facilities of transport and the indefatigable industry of the inhabitants early combined to place Belgium at the very head of the trading countries of Europe. The gradual rise of competitors still more highly favored has deprived her of this pre-eminence, and with the limited extent of her seacoast it is not to be expected that she can ever take high rank as a naval state ; but her trade is still of great importance and within recent years has made a rapid advance. Her coal and iron and the numerous products of her manufactures furnish in themselves the materials of exten¬ sive traffic; while the possession of one of the best harbors in the world (Antwerp), situated on a magnificent river, which directly, or by canals, stretches its arms into every part of the kingdom, and now made accessible by a system of railways with every kingdom of central Europe, naturally renders Belgium the seat of a transit trade even more important than that which it monopolized during the Middle Ages. This she owes chiefly to the admirable system of railway communication which, in the exer¬ cise of an enlightened policy, was early estab¬ lished throughout the kingdom. This system has its centre at Malines, from which a line proceeds north to Antwerp ; another west to Ostend ; another southwest through Mons and on to the Northern Railroad of France, which communicates directly with Paris, and another southeast to Liege, and on into Prussia, where it first communicates with the Rhine at Co¬ logne, and thence by that river and by rail gains access both east and south to all the countries

of central Europe. In addition to these great trunks, one important branch con¬ nects Liege with Namur and Mons; and an¬ other from Antwerp, after crossing the west trunk at Ghent, passes Courtrai, and proceeds directly toward Lille. The ramification is thus complete; and there is not a town in Belgium of any importance which may not now, with the utmost facility, convey the products of its industry by the safest and speediest of all means of transport. The railways have a length of 5,401 miles, of which 2,708 are state-owned; private lines, 190 miles, and 2,503 miles of light railways. In 1911 the navigable rivers and canals had a total length of 1,238 miles. The value of the general commerce in 1913 was $1,632,090,000, of which sum $916,725,000 represented imports and $715,365,000 exports. Germany, France and Great Britain respec¬ tively were Belgium's best customers.

The articles of import for home consump¬ tion include grain and flour, raw cotton, wool, hides, coffee, tobacco, chemicals, oil-seeds, yarn, timber, petroleum, *etc.* The exports are principally coal, yarn (chiefly linen and wool¬ en), cereals, machinery, flax, woolens and cot¬ tons, chemicals, steel and iron, glass and glass¬ ware, sugar (raw and refined), zinc, manure, eggs, *etc.* The trade with Great Britain has grown considerably of late years, the chief ex¬ ports being silks, v/ oolen yarn, cottons, flax, glass, eggs; the chief imports cottons, woolens, raw cotton, metals and machinery. The exter¬ nal trade is chiefly carried on by means of for¬

eign (British) vessels and the great bulk of the shipping enters and clears from the port of Antwerp. The total burden of the Belgian mercantile marine is over 180,000 tons. Im¬ portant results are expected from the Associa¬ tion B elgo-H ollandaise, an international asso¬ ciation of Belgian and Dutch manufacturers and business men founded in 1903 to effect a closer commercial union between the two coun¬ tries. The trade with the United States is im¬ portant, Belgium being classed as fifth in the value of its imports from this country and sev¬ enth in the exports it sends hither.

Education. — As already stated, almost the entire population of Belgium adheres to the Roman Catholic Church. Protestantism, though fully tolerated and recognized, does not count more than a mere fraction of the people among its adherents. For nearly a century there has raged an incessant struggle over the question of education between the Clerical party on the one side and the Liberal on the other. During numerous political crises the Socialists have thrown

their weight into the scale against the Clericals. The position of the Church toward the state is based on the Constitution and cer¬ tain unrepealed laws dating back to 1802. By the former absolute freedom is decreed, no compulsion in regard to religious observances, no state interference with appointment of min¬ isters, all religious marriage ceremonies to be preceded by a civil marriage and salaries of ministers of all creeds to be defrayed by the state. By the older law provincial councils were to provide for the maintenance of cathe¬ drals, episcopal palaces and diocesan seminaries, and the state to provide funds for the con¬ struction of churches and the expenses of religious services. At various intervals these prescriptions have been altered to meet modern conditions, Belgium being no longer a French possession, as she was at the time those laws were passed. During the first decade of Bel¬ gian independence the Catholics had gathered the whole educational system into their hands, when the Liberals began to raise their voices. A compromise was effected between the parties by the Education Act of 1842, by which re¬ ligious teaching became obligatory in elementary schools, with a contracting-out provision for children of other beliefs. This arrangement worked smoothly for the next 25 years, during which the Catholic party appropriated ever-increasing sums for the up-keep of ˆofficial® schools, and matters came to a climax with the fall of the Catholic ministry in 1878. Radicals, Freemasons and Socialists united to secularize education ; the power of appointing teachers passed into their hands, and anti-clericalists were frequently chosen. The new ministry cre¬ ated a Department of Public Instruction on the basis that public education ((must depend exclusively on the civil authorities.® An edu¬ cation bill was introduced in 1879 aiming at the abolition of religious instruction and sub¬ stituting therefor a <(universal morality.® The measure provoked violent opposition ; many thousands signed petitions of protest to Parlia¬ ment ; the intervention of the Pope was solicited, but the ministry remained obdurate and the bill became law. M. Frere-Orban, the Premier, severed diplomatic relations with the Vatican ; the Belgian bishops prohibited Cath¬ olic children from attending the schools and

Catholic teachers from giving instruction in them. Thousands of teachers and children dropped out of the schools, and new school buildings were speedily erected by public sub¬ scriptions, the artisans

giving their services free to the task. Within a year the Catholics had established over 2,000 free schools with close on 9,000 teachers, while the state schools had lost more than half of their pupils. Though resorting to all kinds of tyrannical devices the government was unable to force parents to send their children ; even lavish offers of prizes and clothing failed to produce the desired effect. A government commission of inquiry proved equally futile, and the Liberal ministry suffered a crushing defeat in the elections of 1884.

On their return to power the Catholics re¬ pealed the education bill and restored the old system with additional improvements. Stormy scenes were enacted in the chamber. At the ensuing communal elections the Liberals re¬ ceived increased majorities and claimed that public opinion was on their side. Yielding to the clamor the King dismissed his leading min¬ isters and peace was, for the time being, re¬ stored. Since then the Catholic party has re¬ mained in power, revising the educational code in 1895, 1911 and, finally, introducing compul¬ sory education in 1913. But the conflict over religious or secular education has never been definitely decided. Up to the outbreak of the war the schools were performing valuable service, and the high rate of illiteracy was rapidly diminishing. At the census of 1890 nearly 27 per cent of the population above 15 years of age could neither read nor write; in 1913 it had fallen to slightly over 3 per cent. Colleges and middle-class schools have been es¬ tablished, where a superior education may be obtained. A complete course for the learned profession is provided by four universities, two of them at Ghent and Liege respectively, es¬ tablished and supported by the state ; one at Brussels, called the Free University, founded by voluntary association ; and one at Louvain, called the Catholic University, controlled by the clergy.

Newspapers and Literature. — There were 2,245 newspapers in Belgium in 1911; of these 112 were daily and 1,061 weekly papers, and 1,072 others. The Belgian newspaper press is not highly spoken of by those who know it best. Baron d'Anethan, then Prime Minister, told the Senate in 1870 that the management of native newspapers was in the hands of stran¬ gers, as were also, in great part, their editorial departments. (<People are falsely led,® he stated, <(to consider the language of the news¬ papers an expression of public opinion. Their language causes sentiments and preferences which are not ours to be attributed to us in foreign countries.® As but few Belgian news¬ papers make enough profit to pay their way, most of them call themselves organs of this or that political party. While many have a right to make this claim there are others with large foreign circulations which are — or at least were — merely the mouthpieces

of foreign gov¬ ernments and not by any means friendly to Belgium. After the Franco-Prussian War French journalists swarmed into the country and gained control of many papers, using their power in a manner calculated to injure Bel¬ gian interests. In recent years a number of

journalists, ((neither Belgian by birth nor adop¬ tion, obtained control of journals considered important outside Belgium.® It is stated by one authority (J. de C. MacDonnell, (Belgium, Her Kings, Kingdom and People*) that these journalistic intruders Svere mercenaries in the pay of England's enemies, and succeeded in damaging Belgium as well as England by vio¬ lently upholding what they pretended to be Belgian causes, and attacking England as the foe of Belgium.® This statement was written the year before the war, 1913.

Belgian literature, regarded from a national point of view, is a very modern creation dating from the erection of Belgium as an independent kingdom in 1830. But a purely Flemish litera¬ ture has existed since the 13th century, when that language and the Walloon dialect were spoken throughout the Low Countries. (See Flemish Language and Literature). After the separation from Holland (1830) a strong sentiment of nationality arose in Belgium, to¬ gether with a desire to break away from Dutch traditions. The Flemish language was revived and a literary renascence inaugurated under the leadership of Jan Frans Willems, a freethinker, and the Abbe David, a clergyman. This strange combination worked separately for the same object, and each founded a society to promote it. The memory of both is still honored by two literary funds bearing their respective names. At the death of Willems in 1846, his mantle fell upon Henri Conscience, a romantic storywriter. Though his tales were of a somewhat childish nature, it is said that he <(retaught his countrymen to read.® The publication of his (De Leeuv van Vlanderen) (The Lion of Flanders), gave an enormous stimulant to the literary renascence, which has grown and flour¬ ished in Belgium to this day. Quite a number of Belgian authors write in French; the most celebrated of these is Maurice Maeterlinck (q.v.). The modern school of Belgian writers have largely emancipated themselves from the powerful influence of French style and form and created a distinct type of literature purely national in spirit and atmosphere. The strong¬ est incentive to the ˆemancipation movement® was given in 1846 by the poet Ledeganck, who protested against neglecting the national char¬ acter and language for those of another coun¬ try. Belgian authors cover the whole field of literary activity — history, biography, philoso¬ phy,

economics, poetry, fiction, drama and belles-lettres. Louis Gachard (d. 1885) wrote 16th century history; Charles Rahlenbeck (d. 1903) published a history of Protestantism in Belgium ; Baron Kervyn de Lettenhove wrote a big history of Flanders; Alphonse Wauters was a famous archaeologist ; Emile de Lavaleye was a learned exponent of economics ; F. A. Gevscrt wrote a history and theory of ancient music; Joseph Delbceuf was celebrated for his writings on psychology; Baron de Gerlache wrote a history of the Netherlands; Ernest Nys is recognized as an expert on international law ; Georges Rodenbach was the author of that well-known work (Bruges la Morte) ; the Abbe David already referred to wrote a his¬ tory of Belgium in Flemish; van Rijswijck was a patriotic song writer in the vernacular; Jan Sleeckx was a renowned dramatist, novelist and literary critic ; among dramatists and poets may also be mentioned Charles van Lerberghe,

Max Elskamp, Albert Giraud, Jan van Beers, Prudens van Duyse, Edmond Picard, Edouard Srnits, Julius de Geyter, Andre van Hasselt, Julius Vuylsteke, Ivan Gilkin, Charles Potvin, Emmanuel Hiel, the world-renowned Emil Verhaeren and a host of others. M. Henry Carton de Wiart, Belgian Minister of Justice, is a famous novelist whose masterpiece, (Cite ArdenteP should be read by lovers of beautiful (French) prose. There are many learned so¬ cieties in Belgium, archaeological, historical and scientific. The Belgian Academy, which is modelled on the lines of the Academie Frangaise, has performed most valuable services in the propagation and encouragement of useful knowledge in Belgium. A number of literary reviews, written and published by Belgians, at¬ tain a high standard of excellence that is quite comparable with their French and Dutch con¬ temporaries.

Defense. — The question of national de¬ fense had long been a knotty problem in Bel¬ gium and it was not until 1913 — on the eve of the war — that Baron de Broqueville, the Prime Minister, carried an army bill through Parliament involving compulsory service. Al¬ ready in 1890 the question of obligatory service had assumed an acute form,

when the govern¬ ment categorically refused to introduce that system, notwithstanding that it met with general favor from the Liberal party and the working classes generally, and was, besides, strongly sup¬ ported by all native competent authorities. At that time Lieutenant-General Van der Smissen, one of the ablest Belgian officers seized the first available opportunity to express openly and loudly his formal disapproval of the con¬ duct of the Minister of War, General Pontus, on the subject of personal service. For this freedom of speech the general was promptly dismissed, a circumstance that was regarded as a great loss to the Belgian army. The bill of 1913 called all young Belgians who were physically fit to serve in the army, which would have doubled its nominal strength and raised the number of effectives to 300,000 men. But the measure arrived too late; the war clouds burst over the country before the reforms were carried out. The total available was 263,000, of which number nearly half were required to garrison the fortifications, leaving only 133,000 for service in the field. To bring the latter force up to the necessary strength the govern¬ ment had perforce to call up the old Civic National Guard. At the outbreak of the Franco-Prussian War in 1870 the Belgian army was immediately placed on a war footing, and undoubtedly saved the country from once more being wthe battlefield of Europe.® It is an open secret that the French, on the eve of Sedan, meditated a raid through Belgium ; the Emperor Napoleon III was only prevented from taking the step when one of his generals pointed out that it would mean 70,000 more enemies for France. Under the old law of 1902 the Belgian army was recruited by voluntary en¬ listment augmented, in case of necessity, by annual levies of young men who had completed their 19th year. Anyone unwilling to serve might provide a substitute, for which, of course, he would have to pay. The period of service was fixed at eight years with the colors and five years in the reserve. About 14,000 men were required annually, while the war strength

was calculated at 180,000. While the new law of 1913 retains the same legal period of service, it drafts about half of the number of the total available. The men receive an excellent, all¬ round training, having to serve in all the branches in rotation, viz., infantry, fortress artillery, engineers, field artillery and cavalry. Besides the standing army there is a garde civique, numbering close on 50,000 men in time of peace, in addition to which there were over 90,000 non-active men belonging to this force. Belgium has no navy beyond a small flotilla of gunboats for river and coast service.

The principal means of defense to which the Belgians had long pinned

their faith was the elaborate system of fortifications that guarded their frontiers. These forts were destined, in the early stage of the European War in 1914, to play a prominent and instruc¬ tive part. On the one hand, they stemmed the German invading avalanche for a week; on the other, they proved the utter uselessness of fortifications against modern artillery if the enemy is once permitted to approach within range. Ever since Belgium had gained her independence, plans for fortified defenses had engaged the attention of her best military engi¬ neers. The first proposal was laid before a military committee by General Chazel in 1845. Besides a reorganization of the army, he advo¬ cated the demolition of existing defenses that were in the wrong places, and the establishment of powerful entrenchments at Antwerp. Years later, when the plans were about to be put into execution, Napoleon III, who had climbed to power in the interim, vetoed the plan on the ground that he might some day be obliged to enter Belgium himself, in which case the forts it was proposed to demolish would be his last support. It was not till four years after the close of the Franco-Prussian War, when Brial-mont became inspector-general of fortifica¬ tions, and Napoleon had fallen, that the task was begun. He had already fortified Antwerp in 1868; by 1892 he had completed the forts at Liege and Namur. In his designs he broke away from the old French star-shaped forts with bastioned ramparts and adopted the Ger¬ man type of long front and detached forts. Before the advent of artillery, forts were high as castles ; thereafter they were made as low as possible, burrowing underground, and show¬ ing only a mound hardly visible, cased and roofed in concrete and covered with earth. The guns within were of the ˆdisappearing® type, which were raised just high enough to <(peep® over the level, fire and sink out of sight again. The sections between the forts were supposed to be provided with infantry and artillery trenches, but this most important point was apparently overlooked, and thus the passages between the forts were left unde¬ fended against night attacks by infantry. Liege was defended by 12 forts, six main and six smaller ones, called fortins ; between two of them lay an undefended gap of five or six miles, presenting an open entrance to the Dutch frontier.* Across the Meuse, to the south¬ east, was Fort Barchon and Fortin Evegnee ; farther south stood Fort Fleron, which com¬ manded one of the railroad lines to Aix; the

* The German attack on Vis6 was directed, against this gap; by forcing it they could have avoided all the othei Li6ge forts.

two fortius Chaudfontaine and Embourg, on opposite banks of the Vesdre, controlled the line to Germany via Verviers; Fort Boncelles to the west commanded the elevated ground be¬ tween the Meuse and the Ourthe ; while north of Boncelles stood Forts Flemalle, Hollogne and Loncin, and between the latter and Pontisse lay two more fortius, Lantin and Liers. This irregular circle around Liege was considered a safe, double line of defense; the forts being from 4,000 to 7,000 yards apart toward the Ger¬ man frontier, an enemy would still be under fire from right and left even if a fort fell into his hands. As it happened in actual experience, in 1914, by the capture of Fort Loncin, a vital spot, by the Germans, the whole railway system of Belgium was laid open to the invading forces, and the fall of Namur and Antwerp (neither of which could hinder their progress to French territory after that), was only a question of time after the world had seen with what com¬ parative ease the Liege forts had been demol¬ ished. See Antwerp; Namur.

But perhaps more than to her army and fortifications, Belgium trusted in the protective influence of international treaties among the Great Powers guaranteeing her independence and neutrality. The Treaties of 1831 and 1839 framed between Great Britain, France, Austria, Prussia and Russia provided that <(Belgium shall form an independent and perpetually neutral state ;}) in 1867 the same powers, with the addi¬ tion of Italy and Holland, collectively guaran¬ teed the neutrality of Luxemburg. In 1870, on the outbreak of the Franco-Prussian War, Great Britain immediately made separate trea¬ ties with both France and Prussia by which the neutrality of Belgium was specially guaran¬ teed during the war. At the same time Great Britain pledged herself to co-operate against either of the two belligerents that might violate that neutrality. In addition, the Treaty of 1839 was positively reaffirmed. When Germany de¬ clared war against France in 1914, Great Britain again called upon the two powers to forswear any violation of Belgian territory; France readily gave the desired promise, and Germany refused it.

Government. — The Belgian Constitution combines monarchial with a strong infusion of the democratic principle. Contrary to the cus¬ tom obtaining in constitutional countries, the king of the Belgians has the power to initiate legislation. The executive power is vested in a

hereditary king; the legislative in the king and two chambers — the Senate and the Cham¬ ber of Representatives — the former elected for eight years, the latter for four, but one-half of the former renewable every four years and one-half of the latter every two years. The senators (of whom there are 120) are elected partly directly, partly indirectly (by the pro¬ vincial councils), and must be 40 years of age. Their numbers depend on population. The deputies or representatives are elected directly, one for every 40,000 inhabitants at most. All citizens of 25 years of age are electors, and, according to certain qualifications, one elector may have three votes. Abstention from voting is punishable by law. Each deputy is allowed $800 per annum and a free railway pass be¬ tween his place of residence and the capital. In 1913 the Senate was composed of 70 Catho¬

lics, 35 Liberals and 15 Socialists. In the Cham¬ ber of Representatives there were 101 Catho¬ lics, 44 Liberals, 39 Socialists and two Christian Socialists. On the fall of Brussels, 20 Aug. 1914, the Belgian government was removed to Havre, France. The estimated revenue for 1913, chiefly from railways, customs, excise and direct taxation, was $151,531,000; the estimated expenditure $151,108,000. About one-fourth of the expenditure is in payment of the interest of the national debt, the total of which in 1913 was $747,826,727. The coins, weights and meas¬ ures are the same, both in name and value, as those of France.

History. — The history of Belgium as a separate kingdom, beginning in 1830, when it was constituted an independent European state, would not truly represent the life of the people or account even for the events of the period embraced in it. Situated between the two lead¬ ing states of Europe, and deeply interested in all the political agitations resulting alike from their rivalries and their alliances, the Belgian people often changed masters. Moreover, the Belgian territory contained within itself one leading element of the dissensions which raged around it. The two great races of different origin and habits, the Celtic and Teutonic, or Latin and German-speaking peoples, whose dif¬ ferent policies have divided Europe from the time of the Romans, were combined in its pop¬ ulation; the Walloon provinces, Hainaut, Na¬ mur, Luxemburg, being nearly allied to the French, while Flanders, Brabant and Limburg approximated more in character and language to the Germans. Thus not only were the great rivalries of Europe represented here in minia¬ ture, but their compression within the narrow limits of what is now one of the smallest of European states has resulted in the formation of a distinct national character.

While, there¬ fore, the chief events in which Belgium was interested prior to 1830 are matters of Euro¬ pean history, a brief outline of them is needed here to give a distinct conception of the char¬ acter of the people which they contributed to form.

The territory anciently known as Belgian differed considerably from that which has as¬ sumed the name in modern times. According to Caesar, the territory of the Belgae, who were one of the principal tribes of ancient Gaul, extended from the right bank of the Seine to the left bank of the Rhine and to the ocean. We have it on the authority of Strabo that there were 15 Belgian tribes. This district continued under Roman sway till the decline of the empire and subsequently formed part of the kingdom of Clovis, who subdued nearly the whole of Gaul from the Rhine to the Med¬ iterranean. The Franks at this time did not recognize the law of primogeniture. On the death of a monarch his dominions were divided among his sons, the more ambitious of whom again strove to unite them under their own sway. Thus the Frankish kingdoms under the descendants of Clovis were subject to continual vicissitudes, in which the Belgian territory shared, forming successively a portion of the kingdoms of Metz, Soissons and Austrasia, till the whole was reunited under Charlemagne or Charles the Great. This great conqueror and administrator, the first who strove to unite the

stales ol Europe in a civilized commonwealth, was oi Belgian extraction. It was at Landen and Herstal, on the confines of the forest of Ardennes, that his predecessors, the great may¬ ors of the palace, held sway, while his own capital was established at Aix. Charlemagne in great measure destroyed his own work by adopting the Frankish custom of dividing his kingdom among his sons at his death. This practice, which had proved so disastrous to the dynasty of Clovis, was continued for some time in his family, but was ultimately abolished in France. It long prevailed among the principal¬ ities of Germany, hindering their unity and con¬ tributing to the ascendancy of France in Eu¬ rope. Thus Belgium fell to Lothaire, the grand¬ son of

Charlemagne, forming part of the king¬ dom of Lotharingia, which was dependent on the German Empire; but by the Treaty of Ver¬ dun (843) Artois and Flanders were united to France.

For more than a century this kingdom was contended for by the kings of France and the emperors of Germany. In 953 it w as conferred by the Emperor Otto upon Bruno, archbishop of Cologne, who assumed the title of archduke and divided it into two duchies — Upper Lor¬ raine, containing modern Lorraine, Luxemburg and the dioceses of Metz, Toul, Verdun and the Palatinate; and Lower Lorraine, containing Brabant, Guelders, the bishoprics of Cologne, Liege and Cambray. These duchies were tem¬ porarily reunited under Gonthelan I, Duke of Lower Lorraine, who acquired Upper Lorraine in 1033. Among the dukes of Lower Lorraine may also be mentioned Godfrey of Bouillon, the great Crusade leader, who, in 1099, was crowned King of Jerusalem.

The feudal system, which had established itself over the greater part of Europe, likewise prevailed in the Belgian territory, which in the 11th century was divided into duchies, counties and marquisates, under the sway of chiefs owing allegiance to the empire or other of the greater princes, but exercising an almost abso¬ lute dominion over their own subjects. Thus were formed the counties of Holland, Brabant, Zealand, Friesland, Namur, Hainaut; the duchies of Limburg, Guelders, Juliers, Luxem¬ burg ; the marquisate of Antwerp and others. In the frequent struggles which took place dur¬ ing this period, Luxemburg, Namur, Hainaut and Liege were usually found siding with France, while Brabant, Holland and Flanders commonly took the side of Germany. The princes and the people, however, particularly of Flanders, were not always found on the same side.

The 12th and 13th centuries were distin¬ guished by a general uprising of the industrial communities, which had begun to grow in im¬ portance throughout Europe, against the feudal system. This movement was very strongly manifested throughout the Netherlands, less strongly perhaps in Belgium than in Holland. In both countries prosperous municipalities be¬ gan to arise and assert their freedom; but the spirit of centralization, more strongly developed among the Latin-speaking races, prevailed more in the southern provinces, while the love of individual liberty was more strongly manifested in the north. Many of the towns of Flanders and Brabant, however, became extremely dem¬

ocratic. Ghent in particular distinguished itself by the violence and frequency of its revolts against its rulers.

b rom this time the popular and civic element began to count for something in political com¬ binations. If one potentate secured the alliance of a count, another might strengthen himself by secretly encouraging insurrection in his towns. The people of Flanders often allied themselves with the English, with whom their commercial intercourse and their love of free¬ dom gave them many common interests and feelings, and both their own counts and the French monarchy often felt the effects of this alliance.

The battle of Courtrai in 1302 greatly weak¬ ened the feudal authority, but the ascendancy of the popular element led to various excesses. The organization of popular power was reserved for a later age, and the battle of Rosebeque, 1382, in which the Ghentese under Philip van Artevelde (who had offered the crown of France to Richard II of England as the price of his assistance) were totally defeated, restored the authority of the nobles. In 1384, Flanders and Artois fell to the house of Burgundy by the marriage of the Duke, a scion of the French Crown, with Margaret, daughter of Louis II, Count of Nevers, the last ruler of these prov¬ inces. By a succession of happy marriages, by purchase or by force, Holland, Zealand, Hain¬ aut, Brabant, Limburg, Antwerp and Namur had all by 1430 become the inheritance of the same house. In 1442 the duchy of Luxemburg was acquired, and in 1470 Guelders and Fries¬ land. This extraordinary prosperity induced Charles the Bold, who succeeded in 1467, to at¬ tempt to unite his territories by the conquest of Alsace, Lorraine and Liege, and raise his duchy to a kingdom. The details of this enter¬ prise, which forms one of the most exciting epi¬ sodes in European history, belong more imme¬ diately to the history of France. It ended in his defeat and death at the battle of Nancy in 1477. His daughter Mary, who succeeded him, carried the fortunes of her house still higher, or rather she carried them into a house still more fortunate than her own, by her union with the Archduke Maximilian, son of the Emperor Frederick. Her splendid possessions had been coveted by many potentates and there were five candidates for her hand, among whom the most important were the Dauphin, son of Louis XI, and the Archduke.

It now became the part of France to excite troubles in Flanders. The policy of Maximilian, conformably to the traditions of the house of Austria, was directed to the aggrandizement of his house. He was frequently at feud with his Netherlandish subjects, whose manners he took little pains to understand, and for whose liber¬ ties he had little

respect. Wars and leagues succeeded each other, which belong to the his¬ tory of the great states of Europe. The Nether¬ lands were by this union again brought under the German empire, and especially under the house of Austria, destined soon to become the most powerful in Europe. In 1512 they were formed into a division of the empire under the title of the circle of Burgundy. East Friesland was included in the circle of Westphalia. On being called to the empire, Maximilian con¬ ferred the government of the Netherlands on

his son, Philip the Fair, under whom they began to experience the material advantages of an alliance with the house of Austria. The vast European possessions of this house opened up to its subjects the greatest facilities of the age for commercial intercourse, while the discovery of America gave them in addition the commerce of a new world. The industrial skill and en¬ terprise of the Netherlands fitted them much more than the Spaniards, whose haughty dis¬ position made them apt to substitute rapacity for industry, to derive permanent benefit from these opportunities. Margaret, the aunt, and Mary, the sister of Charles V, who succeeded to the government of the Low Countries, exer¬ cised it in many respects wisely and well. The former, a patroness of arts and letters, kept her court surrounded with poets, artists and men of learning. A council of state, consisting of the governors or stadtholders of the 17 prov¬ inces, assisted them in the administration of affairs, and such was the prosperity of the coun¬ try that more than one of the cities of the Netherlands rivaled in extent and opulence the capitals of the greatest European kingdoms. This bright day was too soon clouded. The reign of Charles V is less distinguished for the political struggles excited by a too prosperous ambition, which shook nearly every nation of Europe, than for the religious dissensions and the social troubles resulting from them which attended the dawn of the Reformation. _ The Reformed opinions made great progress in the Netherlands; but here again a remarkable illus¬ tration was afforded of the strength of those differences of race, language and sentiment which divided their populations. In Holland, as in Germany, the Reformation triumphed.

On the Belgian territory, especially where the Wal¬ loon or French element of the population pre¬ vailed, although these opinions spread widely, they yielded at length, as in France, to the force of authority or the sentiment of unity. In 1535 Mary published at Brussels an edict condemning all heretics to death. An insurrec¬ tion excited by persecution was suppressed by Charles V in 1540, and the Netherlands were inseparably united by the law of primogeniture with the crown of Spain. No union could have been more unfortunate. The bigotry of the Spanish branch of the Austrian family has be¬ come proverbial, and a country torn with re¬ ligious dissensions could not have found itself under a worse rule.

Charles V, himself a Netherlander, born in Ghent, and still more his son, Philip II, of Spain, strove to extinguish the Reformed opin¬ ions among the Netherland subjects in seas of blood. Philip discarded all respect for the lib¬ erties of the Netherlands and subjected them under his governors, particularly the Duke of Alva, to all the horrors of a hostile military rule. Thousands of victims perished by every variety of execution which a barbarous cruelty could devise — hanging, beheading, burning, drowning, interring alive, to which tortures and imprisonments were added in still greater num¬ ber. During this period of desolation, great numbers of artisans, abandoning their country, carried elsewhere, especially to England and Germany, which sympathized with their opin¬ ions, the arts that had enriched their own country and which now acquired through them

a wider scope, and contributed to the industrial progress of Europe. William of Orange, the Silent, now made himself the champion of the liberties of his country. Supported chiefly by the northern states, thwarted by the jealousy of the Flemish nobles and opposed by the Walloon provinces, which remained faithful to Spain and even supplied her with troops, he at length suc¬ ceeded in freeing the seven northern states and forming them into the confederation of the United Provinces, whose independence, declared in 1581, was ultimately acknowledged by Spain. These events belonged chiefly to the history of Holland.

Requesens, the successor of Alva, had tried too late a more humane policy. At Antwerp and Ghent the Spanish soldiers broke out into excesses. The confederates assembled in the latter town signed the pacification of Ghent, proclaiming liberty of conscience and convok¬ ing the Estates-General. The Estates called in the aid of France and

offered the crown -to Henry III, who declined to accept it, dreading the Roman Catholic League in his own country. It is a special feature of the history of those days that while the great rulers, particularly those of France and Germany, persecuted their Reformed subjects, each was ready to protect the Protestant subjects of the others when op¬ posed to their political policy. The success of the revolutionary party, consummated in the north, was at length checked in the southern provinces by the ability of Alexander Farnese, Duke of Parma, the Spanish commander, and by the reactionary spirit evoked in the prov¬ inces themselves, strengthened by the emigra¬ tion of many influential reformers to the north¬ ern states, and the Belgian Netherlands re¬ mained attached to Spain. From 1596 to 1633 the Spanish Netherlands were transferred to the Austrian branch of the family by the mar¬ riage of Isabella, daughter of Philip II, with the Archduke Albert of Austria. On the death of Isabella they reverted to Spain. By the Treaty of Rastadt in 1714 they were again placed under the dominion of Austria. During this period they were the subject of continual intrigues and frequently of open warfare among the European states. Twice conquered by Louis XIV, conquered again by Marlborough, coveted by Holland, Spain, Germany, France and England, they lay continually open to the invasions and struggles of foreign armies, and it was at this period especially that they were, as they have been called, the battlefield of Europe. Some portions of maritime Flanders, Brabant and Limburg which had remained to Spain were during this period conquered and annexed by Holland, while France acquired Artois and Walloon Flanders, the south of Hainaut and part of Namur and Luxemburg, including the important towns of Douai, Lille, Valenciennes, Dunkirk and many others. From 1714 Austria was left in undisturbed possession of the remainder of the northern Netherlands. Joseph II, styled the Philosophical Emperor, excited by his reforms a revolt, headed or stim¬ ulated by the monks of Flanders and Brabant, whom he had dispossessed of their convents. The Estates of the two provinces refused to vote the imposts and were dissolved. The popu¬ lace took to arms. The Virgin was proclaimed generalissimo of the patriot army. The Aus-BELGIUM

trian army concentrated at Turnhout was totally defeated. After applying in vain for assistance to Holland and France, neither of which could be expected to have much sympathy with their

movement, the insurgents were at length sub¬ dued andˆ the Austrians re-entered Brussels October 1790. Soon after the whole Nether¬ lands were conquered by the revolutionary armies of France and the country was divided into French departments, a change which, as might be expected, provoked as much resistance as the people were able to offer. When Napo¬ leon ruled France, his brother Louis became King of Holland, in 1806. Before long, how¬ ever, the two brothers quarreled, and when Napoleon sent an army against the Dutch capi¬ tal in 1810 Louis fled to Bohemia. The lat¬ ter's son, Charles Louis, afterward became Napoleon III.

Just before the battle of Waterloo, fought on Belgian territory, had once more changed the face of Europe, Belgium was united by the congress of Vienna to Holland, under the title of the kingdom of the Netherlands. The new ruler was Willem I, of the house of Orange, who commanded Dutch and Belgian troops at Waterloo. This fusion had much to recom¬ mend it. The ports and colonies of the north formed a suitable complement to the arts and industry of the south. The Flemings and the Dutch spoke the same language and had the same origin; but there remained outside of this harmony the Walloon provinces, French in language and extraction. A most injudicious measure of the Dutch government, an attempt to assimilate the language of the provinces by prohibiting the use of French in the courts of justice, excited an opposition which, encouraged by the success of the French Revolution of 1830, broke out into revolt. The electoral sys¬ tem, moreover, gave the preponderance to the northern provinces, though inferior in popula¬ tion, and the interests of the provinces were diametrically opposed in matters of taxation. Belgium was agricultural and manufacturing, Holland commercial ; the one wished to tax imports and exports, the other property and industry. Three different languages were spoken in the Chamber — Dutch, German and French; frequently, indeed, the members did not understand each other. Nothing but the most skilful government could have overcome these fundamental differences, and no states¬ man appeared fitted to grapple with them. The King, Willem, was far too bigoted and auto¬ cratic to reconcile his Flemish subjects to Dutch preponderance. The Belgians, though insisting upon a separate government, offered to accept the King's son as viceroy, but the tactless conduct of that prince snapped the link that might have held the two countries together. The revolutionary movement, which broke out in Brussels on 25 Aug. 1830, became general in the south, and the Dutch troops, at first successful before Brussels, were finally repulsed and compelled by the ever swelling ranks of the insurgents to retire. Austria, England, Prussia and Russia each threatened armed

intervention to maintain the union, but France stood behind the Belgian revolution¬ aries. A seven hours' bombardment of Ant¬ werp by the Dutch so horrified and enraged the Belgians that reconciliation passed beyond vol. 3 — 30

the bounds of human possibility. Undeterred by the mutterings of the powers, the provi¬ sional government continued to frame a new constitution and to fight the Dutch. They offered the crown to the Due dc Nemours, second son of Louis Philippe ; but the father refusing his consent, they next offered it, on the recommendation of England, to Leopold, fourth son of the Duke of Saxe-Coburg-Saal-feld, who accepted it 4 June 1831 under the title of Leopold I (q.v.). In the following year Leopold married, as his second wife, the daughter of Louis Philippe, a circumstance that no doubt contributed toward curbing the French King's designs on the annexation of Belgium to his own dominions. A conven¬ tion of the powers was held in London to determine on the affairs of the Netherlands and stop the effusion of blood. It favored the separation of the provinces and drew up a treaty to regulate the change. The powers divided Luxemburg, Limburg and the national debt between Holland and Belgium, awarded Antwerp to the latter, declared the Scheldt open to both countries and recognized Belgium as a neutral, independent state. But the Dutch king refused to accept these terms and in¬ sisted on holding Antwerp. A combined French and British fleet sailed for Holland and a French army was sent to besiege Antwerp. These manoeuvres had the desired effect ; the Dutch evacuated Antwerp but retained two forts commanding the Scheldt. In retaliation, the Belgians held on to Limburg and Luxem¬ burg. Not until 1838 did King Willem signify his acquiescence to the terms laid down by the powers, and in 1839 the Belgians yielded, most reluctantly and under pressure, the portions of Limburg and Luxemburg — which they had retained since 1832 — back to Holland.

Under the wise and enlightened reign of Leopold I, a prosperous period of 34 years, Belgium became a united and patriotic com¬ munity. Arts and commerce flourished, and a place was taken in the family of nations upon which the Belgian people could look with un¬ alloyed satisfaction. During the French Revo¬ lution of 1848 Leopold was supposed to have declared his willingness to resign the crown if his subjects wished it, but there is no historical foundation for that statement although many Belgians believed it. Yet the fact that the crisis which shook most of the thrones of Eu¬ rope passed harmlessly over Belgium con¬ firmed the stability of the monarchy at a crit¬ ical moment. The explanation may perhaps be found in the intensely

democratic character of the Constitution framed in 1830-31. By its provisions the King, while nominally endowed with all the prerogatives of executive power and even the rights of initiative, is neverthe¬ less so strictly hand-tied by ministerial control that his power is practically non-existent. (<Our Constitution … breathed hatred of the past King and fear of the future King. It snatched from the Crown the faculty of doing good or evil.® Leopold I died in 1865, regretted and respected. He began the task of molding the Belgian people ; it was continued with equal prudence bv his eldest son and successor, Leo¬ pold II.

Leopold I had ruled for 34 years; notwith¬ standing all constitutional limitations, it was

his will, and not that of his ministers, which prevailed on important occasions. Leopold II (q.v.) was destined to reign 10 years longer than his father, and to illustrate the political theory of a ((benevolent despotism.® A man of iron resolution, shrewd business sense and not overburdened with ethical ballast, he widened the narrow vision of his people, built up an amazing degree of prosperity, carried the Bel¬ gian flag far beyond the narrow confines of his kingdom by commerce and colonization, and literally fulfilled the grandiose promises he made on taking the accession oath. The out¬ standing feature of his reign is the acquisition and development of that rich territory now known as the Belgian Kongo (q.v.). Between 1886 and 1894 Belgium was convulsed with labor strikes, socialist risings and universal clamor for electoral reforms. The working men's party threatened to organize a general strike if their grievances were not speedily recognized. At the end of 1889 the 28,000 workmen in the coaling district of Charleroi joined the movement without abandoning for a moment a perfectly calm and legal attitude, and gained a complete victory on economic points in dispute. From this developed a po¬ litical strike, and a few weeks later an assem¬ bly in Brussels of 50,000 workmen from every part of the country demanded, with all the calm that the knowledge of their power gave them, an extension of electoral rights.

For nearly five years the struggle raged in the country and in the Parliament before a modi¬ fied system of universal suffrage was adopted. Leopold II died in 1909. His only son had died in childhood, since when the succession de¬ volved upon Leopold's brother, Philippe Eu¬ gene, Count of Flanders, who immediately re¬ nounced his right of succession when his first son, Prince Baldwin (Baudoin), was born. To prepare him for his eventual inheritance the young prince was carefully educated, but he died suddenly of pneumonia in 1891, at the age of 21. The second son of the Count of Flanders, Prince Albert, then 16 years of age, became heir-presumptive to the throne, and succeeded his uncle, Leopold II, on 17 Dec. 1909. See Albert I, King of the Belgians.

The new King proved himself a monarch of a different type from his predecessors. Of great stature and masterful will like his uncle, his character and demeanor run in entirely different channels. Before he had been five years on the throne he became a king without a country, an exile with his family and gov¬ ernment. The main events of his short reign before the war were inherited troubles — the religious strife and the question of military reforms.

Bibliography. — Baedeker's ' Belgium and Holland, including the Grand Duchy of Luxembourg) (15th ed., Leipzig 1910) ; Balan, L., 'Soixante-dix ans d'histoire de Belgique) (Brussels 1890) ; Banderkinken, 'History of the Formation of the Belgian Principalities in the Middle Ages) ; Banning, E., 'La Belgique au point de vue militaire et international (Brussels 1901) ; Bavary, Ch. Victor de, 'Histoire de la revolution beige de 1830) (Brussels 1876) ; Bouche, B., (Les ouvriers agricoles en Belgique) (ib. 1914) ; Boulger, D. C., (Belgium of the Belgians) (London 1911) ; id., 'History

of Belgium) (Vol. I, 1902; Vol. II, 1909; rev. ed., London 1913) ; Bumpus, F., (Cathedrals and Churches of Belgium 5 (London 1909) ; Char-riaut, H., 'La Belgique moderne5 (Paris 1910) ; Delplace, Belgium under French Rule5; id.,

' Belgium in the Reign of William P; Dc-schamps, Le Chevallier, 'La constitution internationale de la Belgique) (Brussels 1901) : Errera, (Das Staatsrecht des konigreichs Belgien) (Tubingen 1909); Essars, 'Banking in Belgium 5 (in (A History of Banking in All the Leading Nations, 5 Vol. Ill, New York 1896) ; Garcia de la Vega, 'Rovaume de la Belgique5 (Brussels 1883) ; Genonseaux, 'La Belgique physique, politique, etc.5 (ib. 1878); Griffis, W. E., (Belgium, the Land of Art5

(New York 1912) ; Hanslik, E., ‘Das Konigreich Belgien) (Berlin 1912) ; Holland, Clive, ‘The Belgians at Home5 (London 1911); Hymans, ‘Histoire parlementaire de Belgique de 1830 a 1880) (Brus¬ sels 1878-80) ; Jacquart, C., (Etude de la de¬ mographic, statique et dynamique, des agglom¬ erations urbaines, et specialement des villes belges) (Brussels 1903) ; id., (Mouvement de l’etat civil et de la population en Belgique pendant les annees 1876— 1900) ; id., ‘Brussels — La mortalite infantile dans les Flandres); id., Essais de statistique morale — I, Le suicide5 (Brussels 1908) ; II, ‘Le divorce et la separation du corps5 (ib. 1909); id., ‘La criminalite Beige, 1868-19095 (Louvain 1912) ; Jourdain, A., and Stalle, L. von, (Dictionnaire encyclopedique de geographic de Belgique5 (Brussels 1895 et seq.) ; Julin, ‘Le recensement general des industries et des metiers ,en Belgique an 31 Octobre, 18965 (in La Reforme Sociale, Vol. IX, Paris 1900) ; Juste, (History of Belgium5; id., ‘Memoirs of Leopold, King of the Belgians5; Laveleye, ‘Le parti clerical en Belgique5 (Leipzig 1874), a statement from the Liberal viewpoint; Leroy, ‘Geographic generale de la Belgique, (Namur 1889); Lavisse, E., (ed.), ‘Histoire generale5 (Vols. X, XI, XII, Paris 1898-1900) ; MacDonnell, J. de C., ‘Belgium: Her Kings, King¬ dom and People5 (London 1914) ; id., ‘King Leopold II ; His Rule in Belgium and the Kon¬ go5 (ib. 1905); Martel, H., ‘Le developpement commercial de la Belgique5 (Brussels, an¬ nually) ; Moke, ‘Histoire de la Belgique,5 con¬ tinued by E. Hubert (Brussels 1881) ; Mossel, H. G., ‘Histoire de la Belgique5 (Brussels 1881) ; Nothomb, ‘Political and Historical Essay on the Belgian Revolution5 ; Penck, ‘Das Konigreich Belgien5 (in Kirchoff’s ‘Lander-kunde von Europa,5 Vol. II, Leipzig 1889); Pirenne, ‘History of Belgium5 ; Prost, E., ‘La Belgique agricole, industrielle et commerciale5 (Paris and Liege 1904) ; Rossel, E., (ed.), ‘La patrie beige, 1830—1905 5 (Brussels 1905); Scudamore, C., ‘Belgium and the Belgians5 (London 1901) ; Seignobos, C., ‘Histoire politique de l’Europe contemporaine5 (Paris 1897 ; Eng. trans., London 1900) ; Siosteen, G., ‘Das moderne Belgien5 (Berlin 1909) ; Smythe, C, ‘The Story of Belgium5 (London 1900) ; Thonissen, ‘La Belgique sous le regne de Leo pold I5 (4 vols., Louvain 1858); Van Bruyssel, ‘History of Commerce in Belgium5 ; Vincent,

1898).

Charles Leonard-Stuart,

Henri F. Klein,

BELGIUM AND THE WAR. Whereas the variously-described ((causes>) of which the war was the effect may long remain the sub¬ ject of controversy among historians — accord¬ ing to the national viewpoint of each, the man¬ ner in which Belgium was swept into the con¬ flict is comparatively clear and simple of expla¬ nation. The political status of Belgium was one of ((perpetual neutrality,® imposed upon her without consultation or consent by powerful neighbors. The historic instrument which guaranteed the independence, integrity and per¬ petual neutrality of the kingdom, dated London, 19 April 1839, bears the seals and signatures of the plenipotentiaries of Austria, Belgium, France, Great Britain, Prussia and Russia. (<In the name of the Most Holy and Indivisible Trinity® the sovereignty of Belgium was strictly circumscribed at her birth ; being ((held to observe the same neutrality toward all the other states,® she was not permitted to enter into political agreements with any other state, and was only entitled to call for help if one of the guarantors broke faith and invaded her ter¬ ritory. Of this solitary privilege Belgium duly availed herself on 4 Aug. 1914. On 1 Aug. 1914 Germany declared war on Russia and in¬ vaded Luxemburg, a little state adjoining Bel¬ gium, and similarly a neutral territory with guaranteed independence and integrity (11 May 1867). On 2 August (7 p.m.) the German government issued an ultimatum to Belgium asserting ((the intention of France to march through Belgian territory against Germany,® and expressing a ((fear that Belgium, in spite of the utmost goodwill, will be unable, without assistance, to repel so considerable a French in¬ vasion with sufficient prospect of success to afford an adequate guarantee against danger to Germany. It is essential for the self-defense of Germany that she should anticipate any such hostile attack.® On the other hand, (<the Ger¬ man government would, however, feel the deepest regret if Belgium regarded as an act of hostility against herself the fact that the measures of Germany's opponents force Ger¬ many, for her own protection, to enter Belgian territory.® The note, which was written

.in German and marked <(Very Confidential,® pro¬ ceeded with the following declaration, ((in order to preclude any possibility of misunderstand¬ ing,® that :

1. Germany has in view no act of hostility against Belgium. In the event of Belgium be¬ ing prepared in the coming war to maintain an attitude of friendly neutrality toward Germany, the German government bind themselves, at the conclusion of peace, to guarantee the posses¬ sions and independence of the Belgian king¬ dom in full.

2. Germany undertakes, under the above-mentioned condition, to evacuate Belgium ter¬ ritory on the conclusion of peace.

3. If Belgium adopts a friendly attitude, Germany is prepared, in cooperation with the Belgian authorities, to purchase all necessaries for her troops against a cash payment, and to pay an indemnity for any damage that may have been caused by German troops.

4. Should Belgium oppose the German troops, and in particular should she throw dif¬ ficulties in the way of their march by a resist¬ ance of the fortresses on the Meuse, or by de¬

stroying railways, roads, tunnels or other sim¬ ilar works, Germany will , to her regret, be com¬ pelled to consider Belgium as an enemy.

In this event, Germany can undertake no obligations toward Belgium, but the eventual adjustment of the relations between the two States must be left to the decision of arms.

The German government, however, enter¬ tain the distinct hope that this eventuality will not occur, and that the Belgian government will know how to take the necessary measures to prevent the occurrence of incidents such as those mentioned. In this case the friendly ties which bind the two neighboring states will grow stronger and more enduring.

The Belgian government were given a time limit of 12 hours within which to reply. At 1 :30 a.m. on 3 August the German Minister in Brussels called on Baron van der Elst, the Bel¬ gian Foreign Secretary, and informed him that French dirigibles had dropped bombs and a French cavalry patrol had crossed the frontier in violation of international law, as war had not been declared. The Belgian official asked where these incidents had happened, and was told that it was in Germany. Baron van der Elst then observed that in that case he could

not understand the object of this communica¬ tion, to which the German Minister replied that these acts were contrary to international law and Svere calculated to lead to the supposition that other acts, contrary to international law, would be committed by France.® During the same day the Belgian representatives at Paris, London, St. Petersburg, Vienna, Berlin and The Hague were instructed to announce the terms of the German demands and the Belgian reply thereto : (<Our answer has been that this infringement of our neutrality would be a flag¬ rant violation of international law. To accept the German proposal would be to sacrifice the honor of the nation. Conscious of her duty, Belgium is firmly resolved to repel any attack by all means in her power.® At the same time the King of the Belgians telegraphed to King George making a <(supreme appeal® to the Brit¬ ish government (<to safeguard the neutrality of Belgium.® The British government had (31 July) requested the French and German gov¬ ernments to state whether, in the event of war, both countries would be (<prepared to engage to respect the neutrality of Belgium so long as no other power violates it.® France gave a ready guarantee; Germany did not reply. On receipt of the Belgian King's appeal the British government again requested from Germany an assurance that Belgian neutrality would be re¬ spected. Later in the day news came that Ger¬ man troops were at Gemmenich inside the Bel¬ gian frontier opposite Aix-la-Chapelle. The British Ambassador was instructed to demand a reply before midnight. The telegram reached Berlin at 7 p.m., and the German government, without waiting for the full time to expire, handed the Ambassador his passports. The in¬ vasion of Belgium had begun. In a speech to the Belgian Chambers (4 August) King Albert said : (<if we are called upon to resist the invasion of our soil and to defend our threatened hearths, this duty, however hard it may be, will find us armed and ready for the greatest sacrifices … one vision alone fills our thoughts — our menaced independence ; one

duty alone presents itself to our wills — stub¬ born resistance. In these grave circumstances two virtues are requisite, a courage that is

calm and stedfast, and complete unity among all Belgians. If the foreigner violates our territory, in contempt of the neutrality whose claims we have always scrupulously ob¬ served, he will find all Belgians grouped around their Sovereign, who will never betray his con¬ stitutional oath, and around the government which enjoys the full confidence of the entire nation. … A country which defends itself wins the respect of all… . That country does not perish.® See Albert, King of the Belgians; Bethmann-Hollweg, von Theo¬ bald; War, European — Diplomatic History.

Bibliography. — Belloc, Hilaire, (General Sketch of the European War' (London 1916) ; Billiard, R., (La Belgique industrielle et commerciale de demain) (Paris 1915) ; Brangwyn, F., and Stokes, H., Belgium' (London 1916) ; Cram, R. A., (Heart of Europe' (ib. 1916); Buchan, J., (ed.), (Nelson's History of the War' (London 1914 et seq.) ; Essen, L., van der, (A Short History of Belgium' (ib. 1916); Gibson, Hugh, (A Journal from Our Legation in Belgium' (New York 1917); Hampe, Karl, (Belgiens Vergangenheit und Gegenwart' (Leipzig 1916); Fried, A. H., (The Restoration of Europe' (London 1916) ; Huberich, C. H., and Nicol-Speyer, A., (German Legislation for the Occupied Territories of Belgium' — Official Texts (The Hague 1915 et seq.); Ingpen, R., (The Glory of Belgium' (London 1914) ; Kess¬ ler, O., (Das deutsche Belgien' (Berlin 1915) ; Krusch, P., (Die nutzbaren Lagerstatten Belgiens, ihre geologische Position und wirtschaft-liche Bedeutung' (Essen 1916) ; Norden, Fritz, (Das neutrale Belgien und Deutschland im Urteil belgischer Staatsmanner und Juristen' (Munich 1916) ; Massart, J., (Belgians under the German Eagle' (London 1916) ; Probst, Eugen, (Belgien: Eindriicke eines Neutralen' (Zurich 1916) ; Quelle, Otto, (Belgien und die franzosischen Nachbargebiete' (Brunswick 1916); Visscher, C. de, Belgium's Case: A Juridical Enquiry' (London 1916) ; Waxweiler, E., (Belgium and the Great Powers' (ib. 1916). Consult also (The Times Documentary History of the War' (London 1915 et seq.); (Reponse au Livre-Blanc allemand du 10 Mai 1915' — <(Die Volkerrechtswidrige Fiihrung des belgischen Volkskriegs" (Royaume de Belgique, Ministere de la Justice, et Ministere des Affaires Etrangeres, Guerre de 1914-16, Paris 1916) ; Stowell, E., and Munro, A. F., (International Cases: Peace' (London 1917).

Henri F. Klein.

Editorial Staff of The Americana.

BELGIUM, Princess Dowager Marie of,

Countess of Flanders and mother of the reign¬ ing King Albert: b. 1845; d. 26 Nov. 1912; daughter of Prince Charles Anton of Hohenzollern-Sigmaringcn. She married, 1867, Philip, Count of Flanders and third son of Leo¬ pold I. Her husband, who became very deaf, died in 1905, having renounced his right of succession, and her eldest son, Prince Baldwin, died unmarried in 1891. She was known as ftLa Princesse artiste," and was an accom¬ plished painter, etcher and musician.

BELGOROD, bvel'gd-rot, or BIELGOROD, Russia, town in the government of, and

87 miles south from the town of, Kursk, on the Donetz. It is the seat of an archbishop's see and has important fairs. Belgorod, which de¬ rives its name from a neighboring chalk hill, is divided into two — the old and new — towns. It has manufactures of leather and soap, and agriculture is fairly well developed. There is a considerable trade in wax, apples, tallow can¬ dles and especially of chalk, of which about 1,300 tons are produced annually within the city limits. Pop. about 22,000.

BELGRADE, Serbia, the capital of the kingdom, situated in the angle formed by the junction of the Save with the Danube, over¬ looked by a citadel on a rocky eminence about 160 feet high. The town has been almost en¬ tirely transformed in recent times and now contains a number of fine buildings and wide streets, being provided with the electric light, tramways, telephones, waterworks, etc., and having generally the aspect of any modern Eu¬ ropean town. It contains the royal palace, residences of various ambassadors or ministers, the chief courts and government departments, archiepiscopal cathedral, Protestant church and school, high school or college, gymnasia, mili¬ tary school, national library of 80,000 volumes, national museum, *etc.* ; also very fine parks and an old Turkish kiosk. At the head of the educational institutions is a university with faculties of philosophy, jurisprudence and en¬ gineering. It is the seat of the Royal Serbian Academy of Sciences. The most numerous places of worship are the Greek Catholic. There are no industries of any importance, but trade, however, is active, Belgrade being the chief emporium of the kingdom, the place to which most of the imports and exports of Serbia are brought, and through which a large transit trade passes between Austria and Tur¬ key. It is now connected by railway with Budapest and with Constantinople and Salonica, and carries on a large shipping trade by the Danube and also the Save. Under the name of

Singidunum, Belgrade was the station of a Roman legion, and in later years was several times destroyed in the contests of the Byzan¬ tines, Bulgarians and Hungarians. Being the key of Hungary, it was long an object of fierce contention between the Austrians and the Turks. It was taken by the latter in 1521 and held by them till 1688, when it was retaken by the imperial army. Two years afterward it was again captured by the Turks, who per¬ petrated every sort of atrocity in the conquered city, besides killing 1,200 of the garrison. From this period it remained in possession of the Turks till 1717, when it was besieged by Prince Eugene. After a desperate conflict between the contending armies the Turks were defeated. In 1739 the Turks came into possession of it by treaty, retaining it till 1789, when it was taken by the Austrians. It was restored by treaty to the Turks in 1791 ; since which time it has shared the varying fortunes of Serbia. Though Serbia became practically independent in the early part of the 19th century, the Turkish gar¬ rison was not withdrawn till 1867. In conse¬ quence of a quarrel with the Serbians it was bombarded by the Turkish garrison in 1862. In 1867 it was evacuated by the Turks altogether, and from the Treaty of Berlin (July 1878) until 1914, the capital of an independent state On 9 Oct. 1915, it was occupied by Austro-

German troops, and after the Austro-Bulgarian occupation of the country, completed 2 Dec. 1915, the Serbian government was established at Corfu. An American consul resides here. See Serbia; War, European. Pop. 90,890.

BELGRADE, Forest of, is the only forest on the European shore of the Bosporus. It has an area of about 20 square miles and is preserved untouched by the axe to attract rain.

BELGRAND, bel-gran, Marie Frangois Eugene, French civil engineer: b. Ervy, 23 April 1810; d. 8 April 1878. He designed the gigantic sewerage system and water supply sys¬ tem of Paris, and published (La Seine) ; (Les travaux souterrains de Paris) ; (Les eatix anciennes de Paris) ; (Les eaux nouvelles,* *etc.*

BELGRAVIA, the name given to the fashionable quarter of London south and west of Belgrave Square. Till the early part of the 19th

century the district was a marshy farm. The district was drained and filled in about

BELHAVEN, N. C., town in Beaufort County, 120 miles east of Raleigh, located at the mouth of the Pungo River on Pamlico Sound and on the Norfolk Southern Railroad. It is in the centre of an agricultural region whose products are chiefly cotton, corn and potatoes. Another industry of some import¬ ance having its centre here is fishing and dredg¬ ing for oysters in the Sound. In the town are a number of large saw mills and cooperage shops. Pop. (1920) 1,816.

BELIAL, be'H-al or bel'yal. By the trans¬ lators of the English Bible, this word which occurs 27 times in the Old Testament is often treated as a proper noun, as in the expression <(daughter of Belial,® which the translators of the Revised version translate as ((wicked woman.® Cheyne in the Expositor for 1895, pp. 435-39, gives as its equivalent (1) subterra¬ nean waters (and so connected with Belite, a goddess of the underworld in Babylonian myth¬ ology) ; (2) a hopeless ruin; and (3) a worth¬ less scoundrel. To the later Jews Belial seems to have become what Pluto was to the Greeks, the name of the ruler of the infernal regions; and in 2 Cor. vi, 15 it seems to be used as a name of Satan, as the personification of all that is bad.

BELIEF. In a general sense belief is the assent of the understanding to the truth of a proposition, but in a technical and theological sense has come to be used as a mental exercise somewhat depending upon the volition of the individual. The word is used to mean the ac¬ ceptance of a proposition, statement or fact as true on the ground of evidence, authority or irresistible mental predisposition ; the state of trust in and reliance on a person, thing or prin¬ ciple; as also for the fact believed, and some¬ times specifically for the Apostles' Creed. Be¬ lief is by some distinguished from knowledge, inasmuch as the latter rests on evidence, while belief rests on authority. Belief should, some say, not be used of facts occurring in one's own experience, or principles of which ihe opposite implies absurdity, such as the law of contradiction in deductive logic. Tfuse we know, and, according to this view, the term should be limited to cases where a proposition is accepted without evidence, or where such

evidence as is available implies only probability. On the other hand, certain psychologists are accustomed to regard as beliefs the fundamental data on which reasoning rests ; and to say that all

knowledge rests ultimately on belief. Belief, they say, may admit of all degrees of confidence, from a slight suspicion to full as¬ surance. There are many operations of mind in which it is an ingredient — consciousness, remembrance, perception. Kant defined opinion as a judgment which is insufficiently based, sub¬ jectively as well as objectively; belief, as sub¬ jectively sufficient but objectively inadequate; knowledge, as both subjectively and objectively sufficient. The strongest beliefs may, of course, be false; beliefs in ghosts, astrological prog¬ nostications, etc., are usually treated as supersti¬ tions. Beliefs as such rest on grounds regarded as sufficient by the person believing, who is pre¬ pared to act on his belief ; but their grounds may have absolutely no validity for any other per¬ son. Such beliefs are nevertheless very real. On the other hand there are many propositions accepted traditionally, and spoken of as beliefs, which are not _ real, vital abiding truths for those who nominally accept them ; which have no influence on character or mental tone, and on which those who hold them would not be pre¬ pared to act. Faith is a word used in very much the same sense as belief, but especially signifies the acceptance of and reliance on the truths of religion.

Bibliography. — Bain, (The Emotions and the WilP (London 1800) ; Balfour, (The Foundations of Belief* ; Brentano, Psycholo¬ gicˆ (Leipzig 1874) ; Carveth, Conditions of Belief in Immature Minds* (in British Journal of Psychology, Vol. VI, p. 304, 1914) ; Doras-wamy, Pnowledge, Belief and WilP (in Prahmavadin,* Vol. IX, p. 85, 1904) ; Hume, Unqtliry* (Oxford 1894) ; James, Psychology* (New York 1890); Ladd, (What Shall I Be¬ lieve* (1915) ; Mill, (Analysis of the Phenom¬ ena of the Human Mind* (London 1869) ; New¬ man, (Grammar of Assent* ; Spencer, Psy¬ chology* (New York 1881) ; Thomas, judg¬ ment as Belief* (1910) ; Verbrot, Pie Psychol¬ ogic des Glaubens* ; Ward, (The Wish to Be¬ lieve* (1884).

BELINDA, a novel by Maria Edgeworth. Belinda Portman goes to spend the winter in London with Lady Delacour, a brilliant and fashionable woman ; at her house she meets Clarence Hervey for the first time. Various obstacles keep the lovers apart, but the story ends happily with the marriage of Hervey and Belinda. Despite a didactic vein, apparent here as in others of her novels, Belinda is an interesting work and secures for its author her prominent place in English fiction.

BELINSKY, Vissarion Grigorevitch, Rus¬ sian writer and critic : b. Tchembar, government of Penza, 1810; d. Saint Petersburg, 28 May 1848. Entered the University of Moscow 1829, but was expelled before graduation on account of a drama he had written which fiercely at¬ tacked the institution of serfdom. His first im¬ portant

work, however, was his (Literary Rev¬ eries* (1834), a critical review of the develop¬ ment of Russian literature. In 1839 he removed to Saint Petersburg, where he became promi¬ nent as a critic, especially after the appearance of his essays on the Russian writers of his time,

the last of these, on Pushkin, constituting a vol¬ ume of over 500 pages (1848). His last import¬ ant work was his (Literary Review for 1847, } in which he strongly expressed the radical views that tinged all his works. His collected w'orks were published in 12 volumes in 1862. Belinsky is now considered to have been the foremost critic of Russian literature, his fame having augmented considerably since his death. Consult Pypin, (Belinsky: His Life and Corre¬ spondence) (Saint Petersburg 1876).

BELISARIUS, Byzantine general : b. about 505; d. 565. To him the Emperor Justinian chiefly owed the splendor of his reign. Belisarius first served in the bodyguard of the Em¬ peror, soon after obtained the chief command of an army of 25,000 men stationed on the Per¬ sian frontiers, and in the year 530 gained a complete victory over a Persian army of not less than 40,000 soldiers. The historian Proco¬ pius was at this time secretary of Belisarius. In 531, however, he lost the battle of Callini-cum against the same enemy, who had forced his way into Syria — the only battle which he lost during his whole career. He wras recalled from the army and soon became at home the support of his master, the Emperor. In the year 532 civil commotions, proceeding from two rival parties, who called themselves the green and the blue and who caused great disorders in Constantinople, brought the life and reign of Justinian into the utmost peril, and Hypatius was already chosen emperor, when Belisarius with a small body of faithful adherents restored order. Justinian, wuth a view of conquering the dominions of Gelimer, king of the Vandals, sent Belisarius with an army of 15,000 men to Africa. After two victories he secured the person and treasures of the Vandal King. Geli¬ mer was led in triumph through the streets of Constantinople, and Justinian ordered a medal to be struck with the inscription (Belisarius gloria

RomanorumP which has descended to our times. By reason of the dissensions exist¬ ing in the royal family of the Ostrogoths in Italy, Justinian was induced to attempt to bring Italy and Rome under his sceptre. Belisarius reduced Sicily in 535 and in the following year received the submission of the cities of lower Italy, with the exception of Naples, which he carried by storm. In December of the same year he entered Rome, where he was besieged by the Goths for an entire year. The latter were finally compelled to raise the siege. In 538 Belisarius was reinforced by Narses, but the latter failed to co-operate with him and Milan was sacked by the Goths under Braias. Narses was recalled and both armies were placed under the command of Belisarius. In 540 Belisarius pushed the Goths back to Ra¬ venna, and here vanquished their army and cap¬ tured their king, Vitiges, whom, together with many other Goths, he conducted to Constanti¬ nople. The war in Italy against the Goths con¬ tinued, but Belisarius, not being sufficiently supplied with money and troops by the Emperor, demanded his recall in 548. Narses, his rival, was appointed to the command. He afterward commanded in the war against the Bulgarians, whom he conquered in the year 559. Upon his return to Constantinople he was accused of having taken part in a conspiracy. But Jus¬ tinian was convinced of his innocence, and is

said to have restored to him his property and dignities, of which he had been deprived. His history has been much colored by the poets, and particularly by Marmontel, in his other¬ wise admirable politico-philosophical romance. According to his narrative, the Emperor caused the eyes of the hero to be struck out, and Belisarius was compelled to beg his bread in the streets of Constantinople. Other writers say that Justinian had him thrown into a prison, which is still shown under the appellation of the Tower of Belisarius. From this tower he is reported to have let down a bag fastened to a rope and to have addressed the passers-by in these wrords : (<Give an obolus to Belisarius, Avhom virtue exalted, and envy has oppressed. y> Of this, however, no contemporary writer makes any mention. The blind Belisarius forms the subject of a noted painting by Gerard. Tzetzes, a slightly esteemed writer of the 12th century, was the first who related this fable. Certain it is that, through too great in¬ dulgence toward his wife, Antonina, Belisarius was impelled to many acts of injustice, and that he evinced a servile submissiveness to the de¬ testable Theodora, the wfffe of Justinian. Con¬ sult Gibbon, E., (Decline and Fall of the Roman Empire } (edited by Bury, Vol. IV, London 1898) ; (The Cambridge Mediaeval Historv) (Vol. I, New York 1911) ; Hodgkin, Htaly and Her Invaders y (Oxford 1880-85) ; Bury,

(Later Roman Empire* (London 1893).

BELIZE, be-lez' (sometimes written Belice or Balize), British Honduras, the capital of the colony. Lat. 17° 29' N. ; long. 88° 8' W. It has been suggested that the name is derived from the French balise, a beacon, but more probably it is a corruption of Wallace, a Scotch buccaneer named Feter Wallace, with 80 com¬ panions, having erected houses enclosed with a rude palisade at this point after the Spaniards abandoned Bacala, leaving a large part of the rugged, uninviting north coast of the Gulf of Honduras unoccupied, save by freebooters, during the latter half of the 17th century. Ac¬ cordingly the name Walis, Balis or Belize was applied by the natives and Spaniards to the set¬ tlement, the river on which it wras situated and subsequently to the whole region occupied by the English. (Consult Bancroft's 'History of Central America, > Vol. II, p. 624). Wood-cut¬ ting was the chief occupation of the establish¬ ment. The value of the forests attracting other settlers, Belize was attacked by the authorities of Yucatan, who sought to expel them as tres¬ passers in 1733. Various unsuccessful attempts with the same object were made in subsequent years, the most formidable in 1754. Again in 1779, war existing between England and Spain, the governor of Yucatan organized an expedi¬ tion against Belize; and Spain's last effort to regain possession by force was made in 1798. Before that time the settlers had organized a government. It is an interesting fact that, originating as it did, the towm has become, with its population of more than 5,000, its church, schools and hospital, a centre for the mainte¬ nance of good order. Tt has the characteristic leatures of a small English colonial capital — the governor's house, *etc.* Coral reefs form a natural breakwater for the harbor. Large ves¬ sels are loaded and unloaded by means of tenders. Logwood and mahogany are the chief

items of trade. Other staple products are bananas, coffee, cacao, plantains, *etc.* See Hon¬ duras, British, and consult works there re¬ ferred to. Pop. 10,478.

BELKNAP, George Eugene, American naval officer: b. Newport, N. H.,

22 Jan. 1832; d. Key West, Fla., 7 April 1903. He was ap¬ pointed midshipman in the navy in 1847 ; be¬ came lieutenant-commander in 1862 ; com¬ mander in 1866; captain in 1872; commodore in 1885, and rear-admiral in 1889, and was re¬ tired in 1894. He took part in the capture of the Barrier Forts on the Canton River, China, in 1856; and in the Civil War commanded the New Ironsides at the bombardment of the forts and batteries in Charleston Harbor, and in both of the attacks on Fort Fisher. In 1873, as com¬ mander of the Tuscarora, while engaged in deep-sea sounding in the north Pacific Ocean, he made discoveries concerning the topography of the bed of the ocean that found high favor among scientists. He was appointed superin¬ tendent of the United States Naval Observa¬ tory in 1885 and, among other works, published (Deep Sea Soundings. ‘

BELKNAP, Jeremy, American Congrega¬ tional clergyman: b. Boston, Mass., 4 June 1744; d. there, 20 June 1798. He was graduated at Harvard in 1762; was pastor of the Congrega¬ tional Church in Dover, N. H., 1767-86, and of the Federal Street Church in Boston, 1787-98; and was active for the American cause during the Revolution. The Massachusetts Historical Society, organized in 1790, recognizes him as its founder. In 1792 he became an overseer of Harvard College. A very great part of his time was spent in biographical and historical research. He was the author of a (History of New Hampshire’ (3 vols., 1784-92) ; (A Dis¬ course Intended to Commemorate the Discov¬ ery of America by Columbus, with Four Dis¬ sertations’ (1792) ; (An Historical Account of Those Persons Who Have Been Distinguished in America,’ generally known as the Amer¬ ican Biography’ (2 vols., 1792-98) ; (The For¬ esters: An American Tale’ (1796); Collec¬ tion of Psalms and Hymns’ (1795). Consult his (Life,’ (New York 1847).

BELKNAP, William Worth, American military officer, son of Gen. W. G. Belknap : b. Newburg, N. Y, 22 Sept. 1829; d. Wash¬ ington, D. C., 13 Oct. 1890. In 1861 he entered the Union army as major of the 15th Iowa Volunteers and was engaged at Shiloh, Corinth and Vicksburg; but became most prominent in Sherman’s Atlanta campaign He was pro¬ moted to brigadier-general, 30 July 1864, and major-general, 13 March 1865. He was collec¬ tor of internal revenue in Iowa from 1865 to 13 Oct. 1869, when he was appointed Secretary of War, which office he occupied till 7 March 1876. He resigned in consequence of accusa¬ tions of official corruption. Subsequently he was tried and acquitted.

BELL, Acton. See Bronte, Anne.

BELL, Alexander Graham, American scientist, inventor of the

telephone: b. Edin¬ burgh, Scotland, 3 March 1847. He was a son of Alexander M. Bell (q.v.), and was taught at home by his parents, more especially by his mother, whose musical talent he inherited, and by August Benoit Bertini, a musical authority

and composer. He entered McLauren's Acad¬ emy in Edinburgh and, a year later, the Royal High School, graduating shortly after his 13th birthday. Then he went to London and re¬ ceived instruction in elocution and the mech¬ anism of speech from his grandfather, Alex¬ ander Bell (b. 1790; d. 1865), a recognized authority on these subjects. Returning home, he was further trained along the same lines by his father, with a view to following the family profession. Was then employed during a year as pupil-teacher at Weston-House Acad¬ emy, Elgin, Scotland, after which he entered the University of Edinburgh and attended lec¬ tures upon Latin under Doctor Sellers and upon Greek under Professor Blakie. Then he re¬ turned to Elgin as resident master and teacher of elocution and music, and remained two years. Was instructor in Somersetshire Col¬ lege, Bath, England, during a year, then be¬ came assistant to his father in London (the latter having removed there and received the appointment of lecturer on elocution in Uni¬ versity College). In 1868 he taught several deaf-born children to speak, and from July to December had entire charge of his father's professional affairs, including the giving of lessons and lectures at the different schools and the correcting of defects in speech, while the father was delivering lectures in America. Early the next year he was taken into partner¬ ship with his father. During 1868-70 he at¬ tended courses on anatomy and physiology at University College, London, joined the college medical society and matriculated as an under¬ graduate at the London University. Owing to the death of two of his sons by tuberculosis and the fear that his only remaining son might fall a victim, Graham's father resigned his lec¬ tureships, disposed of his practice in London and, with his family, moved to Canada and secured a country place at Tutelo Heights, near Brantford, Ontario. Through living out-of- doors as much as possible, Graham Bell re¬ gained his health.

Beginning 1 April 1871, Alexander Graham Bell gave special instruction to teachers of deaf children in the use of his father's physio¬ logical symbols of visible speech in Boston and Northampton, Mass., Hartford, Conn., and other cities. In 1872 he opened in Boston a normal training school, known as the School of Vocal Physiology, for teachers of the deaf and for instruction in the mechanism of speech, faults of speech, *etc.* In 1873 he was appointed professor of

vocal physiology in the school of oratory of the Boston University. Here he remained until 1877, when he went abroad to lecture on the telephone. Before he was 17 years of age he devised a method for removing the husks from wheat, and he and his brother made a speaking automaton. Among the more important inventions are the harmonic multiple telegraph (1874) ; the fundamental method that underlies the electric transmission of speech in any form in any part of the world (1875) ; the magneto-electric speaking-telephone (1875) ; the photophone for transmitting speech and other sounds to a distance by means of a beam of light (1880) ; an induction-balance with magneto-electric telephone for painlessly locat¬ ing bullets or other metallic masses lodged in the human body (1881); the telephone probe

to determine the position and depth of metal¬ lic masses in the human body (1881) ; the spec-trophone for determining the range of audi¬ bility of different substances in the spectrum 1881); joint inventor of the graphophone and flat disc records for recording and reproducing speech, music and other sounds, <(the commercial origin of the sound-repro¬ ducing art® (1884-86) ; tetrahedral kites and kite structures (1903) ; joint inventor in a number of improvements designed to pro¬ mote aerial locomotion in connection with the Aerial Experiment Association (1903-08).

Among the medals awarded to Alexander Graham Bell are the following: Centennial Exposition, Philadelphia, gold medal for speak¬ ing-telephone, gold medal for visible speech (1876) ; Royal Cornwall Polytechnic Society, the James Watt silver medal for the telephone (1877) ; Massachusetts Charitable Mechanics Association, gold medal for the telephone, gold medal for visible speech (1878) ; Society of Arts, London, Royal Albert silver medal for his paper on the telephone (1878) ; Republique Franqaise Exposition Universelle Internation¬ ale, Paris, gold medal for the telephone and a silver medal (1878) ; Society of Arts, London, Royal Albert silver medal for his paper on the photophone (1881) ; the Karl Koenig von Wuertemberg gold medal;

Society of Arts, London, Royal Albert gold medal for his in¬ vention of the telephone (1902) ; John Fritz gold medal (1907) ; Franklin Institute of Phil¬ adelphia, Elliott Cresson gold medal for the electrical transmission of speech (1912) ; David Edward Hughes gold medal and a silver medal (1913) ; American Institute of Electrical En¬ gineers, Thomas Alva Edison gold medal (1914). Among the honorary degrees con¬ ferred upon Alexander Graham Bell are the following: Doctor of Laws, Illinois College (1881), Harvard College (1896), Amherst Col¬ lege (1901), Saint Andrew's University (1902), Edinburgh University (1906), Queen's Univer¬ sity, Canada (1908), George Washington Uni¬ versity (1913), Dartmouth College (1914); Doctor of Philosophy, National Deaf-Mute College (now Gallaudet College) (1880), Wurz¬ burg University (1882) ; Doctor of Science, Oxford University (1906) ; Doctor of Medi¬ cine, Heidelberg, Germany (1886). To him was awarded by the government of France the Volta prize of 50,000 francs for the electrical transmission of speech (1880) ; he was also decorated and created an officer of the Legion of Honor of France (1881).

Among the societies of which Alexander Graham Bell is a member are the following: Boston Society of Natural History; American Academy of Arts and Sciences, Boston; Royal Society of Arts, London (honorary) ; Society of Telegraph Engineers and Electricians, Lon¬ don ; Institute of Electrical Engineers, London ; American Association for the Advancement of Science (life) ; Philosophical Society of Wash¬ ington ; American Philosophical Society, Phila¬ delphia ; National Academy of Sciences; Na¬ tional Educational Association (life) ; Societe dc Physique (corresponding), Paris; American Otological Society (honorary) ; American In¬ stitute of Electrical Engineers (ex-president) ; American Association to Promote the Teach¬ ing of 'Speech to the Deaf (founder, endower

and ex-president) ; Antiquarian Society of Massachusetts ; Anthropological Society of Washington; Washington Academy of Sci¬ ences; National Geographic Society (ex-pres¬ ident) ; Association for the Improved Instruc¬ tion of Deaf-Mutes (honorary) ; Telephone Pioneers of America; American Anthropologi¬ cal Society; American Senefic Association; American Laryngological, Rhinological and Otological Society (honorary). In 1887 he founded and endowed the <(Volta Bureau for the Increase and Diffusion of Knowledge Re¬ lating to the Deaf,® Washington, D. C In 1900 he assisted in the formation of the Ameri¬ can Association to Promote the Teaching of Speech to the Deaf and endowed the associa¬ tion. As special agent of

the Bureau of the Census he determined the scope of that part of the 12th census relating to the deaf of the United States living on 1 June 1900, initiated the inquiry, specified the tabulations to be made from the data secured, conducted the correspondence and prepared the text of the special report of 200 pages that is valued highly by all who are investigating any phase of deaf¬ ness. He was appointed by Congress a regent of the Smithsonian Institution in 1898 and has been regularly reappointed since. In January 1904 he brought the remains of James Smithson, founder of the Smithsonian Institution, from Genoa, Italy, to New York, where they were received with national honors and con¬ veyed to Washington.

BELL, Alexander Melville, Scottish—

American educator : b. Edinburgh, 1 March 1819; d. Washington, D. C., 7 Aug. 1905. He was a distinguished teacher of elocution at the university of his native city ; in 1865 removed to London to act as a lecturer in University College, and in 1870 went to Canada and be¬ came connected with Queen's College, King¬ ston. He invented the system of (<visible speech,® in which all the possible articulations of the human voice have corresponding charac¬ ters designed to represent the respective posi¬ tions of the vocal organs. This system has been successfully employed in teaching the deaf and dumb to speak. Besides writing on this subject he wrote on elocution, stenography, *etc.* He was the father of Alexander Graham Bell, the inventor of the telephone.

BELL, Andrew, Scottish educator, author of the mutual instruction or <(Madras® system of education: b. Saint Andrews, 27 March 1753; d. Cheltenham, England, 27 Jan. 1832. He was educated at the university of his native town, resided for seven years in Virginia as tutor to a plasterer's family, and on returning took or¬ ders in the Church of England. In 1787 he went to India, where he held eight army chap¬ lainships simultaneously and became manager of the institution for the education of the or¬ phan children of European soldiers at Madras established by the East India Company. The superintendence of this asylum was undertaken by Dr. Bell, who, though the love of money was his besetting weakness, refused the salary of 1,200 pagoda (£480) which was attached to it. Failing to retain the services of properly qualified ushers he resorted to the expedient of conducting his school through the medium of the scholars themselves. It was in the mode of conducting a school by means of mutual in-BELL

struction that the new method of Dr. Bell con¬ sisted ; and its value as an abbreviation of the mechanical part of teaching, and where large numbers were to be taught economically, could not be easily overestimated at the time. His system, however, is now abandoned. From the commencement of his experiment he made the scholars, as far as possible, do everything for themselves ; they ruled their own paper, made their own pens, etc., while the teacher only directed them. The maxim of the school was that no boy could do anything right the first time, but he must learn when he first set about it, by means of his teacher, so as to be able to do it himself ever afterward. After superintending the school for seven years he found it necessary for his health to return to Europe. On his arrival he published in 1797 a pamphlet entitled (An Experiment in Edu¬ cation made at the Male Asylum of Madras, > in which he gave an account of his system. He founded a national society for the education of poor children by means of his system, to be operated in accordance with Anglican teach¬ ing. The first place in England where the sys¬ tem was adopted was the charity school of Saint Bodolph's, Aldgate, and gradually, es¬ pecially through the influence of Joseph Lan¬ caster, who founded a rival society on non¬ sectarian lines, it was widely carried out in England, and indeed in almost every other civilized country. Dr. Bell became in 1801 rector of Swanage, Dorset, and in 1819 ac¬ quired the dignity of a prebendary of West¬ minster and was master of Sherburn Hospital, Durham. He employed himself during his later years in writing several works on educa¬ tion, among which the most valuable were (The Elements of Tuition, 5 (The English School } and (Brief Manual of Mutual Instruc¬ tion and Disciplined Before his death he gave over to trustees £120,000 3 per cent stock for education, half of it for the purpose of found¬ ing an academy in his native city. His method was the forerunner of the pupil-teacher sys¬ tem. Consult (Life by Southey) (1844) ; Meiklejohn, (An Old Educational Reformed

(1881).

BELL, Sir Charles, Scottish anatomist : b. Edinburgh November 1774; d. near Worces¬ ter, England, 28 April 1842. He studied anat¬ omy under his brother, John Bell (q.v.), and had scarcely reached manhood before he had proved himself to be a first-rate anatomist as well as an excellent lecturer. In 1804, being already known by his published

works, he went to London, and in 1811 published an essay en¬ titled (A New Idea of the Anatomy of the Brain,* containing the important discovery of the distinction between sensory and motor nerves, on which his fame chiefly rests. In 1812 he was appointed surgeon to the Middle¬ sex Hospital, to whose prosperity he afterward greatly contributed. In 1824 he accepted the chair of anatomy and surgery to the London College of Surgeons, and in 1836 that of sur¬ gery in the University of Edinburgh. His prin¬ cipal works are (Anatomy of Expression > (1806); (System of Operative Surgery) ; Anatomy and Physiology,* with his brother John; (Animal Mechanics) (1828); (Nervous System * (1830) ; and the (Bridgewater Treatise on the Hap 4' (1833) ; (Thc Institutes of Sur¬

gery } (1838), and (Practical Essays) (1841). He was knighted in 1831. There is a life in French by Pichot (1859), and in 1870 a selec¬ tion from Sir Charles Bell's correspondence was published.

BELL, Charles Frederick Moberly, Eng¬ lish journalist, managing director of the Lon¬ don Times: b. Alexandria, Egypt, 2 April 1847; d. London, 5 April 1911. Started as a young man on a commercial career in Egypt, in 1865, aged 18, he took a vacation in walking along the entire length of the Suez Canal (103 miles) then in course of construction, and sent a glow¬ ing account of his trip to the London Times, pointing out the enormous advantage and bril¬ liant prospects of the undertaking. At that time the venture was still decried in England as a colossal folly, and Bell's article was re¬ ceived with a shower of reproof. When the canal was opened, four years later, and speedily became one of the world's most important high¬ ways, the young correspondent's prophecy was amply fulfilled. He was appointed by The Times to send reports of news from Egypt, which he did for many years while carrying on his business as a cotton merchant. He kept the outside world in close touch with Egyptian af¬ fairs, especially the profligate rule of the Khedive Ismail. The Arabi Pasha rebellion in 1882 gave him his chance. With unerring fin¬ ger he pointed out the real instigators of the revolt, who were using Arabi as a tool to fur¬ ther their own purposes. The Anglo-French intervention was directly due to Bell's writings in The Times; it was he who drove Gladstone into the only act of foreign aggression that statesman was ever guilty of. When the French fleet withdrew from the harbor of Alexandria, the British squadron remained and bombarded the rebel positions in the forts, afterward land¬ ing troops. This proceeding led to the British occupation and ultimate absorption (17 Dec. 1914) of Egypt. Bell was an attentive eyewit¬ ness of these

historic events, and his descrip¬ tions of them were masterpieces of journalistic composition. In 1890 Bell was invited to come to London and take over the management of The Times. That paper had just passed through a critical period. The disastrous Par¬ nell case (q v.) had cost The Times over a million dollars and a strong hand was needed to guide the business side of the concern. Fqr 21 years Bell labored with terrific energy in that post and finally died in his office chair while writing a letter respecting newspaper copyright. He led the paper into avenues dis¬ tinct from journalism, such as publishing the 9th and 10th editions of the (Encyclopedia Britannica,* The Times (Atlas,* The 7 imes (History of the War in South Africa,) and instituted The Times Book Club. He chartered a steamer for a Times correspondent to follow the naval operations of the Russo-Japanese War; established a private wireless system and inaugurated the first service of wireless press messages across the Atlantic. A man of im¬ mense stature, with a leonine head and merci¬ less driving force, he spared neither himself nor those who worked under him. He had the gift of choosing the right men for allotted positions, and never failed to encourage merit and reward those who had achieved any suc¬ cess for the paper. He published three books on Egypt.

BELL, Clark, American writer on medical jurisprudence: b. Whitesville, N. Y., 12 March 1832; d. 24 Feb. 1918. After practising law he became, in 1861, assistant district attorney of Steuben County, N. Y. Later he became attorney for the Union Pacific Railroad and as such drew up the act by which Congress authorized its construction. In 1883 he became editor of the Medico-Legal Journal , in which position he continued for many years. He was president of ihc Medico-Legal Society for 16 terms and organized the first Congress on Tuberculosis. In 1900 and in 1906 he was a delegate to the International Medical Congress, held respectively at Paris and Lisbon. Among his works are (Bell's Medico-Legal Studies' (11 vols., 1893); judicial History of the Supreme Court of the United States and Prov¬ inces of North America' (1895) ; 'Spiritism, Telepathy and Hypnotism' (1902, 2d ed., 1904).

BELL, Currer. See Bronte, Charlotte.

BELL, Digby (Valentine), American actor and singer in comic opera : b. Milwaukee, Wis., 1849; d. 20 June 1917. His earlier years were spent in the steamship business, but later he was encouraged to take up the cultivation of his voice in Naples. His first appearance was made in Malta, in 1876. Since then he has been promi¬ nent on the American comic opera stage, tour¬ ing ihe United States and Canada with Augus¬ tin Daly, the McCaul Opera Company and the Duff Opera Company. His most notable suc¬ cesses have been in the Gilbert and Sullivan operas, especially as the Admiral in 'Pinafore,' as Ko-Ko in 'Mikado' and in 'Patience.' He played Sam Weller with De Wolf Hopper in 'Mr. Pickwick' and also starred in 'Tar and Tartar.' In 1912 he appeared in a revival of 'The Mikado.' He later became a motion pic¬ ture star.

BELL, Ellis. See Bronte, Emily Jane.

BELL, George Joseph, Scottish lawyer, brother of Sir Charles and John Bel]: b. Edin¬ burgh, 26 March 1770; d. 1843. He passed as advocate in 1791, and became one of the first authorities on the subject of mercantile juris¬ prudence and the law of bankruptcy. This distinction he earned for himself by the publi¬ cation of a work which first appeared in 1804, under the title of a 'Treatise on the Laws of Bankruptcy,' but in subsequent editions was extended and appeared as 'Commentaries on die Laws of Scotland and on the Principles of Mercantile Jurisprudence.' This work, not¬ withstanding recent changes in the law, is still a standard. Besides the work above mentioned, he published 'Principles of the Law of Scot¬ land,' the 10th edition of which was issued in 1897 ; and other works.

BELL, Henry, Scottish engineer, the first successful applier of steam to the purposes of navigation in Europe: b. Torphichen, Linlith¬ gowshire, 7 April 1767; d. Helensburgh, 14 Nov. 1830. He practised for several years, at Glasgow, the craft of a house carpenter, but in 1808 removed to Helensburgh, where he contin¬ ued to prosecute his favorite task of mechanical scheming, without much regard to the ordinary affairs of the world, though he became proprie¬ tor of baths there. The application of steam to navigation had already been attempted by Mr. Miller of Dalswinton (among others), who,

in 1788, had a vessel constructed, propelled by a small engine and paddle-wheel, the scene of operations being a loch on his own

property in Dumfriesshire. Some further experiments were made, yet the scheme had no practical result for several years. Henry Bell seems to have turned his attention to the subject before the end of the century, and in January 1812 produced the Comet, a vessel 40 feet long, which was found in a great measure to answer the purpose contemplated. This vessel could make way against a head tide in the river at the rate of five miles an hour, and continued to ply on the Clyde for a number of years. It may be mentioned that Mr. Robert Fulton, an Ameri-ican engineer, had launched a boat upon this principle in 1807, and that it performed long voyages upon the Hudson River; but it ha5 been proved that Fulton had derived assistance in the construction of his vessel from Bell, who must therefore be allowed the praise of having done, in his own country, what all other men, notwithstanding the superior advantage > of skill and capital, had failed in doing. Be1! lived to see the bosom of the Clyde dotted far and wide by innumerable copies of his own invention ; to know that steamboats promised to give a new turn to the art of general warfare ; yet he reaped for himself little advantage While mankind at large were enjoying the blessings which he had pointed out to them, he approached the confines of old age with the prospect of hardly the average comforts which attended that stage of existence in the humbler walks of society. Touched by his condition, a number of benevolent individuals instituted a subscription in his behalf, and it is creditable to the good feeling of the citizens of Glasgow and other places that a considerable sum was raised. The trustees on the river Clyde also gave him an annuity of £100, which he enjoyed for several years, the half of which sum was continued to his widow. A monument was erected to his memory at Dunglass Point on the Clyde. See Steam Vessels.

BELL, Henry Glassford, Scottish lawyer and author: b. Glasgow 1803; d. 1874. He founded the ‘Edinburgh Literary Journal’ 1828, was admitted to the bar in 1832, became one of the most esteemed Scottish mercantile law¬ yers of his day and sheriff of Lanarkshire 1867-74. He published a spirited defense of Mary Queen of Scots (1830), ‘Summer and Winter Hours’ (1831); ‘My Old Portfolio’ (1832) ; ‘Romances and Minor Poems’ (1866).

BELL, Henry Haywood, American naval

officer: b. North Carolina 1808; d. 11 Jan. 1868. He was appointed a midshipman in 1823, and served on the Gram pas tvhen she was en¬ gaged in clearing the Cuban coast of pirates. For many years he served with the East Indian squadron, and commanded one of the vessels of the squadron which, in November 1856, de-si roved four forts near

Canton, China. Shortlv after the outbreak of the Civil War he became fleet captain of the Western Gulf squadron. He commanded one of the three divisions of the fleet which captured New Orleans. In 1865 he took command of the East India squadron with the rank of commodore; in 1866 was promoted to rear-admiral and, after resigning his com¬ mand, he was drowned at the mouth of the Osaka River, Japan.

BELL, Isaac, American philanthropist: b. New York, 4 Aug. 1814; d. there, 30 Sept. 1897. He began his business life in a banking house when 14 years old, and in 1836 became interested in large financial and other concerns. About this time he began to devote himself to the work of benevolent institutions, and was presi¬ dent of the department of charities and correc¬ tion 1857-73. It was principally through his efforts that the Bellevue Hospital, and also the Bellevue Hospital Medical College, were found¬ ed. In connection with the first institution he established the system of ambulance service. He was also largely instrumental in the estab¬ lishment of the Normal College, and was responsible for the schoolship Mercury, which came under the control of the department of charities and correction, and of the Saint Marys, as well, loaned by the Navy Depart¬ ment to the Department of Education, of which he was also for a long time a member. During the Civil War he was active in raising and dis¬ bursing money for the benefit of New York volunteers, and in aiding soldiers' wives, widows and orphans.

BELL, James, Scottish geographer: b. Jed¬ burgh 1769; d. 1833. After receiving a liberal education he served an apprenticeship to the weaving business, and in 1790 commenced the manufacturing of cotton goods upon a large and respectable scale. In the depression occa¬ sioned by the shock of the French Revolution in 1793, he was reduced to the condition of a common warper; but having relinquished that line of life, he was about the year 1815 engaged to improve the (Glasgow System of Geography,) a work which had met with considerable en¬ couragement, and was now, chiefly by the

labors of Mr. Bell, extended to five volumes. It was well received by the public, and formed the basis of his principal work, (A System of Popular and Scientific Geography, ‘ published at Glas¬ gow in 1830 in six volumes. His annotated edition of (Rollins’- Ancient History’ (1828), was a notable piece of work. His (Gazetteer of England and Wales’ was in the course of publication at the time of his death.

BELL, James, Canadian physician : b. North Gower, Ontario, 10 Oct. 1852; d. 11 April 1911. He was graduated at McGill University in 1877; became house surgeon of the Montreal General Hospital the same year, and medical superintendent of it in 1881. In 1885 he be¬ came a member of the hospital staff as assist¬ ant surgeon, and in 1886 full surgeon. In 1894 he was made consulting surgeon to the General Hospital, surgeon of the Royal Victoria Hos¬ pital of Montreal, and professor of clinical surgery in McGill University.

BELL, James Franklin, American soldier: b. Shelbyville, Ky., 9 Jan. 1856; d. 8 Jan. 1919. He was graduated at the West Point Academy 1878; he was appointed additional second lieu¬ tenant, 14 June 1878; second lieutenant, 28 June 1878; transferred to 7th Cavalry, 9 Aug. 1878; first lieutenant 1890; major of Engineers, United States Volunteers, 1898; captain, United States army, 2 March 1899; major, assistant adjutant-general, United States Volunteers, 17 April 1899; colonel of 36th Volunteer Infantry, 5 July 1899; brigadier-general of volunteers, 5 Dec. 1899; brigadier-general, United States army, 19 Feb. 1901 ; major-general, 3 Jan. 1907.

He served on plains in 7th United States Cav¬ alry, 1878-94; captured band of half-breed Cree Indians, near Fort Buford, S. D., 1883; in Sioux campaign, Pine Ridge, S. D., 1891; adjutant of regiment and secretary to the Cavalry and Light Artillery School 1891-94; aide to Gen. J. W. Forsyth in California, Arizona and Washing¬ ton; was awarded Congressional Medal of Honor, 27 Nov. 1899, (<for most distinguished gallantry in action, 9 Sept. 1899, near Porac, Luzon, P. I.” ; commanded 4th brigade, second division, 8th Army Corps, and third district, department of northern Luzon, to July 1900; provost marshal-general of Manila, P. I., to Feb. 1901 ; commanded first district, depart¬ ment of northern Luzon, to November 1901, and third brigade, department of southern Luzon to December 1902 ; returned to the United States in 1903; commandant of Infantry and Cavalry School, Signal School and Staff College to April 1906; chief of staff, United States army, April 1906 — April 1910 ; com¬ mander of the Philippines Division, January 1911 — April 1914. Ass’.gned to

command of mobilized second division, United States army, May 1914, which he commanded until demobil¬ ized in October 1915, then assigned to command Western department, with headquarters at San Francisco, December 1915. In 1917 Major-General Bell was placed in charge of the 77th Division of the New National Army, consisting of draft quotas from New York city and State, at Camp Upton, Yaphank, Long Island.

BELL, James Montgomery, American sol¬ dier: b. Williamsburg, Pa., 1 Oct. 1837; d. 17 Sept. 1919. He entered the 86th Ohio Infantry, and served throughout the Civil War, being twice brevetted for gallant and meritorious services in the battles of the Wilderness and Ream's Station, Va. Entering the regular army as second lieutenant in 7th Cavalry, 1866, he took part in the Cheyenne and Arapahoe war, 1867-69; the Sioux wars, 1876-81, and the Nez Perces war, 1877. Lie received a brevet-com¬ mission of lieutenant-colonel for gallant services in action against the Indians at Canon Creek, Mont., 13 Sept. 1877. He commanded Bell's expeditionary brigade to the Camarines prov¬ inces, southern Luzon, 1900-01, and was ap¬ pointed brigadier-general of volunteers, 20 Jan. 1900; was appointed brigadier-general, United States army, 17 Sept. 1901, and retired, 1 Oct.

BELL, John, Scottish traveler : b. Anter-mony, Stirlingshire, 1691 ; d. there, 1 July 1780. Having gone to Saint Petersburg in 1714, after the completion of his studies, he was sent as med¬ ical attendant on an embassy to the Sophy of Per¬ sia. On his return from Persia to the Russian capital in 1718 he found another embassy pre¬ paring to set out for China and obtained an appointment in it also. The embassy arrived at Pekin ((after a tedious journey of exactly 16 months," and returned in January 1722. The Tsar now determined to undertake an expedi¬ tion into Persia to assist the Sophy against the Afghans, his subjects, who had seized Kanda¬ har and possessed themselves of several prov¬ inces on the frontiers toward India. Bell's former journey to Persia gave him peculiar advantages and he was accordingly engaged to accompany the army to Derbend. In 1 7 37 he was sent to Constantinople by the Russian

chancellor and the British Minister at the Rus¬ sian court. He afterward settled at Constanti¬ nople as a merchant, and about 1746 married a Russian lady and returned to Scotland. The only work written by him is his 'Travels from Saint Petersburg in Russia to Various Parts of Asia5 (1763).

BELL, John, Scottish surgeon : b. Edin¬ burgh, 12 May 1763; d. Rome, 15 April 1820. He was a brother of Sir Charles and George Joseph Bell, and after completing his profes¬ sional education traveled for a short time in Russia and the north of Europe, and on his return began to deliver lectures on surgery and midwifery. These lectures, delivered between 1786 and 1796, were very highly esteemed and speedily brought him into practice as a consult¬ ing and operating surgeon. The increase of his private practice, indeed, rendered it necessary for him, in 1796, to discontinue his lectures, and from that time forward he devoted himself to his patients and to the preparation of the sev¬ eral publications of which he was the author. Patients came to him

from all quarters, both of Scotland and England, and even from the Con¬ tinent; and during that interval he performed some of the most delicate and difficult opera¬ tions in surgery. The exclusion of visiting surgeons from Edinburgh infirmary led to an acrimonious controversy between Bell and Pro¬ fessor Gregory. Early in 1816 he was thrown by a spirited horse and never entirely recov¬ ered from the effects of the accident. He was the author of 'The Anatomy of the Human Body5 (1793-1802; 3d ed., with plates by Charles Bell, 1811) ; 'Engravings of the Bones, Muscles and Joints,5 illustrating the first vol¬ ume of the 'Anatomy of the Human Body,5 drawn and engraved by himself (1794, 3d ed.) ; 'Engravings of the Arteries,5 illustrat¬ ing the second volume of the 'Anatomy of the Human Body5 (1801) ; 'Discourses on the Na¬ ture and Cure of Wounds5 (1795) ; 'The Prin¬ ciples of Surgery5 (1801-08).

BELL, John, American statesman : b. near Nashville, Tenn., 15 Feb. 1797; d. Cumberland Iron Works, Tenn., 10 Sept. 1869. Grad¬ uating at Cumberland College (now University of Nashville) in 1814, he practised law until 1827, when he was elected to Congress from 1827 — 41 ; he then became Secretary of War in President Harrison's Cabinet, but resigned when President Tyler withdrew from the Whig party. From 1847 to 1859 he was senator from his State. He was chairman of several im¬ portant committees and vigorously opposed the Kansas-Nebraska bill and the Lecompton Con¬ stitution framed for Kansas. In May 1860 he was nominated for President by the Constitu¬ tional Union party (q.v.), but was defeated. During the Civil War he took no active part in politics.

BELL, John, English sculptor: b. Hopton, Suffolk, 1811; d. 25 March 1895. His best-known works are the 'Eagle Slayer,5 'Una and the Lion,5 'The Maid of Saragossa,5 'Imo¬ gen,5 'Andromeda,5 'The Wounded Clorinda5 ; statues of Lord Falkland, Sir Robert Walpole, Newton, Cromwell, etc., and the Wellington Memorial in the Guildhall. He was one of the sculptors of the Guards' Monument in Water¬ loo Place, London, and the marble group of

the United States directing the progress of America for the Albert Memorial in Hyde Park, a replica of which in terra cotta is in Washington. His earlier works were notable in their departure from the frigid classicism that had up to then hampered expression in English sculpture, but his later works were marred by an obtrusive religiosity.

BELL, John Joy, Scottish author : b. 7 May 1871. He was educated at Ivelvinside Academy, Morrison's Academy, Grieff and Glasgow University. His first novel, 'New Noah's Ark,5 was published in 1898; but it was not until 1902 that he made a great popular hit with a series of sketches of humble life, 'Wee Macgreegor,5 in which the broad Glasgow dialect was effectively employed, the hero tak¬ ing his place at once among the notable crea¬ tions of Scottish fiction. The story was dramatized in 1912. 'Wee Macgreegor Again5 (1904) ; 'Wee Macgreegor Enlists5 (1915), are continuations of the series and in the same vein of dialect fiction are 'Mistress M'Leerie5 (1903); 'Oh Christina5 (1909); 'Coortin' Christina5 (1913) and 'Mr. Pennycook's Boy5 (1905). He is also author of 'Clyde Songs5 (1906-11); 'A Kingdom of Dreams5 (1914), *etc.*

BELL, John Keble (Keble Howard) : Eng¬ lish playwright and novelist: b. 8 June 1875. He was educated at Worcester College, Ox¬ ford, was editor of 'The Sketch5 (1902-04); and founded the Croydon Repertory Theatre in 1913. He is the author of some 10 plays and his output in fiction has been considerable.

BELL, Joseph, Scottish surgeon and diag¬ nostician: b. Edinburgh 1837; d. Milton Bridge, Midlothian, 4 Oct. 1911. His father, grand¬ father and great-grandfather had been surgeons before him. W hile his father was president of the Royal College of Surgeons he was elected a fellow of the college. Upon his father's death he succeeded him in-that high and im¬ portant office. W hile a medical student at the Edinburgh University Sir Arthur Conan Doyle became so impressed by the successful deductive powers of Dr. Bell, from what appeared to be minute details in diagnosis and prognosis, that he became the prototvpe of the former's ro¬ mantic detective hero "Sherlock Holmes.55

BELL, Lilian. American novelist: b. Chi¬ cago. Ill., 1867. She began to write at the age of eight and afterward became widely known as a contributor to periodicals. In 1900 she was married to Arthur Hoyt Bogue, but con¬ tinues to write under her maiden name. Her writings include 'The Love Affairs of an Old Maid' (1893); 'A Little Sister to the Wilder¬ ness5 (1895); 'The Under Side of Things5 (1896) ; 'From a Girl's Point of View5 (1897) ; 'The Instinct of Stepfatherhood5 (1898); 'As Seen by Me5 (1900); 'The Expatriates5 (1900); 'Yessum5 (1901); 'Abroad With the Jimmies5 (1902); 'Hope Loring5 (1902); 'Sir John and the American Girl5 (1901) ; 'The In¬ terference of Patricia5 (1903); 'A Book of Girls5 (1903) ; 'At Home with the Jardines5 (1904); 'Carolina Lee5 (1906); 'Why Men Remain Bachelors, and Other Luxuries5 (1906); 'Concentrations of Bee5 (1909); 'Angela's

Quest5 (1910); ‘The Runaway Equator5 (1912) ; ‘The Story of the Christmas Ship5

(1915); (About Miss Mattie Morningglory 5 (1916) ; (The Land of Don’t-Want-To5 (1916).

BELL, Robert, I rish journalist and miscel¬ laneous writer: b. Cork, 16 Jan. 1800; d. Lon¬ don, 12 April 1867. He settled in London in 1828, edited an important weekly paper, the Atlas, for several years, and afterward the Monthly Chronicle , Mirror and Home News. He compiled several volumes of Gard¬ ner’s Cabinet Cyclop3edia) ; wrote three plays, (The Ladder of Gold,5 a novel (1856) ; (Hearts and Altar,5 a collection of tales (1852), and did a great deal of miscellaneous literary work; but is best known by his annotated edition of the (British Poets5 (29 vols., 1854—57).

BELL, Robert, Canadian geologist: b. To¬ ronto, Ontario, 3 June 1841. He was educated at McGill and Queen’s universities, and in 1867 joined the Canada Geological Survey, and in 1900 was an assistant director of it. In 1861 he was elected a member of the American Insti¬ tute of Mining Engineers ; in 1881 became a fellow of the Royal Society of Canada, and in 1888-89 was a member of the Ontario com¬ mission which reported on the mineral re¬ sources of that province. During his connec¬ tion with the geological survey he made more extensive explorations throughout the Dominion than any other man. He was the author of about 130 reports and papers, a list of which is found in the (Biblio of the Royal Society.5

BELL, Thomas, English zoologist: b. Poole, Dorset, 1792; d. Selborne, Hampshire, 1880. He studied medicine at Guy’s and Saint Thomas’ hospitals, London, became a member of the Royal College of Surgeons in 1815 and soon secured a large practice as a dentist. In 1832 he was appointed professor of zoology at King’s College, London. Latterly he lived for a number of years at Selborne in the residence that had belonged to the celebrated Gilbert White. He was president of the Ray Society 1843-59, and of the Linnean Society 1853-61. His best-known

separate works are his his¬ tories of (British Quadrupeds5 (1837, revised 1874) ; (British Reptiles5 (1839) ; and (Britfsh Stalk-eyed Crustacea5 (1853). In 1877 he pub¬ lished an excellent edition of White's (Natural History of Selborne5 with a memoir of its author.

BELL, a hollow vessel, which, by its vibra¬ tions when struck, gives forth sounds ; whence its name, from the old Saxon word bellan, to bawl or bellow. It is an instrument of great antiquity, being spoken of by Hebrew writers, as in Exodus xxviii, where golden bells are pre¬ scribed as appendages to the dress of the high priest, that notice may thus be given of his approach to the sanctuary. And at this day the bell is used for a similar purpose before the priest, in Roman Catholic countries, as he pro¬ ceeds to administer the Holy Viaticum to the soul that is passing away ; and so when the bell is tinkled, in administering the sacrament, by the same priest, it is in pursuance of a cus¬ tom founded on the ancient Hebrew use of the bell. More intimately than any other instru¬ ment are bells associated with the religious and imaginative, as also with the most joyous and the saddest feelings of mankind. The metal from which bells are usually made (by found¬ ing), is an alloy, called bell-metal, commonly

composed of 80 parts of copper and 20 of tin. The proportion of tin varies, however, from one-third to one-fifth of the weight of the cop¬ per, according to the sound required, the size of the bell and the impulse to be given. The clearness and richness of the tone depend upon the metal used, the perfection of its casting, and also upon its shape ; it having been shown by a number of experiments that the well-known shape with a thick lip is the best adapted to give a perfect sound. The depth of the tone of a bell increases in proportion to its size. A bell is divided into the body or barrel, the ear or cannon, and the clapper or tongue. The lip or sound bow is that part where the bell is struck by the clapper.

The sound of a bell is a compound tone, pre¬ senting five and in many instances more notes to the ear. There is a great difference between the harmonics of a bell and of a vibrating string. In the case of the former a minor third is not infrequently one of the loudest tones next to the fundamental tone. When a bell is properly struck the first note which attracts the atten¬ tion of the ear is known as the strike note, tap note or fundamental, and forms what is called (<the55 note of the bell. The low sound heard after the strike note has lost its intensity is called the hum note, and the octave above the strike note the nominal. There are also present a minor third and a perfect fifth in the

first octave, and a major third and a perfect fifth in the second octave. Very few bells agree with these conditions. Generally the hum note is a sixth or seventh, and in rare cases a ninth below the strike note. The nominal is some¬ where about an octave or a ninth above the strike note, and the other notes diverge accord¬ ingly. Bells that are swung are more likely to conform to the conditions than those that are struck.

Bells were used very early in the form of cymbals and hand bells in religious services. In Egypt the feast of Osiris was announced through the ringing of bells. Bronze bells have been found in Assyria. Bells of gold were worn by Aaron and the high priests of the Jews on the border of their robes, and in Athens the priests of Cybele used them in their offerings. The Romans also used bells which they called tintinabula, to announce the public assemblies, and, according to Suetonius, Augustus had a bell suspended before the temple of Jupiter. In the Christian churches a similar custom early came into use, though it is not known that in the first Christian churches divine service was announced by any such method. They were used, however, in the early monasteries to announce the hours of prayer. Generally they were made of tubes struck with a hammer. They are said to have been first introduced into Christian churches about 400 a.d., by Paulinus, bishop of Nola in Campania (whence campana and nola as old names of bells) ; although their adoption on a wide scale does not become apparent until after the year 550, when they were introduced into France. They are rung to summon monks and choir nuns to the office, and the people to mass, to announce the Ange-lus, to toll during funerals and peal on occa¬ sions of joy. They are blessed with elaborate ceremonies and consecrated or (<baptized>5 in honor of some saint.

Until the 13th century they were of com¬ paratively small size, but after the casting of the Jacqueline of Paris (6 54 tons) in 1400, their weight rapidly increased. Among the more famous bells are the bell of Cologne, 11 tons, 1448 ; of Dantzic, 6 tons, 1453 ; of Halber-stadt,

7p2, 1457 ; of Rouen, 16, 1501 ; of Bres¬ lau, 11, 1507; of Lucerne, 754, 1636; of Oxford, 7(4, 1680; of Paris, 12%, 1680; of Bruges, 1014, 1680; of Vienna, 1 7J4, 1711; of Moscow (the monarch of all bells), 193, 1736; three other bells at Moscow ranging from 16 to 31 tons, and a fourth of 80 tons, cast in 1819 ; the bell of Lincoln (Great Tom), 554, 1834; of York Minster (Great Peter), 10J4, 1845; of Montreal, 1354, 1847; of Westminster (Big Ben), 1554, 1856; Saint Stephen, 1 354, 1858; the great bell of Saint Paul's, 1 754, 1882. Oth¬ ers are the bells of Ghent, 5; Gorlitz, 10)4; Saint Peter's, Rome, 8; Antwerp, 7) 4; Olmiitz, 18; Brussels, 7; Novgorod, 31; Pekin, 5354. (See Bells; Chimes). Consult Gatty, (The Bell: Its Origin and Uses) (1848); Lukis, (Church Bells and Their Founders) (1857) ; Andrews, (History of Church Bells) (1885) ; Otte, (Glockenkunde) (1884); Tyack, (A Book About Bells> (1899).

BELL, Liberty, the bell in Independence Hall, Philadelphia, that was rung to announce the adoption of the Declaration of Independence by the Continental Congress. The bell was cast in London by Robert Charles and cost about $500. The specifications provided that it was to be made by the best workmen, to be examined carefully before being shipped and to contain, in well-shaped letters around it, the inscription : <(By order of the Province of Pennsylvania, for the State House in the City of Philadelphia, 1752.)) An order was given to place underneath this the prophetic words from Leviticus xxv, 10: <(Proclaim liberty throughout the land and to all the inhabitants thereof.® The reason for the selection of this text has been a subject of much conjecture, but the true reason is apparent when the full text is read. It is as follows : ((And ye shall hallow the 50th year and pro¬ claim liberty throughout the land and to all the inhabitants thereof.® In selecting the text the Quakers had in memory the arrival of Wil¬ liam Penn and their forefathers more than half a century before. In August 1752, the bell ar¬ rived, but though in apparent good order, it was cracked by a stroke of the clapper while being tested. It could not be sent back as the captain of the vessel who had brought it over could not take it on board. Two skilful men undertook to recast the bell, a bell being pro¬ vided which pleased very much. But it was found to be defective also. The original bell was considered too high in tone, and in an attempt to correct this fault, too much copper was added. There were a great many witticisms on account of the sound failure, and ingen¬ ious workmen undertook to recast the bell, which they successfully did, and it was placed in condition in June 1753. On Monday, 8 July (not the 4th), at noon, true to its motto, it rang out the memorable message of ((Liberty throughout the land and to all the inhabitants thereof.® For years the bell continued to be rung on every

festival and anniversary, until it eventually cracked 8 July 1835, while being tolled in memory of Chief Justice Marshall.

An ineffectual attempt was made to cause it to continue serviceable by enlarging the cause of its dissonance and clipping the edges. It was re¬ moved from its position in the tower to a lower story, and only used on occasions of public sorrow. Subsequently, it was placed on the original timbers in the vestibule of Inde¬ pendence Hall, and in 1873 was suspended in a prominent position immediately beneath where a larger bell, presented to the city in 1866, now proclaims the passing hours. In 1893 it was taken to Chicago and placed on exhibition at the World's Columbian Exposition. In 1915 it was taken to the Panama-Pacific Exposition at San Francisco and placed on exhibition.

BELL, Song of the ((Lied von der GlockeQ, a poem which is generally considered Schiller's masterpiece. It was first published in the Musenalmanach, in 1800. In this work the various operations attending the casting of the bell are made to symbolize the whole course of human life.

BELL-BIRD, the name given to birds in various parts of the world, which utter bell-like notes; especially the (<campanero® (Chasmorhyn - elms niveus), one of the chatterers of the South American family, Cotingidce. It resembles, in form and size, the North American waxwing, but is pure white, and has a remarkable ap¬ pendage upon its forehead. This consists of a fleshy, tapering caruncle, which is black, thinly covered with star-like tufts of minute feathers. This caruncle ordinarily hangs loosely down at the side of the beak, but in moments of excitement becomes swollen and much extended, reaching a length of even five inches. This seems to be produced by air forced into its elastic tissues from the bird's lungs, and occurs whenever the characteristic notes are uttered. The bird's voice has been described by many travelers as like the sound of a loud, clear bell, which rings out over the forest at mid-day, when most other birds are silent. Waterton said: <(You hear his toll and then a pause for a minute, then another toll, and then a pause again, and then another toll, and so on.® Others have compared the sound to a blow upon an anvil, and all agree that it can be heard a great distance. Several other species exist in cen¬ tral and southern South America, all of which have caruncles, and utter extraordinary, ring¬ ing notes ; but the former belief, that the loud voice was aided by these hollow appendages, is now known to be erroneous. These birds go about in small flocks, which flit through the tree-tops, and feed mainly upon

forest fruits. They have been particularly studied by J. J. Quelch, a naturalist of British Guiana, an account of whose interesting investigations will be found in The Field of London, for 26 Nov.

1892.

In Australia, the name ((bell-bird® is given to one of the honey-suckers (q.v.), whose ching-ching is welcomed by travelers in the forest as an indication that water is near. The (<bell-bird® of New Zealand is another honeysucker (Anthornis melanura), whose voice, usually heard in chorus, resembles the tinkling of a silver bell.

BELL, BOOK, and CANDLE, a mode of excommunication employed in the Roman Catholic Church between the 7th and 10th cen-

furies. After sentence read, the book is closed, a lighted candle thrown to the ground, and a bell tolled as for one dead.

BELL-FLOWER. See Campanula.

BELL ROCK, or INCH CAPE, a danger¬ ous reef of sunken sandstone rocks on the east coast of Scotland, about 12 miles from Ar¬ broath, opposite the mouth of the Tay. It is about 700 yards long and at certain tides a great part of it is uncovered, and directly in the way of vessels making for the firths of Forth and Tay. The Inch Cape or Bell Rock reef was long the terror of seamen, and on it numerous vessels were wrecked. At a very early period the Inch Cape Rock was unhappily too well known, and tradition has it that one of the abbots of Aberbrothock succeeded in plac¬ ing a bell upon it (hence the name), in such a way as to be rung by the motion of the waves, to warn sailors of its proximity. The legend tells us that a notorious Dutch sea pirate cut the bell from the rock, and on returning with his ship laden with spoils from one of his piratical ex¬ peditions, he and his crew perished, as an old historian has it, ((by the righteous judgment of God,w for want of the signal which he had so wantonly removed. On this legend Southey has founded his well-known ballad of (The Inch Cape RockP The lighthouse on the rock was designed by Robert Stevenson in 1800. It was erected in 1810 and is 100 feet high.

BELL-SMITH, Frederic Marlett, English artist : b. London, 26 Sept. 1846. He went to Canada in 1866 and was for seven years art director at Alma College, Saint Thomas, and teacher of drawing in the public schools of London, Ontario. About 1888 he became a por¬ trait and figure painter, but he is best known as a painter of landscapes. In 1894 he produced 'Lights of a City Street, } his greatest achieve¬ ment up to that year, and later two canvases depicting incidents connected with the death of Sir John Thompson. He is president of the Ontario Societv of Artists.

BELLA GIARDINIERA, bella-zhar-de-nara, La, a celebrated painting by Raphael, now in the Louvre. It represents the Madonna with the holy child, and the infant Saint John.

BELLADONNA, or DWALE, Deadly Nightshade (Atropa belladonna) , a perennial disagreeable-smelling herb of the Solanacece family, is a native of the region from southern Europe to India, but widely naturalized in civilized countries. It is an erect plant which sometimes attains a height of six feet; has en¬ tire, ovate leaves, purple, bell-shaped, nodding axillary flowers, single or in pairs, and shining, black, sweetish berries as large as large currants. The plant has long been reputed poisonous but is used in medicine, especially by oculists, be¬ cause of its property of dilating the pupil of the eye. It is said to derive its name, belladonna (((beautiful lady®), from its use as a cosmetic tor distending the pupil and giving the eye a bright glistening appearance and also from the use of the juice for staining the skin. Its names, deadly night shade, and dwale (which latter is believed by some to come from the same source as the French deuil, sorrow, and by others form the Anglo-Saxon dull, because of its stupefying effects), refer to popular belief in the plant's poisonous properties. The generic name

came from Atropos, the fate who cut the thread of life.

BELLADONNA LILY. See Amarylli—

I/ACEˆE.

BELLAIRE, bel-lar', Ohio, city in Belmont County, on the Ohio River, and several rail¬ roads, five miles south of Wheeling, W. Va. The river is here crossed by a costly iron rail¬ road bridge. Bellaire is the centre of a region rich in coal, iron, cement, brick, clay and lime¬ stone, and has manufactories of stoves, glass, carriages, boilers and foundry and

machine shop products. The United States census of manufactures for 1914 reported 40 industrial establishments, employing 2,865 persons, of whom 2,603 were wage earners who receive an¬ nually $1,566,000 in wages. The capital invested aggregated $7,671,000, and the value of the year's output was $9,278,000; of this, $2,892,000 is the value added by manufacture. Bellaire adopted the Federal plan of government in 1910, and owns its waterworks. The city has a national bank, high-grade educational in¬ stitutions, daily and weekly newspapers, and an assessed property valuation of over 3,000,- 000. Pop. (1910) 12,946; (1920) 15,061.

BELLAMONT, or BELLOMONT, Rich¬ ard Coote (Earl of), royal governor of New York and Massachusetts: b. 1636; d. New York,

5 March 1701. He was returned to Parliament for Droitwich in 1688, was a strong supporter of William III, was raised to the earldom of Bellamont in the peerage of Ireland 1689, and continued to hold his seat in the Commons. He was appointed governor of New York and Massachusetts in May 1695, but did not arrive in New York until May 1698. His administration was uneventful, his time having been occupied in the pursuit of the pirates who infested the coast, one of whom, the notorious Kidd, he had assisted in fitting out for the suppression of illicit trade and piracy, but whom he ultimately secured and sent to England in 1700. He was disliked by the aristocratic party in New York, but was very popular in New Hampshire and Massachusetts and distinguished by an (<honorable sympathy for public freedom.® Hutchinson speaks of Bellamont as being a hypocrite in a pretended devotion to religion. It appears, however, that while living at Fort George, in New York, he passed much time in meditation and contrition for his youthful ex¬ cesses. Consult De Peyster, (Life and Ad¬ ministration of Richard, Earl of BellamonC

(1869).

BELLAMY, Edward, American author: b.

Chicopee Falls, Mass., 29 March 1850; d. there, 22 May 1898. He was educated in Germany; admitted to the bar; was on the staff of the Evening Post of New York in 1871-72; and on. his return from the Sandwich Islands in 1877, founded the Springfield News. He is best known by his novel (Looking Backward' (1888), a socialistic work, of which an im¬ mense number of copies were sold in two years. This led to the formation of Nationalist clubs, in which work Mr. Bellamy

took active part. His other books are (Six to One: a Nantucket IdyP (1878) ; (Dr. Heidenhoff's Process) (1880); (Miss Ludington's Sister) (1884); <Equality) (1897) ; (The Duke of Stockbridge) (1901), a sequel to (Looking Backward.*

BELLAMY, Joseph, American clergyman and educator: b. North Cheshire, Conn., 20 Feb. 1719; d. 6 March 1790. In 1740 he became pas¬ tor of the church in Bethlehem, Conn., where he remained until his death. About 1742 he established a divinity school, in which many celebrated clergymen were trained. Among his published works, besides his (Sermons, > are (True Religion Delineated) (1750) ; (The Nature and Glory of the Gospel > (1762),

and (The HalfWay Covenant (1769). An edition of his (Complete Works) appeared (3 vols., New York 1811-12; new ed. with Memoir by Dr. Tryon Edwards, 2 vols., Boston 1850).

BELLAMY, Samuel, a notorious pirate, was wrecked in his ship, the Whidah, of 23 guns and 130 men, off Wellfleet, on Cape Cod, in April 1717, after having captured several vessels on the coast and an indecisive engage¬ ment with a French ship proceeding to Quebec. Only one Indian and one Englishman escaped of his crew. Six of the pirates, who had been run ashore when drunk a few days previous, by the captain of the captured vessel, were hung in Boston in November 1717.

BELLANGE, bel-lan-zha, Hippolyte, French painter: b. Paris 1800; d. 1866. Atten¬ tion was first directed to him by his painting of (The Return of Napoleon from ElbaP ex¬ hibited in 1834. He was director of the mus¬ eum at Rouen, 1837-53. Among his many noted battle pieces are (Battle of Wagram' (1837); (Kellerman's Charge at Marengo) (1847) ; (Battle of the Alma* (1855) ; As¬ sault on MalakofP (1859); (Cuirassiers at Waterloo> (1865); (The Guard Dies) (1866).

BELLARMINO, bel-lar-me'no, or BEL-LARMINE, Roberto Francesco

Romolo,

Italian cardinal and controversialist: b. Monte Pulciano in Tuscany, 4 Oct. 1542; d. Rome, 17 Sept. 1621. At the age of 18 he entered the College of Jesuits, where he soon distinguished himself ; and his reputation caused him to be sent into the Low Countries to oppose the prog¬ ress of the reformers. He was ordained in 1569 by Jansenius, bishop of Ghent, and placed in the theological chair of the University of Louvain. After a residence of seven years he returned to Italy, and was sent by Sixtus V to France, as companion to the legate. He was made a cardinal on account of his learning, by Clement VIII, and in 1602 created archbishop of Capua. At the elections of Leo XI and Paul V he was thought of for the pontificate, and might have been chosen had he not been a Jesuit. Paul V recalled him to Rome; Bel-larmino had the double merit with the court of Rome of supporting her temporal power and spiritual supremacy to the utmost, and of strenuously opposing the reformers. The talent lie displayed in the latter controversy called forth similar ability on the Protestant side; and for a number of years no eminent divine among the reformers failed to make his arguments a particular subject of refutation. The great work which he composed in this warfare is entitled Body of Controversy,* written in Latin, the style of which is perspicuous and precise, without any pretension to purity or elegance. He displays a vast amount of Scrip¬ tural learning, and is deeply versed in the doc¬ trine and practice of the Church in all ages.

His maxims on the right of pontiffs to depose princes caused his work on the temporal power of the Popes to be condemned at Paris. On the other hand, it did not satisfy the court of Rome, because it asserted, not a direct, but an indirect, power in the Popes in temporal mat¬ ters; which reservation so offended Sixtus V, that he placed it among the list of prohibited books. His controversial works were published at Prague in 1721, and again at Mayence in 1842. Of his other works the most important is his (Christianae Doctrinae Applicatio* (1603) — a work originally composed in Italian, but since translated into all European languages. He left an autobiography, which was reissued and annotated by Dollinger and Reusch (1887).

BELLARY, bel-la’re, or BALLARI, India,

town in the presidency of Madras, capital of a district of the same name, 280 miles northwest of Madras. It is the headquarters of the troops belonging to the districts of Bellary and Kada-pah, is connected

by good roads with Belgaum, Bangalore, Hyderabad and Madras, and pos¬ sesses two forts, one built on the summit, and the other on a lower eminence of a huge granite rock about two miles in circumference, and ris¬ ing to the height of about 450 feet from the ground. Bellary is the terminus of a branch line of the Madras Railway, and carries on an active trade in cotton. Pop. (1911) 58,247.

BELLAVITIS, bel-la-ve'tis, Giusto, Count, Italian mathematician: b. Bassano, 22 Nov. 1803; d. 6 Nov. 1880. In 1841 he became pro¬ fessor of mathematics at the Institute of Vicenza. Four years later he was appointed professor of geometry at Padua, later having algebra added to this subject. His writings include important contributions to modern geometry, especially in the field of projective geometry. His chief works are a series of textbooks on geometry (Padua 1851), a work on analytical geometry (Padua 1870) and a work on algebra (Padua 1875).

BELLA Y, be-la, Joachim du, French poet, known as the French Ovid: b. about 1524; d. 1560. He joined Ronsard, Daurat, Jodelle, Belleau, Baif and De Tisard in forming the <(Pleiade,** a society the object of which was to bring the French language on a level with the classical tongues. Bellay's first contribution was (La defense et l'illustration de la langue frangaise.* His chief publications in verse are (Recueil de poesie* ; a collection of love-son¬ nets called (L'01ive* ; (Les antiquites de RomeJ a series of sonnets; (Les regrets*; and (Les jeux rustiques.* His poems are strongly per¬ sonal in tone, and they are suffused with plain¬ tive melancholy. In 1555 he became canon of Notre Dame, and a short time before his death he was nominated archbishop of Bordeaux. A statue of Bellay was unveiled in Ancenis in 1894. Spencer translated some of his Roman sonnets into English; and there are transla¬ tions of poems by him in Andrew Lang's bal¬ lads and Lyrics of Old FranceP Consult <Life* by Seche (Paris 1880): Pater, (Studies in the flistory of the Renaissance* (London 1888). His letters, edited by Nolbae, appeared in 1883.

BELLE-ALLIANCE, bel-a-le-ans, La, a farm. 13 miles south of Brussels, famous as position occupied by the centre of dm French army in the battle of Waterloo, 18 June 1815.

By the Prussians the battle was called that of Belle-Alliance.

BELLE CHOCOLATI&RE, bel-sho-ko*- la-tyar, La, a noted portrait by the artist Liotard of the Princess Dietrichstein, who, prior to her marriage, was a waitress in a cafe in \ ienna. The painting is now in the Dresden Gallery.

BELLE ISLE, Va., an island in the James River, opposite Richmond, where nearly 12,000 Federal prisoners were confined in 1863.

BELLEISLE, bel-el, or BELLEISLE- EN-MER (anciently Vindilis), an island in the Bay of Biscay, belonging to France, in the department of Morbihan, eight miles south of Quiberon Point, about 11 miles long, and 6 miles across at the widest point. The soil is diverse, consisting of rock, salt marsh and fertile grounds. Palais is the capital. The island is of much interest historically. In 1747 the French fleet was defeated by Admiral Hawke off the island, and it was captured by the English in 1761. Pilchard and sardine fish¬ ing is the important industry. Pop. 10,000.

BELLE ISLE, North, or BELLE ISLE,

an island, 15 miles north of Newfoundland and northeast of the Gulf of Saint Lawrence, about 21 miles in circuit. On the northwest side it has a small harbor, called Lark Harbor, within a little island close to the shore. At the eastern point it has another small harbor or cove that will admit only fishing shallops. A rescue station has been established for persons who may be shipwrecked. Its area is about 15 square miles. At its southern end is a light¬ house whose light is 470 feet above the sea, and visible for 28 miles. The narrow channel be¬ tween Newfoundland and the coast of Labrador is called the Straits of Belle Isle. Steamers from Glasgow and Liverpool to the Saint Law¬ rence commonly go by this channel in summer as being the shortest route; in winter and spring it is choked with ice. Jacques Cartier passed through it in 1534.

BELLE PLAINE, Iowa, town in Benton County, on the Iowa River and the Chicago and Northwestern Railroad, 90 miles northeast of Des Moines, and 257 miles west of Chicago. It has flouring mills, furniture factories, cream¬ eries, machine shops, broom factories, a brick and tile factory, a brass foundry, a cannery and numerous artesian wells. It was founded in 1862 and wras first incorporated in 1879. Pop.

(1920) 3,867.

BELLE SA.VAGE (Fr. Belle Sauvage, beautiful savage), an old inn, on Ludgate Hill, London, celebrated in coaching days, and fre¬ quently mentioned by Dickens and other writers dealing with that period. It was built around a court, and was admirably suited for an ex¬ temporized stage, it being possible to view the performance from the gallery above.

BELLEAU, be-lo-, Remy, French poet: b. Nogent-le-Rotrou 1528; d. Paris, 16 March 1577. He made an -elegant and spirited trans¬ lation of (The Odes of Anacreon* (1576). His <Bergerie) (1572), a compound of prose and verse; is of unequal merit ; but it contains some passages, — for example, the <(April,)} — which are of great beauty. His collected works are published (3 vols., 1867; 2d ed., 2 vols.. 1879).

BELLEEK CHINA, a porcelain of very high quality distinguished by its iridescence, obtained by means ol metallic washes, which are subsequently fired. It was invented by Brian-chon, a Frenchman, in 1857. It was' at first manufactured in England and France, but it became famous after a manufactory had been established in Belleek, Ireland, whence it de¬ rived its name.

BELLEFONTAINE, Ohio, city and county-seat of Logan County, on the Cleveland. C., C. & St. L., the Toledo & O. C. and the Ohio Electric railroads, four miles northwest of Columbus and 57 miles northeast of Dayton. It occupies the highest elevation in the State; and is surrounded by an agricultural region. It has extensive carshops and other railroad works ; manufactures of iron and steel bridges, carriage and automobile bodies, tools, mat¬ tresses, harness, shoe blacking, flour and cem¬ ent ; two national banks ; daily and weekly newspapers; an assessed property valuation of $2,250,000. The Lewiston reservoir, with an area of 13,400 acres and a holding capacity of 4,500,000,000 cubic feet, is situated about eight miles from Bellefontaine. The city was settled in 1818. The government is vested in a mayor, elected biennially, two directors, ap¬ pointed by him, and a city council. An ad¬ ministrative board of education is elected by the people. The waterworks, gas and electric-light works

and sewage system are owned and operated by the city. Pop. (1920) 9,336.

BELLEFONTE, Pa., borough and county-seat of Centre County, 87 miles northwest of Harrisburg, on the Pennsylvania Railroad. It has important lime quarries, iron furnaces, glass works, manufactories and machine shops, and was incorporated in 1800. There is a soldiers and sailors' monument and a statue has been erected to Gov. A. G. Curtin. The borough is governed by a chief burgess, elected for three years, and nine councilmen. The State penitentiary is .located at four miles distance from Bellefonte. Bellefonte is a summer resort much visited for its scenery and noted for its spring, whose waters have supplied the borough since 1807. Pop. (1920) 3,996.

BELLEGARDE, bel'gard', Henri (Comte de), Austrian general and statesman: b. Dres¬ den, 28 Aug. 1756; d. Vienna, 22 July 1845. After spending some time in the army of Saxony he entered that of Austria and took part in the campaign of 1788 against the Turks. He became major-general in 1792, served against France under Wurmser and was sent on a mission to the Congress of Rastadt. He be¬ came chief of staff in Italy in 1800, member of the aulic council and president of the council after the retreat of Archduke Charles in 1805. He commanded the Austrian right at Caldiero and was afterward successively governor-gen¬ eral of Venice and of Galicia. In 1809 he commanded the 1st and 2d Austrian corps and took part in the battles of Essling and Wagram. After this campaign he was made field marshal and was again governor of Galicia. He was again president of the Aulic council of war in 1812 and afterward com¬ manded the Austrian forces in Italy. After the first treaty of Paris he became governor of Austria's Italian provinces and in 1815 he

destroyed the army of Murat. After 1815 he resided several years in

Paris. In 1820 for the third time he was president of the council and became also Minister of State. He retired in 1825. Consult Von Smola, (Das Leben des Feldmarschalls H. von Bellegarde3 (Vienna

1847).

BELLEGARDE, Jean-Baptiste Morvan

de, French ecclesiastic and writer: b. Piriac, Hautes, 30 Aug. 1648; d. Paris, 26 April 1734. He entered the Jesuit order and was a pupil of Bonhours. After 18 years he left the order because of his leanings toward Cartesianism. He became a member of the community of Priests of Saint Francis of Sales. He was a prolific writer, being the author of a great number of works and of translations often inexact. He is best remembered as the trans¬ lator of the works of eminent ecclesiastics, as (Lettres de S. Basile le grand3 (Paris 1693, 1701); (Sermons de S. Gregoire de Naziance) (Paris 1698) ; (Discours et homelies de S. Jean-Chrysostome) ; (Sermons de S. Leon le grand) (Paris 1701) ; Hmitation de Jesus-Christ3 (Paris 1698).

BELLEGARDE, France, a tortress sit¬ uated on an isolated summit, 1,380 feet above sea-level, in the department of Pyrenees-Orien- tales, and commanding the highway from Figueras to Perpignan. It has been the scene of several armed conflicts. Peter III of Aragon defeated Philip III of France here in 1285. In 1674 it was taken by the Spaniards and again by the French under Schomberg in 1675. Louis XIV erected the height into a regular fortress with bastions in 1678-79. The Spaniards blockaded and captured it in 1793, but it was retaken by the French in the following year.

BELLEISLE, bel-el, Charles Louis Au¬ guste Fouquet (Comte de), marshal of France : b. Villefranche, 22 Sept. 1684; d. Versailles, 26 Jan. 1761. He distinguished himself during the famous siege of Lille. After the conclusion of the war of the Spanish Succession the cession of Lorraine to France at the Peace of Rastadt was principally his work (1735) ; Louis XV made him governor of Metz and the three bishoprics of Lorraine. After a diplomatic mission to the courts of Germany in 1741 he was placed at the head of the French forces sent to oppose those of Maria Theresa. He took Prague by assault; but the King of Prussia having made a separate peace, he was compelled to a retreat, which he performed with admirable skill. In December 1744, when on a diplomatic journey to Berlin, he was arrested in Germany and sent to England, but he was exchanged in 1746. In the following year he

forced General Browne, who had entered the south of France from Italy, to raise the siege of Antibes and to retreat over the Var. In 1748 the King made him a peer of France, and the Department of War was committed to his charge. He re¬ formed the army by abolishing many abuses, enlarged the military academy, and caused an order of merit to be established.

BELLENDEN, William, Scottish author: b. Lasswade, Midlothian, about 1555; d. about 1633. He was educated at Paris, where he was professor of belles-lettres in 1602; and though he was made master of requests by James I he still continued to reside in the

French metropolis. He was distinguished for the elegance of his Latin style, and in 1608 he published a work entitled (Ciceronis Princeps,3 containing a selection from the works of Cicero, consisting of passages relating to the duties of a prince, *etc.* He afterward published ‘ Ciceronis Consul, Senator,3 *etc.* (1612), with two other treatises, from one of which Conyers Middleton’s (Life of Cicero) was largely com¬ piled — a plagiarism first denounced by Wharton and clearly proved by Dr. Parr in a Latin preface prefixed to a reissue of Bellerden’s writings (1787). His (De Tribus Luminibus Romanorum,3 published, posthumously, was de¬ signed to illustrate the history of Rome from the writings of Cicero, Seneca and Pliny; but it is incomplete, and only contains matter drawn from the first named author.

BELLERMANN, Ferdinand, German

painter: b. Erfurt, 14 March 1814; d. Berlin, 11 Aug. 1889. He was educated at the academy at Weimar, and studied later at Berlin under Karl Blechen and Wilhelm Schrimer. He traveled in Norway, the Netherlands, Vene¬ zuela and Italy, and in 1866 became professor of landscape painting at the Berlin Academy. He utilized the results of his travels in the production of many magnificent landscapes, among which may be mentioned (Evening in the Valley of Caracas3 ; the (Guacharo Cave, Venezuela3; (Sierra Nevada,3 *etc.*

BELLEROPHON, bel-le’rd-fon, son of Glaucus, king of Ephyre, by Eurymede, at first called Hipponous. The murder of his brother, whom some call Alcimenus and Bellerus, pro¬ cured him the name of Bellerophon, or mur¬ derer of Bellerus. After this murder Belle¬ rophon fled to the court of Prcetus, king of Argos, whose wife became enamored of him ; and because he slighted her passion she sought to destroy him. He escaped her machinations, was introduced to the

court of Jobates, king of Lycia, and, after a number of adventures, in one of which he conquered the Chimaera, he married the daughter of Jobates and succeeded to the throne of Lycia. According to the fabled accounts, on Bellerophon attempting to soar to heaven on the back of Pegasus, Zeus sent a hornet which so stung his winged steed that he cast his rider to the earth, where lame and blind he wandered lonely in the Aleian fields, a prey to corroding grief and melancholy, shun¬ ning men, and hated by the gods. At Corinth and in Lycia Bellerophon was worshipped as a sun-god. His adventures were a favorite sub¬ ject in ancient art.

BELLEROPHON, a genus of gaster—

opodous mollusks, typical of the family Bel-leropliontidce. The species are all fossil shells found in the limestones of the Silurian, Devo¬ nian and Carboniferous periods. The best-known American species are found in the coal measures of the Mississippi Valley and the Southwest. The so-called B. cilobatus, a fossil characteristic of the Trenton formation, is now assigned to the genus Protowarthia.

BELLES-LETTRES, bel-letr, the French term, for which the English equivalent is polite literature. It is impossible to give a satisfac¬ tory explanation of what is or has been called belles-lettres ; in fact, the vaguest definition would be the best, as almost every branch of

know ledge lias at one time been included in, at another excluded from, this denomination. The most correct definition, therefore, - would be, perhaps, such as embraced all knowledge and every science not merely abstract or simply useful. In the division of the departments at the Lyceum of Arts, established at Paris in 1/92, the belles-lettres comprehended general grammar, languages, rhetoric, geography, his¬ tory, antiquities and numismatics ; while philos¬ ophy, mathematics, etc., were called, in contra¬ distinction, sciences.

BELLEVAL, bel-val, Pierre Richer de,

French botanist: b. Chalons-sur-Marne c. 1564; d. 1623. He was the first person in France who taught botany as a science distinct from medi¬ cine. Henry IV established a botanical garden at Montpellier, and created a chair of botany. Belleval obtained the first appointment in 1593, and immediately began a collection of all the plants in Languedoc, in order to the production of an illustrated flora, for which about 500 quarto plates had been engraved, when he died. Through the carelessness of his representatives, almost all of these were lost.

BELLEVILLE, Canada, town, port of entry and county-seat of Hastings County, On¬ tario, on the Bay of Quinte, at the mouth of the Moira River. It is on the Grand Trunk Railway 60 miles west of Kingston. It has an excellent harbor, and the Moira affords abun¬ dant water-power for manufacturing. Belleville is in the heart of the finest dairying region of Canada ; is in direct steamboat communication with many Canadian and United States points, and enjoys an extensive trade, especially in lumber. It is the seat of Albert College, and has other excellent educational institutions, a deaf and dumb institute and public library. The chief manufactories are lumber, pottery, cigars, sash and blinds, woolens, shirts, mining tools, machinery, lanterns and tinware. A short distance east of Belleville are large cement works for the utilization of a limestone which exists in great abundance in the vicinity. The city has agencies for the principal banks of Canada, daily and weekly newspapers, and is the seat of a United States consulate. Pop.

9,876.

BELLEVILLE, Ill., city and county-seat of Saint Clair County, situated on several rail¬ roads, 14 miles east of Saint Louis, Mo. It is in the midst of very productive coal mines ; has a large trade in flour, and general produce ; and is chiefly engaged in the manufacture of glass, stoves, flour, nails and machinery ; there are also a distillery, breweries, shoe factories, ice plant, *etc.* ; it has one of the largest rolling mills in the west. The city has trolley lines to Saint Louis, a public library, Saint Peter's Cathedral (Roman Catholic), convent, four national banks and an assessed property valua¬ tion of over $2,250,000. Settled in 1814, it was incorporated in 1846. The government is vested in a mayor, elected biennially, who ap¬ points all the important administrative officers. Pop. 25,000.

BELLEVILLE, Kan., town, county-seat of Republic. County, 219 miles northwest of Kan¬ sas City on the Union Pacific, the Chicago, Rock

Island and the Pacific railroads. It is in the centre of a stock raising and grain produc¬

ing country and has many grain elevators, flour mills and alfalfa mills. Pop. 2,224.

BELLEVUE, Iowa, city of Jackson County, 20 miles east of Maquoketa, the county-seat, on the Chicago, Milwaukee and Saint Paul Railroad. The city's industries include button¬ making, piano factories, flower pots and hollow block works and gasoline marine engines. It has three banks with combined resources amounting to $1,012,000, public, parochial and Lutheran schools. The electric-lighting plant and the waterworks are the property of the municipality. In 1917 the city's receipts from all sources totaled $22,464.67 and the expendi¬ tures $19,259.17. Clay suitable for many clay products is abundant in the neighborhood. The government is vested in a mayor and an aldermanic board of five members. Pop. 1,776.

BELLEVUE, Ky., city in Campbell County, on the Ohio River, opposite Cincinnati, of which it is practically a suburb. It is almost exclusively a city of residences, but has a few industries of which sand and gravel quarry¬ ing are the principal. Bellevue was first set¬ tled in 1866 and received its city charter in 1871. The government is vested in a mayor, elected for four years, and a council of eight members chosen every two years. Pop. (1920)

7,379.

BELLEVUE, Ohio, city in Sandusky County, on the Lake Shore and Michigan Southern, the New York, Chicago and Saint Louis, the Lake Shore Electric and other rail¬ roads, about 16 miles south of Sandusky. It contains a Carnegie library and a hospital and has railroad repair shops, canning factories, lumber yards, manufactories of agricultural and drainage machinery, fixtures and stoves. It is the trade centre for a thriving agricul¬ tural region. The most unique feature of the city is its sewerage system. An underground stream flows beneath the city into Lake Erie and on each block a hole is drilled to this stream which thus serves to dispose of all sew¬ age and surface water as well. Pop. 5,776.

BELLEVUE, bel-vii (French, (<fine pros¬ pect®), a beautiful country palace in the neighborhood of Paris, situated on a ridge of hills

stretching from Saint Cloud toward Meudon. It was built by *Mme.* de Pompadour, between 1748 and 1750. The first French artists of the time had exerted all their talents in embellishing it ; so that at the period when it was built, it was considered the most charm¬ ing in all Europe. After the Revolution it was sold and the purchaser had it demolished. There is a pretty village on its site, which, during the siege of Paris (1870-71), was an important strategic point.

BELLEW (Harold), Kyrle, English actor, the son of the Rev. J. M. Bellew, Calcutta, a well-known elocutionist : b. 1857 ; d. Salt Lake City, 1 Nov. 1911. After serving for some years in the British navy, he went to Australia, where he was successively engaged as gold prospector, actor, newspaper man and lecturer. Returning to England, he made his first appearance as an actor in that country at Brighton in 1875, and joined Henry Irving's Company in 1878. He made his debut in New York in 1885 as Hubert in the play (In His

Power. > He was associated with Mrs. James Brown Potter from 1888-98, and accompanied her (1888-91) on a world tour in which Australia and India were included. He re¬ turned to Australia in 1899, and there engaged in mining ventures. His later years were spent in the United States, where he achieved notable success in the parts of baffles5 and briga¬ dier Gerardo

BELLEY, bel-la, France (ancient Bellica), a town in the department Ain, 39 miles south¬ east of Bourg, and 38 miles southwest of Geneva; situated in a fertile valley watered by the Furan. It is very ancient, having been a place of note in the time of Julius Caesar, and is the seat of a bishopric founded in 412. It contains a communal college, has an agricul¬ tural society and a court of primary resort. The episcopal palace, the belfry of the cathe¬ dral, the college and the rich cabinet of medals and antiquities, are worth notice. Silk worms are reared; and lithographic stones, reckoned the best in France, are obtained from quarries in the neighborhood, and it has silk and cotton industries. Pop. 6,182.

BELLI, bel'le, Giuseppe Gioachino, Ro¬ man humorist and satirical poet: b. 1791; d. 1863. He wrote in the popular dialect of the Trastevere; and in early life scourged the papacy and the clergy with stinging, irreverent and often vulgar satire. Becoming afterward a zealous convert to the Roman faith, he en¬ deavored to call in and destroy the indiscretions of his youth. In his last years he published a beautiful translation of the Roman Breviary. His published sonnets amount to more than 2,000; his other published Italian verses fill four considerable volumes; while two-thirds of his literary remains have never been gathered and edited. Of this last, much is clothed in lan¬ guage too coarse' to bear the light of modern culture.

BELLIARD, bel-yar, Augustin Daniel,

(Comte de), French soldier and diplomatist: b. Fontenay-le-Comte, La Vendee, 1769; d. 27 Jan. 1832. finder Napoleon he served in Egypt, Germany, Spain and Russia and rose to great military distinction, and was wounded at the battle of Leipzig. He supported the Emperor on his return from Elba, and on the restoration of the monarchy was made a peer and became, in 1832, ambassador to Belgium. His autobiography was published in 1842.

BELLIGERENCY. In international law, a state of armed hostility which has been legally recognized. This condition may exist between, nations, between a nation and a community not within the family of nations, or between an established and recognized nation and one of its sections which may be attempting to throw off the jurisdiction of the parent state with the object of becoming independent or attain¬ ing some other political end. It is not neces¬ sary that a community be independent in order to have the status of a belligerent, but it is necessary that such community conduct hos¬ tilities according to customs pursued by reg¬ ularly established states or otherwise be under a de facto government. When the fact of belligerency between two nations is established, their legal relations are changed at once, the

laws of peace being superseded by the laws of war, while neutrality laws govern the conduct of states not participating in the conflict. See Neutrality.

When a revolted party of great numerical strength forms a regular government and rules over the whole or part of the territory claimed, humanity dictates that the members of such party should not be

treated as rebels guilty of treason but, if captured, should be regarded as prisoners of war. Hence those who have risen in arms against the parent government exert every effort to obtain for themselves the status of belligerency, since the recognition of the belligerency of a party, not a state, bestows all the rights of war of an established state. The usual manner of notifying neutrals of the existence of a state of war is by public procla¬ mation and the most common method employed by outside states to recognize belligerency is the issuance of a proclamation of neutrality which states the attitude of the maker thereof toward the belligerents. (See Declaration of War). Under the rules of modern warfare, belligerents must respect the lives and prop-rrty of non-combatants, must refrain from in¬ flicting any more damage than is absolutely necessary to accomplish victory, and must not employ cruel methods of warfare or use bar¬ barous weapons. Upon occupying conquered territory the dominant belligerent may require the submission of the inhabitants ; in the European War Germany imposed numerous fines not only on private citizens but also on established communities for real or alleged disobedience of commands or for hostility dis¬ played by the inhabitants. (See Conquest, Right of). Under international law, neutrals and their goods, ships, commerce, etc., are sup¬ posed to be exempt from the dangers and in¬ juries wrought by the war, provided they adhere strictly to a policy of neutrality as regards the belligerents. See Neutrality.

When one community is in rebellion against the parent state (as in the Revolutionary War) or a revolutionary party or section wages war against the general government (as in the Civil War) a more difficult question arises. If a nation or state recognize the belligerency of a community outside the family of nations, that community, so far as the rights of war are concerned, has an international status as re¬ gards the nation or state which recognizes it. If foreign nations recognize the belligerency of a community within the territorial area of an established state, then such community has international standing, but, if not, its acts of war are technically acts of piracy, it has no belligerent rights, nor can foreign states be compelled to recognize its blockades or receive its vessels in their ports. (See Blockade). If the parent government recognize the bellig¬ erency of the revolted community, then a state of belligerency exists for all nations, but if the government refuse to recognize the revolution¬ ary section and another nation do so, then for the latter a state of belligerency exists and other nations must take cognizance of the ex¬ istence of such a status between the recognized and the recognizing parties. It is not necessary that the parent government recognize a revolt¬ ing community by a formal declaration, but the existence of

war may be made known by

an act o' I formal character (such as a blockacL proclamation or a call for volunteers to suppress rebellion) as was the case in the C vil War. The conferring of belligerent rights on a revolting community by a neutral state does not carry with it the recognition by that s' ate of the independence of the insurgent gov¬ ernment; such recognition would imply that the parent government cannot subdue the rebellion and hence, being premature, might be regarded by the parent government as a cause for war against the state making such recognition. No insurgent may claim as a right the recognition of a status of belligerency; it is merely a question of expediency which the neutral state must decide for itself ; such recognition may be granted for any reason or reasons deemed suffi¬ cient by the grantor, whether they be wholly selfish or humanitarian or dictated by a fixed international policy. But there are two con¬ ditions that a neutral must find existent before granting belligerent rights, viz., a civil govern¬ ment in the rebellious community exercising de facto authority in a definite territory and a state of hostilities between such de facto govern¬ ment and the parent government. These mil¬ itary operations need not be of great extent, but if the rebellion should have assumed enor¬ mous proportions and be of such a formidable character as to affect outside interests, neutral states may consider that the demand for a recognition of belligerency has become con¬ clusive.

Some have contended that the British procla¬ mation of neutrality of 13 May 1861 was a premature recognition of the Confederate States and that by selling munitions of war and other merchandise to the South and buying her cotton Great Britain was aiding rebellious citizens against the parent government, and, in fact, filibustering. They have compared the protest of the United States against the recog¬ nition of Confederate belligerency and the ship¬ ment of arms to her by Great Britain with Germany's protest against shipments of muni¬ tions to the Allies from the United States in the war of 1914. The fact often overlooked, in the case of the Civil War, is that

England, France, The Netherlands and other nations, by their proclamations of neutrality, recognized the belligerency of the Confederacy; this did not mean that these powers recognized the Con¬ federate States as an independent, sovereign government but merely that these foreign states considered the conditions to warrant the con¬ ferring of belligerent rights so that both sec¬ tions would be treated alike and impartially. In his dispatch of 6 May 1861 to Lord Crowley, Lord John Russell states Ghat Her Majesty's Government cannot hesitate to admit that such confederacy is entitled to be considered as a belligerent, and, as such, invested with all the rights and prerogatives of a belligerent.® ((The Case of the United States before the Tribunal of Arbitration at Geneva, > Senate Ex. Doc. 31, 42d Congress, 2d session, pp. 24-27). If a civil war affect the relations of the community with foreign countries, if such countries find a new government de facto applying belligerent rights on the seas, if the rules of blockade, contra¬ band and search hamper their commerce, and if they be called upon to decide whether ships carrying a new flag may enter their ports, then

such countries are warranted by international law and a due regard for the commercial inter¬ ests of their subjects in recognizing the bellig¬ erency of the insurgent and declaring their town neutrality. Hence, England's course in ac¬ knowledging the belligerent rights of the Con¬ federacy was justifiable. (Dana, R. H., ed., Wheaton's (Elements of International Law,) § 23, Boston 1866; Woolsey, T. D., (Inter¬ national Law,* § 180, New York 1875). The British believed their commerce needed pro¬ tection on the high seas and that by issuing a proclamation of neutrality they would not only bring the management of the conflict within the rules of civilized warfare but would pre¬ vent inroads on their commerce by pirates, since, in the eyes of the world, the neutrality proclamations placed all vessels that accepted letters of marque from the Confederacy on the level of privateers instead of considering them pirates and their crews amenable for piracy, as Lincoln's proclamation of 19 April had declared them to be. (See Privateers; Piracy). On 15 May 1861 the London Times said:

" Being no longer able to deny the existence of a dreadful civil war, we are compelled to take official notice of it… . Our foreign relations are too extensive, the stake we

hold in the commerce of the world is too vast, and, we may add, our attitude is a matter of too much importance for us to allow ourselves

the gratification of saying ‘ Peace, when there is no peace,’ so largely indulged in up to the very latest moment by the statesmen of America herself. Yes, there is war, … Eteocles and Polynices are con¬

fronting each other with hostile weapons, and England, like the venerable queen of Thebes, stands by to behold the unnatural combat of her children. From acknowledging the state of war, the next step is to acknowledging the belligerent rights of the contending parties. … As belligerents they are as equal in our eyes as Trojan or Tyrian was in the eyes of Queen Dido. We are bound equally to respect their blockades and equally to abstain from any act which may violate the conditions of the most impartial and un¬ discriminating neutrality.” (Consult also Earl Russell’s letter to Adams, 30 Aug., 1865; Bernard, Montague, ‘ An Historical Account of the Neutrality of Great Britain during the American Civil War,’ p. 162 el seq., London 1870).

The conferring of belligerent rights gave the Confederacy the powerful moral support which insurgent movements gain from international recognition, and among these rights were respect for the lives and property of non-combatants, the regarding of captives as prisoners of war, the privilege of negotiating foreign loans, the recognition of its flag, and the right to purchase arms and am¬ munition in the open market. Hence foreign countries could sell munitions of war to both sides without fear of violating neutrality, and the Northern government had no more justifi¬ cation than Germany in protesting. But when these nations conferred belligerent rights upon the Confederacy they could not hold the Northern government liable for injuries in¬ flicted on their subjects by the Confederates in the territory occupied by the latter, whereas Turkey, not having issued a proclamation of neutrality, was able to claim indemnity for losses sustained at the hands of rebellious sub¬ jects of the United States. Some state that the European nations were unduly hasty in placing the Confederate States on an equality with the Union as to belligerent rights, as is witnessed by the speeches of ToHn Bright and other prominent men, since such action seemed to presage the recognition of their independ¬ ence at an opportune moment. (Consult Curtis, G. W., ed., Correspondence of J. L. Motley, > Vol. I, p. 380; Rogers’ ed. of (Tohn Bright’s

Speeches,' Vol. I, p. 132; Woolsey, T. D., in The New Englander , July 1869, p. 579). Seward wrote to Adams :

" The proclamation of neutrality was a concession of belligerent rights to the insurgents and was deemed by this government as unnecessary and in effect as unfriendly… . The United States stand upon what they think

impregnable ground when they refuse to be derogated, by an act of the British government, from their position as a sovereign nation in amity with Great Britain and placed upon a footing of equality with domestic insurgents who have risen up in resistance against their authority." (' Diplomatic Correspondence,' 1863, Pt. L p. 393).

John Jay said also: ((The Proclamation … in a moral view lowered the American Gov¬ ernment to the level of the rebel Confederacy, and in the next place, it proceeded, in an inter¬ national view, to place the rebel Confederacy on a par with the American Government.® ((The Great Conspiracy: Address at Mount Kisco,' 4 July 1861). Seward claimed that war did not exist in an international sense and that foreign powers should not take cognizance of the in¬ surgents in territory over which the United States had not relinquished its sovereignty. He claimed for the North the rights of a belligerent to blockade and search which im¬ plied a legal war but denied the existence of a war, in which case there could not be a body of neutrals. But Seward's opinion was not binding on European nations then any more than Germany's wishes in 1914 could be con¬ strued into law for the United States to fol¬ low. Moreover, at its December term of 1862, the Supreme Court decided that Lincoln's blockade proclamation of 19 April 1861 (Con¬ sult Richardson, J. D., (Messages and Papers of the Presidents,' Vol. VI, p. 14) was in itself ((official and conclusive evidence to the court that a state of war existed.® (Consult also Snow, Freeman, (Cases and Opinions on In¬ ternational Law,' pp. xvi, .254, Boston 1893). Judge Chase also stated from the bench that ((the rights and obligations of a belligerent were conceded to it [the Confederacy] in its military character very soon after the war began from motives of humanity and expediency by the United States.® (Wallace, (Supreme Court Reports, > 1868, p. 10). Hence, when Adams complained to Lord Russell of the dispatch of (<numbers of steam vessels laden with arms, and munitions of war of every description, together with other supplies, well adapted to

procrastinate the struggle with a purpose of breaking a blockade legitimately established and fully recognized by her majesty® (< Diplomatic Correspondence,' 1863, Pt. 1, p. 314), Lord Russell was fully justified in replying as fol¬ lows :

" With regard to the general duties of a neutral, according to international law, the true doctrine has been laid down repeatedly by presidents and judges of eminence of the United States, and that doctrine is that a neutral may sell to either or both of two belligerent parties, any implements or munitions of war which such belligerent may wish to purchase from the subjects of the neutral. Admitting also, that which is believed to be a fact, that the Confederates have derived a limited supply of arms and ammunition from the United Kingdom, notwithstanding the Federal blockade of their ports; yet, on the other hand, it is perfectly notorious that the Federal government have purchased in and obtained from the United Kingdom a far greater quantity of arms and warlike stores." (' Diplomatic Correspondence', 1863, Pt. 1, p. 373).

Tohn Bright wrote to Sumner as follows:

" The people … know that great quantities of

arms have been sold to the North and argue that it must be equally lawful to sell arms or ships to the South. And Mr. Seward and Mr. Adams have lent some support to this

view in complaining of the sale of arms to the Confederacy as if it were an offense in magnitude equal to that of furnishing ships of war. Since the South were admittted as belligerent;, in respect to the sale of arms, you have been treated as two nations equal in the sight of our government and one as much in their favor as the other."

Of course, the equipping in England of privateers for the Confederacy was a breach of neutrality for which England paid a consider¬ able sum of money under the decision of the Geneva Tribunal and Lord Russell admitted in a speech of 26 Sept. 1863 that such acts or similar ones would constitute such breach :

" If you are asked to sell muskets, you may sell muskets to one party or the other, and so with gunpowder, shells or cannon; and you may sell a ship in such a manner. But if you will on the other hand, train and drill a regiment with arms in their hands to take part with one of the two bel¬ ligerents, you violate your neutrality and commit an

offense against the other belligerent. So in the same way in regard to ships, if you will allow a ship to be armed and go at once to make an attack on a foreign belligerent, you are yourself, according to your law, taking part in the war, and it is an offense, which is punished by the law." (Speech in reference to the Foreign Enlistment Act quoted in London Times 28 September).

See Confederate States; United States, Diplomacy of the; Neutrality; Blockade; Declaration of War; Conquest, Right of; International Law; War; Insurrection; Privateers; Piracy; Rebellion; Treason.

Bibliography. — • Bentwich, Norman, bellig¬ erents and Neutrals at Sea) (in Laiv Quart erly Review, Vol. XXXII, pp. 14—25, London 1916) ; Callahan, J. M., (Diplomatic History of the Southern Confederacy' (1901) ; Halleck, H. W.,

(International Law) (4th ed., London 1908) ; Laughton, L. G., belligerents and Neutrals) (in United Service Magazine, N. S. Vol. XXIX, Vol. CL, pp. 226-33, London 1904) ; Metcalfe, A. Wharton, (Naval Belligerent Rights and Neutral Seaborne Trade((in Ibid, N. S. Vol. L, Vol. CLXXI, pp. 243-54, London 1914) ; MacDonnell, J., (Recent Changes in the Rights and Duties of Belligerents and Neutrals ac¬ cording to International Law> (in Journal of the Royal United Service Institute, Vol. XLII, pp. 787-811, London 1890) ; Moore, J. B.,

(Digest of International Law' (New York 1906) ; Oppenheim, L. F. L., (International

Law) (London 1912) ; Snow, Freeman, Man¬ ual of International Law' (2d ed., Washington 1898) ; Spaight, J. M., (War Rights on Land' (London 1911) ; Westlake, J., (International Law' (Cambridge 1907) ; Wheaton, Henry, Elements of International Law' (London

1916).

BELLIGERENT, a nation or a large sec¬ tion of a nation engaged in carrying on war. On the outbreak of war between sovereign powers the rights and duties of the warring nations in regard to each other and in regard to neutral powers are clearly defined by inter¬ national law. The first general stipulation is that neutral powers be formally notified of the existence of a state of war. In regard to the rights and duties of belligerents one to another, international law and custom in modern times demand that non-combatants be protected in their persons and property, and that barbarous weapons or methods be

avoided. When hostile territory is occupied, the invading army may require the submission of the inhabitants and may exercise in such territory all the powers previously exercised by the ousted goyernment. The trade of neutrals is to be relieved as far as possible of all inconven-BELLINCIONI

t

lences. An insurgent state cannot claim the recognition of belligerency from a neutral state as a matter of right and for the latter such recognition is merely a matter of ex¬ pediency. In the contest between the Federals and Confederates in 1861-65 the latter section of the American people, at the very commence¬ ment of the struggle, claimed the privileges of belligerents. Their demand was promptly acceded to by the British and French govern¬ ments, at which the Federal authorities took umbrage, contending that the recognition had been premature, while the British maintained that it could not have been refused or delayed. The grant of belligerent rights to insurgents imposes certain obligations on the latter, such as the observance of the rules of international law both in regard to their opponents and to neutrals. Such a grant also shifts the re¬ sponsibility for damages to neutrals from the sovereign state to the insurgent party. Its ad¬ vantages to the latter lie in the moral support gained from recognition by neutrals, giving it the right to negotiate loans and placing its commanders and their troops under the pro¬ tection of the laws of war. See Belligerency ; Blockade; International Law; Neutrality; and consult Snow, (Manual of International Law} (2d ed., Washington 1898), and Wheaton, (Elements of International Law) (8th ed., Bos¬ ton 1866).

BELLINCIONI, bel-len-cho'ne, Gemma, Italian singer : b. Como, 18 Aug. 1866. Showing herself possessed of a remarkable voice at an early age, her father began cultivating it. Later she became a pupil of Corsi. She made her first appearance in Pedrotti's (Tutti in Mas-chera) at Naples, in 1881, when she was only 15 years of age. Among the audience was the famous tenor, Tamberlik, who was so keenly impressed by her voice that he forthwith en¬ gaged her as his prima donna for an extended tour of Spain and Portugal. She soon became recognized as one of the best, if not the best, singer of her time. In 1890 Mascagni created for her the part of Santuzza in (Cavalleria RusticanaC and it is generally admitted that she contributed not a little to the immediate success of that famous opera.

BELLING, Wilhelm Sebastian von, Ger¬ man cavalry officer and one of the generals of Frederick the Great: b. Paulsdorf, Prussia, 15 Feb.

1719; d. Stolp, 28 Nov. 1779. He entered the Prussian army in 1737 and rose rapidly in rank, being an officer in the Black Hussars. He especially distingished himself in the cam¬ paign against the Swedes in Pomerania and Mecklenburg during the period from 1759 to 1761. In 1762 he was made a major-general and four years later a lieutenant-general. It was during the operations against the Swedes that he took prisoner the famous Bliicher, then a young subaltern, and persuaded him to enter the Prussian service.

BELLINGHAM, Richard, royal governor of Massachusetts: b. about 1592; d. 7 Dec. 1672. He emigrated to the colony, of which he was one of the original patentees, in 1634; in 1635 was made deputy-governor; and in 1641 was elected governor in opposition to Winthrop by a majority of six votes. He was reelected in 1654 and' after the death of Endicott was

chosen again in May 1665, and continued in the executive chair of the colony as long as he lived, having been deputy-governor 13 and governor 10 years. He was appointed assistant major-general in 1664, in which year the King sent commissioners to inquire into the state of the colony, when, according to Hutchinson, Bellingham and others obnoxious to James II were required to go to England to account for their conduct. The General Court, however, re¬ fused obedience and maintained the authority of the charter. His wife having died, in 1641 he married a second time, of which a con¬ temporary speaks thus : ((A young gentleman was about to be contracted to a friend of his, when on a sudden the governor treated with her, and obtained her for himself.® The banns were not properly published, and he performed the marriage ceremony himself. He was prose¬ cuted for a violation of the law, but at the trial he refused to leave the bench, sat and tried himself, and thus escaped all punishment. In his last will he provided that after the de¬ cease of his wife and of his son by a former wife, and his granddaughter, the bulk of his estate should be spent for the yearly main¬ tenance (<of godly ministers and preachers® of the true Church, which he considered to be that of the Congregationalists. This will the General Court set aside on the ground that it interfered with the rights of his family. He was a clean and just administrator, but intolerant in his attitude to the Quakers. A sister of his, Anne Hibbens, was executed at Salem in June 1656, during the witchcraft persecution.

BELLINGHAM, Wash., city and county-seat of Whatcom County, on the eastern shore of Bellingham Bay, and on the Great Northern, Northern Pacific, Canadian Pacific and Bell¬ ingham Bay and British Columbia railroads, 97 miles north of Seattle. The first settlement was made in October 1852 by Capt. Henry Roeder, who built a sawmill on what is now Whatcom Creek. The Lummi tribe of Indians maintained their chief camp on the beach near the mouth and falls of Whatcom Creek, and called the camp or rather the locality alVhrap cop ,® mean¬ ing ftthe noisy water® or ((the place of the noisy water.® The white men retained the Indian name for their town, modified as indicated by the spelling to Whatcom. This remained the name of the town until the consolidation of Whatcom and New Whatcom in 1891 under the name of New Whatcom, from which the prefix (<New® was dropped by action of the State legislature 19 Feb. 1901. Fairhaven is the Eng¬ lish interpretation of an Indian word or phrase, aSee-see-leechel,y> meaning <(a safe harbor® or (<the sheltered beach ;® this town was plotted and named in 1883 by Daniel J. Harris, the original donation claimant. In 1890 Fairhaven and the adjoining town of Bellingham were incorporated as one city under the name of Fairhaven. On 27 Oct. 1903, the electors of Fairhaven and Whatcom voted to consolidate the two cities under the name of Bellingham and the consolidation was duly consummated. The new name went into effect 28 Dec. 1903, and the post-office became Bellingham 1 April 1904. Bellingham Bay was named by Van¬ couver in 1792, and the consolidated city takes its name from that bay. The city is the com¬ mercial centre of a large lumber and agri-488

cultural region ; salmon fishing is also an in¬ dustry of great importance. Largest salmon cannery in the world, and mining and quarry¬ ing are carried on in the vicinity. The princi¬ pal manufacturing establishments include lum¬ ber and shingle mills, salmon canneries, wood working and iron working plants and brick kilns. Salmon canning and brewing, milk con¬ densing and the manufacture of cement and cans are also important industries. The United States census of manufactures for 1914 reported 86 industrial establishments of factory grade, employing 2,182 persons, of whom 1,922 are wage earners who receive $1,318,000 annually in wages. The capital invested totaled $6,- 912,000, and the value of the year's output was $6,264,000: of this, $2,898,000 was the value added by

manufacture. There are four banks with a combined capital of $600,000. There are 49 established churches in Belling¬ ham representing practically all denominations. There are 11 city schools, two libraries, the Bellingham Bay Library and the Carnegie Library. The city also contains the State Nor¬ mal School, and three business colleges, a parochial and two high schools. The govern¬ ment is vested in a mayor, elected biennially, and a council of seven members, elected alter-natelv every two years. Pop. (1910) 24,298;

(1920) 25,570.

BELLINGSHAUSEN, Fabian Gottlieb von, Russian naval officer and Antarctic ex¬ plorer: b. island of Osel, 9 Sept. 1778; d. Kron¬ stadt, 13 Jan. 1852. Graduating from the Naval Academy at Kronstadt, he became an officer in the Russian navy. In 1809 he distinguished himself in his operations as captain of a cor¬ vette against the Swedish fleet. In 1819 he was assigned by the Emperor Alexander to the command of two ships for the purpose of conducting an exploring expedition into the south Polar regions. He succeeded in pene¬ trating the Antarctic Circle to lat. 70° S., dis¬ covering and naming Alexander Land, Peter Island and Traversay Island. The expedition returned to Kronstadt, arriving 5 Aug. 1821. Seven years later Bellingshausen so distinguished himself in the naval operations against the Black Sea port of the Turks, Varna, that he was made a vice-admiral and was given com¬ mand of the Russian Baltic fleet. Later he became military governor of Kronstadt. A narrative of his Polar explorations was pub¬ lished in Saint Petersburg in 1831.

BELLINI, bel-le'ne, Gentile, elder son of Jacopo (q.v.) : b. 1429; d. 1507. He became more distinguished than his father, but did not rival his younger brother, Giovanni. In 1469, in reward for his work, he was made a count palatine of the empire and in 1474 official painter to the Venetian state. In conjunction with his brother Giovanni, he painted a series of frescoes for the ducal palace at Venice, depicting the conflict between the Papacy and Barbarossa, but these were destroyed by fire in 1577. His fame attracted the notice of Mo¬ hammed II, conqueror of Constantinople, and Bellini visited the grand seignor in 1480, being sent by the Senate. He painted a number of pictures for Mohammed, and also struck a medal for him, with all of which he was greatly pleased, and rewarded the painter by presenting him with a gold chain and 3,000 ducats. There

is a very fine pen-and-ink drawing by Bellini in the British Museum, representing Mohammed and the Sultana mother, in whole-length figures in a sitting position. (The Adoration of the MagP is in the Layard collection, Venice; and (Saint Mark Preaching in Alexandria,) is in the Brera at Milan. A small painting in water-color of a scribe, discovered in 1905 in a bazaar in Constantinople, is in the possession of Mrs. Gardner, Boston.

BELLINI, Giovanni, Venetian painter: b. about 1430; d. 1516. He was the younger son of Jacopo Bellini, an original artist of great vigor and attainments, who went to vari¬ ous cities of northern and central Italy and came in contact with the Renaissance influences, new in his time, which were to vivify the de¬ clining mediaeval art of Italy. It was particu¬ larly in Padua where Squarcione had his famous collection of classical antiquities, that the new attitude toward art was taking shape, and the closeness of relation between the Bellini and Squarcione groups may be judged from the fact that Jacopo Bellini gave his daughter in marriage to Mantegna, the adopted son of Squarcione. Giovanni Bellini and his older and only less gifted brother Gentile carried on their father's work, and the two sons lived to see their art triumph over that of the previous school of the Vi-varini of Murano. This is the true point of departure of the Venetian school. Beginning with works in which the Squarcionesque ideas joined to his father's teaching forms the dominating influence (this period is well repre¬ sented at the Correr Museum in Venice by the <Pieta,> the (Transfiguration } and the (Cruci-fixionUj we find Giovanni Bellini in 1459 painting the (Agony in the Garden, } the master¬ piece of his early manner. From this time on he is more independent and of the character we associate with Venetian art. The great Coro¬ nation of the Virgin) at San Francesco, Pesaro, shows Bellini in almost full possession of his personal style as does the (Madonna } of the National Gallery, London. The change was accentuated in decade 1470-80, when Bellini learned from Antonello da Messina the process of oil-painting, his work up to this time having been done in tempera. The dis¬ covery was one peculiarly suited to the nature of Bellini and his people. For while fresco and tempera with their tendency toward sever¬ ity were well adapted to the draughtsmen of Florence, the warmth and modulation of oil-color were of the greatest value to the sumptu¬ ous art of Venice. It was probably as much Giovanni Bellini's national character as his great mastery that brought to him his great pupils Giorgione and Titian, beside many others who attained fame. The Venetian spirit and sense of beauty are evidenced in the celebrated (Conversazione) or 'Allegory* in the Uffizi, or the 'Virgin with Four Saints) at San Zaccaria, Venice. Landscape and atmosphere

are brought, in the LTffizi picture, to one of the highest points they had yet attained, and in¬ deed we may almost say, that they were too attain subsequently. Another fine example of the qualities is afforded by the 'Transfigura¬ tion* in the Naples Museum. To the artist's middle period belong such important works as the altar-pieces of San Giobbe and of San

Francesco della Vigna, Venice, that of Santa Corona at Vicenza (the (Baptism of Christ)), the (Madonna and Child) of the Brera, Milan, the famous picture of the (Madonna with the Doge Barberino) at Murano and the (Madonna with Saints* at the Venice Academy. From 1488 to 1505 Bellini was constantly engaged on decorations in the ducal palace, which were later destroyed by fire. Chosen state painter, he executed (about 1500-05) the portrait of the Doge Loredano which is now in the National Gallery, London. Two pictures in American collections may be safely attributed to him, one being in the Metropolitan Museum of New York. The last picture by Bellini to which we can assign a date with certainty is the altar-piece of the church of San Giovanni Chrysos-tomo, Venice (1513). It shows the venerable painter still in command of his powers, and if he had at this time left innovation to his pupils, he was yet able to intensify the qualities he possessed. Beside his service to landscape art, which we have noted, Bellini gave the first great example of the color for which Venice was to have its unsurpassed renown. His religious feeling is serene and pure, a certain sweetness and an almost pathetic sincerity mak¬ ing him one of the best-loved of painters. Con¬ sult Fry, Roger E., (Giovanni Bellini) (London 1899) ; Berenson, (Venetian Painters of the Renaissance* (New York 1897) ; Venturi, (Le origini della pittura veneziana > (Venice 1907), and Meynell, (Giovanni Bellini * (New York

1906).

BELLINI, Jacopo, Italian painter: b. Venice about 1400 ; d. 1470. He

was a pupil of Gentile da Fabriano, and is said to have been taught oil-painting, which was then a secret, by Andrea dal Castagno, and in turn taught it to his sons Gentile and Giovanni (qq.v.) He accomplished much in bringing the art of painting to maturity in his native city. The first works by which he acquired fame were portraits of Catharine Cornaro, the beauti¬ ful Queen of Cyprus, and one of her brothers: a picture representing the passion of Christ, in which many figures were introduced, himself among the number ; and a historical picture representing a Venetian legend of the miracle of the cross. This cross, containing a piece of the true one on which the Saviour died, was by some accident thrown into the Grand Canal at Venice, and although many persons plunged in after it, it was the will of God that only the guardian of the brotherhood to whom the cross belonged, Andrea Vindramino, could take it out again. This event was represented in the painting. Almost all of Jacopo's works have perished; only three signed pictures survive — one in the archiepiscopal palace at Verona, one in the Tadini Gallen' at Lovere, and one in the academy at Venice, others (unsigned) are in the Uffizi gallery at Florence, the Louvre, and the National Gallery, London. Two sketch books have been preserved, and those of price¬ less value, the one in the British Museum, London, and the other in the Louvre.

BELLINI, Lorenzo, Italian surgeon : b. Florence, 3 Sept. 1643; d. 8 Jan. 1704. In 1663 he became professor of anatomy at Pisa. Later he became physician to the Grand Duke of Tus¬ cany and senior consulting physician to Pope Clement XI. He was the first to observe and

comment on the action of the nerves on the muscles. The uriniferous ducts, now known as Bellini's tubes, were named from him. His principal work is (De Structura et Usu RenunP

(1662).

BELLINI, Vincenzo, Italian composer: b. Catania, Sicily, 1801 ; d. near Paris, 1835. He was educated at Naples under Zingarelli, com¬ menced writing operas before he was 20, and composed for the principal musical establish¬ ments in Europe. His most celebrated works are (Normal (I PuritanP and (La Sonnam-bula.* He is remarkable chiefly for sweetness of melody, suitableness of harmony, and an adaptation of sound to sense, and stood honor¬ ably

distinguished from many of his profession by the excellence of his moral character.

BELLINZONA, bel-m-zo'na, or BEL-LENZ, bel' lents, Switzerland, the capital of the canton of Ticino on the left bank of the Ticino, about five miles from its embouchure in the northern end of Lago Maggiore. The town has a very picturesque situation about 760 feet above sea-level and overlooking the Saint Gothard Pass. It was fortified in the Middle x\ges and modern ports have been constructed near the pass to protect the town. Pop. 10,773.

. BELLIS. See Daisy.

BELLMAN, Karl Mikael, Swedish poet: b. Stockholm 1740; d. 1795. He grew up in the quietude of domestic life, and the first proofs he gave of his poetical talents were religious and pious effusions. The dissipated life of young men at Stockholm devoted to pleasure was afterward the subject of his poems. By these his name was spread over all Sweden. Even the attention of Gustavus III was at¬ tracted to him, and he received from the King an appointment which enabled him to devote himself almost entirely to poetical pursuits, in an easy independence, until his death. His songs are truly national, and love and liquor their most common themes.

BELLO, be'lyo, Andres, Spanish-American diplomatist and author: b. Caracas, Venezuela, 29 Nov. 1781 ; d. Santiago, Chile, 15 Oct. 1865. He became undersecretary of the government of Venezuela in 1802, and in 1807 the King of Spam appointed him Venezuelan Commissioner of War, then an unprecedented honor. In 1810, with Bolivar and Lopez Mendez, he went to London to solicit aid for the South American insurgents. Until 1829 he served as secretary of the Colombian, Chilean and Venezuelan legations in London, when he returned to Caracas. Soon after he removed to Chile, where, in 1834, he became Secretary of State. In 1842 he was appointed the first rector of Santiago University. In 1864 the United States submitted to his arbitrage a question pending with Ecuador and in the following year he was arbiter in a matter in dispute between Colombia and Peru. He was the author of Principles of International Law-* (1832) ; (Gramatica de la lengua castellana, dedicada al uso de los Americanos) (1st ed., 1847; latest edition re¬ vised and annotated by R. J. Cuervo, Paris 1874) ; (Silvas Americanas,* a poem (1827). The Chilean government published his complete works in 1881-93 QObras de Andres Bello.* 15 vols., Santiago de Chile; reprinted in (Colec-cion de escritores castellanos,* Madrid). (See

Silvas Americanas). Consult the biography by Miguel Luis Amunategui (Santiago de Chile 1882), also A Balbin de Unquera, (Andres Bello, su epoca y sus obras) (Madrid 1910).

BELLO HORIZONTE, or-e-zon'ta, the typically modern city of Brazil, capital of the state of Minas Geraes, united by rail with Rio de Janeiro. Its special distinction dates from 1897. Formerly it was a village called Cural del Rey, afterward its name was Minas, and before it was made the capital of the state it had only 3,500 inhabitants. It possesses the advantages of a climate admirably healthful and pleasant, and the surrounding country is attractive, as its name implies. Pop. (1916)

50,000.

BELLOC, bel-lok', Hilaire, English littera¬ teur : b. La Celle Saint Cloud, France, 27 July 1870. He is the son of M. Louis Belloc, a French barrister; was educated at Balliol Col¬ lege, Oxford, after serving for a time in the French artillery at Toul, and was Liberal mem¬ ber for Salford, 1906-10. In 1911-13 he lec¬ tured on English literature at East London College and in 1911 founded The EyeWitness. He has published (The Bad Child's Book of Beasts 5 (1896) ; (More Beasts for Worse Chil¬ dren } (1897) ; (The Modern Traveled (1898) ; (The Moral Alphabet (1899); (Danton,5 a much-admired biography (1899) ; (Lambkins Remains5 (1900) ; Raris5 (1900) ; Robes¬ pierre5 (1901) ; (The Path to Rome5 (1902) ; (The Old Road5 (1905); (The Historic Thames5 (1907) ; (The Pyrenees5 (1908) ; (The Party System5 (with C. Chesterton, 1911, in which the British political system is strongly a , ailed) ; (The Four Men5 (1912); (The River of London5 (1913); (The Book of Bayeux Tapestry5 (1914) ; (The Girondin5 (1914) ; (General Sketch of the European War5 (1914). During the European War he took a distinguished place as a military commentator, his articles being quoted extensively all over the world.

BELLOC, Marie Adelaide. See Lowndes, Marie Adelaide.

BELLOMONT, Earl of. See Bellamont, Richard, Earl of.

BELLONA, the goddess of war among the Romans, daughter of Phorcys and Ceto. She was called by the Greeks Enyo, and is often confounded with Minerva. She was anciently called Duellonci, and was the sister of Mars, or, according to some, his daughter or his wife. She prepared his chariot when he was going to war, and drove his steeds through the tumult of the battle with a bloody scourge, her hair dishevelled and a torch in her hand. The Romans paid great adoration to her; but she was held in the highest veneration by the Cap¬ padocians, chiefly at Comana, where she had above 3,000 priests styled Bellonarii. In the Samnite War of 296 b.c., the consul, Appius Claudius, vowed a temple to Bellona, which was erected on the Campus Martius, near the Porta Carmentalis. In it the senators gave audience to foreign ambassadors and to generals re¬ turned from war who claimed a triumph, which claims would be void did they enter the city. At the gate was a small column, called the “column of war,55 against which they threw a spear whenever war was declared. The priests of this goddess consecrated themselves by mak¬

ing great incisions in their bodies, and par¬ ticularly in the thigh, from which they received the blood in their hands to offer as a sacrifice to the goddess. In their wild enthusiasm they often predicted bloodshed and wars, the defeat of enemies or the besieging of towns. Consult Fowler. Roman Festivals5 (London 1899).

BELLOT, bel-lo, Joseph Rene, French

naval officer and Arctic explorer: b. Paris 1826; d. 21 March 1853. At the age of 16 he entered the Naval Academy at Brest, and two years afterward received a commission as eleve de marine on board the Berceau. He was pro¬ moted, for bravery in the French expedition against Tamatave in 1845, to the rank of eleve of the first class, and also created a chevalier, of the Legion of Honor, though not yet 20 years old. On his return to France in 1847 he was made a sub-lieutenant, and shortly after a two-years’ voyage to South America in the Triomphante he volunteered his services on the Royal Albert schooner, fitted out by Lady’ Franklin, in June 1851, to search for her hus¬ band, Sir John Franklin. During this expedi¬ tion he reached with a sledge party the strait now known by his name. The expedition failed in its main object, but an interesting journal of it, kept by

Bellot, was published after his death. In June 1853, he sailed again on board the Phoenix, under command of Captain Inglefield, on a new Arctic expedition, the principal object of which was to convey dispatches to Sir Ed¬ ward Belcher, then commanding H.M.S. Assist¬ ance in the Polar seas. Arrived in Erebus and Terror Bay, where lay the North Star, whose commander, Captain Pullen, was absent on a journey of discovery, Captain Inglefield set out in search of him ; but in his absence it became desirable to get the despatches conveyed to Sir Edward Belcher — a duty which Lieu¬ tenant Bellot undertook to perform by crossing the ice. Having set out with four sailors, a canoe and a sledge, the party got separated in a gale of wind on 18 August, and Bellot, with two others, drifted away on a piece of ice. With the view of ascertaining the direction the ice was taking, he crossed over to the opposite side of the hummock and was never more seen. A handsome granite obelisk was erected to his memory in front of Greenwich Hospital, and a provision was made for his sisters. Consult his (Jollrnal d'un voyage aux mers polaires,5 edited with a brief biographical notice (Paris

1854).

BELLOT STRAIT, the passage on the north coast of North America which separates North Somerset from Boothia Felix and con¬ nects Prince Regent Inlet with Franklin Chan¬ nel. Its eastern entrance was discovered in 1852 by Lieutenant Bellot (q.v.), who lost his life there. After four unsuccessful attempts it was explored for the first time by McClin-tock on his crowning voyage. It is about 20 miles long, and, at its narrowest part, about one mile wide, running nearly on the parallel of 72°, between granite shores which, everywhere high, rise here and there to 1,500 or 1,600 feet. Through this funnel both the winds and the waters have full play ; the latter, permanent cur¬ rents and flood tides alike, coming from the west. A point on the southern shore, 71° 55' N., 95° W., is the most northerly point of the North American continent.

BELLOTTO, Bernardo, Italian painter and engraver: b. Venice 1724; d. Warsaw 1780. He studied under his uncle, Antonio Canal, and painted perspective and architectural views. He passed much time in Germany and was a mem¬ ber of the Academy of Dresden, where many of his pictures are exhibited. He etched, from his own designs, views of Vienna, Dresden and Warsaw. His pictures are called by the name of Canaletto, which he assumed. Consult Meyer, cDie beiden Canaletti,1 and (Les deux Canaletti1 (Paris 1906).

BELLOWS, Albert F., American painter: b. Milford, Mass., 29 Nov. 1829; d. Auburndale, Mass., 24 Nov. 1883. In 1845 he obtained a position in the office of a Boston architect and at 19 became a partner of the firm. After a time he adopted painting for a profession and was for some years principal of the New Eng¬ land School of Design. He was one of the first to succeed with water-colors. He studied in Antwerp, Paris and England, becoming a National Academician (1861), and an honorary member of the Royal Belgian Water Color Society (1868). His landscapes are his best work. Of these the best are (Study of a Head) (1876) ; (Autumn Woods1 (1876) ; (New Eng¬ land Homestead) (1878) ; (Sunday in Devonshire) and (The Village Elm.1

BELLOWS, George Wesley, American painter : b. Columbus, Ohio, 12 Aug. 1882. He was graduated from the Ohio State University in 1905, and studied painting in New York under Robert Henri and others. Though known chiefly as a landscape painter, he has interested himself also in portraiture and the painting of figure subjects. His pictures at various American exhibitions rapidly attracted notice and he was made associate to the Acad¬ emy of Design at the age of 26, receiving the title of Academician in 1913. Meanwhile one of his works, entitled (Up the Hudson 1 had been placed in the Metropolitan Museum in New York and another, the (North River,1 in the Pennsylvania Academy. (The Coast of Maine,1 (Club Night1 and (Forty-Two Kids,1 a swimming scene, are among his most success¬ ful paintings. Further examples of his art in public institutions are (The Snow-Capped River1 at the Savannah Gallery; (Polo at Lake-wood) in the Columbus, .Ohio, Museum; (Blackwell's Bridge) at Toledo, Ohio, and (Skating1 at the Art Institute of Chicago. He has, besides, painted portraits and figure com¬ positions, the latter — some of which he has executed in lithography as well — being often in a spirit of social satire along the lines laid down by John Sloan and others. The popular nature of his painting with its employment of the dashing technique now in vogue among many artists has won him prizes at the National Academy, (1908 and 1913), at the Pittsburgh, Philadelphia, Panama-Pacific and other exhi¬ bitions.

BELLOWS, Henry Whitney, American Unitarian clergyman and writer: b. Walpole, N. H., 11 June 1814; d. 30 Jan. 1882. He was graduated at Harvard in 1832, and at the Divin¬ ity School there in 1837. He became pastor of All Souls Church, New York, 1839; became widely known as a pulpit orator, public speaker and writer; was chief founder and long editor of the Christian Inquirer (1846); chief orig¬

inator of the United States Sanitary Commis¬ sion and its president during the Civil War (1861-65). His services in this connection were of incalculable value to the country. Dur¬ ing the Civil War he supervised the expendi¬ ture of more than $5,000,000 and the distribu¬ tion of supplies valued at over $15,000,000. He assisted Peter Cooper in his plans for Cooper Union. He wrote (Public Life of Washington (1866) ; (Relation of Public Amusements to Public Morality1 ; (The Old World in Its New Face; Impressions of Europe in 1867-68) (2 vols., 1868-69) ; <The Treatment of Social Diseases) (1857) ; Restatements of Christian Doctrine) (I860).

BELLOWS, machine for blowing fire, so formed as, by being dilated and contracted, to inhale air by an orifice which is opened and closed by a valve, and to propel it through a tube upon the fire. The invention of bellows is ascribed to Anacharsis the Scythian, though probably it took place in different countries. The forms of bellows at present are very vari¬ ous, as many attempts have been made for the improvement of this highly important machine, which becomes necessary wherever a powerful flame is required in the arts. As mining was carried on at an early date in Germany, and great heat is required in smelting the ores and working the metals, various new kinds of bel¬ lows were invented in that country, one of which consists of an empty box, which moves up and down in another, partially filled with watei'. Between the bottom of the empty box and the surface of the water is a space filled with air, which is driven out by the descent of the enclosed box. Bellows of very great power are generally called blowing-machines (q.v.), The common Chinese bellows consist of a box of wood about two feet long and one foot square, in which a thick, square piece of board, which exactly fits the internal cavity of the box, is pushed backward and forward. In the bot¬ tom of the box, at each end, there is a small conical or plug valve to admit the air, and valves above to discharge it. The common bel¬ lows does not give a continuous blast but only a series of puffs. To remedy this two bellows were used, one filling while the other was blow¬ ing. The double bellows was an even greater improvement. This machine has a third board placed between two main boards ; this third board is fixed and

both it and the lower board are fitted with valves opening inward. A weight on the lower board keeps the lower chamber filled with air and when raised the air flows into the upper chamber in which the noz¬ zle is placed. A weight on the upper board tends to force the air from the upper cham¬ ber through the nozzle in a continuous stream. However, the blast is not uniform and the use of the bellows is limited to domestic fireplaces and ordinary forges. Consult Weisbach, (Me¬ chanics of Air Machinery1 (New York 1905).

BELLOWS FALLS, Vt., village in the town of Rockingham in Windham County, on the Connecticut River, so called from several rapids and cataracts occurring there. The whole descent is about 44 feet. It was formerly a famous place for spearing salmon. A canal with locks has been cut around the falls, through the solid rock. The scenery is roman¬ tic, and various interesting minerals are found

in the vicinity. Ample power is furnished by the falls and is utilized in the several manufac¬ tories which turn out dairy tools, machinery, paper, paper boxes and shirts. The lumber trade is also extensive, and farming is carried on in all the surrounding land. The village contains a public library, hospital, meeting house and is the seat of the Vermont Academy. It was settled as early as 1753, was organized as a town in 1761 and incorporated in 1833. It is governed by a president and four trustees. The waterworks are the property of the vil¬ lage. Pop. 4,883.

BELLOWS-FISH. See Globe-fish.

BELLOY, bel-lwa, Pierre Laurent Buir-ette de, French dramatist: b. Saint Flour, Auvergne, 17 Nov. 1727 ; d. 5 March 1775. The first French dramatist who successfully intro¬ duced native heroes upon the French stage. He was designed by his uncle, a distinguished advocate in the Parliament of Paris, who reared him after his father's death, for his own pro¬ fession, but while he applied himself to the law with reluctance, he showed much genius for the drama. His uncle opposed this taste, and the young man secretly left his house. He next

made his appearance as an actor under the name of ((Dormont de Belloy.55 Belloy had hoped to reconcile his family to him by the success of his first tragedy, <Titus,) but this hope was disappointed by the failure of the piece; and the author went to Saint Peters¬ burg. He returned to France, where he brought out his tragedy <Zelmire,) which met with com¬ plete success. In 1765 followed his (Siege of Calais,5 a tragedy which produced a great sen¬ sation, and is still esteemed, though it owes the applause bestowed on it rather to its subject than to its poetical merit. He received the medal promised by the King to those poets who should produce three successful pieces, and which was awarded on this occasion only, the <Siege of Calais5 being counted as two, it be¬ ing, in fact, only the second successful piece of Belloy. The city of Calais sent him the free¬ dom of the city in a gold box. Belloy wrote sundry other dramatic pieces, of which (Gaston and Bayard5 procured his reception into the Academy.

BELLS, a term used aboard ship to signify the time of day. The hours are struck by the ship's bell, not as on land, one stroke for each hour, but by a system which limits the strokes to eight, each stroke representing half an hour of a four hours' watch. The day is divided into six watches, of four hours each, beginning with noon or midnight. Thus half-past 12 is repre¬ sented by one bell; one o'clock is denoted by two bells, struck in rapid succession. Half¬ past one is struck with three bells, the first two strokes in quick succession and the third after a longer interval. Two o'clock is struck by four bells, the first two and the second two strokes, in rapid succession, being separated by an in¬ terval. At four o'clock the watch is ended with eight bells, half-past four being struck again by one bell. The watch from 4 p.m. to 8 p.m. is divided into two, each known as the ((dog watch,55 when the (<watch on deck55 shifts with the (<watch below,55 so that the periods on duty may be varied every other day, but this does not affect the system of timekeeping.

BELLS, The, the title of one of Edgar Allan Poe's most famous poems. It is also the name of the dramatic sketch in which Henry Irving appeared most successfully, adapted from Erckmann-Chatrian's (Le Juif polonais.5 It is a psychological study of remorse ; an innkeeper murders a merchant who stops with him over night, and he is so haunted by his crime that the jingling of the merchant's sleighbells are constantly ringing in his ears, finally driving him insane.

BELL'S PALSY, named after Sir Charles Bell (q.v.), a palsy of the muscles of the face supplied by the seventh or facial nerve, and due to

some peripheral lesion, in distinction to facial palsy of a central, or of a nuclear origin. It may occur on both sides of the face. The causes are many, but exposure to cold, such as sleeping in the open with the wind blowing over the face, or sitting by an open window in a railway train or steamboat, is one of the most frequent causes. It may also occur in a mul¬ tiple neuritis that is due to poisoning by alco¬ hol, lead, arsenic or the poison of diphtheria, etc., and in rare instances from fractures of the skull. It comes on suddenly, the patient often waking in the morning to find one side of his face stiff, and in two or three days the palsy has developed. There is a sense of discomfort on the paralyzed side. The patient cannot close one eye completely and cannot manage his food on the affected side. He cannot whistle, and his speech is peculiar. The wrinkles of the paralyzed side are smoothed out and every motion of the facial muscles seems to be an exaggerated one, so that many patients say their face is drawn to one side, the reality be¬ ing that it is the opposite side that is affected and immovable. The paralysis usually gets well in from three to five months, especially if the treatment is begun early and perseveringly followed out. Some patients never entirely re¬ cover, although much improvement takes place in practically all. The treatment is electrical, massage and general tonics, the administration of iron and strychnine and treatment and re¬ moval of the cause. Particular attention should be paid to the care of the paralyzed eyelid. (See also Facial Paralysis; Paralysis). Consult Starr, (Textbook of Organic Nerve Diseases5

(1903).

BELLUNO, bel-loo’no, Italy, a northern city, capital of a province of the same name, on the Piave, 48 miles north of Venice. It has a cathedral, containing some excellent paintings. The campanile is 217 feet high. There is a handsome theatre. It has manufactures of silk, straw-plait, leather and wax ; the principal trade is in silk, lumber, wine and fruit. Pop. (1911)

22,342.

BELLWOOD, Pa., borough in Blair County, 124 miles west of Harrisburg and 120 miles east of Pittsburgh, on the main line of the Pennsylvania Railroad. It was incor¬ porated in 1888. Its assessed value is $650,000 and there is a borough debt of $55,000. It has 10 miles of paved streets, two public schools, two banks, eight churches,

hotels and a weekly newspaper. It has also a fine Y. M. C. A. building, costing $50,000. Its industrial estab¬ lishments include machine shops, iron foundries and railroad repair shops. It has

good electric-light service and a good water supply. The government is vested in a bur¬ gess and elective council. Pop. 3,500

BELMAR, N. J., borough in Monmouth County, on the Atlantic coast, 55 miles south of New York City, on the Pennsylvania, the Yew Tork and Long Branch and the Central of New Jersey railroads. It is famed as a summer resort, has a splendid bathing beach, clubhouse, public library, borough building, a high school and eight graded public schools and a national bank, eight churches and nu¬ merous hotels and boarding-houses. It has manufactories of muslin underwear and shirt waists. The value of its taxable property is about $3,000,000. The borough expenses amount to about $80,000 annually. The borough owns and operates the waterworks — an artesian system. Pop. 2,500.

BELMONT, August, American banker: b. Alzey, Germany, 1816; d. 24 Nov. 1890. He was educated at Frankfort, and was apprenticed to the Rothschild's banking house in that city when 14 years old. In 1837 he went to Havana to take charge of the firm's interests, and soon afterward was sent to New York, where he established himself in the banking business and as the representative of the Rothschilds. He was Consul-General of Austria 1844-50; became charge d'affaires at The Hague in 1853 ; and was Minister-resident there in 1854-58. He was a delegate to the Democratic National Conven¬ tion in 1860, and when a portion of the dele¬ gates withdrew and organized the convention in Baltimore he was active in that body, and through it became chairman of the Democratic National Committee, an office he held till 1872. He was an active worker in the party till 1876, when he closed his political career.

BELMONT, August, American banker: b. New York, 18 Feb. 1853; son of the preceding. He was graduated at Harvard University in 1875 ; at once entered his father's banking house, and on the death of his father

became head of the firm of August Belmont & Company, also representing the European banking firm of the Rothschilds. The house, under the manage¬ ment of the son, has continued to exert the large influence in the financial and railroad affairs of the city and country that it gained under its founder. In February 1900 he organ¬ ized the Rapid Transit Subway Construction Company to back John B. McDonald, who had been awarded the $35,000,000 contract for the construction of a rapid-transit system in New York. He was elected president of the National Civic Federation in 1905, and was reelected in 1906. In 1905 he was appointed treasurer of the Democratic National Committee. He has also served as chairman of the board of di¬ rectors of the Interborough Consolidated Cor¬ poration, the Interborough Rapid Transit Com¬ pany and the Rapid Transit Subway Construc¬ tion Company.

BELMONT, Perry, American lawyer : b New York, 28 Dec. 1851 (son of August Bel¬ mont 1816-90). He was graduated at Harvard University in 1872, and at Columbia College Law School in 1876; was admitted to the bar and practised in New York till 1881, when he was elected as a Democrat to Congress and served till 1887, being a member of the com¬

mittee on foreign affairs, and in that capacity, in his first term in Congress, came into notice by his cross-examination of James G. Blaine, then ex-Secretary of State, as to his relations with a syndicate of American capitalists inter¬ ested in Peruvian guano. In 1885 he was ap¬ pointed chairman of the committee on foreign affairs, and in 1888 United States Minister to Spain. In 1889 he was commissioner to the Universal Exposition in Paris, and for his services received from the President of France, in 1890, the decoration of commander of the Legion of Honor. He was one of the princi¬ pals in the rapid-transit contract in New York, in which his brother August (q.v.) was inter¬ ested. He is a member of the Navy League and of the New York Chamber of Commerce.

BELMONT, Cape Colony, town midway between Orange River Junction and Kimberley. It was the scene of one of the earliest engage¬ ments in the war of 1899-1900, between the Boers and the British under Gen. Lord Meth¬ uen. The town was attacked by the British on 23 Nov. 1899, while on the march to the relief of Kimberley; and the battle resulted in a victory for them. Two days later Lord Methuen took Graas Pan, 10 miles north of Belmont, after again defeating the Boers.

BELMONT, N. Y., county-seat of Alle¬ gany County, on the Erie and Buffalo & Sus¬ quehanna railroads and the Genesee River, 93 miles west of Elmira. The surrounding coun¬ try is a prosperous farming and dairying com¬ munity. In the town are a number of flour mills and condensed milk factories, as well as a public library, a high school and a State agri¬ cultural college. Pop. 1,094.

BELMONTET, bel-mon-ta, Louis, French poet and publicist : b. Montauban, 26 March 1799; d. Paris, 14 Oct. 1879. He studied and practised law in Toulouse until involved in difficulties with the magistracy on account of some satirical poems, when he went to Paris and there produced his principal works : (The Sad Ones* (1824), a cycle of elegies; (The Supper of Augustus* (1828); and with Sou-met, (A Festival of Nero) (1829), a tragedy which exceeded 100 performances. In 1830 he edited the Tribune newspaper, opposed the ac¬ cession of Louis Philippe and predicted his downfall and a second revolution in a bold pamphlet addressed to Chateaubriand, for which he was arrested. In 1839 he established, to¬ gether with Messrs. Laffitte and Mauguin, a manufactory, in which the men were to share the benefits with the employers. In 1852 he became a member of the legislative assembly. Subsequently he became an ardent partisan of Bonapartism, pleading its cause as a journalist and poetically extolling the Napoleonic dynasty in many enthusiastic odes.

BELODON, an extinct reptile (B . Plieningeri) of the Triassic period, partly in¬ termediate* between dinosaurs and crocodiles, but with many archaic characters. The body was protected by bony plates, those on the back interlocking by a peg-and-socket joint. The snout was long and narrow, the external nares behind in contrast to their position in modern crocodiles, where they are at the tip of the snout. The limbs were longer than those of modern crocodiles, but the proportions were

otherwise similar. Its remains have been found in the Triassic coal-beds of North Carolina and Pennsylvania, and the red beds (estuarine sedi¬ ments) of New Mexico, as well as in European strata of

corresponding age. It was early de¬ scribed by Jaeger under the name phytosaurus, since he considered it herbivorous because of an error due to the fossilization.

BELOIT, Kan., city and county-seat of Mitchell County, on the Missouri Pacific and the Union Pacific railroads and the Solomon River, 184 miles west of Atchison. Besides being the seat of the State Industrial School for Girls, it has an opera house, a large post-office building and a library. Being in a grain-producing country, the city contains a number of grain elevators and flour mills. A rock quarry gives the city a considerable trade in building stones. Pop. (1920) 3,315.

BELOIT, Wis., city in Rock County, on the Rock River, and the Chicago & N. W. and Chicago, M. & St. P. railroads, 85 miles south¬ west of Milwaukee and 91 miles west of Chi¬ cago. The city derives fipe power for manu¬ facturing from the river, and has the second largest woodworking machinery plant in the world, besides manufactories of gas-engines, windmills, iron, paper-mill machinery, paper, rye flour (the oldest mill of its kind in the country), gasoline engines, agricultural imple¬ ments, tools, scales and shoes. The United States census of manufactures for 1914 reported 50 industrial establishment's of factory grade, employing 3,826 persons, of whom 3,527 were wage earners receiving a total of $2,346,000 annually in wages. The capital invested aggre¬ gated $9,647,000, and the value of the year's output was $6,928,000; of this $3,915,000 was the value added by manufacture. The city is widely known as the seat of Beloit College (q.v.). It was first settled in 1836, and received its city charter in 1856. It is governed by a mavor, chosen for two years, and a council. Pop. (1910) 15,125; (1920) 21,284.

BELOIT COLLEGE, a coeducational (non-sectarian) institution in Beloit, Wis.; organized in 1846 by the Congregational and Presbyterian Churches. Reported at the end of 1916: Professors and instructors, 37; students, 388 ; volumes in the library, 56,000 ; grounds and buildings valued at $600,000 ; pro¬ ductive funds, $1,500,000; income, $94,000; number of graduates, 1,503.

BELOMANCY, divination by arrows, practised by the ancient Scythians and other nations. One of the numerous modes was as follows : A number of arrows, being marked, were put into a bag or quiver, and drawn out at random, and the marks or words on the arrow drawn determined what was to happen. Consult Ezekiel, xxi, 21. (See Superstition).

BELON, be-lon', Pierre, French naturalist and writer: b. Soulletiere, 1517; d,, 1564. He was first a medical student, then traveled extensively in the Orient, devoting him¬ self at the same time to a close observation of nature. His works form the distinct be¬ ginnings of the sciences of ornithology and comparative anatomy. His. books include (Les observations de plusieurs singularites et choses memorables trouvees en Grece) (1551) ; (Judee, Egypte, Arabie, et autres pays etranges, redi¬

gees en trois livres) (1553-58); (Histoirc naturelle des etranges poissons marins' (1551); Hdistoire de la nature des oiseaux, avec leurs pourtraics graves en bois ; plus la vrai peinture et description du Dauphin et de plusieurs au¬ tres raies de son espece) (1555).

BELOOCHISTAN. See Baluchistan.

BELOT, be-16', Adolphe, French novelist and dramatist: b. Pointe-a-Patre, 6 Nov. 1829; d. Paris, 17 Dec. 1890. He traveled extensively and settled at Nancy as a lawyer. He won reputation with a wfitty comedy, (The Testa¬ ment of Cesar GirodoD (1859, with Villetard) ; and, being less successful with his following dramatic efforts, devoted himself to fiction. Of his novels may be mentioned (The Venus of Gordes) (1867, with Ernest Daudet) ; (The Drama of the Rue de la Paix) (1868) ; Arti¬ cle 47> (1870); all of which were dramatized.

BELOVED DISCIPLE, The, a name by which Saint John is sometimes known, from the reference to him in John xiii, 23, wherein he is described as <(one of His disciples, whom Jesus loved.®

BELOVED PHYSICIAN, The, a name sometimes applied to Saint Luke. Consult Colossians iv, 14.

BELPER, England, market town of Der¬ byshire, on the left bank of the Derwent, over which there is a handsome stone bridge of three arches, eight miles north of Derby, on the Midland Railway. It has three churches, besides other places of worship, a public hall, with reading-rooms, library, *etc.* There are large cotton-mills, first established in 1776, hosiery works, engineering w'orks, foundries and collieries. It is a thriving town and has recently been much improved. Pop. 11,640.

BELPHEGOR. (1) An arch-demon ap¬ pointed by Pluto and his council to undertake an earthly marriage, who fled unable to endure female companionship. He has been made the subject of one of La Fontaine's

<Contes) and also of an English play by Wilson, (Belphegor, or the Marriage of the Devil,) published in

(2) An English play by Charles Webb, translated and adapted from the French ‘PaliasseP in which the chief character is Belphegor, a mountebank. Another play of this name has appeared since.

(3) One of the deities of the Moabites, worshipped with peculiarly disgusting rites.

BELSHAM, Thomas, English Unitarian clergyman: b. Bedford 1750; d. 11 Nov. 1829. He became pastor of the Dissenting congrega¬ tion and theological tutor of an academy at Daventry in 1781. At this time he was a Cal¬ vinist, but a change of views unfitted him for this situation and he became tutor of an acad¬ emy which had been recently established at Hackney. This institution soon failed for want of funds and Belsham removed first to the Gravel Pit Chapel, which had been occupied by Dr. Priestly, and afterward to Essex Street Chapel, where he officiated for some time as the colleague of Lindsey, and latterly as sole pastor till his death in 1829. His works are chiefly of a controversial nature and probably attract¬ ed attention as much from the celebrity of the works which they attacked as from their own merits. His first appearance in the polemical

field was as an opponent of Wilber force, of whose celebrated ‘Practical View of the Pre¬ vailing Religious Systems’ he published a re¬ view. His doctrine regarding the person of Christ represents the humanitarian view. He also published a work on mental and moral ph losophy and ‘Memoirs of Mr. Lindsey ’ (1812, reprinted Boston 1873), which was re¬ viewed by the celebrated Robert Hall. Con¬ sult his ‘ Memoirs, ’ edited by J. Williams (Lon¬ don 1883). His brother, William Belsham (b. 1752; d. 1827), wrote much on history and was the author of numerous political pamphlets espousing the cause of the Whigs. He is the author of a ‘History of Great Britain from 1688 to 1820’ (14 vols, London 1805-24).

BELSHAZZAR, mentioned in the book of Daniel as the son of Nebuchadnezzar and the last of the Chaldsean dynasty who reigned at Babylon, who was slain and his empire sub¬ jugated in the Median conquest under Darius. The last king, however, according to history and the monumental inscriptions, was Naboni-dus, who had a son named Bel-surra-user, who was probably associated with him in the gov¬ ernment and is supposed to have been slain at the battle of Akkad, in the successful campaign of Cyrus in which Babylon fell (b.c. 539). The interesting circumstances which immedi¬ ately preceded this event, and are recorded at length in the book of Daniel, have repeatedly furnished subjects to painters and poets.

BELT, The Great and Little, two straits of Denmark, connecting the Baltic with the Cattegat. The former runs between the islands of Zealand and Funen, and is about 15 miles wide, where it is crossed from Nyborg, in Funen, to Corsoer, in Zealand. The greatest breadth of the strait is 20 miles. The navigation is very dangerous, on account of the many small islands and sandbanks by which the channel is impeded. The Little Belt is between the island of Funen and the coast of Jutland, and the narrowest part of the strait is not more than a mile wide. At this place stands the fortress Fredericia, where tolls were formerly paid. The fortress completely commands the entrance from the Cattegat. The Sound, between Zea¬ land and the Swedish coast, is preferred for all large vessels entering or leaving the Baltic.

BELT, in astronomy, a varying number of dusky, belt-like bands or zones encircling the planet Jupiter parallel to his equator, as if the clouds of his atmosphere had been forced into a series of parallels through the rapidity of his rotation, and the dark body of the planet was seen through the comparatively clear spaces between.

BELTANE. Sec Baal.

BELTON, Tex., city and county-seat of Bell County, situated on the Leon River, 56 miles northeast of Austin City, and on the Gulf C. & S. F. and the Missouri, Kansas & Texas railroads. Baylor Female College (Bap¬ tist) is located here, and there is a county court¬ house and a Carnegie library. It is in a cotton¬ growing district, near some good building-stone quarries, and has a considerable export trade; its chief manufactories are cotton-mills, a (ottonseed oil-mill, flour-mills, foundries, lum¬ ber yards and marble works. Pop. 5,000.

BELTRAFFIO, bel-lrafVo, or BOL-TRAFFIO, Giovanni Antonio, Italian

painter: b. Milan 1467; d. 1516. He was a pupil of Leonardo da Vinci and imitated him in the treatment of his subject and in the use of color. Among his works, the best of which are in his native city of Milan, are several portraits; a ‘Virgin and Child,’ in the National Gallery, London, and a ‘Madonna of the Casio Family.’

BELTRAMI, bel-tra’me, Eugenio, Italian

mathematician: b. Cremona, 16 Nov. 1835; d. 18 Feb. 1900. He studied at Pavia. In 1862 he was professor at Bologna, then professor at Pisa, Rome and Pavia, and in 1891 again at Rome. He was president of the Academy of the Lincei. His work has been chiefly in non-Euclidian geometry, in which he did valuable work; also in electricity and magnetism. His ‘Mathematical Works’ (1902) and ‘Bibliog¬ raphy of Mathematics’ (1901) were published by the University of Rome after his death.

BELTRAMI, Giovanni, Italian lapidary: b. Cremona 1779; a. _854. He was self-edu¬ cated and at the time of French rule in Italy found a patron in Eugene Beauharnais for whom he made a chain of 16 cameos, illustrating the story of Psyche. Among his other notable works is a reproduction of the ‘Last Supper’ of Leonardo da Vinci on a topaz.

BELUGA, or BIELAGA, be-la’ga. See Sturgeon.

BELUS, the Roman name of the Assyrian and Babylonian divinity called Bel in Isaiah xlvi, 1.

BELUS, a Phoenician river at the base of Mount Carmel. Its fine sand, according to tradition, first led the Phoenicians to the inven¬ tion of glass.

BELUS, Temple of, an enormous temple in ancient Babylon, rebuilt by Nebuchadnezzar about 604 b.c. Its site is thought by some authorities to be the modern Bers-Nimrud, and by others Babil, both situated near Hillah.

BELVEDERE, bel-ve-der’ (It. “ fine sight ”). A name given in Italy to buildings destined for the enjoyment of prospects. The name is also given to small cupolas on houses built for the advantage of fresh air, or of the view which they afford. Many of the buildings in Rome are fur¬ nished with such cupolas ; yet the term “belvedere” is generally applied only • to those on the palaces of the rich. This is the name also of a part of the Vatican where the famous statue of Apollo is placed, which, on this ac¬ count, is called Apollo Belvedere. Other build¬ ings

so named are an open hall in the imperial gardens at Schonbrunn, the palace of Prince Eugene in Vienna, and a summer-house in the royal palace, Prague.

BELVIDERE, bel-vi-der', Ill., city and county-seat of Boone County, on the Kishwau-kee River, and the Chicago & N. W. Railroad, 78 miles northwest of Chicago. An important farming and dairying trade centre, and con¬ tains railroad shops, one of the largest sewing-machine and bicycle works in the country, manufactory of sewing-machine supplies, flour¬ mills, creamery and other industries ; and has a public library, opera house, a courthouse, county-record building, two national banks, sev-

era! daily and weekly periodicals and a property valuation of about $2,000,000. Settled in 1836, it was incorporated in 1857. It is governed by a mayor, elected biennially, and a city council. Pop. (1920) 7,804.

BELVIDERE, N. J., town and county-seat of Warren County, on the Pennsylvania and Lehigh & Hudson River railroads and the Delaware River, 62 miles northwest of Tren¬ ton. It is an industrial centre of some im¬ portance, having a large silk mill, furniture, felt and hosiery factories and a number of flour mills, all of which are supplied with power from Request Creek where it empties into the Delaware. Pop. 1,764.

BELZONI, bel-zo'ne, Giovanni Battista

(John Baptist), Italian traveler: b. Padua 1778; d. 3 Dec. 1823. Destined for a monastic life he was educated at Rome, but left the city when it was occupied by the French and in 1803 went to England, where he acted in Ast-ley's amphitheatre. Here he acquired, besides an acquaintance with the English language, much knowledge of the science of hydraulics, the study of which had been his chief occupa¬ tion in Rome and which afterward carried him to Egypt. He left England after a residence of nine years and took his way through

Portu¬ gal, Spain and Malta to Egypt. There he lived from 1815 to 1819, at first as a dancer, till he won the favor of the pasha. Belzoni kept the rude inhabitants of the country in awe by his extraordinary stature and strength. The ob¬ ject of his journey to Egypt was to build a hydraulic engine for Mohammed Ali, to raise the waters of the Nile. Here he met Burckhardt and Salt and by them was advised to take up the exploration of Egyptian antiquities. He opened the second of the pyramids of Ghizeh, known by the name of Cephrenes. In the year 1816 he succeeded in transporting the bust of Memnon from Thebes to Alexandria, whence it was taken to the British Museum. In 1817 he entered several catacombs near Thebes, especially one in a fine state of preser¬ vation in the valley of Biban el Molook, which is considered to be the mausoleum of Psamme-tichus, and from which he took the splendid alabaster sarcophagus which is now in the Brit¬ ish Museum. On 1 August in the same year he opened the temple of Ipsambul, near the second cataract of the Nile, which two Frenchmen, Cailliaud and Drovetti, had discovered the year before, but had not succeeded in opening. Bel¬ zoni discovered a subterranean temple in its ruins, which until that time had been unknown. He then visited the coasts of the Red Sea and the city of Berenice, discovering the emerald mines of Zubara and made an expedition into the oasis of Jupiter Ammon. Belzoni refuted Cailliaud's assertion, that he had found the famous Berenice, the great emporium of Europe and India, by subsequent investigations on the spot, and by the actual discovery of the ruins of that great city four days' journey from the place which Cailliaud had taken for Berenice. Belzoni's (Narrative of the Operations and Re¬ cent Discoveries within the Pyramids, Temples, Tombs and Excavations in Egypt and Nubia; and of a Journey to the Coast of the Red Sea in Search of Berenice ; also of another to the Oasis of Jupiter Ammon' (London 1820), ac¬

companied by a folio volume of 44 copperplate engravings, was received with general approba¬ tion. Padua, his native city, requited his pres¬ ent of two Egyptian statues from Thebes with a medal by Manfredini. In the year 1823 this enterprising traveler had made preparations for passing from Benin to Hausa and Timbuktu, when he died at Gato, on his way to Benin, 3 Dec. 1823. His knowledge of draughtsmanship was of great service to him in his archaeological researches. In 1829 his widow published his fine drawings of the royal tombs of Thebes. He believed the Nile and Niger to be different streams, and that the Niger emptied its waters into the Atlantic Ocean; opinions which have long been proved to be correct.

BEM, Jozef, a distinguished military com¬ mander: b. Tarnow, in Galicia, 1795; d. Aleppo, Syria, 1850. He was educated at the University of Cracow, and in 1810 was admitted into the corps of cadets founded at Warsaw by Na¬ poleon, afterward entered the horse artillery, and took part as lieutenant in the expedition of the French army in Russia. For the bravery here displayed by him he received the decora¬ tion of the cross of the Legion of Honor. On hearing of the outbreak of the Polish revolu¬ tion, he at once hurried to Warsaw, and dur¬ ing the whole of the Polish struggle he dis¬ played great gallantry and military skill. On the night of 7 Sept. 1831, he held the bridge of Praga with his artillery, but the following morning, on hearing of the agreement con¬ cluded with the Russians, withdrew to Modlin. After the fall of Warsaw he went to Prussia, and in 1832 to Paris, where he was occupied partly with political schemes, partly with scien¬ tific pursuits. Upon the commencement of the Austrian insurrection in 1848, Bern proceeded there and took a prominent part in conducting the defense of Vienna against the imperial troops. Toward the end of the year he re¬ ceived a commission from the new Hungarian government to undertake the conquest of Tran¬ sylvania, and crossed over into that territory at the head of a large army, raised by his own exertions in an incredibly short space of time. His progress here was marked with great suc¬ cess, with occasional checks ; and in March 1849, he succeeded in driving the Austrians, with their Russian auxiliaries, into Wallachia. He subsequently made an incursion into the Banat, which he compelled Puchner to evacu¬ ate. Returning to Transylvania, he found him¬ self opposed by overwhelming numbers, and, after several reverses, returned to Hungary, where he took part in the disastrous battle of Temesvar. Shortly after he went to Turkey, became a convert to Mohammedanism, and re¬ ceived an appointment in the Sultan's army under the name of Amurath Pasha. He wrote a work on mnemonics entitled (Expose general de la methode mnemonique polonaise.' Con¬ sult Czetz, (Bems Feldzug in Siebenburgen ' (Hamburg 1850) ; and Lajos, N., (Le general Bern' (Paris 1851).

BEMA, be'ma (Gr. bema, a step, raised place), the name applied in the Greek Church to the sanctuary because of its position above the rest of the church. The inconostasis or choir screen divides it from the main portion of the church.

BEMAN

BEMAN, Wooster Woodruff, American mathematician : b.

Southington, Conn., 28 May 1850. Graduating from the University of Michigan in 1870, he was appointed instructor in Greek and mathematics at Kalamazoo Col¬ lege. A }-ear later he was appointed to the same position at the University of Michigan, where he became professor of mathematics in 1887. In collaboration with David Eugene Smith he wrote (Plane and Solid Geometry > (1895) ; (Higher Arithmetic } (1897) ; (Famous Problems in Elementary Geometry) (1897) ; (New Plane and Solid Geometry* (1899) ;

(Elements of Algebra* (1900) ; (A Brief His¬ tory of Mathematics* (1900) ; (Academic Al¬ gebra } (1902).

BEMBATOKA, Bay of, a safe and com¬ modious bay on the northwest coast of Mada¬ gascar, lying in lat. 16° S. and long. 46° E. The river Betsiboka, with the Ikiopa, drain into the bay; the former, about 300 miles long, is navi¬ gable for small steamers for about 90 miles. Mojanga, on the north side of the bay, is the second town in the island, with about 14,000 inhabitants, Bembatoka being but a village.

BEMBERG, ban-bar, Henri, French com¬ poser: b. Paris 1861. He studied at the Paris Conservatory, where he had among his teachers Dubois, Franck, and Massenet. His principal works are (Le Baiser de Luzon,* a one-act opera (1888) ; and (Elaine,* a four-act opera successfully produced in London 1892, and in New York 1894. He is popularly known as the author of many songs and works for piano. In his native land he is regarded principally as a dramatic composer.

BEMBXCID2E, bem-bis'f-de, a family of wasp-like hymenopterous insects with stings, mostly natives of warm countries, and known also as sand-wasps. The female excavates cells in the sand, in which she deposits, together with her eggs, various larvae or perfected insects stung into insensibility, as support for her prog¬ eny when hatched. The insects are very ac¬ tive, fond of the nectar of flowers and delight in sunshine. Bembix is the typical genus of the family.

BEMBO, Pietro, Italian scholar and writ¬ er: b. Venice, 29 May 1470; d. 18 Jan. 1547. At Ferrara he completed his philosophical studies, and after visiting Rome went, in 1506, to the court of Urbino, at that time one of those Italian courts where the sciences stood highest in esteem. In 1512 he went to Rome, where Pope Leo X made him his secretary. His many labors arising from his office, as well as his literary pursuits, and perhaps too great an indulgence in pleasure, having impaired his health, he was using the baths of Padua when he was apprised of the death of Leo X. Being by this time possessed of several church bene¬ fices, he resolved on withdrawing entirely from

business, and on passing his days at Padua, oc¬ cupied only with literature and science, and enjoying the society of his friends. Bembo collected a considerable library; had a cabinet of medals and antiquities, which at that time passed for one of the richest in Italy, and a fine botanical garden. In the year 1529 the office of historiographer of the republic of Venice was offered to him, which he accepted, declining the salary connected with it. At the vol. 3 — 32

same time he was nominated librarian of the library of Saint Mark. Pope Paul III, having resolved upon a new promotion of cardinals, from the most distinguished men of his time, conferred on him, in 1539, the hat of a car¬ dinal. From that time Bembo renounced the belles-lettres, and made the Fathers and the Holy Scriptures his chief study. Of his former labors he continued only the (History of Ven¬ ice. } Two years later Paul III bestowed the bishopric of Gubbio on him, and soon after the rich bishopric of Bergamo. Bembo's influence on the literature of Italy was deep and lasting. By his works, especially the (Prose della volgar lingua) (1525) he helped bring about the tri¬ umph of classic tradition in Italian. In poetry he aroused an increased interest in Petrarch and the resulting imitation of the latter by the Italian poets for a long period is known as bembism. A collection of all his works ap¬ peared in 1729, at Venice, in four folio volumes. Consult Fletcher, J. B., (The Religion of Beauty in Woman) (New York 1911) ; Spin-garn, (History of Criticism in the Renaissance> (2d ed.. New York 1906) ; Symonds, Renais¬ sance in Italy> (London 1881) ; Trabalza, (Storia della graminatica italiana) (Padova

1908).

BEMBRIDGE BEDS, in geology, a fossil-iferous division of the Oligocene strata, prin¬ cipally developed at Bembridge, in the Isle of Wight, consisting of marls and clays resting on a compact, pale-yellow or cream-colored lime¬ stone, called Bembridge limestone. They ex¬ hibit a rich molluscan and insect fauna.

BEMENTITE, a mineral occurring at Franklin Furnace, N. J., in radiated-stellate masses. It has a grayish-yellow color and pearly lustre, is soft and has a specific gravity of about 3.0. It is a hydrous silicate of manga¬ nese, having the formula RMnSiCh. It was named

in honor of C. S. Bement, whose un¬ rivaled private collection of minerals is now in the American Museum of Natural History in New York city.

BEMIDJI, Minn., city and county-seat of Beltrami County, on the Great Northern, the Minneapolis, Red Lake & Manitoba and the Minneapolis, Saint Paul & Sault Sainte Marie railroads, 180 miles west of Duluth. It has a State normal school and several Federal build¬ ings. Lumbering is the principal industry of the neighborhood. Bemidji is also a popular summer resort, being situated on the shore of a picturesque lake. Pop. (1920) 7,086.

BEMIS, Edward Webster, American econ¬ omist and public utility expert : b. Springfield, Mass., 7 April 1860. He was graduated at Amherst College in 1880; received degree of Ph.D. in 1885 at Johns Hopkins University after over three years' advanced work in eco¬ nomics and history; was a pioneer lecturer in the university extension system, 1887-88 ; pro¬ fessor of economics and history, Vanderbilt University, 1889-92; and associate professor of economics, University of Chicago, 1892-95. In 1897 he was professor of economics and history in the Kansas State Agricultural College. He was superintendent of the city water department of Cleveland, Ohio, 1901-09; deputy commis¬ sioner of water supply, gas and electricity of New York, 1910; consulting expert for cities and

States on public utilities since 1910. He is now a member of the advisory board, valuation di¬ vision, Interstate Commerce Commission, city representative on board of supervising engi¬ neers, Chicago Traction, and director of valua¬ tions of public utilities for the District of Columbia, the city of Dallas and other places. He published (Municipal Monopolies) (1899) and many scientific studies of cooperation, trades unions, immigration, etc., but since 1900 has chiefly confined his writing to technical reports for various public bodies.

BEMIS HEIGHTS, N. Y, village in Sara¬ toga County, on the Hudson

River, famous as the scene of the first battle of Stillwater, 19 Sept. 1777. See also Saratoga, Battle of.

BEMISS, Samuel Merrifield, American surgeon in the Confederate army: b. Nelson County, Ky., IS Oct. 1821. He received his early training and education from, his father, Dr. John Bemiss, and from private tutors, and was graduated at the medical department of New York University in 1846. He practised in Bloomfield, Ky., until 1853, when he removed to Louisville, and in 1858 became connected with the medical department of the University of Louisville, filling various chairs, and at times was secretary and vice-president. From 1862 to 1865 he was a surgeon in the Confederate army. After the war he settled in New Or¬ leans, and in 1866 he became professor of the theory and practice of medicine in the Univer¬ sity of Louisiana. He became a member of the State board of health and of the American Medical Association, being its vice-president in 1868, and of other medical societies. He con¬ tributed papers to the literature of his pro¬ fession, among which are (Essay on Croup) and (Report on Consanguineous Marriages. y He was also editor of the New Orleans Medical and Surgical Journal.

BEMMEL, Peter von, German painter: b. Nuremberg 1685; d. 1754. He was educated by his father, also an artist, and was employed by the Prince Bamberg, Franz Konrad von Stadion in adorning the walls of his palaces. Many of his paintings are preserved at Bam¬ berg and Brunswick. Of the Bemmel family 14 were prominent as artists.

BEN (Hebrew, son), a prepositive syllable found in many Jewish names, as Bendavid, Benasser, etc., which, with the Jews in Germany, has been changed into the German sohn (son), for example, Mendelssohn, Jacobssohn, *etc.* In Arabic the plural form Beni occurs in the names of many tribes, as Beni Omayyah and in those of places, as Beni Hassan.

BEN, BEINN, or BHEIN, a Gaelic word signifying mountain peak or head, and prefixed to the names of many mountains in Scotland north of the firths of Clyde and Forth, as Ben Nevis and Ben MacDhui. It also occurs in Ireland, as Ben Eadar, Eadar's mountain (the modern Hill of Howth), and Nephin (Gaelic Neamh-bhein, white mountain). Pen, which occurs in Welsh and Cornish nomenclature, is a corresponding term. The term Pen is also found in the Pennine Alps and in the word (< Apennines,® and some hold that it, occurs in somewhat disguised form in the Cevennes of France.

BEN, Oil of, the expressed oil of the bennut, the seed of Moringa aptera , the ben oe horse-radish tree of India, northern Africa and Arabia. The oil is inodorous, does not become rancid for many years, and is used by per¬ fumers and watchmakers. In perfumery it is used in extracting the fragrant principles of various plants.

BEN BOLT, a noted poem by Thomas Dunn English (1843) set to an old German air. It had been partially forgotten when it was revived by its effective employment in Du Maurier's (Trilby.)

BEN HUR: A Tale of the Christ, a popu¬ lar novel, by Lew Wallace, published 1880. The scene of the story is laid in the East, principally in Jerusalem, just after the Christian era. The first part is introductory, and details the coming of the three wise men, Melchior, Kaspar and Balthasar, to worship the babe born in the manger at Bethlehem. In the course of the narrative, which involves many exciting adven¬ tures of Ben Hur, hero, John the Baptist and Jesus of Nazareth are introduced, and Ben Hur is converted to the Christian faith through the miracles of our Lord. The tale has been suc¬ cessfully dramatized, its spectacular features, especially the chariot race, having made it a prime favorite.

BEN HUR, The Tribe-of. A fraternal

beneficial society founded upon Gen. Lew Wal¬ lace's book, (Ben Hurp a tale of the Christ, the life of the young Hebrew, Ben Hur, fur¬ nishing the attributes of devotion to family and people and faith in God. The society was or¬ ganized in Crawfordsville, Ind., in 1894 by David W. Gerard, Frank L. Snyder and others. Through this society Gerard found opportunity to express and put in operation a broad and practical system of mutual philanthropy and, though defective in its financial plan, yet so far was the plan in advance of fraternal operation of the time that for more than 20 years it suc¬ cessfully carried out the purposes of its found¬ ers. In 1908 the society adopted the National Fraternal Congress table of mortality as a basis upon which to determine the benefits to be provided and contributions to be collected therefor, and this table of mortality has since become the legal standard of this (Indiana) and many other States. The beneficial department of the Society provides substantial benefits upon the death or disability of its members. The benevolent purposes of the Society are carried out by means of local courts or lodges char¬ tered by the supreme or governing body. At the close of 1915 the Society had over 100,000 members in 1,356 local organizations, and had paid to the beneficiaries of its members over $14,000,000 in benefits.

BEN-LAWERS, a huge pyramidal moun¬ tain of Scotland, Perthshire, on the north bank of Loch Tay, 3,984 feet above the level of the sea, or 4,004 with the cairn at the top. Many rare Alpine mosses and other plants are found on it.

BEN-LEDI. a Scottish mountain, lying northwest of Callander, Perthshire, reaching the height of 2,875 feet above sea-level. It is somewhat difficult of ascent, but gives a splen¬ did view. High up on it there is a small loch. It is mentioned in Scott's (Ladv of the LakeP

its name, Ben le Via, (<God's mountain,** was bestowed by the Druids, who were wont to celebrate the Bealteine, or sun-festival, on its summit.

BEN-LOMOND, a Scottish mountain at

the western extremity of Stirlingshire, on the east shore of Loch Lomond. The ascent is divided into three great stages, and the top has an elevation of 3,192 feet above sea-level. On the southeastern side it presents a sheer preci¬ pice of about 2,000 feet. From the hotel at Rowardennan, on the east shore of the loch, to summit, the distance is four miles. The lower part is well wooded, and the upper affords excel¬ lent healthful pasture. It commands a most extensive prospect of the vale of Stirlingshire, the Lothians, the Clyde, Ayrshire, Isle of Man, Hills of Antrim, and all the surrounding highland territory. Like Ben-Lawers this is one of the botanical gardens of the highlands.

BEN-MORE (the great mountain), a coni¬ cal hill between Loch Dochart and Loch Voil, western part of Perthshire, among the Braes of Balquhidder. It rises to an elevation of 3,843 feet above the level of the sea. Several other hills also bear this name.

BEN-MUICH-DHUI, ben-mak-doo'e, or LEN-MAC-DHUI (Gael. Ben-na-muice-dubh, mount of the black pig), the second highest mountain in Scotland, situated in the southwest corner of Aberdeenshire, on the borders of Banffshire. It is a granite mass, rising to the height of 4,296

feet, and forms one of a cluster of lofty mountains, among which are Brae-riach, Cairntoul, Cairngorm, Ben-a-bourd and Ben-A'an. Its upper parts are bare of vegetation. The view from the top includes the Moray Firth, the hills of Caithness and Sutherland, Ben Nevis, Benmore, *etc.*

BEN NEVIS (Gael, ben, mountain, + neamhis, heavenly), a Scottish mountain now ascertained to be the most lofty height in Great Britain, is situated in the southwestern extrem¬ ity of Inverness-shire, immediately east of Fort William and the opening of the Caledonian Canal into Loch Eil. It rises from the brink of the latter piece of water to the height of 4,406 feet. In clear weather a view can be obtained from its summit across nearly the whole of the north of Scotland from sea to sea. It consists principally of a fine brown porphyry, and contains red granite of a beau¬ tiful grain. Its base has a circumference of 24 miles. It has some very lofty precipices, and in its fissures the snow remains unmelted, even in the warmest weather. An observatory occupied by a resident staff was established on the top of the mountain by the Scottish Mete¬ orological Society in 1883.

BENADIR, ben'a-der', administrative district in Italian Somaliland, at the mouth of the Juba River, on the east coast of Africa. In 1892 this territory was leased from the Sul¬ tan of Zanzibar for a small annual sum, but in 1905 it was purchased for $700,000. The Italian administration is enforced by a police force and a garrison of about 3,000 men. Cat¬ tle and cotton are exported in considerable quantities. Mogadisho is the largest town, with a population of about 10,000, being also the administrative centre.

BENAIAH, be-na'ya, the name of 12 different persons mentioned in the Bible, the most important being a son of Jehoiada, a chief priest. He figures as a mighty and valiant warrior who overcame two Moabite champions, slew an Egyptian giant with the giant's own spear, went down into a dry cistern and slew a lion that had fallen in while it was covered with snow, and killed the rebels Adonijah and Joab. He was made commander-in-chief in Joab's place by Solomon.

BENALCAZAR, ba-nal-ka'thar, Sebas¬ tian de, Spanish leader, the first conqueror of Popayan, New Granada: b. about the end of the 15th century, at Benalcaz, in Estremadura, Spain; d. 1550. He set out as a common sailor in the train of Pedrarias, the newly appointed governor of Darien, 1514. The ability and daring of young Sebastian gained for him the confidence of Pizarro, who sent him against the Indian leader,

Ruminahui. Sebastian was favored at the moment of engagement by a happy accident; the volcano of Cochabamba suffered an eruption. The frightened Peruvian army lied to Quito and Sebastian then possessed himself of the smoking ruins of this city. From here he passed northward and conquered the territory possessed by a chief named Popayan, whose name he preserved to desig¬ nate the territory over which the former had held sway. Inflamed by the speeches of an Indian captive, who spake strange words about a chief farther north, anointed with gold powder, Benalcazar and his band determined to visit and conquer this El Dorado, or chief of gold. After traversing vast forests, in 1534, he arrived at the country which afterward re¬ ceived the name of New Granada. Arrived there, he found himself forestalled by two other Spanish adventurers or conquistadores. He re¬ turned to Popayan, and was made governor of this province by a decree dated 1538. When La Gasca succeeded in supplanting Diego Pizarro, he deprived Sebastian of his governor¬ ship.

BENARD, ba-nar', Henri Jean Emile,

French architect: b. Goderville 1844. As a student of the Ecole des Beaux Arts in Paris, he competed for and won the Prix de Rome in 1867. In 1899 he was the winner out of a hundred competitors for the plans for the University of California. With some modifica¬ tions his plans have been followed in the build¬ ing of the university buildings, at a cost so far of $10,000,000.

BENARES, be-na'rez, India, a division in the Northwestern Provinces with an area of 10,414 square miles, largely made up of rich cultivated flats on each side of the Ganges. The heat in summer is excessive, but in winter fires are requisite. About 50 per cent of terri¬ tory is irrigated by wells and canals. Garden stuffs, grain of different kinds, flax for oil and sugar, are the principal objects of cultivation. Rice, for which many parts of the soil seem well adapted, is seldom grown. Muslins, silks and gauzes, salt, indigo and opium are made very extensively. The principal town is Benares. Pop. about 5,368,600, about 90 per cent Hindu.

BENARES (in Sanskrit, Varanasi), Hin¬ dustan, a town in Northwest Provinces, in the

division of the same name, on the left bank of the Ganges, from which it rises like an amphi¬ theatre, presenting a splendid panorama of temples, mosques, palaces and other buildings, with their domes, minarets, *etc.* Fine ghauts lead down to the river. It is built of freestone and contains many handsome and highly decorated houses, but the height of the houses and narrowness of the streets give it all the usual inconveniences of an Asiatic town. Kasi the Splendid, as the Hindus commonly call it, is one of the most sacred places of pilgrimage in all India, being the headquarters of the Hindu religion. To die at Benares is the great¬ est happiness for a Hindu, because he is then sure of immediate admission into heaven. The number of pious foundations and temples is exceedingly great. There is a continual influx of wealthy pilgrims into the city, and many of the Hindu princes have a town residence here. The principal temple, called Bisheswar, is dedi¬ cated to Siva. Aurungzebe built a splendid mosque on the highest ground in the city, and it is the most prominent object from the river side. At the end of the 17th century an ob¬ servatory was erected in this city by one of the rajahs, which still exists. One of the temples has a great number of sacred monkeys attached to it. Altogether there are about 1,500 Hindu temples. Among the municipal structures are the government college, hospitals, townhall, asylums, swimming baths and waterworks. Benares carries on a large trade in the produce of the district and in English goods, and manu¬ factures silks, shawls, embroidered cloth, jewelry, *etc.* The merchants and bankers are numerous and wealthy. There are few English inhabitants, except the government officers, and the members of the various missions. Kasi was ceded to the East India Company by the Nabob of Oude in 1775. During the mutiny of 1857 a serious outbreak occurred here. The Benares College was opened in 1791. It is maintained by the government and includes the Sanskrit College, with over 400 students, and the English College, with about 100. It occupies a fine building, completed in 1852. Pop. about 204,000. Consult Sherring, (Sacred City of the Hindus ' (1869); Havell, (Benares, the Sacred City)

(1911).

BENAVENTE, be-na-ven-te, Y MARTI¬ NEZ, Jacinto, Spanish dramatist : b. Madrid, 12 Aug. 1866. His father, Mariano Benavente,

was a specialist in children's diseases, and enjoyed high repute in Madrid. He studied at the University of Madrid, at first intending to follow the law, but failed to complete the course. For a time he traveled with a circus and subsequently appeared upon the stage, upon which he has ever since been an occasion¬ al performer. His first publication was a vol¬ ume of poems (1893), which was followed by <Vilanos) (or thistledown*), <Figurines) and the Ladies' Letter Writer,) impression¬ istic sketches of great subtlety and delicacy of workmanship, which display strong French influence. These works have the same sig¬ nificance in the renascence of Spanish letters as the early canvases of Sorolla, exhibited at Madrid in the year 1893, in the rebirth of Spanish painting. In this year also Ignacio Zuloaga completed his sojourn of apprentice¬ ship in Paris. Benavente produced his first

play, (E1 Nido Ajeno> (thv Brother's House'), in 1894. Two years later (Gente Conocida) (<In Society') established his repu¬ tation. the Banquet of Wild Beasts) (1898) placed him at the head of Spanish play¬ wrights. It was succeeded by a remarkable series of satirical comedies, as also by a num¬ ber of plays of serious import, the effect of which was for a time obscured by the dazzling brilliance of his satire. As editor of La Vida Literaria, a periodical in which he gathered about him the writers whose names were to become famous in the new Spain, Benavente gave form and substance to the modern move¬ ment, of which he assumed intellectual lead¬ ership. In (Autumnal Roses' and the Evil Doers of Good) (1905), he reached the ma¬ turity of his powers, and (The Bonds of In¬ terest ((Los intereses creados') (1907) and (Princess Bebe,' acted in 1909, established his hegemony among the writers of the Spanish¬ speaking world. His plays are to-day the most popular and frequently performed in the Spanish repertory. In 1913 he was admitted into the Spanish Academy upon the occasion of the performance of his fine peasant trag¬ edy (La Malquerida.' He is a lecturer and contributor to the periodical press on a wide variety of topics and has made translations from the English, Catalan and French. In his (Nuevo Coloquio de los Perros) (1916) he deliberately challenged comparison with the dialogue of the same name by Cervantes, with whose work his own has much in common. The drama of Benavente is a drama of char¬ acter, with predominant human and social in¬ terest. He has done away with all melo¬ dramatic artificiality, in which respect the theatre as it exists in Spain to-day must be regarded as his creation. Consult Bonilla y San Martin, CJadnto Benavente' (Ateneo , Madrid, I, No. 1, 1906) ; (Plays by Jacinto Benavente,' with an introduction by John Gar¬ rett Underhill

(New York 1917, et seq.).

John Garrett Underhill.

BENAVENTE Y ROCAMORA, Enrique,

Spanish writer : b. Reus, Tarragona, 8 Sept. 1837. Rather early in life he showed a de¬ cided inclination for the study of languages and for many years taught with great suc¬ cess in Madrid. He was professor of French for several years at the Municipal College of Saint Ildefonso and founded the well-known Benavente Lyceum, of which he was the director from its institution. At an educational exhibition held in Madrid in the 80's Bena¬ vente was awarded a medal for his method of teaching. He has contributed to several edu¬ cational periodicals, and has also written novels both in Spanish and French. His published works include (Solucion practica de la politica espanola' ; (E1 idioma f ranees al alcance de los espanoles;' (La mano de Providencia,' a novel.

BENBOW, John, English admiral : b.

Shrewsbury, England, 1653; d. Jamaica, 4 Nov. 1702. After serving for some time in the navy he entered the merchant service, and fought so desperately against a pirate from Sallee, in one of his trips to the Mediterranean, about the year 1686, as to beat her off, though greatly his superior in men and metal. He re-entered the navy after the Revolution, and was em¬ ployed in protecting the English trade in the

channel, which he did with great effect. His valor and activity secured him the confidence of the nation, and he was soon promoted to the lank of rear-admiral, and charged with opera¬ tions against Dunkirk and the French coasts. In 1698 he was sent to put down the pirates in the West Indies, and not long after returning, he again sailed to the

West Indies with a small fleet, having accepted a command previously de¬ clined by several of his seniors, from the sup¬ posed superiority of the enemy's force in that quarter. On 19 Aug. 1702, he fell in with the French fleet under Du Casse, and for five days maintained a running fight with them, when he at length succeeded in bringing the enemy's sternmost ship to close quarters. In the heat of the action a chain-shot carried away one of his legs. His officers offered their sympathy. ((I had rather have lost them both,® he replied, ((than have seen this dishonor brought upon the English nation. But, harkye — if another shot should take me off, behave like men, and fight it out.® He was taken below ; but the moment the dressing had been applied to the wound he caused himself to be brought again on deck, and continued the action. At this critical in¬ stant, being most disgracefully abandoned by several of the captains under his command, who signed a paper expressing their opinion that (<nothing more was to be done,® the whole fleet effected its escape. Benbow, on his return to Jamaica, brought the delinquents to a court-martial, by which two of them were convicted of cowardice and disobedience of orders, and condemned to be shot ; which sentence, on their arrival in England, was carried into execution at Plymouth. Consult Clowes, (Royal Navy) (Vol. II, London 1897) ; Fletcher, (Admiral Benbow } in Macmillan's Magazine (Vol. LXXXIV, London 1901).

BENCH, in law, the seat which judges or magistrates occupy officially in a court of jus¬ tice; the court or tribunal itself, also the judges or magistrates sitting together to try cases in contradistinction to the bar. The Court of Com¬ mon Pleas in England was formerly called Ban¬ dits, the Bench, as distinguished from Ba-ncus Regis, the King's Bench. It was also called Communis Bancus, the Common Bench, and this title is still retained by the reporters of the decisions in the Court of Common Pleas. Men¬ tion is made in the Magna Charta iCde jus-ticiariis nostris de Banco? which all men know to be the justices of the Court of Common Pleas, commonly called the Common Bench, or the Bench. Viner, Abr. Courts (n. 2). The King's Bench (Queen's Bench during the reign of a queen) was formerly the highest court of com¬ mon law in Britain. Since 1875 it is included in the High Court of Justice.

BENCH-MARK, a mark placed upon some permanent object, as a stone or wall, for use in tidal observations and leveling surveys. Its position above the zero of the tide-gauge or other datum level is made a matter of record and any level once established may be readily ascertained at a future period. It is usually made upon some durable material, as the stone foundation of a pier. In tidal observations a bench-mark is made

and its height above the zero of the tide-gauge is recorded immediately so that in case the latter is destroyed, it may be set up again by means of the bench-mark.

In leveling engineers and surveyors make ex¬ tensive use of bench-marks and to them refer all levels measured.

BENCH WARRANT, a warrant issued by the court before which an indictment has been found to arrest the accused, that he may appear and find bail for his appearance at the trial. Where a bench warrant is directed to the sheriff it cannot be executed by one having only verbal authority from the sheriff, and such arrest does not discharge the recognizance. A bench warrant is defective which does not direct that the party shall be brought before some judge or justice.

BENCHERS, in England, senior members of the Inns of Court, who have the entire man¬ agement of their respective inns, the power of punishing barristers guilty of misconduct, and the right to admit or reject candidates to the bar. See also Inns of Court.

BENCOOLEN, ben-koo'len (Dutch, Ben-koelen), Sumatra, a seaport on the southwest coast ; long. 102° 19' E. ; lat. _3° 47′ 36″ S. The English settled here in 1685, and in 1690 the East India Company built a fort here, calling it Fort York. It rose to some eminence as a centre for trade and coffee growing. In 1825 Bencoolen was yielded up to the Dutch in ex¬ change for the settlements on the Malay Penin¬ sula. A convenient river on its northwest side conveys pepper out of the inland country ; but there is great inconvenience in shipping it, by reason of a dangerous bar at the river's mouth. The place, which is almost two miles in compass, is known at sea by a high, slender mountain, which rises in the country 20 miles beyond it, called the Sugar Loaf. It is inhabited by a mixed population. The medium heat through¬ out the year is from 81° to 82°. Pepper is the chief produce of the adjacent country, which is mountainous and woody. The place is un¬ healthy and subject to earthquakes; storms are frequent. Pop. about 12,000.

BENCZUR, ben'tsoor, Gyula (Julius),

Hungarian artist: b. Nyiregyhaza 1844. He studied with Hiltensperger, Anschutz and Piloty. He was made professor at the Acedemy of Munich in 1880 and was subsequently director of the Academy of Parnking in Budapest. His distinction was recognized by his

nomination as a member of the Hungarian House of Mag¬ nates. His paintings, which are of the School of Piloty, are noted for their splendid coloring. Among the most celebrated are (Farewell of Ladislas Hunyady) (1867); (Arrest of

Rakoczy in 1701 * (1869); (Louis XV in the

Boudoir of Dubarry) (1870) ; (Family of Louis XVI during the Assault on Versailles> (1872) ; owned by D. O. Mills, New York; (Baptism of Saint Stephen* (1875) ; ˆacchanti* (1881) ; (The Reconquest of Buda by Charles of Lor¬ raine* (1888).

BEND, in heraldry, one of the nine honor¬ able ordinaries, containing a third part of the field when charged, and a fifth when plain, made by two lines drawn diagonally across the shield from the dexter chief to the sinister base point. The bend sinister differs only bv cross¬ ing in the opposite direction, diagonallv from the sinister chief to the dexter base. It indi¬ cates illegitimacy..

BENDA, Franz, German violinist: b. Jungbunzlau, Bohemia, 1709; d. Potsdam, 1786. He exhibited, while a boy, a great desire to learn the violin which he could gratify in no other way than by joining a band of strolling musi¬ cians. He found means, however, to acquire an extraordinary mastery of the instrument, and in 1732 entered the service of Frederick the Great, then prince-royal, with whom he re¬ mained the rest of his long life. He founded a school of violinists, whose method of playing was entirely original and quite effective. He also published some excellent solos for the vio¬ lin.

BENDA, Georg, German musician, the most distinguished of a notable musical family: b. Jungbunzlau, Bohemia, 1721 ; d. Kostriz 1795. He was bandmaster to the Duke of Gotha (1748-87), and in this period produced several operas and cantatas, such as (Ariadne auf Naxos) and <Medea.)

BENDALOU, Paul, a soldier of the American Revolutionary army : b.

Montauban, France, 15 Aug. 1755; d. Baltimore, Md., 10 Dec. 1826. In October 1776 he embarked at Bordeaux for the United States as a volunteer in the cause of liberty, and, on reaching the headquarters of Washington, received a lieu¬ tenant's commission. Transferred to the com¬ mand of Pulaski he was captain of the first company in his famous legion at the siege of Savannah. There he carried off the field the body of the generous Pole, and preserved, also, the standard of the legion which had been wrought and presented by the wives and daughters of Maryland. He was quartermas¬ ter-general with the rank of colonel, in the Maryland militia during the War of 1812, and for many years United States marshal for the Circuit and District Courts of Maryland, his official conduct, from first to last, being marked with exactness and integrity.

BENDAVID, ben-da'-vlt, Lazarus, German-Jewish mathematician and philosopher: b. Berlin, 18 Oct. 1762; d. there 1832. After his graduation from the University of Berlin he lectured for some years on the philosophy of Kant in Vienna. His lectures being discouraged by the Austrian government he returned to Ber¬ lin, where he found employment under the gov¬ ernment. He is the author of (Uber die Paral-lellinieiP (Berlin 1786) ; (Versuch einer logischen Auseinandersetzung des mathematisch-unendlichen) (Berlin 1796) ; (Versuch fiber das Vergnfigen) (2 vols., Vienna 1794) ; (Vorlesungen fiber die Kritik der reinen VernunfD (Vienna 1795) ; (Vorlesungen fiber die Kritik der praktischen VernunfD (Vienna 1796) ; (Vorlesungen fiber die Kritik der UrteilskrafD (Vienna 1796) ; (Rede fiber den Zweck der Kritischen Philosophic) (Vienna 1796) ; ˆelbstbiographie5 (Berlin 1804).

BENDEMANN, ben'de-man, Eduard, German painter: b. Berlin, 3 Dec. 1811; d. Diisseldorf, 27 Dec. 1889. As early as 1832 his great picture of the (Jews Mourning in Kxile> was exhibited at Berlin, and in 1837 he gained the gold medal at Paris. In 1838 he was appointed professor of the Academy of Art at Dresden. Here he was entrusted with the execution of the larger frescoes in the palace, and on these his fame chiefly depends.

In 1858 he was appointed director of the D:* - seldorf Academy, a post which he held until 1867. He afterward produced several large canvases and frescoes, some of which are among his best works. Tytler, (Modern Painters and their Paintings) (1899).

BENDER, Rumania, a city in the district of Bessarabia. It is situated on

the Dniester, 55 miles from its mouth, and 36 miles from Kishinev, the capital of the government, and is a straggling place, chiefly consisting of low houses and mere huts. It contains several churches, synagogues, a mosque and a gym¬ nasium for women. It formerly possessed ˆa strong fortress but this was dismantled in 1897. Its commerce is important. It has a trade in grain, timber, cattle, animal products and wine. In 1770 the Russians captured the city and put the garrison and inhabitants, about 30,000, to the sword. After being several times taken from the Turks by the Russians, it belonged to Rus¬ sia after the Peace of Bucharest, in 1812. Pop. 33,800, mostly Jews. After the World War it was included in Rumania.

BENDER ABBAS, Persia, seaport in the Strait of Ormuz. It was once of considerable commercial importance but its trade has di¬ minished within recent years. The chief ex¬ ports passing through this port are fruit, tobacco, wool, carpets and opium, amounting to about $2,300,000 a year. The population, about 20,000, is composed of Armenians, Arabs and Kurds, beside the native Persians.

BENDIGO, formerly Sandhurst, Aus¬ tralia, city in Bendigo County, Victoria, on Bendigo Creek, fully 100 miles north-northwest of Melbourne with which it has direct railway communication. It is one of the chief cities in the colony and an important railway centre. Along one side of its main street (Pall Mall) there are fine buildings of brick and stone, and facing these, in Rosalind Park, are the elegant government buildings and the law courts, which together cost nearly £80,000. Other buildings worthy of mention are the handsome townhall ; mechanics' institute, with library and school of mines; free library; temperance, masonic and other halls ; hospital, benevolent asylum ; some fine banks; Anglican, Wesleyan, Presbyterian and other churches ; Roman Catholic cathedral, art gallery, jail, state and other schools, *etc.* The public parks comprise, besides the Rosalind Park, the fine Botanic Gardens and two others largely used for sports. The streets are lighted by gas and electricity, and there is an excellent water supply from large reservoirs near the town. The chief industry of the district is gold mining, which gives employment to 5,000 miners. Other important industries are brew¬ ing, iron-founding, stone-cutting, granite-pol¬ ishing, tanning and the manufacture of pottery, bricks, tiles, cordials, *etc.* Agriculture and viti¬ culture are carried on in the district and there is a trade in wine and fruits. Bendigo was founded at the time of the gold discovery in 1851, it became a municipality in 1855, a borough in 1863 and a city in 1871. Nearly £70,000,000 worth of gold has been obtained here, much of it from quartz reefs. Pop. (1911) 39,417, including about 300 Chinese. Consult Mackay, (History of Bendigo) (1901).

BENDIRE, ben-de’re, Charles Emil, German-American military officer and ornithologist:

b. Darmstadt, Germany, 27 April 1836; d. 1897. He came to the United States in 1852, and en¬ tering the army in 1854, served through the Civil War, becoming a captain in the 1st Cavalry. After the war he was transferred to the West, and was retired 24 April 1886. Dur¬ ing his stay in the West he applied himself to the study of ornithology, and collected a vast amount of material in various branches of natural history. In 1870 he began to collect the eggs of North American birds, which finally numbered more than 8,000 specimens, and this collection he presented to the United States National Museum. He is the author of (The Life Histories of North American Birds, with Special Reference to their Breeding Habits and Eggs. >

BENDZIN, beii’jen, Poland, the capital of a district in the government of Piotr-kow, situated on the Black Przemsza, 264 miles from Warsaw, on a branch of the Warsaw & Vienna Railroad. Its chief industry is the zinc works, under government control ; there are also coal mines in the vicinity, and a consider¬ able manufacture of fireproof bricks. The in¬ teresting ruins of an ancient castle are a feature of the town. Pop. 21,200, more then one-half of which is Jewish.

BENE, ben’e, the plant that furnishes oil of sesamum.

BENEDEK, ba’ne-dek, Ludwig von,

Austrian military officer : b. Odenburg, Hun¬ gary, 14 July 1804; d. Gratz, 27 April 1881. He was educated at the Academy Wiener-Neustadt and joined the army as ensign in 1822. By 1846 he was colonel and won further recogni¬ tion in suppressing the insurrection in Galicia. He fought against the Italians in 1848, and afterward against the Hungarian patriots. He distinguished himself at Solferino in the cam¬ paign of 1859, being the last to leave the field at Solferino; he was military governor of Hun¬ gary in 1860 and soon’

after was made com¬ mander of the Austrian army in Venetia; and in the war with Prussia in 1866 commanded the Austrian army till after his defeat at Sadowa, when he was superseded.

BENEDETTI, ba-na-det'te, Vincent (Comte de), French diplomatist of Italian ex¬ traction: b. Bastia, Corsica, 29 April 1817; d. Paris, 28 March 1900. He was educated for the public service, held consulates in Cairo, Palermo, Malta and Tunis; and as secretary of the Congress of Paris in 1856 drew up the pro¬ tocols of the treaty then agreed upon. In 1861 he was appointed Ambassador to Italy, and in 1864 to Prussia. Great excitement was aroused throughout Europe by the publication in the London Times on 13 July 1870 of the alleged draft of a secret treaty between France and Prussia, in which the latter agreed to a French occupation of part of Belgium. The authentic¬ ity of the document was not denied. The French government declared that although Benedetti had written the document, he had done so at the dictation of Bismarck. At the same time Benedetti was under orders to pro¬ test against the candidature of Prince Leopold of the house of Hohenzollern for the crown of Spain. He became so importunate in trying to carry out these orders that he was forbidden to seek further interviews with King William. The refusal of the King to again receive Bene¬

detti gave great offense in France, and was made a pretext for declaring war within a few days. After the fall of the empire, Benedetti withdrew from public life. In 1871 he pub¬ lished a pamphlet charging Bismarck with the "whole responsibility of the secret treaty, to which the latter made a vigorous reply. Bene¬ detti was author of (Ma mission en Prusse) (1871) ; and (Essais diplomatiquesP an English translation of which appeared in 1895.

BENEDETTO DA MAIANO (or

Majano) da ma-ya-'no (real name Benedetto di Leonardo), Italian sculptor and architect: b. Florence 1442; d. there 27 May 1497. He was the son of Leonardo da Maiano, a stone mason and builder, in whose family the trades and those allied to them seem to have been a tradi¬ tion. Of Benedetto's two brothers, one was a carpenter and the other, Giuliano, was an archi¬ tect, wood-carver and terra cotta worker. Bene¬ detto, indeed, seems to have begun his career in the workshop of Giuliano who was by 10 years his senior. The tradition of the family was again carried on when one of Benedetto's four sons became a wood-carver. The first in¬ dependent work of Benedetto's is

the tomb of Saint Savinus in the cathedral of Faenza, probably dating from 1471-72. The execution of the monument is already so masterly that some authorities have thought it should be as¬ signed to a later date. By 1474, Benedetto was established in Florence, at least for some time, and we have reason to think that the orders he received from other cities, such as Arezzo, Siena and Naples, were executed in the Floren¬ tine workshop and sent to their destination ready for setting up in place. Shortly after 1474 Benedetto produced the famous pulpit of the Church of Santa Croce — the finest example of marble pictorial relief in Italian sculpture. It is the most imposing of his works and one which must be referred entirely to his own genius. About the same time he was at work in the Palazzo Vecchio (Municipal Palace) of Florence, which he enriched with architectural and sculptural decorations. That his art was remunerative may be judged from the fact that in 1480 Benedetto and his brother founded a family chapel in Prato. We find the artist working for Loreto in the succeeding years, with another great patron in King Ferdinand of Naples. But the work which has probably done most for his fame is the building of Palazzo Strozzi in Florence. He did not live to see it finished (it was begun in 1489) but there can be little doubt that the conception is his, that he saw the gigantic palace rise to its second story, that he planned its structure and designed its court. His sculptural portrait of Filippo Strozzi (the marble of which is in the Louvre and the clay model in Berlin) shows the kin¬ ship between the conceptions of the two parts as practised by the great Florentine — it also shows his appreciation of the character of the man who was suited by the warrior-palace he had asked for. A striking contrast with this construction is found in Benedetto's Loggia of Santa Maria delle Grazie at Arezzo, which has all the fineness and charm that the name sug¬ gests. As sculptor and architect Benedetto will stand for all time among pure and noble figures of Florentine art.

We may note further the following import¬ ant works by him: the altar of Sqnta Fina at

San Gimignano, the ciborium of San Domenico in Siena, the tabernacle of the Badia at Arezzo, and the Madonna of the Berlin Museum. Con¬ sult for reproductions and comments on his sculpture Bodc's (Denkmaler der Renaissance Skulptur Toskanas' (Vol. VII, Munich 1892-1905) ; for his architecture, Stegmann and Von Geymiiller, (Architektur der Renaissance in Toscana' (Vol. IV, Munich 1885-1908).

BENEDICITE, ben-ˆ-dis'i-te, the song of the (Three Children' in the fiery furnace, as given in the Apocrypha and the Septuagint version of Daniel, which is a part of the Roman Breviary in the office of lauds; it is also a part of the Anglican morning prayer, to be used when the Te Deum is not sung, usually from Septuagesima to Easter and during Advent. It was sung in the Church as early as the time of Saint Chrysostom. The name originated in the opening sentence, <(Benedicite omnia opera Dei" (<(Praise all the works of God").

BENEDICT, Saint, the founder of the first religious order in the west: b. Norcia, Italy, 480; d. 21 March 543. While yet a youth he retired to a cavern situated in the desert of Subiaco, 40 miles from Rome, and for three years dwelt in a cavern (afterward called the Holy Grotto). He afterward founded 12 monasteries. In 515 he drew up a rule for his monks, which was first introduced into the monastery on Monte Cassino, in the neighbor¬ hood of Naples, founded by him (529) in a grove of Apollo after the temple had been de¬ molished. This gradually became the rule of all the western monks. The abbots of Monte Cassino afterward acquired episcopal juris¬ diction and a certain patriarchal authority over the whole order. Benedict, with the intention of banishing idleness, prescribed, in addition to the work of God (as he called prayer and the reading of religious writings), the instruction of youth in reading, writing and ciphering, in the doctrines of Christianity, in manual labors (including mechanic arts of every kind), and in the management of the monastery. With regard to dress and food, the rule was severe but not extravagant. Benedict caused a library to be founded, for which the aged and infirm brethren (ordo Scriptorins) were obliged to copy manuscripts. By this means he contri¬ buted to preserve the literary remains of an¬ tiquity from ruins; for though he had in view only the copying of religious writings, yet the practice was afterward extended to classical works of every kind ; and the wTorld is in¬ debted for the preservation of great literary treasures to the order of Saint Benedict.

Bibliography. — Doyle, F. C., teachings of Saint Benedict' (London 1887) ; Henderson, G. F., ˆHistorical Documents of the Middle Ages' (pp. 274-314, ib. 1892) ; Lechner, (Life and Times of Saint Benedict' (ib. 1900) ; Speit-zenhofer, S., (Die historische Voraussetzungen der Regel des heiligen Benedict von Nursia' (Vienna 1895) ; Wolfflin, (B. von Nursia und seine Monchsregel' (Leipzig 1895). See Benedictines.

BENEDICT X, succeeded ˆohn III 575;

d. 578, and was himself succeeded by Pelagius

II.

BENEDICT II, succeeded Leo II, 684: d. 685, and was succeeded by John V. He de¬ cided the English controversy in favor of Wil¬

frid of York and was canonized because of his virtues.

BENEDICT III, succeeded Leo IV, 855. The Emperor Lothair opposed his election, but he was acknowledged finally. He did much to improve and beautify the ecclesiastical edifices of Rome. During his pontificate, the Saracens were ravaging Apulia and Campania ; d. 858, and was succeeded by Nicholas 1.

BENEDICT IV, succeeded John IX, about 900. He crowned Louis, son of Boson, King of Italy. He was famed for his charity to the poor; d. 903. and was succeeded by Leo V.

BENEDICT V, succeeded John XII, 964, and was appointed by the Romans in opposition to Leo VIII. The Emperor Otho, supporter of Leo, appeared before Rome with an army, re¬ duced the city to famine, and a new assembly of the clergy declared to be null the election of Benedict, who was exiled ; d. in prison at Hamburg, 965.

BENEDICT VI, succeeded John XIII, 972. After the death of the Emperor Otho I, the Romans imprisoned Benedict, who was strangled in the castle of Saint Angelo, in 974. Owing to the mistake of later chroniclers in confusing Dominus Papa with a supposed proper name, Donus II appears in many lists of the Popes between Benedict VI and Benedict VII. Geisebrecht, in his (YearBook of the German Kingdom under Otho II' has clearly shown that no such Pope as Donus II ever existed.

BENEDICT VII, of the family of Conti, elected in 975. He promoted

ecclesiastical discipline and did much to suppress simony. During his pontificate, the Emperor Otho II came repeatedly to Rome, where he died in 984. Benedict died about the same time, and was succeeded by John XIV.

BENEDICT VIII, of the same family, succeeded Sergius IV, in 1012. In 1016, the Saracens from Sardinia having landed on the coast of Tuscany, Benedict attacked and de¬ feated them. He crowned the Emoeror Henry II, and his wife, in the Church of Saint Peter. At the synod of Pavia he interdicted clerical marriage and concubinage; d. 1024, and was succeeded by his brother, John XIX. Consult his (Life' by P. G. Wappler (Leipzig 1897).

BENEDICT IX, a relative of the two

preceding Popes, succeeded John XIX in 1034. He was then very young, some say only 18 years old. He was . deposed by the Romans soon after election. Conrad II reinstated him in 1038. In 1044 he was again banished by Consul Ptolemaeus, but was reinstated within three months. The following year Gregory VI was declared Pope, and in 1046 all three Popes, Gregory, Benedict and Sylvester were deposed by the Emperor Henry III, who set up as Pope, Suidger, bishop of Bamberg, as Clement II. Clement died in 1047 and Benedict resumed the papal throne for eight months, when he was displaced by Leo IX. He died in the convent of Grotta Ferrata in 1056. Consult <Life' by Gioragnoli (Milan 1900).

BENEDICT X was elected by a faction after the death of Stephen IX, in 1058; but the Council of Siena nominated Nicholas II. Bene-

diet did not submit till the following year, when Nicholas came into Rome; d. 1059.

BENEDICT XI, a Dominican, succeeded Boniface VIII, in 1303. Contemporary his¬ torians speak highly of his character and virtues. He died 1304, and was succeeded by Clement V.

BENEDICT XII, Jacques Fournier, a

native of France, succeeded John XXII, in 1334, the Popes residing then at Avignon. He put a stop to many abuses in the distribution of ecclesiastical patronage, enforced discipline among the monastic orders, and insisted that temporal rulers should observe their compacts with the Holy See ; d. 1342, and was succeeded by Clement VI.

BENEDICT XIII, Cardinal Orsini, suc¬ ceeded Innocent XIII, in 1724, but it was with difficulty that he could be made to accept the pontificate. Benedict lived with the greatest frugality, and has been called more a monk than a Pope. He managed, however, to trans¬ act an extraordinary number of affairs. A large number of saints were included in the calendar during his pontificate. Benedict was moderate in politics and a great lover of peace, was instrumental in arranging the Treaty of Seville in 1729. His great fault was his im¬ plicit confidence in Cardinal Coscia, who much abused it. His works were published in 1728, in three volumes folio. He died in February 1731, and was succeeded by Clement XII.

BENEDICT XIV, Prospero Lambertini:

b. Bologna 1675; d. 3 May 1758. He applied himself with success to the canon and civil law, and became advocate to the consistory at Rome. Afterward he was appointed promotor fidei, and wrote a valuable work on the (Ceremonies used in Beatifications) (1734). He was pas¬ sionately fond of learning, of historical re¬ searches, and monuments of art, and also asso¬ ciated with the distinguished men of his time; among others with Father Montfaucon, who said of him: ((Benedict has two souls; one for science and the other for society.® He also made himself familiar with the best poetical works, whereby his mind became elevated and his style animated. Benedict XIII made him, in 1727, bishop of Ancona; in 1728 cardinal, and in 1732 archbishop of Bologna. In every station he displayed great talents, . and fulfilled his duties with the most conscientious seal. He opposed fanaticism even at the risk of his own safety, defended the oppressed and ex¬ pressed himself with the greatest frankness to Clement XII without losing his favor. When, after the death of Clement XII in 1740, the election of a new Pope in the conclave was re¬ tarded by the intrigues of Cardinal Tencin, and the cardinals could not agree, Lambertini, with his usual good nature, said to them, <(If you want a saint take Gotti ; if a politician, Aldo-brandi ; if a good old man, myself.® These words, thrown out in a humorous manner, operated on the conclave like inspiration, and Lambertini, under the name of

Benedict XIV, ascended the papal throne. His choice of the ministers and friends whom he assembled around him does the greatest honor to his judgment. The condition of the Church and of the Roman court had not escaped his pene¬ tration. Since the Reformation princes no

longer trembled at the thunders of the Vatican. The power of the Popes in temporal affairs had notably declined, and Lambertini knew that respect for the papal authority could -be main¬ tained only by a wise moderation. He con¬ stantly regulated his measures by this prin¬ ciple, and thus succeeded, even in difficult cir¬ cumstances, in satisfying not only the Catho¬ lic but even the Protestant princes. The sciences were a special object of his care. He established academies at Rome; promoted the prosperity of the academy at Bologna; caused a degree of the meridian to be measured ; the obelisk to be erected in the Campus. Martius ; the church of Saint Marcellino to be built after a plan projected by himself; the beautiful pic¬ tures in Saint Peter's to be executed in mosaic; the best English and French works to be trans¬ lated into Italian ; and commanded a catalogue of the manuscripts contained in the Vatican library (the number of which he had enlarged to 3,300) to be printed. His government of the papal states did equal honor to his wisdom. He enacted severe laws against usury, favored commercial liberty, and diminished the number of holidays. His piety was sincere, yet en¬ lightened and forbearing. He strove to main¬ tain purity of doctrine and of morals, giving in his own character the most praiseworthy ex¬ ample. The sole reproach brought against him by the Romans was that he wrote too much and governed too little. His works compose, in the Venice edition, 16 volumes folio (1767). The most important of his works is that on the Synods, in which we recognize the great canon¬ ist. Other editions of his works are those issued under the editorship of Azevedo (12 vols., 1747-51) ; at Prato (17 vols., 1846). His letters were edited by F. X. Kraus (Freiburg 1884; 2d ed. as a biography by F. Scarselli, with bibliography 1888). Other letters edited by B. Manzone (Bra 1890). Consult McHilliam, (A Chronicle of the Popes) (London 1912) and Pastor, (The History of the Popes) (London

1906-12).

BENEDICT XV, Giacomo della Chiesa:

b. Pegli, near seaport of Genoa, 21 Nov. 1854. Made his early studies

in the town gymnasia of Genoa at the university of which he received the doctor's degree in jurisprudence. He studied theology at Rome in the Collegio Capranica and was ordained priest in 1878. He then became secretary of Cardinal Mariano Rampolla who when appointed Secretary of State in 1887 chose him as under secretary. In 1907 Mgr. della Chiesa was created arch¬ bishop of Bologna and elevated to the cardinalate 25 May 1915 and on 3 September follow¬ ing, after nine ballots, was elected the succes¬ sor of Pius X. The tidings from the conclave were proclaimed from the upper portico of the Vatican Basilica by Cardinal della Volpe. He announced in Latin : <(the great joy that we have as pope most eminent and most reverend Giacomo della Chiesa who has taken the name of Benedict XV.® Points of resemblance are easily traced between Benedict XV and Pros¬ pero Lambertini, Pope Benedict the XIV who was archbishop of Bologna when elected in 1740 of whom Voltaire wrote: (<This is Lamber¬ tini the honor of Rome and the father of Christendom who has fought the world by his writings and adorns it by his virtues.® The

scholarship of Benedict XV is comprehensive and finished. He is a patron of arts and litera¬ ture. His is a lofty and penetrating mind. In disposition he is strong and gentle. Noble and aristocratic he counts in his ancestry men dis¬ tinguished by birth and deeds. From the mo¬ ment of his succession to the papacy he found himself face to face with world conditions which for the difficulties they still beget and the problems they will surely create have no equal in all history. His predecessor, Pius X, succumbed to the terrible prostration forced-upon him by the desolation into which all the European, families were plunged by the Great War which at the present writing, that is two years after it began, is still agonizing the uni¬ verse. Benedict XV stands firm fronting the terrible scenes with which hourly he is pre¬ sented. He is neutral in the strictest sense of the word. His cry is an eloquent appeal for peace. His sympathy is with every fighting man and with the war widows and orphans. In (Ubi Primum,* his declaration to the Uni¬ versal Church, 8 Sept. 1914, he gives the key¬ note of his policy when he says : <(Since fol¬ lowing the example of

our Lord, we must be ready even to lay down our life for the salva¬ tion of the flock of Christ, it is our avowed intention to leave nothing undone, in as far as in us lies, to bring the present calamity to a speedy termination.® He is undismayed, and so far as his children are scattered the world over and his priests are on every battlefield and engaged in all kinds of tasks, his figure is the most conspicuous in these disastrous times. All nations look up to him, approve his efforts and are grateful. His most notable pronouncement is his encyclical (Ad Beatissimi Apostolorum Principis,* 1 Nov. 1914. In it he refers to many matters of w'orld-wdde importance. He emphasizes the moral disorders that are ad¬ mitted to be the true source of the present disturbance, the chief of which are : Lack of mutual love among men ; disregard for author¬ ity; unjust quarrels between the various classes; material prosperity becoming the prominent ob¬ ject of human endeavor, as if there were nothing higher and better to be gained. His affection for America is very strong. The bibli¬ ography of Benedict XV is very fragmentary. Outside of some magazines and review's and addresses there is very little information. The best material is to be found in the newspapers of his own and other countries published at the time of his accession. Consult also (The Offi¬ cial Catholic Directory) (New York 1916).

Patrick A. Halptn,

Late Professor of Ethics, Neiv Rochelle College.

BENEDICT, Sir Julius, German-English pianist and composer: b. Stuttgart 1804; d. Lon¬ don 1885. In 1821 he w'ent to Dresden to studv under Weber, and two years later became conductor at a Vienna theatre. His 'first opera, (Giacinta ed Ernesto,* was produced in Naples in 1829 without success. He took up his resi¬ dence in England in 1835, and was knighted in 1871. Lie was for many years conductor at the Norwich festival, and during a number of seasons acted as operatic conductor in London, both for English and Italian opera. His prin¬ cipal wrorks are the operas (The Gipsy's Warn¬ ing0 (1838); (The Bride of Venice* (1843); 'The Crusaders* (1846); <The Lily of Kfl-

larney* (1862), founded on Boucicault's f Col¬ leen Bawn* ; and (The Bride of Songˆ (1864) ; the cantatas (Undine* (1860) and 'Saint Ce¬ cilia* (1866) ; the fine oratorio < Saint Peter* (1870) ; and the cantata (Graziella* (1882).

BENEDICT, Wayland Richardson,

American writer and educator: b. Rochester, N. Y., 9 Jan. 1848; d. 21 July 1915. Graduat¬ ing from the University of Rochester in 1868, he taught school for several years, after which he entered the Rochester Theological Seminary to train as a teacher of theology. He then finished his education with a year abroad at the University of Giessen. In 1875 he was appointed professor at the University of Cincinnati, where he remained for the rest of his active life, filling at various times the chairs of history, psychology, logic and philosophy. In 1907 he retired as professor emeritus. Among his works are (The Nervous System and Con¬ sciousness* (1885) ; (Theism and Evolution* (1886) ; (Outlines of the History of Educa¬ tion* (1888); Ethics and Evolution* (1889); (New Studies in the Beatitudes (1890) ; ‘^Re¬ ligion as an Idea* (1903) ; (Greek Thought Movements and their Ethical Implications*

(1905).

BENEDICT BISCOP, An Anglo-Saxon ecclesiastic: b. of a noble Northumbrian family in 628 or 629; d. Wearmouth, 12 Jan. 690. He spent the first years of his life at court, but at the age of 25 he relinquished this manner of life and accompanied Wilfrid on a pilgrimage to Rome in 653. Here he lived for more than 10 years, when he returned to England; but not very long after again w’ent to Rome, on a mission intrusted to him by Alchfrid, King of Northumbria. On his way back he stopped at I.erins in Provence, where he remained for the next tw’o years, making himself acquainted with the rules of monastic life in the monastery of Lerins, of which he had become a member. In 668 he made a third journey to Rome, where he arrived just at the time when the Pope was about to appoint some one to fill the see of Canterbury, which w?as then vacant. Having fixed upon Theodore, a Cilician monk, he re¬ quested Benedict to accompany him to England to assist him in securing the favor of the Anglo-Saxons, wffiich as a foreigner he might have difficulty in doing. Benedict agreed to do this, and was presented with the abbacy of Saint Peter’s in Canterbury; but at the end of two years he resigned the abbacy and again wrent to Rome. On this occasion he returned to Eng¬ land with a valuable collection of books and a large number of relics, which he had accumu¬ lated during his previous visits to Rome. With these he proceeded first to Wessex with the intention, of remaining there, but finding that the King of Wessex wras dead he returned northward to his native Northumbria, and there he

wras fortunate enough to secure the favor of King Egfrid. From him he received a donation of land at the mouth of the Wear, on which he founded the monastery of Wearmouth. Workmen were brought from France to build the church and monastery. In 678 he made his fourth journey to Rome, and brought back additional stores of books for his library, as well as pictures, images, glass for windows, etc., with which he decorated the monastery he had founded. Here we have one of the first in—

stances of the use of window glass in England. Ke was now presented by Egfrid with a further grant of land on the other side of the Wear, where he founded another monastery, that of J arrow, dependent on the monastery at Wearmouth. During the remainder of his life he continued to live in the latter monastery, ex¬ cept on the occasion of a fifth voyage to Rome, made in 685, and from which he derived as before valuable additions to his various collec¬ tions. It is chiefly by these collections that his services to learning are to be estimated, and there can be no doubt that his great pupil, the ((Venerable Bede,® who was a monk in the monastery of Jarrow, was immensely indebted to them for the learning he acquired. The impulse _ given by his labors to Anglo-Saxon civilization are difficult to estimate. It is cer¬ tain, however, that the valuable and extensive library he founded at Wearmouth imparted to the nation a taste for literature and learning, which bore excellent fruit for many centuries. His famous pupil, Bede, wrote his life.

BENEDICT COLLEGE, a coeduca- tional institution for negroes at Columbia, S. C., conducted by the American Baptist Mis¬ sion Society. It was founded in 1871 as Bene¬ dict Institute and chartered as a college in 1894. It has elementary, high school, collegiate and theological departments. All work on the cam¬ pus is done by students, also all the work of the kitchen and dining-room. There are 13 buildings and the college has a permanent invested and productive endowment of $140,000. In 1916 it had 35 instructors and 700 enrolled students. The library contains 7,900 volumes.

BENEDICTINE, a liqueur originally pre¬ pared by the Benedictine monks of the abbey of Fecamp, in Normandy, consisting of spirit (fine brandy) containing an infusion of the juices of plants, and said to possess digestive, anti-spasmodic, and other virtues, and to have prophylactic efficacy in epidemics. It some¬ what resembles chartreuse and has been made in the same way since 1510. See Liqueur.

BENEDICTINES. From the 6th to the

10th century almost all the monks in the West might be so called, because they followed the rule of Saint Benedict of Norcia. The rules which at that time the monasteries in Spain and France received from their bishops, as well as the rule of the Irish Saint Columba, were essentially the same as those of Saint Benedict; and in the progress of his order the monasteries in Spain and France, as well as those of the order of Columba, united them¬ selves with it. Monte Cassino, the magnificent primitive monastery of the Benedictines, be¬ came the model of all others. At that time the monasteries, having no common superiors, were under the immediate control of the bishops in their respective dioceses, and differed from one another in many qualifications of the primitive rule. Not even the color of their dress was the same. The disciples of Columba wore white garments like 'the first Benedictine nuns, who originated in France in the 6th century. After the unions which took place at a later period, all the members of this order wore black, as the founder is said to have done. The decline of monastic discipline after the 8th century occasioned the reforms of Benedict of Aniana in France, the renewed inculcation of

the old rule, and the adoption of new ordi¬ nances suited to the times, by the Council of Aix-la-Chapelle (817), as well as the particu¬ lar rules and fraternities of the celebrated monasteries in France, Germany and England, which in those barbarous times became seats of civilization, and finally the institution of the Cluniacs, a new branch of the Benedictines, which proceeded from the convent of Clugnyin Burgundy, founded in the year 910. The Bene¬ dictine monasteries, in the Middle Ages, were often asylums in which science took refuge and found protection. In place of the discordant and uncertain rules which had hitherto existed, the Cluniacs made fixed regulations concern¬ ing the hours of worship, the obedience, dis¬ cipline and common government of all the monasteries belonging to their order, which were soon imitated in all Europe. In the 12th century their order contained 2,000 monasteries, whose luxury frequently called for

reforms, and finally became the chief cause of their decline. The remains of the Cluniacs united themselves in the 17th century, under the pat¬ ronage of Richelieu, with the Benedictine fra¬ ternities of Saint Vannes and Saint Maurus, the latter of which, founded in 1618, had in the beginning of the 18th century 180 abbeys and priories in France, and acquired by means of its learned members, such as Mabillon, Montfaucon and Martene, merited distinction. To this family belong those new orders estab¬ lished on the foundation and observing the rule of Saint Benedict, which have originated since the 11th century, and are distinguished from and proper Benedictines by their dress, names and particular regulations ; for example, the Camaldulians, the monks of Vallombrosa, the Sylvestrians, the Grandimontenses, the Car¬ thusians, the Coelestines, the Cistercians and Bernardines, the Trappists and the monks of Fontevraud. The Benedictine monasteries never constituted one society, constitutionally regulated and governed under an aristocratical or monarchical form ; on the contrary, a great many monasteries which descended from the old Benedictines were compelled by the Council of Trent to unite themselves gradually into par¬ ticular fraternities. Among these the Benedic¬ tines of Monte Cassino, of Monte Vergine and Monte Oliveto (who called themselves Olivetans) in Itaty and Sicily; those of Valladolid and Montserrat in Spain ; those of Hirschau and Fulda in Germany, and that of Molk in Austria, deserve particular notice on account of the extent of their possessions, the magnificence of their churches and the mildness of their rules. To the fraternity of Molk (or Melk), which still exists, but accommodated to the spirit of the times, the rest of the Benedictine convents in Austria are joined. Many of the nunneries of this order are reserved for the nobility, because the places in them are equal to the most lucrative benefices. During the first French revolution the monasteries of the Benedictines along with all other monastic orders were abolished ; but the Benedictines later partially re-established themselves in France. In England the Benedictines were an important body at the dissolution of the mon¬ asteries, having then 186 abbeys, priories and nunneries besides many smaller houses. At present there are eight Benedictine abbeys in England, besides an extensive establishment

at Fort Augustus in Scotland, comprising an abbey and college. In the United States there are 13 abbots, 545 priests, 133 clerics and 345 lay brothers in the order. The Benedictines have charge of 16 colleges in the United States.

Bibliography. — (Annales Ordinis S. Bene¬ dict } ; (Acta Sanctorum Ordinis S. Benedicti* ; (Bullarium Cassinense) (2 vols., Venice 1650) ; Dantier, <Etudes sur les Benedictins* (Paris 1864) ; id. (Les monasteres benedictins de l'ltaiie* (ib. 1866) ; Gasquot, A., (English Mo¬ nastic Life* (London 1904) ; Reyner, (Apostol-atus Benedictinorum in Anglia* (Dovai 1626) ; Tassin, (Histoire de la Congregation de Saint-Maur> (Paris 1770) ; (Cronica del Orden de San Benito) (7 vols., Salamanca 1609-15). Con¬ sult also the ˆiversarum Artium Schedula> by Theophilus (11th century) ; Pertz, (Monumenta Germanise Historica* ; Carlyle, (Pas,t and Present* ; Montalembert, (Monks of the West* (6 vols., English translation by A. Gasquet, London 1895) ; Taunton, (English Black Monks of Saint Benedict (ib. 1897) ; Digby, (Ages of Faith.*

BENEDICTION, the act of blessing, of wishing to a person or thing the grace of God. It has always existed as a custom among Jews and Christians. The Jewish priests bestowed benedictions upon the people when they re¬ mained obedient to the law, and maledictions when they neglected it. In the Catholic Church the term is generally applied to the religious public service at which the priest makes the sign of the cross over the congregation with the ostensorium containing the consecrated Host. The Anglo-Saxon term "blessing** is now commonly used to express the benediction invoked with prayer, sign of the cross, and holy water upon religious articles such as prayer-books, holy pictures, rosary-beads, *etc.* In Protestant churches the benediction is usually given in words similar to those prescribed by Moses to Aaron. It is often accompanied with laying on of hands, especially in the celebration of marriages, the ordination of pastors, the confirmation of converts and the baptism of children.

BENEDICTUS, the song of Zacharias (Luke i, 68-79) used in the Roman breviary at lauds and also in the Anglican morning service.

BENEFICE, ben'e-fis (Lat. beneficium) , an ecclesiastical living, originally including every species of preferment, as well as those to which dignities and offices were attached, namely, bishoprics, deaconries and prebends, as the lesser sort, namely, rectories, vicarages, per¬ petual curacies and endowed chaplaincies ; but in its

popular acceptation it includes only the latter class, and the distinction is recognized in recent acts of Parliament. A benefice now de¬ notes the beneficial property right or usufruct enjoyed by the clerical incumbent ex officio, but without regard to his dignity. The name is derived from the beneficium of the Romans, a grant of any kind to a subject by the sovereign. It was afterward the designation of a grant of land by any large proprietor to a retainer or follower as a reward of services, being the same that later was denominated a fief or fee, the essential incident of which was perpetuity; that is to say, it was a permanent stipendiary

estate held of a superior and usually subject to some condition indicating vassalage. The principle of the feudal tenure was applied, in the Middle Ages, to ecclesiastical benefices to this extent, that they were held of the Pope, as a superior lord, though these benefices had not the hereditary character of a fee, so far as respected the office or dignity connected therewith, and the lands or emoluments con¬ ferred by a grant were usually attached to such office or dignity, and on the death of the in¬ cumbent, reverted to the ecclesiastical superior who was entitled to appoint a successor. This, at all events, was the claim of the Popes, though it was the subject of contest between them and the principal European sovereigns. Consult Phillimore, (Ecclesiastical Law of the Church of England* (2d ed., London 1895).

BENEFIT OF CLERGY, in English

criminal law, the privileghun cleric ale, exemp¬ tion of the clergy from penalties imposed by law for certain crimes. It was for many cen¬ turies an important element in the administra¬ tion of criminal law and still is a curious and instructive part of the history of England. The origin of this privilege was a claim made by the ecclesiastics at an early period for the en¬ tire exemption of their order from the juris¬ diction of the common-law courts. The only exception was the cleric being held in custody by the king himself ; but, even in that case, he could only remain in such regal custody with the pleasure and consent of the bishop, who had entire control over his person and over the inquiry into his offense. If a priest or “clerk** happened to be imprisoned by the secular arm, on a criminal charge or capital felony, he was, on the bishop’s demand, to be instantly delivered up without any further in¬ vestigation, to be detained by the ordinary till he had either purged himself from the offense, or, having failed to do so, had been degraded. This state of things continued till the Statute of Westminster the First, in 1275, which pro¬ vided that the prisoner

must first be indicted before he could be claimed; and then, in the reign of Henry VI, it was settled that the pris¬ oner must first be convicted and might either then claim his clergy by plea declining the jurisdiction or, as was more usual, after con¬ viction, by way of arresting judgment. The test of admission to this privilege was the cleri¬ cal dress and tonsure. The statute Pro Clero (1350), however, extended it to all manner of clerks, and by later practice it was extended to all who could read, whether of the clergy or laity. Women, however, except professed nuns, were until the Reformation excluded. But laymen could claim it only once, and upon so doing were burned upon the hand and dis¬ charged, to be again tried by the bishop and, if acquitted by the latter, restored to their liberty, credit and property. By a series of statutes most of the serious crimes and all capital crimes had been excluded from* benefit of clergy before the end of the 17th century, but it was extended to all persons convicted of clergyable offenses, whether they could read or not ; and instead of burning on the hand, a discretionary power was given to the judge to inflict a pecuniary fine or imprisonment. The privilege was entirely abolished in England in 1827 (7 and 8 George IV, cap. 82). It had never

any legal existence in Scotland. In scattered instances the right was recognized in the col¬ onies of Carolina and Virginia. An act of Congress passed 30 April 1790 provided that benefit of clergy shall not be allowed for any offenses punishable by death. It is now uni¬ versally obsolete in English and American law. Consult Chitty, (Criminal Law} ; Desmond, (The Church and the Law° (Chicago 1898) ; Pollock and Maitland, (History of English Law* (Cambridge 1899); Flanagan, . (History of the Church in England, a.d. 1076) (London 1857) ; Stephen, (History of Criminal Law.*

BENEKE, ba’ne-ke, Friedrich Eduard,

German philosopher and psychologist : b. Ber¬ lin, 17 Feb. 1798; disappeared 1 March 1854; found drowned in a canal at Charlottenburg, 4 June 1856. After serving as a volunteer in the

campaign of 1815, he studied theology and philosophy at Halle and Berlin, giving special attention to the English philosophers. In 1820 he lectured in the University of Berlin as a private teacher, but the continuance of his lec¬ tures was forbidden by the minister Altenstein, in 1822, on account of his departure from the philosophical principles of Hegel. He then taught for a few years in Gottingen, but, re¬ turning to Berlin in 1827, received permission to lecture in the university, in which he was elected extraordinary professor of philosophy after Hegel's death, in 1832. The starting point of his system is that philosophy must be founded upon a strict and careful examination of the phenomena of consciousness. He thus adopts, in mental philosophy, the method observed by Bacon in the natural sciences, and his system is described as an empirical psychology. He was opposed to the speculative system of Hegel and held that a true psychology, the basis of all knowledge, must be formulated along the methods of exact physical science, and he be¬ lieved the genetic method to be superior to all others. He was a voluminous writer and among his chief wmrks (Erfahrungsseelcnlehre, als Grundlage alles Wissens, in ihren Haupt-ziigen dargelegt* (1820) ; (Neue Grundlegungen zur Metaphysik) (1822); (Pragmatische Psy¬ chologic, oder Seelenlehre in der Anwendung auf das Leben) (1850); (Psychologische Skizzen* (1827) ; (Lehrbuch der Psychologie als Naturwissenschaft* (1833; 4th ed., 1877) ; (Erziehungs und Unterrichtslehre) (2 vols., 1835-36; 4th ed., 1876); (System der Logik als Kunstlehre des Denkens* (2 vols., 1842). Consult Brandt, (Beneke, the Man and His Philosophy* (New York 1895) ; Kiihn, C. H. T., (Die Sittenlehre F. E. Benekes* (1892); Renner, H., (Benekes Erkenntnistheorie* (Halle 1902) ; Wandschneider, A., (Die Metaphysik Benekes* (Berlin 1903).

BENEVENTO, Italy, a province with an area of 680 square miles, and an archiepiscopal city. The surface of the province is hilly but the soil fertile in corn, fruit and pasture. Game is very abundant, and cattle, grain, wine, oranges and dead game are exported. Benevento was originally called Maleventum, but this w7as changed to Beneventum by the Romans wdien they founded a colony here after the defeat of Pyrrhus. Before it came into the hands of the Romans it belonged to the country of the Samnites. The Lombards in 571 made it a dukedom, which, long after the extinction of

the Lombard kingdom, remained independent. At a later period it fell into the hands of the Saracens and Normans. The city, howrever, was not conquered by the latter because Henry III had given it to the Pope,

Leo IX. In 1418 Benevento became part of Naples, but was given back to the Pope by Ferdinand I. In 1798 it was conquered by the French and handed over to Naples, and then in 1806 Napoleon made a present of it to his minister, Talley¬ rand, who received thence the title of Prince of Benevento. In 1815 it was restored to the Pope, and finally with Naples wras annexed to the kingdom of Italy, in 1860. The city of Benevento is situated on a hill between the rivers Sabato and Calore, is 60 miles by rail from Naples but only 32 miles by dirbet route, is surrounded with a wrall, has narrow dirty streets and some interesting buildings. Since 969 it has been the see of an archbishop. Few cities in Italy deserve so much attention on account of the antiquities which they contain as Benevento. Almost every wall consists of fragments of altars, sepulchres, columns and entablatures. Among other things, the wrell-preserved, magnificent triumphal arch of Tra¬ jan, built in 114, deserves particular mention. It is now called Porta Anrea (the golden gate), and is a gate of the city. The cathedral is a beautiful building in the Lombard-Saracenic style. This cathedral has a famous bronze door, with reliefs of New Testament scenes, said to have been executed at Constantinople in the 12th century. There are also several magnificent paintings. The city has also sev¬ eral palaces, a castle and numerous churches, including the circular Santa Sofia. In the pub¬ lic squares are Egyptian obelisks. Gold and silver plating, leather curing and parchment making are the principal industries. Pop. about

25,000.

BENEVOLENCE, a forced loan or con¬ tribution, by w'hich the kings of England were wont, without any sanction from Parliament, to levy money from their subjects. Such benevo¬ lences had been denounced by Magna Charta, and even Richard III had allowed the only Parliament of his reign to enact a statute de¬ claring them illegal, but they still continued under some shape or other till finally abolished by the Bill of Rights in 1689.

BENEVOLENT ORDERS. This term is applied in the statutes of many of the states to those societies whose objects are mainly good fellowship, combined with charitable relief or stipulated benefit of limited amounts in case of necessity, sickness or death, as distinguished from the fraternal orders or societies which afford a substantial death benefit, combined in some cases with sick relief and funeral bene¬ fit. Both classes of these orders employ the lodge system and have a representative form of government. The benevolent orders in¬ clude

the various bodies of Masons, the Odd Fellows, Knights of Pythias, Red Men, Elks, Foresters of America, Hibernians, Order of Eagles, United American Mechanics, Good Templars, Grand Armv of the Republic and many others, the more important of which may be consulted under their individual titles.

BENEZET, Anthony, American Quaker philanthropist: b. Saint Quentin, France, 31 Ian. 1713; d. Philadelphia, 3 May 1784. His

family came to Philadelphia from London in 1731. He earnestly opposed the slave trade, advocated the emancipation and education of the colored population of the colonies and him¬ self opened an evening school for negroes. Of his numerous tracts, ‘ distributed gratuitously, the most important are (A Caution to Great Britain and Her Colonies, in a Short Represen¬ tation of the Calamitous State of the Enslaved Negroes in the British Dominion) (1767) ;

(Historical Account of Guinea * (1772) ; (A

Short Account of the Society of Friends* (1780) ; dissertation on the Christian Reli¬ gion* (1782) ; Observations on the Indian Na¬ tives of this Continent* (1784).

BENFEY, ben’fi, Theodor, German Orientalist and comparative philologist : b. of Jewish parents, Norlen, Hanover, 28 Jan. 1809; d. 26 June 1881. He studied in Gottingen, Munich, Frankfort and Heidelberg, devoting himself especially to classical and comparative philology. In 1862 he was appointed to the chair of Sanskrit and comparative philology in the University of Gottingen, which he held till his death. One of his earliest literary efforts was a translation of Terence* (Stuttgart 1837) ; after this, however, he turned his at¬ tention almost exclusively to comparative phi¬ lology, Oriental languages, especially Sanskrit, and mythology. In his 50 years devoted, with rare enthusiasm and persistency, to linguistic studies, he did more than any other scholar to enlarge the boundaries of Sanskrit philology. In comparative philology, though an adherent of Bopp, he

deviated from his master in deriv¬ ing all Indo-European words from mono¬ syllabic primitive verbs. This conception de¬ pends on his theory of the origin of stem suffixes. These, he holds, are almost all de¬ rived from a fundamental form, ant, which appears in the present participle of verbs. To support this view he assumes the most violent permutations of sounds, which set all phonetic laws at defiance. For his theory consult his (Lexicon of Greek Roots* (1839) ; < Short San¬ skrit Grammar* (1868), and numerous essays. In Sanskrit he laid a foundation for the true study of the Veda by editing the (Sama Veda* (1848) with glossary and translation ; and this work he continued by a scholarly translation of the first mandala of the Rig Veda in his magazine, Orient and Occident (1863-64). His Vedic grammar, for which he had been collecting ma¬ terials for many years, was left unfinished. He also published a (Complete Sanskrit Grammar, Crestomathy and Glossary* (1854), and a (Sanskrit-English Dictionary* (1866). In compara¬ tive folklore his principal work is a translation of the ˆPanchatantra* (1859). It is accompa¬ nied with elaborate notes, and the first volume consists entirely of an introduction in which he traces the course of these Indian stories in their wanderings and transformations both in eastern and western literatures.

BENGA, an African tribe, living on the Spanish island Corisco, off the western coast, having moved from the interior within a few generations. The American Presbyterian board of missions have christianized many of the Bengas and translated books into their lan¬ guage, which closely resembles the Kamerun and Dualla.

BENGAL, ben-gal', India (Hind. Ban-gala, Skt. Van gal am, from Vanga), a province of India, administered by a governor and re¬ constituted in 1905 and in 1912 from the for¬ mer Bengal presidency and province, which included under its administration the native states of Bihar, Orissa and Chota Nagpur. As reconstructed the province of Bengal has an area of 78,700 square miles and a population (1911) of 45,500,000, mainly Hindus and Mo¬ hammedans. The native states were also re¬ constituted 1 April 1912 as the separate prov¬ ince of Bihar and Orissa, administered by a lieutenant-governor.

Physical Features. — The general physical character of Bengal, which occupies the north¬ east of India, is that of a practically level country, though it is surrounded with lofty chains of mountains. The northern part rests on the terraces of the Himalaya Mountains, the east is

bounded by the Garos or Garrows chain and the west is ribbed with offsets of the Vindhya Mountains. It is intersected in all directions by rivers, the principal of which are the Ganges and Brahmaputra, whose annual inundations render the soil which they reach extremely fertile. In those tracts where this advantage is not enjoyed, the soil is thin, sel¬ dom exceeding a few inches in depth. The most inhospitable part of Bengal is what is called the Sunderbunds (from being covered with the soondru or sunder tree), that portion of the country through which the numerous branches of the Ganges seek the sea, or the deltaic space lying between the Hoogly River and Chittagong, about 150 miles from east to west and about 160 from north to south. This district is infested with tigers, is traversed in all directions by watercourses, or nullahs, and interspersed with numerous sheets of stagnant water called j heels, which abound with fish and waterfowl and are much resorted to by crocodiles.

Geology and Minerals. — In the northern

part of Bengal, at the foot of the Himalayas, is a band of Tertiary formation; south from which, and along the course of the Ganges, more especially east from that river and in¬ cluding the greater part of its delta and that of the Brahmaputra, the country is wholly com¬ posed of alluvium or modern detritus. Cal¬ cutta stands upon strata of the transition series, which stretch west into Bihar, and are flanked north and south by tracts of crystalline forma¬ tion. In the Garo Hills coal, iron and lime¬ stone are found, and nitre effloresces on the surface around Calcutta and elsewhere. Min¬ eral springs are not numerous.

Rivers. — The principal rivers, besides the Ganges and Brahmaputra, the latter of which enters the province at its northeast extremity and falls into the Bay of Bengal near the prin¬ cipal embouchure of the Ganges, are the Soo-bunreka, which falls into the Bay of Bengal, in lat. 21° 35’ . north, south-southwest of the Hoogly; the Cosi or Coosee, which rises near Khatamandu in Nepal and falls into the Gan¬ ges near Bhagalpur, in lat. 25° 20’ N. ; and the Dumooda, which, rising in Bihar, falls into the Hoogly about 22 miles below Calcutta. There are numerous other streams of less note, mostly tributaries of the Ganges and Brahmaputra or iheir larger affluents.

Climate. — There is more regularity in the changes of the seasons in Bengal than perhaps in any other part of India; but it is subject to great extremes of heat, which, added to the humidity of its surface and the heavy dews that fall, render it generally unhealthy to Europeans. The prevalence of hot winds, which are some¬ times loaded with sandy particles, is another source of disease. The seasons are distin¬ guished by the terms hot, cold and rainy. The hot season continues from the beginning of March to the end of May, within which period the thermometer frequently rises to 100°, some¬ times to 110°. The month of September is also often intensely hot, and when so is the most unhealthy period of the year to natives as well as Europeans, owing to the profuse exhalations from stagnant waters left by the inundations and from a rank decaying vegetation. The rainy season commences in June and lasts till October. During the first two months of this period the rain is frequently so heavy that five inches of water have fallen in one day, the annual average being from 70 to 80 inches. It is in this season that the inundations take place and that the Ganges overflows its delta, cover¬ ing the land with its waters for more than 100 miles. The cold season, the most grateful and healthy of any to Europeans, continues from November to February, during which period north winds prevail, with a clear sky.

Forests. — In Bengal, as in India generally, great attention has been paid to the manage¬ ment of forests. Great destruction is caused among forests by fires, which are sometimes the result of accident but more frequently made purposely by the natives in pursuance of a system of jungle cultivation that appears to prevail throughout India. This consists in cut¬ ting down and burning a patch of forest and raising a crop in the open space, no plowing or digging being necessary. The next year this patch is abandoned and another treated in the same way. Another cause of destruction is the wastefulness of those who use the timber. The sunder-trees, for example, which furnish the best wood for the boats which are built in great numbers throughout eastern Bengal, have been cut down in so reckless a manner that the west¬ ern parts of the Sunderbunds have already been to a large extent exhausted. In order to limit the destruction that goes on by such proceed¬ ings certain portions of the Indian forests are reserved and placed under the entire control of the government and additions are made to these reserves every year. Of the total 10,612 square miles of forest in Bengal in 1913, 4,871 were reserved, 1,711 protected and 4,030 unclassed.

Animals. — Among the wild animals are tigers, elephants, boars, bears, wolves, foxes, jackals, hyenas, leopards, panthers, lynxes, hares, deer, buffaloes, antelopes and monkeys. The most formidable of all these animals (and more so even than the lion) is the tiger, which here attains its utmost size and perhaps also its greatest ferocity. The domestic animals include native horses, thin, ill-shaped animals, and not well adapted for any kind of labor; cattle, of a very inferior breed, being extremely small and miserable looking; sheep, likewise of diminutive size, with very coarse, hairy wool, but when well fed their flesh is excellent. Flogs and goats

are also plentiful, and buffaloes are domesti¬ cated for the sake of their milk. Reptiles are numerous and formidable, including gavials, a kind of crocodile, with which the larger rivers are infested; and among the serpent tribe, many of which are highly poisonous, the deadly cobra-de-capello. Turtles, frogs and lizards also abound, with swarms of mosquitoes. The turtles are chiefly procured from the island of Cheduba, in the Bay of Bengal. Fish are so ex¬ ceedingly plentiful as to be within the reach of almost every class of inhabitants. Game, poul¬ try and waterfowl of all descriptions abound in Bengal, particularly ducks, of which there is a great variety and most of them of a superior kind. The gigantic crane, commonly called the adjutant, from the stately air with which he struts about, frequents the towns in consider¬ able numbers, performing the office of scaven¬ ger by clearing the streets of garbage, in con¬ sideration of which duty he enjoys an entire immunity from all disturbance; his principal food is offal, toads, lizards, serpents and in¬ sects. Crows, kites, sparrows and other small birds are numerous.

Agriculture. — The staple crop of Bengal is rice, which is cultivated so as to produce three harvests in the year — spring rice, autumn rice and winter rice. The last of these har¬ vests is by far the most important. Besides sufficing for the wants of the population, the rice crop leaves a large surplus for exportation. Oil seeds are also largely cultivated, chiefly mustard, sesamum and linseed. The jute plant (pat) has long been cultivated, and in recent times the cultivation of it has greatly extended. It will grow on almost any description of land. Part of this crop is cultivated by those who use or manufacture it, almost all the Hindu farmers weaving cloth from it. It is now man¬ ufactured also in large mills under European management, and jute goods are now an export of some importance, though not nearly so much so as jute in the raw state for manufacture in Europe. The sunn plant, somewhat resembling the Spanish broom, is now quite extensively

cultivated and exported to Great Britain, afford¬ ing excellent material for both sails and cord¬ age and being made into fishing nets by the natives. Cotton is grown over all India, but the best of the herbaceous kind is raised in Bengal and on the Coromandel coast ; the finest grows on light, rocky soil. The cotton of India is generally inferior to that of the United States, but this is believed to be wholly owing to careless cultivation and to the slovenly man¬ ner in which it is prepared for the market. The cultivation of the date-palm and the manu¬ facture of date sugar are carried on to a con¬ siderable extent, forming a profitable business for the cultivator. This kind of sugar forms an article of export. The sugar-cane is culti¬ vated, but not nearly to such an extent as might be expected. There are two kinds of sugar-cane, a yellow hard cane, about the thick¬ ness of a finger; the other much thicker and deeply stained with purple. The latter is the most productive but the most troublesome to cultivate and therefore avoided by the more indolent farmers. Tobacco, which requires a light soil, is grown in three different situations — in rich spots of land contiguous to the farmer's house, in high land suitable for the

growth of sugar-cane and on the banks of rivers. The betel leaf, famous for its intoxi¬ cating quality and largely used over all India on that account, is cultivated in what is called a voroj, or fort, and is carefully protected from the sun and wind. Indigo being one of the principal articles of foreign commerce with Bengal, is extensively cultivated in that prov¬ ince. The opium production of Bengal was a government monopoly under Mohammedan rule and has been retained as such by the Brit¬ ish. All the juice of the opium poppy must be sold to the government at a fixed price. This cultivation is carried on in the west of Bengal. Orchards of mango trees are to be found in every part of Bengal, the fruit being in general demand during the hot months. The cinchona tree and the tea plant have also been added to the agricultural products of Bengal.

Manufactures. — The principal manufacture of Bengal is that of cotton goods, including cotton piece-goods of various descriptions, cali¬ coes,

thread, and sailcloth. Muslins of the most beautiful and delicate texture were for¬ merly made at Dacca, a city in this province, but the manufacture is almost extinct.

The modern decay of the muslin manufac¬ ture of India has been owing in a great measure to the successful competition of Great Britain and to the circumstance of English fabrics be¬ ing subject to no duty in Bengal, while high duties were levied on the fabrics of Bengal in Great Britain. These duties are now abolished. Large quantities of coarse cloth, manufactured from jute, are made in various districts of Bengal. Sericulture is carried on more largely in Bengal than in any other part of India, and silk-weaving is still a leading industry in many of the districts, but of late years there has been a serious decline. One branch of this industry, however, seems more flourishing than some others, namely, the cultivation of tasar or wild silk, the worm that produces it feeding upon the leaves of the sal and other forest trees. On the other hand, various new manufactures, carried on by machinery, are increasing. The most important of these are the industries connected with jute, cotton and sugar. These are already affording employment to many thousands and the natives show great aptitude for factory work.

Commerce. — The commerce of Bengal, both internal and external, is very large. Mul¬ titudes of native boats and other craft navigate the rivers. The imports to Calcutta from the interior have been valued at over $13,000,000, consisting of rice, tea, jute, indigo, linseed, mustard seed, wheat, *etc.* The foreign trade is large and increasing. Aljnost the whole of it passes through Calcutta, and the value of it annually is over $275,000,000, over $170,000,000 being exports. The most important exports are opium, jute, indigo, oil seeds, tea, hides and skins and rice; the chief import is cotton piece-goods. The foreign trade is chiefly with Great Britain, China, the Straits Settlements, France, the United States and Ceylon.

History. — The English first got a firm footing in Bengal about 1644 when, through the influence of an English medical man named Boughton, a favorite of the Emperor of Delhi, the East India Company obtained permission to locate themselves at Hugh or Hoogly, some 28

miles above Calcutta. In 1686 the company's factors, having had a rupture with the Moslem commander at the place where they were lo¬ cated, removed to Calcutta, then the village of Chuttanutty, where they continued to carry on their trade. In 1700 the viceroy of Bengal,

being in want of money to dispute the succes¬ sion to the Mogul throne, obtained a large sum from the company for the township on which their factory stood at Calcutta and some adja¬ cent lands. Seven years afterward, namely, in 1707, Calcutta was erected into a presidency and the foundation of British power in India laid. For nearly half a century the company pursued a peaceful and profitable commerce, but at the expiration of that period, 1756, Cal¬ cutta was attacked and taken by the Soubahdar of Bengal, who threw the 147 Englishmen he found there in the notorious ˆblack-hole® of Calcutta, where 123 of them perished in 11 hours. In the ensuing year Calcutta was re¬ taken by Lord Clive — an event which was fol¬ lowed by a series of victories on the part of the British that terminated in the entire conquest of India. In consequence of unprecedented drought great scarcity of food prevailed in 1873 and 1874, but the prompt measures of the gov¬ ernment were sufficient to prevent any wide¬ spread mortality. A bill conferring upon agri¬ cultural tenants a transferable interest in their holdings and protecting them against eviction wras passed in 1885. For the purpose of more efficient administration, a preliminary partition and reconstitution of the presidency was effected in October 1905, not without consider¬ able agitation and opposition on the part of the population. The present reconstitution into a province took effect in April 1912. For fur¬ ther general history and bibliography see Indi.*

BENGAL, Bay of, that portion of the Indian Ocean between Hindustan and Farther India, or Burma, Siam and Malacca and ex¬ tending south to Ceylon and Sumatra. It receives the waters of the Ganges, Brahma¬ putra, Irrawadi, Mahanadi, Godavari, Krishna and Kaveri. Calcutta, Rangoon and Madras are the most important towns on or near its coasts. On the west coast there are no good harbors, but the east coast has a considerable number, among them being Akyab, Cheduba, Negrais, Mataban and Syriam. On account of the extreme heat the rate of evaporation is very high, sometimes amounting to an inch per day. The tide sometimes rises . to the height of 70 feet. In summer the northeast monsoon prevails, and in winter the southwest monsoon. The Andaman and Nicobar islands are situated in the eastern part of the bay.

BENGAL, or BENGOLA, Light, a fire¬ work, giving a vivid and substained variant light. It is used for signals at sea. It is com¬ posed of six parts of nitre, two of sulphur and one of antimony tersulphide. These are finely pulverized and incorporated together and the composition pressed into earthen bowls or sim¬ ilar shallow vessels. It is also used in ordinary pyrotechny to illuminate a district or section of country. Because of a poisonous oxide of antimony given off during

combustion the light cannot be used without danger indoors.

BENGALI, ben-ga'le, the dealer's name, originating in a mistake as to their origin, for

any of several of the beautiful little African vvaxbills, bred and sold as cage-birds ; especially the ((blue-bellied finch** (Estrilda bengala), which is ashy-brown above, with the wing quills brown, and the sides of the head, the throat and whole lower surface azure blue, spotted under and near the wings. They add to this charming dress lively manners and an agreeable song. Their requirements in the cage are like those of a canary. They are common also in Australia and Oceanica.

BENGALI ERA, The, one of the chrono¬ logical eras of the Hindus, supposed to have been derived from the Hegira. The Hindus, however, use the sidereal year and the Moham¬ medans the lunar, hence the Mohammedan epoch is at present some nine years in advance of the Bengali.

BENGALI, or GAURA, LANGUAGE,

one of the five modern languages of Hindu¬ stan, which are derived from the ancient San¬ skrit. Its name is derived from Banga, the Sanskrit name of the country, with the Arabic article al suffixed; the whole being corrupted into the present form. Gaura is derived from Gaur, the name of the ancient metropolis ; it is spoken by 44,624,048 British subjects, of whom about one-fourth speak also some other dialect. It extends over the regions on the lower Ganges, from Patna down to its delta, being purest in the province of Bengal and in the eastern regions. This language consists of an aboriginal basis, with which a much greater portion of Sanskrit and Pracrit has been admixed than with any one of its cog¬ nates ; with a considerable addition of Afghan, Persian, Arabic, Portuguese, Malay and English words. Although the Sanskrit element pre¬ dominates as regards the words, the grammati¬ cal forms of the language differ more from the

Sanskrit than the forms of the Greek, Latin, Gothic and Persian; most of the flexions of nouns and verbs having been lost, and their places being supplied by auxiliary words and by circumlocution. Notwithstanding this, it admits in the higher style many of those forms which are intelligible only to more cultivated persons. There are no forms of gender, sex being denoted by the use of qualifying terms or by different words. There are seven cases made by suffixes — nominative, accusative, instru¬ mental, dative, ablative, genitive and vocative. The plural of nouns is made by suffixing dig to the genitive singular. It delights in compound words, formed especially by means of a sort of past participle; elegant Sanskrit compounds being unidiomatic. There is but one conjuga¬ tion, whose radical is the imperative. Com¬ pound tenses are made by the auxiliaries, mean¬ ing to do, to be, to become. The singular and plural of verbs are often confounded; the plural with a singular noun denoting respect, the singular with the plural noun being used in speaking to inferiors. There are three simple moods, infinitive, indicative, imperative ; four others being periphrastic, the potential, optative, inchoative and frequentative. Any verb is con¬ jugable negatively by the suffix nd. The sys¬ tem of writing is that of the devandgari of the Sanskrit language but the forms of letters are more broken and twisted. B and v, however, are written by one character, and the charac¬ ters of the sounds, s, z, sh, are interchangeable.

No book written in Bengali appeared before 1500 a.d. After the settlement of Moslems in Gaur, the Voisyas and Soodras (agricultural and servile castes) began to study Persian, to gain a livelihood, and were well rewarded by the conquerors. Except the stories of Krishna's study, the rules of arithmetic in verse and a few other elementary books, the vernacular lit¬ erature was very poor, until Rajah Krishna-chandra Roy Bahadoor restored Hindoo litera¬ ture in India, by bringing in pundits and en¬ dowing schools. Owing to the abundance of Sanskrit books, and the prejudice of most Brahmins against the Bengali, this was neglected until 1800, when the college of Fort William was founded, and the study of Bengali was made imperative and collateral to the San¬ skrit. Many Bengali works have since been printed at Calcutta and Serampore. The first native newspaper was published at Serampore in 1818. Considerable change has been made since in the diction and composition of this language, which continues to be enlarged and ennobled, by being capable of borrowing in¬ definitely from the venerable Sanskrit mother. In 1913 the Bengali

poet Sir Rabindra Nath Tagore received the Nobel prize in literature. Gilchrist, H. P. Forster, Carey, W. Morton, Hunter, Mohun Persaud, Tahur, Tarachand Chukruburti and Sir G. C. Haughton have pub¬ lished Bengali English dictionaries and vocabu¬ laries, and Ram Comul Sen has translated Todd's edition of Johnson's English dictionary into Bengali.

Bibliography. — Beames, (Comparative Gram¬ mar of the Modern Aryan Languages of India *; (Grammar of the Bengali Language> (Oxford 1894) ; Cust, (The Modern Languages of the East Indies) ; Dutt, <The Literature of BengaP (Calcutta 1895) ; Ganguli, (Students' Bengali-English Dictionary* (Bhawanipur 1903) ; Grier¬ son, Specimens of the Bengali and Assamese Languages* (Calcutta 1903) ; Haughton, G. C,

(Bengali, Sanskrit and English Dictionary* (London 1833) ; Nicolls, (Manual of the Ben¬ gali Language) (London 1894) ; Sen, D. C.,

(History of the Bengali Language and Literature) (Calcutta 1911).

BENGAZI, ben-ga'ze, or BENGHAZI, north Africa town, capital of the vilayet Barca, on the east coast of the Gulf of Sidrah. Next to Tripoli it is the most important seaport on this coast. The harbor is fast silting up, and admits only small vessels ; but there is still a considerable trade, cattle, corn, barley, sponges, ivory, ostrich feathers, etc., being exported, especially to Malta. It is the centre of a fer¬ tile region and has a large trade with the in¬ terior by means of caravans. The population, between 25,000 and 35,000, is composed of Maltese, Greeks and Italians. It. is sometimes identified as the ancient Hesperides, which was named Berenice by Ptolemy III. It was oc¬ cupied by the Italians 20 Oct. 1911, and was the scene of several skirmishes during the war with Turkey.

BENGEL, beng'el, Johann Albrecht, Ger¬ man theologian and philologist : b. Winn.enden, Wiirtemberg, 24 June 1687 ; d. Alpirsbach,. 2 Nov. 1752. He studied at Stuttgart and Tubin¬ gen, and became curate of Metzingen. In 1708 he was appointed tutor in theology at Tubin¬ gen. Among other high offices filled by him

later in life were those of consistorial coun¬ cillor and prelate of Alpirsbach. He especially applied himself to the critical study of the Greek Testament, of which he published an edition in 1723. Among his other works are (Apparatus Criticus Novi Testamenti,5 a work of great value for its suggestive condensed comments, which first appeared in 1742, and has been several times reprinted, *etc.* An at¬ tempt has been made to adapt his (Gnomon *to English readers in the (Critical English Testament, > by Blackley and Hawes (1866). Bengel was the first Protestant author to treat New Testament exegesis in thoroughly criti¬ cal style. He also rendered invaluable seryice in amending the text of the Bible and in point¬ ing the way to the classification of the biblical codices into families. The notes appended to his (Gnomon N. TestamentP (Tubingen 1742) have been highly regarded and translated into nearly all modern tongues (English ed., Phila¬ delphia 1862). They were used by John Wes¬ ley in his (Notes on the New Testament.-* Other works of Bengel are (Erklarte Offen-barung Johannis> (Stuttgart 1740) and (Ordo Temporum a Principio per Periodos CEconomiae Divinae Historicus atque Propheticus) (Tubin¬ gen 1741). Consult the biography by H. P. Burke (Stuttgart 1831, English trans., Lon¬ don 1837), and Oscar von Wachter, (Bengel, Lebsnsabriss* (Stuttgart 1865).

BENCKENDORFF, Alexander, Count, Russian diplomat: b. 1849; d. London, Jan. 1917. The son of Constantin Count Bencken¬ dorff and Louise Princess de Croy-Diilmen ; he was reared in the Roman Catholic faith and educated in France and Germany. Entering the diplomatic service in 1869 he acted as attache to the Russian embassies at Rome and Vienna, and minister to Denmark from 1897 to 1903. In the latter year he became ambas¬ sador to Great Britain, and occupied that post till his death. He married Sophie Countess Shuvaloff in 1879 ; his only daughter was mar¬ ried in 1911 to the Hon. Jasper Ridley, second son of the first Viscount Ridley. Count Benckendorff may be held in a very large measure responsible for the reconciliation be¬ tween Russia and Great Britain after many years of mutually suspicious animosity. It was he who negotiated the Anglo-Russian Agreement of 1907, which, following on the Anglo-French Agreement of 1904, finally re¬ sulted in the Triple Entente.

BENGER, Elizabeth Ogilvy, English his¬ torical writer: b. Wells, Somersetshire, 1778; d. London, 9 Jan. 1827. She early displayed a turn for literature, but her straitened means preventing her from gratifying this taste by the purchase of books, she was in the habit of perusing the opened books in a bookseller's window, and would

return day after day to see if the page had been turned over. In 1802 she removed with her mother to London. Her first literary attempts, including a poem on the abo¬ lition of the slave trade and two novels, at¬ tracted little attention, but she was more suc¬ cessful with her (Memoirs of Mary Queen of Scots,* and of (Elizabeth Queen of Bohemia.* She also wrote the Lives of Anne Boleyn, Mrs. Elizabeth Hamilton and John Tobin, the dra¬ matist. Her chief merits are a clear style and

industry in the collection and arrangements of facts.

BENGOUGH, ben'go, John Wilson, Ca¬ nadian poet: b. Toronto, 5 April 1851. In 1873 he established the Grip, a humorous weekly, in Toronto. His political cartoons in this paper were highly artistic. He is also widely known as a lecturer and a poet. His publications in¬ clude (Ontario, Ontario) (a famous election song) ; (Grip's Cartoons * (1875) ; (Popular

Readings, Original and Selected) (1882); Cari¬ cature History of Canadian Politics * (1886) ;

(Motley: Verses Grave and Gay* (1895) ; (The Up to Date Primer: A First Book of Lessons for Little Political Economists) (1896) ; (The Gin Mill Primer* (1898) ; (In Mahy Keys) (poems 1902), *etc.*

BENGUELA, ben-ga'la, or BENGUEL—

LA, a district belonging to the Portuguese on the western coast of south Africa, forming one of the three provinces of Angola ; bounded north by the province of Loanda, south by that of Mossamedes and west by the Atlantic Ocean. The interior of the country is mountainous, the direction of the elevated lands being from northeast to southwest. It is well watered, being intersected by numerous rivers and streams. Its vegetation is luxuriant and it possesses extensive forests. Its products are those of tropical Africa generally. Tobacco, fruit and vegetables are grown. Coffee grows wild. The soil in parts is well adapted for the production of grain, but little is grown. The larger animals of Africa are numerous, such as lions, elephants and hippopotami. The minerals include copper, sulphur, lead, gold and silver. The only town worth mention is the seaport, Benguela, founded in 1617 as San Felipe de Benguela, which is pleasantly situated and fairly healthy. In slave-trading days Benguela's population was greater than it is to-day and it was an important centre of the trade. It has rail

con¬ nection with Lobito, which has a good harbor with improved docking facilities. It exports rubber, coffee, skins, ivory, *etc.* A short rail¬ way starts from the town, the population of which is about 3,600, of which between 1,000 and 1,500 are whites. The population of the province may amount to several millions.

BENHADAD, the name of three kings of Syria, all mentioned in' Scripture. The most conspicuous is the second, who was equally re¬ markable for his arrogance in prosperity and his craven spirit in adversity. He first sent an insolent message to Ahab, claiming him and all his subjects as his slaves; and after Ahab encountered and defeated him, Benhadad sent a message abjectly begging his life. Ahab was impolitic enough to grant it, and Benhadad, dis¬ regarding all his promises, proved a bitter enemy to his successor. Jje was murdered about 890 b.c.

BENHAM, Andrew Ellicott Kennedy,

American naval officer: b. New York, 10 April 1832; d. at Lake Mahopac, N. Y., 11 Aug. 1905. He entered the navy in 1847 ; served in the East India and the home squadrons in 1847-52; attended the United States Naval Academy 1852-53 ; was commissioned lieutenant in 1855, lieutenant-commander in 1862, com¬ mander 1866, captain 1875, commodore 1885

and rear-admiral in 1890, and retired in 1894. During the Civil War he served in the South Atlantic and West Gulf blockading squadrons, taking part in the capture of Port Royal, S. C. In 1868-69 he served at the Brooklyn navy yard; was lighthouse inspector 1870-71 and 1884—88. In April 1893 he commanded one of the divisions in the great naval display at New \ork; in 1894, as commander of a squadron at Rio de Janeiro, Brazil, he forced the com¬ mander of the insurgents' squadron to raise the blockade of the city and to discontinue firing on American merchant vessels ; and in 1898 was naval prize commissioner in Sa¬ vannah, Ga.

BENHAM, Henry Washington, American military engineer : b. Cheshire, Conn., 1816 ; d. 1 June 1884. He was graduated at the United States Military Academy in 1837 and became brevet major-general, United States army. He commanded the engineer brigade and laid sev¬ eral pontoon bridges under fire during the Chancellorsville battles ; constructed and com¬ manded the defenses at City Point, devised the picket shovel and made many improvements in the construction of pontoon bridges, in which he was a recognized expert. After the war he was in charge of the Boston harbor sea wall and later of the New York harbor defenses; retired from active service 1882.

BENHAM, William, English clergyman and author: b. West Meon, Hampshire, 15 Jan. 1831; d. 30 July 1910. He was vicar of Ad¬ dington, 1867-73; of Margate, 1872-80; of Mar-den, 1880-82 ; and rector of Saint Edmund's, Lombard street, London, from the year last named. He was canon of Canterbury from 1885. He published among other works (The Church of the Patriarchs5 (1867) ; (Catherine and Craufurd Tait; (Annals of the Diocese of Winchester5 (1884) ; (A Short History of the Episcopal Church in the United States5 (1884) ; (The Dictionary of Religion5 (1887) ; (Life of Archbishop Tait,5 with Davidson (1891), and histories of the cathedrals of Win¬ chester, Rochester and old Saint Paul's, Lon¬ don. He edited the (Ancient and Modern Li¬ brary of Theological Literature.5

BENI, ba'ne, Bolivia, one of the nine de¬ partments of Bolivia, South America. It is in the northeastern part and bounded on the north and east by Brazil, by the departments of Cochamba, La Paz and Santa Cruz on the south and La Paz on the west, with an area of 107,744 square miles. It is a level, fertile region, growing cocoa, coffee, sugar-cane and tobacco, tropical fruits and containing vast forests of rubber-trees and rich deposits of gold. The climate is hot and moist, but is healthful, nevertheless. Pop. 37,300, mostly Indians. Trinidad (4,810) is the chief town of the department.

BENI, a river of South America, formed by the junction of several streams flowing eastward from the Andes in about 18° south. Its course is north and northeast through Bo¬ livia; and on the border of Brazil it unites with the Mamore to form the Madeira, by which its waters are carried to the Amazon. It receives several tributaries of importance, the chief being the Madre de Dios from Peru, and

it is navigable throughout a great part of its course. Its length is about 850 miles.

BENI-HASSAN, ba’ne-has’san, Egypt, village on the east bank of the Nile below Assiut, remarkable for the rock-hewn tombs in the neighborhood, 39 in number, cut in the calcareous stone of the mountain. They are sepulchres of the ancient monarchs who ruled the district about 2000 b.c. They exhibit inter¬ esting paintings and hieroglyphics. The paint¬ ings portray incidents in the ancient life of Egypt and the inscriptions are of great value for the light they throw upon the history of the 12th dynasty. In recent years the mural decorations have suffered at the hands of relic-hunters. The remainder have been carefully copied at the direction of the Egypt Explora¬ tion Fund. Consult Publications of the Ar¬ chaeological Survey of Egypt5 (Vols. I, II, V,

1892, 1893-96).

BENI-ISRAEL, ba’ne-iz’ra-el, a race in the west of India (the Konkan sea board, Bombay, etc.), who keep a tradition of Jewish origin and whose religion is a modified Juda¬ ism. By some persons they are supposed to be a remnant of the 10 tribes. Theiir number is estimated at 5,000 and in feature they re¬ semble the Jews of Arabia. They abstain from the flesh of unclean animals and observe the Sabbath strictly. Some of their learned doc¬ tors are acquainted with Hebrew, but to the vast majority the Scriptures are unknown. They observe several of the religious customs common among their neighbors the Hindus. Little is known as to the time of their settle¬ ment in India, but it is certain that they had been there for many centuries when, in 1000 a.d., the reformer David Rahabi came among them. Benjamin Tudela knew them in the 12th century and Marco Polo in the 13th. Their communities are governed by the Mukadam, or head man, and their religious chiefs are called cadi. The latter perform circumcision and other rites. Consult Ezekiel, Joseph, in (The Jewish Encyclopaedia5 (1902) and Sam¬ uel, H., (Sketch of Beni-Israel5 (1889).

BENI-ISRAEL, a small antelope (Neo¬ tragus saltianus) closely allied to the duyker-boks, common in Abyssinia and on the shores of the Red Sea. It is known by the names omdigdig, madoqua, hegoleh and Salt’s ante¬ lope. It is a related species of the Neotragus Kirki, or Kirk’s antelope, of southern Abys¬ sinia, which is very numerous. They utter shrill cries and travel by long bounds. Their flesh has a heavy, unpleasant flavor.

BENI-KHAIBIR, ba-ni-ka-i’ber (sons of Keber), an Arabic tribe

supposed to be a rem¬ nant of the ascetic tribe of Rechabites.

BENI-MZAB, a race or tribe, of Berbers that dwell in the Sahara, near its northern border, under the supremacy of the French. They number some 30,000. They are peacefully disposed, and numbers of them are employed in Algiers in various occupations. In 1882 their territory was finally annexed to the department of Algiers and a special bureau was established at Ghardaia. Consult Coyne, A., (Le Mzab5 (Algiers 1879).

BENI-SUEF, ba'ne-swaf', Egypt, the capi¬ tal of a province of the same name; is pleas-

antly situated on the left bank of the Nile, 65 miles south from Cairo, with which it is con¬ nected by railway. It is the entrepot for the produce of the fertile valley of Fayoum, and contains cotton mills, controlled by the state, and alabaster quarries. Pop. (1907) 23,357. The province has an area of 400 square miles and a population estimated at 370,000.

BENICARLO, ba-ne-kar-lc/, Spain, sea¬ port in Valencia, in the province of Castellon de la Plana, at the mouth of the Benicarlo River, on the Mediterranean, 42 miles northeast of Castellon de la Plana. It is surrounded with walls, having an old castle, a fine church, with an octagonal tower, and some manufactures, *etc.* It is chiefly noted as being the place of export of the red wines called by its name which are produced in the surrounding country. These are chiefly sent to Bordeaux to be mixed with clarets, or to England to be manufactured into port. Grain, oil, vegetables and oranges are produced, and spirits are manufactured. Pop. (1910) 7,200.

BENICIA, ben-ish'i-a, Cal., city in Solano County, at the mouth of the Sacramento and San Joaquin rivers, and on the Southern Pa¬ cific Railroad, 24 miles northeast of San Fran¬ cisco. The harbor is good and there is steam¬ ship communication with San Francisco. The city has among its principal industries cream¬ eries, tanneries, farm implement works, ship¬ yards and fruit packing establishments. It re¬ ceived its charter as a city in 1861. Its gov¬ ernment is vested in five

trustees elected for a term of four years. It contains a United States arsenal and barracks ; Saint Augustine College (Roman Catholic) ; Saint Catherine's Convent (Roman Catholic). Benicia was founded in 1848 and in its early years rivalled San Fran¬ cisco. In 1853 it was the capital, but the gov¬ ernment seat was transferred to Sacramento in 1854. Pop. 3,100.

BENIGNI, ben-in'ye, Umberto, Italian cler¬ gyman and educator : b. Perugia, 30 March 1862. He was educated at the seminary of his native city, the School of Palaeography and Diplomacy and State Archives, Rome. In 1880-93 he was successively secretary to the archbishop of Perugia, professor of Church history at the seminary there and founder of the Rasscgna sociale, the first Italian period¬ ical devoted to Catholic sociology. After 1895 he resided in Rome, where he edited the Bes-sarione and Voce della Verita. He was also professor of Church history at Saint Apollinaris, the Propaganda and the Vatican Sem¬ inary. He was assistant at the Vatican Li¬ brary and member of the Historico-liturgical Commission of the Congregation of Rites. He is at present professor of Church history and diplomatic forms at the Pontifical College for noble ecclesiastics. He has written (Pro-paedeutica historian ecclesiasticae) (2 vols.) and (Storia sociale della Chiesa"* (2 vols.). He contributed upwards of 400 articles to the (Catholic Encyclopedia. >

BENIN, be-nm', Africa, a negro country or kingdom, on the Bight of Benin, Gulf of Guinea, extending along the coast on both sides of the Benin River, and to some distance in¬ land,. but the limits are not accurately known. The capital is Benin, a town which at one time

had some 15,000 inhabitants, but is now said to have greatly decreased in population. It is situated about 50 miles from the coast, and con¬ sists of clay-built houses neatly thatched with reeds, straw or leaves. The coast, which now belongs to the British, is thickly indented with estuaries, some of them of considerable breadth and studded with islands. The country is flat for some distance inland, when it begins gradu¬ ally to rise till it attains a height of over 2,000 feet. It is very well wooded, and being like¬ wise well watered, it is rich in all the vegetable productions of the tropics. Cotton is indige¬ nous and is woven into cloth for the women. Sugar-cane of good quality is grown ; and yams, plantains, maize, rice, etc., are cultivated. The religion is Fetishism. The climate, especially at the mouth of the

rivers, is very unhealthy. Palm oil is now the principal article of com¬ merce. The inhabitants are still in almost the savage state, human sacrifices being offered in recent times. It is believed that the Portuguese, Diogo Carn, discovered Benin in 1484. It was long the centre of the slave trade, which the British suppressed when their influence became paramount there. A massacre of British officials and other Europeans took place in 1897 and a punitive expedition was sent to take the city, which with the surrounding district now forms part of the southern Nigeria. Government au¬ thority is vested in a British resident assisted by a council of native chiefs. Consult Roth, (Notes on Benin Customs> (1898) and (Great Benin } (1903).

BENIN, Bight of, Africa, a large bay on the west coast, forming a portion of the Gulf of Guinea, and extending from the Niger delta westward to Cape Saint Paul, a distance along the coast of 500 miles. The Forcadas River, flowing into the bight, forms the principal water route between the ocean and the Niger above the Delta.

BENIOWSKY, ba-ne-off'ski, Moritz Au¬ gust von, Hungarian adventurer: b. Verbova, Hungary, 1741 ; d. 23 May 1786. The son of an Austrian general, he served as lieutenant in the Seven Years' War and in the Polish war against Russia. In 1769 he fell into the hands of the Russians, who exiled him to Kamchatka. Avail¬ ing himself of a knowledge of navigation, he succeeded in saving from wreck the vessel which was to convey him to Siberia. This feat won for him the sympathy of the governor of Kamchatka, which was still more strengthened by his proficiency in chess, and he appointed him tutor of his children. One of his pupils fell in love with him, and with her father's consent they were married. In 1771 he effected his escape from Kamchatka with the assistance of his wife, who, although she had since learned that he had another wife in Hungary, followed him to Formosa and Moscow, at which latter place she died. On his return to Paris he un¬ dertook to found a French colony at Madagas¬ car, where he arrived in June 1774, founded his colony, and in 1775 was proclaimed king by some of the native tribes, while his wife was proclaimed queen. The governor of the Isle of France refusing to supply him with men to support his state, Beniowsky applied directly to the French government, but without success. Disgusted with the French and their colonies,

he now entered the Austrian service, and was commander in the battle of Habelschwerdt, in 1 778 against the Prussians. His subsequent efforts to interest the English government for Madagascar were fruitless, but with the sup¬ port of a wealthy firm of Baltimore, Md., he effected a landing in Madagascar, but was killed soon after in a conflict with troops from the Isle of France. He wrote his autobiog¬ raphy in French; it was translated into German by George Forster, into English by William Nicholson and into various other languages. Kotzebue dramatized his character and career in his play entitled 'The Conspiracy in Kam¬ chatka.' The 'Memoirs and Travels, * edited by Nicholson and Magelhan, were published in London in 1790. Another edition was prepared by Kubalski (Paris 1863).

BENISH' DAYS, days (Mondays, Wednes¬ days and Saturdays) on which the modem Egyptians don the benish (whence the name), or ordinary garment, relax their religious duties and engage in pleasures.

BENJAMIN, the youngest son of Jacob and Rachel (Gen. xxxv, 16-18). Rachel died immediately after he was born and with her last breath named him Ben-oni, "son of my borrow® ; but Jacob called him Benjamin, "son of my right hand.® He was a great comfort to his father, who saw in him the image of the wife he had buried, and of Joseph, whose loss he also mourned. He could hardly be persuaded to let him go with his brethren to Egypt. When Jacob migrated to Egypt Ben¬ jamin appears at the head of the family of 10. The territory of the tribe in Palestine was be¬ tween those of Ephraim and Judah and in¬ cluded the cities of Bethel, Jericho, Gibeon, Ophrah and Ramah. The tribe was one of the most warlike and holds an important place in Hebrew history. The tribe of Benjamin, small at. first, was almost exterminated in the days of the Judges, but later it greatly increased. On the revolt of the 10 tribes Benjamin ad¬ hered to the camp of Judah; and the two tribes afterward closely united. King Saul and Saul of Tarsus were Benjamites; also Esther and Mordecai. Some scholars regard the tribe as being formerly a constituent part of the tribe of Joseph. See Jews and Judaism.

BENJAMIN, Asher, author of the first American books on architecture, who lived about the close of the 18th century. Little is known of his life except that he followed his profession as architect and builder in Massa¬ chusetts. He was the author of 'The Elements of Architecture, Town and Country Builder's Assistant (1797) and (The Practical House

Carpenter. *

BENJAMIN, Charles Henry, engineer and educator : b. Patten, Me., 29 Aug. 1856. He was graduated at the University of Maine in 1878. Degrees, M.E., LTniversity of Maine; D.Eng., Case School of Applied Science. From 1880 to 1886, professor of mechanical engi¬ neering at the University of Maine; 1889-1907, professor of mechanical engineering. Case School of Applied Science; since 1907, dean of the Schools of Engineering, Purdue University. Principal miblications, ‘American Machine Tools* (1906) ; ‘Steam Engine* (1909) ; ‘Machine Design. > in collaboration with J. H.

Hoffman (1906) also papers and monographs on engineering subjects in various technical journals and proceedings of engineering socie¬ ties; member, Tau Beta Pi and Sigma Xi ; honorary member of the Cleveland Engineering Society; member of-the American Society of Mechanical Engineers, Master Mechanics’” As¬ sociation, Master Car Builders’ Association, Western Railway Club, Society for the Promo¬ tion of Engineering Education.

BENJAMIN, Judah Philip, American lawyer and statesman: b. Saint Croix, West Indies, 11 Aug. 1811; d. Paris, 7 May 1884; of English parentage and of Jewish faith. He was educated at Yale College and was admitted to the bar in New Orleans in 1832 He had an extensive practice in New Orleans, was engaged as counsel in several cases of nation¬ wide interest and published a valuable ‘Digest of Reported Decisions of the Supreme Court of the Late Territory of Orleans and of the Supreme Court of Louisiana.) In 1848 he was admitted to practice before the United States Supreme Court and was elected to the United States Senate in 1852 and 1858. At the begin¬ ning of the Civil War he resigned from the Senate and declared his adhesion to the State of Louisiana. In 1861 he accepted the office of Attorney-General in the Cabinet of Jefferson Davis, and afterward became successively Con¬ federate Secretary of War and Secretary of State. He served with great energy and ability in the latter capacity until the close of the war. After Lee’s surrender, Benjamin fled from Richmond and after many hardships succeeded in reaching London, England, where he was admitted to the bar in 1866. He gained a successful practice, and in 1872 was formally presented with a silk gown. He wrote a ‘Treatise on the Law of Sale of Personal Property* (1868), which became a legal classic in England. He retired in 1883. Consult Butler, Pierce, ‘Judah P. Benjamin * (Phila¬ delphia 1907).

BENJAMIN, Lewis S. (Lewis Melville), English writer: b. London, 30 March 1874. He was on the stage from 1896-1901, afterward taking up literature as his profession, and specializing in the Georgian and Early Victor¬ ian periods. Pie has written a ‘Life of Thackeray* (1909), and edited an edition of his works (1901-07). His other works in¬ clude ‘Victorian Novelists* (1906) ; ‘The hirst Gentleman in Europe* (1906) ; ‘The Beaux of the Regency* (1908); ‘Life and Letters of Lawrence Sterne* (1911); ‘William Cobbett* (1913); ‘Memoirs of Lady Craven* (1913); ‘The Berry Papers* (1914).

BENJAMIN, Marcus, American editor : b. San Francisco, Cal., 17 Jan. 1857. He studied at the School of Mines, Columbia University, in 1878; received the A.M. degree from Lafay¬ ette College in 1888; Ph D. University of Nash¬ ville, 1889; Sc.D. University of Pittsburgh, 1905; LL.D. Saint John’s College, Maryland, 1910. He became editor of the American Phar¬ macist in 1882, and later of its successor, the Weekly Drug Ncivs. He has edited more than 100 volumes in connection with his special duties as editor of the United States National Museum since 1 April 1896, and as member of the United States Assay Commission 1896, 1900, 1904, 1906 and 1912. Pie contributed vari-

ous articles to Appleton’s (Annual Cyclopedia,5 1883 to 1902 ; was on the staff of Appleton’s (Cyclopedia of American Biography5 ; was ed¬ itor of various Appleton’s guides and hand¬ books, etc., also of (Standard Dictionary,5 (Universal Cyclopedia, 5 -(Encyclopedic Dic¬

tionary,5 (American Educator,5 international Year Book,5 (New International Cyclopedia5 ; was editor-in-chief of Appleton’s (New Practi¬ cal Cyclopedia5 (6 vols., 1910) ; was translator of Bertholet’s (Explosive Materials5 (1883). He was secretary (1904-07) and registrar (1914-15) of the society of the Sons of the Revolu¬ tion, and

president of the Alumni Association of Columbia University in the District of Columbia, 1909-15. He has contributed various articles to the principal magazines.

BENJAMIN, Park, American journalist, poet and lecturer : b. Demerara, British Guiana, 14 Aug. 1809; d. New York, 12 Sept. 1864. Early in life he was sent to New England and was educated at Trinity College, Hartford. He studied law, but later took up literary work, helping to found The New World in New York in 1840. His poems, of a high order of merit, have never been collected. (The Contempla¬ tion of Nature,5 read on taking his degree at Hartford, 1829; the satires, (Poetry5 (1843); Hnfatuation5 (1849) ; (The Nautilus5 ; (To One Beloved5 ; and (The Old Sexton5 are among his works. He was associated editori¬ ally with Epes Sargent and Rufus W. Gris¬ wold. (The Old Sexton5 has found its way into several anthologies.

BENJAMIN, Park, American lawyer, edi-itor and miscellaneous writer: b. New York, 11 May 1849. A graduate of the United States Naval Academy (1867), he served on Admiral Farragut's flagship, but resigned in 1869, and was graduated at the Albany Law School in the following year. As a lawyer he has been a patent expert. He edited the Scientific Ameri¬ can (1872-78), and Appleton's Cyclopaedia of Applied Mechanics and Cyclopedia of Modern Mechanism. He has written (Shakings: Etch¬ ings from the Naval Academy5 (1867); (Wrinkles and Recipes5 (1875) ; (The End of New York5 (1881); < The Voltaic Cell5 (1892); (Modern Mechanism5 (1905) ; (The Age of Electricity5 (1886) ; (The Intellectual Rise in Electricity, a History5 ; (The United States Naval Academy5 (1900).

BENJAMIN, Samuel Green Wheeler,

American traveler, artist and miscellaneous writer: b. Argos, Greece, 13 Feb. 1837; d. Bur¬ lington, Vt., 19 July 1914. He was educated at Williams College and at the English College in Smyrna; was assistant librarian in the New York State Library, 1861-64; and was United States Minister to Persia, 1883—85. He was also editor of the American Magazine of Art and was a frequent contributor to magazines and periodicals. He was also favorably known as a marine painter and illustrator. Among his numerous works, both in prose and verse, are (Art in America5 (1879) ; Contemporary Art in Europe5 (1877); Constantinople5 (1860); 'Troy: Its Legend, Literature and Topography5 (-1881) ; (A Group of Etchers5 (1883) ; (Persia and the Persians5 (1886) ; 'Sea Spray5 (1888).

BENJAMIN-CONSTANT, bon-zha-man-kon-ston, Jean Joseph, French

painter: b.

Paris, 10 June 1845; d. there, 26 May 1902. He studied under Caban el, and exhibited in the Salon of 1869 a scene from (Hamlet. 5 His taste inclined him to Oriental subjects and the nude, and his vivid coloring and dramatic treatment made his work fashionable in Paris, London and the United States. His work dis¬ plays much finished and minute detail, but he paid chief attention to harmony of effect and decorative value. The most celebrated of his pictures are Che Last Rebel5 (1870) ; (Mo¬ hammed II's Entry into Constantinople5 (1876) ; and 'Thirst in the Desert5 (1878). In his later years he devoted himself to portrait¬ ure and mural decoration. Two striking ex¬ amples of the last named are the ceiling of the Opera Comique, Paris, and (Justinian in Council5 in the Metropolitan Museum of New York. In 1893 he carried off the medal of honor of the Salon by his portrait of his soil Andre, now in the Luxembourg Museum, Paris. Among other successful portraits are those of Queen Victoria and Queen Alexandra, M. de Blowitz, Anthony Drexel of Philadelphia and Frederick Ayer. He visited the United States several times. He was elected a member of the Institute in 1893 and was an officer of the Legion of Honor.

BENJAMIN OF TUDELA, J ewish trav¬ eler: b. Tudela, Navarre, Spain, in the 12th century. In 1160-73 he traveled from Sara¬ gossa, through France, Italy, Greece, Palestine, Persia to China, returning by Khuzistan, the Indian Ocean, Arabia, Egypt, Sicily and Spain. As the first European traveler who penetrated far into the East, he furnishes a great amount of interesting information, and though not free from error or fable, proves himself worthy of the high estimation in which he has always been held among his Jewish country¬ men for soundness of judgment and extent of learning. His 'Itinerary, 5 first printed in He¬ brew at Constantinople in 1543, has been often reprinted, the latest being the edition of Griinhut (Jerusalem 1903). It was translated into Latin by Arias Montanus in 1575, and afterward into Dutch, German and French. A part of the text was published by M. N. Adler in (Quarterly Statement of the Palestine Ex¬ ploration Fund5 (October 1894), from a manu¬ script in the British Museum. Consult Carmoly, E., and Lekwel, L., (Notice historique sur Ben¬ jamin de Tudele5 (1852). The edition of Asher (London and Berlin 1840-41) contains an English translation.

BENKULEN. See Bencoolen.

BENNDORF, Otto, German archaeol¬ ogist: b. 13 Sept. 1838; d. 2 Jan. 1907. He studied at Erlangen and Bonn, went to Italy and Greece, 1864-68, and was professor of archaeology at the universities of Gottingen, Zurich, Munich, Prague and Vienna. In 1875 he made a second archaeological tour to Samothrace; in 1881 and 1883 he made two expedi¬ tions, at state cost, to southwestern Asia Minor ; in 1898 he was made director of the Austrian Archaeological Institute. He wrote (The An¬ cient Sculptures in the Lateran Museum5 (in conjunction with Schone) (Leipzig 1867) ; (An dent Historical Helmets and Sepulchral Masks5 (1878); 'Travels in Southwest Asia Minor5 (1884) ; 'Reisen in Lykien und Karien5 (1884), *etc.*

BENNE OIL, a valuable oil expressed Horn the seeds of Scsamum orientate and S. indicum, much cultivated in India, Egypt, etc., and used for purposes similar to those of olive oil. Also called sesamum oil and gingelly oil. See Sesame.

BENNET, Elizabeth, the heroine of Jane Austen's novel, (Pride and Prejudiced Con¬ sult Howells, 'Heroines of Fiction 5 (1901).

BENNET, Henry (Earl of Arlington), English statesman : b. Arlington, Middlesex, 1618; d. 28 July 1685. He was devoted to the cause of Charles I, and was appointed Under¬ secretary of State ; he fought in several battles, and was wounded at Andover, but after the battle of Worcester he retired to Spain. Upon the restoration he returned to England, and was appointed keeper of the privy seal, and shortly afterward Secretary of State. In 1664 he was created Baron Arlington ; in 1670 became noted as one of the famous Cabal, but is not accused of entertaining their extreme sentiments; he was created Earl of Arlington in 1672. He was one of the plenipotentiaries sent to Utrecht to negotiate a peace between Austria and France, but the mission not being successful, an en¬ deavor was made by his colleagues to cast the , odium of the failure upon him. He defended himself, however, before the House of Com¬ mons, and was acquitted. The war with Hol¬ land, which is said to have been caused by the machinations of the Cabal, lost to Arlington the favor of the King and people; but in spite of this

he received the office of chamberlain. In 1679 he became a member of the new council, and retained his office of chamberlain on the accession of James II.

BENNETT, Alfred Allen, American chem¬ ist : b. Milford, N. H., 30 Nov. 1850. He was graduated at the University of Michigan 1877 ; became professor of chemistry and physics in Iowa Wesleyan University; and since 1885 has been professor of chemistry in Iowa State College. Publications: ‘Text Book of Inor¬ ganic Chemistry5 (2 vols., 1895) and articles in the American Chemical Society Journal.

BENNETT, Alfred William, English bot¬ anist : b. Clapham, 24 June 1833; d. 23 Jan. 1902. He engaged in business as a bookseller and publisher in London, which he abandoned in favor of botanical research. He was the author of (The Flora of the Alps5 (1876-77), and of some admirable translations from the German: Sachs’ (Lehrbuch der Botanik5

(1875); Seboth’s ‘Alpine Plants5 (1879-84); and von Dalla Torre’s (Tourists’ Guide to the Flora of the Austrian Alps5 (1882).

BENNETT, Charles Edwin, American educator: b. Providence, R. I., 6 April 1858; d. Ithaca, N. Y., 2 May 1921. Graduated at Brown University 1878; pursued graduate studies at Harvard and in Germany 1881-84; was professor of Latin at the University of Wisconsin 1889-91 ; of classical philology at Brown 1891-92; and in the latter year was elected professor of Latin at Cornell. He was editor of classical texts. Publica¬ tions: ‘A Latin Grammar5 (1895) ; ‘The Foundations of Latin5 (1898); ‘Critique of Some Recent Subjunctive Theories5 (1898) ; ‘The Quantitative Reading of Latin Poetry5 (1899) ; ‘The Teaching of Greek

and Latin in Secondary Schools5 (with George P. Bristol) (1900) ; ‘The Latin Language5 (1907) ; ‘Syntax of Early Latin5 (Yol. I, 1910; Vol. II, 1914). Lie edited ‘Xenophon’s Hellen-ica, Books V-VIII5 (1892) ; ‘Tacitus, Dialogus de Oratoribus5 (1894) : ‘Cicero, De Senectute5 (1897); and ‘Cicero, De Amicitia5 (1897); ‘Horace, Odes and Epodes5 (1901); ‘Caesar, Gallic War, Books I-IV5 (1903) ; ‘Cicero, Selected Orations5 (1904) ; ‘Virgil, 2Eneid, Books I-VI5 (1905). Translator: ‘The Char¬ acters of Theophrastus5 (with Wm. A. Ham¬ mond) (1902); ‘Horace, Odes and Epodes5 (in Loeb Classical Library) (1913). He was a frequent contributor to philological journals.

BENNETT, Edmund Hatch, American lawyer: b. Manchester, Vt., 6 April 1824; d. Boston, 2 Jan. 1898. He was graduated at the University of Vermont in 1843, and admitted to the bar in 1847. He practised for many years in Taunton, Mass., and was mayor of that city 1865-67, and judge of probate and insolvency of Bristol County 1858-83. He was lecturer at Harvard Law School 1865-71, and afterward professor and dean at the Law School of Bos¬ ton University. In 1896 he was chairman of the Massachusetts commission on "Uniformity of Legislation55 throughout the United States and chairman of the commission to revise the Massachusetts statutes. His works include 30 volumes of 'English Law and Equity Reports5 ; '9-12 Cushing's (Mass.) Reports5 ; 'Massa¬ chusetts Digest5 (3 vols.) ; 'Bingham on In¬ fancy5 ; 'Blackwell on Tax Titles5 ; 'Leading .Criminal Cases5 (2 vols.); 'Goddard on Ease¬ ments5 ; 'Benjamin on 3ales5 '> 'Pomerov's Constitutional Law5 ; 'Indermaur's Principles of Common Law5 ; and 'Fire Insurance Cases5 (5 vols.). He made contributions to profes¬ sional journals, and was coeditor of the Ameri¬ can Law Register.

BENNETT (Enoch), Arnold, English author : b. Hanley, Staffordshire, 27 May 1867. He was educated at Newcastle Middle School, first took up law as his profession, which he abandoned to take up journalism, becoming assistant editor of Woman in 1893, and editor in 1896. He gave up journalism in 1900 to devote himself exclusively to literature. He had published two novels — 'A Man from the North5 (1898), and 'The Great Babylon Hotel5 (1902), before his 'Anna of the Five Towns,5 issued in the same year, revealed the fact that a new master had risen in English fiction, and his succeeding books dealing with the Five Towns — the pottery district of North Staf¬ fordshire in which the author was reared — have, in the opinion of H. G. Wells, given him the foremost place in contemporary English fiction. These are 'The Grim Smile of the Five Towns5 (1907) ; 'The Old Wives' Tale5 (1908); 'Clayhanger5 (1910); 'The Card5 (1911); 'Hilda Lesswavs5 (1912) and 'The Matador of the Five Towns5 (1912). A realist of great power, these tales deal with common¬ place people in drab and unimpressive surround¬ ings, and reveal in the most arrestive fashion how the seemingly outward monotony of their existence pulsates inwardly with moving drama. A writer of amazing fecundity, Mr. Bennett has already published over 30 volumes, the majority of which reach a high level as litera¬ ture. Others of these are 'Leonora5 (1903);

(A Great Man' (1904) ; (Sacred and Pro-ane Love' (1905); (The Regent' (1913); (The Price of Love' (1914). His plays include (What the Public Wants' (1909) ; (The Great Adventure' (1913) and (with Edward Knob¬ lauch) the brilliant, satisfying and enormously successful Milestones' (1912), the motif of which, youth rebellious against the putrefaction and tyranny of age, and youth becoming old in its turn and bewildered before the onslaught of the next generation, is a favorite with the author.

BENNETT, James Gordon, American journalist: b. New Mill, Keith, Scotland, 1 Sept. 1795; d. New York, 1 June 1872. He was of French extraction. He entered a Catholic seminary at Aberdeen with a view to entering the priesthood and after a three years' course emigrated to America, arriving at Halifax, N. S., in 1819, where he taught bookkeeping. Meeting with little success he removed to Bos¬ ton and for three years was there employed as proofreader. We next find him in New York writing for various newspapers after which he was engaged on the Charleston, S. C., Courier as translator of articles from Latin-American journals. He was soon back in New York, there established a commercial school and also did some work for the newspapers. In 1827 he became Washington correspondent of the New York Enquirer in which capacity he made a reputation for himself by his reports of the proceedings in Congress. In 1829 the Courier and Enquirer were consolidated and Bennett became associate editor and a recog¬ nized leader in politics. He withdrew from his editorial position in 1832, went to Phila¬ delphia, and there acquired an interest in the Pennsylvanian, of which he became editor. Be¬ ing of an independent nature and refusing to be the tool of the politicians his position made him many enemies and finally led to his with¬ drawal from Philadelphia. He now embarked on his real life work, investing his savings (about $500) and his experience in establish¬ ing a small four-page journal, which he sold for a cent a copy and called it the New York Herald. He was its sole editor, reporter and contributor. The office was in a cellar in Wall street and two printers shared in the profits of the. enterprise. Mr. Bennett brought new views into the journalistic field, his new paper was free of all party control, the acquisition of news from every quarter of the globe be¬ came its chief aim: it exposed fraud in every guise, it disseminated facts, not opinions, and lauded everything calculated to benefit and ele¬ vate mankind in general. On 13 June 1835 it printed an article on the state of the money market, which gained wide attention and which, despite

considerable opposition, became a per¬ manent feature of the Herald and of every other newspaper. Toward the end of the same year Mr. Bennett originated the reporting in detail of public occurrences. He reported ser¬ mons and the proceedings of public meetings and introduced the practice of interviewing the chief actors in any great occurrence. He first used the telegraph for reporting and originated the system of distribution by carriers. By means of these and other novel features the Herald increased its circulation rapidly and within a few years was the most valuable news¬

paper property in the country. Mr. Bennett's strong personality was impressed upon the paper by his directing every detail of manage¬ ment and examining every item of news as well as the general moulding of public opinion. In 1867 James Parton wrote that <(his paper is generally read and its proprietor universally dis¬ approved." Bennett was often accused of utter lack of conviction, chiefly, perhaps, because of his reiterated remark (<We have never been in a minority, and we never shall be." Consult Hudson, Frederic, journalism in the United States from 1690 to 1872' (New York 1873) and Parton, (Famous Americans of Recent Times' (Boston 1867).

BENNETT, James Gordon, American

journalist (son of the preceding) : b. New York, 10 May 1841 ; d. Beaulieu, France, 14 May 1918. He was educated abroad and returned to Amer¬ ica in 1866. He became managing editor of the New York Herald in 1866, proprietor on the death of his father in 1872. In 1870 he sent Henry M. Stanley on the exploring expedition which resulted in the finding of Dr. Livingstone, and, in conjunction with the Lon¬ don Daily Telegraph, supplied the means for his journey across Africa by way of the Kongo in 1874-78. He organized a system of storm prognostications of value to shipping-masters; fitted out the Jeannette Polar expedition; and in 1883 was associated with John W. Mackay in organizing the new Commercial Cable Company. He founded the Evening Telegram in New York, and established daily editions of the Herald in Paris and London. He early gave much attention to yachting, in 1866 taking part in an ocean yacht race from Sandy Hook to the Needles, Isle of Wight, which was won by his schooner Henrietta against two competing yachts in 13 days, 21 hours, 55 minutes. In 1870 he raced in his yacht Dauntless from Queenstown to Sandy Hook, but was beaten by the Cambria by two hours. He resides mainly in Paris, collecting foreign news, and directing by telegraph the management and policy of his newspapers.

BENNETT, Richard Bedford, Canadian

lawyer and legislator: b. Hopewell, New Bruns¬ wick, 3 July 1870. He was graduated LL.B. at Dalhousie University, Halifax, Nova Scotia, in 1893, and admitted to the bar of New Bruns¬ wick in 1894. After his removal to Calgary, Alberta, in 1897, he became a member of the local legislature (1898-1905, 1909-11), and was in 1911 elected to the House of Commons from Calgary, and soon made his mark in the House as an effective and ready debater. He accom¬ panied Sir Robert Borden to England in 1915, and on his return was appointed director-

gen¬ eral of national service.

BENNETT, Samuel Crocker, American

lawyer: b. Taunton, Mass., 19 April 1858. He was graduated at Harvard in 1879. He is a son of Edmund Hatch Bennett (q.v.), and in 1898 succeeded his father as dean of the law school of Boston University. He is a member of the American Bar Association, and of the Massachusetts and Boston Bar Associations. He is one of the editors of (Federal Decisions' ; (Smith's Leading Cases' ; (Benjamin on Sales' ; (Cyclopedia of Law and Procedure.'

BENNETT, Sanford Fillmore, American hymnologist : b. Eden, N. Y., 1836; d. 12 June 1898. He settled in Elkhorn, Wis., in 1860, and became editor of the Independent. Re¬ signing this place, he entered the 40th Wis¬ consin Volunteers and served with them throughout the Civil War. In 1867 he aided J. P; Webster, the composer, in preparing (The Signet Ring, 5 a Sunday-school hymnbook, to which he contributed about 100 hymns. (The Sweet Bye and Bye) was one of the first of these. Many of Mr. Bennett's hymns and songs have been published in sheets.

BENNETT, William Cox, English song¬ writer: b. Greenwich, 14 Oct. 1820; d. Blackheath, 4 March 1895. He suggested that the bust of Longfellow be placed in Westminster Abbey, and formed a committee of 500, with the Prince of Wales at its head, to effect it. He was the author of <Poems) (1850) ; (The Trial for Salamis5 (1850) ; (Endowed Parish Schools and High Church Vicars) (1853) ; (Queen Eleanor's Vengeance, and Other Poems5 (1856); (War Songs5 (1857); (Songs by a Song-Writer5 (1858) ; (Baby May, and Other Poems5 (1859) ; (Our Glory Roll, and Other National Poems5 (1867) ; Contributions to a Ballad History of England, etc.5 (1869) ; (SchoolBook of Poetry5 (1870) ; (Songs for Sailors5 (1872); (Narrative Poems and Bal¬ lads5 (1879) ; (Songs of a Song-Writer5 (1876); and (Sea Songs5 (1878); (Prometheus the Fire-Giver5 (1877) ; (The Lark; Songs, Ballads, and Recitations for the People5 (1885).

BENNETT, Sir William Sterndale, Eng¬ lish composer: b. Sheffield, 13 April 1816; d. London, 1 Feb. 1875. He became a pupil of the Royal Academy of Music in 1826, studying under Cipriani Potter, Crotch and Lucas, and afterward Moscheles. By the advice of Men¬ delssohn, whose friendship he had gained, he studied in Leipzig from 1836 to 1838, and his performances and compositions were held in high esteem by the younger German musicians, and especially by Schumann. In 1842 he again visited Germany. He was one of the founders of the Bach Society in 1849; in 1855 he became conductor of the Philharmonic Society, in suc¬ cession to Richard Wagner. After a period spent in teaching, conducting and composing, he was appointed professor of music at Cam¬ bridge in 1856, and was knighted in 1871. In 1868 he became principal of the Royal Acad¬ emy of Music. He was too entirely dominated by Mendelssohn's influence to do great original work. He was a first rate pianist, and was highly rated as a composer, and was esteemed the greatest of contemporary English musicians. He is best known by his overtures, (The Naiads5 and (Parisina5 ; his cantatas, (The May Queen5 and (Woman of Samaria5 ; and his little musical sketches, (Lake,5 ˆlillstream,5 and (Fountain.5 Consult Bennett, V. J., (The Life of William Sterndale Bennett5 (London

1907).

BENNETTSVILLE, S. C, town and county-seat of Marlboro County, on the Ben-nettsville and Cheraw railroad and the Atlantic coast, 106 miles northeast of Columbia. Being in the center of an extensive cotton and corn raising district it has a number of textile mills and fertilizer manufactories. There is a large sanatorium in the town. Pop. (1920) 3,197.

BENNIGSEN, Levin Augustus (Baron von), Russian soldier: b. Brunswick 1745; d. 3 Oct. 1826. He entered the Russian service at an early age, and distinguished himself by his bravery in the war against Poland, under the Empress Catherine II. In 1806 he was ap¬ pointed to command the Russian army which went to the assistance of the Prussians. He afterward fought the battles of Evlau and Friedland. After the Peace of Tilsit he retired to his estates. He commanded the Russian centre at Borodino and voted for a second bat¬ tle in front of Moscow. Before the French re¬ treat began he defeated Murat at Taratino on 18 October. He retired from the army be¬ cause of ˆ

differences with Kutusoff, but after the latter's death he became commander of the Russian army of reserve, which in 1813 he led into Saxony, took part in the battle of Leipzig, and was created a count by Emperor Alexander on the field. He aided in the pursuit of +he French army and blockaded Hamburg. Because of ill health he retired from the Russian serv¬ ice in 1818, and settled on his paternal estate in his native country.

BENNIGSEN, Rudolph von, German statesman: b. Liineberg, Hanover, 1824; d. Ben-nigsen, 7 Aug.. 1902. After Hanover became a part of Prussia he was elected to the North German Diet and the Prussian Assembly, be¬ coming vice-president of both. Entering the German Reichstag in 1871, he became promi¬ nent as leader of the National Liberals, warmly supporting Bismarck for years, but later op¬ posing his policy toward the Socialists. After some years spent in retirement, Benningsen re¬ entered politics in 1887 and continued active until 1897, when he resigned his position as president of the province of Hanover, which he had held from 1888.

BENNINGTON, Vt., town and county-seat of Bennington County, on the Rutland railroad, 36 miles east of Troy, N. Y., and 52 miles southwest of Rutland. It contains the villages of Bennington, North Bennington, and Bennington Centre ; and has large woolen and knit-goods, hosiery, machinery, needles, paper, shirt and collar factories; a Soldiers' Home, a memorial battle monument over 300 feet high dedicated on the centennial of the admission of the State into the Union, 19 Aug. 1891 ; two national banks, public library, numerous churches and graded public schools. There are valuable deposits of brown hematite ore in the town. The government consists of a town presi¬ dent and a board of trustees elected annually at town meetings under the charter of 1885 but each village manages its own local affairs. The town, which was named after Governor Benning Wentworth of New Hampshire, was settled in 1761, and for many years before Vermont be¬ came a State was claimed by both New York and New Hampshire. Bennington was the home of Seth Warner and Ethan Allen and on 16 Aug. 1777, the battle of Bennington was fought here. Pop. (1920) 7,230. Consult Merrill and Merrill, (Sketches of Historic Bennington5 (Cambridge 1898).

BENNINGTON, Battle of, one of the early battles of the Revolution, fought at Bennington, Vt., 16 Aug. 1777. The army of General Burgoyne, marching to the south from Canada, and causing the abandonment of Ticon-

deroga by General St. Clair, created the greatest commotion throughout New England, since Bos¬ ton was supposed to be its point of destination. General Stark chanced to be at the time at Bennington, having under his command a corps of New Hampshire militia, and he determined to confront a strong detachment of the enemy sent out under Colonel Baum to procure sup¬ plies. He hastily collected the Continental forces in the neighborhood, and on 16 August approached the British, whom, after a hot action of two hours, he forced to a disorderly retreat. The engagement was hardly over when a reinforcement arrived, sent by General Burgoyne, and the battle was renewed, and kept up several hours till dark, when the British forces retreated, leaving their baggage and am¬ munition. The loss of the enemy was 207 killed, 600 taken prisoners, and 1,000 stand of arms. The Americans lost only 14 killed and 42 wounded.

BENNO, Saint, bishop of Meissen (son of the Count of Bultenburg) and Apostle of the Slavs: b. Hildesheim, 1010; d. 1106. At 26 years of age he became a monk in the Bene¬ dictine convent of Saint Michael in his native town. His extraordinary virtues and learning caused his brethren to elect him abbot in 1042, but this dignity and office he resigned three months later. During the minority of Henry IV, he was appointed to the see of Meissen, and during his episcopate of 40 years he led the life of an ascetic. In the quarrel between Henry and the Saxon nobles he stood by the latter, and in consequence was led away pris¬ oner when Henry passed through Meissen in 1075 after his victory on the Unstrut. He sup¬ ported Pope Gregory VII in the long dispute between the Emperor and the Pope. In 1085 he was deposed at the Synod of Mainz, and two years afterward was reinstated. He died at the advanced age of 96 years and his tomb in the Cathedral of Meissen was venerated as a shrine, until the remains were transferred to the cathedral in Munich. The Bavarians chose him as their patron saint after he was canonized by Hadrian VI in 1523. Consult his (Life5 by Emser in the Bollandists for June 3d, also his <Life) by Seyffort.

BENOIST, ben’-wast’, Rene, French

theologian, confessor of King Henri IV, cure of Saint Eustache : b. 1521; d. 7 March 1608. He published a French translation of the Bible in 1566, for which he was censured by the Sorbonne and, later, by Pope Gregory XIII, leading to his expulsion from the Faculty of Theology. He was driven out of Paris in 1591, when he had associated with a political faction supporting the claims of King of Navarre to the throne of France. Henri IV nominated him Bishop of Troyes, but the Pope refused his sanction. He wrote about 150 works and pamphlets, mostly dealing with the history of his time.

BENOIT, be-nwa, Pierre Leopold Leon¬ ard, Flemish musician and composer: b. Harel-beke, Belgium, 17 Aug. 1834; d. 1901. He studied under Fetis. He held the position of director of the Flemish School of Music in Antwerp from 1867 until his death. He was in his time the foremost advocate of a national school of music for Belgium. His compositions

include <Het Dorp in’t Gebergte,5 a comic opera (1856); the operas (Isa) (1867); Compeja5 (1896) ; the oratorios (The Scheldt5 ; (Lucifer) ; Children’s Oratorio5 ; (Drama Christi5 ; (Thc Rhine5 ; incidental music to Vander Ven’s Charlotte Corday,5 and Goethem’s (Willem de Zwijer5 ; (De Oorlog5 ; and (Vlaanderen’s Kunstroem5, cantatas; a (Missa Solemnis5 ; a (Te Deum5 ; and a (Requiem5 ; choral sym¬ phony, (De Maaiers5 ; several choral works with orchestra pieces, and songs. He also wrote much on musical subjects. Consult L. Mortelmans (Pierre Benoit5 (Antwerp 1911).

BENOIT DE SAINTE-MAURE, de sant-mor, French troubadour and chronicler : b. Touraine; fl. in the 12th century. From 1154 to 1189 he was attached to the court of Henry II of England. He wrote in about 42,300 octosyllabic verses a Chronicle of the Dukes of Normandy5 to the year 1135. To him is usually ascribed the (Romance of Troy,5 founded on the story of the siege of Troy as written by Dictys Cretensis and Dares ; it was translated into the languages of western Europe. Boc¬ caccio, Chaucer, and Shakespeare would seem to be indebted to Benoit for the story of the loves of Troilus and Briseis (Cryseyde or Cressida being originally called Briseida). An¬ other work from his hand is (Le Roman d’Eneas5, a continuation of the (Romance of Troy.5

BENRATH, ben’-rat, Karl, German Prot¬ estant theologian and

historian : b. Diiren, 10 Aug. 1845. Having studied at and graduated successively from the universities of Bonn, Berlin and Heidelberg, he went to Italy, in 1871, where he spent some years in research. In 1879 he was appointed professor at Bonn and 11 years later accepted a similar appointment at Konigsberg. He was also the founder of the Revista Crist iana. Much of his writing refers to the history of the Reformation in Italy, on which subject he is a leading authority. Among his chief works are Ceschichte der Reformation in Venedig5 (1887) ; (Bernardino Ochino von Siena5 (1892) ; Ceschichte des Hauptvereins der Gustav-Adolf Stiftung fur Ostpreussen) (1894) ; (Julia Gonzaga5 (1900) ; Cuther im Kloster) (1905).

BENSERADE, ban-s'rad, Isaac de, French poet: b. Paris 1613; d. Gentilly 1691. He wrote for the stage, composed a great number of ingenious verses for the King and many dis¬ tinguished persons at court and published a translation of the (Metamorphoses5 of Ovid. In the first half of the reign of Louis XIV the court and its followers patronized songs of gallantry, rondeaux, triolets, madrigals, and sonnets, containing sallies of wit, conceits and effusions of gallantry in the affected style then prevalent. No one succeeded so well in this art as Benserade, who was therefore, by way of eminence, called le poete de la conr. His col¬ lected works appeared in 1697, and an edition was published in 1875.

BENSLEY, Thomas, English printer: d.

1833. He is much known for an edition of (Lavater,5 printed by him in 1789, in 5 volumes quarto, and for an edition of the English Bible between 1800 and 1815, in 7 volumes quarto. He also printed Shakespeare in 1803, in 7 volumes octavo, and in 1806 Hume's (England5 in 10

volumes folio, which is adorned with elaborate portraits and engravings on copper. He was prominent also in the construction of the machine press invented by Koenig and applied to printing the Times newspaper in 1814.

BENSON, Arthur Christopher, English man of letters (son of Edward White Benson and brother of Edward Frederic, qq.v.) : b. 24 April 1862. He was educated at Eton and King's College, Cambridge, was a master at Eton 1885-1903, and is now president, fellow and lecturer of Magdalene College, Cambridge. He has achieved distinction in nearly all de¬ partments of literature, as novelist, poet, biogra¬ pher, and essayist. His first book, (Memoirs of Arthur Hamilton 5 (1886) was published

under the nom-de-plume of (Christopher Carr.5 His novels are lacking in movement, but are written in the fine English characteristic of the author. He published volumes of poems, marked by great refinement and sympathy, in 1893, 1895, 1896, 1900, 1905, and published his (Collected Poems 5 in 1909. His biographies include (Lives' of Archbishop Laud, and of his father Archbishop Benson, Tennyson, Kos¬ suth, Edward Fitzgerald, Walter Pater, Ruskin, and (Hugh: Memoirs of a Brother) (Robert Hugh Benson, the distinguished Catholic priest and author, q.v.). But it is as an essayist that a discriminating public thirsts for Mr. Benson. These are the fruit of ripe scholar¬ ship, broad and tolerant in its outlook, and are written with a gracious, winning charm, and in the reverential spirit typical of Anglican teach¬ ing at its best. Their titles are suggestive of their contents, and include: (The House of Quest5 (1903) ; <The Hill of Trouble5 (1903) ; (The Isles of Sunset5 (1904) ; (From a College Window5 (1906) ; (The Gate of Death5 (1906) ; (The Altar Fire5 (1907); <The Silent Isle5 (1910); (The Leaves of the Tree5 (1911): (Thy Rod and Thy Staff5 (1912); (Water-springs5 (1913); (Where No Fear Was5 (1914); (Life and Letters of Maggie Benson5 (1917). Air. Benson collaborated with Vis¬ count Esher in editing Selections from the Correspondence of Queen Victoria5 (1907).

BENSON, Carl, pseudonym of Charles Astor Bristed (q.v.).

BENSON, Edward Frederic, English author: (son of Edward White Benson and brother of Arthur Christopher) (qq.v.) b. Well¬ ington College, 24 July 1867. He was educated at King's College, Cambridge; worked at Athens for the British Archaeological School (1892-95), and in Egypt for the Hellenic Society (1895). His writings include (Dodo5 (1893), a novel of London society which was very successful; Six Common Things5 (1893) ; (Rubicon5 (1894); ˆJudgment Books5 (1895); limita¬ tions5 (1896); (The Babe5 (1897); Vintage5 (1898); (The Capsina5 (1899); (An Act in a Backwater5 (1904) ; She Angel of Pain5 (1906); She Blotting Book5 (1908); She Osbornes5 (1910); (AIrs. Ames5 (1912); She Weaker Vessel5 (1913); (Dodo the Second5 (1914); Sinner for Eight5 (comedy 1915); She Tortoise5 (1917).

BENSON, Edward White, Archbishop of Canterbury: b. near Birmingham, 14 July 1829: d. Hawarden, 11 Oct. 1896. He was graduated at Cambridge in 1852 as a first-class and senior

optime, and was for some time a master at Rugby. He held the headmastership of Well¬ ington College from its opening in 1858 to 1872, when he was made a canon and chancellor of Lincoln Cathedral. In 1875 he was appointed chaplain in ordinary to the queen, and in De¬ cember 1876 was nominated to the newly erected bishopric of Truro. Here he began the build¬ ing of a cathedral (1880-87), most of the first cost, £110,000, having been gathered by his own energy. In 1882 he was translated to Canter¬ bury to succeed Dr. Tait as primate of all England. A high-churchman, Dr. Benson was frequently select preacher at both universities, and published several volumes of sermons, a small work on (Cathedrals, 5 and a valuable article on (St. Cyprian5 (London 1897). A distinguished ecclesiastical lawyer and diplo¬ matist, he gave the important judgment in the Lincoln case on ritual. Consult his (Life5 by his son, Arthur Christopher Benson (London 1899; abridged edition 1901).

BENSON, Egbert, American jurist and politician: b. New York, 21 June 1746; d. Jamaica, N. Y., 24 Aug. 1833. He was grad¬ uated at Columbia College 1765; was member of the New York Legislature in 1777, and of Congress 1784-88, 1789-93, and 1813—15 ; judge of the supreme court of New York 1794-1801; and became a judge of the United States circuit court. He was a regent of the University of New York 1789-92, first president of the New York Historical Society in 1817-20, and wrote a Vindication of the Captors of Major Andre,5 (1817) and (Memoir on Dutch Names of Places5 (1835).

BENSON, Frank Weston, American painter: b. Salem, Mass., 24 March 1862. He was educated at the Museum of Fine Arts, Boston, and in Paris ; became a member of the Society of American Artists in 1888. He has won many honors from art institutes and academies, including the Hallgarten and the Clarke prizes at the National Academy of Design in 1899 and 1891 ; has done much in figure work with outdoor effects, but is best known for his portraits.

BENSON, Sir Frederick William, Cana¬ dian soldier: b. Saint Catherines, Ont., 2 Aug. 1849. He was educated at Upper Canada Col¬ lege and the Royal Military College, Sandhurst ; served as a volunteer during the Fenian raids on Canada in 1866; joined the 21st Hussars in 1869; rose to be colonel of the 21st Lancers; served in the South

African War 1900-01 ; was inspector-general of remounts, 1903-04; director of transport and remounts, 1904-07; and major-general in charge of administration, 1907-09. He was created C. B. in 1901, and Iv. C. B. in 1910, and on the outbreak of the Great War in 1914 was appointed chief of the Remount Com¬ mission.

BENSON, Robert Hugh, English Roman Catholic clergyman and writer : b. Wellington College, 1871 ; d. Salford, 19 Oct. 1914. He was son of Edward W. Benson, former archbishop of Canterbury and was educated at Eton and at Trinity College, Cambridge. After leaving Cambridge he prepared to enter the ministry, and joined the Community of the Resurrection at Mirfield. In 1903 he was received into the Roman Catholic church and was ordained to

the priesthood in 1904. After a year spent at Cambridge, he was appointed assistant priest at the Catholic church of that city and became a sort of unofficial Roman Catholic chaplain to the students of Cambridge University. In 1911 he received the appointment of private cham¬ berlain to Pope Pius X. He published several novels and contributed many articles on re¬ ligious subjects to magazines and newspapers. His writings include 1 Richard RaynaP ; (Solitary* ; (The King's Achievement ; (The Queen's Tragedy* ; ˆhe Light Invisible* ; (St. Thomas of Canterbury* ; (Non-Catholic De¬ nominations } ; (Christ in the Church* ; (The Dawn of A1P ; (The Coward* ; (The Friend¬ ship of Christ) ; (Come Back) ; Tome Rope) ; (By What Authority?*; loneliness*; (Con¬ fessions of a Convert* ; (Paradoxes of Cathol¬ icism* ; and (An Average Man*. Consult Mar-tindale, C. C., (The Life of Monsignor Robert Hugh Benson* (1916).

BENSON, William Shepherd, American admiral : b. Macon, Ga., 25 Sept. 1855. He was graduated from the United States Naval Academy in 1877 ; rose to lieutenant in 1893 ; lieut.-commander in 1909 ; captain, 1909, and rear-admiral 11 May 1915. On the last-men¬ tioned date he was named by Secretary Daniels as Chief of Naval Operations; in 1916 he was granted the title of admiral, and in January 1917 was designated as president ex-officio of the Navy

General Board. During his long service of over 40 years Admiral Benson has performed numerous duties afloat and ashore, as squadron commander and in the Naval Academy. During the Naval War game held off the North Atlantic coast in August 1916, the admiral announced that beginning in the spring of 1917 all reserve battleships would be sent regularly to participate in target practice in order to maintain ihe personnel and batteries in fighting trim. A sensational development of that war game was the ((defeat** of the de¬ fending ((Blue** fleet under Admiral Helm by the attacking ((Red** fleet under Admiral Mayo, who succeeded — theoretically — in landing ˆattacking** troops at Far Rockaway Beach, Long Island. Admiral Benson stated that when the Navy Department's plans for establishing submarine bases along both coasts were carried into effect, such a feat as the landing of a hostile force on these shores would be quite impossible. In March 1917 Admiral Benson was selected by the University of Notre Dame, Indiana, as the recipient of the Laetare medal for the year 1917, in recognition of his public services, This honor, which he was the first naval officer to receive, is regarded as one of the highest honors conferred upon laymen of the Roman Catholic Church in the United States. Shortly after the entry of the United States into the European War, Admiral Ben¬ son acted as principal representative of the Nav}r at the important conference held at the Navy Department with Admirals Browning and Grasset, of the British and French navies. In November 1917 Admiral Benson accompanied the American mission headed by Colonel Ed¬ ward M. House to represent the United States at the inter-Allied war conference in Paris.

BENSON, Neb., city in Douglas County, five miles northwest of Omaha, on the Missouri River. Corn, flax, fruit, oats, wheat and

vegetables are cultivated in the district, which is remarkably fertile. The city has a country club and is the seat of Saint James Orphanage. It owns the waterworks. Pop. (1920) 1,145.

BENT, Charles, American fur trader and territorial governor: b. Marietta, Ohio, 1799; assassinated, 19 Jan. 1847. After having been engaged in trapping and trading in the region of the Upper Missouri, Charles Bent, with his brothers, Robert, George and William and Ceran St. Vrain, under the firm name of Bent, St. Vrain & Company, established themselves in the Indian trade in the valley of the Upper Arkansas. At first they built a rude stockade between the present towns of Pueblo and Canon City but, two years later, they began the

erection of a permanent structure which was known as Bent's Fort, which was com¬ pleted in 1832. Charles Bent married a lady who was a member of a prominent Spanish-Mexican family at Taos, N. M., where he set¬ tled, though still retaining his interest in the trading, firm at Bent's Fort. After the oc¬ cupation of Santa Fe by the American forces under the command of Gen. Stephen W. Kearney, in 1846, and upon the organization of the civil government for New Mexico, Charles Bent was appointed as the provisional governor of the Territory. Governor Bent was assassi¬ nated during an insurrection of the native people.

BENT, James Theodore, English traveler: b. near Leeds, 30 March 1852 ; d. London, 6 May 1897. He was graduated at Oxford Uni¬ versity in 1875, and managed excavations in Greece, Asia Minor, Abyssinia, Arabia and South Africa, for the British Museum, the Hellenic Society and the Royal Geographical Society. He went to Mashonaland in 1891 to explore and excavate the ruins of the Great Zimbabwe, discovered in 1871 by Mauch. In his report he assigns to the ruins an Asiatic origin. In 1894 he was engaged on a tour of exploration in southeast Arabia. His publica¬ tions include: (A Freak of Freedom, or the Republic of San Marino* (1879) ; (Genoa: How the Republic Rose and Fell* (1880) ; (Life of Giuseppe Garibaldi* (1881) ; (The Cyclades, or Life Among the Insular Greeks* (1885) ; (The Ruined Cities of Mashonaland* (1892) ; (The Sacred City of the Ethiopians* (1893). For the Hakluyt Society he edited a volume on (Early Travels in the Levant.*

BENT, Silas, American naval officer : b. Saint Louis, 10 Oct. 1820; d. 1889. He entered the navy in 1836; served in the Seminole war, and was with Commodore Glynn and Com¬ modore Perry on several cruises to Japan. He was always especially active in survey work ; on Perry's Japan expedition he had charge of the hydrographic survey, and his excellent work became the basis of the surveys undertaken later by the Japanese government. His most important work was to delineate and describe scientifically the Kuro Shiwo, or Black Tide, the great northward-flowing stream of the Pacific, corresponding to the Atlantic Gulf Stream. Ho was on the brig, Preble, under Glynn, when the latter, in 1849, at Nagasaki, procured the release of 18 American seamen, who had been held as prisoners. He piloted the fleet into Napha, in the Liu-Kiu Islands, and

served as United States commissioner in the negotiations for a treaty with the Regent.

BENT, William W., American fur trader and pioneer : b. Marietta, Ohio, 1809 ; d. near Las Animas, Colo., 19 May 1869. He became a trader and trapper on the Upper Missouri and, in 1826, with his brothers, Charles, Robert and George, helped to organize and establish the business of Bent, St. Vrain & Company in the valley of the Upper Arkansas, near the foothills of the Rocky Mountains. The permanent trading post of this firm, known as Bent's Fort, was built lower down, where the valley of the Arkansas emerges upon the Great Plains, 1828-32, and became one of the most noted places in the history of the surrounding region during the ensuing quarter century. In 1835, William Bent married Owl Woman, a daughter of White Thunder, the venerated keeper of the sacred bundle of (<medicine arrows, }) the national talisman of the Cheyenne tribe. He gained great influence among the Indians, continuing to operate the trading busi¬ ness at Bent's Fort after the death of his brothers. He served a brief term as govern¬ ment agent for the Cheyenne, Arapaho, Comanche and Kiowa tribes, in 1859-60, and, at various times he acted as a mediator in the settlement of troubles with the people of those tribes. In October, 1865, he served as a mem¬ ber of the government peace commission which negotiated new treaties with the chiefs and head men of the tribes of the Southern Plains in the council which was held at the mouth of the Little Arkansas River. Bent County, Colo., was named in his honor. Con¬ sult (Baskin's History of Arkansas Valley, Colorado > ; also Kansas Historical Society Collections) (Vol. VII, p. 327; Vol. VIII, p. 491; Vol. IX, p. 564; Vol. X, p. 113; Vol. XI, p. 311).

BENT-GRASS (Agrostis), a genus of grasses usually regarded as weeds except in soils which cannot produce better. Common bent-grass or red-top (A. vulgaris) is a narrow¬ leaved specks with trailing stems rooting at the joints, and small thin panicles of purplish satiny flowers. It is sometimes sown for lawns or for hay. March bent, white bent, or fiorin grass (A. stolonifcra) , has broader leaves than com¬ mon bent, a much closer and larger panicle, and green or pale flowers. It is very common in low, damp places, which it overruns with its compact, trailing, rooting stems, and is a useful grass in newly reclaimed bogs or land liable to inundation. Brown bent-grass (A.

canina) is known in the United States as Rhode Island bent-grass, and is highly prized as a lawn grass.

BENTANG. See Eriodendron.

BENTEEN, Frederick William, American

soldier: b. Petersburg, Va., 24 Aug. 1834; d. 22 June 1898. He was educated in his native state; and at the outbreak of the Civil War went to Missouri and organized a company of Union volunteers. He became first lieutenant of the 10th Missouri Cavalry, 1 Sept. 1861 ; promoted cantain, 1 Oct. 1861; major. 18 Dec. 1862; lieu¬ tenant-colonel, 27 Feb. 1864; and colonel of the 138th United States Colored Infantry, 15 July 1S65; mustered out of volunteer service 6 Jan. 1866. On 28 Tuly 1866 he was commissioned

captain in the 7th cavalry; promoted major of the 9th cavalry, 17 Dec. 1882; and retired 7 July 1888. His most brilliant service after the war was in his campaigns against the Indians.

BENTHAL FAUNA, the abyssal or deep-sea fauna ; the great assemblage of animals living at all depths below 150 fathoms in the North Atlantic, to 500 fathoms in the tropics. See also Deep-sea Life.

BENTHAM, George, English botanist; nephew of Jeremy Bentham (q.v.) : b. near Plymouth, 22 Sept. 1800; d. 10 Sept. 1884. He was privately educated, early attached himself to botany, and having resided in southern France (where his father had an estate), 1814—26, he published in French (1826) a work on (The Plants of the Pyrenees and lower Lan¬ guedoc. } Having returned to England he studied law, and on this subject, as well as logic, he developed original views. Finally, however, he devoted himself almost entirely to botany; was long connected with the Horticul¬ tural Society and the Linnsean Society ; and from 1861 onward was in almost daily attend¬ ance at Kew (except for a few weeks occa¬ sionally), working at descriptive botany from 10 to 4 o'clock as a labor of love. Along with Sir J. D. Hooker he produced the great work of descriptive botany, Genera PlantarunP ; an¬ other great work of his was the (Flora Austra-liensis) (in seven volumes). His (Handbook of the British Flora) is well known.

BENTHAM, Jeremy, English jurist and publicist: b. London, 15 Feb. 1748; d. London, 6 June 1832. After an early education at West¬ minster School he went to Oxford in his 13th year, taking his

bachelor's degree at 15, and his master's degree at 18. He studied English law, but never appeared at the bar, being enabled by easy circumstances to devote himself entirely to literary compositions. He did not, however, publish his chief works himself. They were arranged and translated into French by his friend, Etienne Dumont, and printed partly in Paris and partly in London. Among them are (Treatises on Civil and Penal Legislation* (Paris 1802, 3 vols.), and (Theory of Punish¬ ments and Rewards) (London 1801, 2 vols.). Bentham advocated a thorough correction of civil and criminal legislation. His (Fragments on Government, > in opposition to Blackstone, appeared anonymously in 1776, and with his name, London 1823. In France his literary labors found a better reception than in England or Germany. A small pamphlet on the liberty of the press (London 1821) was addressed by him to the Spanish Cortes during their discus¬ sion of this subject; and in another ((Three Tracts Relative to the Spanish and Portuguese Affairs, > London 1821) he refuted the idea of the necessity of a house of peers in Spain, as well as Montesquieu's proposition that judicial forms are the defense of innocence. One of his latest works was the (Art of Packing' (London 1821), that is, of arranging juries so as to obtain any verdict desired. His previous work, (Essay on Parliamentary Practice, > ed¬ ited from the author's papers by Dumont (Geneva 1815), and translated into German, contains many useful observations. His (In¬ troduction to the Principles of Morals and Leg-islatioiP (London 1823, 2 vols.) treats of the

principal objects of government in a profound and comprehensive manner. Zanobelli has translated Bentham's (Theory of Legal Evi¬ dence, } into Italian (Bergamo 1824, 2 vols.). Among the earlier works of Bentham was his (Defense of Usury, > showing the impolicy of the Present Legal Restraints on the Terms of Pecuniary Bargains) (1787). At his death Mr. Bentham bequeathed his body to be dis¬ sected for the benefit of science. A complete edition of his works, with a biography by Bow¬ ring, was published in London (11 vols., 1843). He was a man of primitive manners, unblem¬ ished character and

undoubted earnestness in the cause of the people at large. He is consid¬ ered the father of the Utilitarians, or those moral political economists who view everything as it is affected by the principle of ((the greatest happiness of the greatest number.1® Consult Albee, (History of English Utilitarianism } (London 1902) ; Atkinson, C. M., (Jeremy Ben¬ tham : His Life and Work) (London 1905; 2d ed., 1909) ; Graham, W., (English Political Philosophy from Hobbes to Maine* (ib., 1899) ; Kent, C. B. R., 'The English Radicals * (ib., 1899) ; Mill, J. S., (Bentham, } in London and Westminster Review (August 1838) ; Stephen, L., (English Utilitarians) (London and New York 1900).

BENTHOS, the fauna of deep water, as distinguished from that of the surface (plankton). The benthal animals live per¬ petually at depths below a hundred fathoms, a few making nocturnal excursions to the sur¬ face, but as a whole constituting a deep-sea fauna. Consult Murray, (Depths of the Ocean * (London 1912).

BENTINCK, Lord William Charles Cav¬ endish, English soldier and statesman (second son of the 3d duke of Portland) ; b 14 Sept. 1774; d. Paris, 17 June 1839. He entered the army at an early age, and served in the Duke of York's campaign in Flanders, and also in Italy with the Russian army under Suwaroff, 1799-1801. In 1803 he proceeded to India as governor of Madras, returned thence in 1805, and subsequently went to Spain, where he commanded a brigade under Sir John Moore at Corunna. In 1810 he visited Sicily as British plenipotentiary, and commander-in-chief of the English troops. The most noticeable feature of this expedition is his bestowment on the Sicili¬ ans of a constitution, which, however, was over¬ turned on the restoration of the Bourbons. He conducted in 1813 the expedition from Sicily to Catalonia, and in 1814 took possession of Genoa on the revolt of the inhabitants from French rule. The same year he returned to England, and subsequently entered Parliament as member for Nottingham. In 1827, under Mr. Canning's administration, he was sent to India as govern¬ or-general, and held that office till 1835, when he returned to England. Among the principal events of his administration are the abolition of the practice of suttee, the repeal of the restric¬ tions which prohibited all Europeans, except servants of the company, from settling in India, the opening up of internal communica¬ tions, the establishment of the overland route, and the recognition of the liberty of the press. In 1836 he again entered Parliament as mem¬ ber for the citv of Glasgow, but was now unable from ill health to take any active share in politi¬

cal matters. Consult Boulger, ‘Lord William Cavendish Bentinck) (Ox lord 1892).

BENTINCK, Lord William George Frederick Cavendish, generally known as Lord George Bentinck, English statesman (son of William Henry Cavendish, 4th duke of Port¬ land) ; b. 27 Feb. 1802; d. 21 Sept. 1848. He entered the army, but quitted it early to become private secretary to Mr. Canning, who had married his mother’s sister. In 1827 he entered Parliament as member for King’s Lynn, and continued to represent that borough for the rest of his life. He was attached to no party at first, voted for Catholic Emancipation, and the Reform Bill. Up to 1846 he was a warm adherent of Sir Robert Peel and his measures; but on the latter announcing himself in that year a convert to free-trade principles, Lord George abandoned his old ally and came for¬ ward as the zealous and indefatigable leader of the Protectionists in the House of Commons. With the assistance of Disraeli he maintained this position for two years, and though often illogical, and sometimes unscrupulous in his statements, he nevertheless commanded much attention by the vigor and earnestness of his oratory and *deportment. He was an ardent champion of religious liberty, and supported the measure for the removal of the disabilities of the Jews. He was famed for his skill in many sports, and helped put a stop to many abuses in connection with racing. Consult Disraeli, B., (Lord George Bentinck: A Politi¬ cal Biography* (London 1851).

BENTIVOGLIO, ben-te-v6l’yo, Cornelio, Italian ecclesiastic and poet: b. Ferrara, 1668; d. Rome, 1732. He early distinguished himself by his progress in the fine arts, literature, phi¬ losophy, theology and jurisprudence, and was a patron of the literary institutions at Ferrara. Pope Clement XI made him his domestic prelate and secretary to the apostolic chamber, and sent him, in 1712, as nuncio to Paris, where, during the last years of the reign of Louis XIV, he acted an important part in the affair of the bull Unigenitus. The Duke of Orleans, regent after the death of Louis, was not favorably disposed toward him ; the Pope therefore transferred him to Ferrara, and in 1719 bestowed on him the hat of a cardinal, and employed him at first in Rome near his own person, then as legate a latere in Romagna, *etc.* Poetry had occupied his leisure hours. Sonnets composed by him may be found in Gobbi’s Col¬ lection, Vol. Ill, and in other collections of his time. Under the name of Selvaggia Porpora he translated the (Thebais of Statius) into Italian. He was a great protector and patron of literature.

BENTIVOGLIO, Guy or Guido, Italian

historian and ecclesiastic: b. Ferrara, 1579; d. Rome, 1644. He studied

at Padua with great reputation, and afterward, fixing his residence at Rome, acquired general esteem by his pru¬ dence and integrity. He was an important figure at the courts of Clement VIII and Paul V. He was made archbishop and received the appointment of Apostolic nuncio in Flanders 1607, and nuncio in France in 1617. In 1621 he became cardinal. He had confidential rela¬ tions with Urban VIII and died during the conclave which elected Urban's successor, and just when his own candidacy for the Pontiff-

cate was being generally advanced. He was an able politician, and his historical memoirs are valuable, especially his 'History of the Civil Wars in Flanders, > written in Italian, and first published at Cologne (1630), a translation of which, by Henry, Earl of Monmouth, appeared in 1654 (London, folio). His own (Memoirs } and a collection of letters are reckoned among the best specimens of epistolary writing in the Italian language (an edition of which was pub¬ lished at Cambridge in 1727). His complete works were published in Venice in 1668.

BENTLEY, John Francis, English archi¬ tect : b. Doncaster, England, 1839 ; d. Clapham, London, 2 March 1902. Upon the rebuilding of the great parish church in Doncaster, about 1856, Bentley was placed in the office of the clerk of the wrorks, his architectural education practically beginning at this time. In 1862 he began practice as an architect on his own ac¬ count, and his patrons from that date onward were mainly Roman Catholics. Among his lesser works are the Roman Catholic church and convent at Booking, Essex; and the new Roman Catholic cathedral in Brooklyn, N. Y. ; but the building with which his name will be inseparably associated is the Roman Catholic cathedral at Westminster, a structure of vast proportions with a nave wader than that of any church in England. Bentley left nothing in the way of design to subordinates, but designed and directed everything from the foundation to the minutest decorative feature. Bentley's death took place just as the Royal Institute of British Architects had voted to award him the royal gold medal.

BENTLEY, Richard, English divine, clas¬ sical scholar, and polemicist : b. Oulton, -near Wakefield, Yorkshire, 27 Jan. 1662; d. Cam¬ bridge, 14 July 1742. His father is said to have been a blacksmith. To his mother, a woman of strong natural ’abilities, he was indebted for the rudiments of his education, and in 1676 he entered Saint John’s College, Cambridge. In 1682 he left the university, and became usher of a school at Spalding; a year later he took the position of tutor to the son of Dr. Stillingfleet, dean of Saint Paul’s. He accompanied his pupil to Oxford, wffiere he availed himself of the literary treasures of the Bodleian Library in the prosecution of his studies. In 1684 he took the degree of A.M. at Cambridge, and in 1689 obtained the same honor at the sister uni¬ versity. His first published work was a Latin epistle to Dr. John Mill on an edition of the ‘Chronicle of John MalelaC which appeared in 1691. It displayed so much profound learning and critical acumen as to excite the sanguine anticipations of classical scholars from the future labors of the author. Dr. Stillingfleet, having been raised to the bishopric of Worces¬ ter, made Bentley his chaplain, and in 1692 collated him to a prebend in his cathedral. He was chosen the first preacher of the lecture instituted by the celebrated Robert Boyle for the defense of Christianity. The discourses against atheism which he delivered on this oc¬ casion were published in 1694; they have since been often reprinted, and translated into several foreign languages.

In 1693 he was appointed keeper of the Royal Library at Saint James’— a circumstance which incidentally led to his famous controversy

with the Hon. Charles Boyle, afterward Earl of Orrery, relative to the genuineness of the ‘Greek Epistles of PhalarisP In this dispute Bentley was victorious, though opposed by the greatest wits and critics of the age, including Pope, Swift, Garth, Atterbury, Aldrich, Dod-well and Conyers Middleton, who advocated the opinion of Boyle with an extraordinary degree of warmth and illiberality. In 1699 Bentley, who had three years before been created D.D., published his dissertation on the Epistles of PhalarisP in which he proved that they were not the compositions of the tyrant of Agrigentum, who lived more than five centuries before the Christian era, but were written by some sophist under the borrowed name of Phalaris, in the declining age of Greek literature.

Soon after this publication Dr. Bentley was presented by the Crown to the mastership of Trinity College, Cambridge, worth nearly £1,000 a

year. He now resigned the prebend of Wor¬ cester, and in 1701 was collated to the arch¬ deaconry of Ely. His conduct as head of the college gave rise to accusations of various of¬ fenses, including embezzlement of college money. The contest, lasting more than 20 years, was decided against him, a sentence, de¬ priving him of his mastership, being passed; but Bentley's superior skill and mastery of legal forms constantly baffled all attempts to oust him. In 1711 he published a quarto edition of Horace at Cambridge, which was reprinted at Amsterdam; and in 1713 appeared his remarks on (Collins' Discourse on FreeThinking, > un¬ der the form of a 'Letter to F. H. (Francis Hare), D.D., by Phileleutherus LipsiensisP He was appointed Regius professor of divinity in 1716, and in the same year issued proposals for a new edition of the Greek Testament, an under¬ taking for which he was admirably qualified, but which he was prevented from executing in consequence of the animadversions of his de¬ termined adversary, Middleton. In 1726 he published an edition of Terence and Phsedrus ; and his notes on the comedies of the former in¬ volved him in a dispute with Bishop Hare on the metres of Terence. The last work of Dr. Bentley was an edition of Milton's 'Paradise Lostp with conjectural emendations, which appeared in 1732, but this proved a failure. He died at the master's lodge at Trinity, and was interred in the college chapel. His learning was early recognized on the continent. Dutch classical scholarship followed his lead and modern German classical scholars owe much to Bentley. He is justly regarded as the founder in England of the science of text criticism, and much of his work has served as foundation for the modern science of compara¬ tive philology. The German scholar, J. A. Wolf, wrote an excellent biography of Bentley; and an English biography of him was written by Monk (London, 2 vols., 1833). Consult Professor Jebb's monograph in the 'English Men of Letters Series } (New York 1882) ; Bartholomew and Clark, 'Bibliography of Bent¬ ley } (Cambridge 1908) ; Sandys, 'A History of Classical Scholarship* (Vol. II, Oxford 1908).

BENTLEY, Robert, English botanist : b. 1821 ; d. 1893. He qualified as a member of the Royal College of Surgeons in 1847. He be¬ came professor of botany at the London Insti¬ tution and King's College, and editor of the

Pharmaceutical Journal. His works include ‘Manual of Botany 5 (1861) ; ‘Character, Prop¬ erties, and Uses of Eucalyptus5 (1874) ; and ‘Medicinal Plants,5 with Henry Trimen (1875—

80).

BENTON, Angelo Ames, American clergy¬ man : b. Canea, Crete, 1837. He was graduated at Trinity College, Hartford, Conn., 1856, and at the General Theological Seminary, New York. He was ordained in the Episcopal min¬ istry in 1860. He was professor of Latin and Greek in Delaware College, Newark, Del., 1883— 87, and professor of dogmatic theology in the University of the South, 1887-94, and rector at Albion, Ill., in 1905. His chief publications are ‘The Church Cyclopaedia: A Dictionary of Church Doctrine5 (Philadelphia 1884) ; and ‘Tome of Saint Leo’ (1890).

BENTON, Guy Potter, American edu¬ cator: b. Kenton, Ohio, 26 May 1865. After studying at Ohio, Wesleyan and Baker univer¬ sities he took up a post-graduate course at Ber¬ lin. He was then appointed superintendent of schools at Fort Scott, Kan., and later, state assistant superintendent of public instruction. In 1896 he was appointed professor of history and sociology at Baker University; three years later he became president of Upper Iowa Uni¬ versity. In 1902 he became president of Miami University and in 1911 president of Vermont University. He is the author of ‘The Real College5 (1909).

BENTON, James Gilchrist, American soldier and inventor: b. Lebanon, N. H., 15 Sept. 1820; d. Springfield, Mass., 23 Aug. 1881. He graduated at West Point in 1842, and served in the ordnance department throughout his life. He was in command of the Washington Arsenal and principal assistant to the chief of ordnance during the Civil War, at the close of which he was transferred to the Springfield (Mass.) Arsenal. For single bravery in rescu¬ ing exposed ammunition from fire, he was twice brevetted. The various models of the Springfield rifle, known as the models of 1866, 1868, 1873 and 1879, were made under his direction. He devoted himself especially to the improve¬ ment of firearms, and acquired distinction for his valuable inventions in this and other lines of his work. He refused to patent any of them, as he held that since the government had edu¬

cated him it had every right to benefit from his time and talents. He published ‘Course of In¬ struction in Ordnance and Gunnery for the United States Military Academy5 (1861; 4th ed. 1875).

BENTON, Thomas Hart, American states¬ man : b. Orange County, N. C., 14 March 1782; d. 10 April 1858. He was the greatest of that most valuable and scarcely appreciated class, the Border State leaders, whose sympathies were with the South, and who had no feeling against slavery, yet at the cost of their in¬ fluence and much personal peril opposed the political aggressions of slavery and the doc¬ trines of disunion. Early orphaned, the eldest of a large family, after part of a course in the University of Pennsylvania he went with his mother to Tennessee as a pioneer, settling at the present Bentontown. A few years later he took up the study of law, and was admitted to the bar in 1811 under the patronage of his

friend Andrew Jackson, then a judge of the Supreme Court. Elected to the legislature, he pushed through a judiciary reform bill, and one to give slaves the right of jury trial. In the War of 1812 he was aide-de-camp to Jackson, raised a volunteer regiment, was made lieuten¬ ant-colonel in the regular army, but saw no active service; meanwhile, 4 Sept. 1813, a mis¬ understanding over a duel of his brother’s led to an affray in which the brother was stabbed, Jackson shot and Thomas H. thrown down¬ stairs, and the former friends were at bitter feud for many years. In 1815 he removed to Saint Louis, practised law and established a newspaper, which involved him in duels (one of which cost his opponent’s life, to Benton’s lasting regret) ; but which he used so vigor¬ ously to advocate Missouri’s admission to the Union as a slave State that she elected him one of her senators on her entrance in 1820, and reelected him every term for 30 years. Dur¬ ing this time he stood as one of the foremost public men of his generation — a speaker of great ability and mastery of facts, a hard-headed logician and tremendous debater, of astonishing memory, unwearying industry, an iron will and physique, and a power of wit, sarcasm and denunciation that made most men shrink from a contest with him. Being the spokesman of the Western Democrats, his policy and political feelings were coincident with Jackson’s, their personal quarrel was at last arranged and Benton became Jackson’s first lieutenant and admiring champion. In every regard he supported Western interests : he secured the passage of laws for preemption, donation and graded prices of lands, for throw¬ ing open the government mineral and saline lands to occupancy and for repeal of the salt tax; advocated transcontinental exploration and post-roads, a

Pacific railroad, occupation of the mouth of the Columbia, trade with New Mex¬ ico, military stations through the Southwest, amicable relations with Indian tribes and every¬ thing conducive to opening up the West and making it prosperous. This made him invin¬ cible there till the slavery question drove him into opposition. He supported Jackson in his refusal to recharter the United States Bank, and made a series of speeches urging the adop¬ tion of a metallic currency only, which were widely circulated, gained him the nickname of “Old Bullion,55 and had much to do with the creation of the sub-treasury scheme. When Jackson removed the Secretary of the Treasury, Duane, for refusing to check out the deposits in the bank, the Senate adopted a resolution censuring him for it ; Benton set about having the resolution expunged from the records, and after a protracted struggle succeeded, despite the logical absurdity of his motion, in accom¬ plishing his purpose by a series of fervid pane¬ gyrics on Jackson. In the Nullification contest, Benton was Calhoun’s chief opponent, not only as Jackson’s supporter, but by conviction; and the two men of might — the chiefs of the State-Rights and Nationalist wings of the Democ¬ racy — remained deadly foes until Calhoun’s death. In the Oregon boundary dispute Benton opposed the “fifty-four forty or fight55 war-cry ; it was dropped, but the Polk administration was glad of an excuse to drop it in order to push the Mexican war, and had no notion of dimin-THOMAS HART BENTON

R

I

.

#

r

*(

-A

ishing the area of slavery to enlarge that of freedom. He favored the vigorous prosecution of the war, and came near being made commander-in-chief, from his close acquaintance with the territory. But from this time on, the slavery problem swallowed up every other. Benton fought Calhoun's State-Rights resolu¬ tions in retort to the Wilmot Proviso (q.v.), and they never came to a vote ; but Calhoun sent them to various State legislatures to adopt and utilize for instructing their senators, and they were pushed through the Missouri legisla¬ ture without Benton's knowledge. He de¬ nounced them as misrepresenting the people, canvassed his State for re-election in a long-famous series of powerful and caustic speeches was supported by his party, but defeated by a fusion of Whigs and anti-Benton Democrats, and his senatorial service ended with 1850. He opposed the Clay compromise resolutions of that year, however (see Compromise of 1850), with sarcasm still quoted. In 1852 he canvassed Missouri for election to the lower House and was triumphantly returned. He supported Pierce for election and in Congress till the Kansas-Nebraska bill came up. Against that he made one of his greatest speeches, and the administration thereupon ousted all his Mis¬ souri supporters, and he was defeated for re-election by the now dominant ultra-Southern sentiment in the Democratic party. The time of mediators and middle courses had gone by. He now set about writing his remarkable (Thirty Years' View) (1854—56), a most valu¬ able account of his senatorial experiences and the secret political history of the years 1820-50. In 1856 he ran for governor, but a third ticket in the field defeated him. In the cam¬ paign of 1856 he supported Buchanan against his own son-in-law, Fremont, as representing the party of union ; but materially changed his mind before his death. In these last two years, though in extreme old age, he carried through the immense and useful labor of compiling an abridgment of the debates in Congress from the foundation of the government to 1850, pub¬ lished later in 15 volumes. He also published an Examination of the Dred Scot Case) (1857). Consult Meigs, W. M., (Life of T. H. Benton) (Philadelphia 1904) ; Rogers, J. M., (Thomas H. Benton) (ib. 1905) ; Roosevelt, (Thomas Hart Benton) (Boston 1887).

BENTON, Ill., city and county-seat of Franklin County, on the Illinois Central, the St. Louis, Iron Mountain and Southern and the Chicago and Eastern Illinois railroads, 125 miles southwest of Springfield. It is the centre of an extensive coal mining region. A large stove foundry is located in the city and it also contains the old homestead of Gen. John A. Logan. In 1913 the commission form of municipal government was adopted. Pop.

(1920)' 7,201.

BENTON HARBOR, Mich., city in Ber¬ rien County, situated on the Saint Joseph's River, one and a half miles from Lake Michi¬ gan ; on the Cleveland, C. & C. and Pere Mar¬ quette railroads. It is also connected with the lake by a ship canal and thus by steamboat lines with Chicago and Milwaukee. . It has a large trade in lumber, grain and fruits, especially the latter, and has also considerable manufacturing VOL. 3 — 34

interests, including manufactories of fruit pack¬ ages, furniture, machinery, flour, vinegar and canned fruit. In the city and vicinity are min¬ eral springs with medicinal properties. The waterworks are owned by the city. Pop. (1920)

12,233.

BENTONVILLE, Ark., town and county-seat of Benton County, situated northwest of Little Rock; on the Saint Louis and San Fran¬ cisco Railroad. It is the seat of Bentonville Col¬ lege and a Baptist academy. It contains several springs, three of which have medicinal properties. The town is the centre of one of the most pro¬ ductive apple-growing regions in the United States ; it also carries on a considerable trade in fruit, timber, grain and live stock, and has exten¬ sive fruit-evaporating works and various fac¬ tories, mills, *etc.* The waterworks and electric plant are owned by the town. Pop. 2,313.

BENTONVILLE, N. C., a village in John¬ ston County, noted as the place where a stubborn battle was fought during the Civil War. Here, during his march from Savannah through the Carolinas, Sherman, at the head of 65,000 National troops, encountered 24,000 Confeder¬ ates under Johnston. A battle took place 18 March 1865, Johnston

having come up in great haste from Smithfield, intending to surprise Sherman. The latter, however, was ready for him, and Johnston was thrown on the defen¬ sive near Mill Creek. Johnston was partially defeated and retreated to Smithfield. The Fed¬ eral loss was about 1,600, the Confederate about 2,700. Consult Johnson and Buel, (The Battles and Leaders of the Civil War* (1887).

BENTZEL-STERNAU, bent'zel-star'now, Count Karl Christian Ernst von, German novelist: b. Mainz, 9 April 1767; d. Mariahal-den, Switzerland, 13 Aug. 1849. In 1808 he was Minister of the Interior of the Grand Duchy of Baden, in 1810 president of the Supreme Court of Mannheim and in 1812 Minister of State and Finance of the Grand Duchy of Frankfort. He is esteemed as a humorist after the manner of Jean Paul; and his satirical romances, (The Golden CalD (1802-04) ; (The Stone Guest* (1808); 'Old Adam> (1819-20) ; (The Master of the Chair,* together form a series. His dramatic ventures had less suc¬ cess. He translated Young's Eight Thoughts. *

BENTZON, Th., the pseudonym of Marie Therese Blanc (q.v.).

BENUE, ben'we, or BINUE, a river of west Africa, the chief tributary of the Niger. It rises in the Bub'n Jidda hills on the east of Adamawa, flows for a short distance north¬ west then west to Bassama, after which its course is generally southwest to its junction with the Niger at Lokoja and 300 miles from the coast. Its length is about 850 miles. Its width in its lower reaches is from 1,600 to 3,200 feet, and it is navigable for about 600 miles during the rainy season, but is very shal¬ low in the dry season (January-May) . The source of the Benue was long unknown. Dr. Barth, who . came upon the river in 1851, while traveling in Adamawa, near the confluence of the Faro, which joins it on its left bank about lat. 12° 30' E., was told that it came from the southeast, a distance of nine days' journey. In consequence of his discovery an expedition was fitted out by the British government for the

purpose of exploring the Niger from its mouth upward. The

exploration was made in a small steamer called the Pleiad, and was under the command of Dr. William Balfour Baikie. After reaching the point of confluence of the Benue with the Niger, about lat. 7° 40’ N., Dr. Baikie followed the former eastward for a direct dis¬ tance of about 370 miles. The point thus reached was about lat. 9° 25’ N. ; long. 1 1 0 30’ E. There was sufficient depth of water, though the river was only rising, to allow a still fur¬ ther exploration. The natives, however, had begun to display their hostility in such a man¬ ner as made it necessary to return. The result was to show that a large, fertile and populous tract of a region of Africa previously in a great measure unknown was accessible by means of a navigable river. A second expedi¬ tion, also under Dr. Baikie, explored the same river in 1857. In 1879 a small steamer belong¬ ing to the Church Missionary Society went up the river 140 miles, and its source was discov¬ ered by Flegcl in 1883. The explorer Robert Hegel journeyed along its navigable length and explored some of its tributaries in 1879. In 1892 the expedition of Mizon practically gave us a complete knowledge of the river. Its prin¬ cipal tributaries are the Majo, Kebbi, Gongola, Ivadera and Faro. The freedom of navigation on the river is guaranteed by an agreement be¬ tween Germany and Great Britain. With the Niger the Benue forms the only navigable route to the far interior of Africa.

BEN VO LI O, ben-vo’li-o, in Shakespeare’s ‘Romeo and Juliet, > a friend of Romeo and nephew of Montague.

BENWOOD, W. Va., town in Marshall County; on the Ohio River, adjoining Wheel¬ ing, and on the Pittsburgh, Cincinnati, Chica¬ go, and Saint Louis, and the Baltimore & Ohio railroads. It is the centre of a large iron¬ mining region and has several rolling mills and blast furnaces. About a mile south of the town is a government dam, built to hold the Ohio River in a navigable condition during dry periods. Benwood was settled about 1800. Pop. 4,976.

BENZALDEHYDE, or BENZOIC AL¬ DEHYDE, a colorless, volatile oil, familiarly known as “oil of bitter almonds.® Benzaldehyde does not occur in the bitter almond in nature, but is formed, when the kernels are crushed and allowed to stand in water, by the decomposition of a glucoside known as “amygdalin.® It has the chemical formula GJL.CO.H, boils at 354° F., and has a specific gravity of about 1.05 and a refractive index of 1.56. Benzaldehyde is prepared, artificially, by boiling berfzyl chlorid with nitrate of lead, copper or sodium and subsequent treatment with sodium acid sulphite, with which the ben¬ zaldehyde forms a crystalline compound that may be easily separated from the mother li¬ quor by filtration or otherwise.

BENZENE, an aromatic hydrocarbon dis¬ covered bv Faraday in 1825 and called by him “bicarburet of hydrogen.® It has the chemical formula C«H,,, and is the fundamental substance from which the extensive series of “aromatic compounds® is obtained. In 1845, Hofmann proved its existence in coal tar and that substance now constitutes its most im¬

portant commercial source. In the manufac¬ ture of benzene, coal tar is distilled at a tem¬ perature not exceeding 300° F., and the dis¬ tillate is treated with caustic soda to remove phenols and subsequently with sulphuric acid to remove basic substances. It is then re¬ distilled, the temperature (at least in the up¬ per part of the still) being kept as low as 212° F., in order to prevent toluene from passing over. In order to effect a still further puri¬ fication, the benzene so obtained may be cooled by a freezing mixture of ice and salt. The true benzene solidifies when thus treated and the fluid impurities that it contains may be expelled by pressure or by the aid of a centrifugal drier. Pure benzene is a colorless liquid, strongly refractive, boiling at about 177° F., and freezing at 40° F. It does not mix with wrater, but mixes readily with alco¬ hol, acetone, glacial acetic acid, chloroform and ether. It crystallizes in the trimetric sys¬ tem when solidified by cold and dissolves iodine phosphorus, sulphur, oils, resins, fats and alkaloids. It expands by about 0.00075 of its own bulk, per degree increase in its temperature on the Fahrenheit scale. Its specific gravity is about 0.88 at 15° and its specific heat is 0.40. For the chemical consti¬ tution of benzene, see Aromatic Compounds.

Benzene forms two general classes of com¬ pounds, known respectively as “addition® and “substitution® products. In forming an “addi¬ tion® compound, benzene merely takes up atoms or molecules of some other substance, without parting with any of its own atoms ; the new substance being simply “added® to the benzene. Benzene hexabromid, GiH6Br6, is a good example of a benzene addition com¬ pound. It is formed by dropping bromine into boiling benzene, in direct sunlight ; the hexa-bromide crystallizing out upon cooling. The “substitution® compounds of benzene are far more numerous and important than the “ad¬ dition® compounds, however. They are formed by replacing one or more of the typi¬ cal hydrogen atoms in the benzene by an equal number of other atoms or monad radicals. The general theoiy of benzene substitutions is given under Aromatic Compounds ; but a few of the more important examples of such sub¬ stitution products may be given here. The radical CiHs (which is not capable of inde¬ pendent existence) is called “phenyl,® and is often

represented by the symbol Ph. The mono-substitution compounds of benzene, in which one atom of the hydrogen in the orig¬ inal benzene has been replaced by a radical (or by an atom different from hydrogen), may then be regarded as addition compounds of the radical phenyl. Thus “monochlorben¬ zene,® CeHu.Cl, may also be regarded as chloride of phenyl and its formula may be wwitten PhCl. Benzene itself may even be regarded as hybrid of phenyl, its formula being written GHn.H, or PhH. Carbolic acid (or “phenol®) is hydrate of phenyl, its formula being PhOH, the radical OH being here substituted for one atom of the hydrogen in the original benzene. Nitrobenzene, PhNCb, is formed from benzene (PhH) by the action of nitric acid, in accord¬ ance with the equation

PhH + HN03 = PhN02 + HaO.

It is used in the arts for the manufacture of

aniline (q.v.). Aniline itself is an amide of phenyl, obtained by replacing an atom of H in ammonia (NH3) by phenyl, or by replacing an atom ol hydrogen in benzene by the radical NH, The formula of aniline may be written i’hNK2, and aniline may be called “amido-benzene,® or “phenylamine.® (See Amide; Amine). Methylbenzene, C6H5.CH3, in which one of the original hydrogen atoms of the benzene is replaced by the radical CH3 (“methyl®) is also an important benzene sub¬ stitution compound and is known to chemists as toluene. That portion of the original benzene which remains intact, after a sub¬ stitution, is called the ((benzene residue.® In a mono-substitution compound of benzene, fur¬ ther substitutions may be made by replacing one or more of the hydrogen atoms in the ((benzene residue® by univalent radicals, and sec¬ ondary, tertiary, and higher substitution com¬ pounds may be thus formed. The classifica¬ tion of the secondary substitution compounds is given under Aromatic Compounds. For the classification of higher compounds, special treatises on organic chemistry must be con¬ sulted. It may be mentioned, however, that if A, B, C and D are monad radicals, there are no less than 30 distinct substances pos¬ sible,

which shall all have the same general formula C6H2.ABCD. This fact illustrates the exceeding complexity of the general the¬ ory of benzene substitutions compounds. The full theory is even more complex than this example indicates, however, for it often hap¬ pens that the hydrogen in a substituted radical can be replaced by another radical, as well as the hydrogen of the “benzene residue.® Thus in methylbenzene (or toluene), GH5. CH3, the radical OH may be substituted for one of the hydrogen atoms. If the hydrogen so displaced occurs in the “benzene residue.® the resulting compound will be “cresol,® C-.H* (OH).CH3, a substance which (since it is a cli-substitution compound) can exist in three isomeric forms. If, on the other hand, the OH takes the place of one of the hydrogen atoms of the “methyl® radical, the resulting compound will be “benzyl alcohol,® CH5.CH2 (OH).

When a primary amine of the fatty series is acted upon by nitrous acid (HNO2), the NH2 group of the amine is replaced by OH, with the formation of an alcohol ; but when nitrous acid acts upon aromatic amines, the products are quite different and are known as “diazo-compounds.® Thus when nitrous acid acts upon aniline nitrate, a compound having the formula CiH5.N2.NO3, and known as “diazobenzene nitrate,® is formed. This is regarded by chemists as a compound of the univalent radical CcHs-N = N — . When the free affinity of this radical is saturated by the addition of phenyl (CeHr.), the resulting com¬ pound, CiH5.N2.CeH5, is known as “azoben¬ zene,® or as “benzene-azo-benzene.® Azo¬ benzene may be prepared bv heating nitro¬ benzene with a solution of SnCl2 in aqueous caustic soda. It is deposited from a solution in benzene in the form of bright red trimetric plates and owes its importance largely to the fact that aniline yellow, C6H5.N2.CoH4(NH2), is one of its derivatives.

Benzene is an exceedingly inflammable substance, burning with a luminous flame and

the generation of a great amount of heat. It is volatile and its vapor forms a dangerously explosive mixture with air when present in any considerable quantity. Hofmann, men¬ tioned above as having first demonstrated its existence in coal tar, lost his life on 25 Feb. 1855, while experimenting with a considerable quantitv of benzene, through the mass acci¬ dentally taking fire. Benzene may be formed synthetically by heating acetylene gas (C2H2) to dull redness in a glass tube. Polymeriza¬ tion occurs and among numerous other sub¬ stances benzene is formed in accordance with the equation 3GH2 =

CeH,;. In works on chemistry, benzene is often called “benzol.® (Compare Benzine).

This product is so widely employed in the industry of the aniline dyes that chronic poi¬ soning is by no means uncommon. It’ is usually breathed as vapor in the vat rooms and causes, after some exposure, dizziness in the head, ringing in the ears, nausea and vomit¬ ing, coughing and sleepiness which latter may deepen to unconsciousness somewhat resem¬ bling the narcosis caused by breathing chloro¬ form. In some instances there are blood changes, with cyanosis and death. Treatment by fresh air, oxygen, free diuresis, catharsis and diaphoresis, and if the blood changes are marked infusion of physiological salt solution may be necessary.

BENZIDINE, an important substance be¬ longing to the benzene (or aromatic) series and used in the arts for the manufacture of Kongo red, chrysamin and other so-called “coal-tar colors.® The coloring matters de¬ rived from benzidine have the unusual and valuable property of dyeing cotton without the use of a mordant to fix them upon the fibre. Benzidine has the formula H2N.CH4.CH4. NH;, where both the benzene rings contain the NH; and the CH4NH2 radicals in the para position, and is prepared, commercjially, by heating nitrobenzene (see Benzene) with caustic soda and zinc dust and subsequent treatment with hot dilute hydrochloric acid. Pure benzidine crystallizes in silvery scales which melt at 252° F., and boil at a tempera¬ ture probably above 700° F. It is easily solu¬ ble in alcohol and ether ; it also dissolves read¬ ily in hot water, but is almost insoluble in cold water.

BENZINE, the commercial name for a mixture of the lighter and more volatile hy¬ drocarbons that pass off in the earlier stages of the distillation of crude petroleum. It is essentially different from benzene (q.v.), the latter being a definite chemical substance, be¬ longing in the group of Aromatic Compounds (q.v.) ; while “benzine® is a more or less in¬ definite mixture of hydrocarbons that chiefly belong to the paraffin series. Benzine differs but little from naphtha and gasolene, such slight differences as exist being due to varia¬ tions in the proportions in which the constit¬ uent hydrocarbons are present. Benzine is a colorless, mobile liquid, very volatile and in¬ flammable. It is valuable as a solvent for fats, oils and resins and is much used about the household as a cleansing agent. Its vapor, when mixed with air, is highly explosive and serious accidents are common, as the result of using it in the vicinity of lighted lamps or

tobacco pipes or near stoves in which fires are burning. In printing offices it is used for cleaning type and for removing ink from press rolls. It is also used in large quantities for enriching illuminating gas. Benzine is much lighter than water and will not mix with it. It boils at from 160° to 190° F. Poisoning by benzine is rare. The vapor has been used, combined with chloroform and ether, for pur¬ poses of narcosis, but it is questionable if it will ever be very popular. Instances of sud¬ den death following the prolonged breathing of benzine vapor have been reported.

BENZOATE OF SODA, or SODIUM BENZOATE, most commonly used as a pre¬ servative in canned foods. Under the Federal law regulating the purity of foods one-tenth of 1 per cent may be used for this purpose, but the popular feeling against its use in any quantity is causing the higher class of packers to discard it entirely. Its harmfulness as an ingredient in preserved foods has not been entirely established. See Preservatives.

BENZOIC ACID, an organic acid, be¬ longing in the aromatic series and having the formula C«H5.COOH. It occurs in benzoin gum and in certain other resins and balsams. It may be obtained also from the hippuric acid that occurs in the urine of the horse and other herbivorous animals by boiling that acid with concentrated hydrochloric acid. Benzoic acid is used as a mordant in calico printing, and in the manufacture of aniline blue. It is also used in medicine and as a pre¬ servative agent for anatomical specimens. The largest use of benzoic acid, however, is as a food preservative. With its salt, soda ben¬ zoate, it is used in huge quantities in catsups, sauces, jellies, jams, fruit syrups, sausages and other chopped meats, cider, soft drinks and many other similar food preparations. This use was questioned by the U. S. Chemistry Bureau and led to an elaborate series of experi¬ ments upon a so-called ((poison squad® of young men. The report, published as Bulletin 84 of the Bureau, was to the effect that benzoic acid and its salts were distinctly deleterious to health and should not be permitted in foods. A referee board of eminent physiological chem¬ ists were called to confirm or refute the Chem¬ istry Bureau’s findings, and they decided that the largest

amount that would be eaten in the ordinary use of such preserved foods would not be injurious to health. Upon this decision the government permits such use of benzoic acid and benzoate of soda on condition that the proportion used is stated plainly on the label covering the goods. Many States, however, prohibit it absolutely ; others restrict its use in foods to very narrow limits.

The benzoic acid that is used for medical purposes is obtained by sublimation, through a paper filter of benzoin gum over a sand bath, at a temperature of about 340° F. When so prepared, the acid has a pleasant, vanilla-like odor, which is imparted to it by a trace of an aromatic oil that comes over with it from the gum. For most of the purposes for which it is used in the arts, benzoic acid is formed by chlorinating toluene. The resulting benzotri-chloride is converted into benzoic acid by ox¬ idation with dilute nitric acid in boilers pro¬ vided with mechanical stirrers. Hydrochloric

acid is liberated and the benzoic acid is recrys¬ tallized or distilled under vacuum. Benzoic acid is also made from benzonitrile (C*H-,.CN) obtained from the <(middle oils® or carbolic oils in coal-tar distillation. After washing the carbolic fraction with dilute soda lye to re move the phenol and cresol, the remaining oil is placed in a jacketed vessel. Caustic soda lye of a specific gravity of 1,400 is added in quan¬ tity about double the benzonitrile content, and the mixture agitated. Steam is passed in as long as ammonia is evolved in quantity. The still then contains an upper oily layer and a lower alkaline layer. The latter is neutralized with carbonic acid or a mineral acid, and after the remaining traces of phenol and resinous matters are removed, the resulting solution of sodium benzoate is decomposed while hot by adding an excess of acid. Upon cooling, pure benzoic acid separates in white crystals.

Benzoic acid dissolves in hot water, but crys¬ tallizes out, upon cooling, in needles or pearly prisms. It is soluble in ether, alcohol and ben¬ zene. It melts at 250° F., boils at 480° F., and may be sublimed at intermediate temperatures. Its salts are called (<benzoates.® The methyl, ethyl, isobutyl and amyl esters of benzoic acid are used in making synthetic perfumes and flavors.

In medicine benzoic acid and its salts, the benzoates (sodium, ammonium, lithium) are widely employed for diseases of the bladder and of the mucous membranesˆ of the lungs. They are also used as intestinal germicides. Benzoic acid has marked bactericidal properties,

and may be used for sterilizing purposes. Taken into the intestines it prevents excessive bacterial decomposition ; absorbed into the blood it is partly broken up, and in the kid¬ neys is eliminated in part as hippuric acid, ren¬ dering the urine acid. It is therefore useful in alkaline fermentations of the urine, particularly in cystitis, pyelitis, *etc.* Benzoic acid is partly eliminated by the lungs, here acting to increase the amount of mucus, it is therefore used to loosen the mucus in tight coughs. As a parasi¬ ticide, benzoic acid is very valuable in scabies. Benzoates are practically useless in gout.

BENZOIC ALDEHYDE. See BenzalDEHYDE.

BENZOIN, an aromatic compound, sol¬ uble in hot alcohol and crystallizing in colorless, six-sided prisms having the for¬ mula CoH5.CH(OH) .CO.CeHn. Benzoin is best prepared by acting upon pure benzaldehyde with a hot alcoholic solution of cyanide of potassium. Upon cooling, the benzoin separates and may be removed by filtration. The action of the cyanide is not known, because the chemi¬ cal change involved in the foregoing process of manufacture appears to consist merely in the uniting of two molecules of benzaldehyde to form a single molecule of benzoin.

BENZOIN GUM, or GUM BENJAMIN,

a reddish brown resin that exudes from the tree Styrax benzoin, which grows in Sumatra, Java and other parts of the East. It is a mixture of various resinous substances, to¬ gether with free benzoic acid. Cinnamic acid is also present in the free state in many cases, but it is absent from the Siamese gum. Benzoin gum has a pleasant odor when burned, and for

this reason has been much used for incense and in making pastilles. It has antiseptic properties, and preparations of it are used as a dressing lor wounds, and in the manufacture of court-plaster. Benzoin is also administered internally, especially in asthma and other pulmonary af¬ fections and chronic catarrh. It is readily sol¬ uble in alcohol, and

when the tincture so formed is dropped into water, it forms a white, milky fluid, which is used in France as a cosmetic, under the name ((lait virginal .» The gum is obtained from the styrax-tree by making in¬ cisions in the bark, through which the resin oozes. It is allowed to harden by exposure to the air before removal. The best gum is ob¬ tained during the first three years of the tree's life, though a good quality may be had for seven or eight years subsequently. The Sia¬ mese gum is esteemed more highly than that from Sumatra.

BENZOL. See Benzene.

BENZONI, Girolamo, ben-zt/ne, je-ro- la'-mo, Italian traveler: b. Milan, 1519; d. after 1566. He went to Spanish-America in 1542, visited the principal places then known, and frequently joined the Spaniards in raids on Indian settlements; and after returning to Italy (1556) published a narrative of his adventures, (History of the New World* (Venice 1565).

BENZOYL, in chemistry the mono¬ valent radical CoHs.CO. Benzoyl cannot exist in the free state, but it occurs in the combined state in many organic substances. Benzaldehyde (or oil of bitter almonds), CcHs.COH, may be regarded as its hydride, and benzoic acid, G.Hs.COOH, as its hydrate.

BENZYL, the monovalent organic radical C6H5.CH2, which does not exist in the free state, but which has numerous important com¬ pounds. Toluene is its hydride. Benzylamine, C6H5.CH2NH2, is derived by substituting benzyl for one of the hydrogen atoms in ammonia, by heating benzyl chloride with alcoholic ammonia. Benzyl chloride, which is used as a source of <(oil of bitter almonds® (ˆbenzaldehyde®) and of benzoic acid, has the formula CcH5.CH2C1, and is obtained by passing chlorine into cold toluene, in direct sunlight. Benzyl alcohol, CgH5.CH2(OH), is the hydrate of benzyl, and is obtained by the action of an alcoholic solu¬ tion of potash upon benzaldehyde.

BEOTHUK, ba'6-thuk, a linguistic stock of North American Indians, habitants of the region of the Exploits River in northern New¬ foundland, and believed to have been limited to a single tribe. The Beothuks painted their bodies and their property with red ochre, and from this circumstance their stock and tribal name was derived. They were also known as the Goodnight Indians, from the incorrect translation of a Micmac word that sounded like Beothuk. It is not known whether the Beo¬ thuks became extinct by reason of wars and famine or by absorption among other tribes. They built very large

tepees which they covered with bark or skins and also designed a crescent¬ shaped canoe. Because of their hostility to the white man, they were relentlessly pursued and hunted until 1820, when the remnant of survivors crossed the straits and hid them¬ selves in Labrador, where it is possible that some of their descendants may survive. In

1911, F. G. Speck came upon an old woman, who claimed to be of Beothuk descent, and Irom her obtained a few words which he be¬ lieved indicated Algonquin linguistic stock. Data on the subject, however, are far from decisive.

BEOTHY, Zoltan, Hungarian writer: b. Komorn, 4 Sept. 1848. In 1882 he was appointed professor of aesthetics at the University of Budapest, after he had published several novels and many short stories and some of his critical and dramatic essays. His most important works include a history of Hungarian litera¬ ture (1877) ; a history of Hungarian prose fiction (1886) ; a collection of essays (Buda¬ pest 1881). He is considered one of the fore¬ most critics of Hungary.

BEOWULF, ba‘6-wiilf, Anglo-Saxon epic, of great importance as one of the earliest extant pieces of literature in the English lan¬ guage, as a source of information in regard to early manners, customs and traditions, and as an heroic poem of great dignity and beauty. The unique manuscript, now in the British Museum, dates from about 1000, but the com¬ position of the poem must be placed some three centuries earlier. The manuscript, care¬ lessly written by two scribes, is in the West-Saxon dialect, but the original poem must have been composed in the Northumbrian dialect, like most extant Anglo-Saxon poetry, which represents Southern transcription of Northern work. The name of the poet is not known ; he was not, in any case, the inventor of the inci¬ dents, but rather one who adapted existing material, probably in the form of separate lays, to the ampler frame of the epic.

The plot of the poem is briefly as follows: Hrothgar, King of the Danes, builds a great mead-hall for himself and his warriors. But an evil creature named Grendel, descended from Cain, comes at night and attacks the hall, slaying and devouring Hrothgar’s men. Twelve years this continues. Then Beowulf, nephew of Hygelac, King of the Geatas, in the territory which is now southern Sweden, sails to Denmark with 14 warriors to kill the mon¬ ster. He is entertained magnificently at the Danish court and silences Unferth, the King’s chief counsellor, who belittles his courage. When night falls Beowulf watches in the hall,

with his thanes. The monster appears and kills one of the men before coming to grips with Beowulf. A fearful struggle ensues, in which the hero tears off the demon's arm, but cannot prevent his escape to his lair. On the following day there is great rejoicing, and magnificent presents are bestowed upon Beowulf. But after night comes on the mother of Grendel, bent upon revenge, bursts into the hall and carries off 2Eschere, a Danish warrior. Beo¬ wulf then seeks out the she-demon in her lair beneath the waters of an inland mere. His sword, loaned him by Unferth, fails him, and he kills the hag with one of her own weapons. He cuts off the head of the dead Grendel and takes it back with him to the court of Hrothgar. After more feasting and present-giving he re¬ turns to the land of the Geatas and recounts his adventures at some length to King Hygelac. After the reign of Heardred, the successor of Hygelac, Beowulf himself ascends the throne and reigns gloriously for 50 years. But a

dragon, angered by the plundering of his hoard, devastates the country with fire, whereupon Beowulf attacks and kills him, with the assist¬ ance of Wiglaf, a young thane. In this en¬ counter Beowulf is himself mortally wounded and dies. His body is burned on a great funeral pyre, with solemn ceremonies.

This bare outline gives no hint of the wealth of episodes which enrich the poem. The most important of these are the account of Beowulf's swimming feat with Breca of the Brondings; the story of Finn, King of the Frisians, and Flildeburg, his Danish wife; the tale of the be¬ trothal of Hrothgar's daughter Freawaru to Ingeld; and the descriptions of the wars between the Geatas and Swedes. A part of the Finn story is also preserved in the so-called (Finns-burg Fragment, > 50 lines of verse found in the binding of a book of homilies, and now lost. (Beowulf^ as is evident, represents the fusion of history and tradition with themes of popular story. Much of what is told of kings

and chieftains must be founded upon fact. One event, the death of Hygelac, established by docu¬ mentary evidence as between 512 and 520 (Gregory of Tours and the (Gesta Fran-corunF), serves roughly as a basis for dating the action of the poem. But it is impossible to establish exact chronology for events so highly colored by imagination. The story of Grendel and his dam may be traced in the very wide¬ spread popular tale of the (Bear's Son) ; the fight with the dragon, originally quite uncon¬ nected with this, attached itself independently to the figure of Beowulf. The material prob¬ ably took shape in the form of lays in Scandi¬ navian territory, was carried to England, retold there in the vernacular, and finally molded by the "Beowulf-poet® into the present epic about the first quarter of the 8th century. It is im¬ possible, however, to distinguish in the present poem the lays on the basis of which it was composed. The Christian elements, though foreign to the material in its earlier form, are not mere interpolations, but an integral part of the work of the final poet. The tale of Beo¬ wulf's troll-fights, living on in Scandinavia after its transference to England, reappears at¬ tached to an historical personage in the (Saga of Grettir the Strong, } with very striking re¬ semblances to the English poem. The other Scandinavian analogues are of less importance. Many attempts have been made to explain the chief events of the epic as a nature-myth, but these are to be regarded with distrust. If a mythological significance was ever attached to these events, which may be doubted, there is no sufficient evidence upon which to base an in¬ terpretation.

The poem is written in alliterative long lines, with four strongly emphasized syllables and a varying number of weaker syllables. The style is simple but vigorous. Metaphor, es¬ pecially in decorative epithets, is frequently used, but simile is rare. The narrative is con¬ stantly retarded by repetition and variation, and an understanding of much in the story, especi¬ ally in the episodes, is rendered difficult by un¬ explained allusions. The whole is in no sense primitive, but represents highly developed art¬ istry. As a sustained narrative of heroic events, and as an expression of early ideals of courage and devotion to chief and to kin,

(Beowulf) is unrivalled in the vernacular lit¬ erature of western Europe. Consult the trans¬ lation by Gummere, F. B., (The Oldest English Epic,} with its comments and illustrative ma¬ terial, particularly to be recommended.

William Witherle Lawrence, Professor of English, Columbia University.

BEPPO, a satirical poem on Venetian life by Byron, published in 1818, and named for the chief figure. In Auber's opera, (Fra Dia-voloF is a character of the same name.

BEPPU, bep'poo, Japan, a bathing place and seaport on the Island of Kiushiu, famed for its hot alkaline baths. It is seven miles by rail from Oita. There is a sanatorium for consump¬ tive railway employees. Beppu is also a port of call for steamers.

BERANE, formerly a Turkish town in the vilayet of Kossova, which came into the possession of Serbia after the Balkan wars. After the invasion of Serbia by the Austro-German and Bulgarian armies in 1915 it re¬ verted to the Bulgarians under whose jurisdic¬ tion it remained till 1918. It was the scene of fighting between the Turks and the Ser¬ bians during the First Balkan War. In October 1912 it was stormed by the Montene¬ grins and by them occupied. The population is almost entirely Slavic, only a small percent¬ age being Turkish.

BERANGER, Pierre Jean de, ba-ran-zha,

pe-ar zhon de, national poet of France: b. Paris, 19 Aug. 1780; d. there, 16 July 1857. His father was a restless and scheming man, and young Beranger, left in a great measure to himself, ran a great chance of spending his life as a gamin and vagabond in the streets of Paris. A few days after the destruction of the bastille he was conveyed to Peronne and placed under the charge of an aunt who kept a tavern, and to whom for a time he acted as waiter. At the age of 14 he was apprenticed to M. Laisnez, a printer in Peronne, but after remaining in that employment for some time, was suddenly summoned to Paris by his father, who wished his assistance. The improvidence and prodi¬ gality of his father was constantly involving them in difficulties, and Beranger, with as yet no settled vocation in life, was enduring all the hardships and privation which men of genius in a similar position to himself have frequently had to encounter before the recog¬ nition of their talents. He had now, besides making an unsuccessful attempt in the drama, produced a number of poems, including his (Roger Bontemps,* (Le Grenier, > (Les Gueux) and (Le Vieil Habit. > Some of these were sent by him in 1804 to Lucien Bonaparte, in the hope thereby of obtaining some patronage or assistance. In this, probably the only appli¬ cation he ever made for aid in the course of a long life, Beranger was not disappointed. Lucien sent for him, encouraged him to proceed in his poetical career and made over to him his own income as member of the French In¬ stitute. He was afterward employed in editing the Annales du Musee, and in 1809 received an appointment as clerk in the office of the secre¬ tary to the university.

Many of his songs had now become extremely popular and in 1815 the first collection of them was published. A second collection was published in 1821, but

Beranger had made himself extremely obnox¬ ious to the Bourbon government by his satires on the established order of things ; and in addi¬ tion to being dismissed from his office in the university, he was prosecuted and sentenced to three months' imprisonment and a fine of 500 francs. A third collection appeared in 1825, and a founh in 1828, which last publication subjected him to a second state prosecution, an imprisonment of nine months, and a fine of 10,000 francs. Nothing, however, could daunt his spirit, and in prison he still con¬ tinued to busy himself in the composition of his songs and lyrical satires upon government. In 1833 he published his fifth and last collec¬ tion, which contains some of the most power¬ ful effusions of his genius. He was elected to the Constituent Assembly of the Second Republic, took his seat, and soon after re¬ signed. He refused all honors from the Second Empire. The concluding years of his life were spent in a dignified retirement and he received the honor of a public funeral, which the most eminent men of France, both of the world of literature and politics, attended.

The great attraction of Beranger's songs is the unequaled grace and sprightliness which they display, combined with great descriptive powers, much comic humor, and occasional bursts of indignation and invective when some social or political grievance is denounced. They are sometimes also, it must he admitted, marked by a tendency to levity and looseness of morals, but in this respect they partake emi¬ nently of the French character. No one, in¬ deed, was more thoroughly French than Beranger, and the glory of his beloved pcitrie, as paramount to all other considerations, ap¬ pears constantly as the inspiring genius of his poetry. The intense nationality of his songs

constitutes one of their principal charms, and in this respect he bears some . resemblance to Thomas Moore. He has sometimes been called the Burns of France, but though like him essen¬ tially a poet of the people, he falls far beneath the pathos and depth of feeling displayed by the Ayrshire Bard in depicting the passion of love. In private life Beranger was the most amiable and benevolent of men, beloved by his friends alike for his social qualities and kindli¬ ness of heart, while his charities were so numerous and extensive as often to exceed the bounds of prudence. Consult Boiteau, Paul, (Vie de Beranger5 (5 vols. 1860-61); Brunetiere, (Poesie lyrique5 (Paris 1894) ; far in, (Beranger et son temps5 (1866) ; Sainte-Beuve, Portraits contemporains5 ; Nivalet, (Souvenirs historiques et etude analytique sur Beranger et son oeuvre5 (Paris 1892) ; Peyrat, (Beranger et Lamennais5 (1861).

BERAR, ba-rar', India, former commis-sionership in the Deccan, south and west of the Central Provinces and north of Hyder¬ abad, touching Bombay territory on the west ; with an area of 17,766 square miles. It con¬ sists chiefly of a fertile plain bordered on the north and south by low ranges of hills. It is in¬ tersected by the Purna and is partly bounded north and south by the Wardha and Pen-ganga flowing east to the Godavari. It has a fertile soil, which produces much good cotton and millet, the best wheat in India, as. well as oil-seeds and other produce. The rainfall

is regular and this province is in the position of being able to export food to other parts of India. It is intersected by the railway from Bombay to Nagpur and ultimately to Howrah, opposite Calcutta. After being ruled by in¬ dependent sovereigns, it was added in the 17th century to the Mogul empire and latterly be¬ came part of the Nizam's dominions (Hyder¬ abad), to which it still in a sense belongs. In 1853 it was assigned or handed over to the British authorities to provide for the payment of the body of troops which the Nizam had been previously bound to furnish in time of war for the Indian government. A n w treaty was concluded in 1860 by which certain territorial alterations were brought about and a considerable debt due by the Nizam was canceled. The arrangement continued until 1902, when Berar was leased to the British in perpetuity and it is now attached to the Cen¬ tral Provinces for administrative purposes. The province has greatly prospered under British rule. It consists of six districts: Ellichpur, Amraoti, Akola, Buldana, Basim and Wun. The largest towns are Ellichpur and Amraoti (Oomrawuttee) . Pop. (1911)

3,057,162.

BERARD, ba-rar, Frederic, French physi¬ cian: b. Montpellier, 8 Nov. 1789; d. there, 16 April 1828. When only 20 years of age he wrote a thesis entitled (Theory of Natural Medicine, or Nature Considered as the True Physician, and the Physician as an Imitator of Nature.5 He afterward went to Paris, where he was engaged to write in the dic¬ tionary of Medical Science.5 In 1816 he re¬ turned to Montpellier as professor of thera¬ peutics in a private course of lectures to the medical students of the college. At this period he published a work explanatory of the doc¬ trines of the Medical School of Montpellier. 5 With Rouzet, he published Dumas' work on (Chronic Diseases,5 with instructive commen¬ taries. In 1823 he also published in Paris his work on (The Relations of the Physical and the Moral Organism, as a Key to Metaphysics and the Physiology of Mind.5 In this he ex¬ plains his own views of human nature and the principles of life, in opposition to the views of Cabanis. He also took occasion to publish at the same time a manuscript letter of Ca¬ banis on drimary or Final Causes,5 accom¬ panied by numerous annotations.

BERAT, ba-rat', Albania, a town on the river Ergent, the ancient Apsus, and about 30 miles northeast of the seaport of Valona. The valley in which it stands is very fertile, pro¬ ducing large quantities of grain, oil and wine. The town is picturesque and contains several quaint churches and mosques. It is the seat of a pashalic and . Greek archbishopric and was taken by Ali Pasha from his rival Ibra¬ him. Amurath II captured Berat and his troops held it notwithstanding a desperate at¬ tempt by Scanderbeg with a strong body of Ilalian auxiliaries to retake it. Pop. about 15,000, including 5,000 Greeks.

BERAUD, Jean, ba-ro*, zhon, French painter of great power: b. Saint Petersburg, of French parents, 1849. After serving with dis¬ tinction in the French army during the Fran-co-Prussian War, he became a pupil of Bon-nat. His contributions to the salon began in

1873 and the list of his paintings runs from his Leda (1875) and

L’arlequine (1891), through a very large number of portraits, to (La Ma¬ deleine chez le Pharisien.) He was one of the founders of the Sociee des Beaux-Arts.

BERBE, a west African, much-spotted genet (Genrietta pardina). See Genet.

BERBER, town of Nubia, on the right bank of the Nile, below the confluence of the Atbara. It is a station on the route from Khartum to Cairo and a point to which cara¬ vans go from Suakin on the Red Sea. It is still of commercial importance, but the open¬ ing of a railway line in 1906 to take the place of the caravan route has diverted much of the Red Sea trade elsewhere. In the course of General Graham’s operations against Osman Digna in 1885, a railway was projected from Suakin to Berber and the work was actually begun, but was ultimately abandoned when military protection was taken away. Pop.

10,000.

BERBERA, the chief port and town of British Somaliland, on the African coast of the Gulf of Aden and about 170 miles south of Aden. It has a small but well-sheltered har¬ bor and a long pier; a European quarter with stone houses and warehouses and a native quarter laid out with broad streets but con¬ sisting chiefly of huts or sheds. 1 here is a considerable export trade in the products ot the country, such as hides and skins, gums, ostrich feathers, ghee, sheep, goats and cat¬ tle ; rice, millet, dates, cottons, tobacco, etc., being imported. The traffic is chiefly with Aden. The population is perhaps 5,000, in¬ creased to 30,000 during the trading season. The Somali Coast Protectorate extends along the coast for about 400 miles and inland for about 200, the area being about 80,000 square miles. Besides Berbera it contains also the ports of Zeilah and Bulhar. It was. acquired in 1884 and is administered by a political agent and a consul. A number of Indian troops are stationed in the territory. The trade is of some importance and is increasing.

BERBERINE, a non-poisonous alkaloid discovered by Buchner in 1837 in the root of the common barberry and now known to exist in many other plants also. It crystallizes, or¬ dinarily, in yellow, silky needles, having the composition C20H18NO5 ~b 5l4H20 ; but when thrown down from solution in alcohol the needles are said to be red — probably from the absence of water. Berberine forms numerous salts and is used to a considerable extent in medicine, occurring in notable

quantities in preparations of hydrastis. The alkaloid itself is soluble in from four to five parts of water at ordinary temperatures and is also moder¬ ately soluble in alcohol; but it is only slightly soluble in chloroform and insoluble in ether.

BERBERIS, the generic name of the bar¬ berry (q.v.).

BERBERS, the name of a people spread over nearly the whole of northern Africa. From their name the appellation Barbary is derived. They are considered the most an¬ cient inhabitants of the country. Their dif¬ ferent tribes are scattered over the whole space intervening between the shores of the Atlantic and the confines of Egypt; but the different

branches of Atlas are their principal abode; while to the south they extend to the Soudan. Chief branches into which they are divided are : First, the Amazirgh, Amazigh, or Ma-zigh, estimated to number from 2,000,000 to 2,500,000, and who inhabit Morocco. They are for the most part quite independent of the Sultan of Morocco and live partly under chieftains and partly in small republican communities. Second, the Shillooh or Shella-kah, who number about 1,450,000, and inhabit the south of Morocco. They practise agri¬ culture and carry on some manufactures. They are more highly civilized than the Ama¬ zirgh. Third, the Kabyles in Algeria and Tunis, who are said to number about 1,000,- 000. Fourth, the Berbers of the Sahara, who inhabit the oases and consequently live for the most part at wide intervals from each other. Among the Sahara Berbers the most remarkable are the Beni-Mezab and the Tuareg. To these we may also add the Guanches of the Canary Islands, now extinct, but undoubtedly of the same race.

The Berbers generally are about the mid¬ dle height ; their complexion brown, and some¬ times almost black, with brown and glossy hair. Individuals of fair complexion and light hair and even with blue eyes are said to be not uncommon among them. They are generally thin, but extremely strong and ro¬ bust, and their bodies are beautifully formed. The head of the Berber is rounder than that of the Arab and the features shorter, but of an equally marked character, although the fine aquiline nose, so common among the lat¬ ter, is not often seen among the Berbers. The language of the Berbers is said to have affinities with the Semitic tongues. Such of them as mingle with the Arabs speak or un¬ derstand Arabic; but those who dwell in the interior of the mountains understand no other language than their own. The Berbers are generally straight and honest in their dealings —

contrasting favorably with the Arabs — and of high intelligence. They are Moham¬ medans in religion. They generally dwell in huts or rude houses, the latter rectangular, with two gable ends, covered with thatch am1 entered by a low and narrow door. These dwellings are often built in little groups, scattered about in the valleys and upon the sides of the mountains, and in some parts each group of huts is situated in the midst of a plantation, with a portion of ground laid out as a kitchen-garden. Although the Berbers have alwavs lived in ignorance and have had but little connection with civilized nations, they are remarkably industrious. By working the mines in their own mountains they pro¬ duced lead, copper and iron. With the iron they manufacture gun-barrels, implements of husbandry and many rudely-formed utensils. They understand the manufacture of steel, from which they make knives, swords and other instruments, not very elegant in form, but of good quality. The tribes inhabiting the borders of the plains and some of the great valleys breed sheep and cattle in con¬ siderable numbers. Their sheep are small and yield very little wool, and they have numerous herds of goats. Their cows and oxen are of a small species, but their asses and mules are

much esteemed. Consult Randal-Maciver and Wilkin, (Libyan Notes > (London 1901).

BERBICE, ber-bes', a district of British Guiana, intersected by the river Berbice. It extends from the river Abary on the west to Corentyn River on the east, about 150 miles along the coast, the boundary inland not being fixed. The chief town is New Amsterdam; pop. about 10,000. Its citadel, Fort York, and numerous intersecting canals, give it the as¬ pect of a mediaeval Dutch town. The princi¬ pal productions are sugar, rum, cotton, coffee, cocoa and tobacco. The coast is marshy and the air damp. Berbice came finally into Brit¬ ish possession in 1815, having previously be¬ longed to the Dutch. Till 1831 it formed a separate colony from Demerara and Essequibo. Pop. about, 52,000. See Guiana.

BERBICE, a river of British Guiana; flows generally northeast into the

Atlantic. It rises in lat. 3° N. and flows into the Atlantic in lat. 6° 24' N. Crab Island, at its mouth, divides it into two channels of which the western is from 9 to 16 feet in depth. It is navigable for small vessels for 165 miles from its mouth, but beyond that the rapids are numerous and dangerous.

BERCHEM, berH'em, or BERGHEM, Nikolaas, Dutch painter: b. Haarlem, 1624; d. there, 18 Feb. 1683. Having studied under his father and Van Goyen, Weenix the elder, and other masters, he spent several years in Italy, where he soon acquired an extraordinary facility of execution. His industry was nat¬ urally great and his innumerable landscapes now decorate the best collections of Europe. The leading features of Berchem's works, be¬ sides the general happiness of the composi¬ tions, are warmth and coloring, a skilful handling of lights and a mastery of perspec¬ tive. His etchings are also highly esteemed. Consult Buxton and Poynter, 'German, Flem¬ ish and Dutch Painting) (1881).

BERCHET, bar-sha', Giovanni, Italian

poet and prose writer: b. Milan, 23 Dec. 1783; d. 1851. He was a friend of Manzoni and Silvio Pellico. About 1819 he became a fre¬ quent contributor to a liberal journal at Mi¬ lan, called the Conciliatore. After this was suppressed and its contributors cast into prison or exiled by the Austrian government, Berchet sojourned in England, France and Germany. In 1848 he returned to Italy and during the tenure of office of the provisional government of Milan was Minister of Public Instruction. At the time of his death he was a member of the Sardinian Parliament. His writings include (Poesie) ; (Profugi di Pra-ga-* ; <Romanze) ; (Fantasie) (1829). His collected poems appeared in Milan in 1863, with biographical sketch ; and more recently were edited by E. Bellorini (Bari, 1911-12).

BERCHTA, berH'ta, a female hobgoblin, in the folklore of southern Germany and Switzerland, of whom naughty children are much afraid. Her name is connected with the word bright and originally she was re¬ garded as a goddess of benign influence. She is the patroness of spinners. The last day of the year is kept in her honor and a special meagre fare — gruel, pottage and fish — must

be eaten on that dav to the exclusion of other

¥

foods. Dire penalties are imposed on those who disregard those

injunctions. In certain localities Berchta is represented as queen of the crickets, with a long iron nose and a very large foot. Numerous springs in Salzburg, and elsewhere are named after her, indicating that she once was worshipped in those locali¬ ties. In the course of the centuries many of the sagas of Berchta came to be attributed to the Berthas of history. Many legends of a lady who appears at night in great houses, garbed in white, and nurses the children ai d acts generally as their guardian, are no doubt traceable to the ancient heathen Berchta. Consult article by E. Mogk in Paul's (Grundriss der germanischen Philologie> (Vol. Ill, p. 278).

BERCHTESGADEN, berH-tes-ga'den, Bavaria, village situated in a most picturesque and much-visited region, about 12 miles south of Salzburg, on the Achen, or Aim, a stream which issues from the beautiful lake called the Konigssee. It lies on a mountain slope sur¬ rounded by meadows and trees, consists of well-built houses, and has a fine old abbey, now a roval residence ; the abbey church, with fine Romanesque transepts of the 12th century; a royal villa, *etc.* Wood-carving is extensively carried on and there is an important salt mine. It is the principal settlement in the district of the same name. It has a reputation as a tourist resort. Pop. about 3,000.

BERCHTOLD, Count, Austro-Hunga¬ rian Foreign Minister 1912-15: b. 18 April 1863. Anton Johann Sigismund Josef Kor-sinus, Graf Berchtold, is one of the largest landed proprietors in the Dual Monarchy; he married, 1893, the Countess Fernandine Karolyi von Nagy-Karoly. Whatever may be the verdict of history upon the great European War that broke out in 1914, to Count Berch¬ told belongs the distinction of having applied the actual match that set the world ablaze, namely, the declaration of war against Serbia. It would be unjust, however, to lay more than a theoretical responsibility for that act upon his own shoulders : he was the instrument rather than the cause. He began his official career in a minor administrative capacity at Brunn and afterward became a secretary in the foreign office in Vienna. In 1895 he was appointed secretary at the embassy in Paris ; councillor of embassy in London. 1899; at Saint Petersburg (Petrograd) in 1903, and Ambassador to Russia in 1906. On the death of Count Aehrenthal (q.v.) he became For¬ eign Minister of the Dual Monarchy, 19 Feb. 1912, thus inheriting the aggressive and not over-scrupulous foreign policy of his prede¬ cessors. Before accepting the office Count Berchtold gave up his. Austrian in favor of his Hungarian nationality. It cannot be truly said of him that he practised the Aehrenthal method of tortuous policy; a simple country gentleman — although a diplomat — he brought the instincts of a gentleman into a department organized on a highly efficient but thoroughly

unscrupulous basis. He held no pronounced political tendencies, but he .was surrounded by a number of subordinates in whom the worst traditions of Austrian diplomacy seemed to have been incorporated. They soon became his masters and obliged him to pursue a policy

over which he had practically no control. Dur¬ ing his earlier tenure of office the best augury of peace, it was thought, lay in his personal friendship for M. Sazonoff, the Russian for¬ eign minister. He also cultivated friendly re¬ lations with Italy, and succeeded at Rome in removing the unfavorable impressions created by Aehrenthal's policy. His own efforts not¬ withstanding, he became a respectable figure¬ head for the aggressive and dishonest policy which his government pursued throughout the Balkan Wars (q.v.) of 1912-13, down to the outbreak of the European War. The tool of the military and clerical sections of the state, he prepared for an attack on Serbia in con¬ formity with their designs. At the instigation of Count Tisza, the Hungarian premier, Count Berchtold prompted the Bulgarian attack on Serbia after the end of the first Balkan War and the signing of the Treaty of London. It was expected that the Bulgarians would van¬ quish the Serbs and that the latter would there¬ by become an easy prey to Austria-Hungary and open the road to Salonica. But the scheme was defeated by the Serbian victories over the Bulgarians in June 1913. No sooner was the second Balkan War closed by the Treaty of Bucharest than Austria-Hungary demanded a revision of the treaty and Count Berchtold proposed to Italy to undertake an offensive war. against Serbia on the pretext that it would be in reality a defensive war against the danger of a Greater Serbia to Austria-Hungary. The Italian government, however, declined to recognize the proposal as entering within the terms of the alliance, the undertaking being aggressive, and not de¬ fensive. The action of Italy thus postponed the attack on Serbia for a year, when an ex¬ cellent opportunity presented itself.

The assassination of the Austrian heir and his wife gave the military and clerical parties the pretext they had long sought. In agreement with Berlin it was decided to use the occasion for an attack on Serbia, an act which precipitated the great conflict. It must be asserted that the charge of duplicity has never been leveled at Count Berchtold. Up¬ right and conscientious, weak and vacillating, he was unfitted to guide the affairs of the state in stormy and critical times. The pub¬ lished correspondence of the British Ambassa¬ dor and others clearly indicates that in his personal relations with his colleagues Count Berchtold pursued direct and simple courses, and that the blame for the devious Austrian policy with regard to Serbia and Russia rests rather upon Berlin and the German Ambassa¬ dor in Vienna, the late Herr von Tschirscky (q.v.), than upon the Count himself. He tendered his resignation more than once, but it was not accepted by the: Emperor Francis Joseph till January 1915, when Baron Burian succeeded him as Foreign Minister. In Feb¬ ruary 1917, Count Berchtold was appointed Chief Chamberlain of the Austro-Hungarian Court. He comes of an old Moravian family, one that has intermarried in the most exclu¬ sive ranks of the nobility. See War, European.

BERCK, bark, France, a fishing village of the department of Pas-de-Calais, on the English Channel, 28 miles soulh of Boulogne. A mile distant is Berck-Plage, a summer bath¬

ing resort. The latter has an excellent beach, a Kursaal and two hospitals for children. Pop.

(1911) 11,597.

BERCKHEYDE, berk'hi-de, Gerrit, Dutch painter: b. Haarlem, 1638; d. 1698. He was a younger brother of Job Berckheyde and with him was employed at the court of the Elector Palatine. Gerrit studied under Jacob Dewet. He traveled the Rhine country, painting at Cologne and Heidelberg. He became a mem¬ ber of the Guild of Haarlem in 1654 and there he remained with his brother until his death. His architectural works are regarded as the best of their kind. Of these the Bourse of Amsterdam was a favorite (Amsterdam Mu¬ seum, Rotterdam, Frankfort, Brussels), and the church of Saint Bavon in Haarlem. Other important works are- (View of Amsterdam, > (View of Cologne, * (View of Heidelberg Castled Among his celebrated genre subjects are (At BreakfasD (Schwerin), (Soldiers on Gnardˆ (Dessau)

and <A Courtesan's RoonP (Rotterdam). His elder brother, Job, b. 1630; d. 1693 ; was a more prolific artist, but confined himself to street scenes and civic centres of cities. He was more popular than his brother in his day but time has reversed this judg¬ ment and proclaimed Gerrit the greater artist.

BERDIANSK, ber-dyansk', a seaport of southern Russia, in the government of Taurida, on the northern shore of the Sea of Azof. It contains many handsome houses, arranged in spacious streets, and has a good anchorage, sheltered on all sides except the south. It is the chief entrepot for the surrounding gov¬ ernments, and exports large quantities of grain, oil-seeds, and wool. It has also a large inland trade in wood, coal, fish and salt, the last obtained from apparently inexhaustible mines in the vicinity. It is also the centre of a district in which the manufacture of agricultural im¬ plements and machines is extensively carried on. There are three churches, a gymnasium and a seminary for teachers. Pop. 29,000.

BERDITCHEV, ber-de'chef, city of Euro¬ pean Russia, in the government and 129 miles southwest of Kiev. It is an ill-built place, mainly Jewish, but contains several churches and synagogues, and a large Carmelite convent, in the church of which is an image of the Vir¬ gin Mary, the object of pilgrimages. It carries on a considerable trade in corn, wine, cattle, honey, wax. and leather. It is famous for its four annual fairs. At these, cattle, corn, coun¬ try produce, carriages and harness are sold in large quantities. The principal manufactures include tobacco, oil products and leather. The population in 1910 was 76,896, including many Jews. The town was once the private property of Count Tishkevitch. It has figured promi¬ nently in the many conflicts between the Poles, the Cossacks and the Russians.

BEREA, Ky., town in Madison County; on the Louisville & N. Railroad, 35 miles south¬ east of Lexington. It is the centre of a large agricultural section and is the seat of Berea College (q.v.), founded in 1855. Besides the college buildings and chapel it contains a Car¬ negie library and a stave factory. The water¬ works and electric light works are owned by the college. Pop. (1920) 1,640.

BEREA, Ohio, a village in Cuyahoga County, on the Big Four, L. S. & M. S., and the C. L. & W. division of the B. & O. Rail¬ roads, 14 miles southwest from the centre of Cleveland, with which, and Elyria and OUerlin, it is connected by electric lines. It was founded in 1829. The village is lighted by natural gas and electricily; it has extensive quarries of sandstone (Berea grit) ; a foundry and nut and bolt works, and manufactories of toys, grind¬ stones, pumps and torpedoes. There are two banks. Berea is the seat of Baldwin University, German Wallace College (both Methodist Epis¬ copal), and a German orphan asylum. The assessed property valuation is $1,625,000. Pop.

(1920) 2,959.

BEREA COLLEGE, a coeducational, non¬ sectarian institution, in Berea, Ky. ; organized in 1855. It has 96 members in its faculty, and some 1,668 students. Its building and grounds are valued at $971,722, and its library contains 29,000 volumes. The distinguishing feature of the college is its work in the southern moun¬ tain region, where it carries on, through trav¬ eling libraries, social settlements, and lectures, a very valuable kind of university extension.

BEREA GRIT, a variety of sandstone, great deposits of which are found at Berea, Ohio. It is of Mississippian age, lying next above the Bedford limestone. It is widely famous for its evenness of texture, and color, and exemption from the impurities that would deteriorate its marketable value.

BEREANS, in modern Church history an almost extinct sect of dissenters from the Church of Scotland, founded by Rev. John Barclay (1734-98) in 1773. From the founder's name they are sometimes called Barclayans. They take their title from, and profess to follow the example of, the ancient Bereans (Acts xvii, 10-13) in building their system of faith and practice upon the Scriptures alone, without regard to any human authority whatever. They agree with the great majority of Christians, both Protestants and Roman Catholics, respecting the doctrine of the Trinity, which they hold as a fundamental article of the Christian faith; but differ from the majority of all sects of Christians in various other im¬ portant particulars. For instance, they say that the majority of professed Christians stumble at the very threshold of revelation by admitting the doctrine of natural religion, natural conscience, etc., not founded upon rev¬ elation or derived

from it by tradition. With regard to faith in Christ, they insist, that as faith is the gift of God alone, so the person to whom it is given is as conscious of possessing it as the being to whom God gives life is of being alive, and therefore he entertains no doubts either of his faith or his consequent salvation through the merits of Christ, who died and rose again for that purpose. Consistently with the above definition of faith, they say that the sin against the Holy Ghost is simply unbe¬ lief. Their mode of practice and Church gov¬ ernment differs but little from those of many other dissenting sects. See Barclay, John.

BERENDT, ba'rent, Karl Hermann, Ger¬ man ethnologist: b. Dantzic, 1817; d. 1878. After studying medicine at Konigsberg he be¬ gan to practise in Breslau, where he. lectured

in the university. In 1851 his political attitude during the revolution having made his stay in Germany hazardous, he went to Nicaragua and thence to Vera Cruz, where he devoted some years to ethnological study and research. He retired from the practice of medicine and gave his whole attention to the study of the ethnology and linguistics of the Mayas. He came to the United States in 1863 and soon after was sent to Yucatan by the Smithsonian Institution, which published the results of his investigations in its report of 1867. In 1869 he explored the ruins of Ceutla, Tabasco, Mexico, and went to Guatemala in 1874, where he settled in Coban, began the cultivation of tobacco and studied the Mayan dialects. He published Analytical Alphabet of the Mexican and Central Ameri¬ can Languages* (1869) ; (Los escritos de Don Joaquin Garcia Icazbalceta* (1870); (Los tra-bajos linguisticos de Don Pio Perez* (1871) ; (Cartilla en lengua Maya* (1871) ; (Los indi-genas de la America central y sus idiomas)

(1878).

BERENGAR, ba'ren-gar, two kings of Italy in the 9th and 10th centuries. Berengar I, son of the Duke of Friuli by a daughter of Louis-le-Debonnaire, during the confusion which followed on the dissolution of the em¬ pire of Charlemagne, laid down the crown of Italy, and after a civil war obtained it in 888. At a later period, having been invited by Pope John X to repel the Saracens who were dev¬ astating the south of Italy, he was crowned emperor of Rome (915). His warlike expedi¬ tions had generally been fortunate, and his in¬ ternal government was generally acceptable to his subjects; but his nobility,

jealous of his authority, stirred up a new competitor for the throne in the person of Rudolf II, who invaded Italy in 921, and ultimately obliged Berengar to take refuge in Verona, where he was assassi¬ nated in 924. Berengar II, grandson of Beren¬ gar I, was at first Count of Ivrea, while the throne of Italy was occupied by Hugo, count of Provence, a tyrant who had incurred the enmity of almost all the great feudal lords of the kingdom. Berengar taking advantage of this feeling, put himself at the head of a force collected in Germany in 945, and was almost universally welcomed. Hugo abdicated in favor of his son Lothario, who reigned nominally for a few years, and was succeeded in 950 by Berengar, in whom all the powers of the gov¬ ernment had previously centred. A quarrel with the Emperor Otho in the following year deprived him of his throne, but he was per¬ mitted to resume it on agreeing to acknowledge Otho as his liege lord. In a second quarrel he was not allowed to escape so easily. After losing his territories he shut himself up in the fortress of Saint Leo, and defended himself bravely till famine compelled him to submit. He was imprisoned at Bamberg and died there in 966.

BERENGARIA, ba-ren-ga'ri-a, the queen of Richard I of England: d. Le Mans, about 1230. She was a daughter of Sancho VI of Navarre and was married to Richard at Limasol in Cyprus, 12 May 1191. She remained at Acre while the king was warring with the Saracens and resided in Poitou during his im¬ prisonment in Germany. She became estranged from him soon after his release and seems

never to have joined him again. She was buried at Espan in the Church of Pietas Dei, which she had founded. Tradition says she was of remarkable beauty and was highly ac¬ complished for her age.

BERENGARIO, Jacopo, Italian anato¬ mist: b. Carpi, about 1470; d. Ferrara 1530. He studied at Bologna, taught anatomy and sur¬ gery at Pavia, and finally settled at Bologna till a clamor caused by a rumor that he had got possession of two Spaniards affected by a loath¬ some disease, and was intending to dissect them alive, obliged him to retire to Ferrara. This rumor, caused doubtless by the fact that Berengario

looked upon the dissection of the human body as the only means by which the science of anatomy could be advanced, points out the source of the many important discov¬ eries which he made, and ihe others for which he paved the way, leaving them to be followed out by Vesalius, Eustachius, and Fallopius. He is justly regarded as one of the principal founders of modern anatomy. He was also a dexterous operator, and published a practical work entitled, (De Cranii Fractura) and an¬ other which marked out the path for the ana¬ tomical discoveries of the 16th century, Hsa-gogae breves perlucidae et uberrimae in anatom-iam corporis humani, ad morum scholasiicor-um preces in lucem editae, cum aliquot figuris anatomicis) (Bologna 1514; Strassburg 1530).

BERENGARIUS OF TOURS, French theologian: b. Tours, about 1000; d. 6 Jan. 1088. He is renowned for his philosophical acuteness as one of the scholastic writers. While admit¬ ting the real presence of Christ in the Eucharist, he questioned the doctrine of transubstantia-tion and held that the substance of bread and of wine continued to exist with the body and blood of Christ (consubstantiation) . He was condemned by several councils and several times recanted, but died fully reconciled with the Church. He is the first in theological history to call the doctrine of transubstantia-tion in question. He was treated with forbear¬ ance by Gregory VII, but the scholastics be¬ longing to the party of Fanfranc, Archbishop of Canterbury, were irritated against him to such a degree that he retired to the Isle of Saint Cosmas, in the neighborhood of Tours, in the year 1080, where he closed his life in pious exercises. On the history of this con¬ troversy, which has long occupied the attention of theologians, new light was shed by Fessing in his <Berengar) (1770), and also by Staudlin, who likewise published the work of Berengarius against Fanfranc. This Berengarius must rot be confounded with Peter Berenger of Poitiers, who wrote a defense of his in¬ structor Abelard.

BERENGER, ba-ran-zha, Rene, French criminologist: b. Bourgles Valence (Drome), 22 April 1830; d. 30 Aug. 1915. He was a soldier during the War of 1870 and was wounded at the battle of Muits. The follow¬ ing year he was elected deputy to the National Assembly; and in 1873 he became Minister of Public Works in the cabinet of M. Thiers and national senator in 1875. He was vice-presi¬ dent of the senate from 1891 to 1897. He was founder and president of a number of societies established for the general improvement of the

conditions of society, and the eradication of vice from the streets of

Paris. He instituted a campaign against ihe white slave traffic and headed an association for the protection ol young girls and women from the dangers and vices of the great modern city. His studies of the vicious conditions of the great centres of population and his bold attempts to find remedies for them have made him one of the foremost workers in this field. The Fegion of Honor and many other honors and decorations have been bestowed on him.

BERENHORST, Georg Heinrich, Ger¬ man military writer: b. 1733; d. 1814. He was one of the first writers by whom the military art has been founded on clear and certain prin¬ ciples. He was a natural son of Prince Leo¬ pold of Dessau, ai d in 1760 became the adju¬ tant of Frederick II. He was the author of Reflections on the Military Art) (Feipzig

1797).

BERENICE, ber-e-ni'se (((a bringer of victory^). (1) This was the name of the wife of Mithridates the Great, king of Pontus. Her husband, when vanquished by Lucullus, caused her to be put to death (about the year 71 b.c.), lest she should fall into the hands of his ene¬ mies. (2) The wife of Herod, brother to the great Agrippa, her father, at whose request Herod was made king of Chalcis by the Em¬ peror Claudius, but soon died. In spite of her dissolute life, she insinuated herself into the favor of .the Emperor Vespasian and his son Titus. The latter was at one time on the point of marrying her. (3) The wife of Ptolemy Euergetes ; who loved her husband with rare tenderness, and when he went to war in Syria made a vow to devote her beautiful hair to the gods if he returned safe. Upon his return Berenice performed her vow in the temple ot Venus. Soon after the hair was missed, and the astronomer Conon of Samos declared that the gods had transferred it to the skies as a con¬ stellation. From this circumstance the con¬ stellation near the tail of the Fion is called Coma Berenices (the hair of Berenice).

BERENICE, Egypt, a city on the Red Sea, whence a road, 258 miles in length, extended across the desert to Coptos, on the Nile. This road was constructed in the reign of the second Ptolemy. Berenice was one of the principal c ntres by which the trade of Egypt, under the Macedonian dynasty, and that of the Romans subsequently, were carried on with the remote East. During the Roman period, a sum equal to $2,000,000 is said to have been annually re¬ mitted to ihe East by the Roman merchants as payment for its precious products,

which sold at Rome for a hundred-fold more than their original price. Nothing now remains of Bere¬ nice but a heap of ruins, adjoining the modern port. The modern town is called Sikket Ben-der-el-Kebir, and now, owing to the formation of a sand bar at the entrance of the harbor and the filling up of the harbor itself, the port is practically accessible only to small boats. Bere¬ nice, or Hesperis, a city of Cyrenaica, near which the ancients imagined the gardens of the Hesperides to be situated.

BERENSON, Bernhard, American art-critic: b. Vilna, Russia, 26 June 1865. Pie was brought to America as a child, received his

education in Boston, and graduated from Har¬ vard in 1887. He went abroad shortly after¬ ward, having already decided on his life work. Since that time he has resided nrincinally at Settigano near Florence, Italy, making journeys to the various parts of Europe where works of art needed for his studies are to be seen, and returning to America from time to time. He has been influential in obtaining many im¬ portant works for American collections and is generally regarded as the most significant figure in art criticism that this country has produced. Indeed lie is to be placed with the very front rank of European connoisseurs, especially in his own specially of Italian art. An interest¬ ing fact about his study of the great figures of the Florentine Renaissance is that it brought to him an early realization of the quality and importance of the modern French painters like Cezanne and Degas. Outside of articles in nearly all the great reviews of Europe and America, his principal writings are (Venetian Painters of the Renaissance5 (1894) ; (Lorenzo Lotto, an Essay in Constructive Criticism 5 (1895-1901); Florentine Painters of the Ren¬ aissance5 (1896) ; (Central Italian Painters of the Renaissance) (1897) ; (The Study and Crit¬ icism of Italian Art5 (1901; 2d series 1902); (The Drawings of the Florentine Painters) (1903) ; Forth Italian Painters of the Renaissance) (1907) ; (A Sienese Painter of the Fran¬ ciscan Legend5 (1909) ; (Catalogue of the Ital¬ ian Paintings in the John G. Johnson Collec¬ tion now at Philadelphia5 (1913) ; (Venetian

Painting in America: the Fifteenth Century. 5 Mr. Berenson's method in the study of ancient works is largely a continuation of the one inaugurated by the Italian critic Giovanni Morelli. Mrs. Bernhard Berenson is also deeply interested in art criticism and has writ¬ ten a guide book on Italian pictures.

BERESFORD, Lord, British admiral: b. Ireland, 10 Feb. 1846; d. Langwell, Caithness, Scotland, 6 Sept. 1919. Charles William de la Poer Beresford, second son of the 4th marquis of Waterford, was for many years known by his courtesy title of Ford Charles.® On his elevation to the peerage in 1916 he adopted the title of Baron Beresford of Metemmeh and of Curraghmore. He entered the navy in 1859 and rose rapidly through all grades by force of a strong personality, a fiery enthusiasm in his work and a reckless courage that made him the idol of his comrades. On three occasions he sprang overboard at sea to the rescue of drown¬ ing men. He commanded the gunboat Condor during the bombardment of Alexandria in 1882. By running his vessel close under the forts he succeeded in silencing the most formidable bat¬ tery opposed to the British squadron. After the landing of troops he organized an efficient police force for the protection of the city, and later served on Lord Wolseley's staff in the Nile Expedition (1884-85), and subsequently commanded the naval brigade in the battles of Abu Klea, Abu Kru and Metemmeh. For the second time he was specially commended for gallantry. He was in command of the expe¬ dition which rescued Sir Charles Wilson's party in the Sofia, when her boilers were repaired under fierce fire. For this action he received the thanks of both Houses of Parliament. He was a lord commissioner of the admiralty from

1886 to 1888, when he resigned, owing to what he regarded as inadequate provision for the needs of the fleet. In 1893-96 he commanded the naval reserve at Chatham ; was commander-in-chief of the Mediterranean squadron 1905— 07; of the Channel fleet in 1907—09, and retired from the navy in 1911. He was a persistent critic of the administration of Sir John (now Lord) Fisher while the latter was First Sea Lord. Beresford's . book, (The Betrayal, 5 issued in 1912, was withdrawn by request of the govern¬ ment. . It led, however, to the formation of an Imperial naval war staff. At various times Beresford sat in Parliament for different con¬ stituencies; his last one, Portsmouth, he repre¬ sented till 1916. In the House he was nick¬ named the ((stormy petrel® and ((M.P. for the Navy.® Like Lord Roberts, he was one of the few British public men who foresaw a gigantic conflict in the not distant future, and openly proclaimed it on

every possible occasion. As the one spent 10 years in pleading for a powerful army with which to face the coming storm, so the other at all seasons insisted on the main¬ tenance of the C(two-power standard® for the navy, propounding the fundamental truth that iDattleships are cheaper than battles. Already in 1905 he wrote, ((Great Britain must watch the activity of the German Navy League with the greatest attention.® Early in the war Lord Beresford was appointed honorable colonel of the Marine Brigade in the Rojral naval division organized for land service. In a letter to the president of the American Navy League Lord Beresford expressed the opinion that Germany could have won the war had she promptly at¬ tacked British commerce without any declara¬ tions of war (New York Evening Sun, 30 Oct. 1916). In 1898 he visited China at the request of the Associated Chambers of Commerce of Great Britain to make a study of the compli¬ cated commercial conditions existing there ; and on his return, in 1899, he passed through the United States and was received with distin¬ guished honors by official and commercial bodies. He did very much to promote the (ffipen door® policy in China. His publications include (Nelson and His Times) ; (The Break-Up of China) (1899), and a volume of Mem¬ ories5 (1914).

BERESFORD, William Carr, Viscount, English general, was a natural son of the 1st marquis of Waterford: b. 2 Oct. 1768; d. Bedgebury Park, Kent, 8 Jan. 1854. He entered the army and served at Toulon and in Corsica, in the West Indies under Abercromby, in Egypt under Baird and com¬ manded the first brigade at the capture of Cape of Good Hope in 1805. In 1806 he was raised to the rank of brigadier-general and the same year commanded the land force in the expedition to and capture of Buenos Aires, but on its sur¬ render soon after was imprisoned for six months before he made his escape. Having been ordered to Portugal in 1808, he was in¬ trusted there with the remodeling of the Portu¬ guese army — an office which he accomplished with great success, and in acknowledgment of his services was created a Marshal of Portugal, Duke of Elvas and Marquis of Santo Campo. He covered Moore's retreat at Coruna in 1809 and subsequently took part in the siege of Badajoz-and the battles of Albuera, where he

had very heavy losses, Vittoria and Bayonne. For his bravery at the battle of Toulouse he was raised to the peerage, with the title of Baron Beresford, afterward superseded by that of Viscount Beresford, conferred on him in 1823. In political principles he was a high Conservative and a thorough supporter of the Duke of Wellington. In 1828, when the Duke became premier, he was made master-general of the ordnance, a post he held till 1830.

BERESFORD, S. Dak., town in Union County, on the Chicago and Northwestern Rail¬ road, 20 miles northwest of Sioux City. It has a few local industries, three banks and a public high school. It has a good trade in the agri¬ cultural products of the region. The value of its taxable property is estimated at $948,000. Pop.* (1920) 1,519.

BEREZIN, byer-ye-zen', Ilya Nikolayevitch, Russian Orientalist: b. 1818; d. 1896. He studied oriental philology at the University of Kazan, where in 1846 he was appointed pro¬ fessor, and in 1855 became professor of Turkish at the University of Saint Petersburg. Some of his important works in Russian are '^Li¬ brary of Oriental Authors5 (1849-51) ; (Tour Through Daghestan and Trans-Caucasia* (1850) ; (A Grammar of the Persian Language5 (1853) ; (The Mongol Invasion of Russia5 (1852-54); (Popular Turkish Sayings5 (1857). He wrote in French (Recherches sur les dialectes Musulmans5 (1848-53), and edited the (Russian Encyclopedic Dictionary5 in 16 volumes.

BEREZINA, byer-ye-ze-na', a river in the Russian province of Minsk, a tributary of the Dnieper, with a course of some 335 miles. A canal system connects with the Dwina. It was rendered famous by the passage of the French army under Napoleon, 26-27 Nov. 1812. Ad¬ miral Tchitchakoff, with the Moldavian army, forced his way from the south to join the main army, which, after Borizoff had been re¬ taken, was to assist the army led by Wittgen¬ stein from the Dwina and in this manner cut off Napoleon from the Vistula. Napoleon in face of armies three times as strong as his own and surrounding him on all sides, was obliged to make the greatest efforts to reach Minsk, or at least the Berezina, and to pass it earlier than the Russians. After the advanced guard of the Moldavian army had been repelled to Borizoff by Oudinot and the bridge there been burned by them, early in the morning of 26 November, two bridges were built near Sem-bin, about two miles above Borizoff, an under¬ taking the more difficult because both banks of the river were bordered by extensive morasses, covered, like the river itself, with ice not sufficiently strong to afford passage to the army, while other passes were already threatened by the Russians.

Scarcely had a few corps effected their passage, when the greater part of the army, unarmed and in con¬ fusion, rushed in crowds upon the bridges. Those who could not hope to escape over the bridges sought their safety on the floating ice of the Berezina, where most of them perished, while many others were crowded into the river by their comrades. Besides the multitudes who were obliged to remain beyond the Berezina, the division of Bartouneaux, which formed the

rear-guard, was also lost. It was intrusted with the charge of burning the bridges in its rear, but it fell into the hands of the enemy. The French lost half their total strength, which stood at 25,000 men. The genius of Napoleon saved the remnant, a broken and dispirited force.

BEREZOV, byer-ya'zof (the town of birch trees), Siberia, a town in the government of, and 400 miles north from, Tobolsk, on a height above the left bank of the Sosva, one of the branches of the Obi. Its inhabitants are chiefly Cossacks, who subsist by the chase and by fish¬ ing; they barter furs, skins, fish, etc., for flour, flesh-meat, tobacco, ironware and brandy brought by the Tobolsk dealers, whose craft are floated down the Irtish. It lies in a rough country, covered with thick forests, and has a severe climate. Among the noted personages exiled to this place were Prince Menzikoff, the favorite of Peter the Great, who died here in 1729, and Dolgoruki. Pop. about 1,100.

BERG, berg, Friedrich Wilhelm Rembert,

(generally known as Feodor Feodorovitch Berg), Russian general and administrator: b. Sagnitz, Livonia, 27 May 1794; d. Saint Peters¬ burg, 18 Jan. 1874. He received his education at the University of Dorpat and entered a regiment of infantry at Libau. He took part in the cam¬ paigns of 1812, 1813 and 1814 in Russia, Ger¬ many and France. After his return to Russia he entered the diplomatic service and was suc¬ cessively attache at the embassies of Munich, Rome and Naples. In 1822 he re-entered active service, directed some expeditions against the Kirghizes and explored the shores of the Sea of Aral. On the accession of Nicholas, Berg was appointed imperial chamberlain and was attache at Constantinople. During the Turkish campaign he was quartermaster of the Second Army, directed the operations before Silistria and crossed the Balkans. He arranged the map of a portion of Rumania and the Balkans. In 1831 he served in Poland under Rudigier and distinguished himself at Ostrolenka and at the capture of Warsaw. He was appointed lieutenant-general and was afterward in charge of geodetic surveys and of various diplomatic and military missions. In

1849, at Vienna, he prepared the plan of campaign against Hun¬ gary. In 1853 he was in charge of the troops destined for the defense of Esthonia and he put the fortress of Reval in a state of defense sufficient to withstand and repulse the attack by the English troops. In 1854 he was made governor-general of Finland and repulsed Ad¬ miral Dundas before Sveaborg. Alexander II bestowed on him the title of count and, in 1863, placed him at the head of the kingdom of Poland. He brought this country under submission and retained this post until his death. He was the first to insist on the policy of Russification at all costs. The severity with which he treated the Polish population during the insurrection aroused widespread indig¬ nation.

BERG, Joseph Frederick, American cler¬ gyman : b. Antigua, W. I., 3 June 1812; d. New Brunswick, N. J., 20 July 1871.* He came to the United States in 1825, entered the Ger¬ man Reformed ministry, in which he served, 1835-52, and then entered the Dutch Reformed

Church and was professor of theology in the Dutch Reformed Theological Seminary at New Brunswick from 1861 till his death. He was distinguished for the intensity of his opposi¬ tion to the Roman Catholic Church, on which theme he wrote extensively, his best-known work being ‘Synopsis of the Moral Theology of Peter Dens, as Prepared for Romish Semi¬ naries and Students of Theology } (Philadel¬ phia 1842; new ed., 1856). His learning was extensive and he was an eminent controver¬ sialist. Consult Corwin, (Manual of the Re¬ formed Church in America) (New York

1879).

BERG, an ancient duchy of Germany, now included in the governments Arnsberg, Cologne, and Diisseldorf. It extended along the Rhine from the Ruhr to the frontiers of Nassau, and is everywhere hilly. It is more a manufactur¬ ing than an agricultural district, and has long been famed for its minerals, which include iron of the finest

quality, lead, copper, zinc and the precious metals. In addition to the employ¬ ment furnished by the working of these min¬ erals, the inhabitants, who are very industrious, have with considerable success superadded tex¬ tile manufactures. It is now indeed the chief manufacturing district in Germany, and the most densely peopled. It contains the important towns of Elberfeld and Barmen. The duchy of Berg, founded in 1389, had been long con¬ solidated with the Prussian dominions when (1806) Napoleon revived the title, and con¬ ferred it, with an enlarged territory, on Murat. On Murat's receiving the kingdom of Naples, Napoleon named his nephew Louis Napoleon (brother of Napoleon III) hereditary Grand-duke of Berg, and increased its limits still farther. At the Congress of Vienna, in 1815, the whole was given to the King of Prussia.

BERGAIGNE, Abel, French Orientalist:

b. Vimv, 31 Aug. 1838; d. 6 Aug. 1888. He was for many years professor of Sanskrit at the Sorbonne in Paris. As a Sanskrit philologist he is considered a foremost authority and he was especially noted for the share he took in the interpretation of the Vedas. Among his works are (La religion vedique) (3 vols., Paris 1883) ; and a translation of two Sanskrit dramas <Nagananda) (Paris 1879), and <Sacountala) (Paris 1884).

BERGAMA, ber'ga-ma, Asia Minor, town about 20 miles inland from the west coast, on the Selinus, a tributary of the Caicus, 46 miles north by east of Smyrna. It occupies the site of the ancient Pergamus (q.v.), and contains numerous remains attesting its ancient magnifi¬ cence. In the centre are the remains of a large Roman basilica, a Byzantine church now con¬ verted into a mosque, and a curious double tunnel 200 yards long through which the river runs. To the east of the town is a steep hill with the acropolis and the remains of a Roman palace on the top. To the west of the town are the ruins of the ancient amphitheatre with arches of fine workmanship. It was built so that the arena could be flooded with water from a stream, thus affording an opportunity for nautical sports. Bergama is a flourishing town noted for its manufactures of morocco leather. There is trade also in wool, cotton, and opium. The population is about 7,500, in¬

cluding a number of Greeks, who have estab¬ lished excellent schools.

BERGAMI, Bartolommeo. The celebrated trial of Queen Caroline, wife of George IV of England, was principally founded upon a charge of

adulterous intercourse with Bergami, who, in 1814, upon recommendation of the Marquis Ghislieri, in whose previous employ¬ ment he had been, was attached to her house¬ hold. Bergami, who had fought his way up in the Italian army from a common soldier to the rank of quartermaster, belonged to a respec¬ table family, and the Marquis Ghislieri described him to the queen as a person of character and attainments superior to his condition, and bespoke for him a kind treatment. This, and the personal advantages of Bergami, who was singularly good-looking, combining athletic strength and stature with almost feminine l>eauty, naturally disposed the queen in his favor. Moreover, he was full of loyalty and devotion, and on one occasion nearly became the victim of poison intended for her. The queen treated his whole family, especially a little child of his, with the greatest generosity and kindness. All these circumstances were used by her enemies as so many indications of her criminality, and during the trial one of the Italian witnesses, Teodore Majocchi, excited special indignation by his admitting every fact unfavorable to the queen, and by answering every question which might tell in her favor with Non mi ricordo. Bergami, who was at Pesaro during the trial, exclaimed, when he was apprised of her acquittal, but at the same time of her death, that she had been poisoned, and never could be convinced to the contrary. To the last he ever spoke of the queen with the greatest reverence and affection, and his deport¬ ment before and after her death led to the conclusion that he looked upon her rather as a benefactress than as a mistress. However, wherever he went he became the observed of all observers. During his occasional excursions to Paris his apartments were crowded with visit¬ ors, consisting principally of ladies, who, under the pretext of having been friends of Queen Caroline, gratified their curiosity and obtained an interview with the portly courier. When at home he lived in great splendor; in the capitals of Italy, Rome, Naples, Milan, he was a lion, and the houses of (<the best familiesˆ were open to him. At the time of the trial many different statesments about Bergami's character were cir¬ culated in the House of Lords, but however contradictory in many other respects, they all agreed in this one fact, that he was as inoffen¬ sive as he was good-looking a person, who probably would never have been heard of be¬ yond the precincts of Italian barracks if it had not been for his relation with Queen Caroline, and for the peculiar construction which was put upon it by her enemies at the trial. His name in England was, by a curious mistake, spelled with a P.

BERGAMO, ber'ga-mo, Italy, city and capital of the province of Bergamo, situated in the district lying between the rivers Brembo and Serio, and 33 miles northeast of Milan. It con¬ sists of two distinct

portions, the upper city, situated on hills, and now attainable by a cable tramway, and the lower city. Citta Alta, with its hilly streets, ancient buildings, and lofty

ramparts, now transformed into promenades, has a picturesque mediaeval appearance. The much more extensive new quarters in the plain are very modern in every respect. At its fair goods to the value of a million sterling have sometimes been sold. It has an academy of painting and sculpture, a museum, an athenae¬ um, a public library, several secondary schools, and various manufactories. There is a cathedral but some of the other churches are of greater interest. There is a small Protestant congrega¬ tion. The comic characters in the Italian masked comedy are Bergamese, or affect the dialect of the country people in the neighborhood of this city. In 1796 Bonaparte took Ber¬ gamo, and it was subsequently made the capital of the department of the Serio, in the kingdom of Italy. Among many distinguished men born here are Tiraboschi, the historian of Italian literature ; the composer Donizetti, and Cardinal Mai. Bergamo has a thriving trade; it was one of the first places to introduce the culture of the silkworm. Its principal manufactures are silk and other textiles, hats, farm implements and organs. Bergamum, the ancient town, was settled by the Gauls and became a municipium in Caesar's time. In 1428 it was added to the Republic of Venice. Pop. 55,857.

BERGAMOT, a shrub or small tree, Citrus bergamia (family Rutacece) . The plant is largely cultivated in southern Europe, espe¬ cially Italy, for its green, bitter volatile oil, known as oil or essence of bergamot, which is expressed or distilled from its highly aromatic rind for use in perfumery. The name is also applied, mainly in Europe, to many varieties of pears and in both Europe and America to sev¬ eral species of the family Menthacece ; for ex¬ ample, Mentha aquatica (Europe), Monarda didyma and M. fistulosa (America). The name seems to be a corruption of the Turkish beg armudi, a lord's pear.

BERGEDORF, berg'e-dorf, Germany, town 10 miles southeast of Hamburg, and in the ter¬ ritory belonging to that city, on the Bille, a

tributary of the Elbe. It has flourishing glass works and manufactures of enamel ware. Lesser productions are cane chairs, brushes and buttons, and there are tanneries and brick yards. The town is the seat of a District Court and has a realschule and an institution for the blind. It is the birthplace of the composer, Johann Adolf Hasse. It was held jointly by Liibeck and Hamburg till 1867, when Lubeck assigned its rights to Hamburg on payment of 200,000 thalers. Pop. 14,907.

BERGEN, Joseph Young, American edu¬ cator: b. Red Beach, Me., 22 Feb. 1851. He was graduated at Antioch College, Ohio, 1872, and for a time was on the Ohio geological sur¬ vey and professor of natural sciences at Lom¬ bard University, Salisbury, Ill. He was teacher of physics in the Boston Latin School, 1887 ; junior master and master Boston English High School, 1889-1901. He is joint author (with his wife, Fanny D. Bergen) of (The Develop¬ ment Theory : the Study of Evolution Simpli¬ fied for General Readers) (1884) ; (with Edwin H. Hall) of (A TextBook of Physics) ; (with Dr. Bradley Moore Davis) of Principles of Botany > (1906) ; (with O. W. Caldwell) of Practical Botany) (1911) ; and Untroduction

to Botany* (1914). Sole author of (Elements of Botany) (1896), and (Essentials of Botany.) He spent four years (1901-05) in Italy, mainly in the Naples region, where he made many studies on the ecology of the plants which characterize that part of the Mediterranean coast and published papers on them in the Botanical Gazette and The Plant World. Since his return to America he has made some re¬ searches, mostly unpublished as yet, on the light-relations of plants and on transpiration.

BERGEN, Norway, a seaport on the west coast, capital of a province or diocese of the same name, formerly the principal town of the kingdom, but now the second. It is 186 miles northwest of Christiania, and about 25 from the open sea, and is situated on and about the head of two inlets, one of which forms the harbor. The tongue of land between the harbor and the other inlet (Puddefjord) is an elevated ridge crowned by an old fort, while the entrance on the other or northeast side is commanded by the old fortress of Bergenhus, now partly used as a prison. Rocky hills from 800 to 2,000 feet high encircle the town on the land side and furnish many picturesque spots. The climate is com¬ paratively mild, on account of the sheltered situation, but is remarkable for rain, the annual rainfall being about 73 inches. The town is well built and clean, but the houses are mostly of wood, and many of the streets are crooked and uneven, on account

of the irregularity of the site. A portion of the city, burned in 1855, has been rebuilt very regularly. Electric tram¬ ways traverse the principal streets. There are a number of squares or open spaces, including the market-place. There is a cathedral (built in 1537), and several other churches, the oldest being Saint Mary's, built after a fire in 1249. The public institutions include schools, a library of 90,000 volumes, a theatre, a museum, *etc.* The inhabitants of the middle coast of Norway bring timber, tar, train-oil, hides, etc., and particularly dried fish (stock-fish), to Bergen to exchange them for grain, flour and other neces¬ saries. The town carries on a large trade in these commodities. It is the great fish market of Norway. Twice a year the Norland men come to Bergen with their fish. In March and April several hundred vessels are to be seen in the harbor at once, laden with the produce of the winter fishing and with skins and feathers. Codfish for salting, fish roe, blubber, skins, herrings and cod-liver oil are the chief exports, amounting to two-fifths those of the entire country. A fair, attended by fishermen of all nations, is annually held. A fishery museum was established here in 1881. A con¬ siderable amount of shipbuilding is carried on. A United States consul is resident here. Bergen is the native place of the poet Holberg. Bergen was founded in 1070 by King Olaf Kyrre, who made it the second city of his kingdom, and it was soon raised to the first rank. The first treaty entered into by England with any foreign nation was made with Bergen in 1217. But the English and Scottish traders were soon displaced by the merchants of the Hanse towns, who made Bergen one of their four depots, compelled the fishermen to trade here exclusively, and continued to exercise and abuse their monopoly until their supremacy was broken by an act issued by Frederick II

of Denmark in 1560. In 1763 their last ware¬ house fell into the hands of a citizen of Bergen. Pop. 76,867.

BERGEN-OP-ZOOM, bergy en-op-zotn', Holland, a town in the province of North Brabant in a marshy situation on the Scheldt, where the Zoom enters it, 20 miles north-north- west of Antwerp. It was

formerly a strong fortress, the morasses around it making it al¬ most inaccessible to an assailing force, while its fortifications consisted of regular works, con¬ structed by the celebrated Coehorn. It is well built, but has no edifices deserving of particular notice. It made an important figure during the Spanish war, and successfully resisted the at¬ tacks of the Duke of Parma in 1581 and 1588, and of Spinola in 1622. It was taken by the French in 1747 after a siege of nearly three months; and in 1795 the French under Pichegru again gained possession of it by capitula¬ tion. It was unsuccessfully attempted by the British under Sir Thomas Graham, afterward Lord Lynedoch, in 1814. Its trade has suffered greatly from the proximity of Antwerp. Its industries include the making of cloth, pottery and bricks, and it raises and exports consider¬ able quantities of oysters and anchovies. Pop.

15,000.

BERGENROTH, Gustav Adolf, German

historian: b. Oletzko, East Prussia, 26 Feb. 1813 ; d. Madrid, 13 Feb. 1869. Graduating from University of Konigsberg, where he had studied law, he entered the service of the Prussian government. On account of his ac¬ tivities during the revolutionary disturbances in 1848, in which he took a prominent part, he was dismissed from the government service, whereupon he emigrated to California, in the United States. Here he remained only a few years, however, returning to Europe in 1851. He now became interested in historical research and in 1857 settled in England, where he began a deep study of the historical records and state papers covering the times of the Tudors. In 1867 he went to Simancas, Spain, to continue his historical studies, where he remained until his death. His chief work is (Calendar of Let¬ ters, Despatches and State Papers Relating to the Negotiations Between England and Spain, Preserved in the Archives of Simancas and Elsewhere) (London 1862-68).

BERGER, Georges, French critic and essayist: b. Paris 1834; d. 1910. His early years were spent in the management of his own agricultural interests : he owned large vineyards, from whose income he was enabled to devote most of his time to a study of art. He took a prominent part in the supervision of the exhibitions held in 1867, 1878 and 1899. Finally he accepted an appointment to the chair of aesthetics and the history of the fine arts at the Ecole des Beaux-Arts, a position he re¬ tained for many years. During this period he served also as a deputy in the chamber for the department of the Seine. He

was honored with membership in the Institute of France, the Higher Council of the Fine Arts and the Council of National Museums. He contributed copiously to periodical literature, but his most prominent work is (The French School of Painting from its Origin Down to the Reign of Louis XIV> (1879).

BERGER, Ludwig, German pianist and composer: b. Berlin, 18 April 1777; d. there, 16 Feb. 1839. After studying composition under Gurrlich, he went to Dresden, in 1801, there to continue his studies under Naumann. Later he accompanied Clementi on a tour to Saint Petersburg, where he remained for six years. In 1812 he went to Stockholm and later to London, where he again met Clementi and undertook a short tour with him. In 1815 he returned to Berlin, where he remained until his death. During this period he was the teacher of Men¬ delssohn, Taubert and others who later became famous. Many of his compositions are still popular, especially his (Die schone MullerinP

BERGER, Philippe, French Orientalist: b. Beaucourt, Alsace, 1848. Having concluded his studies at Strassburg and Paris, he became assistant librarian at the Institute and professor of Hebrew at the Sorbonne. Later he was ap¬ pointed to the chair of Hebrew, Syriac and Chaldee at the College de France, succeeding Renan. A few of his many works are (L'Ecriture et les inscriptions semitiques) (1880); <L'Arabie avant Mahomet* (1885) ; (Histoire de l'ecriture dans i'antiquite* (1892); (Etudes sur les renseignements fournis sur le gnosti-cisme par les Philosophoumena) (1893) ; cLe Musee Saint-Louis de Carthage, antiquites pheniciennes* (1900) ; (Un nouveau tarif des sacrifices a Carthage) (1910); (Le Culte de Mithra a Carthage) (1912).

BERGER, Victor, German-American So¬ cialist leader and United States congressman : b. Nieder Rebbuch, Austria, 28 Feb. 1860. Hav¬ ing graduated from the University of Vienna, he emigrated to Milwaukee, Wis., where he became a teacher of German in the public schools. He became at once interested in the activities of the Socialists and was one of the founders of the American Socialist Party. In 1892 he was made editor of the Milwaukee Daily V orwaerts by the party local leaders. Since then he has edited various other Socialist papers and periodicals in Milwaukee. In 1911 he was elected to Congress by the Socialist vote of Milwaukee, being the first of that political faith to be sent to Washington.

BERGERAC, Savinien Cyrano de, French author: b. 1619; d. 1655. He was distinguished for his courage in the field, and for the number of his duels, more than a thousand, most of them fought on account of his monstrously large nose. His writings, which are often crude, but full of invention, vigor and wit, in¬ clude a tragedy, ˆgrippine,* which was re¬ garded at the time as the vehicle of atheistic teaching; and a comedy, (The Pedant Tricked,* from which Corneille and Moliere have freely borrowed ideas; and his (Comical History of the States and Empires of the Sun and the Moon> probably suggested (Micromegas* to Voltaire, and (Gulliver* to Swift. His works have been frequently republished. He was made the hero of a drama bearing his name, written by Edmond Rostand, the French playwright, which had a phenomenal success in the United States in 1899-1900, and was the occasion of a suit for plagiarism. See Rostand, Edmond.

BERGERAC, France, town in the depart¬ ment of the Dordogne, about 25 miles south-southwest of Perigneux, and on the river Dor-

dogne. In 1345 the English took the town and fortified it. They were driven off but again took it and it was in their hands until 1450. It contains a splendid Gothic church, dating from 1856. Its industries include brewing,, flour milling, paper manufacture, tanning, weaving, hat-making and hosiery. There is a consider¬ able trade in brandy, fish and wine. The town, 48 miles east of Bordeaux, gives the name to an agreeable wine cultivated on the banks of the Dordogne, in France sometimes called petit champagne.

BERGERAT, barzh-ra, Auguste Emile,

French journalist, playwright and novelist: b. Paris, 29 April 1845. He received his education in a Jesuit seminary, the Lycee Charlemagne, and at first aspired to be an artist, but soon after turned his attention to journalism. He is son-in-law of Theophile Gautier, and since 1884 particularly known as the amusing chronicler of the Figaro under the pseudonym of Caliban. His feuilletons for that paper were published collectively as (Life and Adventures of Sieur Caliban5 (1886) ; (The

Book of Caliban5 (1887) ; (Caliban's Laughter5 (1890), *etc.* He also wrote two novels, (Faublas in Spite of Himself 5 (1884) ; (The Rape) (1886). He has published (War Poems5 (1871) ; (Enguerande,5 a dramatic poem (1884); (La lure comique) (1889); (La terre est le domaine de l'humanite5 (1903); (Ballades et Sonnets) (1910); Souv¬ enirs d'un enfant de Paris) (Vol. I, 1911; Vols. II and III, 1912; Vol. IV, 1913); besides two volumes to the memory of his father-in-law, (Theophile Gautier, Painter5 (1877), and (Th. Gautier, Conversations, Souvenirs and Correspondence) (1879).

BERGH, berg, Henry, American philan¬ thropist and author: b. New York, 8 May 1820; d. there, 12 March 1888. He was educated at Columbia College, and from 1861 to 1864 was in diplomatic service, being secretary of the Amer¬ ican legation and United States consul at Saint Petersburg. In 1865 he founded the American Society for the Prevention of Cruelty to Ani¬ mals, was chosen its president, and in 1866 secured the passage of an act giving the Society the power of making arrests and carrying on prosecutions for violations of the statute on which the organization was instituted. He re¬ mained president of the Society until his death, being ever its guiding spirit, living entirely in its work, and serving without compensation. At the beginning of his work no State or Terri¬ tory had any statute relating to the prevention of cruelty to animals. At the time of his death 39 States had proper laws on the subject, and in 36 of them branch societies of the organization had been formed. The work of the Society was extended to Argentina, Brazil and Canada. He was the author of a volume of tales and sketches (The Streets of New York) ; a suc¬ cessful drama, (Love Alternative,5 produced in Baltimore (1881) ; (The Portentous Telegram 5 ; (The Ocean Paragon5 : and (Married Off; a Poem5 (1859). Berg also founded the Society for the Prevention of Cruelty to Children, which is now firmly established in every State of the Union.

BERGH, Johann Edvard, Swedish land¬ scape artist: b. Stockholm 1828; d. 1880. He studied at the Stockholm Academy, taking first prize there in 1853. He prosecuted his studies

later with Gude at Diisseldorf and at Geneva under Calame. He toured Italy in 1856-57 and on his return to Sweden became professor in the Stockholm Academy. He is looked upon as the founder of a new school of landscape art in Sweden, distinguished by accurate draw¬ ing, intelligent representation of nature, and a very decided nationalism. Among his most noted subjects are (Wood Interior5

(Stock¬ holm Museum) ; (View of Stockholm5 (owned bv the King of England) ; (View in Dalecarlia) (Amsterdam), and (Beech-Wood) (Sothen-burg) .

BERGH, Pieter Theodor Helvetius van den, Dutch dramatist and poet: b. Zwolle 1799; d. 1873. He took up his residence successively in Paris, Brussels and Vienna, and after becom¬ ing blind removed to The Hague. Here, in col¬ laboration with Weiland, he edited the Mazazijn voor Toon en Schilderkunst. Pie attracted at¬ tention with his comedy (The Nephew 5 (1837), considered one of the best in modern Dutch literature, but did not justify expectations by his subsequent dramatic efforts. He also pub¬ lished (De Nichten,5 and a collection, (Prose and Poetry5 (3d ed., 1863).

BERGHAAN, berg'han, a Dutch and colonial name in south Africa for several large hill-haunting eagles, especially the bataleur (q.v.).

BERGHAUS, Heinrich, German geogra¬ pher: b. Cleve, 3 May 1797; d. Stettin, 17 Feb. 1884. He served in 1815 in the German army in France, and was from 1816 to 1821 employed in trigonometrical survey of Prussia under the War Department. From 1824 to 1855 he was professor of applied mathematics in the Berlin Academy of Architecture. Besides his various maps and his great (Physical Atlas) (repub¬ lished in a remodeled form in 1886-92), he pub¬ lished (Allgemeine Lander und Volkerkunde5 (1837-41); (Die Volker des Erdballs) (1852); (Grundlinien der physikalischen Erdbeschrei-bung) (1856) ; (Grundlinien der Ethnographie) (1856) ; (Deutschland seit hundert Jahren5 (1859-62) ; (Was man von der Erde weiss) (1856-60). His correspondence with Humboldt was published in 1863.

BERGHAUS, berg'hows, Hermann, German cartographer, nephew of Heinrich Berghaus (q.v.) : b. Hereford, Westphalia, 16 Nov. 1828; d. Gotha, 3 Dec. 1890. During most of his life he was cartographer in the Geographical Insti¬ tute of Justus Perthes at Gotha. His best known work is a chart of the world (1863) which has gone through 11 editions. He also prepared a (Physikalische Karte der Erde) (1874) ; (Physikalische Wandkarte von Europa) (1875) ; (Physikalische Wandkarte von Afrika) (1881). Besides this he supervised the revision of his famous uncle's (Physikalischer Atlas5 (1886), which work was participated in by many noted specialists.

BERGHEM, Nikolaas. See Berchem, Nikolaas.

BERGK, Theodor, German classical phi¬ lologist : b. Leipzig, 22 May 1812 ; d. Ragaz, Switzerland, 20 July 1881. He became an indis¬

putable authority on Hellenic poetry, -producing two works of surpassing importance in that department of scholarship: ‘Greek Lyric Poets5 (4th ed., 1878-82), and ‘History of Greek Lit-

crature* (1872); the latter brought to comple¬ tion with the aid of his posthumous papers.

BERGMAN, Torbern Olof, Swedish natu¬ ral philosopher and chemist : b. Katharinberg, West Gothland, 20 March 1735; d. 1784. Sent to Upsala with a view to preparaing either for the Church or the bar, he, disliking both, gave his attention to natural history, physics and mathematics. He soon made important dis¬ coveries in entomology and became noted as an astronomical observer. In 1758 he became doctor of philosophy and professor of physics at Upsala. Upon the resignation of the cele¬ brated Wallerius, Bergman was a candidate for the professorship of chemistry and mineralogy. His competitors charged him with ignorance of the subject, because he had never written on it. To refute them he shut himself up for some time in a laboratory, and prepared a treatise on the manufacture of alum, which is still con¬ sidered as a standard work. In 1767 he became professor of chemistry, and devoted himself with ardor to this science. He invented the preparation of artificial mineral waters, and discovered the sulphuretted hydrogen gas of mineral springs. We are indebted to him for a knowledge of the characters which distinguish nickel from other metals. On a number of minerals he made chemical experiments, with an accuracy before uncommon. He published a classification of minerals, in which the chief divisions are based on their chemical char¬ acter, and the subdivisions on their external form. In preparing this work he was much aided by his former discoverer of the geometri¬ cal relations between different cystals of the same substance, which may be deduced from one primitive form, and are produced by the aggregation of similar particles, according to fixed and obvious laws. His theory of the chemical relations is still esteemed, and although it has received new developments from the fur¬ ther researches of Berthollet, has not been over¬ thrown. The order of Gustavus Vasa was be¬ stowed on Bergman. Among his works the first place is due to (Opuscula Physica, Chemica, et Mineralia)

(Upsala 1779-94), of which an Eng¬ lish translation appeared. His famous essay on (Elective Affinities* was translated into English by Dr. Beddoes.

BERGMANN, Julius, German philosopher: b. Opherdike, Westphalia, 1840 ; d. Marburg 1904. At Gottingen and at Berlin he devoted himself to mathematics and philosophy, was appointed to the chair of philosophy at Konigsberg in 1872, and three years later to a similar chair at Marburg. Among his more important writings are (Grundlinien einer Theorie des Bewusstseins* (1870); (Zur Beurteilung des Kriticismus) (1875) ; (Reine Logik) (1879) ; (Sein und Erkennen) (1880); (Die Grund-probleme der Logik) (1882) ; (Geschichte der Philosophic* (1892-94) ; (Untersuchungen fiber Hauptpunkte der Philosophy (1900) ; (System des objektiven Idealismus) (1903).

BERGMANN Karl, American musician : b. Ebersbach, Saxony, 1821 ; d. New York, 10 Aug. 1876. He studied at Zittau and Breslau. Participation in the revolutionary outbreaks of 1848 obliged him to go into exile and he came to New York. He organized and conducted the first great German music festival, held in the Winter Garden Theatre (1855); in 1856 intro¬

duced German opera at Niblo's Garden, and for several years prior to his death conducted the concerts of the Philharmonic Society. He com¬ posed several orchestral pieces, and excelled as a player of the violoncello and the piano. He contributed greatly to the advancement of good music in America.

BERGMEHL. See Diatomaceous Earth.

BERGONZI, Carlo, Italian violin maker; b. Cremona 1715; d. there 1755. He was an associate of the famous Stradivari, from whom he learned the art at which both were such adepts. Beyond that little is known of his life. His violins are now rare and bring high prices, though not so high as those of his master. They are. not only remarkable for their tone, but for their beautiful shapes as well.

BERGSCHRUND, the large crescentic crevasse partly encircling the head of a glacier, caused by the forward movement of the ice which flows away from the stationary snow and rock walls. See Glacier ; Cirque.

BERGSOE, berg's^, Jorgen Vilhelm, Dan¬ ish novelist, poet and naturalist : b. Copenhagen, 8 Feb. 1835; d. 1911. While suffering

partial blindness, caused by excessive use of the micro¬ scope in his memorable biological researches at Messina, he turned to literary composition ; and soon appeared the first of a cycle of novels, (From the Piazza del Popolo) (1866), which had an extraordinary success. The following year he published his first volume of poems, (Now and Then) (1867). Of his many novels, the one which excels for fineness of touch is, (Who was He?* (1878). All his stories are characterized by rich imagination, fine observa¬ tion and great originality; his poetry is inferior in these respects to his prose. He also wrote an historical work Tome under Pius IX) (1877).

BERGSON, Henri, French philosopher: b. Paris, 18 Oct. 1859. He received his education in Paris, graduating from the Lcole Normale with the degree Licencie es-Lettres. He then taught at provincial lycees and colleges for a number of years, removing to Paris and taking his degree of Docteur-es-Lettres in 1889. In 1898 he received an appointment in the Lcole Normale in Paris and two years later became a professor in the College de France. In 1913 he visited America where he delivered a course of lectures at Columbia University. The same year he was also president of the English So¬ ciety for Psychical Research, and delivered addresses at London and Oxford. The volumes in which his philosophical ideas are contained have been translated into English and other languages. The three principal books are (Essai sur les donnees immediates de la conscience) (tr. into English under the title, (Time and Free-Will,* London and New York 1910) ; (Matiere et Memoire* (1896, English tr., Mat¬ ter and Memory,) London 1911); (L'Evolution Creatrice) (1907, English tr., (Creative Evolu¬ tionˆ New York 1911). In addition, the follow¬ ing translations into English have appeared from his writings: Untroduction to Metaphysics) (New York 1912) ; ˆLaughter* (New York 1911) ; (The Perception of Change) (Ox¬ ford 1911) ; (The Meaning of the War* (Lon¬ don 1915). For an account of Bergson's phi¬ losophy, see Bergsonism.

BERGSONISM, the teaching of the French philosopher, Henri Bergson

(q.v.). The central idea of this philosophy is Freedom ; it is at once an explanation and a refutation of mechanism — a refutation of the claim of mechanical prin¬ ciples and methods to furnish a final explana¬ tion of things, and a demonstration of the essential use and function of these ideas in human life. The significance of Bergsonism in France consists in its attempt to meet and refute the determination and pessimism of writers who claimed in the name of <(science® to lay down certain general conclusions regarding man's place in nature. In the first place, the most original feature of this system is that it finds its primary datum and its explanatory principle in life. The classical historical philosophies, realistic and idealistic alike, proceeded on the plane of the intellect. The relation of ideas and objects furnishes the material for philosophy — the one school explaining ideas as the effects of the movement of material bodies, the other interpreting material things in terms of ideas. For both alike, the relation of man to the world is stated in terms of ideas; both put science or knowledge in the first place. But for Bergson life is something deeper and more significant than knowledge. To live is something more fundamental than to know. All the distinctions that we make, such as that between ideas and objects, between inner and outer, fall within the original unity of the life process. They are secondary distinctions which the reflective intelligence introduces for the sake of its own practical purposes into the immediate unity of life as it actually goes on. Life itself is just unceasing change, an integral continuous proc¬ ess, not made up of parts, but something that is one and indivisible throughout. Moreover, it is characteristic of life that its changes can¬ not be predicted; it is in its very essence unde¬ termined spontaneitv, free creative energy, which constantly advances to what is genuinely new. This creative vital process is at once the reality and moving principle of individual life and of the cosmos as a whole. We become aware of it directly in ourselves through intuition ; and through sympathy, through the power which life everywhere possesses of recognizing life, we divine its presence in objects and in the world as a whole. For we ourselves are part and parcel of the total cosmic movement ; all reality is alike a manifestation of the same vital impulse, the elan vital, as Bergson names it. The ultimate principle for this philosophy is accordingly neither conscious mind nor ma¬ terial substance or energy ; the ultimate reality does not consist of unchanging elements, whether conceived as material or as ((mind stuff® ; but it is a moving, creative, living proc¬ ess, in which there is nothing fixed and static, nothing isolated or related only externally to other things and to the whole. It is creative evolution. We become aware of the nature of reality through direct experience of it, by enter¬ ing into it, forming a nart of it, and interpret¬ ing it through

sympathy. This direct form of knowing, Bergson names Intuition, and he contrasts it sharply with Logic or Intellect, which he confines to the analytic procedure of the reflective understanding.

Intuition, which is just the immediate aware¬ ness of life by itself, through direct experience

and illumined by sympathy, reveals the true nature of reality as a creative indivisible proc¬ ess of change or development. On the other hand, the reflective understanding breaks up this integral process into a world of permanent ob¬ jects existing in apparent isolation, and proceeds to organize them into casual systems and to represent their relations by means of con¬ ceptions which completely exclude freedom. Through this logic of the intellect the stand¬ point of physical science comes into existence. But this intellectual way of reading reality is only a representation of it in symbolic terms. It does not set before us reality as it really is, but is a translation of the real, made in the interest of practical life, into a series of con¬ cepts and symbols. For it is not the function of logic and scientific analysis to reveal to us the nature of the world, but to furnish, through the use of symbols, such a schematized repre¬ sentation of things as will enable us to deal with them in a practical way. Science is an intellectual procedure, depending on analysis. But to analyze is to present a thing as a func¬ tion of something else ; all analysis is thus a translation, a development into symbols, a representation, it may be from successive points of view in which we note as many resemblances as possible between the object we are study¬ ing and other objects which are taken as already defined. Its results accordingly are always relative, yielding only a formulation of the thing in terms of something other than itself. But, it may be asked, Is it possible to know a thing except in this relative way? Bergson replies that there is at least one object which we are able to seize from within by direct intuition, and that is our own personality as it appears as a conscious stream in time. This life is not, however, composed of discrete states of con¬ sciousness, as psychology describes it, and as our ordinary thought is accustomed to repre¬ sent it ; but it is, as actually lived, a continuous flow, a temporal whole without differentiation into distinct states or parts. The tendency to conceive of the mental life as constituted by the addition of <(states of consciousness® rests upon the representation of time in terms of space. It is essential to distinguish between real time or duration (la duree reelle) and the mathe¬ matical view of time which is that of an empty homogeneous qualityless medium, which allows us only to distinguish points as external to each other. Bergson

uses many figures in order to make clear his view of Duration — the concrete form of. the mental life. Perhaps his most illuminating metaphor is. that of the way in which a musical phrase is apprehended. The various notes which compose it are successive, yet are not apprehended as a mere succession. They interpenetrate : each has its own place as part of the musical idea, yet each contains within it what has preceded, and prepares for that which is to follow. So inner experience, life, is a whole, not as an aggregation of ex¬ ternal parts or states of consciousness, but in the sense of a movement which sums up the past and presages the future, uniting them both in itself. It is a continuous process of change, which, however, must not be regarded as a passing away of (<states® or ˆmoments,® but as a whole which changes and endures while changing. The intelligence, operating by means

of logical concepts, cannot enter into the real flow of time : it can represent movement only by taking cross-sections of the process, and de¬ termining and describing the condition of things at some specified point. When science professes to measure time and motion, what it does is to leave out of account in them what is really characteristic, the duration and mobility, and to measure the correspondence of certain fixed points, or determine the relations of certain elements of the system with which it is dealing, at the end of a longer or shorter period. A favorite figure of Bergson for describing the operation of the intellect is the cinematograph. ftThe intellect fixes things as an order of exist¬ ing things in space, setting each thing off as something distinct and unchanging. To repre¬ sent change, it is said, we must introduce time. But it is only the fiction of time that the in¬ telligence is able to represent, just as it is only the appearance of movement that the cinemato¬ graph gives us. In both cases alike, we have presented, not real change, and not motion, but only a succession of fixed states; not the flow which is the real, but a representation of it in terms of what is static and unchanging.® The idea of time which the sciences employ is there¬ fore not that of real concrete time at all, but of time which has been assimilated to space. Time from this point of view is

represented as a line, or as the successive movements of a body over the parts of a line. But, so regarded, it is robbed of its real continuity, and of all that is characteristic of concrete time, being assim¬ ilated to sp-ace in two respects. First, it is regarded as something discrete, made up of parts, of minutes or seconds, or fractions of a second. And, secondly, it is reduced to terms of space by being regarded as homogeneous throughout, in short, as having quantity but no quality. But time is in every respect the an¬ tithesis of space; it is not quantity, but pure quality. Space is homogeneous and without quality, it is made up of parts that are discrete: it is just pure quantity without quality.

But it is on this spatial view of things that the physical sciences are built up: the logic of their procedure is based upon the arrangement of solid bodies in space. Corresponding to the antithesis of space and time, accordingly, there is the opposition between life as a continuous movement, essentially free and creative, and the world of permanent objects, standing apart from each other, and related by necessary laws. The former is the view of Intuition, the latter that of the logic of the Intellect. But the former is the world of real immediate experience, the latter a transformation or construction of the former effected by the intelligence. It is be¬ cause we are made for action as well as for speculation that this transformation of the real is necessary. The intellect is the servant and instrument of action. For the sake of action, it is necessary to break up the inner flow of events, differentiating it into permanent ele¬ ments with fixed relations. Only by thus ex¬ ternalizing and fixating the unceasing move¬ ment of the real can we get a fulcrum for our action ; only by symbolizing it by means of un¬ changing concepts and established, definitions are we able to predict the future behavior of things ; and without such prediction we should be unable to act. Moreover, it is inevitable that these same concepts and descriptive terms which

have proved so practically important in dealing with the outer world should be carried over to the mental life, and that psychology should come to describe the mind by means of concepts and methods derived from the physical sciences. Nor is it possible to deny a certain justifica¬ tion to this description : mind has a mechanical habitual side, and to a large extent we live in terms of external acts and ideas. But in our everyday acts and ordinary associative play of ideas we live outside our true selves ; and it is only such an externalized form of life which can be represented or symbolized in terms of separate states of consciousness and their re¬ lations.

We have now before us the grounds on which Bergson bases his defense of freedom. Freedom is possible because the intellectual point of view is not absolute and final. The concept of causality and the logical standpoint of the sciences is something which the intel¬ ligence has superimposed upon reality as it is immediately given in experience. It has even extended this deterministic point of view to living things and to the inner world of con¬ sciousness. But this transformation is for prac¬ tical purposes only. The true reality as it is lived is quite different from the symbolic repre¬ sentation of it which science gives : reality is no repetition of identical terms, but a free crea¬ tive process in wrhich w7hat appears is new and original. The importance of Bergson's view of change as a process of creation is seen when this is contrasted wdth the older ways of con¬ ceiving of the process of evolution. The logic of the sciences, unable to deal with genuine change, represents evolution as a procession of unchanging elements. From this standpoint, the process of evolution is described as consist¬ ing in the redistribution of matter and energy: in a progressive adjustment of factors and forces which are taken as given, ready-made, perhaps contained in the primitive nebula from wrhich the movement is supposed to set out. And the same thing is true in principle of those theories which find in the idea or intelligent end the explanation of the evolutionary proc¬ ess. In both cases alike, nothing genuinely new ever occurs : all is predetermined, pre¬ arranged : there is transformation and redis¬ tribution, but no real change. From this point of view, real time is eliminated, being taken to be only an external medium like space : it is that in which things are, but it is not essential to them or they to it. But concrete time bites into things, and is essen¬ tial to their comings and goings. Bergson describes his own point of view by the term (<creative evolution.® Change must find its way to the very heart of things, time is of their very essence; the concrete movement of life and history cannot be adequately represented in terms of the mechanical redistribution of ab¬ stract elements or unchanging counters. It is noteworthy that in this connection he repre¬ sents teleology as in principle identical wdth mechanism, being, as he says, nothing but an inverted mechanism, and like it an intellectual and deterministic point of view.

Bergson, however, does not confine his de¬ fense of Freedom to these general considera¬ tions. In his book entitled (Matter and Memory, > he enters into a detailed discussion of the. r lations of body and mind, The gen-

eral position which he defends is that the body, like the intellect, is the tool or instrument of life, not something which causes or determines it. By an examination of psycho-physical ex¬ periments, he attempts to refute the current notion that the brain is a kind of manufactory of ideas, or that memories are stored up in brain cells. To understand the function of the brain, we must regard it, not from the point of view of knowledge, but from that of action. The body is organized for action, the impres¬ sions which pass into the body are stimuli for action, and the function of the brain (which may be compared to a telephone exchange) is to respond by initiating the appropriate move¬ ment. Perceptions then depend upon the body, and their function is not theoretical, but purely practical. On the other hand, pure memory is completely spiritual in character, it does not depend upon the body, but is the affirmation of the life of the spirit. These two, pure per¬ ception and pure memory, are fundamentally different in principle and origin and sharply opposed to each other in every way. Never¬ theless, in concrete experience they co-operate, always being found in correlation. But in the end, Bergson maintains that the memory, as the inner spiritual principle, is primary and that it subordinates to itself the body and the life of perception. Progress consists in bringing the past to bear upon the present, in prolonging memory through perception, in the embodiment of the spiritual in the material, in making the inner outer.

Bibliography. — Ruhe, A. and Paul, N. M., (Henri Bergson : An Account of His Life and Philosophy5 (London and New York 1914) : Carr, H. W., (The Philosophy of Change5 (London 1914) ; Lindsay, A. D., (The Philoso¬ phy of Bergson5 (New York 1911); Kallen, H. M., (William James and Henry Bergson5 (New York 1914) ; Cunningham, G. W., (The Philosophy of Bergson5 (New York 1916) ; Wilm, E. C., (Henri Bergson5 (New York 1914) ; Stewart, J. A., (A Critical Exposition of Bergson’s Philosophy5 (London and New York 1911).

James E. Creighton,

Professor of Philosophy, Cornell University.

BERGSTROM, Hjalmar, Danish play¬ wright : b. 1868. In 1893 he became a teacher in the Brockshe Commercial School, where he

remained until 1905. He is a member of the commission for the preservation of the manu¬ scripts of neglected Danish dramatists and one of the directors of the Danish Dramatic So¬ ciety. Most of his plays were first produced in Copenhagen at the Royal Theatre. Among the most important are (Ida's Wedding5 (1902); (Montergarde 39 5 (1904); (Lynggaard & Co.5 (1905) ; (The Golden Fleece5 (1908) ; (The Birthday Party5 (1910) ; (The Way to God5 (1912). (Lynggaard & Co.5 has been translated into English by Edwin Bjorkman in (The Modern Drama Series5 (New York

1913).

BERGUES, barg, France, town in the de¬ partment of Le Nord. in a marshy district, five miles south of Dunkirk; pop. (1911) 4,856. It is situated at the confluence of three canals, one of which admits vessels of 300 tons' burden and connects Bergues with Dun¬ kirk and the ?ea. This circumstance, united

with its central position, makes it the entrepot of the adjoining country. It has manufactures of beer and oil and also sugar and salt refin¬ eries. It ranks as a fortress of the second class, is well built of brick and has facilities for laying the valley under water as a de¬ fensive measure in war time. Its principal edi¬ fices are the townhouse and a beautiful and richly ornamented belfry about 160 feet high. It owes its origin to the castle of Berg, to which Saint Winnoc retired in 902, was first fortified by Baldwin II, Count of Flanders, afterward adorned with a magnificent monas¬ tery of Saint Winnoc by Baldwin IV, and in the 13th century possessed flourishing manu¬ factories. It has sufifered all the vicissitudes of a frontier fortress; it was finally taken by Louis XIV in 1667, and Vauban so effectively fortified it that the English found it impreg¬ nable in 1793.

BERGUT, or BEARCOOT, the Tartar name in Central Asia for the golden eagle (see Eagle), there trained by Kirghiz for use in falconry.

BERHAMPUR, ber-ham-poor', India, the name of two towns. (1) The capital of the Ganjam district, Madras, 525 miles northeast of Madras, with which it is connected by rail. A good road leads from it to the coast town of Gopalpur, nine miles distant. As the headquar¬ ters town of the district, it contains the usual official buildings. (2) A town of the Moorshedabad district, Bengal, on the left bank of the

Bhagirathi, five miles south of Moorshedabad. Berhampur was at one time a large mili¬ tary station of the British. It contains a college, hospitals and churches. The cantonment has been abandoned. The town has manufactories of gold, embroidered turbans and tussah-silk cloths. Improved sanitation methods have made the place the equal of any in Bengal for health¬ fulness. The first open act of the Sepoy mutiny took place here on 25 Feb. 1857. The town con¬ tains a government college. Pop. 22,777.

BERI-BERI, ba-ri-ba-ri. This is the strange name for a disease of which but few cases are seen in the United States, but in Ori¬ ental countries and in the Philippines it is of common occurrence and still more so in Japan. It is also very common in Ceylon, Java, Borneo and the Malay countries else-w'here. It is a member of the group of diseases called tropical diseases which at the present time, when all the nations of the world are neighbors and mutually interested in each other, for purposes of trade if for nothing else, are being constantly investigated. The word originated in Ceylon and simply means great weakness, in Japan it is called Kakke, while the English equivalent is tropical endemic multiple neuritis. It is common not only among the common people in tropical countries, but is also often seen in camps, hospitals and on ship¬ board.

Multiple neuritis is a disease which is very well known in this country, it is very pain¬ ful, disfiguring, protracted' and fatal. If a large number of people were constantly affected with this disease at the same time and in the same region of territory it would be called endemic multiple neuritis, and if they were in a tropical country it wotild be called beri-berl

Multiple neuritis, in temperate climates, can come from a great many causes, from the free use of alcohol in any form, from poisoning by arsenic, lead, mercury or phosphorus, from syphilis, malaria and the infectious fevers, from cold and wet, poor food and poor home sur¬ roundings, and some of these causes are often at work when the disease is called beri-beri.

So many diseases are the result of germ life and action, it was thought for a long time there must be such a cause for this disease. As yet no such germ has been found, though when it is associated with other diseases like syphilis, malaria and the infectious fevers, the specific germs of those diseases will of course be present. It is chiefly observed in those countries in which rice forms the principal article of food for the majority of the people, and about 20 years ago it began to be suspected by those who were studying the disease in the islands of the East India archipelago that there must be a relation between a diet of rice and this disease, especially after it was observed that those who had multiple neuritis as a result of insufficient food and those who were fed on a diet of polished rice, that is, rice from which the husk has been removed, suffered with the same symptoms.

In experiments which were made on fowls the symptoms of multiple neuritis were pro¬ duced when they were fed on polished rice but not when they were given the unhusked or red rice. Similar results were obtained on human beings in Java, in the Malay Peninsula, and in the Philippines, and hence it was concluded that the husk of rice like the husk of wheat contains important mineral constituents, probably phos¬ phorus in particular, the lack of which resulted in the development of beri-beri. When those who suffered with this disease were fed with rice bran they at once began to improve and steadily got well. In this disease there is injury or destruction of the ends of the nerves which go to the skin, with consequent loss of sensa¬ tion, and of those which go to the muscles, with loss of motion and gradual withering, the heart muscle becomes flabby and weak and the liver, kidneys, lungs and spleen become congested. There are two forms of the disease, the wet and the dry.

In the wet form there are dropsical swell¬ ings of the tissues, especially of the legs and ankles, and the cavities of the body, the abdo¬ men, the chest and the pericardium, which sur¬ rounds the heart, become more or less filled with fluid. This of course produces great weak¬ ness, difficulty in walking, standing and breath¬ ing, weak heart action and frequently death within a few days. The disease often begins with a chill and besides the symptoms already mentioned there are fever, nausea, vomiting of blood, albumen in the urine, *etc.* Should the disease take a favorable turn the bad symptoms will gradually subside leaving more or less paralysis and withering of the muscles which after weeks or months may entirely disappear. In the dry form of beri-beri the disease pro¬ gresses slowly and is less fatal than the wet form. It begins with neuralgic pain in the ex¬ tremities and with changes in the nutrition of the skin. There are cramps, tenderness to the touch, deformity of the joints, paralysis of the

muscles and unsteady gait. Then follow dis¬

turbances of the stomach, blood poisoning and emaciation, and the disease may continue for weeks, months or years or until some other disease develops and the patient dies. The mortality from both forms of the disease is from 10 to 40 per cent. The most important thing in the treatment of the disease is to change the diet from polished rice to un¬ polished, that is with the husk intact or ground up in bran with the rest of the kernel. Pre¬ ventive measures are all important and mean proper diet, freedom from exposure to wet and cold, freedom from excesses and vice, and avoidance of infectious tropical diseases. Tonics like quinine and strychnia must be given, and such drugs as will relieve pain and assist in removing the dropsical fluids from the body. Massage, electricity and hot baths also play an important part in the treatment.

BERING, be'ring, or BEHRING, Vitus,

Danish navigator: b. Horsen 1680; d. 19 Dec. 1741. Being known as a skilful seaman, he was employed by Peter the Great in the navy estab¬ lished at Cronstadt. His talents and the un¬ daunted courage displayed by him in the naval wars against the Swedes procured him the honor of being chosen to command a voyage of discovery in the Sea of Kamchatka. He set out from Saint Petersburg, 5 Feb. 1725, for Siberia. In the year 1728 he examined the northeastern coasts of Asia, discovered the strait named after him and proved that Asia is not united to America. It remained, however, to be deter¬ mined whether the land opposite to Kamchatka was in reality the coast of the American con¬ tinent or merely islands lying between Asia and America. On 4 June 1741 he sailed, with two ships, from Okhotsk, and touched the north¬ west coast of America. Tempests and sickness prevented him from pursuing his discoveries; he was cast on a desolate island covered with snow and ice, where he died. The account of the voyage was written by the survivor, Steller (Saint Petersburg 1793). Consult also the <Life) by Laridsen (Chicago 1890).

BERING SEA, that part of the north Pacific Ocean between the Aleutian Islands, in 55°, and Bering Strait, 66° N., by which latter it communicates with the Arctic Ocean. It has on its west side Kamchatka and the Chukchi country, with the Gulf of Anadyr, and on its east the territory of Alaska, with Norton Sound and Bristol Bay; contains several islands, and receives the Yukon River from North

America and the Anadyr River from Asia. It is about 1,000 miles from north to south and 1,500 from east to west. Fogs are almost perpetual in this sea. Ice is formed and melted in the sea every year, the northern part becoming closed to navigation about the beginning of November. The chief islands are the Pribilof, Nunivak, Saint Lawrence and Saint Matthew. The northern portion is about 100 fathoms deep, while the southern portion has a depth of from 1,000 to 1,700 fathoms. Pack ice gradually ex¬ tends southward to a little below the latitude of Saint Matthew's Island (60j4°), beyond which ice is found in floes. The southern limit of the ice usually extends from Bristol Bay, Alaska, to about 35 miles south of the Pribilof Islands though in exceptionally severe winters it reaches as far south as Unimak Pass. It usually leaves the Pribilof Islands about 1 May, and vessels

following in its wake may reach Bering Strait between about 15 and 25 June. A strong and comparatively warm current sets northward at about two to three knots an hour, through Bering Strait, and after following the Siberian shore turns north toward Herald Island. A cold current also passes out through the strait.

BERING SEA CONTROVERSY, an

international dispute over the territorial status of that sea, chiefly between the United States and Great Britain, and growing out of attempts of the former to protect its fur-sealing indus¬ tries there from the Canadian subjects of the latter. This industry rests on three great herds in the north Pacific, which resort regularly to certain islands in the breeding season, from May or June till the autumn storms, then move southward to about 35° N., and gradually work northward the next spring. At the islands the elder males remain with the young on the beach while the females go in search of food, some¬ times 200 miles. The younger males, or <(bachelors,® two to four years old, herd apart, and should furnish all the commercial sealskins, the pelts of the old males being unsalable and the killing of females a blow at the continuance of the species. But this selection can only be made on shore ; pelagic or ocean sealing is at best indiscriminate if done during

migrations, and is almost exclusively of females during the breeding season, while every mother seal then killed means a young seal starved ashore. The largest of these (< rookeries® is on the Pribilof Islands in Bering Sea, where the Russian-American Company carried on sealing till their cession to the United States in 1867, when it was taking some 40,000 seals a year ; the herd being protected by restrictive regulations. In 1821 Alexander I issued a ukase claiming Bering Sea as Russian property, and forbidding trespass on pain of confiscation; but the United States and Great Britain protested so vigorously that the claim was dropped. After the cession, the rivalry of competing companies would • speedily have made an end to the seals in the Northern Ocean, as it long since had in the Southern, had not the United States leased the islands for 20 years to the Alaska Commercial Company (which then leased the Russian seal-islands also) for $55,000 a year and $2.62ˆ4 a skin, restricting the catch to 100,000 a year. In fact the company kept a little under that mark; but the contract was so profitable that vessels were soon fitting out from British Co¬ lumbia, Hawaii and Australia, which intercepted the seals as they passed between the Aleutian Islands northward or southward, or entered Bering Sea and caught the females as they ranged the seas for food. The poaching grew in volume, and a stream of protest from the Alaska Company flowed in year after year to the government at Washington, which in 1881 was goaded into officially reversing its former contention, and declared Bering Sea east of the treaty meridian of 1867 American waters; but took no further step till 1886, when under President Cleveland it seized and condemned three Canadian sealers. * Great Britain pro¬ tested, and proceedings were suspended pending discussion ; but in 1887 five more were seized, and the question at once became a matter of serious diplomacy. Secretary Bayard attempted to convene delegates from Great Britain,

France, Germany, Sweden, Russia and Japan to meet with our own and frame regulations to prevent the extirpation of the northern seals ; but in June 1888 Great Britain withdrew, under pressure from Canada. In 1889 several more Canadian vessels were seized, and Great Britain sent a practical menace of war if this were not stopped. There being but three alternatives, abandonment of the sealing interest to destruc¬ tion, which the country would not endure; seiz¬ ure of all poaching vessels, which meant war; and arbitration — the latter was decided on in 1890. The same year the Alaska Company, its lease expired, was succeeded by the North American Company ; the herd, estimated in 1867 at over 3,000,000 on the Pribilof Islands, had shrunk so enormously under the pelagic sealing that the price had

risen from $2.50 to $30 per skin, and the new company's limit of capture was restricted to 20,000, with a royalty of $10 a skin. On 15 June 1891 a modus vivendi was agreed on for joint policing of Bering Sea by British and American vessels ; and on 29 Feb. 1892 a treaty of arbitration was signed, under which on 23 March 1893 a tribunal met at Paris, composed of Baron de Courcel (France), Mar¬ quis Emilo Visconti-Venosti (Italy), Judge Gregers W. W. Gram (Sweden-Norway) , Lord Hannan (England), Sir John S. D. Thompson (Canada), Justice John M. Harlan and Senator John T. Morgan (United States). The United States case was conducted by the Secretary of State (John W. Foster) ; counsel, Edward J. Phelps, James C. Carter, Frederick R. Coudert and Henry Blodget. The decision on the logical points was entirely against the United States ; Bering Sea was held part of the high seas and no one's preserve, and seals feres natures and no one's property. But on the point of equity in our case, that the preservation of the seals from extinction was a common interest of the civil¬ ized world, it agreed with us and framed reg¬ ulations binding for five years to prohibit all pelagic sealing within 60 miles of the Pribilofs, or from 1 May to 31 July in the north Pacific east of 180° or north of 35°, with other regula¬ tions. The restrictions proved absurdly ineffec¬ tive, and Great Britain would not antagonize Canada to make them less so ; in 1894 the pelagic catch was the enormous one of 142,000, far beyond any former record, and for several more seasons was very great, till the herds showed signs of rapid exhaustion. Great Brit¬ ain obstinately refused to make any change in the regulations till the five years were up, sent an expert to the spot who laid all the blame on the North American Company, and refused to send a delegate to meet those of Russia, Japan and the United States, who agreed to prohibit pelagic sealing to their sub¬ jects if Great Britain would do so. Meantime, to put pressure on the latter, Congress prohib¬ ited the importation of all sealskins except the North American Company's, in order to destroy the market for Canadian-caught skins and make their business unprofitable; but England still refused to agree to the provisional treaty, on the ground that it would injure Canada, was not necessary to protect the seals and that the North American Company was solely in fault. But on 18 Nov. 1897 a joint meeting of Eng¬ lish, American and Canadian experts was held, and unanimously supported the American con-BERING STRAIT — BERKELEY

tention at every point, that the herds had dimin¬ ished by from 66ˆ to 80 per cent, and mark¬ edly so even from 1896 to 1897; that the North American Company was handling its business with entire propriety ; that pelagic sealing, in¬ volving the killing off of the females, was the sole cause of the reduction, which was threat¬ ening the entire extinction of the fur seal. Another year would bring about the time for changing the Paris regulations, and the United States agreed to prohibit all seal killing, even on the Pribilofs, for a year, but Canada would not consent because it would scatter the crews of her sealing fleet. Meantime, Congress on 14 June 1898 appropriated $473,151.26 to pay for the Canadian vessels seized years before. On 30 May 1898 a joint Canadian and American commission was authorized; it met at Quebec in August, adjourned to November at Washing¬ ton, continued till February 1899, adjourned to the si mmer and did not reassemble. Most un¬ fortunately, its scope included all the questions at issue between the two governments : the seal¬ ing problem became entangled at the outset with impossible bargains for general commer¬ cial reciprocity, then with the Alaska boundary question (q.v.) made acute by the Klondike gold discoveries, and at the adjournment not a single issue before it had been decided. The Paris regulations had expired, no new ones had been established, and the seals were left wholly without protection ; while even so, as the United States forbade pelagic sealing to its citizens while England did not, all the profit of the perishing industry was being reaped by foreigners. The Canadian fleet of 1899 num¬ bered 26 vessels, that of 1900 numbered 33, with a catch of over 35,000 each year, considerably more than half females. The same conditions continuing, the North American Company increased its efforts in order to obtain its share while the seals lasted; and in the Congressional session of 1901-02 it was seriously proposed to kill off the entire herd at once, and thus end the question by putting an end to the seals! In 1911, an international agreement pro¬ vided for the conservation of the seal industry. See Alaska: Commercial Development — Fur-Seals. Consult Henderson's (American Diplomatic Questions5 (New York 1901) ; Stanton's (Bering Sea Controversy5 (New York 1892) ; Snow, (Treaties and Topics in American Diplomacy5 (Boston 1894). See United States — Diplomacy of the.

BERING STRAIT and ISLAND. The

strait is the channel that separates Asia from America, and connects the north Pacific with the Arctic Ocean. Its breadth at the narrowest part, between Cape Prince of Wales on the American coast and East Cape in Asia, is about 36 miles, and its depth in the middle varies from 29 to 30 fathoms. On both sides are sev¬ eral commodious bays;

but the country is bar¬ ren and rocky, with scanty vegetation. The sea here is frozen over every winter, and foggy, hazy weather is almost perpetual. Whales fre¬ quent the strait, and the walrus occurs in vast numbers. The inhabitants on either shore sup¬ port themselves chiefly by hunting and fishing; but those on the Asiatic side are greatly su¬ perior, both physically and intellectually, to those on the American. The strait is called after Vitus Bering, by whom it was first dis¬

covered. It was more fully explored by Cap¬ tain Cook in 1778. Bering Island is in the southwest part of the above sea, off the coast of Kamchatka. It is uninhabited, and is with¬ out wood. It has, however, several springs of excellent water. Here the navigator Bering died in 1741.

BERINGTON, Joseph, English Roman Catholic theologian: b. Shropshire 1746; d. Berkshire, 1 Dec. 1827. He was a Catholic liberal, who agitated for the repeal of the tests. In 1779 he published a letter to Fordyce on his (Sermon against Popery.5 His other works include (State and Behavior of English Catho¬ lics from the Reformation till 17805 (1780) ; (An Address to the Protestant Dissenters5 (1786) ; (History of Abelard and Heloise,5 with their genuine letters (1787) ; (History of Henry II5 (1790) ; (Memoirs of Gregorio

Panzani,5 papal legate to England in 1634-36, translated from the Italian (1793) ; (The Faith of Catholics5 (1813), and (A Literary History of the Middle Ages5 (1814).

BERIOT, ba-re-o, Charles Auguste de,

Belgian violinist: b. Louvain, 20 Feb. 1802; d. there, 20 April 1870. He studied with Rob-brecht and Tiby, and, in Paris, with Baillot ; and became a professor in the Conservatory in Paris and in that of Brussels in 1842. In 1836 he married the celebrated singer, Malibran. In 1851 failing eyesight obliged him to resign. He composed a complete manual for the violin (1858) and wrote seven concertos and a great number of popular compositions, all distin¬ guished by refined taste and great brilliancy. He showed a great advance over his prede¬ cessors in his treatment of the instrument. His splendid technique and eminent qualities of composer made him the head of the Belgian school of violinists, which through him and his pupils became justly famous.

BERISLAV, ba’re-slaf, or BORISLAV,

Russia, a fortified town on the Dnieper River in the government of Kherson, 46 miles north¬ east of Kherson. The trade in grain is consid¬ erable. The Turks are supposed to have founded a town here in 1450 which they named Ivizi-Kerman. Peter the Great wrested it from them in 1696, and later it was named Berislav. Pop. about 12,000.

BERKELEY, George, English philosopher and bishop : b. Kilcrin, Ireland, 12 March 1685 ; d. Oxford, 14 Jan. 1753. He was educated at Trinity College, Dublin, where he took a keen interest in the philosophical problems then un¬ der discussion. He received the degree of A.B. with honors in 1704, being afterward succes¬ sively scholar and fellow. Almost immediately he began his career of authorship. He pub¬ lished in 1709 his first important work, the (New Theory of Vision,5 which is the logical preliminary to his system and gives expression to certain of its fundamental principles. A year later his philosophy finds complete statement in the (Treatise Concerning the Principles of Human Knowledge.5 During the next 15 years Berkeley advanced to a position of prominence in the English Church. In 1711, shortly after his ordination to the diaconate, he published his < Discourse on Passive Obedience,5 a treatise upon ethics, in which he develops a system of theological utilitarianism. The (Dialogues, 5

published in 1711, presented his philosophy in literary form, clothing subtle argument in a garb of rhetorical beauty. In the years imme¬ diately following, several new works appeared, accompanied by increasing fame and prosperity. He was appointed successively to the deaneries of Dromore and of Derry, the latter of which yielded a large income. But this he resigned in order to devote himself to a plan for the establishment of a college in the Bermudas, where the Indians of America were to be en¬ lightened and christianized. For the further¬ ance of such a plan he obtained a promise from the government for a grant of £20,000. Upon the strength of this he sailed for America in 1728, accompanied by his wife and a few friends. They went first to Rhode Island, where they planned to await the expected grant. Here

Berkeley purchased a farm and waited three years in quiet and study. Finally, upon the failure of the government to make good its promise, he was compelled to give up his cher¬ ished plan and return to England in 1731. Soon after his return he was made bishop of Cloyne. During the remaining years of his life he pub¬ lished a number of works upon philosophy, economics and other subjects. Notable among these were (Alciphron, or the Minute Philoso¬ pher, J the result of his quiet studies in Rhode Island, and (Sirus, > a remarkable essay in which the author interweaves his convictions concerning the healing properties of tar-water with the deepest and most profound of his philosophic reflections.

Although the representative English idealist, Berkeley proceeds in his thought from the empirical philosophy of Locke. It was Locke's contention that in knowledge we are concerned with our own ideas only, and that these ideas are derived entirely from experience. He made an important distinction among these ideas, however, with reference to their representation of objective or material reality. Ideas of color, sound, taste, etc., called secondary qualities, are subjective processes, and reveal nothing of the nature of material reality. But ideas of ex¬ tension, figure, motion, etc., called primary qual¬ ities, reveal directly the nature and constitution of that reality which exists without the mind in the material world. Berkeley agreed with Locke that we know only our own ideas, but he attacked vigorously this distinction between pri¬ mary and secondary qualities. He maintained that ideas of primary qualities are wholly sub¬ jective, and tell us no more of the nature of material reality than do our ideas of secondary qualities. He attempts a partial proof of this in his (New Theory of Vision,* by showing that distance, magnitude and situation are not directly perceived by sight, but are inferred in an indirect manner. These ideas of distance, magnitude and situation are results of judg¬ ment based upon visual sensations. Such visual sensations have no essential relation to the ideas in question, however — they are simply associated with them in experience. For ex¬ ample, consider our idea of distance. We find connected with this idea: (1) Sensation of movement in the eye; (2) confusion in vision due to nearness of the object, and (3) strain of fixation. These sensations are associated by custom with degrees of distance. Hence we have in this idea of distance no direct revela¬

tion through vision of the nature of material reality. Rather we have the product of our own judgment, based upon sensations which have themselves no objective reference. So it is with other ideas of primary

qualities which have been held to bring us into immediate con¬ tact with material reality. In ideas of figure and motion we have sensations of light, color and strain, and the remainder is due to asso¬ ciation and judgment. Thus Berkeley concludes that we have in visual ideas not a revelation of the nature of matter, but a universal lan¬ guage of symbols whereby we interpret our sensations of touch, and so regulate our actions as to preserve and promote our lives. In hF (Treatise Concerning the Principles of Human Knowledge,* he uses this conclusion to dis¬ prove the existence of a material world apart from, and independent of, the perceiving mind. The very notion of matter or corporeal sub¬ stance involves insoluble contradiction. By mat¬ ter is meant inert, senseless substance in which extension, figure and motion reside. But these so-called attributes of matter are ideas in the mind, and are shown to be every whit as sub¬ jective as ideas of colors and tastes. Now ideas can be similar only to ideas. Hence to suppose that our ideas copy or represent a material substance that is unperceiving and un¬ perceived, is a crass absurdity. Ideas are the only objects of our thought. To exist as an object is to be perceived. (Esse cst percipi.) Al¬ though confined to our own ideas, we may ob¬ serve their various characteristics and combina¬ tions. Sense qualities are simply states of con¬ sciousness. Sense-objects are sensation-com¬ plexes. There is in our consciousness a con¬ tinuous succession of these perceptions, in which we perceive perceptions newly excited, perceptions changed and perceptions obliterated. For all these phenomena there must be some cause. This cause cannot be an idea or com¬ bination of ideas; for it is the appearance and arrangement of ideas which must be explained. This cause must be a substance, a ground of existence. Matter, or corporeal substance, is an impossibility. We are compelled, therefore, to find the cause of our ideas in an incorporeal, active substance or spirit. But we observe an important difference in the production of our ideas. Those ideas actually perceived by the senses of the individual are not dependent upon his own mind or will. Hence there must be some other will or spirit which produces them. This is God, the Author of Nature. The ideas of sense are imprinted upon our minds by the direct influence of the Divine Mind. Hence they are strong, orderly and coherent. Their source guarantees their trustworthiness, and with good reason they may be called ((real things.® In this way our knowledge acquires an objective validity much more adequate than if our ideas were aroused by the action of a material substance upon our sense-organs. The laws of nature, which we properly regard, rep¬ resent the regular operation of the Divine Mind upon our minds. There is consequently no dif¬ ficulty in distinguishing the order of ideas which is real and objective, from the train of subjec¬ tive fancies and imaginations.

Bibliography.— The best edition of Berke¬ ley's works is that by Fraser (2d ed., Oxford 1902), containing a (Life.* Consult further

Fraser's briefer <Life) (London 1881 ; new ed. 1901; in Philosophical Classics)); Frederichs, MJeber Berkeleys Idealismus) (Berlin 1870) ; Spicker, (Kant, Hume und Berkeley J (Berlin 1875) ; Janitsch, (Kants Urtheil iiber Berke¬ ley } (Strassburg 1879) ; Penjon, (Etudes sur la vie et les oeuvres philosophiques de Berkeley) (Paris 1878) ; Stephen, Sir L., 'English Thought in the Eighteenth Century) (1902); Fullerton, G. S., (System of Metaphysics*

(New York 1904). . For Berkeley's visit to America consult Tyler, M. C., (Three Men of Letters * (New York 1895).

Henry W. Wright, Lake Forest College.

BERKELEY, George Charles Grantley Fitzhardinge, English writer: b. 10 Feb. 1800; d. Poole, Dorsetshire, 23 Feb. 1881. In 1832-52 he was a, member of the British Parliament and for a time he was in the army. He vis¬ ited America in 1861. His (My Life and Rec¬ ollections * (1864—66), an extensive work, at¬ tracted some attention. Among his further works are (Berkeley Castle* (1836), adverse criticism of which in Fraser's Magazine led Berkeley to assault the publisher and fight a duel with the critic, Dr. William Maginn ; (Sandron Hall, or the Days of Queen Anne) (1840) ; (The English Sportsman on the West¬ ern Prairies) (1861) ; (Anecdotes of the Upper Ten Thousand at Home and Abroad) (1867) ; and 'Tales of Life and Death* (1870). He was the last person who wore the flat cocked hat known as the chapeau bras. Consult his <Recollections) and also 'Men of the Time) (7th ed).

BERKELEY, Sir George, English en¬ gineer: b. London, 26 April 1821; d. there, 20 Dec. 1893. In 1835 he began experimenting with methods for operating atmospheric rail¬ ways. In 1841 he associated himself with Rob¬ ert Stephenson and continued his experiments. On Stephenson's death he became engineer of the Great Indian Peninsular Railway. In 1892 he was made president of the Institute of Civil

Engineers. He wrote papers on atmospheric railways and on the strength of iron and steel ; and was knighted in 1893.

BERKELEY, Sir John, English nobleman, one of the proprietors of New Jersey: b. 1607; d. 28 Aug. 1678. He was a prominent Royalist during the contest of Charles I with Parlia¬ ment. Charles II granted him, with Sir George Carteret, a proprietary interest in New Jersey and Carolina.

BERKELEY, Miles Joseph, English bota¬ nist: b. Biggin, Derbyshire, 1803; d. Sibbertoft, Leicestershire, July 1889. Educated at Christ Church, Oxford, he took orders, was curate at Margate (Kent) and Market Harborough (Leicestershire), and subsequently was made vicar of Sibbertoft. He soon became the lead¬ ing British authority on fungi and plant pathol¬ ogy and was especially well known for achieve¬ ments in mycology. About 6,000 species of fungi are credited to him; his most important work was the section on fungi contributed to Hooker's (British Flora) (1836) and his Out¬ lines of British Fungology) (1860), and he as¬ sembled a fine herbarium of more than 9,000 species, now at the Kew Gardens and regarded as one of the most noteworthy in the world.

A bibliography may be found in the (Cata¬ logue of Scientific Papers) of the Royal Socie¬ ty. Consult also Proceedings of the Royal Society) (Vol XLVII, 1890) for a sketch by Hooker.

BERKELEY, Sir William, American colo¬ nial governor: b. near London about 1610; d. 13 July 1677. His father and brother were colo¬ nial proprietors. Graduating from Oxford 1629, he traveled on the Continent for a year; was appointed a commissioner of Canada 1632 and won a high reputation there. In 1641 he was made governor of Virginia, and arriving in 1642, was. for a time very popular. He ex¬ perimented in the cultivation of rice, cotton, indigo, hemp, flax and silk, the manufacture of potash and naval stores and the cutting and exporting of masts; pleased the Royalist party by expelling the New England Puritans in 1643, and all parties by capturing the Indian chief Opechancanough in 1644, after a series of In¬ dian massacres. Always with an eye to profit, however, he received from the King a monop¬ oly of the fur trade. During the English revolution he adhered to the royal side and offered an asylum in Virginia to exiled or dis¬ satisfied Royalists; many hundreds availed themselves of this. When Cromwell felt strong enough he sent a fleet (in 1651) to bring him back for punishment ; but Berkeley suc¬ ceeded in making certain terms by

mingled “bluff** and finesse and was allowed to retire in safety to his plantation, though deprived of his office. When the Restoration began to seem probable, the colonists elected Berkeley as gov¬ ernor to gain favor in such event; Berkeley accepted it provisionally and Charles II on ac¬ cession confirmed it. But in this second term all Berkeley’s evil side showed itself, till it ended in the atrocities of 1676. Besides ex¬ pelling and confiscating the goods of Puritans and Quakers, a measure popular at the time, he frowned on the establishment of schools and absolutely refused to have a printing-press set up, as making people too censorious of their superiors. He formed a council of the wealthier planters and having obtained during the spasm of Restoration loyalty in 1662 an ultra-royalist house of burgesses, would not issue writs for another election for 14 years, simply adjourning annually the ((Long Assem¬ bly,)) as it came to be called ; and in 1670 abol¬ ished universal suffrage, substituting a property qualification, purely as a precaution for the future, as no elections were held for years be¬ fore and after. These, however, were only means to the end of profiting himself and his friends and the rapacious crew of civil officers sent over by Charles to quiet the people’s importunities. Heavy taxeˆ and fees imposed on the colony drove them to desperation, so that as early as 1667 they were ripe for revolt. Besides Berkeley’s share in various extortions, he had one monopoly which led directly to the catastrophe, that of the Indian trade, which he gained by under¬ hand means. The colony allowed no trade with the Indians without license; Berkeley there¬ fore licensed a small number of men to trade in furs with them, which secretly included liq¬ uor, firearms and other things and exacted a third of the profits. It was believed to be this gain which led him to refuse permission to the

colonists to protect themselves against the In¬ dians in 1675-76, while hundreds of them were being massacred and tortured and scores of plantations laid waste, and to dissolve force after force assembled to protect them. How Nathaniel Bacon chastised the Indians in spite of him, was proscribed for it, forced into open rebellion, drove Berkeley into retreat and burned his capital, and died at the moment of his

victory, is told under (Bacon's Rebel¬ lion. 5 Berkeley's soul was as full of senile fury as it had been of senile avarice; he slaughtered right and left, hanging a score of victims with such vindictive haste and ruf¬ fianly insult that the assembly remonstrated, and the royal commissioners, who came in January to investigate the condition of the colony, made a report that led the King to re¬ move him, with the comment, ((The old fool has put to death more people in that naked country than I for the murder of my father.® He sailed 27 April, his departure celebrated with bonfires and salutes of cannon ; and ex¬ pected to justify himself to the King and re¬ turn. But Charles kept postponing an inter¬ view and in a few weeks Berkeley died — of chargin, it was believed. He wrote (The Lost Lady* (1638) and (A Discourse and View of Virginia* (1663).

BERKELEY, Cal., city in Alameda County, on San Francisco Bay, nine miles northeast from and directly opposite to San Francisco and the Golden Gate. A channel with a con¬ stant depth of 42 feet leads straight from the Berkeley waterfront clear out through the <(Gate,** into the Pacific Ocean, affording facili¬ ties unsurpassed anywhere in the neighborhood for a projected great docking warehouse and railway district and for an important auxiliary naval base or station. Berkeley is a motoring centre. You may use your automobile every day. Starting from Berkeley you will find well-kept boulevards that reach to all parts of the county and to interior points in California. The Lincoln Highway, the Midland Trail and the Pike's Peak Ocean-to-Ocean Road all pass through Berkeley. Owners of machines declare this city to be an ideal rendezvous for tourists. As a summer home Berkeley cannot be excelled. The average temperature in summer is about 59° F. In winter the average is about 48° F., giving a range of something like 11° for the year. This equable climate is beneficial to health. It is particularly good for children who live out-of-doors the year round. Berkeley is just south of lat. 38 N., 375 miles south of the latitude of Marseilles, 400 miles south of the latitude of Nice, Cannes, Mentone and the famous Riviera, all boasting so many attrac¬ tions t>f climate; on the latitudinal line of south¬ ern Sicily, southern Greece and Smyrna. To this geographical position and the favorable topographical formation of the surrounding country must be attributed the enjoyable cli¬ matic conditions that prevail in Berkeley. The average rainfall is about 25 inches. During the summer and autumn months gentle fogs or mists prevail that are charged with health-giving ozone. Electric lines connect with Oakland the county-seat adjoining Berke¬ ley, and with San Francisco, which is also con¬ nected by ferry service. Two transcontinental railroads, the Southern Pacific and the Santa

Fe systems, pass through Berkeley. The city's fame rests primarily on its established char¬ acter as a home place, the favorite residence of many San Franciscans, to which its attractive location and scenic surroundings have contrib¬ uted. That character it still maintains, with added qualities which enhance its attractiveness and the prominence which it has attained lat¬ terly because of the advantages that it offers to manufacturers. Climatic conditions conduce to efficiency. Even when paid higher wages for fewer hours, workers here return a greater profit to the factory per unit than operatives in any other location, because operatives are able to keep employed every working day of the year, with no interruptions on account of ex¬ cessive heat or cold. Besides this, Berkeley enjoys a low rate for electric power — as low as any city in the country, not even excepting Niagara Falls; fuel oil for motive machinery is also procured at small cost, because of near¬ ness to the terminals of the pipe lines ; level land and reasonable prices provide for factory sites ; water competition insures moderate freight rates by rail; while railroad facilities and the liberal policy of the municipal authori¬ ties govern spur tracks and like accommoda¬ tions. Above all, the civic and social condi¬ tions prevailing in the city, — Berkeley has neither a saloon nor a disorderly house within its boundaries, — are big physical points in its favor with companies and corporations which, along modern lines, devote thought and care to clean surroundings for their employees and those dependent on them. Twenty new fac¬ tories were established in Berkeley since the year 1915 and options on many other sites w?ere obtained by several companies. The lead¬ ing manufactures of Berkeley include aeroplane and other motors, hydraulic machinery, health foods, soaps, refined petroleum, cocoanut oil. carbonic gas, elevators, pumps, *etc.* The survey of manufactures for 1917 recorded 107 in¬ dustrial establishments of factory grade, em¬ ploying 2,350 persons, of whom 1,828 wrere wage earners, receiving annually $3,054,- 000 in wages. The capital invested aggregated $9,814,000 and the value of the year's output was $7,321,000: of this, $2,532,000 was the value added by manufacture. It also carries on lu¬ crative fishing industries. As a dependable barometer of business the upward tendency of the city's postal receipts indicates continuous and growing prosperity. From $112,444 in 1910 they had increased to $190,338 in 1917. Property returns for taxation also increased from $35,736,140 in 1910 to $45,000,000 in 1917. Not a single dollar on current account was due to any city creditor and the bonded indebted¬ ness amounted to only $1,266,075. As Berkeley has authority under the law to incur bonded indebtedness

aggregating more than $5,000,000, the city's paper is regarded as gilt-edged by the financial experts of the country. A new and ample sewer system has been installed at a cost of $700,000. An efficient fire department is maintained, with nine stations serving the city's area of nine square miles. The department is completely motorized, operating 16 cars. Double platoon system for the department has brought more expense, but also has insured better service, as the men are on full pay, with no call men. Berkeley wras the first city in the West to introduce the golden rule of the po-GEORGE BERKELEY

*

.

Jr.

lice department, impressing on patrolmen the duty to befriend unfortunates wherever possi¬ ble. The consequence is that there is less dis¬ position to lawlessness than in cities where the stern hand of authority is never relaxed even in trivial affairs. There were only four ar¬ rests for drunkenness in Berkeley during 1915 ; eleven in 1916, and seven in 1917. The total arrests in the city in 1915 were 291 ; in 1916, 307 ; in 1917, 333. The death rate in 1915 was 7.75 per thousand, which was above the figure of several previous years, on account of the number of elderly people who retire here to enjoy their declining years. The city is the home of a great many men and women above the age of 80 years. Death rate in 1916 was 7.34; in 1917, 7.52. Race suicide does not exist in Berkeley. The average birth¬ rate per thousand is 11.36 and childhood in Berkeley is blessed with favorable con¬ ditions, the little ones living in the open air almost constantly. The result is a vigorous lot of youngsters. This is shown by the way in which school children win cham¬ pionships in the various sports which bring them in competition with students from other parts of the State. In 1915 Berkeley built and equipped five new school buildings

at a cost of over half a million dollars. These are lo¬ cated in different parts of the city for the greater accommodation and convenience of parents and pupils. The equipment of these schools is modern in every particular. Berke¬ ley is the acknowledged educational capital of the Pacific coast. The city is not surpassed in this by any other community _ west of the Rocky Mountains. This is true in respect to all departments of instruction, from kinder¬ garten to the University of California, which has its home here. This university ranks with the great seats of learning in the world. Sit¬ uated in beautiful grounds covering 250 acres, new buildings at a cost of $2,000,000 are being added to the existing structures. (For full de¬ scription see California, University of). In Berkeley also are located the California School of Arts and Crafts, the Cora L. Williams In¬ stitute for Creative Education, the State School for the Deaf and the Blind, White's School for Boys, Miss Head's School for Girls, Saint Joseph's Academy for Boys, Saint Joseph's Presentation Academy for Girls, the A to Zed School, the Berkeley Business College, the South Berkeley Business College, the Pacific School of Religion, the Berkeley Baptist Di¬ vinity School, the Pacific Unitarian School, the Berkeley Outdoor School, the Berkeley Kinder¬ garten and several musical and art schools ; also public and school libraries. As a genuine musi¬ cal centre also, Berkeley is attractive to all who are musically inclined. The • Berkeley Musical Association, which has a membership of 2,000, gives four or five events a year, the artists being of international fame. The Berkeley Oratorio Society presents two con¬ certs a season at which students are accorded liberal concessions. Club life in Berkeley is attractive by reason of variety. There are three kinds of clubs: clubs for men; clubs for women ; and clubs to w hich both men and women are admitted. All of these devote much time and attention to the serious affairs of life. This is particularly true of the women's clubs of Berkeley which are merely social organi¬

zations, although the society of the community-is a highly developed organism. Women here devote much attention to civic betterment and public affairs, as befits their character as voters and law makers. While the natural ad¬ vantages of Berkeley are highly prized by the citizens and although they undoubtedly at¬ tract a great many of the thousands who are coming here annually, yet the real lure of Berkeley is its characteristic hospitality. All comers are welcomed with a broad spirit of Western comradeship that is most inviting. The schools, art institutes, civic centres, frater¬ nal organizations, religious societies and social conditions tend to elevate and enrich the lives of those who come here. In all the world there is not a more cosmopolitan

community — cos¬ mopolitan in the best sense — that of equal op¬ portunity and equal respect. Character and personal worth are what count in fixing the status of the individual or the family in this communty. The settlement of Berkeley dates from the selection of the university site in 1868. The town was incorporated in 1878 and adopted the commission form of government in 1909. Pop. (1900) 13,214; (1910) 40,434;

(1920) 56,036. In view of Berkeley's fame as an educational centre it is proper to mention that the city was named in honor of Dr. George Berkeley, Dean of Derry and lord bishop of Cloyne, the gifted scholar and phi¬ losopher, author of the oft-quoted line, ((Westward the course of empire takes its way.®

Wells Drury,

Secretary Berkeley Chamber of Commerce.

BERKELEY, England, market town, 1 7]/2 miles southwest of Gloucester, pleasantly situ¬ ated on the right bank of the Avon, in. the rich vale of Berkeley, and celebrated for its castle, where Edwrard II was confined and barba¬ rously murdered in 1327.

BERKELEY DIVINITY SCHOOL, an

Episcopal theological school at Middletown, Conn. It was organized in 1851 by Bishop John Williams of Connecticut while he was president of Trinity College, at Hartford, and was at first intended to be the theological de¬ partment of the college. It was later (1854) placed upon an independent basis and removed to its present location. The chapel was built in 1851, and the library in 1896. The graduates on the roll of the seminary number (1913) 525, of whom 335 survive, including 20 bishops and many of the best-knowm clergymen of the Epis¬ copal Church. There are about 30,000 volumes in the library. The value of its buildings is about $100,000, and its endowment fund aggre¬ gates $485,000.

BERKELEY SOUND, next to Stanley Sound the most frequented inlet of the East Falkland Island, near its northeast extremity. Though it is difficult to enter, it contains some of the best harbors in the south Atlantic.

BERKELEY SPRINGS, W. Va., town and county-seat of Morgan County, two miles south of the Potomac and 103 miles northwest of Washington, on a branch of the Baltimore & Ohio Railroad. It is in an agricultural region, tomatoes and fruit being extensively raised, and

has been widely known and popular for more than a century because of its mineral springs. The site of the town was a part of the vast

estate of Lord Fairfax, and Washington owned considerable property here. It is the oldest pleasure resort in the South, and as far back as the colonial days the gentry of Virginia came here in warm weather and lived in log huts in order to enjoy or be benefited by the baths and swimming pools. Mount Wesley Academy is situated in the town, ar.d there are handle and canning factories, a planing mill and sand pulverizing plant, extensive deposits of silica sand being in the vicinity. Berkeley Springs was incorporated in 1872. Pop. 980.

BERKENHOUT, John, Dutch-English physician and general writer : b. Leeds, about 1730; d. 1791. Having entered the Prussian service, he rose to the rank of captain. In 1756 he quitted that service and entered into that of England, where he obtained the same rank. At the peace in 1760 he went to Edin¬ burgh and began the study of physic; while there he published his (Clavis Angelica Linguae BotanicaeP a book of great merit, and later his (Pharmacopoeia Medici, } which passed through three editions. Other works by him are ‘Outlines of the Natural History of Great Britain and Ireland) (3 vols., 1770) ; ‘Essay on the Bite of a Mad Dog) (1773) ; ‘ Symp¬ tomatology > (1774), *etc.* In 1778 he attended the British commissioners to America, and at Philadelphia he was committed to prison, but he soon afterward was set at liberty, and returned with the commissioners to England, where he obtained a pension. He was an in¬ dustrious writer, and his publications possess considerable merit. Consult Rose, ‘New Bio¬ graphical Dictionary.)

BERKHAMPSTEAD, berk’hamsted, or BERKHAMSTED, Great, an urban district, parish and marked town in Hertfordshire, Eng¬ land, beautifully situated in a hollow surrounded by hills, on the London & N. W. Railway, 28 miles north of London. It consists almost wholly of one main street, and has a fine old church, restored 1871-87 ; several chapels and Berkhamsted School, with a fine chapel (1895). There are works for wooden ware, a large chemical work, a boatbuilding yard,

brush, coach and mantle factories, an iron foundry, *etc.* The poet Cowper was born here in 1731. In the small parish of Little Berkhampstead, some miles to the north, the famous Bishop Ken was born. Pop. 7,302.

BERKHEY, berk'hT, Johannes Lefranca van, Dutch writer and naturalist : b. Leyden, 3 Jan. 1729; d. there, 13 March 1812. He was early interested in natural history and also studied Latin and Greek. Poetry he reserved for his leisure moments. He resided succes¬ sively at Amsterdam, Leervliet and Leyden, where he was professor at the university. His later years were passed at The Hague. Among his principal works are 'Expositio Characteristica florum qui dicuntur compositP (Leyden 1761) ; 'Letter on the Generation of the Tes-taceae) ; 'Notes on the Best Methods of Pre¬ paring the Lands of Holland, both Upper and Lower, so as to Cultivate Them to the Best Advantage* ; 'Natural History of Holland) (6 vols., Amsterdam 1769). He also distinguished himself as a poet, though he often manifests a tendency to bombast, and indulges in false pathos. One of his best poems is entitled 'Het Verheerligkt Leyden.*

BERKSHIRE, England, an inland county, lying in the valley of the Thames, with an area of 450,132 acres or 712 square miles. Its shape is very irregular, and has been compared to that of a shoe or slipper. A range of chalk hills crosses the country in a westerly direction, and forms a boundary to the fertile vale of Whitehorse, so called from the gigantic form of a horse which has been scooped out on the side of a chalk hill, so as to become conspicuous to all the country round, referred to in Thomas Hughes' 'The Scouring of the White Horse. *The cultivated parts of the county, and more especially this vale, are peculiarly fruitful in barley. They also contain much rich pasturage and many excellent dairy farms. Timber abounds, particularly oak and beech, in Wind¬ sor Forest and toward the west. Turnips are an important crop. There are but few manufac¬ tures carried on in this county, the principal being agricultural implements and artificial manures, flour, paper, sacking and sailcloth, and biscuits (at Reading). Malt is made in great quantities, and chiefly sent to London. The principal towns of Berkshire are Reading (the county town), Newbury, Maidenhead, Wokingham, Wallingford, Windsor, Abingdon, Wantage and Farringdon. Including the boroughs of Windsor and Reading the county returns five members to Parliament. Pop. (1911) 280,794. Consult Graves, 'The Way About Berkshire* (1898).

BERKSHIRES, The, or BERKSHIRE HILLS, a range of mountains in the northwest of Massachusetts, in Berkshire County, stretch¬ ing 16

miles north and south on the east of the valley of the upper Hoosac River. They are a favorite summer and autumn resort. The highest summits .are Greylock in the north, 3,535 feet, and Mount Everett, or the Dome, in the south, 2,635 feet.

BERLAD, ber-lad', Rumania, a town on the Berlad River, and Teucuci-Baslui Railroad, in the district of Tutova, about 68 miles north¬ west of Bucharest. It is the trade centre of a grain-raising district and has many distilleries. It is a well-built town, with good schools, a theatre, a hospital and a number of institutions for secondary education. Pop. 25,381.

BERLEBURG, ber'le-boorg, or BERLEBURGER BIBLE, a translation of the Scrip¬ tures published at Berleburg, Germany (8 vols., 1726-42). Its unknown editors have given an original version with accompanying exposition more or less mystical in character. It has all the merits and demerits of pietism.

BERLICHINGEN, ber'liH-ing-en, Gotz, or Gottfried von, German soldier of fortune : b. Tagsthausen 1480; d. 23 July 1562. He was a bold, restless, warlike and honorable knight. At first he served Elector Frederick of Bran¬ denburg, but soon joined himself to Albert of Bavaria. He lost his right hand in 1504, at the siege of Landshut, and in its stead wore an iron one, being thereafter known as Gotz of the Iron Hand. He was continually engaged in quarrels with his neighbors, disregarded the edict against private warfare and was twice under the ban of the Empire — in 1512 and 1518. He placed himself at the head of a bodv of the rebellious peasants, in the war which they waged against their oppressors, but was

soon made prisoner. On promising to refrain from further warfare he was released after two years. For many years he was inactive, but in 1542 he took part in the Hungarian campaign against the Turks, and two years later fought for Charles V against the forces of Francis I. His biography, written by him¬ self, was printed in Nuremberg in 1731 and 1775, and, for the third time, at Breslau in 1813. It was edited by

Schonhuth (Heilbronn 1859) and by Muller (Leipzig 1882). This book contains an excellent picture of the social life and customs of the time, and has furnished Goethe with the subject of his drama, (Gotz von Berlichingen, translated by Sir Walter Scott. The best biographies of this typical feudal knight are : Gotz, Graf von Berlichingen-Rossach, (Geschichte des Ritters Gotz von Ber¬ lichingen mit der eisernen Hand* (Leipzig 1861) ; and Pallman, (Der historische Gotz von Berlichingen) (Berlin 1894).

BERLIN, Alfred Franklin, American archaeologist: b. Cherryville, Pa., 12 Jan. 1848. He was educated at Easton, Pa., and is a mem¬ ber of many learned societies at home and abroad. He is author of numerous archaeological papers and of (Section VI, The East Allegheny Sec¬ tion in Prehistoric Implements, <*(The Lenni-Lenape and their Implements® (in (History of Lehigh County*); (Notes on American Antiquities> in the A. F. Berlin Collection (Vol. XVI, Transactions of the Wyoming Historical and Geological Society).

BERLIN, Conn., town of Hartford County, 11 miles south of the city of Hartford, on the New York, New Haven and Hartford Rail¬ road. Pop. (1920) 3,728.

BERLIN, Germany, capital of the republic and of the state of Prussia, 180 miles south¬ east of Hamburg. The river Spree, here nearly 200 feet wide, spanned by several fine bridges, flows through the centre of the city, com¬ municating through the Elbe with the North Sea, and also having canal communication with the river Oder and the Baltic Sea.

History. — No account of the earliest settle¬ ment of Berlin has come down to us, but it is supposed that the city was founded during the decade from 1230 to 1240. Indeed, the Mar¬ graves John I and Otto III are said to have established the city as a stronghold against the Slavs. The name Berlin is probably of Slavic origin, although some scholars trace the word to (<Barlein,** from the fact that a bear appears on the coat of arms of the city. The new city, or town, was situated on the old commercial highway which led from Leipzig to Stettin and was known especially as a market for herring, grain and wood. Cologne (Colonia), the near-by sister city on the river Spree, seems, to have been established as an independent munici¬ pality simultaneously with Berlin and was united with Berlin, temporarily, in the year 1307. Though the margrave had his castle in the city, the municipal government was left to the mayor and aldermen, who enjoyed full sway.

In 1134 the mark of Brandenburg had come into the hands of Albrecht the Bear, of the house of Ascan, to which family also belonged the founders of Berlin, who ruled in common. After the extinction of this family (1323) the German emperor, Ludwig of Bavaria, gave

Brandenburg to his son Ludwig as a fief, who in 1351 passed it to his brother, Ludwig the Roman. His successor, Otto the Lazy, sold the mark to the Emperor Karl IV (1373). Karl's son, the Emperor Sigismund, appointed Friedrich von Hohenzollern, Burggrave of Nu¬ remberg, viceroy of the mark in 1411 and made him an elector in 1415. This increased dignity, which indeed had already been worn by Ludwig the Roman, gave the ruler of the mark an im¬ portance that redounded to the good of the country and of the city. The first Hohenzollern had a difficult position to fill, in that he had to put down a rebellious and, in part, thievish nobility. This nobility, especially the family of Quitzows, did great damage to the trade of Berlin (1406-10). Just as his father had had to contend with the nobility, Frederick II, the second Hohenzollern, had to fight against the populace of Berlin-Cologne. Soon after he un¬ dertook the government he began a strong citadel in Cologne, on the bank of the Spree.

This same citadel, enlarged and extended during the centuries, now serves the present emperor both as a residence, and as the palace where he receives his princely guests. With the building of the citadel the margrave removed to Berlin ; and the result was that Berlin and Cologne had to surrender much of their au¬ thority to him. At first the cities had become involved in a dispute over constitutional and administrative matters and had called in Fred¬ erick II as arbiter; but soon they were quarrel¬ ling with the prince himself, and he defeated both of them.

After Berlin-Cologne became the residence of the Hohenzollerns the history of the city was intimately connected with that of the reign¬ ing family. The rulers were always par¬ ticularly interested in building up the city. In this respect the work of the Great Elector, Fred¬ erick William (1640-88), was noteworthy. He added two new wards to the city, Friedrichs.- werder and Dorotheenstadt, built magnificent fortifications (though later these were re¬ moved), and summoned architects and engineers from Holland to finish the palace and lay out public grounds, as the Lustgarten and the Lin¬ den-promenade. His successor, Frederick III, the first king of Prussia, added to the city Friedrichstadt and other suburbs. Supported by

artists like Schliiter and Eosander he enlarged and beautified the palace and gave the city a number of fine statues and public buildings, par¬ ticularly the Zenghaus, which is one of Berlin's conspicuous monuments of architecture. The fine equestrian statue of the Great Elector, on the bridge near the palace is by Schliiter. Fred¬ erick William I was especially interested in building private residences. He made presents of building-lots and even furnished lumber gratis and made other concessions.

His son, Frederick the Great, turned his at¬ tention to the erection of new buildings in Pots¬ dam, his favorite residence. After the Seven Years' War, in which Berlin had been burned twice, the King began, at great personal expense, the construction of houses for those who en¬ joyed his favor. External architectural beauty was aimed at, rather than convenience. Among the public structures erected by Frederick the Great may be mentioned the two domes of the German and the French church, the King's

Colonade and the Royal Library. In 1763 he established the Royal Porcelain Manufactory.

The famous Brandenburg Gate, a triumphal arch in classic style, was erected in 1793, during the reign of Frederick William II. It was orna¬ mented by the sculptor Schadow with a bronze statue of Victory driving a four-horse chariot. When Berlin was taken by the French in 1807 this was taken to Paris, but was recovered in 1814 after Paris had been taken by the Allies. Under Frederick William III the present Royal Theatre and the Old Museum were built, and under Frederick William IV the statue of Fred¬ erick the Great. The wonderful progress made by Berlin during the reign of William I gave the city quite a different appearance in a short time. Buildings of a monumental character, both public and private, sprang up everywhere.

. This development has continued ; and Wil¬ liam II did all he could to beautify the city, chiefly with monuments and statues. Likewise the activity of private citizens along the same lines is now far greater than

in former centuries. The great historical events which created the German Empire and made Berlin the capital of it found a happy echo in the populace. The new development of the city to the metropolis of the political life and of na¬ tional and international trade has not been ex¬ ternal and artificial as formerly, but has been internal and necessary. This fact cannot be set forth in an account of buildings and monu¬ ments. It would be necessary to examine the statistics of trade and commerce, of banking, and of the industries, *etc.* If one studies the statistics, then it becomes clear that those material aspects of the city that amaze one and compel admiration are only the manifestation of a powerful historical development, which cannot by any means be regarded as having reached its zenith.

Area, Population, Suburbs, *etc.* — Besides Cologne, other neighboring towns were built up later, as Friedrichwerder (with Friedrichstadt) and Dorotheenstadt. All four of these towns, +hough lying in immediate proximity to one another, remained completely independent of each other till 1709, when Frederick I fused them into one municipal corporation. At that time the population was about 57,000. Now, after over 200 years, we find a similar situ¬ ation as regards a plurality of independent cities. Immediately adjoining Berlin there are some 20 completely independent municipali¬ ties of one kind and another. For the most part these towns and cities have, to all appearance, become fused with Berlin, and boundary lines have been obliterated ; but each one has it own independent municipal government. As yet there is no centralized, unifying government to bind them together. The population of Berlin was in 1820. 202,000; in 1871, 826,000; and in 1910, 2,071,257, composed of 1,689,118 of the Evangelical faith, 243,020 Roman Catholics and 90,013 Jews. Among the contiguous cities may be mentioned Charlottenburg (305,978 inhabit¬ ants) ; Neu-Koln (formerly Rixdorf, 237,289); and Schoneberg (173,823). The area of Berlin is 15,696 acres, and of Greater Berlin 156,290 acres. The area of Berlin proper is much less than that of several other German cities, as for instance Cologne (27,750 acres), Frankfort-on-Main (20,000 acres), Strassburg (19,500

acres), Munich (18,570 acres) and Mannheim (16,500 acres).

There has been no considerable extension of the corporate limits of Beilin into this neigh¬ boring territory since 1860, though the neces¬ sity for such a proceeding has been urged re¬ peatedly in various quarters. To do this, and thus effect a union of these several municipali¬ ties, the consent of both the state government and the

Parliament is necessary. For a long time the Prussian government was inclined to carry out such a plan, but the city of Berlin objected to assuming the burden which the poor condition of the streets and public utilities of the suburbs would have imposed upon her. At present the state government encourages the incorporation of the smaller country suburbs into towns, and sooner or later all these ele¬ ments, large and small, will be brought together under one municipal government.

The present fragmentary condition of the city entails upon Berlin many practical difficul¬ ties. For instance, the city has bought in the suburbs not less than 14,200 hectares of land for the utilization of the sewerage, and the lay¬ ing of pipes through these neighboring mu¬ nicipalities often gives occasion for long and tedious negotiations. Similar difficulties have formerly attended the construction of street¬ car lines. In every case the company in ques¬ tion has had to secure a. concession from every suburb concerned. This always involved long negotiations as to details.

Municipal Government. — The administra¬ tion of the city of Berlin is in the hands of a municipal council of 34 members, including the mayor. Half of these fill honorary positions, half receive pay. Among the salaried members may be mentioned the chief mayor (Ober-burgermeister), the mayor, two syndici, a min¬ ister of finance, two school commissioners and two commissioners on buildings. The mem¬ bers of the council are elected, for a limited period, by the board of aldermen. The aider-men themselves are elected by vote of the citi¬ zens. The sessions of the council are secret ; those of the board of aldermen are usually pub¬ lic. All important innovations require the con¬ sent of both bodies. Besides, there are a num¬ ber of committees, composed of members of the council and of the board of aldermen. In certain branches of the administration the au¬ thority of these committees is competent, but in important matters transcending their special departments their authority is conditioned by the consent of the municipal council.

The aldermen, 144 in number, receive no salary, their position being honorary. They are represented by a chairman and his deputy. A further category of honorary and unsalaried officials is formed by the citizen-deputies, who are elected by the board of aldermen ; also the poor law guardian and the members of the poor commission. Altogether, there are several thousand persons working for the city without any salary. The city police force is employed and controlled by the state, under the Ministry of the Interior, but the city has to make appropriation for this object.

Finances. — The city budget for 1910-11, amounted to $75,000,000 and the indebtedness in 1904 was $351,000,000.

The receipts come mainly from taxes, in-

BERLIN

1 Lust Garten, showing Statue of Frederick William III

2 Brandenburg Gate

BERLIN

1 Schlossbriicke, with Lust Garten

2 Palace of Emperor William I

BERLIN

561

eluding income tax — levied on incomes just as the corresponding state tax — the special tax on incomes derived from trade, taxes on real estate and real estate transfers, and for sewerage purposes. The citizen of Berlin pays on an average, not less than $25 a year in taxes.

Public Utilities. — 'The gas plant is munici¬ pally owned. The street lighting system covers an area of 320 miles. The water supply is entirely in the hands of the city. There are several waterworks, the water being obtained in part from deep wells. Other wells are to be

bored soon. Sewerage is also provided for by the city, the waste being brought through pressure pipes to the city's farms in the country, where it is prepared for agricultural purposes. The sewage and drainage system, begun in 1873, was completed in 1911 at a cost of upwards of

$42,000,000.

The city has a stock-yard, which serves as a general market for live stock, also a slaugh¬ terhouse, where all slaughterings must take place. Here the fresh meat is at once officially inspected. All meats shipped into Berlin are inspected, unless an official inspection has taken place elsewhere. There are 14 city market-houses for the retail trade and one special market-house for the wholesale trade.

There are five regular city hospitals and a smaller sick-house, which are open to the pub¬ lic ; also three state hospitals and at least 10 other public hospitals, including the large Vir¬ chow city hospital. Besides there are three city asylums for the insane. The city also main¬ tains a disinfecting establishment for furnish¬ ings, flats, *etc.* There are seven public bathing places for hot baths, and 16 with cold running water.

The city also runs a savings bank (ˆSparkasseˆ). There is also a royal pawn-office, and a number of private benevolent insti¬ tutions which are, in part, supported by the city.

The Central Employment office is of par¬ ticular significance, and its management is un¬ usual. In many German cities such an institu¬ tion is managed directly by the city administra¬ tion. A special office is fitted up for the purpose, notices of vacancies of one kind and another are received and those seeking employment are informed of such opportunities for work. Now, in Berlin, this general employment agency is not directly in the hands of the city, but re¬ ceives support from the city. This support on the part of the city, which has been extended to $10,000, was given after a number of high city officials had identified ihemselves with the management of the agency in question, which was called the Central-V erein. This employ¬ ment agency has a special building for its pur¬ poses, containing separate offices for different kinds of work; also youthful applicants are separated from the mature. A number of smaller employment agencies and unions of one kind and another have joined this general union. This condition for thus joining is that an executive committee be

formed for each trade, consisting equally of workmen and em¬ ployers, with a chairman belonging to neither party.

Charities, *etc.* — The city council spends an¬ nually about $80,000, aiding various private charitable associations; for instance, nine or¬ ganizations for nursing the sick, 15 for the care vol. 3 — 30

of children, five for the care of women lying-in, and 43 other aid associations; also 23 educa¬ tional institutions, besides a large number of foundations partly under the administration, partly under the inspection of the city.

The city has two asylums for the homeless, one for families, the other for such persons as only require a shelter for the night. A simi¬ lar institution, as «Asyl,» is. maintained by a private association. In fact, it is characteristic of Berlin that public and private charity sup¬ plement each other. The care of the poor, as such, is in the hands of the city administration, and about 4,000 persons are employed in this work, though in honorary positions and with¬ out salary.

In addition to these means of providing for the poor must be mentioned the system of in¬ surance for the working classes. The statute regulating insurance against sickness was passed in 1883, though previous to that time such insurance had already been made com¬ pulsory. The obligation is placed upon the employer, who pays th-e assessments and de¬ ducts the amount from the wages of the work¬ man. At present there are 129 branches of this kind of insurance under the control of the city council, besides a few branches that are con¬ trolled by the state, and a number of private associations. The number of workingmen and women insured already exceeds 700,000, and in 1910 about $7,000,000 was paid out in sick insurance. According to the law, the weekly al¬ lowance during sickness is paid for as long as 26 consecutive weeks, but, under special cir¬ cumstances, it may be paid for as long a period as 52 weeks. The city has built upon its own land homes for the convalescent, which are for the complete recovery of the sick. For the rest the city hospitals are open to the insured, but their expenses must be paid out of the in¬ surance money.

There is in Berlin a state institution for the care of invalid workmen. In connection with the same there are several sanatoria which care for those who are about to become invalids. The sanatorium at Belitz may be mentioned. It is fitted up in magnificent style and is probably the

best sanatorium on the continent of Europe.

Educational Institutions. — In the field of education the University of Berlin takes the first place. It was founded by Frederick Wil¬ liam III in 1810. During the winter term of 1910 there were enrolled over 7,500 regular students, besides almost as many more so-called Zuhorer, i.e., mostly persons who have secured permission to attend lectures, but whose previous education is not sufficient to enable them to take up systematic studies lead ing to a degree. In connection with the uni¬ versity is the Seminary for Oriental Languages.

Further, of special significance is the ((Tech-nische Hochschule,® which has nearly 3,000 students ; also the ˆBergakademie,® and the Hochschulen for agriculture, for fine art, and for music.

All these are state institutions. To them has now been added a Hochschule for Commerce, which is being erected by the <(Aeltesten der Berliner Kaufmannschaft.® This is a society of merchants which was licensed by Frederick William III in 1820. Formerly they exercised the function of a board of trade. Since the

#

Chamber of Commerce was formed some years ago they have had to give up this function and have extended their activity into the field of commercial education.

As to Gymnasia and Realgymnasia, Berlin has five royal and 20 city institutions. There are besides, 13 city Realschulen, two royal and six city high schools for girls, four city finish¬ ing schools, a normal school, a royal seminary for male teachers, a similar one for female teachers and teachers of gymnastics, a royal the¬ atre-school and school for deaf-mutes, a city school for deaf-mutes, and a city school for the blind. Instruction in these schools is free. It may be added that each of the suburbs has its own schools of various kinds.

Museums and Collections. — The more im¬ portant picture galleries and collections are, the Old and the New Museums, the National Gal¬

lery, the Pergamon Museum and the Emperor Frederick Museum — all maintained by the state. Further, the Ravene Museum. Among historical collections may be mentioned the Royal Hohenzollern Museum, the Zeughaus, the Provincial Museum — a city institution, the Post Museum, and the royal museums for an¬ thropology and German ethnology. The liberal arts are represented by the Royal Museum for Liberal Arts and by the exhibit of the Royal Porcelain Manufactory. Further, there are the royal museums for science, for agriculture, for mining and smelting, and for pathology. The Zoological Garden belongs to a private com¬ pany, but it is in the nature of a public utility. The Aquarium is also owned by private par¬ ties, but is subventioned by the authorities. The state maintains a botanical garden. There are also the Hygienic Museum, the Colonial Mu¬ seum and the Institute for Hydrography, which serve further the interests of science and the technic of shipbuilding. A curious recent crea¬ tion is a permanent exhibition of contrivances for the betterment of the conditions of labor. There are three astronomical observatories, a state observatory and two private ones. The latter are always open to the public.

Many libraries, including the Royal Library of about a million volumes, provide opportuni¬ ties for study in every field of knowledge.

Monuments and Public Buildings. — There are a large number of monuments on the streets and public squares of the city. A considerable number of them have been erected during the reign of the present Emperor, and, in fact, un¬ der ‘his immediate influence.

The number of the palaces and public build¬ ings is likewise very large, though, as com¬ pared with other German cities, Berlin is poor in specimens of old architecture.

There are numerous theatres, including the Royal Play House, the Royal Opera House, the New Royal Opera-Theatre, 13 other large the¬ atres, and about a dozen smaller ones, a num¬ ber of so-called ˆcabarets,** and two permanent circuses.

Churches. — The oldest churches in Berlin are the Nikolai Church and Saint Mary’s. Both were built in the 13th century but have been restored. Further, Saint Peter’s may be men¬ tioned. There are more than 40 evangelical churches, the most important heing the Em¬ peror William Memorial Church, built in 1891— 95 in beautiful Romanic style (two large

neighboring houses are in the same style of architecture) ; the Emperor Frederick Memorial Church, beautifully situated in the Thiergarten ; and the New Cathedral (dedicated in 1905), built in Italian Renaissance style and orna¬ mented with numerous sculptures. A French church was built in 1701-05; and there are also an English and an American church. Saint Hedwig's Church (Catholic) dates from the middle of the 18th century. Of the two larger synagogues the oldest and finest dates from the year 1866.

Monumental Buildings. — To be mentioned

here especially are the Royal Palace, the palaces of Emperor William I, Emperor Fred¬ erick and Prince Albrecht, and the palace at Charlottenburg ; further numerous state build¬ ings, e.g., those occupied by the Departments of War and Education, the Foreign Office, the Imperial Health Office, the Imperial Insurance Office, the Patent Office, the Abgeordnetenhaus, and the large Reichstag building, in Italian Renaissance style ; also various railway stations and palatial structures of the Postal Depart¬ ment. Of municipal buildings the city hall deserves mention ; further, the city museum and numerous public schools ; also the new city hall in Charlottenburg. The magnificent structures of the large banks, stores, breweries, insurance companies, etc., add much to the beauty of the city. The arcade between Frederick street and Unter-den-Lir.den may also be mentioned.

Bridges, Statuary, Fountains. — The following are the more notable of the monumental bridges in Berlin : Heydtbrucke, Potsdamer-briicke, Belle Alliancebriicke, Kurfiirstenbrucke, Wilhelmbriicke, Friedrichbrucke, Schlossbrucke, Moltkebrucke and Oberbaumbriicke. Aside from the National Monument, the most note¬ worthy statues in the central part of the city are those of William I, Frederick the Great, the Great Elector, Frederick William III, Emperor Frederick, Empress Augusta, the two Hum¬ boldts, Helmholtz, Luther, Schiller, Waldeck and Schulze-Delitzsch. In front of the Reichstag building is an immense bronze statue of Bis¬ marck. Near by are the statues of Moltke and Roon and the Column of Victory, which over¬ looks the 32 marble groups of Brandenburgian and Prussian statesmen and rulers in the Ave¬ nue of Victory. Other notable statues in the Thiergarten are those of Goethe, Lessing, Richard Wagner, Frederick William III and Queen Louise. Some of the numerous foun¬ tains worthy of note are the large fountain before the palace, which was designed by Begas and presented by the city on the accession of

Emperor William II ; the Hercules Fountain on Liitzowplatz, which was designed by Lessing; and the artificial waterfall in Victoria Park.

Trade, Transportation and Population. — The land traffic of Greater Berlin in 1910 amounted to 12,697,965 tons (exclusive of transit trade), and the water-borne traffic to 8,848,900 tons. In that year the value of the exports to the United States and its possessions amounted to $17,172,413.

Twelve main lines of railway enter the city, and these are splendidly equipped. An import¬ ant waterway for large ships from Berlin to Stettin on the Baltic, a distance of 62 miles, was opened on 2 May 1914. It is an extension and deepening of canals previously existing, and is

expected to develop enormously the several trades of the metropolis.

The character of the population of Berlin is subjected to a gradual change, which is caused partly by the building up of new industries, partly by the removal of well-to-do taxpayers to the suburbs. This migration of the wealthier classes is attended by an influx of the laboring classes, especially in the newly built parts of the city, so that the laboring population is con¬ stantly increasing. Again, the inner residential part of the city is coming to be used more and more for business purposes, so that here the population is decreasing continuously.

The development of facilities for transpor¬ tation has contributed much to these changes. The ((Stadtbahn,® a railway which crosses the city from east to west, then encircles it both on the north and on the south, was and has been the cause of the wonderful growth of the western suburbs. Migration was encouraged by the ex-, ceedingly low fare of 10 pfennigs to the fifth station, or 20 pfennigs for the entire distance, not to mention the great reduction allowed on monthly tickets. This has led to the building of new stations along the outer parts of the ˆStadtbahn” and to the institution of suburban trains, on w

hich one may have a monthly ticket at a price varying with the distance.

In this connection must be mentioned also the ((Grosse Berliner Strassenbahn.® This is a private traction company, which owns nearly all the street cars in the city. Since on most of the lines the fare is only 10 pfennigs this com¬ pany has had great influence in the development of the suburbs. The fare is 5 and 10 pfennigs. The electric elevated and underground road passes along the southern periphery of the city from east to west. Important extensions of the subway system have been recently com¬ pleted. During construction a section under the Spree was flooded on 27 March 1912, happily without loss of life.

Since 1911, when the lease of the operating company expired, the tramway lines within the city have been municipally owned. In 1912 the decision was taken to electrify the entire suburban system of Berlin. The whole enter¬ prise was completed in 1917. Electric loco¬ motives are used in traction, the current for which is supplied by two 150,000 horse¬ power electric plants, one near Bitterfeld coal mines, 80 miles from Berlin, and the other in Berlin. The entire cost, including stations, cables, feeders and rolling stock was, in round figures, $32,000,000. The system has been leased to a company for a period of 30 years.

The bridging of the Havel Valley, completed in 1914, marks an important epoch in the de¬ velopment of Greater Berlin. This engineering triumph, carried through in despite of bad soil conditions, has involved the building of a dam and two bridges — the Stateserge and the Havel — the latter, 79 feet wide and 537 feet long, with five spans.

Under the influence of improved facilities for transportation the composition of the popu¬ lation in the various parts of the greater city has become quite varied. The well-to-do live in the west and in the western suburbs, while the working classes have settled in the east and the north, and partly in the southeast. The large factories are situated in the east and in

the northwest. While in Berlin 80 persons out of every thousand pay tax on an income of $750 and upward, the proportion of people in Rixdorf, a southeastern suburb, who have such an income is only 27 out of a thousand. On the other hand, in the wealthy western suburbs,

Griinewald and Wilmersdorf, the proportion is 441 and 228, respectively, out of every thousand. Similar differences can also be noted in the interior of the city.

The city maintains a statistical bureau that keeps a careful record of all these conditions. Undoubtedly, such differences in the composi¬ tion of the population will be found to account for the varying rate of mortality in the different parts of the city, as well as for the varying rate of taxation.

Death Rate. — To be sure, the mortality in Berlin is not only low, but is still decreasing. In 1873 the death rate was 28 per 1,000; in 1885 it had risen to 29.98; but by 1898 it had fallen to 18.16; in 1904 was 17; and in 1911, 15.59. Still, the rate is not uniform, varying from 8 in the wealthier parts of the city to 22 per thousand in the poorer quarters. The decrease of mortality is due to better hygienic conditions, especially to water-supply and sewerage. Though the death rate among children is still high the city authorities are doing everything possible to combat the evil. Building ordinances have been made stricter, and the hygienic conditions of flat-houses have been thereby greatly improved, especially in the newly built portions of the city. Within recent years there has been a de¬ cline in the birth rate which was 25.98 in 1906, and 21.64 in 1911.

Tenements. — Still the principal evil per¬ sists, i.e., the crowded condition of apartment-houses. On an average such a house in Berlin shelters 77 persons, and the flat of a workman, which usually consists of only two rooms, closet, etc., must not only shelter the family, but pro¬ vide sleeping quarters for one or two outsiders. The explanation of this is to be found in the relatively high rents for such flats, the minimum being $5 per month, or about one-fourth of a laborer's income. The desire to cut down the rent by letting sleeping quarters is amply met by the large number of workmen moving into Berlin.

The building of model tenements for the bet¬ terment of living conditions among the poor has not taken place to any considerable extent. Aside from a co-operative company that built 269 small homes for workingmen in the sub¬ urbs, which were sold to the members of the company, there are seven building companies of philanthropic nature, but their houses offer ac¬ commodations for less than 10,000 persons. Be¬ sides, the administrations of some of the state industries have placed homes at the disposal of their workmen, and both the city and the state aid such benevolent enterprises by furnishing capital at a low rate of interest.

Aside from the evils of high rents, and, con¬ sequently, overcrowded flats, the conditions are not bad. The plumbing in the newer flat-houses leaves nothing to be desired. In fact, both in Berlin and the suburbs, the better class of such houses have all modern conveniences, and are comparatively luxurious.

Streets. — The streets of Berlin are well cared for and are in excellent condition. Al-

ready 40 per cent of the streets are paved with wood or asphalt, the rest being paved with stone or cement. But the work of improvement con¬ tinues. The yearly payroll for street cleaning amounts to $531,000. Much more is spent now on parks than formerly. Within the city limits there are seven state and five city parks. For the most part the city is illuminated by gas, but, since recently, in part by electricity. The city maintains an efficient fire department, which also acts as a good Samaritan in all cases of dis¬ tress, whether from fire or otherwise. In ac¬ cordance with an ordinance of more than a hun¬ dred years standing, all buildings must be in¬ sured in the city ((Feuerkasse.w The average in¬ surance valuation per house is $41,500.

Naturally, the great demand for real estate and the more luxurious style of architecture have increased valuations considerably. On an average property is worth about $65 per square metre.

Climate. — The mean temperature is 9° Cen¬ tigrade, the thermometer varying from about 0.7° below zero in the middle of January to 19° above zero in the middle of July. During the months of December, January and Febru¬ ary the mean temperature varies from 0.7° be¬ low zero to 0.8° above zero. The mean tem¬ perature for other months is as follows : March, 3.5° ; April, 8.5° ; May, 13.3° ; June, 17.4° ; July, 18.9°; August, 18.1°; September, 14.6°; Octo¬ ber, 9.5° ; November, 3.8°. The mean barome¬ ter is 76.2, the lowest, 56.9 centimetres. West winds prevail.

While, in general, healthful, the climate has been found to be unfavorable to young children in the summer. Stomach troubles are aggra¬ vated by the heat, and the death rate among in¬ fants is thereby considerably increased. The city has been free of epidemics for years.

Recent Development. — Since about 1865 the capital city of the republic has had, in many respects, a brilliant development. In this short period the population has trebled, hygienic con¬ ditions have been wonderfully improved, and the city has become one of the most beautiful, and one of the most visited, cities in the world. More than a million strangers register in the hotels annually, not including the large num¬ ber of visitors who find their temporary quar¬ ters in those parts of the greater city which are under separate municipal control. Indeed, for the stranger, who cannot see the imaginary boundary lines, it is all Berlin. Socially and industrially it is really only one city, and the entire complex of separate municipal corpora¬ tions might be fittingly called Greater Berlin.

E. Hirschberg, Ph.D., Director of Statistical Bureau of Berlin.

BERLIN, N. H., city in Coos County on the Androscoggin River and on the Grand Trunk and the Boston and Maine railroads, 98 miles northwest of Portland, Me. The sur¬ rounding mountains, including Mount Washing¬ ton, add much to the scenery, and the river supplies a water power equivalent to nearly 20,000 horse power. The chief manufactures are sulphite pulp and paper, in connection with the large lumbering industry. The United States census of manufactures of 1914 recorded 19 industrial establishments of factory grade employing 2,886 persons, of whom 2,680 were wage earners, receiving annually $1,974,000 in

wages. The capital invested aggregated $20,- 860,000, and the year's output was valued at $13,090,000; of this, $4,245,000 was the value added by manufacture. The city has a-public library, a hospital, two theatres, parochial and public schools and a fine municipal building. Pop. (1910) 11,780; (1920) 15,104.

BERLIN, Wis., city in Green Lake County, 97 miles northwest of Milwaukee, on the Chicago, Milwaukee and Saint Paul Railroad, and on the Fox River. There are granite quarries in the vicinity, and the dairying and cranberry growing industries are of considerable importance. It manufactures apiary supplies, bricks, dairy supplies,

brooms, gloves, fur coats, mittens, shoes and washboards. It was settled in 1847 and was incorporated in 1856. The gov¬ ernment is vested in a mayor, chosen for two years, and a council. Pop. 4,636.

BERLIN, Treaty of. See Berlin Congress.

BERLIN, University of, a celebrated in¬ stitution of learning in Berlin, Germany. It is, with the exception of Bonn, the youngest of the German universities, but is probably the most famous of them all. It was founded in 1810, when the Napoleonic victories had left Prussia apparently crushed, and had even transferred her great University of Halle to the newly-formed kingdom of Westphalia. Wilhelm von Humboldt was Minister of Education at the time, and Prussia's debt to him for organizing her national school system, with ihe University of Berlin at its head, during that period of national defeat and disaster, is certainly very great. It should be borne in mind, too, that Humboldt was ably seconded by Fichte and Schleiermacher. The first rector of the uni¬ versity was Schmalz ; the first deans of its faculties were Schleiermacher, Biener, Hufe-land and Fichte; and before it was 10 years old it had for professors such men as Niebuhr, Wolff, Bockh, Bekker and Hegel. In more recent years, Ranke, Mommsen, Helmholtz, Grimm brothers, Lepsius, Ritter, Gneist, Savigny, Virchow, and other famous scholars have up¬ held the reputation which the university won for itself at the very start. There are four faculties, theology, medicine, jurisprudence and philosophy, with a total of 377 professors and teachers. It had in 1912 more than 14,000 students, of whom over 8,000 were matriculated. The university also includes several ((institutions,® comprising the seminars, the institutes of physics, clinics, museums and observatories. The university is supported by the state and is under control of the Minister of Education. The administration is* in the hands of the rector and senate, the so-called ˆplenum,® or full body of professors, and the faculties. It has police and judicial powers over its members, exercised by the administration and a university court. Men and women of all nationalities are ad¬ mitted. The choice of professors for distin¬ guished excellence is still maintained. The library consists of over 200,000 volumes and more than that number of university and school '■theses, M *etc.* The chief library facilities for students are to be found, however, in the Royal Library (1.260.000 volumes), in the Reichstag Library (153,000 volumes), the Royal War Academy library (94,000 volumes), and the Royal Prussian and Royal Secret Archives; other collections are also accessible.

From 1906-14 the University of Berlin was exchanging professors with Columbia and Har¬ vard universities, a system by which it maintained permanent chairs at these univer¬ sities in return for an American professorship at home. The arrangement was in the hands of the Prussian government. The (Akademische Auskunftsstelle5 was recently established as a bureau of information, particularly for foreign students.

BERLIN CONGRESS, a gathering at Ber¬ lin, Germany, where the European powers undertook the settlement of the questions grow¬ ing out of the Russo-Turkish War of 1877-78. The Congress met 13 June 1878; and completed its labors with the signing of a treaty on 13 July following. The Treaty of San Stefano (3 March 1878) between Russia and Turkey did not suit the other powers ; and the Congress, convened at the suggestion of Germany, so modified the agreement between Russia and Turkey that the former lost nearly all the fruits of victory. By the new arrangement Bulgaria was divided into two parts, Bulgaria proper and eastern Rumelia. Parts of Ar¬ menia were given to Russia and Persia ; the independence of Roumania, Serbia and Monte¬ negro was guaranteed ; Bosnia and Herzegovina were transferred as protectorates of Austria; and Bessarabia restored to Russia. Greece was also to have an accession of territory. By a separate arrangement previously made between Great Britain and Turkey, the former got Cy¬ prus to administer. Bismarck was the president of the Congress. The more important members were Prince Gortchakoff, Count Andrassy, Lord Beaconsfield, Lord Salisbury, Lord Rus¬ sell, M. Waddington, Count Corti, Karatheodori Pasha, Prince Hohenlohe and General von Bil¬ low. On 9 April 1909 Great Britain and Ger¬ many recognized the annexation of Bosnia and Herzegovina by Austria and signed their con¬ sent to the abrogation of Article 25 of the Treaty of Berlin. France and Russia took the same action on the following day. Consult Hertslet, (The Map of Europe by Treaty) (Vols. Ill and IV, London 1891); Holland, (The European Concert in the Eastern Questions) (Oxford 1885) ; id., (Studies in Inter¬ national Law5 (Oxford 1885).

BERLIN DECREE, a d ecree issued by Napoleon, 21 Nov. 1806, which

declared the British Islands in a state of blockade. It for¬ bade commerce with them and trade in their merchandise, and declared all merchandise be¬ longing to Englishmen, or transported from England, lawful prize. Its. effect was to inflict great injury on the American carrying trade. See Continental System.

BERLIN MEMORANDUM , a remon¬ strance addressed to the Turkish government in May 1876 by the principal European Powers, insisting on a two months' armistice between the Sultan and his European subjects who were in rebellion, in order that terms of peace might be negotiated. See Andrassy Note.

BERLINER, Emile, bar-le'ner, a'mel, American inventor: b. Hanover, Germany, 20 May 1851. After graduating at Wolfenbiittel in 1865. he came to America five years later, and in 1878 was appointed chief inspector of instru¬ ments by the Bell Telephone Company. He

invented the loose contact telephone transmitter or microphone, known by his name, and the device called the gramophone. He has devoted his energies to perfecting the telephone, and has secured many patents for his inventions. He planned and was a member of the Washington milk conference of 1907. He has been engaged since 1901 in an educational campaign against the dangers of raw milk and other dairy prod¬ ucts. He was the first to have made and used in aeronautical experiments the light weight revolving cylinder internal combustion motor, at one time extensively used on aeroplanes. He is the author of a number of pamphlets deal¬ ing with the prevention of sickness and has published (Conclusions, } a work dealing with philosophical and religious questions.

BERLIOZ, Louis Hector, French com¬ poser: b. Cote Saint Andre, 11 Dec. 1803; d. Paris, 8 March 1869. His father, a physician, desired his son to follow the same career but the latter early in life was greatly attracted to music, and soon found his way to the Paris Conservatory library, where he studied the masters. Pie studied harmony under Lesueur and composed a mass which was performed at Saint Roch. In 1823 he was admitted to the Conservatory and at once his great talent be¬ came evident, and at the same time his dis¬ regard for the traditional canons. Bent on giving expression to his own ideas, Berlioz proceeded by violating all precedents and estab¬ lished rules. As a consequence he was never complete master of the various forms of com¬ position. With his (Fantastic Symphony,5 and the cantata, <Sardanapalus) he established a new school of composition which

came to be known as the school of program music. Com¬ posers of the school seek to express by means of music definite ideas and moods and even to relate definite events. Berlioz had won the Prix de Rome with <Sardanapalus) in 1830 and his residence in Italy furnished him with in¬ spiration for his gifts. He wrote the overture to (King Lear) and <Lelio,) a symphonic poem. He took up journalistic work successively for the Correspondent, the Courrier de l' Europe, the Revue Europeenne and the Gazette Musicale de Paris. His style was marked by its brilliancy and power and by unswerving honesty and candor. In 1839 he was made conservator; and in 1852 librarian at the Conservatory. The symphony, (Harold en Italie) (1834), the (Messe des morts) (1837) and (Romeo et Juliette5 (1839) won him high praise from the critics, but his opera, (Benvenuto Cellini5 (1838), was a dismal failure. In 1843 Berlioz made a tour of Germany and for the next 10 years he toured Austria, England, Russia and other countries of Europe, and met with success everywhere. In 1856 he was elected to the Academy. (Les Troyers5 (1863) proved a failure, which greatly disheartened the composer. His writings on music and musical topics are among the best of their kind. His (Traite d'in-strumentation5 expressed his views on instru¬ mentation and long remained the first work in its field. In his lifetime Berlioz did not receive his due measure of appreciation. It is true he lacked melodic invention but he was master in all else. His place in the history of music is most important. He exerted a wide influence on the advance in orchestral technique and he is the acknowledged father of modern orchestration.

There is a German translation of his collected writings by Richard Pohl (4 vols., 1864). A complete edition of his compositions and writ¬ ings in 17 volumes is in preparation at Leipzig under the editorship of Breitkopf, Malherbe, Hartel and Weingartner. Consult Ambros, (Bunte Blatter } ; Hippean, (Berlioz, l'homme et l'artiste) (Paris 1888) ; Julbien, A., (H. Berlioz) (Paris 1888) ; Pohl, R., (H. Berlioz, S.tudien und Erinnerungen) (Leipzig 1884) ; id., (H. Berlioz, Leben und Werke) (ib. 1900) ; the autobiographic (Memoirs) (Paris 1870; English trans., R. & E. Holmes, London 1884) ; Prud'- homme, J. G., <Hector

Berlioz, 1803-1869) (Paris 1905).

BERM, or BERME. In fortification, a narrow, level space at the foot of the exterior slope of a parapet, to keep the crumbling mate¬ rials of the parapet from falling into the ditch. It is from four to eight feet in width and is about level with the natural ground surface.

In engineering, a ledge or bench on the side or at the foot of a bank, parapet or cutting, to catch earth that may roll down the slope, or to strengthen the bank.

BERMEJO, ber-ma'ho, a South American river rising in Tarija, Bolivia, and flowing across Argentina to the Paraguay River, which it enters about 140 miles south of Ascension. It is navigable for about half of its length of 1,300 miles. It is of great importance as a waterway from Paraguay to the Andine region. There is a steamer service in operation on the river. It was first thoroughly explored by Cornejo in 1790.

BERMONDSEY, a metropolitan borough in the southeast of London, England, bounded on the west by Southwark. Area, 1,500 acres. It is a congested district of mean streets, and is the centre of the leather trade. The riverside wharves give employment to numbers of the laboring population. Pop. (1911) 125,903. Con¬ sult local histories by Bell (1880), Clarke (1901), Phillips (1841), and Besant's (South London > (1899).

BERMUDA, ber-mu'da, or SOMERS, ISLANDS, a cluster of small islands in the Atlantic Ocean, belonging to Great Britain, and situated 580 miles southeast of Cape Hatteras and 677 miles from New York. They number 360, but 20 are for the most part so small and so barren that they have neither inhabitants nor name. They were first discovered by Juan Bermudez, a Spaniard, in 1522; in 1609 Sir George Somers, an Englishman, was wrecked here, and after his shipwreck, formed the first settlement. The most considerable of these islands are Saint George, Bermuda or Long Island (with the chief town, Hamilton, popu¬ lation 2,630, forming the seat of the governor), Somerset, Saint David's and Ireland. They are chiefly used as a naval and military station, the strategic importance of which has increased since the construction of the Panama Canal and has led to improvements in the spacious harbor of Saint George. The island of Ireland is oc¬ cupied by a government dockvard and other naval establishments, while Boaz and Watford islands have the military depots. The military headquarters are at Prospect. The climate is generally healthful and delightful, the air being mild and moist at all seasons. It is not adapted,

however, for consumptive patients. The ther¬ mometer seldom falls below 40° F., and rarely rises above 85°. These islands with their scenic attractions have become a popular holiday re¬ sort for Americans, and plentiful hotel accom¬ modation is supplied at Saint George's and Hamilton. The surface is rather irregular; the soil, though light and stony, is in general rich and fertile. The islands form a nearly con¬ tinuous chain aid are connected almost unin¬ terruptedly by roads, bridges and causeways. The water is in general salt; there is but liitl ' fresh except rainwater, preserved in cisterns The inhabitants export early potatoes, onions, lily bulbs, etc., nearly all of these products be¬ ing shipped to New York. The value of the exports ranges from $585,000 to $635,000 an¬ nually; that of the imports from about $2,- 851,000 to $3,185,000. The revenue is about $405,000. Pop. about 20,000. Consult Bell, E. Y., (Beautiful Bermuda) (New York 1902).

BERMUDA GRASS (Capriola dactylon), a perennial grass cultivated in the West Indies and the United States, where it is of special value on the sandy soils of the Southern States. It is a valuable fodder grass for warm cli¬ mates. It will grow in any soil not too damp, but in America it matures only in the extreme south. It is probably a native of India, but has no spread throughout the warmer portions of the globe. It is a low, creeping plant, root¬ ing at the joints and has short flower stalks. It makes a dense sod. It turns brown under frost. Because of its rooting qualities it is dis¬ lodged with difficulty once it is well established. It is propagated from root stocks as well as from its seed.

BERMUDA HUNDRED, Va., a peninsula

in Chesterfield County, formed by the junction of the Appomattox and James rivers, occupied by Gen. B. F. Butler, who, in 1864, commanded the Army of the James, numbering about 25,000 Federals, where he might intrench himself and await Grant's arrival. In the vicinity of this position there was constant fighting between Butler's troops and those of the Confederates under General Beauregard whose forces were 20,000 strong. The fighting continued from 16 May to 30 May. On the 16th Heckman's brigade was destroyed by the Confederates, who were then pushing on to Bermuda Hun¬ dred, when Ames and Gillmore came up and Beauregard's plans miscarried. On the 19th the Confederates assaulted the Federal rifle pits under Ames and Terry, but without suc¬ cess. Skirmishing continued until the 30th, when the Confederates desisted. Bermuda

Hundred was a valuable position, since it was very near both Richmond and Petersburg; but Butler was charged with military incapacity in having (<corked himself up in a bottle. M The population of the district was 2,554 in 1910. Consult Johnson and Buel, (Battles and Lead¬ ers of the Civil War} (Vol. IV, New York

1887).

BERMUDEZ, Remigio Morales, bar-moo'dath, ra-me'je-o mo-ra'lez, Peruvian states¬ man : b. Tarapaca province, 30 Sept. 1836; d. Lima, 31 March 1894. He began business in the nitrate trade in his native province. In 1854, as a lieutenant, he joined the revolution¬ ary army which finally overthrew General

Echinique's government. In 1864 he joined the revolution against President Castilla. In the war with Chile he led the force that marched to Arica. When Caceres was elected President in 1886, Bermudez was chosen Vice-President and was elected President in 1890.

BERN, barn, or hern, Switzerland, the chief canton of the confederacy, situated in the western half and surrounded by the cantons of Neuchatel, Freiburg, Vaud, Valais, Uri, Un-terwalden, Lucerne and Solothurn, being partly bounded also by France and Alsace; area 2,657 square miles. The more northern portion of the canton has beautiful plains and valleys and a fertile and highly cultivated soil, producing corn, wine and fruits; the Emmenthal, one of the richest and most fertile valleys in Switzer¬ land, raises the finest cattle and produces a celebrated cheese. The southern portion of the canton, the Bernese Oberland, begins at the foot of the high mountain chain between this canton and that of the Valais and extends to its summit. The lower valleys produce good fruits and are fertile ai d agreeable: higher up are excellent Alpine pastures; then succeed bare rocks, extensive glaciers (the source of magnificent streams and waterfalls) and some of the highest mountains of Switzerland, as the

Finsteraarhorn, the Schreckhorn and Wetter-horn, the Eiger, the Jungfrau. The chief trade of the canton is in linen and woolen manufac¬ tures and cattle-raising. Pop. about 550,000.

BERN, Switzerland, the capital of the can¬ ton of the same name (see above) and of the whole confederation since 1848, situated on an elevated rocky peninsula, washed on three sides by the Aar, which is crossed by several bridges, including the handsome Nydeck Bridge, the huge iron Kirchenfeld Bridge and the Korn-haus Bridge (opened in 1898), with a roadway 160 feet above the Aar and a principal arch of 380 feet span. The streets are, for the greater part, straight, wide and well paved ; and the houses, partly provided with piazzas, are sub¬ stantially built of stone. The streets are puri¬ fied by rills of water and adorned with foun¬ tains. The city gets water for its drinking sup¬ ply and for the motive power of its electric plants by means of a dam 1,000 feet long across the Aar. Among the public buildings are the great Gothic cathedral 1421-1573; the Church of the Holy Spirit; the University; the hall of ihe Swiss Federal Council; the art museum, containing the municipal picture gallery; a hos¬ pital ; the townhouse, a Gothic edifice of the 15th century, restored 1868; the mint, corn hall, historical and archaeological museum; the nat¬ ural history museum; observatory; deaf-and- dumb institution; infirmary; orphan and luna¬ tic asylums. The public library possesses great treasures of printed books and manuscripts. Trade and commerce are lively; the manufac¬ tures consist of woolens, cottons, silks, machin¬ ery, chocolate, scientific instruments, *etc.* It has two great annual fairs and a large cattle and horse market. There are street railroads with compressed air and electricity as motive power. Steam roads run to the suburbs. At Bern is located the central office of the Inter¬ national Postal Union. The city was founded in 1191 and in 1218 the German Emperor Fred¬ erick II declared it a free city of the empire and confirmed its privileges by a charter, which

is still preserved. In 1353 it entered into the Helvetic Confederacy. The government of the town from early times was democratic but in the 16th century a tendency toward aristocratic domination set in. The invasion by the French in 1798 overthrew the aristocratic regime. The struggle between Liberals and Conservatives during the 19th century resulted in victory for the Liberals. The Constitution was repeatedly revised in a democratic sense and after 1870 the referendum was developed with great com¬ pleteness. In 1405 the greater part of the c'.ty was destroyed by fire, but it was afterward regularly rebuilt. The bear, as the heraldic emblem of Bern, figures

frequently in a sculp¬ tured form ; and a number of these animals in the flesh are kept at the cost of the municipal¬ ity. There is a curious clock-tower containing mechanism by which the striking of the hours is heralded by the crowing of a cock and a procession of bears. Pop. (1910) 85264.

BERN, University of, a state educational institution having its origin in a minor school which in the early part of the 16th century was much enlarged by the demand for accommoda¬ tions for theological students. About 200 years later it expanded by the institution of depart¬ ments of law, science and medicine. The Na¬ poleonic period seriously affected the univer¬ sity, as it did others near to the French fron¬ tier, but in 1834 it was formally reorganized as a state university. It has an income of about 900,000 francs and an endowment of 1,000.000 francs. Its 1,800 students include over 300 women and are divided among the faculties of evangelical theology, Catholic theology, philosophy, law, medicine and veterinary med¬ icine. The library was incorporated in 1905 with the city library at Bern and numbers over 200,000 volumes.

BERNADOTTE, Jean Baptiste Jules,

bar-na-dot', zhon baptest zhool, king of Swe¬ den and Norway, b. Pau, 26 Jan. 1763; d. 8 March 1844. He was the son of an advocate of Pau and enlisted in a French regiment of marines at the age of 17. He was made a sub¬ altern in 1790 and thereafter his promotion was rapid. In 1794 he was appointed geieral of division and distinguished himself greatly in the campaign in Germany and on the Rhine. After the battle of Neuwied he was introduced for the first time to Bonaparte, who conceived the highest opinion of his abilities, though a constant suspicion of Napoleon seems always to have been present in the mind of Bernadotte. In 1798 he married Mademoiselle Clary, sister-in-law of Joseph Bonaparte. The following year he became Minister of War, but was shortly obliged to resign. On the establish¬ ment of the empire Bernadotte was created Marshal of France and (after Austerlitz) Prince of Ponte-Corvo. At the head of an army of observation stationed in the north of Germany, he fixed his headquarters at Ham¬ burg. At the battle of Wagram (1809) he led the Saxon contingent. At this time Gustavus IV had been driven from the throne of Sweden. The Duke of Sudermania assumed the crown under the name of Charles XIII ; and as he was far advanced in years the Diet had nomi¬ nated, as his successor, the Prince of Holstein-Augustenburg, when the latter died in a myste¬ rious manner. The heir-apparency to the

Swedish crown was then offered to the Prince of Ponte-Corvo. This offer was accepted by Bernadottc with the consent of the Emperor; and in October 1810 he arrived in Sweden, where, having previously abjured the Roman Catholic religion, he was proclaimed heir-ap¬ parent to the throne under the title of Prince Charles John. He had not long been estab¬ lished in this dignity before serious disagree¬ ments took place between him and Bonaparte, whose blockade of the Continental ports was very detrimental to the commercial interests of Sweden. The result was a complete rup¬ ture and the accession of Sweden in 1812 to the coalition of sovereigns formed against Na¬ poleon. At the battle of Leipzig Prince Charles John contributed effectually to the victory of the Allies. The acquisition of Norway was one of his chief aims; it was provisionally ceded from Denmark under the Treaty of Kiel (1814), but a military campaign was required to make it effective. On the general re-establishment of the European dynasties at the termination of Napoleonic war, Bernadotte retained his position as crown prince and became king of Sweden in 1818, under the title of Charles XIV. During his reign agriculture and com¬ merce made great advances, many important public works were completed, and the King, though he could not speak their language, was popular with his subjects. Consult Meredith, c Memoirs of Charles John, King of Sweden and Norway5 (London 1829)

BERNARD, ber'nard, ber-nard', or (Fr.) bar-nar, Saint, of Ciairvaux, French eccle¬ siastic: b. Fontaines, Burgundy, 1091; d. 1153. In 1113 he became a monk at Citeaux; in 1115 1st abbot of Ciairvaux, near Langres. An austere manner of living, solitary studies, an inspiring eloquence, boldness of language and the reputation of a prophet, rendered him an oracle to all Christian Europe. In 1128 he drew up the rules for the new order of Knights Templars and was instrumental in securing its recognition. He was the founder of 70 mon¬ asteries. Such was the spell of his oratory that it is said mothers hid their sons, wives their husbands, companions their friends, that they might escape the contagion of his spiritual en¬ thusiasm. He promoted the Crusade of 1146, with almost fatal success, as of the many thou¬ sands who gave up home and kindred to join that adventure, few returned. Its failure, in ˆhe face of his glowing prophecies, was a cruel

disappointment to him. He succeeded, how¬ ever, in quieting the fermentation caused about that time by a party of monks against the Jews in Germany. He declined all promotion and in the rank of abbot of his <(beloved Jerusa¬ lem® (as he used to call Ciairvaux), he con¬ tinued with all humility, but with great bold¬ ness, his censures of the laxity of the clergy and his counsels to the Popes. Innocent II owed to him the possession of the right of in¬ vestiture in Germany and Eugenius III his education. He was, at the same time, the um¬ pire of princes and bishops and his voice in the synods was regarded as divine. By his rigid orthodoxy and his remarkable eloquence, which was always directed to the promotion of practical Christianity, he did much to confirm the power and influence of the Church in the Middle Ages. JJi§ sermons were preached in

Latin, he was honored with the title of the ((Mellifluous Doctor,® and he is esteemed by the Catholic Church as the last of the Fathers. He was a strong opponent of Abelard and Gil¬ bert of Poree in their philosophical teachings. He is the author of two well-known hymns, ((Jesus, the Very Thought of Thee,® and <(G Sacred Head, Now Wounded.® He was canon¬ ized by Alexander III in 1174. The monks of the reformed order of Cistercians, which he founded, are named in his honor. The best edition of his works is that of Mabillon (Paris 1690, 2 vols. ; reprinted Paris 1839-40). Con¬ sult the works bearing his name by Eales, S. J. (1890); Morrison, J. C. (1863); Ratisbonne (1841; English trans., 1878); Sparrow-Simp- son (1895); Storrs (1893); and Vacandard

(1895).

BERNARD, Saint, of Mentone (Men-thon) : b. Mentone, Savoy, 923; d. Novara, May 1007. Very little is known of his life except that he was at one time archdeacon of the city of Aosta and that he later entered upon a monastic life and founded the hospices on the Great and Little Mount Saint Bernard, about 962 a.d. For his biography consult L. Burgener (2d ed., Lucerne 1870).

BERNARD, Alexis Xyste, Canadian cler¬ gyman : b. at Beloeil, 29 Dec. 1847. He was educated at Montreal College, Grand Seminary of Montreal and the College of Sorel, ordained to the priesthood in 1871 and consecrated bishop of Saint Hyacinthe 15 Feb. 1^06.

BERNARD, ba-nar', Charles de, properly Bernard du Grail de la Villette, French novel¬ ist : b. Besangon, 25 Feb. 1804; d. Neuilly, 6 March 1850. He entered upon the study of the law, but soon gave it up to engage in journal¬ ism. He was a disciple of Balzac, whom he resembles in his power of realistic description and psychological analysis; but he possesses a purer and more nervous style and above all is content with a less minute elaboration of story and characters. His first piece, ˆhe Gerfal¬ conˆ made a hit with its clever description of the literary cliques. Everywhere he evinces clear insight into the foibles of society. Of his novels, the following may be named as only second in rank to his masterpiece, (The Ger¬ falcon5, (A Magistrate's Adventure5 ; (The Gordian Knot) ; (Wings of Icarus5 ; (The Lion's Skin) ; (The Country Gentleman.5 He collaborated with C. H. L. Laurengot in produc¬ ing two comedies. His (QEuvres completes5 were published in 12 volumes after his death. For appreciative criticisms consult James, Hen¬ ry, (French Poets and Novelists5 (1878) and Thackeray, W. M., (Paris SketchBook.5

BERNARD, Claude. French physiologist: b. Saint Julien, Rhone, 12 July 1813; d. Paris, 10 Feb. 1878. His parents were small rural proprietors. The parish cure taught Bernard at first, and he continued his studies at the col¬ lege of Villefranche and at Lyons. He was destined at first for the profession of pharma¬ cist, which he soon abandoned for literature. St. Marc Girardin, to whom he submitted one of his works, dissuaded him from following a literary career and Bernard turned to medicine, He paid particular attention to anatomy, dis¬ section and operation. In 1839 he became in¬ terne and in this capacity became associated

with Magendie at the Hotel Dieu. Under the direction of the latter he was soon attracted to the study of physiology and took Magendie's course at the College de France in 1841. In 1843 Bernard published his first work on an¬ atomy and physiology, the same year his thesis on gastric juice secured to him his doctorate. Within a few years his discoveries placed him in the first rank among the physiologists of

France and of Europe. In 1847 he assisted Magendie at the College de France and suc¬ ceeded to the latter's chair of medicine in 1855. In 1854 he entered the Academy of Sciences and entered on his duties in the newly-founded chair of experimental physiology at the Sorbonne. In 1868 he was succeeded at the Sorbonne by Paul Bert and became professor of general physiology at the Museum of Natural History. He was elected to Flouren's place in the French Academy in 1868, and became sen¬ ator of the empire in 1869. Bernard exer¬ cised a great influence on the science of physi¬ ology through his works and his important dis¬ coveries, also by his lectures at the museum, and by his activity as president of the Societe de Biologie. In his later years he was a world¬ wide figure and his prestige, gained through his discoveries, was sustained by his personal char¬ acter. His death caused universal regret. The Chamber of Deputies, on the motion of Gam-betta, voted him a public funeral, the first scientist so honored. A monument by Guil¬ laume was erected to his memory on the grounds of the College de France. It is diffi¬ cult to point out in detail all his original discov¬ eries ; they cover the entire field of physiology and time has left them almost intact. His works include (Legons de physiologie experimentale appliquee a la medicine5 (2 vols., 1854 — 55) ; (Legons sur les effets des substances tox-iques et medicamenteuses5 (1857) ; (Legons sur la physiologie et la pathologie du systeme nerveux5 (1858) ; (Legons sur les proprietes physiologiques et les alterations pathologiques des liquides de l'organisme5 (1859) ; (Leqons sur la chaleur animate5 (1876) ; (Legons sur la diabete et la glycogenese animate5 (1877) ; (Legons sur les proprietes des tissus vivants5 (1866); (Physiologie generate 5 ˆ(1872);

(Legons de physiologie operatoire5 (1879) ; (La science experimentale5 (1878), and (Introduc¬ tion a la medicine experimentale5 (1876). Con¬ sult Malloizel, G., (Bibliographic de travaux scientifiques5 (1881) and the notices by Chau-veau, Dartre and Paul Bert in the Proceedings5 of the Societe de Biologie for 1886.

BERNARD, ber'nard, Sir Francis, Eng¬ lish administrator: b. Nettleham, England, 1714; d. Aylesbury, England, 16 Tune 1779. Gradu¬ ated at Oxford in 1736, he became a dis¬ tinguished member of the bar, and was made governor of New Jersey 1758-60, and of Mas¬ sachusetts Bay 1760-69. At first he enjoyed the good will of the people; but when the di¬ vision into two parties came he favored the Crown and did a great deal toward precipitat¬ ing the Revolution by his aggressive attempts to strengthen the royal authority. He was finally recalled on account of the unpopularity resultant on his bringing troops into Boston. His departure was the occasion of general

re¬ joicing. He manifested a special interest in Harvard College, and when its library was

destroyed in 1764 he obtained funds for its reconstruction. He published (Letters to the Ministry* (1769) ; (Select Letters on the Trade and Government of America5 (1774). In 1848 his (Letter Books5 were purchased by Dr. Jared Sparks, who bequeathed them to the library of Harvard University.

BERNARD, Jacques, French Protestant clergyman and author: b. Nions, in Dauphine, 1 Sept. 1658; d. The Hague, 27 April 1718. When the Edict of Nantes was revoked, Ber¬ nard went to Holland, and while there founded a school of philosophy and belles-lettres at The Hague. He was for a time assistant professor at Leyden. He became editor of the Bibliotheque Universelle, and later editor of the Republique des Lettres. He wrote and pub¬ lished (Recueil de traites de paix, de treves, de neutrality et d'autres actes publics

faits en Europe5 (1700) ; (Actes et memoires des negociations de la paix de Ryswick5 (1725), *etc.*

BERNARD, Montague, English lawyer: b. Gloucestershire, 28 Jan. 1820; d. Overross, 2 Sept. 1882. He was educated at Trinity Col¬ lege, and was professor of international law at Oxford 1859-74. In 1871 he was one of the high commissioners who signed the Treaty of Washington, and on his return home was made a privy councillor. In 1872 he assisted Sir Roundell Palmer in preparing the British case for the Geneva Arbitration Tribunal. He re¬ signed his professorship at Oxford in 1874 be¬ cause of the multiplicity of his public employ¬ ments, but he also took an active interest in the university. He published (Four Lectures on Subjects Connected with Diplomacy5 (1868), and (Historical Account of the Neutrality of Great Britain during the American Civil War5

(1870).

BERNARD, Pierre Joseph, bar-nar, pe-ar zho-sef, or GENTIL (zhon-tel) BERNARD, French poet: b. Grenoble, 26 Aug. 1708; d. Choisy-le-Roi, 1 Nov. 1775. At an early age he showed a great taste for poesy, and was at first an attorney's clerk, but afterward became secretary to Marshal de Coigny, who had com¬ mand of the army of Italy in 1733-34. After the marshal's death he obtained a lucrative ap¬

pointment, through the protection of Madame Pompadour, and was then able to indulge his poetic faculties. Few writers were more popu¬ lar in their own day than Bernard. He wrote an opera, (Castor and Pollux,5 which met with great success; the <Art of Loving,5 and a num¬ ber of odes, songs, *etc.* His works were col¬ lected and reprinted by F. Drujon (1883). Con¬ sult (Correspondance litteraire, philosophique et critique5 (16 vols., Paris 1877-82), and Vol¬ taire, (Correspondance generate.5

BERNARD, Simon, bar-nar, se-moii, French engineer: b. Dote, 28 April 1779; d. 5 Nov. 1839. He served as aide-de-camp to Napoleon; was wounded in the retreat after the battle of Leipzig; superintended the defense of Torgau, and was present at Waterloo. In 1816 he came to the United States ; was com¬ missioned brigadier-general of engineers, and planned an elaborate system of seacoast de¬ fenses, the most important of the works built by him being Fort Monroe. He was also asso¬ ciated with the building of the Chesapeake and

Ohio canals and the Delaware breakwater. In 1831 he returned to France, where he designed the fortifications of Paris. In 1834 he was appointed inspector-general of engineers, and from 1836-39 was Minister of War.

BERNARD, ber-nard, William Bayle,

Anglo-American dramatist : b. Boston, Mass., 27 Nov. 1807 ; d. 5 Aug. 1875. His first work was a nautical drama called (The Pilot. } This proved successful and encouraged him to pur¬ sue a literary career. He wrote in all 114 plays, of which the best known are <Rip Van Winkle* ; (The Man About Town' ; (Marie Ducange,* and (The Boarding School.*

BERNARD, ber'nard, Great Saint, a cele¬ brated pass of the Pennine Alps, Switzerland, in the canton Valais, on the mountain-road leading from Montigny to Aosta in Piedmont. On the east side of the pass is Mount Velan, and on the west side the Point de Dronaz ; there is no

mountain known by the name of Saint Bernard. Almost on the very crest of the pass is the famous hospice, among the high¬ est permanently inhabited spots of Europe, 8,700 feet above the level of the sea. There is a massive stone building capable of accommo¬ dating 70 or 80 travelers with beds and of sheltering 300. As many as 500 or 600 have received assistance in one day. It is situated on the highest point of the pass, exposed to tremendous storms from the northeast and southwest, and is tenanted by a prior and 15 brethren of the order of Saint Augustine, who have devoted themselves by vow to the aid of travelers crossing the mountains. The climate of this high region is extremely rigorous. There is a lake on the summit, at a short dis¬ tance from the hospice, on which ice has fre¬ quently remained throughout the whole year. From the difficulty of respiration in so elevated a locality, and the severity of the climate, few of the monks survive the time of their vow, 15 years from the age of 18, when they are de¬ voted to this service. The famous breed of dogs kept at Saint Bernard to assist the breth¬ ren in their humane labors have died out, and their place is now taken by Newfoundland dogs. In the midst of tempests and snowstorms the monks, accompanied by some of the dogs, set out for the purpose of tracking those who have lost their way. If they find the body of a traveler who has perished they carry it into the vault of the dead, where it is wrapped in linen and remains lying on a table till another victim occupies the place. It is then set up against the wall among other dead bodies, which, on account of the cold, decay so slowly that they are often recognized by their friends after the lapse of years. Adjoining this vault is a kind of burying-ground, where the bones are de¬ posited when they accumulate too much in the vault. It is impossible to bury them, because there is nothing around the hospice but naked rocks. The institution is supported partly by its own revenues, partly by subscriptions and donations. The pass appears to have been known at a very early period ; and a Roman road led down the Piedmontese side of the mountains. The remains of a massive pavement are still visible; and the cabinet of the hospice contains votive tablets, bronze figures and other antiques found in the vicinity. The hospice was founded in 962 by Saint Bernard of Men-thon, an Italian ecclesiastic, for the benefit of those who performed pilgrimages to Rome. In May 1800 Napoleon led an army of 30,000 men, with its artillery and cavalry, into Italy by this pass. A carriage road has been built to its summit; but the importance of the pass has diminished with railroads.

BERNARD, Little Saint, a mountain of Italy, belonging to what are called the Graian Alps, about 10 miles south of Mount Blanc. It stands between Savoy and Piedmont, having the valley of the Isere, in the

former, on the west, and that of the Doire, in the latter, on the east. The pass across it is one of the easiest in the Alps, and is supposed by many to be that which Hannibal used. The hospice, at the summit of the pass, has an elevation of 7,192 feet.

BERNARD DE CHARTRES, bar-ndr de shartr (surnamed Sylvestris), a writer of the 12th century, who has been lauded as the ablest Platonic of his time, and wrote two works, now lost, in one of which he endeavored to reconcile Plato and Aristotle, and in the other maintained the doctrine of a Providence, and proved that all material beings, possessing a nature subject to change, must necessarily perish. Another work under the name of Bernard Sylvestris still exists, and is composed of two parts, dis¬ tinguished by the names of (Megacosmus* and (Microcosmus,* or the (Grcat World) and the (Little World.* He reduces all things to two elements — matter and ideas. Matter is in it¬ self devoid of form, but susceptible of receiv¬ ing it; ideas reside in the divine intellect, and are the models of life, and from their union with matter all things result. M. Cousin has published extracts from these works.

BERNARD OF CLUNY, Benedictine

monk: b. at Morlaix, about 1100; d. 1156. He was a member of the Benedictine monastery at Cluny under Peter the Venerable, and is best known as the author of three hymns included in almost every English collection: “Jerusalem the Golden” ; “For Thee, O Dear, Dear Coun¬ try,” and “The World is Very Evil.” These are a part of his 3,000-line poem (De Contemptu Mundi,* in dactylic hexameters, trans¬ lated by J. M. Neale.

BERNARD DE VENTADOUR, bar-nar

de von-ta-dor, French troubadour: b. about 1125; d. Dalon, about 1197. Love songs (To Eleonore,* and various amatory lays to courtly dames, form the riches of his delicate verse.

BERNARDAKIS, Demetrios, ber-nar’da-kis, da-ma’tre-os, Greek poet and dramatist : b. Santa Marina, Lesbos, 2 Doc. 1834. After a course of study at Athens and in German uni¬ versities he was (with one considerable inter¬ mission) professor of history and philology in the University of Athens, 1861—82, when he went back to Lesbos. He is author of a spirited Pindaric ode for a jubilee occasion, of several dramas and of a satire, (The Battle of Cranes and Mice) ; he has also written a (Universal History) ; a (Church History) ; and a spirited tractate, Confutation of a False Atticism,* directed against the would-

be Attic purists.

BERNARDES, Diego, ber-nar'des. de-a' go, Portuguese poet : b. Ponte de Lima about 1530; d. 1605. He was called "the Sweet Singer of the Lima," a streamlet immortalized in

his verse. He left his native valley in 1550 and attached himself to the master-singer, Sa de Miranda, who lived retired on his estate, Quinta da Tapada, a devotee of the Muses. Here Bernardes wrote (The Lima* ; (Various Rimes — Flowers from Lima's Banks) ; Vari¬ ous Rimes to the Good Jesu,* and other poems.

BERNARDIN OF SIENA, Italian eccle¬ siastic: b. Massa, Italy, 8 Sept. 1380; d. Aquila, Abruzzi, 20 May 1444. He became a Francis¬ can friar in a monastery near Siena in 1404, but desiring to make a pilgrimage to the Holy Land, was appointed a commissary of that country, and was thus enabled to gratify his wish. After his return he acquired a great reputation as a preacher, and three cities were rival suitors for the honor of having him as bishop. Bernardin, however, was unwilling to accept the distinction, and was made vicar-general of the friars of the Observantine order in Italy. He is said to have founded more than 300 monasteries. In 1450 he was canon¬ ized by Pope Nicholas V. His works appeared at Venice in 1591 in 4 volumes quarto, and at Paris in 1636 in 2 volumes folio. They consist of essays on religious subjects, sermons and a commentary on the book of Revelation. A biography by J. P. Toussaint was published (Regensburg 1873), and one by L. Bianchi (Siena 1888).

BERNARDINES, ber'nar-denz. See Cis¬ tercians.

BERNARDO DEL CARPIO, ber-nar'do del kar'pe-o, Spanish knight-errant (the fruit of a secret marriage between Ximena, the sister of Alphonso the Chaste, and of Don Sancho, lord of Saldagua) : b. in the 9th cen¬ tury. Alphonso, irritated at the marriage, put out the eyes of Don Sancho and imprisoned him in a castle, but spared Bernardo and brought him up carefully at his court. In course of time Don Bernardo

grew up to be a warrior, and distinguished himself in the Moor¬ ish wars, in the hope that the King would be bent to pity and set his father at liberty. Al¬ phonso was inflexible, and Bernardo withdrew to his paternal domains; and leaguing with other lords opposed to the court, set him at defiance. On the accession of Alphonso the Great, Bernardo returned to court, and again performed many exploits against the Moors, hoping to be rewarded with his father's free¬ dom. He was once more denied the boon, and withdrew as before, not only leaguing with his friends, but making alliance with the Moors. Alphonso agreed at length to give up his father on receiving the surrender of the castle of Carpio. Bernardo, true to his word, per¬ formed his part of the stipulation, and then learned with indignation that Alphonso had practised an infamous deception upon him, as his father had been for some time dead. He disdained any longer to tread the Spanish soil, and removed to France, where he spent the remainder of his life as a knight-erran*.

BERNAUER, ber-now-er, Agnes, Bava¬ rian lady celebrated for her beauty and her unfortunate fate; d. 2 Oct. 1435. She was the daughter of a poor citizen, said to be a barber of Augsburg. Duke Albert of Bavaria, only on of the reigning prince, met Agnes at a tournament given in his honor by the grandees

of Augsburg, became enamored of her, and, as he could not prevail on her to be his mistress, secretly married her. He conducted her to his own castle of Vohburg, and for a time suc¬ ceeded in concealing the alliance he had con¬ tracted; but his father wishing to marry him to Anne, daughter of the Duke of Brunswick, he was compelled to acknowledge his marriage with Agnes. His father refused to credit it, and having caused the Duke to be denied ad¬ mission to a tournament on the plea that he was living unlawfully with a woman, Albert openly proclaimed his marriage and caused Agnes to be recognized as Duchess of Bavaria, giving her for residence the castle of Straubing on the Danube. The Duke of Bavaria, incensed at this open avctwal of a misalliance, caused Agnes to be seized in her castle during the absence of his son, brought her before a tribu¬ nal specially constituted, where she was accused of magic, and being condemned, had her hands tied together and was thrown into the river. Albert in revenge took arms against his father, but the Emperor Sigismund finally reconciled them. The story is a favorite theme with the Bavarian poets.

BERNAY, bar-na, France, town in the de¬ partment of Eure, 25 miles west-northwest of Evreux and 17 miles southeast of Lisieux, on the

right bank of the Charentonne. It has two fine old churches, a communal college, a hospi¬ tal, a court of first resort, a board of manu¬ factures, an agricultural society and a savings bank. It has important manufactures of cloth and flannel, tape, linen and cotton goods ; and spins a good deal of cotton, thread and worsted. It has also bleachfields, dye works, tanneries, *etc.* Its trade is principally in grain, cider, cloth, iron, paper, leather, linen, horses and cattle. The horse-fair, held in Lent, is one of the greatest in France, and is attended by pur¬ chasers from all parts of the country. Pop.

7,883.

BERNBURG, bern-burH, Germany, town in the duchy of Anhalt, capital of the former duchy of Anhalt-Bernburg ; on both sides of the Saale, northwest from Leipzig, with which, as well as with Berlin and Magdeburg, it is connected by railway. It is divided into the old, the new and the high town, the first two sur¬ rounded by walls and communicating by a bridge 173 feet long. Bernburg is well built and contains several well paved and well lighted streets. The principal building is the palace, situated, with a garden, on the highest part of the high town. It is very ancient, but has received numerous modern additions and con¬ tains a picture gallery, theatre and church. Be¬ sides an oil-mill and several breweries and dis¬ tilleries, there are manufactories of paper and earthenware, copper and tin wares, lead, zinc, cement and starch, *etc.* Old Bernburg was a fortified town as early as the 10th century. Pop. about 35,000.

BERNE-BELLECOUR, Etienne Prosper,

barn-bel-koor, a-te-en prosper, French painter : b. Boulogne, 29 July 1838; d. 1910. After some years of study under Barras and Picot, he made a reputation by his spirited representa¬ tions of episodes in the Franco-Prussian War of 1870. He received a first-class medal in the Paris Salon of 1872, the Legion of Honor in

1878 and a second-class medal at the Paris Exposition of 1889. His best-known works are (Cannon Shop ; (The Intended,5 and (In the Trenches,5 the last two in the Metropolitan Museum, New York; (Attack on the Chateau5 ; (To Arms P

BERNERS, John Bourchier, boor'she-a, Lord, English baron, a descendant of the Duke of Gloucester, youngest son of Edward III : b. 1474; d. 1533. He was a member of Par¬ liament, 1495-1529; aided in suppressing the Cornish insurrection, 1497 ; Chancellor of the Exchequer, 1515; Ambassador to Spain, 1518, and for many years governor of Calais. He translated (Froissart's Chronicles5 (1523-25) and other works, his translation of the former being a sort of English classic.

BERNERS, or BARNES, Dame Juliana,

Lady, English prioress and author: fl. 1 5th century; daughter of Sir James Berners, who was beheaded in the reign of Richard II. Lit¬ tle more is known than that she was prioress of ihe nunnery of Sopewell, near Saint Albans, and has her name prefixed as wrriter or compiler to one of the earliest and most curious produc¬ tions of the English press. The first edition, entitled (The Treatyses Pertynynge to Hawkynge, Huntynge and Fysshynge with an Angle5 (of which only three perfect copies are known), printed in the abbey of Saint Albans in 1486, treats of hawLing, hunting and her¬ aldry. A second edition was printed by Wyn-kyn de Worde in 1496. This wˆork, under the title of the (Book of Saint Albans,5 became a popular manual of sporting science and was many times reprinted in the 16th century. It has latterly been issued in facsimile of the original print.

BERNHARD, bern'hart (Duke of Wei¬ mar), German soldier (fourth son of Duke John of Saxe-Weimar) : b. 6 Aug. 1604; d. 8 July 1639. He entered first the service of Hol¬ land and afterward the Danish army employed in Holstein against the troops of the Emperor. When Gustavus Adolphus entered Germany, Bernhard joined him (1630) and was present at the attack upon Wallenstein's camp in the neighborhood of Nuremberg, 24 Aug. 1632. In the battle of Liitzen, 6 Oct. 1632, he commanded the left wing of the Swedish army and took over the command of the army on the death of Gustavus Adolphus, and, although himself severely wounded, put the right wing of the imperial troops to flight. In 1633 he captured Ratisbon and Straubing

and frustrated Wallen¬ stein. His impetuosity caused the defeat at Nordlingen (q.v.), 24 Aug. 1634, where he nar¬ rowly escaped being made prisoner. France, now entering into a closer alliance with Swe¬ den (1634), Bernhard carried on the war in the country adjacent to the Rhine, took the fortress of Zabern and vanquished the forces of the Emperor in several battles. A brilliant campaign in 1638 culminated in the capture of Breisach. Friction over the occupation of Breisach is said, on unsubstantial foundations, to have been the cause of his death by poison at the instigation of Richelieu. He died suddenly at Neuburg on the Rhine.

BERNHARDI, August Ferdinand, bern-har'de, German scholar: b. Berlin 1769; d. there 1820. In his youth his attention was

directed to universal language (that is, to language as far as it is common to all rational beings), to the mystery of its con¬ struction — the mathematics, as it were, of lan¬ guage. Bernhardi, considering all different languages as a whole, endeavored to discover a universal grammar common to them all. The result of his researches appears in his works, (Abstract Grammar5 (2 vols., 1801) ; (Grammar in Its Application5 (1803) ; and (Elements of the Science of Language,5 in which many philo¬ sophical principles of language are laid down. He was a professor and director of a classical school in Berlin.

BERNHARDI, Friedrich von, Prussian

general and military writer: b. 22 Nov. 1849, the son of an able diplomat and historian and grandson of a philologist and his poet wife, the sister of Ludwig Tieck. He was hardly known until the English translation of his (Deutschland und der nachste Krieg5 (1911) was seized upon in England as revealing the cause of the European War. In it he makes some interesting statements, declaring that the conflict between England and Germany was an eventuality determined upon in 1902. He pre¬ dicted in 1911 the defection of Italy from the Triple Alliance. Recalling the British capture of the Danish fleet in 1807 and the bombard¬ ment of Alexandria in 1884, he wrarned Ger¬ many that she would have to fight Russia, France and England (the Entente) with only the assistance of Austria. The Prussian disas¬ ter of Jena in 1806 he laid to a fatuous pacifism, which was being repeated in a Germany de¬ voted to commercialism and enjoyment. He calls war a biological necessity, an indispensable regulative element in the life of man, due to the universal struggle for existence, posses¬ sions, power, sovereignty. Only the weary, spiritless ages have toyed with

the dream of perpetual peace, and if strong nations estab¬ lish peace congresses and Hague tribunals he thinks pacific ideals are seldom the real motive of their action but only a cloak under which to further selfish political aims. No power exists which can judge between states and make its judgment final. Increase of population and trade rivalry make expansion imperative or nations' decay inevitable. War does more to arouse national life and to expand national power than any other known means. National needs may demand an aggressive war. Most unfavorably situated in the midst of mighty colonial powers, who are determined not to allow German expansion, Germany must be prepared to ((gain a start55 on her probable enemies. She must strike quick and with all force in order to win. The most efficient and most dangerous foe must be struck first. It is the moral duty for the state to begin the struggle before the rival nations gain a lead which cannot be won back. As Germany was vulnerable only in the northwest, Bernhardi was convinced that in case of war England and France wˆould attempt to turn Germany's stra¬ tegical right flank between Flushing and Wesel (a fortress near the Dutch border), at the same time seizing a naval base on the north¬ west coast of Germany. Hence he regarded the neutrality of Belgium as impossible. Ger¬ many must maintain a defensive war by seas, controlling the Baltic at all hazards, but must

del eat France decisively on land and destroy her Channel naval ports. The occupation by the enemy of the Danish islands must be pre¬ vented at all hazards. For Bernhardi the dan¬ ger is in the west, while Russia's defeat is presupposed, providing Germany is successful in the west. He expects the effective blockade of the German coast and urges the develop¬ ment and vigorous use of the submarine and the aerial service. He is opposed to a sea bat¬ tle with superior hostile forces, but torpedo-boat attacks by night are recommended. (<The blockading fleet must be given no breathing¬ time® and must be "whittled down.® Ger¬ many's "whole history may turn upon the im¬ pregnability of the fortifications which, in combination with the fleet, are intended to guard our coasts and naval bases, and should inflict

such heavy losses on the enemy that the difference of strength between the two fleets would be gradually equalized.® He accepts the principle of the submarine blockade and the sinking of all enemy or neutral ships to or from hostile ports. As a popular explanation of Germany's defense, Bernhardi's book is keen and ingenious. Less so is the program of offense in (Unsere Zukunft, ein Mahn-wort an das deutsche Volk,* to which the translator gives the title 'Britain as Germany's Vassal. J This contemplates Turkey's making common cause with the Central Powers from the beginning. Other books by Bernhardi are (How Germany Makes War} ; ' Cavalry) ; (On War of To-day > (trans. by Karl von Donat).

Carl E. Eggert.

Assistant Professor of German, University of Michigan.

BERNHARDI, Theodor von, German historian and diplomat: b. Berlin, 6 Nov. 1802; d. Kunersdorf, Silesia, 12 Feb. 1887. His diplomatic career was important and af¬ forded him special facilities for compiling a 'History of Russia and of European Politics during the Years 1814— 3D (1863-77) ; 'Fred¬ erick the Great as a Military Commander } (1881); and similar works, all of value.

BERNHARDT, Rosine, barn-hart, rcFzen, better known as Sarah, French actress: b. Paris, 23 Oct. 1845. Of Jewish descent, her father French, her mother Dutch, her early life was spent largely in Amsterdam. In 1858 she entered the Paris Conservatoire and gained prizes for tragedy and comedy in 1861 and 1862, but her debut at the Theatre Frangais in 'Iphi-genie} and Scribe's 'Valerie) was not a suc¬ cess. After a brief retirement she reappeared at the Gymnase and the Porte Saint-Martin in burlesque, and in 1867, at the Odeon in higher drama. Her success in Hugo's 'Ruy Bias* in 1872 led to her being recalled to the Theatre Frangais, since which she has abundantly proved her dramatic genius. In 1879 she vis¬ ited London and again in 1880, about which time she severed connection with the Comedie Frangaise under heavy penalty. In 1880, 1887, 1891, 1896 and 1900 she made successful ap¬ pearances in the United States, and between and after these dates visited Switzerland, Hol¬ land, South America, Italy, Algeria, Australia, *etc.* In 1899 she appeared in a new rendering of 'Hamlet* in Paris and scored a most flat¬ tering triumph. Among her most successful impersonations are 'Theodora,* 'Fedora, * 'La

Tosca* and 'Cleopatre* in the plays bearing those titles. In 1882 she

married M. Damala, a Greek, whom she divorced not long after¬ ward. She visited America again in 1911, appearing in a repertoire of her best-known roles, and in the spring of 1913 returned and played a short engagement, her repertoire con¬ sisting of single acts selected from ‘Phedre,* ‘Lucrece Borgia,* ‘La Dame aux Camelias,* ‘La Tosca) and a new one-act play, ‘Une Nuit de Noel, sous la terreur,* written by her son Maurice Bernhardt in collaboration with Henri Cain. Owing to a slight accident, she was unable to walk without assistance during this engagement, but her matchless voice was un¬ impaired and she received an ovation at every performance. Her position as the first actress of her day is undisputed. She is mistress of every item of stagecraft. With the exception of Coquelin, no actor or actress of her time has approached her in the perfection of her art. In addition to her extraordinary gifts as an actress, she has shown considerable talent in sculpture, painting and writing. She has exhibited both painting and sculpture at the Salon, where her piece ‘Apres la tempete*

(1876) received honorable mention. In 1907 she published a volume of ‘Memoires.* She has written two plays, ‘L’aveup a one-act comedy, produced at the Odeon in 1888, and ‘Adrienne Lecouvreur* (1907), based on the play of the same name by Scribe and Legouve. She was made a member of the Legion of Honor in 1913, and in the same year, in Paris, won one of her greatest triumphs in ‘Jeanne DoreP Consult Jules Huret, ‘Sarah Bern¬ hardt, J with a preface by Edmond Rostand (Eng. trans., Philadelphia 1909), and her own ‘Memoires* (Paris 1907).

BERNHARDY, Gottfried, bern’har-de got-fred, German classical philologist: b. Lands-berg-on-the-Warthe, 20 March 1800; d. Halle, 14 May 1875. He was professor at the philo¬ logical seminary in Halle and librarian of the university. His principal works are ‘Greek Syntax Scientifically Considered) (1829), an historical study of the subject; ‘Outlines of Roman Literature) (5th ed., 1872) ; ‘Outlines of Greek Literature) ; a supplement to the first-named treatise, entitled ‘Paralipomena [Omis¬ sion] in [the Work on] Greek Syntax* (1854—62) ; and a monumental edition of Suidas’ ‘Lexicon* (1834-53).

BERNI, BERNA, or BERNIA, Frances¬ co, ber’ne, ber’na or ber’ne-a, Italian poet : b. Lamporecchio, Tuscany, about 1497; d. 26 July 1536. His family was noble but poor, and young Berni went to Florence and, at the age of 19, to Rome, where he lived under the care of his relation, Cardinal Bibbena. At length he entered the service of Ghiberti, bishop of Verona, datary of the papal chancery, as sec¬ retary. In the hope of promotion, he took orders ; but sought recreation in amusements which displeased the prelate. A society had

been established in Rome, consisting of young ecclesiastics of a jovial temper like Berni, and of a poetical vein, who, in order to denote their love for wine and their careless gaiety, called themselves i vignajuoli (vine-dressers). They laughed at everything and made sport in verse of the most serious, nay, the most tragic matters. Berni's verses were the most success-574

fill and were written in so peculiar a style that his name has been given to it (maniera ber-nesca or bcrniesca) . When Rome was sacked by the troops of the Constable Bourbon, 1527, Bcrni lost all that he possessed. He afterward made several journeys, with his patron Ghiberti, to Verona, Venice and Padua. At length, wearied with serving and satisfied with a canon-ship in the cathedral at Florence, he retired to that place. The favor of the great, how¬ ever, which he was weak enough to court, brought him into difficulties. He was required to commit a crime, and his refusal is said to have cost him his life. Alessandro de' Medici, at that time Duke of Florence, lived in open enmity with the young Cardinal Ippolito de' Medici. Berni was so intimate with both that F is doubtful which first made him the pro¬ posal to poison the other. Certain it is that the cardinal died by poison in 1535, and it is probable that Alessandro caused Berni's death. In the burlesque style of poetry, Bcrni is still considered the best model. His satire is often very bitter and frequently unites the good humor of Horace with the causticity of Juvenal. The extreme licentiousness of his writings is his greatest fault. Berni also wrote Latin verses very correctly and was well acquainted with Greek. His (Burlesque Verses) have great merit; so also has his rifacimento of Boiardo's (Orlando innamoratoP

BERNICE, in biblical history, was the daughter of Herod Agrippa I and married to King Herod of Chalcis, who was her uncle. After his death she lived with her brother Agrippa, and subsequently became the wife of Polemon, the King of Cilicia, but soon left him and returned to her brother. Josephus, Tacitus and Suetonius state that she was mistress of Titus and Vespasian.

BERNICLE or BARNACLE GOOSE,

a large goose of northern Europe and Green¬ land, allied to the brant and named Branta leucopsis, a name identified with strange old fables. It differs from the brant mainly in its white cheeks and the lavender-gray of the mantle. This goose is a common winter visitor to western Europe, retiring in summer to Arc¬ tic regions to breed, but the region

and char¬ acter of its nesting remain undiscovered. Up to comparatively recent times it was the belief of the European peasants that this goose was born from the stalked barnacles which adhere to driftwood and sometimes to the branches of trees that reach down into the sea at high tide. Circumstantial accounts were given of the birth of the young, whose tiny wings (the waving filaments of the feeding cirripeds) could be seen sticking out of the shells from which they were supposed to escape. So firmly was this fixed in the minds of the people that it is given and illustrated with much detail as truth in many books of the time, and the Roman Church permitted these geese to be eaten on holy days because they were sea-born and therefore (<fishw ! What is less generally known is that the cirripeds were named after the bird, as their supposed parent, and not the bird after the crustacean. Bernicle, like <(brant,):> refers to the ˆburnt® black color of the birds, as ex¬ plained in the (English Dictionary } and by other authorities. Others derive bernicle from hibernacula, as the bird was supposed to come

from Ireland. The name has been adopted as generic for a large group of the geese usually distinguished by sportsmen as “brants® (q.v.).

BERNIER, ber-nya, Camille, French painter: b. 1823; d. 1902 or 1903. His best-known works are (The Abandoned Lane) (La Rochelle) ; <Road near Bannalec) (Nantes) ; and <Morning) (Lille).

BERNIER, Francois, French physician and traveler: b. Angers, about 1625; d. Paris 1688. He set out on his travels in 1654, and after visiting Egypt and Palestine, went into India, where his skill in medicine brought him into notice, and he remained for 12 years, residing chiefly at Delhi, as physician to the great Mogul Emperor Aurungzebe. On one occasion he ac¬ companied the Prime Minister on his march, at the head of an immense army, to the con¬ quest of Cashmere, and in his travels, recording all that he saw, has given accounts full of in¬ terest and recognized by subsequent travelers as remarkable for their fidelity. After his return to France he not only compiled his <Travels> and several volumes of history relating to the empire of the Great Mogul, but turned his at¬ tention to philosophical subjects and published an abridgment of the philosophy of Gassendi. He also wrote a treatise entitled (Traite du Libre et du VolontaireP

BERNINA, ber-ne’na, a mountain of the Rhsetian Alps, 13,290 feet high, in the Swiss canton of Grisons, with remarkable and exten¬ sive

glaciers. Its summit was first attained in 1850. The Bernina Pass, which attains an ele¬ vation of 7,642 feet and over which a carriage road was completed in 1864, leads from Pontre-sina to Poschiavo.

BERNINI, Giovanni Lorenzo, ber-ne'ne, jo-van'ne lo-ren'zo, called II Cavaliere Ber¬ nini, Italian sculptor and architect: b. Naples, 7 Dec. 1598; d. Rome, 28 Nov. 1680. His father was a sculptor, and even in childhood he showed remarkable aptitude in this art. Thus richly endowed by nature and favored by circum¬ stances, he rose superior to the rules of art, creating for himself an easy manner, the faults of which he knew how to disguise by its bril¬ liancy. One of his first works was the marble bust of the prelate Montajo; and in this type of art he excelled from first to last. He was not yet 18 when he produced the (Apollo and Daphne, } in marble, a masterpiece of grace and execution. Looking at this group near the close of his life, he declared that he had made very little progress since the time when that was produced. Without forsaking sculpture, Bernini's genius embraced architecture, and he furnished the design for the canopy and the pulpit of Saint Peter's, as well as for the cir¬ cular place before the church. Among his numerous works were the palace Barberini, the belfry of Saint Peter's, the model of the monu¬ ment of the Countess Matilda and the monu¬ ment of Urban VIII, his benefactor. Urban had scarcely closed his eyes and Innocent X ascended the papal throne, when the envy en¬ gendered by the merits of the artist and the favor bestowed on him broke forth. His ene¬ mies triumphed, but he regained the favor of the Pope by a model for a fountain. About the same time he erected the palace of Monte Citorio, Alexander VII, the successor of Inno-BERNIS — BERNOUILLI

cent X, required of him a plan for the embel¬ lishment of the Piazza di San Pietro. The admirable colonnade, so beautifully proportioned to the Basilica, was built under the direction of Bernini. We may also mention the palace Odescalchi, the Rotunda della Riccia and the house for novices belonging to the Jesuits, on Monte Cavallo. Louis XIV having invited him to Paris, he set out from Rome in 1665, accom¬ panied by one of his sons and a numerous retinue. Never did an artist travel with so great pomp and under such flattering circumstances. The reception which he met with in Paris was highly honorable. He was first occupied in pre¬ paring plans for the

restoration of the Louvre, which, however, were never executed. Cardinal Rospigliosi having become Pope, Bernini was admitted to an intimate intercourse with him and charged with several works, among others with the decoration of the bridge of Saint An¬ gelo. In his 70th year this indefatigable artist ■executed one of his most beautiful works, the tomb of Alexander VII. He was buried with great magnificence in the church of Santa Maria Maggiore. To his children he left a fortune amounting to about 3,300,000 francs. Bernini's favorite maxim was Chi non esce talvolta della rcgola, non passa niai. Thus he was of opinion that, in order to excel in the arts, one must rise above all rules and create a manner peculiar to one's self.

BERNIS, Frangois Joachim de Pierres de,

bar-nes, fron-swS. jo-a-kem de pe-ar de, French cardinal and minister of Louis XV : b. Saint Marcel, de l'Ardeche, 1715; d. Rome, 2 Nov. 1794. Madame de Pompadour presented him to Louis XV, who, being pleased with him, as¬ signed to him an apartment in the Tuileries, with a pension of 1,500 livres. He went as Ambassador to Venice, and after his return en¬ joyed the highest favor at court and soon be¬ came Minister of Foreign Affairs. The politi¬ cal system of Europe was changed at that time. France and Austria, hitherto enemies, united in an offensive and defensive alliance, which was succeeded by the Seven Years' War, so unfortunate for France. Bernis has been des¬ ignated by several writers as the chief author of this alliance. Duclos, however, asserts that it was the intention of Bernis to maintain the old system which, since the time of Henry IV and especially since the time of Richelieu, had made France the protectress of the less power¬ ful states of Germany and the rival of Austria. Oppressed by the misfortunes of his country, which, in part at least, were ascribed to him, Bernis surrendered his post and was soon after banished from court. His disgrace lasted till the year 1764, when the King appointed him archbishop of Albi and, five years later, Am¬ bassador to Rome. Here he remained till his death. In the name of his court, and against his own opinion, he labored to effect the abo¬ lition of the order of the Jesuits. When the aunts of Louis XVI left France in 1791 they fled to him for refuge and lived in his house. The Revolution deprived him of his fortune and the means of indulging his generous dispo¬ sition. The easy poetry of youth had procured him a place in the French Academy, but he himself is its severest critic. Voltaire had a great esteem for his talents, his judgment, his criticisms and his character, as is evident from

their correspondence, which, in every other re¬ spect, is very honorable to Bernis. A collec¬ tion of Bernis' works was published in 1797 by Didot, and another in 1825.

BERNOUILLI, ba r-noo-ye, or BER¬ NOULLI, a family which has produced nine distinguished men, who have cultivated mathe¬ matical and physical science with success. The family, emigrated from Antwerp on account of religious persecutions under the administration of the Duke of Alva, fled first to Frankfort and afterward removed to Basel. Important members of the family were Nicolas (1 623— 1708), Jakob (1654—1705), Johann (1667-1748), Nicolas (1687-1759), Nicolas (1695-1726), Dan¬ iel (1700-82), Johann (1710-90), Johann (1744-1807) and Jakob (1758-89).

BERNOUILLI, Daniel, Swiss philosopher: b. Groningen, 9 Feb. 1700; d. 1782. He studied medicine, he took the doctor's degree, and at the age of 24 was offered the presidency of an academy about to be established at Genoa, but in the following year accepted an invita¬ tion to Saint Petersburg. Accompanied by his younger brother John, he returned to Basel in 1733; became there professor of anatomy and botany; in 1750 professor of natural philos¬ ophy; resigned this place, because of his ad¬ vanced age, to his brother's son, the younger Daniel Bernouilli, in 1777 and died in 1782. He was one of the greatest natural philoso¬ phers as well as mathematicians of his time. At 10 different times he received a prize from the Academy of Paris. In 1734 he shared with his father a double prize, given by this academy for their joint essay on the causes of the dif¬ ferent inclinations of the planetary orbits. Most of his writings are contained in the Transac¬ tions of the Saint Petersburg, Paris and Berlin academies, of which he was a member. His prin¬ cipal work is the ˆydrodynamicaˆ in which he first developed the kinetic theory of gases.

BERNOUILLI, Jakob, Jacques or James, Swiss mathematician: b. Basel 1654; d. 1705. The differential calculus discovered by Leib¬ nitz and Newton was applied by him to the most difficult questions of geometry and me¬ chanics ; he calculated the loxodromic and cate¬ nary curve, the logarithmic spirals, the evolutes of several curved lines and discovered the ((numbers of Bernouilli,® as they are called. Unquestionably the most original and able rep¬ resentative of the second generation of eminent mathematicians in this family (see Bernouilli oi Bernoulli), he probably outranks also all the other Bernouillis of the 17th and 18th cen¬ turies in that quality of intellectual venturing that appears in the posthumous work entitled (Ars ConjectandP (1713). Noteworthy are also his (Conamen Novi

Systematis Com¬ etarum) (Amsterdam 1682) ; (Dissertatio de Gravitate Hftheris) (Amsterdam 1683) ; and the two-volume edition of his works, Uacobi Bernoulli Basileensis Opera) (Geneva 1744).

BERNOUILLI, Johann, Swiss mathema¬ tician: b. Basel 1667; d. 1 Jan. 1748. He was one of the greatest mathematicians of his time and the worthy rival of Newton and Leibnitz. He was destined for commerce, but his incli¬ nation led him to the sciences, and from the year 1683 he principally devoted himself to medicine and mathematics. To him and his brother James we are indebted for an excel-

lent treatise on the differential calculus. He also developed the method of proceeding from infinitely small numbers to the finite, of which the former are the elements or differences, and called this method the integral calculus. In 1690-92 he made a journey to France, where he instructed the Marquis de l'Hopital in math¬ ematics. At this time he discovered the ex¬ ponential calculus, before Leibnitz had made any communications respecting it, and made it known in 1697. In 1694 he became doctor of medicine at Basel, and in 1695 went, as pro¬ fessor of mathematics, to Groningen, where he discovered the mercurial phosphorus or lumi¬ nous barometer, for which he received from King Frederick I of Prussia a gold medal and was made a member of the Academy in Berlin, afterward of that of Paris. After the death of his brother in 1705, he received the profes¬ sorship of mathematics at Basel, which he held until his death. His collected works were pub¬ lished at Geneva in 1742.

BERNOUILLI, Nicolas, nephew of Jo¬ hann Bernouilli, Swiss mathematician: b. Basel 1687; d. 1759. He studied law but more par¬ ticularly devoted himself to mathematics ; in 1705 went to Groningen to Johann Bernouilli; returned, howTever, with him to Basel toward the close of the year and became there profes¬ sor of mathematics. He traveled through Switzerland, France, Holland and England, and in 1713 became a member of the Academies of Science in London and Berlin. On the recom¬ mendation of Leibnitz, he went as professor of mathematics to Padua in 1716, but returned to his native city in 1722

as professor of logic. In 1731 he became professor of the Roman and feudal law in that place.

BERNSTEIN, Eduard, leader of the Ger¬ man social democracy: b. Berlin, 6 Jan. 1850. As a young man he edited socialistic news¬ papers in Berlin until the vehemence of his opposition to the government of Bismarck made it desirable for him to leave Germany. After the publication of his criticism of Marxist doc¬ trines he was permitted to return to Germany, where in 1901, he became editor of Vorwdrts. In 1902 he became editor of Dokumente des Sozialismus. He contends that every movement for the advancement of the people should be encouraged and taken advantage of by the com¬ mon people, whom he urges to take an active part in politics. He regrets the materialistic conception of history as inadequate to explain modern social evolution. He was elected to the Reichstag in 1902, failed at the elecrions of 1907, but was returned in 1912. His published works, besides an edition (1891-93) of the speeches and writings of Lasalle (translated into English, 1893, by E. Aveling), include (Die Voraussetzungen des Sozialismus und die Auf-gaben der Sozialdomokratie) (1899, 1909) ; (Zur Geschichte und Theorie des Sozialismus* (1904); (Die heutige Sozialdemokratie in Theorie und Praxis* (1905) ; (Die Geschichte der Berliner Arbciterbewegung) (1907-10).

BERNSTORFF, Andreas Peter, bern'- storf, Count von, Danish statesman: b. 1735; d. 1797. He was Foreign Minister 1773-80, and 1784-97. He introduced a new system of finance, prepared the abolition of viilanage in Schleswig and Holstein. He was instrumental in making an exchange of territory, by which

the Gottorp part of Holstein was ceded to Russia for Oldenburg and Delmenhorst. He was a pronounced Liberal, and contended for the freedom of the press.

BERNSTORFF, John Hartwig Ernst,

Count von, Danish statesman in service of the King of Denmark: b. Hanover 1712; d. 1772. He was employed in divers embassies, and afterward filled with consummate ability, the office of Foreign Minister to Frederick V for about 20 years, resigning in 1770. He was called by Frederick the Great (<the oracle of Denmark.**

BERNSTORFF, Johann Heinrich A.,

Count von, German diplomat : b. London, 14 Nov. 1862. He received his early education in England, wdiere his father was the German ambassador — before 1871, Prussian minister. During the Franco-Prussian war the latter acted as a press agent in London for his government, transmitting to Berlin all the news that might prove useful to his country. Knowing French, he read the indiscreet revelation by a Paris newspaper of MacMahon's sudden change of march just before Sedan, which news he wired to Berlin. He entered the German army (artillery) in 1881, was made attache at Con¬ stantinople in 1889, served in the Foreign Office in 1890, secretary of Legation at Belgrade 1892, Dresden 1894, Saint Petersburg 1896, and Munich 1898. In 1902 he was appointed advisor to the embassy in London, and in 1908 was transferred to Egypt as German Consul-Gen¬ eral. On 14 Nov. 1908 he was appointed Am¬ bassador and Plenipotentiary Extraordinary to the United States. From the outbreak of the European War he carried on a strenuous press campaign throughout America with the object of enlisting sympathy for the German cause. During 1915 the United States Department of Justice unearthed a conspiracy carried on in New York by Hans von Wedell and Carl Ruroede to forge passports to enable German reserve officers to return home. Ruroede was arrested and sentenced to three years' imprison¬ ment ; von Wedell escaped on a Norwegian vessel, but was taken off by a British cruiser which was shortly afterward sunk by a sub¬ marine. Correspondence seized by the secret service implicated Count Bernstorff's naval and military attaches, Captains Boy-Ed and von Papen, who were dismissed from the United States. Later various checks for large sums to spread pro-German propaganda were traced to Count Bernstorff, who had telegraphed home for authority to spend $50,000 ((in order … to influence Congress.** Consult World's Work (March 1918). See War, European.

BERNWARD, Saint, bishop of Hildes-heirn : b. about 950; d. 20 Nov. 1022. He was equally distinguished in theology and art, de¬ voting himself to painting, gold and mosaic work. About 988 he was charged by the Em¬ press Theophania, widow of Otho II, to under¬ take the education of her seven-year-old son Otho III, in conjunction with Gerbert (after¬ ward Pope Sylvester II). Bernward taught the young king mathematics ; the actual man¬ ual which he composed for these lessons is still preserved in the cathedral at Hildesheim. The Empress Regent had some years before brought a colony of Byzantine artists and craftsmen from Constantinople. These were settled in Germany,

some building churches and others engaging in painting and enameling. Bernward industri¬ ously studied their methods and, from the time he was consecrated bishop (7 Dec. 992) he divided his labors between the administration of his diocese and of converting his episcopal town into a flourishing artistic and literary centre. One of his predecessors had begun the construction of the cathedral, and a large stock of golden ingots and precious stones had been accumulated. These the bishop proceeded to utilize for the ornamentation of his church; he melted the gold and fashioned it into decora¬ tions, set the stones himself, painted and enameled, and drew architectural designs. He equally cultivated literature ; he founded a school for copyists and himself prepared the original manuscripts for them to work from. He also traveled in France and Italy, often taking parties of his pupils with him for their enlightenment. This versatile prelate, whose life has aptly been described as one of the most remarkable biographical monuments of the Middle Ages, combined the functions of priest, leacher, artist and diplomat. He even built the fortifications of Hildesheim, and on at least one occasion accompanied a military expedition in war. He was canonized in 1194, or 172 years after his death.

BEROALDO, ba-ro-al'dd, Filippo, Italian

scholar: b. Bologna 1453; d. 1505. He gave instruction, chiefly by lectures, at Parma, Milan and Paris ; finally, in response to the wish of his fellow-townsmen, returning to Bologna, where he spent the remainder of his life as professor of belles-lettres. He is now chiefly known as the editor of some good editions of the classics, and the author of a curious tract entitled ˆeclamatio Ebriosi, Scortatoris et AleatorisP in which the drunkard, rake and gambler, represented as three brothers, debate which of them, as being the most vicious, should be excluded from sharing in his father's inheritance.

BEROE, daughter of Oceanus ; also the name of several women connected with Thrace, Illyria etc.; also a genus of animals, the typical one of the family Beroidoc. The heroes are oval or globular-ribbed animals, transparent and gelatinous, with cirri from pole to pole, and two long tentacles fringed with cirri, which aid them in breathing and in locomotion. They have a mouth, a stomach and an anal aperture.

They are free swimming organisms inhabiting the sea, sometimes rotating, and at night phos¬ phorescent.

BEROSUS, according to some a Chaldaean by birth, and a priest of the temple of Belus at Babylon, and according to others a contempo¬ rary of Alexander the Great, is celebrated both as an historian and an astronomer, though it has been alleged that his name merely has been used for the purpose of giving a reputation to what others had written. His history, giving an account of the Babylonian Chaldaeans and their kings, consisted of three books written in Greek, and professed to be founded on the ancient archives of the temple of Belus. It has been preserved only in fragments, con¬ tained in the writings of Josephus, Syncellus, Eusebius and others. He was also the author of a treatise on Chaldaean astrology. _ Accord¬ ing to Pliny the astronomical observations con-vol. 3 — 37

tained in the works of Berosus extended over a_period of 480 years.

BERQUIN, Arnaud, ber-kati, ar-no, French writer: b. 1749; d. 1791. He first attracted notice by poems and translations from the Eng¬ lish but is best known by his work entitled (L'Ami des Enfants) (1782-83), crowned by the Academy and repeatedly translated. His complete works (20 volumes) were published in Paris in 1803.

BERQUIN, ber-kan', Louis de, the first Protestant martyr in France: b. 1490; d. Paris, 17 April 1529. He was a gentleman of Artois, a friend of Badius, the savant. When, in 1523, the police began to seize Luther's works with a view to suppressing Protestantism, they found among Berquin's books some manuscripts of his own writing that were pronounced heretical. As he refused to retract, he was thrown into prison. Francis I, whose counsellor he was, ob¬ tained for him his freedom; and Erasmus, al¬ ways his friend, tried in vain to prevent him from exposing his life in a useless struggle. His fixed opinions and intrepid nature, however, having thrown him into prison three times, caused him to be condemned to death, and he was burned alive.

BERREDO E CASTRO, bar-ra'do e kash'tro, Portuguese soldier and historian : b. Serpa, about 1680; d. Lisbon, 13 March 1748. Having entered the army he fought at the battle of Saragossa (1710), so distinguishing himself on that occasion that he was made governor-general of the province of Maranhao, Brazil, and in 1718 he became captain-general of Maza-gao. The rest of his life was spent upon his history, which is of great value as an original source of information for

the period of which it treats. It is entitled (Annaes Historicos, do estado do Maranhao) (1749).

BERRETTA. See Biretta.

BERRIEN, John Macpherson, American lawyer and politician: b. New Jersey, 23 Aug. 1781 ; d. Savannah, Ga., 1 Jan. 1856. He was the son of an officer in the war of the American Revolution, graduated at Princeton in 1796, was admitted to the bar of Georgia at the age of 18, and gradually rose in reputation till he was elected, in 1809, solicitor of the eastern district of Georgia. He became judge of the same district the next year, retaining the ialtcr office till 1822, when he entered the Georgia senate, from which he was transferred, in 1824, to the Senate of the United States. He established in that body a high reputation as an orator and statesman, was appointed Attorney-General of the United States in 1829, resigned this office in 1831 when General Jackson's Cabi¬ net became inharmonious, resumed the practice of his profession in Savannah till 1840, when he was elected again to the national Senate, and was reelected in 1846.

BERRUGUETE, ber-roo-ga'tˆ, Alonzo, Spanish sculptor, painter and architect : b. Paredez de Nava, Spain, about 1486; d. Toledo 1561. He went in or soon after 1504 to Flor¬ ence, studied in the school of Michelangelo, and became intimate with Bandinelli, and other celebrated artists. In 1523, three years after his return to Spain, he was appointed painter to Charles V. His skill as a sculptor is seen to great advantage in the choir of the cathe¬ dral of Toledo. Berruguete's work there was

begun in 1539 and finished in 1548. Authentic paintings by him (and it is to be said that those are few the authenticity of which is above dispute) have been preserved, in the sur¬ roundings for which they were painted, at Sala¬ manca, and in the old capital, Valladolid, where Berruguete built a house for himself in 1528. See Spain — Spanish Painting, Architecture and Sculpture.

BERRUYER, Joseph Isaac, French Jes¬ uit: b. Rouen 1681; d. Paris 1758. He was the author of a (History of God's People, } 1728-58, written in a strong, secular vein. It created a scandal when the first part appeared, and the Jesuit General ordered the writer to prepare an expurgated edition, which he did, though the second version was little belter than the first, which was devoted to the Old Testament. The work was censured at Rome in 1734; the second part, (The Gospel,) printed in Paris 1753, was prohibited by the French clergy. When the third part (Epistles) appeared in Lyons in 1758, Pope Clement XIII declared that the measure of scandal had overflowed, and ordered special prayers to the Holy Trinity for the outrage inflicted by the works of Berruyer.

BERRY, ba-re, Carolina Ferdinanda Louisa, Duchesse de, widow of the second son of Charles X of France; daughter of Ferdinand I, of the Two Sicilies: b. 5 Nov. 1798: d. 17 April 1870. Her futile attempt at insurrection in 1832, to place her son on the French throne, caused her imprisonment and subsequent with¬ drawal to Sicily. That son, called by his parti¬ sans Henri V, died without heirs in 1883.

BERRY, Charles Ferdinand, Due de, sec¬ ond son of the Count d'Artois (afterward Charles X) and Maria Theresa of Savoy: b. Versailles, 24 Jan. 1778; d. 14 Feb. 1820. He was educated along with his elder brother, the Duke of Angouleme. In 1792 he fled with his father to Turin, served under him and Conde on the Rhine, and early learned the art of winning the love of the soldiers. Subsequently he lived alternately in London and Scotland, continually occupied with plans for the restoration of the Bourbons. Landing at Cherbourg, 13 April 1814, he passed through the cities of Bayeux, Caen, Rouen, etc., gaining over the soldiers to the cause of the Bourbons, distributing alms, and delivering prisoners. When Napolean landed from Elba, the King committed to Berry the chief command of all the troops in and around Paris. All his efforts to secure their fidelity proving ineffectual, he was obliged to retreat on the night of 19 March, with the troops of the household, to Ghent and Alost, where the King then was. The battle of Water¬ loo enabled him to return to Paris, where he arrived 8 July, and surrendered his command over the troops of the household into the hands of the King. At the opening of the chambers in Paris he took the oath to maintain the Con¬ stitution, and was appointed president of the fourth bureau; but soon retired from public life. He died of a blow inflicted by a political fanatic named Louvel. The Duke left a daugh¬ ter Louise Marie Therese, afterward Duchess of Parma ; and a posthumous son, subsequently known as Comte de Chambord.

BERRY, Hiram George, American sol¬ dier. b. Thomaston, Me., 27 Aug. 1824; d. Chancellorsville, 2 May 1863. He was promi¬

nent in local politics, holding office as repre¬ sentative in the State legislature and as mayor of Rockland. He entered the Union army as colonel of the 4th Maine Infantry and was pres¬ ent at the battle of Bull Run, the siege of Yorktown, took a conspicuous part in the battles of Williamsburg, Fair Oaks, Chantilly and the second Bull Run campaign. President Lincoln nominated him a major-general of volunteers, January 1863, and he succeeded General Sickles in command of the 2d division of the 3d army corps. At a critical point in the battle of Chan¬ cellorsville, 1 May 1863, Hooker ordered Gen¬ eral Berry to charge with the bayonet the ad¬ vancing enemy. He did so, and for three hours his division, almost alone, withstood the enemy's assault and regained for the Federal forces a portion of their lost ground. He was killed at the head of a successful bayonet charge upon the renewal of the battle the following day.

BERRY, Joseph Flintoft, Methodist bishop: b. Canada 1856. Ordained 1874, elected bishop 1904; editor Michigan Christian Advo¬ cate 1884-90; of Epworth Herald 1890-1904.

BERRY, Mary, English author : b. Kirk-bridge, Yorkshire, 16 March 1763; d. London, 20 Nov. 1852. She and her sister Agnes were intimate friends of Horace Walpole, who in his letters spoke of them in terms of the strong¬ est affection. For their amusement he wrote (Reminiscences of the Courts of Georges I and IP (1789). He established the sisters at Ted-dington in 1789. In his will he bequeathed $4,000 to each and to both the house and prop¬ erty at Little Strawberry Hill, where they had made their home after 1791. In 1798 Mary edited the { Works of Horace Walpole. } Her most ambitious work was her (Social Life in England and France) (1844).

BERRY, Richard James Arthur, Anglo-Australian author and educationalist : b. Lan¬ caster, England, 30 May 1867. He was edu¬ cated at the University of Edinburgh, where he was Gunning Victorian prize man in 1894 ; graduated in medicine and became lecturer on anatomy in the School of Medicine of the Royal College of Edinburgh (1894—1906) ; ex¬ aminer in anatomy in the University of Saint Andrew (1898-1901), in the University of Ab¬ erdeen (1901-05) and in the Royal College of Surgeons (1896-1905). In the latter year he became professor of anatomy in the University of Melbourne. He at once thoroughly identi¬ fied himself with the life and interests of

Aus¬ tralia. Among his published works, which are all of a scientific nature, are (The Colcal Folds and Fossae) (1897) ; (Regional Anatomy > (1900); (Surface Anatomy) (1906); and <A Clinical Atlas of Sectional and Topographical Anatomy.-*

BERRY, or BERRI, a former province and

dukedom of France, of which Bourges was the capital. With the exception of the arrondissement Saint Amand, which belonged to the Bourbonnais. it now forms the departments Indre and Cher. In ancient times it formed part of the Roman province of Aquitania and passed under the domination of the Franks in the 6th century. Later it enjoyed its independ¬ ence under a line of hereditary counts. In 1360 it was made a duchy and in 1601 annexed by the French Crown. It gave title at various times to French princes, the younger son of

Charles X being the last to hold them. George Sand, in her (Legendes Rustiques) and others of her later novels, gives very good pictures of the country and life of Berry.

BERRY, Canal de, one of the important

canals in France. It begins at Montlugon on the Cher, the chief trading centre of the coal fields of the Allier; descends the Cher valley to Saint Amand, and ultimately enters the Cher itself near Saint Aignan, below which point the canalized Cher continues the line of navigation to Tours. Length of navigation 200 miles, of which 36l/2 miles belong to the canal¬ ized Cher. Constructed 1807-41.

BERRYER, bar-ya, Antoine Pierre,

French advocate and orator: b. Paris, 4 Jan. 1790; d. 29 Nov. 1868. In 1814 he proclaimed at Rennes the deposition of Napoleon and re¬ mained till his death an avowed Legitimist of liberal principles. He assisted his father in the defense of Ney, secured the acquittal of Gen¬ eral Cambronne and defended Lamennais from a charge of atheism.

His eloquence was com¬ pared with that of Mirabeau, and after the dethronement of Charles X (1830) he remained in the Chamber as the sole Legitimist orator. In 1840 he was one of the counsel for the defense of Louis Napoleon after the Boulogne fiasco. In 1843 he did homage to the Comte de Chambord in London, adhering to him through the revolution of 1848 and voting for the deposition of the prince-president the morn¬ ing after the coup d'etat of 1851. He gained additional reputation in 1858 by his defense of Montalembert, and was counsel for the Patterson-Bonapartes in the suit for the recogni¬ tion of the Baltimore marriage. In 1863 he was reelected to the Chamber with Thiers. He was elected to the Academy in 1854.

BERSAGLIERI, ber-sa-lya're, a corps of riflemen or sharpshooters, introduced into the Sardinian army by General Della Marmora about 1849. They took part in the Crimean War and assisted at the battle of the Tchernaya, 16 Aug. 1855. They were likewise employed in the Italian wars of 1859 and 1866. They wear cocks' feathers in their hats. They are not big men but are noted for their marching powers and endurance. They regularly march at four miles an hour, with a step of 34 inches. The 11th Bersaglieri in the Tripolitan campaign made two wonderful desert marches — one of 50 miles in 26 hours and one of 33 miles in 17 hours. At the entry of Italy into the Great War in 1915 there were 12 regiments of Ber¬ saglieri in the regular army, with about 3,000 men in each, and 20 battalions in the mobile militia, with 1,000 men to the battalion.

BERSERKER, a descendant of the eight¬ handed starkader and the beautiful Alfhilde and, according to the Scandinavian mythology, a famous warrior. He disdained the protection of armor, whence he received his name, which signifies, according to Vigfusson and Fritzner and (The Oxford English Dictionaryˆ (Oxford 1888), probably "bear-sack,® that is, "bear-coat.® He raged like a madman in battle. He killed King Swafurlam and married his daugh¬ ter, by whom he had 12 sons as untamable as himself. They were also called Berserker, and after their time the name was given to wild and fierce Scandinavian warriors.

BERSEZIO, bersets'yo, Vittorio, Italian

novelist and playright : b. Peveragno, Pied¬ mont, 1830; d. 1900. He was long active as an editor and was a voluminous writer of fic¬ tion, drama and works of history. Both as a writer of tales and of comedies he is con¬ spicuous for vivid and faithful delineation of Piedmontese

life, especially in his dialect come¬ dies, among which (The Misfortunes of Monssu TravetD is considered to be his masterpiece. He also wrote an excellent historical work, (The Reign of Victor Emmanuel IP (1878-93). Consult Orsi, D., (Piedmontese Dialect and the Theatre) (1890).

BERSIER, bar -sya, Eugene Arthur Frangois, a French Protestant pulpit orator of note: b. Morges, near Geneva, 1831 ; d. Paris, 19 Nov. 1889. He became in 1855 a preacher in Paris, where he was much admired and his sermons were translated into several languages. Among his writings are (Coligny avant les guerres de religion* (1884) ; (Histoire d'une petite fille heureuse> (1890) ; in English, (Sermons) (London 1881-1901). Consult Tinling, J. F. B., (Bersier's Pulpit: An Analysis of the Pub¬ lished Sermons of Pastor Eugene Bersier*

(1901).

BERTHEAU, ber-to', Ernst, German the¬ ologian and orientalist: b. Hamburg 1812; d. Gottingen 1888. Most of his active life as professor of Oriental languages and Scripture exegesis was spent at Gottingen. His fame rests mainly upon his theological works, of which the more important are: (The Seven groups of Mosaic Laws) (1840) ; (History of the Israelites* (1842) ; (Exegetic Handbook to the Old Testament* (1845) ; Commentaries on the Books of Judges and RutlP ; (Proverbs of Solomon) ; (Books of the Chronicles, * and a (Syriac Grammar,'

BERTHELOT, bar-tlo, Pierre Eugene Marcellin, French chemist and politician: b. Paris, 25 Oct. 1827 ; d. there, 18 March 1907. He early studied chemistry, and was brought into notice in 1854 by his thesis for a doctor's degree, in which he gave an account of his arti¬ ficial reproduction of natural fats. In 1859 he was appointed professor of organic chemistry in the Superior School of Pharmacy; and in 1865 a new chair of organic chemistry was organized for him in the College of France. In 1870 he was elected president of the scien¬ tific committee of defense, and during the siege of Paris was entrusted with the manufacture of ammunition and guns, and especially dyna¬ mite and nitro-glycerine. In 1873 he became a member of the Institute, and in 1878 he became president of the committee on explosives, which introduced smokeless powrder. His labors also led to the discovery of dyes extracted from coal tar. He received the decoration of the Legion of Honor in 1861 ; w?as made com¬ mander in 1879, and. grand officer in 1886. In 1889 he was elected permanent secretary of the Academy of Sciences. He contributed to the knowledge of synthetical

processes and to the relations between the phenomena of heat and of chemistry, and may be regarded as the founder of synthetic chemistry and thermo¬ chemistry. In public life he held a prominent place, became in 1876 inspector-general of edu¬ cation, in 1881 a life member of the Senate,

in 1886-87 was minister of public instruction and in 1895-96 foreign secretary. His works include (Chimie organique fondee sur la synthese) (1860) ; (Legons sur les principes sucres' (1862) ; Leqons sur l'isomerie' (1865) ; (Traite elementaire de chimie organique) and (Sur la force de la poudre et des matieres explosives) (1872 and 1889) ; Essai de mecanique chimique' (1879) ; (Les origines de ralchimie) (1885) ; Collection des anciens alchimistes grecs) (1888) ; Chimie des anciens) (1889) ; (Traite pratique de calorimetrie chimique) (1893) ; (Recherches experimentales)

(1901).

BERTHIER, bar-tya, Louis Alexandre,

marshal of France, Prince and Duke of Neuchatel and Valengin, Prince of Wagram : b. Versailles, 20 Nov. 1753; d. Bamberg, 1 June 1815. In the American war of independence he served under Lafayette. In the early days of the Revolution, he aided in the escape of some members of the royal family. He served with distinction in Vendean War, 1793-95. In 1795 was appointed chief of the staff to Kellermann, and by causing the French army to take up the lines of Borghetto, contributed to arrest the advance of the enemy. In October 1797 Bonaparte sent him to Paris to deliver to the directory the treaty of Campo-Formio. In 1798 he received the chief command of the army of Italy, and in the beginning of February made his entrance into Rome, abolished the papal government, and established a consular one. In 1799 he was appointed Minister of War. He afterward became General-in-Chief of the army of reserve, accompanied Bonaparte to

Italy in 1800, and contributed to the passage of Saint Bernard and the victory of Marengo. He signed the armistice of Alessandria, formed the provisional government of Piedmont, and went on an extraordinary mission to Spain. He ac¬ companied Napoleon to Milan, June 1805, to be present at his coronation, and in October was appointed chief of the general staff of the grand army in Germany. He distinguished him¬ self at Austerlitz and Jena, and for his services after the battle of Wagram (1809) he was given the title of Prince of Wagram. In 1810, as proxy of Napoleon, he received the hand of Maria Louisa, daughter of the Emperor Francis I, and accompanied her to France. Somewhat later Napoleon made him colonel-general of the Swiss troops. In 1812 he was with the army in Russia as chief of the general staff, which post he also held in 1813. After Napoleon's abdication he lost his principality of Neuchatel, but retained his other honors, and possessed the favor and confidence of Louis XVIII. Subsequently he retired to Bavaria, where, in a fit of insanity, he committed suicide. His memoirs were published in 1826.

BERTHOLD VON REGENSBURG,

ber'tolt fon ra'gens-boorg, German Franciscan preacher: b. about 1210; d. 13 Dec. 1272, and buried in the Franciscan convent at Ratisbon, of which he was a member. From 1250 to the close of his life, he preached to immense con¬ gregations in Switzerland, Hungary, Austria, Moravia, Bohemia, Saxony, Swabia, etc., gen¬ erally in the open air, as the churches were not large enough to hold the audiences. In the

Heidelberg University library some MSS. of his sermons are preserved. Near Glatz, in Silesia, a tent under which he had preached was exhibited long after his death, and revived the feelings of affection and reverence in which his name is held by the people. His sermons are models of homely and affecting pulpit eloquence. Consult (Biography by UnkeP (Cologne 1882).

BERTHOLET, Alfred, Swiss theologian : b. Basel 1868. He was educated at Basel, Strassburg and Berlin. In 1904 he was chosen secretary of the Second International History of Religious Congress at Basel. He has pub¬ lished (Die Stellung der Israeliten und der Juden zu den Fremden) (1896) ; (Kommentare zu Leviticus, Deuteronomium, Hesekiel, Ruth, Esra, und Nehemia' (1897-1902) ; (Die Gefilde der Seligen) (1903) ; (Seelenwanderung) (1904) ; (Daniel und die Grieche Gefahr)

(1907) ; (Aesthetische und Christenliche Leben-sauffassung) (1910); (Die judaische Religion von dem Zeit Esras bis zu Zeitalter ChristP

(1911).

BERTHOLLET, bar-to-la, Claude Louis,

Count, French chemist of distinction: b. Talloire, Savoy, 9 Dec. 1748; d. Paris, 7 Nov. 1822. He studied medicine at Turin; went to Paris, where he became connected with La¬ voisier, was admitted in 1780 a member of the Academy of Sciences in that city; was made in 1794 professor in the normal school there, and was sent to Italy in 1796, in order to select the plunder that was to be carried to Paris. He followed Bonaparte to Egypt, and returned with him in 1799. After the 18th Brumaire he was made a member of the senat-conservateur ; afterward count and grand-officer of the Legion of Honor. In 1804 Napoleon appointed him Senator for the district of Montpellier. In 1813 he received the grand cross of the Order of the Reunion. He voted, however, for the establishment of a provisional government and the dethronement of Napoleon. Louis XVIII made him a peer; but Napoleon passed him by in 1815. After the restoration of Louis, he took his seat again in the chamber of peers. Among the inventions and new processes with which the sciences and the arts were enriched by him, the most important are those for the charring of vessels to preserve water in ships, for the stiffening and glazing of linen, for the artificial production of nitre, etc., but princi¬ pally that for the bleaching of vegetable sub¬ stances by means of chlorine, which, since 1786, has been in general use in France. Be¬ sides different essays in the collections of the Academy and the Institute, he wrote several larger works, among which his (Essai de Statique Chimique) (1803; translated into English, German and Italian) must be considered as the most important. The complicated phenomena of chemistry were here treated as under the strict and simple laws of mechanics. He had also a large share in the reformation of the chemical nomenclature, as well as in the publica¬ tion of the work that appeared on this subject in Paris, 1787 — (Methode de Nomenclature ChimiqueP Consult Cuvier, (Eloge de Claude Louis BertholleD (Paris 1826).

BERTHOLLETIA, ber-thol-le’shi-a, the generic name of Brazil nut (q.v.).

BERTHOUD, bar-too, Ferdinand, Swiss mechanician, celebrated for his marine chronom¬ eters : b. Plancemont, Neuchatel, 19 March 1727 ; d. 20 June 1807. His father caused him to be instructed in the art of watchmaking, and, to afford him an opportunity of perfecting his knowledge, sent him to Paris. He resided in this city from 1745, and there made his first marine chronometers, which have been used by French navigators on so many occasions for ex¬ tending and correcting geographical knowledge. He left several works relating to his art. His nephew, Louis Berthoud, his pupil and the heir of his talents, extended his improvements still further. His chronometers came to be very widely used by French navigators, and were even more convenient than those of his uncle.

BERTIE, Willoughby, fourth Earl of Abingdon, English politician: b. 16 Jan. 1740; d. 26 Sept. 1799. He was a vigorous opponent in the House of Lords of the policy of England toward the American colonies that culminated in the Revolution ; wrote a famous and very popular tract called (Thoughts on Mr. Burke's Letter on the Affairs of America, > was active in promoting favorable legislation for Ireland, and sympathized with the French Revolution.

BERTIER, bar-tya, Francisque Edouard,

French painter: b. Paris, 1841. He was a pupil of Cabanel, and among his many portraits of notables are those of De Lesseps, Grand Duchess Olga, Countess of Warwick, Prince of Wales and Max O'Rell. He has several times visited the United States in order to paint the portraits of prominent Americans.

BERTILLON, bar -te-yon, Alphonse, French anthropologist: b. Paris 1853; d. there, 13 Feb. 1914. He is widely noted as the founder of a system of identification of criminals. In 1880, while chief of the bureau of identification in the prefecture of police, he established his system of measurements which has given re¬ sults marvelous for their precision. The system has since been adopted by the police authorities of the large cities of Europe and the United States. The French method of Reconstructing® a crime by photography and Rehearsing® it in the way it was probably perpetrated, is also his invention, though the idea

was no doubt bor¬ rowed from Gaboriau. He was one of the expert witnesses in handwriting in the trial of Captain Dreyfus in 1899, and soon after its close was removed from office. He is author of numerous works bearing upon his system, including (Identification anthropometrique) (1893) ; (La comparison des ecritures et l'identification graphique) (1897) ; (AnthropolOgie

metrique et photographique) (1909). See Bertillon System.

BERTILLON SYSTEM, a scientific method of identifying suspected male criminals, invented March 1879, and set forth in 1885 by Dr. Alphonse Bertillon of Paris. As now in use it is not a single system, but a combination of the one invented by himself with two others approved by use. It rests on three principles: (1) Simple and exact measurement of certain parts of the body in a living subject; (2) ex¬ treme diversity of the relative dimensions in different subjects, no two correlations ever closely approximating each other; (3) almost absolute fixity of the male skeleton after 20.

The measurements are taken with calipers and include : Height, standing and sitting, reach of outstretched arms; length and width of head; length and width of right ear; and length of left foot, forearm, middle and little fingers. The descriptive elements are color of eyes (the most important detail of all, as it never changes and is impossible to disguise), hair, beard and complexion; deformities and peculiarities of shape; marks on body, as moles, scars, the tattooings frequent among criminals, etc., care¬ fully located — as (<mole six centimetres to left of fifth vertebra,® or "horizontal scar on back of second phalanx of right forefinger, three millimetres below middle.® A photograph of full face and one of profile are taken when thought desirable, from a fixed chair and a fixer camera. The entire process, by a meas¬ urer and a secretary who writes from dicta¬ tion, takes five to seven minutes, and the measurements are planned to be accurate within one thirty-second of an inch. De¬ scriptions and photograph are put together on cards of uniform size. The cards are divided into three equal sections according to length of head : short heads, of 187 millimetres and less ; medium 187 to 194 ; long, 194 and above. Experience proves that these divide very closely into nearly equal num¬ bers ; and their cards are placed in three tiers of drawers, the short heads uppermost. Each of these is subdivided into thre-e sections ac¬ cording to width of head, without further ref¬ erence to length; each of these into three sec¬ tions, according to length of middle finger ; each of these into three sections, by length of foot; these are

subdivided successively by length of forearm, full height, length of little finger, and color of eyes. These last groups contain from 12 to 14 individual cards, and are classed by length of ear. Thus any new measurement can be compared with its duplicate in this enormous mass, or the absence of such record shown, with marvelous celerity and almost in¬ fallible accuracy. Its index value alone is of the first order. Under the old systems, the entire mass of descriptions and photographs had to be searched and compared with any given arrested person, and with the immense number accumulating in great cities it became physically impossible to proceed with any cer¬ tainty. The system was for some years also of great value in distinguishing new crim¬ inals from old offenders: it not merely registered identity, but the fact of a first of¬ fense.

In European cities the Bertillon system has been almost entirely superseded by the finger¬ print system. The great weakness of the former was that the element of personality affected the measurements upon which the identifications depended, hardly any two meas¬ urers getting exactly the same dimensions from the same subject. The delicate instruments used were often injured so that they gave in¬ correct readings. Moreover, the system abso¬ lutely failed as to women and children, whose physical dimensions are subject to constant change. On the other hand, the finger-print records are made without any intervening agency, are as readily classified and indexed as the Bertillon cards, and retain their distinctive characteristics from childhood to old age, re-

gardless of sex. (See Finger-Printing). Consult Bertillon, A., identification Anthropometrique) (Paris 1893) ; Boies, (Science of Penology) (1901) ; McClaughry, R. .W., (The Bertillon System of Identification) (Chicago

1896).

BERTIN, bar-tan, Antoine, French poet: b. Isle of Bourbon, 1752; d. San Domingo, 1790. He was much admired by his contem¬ poraries, who, somewhat extravagantly, styled him the French Propertius. He was a friend of Parny, and like him excelled in elegiac and epistolary verse. His principal works are (Voyage in Burgundy) (1777) ; and (The Loves) (1780).

BERTIN, Louis Frangois (called Bertin l'Aine), French journalist: b. Paris 14 Dec. 1766; d. 13 Sept. 1841. The Revolution made him a journalist, and in 1799 he started the fa¬ mous Journal des Debats. His royalist princi¬ ples offended Napoleon, and cost him imprison¬ ment and banishment to Elba; thence, however, he escaped to Rome, where he formed a friend¬ ship with Chateaubriand. In 1805 he returned to Paris, and resumed the editorship of the Debats , but was much hampered by Napoleon placing it under police supervision and causing it to be styled (Journal de l'Empire.) The sec¬ ond restoration of the Bourbons restored once more to Bertin the free control of his journal, and henceforward he gave almost constant support to the ministerial party. He supported the July monarchy, and edited the Debats till his death.

BERTIN, Louise Angelique, French musi¬ cian and composer, b. Les Roches, near Bievres, 15 Feb. 1805; d. Paris, 26 April 1877. She was a daughter of L. F. Bertin (q.v.), and composed (Guy Mannering) (1827), (Faust) (1831), Esmeralda) (1836), and other operas. She published volumes of verse, (Les Glanes) (1842) and (Nouvelles Glanes) (1876).

BERTIN, Nicolas, French artist: b. Paris, 1668; d. 1736. His picture, (The Building of the Ark,) obtained the grand prize, in 1685, and (Prometheus Liberated by Hercules) brought him, in 1703, membership in the Academy, where he became professor in 1715. His paint¬ ings will be found in the galleries of Dresden, Stockholm, Saint Petersburg, Antwerp, Am¬ sterdam, Orleans and Toulouse.

BERTINI, Giuseppe, ber-te'ne, Italian his¬ torical painter: b. Milan, 1825; d. 1898. The Milan Academy awarded him the prize for the best historical picture in 1845, and his painting on glass of (Dante and the Divine Comedy,) exhibited in London in 1853, has been greatly admired. He became professor of painting at the Academy in 1860. Among notable pictures by him are: (The Vision of Saint Francis of Assisi) ; (Death of Saint

Joseph) ; (Tasso Introduced to the Duke of Ferrara.)

BERTRAND, Henri Gratien, bartran, on-re gra-tyan, Count, French

military officer: b. Chateauroux, 1773; d. there, 31 Jan. 1844. He accompanied Napoleon's expedition to Egypt, distinguished himself at Austerlitz and became his adjutant; and, after the battle of Aspern, in 1809 for his share in saving the French army by bridges, was created count and governor of Illyria. After serving with credit

in the subsequent campaigns, and saying the French army after the battle of Leipzig, he retired with the Emperor to Elba, was his con¬ fidant in carrying out his return to France, and finally shared^ his banishment to Saint Helena. On Napoleon's death, Bertrand returned to France, where, though sentence of death had been pronounced upon him, a sentence which Louis XVIII had wisely recalled, he was re¬ stored to all his dignities, and, in 1830, ap¬ pointed commandant of the Polytechnic School. In 1840, he formed part of the expedition which brought back the remains of Napoleon to France.

BERTRAND, James, French historical painter: b. Lyons, 1825; d. 1887. He studied in Rome, and his (Saint Benedict taking Com¬ munion,) exhibited at the Salon in 1859, was highly approved. He worked in the classical style, and his paintings are as notable for their careful finish as for their religious tone. They have been frequently engraved. Among them are (Death of Virginia) (1869) ; Char¬ lotte Corday's Last Day) (1883); Calvary)

(1884).

BERTRAND, Joseph Louis Frangois,

bartran, jo-sef loo-e fron-swa, French mathe¬ matician : b. Paris, 1822 ; d. 1900. He taught at the Polytechnic and Normal schools, and the College de France, and in 1884 became a member of the French Academy. He wrote treatises on arithmetic, algebra, calculus, ther¬ modynamics, and probabilities, and in 1881 was appointed commander of the Legion of Honor.

BERTUCH, Friedrich Justin, German translator, publisher and author : b. Weimar, 30 Sept. 1747 : d. there, 3 April 1822. He studied at Jena, first theology, then law, gradu¬ ating in 1769, then became private tutor in Altenburg, during which period he made a thorough study of Spanish literature. In 1775 he became cabinet-secretary at Weimar and Councillor of Legation in 1785. He, Wieland and Schultz founded the Jenaische allgemeine Litteraturseitung , to which he was a very

fre¬ quent contributor. He was also an editor of the Journal des Luxus und der Modcn. One of his most popular works was a compilation for children, (Bilderbuch fur Kinder) (12 vols., 1790-1822). But it was as a publisher of maps and geographical works that he at¬ tained a world-wide reputation. Consult Feld-mann, (F. J. Bertuch) (Saarbriicker 1902).

BERULLE, ba-rul, Pierre de, French cardinal: b. near Troyes, 4 Feb. 1575; d. Paris, 2 Oct. 1629. He early showed remarkable men¬ tal acuteness and knowledge, and became dis¬ tinguished for skill in controversy. He instituted, and was the first superior of, the order of Carmelites in France, and also founded the congregation of the Oratory notwithstand¬ ing the opposition of the Jesuits. He was statesman as well as priest, as Ambassador to Spain negotiated the treaty of Mongon (1626), and was for a time secretary of state. He was often opposed to Richelieu, whose jealously he excited, and who could not conceal his satis¬ faction at the news of his death. He accom¬ panied the Princess Henrietta to England, on her marriage with the Prince of Wales. He shunned elevated positions, and was very un¬ willingly obliged to accept the hat of a cardinal.

This elevation made no difference, however, in his humble way of life, and did not prevent him from taking part, as he had always done, in the servile work of the religious community to which he belonged. He was also a man of letters, and was the first to appreciate and encourage the genius of Descartes, urging him, by his sense of obligation to his Creator, to make known to the world his discoveries. The most noted of his writings is (Les grandeurs de Jesus. }

BERVIC, bar-vek, Charles Clement,

French engraver: b. Paris, 1756; d. 1822. The works of Bervic are among the best of the French school, but are not numerous. The most celebrated of them is the full length figure of Louis XVI, after a picture of Callet. The copies are very rare and dear, because the plate was broken to pieces in the revolutionary tumults of 1793. The exactness

of his drawing, the firmness and brilliancy of his touch, the purity and correctness of his design, and the happiness with which he transferred to his plate the beauties of the original, gave a high char¬ acter to his productions.

BERWICK, James Fitz-James, Duke of French marshal: b. Moulins, 1670; d. 1734. He was the natural son of the Duke of York, after¬ ward King James II, and Arabella Churchill, sister of the Duke of Marlborough; and first went by the name of Fitz-James. He received his education in France, and served his first campaigns in Hungary under Charles, Duke of Lorraine, general of Leopold I. He returned to England at the age of 17, and received from his father the title of duke. On the landing of the Prince of Orange in 1688 he went to France with his father, whom he afterward accom¬ panied on the Irish expedition. He took part in the siege of Derry and was wounded at the battle of the Boyne, 1 July 1690. He afterward served in the low countries. In 1705 he sup¬ pressed the rising of the Camisards of Lan¬ guedoc, and was naturalized in France. In 1706 he took Nice, was made marshal of France, and sent to Spain, where he gained the battle of Almanza, which rendered King Philip V again master of Valencia. In 1709 he went to take the command in Dauphine, and the measures which he took to cover this and the neighboring provinces against the superior forces of the Duke of Savoy gained him a great reputation. In 1718 and 1719 he was obliged to serve against Philip V, who from gratitude to the marshal had taken a son of his into his service. On his entrance into the Spanish dominions he wrote to his son, the Duke of Liria, admonish¬ ing him to do his duty to his sovereign. At the siege of Philipsburg, on the Rhine, his life was terminated by a cannon-ball. He had served in 29 campaigns. His memoirs were published in French in 1778 and have gone through English editions. Consult Wilson, (Duke of Berwick, Marshal of France) (1883).

BERWICK-ON-TWEED, England, sea¬ port town, once forming a county of itself, but now incorporated in Northumberland, on the north or Scottish side of the Tweed, within half a mile of its mouth. It is surrounded by a complete series of ramparts, which are well pre¬ served, and along which is an agreeable prome¬ nade. The ramparts arc in the main of Eliza¬ bethan construction, with parts dating from

Edwrard I. The streets are for the most part narrow, steep, straggling and irregular, though some of the principal ones are wride and open. The Tweed is crossed at the town by an old bridge of 15 arches, 1,164 feet long and only 17 wide, and by a magnificent railway viaduct of

stone, 667 yards long and 184 feet in ex¬ treme height with 28 semicircular arches built by Robert Stephenson in 1850. The chief in¬ dustries are iron-founding, the manufacture of engines and boilers, agricultural implements, feeding-cake, manures of various kinds, ropes, twine, *etc.* The chief exports are grain, arti¬ ficial manures, and herrings. A dock affording accommodation for large vessels was opened in 1876, but its shipping remains unimportant. In the beginning of the 12th century, during the reign of Alexander I, Berwick was part of his realm of Scotland, and the capital of the dis¬ trict called Lothian. Soon after this date it became populous and wealthy, was the chief seaport of Scotland, contained a strong castle, churches, hospitals and monastic buildings, and was created one of the four royal burghs of Scotland. In 1216 the town and castle were stormed and taken by King John. During the competition between Balliol and the elder Bruce for the Scottish throne the English Parliament sat in Berwick; and in the hall of the castle Edward I pronounced judgment in favor of Balliol. King Robert Bruce retook the town and castle in 1318; but, after undergoing various sieges and vicissitudes, both were sur¬ rendered to Edward IV in 1482, and have ever since remained part of the soil of England. From 1482 to 1885 the borough sent two mem¬ bers to the English Parliament, when it wras merged in the Berwick division of Northumber¬ land. The borough includes the watering places of Tweedmouth and Spittal, situated on the south bank of the Tweed. Pop. (1911) 13,075.

BERWICKSHIRE, Scotland, maritime and border county, nominally divided into the three districts of Lauderdale, Lammermoor, and the Merse or March. The principal rivers of the county are the Tweed, the Leader, the Eye, the Whiteadder and the Blackadder ; and all except the last contain salmon, of which great quantities are shipped for London. Vast quantities of agricultural produce are shipped from the ports of Berwick and Eyemouth, and much is also sent to Edinburgh, Dalkeith, Llad-dington and Dunbar. Very few manufactures are established in this county, the principal one which it supplies beyond domestic consumption being that of paper. The North Sea fisheries are of great importance. Berwick formerly abounded in strong castles and fortified places mainly on the high and rocky coast. The ruins of Fast Castle, the (Wolf's Crag) of Scott's 'Bride of Lammermoorˆ stand on a pre¬ cipitous headland four miles northwest of Cold-ingham. In the Tweed Valley the land is highly cultivated ; otherwise the county is mainly pastoral. The county town is Greenlaw. Other small towns are Duns and ˆEyemouth. • I he county has an area of 292,535 acres; its popu¬ lation (1911) was 29,643; and it returns one member to Parliament.

BERYL, a native silicate of aluminum and the rare metallic element gPucinum (or “beryl¬ lium®), having the formula 3G10.Al203.6Si02, and crystallizing in the hexagonal system. It

commonly has a specific gravity of 2.70, and a hardness of from 7.5 to 8. A portion of the glucinum is sometimes replaced by lithium, so¬ dium or caesium, and chemically combined water is also occasionally present. In the latter case the formula of the mineral appears to be HaGleAhSIuOar. Beryl is usually transparent or translucent, and in color may be green, blue, yellow, white, or light red. A variety which is transparent, and bright green from the presence of oxide of chromium, is known as “emerald,® and is highly esteemed as a gem (see Gems) ; the (<Oriental emerald® (see Sapphire), how¬ ever, is not a variety of beryl, but a green variety of sapphire. A bluish-green variety of the common beryl, known as “aquamarine,® is also used as a gem. Beryl occurs in all parts of the world, being commonly associated with granite. Its crystals are sometimes enormous in size, and two speciments from Grafton, N. H., are known, which weigh 2,900 pounds and 2ˆ2 tons, respectively. The finest emeralds (q.v.) are from Bogota; aquamarines (q.v.), from Siberia, Brazil, Maine, North Carolina and Colorado; golden beryls, from Connecticut and North Carolina.

BERYLLIUM, a rare metallic element, called “beryllium® from the fact that it was first found in the beryl. Its salts have a sweetish taste, and from this circumstance the element itself has received the name glucinum (q.v.).

BERYTUS, School of, a famous Greek Law school which existed in the 3d century a.d. and probably for some time previous. When Justinian closed the schools of philosophy and law at Athens, in 529, he confined the study of jurisprudence in the East to Constantinople and Berytus. He reorganized the course of study, making his new codification the basis of the curriculum, to be pursued in its logical sequence for five years. Berytus was destroyed by earthquake in 554.

BERYX, ber'iks, the designation of a genus of deep-sea fishes in tropical waters belonging to the division Perciformes of the Acanthopterygii and the family Berycidce. B. splendens, deep red with bright streaks, is one of the most beautiful of the Cuban fishes.

BERZELIUS, ber-tsa'H-us, Jons Jakob

Baron, Swedish chemist of distinction: b. Westerlosa, East Gothland, Sweden, 29 Aug. 1779; d. Stockholm, 7 Aug. 1848. The first fruit of his studies and of a year's residence as assistant to a physician at the famous watering-place of Mcdewi, was the (Nova Analysis Aquarum Medevi-ensiunP (1800). After tak¬ ing his doctor's degree, he was appointed by the board of health in 1802 adjunct of medicine and pharmacy in Stockholm. In 1807 he became professor of medicine and pharmacy in Stock¬ holm. In 1808 he was admitted a member of the Academy of Sciences at Stockholm, in 1810 one of its directors, and in 1818 its perpetual secretary. In 1818 the King, while allowing him to retain his own name, made him a noble; and in 1835, on the occasion of his marriage with a daughter of Poppius, a councillor of state, he was named a baron.

The existing state of chemistry is founded in a great measure on the discoveries and views of Berzelius, though, by the rapid devel¬ opment of the science, the edifice which he

erected has undergone many alterations, notable defects have been discovered in it. Hence his views in regard to atomic weights, his electro¬ chemical theory, and his mode of procedure in organic chemistry, have met with many oppo¬ nents. He discovered selenium and thorium, first exhibited calcium, barium, strontium, tan¬ talum, silicium and zirconium in the elemental state, and investigated whole classes of com¬ pounds, as those of fluoric acid, the metals in the ores of platinum, tantalum, molybdenum, vanadium, sulphur salts, *etc.* He introduced a new, or at least a wholly altered nomen¬ clature and classification of chemical com¬ pounds. In short, there is no branch of chem¬ istry to which he did not render essential ser¬ vice; and his labors were so numerous that, when the accuracy with which they have been executed is kept in view, it becomes almost in¬ comprehensible how one man should have been able to perform them. It ought to be especially mentioned that he never rested satisfied with the bare investigation of isolated facts, but always extended his investigations over a wide field, so as to contribute to the advancement of chemistry as a whole. In addition to his numer¬ ous

communications to the journals and period¬ icals of the period, may be mentioned, among his separate works, his (View of the Compo¬ sition of Animal Fluids,* (New System of Min¬ eralogy,) (Essay on the Theory of Chemical Proportions, *and above all his (Textbook of Chemistry,* which has been translated into most European languages. As secretary of the Academy of Sciences, he published an an¬ nual account of the progress of chemistry and mineralogy, which, having been continued dur¬ ing 27 years, extends to as many volumes. Con¬ sult Soderbaum, (Berzelius, Werden und Wachsen) (Leipzig 1899).

berzs£nyi, ber'zha-nyl, Daniel, Hun¬ garian poet: b. Heyte, 1776; d. 1836. An au¬ thorized version of his <Versei) appeared in 1813 and in 1816 was reprinted with his consent and speedily became classic in Hungarian lit¬ erature. The poems received a hearty acclaim from the younger patriots. The best edition is that by Toldy (2 vols.. Pesth 1864).

BES, an Egyptian god, represented clad in a lion's skin, with the head and skull of the animal concealing his features, and with a dwarfish and altogether grotesque appearance. He was supposed to preside over art, music, the dance and childbirth. He was formerly identified with Typhon. He was of foreign origin and appears chiefly after 1500 b.c.

BESANQON, be-zan-son, France, fortified town, capital of the department of Doubs, 206 miles southeast of Paris. The town is sur¬ rounded by hills, covered with vineyards. The isthmus or peninsula on which it is built is composed of a mass of rocks crowned by the citadel, which commands the country toward the north, but the citadel itself is commanded by several eminences, on which forts have been erected for the purpose of securing the ap¬ proaches. Besanqon is one of the strongest towns in France, and also one of the best built. The streets are spacious and well laid out, and the squares are adorned with fountains. The citadel is one of Vauban's finest works. There are here a theatre, a large and valuable public

library, containing over 130,000 volumes, a mu¬ seum, a botanic

garden, school of artillery, lyceum, *etc.* The trade and manufactures are extensive. The latter comprise linen, cotton, woolen and silk goods, ironmongery, *etc.* ; but the principal industry is watch-and clock¬ making. It employs about 12,000 work people. There are also extensive foundries, breweries, sawmills and tanneries. Besangon is the an¬ cient Vesontio, Besontium, or Bisontium, which is mentioned by Julius Caesar, who drove the Sequani from it in 58 b.c., as a place of great natural strength. Several of the streets and places still bear their old Roman names, and there are numerous Roman remains, especially a triumphal arch of the Emperor Marcus Aure¬ lius, an aqueduct, an amphitheatre and a large theatre. Pop. (1911) 57,978.

BESANT, bes-ant, Annie, English theoso-phist and author : b. London, 1 Oct. 1847. She was married in 1867 to the Rev. Frank Besant, brother of Sir Walter Besant, but was legally separated from him in 1873. She early mani¬ fested an earnest interest in social and political topics, and in 1874 became connected with the National Secular Society. Owing to the publi¬ cation of bruits of Philosophy, *Mrs. Besant was prosecuted, in conjunction with Charles Bradlaugh (June 1877), but the prosecution failed. Mrs. Besant has since stated her dis¬ agreement with the sentiments expressed in this book. In 1883 she announced her adhesion to Socialism. For three years she was a member of the school board of London. She was prominently connected with various socialistic movements and a frequent speaker at meetings for workingmen. In 1899 she underwent a complete change of mind when she joined the Theosophical Society, and in 1907 she was elected president. She visited the United States in 1891 and 1892-93 and lectured on Madam Blavatsky and reincarnation and on theosophy and occultism. Among her numerous publica¬ tions are Reincarnation* ; (Seven Principles of Man*; (Autobiography *; (Death and After*; (Building of the Kosmos* ; (In the Outer Court) ; (Karma *; (The Self and Its Sheaths) ; Rath of Discipleship) ; (Man and His Bodies) ; Rour Great Religions) ; (The Ancient Wis-dom) ; (Three Paths to Union with God) ; (Evolution of Life and Form) ; (Dharma* ; (Avataras* ; (Ancient Ideals in Modern Life' ; ˆEsoteric Christianity) ; <Thought-Power) ; (The Religious Problem in India) ; (Theosophy and the New Psychology) ; *The Wisdom of the Upanishats.* In July 1916 she was re¬ fused admission into India by the British authorities.

BESANT, be-zant', Sir Walter, English novelist: b. Portsmouth, England, 14 Aug. 1836; d. London, 9 June 1901. He was educated in London and at Christ's College, Cambridge, where he graduated with mathematical honors. He was for a time professor in the Royal Col¬ lege, Mauritius. His first work, (Studies in Early French Poetry,* appeared in 1868, and to the field of French literature also belong his (French Humorists) (1873), and his Rabe-lais) (1877 for the Foreign

Classics series). He was for years secretary to the Palestine Ex¬ ploration Fund, and published a (History of Jerusalem* (1871) in conjunction with Pro¬ fessor Palmer, ihc life of whom he also wrote.

The (Survey of Western Palestine) was edited by him. He is best known by his novels, a num¬ ber of which were written in partnership with James Rice, including (Ready-Monev Morti-boy) (1872) ; (This Son of Vulcan* ; (The Case of Mr. Lucraft* ; <The Golden Butterfly* (1876); (The Monks of Thelema,* *etc.* After Mr. Rice's death (1882) Sir Walter wrote:

(All Sorts and Conditions of Men* (1882), which led to the establishment of the People's Palace in London; (A11 in a Garden Fair* (1883) ; (Dorothy Foster* (1884), which in his own estimation was his best work; (The World Went Very Well Then* (1887); (The Ivory Gate* (1892); (The Rebel Queen* (1893); (Beyond the Dreams of Avarice* (1895) ; (The Orange Girl* (1899); (The Alabaster Box* (1900); (The Story of King Alfred* (1901), *etc.* Among his other works are (The Eulogy of Richard Jefferies* (1888). He labored for many years to promote the interests of all members of the literary profession, and was editor of the monthly The Author. In 1894 he projected a great survey of London, which was intended to bring the history of the city from the earliest times down to the end of the 20th century, and wrote four volumes of preliminary studies with that end in view, but he did not live to complete the undertaking. He was knighted in 1895.

BESHOW, the Alaskan pollack. See Pollack.

BESIDE THE BONNIE BRIER BUSH,

a novel by Ian Maclaren (the Rev. Dr. John Watson), delineating Scottish character and life among the lowly and published in 1894. It consists of short sketches with no attempt at plot, but interest attaches to the well-drawn characters. It is one of the best examples of what has been styled the ((kail-yard** school of fiction, whose principal exponents are Crockett, Barrie and Watson. It was successfully dram¬ atized.

BESIKA BAY, an inlet of the 2Egean Sea on the northwest coast of Asia Minor, opposite Tenedos, to the south of the entrance of the Dardanelles. The English fleet was stationed here during crises in the Eastern question in 1853-54 and 1877-78. Sec War, European,

Dardanelles Campaign.

BESKOW, bes'kov, Bernhard von, Swed¬ ish dramatist: b. Stockholm, 19 April 1796; d. 17 Oct. 1868. He was ennobled in 1826 and appointed marshal of the royal household in 1833. He officiated for some time as director of the royal theatre, and is the author of sev¬ eral excellent tragedies, which were translated into Danish and German by Oehlenschlager, and of which (Torkel Knutsson* is considered the best acting play of the Swedish stage. He wrote an opera, <rfrubaduren,* for which King Oscar composed the music. His literary repu¬ tation was increased by his books of travel, by his poetical works, and by his contributions to the press. The great prize of the academy was awarded in 1824 to his poem (Sveriges anor.* Other tragedies, which were very popular, are (Erikden Fjortonde,* and (Birger och Lans Att.* His poem (Karl XII* has also been very widely known.

BESNARD, (Paul) Albert, ba-nar\

French painter: b. Paris, 2 June 1849. His

parents were both artists, his father having studied under Ingres. The young Besnard, with such influences, showed an early aptitude for art-study and went into Cabanel's private studio at the age of seventeen. He studied un¬ der Bremond as well. His first salon picture was received in 1868. In 1874 he received the Prix de Rome bringing with it the sojourn in Italy at the Villa Medicis. From 1879 to 1881 he practised portrait painting in London. In 1884 he exhibited at the salon his decorations for the Lcole de Pharmacie in Paris which, fol¬ lowed (in 1899) by his (Femme qui se chauffe) now in the Luxembourg, raised considerable outcry against him in orthodox circles. It was asserted that he, designated by his training to carry on the traditions of the Ecole des Beaux-Arts, was surrendering to the allurements of impressionism. In reality there was little need for the academic group to take alarm, for de¬ spite his extreme virtuosity and his learning certain principles from the advanced painters, he remains

a school man, though a brilliant one. The idea is corroborated as his work advances, later productions being (Life Re¬ born from Death, ' at the Sorbonne; (Truth Attended by the Sciences Enlightening Man,' a ceiling decoration in the Hotel de Ville ; 'The Happy Isle,' at the Musee des Arts Decoratifs and the Petit Palais, portraits like the Por¬ trait de Femme, ' at the Dusseldorf Museum, and genre, like his pictures of India. He has received many honors and is represented in the Brussels Gallery by (Les Cariatides) and the Luxembourg by the (View of Algiers,' the Portrait of an Engraver' and the Pemme qui se chauffe,' before mentioned. Besnard is a great traveler and brought from Spain and Algiers admirable specimens of his art; but his greatest undertaking was his journey to India in 1911. He brought back incomparable pic¬ tures of the exotic color and the interesting life of that country. They are masterpieces of in¬ tense color, often in a single tone; such as his (Weeping Woman,* painted entirely in red. Other excellent examples are the (Steps at Benares'; Hndian Dancing GirP ; 'The Brace¬ let Merchant.' The exhibition of his Indian works in Paris in 1912 attracted interna¬ tional attention. A large and representative exhibition of his works was held in 1913 in the Boston Museum of Fine Arts and afterward in other American museums. He was engaged in 1914 to execute mural paintings for the Peace Palace at The Hague. He is also a pas-tellist and engraver of note. Besnard has suc¬ cessfully united the achievements of the im¬ pressionists in light and color with whatever is really sublime and permanent in classic tradi¬ tion; he has resumed the historic mission of French painting to express in form and color the intellectual and spiritual achievements of the nation. A good example of his unconven¬ tionality is his portrait of Madame Rejane. Consult Marx 'The Painter Albert Besnard' (Paris 1893), and Mourey, 'Albert Besnard' (ib., 1906), with 100 illustrations and literary contributions by the artist.

BESSARABIA, a province in the north¬ east of Rumania, on the borders of Russia. It extends in a northwesterly direction from the Black Sea, between the Pruth and the Dniester; area, 16,181 square miles. Possession of the

territory was stubbornly contested between the Turks and Russians at different times from early in the eighteenth century'; in 1812 it was definitely annexed to Russia. A portion at the southeast extremity was given to the princi¬ pality of Moldavia (now incorporated in the kingdom of Rumania) in 1856, but the greater part of this (3,580 square miles) was re¬ stored in 1878. Agriculture is chiefly developed in the north, pasturage is most largely carried on in the south, in the

middle portion are exten¬ sive forests. It is watered by the Dniester, the Pruth and the Danube. In March 1918 Bessarabia was added to Rumania. The capi¬ tal is Kishenef. The products are salt, wool, tallow, leather, soap, *etc.* Pop., according to the latest figures, 2,344,800.

BESSARION, Johannes, or Basilius,

Greek monk: b. Trebizond, 1389; d. Ravenna, 19 Nov. 1472. He was titular patriarch of Constantinople, archbishop of Nicsea, afterward cardinal and legate to France, in the time of Louis XI. After having spent 21 years in a monastery of Greece, devoted to theology and literature, he left it to follow the Emperor John PaHologus to Italy, with the intention of being present at the Council of Ferrara, in the hope of uniting the Greek and Latin churches. They were accompanied by many Greeks, dis¬ tinguished bv their talents and dignity. Bcs-sarion seconded with so much zeal the projects of Palseologus that he became odious to the Greek Church, while Pope Eugenius IV re¬ warded him for his devotion to that of Rome, by the dignity of cardinal-priest. He was sent to France by Sixtus IV to reconcile Louis XI with the Duke of Burgundy and obtain aid against the Turks. He did not succeed, and it is pretended that he received a personal insult from the king, which humiliation some suppose to have been the cause of his death.

BESSEL, Friedrich Wilhelm, German as¬ tronomer: b. Minden, Prussia, 22 July 1784; d. 17 March 1846. An astronomical tract which he had drawn up brought him into communica¬ tion with Olbers, who encouraged him in his labors and procured for him the appointment of inspector of astronomical instruments to the University of Gottingen. In 1810 he removed to Konigsberg, and in 1812-13 superintended the construction of the observatory of this town From 1824 to 1833 he completed a series of 75,011 observations on the celestial zone con¬ tained between 15° N. and 15° S. declination. These observations included all the stars in the zone as far as the ninth magnitude. A disserta¬ tion which he published in 1844 contains im¬ portant investigations on the variability of the movements of the fixed stars. An important share in the discovery of the new planet Nep¬ tune belongs to him, as in a paper read in 1840 he called attention to the existence of a plane¬ tary mass beyond Uranus, founding on consid¬ erations which were afterward happily proved to be correct. Few contributed as much to the advancement of astronomy in the first half of the 19th century. He was the inventor of (Bessel's Functions.' His principal works are an 'Essay on the Path Traversed by the Comet of 1807' ; 'Astronomical Observations' during various years;

‘Determination of the Length of the Pendulum Which Beats Seconds at Ber¬ lin’ ; ‘Investigations and Measurements made

with a View to Establish a Metrical Unit for Prussia) ; (Measure of the Distance of the Sixty-first Star of the Constellation of the SwanQ and (Popular Lectures on Scientific Questions. } Consult Herschel’s (Brief Notice of F. W. BesseP (London 1847), and Durege,

(Bessels Leben und Wirken) (Zurich 1861).

BESSELS, Emil, German naturalist: b. Heidelberg, 2 June 1847; d. Stuttgart, 30 March 1888. He was educated in the University of Heidelberg, and while an assistant at the Royal Museum in Stuttgart became interested in the subject of Arctic research. In 1869 he was a member of Petermann’s expedition that sailed into the sea between Spitzbergen and Nova Zembla. In 1871 he came to the Lfnited States and was appointed both naturalist and surgeon to the expedition under Capt. Charles F. Hall, United States navy, most of his collection being lost in the wreck of the Polaris. Most of the scientific results of this expedition were gath¬ ered by his personal efforts, and published under the title of (Report on the Scientific Re¬ sults of the Polaris Expedition) (1876). In 1879 he published a German narrative of the expedition, illustrated with his own sketches. Later he returned to Germany.

BESSEMER, Sir Henry, English inventor: b. Charlton, Llertfordshire, 19 Jan. 1813; d. London, 15 March 1898. He received mechani¬ cal training at an early age in the type foundry of his father, a French artist, and going to London at 18 began his career as a modeler and designer. His earliest invention was an im¬ proved method of stamping deeds which the revenue office straightway adopted without giving him any compensation therefor. Late in life he brought the

matter to the attention of the government and was then knighted (1879) in acknowledgment of his services in this par¬ ticular. His inventive ability was next turned to the production of a new method of making bronze-powder or <(gold® paint, as it was called, which proved a commercial success, and subse¬ quent inventions of his were machines for making Utrecht velvet and improvements in type-casting machinery. At the time of the war in the Crimea he designed a projectile in¬ tended to revolve in its flight, but as the cannon of that day were not strong enough to permit of its use, he went on experimenting in Paris under the patronage of Louis Napoleon till he had secured a much improved kind of cast iron. This, however, did not fully satisfy him and he continued at work refining the iron until steel was produced. He took out patents for this invention in 1855, but persevered in experiments till at his London bronze factory steel ingots had been manufactured which could be rolled into rails without hammering. When this pro¬ cess had become fully developed the Bessemer Steel Works were built in Sheffield, where, be¬ sides employing a large number of workmen in steel manufacture, many others were trained for similar work in factories all over the world. On 13 Aug. 1856, he read before the British Association at Cheltenham a paper dealing with the invention which has made his name famous, ((Thc Manufacture of Malleable Iron and Steel without Fuel.® This was a new and cheap process of rapidly making steel from pig-iron bv blowing a blast of air through it when in a state of fusion, so as to clear it of all carbon,

and then adding just the requisite quantity of carbon to produce steel — a process which has introduced a revolution in the steel-making trade, cheap steel being now made in vast quan¬ tities and used for many purposes in which its price formerly prohibited its application. At the Birmingham meeting in 1865 he read a second paper <(On the Manufacture of Cast Steel, Its Progress and Employment as a Sub¬ stitute for Wrought Iron.® The Bessemer pro¬ cess not only stimulated the growth of the steel industry but greatly reduced the cost of manu¬ facture and rendered steel available for rails and general engineering work. Bessemer was also the originator of a method still in use for compressing into a solid block the graphite em¬ ployed in the manufacture of lead pencils; of a system of rollers for embossing and printing paper, and of improvements in telephones. In 1859 he received the Telford Medal of the In¬ stitute of Civil Engineers, and in 1872 the Al¬ bert Medal of the Society of Arts. He was president of the Iron and Steel Institute of Great Britain, 1871-73, and in 1879 became a Fellow of the Royal Society. In the United

States eight localities and one railway bear his name. Bessemer was an honorary member of many foreign scientific and engineering so¬ cieties, among which was the American Society of Mechanical Engineers. Before the latter, in December 1896, he presented a paper entitled ((The Origin of the Bessemer Process,® printed in its transactions.)

BESSEMER, Ala., a city in Jefferson County, on several trunk railroads ; 12 miles southwest of Birmingham, the county-seat. It was founded in 1887 as a manufacturing place because of the valuable iron and coal mines in its immediate vicinity. It contains iron foun¬ dries, coke ovens, a number of blast furnaces, machine shops, planing mills, iron pipe works, fire brick works, and other works connected with the iron and steel industry. The United States census of manufactures for 1914 re¬ corded 47 industrial establishments of factory grade, employing 1,999 persons, of whom 1,772 were wage earners receiving annually $1,069,000 in wages. The capital invested aggregated $6,- 659,000 and the year's output was valued at $6,023,000: of this, $2,185,000 was the value added by manufacture. It has four banks, sev¬ eral weekly newspapers, electric lights, water¬ works, a Carnegie library, the Elizabeth Duncan hospital, and a property valuation of $3,000,000. It is governed by a mayor elected biennially and a board of aldermen elected on a general ticket. Pop. (1910) 10,864; (1920) 18,674.

BESSEMER STEEL PROCESS. See

Bessemer, Sir Henry ; Steel Manufacture.

BESSENYEI, Gyorgy, Hungarian dram¬ atist: b. Berezel 1747; d. 1811. Being of a noble family he spent his earlier years in idleness, until, in his 18th year, he became a member of the court bodyguards. It was then that he be¬ gan his serious studies, applying himself espe¬ cially to foreign languages and literature, which led on to his first attempts at writing. His first work was a tragedy, (Agis,) portraying a period of Spartan history (Vienna 1872), considered by Hungarian critics as the first of its kind in modern Hungarian literature. His comedies are also the first works of a humorous nature in

Hungarian. Chief of these is (The Philosopher (1777). Among his other works are (Life of John HunyadP and a (Philosophic History of Hungary. > He has been considered the father of modern Hungarian literature.

BESSEY, Charles Edwin, American bot¬ anist : b. Milton, Ohio, 21 May 1845 ; d. Lin¬ coln, Neb., 25 Feb. 1915. He was graduated at the Michigan Agricultural College 1869, studied at Harvard under Asa Gray 1872 and 1875— 76, and was professor of botany at the Iowa Agricultural College 1870-84; professor of bot¬ any at the University of Nebraska in 1884, and head dean of the university 1909. He published (The Geography of Iowa) (1876) ; (Botany for High Schools and Colleges) (1880) ; (The Es¬ sentials of Botany y (1884) ; (Elementary Bot¬ any) (1904) ; (Plant Migration Studies} (1905) ; (Synopsis of Plant Phyla) (1907) ; (Outlines of Plant Phyla) (1909) ; and with others, (New Elementary Agriculture) (1911).

BESSIERES, bes-yar, Jean Baptiste,

Duke of Istria, French marshal: b. Preissac, 5 Aug. 1768; d. Liitzen, 1 May 1813. Entering the army in 1792 as a private soldier, in less than two years he had attained the rank of cap¬ tain. After making the Spanish campaign, he passed into the army of Italy and soon at¬ tracted the notice of Napoleon who took him to Egypt in 1798, where his conduct at St. Jean d'Acre and Aboukir covered him with glory. At the accession of Napoleon to the throne, he became marshal of France. He showed his usual conspicuous courage at Austerlitz Jena, Eylau and Friedland, and, raised to the rank of Duke of Istria, commanded in Spain in 1808-09. In the Russian campaign he led the cav¬ alry of the Guard, and did much by his sleep¬ less courage and presence of mind to save the wreck of the army in the disastrous retreat from Moscow. On the morning of the battle of Liitzen he fell mortally wounded by a can¬ non ball. He was a great cavalry leader, cool and dauntless, and beloved by his troops.

BEST, William Thomas, English mu¬ sician : b. Carlisle, 13 Aug. 1826 ; d. Liverpool, 10 May 1897. In 1849 he was appointed or¬ ganist of the Philharmonic Society in Liver¬ pool ; in 1853 he went to London and became organist of the Panopticon of Science and Art and also of the Church of Saint Martin-in-the-Fields; in 1854 he was organist of Lincoln's Inn Chapel and in 1855 organist of Saint George's Hall, Liverpool. He was the author of (The Modern School for the Organ* (1853) ; (The Art of Organ Playing) (1869) ; Arrangements from the

Scores of the Great Masters} (1873), and was well known as an editor.

BESTIARIES, the name given to certain extremely popular books of the Middle Ages. In the written volumes, sometimes with copious illustrations, were given descriptions of ani¬ mals, real and imaginary, which was which being left to the discretion or knowledge of the readers. They were composed in verse or prose or a mixture of both, and were designed not only as handbooks of zoology, but as teachers of morals as well. It was the fashion to at¬ tach spiritual meanings to the animals or their actions, until every quality of good or evil in the soul of man had its type in the beast world. It is to the bestiaries that we must look for

explanation of the strange, grotesque creatures which are found sculptured on the churches and other buildings of the Middle Ages. The oldest Latin bestiaries had an early Greek or¬ iginal, the well-known (Physiologus, > under which name about 50 such allegories were grouped. The Greek text of this famous work is found only in manuscript. There are old Syriac, Armenian, Ethiopic, Arabic, Icelandic and numerous Latin versions. Editions of the Latin have been issued — Mai, Heider and Cahier. An Old High German version was made earlier than the 11th century; in the 12th century versions in French were made by Phil¬ ippe de Thaun and Guillaume, a priest of Nor¬ mandy. The (Bestiary of Love> of Richard de Fournival was rather a parody upon the earlier form of such books. The following is a characteristic extract from the (Divine Bestiary* : (<The unicorn has but one horn in the middle of its forehead. It is the only animal that ventures to attack the elephant ; and so sharp is the nail of its foot, that with one blow it rips up the belly of that most terrible of all beasts. The hunters can catch the unicorn only by placing a young virgin in the forest which it haunts. No sooner does this marvelous ani¬ mal descry the damsel than it runs toward her, lies down at her feet, and so suffers itself to be taken by the hunters. The unicorn repre¬ sents our Lord Jesus Christ, who, taking our humanity upon him in the Virgin's womb, was betrayed by the wicked Jews and delivered into the hands of Pilate. Its one horn signifies the gospel truth, that Christ is one with the Father, » *etc.*

BESTUZHEV, be-stoo'zhef, Alexander Alexandrovitch, Russian novelist and soldier: b. Saint Petersburg, 3 Nov. 1797; d. 19 July 1837. Of his numerous novels, the most cele¬ brated are (Ammalat-Beg* ; (The Nadeshda Frigate* ; (The Terrible Prophecy. * His (Private Correspondence is highly prized. He was killed in battle in the

Caucasus.

BESTUZHEV-RYUMIN, be-stoo'zhef ryoo'men, Alexei Petrovitch, Count, Rus¬ sian statesman: b. Moscow 1693, of a family of English origin, and of the second class of nobles in Russia ; d. Saint Petersburg, 21 April 1768. He entered the civil service un¬ der Peter the Great, and became a diplomatist. Lender the Empress Anne he was made a mem¬ ber of the Cabinet, and the Empress Elizabeth, whose fullest confidence he possessed, created him count, great chancellor of the empire, and his influence in the government became almost boundless. He was strongly opposed to the Prussian and French diplomatic influence, and was disliked on this account by Peter III, nephew and presumptive heir of Elizabeth. He concluded several treaties with England, Swe¬ den and Denmark, favorable to English policy. By a treaty concluded in 1747, he paved the way for the union of Schleswig and Holstein with the kingdom of Denmark. By his influence, the Russian troops supported Austria against Fred¬ erick the Great in the Seven Years' War. But their commander, Apraxin, retired to Russia, and this occasioned the fall of Bestuzhev. He was banished to his country seat, but Catharine II. in 1762. restored him to liberty and made him a field marshal. He is regarded as the inventor

of a chemical preparation known in medicine under the name of tinctura tonica Bestucheffi.

BESTUZHEV-RYUMIN, Konstantin Nikolayevitch, Russian historian : b. Kud-resh, government of Nizhni Novgorod, 1829; d. 1897. After graduating from the University of Moscow, where he had studied law, he taught school. In 1856 he became associate editor of the Moscow Gazette. Later he removed to Saint Petersburg, where, in 1865, he was appointed professor of Russian history at the university. In 1890 he was elected to membership of the Imperial Academy of Science. He and Tiblin collaborated in trans¬ lating Buckle's 'History of Civilization * into Russian. Among the more important of his works are (The Christianization of Russia) (1864) ; 'The Black Days of TatarisnP (1864) ; 'Biographies and Characteristics) (1882). Of

greatest importance was the ‘History of Rus¬ sia, } which he did not complete, of which only two volumes were published, the first in 1872 and the second in 1885. The last volume con¬ cludes with the reign of Ivan the Terrible.

BETAIN, or BETAINE, an organic base, having the chemical composition C.-.HnNCh, ob¬ tained from the juice of the common beet, or from beet-root molasses. It is not present in the beet-root in nature, but is obtained from it by the action of baryta or hydrochloric acid. The hydrochloride is one of its most important salts, and numerous others are also known.

BETANZOS, ba-tan’thos, Juan Jose de,

Spanish historian of the 16th century. His biographers tell little of him, other than that he was among the first to accompany the nine expeditionaries to the Indies, that he remained a long time in the New World and there studied the customs, usages and language of the abor¬ igines and at his death left the manuscript of the well-known and very interesting work en¬ titled ‘Historia de Indorum MoribusP

BETEL, BETLE, PAWN or PINANG,

popular Oriental names for various species of Chavica (see Pepper), especially C. betle, and C. siriboa, climbing shrubs cultivated in the East for their leathery leaves which are used to a prodigious extent with bits of areca-nut and shell lime for chewing, particularly by the Malay races. The plants are trained upon trel¬ lises, poles, etc., in shady but hot and moist places, which in northern India are secured by means of sheds. Europeans do not take readily to the habit because the mixture is hot, acrid, astringent, abraids the mouth, temporarily de¬ stroys the sense of taste, reddens the lips as if they were covered with lDlood and blackens the teeth, which are sooner or later destroyed. At 25 years of age, habitues are often toothless. Among East Indian races the habit dates back more than 2,400 years and at the present time is as general as was the habit of using snuff among Europeans ; the betel box is carried by old and young, men and women, and presented upon all occasions. Opinions differ as to the utility or perniciousness of this habit, some writers claiming advantages which in the face of the above-mentioned facts seem as far¬ fetched as like arguments in defense of the sim¬ ilar use of tobacco. Sir James Emerson Tennent is of opinion that the habit is beneficial to a people of whose food flesh forms no part, as

it is the antacid, the tonic and carminative they require. Chavica is the genus into which the old genus Piper has been divided.

BETELGEUSE, bet-el-gerz', the star Alpha Orionis, the bright, reddish star in one of the shoulders of Orion. It varies some¬ what in brightness and is of enormous size.

BETH-AVEN, "house of idolatry,® men¬ tioned in Joshua and Samuel, lay northwest of Michmash near Ai and on the way to Aija-lon. The place was still inhabited during the 8th century b.c. The "calves of Bethaven® were probably those at Bethel nearby.

BETH-DAGON, or HOUSE OF DA-GON, the name of two Biblical cities whose location has not been determined. About four miles southeast of Jaffa stands a village named Beit Dejan, which has arisen in comparatively recent times. Khurbet Dajun, a Roman site, is close by. The other Beth-Dagon was a city of the tribe of Asher.

BETH-HORON, in Bible history, two important towns of Palestine, supposed to have been built by Sheerah, a daughter of Ephraim. In the neighborhood Joshua defeated the Canaanites ; under Solomon both towns were strongly fortified ; the Egyptian King Shishak passed along the high road to invade Judah, and here, also, the Syrian commander Seron was defeated by Judas Maccabseus. At a later period a Roman army under Cestius Gallus was driven back by the Jews. The site is occupied to-day by two villages barely two miles apart.

BETH PEOR, beth pe'or (Hebrew, house of Peor, i.e., the god of Baal-Peor), a city where the Israelites are said to have received the laws of Deuteronomy, and the supposed locality of Moses' burial. The precise locality of Beth Peor is undetermined, however, and various points have been suggested as probable sites, but the only theory which seems reasonably sure is that it stood somewhere among the Nebo-Pisgah Mountains. It belonged to the tribe of Reuben. Some geographers have sug¬ gested Ain el-Minyeh, on the northern side of the ridge, as the location of the city.

BETH-SHAN, or BETH-SHEAN, in

ancient times a fortified town of Palestine, on the site of which stands the modern village of Beisan, inhabited by Circassians, and lies about 20 miles south of Tiberias, on the route of the Acre-Damascus railroad. It is believed that the stronghold was included in King Solomon's domains, but it belonged to the Philistines at the time of Saul, for it was there that they dis¬ honored the bodies of Saul and his

sons. The place was known as Scythopolis during the Greek period, and after the Maccabsean strug¬ gle it rose to prosperity as a member of the Decapolis, or league of 10 Greek cities. It re¬ tained its Canaanite population for a while during the Israelite occupation after submission to Manasseh.

BETH-ZUR or BETHSURA, “house of rock,® a town of Judah in the Hebron Moun¬ tains. Rehoboam built the fortifications. The Greeks under Lysias were here defeated by Judas Maccabseus (165 b.c.). The ruins still exist on a cliff near the Hebron road; the site is called Beit Sur.

BETHABARA, the scene of Saint John’s baptism. This name occurs only once (John i, 28), whereas the revised version, following the principal codices, reads Bethany (q.v.).

RETHAM-EDWARDS, Matilda, Eng¬ lish author: b. Suffolk 1836. She was privately educated and has published numerous works in poetry, fiction and on French rural life. Among her works are (The Dream Charlotte > ; (France of To-day } ; (A Romance of Dijon) ; (The Lord of the HarvesD ; (Anglo-French Remi¬ niscences‘1 ; (A Suffolk Courtship) ; (Literary Rambles in France) ; (French Men, Women and Books) ; Un French Africa) ; three vol¬ umes of poems, and an edition of Arthur Young’s (Travels in France. >

BETHANY, a village of Palestine, at the foot of Mount Olivet, on the eastern side, about two miles east of Jerusalem, where Lazarus dwelt and was raised from the dead and where the ascension of Christ is related to have taken place. The house and grave of Lazarus and the house of Mary Magdalene are still shown to travelers.

BETHANY, Mo., city and county-seat of Harrison County, 64 miles

northwest of Saint Joseph, on the Chicago, Burlington and Quincy Railroad. It has flour mills, brickyards and canning factories. The district is rich in agri¬ cultural and stock raising products. Building stone is quarried nearby. The city is the seat of Heilbron Sanatorium. The electric light and power plant is municipal property. Pop. 2,080.

BETHANY COLLEGE, American co¬ educational institution at Lindsborg, Kan., un¬ der the auspices of the Swedish Lutheran Church, founded in 1881. In 1884 arrangements were made for the training of teachers for the parochial and public schools ; the name was accordingly changed to Bethany Normal Insti¬ tute. In 1886 the school was invested with the power to confer academic degrees. It now has preparatory, normal, commercial, collegiate, model school, art and music departments, with 47 instructors and a student-body of 792, and a library of over 10,000 volumes.

BETPIANY COLLEGE a coeducational

institution at Bethany, W. Va. The college was chartered by the Legislature of Virginia, 2 March 1840. The total number of graduates is 1,448. Prominent alumni, Champ Clark, United States senator George T. Oliver, associate justice of the Supreme Court Joseph R. Lamar, John C. New and governor B. B. Odell. The endowment is $420,000; property assets $500,- 000; students enrolled 447; professors and in¬ structors 30; courses offered classical, scien¬ tific, philosophical, ministerial, agricultural, domestic science, normal, music.

BETHEL, a village of Palestine, about 10 miles from Jerusalem, now called Beitin or Beiteen. It is situated at a point of strategic importance on which three roads converged and is mentioned frequently in the Old Testa¬ ment. Here Abraham reared an altar and called on the name of the Lord (Gen. xiii, 4), and here Jacob, weary with travel, fell asleep and had a vision of angels, in commemoration of which he built an altar and called the place Bethel (“the house of God®). It is memorable in the story of the apostasy of Rehoboam and the miracle of the withered hand, when, instead

of the house of God, it became Bethaven, the place of idols, until every memorial of the idolatry was destroyed by Josiah. Consult 1 Kings xii, xiii; 2 Kings xxiii, 15-20). In this neighborhood the two she-bears came out of the wood and tore forty and two of the children that had mocked at Elijah (2 Kings iii, 23, 24). It became a royal residence

after the secession of the northern kingdom, and was one of the border fortresses. It was cap¬ tured by Vespasian on his march to Jerusalem. It is not mentioned in the New Testament. Pop. about 500.

BETHEL, Maine, town in Oxford County situated on the Androscoggin River and the Grand Trunk Railroad, 70 miles northwest of Portland. It is a popular summer resort and is noted for its beautiful scenery. Being the centre of a lumbering region, it has a number of woodworking establishments, which pro¬ duce chairs, spools, bobbins, *etc.* A large fish cannery is also located in the town. It con¬ tains Gould's Academy. Pop. 1,930.

BETHELL, Sir Richard, first Lord West-bury, English jurist: b. Bradford-on-Avon 1800; d. 20 July 1873. The son of a Bristol physician, he matriculated at Wadham College, Oxford, at 14, gained a scholarship the succeed¬ ing year and took his degree in his 18th year. He wras called to the bar in 1823 and rapidly rose in his profession; was returned to the House of Commons, as member for Ayles¬ bury, in 1851 ; became solicitor-general in 1852 and attorney-general 1856-57, rendering con¬ spicuous service to Mr. Gladstone in carrying through the complicated Succession Duty Bill ; and became Lord Chancellor in 1861, taking the title of Baron YVestbury. As Lord Chan¬ cellor he carried through important reforms. Owing to scandals associated with the admin¬ istration of a protege of his in Leeds Bank¬ ruptcy Court, he was forced to resign. After his fall he did excellent work as one of the law lords.

BETHENCOURT, Jean de, ba-toii-koor, zhon de, king of the Canary Islands: d. 1425. He was chamberlain to Charles VI of France, but being ruined in the war with England, he sought to repair his fortunes in foreign coun¬ tries and made a descent from Spain on the Canary Islands in 1402. Not having sufficient force, how'ever, he returned and obtained rein¬ forcements from Henry III of Castile, with which he was successful and wras crowmed king in 1404, under the title of Louis. He converted the greater portion of the Canaries to Christi¬ anity and in 1405 received from the Pope the' appointment of bishop to the islands. The fol¬ lowing year he went to Normandy, where he passed the remainder of his days.

BETHESDA, be-thez'da, a pool in Jeru¬ salem, the name of which signifies "house of the stream.® In the five halls or porticos near ii many patients lav waiting, according to the account of John (ch.v), for the moving of the waters to bathe in. According to the belief of the Jews, an angel descended, at a certain time, into the pool and troubled the water, and who¬ ever first entered the water after this

agitation was cured. It was near the Sheep Gate, north of the temple. The traditions as to Bethesda have varied. It was variously placed at differ-

ent times. A probable site for Bethesda is the \ irgin's Pool, the only natural spring of Jeru¬ salem, which still presents the phenomenon of intermittent <(troubling of the water,® which overflows from a natural siphon under the cave and in which the Jews continue to bathe, when this overflow occurs, for the cure of rheumatism and of other disorders. Consult Hastings, dictionary of the Bible.)

BETHLEHEM, beth-le-em, or -hem, (Beit Lahm, (<house of bread® ; also known as Ephra-tah, ((the fruitful®), Palestine, a village five miles from Jerusalem and only second to Jeru¬ salem in sacred interest. If lies at the foot of a hill covered with vines and olive-trees, and is of surpassing interest to the Christian world as the birthplace of Jesus Christ. It is of fre¬ quent mention in both Old and New Testa¬ ments. It was the scene of Rachel's death (Gen. xxxv, 19) and of the romance of Ruth. It is the city of David, the scene of his early exploits and the home of his kindred. Here he. was anointed by Samuel to be king of Israel (1 Sam. xvi, 13), and from Bethlehem he was sent for by Saul to minister to him with his harp (1 Sam. xvi, 19). It was one of the strongholds built by Rehoboam. After the Captivity a small band of Bethlehemites re¬ turned to their old dwelling-place. As the birthplace of Christ it is one of the great Christian shrines of Palestine. The Church of the Nativity, erected by the Empress Helena in 327, 120 feet long by 110 broad, is divided into nave and four aisles by ranges of Corinth¬ ian columns with crests of the Crusaders on some of the stones. The nave is the oldest monument of Christian architecture in the world. The mosaics date from 1169. The site is held in common by Latins, Greeks and Ar¬ menians, and the greater part of the buildino-is occupied by converts of those churches. In this church Baldwin I was crowned. The roof was renewed in English oak by Edward IV. Below the church is the grotto of the Nativity, 33 feet long by 11 wide, furnished with silver and crystal lamps, where a

marble trough is shown, traditionally believed to be the manger in which Christ was born. Other objects of interest are the Altar of the Innocents, mark¬ ing the burial place of the 20,000 children slain by Herod, the tomb of Saint Eusebius, the chapel and tomb of Saint Jerome and (some distance off) the grotto where the shepherds watched by night when the angels appeared to them (Luke ii, 8-18). In order to prevent con¬ fusion with another place of the same name, seven miles northwest of Nazareth, mentioned in Joshua xix, 15, it is called Bethlehem Judah. It is the most Christian town in southern Pal¬ estine. Agriculture and the rearing of cattle are the chief occupations of its inhabitants, and the making of rosaries, crucifixes, etc., for pil¬ grims to the sacred shrines. Pop. 8,000.

BETHLEHEM, Pa., borough of North¬ ampton and Lehigh Counties, on the Lehigh river and canal, and on the Lehigh Valley, the Central of New Jersey, the Pennsylvania and the Lehigh and New England railroads, 57 miles north of Philadelphia. It is prominent both as a manufacturing centre, the seat of im¬ portant steel and other works, and as a musi¬ cal centre, sometimes referred to as the (< Amer¬

ican Bayreuth® and the ((American Oberammergau.® Among its prominent buildings are those of the Moravian college and theological seminary, the Moravian seminary for girls, the Church of the Nativity, Saint Luke's Hos¬ pital and a public library, while on Church and neighboring streets are notable dwellings built in the 17th century style of domestic architecture of eastern Germany. On the opposite side of the river, here spanned by three bridges, is South Bethlehem (q.v.), the seat of Lehigh LTniversity, of the Lehigh Valley Railroad Com¬ pany, of the famous Bethlehem steel works and other important manufacturing establish¬ ments. Monocacy Creek separates Bethlehem from West Bethlehem, formerly a separate borough but since 1904 consolidated with Beth¬ lehem borough. Bethlehem was founded in 1741 by Moravians or United Brethren under Count Nikolaus Ludwig Zinzendorf, shortly before Christmas, which suggested its name, and it has remained ever since the chief centre of the Moravian sect in the United States. The old colonial hall in the seminary, built in 1748, was used as a general hospital for the Continental army during the Revolutionary War, and over 500 soldiers lie buried in West Bethlehem. On festival and funeral occasions, the old European custom of trumpet playing from the tower was early established and Beth¬ lehem soon became recognized as a musical centre, Benjamin Franklin recording his im¬ pressions of the fine orchestral music rendered in the church. In modern days, under the

directorship of J. Frederick Wolle, a pupil of Rhcinberger and organist of the Moravian Church, Bethlehem, attained a conspicuous po¬ sition in the musical world from the institution of an annual festival largely devoted to the compositions of Johann Sebastian Bach. The first organized festival was held in 1901 and attracted considerable attention, lasting for three days. During Mr. Wolle's absence in California, from 1906 to 1911, when he gave annual Bach festivals at Berkeley, the Bethle¬ hem festivals were discontinued, but were re¬ sumed on his return in 1912. Pop. (1900) 7,293; (1920) 50,358. See also Moravian

Church and Moravian Seminary.

BETHLEHEMITES. (1) An order of monks somewhat like the Dominicans, who set¬ tled in England in 1257. They were so named because they wore on the breast a five-pointed star in commemoration of the star that ap¬ peared at the birth of Jesus. The order was comparatively insignificant and had only one convent in England (at Cambridge). (2) An order of American Bethlehemites, sanctioned by Innocent XI in 1687, was established in the city of Guatemala by a Franciscan monk named Pedro de Bethencourt (1619-67), a native of the island of Teneriffe, about 1655, and was specially devoted to the nursing of the sick and the education of children. It became extinct about 1850. A female order of Bethlehemites also was founded by Maria Anna del Galdo, who belonged to the Tertiaries of Saint Fran¬ cis. Twenty years later the privileges of the order were enlarged to an equality with those of the Augustinians, Dominicans and Francis¬ cans. (3) The followers of Huss are some¬ times called Bethlehemites, from the name of the church in Prague in which Huss preached.

BETHLEN-GABOR, bet-lem ga'bor, or GABRIEL BETHLEN, P rince of Transyl¬ vania: b. 1580; d. 1629. He was a member of a prominent Protestant family of upper Hun¬ gary, which also held large estates in Transyl¬ vania. At the age of 17 he entered the service of Gabriel Bathori, prince of Transylvania, fought under his orders and then repaired to Constantinople, where his courage gained him the esteem

of the Turks. Prompted by ambi¬ tion, he became ungrateful to his first benefac¬ tor, and after bringing Bathori into bad odor with both the Transylvanians and the Turks, managed to make the latter declare war and actually headed a Turkish army against him. His treachery was successful and in 1613 he was proclaimed prince of Transylvania in de¬ fiance of the Emperor. Shortly after, having succeeded in stirring up the Hungarians against the Emperor Frederick II, he took several towns and in 1620 was chosen king of Hun¬ gary. Thereafter, supported by Turks and Tar¬ tars, he entered Austrian territory, laid waste Moravia, hemmed in the imperial army and was on the eve of gaining a complete victory when the refusal of the Turks to undergo a winter campaign defeated all his hopes. The approach of Tilly compelled him to withdraw. The Protestants of Germany were his allies, and when they were worsted at the bat¬ tle of Prague Bethlen-Gabor concluded peace with Ferdinand II, receiving Kaschau, seven Hungarian counties adjoining Transylvania, the principalities of Oppeln and Ratibor in Silesia and the rank of Prince of the Empire. In 1625 he married Catharine of Brandenburg and became again involved in the Thirty Years' War. He at length retired from the strife and gave his attention to the internal affairs of Transylvania. He was one of ((the three great Magyars® of his time, was an able administra¬ tor and a promoter of sciences and literature. While preparing for a new war against the imperialists he died of dropsy. He is said to have participated in 42 battles.

BETHMANN-HOLLWEG, Moritz Au¬ gust, German jurist and statesman: b. Frankfort-on-the-Main, 10 April 1795; d. Andernach, 14 July 1877. Having graduated from his law studies at Gottingen and Berlin, he was ap¬ pointed professor of civil law at the latter in¬ stitution. In 1829 he was appointed to a similar position at Bonn, which he held until 1842. Three years later he was made a councillor of state and in 1852 he became a member of the First Chamber of the Prussian Parliament. In 1858 he was appointed Minister of Public In¬ struction, which office he held for four years. He was a strong supporter of the Moderate Constitutionalist Party. As a writer on juris¬ prudence he had a deep influence in the reforms of the German laws following the enactment of the German Civil Code in 1896. Among his works are (Grundriss zu Vorlesungen fiber den gemeinen und preussischen Civilprozess) (1821); (Ursprung der lombardischen Stadte-freiheit* (1846) ; (Der Civilprozess des ge¬ meinen Rechts in geschichtlicher Entwickelung) (6 vols., 1864-74) ; (Ueber Gestezgebung und Rechtswissenshaft als Aufgabe unserer Zeit)

(1876).

BETHMANN-HOLLWEG, Theobald Theodore Friedrich Alfred von, German

statesman : b. Hohenfinow, Brandenburg, 29 Nov. 1856; d. 1 Jan. 1921. Descended from one of the oldest patrician families, who wrere en¬ gaged as bankers at Frankfort-on-Main, he was educated at the Universities of Strassburg, Leip¬ zig, Berlin and Bonn. At the last named he was a fellow-student of the future Kaiser Wilhelm II ; a close friendship was formed between them. Bethmann-Hollweg entered the civil service in 1879, was appointed Landrat of Ober-Barnim in Brandenburg in 1885 and thence rose in rapid succession to provincial president of Potsdam, president of the government of Brom¬ berg and president of the province of Branden¬ burg. He became Prussian Minister of the Interior in 1905, introduced numerous import¬ ant social reforms and in 1907 was ap¬ pointed Imperial Home Secretary and vice-president of the Prussian Council. On 14 July 1909 the Kaiser conferred the greatest office of the state upon Doctor Bethmann-Hollweg by making him Imperial German Chancellor in succession to Prince Buelow. Two notable incidents of his chancellorship were the Agadir crisis of 1911 and the famous Zabern affair, which resulted in the censure of the imperial and military executives by a large majority in the Reich¬ stag. But it was the European War and its diplomatic connections that made the Chancel¬ lor a prominent actor in the drama. He was the author of the now famous phrase describ¬ ing the Treaty of 1839, which guaranteed the neutrality of Belgium, as <(a scrap of paper.® Much has been written concerning his personal share in the events of July and August 1914; that part of history remains for the future. In his speech in the Reichstag on 4 Aug. 1914, when the violation of Belgian neutrality was already in progress, he said: <(We are now in a state of necessity, and necessity knows no law. Our troops have occupied Luxemburg and per¬ haps have already entered Belgian territory. Gentlemen, this is a breach of international law. It is true that the French government declared at Brussels that France would respect Belgian neutrality as long as her adversary respected it. We knew, however, that France stood ready for an invasion. France could wait, we could not… . Thus we were forced to ignore

the rightful protests of the governments of Luxemburg and Belgium. The wrong — I speak openly — the wrong we thereby commit we will try to make good as soon as our mili¬ tary aims have been attained. He who is men¬ aced as we are and is fighting for his highest

possession can only consider how he is to hack his way through (wie er sich durchhauen kann).® Later in the evening the British Am¬ bassador called upon him for a final interview. Sir W. E. Goschen reported : <(I found the

Chancellor very agitated… . He at once

began a harangue, which lasted for about 20 minutes… . Just for a word — neutrality

— a word which in war time had so often been disregarded — just for a scrap of paper Great Britain was going to make war on a kindred nation who desired nothing better than to be friends with her. … He held Great Brit¬ ain responsible for all the terrible events that might happen.® (See War, . European — Diplo¬ matic History). On the eighth anniversary of Doctor Bethmann-Hollweg' s assuming the office

of Chancellor, the following was sent out through the wireless stations of the German government : (<The Kaiser has accepted the

resignation tendered by the Imperial Chancel¬ lor, Herr von Bethmann-Hollweg, and has ap¬ pointed as his successor the Prussian Under¬ secretary of Finance, Herr Michaelis® (14 July 1917). The Chancellor fell as a result of the powerful opposition he encountered from the military party. He had the reputation of being a man of peace, a scholar and a philosopher, yet he had been identified throughout his offi¬ cial career with the agrarian and military caste known as Junkers (q.v.). He had never served in the army, but since the war he was appointed to an honorary rank which carried with it the wearing of a general's uniform. The Kaiser had more than once offered him a title, which he had steadily refused. His activities as Chan¬ cellor were spread over a wide field, not the least important being the various peace man¬ oeuvres conducted under his official patronage. See Germany — History; Morocco; Peace Proposals ; William II.

BETHNAL GREEN, England, a metro¬ politan and parliamentary borough in the east end of London, Middlesex County. Area 759 acres. It was formerly a great centre of the weaving industry. The chief industries are now bootmaking, cabinet-making and matches. The borough returns two members to Parlia¬ ment. Pop. (1911) 128,183. Consult Allgood, (History of Bethnal Green* (1894) ; Gavin, (Sanitary Ramblings — Sketches and Illustra¬ tions of Bethnal Green* (1848).

BETHPHAGE, beth'faj (Hebrew, "house of figs®), a place of Scriptural interest, of which no trace is left. Its name was signifi¬ cant of its general location but not of the particular site. (<The place of figs,® it must have been situated somewhere on the eastern slope of that range of hills extending north and south between Jerusalem and Bethany, at the foot of which in the western valley flowed the Kedron. The principal points of this range are the Mount of Offence and the Mount of Olives. The fig-tree still abounds both on the eastern and western slopes of the range and even beyond Bethany toward Jericho. Some travelers have been disposed to place Bethphage on the site of the modern village of Abu Dis, lying south and a little to the east of Bethany. Robinson thought this could not have been its position and gave little credit to the tradition of the monks of the country, who place it between Bethany and the sum¬ mit of the Mount of Olives, since there is no trace that a village of any description ever existed there. Lightfoot thought it was a district extending from the Mount of Olives to Jerusalem and embracing a village of the same name.

BETHSAIDA, beth-sa'i-da, Palestine, vil¬ lage on the west shore of the Lake of Galilee, a little east of where the Jordan enters and near the newer Greek city, which was some distance back from the shore. It was the birthplace of Peter and Andrew and Philip. Its site has been identified with a heap of grass-grown ruins. At the northeast extrem¬ ity of the lake was another Bethsaida, a vil¬ lage near which the 5,000 were fed. Philip

the Tetrarch raised it to the dignity of a town and renamed it Julias, in honor of the Em¬ peror Augustus' daughter.

BETHSHEMESH, beth-she'mesh (He¬ brew, "house of the sun®), a city of ancient Palestine, which probably occupied the site of the modern village, Ain Shems, about 15 miles west-southwest of

Jerusalem, where extensive ruins are still remaining. The exploits of Samson were mainly in the neighborhood of Bethshemesh.

BETHUNE, Alexander Neil, Canadian clergyman : b. Glengarry, Ont., 28 Aug. 1800 ; d. 3 Feb. 1879. He was ordained to the priest¬ hood in 1824, became archdeacon of York in 1846, coadjutor to Bishop Strachan of To¬ ronto in 1867 and succeeded to the bishopric in the same year. He wrote the biography of Bishop Strachan.

BETHUNE, George Washington, Amer¬ ican Dutch Reformed clergyman and poet : b. New York, 18 March 1805; d. Florence, Italy, 27 April 1862. He was educated at Dickinson College and at Princeton Theological Semi¬ nary. He had charges at Rhinebeck and Utica, N. Y., Philadelphia, Brooklyn and New York city. In 1859 he visited Italy to improve his health and in 1861 again went to Italy, where he died of apoplexy. He was noted as an ora¬ tor, wit, poet, scholar and angler. Besides re¬ ligious works, he wrote (British Female Poets) ; (Lays of Love and Faith* (1847); several of the hymns which are widely used; (Orations and Discourses) (1850) ; (Memoirs of Joanna Bethune) (1864). He also pub¬ lished an edition of Izaak Walton's (Complete Angler* (1846), *etc.* Consult the life by A. R. Van Nest (New York 1867).

BETHUNE, ba-tun, France, town in the department of Pas de Calais, 19 miles north-northwest of Arras. It stands on a rock washed by the Brette and is a place of con¬ siderable strength. The appearance of the town is not prepossessing. There is, however, one fine square, the centre of which is occu¬ pied by an ancient belfry of remarkable con¬ struction, while tjie hotel-de-ville, among the best edifices in the town, forms one of its sides. The chief manufactures are oil, soap and cloth. There are also distilleries, tan¬ neries and salt and sugar refineries. The trade is greatly favored by the canals of Lawe and Bassee, which meet here. The family of the lords of Bethune is very celebrated and a branch of it was established in Scotland about the end of the 12th century. To this branch the celebrated Cardinal Beaton belonged. Dur¬ ing the great European War Bethune formed part of the "debatable land® in which German and British forces faced each other in the trench warfare of 1915 and 1916. Pop. 15,309.

BETLIS, or BITLIS, Armenia, a town about 20 miles west from Lake Van. It is one of the most ancient cities of Kurdistan, situated in a wide ravine traversed by a stream on whose steep banks the town is built. The houses are of red stone, generally two stories in height, with grated windows to the streets. In the centre, on a high rock, is an ancient castle, formerly the residence of the Khans of Betlis. The

country around is fer¬ tile, well cultivated and produces excellent

crops of grain, cotton, hemp, rice, olives, to¬ bacco of the best description and excellent fruits and vegetables. The principal manufac¬ tures of the town are coarse cotton cloth and tobacco. In February 1916, during the great Russian drive in Armenia, Betlis was occupied by the Russians following on the capture of Erzerum. Pop. about 30,000.

BETOYAN, a primitive but widely-ex¬ tended branch of the South American Indians, between 67° and 73° west longitude, covering parts of eastern and southern Columbia and the neighboring regions of Venezuela and Bra¬ zil. Consult Koch-Grunberg's (Zwei Jahre unter den Indianern,* and (Reisen in Nord-west Brasilien 1903—05 > (Berlin 1910).

BETROTHED, The. (1) A famous ro: mance by Alessandro Manzoni — (I Promessi SposiP (See below). (2) A novel by Sir Walter Scott (1825), the scene of which is laid in the reign of Henry II. (3) An opera by Petrella, first sung in 1869 at Lecco.

BETROTHED, The (<I Promessi SposP). There are three redactions of this masterpiece of Alessandro Manzoni. The first (1821-23) bore the title (Fermo e Lucia) and constituted a vast historical canvas, rich in digressive epi¬ sode of Milanese life around 1630, the year of the great pestilence. In the second, entitled in manuscript (Gli sposi promessP and published in 1827 as (I promessi sposi, J we have a thor¬ ough critical revision. The historical materials extraneous to the story proper are made more proportionate to the imaginative content, while the ethical purpose of the novel more rigidly controls. In preparation for the third and final edition (1840-42) Manzoni had (<washed his duds in the Arno,® as he modestly avers. It ex¬ presses the Manzonian theory, now triumphant, of the national Italian language. (I promessi sposP in this form is the leading classic model of modern Italian speech. This romance is the best Italian effort in prose of the Romantic period. It substituted sound historical scholar¬ ship

and studied psychological portraiture for the sentimentality of the mat du siecle and the purposeless adventures of the old romanesque novels. It gave a typical and evolved interpre¬ tation of Italian middle-class idealism, demo¬ cratic (civile) in outlook, Roman Catholic in inspiration, conservative and evolutionary in tactic. In artistic mood, it shows a kindly, ironical scepticism toward human nature, ex¬ pressed subtly in the conception of the plot and more openly in frequent epigrammatic flashes. The conviction that man's efforts are powerless to win happiness leads Manzoni to a pessimism essentially passive and inactive ; save that this feeling is but the groundwork for something more positive. Through faith in God and in the triumph of righteousness we may take refuge in a peaceful and secure optimism. ((When troubles come, deserved or undeserved, trust in God softens them and makes them useful to a better life.® In lifting the veil delicately from the hidden vanities of his char¬ acters to reveal their helplessness in their pride, Manzoni finds a source of a rich humor, dis¬ cerning but free from bitterness. The plot, baldly summarized, is amusingly melodramatic. Renzo and Lucia, two naive and simple peasants, by the wickedness of a bold, bad baron, and

the deliciously human weakness of a priest, Don Abbondio — the most popular figure of the novel — are prevented from marrying; and compelled to flee from their homes, they are caught up in the turmoil of great events occur¬ ring in their province. This review of 17th century society is accurate and sound. Its various traits and tendencies are incarnated in characters elaborated in detail. Hardly one of them but has become in some aspect or phrase proverbial ; for belonging exactly to their own ancient period, they reflect Manzoni's charac¬ teristic view of life, and are universally typical of humanity. The sagaciously worldly saint, Padre Cristoforo; the unwilling nun (monaca forzata) Gertrude; the converted reprobate called l' Innoniinato ; the officious and wisely blundering mother, Agnese, are all famous and engaging personages. Perhaps the best-known section of the book is the lurid description of the pestilence at Milan, with its weird super¬ stitious terrors. In the portrayal of feudal Italy, crushed by foreign oppression, modern Italian patriotism has always found much stim¬ ulus. Nevertheless, the complexity and deli¬ cacy of Manzoni's humorous touch makes the full richness of (I promessi sposP accessible only to maturer minds. It seemed disappoint¬ ingly oppressive and quiescent to the more tur¬ bulent spirits even of its own age. Forced, by its linguistic prestige, upon Italian children, it presents to them the conventional requisites of the textbook: dullness and sublimity. (I promessi sposP is not only the UvanhoeP but the

(Vicar of Wakefield) of Italians. A dis¬ tinguished American, Andrew D. White, has called it the best novel ever written ; which means simply that it can be read over and ovei again with increasing pleasure, due to ever new discoveries, though it will never have for Amer¬ icans the glamour of sanctity with which the Italian scholastic tradition surrounds it as the principal model of the mother tongue.

Arthur Livingston, Western University, London, Ont.

BETROTHMENT, or BETROTHAL, a

mutual promise or compact between two par¬ ties, by which they bind themselves to marry. The word imports giving one's troth, that is, true faith or promise. Formal ceremonies of betrothment are not the custom in the United States and Great Britain, as on the Continent, where the betrothment is either solemn (made in the face of the church) or private (made before witnesses out of the church). As betrothments are contracts, they are subject to the same rules as other contracts ; for instance, that they are valid only between persons whose capacity is recognized by law ; and the use of fraud, violence or intimidation vitiates the contract. The consent of both parties, of course, is required. This may be expressed either verbally, or by writing, or by action. In Germany the consent of the parents is al¬ ways necessary, if the parties are under age, not yet sui juris. But if the parents withhold their consent unreasonably, the permission of a judge is allowed to sanction the contract. If the opinions of the parents are diverse, the law gives effect to that of the father. Betroth-ments contracted thus, according to law, are called sponsalia publica; others are called sponsalia clandestina. The latter are, in some

places, utterly invalid; in others, only punish¬ able. By the common German law, however, they are valid in every case in which consum¬ mation or consecration by the priest has taken place. 1 he parents, in these cases, are not allowed to apply for a dissolution of the con¬ tract, nor can they refuse their consent, except for highly important reasons. Public betroth¬ ment induces the obligation to marry. In case

of refusal to complete the contract by mar¬ riage, the injured party is allowed an action at law to compel its performance ; but, since unhappy marriages are among the greatest misfortunes, the means of compulsion applied by the law are never great, amounting only to a small fine or a short imprisonment. If cir¬ cumstances take place which, if happening be¬ fore the betrothment, would have necessarily prevented it, the party affected by them is al¬ lowed to recede from the engagement, and modern laws allow only an action for damages. In Germany betrothment generally takes place in a small company of relations and friends. In Russia it was once binding and indissoluble, like marriage, but is now a mere form accom¬ panying the marriage ceremony. The contract is called by the Jews thenaim rischonim. In the laws of Moses there are certain provisions respecting the state of the virgin who is be¬ trothed. Selden's 'Uxor Hebraica) gives the schedule of Hebrew contracts of betrothment. With the Jews, a young woman is rarely al¬ lowed to enter into an engagement without the cognizance of her relatives, who, in fact, in most cases, arrange matters for her and generally avail themselves of the services of marriage brokers, who receive a percentage upon the amount of the dowry, beside a gra¬ tuity. In continental cities these Jew marriage brokers have matches always on hand, with dowries varying from $5,000 to $200,000, and as soon as the betrothment has taken place they look upon the bargain as concluded ; but cases frequently occur in which on the day of the wedding the bridegroom breaks the match because the Austrian metalliques or Spanish Ardoins, tendered in payment for the dowry, have fallen in value and reduced the dowry perhaps to the extent of 20 or 25 per cent. Among the ancient Greeks, the father made a selection for his daughter. The young couple kissed each other for the first time in the presence of their friends, and it was cus¬ tomary for the bridegroom to bring flowers daily, until the wedding day, to the house of his bride. The Arab sends a relative to nego¬ tiate about his intended bride and the price at which she is to be had. The bridegroom of Kamchatka has to serve in the house of his prospective father-in-law before an engage¬ ment is allowed to take place. With the Letts and Esthonians no engagement is considered valid until the parent and relatives of the bride have tasted of the brandy which the bridegroom presents. Among the Hottentots, the would-be bridegroom is not allowed to propose without being accompanied by his father. Father and son walk arm in arm, with pipes in their mouths, to the house of the bride, where the engagement takes place. Among some of the indigenous tribes of America it was customary to keep the be¬ trothed lady in durance for 40 days, as the superstition prevailed that she would exert an

occult influence upon anything she touched or anybody with whom she came into contact. During these 40 days the lady was kept on starvation fare, so that when the day of the wedding came she looked more like a skeleton than a bride, fonsult Pollock and Maitland, ‘History of English Law> (2d ed., 1899) ; Hut¬ chinson, H. N., ‘Marriage Customs in Many Lands } (1897) ; and Miln, L. J., (Wooings and Weddings in Many Lands) (1900).

BETSY AND I ARE OUT, the title of a popular American poem by Will Carleton (q.v.), first printed in the Toledo Blade in 1872. It was followed by (Betsy and I Made Up.>

BETTELHEIM, Anton, Austrian author: b. Vienna, 18 Nov. 1851. Having graduated from the universities at Vienna and Munich he immediately devoted himself to a literary career. Most of his writings have been bio¬ graphical. He edited the collection of biog¬ raphies ‘Fiihrende Geister,* to which he contributed a biography of Anzengruber (1891, 2d ed., 1897). He was editor of the ‘Allgemeine Deutsche BiographieP Among his notable biographies are ‘Deutsche Geistes-heldeiP (1895) ; ‘Louise von Frangois und Conrad F. Meyer} (1905) ; ‘Auerbach) (1907) ; ‘Prince Hohenlohe) (1910).

BETTERTON, Thomas, English actor : b. August 1635; d. London, 28 April 1710. He was the son of an under-cook in the service of Charles I, and was apprenticed to a bookseller in London. His master, Mr. Rhodes, obtained a license for a company of players in 1659, and with him Betterton commenced his career. He was engaged by Davenant in 1661 for Lincoln’s Inn Fields theatre. He was sent by royal com¬ mand to visit Paris with a view to the adoption of French methods of staging, etc., in England. For his performance of Alvars in ‘Love for Love,} Charles II lent him his coronation suit. His position was pre-eminent. He seems to have had no personal graces from nature to second his rare talents, if the following account be true : “Mr. Betterton, though a superlatively good actor, labored under an ill figure, being clumsily made, having a great head, a short thick neck, stooped in the shoulders, and had fat, short arms, which he rarely lifted higher than his stomach. His left hand frequently lodged in his breast between his coat and waist¬ coat ; while with his right he prepared his speech; his actions were few but just; he had little eyes and a broad face, a little pockfretten; a corpulent body, and thick legs, with large feet; he was better to meet than to follow, for his aspect was serious, venerable, and majestic. In his latter time, a little paralytic ; his voice was low and grumbling, yet he could tune it by an

artful climax which enforced universal attention even from the fops and orange girls. He was incapable of dancing even in a country dance, as was Mr. Barry, but their good qualities were more than equal to their defi¬ ciencies.® Betterton had the rare faculty of identifying himself with his part. He married Mrs. Sanderson, an actress of almost equal merit with himself, whose Lady Macbeth was reckoned a perfect piece of acting. He was prudent and saving, but he lost his small means in a commercial speculation, and a theatre which he afterward opened was not successful. After

his retirement from the stage, he reappeared in his old age a few times to take a benefit, his last appearance being 13 April 1710. He was the author of three plays. He was buried in Westminster Abbey. Consult Howe, (Thomas Betterton) (1801) ; (Life and Times of Thomas Betterton* (1888).

BETTINELLI, bet-te-nel'le, Saverio, Italian author: b. Mantua, *1718; d. 1808. He studied under the Jesuits; entered, in 1736, the novitiate of this order, and taught from 1739 to 1744, belles-lettres at Brescia, where he made himself known by some poems composed for the use of schools. In Bologna, where he studied theology, he continued to cultivate his poetical talents, and wrote for the theatre of the college his tragedy of Jonathan. In 1751 he was entrusted with the direction of the col¬ lege of nobles at Parma. After the suppression of the Jesuits in 1773 he returned to his native city, where he resumed his literary labors. His chief work is his (Risorgimento negli studj, nelle Arti e ne' Costumi dopo il Mille* (1775). The (Lettere dieci di Virgilio agli Arcadi* at¬ tracted great attention, and its criticism of the older poets, particularly Dante, involved him in many controversies. The best of his poems are his (Vers sciolti,* which though they do not show any great poetical power, are always ele¬ gant and ingenious. His collected works ap¬ peared in 24 vols., 1799-1801.

BETTING, the staking or pledging of money or property upon a contingency or issue. The processes of betting may be best illustrated in connection with horse-racing, which fur¬ nishes the members of the

betting fraternity with their best markets. Bettors are divided into two classes — the backers of horses, and the bookmakers, or professional bettors, who form the betting ring, and make a living by bet¬ ting against horses according to a methodical plan. By the method adopted by the profes¬ sional bettor the element of chance is as far as possible removed from his transactions, so that he can calculate, with a reasonable prospect of having his calculations verified, on making more or less profit as the result of a season's engage¬ ments. Instead of backing any particular horse, the professional bettor lays the same sum against every horse that takes the field, or a certain number of them, and in doing so has usually to give odds, which are greater or less according to the estimate formed of the chance of success which each of the horses has on which the odds are given. In this way, while in the event of the race being won (as is usually the case) by any of the horses entered in the betting-book of a professional bettor, the latter has always a certain fixed sum (say $1,000) to pay, he receives from the backers of the losers sums which vary in proportion to the odds given. Thus, if a bookmaker is making a $1,000 book, and the odds against some horse is four to one, he will, if that horse wins, have to pay $1,000, while, if it loses, he will receive $250. It usually depends upon which horse it is that wins a race whether the bookmaker gains or loses. If the first favorite wins it is evidently the worst thing that could happen for the bookmaker, for as he is bound to receive the sum of the amounts to which all the horses except one have been backed, the largest deduction must be made from his total

receipts on account of the first favorite. Very frequently the receipts of the bookmaker are augmented by sums paid on account of horses which have been backed and never run at all. Sometimes, although not often, the odds are given upon and not against a particular horse. Books may also be made up on the principle of betting against any particular horse getting a place among the first three. The odds in this case are usually one-fourth of the odds given against the same horse winning. Another mode of betting is that called a sweepstake, in which a number of persons join in contributing a cer¬ tain stake, after which each of those taking part in the sweepstake has a horse assigned to him (usually by lot), which he backs, and the backer of the winning horse gains the whole stakes. If there are more persons taking part in the sweepstake than there are horses running some of them must draw blanks, in which case of course their stakes are at once lost.

At common law, wagers are not per se, void, but statutes prohibiting betting have been passed by many of the States. When one who loses a

wager gets another to pay the money for him, an action lies for the recovery of the money. Wagers on the event of an election laid before the poll is open, or after it is closed, are illegal. In horse-racing, simple bets upon a race are unlawful both in England and the United States. In the case even of a legal wager, the authority of a stakeholder, like that of an arbi¬ trator, may be rescinded by either party before the event happens. See Wager.

BETTS, Samuel Rossiter, American jur¬ ist: b. Richmond, Mass., 8 June 1787; d. New Haven, Conn., 2 Nov. 1868. He practised law in Sullivan County, N. Y. ; served in the War of 1812 and first became prominent when appointed judge advocate. He was a member of Congress 1815-17; Circuit Court judge, 1823-26; and United States district judge, 1827-67. As codi- .fier of the maritime laws of the United States he exercised a clarifying influence upon such questions as salvage, wages, charters, insurance, seamen's wages, etc., and the formulation of the neutrality and patent laws. Despite the enor¬ mous volume of business brought to him over a long period his decisions were uniformly up¬ held. Hoffmann, Van Buren, Webster, Hall, Emmet and Choate were among the eminent lawyers who conducted cases before him. He published (Admiralty Practice* (1838).

BETULA, the generic name of birch (q.v).

BETWA, Hindustan, a river which takes its rise in the Vindhya Mountains, near Bhopal, and flowing nearly 340 miles in a northeasterly direction through the provinces of Malwa and Allahabad, finally joins the Jumna below Kalpee. Near Erech a slight fall occurs. The country through which it flows is highly culti¬ vated. The river at times is said to rise to a great height and in a portion of its course flows through beds of iron ore. The towns Bhilsa and Jhansi are located on its banks.

BETZ, Franz, German opera singer: b. Mainz, 19 March 1835; d. Berlin, 11 Aug. 1900. He made his first appearance in 1855 and four years later became a member of the Royal Opera House Company at Berlin, where he first appeared in Verdi's (Ernani.* Wagner chose him to create the part of Hans Sachs at

Mmnch in 1868 and of Wotan at Beyreuth in 1876, alter which he devoted himself entirely to Wagnerian opera.

BEULAH, bu'la, a region described in Bunyan s (Pilgrim's Progress, } where there is nothing to annoy and all sounds are agreeable.

BEULE, Charles Ernest, French archae¬ ologist and politician: b. Saumur, 29 June 1826; d. 4 April 1874. Having graduated from the ficole Normal in Paris, he was for a time pro¬ fessor of rhetoric. In 1849 he accompanied an expedition of French archaeologists to Greece, where he discovered the propylaea of the Acro¬ polis. On his return to Paris he was appointed professor of archaeology at the Bibliotheque Rationale. In 1858 he undertook on his own account a trip to the site of Carthage. The latter part of his life was devoted to politics. In 1871 he was elected to the National Assem¬ bly, where he showed himself an ardent royal¬ ist. In 1873 he was for a brief period Minister of the Interior under MacMahon. Among his works are (L'acropole d'Athenes) (2 vols., 1854); c Etudes sur le Peloponnese) (1855); (Les monnaies d'Athenes) (1858) ; (Histoire de 1'art grec avant Pericles* (1868;); (Le proces de Cesars* (4 vols., 1870).

BEURMANN, Karl Moritz von, German African explorer; b. Potsdam, 28 July 1835; d. Mao, Africa, February 1863. In 1853 he began his studies at the Military Engineering School at Berlin, from which he graduated and became an officer in the engineer corps of the German Army. In 1860 he left the military service and accompanied an exploring expedition to the Nile and the Nubian Desert. Two years later he set forth on an exploring expedition on his own account, to seek traces of Eduard Vogel (q.v.) who had gone into the interior of Africa and had not since been heard from. Beurmann had as his objective Wadai. He proceeded to Kuka, the capital of Bornu, thence southwest to Yakoba, capital of Bautshi. Thence he set out for Wadai, but was com¬ pelled to return on account of the desertion of his carriers, who also robbed him of his outfit. A month later he made another start, reaching the frontier of Wadai, where, like Vogel, he was murdered at the command of the Sultan. His one work is (Glossar der Tigresprache* (Leipzig 1868) which was also published in English (Halle 1868). A biographical sketch, by A. Merx, appears in (Jahresbericht des Leipziger Vereins fur Erdkunde* (1866).

BEURNONVILLE, ber-noii-vel, Marquis de (Pierre de Ruel, pe-ar de ru-el), marshal of France: b. Champignolle, Burgundy, 10 May 1752-d. 23 April 1821. He served in the east until 1789. Arriving in Paris at the

commence¬ ment of the Revolution, he identified himself at once with it, and in 1792 commanded on the Moselle; in 1793 he became minister of war. Sent in 1793 to arrest Dumouriez, he was him¬ self arrested by Dumouriez, and confined until 1795, when he was exchanged, and became suc¬ cessively general-in-chief of the army of the north, inspector-general of infantry, Ambas¬ sador to Berlin in 1800, to Madrid in 1802, and count of the empire. In 1814 he was commis¬ sioned bv Napoleon to organize means of de¬ fense upon the frontier, and on the Emperor's abdication was named Minister of State and

Peer of France by Louis XVIII. On the re¬ turn of Napoleon to Elba, he was proscribed by a special decree but was reinstated in all his dignities after the battle of Waterloo. He be¬ came marshal of France in 1816, and marquis in 1817.

BEUST, Friedrich Ferdinand, boist, fre-driH Jer'de-nand (Count von), Saxon and Austrian statesman: b. Dresden, 13 Jan. 1809; d. Altenberg, 24 Oct. 1886. He adopted the career of diplomacy, and as member of em¬ bassies or ambassador for Saxony resided at Berlin, Paris, Munich and London. He was successively Minister of Foreign Affairs (1849) and of the interior for Saxony (1853). At the London conference regarding the Schleswig-Holstein difficulty he represented the German Bund. He lent his influence on the side of Austria against Prussia before the war of 1866, was on its conclusion forced out of office by Bismarck. He entered the service of Austria as Minister of Foreign Affairs, became presi¬ dent of the ministry, Imperial Chancellor, and in 1868 was created count. He rendered excel¬ lent service in the reorganization of the dual monarchy. In 1871-78 he was Ambassador in London, and in 1878-82 in Paris. An English translation of his memoirs appeared in 1882.

BEUTENMULLER, boi'ten-miil-ler, Wil¬ liam, American entomologist : b. Hoboken, N. J., 31 March 1864. Educated in the public schools. From 1889-1910 he was curator of the department of entomology in the American Museum of Natural History. He has written admirable works on butterflies and moths, especially on those in the vicinity of New York, and contributed voluminously to scientific and popular magazines. He was president of the New York Entomological Society (1900-01) and editor of its Journal.

BEUTH, Peter Christian Wilhelm, Prus¬ sian statesman : b. Kleve, 28 Dec. 1781 ; d. Ber¬ lin, 27 Sept. 1853. Graduating from the Uni¬

versity of Halle, where he had studied law, he entered the service of the government. In 1810 he was appointed director of the Board of Inland Revenue at Berlin ; three years later he became a member of the Ministry of Finance, to which he was promoted on account of the reforms he had effected in the financial manage¬ ment of the revenue department. In 1821 he became a member of the Council of State. In 1844 he was raised to the position of acting privy councillor. He was the founder of the Industrial Institute in Berlin and of similar institutions in the provincial cities. A statue was erected in honor to his memory before the Architectural Academy.

BEUTHEN, boi'ten, city of the province of Silesia, government of Oppeln, about two and a half miles from the old frontier of Rus¬ sian Poland. It has steam and electric tram¬ ways, and among buildings of note are the Roman Catholic church of Saint Mary (13th century), Protestant parish church (1 5th cen¬ tury), synagogue, royal Catholic gymnasium, higher girls' school, *etc.* It is an important centre of mining and metallurgy, having iron¬ works, zinc-works, lead-works, coal mines and various industrial establishments. The town passed from the Kingdom of Bohemia into that of Prussia in 1742. Pop. 67,718.

BEVELAND, ba've-lant, North and South, Netherlands, two islands in the province of Zealand, and formed by the mouths of the Scheldt. North Beveland lies east of the island of Walcheren, from which it is sep¬ arated by a narrow channel. South Beveland, 22 miles long and 10 miles wide, the larger and more fertile, contains Goes, the capital, and several forts and villages. The united area of the islands, which have suffered much from inundation^, is 120 square miles.

BEVERAGES. Beverages are those drinks to which mankind resorts in order that he may relieve the pangs of thirst or supply some other demand of the system. In the beginning man's life was marked by its simplicity. Our first parents were content to eat the fruits that they found so convenient for their needs and it is doubtful if they knew any other beverage than the pure water coursing through the streams that

irrigated the ground. It. was not until they began to eat the flesh of beasts and searched the soil for delicacies to gratify their newly awakened appetite for a variety in foods that they felt the craving of unnatural thirst. But the eating of strong meats required the drinking of stronger drinks than water and in this fact we find the origin of the history of beverages.

It would be intensely interesting if we could know in just what way prehistoric man first satisfied his unnatural thirst for drink. It is, of course, more than probable that the second beverage discovered by man was the milk of the animals he slaughtered to gratify his taste for meat. From a temperate and hygienic point of view it was not a long stride from the waters of the brooks to the milk of cows and asses and yet it stands out as a landmark in the develop¬ ment of the demand for variety, the demand which may be regarded as the first tendency toward civilization. It is also quite probable that, in the beginning, man drank his milk soon after it was drawn or while it was still fresh, but finally there came a day when some prehistoric investigator was bold enough to take a drink of the milk of mares that had been set aside, and from this fermented liquid learned the sensations of intoxication, for kumyss, still the favorite tipple of the Tartar, is unquestion¬ ably the most ancient of all intoxicating bever¬ ages.

To mankind, next to water, milk is still a favorite beverage, for it possesses the double advantage of being both food and drink. To the civilized taste the milk of cows is the most desirable but more barbaric taste calls for a stronger beverage and is best gratified by the milk of mares, asses, camels or even rein¬ deers.

It is undoubtedly true that if we ate only wholesome foods in such quantities only as our system requires ; performed our work with reg¬ ularity; enjoyed, at proper intervals, requisite rest and recreation, and avoided all such dele¬ terious distractions as excitement and worry, water would be the only beverage that nature would demand.

While it is the primary object of all bever¬ ages to relieve thirst nearly, all of them also possess other properties that exercise more or less effect upon the body. For example, those drinks which contain the largest quantities of water pass most rapidly into the circulation,

increasing the volume of blood. Diluting the food, they not only assist

digestion but also aid in eliminating waste matter from the body through the ordinary channels. There are beverages that soothe and beverages that irri¬ tate, but all have their purpose. The former find their scope of usefulness in times of fever and cold, while the latter are stimulating irri¬ tants of great medicinal value.

Among the most useful beverages are those that best relieve the cravings of thirst, the sour liquids prepared from the lemon, or other fruit juices, which, while perhaps not acid in them¬ selves, have been rendered acidulous by charges of carbon dioxide. While the carbonated and mineral waters have the greatest effect in elimi¬ nating waste matter from the system they are not so useful in this regard as the hot drinks, like tea, coffee or even hot water, for they not only play their part in the elimination of waste but also cool the body by increasing the perspiration.

Particularly soothing are such mucilaginous or gelatinous liquids as barley water, flaxseed tea and Irish moss. The mineral waters, malt liquors and light wines act with a tonic effect; the more common beverages, like tea and coffee and the milder alcoholic liquors are stimulating to the nerves, while tea and coffee, if milk and sugar are added, as well as chocolate, cocoa and the malt liquors may be classified as the nutri¬ tious drinks.

Next in popularity to milk are those unfer¬ mented beverages which are made from pro¬ ducts of the vegetable world such as tea, coffee, cocoa and chocolate. Although cocoa is by far the most ancient of these drinks, having been in use long before the stimulating qualities of either tea or coffee were discovered, coffee has long been in greatest demand. In fact, it has been estimated that about 500,000,000 peo¬ ple drink coffee daily, as against the 100,000,000 who drink tea, and the 60,000,000 who partake of chocolate and cocoa. In the United States alone some 500,000,000 pounds of coffee are consumed annually, as against 90,000,000 pounds of tea, and some 20,000,000 pounds of the vari¬ ous preparations of cocoa and chocolate.

There are several points of resemblance be¬ tween all these table drinks dissimilar as they are in appearance and flavor. In each case they exercise a stimulating effect, the caffeine of coffee and theine of tea being almost iden¬ tical, while the theolronsine of chocolate and cocoa is but a slightly different principle. Each also contains the same bitter . principle, tannin, and each owes its characteristic odor and flavor to an essential oil.

Coffee, which must be considered first, be¬ cause of its great popularity, is the berry from the several species of the genus Coffea, of which C. arabica is the most important. First used in Abyssinia during the 9th century, it was later introduced into Arabia, and from there to Constantinople, where it had become popular¬ ized by the middle of the 16th century. It is supposed that it was Leonhard Rauwolf, a Ger¬ man physician, who introduced coffee into Europe in 1573. A few years later Prosper Alpinus brought some of the beans to Venice to use them as a drug, but it was many years before it was drunk to any extent outside of Constantinople. In 1652, however, a coffee house was opened in London by the Greek serv-

ant of a merchant named Edwards, whose ships sailed to the Levant, and since that time the popularity of the beverage has never waned.

In its preparation as a drink coffee should not be boiled in water, but instead, should be covered with water that has previously been boiled. Here it should be allowed to infuse for iully 10 minutes, at a temperature little below the boiling point. As coffee does not contain as great a quantity of tannin as tea and does not yield it so readily, it may infuse longer without becoming bitter and indigestible, the effect which tannin exerts if it is boiled or left for too long a time over the fire.

Like many other beverages coffee exercises both good and evil effects upon the system. Stimulating the muscles, heart and nerves, its tendency is to overcome the ills of fatigue, while its strengthening effect upon the heart's action makes it a most valuable stimulant. At the same time its action upon the nervous system is so marked that over-indulgence in the drink is certain to be attended by such ill effects as insomnia, and nervous headaches, if not palpitation and general nervous disability.

Tea, which stands next to coffee as a table beverage, is a native of China where these shrubs of the Camellia family have been culti¬ vated for more than a thousand years. It was once a general belief that

there were many kinds of tea plants, but Robert Fortune, the botanist, exposed the myth by his thorough in-vestigalon of the various methods of cultiva¬ tion and manufacture in use in the tea dis¬ tricts of China and India. It is now known, therefore, that while there are many variations in the tea plant the varieties are all the same plant cultivated under different conditions, while the two distinctive varieties, the green and the black tea, are the results of different methods of manufacture. Green tea, for example, is pre¬ pared by steaming the leaves before they have been rolled and dried, a method of procedure which produces a greater quantity of tannin.

As the flavor of tea as a beverage depends as much upon the quality of the water in which it is infused as upon the method of infusion, care should be taken to see that the water is neither too soft nor too hard, and that it has been well boiled before it is poured over the tea. The period of infusion, which is then con¬ tinued at a lower temperature, should not last more than a few minutes, for the longer the infusion the greater the quantity of tannin that will be extracted.

Like coffee, tea has its good and evil effects. If infused too long it becomes bitter unwhole¬ some and indigestible. If drunk too freely it not only induces insomnia and kindred nervous disorders but irritates the stomach, producing a serious kind of catarrh. At the same time it is a mild stimulant which refreshes the body and prepares the brain for intellectual energy. It is also beneficial in aiding one to withstand the ill effects of cold, fatigue and hunger. By producing perspiration it cools the body when heated, and, by means of its action upon the heart, it warms the body when cold.

While tea has been consumed in China and other parts of Asia since the latter part of the 6th century it was not introduced in European countries for more than 1,000 years. Pepys mentions having tasted it for the first time in 1660, but the novel beverage must have

met with almost instant recognition for, less tnan 18 years later, it was in general use in every part of England.

As both cocoa and chocolate contain starch and fat in considerable quantities they are among the most nutritious of the stimulating table beverages. Both are obtained from a small evergreen tree, native to tropical coun¬ tries, for while the cocoa of commerce is pre¬ pared by grinding the seeds themselves, the commercial chocolate cakes contain the better parts of the berry, usually mixed with sugar and

some distinctive flavoring. The prepara¬ tion of the drink is a simple process, the cocoa or chocolate merely being dissolved in milk and boiling water.

Although by no means so popular as tea or coffee the drinking of mineral waters has be¬ come so general during the past century that they must now be regarded as among the most important temperance beverages. Early in the 16th century an attempt was made to produce artificial mineral waters, but it was not until the 18th century that chemistry had made suffi¬ cient progress to enable the experimenters to prove the elementary compounds of the waters both as to quality and quantity. In fact, the first unqualified success in this line of investi¬ gation was made by Dr. Frederick Adolphus Augustus Struve, a Dresden druggist, who celebrated his achievement by opening an arti¬ ficial mineral water pavilion in that city, in

1820.

The alkaline and mineral waters which are so much in use to-day owe their distinctive characteristics to the preponderance of car¬ bonate and bicarbonate of sodium as well as to the carbonate of potassium, lithium, calcium and magnesium which they contain, all of which tend to make them useful aids to the physician in the treatment of disease. The Vichy of France, for example, or the Ems of Germany, are extensively used in the dietetic treatment, correcting disorders of the stomach and acting as alkalinizers of the blood, bile and urine. In cases of gout, gall stones, rheumatism, dyspepsia, constipation, etc., they have proved of invaluable service and have also been used successfully in the treatment of obesity. In many instances their value as medicinal agents is enhanced by the addition of carbon dioxide, while, in other cases, they are made more palatable and easy of digestion by being served with milk. Among the natural mineral waters produced in this country are those of Saratoga, N. Y., Saint Louis, Mich., and Waukesha, Wis., all of which are well and favorably known to those who make use of such beverages.

Another class of drinks, the popularity of which is beyond question, are those beverages which contain alcohol as an active principle : beer, ale, wine, cider and the many kinds of spirituous liquors that are now manufactured in almost every part of the world. In addi¬ tion to the alcohol these beverages also contain such properties as tannin, sugar, carbon diox¬ ide, or various acidulous substances, any or all of which exert an influence over the flavor of the liquid. As to alcohol itself it has so long been a bone of contention that it would be folly to attempt to review a century-long contest in a single article. Originally used exclusively a$ a medicine, and admittedly a valuable agent in

the treatment of certain diseases it is to be doubted if even the moderate use of such liquors as beverages is not productive of far more evil than good, while the effect of im¬ moderate indulgence in

such liquid stimulants is too well known to require further discussion. In spite of all the warnings of science, how¬ ever, man continues to gratify his craving for alcoholic preparations. Even in countries where the ordinary beverages of commerce are unknown, savage taste has learned to delight in the flavor of fermented liquors, and this desire even the most barbaric people have had ingenuity enough to gratify.

Beer, or lager, as it is more generally known in America, is by no means a modern inven¬ tion and no drink has continued to maintain a more steadfast hold upon the taste of man since the earliest days of civilization. The Egyptians manufactured beer from barley many hundred years before the Christian Era. Archilochus, 700 b.c., shows that the Greeks had learned the art of brewing, while we have such eminent authorities as Sophocles and ˆEschylus, Dio¬ dorus and Pliny to prove that the Greeks and Romans both made beer and loved it. Like the Gauls, the Romans called it Cerevisia, from Ceres, the goddess of field fruits, and there is ample history to prove that the art of making this beverage was known to man fully as early as the art of making wine from the grape. Prior' to the invasion by the Romans the Britons were drinkers of milk and water although they occa¬ sionally drank mead, an intoxicating beverage made from honey. As Tacitus tells us that beer was the ordinary drink of the Romans, and beer and vinegar the favorite beverage of the soldiers of Julius Caesar, it is not difficult to imagine why, so soon after his invasion, the Britons be¬ came a nation of beer-drinkers. Unlike the Romans, however, they employed wheat instead of barley in their malting. In Germany, too, beer was introduced at a very early date. Charlemagne loved it dearly and not only com¬ pelled the best brewers in the land to become attaches of his court, but gave his personal at¬ tention to the subject so conscientiously that he was able to tell them how to improve their brew. As early as 1482 the monasteries of that country began to make beer and, by the 16th century, that beverage had become one of the chief exports of the country. In fact, the Ger¬ man brewer has always been recognized as one of the best beer makers of the world and it has only been within the past century that the suc¬ cess of their Austrian rivals has had a tendency to somewhat eclipse their glory. Centuries ago beverages known as beer were made in Eng¬ land by tapping such trees as the birch, maple, spruce and ash for their juices, or by resorting to the properties contained in ginger and other roots, a practice which not only still prevails in that country, but that was brought to America by the first colonists, who loved thes£ humble, harmless drinks too well to leave their recipes in the motherland.

Ale and porter, the heavier malted liquors which are so much used in England and the United States, cannot boast such ancient lineage as

beer, but still there is reason to believe that it was a beverage like ale on which the Anglo-Saxons and the Danes loved to become drunken, and, fully as early as the reign of Henry II,

the monks of England had become famous for their wondrous brews. In fact, it was due to the investigations of some of these fathers of the monasteries that the superior quality of the waters of Burton-on-Trent for brewing pur¬ poses was discovered, a discovery that has made the ales and porters of England world cele¬ brated.

Wine, whose history is as old as that of civil¬ ization, is the most aristocratic of drinks. As¬ cribed to the gods by the ancients — to Dionysus by the Greeks, Bacchus by the Romans and Osiris by the Egyptians — there can be no ques¬ tion but that the use of the juice of the grape as a beverage was one of the first discoveries of civilized man. It is true that the very ancient Romans did not know it at the time when even the Israelites had learned the secret of its pro¬ duction, but, later, wine-making in Rome be¬ came such a general enterprise that Emperor Domitian ordered half of the vineyards de¬ stroyed that the more necessary wheat might be raised in the place of the grape.

According to the best authorities Asia was the country in which the vine first grew with¬ out the aid of man, while Armenia and eastern Pontus were the lands in which the cultivation of the grape was first undertaken. From there the love of wine spread rapidly through all the lands of ancient civilization. Among the best known Asiatic wines was that of Chalybon, near Damascus, the beverages with which the tables of the Persian kings were constantly supplied, while the most famous Greek wines came from such places as Chios and Lesbos.

In ancient India and in Egypt priests were forbidden to drink, while the Jewish priests were only forbidden on days of religious services. In fact, the Hebrews were by no means as strict about the use of the wine cup as were some other nations and the fact that vine-culture was one of their favorite occupations is proved by history, both biblical and profane. Traditions state that it was the Phoenicians, the earliest of vine-growers, who carried the secret of wine making to Spain, Italy and France. They also established large vineyards on the islands of Chios, Mitylene and Tenedos.

As early as 550 b.c. the process of blending selected wines was known to the Carthaginians, while the ancient practice of adding turpentine

to the wine for the purpose of preserving it was probably an invention of Italy. France, Spain, and Portugal are now the chief centres of vine-culture although the grape-growers in many parts of the United States, and particularly in the far Western States, have recently raised the making of wine to the dignity of a greater American industry. Champagne, however, one of the most popular of wines, is a beverage of extremely modern invention when compared to other makes. Invented by Dom Perignon of Hautvillers about the beginning of the 18th century its use has become more and more general until it is now consumed by wine-lovers in all parts of the world. If wine is the most aristocratic, whisky may be designated as the most democratic of drinks. Thoroughly cos¬ mopolitan in character, in various countries it is distilled from various substances, but always, whether it is made from barley, corn, wheat, rye, or even from potatoes, it bears the same name and usually enjoys the same proportion of

popularity, The word Svhisky® is a name that was bestowed upon this beverage by the Celts of Treland and Scotland who began to make it about the middle of the 17th century. The word itself is a corruption of the Gaelic <(uisge® (water), and closely interpreted means ((strong water.'* In the beginning this drink was used almost exclusively as medicine but as soon as it had become introduced as a beverage it be¬ came a favorite drink throughout Great Britain, and while the word <(whisky® once referred only to the Scotch and Irish drinks of that name, the rye and Bourbon whiskies of American manu¬ facture are now consumed almost as generally as those made from recipes that have been handed down from the days of the ancient Celts.

Almost as strong as whisky, brandy, the ((brande-vin® or burnt wine, is a drink which is often used, both for medicinal purposes and as a beverage. Its name, as is indicated, was de¬ rived from the method of its manufacture, a formula for liquor making that has been fol¬ lowed for many generations and in many parts of the world. In Morocco the Jews use the refuse of the grape as well as such fruits as raisins, figs,

dates and pears in its distillation, and they have become strongly attached to their strange drink because they believe that their freedom from that terrible disease, elephan¬ tiasis, always so common among the Moham¬ medans in that country, is due to the fact that they partake so freely of this unique spirit. Moliere, in his travels, discovered a tribe on the Barbary coast which made excellent brandy from honey; in Persia it is the lees of the weaker sorts of wines that are distilled, and al¬ most every country has its particular method of making this beverage. None of them, however, can compare in quality to the cognac of France, that rich distillation from wines which alone properly bears the name of <(brandy.®

Gin is another distilled liquor. It is made from rye, grain and malted barley, flavored with juniper-berries and sometimes with turpentine. It is also known as Hollands, and as Holland gin, these names being a relic of the days when the beverage was called Holland-Geneva, the word ((gin® being a corruption of the word ((Geneva.® Although originally made in Holland it was soon introduced into England where it immediately became one of the most popular of drinks. Easily manufactured and always strong it could be sold so cheaply that it was finally found necessary to adopt strict legislative meas¬ ures restricting its sale and consumption. Hogarth's horrible picture, (Gin Lane,* which was one of the influences in bringing about the much needed reform, is said to have been but slightly an exaggeration of the actual condi¬ tions which existed in all the large English cities during the reign of gin.

Rum, formerly spelled as the French still spell it, (<rhum,® is a spirit which is distilled from the sugar-cane juice, from the skimmings of the juice from the boiling house, or from the molasses mixed with the lees of former distilla¬ tions. Although not so commonly used as some of the other strong liquors rum has been known both for its medicinal value and as a beverage ever since its introduction from the West Indies, more than a century ago.

The following are among the drinks which are not so generally known but which are in

common use among the people of other coun¬ tries :

Arrack, a drink manufactured widely in the East and West Indies, is much used by the natives. In making it it is sometimes distilled, from the fermented juice of the palm tree, and sometimes from a

combination of rice and mo¬ lasses used in connection with the palm-tree juices.

Vodka, which is the chief source of intoxica¬ tion in Russia, is a liquor which may be dis¬ tilled either from rye or from potatoes.

In several parts of the world the sap of trees is called into reqisition to satisfy the thirst for intoxicants. Pulque, for example, the bev¬ erage most commonly used in all Spanish-American countries, is made from the fermented sap of the aloe, while a somewhat different drink, called Tepache, is made by mixing sugar and water with this sap of the aloe, which after¬ ward is allowed to ferment for a few hours only. In Tasmania the so-called <(cider-tree® furnishes the bushmen with a means of intoxi¬ cation. In this case the sap is of such a char¬ acter that it may be drunk as soon as it is drawn from the tree, in which state it is both refresh¬ ing and harmless, but when it is allowed to stand for some time it becomes an intoxicant of great potency.

The Soma of the Hindus is supposed by some to have been the original intoxicant of the human race. The Persians, who accept this tradition, revere the beverage as Haoma, while in India it is looked upon as the beverage of the mighty god, ever-giving new strength and new vigor. It is a milky fluid which is found in the climbing bindweed, and, when properly fer¬ mented, is extremely ((heady.®

Sake, the commonly used distilled liquor of Japan, is made entirely from rice, as also is Samshee, a drink used by the lower classes in China.

Kvass is the name of a sour beer much fa¬ vored by the Russian peasantry. It is made from barley and rye, by a similar malting proc¬ ess as that applied to the manufacture of beer.

The natives of South America have a drink which they call Guarapo, which is made from the fermented juice of the sugar-cane.

Chi-chi is the name of a peculiar kind of cider which is made by the natives of Patagonia. In brewing it, in the autumn when the apples are ripe, they dig large pits which they line and interline most carefully with hides in order that none of the juice may soak into the earth. Into these hides they throw the ripe apples which are left to decay and ferment until they are ready for use. It is then extremely intoxi¬ cating.

A drink called Kephir is drunk by the natives of the Caucasus. It is an

effervescing milk¬ like liquid, the effervescence being caused by the introduction of horny, yellowish-brown masses called (<Kephir-grains.® Kern, who made a scientific examination of these grains, discovered that they were made of a rod-like bacterium and a yeast-like substance that was entirely unknown to him. Not unlike Kumyss in appearance and in taste, Kephir is far more intoxicating.

Kava, or ava, is a Polynesian drink which is made by macerating in water a portion of the root and stem of one of the piperaceae.

There are several substitutes for tea in use in various parts of the world. In some of the Pacific Islands there are “tea-trees,® while the natives of Tibet are very fond of their ((brick tea,® which is made from the offscourings and dust of the leaves and stems of the tea plants. It derives its name from the fact that the dust is pressed into hard, solid, brick-shaped lumps, from which pieces are chipped off as they are to be used.

BEVERIDGE, Albert Jeremiah, Ameri¬ can lawyer: b. Highland County, Ohio, 6 Oct. 1862. He was brought up on a farm in Ohio; was graduated at De Pauw University in 1885, and engaged in law practice in Indianapolis. He entered political life in 1883, and soon won a reputation as an effective orator. On 17 Jan. 1899, he was elected United States senator for Indiana, as a Republican. • Soon after his election he went to the Philippine Islands; made a thorough study of political and material conditions there; and, on the assembly of Congress in December following, delivered a thrilling speech in the Senate in support of the administration’s policy concerning the new possessions in the East. In 1906 he introduced an amendment to the Agricultural bill provid¬ ing for closer inspection of the meat-packing •industry. He became one of the leaders of the new Progressive party in 1912. He wrote ‘The Russian Advance) (1903) ; ‘The Young Man and the World> (1905) ; (The Meaning of the Times) (1907) ; (Americans of Today and Tomorrow) (1908) ; (Pass Prosperity Around) (1912) ; ‘What is Back of the War*

(1915).

BEVERIDGE, William, English divine : b. Barrow, Leicestershire, 1637 ; d. Westminster 1708. He studied at Saint John's College, Cam¬ bridge, devoting his attention particularly to Oriental literature. In 1658 he published a work on Eastern tongues, especially Hebrew, Chaldee, Syriac, Arabic and Samaritan, accom¬ panied with a Syriac grammar. In 1660 he took orders, and obtained the vicarage of Ealing in Middlesex, where he wrote a useful 'Introduction to Chronology.* In 1672 he was ap¬ pointed to the rectory of Saint Peter, Cornhill, London, and the same year published his 'Syn-odicon) in two folio volumes, containing the Apostolic canons, decrees of the councils re¬ ceived by the Greek Church, and the canonical epistles of the early Fathers. This work called forth an opponent, to whom Beveridge replied in a 'Vindication.* In 1674 he obtained a pre¬ bend in Saint Paul's, and in 1681 was appointed archdeacon of Colchester. In 1684 he became prebendary of Canterbury, and in 1688 was appointed chaplain to William and Mary. Shortly after, the see of Bath and Wells was offered him ; but as it had become vacant by the conscientious refusal of Bishop Ken to take the new oaths, Beveridge, to his honor, de¬ clined to accept it. The episcopal dignity, how¬ ever, was only delayed; in 1704 he became bishop of Saint Asaph. Among his best-known works are (The Church Catechism Explained * ;

(Private Thoughts upon a Christian Life* ; and 'The Great Necessity and Advantage of Public Prayer and Frequent Communion.) Collective editions of his works were published in 1824 end in 1842-46. Consult Burnet's 'Own Times) ; and the 'Life* by Horne.

BEVERLEY, Constance de, in Scott's poem 'Marmion,* a nun who for love of Marmion follows him in the disguise of a groom, and on being thrown over by Marmion is immured at Holy Isle for breach of her vow of chastity.

BEVERLEY, Robert, American historian : b. Virginia 1675; d. 1716. He was educated in England and about 1697 became clerk of the Council of Virginia and had charge of the records of the colony. He was the author of a 'History of the Present State of Virginia, * published in 1705, a most interesting account of the details of the daily life in colonial Virginia. A reprint was published in Richmond in 1855.

BEVERLEY, Saint John of, English divine: b. about the middle of the 7th century at Harpham, Yorkshire; d. Beverley 721. He was educated at Canterbury under Archbishop Theodore, and became a monk under Hilda in the monastery founded by her at Whitby. In 687 he was appointed to the see of Hexham, and in 705 was transferred to York. He founded a convent of nuns at Beverley, and built the choir of the church there. He re¬ signed his bishopric and retired to Beverley in 718. Bede, who is said to have been his pupil, speaks of him with great veneration. He was canonized in 1037, ar.d his remains were placed in a costly shrine, in Beverley Minster. His fame was so widespread that when William the Conqueror led his army to the north and ravaged the country he saved the town of Beverley out of respect to the memory of the bishop. In 1416 Archbishop Chicheley ordered the anniversary of his death to be celebrated as one of the festivals of the Church, and special privileges were conferred on his church at Beverley by several English sovereigns. He is said to have written an Exposition of Luke) and (Homilies on the Gospels.)

BEVERLEY, England, municipal borough and the principal town in the East Riding of Yorkshire, eight miles north-northwest of the city of Hull and a mile from the river Hull. It stands on the eastern edge of the Wolds, and on a branch of the Northeastern Railway, and consists of a principal street above a mile in length, and several minor streets, all spacious and tolerably well built. Its most remarkable edifice is the minster of Saint John the Evan¬ gelist, in the early English, Decorated and Per¬ pendicular styles, and one of the finest speci¬ mens of ecclesiastical architecture in the king¬ dom, its west front in the opinion of excel¬ lent authorities surpassing in magnificence that of York Minster. The choir contains the cele¬ brated Percy shrine, of chaste and exquisite workmanship. Other churches are Saint Mary's and Saint Nicholas. The grammar school is so old a foundation that its date is unknown. Among the other chief buildings are the guildhall and corn exchange. The chief manufactures are leather, iron castings, agri¬ cultural implements, whiting, linseed oil and cake, manures, wagons and ale. Its environs abound with beautiful walks. It sent two mem¬ bers to Parliament until merged in one of the divisions of Yorkshire in 1885. Pop. 13,654. Consult Hiatt, 'Beverley Minster* (1900),

BEVERLY, Mass., city in Essex County, on the Boston & M. Railroad, two miles north of Salem. It was founded 14 Oct. 1668; was incorporated as a city 23 March 1894; con¬ tains several villages ; and is connected by trolley lines with Salem, Peabody, Gloucester and Wenham. It is a popular summer resort. It is theˆ distributing station for the products ot the I exas oil fields, a regular line of steamers plying between Beverly and Port Arthur, Tex. The government is vested in a mayor and council. It is the seat of the New England Institute for the Deaf and Dumb; is principally engaged in the manufacture of women's boots and shoes, and leather; has con¬ siderable shipping and fishery interests ; con¬ tains high and graded schools, a public library, a national bank, a number of handsome resi¬ dences belonging to Boston business men ; and has valuation exceeding $16,000,000.

BEVERLY'S FORD, Va., scene of a sharp cavalry fight during the Civil War, be¬ tween Buford, Pleasanton and Gregg, com¬ manding 9,000 Federals, and Stuart leading 12,000 Confederates. Hooker had sent Pleasan¬ ton to find Stuart, who was said to be near Beverly's Ford. Pleasanton planned to sur¬ prise the Confederates, but his plan miscarried. Stuart was fully prepared for him. Pleas¬ anton was badly beaten. This action is also known as the battle of Brandy Station.

BEVIS OF HAMPTON, Sir, a legendary English knight who has been made the hero of mediaeval romances by both English and Con¬ tinental writers. He was the son of Sir Guy, Earl of Hampton, who was treacherously mur¬ dered by Divoun, Emperor of Almayne, and was given by his false mother to some heathen merchants to be sold for a slave among the Paynim. By them he was carried to Ermony, where he soon became dear to King Ermyn, and dearer still to his only daughter, the lovely Josian. * His chief exploits were the overthrow of Brademond of Damascus, of a monstrous boar, of the giant Ascapard, whom he spared to become his squire, and of a dreadful dragon near Cologne. His famous sword (<Morglay® he won in battle; his horse ˆArundel® was the gift of Josian. Still more romantic episodes in his story arc his carrying his own death-warrant in a sealed letter to the vassal Brade¬ mond; his escape from his noisome dungeon after seven years' imprisonment; and recovery of his wife.

BEWICK, bu'ik, Thomas, English wood-engraver: b. Cherryburn, Northumberland, 12 Aug. 1753; d. Gateshead, 8 Nov. 1828. He early

showed a great talent for drawing, and was apprenticed to an engraver in Newcastle. The celebrated Dr. Hutton, of Woolwich, then a schoolmaster in Newcastle, was preparing his great work on mensuration, and having em¬ ployed Bewick's master in getting up the wood-cuts for illustrating it, the execution of these was entrusted to the young apprentice. Bew¬ ick performed the work so admirably that his master advised him to turn his attention to wood-engraving, and accordingly with this view he proceeded to London. He returned, however, to Newcastle after a short time, and established himself there in partnership with his former master. His turn of mind led him

to the study of natural objects, more especially animals. In 1779 appeared his edition of (Gay's Fables) ; in 1784 (Select Fables) ; in 1789 his large wood cut the (Chillingham Ball,0 one of his most ambitious works; and in 1790 appeared his ˆHistory of Quadrupeds, > the beauty of the illustrations of which attracted universal attention, so superior were they to anything hitherto 'produced by the art of wood¬ engraving. In 1797 appeared the first, and in 1804 the second volume of his (British Birds,* generally regarded as the finest of his works. Bewick has never been surpassed in his spirited delineations of animals and the admirable naturalness with which the accessories and backgrounds of the drawings, such as foliage, grass, and other rural objects, are represented. The tail-pieces to chapters throughout his works are of the highest excellence, and often display a rich vein of humor. His illustrated edition of (2Esop's Fables) appeared in 1818. He was the reviver of the art of wood-en¬ graving; he was one of the earliest to cut upon the end of the wood instead of along it; and he invented what is technically called the (<white line® in wood-engraving. Consult his <Memoir) (London 1846) ; Clement, (Painters, Sculptors, Architects, and Engravers) (Boston 1899) ; Dobson, (Thomas Bewick and His Pupils* ; Linton, (Masters of Wood Engrav¬ ingˆ (London 1899) ; and Thomson, D. C., Wife and Times of Thomas Bewick) (ib.

1882).

BEWLEY, Anthony, American abolition¬ ist: b. Tennessee, 22 May 1804; d. Fort Worth, Tex., 13 Sept. 1860. A Methodist clergyman opposed to slavery in 1843 he entered the Mis¬ souri Conference. When the slavery question rent the Church, he adhered at first to neither side, but earned his livelihood at manual labor. He re-entered

the Church in 1848 and at once launched forth against slavery. In 1858 he was driven from Texas for preaching according to his convictions. Against the advice of friends he returned in 1860, but remained only a few weeks, being again obliged to flee for his life. A reward of $1,000 was offered for his appre¬ hension ; he was seized in Missouri, carried to Fort Worth, and there hung by the mob, the only reason for whose act was that he had maintained human slavery to be unjust.

BEY, ba, among the Turks, signifies a gov¬ ernor of a town, seaport or small district. The Turks write the word beg (q.v.). It is often applied to superior military officers, sea captains and to distinguished foreigners.

BEYER, bl-er, Samuel Walker, American geologist: b. Clearfield, Pa., 15 May 1865. He graduated at Iowa State College, 1889, and at Johns Hopkins University 1895. He is pro¬ fessor of geology and mining engineering in Iowa State College since 1898, and vice-dean of the engineering division since 1908. As special assistant on the Iowa Geological Survey he has prepared reports on the geology of Boone, Mar¬ shall, Story and Hardin counties, and annual reports on the mineral productions of the State. In 1897 he was a delegate to the International Geologic Congress at Saint Petersburg. He is assistant geologist of the United States Geo¬ logical Survey since 1901, specializing in eco¬ nomic geology. He is the author of (Clays and

Clay Products of Iowa) (1903) ; (Quarries and Quarry Products of Iowa) (1906) ; (Road and Concrete Materials in Iowa) (1907) ; (Peat Deposits in Iowa) (1908), all published in Iowa Geological Survey reports.

BEYERLEIN, Franz Adam, German novelist and playwright : b.

Meissen, 22 March 1871. He is a graduate of Freiburg and Leip¬ zig. He became suddenly famous in 1903 on the production of his play (Zapfenstreich,5 which dealt with conditions in the German army and caused a strong sensation. It was translated into English and produced in the United States under the title (Taps.5 His other works are (Jena Oder Sedan > (1903, Eng. trans. 1913) ; (Damon Othello) (play, 1895) ; (Similde Hegewalt5 (1904); (Der Grossknecht5 (1905) ; (Stirb und werde> (1910) ; (Das Wunder des heiligen Terenz) (1911).

BEYERS, Christian Frederick, South

African general: b. 1869; d. 8 Dec. 1914. A lawyer by profession, he enlisted as a private soldier in the Boer army during the South Af¬ rican War (1899-1902) and rose to the rank of assistant commandant-general for the northern district. His principal achievement was the capture of the British camp at Nooitgedacht ; he was also chairman of the congress that met at Vereeniging to draft the peace terms. He afterward became speaker of the legislative assembly of the Transvaal and appeared to have become reconciled to the incorporation of the republics by Great Britain and the estab¬ lishment in 1906 of the Union of South Africa. He had also visited Germany and been received by the Kaiser; <(from that honor he had never recovered.® At the outbreak of the European War Beyers was commandant-general of the Defense Forces of the Union, a post he re¬ signed early in September 1914. Together with General Kemp, a former lieutenant of Delarey's and a good soldier, he proceeded to stir up dis¬ affection in the western Transvaal. He was joined by Gen. Christian De Wet, Col. S. G. Maritz and General Delarey. A certain local preacher, Van Rensburg, had ˆprophesied® that Germany was the agent appointed of God to purify the world; he <(beheld visions® and saw an angel perched on the Paardekraal monument and announced that Delarey, De Wet and Bey¬ ers were the leaders destined to restore the old republic. A number of irreconcilables flocked around the plotters, all determined to throw in their lot with Germany. On the night of 15 Sept. 1914 Delarey and Beyers were speeding in an automobile from Johannesburg when they were challenged by a police patrol. As they failed to stop, a shot was fired which glanced off the car and killed Delarey, whose intentions with regard to the proposed rebellion have never become known. Beyers formed a com¬ mand and threatened Pretoria, while De Wet operated in the Orange Free State. General Botha, the Premier, quickly raised 30,000 burgh¬ ers and fell upon Beyers and Kemp so fiercely that their forces were scattered in all directions. Beyers fled across the Vaal into the Orange Free State, lost 400 men in a fight and just escaped himself, making for German territory via Bechuanaland. De Wet was defeated and taken prisoner;

Kemp and the <(prophet® preacher crossed into German Southwest Af¬ rica, and Beyers was defeated at Bulfontein.

On the morning of 8 December he encountered a body of Union troops and was driven toward the Vaal River. Beyers and some companions attempted to cross; midway in the stream his horse failed and he slipped from its back to swim. He tried in vain to get rid of his heavy coat, which hampered his movements. One of those with him heard him cry, (<I can do no more® as he disappeared beneath the swollen flood. Two days after his body was re¬ covered.

BEYLE, Marie-Henri, bal, ma-re-on-re

(pseudonym De Stendhal), French author: b. Grenoble, 23 Jan. 1783; d. 23 March 1842. He was educated at Grenoble and at Paris, and for a time gave much attention to painting, study¬ ing under Regnault. He held civil and military appointments under the empire ; took part in the Russian campaign of 1812; thence until 1821 lived at Milan, chiefly occupied with works on music and painting. After nine years' resi¬ dence in Paris he became in 1830 consul at Trieste, and in 1833 at Civita Vecchia. In 1841 he returned to Paris, and during the following years made several excursions in France, Eng¬ land and Italy. He wrote under various pseu¬ donyms articles which appeared in French and English periodicals. The distinguishing feature of his works was the application of acutely analytic faculties to sentiment in all its varieties, his best books being the treatise (On Love) (1822) ; (The Red and the Black) (1830) ; (History of Painting in Italy) (1817) ; (Racine and Shakespeare5 (1827), and (Life of Na¬ poleon,) *etc.* A collective edition of his works appeared in 18 volumes in 1855-56, and his (Correspondance Inedite5 in two volumes in 1855. Consult Colomb, (Notice sur la vie de M. Beyle5 and the article by Merinee in Revue des deux Mondes (15 June 1843).

BEYRICH, Heinrich Ernst, German geol¬ ogist and palaeontologist : b. Berlin, 31 Aug. 1815; d. there, 9 July 1896. He was appointed professor of geology and palaeontology "at the University of Berlin, also serving as assistant director of the Prussian Geological Survey. While in the latter position he 'Supervised the preparation of the (Geological Chart of Prus¬ sia and the Thuringian States.5 Aside from that he did much original research work. Among his important works are (Beitrage zur Kenntnis der Versteinerungen des rheinischen Uebergangsgebirges5 (Berlin 1837) ; (Untersuchungen iiber die Trilobiten5 (2 vols., Ber¬ lin 1846) ; (Konchylien des norddeutschen

Ter-tiargebirges5 (Berlin 1853-57) ; (Uber einige Cephalopoclen aus dem Muschelkalk der Al-pen5 (Berlin 1867). His wife was also a well-known writer of children's stories under the pen name Klementine Helm.

BEYROUT. See Beirut.

BEYSCHLAG, Adolf, German musician: b. Frankfort 1845. Orchestral conductor, Treves and Cologne 1868-80; director of the Philharmonic Society in Belfast and Leeds. Appointed royal professor, Berlin 1907. Com¬ posed songs, pianoforte dances, and wrote (Die Ornamentik der Mu§ik5 "(Leipzig 1908).

BEYSCHLAG, Willibald, German theo¬ logian: b. Frankfort 1823; d. 1900. He studied theology at Bonn and Berlin, became minister in Coblenz 1850; vicar at Treves in 1856 and

court chaplain at Karlsruhe. In the last-named place he took an active part as a defender of ecclesiastical regime against the liberal agita¬ tion. He was one of the founders of the Deutschevangelische Blatter and a prominent organizer of the Evangelical Alliance for the protection of German Protestant interests. In 1860 he was appointed professor of practical theology at Halle. During a long career of politico-religious controversy he wrote a num¬ ber of Protestant theological works, among them a (Life of Jesus, } (Christology of the New Testament, } (Melanchthon and the Ger¬ man Reformation, } and published a collection of sermons.

BEZA, be'zq. or DE BEZE, de baz, Theodore, Calvinistic divine: b. of a noble family at Vezelay, in Burgundy, 24 June 1519; d. 13 Oct. 1605. He was educated in Orleans under Alelchior Volmar, a German philologer devoted to the Reformation ; and, early famil¬ iar with the ancient classical literature, he be¬ came known at the age of 20 years as a Latin poet by his petulant and witty (Juvenilia > (a col¬ lection of poems of which he was afterward ashamed). In 1539 he was made a licentiate of law, and went to Paris. He received from his uncle the

reversion of his valuable abbey Froid-mond, and lived on the income of two benefices and on property which he inherited from a brother. Wit, scholar and poet, his habits were dissipated, but a clandestine marriage in 1543 recalled him from his excesses, and a danger1-ous illness confirming the intention which he had formed at Orleans of devoting himself to the Reformed Church, he went to Geneva with his wife in 1547. He accepted a Greek pro¬ fessorship at Lausanne in 1549. During his 10 years in this office he wrote a tragi-comic drama in French,— (The Sacrifice of Abra¬ ham } (1550) — which was received with much approbation; delivered lectures (which were numerously attended) on the Epistle to the Romans and the Epistle of Peter (which served as the basis of his Latin translation of the New Testament, of which he afterward published several editions) ; finished Marot's translation of the Psalms in French verse, and obtained to such a degree the confidence of the Swiss Calvinists that he was sent in 1558 on an embassy to the Protestant princes of Germany to obtain their intercession at the French court for the release of the Huguenots imprisoned in Paris. In the following year he went to Geneva as a preacher, and soon after became a profes¬ sor of theology and the most active assistant of Calvin, to whom he had already recommended himself by several works, in which many of the views of that eminent theologian were advo¬ cated with great zeal and no small measure of ability, so that he was generally regarded as Calvin's ablest coadjutor and the person des¬ tined to be his successor. His talents for nego¬ tiation, which were distinguished, were now often put in requisition by the Calvinists. He was sent to the court of Anthony, King of Navarre, at Nerac, to obtain toleration for the French Huguenots; and at his desire he ap¬ peared, 1561, at the religious conference at Poissy, where he spoke in behalf of his party with a boldness, presence of mind and energy which gained him the esteem of the French court. He often preached in Paris before the

Queen of Navarre and the Prince of Conde; also in.the suburbs. At the conference of Saint Germain, in 1562, he spoke strongly against the worship of images, and after the com¬ mencement of the civil war accompanied the Prince of Conde as chaplain, and on the cap¬ ture of the Prince joined Admiral Coligny. After the restoration of peace he returned to Geneva in 1563, where, besides discharging the duties of his offices, he continued to engage in theological controversies in support of the Cal¬ vinists ; and after Calvin's death in 1564 became his successor, and was considered the first theo¬ logian of this Church. He presided in the synods of the French Calvinists at La Rochelle (1571) and at Nimes (1572), where he opposed Morel's proposal for

the alteration of clerical discipline; was sent by Conde (1574) to the court of fhe Elector Palatine ; and at the re¬ ligious conference at Montpellier (1586) op¬ posed the theologians at Wiirtemberg, particu¬ larly James Andreas. At the age of 69 years he married his second wife (1588), and still continued to repel, with the power of truth and wit, the attacks and calumnies which his ene¬ mies, apostatized Calvinists (such as Bolsec), Lutherans and Jesuits, heaped upon him. They reported in 1597 that he had died, and re¬ turned before his death to the Roman Catholic faith. Beza, now 78 years old, met his assail¬ ants in a racy poem full of youthful enthu¬ siasm, and resisted in the same year the at¬ tempts of Saint Francis de Sales to convert him and the alluring offers of the Pope. In 1600 he visited Henry IV in the territory of Geneva, who presented him with 500 ducats. Among his many works, his exegetic writings are now very little read, but the able and cor¬ rect (History of Calvinism in France from 1521 to 1563, } which is ascribed to him, is still much esteemed. Beza's name is associated with the Codex which he presented to the University of Cambridge, for an account of which see Bible. Consult the (Life) of H. M. Baird (New York 1899).

BEZALEL, in biblical history, a son of the Jewish clan Pahath-Moab (Ez. x, 30). Another bearer of that name was the chief architect of the Tabernacle, expressly called by Jehovah to superintend the work of erection, decoration and furnishing of the <(tent of meet¬ ing.® He taught the arts of his craft to his assistants, the chief of whom was Aholiab.

> BEZANT, a round, flat piece of pure gold, without any impression, supposed to hatfe been at one time the current coin of Byzantium. Bezants are frequently employed as one of the charges in heraldry, a custom supposed to have been introduced by the Crusaders. Its value was about $2. For a long time after the Crusades it was current in England and on the Continent. Bezants are common in the arms of banks and of individuals who have been connected with money. Figures, similar to bezants, when not colored, are in heraldry known as roundels.

BEZBORODKO, Alexander Andreye-vitch, Prince, Russian soldier and statesman : b. Little Russia, 25 March 1747 ; d. St. Peters¬ burg, 17 April 1799. Having graduated from the theological seminary at Kiev, he decided to devote himself to a military career and en¬ tered the army, where he rose rapidly in rank.

In the Russo-Turkish War he was second in command to the field marshal. In 1774 he en¬ tered the civil service. Six years later he was appointed secretary of the council on foreign affairs. His abilities attracted the attention of the Empress Catherine II, whose private adviser he became. In this unofficial position he acquired a strong influence in matters of state policy. After the coronation of Paul in 1796 he was appointed to the highest office in the empire, Imperial Chancellor. Two years later he was instrumental in effecting an Anglo-Russian alliance against France. He was also largely responsible for the third partition of Poland. He was one of the very few men who were able to retain the favor of Tsar Paul throughout that capricious monarch's entire reign.

BEZIERS, ba-ze-a, France, town in the department of Herault, 38 miles southwest of Montpellier ; situated on a height above the Orb, and on the Canal du Midi, a few miles from the Mediterranean, to which there runs a tramway line. It is surrounded by old walls, and though its streets are narrow, it is tolerably well built. Its most conspicuous edifice is the cathedral, a Gothic structure, crowning the height on which the town stands, and possess¬ ing a fine semi-cicular choir surrounded by columns of red marble. The city has a com¬ munal college, a museum, a library, and a society of economics and archaeology. Its man¬ ufactures consist chiefly of woolens, silks, hosiery, chemicals, spirits, parchment, gloves, glass, soap, leather and confectioneries, *etc.* It has also extensive brandy distilleries and is the centre of most of the trade of the district. Beziers was from immemorial times a fortress town, first Gallic, then Roman. It was during the Roman occupation named first Beterrae, then Beterra Septimanorum, and was the sta¬ tion of the 7th Legion, and still contains Ro¬ man remains. It is historically interesting in connection with the massacre of the Albigenses, when its inhabitants were indiscriminately put to the sword to the number of over 20,000 by Simon de Montfort and the papal legate, for having afforded protection to the fugatives in 1209. It suffered also in the religious wars of the 16th century. Pop. 51,042.

BEZIQUE, a card game which crystallized into official form in 1887.

Two packs of cards are used, two players participate and the cards rank, ˆce high, then ten, king, queen, knave, nine, eight and seven. All cards below that are discarded from both packs. Eight cards are dealt to each player. Trumps may be determined either by turning up the first card of the stack or by the suit of the first marriage. The non-dealer leads for the first trick, and the winner of each trick has the suc¬ ceeding lead. After each trick, each player draws one card from the top of the stack, the winner of the trick taking the top card. The playing is as in whist, the leader taking the trick unless his opponent plays a higher card of the same suit or a trump. It is not neces¬ sary to follow suit until the stack is exhausted, when one must do so and take each trick, if possible. Counting is done by means of the values of the cards ; each ace or ten-spot taken in a trick counts 10, the winner of the last trick

of each hand scores 10, and if the trump is turned, both sevens count 10 for the turner, and if one exchanges from his hand a seven of trumps for another turned trump or if one declares the other seven of trumps 10 more is scored. The game is won by the player who first makes 1,000 points, and if his opponent has not made 500 the game counts double. There are certain combinations of cards other than the above, which, when declared, count as follows: Double bezique (both queens of

spades and both knaves of diamonds), 500; sequence of five highest trumps, 250; any 4 aces, 100; any 4 kings, 80; any 4 queens, 60; any 4 knaves, 40; bezique (queen of spades and knave of diamonds), 40; royal marriage (king and queen of trumps), 40; marriage (king and queen of same suit), 20. A declara¬ tion is made by placing the declared cards face up on the table where they remain till played or the stack is exhausted, except in the case of the seven of trumps. To score, a declaration can only be made after winning a trick and be¬ fore drawing, and but one declaration can be made at a time. After a card has been used in one combination it may be used to form another, excepting when used to form an equal or inferior combination in the same class as before. A player need not declare a combina¬ tion which he holds and only before the stack has been exhausted can a declaration be made. Consult A. Howard Cady's treatise for details $nd rules.

BEZOAR, concretions found in the fourth stomach of many of the lierbivora, notably goats, at one time held in high repute because of fancied miraculous healing properties.

BEZOBRAZOV, Vladimir Pavlovich,

bie-zo'bra-zof, Russian political economist and publicist: b. 3 Jan. 1828; d. 29 Aug. 1889. He received his education in the Imperial Aleksander College. In the governmental service he spent a few years in almost every department and finally became a senator. In recognition of his activities in the field of political econ¬ omy the Academy of Science awarded him the honor of regular membership. He became a lecturer in political economy at the Imperial Aleksander College and gave also private in¬ struction, in that subject, to Grand Dukes Aleksyei and Serge Aleksandrovich, Nikolay and Konstantin Konstantinovich. In recogni¬ tion of these services he was awarded the order of Alexander Nevski. In the course of many years the imperial government availed itself of Bezobrazov's practical knowledge of finance and political economy. In these fields he had an opportunity of applying effectively his own theories which bear largely the stamp of Adam Smith. In his pamphlets on (Inspections of Factories* he severely critized the established order of things in the industrial institutions of the empire. As a statesman and a politician he was a moderate Liberal. Disregarding constitm tional problems he severely attacked the form¬ alism and bureaucratic methods then common in Russian home affairs. In his noteworthy treatise on Government and Society) (1882) he laid stress on the indispensability of an or¬ ganic link between the local governments and the central power. It was upon his initiative and under his supervision that the Sbornik Gomdarstv Znania (Magazine of Political

Sciences) was established and published for six years (1874-80).

BEZOLD, Karl, German philologist: b. Donauworth, 18 May 1859. He pursued his studies in the universities of Leipzig, Munich and Strassburg, after which he became, in 1883, lecturer at Munich. In 1888 he received an appointment in London to lecture at the British Museum. This position he held until 1893, when he was appointed professor and director of the Oriental seminars at the University of Heidelberg. In 1908 he became privy coun¬ cillor. Among his original

works are Cata¬ logue of the Cuneiform Tablets in the Kouyun-jik Collection of the British Museum) (London 1889-99) ; (The Tell el-Amarna Tablets in the British Museum) (1892) ; (Oriental Diplomacy) (1893) ; (Nineve und Babylon* (3d ed., 1909); (Die Babylonischen-assyrischen Keilschriften und ihre Bedeutung fiir das Alte Testament) (1904) ; (Festschrift fiir Ignatz Goldziher* (in (Zeitschrift fiir Assyriologie und Verwandte Gebiete,* 1912).

BEZOLD, Wilhelm von, German meteor¬ ologist: b. Munich, 21 June 1837 ; d. 1907. After graduating from the University of Got¬ tingen he was appointed professor at the Uni¬ versity of Munich, later shifting over to the Technical Institute in the same city. In 1885 he was appointed professor of meteorology at the University of Berlin, where he at the same time became director of the Meteorological In¬ stitute, lately established. He has conducted some valuable and original researches in the held of thermodynamics. Among his writings are (Die Farbenlehre im Hinblick auf Kunst und Kunstgewerbe> (1874); cDie Kalteriick-fiille im Mai) (1883); (Zundende Blitze im Konigreich Bayern) (1884); cZur Theorie des Erdmagnetismus) (1897); (Ergebnisse der Meteorologischen Beobachtungen* (48 vols., 1885-1902). Consult Heilman's (Wilhelm von Bezold, Gedachtnissrede* (1907).

BEZOUT, Etienne, French mathemati¬ cian: b. Nemours 1730; d. Paris 1783. His writings, which attracted much attention in his time, contained important contributions to the theory of elimination. He was also one of the first mathematicians to recognize the value of determinants. His best known works are cTheorie generale des equations* (Paris 1779) ; (Cours complet de mathematique* (Paris

1780).

BEZSONOV, Peter Alexeyevitch, Rus¬ sian writer on Slavic folklore: b. Moscow 1828; d. 1898. He studied at the University of Mos¬ cow, where he devoted five years to ancient and modern languages. In 1864 he was ap¬ pointed supervisor of the Vilna Museum and Public Library, becoming at the same time di¬ rector of public education in the same city. This position he held three years, after which he became librarian at the University of Mos¬ cow. In 1879 he was appointed professor of the Slavic languages at the University of Khar¬ kov, where he remained for the rest of his life. His works include Bulgarian Songs* (1855); (Serbian Folk Songs* (1857); <Russian Folk Songs* (1861).

BEZZENBERGER, Adalbert, German philologist: b. Cassel, 14 April 1851. Gradu¬

ating from the University of Munich, where he had made a special study of Indo-Germanic languages, he became lecturer at the University of Gottingen. In 1879 he was appointed pro¬ fessor of Sanskrit at the University of Konigsberg, becoming rector in 1890. His works in¬ clude ˆBeitrage zur Geschichte der Litauischen Sprache) (1877); (Litauische Forschungen* (1882); (Lettische Dialektstudien* (1885); (Ober der Sprache der Preussien Letten) (1888) ; (Die Kurische Nehrung und ihre Be-wohner) (1889) ; (Sitzungsbericht der Alter-tumsgeschichte Prussia) (1892) ; (Analysen Vorgeschichte Bronzen Ostprussia> (1904); cBeitrage zur Kunde der Indogermanischen Sprachen* (1877-1906).

BHAGALPUR, b'ha-gal-poor', city of Hin¬ dustan, in Bengal, capital of a district and division of the same name, situated on the Ganges, 113 miles northwest of Moorshedabad and 265 miles northwest of Calcutta by rail. The situation is unhealthy; malaria is en¬ demic and cholera is epidemic. Tcjnarayan Jubilee College (established in 1887) is main¬ tained almost wholly by fees. The city is the headquarters of the troops for keeping in check the Sonthal tribes. In the town and neighborhood are some interesting Moham¬ medan shrines ; and there are here also two monuments, one erected (in 1780) by natives and the other erected by government in mem¬ ory of Augustus Cleveland, the conciliator of the formerly turbulent and marauding hill tribes of Sonthals. There are several indigo works in the neighborhood. Pop. about 75,- 275. The division of Bhagalpur lies between that of Rajshahi on the east and that of Pat¬ na on the west. It has an area of 19,776 square miles. Pop. (1911) 8,144,821. The district of Bhagalpur is fertile, well watered and highly cultivated. Cereals, pulses, tobacco, cotton, indigo, opium, flax, hemp and sugar¬ cane are the principal products and there is a large trade by river and rail with lower Ben¬ gal. It is divided into two unequal portions by the Ganges. Area, 4,226 square miles; pop.

2,139,318.

BPIAGAVADGITA, bha'ga-vad-ge'ta (San¬ skrit, <(the Divine Song®), the title of a re¬ ligious-philosophical didactic poem interwoven as an episode in the great Indian epic of the Mahabharata (q.v.). The

leading theme of the poem which is divided into three sections, is the exaltation of the god Vishnu in his hu¬ man form or avatar of Krishna, and throughout the god speaks in his own person. In the in¬ carnation Vishnu became the character of Arjuna, a chief of the Pandus, who were then at war with their kinsmen the Kurus. On the eve of battle, when Arjuna is appalled at the thought of slaughtering his own kindred, Krishna sets before him the duties demanded of him as a member of the warrior caste, and at the same time propounds an eclectic, system of philosophy of an ethical pantheistic type, laying especial emphasis on the doctrine of bhakti, or faith in the Supreme Being, whom he declares himself to be. There are transla¬ tions in English by Davies (1882) ; Telang in (Sacred Books of the East,-* Vol. VIII (Ox¬ ford 1898) : Thompson (1855), and Wilkins

(1875).

BHAIRAVA, b'hi'rava, a Sanskrit word signifying (<fear® and ((terrible,)) one of the many names applied to Siva. Though the name as applied in this sense is of ancient origin, the worship of Siva under the separate form of Bhairav.a is a later development in Hindu mythology, and some 10 or 12 forms are regarded as objects of worship chiefly by the Mahrattas. There are various designations of Bhairava, the most popular apparently being "Bhairava the Dog,® "Bhairava the Black** and Svasva, the latter having a female consort named Bhairavi. This modern character is not connected with Siva, but is derived from Bhairon, the village god, originally a ((peasant godling,® who rose through successive stages and became the only form of Siva recognized by some communities in northern India. The confusion over the two distinct gods arose from the accidental resemblance of their names and the attributes of the greater were transferred to the smaller deity by his worshippers, with the result that it is now impossible to dis¬ tinguish the attributes or characteristics of one from the other. See Siva.

BHAMO, bha-mo', India, town of Burma, on the upper Irrawaddy, about 40 miles from the Chinese frontier and 180 north-northwest of

Mandalay, with which it has railway communi¬ cation. About 20 miles above Bhamo the river suddenly narrows from 1,000 to 150 yards and flows through a rocky gorge subject to eddies and back-waters. Navigation is at that point very difficult and at times impossible. It was formerly the capital of a Shan principality and was a large and flourishing city, but fell into decay. It is, however, important as the chief mart of the trade with China, through western Yun-nan. A British consulate at Manwyne, Yun-nan, since 1893, has greatly facilitated commercial intercourse. The imports are woolens, cottons and silks, which are brought chiefly by caravans. It has a considerable trade with the tribes of the neighborhood, who ex¬ change their native produce for salt, rice and a sauce made of dried fish. It is at the head of navigation on the Irrawaddy, and steamers con¬ nect it with Rangoon. Pop. 9,762.

BHANG, bang, (1) an Eastern name for common hemp (Cannabis Indica). (2) A nar¬ cotic made from Indian hemp. The large leaves are smoked with or without tobacco, or are chewed or made into a drink by the addi¬ tion of cold water.

BHARTPUR, bhert-poor', or BHURT-PORE-. (1) A native state of India with an area of 1,961 square miles. The surface is gen¬ erally low and the state is scantily supplied with water; soil generally light and sandy; chief productions, corn, cotton, sugar and salt. It has been under British protection since 1826. Pop. (1911) 558,785. (2) A town, the capital of the

above state, on an extensive and fertile plain, 110 miles south-southwest of Delhi. It covers an area about four miles in circuit, and was so strongly fortified that in 1805 it stood a siege by Lord Lake of 14 weeks and cost the besiegers 3,100 men. In a second siege, in 1826, its re¬ sistance to Lord Combermere was less success¬ ful. The fortifications have been demolished, but the fort still exists, and is enclosed by a wet ditch and a wall of hewn stone, which taken together are 60 feet high. Within the

fort is the Rajah's palace, built of red and yel¬ low freestone in the Mogul style, and pictur¬ esquely crowning an eminence surrounded by flower-gardens and fountains. The population (1911) was 33,918, about one-half that for 1881, the decrease in that period having been 48.7 per cent, due to many causes, such as poverty, famine and emigration.

BHARTRIHARI, bhar-tre-ha’re, Indian

poet, author of a book of apothegms. Accord¬ ing to the legend he was the brother of King Vikramaditya, who lived in the 1st century b.c. The collection of 300 apothegms (short poems) bearing his name is divided into three parts, and present us with graceful descriptions of nature, charming pictures of love, shrewd remarks on everyday life and profound thoughts on the Deity and the immortality of the soul. Bhartrihari was the first Indian writer who became known in Europe, 200 of the apothegms having been translated by the missionary Abraham Roger and published at Leyden (1653). His actual personality has been much discussed without any very satisfactory conclusion having been reached. The weight of opinion inclines to belief in his existence, and that he was a poet of a philosophical cast, possibly a grammarian also, and very likely of royal descent. Consult Von Bohlen, (Bhartrihari’s Sentential (1833) ; Tawney, (Two Centuries of BhartriharR (1877) ; Wortham, translation of the Satakas of BhartriharR (1886) ; Afore, (A Century of Indian Epigrams, Chiefly from the Sanskrit of BhartriharR (1898) ; Kale and Gurjar, (Nitisa-taka and Vairagysataka, with Notes and an English TranslatioiR (1898).

BHASKARA, surnamed Acharya, the Learned, Hindu astronomer and mathematician : b. 1114; date of death unknown. He was the sixth successor of Brahmagupta, at the head of the college of astronomy of Ujjain. His chief work was the (SiddhantasiromanR ((Crowning of the Star System*), which, like all his works and those of his contemporaries, was written in verse. He differed from them in adding prose comments and explanations.

BHATTI, bhat’te, Indian epic poet of the 6th or the 7th century. His poem, named after him, ˆhattikavyam,* is in 22 cantos. Its theme is the deeds of Rama; but the author designed the work to be also an exemplification of the rules of grammatical and rhetorical composi¬ tion. It was published with a twofold com¬ mentary at Calcutta (1828).

BHAVABHUTI, bha-va-bhoo’te, surnamed Sri-kantha, Indian dramatist, of the latter part of the 7th and first part of the 8th century. He wrote at least three plays, the (Mahaviracharita) (<(life of the great hero®) and the (Uttarara-macharita) (((later life of Rama®), forming to¬ gether, in seven acts each, a dramatized version of the story of the Ramayana, and the <Malati-madhava) (the Hindu Romeo and Juliet), a domestic drama in 10 acts. Bhava-bhuti is often compared with Kalidasa, whom he equalled in vigor and variety, but hardly in genius. All three plays have been translated into English.

Consult Frazer, < Literary His¬ tory of India) (London 1907) ; Horwitz, (The Indian Theatre) (ib. 1912), and Levi, (Le theatre indierR (Paris 1890).

BHILS, bels, or BHEELS, a Dravidic race inhabiting the Vindhya, Satpura and Sat-mala Hills, a relic of the Indian aborigines driven from the plains by the Aryan Rajputs. I hey appear to have been orderly and indus¬ trious under the Delhi emperors, but on the transfer of the power in the 18th century from the Moguls to the Mahattas they asserted their independence, and being treated as outlaws took to the hills. Various attempts to subdue them were made by the Gaekwar and by the British in 1818 without success. A body of them was, however, subsequently reclaimed, and a Bheel corps formed, which stormed the retreats of the rest of the race and reduced them to com¬ parative order. The hill Bheels wear little clothing and live precariously on grain, wild roots and fruit, vermin, etc., but the lowland Bheels are in many respects Hinduized. Their total numbers are about 1,250,000. Their re¬ ligion contains much superstition, including the worship of Mother Amba Bhavani. Their lan¬ guage belongs to the Ivolarian stock of Indian tongues, but many of them speak a dialectic Aryan. Consult Rowney, (Wild Tribes of In¬ dia* (1882) ; Reclus, Primitive Folk* (1891); Crooke, (Natives of Northern India.*

BHIMA, be'ma, BEEMAH, or BIMAH,

(1) a god in Hindu mythology, the son of Pritha (or Kunti) by Vayu, the god of the wind, remarkable for his great size and strength; (2) the name of a river of India ris¬ ing in the Poona district of Bombay and flow¬ ing southeast to the Kistna River, about 400 miles in length.

BHIWANA, bhe-wa'-ne, India, a town in the Punjab, district of Hissar, 55 miles west of Delhi. It is the trading centre of its district, exporting metals, sugar, salt and spices. Pop.

31,100.

BHOPAL, bho-pal', India. 1. A native state of central India, with an area of 6,874 square miles. The country is full of jungles and is traversed by a hilly tract, forming part of the Vindhya Mountains. The soil is fertile, yielding wheat, maize, millet, pease and other vegetable productions peculiar to central In¬ dia. Sugar, tobacco, ginger and cotton are the chief exports. The district is well watered by the Nerbudda, Betwa and other minor si reams. The state of Bhopal was founded by an Afghan adventurer named Dost Mo¬ hammed Khan, who in 1723 succeeded in es¬ tablishing himself here by the countenance of Aurungzebe, on whose death he assumed the title of nabob, which was retained by his suc¬ cessors. Bhopal has all along been friendly in its relations with the British. In 1818 the state was placed under British protection. Pop. 1,375,317; (2) a town, capital of the above state, on the boundary between Malwah and Gundwana, 108 miles east of Oojein. It was defended successfully in 1813 against the forces of Scindia and the Rajah of Nagpore. It is surrounded by a wall two miles in cir¬ cuit and contains a fort. Outside is another fort on a large rock, the residence of the ruler of Bhopal. Among other buildings of note are two mosques, arsenal, mint and the palace of the Begum. Large artificial lakes supply good water. The town is clean, has fine prom¬ enade gardens and is well lighted. Pop. 56,-

000.

BHRIGU, a Sanskrit word signifying <(radiant,** “sparkling.** A mythical race of men or demigods mentioned in the (Rig Veda* (q.v.). They are connected with fire, which is brought to them and first kindled by Ma-tari-svan and afterward given by the Bhrigu-to men. They are also said to fabricate chariots. Bhrigu is likewise the name of one of the chief Brahmanical families and also of Varuni, author of one of the Rig Veda, being enumerated among the 10 Maharshis created by the first Manu. The name of Bhrigu is furthermore borne by one of the Prajapatis produced from Brahma’s skin; by one of the seven sages; by the father of Cyavana; by the author of a Dharma shastra; by an ancient astronomer, a physician, of the planet Venus and a number of other persons and things. The Bhrigu myths of the Rig Veda and the Mahabharata are believed to be merely a more developed form of the tradition regarding the descent of fire and some authorities identify Bhrigu with Agni. Consult Monier-Williams, Sir M., (Sanskrit-English Dictionary* (Ox¬ ford 1899). See Sanskrit Literature.

BHUJ, or BHOOJ, India, chief town of Cutch in India, Bombay presidency, at the base of a fortified hill, with military canton¬ ments, high school and school of art, mauso¬ leums of the Raos or chiefs of Cutch, pago¬ das, etc., including a temple dedicated to the cobra di capello. Bhuj is famous for its man¬ ufactures of gold and silver. Pop. 21,579.

BHUTA WORSHIP, in Indian (Hindu) mythology: bhuta (the word is plural) are evil spirits or goblins who kill the living and breathe life into the dead. The myth has ex¬ isted from the earliest ages and in later periods the god Siva (q.v.) was recognized as the chief of the bhuta. Hence, Siva is also called Bhutapati — “Lord of the Bhuta.** These spirits are worshipped and propitiated by many non-Aryan tribes in India, in tem¬ ples and houses, under the forms of animals, such as boars, tigers, pigs; of human beings in gaudy dress, or of stones and pyramidal mounds of earth. Blood sacrifices are offered to the bhuta, especially gray pigs, black he-goats or fowls ; also rice soaked in blood. The ceremony is performed with wild dances accompanied by tom-toms. In the south of India the people recognize the amiable Bhuta Kannimar, or virgin spirits. Bhut-Bali are offerings to malignant spirits ; Bhuta-Devata is an evil being worshipped as a divinity; Bhut-khet is a piece of land granted for the cost of sacrifices. A Hindu purificatory rite is called Bhuta Shuddhi ; in this connection,

however, Bhuta signifies the four elements.

BHUTAN, bhoo-tan', an independent state in the eastern Himalayas, with an area of about 16,800 square miles, lying between Tibet on the north and Assam and the Jalpaiguri district on the south and consisting of rugged and lofty mountains, abounding in sublime and picturesque scenery. Pop. (estimated) 250,000. The climate varies with the eleva¬ tion and extremes of heat and cold may be ex¬ perienced in a day's journey. Some portions of the territory are fertile and produce corn, rice, wheat, buckwheat, mustard and carda¬ moms. Cattle and considerable numbers of a

peculiar breed of ponies are raised. The man¬ ufactures, which are primitive and intended for home consumption, include coarse blan¬ kets, cotton cloth, swords, daggers and other weapons and agricultural implements. The Bhutanese are a hardy and vigorous race, of Tibetan stock, and their language is a dialect of Tibetan. They profess to be Buddhists, but their religion, like that of Tibet, partakes largely of the old Bom-po, which preceded Buddhism and consists chiefly of devil wor¬ ship and propitiatory sacrifice. The admin¬ istration of the state is divided between the secular Deb rajah, who is elected for a term of three years by the penlops, or magnates, from their midst, and the Dharma rajah, the presumed reincarnation of Buddha, who is supposed to interest himself solely with the spiritual control of the state. The winter cap¬ ital is Punaka, or Dosen, a strong natural fortress 96 miles east-northeast of Darjeeling; Trashichodzong is the summer capital. Bhu¬ tan formerly included considerable tracts of territory now included in Bengal and Assam, which were annexed in 1864 and 1866 by the British government in retaliation for outrages committed by the natives. In 1865 they drove the English out of Dewangiri and a punitive expedition was sent against them. A treaty concluded with the Bhutan government pro¬ vided for the payment

by the Indian govern¬ ment of an annual subsidy in return for for¬ mal cession of the annexed territory. This subsidy began at £2,500 and was gradually increased to £3,333; it is conditional upon the maintenance of peaceful relations.

BIAFRA, Bight of, a large bay on the

west coast of Africa, at the head of the Gulf of Guinea, between Capes Formosa and Lo¬ pez. Its breadth is about 190 miles. The principal rivers flowing into it are the. Niger, the New and Old Calabar rivers, the Rio del Rey, the Kamerun and the Gaboon ; its islands are Fernando Po (Spanish) and Saint Thom¬ as' and Prince's (Portuguese). Opposite Fernando Po are the Kameruns.

BIALYSTOK, byal-e-stok" Poland, or RIELOSTQK, town in the province of Grodno, on the Bialy, 45 miles south-south- west of Grodno, with which and Warsaw it is connected by rail. It is a well-built, handsome town, with a spacious market, gymnasium and several churches and has among its edifices a palace which belonged to the counts of Bran-iski and was once known as the Polish Ver¬ sailles. Its manufactures are woolen goods, leather, hats, soap, *etc.* The town was found¬ ed in 1320 and became part of Russia after the third partition of Poland. Pop. about

80,000.

BIANCAVILLA, byan-ka-vel'la (Italian bianca, white, and villa, town), a city of Sicily situated on the slope of Mount Etna, 20 miles northeast of Catania, founded in 1480 as an Albanian colony. Lava is employed for pav¬ ing its streets and in its neighborhood are the noted grottoes of Scila and Archi, the former basallic, the latter in the lava of 1607 with a tunnel half a mile in extent. Wine and grain are produced in the district and all the cotton in this portion of Sicily is called Biancavilla.

BIANCHI. byan'ke, Francesco (called II Frari), Italian painter: b. Modena 1447; d.

1510. He was the instructor of Correggio, according to Vidriani, and his works were es¬ teemed for graceful design and agreeable col¬ oring. His works, however, have all the tra¬ ditional dryness of the period and the eyes are painted in a manner somewhat grotesque.

Among his few works extant are a (Madonna with Saints, 2 now in the Louvre. He must not be confounded with Federigo Bianchi, a Milanese artist, born about the end of the 16th century. The paintings of the latter are nu¬ merous in northern Italy and are held in high esteem. He wrote a volume of biographies of painters. Consult Lancilotti, (Cronaca Mo-denese) ; Vedriani, (Scultori ed Architetti ModenesP ; Winckelmann, (Neues Malerlexi-con.)

BIANCHI-GIOVINI, Aurelio, Italian

journalist and historian: b. Como, 25 Nov. 1799; d. Naples, 16 May 1862. His early studies were adapted to the purpose of fol¬ lowing a commercial career, but he took up the profession of journalism in Switzerland, where he had gone to escape the persecutions of the Austrian police. For some years he was editor of various Swiss-Italian newspa¬ pers. In 1841 he began his more serious work, writing a number of historical works in Mi¬ lan and Turin. During this time he became a member of the Chamber of Deputies. His principal works are (Biografia di fra Paolo SarpP (1834) ; an incomplete history of the Popes (12 vols., 1850-64); (L' Austria in

Italia) (2 vols., 1854). His biography has been written by Montazio (Turin 1862).

BIANCHI AND NERI, Italian, White and Black: Parties or factions in the Floren¬ tine Republic in the 14th century. Dante be¬ longed to the Bianchi, and, being banished, wrote his great <(Divina Commedia® in exile.

BIANCHINI, be-an-ke'ne, Francesco,

Italian antiquarian and astronomer: b. Verona, 13 Dec. 1662; d. Rome, 2 March 1729. He was intended for the clerical profession and to this end studied theology, jurisprudence, languages, mathematics and botany in Padua. Afterward he repaired to Rome and applied himself to jurisprudence and continued the study of ex¬ perimental physics, astronomy, etc., as well as of Greek, Hebrew and other languages. Pope Alexander VIII bestowed on Bianchini a rich benefice, with the appointment of tutor and librarian to his nephew, the Cardinal Pietro Ottoboni. Pope Clement XI also patronized him and appointed him secretary to the com¬ mission employed in the correction of the cal¬ endar. Being on a tour through France, Hol¬ land and England, he formed the idea of draw¬ ing a meridian in Italy, from one sea to the other, in imitation of that which Cassini had drawn through France. He was occupied eight years at his own expense in that work; but

other employments withdrew his attention from it, and it remained unfinished. He concluded his career with two important works (1727) on the planet Venus, and on the sepulchre of Au¬ gustus. He is the author of several memoirs and dissertations on antiquarian and astronom¬ ical subjects, including (Istoria universale pro-vata co' momenti, e figurata co' simboli degli antichi' (Rome 1697), and (Astronomicae et Geographical Observationes SelectaP (edited by

his nephew, Verona 1737). An edition of An¬ astasias, (De Vitis Romanorum Pontificum) was begun by him and completed by his nephew, Guiseppe Bianchini (4 vols., Rome 1718-34). There is a monument to the memory of Fran¬ cesco Bianchini in the cathedral of Verona.

BIANCO, Andrea, Italian cartographer who lived in Venice in the beginning of the 15th century. It has been asserted that he had a knowledge of America previous to Columbus, for among his charts is one dated 1436, in which are indicated two islands, one ((Antiilia,® the other (<De laman Satanaxio,® located in the Atlantic Ocean west of the Azores. His maps are now rare and are valued as illustrating the knowledge, or ignorance, of geography then prevalent.

BIANCONI, Charles, Italo-Irish promo¬ ter of transportation: b. Tregolo, Italy, 24 Sept. 1786; d. Tipperary, September 1876. At 15 or 16 he was bound for 18 months to a country¬ man, who took him to Dublin, where he was sent out to vend cheap prints. Soon he re¬ moved to Waterford and started on his own account as itinerant vendor. In his long pedes¬ trian journeys he was led to envy those of his own calling who could afford to drive. He engaged in other enterprises, all of which were successful, and in July 1815 he started a one-horse, two-wheeled car to carry passengers, goods and the mail-bags from and to Clonmel and Cahir, a distance of about 10 miles. The

experiment succeeded and grew apace, so that in 1845 Bianconi was conveying passengers and freight over 1,633 miles and working daily 3,266 miles of road. His cars were patronized by all classes and were of great benefit in opening up communications with remote districts. Be¬ tween 1846 and 1865 the growth of railways forced the discontinuance of the Bianconi serv¬ ice on 4,534 miles, but during the same period it was extended over 3,594 miles in routes crossing the railways and reaching districts remote from the new mode of conveyance by rail. Bianconi was the friend and supporter of O'Connell, and on the occasion of a visit to Rome he erected at his sole cost the monument over O'Connell's heart in the church of the Irish College. In 1863-65 he disposed of his vast interests on liberal terms to his agents and others employed by him and then retired to his estate at Longfield, near Cashel, Tipperary. Consult O'Connell, Mrs. Morgan John, (Charles Bianconi: A Biography* (Dublin 1878).

BIARD, Frangois Auguste, byar, a-gust froii-swa, French genre painter : b. Lyons, 30 June 1799; d. near Fontainebleau, 20 June 1882. He traveled extensively, visiting Spain, Greece, Syria, Egypt, Mexico, Greenland and Spits¬ bergen, Brazil, *etc.* Among his best known pic¬ tures are the (Babes in the Wood) (1828) ; the (Beggar's Family* (1836) ; the (Combat with Polar Bears) (1839), and <The Strolling Play¬ ersˆ now in the Luxembourg. A strong ele¬ ment of caricature runs through most of his works.

BIARD, Pierre, French missionary in America: b. Grenoble 1565; d. 17 Nov. 1622. He was one of the first two missionary priests sent to New France. With his companion. Masse, he arrived at Port Royal 22 May 1611,

and on 11 June wrote the earliest letters sent by the Jesuit order from Canada. He at once began a study of the Indian languages with a view to their conversion, — a task of extraor¬ dinary difficulty, as the Indians had no sym¬ bols which could express either moral or re¬ ligious ideas. He established friendly relations with the Indians on the Kennebec in 1612, and in the same year composed a Micmac catechism. Owing to the hostility of the colonists to the Jesuits, the missionaries left Port Royal and founded a settlement on Mount Desert Island, near the mouth of the Penobscot. The colony was soon destroyed by the forces of Argali, deputy governor of Virginia, and Biard, being captured, was sent to England. This enterprise of Argali's marks the actual beginning of hos¬ tilities between the French and English in North America. Biard was liberated after a short time, and

returning to Lyons, became a professor of theology and afterward chaplain of the King's forces. He published, in 1616, (Relation de la Nouvelle France, et du voyage des peres Jesuites dans cette contree.* This is the earliest of the 40 volumes of (Jesuit Re¬ lations * (1632-72), which are such valuable

storehouses of material for early American his¬ tory. Consult Hughes, (History of the Society of Jesus in North America) (Cleveland 1910).

BIARRITZ, bya-rets, France, a fashion¬ able watering place, department of Basses-Pyrenees, five miles south of Bayonne. It is a favorite of bathers and other persons who come from all parts of Europe, and especially of the Basque mountaineers, who deem it an obligation to drink of the mineral waters once a year, as well as to bathe in the sea of Biarritz. In 1856, the place acquired additional import¬ ance from being made the summer residence of Napoleon III and his court. Since then its popularity, both in winter and summer, has steadily increased. It has no industries and is composed almost entirely of hotels and lodging-houses. Pop. 18,260. Consult Laborde, (Encore le vieux Biarritz* (1909).

BIART, byar, Lucien, French novelist, poet and writer of travels: b. Versailles, 21 June 1829. He published a number of novels, containing masterly descriptions of Mexican nature and customs. Among his works are (Les Mexicaines,* (La Terre Chaude,* (A travers l'Amerique,* and (in 1885) (Les Azteques,* an interesting historical study. He died in Paris 18 March 1897.

BIAS, be'as, one of the seven wise men of Greece: b. Priene, one of the principal cities of Ionia, about 570 b.c. He was the son of Teutames, was a practical philosopher, studied the laws of his country, and employed his knowledge in the service of his friends, defend¬ ing them in the courts of justice or settling their disputes. He is said to have died at an advanced age immediately after successfully defending in court one of his friends. The in¬ habitants of Priene having resolved to aban¬ don the city with their property, Bias replied to one of his fellow-citizens, who expressed his astonishment that he made no preparations for his departure — <(I carry all that is mine with me.® Many of the stories attributed to him are of doubtful authenticity. A number of his short, pithy sayings have come down to us.

Consult Mullach, F. W. A., (Fragmcnta Phi-losophorum GraecorumP

BIBAUD, Michel, French-Canadian poet and historian: b. near Montreal 1782; d. 1857. He published in 1830 a volume of poems, (Epitres, Satires, Chansons, EpigrammesP — the first miscellany of poems in the history of French-Canadian literature. He afterward published in three volumes the (Histoire du CanadaP This work, however, was not well received by his compatriots, being written from the British rather than the French-Canadian standpoint.

BIBB, George M., American jurist: b. Virginia 1772; d. Georgetown, D. C., 19 April 1859. He was graduated at Princeton in 1792 and took up the practice of law in Kentucky. He was twice chief justice of the State Court •of Appeals, served two years in the State sen¬ ate and was chancellor of the Court of Chan¬ cery. He was a senator in Congress, 1814-19 and 1829-35 and Secretary of the Treasury under President Tyler. During later life he practised his profession in Washington, D. C. He compiled (Reports of Cases at Common Law and in Chancery in the Kentucky Court of Appeals) (1808-11).

BIBBIENA, be-bya'na, Bernardo Dovizio

da (styled Bibbiena), Italian poet: b. Bibbiena, 4 Aug. 1470; d. 9 Nov. 1520. For many years secretary to Cardinal Giovanni de Medi¬ ci, in whose election as Pope Leo X he is said to have had a considerable share, he was ap¬ pointed treasurer and soon after raised to the dignity of cardinal (1513). He conducted a successful campaign against Urbino and in 1518 was legate to France for the purpose of securing concerted action of the Christian na¬ tions against the Turks. He translated sever¬ al plays of Plautus, which were performed be¬ fore the Pontifical court. He was an ardent promoter of art and science. His comedy, ˆalandria,* is probably the earliest in Italian literature. Consult the biography by Bondini (Leghorn 1578) ; Camerini, (Nuovi profili let-terarp (Milan 1875) ; Flamini, (History of Italian Literature* (New York 1906) ; Graf, (La Calandria* (1878) ; Wendriner, (Die Quellen von Bernardo Dovizis Calandria)

(1895).

BIBBIENA, Giuseppe, Italian painter: b. 1696; d. 1757. The most distinguished of the Bibbiena family, he was famed as architect as well as an artist. Not only did he design gorgeous decorations for a court wedding at Munich in 1 722 and a dazzling court festival in Prague in

1723, but he built the noted thea¬ tre at Bayreuth in 1757 and remodeled the opera house at Dresden. The (Architettura e Prospettire) (1740) contains several illustra¬ tions of his works. Consult Nagler, (Neues Allgemeines Kimstler-LexiconP

BIBERACH, be'be-raH, Wurtemberg, a town on the river Riss, an affluent of the Dan¬ ube, 22 miles south-southwest from Ulm. It is 1,750 feet above sea-level, is irregularly built and with its old walls, still in part remaining, and its old towers and gateways, has a me¬ diaeval aspect. Among its buildings is a fine church, dating from 1100 and recently restored. The town has important educational institu¬ tions and a richly endowed hospital. The

French, under Moreau, defeated the Austrians near Biberach on 2 Oct. 1796; and again 9 May 1800 the Austrians suffered defeat at the hands of Saint-Cyr. There is a monument to the poet Wiejand, who was born in the vicin¬ ity. The town is noted for its bell foundries and manufactures of artificial flowers, leather, toys and machinery. Its grain and fruit mar¬ kets are famous. The gas works and water¬ works are the property of the town. Pop.

9,096.

BIBESCO, Barbo Demetrius, also known as Prince Stirbey, Wallachian statesman : b. 1801 ; d. Pisa, Italy, 13 April 1869. In 1817 he went to study in Paris where he remained until 1821 when he returned to his native land. He participated in the uprising against the Greek officialdom established in Rumania under the Turkish government. Under the provisional government established under Russian protection he accepted the portfolio of Minister of the Interior. He is considered one of the founders of the modern Rumania.

BIBIKOV, be-be'kof, Vasili Ilich, Russian actor, dramatic critic and playwright: b. 1747 ; d. 1787. He was the secret councillor of the Imperial court. From his earliest boyhood he manifested a passionate love for the theatre as also a remarkable dramatic verve which did not escape the eye of his future guide and teacher, A. Sumarokov. It was with the aid of that great master that Bibikov originated the theatrical art in Russia by establishing, upon the invitation of Empress Catharine II, the Imperial Theatre in Saint Petersburg. He was the first director

of that company and as such has deserved an immortal name. But he was even more celebrated as founder of the first Academy of Drama in Saint Petersburg (1779) which became the nursery-garden of Russian actors. No smaller fame did he de¬ serve as author of a comedy in five acts (Likhoi-metz) (The Usurer) which was performed with immense success in all the theatres in Saint Petersburg. It is obvious, however, that he had been familiar with Moliere's master¬ piece, <L'Avare,) but the elaboration and the dialogue are essentially Russian in character. The subject matter of the comedy has been taken from the contemporary customs of the metropolis, which he had satirized in a pow¬ erful manner, and the characters of the play are drawn with vigor so that, in its time, (The Usurer* was considered, and is now to a great extent, one of the best comedies de mceurs ever written in Russian.

BIBLE, The. Introduction. The Name.

— The Phoenician port of Gebal, the modern Jebel, famed as seat of the Adonis cult and still earlier as a mart for papyrus, was called Byblos by the Greeks, whence the Greek word byblos or biblos came to denote the papyrus plant (as we say barege or nankin) and its inner pith, then the paper made therefrom, then a book or writing (Matt, i, 1, first used to denote a body of sacred writ in the Letter of Aristeas, 316). Thence the diminutive biblion with its plural biblia (often byblion, -a), meaning papers, lit¬ tle books, books, documents, scriptures, library. In the preface to Ecclesiasticus (written in Hebrew about 172 b.c. by Joshua Sirach, turned into Greek and prefaced by his grandson Joshua about 117 b.c.) this biblia is used twice . . ,

(fof the Law and the Prophets and the other Biblia® … (<also the Law and the Prophe¬

cies and the rest of the Biblia® … to denote the literature of Israel, as the equivalent and in fact a translation of the Hebrew S'farim (scriptures) used in the same era in the same sense in Dan. ix, 2, ((I Daniel understood from the s'farim .® From the Jews this term

passed, along with so much other freightage of thought and word, to early Christians (first in 2 Clem, to Cor. xiv, 2), by whom it was at last extended to include all authoritative scriptures, Jewish and also Christian. In the Middle Ages this Greek neuter plural was mistaken for a Latin fem¬ inine singular and so declined : biblia, biblice, *etc.* As such it has passed over into various languages of modern Europe (the Bible, die Bibel, la Bible, la Bibbia, etc.).

Other Names. — S'farim or biblia was by no means the only term applied by Jew or Christian to the scrolls in question. At first all Israel's literature was regarded as holy, if not quite equally so, merely as being written* — such was his preoccupation with religion — and not till the Middle Ages do the Jewish ex¬ pounders (never the Talmud or Midrash) speak of the <(Scriptures Holy® (sifre ha-qodesh) . When other books appeared, they received the special suffix <(the outsiders® (ha-chitzunim) , the Greek <(Apokrypha ® ((<hidden away®), — per¬ haps as not included in Temple or Synagogue libraries. As read publicly on Sabbaths and holidays, the books were named: (a) Miqra, ((the read®; also (b) ((writings the holy® (kitli'be ha-qodesh), a title reappearing in Rom. i, 2 (graphais hagiais) and in 2 Tim. iii, 15 (hiera grammata) . Again, the superflous (<holy® omitted, they were called (c) simply Writ (katub), and the modern phrase <(the Scripture says® merely translates the Hebrew ha-katub ' omer , as the <(every scripture® of 2 Tim. iii, 16 translates kol ha-katub. Once more (d) since ((Law® (Torah) was the first and chief division of these ((Books,® the term is applied to the whole, as also in John x, 34, 1 Cor. xiv, 21. (e) The name (CTestament® (Old and

New), translating the Greek diatheke (cove¬ nant), first used in this sense in 2 Cor. iii, 14, the most familiar to us, very naturally is rarely if ever used by a Jew to mean <(Scripture® ; the <(Book of Covenant® or Testament (sefer ha-brith) denotes the whole (<Law® in Ben Sirach xxiv, 23, but properly only Ex. xx, 20-xxiii, 35.

(f) Still other less important designations are found: as Cycle (machzur), <(Twenty and Four Books,® (<Verse®; often an acrostic was formed with the Hebrew initials (t-n-k) of Law, Prophets, Writings, and of other designations.

(g) Lastly, in the Mishnah the mark of the Holy Books is that they ((defile the hands,® which sounds like a tabu, but in any case the phrase <(defiling the hands® came to define the ((Holy Books® as canonical.

Division of the Subject. — In discussing this authoritative literature, the question is first, What are these various Scriptures?; then, what is their actual literal content?; and lastly, what is its meaning (or interpretation) ? The first question, in all its ramifications, concerns the Canon ; the second, the Text and textual

*The Chinese are said to regard as holy all writing (Cal-quhoun's 4 China in Transformation,' p. 246), perhaps as possibly containing the name Confucius.

criticism; the third, the History of Interpreta¬ tion and so-called ((Higher Criticism.® These topics, then, will be discussed in this order. As is well known and has already been observed, the whole literature falls into two grand divi¬ sions: the Old Testament and the New, or Jewish and Christian Scriptures, and these, be¬ ing wide apart, will require separate and dis¬ tinct treatment.

Canon of the Old Testament.

Terms. — Both the word and the idea of Canon appear to be Semitic. The Assyrian qanu, Hebrew qaneh, Greek kanna , along with the English cane and many others, all mean reed, whence the Greek kanon meant a rod or bar used to keep a thing straight or right; thus Homer calls the arm-rods of Nestor's shield kanonas (II. viii, 192f).* Thence kanon came to mean a straight-edge, thence rule, norm, standard, model; thence canons or canonical biblia came to denote Scriptures accepted as authoritative, as the rule of faith and practice, whether prescribing or prescribed. All this, however, is Christian; the Jews employed no such term, but instead of it the names al¬ ready mentioned, to designate their regulative literature. This latter, of course, came into being gradually, indeed very gradually, and for many generations no question was raised as to the authoritative or unauthoritative character of any particular ((Writing,® for no such distinc¬ tion arose into consciousness. Nor was there, for many years, perhaps hundreds, any collec¬ tion of writings into a single bod}' ; but in the 2d century b.c. there may be discovered traces more or less distinct of such an assembling. In 2 Maccabees ii, 13ff we read: <(and there were related in the records and the memoirs of Nehemiah the same things, and how he, found¬ ing a library, collected the biblia concerning the kings and the prophets and those of David and the letters of kings concerning offerings® (anath¬ emas). But especially this part (i, 2— ii, 18) of this book (dated by Niese 124 b.c.), namely, the letters recommending the temple-consecra¬ tion, ostensibly from

Palestinian Jews to their brethren in Egypt, is admittedly late and un¬ trustworthy, and its statements may be only enlarged inference from the actual mention in Nehemiah of the book of the Law (viii, 8), the book of the Chronicles (xii, 23), <(the command¬ ment of David® (xii, 24), and letters of King Artaxerxes to governors and others, touching (among other matters) the gift of timber for the gates, *etc.* (ii, 7-9), as well as earlier alleged proclamations of Cyrus, Darius, Artaxerxes, prescribing the offering of gifts for restoration of the temple, letters ostensibly copied in Ezra (i, 2-4, vi, 6-12, vii, 12-26). (Consult Wellhausen's <Bleek,) ed. iv, p. 559f, and Ivonig's <Einleitung,) 442f, for opposite judgments.) But we may detect here some faint hint of a triple or quadruple segmentation of a body of literature generally accepted but not yet pecu¬ liarly sacred.

Ben Sirach. — Much clearer are the lines of cleavage in the passage already quoted from the grandson of Sirach, as well as in this, from the same context : (<Whereas many things and great

*Even the buckler of Nestor, the fame whereof unto heaven Reacheth, as being of gold, wrought solid, itself and the arm-rods.

have been transmitted unto us through the Law and the Prophets and the others that followed after them, wherefore one must needs praise Israel for culture and wisdom,– and since there is need not only for such as (can) read (the original) to get understanding but also for those without to profit both by the word and the writ of the lovers of learning (the scribes), therefore my grandfather, etc.® Here we dis¬ cover not only the triple classification, Law, Prophets and the Others, but also what impulse was urging to recognition of literary values and consolidation of a body of authoritative scrip¬ tures : It was the contact with Greek culture, in which literature played such a dominant part, that forced Israel to recoil and say in self-defense, <(But we too have a literature, greater even than the Greek,® and to make it accessible, Israel proceeded to translate it into Greek, the vernacular of culture, as Ben Sirach relates. This contact with the Hellenic world started Israel on the path of self-vindication, which

spread out into the great missionary propaganda of early Christianity.

Men of Grace. — The authors that Ben Sirach names in his (Hymn of the Fathers of 01d) (xliv, 1; 1, 24) are these: Moses, Joshua, Samuel, David, Solomon, Isaiah, Jeremiah, Ezekiel, Job, Twelve Prophets, Nehemiah, but there is no clear indication of what or how much he attributes to each. Ecclesiastes, Daniel and Esther are not mentioned. Ruth may be included in the works of David (the Psalms), and Ezra in Nehemiah. The substance of Ezra iii, 2 is quoted in xlix, 12; the Law and the Prophecies are mentioned in xxxix, 1. Some have thought to find reference to Psalms, Pro¬ verbs and Job in xliv, 4—5, but these verses (xliii, 3-9, 7?) all refer, as Levi has perceived, not to Israel, but to pagan worthies, the con¬ trast with whose perishable fame begins in v. 10: <(But these men, the pious, etc.® Neither is ‘there any hint in Ben Sirach of a closed canon, though there may be some faint allusion thereto at close of the book of Malachi (iv, 4-6 : (<Remember the Law of Moses Behold I will send you Elijah the Prophet, etc.,® words doubtless appended by a later hand. Again, Qoheleth (Ecclesiastes) closes with a warning against making many books and wearying the flesh (xii, 12f). These verses, also doubtless inserted later, were understood by Rabbis to forbid not only the addition of any other work to the ((Twenty-four,® but also the study <(to weariness® of any such, and even in later times to read at all any <(outside® books, was held to forfeit all ((lot in the future life.®

First Canon. — In Nehemiah viii-x is found an elaborate account of the formal introduc¬ tion, proclamation and acceptance of the Law on the part of the Jews returned from Baby¬ lon. It was read and expounded from morn till noon for seven days : one may say then it was canonised from the 1 7th to the 24th of the seventh month of the year 444 b.c. (the year when Thucydides was ostracized and Pericles’ sway established in Athens). About 200 years later the list of the prophets appears complete, and over 100 later, in the latter half of the 2d century b.c., the roll of the (<Rest® was finished and closed forever, and therewith the canoniza¬ tion of Jewish Scriptures was ended. Such at least is the face-value of the facts in evidence;

but it must not be disguised that the trend of deepening research is to lower all the dates in question, to what extent it is not yet possible to determine. Thus it is not even certain whether Artaxerxes I (Longimanus, 465-425) or II (Mnemon, 405-359), is meant in Ezra vii, viii, and Neh. ii, 1, v. 14, xiii, 6; the whole Ezra-Nehemiah matter is unsettled, and there is a wide range between the radicalism of Torrey

and the conservatism of Meyer.

Text Open. — More important, however, than any single variation in date, is the fact that establishment of a Canon by no means im¬ plied cessation of literary process within the Scriptures canonized. The sacred lists of Prophets and Writings were never formally closed with any such ceremony as honored the Law, which to the last retained its position of easy pre-eminence, but even its majesty was attinged by various hands for hundreds of years after its canonization. Of this there are many clear indications ; one may be noted. In Ex. xxv-xxxi is a body of regulations con¬ cerning details of worship and especially sacred utensils and furniture; in Ex. xxxv-xl the same is repeated, often nearly verbatim, but in greater detail, by another hand ; in this latter the Septuagint (Seventy) translation differs exten¬ sively from the Masoretic in arrangement, in diction and in the smaller amount of material, an index pointing to the fact that so late as 250 b.c. the text had not attained a final form.

Jeremiah . — Still more heavily must the Prophets and the Writings, protected by far less sacrosanctity, have felt the finger of redaction. This is most clearly seen in the book of Jeremiah,* where the later Masoretic or Palestinian (Hebrew) text exceeds in length (by about one-eighth of the whole) the older ˆEgyptian text represented in the Septuagint. By so much the prophecies of Jeremiah were enriched after 250 b.c. Yet they were rated especially high by the post-exilic Jews (as ap¬ pears from Daniel ix) ; indeed, it was just because they were so dear to the people's heart that they were edited and re-edited and en¬ larged and enlarged again. The interpolator was removed as far as possible from ir¬ reverence. His interpolations were in truth the answer of his soul to the strong appeal of the prophet. This holds quite as well of the other Scriptures of both Testaments. Extensive and repeated revision and interpolation is the sure sign of esteem and affection. The notion of an author's rights, as we count them, was quite unknown. The worshiper whose heart was enkindled by the saintly chant did not hesitate to add his own voice to that of the invisible choir. With respect, then, to every important book of the Bible, there is a highly antecedent probability, indeed almost a certainty, that it

* At this point it may be instructive to note the results of the latest analysis of the Jeremian prophecies, as set forth in Mowinkel's ' Zur Composition des Buches Jeremia ' (Kristiania 1914) whose fundamental principle is, " The prophetic books are compilations, as are the Gospels " Jeremiah " proper, cc. i-xlv (cc. xlvi-lii forming a later appendix), is compiled from four written sources, A, B, C, D. Of

these, A was a collection of Jeremian oracles; B, a rather personal narrative, perhaps composed in Egypt; C, a group of rather long speeches; D, certain anonymous prophecies of salvation, never professing to be Jeremian; A has itself been redacted, and a redactor compounded the four ABCD into the present “ Jeremiah ” sometime before 165 B.c. Even this analysis can hardly claim to be ultimate. Perhaps a dozen, or even a score of authors have contributed features to the composite photograph, “ Jeremiah.”

BIBLE

|

■

i”

L’V-

o y l o o xyio yx w I *y

f •FoyeKeKieweicrAA

jfv rXX’KM All o PAATA A

C l C(JTX1 > xo X PM XI » Pr~M xj > y o i yxxTtu h i * (Jm «i < eiMcirrtuKA»f.-

fj O OTO IXPMKP Ti I YX f I MAO VCI Alfc** MM I < IK < MrlY > M7 Me—

PˆIM XOHKHCKVNXfe cV*Im X 1C NANTIKV , X6rmvflYiWKXiCri|

a a x i a n-rrcoa m*-

M, AM XV’i OVWcIrV

g» MMOf xerox yTM < ;

-•a. i atx > yro oykecH no faxayari xi «| m - pit; t < \ j k x 1 1 f < > c c m rat axt •

xaxvTo a ka i * focw

‘JY o i I K X OXF 1 1 tf’ m cy

•\ ro i ckxj efw e cH ;r

Koi i’ixh kjaY*(;f<xj Te e : ea fAK< > itxn-v

K’FA a ~ K X I C 1 Oft KOV

mo y k c e bj0jrcty

i< Wf*Li mi y ‘? > ‘ * x » o v

K t f C i Kl

X it i#fc y ex* vm x

|< X I O lilt: F » K

Ey, ‘ J^iUfc

p

Kxxi/,eArixfow e^X

r r i ti > y x x o yro vT^» ^ k xi ci or i opeyect^

C X M K X I |<XrtpON*»M”

‘IMcai rrH m mwMN

(duo cato i a nxTr*

a i f i XV’ ro > max) v waj

AVTOl C *

KAmywicxYiKco

o c e o yx iTOJ’rxi n a

FACOy A X A* M <J> OB«M

COA1K M TO MOM v r i Of eye* c; oxi cmiia

1 CTA *A,* 0X0 1 C XV JMVKAI VrAMANAYlF *

k x ix x i yo yc i m r<ˆK~ ecu exov aio x 1 1 1 3 1 m *-

KAPXIVCCOVKAJˆ

X M 1 < VKMCco\ J>*/Xa aiu5uoxrrxa< ;m . ■ - tu A a ok vto yo ycay

. |< X I TAX J K X I Cl > M ATX

c) ox c : ro > e m 7 cx xo wm

COICHMepOMlNAty coni' V.xoyKyro% o yo o y o 6 ym a o k ai > (> y m ocn y > y 6 vm of

NTHKAinAMTioeA

nr XT i mTc » yc f rr'Acyo

-

M

npo eu

• , V-.

Deuteronomy X, 6-15 Early 5th Century MS.

By permission, from a papyrus Manuscript in the Freer Collection

BIBLE

ATlOt Vl*p a fa M TO Yt:a WOAAM c M *oyMH A.I ,N M ATAIOITJ 1 U'K

a n tr h 6Xa>cK»v y. h ooˆ ivie o Tt hxw i c utAoy A.in<ioy

. * -ft i onror?<|>OH.ˆ <JpY mM

TJ'.|> 1 eMirO flOiP I A*b MiliM

t> 7* I TAKP * M A'lWOOWf

/Xbye ti'6 © y mWc#a<

tl M 'I -HAIK A i bˆ4fcl ISO J Aeoten e m 6 'i;oe| 7ˆ0) n tfUW Goyfej

! t)N O'l'l

AHalAt

Ai,ah\n i

Oˆr&rxc t

Av ,«yp

./ *» K Afte »a«l TWHUAY ˆSYNAurjupwMOK MHMUIII.OV

K/X i 4*fA A?J)Ayi«H ibnii

Psalm CXVIII, 33-45 5th Century MS.

Washington MS. in Freer Collection

BIBLE

ktiCiHrkfh

mmbi

jtar 4t « a &h? w **r

: - j ‘ ‘ ; ; ‘ ■’

’nepie$Atx

£*V-

John IV, 53-V, II

Sample of inserted quire. Early 4th Century Washington MS. of the Gospels, Freer Collection

BIBLE

Mark I, 1-7

Sample of regular hand of MS., late 4th Century By permission, from the Washington Codex of the Gospels, in the Freer Collection

BIBLE

has had a prolonged birth, that it is the joint issue of multiplied labors.

Ezra. — The modern idea, long prevalent, that the total canonization was effected by Ezra, who as president of the ftMen of the Great Synagogue" (merely the shadow of a mighty name),* both unified all the Jewish Scriptures in one volume, restored the correct text and made the three-fold division into Law, Prophets and Writings, — this idea budded in the 13th century and developed amply 400 years later in the imagination of Elijah Levita (1538), and to still greater proportions in that of Buxtorf (1665), — a merely fictive out¬ growth from the records that Ezra ((the priest, the scribe" <(ready in the law of Moses," of¬ ficiated as chief reader during the work of canonization of the Law (Neh. viii, 1, 2, 6,

9, 13).

Meaning. — • The occasion of this latter is very significant. Since the first return from Babylon (536 b.c. ?.)t three generations had passed away, but affairs in Jerusalem and Ju¬ dea, so far from showing improvement, had grown even more deplorable. Not only were country and city the prey of neighboring free¬ booters, but far worse, a process of miscege¬ nation with the heathen nomads and of conse¬ quent religious degeneration and decay had set in, and threatened to extinguish Israel in the South as totally as (already) in the North. Ezra had indeed not neglected the most dras¬ tic measures against this amalgamation (Ezra x), and in the midst of a drenching rain had pledged the people to put away all (<strange wives," even those that were mothers. Never¬ theless the strong hand of the governor Nehemiah was needed to lift up the people from their degradation, to restore the walls that were broken down and the gates that were burned with fire. It is the revival of a na¬ tional consciousness, the reanimation of a per¬ ishing people, that is celebrated in that great Feast of the Tabernacles (Chag Ha-sukkoth) . It is the group-soul that comes back to life and the canonization of the Law is the seal and symbol of the new career just opening. No such formal solemnity marked the canon¬ ization of the Prophets and the Rest, yet we may be sure that the significance was similar. They were conservative measures, protective reactions of the racial consciousness against an

environment hostile or still more danger¬ ous in its friendship. Some such instinct of self-defense seems to have dictated the for¬ mation of every canon.

What then were the books thus sanctified and hallowed as the guardians of the national life? As already indicated, they were the ((Four-and-Twenty" ; Genesis, Exodus, Levit¬ icus, Numbers, Deuteronomy (forming Torah, the Law) ; Joshua, Judges, Samuel, Kings, Jeremiah, Ezekiel, Isaiah, the Twelve Minor Prophets (forming the Nebi'im, Prophets) ; Ruth, Psalms, Job and Proverbs, Ecclesiastes, Song of Songs and Lamentations, Daniel and the Roll of Esther, Ezra (including Nehe-

* As shown by A. Kuenen in 'Over de mannen des Groote Synagoge' (1876; tr. into German by K. Budde, 1894).

t The actuality of which is now doubted or denied in the highest quarters, since Koster's ' Herstel van Israel in het Perzische Tijdvak ' (1893), in spite of Wellhausen's con¬ cessive rebuttal (1895).

m + h) and Chronicles (forming the Kethubim, <(Writings" or Hagiographa) .* These familiar names agree in the main with the Greek, whence the Latin, and denote the books ac¬ cording to Content or Author; but the Hebrew uses instead the first words of the Content; thus, <(Breshith" (In-the-Beginning), «(Vel-leh) Shemoth" (Now-these-the-names, Ex. i, 1), «Vayyiqra" (And-called, Lev. i, 1), ((B'mid-bar" (In wilderness, Nu. i, 1), «Elleh Ha-d'ba-rim" (These-the-words, Deut. i, 1) ; (but ((T'hil-lim," Psalms), ((Mishle" (Proverbs-of), «Qoheleth" (Words of Qoheleth, Ecc. i, 1), <(Shir Ela-shirim" (Song of-the-Songs, i. 1), «Ekah" (How, Lam. i, 1) (but ((Dibre Ha-yamim," Words-of the-days Chronicles). Still other titles, as Book of Creation; of Patriarchs; of Penalties; of Priests; of Offerings; of Pre¬ cepts, of Numbers; of Reiteration, of Re¬ proofs; Prayers; Book of Wisdom; Lamenta¬ tions — which seem to show later influence — are found in the Mishnah.

Number. — 'Note that our present two Books of Samuel, two of Kings, two of Chron¬ icles are each reckoned as one book ; also the Twelve Minor Prophets as one, and Nehemiah is included in Ezra, which reduces our present 39 by 3 + 11 + 1, i.e., by 15, to 24. It is perhaps not quite accidental that this number is the double of the sacred

Number Twelve, the num¬ ber of the Tribes of Israel. By its peculiar spiritual properties, as the most divisible of all small numbers. Twelve justly reigns among symbolic and significant numbers, though Ten, as the number of fingers on the hand, has very unfortunately displaced it as the basis of notation.

Apocrypha. — In IV Ezra xiv, 37-48 (written shortly before Domitian's death, 96 a.d.) we find a purely imaginative account, with mythologic elements, of the writing or copying of 94 books, by Ezra with five assistants in 40 days, at command of God. Of these, the (<Four-and-Twenty, which thou didst first write, thou shalt publish, for the worthy and the un¬ worthy to read ; but the last 70 thou shalt hold back and give only unto the wise of thy people. For in them is the vein of insight and the well of wisdom and the river of knowledge." The 70 books, regarded here and also in wide circles of the Jews as superior even to the 24, are the Apocrypha, of which this IV Ezra is itself a great part. The number 70 is also sacred and symbolic as in the 70 (strictly 72) translators (the Septuagint), the 70 disciples (the univer¬ sal mission, Luke x, 1-18), and elsewhere.

Twenty-two. — The number 72, as six times 12, was also emblematic, and 22 was the number of letters in the Hebrew alphabet; hence Ephiphanius divides the foregoing 94 into 22+72, and Josephus actually gives 22 as the number of the Books (con. Ap. i, 39, Niese), and Origen also, as quoted in Eusebius (Historia Ecclesias) vi,

* So given as what " our Rabbis teach " in the classic Talmudic passage, the Baraitha (" outside " gloss) with Gemara (comment), in Baba Bathra (" gate," or division, " last "), of the first section of the Fourth Order of the Mishnah, dealing with Neziqin (" damages "). The wdiole passage (14b, 15a) is full of queer traditions concerning biblical authorship, as that " the Men of the Great Synagogue wrote Ezekiel, and the Twelve, Daniel, and the Roll of Esther," that " Hezekiah and his company wrote Isaiah, Proverbs, Song of Songs, and Qoheleth," and was formerly, though without reason, supposed to contain real data con¬ cerning the Canon.

25, who omits the Twelve (Minor) Prophets, and reckons Judges and Ruth together, as well as Jeremiah, Lamentations, and his Epistle in one; these three reductions leave only 21, but Origen adds, ((And besides these are the Mac¬ cabees, which are entitled Sarbeth Sabaniel.® Whence it might seem he regarded this work as canonic, though it is not now so reckoned by Jews or Protestants. From a Mishnah (B. B. 13b, 14b), it appears that each of the books (after the Law) had to be written on a distinct roll, except that Judges might be written with Ruth, and Jeremiah with Lamentations, each pair on one roll ; which would then reduce the number of rolls, and hence in the reckoning of some, the number of Books, to 22. But the examples of Josephus and of Origen (who, taught by Jews, had uncommon knowledge of things Hebrew) show that the number and names of the Books (<that defile the hands® was not absolutely settled till late in the 3d century of our era.

Order. — The order of the Prophets, <(Jeremiah, Ezekiel, Isaiah,® is at first surpris¬ ing. Fanciful explanations have been devised but soberer criticism regards it as merely that of size, like the orders <(Psalms, Job, Proverbs,® and <(Ecclesiastes, Song of Solomon,® the largest leading. This explanation seems suffi¬ cient, but is not therefore necessarily correct ; deeper analysis may yet show that the order of time has been roughly observed. Ben Sirach gives the familiar scheme, Isaiah, Jeremiah, Ezekiel, but then inserts Job before the Twelve Prophets (xlviii, 22; xlix, 7-10). The order of the historical works, Joshua, Judges, Samuel, Kings, is chronological and fixed, but in the Writings (Hagiographa) the greatest uncer¬ tainty prevails : Ginsburg tabulates at least eight different sequences, forming three grand classes: the Liturgic (of the Five Rolls), the Masoretic according to size, and the Talmudic according to time. This diversity testifies clearly to the comparatively late formation of the third part of the canon. It is interesting to note how Nehemiah, a man of affairs, glorified by Ben Sirach (xlix, 13) and evidently much more important than Ezra, priest and scribe, gradually retires before the latter, who rises steadily to the highest pinnacle in Jewish tra¬ dition, following the waxing ascendancy of the priestly idea in the course of Israel's history (though the Rabbis think it a rebuke to Nehemiah's vainglory; cp. Levy's (Worterbuch,* II, p. 184b).

Josephus. — A closer determination of the canonization of <Prophets) and ˆScriptures* has been repeatedly attempted but with no great success. Josephus (100 a.d.) departs from the ordinary, both in the number 22 and in the division of the Books into three classes :

Mosaic (5), historical (13), poetic and didactic (4), apparently counting Ruth with Judges and Lamentations with Jeremiah. His witness is so important as to deserve quotation ; after mentioning the measures taken to preserve the purity of the Jewish blood, and that writing is confined to the prophets inspired of God, and eye-witnesses, he continues (con. Ap. i, 38-41) ; (<For there are not with us myriads of Books discordant and embattled, but only two besides the 20 containing the record of all past time,

which are justly believed (divine*). And of these, five are of Moses, which contain both the Laws and the tradition of the origin of man¬ kind, till his death, and this period lacks little of 3,000 years. But from Moses' death till the reign of Artaxerxes the King of the Persians after Xerxes, the prophets write down the doings in their days in 13 books ; and the other four contain hymns unto God, and for men, precepts of life. And from Artaxerxes to our time details have been written, but have not been esteemed as of like credence with those before them, because of there not having been the exact succession of the prophets. And it is evident indeed how we have believed in these Scriptures of ours, for during so many ages as have already passed, none has dared to addf or subtract or to change anything . in them; yea, it is inborn in all of the Jews im¬ mediately from their very birth to esteem them as doctrines of God, and to abide in them, and for them, if need be, gladly die.®

Others. — In a passage of disputed genuine¬ ness ((De Vita Contemplativa,* 3), Philo names four divisions, Haws, and oracles pro¬ claimed through prophets, and hymns, and the rest whereby knowledge and piety wax together and are perfected® — <(the rest® referring ap¬ parently to Proverbs and the Wisdom-litera¬ ture. The New Testament (Luke xxiv, 44) agrees with Philo in the three divisions, Law, Prophets and Psalms, but elsewhere the con¬ stantly recurring division is twofold, into the Law (or Moses) and the Prophets. The Psalms are cited thrice (Luke xx, 2; Acts i, 23, xiii, 33), and David nine times (Matt, xxii, 42; Mark xii, 35ff; Luke xx, 41 f f ; Acts i, 16, ii, 25, iv, 25; Rom. iv, 6, xi, 9; Heb. iv, 7), but the New Testament consciousness of the other Hagiographa seems exceeding faint. Even Melito, bishop of Sardis, writing to the unknown Onesimus, speaks of the Law and the Prophets only, in giving the first detailed list of (<the ancient books,® of only 21 however, for he omits Esther, separates Judges and Ruth, but unites Samuel and Kings into one. Jerome (340-420 a.d.) in his preface to Daniel declares that <(all scripture is divided by them (the Hebrews) into three parts:

Law, Prophets, Hagiographa, i.e., into five and eight and eleven books® ; but in the preface to Samuel and Kings, the famous (<helmeted beginning to all the books which we turn from Hebrew into Latin,® he is convinced there should be and are properly only <(22 books of the ancient Law : of Moses five, of Prophets eight, of Hagio¬ grapha nine.® For there are only 22 letters of the Hebrew alphabet, t of which ((five are double, Caph, Mem, Nun, Phe, Sade, written one way as the beginning or middle and another as the end of words. Whence also, by the most, five books are accounted double : Samuel,

* This word (theia), generally given in the texts, is an interpolation, as Niese has shown, and very instructive. From their being “believed” the interpolator argued that they must be divine; later, from their being divine it was argued that they must be believed.

t Evidently Josephus was not au rourant with modern criticism.

t The mystery of the origin of this alphabet of 22 letters (in a certain order), the mother of all Western and certain Eastern alphabets, and hence in a measure of the cognate civilizations, has long fascinated and defied inquiry. How came man to imprison spirit in speech? Ideograms and phonograms conducted to syllable-script, even to the old Persian, but no further. Whence, then, the supreme

Kings, Chronicles, Ezra, Jeremias with Cinoth, i.e., his Lamentations. Therefore, just as the elements are 22 by which we write in Hebrew all that we speak, and in these primes the human voice is embraced; so 22 volumes are reckoned by which, as if by letters and pre¬ ambles, the infancy of the righteous man, while yet tender and fed on milk, is instructed in the doctrine of God.® This passage deserves quo¬ tation as perhaps pointing to a diversity of judgment among the Rabbis at whose feet Jerome had sat, and as throwing a vivid light on the Fathers’ habits of thought and of ad¬ justing facts to a keen sense of the eternai fitness of things, in presage of the great con¬ ception that truth is harmony.

Prophets. — We may then sum up by saying that the Law or Pentateuch was first in Israel, by unanimous consent, by universal preference, and by hundreds of years. At a long remove came the Prophets in two ranks, the former (historic) being Joshua, Judges, Samuel, Kings, and the latter Jeremiah, Ezekiel, Isaiah and the Twelve, but all attained (in some form, not by any means exactly their present form) an undisputed place as authoritative perhaps as early as 200 b. c., possibly even earlier, though there is some divergence of opinion, K. Marti holding that the prophetic canon was still open to the days of Hillel the Old (75 b.c.-IO a.d.). That Daniel failed to find place among the prophets has been thought to show that the list was closed before 165 b.c., the supposed date of his visions ; but this date is uncertain ; there are perhaps much later elements in Daniel, which descend far down into the Roman period, ac¬ cording to the trenchant analysis of Eduard Hertlein. In fact, there is no exact date for the canonization of the prophets, such as is appar¬ ently found in the case of the Law; the feeling that the list was closed arose gradually and most probably not for a whole generation or more did it become general and accepted ; and it was doubtless felt long after to be perfectly legiti¬ mate to add to a prophet's Book in a prophet's spirit and to modify it otherwise more or less profoundly. Hence the Prophets are found to have been interpolated more or less extensively long after the last of the name was enrolled in the canon. But insensibly the sacred awe spread itself deeper over the whole prophetic text, and all such tamperings, gradually grown slighter and rarer, now ceased altogether ; and this reverence extended itself finally to the very letters and pointings of Holy Writ.

Hagiographa. — With respect to the third division, the ((Writings,® all the features of the foregoing hesitancy appear strongly marked. The question of 22 or 24 may have been large¬ ly a matter of convenience in rolls (Megil - loth), as already stated, but not the admission or rejection of Esther, the Song and Qoheleth.

invention of letters? Halevy would derive it from Egyptian hieroglyphs, De Rouge from hieratic script, Delitzsch and Hommel from Old Babylonian — in vain. Then Hommel and Winckler (as Seyfarth already in 1 840) turned to the sky, — for in the Qabbala the notion of the heavenly origin has been preserved, and in Job (xxxviii, 33.) we read of the laws of the heavens and their lordship over earth — -first to the 12 signs of the zodiac, then to the 22 Old Hebraic lunar mansions still present in Job xxxviii-xli; and in these latter it is Eduard Stucken that claims to have dis¬ covered beyond doubt the originals of the 22 Canaanite letters, agreeing both in names and in order, — all of which and much more is set forth comprehensively in his ' Der

Ursprung des Alphabets und die Mondstationen ’ (1913).

Against these as not ((polluting the hands® many eloquent voices were raised. Nay more, among the Later Prophets even Ezekiel had not quite escaped opposition ; as contradicting the Law, some would have put his Book away, but Hananiah ben Hezekiah ben Garon was its successful champion, <(spending * three hundred jars of oil.® So, too, some opposed (Proverbs> as self-contradictory, but in vain. However, regarding Esther the dissent con¬ tinued for centuries. The Tannaim (10-210 a.d) would defend it by quoting Ex. xvii, 14 : KWrite this as memorial in a book,® not convincingly to a western mind. Aqiba urged that ((Haman said in his heart® (Es. vi, 6) refers to dictation by the Holy Spirit, which seems inconclusive, in view of Haman’s char¬ acter. Rabbi Samuel (200 a.d.), one of the last of the Tannaim, rejected all such proofs and declared that <(Esther does not make hands unclean.® Similarly the defiling virtue of the Song of Songs was questioned and again it was Aqiba that rose up in defense, declaring ((all Writings holy but the Song the holiest® ; (<the whole world is not worth the day when the Song was given to Israel® ; ((he who sings from the Song in the wine-houses and makes it profane will not have share in the world to come.® His great authority seems to have rescued the Song from the Chizunim (Apocrypha) to which some would have consigned it.

Preacher. — Most earnest of all was the strife about Qoheleth (Ecclesiastes), which Shammai’s school defended against Hillel’s. Said R. Judah, ((the Song defiles, Qoheleth is debated® ; and Aqiba, (<if there was any de¬ bate, it was about Qoheleth only® ; and Rabbi Simon ben Menasya, (<the Song defiles, being inspired by the Holy Spirit, but not Qoheleth, being produced only by the wisdom of Solo¬ mon.® Gratz holds that the decision as to the canon dates from 90 a.d., but as late as 150 a.d. Simon declared Qoheleth doubtful.

Many Scribes. — However, all such objec¬ tions were finally overruled, though the so-called additions of Daniel and Esther, as well as the Baruch Epistle added to Jeremiah, were thrust aside. The critical movement made it¬ self felt mainly in the exclusion of the nu¬ merous Chinuzim that had begun to spring up thick and to throng the entrance to the Canon. Qoheleth himself complains (xii, 12), (<of making many books there is no end.® Formerly, every writing was considered pro¬ phetic, f the phrase Esther wrote® (Es. ix, 29) was held to prove that she was a prophetess ; if this seems strange, let us remember that, in comment on Ps. xlii, 5, the Rabbis reckoned the

number of prophets at six (or ‘twelve) hun¬ dred thousand, only prophecies significant for the future being published. Such views are, of course, centuries later, but they magni¬ fy and distort the real facts, that the literary production of Israel proceeded almost whollyt from the prophets and was hence religious in aim though often historic in content, and that there arose thence a strong presumption that every writing, as the work of a prophet, was holy. Nor must we fancy that the list of sa-

*That is, in its study and defense.

fCp. 2 Tim. iii, 16 “Every Scripture God-inspired, etc.”

tHit-fig exaggerates in holding “all prechristian Hebrew books are canonic” (Hist. Crit. Comm. (Ps.), ii, p. 118).

crcd writers was no longer than the list of sacred writings, since, as we have seen and shall see again, all such are highly composite, the results of revision and rerevision, so that each may very well embody on the average the labors of a dozen or even a score of scribes. The whole body of Hebrew litera¬ ture may be the issue of hundreds or even thousands of pens. In this connection it is good to bear in mind that the scribe of that elder day was a person of rare dignity and accomplishment ; even in the very advanced civilization of Egypt he figures very important¬ ly in mural decorations, and it is not strange that he should have been esteemed still more, particularly among the Hebrews, where his culture was less generally known and hence more mysterious.

We may also recall that undoubtedly the main, if not the exclusive, interest of other scribes was religious. Even under the far more secular civilization of Assyria, the great library of Assur-banipal was composed in much the larger measure of tablets that dealt with religion in some or other of its phases. <(The content is extremely varied :. astrologic compends, the most important being (As the God Belp fragments of the annals of the an¬ cient kings, each event

connected with the proper constellation; fragments of the Gilgamesh epos (Flood, Creation, Conquest of Tiamat by Marduk, Ascension of Etana, Hymns, Prayers, Psalms, Rituals for Exor¬ cism, the State Prayer-book, historical texts, Letters, Contracts, Commentaries on older difficult texts, catalogs of words, and Ideo¬ grams with interpolation) ,® Of these only the last five are secular, and the great predominance of the religious is apparent. Neither should we forget that in the Middle Ages, not very long over-past, the ability to write was con¬ fined almost wholly to the clergy. It is then by no means strange that in the very primitive Hebrew state, the functions of scribe and of prophet should almost coincide, that the writ¬ ings should deal almost wholly with some as¬ pect of religion and should all be regarded as authoritative and sacred.

Hellenism. — But when the conquests of Alexander began to spread Greek civilization over the Orient, including Juda, and still more, when the Jews of the Dispersion began to lead a larger life, to take an a half-pagan culture with some knowledge of the Greek language and even of Greek literature, we may believe that the power of the pen became far more widely dif¬ fused and its products not only greatly multi¬ plied but frequently secularized. It was no longer possible to identify even partially the prophet with the scribe, there arose a profane literature by the side of the religious, and it was found necessary to discriminate between them. Then dawned the day of strife over the Canon, over the question, <(Does this book make the hands unclean?®

Wisdom and Song. — After the close of the prophetic list, indicated later by saying, “When Haggai, Zachariah and Malachi died, the Holy Spirit left Israel® and even earlier, a new form of literature, the literature of Wis¬ dom (Chokmah), began to flourish; two illus¬ trious specimens are universally known and received as canonic, Job and Proverbs; a

third, Qoheleth ((Preacher } or (Ecclesiastes J), came later and met with less favor, but still, be-, ing ascribed to Solomon, made good its place among the listed. Also the Psalter, the Na¬ tional Anthem, the lyric cry of suffering Is¬ rael,* established itself as the book of Songs for the service of the second Temple, and there was no occasion to question Lamenta¬ tions. Very different indeed was the (Song of Songs,) a cento of love-lays, and we may justly wonder why such an erotic ever came to rank with the Writings, among them but not of them. The answer appears to be that it was n6t unjustly popular, parts

of it being sung from an early day at yearly folk-festi¬ vals (Taanith, 48), that it bore the illustrious name of Solomon and finally that Aqiba (at the Synod of Jamnia, 90 a.d.) had recommended it as an allegory of God's Love for his Peo¬ ple Israel. Nevertheless, as already observed, it was long doubted or rejected by many. The historic or quasi-historic books of Ruth, Ezra, Nehemiah and Chronicles offered no ground of offense and seemed necessary to complete the Hebrew History, while Esther, as a glori¬ fication of the Jew in exile, made strong ap¬ peal to the national consciousness and there¬ by established its claims, against long and strong opposition. Lastly, Daniel, as both in¬ tensely national and intensely religious, was admitted to the company of Writings, though not of Prophets, where would have been its natural place but for its later origin (not be¬ fore 165 b.c.), and was peculiar in introducing a new form of literature, the Apocalyptic (revelative or visionary), which afterward attained to great dimensions as well as popu¬ larity.

Cloture. — These works, then, at the time of the close contact of Jew and Greek, in the dawn of the critical consciousness of Israel, succeeded, not without dissent widespread and sometimes vehement, in securing a permanent foothold among expressions of race-conscious¬ ness before the doors were shut in the street and no further admissions allowed. It was indeed high time for the cloture ; for ((of mak¬ ing many books there was no end,® and already a great throng were knocking and clamoring for admittance. Such were Baruch, Judith, Maccabees, Sirach, Tobit, as well as Jubilees, the Wisdom and the Psalms of Solomon, the As¬ sumption of Moses, with the Apocalypses of Ba¬ ruch, Enoch, Ezra, Noah and others. Had these been received, it would have been hard indeed to close the gates at all, and to have canonized all would have amounted at last to canonizing none : neither was there any clear principle of discrimination, and the com¬ mon consciousness rejected them in a lump. Henceforth no more books sacred and authori¬ tative could proceed from the Hebrew mind, all of whose literary energies were to be di¬ rected toward the exploitation, explication and elaboration of the exhaustless treasures al¬ ready securely gathered in the Law, the Pro¬ phets and the Writings. Hence, under the un-

* At least half the Psalms are distinctly national, expres¬ sions of the communal experience; of the rest, in a large number the much-afflicted "I" is in all likelihood a personi¬ fication of the cruelly buffeted People; in some, perhaps personal experience may lie at the base, but the individual features have been mostly effaced in the

course of successive compilations of compilations.

wearied hands of so many generations of Rabbis arose that stupendous mass of inter¬ pretation and commentary known as the Tal¬ mud (Learning) in all its endless divisions, extensions and ramifications, which is thus seen to be a direct and inevitable result of the sealing of the Canon, of the authorization and sanctification of a definite body of na¬ tional literature, so much and no more, even as this itself was the unavoidable reaction from the wide and intimate contact of Jew and Greek brought about by the conquests of Alexander and the domination of his succes¬ sors.

® Outsiders.® — Neither is it strange that in Alexandria, a firm seat of Hebrew learning and influence, more liberal views with respect to the <(Chitzunim® prevailed than in Palestine and that the so-called Alexandrian Canon, had it not yielded to Palestinian authority, would have sensibly enlarged the volume of Writ¬ ings. As it was, these ’^Outsiders® were sent forth upon very uncertain seas, to be buffeted hither and thither for nearly 2,000 years, and only within the last decade to come into their critical rights.

Style. — It is impossible to tell their story here even in bare outline ; only some salient points may be noted. From the first they seem to have enjoyed a popularity not wholly un¬ merited. Though never rising quite to the highest summit of the canonized Scriptures, in many parts they attain very respectable ele¬ vation, distinctly above a very large portion of the canonics themselves. They are written in general with considerable literary skill and have often a good share of human interest. Their content is various, as is also their lit¬ erary form. In Baruch the elder prophecy of Israel reappears like an Indian summer; in the J3ook of Wisdom we find the Faith of the Fathers tempered with Alexandrine philoso¬ phy; in Bar Sirach, proverbial philosophy tempered with religion ; in the Odes of Solo¬ mon the hopes and enthusiasms of the early Gnostics glow with poetic ardor; in IV Mac¬ cabees the Jew has learned the ways of the Stoic and the tongue of philosophic Athens ; in Enoch, IV Ezra* and others, the

apocalyptic imagination burns at white heat; in I Maaca-bees, Judith and Tobit the narrative faculty of the Jew is displayed to high advantage; in I Esdras pure literature comes ‘to its own in the story of the three Youths, while in Ahikar the walls of nationalism seem to fall away and disclose the wider horizon of universal interest, — all these and many moref in the 30 (<Books Outside,® the Chitzunim or Apocrypha. Some of them won the honor of occasional citation by the Rabbis, Ben Sirach oftener than all the others put together, and Baruch is said even to have been read in the synagogue on the Day of Atonement.

* The works named Ezra (Greek, Esdras) are a tangle. The I Esdras of the LXX and the English Apocrypha (entitled 3 Esdras in the Vulgate) for the most part parallels and varies with a fixed tendency certain portions of the canonic Ezra Nehemiah (the Hebrew Ezra, entitled 2 Esdras in the Greek), of which the two divisions, E. and N. in English, are the I and II Esdras of the Vulgate. IV Ezra (the II Esdras of the English Apocrypha), to which the first two chapters are a Christian prefix, is a beautiful Jewish apocalyptic phi¬ losophy, written about 90-96, vehement but tender, a match both for Romans and Revelation, a noble endeavor “ to comprehend the ways of the Highest ” (v. 34).

|As the “Testaments of the Twelve Patriarchs,”

In the New Testament. — But their chief recognition came not from Jews but from Christians. Since the proto-Christian move¬ ment found its start not in Judea but in the Dispersion, it is not strange to find Apocrypha frequently quoted in the New Testament, as Matt, xxvii, 9 ((Jeremiah the Prophet,) the passage is not in the canonic Jeremiah), Luke xi, 49 (((Wisdom of God®), Jude 9 (<(Assumption of Moses®), Jude 14ff (“Enoch®), 1 Cor. ii, 9 and Eph. v, 14 (“Apocalypse of Elijah®), Heb. xi, 37 (((Martyrdom of Isa¬ iah®). How many are the points of lighter contact may be seen from Dittmar’s 13 pages of references ((Vet. Test, in Nov.p 149-162).

Adoption. — When the triumphant Chris¬ tian Propaganda had organized itself into a church, and-, indeed, during the process of organization, the question of standards, of authoritative scriptures, arose, and the first most obvious answer, since the propaganda issued from Jewry in contact with Hellenism, was that the standard books of the Jews should be also the standard books of the Chris¬ tians ; and, accordingly, we find them quoted from the start as authoritative. Since the Greeks had no such standard (even in Ho¬ mer), there was,

of course, none to be taken over into their new faith by the Gentile con¬ verts. Naturally, diversities of view with re¬ spect to the canon that were current in Jewry passed over into the ranks of the Christians, with the difference already noted, that the new religionist tended toward a more liberal view than that of the stricter orthodox Tews, rep¬ resented so forcefully by Rabbi Aqiba. Ac¬ cordingly, not only were the Apocrypha from the first used freely by the Christians, but many were finally received into the Catholic canon.

Early Use. — The history of these Deutero-canonics (sometimes so called to indicate their secondary position) is both interesting and instructive. The free use of them in the New Testament has already been noted. Except, perhaps, Baruch, 1 Maccabees, and the addi¬ tions to Daniel, they seem all to enter into the religious consciousness of the Apostolic Fa¬ thers, though the allusions are, as a rule, loose and implicit, as is generally the case with the Fathers. Next we find nearly all attested by this or that apologist, as Baruch by Athenagoras and Irenseus, the latter also noting that the stories of Bel and the Dragon were ascribed to Daniel. Justin Martyr is the first to hint at the ability of the Church to form its own Canon, regardless of Jews, though the Church itself came only slowly to this conviction. Melito, bishop of Sardis, gave (170 A.n.) the first list of Jewish canonics, omitting Esther. Origen mentions Maccabees at the foot of his list (Eus. H. E. iii, 11), but writing to Julius Africanus he defends Judith and Tobias and the Danielic additions, agreeing with the Mar¬ tyr that the Church is empowered to decide, and introducing all the Deuteros in his Hexapla. The Codex Claromontanus, itself of the 6th century, contains, immediately before the Epistle to Hebrews (with which it ends), a table, “Versus Scribturarum Sacrarum,® re¬ ferred by such opposing critics as Harnack and Zahn to Alexandria and the time of Origen, in which are found the two (Wisdoms) (of

Solomon and Ben Sirach), 1, 2, 4 Maccabees, Judith and Tobias (along with the Epistle of Barnabas, the Shepherd of Hermas, the Acts of Paul and the Revelation of Peter). Bishop Hippolytus cites (Wisdom > as

Solomon's, uses Maccabees and Baruch as Scripture and treats of the incident of Susanna. In Africa, Cy¬ prian, as well as Tertullian, is said to employ all the Deutero-canonics but Judith and Tobit. This is, indeed, by no means certain. On looking up the scores of "citations® the reader will find that nearly all are more or less faint resemblances and prove nothing whatever; however, in writing "Against Valentinians,® Tertullian does declare (c. 2), "The Face of God is awaited of whoso seeketh Him in sim¬ plicity, as teacheth (Wisdom) itself, not of Valentinus, but of Solomon,® with manifest allusion to Wisdom i, 1. He also refers to the Maccabees as fighting on the Sabbath, but does not cite the books.

Later. — On entering the 4th century we find the authority of these Chitzunim on the wane. At Alexandria the far-famed watchdog of dogma, Athanasius, in his 39th Festal Epis¬ tle (367 a.d.) accepts only the Hebrew Old Testament, excluding Esther, but allowing it to be read to catechumens for edification and in¬ struction, along with the two (Wisdoms) and Ouditlp and (Tobias) (also the Shepherd and the Teaching) . Similarly Saint Cyril at Jeru¬ salem, — as always a centre of Jewish influence, — nor will he allow any book not read in the Church to be read privately. Eusebius classes them all as Antilegomena (Contradicted), as intermediate between the Accepted and the Re¬ jected. Still they maintained their popularity, as shown by their persistent presence in Greek manuscripts and in Oriental versions.

Jerome. — Passing over this we now come to Jerome who, in his "Helmeted Prologue® rejected all but the Hebrew Canon as apocry¬ phal, naming the (Wisdoms, } Tobias and Judith, which indeed the Church "may read for edification of the people, but not to confirm the authority of Church dogmas.®* The Solitary of Bethlehem was the most learned Christian and especially the most erudite Hebraist of his day; he was also the companion of Rabbis, and his weighty words bore down the scale against the Deuteros, especially wherever his Vulgate translation of the Old Testament into Latin found its way.

Rome. — But Rome had not yet spoken nor did speak till in the so-called Decretal of Gela-sius "Concerning books to be received and not to be received,® dating in substance (it is held) from the synod convoked by Pope Damasus in 382. In this, as well as in the Canon of Inno¬ cent I, "sent in 405 to a Gallican bishop in answer to an enquiry,® the list is the same as that adopted by the Tridentine Council in 1546, and all the Deuteros are included.

Augustine. — The leading spirit of the Afri¬ can Church, Augustine,

would distinguish de-

* The phrase is notable. The reader will remark that nowhere is it a matter of reason or argument, neither could it be, but solely of authority. At first the question was not, “Are these books canonical? “but rather, “ Shall we establish them as canonical, as a part of the rule of faith, of the stand¬ ard of the truth? ” In Jerome’s view, what served to confirm the Church doctrine should be canonic, what did not was uncanonic. Such seems to have been the guiding principle with the most; though few were so bold in statement as the Hermit.

grees of inspiration but used the Deuteros freely and the four synods that he guided (Hippo 393, Carthage 393, 397, 419) on traditional and litur¬ gical grounds included all the Deuteros in their sacred lists. Of these the Carthaginian passed over to the East and there by its mere authority determined the attitude of the Greek Church, which, however, in excess of generosity, added III Maccabees, a Jewish-Greek patriotic ex¬ travaganza and maintained the canon down to the beginning of the 18th century (Rev. Bibl., April 1901).

The End. — Meanwhile for over 1,000 years in the Latin Church the beam was held trem¬ bling between acceptance by Rome and rejection by Jerome, reminding us of the famous line of Lucan :

“ Victrix causa deis placuit, sed victa Catoni.”

The scholars sided with the man, the untu¬ tored mind and all underlings of authority were led by the other; the chief of the schoolmen,, St. Thomas Aquinas was hesitant and bewil¬ dered. But the final decision came at last. In 1442 the Council of Florence approved the “Decree for Jacobites® of Pope Eugenius IV, which declared the Deuteros received by the Church to be inspired, but did not yet say Ca¬ nonic* ; not until 1546 did “the holy oecumenical and general Council of Trent® by its decree of April 8 establishing the Canon, “the entire books [of the two Testaments] as sacred and canonical with all their parts as wonted to be read in the Catholic Church, and as found in the ancient Latin Vulgate edition,® stamp authority upon all the Deuteros, including Tobias, Judith, Wisdom, Ecclesiasticus, Baruch, I and II Maccabees, with “Let him be anathema® on “whoever does not receive.® Herewith all doubts were ex¬ cluded ; and it is again notable that the grounds of canonization did not involve authorship, or character of the books, but only tradition and liturgy; they had been accepted and used as canonic, and

therefore were established as ca¬ nonical, precisely as at Carthage nearly 1,200 years before. Thus had Trent filled up the gap left by Florence, but in so doing it had opened again the very gap that Florence had closed, for it did not affirm the inspiration ex¬ plicitly. This defect, which had begun to give annoyance, the Vatican Council of 1870 duly amended by stamping all the canonicals as in¬ spired in all their parts — thus closing the dis¬ cussion forever.

Basis. — The Church has thus based both canonicity and inspiration on authority, and in truth with wisdom, for they could be based on nothing else. The difficulty is not theological but psychological, as Hobbes long ago perceived. Though a man might honestly say "the spirit of Jehovah is upon me,* he could never com¬ municate his own consciousness to another, he could never make another know his own self-knowledge.

Rejection. — Authority, however, may be either acknowledged or rejected, and in the stress of controversy with Eck in Leipzig (June 1519), Martin Luther found it necessary* to reject II Maccabees as outside the Canon, in order to invalidate the argument for Purgatory

* But hardly sufficient, since the doctrine of the purgatorial fire was certainly a part, however inessential, of the Jewish faith, as indeed also of the Zendavestan.

drawn from the example of Judas (xii, 43-46). Moreover, in the first edition of his translation of the Bible, he gathered together the Deuteros with the other Apocrypha between the Testa¬ ments, as the unholy between two holies, a position of dishonor to which Protestants uni¬ versally consigned them, but which they have not always been able to maintain. Calvinism has shown them all its native sternness, espe¬ cially since the Westminster Confession (1647), which shore them of all authority and reduced them precisely to the low level of ((other human writings.® The Anglican Confession of 1562 had been milder, restating the patronizing posi¬ tion of <(Hierome.® However, they were still printed in Protestant Bibles till

in 1825, after 12 years of preliminary wrangling, the Edin¬ burgh branch of the British and Foreign Bible Society announced to London that the Scottish societies would withdraw their support unless the British and Foreign Bible Society should finally and entirely desist from distributing Apocrypha. After two more years of warm debate, London yielded, whereupon most of the continental branches withdrew, and the Scot¬ tish branch, on the refusal of the Society to retire all its officers that had championed the Apocrypha, itself withdrew and founded a new Bible Society in Edinburgh.

Cut off. — Since then the Deutero-canoni- cal Appendix (along with all Apocrypha) has been omitted from nearly all Protestant Bibles in English-speaking countries, though still re¬ taining its ambiguous position among other Protestants, and still furnishing lessons, though in diminishing numbers, for the Anglican lit¬ urgy, and even appearing in a separate volume of the Revised Version (1894), in a translation inferior to that of the canonicals.

True Worth. — Meantime, however, with the general deepening and broadening of re¬ search, due to the critical spirit of modern scholarship, interest in all the (<outsiders® has been revived and greatly intensified and has as¬ sumed a thoroughly rational character. It is now seen that these works are natural and intelligible expressions of the Hellenistic soul,, of the Jewish mind active under the profoundly altered conditions of its intimate contact with the spirit of Greece. It is also perceived that they sustain the most vital relation to the greatest event of all history, the proclamation of the Gospel, the propaganda of primitive Christianity, to which they form a prelude and accompaniment, and to the correct understand¬ ing of which they are well-nigh indispensable.

Kautzsch. — Accordingly, as attention has been centred more and more on the origins of Christianity, the Apocrypha have been studied more and more intently. An unequivocal sign of this lively interest may be seen in the splen¬ did editions that have recently appeared, not only of separate books, but also of the whole body of such literature discovered thus far. The great work of Kautzsch, collaborating with 16 German scholars, on (Die Apokryphen und Pseudepigraphen * des Alten Testaments) ap¬ peared in 1900 in two volumes of 542 and 540 large pages, treating 24 of these books, and the

* This title is most unfortunate, since it suggests a funda¬ mental

difference that does not really exist. The device of the pen-name has been employed in every age, and is not ab¬ sent from the Hebrew Canon; yet we do not dub Psalms and Proverbs and the Song and others Pseudepigrapha.

reader must remember that the whole Hebrew Canon has also been similarly treated by Kautzsch (assisted by ten German scholars) in two volumes of 960 and 637 slightly larger pages, on (Die Heilige Schrift des Alten Tes¬ taments' (1909-10) ; whence it appears that though they are no longer entitled ((Holy Writ,® they at length receive critical attention of the first order — which is indeed far better.

Charles.— The scholarly work of Kautzsch has been quickly followed and surpassed by a still more ambitious work, bearing the like title, cThe Apocrypha and Pseudepigrapha of the Old Testament, > under the editorship of the illustrious scholar, ((R. H. Charles, … in conjunction with many others® (Oxford 1913), professing to include ((all the extant non-ca- nonical Jewish books written between 200 b.c. and 100 a.d., with possibly one or two excep¬ tions,® though the reader will not find Josephus nor Philo; what is meant, is the non-canonical literature of unknown authorship, but even then the profession remains too wide for the <(books® and too narrow for the dates. Plainly, then, these 30 ˆoutsiders® have at length been established immovably in their rights, not in¬ deed as inspired or in any way superhuman, but as shedding much welcome light on a very ob¬ scure but extremely important transition period in history.

New Base. — It remains to add that the position of Protestants with respect to the Canon, after they had abandoned the solid rock of authority and rejected the witness of tra¬ dition, seemed somewhat insecure and difficult to defend. It became necessary to find some still firmer foundation than either Jerusalem or Rome could offer, and this was sought, with the most extraordinary diligence and with the utmost prodigality of learning and ingenuity, in the Scriptures themselves which were to be their own witness, self-luminous, self-evident, self-proving. ((Canonical authority of Scrip¬ ture does not depend on the Church or on its councils,® but <(lies in the Scripture itself ; it is inherent in the books so far as they contain a revelation or declaration of the divine will. Hence … the authority of Scripture is

from God alone.® These words of the eminent scholar and critic, Dr. Samuel Davidson, are found in the Encyclopaedia Britannica) (9th edi¬ tion 1875), but neither they nor any equivalent in the 11th

edition (1910), — where the whole matter is left undefined and floating in the air, — such is the change a generation has wrought. The deliverance of Davidson is clear and direct, except for the elastic clause ((so far … divine will,® which saps it of force and value : for this clause simply means, <(so far as they are inspired of God,® but leaves the question ((How far are they inspired?® entirely un¬ touched. The proposition that the Scriptures are authoritative so far as they are divinely in¬ spired, it is indeed impious to deny, but it is also vacuous to affirm.

Canon of the New Testament.

In dealing with the Canon of the New Testament we find the area of inquiry much narrower and more sharply bounded and the sources of evidence more abundant as well as closer at hand; nevertheless, the debate has not been less but even more stubborn and acrimonious.

Earliest Stage.— Proto-Christian preaching, as it appears in the earliest Christian litera¬ ture, was essentially missionary (a Missions-prcdigt, says Norden, 1913), the propaganda of a new universalistic, in contrast to the Jewish particularistic, Monotheism (<(the mon¬ otheistic Jesus-cult,® Deissmann, 1912), the <(Etemal Gospel,® (<Fcar God and give Him glory® (Rev. xiv, 7). Though directed to the whole Roman pagan world, ((a light to lighten the Gentiles® (Luke ii, 32, Matt, iv, 16, Acts xiii, 47; xxvi, 23), its prime ob¬ ject the overthrow of idolatry, it proceeded from the Jewish Dispersion, its inspiration was the thousand-year-long struggle that Is¬ rael had waged for the One God against the surrounding hosts of Polytheism, its apostles (missionaries) were in general liberal-minded Jews or Jewish proselytes full of zeal for their pearl of great price, their new-found faith in God, and their common armory and arsenal of arguments was the Law, the Prophets, the Writings, the three-fold Canon of Hebrew Scripture, as it was then taking final and per¬ manent shape in the teaching of Rabbis and in the service of the Synagogue. An evangelist like Paul or Barnabas might indeed deliver a philosophic discourse against idolatry, after the type of that on Mars'

Hill (Acts xvii, 22-30), without allusion to Scripture, but on grappling in closer combat he would nearly always have recourse for proofs to the liter¬ ature of Monotheism, the well of religion un¬ defiled, the authoritative Books of the People of the Living God. So Tatian tells us (Ad¬ dress to the Greeks, } c. 29) that, having found one demon (heathen god) here and another there instigating to evil, he chanced to light on certain <(barbaric writings® (of the Jews), too old to be matched with opinions of Greeks and too divine to be matched with their er¬ rors, which declared the government of the universe to be centred in One Being. It is obvious, indeed, that the new religion would naturally and almost unavoidably adopt these sacred volumes as their own standards in their high debate, and, accordingly, we find early Christian literature richly laden with quota- • tions from Scriptures (graphai) ; though by no means always either accurate or relevant, such citations and reminiscences show how completely Christian consciousness was domi¬ nated by the Hebrew Bible.

But comparatively few could extort its meaning from the Hebrew text, and, accord¬ ingly, recourse was had to the Septuagint or some other translation. Of the 350 citations in the New Testament from the Old, about 300 lean toward the Septuagint, away from the Hebrew. Hence it was natural, if not inevi¬ table, for the proto-Christian to look more kindly upon <(outsiders® than did the Pales¬ tinian Jew, since he found them not only en¬ listed but actually inscribed among the trans¬ lated Scriptures <(that defiled the hands.® As already noted, we find works like Enoch and the Assumption of Moses, though lying far on the borders of the Apocrypha, still cited in Jude (xiv, 9), and several of these ˆextraneous works® established themselves fixedly in the Tridentine Canon, — about which sufficient has been said.

Christian Scriptures. — We may conclude, then, that the natural Canon of the early

Christian was that of the Jews, not in its nar¬ row Palestinian-Hebrew, but in a wider Alcx-andrian-Greek form, which not only made room already for numerous Outsiders,® but also opened the door for admission of other works to be born hereafter of the world-wide religious fermentation and deemed worthy of place among the worthies of old. Yet it was centuries before any product of the new Faith could make good its claim to such recognition. Everywhere in our present New Testament the term Scripture(s) refers to the Hebrew Canon, as well as in the Apostolic Fathers, who attest and represent usage in the first half of the 2d century. — with one apparent

exception : In 2 Peter iii, 16, we read : <(even as our beloved brother Paul … wrote unto you; as also in all his epistles … as also the other scriptures …® Here it seems plain that Epistles of Paul are spoken of as (<Scriptures,® such being the force of (Cother® (((remaining,® loipas). However, the exception is only apparent, for this 2 Peter is recognized with practical unanimity (in spite of Zahn) as a pseudepigraph dating from (say) 170, though there is no sure proof of its existence before the beginning of the 3d century (Harnack, 'Chronologies 469), and moreover as proceeding from some source in Alexandria, where, from the looseness of prevalent con¬ ceptions concerning the Canon, the term ((Scriptures® would find easier and earlier ex¬ tension to Pauline Epistles than it would else¬ where. The famous verse does not, then, rep¬ resent apostolic or even sub-apostolic, but, at the earliest, patristic apologetic usage, after the middle of the 2d century. Nor is the weight of its witness increased by the fact that the author impersonates ((Symeon Peter, servant and apostle of Jesus Christ,® who had died a century before.

A nearly contemporaneous, perhaps slight¬ ly earlier, use of ((Scripture® is found in the Homily, formerly called the second Epistle of Clement to Corinthians (ii, 4) : ((And another Scripture says that (I came not to call just men, but sinners,*® — exactly as in Mark ii, 17, Matt, ix, 13. However, we cannot con¬ clude with confidence that there is any refer¬ ence to these Gospels ; for the sentence quoted is epigrammatic in form and was probably a slogan of the Gentile mission (just men = Jews, sinners = Gentiles), and as such it may have appeared in various writings before our era. Nevertheless, it is in any case cited as Scripture.

Irenaeus. — On entering now the last quar¬ ter of the 2d century, we are met near the gate by the monumental work of Irenaeus. This chosen champion of Catholic faith seems to have been sent about the year of the persecu¬ tion (177), as presbyter of Lyons, on a mission to Rome, whence returning he succeeded to the bishopric made vacant meanwhile by the martyrdom of Potheinos. It was the crisis of church-fortunes in the battle with the ((heretics,® especially the followers of Valentinus and Marcion, the former the first great bibli¬ cal theologian, the latter the only man that had understood Paul, though he misunderstood him (Harnack), and by the testimony of ve¬ hement opponents, . both of them men of ex¬ ceeding ability, religious devotion and spiritual insight, who had carried their campaign into

Rome itself and there established themselves (138—146) in a determined effort to “reform® the Church. Their ‘‘heresies® must have in¬ terested Irenaeus intensely and on returning to Lyons he began writing, apparently at the re¬ quest of some “very dear friend,® who may have been the highest official, a series of five Books “Against Heresies.® This “Detection and Refutation of the Gnosis falsely so-called® is ordinarily dated between 181 and 189: because in Book III, c. 23, is quoted the Ephesian Theodotion’s translation of Isaiah, which appeared (Eusebius says) in the second year of Commodus (181); and in Book III, c. 3, we read that “Eleutherius (d. 189) now holds the bishopric (of Rome) in the twelfth place from the Apostles.® While these state¬ ments may fix the date for so much of this book, it is clear that they fix less for the earlier and later ones. For the composition evidently extended over a considerable period, the separate books being sent from time to time to the “friend very dear.® Especially is the interval noticeable between the second and the third; indeed, the work seems logically well-nigh completed in Book II with the minute description and confutation of heretical schools, while the other three concern them¬ selves, apparently by afterthought, with set¬ ting forth and vindicating the whole body of Church-doctrine. Accordingly, this elaborate apology has especial interest as accompanying, characterizing and exhibiting in its gradual growth the idea of a New Testament Canon. In the earlier books we find scarcely any al¬ lusion to the sources of the Scripture citations, while in the later the references by name to nearly all the New Testament books become too numerous to catalogue. Approaching the close of the century we behold in birth the consciousness of a New Testament Canon.

His Usage. — What, then, is the Bishop’s use of the term Scripture? It is not easy to give a thoroughly satisfactory answer. About 100 times the word refers clearly to Hebrew Scriptures; about 17 times it might include the Christian as well ; about 16 times it would seem to be aimed more directly at the’ latter. A diffi¬ culty in determining the reference lies in the fact that Irenaeus conceives of ancient Scrip¬ ture as already containing in minutest detail the Gospel story and the history of the primitive Church (as did Justin and other leading lights), so that wThen he speaks of “Scriptures domini-can,® which we should use exclusively of the New Testament, his reference may

very well be to the Old. Again, he seems rarely if ever to employ the phrase “the Scripture says® of any but Jewish Scriptures. He also distinguishes often between the Old Canon and the New that is just in birth, by such locutions as “neither any Scripture has told nor the Apostle has said nor the Lord has taught® (II, 43), and “all Scriptures cry aloud and the Lord teaches® (II, 3, 7), and “all Scriptures cry aloud and Paul moreover (et Paulus autem) bears witness® (II, 47) — all these examples being in the sec¬ ond book, after wThich he seems to have ac¬ quired new knowledge or felt a change of heart. Yet how largely the new literature bulked in his mind appears in the fact that of 1,467 citations 532 are Old Testament and 935 New Testament. This latter term itself is

frequent enough in the later books of Irenaeus, being used over a score of times, but never in the modern sense of a body of writings, always in the proper use of covenant, dispensation; it is “the Old order changeth, yielding place to the New® : the Old is the lawgiving that was aforetime, but the “New is conversation (man¬ ner of life), according to the Gospel®; “the New Testament (covenant) having been known and preached by the prophets.® For him the Christian Scriptures are not yet the New Tes¬ tament.

Four Gospels.— What, then, are they? He gives no catalogue but proves (III, 11) that there are and must be in the nature of the case neither more nor less than four Gospels, since there are “four climes of the world® and “four catholic winds® and four faces of the Cherubim (lion, calf, man, eagle, Rev. iv, 7), “images of the activity of the Son of God.® He is perhaps not far wrong, in voicing a vague but dominant sense of the eternal fitness of things and of the omnipresence of the Divine. In accord with this reverence for the Quaternion “a fount •with roots of eternal being,® the Johannine, though originally intended as unique, the sole and sufficient Gospel (Wendland, (Literaturfor-menP p. 236,) was ranged in the ranks of the Four. These he ascribes to Matthew “who edited a writing of Gospel among Hebrews in their own tongue® ; to “Mark the disciple and interpreter of Peter® ; to “Luke the follower of Paul,® “who set down in a book the Gospel preached by him® ; and “John the disciple of the Lord, who also leaned on His breast, himself also edited the Gospel, while tarrying in Ephe¬ sus of Asia® (III, 1).

The Rest. — The other Scriptures, though not yet classified, are cited often by name, Acts, Romans, 1 and 2 Corinthians, Ephesians, Philippians, Galatians, Colossians, 1 and 2 Thessalonians, Peter, John,

Apocalypse, — the others are not named. Verses 7, 8 of 2 John are cited as from 1 John iii, 17, 7, also v. 11 as from John. Two expressions are used that are also found in Jude ("an example of just judgment of God,® 7, and "faith delivered unto us,® 3), but neither as quoted, nor is there reason to sup¬ pose that either was taken from Jude. Like¬ wise the aphorism in 2 Peter iii, 8 is twice used (v. 23, 2 ; 28, 3) in the form "the day of the Lord is as a thousand years,® but with no indication of derivation from 2 Peter. Three phrases are somewhat like phrases in James, but only one need be mentioned, "the friend of God,® a characterization of a devout man, frequent in the classics and appearing in 2 Chron. xx, 7 ("Abraham, thy friend®) . Harvey thinks he finds references to 10 passages in Hebrews, all of which is mere imagination; there seems to be no use made of this Epistle, the correspondences are merely in stock phrases. The whole verse Titus iii, 3—10, about avoiding heretics is quoted with the formula, "As Paul also said® (iii, 2, 4; also in i, 9, 3, in what seems to be an interpola¬ tion). Other supposed references are illusory; of about eight phrases, only one, "novelties of words of false knowledge,® is referred to Paul (ii, 18, 51, 1 Tim. vi, 20) in a sentence much discussed and perhaps inserted. About half a dozen phrasal resemblances to 2 Timothy may be hunted down in Irenaeus, and of 4, lOf, it is expressly said (iii, 1), "Paul has manifested

in his Epistles.® There is no allusion to Philemon.

Apocrypha. — It seems, then, that seven Epistles, the Pastorals, Philemon, Hebrews, James, Jude, find no express recognition by Irenaeus, though passages in the Timothies are ascribed to Paul. But the Bishop knows and uses still other ˆScriptures.-® He cites (III, xxii, 1, xxxi, 1) from Isaiah: <(And the Holy Lord remembered his dead of Israel that had slept in the land of sepulture., and descended to preach them salvation that is from Him, to save them.® Again (IV, xxxvi, 1) he cites it in almost the same words from Jeremiah, as does also Justin (Dial. 72) characteristically accusing the Jews of suppressing it, though it is unknown to the Hebrew, Septuagint, Vulgate, Targums,

Hexapla, and all other versions, — clearly a Christian addition useful in argument and the basis of the famous passage <(the gospel was preached even to the dead® (1 Peter iv, 6). Again, (IV, ix) we find the apocryphal Daniel xiv, 3f, 24, quoted and ascribed to the prophet. Once more (IV, xxvii, 2) we find Enoch de¬ scribed as <(God's legate to the angels,® in* apparent reference to the long story in the apocryphal Enoch, xii-xvi. Still further, at IV, xxix, 3, (<It says, Sacrifice ...® The passage cited here (also by Clemens Al., paed. Ill, xii) as Scripture is not in our present Scriptures. Lastly, we find (IV, xxxiv, 2) the first com¬ mandment of the Shepherd of Hennas cited with praise as ((the Scripture,® and the First Epistle of Clement described and approved as <(Scripture itself® or ((very Scripture® (ipsa Scriptura). At II, Ivi, 1 <(the Lord said®: <(If, etc.,® which words are also cited in 2 Clement viii, 5 as (<in the Gospel,® and Grabe thinks the reference is to <(the Gospel according to Egyp¬ tians,® whereof fragments are still afloat. Finally, the letter of Polycarp is declared (III, 3, 4) <(written most sufficient® to teach <(both the character of his faith and the preach¬ ing of the truth,® and at V, xxxv, 1 the long citation from <(Jeremiah® is found only in apocryphal Baruch (iv, 36-v, 9).

Canon. — Ten such examples are enough to show that the scriptural horizon of the ancient Bishop was notably wider than the modern, as well as only vaguely defined at many points. Manifestly the Canon is coming to birth, but for him it is not yet born. It remains only to recall that the allusions (real or apparent) to the later New Testament writings are nearly all to be found in the later books (III-V) of Irenaeus, written it appears after the demand of his friend had been fulfilled, as an overplus beyond what was expected ((<praeter quam opinabaris®) . Also, in the barbarous though generally faithful Latin translation of the Greek, it is almost impossible that some emen¬ dations should not be found, — the marginal comments of readers or copyists, which have crept into the text, as at V, xiii, 3, where the words <(in second to Corinthians® are not in the Greek. These definite references to the New Testament Scriptures represent in large meas¬ ure a somewhat later consciousness, even as Harvey notes. The rapid growth of this recog¬ nition of an authoritative literature, and of its precise determination, is the all-important fact that shines through the pages of Irenaeus.

In Tertullian the development of nearly 20

years reveals itself distinctly. His earliest po¬ lemics, (Ad Nationes)

and (Apologeticus,* are assigned to the year 197, and his literary span reaches to 220. Far more brilliant and prolific than Irenaeus, indeed a forensic genius, but far less catholic and representative, — he was never canonized, nay, he fell ultimately into Montan-ism, a heresy much less rational and more extravagant than any he had so vehemently opposed, — his witness withal to the growth of the Canon-consciousness and the Canon itself is an invaluable supplement to that of Irenaeus.

Tertullian's Terms. — The fierce African pours forth such a deep and rapid torrent of speech that one is often bewildered in its up¬ roar. Some things, however, are heard dis¬ tinctly, and it soon becomes clear that he has gone much beyond the Gallican Bishop. Of terms to denote the Scriptures, Old and New, together and apart, as a whole or in division or even opposition, he has about 30. He uses the word (<Scripture® for the Christian writings (De Res. Car. xxvii, 1 and often elsewhere less certainty), but his favorite word is Instrumentum, for which he tells us (in Marc. IV, 1) Testamentnm is more in use; he distinguishes two such Instrumenta (Testamenta), Old and New; he speaks of the (<old Scripture® and the <(New Testament® (adv. Prax. 15), of the (<old instrumentum® and ((our rather new apparatus®* (Apol. 47) ; also of the <(old instrumenta of legal Scriptures® and <(all our apparatus® (Monog. 7). With him instrumentum sig¬ nifies (means of) documentary proof, a sense adopted from the Roman forum or books of law and still approved at the bar; over against the ˆinstrument of Jewish literature® (Cult. I, 3), he sets the (<Christian letters® (Prescr. Her. 37) and the ˆinstrument of preaching® (Mod. 1). He has then clearly in mind a body of Christian evidential literature, and it seems remarkable that he still hesitates and rarely applies to it the term <(Scripture.®

His List. — This New Apparatus, Instru¬ ment, or Testament consists in his mind of two grand divisions: the Evangelic (Marc. IV, 2) and the Apostolic (Resurr. 39), called also "evangelic letters,® ((evangelic® (Gospels), and <(apostolic letters,® or simply (<apostles.® Of these two, the first consists of the Four Gos¬ pels, which, possibly for controversial reasons, he gives in the order John, Matthew, Luke, Mark (Comp. Codex Bezae : Matthew, John, Luke, Mark), the first two being apostles, the ■others only apostolic. The second comprises the "Instrument of Acts® (Marc. V, 2) — used relatively little, called also "Acts of Apostles,® ((Scriptures of Apostolics,® ((commentarj' of Luke,® — and the "Apostolic Instrument® proper, or <(his own Instrument,® i.e., the "Apostle's,® i.e., Paul's, called also simply ((Paul®; as well as, thirdly, the "Instrument of John® (Resurr. 38), embracing the Apocalypse and the First Epistle of John. The main

division, “Instrument of Paul,® consists primarily of the Ten Epistles, first collected by Marcion (near 140) under the name of “Apostle or Apostolicon® and in this order: Galatians, 1 and 2 Corin¬ thians, Romans, 1 and 2 Thessalonians, Laodiceans (Ephesians), Colossians, Philemon, Philip-pians; but the “auostolic battle-front® (acies),

*This word “paratura” is a pet of Tertullian’s, who uses it in senses diverse and sometimes rather strained.

as Tertullian calls it (Mod. 17), was strength¬ ened by the three Pastorals of Timothy and Titus.

The Dubious. — So much, then, seems to have been not only definitely included but also placed and named in the body of Christian writings recognized as authoritative by Ter¬ tullian and doubtless in the main by the African Church. But there was also a considerable group of writings not yet securely folded within the sacred pale. Of these the Epistle to Hebrews was chief. In his pamphlet on “Modesty,® having gone through the whole “discipline of the Apostles properly® (so-called), at the beginning of c. 20 he “superduces® another ((redundant testimony of a companion of Apostles® : “For there exists also a title ‘To Hebrews, } of Barnabas, a man well authenticated by God,® … <(and surely

the Epistle of Barnabas is more received among churches than that apocryphal Shepherd of adulterers®; he then quotes vi, 1, 4—8, almost as we now read them. His other allusions to this Epistle, though numerous, are illusive. Again ˆPrayer,* 20), with apparent reference to 1 Peter iii, 1-6, he mentions the “prescription of Peter® as checking with the same mouth, because with the same spirit, as Paul, the glory of garments, etc., yet without any assertion of recognized authority. But this chapter is apparently interpolated, being out of connection with the context and absent from some MSS., one of which places here the words, ((End of Tertullian’s book on Prayer.® Other allusions are quite unconvincing; per¬ haps Tertullian knew 1 Peter, but only as an appendix to his “Scriptures.® Similarly

he concludes his defense of the book of Enoch as “Scripture® with “the fact that Enoch pos¬ sesses testimony in Jude, an apostle® (Fern. Dress, 3), but he does not stress this fact, merely “adding® it as of seemingly little wreight, nor does he certainly use the Epistle, not even v. 25. The second Epistle of John (or the Presbyter) Tertullian may have known but does in no way recognize. The second Epistle of Peter, the third of John, and that of James doubtless existed in Tertullian’s time but lay beyond the utmost border of authority’ or canonicity, being apparently unknown both to him and to the African Church. We have also seen that he rejected the Shepherd, for dogmatic reasons, as overlenietL in matters of sexual relation, but accepted Enoch. The dates of Tertullian’s numerous writings are too uncertain to permit discussion of the develop¬ ment and determination in his own mind of the Canon-idea, — only one positive and absolute datum is to be found: he was writing (Marcion I, 15) in “the 15th year now of the Emperor Severus® (207-08). However, the growth from the time of Irenseus is obvious and doubtless went on continuously during the 25 years of Tertullian’s literary career (197-222).

First Catalogue. — The third important wit¬ ness to the Canon at the junction of the centuries is the so-called “Muratorian Frag¬ ment,® discovered (1740) by the “father of Italian history,® Ludovico Antonio Muratori (1672-1750), in an 8th century compound of theologic tracts and five early creeds. It con¬ tains 85 lines of barbarous Latin, possibly, a translation from Greek, cataloguing the Chris—

tian Scriptures. The date of the original seems to lie somewhere between 195 and 205 (pos¬ sibly 210). The first line is “at which (or some) he was nevertheless present and so put down® (quibus tamen interfuit et ita posuit). The reference is seemingly to Mark, the first part of the list being lost, which doubtless noted both Matthew and Mark, as the second line reads, “third book of Gospel according to Luke,® and the origin of the various books is described: four Gospels, Acts (assigned to Luke), thirteen Epistles of Paul (to seven Churches, — for there were just seven in Revelation, — two repeated and four personal), two of John, one of Jude, two Apocalypses (John’s and Peter’s), and “Wisdom written by friends of Solomon in his honor® (like a jubilee-volume presented to a university pro¬ fessor.). “Epistles to Laodiceans and to Alex¬ andrians, feigned in the name of Paul, for

the heresy of Marcion® are rejected, “for gall fits not to be mixed with honey® (“fel cum melle,® as we might say, sand with candy) ; the Epistles “To Hebrews,® of Peter, and of James are not mentioned, and “the Shepherd …

it is indeed meet to read but not publicly in the church to the people, neither amid the’ prophets, complete in number, nor amid the apostles, to the ages’ end.® The Psalm-book of Marcion, along with Basilides and other Gnostics, is wholly rejected. Here then again is a region demarked in the main like that of Irenaeus, and of Tertullian, but with some very notable divergencies. The list does not lay claim to authority but doubtless represents the general Roman opinion and usage of its time. Into further details we have no space to enter; but a rapid glance will show how the border warfare was maintained for yet hundreds of years.

Third Century. — The learned and liberal Clemens Alexandrinus conceived of the New Testament Scriptures (all save James, 2 Peter, 3 John) more generously than either the Bishop or the African. He recognized He¬ brews, 2 John, and Jude, and in line with them the Apocalypse of Peter, the Epistles of Barna¬ bas and Clement of Rome, both cited as

apostles, and the Shepherd, quoted as divine. Clearly a case of the personal equation.

Origen is very cautious in his classification, which is far from original, into authentic,

intermediate, and unauthentic; the Apocalypse has won its way into the first class, Hebrews not so certainly; James, Jude, .2 Peter, 2 and 3 John are still in the second class, with the

Shepherd on the edge; Barnabas, the Preach¬ ing of Peter, the Acts of Paul, and the Gospel according to Hebrews and Egyptians have settled down into the third division. His standard professed but not maintained, is

apostolic origin according to the tradition of the Church, — an honest but futile attempt to escape to Reason, since the final appeal is still to the authority of tradition.

Fourth Century. — Eusebius seems to have completed his Church History in the year 324, and the first nine books perhaps before 314, but we know not when he began. There seems indeed to have occurred a perceptible change between the 3d and the 25th chapters

of Book III : the Shepherd, treated very tenderly in the third, is summarily rejected in the 25th; also

the Acts and Gospel and Preaching and Apocalypse of Peter <(we know have not been universally accepted® (in 3), but in 25 his Apocalypse is (<among the spurious,® while still worse, his Gospel and Acts are <(all of them to be cast aside as absurd and impious,® <(the fictions of heretics,® unworthy of place <(even among the spurious.® This is progress, surely. In his later discussion the historian uses a puzzling cross-division : First, the four Gospels ; then Acts ; ((after this must be reckoned the Epistles of Paul®; next 1 John and ˆlikewise the Epistle of Peter must be maintained® ; <(after them is to be placed the Apocalypse, if it really seem proper® ; these are among the Confessed (Homologoumena) . Among the Contradicted (Antileg omend) , but ˆnevertheless recognized by many® are <(the so-called epistle of James, and that of Jude,® also 2 Peter, and the so-called 1 and 3 John. Among the Spurious (Nothoi) are the Acts of Paul, the Shepherd, Apocalypse of Peter, Epistle of Barnabas, the so-called Teachings of the Apostles, and besides ((the Apocalypse of John, if it seems proper,® and ((the Gospel ac¬ cording to the Hebrews,® ((and all these may be reckoned of the Contradicted.® Lastly, ((those cited by heretics under the name of Apostles,® <(Gospels,® and ((Acts® which are (<fictions of heretics … absurd and im¬

pious.®

It seems worth while to note the standard applied by Eusebius : it is <(church tradition® alone that decides what are ((true and genuine and commonly received.® Some were uni¬ versally received, some by most but not by all, some by only a minority, some ((by no one of the succession of Church writers deemed worthy of mention.® Clearly there was still much ground for debate.

As general result, we find the notion of a body of authoritative Christian documents rapidly forming in the usage of Irenaeus, dis¬

tinctly formed in that of Tertullian, and actually formulated in the Muratorian Frag¬ ment. But this notion of the Canon is not yet canonical. There is agreement as to central and even medial portions but the widest dis¬ agreement as to the peripheral, a difference of judgment that it will require long centuries to adj ust.

Still Earlier. — If now we ask, Had Ire¬ naeus no forerunners in his idea of a Canon? the answer must be: Assuredly he had; the law of continuity was not broken. Beyond doubt the composition of the ((proof-documents® was gradual and their collection into smaller and then into larger groups was also by degrees. Backward from Irenaeus, through two or even three generations, lies indeed a dark abysm of time, yet not wholly unlit of stars. To be sure, we find no certain conception of authoritative Christian writing. Scripture is the Old Testa¬ ment only, in wider or narrower sense. True, the famous church letter of <(the servants of Christ residing at Vienne and Lyons® to their Asiatic-Phrygian brethren, respecting the persecution in the year 177, does in fact say ®that the Scripture might be fulfilled. He that is lawless, let him be lawless still, and he that is righteous, let him be righteous still® (Eus.

| Hist. ECclP V, ii, 58). But in spite of the just praise accorded this letter we really know

nothing of its authorship, authenticity, or date; moreover, the citation sits loose and even jars in its context, without sufficient attachment either side; nothing suffers from its removal; it makes the impression of a pious observation of a copyist, which has crept from the margin into the text. Besides, it is quoted as a stock phrase, none knows whence, for in Rev. xxii, 11, it is also most probably not original but a quotation.

In the uncertain letters of ((Theophilus to Autolycus® (173-90) there are two mentions of the <(Gospel,® in Book III, 13 and 14; the first is manifestly and the second very probably interpolated, as is also the phrase, (<and in the Gospels,® c. 12. But in any case, the text need not modify the foregoing.

Nearest to Irenaeus stands Tatian (160-80), who seems to have known of four Gospel forms and sought to blend them into one in his <Diatessaron) (173?), in which scarcely any traces of the humanity of Jesus appear to have been found. His (Address to the Greeks) (165?) contains sentences or phrases that are also found in the Gospels and

Epistles, apparently the watchwords of certain religious or dogmatic tendencies, but none given as citations.

The Martyr. — Tatian's master, Justin Mar¬ tyr, had considerable acquaintance with litera¬ ture now found in the New Testament, but all of it seems to be floating as an unorganized mass (or rather as a meteoric swarm) in h s mind. He never cites any such passage by the author's name, but ascribes them in the main to <(the Lord® or to Jesus or Christ or th ; Saviour, most frequently omitting the subject (<He.® In Apology I, 66, and especially toward the close of the Dialog (cc. 100-07), he speaks of the <(Memoirs of (or composed by) His Apostles.® The phrase <(which are called Gospels,® in Apology I, 66, has long been felt to be interpolated, and so indeed is the whole chapter, which breaks visibly the connection between cc. 65 and 67. Again, that these Memoirs or Commentaries (Apomnemoneu - mat a) should be mentioned 12 times in cc. 100-07, only in treating of Psalm 22, and not at all elsewhere in the Dialog, is surely extremely suspicious, suggesting easy interpo¬ lation, or a later date for these late chapters.* That Justin Martyr did not really refer to our Four Gospels seems clear for many reasons. Had he known of them under the names of Matthew, Mark, Luke, John, it seems prac¬ tically certain that in the course of 120 al¬ lusions (50 in App., 70 in Di.), he would have named some one, for he is a stickler for names and exactness, as he conceives it. In citing the Old Testament he names the author 197 times, omitting the name only 117 times, for various, mainly literary, reasons. He names John the Baptist repeatedly. He ascribes to (<a certain man among us, by name John, one of the Apostles of the Christ, the Revelation that they who believed in our Christ should spend a thousand years in Jerusalem® (Di. 81) ; had he ascribed the Gospels and Epistles to authors, as Irenaeus (Books III-V) and Tertul-

* Critics recognize Justin's text as strongly interpolated, and it is antecedently likely that it would be, for his name was like the broad shield of Aias, from behind which Teukros winged his darts. Of 15 works ascribed to Justin, only three are now accounted genuine.

BIBLE

2.

<Y3

m i n -r<3 nmoon£k thc ©y p >sCTdyM w h Me»oy

K Al AN A.8 A6 ‘f’AC AUJPuj

f> 6 y c i n 6 nr uNˆKeKf Aj ctxi OAiebcrt wrAf

MgVaC C<t> OAfˆKAlEA 0OYCˆI€KTOMNHMti ON €*! AON N G AN icKon K A© H M6N ON €NTT>|C fc.6IlOICn€|l|€|AHM« NON C TO KHN KG-yKtin

K’A.ieyeoAMB hbhcan 6 ag Ae’rei om h

4 k e amk e icee’i ki“t:ht*i

TeTON NA’ZˆPHNdN’T*.

€ CTB.y f(l)M6 NON

% h oy Keen n ojac i’ a« o to n o c &‘n o ye© h k *iyTON KAAA’yriireTˆ e i riATeToicM aohtn* iff nrdy k X i ~rct> n 6tti npoA rsiyMAceic thn r> A i aX »a n e K6iˆy

TONOy 6C ©6 KA.©0>9®2

n e N*f min kxie igao-t C a » 6 <£> y r o Njˆ n onroy MNHˆeioyeiyeNrAf

AyTACT»OM OCKAlfK

c itaci c sca i oyxe Nni oy

AˆHSinoNe <|> o & oy N

“Tor A ft **

t

VK&.‘T-*

o* «a»

\ltAJ« ko

CODEX VATICANUS (B): MARK XVI.3-8

The Close of the Gospel. From Burgon’s photograph of the page

BIBLE

tYa*: OM’IOICI

pjtyj

1 1 m i (vauHsurint;

i* « i < >v qo n ot jjjlUI

i f noV»:i i »Y” il

Miumuuxofo

‘

» ■ •

||§|f ipl

:

111 ^rp*|ipA| l>tl

I* 1 .

- *:>■;

5lkMK:

r | *

*

S II

V: 1 I !

fiu > v’ a

oVi‘ «n: M M1^ >» ’«»’/

‘uvli*>i»Ti*»f‘‘Vw*nj« iW’4 h’iohian K

,1* » rpNti ’}&>* i ‘fj

o .xh>i’. « Vt <Xi v

> 1* >*1 ’ ‘

13®* .

A. Hebrews XIII, 16-18. B. II Timothy I, 10-12

6th Century

Washington MS. of the Fragmentary Epistles of Paul

BIBLE

w vrˆ%-

‘,*$» IrflOfi Cv.HN* -

P*’-

!/*«* ,

i a it *j j-h® t* ;• 1 »- >•

-

HT*1<

*T;

\v ■; ■-*

‘Jt*rˆP

ˆNt«U’ v’AaA/* t ••’*

4*wi> rtL •**!•** r

£*9

k» . * v <•”

>?

tsm

TO ■■«■ ■; P

J% t, ‘4 »

p * «K

p/* % % . •

v’ - • ^ X: w*\,

Y’W ft:.- o*HeW*^&U£«*

, .•<->? pHfi tMf i ** vtrP’»‘v %?trk

Mm WB IB

‘f

»;,£ 4

‘ ttl**^** ‘

‘ • r$

- ■ < ;r ti

;~ r- «*>• ..„.

r - * rj}

J

i <••/* ,r >■ •

‘U, 7

ml

4

;|w

>.h ri

%»%■

>?#*

■•* •

■/!.

■X :K'l??iry .. , ! . / v . • S • “•-

.. M P-” . ‘ ‘ v . ; f

rHUˆ

iT2 .

T ,,

;r, y. ;?X P y* i

‘§• ~i* ‘ ‘ v>? <cihdˆ

‘ * : . r .

OLDEST ORIGINAL OF A CHRISTIAN LETTER

Written in Rome between 264 and 282 by an Egyptian Christian to his brethren near Arsinoe. The papyrus is now the property of Lord Amherst of Hackney. From the reproduction by Deissmann

BIBLE

EDICT OF G. VIBIUS MAXIMUS, PREFECT OF EGYPT

The Papyrus (of the year 104 A.D.) is now in the British Museum. From the reproduction by Deissmann

ti'-rac

. V -* 1

» i '

r v <

i or!

5 .

*. ... ' • j\

■%r

- . ■ -7

. .. ■ /

lian did, it seems inconceivable that he would not have adorned his pages with their names. Moreover, it is certain that he drew from apocryphal sources, as from the Gospel of Peter; for both he and this Gospel (in the Akhmim fragment discovered 1885) use the strange word lachmon for Hot® in the casting of lots over the garments of

Jesus, a word known there only to these two and to Cyril. Again, he says, (<And fire was kindled in the Jordan® at the baptism of Jesus, as ((wrote the apostles of him, this Christ of ours® (Di., 88), an incident noted in the ((Preaching of Paul,® the Ebionite Gospel, the Sibylline Oracles, and the Syrian Liturgy, but not in the New Testament.

Without going into further details, it ap¬ pears manifest that Justin Martyr had before him, in writing or in memory, a considerable body of miscellaneous Christian literature, much of it perhaps under the name of Oracles (Logia) of the Lord or Jesus or the Saviour, some of it maybe professing apostolic origin or (<gospel® character. Most of this has been taken up and organized in the New Testament, though some of it has failed of that honor; none of it did Justin certainly regard as in¬ spired, canonic, authoritative; all of it he used or disused, and often misused, according to his own fancied needs in argumentation and his own sense of eternal fitness. The notion of a New Testament canon was unformed in the Martyr's mind.

Others. — Tf such was the case with this learned and zealous student between the years 140 and 166, perhaps about 147, it would seem almost needless to look unto lesser lights whether earlier or slightly later. However, a momentary glance at Athenagoras (176), the letter ascribed to Diognetus (200), Hegesippus (185?), and Dionysius of Corinth (170) dis¬ covers the same usage and state of mind as with the Martyr. The latter says, (<there are many false teachers among us® <(forging in His name® (Di. 82), and Dionysius makes similar com¬ plaint (Eus. Hist. Eccles., xxiii, 12) : <(My epistles have the devil's apostles filled with tares, cutting out some things and adding others … It is not strange then that some have es¬ sayed to adulterate the Lord's writings also® — a practice that pervaded all literary ranks.

Apostolic Fathers. — Ascending the stream we find Polycarp's Epistle (150-166) crowded with sentences and phrases now incorporated in the New Testament, but without any indica¬ tion of their source, with no name of an author, with no hint of inspired or canonic character.

Of the other Apostolic Fathers, Clemens Romanus, Ignatius, Hermas, Barnabas and the Teaching, none have any idea of canon or au¬ thoritative scriptures besides the Old Testament, though they use many New Testament phrases and sentences apparently drawn from the com¬ mon stock of religious feeling and expression. In Barnabas' Epistle (iv, 14) we read, ((lest, as it is written, (Many called but few chosen/ we be found.® The five words agree exactly with Matt, xx, 16, but they are there also a proverb, whence quoted we cannot say. It

seems certain that Barnabas (119?) is not cit¬ ing Matthew as Scripture. It is common enough for him to quote from Scripture or prophets what we do not find therein.

Collections. — But while the notion of Canon first takes form in Irenaeus and Tertullian, we may be sure there had been much earlier collections of Christian writings. Of one such we hear definitely, that of Marcion, who came to Rome a little before 140, having 10 Pauline Epistles and one Pauline Gospel, the relation of which to our present <(According to Luke® has been a theme of elaborate discussion. Tertullian and the Catholics held it was a mutilation of their Lucan Gospel; un¬ fortunately the Marcionite reply has not reached us. With respect to the Epistles the case is similar, but in any event the example of Marcion seems to have been widely followed and to have precipitated a battle of the books, whose echoes resound through the pages of Irenaeus, Tertullian and others. The Gnostics were indeed the first scientific theologians of the new faith, copious writers, religious philoso¬ phers, keen-witted expositors, if too often law¬ less in allegory. They were the teachers of the most illustrious Church Fathers, such as Clemens Alexandrinus and Origen; with the former, — in whom ((the modern theologian is disappointed to find very little of what he deems characteristically Christian, }) <(Perfect Gnostic® means ˆperfect Christian,® and Origen was a close student of the Gnostic Herakleon's Com¬ mentary on a John's Gospel (170?). Basilides was perhaps the deepest thinker, Valentinus the jiost constructive, as well as conservative, of the whole school. As these vigorous exponents of the Gnosis entered the fray armed with numerous collections of writings, among them certain forms of our present Synoptics as well as the Fourth Gospel, it became necessary for Catholic champions to meet them on even terms, with counter-arrays of authoritative writings, of proof-documents, the instrumental of Ter¬ tullian. From this desperate and long-fought battle the Canon of the New Testament has emerged, in proof that <(Strife is Father of All.®

Contents. — To discuss the questions, What were the earliest contents of these documents? and, How were the Gnostic and the Catholic forms related to each other?, would carry us much too far afield, into the region of Christian Origins ; but we may be sure that the extant forms are all developments of similar though simpler primitive forms that grew up under endless revision and rerevision through suc¬ cessive generations, each new growth displacing the preceding like leaves of the forest, so that from the short and pithy oracles that

Polycarp and Justin love to cite, we pass over by a devious path into the continuous discourse of the Gospel of John: — though one must not think all the earlier forms were short; some long ones have doubtless been shortened and fitted with finer point and brighter polish. *

Authorship and Date. — It is not strange then that the query as to the date and author¬ ship of many New Testament Scriptures should not be answerable in simple or positive terms,

A striking characterization of the Gospel-Content appears in Canon Cheyne's review of Ecce Deus' 4 (Hibbert Journal, July 1913): " The Symbolism of the Gospels envelops a rich variety of thought. We may, however, appropriately describe these wonderful productions (including Acts) as allegories of the things relating to the God Jesus and the progress of his cult. Professor Smith has only been able to give specimens of the range of the symbolism, but these specimens are thoroughly adequate."

for they have not dates and authors in the ordinary sense of these words, having been molded gradually under many hands into their present forms. If date and author of a certain verse were proved ever so clearly, it would de¬ cide nothing as to the verses before or after. During those early centuries the Spirit, whether Catholic or Gnostic, was weaving and unweav¬ ing ceaselessly at the loom of speech, and the New Testament is the perfected garment, the fruit of its toil.*

The Non-Canonics. — But it must not be for a moment supposed that the finally rejected writings (however inferior to the Canonics) in any of their forms or stages are worthless or to be despised. On the contrary, their virtue is often exceeding great, the light they shed on the whole genetic process most welcome and even invaluable. They are like intermediate and collateral forms in fossils, without which the familiar types could not be understood. Again, it is absurd to suppose that the Gnostic variants were in general mere corruptions of an elder uncorrupted text. They were rather the honest expressions of another

and often of an earlier consciousness. A single example of extreme importance may make this clear. In Matt, xi, 27 (Luke x, 22) are the weighty words : ((no one knoweth the Son, save the Father; neither knoweth any the Father, save the Son, and he to whomsoever the Son willeth to re¬ veal.® So it stands in Matthew, Luke and Mark, says Irenaeus (IV, II), but he charges that they who wish to be experter than Apostles write it thus : ((No one knew the Father save the Son, nor the Son save the Father, and he to whomsoever the Son willeth to reveal® ; and at first the charge sounds plausible, since the former seems more natural. But Irenaeus him¬ self in Book I, 13, gives the Gnostic form with¬ out protest and argues therefrom; and again in Book II, 4 he quotes the same as his own in the Gnostic form (with only knows for knew), and again (Book II, 18) he quotes twice the Gnostic <(No one knew the Father,® uncomplain¬ ing. Thus it appears that in Books I and II he makes no objection to the Gnostic form but sanctions it by his own use, seeming to know no other; which is confirmed by the fact that when he requotes the passage in Book IV, xi, 5

* How much was or could be known of Gospel authors is shown by the following: Eusebius (H. E., iii, 39) says that Papias, bishop of Hierapolis, said (in his five books of 'Exposition of Dominican Oracles'), "This also the Elder said: Mark, having become Peter's interpreter, wrote

carefully whatever he remembered, tho not indeed in order, the things whether said or done by the Christ." Again, " Matthew accordingly compiled the oracles in the Hebrew dialect, but each interpreted them as he was able." Now Eusebius, a thorough master of tradition, in his great History has amassed the best he could learn, especially on such a critical point; moreover Papias was a restless tradition-hunter, and what the Elder said was surely the best that Papias could find; these traditions, then, must count as the best that Eusebius and Papias could unearth. Yet critics assign them little worth, as applicable to neither Gospel as it now is (see Schmiedel's 'Gospels , Enc. Bib., § 148 p. 149). But even if they fitted exactly, the case would hardly be altered; for the fact that Eusebius could give only the word of Papias, who could report only the word of an unknown Elder, shows that there was no real knowledge on the subject, but only the best conjecture the Elder could make. With respect to the other Gospels, the indication is, if possible, even less. But it is no reproach to these wonderful works, nor to Iliad or Odyssey, that their authors are unknown. Rather, as in case of nearly the whole Bible, it is the fact that they mirror not any

individual consciousness but a collective consciousness, whether of a race or of a Church, that makes them both Catholic and Canonic.

he not only gives but repeats and emphasizes the Gnostic form ((shall have revealed® (revelaverit) , instead of the orthodox (<shall have willed to reveal" (volucrit ...revelare) . Hence the vehement churchman and heresy-hunter Harvey admits in a note (II, 162) ; (<It is re¬ markable that this text, having been quoted cor¬ rectly at page 158, the translator now not only uses the single verb revelaverit, but says point¬ edly that it was so written by the venerable author. It is probable therefore that the previous passage has been made to harmonize with the received text by a later hand.®

The Gnostic Form Order. — When now we recall that in a Syriac Fragment (XVI) Irenaeus himself again quotes the verse and again in the Gnostic order of words with the ((single verb,® declaring <(Our Lord said: None knows the Father save the Son nor the Son save the Father and to whomsoever the Son shall have revealed®; moreover that Justin quotes the passage first (Ap. I, 63) exactly in the Gnostic form, and afterward (Di. 100) again in the same form, with only knew changed to knows, and that Eusebius ((Hist. EcclesC I, 2) again confirms the Gnostic order of words, as well as still other Fathers, it seems that Har¬ vey's (<probable® must be changed to certain, that the Gnostic was the older form, which Irenaeus along with Justin accepted at first, but which afterward it was found wise to (<harmonize® with Church doctrine by changing it into the (<received text.® That this elder form agreed with the Gnostic in giving knew and not knows is now clearly shown independently by both Harnack ((Spriiche u. Reden JesuC pp. 189ff., 1907) and E. Norden ((Agnostos

TheosC pp. 279ff. 1913). An ((elder form,® not a better, and by no means the eldest, which was doubtless much simpler. Wellhausen has per¬ ceived that the clause (<no one knows the Son save only the Father® is ((a very old interpola¬ tion. It is a corollary, must therefore not stand in the first place and can nevertheless not be put in the second® (D. Ev. Mt., p. 58). The whole passage (Matt, xi, 25-30, Luke x, 21f), among the most famous and important ever written, reaches far back of our Gospels or even our era;* in (Ecce Deus) (p. 118) it is called (<the great Gnostic Hymn,® and again (p. 166), ((these rhythmical and almost metrical verses® are «the voice of Wisdom,® and two years later, in 1913, Norden proved as much by a profound analysis ((Agnostos Theos,> 277-308), and this, conception

is now adopted by Bacon in Christianity Old and New* (1914) : (<there is placed in the mouth of Jesus a typical Hymn of Wisdom® (p. 164).

Later Growth. — When now we glance once more, from this specular mount of history, the junction of the 2d and 3d centuries, down the stream of years, we behold the notion of the Canon indeed firmly fixed, but the bor¬ ders still vaguely defined, uncertain, unsteady. Of the Fathers, Cyprian followed Tertullian as his Hnaster® ; Origen (as we have seen) indeed attempted scientific criticism but without ade-

* With v. 27 compare the words of the first great mono¬ theist Ikhnaton (1370-50 b.c.) in his Hymn to the " Sole God, beside whom there is none other:"

"Thou art in my heart,

There is none else that knows Thee,

Save Thy Son Ikhnaton."

quate principles to guide him ; Church tradi¬ tion was empirical and often inconsistent, in¬ spiration was not determinable. Slowly during the 3d century the mantle of the Canon was widened. At length, in 363, the Council of Laodicea by its 59th canon enacted that ((only the Canonics of the New and Old Testament® be read in the Church, but ((not private psalms nor uncanonized books® ; the 60th canon, which follows with a list, has been shown by Credner to be not genuine but of much later date (G.

7 d. nt. K., 217ff). The Apostolic Constitutions (viii, 47, 85) gives the Old Testament list of <(books to be esteemed venerable and holy® by <(all you both clergy and laity® (adding, (<See that your young men learn the Wisdom of the most learned Sirach®), and names as ((our sacred books® <(of the New Covenant® <(the four Gos¬ pels, fourteen Epistles of Paul, two of Peter, three of John, one of James,

one of Jude, two of Clement, and the Constitutions dedicated to you, the Bishops, by me, Clement, in eight Books, which it is not fit to publish before all, because of the mysteries contained in them,— and the Acts of us, the Apostles,® omitting Revelation. Cyril of Jerusalem (348) in his list of divine Scriptures includes ((Baruch and the Epistle® with Jeremiah and also omits Revelation. At last the archbishop of Alex¬ andria, Athanasius, in his 39th Festal Epistle (367), determines as ((canonized and handed down and believed to be divine® 22 Old Testa¬ ment books (excluding Esther) and our pres¬ ent New Testament exactly; but he still quotes Apocrypha as ((Scripture® and allows them to be ((read.® The great authority of Athanasius finally prevailed, though various fluctuations lingered long in the judgment of the Fathers.

East and West. — In the West the councils swayed by Augustine, though somewhat more liberal toward the Old Testament, yet fixed the New Testament as at present. Meantime the Syrian Church inclined to a narrower con¬ ception of the Canon. The Common (Peshitta) version, omitting the Apocrypha at first, admitted them later, but in the New Tes¬ tament it lacked four Catholic Epistles and the Apocalypse, all of which, however, were used by Ephrem. Like Origen, the Syrians (about 500) divided the Scriptures into authoritative, semi-authoritative and unauthoritative. In the mid-class, beside Job, Chronicles, Ezra, Nehemiah, Esther, Judith, 1 and 2 Maccabees, were found James, 2 Peter, Jude, 2 and 3 John, — and Revelation was much debated. Armenian and Abyssinian canons show many minor ec¬ centricities of no great interest or importance.

Still Later. — During the Middle Ages the Eastern canon alternately expanded and con¬ tracted from time to time under various hands, but these variations about balanced each other. Meanwhile in the West the pendulum trembled between the stricter view of Jerome and the laxer of Augustine, till the day of Luther, when the Catholic sided definitely with the lat¬ ter and the Protestant with the former. In dealing with the New Testament also Luther showed a similar spirit, reviving the Eusebian distinction between Accepted and Contradicted, and ranging among the latter the Apocalypse, Hebrews and the Epistles of Jude and James, which last he called a ((straw-epistle,® an un¬ critical judgment determined by his dogma of

<(Justification by Faith alone,® against which James had protested, and which, as it existed in the early Christian consciousness, the Re¬ former had wholly misunderstood. But his work was invaluable in

partially freeing the Christian mind in the presence of the Canon. His notion of degrees of inspiration, authority, dignity among the Scriptures* has been fol¬ lowed up by many theologians and has even found its way into various creeds and confes¬ sions ; but it makes a vain distinction leading nowhere and logically worthless. Better rea¬ soned were the decrees of the Florentine, Tridentine and Vatican Councils (1441, 1546, 1870) and of the Jerusalem Synod under Dositheus (1672), which threw the robe of the Canon over all the Deutero-canonics. Of ab¬ solute authority there are no degrees.

Text Criticism.

Modern thought accepts the millennial de¬ bate over the Canon as an interesting phase of the history of spirit, but turns its own at¬ tention to a far deeper question, as to what the remarkable literature thus canonized really is, or, What is the text of the canonical scrip¬ tures ?

It was the learned Jerome, a critic born out of due time, who first consciously con¬ fronted this query, when he came to translate the Hebrew into Latin. His notion, that only the original script itself is inspired and au¬ thoritative. has maintained itself to this day, when it is still widely prevalent, though crit¬ icism long since perceived it to be wholly il¬ lusory. More sanely the Council of Trent (1546) declared that canonicity and authority reside in the Vulgate translation used in Church Service. t It would indeed be vain and nugatory for authority to reside wholly in the Hebrew text, which extremely few could read if ascertained, and which could not really be ascertained at all. Of what use a Supreme Court inaccessible to appeals? Nevertheless, though the Council has wisely closed the ques¬ tion for the faithful, it still remains open for unfettered critics : What is the Text of the Scriptures? What in their own tongue do they really say?

The Old Testament.

The Original. — The Old Testament was composed and is extant in the Hebrew, ex-

.

* Luther’s view as given at close of the Preface to his Translation (1st ed., omitted from later eds.) appears very extreme: “From all this you can rightly judge between all

the books, and distinguish which are the best. For St. John's Gospel, and St. Paul's Epistles, especially that to the Romans, and St. Peter's first Epistle, are the true marrow and kernel of all the books; which properly also might be the first, and each Christian should be counseled to read them first and most, and make them as common by daily reading as his daily bread … briefly St. John's Gospel and his first Epistle, St. Paul's Epistles, especially those to the Romans, Galatians, Ephesians, and St. Peter's first Epistle -. these are the books that show thee Christ and teach all that it is needful and blessed for thee to know, even if you never see or hear any other book, or any other doctrine. Therefore is the Epistle of St. James really a straw-epistle compared with them, for it has no character of the Gospel in it." The ground of this unjust judgment of James is really what makes the latter one of the most valuable and enlightening of the early Christian documents.

t To the same effect, the Complutensian Polyglot of Cardinal Ximer.es (which, leaving the press 10 Jan. 1514, was published in 600 copies, 1522) presented the Latin bordered by Greek and Hebrew, symbolizing (it was said) the Roman Church between the Orthodox Greek and the Synagogue, like the Crucified between the two thieves.

cept certain small portions (Jer. x, 11, Ezra iv, 8 — vi, 18 ; vii, 12-26, Dan. ii, 46 — vii, 28) written in Aramaic or Chaldean as some¬ times called since Jerome (because used by the Chaldeans in the speech reported in Dan. ii, 4ff.). Hebrew was the language of Canaanites, called Hip of Canaan® (Is. xix, 18) but also Jewish (in Judea, 2 K. xviii, 26, Neh. xiii, 24), from the 5th century b.c. on, gradually displaced as the vernacular by the kindred Aramaic (called profane in contrast with the holy but obsolescent Hebrew, and displaced in turn by the conquering Arabic, 7th century). The term hebraisti (<(in He¬ brew®) occurs first in Scripture in Ben Si-rach's Prolog (117 b.c.), long after the eclipse of Hebrew, and is used often for the profane, sometimes for the holy tongue. Both belong to the grand group of languages (called Se¬ mitic by Eichhorn), between whose two chief

representatives, Assyrian north and Arabic south, the Hebrew lies in the middle, some¬ what as Dutch between German and Old Eng¬ lish. The main mark of these tongues is that the stems consist nearly always of three con¬ sonants, whose vocalizations vary from shade to shade of the radical idea. Vowels being unwritten, the text was purely consonantal, as if one should write r g d and pronounce it raged, rouged, ragged, rugged, rigged, rigid, according to sense, or f r m and pronounce it farm, frame, firm, form, from, forum, or even affirm — a fact of fundamental importance.

The Masoretic. — The earliest text of at least the oldest Old Testament Scriptures was in the Canaanite Script (called Ra‘atz * or Libona’ah by the Rabbis), of which six lines dating apparently from Hezekiah’s reign (ca. 700 b.c.) , discovered (1880) in a tunnel of the Siloam pool, resemble that of the Moabite Stone, though slightly more cursive. The oldest known specimen of what developed into the present Aramaic script (kethob , called by the Rabbis merubbd ’ square, or Asshuri , Assyrian) is a single word of five letters, discovered at Araq-al-amir (former castle of Hyrcanus, east of Jordan), dating from 176 b.c. Somewhere about this time the portions of the Old Testament then existent were copied from the Canaanite-Moabite form into the oldest form of square script. It was impossible that minor mistakes of copying should not creep in, and as many copies were doubtless made, a somewhat uncertain form of text must have resulted. Whence, then, came the standard consonantal Hebrew text? From a critical comparison of various copies? By no means ! Some one copy was adopted, what one we know not, for reasons also un¬ known. This text thus chosen was long after¬ ward regarded as sacrosanct, not to be al¬ tered in a single Jod (((or tittle,® keraia, ((horn,® is apparently interpolated, Mt. v. 18). As the ancient holy tongue sank lower in the consciousness of the people, the guardians of tradition (Massorah) devoted themselves to preserving the text inviolable not only in let¬ ters but also in pronunciation, and according¬ ly from the 5th century on they intervocalized the text with a system of vowel signs (de-

* I. e., “ broken, splintered,” a name well-fitting but probably corrupted from da’atz (pricked, chiseled), whence the term deessenon used by Epiphanius (Migne, ‘ Patr. Gr.’

43, 356).

rived from the Syrian?), — as if we should write permanent or pr0mjnent or preempient — at the same time interpunctuating with an elaborate system of signs as guides to proper cantillation. Thus they superposed a vowel text upon the adopted consonants and there¬ with established for millenniums an interpre¬ tation thereof. Moreover, they not only vocal¬ ized, but also verbalized, for the earliest manu¬ scripts were doubtless written continuously without any evident division into words, as if thus: Yhvhthstsrcdmndknntm (Yahveh, thou hast searched me and know me). — Three sys¬ tems of such signs are now known, Babylonian, Palestinian, Tiberian, developed between 500 and 900 a.d. But much earlier a number of so-called vowel letters (consonants tending to quiesce into vowels, as in English draw, dray, from drag; plow , though, etc.) had been intro¬ duced as guides to vocalization, though form¬ ing no part of the earlier text, so that wher¬ ever such a letter is present the question may be raised, Is it original or a Masoretic in¬ sertion? The oldest dated manuscript of this so-called Masoretic Text (denoted by MT) is the Codex Babylonicus Petropolitanus of 916 a.d., but a very few others may be a century older. In any case it would seem that the Masorites have handed down with remarkable accuracy and fidelity the text that had estab¬ lished itself with the sturdy Rabbi Aqiba (d. 132 a.d.) . Where they felt called on to sug¬ gest a new reading, they did so by keeping the old consonants (the <(k'thiv ,® written) and writing with them the vowels of the suggested consonants written in the margin and called Q're (legend, to be read). They also made many other minor emendations of little inter¬ est except as evidence of painstaking study and unspeakable devotion.

Variants. — But before Hadrian's time or the death of Aqiba, there was no small diver¬ sity in the numerous copies of the sacred con¬ sonantal undivided text, a fact attested in many ways. What copy Aqiba chose and why he chose it, no one knows ; perhaps it was merely the best written that was accessible. We may be sure there was no critical adjust¬ ment of contesting claims, for the means thereto were wanting. Accordingly, to rely on the printed pointed text is to rely on a Masoretic interpretation of an unknown square Hebrew copy of an unknown cursive Canaan¬ ite text. It is not strange that Protestant scholarship, represented especially by the Swiss lexicographers, the Buxtorfs,* long held to the inspiration and divine authority of the J Masoretic points as well as of the consonantal text; for it seemed to be the sheet anchor of the whole doctrine of verbal inspiration, — a position long since abandoned. It now seems to be no radicalism but merely common sense when Kittel in the Preface to his

(Biblia Hebraica) raises at the start the question whether to attempt a continuous emended text (such as may have existed 300 or 100 b.c.) or to use the Masoretic as the base, subjoining emenda¬ tions in footnotes. Though he decides for the latter, the former remains the goal of further study.

* Who leaned on the learned Jew Azariah dei Rossi, whose 'Light of the Eyes' (1575) referred the 5 vowel-points back to Adam.

Septuagint. — The means that help mightily forward are the existing versions in othet tongues. Made at various periods over a long stretch of time, these are now considered in¬ valuable in establishing the preChristian He¬ brew text. Oldest and most authoritative is the so-called Septuagint (LXX), so named from the story related at much length in the romantic (Letter of Aristeas,* of how Ptolemy Philadelphus (283-247 b.c), at the suggestion of his librarian, Demetrius Phalereus, wishing to gather all literature into his library at Alex¬ andria, called by embassy on the Jews for their sacred books in a Greek translation, and how the High Priest Eleazer at Jerusalem re¬ plied by sending him 72 experts, six from each tribe (as requested), who were then, after preliminary seven days' symposium, dismissed each to his own hut on the Island of Pharos, where each made independently his transla¬ tion, and finally on comparison it was found they all agreed exactly, whereupon, by unani¬ mous approval of Alexandrian Jews, the trans¬ lation was proclaimed canonic, henceforth to be received as authoritative, with a curse against any modification (as in Rev. xxii,

18, 19).

Its Origin and Character. — Back of this extravagance (describing everything as in¬ describable), which indeed refers to the Law only and is marked at every step by ample arch¬ aeological knowledge and a plentiful display of local color, there may lie some semblance of the

fact that there was a felt need for a Greek translation of the Scriptures, felt however among the Jews themselves, though their in¬ struction in Holy Writ was oral, and the trans¬ lation may have begun as early as 260 b.c. and extended slowly from book to book through two or three hundred years. The presence of many hands is indeed not doubted, the charac¬ ter of the version varies within wide limits in different sections : Sometimes it is almost word for word, as in the Song of Songs, in Chronicles, in Ecclesiastes; again, it is exceed¬ ing loose, with considerable apparent additions, as in Daniel and Job. The more narrative por¬ tions, especially the Pentateuch, seem to be rendered best, while the chief Prophet, Isaiah, has suffered most. The change in style be¬ comes most notable on comparing younger with older portions. In general there is fair agree¬ ment with the MT, which, however, does not exclude disagreement at countless points to in¬ definite extent. In the Pentateuch the conform¬ ity is in general good, but toward the close of Exodus (cc. 35-40) the departures grow wide and frequent, both in words and arrangement, an indication of late composition, the text hav¬ ing not then attained a fixed form (p. 614)). Still more marked the divergencies in Samuel, Kings, Job, Proverbs (particularly in the or¬ der), the Prophets, as Ezekiel, and most of all in Jeremiah, where many chapters are differ¬ ently numbered, with a total of some 2,700 words wanting. Such variations show clearly that another Hebrew text, in general shorter than the Masoretic, underlay the Septuagint, which indicates that in the border centuries (150 b.c. to 150 a.d.) the Holy Writ was still alive and undergoing development. Occasion¬ ally the translators ventured to go beyond the (present) Hebrew text; thus they added con¬

siderable to Daniel, from what Hebrew orig¬ inal, if any, cannot be said.

Its Text. — The Septuagint is probably the first translation of large scope that was ever undertaken, and its importance, notable then, has even to the present remained scarcely di¬ minished. It gave a distinct stamp to all Bibli¬ cal Greek, supplies even now the clew not only to the New Testament but to all Greek litera¬ ture kindred and derived, and is the most trust¬ worthy collateral witness to the contents of Hebrew Scriptures in the two centuries imme¬ diately before our era. Accordingly, it be¬ comes a matter of signal interest to determine just what this translation was in its original form, — but at the same time a matter of per¬ plexing difficulty. The manuscript and testi¬ monies do indeed vastly abound, — as seen in the fact that the critical apparatus (of 20 uncials and 277 cursives) ama&sed by Holmes and

Parsons fills five huge volumes (1798— 1827), — but their witness is inordinately con¬ tradictory and uncertain. Indeed the problem proper of the Septuagint, so brilliantly attacked by Lagarde in his (Remarks on the Greek Translation of Proverbs) (1863), remains yet one of the most embarrassing in textual crit¬ icism. The reason for this should be briefly stated.

Other Versions. — Under the Roman irri¬ tation and especially after the destruction of Jerusalem by Titus (70 a.d.), as the national Jewish feeling became extremely intense, the cleft opened between the Jewish consciousness and the Christian widened, through two gen¬ erations, into a chasm in the time of Hadrian. The Jewish race, recoiling from its pagan en¬ vironment, fenced itself more and more firmly within its own institutions, especially its. re¬ ligious and sacred books, becoming a stricter and stricter constructionist. The highest imper¬ sonation of this tendency was the illustrious Rabbi Aqiba. Inasmuch as the Christians de¬ pended almost wholly on the Septuagint, the latter became unpopular with the Jews, not solely because of its inaccuracies and diver¬ gencies from the synagogal text. Hence arose a demand for a new and faithful rendering of the latter, since the dispersed Jews could not now dispense with a Greek translation. This demand was met (about 132?) in the spirit of Aqiba by the version of Akyla (Aquila), slav¬ ishly faithful, turning the Hebrew word for word. Meantime it was widely perceived that the official Palestinian text could not be that used by the Seventy, and accordingly still other translations of the former were now. under¬ taken, as by Symmachus and Theodotion into Greek, and also into Syriac (Peshitta). The version of Symmachus is highly praised by the Fathers for its elegance and clarity,— in con¬ trast with Akyla's, often obscurer than the original ; Theodotion's is thought to display a rather inferior scholarship.

The Hexapla.— Here, then, were four ver¬ sions, and more than one edition of some, often widely divergent. Such apologists as Justin, assuming that the Septuagint was perfectly made from a perfect text, charged the Jcv ˆ with corrupting their own Scriptures ; others assumed (with many generations of moderns) that the Palestinian was the true aboriginal and hence discredited the Septuagint and other ver-

sions, and Origen even proposed to himself the superhuman task of making a collation, at first in four, then in six (or even in nine) parallel columns, of the Hebrew (in Hebrew and also in Greek characters), of Aquila's, of Syrp-machus,' of the LXX, and also of Theodotion's translation, a formidable array of deadly par¬ allels, called the Sextuple (Hexapla) . The Septuagint he then corrected as seemed best, prefixing an asterisk (*) to each insertion and an obelos (f) to each deletion, and suffixing a metobelos (+) to each of both, — a scheme that could be carried out only very imperfectly.

Chaos. — The example and authority of Origen stimulated to endless attempts at im¬ proving the Septuagint, all of which ended in making confusion worse confounded. Half a century after his death (254) three main types of text appeared and established themselves on the eastern coast of the Mediterranean: as named in order by Jerome (Preface to Chron.), that of Hesychius in Egypt, of Lucian in Asia Minor from Constantinople to Antioch, of Eusebius and Pamphilus in Palestine, this lat¬ ter being really Origen's fifth column; and the most, but not all, of the manuscripts still fall under these three types.

Targums. — Still another, though far in¬ ferior, index to the old Hebrew text, is found in the Targums, or Aramaic paraphrases of the Old Testament Scriptures. The two most im¬ portant are those of Onkelos* and (Pseudo-) Jonathan, the latter called Palestinian. But the former is by far the more valuable, be¬ cause of its fidelity to the Hebrew, whereas pseudo-Jonathan-? has adorned his scroll with all manner of more or less vivid pictorial ad¬ ditions and elucidations. Thus he assures us, (<the Lord made the firmament, poising it with his three fingers,® and to the serpent is said, ((thy skin thou shalt cast off once every seven years® ; in this way the text is expanded by nearly one-half, a fact that is interesting as showing a manner of literary growth. The Targums attest the Hebrew text as it was ex¬ pounded to the people of the 1st century of our era, and in parts perhaps two centuries earlier.:?

Samaritan. — - Still further, the Samaritan Pentateuch, i.e., the Hebrew text in Samaritan characters, as current among Samaritans, is an important witness to the text of the Law. First brought from Damascus to Europe in 1616 by Pietro della Valle, it has long been a bone of bitter but indecisive contention. At many points diverging from the MT, it agrees with the Septuagint at many, but critics still

debate whether it represents a truly different tradition or only a faulty retranslation from the Greek. Its witness is by no means yet proved neg¬ ligible, but rather gains steadily in considera¬ tion.

* This name is most probably only a disguise or corruption of Aquila, the result of a confusion of two very different works of translation.

t A mistaken form for Yerushalmi. The Targum of the true Jonathan ben Uzziel (a pupil of Hillel) is of the prophets only and departs widely from the MT and the interpretation of the scribes.

X It is reckoned (by Turpie) that of 278 quotations of the Old Testament in the New Testament, 10 agree with MTonly, 37 withLXXonly, 53 with both, 175 with neither, 3 have no originals in our Old Testament; whence Bohl, Neubauer, Toy, and others infer that the New Testament never quotes from the Hebrew text but always from some Targum.

Progress. — Armed with all these and many other helps,* and embarrassed by so many men¬ tioned and unmentioned difficulties, the textual critic strives with the question, What was the earliest written form of the Hebrew Bible? He is very far yet from being able to give an entirely satisfactory answer ; at the same time it cannot be denied that he has made mem¬ orable advances along a path where he will hardly have need to retrace his steps. Knot after knot has been untangled, obscurity after obscurity cleared up, and. a broad light diffused over the sacred page. True, the solution of one problem is often found to open up a still pro¬ founder problem, and doubtless many surprises are yet in store for the student ; but enough has been securely fixed to make the need for a new version of the Old Testament as impera¬ tive now as it was before the revision of 1885. To convince oneself, it should be enough to compare the successive editions of the noble work of Kautzsch and his coworkers, (Die Heilige Schrift des Alten Testaments, } first issued in 1890, then in 1894, of which — so rapid was the encroachment of new knowledge in this ancient demesne — it was found neces¬ sary in 1909-10 to issue a third <(vollig neugear-beitete® edition.

Conjecture. — At the very best, however, when all the documentary aids have been ex¬ ploited to the utmost, there will still be a con¬ siderable residuum of dissatisfaction. Often enough the critic must feel

that the text before him, in none of its attested forms, can be the original, that some primitive error lies still farther back, disturbing or hiding the sense first intended. His plight is that of the phy¬ sician who divines some deep organic malfor¬ mation or perversion, which nothing but the knife can relieve. In such a case the textual critic is driven in last resort to conjectural emendation, ®not only a right but a duty of the exegete® (Dillmann, 'Bibeltext,* in P R E). His own spirit thoroughly saturated with his author's inodes of thought and expression, he must divine what the latter would have said in the context, under the ascertained conditions of language and feeling. Of course, conjectures will almost surely go astray, — there is only one way to be right, many ways to be wrong. How¬ ever, there will be a thousand of the critic's peers, all eager to detect and expose any error he may commit. Hence, his mistakes, though many, will be harmless, while his guesses, though few, that command acceptance, will be so many points of vantage gained in the slow campaign of science. Conjectural emendation must then be reconciled to frequent failure and rare success, but the latter may be like the lucky number in a lottery, of priceless value.

Text-emenders.— Such textual reconstruc¬ tion has been plied by Bickell and Duhm and others under guidance of metrical considera¬ tions, . and by the pioneer Cheyne in the interest of his North-Arabian theory (adopted from Winckler), as the majority believe, to an ex¬ cessive extent. To what lengths a sober editor may find himself led to. go may be seen in Karl Budde's booklet, (Die schonsten Psalmen,

* Even the book of Jubilees for Little Genesis), of the 1st century b.c., enables R. H. Charles to correct the MT of Genesis in 25 places.

iibersetzt und erlaiitertˆ on the basis of a re¬ vised text, and the nature and extent of this revision of 51 short Psalms Budde has set forth in the Zeitschrift fiir die Alttestamentliche Wissenschaft (pp. 175 —95, November 1915). Plainly we are yet very far from having at¬ tained a satisfactory (original) text of the Hebrew Scriptures, but this fact weighs com¬ paratively little against the literary worth, the

historic value and the religious significance of these writings.

Illustrations. — A striking example of the false vocalization of the consonantal text is the following: In Jer. xvii, 9, occurs the

familiar pronouncement, ((The heart is deceit¬ ful above all (things) and desperately wicked; who can know it ?® The word rendered (<desperately wicked® is in consonants ’ - n - sh, vocalized by the Masorites, ’a-n-u-sh; but the Septuagint evidently vocalized it ’c-n-o-sli (man) and accordingly translated thus: ((Deep is the heart beyond all things, and is ‘man, and who shall know him?® Strange as it may sound, it was accepted, and when Irenaeus was challenged by the Gnostics to prove the human¬ ity of Jesus, he appealed (IV, 55) to this pas¬ sage: <(Again there are those [prophets] who say, He is a man, and who shall know him? [Homo est, et quis cognoscet eum?]® Again in Hos. vii, 6, we read: ((Their baker sleepeth all the night ; in the morning it burneth as a • flaming fire.® Here the letters ’-p-h-m have been pointed to read ’ophehem, but on reading ’app’hem (with Targum and Syriac) we obtain the couplet :

All the night smoulders their anger.

Mornings it burneth like flame of fire.

The change of ((anger® into <(baker® (in Hebrew) is like turning ˆTipple” into (< rifle® in English. Once more, the consonant-group m-z-r-y-m, as vocalized in the MT, is pro¬ nounced Mizraim and translated Egypt, the apparent dual ending being referred incorrectly to Upper and Lower Egypt. In Assyria on the monuments it appears often, in various forms, as Mizir, Mizri, Muzri, Muzur, Muzuru, with many cognates, and means apparently border, frontier. As early as 1834, Dr. C. T. Beke deduced from Exodus that Mizraim was not always Egypt, but like so many Anglo-Saxon seeds of thought, this fell among thorns and was choked, though noted by Ewald. In 1874, Schrader renewed the observation, but not till about 1890, in a series of memoirs, did Winckler make clear from the inscriptions the exist¬ ence of both a North-Syrian and a North-Arabian Muzri, which required the frequent change of the Masoretic vocalization from Mizraim to Mizrim, and draws along with it a series of revisions both of the Hebrew text and of our whole conception of Israel’s history. In particular, Winckler, followed by Cheyne, would find in this confusion of the two Muzris the single and simple origin of the legend of Israel’s, sojourn on the banks of the Nile. Still further, to understand what Cheyne’s gen¬ eral text-revision ((Critica BiblicaO may ac¬ complish, consider, not indeed the mere jumble of words in the Authorized

Version, but the much improved American Standard Version of Is. vi, 3. <(And if there be yet a tenth in it, it also shall in turn be eaten up; as a terebinth, and as an oak, whose stock remaineth when

they are felled ; so the holy seed is the stock thereof.® But the amended text yields this quatrain :

And should there yet be a remnant therein,

It shall again be destroyed.

For consumption shall be on its plants,

And failure of fruit on its sprouts.

A few among countless such examples may show at once the importance, the difficulty and the necessity of a reconstruction of the Hebrew text.

The New Testament.

How stands the case with the New Testa¬ ment? One might suppose its problem would be less complex, less difficult to grapple and master, on account of the abundant material of evidence; but it yields no whit to the other. The so-called critical apparatus is indeed so enormous in extent as to be hard even to name for ready reference. It consists wholly of three kinds of manuscripts: (1) The Greek text itself; (2) translations into various other languages; (3) quotations in a multitude of authors. Of these the first might appear to be prepotent, but such is by no means always the case. The manuscripts, very numerous, are rarely of the whole New Testament (only about 167), more often of only some sections thereof, most frequently of the Gospels (1,277), then of Acts and Pauline Epistles (32), then of Acts and Catholic Epistles (25). Many are only small fragments, scattered through the centuries (as well as the libraries) from the 4th to the 17th, and a few pieces of papyrus, each containing but a few verses (over 40 in all), may date from the 3d century . In form they are of two grand types: uncials, up to the 9th century, and minuscules from the 10th century on. In general the material is parchment or vellum up to the 13th century and after the 14th paper. Of course the au¬ thority of the eldest is in general by far the weightiest, but not necessarily decisive.

Notation.; — The system of naming the manuscripts, introduced by

John Jacob Wetstein (1693-1754), designates the uncials by capital letters (Latin, Greek, Hebrew), the minuscules by Arabic numerals ; it has been most fully developed by F. H. A. Scrivener (1813-91) and by Tischendorf's successor, C. R. Gregory (1846-1917), whose notation supplants Scrivener's. But as new discoveries multiply the manuscripts, the letters become insufficient in number and at best such designations are purely formal and tell nothing at all about the manuscripts themselves. Hence Hermann von Soden has proposed (1902) a wholly new system of co-ordinates sharply defining the manuscript itself. He makes three grand di¬ visions, according to the contents of the man¬ uscript, denoted by 6 (for diatheke, Testa¬ ment), e (for evangelion, Gospel) and a (for apostolos, Acts — Epistles), the presence or absence of the Apocalypse not affecting the denotation. The second co-ordinate is a num¬ ber naming the century, the numbers 1 to 49 being assigned to the first nine centuries, those from 50 to 99 to the 10th, the higher numbers to the later centuries, the third digit denoting the centuries after the 10th (as 4 the 14th) and so on. Owing to further distinctions in cen¬ turies where the number of manuscripts is very large, especially in the 12th and 13th, the de¬ notation becomes elaborate and somewhat

cumbrous, but it tells the utmost possible by a few signs and is extensible to any number of manuscripts likely to be found. However, for the most important and familiar codices, the current Wetstein-Gregory notation re¬ mains preferable. B and D are more man¬ ageable than d 1 and d 5, and E than a 1001.

Text. — Criticism of the New Testament text, the attempt to restore the supposed orig¬ inal, after valuable preliminaries by Mill (1707), in Bentley's Proposals5 (1720), in Bengel's (Introduction) (1734), in Wetstein's huge edition (1751-52), a priceless repertory of classical and other citations, and by J. S. Semler (1 725— 91), began in grave earnest with the labors of Griesbach (1745-1812), which came to light in his three-volumed critical edition of the New Testament (1774-75). It was he that first divided the manuscripts into Constan-tinopolitan

(Bengel's <Asiatic)), Western and Alexandrian, and that introduced the principle of genealogy in weighing their evi¬ dence. Naturally Wescott and Hort regard him with peculiar reverence, as the chief of their forerunners, though his New Testament text was inferior. It was not till 1831 that a truly critical text was published by the brilliant Lachmann (1793-1851), who reverted to Bent¬ ley's principle of the agreement of Greek and Latin texts as a test of antiquity (in a read¬ ing). Since then such attempts to restore the presumed primitive have multiplied. Samuel Prideaux Tregelles (1813-75), the distin¬ guished Quaker scholar, following Lachmann's method, but with added material, issued his stately edition (1857-72), and the unwearied zeal of Constantin von Tischendorf (1815— 74) gave forth as 8th edition (1869-72) two volumes of text with the most extensive crit¬ ical commentary up to that time known. Both Tregelles and Tischendorf, smitten by paralysis, were unable to publish their Pro¬ legomena, but the pious task was accomplished for the latter in 1894 by his successor, C. R. Gregory, aided by Ezra Abbot.

(<Neutrals.® — However, as early as 1853, B. F. Wescott (1825-1901) and F. J. A. Hort (1828-92), discontented with the state of the New Testament text, began the life-labor that culminated (1881) in their two-volume work, (<The New Testament in the original Greek,® a signal achievement of British scholarship, making a distinct advance beyond all prede¬ cessors. They exalt the genealogical princi¬ ple of Griesbach, to whose three grand classes of manuscripts, called by them Syrian, West¬ ern, Alexandrian, they add an important fourth, the <(Neutrals,® represented especially by the Vatican and Sinaitic Uncials, B* and K

*Of 4th century, numbered 1209 Gr. in Vat., each page of three columns and 42 lines each, the whole Bible except Pas¬ torals, Philemon, Revelation, Heb. 914-1325 (lost), written by three scribes, one the same as scribe D of S (Tisch.), first catalogued in Vat. in 1481 (not in 1475), prototyped in 1889-90, 1905. — N's page is thin, of four columns 48 lines each, of antelope (or ass) pelt, each of two leaves four pages: in all 346j leaves, 13? by 14 inches, Old Testament and New Testament (134 leaves) with Ep. of Barnabas and part of Shepherd of Hermas, collotyped (Oxford 1909), Tischendorf borrowed this treasure from the monks of Sinai, as the Israelites borrowed from the Egyptians: "I received from them, under the form of a loan, the Sinaitic Bible to carry to Saint Petersburg and thereto have it copied as accu¬ rately as possible!" In 1869 the Tsar presented the monks with decorations and $3,600 in cash!

(the latter, discovered in Saint Catherine's Monastery, Mount Sinai, by Tischendorf — 43 leaves in 1843, now in Leipzig, and the rest in 1859, now in Petrograd — was published in 1862 at the cost of the Tsar). The manu¬ scripts of the three grand classes they re¬ garded as having undergone manifold corrup¬ tion, from various sources according to vari¬ ous tendencies, from all of which the <(Neu¬ trals® (they think) have remained relatively free. With much confidence they made a brave ((attempt to present exactly the original words of the New Testament,® holding that Mits books in extant documents assuredly speak to us in every important respect in language identical with that in which they spoke to those for whom they were originally written.®

Errors. — That this confidence was ill-grounded may appear from three among many facts: They rejected the Pauline Codex F as an independent witness, declaring it was at least in its Greek text a copy of G (as also did Zimmer, in 1887, for much better reasons) ; but this judgment (in which they were fol¬ lowed by English and even by Continental critics generally) was entirely wrong, as Greg¬ ory explicitly declares: ® Smith aus New Or¬ leans weist nach, dass F nicht aus G sein kann, sondern dass F und G aus einer anderen kann, bekannten Handschrift abgeschrieben wurden® (Am. Jour. Theology, Bd. 7, 1903, S. 452-85, 662-88, (Text Kritik d. Neuen Testaments,* iii, 1041). Again, they raise no doubt about the text of Rom. i, 7, regarding the agreement of all the chief manuscripts, versions and cita¬ tions as decisive ; but both Harnack and Zahn now admit the writer's earlier proof (1901) that the word <(Rome® is interpolated in the elder text: <(To all those that are in love of God.® Neither had they any doubt about the text of Matt, xi, 27, yet both Harnack and Norden now recognize that the elder text was epegno (knew), and not epignoskei (knows), as all the manuscripts and editors give. It seems, then, that the text problem is far profounder than even Westcott and Hort conceived.

Recensions.— More recently (1902-13) a much more ambitious attempt at text-restora¬ tion has been carried out by H. von Soden, with collaborators, in the fo'ur-volumed (Die Schriften des Neuen Testaments in ihrer altesten erreichbaren Textgestalt,) with the employment of 165 manuscripts of the New Testament as a whole, 1,240 of the Gospels only, 244 of the Apostolos only, besides 250 Commentaries with texts, 170 on the Gospels, 40 on the Apostolos, 40 on the Apocalypse. The standpoint of von Soden in this colossal work is worth notice ; in large measure it is that of Hug (1765-1846), the acute, if eccentric, Swiss Catholic, devel¬ oped in his Introduction (1808), which West¬ cott and Hort, shrinking from the word Re¬

cension,® have been so careful to repudiate as (<fanciful.® Footing on two statements of Jerome, one already noted, the other in his <(Preface to the Gospels® : <(I disregard those Codices fathered by Lucian and Hesychius, which the perverse contentiousness of a few upholds,® Hug assumed a disorderly popular Western text (koine ekdosis, vulgate edition), prevailing till the last half of the 3d century, when it underwent three independent revisions : by Hesychius (otherwise unknown, the x of

text criticism) in Alexandria, by Lucian, the martyr of Antioch (312), and by Origen in Caesarea. Similarly von Soden assumes that about the year 300 the increasing confusion of text-tradition ((urged to the revision and au¬ thoritative edition of the text® at (< three great Episcopal Sees,® Alexandria, Caesarea, An¬ tioch, and accordingly he classifies his wit¬ nesses under the three text-forms, H, I, K (for koine). Of these H (Hesychian), prev¬ alent only in Egypt, is represented by the au¬ gust (Neutrals } B or 3 1 and x or 3 2; also by the Codex Ephraem (C or 3), in Paris, a palimpsest deciphered by Tischendorf (1842), by 3 48, and (for Luke and John) by the re¬ cent find e014 (in Detroit) ; it is likewise at¬ tested by about 40 papyrus fragments of the 4th, 5th and 6th centuries, by Egyptian translations and by quotations of Egyptian Fathers, as Athanasius, Cyril of Alexandria, Didymus. Such are the decisive authorities for a critic like Hort, such ((The weight dark Egypt on his spirit laid.®

I and K. — Next to H stands I, the text of Pamphilus (presbyter at Caesarea, pupil of Pierius, — Origen's pupil, — teacher of Euse¬ bius, scribe of Origen's works, a martyr in 301?), — a text not nearly so distinctly attested as H, but largely present in the quotations of Origen. Much further off, by itself, stands the K-text — of Lucian, whose ((authority in wide circles,® says Harnack, ((about the year 300 displaced even that of Origen,® — issued from Antioch, a primitive focus of Christian¬ ity, and departing both widely and oft from H as well as I. The main well-spring of these deviations (in the Gospels) von Soden would find in the Diatessaron of Tatian; for Acts

he refers them directly to Latin and Syriac trans¬ lations, indirectly to a second edition of that work, which won great acceptance. For the Apostolos, Marcion's edition is suggested as the culprit. In general the attitude of Lucian seems to von Soden to have been freer than that of Origen, to which, indeed, it was con¬ sciously opposed.

The Three. — No manuscript has reached us antedating these recensions, some one of which is attested by every Codex. Throughout Christendom the three competed, H least of all, but I and K sharply for centuries, with mutual concessions that fell mainly to the good of K. Not one of the 36 I-witnesses to the Gospels, nor of the 14 to the Apostolos, approaches in single¬ ness and purity of its text-attestation the oldest of the H-uncials, but at best only those of second rank, like C (33) or 348. A chief Ms. for the Gospels is the famous Codex of Beza (D or 3 5) in Cambridge, for Acts E (ora 1001), and for Mark e014. These manuscripts of the I-type, beginning perhaps in the 4th, multiplied in the 5th and following centuries, but more and more the K-readings intruded till they finally triumphed. In the Apostolos two main types may be distinguished. Both show close contact with Syrian versions, involving ma¬ terial text-variants, which von Soden would explain (as in case of Acts) by supposing, analogously, very early Eastern editions of the Epistles in which <(the text was treated very freely® (mit sehr freier Textbehandlung) . After the 10th century the mixed texts (of I and K) vanish, and K is left sole-reigning in the manuscripts.

For the Gospels the oldest K-text is that of Matthew in e014 of the 5th or 6th century, next is <?051 (in Tiflis) of the 7th or 8th. But the oldest indirect witness to this text is the Com¬ mon (P'shitta) Syriac translation made by Rabbula (?), bishop of Edessa 411-435, and representing the Greek text at Antioch.

Not Final. — 'This scheme of von Soden's is noteworthy, in dismissing the ((neutral text® and recognizing that the venerable twain, B and X , are revisions like all the rest, as indeed is clearly shown by Adelbert Merx in the test-case of the two sons (Matt, xxi, 28-31). But it is far from true that the text-problem has been solved; von Soden's own conception of the earlier history of the text seems naive, ro¬ mantic and apologetic to a degree, and he is indeed contradicted by himself in immediately sequent sentences, thus : <(As against the Gnos¬ tic redactions as well as Marcion's version of Paul's Epistles, the situation demanded that they lay emphasis now on the authentic verbal form of those Scriptures. Nevertheless, they were still so free in attitude

toward this ver¬ bal form that Tatian between 160 and 170 could offer in his Diatessaron a compound of the four Gospels in one and obtain success for it in the widest circles.® Plainly, then, the <(demand,® however just it ma}' seem to von Soden, did not seem so to the Christians, neither was it by any means met. Moreover, it is to be noted that von Soden's explanation of the creeping-in of Tatian-variants and others is at most only probable, in no case certain. Even when it seems quite satisfactory it is not therefore necessary or proved: such indeed may (not must) have been the case. Now, when there are so many distinct and often independent cases, even though the probability in any one be very high, this does not make the probability high for the whole body of cases ; it may still be very low, even though one may be unable to suggest any other solution nearly so likely in any individual case. We must beware, then, of ascribing great likelihood to such collective explanations as von Soden's. Often the results may have come about in totally different ways.

Originals. — In title the German's work is surely modest enough : <(The Scriptures of the New Testament in their oldest attainable text-form,® which is by no means necessarily the original form. Indeed, not only does any such original form seem almost if not quite as unat¬ tainable as in case of the Old Testament, but we may seriously question whether indeed there was ever any such, in the ordinary sense of the phrase. By original form of a modern work, as it first leaves the press, of an ancient one, as it was first written or dictated by the author himself, we indicate a more or less complete and rounded unit, subject only to minor modi¬ fications. In case of far-reaching changes, by addition, subtraction or otherwise, we should say, <(This is practically a new work,® and we should discriminate, as between the A and B editions of Kant's (Critique of Pure Reason.) Moreover, we associate such an original with a certain author, — or if with collaborators, as¬ signing, generally with fair exactness, responsi¬ bility to each. However, on coming to the New Testament, in particular the central mass, the Gospels, we find all such conditions re¬ versed. Not to speak of leaving the press,

there is no notion of first writing or dictation of the Gospels as a rounded whole complete but for minor corrections. To be sure, some per¬ son or persons must have presided at each transformation of transformations, but they who shaped it, as it now is, most likely supplied but little material. It is indeed an accepted principle of Gospel study that the Synoptics, at least in their present form, are the result of century-long processes of continual growth, directed by continual pruning, of weaving, un¬ weaving and weaving again. At the very open¬ ing we recognize that the first two chapters of Matthew and Luke, the so-called prehistories, form no part of the originals, but are the prefix of a later hand. As we penetrate deeper and deeper into the intimate structure of the Gos¬ pel, the seeming unity resolves into multiplicity, the same chapter, paragraph, verse even show¬ ing layers of different ages and authors, of varying and even inconsistent tendencies. In¬ evitably the critic becomes anatomist and is forced to distinguish the components by finer and finer division. It is not any single output of any single mind nor of any co-operative group of minds that lies before him, but the gradual unfolding of a common consciousness, the stratified deposit of more than 100 (or even 200) years of the intensest religious life. The history of a Gospel is not unlike that of a say¬ ing or (<winged word.® On tracing it down we may find it now has many forms, perhaps in many tongues, that it goes back for genera¬ tions perchance, and may be lost in the mists of antiquity.

Illustration. — As a special case, take the most famous of Logia, the one already men¬ tioned (Matt. xi. 25-30), and hear the latest enlightened and enlightening judgment, that of Ed. Norden (elaborating earlier suggestions) in Agnostos Theos (1913, pp. 307-08). ((The author of the source Q [the Oracles, commonly regarded as an oldest layer of Gospel tradition] was acquainted with a mystic-theosophic tract, which already had a long past behind it and which in any case had taken a fixed literary form in oriental languages (Greek included, which, however, is secondary). Not a few re¬ ligious communities had made it their own ; not only through literature but also by oral propa¬ ganda it had been spread abroad ; meantime the ground-form had in each case been adapted to the special interests involved. Hence it fol¬ lowed of itself that it drew Christianity into its circles, as the latter was just entering into the rivalry of religions. The author of Q has accordingly taken out of it, over into his own book of doctrine and edification for the Chris¬ tian community, motifs, preserving the exact connection of thought and words, a path along which the author of the Fourth Gospel has advanced consistently further. But to the old wine they have given an especial spice. The

Gnosis, to propagating which — according to the conception of the next following genera¬ tions — the Christian Soter [Saviour] was de¬ voted, was of a kind wholly different from that in whose service both before and after him, the Soters of the other cult-communities had been engaged. In their theosophic systems the wis¬ dom of this world was by no means banned ; without knowledge no one could follow their complicated trains of thought. On the con¬

trary, the struggle of the former against the learning of the scribes was still fresh in mem¬ ory when the first sketches were begun. By combining individual traits drawn from the life-struggle of Jesus against the conceit of wisdom, with the traditional motif of the Jew-ish-Gnostic propaganda, the author of this Logion, like the author of the Fourth Gospel, gave the Logion a polemical point directed against such <Gnostic) treatises. The Christian Soter, from whom the (babes> ought to learn that he is meek and lowly of heart, directs his appeal to the weary and heavy-laden, to whom out of love and compassion he will give peace for the soul. Here a new sun flashes through the cold darkness of the pretentious Mages, theurges and (prophets.) In the strict sense of the word, not even this new element was an autophonia [actual utterance of Jesus] : it is far too deeply interwoven with motifs, bor¬ rowed from literary tradition, for that. But that the Ideal is true in the higher sense, and as such is also imperishable, we know from Plato.®

A Gnostic Hymn. — This literal translat'on makes no pretense to lighten the laboring speech of the illustrious linguist, nor does his view seem correct at one vital point ; he throws out sops to Cerberus, nor hints that the <(babes,® as elsewhere in the New Testa¬ ment, are Gentile converts to monotheism; but his general conception of the oracle as primarily a theosophic meditation of prechristian Gnostics, transformed in passing from community to community and laid at last in noble music on the lips of Jesus, is cer¬ tainly correct and in full accord with the two-years earlier statements of Ecce Dens already cited. Now we may indeed inquire with von Soden after the <(oldest attainable text-form® of these verses, but that will certainly not be (<the original text,® a notion that vanishes along with that of the original author.

Verse. — -This glimpse at the studio of an Evangelist reveals also the momentous fact that these <(Oracles® were not prose as every¬ where read, but were verse, even as Norden prints this one, three stanzas of four lines each. If the numerous poems in the New

Testament were all properly printed in verse, it would contribute more to the popular un¬ derstanding of these writings than many commentaries. A good beginning has been made by Professor Briggs in his <Wisdom of Jesus) and some striking examples are given in his (Study of Holy Scripture) ; as also by Dr. Moffatt in his (New Translation (1913).

Latest Phase. — Furthermore, with the dis¬ appearance of the mirage of ((neutrality® in certain manuscripts, the centre of gravity of text-authority seems to have suffered displace¬ ment ; it lies no longer in the testimony of the codices, but rather in the earliest translations and in the quotations by the Fathers. Of these there seem to be three types : Old Syriac, Old Latin, Clementine. Tatian's Diatessaron, Justin's quotations and others may attest the Greek text in Rome in the first half of the 2d century. For Buchanan's views see Biblical Archeology — New Testament.

Bibliography. — The literature of the Bible is immeasurable; 2,000 quarto volumes issued in Paris, in the second third of the last cen-

tury, from the press of Migne alone; fortu¬ nately, it is also in great part dispensable ; it perishes by supersession, what is valuable in the work or possession of one century being constantly absorbed, assimilated and repro¬ duced in the next. A few of the most noted books have already been named or even ap¬ praised in the foregoing text; a few others may now be added.

The writings of the Fathers are preserved in 476 quarto volumes in Migne's Patrologies and in the later more critical collections not yet complete. From time to time copious selec¬ tions have been made under such names as Catena' (e.g., Cramer's, 1841), <Spicilegium' (J. A. Grabius, 1700) and the like. Such a huge anthology is found in the 32-volumed Bible-work of Lemastire, hereafter mentioned under versions. Like the works of Augustine, those of his great continuator, in the Reforma¬ tion, Jehan Calvin, especially the masterly < In¬ stitutes of the Christian Religion' (Latin, 1536; greatly enlarged in

French, 1540), stand con¬ spicuous for all time. Less rigorous but very influential the (Loci communes' (1521) of Melanchthon, scribe of the Reformation. On the Catholic side, surpassing even Bellarmine's, the works of Bossuet (1627-1704), as the (Dis¬ cours sur l'histoire universelle,' and especially the (Histoire des variations, etc.' (1688), out¬ shine all others. (The Great Commentary' of the Flemish Jesuit, Cornelius a Lapide (van den Steen, 1567-1637), excels in extent (omit¬ ting only Psalms and Job) and thoroughness (reveling in the <(fourfold sense"), and has been repeatedly edited and translated. Nathaniel Lardner's Che Credibility of the Gospel His¬ tory, etc.' (1727, 1733-55), a pioneer work of exhaustive patience and painstaking, was the chef d'oenvre of its day. J. J. Wetstein's (Novum Testamentum Graecum' (1751-52) de¬ serves renewed mention as a storehouse of classical parallels. Joseph Butler's famous (Analogy' (1736) displayed extraordinary power of sustained thought, but the arch of argument from premises to conclusion was too long and fine spun. William Paley's more common-sense (Natural Theology, or Evi¬ dences, etc.' (1802), as well as his earlier (Horae Paulinas,' appealed powerfully to the Anglo-Saxon mind, but proved unequal to the increasing demands of thought and knowledge. About the same time (1818) T. H. Horne occupied the field with his long popular, but now superseded, (Introduction to the Critical Study, etc.' Later works are generally less ambitious and comprehensive, content to oc¬ cupy some limited sector in the long line of discussion, and in the main escape brief char¬ acterization.

Canon: Buhl, F., Canon and Text of the Old Testament' (Eng. trans., Edin¬ burgh 1892) ; Ryle, H. E., Che Canon of the Old Testament' (London 1892; New York 1909) ; Wildeboer, Che Origin of the Canon of the Old Testament' (Eng. trans., London 1895) ; Cornhill, C. H., Hntroduction to the Canonical Books of the Old Testament' (Eng. trans., London 1909) ; Jugie, (Histoire du canon de l'ancien Testament dans l'Eglise grecque' (Paris 1909) ; Jiilicher, G. A., (Einleitung in das Neue Testament' (1894); Zahn, Th., Ceschichte des neutestamentlichen Kanons' (Leipzig 1888-92), also 'Forschungen,' also

(Einleitung in das Neue Testament' (1897-99; 1906) ; Harnack, A., 'Lehrbuch der Dogmen-geschichte' (1886-90; Eng. trans.); also (Geschichte der altchristlichen Literatur' (1893— 1904), and many others; Westcott, B. F., his¬ tory of the New Testament Canon' (1899), and others; Leipoldt, W. J., Ceschichte des neutestamentlichen Kanons' (1907-08).

Text: Field, F., Crigenis Hexaplorum quae supersunt' (1867-75) ; 'Sacred Books of the Old Testament' (Polychrome Bible, Heb. 1893ff; Eng. 1897ff) ; Cheyne, T. IC, Critica Biblica' (1904); Ginsburg, C. D., Hntroduc¬ tion to the Massoretico-Critical Edition of the Hebrew Bible' (1897) ; Buhl, F., (Kanon und Text' (see above) ; Scrivener, F. H. A., <A Plain Introduction to the Criticism of the New Testament' (1862 ; re-edited by Ed. Miller 1894) ; Gregor)ˆ, C. R., "Prolegomena" to Tischendorf's (Nov. Test. Gr., Ed. VIII Critics Maior' (1894), also (Die Textkritik des neuen Testaments' (1904) ; Soden, H. von, (Die Schriften des neuen Testaments' (1902-) ; Ken¬ yon, F. G., (Handbook to the Textual Criticism of the New Testament' (London 1901 ; New York 1912) ; Burkitt, F. C., (Evangelion Da" Mepharreshe' (1904).

Interpretation: Meyer, H. A. W., (Kritisch-Exegetischer Kommentar zum Neuen Tes¬ tament' (since 1832 and continually re-edited, Eng. trans.) ; Keil und Delitzsch, (Biblischer Kommentar ueber das Alte Testament' (since 1833) ; Lange, (Theologisch-homiletisches Bi-bel-werk' (1857ff; translated and enlarged by Ph. Schaff) ; Nowack, W., 'Handkommentar zum Alten Testament' (1892-) ; Holtzmann, H. J., 'Handkommentar zum Neuen Testa¬ ment' (1892-) ; Briggs, Driver and Plummer, 'International Critical Commentary' (1895-) ; Zahn, Th., (Kommentar zum neuen Testament' (1903-) ; Godet, F. L., (1812-1900), On Gos¬ pels, Romans, Corinthians (1863-; Eng. trans.), also Hntroduction au Nouveau Testa¬ ment' (1 893— ; Eng. trans.) ; Holsten, C., (Das Evangelium des Paulus' (1880) ; Volkmar, G., 'Marcus' (1876). From 1872 for some years the anonymous Supernatural Religion' (of W. R. Cassels), repeatedly printed, held the front of controversy in England; in a series of essays by the learned Bishop J. B. Lightfoot (1827— 89), whose Commentaries' and 'Apostolic Fathers' formed the apex of British biblical scholarship, it was powerfully attacked and some of its salients were carried. Among liberal critics, P. W. Schmiedel of Zurich is unsurpassed in learning and acumen, as witness his copious contributions to the (Encyclopaedia Biblica' ; B. Duhm, in his comprehension of Prophetism ; and Paul Haupt, in immense and multifarious scholarship; the highest achieve¬ ment in French criticism is A. F. Loisy's 'Les Evangiles synoptiques' (1908).

Archeology: Bennett, C. W., Christian Archaeology' (1889), first American work on the subject) ; de Visser, Th., (Hebreeuwsche Archaeologie' (1894) ; Budge, E. A. W., Che Book of the Dead' (1901) ; Hommel, Fr., (Die alttestamentliche Ueberlieferung' (1903; Eng. trans.) ; Hilprecht, H. W., 'Recent Researches in Bible Lands' (1903), and explorations in Bible Lands during the 19th Century' (1904) ; Jeremias, A., (Das Alte Testament im Lichte des alten Orients' (1906) ;

Savce, A. H., Che Higher Criticism and the Verdict of the Monu-

ments) (1894), (Early History of the Hebrews* (1897), (The Archaeology of Cuneiform Inscriptions* (1907) ; Gressmann, H., Alto-rientalische Texte und Bilder zum Alten Testament) (1909), (Mose und seine Zeit' Jastrow, M., Jr., (Die Religion Babyloniens und Assyriens) (1910) ; Kittel, B., (Die Aus-grabungen und das Alte Testament (1910) ; Petrie, W. M. F., (Egypt and IsraeP (1910), and many others; Breasted, J. H., (Ancient Records of Egypt) (1905), and other works; Rogers, R. W., (Cuneiform Parallels to the Old Testament (1912) ; Barton, G. A., Archaeol¬ ogy and the Bible* (1916) ; Cobern, C. M.„ (Recent Explorations in Palestine* (1915), (The New Archaeological Discoveries) (1917); Deissmann, G. A.,(Bibel-Studien) (1895; 1897) ; (Licht vom Osten* (1898; Eng. trans.) ; (Paulus* (1910) ; Montgomery, J. A., (The Samaritans) (1907) ; Goodspeed, E. J., (His¬ tory of the Babylonians and Assyrians-' (1917).

Versions: Schaff, Ph., A Companion to the Greek Testament and the English Version > (New York 1889) ; Westcott, B. F., (A Gen¬ eral View of the History of the English Bible* (1869; 3d ed., 1905) ; (History of the New Testament Canon* (1855) ; Loisy, A., (Histoire du texte et des versions de la Bible *(1895); Kenyon, F. G., (Our Bible and the Ancient Manuscripts, being a History of the Text and its Translation (1896) ; Swete, H. B., (An Introduction to the Old Testament in Greek* (1900), and article, (<Bible Translation,® in the Schaff-Herzog (Encyclopaedia) (New York 1908-11) ; Lortsch, (Histoire de la Bible en France) (1910) ; Margolis, M. L., (The Story of Bible Translations) (1917).

Among more general works should be named Lightfoot, J., (Horae Hebraicae et

Talmudicae* (1684); Rawlinson, H. C., (The Cuneiform Inscriptions of Western Asia* (1861-84); Schiirer, E., (Geschichte des jiidischen Volkes, etc.*, (1890); Eng. trans.); Stade, B., (Geschichte des Volkes IsraeP (1881-88) ; Maspero, G., Hlistoire ancienne des peuples de

l'Orient* (1895-) ; Meyer, E., (Die Entstehung des Judenthums* (1896) ; Weizsacker, K., (Das apostolische Zeitalter, etcP (1886) ; Ritschl, A., (Die Entstehung der altkatholischen Kirche* (1850), (Die Christliche Lehre von der Rechtfertigung und Ver-sohnung) (1870-74) ; Lipsius, R. A., Acta Apostolorum Apocrypha* (1891), and (Die apocryphen Apostelgeschichten und Apostel-legenden) (1883-90). On the Mythical Theory of Christian Origins, connected but not to be confounded with the views set forth in (Ecce Dcus) (1911) and (Der vorchristliche Jesus) (1906), consult Robertson, J. M., (The His¬ torical Jesus) (1916), (The Jesus Problem) (1917), and earlier works; Drews, A., (Die ChristusmjUhe* (1909), (Die Zeugnisse, etcP (1911), both also in English; contra, Case, S. J., (The Historicity of Jesus) (1912) ; Conybeare, F. C., (The Historical Christ* (1914) ; Thorburn, T. J., (The Mythical Interpretation of the Gospels *; also elaborate reviews by Smith in the Monist; also Sadler, G. T., (The Origin and Meaning of Christianity* (1916) ; Lublinski, S., (Der urchristliche Erdkreis) (1910). Among countless Journals, besides the publications of learned societies, may be named: The American Journal of Theologv (1897-) ; Bibliotheca Sacra (1844-) ; Hebraica

(1884-95), continued as American Journal of Semitic Languages and Literatures (1895-) ; Harvard Theological Reviezv (1908-) ; Prince¬ ton Theological Review (1890-) ; Journal of Theological Studies; Jewish Quarterly Review; Expositor ; Expository Times ; Menzies' Re¬ view of Theology and I'hilosophy (1905-) ; Revue biblique ; Revue des Etudes juives ; Re¬ vue archeologique ; Revue Semitique; Studien und Kritiken; Hilgenf eld's Zeitschrift fur wis-senschaftliche Theologie (1858—) ; Zeitschrift fur die alttestamentliche Wissenschaft (1881—) ; Zeitschrift fur die neutcstamentliche Wissen¬ schaft, *etc.* (1 900—) ; Archiv fiir Religions-ivissenschaft (1897—) ; Theologische Literatur-zeitung; Tlieologisch Tijdschrift (1867-) ; Didaskaleion (191 2—) ; invaluable the Theologischer Jahresbericht (1 88 1 —) . Among works of Reference: William Smith's dictionary of the Bible) (1860-65), superseded by Hasting's dictionary of the Bible* (1898 et seq.) ; Vigouroux, F., dictionnaire de la Bible* (1895 et seq.) ; Migne, J. J., < Encyclopedic The-ologique) (1847). The highest critical level is attained by Cheyne and Black's (Encyclopaedia Biblica) (1899-1903) ; invaluable the (Jewish Encyclopedia) (1901-06), a treasure-house of knowledge elsewhere almost inaccessible. Valu¬ able also the (Catholic Encyclopedia* (1907— 12). The great French and German en¬ cyclopaedias have enlisted the highest abilities of the masters of criticism, as the Schaff-Herzog (Real-Encyclopadie) (Eng., New York 1908-11). If from the foregoing it should appear that

Biblical criticism, especially the (Introduction, } has been in large measure a German discipline, the reason is to be sought in the Reformation and the more tolerant con¬ ditions it engendered, as compared with the firm and often harsh repression that has uni¬ formly met the struggling religious spirit both in the East and in the West.

William Benjamin Smith, Emeritus Professor of Philosophy, Tulane Uni¬ versity.

BIBLE, History of Old Testament In¬ terpretation. Jewish. — Of all peoples the Jewish is the People of Exegesis. For over 1,000 years it poured out all its literary energy in the interpretation of its Bible. When Hebrew philology was born, the one scientific birth of Mediaeval Judaism, it was at once diverted to swell the stream of biblical exposition; when the philosophy of religion was born, the tale was repeated, and even the mysticism of the Qabbala met a simi¬ lar fate. All the rivers of the Hebrew mind have run into the sea of Hermeneutic.

The key-word of this devotion is darash, (<to seek,® as in Ezra vii, 10, <(to seek the Law of Yahveh® — whence midrash (inquiry), which for generations was only oral. As the national science, it was developed by the Pharisees in two main directions, Miqra' (Holy Writ as read) and Mishnah (repetition, tradition, in¬ struction). This latter branched into Mid-rashoth proper, expositions of Scriptures, and (as first shoot therefrom) the legal Halakoth (customs), statutes derived by exegesis from the Law, with others of oral tradition, to be traced back to the Law, and the moral Hag-gadoth (reports), expositions and illustrations connected not with the Law but with materials

derived from other scriptures. This deduc¬ tion of the Halaka from the Law was also called Talmud (learning). The Tosefta (strict¬ ly 7 osefata, increments) supplements the Mishnah. The earliest known commentary on any text is the Midrashim to four books of the Pentateuch: Mekilta (rule) on Exodus, Sifra on Leviticus, Sifre

(Writings) on Numbers and Deuteronomy. The sages of the Mishnah and the Baraitha (“outside® tradition), called Tannaim (“teachers®), flourished from 10 to 220 a.d.

W ith advent of the Amoraim (“speakers,® 219-500) came a change: The Mishnah itself was interpreted, and the whole body of this interpretation (in the second degree) was con¬ solidated later and edited in the two Talmuds, Babylonian (Babli) and Palestinian (Yerushalmi) and alongside of them the Targum litera¬ ture was extended to the whole Hebrew Bible. From Hillel (30 b.c.) on, the names of the expositors begin to appear. Hillel himself formulated seven Rules for halakic exegesis ; his pupil Johanan ben Zakkai followed with a sort of symbolic exegesis, which flourished be¬ tween the two destructions of Jerusalem (70 and 135 a.d. by Titus and Hadrian), a period of symbolism dominant in Christian ranks. Two opposing leaders were the liberal Ishmael ben Elisha, — who expanded the seven Rules to 13, a number afterward raised by Eliezer to 32 (for Haggadah), and laid down the doc¬ trine of the human form of expression in the Bible, — and the rigorist Aqiba ben Joseph, who held every minutia of the sacred text to be significant, and successfully built up tradition as a hedge about the Law. This first period of Jewish exegesis ends with the final redac¬ tion of the Talmud (ca. 500).

Meantime among the Minim (sectaries) and even occasionally among the orthodox there had been considerable infiltration of foreign in¬ fluence, which showed itself in curious specula¬ tions and esoteric doctrine (Ma’aseh , “work®) about Creation (B’reshith) in Gen. i, and the chariot (Merkabah) in Ezek. i. Outside rab¬ binical ranks, Josephus wrote practically a Com¬ mentary on the Bible in his (Archaeology, J and Philo tried to show by thorough allegoriz¬ ing that Greek philosophy had been anticipated by Moses. This exegesis by the Tannaim and Amoraim contained much acute and even just exposition — the depths of the Talmud are in¬ deed thick-strewn with pearls, and would that well-equipped divers might bring more of them up ! — but still more downright imposition of meaning on the text; as Ishmael b. Elisha finely said in rejecting an exegesis of Eliezer b. Hyrcanus : “In fact, you say to Scripture, Be silent while I expound® (Sifra on Lev. xiii, 49). The Babylonian Amoraim distinguished between Peshat (outstretched , manifest, primary sense) and Derasli (Midrash-exposition), declaring but not obeying the maxim that the latter could not annul the former; in the practice of the centuries following the final redaction of the Talmud, the Peshat vanished, only Derash was left, though the Masorah (“fetter®’) still hedged the Law after a fashion.

In the 8th century the Qaraites (Lecturists, “Sons of Scripture,® Bene Miqra’), founded by Anan, disclaiming tradition, reacted from the Midrash back to the Bible itself (reminding

one of Luther). The illustrious Saadya* (892-942 a.d.) , prince of all his order, in turn reacted still more powerfully against them and thereby stimulated them to worthier efforts, some of which made real advances. Benjamin Naha-vvendi revived Philonism ; Chivi of Balkh (885 a.d.) avowed rationalism and gave 200 reasons, historical and legal, against the authenticity of the Pentateuch. For his perversity he is nick¬ named Al-Kalbi (the Cynic) instead of Al-Balki (used only once). Aaron b. Elijah’s (Crown of the Law) (Keter Torah) in the 14th century was the swan-song of Qaraism in exegesis, though Isaac ben Abraham Troki (1533-94) produced in his (Fortress of Faith > (Chizzug Emunah) — translated and published repeatedly in several languages, as late as 1873 in both German and Hebrewˆ — a masterpiece of po¬ lemic, which, according to the word of Voltaire, left the anti-Christian critic nothing new to discover.

Under Saadya, Gaonf of Sura, the Peshat came once more to its own. Writing in Arabic, he not only founded Hebrew philology but strove hard to rationalize all his Bible and har¬ monize it with philosophy. In this interest his follower Abulwalid ibn Ganach did not shrink from transposing and interchanging let¬ ters extensively, holding that the authors put one word for another by mistake, a drastic method by which one of his disciples explained 200 passages. Moses ibn Giqatilla even dared to explain miracles rationalistically, inviting there¬ by the attacks of Ibn Balaam, and wras the first to essay a continuous historic interpretation of the Psalms and Isaiah, dating the former from the Exile and the latter part of the latter from the Second Temple, — so winning the honor of frequent citation by Ibn Ezra. Such under Arabic contact was the golden age of Jewish thought in Spain, which held fast Saadya’s principle that Scripture did not transcend Rea¬ son even in the loftiest flights of religious ex¬ perience. To make the twain agree called for high-handed freedom with the former, since the latter was inexorable, and philosophic Midrash began to threaten Peshat. Meantime in Christ¬ endom, particularly in northern France, the exegetes (Darshanim) were active, and R. Solomon ben Isaac (called Rashi, 1040-1105) w’rote his great common-sense exposition of the Scrip¬ ture, in particular, the Law, never yet sur¬ passed in circulation and acceptance. But the ablest work of this French School was the Pentateuch Commentary of Samuel b. Meir, who held firmly that interpretation must be un¬ fettered by tradition. Lastly, Joseph

Bekor Shor gave a foretaste of modern criticism in assuming a double narrative in the Pentateuch. So considerable was the accomplishment of common sense unguided by scientific philology or philosophic culture. Somewhat later (1140) the rover of learning, Abraham ibn Ezra (1092-1167), in the noon of his days “departed from his native place, in Spain, and went to Rome,® spent 27 years of travel in France, Italy, Eng¬ land, and brought the highest scholarship then known to his Hebrew Commentary, notable for courage as well as caution, for compass even

* Variously spelled even by Saadya himself. The form Saadia seems most common—

f Highness, Excellency, title (first conferred by Ali on Mar Isaac) of presidents of the Jewish academies at Sura and Pumbedita in Babylonia (609-1038).

more than for depth, in general conservative yet admitting minor accretions to the Penta¬ teuch, to which a nebulous note on Deut. i would seem to ascribe post-Mosaic authorship, and hinting a later origin for Is. xl-lxvi. In traditional exposition he sees no exposition proper, but only ˆsuggestion,® ˆreminder,® mnemonic device. The Kimchis, Joseph and his two sons, Moses and David, the latter the chief of all, agreed with Ezra but insisted more on grammar and rationalism, besides inveighing against Christian interpretation of the Psalms. Following but far surpassing all these, Moses Maimonides (Rabbenu Mosheb bar Maimon Haddayyan, of Cordova, 1135-1204), court-phy¬ sician to Saladin of Egypt, mathematician, as¬ tronomer, Talmudist, the Aristotle of Jewry, and leader of all the expositor-choir, in his (Mishneh Torah5 digested and almost super¬ seded the Talmud itself, and in his Arabic (Guide of the Erring5 (Daldlatu ’ l-Hdirin , or, in Hebrew, Moreh Nebukim) essayed the recon¬ ciliation of Moses and the Stagirite. Of course, such an attempt laid all the resources of meta¬ phor, figures, esoterism, symbolism and the like under heavy contribution, but it abjured all mysticism, remaining rationalistic throughout. At miracles and prophecies it might seem to balk, but a

theory of visions contrived to trans¬ fer much from the physical and objective with¬ out to the psychical and subjective within. Translated into Hebrew, it naturalized Aristotle in the Jewish mind and was propagated in a long succession of philosophic interpretations, some of which launched out boldly upon shore¬ less allegory.

Two beliefs now dominating, that there must be a deeper meaning in the Bible than the literal, and that all truth is hidden therein, gave rise (about 1268) to mystic exposition called Secret Wisdom (Chokmah Nistarah) or Qabbala, and at the same time to the Gema-tria * of Eleazer ben Judah at Worms, on which the Qabbala itself is based. Bachya ben Asher commenting on the Law (1298) recognizes four Ways to Truth: Peshat, Midrash, Reason, Qabbala (<(path of light®). More portentous was the simultaneous in¬ troduction into Spain by Moses de Leon of Zohar (Light), a commentary on the Pentateuch, with many digressions and addi¬ tions, professing a hoary antiquity for its mysticism as having been taught by the sages of old, even by Aqiba's pupil, the wonder¬ working Simeon ben Yochai. It also taught four Senses of Scripture: Peshat, Remez (al¬ lusion), Darash and Sodh (secret, mystical), — which indeed it had borrowed from such Christians as the Venerable Bede (673-735), who thought the inner sense surpassed the letter as apples do leaves (cp. Jerome, Ep. ad Gal. i, 2), and Hrabanus Maurus (776-S56), Preceptor Germanise. Hence the consonantal acrostic PaRDeS (Paradise), known since Aqiba, came into vogue as the tenet of the fourfold sense, f which had already marked

* Letter-art, interpretation by numbers, words of the same numerical value being treated as equivalent. It is found in the Talmud and was employed probably much earlier.

t Beautifully allegorized in Zohar (ii,99): Doctrine shows herself to her beloved, her chosen, at first beckoning with her hand (in Remez) then lisping a few words through a thick veil (in Darash), then speaking through a thin veil (in Haggada), at last conversing face to face and heart to heart (in Sodh).

hermeneutic with long and broad eclipse. Herewith the night of one and a half centuries settled down on Jewish Biblical Exegesis, till the morning star of Mendelssohn arose. One lamp indeed was still lit in the dark, the learned and unwearied grammarian and lexicog¬ rapher, Elijah Levita (1468-1549), whose (Masoret Ha-Masoret5 (Venice 1538) demon¬ strated the human and post-talmudic birth of vowel-

points, to the indignant dismay of the orthodox, both Jew and Gentile, who had ac¬ counted them primitive and divine. Mean¬ while the hunt for many meanings went bravely on, and in Poland with especial vigor and success: in 1630 Nathan Spira discovered 250 senses for Deut. iii, 24ff, only alas! to be outvied by Elijah b. Abraham Oettingen, who brought 365 to light.

Moses Mendelssohn (1729-86), the (<Na-than® of Lessing, victor in competition with Kant (1763), by his Commentary on Eccle¬ siastes (1773) and still more by his translation of the Pentateuch (1783) recalled the Rabbis to reason. His coworkers, called Biurists (from Bi'ur, exposition), translated and com¬ mented (in German, at first in Hebrew letters, later in German). Similarly each nation now received its own translation, Luzzatto's Italian and Cahen's French being especially valuable. Nevertheless, in the marvelous advance of the last century toward the comprehension of their Scriptures, the Jews have rarely been con¬ spicuous in front. Though abounding in ability and learning, they have suffered from lack of organization in universities and academies ; their attention has been in large measure absorbed in the study of post-biblical Judaism, a terrain immense and dear as fatherland to their hearts, wherein only they are at home ; and the rapidly increasing complexity of modern life has burdened the Rabbinate with social activities and countless extra-scholastic cares. But when all is said it remains true perhaps that the Jewish scholar has put off his sandals, as treading on holy ground, — <(he feared the gods and heroes and spake low,® — he has not quite found as yet a modus vivendi with the dissolvent criticism of the last 60 years, he awaits another turn of the wheel. Witness the recent severe stric¬ tures of David Hoffmann in (Die wichtigsten Instanzen gegen die Graf-Wellhausensche Hypothese5 (1904) and his uncompromising statement of the (orthodox) Jewish position on the whole Bible-question, in his (Leviticus 5 (1905-06): «As we are firmly convinced of the divinity of the Halakoth, the words of the Tradition count for us exactly as much as the words of the Scripture® (p. 2) ; (<Our first principle is : we believe that the whole Bible is true, holy, and of divine origin, — every word of the Torah was written down at the command of God® (p. 6) ; (<The second principle, which must guide every Jewish ex¬ pounder of the Bible, is the assumption of the integritv of the Masoretic or traditional text® (P-7).

Hoffmann's contradiction, dealing mainly with matters of the Law, would evade the critics by supposing frequent changes and adaptations of the Torah during the wander¬ ings of-the 40 years (it were better 40

squared),* while on the other hand Siegmund Zampel has treated the historic features in detailed articles but has developed no syste¬ matic anticritical view. Both are constrained to many unpalatable concessions, and Barth renounced the pretension of Is. xl-lxvi to proceed from the son of Amoz. More liberal Rabbis, as Graetz, Hirsch, Jacob, have sought peace with the Higher Criticism, while blunt¬ ing its edge at various points, and the Breslau editor, Rabbi A. Geiger (1810-74), has clearly shown in his (Urschrift und Ueber-setzungen der BibeP (1857), that the growing, expanding, self-transforming religious con¬ sciousness of Israel is mirrored in the like-changing text of the Bible, and that the Masoretic as well as the elder forms have shared in this steady evolution. The effect of prolonged study is also strikingly shown in the extremely erudite and even encyclopaedic com¬ mentaries of Marcus M. Kalisch (1828-85) the refugee of 1848, of which ‘Exodus* (1855) is conservative, ‘Genesis* (1858) liberal, ‘Leviticus* (1867, 1872) radical, forestalling Wellhausen at many capital points.

Most of all, Professor David Neumark in his (German) ‘ History of Jewish Philosophy* has brought this discipline to the aid of Judaism, seeking to supplement and correct the Higher Criticism into accord with a deeper and broader view of the genesis of the Idea of God under the influence of Prophetism. Plainly, then, the counter currents are as strong in Judaism as elsewhere, and there is no reason to fear that Jewish exegesis will not yet catch up and keep pace with Gentile, remembering that the vehicle of revelation is not any lifeless form of human speech but the everliving spirit of the People itself.

Gentilic. — Since the Christian movement took its rise among the Jews of the Dispersion, in Galilee of the Gentiles (Matt, iv, 12-16), the attitude of the early disciples toward the Hebrew Scriptures can hardly have differed sensibly from that of the Jews, among whom Hellenistic vied with Rabbinical methods. Very soon, if not indeed at the start, allegoric interpretation acquired vogue and prevailed. <(Which things are an allegory,® Gal. iv, 24. The Scriptures were

regarded as . so many sign-posts all pointing toward the “consummation of ages,® and all previous history was viewed as reflected in the present. <(These things were our examples,® ((that Rock was Christ® (1 Cor. x, 6, 4) ; “whatever was fore-written was written for our learning® (Rom. xv, 4), *etc.* From such premises the Scrip¬ tures were speedily interpreted throughout as prophecies in types, and out of them elaborate lives of Jesus were constructed, as m the epistles of Barnabas and Ignatius, in the writings of Justin and of still earlier and later Christians generally. From such inter¬ pretation the step was easy and natural to invention : if the event was not known to have occurred, our knowledge was defective. Clemens Alexandrinus in his (Stromata) (VI, 673, Sylb.) defines the fourfold engrafting

* Aqiba held that the whole ritual was given thrice, first on Sinai, then in the tent of meeting, finally in the plain of Moab; so Hoffmann assumes four sets of Laws: Pre-Sinaitic, Sinaitic, tent-of-meeting, and Arboth-Moab; of these the content is “eternally invariable,” but the form is subject to change with time and circumstance. (‘Leviticus’, i, p. 22.)

of the sacred word, the last or gnostic form being able (like Sodh) to look through things themselves. Origen, adopting 13 of Philo’s 23 rules and distinguishing three senses of Scripture, corresponding to Body, Soul and Spirit, carried allegoric interpretation to al¬ most inaccessible heights. Under this or that form the typical or allegorical method (re¬ appearing as an after-image in Hengstenberg) prevailed for centuries, though here and there discountenanced by sober judgment represented mainly by the Antiochan School founded by Lucian (300) and for centuries the vigorous mother or grandmother of the most approved patristic exposition, which still however in¬ sisted on two senses corresponding to the Covenants, Old and New. Jerome appears to have been saner, but inconsistent, unwilling to tie himself even to the allegoric method, which reigned throughout the Middle Ages, the four¬ fold sense being formulated in the couplet: “Literal sense (littera) teaches facts; allegor¬ ical, what to believe ; moral, what to do ; anagogic (mystic), whither we tend.®* No steps were taken by the Church toward even proposing the problem of biblical criticism, of whose existence indeed men were quite un¬ conscious. The faith of Augustine was in truth wounded by the phrase <(unto this day® in Josh, iv, 9, but was healed by the same phrase in Josh,

vi, 25. We have noted many such qualms in reviewing Jewish interpreta¬ tion, but the first scientific criticism we owe to the Neo-platonic Porphyry, who showed, against tradition, that (Daniel * originated not in the Jewish Captivity but 400 years later under Antiochus Epiphanes. For the un¬ troubled conscience of the Middle Ages, the Holy Scriptures served only the purposes of edification and controversy, — the thought of making them the subject of scientific study does not seem to have arisen. At length came stirrings of the dawn. From authority and allegory Wyclif and Hus reacted toward the letter, but it was the Jewish convert Nicolaus de Lyra (1270-1340) who by soberer methods and knowledge of Hebrew displayed in his (Postilla Perpetua) (litteralis in 1322-31, mystica in 1339) made smoother the way for Luther. ((If Lyra had not piped, Luther had not danced® (si Lyra non lyrasset, Lutherus non saltasset). By the Council of Trent, how¬ ever, Exegesis was formally immured within four walls : Rule of Faith, Mind of Church, Consent of Fathers, Decrees of Councils.

With the Reformation, Holy Writ sprang up into a seat of supreme authority. Said Chillingworth, (<The Bible, and the Bible alone, is the religion of Protestants®; it became the Court of Cassation, of final appeal. Under Luther, Melancthon, Zwingli, Calvin, the mind of the Reformers maintained in some measure its attitude of new-won freedom; but with the 17th century the Dark Ages of Confessionalism closed down upon Europe, for 150 years, dur¬ ing which practically no advance was made toward understanding the Scriptures. However great the talents of the learned, they all lay wrapped up in the napkin of implicit faith (Hobbes). A rude shock to this slumber in the all-sufficiency and verbal infallibility of the

* Littera gesta docet, quid credas allegoria,

Moralis quid agas, quo tendas anagogia.

Scriptures, as known to clergy and people, was given by the demonstration (already noted) of Elijah Levita, which was indeed

violently re¬ sisted by the Buxtorfs (1564-1664) and others, but was confirmed (1650) by Louis Cappel (1585-1658)* and at length sullenly admitted. Nevertheless, no awakening followed. The mind of the Reformed Church turned over again to a sleep continually troubled by dreams of contending dogmas. It was one of the vir-ilest and widest-armed, if least attractive, of English thinkers, Thomas Hobbes (1588-1679), who in his well-named <Leviathan) (1651), with the unclouded eye of common-sense, armed with no lens of exact philology, first saw and proclaimed the general conception of Hebrew Scriptures that has now long since become the common property of culture. From obvious considerations he shows (c. 33, pp. 200-203) <(that the five books of Moses were written after his time, though how long after it be not so manifest,® while allowing his authorship of the ((volume of the Law® (<found again by Hilkiah, and sent to King Josias (2 Kings xvii, 8).® The ill-famed ((unto this day® and similar phrases refer Joshua, Judges, Ruth, Samuel to times ((long after® those persons, even <(to the day of the captivity of the land® (Ju. xviii, 30). Similarly Kings and Chroni¬ cles, as also Ezra and Nehemiah, are shown to have been written (<after the captivity® and Esther during the captivity <(or after it.® As to the rest, he departs in general much less from tradition, though regarding Job not as history but as philosophy and poetry (<in Hex¬ ameter verses,® with Prologue and Epilogue in prose. The Psalms seemed to him mainly Davidic, though edited after the Captivity, Proverbs the compilation of a <(godly man, that lived after them all® (the authors) ; Ecclesiastes and Canticles ,are ((Solomon's.® Strangely, Sophoniah is <(among the Prophets the most ancient,® and ((if the … Apocrypha … be credited, the Scripture was set forth in the form we have it in, by Esdras.® In the preced¬ ing chapter Hobbes speaks from the summits of intelligence and freedom (pp. 196-197), only to sink at once into the depths of servility (198-199), but his example is extremely instructive as showing what triumphs are possible to the open mind. The Englishman did not excel in keen¬ ness many others, both Jew and Gentile, who far surpassed him in technical mastery of the subject in hand; and yet he saw clearly what had been hidden from rabbinical pilpul and clerical scrutiny for nearly 2,000 years.

Hobbes was soon followed by a far greater thinker far better equipped. In 1670, while the leviathan,* formerly sold for eight shillings, having been condemned in 1666 by Parliament, was selling at 30 shillings, <(it being a book the bishops will not let be printed again® (Pepys' (Diary,) 3 Sept. 1668), Baruch de Spinoza (1632-77) published anonymously his noble plea for ((freedom of thought and speech® (liberta-tem philosophandi) , (Tractatus theologico-politicus,* the

groundwork of modern criticism, wherein having set forth in chapter VI a purely rationalistic doctrine of miracles, and in chapter VII a common-sense method of interpreting Scripture from Scripture alone, he proceeds in

* For 10 years his manuscript sought a publisher; Buxtorf tried vainly at first to dissuade and then to refute.

chapter VIII to lay the foundations of histori¬ cal criticism of the Old Testament by discuss¬ ing in detail the authorship of the Pentateuch and the other historical books <pf the Old Testa¬ ment beginning with the mystic note of ((Aben Ezra® on Deuteronomy, which he expounds, and concluding that ((it is clearer than the sun at noon that the Pentateuch was written not by Moses but by some one living long after Moses,® to whom indeed he attributes other writing, but not the Pentateuch. From various considerations, as of the phrase <(unto this day,® he deduces that the book of Joshua <(was writ¬ ten many generations after his death,® and Judges <(after the establishment of the monarchy,® and Samuel ((many generations after Samuel's death,® and Kings compiled, he does not say when — but <(all the books we have hitherto considered are compilations,® — he might have still said mosaic, no other term is so fitting. But the compiler, he thinks, (<was a single historian,® most probably Ezra, and if we had the originals, (<we should find a great difference in the words of the precepts,® their <(order,® and the ˆreasons® assigned. He thinks (<that all the materials were promiscuously col¬ lected and heaped together to be more readily examined and arranged thereafter.® The work was never completed by Ezra, for unknown <(cause, if it were not untimely death,® whence the duplication and confusion still reigning. He also discusses the marginal readings and the vowel-pointing, which he thinks is always human and sometimes wrong, as in Gen. xlvii, 31, where he would read mate (staff) — as does the Septuagint and Heb. xi, 21 — instead of mita (bed), a criticism with which com¬ mentators do not in general agree. The text, he thinks, has felt the tooth of time, has suf¬ fered various corruption, as witness the 28 cases of hiatus, and the rabbinical readings in the Talmud, often different from the Masoretic; also it was singularly exposed to corruption from the painful resemblance between pairs of Hebrew letters, as Beth and Kaph, Daleth and Resh, Vav and Yod, and he might have added Gimel and Nun, He and Cheth, and even Tav. While there is much in these chapters (VIII-X), that would call for revision or reversal, and while the doctrine of the ˆsimplicity of the Scripture® and its ((purely moral precepts® is superficial, it remains nevertheless

that the philosopher anticipated the method and spirit and many of the results of modern research and blazed a path through a hitherto im¬ penetrable forest.

However, he won no followers for nearly a century, such was the obloquy that clouded his name. In 1682, Father Richard Simon, of the Oratory of Paris, in his (Histoire critique du Vieux Testament, } argued against the single authorship of the Pentateuch on literary grounds, since the style varies where no variety of matter requires it, but the positions of Hobbes and Spinoza were not attained. A further step in pure literary appreciation was taken (1753) by Robert Lowth (1710-87) as professor of poetry at Oxford in his (Academic Lectures on the Sacred Poetry of the Hebrews, > and his translation of Isaiah (1778), in the an¬ nouncement and application of parallelism in Hebrew verse, a peculiarity apparently derived from Babylon (Schrader), already known im-

perfectly to Schoettgcn and even to Rabbi Azarias. In the same year (1753) a much more iniportant advance was made — again on purely literary lines and again by a layman, the Catholic Jean Astruc, in his celebrated (Con¬ jectures sur les memoires originaux dont il paroit que Moyse s'est servi pour composer le livre de la GeneseC wherein he announced that Moses in Genesis and Exodus i, ii made use of two large documents, A and B (besides 10 small ones), distinguished bv use of the divine name: Elohim in A and Yahveh in B. The path thus opened was diligently followed for 155 years; not until 1908 did Eerdmans diverge from it boldly. But though Astruc (1684-1766) rendered a notable service in supplying criticism with its first purely literary criterion of author¬ ship, he himself lingered far behind the stand¬ point of Spinoza (whose ((vain triumph® he would ˆannihilate®) or even of Hobbes, his ob¬ ject being a pious one, to remove obstacles in the way of accepting Mosaic authorship, and his book a strange mixture of naivete and acute¬ ness. He builded better than he knew ; and it may be well to remark that as the first ancient Old Testament critic, Porphyry, was a metaphy¬ sician, so were the

first moderns, Hobbes and Spinoza, while Astruc was physician to Louis XIV, and all were dilettanti. It is also inter¬ esting to note, and significant, that many of the boldest discoveries were not the intuitions of youth nor even the conquests of middle life, but the ripe fruitage of time, the hard-won trophies of declining years. But even Astruc's cry was long unheard in the wilderness. At length under the stimulation of Herder (1744— 1803), the philosophic literateur, in 1780-83 Eichhorn (1752-1827) brought forth his (Einleitung, } the first comprehensive treatment of the Old Testament as literature.* He adopts and extends Astruc's analysis of Genesis into Elohistic and Yahvistic portions, and distin¬ guishes between the people's Code (Dent.) and the preceding priestly legislation ; moreover, while still clinging to Mosaic authorship he recognizes many fragmentary documents em¬ bedded in the Five Books, whence the name Documentary Hypothesis ; he detects in Isaiah, as had Koppe in his translation of Lowth, much that is non-Isaianic, in Daniel no little that is post-exilic; and he displaces the Song from the age of Solomon and the Preacher into the Per¬ sian period (538-332 b.c.) — results that have won him the title ((Founder of Modern Old Testament Criticism.® Twenty years later they were restated in a modified form as the Frag¬ ment-Hypothesis f by the unfrocked Catholic Scot Alexander Geddes (1737-1802), by whom <(almost solely® (fere unicus) Eichhorn was willing to be judged, in his (Critical Remarks on the Hebrew Bible } (1800). But on the

island the season of figs was not yet. The next forward move was made in 1798 by another layman, K. D. Ilgen (1763-1834), in his splendid torso, documentary Archives of the Jerusalem Temple in their original Form* (1798), by dis¬ cerning two Elohistic sources where Astruc and

* In the preface to the second edition (1787) he appro-riates the term "Higher Criticism," already familiar in umanistic studies and brilliantly illustrated by Richard Bentley (1662-1742) in his 'Dissertation upon the Epistles of Phalaris '(1699).

fit is noteworthy how Document-hypotheses tend to dissolve into Fragment-hypotheses, a tendency vigorously resisted by Smend in his 'Erzahlung des Hexateuch' (1912).

Eichhorn had seen only one. But thus far criticism had remained merely literary, starting no question of the evidential worth of the docu¬ ments or sources, a question first brought to the front (1806—

14) in the Contributions to Old Testament Introduction,* the first and best work of the many-sided de Wette (1780-1849), the pioneer of historical criticism, also inspired by Herder in the golden days of Weimar. Turning first to Chronicles, he exhibited its fictive and tendential character, thus clearing away a thick cloud from the history and re¬ ligion of Israel; next he brought Deuteronomy down to the 7th century, where Parvish in his (Inquiry into Jewish and Christian Revelations* had first placed it (1739), and proved that the history from Judges # to Kings contradicted the dogma of Mosaic origin of Pentateuchal legis¬ lation,— all permanent achievements of criticism.

Though a poet, de Wette gave no rein to historic imagination, and indeed all work thus far had been almost entirely negative. In strik¬ ing contrast was the personality and with it the work of Heinrich Georg Augustus von Ewald (1803-75), protege of Eichhorn, <(founder of a new science of the Hebrew language,® critic, controvertist, patriot, — expelled, exiled, tried, acquitted, condemned, imprisoned, — but above all the constructive historian with the gift of tongues, the Niebuhr of Israel as it was in the mind of the first half of the 19th century. His central work, (History of the People Israel * (1843-59; Eng. tr. 1867-74), the product of boundless learning and 30 years of untiring investigation, is a glorification of Israel as the inspired people of God, whose history is the history of the Revelation of Religion to the Race, in a Trinity of Stages, as Hebrews, Israelites, Jews, through three half-milleniums, from the Exodus to the final complete and per¬ fect self-manifestation of God in Christ. On such a huge canvas this passionate artist-scholar, this ((backward-gazing prophet,® has painted the life of the chosen people. Although still deeper study and exacter thought have cast aside the picture as false in color and faulty in drawing, its place is secured among the creations of genius by the immensity of knowledge dis¬ played and the technical skill, by the infinite fineness and minuteness of delineation, the rich¬ ness and vividness of tone, the dramatic skill and boldness of the composition, and by the un¬ wavering faith, the devoted and unflagging enthusiasm that the author has brought to his task. Ewald did not in truth lift or roll away the clouds that hung dark over the history and literature of the People Israel, but he lit them up with the splendor of his learning and imagination into a luminous haze, where we behold <(vast forms that move fantastically® to the charm of his dogmas and preconceptions.

So great was the authority of this Gottingen oracle that for a full generation a conception widely different from his called vainly for recog¬ nition. Ewald had made classic the notion, held by Dillmann with some modifications till his death (1894), that the priestly

legislation (called by him (Book of Origins* and now denoted by P) was the oldest stratum of the Pentateuch, was Grnndschrift (Tuch) or basis of the whole, on which the prophetic parts (J E) and Deuter¬ onomy were later deposits. But as early as 1832

Eduard G. E. Rcuss (1804-91), as privatdocent in the Strassburg Theological School,- had per¬ ceived and maintained in lectures, though he dared not publish, that the order was the re¬ verse, that P came last in time. It was Vatke (1806-82), however, who first gave such views to print (1835) in his (Religion of the Old Testament,5 but without effect on critical opinion, having relied, as Hegel's pupil, on a priori principles, on a just perception of what would be the natural order in the development of Israel's religion and ritual, rather than on any actual determination and interpretation of literary or historical facts. Ewald's towering construction received its first concussion (1866) from the (Historical Books of the Old Testa¬ ment,5 by Reuss' pupil, K. H. Graf (1815-69), but the decisive blow was delivered by the Dutch master, a <(prince of critics,55 Abraham Kuenen (1829-91), who, starting but quickly departing from Ewald's standpoint, developed and demonstrated the Reuss-Graf theory in his celebrated Codsdienst van Israel5 (1869-70), a lasting model of clear, judicial, convincing ex¬ amination, followed by a series of supplemen¬ tary proofs in the leading Dutch journal, Theologisch Tijdschrift, as well as by his compre¬ hensive and exhaustive (Onderzoek5 (Inquiry), *etc.* Hereby to the unbiased mind the matter seemed decided, but it was Julius Wellhausen (1844-1918) who with astonishing mastery of detail and with sovran power in historical com¬ bination overcame the most determined opposi¬ tion and compelled the assent of the most re¬ luctant converts, though of the two props of the earlier construction, Delitzsch and Dillmann, the latter remained unconvinced till death. Wellhausen's incisive memoirs were followed 1878) by his (Prolegomena zur Geschichte Israels,5 reprinted (1883) as first volume of (History of Israel5 (tr. 1885), and (1894) by Hsraelitische und Jiidische Geschichte5. Hereby was established the school that in spite of Harold M. Wiener still

dominates Old Tes¬ tament criticism.*

Meanwhile there had been crying in England the voice of Kuenen's (<valued friend,55 Jn. Wm. Colenso (1814—83), bishop of Natal, through his (Pentateuch and the Book of Joshua critically examined5 (1862, 1871, 1879), wherein he showed forth the fictive nature of the story in P and the many contradictions of the Hexateuch, having been impelled to critical inquiries, while trans¬ lating Genesis, by the puzzling question of his Zulu converts: ((Is all that true?55f His fellow-bishops answered by deposition in Africa and excommunication in England, allowing him however the unique distinction of learning and ability employed otherwise than as a humble

* Smend's "masterpiece," comparatively conservative, 'Die Erzahlung des Hexateuch' (1912), distinguishes three parallel Judaic sources: Ji (850-800 B.c.), J2 (great poet, greatest Old Testament historian, 800-750), E (prophetic-Israelitic, after 700); combined in two redactions: Ri (Ji + J2)t R2 (Jlt J2 + E); with later Interpolations, as of the 'Book of the Covenant': all the work of Yahvists, of Mosids opposed to Aaronids of Jerusalem. Next is Deuteronomy, two editions: D! with the Introduction (U-4«) by an author before downfall of Judah; D2 with the Introduction (441-113-) post-exilic. Lastly, P (Priestly Code and History), in which are many extensive secondary elements. Redactors are always at hand. Apart, by itself, stands the Law of Holiness (Lev. xvii — xxvi).

t The words of the noble Bishop deserve commemoration: "My heart answered in the words of the Prophet, Shall a man speak lies in the name of the Lord? I dared not do so." The converts had converted their converter.

though useful drag-sail. Hardly was the dis¬ cordant cry of Colenso happily silenced, when it was caught up in re-echo much louder from Holland; for as he had stimulated Kuenen, so had Kuenen stimulated W. R. Smith (1846-1894), from 1881 editor of the (Encyclopaedia Britannica5 (9th ed.), who began (1875) to publish a long series of epoch-marking articles from the pens of himself and others, in particu¬ lar Cheyne (1841-1915) and Wellhausen, arousing lively interest and acrid controversy. Denounced (1876) as the ((echo of a dreary voice from Holland,55 in 1878 he was tried, and condemned by vote of want of confidence. Hereby his opponents won a Cadmeian victory, for his reasonings survived such refutation, and thrown into Lectures, which were published as (The Old Testament in the Jewish

Church5 (1881), (The Prophets of Israel5 (1882), and (The Religion of the Semites5 (1889), they swayed powerfully not only the lay but even the clerical mind of English-speaking peoples. At length in 1891 Dr. S. R. Driver (1846-1914), Regius Professor of Hebrew and successor of Pusey as Canon of Christ Church, Oxford, in his (Introduction to the Literature of the Old Testament,5 though he had formerly criti¬ cized Wellhausen harshly, was able to lend, without any official danger, not only the sanc¬ tion of sober and cautious scholarship (at many other points still timid and compromising) but also the dignity of high position to the heresy that cost Professor Smith his chair; since when, the Reuss-Graf-Kuenen-Wellhausen view may be said to be naturalized in Britain.*

Meantime no less a sea-change has come over the criticism of Prophets and Writings. As a cumulative result of the learned labors of a host of scholars, conspicuous among them Cheyne, Duhm, Kuenen, Marti, Oort, Stade, Welhausen, it came to light that perhaps not one of the prophetic utterances had reached us in exactly its original form, but all had under¬ gone, if not before, at least after the exile, a more or less thoroughgoing or even repeated revision that involved every form of modifica¬ tion, compilation, elision, insertion to an indefin¬ able extent. In fact, it became not so much a question of detaching post-exilic deposits as of certifying here and there the presence of a pre-exilic fossil. Herewith the centre of literary gravity began anew its descent toward the Persian period and even beyond, toward the heroic era of the Maccabees. To appreciate the extent of this disintegration under critical analysis, it suffices to consider Cheyne's Com¬ position of Isaiah5 or the latest edition of Duhm's Commentary5 (1914), which reveal the growth of this prophet as reaching through six centuries, from the 8th b.c. far into the 2d b.c. Similarly the book of Jeremiah crumbles under analysis, as in the monograph of Mowinkel, already cited. It has long been known that the Psalms are of dates the most distant apart, and it is now recognized in such a very conservative work as Kittel's (Die

* To measure this movement in the Church of England compare Driver's chapter on Daniel (485-515) with Pusey 's 'The Prophet Daniel' (1864, 1885) written to refute 'Essays and Reviews' (1860), the work of seven authors, the scandal of its day, but long since overbidden. Driver repudiates all of Pusey's contentions, as does even the Catholic now. Fred. Temple wrote the first of the 'E. and R.' but quietly withdrew it (1870), as harmless but in bad company, on elevation to the bishopric of Exeter.

Psalmen) (1914) that they are mainly post-exilic (consult the brilliant book of Cheyne on the c Origin and Contents of the Psalter,

1890) . Without insisting on other examples, it may be said (as even Sayce has repeatedly avowed) that compilation is surely the open sesame to the correct understanding of the Old Testament. Questions of authorship have long since lost much of their pertinence and mean¬ ing. The authors' names have become signs for certain highly complex phases of the one great Spirit of Israel, which wrote and rewrote, which revised and rerevised, the wonderful scrolls of Scripture. In last analysis, this in¬ deed is the only true conception of any litera¬ ture ; it is the visible sign of some shining phase in the life of Spirit; but in the literature of Israel we are brought to face most fully and unmistakably this momentous fact.

The sifting process, under which the centre of Israel's Bible settles down ever deeper into the Perso-Hellenic period, is it now complete? By no means. Of course, it cannot go on in¬ definitely; sooner or later the final position must be practically attained; but there is still room for notable depression, which has even been attempted of recent years with remarkable energy. It was Ernest Havet (1813-89) who suggested in his compre¬ hensive work (Le Christianisme et ses origines) that <(the supposed antiquity of the prophets placed in the 8th, 7th and 6th centuries is a pure illusion, even as that of the Psalms® (III, 180-213, 1884). The inspiration of these prophets he finds not in the fall of Samaria and Jerusalem under Assyrians and Chaldeans, but in the glorious struggles of Jews against Syrian kings in the 2d century. The reproach was made by Scherer (1879) that Havet, though cer¬ tainly acute as a critic, had no right to speak in the matter, being disqualified by his ignorance of Hebrew and German, and his arguments, ad¬ mittedly ingenious, had little effect. More recently his theses have been revived by dis¬ tinguished scholars of France, such as Joseph Halevy ((Recherches bibliques,) 3 vols., 1895, 1901, 1905), Maurice Vernes ((Resultats de l'exegese biblique,* 1890, JEssais bibliques,* and <Du pretendu polytheisme des Hebreux*

1891) , and especially by Edouard Dujardin ((La Source du Fleuve

Chretien, > 1906; revised and translated 1911), who restores the order of the Hebrew books, not in the spirit of (anticritics) (as Sayce and Orr), by placing the Law before the Prophets, but by placing the Prophets after the Law; this with Joshua, Judges, Samuel, Kings he refers to the 4th and the beginning of the 3d century (adding Chronicles and Ezra — Nehemiah somewhat later), but Jeremiah, Ezekiel, Isaiah and the Twelve to the second half of the 4th and all of the 3d century, and lastly Psalms, Daniel and the other Hagiographs to the 2d century and the 1st (b.c.), — in. all, three grand divisions as of old, in the old time-order, Law, Prophets, Apocalypses. Undoubt¬ edly this scheme, set forth by Dujardin with such impressive eloquence and such vivid his¬ toric imagination, has somewhat to say for itself, and it yields a cleaner-cut answer to some questions than any other yet proposed.*

*The claim is also made that it finds confirmation in the Elephantine papyri (discovered 1906), which show the Jewish colony there receiving from Jerusalem a regulation

For instance, it is not easy to think of Amos, the shepherd of Tekoa, as really author of the prophecies that bear his name but attest con¬ siderable culture and literary art. Guthe is con¬ strained to invoke the aid of ((various redactors® ((whose work was completed in Jerusalem, where in the 3d century b.c. the writings of the elder prophets were collected for the Jewish religious community.® These (<various redac¬ tors® not only ((arranged® prophecies but made various ((smaller additions,® such as the denun¬ ciations against Tyre, Edom, Judah, the second half of Chap. 9, and so on. For how much these ((various redactors® are responsible, it is hard to say. Guthe's claim for Amos is modest enough : ((Without doubt the book is based on notes (Aufzeichnungen) of the utterances of Amos, which he made himself or had others make for him® (Kautzsch, D. H. S., ii, p. 27). <(Without doubt® this (<eldest of the prophets® (760 b.c.) seems hereby virtually surrendered to the <(3d century in Jerusalem.® Similarly Haupt refers Zachariah i-vii to the beginning of the reign of Darius Hystaspis (521ˆ486), the others (ix-xiv) to the Maccabean period, though Driver finds the style of cc. xii-xiv (<singularly pure,® ((the diction resembles that of Amos® (473, 505). But there appears no reason why these ((various redactors® may not in any case have taken very considerable tra¬ ditional material, whether oral or written, of very ancient origin, whether lyric, historic or gnomic, and worked it up into forms better suited to the needs of the community, their own ideas and the historical

conditions under which they lived.* In so doing they may either have preserved the ancient names and reference, or have taken over the ancient names, as Edom, Egypt, Babylon, etc., and applied them to the new political factors, as Rome, Greece, Syria, *etc.* That this latter was a habit is proved by Cohen in (Les Pharisiens,* i, 362, ii, 282. The strife between French and German criticism is far from ended, but in one aspect at least it is largely a question of degree, of the extent of admitted 3d-century redaction.

In still another direction the prevailing Wellhausen criticism, brilliantly culminating in Gunkel's Genesis (1902, 2d ed.), has of late met strong opposition. After 155 years of recog¬ nition the Astruc criterion was formally re¬ jected by B. D. Eerdmans in his (Alttestamentliche Studied (1908-12). The basis of rejec¬ tion is largely laid in a deeper study of the Septuagint, which certainly shows considerable irregularity where order had been held to reign. Thus even in the famous first chapters of Genesis, where the separation into Elohistic and Yahvistic documents appeared almost to lie on the hand, the whole matter seems thrown into doubt by the Septuagint and other wit¬ nesses. The distinguished Semitist of Cornell, Nathaniel Schmidt, in a remarkable paper in the Journal of Biblical Literature (March 1914) has shown that the name YHVH probably did not appear at all in the original so-called

for Passover celebration in 419—418 (at which date the law of Deut. xvi, 6f was therefore not known), but appealing in vain to Jerusalem in 409, whereat they turn to Samaria in 406 — an indication that Deut. xvi, 6f went into effect be¬ tween 419 and 409 B.c.

*To feel the force of such "working-over ' or ' over¬ working," compare Chronicles with the canomcs from Genesis to Kings.

Yahvistic account, and Dahse's immense ac¬ cumulation of evidence in (Textkritische Ma-terialen zur Hexateuchfrage5 (1912) is aimed to show that the variations in the divine name arose from divisions of Genesis into reading lessons, while the priestly portions are the in¬

sertions of a compiler. Most of all, however, Eerdmans' studies pierce deep into the matter and would draw in their train a complete recon¬ struction of Old Testament interpretation. Es¬ pecially he is moved to reject the hitherto ac¬ cepted notion that the legends of Genesis were originally monotheistic — for Eerdmans, in fact, Elohim retains its proper meaning, gods — that the Elohistic narrative is pre-exilic, that (priestly) portions are now to be found in Genesis. Of couse, the dominant school, thus boldly assailed in its strongholds, has not been slow to reply, and the battle rages on the Con¬ tinent. A most recent and comprehensive statement of the case is to be found in Eich-rodt's (Die Quellen der Genesis von Neuem UntersuchO ((New Inquiry into the Sources of Genesis, > 1916).*

Yet another aspect of this great historical theme calls for signalization. The lamented Hebraist, Canon T. K. Cheyne, who opened his brilliant career with very conservative con¬ tentions, was irresistibly borne on to liberal positions, and thence, in his devotion to truth, still forward to others ever more and more radical, until he was finally landed in almost painful isolation. In particular, by his so-called North-Arabian Theory of Israel's origin and history, elaborated after adoption from Winckler, in connection with his further theory touch¬ ing the name and worship of Jerachmeel, the rival and arch-enemy of Israel, he was led to far-reaching reconstruction not only of the Hebrew text, but therewith of all Hebrew history. These matters are too technical for full statement in this connection, but they may serve even here to hint the exceeding pro¬ fundity of Old Testament problems.

Thus far, we have spoken of Israel's litera¬ ture and history almost as if it were self-centred and self-contained, without determin¬ ing connections with the world around. Such however was certainly not the case. The lin¬ guistic relations of Hebrew to its sister-tongues are not more clear than the historical, cultural, spiritual ties that bound Jacob to his brother peoples of the Eas.t. Hence it becomes impera¬ tive to conceive of Israel's history not as a de¬ tached episode or entr'acte, but as an inter¬ woven and inextricable part of the whole grand

*Eerdmans' revolutionary criticism regards the main trunk of Genesis as a cento of legends regularly beginning with

"These are the Tales (Toledoth) of - on this stem,

about 502 verses out of 1,553, the other two-thirds of the book having been grafted from time to time. These Tole¬ doth are of the Antediluvians (51-32), of Noah, Shem, Terah, Abraham, Isaac, Esau,

Jacob, and later of Israel, — all pre-exilic and polytheistic. In Genesis as a whole, he finds four kinds of legends: 1st, a few purely polytheistic; 2d, representing Yahveh as chief among gods; 3d, originally polytheistic but transferred to Yahveh as the One God; 4th, later additions (monotheistic). A striking example is Lev. xxiv, 15: “Whoever curseth his god shall bear his sin (i. e. shall be left for his patron god, or genius, to punish). But he that blasphemeth Yahveh’s name, he shall surely be put to death” (by stoning). Eerdmans regards Leviticus as the book of Hezekiah’s Reformation, as Deuteronomy is of Josiah’s. He rejects the theory of parallel documents, J and E, and P, but supposes very extensive additions, redactions and influxes from the margin. Thus he is led to shiver many a lance with the Wellhausen school, as well as with Stucken, Winckler, Ed. Meyer and others.

drama of Semitic history as it unrolled itself between the Mediterranean and the Persian Gulf. Such a conception called for extraordi¬ nary intellectual effort, not only for linguistic attainments of the first order, but for wide-extended collateral knowledge and for historic imagination fitted for the boldest flights. These requisitions appeared fulfilled in remarkable fashion and measure in Hugo Winckler, too early sacrificed to science, who in his Hsraelitische Geschichte) (1895-1900) has sketched Israel in history with a breadth and sweep, a boldness and grandeur unattempted heretofore in such composition. Footing in large measure on the deep researches of Eduard Stucken ((Astralmythen der Hebraer, Babylonier und iEgypterP 1896-1907), Winckler has not only reconstructed the career of Jacob in its Asiatic setting, but has sought to trace it out in its mythic or cosmic relations, as illustrating his fundamental doctrine of the ((old-oriental world-conception® of history as the reflection on earth of a process accomplishing itself in heaven among the stars, a conception that has deter¬ mined (he contends) the form assumed in the Scriptures by the legends of all the patriarchs. Here again it seems quite impracticable to enter into explanatory details, but almost certain that the contest between the followers of Winckler and their opponents, led on by the astute and learned Jesuit Kugler, cannot fail to spread a wonderful if weird illumination over the re¬ motest patriarchal story.

Meantime it must not be inferred that far more conservative criticism has been either idle or ineffective. Not only the brilliant but sometimes erratic free lance, A. H. Sayce, has been indefatigable in his assaults, but the cau¬ tious Orr and the trenchant Wiener with many others have plied incessantly at the structure of <(higher-critical

fancies,® and not a few of its stones they .have loosened or dislodged. In¬ deed, of all these matters we may say,

Verily, though, on the knees of the gods these issues are lying.

There is no finality in criticism, any more than there is in physics or chemistry or the ’ologies. In the most divergent views there may well be some elements of correct¬ ness, reconcilable only when caught up into some far higher synthesis. Criticism will never indeed regress to its elder positions, it will never return upon itself, as the youth will never be¬ come a child again, but neither has it attained maturity, much less the rigidity of age. The front of criticism reforms itself continually in its continual advance, and the honest and en¬ lightened striving neither of radical nor of conservative can ever be lost. The true spirit of research declares to each of its results, even the most plausible, <(I cast thee silently into everlasting time.®

For bibliography see article Bible.

William Benjamin Smith.

BIBLE, History of New Testament In¬ terpretation. On passing now to the interpreta¬ tion of the New Testament, we enter a region strewn thick with the •embers of controversy, fresh and hot, where the conflicting interests are much stronger and livelier than those which beset the path of Old Testament study. At first blush, indeed, it might seem that our feet would rest on surer and safer ground, since

the literature is so much more recent and grew up under conditions so much more modern and more readily discoverable. But a little reflection will show these distinctions in a large measure illusory. In the first place, the difference in age is not what many imagine. It is not a chasm of one or two thousand, but only two or three hundred, years that opens between the Testaments. There may indeed be material in the Old no older than some in the New. Then again, the conditions under which the New Scriptures were written, like <(the conditions under which the new religion was preached, it must be avowed, were more varied and complicated than we have hitherto supposed® (Loisy, reviewing (Der vorchristliche Jesus, > 1906). The naive views so

gratuitously assumed for 1,600 years, which even now appear often under thin disguise in authoritative critical connections, do not call for much notice and need not long detain us.

The earliest Christian theologians were the Gnostics (as Harnack admits), and some of them brought a very high order of ability to the task of constructing a well-ordered system out of the chaos of ((hopes, loves, creeds, together heaped and hurled® that tossed in the soul of the first two centuries of our era. Such names as Basilides, Valentinus, Marcion, and others should not be mentioned but with profound respect. It is true, these pioneers failed completely, but in such a great matter, to have attempted even, was great. Their abundant writings have all perished, and their thoughts have been grossly misrepresented, but even under the grotesque mask of travesty it is still possible to recognize features of grandeur. Origen thought it well worth while to study and to cite that primitive Commentary of Herakleon upon the Fourth Gospel. The earliest * orthodox conception of the New Testament was that of a repertory of proof-texts, as expressed in Tertullian's favorite 'juristic term (Instrumentum) (documentary proof), and again in the elegant distich of Samuel Werenfels (1657-1740), the triumvir of Basel, promoter of hermeneutic and the most distinguished divine among Reformers of that age :

This is the volume in which, for his dogmas each one inquiring,
Findeth his dogmas in truth equally each one his own.*

This conception prevailed for over 1600 years and is by no means yet finally displaced. Orthodox and heterodox alike proved their theses by appeal to the authoritative Word, and seemed to regard this judicial function as its main reason for being. Its main fulcrum was the postulate of the manifold (generally fourfold) sense, of which sufficient has been said. To feel the magic of this number four, one need only read Briggs' (The Study of Holy Scripture, } much of which moves on the plane of Irenseus (III, 11). The procedure of Erasmus in editing the Greek text and trans¬ lating it into Latin with notes (Novum Testamentum, 1516) was more rational and inde¬ pendent, was in fact a movement toward understanding the sacred volume, a movement urged on by Luther, who in his translation with bold injustice relegated Hebrews, James, Jude and Revelation to an Appendix. But

* Hie liber est in quo quaerit sua dogmata quisque;

Invenit et pariter dogmata quisque sua.

when the authority of the Church fell away from the Protestant mind, the latter, dazzled and bewildered, felt the need of a guide and no other was at hand but the Bible itself ; so that Protestantism quickly passed over in doctrinal and controversial phases into the worship of the Bible, and as such it still en¬ dures in wide and respectable circles.

This character of court of last resort required as necessary corollary the verbal inerrancy of the Bible, since it were vain to appeal to a supreme court that could err; and alongside therewith flourished, alike among Catholics and Protestants, the amanuensis-theory of Scripture-authorship, which re¬ garded the writers as mere pens of the Holy Spirit (according to a saying ascribed to Gregory), so that their names and personal¬ ities were quite indifferent; who would care for the pen, knowing that God himself was the penman? — an attitude unfavorable to higher criticism. But over against this cherished dogma there grew up year after year a denser and denser array of facts in variants continually disclosed by the multiplying manuscripts and by textual criticism. At the same time the strong rationalistic trend of the 17th and 18th centuries, propagated from all the adjacent domains of human inquiry, spread resistlessly over the fields of theology and Scripture. The 19th century added the regulative notion of evolu¬ tion, of gradual growth from seemingly simple forms to forms of endless complication. Under the urge of these forces New Testa¬ ment interpretation has pressed forward year after year with quicker and longer strides toward its goal, the sympathetic comprehen¬ sion of New Testament Scriptures.

The Biblical interpretation of the Middle Ages and of the Reformation embodies an immense amount of intellectual effort put forth in many cases by minds of the first order. However, its significance for to-day is by no means proportioned to its intrinsic excellence. From the principles from which it started and the methods by which it was guided, the modern spirit has departed definitely and finally; any return thereto would be like a return to Ptolemaic astronomy or to pre¬ electric mechanics. The student of to-day is not concerned with the ((fourfold sense,® nor even the <(double sense,® of the Scriptures, nor yet again with proof-texts wrested in controversy to the support of this or that system of dogmatic theology. On the con¬ trary, his sole or at least his main concern is to understand the mind

of the author ; what he actually thought and felt and meant at the moment of writing. To such a student the earlier commentaries, learned and deep-thoughted as they often are, seem more like Meditations than Interpretations. No attempt can be made here to set forth the nature and extent of these musings, nor their value, which indeed depends largely on the mood of the reader. A similar state of case presents itself also in the study of the profane masters. When we read (Ueber alien Gipfeln ist RuhV a vast perspective seems to be open before us ; we think of solitary heights < of achievement in art, in science, in action, in suffering and sacrifice, of the holy calm of the victorious soul. This may all be very legitimate and

even ennobling, but it is not interpretation, it does not reveal the mind of Goethe, who was writing of the deep hush of evening as it falls with awe and solemnity upon the moun¬ tain-tops.

So much premised, we may call the 2d century the ((Apologetic® age of Scripture in¬ terpretation, marked by such names as Clemens Romanus, “Barnabas,® Justin Martyr, Irenaeus, Tertullian, whose main interest was to refute Gnosticism and especially, by allegoric inter¬ pretation of the Old Testament, to establish the Gospels as history. The “Philosophic® stage, best represented by Clemens Alex, and Origen in the 3d century, greatly stresses and develops the allegoric method but in a much wider interest, striving to elaborate a theology in some measure acceptable to the Greek intel¬ lect. As a reaction, arose and flourished in the 4th and 5th centuries the “half-critical and historical® schools of Syria, of Ephraem Syrus at Edessa and Theodore of Mopsuestia, “exegete of the Church,® at Antioch. These in some measure recalled exegesis to the literal sense of the Scriptures and to a much soberer handling of the sacred’ text, and especially the Antiochan School spread its in¬ fluence far and wide, over Athanasius, Chrysostom and Cyril in the East, and Ambrose, Augustine and Jerome in the West. But the exigencies of dogma did not allow any but halfway measures, a thoroughgoing histor¬ ical criticism seemed out of the question, and the Antiochan method fell

before the allegoric of Origen, which thenceforth reigned till the Reformation.

There followed the great millennium of “Authority,® marked indeed by some very notable names, hut contributing little or nothing to the comprehension of Scripture. The general contact of the Greek with the Latin mind was now interrupted, and the con¬ duits by which the treasures of the former were transmitted to the latter took the inade¬ quate form of Anthologies, so-called “sen¬ tences® culled from the Fathers. Isidore of Seville (560-636) led the way, exploiting chiefly, however, Augustine and Gregory the Great. In fact, the following centuries fed upon Augustine as the earlier upon Origen. For nearly 600 years such ox-blood capsules sustained the spiritual life of the generations, but with the dawn of the 12th century a new spirit of daring breathed upon the dry bones and they started up clothed with flesh and vigor. It was Peter Abelard (1079-1142) who inaugurated that splendid century and set Reason and Aristotle side by side with the Bible and the Fathers. His audacious Sic et Non, which ranged authority against authority in shocking contradiction, was followed by flocks of “Sentences® compiled with pious purpose, as by Peter Lombard (d. 1164).

Aristotle was now enthroned, and special pleading ruled in the schools, with endless disputations. The stateliest structure of dogma was read by Saint Thomas Aquinas in his <Summae,> and Thomism still sways Catholic thought, as at Louvain. But in boldness, keen¬ ness and originality he had already been sur¬ passed by the Gnostic Johannes Scotus Erigena (d. 877), who made caprice supreme in God (whose essence was nothingness), surpassing

even Origen who had pushed free will and indi¬ vidualism to the utmost, even to the practical annulment of the “historic Jesus® (Harnack). The exceedingly acute William of Occam glorified doubt as the handmaid of God; by removing all the natural bases of mental se¬ curity he sought to settle faith the more firmly on the rock of church authority. Anselm with his <Cur Deus Homo> has also a place in this goodly company of Valhallans, of giants beating the air. No important step was taken toward understanding the Bible, the common armory of this endless warfare, until the (Postilla Litteralis* of Nicolaus de Lyra, who with great learning, with keen acumen and with sound historic judgment strove hard to recall his readers from the “mystic® to the literal sense of the Scriptures, whom the following centuries admired but could not emulate. In Luther, he was partially revived,

but the German was a moral and spiritual force rather than a sequacious thinker. System he left to Melanchthon (1497-1560), who was unequal to the task and fell back more and more into the abandoned paths of traditional¬ ism. Not so Jean Calvin (1509-64), who was nothing if not rigorous and consequential and surveyed the whole field of religious con¬ troversy with scrupulous care in his calcula¬ tions. Augustine came again to his own in the Genevan, the master-builder of the Refor¬ mation, whose method and authority have dominated the severer forms of dogmatic theology from that day to this. But neither he nor his successors raised seriously the pre¬ vious question as to what the Scripture really is ; nor even while proclaiming "The Bible, the Bible alone, is the religion of Protestants® (Chillingworth 1637), did they open up any safe paths of study in order to understand it as an historic product. On the contrary, they fell into a dogmatism as hopeless as the scholasticism from which they had emerged. The Scripture was treated as a complex of proof-texts, a homogeneous whole, self-con¬ tained and unrelated, its own commentary, a verse in John to be explained by a verse in Isaiah, a passage in Daniel by one in Revela¬ tion. Meantime private judgment, untutored, but illumined by "inner light,® was raised to the seat of authority, and a disintegrative process set in, which has continued up to the present. From this the Catholics, even during the reaction sometimes called the Counter-Reformation, headed by Cajetan (1469-1534), Bellarmine (1542-1621), Francis (1567-1622), Jansenius (1585-1638), were sheltered by the still unshaken pillars of Church authority, but their new-quickened zeal while purifying the life, perfecting the organization and inspiring the activities of the Church, did not expand its intellectual horizon nor sharpen its critical insight. The seals of the Bible remained un¬ broken.

The first really modern phase of this pro¬ tracted struggle* was the elder Rationalism as represented by H. S. Reimarus (1694-1768), seven fragments of whose huge work (still in the main unpublished) appeared (1774-78) at the hands of the Wolfenbiittel librarian, Les-

* Which is like nothing else so much as trench warfare, where each new capture leads up to a position still more tenaciously defended.

sing (1729-81), under the title of Wolfenbiitteler (Fragmente eines Ungenannten) (of Reimarus's (Apology for the Rational Wor¬ shippers of GodD-The author's standpoint is that of English Deism, and his unsympa¬ thetic treatment of the Gospels consists mainly in purely naturalistic interpretation of the miracles and a depreciation of the purposes and personalities of the early Christians. The title of the 7th Fragment, so highly praised by Schweitzer, is (The Aims of Jesus and His Disciples. Its literary merits are certainly great, and it inaugurates brilliantly the long reign of the purely natural and historical in the conception of Jesus, anticipating indeed in large measure the recent eschatological view. Hence the remarkably appreciative judgment of Schweitzer. The reaction against Lessing was violent, even to persecution. Semler as¬ sailed him in a famous apologue, and especially the Hamburg Pastor Goeze was vehement and unscrupulous in denouncing him for ((hostile attacks upon our all-holiest religion.® Lessing replied with courage and brilliance, extraor¬ dinary even for him, but was effectively silenced by state authority; turning then to the stage, he produced (Nathan der WeiseP In simple truth, the comments of Lessing had contrasted very unfavorably in their reticence, hesitation and apologetic tone with the bold, resolute and uncompromising text itself of Reimarus ; but this does not mean that the editor was of less heroic mold than the author, who enjoyed the incalculable advantage of being dead. Such rationalism, even in its ablest representative, H. E. G. Paulus (1761— 1851), however acute in negation and however vibrant with hate and scorn, with all its <(natural explanations® does not advance us very far toward a comprehension of the New Testament. Feeling how weak it was in construction, David F. Strauss (1808-74) re¬ nounced it utterly in his (Leben Jesu) (1834-1835), and developed a mythical theory, which saw in the Gospel accounts only reflections, in the excited minds of Messianic enthusiasts, of the historic and prophetic utterances of the Old Testament, or else Messianic ideas modi¬ fied by the personality of Jesus, whose human and historic character it did not occur to Strauss to deny. Whenever in the Gospel he read ((That it might be fulfilled,® Strauss be¬ held an incident devised by the Messianic

imagination of the evangelist, as the flight into Egypt to fulfil the words of Hosea (xi, 1), «Out of Egypt I have called my son,® the

riding into Jerusalem to fulfil the mistrans¬ lated word of Zachariah (ix, 9), ((Thy king cometh — riding upon an ass and upon a colt the foal of an ass.® This work, marked by a pitiless acumen, and pushing German criticism suddenly over a precipice on which it had

long been hovering, was passionately rejected on all sides* by German theologians, f but its most important reaction was in the mindt of F. C. Baur (1792-1860), pre-eminent in the annals of theology as the founder of its Tubingen School, who rightly objected that

* Schweitzer's incomplete list names sixty refutations of Strauss and eighty-five of Renan. .

t Of whom Ullmann should be recalled as its foremost refuter ('Historisch oder Mythisch?' 1838).

t Or, at least, apparently "in the work' — for Baur denied the connection.

Strauss had prematurely criticized the Gospels as history, before he had criticized them as literature, and hence without any proper understanding of their origin and meaning. By a most comprehensive study of the New Testament and early Christian literature in general, he was led to develop in a long series of publications his own idea of the genesis of the New Testament as an example of Hegelian Thesis-Antithesis-Synthesis, the unfolding in successive stages of a primary contrast and conflict between two opposing views of primi¬ tive Christianity, the Conservative or Petrine and the Liberal or Pauline. In terms of this Petrine-Pauline antagonism and of successive efforts at reconciliation, culminating in the Fourth Gospel, he interpreted practically the whole body of early Christian writings. His construction, often exceedingly ingenious, was also noted for the late dates assigned to the great majority of the New Scriptures, — wherein he was partly anticipated by the pre¬ mature Edward Evanson, who, in his dis¬ sonance, etcP (1792), adds (pp. 255-289) ((my reasons for expunging also Romans, Ephe¬ sians, Colossians, Hebrews, James, Jude,® and (<the Epistles to the Seven Churches of Asia® in Revelation, a seed of thought, which, like so many in England, fell among stones. Baur's influence has descended in great strength through the preceding even into the present century, though it is now generally recognized that the New Testament problem is far too complex and profound for the application of his two-term formula ; but in unity and com¬ prehensiveness no other single formula has taken its place.

The learned labors of Baur commanded wide approval and almost universal admira¬ tion. Far different the fate of his deep-thoughted contemporary, Bruno Bauer (1809-1882), whose ten cumbrous and

lumbering vol¬ umes of (Kritik> of the New Testament (1840-1852, followed by more popular statements in 1874 and 1877) not only cost him his career and his position (his ((venia docendi® was withdrawn in 1842) but also provoked almost unanimous rejection and even abhorrence. He who anticipates is lost. Of all his generation he saw furthest into the real problem of the genesis of the Gospel and the character of Christianity; he alone conceived them as environmentally determined, as issuing from the total complex of historical conditions, social and cultural, of that imperial age. His critical constructions were indeed almost wholly of sand, but his grasp of the problem itself was broad and firm. Ostracized in his own country, his thought found welcome among foreigners, especially in Holland, with A. D. Loman, the Teiresias of the North, with Pierson and Naber (Verisimilia, 1886) and later Van Manen (Paulus, 1890), and Bolland, with R. Steck (Der Galaterbrief, 1888) and Edwin Johnson ((Antiqua Mater, > 1887). At last he has been restored to Ger¬ many, as by Wrede ((Das Messiasgeheimnis,> 1901) and the authoritative Schweitzer's (Le-ben-Jesu-Forschung) (1906, 1911), — in which he figures second onlv to Strauss, and where we read: ((Bauer's (Criticism of the Gospel-History) is worth a good dozen (Lives of Jesus) … For his contemporaries he was

merely a fantast, but in his fantasies after all a deep insight lay hidden. It had been re¬ vealed to no man in such comprehensive man¬ ner that primitive and early Christianity can¬ not be understood as the simple result of the preaching of Jesus, but that it reflects the ex¬ perience of the World-Soul in the first gen¬ erations of our era. Since Paul, no one had seized with such power on the mystical in the superpersonal being of Christ, and Bauer, translating this into history, made the Roman empire, as it lay in throes of death, into a (Body of Christ.) ®

If Bauer's <Kritik) was despised and re¬ jected of men, the like could not be said of (La Vie de Jesus5 (1863), by the supreme lit¬ erary genius, Ernest Renan (1823-92). Be¬ gun in Syria at the bidding of his

noble sister Henriette, before their fatal exploration of the upper Lebanon, with intent to <(evoke from the past the Origins of Christianity,® by an Hebraist of the first order, it is steeped in the romance and mystery of the East ; through the far-off haze of legendary marvel looms up in its pages the spectral figure of the ((noble founder,® the “incomparable man.® It is not likely that such exact antiquarian knowledge and high imaginative power and rare charm of style will ever again unite in the effort to produce a convincing portrait of the Jesus of the Gospels as an extraordinary car¬ penter. But its failure could scarcely be more complete. Though 60,000 copies were sold in four months, and though it shook all Chris¬ tendom with its echoes, it is now seldom named, its permanent value lay almost solely in the proof by example that the task it at¬ tempted could never be performed. Close on the heels of Renan’s ‘Life of Jesus) came Theodore Keim’s (History of Jesus of Naz-ara5 (3 vols., 1867; 1871; 1872), written with far greater critical knowledge and conscien¬ tiousness, but with far less literary skill ; it strives hard to find a history proper, a devel¬ opment in the Gospel story; it tells about ((the Holy Youth,® “the Galilean Spring,® (<the Galilean Storms,® ((the Signs of Downfall,® and many such, in the effort at historic plausi¬ bility, but all its learning and skill do not blur the fact that it builds a house of cards on a base of mirage.

Since New Testament criticism passed out of the sign of Baur and Tubingen, and by that of Renan, its course has been steadily onward though at times erratic. For a while there seemed to be an era of disintegration : not only did the Scriptures, in particular the Gospels and Revelation, crumble under incessant probing and analysis, but the problems themselves be¬ came more sharply separate and distinguished ; investigation deliquesced in every direction into various problems, and each of these pre¬ sented its diverse phases.* Among the key¬ words of controversy should be noted: (1) (<The Marcan Hypothesis® — that (Mark’s 5 Gospel is the earliest, nearest to fact, and his¬ torically the most plausible, — propounded, 1838, bv the continuator of Strauss, the philosopher, C. A. Weisse, in ‘Die evangelische Geschichte,5 confirmed by C. G. Wilke in ‘Der Urevangelist5

ˆThough such as Otto Pfleiderer (1839-1908) continued to group them all as a unit (‘Das Urchristentum’, 1878, 1902, Eng. tr. 1906).

(1838), since when it has gained increasing recognition approaching general acceptance in some form, though opposed by Tubingen, in

particular by A. Hilgenfeld (1823-1907) ; (2) <(the Two-Source Theory® — that an original ‘Mark5 and the Oracles1* or <Logia) were the prime elements out of which our present Gos¬ pels were derived and compounded; (3) ((the Son-of-Man Question® — as to meaning and use of the term Bar-Nasha (Son-of-Man), and whether as a self-designation of the Jesus it can be historic, concerning which see Dalman’s (Die Worte Jesu5 (1898) and N. Schmidt’s exhaus¬ tive treatment in the Encyclopaedia Biblica) (4705-40); (4) (<the Johannine question® — concerning date, authorship, composition and aim of the Fourth Gospel, elaborated by Bacon (1909) and much illumined by recent publica¬ tions of Schwarz, Wellhausen, Soltau, Wendland and others; (5) ((the Problem of Acts,® — authorship, date, composition, earliest form, later editions — advanced by F. Blass ; (6)

<(the Pauline question,® — authorship, date, structure of the Pauline epistles, especially ‘Unto Romans5 : the latest phase of this high argument was opened by the Dutch seer, A. D. Loman in ‘Qusestiones Paulinae5 (1882), fol¬ lowed by Pierson and Naber in ‘ Verisimilia5 (1886), then by Michelsen, Steck, Volter, Van Manen (who, at first an opponent, passed over to Loman’s side in his (Paulus II. De Brief an de Romeinen) (1890), the most complete statement for the 2d century date), by W. B. Smith and others named in Van Manen’s article on ‘Romans5 in Encyclopaedia Biblica5 (4127-4145, 1903), also in Schweitzer’s Eaulinische Forschung5 (1913) ; (7) (<the Apocalyptic ques¬ tion® — dealing with the elements blended in ‘ Revelation, 5 their dates, origins and meanings, matters largely cleared up by Volter, Vischer and their successors; (8) “the Eschatological view® — that Christianity originated in a semi-political Messianic movement started by the Baptist, continued by Jesus, in a Palestinian yearning or striving for a kingdom of God as the end, the last things (eschata), — a view championed by J. Weiss and A. Schweitzer and much in vogue, especially in Great Britain; (9) lastly, opposed thereto, ((the Hellenistic or comparative view® — that early Christian doctrine and ritual, espe¬ cially Pauline portions, were deeply dyed with elements derived from the cults and mysteries then flourishing in the Roman empire, — a view favored by Cumont, Gunkel, Pfleiderer, and particularly recommended by the philolo¬ gist R. Reitzenstein. To these must now be added (10) <(the Indian question:® Does the New Testament contain Buddhistic elements? Passing by the extravagant claims of R. Seydel and others, criticism now settles down in the conviction that in at least four items — Simeon (Luke ii, 23-35), Temptation, Peter’s Walking on Water, Miracle of Loaves — the Gospel has drawn from the well of Buddha. R. Garbe admits as much in his Hndien und das Chris-tentum5 (pp. 12-61, 1914), and is now

prepared to concede still further the dependence he had earlier denied in toto. Indeed, it seems highly probable that John ix, 1-3 must swell the list, since only the doctrine of Karma can explain the question, ((Did this man sin (or his parents), that he was born blind?® In this long battle the American scholar A. J. Edmunds has won

especial distinction ((Buddhist and Christian Gospels, > 1902, 1905, 1908-09), as well as the Hollander, van Eysinga.

However, it is now seen more and more clearly that all these riddles are at last only one, they are different facets of the same poly¬ hedron, the varying aspects of one fundamental question: ((What think ye of the Christ?® What was the origin and content of proto-christianity ? Since this latter is far away the most imposing as well as the most mysterious single phenomenon of man's history, it seems clear that this question yields in interest to none that has ever engaged his attention. It may be well, then, to note the different attitudes that may be and actually are assumed in its presence.

The Traditional view, too familiar in all the creeds of Christendom to call for more than the briefest mention, is very imposing. It re¬ gards Scripture as the inspired and authorita¬ tive depositary of God's self-revelation to man, having in view secondarily the instruction, civilization and moralization of mankind, but primarily the salvation of the immortal souls of all the family of heaven, the church of the redeemed. The original single vehicle of this revelation was the People Israel, as represented especially in Moses and the prophets, authors of the Old Testament; but the later bearer was the Son of God Himself, in the form of the son of Mary, (<very man and very God,® along with His immediate disciples and apostles in¬ cluding all the authors of the New Testament. Both these forms of the one continuous revela¬ tion, but especially the latter, were extra-natural, neither included nor paralleled in the forces and processes of the universe as every¬ where else in operation.

The second attitude, that of Liberal criticism, rejects this last thesis of

Tradition and insists on understanding the whole body of Scriptures, with all their attendant history, as normal his¬ toric products of human activity under extraor¬ dinary but strictly natural and intelligible conditions, and Christianity itself as the most richly gifted of the family of four (Islam, Zoroastrianism, Buddhism being the others — cp. Soderblom and Troeltsch, — like the family of Napoleon, Lucien, Joseph and Jerome), and its Founder, the Carpenter-Prophet of Nazareth, as an enthusiast or revivalist of whom scarcely anything can be said with confidence (cp. Schweitzer's ˆeben-Jesu-ForschungR 2d ed.).

At this point the new Radicalism joins issue and enters protest. Liberal critics, after a cen¬ tury of incessant endeavor, can find not one point of common consent in their figure of Jesus (Jesusbild), and the attempt to account for the immediate and world-wide progress and success of the Christian propaganda in terms of a bundle of contradictory guesses seems to the Radical to be not only grotesque but even cen¬ surable trifling; in particular, it leaves the cen¬ tral fact, the worship of the Jesus as God, en¬ tirely unexplained and unexplainable, besides degrading Christianity down to the most irra¬ tional and unworthy of all great religions, to a mere man-worship, a ridiculous compost of de¬ lusion and fraud. Such degradation could be allowed only under compulsion of logic and of the surest and exactest facts, but the Lib¬ erals present no such facts, not one on which

they themselves can even nearly agree. Despite the immense learning, devotion and ability by which it is recommended, liberal criticism ap¬ pears to the Radical to be utterly impotent in presence of the larger facts of early Chris¬ tianity.

On the contrary, Radicalism (as in (Ecce Deus) and (Der vorchristliche Jesus }) regards all cosmic history as the struggle of 'the indi¬ vidual spirit to realize its own universality, its own oneness with the Whole, and the history of Israel (set forth in the Hebrew Scripture) as one signal phase of the general monistic striving, as the continuous national effort to form, appropriate, assimilate and finally propa¬ gate the conception of God as One, and in second line as dwelling (coming to conscious¬ ness) in His chosen people, that had come to know Him. Consistently, Radicalism regards the proto-Christian propaganda as the final phase of this national effort, at length become international in the Dispersion, as the prolonga¬ tion and extension of this same Monotheism in¬ cited to enthusiastic evangelism by contact with

Hellenic philosophy, especially in the doctrine of the Oneness of God, a doctrine reaching in a long line of thinkers as far back as Amenophis IV (Ikh-Naton, 1370-1350 b.c.), and rami¬ fying through all the higher enlightenment of Greece and her pupil Rome. This monotheistic propaganda, zealously preached from shore to shore of the Mediterranean, by missionaries (apostles) of the Dispersion, at first secretly under many devices and slogans, finally con¬ creted around the figure and in the worship of the Saviour-God Jesus, i.e., of God as Jesus, Sotcr, Saviour, under the aspect (or person) of Saviour from sin (i.e., idolatry, the supreme sin of unfaith to God). It was also combined with the purer Jewish doctrine of the Messiah (Christ),* and at the same time deeply tinged with elements derived from venerable faiths sanctified in the mysteries of contemporaneous cults. The (<Eternal Gospel® of this early, even prechristian, propaganda is clearly proclaimed in Rev. xiv, 7, as (CFear God and give him glory,® which is pure monotheism, recalling the last words of the Preacher, xii, 13: (<Fear God and keep his commandments, for that is the duty of every man.®

In looking back over the way we have come, it seems exceeding long and often ex¬ ceeding steep, and one might wonder whether it was all really worth while, whether either in the process or in the result there was any justification for the prodigious expenditure of energy, for the concentrated endeavor of so many minds for so many hundreds of years. For him that measures life in terms of bread and butter and fine linen and yachts and motor cars and opera boxes, the answer may be a decisive No. Not however for him that re¬ gards the soul as worth more than food and raiment, and the revelation of Spirit as the increasing purpose of unending time. To him it may well seem worth while, and all the lingering stages in the monotheization of the world will appear quite as justified and neces¬ sary as the geologic ages that have fitted the earth for the kingdom of Man, and Man for the kingdom of God.

For bibliography see article Bible.

William Benjamin Smith.

BIBLE, Versions of the*. No other book has received the honor of such frequent trans¬ lation as the Bible. The history of this im¬ mense and immensely important body of hu¬ man effort, easy to expand into volumes, but here to be compressed into a few columns, naturally falls into two divisions concerning, respectively, the Old Testament and the New, and the former again into two sections treat¬ ing, respectively, of Jewish and of Christian

translations

Jewish Translations of the Old Testa¬ ment. — Already, under Text Criticism, it has been stated that the elder portions of the Old Testament existed first in the Canaanite script, of which the scantiest traces survive. Says the Babylonian Talmud (Sanh. 21b) : <(At first the law was given to Israel in Hebrew script and in the holy tongue. Again, in the days of Ezra it was given to them in the Assyrian [i.e., Syrian] script and in the Aramaic tongue. Israel chose for themselves the As¬ syrian script and the holy tongue, and they left to the idiots [Kuthim, Samaritans] the Hebrew script [libona'ah] and the Aramaic tongue. })

This change of script from ˆLibonaean® or daas (chiseled) to our present square [merubba '] Hebrew was almost in effect a translation, at present quite beyond us to con¬ trol or appraise. We cannot get behind the existent square form, not even by help of Samaritan manuscripts or monumental Samari¬ tan derived from the earlier script. Deep-thoughted Rabbis have feigned that the Law was originally given to all nations (but re* jected) and engraven in all tongues on the altar stones (Jos. viii, 32). But the first real call for translation was heard when Israel put away Hebrew and adopted the sister Ara¬ maic, first in the north, then in the south, a change speedily effected among Jewish mili¬ tary colonists at Elephantine (6th century b.c.), but passing over Palestine gradually through 800 years. The Tar gum (translation, especially into Aramaic) was made at first orally by the appointed interpreter, Targeman (whence ˆdragoman®) , as the Law was read verse by verse, or the Prophets section by section. Written Targums, at first disfavored if not forbidden for public use, were allowed in private, whence they forced their way into the Synagogue. Gradually Yerushalmi, the Palestinian Targum of the Pentateuch, took definite form, to be displaced gradually by the Babylonian (Babli), now known through the version called of Onkelos (Aqylas, Aquila). Of this learned revision, in the main faithful, of looser predecessors, the older strata go back to Aqiba

(ca. 135 a.d.). The surviving Werushalmip miscalled (of Jonathan, y is later than the Pentateuchal Babli , but contains very old elements, along with much sermonic en¬ richment. There is also a Babli of the Proph¬ ets, ascribed to a Jonathan ben Uzziel, disci¬ ple of Hillel, — a mixture of old and new, faithful in the Earlier prophets, paraphrasing the Later; also a Palestinian Targum, never officially adopted, of the Writings (Kcthubim , Psalms to Chronicles), and another, in scant

* Several of the more important Versions have already been discussed incidentally, but only in their text-critical aspects and significance; it, is the historical and literary features that must now receive some attention.

fragments, of the Prophets. Very characteristic of all is the tendency to tone down, to smooth out the asperities of the original, especially by removing anthropomorphisms (to guard the glory of God) and many compromising phrases (to shield the honor of Israel), as well as the bold beauties of personification in general. Thus they approach the common¬ place, but remain extremely eloquent wit¬ nesses to the growth of the Jewish soul.

The world-wide Dispersion of the Jews gave them all tongues of the Gentiles (Acts ii, 8-11), and accordingly the translations of their Scriptures were numerous, but all have vanished, — unless some fragments of the Egyptian be preserved in the Christian Coptic version, — with the illustrious exception of the Septuagint, already treated in Text Criticism (q.v.). As rendering possible the Christian¬ ization of the ancient world, the day of its birth was a fast day in Palestine and com¬ pared to the natal day of the golden calf. Some at least of the Seventy showed acquaint¬ ance with Greek literature (as in Job), whence the extremely interesting question as to how and where the Old Testament reflects (say) the Iliad, on the average five centuries older. A reaction from the Septuagint, taken over by the Christians, was the translation of the Pon¬ tic proselyte Aquila (guided by Rabbis Joshua and Eliezer), almost by syllables; a supposed reaction from this was the Christian para¬ phrase of Symmachus, while the Jewish prose¬ lyte Theodotion aimed to avoid both extremes. Herewith opens a chasm of nearly 12 cen¬ turies in Jewish-Greek translation. Not till the 14th century did Jewish learning again essay to turn the Hebrew into (Attic) Greek, the Aramaic of Daniel into Doric. A New-Greek version (in Hebrew characters) ap¬ peared in Constantinople, 1547. The next great attempt to vocalize (Hebrew Truths in the world was made by the famous Gaon Saadya (892-942)

in his Arabic translation still owned and read by exiled Jews of Ye¬ men, adapted by Abu Said in the 11th cen¬ tury to the needs of Samaritans, and highly valued by the competent. Saadya's foes, the Qaraites, also had their Arabic version but their Tataric was much later (1640). Jew¬ ish learning in north France produced no translation of the Hebrew Bible save in de¬ tached passages scattered through Rashi's Commentary, and others', as well as in vari¬ ous glossaries. Through the Postillcu Per-petuce (Rome, 1471-72) of the Christian con¬ vert Nicholas de Lyra (1270-1340), Rashi made a deep impress on Luther's German translation. — Spanish-Jewish learning also guarded zealously without translating the He¬ brew text, though Hayyuj of Cordova (?950-1010?), by laying bare in Arabic the tri-literal nature of Hebrew roots, grounded Hebrew linguistics, and the physician, Ibn Janach C ?985— 1 045 ?) <(Greatest of Medieval Hebra¬ ists, M by his grammatical studies, paved the path toward a comprehension of the Bible. The great eye-opener, Ibn Ezra, blazed the way for modern criticism, but did not trans¬ late; neither did the Kimchis ; Jewry had not forgotten the lesson of the Septuagint. But at the close of the 14th century a Jew turned Isaiah, Jeremiah and part of Ezekiel into Per¬ sian and the Pentateuch in Persian by Rabbi

Jacob Tawos (honored with a place in Wal¬ ton's Polyglott, Vol. IV) appeared at Byzan¬ tium, 1546. The next year, along with the New-Greek, appeared the Spanish version, also in Hebrew letters. In 1553 appeared a noted Spanish translation, the Ferrara Bi¬ ble, Rabbi Arragel's version (1422) revised, in two editions, one for Christians, one for Jews, made at Catholic command, with Franciscan help. One unprinted partial Jewish-German version dates from 1421, another, printed, of the Pentateuch, by the Christian Jew, Michael Adam, appeared at Constance 1543, and Elijah Levita translated the Psalms (Venice 1545 L At Amsterdam in 1649 appeared the Jewess's Bible, Teutsch-Homesch (German-Penta- teuch), and 30 years later two other such Jew-German versions, complete. After the great racial calamity of expulsion from Spain (1492), where Jewish learning had flowered in splendor, Bible-study stagnated for cen¬ turies among the Jews,

who, with few excep¬ tions, sank themselves in the Talmud. The Renaissance of the Jews was marked by a re¬ turn to Scripture, especially by Moses Men¬ delssohn's epochal translation of the Penta¬ teuch into German (1783). Still better He¬ braists (called Biurists, interpreters), as David Friedlander (1750-1834), translated and an¬ notated Prophets and Writings, in sober ra¬ tionalistic spirit, with no great critical keen¬ ness or historic sense. But the whole move¬ ment was revolutionary enough to arouse the resolute opposition of Conservatism, and there followed the German translation of Zunz (mainly the work of his friends), 1837-38. A. Geiger did not translate, but in his (Urschrift und Ubersetzungen) (1851) he profoundly interpreted text-history and the elder versions as mirroring the religious evo¬ lution of his people. In Italy the movement issued in I. S. Reggio's Italian Pentateuch translation with Hebrew commentary (Vienna 1821), and later in founding a rabbinic school in Padua, headed by the chief modern Jewish biblicist, Samuel David Luzzatto (1800-65), who raised biblical criticism to a profession among his people. Though strongly conservative, his Italian translations of Isaiah, Job (1855, 1853) and the Pentateuch (posthumous, 1871-76) show deep and exact philology along with a scientific conscience. So much can hardly be said of S. R. Hirsch's German version of the Pentateuch or of others, learned and acute, but straitened in spirit. Not less erudite but far more daring is the eight-volumed work of A. B. Ehrlich (1905, 1908-14).

As the walls fell away and the Jews emerged into 19th century life, translations multiplied rapidly. Leading the van is the French (1831—1851) of S. Cahen; also the people's version (1899-1906) by the French Rabbinate (headed by Z. Kahn), based largely on Wogue's version (1861-69). Less significant was a succession of versions in German, Dutch, Russian, Hunga¬ rian. As early as 1789 Delgado corrected the English Authorized, and in 1839 Sefig New-mann emended it, as did Michael Friedlander (1884). Kalisch commented on the Law, and Benisch published a complete English version (1851-56). In America Isaac Leeser, footing on the Authorized, with help of German ver¬ sions, issued a translation (Philadelphia 1853) generally used in the synagogue, English and

American. But very recently the great design, conceived 1892, of the Jewish Publication So¬ ciety (organized 1888) has at last been ac¬ complished (1917) mainly through the un¬ wearied zeal of M. Margolis, sustained by the munificence of the Jewish Maecenas, Jacob H. Schiff — being nothing less than a thorough re¬ vision, suited for

the synagogue, of the Revised Version of 1885, wherewith has been spoken the latest and best word of Jewish scholarship in the translation of the Old Testament.

Christian Translations. — Inasmuch as the two Testaments have held equal rank in the Christian consciousness for 17 centuries, it would serve no useful purpose to separate them in this discussion; accordingly we shall treat them together, except where distinction is ex¬ pressly made. As we have seen, the sole ob¬ ject of Jewish translations, the all-important Septuagint only partially excepted, was to bring the Holy Writ to the understanding, not of the Gentile but of the Jew himself, to whom the Gentilic tongue was vernacular. Likewise, the aim of early Christian translations was to bring the pure c<Hebrew truths home to the mind and heart of the Christian. As the new religion, the ((Eternal Gospel,® ((Fear God and give Him glory® (Rev. xiv, 7), was from the start a crusade against idolatry, a zealous prop¬ aganda of monotheism, from the first the •audience was mainly pagan, composed mostly of <(God-fearing Gentiles® and proselytes to Judaism. Of these, in great part, the faith was built on some Greek version of the Scripture, particularly the Septuagint, and it was in Greek that the first public preaching was spoken and the first records thereof committed to writing, though some very early Christian compositions may well have been Aramaic. For nearly two centuries the Christian seems to have rested content with the Septuagint, subject to slight alterations, but when the Jew disclaimed it as incorrect or inadequate, substituting the liter¬ alism of Aquila, the logical loss was keenly felt, and a reply seems made in the loose rendering of Symmachus. This also was soon found in¬ sufficient, and in the first great critical essay, the Hexapla, Origen sought to mass all the evidence in point and to show the way clear to the sacred goal of aboriginal <(Hebrew Truth.® As this came more and more to be regarded as altogether unique and indispensable, the one and only record of primitive history, the single depository of divine will, purpose and power, to the more enlightened the need seemed im¬ perative of ascertaining it, if possible, with absolute exactness and completeness. Origen, the most competent explorer, failed, however, to find it, and the search seemed little hopeful. Nevertheless, sufficient appeared to be known.

But the Greek was not the only early Gentile-Christian consciousness. The noble Syriac language, a variety of the Aramaic, was widely spoken, and various attempts were made at a Christian Targum in this tongue, even now not numbered among the silent. Of these the most successful was the so-called Peshitta (ˆsimple,® ((common®), at once faithful and elegant, tinged with traditions of the Jews (whose help

made it possible), but often under the spell of the Seventy. Far away, in north Africa and other western provinces of the empire, at an early date Latin had begun to displace Greek,

and the pressing need of a version in that tongue was met in various ways : there is no Old Latin version, but many Old Latin ver¬ sions, varying indefinitely with the knowledge and skill of the translator and the text of the Greek copy at his hand. It was Lachmann that first restored these modest versions to their critical rights, but their decisive importance (for the New Testament text) is only now coming to full recognition. All were strictly popular, rustic in their Latinity already depart¬ ing from the classic norm at Rome toward the varied Romanic speech of to-day. Gradually even the speech of the Capital fell away from the Greek, and the need was felt of an au¬ thoritative Latin Version. By far the prince of Christian scholars was Jerome; to him Pope Damasus (346-420) committed the task of re¬ vision. He began at Rome by setting a gentle hand to the Psalms (383), and Saint Peter's still resounds with his Roman Psalter, intro¬ duced at once by Damasus. In 392, as Hermit of Bethlehem, he rerevised by the Hexapla, and this Psalter, first introduced in Gaul and hence called Gallican, still holds its place (against his third version, the Hebraic) in the Vulgate. On this latter he toiled at intervals for 15 years, learning Hebrew in Palestine under Jewish teachers and guides. Slowly at first, but stead¬ ily, his translation (complete but for certain Apocrypha, which he too lightly esteemed) won-its way to universal recognition over all others, the greatest single work of Catholic scholar¬ ship, and in the fourth Tridentine session (8 April 1546) it was stamped with the signet of exclusive authority. Jerome aimed to be faith¬ ful to the sense, but classic in style. Slight as is the critical value of this Vulgate, its in¬ fluence upon the religious life of western Eu¬ rope is beyond estimation. An authorized Catholic translation is the Rheims and Douay Version , made by English refugees and called the Douai Bible (1609). Intended as a cor¬ rective of the multiplying Protestant versions, it conforms too closely to the (<authentical Latin® to be idiomatic English, and as a terti¬ ary product has no critical worth ;

nevertheless, it is happy in some turns of expression' and seems to have molded the Authorized Version at certain points. There are many such trans¬ lations of translations, in Arabic, Armenian, Coptic, English, Ethiopic, Georgian, Gothic, Persian and other tongues, ranging over a thousand years. Conspicuous is the Gothic pre¬ served in fragments on the silver-lettered purple Codex Argenteus (ca. 500?) in the Upsala Uni¬ versity; Philostorgius (b. 364), as quoted by Photius (c. 820-91), ascribes the Gothic transla¬ tion of the whole Bible (except Kings, omitted as too warlike) to Wulfilas, Apostle of the Goths, which is stoutly gainsaid by L. Wiener in his revolutionary Commentary to the Ger¬ manic Laws and Mediaeval Documents,* which with his Contributions toward a History of Arabico-Gothic Culture) (I, 1917) would over¬ turn the structure of Germanic philology.

Through all the watches of the mediaeval night Jerome reigned in the West, the Seventy in the East. As new tongues budded forth on the Latin stem, rude paraphrases appeared, often as interlinear glosses, especially in the Psalms, the book of devotion, and these were gradually improved but remained quite devoid of author¬

ity, jealously reserved by the Church for the Vulgate. During the uneasy slumber of the 13th century, premonitions of awakening were faintly heard in widely scattered and far more earnest attempts to get nearer the divine truth in vernacular versions, as the partial Waldensian in Provencal and the first complete French translation (c. 1250). Similar stirrings were felt in Italy in the 14th century, but the first complete English Bible goes back only to John Wyclif and his friends (1382), in which his own share is problematic. A feudalist® till 1374, in the last 10 years of his life he won the fame of a reformer (politico-religious) and the father of English prose, the latter rather by his CermonsP for his English version is poor and slavish to the ((Latyn.® Germany mean¬ while was prolific of translations, and John Hus, following Wyclif along so many lines, among the many improprieties for which he suffered at the stake (Constance, 6 July 1415), produced a vernacular version for his Bohe¬ mians. Movable type (1448), by lessening cost, gave wings to the Word. The Vulgate was the first to leave the press (1452-56), then over a dozen German editions, then the Complutensis (1517-20), then the Aldine (Venice 1519). Morning was now on the mountains, and edi¬ tion after edition appeared in Hebrew, 21 be¬ fore Luther's rupture with Rome (10 Dec. 1520), among these the first great Rabbinic Bible (Venice 1516), dedicated to Leo X by the Christian Jew, Felix Pratensis.

Catholics now felt the need of a new version, and many not without merit were made. These, being Latin, were still voiceless to the people, who cried for the Word in their own tongue. Luther in his German translation (from the Hebrew, in the Brescia edition of 1494) gave the first great national answer. Himself hardly equal to the task, he leaned heavily on Nicholas de Lyra ; but he labored long and conscientiously and well, translating not for scholars but for the man-in-the-street, occasionally in a controver¬ sial spirit, and finally (1530-34) erecting an en¬ during monument of German literature and determining in large measure the set of Ger¬ man speech, as well as the form of various fol¬ lowing translations into other Teuton tongues*

According to Conybeare, unsurpassed in beauty and because of its fidelity almost as valuable as an original text is the Armenian version of the Old Testament made by Mesrop, Sahak, Eznik, and others, with various manu-scriptural helps, from the Greek (though Moses of Chorene says Sahak used the Syriac), between 397 and 430, and revised later. Perhaps a century older and hence valuable accord¬ ing to Tertullian's "id verius quod prius," is the Armenian version of the New Testament made from the Peshitta (as was also the related Georgian), but revised from the Greek about 400. The Georgian Bible (from the Greek) is ascribed to Mesrop, inventor of the Georgian alphabet. The Arme¬ nian Bible, first printed from one manuscript with text adapted to the Vulgate (Amsterdam 1666, Venice 1733), was first critically edited by Zohrab (Venice 1805). Of minor im¬ portance are many versions derived from the Armenian (noted in Scrivener's 'Introduction' and Gregory's 'Pro¬ legomena'), and such as the Philoxenian (lost except 2 Peter, 2 and 3 John, Jude and Revelation), of 508, a Syrian para¬ phrase revised (616) into slavish fidelity by Thomas of Heraklea (hence in this form called " Harklean "), and the "Palestinian," a lectionary of the 6th century, formerly referred to Jerusalem, but now, following Burkitt, to Antioch.

France owes her earliest version (1160) to the Waldensian chief, Pierre de Vaud, the next to Guyard des Moulins (1294, published Paris 1488). At Lyons, 1477, appeared the first Testament in French print, followed in 1487 by the stately Bible dedicated to Charles VIII and by others similar.

The Swiss "Zurich Bible" (1529-30), revised frequently •and as late as 1895, was only in later parts independent of Luther's version.

More for the people were the Testaments of D'Etaples (New, 1523; Old, 1528; both, 1530). Made from the Vulgate, slightly revised (at Louvain) in 1550, and again in 1608, 1621, 1647, though proscribed in 1546, this became the popular version in Catholic France. More modernized were Lemais-tre's huge Port-Royal Bible (1667-87) and R. Simon's New Testament (1702). Lassere's Gospels (1887), accounted excellent, failed of ecclesiastic approval. The received Protestant version (by Calvin's cousin, P. R. Olivetan, published in 1535 by Waldenses and improved later), was revised in 1588 by Genevan pastors and used by Astruc (1753); modernized (1724, 1744) by J. F. Ostervald, it was again revised, the Old Testament in 1805. the New Testament in 1835. Still later and better, the revisions by Oltramare (1872), Segond (1874, 1880), the French Bible Society (1881), and many others, especially Rabbi Cahen's (Hebrew-French) edition of 1830, and Crampon's, revised by the Jesuits (1907).

Following a Dutch version of perhaps 1300, parts of the Scriptures were printed at Delft in 1477, and the next year saw the first complete ("Cologne") Bible in Low German. Luther's New Testament was revised and published in Dutch (Basel and Amsterdam, 1522), and Erasmus' Greek text was turned into "goode platte Duytsche" (Delft 1524), and the whole Bible at Antwerp, 1526. Catholics followed with the New Testament in 1527 and the Old Testament in 1548. As the land of the free, Holland was most prolific of translations. The Dutch official version of 1632 appeared as "Staaten-Bibel" in 1636. Supreme in scholarship is the "Synod Bible" a revision at request by Kuenen's school (New Testament 1866, Old Testament 1897-1902).

Though parts of the Scriptures were turned into Scan¬ dinavian as early as the 12th century, the New Testament appeared in Danish first in 1524, under Christian II, and in 1529 Petersen's New Testament and Psalms, bettered in 1531, appeared at Antwerp and met with more favor. Luther's German Bible passed over into Danish in 1550, was revised in 1605-07, again in 1819 and 1872, and for Norway (sep¬ arated from Denmark 1814) in 1830, 1857-69, 1890, 1904

(New Testament), besides a new popular version (New Testament) in 1889 and 1899. Luther's New Testament went into Swedish at the hands of Andrae and Petri (Stock¬ holm, 1526) parts of the Old Testament 10 years later, the whole Bible in 1540-41, followed by various revisions; A new revision by Sundberg, Toren, and Johanson received official Lutheran sanction in 1883. Many individual trans¬ lations of one or both Testaments have met with favor, those of F. O. Myrberg being accounted first in scholarship and literary quality. The Icelandic New Testament (1540) and Bible (1584) were revised in 1644 and often since.

Passing by the essays of the brothers Methodius and Cyril (855-70, whence the Cyrillic alphabet), we find a Slavic version for Russians 600 years later, first printed at Ostrog (1581) at instance of Prince Constantine, revised at Moscow 1663, again, more carefully, at command of Elizabeth 1753, modernized at bidding of the Holy Synod but published only partially (1818-25) under opposition, till completed under Alexander II, 1876. Other Slavs received their first versions: Czechs, 1488, though thereissaid to be in Vienna a 3-vol. translation of the Old Testament made in 1378 by order of Emperor-King Winceslav; Croatians, 1495; Poles, 15th century; Wends, 1547; Slovenes, 1555; Bulgars, 1828; Serbs, 1847. The Magyar New Testament was printed first in 1541, the Old Testament in 1590; a revision is now in hand. The Finnish New Testament appeared in 1548, the Bible in 1642 and a new translation in 1859; the Lithuanian-Lettisfi New Testament and Psalms appeared in 1662; the Lapp Bible dates from 1838-40.

The oldest Italian version (1270) is the Waldensian of Jacques de Voragine; Nicolo de Malherbi was first to print a Bible in Italian (Venice, 1471); Buccioli's better version from the original tongues (Venice 1530-32) was proscribed. Still other versions appeared at Venice, Zaccaria's 1532, Giglio's 1551. A Protestant New Testament in Italian, appeared the same year at Lyons, and the whole Bible at Geneva in 1562 and in 1607 (translated by Giov. Diodati, a famous work). The Turin version by Archbishop Martini (1776) pleased the Church, was adopted by the British and Foreign Bible Society, and issued in Roman Catholic revision,

Though a Catalonian version of the New Testament was made in the 14th century, when Jewish-Spanish versions (Old Testament) were common in Castile, and a Bible was printed at Valencia in 1478, the first printed Spanish New Testament saw the light at Antwerp in 1543, the next at Geneva in 1546, the first Old Testament at Ferrara in 1553, the first whole Bible in Spanish (Reyna's) at Basel in 1569 (revised at Amsterdam, 1602) — books proscribed in Spain. At length, in 1790, the Roman Catholic Miguel published at Valencia the popular Spanish Bible adopted in 1828 by the British and Foreign Bible Society. Similarly, in 1681, J. R. d'Almeida dared to publish in Portuguese the New Tes¬ tament and in 1712-19 the Mosaic and Historical Books of the Old Testament — at Amsterdam. At last, in 1778, A. P. Figueiredo printed the Bible for the first time in Portu¬ gal (Lisbon), — a version since adopted by the British and Foreign Bible Society.

The Irish New Testament dates from 1595, the Old Testament from 1685: most recent is O'Kane's New Testa-

Gaelic, the New Testament was issued in 1690, the Bible in 1783-1801, and revised in 1826, 1860, 1880. ln , r^^rlC'n,the^ew Testament appeared in 1567, the Bible x? 15>£' Manx version dates from 1770-72. A Breton

New Testament appeared in 1827, another in 1847, and the Bible in 1860.

Immediately upon the appearance of Luther's work the centre of interest in translations was shifted to the English, though not to England, for Willyam Tyndale finding <(no place in all Englonde® to ply his task, such was the con¬ servatism of the island, retired to Germany, where under Luther's shadow he printed the New Testament in English (3,000 copies, oct., at Worms 1525), though stopped at Cologne by Johann Cochlaeus. In 1530 appeared his Penta¬ teuch, in 1531 his Jonah. In his Belgian prison he begged for a Hebrew Bible, grammar and lexicon, along with warmer clothing, and held out true to the end (6 Oct. 1536), when he was strangled and burned, the pre-eminent hero of Bible translation. His noble work, though often faulty, remains the unshaken basis of all subsequent English versions, 80 per

cent of his Old Testament and 90 per cent of his New Testament being retained in the Authorized Version. France, Spain, Italy, Holland, Bo¬ hemia all had their vernacular Bibles before 1509, and Germany hers printed in 1466, re¬ printed 17 times before Luther. But Tyndale's New Testament was the first part of an Eng¬ lish Bible in print (1525), and the first English Bible printing was done in England in 1538. In 1535-36 appeared the first complete printed English Bible, based not on originals but <(out of Douche and Latyn,® with the help of ((five interpreters® (doubtless Luther, Zurich Bible, Yulgate, Pagninus, Tyndale), by the Augustinian friar Michael Coverdale, undertaken at the bidding of Thomas Cromwell and dedicated to Henry VIII. Coverdale was not made of such stuff as Tyndale, but his work contributed to the fineness and felicity of the English. Under the pen-name of (<Thomas Matthews® in 1537 John Rogers, who was to Tyndale what Purvey was to Wyclif, published the ((Matthew's Bible,® being Tyndale's work published and unpublished, supplemented by Coverdale's, annotated by Rogers, for all of which he <(broke the ice valiantly® at the Smithfield stake, 4 Feb. 1555. The book appeared and was sold on Cranmer's petition, through Cromwell's influence, by Henry's authority. Revision fol¬ lowed revision ; one by Coverdale, exploiting Munster's Latin version (1534 —35), was called the Great Bible , or the Chained Bible, was in¬ troduced into every church, and often chained. Public interest was intense and the clergy com¬ plained bitterly that even at divine service the people would read English Scriptures rather than hear English sermons. This Great Folio, begun in Paris, <(Fynisshed in Apryl 11, Anno M.CCCCC.XXXIX,® shows Henry on the title page, giving the (Word of God) to Cranmer and Cromwell, to give to the rest. The second of seven editions (1539-41) in 1540, called Cranme/s Bible , from Cranmer's long preface, contains the addition (<This is the Byble apovnt-ed to the use of the Churches,® since then for nearly four centuries familiar. After 1546 this was the only Bible allowed. Tyndale's was for¬ bidden in 15>43, no notes were allowed, and ((no woman (unless she be a noble or gentlewoman), no artificers, journeymen, servingmen, under

the degree of yeomen … husbandmen or labourers should read or use any part of the Bible under pain of fines and imprisonment.®

Fleeing from the flames that broke forth under Mary, the Puritan Reformers gathered with John Knox at Geneva, home of Calvin and Beza, and there headed by Whittingham, revised the Great Bible into the more literal Geneva or Breeches Bible (so-called from its adopting Wyclif's rendering of chagoroth in Gen. iii, by breeches instead of aprons or girdles). Annotated, divided into verses (for the first time in English), and convenient in size, this Bible from the start (1557-60) won the hearts of the people, reaching 160 editions in 50 years. But as Genevan it could never please the bishops, who under the lead of the learned Archbishop Parker tried to displace it with their (eight) ˆBishops' Bible® (1562-68), but failed for lack of unison, too many cooks spoiling the broth.

After such manifold preparation the time was ripe for the Revision of 1611, first sug¬ gested to King James by the Puritan Dr. John Reynolds in conference (Hampton Court, Janu¬ ary 1604), on (<things pretended to be amiss in the church.® Working under instructions from James to follow the Bishops' Bible wherever possible, to retain old ecclesiastic terms, to re¬ ject marginal notes except in explanation of the Greek or Hebrew*, to translate severally and afterward compare — and translating in six groups, two at Westminster, Oxford and Cam¬ bridge each, 47 in all, with <(three or four of the most ancient and grave divines® in consul¬ tation, they completed the whole work in 33 months, revised it in nine additional, and in 1611 gave it to the world fulsomely dedicated to the King, and with a remarkable preface by Miles Smith.

As may be inferred, its critical authority is feeble, but its literary charm and its emotional appeal are irresistible ; its hallowed rhythm still entrances the heart that no longer under¬ stands. In general faithful to the sense, to the form, and even to the color of the original, in its idiomatic flavor it sets up a standard of ex¬ cellence in English style that the modern reader regards with delight tempered with despair.

To perfect a work of such unrivalled mas¬ tery by the ((great helps® of incomparably supe¬ rior knowledge, and enlarged and corrected his¬ torical perspective, is a difficult though not an impossible task. But for many years the rest¬ less progress of thought and study along the whole circuit of biblical inquiry had made it evident that this Authorized Version (so-called though never publicly sanctioned by King or Convocation or Privy Council or Parliament) could no longer

in reason be held authoritative. Not a few private attempts were made to pro¬ vide translations at first of particular books, afterward of the whole Bible, more fitted to meet at once the more exacting critical de¬ mands and the altered literary feeling of the age ; but of course all such were predoomed to failure, though some were not lacking in merit. At length, at instance of the Convocation of Canterbury, February 1870, a thorough revision of the Authorized Version was undertaken and

* The number of such exceptions, 7,000 in 1611, has since then been much enlarged, and the marginal references have swollen from 9,000 to 60,000.

carried to completion in 1885 (though the Apocrypha did not appear till 10 years later). The revisers worked in four groups, two in England (on the Old Testament, appointed nine, invited 18; on the New Testament, apointed six, invited 22), two (advisory) in America (the second in each dealing with the Apocrypha), including such masters as Cheyne, Davidson, Driver, Field, Ginsburg, Sayce and the two Smiths (R. P. and W. R.). On the New Testa¬ ment their meetings were 407 up to May 1881 ; on the Old Testament 792 up to 20 June 1884; every verse was minutely discussed and the whole submitted to three revisions. A deli¬ cate and dangerous undertaking! No wonder that four of the invited declined, and that 10 died before its completion. The result, not seldom disappointing, has not passed unchal¬ lenged but has been subjected to a severe cross¬ fire of criticism, in large measure intemperate and unjust. A complete reconciliation of older aesthetic with newer critical claims has not in¬ deed been effected, but undoubted progress was made, and the enormous labor was far from thrown away. The Revised Version is steadily forcing its way to general recognition, though it has by no means displaced its predecessor. The American advisers were much more pliant to critical pressure than their English brethren, and the Standard American edition (1901) em¬ bodies many changes unaccepted by the latter.

Nevertheless, even this latest revision is far from final. While the conservatism of accept¬ ing the received Hebrew text should not be condemned, it seems certain that a thorough revision of that text is demanded no less im¬ periously than of the English translation. To be sure, the task is one of extreme difficulty, for which the time is not full, and generations or even centuries may wait on its fulfillment ; a wholly satisfactory result may be attainable only by altering profoundly the statement of the problem ; but a very notable advance

is even now practicable at many points. Similar but less serious and significant was the Lutheran re¬ vision projected at the Eisenach Church Con¬ ference (1861-63). The result ((ProbebibeP) tentatively printed in 1883, finally revised at the Halle Conference (1890), published in 1891 and circulated by the Wiirtemberg Bible So¬ ciety, was welcomed rather coolly in North Germany. Meantime independent scholarship has been brave and unwearied in work. Fore¬ most stands the noble translation of the Old Testament (with notes) by Ed. Reuss (in French 1874-81, in German 1892-94) followed and in minute scholarship surpassed by that of Emil Kautzsch and his fellows (1890-94, 3d ed. 1909-12), and the parallel Dutch work of Hooykaas, Kosters and Oort (1894-1901), both from carefully revised Hebrew texts. The valuable Variorum of Cheyne and Driver (1876-88) contents itself with appending to the Authorized Version suggested variations in text and translation, nor does it present the later and more learned views of these scholars. Noteworthy and admirable is the German New Testament of Carl Weizsacker (1822-99), which, begun in 1874, reached the ninth edition in 1906. The learned new translation of the New Testament by James Moffatt (1913), from von Soden's text, is valuable for its clear recognition in print of the metrical character of

large portions of nearly all the documents; the form of the Scripture is hardly less important than the substance.

A labor of Hercules is the Polychrome or Rainbow Bible ((<Regenbogenbibel®) of Paul Haupt and his company, which would visualize the composite character of the Old Testament by printing ((older incorporated documents or later sections … on back grounds of differ¬ ent colors,® both text and translation. The spectral effect is very striking, and some way of distinguishing the sources in type seems desir¬ able, and various devices have been employed. However, though the composite structure is be¬ yond serious dispute, the complete disintegra¬ tion and just distribution of components are still very far from perfect, the most plausible color-scheme is at best

provisional. But Haupt's S. B. O. T. (Sacred Books of the Old Testament) is a monument of erudition, inval¬ uable to the student.

Attempts to modernize the Bible into jour¬ nalese, to make the ancient — whether his¬ torian, legendist or mythopoet, whether moral¬ ist or parabolist, whether prophet or apostle — speak the language of the street, not to say the gutter — all such attempts are so ill-advised and proceed from conceptions gone so far astray that they may be passed by in silence.

Examples of translations named from certain peculiarities have already met us ; such too is the Donai, reading at Jer. viii, 22 (<Is there no rosin in Galaad?® and thence called the ((Rosin Bible.® The tale of such may be found in the great dictionaries. Often the translator stands before the alternative of being understood amiss or not at all. ((The Father of lights, with whom there is no variableness, neither shadow of turning® (Jas. i, 17). The reader is content to think of (<the least bit of turning!® The American revision gives ˆvariation" and (<shadow that is cast by turning,® which bewild¬ ers the reader, who still finds no hint of astro¬ nomical ((parallax® and <(eclipse.® Again, he seems to understand the Authorized ((course of nature,® but hardly the Revised <(wheel of pature® or (<birth,® for he is not prepared for Orphism in Jas. iii, 6. The false notion that the Bible, at least the New Testament, is crude and artless, the naive record of simple and unlearned men, gives rise to endless misunder¬ standing.

In modern times the original motive of Christianity, the <(conversion® of the world of polytheists and idolaters to Monotheism, the worship of the One God, has reasserted itself in a consuming missionary zeal, which has ex¬ pressed itself in a determined effort to bring the Word, as the power of salvation, to _ the mind and heart of all men, by translations into every tongue under heaven, so that mod¬ ern evangelicism reminds one of the angel bearing the ((Eternal Gospel,® <(Fear God and Give Him Glory® (Rev. xiv, 7). Far in the van is the British and Foreign Bible Society (founded 1804) credited with' translations into over 450 tongues, followed by the American Bible Society (1808, 1816) with a credit of over 150 tongues. Of course, there is here no ques¬ tion of critical accuracy or correct comprehen¬ sion, but rather of difficult adaptation, as when <(Lamb® becomes <(Little Seal® in Eskimo, but these devoted labors have at least borne not¬ able philologic fruit.

In glancing back over this immense range of translations we behold three towering apart, above and beyond all others: the Greek (Septuagint), the Latin (Vulgate), and the English (Authorized). Of these, the chief in import¬ ance is the Greek, since it conditioned the ap¬ pearance and triumph of Christianity; next is the Vulgate, the authoritative voice of the Roman Church to so many millions for so many years ; last in importance though first in literary excellence is the English, which now perhaps speaks to a larger audience than any other, than even the Vulgate itself. Next in eminence is the German (Lutheran), and far below it next the Syriac Peshitta. Of all five the German bears most distinctly the stamp of the individual spirit, and in much less measure the Latin, whereas the Greek is a growth of centuries, and the English the issue of a collec¬ tive effort consummating the long-drawn labors of nearly nine generations. The common con¬ sciousness has passed into the Three Chief Translations and therein found expression; and in spite of errors which the following years will constantly detect and expose in number, these versions will scarcely be surpassed by any future rivals. The corrosion of time may wear down these mountain summits, but it is very unlikely that the energies of the national spirit will ever upheave any others to such solemn and commanding heights.

For bibliography see article Bible.

William Benjamin Smith.

BIBLICAL ARCHAEOLOGY. Old Testament. — Archaeology is literally <(account of the old,® but it has become limited in application, first, to the old in relation to man, thereby distinguished from geology and palae¬ ontology, and secondly, to man as a creator of civilization, thereby distinguished from palaeol-ogy and palaeethnology. As an account of ancient civilization, archaeology itself divides into antiquarianism, dealing with antiquities, the mere physical products and agents of ancient civilized life, such as houses, temples, tombs, tools, arms, household articles and the like, and other artifacts, and epigraphy, which deals with the written legacies of ancient peoples, such as inscriptions on stone, brick, papyrus, pottery, vellum, parchment. The former makes appeal to our artistic nature, but the documents are laden with far richer and more definite infor¬ mation and historic content. Biblical archae¬ ology draws upon both for the illumination of the Scriptures, but in far larger measure upon the second.

The history of the Holy Land, and therewith the peculiar significance of the people Israel with its literature and religion, were decidedly

conditioned, though not determined, by the geographic singularity of its lying on the high¬ road of nations, midway between the two cradles of civilization, Egypt and Mesopotamia, the ever-growing deposits of the Nile and of the Twin Rivers. The independent civiliza¬ tions of these valleys reach back in high devel¬ opment to remote epochs, being definitely cer¬ tified in Egypt 4240 b.c. (beginning of the first Sothic Cycle, of 1460 (i.e., 4x365) years, circuit of New Year's day through the year), and the Nippur tablets carry back the Mesopotamian perhaps still further. Between these two lay Canaan, for millenniums apparently little in-

flucnced by either, but gradually drawn into the widening vortex of their ambition and em¬ pire. The earliest Hebrew tradition recognized this double dependence, reaching out one hand to the Nile, and the other to the Euphrates. According to Gen. xi, 27, xii, 4, Abram hailed from Chaldean Uz, or Haran, whence he went into Canaan at the hest of Yahveh. Again it is to Paddan-Aram (Gen xxviii, 2) that Isaac sends Jacob to get him a wife among his own clansmen. Such early contact of East and West is not unlikely, since the inscriptions attest that Lugalzaggisi, King at Erech of all Babylonia about 2800 b.c., ex¬ tended his sway from the Persian Gulf to the Western Sea, and his successor, the great Sargon, is even said to have crossed it. But again, even Abram is brought into close rela¬ tions with Egypt: he goes thither in time of famine (Gen. xii, 10), dwells there, departs thence, and his concubine, Sarah's maid Hagar, is an Egyptian. Much more, however, the most outstanding facts in the racial consciousness would seem to be the descent of Jacob and his family into Egypt, the sojourn and perse¬ cution there, above all their deliverance through the high hand and outstretched arm of Yahveh, followed by the legislation at Sinai and the wandering in the desert. It would appear then that Egypt bulked far larger than Mesopotamia in the national imagination, but this does not quite prove that the ties of blood and history were really stronger. Indeed, as already ob¬ served, it is not certain that Egypt is always meant by the M-z-r-m of the Hebrew text, and critics of the highest eminence suspect a con¬ fusion of geographic names at the

base of the whole Egyptian story.

When now we ask about the witness of archaeology to these Biblical statements, which undoubtedly represent the popular Hebrew consciousness, the answer is somewhat disap¬ pointing. Palestine is geologically a huge fault in the earth-crust, the western strata having slipped down nearly a mile and become ex¬ tremely crumpled in the dislocation. Hence has resulted its extraordinary variety of sur¬ face, climate and production,* well matched by a long and highly varied racial history gradually coming to light from the mounds that dot it and the caves that afford glimpses of man 10,000 years ago. Since as early as a.d. 333, the Holy Land has been a goal of pious pilgrimage and loving inquiry and exploration. A little later the learned Eusebius composed (and the still more learned Jerome turned into Latin) the ˆnomasticonP a careful list of the places in Palestine that are named in the Bible, identify¬ ing as many as possible and adding data con¬ cerning distances and events. His general method, though not his alphabetic order, has been followed by many travelers and culminated (1841, 1856) in the capital (Biblical Researches) of Edward Robinson, professor in Union Theo¬ logical Seminary, who explored the Holy Land in 1838 and 1852, armed with ((no instru¬ ments, except an ordinary surveyor's and two

* That the Biblical praise of Palestine is not exaggerated appears from the account of Sinuhe, a high-placed Egyptian, who fled thither about 1970: "It was a goodly land named Yaa (A_iah? Gen. xxvi, 24, 1 Chr. i, 40); Figs were in it and vines, More abundant than water its wine, Copious its honey, plenteous its oil: All fruits were upon its trees: Barley was there and spelt, All cattle without end."

pocket compasses, a thermometer, telescopes, and measuring tapes® — not with spade ; it was Renan (1860) who suggested but only feebly ex¬ emplified the supreme value of this latter. About the same time (1848) the depression of the Dead Sea, first recognized in 1837, was deter¬ mined by another American, Lieut. W. A. Lynch of the navy, as nearly a quarter-mile below the Mediterranean. Religious zeal soon began to organize itself for minute study of Palestinian topography, in the Palestine Exploration Fund (London 1865) followed by the American Ex¬ ploration Society (1870), and American Pales¬ tine Exploration Society (October 1870), — one main object of whose efforts was attained in the publication (1880) of a consummate map of Palestine. The Germans followed with their ((Palestine Society® (Deutcher Palastina-Verein, 1877) and its important journal

(Zeitschrif t) . Renan's suggestion was followed after nine years by Warren in excavating on the Temple Hill, Jerusalem, and laying bare the famous (<Robinson's arch® ; but not till 1890 did the scientific use of the spade begin in Palestine, at Tell el-Hesy (the ancient Lachish), under di¬ rection and often under the hands of the re¬ nowned William M. Flinders Petrie, in service of the Palestine Exploration Fund. His prac¬ ticed eye recognized the potsherds exposed by the corrosion of an intermittent stream on the side of the 120 feet high mound as indicating the ruins of by-gone ages, and his excavations published in 1891, continued in 1892 by Dr. F. J. Bliss, revealed city upon city, eight in number, the oldest founded about 1700 b.c., all stratified by the mounting and falling waves of history during nearly 1,400 years. Since then mound after mound has been dug up and sifted, as at Tell es-Safi (Gath?), by Bliss (1901) and es¬ pecially at Tell el-Jazar (Gezer, according to Clermont-Ganneau) by R. A. S. Macalister, which he found had been inhabited from 3000 to 2500 b.c. by non-Semitic cave-dwellers of the Stone Age, not taller than five and one-half feet, and afterward by Semites (Amorites?) till the fall of the Hebrew state (586), and also four centuries afterward, in Seleucid times. Of all Palestinian mounds this has been most exten¬ sively examined (about half of it, 1902-05, 1907-09) and has yielded the longest and fullest record of history. A tunnel cut through the rock 94 feet deep to a cave-well, now 120 feet below the surface, gives some idea of the energy and ability of the men of 3,700 years ago, while the "high place® with its monolithic pillars, from five and one-half to nearly 11 feet high, its votive plaques of Ashtoreth, and its charnel-house of new-born babes, many in jars sacrificed as first-born to the worshipped god, throws a lurid light upon the Palestinian-Phce-nician religion. At Tell el-Mutesellim (Me-giddo), the Germans under Schumacher have disinterred (1903-05) a stone-built city of 40 centuries past, and below it mud structures of still earlier date, surmounted by strata on strata, all preChristian, to the number of seven. At Tell Taanek (Taannach) Professor Sellin in 1902-03 reached a stratum that h-e dates from 2500 b.c. At Jericho also he found a jar handle whose scarab stamp indicates the 12th Egyptian dynasty, about 2000 b.c. The tale of such exhumations stretches out almost indefi¬ nitely. Most recently (1905) the Germans

BIBLE

By permission, from the Hoffman Collection

THE BLACK ARCHAIC BABYLONIAN TABLET

One of the earliest known inscriptions, thought to be at least 7000 years old. As tentatively deciphered by Prof. G. A. Barton, it defines the boundaries of a “field of clay ” “ belonging to the priest of Sallaltur.”

BIBLE

1st, 2d, 3d COLUMNS OF SENNACHERIB’S HEXAGONAL PRISM

The middle column tells of his cooping up Hezekiah as in a cage. In the British Museum.

From Bezold

BIBLE

* .$*4*

In - h t i

^ I

- *d / i’S

if *i&£\

p-tk

j’ d&MM*?#**’ ft

&g|, i

M /*

|t . ˆ

|

l, %*/*&-!<:

i »A

A Sumerian-Babylonian Dictionary, Two Sections of Four Columns Each (Ca. 3000 B. C.). The second and third columns contain respectively the character and its name; the first and fourth respectively the Sumerian and Babylonian equivalents. — From the Yale Collection, by courtesy of Professor Albert T. Clay

BIBLE

Babylonian Tablet Inscribed with the Oldest Known Laws (Ca. 4200 B. C), the supposed basis of the Hammurabi

Code. — From the Yale Collection, by courtesy of Professor Albert T. Clay

BIBLICAL ARCHAEOLOGY

have uncovered at Tell Hum (Capernaum) a synagogue of the 4th century a.d., and below it the floor of an older structure which some fancy may be mentioned in Luke vii, 5. H. Clay Trumbull, followed by C. M. Cobern and many others, has thought to identify the Kadesh-Barnea of Numbers xxxii, 8, with the present Ain Kades, which Woolley and Lawrence hotly contest in the interest of Kossima ((The W ilderness of Zin,) 1912). Also the Assump-tionist Fathers of Notre Dame de France have uncovered streets on the western hill sloping east, south of the present city wall of Jeru¬ salem, and think they have found the house of Caiaphas (John xviii, 24; Matt, xxvi, 3).

It is seen that the spade has made wonder¬ ful revelations, widening immensely the horizon of Palestinian history, but has dug up little of direct bearing on the Bible, beyond a long array of objets d'art too numerous to mention or even classify. Civilization after civilization, often of no mean order, is revealed surging over Canaan, the Hebrew monarchy (1000-586) appearing only as a comparatively brief inter¬ lude in the grand drama of history. The He¬ brews themselves seem to be of dubious antece¬ dents and connections, and we are startled at recalling the repeated charge of Ezekiel (against Jerusalem) : ((Thy birth and thy na¬ tivity is of the land of the Canaanite ; the Amorite was thy father, and thy mother was a Hittite® (xvi, 3, 45). The Amorite has long been known as the elder inhabitant of the land, and the Hittite emerges slowly from the mists of antiquity as a composite race wide-scattered from the Hfgean to the Tigris, from the Eux-ine to the Jordan. The conquest of Canaan looks like the work of centuries and of widely separated but related tribes invading at various times from different and distinct quarters and with varying and uncertain success. Coming to closer quarters, we ask what does archaeology tell us of Bible history and worthies, and first of Abraham? On a tablet dating from 1965 b.c. it is written that ((Abarama, son of Awel-Ishtar, For one month has hired … One ox

broken to the yoke.® Again <(Concerning the 400 shares of land, the field of Sin-idinam, Which to Abamrama To lease, thou hast sent … .® Again ((One shekel of silver Of the

rent of his field … brought Abam¬ rama® … These tablets and two others

in which Abamrama is mentioned as owning a field come from Dilbat opposite Babylon on the Euphrates midway between Ur and Haran. Whence it appears that the name is genuinely Babylonian, and the region agrees with the Bible text, but there is no suggestion of iden¬ tity between this humble tenant-peasant and the patriarch-in Genesis.

Over a thousand years later Sheshonk (Shishak) speaks of a place, ((The field of Abram® (near Hebron?), but this does not enlighten us. Still another tablet, of the Hammurapi era, records the lease of a wagon for a year, declaring “Unto the land of Kittim He shall not drive it,® which bears unneeded witness to the intercourse between Mesopotamia and the western coast. A far more important historical relation has ap¬ peared to some in Gen. xiv, the account of the triumphant foray of Abram, dwelling by the terebinths of Mamre, with 318 trained men of his household, against the four eastern kings already victorious over the five kings of Pen-tapolis. Schrader, followed by many, identified “Amraphel King of Shinar® with ((Hammurapi King of SunseO (Mar-tu), through a supposed corruption, Amrapi. But later scholarship questions or denies outright any such connec¬ tion. Similarly, the Chedorlaomer of Gen. xiv has been identified with the <(King of Elam Kukumal ’ (read “KudurlakhmaP* by Sayce and others, in the cuneiform inscription). But the reading is unwarranted and fails to iden¬ tify. Again, the same Chedorlaomer has been sought but not found in “Kudur-Mabug, < Fath¬ er) oi Sunset® (Mar-tu) in another wedge¬ writing, where <(Sunset® or ((Westland® means not Palestine but Babylonia. Other imagina¬ tive identifications are ((Arioch, King of Ella-sar,* with Arad-Malkua (read as Sumerian, Eri-eaku), and ((Tidal, king of nations,® with <(Tudkhula, son of Gazza.® But the tablets of the 4th century celebrate Babylon’s overthrow by Elam, Kukumal’s conquest of Hammurapi’s capital ! They doubtless deal with centuries after Abraham. . But even if the identifications were complete, it would only discredit Genesis ; for that Abraham with 318 household servants should attack and discomfit the victorious armies of the four kings and ((return from the slaughter of Chedorlaomer® is too heavy a tax upon our faith. If the whole account be not in some way symbolic, but semi-historic, the facts in the case are too deeply disguised for recog¬ nition.

When we turn to the West and ask con¬ cerning the early Egyptian connections of Israel, the gleaning is scanty. <(Sargon the mighty king, king of Agade® tells of his ex¬ posure ((in a basket of reeds® and of his rescue by ((Akki, waterman.® There need be no copy¬ ing of this in the account of Moses, but rather independent elaboration of a favorite motif ; the Freudians, of course, understand it all as a part of the dream-myth of the hero-birth, the basket as the womb, and *etc.* Hitherto, King Merenptah (1225-15) has enjoyed the ill-fame of being the Pharaoh of the Exodus ; but in 1896 Petrie discovered a stele inscribed with his paean of triumph in which, proclaiming his victory over Lybians, Hittites, Canaan, Phoe¬ nicia, he adds: <(Ytzrael is

wasted, his seed (fruit, crops?) is not.® Yet it is uncertain, from the absence of the “determinative,® whether a settled people be meant. In any case, the implication that Israel had been overthrown in Palestine is puzzling and seems to call for revision of previous ideas. Hardly less be¬ wildering is the frequent reference in the Tell el-Amarna letters’}” (to Amenophis III and IV, from the vassal King of Jerusalem, Abdi-Hipa) to the inroads of Habiri, who seem to be Hebrews, nearly 150 years before the sup¬ posed Exodus. The implication seems to be that the Hebrew invasion was a century-long process with no apparent outset from Egypt — a view not antecedently improbable. Of nearly the same date is a letter exhumed by Sellin at Tell el-Taaneh (1903) and containing the proper name Ahi-ya-mi, apparently the Babylonian for the Hebrew Ahijah or Ahi-Yahveh, attesting (as Barton thinks) the knowledge of the Holy

*Or Kudur-laghghamar.

fFour hundred clay tablets in Babylonian, discovered (1887-88) on the site of the new capital of Amenophis IV, — it is said, by an Egyptian woman, accidentally, and sold for two shillings!

Name Yahveh at the early period in Canaan.

Of somewhat similar purport is the dis¬ covery of the name <(Yakub-ilu® (in Hebrew, Jacob-el) of three men in Babylonia as early as 2161-44. Under Hammurapi, a fourth gave his father’s name as Yakub, the first antedating ((Abarama® by 190, the last by 75 years. Seven hundred years later (1478-46) Thothmes III records the conquest in Palestine of a city Jacob-el (in Egyptian Ja-k-b’-rd), which com¬ bined with the biblical history of Jacob sug¬ gests the partial derivation of the Chosen People in Palestine from immigrants from the North East. Similar conjecture is suggested by the similar presence in a Babylonian document (c. 2200) of the name Yashub-ilu (Joseph-el), along with the city name Ya-sha-p’-ra (Jo¬ seph (?) -el) in Thothmes’

list. The Bible ac¬ count seems to point toward a powerful more or less independent Josephine element in the Chosen Race. The touching story of Joseph and his temptation is remarkably paralleled in the Egyptian (Tale of the Two Brothers) (writ¬ ten for the crown-prince, afterward Seti II, 1209-05), as well as in the case of Bellerophon and Anteia (II. vi, 160ff) and elsewhere; but again it does not seem to be borrowing, but rather independent exploiting of an obvious and favorite motif. Among the El-Amarna Letters are two of the Amorite vassal, Aziru, to Dudu (Hebrew, David), a Semite, apparently all-powerful favorite of the King Amenophis. Again, an inscription published by Brugsch (1891), dating from Ptolemy X (117-89), tells how King Zoser (2980) prayed to Khnum, god of Yeb, in time of famine, caused by the Nile's failure to overflow for seven years, while an¬ other inscription of Baba (1500) tells how he prepared his city of El-Kab against such a famine, distributed corn, etc., much as we read of Joseph. Whence it appears that the historical background upon which the pleasing picture in Genesis is painted is sufficiently justified and exact.

If the illumination shed by archaeology on the times of the patriarchs and the Exodus is faint, scattered and uncertain, the light cast on the period of the Judges is almost <(darkness visible.® Only a remarkable report of one Wen-Amon, sent from Egypt to procure logs from Lebanon ffor the great and august barge of Amon-Re,® might do honor to a modern consul or special envoy and sets forth in lively hues the difficulties and dangers of primitive commerce ; but beyond confirming the repute of Lebanon, attesting the disorganization of the maritime Palestinian dependencies of Egypt, and presenting a parallel to <(Saul also among the prophets® in a noble youth whom (<the god seized and cast into frenzy,® this admirable state paper offers no points of contact with the contemporary Israel of Gideon and Deborah. The fame of the Lebanon cedars far antedates these Judges. Nearly 2500 years b.c. Gudea, the noted ruler of the Babylonian Lagash, in re¬ storing the temple of Ningirsu, ((brought from Amanus, mountain of cedar, cedar wood whereof the length was 60 cubits,® as well as <(great cut stones from Umanu … mountain of Amorites.® Such was the enterprise of the ancients! Not till after the establishment of the monarchy does the Hebrew step forth

clearly into the light of profane history. Sheshonk I (954-924), the Shishak of I Kings xiv, 25, having plundered Jerusalem in the fifth year of Rehoboam, pictured his victory on the walls of his pylon at the Karnak temple, affix¬ ing a list of conquered towns, 120 still legible,

indicating conquests of both Southern and Northern kingdoms, even beyond Jordan. Ashurnasirpal (884-860) boasts, <(In the great sea I washed my weapons,® but seems to have passed by Canaan. But his son, Shalmeneser III (860-825) claims, perhaps with exaggera¬ tion, to have vanquished (854) an extensive alliance including (<2,000 chariots, 10,000 men of Ahab, the Israelite® and (< 1,200 chariots, 1,200 horsemen, 20,000 men of Hadad-Idri® (Benhadad, in 1 Kings the determined foe of Ahab). This king has chronicled many campaigns and set up a black obelisk depicting <(Jehu son of Omri,® of whom be <(received tribute,® bowed and kneeling before him. Scripture is silent concerning those exploits. Again, Adad-nirari (810-782), unnamed in the Bible, boasts of hav¬ ing <(conquered … the land of Omri … to the coasts of the great sea.® The warlike Tiglath-pileser IV, whose inscriptions were sadly marred by Esarhaddon, vaunts a victory over ((Azariah the Yaudean,® ((of Yaudi® (738), but this was perhaps Azariah of Yadi in North Syria, named again in Sargon's inscription of 717 ; the Assyrian conqueror is the Pul to whom Menahem of Israel (<gave a thousand talents of silver® as tribute, the price of his throne. Six 3rears later, Pul swept again in full triumph over the west, Judah being saved only by the tribute by (Jeho) Ahaz (2 Kings xvi, 7-10), presented in person at Damascus. The muti¬ lated inscription declares ((The country of the house of Omri … all its people … I carried away unto Assyria. Pekah their king they had overthrown. Hoshea … over them I placed. 10 talents of gold … talents of silver I re¬ ceived as tribute from them.® This greatly overlaps the statement of 2 Kings xv, 29. Hoshea rebelled, and Shalmeneser V (727-22) besieged him in Samaria but did not live till his capture, recorded by Sargon (721-706) for <(my first year,® — <(27,290 people from its midst I carried captive,® which accords reasonably well with 2 Kings xvii, 1-6.

The deportation was small, even when aug¬ mented by that of Pul, far less than has oc¬ curred in recent cultured times. It was rather by absorption at home that the <(ten tribes were lost.®* For ages this Sargon was known from Is. xx, 1 as conqueror of Ashdod (711). His name was next discovered when Botta exhumed his palace in 1845. It is Sennacherib (706-681) that bulks largest in Judah's history. His in¬ scription relating to his campaign of 701 tells of his delivering Ekron's king ((Padi my ally® from (<Hezekiah, the Judaean,® — to whom his people <(had delivered him® in ((fetters of iron,.® — <(out of the midst of Jerusalem®; that he captured (<46 of his (Hezekiah's) strongholds,® a200,150 people, … I brought out of their midst® with countless <(booty.® ((Himself I shut

ˆTablets in the British and Berlin Museums, dated 666 to 606 and

concerning the sale of slaves, give a number of names with the divine prefix a-u, as Au-sabi, A-u-shezib, *etc.* This A-u would be Assyrian for the Hebrew Yo, or Yeho, or Yahu, the combining form of Yahveh in the Old Testament. Thus A-u-iddina would be for Jonathan (Yahveh gives). Hence it is thought these tablets afford us a glimpse of the " lost tribes " — engaged in the transfer of human chattels.

up like a caged bird in Jerusalem.® ((Deserted® by ((Urbi and his favorite soldiers,® Hezekiah <(with 30 talents of gold, 800 talents of silver,® and endless treasures, ((also his daughters, the women of his palace, male and female musicians he sent after me to Nineveh, my capital, and sent his messenger to present the gift and to do homage.® From this much-debated inscrip¬ tion it would appear, quite in accord with Is. xxxvi, xxxvii, and 2 Kings xviii, xix, that Jerusalem did not actually fall to the Assyrian, but that he departed to Nineveh, leaving his army behind. However, the extent of Hezekiah's disaster is only vaguely hinted in the Scrip¬ ture, and no intimation of the angelic slaughter of 185,000 Assyrians is found in the wedge¬ writing. Some, as Meinhold, would accept this latter, whose minuteness inspires credence, at its face value and regard the Biblical account as confused or garbled; others, as Winckler, refer 2 Kings xix, 9-36, to a second expedition, about 691 (when Tirhakah first ascended the Ethiopian throne), and the inscription to the first expedition only, — though this seems im¬ possible, as the return of Sennacherib to Nineveh (2 Kings xix, 36) is clearly implied in the close of his inscription. This latter how¬ ever strongly suggests that something happened to the Assyrian to call him away, and G. A. Smith, followed by others, in view of a passage in Herodotus (II, 141) telling how Egypt was delivered from Sennacherib's host by field-mice that ate up their quivers, bowstrings and shield-straps ((in the night,® conjectures that it was the bubonic plague that paralyzed the (<might of the Gentile,® and became in the Egyptian tradi¬ tion a ((multitude of field-mice,® vehicles of the pestilence, but in Hebrew imagination the Angel of Yahveh. In these accounts, then, we <(see men as trees walking.® An inscription of Esarhaddon (680-669) names <(Manassah King of Judea® as second

among ((22 kings of Hittite lands,® whom ((I overthrew,® confirming 2 Chr. xxxiii, 11, and Ezra iv, 2. Asurbanipal (669-626) also appears in Ezra iv, 10, characteristi¬ cally disguised as (<the great and noble Osnap-par.® In Is. xxxix, 1, 2 Kings xx, 12, 2 Chr. xxxii, 31, we find Merodach-Baladan sending an embassy to congratulate Hezekiah on re¬ covery from illness; Sennacherib's inscription of 703 tells of the overthrow of the former at Kish ; the embassy was doubtless to induce the latter to rebel. The many inscriptions of the highly religious* Nebukadrezar (Nabu-kudurri-uzur, ((Nabu, border-mine defend®) re¬ late chiefly to his buildings (Dan. iv, 30) and pass by his Judaean conquests.

Inscriptions that merely contain Bible names are too abundant for any specification. The Siloam inscription, which may illustrate 2 Kings xx, 20, has already been mentioned. The cele¬ brated ((Stone of Mesha® the King of Moab mentioned in 2 Kings iii, 4, discovered by Klein 1868, and after serious mishap finally lodged in the Louvre, contains a long inscription con¬

* Witness his Inaugural prayer and compare with Solo¬ mon's (I Kings viii, 22-61): "Ruler eternal, universal Lord, grant that the name of the king whom thou lovest, whose name thou hast proclaimed, may prosper as pleases thee. Conduct him along the path of righteousness. I am the prince devoted to thee, the creature of thy hand. Me hast thou created, and lordship over men hast committed to me… . The fear of thy godhead lay thou in my heart.

Vouchsafe me what seemeth good unto thee, for thou art He hath created my life ".

firming the subjection of Moab to the house of Omri <(for forty years® and its deliverance un¬ der Mesha, whose narrative is at best tangent to that in 2 Kings ; the two scarcely at all overlap, their viewpoints being wide apart.

It remains to add that the inscriptions show clearly enough that Babylon fell to Cyrus under the usurper Nabuna'idu (not to Darius, as in Dan. v, 31, not under Belshazzar, as in Dan. v, 30), who (and not Nebukadrezzar as in Dan. v, 11-18) was father of Belshazzar. They also make clear how the later Isaiah could speak so knowingly of Cyrus (xliv, 28-xlv, 5). On the other hand, Pinches and Clay have pub¬ lished two tablets which may indicate that Bel¬ shazzar was in some way associated with his father Nabuna'id in sovereignty. On the

whole, it seems likely that the author of (Daniel > was too far removed from the situation to write of it with correctness. The famous inscription of Cyrus celebrates how he triumphed as the chosen instrument of Marduk (not of Yahveh, as in Ezra i, 1-4), how he took ((Babylon .with¬ out war or battle,® how he established a rule of mercy and justice, how he reversed the stern policy of Tiglath-pileser IV, for two centuries prevalent, and restored the deported to dwell, the people <(in their homes,® the gods <(in their eternal shrines.® Such was his general policy, not his special favor toward the Jews. A special decree in favor of the latter (as in Ezra i, 1ˆ1) seems possible but unlikely. Such are the main points of historical contact between the Bible and the inscriptions.

Another important matter is that of literary resemblance or contrast. The vast Egyptian and Assyrian literatures continually emerging to light raise this question afresh at each new decipherment. With the first chapters in Gen¬ esis one must compare the Seven Tablets of the Babylonian Epic of Creation. Minute treatment is not possible in this connection ; suffice it that critics feel sure that there is intimate relation at a number of points, though the discrepancies are far greater and more numerous. Thus, the two accounts agree in assuming a primaeval chaos of waters, — in Hebrew Tehom, in Baby¬ lonian (Mummu) Tiam-at, cognate terms, like English morrow and German Morgen. But Genesis is monotheistic, while the epic is poly¬ theistic, and though vivid in its depiction of the god Marduk's struggle and triumph, it by no means approaches the serene sublimity of the fiats of Elohim. Yet the notion of cosmic Creation as a victorious struggle against Chaos had a charm of its own and seems to appear here and there in the Scriptures, as in Job ix, 13-14, where <(Rahab's helpers® seem to be ((the helpers® of Tiamat in Tablet IV, 105-18. Also in Ps. lxxxix, 10, and Is. li, 9, Rahab is like Tiamat. Similarly Job xxvi, 13, seems to recall Marduk's cleaving of Tiamat (IV, 93-104, 135-140). Once more, the ((Leviathan® of Ps. lxxiv, 13, 14, Job iii, 8; xli, 19-21, Is. xxvii, 1, remind us of Kingu in • the Tablets, the spouse of Tiamat. Lastly, to the present writer the noble 93d Psalm, especially in verses 3, 4, appears to re¬ echo and glorify the triumph of the cosmogonic God over the turbulent chaos (of Tehom). In another tablet is found a distant resemblance to the second account of creation in Gen. ii, 4ff, as well as in the great Gilgamesh-epic, where (<Aruru laved her hands, Clay she pinched off and spat thereon, Eabani, a hero she created,

Exalted offspring, with Ninib's might.® Once more in the myth of Adapa, who ((broke the Southwind's wing,® critics detect sundry' sugges¬ tions of the fall of man in Gen. iii. In spite of countless disparities, the atmospheres are alike. Moreover, the antediluvian patriarchs are matched in the long-lived Babylonian kings of the tablets and of Berossos, and even their names have been equated by Barton, extremely interesting results, which cannot be detailed in these columns. Very striking resemblances to the account of the Flood in Genesis are found in the 205 lines of the immense Gilgamesh-epic dating from Babylon, 7th century, but doubtless elaborating far older material. Ut-Napishtim (day-life), or in the Nippurian version, Ziu-giddu (life-day prolonged) figures in place of Noah. The essential features of the Bible story all appear in the Babylonian, along with plentiful polytheistic additions: the warning from heaven to the hero alone, the building and pitching of the vessel of safety, the embarka¬ tion, . the (<mighty rainstorm,® the ruin it wrought, the cessation when (<the sea calmed, the destruction abated, the flood ceased,® the settling on the mount (Nizir), the sending forth and return of dove and swallow, the non-return of the raven, the disembarking and sacrifice, not however the rainbow (but compare the < Iliad, > XI, 27f :

Three on a side, and they likened to rainbows set of

Kronion

High on a cloud, as a marvel to mortals articulate-speak¬ ing).

Another more fragmentary version of the Flood-story from earlier than 2000 b.c. has been found at Nippur and recently published (1914), and there are still others. The Baby¬ lonian poem is well worth reading as literature, far surpassing the Biblical in vividness and vigor, but as far surpassed in the inaccessible monotheistic sublimity of the latter. The cer¬ tainty of community of origin in this case is reflected upon other parallels less exact. The Flood seems to have been a favorite theme for Oriental imagining, but its primitive meaning has not yet been made clear.

Very recently (1915) Stephen Langdon has published (The Sumerian Epic of Paradise, the Flood, and the Fall of Mankind) from a Nip¬

purian tablet antedating 2000 b.c. It differs very widely from the accounts already men¬ tioned, but Langdon's interpretation is very vigorously rejected by other scholars, such as Barton, Jastrow, Prince, who find nothing about Paradise, Flood or Fall, but rather an imagina¬ tion concerning the origin of a city and of social life and the beginning of Agriculture, — a view certainly favored by their translations. The likeness of Tagtug (or Takku) to Adam and Noah is faint. One of the most important discoveries ever made amid the monuments was that of the Code of Hammurapi (2104-2061), on a block of black diorite in three pieces, ex¬ humed (December 1901, January 1902) by the French under de Morgan at Susa, whither it had been taken from Marduk's temple in Baby¬ lon, where the Semitic version of elder Su¬ merian laws was set up for the Semite to read them. These judge-made statutes, 282 in num¬ ber, the oldest known, present very many points of agreement with the Mosaic law, and naturally very many more of difference. They contem¬ plate a far more complex and highly organized

state of society than the Hebrew, though more than a millennium older. The consciousness that dominates them is moral and jural, whereas that of the Pentateuch is ritual and religious. It cannot be made out that the latter has bor¬ rowed directly from the former, but a common consciousness is distinctly shown in many notable parallels. A similar remark, perhaps more emphatic, may be made touching the Car¬ thaginian law of Sacrifices (of 5th or 4th cen¬ tury b.c.) in its relation to the Levitical.

It is a far cry from the Pentateuch to the Psalms, and we are prone to think of the Psalter as the most peculiar book of a peculiar literature; yet it is exactly at this point that the Hebrew-Babylonian approach is nearest. The wedge-writing abounds in Psalms, espe¬ cially the penitential, which often reveal the soul and a sense of sin with great distinctness. In general they are frankly polytheistic — yet intensely earnest, god after god being asked to intercede with some other, — though sometimes henotheistic, as when Bel or the Moon-god Sin is passionately and exclusively invoked in high wrought imagery and exalted conceptions, or in the Akkadian Hymn to Marduk* (c. 3000) : ((Who shall flee from before thy might? Thy will is eternal mystery. Thou makest it plain in heaven and on earth. Bid the sea, and the sea obeys thee. Command the tempest, and the tempest is calmed. Command the curves of the Euphrates, and Marduk's will shall stay the floods. Lord, thou art holy ! Who is like unto thee? Marduk, thou hast honor among gods that are named.® The reader will note the

familiar chords. Finest are the hymns to the sun-god Shamash, extolling his justice and righteousness : (<Thou guidest the law of the hosts of men. Forever righteous in heaven art thou. The righteous wisdom of the lands art thou.® Especially splendid, even in its ruins is the great hymn to Shamash, of four columns, 424 lines, lauding his goodness and glory and might. The repetend, with which we are famil¬ iar in certain Hebrew Psalms, as (<For his mercy endureth forever,® characterizes also the Baby¬ lonian (and especially the magic-formulae) thus:

“My god, who is lord of prayer, may he present my prayer

to thee! (Ishtar)

“ The god of pity, the lord of fields, may he present my

prayer to thee;

“ God of heaven and earth, the lord of Eridu, may he present

my prayer to thee.”

In many of these Psalms the note of anguish is loud, but it is the anguish of the individual sufferer; the grander note of national distress, where the voice of the whole people swells to heaven, remains silent in Babylonia, the privi¬ lege of Israel. However beautiful many of Babylon’s Psalms, they scarcely equal the Egyptian, some of which approach monotheism, which was even fully attained under Amenophis IV (Ikh-n-Aton, <(Man of Aton,® as he called himself), who reached almost the topmost peak of religious consciousness in his long and won¬ derful hymn to Aton (the sun’s disc, symbol of the One God) : <(Thou art in my heart ; There is none other knows thee, Save thy son Ikh-n- Aton® (Matt, xi, 27).

From the Psalms one passes naturally to the Proverbs, though by a steep religious descent,

The noblest religious projection of Mesopotamian musings, in his humanity and tenderness recalling at times he God of the New Testament.

and we find both Egypt and Babylonia rich in the Literature of Wisdom. The (Precepts of Ptah-Hotep* reach far back into the 3d millen¬ nium b.c., a record of experience already hoary, and the great library of Ashurbanipal teemed with proverbial philosophy. The Assyrian seems rather closer both in form and in spirit to the Hebrew than is the Egyptian. ((Before thy God mayst thou have a pure heart, For that is befitting a godhead.* (<The fear (of God) begets favor, Offering enriches life, And prayer brings forgiveness of sin.* Ptah-Hotep : ((If thou plowest and there is growth in the field, the god gives it as increase in thy land. Satisfy not thine own mouth beside thy kin.* (<Love thy wife without alloy.* ((Justice is mighty, immutable, fixed.* <(To please the mas¬ ter greatly, let us do for him more than he has bid,* which recalls the Gospel saying. Since in the proverb it is mainly a matter of practical prudence rather than religious sentiment, it is not strange that the Assyrian and Egyptian rank well with the Hebrew, though overtoiled by the voice of Wisdom in Proverb viii. The climax of ancient, at least, Egyptian morality is found in the (Book of the Dead,* dating in form from the 18th, in ideas from the 3d dynasty, and the Judgment Scene with its three sessions of Introduction, Disavowal and Address to the underworld gods, reminds us at points of the picture (Mt. xxv, 31ff) that inspired the (Dies IraeP The soul says: <(I live, I feed upon right and truth ; I have given bread to the hungry, and water to the thirsty, and raiment to the naked … therefore, let it be said Tome in peace, Come in peace.) *Compare also <(I have not caught fish with bait made of fish of their kind* with ((Thou shalt not seethe a kid in its mother's milk.*

It was especially in prophecy that Israel sur¬ passed all other peoples, yet was not quite alone. As Samuel (1 Sam. iii, 3-4) and Zechariah (i, 7, 8) had visions of Yahveh in the night, and Isaiah (vi, 1) in the temple, so in the stress of Ashurbanipal's victorious struggle with Tiu-man, King of Elam, <(a seer lay down, he saw a prophetic dream* of Ishtar, armed like Arte¬ mis and Athena, promising her invincible help to her faithful worshiper, the Assyrian King. As the prophets, in particular Amos and Isaiah, denounce the avarice, luxury and oppression of the upper classes, so does the sense of common right and social justice find powerful and pas¬ sionate utterance in the nine ˆleas of the Peasant* in Egyptian story. In the prophets, the basis is always religious, such is the will of Yahveh; but the peasant Hunanup's appeal more than a thousand years older is to the level scales, to the abstract and eternal principles of truth and equity:

<(Speak the truth; for it is great, it is mighty, it is everlasting.* Most characteristic of prophecy is the messianic ex¬ pectation, the vision of a king of justice and holiness, who shall restore to its pristine beauty the marred visage of creation and establish a universal reign of righteousness and peace. Characteristic, but not peculiar, nay, almost as universal as the yearning of the soul of man. The classic peoples longed for the return of the Golden Age. In his famous (Eclogue) it was proclaimed as at hand by Virgil, and the circummediterranean world hailed even Augus¬ tus as such a Saviour-Pacificator. But 2,000 years before, such aspirations had found expres¬

sion in the musings of the Egyptian Ipuwer. However, the distinctly religious and mono¬ theistic setting, along with the national con¬ sciousness of world-mission and destiny, re¬ mains unique in the Hebrew prophecies.

On the other hand, world-weariness, if pes¬ simistic, may easily pass over into hedonism or even sensualism, the ((carpe diem* of the Roman poet; such was not only the case with Qoheleth (the Preacher), as in ix, 7-9, but also of the Babylonian scribe of 2000 b.c., who ex¬ horts Gilgamesh, «Day and night be joyful. Daily ordain gladness, Day and Night make merry and riot, Let thy garments be bright. Thy head purify … a wife enjoy in thy bosom* — quite in the manner of the Hebrew moralist. Close akin to this world-weariness, whether pessimistic in the Preacher or optimistic in the Prophets, is bewilderment at the moral government of the earth, at the sufferings of the righteous and the prosperity of the wicked. This problem of Good and Evil is grappled in the book of Job, — apparently with an eye on the misfortunes of the people Israel, — perhaps the finest product of the Hebrew mind, but 1,500 years earlier, the Nippurian Tabu-utul- Bel, a righteous and religious official (<(prayer was my wisdom, my sacrifice, my dignity*) ˆadvanced in life,* appears to have fallen on evil days and slanderous tongues : (<A11 day

long the pursuer pursues me, In the watches of the night lets me breathe not a moment ; Through torture my joints are torn asunder, … On my couch I welter like an ox… . My enemy heard, his face did gladden* — which reminds us not only of Job, but of the sufferer in the Psalms. The wonderful central mass of the Hebrew drama is without parallel in Baby¬ lonian, and its close, perhaps an addition, sur¬ passes the account of how the Nippurian was cured by the messenger from Marduk. Thus the tale of the polytheistic magic-practising offi¬ cial sinks far below the empyrean flight of the

Hebrew, but the parallel is none the less important.

Altogether by itself in Scripture is the Song of Songs, a cento of love-lays, lively and beauti¬ ful, if often indelicate in their suggestions. Similar ditties have been heard in the East and taken down in modern times, but the like were also heard in Egypt nearly 4,000 years ago, and remind us vividly of many passages in the Song, thus : ((I am thy darling sister, To thee like

a bit of land, Each shrub of grateful fragrance… . A beautiful place to wander, Thy hand in my hand, My soul inspired, My heart in bliss, Because we go together.* Compared with Cant, v, 1 ; vi, 2, 3, these lines show that the elder bard has not only rivaled the Hebrew but also the moderns in celebrating the tender passion. It is noteworthy that the use of the term ((sis-ter,* intelligible enough in Egyptian, clears up in a measure the use in the Hebrew.

Lastly the great finds of papyri (dated 494— 400 b.c.) at Yeb or Elephantine-island (in the Nile, near the first Cataract) (published Lon¬ don 1906; Leipzig 1911), show that the Jewish military colony established perhaps by Psam-metik II of Egypt (593-88) had built a <(temple of Yahu-god* there before Cambyses' conquest (525). A letter to Bagohi (407) tells how this temple had lain three years in ruins, destroyed by <(wicked Waidrang.* Having appealed in vain to the High Priest, Jehohanan, at Jerusa-

lem, they turned successfully to the Persian governor Bagoas (Bagohi) and to the two sons of Sanballat, Governor of Samaria, to order its rebuilding. The bearing of these facts on the date of Deuteronomy is disputed. It is possible that Isaiah xix, 19-22, may refer to this temple and not, as hitherto supposed, to that of Onias (170 b.c.). Another letter (419) from a cer¬ tain Hananiah instructs the Jews of Yeb con¬ cerning the Passover, which seems to imply their ignorance of the Pentateuch, as critics maintain.

Such are the more important connections of Hebrew with profane

literature, as they are recognized in the works of even conservative scholars, such as Rogers (1912) and Barton (1916). Pan-Baby l onism, however, goes very much further in the learned works of Gunkel ((Schopfung und Chaos in Urzeit und End-zeit)), Winckler in his new edition, with Zimmern, of Schrader's (Keilinschriften und das Alte Testament, } his Hsraelitische Geschichte,* and numerous monographs, Zimmern in the same edition of Schrader, and elsewhere, A. Jeremias, the spokesman and continuator of Winckler, in his (Das Alte Testament im Licht des Orients,* and especially Jensen, who in his colossal work on the Gilgamesh-Epos would seem to regard nearly all <(world-litera- ture® as an outgrowth from the Babylonian legend, even the gospel with its Christ. Less enthusiastic scholarship reduces such claims to far more modest dimensions. With more rea¬ son Zimmern, in his contribution to the ((Jesus-Question,® finds remote suggestions of New Testament teaching in primitive Babylonian ideas, and Gunkel finds the aboriginal cos¬ mogonic struggle reflected in the Apocalyptic visions of the final consummation. The Winckler-Jeremias theories contain perhaps many golden grains of truth, but it will require years to sift them out, <(Under the whistle of wind and the swing of the winnower's shovel.® The eagerly expected publication of Ed. Glaser's North Arabian inscriptions may shed light on many dark places.

In conclusion, the revelations of the spade have undoubtedly wrought a profound trans¬ formation in our conceptions, both of the his¬ tory and of the literature of Israel. The former is seen to have unveiled itself upon a world-stage of extraordinary range both in time and in space. Though dominated outwardly by the colossal empires that towered on both sides far above it, though it caught and reflected their light at various angles, and was all but lost in their shadows, it still maintained its individ¬ uality in a fashion and not only conserved but magnified, purified, and even glorified its unique ideals. Though Ikh-n-Aton may appear as the first great monotheistic reformer, yet his refor¬ mation was lost in the sand ; though Delitzsch may be right in holding that Babylonia attained or approached the idea of the One God, of whom the many gods were only partial and inadequate phases, yet the idea never became effective in Mesopotamian thought or life. Israel still shines as the elect vehicle in history of the monotheistic conception. Similarlv with respect to the Hebrew literature, we can no longer regard it as wholly unique and peculiar, the pure efflux of an isolated fountain, a well in the wilderness. It flows through a well-watered land and is fed from many sources. It is a tree

on which indeed few grafts are set, but it spreads its roots far and wide and draws its sap from distant and ancient rivers. Or. the outstretched finger of time, this litera¬ ture shines not indeed as a solitaire but still distinct and conspicuous in a brilliant cluster. The imperial libraries of Ashur and Egypt are immense in extent and by no means always inferior in literary quality; but the solitary sublimity of monotheistic re¬ ligion-and the inextinguishable national con¬ sciousness of world-mission and world-destiny still invest the Hebrew Scriptures with a beauty and a majesty all their own. We must indeed recognize fully the utter ineptness of such ˆThoughts® as Pascal's (Art. XIV, ed. Lahure, VII, Bossut), unwarranted even when first they were penned,* but the present relation of the Bible and archaeology need in no way disturb the reverent and enlightened spirit, whether Jewish or Christian, that rightly regards it.

For bibliography see article Bible.

William Benjamin Smith.

BIBLICAL ARCHAEOLOGY. New

Testament. — The contribution of archaeology to the understanding of the New Testa¬ ment has not been less but rather more than to that of the Old, since, while it has in¬ deed come from various quarters, yet the largest element has proceeded from a source far less prolific in case of the one than of the other. It is the recent finds of Egyptian papyri that have cast the broadest light upon the life of the first Christian centuries, at least on the banks of the Nile, but the discovery and decipher¬ ment of numerous inscriptions in other regions, especially in Asia Minor, have also cleared up many questions, while indeed starting many others.

The use of papyrus in writing is thought to date back nearly or quite 5,000 years, and the oldest preserved specimen, about 4,500 years old, to be the copy of an original a mil¬ lennium older. Such writing, though a govern¬ ment monopoly till Alexander's conquest, was the constant occupation of numerous scribes. Papyrus rolls were of course very perishable, and it was Herculaneum that first, in 1752, yielded some charred ones written in Greek, which however were little valued. Twenty-six years later a roll discovered (along with 40 or 50 others) in an earthen pot, by Arabs in Egypt, was brought to Europe, where it excited small interest. Forty-two years then passed before the Serapeum at Memphis yielded the mass of manuscripts of the 2d century b.c., which sup¬ plied local color for Ebers' novels. The next year (1821) the so-called Bankes Homer (Book XXIV of the Iliad),

purchased near Elephan¬ tine, was brought to England; thenceforth the finds enriched more and more the treasury of the classics, and in 1839 the British Museum published 44 papyri. The recent period, marked by four great discoveries (in 1877, 1892, 1895, 1905-06) was opened 1877, by enormous finds at Arsinoe, at first but little

Spoken rather, in a three-hour discourse to friends (1658). The ‘ Pens6es ’ must be judged tenderly, as the product of four years’ progressive invalidism; though written on scraps of paper, they sketch the grandest apology by the greatest mind ever enlisted in the service of tradition. But not even the ten years of health, alas! so vainly craved, could ever have justified either the premises or the methods of Pascal. Con¬ sult Etienne Perier, ‘ Preface,’ and for specimens of criticism the Appendice aux Pens6es.’

BIBLE

THE SHECHEM DECALOGUE INSCRIPTION

Palestine Exploration Fund

•

1 ,

a Xf» * : iti M ˆ ˆ B:X/f/LUX’cˆB

X-.‘MBX’Tf nc-VM’?c\‘-rHX’ri X ˆX: -3 !B X’ritf.m Zr/BiX

M X M -fit Q. XX

X ■ftiarwS’rtXˆ K-c\ “J q /* X &

X rn /¥A: iBMX < ?X :Q2iX’H*:i!Srf)£X ˆ V J : iBniXˆX

XXh’-.\h-.!B’r/X ˆ X : :iBˆX

c\ˆ > BKX.i. BtfXˆX: XIWK-.ViXˆ

‘ti 5 J ˆ:qaWM:q- > o

X 3 :‘H XˆX

3 V V/rS :*/ X<? XX V frf XX

ˆ v : X !* + Y ■ h rn S < •’ * ‘ ˆ :

\ _

THE SHECHEM INSCRIPTION OF THE TEN WORDS OF CREATION

From Lidzbarski

Leaf from a manuscript of the Babylonian Talmud, treatise on idolatry (Aboda Zara), written in Ubeda, Spain, in 1290, now in the Library of the Jewish Theological Seminary of America,

New York

BIBLE

Pr-~\

™ | I iTf

§ § 5 if s|

5 ˆ

||| | 5 |

g-7 513 P § tr-3

S ff g s

S 3 § ..

5 g-g-g

r “p V b* VjT~^ ~

H *j‘ jt* M

y H v tj ^ ,

s 1 3

» m - nj tot <i

- - - S tot?

tor St

rt llllpl Va-»s

3 » JsS ! | s-g_f-J-3 “

.1* tor Hi

to

3 2

5 S „

§. | 3 .g ^ y _*s*-g -3 g s |

si « d i J § a =

•to bj to to M tl v’S ** H ^ v; : ~ P *Sf

5 e to to e~b ;f g §3- * = 2 §

i 1 g g ^ * 1 J §4 >?

“ga-Sgsgg a_g a

V* to ˆ s b <2 > 5 £?“X> ‘is p w

to

ˆ3 -3 M

$

ˆ•2 2 , £f- ˆ b fa to

I ■» M j

tt > <3

Jl

a .3

g

vjr ˆ

• St

p Vi to

O* VI ,vj

P a £»

ˆ ~1§f V: Q 4 £?

ri

is ts | e | ˆ

3

I ? W-* IL<tt $

S s £: S . <ƒ 3 V* tf y Er p

1 4-1 1

s

§ |-f -

| S

& to >

O vj:

p . ts p

£: : <7

v* V*

£ £

o p .

4440

g 2 & # -5~g ,0 e

i» -7J g g

tr x r _ s» — v/ *~~j s5 -X

ff I § M

m

i_g 4 « i 1 5-5 «s 1 1 § |4 | ITˆ-al iIrI \

I § Sip 5-‘§ 1 I H 111 3 .4ˆ3 8-i 111

p I ˆ ? .S il ˆ eˆ-S r- - C3 ˆ

y* w S7- “x ,v» ag ˆ ˆ - 3 ˆ7, v*Jj£ ti v5 g , ,4

ˆ ˆ ˆ H ˆ ˆ J 4 * b— 2 S 4rd -xj ˆ i ˆ

t3 ˆ Vj— d iS 4-<S <1 VI vS— 13 ˆ3 h 4 ii ‘4 fe. bi >5 ˆ *5 <3 g t5

g 1 <3 g_a_i g-4 « i 5 341 e g 1 1 § 3 lit

ˆ <4 t<i-J4Tˆifr<5 « i5 c- - 3 4 5 r; Ai_e B-rn ˆ

ˆ ˆ5 3r ˆ5 C5 5 ˆ U ˆ it <j Q 1J g ˆ3 Is J 42

& 4 . M tt. Sj vl *S t! ‘ vj ‘T- ‘ 7ˆ ˆ5 ˆ ˆ -T? u ˆ-vl ‘t. 2 ˆ ‘ —*

l; s ?. 1 •§ S 4 ?…* ?. §J g 4 slLg’ˆB? 3 a4

? 2 a-g pi; &rl s 5 s |l-

-« kj “it t-» Xj — • ij li ˆ4 -. _ j -K cj Vs ci- ˆJ

ˆ ˆ v< o-,- vi ˆ -J J

s sr 13 to*, y y M H ‘x t\ **

5k a <i— § js fs— ij ‘3 S

ˆ ‘ rv- - vj ˆ p ˆ

VI *” IS t »

€4 I3 ‘Ir ^ ” ?

^ .3 P t5 <4

^ i/ § I I

p— S p — : ‘4

u S ‘l

ci — j H ^

g *■§

h — ^ S <c3

p - _

to toj

V i N| >3 ^-,*i toi

t t i 8 4 n

p s: ^

>j 3

5; tor ^ P vs

8 S ? » 2 « ^ ?> &-,« .5 -j 1 a

at.li3P a §1 r

5 35 Vj 3 ^ u P ‘to* ^r*”*

toe p Qp T ^ - «

Si b a ->j

p

% 3 2 ig

* p p ˆ

“5 ? 3

q U v»

1 I g « 3

ti

?5

/

*4 n

S3 4

ˆ § , .

15

§ § ˆ g

4 P— ‘ ti * 55 • ˆ. ‘T Sj

7 ti 4 1

y

Vj

P

3

5j ~* p

,r ,- at v'J y

Vj K_r s^. Vj

1 x'4

_ J ^

to< , -* tot v*

St s$ ' P ""'3

•J - v i a

y 5 g. y 3

w - Vjr-^ -l S' ,

% § e ^ f 3

k ^ p p

I . P <3 ,

p3 SJ 3

wt p Vi S5

“y

ˆ P

_ —ˆ. “~~f — • tj P <V£ <4

ˆ5*ˆ3 V3 S <S

ˆ C tl b

ˆ g~g ‘J

ˆ3

P 4 , toi to)

ˆ - -7i_-ci r* . 0

u q ‘

« *0-» g to a a. :-;• « f;-.”, a § a t 3 a 3 a -. . a g n « g-g

V — >; >, qSi«m vitoxj b y

1ˆ’ <3

‘: a

e g > is g <3 * vi 0ˆ5

- •-* v.«- — tot y

a a s a 8-g

« p to to P y

to to

to to

<3

3t 3

tl

si : s:

g vi Vj

3 ‘•

p -4 o

t3-p to

&

,,:S C

^ ‘.4

«’ toP^-n

,.».//•• t + * ‘•*■’

BIBLE

i

/

/

p

o

h

riftf’ * a8 ˆ I f B n

; b J £ i J-p I f fin £

f 1 f«- 1 1 r N f ˆ |

l t’ f i b-l g r-t

* r ˆ p f h o

P

J» ft

£ ‘

e-B

r

r

n

\h IfetbUhii tit

** p g s r > b

£ s h ‘ ; ; fj

•• _£ £ g

n n IT

•X’ F > ’£! ^

-c xcL” n

& B1 g 2 -F5’?\T

il r IT > ’ „ - •

, ffl .- > ,■ C

b gif’

£’ Bl n < P-4,

X^§

II n > p r.

foxfo 5 ,fV ” si.-tl-jp J^‘4* P,g:

•t-r x „gt

r X.. r a ‘55-35 n* atv P o rfo 3-u,v

r p x-V»

a < rv rv .;J*

f; PP &

xf X jCCH.

m - *c_. n* - r r p n £X n-r t &»

H’ fo K x r D-c • 3i •

P5 x-e

J* -pi nr £-F

f- , tv’ ft.

:J. F ** •

n’.-C •’•X’” CJ

O £ ?. j&

£:. p: gl cv

*a. r« r-»

¥■ P -C r

r x” P

for P “p

f_:- n > ir **

§. p’ &

f b £

fo ” f:’ p-Eit

” ft’ pi- ■0 - t— . X ..

h £ fei

& n x: 2” 0 CL” c f r foi? rr £:* > X 9«,ˆn:Ar: p= n-‘tr.

£ r ˆ 2-pr -K-

L ” *• -r

C r ˆ V 2- ? F &: p2t.,p 0’p h

9 2’t c r. n

9 s

52. - a g ˆ c C. F

-PIP’ M> £,|f 8: B’i:

0 B

.§•

ˆ,-C, Hr

iPX’P, g, & f. -n ! -c- ˆ iˆ4 frg5

.r-Q S*r-§’ B’ S 2s

ft r i i. i-r- .

B b b Cr « *

•-fi-S» ?!• jS “b:

,r1s I1’ C G*’ 34f

-2-g- g.

j. X* ..Ol 31!. 0’

P,J^;f‘ ri

O’ H « r

jp-

i:

r? b” C 91 b* n< 2^;

-T £1 ^ G, ;-,r5 xrC-a1

jr - - ^

£

!>

P

P

ic;

6

f

tr

4 : fi

r> r*

?—g.

ri

): ?;

*’

C

H

S#“f_r’- >»► ■ P n-

*vJ = - C ˆ

S)’ p; Jj, gr f3 fc

i? S,‘RX1r;:S

pH

a gl . ..

k = j5 5 .S: g:

3 Dfo”

r», n > r £-. -;-i p » w. p

n -/’ j— r p .p*. |r i “jf: Cv p.

2r n F. K; S-F. ** -c. L .

a. t ■ Ck p- /p - n C -C u-

‘ p - Jj v tˆ r

. r “

b b

§

h

%

a-P’lfo’- r-p;- p

ft?.p24?:§ G-f p.-t “ ‘£” S’ p’ s-pl a &*■■£. p. «

-*» *7 c* r-p O’ n

r-‘ r K; i∼- n pi Of-n” r r *

ˆy-v fo” -h- *a r Lj n x

r V . >. L_ f* -XT p>. f∼*v . - . 4rˆ-

Pi ˆ ˆ r-» IT* /n -*— { * J {7) -‘i\ f-y.

S’; r 9 n> r Ji c r- —

for P’S’ •fcj.x-.. F fc; for *j ■r; n p, b p» ˆ J ‘-

b 52 1 pv .

n f∼ -L*’ in ‘X’-

P F; II P ‘ Cl q

X’ it r ∼ b

‘ ˆ o x -*

rVF

n

F * a

x x

X

c

-r

r*

ft

£ t fin ˆ r l.; Fx ft [■ b> §

r l “ f‘ 5 ‘tj i ? n a . a p u

f - a a B. -n f fop r1 ? ? <« fo fo

>■ f.? g ; § f iJ) r; ? g t? 3

. *V-3 !! b U f* ■! r. f - * r t » Xj. S i’r-J

«r PT’ “

6! p

a 5’

Xi-

c

r£-e If

J. r- ” S X f) ..

f, > f; ■> f-

* f r* > $;

Ft t£p 2 F i’

ˆ % W t» c

P: « grn’

rr x <rj>

n-IT

tJ t ;n

_ . II c . fo; £;;• p; n-X< “ r PˆQ-X

t > f~ ” ’ 7 a .. 7* M

• n. fo x fo r -

r\ f-. -ft r- . n» X’, ‘XI fo i • 7a i

It -3i • x q c-

5:-

x r, - r r nlaˆ-ssa: p

i.foffox::

fo *c ;J n- ˆ

p fo P Lfo

P~ ;> b fo;

r ˆ X) X n

iJ I; P L r

\l [‘ fi Si s

>; !• f? X i; !}

* i p ?, r.f-B

t- !• i> »- r. i k

O <- 2 (R ” i j ” n -f; t>

- n Pi fof f TP ’ ‘2

«a j> ., r ˆ

4.1

.-s’;?

w

<u

J3

aj >*-< X! © ** o

crl

B g

v* ri

£ S

H jo

0 r—

JQ S

4-» O

w S o

« -r »-« ® v W J3 .

r «

x ^ a; o

; s

<u 2

£ g w fi e

- S

--

o a > JS

—A A~t

V r*

~ .S

« aS

W -l-»

eB C a O o

w CO

W Q >

« M •2 « fi a

3 0 > O

M C

.s a

g 2

•a ˆ

< L»

•° T3

4J c

J3 cB

•W

a

a 2

s o « js

3 -*-»

O

• -n <d

> 2

3 *

O 2

■o 2

C {j « « .• v k4

g «

•M J3

w .

c

03

0)

o

C/3

0/

• -4

c

1-4

a

＜v

u

IS

X3

cB

＜v

02

be

c

CS

• «4

G.

U)

a＞

a >

X!

H

S

o

>

M*

X

w

3

O

J3

cT

i

3

M -O

03

3

3

ffl

*

O.

S

•«

03

u*

o

X)

03

03

X

3

c

o

o

J3

03

T3

3

03

03

-O

3

-♦-»

*Ui

CJ

3

03

C/3

3

fc

3

03

O

*3

*4-»

-2

»4-(

“w

o

3

3

3

O

w_

•♦-»

v >

o

-5

3

0)

£

•-

cB

w

W-.

u.

-<

£

2

2

Troves, commonly called Rashi

commentary of R. David Kimhi, in which an Italian censor has crossed out some words

BIBLE

►1

w

9+

(t

a

o

P

tr

a

►a

W

p

S

CA

Mi

13

K

rt

O’

rt

S’

w

o

o’

＜w

o

P

■p

o

H

sr

o

05

H

V)

ft¬

‘s

to

O’

a >

W

o;

< T

> o

a >

a

O’

n

•S.

5’

£.

X

a

o’

> -i

< t

Si

H

O’

»

r*

n

X

f-fO’

p

w

O

o

<

o

sn

P

P

a

p

o

<■)

(V

o

»

p

o

O’

<

n

►i

tn

<T>

O

S’

<V

a

o’

><

O’

o

rr J J

> J ?

3 2

d

j

S

J

rt

* j. s t . 12 j? p

rt tf

« J

- c 3

- if if

vT

u

sT

C j 3

g-J U <!

n 3

*i rt

‘I n J «

ii ^ x

5 3 H f

i*-4

D c r«

y ? ^

n Ji » G O’ a

& J a

g st

-*

3 if?

J rt

a i I

i Si 3 . 2 j a B H S-3

nn

rf .*1 £ £*

M . fl *j 5-15 « g.* ^ y -1 T2 o i ^ y ^ ii

$

rt

y

3

j

-j

«#

rt

3

1

il

3

CJ

i

»• * i r >

4 G “St £ ˆ

> r5-d ˆ 45

3

c s c ˆ

ˆ xx [j q J-Cr i

U O d 2 g q H 2

‘ « d S » « « 3

-> >j a_ si q «

u

lr

J

or

cf—

5f

r

C*

vt*

(I

.»

rr

Cl

vf

*1

vf* ..

4 J (j

i* 5 y

d §

II 3~ y d a

-ir frisi

1

esteemed as non-literary fragments from Byzantine times ; many others of the first three Christian centuries, better preserved and with interesting contents, were found in 1892 on the site of the neighboring village of Socnopaei Nesus. But already in 1890 the first great papyrus sensation had been felt in the dis¬ covery of Aristotle's Constitution of Athens,) supposed to be irrecoverably lost, written on the backs of four rolls (ledger of a small Egyptian farm, 78-79, a.d.), about 19 by 12 inches, a book, when translated, of 116 pages, startling by the

strange light cast on the polit¬ ico-legislative history of Athens. In 1891 Ken¬ yon of the British Museum published a volume of Classical Texts from the Papyri,* includ¬ ing seven mimes of Herodas (found in 1889), and the next decade witnessed a rivalry among museums in the purchase and publication of the long neglected papyri, adding to the Greek classics masterpieces of Hypereides, Bacchylides and Timotheus, the (Persai) of the latter found at Abusir near Memphis (Weidemann, 1902) in a coffin with a corpse and dating from the 4th century b.c., being the oldest Greek manuscript book yet known. In 1892 Ed. Naville disclosed a whole library in a govern¬ ment registration office at Thumuis in the Delta, but the charred rolls defied decipherment until 1915, when the editors of the Greek papyri in the John Rylands library, Manchester, suc¬ ceeded in making 80 of them legible in publica¬ tion, thereby disclosing an ancient bookkeeping comparable with the best of to-day. Still earlier (1888-90) the illustrious W. M. Flinders Petrie had unwound extremely instructive papyri-manuscripts (of the 3d century b.c.) from the faces of mummies in the Hawara cemetery. Trained by him (1894-95), B. P. Grenfell, with A. S. Hunt, began digging (1895) in the Fayum (sunken oasis, 30 miles across, 40 miles south-southwest of Cairo), and in 1897 at Oxyrhynchus (south, on the canal supplying the Fayum with water) in the heaps of rubbish that gird this town, like others of the East, they began the series of discoveries that have restored so vividly the life of the Fayum from Philadelphus (270 b.c.) to the 3d century a.d. (when irrigation ceased and the desert sand resumed its sway), and have con¬ tributed no little to our comprehension of New Testament Greek. These remarkable finds have been published, text and translation, in a stately series of 14 volumes entitled (Oxyrhynchus Papyri > (1898-1918). While the great mass of these and similar publications by the same and other scholars concerns only the private life of that time and clime (letters, accounts, re¬ ceipts, deeds, tax-lists and the like), not a few contain verses of the Scriptures, particularly the New Testament. Of these, five date ap¬ parently from the 3d century (90 verses), two others from the 3d or 4th century (33 verses), and very many from the 4th, 5th and 6th cen¬ turies, while from the 7th comes a treasure in some ways still more remarkable, 20 fragments of a gospel lectionary, possibly a continuous text, written by three poor Christians not on papyrus but on much cheaper pottery. Such ostraka, long disregarded, are now carefully collected and studied, since the great work of U Wilcken (< Greek Ostraca in Egypt and Nubia, > 1899) and W. E. Crum (< Coptic

Ostraca. > 1902)

Altogether, the New Testament finds of recent years reach the imposing total of 28 New Testaments (17 on skin, 11 on papyrus), 14 parchment manuscripts (listed by C. R. Gregory, 1909), 20 papyrus manuscripts (Ken¬ yon and Milligan, 1912-13), with countless frag¬ ments in hopeless dismemberment, an array constantly swollen by frequent additions. Chief among all, however, is the (Washington Codex, *bought (19 Dec. 1906) with three others* by Charles L. Freer of Detroit from the Arab dealer Ali, in Gizeh, near Cairo, who got (Sanders), or possibly from near Akhmim, it from some ruined monastery in the Delta prolific of manuscripts (Schmidt). Critically edited, with facsimile, by H. A. Sanders (1912), it takes its place beside the other three great manuscripts, Alexandrine (A), Vatican (B), Sinaitic («), dating probably from the 4th century and bringing strong and unsuspected support to the ˆWestern® text of the New Testament, hitherto chiefly represented by the almost outlawed Codex Bczce (D). Almost as important is the palimpsest of the Gospels in Syriac, discovered February 1892 by the twins, Mmes. Agnes Smith Lewis and Margaret Gib¬ son, in Saint Catherine's Convent, Mount Sinai, overwritten (778) with lives of women saints. Mrs. Lewis, having detected the words Evangelion, Mathi, Luca, in the underwrit¬ ing, guessed that it was the Syriac Gospels, a guess that Professor Bensly was the first to confirm on examining the photographs made from it by the two sisters on Mount Sinai. The interesting question of the relative author¬ ity of this ancient Syriac version compared with oldest known Greek text remains yet de¬ bated and debatable. Five more recent visits of Mrs. Lewis to the Convent have resulted in various interesting finds, none comparable in importance with the first.

Less weighty are the rapidly multiplying Coptic New Testaments in the various dialects: (Sahidic) of southern, (Bohairic) of northern,

(Fayum-Akhmimic) of middle Egypt. Nearly the whole New Testament may now be pieced together out of fragments in Bohairic; lately has also been found a manuscript (not com¬ plete) of the Gospels in Bohairic with Paul's, Peter's and John's Epistles in Sahidic pos¬ sibly representing a text older than B's or n's; and Dr. Budge has published (1912) the oldest known copy (350?) of any translation of any large part of the Greek New Testament (the Acts and the Apocalypse) in Sahidic (found 1901). Besides Proverbs and the Minor Prophets (the latter not yet published), not much of importance is offered in Fayum-Akh- mimic.

More, if not most, important textually are the Old Latin versions, especially current in North Africa. These, displaced (384-400) by

Jerome's Vulgate, t reach back into the 2d cen¬ tury, but only of late are coming into their rights as witnesses. Of the 18 fragmentary manuscripts 5 date from the 5th or even the 4th century. Thus far their voice has been faint, but very recent criticism, as represented by E. S. Buchanan and others, gives them full

* After reiection bv Grenfell and Hunt.

t Of which the oldest manuscript is of the 6th century, one side of one leaf of an uncial Latin New Testament con¬ taining Mk. xvi, 15-20, with queer variants, and the other side later readings from Luke and John.

ear and would revise thereby the New Testa¬ ment in the most radical manner, claiming a Latin original for Mark's Gospel and regard¬ ing the present accepted New Testament text as the result of a systematic corruption by the hierarchy in a semi-rationalistic sense. What¬ ever may be the final verdict of criticism, it seems certain that the deeper study of the Old Latin texts is both imperative and hopeful. Hardly less, nay, even more important than Grenfell and Hunt's unearthing of New Testa¬ ment texts was their discovery (1896) of seven <Logia) or Sayings of the Jesus, copied in the 3d century and referred directly to the Jesus by the recurring formula: <(The Jesus says® (6 'iTjaovg-Tiyei), seeming to indicate high antiq¬ uity. Several such were already known from extra-canonical sources ; but the newest seemed to form part of a handsome volume and breathed a more mystical speculative spirit than prevails in the Canonic Gospels. In 1903, Grenfell and Hunt, on returning to Oxyrhynchus, exhumed five more such ancient Oracles (42 lines), written on the back of a list of land-surveys not later than 300 a.d., oracles of highly Christian but not quite canonic tone, veering still more from the Synoptics toward the mystical Fourth Gospel. In collected form these (Logia) seemed to be not later and most probably much earlier than 140, in fact, quite as primitive as any Gospel, if not indeed present¬ ing the very earliest known form in which ®The (Doctrine) concerning the Jesus® (ra Trepl rod 'Itjijov) was reduced to writing.

This momentous find has been supplemented in various directions. It had long been known that Tatian, the Syrian rhetorician and friend of Justin Martyr, had produced about the year 170 (180?) a ˆiatessaron,* a kind of Gospel Harmony, which in spite of criticism and in spite of the virtual absence of the human in its Jesus, almost displaced the Canonics in the Syrian Church (especially at Edessa) and was laid by Ephraem Syrus at the base of his Gospel Commentary (4th century), though itself displaced* in the 5th century by the Peshitta version of the Edessan Bishop Rabbula (411-35). But Tatian's (Diatessaron) was known only from one in¬ complete manuscript of an Arabic version (14th century), a Latin version (Fuldensis, 6th century), and the Commentary of Ephraem till 1888, when Ciasca published, with Latin trans¬ lation, a far better Arabic text (11th century) translated from Syriac in the 9th century, which omitted the last 12 verses of Mark as well as the Lucan incidents of the bloody sweat and prayer on the cross (xxii, 43-44, xxiii, 34). The (Diatessaron, > by its early testimony to a Four¬ fold Tradition, has brought the orthodox much satisfaction not untempered with keen regret that in stressing the divinity it has slighted the humanity of the Saviour. Far more important the discovery, announced 1875 by Bishop Philo-theus Bryennios, in the library of the Jerusalem Monastery of the Most Holy Sepulchre in the Phanar of Constantinople, of a parchment volume (copied and dated 11 June 1056, by

* The Syrian Theodoret of Antioch, bishop of Cyrrhus, wrote in 423, referring to the 'Diatessaron': "I have found more than 200 such books highly esteemed by the churches in our part of the world. These I have collected and de¬ stroyed, every one, and substituted the Gospels of the Four Evangelists."

the <(notary and sinner,® Leon) of 120 leaves, containing besides the so-called Epistles of Clement to the Corinthians and other less in¬ teresting matter, 10 priceless pages written with the (Teaching) (D id-ache), a long-lost document of two parts, often mentioned in early Christian literature, composed probably before 100 and containing matter far more primitive. Published in 1883, after a strangely accurate forecast by Adam Krawutzcky, 1882, it startled all Christendom with its voice, silent for 16 centuries. The earliest manual of Christian theory and practice, it is full of parallels to the teaching of the New Testa¬ ment, agreeing strikingly in phraseology with the Gospels, but with hardly the slightest al¬ lusion to the familiar narrative element. Of course, it has been a storm-centre of discussion, but its witness remains unimpeached and un¬ equivocal.

Scarcely less significant are the 64 leaves of Syriac discovered and published (1909) as (Odes and Psalms of Solomon,* by J. Rendel Harris. Of these the Psalms are a Pharisaic collection (? 50 b.c.), long known in another form, but the Odes, unknown for 1,700 years, are Christian, at least in their recension, and recall the Palestinian soul of the 1st century in its deeper mystical musings, its higher poetic flights, and its wider spiritual visions, with frequent suggestion of the Fourth Gospel, as the teaching* suggests the Synoptics. As a parallel to the New Testament these Odes are invaluable, though like the (Didache, they know little or nothing at all of the evangelic story. A dense cloud of books, pamphlets and articles, nearly 200 in number, has gathered and still gathers around this (<HymnBook.®

Somewhat similar in spirit, though far more artificial and less profound, is the (Shepherd of Hermas,) a vade mecum of 2d and 3d cen¬ tury Christians, a product of the Roman soul, known only as cited or translated till 1856, when Tischendorf discovered one-fourth of it in a manuscript of the 4th century, on Sinai, and 1888, when S. Lambros found the other 12 leaves, of the 3d century. But, in 1900, seven more leaves were published, and in 1907 Kirsopp Lake published (Athos Leaves, etc.,* facsimiles of the Hermas-fragments found on Mount Athos, as well as the (Codex Sinaiticus> in 1911. Taylor has translated all and striven hard to show that this Pastor (dating from near 100) is saturated with covert allu¬ sions to the New Testament and with its phra¬ seology disguised, — all of which the natural eye fails wholly to discern and especially any reference to the Synoptic story.

Other early Christian documents have been unearthed, too numerous to mention, such as the (Gospel of Peter,) a <Revelation of Peter, *also various (Acts,* as of Peter, John and Paul (secured at Akhmim by Reinhardt, 1896), the (Book of Revelation,* ascribed to Bartholomew, and various others, — all evidently products of religious fancy. Some were exceedingly popu¬ lar in their day, like a modern <(best seller,® as also a noted book of devotion, (The Ring of Pope Xystus,* written not later than 150, but first translated into English and edited, in 1910, by F. C. Conybeare.

Also certain long-lost works of the Fathers have come lately to light, as in 1904 the

‘Apostolic Preaching* of Irenaeus, notable for establishing New Testament incidents from Old Testament prophecies; also 37 passages from an unsuspected treatise of Origen on Revela¬ tion were found 1911 in the Meteoron Mon¬ astery in north Greece. Far richer, however, the wealth exhumed of Christian Sermons (250-600), bearing witness in general to a fervid imagination directed with rhetorical skill, to a highly mechanical and extravagant orthodoxy, and much more to an all-pervading tendency to symbolic interpretation* of Scripture stories, — a very clear indication of the atmosphere in which these were born. Deficient as they were in knowledge, the preachers of old do not yield in mental power to their successors of to-day. Numberless Amulets (bearing Gospel versions like beads, with prayers for healing) show that paganism and magic, especially in the use of the “Name® had departed not wholly from the first Christian centuries and returned powerfully in the later. Much of the phraseology of peti¬ tion is dignified and impressive, eloquent with invocations still heard in Church service.

The great hymn of Clement of Alexandria, long accounted the oldest of Christian songs, consisting almost wholly of a succession of poetic epithets of the Jesus, is now at last rivalled in antiquity by one similarly discovered at Oxyrhynchus. Almost as old is the famous Syriac (Hymn of the Soul,* quite extraordinary in its sustained symbolism and imagery. Com¬ plete Coptic Psalters (6th or 7th century) have been recently uncovered. These ancient hymns disclose a strong movement toward Mariolatry, as the devotee mused on the mystery of the Virgin birth. Many Christian letters recently deciphered give welcome and intimate glimpses at the early disciples ; along with which are others pagan, but so nearly like the Christian in language and spirit as to be scarcely dis¬ tinguishable. One gets the impression that these souls were Christian because they were noble, rather than noble because they were Christian. In the descent toward the 7th century the early simplicity degenerates into mock modesty and humbleness. Christian epitaphs, found in great numbers, are strangely enough often hard to discriminate from the pagan, though in general sounding a clearer note of hope. Some have established model forms in use even to this day. Least attractive of all such religious relics are the (Libelli, * certifi¬ cates of Christianity disclaimed, of which Krebs detected the first (1893) in the British Museum, Grenfell and Hunt the

fourth in 1904, dating from the Decian persecution (ca. 250), and Meyer published 19 others (1911) ; still later the number has risen to about 30, mostly from Theadelphia. It remains possible that such disclaimers may have proceeded from sincere pagans falsely reported as Christians. It is remarkable that the persecuting emperors, Trajan (112), Aurelius (176), Septimus Severus (202), Decius (250), were among the noblest that adorned the Roman throne; they regarded the new religion as anti-patriotic.

While Egypt has yielded papyri, it is Asia Minor, and particularly Phrygia, that has most enriched the fund of inscriptions. Palestine

* Often far-fetched, as when Athanasius identifies the

laborers (Matt, xx, 1-16) with the long series of Scripture worthies from Moses to the Apostles.

might indeed have been expected to speak most eloquently of early Christianity; but nay; though 11 cities have been excavated and called to witness, they are dumb ; the decipherments of Dalman, Schmidt, and others do not hark back beyond the 4th century. The greatest single ˆinterpreter of Graeco-Roman life is Pompeii, but its testimony is too early to il¬ luminate Protochristianity. It is the stupendous excavations at Rome that shed light upon the 1st century, whence dates the earliest Christian inscription (72) of the oldest Catacombs (of Domitilla, Priscilla, Commodilla, (crypt) Lucina) while the majority are of the 4th cen¬ tury and the latest from the time of Alaric (410). The output of Catacomb-inscriptions has been enormous in number (15,000 of De Rossi alone) rather than significant or instruc¬ tive. The temper of the people is revealed as peaceful, trustful, hopeful, their religion as centred in the worship of Christ as God (under form of a beautiful shepherd youth) and as abounding in symbols, their morality as pure, their ritual as simple, their art as classic and excellent. Connections with the New Testa¬ ment or Palestine, if any at all, seem very remote.

As yet the papyri bear no clear witness to Quirinius as governor of Syria before 6 a.d., but they have yielded decisive information touching the Roman census (Luke ii, 3), from which U. Wilcken has shown (Hermes, 1893) that the regular registration fell on each 14th year from 20 a.d., and possibly from 6 a.d., or even 8 b.c. The enrolment was by households, and naturally all members of a family were ex¬ pected to be at home at the taking. An order to this effect, in

No. 408 of the Greek Papyri in the British Museum, reads thus (trans¬ lations of the supplied portions of the mutilated text being inclosed in brackets, and the initials of the lines capitalized) : ((G(aius Vibiu)s Maximus (pref)ec(t) (Of) Egypt (says) Be¬ cause of the (im)min(ent census by) house (holds) Necessary (it is for all tha)t any time for a(ny) rea(son have departed from their own) Nomes to be no(tifi)ed to r(etu)Rn unto their ow(n he) arth stones tha(t) Also the accus¬ tomed (dis)pensation of th(e en)Rolment they may fulfil and to the farmland be (long¬ ing to them may firmly adher(e).** — This edict recalls to their own present homes the peasants that have gone out (Ikctclch). In spite of learn¬ ed attempts to wrest its meaning into the exact opposite, it gives not the slightest hint of going to (<ancestral abodes** (Luke ii, 4), — as if a Kansas farmer should return to Vermont to register !

In Egypt also the symbolism of the Good Shepherd appears, the ancient burial rites were christianized and preserved, the figure and functions of Osiris are supplanted by similar ones of the Saviour, the two being sometimes indistinguishable, and Isis nursing Horus is transformed into the Madonna with the Child. The venerable swastika, welfare symbol of the Age of Bronze, is everywhere sanctified, and even Anubis and Apuat adorn the skirts of a Christian burial-robe. So tenacious of life were the mvthologic motifs, and so they have remained. If one may trust the inscriptions, it was in Asia Minor, and mainly in Phrygia, that Christianity took its firmest and widest

hold. A region largely inhabited by Jews, many of them wealthy and prominent, descend¬ ants (says the Talmud) of the Ten Lost Tribes, 2,000 having been imported from Babylon by Antiochus Magnus (ca. 200 b.c.), who had become in large measure paganized and so were open to the universalism of the Gospel. Here, too, flourished the mystery-cults of Atys, Adonis and others, whose deep imprints on New Testament phra¬ seology as well as ecclesiastic dogma and ritual are daily becoming more visible. This region has been the favorite haunt of exca¬ vators, conspicuous among whom, at least for zeal and

production, is Sir William M. Ramsay, whose intense pursuits led him to the famous South Galatian Theory in answer to the puzzling query, Who were Paul's ˆfoolish Galatians"? — a theory zealously advocated by archaeol¬ ogists and as earnestly rejected by linguists in favor of the North Galatian Theory. In northern Syria, also, numerous cities have been exhumed, as well as the extensive Christian cemeteries of Salona, the ancient Adriatic port of Dalmatia, but their revelations are more important in artistic and sociologic than in biblical bearings. Great interest has attached to explorations, notably the Austrian (1897-1913), at Ephesus, especially because of the uproar narrated in Acts. The title there (xix, 35) given to the city, (<temple-warden of … Artemis" (veuadpov … ' Aprifudoc),

is confirmed by a dedication exhumed, and Dr. Hicks (half-supported by Ramsay) fancies he finds the Demetrius of Acts xix, 24 at the head of Ephesian magistrates ; an official in¬ scription speaks of Julius Caesar as ((God made manifest … saviour of human life" ; a

Christian tablet tells of a ˆdeceiving image of the demon Artemis" and of a (<God that ban¬ ishes idols," where the identification of ((demon" with heathen god sheds light on the Gospel ((demons" ; neither is it strange, in a city given to the worship of the ((Great Mother" and the chaste Artemis, that many inscriptions attest an early reverence for the Virgin Mary.

Touching the moot question, Was any altar at Athens inscribed ((To an Unknown God" ? answered negatively by E. Norden in (Agnostos Theos) (1913), Deissmann has published (1911) a picture of an altar uncovered (1909) in Pergamon, ((To Gods Unk[nown],"* where the added <(s" makes a difference ; but endless explorations at Athens have discovered nothing Christian of importance. At Delphi, however, a fragment (found 1908), inscribed with a letter of the Emperor Claudius, dates the Achaian proconsulship of Gallio from the summer of 51 ; Paul then -would seem to have left Corinth the autumn of 51 and to have reached it early in 50 (Acts xviii, 11, 12) : an important synchronism, throwing back the beginning of his mission almost to the received date of the Pentecostal wonder. Remembering that Paul did not inaugurate the Gentile mis¬ sion, but found it in full flood and was up¬ borne by its current (Bousset, (Kyrios Chris¬ tosˆ p. 93), one sees that this mission dates practically from the first dawn of Christianity.

* The Greek is deoig-ay. This has been completed by Hepding into ay[vG)OTOi<y], uncertainly, as he admits

(1910).

At Antioch (in Syria) some well-digger? exhumed (1910) a silver chalice or communion bowl of rude workmanship but covered with a silver sheet on which amid exquisite grape¬ vine decorations are wrought ((portrait-figures" of Christ and 10 Apostles, said to be of exceeding excellence. Pious imagination has dated this sheet between 57 and 87 and has even thought to recognize in the central figure a genuine portrait of the head of Christ. From numberless other excavated cities various glints are cast upon the New Testament and Protochristianity, as when <(life" and ((light" are found on the door-post of Artemis' temple at Sardis, or at Assos an inscription of the soldiers' sacrament to Caligula (37) : ((We swear by the Saviour and God, Caesar Augus¬ tus, and by the Pure Virgin," i.e., Athena Polias (Cityguard), to whom the temple was built. Very interesting and important are the revelations of the life and soul of the empire, which make plain that former notions of its depravity were gross exaggerations. Many centuries of war and conquest had indeed hardened the Roman in his native cruelty and bloody-mindedness, — much less time has suf¬ ficed in other cases, — and licentious self-in¬ dulgence flourished then perhaps even more than now in the ruling and predatory classes; but the heart of the people was still sound, the homely virtues were still prized and honored and cultivated, and public benefactors w-ere not less numerous or generous than to-day. Civic spirit and social charity were indeed at their height, and almost a frenzy of philan¬ thropy seemed to possess the empire under the Antonines, when philosophy sat upon the throne. Under a slight scarcity of provisions, in time of great national danger and endeavor, profiteering has run amuck among us, prices have doubled or even tripled, and ships offered earlier for sale at $65,000 and $60,000 have been patriotically sold to the government for $650,- 000 and $800,000. Compare herewith the Ephesian public inscription in honor of three wealthy men who had sold their stores of wheat at cost during a famine. Undoubtedly the Graeco-Roman consciousness furnished a soil not unfit for the sowing of the Gospel.* Linguistically, it has come clearly to light that the language of the New Testament was not, as so long imagined, a more or less sacred tongue or dialect, but was the all-prevalent Koine, the everyday speech of the people, not untinctured with the mystic phraseology of the mystery-cults, and soaring at times into solemn sublimity on the wings of a missionary spirit of religious zeal. The net result of these ex¬ humations, which future researches are sure to enlarge and confirm, putting a quietus on all rationalistic attempts to derive Christianity from ((The Carpenter of

Nazareth," has been to delocalize and depersonalize our conception of the origin and early progress of the Chris¬ tian movement. In the words of Professor Gurlitt, ((The rapid spread of Christianity, hitherto an insoluble riddle, receives a startlingly simple explanation, and indeed the whole speech of the New Testament becomes

*At this point epigraphy weighs down the scale of Pliny the Younger against Tacitus, Juvenal, Martial, Petronius, Consult Dill, 'Roman Society from Nero to Marcus Aure¬ lius.' written with eaual fulness of learning and svmoathv.

now, for the first time, understandable.® The setting now supplied for the world-revolution is nothing less than the Judeo-Gneco-Roman world. The religion of the Jew, the art, science and philosophy of the Greek, the law and administration of the Roman, — the ethical monotheism of the cultured, the mysticism of the Asiatic cults, the passionate longing for union with God in the Mysteries, the sense of Brotherhood fostered in the guilds and thiasoi, the seething cauldron of hopes and fears, of superstitions and sufferings in the multitude, — all these and far more mingled their elements in the mighty Birth of 19 cen¬ turies ago. In this new ((Light from the East® the Palestinian portrait bursts its miniature frame and spreads away into the measureless canvas of the circummediterranean world.

For bibliography see article Bible.

William Benjamin Smith.

BIBLICAL CRITICISM. Textual Crit¬ icism of the Bible. — The object of Textual Criticism is to ascertain the original text of a literary work, as written by the author or authors. Since its objects and principles do not vary essentially in different fields of operation, its application to the Bible gives it no special characteristics. Literary works vary, of course, in the nature and amount of the materials available for textual criticism, this being true of the Old and New Testa¬ ments in comparison with each other, and also of the individual books or even

parts of books. Textual Criticism is sometimes called Lower Criticism, in distinction from Higher Criticism. The term Textual Criticism, however, is more exactly descriptive, and hence to be preferred.

The materials available for the textual criticism of the Bible may be classified under three heads, (1) Manuscripts. These are the principal source in the New Testament, more than 3,000 being in existence which con¬ tain the whole or a part of the New Testa¬ ment, of which the earliest are assigned with much confidence to the 4th century a.d. In the Old Testament the manuscript material is of comparatively little importance, since the oldest manuscript, of a part of the Old Testament, is dated in 916 a.d., and the manuscripts show but few variations of importance. An excep¬ tional position, however, is occupied by the Samaritan manuscript of the Pentateuch. This is of uncertain date, but probably comparatively old, and its evidence is of much value. (2) Versions, that is, translations into other lan¬ guages than the original. Several of these have a real, though subordinate, value for New Testament work, the Syriac and Old Latin being most important. In the Old Testament, however, they are the principal documentary source. The chief of these, in the order both of age and importance, are the Septuagint, a Greek translation, made, at least for the most part, in the 3d and 2d centuries b.c. ; the Peshitta, a Syriac translation belonging prob¬ ably to the 4th century a.d., but based on versions as early as the 2d century; the Vul¬ gate, a Latin translation made by Jerome, com¬ pleted in 405 a.d. ; and various Targums, which are Aramaic translations, first oral and then written, these belonging, in the written form, to the period from the 5th to the 9th cen¬ turies a.d. (3) Quotations. Those from the

Old Testament which are sufficiently ancient to be of value are in the Talmud and other Jewish writings, but the textual variations they exhibit are of minor importance, although they would doubtless repay more careful study in reference to this matter. Those of value in relation to the New Testament are found in the early Church fathers, and these have been studied with considerable thoroughness but have not furnished much material of im¬ portance.

The textual criticism of the New Testa¬ ment has been the subject of much careful work which has produced results of great value. Among those specially prominent and successful in this study may be mentioned Michaelis, Tregelles, Tischendorf, Westcott and Hort, and Von Soden.

Textual criticism is necessary because of textual corruption, changes from the original form of the text. This textual corruption has arisen in large measure from the scribal copy¬ ing by hand, but partly also as a result of corrections, so-considered, of manuscripts already copied. The corruption is either de¬ liberate or accidental. Deliberate corruption includes principally grammatical corrections, assimilation to parallel passages, explanatory additions, usually first written in the margin and later put in the text, and dogmatic changes, the last being undoubtedly found but not numerous. Accidental corruption is quite cer¬ tainly more frequent and more important than deliberate. This results from the carelessness that is in some measure inevitable in copying by hand.

The following are the principal forms of corruption that are due to accident: (1) Dit¬ tography and Elision. Dittography is the repetition of letters or words, and elision is the omission. Both are usually due to the occurrence of the same or a similar combina¬ tion of letters or words at two points near together, the scribe unconsciously passing from one to the other. (2) Additions, not of the nature of dittography. These are usually scribal explanations on the margin, and hence at first deliberate; but the reception into the text is usually accidental. (3) Conflation. This results when a scribe or corrector is acquainted with two readings and is uncertain which is correct so that he includes both. Here the inclusion itself is deliberate, but the cor¬ rupted text on which it is based is ordinarily accidental. (4) Changes. This is frequently by mistake for a word that is similar either to the sight or the hearing, as manuscripts were copied in both ways, and sometimes also by mistake for a word of similar meaning. It sometimes arises, also, from the illegibility of the manuscript that is being copied.

The methods of textual criticism are two, comparison of documentary evidence, and con¬ jecture. Where material for the former is abundant, as in the New Testament, the latter has little place. Where such material is scanty, as in the Old Testament, conjecture must be used, although it should always be with caution.

The chief principles generally recognized in the employment of documentary evidence are the following: (1) The weight of manu¬ script evidence is to be considered, although this alone cannot be decisive. The weight of

evidence does not come from a mere enumera¬ tion of manuscripts, but must take into con¬ sideration their division into classes and rela¬ tion to each other, with special reference to their genealogical relation, that is, the deriva¬ tion of one from another or of two or more from a common earlier manuscript. The result of such study is that some manuscripts are to be regarded as of much greater value than others. But any estimate of the value of a manuscript is itself based in large measure upon the question of the correctness of its readings. Hence such judgments can be only tentative or there is danger of reasoning in a circle. (2) The most comprehensive and generally accepted principle is this, that read¬ ing is to be preferred which best explains the others. A special application of this is often stated thus, the more difficult reading is to be preferred. But that is by no means uni¬ versally the case, it applies particularly to deliberate changes, and is of comparatively little importance in relation to the Old Testa¬ ment. (3) The reading should be suitable to the context. On this point, however, there is obviously an especially wide opportunity for difference of opinion.

Higher Criticism of the Bible, Histori¬ cally Considered. — For a discussion concern¬ ing the nature of Higher Criticism see the article, Higher Criticism. The employment of Higher Criticism must have characterized Biblical study from the earliest times, no thor¬ ough study could be made without its use in some measure. A few of the early Church fathers, notably Origen, particularly illustrate this. But such early use was unsystematic and comparatively unimportant. It is only in modern times that Higher Criticism has become one of the most important elements in Biblical study.

Higher Criticism, being a study of internal evidence, proceeds by an inductive method. The use of inductive methods is one of the prominent characteristics of modern science. Without doubt the large use of Higher Criti¬ cism in modern times is simply one phase of the general scientific progress of this period, it is the application of scientific method of literary study.

The evidence used in Higher Criticism may be conveniently classified as of three kinds, literary, historical, and that arising from the thought. In the historical development of Higher Criticism these three

varieties of evi¬ dence have become successively prominent in the order named.

Especially at first the use of Higher Criti¬ cism was much greater in connection with the Old Testament than with the New Testament, although the general historical development was similar in the two cases. Hence in this brief historical account it is the application to the Old Testament that will be more largely con¬ sidered.

Some use of Higher Criticism was made at the time of the Reformation and after. But the beginning of any systematic use, and so of the really modern period, should be put in 1753. In that year Jean Astruc, a French phy¬ sician, published (Conjectures sur les memoires originaux dont il paroit que Moyse s'est servi pour composer le livre de la Geneses This presents the view that Moses in writing Genesis

made use of two earlier documents, in one of which God was known as Jehovah and in the other as Elohim. The evidence he presents is thus purely literary. J. G. Eichhorn, in his (Einleitung ins Alte Testament (1780-83), called attention to the fact that the Jehovah and Elohim sections were also characterized by dif¬ ferences of style, and that the same documents are to be discerned in the remainder of the Pentateuch. He first called this method by the name ((Higher Criticism,® and treated the whole Old Testament from this standpoint. The general type of view which he presented has been called the ˆdocument-theory.® The frag¬ ment-theory® of Alexander Geddes, which ap¬ pears in (The Holy Bible, or the Books ac¬ counted Sacred by Jews and Christians, etc.* (1792-97), does not differ from it in principle, but contemplates smaller documents, or frag¬ ments. Others followed along the line of each of these views.

The second stage was introduced by W. M. L. De Wette in (Kritik der israelitischen Geschichte) (1807), and in other books. He made use of historical evidence in addition to literary. His specific view is called the <(supplement-theory,® because he thought that the writer of Genesis made use of one principal Elohistic document which he supplemented by the use of various Jehovistic documents. De Wette gave particular attention to the origin of the documents, in connection with his special study of historical evidence.

The third stage was marked by the promi¬ nent use of the evidence from thought, in addi¬ tion to that of a literary and historical nature. This means that a large amount of attention was given to the

development of religious thought, particularly in the Old Testament. The philosophical theory of evolution has strongly influenced the way in which this evi¬ dence has been used. The beginning of this stage appears in two works published in 1835, that of Wilhelm Vatke, (Die Biblische Theologie wissenschaftlich dargestellt,* and of Leo¬ pold George, (Die Alteren Judische FesteP Eduard W. E. Reuss, of Strassburg, became one of the most eminent of the teachers of this phase of the study. A pupil of his, K. H. Graf, thoroughly combined the three lines of evidence. He taught the priority of Deuteronomy to the Priest Code, the latter being dated, in his ultimate view, after the exile. Abraham Kuenen, in (Historisch-critisch Onderzoek naar het ontstaan en de verzameling van de boeken des Ouden Verbonds* (1861-65), gave special at¬ tention to the details of the religious develop¬ ment. The theory of Graf was elaborated by Julius Wellhausen, in (Die Composition des Hexateuchs* (1889), which had been published earlier, in 1885, as a part of the series Skizzen und Vorarbeiten. His view of the documents of the Hexateuch, including Joshua with the Pentateuch, is that they consist of J, Yahwist or Jehovist, ffie work of a Judean prophet or prophets, written about 800 b.c. ; E, Elohist, a prophetic work of Israel, written about 750; D, embracing the most of Deuteronomy, written shortly before 621 ; and P, the Priest Code, composed at various times mostlv during and after the exile and completed by Ezra about 444. This view in substance is the prevailing one to the present day.

W hile the Pentateuch, or Hexateuch, has been the chief subject matter for the develop¬ ment of Higher Criticism, more and more the whole Old Testament has been included within its scope. The discussion of the authorship of the several portions of the book of Isaiah be¬ gan soon after that concerning the Pentateuch, and has had many phases.

The more recent study has been devoted, in the case of the Hexateuch, to a more minute study of the details of the analysis, and to more careful study of the relation of the documents to the history and the

development of thought. The whole Old Testament has been studied, from the standpoint of Higher Criticism, with increasing attention to detail. The result is that, in the view of many critics, nearly all books of the Old Testament are considered to contain elements of diverse dates, the original writing having been supplemented by various additions, and in several books two or more documents are believed to have been combined. Many English and American writers have been prominent in the later discussions.

The pioneer work in the development of Higher Criticism has been done for the most part in the Old Testament. New Testament criticism is, therefore, in large measure an ap¬ plication of methods and lines of evidence in use in the Old Testament, although in recent years the Higher Criticism of the New Testa¬ ment has acquired great prominence. Eichhorn, who has been mentioned earlier as con¬ spicuous in reference to the Old Testament, is one of the early leaders in New Testament criticism. In his (Historisch-kritische Einleitung ins Neue Testament* (1804), he, for the first time, clearly grasped the synoptic problem and proposed the hypothesis of an original gospel before the present gospels. The work of De Wette was notable on the New Testa¬ ment as well as on the Old, the results being seen in his (Lehrbuch der historisch-kritischen Einleitung in die kanonischen Bucher des neuen Testamentes) (1826).

Almost simultaneously with the beginning of the third stage of. Old Testament criticism, and corresponding to it, came a strongly-marked movement in New Testament study. This was the work of F. C. Baur, <Die Christuspartei in der Corinthischen Gemeinde, * in the Zeitschrift fur Theologie (1831), and later books; this is sometimes called the Tubingen criticism, sions. In particular, he was dominated by the His work was strongly influenced by preposses-philosophy of Hegel, especially in its theory of development that history moves through the three processes, thesis, antithesis and synthesis. The principal position of Baur was that the New Testament shows the conflict between two parties, original Christianity which was a Jew¬ ish sect, and Paulinism which had the broader spirit. His position aroused violent discussion, the theory being generally held to be extreme ; it has now been entirely abandoned. Baur rendered great service, however, in putting emphasis upon the necessity of seeing the New Testament in its relation to the whole thought of the time.

The principal problems of the Higher Criticism of the New Testament which, have been considered in recent times, in addition to those relating to epistles called Pauline which have always been prominent, are those of the

authorship, editing and sources of the synoptic gospels, the gospel of John, the book of Acts and the book of Revelation. See Apocalyptic Literature; Bible; Higher Criticism; Penta¬ teuch, and the various articles on the books of the Bible.

Bibliography. — ‘Astruc, J., (Conjectures

sur les memoires originaux dont il paroit que Moyse s’est servi pour composer le livre de la Genese> (Bruxelles 1753) ; Baur, F. C., (Die Christuspartei in der Corinthischen Gemeinde * (in Zeitschrift fur Theologie , Tubingen 1831) ; Briggs, C. A., (General Introduction to the Study of Holy Scripture) (New York 1899) ; De Wette, W. M. L., (Lehrbuch der historisch-kritischen Einleitung in die kanonischen Bucher des neuen Testamentes) (Basel 1826) ; Hvritik der israelitischen Geschichte) (Heidelberg-1807) ; Eichhorn, J. G., (Einleitung ins Alte Testament (Jena 1780-83) ; (Historisch-krit- ische Einleitung ins’ Neue Testament (Got¬ tingen 1804) ; Geddes, A., (The Iloly Bible, or the Books accounted Sacred by Jews and Christians, etc.* (London 1792-97) ; George, L., (Die Alteren Judischen Feste) (1835) ; Graf, K. H., (Die Geschichtlichen Bucher des Alten Testamentes) (1866) ; Kuenen, A., (Historisch-critisch Onderzoek naar het ontstaan en de verzameling van de boeken des Ouden Verbonds) (Leyden 1861-65; translated by Weber, Th., as (Historisch-kritische Einleitung in die Biicher des alten Testaments,* Leipzig 1887-92) ; Nash, H. S., (The History of the Higher Criticism of the New Testament (New York 1901) ; Nestle, E., (Introduction to the Textual Criti¬ cism of the Greek New Testament* (London 1901) ; Vatke, W., (Die Biblische Theologie wissenschaftlich dargestellt* (1835) ; Wellhausen, J., (Die Composition des Hexateuchs* (Berlin 1889) ; Zenos, A. C., (The Elements of the Higher Criticism* (New York 1895).

George R. Berry,

Professor of Hermeneutics and Old Testament History and Theology , Colgate University.

BIBLE IN SPAIN, The. (The Bible in Spain* (1843) is an account of the experiences of the author, George Borrow, in the Spanish Peninsula in the years 1835 to 1840, as agent for the English Bible Society. In his rather quixotic but highly congenial task of distribut¬ ing copies of the New Testament in the ver¬ nacular Borrow encountered a series of sur¬ prising adventures among rude peasants, smugglers, bandits and Spanish gypsies which are duly recorded and lose nothing in the tell¬

ing. Many portions of the narrative, as, for instance, the account of the journey from Badajos to Madrid in the company of the mysterious gypsy, Antonio, read more like the • adventures of a Sir John Mandevillc than like the real experiences of a modern traveler in a civilized land, yet we are assured by Borrow's recent biographer that this book, like H-av- engro* and (The Romany Rye,* is a faithful record. Whatever may be the relation of fact and fiction in Borrow's work (and the matter can hardly be said to have been settled) it reveals as no other book has done the wonder and the mystery of romantic Spain. Borrow's linguistic facility and his truly remarkable power of placing himself on a footing of equality with the strange persons whom he en¬ countered enabled him to see their lives from

the most intimate standpoint. By the gypsies he was regarded as one of their own brother¬ hood. (The Bible in Spain) is one of the strangest books that was ever written and one of the most fascinating. Good editions of (The Bible in Spain* are published in English. Consult Walker, Hugh, (The Literature of the Victorian Era* (1042ff.).

James H. Hanford.

BIBLE SOCIETY, a religious society organized and maintained, for the translation, publication and distribution of the Bible or parts thereof at home and abroad, in English and in many other languages. Naturally the Bible Society is a Protestant effort. It grew out of the attempts of the various Protestant denominations to make known the general principles of Protestantism and the particular views of the numerous Protestant sects. The invention and perfection of the printing press made these efforts effective. All denomina¬ tions of Protestants were anxious to spread abroad a knowledge of the Scriptures. Numer¬ ous Protestant societies made a business of distributing free copies of the Scriptures at a very early date on the history of the Reformation and the growth of Protestant¬ ism ; but none of these efforts were con¬ trolled and directed by the one motive, that of the handling of the Scriptures. As early as the time of Spencer, Baron Hildebrand von Constein, a close friend of the latter,

along with other Protestants, founded a society for providing copies of the Bible for those not able to purchase them. This society had given away or sold, at a price often below cost, nearly 3,000,000 Bibles and more than 2,000,000 New Testaments, before the modern Bible societies came into the field. In England in 1780 there was formed an association for the distribution of the Bible among soldiers and sailors under the name of ((The Bible Society®. Later the title was changed to its present designation, ((Naval and Military Bible Society.® Twelve years later the French Bible Society was formed in London for the pur¬ pose of distributing Bibles printed in French. No attempt was made to print the French Bibles in England but the funds collected by the Society were sent to France. During the French Revolution the premises and plant of the Society, together with its funds, were taken possession of by the revolutionary party and, for the most part, destroyed. After two years of effort the British and Foreign Bible Society was formed. Its estaolishment was due, in great part, to the enthusiasm of Thomas Charles, a Welsh minister, who urged the Religious Tract Society to supply the lack of Bibles which he found everywhere among the poor people in Wales. The hint was followed up and a society for the supply of Bibles in all parts of the world was the direct result. All Protestant denominations were invited to help in the work. The Society grew rapidly and extended its sphere of action and influence. In 1912-13 its expenditures amounted to almost £270,000. But this was but a small part of its work; for auxiliary societies sprang up everywhere throughout the British domains ; and these now number in the neighborhood of 6,000. The Society publishes both the authorized and the revised version of the Bible. Naturally, owing

to the influence under which the Society started, it gave great prominence to the dis¬ tribution of Bibles in Great Britain in both English and the Gaelic languages. But gradu¬ ally it extended its sphere until now it trans¬ lates (where necessary) and prints the Bible in all languages and even dialects where there is a call from missionaries for such work. The Bible, or parts thereof, is now printed and dis¬ tributed in over 450 languages and dialects and

the work of distribution requires more than

1,200 agents and distributors. One fact alone shows the vastness of this undertaking; over 50 different alphabets or modifications of alpha¬ bets are employed in the printing of the Bible, or parts thereof, issued by the Society. In a recent year the work of the Society stood as

follows :

No. of languages Copies printed in distributed

Bibles . Ill 968,377

New Testaments . 108 1,584,262

Parts of Bible . 231 4,841,884

The total issue of the British Society during its existence up to the close of 1916 was, in round numbers, 250,000,000 copies. So broad has become the work of the Bible Society that there is scarcely a country or part of the world where its agents are not at work whether they are missionaries or lay distributors.

In Scotland the various Bible societies have been united into the National Bible Society of Scotland since 1861 ; while in the United States the principal work of the Association is carried on by the American Bible Society. In Germany, though there are a number of Bible societies, that of chief importance is the Prus¬ sian Central Bible Society of Berlin founded in 1814. It has branches in many parts of Prussia and distributes over 100,000 Bibles a year. All the other divisions of the German empire have also Bible societies. Some of the German Bible societies do not print their own Bibles but get them from London, from the British and Foreign Bible or from Berlin Society. How'ever the German societies have of late been extending their sphere of influence and broadening their efforts until now the Lutheran version of the Bible is to be met with everywhere.

The one great country where the Bible Society has had but little effect upon the masses of the people is Russia. There the work of its 300 or more agencies is confined almost exclusively to the foreign population. This condition is due to the attitude of the government and that of the Greek Church, both of which took the position in 1826 that the task of supplying the Scriptures to the people could properly be performed only by the Holy Synod. This resolution automatically stopped all secular work in the distribution of Bibles to the members of the. Greek Church throughout Russia and confined the efforts of the Bible Society to looking after the great mass of non-Greek-Church foreigners within the bounds of the empire. So the Bible still remains to be translated into most of the languages and dialects spoken by the vast un-homogeneous population of the Russias. In Austria the influence of the Bible Society has been even less than in Russia; for,

since 1817 its operation throughout the Austrian empire

has been rendered illegal by restrictions on the part of the government. The issue of Bibles by the American Bible Society shows a steady and rapid increase, as the following table demonstrates :

Year	Bibles
1816-1825 .	251,642
1825-1850 .	2,673,826
1850-1875 .	6,786,260
1875-1900 .	9,126,515
1900-1913 .	
1916 .	

6,793,603

7,761,377

Testaments or parts thereof

187,938 4,459,561 18,766,539 26,701,153 25,476,673

In 1661 John Elliot translated the New Testament into the Algonquian Indian lan¬ guage and had it printed at Cambridge. This was the beginning of activity in this work which was destined to assume vast proportions. Two years later he finished the translation of the complete Bible into Algonquian and pub¬ lished it. It was not until 80 years later that a German edition of the Bible was published at Germantown, Pa. The first English Bible published in America appeared in Philadelphia in 1782. Thus it will be seen that the progress of the work of printing Biblical literature in America was very slow in the years of colonial life. The establishment of the first American Bible society in Philadelphia in 1808 was fol¬ lowed by considerable activity in the same work in other places. In 1809 New York, Boston, Princeton and Hartford all established Bible societies. The next seven years saw 54 new Bible societies started in the United States, making in all a total of 59. In this latter year (1816) 35 of these societies meeting in New York, organized the American Bible Society with the subscribing Bible societies as local organizations. This Society was incor¬ porated in 1841; and 11 years later the Bible House was opened at Astor Place, 3d and 4th avenues, where the work of printing, publish¬ ing and carrying on the distribution of Bibles, Testaments and par s thereof was proceeded wkh much as in England. The Society now has one of the most complete printing plants in the United States. The Association is managed by a board of 36 laymen, one-fourth of whom are elected every year. All the publications of the American Bible Society are sold at cost, under cost, or given away and vast quantities of these have been scattered broadcast over the United States in 84 lan¬ guages. The energy of the American Bible Society also aims to reach out to all peoples, races and countries of the world. See Amer¬ ican Bible Society, The.

With the growth of American foreign mis¬ sions the work of the Society in foreign lands has increased enormously until in 1916 it issued almost 5,053,406 copies for foreign distribution. Since its

establishment it has issued 71,536,305 copies at home and 46,151,286 abroad. This is an average well over 1,000,000 a year, for every year of its existence. The publications of the Society are issued in over 150 distinct languageˆ, and this number is being yearly added to. Not all the printing and publishing of the Bible Society is dope in New York, considerable of it being issued from branch establishments in various foreign countries, where the facilities for accurate work are greater than in America.

The American and Foreign Bible Society

and the American Bible Union are two Baptist Bible societies which are very active in the printing and distribution of Bibles and the carrying on of Biblical propaganda and mis¬ sionary work. The publication and other work of these two societies is now united and carried on by the American Baptist Publication Society,

BIBLE STATISTICS, an interesting compilation, said to be the fruits of three years' labor by the. indefatigable Dr. Horne, and given by him in his introduction to the study of the Scriptures. The basis is an old English Bible of the King James version.

Old Testament.— Number of books, 39; chapters, 929; verses, 23,214; words, 593,493; letters, 2,728,100.

New Testament.— Number of books, 27; chapters, 260; verses, 7,959; words, 181,253; letters, 838,380.

The Bible. — Total number of books, 66 ; chapters, 1,189; verses, 31,173; words, 773,746; letters, 3,566,480.

Apocrypha. — Number of books, 14; chap¬ ters, 184; verses, 6,031; words, 125,185.

Old Testament — The middle book of the Old Testament is Proverbs. The middle chapter is Job xxix. The middle verse is 2 Chronicles xx, between verses 17 and 18. The shortest book is Obadiah. The shortest verse is 1 Chronicles i, 25. The word ((and}) occurs 35,543 times. Ezra vii, 21 contains all the letters of our alphabet. The word ˆSelah® occurs 73 -times and only in the poetical books. 2 Kings xix and Isaiah

xxxvii are alike. The book of Esther does not contain the words God or Lord. The last two verses of 2 Chronicles and the opening verses of the book of Ezra are alike. Ezra ii and Nehemiah vii are alike. There are nearly 30 books men¬ tioned, but not found in the Bible, consisting of civil records and other ancient writings now nearly all lost. About 26 of these are alluded to in the Old Testament.

New Testament. — The middle book is 2 Thessalonians. The middle chapter is between Romans xiii and xiv. The middle verse is Acts xvii, 17. The smallest book is 2 John. The smallest verse is John xi, 35. The word ˆand® occurs 10,684 times. The name Jesus occurs nearly 700 times in the Gospels and Acts, and in the Epistles less thrtn 70 times. The name Christ alone occurs about 60 times in the Gospels and Acts, and about 240 times in the Epistles and Revelation. The term Jesus Christ occurs 5 times in the Gospels.

The Bible. — The middle book is Micah. The middle (and smallest) chapter is Psalm cxvii. The middle verse is Psalm cxviii, 8. The middle line is 2 Chronicles iv, 16; the largest book is that of the Psalms; the largest chapter is Psalm cxix. The word Jehovah (or Lord) occurs 6,855 times. The word ˆand® occurs 46,227 times. The number of authors of the Bible is 50. The Bible was not until modern times divided into chapters and verses. The division of chapters has been attributed to Lanfranc, archbishop of Canter¬ bury, in the reign of William I ; but the real author of this division was Cardinal Hugo de Sancto-Caro, about 1236.. The number of languages on earth is estimated at 3,000 ; the Bible or parts of it have been rendered into

over 450 languages and dialects together. The first English translation complete of the Bible was by Wyclif in 1382. The first American edition was printed in Boston in 1752.

BIBLIA PAUPERUM (Bible of the poor), the name for block books common in the Middle Ages, and consisting of a number of rude pictures of Biblical subjects with short explanatory Latin text accompanying each picture. A similar work, but more extended and

with rhymed text, was the speculum Humanae Salvationis) or (Mirror of Human Salvation.5 Prior to the Reformation these two books were much -used by the preaching monks, and as such orders as the Franciscans, Carthusians, etc., were styled (Pauperes Christi,5 the first named book, so popular with them, came to be known, therefore, as the (Biblia PauperumP Many manuscripts of these works have been preserved in different lan¬ guages. The (Biblia) was one of the first books printed in Germany and the Netherlands both from blocks and from types. The chief proof of the discovery of printing in Haarlem is derived from early impressions of the tBiblia) and Speculum.5 The (Biblia Pau-perum5 has been reprinted in facsimile several times. There is an edition by Unwin, with a preface by Dean Stanley issued in London in

1884.

BIBLIOGRAPHY. A leading contribu¬ tion in (The Papers of the Bibliographical Society of America5 (Vol. X, No.. 4, October 1916), supplies the observation that may very well stand at the beginning of a study of this subject. Mr. Feipel writes that ((bibliography, or the compilation of bibliographies, is one of the most important branches of bibliology, or the science of books. It is the chief source of information for seekers after book knowl¬ edge, and is as varied in its resources as the questions [brought] to it are multifarious.® That elastic statement makes room, as we shall show, for the most complete, though brief, characterization — which he gives afterward — of the art or science of bibliography as it is understood in our own times.

But, desiring for our present purpose a more explicit introductory statement, we turn to a definition that seems to us admirable — the one put forward by James Duff Brown in (A Manual of Practical Bibliography5 (Lon¬ don and New York 1906, pp. 3, 4). <(For the purpose of this book,® Mr. Brown writes, <(the definition of bibliography as the science ‘ which treats of the description, cataloguing and preservation of books is ample. Within these limits are included practically every¬ thing which relates to the externals and regis¬ tration of books, without trespassing on the province of criticism, historical typography, librarianship, palaeography, or any other special department which deals more particularly with the archaeology’, qualities, and circulation of books. A sharp distinction must be drawn between bibliography and librarianship, which are too often confounded. The former is the science which relates to the history, materials, and description of books in general. The latter is concerned chiefly with the collection, preservation, classification, and making publicly available the books in a particular collection. The one is universal, and considers the per¬

sonal history of all books; the other is re¬ stricted to the elucidation and distribution of the comparatively small collection which forms a library’ or mere selection of books.® The same writer holds that <(for bibliographical purposes it does not matter whether a book has commanded a fabulous price in an auction saleroom or whether it is a pamphlet of yesterday dealing with some unimportant local controversy. The business of bibliography,® he asserts, (<is to take

heed of all publications, old or new, great or small, cheap or dear, and to describe, and catalogue, and index them in such a clear and sufficient manner that the whole literature of the world on any given subject, or by any given author, shall be placed at the service of the humblest inquirer. This,® he admits, (<may seem an unattainable ideal, but it has the practical advantage of being something definite at which to aim.®

Ripe scholarship, however, does not in¬ variably or unhesitatingly go quite to that extreme. Mr. Wilberforce Lames, for ex¬ ample, — the distinguished bibliographer of The New York Public Library, who is devot¬ ing a part of his time to the completion of Sabin's dictionary of Books Relating to America5 — ds not averse to a more promptly utilitarian practice in some portions of the wide bibliographic field; and a discriminating signification may, we also think, quite properly be added to the definition of the word bibliog¬ raphy. To him it seems right that, in some instances at least, lists of books for common use should be lists of carefully selected books. The service that such lists render is to guide the reader to works of positive value, instead of sending him perhaps on a fool's errand in quest of a volume that may be difficult to procure simply because it never was thoroughly well worth the reading. And this eminent collector and scholar thinks that it is some¬ times helpful to add, after the more strictly bibliographic data, brief literary notes giving a synoptical view of the contents together with a general impression of the character of the listed works.

The interest in this science has never been so widespread and so systematically active as in recent years. In all the leading countries of the world we now find bibliographical so¬ cieties ; and thffir publications, as well as the periodicals devoted to book and library ques¬ tions, or giving to these matters special promi¬ nence, bear testimony to a general and genuine public interest in the subject. ((As to the practical value of a knowledge of bibliog¬ raphy,® Mr. Feipel says, (<there can indeed be little room for doubt® ; and he quotes from the T. D. Brown (Manual5 as follows: ((In every possible avenue of research or inquiry, bibliography plays an important part. An ac¬ quaintance with bibliographical writings, con¬ joined with access to the best examples, is a kind of master-key which will unlock the stores of knowledge of all ages, and, when used with intelligence, has the power of open¬ ing up sources of information which might otherwise be unsuspected or neglected.® When we realize that bibliography assists the student to such an extent, we must also realize that to the librarian, who is consulted by all sorts of students in regard to the actual or possible provision of books, it is wholly indispensable,

L he etymology of the word may afford some explanation of a tendency, observed in certain quarters, to revert, little by little, to the older meaning of fttfiXio-ypcKpia which, in post-classical Greek, was used, says Mr. Feipel, ((to jnean the writing of books; and, as late as 1761, in Fenning's 'English Diction¬ aryˆ a bibliographer is defined as (one who writes or copies books.) The transition from the meaning (a writing of books> to that of (a writing about books) was accomplished in France in the 18th century. An ideal of bibliography — an ideal which, it is needless to say, will never be achieved, but which may be closely approximated— is the description, in minute detail, of all the books of the world.® Bibliography may, according to the views of this writer, be regarded as, first, the art of discovering and imparting to others informa¬ tion about books; second, the great mass of literature containing such information ; third, a compilation of book information concerning a particular thing, person, place, period, *etc.* ((The relation existing between these various connotations is that of means and end — ■ the first constituting the means by which the last two are produced. It follows, therefore, that the perfection of the art of bibliography con¬ sists in adapting the means to the end in the most satisfactory manner possible, and in order to do this a thorough study of the prin¬ ciples underlying the art is essential.®

Again, if we have in mind especially the utilitarian aspects of the several kinds of bibliographic work (as it is eminently proper to do), we may distinguish and discriminate the four classes : historical, eclectic, commer¬ cial and inventorial. Of these, (<the first two are essentially cultural and altruistic in their appeal, while the latter two are practised pri¬ marily for the benefit of the practitioner® — as the following differentiation clearly shows : Works of the class first mentioned serve pri¬ marily the needs of book-collectors and of the students of the art of printing; those of the class termed eclectic are mainly directed toward the appraisal of the subject matter contained in books, with a view to determining their relative values for purposes of study or recreation. On the other hand, commercial bibliography serves as an indispensable me¬ dium of exchange of books between

bookseller and book buyer, and works of the class last mentioned, the inventorial, are prepared by or for the owners of books, manuscripts, etc., for the sake of registering such possessions as may be called literary, in the widest sense of that word. The aims of those who are especially active in the field of historical bibliography may be summarized as follows : (1) tracing the origin of books, (2) describing their form and contents, (3) record.ng the events connected with their ((careers,® so to speak. In other words, historical bibliography deals with books in a manner resembling that in which history deals with nations or biog¬ raphy and genealogy deal with persons. “When properly executed, historical bibliog¬ raphy not only supplies information about various books but also reflects the state of civilization of the eras to which the books belong® — its material comprising both primary and secondary sources. “Primary sources con¬

stitute the bulk of contemporary historical bibliography, while the secondary sources con¬ stitute the great body of antiquarian book knowledge® — a subdivision that will be the theme of the next paragraph. <(The primary sources are to be found in the private and public documents. of the persons and institu¬ tions concerned in the production of books. They comprise journals and correspondence of authors and their friends, and subsequently the correspondence and documents exchanged between authors and publishers. Then follow, if the book is published, advertisements and announcements, including those carried by the book itself and such as appear elsewhere. These are finally supplemented by reviews and news items in the journals of the day. If the book continues to live in the minds of the people for any length of time, contemporary records of the book are apt to multiply in¬ definitely, and bibliographical lore is corre¬ spondingly increased. The aggregate of the foregoing constitutes the storehouse from which succeeding ages must derive their bib¬ liographical information, and without which antiquarian bibliography would be an im¬ possibility.®

Now, the aim of those literary workers who devote themselves to antiquarian bibliography is to construct authoritative descriptions and accounts of the books of former times; and here the varieties are found to range from ex¬ tensive histories of the literature of a nation to a brief paragraph throwing additional light on a single book or on a single phase of its his¬ tory. The essential features of this kind of bibliography are (1) the comparative antiq¬ uity of the book or books concerning which information is being imparted, and (2) the fact that

this information is derived from ac¬ knowledged authoritative sources.

A few words may be added in regard to the eclectic, the commercial and the inventorial divisions or classes. Of these three, the first is regarded as peculiarly the province of the educator, since it strives to suppress the bad and to advance the good; and essential require¬ ments for the proper practice thereof are, of course, impartiality and sound judgment. The second is referred to as a phase of salesman¬ ship, or as advertising ability applied to the sale of books. The third — inventorial bibli¬ ography — is requisitioned wherever a valuable collection of books is deposited, and exemplifies the application of accounting methods to books considered as personal property.

We shall now consider in turn the leading characteristics of Subject and Class Bibli¬ ographies, of National Bibliographies, of Bibli¬ ographical Encyclopedias, of Handbooks of Literary Curiosities, and of Bibliographies of Bibliographies ; and for the reader's convenience a number of titles of representative works will be included.

A large place in bibliographical literature is held by the bibliographies of special subjects, of literary forms and of classes of books; and it has been well said that such bibliographies are, to the literatures of their special fields, what an index is to a book — if the index chosen for comparison be decidedly ample. They show -the extent and character of their respective literatures; they assemble and make

readily accessible the scattered fragments of book knowledge. But obviously the resemblance to an index ceases whenever they become markedly selective and designed to serve a didactic purpose. Guides to the best books in some chosen field, outlines of courses of study and library bulletins of various kinds are given as representatives of the bulk of didactic work among subject and class bibliographies. ((Of these, manuals and textbooks of literature are especially adapted to the narrative form. Other varieties usually take the catalogue form.® An example of the latter may be studied in the (Catalogue of the A. L.

A. Library) (Washing¬ ton 1905) ; and the wide range of the subjects of other bibliographical works may be at least suggested by the following list : Acland, A. H. D., (Guide to the Choice of Books) (Lon¬ don 1891) ; Baker, E. A., (Descriptive Guide to the Best Fiction5 (London, 1903) ; Banner, J. C., (Bibliography of Clays and the Ceramic Arts5 ; Borchard, E. M., (The Bib¬ liography of International Law and of Continental Law5 ; Bowker, R. R., and lies, G., (Reader's Guide in Economic and Political Science5 (New York 1891) ; Brockett, P., bibli¬ ography of Aeronautics5 ; Gregory, J., Cata¬ logue of Early Book on Music5 ; lies, G., ed., (Annotated Bibliography of Fine Art: Paint¬ ings, Sculpture, Architecture, Arts of Decora¬ tion and Illustration, by Russell Sturgis, and Music by H. E. Krehbiel5 (Boston 1897) ; Johnston, R. H., (Railway Economics: A Col¬ lective Catalogue of Books in Fourteen Ameri¬ can Libraries5 ; Larned, J. N., ed., (The Literature of American History : A Biblio¬ graphical Guide5 (Boston 1902) ; Leypoldt, A. H., and lies, G., (List of Books for Girls and Women and Their Clubs5 (Boston 1895) ; Nield, J., (Guide to the Best Historical Novels and Tales5 (London 1904) ; Monroe, P., bibli¬ ographies of Education5 (in Cyclopedia of Education,5 New York 1914) ; Perkins, F. B., and Jones, L. E., (The Best Reading5 (four series, Boston 1872, 1875, 1886, 1895) ;

J. F., beading for the Young: A and Annotated Catalog5 (Boston 1890 and sup¬ plement 1896).

National bibliographies are very numerous, but commonly either incomplete or out of date. Among those mentioned by Mr. Feipel are Lowndes' bibliographer's Manual of English Literature5 (originally published in 1834, but now best known in the revised edition, Lon¬ don 1857-64) ; the bibliotheca Britannica,5 complied by Robert Watt and published at Edinburgh in 1824; Sabin's dictionary of Books Relating to America5 (in 20 vols., New York 1867-92), to which we have already re¬ ferred; and Roorbach's bibliotheca Ameri¬ cana5 (New York 1849-61). Continental na¬ tions of Europe have produced, among many other works of this order, the following: Brunn, C. V., bibliotheca Danica5 (3 vols., Copenhagen 1872-96) ; Haeghen, F. Van der, bibliotheca Belgica5 (Ghent 1879-98) ; Hein-sius, W., (Allgemeines Bucher-Lexicon5 (19 vols., Leipzig 1812-94) ; Hidalgo, D., (Diccionario general de bibliografia espanola5 (7 vols., Madrid 1862-81) ; Linnstrom, H., (Svenskt Boklexikon5 (2 vols., Stockholm 1867-84) ; Pat-tersen, H., <Norsk Boglexikon5 (Christiania 1899, in progress) ; Querard, J. M., (La France

Sargent,

Classified

litteraire5 (12 vols., Paris 1827-64) ; Silva, J. F. da, (Diccionario bibliografico portuguez5 (16 vols., 1858-93) ; Thieme, H. P., Cuide Bibliographique de la Litterature Frangaise de 1800 a 1906 5 (Paris 1907).

Bibliographical encyclopedias, or universal reference-works of book information, should, if the promise of the title were fulfilled, con¬ tain standard descriptions of all books of liter¬ ary, historical or typographical interest, not only as they first issued from the press but also as they subsequently appeared in all the variant editions; but in very few instances has any approach been made to the realization of that ideal in the past, and at the present time the number of such standard works is very small, owing partly to the greater and more accurate detail now demanded, and partly to the absence of any sufficiently extensive or quite adequate system of cooperation among libraries. The' nearest approach to such a work is the (Catalogue of Printed Books in the British Museum,5 which was begun in 1881, and, al¬ though completed as far as the original alpha¬ bet is concerned, receives additions continuously. In general character and plan somewhat closely resembling the British Museum catalogue, that of the bibliotheque Nationale5 of Paris is still in course of preparation. Georgi's (Allgemeines Europaisches Bucher-Lexicon,5 in 11 volumes, was published at Leipzig in 1742-58. Especially noteworthy as a bibliography of the best and rarest editions of books is J. C. Brunet's (Manuel du Libraire,5 the original edition of which was published in 1810. Its 5th edition (Paris 1860-65) was issued in six volumes, and two supplementary volumes ap¬ peared in 1878-80. We mention also the (Tresor de Livres Rares5 by J. G. T. Graesse (7 vols., Dresden 1859-69) and Santander's cDictionnaire Bibliographique5 (Brussels 1805-07).

The dictionaries of anonymous and pseu¬ donymous works, the lists of prohibited works, etc., following ((the many unexplored or partly explored by-paths of literature,55 form a not unimportant branch of bibliography, and are usually classified as handbooks of literary curiosities.

In bibliographies of Bibliographies,5 by A. G. S. Josephson (2d ed., originally published in the Bulletin and concluded in the (Papers 5 of

the Biographical Society of America), may be found a list of works devoted to the catalogu¬ ing of bibliographies on all kinds of subjects. Among these are Peignot's (Repertoire de bibliographies speciales, curieuses et instruc-tives5 (Paris 1810) ; Petzholdt's bibliotheca Bibliographica5 (Leipzig 1866) ; Stein's Man¬ uel de bibliographic generale5 (Paris 1898), and Vallee's bibliographic des Bibliographies5 (Paris 1883-87). .

The Chief Bibliographer of the Library of Congress, Mr. H. H. B. Meyer, calls special attention to the value of such publications as rThe Readers' Guide to Periodical Literature5 and its supplement, to (The Cumulative Book Index,5 (The Index of Legal Periodicals,5 the (Magazine Index5 and the (Engineering In¬ dex.5 Every student of bibliography is glad to acknowledge his obligations also to* the bibli¬ ographical periodicals, bibliographical litera¬ ture in magazine form, constituting a great storehouse or book information55; to the notices

and criticisms of new books in the publications of a general and popular character; and to those "inventories of particular collections of books," the printed catalogues of libraries large and small, public and private.

In regard to the compilation of bibliogra¬ phies, Mr. Feipel writes that the various biblio¬ graphic details fall into the more or less well-defined groups or categories: authorship, title, subject, literary form, place and date of publi¬ cation, size, binding, price, typography, number of copies printed, edition, etc.; and upon the scope and aim of the particular piece of bibli¬ ographic work depends the decision to omit or to include any of these details. Naturally the perfection of the work when completed will be found to depend in great measure upon the good judgment manifested in such careful se¬ lection of the items. Moreover, good judgment must be shown in deciding whether to cast the bibliography in the narrative form or the cata¬ logue form, the choice depending — in this mat¬ ter also — upon the object to be attained and the scope of the work. The narrative form is "particularly adapted to treatises intended to be read as a whole, while the

catalogue form is better suited for occasional or particular ref¬ erence. In either case, a logical arrangement of the subject-matter is essential for proper presentation and consultation. In short, the ideal of bibliographical exposition is that which supplies the greatest number of wants with the least expense of time and effort on the part of the user… . Scholarly bibliography usually

involves a great deal of research on the part of the compiler ; and a thorough knowledge of bibliographical sources and authorities, as well as of general reference books, is of prime im¬ portance.®

In conclusion we refer once more to the all-important consideration of the utility of this art; and shall treat briefly of the requirements of librarians, of private book collectors and of students — the three chief groups of persons who profit by bibliography most directly.

The librarian considers both the contents and the externals of the books he collects, for his aim is naturally to supply the wants of all comers. Theoretically, it • is his privilege to strive to have his library contain books on all topics and representative works — or even all the' work — of all good writers ; "but since this is an unattainable end as well as an ideal of questionable worth, he works up to it as rea¬ sonably as he sees fit and as nearly as his re¬ sources allow. And for his work of buying, making sure that the books are complete and of the best editions, cataloguing them, and filling up gaps in the collection, bibliography is without doubt his most essential tool.® Now, the pri¬ vate book collector, not being obliged to take account of the tastes and requirements of other people, but on the contrary devoting his leisure to the quest of such books as he himself cares for, very often appraises his acquisitions "not according to 'their use as reading-matter, but according to their origin, their history and their scarcity. They are prized not so much for what they contain as for what they are, namely, specimens of an art that can never be replaced.® For him, then, bibliography's utility is measured by the correctness of its replies to these or similar questions: What books exist? What

constitutes a complete copy of each? Which are rare and which abundant? But the student's wants are unquestionably those that have re¬ ceived most solicitous attention ; and the fact has been clearly recognized that bibliography serves him far less as a technical description of books, far more as a guide to literature: "It is a guide to the contents of books, rather than to. their external peculiarities, that

he re¬ quires.® See Bibliomania.

Marrion Wilcox.

BIBLIOMANCY, divination performed by means of the Bible, also called sortes biblicee, or sortes sanctorum. It consisted in taking passages at hazard, and drawing indi¬ cations thence concerning things future. It was much used at the consecration of bishops. It was a practice adopted from the heathens, who drew the same kind of prognostications from the works of Homer and Virgil. In 456 the Council of Vannes condemned all who practised this art to be cast out of the com¬ munion of the Church; as did the councils of Agde in 506 and Auxerre. But in the 12th century we find it employed as a mode of de¬ tecting heretics. In the Galilean Church it was long practised in the election of bishops; chil¬ dren being employed, on behalf of each can¬ didate, to draw slips of paper with texts on them and that which was thought most favor¬ able decided the choice. A similar mode was pursued at the installation of abbots and the reception of canons ; and this custom is said to have continued in the cathedrals of Ypres, Saint Omer and Boulogne, as late as the year 1744. In the Greek Church we read of the prevalence of this custom as early as the con¬ secration of Athanasius, on whose behalf the presiding prelate, Caracalla, archbishop of Nicomedia, opened the Gospels at the words, “For the devil and his angels® (Matt, xxv, 41). The bishop of Nice first saw them and adroitly turned over the leaf to another verse, which was instantly read aloud : “The birds of the air came and lodged in the branches thereof® (Matt, xiii, 32). But this passage appearing irrelevant to the ceremony, the first became gradually known, and the Church of Constantinople was violently agitated by the most fatal divisions during the patriarchate. It has persisted in a measure in modern times and devout persons have used this means of seeking guidance. Tennyson makes use of the custom in (Enoch Arden.)

BIBLIOMANIA (“book-madness®), a word formed from the Greek and signifying a passion for possessing rare or curious books. The true bibliomanist is determined in the purchase of books less by the value of their contents than by certain accidental circum¬ stances attending them. To be valuable in his eyes they must belong to particular classes, be made of singular materials or have something remarkable in their history. Some books ac¬ quire the character of belonging to particular classes from treating of a particular subject; others from something peculiar in their mechanical execution (as the omission of the word “not® in the seventh command¬ ment, which gives the Wicked Bible its name), or from the circumstance of having issued from a press of uncommon eminence, or be¬ cause they once

belonged to the library of an

eminent man. But there are certain fashions in bibliomania and books much sought at one time may at another be comparatively neglect¬ ed. Some collections of books may possess or have possessed much intrinsic value ; such as collections of the various early editions of the Bible; collections of editions of single classics (for example, those of Horace and Cicero) ; the editions of the Greek and Latin classics in usum Delphini and cum notis vario¬ rum; the editions of the Italian classics printed by the Academy della Crusca; works printed by the Elzevirs and by Aldus ; the classics published by Maittaire or Foulis ; and the celebrated Bipont editions, with others. It perhaps was more customary in former times than at present to make collections of books which have something remarkable in their his¬ tory (for example, books which have become very scarce and such as have been prohibited), yet various scarce books are highly prized on account of nothing but their rarity, the original (1786) Kilmarnock edition of Burns' Poems, for instance. First editions may be ranked in the same class. Books distinguished for re¬ markable mutilations have also been eagerly sought for. Those which appeared in the in¬ fancy of typography called incunabula , from the Latin cunce, a cradle, and among them the first editions (editiones principes) of the an¬ cient classics, are still in general request. An enormous price is frequently given also for splendid proof impressions of copperplate en¬ gravings and for colored impressions, for works adorned with miniatures and illuminated initial letters ; likewise for such as are printed upon vellum. Works printed upon paper of uncommon materials or various substitutes for paper (asbestos, for instance), have been much sought after; likewise those printed upon colored paper. • Other books in high esteem among bibliomanists are those which are print¬ ed on large paper, with very wide margins. In English advertisements of rare books some one is often mentioned as particularly valuable on account of its being ((a tall copy®. If the leaves happen to be uncut the value of the copy is much enhanced. Other works highly valued by bibliomanists are those which are printed with letters of gold or silver

or ink of singular color; for example: (1) ‘Fasti Napoleonei* (Paris 1804, 4to), a copy on blue vellum paper with golden letters; (2) (Magna Charta* (London 1816, fob), three copies upon purple-colored vellum, with golden letters.

Bibliomania often extends to the binding. In France the bindings of Derome, Padeloup and Bozerian are highly valued; in England those of Charles Lewis and Roger Payne, among 18th century binders ; while Hayday, Riviere, Bedford and Zaehnsdorf may be mentioned as among the notable craftsmen of the 19th. Even the edges of hooks are often adorned with fine paintings. Many devices have been adopted to give a fictitious value to bindings. Jeffery, a London bookseller, had Fox’s ‘History of King James IP bound in fox-skin, in allusion to the name of the au¬ thor; and the famous English bibliomanist, Askew, even had a book bound in human skin. In the library of the castle of Kofiigsberg are 20 books bound in silver (commonly called the silver library). These are richly adorned with large and beautifully engraved gold plates in

the middle and on the corners. To the exterior decoration of books belongs the bordering or the pages with single or double lines, drawn with the pen (exemplaire regie), commonly of red color — a custom which we find adopted in the early age of printing in the works printed by Stephens. The custom of coloring-engravings has generally been dropped, except in cases where the subject particularly re¬ quires it (for instance, in works on natural history or the costumes of different nations), because the colors conceal the delicacy of the engraving.

Other means of idle competition being aL most all exhausted, a new method of gratify¬ ing the bibliomanist taste was adopted, that of enriching works b}’ the addition of engrav¬ ings, — illustrative indeed of the text of the book, but not particularly called for, — and of preparing only single copies. Books are often mutilated in this way to enrich some other book. Such “grangerized® copies have long been well known.

Among recent books valued as specimens of typography are some of those that issued from the Kelmscott Press of the late William Morris. Bibliomania, which flourished first in Holland (the seat likewise of the tulipo-mania) toward the end of the 17th century, has prevailed in England to a much greater extent than in France, Italy or Germany. The modern bibliomania is very different from the spirit which led to

the purchase of books in the Middle Ages at prices which appear to us enormous. External decorations, it is true, were then held in high esteem ; but the main reason of the great sums then paid for books was their scarcity and the difficulty of procur¬ ing perfect copies before the invention of the art of printing. Consult Dibdin, ‘Bibliomania) (London 1811) ; Fitzgerald, ‘The Book Fancier) (ib. 1886) ; Lary, ‘The Lihrary > (1886); Burton, ‘The Book Hunter) (New York 1882) ; Field, (The Love Affairs of a Bibliomaniac* (ib. 1896) ; Ferguson, ‘Some Aspects of Bibliography* (Edinburgh 1900) ; Lang, A., (The Library* (London 1881) ; Merryweather, ‘Bibliomania of the Middle Ages) (London 1849, reprint, 1900) ; Pollard, ‘Fine Books1* (New York 1912) ; Fletcher, ‘An Index to General Literature* (Boston 1901) ; Gusterie, ‘Guide to Periodical Litera¬ ture* (2 vols., Minneapolis 1910) ; Poole, ‘In¬ dex to Periodical Literature,* covering the period after 1802.

BIBRA, be-bra, Ernst, Baron von, Ger¬ man naturalist and writer: b. Schwebheim, Bavaria, 9 June 1806; d. Nuremberg, 5 June 1878. Being left an orphan with a large fortune at. an early age, he devoted himself to physical science, and published various works that brought his name before the public. He studied law at the University of Wurzburg. He trav¬ eled in South America, taking home with him important natural history and ethnological col¬ lections. He wrote several works on chemistry, including ‘Chemische Untersurhungen fiber die Knochen und Zahne der fvlcnschen und der Wirbeltiere* (Schweinfurt 1844) ; ‘Chemische Fragmente fiber die Leber und die Galle* (Brunswick 1849) ; ‘Die Bronzen und Kupfer-legierungen der alten und altesten Vblker* (Frlanoren 1869 V Among; h.i« numerous work.ˆ

of travel and fiction are (Travels in South America 5 (2 vols., Mannheim 1854) ; (Memories of South America) (3 vols., Leipzig 1861); ‘Sketches of Travel and Novels5; (In South America and Europe5 (2 vols., Jena 1874).

BIBULUS, Lucius Calpurnius, Roman politician : d. near Corcyra,

Greece, 48 b.c. His wife was Porcia, daughter of Cato of Utica. In 45 b.c. Porcia married M. Junius Brutus and thus young Bibulus was brought up in the home of the future murderer of Gesar. He was consul with Julius Caesar in 59 b.c., which office he acquired through the influence of the aristocratic party. After his opposition to Caesar's Agrarian Law had failed, he se¬ cluded himself in his house, whence he issued edicts against the measures of Caesar. In 49 b.c. Pompey appointed him commander of the fleet in the Roman Sea. Bibulus took part in the battle of Philippi and was made prisoner by Antony. The latter afterward made him his legate in Syria. He composed a little volume of (Memoirs5 of Brutus. It was extant in Plutarch's time but has since been lost.

BICAMERAL SYSTEM, or two-cham¬ bered system, the universal form of the State legislature. The upper house is invariably called the senate and the lower house is usually termed the assembly or house of representatives or house of delegates, the former differing from the latter chiefly in number of members, in special duties and in greater length of tenure, while in Congress and some of the States there is also a difference in the systems of repre¬ sentation in the two houses. The bicameral system was in vogue in England when America was settled but local needs as well as a desire to imitate the English system led the colonists to adopt the system. When the Constitution was framed in 1787, the members of the Convention decided to retain the system since the powers of the legislature were increased and the members believed in a government of checks and bal¬ ances. Without question the system has tended to minimize the evil of over-legislation by giving opportunity for sober second thought on proposed legislation, though it has resulted, too, in friction and unnecessary delays with divided responsibility for compromised legislation. See Congress; Assembly, Legislative; Senate; House of Representatives. Consult Bryce, James, (Americ.an Commonwealth5 (4th ed., 1910) ; Reinsch, Paul S., (American^ Legisla¬ tures and Legislative Methods5 (1907); Wil¬ son, Woodrow. Congressional Government5

(1885).

BICANERE, bik-a'ner, India, a town, capital of a principality of the same name, 240 miles west by south from Delhi. With its battlemented walls and large citadel, both flanked with round towers, and its temples, one of which rises to a great height, it presents a magnificent appearance to the traveler approach¬ ing it ihrough the desolate tract of country in which it stands; but a nearer inspection

dispels the illusion, and the greater part of the houses are found to be hovels of mud, painted red. Water is obtained from wells.

BICARBONATE. See Carbon.

BICCI. Ersilio, be'che, ar-sel'yo, Italian poet: b. 1845. He studied in Florence, and became professor of Italian literature in the

Licei Dante and Toscanelli of that city. His best composition is in the collection styled (New Verses.5

BICE, bice, or BISE, the name of two colors used in painting, one blue, the other green, and both native carbonates of copper, though inferior kinds are also prepared arti¬ ficially. As other artificial pigments are often so called, the word is now of doubtful value and has become almost obsolete. Blue bice is known as mountain blue or ongaro, and green bice as Hungarian green, verde de Spagna, *etc.*

BICEPS (biceps flexor cubiti), the prin¬ cipal flexor muscle of the arm, the muscle pop¬ ularly shown as evidence of muscular develop¬ ment. At its upper end it consists of twro parts, one being attached to the coracoid process of the scapula, and the other to the margin of the glenoid fossa, about the joint. This latter, the long head, passes over the head of the humerus as a tendon and unites with the short head to form the belly of the muscle. The lower end of the biceps is inserted for the greater part to the radius, and a smaller tendonous expansion is inserted in the fascia of the forearm. The action of the biceps is to bring the forearm to the arm and to turn the inturned hand outward.

BICETRE, be-satr, France, village a little to the southwest of Paris, with a famous hos¬ pital for old men in indigent circumstances, and an asylum for lunatics, together forming one vast establishment, containing over 2,700 beds. This establishment was originally founded by Louis IX as a Carthusian monastery, became later a castle, which was demolished in 1632, after being lonˆ in a ruinous state, and was restored by Louis XIII, and destined as a re¬ treat for infirm officers and soldiers. When Louis XIV afterward erected the great Hotel Royal des Invalides, Bicetre became a general hospital, and it continued as such down to the Revolution, and contained also a house of correction. The establishment was then en¬ tirely altered and converted to its present use. The poor persons admitted must be at least 70 years of age or incapacitated by some incur¬ able disease from earning a livelihood. The lunatics are such as belong to the

department of the Seine. They are attended to with the greatest care and fabricate neat little articles of wood and bone, known in France by the name of (<Bicetre work.55

BICHAT, be'sha, Marie Frangois Xavier,

French physician : b. Thoirette, department of . Jura, 14 Nov. 1771 ;. d. 22 July 1802. His father, a physician, early initiated him into the study of medicine, which the young Bichat prosecuted at Lyons and Paris, where he studied under the direction of Desault (q.v.), who treated him as a son. On the latter's death, Bichat superin¬ tended the publication of his surgical works, and in 1791 began to lecture upon anatomy in connection with experimental physiology and surgery. From this period, amidst the pressing calls of an extensive practice, he employed him¬ self in preparing those works which spread his reputation through Europe and America, and which had the most beneficial influence upon medical science generally. In 1800 appeared his (Treatise on the Membranes,5 which passed through numerous editions, and immediately after publication was translated into almost all

European languages, and Researches Concern¬ ing Life and Deaths followed, the next year, by his (General Anatomy) (4 vols., 8vo) — a complete code of anatomy, physiology and med¬ icine, which was translated into English by Dr. G. Hayward, and published in 3 vols. 8vo. In 1800 he was appointed physician of the Hotel-Dieu, in Paris, and with the energy character¬ istic of true genius began his labors in patho¬ logical anatomy. In a single winter he opened no less than 600 bodies. He had likewise con¬ ceived the plan of a great work upon pathology and therapeutics ; and immediately upon com¬ mencing his duties as physician to the Hotel-Dieu he began his researches in therapeutics by experiments upon the effects of simple medi¬ cines. In the midst of his activity and useful¬ ness he was cut off by a malignant fever, prob¬ ably the consequence of his numerous dissec¬ tions. His friend and physician, Corvisart, wrote to Napoleon in these words: "Bichat has just fallen upon a field of battle which counts more

than one victim ; no one has done so much, or done it so well, in so short a time.® He was the creator of general anatomy, or of the doctrine of the identity of the tissues of the different organs, which is the fundamental prin¬ ciple of modern medicine.

BICHIR, be-sher' one of the African

mudfishes (Polyp terns bicliir), which inhabits the upper Nile and its tributaries, and is re¬ garded as the best food-fish of those waters. It may attain the length of four feet, and is one of the few remaining species of the great nearly extinct group Ganoidea, and is related to the American gar-pike. It is not truly a mudfish in its habits, though it haunts the deeper holes of the Nile. Its swim-bladder opens ventrally and is double, simulating a pair of lungs in many respects, though the fish can¬ not live long out of water. See MudFish ; Reed-Fish ; Icthyology.

BICHLORIDE OF GOLD, a substance formed by the action of chlorine gas upon dry metallic gold that has been previously thrown down in the form of an impalpable powder, by chemical means. Some authorities formerly asserted that the substance so formed is a true chemical compound, having the formula AuCh : however, it is a mere mixture of metallic gold and the well-known trichloride, AuCU.

BICKELL, Gustav Wilhelm Hugo, Ger¬ man theologian and Orientalist, son of J. W. Bickell (q.v.) : b. Cassel, 7 July 1838; d. Vienna, 15 Jan. 1906. At the age of 24 he be¬ came tutor of Semitic and Indo-Germanic phi¬ lology at Marburg. He became a convert to Roman Catholicism in 1865, was ordained priest in 1867 and appointed professor of Orien¬ tal languages at Munster. In 1874 he accepted a similar post at Innsbruck, and finally settled in Vienna in 1891. Bickell wrote a great num¬ ber of theological treatises, a Hebrew gram¬ mar and made several translations ; also 'De indole ac ratione versionis Alexandrinse in interpretando libro Job) (1862) ; 'Grounds of the Infallibility of the Head of the Church' (1870); 'Mass and Pasha' (1872); 'Metrices biblicse regulae exemplis illustratae' (1879) ; 'Syrodi Brixinenses saeculi XV' (1880) ; 'Hebrew Poetry' (1883) ; 'A Papyrus Frag¬ ment of a non-Canon jea] Gospe]' (1885) ;

'Selected Writings and Poems of the Syrian Church Fathers.'

BICKELL, Johann Wilhelm, German ec¬ clesiastical jurist: b. Marburg 1799; d. Cassel-1848. He became professor of jurisprudence at the age

of 25; at 33 he was appointed coun¬ sellor of the High Court of Appeal in Cassel and vice-president in 1845. Bickell gave the im¬ petus to the modern development of ecclesias¬ tical law, leading to extended researches among the writings of early authorities. Of his great work, 'History of Ecclesiastical Law' (Giessen 1844), only one volume was com¬ pleted. Among his other works are 'Corpus juris canonici' (1825) ; 'De paleis quae in Gratiani decreto inveniuntur' (1827) ; 'Reform of the Protestant Church Constitution' (1831).

BICKERSTAFFE, Isaac, Irish dramatic writer: b. Ireland, about 1735; d. about 1812. At the age of 11 he became page to Lord Ches¬ terfield, lord lieutenant of Ireland. Later he was officer of marines, but was dismissed be¬ cause of some escapade. In 1772 he was sus¬ pected of a capital crime and fled abroad. Lit¬ tle is known of his later life, save that he lived for a time at Saint Malo under an assumed name. He wrote many successful pieces for the stage, some of which, such as the operas of 'Love in a Village' and 'The Padlock,' are still presented. His celebrated comedy of 'The Hypocrite,' adapted from Colley Cib¬ ber's 'Nonjuror,' which was again borrowed in its leading incidents from Moliere, long re¬ tained its place on the stage, with its well-known characters of Mawworm and Dr. Cant¬ well. The music of many of Bickerstaffe's pieces was composed by Charles Dibdin. Most of his comedies and light musical pieces were produced under the management of Garrick.

BICKERSTETH, Edward, English clergy¬ man : b. Kirby Lonsdale, Westmoreland, 19 March 1786; d. 28 Feb. 1850. He was educated in the grammar school of his native town, and became successively a postal official, clerk to a London attorney and flourishing solicitor in Norwich. Influenced by a new and powerful impulse, he began in 1805 to exert himself in promoting the diffusion of the truths of re¬ ligion among his fellow men. After publishing successfully in 1814 'A Help to the Study of the Scriptures,' he resolved to enter the min¬ istry of the Church of England. The Church Missionary Society wished to send him abroad on a special mission to Africa, and in this view his bishop, dispensing with the usual course of a university education, admitted him to orders in 1815, and a fortnight afterward he was ad¬ mitted to full orders. Mr. Bickersteth there¬ upon, with his wife, proceeded to Africa, from which, after accomplishing the objects of his mission, he returned in the following autumn. He filled afterward the office of secretary to the Church Missionary Society with zeal and distinction until 1830, when he became rector of Watton, in Hertfordshire. He was a strong Protestant, warmly evangelical, and an ardent Millenarian. One of the founders of the Evan¬ gelical Alliance, he was the author of a series of publications which had an immense

circula¬ tion, including his famous compilation, ‘The Christian Psalmody,’ \yhich went through 59

editions in seven years. A collected edition of his works appeared in 1853.

BICKERSTETH, Edward Henry, Eng¬ lish divine and hymn-writer: b. 25 Jan. 1825; d. London, 16 May 1906. His father was a Church of England clergyman and at the age oi 14 he decided to take holy orders. Though not eminently successful in other subjects dur¬ ing his university career, he won the chancel¬ lor s medal for English three years in succes¬ sion — a unique feat. Ordained priest in 1849, Bickersteth held several church livings before he became vicar of Christ Church, Hampstead, in London, where he remained 30 years. Here he established daily services and engaged actively in missionary work. He made journeys through India, Palestine and Japan. Of extremely broad-minded views, he aided and encouraged many church and diocesan societies which lacked the prescribed evangelical sanc¬ tion. Elis writings in prose and verse were very numerous. He published in 1866 Yester¬ day, To-day and For Ever: a poem in 12 books,) which quickly achieved a world-wide popularity. Nearly 30,000 copies were sold in Great Britain, and twice that number in Amer¬ ica. In 1858 he published (Psalms and Hymns, ‘ based on his father’s (Christian Psalmody.’ Some 30 hymns of Bickersteth’s own composi¬ tion are in popular use, the best known being (Peace, Perfect Peace’ (1883) and (0 Broth¬ ers, Lift Your Voices.’ In 1885 he was ap¬ pointed dean of Gloucester, and shortly after¬ ward was nominated bishop of Exeter. Be¬ sides sermons, charges and poems, he wrote a Practical and Expository Commentary on the New Testament’ (1864), of which over 40,000 copies were sold. (The Rock of Ages; or Scripture Testimony to the one Eternal God¬ head of the Father and of the Son and of the Holy Ghost’ (1859-60) ; <The Lord’s Table’ (1884); (The Second I3eath ; or the Certainty of Everlasting Punishment’ (1869). Consult Aglionbv, F. K., (Life of E. H. Bickersteth’

(1907).’

BICKNELL, Ernest Percy, American public official and social worker : b. near Vin¬ cennes, Ind., 23 Feb. 1862. After graduating from Indiana LTniversity he became a news¬ paper reporter in Indianapolis. In 1893 he was appointed secretary of the State board of charities of Indiana, and five years later he became general superintendent of the Chicago bureau of charities. In 1908 he became national director of the American Red Cross Society, whose principal agent he was in San Francisco after the great fire in 1906. He was also active in behalf of this organization in Sicily and Calabria after the earthquake of 1909. In 1914 he was appointed a member of the United States Government Commission sent to Europe to assist Americans stranded in the war zone. He is a member of the execu¬ tive board of the Boy Scouts of America.

BICKNELL, George Augustus, retired rear-admiral of the United States navy: b. Batsto, N. J., 15 May 1846. As a midshipman he saw much active service during the Civil War. At the conclusion of hostilities he entered the Naval Academy, from which he graduated in 1866. During the opening of the Japanese ports of Kobe and Osaka two years later commanded the marines which maintained

order at Yokohama. During the Spanish-Arnerican War he commanded the Niagara, and during the Boxer uprisings in China in 1899 he was in command of the Monocacy. From 1902 until 1904 he was commandant of the Naval Station at Key West, Fla., after which he commanded the battleship Texas for two years, flagship of the United States coast squadron. In 1906 he was appointed commandant of the Pensacola and Portsmouth navy yards, which position he re¬ tained until 1908, when he was retired, having been promoted to the rank of rear-admiral the year before.

BICKNELL, Thomas Williams, Ameri¬ can author, educator, historian : b. Barrington, R. I., 6 Sept. 1834. He was educated at Thet-ford Academy, 1850-53; Amherst, 1853-54; Brown University, 1858-60. He was school teacher and principal, 1860-69; commissioner of education for Rhode Island, 1869-75. He founded the new Normal School, Rhode Island, in 1871. He was the founder, editor and publisher of the New England Journal of Education, Education and Primary Teacher. He founded the New England Bureau of Edu¬ cation, 1876; was a member of the Rhode Island house of representatives, 1860, and of the Massachusetts house of representatives, 1888-90; cofounder of the

town, New England, N. D. ; founder (1880) and president (1880-84) of the National Council of Education; president of the American Institute of Instruc¬ tion, 1877-78; president of the International Sunday School Association, 1884- ; president of the Rhode Island Citizens' Historical Associa¬ tion since 1904; founder, secretary and reg¬ istrar of the National Society of Sons and Daughters of the Pilgrims, 1908; founder and secretary Providence Founders Society, 1911. He has published (Biography of William L. Noyes' (1867) ; (Reports as School Commis¬ sioner' (1869-75); (Annals of Barrington, R. I.' (1870) ; (The Bicknells' (4 vols., 1880-88) ; (Tohn Myles and Toleration' (1888) ; (The History of Barrington, R. I.' (1898) ; Barring¬ ton in the Revolution' (1898); (Sowams' (1908); (Bicknell Family Genealogy' (1913); (History of the Rhode Island Normal School' (1912); (The Story of Dr. John Clarke, Founder of Civil and Religious Liberty in Rhode Island, 1638' (1915), and many histori¬ cal addresses and poems.

BICYCLE, a light steel vehicle consisting of two wheels arranged tandem, united by a frame with the rider's seat upon it; propelled by his feet acting on the pedals connected with one of the axles, at present that of the rear wheel ; and steered by a handle-bar guiding the direction of the front wheel. As at present constructed the wheels are of equal size ; the driving mechanism is usually a chain with the links fitting over a sprocket-wheel, but about one in 25 are chainless, mainly with a shaft and bevel driver; the weight is 23 to 2 7p2 pounds, complete; the frame is of hollow cold-drawn tubing, with brazed joints; the wheels are sus¬ pension, with crossed tangent spokes, wooden rims, pneumatic tires and ball bearings. The name dates from about 1865, though first so spelled in a patent of 8 April 1869, and else¬ where called <(bysicle," <(bicircle," <(bicycular velocipede," *etc.* ; but prior to 1870 the form

of the machine was usually called a velocipede, a French name dating from 1779.

The pedomotor itself goes back perhaps to Egyptian and probably at

least to classic times, winged figures astride of a stick connecting two wheels being found in the frescoes at Pompeii. In the 17th century it suddenly appears with surprising frequency; there is a picture of a bicycle in a stained-glass window at Stoke Pogis, England; in August 1665, John Evelyn writes in his diary of (<a wheele to run races in® ; in 1690 a Frenchman named De Sivrac invented a two-wheeled celerifere having a horse-shaped wooden body with a saddle, and steered by the rider's feet; in 1693 Ozanam de¬ scribed before the Royal Society a vehicle ped¬ aled by a foot traveler. In 1761 the Universal Magazine describes a similar one invented by an Englishman named Ovenden ; in August 1769 the London Magazine describes ((a chaise to go without horses.® On 27 July 1779, Le Jour¬ nal de Paris describes a velocipede invented by MM. Blanchard and Magurier, which is merely the celerifere with an upright bar to support the hands; this gained considerable vogue. From France and England the idea spread to Germany, which added to it the one idea needed to vivify it. In March 1784 one Ignaz Trexler, of Gratz, Austria, invented a pedomotor cred¬ ited with the speed of a galloping horse — un¬ questionably meaning down hill. But the di¬ rect progenitor of the modern bicycle was one built in 1816 by Baron Karl von Drais, Freiherr von Sauerbronn (1784-1851), chief forester to the Grand Duke of Baden (to whose memory in 1891 the bicyclers erected a monument at (Karlsruhe), often called <(the father of the bicycle.® It was designed to aid him in his daily journeys. The whole was of wood; the wheels of equal size, connected by a perch, astride which the rider sat in a saddle, and to the fore end of which was swiveled a fork into which the front wheel was axled; the rider propelled it on level ground or up hill by strik¬ ing the ground with his feet, and coasted down hill. But the significant feature, the germ of the bicycle, wˆas the pivoting of the front w'hcel and its steering by a handle-bar; for which there was a stuffed arm-rest on an elevated cross-piece. Drais patented this in Paris, 1816, and claimed that it would go up hill as fast as a man could walk, on a level, after a rain, at six or seven miles an hour, or courier's pace, ihe same when dry at eight or nine and down hill at a horse's gallop. It excited much atten¬ tion and w-as called the Glraisine®; and in 1818 one Dennis Johnson patented in England an improved form called the <(pcdestrian curricle,® vrith adjustable saddle and elbow-rest. Mean¬ time, in June 1819, the curricle had been intro¬ duced into the United States and became a craze in Boston, New York, Philadelphia, etc.; and many riding-schools were opened. On 26 June 1819 William K. Clarkson was granted a patent for an "improved velocipede® ; but the excitement soon subsided here also.

The real ancestor of our bicycle, the crank-driven velocipede that led straight to better things, arose in France: the honor of the in¬ vention is hotly disputed. According to one account it belongs to Ernest Michaux, the son of a Parisian carriage repairer (to whom a monument was erected in 1894) ; but if so, he

did not make it public and it led to nothing, and it is generally accredited as theory, where it belongs as practical result, to Pierre Lallement, a Parisian blacksmith, said to have been, in Michaux's employ. It sprang, in fact, not from Michaux's, if that existed, but from a multi¬ cycle invented in 1865 by one Marechal ; a five¬ wheeler, each wheel having an independent axle with cranks, loose pedals and a separate seat ; the front wras the guide-wheel, but it could be ridden by one or many. In September MM. Woirin and Leconde patented a tricycle, with turn smaller rear wheels on the same axle, and a large front one writh cranks and loose pedals, the whole connected with a wooden horse¬ shaped body like De Sivrac's, on whose back the rider sat well over the front wheel ; this was the progenitor of the modern tricycle. Lallement, against the judgment of his friends, who thought that keeping one's balance wˆould be impracticable on two wheels tandem, applied the principle thus the same'year, learned the art of balancing, and exhibited his machine and his skill at the Paris Exposition of that year; but thought too little of it to patent it. The next year (1866) he came to the United States to look for work, made a velocipede and rode it about New Haven, Conn., and was induced by one James Carroll to patent it with him, which w7as done 20 November. It had two wooden wheels, the front one slightly the larger, with iron tires ; wras a front-driver, and the saddle was on a steel spring midwray be¬ tween the wheels. But it wras too crude and un-pleasurable to attract much notice. In France, however, great improvements were shortly made on it, and in the wfinter of 1867 it became the sensation of Paris ; riding schools sprang up all about, and straps to fasten the machines were part of the equipment of the great places of amusement. This continued till the Franco-German War temporarily destroyed the busi¬ ness, which had developed a large manufactur¬ ing interest. Meantime, in England, Edward Gilman in 1866 had patented a rear-driver with a single treadle, and the chain gear had been broached. In 1869 the im¬ proved velocipede and the reflex of the French enthusiasm brought it into sud¬ den vogue in the United States, and American inventiveness was turned toward perfecting it: at the time the ((boom® burst in 1870 the Patent Office w7as receiving half a dozen applications for newT patents every wreek. The sport, however, collapsed, with the suddenness of a finan¬

cial crash, within a single week; thousands of machines, worth $100 to $150 one day, could not be sold at any price the next, and wˆere ultimately disposed of to boys or the poorest classes at nominal prices, or allowed to become old iron; and manufactories crowded with orders had them countermanded in a mass. It w7as nearly a decade before America took it up again in any general way, and then wdth a dif¬ ferent wheel, the bicycle proper.

Meantime a great development had gone on in England, where the hard, smooth macadam roads and beautiful by-paths for cyclers without disturbing horses made all conditions more favorable. The bicycle under that name w7as patented 8 April 1869; it had steel rims and solid rubber tires, round or half round. To gain speed the front wheel was

gradually enlarged and the rear reduced to a mere steerer, till the Ordinary was attained in 1871 with a 40-to 48-inch fron,t wheel and 16-inch rear. The front wheel was gradually raised in proportion to the rider's height and skill, and in the early eighties attained 60 and even 64 inches. It still remains the perfection of grace and simplicity in bicycle construction : the motive power being applied direct, and the wheel, with cranks and pedals, forming a solid body. It is also the most exhilarating to ride, given strength and skill.

The Ordinary, however, could not be the bicycle of the future. It was hard to mount, except in favorable spots, and if the rider was dismounted had often to be walked long dis¬ tances on streets or hillsides; both from this and the great air resistance due to the rider's elevation, it was merely the sport of a few athletic men, mostly young; headers were frequent from the rider's mass centre being directly over that of the large wheel, and liable to be serious from his high seat, though the danger was exaggerated. A safer build was therefore mooted. The first idea was to bring the rider's centre below that of the driving wheel ; this could only be accom¬ plished by operating the pedal with some kind of leverage, and a rear-driving safety with lowered front wheel was patented in 1879 by H. T. Lawson of

England. A similar type, called the ((Bicyclette,® followed in 1880. In the same year the ((Star,® a reversed Ordinary with the small wheel in front, was introduced. A more popular form, which had high racing speed and made new records, was Starley's ˆKangaroo® (1883), with diamond frame, inde¬ pendent crankshafts and two chains gearing them to the front wheel, followed in 1884 by Starley's famous and still speedier <(Rover,® for a long time the popular term for Safeties® of any pattern. Here the cranks and pedals were on a separate axle, connected with the driving-wheel by a single chain which was therefore permanently tight; the seat was far back over the rear wheel, so that headers over the handle-bar were absolutely impossible. The front wheel was about one-fourth larger than the rear ; later they were made of practically the same size as now, completing the evolution back to the velocipede, and making its general utility possible. This advent of the Safety® has carried the bicycle into everyday business and the life of every household; carriers, police¬ men, messengers, etc., find it of great service. The enormous brain-power devoted to its per¬ fection is shown by the fact that in the United States alone 7,573 patents had been granted, up to 1900 for cycles and their parts, and prob¬ ably double that in the world altogether. Of these, only 16 had been issued before 1865, and the great majority were granted after 1890. In 1892 the applications had grown so numerous that a special department of the Patent Office was created for them.

The greatest of all single inventions, and the one which has revolutionized the business and made cycling a delight rather than an exertion, > ihe pneumatic tire. It was originally in¬ vented, not for bicycles, but road wagons, by an English civil engineer named R. W. Thompson, in 1843, and was patented in the United States in 1847; but was allowed to lapse. The first

bicycle tires were iron or steel; then a strip of rubber was fastened over the tire; later, a round or half-round piece of solid rubber was cemented or fastened into the hollow of the rim. But in 1889 an Irish veterinary sur¬ geon, Dr. John B. Dunlop, fitted a piece of rubber hose on his son's bicycle ; it worked so well that he patented it,- not broadly, but for specific details now disused. About the same time P. W. Tillinghast, of Providence, R. I., patented a hollow tire in this country. But even this would have been ineffectual save for the enormous reduction in weight by the use of steel weldless tubing and wire, so that a machine of the incredibly small weight of nine pounds has been used for racing, with a wheel on whose spokes four men can stand without injuring it: these machines are too frail for road use, but

even the average road¬ ster does not reach 28 pounds, while in 1873 65 pounds, and even in 1885, 48 was thought fair, and 27 a racing wonder.

The ball-bearing, invented by an Englishman named Bonn, is another epoch-making inven¬ tion. The earliest bicycle bearing was a plain one with a sleeve, known as the parallel bear¬ ing. The friction was so heavy . that the roller bearing was substituted, but did not work well; the next was the adjustable cone, which for a time was in universal use. But in all solid-sur¬ face bearings the grinding of the sand which worked in made them irregular and rattling after a while, and the layers of gudgeon grease required a steady tax on time for cleaning. In the ball-bearing, the conical axle bears against a row of steel balls in a circle, tangent to the bearing surface and to two other surfaces at right angles, so that the friction is only against three points, and the bearing parts roll over instead of sliding upon each other. The wear of the balls is astonishingly slight, and from the constant change of surface there is little irregularity, and from the small contact points scarcely any making of axle grease.

A fundamental invention was the suspension wheel, of which, in the words of an English patentee of 1826, ((the weight they have to carry is suspended from that part of the wheel which happens to be uppermost, instead of being sup¬ ported, as is usual, by the spokes that happen to be under the axle-tree® — a principle in¬ vented by Leonardo da Vinci before 1490, re¬ invented as above stated, and in France in 1864. Spring seats have abolished the saddle-galling which was one of the worst tortures of the <(bone-shaker,® and even of the earlier bicycles. The wooden rim takes two and a half pounds off the weight of the machine, but is not used in England, the roads being too wet. The drop-frame for ladies' use is perhaps the most im¬ portant single advance made on the velocipede, so far as the increase of social pleasure is con¬ cerned. The coaster-brake is another import¬ ant advance. The chain gearing which made the Safety® possible has been noted ; later, much ingenuity has been employed to get rid of it, but not with complete satisfaction, the cost being prohibitive to the mass, and the complaint of extra exertion being heard. The two chief devices for chainless machines are the pin-wbeel gearing, which works smoothly but lacks durability; and the bevel gear, which is very difficult to cut so that the teeth shall fit

exactly, but is said to increase in both accuracy and case of driving with use, as the surfaces of the teeth grow to fit each other. In the chain gear the case is the reverse, as the links and rivets wear and dust grinds them off.

In the United States the bicycle did not ap¬ pear after the collapse of 1870 till the Centen¬ nial Exposition of 1876, when some English machines were imported and exhibited. Col. Albert A. Pope of Boston saw them and thought of reviving the business here; went to England to study the industry, brought back some English wheels, and had W. S. Atwell of Boston build him one, weighing 70 pounds and costing $313. Again visiting England, he de¬ cided that conditions here warranted their manufacture for the market, and in 1878 he had the Weed Sewing Machine Company, of Hart¬ ford, Conn., make some “Columbias® for him in a corner of their shop, the first bicycles made in America. From the first, these have been the American model of durability and ex¬ cellence of make, as well as of advanced in¬ vention in construction and fittings, and unsur¬ passed in the world; and they still maintain that position. The business soon grew into one of the great manufactures of the country, and the Pope Company was the chief among those merged in the American Bicycle Company a few years ago. The “safety® brought the same expansion here as elsewhere ; but since about 1895 there has been a severe decline. The slack¬ ening of demand produced a severe crisis in the business, but it eventually settled upon a firm though more limited basis of practical service and everyday pleasure. The census returns show the remarkable changes that have taken place. In 1890 there were 27 establishments engaged in making bicycles in the United States; the capital invested being $2,058,072; the number of employees, 1,797, and the value of the product, $2,568,326. By 1900, the business had so extended that the number of establish¬ ments had increased to 312; the amount of cap¬ ital invested to $29,783,659, while the 17,525 workmen employed received an annual wage of $8,189,817. The cost of material in that year was $16,792,051 and the value of the product $31,915,908. Five years later, when the special census of American manufacturing interests was taken, the number of establishments had been reduced to 101. In that year the capital employed was but $5,883,458; the number of em¬ ployees, 3,319; the wages paid, $1,971,403; the cost of materials, $2,628,146, and the value of the

product, $5,153,240. The number of finished machines turned out was 250,487, of which 2,328 were motorcycles. Between 1904 and 1914 the number of establishments in operation de¬ creased from 122 to 94, but the number of workers increased 33.7 per cent — to 4,487, and the value of the output 111.2 per cent — to $17,667,676. A considerable part of this in¬ crease was due to the motorcycle industry: there were 62,793 of these machines made, a value of $12,306,447. The number of bicycles made was 398,899, valued at $5,361,229. The remainder of the output was in parts, valued at $7,819,266. The capital employed in 1909 was $9,780,102. In France the vogue of the bicycle has steadily progressed. The official records show that in 1912 there were 2,969,585 bicycles in use in that country: about one to each 13

persons. Ten years before the proportion was one to each 30 persons.

Bibliography. — -Allen, J. T., ‘Digest of Cycles or Velocipedes, Patented in the United States from 1789 to 1892> (Washington 1892) ; Bougier, H., ‘Cycles et Motocycles) (Paris 1911); Clyde, H., ‘Pleasure-Cjxling* (Boston 1895) ; Garratt, H. A., (The Modern Safe¬ ty Bicycle) (New York 1899) ; Sharp, An¬ drew, ‘Bicycles and Tricycles* (London 1896) ; and the valuable historical summary in the United States census reports of 1910, ‘Mariu-factures) (Part X, p. 825).

BIDA, be’da, Alexandre, French painter: b. 1813; d. 2 Jan. 1895. He studied in Paris under Delacroix; traveled in the East for two years, and most of his paintings have Oriental or Scriptural subjects. He was at his best in water-color work. Among his paintings are ‘The Slave Market, *‘The Massacre of the Mamelukes) (Metropolitan Museum, New York) ; ‘Jews Praying at the Well of Solo¬ mon* and ‘The Field of Boaz.* He is more generally known as the illustrator of Alfred de Musset’s complete works (10 vols., Paris 1865— 66), and of the Bible, comprising the ‘Four Evangelists> (1876), and the ‘Book of Ruth.*

BIDAR, be’dar, India, an ancient town in the Nizam’s dominions, 75 miles northwest of Haidarabad; noted for the metal ware to which it has given the name of Bidri or Bidery. It occupies a commanding site above the surround¬ ing country, and its mosque and madrissa or college testify to its former splendor and im¬ portance. Pop. 14,000.

BIDASSOA, be-das-so’a, a river in Spain, about 45 miles long, the last 12 of which form the boundary between France and Spain. It rises in the mountains of Spanish Navarre, and, after various changes of

direction, falls into the Bay of Biscay near Fuenterrabia. In former times Spain claimed not only the entire river, but so much of its banks, on the French side, as its waters covered at full tide. This difference was finally settled by each country contenting itself with its own shore. Near Irun there is a small island in the middle of the stream, called the Island of Pheasants, on which, being neu¬ tral ground, Louis XI and Henry IV met in 1463. Here also peace was concluded between France and Spain in 1659. It was the scene of two engagements of the Napoleonic wars. On 1 Aug. 1813 the Allies defeated the French under Soult at San Marcial, on the Bidassoa, and in the following October Wellington ousted the French from their entrenched positions on the northern bank of the stream.

BIDDEFORD, Me., city in York Coun¬ ty, on the right bank of the Saco River, six miles from the sea, and on the Boston & Maine Railroad, 15 miles southwest of Portland. The river separates it from Saco (q.v.) and, like that city, Biddeford grew up as a manufactur¬ ing centre, its development being favored by the abundant water-power furnished by the falls, the stream descending here about 40 feet. The city also has a large local trade. The leading industries include the extensive manu¬ facture of cotton goods, _ lumber, match blocks, boots and shoes, machinery, *etc.* Here are some of the most important cotton mills in New England, the products of which are found

in the markets of many States. Near the city are granite quarries which annually produce large quantities of superior stone, used in many parts of the world. Several thousand people are employed in the city's industries and the flourishing of these has led to its gradual growth. It has two national banks. There is a fine beach here with good boating and bathing facilities and Biddeford is becoming a favorite resort. The public school system is well organized and conducted and the vari¬ ous religious denominations are represented by 14 churches. The intellectual life of the people is also stimulated through useful local publi¬ cations and an excellent public library. The city was named from Biddeford, England, the home of some of its

early settlers. In 1616 a small settlement was made at Biddeford Pool, near the mouth of the Saco, and Biddeford was settled under a patent in 1630, embraced Saco until 1718 and was then incorporated under its present name. This was long the chief settle¬ ment of the Maine province. In 1855 Bidde¬ ford received a city charter. The present gov¬ ernment includes a mayor and a city council, elected annually. The population in 1920 was 18,003. Consult Folsom, ‘History of Saco and Biddeford) (Saco 1830) ; Clayton, (History of York County5 (Philadelphia 1880) ; Ridlon, ‘Saco Valley Settlements and Families5

(1895).

BIDDING PRAYER, a prayer which di¬ rects that which is to be prayed for. The form is very ancient, dating back to Apostolic times. In the ancient Church it was used in the service after the departure of the cate¬ chumens, the communicants remaining. It was offered by the deacon, each petition be¬ ginning, “Let us pray for - ,55 and the

faithful making responses at its conclusion. A form of bidding prayer was enjoined by the 55th canon of the Anglican Church in 1603 to be used before all homilies and sermons. It is a prayer for the Church, the sovereigns and others in high station, and a thanksgiving for the faithful departed, always concluding with the Lord’s Prayer. Consult Dearmer, < Every¬ man’s History of the Prayer Book) (Milwau¬ kee 1913) ; Harford, (Prayer Book Diction¬ ary } (New York 1912) and Wheatley, bid¬ ding of Prayers Before Sermon No Mark of Disaffection to the Present Government: Or an Historical Vindication of the LVth Canon) (London 1718; new ed., 1845).

BIDDLE, Anthony Joseph Drexel,

American publisher, journalist and miscella¬ neous writer: b. West Philadelphia, 1 Oct. 1874. He was educated at a private school in Philadelphia and at Heidelberg, Germany. He lived in the Madeira Islands, studying con¬ ditions there, returning to the United States in 1891. He joined the staff of the Philadel¬ phia Public Ledger, and contributed to maga¬ zines and humorous journals. In 1895 he re¬ vived the Philadelphia Sunday Graphic and became its editor and was president of the Drexel Biddle publishing house in 1897-1904. He is the founder of the movement known as Athletic Christianity and in 1907 founded the Drexel Biddle Bible Classes, now numbering 30,000 in English-speaking countries. He is fellow of the Royal Geographical Society and corresponding member of the Societe Archae-

ologique de France. He has written ‘A Dual Role and Other Stories,) (An Allegory and Three Essays,5 (The Madeira Islands, 5 ‘The Froggy F’airy Book,5 (All Around Athletics5 (1894) ; (The Flowers of Life5 (1898) ; (Shan¬ tytown Sketches) (1898); (The Madeira Islands5 (1900) ; (The Land of Wine5 (2 vols.,

1901).

BIDDLE, Arthur, American lawyer: b. Philadelphia, Pa., 23 Sept. 1852; d. 8 March 1897. He studied law and was admitted to the bar inˆ 1878. Later he became a member of his father’s firm and devoted much time to the study of certain, branches, the results of which were published in his works, ‘Treatise on the Law of Stock Brokers5 (1881) ; ‘Treatise on the Law of Warranties in the Sale of Chat¬ tels5 (1884) ; and (The Law of Insurance5

(1893).

BIDDLE, Clement, American Revolu¬ tionary soldier: b. Philadelphia, 10 May 1740; d. there, 14 July 1814. He was educated in the tenets of the Society of Friends (Quakers) and in early life engaged in commercial pur¬ suits in his native city; but notwithstanding his Quaker training, he joined a number of Quak¬ er friends, in 1764, in forming a military corps for the protection of a party of friendly In¬ dians who had sought refuge in Philadelphia from the fury of a band of lawless zealots known as the “Paxton Boys,55 who had recent¬ ly massacred some unoffending Conestoga In¬ dians at the interior town of Lancaster. These banditti, powerful in numbers, had advanced within five or six miles of the city, threaten¬ ing destruction to all who should oppose them, when the vigor of the military prepa¬ rations checked their further progress. Scarce¬ ly had this local disturbance been quieted when news was received of the resolution of the British House of Commons to charge certain stamp duties in the colonies. The feeling en¬ gendered throughout the whole country by this step and by the subsequent passage of the Stamp Act induced, in Philadelphia, the cele¬ brated “non-importation resolutions55 of 25 Oct. 1765, signed by the principal merchants of the city, including Colonel Biddle and his brother Owen. When all hope of a reasonable adjustment of the differences was lost, Colonel Biddle was greatly

instrumental in forming the “Quaker55 company of volunteers raised in Philadelphia in 1775, of which he was elected an officer before the corps joined the army. Congress, on 8 July following, elected Colonel Biddle deputy quartermaster-general of the militia of Pennsylvania, New Jersey, Maryland and Delaware, ordered to rendezvous at Tren¬ ton. Colonel Biddle took part in the battle of Trenton at the close of the same year and, with another officer, was ordered by Washing¬ ton to receive the swords of the Hessian of¬ ficers. He was also engaged in the victory of Princeton, the surprise and retreat of Bran¬ dywine and the unsuccessful enterprise of Ger¬ mantown and during the winter of 1777-78 shared the sufferings of the American army at Valley Forge. As commissary-general of for¬ age under General Greene he rendered im¬ portant service to the army in several critical junctures, especially during the famine at Val¬ ley Forge. At Monmouth he shared the suc¬ cess of his countrymen. In September 1780,

owing to the pressure of his private affairs, he was compelled to return to private life. His military career, however, was briefly renewed in the capacity of quartermaster-general of Pennsylvania in the expedition under Washing¬ ton, in 1794, against the whisky insurgents of that State. Colonel Biddle labored earnestly also in the early political movements of the patriot party of his State, advocating effec¬ tively the revolutionary State Constitution of 1776 (which his brother Owen had had, as a member of the convention, a share in fram¬ ing). He was also active in support of a declaration or bill of rights as a constituent part of the Federal Constitution to prevent abuse or misconstruction of its powers. Af¬ ter the organization of the Federal govern¬ ment under the Constitution of 1787, Colonel Biddle was appointed marshal of Pennsylva¬ nia, as an evidence of the regard in which he was held by Washington.

BIDDLE, James, American naval officer: b. Philadelphia, 28 Feb. 1783; d. 1 Oct. 1848. He was educated at the University of Penn¬ sylvania and entered the navy in 1800. In the war against Tripoli he served as a midship¬ man, was taken prisoner and kept in confine¬ ment for 19

months. In the War of 1812 he was a lieutenant on the Wasp when she cap¬ tured the Frolic and was later captured by the Poictiers. Though a prisoner for a short time at Bermuda, Biddle was exchanged and in 1813 took command of the Hornet and cap¬ tured the British brig Penguin on 23 March 1815, being wounded in action. He was made captain in 1815 and received a gold medal from Congress in reward for his services. In 1817 he was sent to take possession of Oregon for the United States. He was afterward commissioner to Turkey and China and in 1845 negotiated the first treaty between the United States and China. He also served on the Pacific coast in the Mexican War.

BIDDLE, John, English Socinian writer and founder of English Unitarianism : b. Wotton-under-Edge, Gloucestershire, 14 Jan. 1615 ; d. London, 22 Sept. 1662. He entered Magdalen College, Oxford, in his 19th year and graduated A.M. in 1641. Being led to doubt the doctrine of the Trinity, he drew up ‘Twelve Arguments) on the subject, for which he was committed to jail, but was re¬ leased on bail. About six months afterward, on examination before a committee of Parlia¬ ment, he acknowledged his opinion against the divinity of the Holy Ghost and his (Twelve Arguments) were ordered to be burned. He persisted in his opinion and in 1648 published two tracts, containing his (Confession of Faith Concerning the Holy Trinity* and ‘Testimonies) of Irenaeus, Justin Martyr and several other early writers on the same subject. On this the Assembly of Divines asked Parlia¬ ment to decree the punishment of death against those who should impugn the established opin¬ ions respecting the Trinity and to enact se¬ vere penalties for minor deviations. Such a decree was passed, but differences of opinion in the Parliament itself and the penalties to which this sweeping measure rendered many in the army liable prevented its execution. Biddle was again remanded to prison, how¬ ever, and remained for some years in rigor¬

ous confinement. A general act of oblivion in 1651 restored him to liberty, when he im¬ mediately disseminated his opinions both by preaching and by the publication of his two¬ fold Scripture Catechism. > For this he was confined in the Gate House for six months. Cromwell banished him to Saint Mary’s Cas¬ tle, Scilly Islands, assigning him an annual subsistence of 100 crowns. Flere he remained three years, until liberated in 1658. He then became pastor of an Independent congrega¬ tion and continued to support his opinions un¬ til fear of the Presbyterian Parliament of Richard Cromwell induced him to retire into the country. On the dissolution of

that Par¬ liament he preached as before until the Res¬ toration, after which he was obliged to con¬ fine himself to private preaching. In June 1662 he was apprehended at one of the private assemblies and upon process of law fined £100 and ordered to lie in prison until it was paid. He fell a victim to jail fever and died in the 47th year of his age, a martyr to religious in¬ tolerance. His private character was moral, benevolent and exemplary and Toulmin styles him the Mather of the modern Unitarians.® Consult Toulmin, Joshua, 'Life of John Bid-dle) (London 1789; new ed., 1805) and Spears, 'Memorable Unitarians) (London 1906).

BIDDLE, Nicholas, American naval of¬ ficer: b. Philadelphia, 10 Sept. 1750; d. 7 March 1778. In 1765, w'hile on a voyage to the West Indies, he, with two others, chosen by lot, were left for two months on an uninhab¬ ited island. In 1770 he entered the British navy. When Phipps, afterward Lord Mul-grave, was about to start on his exploring ex¬ pedition, young Biddlej though a midshipman, deserted his own vessel and shipped as a sea¬ man on the Carcass, serving through the cruise with Lord Nelson, who was a mate of Phipp's vessel. On the commencement of the American Revolution he came to America. and was made captain of the Andrei v Doria, a brig of 14 guns and 130 men, taking part in Com¬ modore Hopkins' attack on New Providence. After refitting in New London he was ordered on a. cruise to the banks of Newfoundland and in 1776 took, among other prizes, two transport ships with valuable cargoes and a battalion of Highland troops. He was ap¬ pointed to the command of the Randolph, a 32-gun frigate, in February 1777. In March 1778 he was wounded in an action with the Yarmouth, an English 64-gun ship, near Charleston, S. C. While under the hands of a surgeon the magazine blew up and the whole crew of the Randolph were lost, except four men, who were tossed about on a piece of wreck for four days before being rescued. The other vessels of the squadron escaped in consequence of the disabled state of the Yar¬ mouth.

BIDDLE, Nicholas, American financier: b. Philadelphia, ' Pa., 8 Jan. 1786; d. there, 27 Feb. 1844. He became secretary to John Arm¬ strong, United States Minister to France, in 1804 and subsequently went as secretary to James Monroe, then United States Minister to England. He returned home in 1807 and took up the practice of law, was elected to the Pennsylvania legislature in 1810 and appointed a director of the United States Bank in 1819.

He became president of the bank in 1823 and managed it ably down to the expiration of its charter. The financial trouble precipitated upon the country by Jackson's withdrawal of the government deposits in 1833 gave an un¬ fortunate ending to Biddle's career as a bank¬ er, but while both his ability and his integrity were questioned at the time, he has been amply vindicated since. In 1836 he became president of the new United States Bank, but resigned in 1839. Besides miscellaneous writings, he published a Commercial Digest) and 'His¬ tory of the Expedition Under Lewis and Clarke to the Pacific Ocean.* He was presi¬ dent of the board of trustees for the funds of Girard College and was instrumental in es¬ tablishing that institution.

BIDDLE, Richard, American lawyer : b. Philadelphia, Pa., 25 March 1796; d. Pittsburgh, 7 July 1847. He studied law and was admitted to the bar in Pittsburgh. He was a member of Congress (1837-41) and was author of a 'Memoir of Sebastian Cabot, with a Review of the History of Maritime Discovery* (1831).

BIDDLE, William Phillips, American marine officer: h. Philadelphia, Pa., 17 Dec. 1853. Graduating from the University of Pennsylvania he entered the United States Marine Corps, in which service he attained the rank of captain in 1894. He was present on board the Olympia with Admiral Dewey dur¬ ing the battle of Manila Bay 1898. In 1900, during the Boxer uprisings in China, he was in command of the American forces operating with the international expedition to Pekin. From 1909 to 1910 he was commandant of the marine barracks at New York, after which he filled a similar position at Panama. In 1911 he was promoted to the rank of major-gen¬ eral and in 1914 he was retired.

BIDDULPH, Sir Michael Anthony Shrapnel, English military officer, b. Cleeve Court, Somersetshire, 1823 ; d. London, 23 July 1904. He 'entered the Royal artillery in 1843 and served in the Crimean War at Alma, Inkerman, Balaklava and the siege of Sebas¬ topol. In India he commanded the field force and marched to Kandahar and the Helmund and returned by the Tal Chotiali and Boree to the Indus, in 1878-79. He was created K.C.B. in 1879 and G.C.B. in 1895 and in 1896 became gentleman usher of the Black Rod.

BIDEFORD, England, a market town and municipal borough of Devonshire, 44 miles north of Plymouth; situated on both sides of the Torridge, four miles from the sea, the principal portion being on the west side, on a bold acclivity. A handsome stone bridge of 24 arches and 677 feet in length connects the two divisions of the town. It has a spacious market place, an Elizabethan townhall, public assembly rooms and music hall. 1 he Bridge Hall, in French Renaissance style, contains a free library, a reading-room and a science and art school. The most important church is that of Saint Mary, in Perpendicular style, re¬ built, except the tower, in 1865. The chief in¬ dustries comprise the manufacture of coarse earthenware, ropes, sails and collars and cuffs, tanning, malting, iron-founding, *etc.* Timber and coal are exported chiefly to Ireland and Wales. In former times Bideford had an ex¬ pensive shipping trade and is said to have im¬

ported more tobacco in some years than the metropolis. From the beginning of the 18th century this trade gradually declined and gave place to a small coasting trade. Vessels of 500 tons approach the quay. Bideford dates from before the Norman conquest. It was the birthplace of Sir R. Grenville, a founder of Virginia, whose exploit in attacking a Spanish fleet is celebrated by Tennyson. Pop. 9,078. Consult Watkins, 'History of Bideford* (Exeter 1792).

BIDPAI, bid'pi, or PILPAI. When we consider the wonderful history of 'Bidpai's Fables,* their fame and their charm, we nat¬ urally invest their supposititious author with a personality and a name. In fact, however, "Bidpai** is probably a changed form of an Indian word for "court-scholar,** misunder¬ stood as a proper name, and implying there¬ fore neither personality nor specific date. In India from early times the parable or "ex¬ ample** has been the recognized method of conveying moral instruction. In the didactic literature, some general truth or some rule of life is stated in the form of a maxim, and a beast fable or other story then added as a con¬ crete instance or "example.** The folklore of which these tales are a reflex is not the exclu¬ sive property of any of the great religions of ancient India, but is common to Buddhism, Jainism and Brahmanism alike. The sculp¬ tured representations of the stories upon the great Buddhist monuments of 250 b.c. make it certain that the stories themselves were famil¬ iar to the common people at that early date ; and it is hardly less certain that they were so known long before that time. The oldest and most important collection of Indian folklore is the Buddhist one called 'Jataka* — that is, 'Birth-stories,* or stories of Gautama Buddha in his previous births : it consists of 550 tales, each containing

a moral ; each is placed in the mouth of the Buddha, and in each the Buddha plays the best and most important part. It is this device of a framework or setting for the folk-tales that constitutes the principal essen¬ tially literary element of the collection. Next in importance to the Buddhist ‘Jataka* stands the Brahmanical ‘Panchatantra.* Here the material is not essentially different in kind from that of the ‘Jataka* ; but again it is the setting of the material which gives the work its dis¬ tinctive literary character. It is a kind of ‘Mirror for Magistrates.* Both the ‘Jataka,* written in Pali, and the ‘Panchatantra,* in Sanskrit, are still extant, and contain many of the stories which in translations of transla¬ tions attaineu great currency and celebrity in mediaeval literature.

The precise Indian original of these transla¬ tions is lost ; but we know that it was trans¬ lated into the literary language of Persia (the Pehlevi, or Pahleir), by command of the Sassanian King, Khosru the Just, about 550 a.d. From the Pehlevi came two notable versions: one the Old Syriac, called ‘Kalilag and Dam-nag,* after the two jackals, Karataka and Damanaka, who figured prominently in the framework of the Sanskrit original; and the other the Arabic version, called ‘Kalilah and Dimnah,* or ‘Fables of Bidpai,* made about 750 a.d. by Abd-allah ibn al-Moqaffa, a Persian convert to Islam under the Caliph

al-Mansor. According to the Arabic introduc¬ tion, Dabshelim was the first king of the Indian Restoration, after the fall of the gover¬ nor appointed by Alexander at the close of his campaign in the Punjab, 326 b.c. When firmly established, Dabshelim gave himself over to every wickedness. To reclaim the King, a Brahman philosopher takes up his parable, as did Nathan before David, and at last wins him back to virtue. The wise man is called in Arabic bid-bah, and in Syriac bid-vag. These words are traced through the Pehlevi to the Sanskrit vidya-pati, (<master of sciences.® Ac¬ cordingly bid-ball , which has become Bidpai or Pilpai in our modern books, is not really a proper name, but an appellative, applied to a (<chief pandit® or ((court-scholar® of an Indian prince.

From the Arabic are descended, in the fourth generation from the original, a dozen or more versions, of which three may be men¬ tioned as noteworthy links in the chain of tradition : the Greek one, made about 1080 by Symeon Seth, a Jewish physician; the Persian, made some 50 years later, by Nasr Allah of Ghazni ; and the Hebrew, ascribed to Rabbi Joel, and probably made before 1250. Of the descendants in the fifth degree from the origi¬ nal, the (Directorium Humanae Vitae,) made about 1270 by John of Capua from the Hebrew, is distinctly the most celebrated, because it gave rise in turn to Danish, Dutch, Spanish, Italian and French, and above all to the famous German and English versions men¬ tioned below. But besides the (DirectoriumP we must notice the specimen of the Wisdom of the Ancient Hindus, } a version into Latin from the Greek Symeon, made by the Jesuit father, Petrus Possinus (1666) ; and the (Anvar-i SuhailP or Wights of Canopus, 5 a simplified recast of Nasr Allah's. In the second edition of his fables, La Fontaine tells us that he owes the largest part of his new material to <(Pilpay, the Indian sage.® Pierre Poussin's (Specimen } was the one embodiment of his shadowy Oriental fabulist, and a French ver¬ sion of the (Lights } was the other. Two off¬ shoots of the (Directorium) are of unrivaled interest to the student of the beast fable. The one is the (Book of Examples of the Ancient Sages,* and the other is Doni's Wa Moral Fil-osophia) (1552). The (Book of Examples) was made at the instance of Duke Eberhard in Bart, whose name and motto, ((Eberhart Graf z(u) Wirtenberg Attempto ,® appear as an acrostic in the initials of the first sections. It was first printed about 1481 and has since been admirably edited by W. L. Holland (Stuttgart 1860). Holland used, besides three manuscripts, two printed editions without place and year, and enumerates 17 dated editions that appeared between 1483 and 1592. Four dated editions appeared at Ulm between 1483 and 1485. The great number of editions of the work and their rapid succession are the best proof of its im¬ portance as a means of instruction and amuse¬ ment at the beginning of the age of printing. The examples themselves had doubtless pointed the moral of many an ancient homily long be¬ fore the days of Gutenberg; but the language of the old German version of them is so re¬ markable for its simplicity, dignity, strength and beauty that we cannot wonder at its im¬ mense popularity; and to this version, more

than to any other, is Europe indebted for the widespread knowledge of this cycle of litera¬ ture from the last part of the 15th to the middle of the 17th century. The other offshoot of the (Directorium) — namely, (The morall philosophic of Doni : drawne out of the auncient writers.

A worke first compiled in the Indian tongue and afterwardes reduced into divers other languages ; and now lastly Englished out of Italian by Thomas North) (London 1570) — is most interesting to us as English-speaking people because it is <(the first literary link be¬ tween India and England, written in racy Elizabethan,® a piece of ((Tudor prose at its best,® a veritable English classic. Consult Browne, E. G., (Persian Literature) (1906) ; Deslongchamps, (Essai sur les fables indiennes) (Paris 1838) ; id., Wights of Canopus* (new ed., London 1904) ; Hervieux, Wes fabulistes latins) (1899) ; Keith-Falconer, (Kalilah and Dimnah* (1885) ; id., translation of Wright's Edition of the Latin Syriac Version of Bid-pai's Fables* (Cambridge 1885) ; Lanman, (Sanskrit Reader* (1888) ; Rhys Davids, (Buddhist Birth Stories* (London 1880) ; Mul¬ ler, Max, <(On the Migration of Fables® (in Whips from a German Workshop), Vol. 3, London 1880) ; North, (Morall Philosophic of Doni) (ed. Jacob 1888).

Charles Rockwell Lanman, Professor of Sanskrit , Harvard University.

BIDWELL, John, American politician : b. Chautauqua County, N. Y., 5 Aug. 1819; d. 5 April 1900. He went to California in 1841 ; served in the Mexican War, reaching the rank of major; was a member of the Constitutional Convention of 1849, and of the National Demo¬ cratic Convention in Charleston in 1860. In the Civil War he was brigadier-general of Cali¬ fornia militia. In 1864 he was elected to Con¬ gress as a Republican ; in 1866 was a member of the Philadelphia convention; in 1890 was the unsuccessful Prohibition candidate for gover¬ nor of California, and, in 1892, unsuccessful candidate of his party for the Presidency.

BIDWELL, Marshall Spring, Canadian statesman: b. in New England 1799; d. 1872. Migrated to Canada in 1812 and elected to the Upper Canada assembly in 1824, becoming speaker in 1829 and securing re-election to that office in 1835. His strong sympathy with the popular movement which culminated in the Re¬ bellion of 1837, and his covert part in the rising, led to his voluntary banishment from the coun¬ try in 1838.

BIEBERMANN, Gustav Woldemann von, Baron, German historian : b. 5 March 1817 ; d. 1903. After graduating from the University of Heidelberg, where he had studied law, he prac¬ tised privately for a while, then entered the government civil service. He rose rapidly in rank in the management of the state railroads, finally becoming chief director of railroads. He made many contributions to the literature on Goethe, among _ which may be mentioned (Goethe und Leipzig* (2 vols., Leipzig 1865) ; (Zti Goethes Gedichten* (Leipzig 1870) ;

Woethes Gesprache* (10 vols., 1889-97).

BIEBERSTEIN, Adolf Marschall von,

Baron, German statesman : b. Karlsruhe, Ger¬ many, 1831 ; d. Badenweiler, 24 Sept. 1912. Son of a court chamberlain of Baden, he studied

law at Heidelberg and Freiburg, and entered the civil service of his native state. In 1878 he was sent to the Reichstag as a Conservative and appointed representative for Baden in the Federal Council (1883). In 1880 he succeeded Count Herbert Bismarck as Foreign Secretary, in which capacity he negotiated the commercial treaties under Chancellor Caprivi. He incurred the bitter hostility of the Agrarians and certain court circles, and was the subject of a police intrigue which he defeated. The Kaiser's his¬ toric telegram to President Kruger over the Jameson raid (5 Jan. 1896) is generally ascribed to him ; he also declared that the independence of the South African Republic was a matter of vital interest to Germany. Political opposi¬ tion compelled him to resign the Foreign Secre¬ taryship in June 1897; four months later he was sent as Ambassador to Constantinople, where he revealed most remarkable ability as a diplomatist. He consolidated German influ¬ ence in Turkey, obtained the Bagdad Railway concession which caused so much strife be¬ tween interested European powers, especially with England, and brought about the downfall of the notorious Fehim Pasha, a favorite of Abdul Hamid and certainly the most disrepu¬ table villain in the Sultan's entourage. He had overreached himself by literally stealing a Ger¬ man vessel laden with lumber, which brought the energetic German Ambassador on his trail. When Fehim had to be dropped, all Constanti¬ nople rejoiced; the mob shortly after expressed their gratification by hanging him on a lamp-post in the street. After the Young Turk revolution (1908-09) Baron Marschall ingrati¬ ated himself with the new rulers, but his posi¬ tion was severely shaken by the Turco-Italian War — the seizure of Tripoli being an equally bitter disappointment to both Germany and Turkey. Germany could not well interfere as she was an ally of both

belligerents. On the retirement of Count Wolff-Metternich (8 May 1912) Baron Marschall was appointed Ambas¬ sador in London. It was hoped in England that the strongest man in German diplomacy would help to place the relations between the two countries on a more satisfactory basis, but unfortunately he died four months later, before he had entered upon his new duties. His death was deeply regretted alike in London and Berlin.

BIEDA, be'da, the modern name of the ancient Blera, a town in Italy. It is noted for its extensive Etruscan necropolis of rock-hewn tombs, built in several terraces. These tombs are interesting for their imitation of dwellings. They have molded doorways, and, within, the ridge beams and rafters of the roof are cut in relief. There are rock benches on three sides made to receive the dead and, besides the doors, numerous windows.

BIEDERMANN, Friedrich Karl, German author: b. Leipzig, 25 Sept. 1812; d. 1901. He was educated at Leipzig and Heidelberg. He became professor of philosophy in Leipzig Uni¬ versity in 1838 and held this chair till 1845, when he was deposed on account of his politi¬ cal opinions. In 1849 he played an important role in the Parliament of Frankfort; was elected to the National Assembly, of which he was vice-president for a short . term, and was reinstated as professor at Leipzig, but was

again removed in 1853 for political reasons. In 1854 he edited the Deutsche Annalen and was sentenced to a term of imprisonment and removed from his professorship. He was edi¬ tor of the Deutsche Allgemeine Zeitung (1863-66), and founded and edited a number of other liberal papers. His works include 'Wissenschaft und UniversitaD (1838); (I)ie deutsche Philosophic von Kant bis auf unsere Tage} (1842-43); 'Vorlesungen uber Sozialismus und soziale Fragen) (1847) ; (Erinnerungen aus der Paulis Kirche) (1849); 'Fiinfzig Jahre im Dienste des nationalen Gedankens** (1892); 'Friedrich der Grosse und sein Verhaltniss zur Entwickelung des deutschen Geisteslebens) (1859) ; (Vorlesungen uber Sozialismus und Sozialpolitik) (1900) ; (Deutsches Volks und Kulturgeschichte) (4th ed., 1901). Consult his (Mein Leben und ein Stiickzeitgeschichte 1812— 1886 > (2 vols, 1886).

BIEFVE, byef, Eduard de, Belgian painter: b. Brussels, 4 Dec. 1809; d.

there, 7 Feb. 1882. He painted many portraits and was also noted for his scenes from history. His best-known work probably is his Compromise of the Netherlands Nobles at Brussels, 15664 Among others are ‘Last Moments of Anne BoleynP ‘The Introduction of Rubens to Charles I of England, } ‘MasanielloP ‘Raphael and La FornarinaP

BIEL, bel, Gabriel, German philosopher: b. Spires about 1425; d. Tubingen 1495. He was educated at Heidelberg and Erfurt, and became a cathedral preacher in Mainz. In 1477 he was made provost of Urach and an adviser in the founding of the University of Tubingen, where he became professor of theology in 1484. He has been erroneously called “the last of the Schoolmen.® His principal works are ‘Collec-torium ex Occamo super iv Libros Senten-tiarunP (1495); ‘Expositio Canonis Missae) (1510) ; ‘Sermones Dominicales de Tempore et de Sanctis per Totum Annum } (1519) ; ‘De Monetarum Potestate simul et Utilitate) (1541).

BIELA, be’la, Wilhelm von, Austrian of¬ ficer and astronomer: b. Rossla, 19 March 1782; d. Venice, 18 Feb. 1856. He entered the army, reached the grade of major and finally resigned the profession of arms to study the fine arts and astronomy. On 27 Feb. 1826 he discovered at Josephstadt, Bohemia, a new comet which, a few days later, was sighted by Gambart from Marseilles. Both noticed its similarity to comets appearing in 1772 and 1805 and fixed its period at between six and seven years, but it was named after Biela, who had first discovered it. Shortly after its reappearance at the end of 1845 it was seen to divide into two portions, each of which afterward developed a tail and a bril¬ liant nucleus, features wanting in the original body. In August 1852 the double comet reap¬ peared, but this time the two portions were much farther apart; and not long after the comet vanished and has never been sighted since.

BlELA’S COMET, a comet of short period, named after its discoverer, Wilhelm von Biela (q.v.), who discovered it in 1826 and furnished such data regarding its movements as to convince the other astronomers of his day that he had a proprietary right to it. ‘Flic same comet had been noticed 8 March 1772, and

again in 1805. It was reckoned that the comet had passed its perihelion six times between the two periods without being detected by the as¬ tronomers. On another visit it passed out of sight on 3 Jan. 1833. Its next appearance was in July 1839. It was found again late in No¬ vember 1845, and in the following month an observation was made of one of the most re¬ markable phenomena in astronomical records, the division of the comet. It put forth no tail while this alteration was going on. Professor Challis, using the Northumberland telescope at Cambridge, on 15 Jan. 1846, was inclined to distrust his eyes or his glass when he beheld two comets where but one had been before. He would call it, he said, a binary comet if such a thing had ever been heard of before. His observations were soon verified, however. Late in August 1852, the larger came into view and three weeks later the smaller *one, now much fainter than its former companion, was seen about 1,500,000 miles in the lead. Schia¬ parelli's investigations showed it to be probable that the comet is the illuminated central mass of a stream of meteorites. The Bielid stream of meteors (or Andromedes, as they are also known from the position among the stars from which they seem to radiate) revolves around the sun in a period of 13 years, and the earth passes their orbit every year but meets the main swarm only when passing the point of inter¬ section of the two paths. The meeting usually takes place on the 27th or 28th of November.

BIELAGA, a Russian name for the great European sturgeon (Accipenser huso), also called ˆhausen® and <(huso.® See Sturgeon.

BIELAYA, byel-a-ya, the name of 10 Rus¬ sian rivers, the most important of which is about 500 miles in length, rises in the Ural Ridge and flows northwest to the Kama River. From April to November it is navigable from its mouth to the city of Ufa, about 200 miles, reg¬ ular trade in minerals, lumber and salt being carried on. Of the other rivers of this name may be mentioned the one in the government of' Irkutsk, Siberia, which is a branch of the Angara, and another in the government of Yekaterinoslav which flows - through a coal region.

BIELEFELD, be'le-felt, Prussia, a town in the province of Westphalia at the northern foot of the Teutoburger-Waid, 38 miles east from Munster. The river Lutter divides it into an old and a new town. The best Ger¬ man linens are manufactured here, flax-spin¬ ning and

bleaching are largely carried on and there are various other industries, among which some of the chief are shirt-making, silk-weav¬ ing, the manufacture of cycles, sewing machines and motor cars and of cigars, glass, cement, leather, *etc.* It contains a gymnasium, two hos¬ pitals and other public buildings. The Bethel colony for epileptics was founded here in 1876 and has now 1,600 patients. The castle of Sparenburg, built in 1017, is in the immediate vicinity and, since its recent restoration, has been occupied as a museum. Pop. 78,334.

BIELGOROD, byel'go-rot. See Bel¬ gorod.

BIELITZ, be'llts, Czechoslovakia, town in the district of Silesia, 40 miles southwest of Cracow, on the left bank of the Biala. It is

separated from Biala in Galicia by the river, over which is built a bridge. It is an import¬ ant centre of the Austrian textile industries, manufacturing large quantities of woolen goods for the trade in the Orient. Wire, nails, ma¬ chinery, glassware, furniture and paper are also manufactured in important quantities. Pop. 18,568, of which the largest proportion is German.

BIELO-OZERO, byel-6-o'za-ro («white lake®), a lake of European Russia, in the government of Novgorod, whose outflow *is carried by the Cheksna River to the V olga. It is of a somewhat circular form, 27 miles long and 20 miles broad, and has an area of about 430 square miles. Its bottom consists of a white clay which in stormy weather gives the water a milky-white appearance, hence the name. A system of canals connects it with Lake Onega, the Dwina and other rivers. It also forms part of the canal system which connects the Baltic and Caspian seas.

BIELOWSKI, bye-lov'ske, Augustus, Polish poet: b. Krechowice, Galicia, 1806; d. 1876. He received university training and be¬ came director of the Ossolinski Institute at Lemberg in 1869. Among his poetical com¬ positions is to be mentioned the historical rhapsody, (Lay of Henry the Pious.* He wrote a (Critical Introduction to the History of Poland* (1850), but his principal work was the publication of <Monumenta Polonise Vetustissima* (1864-72) ; a collection of Polish chronicles up to the time of Duigoz, since his death continued by the Cracow Academy of Sciences. He also made several translations from Schiller. Pie edited (Pompeii Trogi Fragmenta* (1853), fragments of Pompeius found at the Ossolinski Library.

BIELSHOHLE, belz'hel-e, a stalactite cavern in the Bielstein Mountain Harz, on the right bank of the Bode. It w£.s discovered about 1672, but first made accessible in 1788. Its entrance is 108 feet above the bed of the stream; and its total length is 230 yards.

BIELSKI, byel'ske, Marcin, Polish his¬ torian : b. Biala, near Sieradz, 1495 ; d. there 1575. His (Kronika swiata* and (Kronika Polska* (1550 and 1564) contain the first comprehensive attempt at a history of Poland. He wrote two satirical poems, (Sen majowy* (1590) and (Seym niewiesci* (1595), pictur¬ ing, in the one, the degradation of Hungary and calling upon his countrymen to exhibit a nobler spirit than the Hungarians, while the other gives a keen analysis of the condition of Poland in his days. A stratcgetical work, (Sprawa rycerska* (1569), gives valuable information upon the condition of the Polish army and the. character of Polish tactics. After serving in the army and taking part, in 1531, in the battle of Obertyn, he de¬ voted himself for the rest of his days to liter¬ ary pursuits. In 1617 the bishop of Cracow interdicted his Chronicles,* as they were suspected to contain heterodox sentiments. His satirical poems made him many enemies. Pie idealized the distant past and regarded his own period as one of general decadence.

BIENAIME, bi-en'a-me, Luigi, Italian sculptor: b. Carrara 1795; d. Florence, 17 April 1878. He studied his art in Rome under the

tuition of the famous Danish sculptor, Thor¬ valdsen, with whom he collaborated later ex¬ tensively. He has been considered one of the leading sculptors of his period in Italy. Among his chief works are (John the Baptist* (1820), now in the Metropolitan Museum of Art in New York city; (Cupid and the Dove,* now in Milan; c Venus,* in the Turin Museum; and several statues in the Winter Palace at Petrograd. The influence of Thorvaldsen is obvious in all his works.

BIENCOURT, by-an-coor, DE POUTRINCOURT, Charles: b. 1583; d. 1624. Son of Jean de Poutrincourt (q.v). He ac¬ companied his father to Port Royal in 1605. He visited France in 1611, created a stir at

court by the announcement of Indian conver¬ sions and brought back with him Jesuit mis¬ sionaries. He administered Acadia from 161 1—23 and partially rebuilt Port Royal after its destruction by Argali.

BIENCOURT DE POUTRINCOURT, Jean, French soldier: b. France 1557; d. Mery-sur-Seine 1615. In 1603 he came to Canada, where De Monts made him a lieutenant, and in 1604 received a grant of Port Royal and estab¬ lished there a colony of wThich he took little care. The grant was confirmed in 1607, and at the same time the King urged Poutrincourt to labor for the conversion of the savages. Desirous of keeping the Jesuits from Port Royal, he delayed their departure from France, sent back glowing accounts of his own mission¬ ary success, and welcomed the Jesuits very ungraciously. He went to France in 1612, and after the English left Acadia sailed thither in 1614, but without having done anything to re¬ build Port Royal he returned to France later in the same year. Consult Suite, B., (Poutrin¬ court en Acadie* (in (Royal Society of Canada Proceedings and Transactions,* Vol. XI, p. 31,

1885).

BIENER, Christian Gottlob, German ju¬ rist: b. Zorbig, 10 Jan. 1748; d. 13 Oct. 1828. He studied law at Wittenberg and Leipzig, and became instructor in law at the latter univer¬ sity in 1776, becoming professor in 1790. His chief works are (Commentarii de origine et progressu legum juriumque germanicorum* (Leipzig 1787-95) ; (Systema processus judi-ciarii et communis et saxonici* (Leipzig 1801) ; <Opuscula academica* (2 vols., Leipzig 1830).

BIENNE, bi-en, Switzerland, town in the canton of Bern, 17 miles northwest of the city of Bern, on the north shore of the lake of the same name, in the valley of the Suze; on the railroad between Bern and Basel.. It nestles among the lower foothills of the Jura Mountains, 1,400 feet above sea-level, and cable roads ascend the mountains nearby. Among its architectural attractions are an old castle, the townhall and the Schwab Museum, which contains an exten¬ sive collection of old Roman and Celtic weapons and relics of the ancient lake-dwellers. Here, too, is located the West Swiss Technical Insti¬ tute, which includes a watchmakers' school and a school for railroad employees. . Textiles, tanning, watchmaking, machine building and the manufacture of paper and cigars are the chief industries. Attached first to the bishopric of Basel, it allied itself with Bern canton in 1352, then became a free city, was annexed by the

French in 1797, but awarded to Switzerland in 1815. Pop. 23,583.

BIENNE. Lake of, called in German, Bielersee, a Swiss lake, 1,419 feet above sea-level, about 10 miles long by three broad, with a depth of 280 feet. Its scenery is more beau¬ tiful than bold. Being eight feet below the level of Lake Neufchatel, it receives its waters by the Thiel and discharges itself into the Aar. On the islet of Saint Pierre, in this lake, J. J. Rousseau resided for two months in 1765. That the lake was a centre of population from remote times, the remains of numerous pile-dwellings prove. At the northern extremity is the town of Bienne (q.v.).

BIENNIALS, in botany, plants which do not produce flowers and fruit during the first year of growth, but store up a stock of nour¬ ishment in a thickened stem or root, whence they draw the material for the growth of the second year, during which flowers and fruits are developed and the plant dies. Several of our commonest foodplants, such as turnip, cab¬ bage and carrot, are biennials. Under special circumstances favorable to rapid growth a plant ordinarily biennial may become an annual.

BIENTEVEO, byan-ta-va'o, a flycatcher of southern South America, related to our kingbird and familiar about the villages ar.n gardens of Argentina. Its name comes from its loud and cheerful cry, which resembles the Spanish phrase Bien tevco, ((I see you well.** Unlike its relatives elsewhere, it builds a domed nest, the design of which is so elaborate that several weeks may be required for its completion.

BIENVILLE, byan-vel, Jean Baptiste le Moyne (Sieur de), French colonist: b. 23 Feb. 1680; d. France 1768. In 1698, with his brother Iberville he left France to found a colony at the mouth of the Mississippi. In 1700 he constructed a fort 54 miles above the mouth of the river, and in 1701, at the death of Sou-voile, a second brother, he succeeded to the di¬ rection of the colony, the seat of which became Mobile. In 1704 a third brother, Chateaugay, joined him with 17 settlers from Canada, and from France came 20 women to be married to the colonists. In 1718 he received a commission as governor of Mississippi, and about this time founded the city of New Orleans. In 1724 he was summoned to France and on 9 Aug. 1726 was removed from office. In 1 733 he was sent back to the colony as governor, with the rank of lieutenant-general. In 1743 he was again removed and returned to France, where he lived in retirement for 25 years.

BIER, August, German surgeon : b. Hel-sen, Waldeck, 24 Nov. 1861. He studied at the universities of Berlin, Leipzig and Kiel, after which, in 1889, he became a lecturer at the latter institution. In 1894 he was appointed professor and director of the surgical clinic at Greifswald. In 1903 he continued the same work at Bonn University and four years 1 .ter at Berlin. He is noted for his original re¬ searches, for his many innovations in the prac¬ tice of surgery and for his daring operations. Among his publications _ are (Hyperamie als Heilmittel* (1903; English translation under the title (Bier's Textbook of Hyperamie as Applied in Medicine and Surgery,* 1909) ;

(Ueber die Berechtigung des Teleologischen Denkens in der Praktischen Medizin5 (1910).

BIERBAUM, ber'bowm, Otto Julius,

German poet: b. Gruneberg, Silesia, 28 June 1865. He is a rising man of letters; his (Songs of Experience) (or (Poems That Were Lived5) (1892), is as yet his most noteworthy volume. Other works of his are <Studentenbeichten> (1897) ; (Der bunte Vogel von 1897 und 1899) ; (Ein Kalenderbuch) (1896 and 1898). •

BIERCE, Ambrose, American author and journalist: b. Meigs County, Ohio, 24 June 1842; d. Mexico 1914. He served in the Civil War as a lieutenant of volunteers and was brevetted major for gallantry. In 1866 he went to California, and he went to London in 1872, where he contributed to Fun for 30 years. He was closely identified with Californian journal¬ ism. He edited the Argonaut and the Wasp and was a constant contributor to the Over¬ land Monthly and San Francisco Examiner. His publications are (Cobwebs From an Empty Skull5 (1874) ; (Black Beetles in Amber 5

(1892); (Can Such Things Be?) (1893); (In the Midst of Life) (1898). His most popular work was originally published at San Fran¬ cisco (1891), under the title of (Tales of Sol¬ diers and Civilians5 ; cFantastic Fables5 (1899) ; in collaboration with G. A. Danziger, cThe

Monk and the Hangman's Daughter5 (1892) ; (Shapes of Clay) (1905) ; (The Cynic's Word Book) (1906) ; (The Shadow on the DiaP and (Write it Right5 (1909). His collected works appeared (13 vols.) in 1912.

BIERNATZKI, bernats'ke, Johann Christoph, German pietist, poet and story writer: b. Elmshorn, Holstein, 17 Oct. 1795; d. Friedrichstadt, 11 May 1840. A country pastor, he devoted himself to the versification of his own precepts and beliefs, the volume (Faith 5 being the result. In (The Brown Boy5 and (Hallig, or the Adventures of Castaways on an Island in the North Sea,5 he displays a not unpleasing capacity for prose narrative.

BIERSTADT, ber'stat, Albert, American

painter: b. near Diisseldorf, Germany, 7 Jan. 1830; d. New York, 18 Feb. 1902. He removed with his parents to New Bedford, Mass., in 1831; began to paint in oils in 1851, and in 1853 returned to Diisseldorf to study his art, spending a winter in Rome, traveling in I talyr and Switzerland and returning to the United States in 1857. In 1859 he accompanied Gen¬ eral Lander's expedition to the Rocky Moun¬ tains and spent several months in studies of mountain scenery. He was elected a member of the National Academy in 1860. In 1861 he finished his painting, (Laramie Peak,5 and in 1863 (View of the Rocky Mountains — Land¬ er's Peak.5 These at once gave him a na¬ tional reputation. Among his many other paintings of American subjects are (Valley of the Yosemite) (1866); (E1 Capitan5 ; (Looking Down the Yosemite) (1865) ; (Great Trees of California5 (1874) ; ˆeysfers5 (1883) ; <On the Saco, New Hampshire5 (1886); (California

Oaks5 (1886). (A Storm on the Matterhorn5 is the best known of his Alpine subjects. Bier-stadt received many foreign medals and deco¬ rations and was a member of the National Academy of Design from 1860.

BIESBOSCH, bes'bos, a marshy sheet of water interspersed with islands, between the Dutch provinces of North Brabant and South Holland, formed in November 1421 by an in¬ undation which destroyed 72 villages and 100,- 000 people and spread over an area of 80 square miles.

BIESTER, bi-es'ter, Joao Ernesto, Por¬ tuguese dramatist : b. Lisbon

1829 ; d. 12 Dec. 1880. At the age of 19 he produced nis first play, not without some success. His whole life was spent for and on the stage, producing altogether some 90 plays, many of which were for years the most popular plays before the Portuguese public. Among his best known dramas are (Mocedade de D. Joao V5 (1858) ; (Primavera eterna5 (1860); (Abnegacao5 (1861) ; (Uma Viagem pela litteratura con-temporanea5 (1856), the latter being a critical review of dramatic literature.

BIET, bya, Antoine, French missionary, who in 1652 accompanied 600 colonists to Cay¬ enne, where he remained 18 months. He was the author of <Voyage de la France Equinox-iale (1664), with a Galibi dictionary at the end.

BIEVRE, be-avr, Marechal, (Marquis de), French writer: b. 1747 ; d. Spa, Germany, 1789. He served in the corps of the French musketeers, was a life-guard of the King of France and acquired much reputation by his puns and repartees. After publishing several entertaining works he composed (1783) (Le Se-ducteur,5 a comedy in verse, for the theatre, which has maintained iis place on the stage, although it is bad both in plan and execution. Mes amis , he said, dying, je m en vais de ce pas (de Spa).

BIFROST, be'frest ((<the trembling way55), in northern mythology the name of the bridge represented as stretching between heaven and earth (Asgard and Midgard) ; really the rain¬ bow. It was used by the gods and was guarded by Heimdal.

BIG BEN, the great bell in Westminster Abbey, London. See Bell.

BIG BETHEL, Va., village on the penin¬ sula between the York and James rivers, where an unsuccessful attempt, directed by General Butler, was made by General Pierce, with four regiments, to dislodge outposts of Magruder's Confederate encampment at Yorktown, 10 June 1861. The Federal regiments, under Townsend and Bendix, en route for the Big Bethel camp, mistook each other for the enemy and fired. This created great confusion. Pierce arrived and pushed on to the Confederate earthwork on Back River, destroying the camp at Little Bethel. The Federal troops crossed Back River and charged the earthwork, but were repulsed with considerable loss, Maj. Theodore Winthrop, the well-known novelist, losing his life on this occasion. Consult (Official Records5 (Vol. II, Washington 1881-1901) and (Battles and Leaders of the Civil War5 (Vol. II, New York 1887).

BIG BLACK RIVER, an affluent of the Mississippi, which it enters at

Grand Gulf, Miss., after flowing about 200 miles, 50 of which are navigable. On 16 May 1863 a battle took place on this stream during Grant's pur¬ suit of Pemberton toward Vicksburg. The Confederates were defeated and lost heavily,

both in killed and captured. McClernand, swiftly following the retreating Confederates, came upon them drawn up on both sides of the Big Black River. McClernand led 10,000 Fed-crals, Pemberton 8,000 Confederates, his main command having gone on toward Vicksburg. McClernand began the fight. He was for a time unsuccessful, but Lawler, discovering a weak spot in the Confederate line, immediately took advantage of it and charged impetuously.

BIG BONE LICK, a salt spring, in Boone County, Kv., 11 miles south of Burlington, where fossil remains of mastodons and other extinct fauna have been found. These animals are supposed to have resorted here to lick the salty earth in the vicinity of the spring.

BIG BROTHER MOVEMENT, The.

This movement was founded in 1904 by Ernest K. Coulter, Esq., in New York city. Since that time the work has been taken up in over 100 cities. There is a small staff of paid work¬ ers, supplemented by volunteers — lawyers, ph vsicians, merchants, executives, teachers — all busy men, selected because of their good will and natural ability to do effective work. The little brothers are boys referred by parents, hospitals, police, courts, by boys who have been helped. They are the sons of widows, inebriates, prisoners, of careless or ignorant parents — boys who are largely the victims of their environment. The task is to ascertain the cause of the trouble — whether it be tru¬ ancy, stealing, lying, running away from home, *etc.* ; then, with the cooperation of parents, through the mediation of the Big Brothers, to build up within the boy a sense of honor and good citizenship. Every possible agency is em¬ ployed to secure results — hospitals for exam¬ ination or operation, the Y. M. C. A., church and settlement gymnasiums, industrial classes and boys' clubs, Boy Scouts, trade

schools, camps and farm schools. Where the proper agency does not exist it is established.

BIG-HORN, the wild sheep of the moun¬ tains of western North America, so called on account of the massive, spiral horns of the ram, wrhich resemble those of the Asiatic argali. They originally ranged throughout the whole mountain system from New Mexico to north¬ ern Alaska, and as far down the valley of the Missouri River as the rough country extended. They are still to be found in the loftier and wilder parts of this territory, but remain nu¬ merous only about the headwaters of the Yel¬ lowstone and thence northward. Their home is upon the loftiest parts of the ranges, where they find plentiful pasturage between the high¬ est growth of timber and the snow or ice of the summits, and upon the elevated and rocky plateaus of the Bad Lands of Dakota. In sum¬ mer they wander about a good deal in small flocks, climbing to the highest points, where a wide outlook enables them to see quickly the approach of an enemy and where they are least troubled by flies, in winter they are forced to descend somewhat, but rarely enter the forest, finding shelter against the storm in the mountain gorges and sufficient dried grass upon the wind-swept ridges. Its principal enemy, in the old days, were the pumas and Indian hunters, whose constant pursuit taught it an alertness and wariness which now makes it one

of the most difficult animals for the sportsman to approach. The speed, agility and endur¬ ance of this mountaineer are equal to that shown by any wild sheep or goat of the Alps or the Himalayas, and equally tax the skill and patience of the hunter. Its horns therefore are highly valued as trophies, and its flesh is universally regarded as the best of all Western game.

The common Rocky Mountain big-horn (Ovis cervina) is a strongly built sheep, stand¬ ing up to 40 inches high. In color, in its sum¬ mer coat, it is tawny yellow, and in winter gray¬ ish brown, with the face ashy and a dark line along the spine. The under parts and a con¬ spicuous roundish patch on the buttocks are whitish. The horns of the ram are of large circumference at the base and thick and rugged, with a distinct keel at the outer edge, and sweep around backward into a spiral, which is com¬ plete in the largest specimens and will measure 40 to 42 inches along the outer curve. A smaller and paler variety of Utah and Idaho is called Nelson's big-horn. In the mountains of British Columbia is found Stone's big-horn, which is larger in size and much darker in color (almost black, indeed), with compara¬ tively slender

horns. A third species, Dali's sheep, belonging to the mountains of central Alaska, is perfectly white, with horns of mod¬ erate size and of a clear amber color. A fourth species, also Alaskan, may prove to be a variety of Dali's, which it resembles, except that a mantle of browmish-gray covers the body, as if a blanket were laid across its back. This last species has been named Fannin's sheep. All these sheep breed once a year, at the beginning of warm weather, usually producing two kids at a birth. They are hardly separable from the argalis of northeastern Asia, and doubtless all are descendants from the same primitive stock. Consult Baillie-Grohman, (Fifteen Years' Sport and Life in the Hunting Grounds of Western America) (1900) ; Mayer, (Sport with Rod and Gun) (1892) ; Roosevelt, (Hunting Trips of a Ranchman > (1883). See also Sheep.

BIG HORN MOUNTAINS. This out¬ lying range of the Rocky Mountains extends north through the north-central part of Wyo¬ ming and terminates in southern Montana. Its length is about 120 miles and width varies from 30 to 50 miles. It is a rugged barrier between the Great Plains on the east and Big¬ horn Basin on the west, above both of which its higher portions rise 7,000 to 9,000 feet. Its highest summit, Cloud Peak, is 13, 165 feet above sea-level. Several small glaciers lie in the shadow of the higher peaks and formerly these ice masses were of considerably greater extent. The mountains are due to a great up¬ lift in the earth's crust, an arch whose crest has been truncated by erosion, leaving an ele¬ vated central area of Archaean granite with flanking ridges of Cambrian, Ordovician and Carboniferous sandstone and limestone. The central area of granite presents remarkably fine Alpine scenery, and all through the moun¬ tains are large running streams teeming with trout. Most of the higher region is heavily forested and is embraced in the Bighorn For¬ est Reservation. No important mineral re¬ sources have been developed. For description consult United States Geological Survey, folios

141 and 142, and Professional Paper 51, all by N. H. Darton.

BIG HORN RIVER, a river of Montana and Wyoming. It rises in the

Rocky Moun¬ tains near Fremont's Peak, and flows northeast into the Yellowstone. Along its course is some of the grandest mountain scenery in the world. It is navigable in its lower course, has a total length of about 450 miles and drains an area of approximately 20,000 square miles. At its junction with the Little Big Horn is Fort Custer.

BIG JAW, or LUMPY JAW. See Acti¬ nomycosis.

BIG RAPIDS, Mich., city and county-seat of Mecosta County, on the Muskegon River, the Pere Marquette and other important rail¬ roads, 56 miles north of Grand Rapids. The river is here dammed in two places, providing a very valuable water-power. The city has the Holly system of waterworks and an extensive trade in lumber and manufactures of furni¬ ture, sash, doors and blinds, coiled elm hoops, shingles, veneer, *etc.* Among the noteworthy institutions is the Ferris Industrial School There are daily and weekly newspapers, a pri¬ vate bank, several hotels, a public library, hos¬ pital, theatre and courthouse. Big Rapids was settled in 1859 and incorporated as a city in 1869. It is now governed under the commis¬ sion-manager plan. Pop. 5,000.

BIG SANDY RIVER, a stream forming the boundary between West Virginia and Ken¬ tucky and flowing into the Ohio, having two confluent forks, Tug Fork that rises in West Virginia, and West Fork that rises in Kentucky. For small or flat-bottomed boats 100 miles of its lower course are navigable. Portions of the area which it drains (over 4,000 square miles) have long been regarded as of special interest on account of their mineral products.

BIG SIOUX, soo, a stream of South Da¬ kota, uniting with the Missouri about two miles above Sioux City, after a course of 300 miles.

BIG SISTERS, The. This movement was incorporated on 12 June 1912. It was organ¬ ized about three years prior to this date by Mrs. Wm. Iv. Vanderbilt. It is a movement to enlist the personal interest in behalf of un¬ fortunate girls (particularly those coming be¬ fore the Children's Court) and also small chil¬ dren brought before the court because of im¬ proper guardianship. There is a staff of three paid workers, supplemented by the volunteer Big Sisters who, through their personal inter¬ est, try to give to the Little Sisters friendship and opportunities which are their due, thereby laying the foundation for better citizenship. When a girl is brought before the court an endeavor is made to find the cause of the dif¬ ficulty and then, with the cooperation of the parents or of any possible social or religious agency, the Big Sister endeavors so to change conditions as to make

them constructive and not destructive. The organization is supported entirely by voluntary contributions.

BIG SPRING, Texas, town and county-seat of Howard County, 270 miles west of Fort Worth, on the Texas & Pacific Railroad. It is of importance as a railroad town, the division shops and offices of the Texas & Pacific Rail¬

road being situated here. It carries on an active trade in live-stock, hides, fruit, lumber, cotton and agricultural products. Extensive deposits of salt are found underlying the region and in the neighborhood is the great spring for which the town is named. The city contains cotton gins, an ice plant, fine school buildings, a hospital and public library. The waterworks are the property of the city. Pop. (1920) 4,237.

BIG STONE GAP, Va., town in Wise County, 175 miles southwest of Charleston, on the Louisville and Nashville and the Virginia and Southwestern railroads. The town con¬ tains a large government building, a public park, a museum and Bee Rock Tunnel. It has lumber and mining interests but is chiefly a place of residence. Pop. (1920) 3,009.

BIG STONE LAKE, a body of water on

the boundary between South Dakota and Min¬ nesota, drained by the Minnesota River. It is about 25 miles long.

BIG TREES. See Sequoia.

BIG WOODS, a wooded tract in the southeast part of Minnesota, extending south from Saint Cloud to Le Sueur, where it crosses the Minnesota and sends branches toward Fari¬ bault and Mankato. It is 100 miles long and from 10 to 40 miles wide, covering 5,000 square miles, four-fifths of which lie north of the Minnesota. This great belt of hardwood tim¬ ber is one of the most valuable forests in the West.

BIGAMY, in the canon law, means being twice married; in the common acceptation of the word, as a term of ordinary law, it means the being married to two wives or husbands at the same time. The laws relating to plurality of wives or husbands might be supposed to come strictly under the head of polygamy; but, as it constitutes an offense against these laws to have more than one husband or wife, they are usually brought under that of bigamy. The laws of every

civilized society make some pro¬ vision respecting this subject. By the statute of 4 Edward I, stat. 3, cap. 5, the marrying of a second husband or wife, the first being alive, was made felony; and by that of 2 James I, cap. 11, this crime was made punishable by death. But the same statute provided that, where either party was absent beyond seas for seven years, whether known or not known to the other party to be alive, or was absent, though not beyond seas, for the same period and not known by the other party to be alive, the other party was at liberty to marry again. Now, however, one of the parties is not held guiltless unless the other was absent continu¬ ously for seven years and was not known to be alive. The penalty has been lessened by subsequent enactments, and the guilty party is now liable to penal servitude for seven years or not less than five, or to be imprisoned, with or without hard labor, for not more than two. Every person aiding or abetting the bigamist is held to be equally guilty and may receive the Same punishment. By a Scottish statute of 1551 bigamy was made punishable as perjury — that is, with confiscation of goods, imprison¬ ment and infamy; now imprisonment is the usual sentence, but in some cases penal servi¬ tude is inflicted. If the accused had reasonable ground for believing the first spouse dead, he

is not guilty of the crime; and if the first marriage was void for any reason or dissolved by divorce, the second is not bigamous. In Scottish law, too, it is not necessary that either marriage should be regular for bigamy to be committed. The statute of James I has been adopted in most of the United States as to the description of the crime, but the State laws generally differ from it as to the penalty, hav¬ ing assigned, heretofore, instead of death, as provided by the English statute, the punish¬ ment of imprisonment and hard labor for a number of years, according to the discretion of the court ; others leaving it to the verdict of the jury to fix the period of imprisonment.

The New York statutes against bigamy are substantially similar to those in nearly all the States of the Union. These statutes provide that any person who, having a husband or wife living, marries another

person, is guilty of big¬ amy and is punishable in State's prison or a penitentiary for not more than five years. The statute does not extend to a person whose former husband or wife has been absent for five years successively, without being known to him or her within that time to be living and believed by him or her to be dead, or to a person whose former marriage has been pro¬ nounced void or annulled or dissolved by the judgment of a court of competent jurisdiction for a cause other than his or her adultery, or to a 'person who, being divorced for his or her adultery, has received from the court which pronounced the divorce permission to marry again, or to a person whose former husband or wife has been sentenced to imprisonment for life. A person who knowingly enters into a marriage with another which is prohibited to the latter by the statute is punishable by im¬ prisonment for not more than five years, or by a fine of not more than $1,000, or both. Consult Stephen, (Digest of the Criminal Law) (5th ed., London 1894) ; Phillmore, (Ecclesiastical Law of the Church of England) (London 1895) ; Eversley, 'Law of the Domestic Rela¬ tions 5 (London 1896).

BIGELOW, Edith Evelyn (Taffray), American novelist: b. New York, 23 Dec. 1861; married Poultney Bigelow (q.v.) 1884. She has published diplomatic Enchantments'* and several novelettes.

BIGELOW, Edward Fuller, American editor and naturalist : b. Colchester, Conn., 14 Jan. 1860. He received his preparatory education at Bacon Academy, Colchester; was a special student at the Biological Laboratory, Yale Uni¬ versity, 1896-97 ; student at the Biological Lab¬ oratory, Cold Spring Harbor, L. L, 1899 ; also studied at Nature Study School, Cornell Univer¬ sity; A.M., Ph.D., Taylor University, 1899. He was editor of nature and science departments of Saint Nicholas Magazine 1900-14; is now edi¬ tor of The Guide to Nature; was editor of Popular Science for three years, of the Ob¬ server eight years and of weekly and daily newspapers in Connecticut for eight years. For 10 years he was a teacher in public schools, most of that time as principal of graded schools. For the past 25 years he has taken, yearly, about 4,500 boys and girls on natural history excursions. He has been instructor in nature-study at university summer schools in Ohio, Michigan, North Carolina, Alabama, In¬

diana, Iowa, *etc.* ; is the inventor of chemical tablets for the artificial nutriment of plants (1901) and of an educational bee-hive (1905) ; was elected president of the Agassiz Associa¬ tion (1907). Publications, 'Bigelow's Descrip¬ tive Plant Analysis*; 'How Nature

Study Should Be Taught* ; ‘Walking, A Fine Art* ; ‘The Spirit of Nature Study* (1907).

BIGELOW, Erastus Brigham, American inventor : b. West Boylston, Mass., 2 April 1814; d. Boston, 6 Dec. 1879. His name is prominent in the early development of the American textile industries, his inventions in¬ cluding looms for suspender webbing, pipping cord, knotted counterpanes, carpets, coach laces, *etc.* He was also one of the original incorporators of the Massachusetts Institute of Technology.. He wrote ‘The Tariff Questions Considered in Regard to the Policy of England, and the Interest of the United States* (1863).

BIGELOW, Frank Hagar, American clergyman and meteorologist : b. Concord, Mass., 28 Aug. 1851. He was graduated at Harvard in 1873 and at the Episcopal Theo¬ logical School at Cambridge in 1880; was or¬ dained in 1880. He was assistant astronomer at the observatory in Cordoba, Argentina (1873-76 and 1881-83), and afterward was suc¬ cessively professor of mathematics in Racine College (Wisconsin) (1849-89) and assistant in the Nautical Almanac office, Washington, D. C. In 1891 he was appointed a professor of meteorology in the United States Weather Bureau, and in 1894 professor of solar physics at the Columbia University. He also became, in 1891, assistant rector of Saint John’s Church, Washington, and in 1898 was president of the Washington Philosophical Society. In 1904 he was made a member of the International Com¬ mission on Solar Physics and Meteorology. Pie became professor of meteorology at the Argentine Meteorological Office in 1910, and in 1915 director of the Pilar Solar and Mag¬ netic Observatory. He invented an instrument for obtaining photographic records of stellar transits and endeavored to prove a connection between terrestrial magnetism, the aurora and the solar corona. He published an important monograph on the ‘Solar Corona* (1899) ; ‘Studies on the Thermodynamics of the At¬ mosphere* (1907) ; and bulletins on evapora¬ tion, the radiation of the atmosphere and syn¬ chronism between solar phenomena and terres¬ trial meteorology (1911-13) ; ‘The Daily Nor¬ mal Temperature and the Daily Normal Pre¬ cipitation of the United States* (1908) ; ‘Treat¬ ise on Atmospheric Circulation and Radiation*

(1915).

BIGELOW, Jacob, American physician: b. Sudbury, Mass., 27 Feb. 1787; d. Boston, 10 Jan. 1879. He was graduated at Harvard Col¬ lege 1806 and began medical practice in Boston in 1810. He early became

known as a botanist, and a number of plants were named for him by Sir E. J. Smith in the supplement to 'Rees' Cyclopaedia,* by Schrader, in Germany, and De Candolle in France. He founded Mount Au¬ burn Cemetery in Cambridge, the first garden cemetery established in the United States. He was professor of materia medica in Harvard College in 1815-55 and Rumford professor there in 1816-27. His works include 'Useful Arts

Considered in Connection with the Applications of Science' (1840); 'Florida Bostoniensis' (1824) ; 'American Medical Botany' (1817-20) ; 'Nature in Disease' (1854); 'A Brief Exposi¬ tion of Rational Medicine' ; 'The Paradise of Doctors, a Fable' (1858) ; 'History of Mount Auburn' (1860) ; 'Modern Inquiries,' and 'Re¬ marks on Classical Studies' (1867).

BIGELOW, John, American author: b. Malden, N. Y., 25 Nov. 1817; d. 1911. He was graduated at Union College in 1835, and became first a lawyer and afterward a journalist. In 1845-46 he was inspector of Sing Sing prison; in 1849-61 one of the editors of the New York Evening Post ; in 1861-64 United States consul-general at Paris, and in 1864—67 Minister to France. He was secretary of State of New York 1875-77. From August 1886 he was one of the three trustees and on 27 May 1895 was elected president of the consolidated board of trustees, and appointed chairman of the execu¬ tive committee of the New York Public Library, Astor, Lenox and Tilden Foundations. His works include 'Molinos the Quietist' ; 'France and the Confederate Navy' ; 'Life of William Cullen Bryant' ; 'Life of Samuel J. Tilden' ; 'Some Recollections of Edouard Laboulaye' ; 'The Mystery of Sleep' ; 'A Life of Franklin.' In 1885 he published 'The Writ¬ ings and Speeches of Samuel J. Tilden,' and in 1888, 'The Complete Works of Benjamin Franklin.' Consult Bigelow, J., 'Retrospec¬ tions of An Active Life' (2 vols., New York

1909).

BIGELOW, John, American military of¬ ficer and author, son of the preceding: b. New York, 12 May 1854. He was educated in Paris, Bonn, Berlin, Freiberg, and Providence, R. I.; was graduated at the United States Military Academy in 1877 ; and was assigned to the 10th United States Cavalry. In 1887-89 was adjutant-general of militia in the District of Columbia; and in 1894-98, professor of military science at the Massachusetts Institute of Tech¬ nology. During the war with Spain he was wounded in the attack on San Juan, Cuba, 1 July 1898. He retired from active service at his own request in 1904. From 1904 to 1910 he was professor of French at the Massachusetts Institute of Technology, and from 1906 to 1910, in active military service on the staff of the governor of Massachusetts. He published 'Mars-la-Tour and Gravelotte' (1884) ; 'Prin¬ ciples of Strategy, Illustrated Mainly from American Campaigns' (rev. ed., 1894) ; 'Rem¬ iniscences of the Santiago Campaign' (1899); 'The Campaign of Chancellorsville' (1910); 'American Policy, the Western Hemisphere in Its Relation to the Eastern' (1914) ; 'World Peace, How War Cannot Be Abolished, How It Possibly May Be Abolished' (1915).

BIGELOW, Marshall Train, American printer and proofreader: b. South Natick, Mass., 5 Oct. 1822; d. Cambridge, Mass., 28 Dec. 1902. In 1843 he became associated with the University Press in Cambridge, the firm name of which from 1859 to 1879 was Welch, Bigelow & Company. He was long classed as one of the most competent of American proof¬ readers. He published 'Punctuation and Other Typographic Matters' (1881); 'Mistakes in Writing English and How to Avoid Them'

(1886).

BIGELOW, Maurice Alpheus, American biologist: b. Milford Centre, Ohio, 8 Dec. 1872. Graduating from Harvard University, he be¬ came instructor in biology at Ohio Wesleyan continuing in this position at Northwestern University the following year. In 1899 he was appointed instructor in biology' at Columbia University, becoming professor in 1907. Be¬ sides being editor of the Nature Study Review , from 1905 until 1911, he has written 'The Early Development of Lepas' (1902); 'The Teaching of Zoology in the Secondary School' (1904) ; 'Applied Biology' (1911) ; 'Teacher's Manual of Biology' (1911); 'Introduction to Biology' (1913).

BIGELOW, Melville Madison, American lawyer: b. Eaton Rapids, Mich., 2 Aug. 1846; d. 4 May 1921. Graduated University of Michi¬

gan 1866; removed to Boston 1870. He re¬ ceived the degree of Ph.D at Harvard 1879, and LL.D. Northwestern University 1896. He was lecturer in the law department of the Uni¬ versity of Michigan, and in Northwestern Uni¬ versity Law School ; was professor in and sometime dean of Boston University Law School ; a member of the Massachusetts His¬ torical Society, and of Harvard Chapter Phi Beta Kappa ; fellow of the American Academy of Arts and Sciences. His works include 'The Law of Estoppel' (1872) ; 'Leading Cases in the Law of Torts' (1875) ; 'The Law of Torts' (8th ed., 1907) ; 'Placita Angio-Normannica' (1879) ; 'History of English Procedure' (1880) ; 'The Law of Fraudulent Conveyances' (2d ed., 1911) ; 'The Law of Bids, Notes and Cheques' (2d ed., 1900) ; 'The Law of Wills' (1898) ; joint author 'Centralization and the Law' (1906); 'A False Equation — The Prob¬ lem of the Great Trust' (1911). His works are in use in law schools throughout America, in England, China, Japan, India and South America.

BIGELOW, Poultney, American author : b. New York (son of John Bigelow) 10 Sept. 1855. After a cosmopolitan training in the United States, France and Germany where Emperor William II was his fellow pupil in 1871-72, their friendship persisting until 1896, when the Jameson raid ranged Mr. Bigelow in political opposition to the anti-English policy of Germany, he was graduated at the Norwich Academy 1873, at Yale University 1879, and from the Columbia Law School 1882. In 1875— 76 he made a voyage around the world in a sailing-ship which was wrecked on the coast of Japan. Admitted to the bar in 1882, he abandoned the law, after a few years, for journalism and travel in China, Africa, the West Indies, Borneo, Australia, New Guinea, Russia and India, the while collecting material for studies on colonization. He was the first to take a canoe through the Iron Gates of the Danube and was the founder and first editor of Outing, the first American magazine of amateur outdoor sport 1885-87 ; was lecturer at principal universities on modern history and colonial administration ; was correspondent of the London Times in the Spanish-American War 1898. In 1906 he returned from his 4th voyage round the world and retired to Malden-on-Hudson, the birthplace of his father, where he. devotes his time to rural and literary pur¬ suits. He has published 'The German Em-BIGELOW — BIGGS

peror' (1889) ; (The German Emperor ancl-His Eastern Neighbors > (1892); Saddles and Politics down the Danube) (1892); 'The Bor¬ derland ol Czar and Kaiser) (1894), in gather¬ ing the materials for which he was expelled trom the Russian Empire; Hlistory of the German Struggle for Liberty > (4 vols., 1896; new ed., 1912); 'White Man's Africa5 (1898), and 'Prussian Memories) (1915).

BIGELOW, Robert Payne, American zoologist; b. Baldwinsville, N. Y., 10 July 1863. He was graduated at Harvard in 1887 and studied at Johns Hopkins 1889-93. In 1893 he became instructor in biology at the Massa¬ chusetts Institute of Technology; was made librarian in 1895, assistant professor in 1912, and associate professor in 1915. He has writ¬ ten a number of papers on zoological subjects and contributed articles to the Reference Hand¬ book of the Medical Sciences 1900-04, and 1913.

BIGELOW, Samuel Lawrence, American chemist : b. Boston, 23 Feb. 1870. Graduating from Harvard and the Massachusetts Institute of Technology, he took a post graduate course at Leipzig. After serving as instructor at the University of Michigan from 1898 until 1901, he became acting director of the laboratory of gen¬ eral chemistry. In 1907 he was made professor of chemistry in the same institution. Among his works are 'Denatured AlcohoP (1907) ; 'Theoretical and Physical Chemistry 5 (1912).

BIGELOW, Timothy, American military officer : b. Worcester, Mass., 12 Aug. 1739 ; d. there, 31 March 1790. He was a blacksmith by trade, was a member of the Provincial Congress of 1774— 75 and on 23 May 1775 he led a com¬ pany of minute-men to Cambridge, and became major in Ward's regiment. He was under Ar¬ nold in the expedition to Quebec in 1775, and was there captured, remaining a prisoner till 1776. He became colonel in 1777, and assisted in the capture of Burgoyne. He also saw serv¬ ice at Valley Forge, Monmouth, West Point and Yorktown.

BIGELOW, Timothy, American lawyer (son of the preceding) : b. Worcester, Mass., 30 April 1767; d. 18 May 1821. He was graduated at Harvard College in 1786, was admitted to the bar, and settled in practice at Groton, Mass., in 1789. He took an active part in politics as a Federalist, was for 20 years a member of the State legislature, and 11 years speaker of the House of Representatives, and a member of the Hartford Convention. In 1807 he removed to Medford, and kept an office in Boston. His legal standing and practice were at the head of his profession in his time; and in the course of 32 years, he was supposed to have argued 10,000 causes.

BIGELOW, Willard Dell, American chemist: b. Gardner, Kan., 31 May 1866. Graduating from Amherst College, he was ap¬ pointed assistant professor of chemistry at the Oregon State College. In 1891 he became chemist in the Bureau of Chemistry in the United States Department of Agriculture; 10 years later he was chief of the Division of Foods and in 1903 he was assistant chief of the Bureau. On account of the resignation of his chief, Harvey W. Wiley, he resigned from this position in 1913. Since then he has been chief chemist of the National Canners' Association.

Of the bulletins issued by the Bureau he has written 'Pure Food Laws of European Coun¬ tries affecting American Exports) (1901) ; 'Preserved Meats5 (1902); 'Foods and Food Control5 (1902-04) ; 'Tin Salts in Canned Foods of Low Acid Content5 (1911).

BIGGAR, Hamilton Fisk, Canadian physi¬ cian : b. Oakville, Ontario, 15 March 1839. He was educated at Victoria Universitv, and pur¬ sued his medical studies at the University of Medicine and Surgery, Cleveland, Ohio.' In

1866 he began practice in Cleveland, and in

1867 was made professor of anatomy and clini¬ cal surgery in the Homoeopathic Hospital Col¬ lege there. Later he was for 10 years professor of clinical surgery, with operations in the same college. In 1900 he held the chair of surgical diseases of women and clinical surgery. Dr. Biggar founded the Cleveland Training* Schodl for Nurses, where he was dean for 10 years. He _ wrote 'Twelve Months of Surgery5 ; 'Loiterings in Europe,5 *etc.*

BIGGAR, Henry Perceval, Canadian his¬ torical writer : b. Carrying Place, Ontario, 9 Aug. 1872. He was educated at Belleville Public School, and the universities of Toronto (B.A. 1894), Paris and Oxford. He was the Macken¬ zie fellow in political science at Toronto Uni¬ versity 1900-02. In 1907 he was appointed European representative of the Canadian Archives. He is the author of 'The Early Trading Companies of New France5 (Toronto 1901) ; 'The Voyages of the Cabots and of the Corte-Reals to North America and Greenland, 1497 —1 503 5 (Paris 1903) ; 'The Precursors of Jacques Cartier, 1497-15345 : 'A Collection of Documents relating to the Early History of Canada5 (Ottawa 1911).

BIGGS, Asa, American jurist: b. Williams-ton, N. C., 4 Feb. 1811; d.

Norfolk, Va., 6 March 1878. He received an academical educa¬ tion, and was admitted to the bar in 1831. He was a member of the North Carolina Constitu¬ tional Convention in 1835 ; was elected to the State legislature in 1840, 1842 and 1844; was a member of the commission appointed to revise the State statutes in 1850, and was again sent to the legislature in 1854. In 1854 he was elected United States senator; resigned in 1858, and was appointed judge of the United States District Court of North Carolina.

BIGGS, Hermann Michael, American phy¬ sician ; b. Trumansburg, N. Y., 29 Sept. 1859. He was educated at Cornell University and Bellevue Hospital Medical College. In 1885 he was appointed professor of pathological anat¬ omy in the latter institution. In 1892 he be¬ came pathologist and director of the bacterio¬ logical laboratories. Nine years later he was appointed general medical officer of the de¬ partment of health of New York. In 1907 he became associate professor of medicine at the Bellevue Hospital Medical College. Aside from this he was also director of the Rocke¬ feller Institute for Medical Research. In 1913 he was made chief of a board of experts formed to investigate health conditions in the State of New York and the following year he was ap¬ pointed State Commissioner of Health. He has written 'The Administrative Control of Tuberculosis5 (1904); 'An Ideal Health De-698

partment) (in collaboration with C. E. A. Win¬ slow, 1913).

BIGLOW, William, American educator and poet: b. Natick, Mass., 22 Sept. 1773; d. Boston, 12 Jan. 1844. He was first established as a teacher in Salem, and in 1799 delivered a poem on education before the Phi Beta Kappa Society at Cambridge. He then took charge of the Latin school, Boston, preaching occasionally, writing for different periodicals, and publish¬ ing educational textbooks. Here he fell a vic¬ tim to intemperate habits and was compelled to retire to his home in Natick. In this state of his fortunes it was his habit to lounge about the newspaper offices at Boston, write poetry for his friends, the editors, while the humor lasted, and then return to his rural retreat.

He taught, also, a village school in Maine, and in the latter part of his life was employed as a proofreader in the university printing office at Cambridge. He had a genial and pleasant humor, and was a ready versifier, as well as an agreeable prose-writer. His (Cheer ful Parson) and others of his songs were much admired by his contemporaries and are well worthy of remembrance. He also published, in 1830, a (History of the Town of Natick, } and one of Sherburne, Mass. But his best and most numerous writings were in periodicals, the Vil¬ lage Messenger, of Amherst, N. H., which he edited in 1796, the Federal Orrery, and Massa¬ chusetts Magazine.

BIGLOW PAPERS, The. Lowell's mas¬ terpiece, (The Biglow Papers,* one of the most delightful books ever written by an American, embodies the best humorous and satirical verse since Byron. The papers, first and second series, are made up of one prose paper and of 19 poems in a variety of metres, aggre¬ gating about 3,800 lines, and treat topics sug¬ gested by the Mexican and the Civil Wars. They are written in Yankee dialect, and pur¬ port to be the spontaneous effusions of a cer¬ tain Hosea Biglow, a rustic political philosopher and an astonishingly ready versifier, and are edited for publication by his friend and pastor, the Rev. Homer Wilbur. Though the papers vary greatly in length, subject matter and tone, they produce a remarkablv uniform impres¬ sion. The first series was inspired by Lowell's indignation over the Mexican War, while he was in the midst of his labors on the National Anti-Slavery Standard. Five numbers were printed in the Boston Courier, beginning June 1846, and the four remaining numbers were printed in the Anti-Slavery Standard, ending September 1847. All were anonymous. Lowell himself was astonished at the success of his verses, which he had regarded as mere jeux d'esprit. Hosea Biglow became a household name, and it was evident that the despised anti¬ slavery cause had found a powerful champion. When the first series was published in book form in 1848, with the name of the author, Lowell became famous. Fourteen years later, urged by his friends and in response to a wide¬ spread public demand, he began the second series, the 11 numbers of which were pub¬ lished in the Atlantic Monthly between January 1862 and May 1866. These dealt with slavery, States' rights, the Civil War and national poli¬ tics in general. Though the second series ex¬ hibits the same moral earnestness, and though

it contains the best single number of all the (Papers) (((Sunthin in the Pastoral Line," VI), it is perhaps on the whole not quite so sponta¬ neous and convincing as the first.

Apart from their humor, wit, wisdom and metrical facility, (The Biglow Papers) are re¬ markable among satires for their creation of real characters. Hosea Biglow, the shrewd, humorous, frank critic of political conditions, who together with moral earnestness possesses a vein of sentiment and poetry, is a genuine Yankee type. Birdofreedom Sawin, the clown of the piece, an amusing and likable rascal, represents the same Yankee shrewdness, but uncontrolled by moral sense. The Rev. Homer Wilbur embodies the cautious element of the New England character, with something of ((the harmless vanity and amiable pedantry of a certain type of New England Clergyman.® His elaborate introductions and notes, for all iheir pedantry and verbosity, are no less delight¬ ful in their way, and often no less trenchant, than the winged words of the versifier. Though inconsistently portrayed, he is not unworthy the companionship of the immortal Adams and Primrose.

Lowell's justification for his use of dialect in (Thc Biglow Papers) by the plea that he needed a speech more racy than <(literary® language, was unnecessary; for the dialect adds meaning and point to his satire ; it is redolent of the soil ; it helps to express both Hosea and his race. Though Lowell follows ((Sam Slick® and other satirists in his use of the New Eng¬ land rustic who discusses politics in dialect, he so far surpasses his predecessors that he actually now seems the first to have given to literature the Yankee dialect and the Yankee rustic. Again, (The Biglow Papers* reveal Lowell himself, a great personality, fun-loving and fun-making, witty, wise, fearless and patriotic; and also his race, for he is here the spokesman for New England. With such qualities, the ˆPapers* have as a whole lost little with the years. Their relation to their times is plain enough to the reader with any knowledge of American history; while their satire on peren¬ nial political follies and human foibles and their essential poetry and humanity, are as fresh as ever. From the first series, however, the reader is apt to prefer Hosea's views on ((recrutin® (I), (<B. Sawin's first letter® (II), ((What Mr. Robinson Thinks,® with its facile refrain, worthy of Gilbert at his best fill), and <(The Pious Editor's Creed® (VI) ; and from the second series, ((The Courtin,® prefixed to the series and independent of it; "Jonathan to John® (contained in II) ; that most delightful of New England pastorals, "Sunthin in the Pastoral Line® (VI), in which sentiment and imagination have free play, with little regard to satire or the general purpose of the series; and the poignant verses on the price that we pay for liberty and peace (X). The best edition of (The Biglow Papers* is that contained in the Cambridge edition of Lowell's complete poetical works, edited by H. E. Scudder.

Marion Tucker, Polytechnic Institute of Brooklyn.

BIGNON, ben -yon, Louis Pierre Edouard,

French historian and statesman: b. La Meille-raye, 3 Jan. 1771 ; d. Paris, 5 Tan. 1841. He entered the National Assembly in 1817; became

a peer of France in 1837, and wrote a (History of France > (7 vols., 1827-38). He received trom Napoleon 1. a bequest of $20,000.

BIGNONIA, the type genus of the family Bignoniacetz, consisting of more than 100 species of mostly South American tropical climbing shrubs, many of which are raised in greenhouses for their ornamental foliage and handsome tubular flowers of various colors. Some species are used as cordage in South America and are said to be employed in making mats, baskets, *etc.* The cultivated species are generally of easy management if given good soil, plenty of light, and space for both roots and tops. B. capreolata, which has numerous orange-red flowers, is a common climber throughout the South and as far north as Mary¬ land. In favorable soils and situations it often attains heights exceeding 50 feet. It is known as “trumpet-flower® from the shape of its blos¬ soms, and “cross-vine® and “quarter-vine® from the appearance of the cross-section of its stem. It is sometimes confounded with its near rela¬ tion, Tecoma radicans, trumpet-vine.

BIGORDI, be-gor’-de, Domenico, Italian painter: b. Florence 1146; d. 11 Jan. 1494. He was nicknamed Ghirlandajo, a name already borne by his father, Tommaso. He studied painting and mosaics under Alesso Baldovinetti. At the same time he studied Mosaccio’s fres¬ coes. After 1480 he painted a ‘Last Supper) for the church of Ognisanti, and soon after he undertook a series of frescoes in the Sasseti chapel in La Trinita. Here he depicted the principal scenes of the legend of Saint Francis, introducing many figures which the Florentine public recognized as some of their well-known contemporaries. He also painted at this time (The Adoration of the Shepherds,* now in the Academy of Fine Arts. His fame soon reached Rome and he was

summoned thither in 1483, to work on the Sistine chapel. Here he painted ‘The Vocation of SS. Peter and Andrew) and another work now lost. At Rome he met Francisco Tornabuoni who became his patron. From 1485 to 1490 he was employed in repaint¬ ing the choir chapel of Santa Maria Novella at Florence. Here Michelangelo was the ap¬ prentice of Bigordi and aided his master in the work on the choir chapel, which remains one of the most venerable monuments of Florence. The life of this great artist, one of the most notable precursors of the development which was to follow, was short. He died in 1494 leaving several works unfinished. His two brothers and his pupils undertook to finish them. In fact several of his paintings show traces of a strange hand. Independent of the works mentioned above there are others de¬ serving of mention, such as the (Visitation *in the Louvre and the ‘Old Man and Child J in the Paris Museum. Florence has several works; the convent of Saint Marc’s, now a museum, contains a (Last Supper* and in the church of Ognisanti there is a Saint Jerome. Ghirlandajo’s art represents the highest techni¬ cal development in his century. As a technician he was one of the greatest of the Florentines. He excelled in composition and draftsmanship and was a good colonist but was deficient in originality. Consult Vasari, ‘Lives of th” Painters) (10 vols., New York 1913) ; Crowe and Cavalcaselle, (History of Painting in

Italy’ (London 1903) ; and the monograph by Davies (London 1908).

BIGOT, be-go, Charles Jules, French

critic; b. Paris, 14 Sept. 1840; d. 1893. After finishing his studies at the Ecolc Normale and the Art School at Athens, he entered journalism and soon became known as a critic. His articles appeared in XIXe Siecle and the Revue Bleu. Among his larger works areˆ ‘Les classes dirigeantes) (1876) ; (Le clerge frangais devant la loi frangaise* (1877); (Le petit Frangais* (1882); ‘Raphael et la Farnesine) (1884); ‘Grece, Turquie, le Danube* (1886) ; ‘De Paris au Magara* (1887). His wife, Mary Healey Bigot, an American, is also well known as a writer under the pen name of “Jeanne Mairct.®

BIGOT, Frangois, French colonial admin¬ istrator: b. Bordeaux, 30 Jan. 1703. He be¬ came commissary of marine at Rochefort, 1731 ; ordonnateur at Louisbourg in 1739, where he began that career of peculation which only ended with the ruin of French Canada. After the capture of Louisbourg by the English, he returned to France, and was appointed intendant of Canada in 1748. His administration of the

finances was marked by the grossest cor¬ ruption, the colony being exploited in the most shameless way for the benefit of himself and his associates. On h:s return to France after the conquest, he was brought to trial, sentenced to make restitution and to suffer banishment; but the sentence of banishment was not carried out, and he -was permitted to end his days in Bordeaux. The date of his death is unknown.

BIHACS , or BIHATCH, be-hatch', Bosnia, fortress and town on an island of the Una, about 50 miles east of the Adriatic. It has a low and unhealthful site, but is remark¬ able for its strength. In 1592 the Turks con¬ verted its Gothic church into the Fethija Mosque. The possession of it has often been keenly contested during the Turkish wars. In the autumn of 1878 the Bosnian insurgents successfully defended the town against the Austrians. Pop. 4,700.

BIHAR AND ORISSA, India, a north¬ eastern province reconstituted in 1912 from the native states of Bihar, Orissa and Chota Nagpur, formerly feudatory to the presidency of Bengal (q.v.). Total area 83,181 square miles; population 34,490,184, comprising Bihar, 42,361 square miles, 23,752,969 population ; Orissa, 13,743 square miles, 5,131,753 popula¬ tion; Chota Nagpur, 27,077 square miles, 5,605,362 population.

BIHE, be-ha', Portuguese West Africa, a fruitful district lying east of Benguela, in the colony of Angola. It is an important caravan centre, as the only route across the continent passes through it. Area, 3,900 squares. Pop.

95,000.

BIJAPUR, be-ja-por', India, a decayed city in the Bombay presidency, 160 miles southeast of Poona. It was for centuries the flourishing capital of a powerful kingdom, but fell there¬ with under various dynasties in succession, Hindu and Mussulman, till in 1686 .it was cap¬ tured by Aurungzebe. It passed, during the early part of the 18th century, into the hands of the Mahrattas, and became British in 1848. Now that a gradual decay has done its worst,

Bijapur presents a contrast perhaps unequaled in the world. Lofty walls of hewn stone, still entire, enclose the silent and desolate frag¬ ments of a once vast and populous city With the exception of an ancient temple, the sole relic of aboriginal domination, the ruins are Mohammedan, and consist of beautiful mosques, colossal tombs, a fort, with an inner citadel, a mile in circuit. The British govern¬ ment has done everything to prevent further decay.

BIJNS, binz, Anna, Flemish poet : b. Ant¬ werp 1494; d. there, 10 April 1575. She was the first Flemish writer of the 16th century. Much admired for her melodious verses, full of metaphors and showing great technical skill, she was styled the ((Brabantine Sappho® by her contemporaries. Many of her poems were directed against Luther and his followers. The first of her volumes of collected verse bore the title (This Is a Beautiful and Truthful (or Sincere) Little Book,' while a second is known as Spiritual Refrains.) Consult her (Schoone Refereynen Schruftueren ende Leeringen teghen Tall Kettereyen' (1528; with commentaries by Van Helten and Jonckbloet 1876). In 1886, Van Helten published a collec¬ tion of 94 of her other poems.

BIKANIR, be-ka-ner', India, a native state of Rajputana, under the superintendence of a political agent and the governor-general's agent for Rajputana, lying between lat. 27° 12' and 30° 12' N. and long. 72° 12' and 75° 41' E. ; area, 23,311 square miles; pop. (1911) 700,893. The surface is for the most part undulating sand¬ hills; there are no forests, and for want of wa¬ ter trees are scarce. Two canals form the only irrigation works. The climate is generally dry and healthful, but is characterized by great ex¬ tremes of temperature. Coal is the principal mineral ; woolen fabrics, pottery and lacquer work form the chief native industries. Famine took nearly half of the population in 1868-69, and there were visitations in 1891-92 and 1899—

BIKANIR, India, capital of the above state, 250 miles west-southwest of Delhi, an irregu¬ larly built city surrounded by a fine battlemented wall four and a half miles in circuit, six feet thick and from 20 to 30 feet high. It has a fort, containing the Rajah's palace, and manufactures blankets, sugar candy, pottery, *etc.* It contains 10 Jain monasteries, 160 tem¬ ples and nearly 30 mosques. Pop. 55,826.

BIKELAS, be-ka'las, Dimitrios, modern Greek poet and historian : b. Hemopolis, island of Syra, 1835; d. Athens, 21 July 1908. After completing his studies he went to London, where his parents had settled, and after 1874 lived in Paris. After publishing a collection of his poems in 1862, he devoted himself to the task of making Shakespeare's dramas known in Greece through excellent metrical translations. As a prose-writer he has won wide reputation with his tale, (Lukis Laras' (1879), which was translated into 13 languages. His historical writings include (The Greeks of the Middle Ages' (1878) ; (The Role and the Aspirations of Greece in the Eastern Question' (1885) ; (Greece, Byzantine and Modern' (1893).

BIKU'KULLA (Greek for «double-hooded"), a genus of plants of the fumitory

family (Fumariacece) . The genus numbers about 15 species, natives of North America and western Asia. The best-known American species are the Dutchman's breeches (B . cucul-laria), and wild bleeding-heart (B . eximia). The common squirrel-corn (B . canadensis) is also a member of the genus. The Dutchman's breeches grows in woods from Nova Scotia to Lake Huron and Washington, south to North Carolina and Missouri. Wild bleeding-heart is found in rocky place's from the western part of New York, south to Georgia and Tennessee, along the mountain ranges. The best-known Asiatic species is B. spectabilis, bleeding-heart, a native of northern China and the neighboring parts of Siberia, which was discovered in 1810, and is now everywhere common as a garden plant. It blossoms in April and May, and its long drooping racemes of purplish-red blossoms present a very graceful appearance.

BILASPUR, British India, town of the Central Provinces and capital of the* adminis¬ trative district of Bilaspur. It is situated *on the Bengal

and Nagpur Railroad and the Arpa River. It is in the centre of one of those poorer districts in which the irrigation canal system has been as yet least developed and famines are frequent. The chief crop is rice. Pop. includ¬ ing the entire administrative district, 1,146,2 23.

BILBAO, bel-ba'o, Spain, capital of the province of Viscaya (q.v.) or Bilbao, situated on the navigable Nervion, in a plain surrounded with high mountains, a few miles from the sea. The river is crossed by five bridges. The town is picturesque and well built and contains sev¬ eral good churches, two fine promenades, a theatre, a marine school, *etc.* Bilbao carries on important trade and manufactures . (the lat¬ ter consisting chiefly of sailcloth, ropes and leather, hats, tobacco and earthenware) and possesses large shipyards and iron-foundries, iron and steel works, *etc.* It is one of the most flourishing se.aports of Spain, though its ac¬ commodation for shipping is defective, and it is the seat of a United States consul. Various harbor improvements, however, have recently been carried out, including a breakwater and mole. Bilbao exports much iron ore (especially to the United Kingdom), also pig-iron, wool, wine, fruits, oil, flour, grains, madder, licorice, *etc.* ; the imports are manufactured goods, dried fish, timber, coal, hardware, *etc.* Its supply of water and sanitary arrangements are not good. Its prosperity is due to the valuable iron mines nearby. The city was founded in 1300 by Diego Lopez de Haro as ftBelvao," or <(fine ford." It was an important commercial centre in the 14th and 15th centuries but suffered in the wars with France in 1795 and 1808. It was besieged by the Carlists in 1833-35 and 1872-76. Pop. 92,514. Consult Guiard Larrauri, (Historia de Bilbao' (Bilbao 1905).

BILBERRY. See Huckleberry.

BILBILIS, Spain, an old Celtiberian city, two miles east of the modern town of Cala-tayud, in the province of Saragossa, chiefly celebrated as the birthplace of the poet Martial, but also famed for its highly-tempered steel blades. In the Roman period it was a municipium with the surname of Augusta and had the right to coin money.

BILDAD, <(the traditionalist® : one of the leading characters in the book of Job. See Job.

BILDERDIJK, bil'der-dek, Willem, Dutch poet: b. Amsterdam, 7 Sept. 1756; d. Haarlem, 18 Dec. 1831. Graduating from the University at Leyden where he had studied law, he began a private practice, devoting himself also to the writing of verse. While still very young he became famous as a poet. On ac¬ count of political activities objectionable to the government he was exiled from Holland in 1795, after he lived for a while in England and later in Brunswick. In the latter place he gained some notoriety on account of a scandal in which the name of Katherina Schweikhardt was involved, herself an author of some repute. They were later married. Bilderdijk returned to Holland in 1806 and became state librarian, under the patronage of King Louis Napoleon. In 1817 he went to Leyden, where he lectured for 10 years on history. In 1827 he settled in Haarlem, where he remained for the rest of his life. His poetic masterpiece is (The De¬ struction of the First World) (1820), but he has written a voluminous mass of other matter. Among his other works are (Dood van Edipus) (1789); (Mijn verlustiging) (1781); (De geesten wereld) (Amsterdam 1843). On ac¬ count of his politics, which were ultra con¬ servative, he was for a time very unpopular among his countrymen. Consult Gorter's f Bilderdijk (Amsterdam 1871).

BILE, the most important secretion of the liver. It is formed directly by the liver cells, largely from the blood, is collected by the bile ducts, and discharged through the hepatic ducts. Most of the bile is stored in the gall-bladder, from which it is discharged in man by the cystic duct and the common duct into the upper portion of the duodenum, four inches below the lower end of the stomach. As first secreted in man it is a clear limpid fluid, but in the gall¬ bladder it is mixed with mucin and becomes darker, varying from dark brown to greenish, according to the amount of oxidation of the bile pigments. The bile of the carnivora is usually yellowish in tint, that of the grass-eaters green¬ ish, but the colors vary widely, dependent on the oxidation.

Bile is an alkaline fluid with a bitter taste, and contains water, bile acids, bile pigments, traces of lecithin, cholesterin, soaps and fats, and mineral salts. The proportions of these are very variable. The acids are known as glycocholic acid, yielding glycocoll and cholalic acid, and taurocholic acid, yielding taurine and cholalic acid. The pigments are two, bilirubin and biliverdin, and the color is a compound of the colors of these two and varies with the pro¬ portion of each from reddish-brown to grass-green. They are thought to be derived from the hemoglobin of the blood. The functions of bile are not clearly

understood, but it seems to aid in the digestion of fats ; it is an important organ of excretion, getting rid of many broken down products of metabolism, notably the cholesterin and lecithin. It is an efficient antiseptic, reducing the amount of ex¬ cessive fermentation in the intestines, it aids in peristalsis and thus overcomes constipation, and perhaps has other functions connected with proteid digestion. The amount of bile secreted daily varies from 25 to 35 ounces', its secretion is

more or less uniform, but at the digestive periods the stored bile of the gall-bladder is added to the intestinal contents. Gall-stones re¬ sult from concentration of the bile in the gall¬ bladder. They are also formed as a process of infection of the gall-bladder that creeps up from the duodenum. Gall-stones following ty¬ phoid feyer are very common, and are probably formed in this manner. As a result of inflam¬ mation of the stomach and duodenum the com¬ mon duct sometimes is inflamed and its walls swollen. This prevents the escape of bile into the intestines, and the bile pigments are taken up by the blood and cause the familiar symptom of jaundice (q.v.). The specific gravity of bile is 1.026. The bile of salt-water fish contains potash; that of land and fresh-water animals contains soda. Biliousness, so called, is rarely an affection of the liver, but much more often a mild inflammation of the stomach and in¬ testines, with catarrhal obstruction of the com¬ mon duct that is not severe enough to dam back the bile entirely. Clayey stools are usually indicative of deficient bile-elimination. The best-known stimulants of bile-formation and bile-elimination are heat and the biliary acids themselves. The vast majority of the number¬ less patent liver-pills on the market have no influence on the liver whatever; they are simply cathartics and empty the bowels. Consult Schaefer, < Physiology > (1898). See Digestion; Glycogen; Jaundice; Liver.

BILFINGER, Georg, (ga-om'), Bernhard, German philosopher and mathematician : b. Kan-stadt, Wiirtemberg, 23 Jan. 1693; d. Stuttgart, 18 Feb. 1750. He was born with 12 fingers and 12 toes, and submitted to an operation which removed the deformity. He studied with Wolff at Halle and became a disciple of the school of Wolff and Leibnitz. He was made professor of philosophy in 1721 and of mathematics also in 1724. In 1725 he received an invitation from Peter the Great to the chair of logic and metaphysics in the college at St. Petersburg. He now solved the problem of the cause of gravity proposed by the Academy of Sciences at Paris, and gained the prize. Being recalled in 1731 by Duke Charles Edward of Wurtemberg he returned to Tubingen and

proceeded to lecture on theology ; here his originality in style and ideas soon made him popular, and in 1735 he was appointed a privy councillor. Here he displayed great administrative ability and by severe study soon became as celebrated for his political and statistical knowledge as for his scientific attainments. He afterward paid par¬ ticular attention to agriculture and promoted the culture of the vine. He was the author of numerous theological and philosophical works, including (Dilucidationes philosophiae de deo, anima humana, mundo) (1725; 3d ed., 1746), an able defense of Wolff's division of metaphysics.

BILGE, a term in naval construction, the very bottom of a ship, inside the vessel and above the keel. Bilge Blocks, those blocks on which a ship rests in dry dock and which main¬ tain its upright position. Bilge Keel, strips which are fastened to the side of a ship below the water line to check her rolling. Bilge Keel¬ son, a stiffening plate or timber fastened inside the bilge of a ship. Bilge Water, water which seeps in through the cracks and seams of a

ship's bottom, especially wooden ships, and col¬ lects under the flooring. Unless constantly pumped dry, the water here collected becomes stagnant and acquires a bad odor. Bilgeways, those timbers on the launching ways on which rests the structure which supports the ship being built.

BILGUER, bil'gwer, Paul Rudolf von,

German chess-player : b. Schwerin 1808 ; d. Berlin, 6 Oct. 1840. He entered the Prussian army in 1833, and shortly afterward was pro¬ moted lieutenant. On 18 March 1840, he per¬ formed at Berlin the curious feat of playing three games at once with as many different op¬ ponents, conducting two of the contests without seeing the boards and men. This intense men¬ tal effort is supposed to have been the primary cause of the illness which resulted in his death. His cChess Handbook1 (Berlin 1841 and 1852), completed after his death by his friend T. Heydebrandt von der Lasa, made an epoch in the history of

chess, and is still the best prac¬ tical work on that game. Another work from his hand is (Das Zweispringerspiel im Nach-zugeP

BILHAH, in Biblical history (1) A Simeonite city the position of which is un¬ known ; also referred to as Balah, Baalah and Baalath. (2) According to Gen. xxix, 29, a slave girl given to Rachel by Laban and by her to Jacob as a concubine. She was the mother of Dan and Naphtali.

BILHARZIA, a disease caused by a parasitic worm of which two species are known, the African blood flake, Schistosoma hccma-tohiurn and S. japonicum, very common in Egypt and south Africa, but rare in the United States. The symptoms are usually those of cystis, or inflammation of the bladder, with bloody urine. The diagnosis is usually made by finding the ova of the worm in the blood, by the microscope. (See Parasites). Consult Blanchard, R., (Traite de Zoologie inedicale1 (Paris 1888).

BILIMBI, Cucumber-tree (Averrhoa bilimbi), a tropical tree of the family Oxali-dacece, native of southern Asia, where it is largely cultivated and whence it has been intro¬ duced in other tropical countries. It is ex¬ tensively grown in South America. The tree attains a height of 60 feet, bears racemes of red flowers followed by smooth cucumber-shaped green fruits as large as hen's eggs, which are highly esteemed for their acid pulp. The ca-rambola is a close relative.

BILIN, be-len', Bohemia, town and health resort seven miles south-southwest of Teplitz. It contains a fine old castle built in 1680, and one of more modern date; several churches, chapels, mills, *etc.* Within one mile of the town are much-frequented mineral springs, from which much water is exported. The salts and magnesia obtained from the water form import¬ ant articles of commerce. It is an alkaline water, -and is used with advantage in certain concretionary disorders. Here is also the singu¬ lar basaltic rock called Biliner Stein. Pop. about 7,800.

BILIOUS FEVER, an old name given to a variety of conditions, but in all of which there was characteristic low-grade fever associated with a certain amount of jaundice, clayey stools,

headache, foul tongue, *etc.* It probably repre¬ sents no one disease, but a complication of many diseases. See Biliousness ; Fever ; Gas¬ tritis ; Influenza; Malaria.

BILIOUSNESS, a popular term to express some affection of the liver, but in all prob¬ ability it is frequently a condition of disturbed gastric and duodenal digestion, and having nothing whatever to do with the liver. In the article on bile (q.v.) the passage of this liver secretion into the hepatic duct and storage in the gall-bladder and subsequent emptying into the duodenum is described. When the stomach is inflamed, the inflammation usually extends a certain distance into the intestines and as a con¬ sequence the mucous membrane of the common ducts also becomes inflamed and swollen. This prevents the free passage of bile into the in¬ testines and therefore its important function in digestion is stopped or diminished. This re¬ sults in further indigestion, and causes con¬ stipation, and increased putrefaction of the in¬ testinal contents results. Thus there is a chain of many links formed that results in headache, heaviness, bloating, constipation, foul tongue, foul breath, dark urine, and in severe cases mild jaundice. The entire series may have been set in motion by over-eating, or drinking alcoholic liquors, or deficient exercise, eating excessively of fatty (so-called rich) food, or other hygienic misbehavior. Any or all have started the mild inflammation of the stomach or intestines, and the biliary flow has been dimin¬ ished. But diminished functional activity of the biliary and pancreatic secretion due to congestion of the liver and pancreas produces similar symptoms as well as sometimes nervous prostration or, if prolonged, interference with action of the heart and arteries. The treat¬ ment should take into consideration the cause, and if the condition is obstinate a physician should be consulted. Rest, careful dieting, plenty of water, somq mild laxative's, heat over the pit of the stomach, and hot water enemas, will usually right the condition. The free wash¬ ing of the bowels and the laxative will usually cure the symptoms of poisoning, headache, and heaviness. Dosing with patent pills and teas and even so-called <(home remedies® are to be condemned. Violent cathartics irritate the stomach, intestines and even the liver. While they empty the bowels and thus get rid of the poisoning symptoms, they leave behind or in¬ crease the conditions which permit of further trouble. See Auto-intoxication; Bile; Con¬ stipation; Digestion; Liver.

BILL, BROWNBILL, GLAIVE, VOULGE, or GISARME, all names for nearly the same instrument, which, with some slight modification, was the standing weapon of the English infantry at close quarters, as was the long-bow their weapon at distant range, from the days of the battle of Hastings, at which the Saxons used the bill and the Nor¬ mans the bow, until those of Queen Elizabeth. The original brownbill was a ponderous cutting weapon with two edges, that forward of the shaft having a concave or sickle blade, that to the back, a sort of

angular cutting face, the upper part projecting before the base, so as to give a drawing blow. This terrible instrument was nearly three feet long, and 10 or 12 pounds in weight, set erect on a shaft of three or four

feet. It was wielded with both hands, and could sever a horse's head or a man's thigh or shoulder, through the strongest mail or plate armor, as a modern woodman's bill-hook slices off a hazel sapling. The weapon was afterward lengthened and lightened, and provided with a spear head, so that the holder could charge it like a lance, and sometimes with a cutting hook, for severing bridles or pulling men out of their saddles.

Also a cutting instrument, hook-shaped to¬ ward the point, or with a concave cutting edge ; used by plumbers, basket-makers, gardeners, *etc.* ; made in various forms and fitted with a handle. Such instruments, when used by gar¬ deners for pruning hedges, trees, etc., are" called hedge-bills or bill-hooks.

BILL, a paper, written or printed, giving a statement of the particulars of an account or action. A printed proclamation, an advertise¬ ment, an act of Congress or Parliament, or a tradesman's account is a bill.

In Legislation.— A term used to signify a special act passed by the legislature in the exercise of a quasi-judicial power. Thus, bills of attainder, bills of pains and penalties are spoken of. The draft of a law submitted to the consideration of a legislative body for its adop¬ tion or rejection. The Constitution of the United States provides that all bills for raising revenue must originate in the House of Repre¬ sentatives, but the Senate may propose or con¬ cur with amendments as on other bills. Every bill before it becomes a law must be approved by the President of the United States, or within 10 days returned, with his objections, to the House in which it originated. Two-thirds of each House may then enact it into a law. These provisions are copied in the Constitutions of a majority of the States.

Bill of Adventure. — A writing signed by a merchant, in which he states that certain goods shipped in his name really belong to another person, at whose risk the adventure is made.

Bill of Attainder. — A bill declaring that the person named in it is attainted and his property confiscated. The Constitution of the United States declares that no State shall pass any bill of attainder. During the Revolutionary War, bills of attainder and ex post facto acts of confiscation were passed to a wide extent. The evils resulting from them, in times of cooler reflection, were discovered to have far out¬ weighed any imaginary good.

Bill of Costs. — A statement of the items which form the total amount of the costs of a suit or action. This is demandable as a matter of right before the payment of the costs.

Bill of Credit. — A letter sent by an agent or other person to a merchant, desiring him to give the bearer credit for goods or money. It is frequently given to one about to travel and empowers him to take up money from the foreign correspondents of the person from whom the bill or letter of credit was received.

Bill of Entry . — A written account of goods entered at the custom-house, whether imported or designed for exportation.

Bill of Exceptions. — A bill of the nature of an appeal from a judge w'ho is held to have misstated the law, wEether by ignorance, by in¬ advertence or by design. This the judge is bound to seal if he be requested by the counsel

on either side so to do. The exceptions not d are reviewed by the court to which appeal is taken, and if the objections made to the rulings of the trial judge are w'ell founded, the finding in the case is reversed, and usually the cause is remanded for a new trial.

Bill of Exchange. — A bill or security origi¬ nally introduced for enabling a merchant in one country to remit money to a correspondent in the other. It is an open letter of request from one man to another, desiring him to pay to a third party a specified sum and put it to the account of the first.

Bill of Health. — A certificate given to the master of a ship clearing out of a port in which contagious disease is epidemic, or is sus¬ pected to be so, certifying to the state of health of the crew and

passengers on board.

Bill of Indictment. — A written accusation made against one or more persons having com¬ mitted a specified crime or misdemeanor. It is preferred to and presented on oath by a grand jury. If the grand jury find the allegations unproved, they ignore the bill, giving as their verdict, (<Not a true bill® ; if, on the contrary, they consider the indictment proved, their ver¬ dict is a <(True bill.®

Bill of Lading . — A document by which the master of a ship acknowledges to have received on board his vessel, in good order and condition (or the reverse), certain specified goods con¬ signed to him by some particular shipper, and binds himself to deliver them in similar condi¬ tion, — unless the dangers of the sea, fire or enemies prevent him, — to the assignees of the shipper at the point of destination, on their paying him the stipulated freight.

The bill of lading should contain the name of the shipper or consignor ; the name of the consignee ; the name of the vessel and her master; the places of shipment and destination; the price of the freight, and in the margin, the marks and numbers of the things shipped. It is usually made in three or more original parts, one of which is sent to the consignee w'ith the goods, one or more others are sent to him by different conveyances, one is retained by the merchant or shipper, and one should be retained by the master. It is assignable by en¬ dorsement, and the assignee is entitled to the goods, subject to the shipper's right of stop¬ page in transitu in some cases, and to various liens. It is considered to partake of the char¬ acter of a written contract, and also that of a receipt. In so far as it admits the character, quality or condition of the goods at the time they were received by the carrier, it is a mere receipt, and the carrier may explain or contra¬ dict it by parol ; but as respects the contract to carry and deliver, it is a contract, and must be construed according to its terms. 3 N. Y. 322; 6 Mass. 422. Under the Admiralty Law of the United States, contracts of affreightment en¬ tered into with the master in good faith and within the apparent scope of his authority as master bind the vessel to the merchandise for the performance of such contracts in respect to the propertv shipped on board, irrespective of the ownership of the vessel, and whether the master be the agent of the general or special owner; but bills of lading for property not shipped, and designed to be instruments of fraud, create no lien on the interest of the gen-704

eral owner, although the special owner was the perpetrator of the fraud. Under a bill of lad¬ ing in the ordinary form, having no stipulation that the goods shipped are to be carried on deck, there is a contract implied that the goods shall be carried under the deck, and parol evidence to the contrary will not be received. 14 Wend. 26. But evidence of a well-known and long-established usage is admissible, and will justify the carriage of goods in that manner.

Bill of Rights . — A bill which gave legal validity to the claim of rights, that is, the declaration presented by the Lords and Com¬ mons to the Prince and Princess of Orange on 13 Feb. 1688, and afterward enacted in Parlia¬ ment when they became king and queen. It de¬ clared it illegal, without the sanction of Parlia¬ ment, to suspend or dispense with laws, to erect commission courts, to levy money for the use of the Crown on pretense of prerogative, and to raise and maintain a standing army in the time of peace. It also declared that subjects have a right to petition the king, and, if Protestants, to carry arms for defense; also that members of Parliament ought to be freely elected and that their proceedings ought not to be impeached or questioned in any place out of Parliament. It further enacted that excessive bail ought not to be required, or excessive fines imposed, or unusual punishment inflicted; that juries should be chosen without partiality; that all grants and promises of fines or forfeitures before conviction are illegal ; and, that, for redress of grievances and preserving of the laws, Parliament ought to be held frequently. Finally it provided for the settlement of the Crown. In the United States, a bill of rights, or, as it is more commonly termed in this coun¬ try, a declaration of rights, is prefixed to the Constitutions of most of the States. See United States — State Constitutions of the.

Bill of Sale. — A deed of writing, under seal, designed to furnish evidence of the sale of per¬ sonal property. It is necessary to have such an instrument when the sale of property is not to be immediately followed by its transference to the purchaser. It is used in the transfer of property in ships, in that of stock in trade, or the goodwill of a business. It is employed also in the sale of furniture, the removal of which from the house would call attention to the em¬ barrassed circumstances of its owner ; hence the statistics of the Bills of Sale Act as an index to measure the amount of secret distress existing in times of commercial depression. In not a few cases bills of sale are used to defeat just claims against the nominal or real vendor of the goods transferred.

Bill of Sight. — A form of entry at the cus¬ tom-house by which one can land for inspec¬ tion, in presence of the officers, such goods as he has not had the opportunity of previously examining, and which, consequently, he cannot accurately describe.

BILLAUD-VARENNE, be -y5-va-ren, Jacques-Nicolas, French revolutionist: b. Rochelle, 23 April 1756; d. Port-au-Prince, Haiti, 3 June 1819. He was bred to the legal profession, and having come in 1785 to Paris, political events soon began to occupy his atten¬ tion, and in 1789 three treatises appeared from his pen, entitled respectively (Despotisme des ministres de France) ; (Dernier coup porte aux

prejuges et a la superstition) ; and (Le Peintre politique.) Another publication, (Acephalo-cratie,} which appeared in 1791, subjected him to a judicial prosecution, and he was obliged to conceal himself for a time. He emerged from his retreat on the triumph of his party in Sep¬ tember 1791, and in 1792 was elected a member of the National Convention. On the trial of the King he voted for execution within 24 hours. He contributed to the overthrow of the Girondists, and was subsequently chosen presi¬ dent of the convention, and member of the Com¬ mittee of Public Safety, and in that capacity framed the Bulletin des Lois and assisted in organizing the revolutionary government. In 1795, on a reaction having taken place against the ultra party, he was arrested, and along with Collot d'Herbois, banished to Cayenne. On the overthrow of the Directorate he refused the amnesty offered by Bonaparte. In 1816, he visited New York but was coldly received and in the same year, on the restoration of Cayenne to France, he was obliged to take refuge at Port-au-Prince, in the island of San Domingo. Here he died in poverty.

BILLAUT, be-yo, Adam, or Maitre Adam,

French poet: b. Nevers, 31 Jan. 1602; d. there, 19 May 1662. A carpenter by trade, he wrote rude but original poems, the gaiety of which, together with the contrast they afforded with his occupation, made them very popular at the time. He was a protege of the Duke of Nevers and visited Paris in 1637, where he was feted by the grand monde. He received a pension from Richelieu. Displeased with Parisian life he returned to Nevers, where he followed his trade and continued to write verses. Voltaire called him ((Virgil with the Plane.® The three collections of his poems were entitled (The Pegs) ; (The Centre-Bitˆ and (The Plane.) His (CEuvres choisies) were

published at Paris (1806) and his Poesies' (Nevers 1842). Con¬ sult Laporte, (Histoire litteraire) (Paris 1884).

BILLBERGIA, a genus of about 40

species of evergreen epiphytes of the family Bromeliacea ?, natives of tropica1. America and often cultivated in greenhouses for their showy flowers.

BILLE, be'le, Steen Andersen, Danish

naval officer: b. Copenhagen, 5 Dec. 1797; d. Copenhagen, 7 May 1883. He served in the French navy from 1820 to 1825 and took part in the expedition to Spain. For five years he was professor of French at the naval school, Copenhagen. He was a member of the expe¬ dition that went to South America in 1840, and had command of a scientific expedition round the world in the corvette Galatea, 1845— 47. In his (Beretning om Corvetten Galatheas Reise Omkrung Jorden, 1845-46 og 47 > (1849-51) he has given an account of this expedi¬ tion. In 1852-54 he was Minister of Marine and again in 1860-63. In 1864 he was made vice-admiral and retired in 1868. He was sent to conclude a treaty with China and has left a description of the voyage in (Min Reise til China) (Copenhagen 1865). Consult Bille, Martha, (Steen Andersen Bille > (Copenhagen

1885).

BILLET, be-la', Felix, French physicist: b. Fismes, Marne, 1808; d. 26 Jan. 1882. From 1845 he was professor of physics at the Univer-

sity of Dijon; in 1873 he became dean of the faculty. The apparatus known as the <(Bilen-tilles de Billet® was named from him. He has written numerous important works, among which are (Sur les changements de volume des corps par le passage de letat solide a letat

liquide) (1845) ; Condensations electriques de deuxieme et de troiseme espece' (1851) ; (Traite d'optique physique' (2 vols., 1859) ; Memoire sur les demi-lentilles d'interferences' (1862).

BILLET, the term given to a molding frequently introduced in mediaeval architecture, consisting of a torus ornamented by alternate checkers, like a staff cut into short lengths and disposed horizontally or around a molding, and of another molding, composed of a series of small projections, arranged around a curve in alternate directions, but in a consecutive manner.

BILLETING OF SOLDIERS, the com¬ pulsory lodging of soldiers with the inhabitants of a town, formerly a frequent practice when¬ ever there was a deficiency of accommodation in barracks or regular quarters. The billeting of soldiers on private householders is now abandoned generally, and billeting is reduced as much as possible by camping out and other arrangements. In the United States the practice is regulated by the third constitutional amend¬ ment. In England it is confined to troops on the march and individual soldiers on special duty. Innkeepers or others, on whom troops are billeted, are paid according to a scale fixed by the government.

BILLFISH, any of several fishes having notably long, beak-like snouts, as a gar, needle¬ fish, or spear-fish (qq.v.).

BILLIARDS, the generic name of a group of games ; is played in the United States usually on a 5x10 table, fitted on each side and at the ends with rubber acting as cushions. Ivory balls driven by a wooden cue and varying in size from 2 5-16 inches to 2 7-16 inches are generally used. The bed of the table is slate, from lJ/4 to 1 Y<\ of an inch in thickness, and covered, as is also the rubber, with green cloth. The body of the table and legs, and the rails, are made from various designs of wood.

The origin of the game of billiards is shrouded in mystery, but is known to have been played in a crude way since before the birth of Christ. It is mentioned in Shakespeare's (Antony and Cleopatra) (1607), and it is now generally agreed that the immortal bard, in his researches for facts, had read of billiards before the birth of our Saviour. Cathire More, a sub-king of Ire¬ land, as early as 148 a.d., speaks of billiards and billiard balls of brass. In the 'Confessions' of Saint Augustine (b. 430 a.d.) mention is made of the game of billiards. From this time until the end of the 14th century very little is known of the game. It is mentioned in Spencer's (Mother Hubbard Tales' (1591). About this time the French made it an indoor table game by

playing it on a square table with pockets at each corner, and one in the centre of each side, a little cone in the centre of the table called the <(king," and an arch of ivory, known as the (<port." Certain scores depended on pass¬ ing the (<port" and touching the <(king." As early as 1734, as stated in Seymour's (Court Gamester' these features of the game had dis-vol. 3 — 45

appeared, and cues had begun to replace the ˆmast" or <(mace" first used. Billiards came into fashion in the time of Louis XIV, whose physicians recommended him this kind of exer¬ cise after eating. Some profess to believe the game of English origin as the earliest and full¬ est description of billiards is found in Cotton's (Complete Gamester' (1674). The bed of the table was then made of oak, sometimes marble. Slate beds were first used about 1827. The pockets of the tables at that time, called <(hazards," were at first made of wooden boxes, nets being employed soon afterward.

The billiard table is said to have found its way into America through the Spaniards about 1570. At this time it was played in England, France, Germany and other countries, but the size of the table and style of the game differed. The English style of table and game was first adopted by the Americans. Six by twelve, six-pocket tables and four balls (two reds and two whites) were used. Soon the tables were re¬ duced in size from 6x12 to 5ˆ4x11, then to about 5 feet wide by 10 feet long. Tables vary in measurements. All match and tournament games are now played on 5x10 tables, and are very popular in all leading public rooms and clubs throughout the United States, while the so-called 4ˆx9 tables are almost exclusively used in private residences and in small cities and towns.

It is only in the last 50 years that billiard tables and their paraphernalia, and billiard play¬ ing itself, have made giant strides. Until the year 1855, when Michael Phelan, the father of billiards, first introduced the celebrated com¬ bination cushions, made of rubber chiefly, the tools were necessarily crude and imperfect, and greatly retarded the progress of the players up to that period. Then was played the four-ball game on a 6x12, six-pocket table. Two red balls and two white balls were used. In the 'sixties the tables were reduced in size to 5ˆx11, but so fast did the professionals and amateurs im¬ prove their games under the improved condi¬ tion of the table and tools, and in order to avoid the seeming monotony of long runs, it was found necessary to again reduce the size of the table, from pockets to carrom, to about 5 feet wide and 10 feet long, and change the style of

game from four-ball to three-ball game. This was done early in the ’seventies. Experts soon be¬ came so proficient at this style of game as to render it necessary to place restrictions on the bed of the table by drawing lines first 8 inches, then 10, 12, 14, and finally 18 inches from the edge of the cushions the entire length and width of the table — called balk-line game. This method of restricting the professionals and lead¬ ing amateurs in no wise does away with the beauties of the game, at the Masse, draw, fol¬ low, and combination cushion shots are left in¬ tact. The superb play of the professionals in this country and in France, where the same style of game is played, is due in a great measure to the improved construction of the beveled table, slabs, match rubber cushions, and to the ivory balls, cue, cue tips and chalk.

Various are the styles of billiards played now, such as (<three-cushion carroms.” <(cushion carroms,” ((champions’ game,” ((balk-line game,” and the regular three-ball game.

Pool may be said to be, broadly speaking,

a branch of billiards, and is very popular with the masses. It lacks the skill and variety of billiards. Pool is played on a 5x10 or a 4ˆ2x9, six-pocket table, and generally with gully at¬ tachments — a new device that rather adds to the popularity of the game. This gully is so placed under the table that all the balls, when pocketed, will drop into a basket at the foot of the table. The most popular of the various pool games is “continuous pool,® played with 15 numbered balls and one plain white one — the cue ball. These 15 balls are arranged in a tri¬ angle form at the foot of the table. The play¬ er’s object is to drive as many of the numbered balls successively into one or other of the pockets as he can, subject to certain rules and regulations. There are various other kinds of pool games — “American,® “pyramid,® “Chi¬ cago,® “forty-one,® and others. For a complete list of these various styles of games, also all styles of billiards, with the rules governing them, the reader is referred to the (Handbook of Standard Rules of Billiards and PoolP This handbook also gives valuable hints on the

care of tables, balls, cues, *etc.*

One of the most important parts that go to make billiard playing complete is the cue and cue-tip. The size and weight of the cue is a matter of individual judgment, but nearly all professionals and the best amateurs prefer one that weighs from 19 to 22 ounces, with the tip of the cue about a half inch full in diameter. The cue-tip is one of the leading, if not the leading, factor in billiard playing. Many public and private games are lost because of the im¬ perfect quality of the cue-tip, and many players are wont to ascribe their defeat or bad play to the tip itself. Much depends on the manner of tipping the cue. Cue-tips are made in France and are of comparatively recent origin. They consist of two qualities of leather united, the under leather being very hard and flat, while the upper or top leather is somewhat porous, spongy and springy. Selecting a good leather and the tipping of billiard cues is an art in itself, and has become so important an adjunct to the success of the business that the leading billiard halls in this country find it necessary to employ a man to exclusively attend to that branch of the trade. It is an art, for instance, to hammer a tip down to the requisite firmness before it is ready to be glued to the top of the cue, over which the tip generally projects (if a new one), on all sides. Inside of an hour's time in dry weather, if the quality of the glue is good, the tip may be finished off ready for use. Turn the cue bottom side up, firmly press the leather onto a table, then using a sharp knife, cut the leather even with the top of the cue itself, and pare the upper leather as one would an apple, finish with sandpaper, size about 1 y2, and smooth off with single O sandpaper. A cue-tip, when ready for playing, should be about half-moon shape, but many and various are the shapes of tips. Never use sandpaper on a cue-tip after it has been played with for a while. If the tip becomes hard and greasy from frequent use of chalk, roll it lightly with a French file.

Billiards is without doubt far superior in point of skill and science to any game played, either indoors or outdoors. Chess and check¬ ers are purely mental and yield no exercise to

the body. Golf and other out-of-door games are dependent chiefly on execution, whereas bil¬ liard playing requires and combines both knowl¬ edge and execution. As a health giving exer¬ cise and recreation, restful to the mind, physi¬ cians are now agreed that billiards leads all other games, while divines, politicians, artists, men of letters and women recommend it and play it at home, in the clubs and public rooms. It is steadily gaining in popularity among

merchants, bankers and brokers as a relief to the turmoil of a busy life. No residence is thought complete without a billiard table.

Bibliography. — Thatcher, c Championship Billiards, Old and New' (1898) ; Daly and Harris, (Daly's Billiard Book1 (1913), and for the English game, Ritchie, (Useful Strokes for Billiard Players1 (1910).

George F. Slosson, American Billiard Expert.

BILLINGS, Frank, American physician: b. Highland, Wis., 2 April 1854. He was graduated M.D. at Northwestern University Medical School 1881 ; honorary S.M. ibid. 1891 ; was interne at Cook County Hospital 1881-82; and studied in Vienna 1885—86 ; was appointed professor of medicine at North¬ western University Medical School 1891 ; pro¬ fessor of medicine and dean of faculty of Rush Medical College 1898; professor of medicine University of Chicago 1905 ; president Ameri¬ can Medical Association 1902-04; president American Association of Physicians 1907 ; president National Association for the Study and Prevention of Tuberculosis 1908; Shat-tuck lecturer, Boston 1902 ; Doctor of Science, Harvard University 1915; Lane Medical Lec¬ turer, San Francisco 1915. He became editor of the (Year Book of General Medicine) in

1901.

BILLINGS, John Shaw, American sur¬ geon and librarian : b. Switzerland County, Ind., 12 April 1839; d. 1913. He was graduated at Miami University in 1857, and at the Ohio Medical College, 1860; was demonstrator of anatomy in the last institution, 1860-61 ; entered the Union army as an assistant surgeon, 1861 ; was promoted to lieutenant-colonel and deputy surgeon-general, 6 June 1894; and was retired, 1 Oct. 1895. Dr. Billings became curator of the Army Medical Museum and Library and made the latter the third and one of the most valuable medical libraries in the world. The Undex Catalogue) of the library in 16 quarto volumes, which he prepared, is among the foremost of its End. He was professor of hygiene in the University of Pennsylvania, 1893-96 ; and in the last year was appointed director of the New York Public Library (Astor, Lenox and Tilden Foundations). After the close of the war Dr. Billings reorganized the United States Marine Hospital Service ; was vice-president of the National Board of Health, 1879-82; and had charge of the com¬ pilation of vital and social statistics in the 11th Census. He was a member of a large number of American and foreign scientific so¬ cieties, and his numerous publications include Principles . of Ventilation and Heating1 (1884) ; Undex Catalogue of the Library of the Surgeon-General's Office, United States Army* ; (National Medical Dictionary) (2 vols., 1889) ; description of the Johns Hop-BILLINGS - BILLOT

kins Hospital* (1890); (Social Statistics of Cities* (6 vols., for the 11th Census); (Some Library Problems of Tomorrow) (1902) ; (Physiological Aspects of the Liquor Prob¬ lem > (1903).

BILLINGS, Josh. See Shaw, Henry W.

BILLINGS, Robert William, English architect and author: b. 1813; d. 1874. He was a pupil of John Britton, and illustrated such important works as (The History and Description of Saint Paul's CathedraP (1837); and (The Churches of London* (1839); and made notable additions to the literature of architecture in (Illustrations of Architecture and Antiquities of the County of Durham* (1846); and (Baronial and Ecclesiastical Antiquities of Scotland* (4 vols., 1845-52).

He was employed in the restoration of many im¬ portant old buildings in Scotland and Eng¬ land, including the chapel of Edinburgh Castle, Douglas Room, Stirling Castle. Gosford House, and Crosby-upon-Eden Church, Cum¬ berland.

BILLINGS, William, American composer: b. Boston, 7 Oct. 1746; d. there, 26 Sept. 1800. He published no less than six collections of tunes, which, with a few exceptions, were of his own composition. They were founded upon the new style of church music, then first in¬ troduced by English composers, and their con¬ trast to the dismal old tunes previously in use naturally gave them immense popularity. Yet they were far from being perfect in the requi¬ sites of good melody and harmony, and their author, in a quaintly wrorded preface to his second work, entitled (The Singing Master's Assistant) and commonly known as (Billings' Best,* apologizes for the errors which his first collection contains. Billings was a firm patriot, and an intimate friend of Samuel Adams, who frequently sat with him at church in the singing-choir. Many of his tunes, com¬ posed during the wrar of independence, breathe the true spirit of patriotism, and were sung and played wherever New England trooos were stationed. Billings may fairly claim the title of the first American composer, for before his time there is no record of any musical com¬ position by a native of this country. He is also known as (<the father of New England psalmody.®

BILLINGS, Mont., city and county-seat of Yellowstone County, on the Yellowstone River and the Northern Pacific, the Great Northern and the Burlington and Missouri River railroads, 238 miles east of Helena. The city is a very important wool exporting market, being in the centre of an extensive sheep-raising region. Its industrial establish¬ ments include machine shops, a beet sugar factory, flour and lumber mills and extensive brick yards. Coal, marble and limestone are found in the neighborhood. Pop. (1920)

15,100.

BILLINGSGATE, the proper name (pre¬ sumably, though not quite certainly, from a personal name Billing) of one of the gates of London and of the fish-market long established there, which became a free market in 1699, was extended in 1849, rebuilt in 1852, and finally exposed to the rivalry of another market built 1874-76. The word is also used to indi¬

cate foul, abusive language, such as is pop¬ ularly supposed to be employed by fish-wives who are unable to come to an amicable under¬ standing as to the proper price of the fish about which they are negotiating. Billingsgate is used as a synonym of coarse, vulgar abuse.

BILLINGTON, Elizabeth, English singer: b. London 1768; d. Venice 1818. Her father was a German oboe-player named Weichsel, her mother an English singer. She made her appearance as a singer at the age of 14, and at 16 married Mr. Billington, a double-bass player. She made her debut as an operatic singer in Dublin, and afterward appeared at Covent Garden, where she secured an engagement for the remainder of the season of 1786 for $5,000, the manager giving her two benefits. She finished her musical education under Sacchini, and sang in Venice and Rome with great suc¬ cess. Bianchi composed the opera of (Inez de Castro) expressly for her performance at Naples. After Billington's death, in 1799, she married a Frenchman named Felissent and re¬ turned to London in 1801, where she filled a six months' engagement for $20,000. She retired in 1811 and thereafter lived at her villa near Venice. Her domestic life was unhappy. Her voice was of wonderful compass and was en¬ hanced by her great personal charms. Consult Ferris, G. F., (Great Singers) (Vol. I, New York 1892).

BILLION, in Great Britain and Germany, the term used to denote a million millions. In France, America and elsewhere it denotes a thousand millions. A similar difference is found in the use of the terms trillion, quad¬ rillion, *etc.*

BILLITON, or BLITONG, East Indies, an island belonging to Holland, lying between Banca and the southwest of Borneo, of an ir¬ regular sub-quadrangular form, about 40 miles across; area, 1,863 square miles. There are large deposits of tin and other minerals. It is divided administratively into five districts, under the governor-general of the east coast of Sumatra. There are many Chinese among the population but few Europeans. Coral reefs surround the island. Padang is the capital. Pop. (1912)

58,480.

BILLON, an alloy of copper and silver, in which the former

predominates, formerly used in Austria and Germany for coins of low value, the object being to avoid the bulkiness of pure copper coin.

BILLOT, be'lo', Jean Baptiste, French soldier: b. Chaumeil, Correze, 15 Aug. 1828; d. 31 May 1907. Graduating from Saint-Cyr Military Academy, he entered the army, becom¬ ing a colonel in 1870. He was with the French army of invasion in Mexico and later served in Algeria. On the outbreak of the Franco-Prus- sian War he was commanding general of the 2d Army Corps, on the Rhine, and was one of the defenders of Metz. Later, while com¬ manding the 18th Army Corps, he participated in the fighting at Baune la Rolande and Viller-sexel, where the French gained one of their few victories during the war. During all of 1882 and part of 1883 he was Minister of War in the Cabinet of Freycinet, and again under Meline from 1896 to 1898.

BILLROTH, bil'rot, Theodor, German surgeon : b. Bergen, on the island of Riigen, 26 April 1829; d. 6 Feb. 1894. He was educated at Greifswald, Gottingen, Berlin and Vienna; was assistant to Langenbeck at Berlin and be¬ came professor of surgery at the University of Zurich in 1860, and at Vienna in 1867 ; in the war of 1870-71, he worked in German hospitals on the Rhine. He was one of the foremo3t surgeons of the day, not only as an operator, but as an authority on microscopic work, pathology and military surgery. He made many valuable contributions to medical literature, in¬ cluding (Die allgemeine chirurgische Pathologie und Therapie,1 translated into all European languages and into Japanese (1863; 16th ed., 1906) ; (Chirurgische Brief e aus den Kriegs-lazaretten in Weissenburg und Mannheim) (1872); (Ueber den Transport der im Felde Verwundeten und Kranken* (1874) ; (Die Krankenpflege im Haus und im Hospital) (6th ed., 1899). Billroth was a good amateur musi¬ cian and after his death appeared his AVer ist Musikalisch ?) (3d ed., 1898).

BILLS, Course of. Public bills are those which affect the interests of the people at large and private bills are those which affect the in¬ terests of a person or persons whether they be private individuals or

corporations (see Bills, Private). The term HfilP1 is applied to a pro¬ posed law until it has passed through all its legislative stages and has been signed by the proper official, when it becomes an act or stat¬ ute (see Acts of Congress). In the United States, even after they have become law, some bills are popularly known by the name of the member or members of the legislative body in¬ troducing them, as the McKinley Bill, or the Gorman-Wilson Bill, though the words bill, act and law are used interchangeably in designating them. The British government provides that the preparation of all public bills must be super¬ vised by an expert, the clerk of the House of Commons, and even private bills must pass his scrutiny before introduction. In the United States House of Representatives, however, since there is no check on the right of an indi¬ vidual member to introduce a bill on any con¬ ceivable subject upon any legislative day, and since the form and scope of the bill are deter¬ mined by its introducer, there is much laxity and variation in the methods pursued in the preparation of bills.

In the House, private bills are left in the clerk's box while public bills are left on the speaker's table; in the Senate, after a member is recognized he asks permission to introduce a bill, but unless the other members give unani¬ mous consent (which, however, is seldom re¬ fused) he must wait the customary period of one day. After bills have been introduced they are referred to the committees having jurisdic¬ tion, and are then printed ; when the committee reports they are placed upon the calendar in the order in which they are reported. The Senate has a single calendar and consideration is given to bills in order, but the House has three calendars : the private calendar, the Union calendar for money bills, and the House calendar for other public bills. Hence con¬ sideration is not given to bills in the order in which they are reported but they are brought up either at the instance of the committee re¬

porting them, or by unanimous consent, or by suspending the rules, or by adopting a special rule reported by the committee on rules. While three readings of a bill are required and the rule is followed technically, the committee sys¬ tem has divested the rule of much of its sig¬ nificance. By unanimous consent the first and second readings in the Senate take place before a bill is referred to the proper committee, but in the House a bill is first read by title and then in full when taken up from the calendar for consideration. After finishing discussion of a bill on its second reading and disposing of suggested amendments, the final stage (if no objection be made) is entered upon, consisting of three operations, though only one vote is taken : the

order for engrossment, the third reading and final passage. When reading for the third time it is customary to read by title only, though if a question be raised it must be of the entire engrossed bill; upon final passage the bill is engrossed, now by printing. After this has been done it is signed by the clerk or secretary and forwarded to the other house, in which it pursues the course of a bill originating therein. If it be passed by the second house without amendment, it is returned to the first house for enrolment on parchment, is next signed by the speaker of the House and the president of the Senate (upon report by the committee on enrolled bills that it has actually been enrolled) and then presented by this com¬ mittee to the President for his signature or rejection by veto. But if the bill be amended by the second house it must again be considered by the first house, either to accept the amend¬ ments (in which case the bill is enrolled) or to reject them and request the other house to appoint a conference committee. In this case the other house either eliminates its amend¬ ments or insists and appoints such committee. After conferring, the committees report simul¬ taneously to their respective houses and if the report be adopted by both the bill is enrolled as above. When bills have been signed by the President (but see Veto) they become Acts of Congress (q.v.) and are filed in the State De¬ partment ; and the house in which the bill originated is notified of the signature which fact is recorded in its journal.

In the main the State legislatures follow the proceedings of Congress but there are many minor variations. Some State Constitutions provide that no bill shall receive consideration for passage unless previously referred to and reported by a committee. Several States pro¬ hibit the introduction of bills after a certain period of time has elapsed or within a certain number of days prior to the termination of the session ; and two States forbid the passage of bills on the last day or two. The majority of the States require that a bill be read three times, usually in full on separate days, though this requirement may be overruled by unani¬ mous consent or a special message from the governor. If the legislature fail to conform to the rules strictly, there is no outside power that can compel such observance. Consult Cushing, L. S., (Law and Practice of Legis¬ lative Assemblies) (1907) ; Hinds, A. C., (Rules of the House of Representatives* (1909); Reinsch, P. S., ‘American Legislatures and Legislative Methods1 (1907).

BILLS, Private. A private bill is dis¬ tinguished from a public bill in that it affects only a particular person or place, whereas the latter affects all persons in the State generally or all persons in a class. Private bills are usually designed to benefit some particular per¬ son, corporation or place, and the proceedings with reference to them are not only legislative but to a certain extent judicial. Among pri¬ vate bills are those to incorporate gas, water, railway and other companies ; to incorporate cities or towns or to increase their powers; to naturalize particular individuals or to change their names; to grant pensions to particular persons ; to settle private claims ; divorce bills ; *etc.* A private bill must not be confused with a private member's bill in the British Parlia¬ ment, the latter being a bill which is introduced by a private member of Parliament as distin¬ guished from a member of the government. In England private bills are initiated by "petition® and may be introduced only if they have been advertised publicly for three months prior to the assembling of Parliament. Being regarded as a privilege, fees are required to be paid by the promoters of such bills at the various stages of their passage. They are required to be de¬ posited before 31 December in the "private bill office® where they may be subjected to public inspection and the inspection of two exam¬ iners appointed to ascertain if they have fol¬ lowed the prescribed preliminaries. A com¬ mittee on private bills then listens to arguments on their merits and reports to the House, where they are either passed or rejected. See Great Britain — Parliament.

In the United States House of Representa¬ tives there is a separate private bill calendar but the legislative stages through which private and public bills must pass do not differ in any essential particular. However, the House of Representatives does set aside Friday of each week for the consideration of private bills, such as pension bills, relief measures, claims against the government, etc., though by a majority vote this day may be devoted to other business. Some States observe the English distinction between public and private bills, using a differ¬ ent procedure in their passage. Pennsylvania and some other States require at least 30 days' notice of the intention to introduce such a bill, which notice must be published in the locality in vrhich the thing to be affected is situated. Massachusetts requires a petition and notice by advertisement or otherwise to all parties affected or interested before a private local bill can be introduced and considered. Consult Bryce, James, (The American Commonwealth } (4th ed., 1910) ; Clifford. W. K., (History of Private Bill Legislation > (1885) ;

Cushing, L. S., (Law and Practice of Legislative Assemblies* (1907) ; Hinds, A. C., Precedents of the House of Representatives* (1907-08), and Pules of the House of Representatives) (1909) ; Ilbert, Sir C., (The Mechanics of Law Making) (1914) ; Reinsch, P. S., (American Legislatures and Legislative Methods* (1907).

BILLY-BOY, a flat-bottomed, bluff-bowed vessel rigged as a sloop, with a mast that can be lowered so as to admit of passing under bridges. They generally belong to the Humber ports.

BILNEY, Thomas, ((Little Bilney,® English martyr: b. probably at Norwdch, about 1495; d. Norwich, 19 Aug. 1531. He studied at Trinity Hall, Cambridge, and was ordained in 1519. He was opposed to the formal <(good works® of the Schoolmen and denounced saint- and relic-worship ; and to these plain Protestant views he converted Hugh Latimer and other young Cambridge men. In 1527 he was arraigned before Wolsey and, on recant¬ ing, absolved, but was confined in the Tower for over a year. Stung by remorse, after twro years of suffering, he began to preach in the fields of Norfolk, but was soon apprehended and condemned ; and although reconciled once more to the Church, he had to suffer the pen¬ alty of a relapsed heretic and was burned to death.

BILOXI, bil-oks'i, Miss., a city in Harri¬ son County, on Biloxi Bay, opening into the Gulf of Mexico, and the Louisville & Nash¬ ville Railroad, 80 miles northeast of New' Or¬ leans. It is principally engaged in the can¬ ning of oysters, fish, fruit and vegetables and has also considerable manufacturing and ship¬ ping interests. The waterworks are the prop¬ erty of the municipality. Biloxi is near the site of the first settlement made upon the Mississippi by white men, under the direction of Pierre Le Moyne d'Iberville, in 1699. In 1701 this settlement (now Old Biloxi) was abandoned after a destructive fire and in 1712 a permanent settlement wras made on the present site across the river from the old. It was long the capital of the French territory in that part of America, was incorporated in 1872 and chartered as a' city in 1896. It is gov¬ erned by a mayor and council. The modern town is a popular resort, has a fine beach, paved streets and beautiful surroundings. Consult French, historical Collections of Louisiana> (New York 1846-50). Pop. (1920) 10,937.

BILOXI INDIANS, one of the groups of tribes into which the Siouan stock of North American Indians is divided. In 1669 they had one village on Biloxi Bay near the Gulf of Mexico. Thirty years later there

were three villages, Biloxi, Paskagula and Moctobi. Prob¬ ably early in the 18th century they removed to Louisiana. It was long assumed that they were related to the Choctaws but Gatschet's re¬ searches have shown that their language is a dialect of the Siouan stock. He discovered a few survivors of the group near Lecompte, Rapides Parish, La., who still spoke their lan¬ guage. Consult Darsey and Swanton, dic¬ tionary of the Biloxi Language > (Washington 1912), and Swanton, J. R., (Bulletin 43, Bu¬ reau of American Ethnology. *

BILSON, Thomas, English divine: b. Winchester 1547 ; d. 18 June 1616. He was edu¬ cated at Winchester School, and after complet¬ ing his studies at New College, Oxford, became sucessivly wrarden of the school and preben¬ dary of the cathedral of Winchester. In 1585 he published a work, entitled (1 he. True Differ¬ ence Between Christian Submission and Anti-Christian Rebellion,) intended mainly to defend the government and policy of Elizabeth; it was swiftly perceived by Nonconformists that Bil-son <(gave strange liberty in many cases, for subjects to cast off their obedience.® Histori-

cally, this work, while accomplishing its object in Elizabeth's day, contributed to the ruin and death of Charles I. In 1593 another work, entitled (The Perpetual Government of Christ's Church, > is still considered one of the ablest de¬ fenses of episcopacy. In 1596 he was made bishop of Worcester, and was transferred in the following year to Winchester. In 1603 Bil-son preached the coronation sermon before James I, and in 1604 he took a prominent part in the celebrated conference at Hampton Court. The translation of the Bible, executed during the reign of James, was partly submitted to his revision. He was buried in Westminster Abbey.

BILSTED. See Liquidambar.

BILSTON, England, town in Staffordshire, three miles southeast from Wolverhampton. It is a part of the parliamentary borough of Wolverhampton. It has extensive coal and iron mines ; the other chief industries consist of iron smelting works, foundries, manufac¬ tories

of tin-plate goods, enameled wares, nails, wire and pottery. The waterworks are mu¬ nicipal property. Nearby is found a fine grade of sand much used for metal casting. Pop.

25,681.

BIMETALLISM. A monetary system wherein gold and silver are both used as stand¬ ard money and coined without limit at a fixed ratio imposed by legislation. Bimetallism proper implies, first, that the money unit shall be represented in two metals ; second, that these metals shall enjoy equal and unlimited coinage privileges ; third, that they shall be equalized by law in a fixed and definite ratio ; and fourth, that the coins made from either of them shall be a full legal tender.

The term ((limping bimetallism" has been applied to systems wherein gold and silver were both recognized as standard money, but in which one of the metals was not coined at all, or not coined on equal terms with the other. The term (<free coinage" has sometimes been used to mean unlimited coinage and sometimes to mean gratuitous coinage. Unlimited coinage is necessary to a complete bimetallic system. When coinage is limited the volume of stand¬ ard money is to that extent regulated by law ; when coinage is unlimited the volume depends, first, upon the total accumulation of coin, and, second, upon the annual production of the money metals. This sum is further augmented by the coinage of gold and silver plate when money becomes scarce, or lessened by an in¬ creased demand for gold and silver in the arts when money becomes plentiful.

Bimetallism does not rest upon any natural particular ratio ; the coinage ratio is arbitrarily fixed by law, and can be changed by law. The ratio states the proportion existing between the silver dollar and the gold dollar when measured bv weight — that is, at the ratio of 16 to 1, the silver dollar weighs 16 times as much as the gold dollar. While the legal and commercial ratios between the metals have fluctuated from time to time the commercial ratio has, as a rule, followed the legal ratio, and from the begin¬ ning of history down to 1873 the fluctuations in the commercial ratio were never as sudden or as great as they have been since 1873. During the 400 years which elapsed between 1473 and 1873 the extreme variation in the commercial ratio was from 14 to 1 to 16 to 1, although

during that period there were greater changes in the relative production of the metals than have occurred since. For instance, between 1800 and 1840 the world's production of silver was about 4 to 1 in value, compared with the production of gold ; after the new discoveries of gold in 1849 the production of that metal so increased that the annual output of gold was soon more than 3 to 1 in value, compared with the output of silver, and yet during this tre¬ mendous change in relative production the com¬ mercial ratio was comparatively stable, owing to the fact that all the gold and all the silver could go through the mints into the world's currency.

The ratio of 16 to 1 was advocated by American bimetallists, first, because it was the ratio existing between the silver and gold coins in circulation in the United States ; and, second, because an increase in the ratio, made by increasing the size of the silver dollar, would to the extent that it was joined in by other nations require the recoinage of silver coins into larger coins, and thus reduce the world's volume of standard money. If, for instance, the ratio were changed to 32 to 1 by international agree¬ ment, and the silver money of the world, ap¬ proximating $4,000,000,000, were recoined into $2,000,000,000, it would cause a shrinkage of about 25 per cent in the total volume of metallic money and, as contracts would still call for the same number of dollars, such a change in the ratio would transfer billions of dollars in value from the wealth producers to the holders of fixed investments.

Bimetallism, therefore, relates to the legal status of the metals rather than to their com¬ mercial value, and does not necessarily imply the simultaneous or concurrent circulation of both metals.

The Gresham law has often been quoted against bimetallism. That law is a statement, made by a master of the English mint of that name, who announced as his observation that the worn, light-weight coins ran the full-weight coins out of the country — the explanation be¬ ing that while, to a majority of the people, one coin was as good as another so long as it would pass current, the jewelers would melt and the dealers in money would collect and export the heaviest coins (coins passing by weight rather than by legal tender value out¬ side of their own country)- It can readily be seen that the Gresham law can apply not only to the use of two metals when there is differ¬ ence between government ratios, but also when the commodity values of the two metals differ. When, for instance, we had a ratio of 15 to 1 in this country, and the French ratio was 15jˆ to 1, there was a tendency to send American gold to France and bring French silver to the United States, and yet this tendency did not cause the exportation of all

American gold to France or of all French silver to the United States. France, being at that time the stronger nation commercially, fixed the ratio and our gold rose to a premium. In the payment of debts silver was the money employed, and gold, when it was used, was used at its commodity price, which was expressed as a ((premium." After 1834 the situation was reversed and silver went to a premium. Gold was then used for the payment of debts and for general transac-

tions, and silver, when it was used, brought a premium. When the ratio was 15 to 1 in this country gold went to a premium of about 3 per cent, because the French ratio was 15 to 1 : when our ratio was changed to 16 to 1 silver rose to a premium of about 3 per cent.

In bimetallism the debtor always has the option. This is true, not because of a desire on the part of the government to favor the debtor, but because the parity can be maintained in no other way. The desire of all debtors to secure that metal which is the cheaper will, in itself, by increasing the demand for the cheaper metal, tend to equalize the commercial value of the metals with the legal value.

Bimetallism has been declared to be theoreti-. cally better than monometallism (either of gold or silver), because under the double or bi¬ metallic standard the volume of money changes less rapidly and less suddenly than under the single standard. As a rule the increase in the production of one metal has spread itself over the entire volume of money and has, therefore, caused a less proportionate increase than it would have caused had the world been using but one metal, either gold or silver, as standard money.

The practical argument advanced in favor of bimetallism is that neither metal alone fur¬ nishes a sufficient quantity of money to support the world's commerce. This phase of the ques¬ tion was not much considered until after 1873 because, prior to that date, there were sufficient mints open to the coinage of both metals to furnish a monetary use for every ounce pro¬ duced. When all of the gold and silver avail¬ able for coinage could go through the mints into the currency, each nation could consider the question from a purely theoretical stand¬ point, because so long as the commercial world had

the benefit of the entire volume of gold and silver, it did not make so much difference how many nations used one metal, or the other, or both. When, however, the gold standard for money systems came into favor and enough nations joined in it to reduce the demand for silver below the supply available for coinage, then each nation was compelled to consider not only its preference as to a standard, but whether — and it was a vital question — it was always sure of having a sufficient quantity of the chosen metal.

The advocates of bimetallism contended not only that the law of supply and demand regulates the value of the dollar — an increase in the demand, the supply remaining the same, raising the purchasing power of the dollar, and an increase in the supply, the demand remain¬ ing the same, decreasing the purchasing power of the dollar, but they also asserted that supply and demand regulate the market price of the metals.

The contention of monometallists that it is impossible to fix a relation between two metals was met with the reply that the relation be¬ tween two things of limited production, such as gold and silver, can be fixed by any nation or group of nations which can furnish a use for so much of both metals as is available for coinage.

The demand created by the government must be considered as added to the demand created by the arts. If the demand created by the government is sufficient to utilize the

surplus over and above what the arts require, the commercial value can be kept up to the coinage value for the reason that each owner will seek the highest possible price, and so long as the government stands ready to con¬ vert a given amount of metal into a given amount of money, he will not have to dispose of the metal to any one else for less than the government price. If the government, in¬ stead of standing ready to convert one metal into money, stands ready to convert two met¬ als into money, it can make the commercial ratio and the coinage ratio identical, if there is a use for the money. The changes in rela¬ tive production would not affect this condition so long as the government was able to utilize all of the surplus of both metals.

Independent bimetallists and international bimetallists, though agreeing as to the theoret¬ ical and practical benefits of the double stand¬ ard, differed as to the ability of the United States alone to

maintain the parity, the former contending, and the latter denying, that under conditions as they then existed the nation was able to utilize all the silver that could come to our mint.

The fear that, under bimetallism, our country would be flooded with the coined sil¬ ver of the world was declared to be without foundation, for the reason that our ratio, 16 to 1, was more favorable to gold than the ratio existing between gold and silver in the nations that have a large quantity of silver coin. France, for instance, was the largest European holder of silver, but as her silver circulates on a parity with gold at a ratio of 15J/2 to 1, it could only come here at a loss equivalent to about three cents on the dollar.

Whether the mines would furnish an exces¬ sive amount of silver was a question about which no one could speak positively, because no one can foresee new discoveries or estimate the possible exhaustion of mines.

Raising the government price of a precious metal does not necessarily increase the pro¬ duction of it, neither does the lowering of the price necessarily reduce the production. The use of gold and silver as money is the dom¬ inating factor in its value. If, by agreement among all the nations, the legal tender func¬ tion was withdrawn from both gold and sil¬ ver, and other money-substituted for them, both would fall in value, as expressed in the new money, just how much no one knows, because a fall in the price of either of the metals would develop new uses and thus in¬ crease the demand, which, in its turn, would react with the supply in determining the ulti¬ mate price. The arguments pro and contra as to the desirability of bimetallism as a monetary system belong properly in the arti¬ cle Money.

The United States established the double standard in 1792. France followed in 1803. England adopted the gold standard in 1816 and since then has exerted a controlling in¬ fluence on other European nations whose coin¬ age, however, remained silver for many years. About 1850, France went over to the gold basis and in 1865 the Latin Union adopted the French standard. In 1867 the international money conference at Paris unanimously ac¬ cepted the single standard for co-ordinating the currencies of the countries taking part in

that conference. In 1871, after the Franco-German War, Germany established the gold standard and demonetized silver. In 1873 the United States formally adopted the gold standard, but in 1878 initiated a monetary convention at Paris to discuss the question of a return to bimetallism. The proposition was rejected. Again, in 1881, with the co¬ operation of France, the United States invited the nations to another conference on bimetal¬ lism. England and Germany opposed the change and the movement failed. In 1892 the United States made another attempt at Brus¬ sels to discuss bimetallism, but without result. In 1893 India closed its mints to the free coinage of silver. The elections in 1900 in the United States finally disposed of the question of a double standard and bimetallism disap¬ peared from political controversy.

Bimetallism in the United States. — The bimetallic standard was recommended by Jef¬ ferson and Hamilton and adopted by our gov¬ ernment by a statute approved by Washing¬ ton in 1792. This law provided for the free and unlimited coinage of silver and gold at the ratio of 15 to 1, the coins being equally a legal tender for all debts public and private. The Spanish milled dollar then in use in this country contained the same amount of pure silver as our present silver dollar and, the ratio of 15 to 1 having been adopted, the gold dollar was made to weigh one-fifteenth as much. The silver dollars then coined are sometimes called the <(unit dollars,® because they have on the edge the inscription : ((Hundred Cents, One Dollar, or Unit.®

In 1834 the ratio was changed from 15 to 1 to 15.988 + to 1, which for convenience has been called 16 to 1. The change was made for the purpose of checking the exportation of gold, but as the new ratio undervalued silver it made gold the money in general use. This law provided for the free and unlimited coin¬ age of gold and silver into full legal tender money at the new ratio. In 1837 the alloy in the dollar, both gold and silver, was changed from one-twelfth to one-tenth, making the weight of the standard silver dollar A\2l/2 grains, nine-tenths fine, and the weight of the standard gold dollar 25 8-10 grains, nine-tenths fine.

As the law of 1834 undervalued silver and led to the exportation of considerable quanti¬ ties of it, it became difficult to keep fractional currency in circulation, and to remedy this the law of 1853 was enacted. By the terms of this law subsidiary silver (that is, coins of less

denomination than $1), were reduced from full weight to light weight and made token money, with limited legal tender, in¬ stead of standard money. This law, however, did not change the provision in regard to the standard silver dollar, the free and unlimited coinage of that dollar still continuing. The subsidiary silver coins were redeemable in the standard money, either gold or silver. Sometimes the Act of 1834 has been referred to as establishing the gold standard, but this is erroneous. It merely changed the ratio and that, too, by reducing the weight of the dearer dollar, not by increasing that of the cheaper dollar. Equally erroneous is the assertion that the Act of 1853 established the gold standard. That did not in the least change the law re¬

lating to the standard money, either gold or silver.

On 12 July 1873 the demonetization of sil¬ ver was effected by an act entitled <(An Act Revising and Amending the Laws Relative to the Mints, Assay Offices and Coinage of the United States.®

When this law was passed the business of the country was being transacted with paper money, both gold and silver being at a pre¬ mium — silver at a greater premium than gold. In making provision for silver coinage it omitted the coinage of the standard silver dol¬ lar and substituted for it a trade dollar of 420 grains which was intended for use in the Orient, it being thought that the trade dollar would compete with the Mexican dollar in China and other Eastern countries. In 1874 the Federal statutes were revised and in this revision a clause was inserted limiting the legal tender of silver coins to amounts not ex¬ ceeding $5.

The suspension of silver coinage by the United States alone would not have caused a fall in the price of silver as measured with gold, but other nations joining in the demon¬ etization of silver it soon became apparent that the mints of the world still open could not utilize all the silver available for coinage, and the gold price of silver began to decline. An effort made to reopen the United States mints to silver resulted in the passage of what was known as the Bland-Allison Act. The bill, as it passed the House, under the leadership of Richard P. Bland, of Missouri, restored the free and unlimited coinage of gold and silver at the ratio of 16 to 1. The opposition in the Senate was sufficient, however, to defeat the bill in its original form, and to compel the ac¬ ceptance of a substitute framed by Senator Al¬ lison, whose name was thus connected with the law. This compromise

measure provided that there should be ((coined at the several mints of the United States silver dollars of the weight of 412ˆ2 grains -troy of standard silver as provided by the Act of January 1837,® and also provided that such silver dollars <(together with all silver dollars heretofore coined by the United States of like weight and fineness® should be <(a legal tender at their face value for all debts and dues public and private, except where otherwise stipulated in the contract.®

In order to secure the bullion out of which to coin the dollars mentioned in the Act of 1878, the law provided ((that the Secretary of the Treasury is authorized and directed to pur¬ chase, from time to time, silver bullion, at the market price thereof, not less than $2,000,000 worth per month nor more than $4,000,000 worth, and cause the same to be coined monthly, as fast as so purchased, into such dollars.®

The purchase of silver for coinage under this act retarded the fall in the price of silver, but as it did not consume the entire surplus it was not sufficient to restore the price of bullion to the coinage value of $1.29 an ounce.

The Bland-Allison Act remained on the statute books until 1890, when it was repealed by what was known as the Sherman Purchase Act, which provided for the purchase of 4,500,000 ounces of silver per month, or so much thereof as might be offered at a price not exceeding the coinage value, the bullion to be

paid tor by the issue of treasury notes, re¬ deemable in coin; and after 1 July 1891 only so much of the silver was to be coined as was necessary to redeem the treasury notes presented.

This act immediately increased the demand for silver and the price of silver bullion, not only in the United States, but all over the world, rose to about $1.21 an ounce. But when it was found that even this demand was not sufficient to utilize all the surplus silver, the price

again began to fall.

1 he treasury notes issued in the purchase of silver were made a legal tender for the pay¬ ment of all debts public and private, except where excluded by contract, and were redeem¬ able by the Secretary of the Treasury (<in gold or silver coin at his discretion.® It will be seen that the option as to the coin of pay¬ ment was reserved to the government, but an¬ other clause in the measure which declared it to be ftthe established policy of the United States to maintain the two metals on a parity with each other upon the present legal ratio or such ratio as may be provided by the law,® was afterward construed by the Treasury De¬ partment to deprive the Secretary of the option.

This ruling of the Treasury Department was followed by the presentation of treasury notes and a demand for gold, and the drain upon gold which followed was used as an argument in favor of the repeal of the pur¬ chase clause of the law.

What has sometimes been called <(the silver movement® began with the discovery of the effect of the law of 1873, and has continued with varying force ever since.

It might better be designated as the bi¬ metallic movement, because it was an effort to restore bimetallism, and the supporters of the movement asked for silver nothing more than was already granted to gold.

During the period following 1873 three international conferences have been held with a view to the restoration of silver (at Paris in 1878 and in 1881, and at Brussels in 1892), but they have been unsuccessful, largely because other European countries have hesitated to act without England, and England, being largely a creditor nation, has been unwilling to surrender the advantage which a rising dollar has given her in the increased purchasing power of her credits.

In the summer of 1893, the President, giv¬ ing as his reason the suspension of the coinage of silver in India, called Congress together in extraordinary session and recommended the un¬ conditional repeal of the purchase clause of the Sherman Law. Congressman Wilson, chairman of the Committee of Ways and Means, and leader of the administration forces in the House, introduced a bill identical in purpose and almost repealing the purchase clause of the Sherman Law without substituting any provision for the further coinage of silver. After a pro¬ longed contest this bill became a law in Novem¬ ber 1893.

The campaign of 1896 resulted in the elec¬ tion of the Republican ticket by a large major¬ ity, and as that party had committed itself to international bimetallism, the verdict at the polls was considered a victory for the double standard rather than for the single gold standard.

the pursuance of the promise contained m the Republican platform, President McKin¬ ley, immediately upon taking his seat, sent a commission to Europe to solicit cooperation m the restoration of silver to its former place by the side of gold, but this commission failed to secuie any concessions fr*om England and no formal conference was arranged. See Dem¬ ocratic Party ; Republican Party.

Bibliography.— Andrew, <An Honest Dol¬ lar (1894) ; Barclay, (The Silver Question and the Gold Question> (1890); Darwin, bi¬ metallism' (1887); Giffen, (The Case Against Bimetallism> (1896); Laughlin, (History of Bimetallism in the United States) (1897); Miller, (Gold or Silver) (1896); Stokes, (Bi-metalhsnP (1895) ; Taussig, <The Silver Situa¬ tion in the United States) (1893); Walker (International Bimetallism) (1896). Also the reports of the three international monetary conferences in 1878, 1881 and 1892.

BIN, ban, Emile Jean Baptiste Philippe,

French painter: b. Paris, 10 Feb. 1825; d. 1897. He was a pupil of Gosse and Cogniet. In 1878 he was made a member of the Legion of Honor, and in 1881 was conspicuous as one of the founders of the Society of French Artists. His (Prometheus Chained) is in the Museum at Marseilles. Among his portraits are those of MM. Clemenceau and de Marcere.

BINALONAN, be-na-lo'nan, Philippines, a town of the province of Pangasinan, Luzon, sit¬ uated in the western part of the island of Luzon, about 20 miles from the coast, at the junction of several highroads. Pop. 10,295.

BINANG, be-nang, Philippines, a town of the province of Lagum, Luzon, situated on the Bay Luzon, about 15 miles south of Manila, on highroads connecting it with Cavite, Manila and other important towns. Pop. 19,786.

BINARY LOGARITHMS, a system of logarithms devised by Euler for facilitating musical calculations. Instead of having, like the common system of logarithms, 1 as the log¬ arithm of 10, it had 1 as the

logarithm of 2.

BINARY NOTATION, a method of no¬ tation invented by Leibnitz, but which appears to have been in use in China about 4,000 years ago. As the term binary implies, there are only two characters in this notation ; these are 1 and , 0. By it, our 1 is denoted by 1, 2 by 10, 3 by 11, 4 by 100, 5 by 101, 6 by 110, 7 by 111, 8 by 1000, 9 by 1001, 10 by 1010, *etc.* The principle is that the postposition of 0 multiplies by 2 in place of by 10, as in the common system. Some properties of numbers may be more simply pre¬ sented on this plan than in the common one ; but the number of places of figures required to express a sum of any magnitude is a fatal ob¬ jection to its use. Indeed, Leibnitz himself did not recommend it for practical adoption.

BINARY STAR. See Double Stars.

BINARY THEORY, in chemistry, a hy¬ pothesis proposed by Davy to reduce the haloid salts (as NaCl) and the oxygen salts (as Na N03) to the same type, the monad Cl' being replaced by the monad radical containing oxy¬ gen (NOs)'. Acids are hydrogen salts, as HC1, or H(NOa)'. A radical is only part of a mole¬ cule, which can unite with or replace an ele-

mcnt or another radical, valence for valence. Thus the dyad radical (SCX)" can replace two monad radicals, (NOdˆ, as in the equation

Pb"NO,)2 + Mg"(SO0" = Pb"(SCh)" + Mg"

(N Oa) T A radical cannot exist in a separate state.

BINBIR-KILISSEH, ben'ber-ke-le-sa', some ruins of ancient tombs in the pashalic of Karamania, Asia Minor, 20 miles north-north¬ west of Karaman, supposed to occupy the site of Lystra, where the cripple was healed by Paul.

BINCHOIS, be'shwa', Gilles, composer of Gallo-Belgic music: b. Bins,

Hainaut, 1400; d. Lille 1460. He is supposed to have been a soldier during his earlier years, after which he became a choir singer in the chapel of Philip the Good of Burgundy. Recently some of the manuscripts of his masses have been found, containing some 50 songs in rondeau form with instrumental accompaniment, which have added considerably to a knowledge of the music of that period.

BINDING, Karl, German jurist, criminol¬ ogist and historian: b. Frankfort-on-the-Main, 4 June 1841. He studied law at Gottingen and Heidelberg and in 1873 was appointed professor of criminal law at the University of Leipzig. During 1908-09 he was rector of that institu¬ tion. Among his leading works are (Der Entwurf eines Strafgesetzbuchs fiir den Norddeutschen Bund) (Leipzig 1870) ; (Die Normen und ihre Uebertretung) (2 vols., Leipzig 1872-77) ; (Die rechtliche stellung des Kaisers im heutigen deutschen Reiche) (1898) ; (Grundriss des deutschen Strafprozessrechts) (1899, 5th ed., 1905) ; (Lehrbuch des gemeinen deutschen Strafrechts) (3 vols., 1902-05).

BINDWEED. See Convolvulus.

BINET, be'-na', Alfred, director of the laboratory of research at the Sorbonne, Paris: b. Nice, 4 July 1857; d. 1911. He went to Paris in 1871, where he made a study of medicine and law. For a time he was uncertain which career he should follow; but his deep interest in research work won the day for medicine. He became a frequent and noted contributor to the medical and other journals of Paris inter¬ ested in the special line of work to which he had decided to devote himself. He attracted attention by a book on the psychology of 'thought as applied to hypnotism (1886). This was followed by (Subconscious Thought' (1887) ; (Studies in Psychology) (1888) ;

'Changes in Personality' (1892); Hntroduction to Experimental Psychology' (1894); (Double Consciousness' (1896); (Intellectual Weariness' (1898); Suggestibility' (1900); 'Thoughts upon Children' (1900) ; (An Exper¬ imental Study of the Intelligence' (1903) ; Soul and Body' (1905) ; (Revelations made by writing under Scientific Control' (1906) ; (Abnormal Children' (1907). In several of these works Binet was aided by V. Henri, Courtier, Philippe, H. Beaunis, Th. Ribot and Simon, and in some of them one or other of these writers is acknowledged as joint author, in some others as helper or adviser. Beaunis and Ribot were joint editors with Th. Ribot of L'annec psychologique, a yearly publication de¬ voted, as its name implies, to the progress of psychology. In 1906 this journal confined its

efforts to the study of practical and social questions along the lines of Binet's favorite studies. Previous to this, Binet had been mak¬ ing deep researches, together with Simon, into the working of the human intelligence* In 1905 the joint authors published the first series of the Binet-Simon tests, an attempt to find some exact standard by which to measure de¬ grees of intelligence. This was followed by a second series along the same line in 1908. Binet and his coworkers taught, contrary to the Ger¬ man thinkers along the same lines, that the higher functions of mankind, such as intelli¬ gence, comprehension, imagination, sentiment and suggestion, varied more in the individual than other functions which had, until then, been depended upon for the judgment of mental capacity. So he and his fellow-workers set to work to invent and develop new tests such as would make it possible to make use of these higher functions in the tests for mentality. He and Simon constructed a series of graded tests based upon continuous experiments under dif¬ ferent conditions and surroundings. By these tests it is possible to determine the degree of intelligence of a child and to classify his nor¬ mality or abnormality with considerable exact¬ ness. These tests, as issued in 1908, are 56 in number and cover the ages from three to 12. They are simple tasks such as the child might be expected to perform and they are graded and grouped to suit the age of the child. A subject who performs the tests assigned to his age in a satisfactory manner is classed as nor¬ mal ; if he can perform only tasks of a child several years younger than his age, he is looked upon as sub-normal; but if he can perform those of a child several years older than his age he is classified as supernormal. Under the title <A Method of Measuring the Development of Young Children,' the Binet-Simon work of most importance was published in Chicago in 1913, and the Psychological Method of Test¬ ing Intelligence' appeared in Boston the fol¬ lowing year.

BINGEN, Germany, town of the re¬ public of Hesse, 17 miles wrest of Mainz, on the left bank of the Rhine and the right of the Nahe, opposite Rtidesheim. It contains a Gothic church dating from the 15th century. The castle of Klopp and the sanctuary of Saint Roch are situated nearby on the Rochusberg. A dangerous passage on the Rhine, called the Bingerloch, has been opened up by the blasting of sunken rocks, leaving a channel of 210 feet wide. On the opposite side of the river rises ihe Niederwald Denkmal, raised to commemo¬ rate the victories of 1870-71. In a neighbor¬ ing castle the Emperor Henry IV was detained a prisoner in 1105, and on a rock in the middle of the river stands the Mausethurm or Mouse-tower, the scene of the ancient legend of Arch¬ bishop Hatto, who was devoured by rats in 969. Drusus Bridge over the Nahe near its mouth was first built by Drusus

in 13 b.c. Bingen was a town of the Belgse and here a battle took place in 70 a.d. in which the Ro¬ mans inflicted a defeat on the Gauls. Bingen came under the rule of the see of Mainz in 1281, was taken and retaken several times dur¬ ing the Thirty Years' War and in 1689 was burned by the French, who blew up the castle, hrom 1797 to 1814 it belonged to France and

after 1815 was incorporated with Hesse. Bin¬ gen is the market for the sale of wines pro¬ duced in the neighborhood. The principal in¬ dustries are the manufacture of leather, liquors, tobacco, starch, and there is also considerable trade in cattle, grain, coal and iron. The Rhen¬ ish Technical College is situated here. Pop.

9,950.

BINGER, ban-zha, Louis Gustave, French soldier and African explorer: b. 14 Oct. 1856. He made his way from the upper Niger to Grand Bassam in 1887-89, thus connecting the French possessions with the Ivory Coast. In 1892 he was commissioner of the French gov¬ ernment to settle the Ashanti boundaries with England.

BINGHAM, Amelia (family name Smil—

ley), American actress: b. Hicksville, Ohio, 1869. After studying at the Ohio Wesleyan University, she married Lloyd M. Bingham, who died 22 Dec. 1915. Her first appearance was in the People's Theatre, New York city, in (The Power of Gold.' After six years she became leading lady at the New York Empire Theatre in (His Excellency the Governor,' playing leading roles continually thereafter. In 1901 she appeared with her own company in (The Climbers, ' (A Modern

Magdalen' and (The Frisky Mrs. Johnson.' During the sea¬ son of 1914 she played Mrs. Opdyke in Bron¬ son Howard's (The New Henrietta,' a revision of (The Henrietta.'

BINGHAM, Hiram, American Congrega¬ tional clergyman: b. Bennington, Vt., 30 Oct. 1789; d. 11 Nov. 1869. He was graduated from Andover Theological Seminary in 1819, and wras one of the first missionaries of the Con¬ gregational Church to be sent to the Sandwich Islands, where he acquired much influence with the natives.

BINGHAM, Joel Foote, American clergy¬ man : b. Andover, Conn., 11 Oct. 1827 ; d. Hart¬ ford, Conn., 18 Oct. 1914. He entered the Congregational ministry, but in 1871 exchanged it for that of the Episcopal Church. He has written (The Christian Marriage Ceremony) ; (Francesca da Rimini* (1897-1904), and Sa¬ cred Hymns and Napoleonic Ode of Alexander Manzoni' (1904), translations.

BINGHAM, John Arende, American poli¬ tician: b. Mercer, Pa., 1815; d. Cadiz, Ohio, 20 March 1900. He studied at Franklin College, Ohio, and became a lawyer in 1840. He was elected to Congress as a Republican in 1854 and retained his seat 1855-63. He was chair¬ man of the managers of the House in the impeachment of Judge Humphreys for high treason, in 1862. President Lincoln appointed him military judge-advocate in 1864 and, later in the same year, solicitor of the United States Court of Claims. He was special judge-advo¬ cate in the trial of the assassins of President Lincoln. He sat in Congress again 1866-73. He was one of the managers of the impeach¬ ment trial of President Johnson. From 1873 to 1885 he was United States Minister to Japan. Consult Foraker, J. B., "John A. Bingham" in (Publications' of the Ohio Historical Society (Vol. X, 1902).

BINGHAM, Joseph, English clergyman and antiquarian: b. Wakefield, Yorkshire, 1668; d. Havant, 17 Aug. 1723. He distinguished him¬

self as a student at University College, Ox¬ ford, and devoted his attention particularly to ecclesiastical antiquities. He was graduated in 1688 and became a fellow the following year, but had to withdraw from the university on the charge of preaching unsound doctrines. He now became curate of Headbourn-Worthy, near Winchester, and there, while possessed of a scanty living on which his numerous fam¬ ily could barely subsist, had the merit of com¬ posing one of the most learned works of which his Church can boast. This work, (Origines Ecclesiasticse, or The Antiquities of the Chris¬ tian Church,' was

published in 10 volumes octavo (1708-22) and is still a standard on the subjects of which it treats. The best modern edition is that published at the Clarendon Press (1855, 10 vols.). It was soon translated into Latin and published in Germany, and has since appeared in various languages. In 1712 he was collated to the living of Havant, near Ports¬ mouth. He lost his savings in the South Sea Bubble of 1720.

BINGHAM, Theodore Alfred, American public official : b. Andover, Mass., 14 May 1858. Graduating from the United States Military Academy at West Point in 1879, he served in the engineer corps of the army until 1890, after which he became United States military attache at Berlin and Rome. In 1897, when he had attained the rank of colonel, he was put in charge of the public buildings and grounds at Washington, in which capacity he served until 1903. He then undertook the supervision of the engineering district of Lake Ontario and Lake Erie for a whole year, after which he was re¬ tired with the rank of brigadier-general. In 1906 he was appointed police commissioner of New York city, where he served until 1911, when he was removed by Mayor Gaynor on the charge of insubordination. Later in the same year he was appointed chief engineer of highways of New York city but retired after two months' service. He was then appointed consulting engineer in the department of bridges but resigned again in 1915.

BINGHAM, William, American educator: b. North Carolina 1835. He was graduated at the University of North Carolina in 1856 and succeeded to the management of a classical school at Mebanesville, Alamance Co., N. C., which had been conducted with success by his father and grandfather. He published 'A Grammar of the Latin Language,' (A Gram¬ mar of the English Language' and (Caesar's Commentaries,' with notes and a vocabulary.

BINGHAM, Utah, town of Salt Lake County, 20 miles southwest of Salt Lake City, on the Bingham and Garfield, and the Denver and Rio Grande railroads. It contains a hos¬ pital and has large copper-mining interests. Pop. 2,881.

BINGHAMTON, N. Y., city and county-seat of Broome County, at the junction of the Chenango and Susquehanna rivers and on sev¬ eral railroads, 50 miles east of Elmira. It stands more than 867 feet above tidewater, and both rivers are here spanned by several bridges. The city is supplied with water by the Holly system, which cost over $1,500,000; has nearly 100 miles of streets lighted by electricity, and contains over 30 churches and chapels, public

school property valued at over $1,175,000, a public library, two national banks and assessed property valuation (1910) exceeding $31,486,554. Among the attractions of Binghamton, which has been named the <(Parlor City,® are Ross Park, Ely Park and O'Neil Park, and the driv¬ ing parks and fair grounds. The noteworthy buildings include the State asylum for the in¬ sane, United States government building, State armory, courthouse, city hall, two orphan asylums, an opera house and the Casino and the home office building of the Security Mutual Life Insurance Company. Binghamton ranks as the third cigar-manufacturing city in the United States, and according to the census of manufactures for 1914, it then had 245 indus¬ trial establishments of factory grade, employ¬ ing 8,413 persons, of whom 7,428 were wage-earners, receiving annually $3,653,000 in wages. The capital invested aggregated $18,237,000, and the value of the year's output was $18,360,000; of this, $7,976,000 was the value added by manu¬ facture. Other important manufactures are valves, cigars, silks, scales, chemicals, furniture, sheet-metal work, glass, gloves and refined oils. An interesting feature of the city is the large number of cottages owned by the .working peo¬ ple. Binghamton received a city charter in 1867. Pop. (1900) 39,647; (1920) 66,800.

BINGLEY, England, town of the West Riding of Yorkshire, on the Aire, five and one-half miles northwest of Bradford, 15 miles northwest of Leeds and on the Leeds-Liverpool Canal. The town contains the interesting church of All Saints (restored 1871) in the Per¬ pendicular style, several other places of wor¬ ship, an endowed grammar school and a me¬ chanics' institute. The chief industries are worsted-spinning, cotton and paper manufac¬ tures. The town has a public library, free pub¬ lic baths and owns its water and gas works. Pop. 18,759.

BINMALEY, bin-ma-la'e, Philippines, a town of the province of Pangasinen, Luzon, situated on the Gulf of Lingayen, in the west¬ ern part of the island of Luzon, only a few miles east of the town of Lingayen. Pop.

13,787.

BINNACLE, a brass or wooden stand sup¬ porting a helmet-shaped hood in which is placed a ship's compass. In the front of the hood is a glass-covered aperture through which the helmsman may observe the compass, and on each side is an opening into which are fitted the lights illuminating the compass at night.

BINNEY, Amos, American merchant and naturalist: b. Boston, Mass., 18 Oct. 1803; d. Rome, Italy, 18 Feb. 1847. He was graduated at Brown University in 1821, engaged in busi¬ ness with success and devoted his leisure to natural science. He was one of the founders and, at the time of his death, president of the Boston Society of Natural History. His writ¬ ings on the land shells of America are in the (Journal' and (Proceedings) of that Society. His chief work, (Terrestrial and Air-Breath¬ ing Mollusks of the United States and Adja¬ cent Territories of North America) (3 vols., 1847-51), was issued under the direction of Dr. A. A. Gould. Binney was a patron of artists and scientists and did much to advance the study of natural history in America. The

Museum of Comparative Zoology, Harvard University, contains the collection of land and fresh-water shells of North America and prep¬ arations of their anatomy made by Amos Bin¬ ney and his son.

BINNEY, Hibbert, Canadian clergyman : b. Cape Breton Island, 12 Aug. 1819; d. 1887. He was graduated at Oxford University in 1842. He became bishop (Anglican) of Nova Scotia in 1851.

BINNEY, Horace, American lawyer: b. Philadelphia, 4 Jan. 1780; d. 12 Aug. 1875. He was graduated at Harvard in 1797, and for many years was at the head of the Pennsyl¬ vania bar. He had a number of distinguished cases in his career, the most noted one being the defense of the city of Philadelphia against the executors of Stephen Girard. He was a member of the 23d Congress, in which he op¬ posed the Administration in the question of removing public funds from the United States Bank, and a director in the United States Bank. He withdrew from active practice and confined himself to the preparation of written opinions. In 1850 he retired altogether. He was fre¬ quently called upon to address great public gatherings. He wrote many valuable papers and was the author of (The Leaders of the Old Bar of

Philadelphia) (1858); (The Privi¬ lege of the Writ of Habeas Corpus Under the Constitution, } in which he supported Lincoln's policy of suspending the right of habeas corpus during the Civil War; and (Reports of Cases in the Supreme Court of Pennsylvania) (6 vols., 1814) ; Wife and Character of Chief Justice Tilghman) (1827); Wife and Character of Chief Justice Marshall* (1835) ; ˆSketch of the Life and Character of Justice Bushrod Wash¬ ington } (1858). Consult Binney, C. C., Wife of Horace Binney) (Philadelphia 1903).

BINNEY, Thomas, English theologian : b. Newcastle-on-Tyne 1798; d. 24 Feb. 1874. A bookseller's apprentice in his youth, he worked from 7 in the morning till 9 at night. He was trained for the Congregationalist ministry at Wymondley Seminary, Hertfordshire ; served after ordination (1824) at Bedford and New¬ port, Isle of Wight, and in 1829 was called to the Weigh House Chapel, London, where he ministered for 40 years. He was a voluminous writer on polemical subjects, vehemently anti-Ritualistic; raised a storm of controversy over a statement he made that (<the Church of Eng¬ land damned more souls than she saved,® but regarded with regret the baldness of Noncon¬ formist Church services and was the first to cause the prose Psalms to be chanted in public worship. He was the author of (Is It Pos¬ sible to Make the Best of Both Worlds?* and the hymn (Eternal Light! Eternal Light ! } Consult H. Alton's <Memoir) prefixed to his sermons, and Wives* by Paxton Hood and I. Stoughton (1874).

BINNIE, Sir Alexander R., English civil engineer : b. London, 26 March 1839. He was educated at private schools. He worked on Welsh railways 1862-66 and for the Indian Pub¬ lic Works Department 1868-74; was engineer of the city of Bradford 1875—90 ; constructed the Nagpore waterworks, the Blackwall tun¬ nel, the Bradford waterworks, the Parking Road Bridge, *etc.* In 1897 he was made chief

engineer of the London county council and in the same year he was knighted. His publica¬ tions include articles and reports on profes¬ sional subjects, lectures on waterworks, papers on rainfall, *etc.*

BINNS, Charles Fergus, ceramic expert : b. Worcester, England, 4 Oct. 1857. A son of the director of the Royal Porcelain Works in his native city, he was superintendent of vari¬ ous departments there 1872-97. Leaving Eng¬ land in the last-named year, he became prin¬ cipal of the Technical School of Science and Art, Trenton, N. J., 1897-1900, and since June 1900 has been director of the New York State School of Clay Working and Ceramics, Alfred, N. Y. He has written (Ceramic Technology) (1896); (The Story of the Potter) (1897); 'The Potter's Craft) (1910), and has contrib¬ uted extensively to the (Transactions) of the American Ceramic Society.

BINOCULAR MICROSCOPE. See Mi¬ croscope; Opera Glass; Telescope, *etc.*

BINOMIAL, in algebra, a quantity con¬ sisting of two terms or members, connected by the sign + or — . The binomial theorem is the celebrated formula which shows how to obtain any power of a given binomial, as a + b, from the two terms, a and b , and the exponent of the power. It gives as the value for (a + b)n

ak bn

k ! (n — k)'

for all integral values of k for which the ex¬ pression has a meaning. This theorem, fre¬ quently called the Newtonian theorem, was known, as far as relates to integral positive exponents, to several mathematicians before Newton. But Newton was the first who taught its application to fractional and negative ex¬ ponents ; and this discovery, one of the most important of those made by that great man, is engraved upon his tombstone. The discovery of the correct understanding of the limitations under which this theorem is valid, however, be¬ longs to the last century.

BINONDO, Philippines, a native town near Manila, on the right bank of the Pasig, now a suburb of the walled European city, haying been annexed to it by a magnificent stone bridge 411 feet in length. The bridge of Binondo is regarded as the most remarkable structure ever erected by Europeans in the Indian archipelago.

BINTURONG, a large civet of the Malay Peninsula and islands (Arctitis binturong), which spends its life in the trees, where it is assisted in climbing about by its long, bushy, prehensile tail. It passes the day asleep in the top of a tree and travels about at night in search of small mammals, birds, etc., but also eats leaves and fruit. It is dirty

yellow when young, but black when fully grown, and reaches a length of two and a half feet, exclusive of its long tail, which may measure six feet 10 inches in length.

BINUE, bin we, or BENUE, Africa, the largest and most important tributary of the river Niger. See Benue.

BINYON, Laurence, English poet: b. Lancaster, 10 Aug. 1869. He has been an assist¬

ant in the British Museum from 1893 and assistant keeper from 1909. Besides editing the ‘ Shilling Garland) (1895-98) he has pub¬ lished (Lyric Poems } (1894); <Poems> (1895); ‘London Visions) (1895-98); ‘The Praise of Life) (1896); (Porphyrion and Other Poems> (1898).; ‘Western Flanders) (1898) ; (Odes> (1900); ‘Catalogue of English Drawings in the British Museum> (1898-1907); (Attila> (1907) ; ‘England and Other Poems) (1909); ‘The Flight of the Dragon) (1911) ; ‘Botti¬ celli) (1913); ‘Auguries) (poems, 1913); ‘The Winnowing Fan’ (1915) ; ‘Bombastes in the Shades) (1915). Consult Streatfield, ‘Two Poets of the New Century.)

BINZ, Karl, German physician and phar¬ macologist: b. Bernkastel, 1 July 1832; d. 1913. After studying at Wurzburg, Bonn and Berlin he became, in 1868, professor at Bonn. In the following year he founded the Pharmacological Institute of Bonn. He was the first to demonstrate the action of quinine and he has done much important research in pharmacology and pathology. He has written many works, among which are ‘Ueber den Traum.) (1878) ; ‘Vorlesungen fiber Pharma-kologie) (1891) ; ‘Aether gegen den Schmerz) (1896) ; ‘Rezeptsfinden und ihre Folgen)

(1899).

BINZER, August Daniel von, German author: b. Kiel, 30 May 1793; d. Reisze, 20 March 1868. He studied law at the universi¬ ties of Kiel and Jena, after which he was both teacher and newspaper editor for some years. Among his works are ‘Die Dammerungsstun-den der Familie AberC (Altona 1833) ; ‘Venedig im Jahr 1844) (Pest 1845) ; a German trans¬ lation of Benjamin Franklins’ ‘Autobiography and Writings) (Kiel 1829) ; ‘Erzahlungen und Novellen) (in collaboration with his wife, under the pseudonym “A. T. Beer,® 3 vols., Leipzig 1836). He is also the author of several songs still popular in Germany,

among them one beginning with the line “Wir hatten gebauet ein stattliches Haus.®

BIO-BIO, be‘6-be’o, Chile, an eastern prov¬ ince with Concepcion on the north, the Argen¬ tine territory of Neuquen on the east, Malleco and Cautin on the south, and Arauco on the west. Its area is 4,158 square miles. The rainfall is rather excessive and the variations in temperature are somewhat extreme. There are three departments, La Taj a, Mulchen and Nacimiento. The capital of the province is Los Angeles, situated in the Central or Longi¬ tudinal Valley (see Chile) on the banks of a tributary of the Bio-Bio River. It is a mountainous province, with moderately high peaks and good valleys. Viticulture is carried on in the north ; there are herds of cattle on the pastures ; the cereals are cultivated and the forests exploited. Pop. over 100,000.

BIO-BIO, the largest river of Chile. It has a west-northwesterly course of about 200 miles, from near the volcano of Antuco in the Andes to Concepcion on the Pacific Ocean. It is two miles wide at its mouth, and is navi¬ gable for 100 miles.

BIOGENESIS, (1) the theory of the gene¬ sis or origin of all living beings from living beings. It is opposed to abiogenesis, which im-

plies that at the present time the simplest, lowest forms of life may arise by spontaneous generation (q.v.) The principle of biogenesis was first placed on a scientific basis by Har¬ vey, who demonstrated that living beings arise from eggs, as stated in his famous aphorism, omme vivum ex ovo. As now modified all organisms are known to arise from living mat¬ ter, that is, either from germs, spores, seeds or eggs. (2) The history of a living organism biogenesis, or biogeny, is divided into ontogeny , or the development of any individual organism, and phytogeny, or the development of the class or other group of organisms, to which the indi¬ vidual belongs. (3) Biogenesis also may be interpreted as meaning the different modes of reproduction (q.v.) whether sexual, or asexual or by fission or budding. See Botany ; Evolu¬ tion ; Embryology ; Zoology, *etc.*

BIOGENETIC LAW. See Recapitula¬ tion Theory.

BIOGRAPH, an apparatus that displays in rapid sequence a long series of photographs. It belongs to a class of apparatus which fol¬ lowed the invention of the kinetoscope, and includes the vitascope, cinematograph, phan-toscope, *etc.* It differs from the kinetoscope in that instead of showing small pictures through an enlarging lense by reflected light, it projects them on a screen. The biograph may be described as a stereopticon combined with such mechanism as is requisite for the precise manipulation of the celluloid picture film. When the apparatus is set in motion the long band of celluloid passes quickly, though not continuously, behind the projecting lens, between spools or bobbins which revolve at a uniform rate. While thus passing from its original spool to the winding reel the film en¬ counters certain pulleys and toothed rollers that serve to direct its movements accurately. Along its edges are numerous small perfora¬ tions into which the teeth of the rollers fit with precision, and by this means, the small transparencies are made to occupy exactly simi¬ lar positions when their images are projected upon the canvas. As each picture in its turn attains this critical position it is momentarily brought to a standstill. At the same time a shutter is opened and an image of the picture flashes for an instant upon the screen. The shutter is then quickly closed, the picture re¬ suming its motion, while its successor in the series is brought into a similar fixed situation. This temporary stoppage of the film (or rather of a portion thereof), as each picture attains its proper place behind the projecting lens, is a very essential feature of the process.

At the instant of its arrival a portion of the film on the preceding side of the picture will be in an unstrained or slack condition. The ˆslack® is then taken up by a continu¬ ously moving sprocket pulley, whereupon a rod or roller is quickly brought to bear against the now tightened film, pressing it to one side and as quickly releasing it. By this move¬ ment the next picture is pulled into its fixed position, while the film is made taut (or nearly so) on the following side of this pic¬ ture. These operations are repeated contin¬ uously until the entire film has passed through the holding device in rear of the lens.

The camera used in taking the negative from which motion pictures are made is pro¬ vided with a similar mechanism to that em¬ ployed in showing the finished photographs. The picture roll is replaced by a roll of sen¬ sitized film, upon which the exposures are made at the rate of from 25 to 50 per second. The films range in length from 50 to

200 feet, and contain, when finished, from 800 to

3,000 negatives. After the film has been sub¬ jected to the usual photographic operations it is made to pass, in contact with a second sensitized film, beneath an incandescent lamp, and by this means the photographs are

printed upon the sensitized surface. This

second film is then in turn passed through the various photographic processes, and when complete it is wojLind on a spool which may then be placed in the machine used for exhib¬ iting the pictures.

BIOGRAPHIA LITERARIA. Samuel Taylor Coleridge's (Biographia Literaria) was originally intended as a mere preface to a col¬ lected volume of his poems, explaining and

justifying his own style and practice in poetry. The work grew under Coleridge's hands to a literary autobiography, including, together with many facts concerning his education and studies and his early literary adventures, an extended criticism of Wordsworth's theory of poetry as given in the preface to the (Lyrical Ballads) and a statement of Coleridge's philo¬ sophical views. The work was published in two volumes in 1817. In spite of its miscel¬ laneous character, the (Biographia) remains one of the few prose works of Coleridge which continues to be read, and it is valuable as being the chief vehicle of his very important contri¬ butions to critical theory. In the first part of the work Coleridge is mainly concerned with showing the evolution of his philosophic creed. At first an adherent of the associational psy¬ chology of Hartley, he came to discard this mechanical system for the belief that the mind is not a passive but an active agency in the apprehension of reality. The discussion in¬ volves his definition of the imagination or ((emplastic power,® the faculty by which the soul perceives the spiritual unity of the uni¬ verse, as distinguished from the fancy or merely associative function. The later chapters deal with the nature of poetry and with the ques¬ tion of diction raised by Wordsworth. While maintaining a general agreement with Words¬ worth's point of view, Coleridge elaborately refutes his principle that the language of poetry should be one taken with due exceptions from the mouths of men in real life, and that there can be no essential difference between the lan¬ guage of prose and of metrical composition. A keen and appreciative critique on the quali¬ ties of Wordsworth's poetry concludes the vol¬ ume. Consult (Biographia Literaria,* edited by J. Shawcross (London 1907), and Elton, Oli¬ ver, (A Survey of English Literature, > con¬ taining the best discussion of

the issue between Coleridge and Wordsworth.

James H. Hanford.

BIOGRAPHY, in its general sense, litera¬ ture treating of. the lives of individuals ; in its restricted meaning the history of a person's life. When composed by the subject of the

narrative it is called an autobiography. Biog¬ raphy has existed in one form or another from the most ancient times. In the book of Genesis there are biographies, or at least memoirs, of Adam, Noah, Abraham, Isaac, Jacob, Joseph and others. Homers 'Odyssey) may be con¬ sidered as an extended biography of Ulysses, limited, however, to the most interesting period ot his life, that of his wanderings. Though the <Iliad) may be loosely called a history of the Trojan War, yet, accurately, it is a chapter from the biography of Achilles, describing calamities he brought upon the Greeks by the revenge which he took on Agamemnon for carrying off his female captive Briseis. The most elaborate Greek biography was Plutarch's 'Parallel Lives) ('Bioi ParalleloP), consisting of 46 memoirs of Greek, Roman and other celebrities ; it was published about 80 a.d. In 44 b.c. Cornelius Nepos had sent forth a bio¬ graphical work, his 'Vitae ImperatorunP ('Lives of Commanders)). Under the Greek and Roman civilization, however, the individ¬ ual was absorbed in the state. When Cincin-natus or Coriolanus is mentioned, we recall rather an act than a person. Thp elder Cato wrote a history of the Roman republic, in which there was not found a single proper name. He said simply : (<The consul proposed such a law, the general gained such a battle/0

Biography differs from history, properly so called, in considering public and national events, if at all, only in their relations to a single personage. It assumes various forms, being sometimes most interested in the circum¬ stances and external career, the curriculum vitcc, of its subject; sometimes regarding chiefly intellectual and moral qualities and develop¬ ment ; sometimes being hardfy more than a catalogue of a 'man's positions and changes of position; and sometimes, like the

autobiography of Goethe, fit to be entitled truth and poetry; sometimes being formally narrative through¬ out, but often presenting the hero also by his letters and notes of his conversation. A biog¬ raphy may be a panegyric or a diatribe, or the life of a man may be used as only a frame on which to attach moral reflections. Its true aim, however, is to reveal the personal significance of those men who have played a distinguished part in the world, either by action or by thought. History has reference to the development of principles, biography to that of character. To observe the growth of a nation or of any in¬ stitution from the idea on which it was grounded, through its vicissitudes and conflicts, is the part of history. To trace a human life, to remark the manifold efforts, defeats, tri¬ umphs, perplexities, attainments, sorrows and joys which fill the space between the cradle and the grave is the province of biography. In history, Scipio at the head of the Roman legions subdued Africa, and Agesilaus struggled against the misfortunes of his country; in biography, the former is seen not only gaining victories, but also gathering cockle-shells on the shore, and the latter not only fighting after defeat, but also riding on a hobby-horse among his children. Plutarch says it does not follow be¬ cause an action is great that it therefore mani¬ fests the greatness and virtue of him who did it, but, on the contrary, sometimes a word or a casual jest betrays a man more to our knowl¬

edge of him than a battle fought wherein 10,000 men were slain, or sacking of cities, or a course oi victories. Xenophon remarks that the sayings of great men in their familiar dis¬ courses and amid their wine have somewhat in them which is worthy to be transmitted to posterity.

Modern biographical literature may be con¬ sidered to date from the 17th century since which time individual biographies have multi¬ plied enormously. Dictionaries of biograph)" have proved extremely useful, Moreri's 'His¬ torical and Critical Dictionary) (1671) being, perhaps, the first of this class. During the 19th century there were published the 'Univer¬ sal Biography > (85 vols., 1811-62); 'New Gen¬ eral Biography) (46 vols., 1852-66) ; Chalmer's 'General Biographical Dictionary' (32 vols., 1812-17) ; Rose's 'Biographical Dictionary) (12 vols., 1848-50); Leslie Stephen's 'Diction¬ ary of National Biography) (completed in 63 volumes, the first of which appeared in Janu¬ ary 1885 and the last in September 1901) ; Appleton's 'Cyclopaedia of American Biog¬ raphy) (7 vols., 1887-1900) ; White's 'National Cyclopaedia of American Biography) (New' York) ; 'Men and Women of the Time) (Lon¬ don) ; 'Who's

Who) (London) ; 'Who's Who in America) (Chicago) ; Adams' 'Dictionary of American Authors) (1901) ; Vapereau's 'Universal Dictionary of Contemporaries) (Paris); 'Lamb's Biographical Dictionary of the United States) (8 vols., 1897 et seq.) ; and 'Canadian Men and Women of the Time.) Among works of more limited aim rnav be noted various 'Lives of the Saints) ; Fox's 'Book of Martyrs); various 'Lives of the Poets); Boswell's 'Life of Johnson) (1791), the most noted of all English biographies; Lockhart's 'Scott) (1836-38) ; Forster's 'Dick¬ ens) (1872-74) ; Gaskell's 'Charlotte Bronte); Cross' 'George Eliot) (1884) ; Lonsdale's 'Sis¬ ter Dorothea) (1878); 'Life of Tennyson,) by his son (1897); 'Life of Huxley,) by his son (1901); 'The Life of Gladstone,) by John (afterward Lord) Morley (1903) ; 'The Life of Benjamin Disraeli, Lord Beaconsfield,) by E. Monypenny) (1910-16). Among notable autobiographies are the first Lord Herbert of Cherbury's 'Autobiography) ; Benvenuto Celli¬ ni's 'Vita da lui medesimo scritta) ; Pepys' 'Diary) ; Rousseau's 'Confessions) ; Gibbon's 'Memoirs) ; Franklin's 'Autobiography) ; New¬ man's 'Apologia Pro Vita Sua) (1864; new ed., New York 1913) ; Bismarck's 'Autobiog¬ raphy) (2 vols., trans. by Butler, New York 1899).

BIOLOGICAL SURVEY, Bureau of. A

Bureau of the Department of Agriculture. The bureau has charge of game preservation and protection and the importation of foreign birds and animals, studies the economic relations of birds and mammals to agriculture and investi¬ gates the geographic distribution of animals and plants with reference to the determination of the life and crop belts of the country. The bureau has also made a particular study of noxious mammals and birds with the object of exterminating them if necessary. It co¬ operates with the State fish and game com¬ missions and other departments regarding the interstate commerce in game and plumage for the encouragement of game-farmers. See Ag¬ riculture, Department of.

BIOLOGY. The study or science of living organisms, and the phenomena of life. Its field is the whole breadth of the organic world,

and it seeks to mark the boundaries which separate living from inorganic nature, — to discover the principles that unify it, the processes by which living things have developed, the nature of life itself and the future in store for it. Biology, then, is the sum of all the special departments of study which deal with plants, animals and man in his animal relations, such as botany, zoology, anthropology, and their subordinate or associated sciences ; that is, bacteriology, micro¬ scopy, physiology and many more. In his out-reaching toward the causes and principles under¬ lying its phenomena, the philosophical biologist must therefore understand organic chemistry, and the laws of electricity, light, heat, and mechanics, as they relate to animal needs ; and at the other extreme he must consider psychol¬ ogy as an integral part of his domain.

This array of responsibilities and of objects for investigation seems too formidable for any one mind to undertake or a lifetime to encom¬ pass, and it would be were not the realm of living nature capable of resolution into simple elements; unified in its fundamental structure; and controlled in its developmental growth by definite “laws of being,® which have come more and more clearly into view as knowledge of details has increased. The classification and co-ordination of the enormous mass of facts in¬ cessantly poured into his laboratory and library by experimenters and observers, to illuminate the truth by some generalization, or to exhibit a plan, law, type of structure or growth, is the high purpose of the thoughtful biologist; and the greatest names in the science, — Aristotle, Leibnitz, Harvey, Malpighi, Linne, Buffon, Lamarck, Treviranus (who in 1802 first used the term biology), Cuvier, Galvani, Goethe, Lyell, Von Baer, Owen, De Blainville, Leuckart, Agassiz, Darwin, Wallace, Kowalewsky, Muller, Haeckel, Marsh, Cope, Hyatt, Weismann and many others, — have been those of men who had these large aims in view, and have contributed toward a solution of the great problem of life. The living world may be pictured as an enor¬ mous bundle of tangled and interlaced cords of phenomena, which, moreover, are never quite stationary and fixed, but are always slowly, in¬ visibly, altering and forming new entangle¬ ments. Every naturalist is at work upon some part of this bundle, endeavoring to extricate his particular part. In more cases he pays so little attention to anything else, and is so fascinated with the beauty of his single strand, that he draws but little out. In other cases men of larger view or more serious purpose, or societies of them co-operating, disentangle more. The great biologist is he who can per¬ ceive those who have found a clue, and is able to teach them and the others how still more surely to unravel the intricate threads of phe¬ nomena that entwine and conceal the great

fact of life at the centre of the puzzle.

To drop the figure, the science of biology in its more restricted and ordinary meaning is the co-ordination of the observed facts and manifestations of the organic world into laws, and the discovery of the principle from which all proceed; that is, its object is to find an answer to the ever-present question of exist¬

ence — What is Life? To this end goes on the incessant collection of facts in natural his¬ tory, and it goes on joyously because any moment the biologist may come upon some fact or suggestion which shall contribute to the grand result.

Progress has been made. The study at first was nothing but a miscellaneous gathering of specimens and records of observations. Then a crude sorting out began. Men at first failed to distinguish between what was animate and what was inert. The winds, the lightning, vol¬ canoes, springs were things of life. Later the broad distinction of organic from inorganic was perceived, but even now it is not known whether some of the manifestations of move¬ ment and response in certain “slimes® are purely chemical, or due to the presence of ac¬ tual life.

The next step was the separation of the two great branches of the organic world — plants and animals. The broad features of these groups must have been apparent to primi¬ tive man, but it is only within comparatively recent years that such groups as the sponges, the branching forms of the corals, the spread¬ ing growths of the polyzoans, have been def¬ initely placed among the animals. The names, “sea-anemone,® “moss-animal,® “zoophyte,® and the like, show the popular error or doubt as to these forms. The relationship of the minute or even microscopic hydroids and pro¬ tozoans were still longer in doubt ; and to this day there is a borderland in this great group (the Protozoa) of minute, unicellular objects where no one is able to draw a certain line between what should be called a plant and what an animal, or even whether some of the ob¬ jects are organic at all.

As men perceived certain . likenesses and unlikenesses the sorting of plants and animals went on crudely at first, on purely superficial or even fanciful grounds. This sufficed fairly well for some large and well-marked groups, as beasts, birds, fishes, insects, hardwood trees and the like, yet led to many mistakes, such as placing whales with

the fish and the bats with birds. Meanwhile students here and there had become interested in special groups, and each called his pursuit a science. Thus arose Orni¬ thology — the study of birds: Conchology, the study of shells (in which for a long time little attention was paid to the animal that made them!); Anatomy and Physiology, the study of structure, at first confined wholly to the human form, and only lately to animals in general, when it was distinguished as Compara¬ tive Anatomy; Botany, the study of plants; and so on. In each, men gathered and recorded specimens and facts, as a rule from a single neighborhood. Nevertheless, curiosity began to inquire beneath the surface. Plants were pulled apart, animals dissected and resemblances and contrasts of structure were noted. Naturalists traveled, and found that the creatures of the world were more numerous than had been sus¬ pected, and varied with climate, soil, height above the sea and diverse conditions, and when records and specimens from many localities were gradually accumulated in great 'museums, like¬ nesses and contrasts appeared that had not been visible in the small local cabinet. Materials were thus obtained for more intelligent ar¬ rangement, and classification became one ©f

the most important sciences in the scope of biology. The great service an accurate arrange¬ ment of living things would render to an in¬ quirer as to their nature was perceived, and scientific men everywhere searched for facts which should fill the gaps in their knowledge. The criteria were made more and more exact, and as classification was perfected it became increasingly evident that the criteria for all branches were substantially similar, and there came to be perceived certain plans of structure. One of the latest and most powerful aids to investigation, the result of the perfecting of the microscope, was the science of Embry¬ ology, or the study of the development of a plant from the seed or of an animal from the egg. It went hand in hand with Histology, the study of tissues, and both disclosed the new truth that the structure of both animals and plants was at its basis the same— a cell filled with (<life substance® (protoplasm) ; and that the multiplication of these cells constituted the growth, and their

arrangement and limit the form and bulk, of every animal and plant. It was furthermore ascertained that an egg or a seed (in which it is believed that every animal plant begins, in spite of some apparent excep¬ tions) was simply a cell differing, so far as we can yet see, from other cells in the body only by its possession of the potentiality of inde¬ pendent life under the fostering of suitable conditions. Classification had already shown that its groups might be arranged in some¬ thing like a series from those very simply organized (the one-celled protozoa at the foot of the list) up to the highly complex. Now embryology showed that the changes each indi¬ vidual passed through from egg to birth were a series of changes from simplicity to com¬ plexity and furthermore that they suggested a parallel to the features of the successive groups in classification, especially to those of the subordinate ranks of the subject's own class. Palaeontology enforced this by a similar parallel, finding that the most ancient animals fossil in the rocks were of simple and general¬ ized structure as compared with those of more modern geological formations : in other words, that structural development has also been his¬ toric development.

All these facts changed the point of view of the biologist. Instead of looking at separate animals and seeking to find differences upon which to make new species and subdivide groups, he is now seeking for likenesses — points of unity. It was long ago suggested to thoughtful minds that the world was not al¬ ways as we found it, but that for a vast period there had been a slow, persistent growth and unfolding. The phenomena of the inorganic world pointed the same way, and hence arose the <(nebular hypothesis® — the explanatory theory that the universe developed from a gase¬ ous state, and the earth, as one of its parts, was slowly perfected in pursuance of the forces inherent in its origin. Biologists are only carrying this theory out in a detail when they argue that the facts in their hands can be ac¬ counted for only by the supposition that the living beings on the earth have been slowly developed from a primitive source, comparable to the germ-cell, along unequal and ramifying lines of progress under the influences of their

changeable environment. This is only a de¬ tail, — a flower, — of the general unfolding of the universe which is well called its evolution ; it is an organic evolution.

In the light of this grand generalization biology is now progressing with an organized force for investigation of the great question as to

the origin and nature of life. This has not been answered by any of the fruitful hypoth¬ eses, like those of Darwin or Lamarck, which have placed such effective tools in the biologist's hands. Toward the solution of this problem all scientific men are working, consciously or unconsciously. In aid of this purpose are pushed forward the incessant and world-wide collection and preservation of preserved ani¬ mals and plants — museum specimens ; and the systematic and accurate observation and rec¬ ord of local species and their habits and in¬ stincts. Much of this seems trivial and dry as dust in the eyes of the ignorant or of those whose minds, being occupied with other thoughts, forget the reason and tendency for these ever-multiplied details of natural history. Patient students toil to the same end in labora¬ tories of anatomy and microscopy, laboriously gather statistics of variation, compile lists of geographical distribution, chisel out of the rocks remains of extinct races, and sort and re-sort in experimental classifications — all this in order to provide the generalizers of the science with more and better factors for the solution of the great focal problem. What is Life, and how came it to be? What has been the net result so far? In one direction the conviction of the universal eminence and force of the principle of evolution; in another the realization of the independent life and action of each separate cell. To the study of the constitution, qualities and behavior of the cell, whether standing alone in the unfertilized egg, or as a naked monad, or one in an inter¬ dependent association of millions building up a complex organism, has biology come at last; and not until it has vanquished the difficulties presented by this atom of living and potential protoplasm, the cell, will it accomplish its full purpose.

Ernest Ingersoll, Author of (The Life of Animals P

BION OF ABDERA, Greek mathemati¬ cian: lived about 400 b.c. He was a pupil of Democritus and is said by Diogenes Laertius to have been the first who taught that there were countries in the world where the year consists only of a single day and a single night, each lasting for six months (Diog. Laertius, iv, 58). He must therefore have been ac¬ quainted both with the spherical form of the globe and the obliquity of the ecliptic. Unfor¬ tunately nothing more is known of his history. He is probably the same one whom Strabo (i, p. 29) calls an astrologer.

BION OF BORYSTHENES, Greek phi¬ losopher contemporary with Eratosthenes (born about 275 b.c.) and with Zeno the Stoic. Laertius has preserved an account which Bion gives of his ancestry (iv, 46). His family was sold as slaves and he fell into the hands oi a rhetorician

who made him his heir. He studied philosophy at Athens, first under Crates of the Cynic school, then took lessons of Theodorus,

surnamed the Atheist ; and at last, consider¬ ing his studies completed, set up for himself. It is not easy to ascertain what his opinions were, as only a few fragments of his numerous writings have been preserved, but he was ac¬ cused of Atheism, and apparently on good grounds, as he is said to have regarded all questions relative to the nature of the gods and divine Providence as indifferent. He died at Chalcis in Euboea about 241 b.c. His habits of life were avowedly infamous. Many of his witticisms have been preserved by Laertius. Horace ranks him as a brilliant satirist (Epist. ii, 2, 60), and Cicero preserves one of his say¬ ings (Tusc. iii, 26). He is also referred to by Athenaeus (xiii, p. 591, f. 592).

BION OF SMYRNA, Greek pastoral poet, who flourished in the latter part of the 3d cen¬ tury b.c. He was a contemporary of Theocri¬ tus whose manner he imitated. On attaining manhood, Bion emigrated to Sicily, where a conspiracy was formed against him and he was basely poisoned. The poems of Bion were chiefly pastoral, occasionally erotic. The frag¬ ments of them that are extant fully justify the eulogies of his admirer, Moschus. Their senti¬ ments are tender and delicate; their style is copious, graceful and polished. Seventeen short poems and the famous (Lament for Adonis) are preserved to us, the last-named furnishing the model for Shelley's <Adonais,) edited by Ahrens (1855) ; Meineke (1856) ; Ziegler (1868) ; Williamowitz-Moellendorf, (Adonis> (1900). Consult Smyth, (Greek Melic Poets) (1900) ; Susemihl, (Geschichte der griechischen Litteratur in der AlexandrinerzeiC (Leipzig 1891) ; Edmonds, (The Greek Bucolic Poets) (London 1912).

BIONDO, Flavio, byon'do fla'vyo, Italian archaeologist: b. 1388; d. 1463. He was sec¬ retary to the Popes Eugene IV, Nicholas V, Calixtus III and Pius II. His encyclopedias have served as the foundation for all subse¬ quent collections of archaeological knowfledge. They were called Toma instaurata,* Toma triumphans) and (Italia illustrataP His

works and manuscripts are preserved in the Vatican, at Dresden and at Oxford.

BIONOMICS, in biology, the study of the habits and modes of life of animals or plants and their relations to each other, to all living beings and to the world around them. It cor¬ responds to ˆecology® and to <(biology® as used by German naturalists. Wasmann defines bi¬ ology in the restricted sense of bionomics as —

“The science of the external conditions of existence, which pertain to organisms as individuals and at the same time regulate their relations to other organisms and to the inorganic environment.”

It therefore, he says, embraces in its restricted

sense —

“First, a knowledge of the mode of life of animals and plants, their nourishment, dwelling, mode of propagation, the care of offspring and their development, in so far as these present external manifestations; hence also, second, a knowledge of the life-relations that obtain between indi¬ viduals of the same and different species (including all the phenomena of parasitism, symbiosis, etc.), and hence also, third, a knowledge of the conditions of existence which are essential to the life and maintenance of animals and plants.”

By conditions of existence are meant the action on plants and animals of climate, soil, light, gravity, heat, the dryness or moisture in the air and soil ; the nature of the water, whether salt,

fresh or brackish; currents of air and of water; elevation above the sea, also any other physi¬ cal and biological agents in causing variation in or modification of organisms. As Wheeler states :

“Whenever we undertake the detailed or exhaustive study of an ethological problem, we are led imperceptibly into the details of physiology, morphology, embryology, taxonomy, or chorology, according to the particular aspect of the subject under consideration.”

Many of these subjects, falling under the head of bionomics, are treated under the head of evolution (q.v.), as the struggle for exist¬ ence, mimicry, *etc.* Another department of bio¬ nomics is geographical distribution and distri¬ bution in time, together with migration, hered¬ ity, hibernation and seasonal dimorphism. The word

bionomics® seems preferable to <(ethol-ogy,® which has been used as the name of the science of ethics ; it is also the more compre¬ hensive term. Consult papers by Bessey (Sci¬ ence , XV, p. 593) ; Bather (Science , XV, p. 748) ; Wheeler (Science , XV, 20 June 1902). The writings of Reaumur, Audubon, Huber, Lubbock, Plateau, Fabre, Ford, Wasmann, Riley, Wheeler and others deal especially with the habits and economy or bionomics of insects (bees and ants) and birds. Consult also Waether, (Einleitung in die GeologieP parts i, ii ; (Bionomie der Meeresthiere) and (Lebens-weise der MeeresthiereP See Ecology.

BIOPLASM, that portion of the proto¬ plasm in living bodies that possesses the physio¬ logical qualities of life. This term was first used by Prof. L. S. Beale, an English scientist; the word protoplasm had formerly been used in an analogous sense, but Professor Beale con¬ sidered that a much wider meaning had been given to this latter term by Huxley and others and therefore introduced the use of the word bioplasm with its narrower signification.

BIOT, be-o, Edouard Constant, French authority on China, son of Jean Baptiste Biot (q.v.) : b. Paris, 2 July 1803; d. 12 March 1850. After accompanying his father on a scientific tour to Italy in 1825-26, he undertook the con¬ struction of a railway from Lyons to Saint Etienne, the first in France. In 1833 he retired from active life and devoted his leisure to the study of the Chinese. He was the author of numerous articles in the Journal des Savants and Journal Asiatiquc, as well as of the (Dictionnaire des Noms, Anciens et Modernes, des Villes et Arrondissements compris dans l'Empire Chinois) (1842) and (Essai sur l'Histoire de l'lnstruction Publique en Chine) (1847). Besides translations of Chinese works — for example, the historico-chronological <Tcheou-chou-ni-kien) (Paris 1842) and the (Astronomical Tcheou-pei,* — he wrote a (Notice sur quelques procedes industriels connus en Chine, au l7me Siecle) ; an 'Examen de diverses series de faits relatifs au climat de la Chine,) and (Chine et Indo-ChineP The printing of his translation of the Chinese Imperial Geography, <Tcheou-li,) was interrupted for some time by his death.

BIOT, Jean Baptiste, French mathemati¬ cian and physicist of distinction : b. Paris, 21 April 1774; d. there, 3 Feb. 1862. He was edu¬ cated at the College Louis-le-Grand and in 1793 entered the artillery service. Shortly after-

ward he entered the ficole Polytechnique and thenceforth devoted himself to the study of mathematics and the natural sciences. After teaching physics for some years at Beauvais, he became professor of the same subject in the College de France in 1800, and in 1803 was elected a member of the Institute. He stood neutral on the question of the founding of an empire. In 1804 he made a balloon ascent with Gay-Lussac, and in 1806 was made a member of the Bureau des Longitudes. In 1809 he became also professor of physical astronomy in the University of Paris. With the exception of three journeys, undertaken in connection with the measurement of a degree of the meridian, — namely, to Spain in 1806-08, to Scotland, Orkneys and Shetland in 1817, and to Spain and Italy in 1824—25, — his whole life was quietly passed in study and teaching. He published some excellent textbooks, which became widely known beyond France. Important works by him are the (Traite elementaire d'Astronomie Physique) (3 vols., Paris 1805, and 3d ed., 6 vols., 1850) ; (Melanges scientifiques et litteraires) (1858) ; as well as works on the astronomy of the ancient Egyptians, Indians and Chinese. His most valuable contributions to science, how¬ ever, are chiefly contained in communications to learned societies and periodicals. There are few branches of physics which were not ad¬ vanced by his labors ; and in optics especially he made some valuable investigations, particu¬ larly in connection with refraction and polariza¬ tion. See Curves.

BIOTITE, a mineral of the mica group, having its characteristic monoclinic crystalliza¬ tion and very perfect cleavage. Its chemical composition varies widely, but in general it may be said to be a silicate of aluminum, mag¬ nesium, iron, potassium ; with hydrogen. On ac¬ count of the presence of magnesium, it is some¬ times called <(magnesia mica.® In color, biotite varies from green to black. It has a hardness of from 2.5 to 3, and a specific gravity of about 2.9. It is a common constituent of granite and gneiss, and of many eruptive rocks, such as andesite and trachyte. Biotite was named for the French physicist, J. B. Biot (q.v.).

BIPELTATA, a name given by Cuvier to a family of Crustacea, so called because the car¬ apace is divided into two parts or shields ; the anterior shield is large, oval in shape, and cor¬ responds to the head ; the posterior is angulated in outline, corresponds to the thorax, and

bears the foot-jaws and ordinary feet. This family is one of those making up the order of Stomo-poda, and is now very generally known under the name of Phyllosomidae.

BIPENNIS, a double-headed battle-axe, mentioned in Homer. The Greek literature at¬ tributes its use to the barbarians, most espe¬ cially to the Amazons. Such axes have been found in stone.

BIPES, bi'pez, (1) a genus of reptiles belonging to the order Sauria, in which the pos¬ terior feet only are visible, though the rudi¬ ments of the anterior extremities appear under the skin. This genus is the connecting link be¬ tween the lizards and the snakes. (2) The name given to a lizard from the Cape of Good Hope, which is called Anguis bipes by Linnaeus and Scelotes bipes by Gray.

BIPONT EDITIONS, famous editions of the Latin classics, published in Bavaria in the city of Deux Ponts, whose name in German is Zweibriicken, and in Latin Bipontium. The publication was begun in 1779, but after the French conquest was finished in Strassburg. The collection forms 50 volumes octavo.

BIQUADRATIC EQUATIONS, in alge¬ bra, equations containing but one unknown quantity, of which, in the equation, the highest power is the fourth. An equation of this kind, when complete, is of the form X4 + Ax3 + Bx2 --Cx~-D — 0, where ABC and D denote any known quantities whatever. See Equa¬ tion.

BIR, ber, or BIREJIK, town in Asiatic Turkey, 80 miles northeast of Aleppo, on the side of a steep hill on the left bank of the Eu¬ phrates, which is here about 600 yards wide, and 10 to 12 feet deep. The town is sur¬ rounded on the land side by a wall, with towers at the angles, and pierced with loopholes. The streets are narrow but clean. In the centre, on a steep rock, is an old ruined fortification. Bir has long been the point where caravans and travelers from Aleppo to Orfah, Diarbekir, Bagdad and Persia, cross the Euphrates. Pop.

8,000.

BIRAGO, be-ra'go, Karl, Baron von, Aus¬ trian military engineer: b. Cascina, d'Olmo, 24 April 1792; d. Vienna, 29 Dec. 1845. He studied mathematics at Pavia ; was a teacher in a military school in Milan, and in 1825 invented the military bridge which is named for him. He

assisted at the building of the fortifications of Linz, the fortifications of the Po near Brescello, and in 1839 built a military bridge across the Po which was especially suc¬ cessful. Nearly all the Continental armies have since adopted his system of bridge con¬ struction. In 1844 he was in command of the newly organized Pioneer and Pontonier Corps and became commander of a brigade. He wrote Researches in European Bridge Con¬ struction. >

BIRAGUE, be-rag, Rene de, Italian poli¬ tician: b. Milan 1507 (or 1506); d. 1588. He incurred the hostility of Louis Sforza, the duke, but was received favorably by the French King, Francis I, who made him coun¬ cillor of the Parliament of Paris, governor of Lyonnais, and sent him to the Council of Trent. Under Charles IX his advancement was still more rapid, and in 1570 he was made keeper of the seals. In this capacity he was a party in the secret council at which the massacre of Saint Bartholomew was organized. He zealously defended the Catholic cause against the inroads of French Calvinism, both in its religious and its political aspects. He was bitterly hated by the Huguenots, who in con¬ sequence made many derogatory accusations against him. He was made a cardinal in 1578, and held the bishopric of Lavaur and sev¬ eral rich abbeys. He died chancellor of France.

BIRBHUM, ber'boom, a district of the Division Bardwan in Bengal. It is crossed by a few unimportant rivers; has hot springs, iron mines and limestone deposits. The chief agri¬ cultural product is rice; there is also a large silkworm industry. For over 2,000 years Bir-

bhum was the scene of the conflicts of the Ary¬ ans advancing into Bengal from Hindustan.

BIRCH, Harvey, the principal figure in

Cooper's novel, (The Spy' a romance of the American Revolution.

BIRCH, John, English soldier: b. 7 April 1616; d. 10 May 1691. A Presbyterian in re¬ ligion, he took the side of the Parliament, acting as

a captain of volunteers at the siege of Bristol by the Royalists. On the institution of the ((New Model" he was ordered to join the army of Fairfax and Cromwell in the west of England, and had Bath entrusted to his care. He commanded a body of horse and foot at the storming of Bristol, an affair in which he so highly distinguished himself as to receive special commendation from Cromwell in his report to the Parliament. In 1645 he was sent against Hereford, and by a stratagem succeeded in gaining possession of the city, and with this the special thanks of Parliament. He objected to many of the proceedings of the party of Cromwell, and was repeatedly thrown into prison. He took an active part in bring¬ ing about the restoration of Charles II, and in the latter part of his life was a prominent member of Parliament He was a man of great personal strength and stature, a rough but most effective public speaker, and had remarkable talents for business and practical affairs. Consult Roe, (Military Memoir of Colonel John Birch) (in Camden Society Pub¬ lications 1873).

BIRCH, Samuel, English Egyptologist : b. London, 3 Nov. 1813; d. there, 27 Dec. 1885. At the age of 23 he was appointed an assistant in the department of antiquities in the British Museum and latterly became keeper of the department devoted to Egyptian and Oriental antiquities, a post which he retained till his death. His labors did much to advance the study of Oriental archaeology, and his eminence in his own province was duly recognized by learned bodies and institutions. In 1870 he assisted in founding the Society of Biblical Archaeology, of which he was president till his death. In 1874 he successfully presided over the International Congress of Orientalists that met in London in that year. His studies ranged over a wide field, but it is on his eminence as an Egyptologist that his reputation chiefly rests. His work was invaluable alike to the expert and the beginner : the first dic¬ tionary of hieroglyphics, the first elementary grammar of Egyptian, the first set of popular translations into English, and the first treatise on Egyptian archaeology, came from his hand. Among his works are (Introduction to the Study of the Egyptian Hieroglyphs' (to ac¬ company Gardiner Wilkinson's work on Egypt; 1857) ; (History of Ancient Pottery, Egyptian, Assyrian, Greek, Etruscan and Roman' (1858); (Himyaritic Inscriptions of Southern Arabia' (1863); dictionary of Hieroglyphics and Grammar' of the same in the fifth volume of the English edition of Bunsen's (Egypt's Place in the Universal History' (1867) ; (Guide to the Egyptian Galleries of the British Museum' (1874) ; dew Edition of Wilkinson's Manners and Customs of the Ancient Egyptians' (1878). For full account of his life and work, consult transactions of the Society of Biblical Archaeology' (V.ol. IX, 1893).

BIRCH, Thomas, English historian: b. London, 23 Nov. 1705; d. there, 9 Jan. 1766. His early taste for reading induced him to prefer a literary life, which he was permitted to choose on condition of supporting himself by his own exertions. He took orders in the Church in 1730, and obtained in 1732 a living in Essex. In 1734 he engaged with some coadjutors in writing the (General Historical and Critical Dictionary,' founded on that of Bayle, and completed, in 10 volumes folio, in 1741. He subsequently obtained various pre¬ ferments in the Church, and for about 20 years before his death held the rectories of Saint Margaret Pattens, London, and Depden, in Suffolk. Birch had formed very extensive manuscript collections, which together with his library of printed books, he bequeathed to the British Museum. He produced a large number of historical and biographical works in the course of his laborious life and served as one of the pioneers of literature. He collected fully and faithfully, but without much dis¬ crimination, materials relating to the various subjects of his research, which are calculated to afford important assistance to writers pos¬ sessed of more taste and judgment. Among his works are (Life of the Right Honorable Robert Boyle' ; (Historical View of the Nego¬ tiations Between the Courts of England, France and Brussels, 1592-1617' ; (Life of Archbishop Tillotson' ; (Memoirs of the Reign of Queen Elizabeth, from 1581 till Her Death' ; (History of the Royal Society of London' (of which he was secretary) ; and he edited the works of Raleigh and Bacon.

BIRCH, Thomas, American painter: b. London, England, 1779; d. Philadelphia, Pa., 14 Jan. 1851. Coming to the United States in 1793, he settled in Philadelphia, and painted chiefly portraits until 1807, when he took up marine painting, in which he achieved a high reputation. A number of his works represent naval battles of the War of 1812, and of these the paintings representing the engagements be¬ tween the United States and the Macedonian, and between the Constitution and the Guerriere, are the best known. Both are in the Harrison collection at Philadelphia.

BIRCH (Bctula), a genus of trees belong¬ ing to the family Betulacece. The principal habitats of the trees of this genus are North America, Europe, northern Asia and the Himalayas. The common European birch is indigenous throughout the north, and on high situations in the south of Europe. It is ex¬ tremely hardy, and only one or two other species of trees approach so near to the North Pole. There are two species natives of Great Britain, Betula pubescens, and B. pendula, or weeping-birch; the latter by far the more valuable and

ornamental. When young it may readily be distinguished by the touch, its bark being covered over with rough exudations, while that of the common tree is soft and vel¬ vety. Each species is found exclusively in some districts, but frequently they are inter¬ spersed. Throughout the most remote parts of the Highlands of Scotland the birch is often found covering extensive tracts or rocky eleva¬ tions, where no other ligneous plant is to be met with. It also grows in glens and ravines, adorning the margins of lakes and rivers,

where the silvery whiteness of its trunk and the light and airy habit of its spray form beautiful and interesting pictures, even in the absence of every other tree. Though often found asso¬ ciated with the alder on swampy ground, yet few trees more successfully resist drought. Adapting itself to various soils and situations, it possesses a wider range than any other tree. It is well suited to form a cover on ground from which Scotch pine timber has been re¬ cently removed ; the exuviae, which always overspread such places, though hostile to plants in general, are favorable to the birch, which commonly springs up and becomes the successor of the pine. The common tree, where it grows wild, attains a height of about 30 feet, and the weeping variety about 40 feet; but both sorts rise to a much greater height when formed into plantations, particularly when interspersed with other trees. Although the birch is considered by no means a valuable tree, yet its wood, which is light in color and firm and tough in texture, is used for a variety of purposes. Not long ago, in many parts of the Highlands, the birch may be said to have been the universal wood, and was used by the Highlanders for every purpose. They made their beds, chairs, tables, dishes and spoons of it, and even manufactured ropes and horse-harness by heating and twisting its spray. The brushwood is used in forming wicker fences to prevent the inroads of cattle and sheep, in thatching cottages and in forming brooms or besoms. The wood is largely used for fish-casks and hoops, and for smoking hams and herrings. Turners use it for trenchers, bowls, ladles and other wooden ware. Ox-yokes, small screws, women’s shoe-heels, pattens and in France wooden shoes are made of it. Birch-trees are not

infrequently planted along with hazels, for the purpose of procuring wood to be converted into charcoal for forges. This charcoal is much esteemed, and the soot which is formed on burning the wood constitutes a good black substance for printers' ink. Nearly all the other parts are applicable to useful pur¬ poses. The bark is employed in the tanning c>f leather; and by fishermen for preserving their nets and cordage. In America, northern Europe and Asia the birch is utilized for a great variety of purposes. The North Ameri¬ can Indians' use it for canoes, boxes, buckets, baskets, kettles and dishes, curiously joining it together with threads made of roots of the cedar-tree. It is serviceable in dyeing a yel¬ low color. In Norway it is dried, ground, mixed with meal, and boiled with other food for swine. The houses or huts in many parts of the north of Europe are covered with the outward and thicker part of the bark, instead of slates or tiles. It is spun into a coarse kind of cordage, woven into shoes and hats, and in some places even made into drinking cups. The Laplanders fasten together large pieces of it to keep off the rain. Abounding in resinous matter, slices of the bark are. sometimes tied together to make torches. During a scarcity of corn it has, in several instances, been groun . with bread corn, and successfully used as food for men. The leaves afford a yellow dye. The sap, from the amount of sugar it contains, affords a kind of agreeable wine. Birch-wine is produced by the tree being tapped by boring a hole in the trunk, during warm weather, in

the end of spring, or beginning of summer, when the sap runs most copiously. It is re¬ corded that during the siege of Hamburgˆ in 1814, many birch-trees in that vicinity were destroyed in this manner by the Russian soldiers. The dwarf birch, Betula nana, is a low shrub, a native of parts of the Highlands of Scotland and of Arctic regions generally. It is never more than two or three feet high, and is generally much less ; a full-grown plant being thus a very tiny example of a tree. It is used as fuel, and as stuffing for beds, and its seeds furnish food for ptarmigan and other birds. A similar species is a native of the Antarctic regions. Among others the red or river birch of North America (B . nigra) grows to the height of 90 feet, and produces hard and valuable timber. It is known as the red birch from the redness of the bark in the young trees. Another American species, the cherry birch or sweet birch (B. lenta), is also called the black birch. It grows to a similar height with the preceding, and yields even more valuable timber, used in making furniture, etc., being tough, fine-grained and taking on a good polish. The paper birch (B. papyrifera) is another American species which also attains a large

size. Its habitat extends within the Arctic Circle, but it becomes rare and stunted in the extreme north. It receives its name from the fact that thin strips of the brilliant white bark are sometimes used as a substitute for paper. The bark of this species is put to perhaps a greater variety of uses than that of any other, its wood and sap being also utilized. Another American birch is the yellow birch (B. Intea), so named from the golden color of the outer bark. It is a large-leaved species, yielding timber used for shipbuilding, etc., and is a native of the eastern parts of Canada and the northeast of the United States. Of Himalayan species may be mentioned B. utilis, the Indian paper birch. Its thin papery bark has been used as paper from a remote period, and is still commonly used for packing pur¬ poses, for lining the flexible tubes of hookahs, and in other ways, while the wood is tough, and is employed in making articles of various kinds. In its native mountains it may be found at an altitude of 10,000 to 13,000 feet. Several of the pigmy species deserve mention. B. pumila, which is generally less than eight feet tall, but sometimes reaches a height of 15 feet, is found from Newfoundland to Minnesota, and south to Ohio. B. glandulosa, which ex¬ tends from Labrador to Alaska and south to Michigan and in the mountains to Colorado, seldom exceeds four feet. Other species, natives of Europe and Asia, resemble the preceding more or less in appearance and uses. . Consult Bailey, ‘Standard Cyclopedia of Horticulture’ (1914’); Regel, ‘Monographische Bearbeitung der Betulaceae’ (1861); DeCandolle, ‘Prodro-mus 16) (1869).

BIRCH-PFEIFFER, berH’pfif-er. Char¬ lotte, German actress and playwright : b. Stutt¬ gart, 23 June 1800; d. 24 Aug. 1868, her maiden name being Pfeiffer. She first appeared on the stage in her 13th year at Munich, and soon ac¬ quired a great reputation, her special role be¬ ing that of the heroines of tragedy. In 1825 she married Christian Birch, a writer of some note. After playing with success at places as

far apart as Saint Petersburg, Amsterdam and Budapest, in 1837 she took the management of the theatre at Zurich, and remained in this

capacity till 1843. Next year she was engaged for the Theatre Royal, Berlin, and here she re¬ mained till her death. Her plays, mostly founded on novels, became well known on almost every stage in Germany, and give evi¬ dence of real dramatic talent, as well as of a knowledge of stage effects and what would suit the taste of the theatre-going public. Victor Hugo's (Notre Dame) and Charlotte Bronte's (Jane Eyre) furnished her with materials for two of her dramas. She also wrote novels and tales. Her collected dramatic works appeared at Leipzig in 23 volumes (1863-80); her nar¬ rative writings in three (1863-65). Her daughter has become well known as a novelist under the name Wilhelmine von Hillern.

BIRD, Arthur, American musician : b. Cambridge, Mass., 23 July 1856. After study¬ ing music in Berlin under Rohde, Loeschhorn, Haupt and Urban, he went to Canada. In 1886 he conducted at the Milwaukee Musical Festival and soon after returned to Berlin. He studied two summers with Liszt in Weimar. His compositions comprise a symphony, carnival, three suites for orchestra and various other compositions for the piano and organ; the comic opera (Daphne) (1897) ; the ballet (RubezahP ; and a decimet for wind instru¬ ments, which won the Paderewski prize in 1902. He is a member of the National Institute of Arts and Letters.

BIRD, Charles, American military officer: b. Delaware, 17 June 1838; d. Wilmington, Del., 22 March 1920. Volunteered, 1861, as first lieu¬ tenant, 1st Delaware Infantry; promoted lieuten¬ ant-colonel, 9th Delaware Infantry, in 1864; and was commissioned colonel of the 1st United States Veteran Infantry, 24 Dec. 1865. On 2 March 1867 he was brevetted first lieutenant and captain in the United States army for gal¬ lantry in the battle of Fredericksburg, major for Spottsylvania, and lieutenant-colonel for Petersburg, Va. He was appointed a second lieutenant, 14th United States Infantry, in 1886; promoted to major and quartermaster in 1895; and commissioned a colonel and quarter¬ master of United States Volunteers for the war with Spain in 1898. He became brigadier-general in the regular army 16 April 1902 and was retired 17 June 1902.

BIRD, Edward, English painter of note : b. Wolverhampton, 12 April 1772; d. Bristol 1819. He took up art as a profession, without any regular training, and carried on a school of drawing at Bristol. In 1807 he exhibited some pictures at Bath, and had the good fortune to find purchasers for them. In 1809 he had a picture, <Good News,* in the exhibition of the Royal Academy, and so successful was this work that his name at once became known. He was elected an associate of the Academy in 1812, and his reputation was increased by such paintings

as the { Surrender of Calais, > the (Death of Flip and the (Field of Chevy Chase* — the last considered his greatest work. The (Death of Eli } was sold for 500 guineas, and was awarded a premium of 300 by the British Institution. In 1815 he became a full member of the Royal Academy, and he was also

appointed court painter to Queen Charlotte. Among his last pictures were the (Crucifixion *; (Christ led to be Crucified) ; the (Death of Ananias and Sapphira* ; and the (Burning of Ridley and Latimer.) His talents, however, were considered to be rather for genre than for historic or sacred subjects. Consult Cunning¬ ham, (Lives of British Painters.* There is a catalogue of Bird's works in the British Museum.

BIRD, Frederic Mayer, American Episco¬ pal clergyman: b. Philadelphia, 28 June 1838; d. South Bethlehem, Pa., 3 April 1908. He was rector at Spotswood, N. J., 1870-74 ; chaplain and professor of psychology, Christian evi¬ dences and rhetoric, at Lehigh University, 1881-86; and acting chaplain there, 1893-98. He was noted as a hvmnologist, and collected one of the most complete and valuable musical libraries in the United States. He edited several collections of hymns ; was associate editor of (Chandler's Encyclopaedia* ; editor of Lippincott's Magazine (1893-98) ; and pub¬ lished (The Story of Our Christianity) (1893).

BIRD, Golding, English medical and scien¬ tific writer: b. Downham, Norfolk, 1814; d. 27 Oct. 1854. In 1838 he took the degree of M.D. at Saint Andrew's, and in 1840 that of M.A. In the latter year he became a licentiate of the Royal College of Physicians, London, and in 1845 was elected a fellow. In 1843 he was appointed assistant physician at Guy's Hos¬ pital, where he also lectured on materia medica ; and in 1847 he entered on a three years' course of lectures on the same subject at the College of Physicians. He took an active interest in natural history, chemistry and other subjects more or less connected with medicine; and his multifarious occupations overtaxed his strength and undermined his health, so that he died at a comparatively early age. He had by this time acquired a very large practice, and had made his name well known in his profes¬ sion, more especially by his researches in scien¬ tific medicine. A work by which he was more generally known was his (Elements of Natural Philosophy, *for many years a textbook. A well-known work on (Urinary Deposits* was also published by him, as also (Lectures on Electricity and Galvanism in their Physiologi¬ cal and Therapeutical Relations) ; (Lectures on Oxaluria) ; *etc.* A biographical notice by his brother, Dr.

Frederic Bird, was published in 1855

BIRD, Isabella. See Bishop, Isabella

Bird.

BIRD, John, English mathematical instru¬ ment maker: b. in the county of Durham 1709; d. 31 March 1776. He set up in London about 1745 as a maker of scientific instruments, hav¬ ing previously received instructions from Gra¬ ham, the greatest mechanician of the time. In 1749 he received an order to construct a new brass mural quadrant of eight feet radius for the Royal Observatorv. This was used by Bradley and by Maskelyne, and continued serv¬ iceable for 62 years. Duplicates of it were soon ordered for Saint Petersburg, Cadiz and the Ecole Militaire, Paris — the last employed by D'Agelet and Lalande in determining the declinations of 50,000 stars. He also furnished Bradley with a new transit instrument and a

40-inch movable quadrant. Bird's marked superiority to all other makers of the day is strikingly exemplified by the fact that in 1767 the Board of Longitude paid him £500 on his agreeing to take an apprentice for seven years, instruct other persons as desired, and furnish upon oath descriptions and plates of his methods. A result of this arrangement was the publication of two treatises, named respectively (The Method of Dividing Astronomical Instruments) (1767), and (The Method of Construct¬ ing Mural Quadrants ' (1768), each with a pref¬ ace by Maskelyne, the astronomer-royal.

BIRD, Robert Montgomery, American novelist: b. Newcastle, Del., 1803; d. Philadel¬ phia, 22 Jan. 1854. He qualified as a physician, but soon gave up the practice of medicine for literature. He first became known as a dram¬ atist, having written three tragedies, — (The Gladiator' ; (Oraloosa' ; and (The Broker of Bogota' — the first of these often acted by Ed¬ win Forrest. His first novel was (Calavar' (1834), his second (The Infidel (1835) — both of them having their scene in Mexico, at the time of the Spanish conquest. Then followed

the (Hawks of Hawk Hollow) ; (Sheppard Lee) ; and (Nick of the Woods, or the Jib-benainosay' (1837) ; the last probably the most popular of all his fictions. Its scene is laid in Kentucky soon after the close of the Revolu¬ tionary War, and in it we have a lively picture of pioneer life at this date, and the relentless hostilities between the Indians and the early settlers. He also wrote (Peter Pilgrim,' a collection of tales and sketches; and Adven¬ tures of Robin Day,' a novel.

BIRD, BIRDE, or BYRD, William, Eng¬ lish composer; b. 1538; d. London, 4 July 1623. He was trained in music under Thomas Tallis, and was appointed organist of Lincoln about 1563. In 1575 the two composers obtained the monopoly for 21 years of printing and selling music and music paper; and on the death of Tallis in 1585 Bird became sole patentee. His first work of importance was (Psalms, Sonnets and Songs of Sadness and Piety, Made into Music of Five Parts' (1588). In 1589 he pub¬ lished a collection of songs, and also a collec¬ tion of sacred pieces for five voices; a second collection of similar pieces appeared also in 1591. In 1607 he published two books of

<Gradualia,' being a collection of motets for the ecclesiastical year of the Roman Catholic Church; and in 1611 (Psalms, Songs and Son¬ nets.' He continued all his life a Roman Catholic, but notwithstanding this held a lease from the Crown of lands confiscated from a Roman Catholic recusant, and never lost the appointment which he held in the Protestant Chapel Royal. Bird was the composer of the first English madrigal. He wrote a large num¬ ber of pieces for the virginals, and also three masses. He was the author of a celebrated canon, (Non nobis, DomineC often sung in England by way of grace after meat at public banquets, and which has never ceased to be popular.

BIRD-CATCHING. See Trap-shooting.

BIRD-CATCHING SPIDER, a name ap¬ plied to gigantic spiders of the genera My gale and Epeira, which catch birds and suck their blood. The species to which the name was

originally given was My gale avicularia, a native of Surinam and other parts of tropical South America. The body of this insect is about two inches long, very hairy and almost black ; when the legs are stretched out it measures about a foot across. It lives in holes or crevices and

does not spin a net proper, but makes a tubular nest for itself in which it lurks during the day, seeking its prey by night. Other species of Mygale belong to the Malay Archipelago, as M. javanica and M. sumatrensis. In experiments made with these spiders small birds have been known to die in a few seconds after being bitten. Some of the web-spinning spiders mak" webs strong enough to entangle small birds, which thus become their prey.

BIRD-CHERRY, in America, the wild, red, pin or pigeon cherry (Prunus pennsylvanica) of the natural order Rosacece, a tree 20 to 40 feet high of little use except occasionally for ornamental purposes, as fuel and as a stock for grafting garden cherries upon. Its red, thin-fleshed fruit is sour and somewhat astringent. The name is also given in Europe, to the hag-berry of Scotland (Prumts padus), whose many varieties are often cultivated for ornament. It sometimes attains a height of 20 feet, bears racemes of flowers larger and a week earlier than the choke-cherry (Primus virginiana), which it somewhat resembles. The fruit, which is black, is smaller than the common cherry and has a disagreeable taste, but is greedily eaten by birds. The wood, which resembles mahogany, and takes a good polish, is used in cabinet-making.

BIRD DAY, a special school holiday on 5 May to commemorate the birthday of Audubon. The purpose of the holiday is to stimulate interest in natural history and nature study.

BIRD LICE, minute wingless insects para¬ sitic under the feathers of birds and hair of certain mammals, to which they are very annoy¬ ing. They belong to the suborder Mallophaga, a group of wingless degraded insects allied to the death-tick (Psocidce) , stone-flies (Perlidce) , and the white ants, altogether constituting the order Platyptera. They differ from true lice in having free jaws adapted for biting, and not a sucking beak. The flattened body is corneous, hard above, and the head is horizontal, with three-to five-jointed antennae; the eyes are small and simple, the mandibles are small, like a hook, and the maxillary palpi, when present, for they are sometimes wanting, are four-jointed, while the labial palpi arc two-jointed. The thorax is small and but two-jointed ap¬ parently, as the meso-and meta-thorax are united. The abdomen is from nine-to ten-jointed, while the short, thick limbs have two-jointed tarsi and one or two claws.

BIRD-LIME, a viscous substance used for entangling small birds so as to make them easily caught, twigs being for this purpose smeared with it at places where the birds resort or to which they are attracted by a

call-bird. It is often prepared from the middle bark of the holly, which is stripped off in June or July, boiled in water for six or eight hours, and the water being strained off, is then left to ferment. This process may take two or three weeks, dur¬ ing which it is watered if necessary. At the end

of this time it assumes a mucilaginous form, and after being pounded in a mortar and worked with the hands in water is fit for use. This substance, when prepared, is of a greenish color and very tenacious. Mice are sometimes caught with it as well as birds.

BIRD OF PARADISE FLOWER. See

Strelitzia.

BIRD SPIDER, also called Bird-catching Spider, gigantic representative of the family Theraphosidce, infesting the tropical jungles of South America. Its body is two inches in diameter, black and hairy, but with outspread legs it has a diameter of nearly 12 inches. Like the tarantula, which it resembles, it builds its nest in the ground in the form of a hole about 18 inches deep, which it lines with a silky-white substance. In spite of its ferocious appearance, it is not dangerous and will not even bite when handled. Its reputation as a bird catcher seems to be founded on a travelers' myth, for the natural food of this strange insect is as yet unknown to science.

BIRD-TICK, one of the horse-tick or forest-fly family (Hippoboscida) of the order Diptera. Like the horse-tick the body is much flattened; unlike the Hippobosca, or horse-tick, it has ocelli, but in the short proboscis it resem¬ bles the latter fly. In the wings there are six costal veins. There are numerous species, all of which are bird-parasites. Olfersia americana lives on the owl and other birds. Certain spe¬ cies of Lipoptera live on birds, but afterward migrate to mammals, finally losing their wings through disuse.

BIRDS. The birds form that class (Aves) of warm-blooded vertebrate

animals most dis¬ tinctive, most easily defined and most popu¬ larly known and interesting. They are at once distinguished by their covering of feathers, which is possessed by no other sort of animal ; and by the modification of their fore-limbs into instruments for flight (wings). Their aerial existence, from which few have wholly de¬ parted, requiring great activity and exertion, has called forth a high perfection of organiza¬ tion, especially in the respiratory and circulatory systems of the body, and has led to the charac¬ teristic spindle-shaped form, narrowing from the full chest and shoulders toward a pointed head, which will cleave the air easily, and dimin¬ ishing toward the rudder-like tail. The graceful form, to which the beauty of birds is largely due, has been brought about by the enlarge¬ ment of the shoulder-girdle, and its great pec¬ toral muscles, and by the necessity of an increased capacity of chest to contain the com¬ paratively great heart and lungs. In birds such as ostriches, cassowaries, moas and the like, which have ceased to fly, and have de¬ veloped very strong legs ; or in those like the penguins, which have become swimmers and divers, the changes of structure are degenera¬ tions from the type, which is a bird with powers of flight.

Character of the Feather Coat. — Flight, as well as clothing, is due to the presence of the complicated horny appendages growing from the skin, called feathers, which are peculiar to the class. Their structure is de¬ scribed under Feathers. Those of the body are usually small, grow in certain definite tracts

(see Pterylography), varying in the different groups, and form a close jacket, not easily pervi¬ ous to moisture and a poor conductor of heat, thus conserving the vital warmth and protect¬ ing the body against sudden changes of temperature. It is shed (molted) and renewed semi-annually. This body-coat is ordinarily nearly uniform in length and' character, but often is varied by ornamental plumes, erectile crests, ruffs, and other modifications, such as are seen in birds of paradise, herons and many others. The feathers are also variously colored in patterns varying with the groups and more minutely with the species, whereby they may recognize each other and be distinguished by us. These colors are usually those of pig¬ ments incorporated in the web of the feather itself, but may be due to minute scales on the surface, which break up the light, giving it an iridescent or metallic sheen, conspicuous in hummingbirds and in certain pheasants. The plumage often varies, according to age, sex, sea¬ son, or all three conditions; and these colors play an important part in bird-life. See Colora¬ tion, Protective; Natural Selection,

Powers of Flight. — The bones of the wing and tail support very large, strong Squill® feathers, which, when outspread, support the bird in the air, and when moved in the proper manner carry it forward — enable it to fly, the mechanism and phenomena of which method of locomotion are explained under Flight. The wing-power of most birds is very great, but the speed of their flight is often exaggerated. Few exact facts are at hand, but it is apparent that the highest speed is nearer 50 than 100 miles an hour, although the latter speed is un¬ doubtedly reached by ducks and other swift flyers under pressure of attack or escape. En¬ durance on the wing is more remarkable. Many seabirds seem tireless, and swallows, among land-birds, are almost incessantly in the air. During migrations a large variety of birds, in¬ cluding some of the smallest and feeblest, undertake rapid and extensive journeys, reach¬ ing in some cases almost half around the world; and some regularly pass over spaces of ocean as much as 2,000 miles in width, while a flight of 500 miles from land to land is accomplished by many species. This is the more notable as a feat because in many cases they are birds which during nine-tenths of the year only flit from bush to bush. In these migratory journeys (see Migration) birds often fly very high; but this is the regular custom of certain ones, es¬ pecially vultures, which soar beyond human sight, yet will swoop to the earth in a swift dash, betraying great adaptability to sudden changes in atmospheric density. Other notable qualities are the power (largely residing in the tail) to suddenly change speed and direction, helping them to dodge and elude winged pur¬ suers, and to catch the agile aerial insects, upon which many of the smaller species depend for subsistence. The sharpness and quick ad¬ justability of eyesight also involved in this is noteworthy.

These abilities in flight have led to the very wide distribution of birds, which occur in every part of the world yet seen by man; and are the most numerously represented of all terrestrial branches of animal life in the oceanic islands. Nevertheless very few are cosmopolitan, and

1 Motmot

2 Mother Carey’s Chicken

3 Mouse-bird

4 American Mockingbird

not many range beyond the confines of a single continent, while many are more narrowly re¬ stricted, so far at least as their habitat in the bleeding season is concerned. Thus the geo¬ graphical distribution of birds has been found perhaps the best criterion for the mapping out of zoogeographical regions (see Zoogeography). i he greater number of families of birds is t t opical, and both variety of kinds and numbers of individuals decrease toward the poles. A striking fact is the great difference between the birds of the northern and the southern hemi¬ spheres — a difference much more decided than exists, between those of Europe and North America, or of South America and Australasia.

Reproduction. — Birds in every case repro¬ duce their kind by means of eggs protected by a calcareous, often highly-colored shell, laid by the mother a considerable time before they are ready to hatch, which consummation is brought about by the application of warmth. This may be arranged for in two ways. A few birds bury their eggs in rotting vegetation, or in hot sand, and let the chemical heat evolved by the ferment in the former case, or the sun's rays in the latter, accomplish the desired result. The great majority, however, place their eggs in some sort of a receptacle (sometimes a mere hollow on the ground, or hole or niche in a cliff or tree, sometimes in a burrow or nest of more or less elaborate construction (sec Birds, Nests of), and there brood upon, or "incubate" them until the chick matures and emerges. In one class of birds (Prcccoces) incubation is so long continued, and the embryonic chick becomes so far advanced before leaving the shell, that it is well coated with feathers, and can at once begin to take care of itself. These birds are the seabirds, water-birds, game-birds and their allies of comparatively low organiza¬ tion. In another class (Altrices) of higher organization as a group, the chicks are per¬ mitted to break from the shell before they have acquired feathers or are able to move about or obtain food. They must therefore be shielded, defended, fed and cared for by the parents for several days or weeks. Out of this condition have grown some of the most interesting, com¬ plicated and delightful features, habits and instincts of bird-life.

Food and Feeding Methods. — Birds as a class are omnivorous, but each of the various groups might be characterized by its food, which, more than anything else in the process of evolution, has determined the various types of structure that distinguish their tribes, and which are indexed, as it were, by the form of the bill and feet. Those of lowest organiza¬ tion, — nearest the ancestral type, — are the sea¬ birds, which live upon fish varied to some ex¬ tent by mussels and other small marine crea¬ tures. Many of the ducks and shore-birds share this marine diet, and numerous wading birds eat fresh-water fish, frogs, crayfish and the like. The great body of ratite and gallinaceous birds, — ostriches, emeus, partridges, pheasants, etc., that run and nest on the ground, — are vege¬ table-eaters, seeking green leaves, fruits, seeds, lichens, etc., and picking up such insects as come in their way. All the foregoing are praecocial birds, and the young feed on the same things as their parents. These classes have little relation to mankind so far as their food

is concerned except that they sometimes devour too much grain or spoil certain plants. Among the higher class, or altricial birds, the fare is more varied, and while there is a very numerous group (the cone-billed or fringilline birds; see Finch; Sparrow, etc.), which live altogether upon seeds, and a few others, like the king¬ fishers, which catch fish, the great majority indulge themselves in a miscellaneous diet of both vegetable and animal materials. Some called “soft-billed,” and including most of our song-birds, except the finches, are mainly in¬ sect eaters, some catching them upon the wing, others digging them out of rotten wood, and the greater number picking them off the leaves of trees or searching for them among the herbage. Another large class, embracing the birds of prey, and a few others, like the shrikes, depend for food upon capturing and devouring other smaller birds, together with such small mam¬ mals, reptiles, amphibians, fish and insects as they are able to seize and kill. These are the falcons, owls and their relatives; but a related group, the vultures, varies this fare by feeding upon carrion.

Usefulness to Man.— In the case of all of these altricial birds, however, except the birds of prey, the young are fed upon soft insect food, mainly worms, caterpillars and maggots; and the period of their nesting coincides with the time when these larval insects abound. In the feeding habits of these higher birds man has a great interest, for nearly all of the in¬ numerable insects which they capture for them¬ selves, or for the nourishment of their young, are such as are annoying or injurious to him; and experience in many localities has shown that

the destruction of bird-life is accompanied by a distressing increase of noxious insects. In the same way the hawks and owls, by their incessant pursuit of mice, and other small animals injurious to agriculture, so reduce the numbers of these pests, as greatly to benefit the farmer; while the useful work done by the vultures, as scavengers, by removing offal and dead animals, is recognized by everyone in the tropical regions where these birds most abound.

Nor does the relative usefulness of birds to man stop here. They not only afford him great pleasure, by their pleasing colors and animated behavior, and delight his ear by their voices, but large numbers of them furnish him with excellent and even dainty food. Lastly, this group has furnished men with several varieties of domestic poultry, such as the turkey, pea¬ cock, guinea-fowl, duck, goose and various pigeons and partridges, that are among the most valuable of his animal possessions.

Distinctive Character of North American Bird-Life. — In considering the bird-life of North America, the natural southern boundary is the arid region between the United States and Mexico, which acts as an effective barrier. Our bird-fauna is by this means substantially separated from that of Central and South America. On the contrary it strongly resembes that of northern Europe and Asia. While a large number of extensive tropical families are not known north of central Mexico, or are represented by only one or two species, many of the families, the genera and even a fair number of species — not counting the seabirds common to both oceanic coasts — of the United

States and Canada are the same as those of Europe, and, to a less degree, of Siberia. This is especially true of the ducks, geese, shore-birds and birds of prey. When we examine the list of birds of the interior fields and wood¬ lands the general resemblance to those of Europe remains close, while their divergence from those of South America is very striking. In fact, Europe has only two families of small birds not also represented in North America — • the starlings and the wrynecks.

The explanation of this condition, like that of so many other facts in our natural history, is to be looked for in the past. Geologists find evidence that in the early part of the Tertiary period, and at intervals during its progress, the northern borders of this continent were con¬ nected with both Europe and Asia ; and that at times in the past the subarctic climate was comparatively warm — perhaps like that of the Middle States now.

This state of things enabled birds and many other animals of the Old World (which there is reason to believe was provided with animal life before this continent) to pass hither to the New; and abundant time has elapsed since for them to spread all over the continent, and to undergo the changes promoted by the differ¬ ences in climate and food, which have resulted in the promotion of new American species, all derived from a remote, Old-World ancestry. This history gives a reasonable explanation of both the likeness and the diversity between the two faunas.

Distribution of Birds in North America.

— One of the most important features in orni¬ thology is the study of geographical distribution (q.v.). Few species of birds extend their range over a whole continent, even in their seasonal migrations ; almost all are restricted to a comparatively small area, the limits of which are set principally by their requirements in each case in the matter of food suitable not only for themselves but for their young in the nest.

The birds of widest range are those whose food is widely distributed, such as swallows, seed-eating sparrows, river-haunting sandpipers and ducks, and the predatory hawks and owls that feed on small animals. Even these are more or less affected by local food-conditions.

But the food available to and suitable for birds depends very largely on climate ; and climates vary according to geographical condi¬ tions. Hence, climate is the greatest factor in determining the range of any species of birds. But by climate in this connection we mean the climate of summer, that is the average degree of warmth and moisture — the average kind of weather during the season when a bird is hatching and rearing its young.

On this continent the isotherms, or lines of equal warmth, do not run straight across from east to west according to the latitude, because of the interference made by our two great north-and-south mountain systems, whose crests are colder than are the low countries between

them Therefore in the middle w st they bend northward and run up toward Alaska. Thus a species that is comfortable in Connecticut, but finds Maine too cold, will reside in Michigan, Minnesota and halfway to Alaska — perhaps 20 degrees north of the lati¬ tude of Maine — because it finds there an aver¬

age mid-summer warmth like that of southern New England. Thus are constituted approx¬ imately east-and-west districts, or “zones,” of life inhabited and characterized by groups of birds requiring similar conditions.

Thus characteristic Arctic birds do not come much south of the treeless region extending in the west from Great Bear Lake to a point half¬ way down the coasts of Hudson Bay and into northern Labrador. These dwell in the “Arctic” Zone. South of it lies the narrow “Hudsonian” Zone, which swings from the mouth of the Saint Lawrence along the south¬ ern shore of Hudson Bay and northwestward to Alaska, including all of that peninsula. South of this the “Canadian” Zone embraces all the wooded parts of Canada except the Saint Lawrence Valley, and sends a long tongue down the Mackenzie River almost to the Arctic Circle. South of this lies the “Tran¬ sition” Zone — a narrow strip running from New England and New York through southern Quebec and Ontario west and northwest to the prairies of the Dakotas and western Canada; it also extends far south along the cool heights of the Alleghanies and the Rockies. The re¬ mainder of the United States east of the Rockies is included in the “Austral” Zone, which is divided into an “Upper” and a “Lower” half, the latter embracing the South Atlantic and Gulf States. The Rocky Moun¬ tains form a composite zoological district where altitude has much the same effect on local climate, and consequently on animal life, as has latitude elsewhere. West of them the Pacific Coast is a “region” itself, with many exclusive birds.

Each of these zones has a bird-population which is not to be found outside of it in the breeding season; and that is true also of the vegetation and of other kinds of animals, showing the interdependence of all forms of life, and the reason for the facts noted in the distribution of North American birds.

Migration of American Birds. — The gen¬ eral subject of migration (q.v.) is treated else¬ where; but a few words may be pertinently added in this connection as to local peculiari¬ ties. Here, as elsewhere, migratory habits are adapted to local conditions, especially

as to routes followed: and hwe as elsewhere most of these are far from keeping to the precise north-and-south direction that many persons suppose birds always take.

In the first place many of our birds make no regular migration at all. These are known as “residents.” They are such as are able to find food all the year round in the region where they live ; but in the case of some of these there is a partial migration, the individuals of a species moving a short distance southward from the northern border of its range into a more favorable climate, chiefly to escape deep snow. Then a considerable number of species of birds of northern Canada are forced south¬ ward in the fall, and visit the region of the Great Lakes, northern New York and New England during the cold weather, but rarely go farther south. These are the true “winter birds.”

Running over the list one will find that of about 1,000 species of North American birds only about 225 depart in winter as far south

FAMILIAR AMERICAN BIRDS

i. Yellow-bellied Woodpecker, or Sapsucker. 2. Black-capped Titmouse, or Chickadee. 3. Black-and-White Creeping-Warbler. 4. Wood Thrush. 5. Cedar Waxwing, or Cherry Bird. 6. Black-billed Cuckoo. 7. Tree, or Canada Sparrow.

S. Red-eyed Vireo. 9. Golden-crowned Kinglet. 10. Little Screech-owl (red phase). 11. American Redstart.

as the Gulf States, and of these only two-thirds entirely leave the United States. The fact that these far-travelers include almost all of the song-birds, or those most noticeable in sum¬ mer, makes it seem to the uninformed north¬ erner as if the whole bird-tribe had left the

country.

Federal Protection of American Birds. —

The Federal migratory bird regulations of the United States prohibit through¬ out the United States the killing at any time of the following birds : Band-tailed pigeon ; little brown sandhill and whooping cranes; wood duck, swans; curlews, willet, upland plover and all shore birds (except the black bellied and golden plovers, Wilson snipe or jacksnipe, woodcock, and the greater and lesser yellowlegs) ; bobolinks, catbirds, chicka¬ dees, cuckoos, flickers, flycatchers, grosbeaks, hummingbirds, kinglets, martins, meadowlarks, nighthawks (or bull bats), nuthatches, orioles, robins, shrikes, swallows, swifts, tanagers, tit¬ mice, thrushes, vireos, warblers, waxwings, whippoorwills, woodpeckers and wrens, and all other perching birds that feed entirely or chiefly on insects.

Books about North American Birds. —

Under Ornithology will be found a list of books to be consulted by the scientific student. It is desirable here to mention a few books of general interest and giving an account of the bird-life of special districts. For birds of the world generally: Evans, <Birds) (New York 1900) Beebe, (The Bird) (ib. 1906) ; Knowlton and Ridgway, (Birds of the World) (ib. 1909). For the Eastern States; Chapman, (Handbook of Birds of Eastern North America> (New York 1912) ; Chapman, (Bird-life) (New York 1901) ; Stearns and Coues, <New Eng¬ land Bird-life5 (Boston 1904) ; Eaton, (Birds of New York5 (2 vols., col. plates, Albany 1910-12) ; and books by Thoreau, Torrey, Hoff¬ man, Wright, Abbot, Knight, Parkhurst, Merriam, Miller, Ekstorm, Sharpe and other popu¬ lar writers. For the Mississippi Valley: Wheaton, (Birds of Ohio5 (Columbus 1891) ; Dawson, (Birds of Ohio5 (Columbus 1903) ; Butler, (Birds of Indiana5 (Indianapolis 1890) ; Barrows, (Michigan Bird-life5 (Lansing 1912) ; Cory, (Birds of Illinois and Wisconsin5 (Chi¬ cago 1910) ; Goss, (Birds of Kansas5 (Topeka 1899) ; Coues, (Birds of the Northwest5 (Washington 1874). For the western United States, besides many government documents : Coues, (Birds of the Colorado Valley5 (Wash¬ ington 1878) ; Cooper, (Ornithology of Cali¬ fornia5 (Sacramento 1872) ; Bailey, (Handbook of Birds of the Western United States5 (Bos¬ ton 1912) ; Iveyser, (Birds of the Rockies5 (Chicago 1902) ; Wheelock, (Birds of Cali¬ fornia5 (San Francisco 1904) ; and writings of Dawson, Grinnell, Bryant, Henshaw, Keeler, Merriam, *etc.* For the Southern States: Bailey, (Birds of Virginia5 (Richmond 1912) ; Wayne,

(Birds of South Carolina5 (Charleston 1910). For Canada: Dionne, (Oiseaux de la Province de Quebec5 (Quebec 1906); Mcllwraith, (Birds of Ontario5 (Toronto 1894) ; Macoun,

(Catalogue of Birds of Canada5 (Ottawa 1909) ; and several valuable documents of the Canadian and United States government relat¬ ing to western Canada. The files of the ornithological magazines, The Auk (New

York), Bird-Lore (New York), Wilson Bul¬ letin (Ohio), and The Condor (California), should also be consulted. Also the bulletins5 and (North American Fauna5 (series) of the United States Biological Survey; the (Bul¬ letins 5 of the United States Department of Agriculture; and the Proceedings5 of the United States National Museum.

Ernest Ingersoll.

BIRDS, Fossil. Birds are rare as fos¬ sils, compared with other vertebrates, and little is known about their early evolution. Four or five hundred extinct species have been de¬ scribed, as against 12,000 living, and most of them are from very fragmentary remains, found in widely scattered places. The explana¬ tion of this is found in their small size, their liability to be eaten, dead as well as alive, and the slight construction of their skeletons, which makes their bones less likely to be buried in sediments and preserved as fossils. At a few favorable places, however, as in the Oligocene strata of the department of Allier in France, and the Pleistocene deposits of Fossil Lake in Oregon, they occur abundantly. Birds have been found as far back in geological time as the Jurassic Period of the Age of Reptiles. The supposed bird-tracks of the more ancient Triassic sandstones of the Connecticut Valley are now believed to be mostly, if not all, tracks of dinosaurs (q.v.), a group of reptiles having many bird-like characters. From some ancient offshoot of this group the birds are probably descended, but the early stages of their evolu¬ tion are not known.

The oldest fossil bird known is the Archceopteryx, of which three specimens, one in marvelously complete condition, have been re¬ covered from the upper Jurassic lithographic slates at Solenhofen, Bavaria ; and it is a true bird although its skeleton presents many reptilian features. It was about the size of a crow, and had a rather elongated, narrow body, with a small, somewhat flattened head, and

very large eye-sockets. The jaws protruded in a beak-like form ; but there was no horny beak, and the upper jaw, and probably the lower also, was armed with many slender lizard-like teeth, set in a groove. The legs were of normal length, and had four bird-like toes ; but the two bones of the shank (tibia and fibula) were separate, as in most reptiles. The wings were short and rounded, ((but unlike all known birds there were three long, slender fingers on each wing, which was armed with a hooked, sharp-edged claw.55 The wing-quills were large and strong. These feet and the claw-armed wings indicate arboreal habits ; but great powers of flight are doubtful, mainly because the breast¬ bone is poorly preserved, so that its adaptation to large flight-muscles cannot be determined. The bird probably took short flights, and scrambled about in tree-tops by aid of its wing-fingers. Its food can only be guessed at. The most remarkable feature of Archceopteryx, however, was its tail, which was as long as its body and head together, and consisted of 23 free bones, as in lizards. Beside it, in the fos¬ sil, are many pairs of broad quill-feathers: and it is probable that each caudal bone sup¬ ported a pair of these, arranged horizontally into a flat series of tail-feathers. What was the covering of the body is not known; but

there are indications of feathering on the legs, and around the neck, and it is certain that the body was not coated with scales. Dr. Freder¬ ick A. Lucas said of it : (<It was, on the whole, much nearer to the birds than to the reptiles. It is clearly a connecting link between the two classes, and yet we are undoubtedly still very far front the original point where the branch was made from the reptilian stem. … It must have taken a very long period of time for the development of such distinctly bird-like feet and feathers.®

In point of time the next bird known ap¬ pears in the rocks of the Upper Cretaceous Age, when the dinosaurs had about disap¬ peared, and the earliest known mammals are faintly discerned as precursors of their class. These are the toothed birds of the subclass N eornithes, in two typical forms named Hes¬ perornis and Ichthyornis, both of

which are found fossil in the Cretaceous rocks of west¬ ern Kansas. The true affinities of both are still in discussion. They were first put to¬ gether in a “toothed-bird® group called Odon-tornithes; then rearranged into two groups, on account of a difference in dentition: (1) N eornithes Odontolcae (Hesperornis , etc.), in which the teeth are set in a continuous groove and (2) N eornithes Odontotomies {Ich¬ thyornis, etc.) having teeth set in separate sock¬ ets. Hesperornis was a flightless, swimming and diving seabird, nearly four feet long, with a long neck and strong legs ending in four lobed toes, and set far back at right angles to the spine. It no doubt caught fish as food, and rarely came ashore except to nest, re¬ sembling in this respect the habits of a modern penguin. Its structure, however, was very primitive, and its race soon became extinct, without leaving any line of developing descent, although several related forms were contem¬ porary with it.

Ichthyornis was also an aquatic, fish-eating bird, but was only about as large as a pigeon. Its wings were long and fitted for powerful flight, and its habits were apparently like those of the modern terns; but its relationship is still in doubt. The tail in both these N eorni¬ thes had become greatly shortened as com¬ pared with Archaeopteryx, and exhibited the condensation of bones completed in the pygostyle of modern birds.

In the succeeding epoch, the Lower Eocene, at the beginning of the Tertiary Period, or (<Age of Mammals,® birds had begun to fore¬ shadow modern types with little or no refer¬ ence to the preceding “toothed® type. That seems to have come to an end ; and there is no evidence of any ancestral connection be¬ tween them and the modern types, whose ancestors, earlier than the Eocene, remain un¬ discovered. These earliest Tertiary birds are also aquatic, however, and are to be classed with the cormorants, cranes, *etc.* ; but there were also gigantic, ostrich-like forms, such as Dasyornis , Gastornis and Diatryma — not real ostriches, but with affinities with wading birds. Especially notable among these was Diatryma gigantea, of the Wahsatch formations of Utah, — a flightless bird standing 12 feet in height and the largest known fossil bird, hardly ex¬ ceeded by the great moas (q.v.) of New Zealand. By the end of the Eocene period, a

wide variety of kinds of birds occur, usually referable to existing families but not to exist¬ ing genera. “They are all types,® says Osborn, “fitted to inhabit great warm plains, scattered with groves… . It is an essentially tropical assemblage [representing birds] now for

the most part inhabitants of the equatorial regions of Africa and South America.® In the succeed¬ ing epoch, the Oligocene, some existing genera may be recognized, and the fauna of that time has “an unmistakeable African aspect,® but in the next, or Miocene, period many forms belonging to the North Temperate Zone appear. It is in this Miocene epoch that the plains of Patagonia, then warm and bearing abundant vegetation and a crowded population of strange animals, were the home of certain great ostrich-like birds of which the most remark¬ able, perhaps, was Phororhaclios, several species of which are known from bones re¬ covered from the Santa Cruz formation, so rich in fossils. It stood eight or nine feet high, was supported on long legs, very thick and strong, had a rather long tail, fully formed wings, useless, however, for flight, and carried an immense head with a huge hooked beak shaped like an eagle’s. A short-legged form of these gigantic birds, whose habits were probably raptorial, is named Brontornis.

From this time on the birds became well fixed in modern types ; and they appear to have changed but little, in marked contrast to the great evolution of the Mammalia, since the Middle Tertiary.

Consult books listed under Geology ; Orni¬ thology ; Palaeontology.

Ernest Ingersoll.

BIRDS, Nests of. The receptacles pre¬ pared by birds for the holding and security of their eggs and young. The eggs of birds are few in number, larger in proportion and more advanced in development than those of fishes, amphibians or reptiles, and are encased in fragile shells, the rupture of which would be fatal to the enclosed embryo; they are never (with a single exception) buried out of harm’s way; and they require a comparatively high degree of warmth, continuously applied, in order to mature successfully into living and energetic young. (See Egg). To meet these complicated conditions of success great care is necessary on the part of the parent-birds ; and the necessity for this care increases in proportion to the superiority of organization and development of the bird, — a matter of wide range in the class. The young of the higher forms, as hawks and thrushes, would inevitably perish under the limited care that suffices for such lower forms as the seafowl. In this view birds are divisible into two classes : first, those whose young are developed within the egg, that is before hatching, to such a point that they are able as soon as freed from the shell to run about, pick up their food and to a great degree take care of themselves ; second, those hatched before they have reached this state of advancement, and which hence must be fed,

protected and guarded by their parents until they have completed their development to the point of self-care. Parental preparations for the former need have regard only to the proper incubation of the eggs; for the latter it must be extended to the safety and comfort of

BIRDS OF PREY

•P 2

CO

3

-s.

a

>.

u

bO

to

3 43

i a

£ 2

2 3

u!

|>

u a

<33

4> 4)

43 43

HH

BIRDS

1 Digestive Organs.

2 Forms of Feet — a, incised palmate foot; b, k, lobe-foot; c, g, insessorial foot; d, runner's foot; e, scratcher's foot; f, totipalmate foot; h, palmate foot; i, passerine foot; j, m, scansorial or yoke foot; 1, staff foot.

3 Forms of Head and Bill — a, flamingo; b, spoon bill; c, yellow-hammer; d, thrush; e, hawk; f, pelican;

g, avocet; h, saw-bill; i, scissor-bill; j, dove; k, shoe-bill; 1, gap bill; m, arassari; n, ibis; o, song-bird; p, stork.

4 Feathers of a Bird — a, frontal; b, crown; c, occip¬ ital; d, bill; e, cheek; f, breast; g, abdominal; h, rump; i, croup; j and k, sickle feathers; 1, back; m, primary quills; n, secondary quills; o, coverts; p, pinions; q, shoul¬ der-pinions.

BIRDS

the young for a period after they have hatched, greater or less according to their helplessness, which varies with the degree of organization. It is among birds of the highest organization, therefore, that complete and elaborate nests are alone to be found, because there only are they required as cradles and homes for the young.

The seafowl, such as penguins and auks, make no nest whatever, depositing only a single egg on some cliff-ledge or sea-islet, almost in¬ accessible to enemies, and covering it with their warm bodies until the young one hatches, when it is immediately ready to go into the water and fish for itself. The great company of shore¬ breeding birds, gulls, sandpipers, etc., need do nothing more than scrape a smooth hollow among the pebbles or sea-wrack where their eggs may lie close together and not roll or be blown away. The waterfowl — rails, ducks, pelicans and other, — seeking the greater se¬ clusion of marshes and swamps, must do a little better, making a firm raised bed of earth with a rim around it, or else a platform of reeds, etc., to keep their eggs out of the mud or water. Some of these, as the herons, cor¬ morants and the like, have learned to make their homes in bushes and trees, and these are likely to be rather more substantial than those on the ground, to prevent their falling to pieces in the swaying of the branches, or dropping the eggs over the side or through the bottom. Similarly the great tribe of ratite, limicoline and game-birds, which breed inland on the ground, do not make nests in such sense as are those of the song-birds, but mere beds for the eggs, since these are all Precoces, or Nidi fug <z, that is, of those whose chicks run about as soon as they hatch.

The higher families of birds, however, called Altriccs or Nidicolce (but more con¬ venient terms for these classes are found in the words ˆindependent® and ˆdependent,® respectively), must safeguard and nourish their young for a period after birth from the egg, and these must make a home for them which shall be durable and of such a form and finish as shall protect the helpless young from bad weather, observation and attack, and pre¬ vent their falling out. These objects are at¬ tained with a varying degree of success, but in many cases seem to be almost perfectly accom¬ plished, and the nests resulting have added to them the finish of great beauty. Some birds' nests are marvels of skill, ingenuity and adorn¬ ment; while others, perhaps

made by nearly related species, are rude or slovenly.

Classifying Nests. — Several of the earlier writers on ornithology have attempted to class¬ ify birds according to their modes of nest¬ building. Such attempts are not without value, but they are purely artificial and of no use to the systematic ornithologist. The classification of nests may take account of their situation, means of support, shape, materials or other characters, or of two or more of these. Taking the first-mentioned consideration as a basis, we may group birds into miners, such as the king¬ fisher and the sand-martin ; mound-builders, like the brush-turkey and scrub-pheasant of Australia; masons, which use a sort of mortar of earth or clay, including several swallows and allied birds, *etc.* One of the most dis¬ tinctive categories is that of the borers, such

as the woodpeckers and their relatives, which carve out tunnels and chambers in the trunks of trees as breeding-places. Many of the terms employed in nest classification are useful for descriptive purposes. Such are platform-nests, basket-nests, pensile nests, etc., or, as names of birds, weavers, tailors, felt-makers, *etc.* As a general rule birds of the same family or lesser group will agree pretty well in their style of nidification ; but there are many exceptions, as, for example, the North American tyrant-fiycatchers, among which a re¬ markable diversity of style in architecture exists.

Methods of Construction. — Birds choose for their nests the material of that kind to which they are habituated which lies nearest ; and if it cannot be found will seek a good substitute, so that the nests of birds whose specific range covers a wide region will be found varied greatly apd often much improved in some localities. Similarly the builders are likely to change the site when necessary, breed¬ ing in trees in wooded regions and on the ground or rocks where trees are absent. In this way certain birds have greatly modified their nesting habits since the civilization of their habitats — notably the swallows and swifts which all over the world abandon, as a rule, their natural breeding places in hollow trees, or about rocky cliffs, and make their nests under the roofs of farm outbuildings or in bird-boxes. The nests of closely related birds may vary considerably. In many families, as, notably, in the Fringillidce, some species nest on the ground, others in bushes or trees ; and it is hard to say which is to be considered the normal method.

A bird’s nest sometimes forms an immense mass, as is the case with

the birds of prey, crows, or herons, one of which, the umbrette of central Africa, makes a home large enough to fill a dumping-cart. Such great structures are likely to be used many years in succession ; but few small nests outlast the winter. The hollow bed in the centre is formed by a lining of lesser and smoother substances. Small birds naturally use finer materials, and the char¬ acter of the structures varies with the char¬ acteristics and habits of the birds. Some are made almost wholly of twigs, others of grass blades, others of flexible ribbons of such bark as that of the grape-vine, others of shreds of hempen fibre torn from the milk-weed and similar plants, others of a matted felt formed of the down of cat-tail flags or of ferns. Some are made in whole or in part of mud, and plastered upon rocks, either supported upon a ledge or projecting glued to the face of a cliff like a hollow bracket. Of this shape are the nests of many swifts, some of which are composed almost wholly of glutinous saliva, as is the case with that of the edible swift mentioned below. Some of the rudest nests externally are beautifully soft and smooth within ; while others are exquisitely finished and adorned outside as well as in ; or are intricately woven, as are the pensile ham¬ mocks of the vireos, the pouches of the Balti¬ more orioles, European titmice and others, and the leaf-sewn nests of the tailor-birds and many hummingbirds. In most cases the fe¬ male is the architect, while the male is per-

mitted to do little but bring materials which are often rejected by the fastidious builder. While most, especially of the smaller kinds of birds, separate into pairs and seek secluded places for their homes, others breed gre¬ gariously, as is the custom of many seafowl and most herons, pelicans, *etc.* Some of the land-birds, as the swallows, betray a tendency toward this ; but the most remarkable case is that of the African social weaver-birds (q.v.), which actually build a roof in common, be¬ neath which each pair of the flock establishes its individual dwelling. This strictly com¬ munity life does not occur elsewhere among birds, although cases of commensalism are occasional.

Edible Nests. — Few birds' nests serve any human utility, though many are utilized by other members of the animal kingdom. One, however, is valuable as food. This is the nest of the selangane (Collocalia fuciphaga) or of related species of swift or swiftlet of the

Malay Archipelago, used as a delicacy by the Chinese. It has the shape and size of a half teacup, is attached to the rock in the interior of a cave and has the appearance of fibrous gelatine or isinglass. It is composed of a mucilaginous substance secreted by special glands, and is not as was formerly thought made from a glutinous seaweed. The caves in which these swifts dwell in crowds are numer¬ ous in northern Sumatra and in Borneo, especially near the north end of the island, and are in most cases the property of wealthy owners, who get a large annual income from the hazardous occupation of securing the nests, which can be done only by climbing about the interior of the great sea-caves, holding torches and raking off the nests into little bags hung upon the end of the pike-poles. The best, which are whitish in color, and almost free from any mixture with the pure glutine from the glands in the mouth of the bird, are worth $10 to $15 a pound.

Among works dealing with the subject of birds' nests are Rennie, Architecture of Birds) (London 1831) ; Wood, (Homes Without Hands) (New York 1865) ; Pycraft, (Infancy of Animals) (New York 1913). Special books for the United States and Canada are Bendire, (Life Histories of North American Birds) (with colored plates of eggs, Washington 1892-95) ; Davie, (Nests and Eggs of North Ameri¬ can Birds > (Columbus, Ohio 1898) ; Reed, (North American Birds' Eggs) (New York 1904) ; Ingersoll, (Primer of Bird Study* (New York 1915).

Ernest Ingersoll.

BIRDS, Plants Attractive to. Certain

trees, shrubs and herbaceous plants bear fruits which afford food for birds. These have been discovered by observation, and by the scientific examination of the contents of birds' stomachs. By planting those species, therefore, which have been proved most desirable and that are suited to the climate and soil of the chosen location, birds can be attracted to the vicinity of dwell¬ ing-houses or to any other desired spot as a copse or shrubbery; or, on the other hand, lured away from valuable orchards, since they fortunately appear to like best arid, bitter, sour or aromatic fruits, distasteful to human beings, even better than the cultivated kinds.

Moreover, these bird-attracting plants are apt to be ornamental as well, since many have pretty fruits, red in color and often clinging to their branches far into the winter, furnish¬ ing grateful additions to the meagre fare of the hard-weather birds. Among the most fre¬

quented trees are the various wild cherries (Primus) ; dogwoods (C omits) ; pepper-tree (Schinus) ; pepperidge (Nyssa) ; China-tree (Melia) ; pines (Finns) ; oaks (Quercus) ; magnolias (Magnolia) ; apples (Acer) ; manzanita (Arctostaphylos) ; cedars and junipers (Juniperus) ; hollies (Ilex) ; mountain ashes (Pyrus) ; hackberries (Celtis) ; sassafras (Sas¬ safras) and thorns (Crataegus) . The mulberry (Morns) is the prime favorite, and the tree most used for tolling the birds away from cul¬ tivated fruits.

For shrubberies, one can plant with success all of the ordinary edible small fruits and berries besides the elders (Sambucus) ; service

(-) or juneberries (Amelanchier) ; wild

roses (Rosa) ; snowberries (Symphoricarpus) ; sumachs (Rhus) ; spicebush (Benzoin) ; poke-berry (Phytolacca) ; cornels (Cornus) ; bearberry (Arctostaphylos) ; silverberry (Eleag-nus) ; buffalo berry (Shepherdia) ; buckthorn (Rhamnus) ; bayberries (Myrica) ; black-alder (Ilex) ; viburnums (Viburnum) ; bluewood (C ondalia) ; lotebush (Zizyphus) . firethorn (Cotoneaster) ; nockaway (Ehretia) ; barberry (Berberis) ; and a number of others.

Climbing plants can also be utilized, among them the wild grapes (Vitis) ; Virginia creeper (P seder a) ; bittersweet (Celastrus) ; hog-peanut (Falcata) and milk-pea (Galactia).

The many sparrows feed chiefly on weed seeds, but more acceptable plants from the gardener's point of view can be offered to them, such as the various so-called millets (Panicum, Setaria, Eleusine) ; princes' feather (Ama-ranthus, Polygonum) ; chamomiles, white and yellow (Antliemis) ; California poppy (Escholt-zia) ; tarweed (Madia) ; bachelor's buttons (Centaur ea) and the like. Wild ducks are at¬ tracted by several aquatic and semi-aquatic plants, among the most important being the wild rice (Zizania) ; the wild celery, or tape-grass (V allisneria) ; various pondweeds (Po-tomageton) and arrowheads, also called wapato and the Delta duck potato (Sagittaria) . The wild millet (Echinochloa) and chufa tubers (Cy penis) also afford them food. Consult Kennard, H., (List of Trees, Shrubs, Vines and Herbaceous Plants, native to New England, bearing fruit or seeds attractive to Birds* (Reprint from Bird-Lore, Vol. XIV, No. 4, 1912) ; McAtee, W. L., (Plants useful to at¬ tract Birds and protect Fruit, * (Reprint from (Yearbook of Agriculture) 1898) ; also many pamphlets, farmers' bulletins, circulars and re¬ ports published by the United States Depart¬ ment of Agriculture, and Bureau of Biological Survey.

Helen Ingersoll.

BIRDS, Protection of. During all the early history of this country little or no atten¬ tion was paid to the destruction of birds or other wild animals. Probably the earliest law on the subject was one passed in Massachusetts in 1817, establishing closed seasons for certain animals and birds shot as game. It was not

until many years later that any protection was thrown over small birds, even in New England. About 1880 it began to be fashionable for women to adorn their hats and other decora¬ tive garments with the feathers of birds, and the whole world was ransacked for fine feathers. The enormous destruction of bird-life large and small that ensued pained bird-lovers and humane persons, and alarmed econo¬ mists, who understood the immensely beneficial service birds did in aiding to keep down the hordes of injurious insects that preyed on our grain fields, orchards and gardens. Societies for bird-protection were organized in Great Britain and on the continent of Europe, and in the United States Audubon societies came into existence, and exerted a powerful and perman¬ ent influence, as described elsewhere (see Audubon Societies). The result of this was to discourage the wearing of feather-ornaments, and the restriction of the local supply, by laws passed in most of the States prohibiting the killing of game-birds and wild fowl except dur¬ ing limited seasons of the year; and the pro¬ hibition of the killing, or destruction of their eggs, of all other birds, with a few exceptions, such as some hawks, the crow, etc., regarded as injurious. With these laws behind them the Audubon societies and other friends of the birds were able to punish wanton shooting and trapping, guard breeding-colonies of herons (especially the egrets), gulls, terns and wild¬ fowl ; and to carry out plans, now widely use¬ ful, for education of the young in the interest and value of birds, and regard for them and for other native animals. In this way the de¬ struction of birds for millinery use was largely stopped; but in order to complete the reform greater cooperation with foreign efforts in the same direction was needed. This was seen to be a matter of Federal

action, and first resulted in the United States Statute of 4 March 1909, known as the Lacey Act. This prohibited the importation into the United States of any bird or other animal declared by the Secretary of Agriculture to be injurious; and forbade com¬ mon carriers handling or transporting any such animals, or their dead bodies, or parts thereof, or any animals killed in, or shipped from, any State or Territory in violation of the laws. This prevented would-be evaders taking ad¬ vantage of inequalities between the States as to ((open seasons" for game.

This inequality among State laws as to the periods when shooting was permitted was the cause of continual dissatisfaction and evil, es¬ pecially as to ducks, geese and shore-birds, during their annual migrations between the tropics and their northern breeding-places ; the open season for them began early in the South and extended late in the North, so that the intent of various local laws was practically annulled, and this class of birds was threatened with extinction. After a long campaign of effort Congress came to adopt the theory that the migratory birds, being in most cases mere travelers across States, were not local residents nor State property, but belonged to the people at large; and if they were to be saved to the people the national authority must intervene. Congress, therefore, passed (4 March 1913) the Migratorv Bird Law, popularly known as the McLean Law in compliment to its foremost

promoter, Senator McLean of Connecticut, the gist of which is as follows:

All wild geese, wild swans, brant, wild ducks, snipe, plover, woodcock, rail, wild pigeons, and all other migratory game and insectivorous birds which in their northern and southern migrations pass through or do not remain perma¬ nently the entire year within the borders of any State or territory, shall hereafter be deemed to be witnin the custody u,1pr0tectl0n Government of the United States, and

shall not be destroyed or taken contrary to regulations hereinafter provided therefor. The Department of Agricul¬ ture is hereby authorized and directed to adopt suitable regulations to give effect to the previous paragraph."

These regulations have been issued in suc¬ cessive bulletins by the Biological Bureau of the Department of Agriculture, with slight

changes from year to year. The most import¬ ant effect of this law — and a very far-reaching benefit — is stoppage of the shooting of wild fowl in the spring, an evil especially prevalent in the Mississippi Valley.

The well-disposed people of Canada had been equally active in bird-protection with those of the United States, but met with the similar difficulty of inequality of laws between their provinces; furthermore both countries were hampered by gunners and dealers shoot¬ ing and trafficking more or less illegally across the border. It was perceived after the passage of the Migratory Bird Law in 1913 that its full purpose could not be realized in the United States, or availed of by the Canadians, except by cooperation. This resulted, after much effort, in formulating a ˆconvention" or treaty be¬ tween this country and Great Britain (for Can¬ ada), which unified the protective laws of both countries. This treaty was perfected in the autumn of 1916 and proclaimed by the Presi¬ dent on 8 December; and several months later Congress passed an <(enabling act,® giving power and money to the designated officials to enforce its observance, as Canada had pre¬ viously done for its side of the border. This treaty incorporates the substance of the Migra¬ tory Bird Law ; declares that the close season on migratory game birds shall be between 10 March and 1 September (except for shore-birds along the northeastern coast, for which the close season shall be 1 February to 15 August) ; pro¬ hibits the killing, capture or destruction of eggs of all migratory song-birds at all times (with certain special local provisions and ex¬ ceptions) ; a'nd establishes prohibitory regula¬ tions in regard to international commerce in game or other birds. Consult Forbush, (Use-fu1 Birds and Their Protection (Boston 1908), and publications of the United States Depart¬ ment of Agriculture (Biological Survey), Re¬ ports of Game Commissions of the various States and provinces and reports and publica¬ tions of the National Association of Audubon Societies (New York).

Ernest Ingersoll.

BIRDS, The, a play by Aristophanes, first performed in 414 b.c. The happy thought of the Birds is the establishment of Cloud Cuckoo town or Nephelococcygia, a city in mid-air, in order to starve out the gods by cutting their communications with the earth and restore to the birds their rightful sovereignty. It was produced at the time of' the Sicilian expedi¬ tion. But the traces which some modern critics have detected of admonitory satire of that overambitious project are very faint and

nebulous. The fleet had sailed, and even an Athenian audience would hardly have tolerated unpatriotic and ill-omened ridicule of an enter¬ prise to which the entire power and the future of Athens were pledged. The comedy is then in the main a pure phantasia into which Aristophanes has distilled the quintessence of all the bird vocabulary, the bird lore, the bird mythology, the bird poetry of the Greeks.

Plausible and Hopeful with a raven and a jackdaw for guides are wandering in quest of some quieter city than litigious and party-ridden Athens. They knock at the doors of birdland and a long beaked runner bird ((opens the wood® and admits them to the presence of King Hoopoe, the hero of Sophocles' recent tragedy. They have so to speak gone "through the looking glass.®

After some preliminary badinage, the great thought of the foundation of Bird City strikes Plausible. Hoopoe in a lovely lyric summons his mate, the nightingale, whose answering song is represented by a flute solo, and calls all the birds to council. The chorus of birds come fluttering, twittering and hopping in, amid the scurrilous comments of Plausible and Hopeful. They are at first very angry with Hoopoe for entertaining their enemy, man. The threatened conflict is resolved by the usual compromise and there follows a set debate on the magnifi¬ cent new project submitted to them by the <(two strangers from wise Hellas.® The birds are won over by Plausible's denunciations of the usurpations of the Olympians that have robbed them of their ancient prerogatives. The birds themselves expand and develop this theme in the magnificent anapaests amusingly paraphrased by Courthope in his charming (Paradise of Birds.)

"We wish to declare how the birds of the air All high institutions designed,

And holding in awe art, science and law,

Delivered the same to mankind."

Matthew Arnold's Poor Mathias draws its inspiration from the same source.

"Was it as the Grecian sings Birds were born the first of things?"

Andrew Lang transposes it into the key of savage ethnology in his (Barbarous Bird GodsP

" We would have you to wit that on eggs though we sit and are spiked on the spit, and are baked in the pan.

Birds are older by far than your ancestors are, and made love and made war ere the making of man."

Swinburne translates it to show how nearly English anapests match the resonant harmo¬ nies of the Greek.

"Come on then ye dwellers by nature in darkness and like to the leaves' generations,

That are little of might, that are moulded of mire, unendur¬ ing and shadow-like nations."

The plan once accepted, execution follows with magic celerity. The birds discover in themselves all needful capacities and resources.

"There came a body of thirty thousand cranes With stones from Africa in their craws and gizzards, Which the stone curlews and stone chatterers Worked into shape and finished. The sand martens And mud larks too were busy in their department, Mixing the mortar while the water birds As fast as it was needed brought the water." (Frere)

After the realization of the happy thought the last half of the comedy as usual illustrates its consequences in a series of farcical scenes.

The new colony is visited by every type of ambitious, designing projector and fakir in Greece. And Plausible's dealings with the peti¬ tions and the pretensions of the poet, the priest, the political sycophant, the sophist, and designer of the city beautiful, afford material for so many scenes of parody, buffoonery and farce. Prometheus comes in camouflaged by an um¬ brella from the thunder bolts of Zeus. Winged Iris, messenger of the Homeric gods, in the role of a saucy soubrette is arrested and brought in by the guard for "flying about in other peoples' chaos.® And her threats to tell ((Pa Zeus® on

them are answered by Plausible in terrific strains of more than ZEschylean sublimity. Finally a deputation from the gods headed by Neptune and Heracles appears to treat for terms of peace. Heracles, the glut¬ ton, and shirtsleeve diplomatist, cannot resist the savor of a dish of rebel squabs which Plausible is ostentatiously preparing and he concedes a peace that yields to the birds the beautiful maiden Sovereignty herself. A riotous celebration of the marriage of Plaus¬ ible and Sovereignty furnishes the motive of the song and dance and revelry of the conclud¬ ing scenes.

There is an interesting account of a modern performance of the play at Cambridge, Eng¬ land, by Jebb in the Fortnightly Review 41.88.

Paul Shorey,

Head of Greek Department } University of Chicago.

BIRDS, Vision of. See Eyesight in the Lower Animals.

BIRDS OF AMERICA, The, the monu¬ mental work of John James Audubon, the great American naturalist, first published in England between the years 1827 and 1830. It contained colored illustrations of 1,065 species of birds. The text is descriptive of the habits and manners of the birds observed by Audubon himself in his long wanderings over the North American continent.

BIRD'S-EYE LIMESTONE, one of the

subgroup into which the Lower Silurian has been divided by New York State geologists, now called Lowville Limestone, in which the crys¬ tallized corals of the genus Tetradium appear as whitish points. The maximum thickness is 30 feet but is generally not over 20 feet. The rock is a fine-grained limestone, generally of a dove color and when free from the whitish points, or "eyes,® is used as a secondary grade of lithographic stone. A tribolite (Ba - thyurns extans) is a characteristic fossil of the Lowville limestone.

BIRD'S-FOOT, (Ornitliopus) , a genus of about seven species of small slender pinnate¬ leaved, white, pink or yellow flowered annual herbs of the natural order Leguminosce. The common and generic names were suggested by the shape of the articulated, cylindrical pods which resemble the bent claws of a bird. The principal species, O. sativus, is used as a forage plant. It is a member of the sub-family Papilio-naceae of the Leguminosae. A small plant of this genus (O. perpusillus) , having white or yellow flowers streaked with red, is common in Great Britain and on the continent.

%

/

✓“V

Vol. 4, BIRDS TO BULFINCH

Americana

d

\

|

I

%

i

1

1

I

I

I

I

I

§

I

THE

ENCYCLOPEDIA

AMERICANA

■ • -cˆJi’

Im/mr

SE

Unp/EHSAL

MgOWLEDGEy

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK. CHICAGO

I

I

I

I

I

£

|

|

\

\

\

I

§

p

b

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

k

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING

BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 18 1922

£>r.' 6654317

-'■VO J

PARTIAL LIST OF CONTRIBUTORS TO VOLUME IV

ALLEN, EDWARD ELLIS

Director of Perkins Institute and Massachusetts School for the Blind

BLIND, EDUCATION OF THE

BAKER, DAVID

Consulting Metallurgical Engineer, Philadelphia BLAST FURNACE PRACTICE

BELL, WALTER E.

Of Harris, Forbes & Co., New York

BONDS

BRETT, GEORGE M.

Assistant Professor in the Department of Political Science, The College of the City of New York BOOKKEEPING

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

BLACKMORE, RICHARD DODDRIDGE

BROWN, DAVIS

The American Clay Machinery Company

BRICK MAKING MACHINERY

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

BRITISH WEST INDIES, DIPLOMATIC
RELATIONS WITH

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology, University of Chicago.

BLEPHAROPLAST

CHANDLER, FRANK W., A.B.

Dean of College of Liberal Arts, University of Cin¬

cinnati

BLUEBIRD, THE

COCHRANE, CHARLES H.

Author of “Wonders of Modern Mechanism,” *etc.*

BLOWPIPE ANALYSIS

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

BRAZIL — POLITICAL DIVISIONS

BRAZIL — TRANSPORTATION

COUMBE, CLEMENT W.

Technical Art Expert

BOW PORCELAIN

BRISTOL EARTHENWARE

BRISTOL PORCELAIN

BRONZES

COVILLE, FREDERICK V., A.B.

Chief Botanist, United States Department of Agri¬
culture

BOTANY

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

BRONTE, CHARLOTTE, EMILY AND
ANNE

CURRIER, ANDREW F., M.D.

BLOOD, DISEASES OF THE

BLOOD PRESSURE

BLOOD VESSELS, DISEASES OF THE

DARTON, N. H.

Geologist, United States Geological Survey

BLACK HILLS

DENT, R. K.

Chief Librarian Aston Manor, and author of “ Old and New Birmingham,” *etc.*

BIRMINGHAM, ENGLAND

DOBSON, AUSTIN, LL.D

Author of “ Life of Goldsmith,” “ Life of Richard¬

son,” *etc.*

BOLINGBROKE, HENRY ST. JOHN

DOUGLAS, D. S.

Editorial Staff of The Americana

BRITISH EMPIRE

BROWNING, ELIZABETH BARRETT

BROWNING, ROBERT

DUNN, WALDO H., Litt.D.

Professor of English Languages and Literature, The College of Wooster

BRONTE, CHARLOTTE, MRS. GAS—

KELL'S LIFE OF

EVERETT, WILLIAM BLANKS

General Manager, Birmingham Chamber of Com¬

merce

BIRMINGHAM, ALABAMA

FARROW, EDWARD S., C.E.

Consulting Civil and Military Engineer

BLOCK SIGNAL SYSTEM

FERRIS, RICHARD, C.E., D.Sc.

Editorial Staff of The Americana

BRIDGE

BRIDGES, LIFT

BUILDING MATERIALS

BUILDING IN THE UNITED STATES

BUILDING AND LOAN ASSOCIATIONS

BUILDING LAWS

FLEMING, WALTER L., Ph.D.

Professor of History, Louisiana State University BUCHANAN, JAMES

HAMILTON, CLAYTON, M.A.

Extension Lecturer, Columbia University

BROWNE, SIR THOMAS

HODGE, HENRY W., C.E.

Consulting Engineer, New York

BRIDGE DESIGNS, RAILWAY

HOWE, M. A. DE WOLFE, A.M.

Author of “ Boston: the Place and the People ”

BOSTON, MASSACHUSETTS

Contributors to Volume IV — Continued

INGERSOLL, ERNEST

Naturalist and Author

BOA

BREEDING

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

boh£me, la

BOHEMIAN GIRL, THE

BORIS GODOUNOV (OPERA)

IVES, EDWIN S.

Book Manufacturer, New York

BOOKBINDING

JACOBY, HENRY S., C.E.

Professor of Bridge Engineering, Cornell University BRIDGE CONSTRUCTION

JELLIFFE, SMITH ELY, M.D., Ph.D.

Formerly Professor of Pharmacognosy, Columbia University; Adjunct Professor of Diseases of Mind and Nervous System, Post Graduate Hos¬

pital and Medical School; Professor of Psychiatry, Fordham University, *etc.*

BLADDER

BLADDER, DISEASES OF THE

BLEEDING

BLOOD, CIRCULATION OF

BRAIN

BRAIN, DISEASES OF

BRAIN, TUMORS OF

KENISTON, G. N.

Secretary of the Bismarck Commercial Club

BISMARCK, NORTH DAKOTA

KLEIN, HENRI F.

Librarian “ London Times,” 1898-1905; Editorial Staff “ London Standard,” 1905-15; and Staff of The Americana

BOERS

LANDON, ARCHER A.

President of the Buffalo Chamber of Commerce BUFFALO, N. Y.

LEONARD-STUART, CHARLES, B.A.

Editorial Staff of The Americana

BOHEMIA

BROOKLYN, N. Y.

MacDOUGAL, DANIEL T., Ph.D., LL.D.

Department of Botanical Research, Carnegie In¬

stitution, Washington

BOTANICAL GARDENS

NEILSON, WILLIAM A., Ph.D.

Professor of English, Harvard University

BUCHANAN, GEORGE

OGDEN, CHARLES J., Ph.D.

BUDDHA

BUDDHISM

PALLEN, CONDE B., Ph.D., LL.D.

Managing Editor of the Catholic Encyclopedia }

BROWNSON, ORESTES A.

PETROVICH, WOISLAV M., Ph.D.

Chief Slavonic Division, New York Public Library BOSNIA

RINES, IRVING E.

Author of “ History of the United States ”

BOUNDARIES OF THE UNITED

STATES

BOUNTIES

BUDGETS, AMERICAN

BUDGETS, FOREIGN

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers In¬

surance Company

BOILER

‘ BROWNIAN MOVEMENT

SENILLOSA, JUAN A.

Former Argentine Consul-General to Canada

BUENOS AIRES, ARGENTINA

SCOTT, S. DUNN

Editor “ News-Advertiser,” Vancouver

BRITISH COLUMBIA

SPIVACKE, CHARLES A., M.D.

Adjunct Visiting Physician and Pediatrist, Saint Mark's Hospital, New York

BLOOD TRANSFUSION

URQUHART, L. C., C.E.

Instructor in Civil Engineering, Cornell University BRIDGE CONSTRUCTION, MODERN

METHODS OF

WAHL, ROBERT

President and Director of Wahl-Henius Institute of Fermentology, Chicago

BREWING AND MALTING

BREWING INDUSTRY IN AMERICA

WELLS, BENJAMIN W., Ph.D.

Author of " Modern French Literature," *etc.*

BODIN, JEAN

WIENER, LEO

Professor of Slavic Languages and Literatures, Har¬

vard University

BORIS GODUNOV

WILCOX, MARRION, A.M., LL.B.

Coeditor of “ Encyclopedia of Latin America ”

BOLIVIA

BOLfVAR Y PONTE, SIMON

BRAZIL — TOPOGRAPHY

BRAZIL — HISTORY

BRAZIL — COMMERCE

BRAZIL — GOVERNMENT

BRAZIL — AGRICULTURE

BRAZIL — EDUCATION

BRAZIL — MANUFACTURING

BRAZIL — BANKING AND FINANCE

WILSON, GEORGE GRAFTON, Ph D., LL.D.

Professor of International Law, Harvard University BLOCKADE

KEY TO PRONUNCIATION

a

far, father

i

n

Span, h, as in canon

pin on (pen’yon)

(can’yon),

a

fate, hate

ng

mingle, singing

a or

a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

a

all, fall

o or 6

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or

e

bed, end

o

book, look

e

her, over: also Fr. e, as in de;

ch, as in neuf ; and och , as in

oi

oil, soil ; also Ger. eu,

as in beutel

boeuf, coeur; Ger. 6 (or oe),

as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

nr

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or

n

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

ii

between u and e, as

in Fr. sur,

Ger. Muller

i or

w

1

him, it

V

of, very

i

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

y

(consonantal) yes, young

j

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

ri

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents,

to indicate

point, Jean, temps

syllabic stress

< :■’> ■’ ‘»;•.«) r M , • i .4 rtJ ‘|P.

(«v r if-iq;) wow \

, ”ir.l’y ‘ ,|nifH

itkjo «otf

. . a - -o o

. • r . • . . ■

r.U«v\ iU an ,\'i ,1 : •) ozfc ; itt a ,1 >

l ,1 ■ 00 • •" <

ryjii , . tii:

TtUri ,v/on <

T3L. If ,i\U

di

ifl

'*V*,, .11 ,V ' ■ 1! ; ■■■! ■ '

.

YYiv ,i.i

o r. .■•tj'.-'i

•jii ifbo; Of o f: :i : y . (ooi. >■

)0.i I

fo

J&VSII t Hi;

a -fiii

■■ ■ ■ r. ■ - • ■ • .. <

Birds of paradise, or para-

DISiEID/E, a family of birds of New Guinea, northern Australia, and the neighboring islands, which contains a large number of species, notable for splendid plumage, although they are most nearly allied to the plainly dressed crows. The name ((bird of paradise® is a transla¬ tion of the native name in the island of Batchian, Gnanukdewata,® meaning birds of the gods. About 50 species of these birds are known, varying in size from that of a crow to that of a sparrow ; all are forest birds, spend¬ ing their lives in the tree-tops, where many of them go about in small

flocks, active and noisy, but are inclined to hide themselves in the thickest foliage, as though aware that their plumage rendered them easily conspicuous to

their enemies. None are singers, and in most cases the voice is a loud, harsh cry, or a sharp whistle, or in some species, strange mewing notes. It is related that on some of the islands certain species were called ((birds of the sun,®

because of their habit of joining in loud cho¬

ruses at sunrise. Their diet consists mainly of fruit, and especially of berries and seeds; the fig and the nutmeg are especially eaten, and some species suck honey from the large tropical flowers. Insects are captured by all species, as also are the numerous snails inhabiting the trees and bushes of that region, and the larger forms devour frogs and lizards. In pursuit of insects, worms and snails, several species spend much of their time scrambling about the trunks of trees and searching the bark, like creepers.

The breeding habits of these birds vary exten¬

sively, and the nests and eggs of many have not yet been discovered. The typical paradise-birds construct rather loose, careless platforms of sticks and leaves, moss, etc., placed in trees or bushes, and lay eggs which are much

streaked and spotted, and vary in color and patterns. The very extraordinary nests and

playgrounds of that section of the family

which is terrestrial, and inhabits Australia, are described under bower-birds (q.v.). Many

recent authorities place these in a distinct family, the Ptilenorhvncidae.

Interest in the birds of paradise centres in their marvelous displays of plumage. These

are exhibited in most species by the male alone, the female being comparatively plain and simple in her attire, as also are the young of both sexes, until the young males arrive at maturity.

This dissimilarity between the females and

males of birds, of which the latter are highly adorned, is a protective arrangement, designed to keep the females from observation while

they are sitting defenseless upon their nests, where they would easily be discovered, and

often killed, did they wear the conspicuous colors and ornaments of their brilliant mates.

Natural selection, by keeping their colors, and those of the inexperienced and comparatively helpless young ones plain, has tended to pre¬

serve the species ; and at the time when the females are brooding their mates remain at a discreet distance from the nests, so as not to betray their position to the monkeys, lemurs, civets, serpents and other searchers for eggs and fledglings. The same influence, acting

through sexual selection (q.v.), has developed in the males the bright colors and eccentric adornments which distinguish this group of

birds as a means of increasing their attractive¬

ness in the eyes of the females. The theory is that the most beautiful male will be chosen first as a mate, and will transmit to its offspring its tendency toward ornamentation or high color, and that thus, by constant rivalry between the males, the excessive ornamentation in this group has slowly arisen. A justification for this view is found in the fact that in the courting season, which occurs at the opening of the rainy season, numbers of males of each species gather in certain spots, sometimes on the ground, but more usually on the limbs of the forest trees, and go through a great variety of movements and strange antics, lifting their wings, spreading their tails, erecting their crests and apparently doing everything in their power to display their finery in the eyes of the females, and thus solicit them to make a choice. Natives call these

assemblages, which usually occur at sunrise, and always in the same place, ((dancing parties,®

and it is during this time that they secure specimens for the trade, by shooting them from ambush with blunt arrows. So persistent has been

the demand for their skins and feathers, chiefly for millinery purposes, that many of the species have been nearly exterminated. This

may easily occur from the fact that the range of most of the birds of paradise is very limited, several species being confined to a single island.

Their increase, too. is slow, as most of them lay only two or three eggs, a condition which has arisen from the fact that their natural enemies are comparatively few. They have

occasionally been captured alive, and kept for a time in captivity, even in the zoological gardens of Europe, but they do not thrive in confine¬

ment. The best-known of the birds of paradise is the great emerald paradise bird (Paradisea apoda) of the Moluccas which was brought to Europe first in 1523, by the members of Magel¬

lan's company, on their return from the first circumnavigation of the world. They brought

two dead specimens which had been given to them in the island of Batchian as a mark of royal favor. From these skins the natives, as was their custom, had cut off both the wings and the feet; and this gave rise to the absurd stores of the early books, that the paradise-birds were naturally footless and wingless,

never perched, suspended themselves by the

tail-feathers, *etc.* It was also said that they gazed perpetually at the sun, and that the hen laid her eggs on the back of her spouse. This species is as large as a crow. The male is rich brown, becoming purplish beneath ; the head

and neck are pale yellow, the forehead, cheeks and throat metallic green. From the sides of the body, beneath the wings, spring thick

tufts of delicate, loosely-webbed, golden-orange

feathers, which, when the wings are lifted, may be lifted and spread out so as to seem to fall like a shower over the whole bird ; and the two middle tail-feathers are like long wires each with a very slight flag-like web at the tip.

It would be impossible to describe at length the great variety and splendor of the plumage of these eccentrically ornate birds, only a few of which may be further alluded to. In the red bird of paradise (Paradisea sanguined) the plumage is like velvet in a variety of gorgeous colors, and the tufts in the sides are rich crimson, while the elegantly curling central tail-shafts are 21 inches in length. A genus of New Guinea (Cincinnurus) includes a number of

species, only about six inches long, called the king birds of paradise, which are distinguished by large tufts of fan-like plumes on each side of the breast. Another genus (Parotia) has as its especial ornament a group of three long feathers springing from behind each eye, which are in the form of metallic wires, with a racket-like web at the end that may be erected and moved about as the bird wishes. Other¬

wise the plumage is black, except for some vivid steel-green and white feathers about the head.

Some species have a distinct shield of metallic, scale-like feathers upon the back or upon the breast, which may be glossy blue, or green, or violet, or glowing scarlet, or a mixture of these.

The acme of this strange and gorgeous develop¬

ment in plumage seems to be attained by the ˆsuperb® bird of paradise (Lophorhina su-Perba), which is characterized by the presence of an enormous erectile forked shield of vel¬

vety black feathers arising from the nape of the neck, and when in repose lying flatly on the back. So strange and apparently incongruous

is this shield, that it might suggest to the be¬

holder that the tail of some other bird had been stuck on to the skin, were it not that its feathers are of a different type. The ground-color of the plumage is of the deepest black, but with bronze reflections on the neck; while the feathers of the head are metallic green and blue. Spreading over the breast is a shield composed of narrow and rather stiff feathers, which extends in a pointed form, along each side, and is

emarginate in the middle, In color, this is bluish-green, with a satiny sheen ; the back shield, on the other hand, is velvety black, with reflections of bronze and purple, its outer¬

most feathers exceeding the primaries of the wing in length. The natives say that the enor¬

mous crest, when displayed during the courtship of the female, is not only raised, but spread widely out, in a fan-like manner, while the chest shield is similarly expanded. Hence the head of the bird forms a circle of irregular feathers of velvety black and emerald, com¬

pletely concealing the rest of the body when viewed from the front.

The name, (<bird of paradise,® has also been applied to Miluvius forcatus, the ((scissor-tail®

of Central America, Mexico and some of the Southern States.

General information as to the birds of para¬

dise will be found in books of East Indian travel, especially in (The Malay Archipelago) (1869), by Alfred Russell Wallace, the first naturalist to study these birds attentively in their native haunts. As early as 1873, Daniel Elliot completed a magnificent monograph of

the family illustrated with colored folio plates, and in 1881 was published a second monograph, by Salvatori, as a part of his general work on the ornithology of the Papuan region. Still more recently German naturalists have in¬

creased our knowledge of this family by many papers in German scientific periodicals, which have been utilized by Rothschild in the prepara¬

tion of his account of these birds in (Das Tier-reich> (Berlin 1898). The most recent sketches are those of the (Royal Natural History0

(London 1895), and Evans, <Birds) (London

1900). See also an article by A. Menegaux in the Revue Frangaise d'Ornithologie, Year V,

BIRDS OF PREY. This group is a sur¬

vival of the old-fashioned classification of animals by resemblances in appearance and

function, rather than in structure. Broadly

speaking, a bird of prey is merely one which subsists by attacking and devouring living

creatures, and hence the name covers such

birds as skuas, frigate-birds, shrikes and fish-catching birds, as well as the eagles, hawks and owls, to which it is restricted by popular usage. In all these cases the adaptations are for a predatory life, especially marked in the strong seizing talons of the hawks and owls, and in their hooked, sharp-edged beaks, suit¬

able for tearing and cutting, along with which go suitable modifications of the digestive or¬

gans, characteristic of the accipiters. These adaptations bear a curious, yet natural, likeness to the claws, teeth, etc., of carnivorous mam¬

mals and reptiles.

BIRDSBORO, Pa., borough of Berks

County, 10 miles southeast of Reading, on the Pennsylvania and the Philadelphia and Reading railroads. Its industries comprise extensive

foundries and machine shops. Pop. 3,299.

BIRDWOOD, Sir George (Christopher

Molesworth), English scientist: b. Belgaum,

Bombay, 8 Dec. 1832; d. 27 June 1907. He was graduated at Edinburgh University, joined the Bombay medical staff in 1854,

served in the Persian Expedition of 1856-57, and was some¬

time professor in the Grant Medical College, Bombay. He also acted as a commissioner at BIRDWOOD — BIRGER OF BJALBO

important exhibitions after 1851. He was

author of (Economic Vegetable Products of the Bombay Presidency } (1868) ; of numerous re¬

ports on botanical subjects, and of introduc¬

tions to various historical and other works on India.

BIRDWOOD, Herbert Mills, English

lawyer: b. Belgaum, Bombay Presidency, 29

May 1837 ; d. about 1908. He was educated

at Edinburgh University, and was dean of arts (1868, 1881, 1888, 1890) and syndic of the Bombay University, and vice-chancellor 1891 —92. He entered the Bombay civil service 1858; was made assistant collector and magistrate

1859; assistant judge 1862; under secretary to the government, judicial, political and educa¬

tional departments, and secretary of the legis¬

lative council 1863 ; acting registrar of the High Court, Bombay 1867 ; district judge for Ratnagiri, Surat and Thana, 1871-80; judicial commissioner and judge of the Sadar Court,

Sind 1881 ; three times acting judge of the High Court, Bombay 1881-85; puisne judge of the High Court of Bombay 1885-92 ; and mem¬

ber of the executive council of the governor of Bombay 1892-97. His

publications include

(Catalogue of the Flora of Matheran and Ma-hableshwaU ; (Catalogue of Bills Introduced into the Bombay Legislative Council in

1862-65 > ; and papers relating to the constitu¬

tion of the council, the plague in Bombay, *etc.*

BIREME (Lat. bi -}- remus, two oar), a

Roman ship of war with two banks of oars.

It was inferior in magnitude and strength to the trireme.

BIREN, be-roh, or BIRON, Ernest John

von (Duke of Courland), Russian statesman

(grandson of a groom of James, Duke of

Courland, and the son of a Courland pro¬

prietor of the name of Biihren) : b. 1687; d.

28 Dec. 1772. He studied at Konigsberg, se¬

cured the favor of Anna Ivanovna, Duchess of Courland, and niece of Peter the Great of

Russia; but he was unsuccessful in his at¬

tempt to obtain admission among the Courland nobility. When, in 1730, Anna ascended the

Russian throne, Biren was loaded by her with honors and introduced at the Russian court.

Here he assumed the name and arms of the

dukes of Biron in France. Fierce and haugh¬

ty by nature, he indulged his hatred against the rivals of his ambition. The princes Dol-gorucky were his first victims. He caused

11,000 persons to be put to death and double that number to be exiled. It is said that the Empress often threw herself at his feet to in¬

duce him to lay aside his severity, but that neither her entreaties nor her tears were able to move him. The firmness of his character, however, introduced vigor and activity into

all branches of the administration throughout the empire. In 1737 Anna forced the Cour-landers to choose her favorite (who had in 1722 married a Courland lady) for their duke.

After declaring Prince Ivan her successor,

she appointed Biren regent. Anna died 28

Oct. 1740. The new regent acted with pru¬

dence and moderation. But a secret conspir¬

acy was soon formed against him. Field-Mar¬

shal Miinnich caused him to be arrested in his bed during the night of 19 Nov. 1740 and to be confined in the castle of Schlusselburg. He was subjected to a trial; but the sentence of death was changed into that of imprisonment for life and his fortune was declared confis¬

cated. Together with his family he was trans¬

ported to Pelym, in Siberia, and thrown into a prison, of which Miinnich himself had furnished the plan. In the following year Elizabeth,

daughter of Peter the Great, being raised to the Russian throne by a new revolution, Biren was recalled 20 Dec. 1741, and Miinnich was obliged to occupy his prison. At Kasan the sledges met ; the travelers recognized each

other and proceeded on their way without in¬

terchanging a word. Biren was detained at

Jaroslav and only received his full liberty in 1762 from Peter III. When Catherine II as¬

cended the throne the duchy of Courland was restored to Biren in 1763. He governed with wisdom and lenity, transferring the govern¬

ment to his eldest son, Peter. Consult Halem, (Lebensbeschreibung des russischen General-Feld-marschalls Miinnich > (Oldenburg 1803) ; Rambaud, <Russia) (Vol. II) ; Rambaud and

Lavisse, (Histoire generale* (Paris 1893-1901) ; Ruehl, (Geschichte E. J. von Birons) (1764); (Les antiquites russes) (Moscow 1884) ; and (Lettres d'Anna Ivanovna) (in L' Archive

Russe, Vols. II and III, Moscow 1873-77).

BIRETTA, a cap worn by ecclesiastics,

especially those of the Catholic Church, and by ritualistic clergymen of the Anglican and Epis¬

copal churches. It is of considerable an¬

tiquity, though it has varied in shape and ma¬

terial at different times. It is at present a stiff-sided, square-shaped cap with sharp

edges, a flattened top surmounted by ridges rising above it, having in the centre a sort of tuft or tassel. It is made of cloth or stuff, the color being black for priests, purple or violet for bishops and scarlet for cardinals.

See Vestments.

BIRGE, Edward Asahel, American nat¬

uralist: b. Troy, N. Y., 7 Sept. 1851. He was graduated at Williams College 1873; studied

physiology and histology at Leipzig 1880-81 ; became instructor of natural history in the University of Wisconsin 1875 ; professor of

zoology 1879-1911; dean of the College of Let¬

ters and Science in 1891 ; and acting president of the university

1900-03. In 1897 he became director of the Geological and Natural History Survey of Wisconsin and was a member of

the State Forestry Commission 1905-15 and

of the Conservation Commission 1908-15. He

has written many articles and papers on zool¬

ogy.

BIRGE, Henry Warner, American soldier:

b. Hartford, Conn., 25 Aug. 1825; d. New

York, 1 June 1888. At the outbreak of the Civil War he organized the 4th regiment Con¬

necticut Volunteers and was commissioned its major. In November 1861 his uncle, Gov¬

ernor Buckingham of Connecticut, appointed

him colonel of the 13th Connecticut Volunteers, which joined Butler's army at New Orleans.

He took part in the siege of Vicksburg and the first Red River campaign ; commanded a divi¬

sion in Grant's Virginia campaign; and was

with Sheridan in the latter's most brilliant movements in the Shenandoah Valley. In No¬

vember 1865 he resigned with the rank of brev¬

et major-general.

BIRGER, bir'ger, OF BJALBO, Swedish

regent, sometimes called <(the nameless king.**

He lived in the early part of the 13th century and was regent during the minority of his son, Waldemar, who succeeded Eric XI. He was

the first to introduce Christianity into Finland where he extended the territories of Sweden.

He was the founder of the city of Stockholm and established trade relations between the

kingdom and Hamburg.

BIRINUS, Saint, bishop of Dorchester,

Oxfordshire: d. 650. He was a Benedictine

monk, sent by Pope Honorius to visit Britain, where he arrived in 634. Preaching to the

heathen West Saxons, he succeeded in con¬

verting them to Christianity and baptized the King of Wessex, Cynegils. The see of Dor¬

chester was founded and he became the first bishop. He built and consecrated a number of churches (according to Bede) and many peo¬

ples ((were called to the Lord by his pious labors.® Birinus was buried at Dorchester in 650, but in 680 the remains were removed to Winchester. The Anglo-Saxon (Chronicle) re¬

fers to several princes baptized by Birinus and to his earnest endeavors as a missionary.

BIRKBECK, George, originator of me¬

chanics' institutes: b. Settle, Yorkshire, 10 Jan.

1776; d. 1 Dec. 1841. He studied medicine in Edinburgh and took the degree of M.D. in

1799, among his friends and fellow students being Brougham and Jeffrey. He was appointed to

the chair of natural and experimental philos¬

ophy in the Andersonian University at Glasgow, in 1799. The following year he began to give gratuitous lectures to mechanics, which were soon largely attended. This was the first at¬

tempt to establish mechanics' institutes, and to Dr. Birkbeck the honor of being their

founder belongs. The Glasgow Mechanics'

Institution, though not established till 1823, owed its origin to these lectures delivered by him. In 1804 he settled as a physician in Lon¬

don, and was soon engaged in an extensive

practice ; but the extension of scientific knowl¬

edge to working men was ever in his thoughts, and in 1824 he had the happiness of being elected president of the London Mechanics'

Institution, for which that at Glasgow had led the way. Similar institutions soon arose and prospered in all the large towns of the king¬

dom. Dr. Birkbeck was also connected with the founding of University College, London, and

advocated the repeal of the tax on newspapers.

The London Mechanics' Institute still exists, but it is now known as the Birkbeck Literary and Scientific Institution.

BIRKENHEAD, England, a parliamen¬

tary, county and municipal borough of Ches¬

hire, on the estuary of the Mersey, opposite Liverpool. Its growth has been rapid. It

owes its prosperity to the same causes that have made Liverpool a great seaport, and may be regarded as a suburb of that city. Its docks have an area of 173 acres and a lineal quay space of over nine miles, with a complete sys¬

tem of railway communication for the ship¬

ment of goods and direct coaling of steamers.

The system of drainage and sewerage is very complete. There is a theological college of the Church of England (Saint Aidan's) ; a free public library, schools of art, *etc.* The ruins of an ancient Benedictine priory founded in 1153 still exist in a good state of preservation.

The ferry privileges were formerly vested in the monks of this priory. It has a large public park of 114 acres beautifully laid out. Its mag¬

nificent docks and dock warehouses, however, which belong to the splendid Liverpool system, form the distinguishing feature of Birkenhead.

The Mersey tunnel, four and one-half miles

long, including the approaches, 21 feet high and 26 feet wide, and which cost $6,100,000, now connects Liverpool with Birkenhead. Communi¬

cation with Liverpool is also kept up by steam ferries, the property of the corporation, which yield a handsome revenue. The corporation also owns the gas, water and electric-lighting plants, and the tramway lines, which, introduced here by George Francis Train, were one of the earli¬

est systems in Great Britain. The water supply, which is abundant and of excellent quality, is obtained within the borough by pumping from the red sandstone strata which underlie it.

Birkenhead has gained a distinguished name

for shipbuilding, the extensive yards of Laird Brothers (builders of the famous Confederate ship Alabama) being located here. There are

machine and engineering works, and an exten¬

sive trade in coal, cattle, sheep and grain. Birk¬

enhead has returned a member of Parliament

since 1861. Pop. 130,794.

BIRKET-EL-KEROON (Hake of the

horn®), Egypt, is a lake in the Fayoom, about 30 miles long and 6 miles wide. It communi¬

cates with the Nile and had connection for¬

merly with the artificial Lake Mceris, with which it has been confounded. See Egypt —Topography.

BIRKETT, Herbert Stanley, Canadian

physician: b. Hamilton, Ontario, 17 July 1864.

He graduated at McGill University in 1886;

was senior house surgeon to the Montreal Gen¬

eral Hospital 1886-87 ; assistant physician to the Montreal Dispensary 1887-89 ; laryngologist to Montreal Dispensary 1889-91, and to the Gen¬

eral Hospital 1891-99 ; demonstrator of an¬

atomy at McGill L'niversity 1890-1906; profes¬

sor of laryngology and otology since 1895 and dean of the medical faculty at McGill Univer¬

sity. He is the author of numerous medical works.

BIRKNER, Ferdinand, German anthro¬

pologist : b. Munich, 28 Dec. 1868. He was edu¬

cated at the Wilhelms-Gymnasium and the

university of his native city. He has made a special study of the natural sciences, particu¬

larly anthropology, and is now extraordinary professor of anthropology in the University of.

Munich and royal custodian of the state An-thropologico-Prehistoric Collection, Munich. He is also secretary of the Anthropological Society of Munich and member of the Imperial Leopold-Charles Academy of Naturalists and cor¬

responding member of the Pontificia Academia Romana dei Nuovi Lincei. He has published

(Beitrage zur Anthropologie der Hand >

(Munich 1895) ; (Beitrage zur Rassenanatomie der Chinesen) (ib. 1904) ; (Der diluviale

Mensch in Europa) (ib. 1910) ; (Rassen und Volker der MenschheitR in collaboration with Wilhelm Schmidt (1911). He is a contributor to Archiv fur Anthropologie Korrespondenz-blatt der Deutschen Anthropologischen Gesellschaft, Natur und Kultur, *etc.*

BIRMINGHAM

5

BIRMINGHAM, Ala., (< the Pittsburgh of

the South, the industrial head of the entire South between Atlanta and New Orleans, and

the chief centre of the iron and coal industry south of Pennsylvania; county-seat of Jefferson County, in the northern centre, is situated mid¬

way between the Coosa and Black Warrior

rivers, 608 to 1,000 feet above the sea, in a val¬

ley, near where the last Appalachian spurs sink to the coast plain, 96 miles north of Montgom¬

ery, the State capital, and 168 miles west of Atlanta. Nine railroad systems radiate from

Birmingham to every section of the country; the Alabama Great Southern, Seaboard Air

Line, Central of Georgia, Illinois Central, At¬

lanta, Birmingham and Atlantic, Southern,

Frisco, Louisville and Nashville and Mobile

and Ohio. Located in the heart of the greatest coal, iron and limestone district of the South, around it lie three huge coal fields, the Warrior, Cahaba and Coosa, aggregating over 8,610

square miles, with some 60 seams, more than half of them workable; the nearest deposits being only four miles from the city, and all of them having an estimated available supply in 1911 of 68,572,000,000 tons. Birmingham is

built partly upon the slope of Red Mountain, named from its outcrop of hematite iron ore, which extends many miles in every direction from the city, in a vein from 6 to 26 feet thick with an indefinite depth. This district produced in 1915 about 95 per cent of the State's production of 17,884,745 tons of coal, 3,526,624 tons of coke and 2,025,378 tons of pig iron. In 1915 1,121,618 freight cars were

hauled in and out of Birmingham, carrying 70

per cent, of the entire tonnage of Alabama, and also hauling more than 1,000,000 tons of lime¬

stone. This ideal equipment for the production of iron and steel at the lowest cost is building up a great city with such rapidity that no statistics can be other than temporary. After the census of 1904, Birmingham extended its corporate limits to six times the former area; that is, from 4,270 acres to 30,881 acres. Popu¬

lous suburbs were added in which are manu¬

facturing establishments.

Business Establishments, *etc.* — There are

in Jefferson County more than 300 mining and manufacturing plants of various kinds, among which are 27 blast furnaces, 7,168 coke ovens, 60 coal mines, a large number of mines and stone quarries, two steel plants, three rolling mills, a wire rod and nail mill, a steel rail mill, besides other plants of various kinds. In 1912, 255 new companies were organized, with a cap¬

ital of $6,068,300, and existing corporations in¬

creased their capital stock $4,213,900 and made extensions to their plants costing several mil¬

lions. In 1909, according to the Federal census, the city of Birmingham alone had 248 manu¬

facturing establishments of the factory system grade, . which were operated on a capital of $23,7 18,T47,: empl oyˆd 10,150 wage earners, paid for wages $4,392,476, for materials used in process $14,009,700, and for all expenses $21,-

549,129, and had products aggregating $24,128,-

214 in value, nearly one-sixth of the total for the State. These figures showed an increase in 10 years of 139 establishments, $19,404,000 in capital, $3,003,500 in wages, $10,000,000 in cost of materials and $15,530,000 in value of prod¬

ucts. The Birmingham district contains over

50 blast furnaces and more than half of all the iron smelters in the State : and smelting 2,500

tons of iron daily, it became fourth in produc¬

tion of iron in the world in 1908. Ten years before, Birmingham was already furnishing six-sevenths of the total United States' export of pig iron, but since then none of the product has been exported on account of the increased

home demand. The maximum production of

iron ore, pig iron, coal and coke was made in 1910, when the output of iron ore was 4,801,275

long tons; pig iron, 1,969,770 long tons; coal, 16,111,462 short tons, and coke, 3,249,027 short tons; the entire output having a value of

$59,614,012. The first steel plant in the South was started in 1897 at Birmingham, two open-hearth furnaces of 160 tons a day; now the Tennessee Coal, Iron and Railroad Company

has in operation at Ensley, a suburb, 10 fur¬

naces and a 44-inch blowing mill, capacity 1,000

tons a day. This is the largest basic open-hearth plant in the world except the Carnegie works at Homestead. There is a casting plant and rail mill in connection with it. The Ala¬

bama Steel and Shipbuilding Company began

in 1899 with $1,000,000 capital, and the Alabama Steel and Wire Company with $2,000,000 capi¬

tal. In recent years, owing to the superior quality of the basic over the Bessemer steel, the demand of the country has been for basic rather than Bessemer steel rails. This change resulted in a production of basic rails in 1911

nine times larger than that of 1905, and of Bessemer rails less than one-third as large.

Besides the plants already mentioned, Birming¬

ham has a steel casting plant, a bi-product plant, a wrought pipe plant, cast pipe and foun¬

dry plants, pipe fittings plant, soil pipe plants, clay pipe plant, cement factories, chemical

works, fertilizer factories, corn mill, flour mill, ice factories, gas and gasoline engine works, iron and steel bridge works, boiler works,

foundries and machine shops, stove foundry,

railroad shops, sash factories, wagon factories, agricultural implement

works, printing and

bookbinding concerns, hollow ware plant, brick plants, planing mills and wood working plants, packing company, *etc.* Birmingham is the sec¬

ond largest yellow pine market in the South and is also a cotton market, the cotton receipts an¬

nually exceeding 125,000 bales. It has cotton factories, cotton seed oil mills and knitting fac¬

tories. Besides the unparalleled cheapness of material, its transportation facilities have been greatly increased by the government improve¬

ments on the Warrior and Tombigbee rivers,

by which coal and other products are trans¬

ported to tide water at Mobile, thence to the Atlantic seaboard at greatly reduced cost. In 1913 Birmingham produced 17,884,745 tons of

coal, 3,526,624 tons of coke, 2,025,378 tons of iron and 778,390 tons of steel. Its bank de¬

posits amounted to $28,883,316, its bank clear¬

ings to $173,857,772.

Public Institutions, *etc.* — Birmingham is

a handsome and solidly built city with wide avenues, handsome dwellings and imposing pub¬

lic buildings. It has a large government build¬

ing, county courthouse, new city hall, <(skv-scraper® business houses, a fine public library, high schools and other educational buildings and numerous handsome churches. Among

other notable buildings are the Jefferson Theˆ’

tre, the Auditorium, Saint Vincent's Hospital, Hillman's Hospital, Union Station and the Hill¬

man, Tutwiler and Molton hotels. There are

16 or more public parks, the most prominent of which are the Capitol, North Birmingham, East Lake and Lakeview. The city has an

extensive waterworks system, with a reservoir on Shade's Mountain, 225 feet above the city, a Waring system of sewage and over 180 miles of street railroads, connecting not only with immediate suburbs, but with points many miles away.

The educational facilities are of the best.

There are five high schools and 60 elementary schools besides colleges of high repute, includ¬

ing a dental college. Its charitable institutions include Saint Vincent's Hospital, Hillman Hos¬

pital, Mercy Home, Jefferson County Alms¬

house and the Boys' Industrial School at East Lake.

Government. — Birmingham is now gov¬

erned by five commissioners, under whose

administration much effective work has been

accomplished with a great saving of expendi¬

ture. The fire department has been modern¬

ized by the installation of motor driven appara¬

tus. The assessed valuation of the city's real estate in 1913 was $86,073,000, the tax rate $1 ; the same year 3,641 new buildings were erected at a cost of $6,429,737.

History. — Birmingham is entirely the crea¬

tion of the last 30 years. The future of the district was foreseen as early as 1849, but the first attempt to realize it was about 1870 by a company which bought a made tract of land

around Elyton, then the. county-seat, now a suburb of Birmingham, which sought to make

that the centre of the new development. It failed because prices were too high, and an¬

other company bought a tract to the east, where stood a single shanty on the spot where the Florence Hotel now stands, which they named Birmingham. The next year a small iron fur¬

nace was erected and this started up coal min¬

ing. Coal had hitherto lacked a market, but in 1874, 50,400 tons were mined. The demand of the Oxmoor furnace for coal led, in 1879, to the opening of the Pratt mines, and with this began the era of great growth. The population leaped in the next decade from 3,000 to 26,000, a growth unparalleled in United States history, except by Chicago. Retarded for some years

by the collapse of the boom, it still had grown 46.7 per cent by 1900. The city is the business hub of a large group of cities and towns, built up by the same interests and but little removed from each other. A number of these have been incorporated under the name of Greater Birm¬

ingham. The largest of these surrounding

towns is Bessemer, 11 miles away; others are Ensley, Pratt City, Elyton, Gate City, Irondale, Powderly and Smithfield. When Birmingham

was settled, the county had 12.345 inhabitants ; in 1910 it had 226,476, practically all the growth of the Birmingham district. The rapidity of the city's present growth is shown by the fact that in a

single year (1913) 3,641 new buildings were erected at a cost of $6,429,737. Birming¬

ham is becoming popular as a convention city.

Its numerous auditoriums together with the

modern hotels and apartment buildings enable the city to accommodate some of the largest gatherings in the country.

Population. — By the census of 1880, the

first after Birmingham's settlement, the popula¬

tion was 3,086; in 1890, 26,178; in 1900, 38,415; in 1910, 132,685, many surrounding precincts having been annexed in 1903 and 1910; in (1920) 178,270.

Bibliography. — Armes, Ethel, (Story of

Coal and Iron in Alabama) ; Gates, J. W., (Why Birmingham will have 1,000,000 Popula¬

tion in 1920) (Birmingham 1907) ; Birming¬

ham — Its Resources and Advantages y (Bir¬

mingham 1904) ; (Jefferson County and Bir¬

mingham — Historical and Biographical* (Bir¬

mingham 1911).

William Blanks Everett,

General Manager Chamber of Commerce.

BIRMINGHAM, England, a city and a

municipal county and parliamentary borough

and one of the greatest manufacturing cities of the world, situated on the river Rea, near its confluence with the Tame, an affluent in the northwest extremity of the county of Warwick, 112 miles northwest of London and nearly in the centre of England (north lat. 52° 28’ 45”, west long. 1° 54’). The lower part of the city, consisting chiefly of old houses, is crowded with workshops and warehouses, and inhabited

principally by the working classes ; but the upper part has some fine streets and buildings, and there are fine suburbs westward and southward of the city.

Public Buildings. — The town hall, built of Anglesey marble in 1832, is a rectangular build¬

ing, modeled after the temple of Jupiter Stator at Rome. Its large hall is 145 feet long, 65 feet wide and 65 feet high, seating 2,250 persons, and contains a magnificent organ. In this hall a great musical festival is held once every three years, the proceeds of which go to the General Hospital. It was at the Birmingham Festival that Mendelssohn’s oratorio, (Elijah, *was first performed (1846), and Gounod’s Redemption*

and Elgar’s Bream of Gerontius) are among

other famous works first heard at this festival.

Among other public buildings of note are the council-house, for the accommodation of the

different corporation offices, with fine reception rooms and council chamber, erected 1874-78

(cost $1,000,000) ; the Victoria Law Courts, a fine edifice in terra cotta (Renaissance), (cost $580,000) ; University buildings, municipal tech¬

nical school, municipal schools of art and de¬

sign, Grammar School of King Edward VI,

Bingley Hall (a large covered place holding 25,000 persons, wherein the late John Bright, •W. E. Gladstone and Joseph Chamberlain have addressed vast audiences), postoffice, corpora¬

tion baths, the stations of the L. & N. W., Mid¬

land and Great Western railways, cavalry bar¬

racks, public libraries, the Exchange buildings, art gallery (special features, paintings by David Cox and by the Pre-Raphaelite school of artists, and valuable collections illustrative of industrial arts), Birmingham and Midland Institute, Corn Exchange, Masonic hall, markets, *etc.*

Monuments. — The public statues include

those of Queen Victoria, Prince Albert, James Watt, Joseph Priestley, Lord Nelson, Sir

Robert Peel, John Bright, Joseph Sturge,

Thomas Attwood, George Dawson, Dr. R. W.

Dale, Sir Josiah Mason, *etc.*

Churches, Hospitals, *etc.* — The mother

church of Birmingham is that of Saint Martin's, BIRMINGHAM, ALA

■•'•iri.ni sis'

i : ; ' -•* 5 ;I *

»* *aiiiiifciiii n n I* * £ ˆ » -

»sr ipwiwiMiuMtil:,* IlNiiSii.

'«! 8 »8MBSWW«* «"! in 5 18

|^;sa: » » «

!H‘ 3llt|fl

1 1 1’ “* i lull

HI’ ** 8,1188

Jllf »« IWi

fi J. mil

Hit’.- ‘••a$g

£ht ‘ **S list!

3 HI II I

:nim

ililllli

I III il l m

*111111 J|

sillin' ';.dw

5 §s i * s s tatt

.hum (»»*

mw« » nm

IMP is all

isle oil

IK® III, Ii Ii®i

I aSS El 18 sg

1 Highland Avenue — Residence Section

2 Part of Downtown Business Section

BIRMINGHAM

7

orˆ the Old Church (built about 1250, rebuilt 1875), the parish registers of which date from the year 1544; this church contains several altar tombs of the Birmingham family. Saint Philip's (recently constituted the cathedral

church) was the second parish church, built 1711, palladian style, restored 1868; both

churches contain fine stained-glass windows de¬

signed by Sir E. Burne Jones, a native of Birmingham. Among the more noteworthy

non-Anglican churches are the Roman Catholic cathedral of Saint Chad, a noble Gothic

church designed by Pugin, richly adorned with stained-glass windows, and with fine 16th cen¬

tury pulpit and stalls; the oratory of Saint Philip Neri (founded by Cardinal Newman) ; the

old Meeting House of Carr's Lane (Congrega¬

tional), associated with the labors of John Angell James and R. W. Dale; the Wesleyan

Central Mission Hall, erected 1903, surmounted by a lofty Renaissance tower, and seating over 2,000 persons (cost $300,000) ; the two Unitarian churches, ((01d Meeting House® and <(Church of the Messiah,® the successors of the old meeting houses destroyed in the memorable riots of

1791. Among the charitable institutions the

most important are the General Hospital

(founded 1766, rebuilt on new site 1894-97, cost over $1,000,000); the Queen's Hospital; Free Hospital for Sick Children; Women's

Hospital ; Ear and Throat Hospital ; Ortho¬

paedic and Spinal Hospital ; Homoeopathic

Hospital ; Skin and Lock Hospital ; Dental

Hospital; Eye Hospital; Jaffray Hospital for Convalescent Patients, *etc.*

Educational Institutions. — The principal

educational institutions are the Birmingham

University, incorporated 1900, a growth of

Mason University College, founded by Sir

Josiah Mason in 1875 (and further endowed

by public subscription with about $2,000,000), which has faculties of arts, science, medicine and commerce, while new buildings for the en¬

gineering, physics and science sections generally have been erected in the suburb of Edgbaston at a cost of about $2,000,000 ; Roman Catholic College at Oscott; Wesleyan Theological Col¬

lege at Handsworth ; Saltley diocesan training college; Free Grammar School founded by

Edward VI out of the endowments of the older Birmingham town guild, which has a central

and seven branch schools ; Blue Coat School ; Protestant Dissenting Charity School (for

maintaining and educating poor girls for domes¬

tic service) ; the municipal schools of art and design, and technical schools ; industrial schools, and numerous public elementary schools, mostly erected by the now defunct school board, and maintained by the council under the Education Act, 1902.

Libraries. — There is a central free library, having 170,000 volumes in its reference section, a Shakespeare Memorial Library (11,500 vol¬

umes), and 11 lending libraries, containing

over 110,000 volumes; the Birmingham Library, an old proprietary library (established 1779), which contains 80,000 volumes.

Parks, *etc.* — There are 10 public parks and several recreation grounds, and the city owns two natural beauty-spots somewhat remote from its boundaries, viz., Rednal Hill (Lickey) and Warley Abbey estate. In Aston Park (one of the oldest belonging to the city) is Aston Hall, a fine Jacobean residence built by Sir Thomas Holte in 1618, which was besieged in the civil war by the parliamentary forces, Deccmbc. 1643.

Its chief features are the long gallery, one of the finest in England, and the great staircase, which was injured during the siege. The Hall is now a public museum.

Industries. — The prosperity of Birming¬

ham is attributable to the excellence, variety and extent of its hardware and metal manu¬

factures, as well as to its geographically central situation on the border of the great South Staffordshire coal and iron district, combined with the command of a wide and ready transit by canal and railway. There is an extensive system of tramways. At Soho, in the vicinity of the city, was the earliest and one of the largest steam-engine manufactories in the

world, belonging to Boulton, partner of the celebrated James Watt, whose workshop is still preserved intact in the garret of his house in the suburb of Heathfield. The Soho works

were founded in 1757 and came into the pos¬

session of Matthew Boulton in 1762. Not a

vestige of the buildings now remains. About everything from pins and needles to military supplies are manufactured in Birmingham. The iron and steel industries are among the largest, the production for the period January-October 1916 being 156,920 long tons at the average price of $65.65 per ton. One of the most im¬

portant manufactures is that of firearms. The number of gun-barrels tested in recent years has been between 500,000 and 600,000. The manu¬

facture of swords is also one of the staple trades. Cast-iron articles of all kinds, and of the most beautiful patterns and workmanship, are manufactured at Birmingham to a great

extent. In former years iron-founding was

limited to large and heavy articles, but is now extended to the lightest and most graceful, in the finishing of which bronze is very generally employed. The manufacture of railway wagons

and carriages has been very extensively devel¬

oped. The quantity of solid gold and silver plate manufactured is large, and the consump¬

tion of silver in plating is very great. Electro¬

plating was first practised in this town in 1840.

After the outbreak of the Great War Belgian refugees were employed here in cutting valuable diamonds, an industry that bids fair to become permanent. Japanning, brass-founding, glass

manufacturing and glass staining or painting are important trades. There are also large chem¬

ical works for vitriol, sal-ammoniac, cobalt and other substances. Steel pens, of which hundreds of millions are manufactured annually, pins, buttons, fancy seals, brooches, clasps and other trinkets are made in immense quantities. Bi¬

cycles, motor cars, tires and accessories are made in Birmingham in greater numbers than

in any other town in England. It also has a large cotton trade and important lumber in¬

terests. In 1916 the declared exports from Bir¬

mingham to the United States amounted to

$2,743,402.

Government, *etc.* — The charter of incor¬

poration dates from 1838. By the Reform Act of 1832 Birmingham was constituted a borough, sending two members to Parliament. The act

of 1867 gave it a third, while that of 1885

added four others and divided the borough into seven parliamentary districts. In 1889 it was raised by order in council to the rank of a city, and by the Local Government Act of that year.

it also became a county borough. A further order in council (1896) conferred upon the

chief magistrate of the city the title of lord mayor. In 1891 the boundaries of the borough were extended, and its area is now 13,478 acres, comprising the parishes of Birmingham and

Edgbaston, and parts of others. The borough is divided into 18 wards, and has 18 aldermen and 54 councillors. Water is now brought from the Elan Valley, Wales, a distance of 80 miles, at a cost of about $30,000,000. The corporation of Birmingham has long been recognized as in the forefront of British municipalities, a repu¬

tation which it largely owes to the work done by the Right Eton.

Joseph Chamberlain (three times mayor). The corporation purchased the

gasworks and waterworks in 1875, and the

Electric Company's rights in 1898. In 1876 an ˆImprovement Act® was obtained, by which at a cost of about $10,000,000 a large area of unsanitary propert}r in the centre of the city was removed, and Corporation street was laid out on the site thereof. The corporation also owns the markets, slaughter-houses and street rail¬

ways, and is the largest employer of labor in the borough, and a large landowner.

History, Populations, *etc.* — The city of

Birmingham is supposed to have originated in a Saxon settlement formed in a clearing in the great central forest of England, the forest of Arden, near to the Icknield street, a Roman road of which an original portion is still visible in Sutton Park. It was the home of the Bermings — the young, or progeny of Berm, from whence the name is derived. It was a place of comparatively small importance at the Con¬

quest, although it is mentioned in Domesday Book (1086) where it is called Bermingham,

a name of which there were many corruptions, chiefly arising from the old pronunciation and from misspellings, wherefrom the popular local name <(Brummagem® is derived. In the 14th

century two guilds were founded, the more im¬

portant of which (the Guild of the Holy Cross) exercised functions akin to those of a munici¬

pal character, until the dissolution of the monasteries and religious houses. There was

also a priory or hospital of Saint Thomas, and several chantries attached to the parish church, but all these were sequestrated with the religious houses. Some of the revenues of the town guild were devoted by Edward VI to the foundation of the Free Grammar School. Birmingham was

visited in 1532 by John Leland, who wrote of it in his <Itinerary) as having (<many smiths in the town, that make knives and all manner of cutting tools loriners that make bits, and many naylors.® Camden, in 1576, found it (<swarming with inhabitants and echoing with the noise of hammers and hammers.® In the civil war Bir¬

mingham suffered considerably at the hands of Prince Rupert and the royalists, who encoun¬

tered the inhabitants in a fierce hand-to-hand fight in the streets, and burnt a great many houses, in 1643. The plague also ravaged the town in 1665. The old market town first began to outgrow its ancient boundaries in 1700, at which date the population was about 15,000.

Birmingham began to assume importance as a

manufacturing town about the middle of the

18th century. John Baskerville, by his fine printing, John Taylor bv innumerable fancy

articles, Boulton and Watt by the introduction of the steam engine, helped to make Birming¬

ham <(the toyshop of Europe,® as Burke de¬

scribed it. Steel was made there until 1797, and cotton spinning was begun as early as 1730.

In the 19th century the introduction of steed pens and electro-plated goods gave Birmingham new fame as a manufacturing centre. It also attracted attention as the centre from whence spread the Reform agitation of 1830, which cul¬

minated in the Reform Bill of Earl Grey, which became law in 1832. Birmingham had also an unenviable reputation for rioting and disturb¬

ance at the end of the 18th century, and the Priestly Riot of July 1791 is among the mem¬

orable ententes of that century.

The general healthfulness of Birmingham

is probably due to the large quantity of open space which it possesses ; to the general excel¬

lence of its drainage, greatly facilitated by the substratum of sand and gravel (belonging to the new red sandstone or Trias formation) on which it is built; to its pure water supply; and the circumstance that there is scarcely an un¬

derground dwelling or cellar (used as a dwell¬

ing) within its precincts In 1915 the birth-rate was 25.8 and the death-rate 14.8 per thousand.

In 1801 the population was 75,670; in 1901 it was 523,179, and in 1911 525,833; but this does not take into account the densely populated boroughs and urban districts by which the city is closely surrounded. With the inclusion of these the urban population of the midland

metropolis would amount to 868,430.

Bibliography. — Bunce and Vince, (History of the Corporation of Birmingham* (Bir¬

mingham 1878-1902) ; Dent, R. K., (01d and New Birmingham* (ib. 1880) ; (The Making

of Birmingham* (ib. 1894) ; Hutton, W., his¬

tory of Birmingham *(2d ed., ib. 1783) ; Jones, J. E., (A Short History of Birmingham* (ib.

1911) ; Langford, J. A., <A Century of Birming¬

ham Life> (1741-1841; 2 vols., ib. 1868).

R. K. Dent,

Chief Librarian Aston Manor, and author of

(Old and New Birmingham ,* *etc.*

BIRNAM, Scotland, a forested hill in

eastern Perthshire, near Dunkeld, immortal¬

ized by Shakespeare in (Macbeth.* It was

foretold to the ambitious thane, yet guiltless except in thought of bloody ambition, that, until Birnam wood should come to Dunsinane, his life and power could suffer no disaster. On the approach of Malcolm with the avenging

army, the invaders, ignorant of the prophecy, cut down the boughs and bore them as leafy screens, by which to conceal their numbers.

The report of (<the moving forest® marching upon Dunsinane struck a fatal despair into the soul of Macbeth, the usurper.

BIRNEY, David Bell, American military

officer (son of J. G. Birney, q.v.) : b. Hunts¬

ville, Ala., 29 May 1825 ; d. Philadelphia, Pa., 18 Oct. 1864. He was graduated at Andover, later studied law in Cincinnati and in 1848 be¬

gan practice in Philadelphia where he remained for several years. In April 1861, upon the out¬

break of the Civil War, he entered the Union army as lieutenant-colonel of the 23d Pennsyl¬

vania Infantry; in the summer of 1861 was

commissioned colonel ; in February 1862 was

raised to the rank of brigadier-general of vol¬

unteers ; and was promoted major-general of

volunteers 23 May 1863. He served throughout the Peninsula campaign (q.v.) and with par-BIRNEY — BIRRELL

ticular distinction at the battles of Yorktown and Williamsburg. He subsequently distin¬

guished himself at the second battle of Bull Run and in the battles of Fredericksburg and Chancellorsville. He was in command of the

3d Army Corps during a part of the battle of Gettysburg; from May to June 1864 was in

command of a division under General Hancock ; and from July 1864 commanded the 10th Corps of the Army of the James.

BIRNEY, James Gillespie, American pol¬

itician : b. Danville, Ky., 4 Feb. 1792; d. Perth Amboy, N. J., 25 Nov. 1857. He studied law, and removed early to Alabama, where he

prospered in his profession and held the office of district attorney. Having had his attention turned toward the question of property in

slaves, in 1833 he interested himself in the or¬

ganization of a branch of the Colonization So¬

ciety for the State of Alabama. Soon after¬

ward, returning to Kentucky, he organized

one there also, of which he became president.

But in 1834, his views rapidly advancing, he espoused the cause of immediate emancipation in a public letter, at the same time emancipating all his own slaves, about 20 in number. This letter, the (Letter on Colonization (1834), was shortly afterward followed by (American

Churches the Bulwarks of American Slavery'

(1840); speeches in England' (1840); and

Examination of the Decision of the United

States Supreme Court in the Case of Stroder *et al.* vs. Graham' (1850). Making arrange¬

ments to establish a newspaper to disseminate these views at Danville, where he resided, and where he held the situation of professor in the university, he found it impossible to have such a paper printed in Kentucky, and removed to Cincinnati, where he began to issue the Philan¬

thropist. It had not been long published before it was found no less obnoxious to public senti¬

ment in Ohio than it had been in Kentucky, and the press was thrown into the river. The editor, however, managed to revive the paper, and, in connection with Dr. Bailey, made it a powerful instrument in acting upon the opinion of the State. About the year 1836 he. went to New York as secretary of the American Anti-Slavery Society, and for many years devoted his time and strength to the furtherance of the objects of that Society by letters and ar¬

ticles from the press and by public addresses wherever he could make an opportunity to be heard. His purpose was to build up a political party upon the single question of slavery, to act upon the government within the forms of the Constitution; and he succeeded in forming an organization in most of the Northern States, under the name of the Liberty Party. During his absence in England he was nominated in 1840 by that party for the presidency, but met with little success. He was again nominated in 1844, when he received more votes. It was charged upon his friends at the time that by withdrawing their votes from Air. Clay, espe¬

cially in the State of New York, they accom¬

plished the election of Mr. Polk, thus aiming the death-blow at their own projects. Previous to this, in 1842, Mr. Birney had become a resi¬

dent of Michigan, where not long afterward

he was disabled, by a fall from his horse, from taking the active part in politics to which he had been accustomed. The latter part of his life was spent at Perth Amboy, N. J. Consult the biography by his son, William Birney,

'James G. Birney and His Times' (New York

1890).

BIRNEY, William, American lawyer : b.

Madison County, Ala., 28 May 1819; d. Wash¬

ington, D. C., 14 Aug. 1907. He was educated in Paris; took part in the Revolution of 1848, and vvas appointed professor of English litera¬

ture in the college at Bourges, France. In 1861 he entered the United States army as a private, and was promoted through all the

grades to brevet major-general. He drilled the colored troops, and freed the inmates of all the slave prisons in Baltimore. In 1863-65 he commanded a division. In 1874 he moved to

Washington, D. C., where he became attorney for the District of Columbia. His writings

include (Life and Times of James G. Birney,'

Elea for Civil and Religious Libert}ˆ,' *etc.*

BIRON, be-ron, Baron de (Armand de

Gontaut, de gon-to), French soldier: b. 1524; d. 1592. He took a prominent part in the

civil wars between the Huguenots and Catholics, and served at the battles of Dreux, Saint Denis and Moncontour. He was made marshal of

France in 1577 by Henry III. He negotiated the peace of Saint Germain, and narrowly es¬

caped the massacre of Saint Bartholomew. He recovered Guienne and Languedoc from the

Protestants, served in the Netherlands against the Duke of Parma, and was one of the first to recognize Henry IV as King. He distin¬

guished himself in various battles and was

killed at the siege of Epernay.

BIRON, Due de (Charles de Gontaut),

French soldier, son of the preceding: b. about 1562; d. 31 July 1602. He served Henry IV in the field with much zeal and courage, was

raised to the rank of admiral of France in 1592, and in 1598 was made a peer and duke.

He thought himself, however, not sufficiently rewarded, and began to intrigue with the Span¬

ish party against the King. In 1599 he con¬

cluded an agreement with the Duke of Savoy and the Count of Fuentes, by which he pledged himself to take up arms against his benefactor.

Meanwhile, war being* declared against the

Duke of Savoy (1600), Biron saw himself re¬

duced to the necessity of attacking him. He still continued his negotiations with the enemy, however, and at last they became known to the King, who interrogated the marshal as to his designs, with promises of pardon. Biron made a partial confession and continued his intrigues as before. Notwithstanding this, Henry sent

him in 1601, after the conclusion of peace with Savoy, as envoy to Queen Elizabeth of Eng¬

land. In the meantime the Count of Fuentes discovered the whole plot. He was tried before Parliament, and was beheaded.

BIRON, Ernest John. See Biren.

BIRRELL, Augustine, English essayist

and statesman: b. Wavertree, near Liverpool, 19 Jan. 1850. He was graduated at Cambridge and was called to the bar. In 1903 he became

a Bencher of the Inner Temple; from 1896-99

was Quain professor of law in University Col¬

lege, London; from 1889-1900 represented Fifeshire W. in Parliament, and since 1906 North Bristol. He is author of charming critical and biographical essays on literary subjects, col-10

lected in the two series of ‘Obiter Dicta1*

(1884 ; 2d series, 1887) and ‘Res Judicatae*

(1892) ; (Men, Women and Books* (1895). In 1887 he published a ‘Life of Charlotte Bronte; in 1897 edited Boswell’s (Life of Johnson* ; in 1898 published (Life of Sir Frank Lockwood* ; ‘Copyright in Books* (1899) ; (Collected

Essays* (1900); ‘Miscellanies* (1901); ‘Wil¬

liam Hazlitt* (1902); ‘Andrew Marvell*; ‘In

the Name of the Bodleian* (1905). In 1905 he became president of the Board of Education in the Liberal Cabinet and from 1907-16 was Chief Secretary for Ireland. His occupancy of the latter post was brought to a sudden termination.

Coincidentally with the capture of Sir Roger Casement (q.v.), who had landed from a Ger¬

man submarine on the coast of Kerry on 21 April 1916, a rebellion broke out on 24 April in Dub¬

lin, organized by the Sinn-Feiners, the ultra-Radical, physical-force section of the Irish Nationalists, and simultaneously movements of the same kind took place in other centres, mainly in the west and

southwest. On the suppression of these outbreaks Mr. Birrell at once resigned (3 May), the lead the rebels were enabled to make being generally attributed to the supine¬

ness of the Irish Office.

BIRT, Henry Norbert, English Benedic¬

tine monk and author: b. Valparaiso, Chile, 1861. He was educated at London University

College School ; entered the Benedictine order in 1880; taught in Downside School 1884-92, and was ordained in 1889. He was assistant at Coventry 1892-95, and chaplain at Heckfield and Ealing. He was acting chaplain to the forces during the South African War, receiving medal with four clasps. In the European War he

again served as chaplain after 1915. Since 1904

he has been official secretary to the president of the English Benedictines. He has done much

literary research work, visited Germany as one'

of the Catholic representatives of British

Christian Churches in 1909, and is the author of an abridgment of Lingard's 'History of

England* ; 'History of Downside School* ;

'Elizabethan Settlement of Religion* ; 'The

Line of Cleavage under Elizabeth* ; 'Benedic¬

tine Pioneers in Australia* (2 vols.) ; 'Obit Book of the English Benedictines.* He is a contributor to the Tablet, the Downside Re¬

view and the 'Catholic Encyclopaedia.*

BIRTH, or LABOR, in physiology, is the

act by which a female of the class Mammalia brings one of her own

species into the world.

When the foetus has remained its due time in the womb, and is in a condition to carry on a separate existence, it is extruded from its place of confinement, in order to live the life which belongs to its species independently of the mother. The womb having reached its

maximum of growth with the increasing size

of the foetus, its peculiar irritability excites in it the power of contraction ; it thereby narrows the space within and pushes out the mature foetus. The period of gestation is very differ¬

ent in different animals, but in each particular species it is fixed with much precision. In the womb the corporeal frame of man com¬

mences existence as an embryo ; after further development, appears as a foetus ; then as an immature, and finally a mature, child. With its growth and increasing size the membranes which envelop it enlarge, the womb also ex¬

panding to give room for it. At the end of the 39th or the beginning of the 40th week the child has reached its perfect state and is capable of living separate from the mother; hence follows in course its separation from her, that is, the birth.

Contractions of the womb gradually come

on, which are called, from the painful sensa¬

tions accompanying them, labor-pains. These

are of two kinds : first, the preliminary pangs, which begin the labor, do not last long, are not violent and produce the feeling of a dis¬

agreeable straining or pressure. When the

pregnant female is involved in these she is often unable to move from her place till the pang is over, after which she is often free from pain for some hours. Then follow the true

labor-pains ; these always last longer, return sooner and are more violent. The contractions of the womb take place in the same order as

the enlargement had previously done, the upper part of it first contracting, while the mouth of the womb enlarges and grows thin, and the

vagina becomes loose and distensible. By this means the foetus, as the space within the womb is gradually narrowed, descends with a turning motion toward the opening; the fluid contained in the membranes enveloping the foetus, as the part making the greatest resistance, is forced out, and forms a bladder, which contributes much to the gradual enlargement of the open¬

ing of the womb. It is therefore injurious to delivery if hasty or ignorant midwives break the membranes too soon. By repeated and

violent throes the membranes at length burst and discharge their contents, and some time after the head of the child appears. As the skull-bones have not yet acquired their perfect form and substance, but are attached at the crown of the head only by a strong membrane, and may be brought nearer together, the head, by the pressure which it undergoes, may be somewhat diminished in size and squeezed into a more oblong form, so as to pass through the opening of the matrix and the pelvis in which it is contained, and, finally, through the exter¬

nal parts of generation; and when this is done, the rest of the body soon follows.

The act of birth or delivery is accordingly, in general, not an unnatural, dangerous and diseased state of the system, as many timid women imagine. It is a natural process of

development, which is no more a disease than the cutting of the teeth or the coming on of puberty, although, like them, it may give rise to important changes in the body and to various diseases. It is true that the process of child¬

birth requires a violent exertion of nature, but this is facilitated by many preparatives and helps adapted to the purpose. If the birth suc¬

ceeds in the way described, it is called a natural birth. ‘For this it is requisite that the pelvis should be properly formed and the open¬

ing should permit a free passage to the per¬

fect fcetus ; that the growth and size of the foetus should be proportioned to the pelvis, especially that the head should have the size designed by nature, proportioned to the

diameter of the pelvis ; also, that there should be a proper situation of the womb, in regard to the axis of the pelvis, and a proper position of the foetus, namely, the head down, the back of the head in front and toward the opening of the womb, so as to appear first at birth ; and,

finally, that the external parts of generation should be in a natural state.

An easy birth takes place without any exces¬

sive strainings and in due season. A difficult birth proceeds naturally, but is joined with great efforts and pangs, and occupies a long time — over six or eight hours. The cause of it is sometimes the stiffness of the fibres of the mother, her advanced years, the disproportion¬

ate size of the child's head and various other causes. Nature, however, finishes even these births ; and women in labor ought not to be immediately dejected and impatient on ac¬

count of these difficulties. An unnatural (or properly, an irregular) birth is one in which one or more of the above-mentioned requisites to a natural birth are wanting. An artificial birth is that which is accomplished by the help of art, with instruments or the hands of the attendant. Premature birth is one which happens some weeks before the usual time,

namely, after the seventh and before the end of the ninth month. Though nature has as¬

signed the period of 40 weeks for the full maturing of the foetus, it sometimes attains, some weeks before this period has elapsed,

such a growth that it may be preserved alive, in some cases, after its

separation from the mother. That it has not reached its mature state is determined by various indications.

Such a child, for instance, does not cry like full-grown infants, but only utters a faint sound, sleeps constantly, and must be kept con¬

stantly warm, otherwise its hands and feet

immediately become chilled. Besides this, in a premature child, more or less, according as it is more or less premature, the skin over the whole body is red, often indeed blue, covered with a fine, long, woolly hair, especially on the sides of the face, and on the back; the f6ntanel of the head is large, the skull-bones easily moved ; the face looks old and wrinkled ; the eyes are generally closed ; the nails on the fingers and toes short, tender and soft, hardly a line in length ; the weight of such a child is under six, often under five pounds.. The birth is called untimely when the foetus is separated from the womb before the seventh month.

Such children can rarely be kept alive ; there are instances, however, of five months' children living. Some writers have contended that a

seven months' child is more likely to live than one born a month later.

Late birth is a birth after the usual period of 40 weeks. As this reckoning of the time from pregnancy to birth is founded for the most part solely on the evidence of the mother, there is much room for mistake or deception.

The question is one of much interest in medical jurisprudence, as the inquiry often arises

whether a child born more than 40 weeks after the death of the reputed father is to be con¬

sidered legitimate or not. The importance of the question and the uncertainty of the proof have occasioned a great variety of opinions among medical writers. Most of them doubt

the truth of the mother's assertions about such a delayed birth and give as their reason that nature confines herself to the fixed period of pregnancy; that grief, sickness, etc., cannot hinder the growth of the foetus, *etc.* Others maintain, on the contrary, that nature binds herself to no fixed rules; that various causes may delay the growth of the

child, *etc.*

Abortion and miscarriage take place when

a foetus is brought forth so immature that it cannot live. They happen from the beginning of pregnancy to the seventh month, but most frequently in the third month. The occasions, especially in those of a susceptible or sanguine temperament, are violent shocks of body or

mind by blows, falling, dancing, cramp, pas¬

sion, *etc.*

BIRTH RATE. See Vital Statistics.

BIRTHMARK. See Nˆevus.

BIRTHRIGHT, any right or privilege to

which a person is entitled by birth, such as an estate descendible by law to an heir, or civil liberty under a free constitution. See Primo¬

geniture.

BIRTHROOT. See Trillium.

BIRTHS, Registration of. The original

object of birth registration, which was per¬

formed by the clergy in England as early as 1538, was to prevent disputes regarding in¬

heritance, but it was not until 1837 that sys¬

tematic records were kept in England by the Registrar-General's Office

becoming compul¬

sory in 1876. On the continent birth registra¬

tion became compulsory in most countries

during the 19th century. In most of the United States birth registry is also compulsory, but it is only in Pennsylvania, Michigan and most

of the New England States that the laws are fully enforced. In 1912 the Census Bureau

prepared a model bill for the registration of births, which is being urged upon the individual States by the various organizations interested in vital statistics, among these, for obvious reasons, being the societies seeking to limit the employment of children and to control

infant mortality. See Vital Statistics.

BIRTH WORT. See Aristolochia.

BIRU, the name of a warlike chief of

South America, who flourished in the 16th cen¬

tury. During an exploring expedition of Gaspar de Morales in 1515 the Spaniards encoun¬

tered a chief called Biru, by whom they were repulsed. His territory extended on both sides of the river Biru or Piru. All the country south of the Gulf of Panama was soon char¬

acterized as the Biru country. In 1526 this name was given to the empire of the Incas, now known as Peru.

BIRUNI, be-roo'm, Abu Raihan Muhammed ibn Ahmed, Arabian scholar and writer : b. Khwarizm 973 ; d. Ghazni, Afghanistan,

1048. He visited India, where he spent a long period teaching the Greek sciences and observ¬

ing the life and customs of the people. His latter years were spent at Ghazni, Afghan¬

istan. Some of his more important works

have been translated into English by C. E. Sa¬

cha w, among these being (Chronology of An¬

cient Nations> (London 1879) ; (An Account

of the Religion, Philosophy, Literature, Geog¬

raphy, Chronology, Astronomy, Customs, Laws

and Astrology of India about 1030 a.dP (Lon¬

don 1910).

BISBEE, William Henry, American gen¬

eral : b. Rhode Island, 28 Jan. 1840. At the outbreak of the Civil War he enlisted as a private and served until its conclusion. On the mustering out of the volunteers he was re¬

tained in the regular establishment, after

which he served against the Indians in the West, quelling many of the Indian disturb¬

ances. During the Spanish-American War he

served in Cuba, participating in the battles of El Caney and San Juan. In 1899 he was trans¬

ferred to the Philippines, where he had com¬

mand of all the American forces north of

Manila for some time. In 1902 he was re¬

tired with the rank of brigadier-general.

BISBEE, Arizona, town of Cochise County,

the terminus of a branch line of the El Paso and Southwestern Railroad, which connects

with the Southern Pacific Railroad at Benson.

Bisbee lies in a canon of the Mule Pass Moun¬

tain, about 30 miles south of Tombstone, the county capital, and has gold, silver and lead mining interests and is a busy copper mining and smelting centre, the daily output in the district reaching about 7,000 tons. It contains two hospitals and a public library. Pop. 9,019.

BISCAY (Spanish Vizcaya, veth-ca-ya),

Spain, a province, forming one of the three Basque provinces, the other two being Alava and Guipuzcoa. It lies near the northeast

corner of Spain, between the Bay of Bis¬

cay and the provinces of Santander, Burgos, Alava and Guipuzcoa. The area is 836

square miles ; the population was estimated

at 368,024 in 1914. The surface is generally mountainous; the principal river is the Nervion or Ibaizabal. In point of soil and natural productions Biscay is one of the least favored provinces of Spain ; but the industry of the inhabitants has converted naturally barren

tracts into fruitful fields and verdant pastures.

The chief crops are maize and barley. Many fine fruits, especially nectarines, are raised; walnuts and chestnuts everywhere abound and

form a considerable export to England and

Germany. The cattle are of a small and in¬

ferior breed; and the rearing of sheep for wool is rendered difficult by the brushwood which covers a great part of the mountain dis¬

tricts and tears and destroys the fleece. Fish abound along the coast and give occupation to a great number of fishing-boats. The most

important mineral is iron, which is found of excellent quality throughout the province and is extensively worked. Lead, copper and zinc also occur. The inhabitants of Biscay, who

are called Basques, are brave, active and in¬

dustrious. The capital of Biscay is Bilbao

(pop. 93,536).

BISCAY, Bay of, Roman ((Sinus Aquita—

nicus,® (<Sinus Cantabricus,® ((Cantaber Oceanus® or (<Gallicus Oceanus,® and French

(<Golfe de Gascogne,® called the Cantabrian Sea ; that portion of the Atlantic Ocean which sweeps in along the northern shores of the Spanish Peninsula in an almost straight line from Cape Ortegal to Saint Jean de Luz, at the western foot of the Pyrenees, and thence curves north along the western shores of France to the

island of Ushant. Its extreme width is about 400 miles and its length about the same.

The depth of water varies from 20 to 200

fathoms, being greatest along the northern

shores of Spain. The whole of the southern coast is bold and rocky and great parts of the French shores are low and sandy. The bay

receives numerous unimportant streams from

the mountains of Spain and, through the riv¬

ers Loire, Charente, Gironde and Adour. the waters of half the surface of France. Its

chief ports are Santander, Bilbao and San

Sebastian, in Spain; and Bayonne, Bordeaux,

Rochefort, La Rochelle and Nantes, in

France. Navigation of the bay is proverbially trying to inexperienced voyagers and is fre¬

quently rendered dangerous by the prevalence of strong winds, especially westerly ones.

Rennel Current sweeps in from the ocean

round the northern coast of Spain. Consult

ˆTransactions® (Linnean Society of London,

series 2 ‘ Zoology,) London 1904-11).

BISCEGLIE, be-shal-ya, Italy, a seaport

town in the province of Bari, 13 miles east-southeast of Barletta, on a rock on the west¬

ern shore of the Adriatic, surrounded by

walls and in general badly built. It has a cathedral, a dilapidated castle, a seminary, a hospital and the ruins of a hospital for pil¬

grims founded by the Crusaders. The port

admits vessels of small burden only. The

town being almost destitute of water, rain is collected in large cisterns cut in the solid rock. The neighborhood produces good wine.

Important fairs are held here twice a year.

Pop. 34,425.

BISCHOF, bish'of, Karl Gustav Chris¬

toph, German geologist and chemist: b. Nu¬

remberg, 18 Jan. 1792; d. Bonn, 30 Nov. 1870.

He studied in Erlangen; became professor of chemistry and technology there in 1819 and

professor of chemistry and mineralogy at

Bonn in 1822. He devoted himself especially to geological research and advanced some en¬

tirely new opinions in regard to the formation of mountain ranges, on which he wrote three works. He also made a series of important

experiments on gases in coal mines and safety lamps. His greatest work, (Textbook of

Chemical and Physical Geology> (3d ed.,

1863-66), is an important contribution to the development of that phase of geological re¬

search.

BISCHOFF, Joseph Eduard Konrad,

German novelist: b. Niedergailbach, 9 Aug.

1828; d. 1910. He was fitted for the priest¬

hood, studying at the Catholic Seminary at

Munich and was ordained a priest, but later gave his w'hole attention to literary work and wrote a number of novels in which he attacks the Protestant Reformation and the modern

movement in literature and science. Among

his works are historical Novels concerning

Frederick II and his Time) ; <Wegenfried) ; (Gustavus Adolphus> ; (The Free Thinkers* ; {The Social Democrats and their Fathers) ;

(Otto the Great) ; and (The New God.*

BISCHOFF, Theodor Ludwig Wilhelm,

German physiologist: b. Hanover, 28 Oct.

1807 ; d. Munich, 5 Dec. 1882. He was edu¬

cated at Bonn ; was lecturer in the university there in 1833 ; and professor at Heidelberg in 1836, in 1844 he was at Giessen and from

1855-78 at Munich. His chief work was

a series of books on the history of the devel¬

opment of man and some of the higher ani¬

mals and his (Evidence of the Periodic Ripen¬

ing and Detachment of the Ova, independently of Generation in Man and the Mammals.* He

also established the presence of carbonic acid and oxygen in the blood and studied the dif¬

ference between man and the anthropoid apes.

BISCUIT

BISHOP

BISCUIT, a thin cake, baked until crisp

and dry. In this shape it is known in the United States as a cracker; the name biscuit being applied to a soft cake made from dough raised with yeast. Plain biscuits are more nu¬

tritious than an equal weight of bread, but owing to their hardness and dryness, they

should be more thoroughly masticated to in¬

sure their easy digestion. When exposed to

moisture, biscuits are apt to lose their brittle¬

ness and become moldy, hence it is necessary to keep them in a dry atmosphere. Digestive

biscuits consist almost entirely of bran. Char¬

coal biscuits contain about 10 per cent of pow¬

dered vegetable charcoal. Meat biscuits, which are very nutritious, contain either extract of meat, or lean meat which has been dried and ground to a fine powder.

In pottery, articles molded and baked in

an oven, preparatory to the glazing and burn¬

ing. In the biscuit form, pottery is porous, but the glaze sinks into the pores and fuses in the kiln, forming a vitreous coating to the ware.

BISHARRIN, be-sha-ren', a group of

tribes of northeast Africa, forming the north¬

ern division of the Beja, said to be the Kush-ites of the Bible. They live between the Red Sea and the Nile and between Egypt and Abys¬

sinia; they are nomadic in habit and nominally Mohammedans. They

are of Caucasian race

and speak a well-developed Hamitic language.

The grammar has been compiled by Olmkvist

(Upsala 1881-85) and Reinisch (Vienna 1893).

Consult Munzinger, (Ostafrikanische Studien}

(Schaffhausen 1864).

BISHOP, Sir Henry Rowley, English

musical composer: b. London, 18 Nov. 1786;

d. 30 April 1855. He was trained to his pro¬

fession under Signor Bianchi, composer to the London Opera House. In 1809 his first im¬

portant opera, the Circassian Bride, } was

produced at Drury Lane with great success ; but the following evening the theatre, with the score of Bishop's opera, was consumed by fire. Numerous operas and other musical

pieces of his composition now followed and

from this period to 1826 upward of 70 works were produced by him. Among others may be

mentioned the music of (Guy Mannering) ;

(The Slave* ; (The Miller and His Men) ;

(Maid Marian* ; (The Virgin of the Sun,* and the adaptations of (The Barber of Seville)

and the (Marriage of Figaro.* From 1810 to 1824 he acted as musical composer and di¬

rector to Covent Garden Theatre. He also ar¬

ranged several volumes of the (National Melodies) and completed the arrangement of the music for Moore's (Irish Melodies, * com¬

menced by Sir John Stevenson. In 1826

Bishop produced an opera called (Aladdin, *

which was not successful. He was elected

Reid professor of music in Edinburgh Uni¬

versity in 1841, was knighted in 1842 and in 1848 became professor of music in the Univer¬

sity of Oxford. Some of his work is the most popular of all music among English-speaking

people, particularly his setting of John How¬

ard Payne's ((Home Sweet Home® and ((When

the Bloom is on the Rye.® His manuscript

scores may be found in the Royal College of Music and the Liverpool Free Library.

BISHOP, Isabella (Bird), English author

and traveler: b. Boroughbridge Hall, York¬

shire, 15 Oct. 1832; d. 7 Oct. 1904. She be¬

gan to travel at the age of 22 and made her first trip abroad in 1855, when she visited Prince Edward Island and the United States

and afterward circumnavigated the globe three times. In her later years she spent much time in Japan and the Far East. In 1892 she was elected the first lady fellow of the Royal Geo¬

graphical Society. She was married in 1881

to Dr. John Bishop, who died five years later.

Her publications include (The English Wo¬

man in America) (1856) ; (Six Months in the Sandwich Islands) (1873) ; (The Hawaiian

Archipelago) (1875) ; (A Lady's Life in the Rocky Mountains* (1874) ;

(Unbeaten Tracks

in Japan* (1880) ; (Journeys in Persia and Kurdistan 5 (1892) ; (Among the Tibetans)

(1894); (Korea and Her Neighbors) (1898);

(The Yangtze Valley and Beyond) (1899);

(Pictures from China) (1900). Her (Life, } by A. M. Stoddart, was published in London

1907.

BISHOP, Joseph Bucklin, American au¬

thor and government official : b. Seekonk, Mass, (now East Providence, R. I.), 5 Sept. 1847.

A graduate of Brown University, after sev¬

eral years' editorial experience on the Tribune, Evening Post and Globe, New York city, he

was appointed secretary of the Isthmian Canal Commission 1 Sept. 1905. He wrote (The

Panama Gateway) (1913) ; and with Robert

E. Peary, (Uncle Sam's Panama Canal and

World History * (1913). His previous works

were (Cheap Money Experiments) (1892) ;

(Our Political Drama* (1904) ; Ussues of a New Epoch) (1904).

BISHOP, Louis Faugeres, American phy¬

sician: b. New Brunswick, N. J., 14 March

1864. He was graduated at Rutgers College

in 1885 and at the New York College of Phy¬

sicians and Surgeons in 1889. He was resident physician of Saint Luke's Hospital, New York, in 1889-92 and secretary of the New York

Academy of Medicine and chairman of its

Section of Medicine in 1900. His publications include (Arteriosclerosis> (1914) ; (Heart Dis¬

ease, Blood Pressure and the Nauheim Treat¬

ment (1914).

BISHOP, Seth Scott, American physician :

b. Fond du Lac, Wis., 7 Feb. 1852. In his boyhood he learned the printer's trade and

edited and published a paper called The Pen while attending Pooler Institute, a private

school, setting all the type and printing it him¬

self. Before graduating from Pooler Institute, he entered upon the study of medicine. Af¬

ter his course at this school, he was a student at Beloit College for three years, took two courses at the University of the City of New York, medical department, and completed his

undergraduate course at Chicago Medical Col¬

lege, now the Northwestern University Medi¬

cal School, from which he was graduated

M.D. in 1876. Among other institutions which have conferred degrees upern him are the

Chicago Law School and the Chicago School

of Science. He did post-graduate work in

Chicago and in Berlin, Germany. For a short time he practised his

profession in his native town and in Rochester, Minn., after which, in 1879, he removed to Chicago where he has

practised continuously since. For more than

15 years he was engaged in general practice, but afterward made a specialty of diseases of the nose, throat and ear. In order to meet the necessities of his special practice he has devised over 50 instruments and surgical ap¬

pliances, discovered camphor-menthol, which

is in universal use now in various countries, and invented new methods in his chosen field of work; has taught in several medical col¬

leges of Chicago and is now a professor of diseases of the nose, throat and ear in the Loyola University Medical School.

Dr. Bishop has written for a large num¬

ber of medical journals and has been either editor or associate editor of the Illinois Medi¬

cal Bulletin, the Medical Examiner, the Ne v York Medical Times and others. He was the

head surgeon of the ear, nose and throat de¬

partment of the Illinois Charitable Eye and Ear Infirmary and served on its staff for more than 15 years. He has written extensively in his special field. His publications include

(Diseases of the Ear, Nose and Throat and

Their Accessory Cavities) (4th ed., 1908)

and (The Ear and Its Diseases) (1906).

BISHOP, William Henry, American nov¬

elist: b. Hartford, Conn., 7 Jan. 1847. He was graduated at Yale in 1867. He studied archi¬

tecture, then engaged for a while in journal¬

ism, being one of the editors and proprietors of the Daily Commercial-Times at Milwaukee,

Wis. From 1892 to 1902 he was instructor in French and Spanish at the Sheffield Scientific School of Yale, resigning to live in Europe.

He was appointed United States consul to

Genoa, Italy, 1903, and was transferred to

Palermo 1905, which post he resigned

1910. Since then he has lived by turns

abroad and in this country, his main

preference being for quiet rural life. He was decorated by the King of Italy for services in the great earthquake at Messina 1908. His published works are (Detmold) (1879) ; (The House of a Merchant Prince) (1882) ; (Choy Susan and Other Stories) (1884) ; (01d Mex¬

ico and Her Lost Provinces) (1884) ; (Fish and Men in the Maine Islands> (1885) ; (The Golden Justice > (1887) ; (A House Hunter in Europe) (1893) ; (The Brown Stone Boy and

Other Queer People,) reissued as (Queer People) (1902) ; (Sergeant Von) (1889) ; (The Yellow Snaked reissued as (Tons of Treasure) (1902) ; (A Pound of Cure) (1894) ;

(Writing to Rosina) (1894); (The Faience

Violin, > translation from the French of

Champfieury (1893).

BISHOP (Sax. biscop, from Gr. episcopos,

a superintendent), in the Greek, Latin and

Anglican churches, the title given to those who are of the highest order of the priesthood, to the successors of the 12 apostles, in distinc¬

tion from the priests who are the successors of the 72 disciples ; in the Methodist Episcopal and Moravian churches and in the Protestant churches of Sweden, Norway and Denmark,

the title given to the highest officers in the ministry, who are not, however, regarded as a distinct order; in Germany the office is hardly more than titular and is conferred upon princes, as well as ecclesiastics. The name was borrowed by the first Christians from the languages of Greece and Rome, in which it

designated a civil magistrate. Thus, Cicero

was at one time episcopus orce campanice.

In the New Testament the words bishop and

presbyter, or priest, are sometimes inter¬

changed, as in Acts xx, 17, 28; and Saint John, in his last two epistles, adopts the title of priest. Yet, as maintained by Roman Cath¬

olic writers, it does not follow because the names priest and bishop were then applied in¬

distinctly, that there existed no distinction be¬

tween the episcopate and the priesthood.

(<There might have been confusion in the

names,® says Saint Thomas, <(but not in the character.® The identity of the original sig¬

nification of the words ((presbyter® and

(<bishop® was acknowledged by the Christian

fathers Saint Jerome and Saint Augustine in the 5th century, and even by Pope Urban II at the end of the 11th century, and it is not denied by many Episcopalians even at the

present day. By the Council of Trent, how¬

ever, the doctrine which placed presbyters and bishops originally on a footing of perfect

equality in the early Church was declared a heresy, thus denying to the bishops of the Church the priority of rank which they claimed.

Those who adhere to the Episcopalian form

of Church government and at the same time

admit the original identity of presbyters and bishops, differ from the Presbyterians in their theory of the origin of the episcopal authority.

The Episcopalians maintain that even before

the words had a separate meaning attached to them the distinction between bishops and sub¬

ordinate pastors existed in fact and was a regular ecclesiastical institution, those who held a peculiar authority over others being ap¬

pointed originally by the apostles. The Pres¬

byterians, on the other hand, believe that the authority that was undoubtedly conceded to

certain of the <(bishops® or <(presbyters® when they met to consider the affairs of the Church, was not due to any formal appointment, but merely to the mutual agreement of the assem¬

bled presbyters and that this distinction was no more than a mark of respect paid to some member who was venerable by his age or dis¬

tinguished by his piety. But, whichever of

these two theories may be correct, there is no doubt of the fact that at a comparatively early period in the history of the Church a position of authority was acquired by the pastors of the Christian communities belonging to cer¬

tain places, and that these came to be distin¬

guished from the others by the name of

bishops. The growth of this authority was

favored by the doctrine which we find stated in the beginning of the 2d century with regard to the priestly dignity being a peculiarly divine institution. The more this doctrine was af¬

firmed the higher grew the claims of the

bishops. Ignatius of Antioch, who died about 115, had already declared every bishop to be a representative of Christ, in which we have the statement of the doctrine of the apostolic succession, that is to say, the doctrine of the transmission of the ministerial authority in uninterrupted succession from Christ to the

apostles and through these from one bishop to another. By the foundation of new churches

in the larger towns which were affiliated with the original churches and by the dependence BISHOP

of the presbyters in the country districts upon those having urban charges, the authority of the bishops came to be gradually extended

over greater or lesser dioceses ; and at the same time the bishops began to reserve to them¬

selves peculiar privileges. As the early

Church advanced and increased in growth, the offices and jurisdiction of the bishops devel¬

oped correspondingly and by the 2d century

their duties are clearly marked off from the subordinate clergy.

While this, then, was the position of the

bishops in relation to the presbyters, they at first considered themselves as standing on a footing of equality in relation to each other.

But as certain of the presbyters in their as¬

semblies had acquired a priority of rank over the others, it gradually came about in the same way that the bishops of the chief cities (Jerusalem, Antioch, Corinth, Alexandria,

Constantinople, Rome) obtained a similar

precedence among the bishops and received the title of metropolitan bishops; and very early in the history of Christianity we find the Bishop of Rome claiming to be the head of the Church as the true successor of Peter, whom Christ Himself had pronounced to be

the rock on which he would build his Church.

Roman Catholic writers found this supremacy

of Peter upon the evidence of Scriptures,

upon the a priori argument of the necessity of one supreme head both in the matter of government and the preservation of the integ¬

rity of doctrine and upon the testimony of early ecclesiastical writers, who witness to the tradition of the universal supremacy of the Roman see.

After the transfer of the capital of the

Roman empire to Constantinople, this city

rapidly rose to ecclesiastical importance and became a metropolitan see. Its bishops made claim to be the first see in the Christian world after Rome on account of the imperial dignity of the city, but this assumption was stoutly resisted by the apostolic sees of the East, whom Rome always sustained against Constan¬

tinople's claim. After the Greek schism, Con¬

stantinople assumed the primacy of the Greek Church.

The practice of solemnly investing bishops

with their offices dates from the 7th century.

Already in the 5th century the Popes had begun to send to the newly elected metropolitan bish¬

ops (now called archbishops) the pallium, a kind of official mantle worn by archbishops, as a token of their sanction of the choice. Two centuries later it became the custom to conse¬

crate bishops by investing them with the ring and crosier, the former as a token of marriage with the Church, the latter as a symbol of the pastoral office. Since this investiture was what gave validity to the election of the bishops, it became the source of long continued contests between the Popes and the temporal sovereigns in the Middle Ages. The influential position which the bishops occupied in the state caused the temporal rulers to be desirous of keeping the right of investiture in their own hands,, while the Popes with equal determination claimed

the right for themselves. The contest was most bitter between the Popes and the emperors of the Romans, as they were called. It began in the 11th century, but was not settled till 1122, when it was agreed in the concordat of Worms between Pope Calixtus II and the Emperor

Henry V that the election of bishops should take place according to the laws of the Church, under the direction of the Emperor, and that the spiritual investiture (with ring and crosier) should remain in the hands of the Pope, while the bishops were to be invested with the tem¬

poral rights of their office by the Emperor.

This is still the fundamental law of the Roman Catholic Church with regard to investiture. The election to a bishopric is for the most part in the hands of the dean and chapter of the cathedral of the diocese; but in some cases it is a right of the territorial sovereign. In any case papal confirmation is requisite before the appointment is complete. Roman Catholic

bishops in England are appointed exclusively by the Pope.

When the system of the ecclesiastical rule

was matured, the almost absolute authority

exercised by bishops over the clergy of their dioceses ; their intervention in the secular con¬

cerns of the governments, to which they soon rendered themselves necessary by their superior information and their elevated rank; the ad¬

ministration of the Church revenues; and their extensive ecclesiastical as well as criminal juris¬

diction, drew them into the vortex of secular affairs, sometimes at spiritual expense. Still it continued to be the bishop's duty to teach and preach in his own diocese, to watch over purity of doctrine, to see that the people were provided with the sacraments, to visit the

churches in his diocese, *etc.* The most dis¬

tinctive functions of their spiritual office re¬

mained as they still are, the ordination of the clergy, the consecration of other bishops, the confirmation of youth, the consecration of

churches, *etc.* In the Middle Ages they at¬

tached to themselves subordinate or assistant bishops called suffragans or coadjutors, who often had entrusted to them the performance of those functions which more especially con¬

cerned the Church. The episcopal office being such as we have described it, the nobility, and even the sons of princes and kings, strove to obtain a dignity which was as honorable as it was profitable, and was not deemed incom¬

patible with festivities and luxurious enjoy¬

ments. The splendid establishments which

they were able to maintain from the large reve¬

nues derived chiefly from rich donations to their churches by pious devotees, gave, to the bishops of Germanv particularly, a high de¬

gree of dignity. They became princes of the empire, and their

influence on public affairs was highly important.

The Reformation lessened the number of

bishops, and though in some of the Protestant countries of the north of Europe the higher clergy have retained the title of bishop, yet they have lost the greater part of their former revenues and privileges, though in neither of these particulars have those of England any reason to complain. The Anglican Church has left to its bishops more authority than the rest, and this is one reason why it bears the name of Episcopal. To them belong ordination, confir¬

mation, the consecration of churches, the licens¬

ing of curates, and institution to benefices. They receive their appointment from the Crown. In Prussia, though the majority of the population are Protestants, the Roman Catholic bishops

receive an annual allowance from the state.

Some bishops in the Roman Catholic Church

are nominally in charge of dioceses in coun¬

tries which do not acknowledge the Christian faith. The dioceses of such bishops are said to lie in partibus infidelium (in parts belonging to unbelievers), and they are chiefly those that were wrested from the Christian Church by

the Mohammedans.

The appointment of bishops was one of the

grievances of the American colonists; few

things more exasperated them than the scheme of appointing and sending out a bishop from England. It is said that there was a project of making Dean Swift bishop of the American colonies. In 1771, at the instance of the clergy of New York and New Jersey, the plan was

again urged. The clergy of Virginia generally assented, but throughout America the dissent¬

ers and the Episcopal laity opposed. After

the Revolution the case was altered. The first Episcopal bishop, Samuel Seabury, of Connec¬

ticut, was consecrated by Scotch non-juring

bishops in 1784. The Methodists began to use the term bishop in 1787. The first Roman

Catholic bishop, John Carroll, of Baltimore, was consecrated in 1790. See Archbishop; Ap¬

ostolic Succession.

Bibliography. — Baur, Christianity and the

Church in the First Three Centuries) (Tubingen 1853) ; Dollinger, (The First Age of the

Church5 (Eng. trans. Oxenham, London 1866) ; Hatch, Organization of the Early Christian

Churches5 (London 1881) ; Lightfoot, (Saint Paul's Epistle to the Philippians5 (London

1868) ; Jungfer, (Die Unterschiede zwischen

der Papstwahl und den Bishopwahlen nach

dem gemeinen Kirchenrecht5 (Borna-Leipzig

1909) ; Moberly, Ministerial Priesthood5 (Lon¬

don 1898) ; Reville, (Les origines de 1' episco-pat5 (Paris 1894) ;

Wordsworth, (Theophilus

Anglicanus5 (London 1843).

BISHOP-AUCKLAND, England, market

town, in the county and nine miles southwest from the city of Durham, situated on an emi¬

nence at the confluence of the Gaunless with the Wear and has much improved in recent

times. Near it is Auckland Palace, the epis¬

copal residence, which covers about five acres of a park of 800 acres; its site was selected during the reign of Edward I (1272-1307).

Among its buildings are a free grammar

school (founded 1605), Saint Anne Chapel,

Edgar Memorial Hall, Lightfoot Church In¬

stitute and the Temperance Hall. Iron found¬

ing and coal mining are the chief industries.

Pop. 13,834.

BISHOP'S BOOK, a handbook of in¬

struction and doctrine compiled in 1537 by a committee of bishops and ministers of the

Anglican Church. It is to be found in form¬

ularies of the Faith Put Forth by Authority During the Reign of Henry VIII.5 Consult

Hardwick, (Reformation 5 (London 1856).

BISHOPS' SCHOOLS. At the beginning

of the history of modern schools, the bishops were the chief educators and directors of edu¬

cators, and their schools were the chief seats of education throughout western Europe. It is difficult to ascertain at what date the public schools of grammar and of rhetoric were

superseded by the episcopal schools. In the 6th century, however, there is record of the identification of the episcopal office with that of the schoolmaster. This was not effected

without opposition. But the necessity of teach¬

ing the gospel to converts brought in the obvi¬

ous need of knowdedge of Latin grammar,

since it was considered sacrilegious to trans¬

late the sacred words into the heathen tongues.

Augustine doubtless set up a school soon

after his arrival in England. In Bede's

(Ecclesiastical History5 we have a record

of a grammar school at Canterbury. From

this school the movement spread to France.

In England in 635, Paulinus, first bishop

of York, introduced a song school, simi¬

lar to the one founded by Pope Gregory at Rome. Theodore and Tobias, bishop of Roches¬

ter, were well known teachers of grammar

and rhetoric. Archbishop Egbert and his suc¬

cessor, Ethelbert, are mentioned by Alcuin in 780 as learned teachers of the seven liberal arts. From the end of the 8th century, the bishop himself ceased to teach in the secular cathedrals in most cases, and the duties of instruction and its supervision devolved upon the schoolmaster or chancellor of the church and his assistants. The monastic cathedrals

retained the double function of the bishop.

Throughout the 13th and 14th centuries we

find references to the bishop's supervision of schools. The Reformation caused the schools

to be made part of the new cathedral founda¬

tions, and at the same time brought the bishops into direct connection with all of the schools.

Henry VIII, Queen Mary and Queen Elizabeth

appealed to the bishops for aid in supervising the religious tenets of schoolmasters. The

canons of the Church and the Orders of Privy Council on successive occasions in 1559, 1580

and 1603 forbade any schoolmaster to teach

without the license of the bishop. This in¬

cluded even the elementary schools. After the commonwealth, the bishop's jurisdiction was

restricted to grammar or classical schools.

It was not until the Endowed Schools Act of 1869 that the bishop ceased to have the right to interfere with secondary schools. The schools were finally freed from all denominational re¬

striction by the act of 1902, which transferred all supervisory power to the board of education.

BISHOPS SUFFRAGAN, a class of

bishops in England appointed by the Crown to take the places of the early bishops in partibus , who were assistants to the active bishops of English sees, and who held their warrant at the pleasure of the bishops to whom they were

assigned. They were distinguished from suf¬

fragan bishops in the Church of England, as every regular bishop was a suffragan of his superior or metropolitan.

BISKARA, bes'ka-ra, or BISKRA, Al¬

geria, a town situated at the southern base of the last spurs of the Aures Mountains, about 120 miles south-southwest of Constantine. The railway from Philippeville, on the Mediter¬

ranean, terminates here. It is situated in a fer¬

tile oasis three miles long, containing 150,000

date palms and numerous other fruit trees, and is the southernmost point of tourist travel in Algeria. It is an important military post, and there are sulphur springs in the neighborhood.

The climate is one of the driest on the globe.

Pop. of commune (1911) 10,606.

BISMARCK, Friedrich Wilhelm, (Count

von), German general: b. Windheim, West¬

phalia, 28 July 1783; d. 18 July 1860. In 1796

he entered the army of Hanover as an ensign, and in 1804 was attached to the Hanoverian legion in the English army. As the result of a duel he was forced to leave the English serv¬

ice. He entered that of the King of Wiirtemberg, in 1807, and was soon after appointed captain of cavalry. During the campaign in

Russia, he served under the command of Ney, and distinguished himself at the Beresina. He was made a prisoner at Leipzig, but returned to Wiirtemberg in 1813. In 1815 he received the title of count; in 1819 he was appointed brigadier-general. In 1828 Count Bismarck in¬

troduced his system of cavalry tactics into the Danish army, and was soon after appointed

commander-in-chief of the cavalry of Wiirtemberg. He published several military treatises, and also a work upon Russia.

BISMARCK, N. D., capital city of North

Dakota, county-seat of Burleigh county, on

the Missouri River, on the main transconti¬

nental line of the Northern Pacific; division point on the Minneapolis, Saint Paul and S. *Ste.*

Marie Railway; terminal for the Chicago Mil¬

waukee & Saint Paul Railway, 194 miles west of Fargo, 12 hours from Minneapolis and Saint Paul, 24 hours from Chicago. Notable insti¬

tutions are the State capital buildings, costing $1,000,000; Fort Abraham Lincoln, modern mil¬

itary post, costing $1,000,000, last command of Custer; United States Indian School; $150,000

Federal building, housing department of jus¬

tice; district offices of department of animal husbandry; United States land office; local and district postal service heads ; Burleigh county courthouse ; municipal auditorium erected by people at cost of $75,000, finest theatre be¬

tween Minneapolis and Helena, Mont. ; Bis¬

marck and Saint Alexius hospitals ; two largest sanatoriums in State, with more than 200 pri¬

vate guest rooms ; seven-story hotel McKenzie, largest between Twin Cities and coast; four-story Grand Pacific hotel, covering quarter—

block; State armory of national guard; Carne¬

gie library costing, with site, $40,000; State library and historical museum ; proposed site of large German Evangelical and Methodist

Episcopal colleges. Bismarck is base of Mis¬

souri River navigation for distance of 1,500

miles and is home of a modern fleet of a dozen packet steamers. The Missouri River is spanned at this point by the only bridge^ over that stream in North Dakota, costing $1,500,000; counties of Morton and Burleigh are now bonding for third of million for construction of a wagon bridge. City has unlimited supply of pure, soft water, pumped from Missouri river and clari¬

fied ; several miles of handsome, boulevard ((White Way,}) has 9 miles of paving under way; adequate sewer and storm drainage sys¬

tems ; gas and electricity for cooking and lighting, with electric cooking rate equivalent to dollar gas; street railway service; taxi-service ; co-operative merchants' delivery. As¬

sessed valuation of $2,500,000; city tax rate of 18.4 mills, lowest of any incorporated town in North Dakota. Industries include immense

flour mills, elevators, stone and brick and pot¬

tery works ; flax fibre mill ; stock-food manu¬

factories; largest greenhouses and nurseries in VOL. 4 — 2

the State; oldest seedhouse in North Dakota; large packing plants. Is publishing centre for Jim Jam Jems, the Northern Farmer, Public

Opinion and other periodicals of large general circulation ; has three daily and weekly news¬

papers and number of monthly technical and

secular publications. Trading centre for area 200 miles square; jobbing centre for dis¬

trict extending west into Montana ; has 50

large wholesale and jobbing houses; distributes more automobiles and more farm implements

than any other city but one in North Dakota.

Three national banks with resources of $4,500,-

000 ; substantial building and loan association ; home office of the Provident Insurance Com¬

pany of North Dakota. In 1883 it was made the capital of Dakota Territory and in 1889

became the capital of North Dakota. Bis¬

marck adopted the commission form of govern¬

ment in 1913. The North Dakota Industrial

Exposition is held in Bismarck in October of each year. Pop. (1910) 5,443; (1920) 7,122.

G. N. Keniston,

Secretary of the Bismarck Commercial Club.

BISMARCK ARCHIPELAGO, a group

of islands formerlv a German colony,

formed in 1885, under agreement with the

British government, by the consolidation of the New Britain Archipelago with adjacent islands.

The principal islands of the group lie off the northwestern coast of New Guinea. The

largest of them are Neupommern (formerly

New Britain), and Neumecklenburg (formerly

New Ireland). The group includes the Ad¬

miralty Isles, the French Islands, the Duke of York Islands, New Hanover and several

others. The combined area of the group is

about 18,000 square miles, and they have a population of about 200,000, mostly Papuans.

The Bismarck Archipelago was captured by

the Australian fleet on 12 Sept. 1914.

BISMARCK-SCHONHAUSEN, Herbert

Nikolaus von, Prince, her'bert nik'o-lows

bes'mark-shen'how-sen, German statesman : b.

Berlin, 28 Dec. 1849; d. Friedrichsruhe, Prussia, 18 Sept. 1904; son of Otto Eduard Leopold, Prince von Bismarck-Schonhausen. He served

as councillor to the London embassy; 1882-84; was under-Secretary of State in 1885, and nego¬

tiated the Anglo-German treaty of that year ; and Secretary of State 1886-90. In 1889, the Emperor conferred on him the first class of the Order of the Red Eagle.. When his father re¬

signed in 1890, Herbert withdrew from the

diplomatic service and remained upon his

estate for several years. In 1893 and 1898 he was a member of the Conservative party in the Reichstag. His speeches are published under

the title, (Politische Reden) (1899).

BISMARCK-SCHONHAUSEN, Otto

Eduard Leopold von, Prince, of a noble

family of the ((Mark}) (Brandenburg) : b.

Schonhausen, 1 April 1815; d. 30 July 1898. He studied at Gottingen, Berlin and Greifswald; entered the army and became lieutenant in the Landwehr. After a brief interval devoted to his estates and to the office of inspector of dikes, he became in 1846 a member of the

provincial Diet of Saxony. And later he entered the Diet of Prussia, when he began to attract attention as an ultra Royalist. He opposed

the scheme of a German empire as proposed by 18

the Frankfort Parliament of 1849. His diplo¬

matic career began in 1851, when he was ap¬

pointed Prussian member of the resuscitated

German Diet at Frankfort. In the Diet, he gave open expression to the long-felt discontent with the predominance of Austria, and demanded

equal rights for Prussia. He remained at

Frankfort till 1859, when he beheld in the ap¬

proach of the Italian War an opportunity of freeing Prussia and Germany from the domi¬

nance of Austria. In the spring of 1862 King William, on the urgent advice of the Prince of Hohenzollern, transferred Bismarck as

Ambassador to Paris, in order to give him an insight into the politics of the Tuileries. Dur¬

ing his short stay, at Paris Bismarck visited London, and had

interviews with the leading politicians of the time, including Lord Palmer¬

ston and Disraeli. In the autumn Bismarck

was recalled, to take the portfolio of the Min¬

istry of Foreign Affairs, and the presidency of the Cabinet. Not being able to pass the organization bill and the budget, he closed the chambers (October 1862), announcing to the

deputies that the King's government would be obliged to do without their sanction. When

the (<conflict era,® as it was called, approached a crisis, the death of the King of Denmark re¬

opened the Schleswig-Holstein question, and

excited a fever of national German feeling, which Bismarck was adroit enough to work so as to aggrandize Prussia by the acquisition of the Elbe duchies. Having disposed of the

Danish trouble, Bismarck carried out a similar policy toward Austria which resulted in the defeat of Austria in the war of 1866.

The action of France in regard to the can¬

didature of Prince Leopold of Hohenzollern

for the throne of Spain gave Bismarck the. op¬

portunity of carrying into action the intensified feeling of unity among Germans. During the

war of 1870-71, Bismarck was the spokesman

of Germany; he it was that in February 1871

dictated the terms of peace to France. Having been made a count in 1866, he was now created a prince and chancellor of the German empire.

Following the Peace of Frankfort (10 May

1871), the sole aim of Bismarck's policy, do¬

mestic and foreign, was to consolidate the

young empire of his own creation. Thus, con¬

ceiving the unity of the nation and the author¬

ity of its government to be endangered by the Catholic Church and its doctrine of papal

infallibility, he embarked on that long and bitter struggle with the Vatican, called the Kul-turkampf, in the course of which the Imperial and Prussian parliaments passed a series of most stringent measures (Falk or May laws)

against the Catholic hierarchy. But Bismarck had underrated the resisting power of the

Church, and motives of political expediency

gradually led him to modify or repeal the most oppressive of the anti-papal edicts, leaving the Catholics virtual masters of the field. Other¬

wise, his domestic policy was marked, among other things, by a reformed coinage, a codifi¬

cation of law, a nationalization of the Prussian railways (as a preliminary step to imperial state lines), fiscal reform in the direction of making the empire self-supporting (that is, in¬

dependent of matricular contributions from its component states), repeated increase of the

army and the regular voting of its estimates for seven years at a time (military septennate), the introduction of a protective tariff (1879), and the attempt to combat social democracy.

In 1884 Bismarck inaugurated the career of

Germany as a colonizing power, a new depart¬

ure which brought him into sharp but temporary conflict with the England of Gladstone. For the rest, his foreign policy mainly aimed at isolating France and rendering her incapable of forming anti-German

alliances. On the other hand, he gradually combined the central powers of

Europe into a peace league, aiming at counter¬

acting the aggressiveness of Russia and France, separately or combined, on the Danube or the Rhine. The nucleus of this peace league was formed in 1879 by the Austro-German Treaty

of Alliance (published in February 1888) which Italy formally joined in 1886, and which entitles Bismarck to be called the ˆpeacemaker® and

the “peacekeeper® of Europe, a character he first publicly acquired when, as <(honest broker®

between Austria and Russia, he presided over the Berlin Congress in 1878. The phrase, (<man of blood and iron,® is based on the Iron Chan¬

cellor’s own use of the words in a speech in 1862, a much misrepresented remark, as Bis¬

marck afterward explained in his Auto¬

biography. >

Bismarck’s life was often threatened, and

twice actually attempted — once at Berlin in 1866, just before the Bohemian campaign, by Ferdinand Cohen (or Blind), a crazy youth

who aimed at making himself the instrument

of popular dissatisfaction with Bismarck, as the champion of absolutism and the fancied apostle of a fratricidal war; and again in 1874 at Kis-singen, by a Roman Catholic tinsmith named

Kullmann, who was a product of Ultramontane fury engendered by the May laws.

Emperor William died 9 March 1888. The

short reign of Emperor Frederick followed and then William II ascended the throne. Resultant friction led to Bismarck's resignation on 18

March 1890. Many explanations have been

given — that Bismarck objected to the labor rescripts, that he opposed the abolition of the laws against socialists, that he would not tol crate the Emperor's direct consultation with the other ministers or the parliamentary leaders.

After the war with Denmark, King William

had made Bismarck a count. After the con¬

quest of France, Emperor William had named

him prince. Emperor William II gave him

the title of Duke of Lauenburg. When Bis¬

marck's 81st birthday was celebrated in 1896, a reconciliation took place between the prince and his sovereign, and the Emperor visited

Bismarck at Friedrichsruhe, where the states¬

man died two years later.

Bibliography. — Bismarck, Autobiography*

or (Bismarck the Man and the Statesman:

being the reflections and reminiscences of Otto Prince von Bismarck, written and dictated by himself after his retirement from office) (2

vols., trans. by Butler, New York) ; Ashley, (Social Policy of Bismarck) (New York 1913) ; Busch, (Bismarck: Some Secret Pages of his History* (2 vols., New York 1899) ; Dawson, (Bismarck and State SocialisnP (London

1890) ; Lowe, (Prince Bismarck* (London

1885) ; Matter, (Bismarck et son temps * (Paris 1908) ; Mareks, (Bismarck, eine Biographie) (Stuttgert 1909) ; Munroe-Smith, (Bismarck

and German Unity* (New York 1898) ; Sybel, ‘I he Founding of the German Empire* (7

vols.. New York 1898) ; Whitman, (Personal

Reminiscences of Prince Bismarck> (New

York 1903).

BISMILLAH, Arabic, ((In the Name of

God,® a contraction of bi = in, ism = name, Allahi = of God. Every sureh or verse of the Koran begins with ((Bismillahi er-Rahmani er-Rahim** = ((In the Name of the All Compas¬

sionate God.®

BISMUTH, biz’muth, a metallic element,

first accurately described by Pott in 1739. It was known before that time, but had been

previously confounded with antimony and

zinc, which it resembles to some extent. Bis¬

muth occurs in nature in the metallic form, always in small quantities, and generally asso¬

ciated with copper, lead, cobalt, nickel, arsenic, silver, tin or rarely iron. It is found in various form — • massive, granular, reticulated and arborescent. Several ores of it also are known, from which the metal may be easily

obtained by roasting and smelting. The prin¬

cipal supply in Europe comes from Saxony,

but considerable quantities are obtained from Austria, Norway, England, Spain and New

South Wales. The largest known deposits are those of Bolivia where it is found as the hydrated oxide. In Mexico it is found as

carbonate. Native bismuth is found in Cali¬

fornia but in very small quantities. Small

amounts have been reported from Utah. The

total consumption of the metal probably does not greatly exceed 50 tons per annum and the demand for it is so variable that the price has ranged all the way from 50 cents to $5 a pound. Bismuth is a grayish-white metal with a peculiar reddish tone, as compared with other white metals, and is highly crystalline, and so brittle that it can be readily pulverized. It melts at 510° F., and boils in the vicinity of 2300° F.

Its specific gravity is about 9.82 at 54° F., that of the melted metal, just above the point of fusion, being 10.06. Its specific heat is about 0.030 at ordinary temperatures, and 0.036 just above the melting point. Its coefficient of ex¬

pansion is about 0.000736 per degree Fahren¬

heit, its conductivity for heat is about one-fiftieth of that of silver and its electrical re¬

sistance at 32° F. is 1.15 times that of mercury at the same temperature. Bismuth is readily recognized by the spectroscope, as it shows a large number of characteristic lines. Its

chemical symbol is Bi, and its atomic weight is 208.5 in the scale where O = 16. It has tensile strength of 6,400 pounds per square inch. Ac¬

cording to some authorities, the specific gravity of metallic bismuth is diminished by pressure; but Spring has shown that this is not the case.

He subjected a sample whose specific gravity was 9,804 to a pressure of 20,000 atmospheres, and found that the specific gravity rose to

9.856, while a second compression increased it still further, to 9.863. Bismuth expands upon solidifying, but Tribe has shown that this

expansion does not take place until immediately after the congelation of the metal. Bismuth is the most diamagnetic substance known, a

sphere of it being sensibly repelled by a magnet.

It has marked thermo-electric properties also, on account of which it is much used in con¬

nection with antimony in laboratories in the construction of delicate thermopiles. In the arts, metallic bismuth is used chiefly in the preparation of alloys. By adding a small

amount of it to lead, that metal may be hard¬

ened and toughened. An alloy consisting of

three parts of lead and two of bismuth has 10

times the hardness and 20 times the tenacity of pure lead. The alloys of bismuth with both tin and lead are extremely fusible, and take fine impressions of casts and molds, owing to their property of expanding at the moment of solidifying. An alloy of one part of bismuth, two parts of tin, and one part of lead, is used by pewter workers as a soft solder, and by soap-makers for molds. An alloy containing

five parts of bismuth, two of tin and three of lead melts at 199° F., and is somewhat used for stereotyping, and for the manufacture of metallic writing pencils. Thorpe gives the

following proportions for the better known

fusible metals, into which bismuth enters :

Newton's: Bismuth, 50; lead, 31.25; tin,

18.75. Melts at 202° F.

Rose's: Bismuth, 50; lead, 28.10; tin, 24.10.

Melts at 203° F.

D’Arcet’s: Bismuth, 50; lead, 25; tin, 25.

Melts at 201° F. (If 250 parts of mercury are also added, the resulting alloy, or amalgam, melts at 113° F.)

Wood’s: Bismuth, 50; lead, 25; tin, 12.50;

cadmium, 12.50. Melts at 149° F.

Lipowitz’s : Bismuth, 50; lead, 26.90; tin,

12.78; cadmium, 10.40. Melts at 149° F.

Guthrie’s <(eutectic® alloy: Bismuth, 50;

lead, 20.55; tin, 21.10; cadmium, 14.03. Melting point not definitely stated, but said to be <(very low.® See Fusible Metals.

The action of heat upon some of the fore¬

going alloys is remarkable. Thus, Lipowitz’s alloy, which solidifies at 149°, contracts very rapidly at first, as it cools from this point. As the cooling goes on, the contraction becomes slower and slower, until the temperature falls to 101.3° F. From this point the alloy expands as it cools, until the temperature falls to about 77° F., after which it again contracts, so that at 32° a bar of the alloy has the same length as at 115° F. Alloys of bismuth have been used for making fusible plugs for steam boil¬

ers, but it is found that they are altered in some unknown way by prolonged exposure to

heat, so that they cannot be relied upon, after any great length of time, to melt at the proper temperature. Some of the alloys of bismuth

are also used in tempering steel.

In its compounds, bismuth has an odd

valency — usually three, but sometimes five.

Metallic bismuth does not oxidize readily in dry air at ordinary temperatures, but it burns with a blue flame when strongly heated in

presence of air, passing into the trioxide, Bi203. If the trioxide is dissolved in a solu¬

tion of caustic potash, and nitric acid is sub¬

sequently added, bismuth peroxide (or pentoxide, Bi205, is precipitated. The trioxide is pale yellow, and the pentoxide is brownish-red.

The trioxide exists in nature as ˆbismuth

ochre.® It is used for staining glass and porce¬

lain. Both unite with acids to form salts.

Bismuth trichloride, BiCb, is formed when the metal is heated in chlorine gas ; it is a white, crystalline, deliquescent substance, which is decomposed by water with the formation of

hydrochloric acid and bismuth oxychloride

BiOCl. Bismuth trisulphide, Bi2S3, is thrown down as a black, insoluble precipitate, when a stream of sulphuretted hydrogen gas is passed through an acid solution of a salt of bismuth.

The trisulphide also occurs native as (<bismuth glance,® or Bismuthinite (q.v.). Bismuth dis¬

solves readily in nitric acid, with the formation of the nitrate, $Bi(N03)2 + 5H20$. A pecu¬

liarity of the soluble bismuth salts, as a class, is that their solutions are rendered milky by the addition of water in considerable excess, owing to the formation of insoluble basic com¬

pounds. The nitrate, for example, becomes

transformed by this process into a series of so-called subnitrates.

In medicine, bismuth is used in the form of some one of this metal's insoluble salts, the soluble salts of bismuth being actively poison¬

ous. The poisoning closely resembles that

caused by lead (q.v). The insoluble salts used most frequently are bismuth subnitrate, sub-carbonate, salicylate and subgallate. These are for the most part employed as gastric sedatives, as gastro-intestinal anti-fermentatives, and

locally as bland astringent dressings.

Practically the entire commercial supply of

bismuth in the United States market is obtained as a by-product in smelting lead, copper, gold and silver ores. In the lead-silver mines at Leadville, Colo., occur occasional pockets of ore that are relatively rich in bismuth. These ores are smelted separately to secure a lead rich in bismuth, which is afterward treated by the electrolytic process to recover the bis¬

muth. A very large quantity of bismuth is

vaporized and escapes from the chimneys of

the great smelters. An examination at the

Anaconda smelter proved that not less than

800 pounds of metal was lost daily in this way. The demand, however, is limited, and the production is kept by the manufacturers at a point where the price which can be obtained will be large enough to make

the recovery

profitable. The latest figures on the produc¬

tion of bismuth in the United States given by the Geological Survey arc those for 1914 — a total of 220,000 pounds, valued at $426,000.

Since then the government has ordered the

figures concealed, as they might reveal facts relating to private business. The imports have fallen off in value from $330,000 in 1913 to $180,000 in 1915.

BISMUTHINITE, a native sulphide of

bismuth, having the formula Bi2S3. It com¬

monly occurs massive, but is also found in needle-like crystals belonging to the orthorhom¬

bic system. It is opaque, and leaden in color, often with a superficial yellowish or iridescent coating. Its hardness is 2, and its specific gravity usually about 6.5. In the United States it occurs in Connecticut, California, North Car¬

olina and Utah. It is also found in Mexico and Canada, and in Sweden, France, England, Sax¬

ony, Bohemia, New South Wales, Hungary,

Cornwall and Bolivia. Where it can be had in quantity, it is mined as an ore of bismuth.

BISMYA, in Mesopotamia (ancient Baby¬

lonia), between the Tigris and Euphrates,

about 32° N. and 45° 40’ E. Within a space of less than a square mile there are a number of ruined mounds up to 40 feet in height. In 1904

Dr. Edgar J. Banks, deputed by the University of Chicago, conducted excavations here, which led to the discovery that the site was that of the ancient city of Adab (Ud-Nun), referred to in the code of

Hammurabi, dating back to nearly 3,000 b.c. The city appears to have been abandoned ages ago, for some of the ruins unearthed belong to the kings of Ur. Dr. Banks found a number of inscribed tablets of stone and bronze, walls, towers, houses and tombs, besides a perfect white marble statue inscribed ((E-mach, King Da Udu, King of Ud Nun.®

The statue now reposes in the Museum of

Antiquities on Seraglio Point in Constantinople.

A refuse heap close to a temple contained many pieces of marble, onyx, porphyry and alabaster vases, inlaid with precious stones and ivory.

BISON, a form of wild cattle regarded by

some naturalists as constituting a genus Bison, separated from the larger group Bos, which is represented by the American <(buffalo,® the

European aurochs, and some extinct species.

Bison differ from other cattle, in external appearance, mainly by their massive and shaggy forms. Their heads are exceedingly broad, and the horns curve outwardly from each side of the forehead, and are short, round and thick.

A mop of long and shaggy hair covers the fore¬

head, nearly hiding the little eyes, and forms a great beard upon the throat and chin, espe¬

cially of the bulls. In order to support this massive head, which is usually carried low, great spines rise from the vertebrae of the back over the shoulders, giving attachment to the huge muscles necessary to support the

skull. This makes the neck very thick, and the fore-quarters much higher than the haunches, which droop away from the arched contour of the back, over the withers. The massive ap¬

pearance of the fore-quarters is increased by the long growth of hair on the neck, shoulders and fore-legs, which is especially coarse and shaggy in bulls, and is of protection to them in their furious assaults

upon one another in the rutting season. This hair consists mainly of a short, crisp, wool-like growth, different from that of other cattle, and capable of being woven.

Internally, the bison are peculiar in having 14

ribs instead of 13; in the breadth and convex¬

ity of the frontal bones of the skull, in having six instead of four nasal bones ; and in the com¬

parative slenderness of the bones of the limbs.

The bison are inhabitants of the northern

hemisphere, and, in the era preceding the pres¬

ent, were represented by two or three species of probably circum-polar range. The race is rep¬

resented in the Old World by the aurochs, now preserved only in small, protected herds in Russia (see Aurochs) ; and in America, by

the buffalo (Bison aniericanus) , now nearly extinct.

The American bison or buffalo is somewhat

smaller than the aurochs, and has shorter and thicker horns, and a shorter tail, but its hump and fore-quarters are higher, and more shaggy.

The females are much inferior to the males in bulk, weighing only about 1,200 pounds, whereas an old bull in good condition will weigh 2,000

pounds. The American animal differs in one

very important respect from the European spe¬

cies, due to the difference in their habitats.

The auroch was a native of a region covered with forests, where large herds could not find open pasturage of any considerable extent, and

1 Celebes Wild Ox or Anoa

2 North American Bison or Buffalo

3 Indian Domestic Buffalo

consequently moved about only in small bands, whereas the American animal had open to it the immense, grassy prairies and plains of the interior of this continent, and was able, and in effect, forced to join into vast herds, so that it acquired gregarious habits. When North

America was explored by white men, the bison was first encountered in the valleys of the Alleghanies, and scattered throughout the prairies of the Mississippi Valley, north of the Tennes¬

see River. Its principal home, however, was upon the grassy plains, between the Missouri River and the Rocky Mountains, where the herds

sometimes contained hundreds of thousands of individuals, and grazed all the way from south¬

ern Texas to the shores of Great Slave Lake.

They wandered through the valleys of the Rocky Mountains, to the plains of New Mexico, Utah and Idaho, but seemed never to have crossed the Sierra Nevada. Those east of the Missis¬

sippi River were probably killed off before the beginning of the 19th century, and by 1850 none remained east of the dry plains. The building of the Union Pacific and Kansas Pacific rail¬

roads, where the early trains were sometimes stopped by herds crossing the tracks, soon led to the disappearance of the animals from the central plains ; and by 1875 they were divided into two distinct groups, a northern and a southern. These were rapidly slaughtered by

parties of men who followed the animals at all seasons, and killed them for their hides, which, as ((buffalo robes® became more and more valu¬

able, until by 1890 the Texan herd had been utterly exterminated, and of the northern herd, none remained except such as had been gathered by the government for preservation in Yellow¬

stone Park, and a few hundred that still sur¬

vive in the remote forests beyond the North Saskatchewan. The herd at Fort Pierre, S. D., numbering over 700 animals, contains about one-fifth of all in existence. Other small bands are kept in parks and zoological gardens in various parts of the world. In 1913 there were 3,453 liv¬

ing bison, the sole relic of the millions of these valuable animals, which half a century ago

ranged our western plains, and which were reck¬

lessly destroyed.

The buffalo herds were made up of small

companies, consisting of a patriarchal old bull, several cows and a number of young of various ages, and thousands of these companies would graze in the same region, all moving slowly in the same direction, so that travelers would never be out of sight of bison during a whole day's journey. They were more or less nomadic,

wandering from one part of the plains to the other in search of fresh pasturage. Thus on the approach of winter a general movement

always took place from the high, central plains toward the warmer south, and also into the shelter of the wooded valleys of the foothills.

In these journeys they had the habit of travel¬

ing in single file, thus forming long narrow paths, which the plainsmen called <(buffalo

trails,® yet traceable in many places. In spite of their weight and apparent clumsiness, they swam rivers with ease and climbed about the mountains with remarkable ability. Neverthe¬

less they chose the easiest places, and the well-marked buffalo-trails were the guides for ex¬

plorers, and were most deeply imprinted in

those mountain passes, which are now the high¬

ways of commerce. The sexes kept together

throughout the year, and as is usual among gregarious animals, there was constant fighting among the bulls for the supremacy of their bands, the old leaders being overthrown by

younger and more vigorous aspirants, as soon as their strength began to wane. Thus the very best sires were continually selected by the law of battle, and the race kept at its highest point.

The herding was a measure of protection

against the enemies which hung upon the

skirts of every band. The grizzly bear was perhaps the only animal that could vanquish a bison bull in fair fight, but pumas and wolves were ever on the watch to seize any young or feeble ones that strayed from the band. When attacked the band would instantly form a close crowd with the cows and calves in the centre, protected by the bulls, forming a circle with lowered heads on the outside. The calves were born in the spring, a single one, as a rule, to each cow after a gestation of about nine

months.

To the western Indians the bison was the

principal resource for food and shelter, and was continually hunted. In the days before

firearms, the Indians would approach them on foot, by creeping within bowshot on all fours, often disguised in the skin of a calf or an ante¬

lope; or would rush the herd upon horseback.

They also had the practice in rough countries of driving the buffaloes into enclosures or small canyons, where they could easily be slaughtered ; or sometimes would force them over a cliff, to be killed

by the fall. Besides eating the flesh as fresh meat, vast quantities of it would be cut into strips each autumn, and dried in the sun for winter use ; while the northern tribes chopped it into fine pieces, mixed it with ber¬

ries, and preserved it in skin bags, mixed with boiled fat, and so formed the highly portable and nutritious food called (<pemmican.® The

disappearance of the buffalo consequently meant starvation to the Indians, as well as the loss of the principal material for warm clothing and bedding, and the Indian wars which raged upon the plains, during the third quarter of the 19th century, were mainly due to the desperate

efforts made by these people to preserve their hunting-grounds.

Species of fossil bison have been found

both in Europe and America, associated with the remains of mammoths, mastodons and other extinct animals of the Quaternary Period.

Some of these extinct bison exceeded in size any of the living species, the bony horn-cores in one being six feet from tip to tip (the length of the horns themselves must have been con¬

siderably greater) ; the height of this species is estimated to have been over six feet at the shoulder.

The literature relating to the American buf¬

falo is as extensive as the story of the Western States. The most complete and special accounts are J. A. Allen's monograph, (The American

Bison) republished by the United States Geo¬

logical Survey in 1875 ; and W. T. Hornaday's Extermination of the American Bison, > in the annual report of the Smithsonian Institution for 1887; (Our Vanishing Wild Lifeˆ also by Dr.

Hornaday (New York 1913) ; and the Annual

Reports of the American Bison Society. For the more picturesque and adventurous side of the 22

animal's history, and its hunting, consult Audu¬

bon's (Quadrupeds of America) ; Catlin's ˆorth American Indians5 ; Gregg's (Commerce of the Prairies) ; Dodge's (Black Hills 5 ; Butler's (Great Lone Land5; Inman, (Buffalo Jones:

Forty Years of Adventure 5 (1899) ; and the accounts of western explorations by such

writers as Pike, Fremont, Marcy, Long, Emory and Stansbury.

BISPHAM, bis'pam, David Scull, baritone

singer: b. Philadelphia, Pa., 5 Jan. 1857, of Quaker parentage. Educated at Haverford

College, Pennsylvania, he later studied music and singing in England and Italy. His debut was made as the Due de Longuevillc in (The Basoche,5 London, in 1891, and since then he has been the principal baritone of the Royal Opera Company, Covent Garden, London, and

the Metropolitan Opera Company, New York.

An accomplished linguist, he is equally at home in German, French or Italian, but his greatest successes have been in Wagnerian roles, such as ((Alberich55 and <(Wolfram.55 He abandoned the operatic stage for concert singing in which he has been eminently successful. He is a

staunch advocate for the use of English in opera and has achieved a large measure of

success in his rendering of German songs in English translations.

BISSAGOS, bis-sa'goz, a group of islands,

about 20 in number, near the west coast of Africa, opposite the mouth of the Rio Grande, between lat. 10° and 12° N., long. 18° W., be¬

longing, like the mainland opposite, to Portugal.

The largest, Orango, is about 25 miles in length, and most of them are inhabited by a rude negro race. The inhabitants cultivate maize, bananas and palms, but their chief employment is in fishing. Most of the islands are under native chiefs, who are-nominally vassals of Portugal.

At Bolama or Bulama, once a British settle¬

ment, but abandoned in 1793, there is a thriving Portuguese town, which is the seat of govern¬

ment. Consult Antichan, (Les lies Bissagos)

(Revue de geographic 1881, 1882).

BISSAO, bes-sa'o, an island and Portu¬

guese station closer to the African coast than the Bissagos and opposite the Jeba's delta.

Before the prohibition of slavery by the Portu¬

guese government it was an important slave

market. It is the chief port of Portuguese Guinea.

BISSELL, Edwin Cone, American biblical

scholar : b. Schoharie, N. Y., 2 March 1832 d.

Chicago, 9 April 1894. He prepared for the min¬

istry at Union Theological Seminary, New York and held Congregational pastorates at West-hampton, Mass., San Francisco, Cal., and Win¬

chester, Mass., and was professor of Hebrew in the Hartford Theological Seminary, 1881-92,

and at the McCormick Presbyterian Seminary,

Chicago, 1892-94. He published (The His¬

toric Origin of the Bible5 (1873) ; (The Pen¬

tateuch: Its Origin and Structure5 (1885);

ˆBiblical Antiquities5 (1888) ; (Genesis Printed in Colors, Showing the Original Sources from which it is Supposed to Have Been Compiled5

(1892) ; (The Apocrypha of the Old Testament, with Historical Introductions,5 his greatest

work (1880).

BISSELL, George Edwin, American

sculptor -: b. New Preston, Conn., 16 Feb. 1839; d. Mount Vernon, N. Y., 30 Aug. 1920. His works include a bronze statue of Chancellor John Watts in Trinity churchyard, Col. Abraham de Peyster at Bowling Green, and (Lycurgus,5

a marble statue on the appellate courthouse, in New York city: Chancellor James Kent in the Congressional Library, Washington ; the Elton Memorial Vase and a statue of Col. John

L. Chatfield at Waterbury, Conn. ; a bronze statue to Abraham Lincoln in Clermont, Iowa ; a monument to Lincoln in Edinburgh, Scot¬

land; and numerous soldiers' monuments

throughout this country, the best of which is at his early home in Waterbury, Conn. In

early life he served as a private in the Civil War, 1862-63, and in the United States navy, as assistant paymaster, 1863-65. The son of a prosperous quarryman, he was associated with his father and brother in the marble cutting business in Poughkeepsie, N. Y., and compara¬

tively late in life completed his art studies in Paris, Florence and Rome in 1875-76. He

maintained studios in Paris 1884 to 1896 and in Florence 1903-05 and 1907-09. His work is

distinguished by virility and life-like realism.

BISSELL, Wilson Shannon, American

lawyer: b. New London, N. Y., 31 Dec. 1847; d.

Buffalo, 6 Oct. 1903. He was graduated at

Yale University in 1869; and studied law in Buffalo with Lansing, Cleveland & Folsom. In 1872 he formed a partnership with Lyman K.

Bass, the firm of which Grover Cleveland be¬

came a member in 1873. When Mr. Cleveland

was elected governor of New York the firm

was dissolved. Subsequently it was reorgan¬

ized, and in 1900 consisted of Bissell, Carey &

Cooke. He was a delegate to several State

conventions ; in 1884 was a Democratic presi¬

dential elector; and in 1893-95, during Mr.

Cleveland's second term as President, was Post¬

master-General of the United States. He be¬

came chancellor of the University of Buffalo, 1902.

BISSEN, bls'sen, Hermann Wilhelm,

Danish sculptor: b. Schleswig 1798; d. Copen¬

hagen, 10 March 1868. From 1823 to 1833 he studied in Rome under Thorvaldsen, who in

his will commissioned him to complete his un¬

finished works. In 1850 he was made director of the Academy of Arts, Copenhagen. Among

his masterpieces are the (Valkyrie,5 (Cupid

Sharpening His Arrow,5 and < Moses 5 ; his (Orestes, 5 and a frieze 134 feet long, destroyed in the burning of-the Christianborg at Copen¬

hagen (1884). The royal collection in Copen¬

hagen possesses 100 bronze busts, and numer¬

ous statues and casts.

BISSEXTILE, the ancient name of leap

year, so called from the sixth day before the calends of March being repeated or taken twice.

See Calendar.

BISSING, Baron Moritz Ferdinand von,

German soldier ; governor-general of Belgium, 1914—17 : b. Bellmannsdorf, Silesia, 30 Jan.

1844; d. Brussels, 18 April 1917. He entered the Prussian army at 19, served in the Austrian campaign (1866) and the Franco-Prussian War

of 1870-71, attaining the rank of full general in 1902. Up to the time of his retirement in 1908 he had held several high commands. He was succeeded in his command of the 7th

German Army Corps at Munster by General

von Bernhardi (q.v.). Bissing was recalled to the service on the outbreak of the European War, and in November 1914 he superseded

General von der Goltz as governor-general of the conquered territory of Belgium. During

his tenure of that office the name of Baron Bis¬

sing acquired much unenviable prominence on

account of the stern regime he introduced over the Belgian population. Responsibility has been laid on his shoulders for the levying of mil¬

lions of dollars from various towns for alleged infractions of German military laws; for the execution of Edith Cavell (q.v.) ; and for the wholesale deportation of Belgians into Ger¬

many. There are strong indications, however, that Bissing was rather the obedient instru¬

ment in carrying out these rigorous measures than the instigator of them. While his signature certainly appeared under all the proclamations and drastic restrictions imposed upon the Bel¬

gian people, and his assent was given to many “executions,® the Berliner Tageblatt stated

after his death that (<most of the measures taken under his governorship created a world¬

wide sensation and aroused a world-wide pro¬

test. They were not taken by him, but in spite of his efforts to prevent them.® It is known that Bissing was opposed to the killing of Edith Cavell ; that he tendered his resignation to the Kaiser over the affair, and that he was also opposed to the deportations. Both of these

measures — according to the German paper

quoted — were ordered from the Kaiser’s head¬

quarters. Particular interest attaches to a

document entitled ((General von Bissing's Tes¬

tament,® published after his death. In a letter to Dr. Stresemann (14 Jan. 1917) von Bissing declared that Germany must on no account re¬

linquish Belgium, which ((must be used to

enhance our power.® He confessed that his

policy in Belgium had been guided by ((such consideration of what may happen in the

future. Great difficulties have often been put in the way of my policy, and the policy of the fist alone has been set up as the right policy.®

His church policy had been conducted ((with a wise moderation® because ((we shall need the church when some day we want to develop

German ways and German activity in Belgium.®

On the subject of the ((Testament® he wrote, "There lies in my house a memorandum com¬

posed by me for myself alone, which deals

more precisely and exhaustively with the future of Belgium, and the conclusion I arrive at is this, that, if we do not get Belgium into our sphere of power, and if we do not govern it in German fashion (and use it in German fashion) the war is lost …® The memorandum re¬

ferred to was published by a member of the Reichstag in the Bergische Mdrkische Zeitung a month after Bissing's death. The writer de¬

velops his theories with much ingenuity, ad¬

vancing numerous political and economic rea¬

sons why Belgium must in the future become a German possession. He realizes the difficulty "that we shall ever be able to conclude with the King of the Belgians … a peace by

which Belgium will remain in the German

sphere of power,® and that "in view of our just and ruthless

procedure, the King of the Belgians will be deposed, and will remain

abroad as an aggrieved enemy. We must put

up with that . . and we can read in

Machmvdll that he who desires to take posses¬

sion of a country will be compelled to remove the King or Regent, even by killing him.® One of the necessary methods to be employed in Germanizing Belgium is, in von Bissing's

opinion, that "he who remains in the country must declare his allegiance to Germany, and after a certain time must declare his allegiance to Germanism.® Furthermore, "it cannot be

tolerated that wealthy Belgians shall leave the country, and nevertheless draw profit from

their possessions in Belgium.® In order to

prevent this, "expropriation is absolutely neces¬

sary.® The possession of the Belgian Kongo

"is certainly to be aimed at, and I desire to insist that a German colonial empire, whatever its shape, is indispensable for Germany's world policy and expansion of power.® The memo¬

randum was written toward the end of 1915.

BISSON, be -son, Alexandre, French

dramatist and musical composer : b. 1848. His vaudeville, 'Four Cuts with a Penknife)

(1873), won for him instant celebrity. 'The Deputy from Bombignac) is his masterpiece

(1884), unless we prefer to this (Les Surprises du Divorce) (1890), in which he had the bene¬

fit of the collaboration of Antonio Mars.

Other comedies or operettas were (The Late

ToupineP ; (The Joys of Paternity > ; ‘The Pont-Biquet Family.) With Theodore de La-jarte he was joint author of a ‘Grammar of Music > and of a ‘ Little Encyclopaedia of Music. }

BISTINEAU, bis-te-no’, a lake in north¬

western Louisiana, dividing Bossier and Bien¬

ville parishes, about 30 miles in length from north to south and two in breadth. It receives the Dauchite River from the north, and com¬

municates with Red River by an outlet at its southern extremity. It is navigable for steam¬

boats.

BISTORT (Bistorta), perennial plants of

the buckwheat family; from their astringent

properties (they contain much tannin) some¬

times used medicinally. They are also called adder’s-wort and snake-weed, from being a

supposed remedy against snake-bites. Some

species occur in Europe and Asia, and several are found in North America, chiefly at high altitudes.

BISTRE, bls’ter, a reddish brown watercolor, generally obtained from the soot that collects in chimney-flues. This is pulverized and washed to remove the saline ingredients.

The finest sediment is then dissolved in vine¬

gar, to which gum-water is afterward added.

It was formerly much used for making painters'

crayons, and also for a paint in watercolor de¬

signs. Sepia, however, is now preferred to it, as it has a more agreeable color and is more easily employed.

BISULPHIDE. See Electro-chemical

Industries.

BITHRON, Hebrew "the gorge® : in bibli¬

cal history a ravine leading to the city of Mahanaim, which city was situated on the

borders of Gad and Manasseh.

BITHUR, be-thoor', India, town 12 miles

northwest of Cawnpore, on the right bank of the Ganges, in the United Provinces of Agra and Oudh. In the Indian mutiny it had some notoriety conferred on it from'bdng the resi¬

dence of Nana Sahib; also styled the Rajah of 24

Bithur. The town was long the abode of a

line of Mahratta chiefs, the last of whom died without issue in 1851. His adopted son, Nana Sahib, whose proper name, however, was Dhun-doo Punt, claimed the succession, but his title was ignored by the East India Company, a pro¬

ceeding which is believed to have stimulated him to his subsequent deeds of atrocity.

General Havelock gained a brilliant victory

over the rebels in the vicinity, and subsequently quantities of treasure belonging to the Nana were discovered by the troops in a well close to the palace. Bithur is devoted to the worship of Brahma, and contains numerous pagodas

and ghats. It is a favorite place of pilgrimage for ablution purposes. Pop. 4,386.

BITHYNIA, anciently a country in Asia

Minor, on the Black Sea, the Bosporus and the Sea of Marmora, and bounded on the south by Phrygia. In early times it was called Bebrycia, from the Bebrycians who inhabited it. Before the time of Croesus, Bithynia was an independ¬

ent state, under its own princes. After the death of Prusias I, in the war against Croesus, it fell into the power of the Lydians, 560 b.c. ; into that of the Persians, 555 b.c. ; and into that of Alexander, 334 b.c. The restorer of the Bithynian throne was Bias or Bas, a native prince, at the court of one of whose successors, Prusias II, Hannibal took refuge, and where he ended his life by poison, 183 b.c. Nicomedes, the last king of this race, bequeathed his king¬

dom to the Romans, 75 b.c. Pliny the Younger was governor of Bithynia under Trajan in 103—05 a.d. His letters to the Emperor are of in¬

terest in regard to the condition of the country and also because of the allusion to the Chris¬

tians. Diocletian resided habitually at Nicomedia. The famous cities of Nicomedia,

Nicsea and Heraclea, were in Bithynia, as also the famous Greek colonies of Chalcedon and

Pontica. In the 11th century Bithynia was

conquered by the Seljuks. In 1298 a new king¬

dom was founded there by the Ottoman Turks, of which, in 1327, Prusa was the capital. Con¬

sult Ramsay, historical Geography of Asia

Minor) (London 1890).

BITING-LICE. See Bird-lice.

BITLIS, bit-les', Armenia, town, capital

of the Bitlis vilayet and sanjak, on the

Bitlis Chai, a tributary of the Tigris, and on the road leading south to Persia from Mush, Erzerum and Lake Van. Situated 5,100 feet

above sea-level, the town, built on the hillsides along the river gorge and two tributary

streams, has a picturesque site dominated by a striking old castle in decay, the foundations of which are attributed to Alexander the Great.

Mosques, colleges, Armenian churches and

monastery, an American mission and school are prominent features, and in the busy bazars a considerable trade is carried on in local prod¬

uce, tobacco, manna, gums, fruits, coarse red cloth, wool and in cotton fabrics, arms, gold and silver articles. A point of strategic im¬

portance from ancient times, near here the

Persians defeated Suliman the Magnificent in 1554. During the great World War after the capture of Erzerum 16 Feb. 1916 the Russians, pushing steadily forward, occupied Mush 18

February, and Bitlis 2 March. Pop. about one-third Armenians, 36,000.

BITON, bl'ton, Greek mathematician, of

uncertain date, but supposed to have been a contemporary of Archimedes, wrote a work of some interest on warlike engines, and dedicated it to Attalus, King of Pergamos. It is to be found in the

(Mathematici Veteres) of Theve-not. (2) The son of Cyclippe mentioned in

the legend of Cleobis and Biton.

BITONTO, be-ton'to, Italy, city of Bari

province, 10 miles by rail west of Bari. Affine Romanesque cathedral, the Sylos-Labini palace, the mediaeval walls and a large orphan asylum are prominent features. Trade is chiefly in olive oil and Zagarello wine. Known only

from coins as ancient Butuntum, here in 1734

the Spaniards' defeat of the Austrians gave Naples to Don Carlos. Pop. 33,000.

BITTER, Arthur, pseudonym of Samuel

Haberstich, Swiss poet and story writer : b.

Ried, near Schlosswvl, 21 Oct. 1821 ; d. Bern, 20 Feb. 1872. Novelettes, stories and poems proceeded from his pen for many years, all characterized by sympathy of tone and inoffen¬

sive realism, (Tales, Romances and Poems)

(1865-66), being the most pleasing.

BITTER, Karl Hermann, Prussian states¬

man and writer : b. Schwedt, Brandenburg,

1813; d. 1885. He studied law and politics at the universities of Berlin and' Bonn. In 1856-60 he was plenipotentiary of Prussia on the Danube Commission. During the Franco-Prussian War he was prefect of the Vosges.

In 1879 he was appointed Minister of Finance and in this office he showed remarkable ability.

Through his efforts Hamburg joined the Zoll-verein or Customs Union, the railroads of Ger¬

many were brought under government control,

Prussia's finances were placed on a sound basis, a tax was placed on the Borse, and the indirect taxes were increased on tobacco, spirits and malt. Because of differences with Bismarck

he resigned in 1882. As a litterateur he con¬

fined himself almost exclusively to works on music. His principal work (Gesammelte

SchrifterP appeared in 1884.

BITTER, Karl Theodore Francis, Aus¬

tro-American sculptor: b. Vienna, Austria,

6 Dec. 1867; d. 10 April 1915. He studied at the Vienna Academy with August Kueh-ne and Edmund Heller. He came to

the United States in 1889 and soon acquired world-wide reputation. He won the competi¬

tion for the Astor Memorial bronze doors in Trinity Church, New York. He executed the

sculpture on the main buildings of the World's Columbian Exposition, and was appointed di¬

rector of sculpture at the Pan-American Ex¬

position at Buffalo, the Louisiana Purchase Ex¬

position at Saint Louis and the Panama-Pacific International Exposition, San Francisco 1915.

He executed much decorative sculpture for

many buildings in New York and other cities, notably the Chamber of Commerce and the

Metropolitan Museum, New York, and the

Pennsylvania Railroad station, Philadelphia.

He also executed a number of bronze and mar¬

ble statues of a high order, including the Villard Memorial, New York, the Hubbard

Memorial ((Thanatos)) , the equestrian statue of Gen. Franz Sigel, and the Carl Schurz

Memorial, all in New York; the bust of Dr.

Pepper in Philadelphia. He was awarded gold BITTER ALMONDS — BITTERN

medals at Buffalo 1901, Philadelphia 1902, Saint Louis 1914. He was elected to the National Academy in 1902, and was also a member of the National Academy of Arts and Letters.

BITTER ALMONDS. In medicine the

oil of bitter almonds, containing prussic acid, is used as a gastric sedative and as an antispasmodic. See Prussic Acid.

BITTER ASH, the quassia tree. See

Quassia.

BITTER-ROOT, Lewisia redivwa, a plant

of Canada and part of the United States, family P ortulacacece , so called from its root being bitter though edible, and indeed esteemed as an article of food by whites as well as Indians. From the root, which is long, fleshy and tapering, grow clusters of succulent green leaves, with a fleshy stalk bearing a solitary rose-colored flower ris¬

ing in the centre, and remaining open only in sunshine. Flower and leaves together, the

plant appears above ground for only about six weeks. It is the State flower of Montana.

California bitter-root (Mar ah fabacea) be¬

longs to the gourd family.

BITTER ROOT MOUNTAINS, a range

of the Rocky Mountains, in Montana, deriving its name from a plant with rose-colored blos¬

soms, whose slender roots are used by the

Indians for winter food. The chief summits are Lolo Peak and Saint Mary's Peak.

BITTER ROOT RIVER, a tributary of

the Columbia in Montana, flowing north into Clark's River in Missoula County; length about 110 miles. Gold has been found in this region.

BITTER ROOT VALLEY, a valley on

the east of the Bitter Root range, in Montana, 90 miles long and seven miles wide,.enwalled by lofty mountains, and abounding in farms and cornfields.

BITTER SPAR, rhomb-spar, the crystal¬

lized form of dolomite or magnesian limestone.

The name is derived from the magnesia con¬

tained in it, the taste of salts of magnesia being bitter.

BITTER-SWEET, MATRIMONY

VINE, or WOODY NIGHTSHADE, So-

lanum dulcamara, a sprawling vine of the

family Solanacecc , native of Europe and Asia, and introduced into the United States. It has purplish or blue flowers arranged in cymes

which are succeeded by attractive inedible

berries. The leaves have been used medici¬

nally in the form of an extract. The name, properly false bitter-sweet, is given also to Celastrus scandens, a handsome climber of the family Celastracece found from eastern Canada to South Dakota and southward. It often

grows 20 feet tall and is most attractive on account of its orange-yellow fruits which

split open and expose the crimson seeds. Both seeds* and”* fruits remain attached to the plants during the winter.

BITTER VETCH, a name applied to two

kinds of leguminous plants: (1) Ervum ervilia, a lentil cultivated for fodder; and (2) all the species of Orobus, for example, the common bit¬

ter vetch O. tuberosus, a perennial herbaceous plant with racemes of purple flowers and sweet edible tubers.

BITTERN, a bird of the heron family and

genus Botaurus, several species of which exist iri various parts of the world. The bitterns differ from the herons in their lesser size, shorter neck, comparative shortness of the legs, and superior length of toes, and in their noctur¬

nal habits and loud voices. Otherwise their haunts, food and manner of life closely re¬

semble those of herons (q.v.). The only North American species is the common bittern (B .

lentiginosus) , which is spread throughout the United States and southern Canada in all suit¬

able places, often close to towns. Its length is about 25 inches, and the plumage is tawny brown of various shades, excessively variegated everywhere ; the neck is striped with dull yellow and has on each side a dark patch. Both sexes, and the young, are alike in plumage. The Old World species (B . stellaris) is very similar, but has more red on the upper parts, and green about the head. It is found numerously from Ireland to Japan, in India and throughout

Africa. Other species or varieties spread the range of the genus to New Zealand and the South Sea Islands. The one great peculiarity of the bitterns, to which they owe their Latin and many local names, is their extraordinary vocal utterance in spring, which in the European species is likened to booming by everyone who has heard it, and has been called ((a loud and awful voice.® The old fable that this sound was produced in some mysterious way by the bird while it held its beak plunged into the mud is untrue ; and the flesh is no longer esteemed as a dainty, as it was some centuries ago. The voice of the American bittern is a droning, thumping noise, which has been likened to the driving of a stake with an axe, or, more often, to the working of an old-fashioned pump-handle. Hence the rural, names, ˆstake-driver,®

((mire-drum,® <(bog-pumper,® <(thun.der-pump,®

and the like. Nuttall attempted to suggest the sound of the syllables ((pump-au-gah® ; but Sam¬

uels succeeds better. He writes : ((In the mat¬

ing season, and during the first part of the period of incubation, the male has a peculiar love-note, that almost exactly resembles the stroke of a mallet on a stake ; something like the syllables (chunk-a-lunk-chunk, quank-chunk-a-lunk-chunkH I have often, when in the forests of northern Maine, been deceived by this note into believing that some woodman or settler was in -my neighborhood, and discovered my mistake only after toiling through swamp and morass for perhaps half a mile.®

A genus of smaller birds, Ardetta, is known as that of the ((least bitterns.® One species (A.

exilis) occurs over most of North America, and related species belong to South America. They are intermediate between the true bitterns and the night herons.

Consult Coues, (Birds of the Northwest >

(1874) ; and Newton, dictionary of. Birds*

(1896), and the other authorities therein cited.

BITTERN, or SALT OIL, the name

given to the syrupy residue from evaporated sea-water after the common salt has been taken out of it. The syrup contains salts of mag¬

nesium, which give it a bitter taste, and it is employed as a source of them. It is also one of the sources of bromine. Bittern procured from the salt works at Epsom, England, .was formerly the source of sulphate of magnesium, hence styled Epsom salts. See Salt.

BITTERNUT. See Hickory.

BITTERS, a popular name for a class of

compounds largely employed as appetizers and digestants. They are

for the most part alcoholic drinks to which some plant containing a bitter principle is added. The bitter principles are either alkaloids, as in the quinine of calisaya, or amaroids, which are widely distributed in plants.

The most commonly employed bitters are

quassia, gentian, angostura, cascarilla, wild cherry and cinchona. Medicinally bitters are classed as simple and aromatic, the latter con¬

taining volatile oils in addition to the bitter principles. The simple bitters mostly used are quassia, gentian and calumba. The aromatic

bitters are cascarilla, eupatorium (boneset), angostura, serpentaria and chamomile.

BITTERWOOD, various trees and shrubs

of the genus Xylopia of the family Annonciccce, noted for the bitterness of their wood which is used for furniture because of its resistance to insects. One Brazilian species (X . scricea) furnishes a peppery fruit and a cordage fibre.

The name bitterwood is also given to Simaruba excelsa belonging to the family Simarubacece.

This tree is a native of the West Indies and is used like quassia.

BITTINGER, Lucy Forney, American

historical writer : b. Cleveland, Ohio, 29 Aug.

1859; d. 1907. She has published (Memorials of Rev. J. B. Bittinger) (1891) ; (History of the Forney Family of Hanover, Pennsylvania)

(1893) ; and (The Germans in Colonial Times, >

(1901), a work of much value.

BITUMEN, a general term loosely used

to designate almost any asphaltic or tarry sub¬

stance, but properly restricted to those natu¬

rally occurring. The distinctive features of true bitumen are that it occurs in native form, and that it is soluble in benzol, and in carbon disul¬

phide. It is found in nature in gaseous form in natural gas ; in liquid form in petroleum and maltha; and in solid form in the mineral waxes (ozokerite, montan wax and hatchettite), in

asphaltum, and in the asphaltites (gilsonite, glance pitch, manjak and grahamite). The

pitch of the celebrated (<Pitch Lake® of Trini¬

dad contains about 40 per cent of true bitumen.

The production of solid bitumen in the United States in 1916 amounted to : gilsonite,, about 20,500 tons, valued at $500,000; grahamite, 8,431

tons, valued at $92,555 ; and ozokerite, 4 tons, valued at $3,800. The gilsonite was used chiefly in the manufacture of paints, varnishes, japans, insulations and rubber substitutes. Grahamite is used principally in the making of ready roof¬

ing, artificial rubber and varnish. Ozokerite is a constituent of polishes for shoes and leather goods, and is also used in candles and sealing wax. The United States imported 1,504 tons

of ozokerite in 1916 (see Asphalt). The

bitumens are probably all of vegetable origin, and while not confined to any particular geologi¬

cal formation, they occur most abundantly at or near the earth's, surface, often in connection with rocks containing organic remains.

BITUMEN PROCESS, the first known

method of fixing the image of the camera, so as to make it permanent. The blackening action of light upon salts of silver was known in the 18th century, but no method was found for

fixing the image obtained with salts of silver until about 1838. The bitumen process was

perfected in 1827 by a Frenchman, Nicephore de Niepce. He coated plates of metal with a solution of asphaltum in oil of lavender, and then, after drying them, he exposed them for a prodigious length of time in a camera. A very faint image was the result. The plate was subsequently immersed in a developer con¬

sisting of one part of oil of lavender and 10

parts of petroleum, which slowly dissolved the parts unaffected by light, leaving a permanent picture formed of those parts of the asphaltum that the light had rendered insoluble. Subse¬

quently Daguerre became associated with

Niepce, and together they improved the bitu¬

men process until Daguerre said that (<the time required to procure a photographic copy of a landscape is from seven to eight hours; but single monuments, v/hen strongly lighted by the sun, or which are themselves very bright, can be taken in about three hours.® See Camera ; Daguerre; Photography.

BITUMINOUS COAL, popularly called

<(soft coal,® in distinction from anthracite. It is denser and less woody than brown lignite.

In color it is a dull black, rarely lustrous, soils the fingers readily and burns with a yellow smoky flame. Bituminous coal is characterized by cleavage planes at right angles to each other, so that it breaks up readily into cubical blocks and fragments. The composition of a typical Pennsylvania bituminous coal shows : fixed car¬

bon, 55 per cent ; volatile matter, 38 per cent ; ash, 5 per cent ; moisture, 2 per cent. Sub-bituminous is a term applied to black lignite, a grade between brown lignite and bituminous coal, while semi-bituminous is a grade higher than bituminous and lower than semi-anthra¬

cite. The known coal areas of the United

States include 242,000 square miles of bitumi¬

nous coal deposits, and 97,000 square miles of semi-bituminous deposits. It is estimated that these areas contain 1,375,000,000,000 tons of bituminous coal and 47,700,000,000 tons of semi-bituminous coal. The largest areas worked are in Pennsylvania and West Virginia, in the

Appalachian field; and in Illinois in the Missis¬

sippi basin. The official preliminary estimate of the 1916 production of bituminous coal in the United States is 509,000,000 tons. Of this output the railroads commonly use about 125,-

000,000 tons, and the coke ovens, 65,000,000 tons.

Manufacturers and power plants consume 180,-

000,000 tons, and hotels, schools, etc., 100,000,-

000 tons. See Coal.

BITZIUS, Albert (pseud. Jeremias Gott—

helf), Swiss author: b. at Murten in Switzer¬

land, 4 Oct. 1797 ; d. in Liitzelfliih im Emmental in Switzerland, 22 Oct. 1854. He belonged to a family of pastors, and after studying theology in Bern and Gottingen and traveling in Ger¬

many, he became first vicar and in 1832 pastor in Liitzelfliih, which position he occupied until his death. He did not begin writing until late in life. His first work, (Der Bauernspiegel, oder die Lebensgeschichte des Jeremias GotthelP appeared in 1836. It sketches the de¬

velopment of a poor country orphan boy, but is not an autobiography. Henceforth Bitzius

was a prolific writer and in the last 18 years of his life became one of the important novel¬

ists not only of Switzerland but of the German language in general, He

artist, but was nevertheless wonderfully gifted bv nature. He saw things as they were, was susceptible to all impressions of life and re¬

produced them in true fashion — a genuine

realist, though not a naturalist. He knows the peasant folk of his native country with all their fads and foibles. He sketches his characters with epic simplicity and yet elevates them into the domain of the universal. His peasant world is a mirror of the world in general. His great¬

est work is (Uli der Knecht) (1841). It tells the story of a poor peasant laborer who de¬

velops into the owner of a prosperous farm. A plain theme, to which the epic imagination of Bitzius gives universal application. Vreneli, the chief woman character, charms us by the nobility and purity of her soul. Another novel almost on the same plane is (Uli der Pachter) (1849). Three other novels may be classed in importance with Uli ; (Anne Babi Jowager)

(1843-44) ; (Geld und Geist) (1842-46) ; and (Kathi, die Grossmutter) (1847). One of his short stories, (Elise die seltsame Magd* (1850) was particularly attractive to Gottfried Keller.

Other works of lesser importance are (Leiden und Freuden eines Schulmeisters) (1838) ;

(Funf Madchen) (1838) ; (Dursli, der Brannt-weinsaufer) (1839) ; (Die Kaserei in der

Vehfreude) (1850) ; (Zeitgeist und Berner—

geist) (1852). Bitzius is an interpreter of peasant psychology. In the writing of country and village stories he was a pioneer, and in his ideas on social betterment he pointed to the future. At times the preacher and reformer

obtrudes and endangers the artistic effect, but we must admire the

sincerity of his desire to ameliorate the condition of the poor. Consult Muret, Gabriel, (Jeremie GotthelP (Paris

1913) ; also Roedder, E. C., in Vol. VIII of (The German Classics* (New York 1914).

William F. Hauhart,

Assistant Professor of German, University of Michigan.

BIVALVES, those mollusks of the class

Pelecypoda, whose coverings consist of two

concave shell plates or valves.

Bivalves (for example, the clam), are en¬

tirely protected by the valves, which are con¬

nected by a hinge, consisting of a large tooth or teeth (usually three), and a ligament. In the clam both valves are alike, in the scallop the hinge margin is eared, and the shell is marked with radiating ridges, while in most bivalves there are simple lines of growth. On the in¬

terior, which is usually lined with mother-of-pearl, are either one (in oysters and scallops) or two (clams, etc.) roundish muscular im¬

pressions made by the single or the two ad¬

ductor muscles by which the valves are closed.

The shell is often covered by an epidermis.

The hinge is situated directly over the heart, and is therefore dorsal or ˆhaemal.® The shell is secreted by the thickened edge of the mantle or body-walls. There is in bivalves in distinc¬

tion from snails (Gastropoda) no head, and the mouth is not armed

with teeth or a lingual ribbon, present in snails. The mouth is small with soft lips, and in each side is a pair of labial palpi. The short oesophagus opens into a small stomach which receives the contents of the liver. The long intestine is coiled in the visceral mass, the solid disc-like portion of the body in the clam and oyster; the intestine also usually passes through the ventricle of the heart, and then ends opposite the upper division of the siphon. This heart is three-chambered, consisting of a ventricle and two auricles. The siphon forms, the so-called head of the clam, though it is situated at the posterior end of the body ; it forms a double tube, ending in an ex¬

current and incurrent orifice surrounded by a circle of tentacles which are sensitive to the touch. The siphon is very long in the clam (Mya) and other bivalves which burrow in the sand or mud and live in deep holes. Locomo¬

tion is effected by the so-called ˆfoot,® which is a wedge-shaped or hatchet-shaped fleshy

tongue-like mass situated at the front end under the mouth. Its hatchet-shape gives the name Pelecypoda to the class. This foot is enormous in the razor-fish, which burrows with extreme rapidity in the sand. In fixed bivalves, such as the oyster and mussel, the foot and siphon are reduced by atrophy or are entirely wanting.

There being no head, there are usually no eyes, except in the scallops, where they are numer¬

ous, large and situated on the thickened edge of the mantle. Bivalves breathe by one pair, more usually two pairs, of leaf-like gills, situ¬

ated on each side of the visceral mass. The individuals are usually bisexual, each being male or female. The nervous system consists of three pairs of ganglia, connected by a nerve-thread. The supracesophagal ganglion is the

so-called ˆbrain,® being situated over the

mouth ; the pedal ganglion is in the centre of the foot, while the visceral ganglion is near the middle of the body. Most bivalves possess an organ of the chemical sense and an organ of hearing and of equilibration, a very minute otocyst situated in the centre of the foot, and connected by a nerve with the pedal ganglion.

The ovaries are yellowish, voluminous glands forming the larger part of the visceral mass.

These mollusks are very prolific, the oyster lay¬

ing about 2,000,000 eggs.

In the oyster (Ostrca) or in Anomia the

shell is inequilateral, one valve, usually the left and lower one, being fixed to some object, and the intestine does not pass through the ven¬

tricle; in Area the ventricle is double. In Lucina and Corbis there is but one gill oil each side, and in Pecten, Spondylus and Trigonia the gills are reduced to comb-like processes.

Contrary to the habits of most bivalves, the scallop can swim and even skip out of the water by violently opening and shutting its shell. Trigonia is also capable of leaping a short distance, while Lima is an active swim¬

mer. The foot varies much in form ; in the mussel, Pinna Cyclocardia, and the pearl-oyster it is finger-shaped and grooved, with a gland for secreting a bundle of threads, the byssus, by means of which it is anchored to the bottom. The foot in the quohog Venus,

is large, these mollusks being very active in their movements. In Glycimcris the fringe is toothless, much as in the oyster. In Mactra the middle tooth of the hinge is large, the corresponding cavity large and triangular. In Saxicava and Panopcea, the pallial line is repre¬

sented by a row of dots. In Macoma the

siphons are very long.

Lithodomus, the date-shell, one of the mus¬

sels, bores into corals, oyster shells, *etc.* ; the common Saxicava excavates holes in mud and

tsoft limestone, as does Gastrochama, Pholas 28

and Petricola. Certain boring lamellibranchs, such as Pholas, are luminous.

A very aberrant form of bivalve mollusk is Clavagclla, in which the shell is oblong, with flat valves, the left cemented to the sides of a deep burrow. The tube is cylindrical, fringed above, and ending below in a disc, with a minute central fissure, and bordered with

branching tubules. In Aspergillum, the water¬

ing-pot shell, the small bivalve shell is cemented to the lower end of a long shelly tube, closed below by a perforated disc like the nose of a watering-pot.

Bivalves, in growing, usually pass through

a pre-swimming larval stage called a ((trochosphere,55 resembling a top, and moved by a circlet or zone of cilise. After a while two flaps (vela) arise on each side of the mouth, form¬

ing veliger stage ; meanwhile the shells arise, and as they become larger and heavier, the young bivalve sinks to the bottom, and begins to use its Moot55 for burrowing. Some bivalves, such as the fresh-water mussel Unio, go

through a parasitic stage in their development.

Some bivalves arrive at maturity in a single year. The fresh-water mussels live from 10 to 12 years, while the .giant clam (Tridacna gigas) probably lives from 60 years to a century.

The bivalves began to appear in the Cam¬

brian Period; they became more frequent in

the Ordovician and Silurian, but they did not abound until toward the Mesozoic Age, since the seas during the Paleozoic Age were

crowded with brachipods. Oysters date from

the beginning of the Mesozoic. The genus

Mucula and its allies are very primitive forms, and nearly allied to the earliest known bivalves.

Of about 15,000 known species of bivalves, two-thirds (10,000) are fossil.

The class Pclecypoda (or Lamellibranchiata)

is divided by the gill characters (consult Parker and Haswell's (Zoology5) into five orders,

namely: (1) Protobranchia, (2) Filibranchia,

(3) Pseudo-lamellibranchia, (4) Eulamelli—

branchia, (5) Septibranchia; and by Dali, from the hinge-characters, into three ordinal groups : Prionodesmacea, Anomalodesmacea and Teleo-desmacea. In Neumayr's group P alee o concha, now forming a part of the Prionodesmacea,

are included certain primitive types which ap¬

pear to have given origin to certain more

modern groups. For further information and

the literature of the subject see Mollusca.

BIXBY, James Thompson, American

author and clergyman: b. Barre, Mass., 30 July 1843. He was graduated at Harvard Univer¬

sity, A.B. 1864; A.M. 1867; S.T.B. 1870; Ph.D.

Leipzig, Germany, 1885. Served as pastor of Unitarian churches in Watertown, Mass., 1870-74; Belfast, Me., 1875-79; Meadville, Pa., 1879-83; and Yonkers, N. Y., 1887-1903; was pro¬

fessor of religious philosophy in Meadville

Theological School, 1879-83, and lecturer on the philosophy of religion at Lowell Institute,

Boston, 1876 and 1883. He is a member of the Authors' Club and Authors' League of America.

Author of (Religion and Science as Allies) (1895) ; (Ethics of Evolution5 (1900) ; (The New World and the New Thought5 (1902) •

'The Open Secret5 (1912) ; <What is Bahaism?>

(1912).

BIXBY, William Herbert, American mil¬

itary engineer: b. Charlestown, Mass., 27 Dec.

1849. A graduate of Massachusetts Institute of Technology and of the United States Military Academy, from 1873 he was assistant professor of engineering in the latter institution. In 1881

he was commissioned for special study in

France in the government school of bridges

and highways. In 1908-10 he was president of the Mississippi River Commission, and directed the salvage operations of the battleship Maine in Havana harbor 1910-11. In 1910 he at¬

tained the rank of brigadier-general, chief

of the engineer corps in the United States army, and after 40 years of service retired in 1913. He was the author of numerous gov¬

ernment reports, (A Graphical Computing

Table) (1879), and (A Discussion of River

and Harbor Improvements5 (1911).

BIZERTA, Tunis, city and important

French naval station on the Mediterranean, 60

miles by rail northwest of Tunis. The old Arab city, citadel and disused harbor are north of the modern fortified city and splendid harbor built, since the French occupation in 1881. A canal 2,600 feet long and 787 feet wide, lined with quays, extends from the centre of the outer port to a large commercial port opening on the his¬

toric Lake Bizerta the ancient Hipponitis Palus and Sisarce Palus with an area of 50 square miles and depths ranging from 30 to 40 feet.

On the lake at Sidi Abdallah are the naval port and arsenal, and Ferryville the military town.

The lake abounds in fish, notably mullet, which dried forms botargo, a standard article of

Mediterranean commerce, along with grain and olive oil. Bizerta dates from the Tyrian colony Diarrhytus or Hippo Zarytus. Fortifications

and a new harbor were built by Agathocles, 310-307 b.c. As a Roman colony it was cap¬

tured by Arabs in the 7th century and had a turbulent history during subsequent centuries.

Pop. 18,000.

BIZET, be'zet', (Alexandre Cesar

Leopold) Georges, French composer: b.

Bougival near Paris, 25 Oct. 1838; d. Paris, 3

June 1875. (Carmen, 5 his masterpiece, produced at the Opera Comique, 3 March 1875, three

months before his death, has achieved great popularity as a standard opera. His less known works are (Le Docteur Miracle, 5 an oper¬

etta which received equal honors with one

by Lecocq in a competition organized by Offen¬

bach (1857); <Les Pecheurs de Perle,5 opera (1863) ; (La Jolie Fille de Perth,5 opera (1867) ; (Djamileh,5 one-act opera, and incidental music to A. Daudet's drama (L'Arlesienne5 (1872) ; son of a vocal teacher and pupil at nine years of age in the Conservatoire of Paris, he dis¬

tinguished himself as pianist and organist, and in composition with his cantata (Cloris et

Clotilde5 won the Grand Prix de Rome in

1857. During the three years' study course in Italy he wrote part of a symphony, (La guzla de l'Emir,5 a comic opera, and (Don Procopio,5

an opera discovered among Auber's papers in 1895. Bizet married Miss Halevy, a daughter of his teacher in composition, 3 June 1865.

BJERREGAARD, byar're-gard, Carl

Henrik Andreas, Danish author: b. Fredericia, Denmark, 24 May 1845. He comes of Viking

stock and his family still owns the reputed Viking home. His immediate ancestors were

learned men. His father, was president of

Fredericia College where Carl was educated.

BIVALVES

BIVALVE MOLLUSCA

1-3 Cytheria dione 4, 5 Cardium aculeatum 6-9 Hemicardium cardissa 10-13 Tridacna squamosa 14 Hippopus maculatus

■

,

Later he was graduated from Copenhagen Uni¬

versity and from the Military Academy, and

served five years as lieutenant ; was scout in the Schleswig-Holstein War of 1863-64. He came

to America in 1873 for political reasons. Not knowing English, nor the manners and customs of the country and being unable to perform much hard manual labor, he suffered intensely, sinking so low as to work a whole winter under a negro as boss. Finally he made a place for himself, beginning as teacher and lecturer. In 1879 he entered the service of the Astor

Library and is now assistant librarian of the New York Public Library. His trend of

thought and contribution to American civili¬

zation lies in his teaching of the inner life, often called mysticism. He has advocated the introduction of the healthier side of Oriental literature and life, and has opposed strenuously all those false and often degrading forms of Orientalism so often preached of late. Be¬

sides many articles in magazines and encyclo¬

paedias he has written (Nature-Worship and

Kindred Subjects) ; (A Sufi Interpretation of Omar Khayyam and Fitzgerald) ; (The Inner

Life and the Tao-Teh-King1 (1912) ; (Jesus, Poet, Prophet, Mystic and Man of Freedomˆ

(1912); (The Great Mother: a Gospel of the Eternally Feminine) (1913); (Sufism: Omar

Khayyam and Fitzgerald) (1915). He is now

engaged in the compilation of (A Complete His¬

tory of Mysticism.)

BJ6RNEBORG, byer'ne-borg, Finland,

seaport town, the Finnish Pori, and district capital of the Abo Bjorneborg government,

Finland, at the mouth of the Kumo on the Gulf of Bothnia, 76 miles northwest of Abo. The roadstead cannot accommodate large ships

which stop at Rafso. A large export trade, mostly with England, is carried on in timber, pitch, tar, pine-oil, leather and bricks. Pop.

1 7,000. ˆ

BJORNSON, byorn'son, Bjornstjerne,

Norwegian novelist, poet and dramatist: b.

Kvikne, 8 Dec. 1832; d. 26 April 1910. He entered the University of Christiania in 1852, and he speedily became known as a contributor of articles and stories to newspapers and as a dramatic critic. From 1857 to 1859 he was

manager of the Bergen theatre, producing dur¬

ing that time his novel, (Arne; (1858), and his tragedy of (Halte Hulda.1 He was at

Christiania part editor of the Aftenblad in 1860, then lived several years abroad, and in 1866 became editor of the Norsk Folkeblad. In 1869-72 he was co-director of a Copenhagen

periodical, and much of his later life was passed abroad. The democratic tendencies to be found in his novels found a practical outcome in the active part taken by him in political questions bearing upon the Norwegian peasantry and

popular representation. He was for a long

period the leader of the Norwegian Republicans, and the national entity symbolized by the

change made in the Norwegian flag on 1 Jan.

1901 is more nearly due to him than to any one else. He was an advocate of Norwegian national rights as against Sweden and lent his aid to the movement which brought about the dissolu¬

tion of the union in 1905. He was the greatest distinctively Norwegian writer of his day, so intensely national that <(the mention of his name in a gathering of his countrymen is like running up the national flag.® He was the chief novel¬

ist, probably the chief poet, and, except possibly Ibsen, the chief dramatist of his country's history. In 1903 he was awarded the Nobel

prize in literature. In 1880-81 he traveled and lectured in the United States. His dramas

include (Sigurd Jorsalfar1 (1872); (Mary

Stuart in Scotland) (1864); (The Newly

Wedded Pair1 (1866) ; (Sigurd Slembe) (1872) ; (The Editor 1 (1874) ; (A Bankruptcy) (1875) ; (The King) (1877) ; <Leonarda) (1879) ; (The New System1 (1879); <A Glove) (1883); (Beyond Our Strength) (1883) ; (Geography and

Love1 (1885). ˆ His verse includes (Poems

andˆ Songs1 (1870) ; (Arnljot Gilline,1 an epic (1870). Besides the pastoral tales <Arne)

(1858); <A Happy Boy> (1860); (The Fisher

Maiden1 (1868) ; (Synnceve Solbakken,1 he has written the novels (The Bridal March)

(1873); <Magnhild) (1877) ; (Captain Man—

sana1 (1879) ; (The Heritage of the Kurts) (1884); (In God's Way1 (1889); (Absalom's

Hair,1 *etc.* (See Bankruptcy, A; Editor, The; Sigurd Slembe; Synnove Solbakken.) Consult

Boyesen, (Essays on Scandinavian Literature1

(1895) ; Gosse, (An Essay on the Writings of Bjornson1 (1895) ; Brandes, (Moderne Geister1

(1897) ; Bjorkman, (Voices of Tomorrow)

(New York 1913) ; Bjornsgaard, Cpredte

minder fra 50 til 70-aarenes Norge) (Risor

1911) ; Boeck, (Soldage faa Aulestad1 (Copen¬

hagen 1910) ; Collin, (Bj6rnstjerne Bjornson) (2 vols., Christiania 1903) ; Payne, (Bjornstjerne Bjornson) (Chicago 1910).

BJ5RNSTJERNA, byern'sher-na, Mag¬

nus Frederick Ferdinand, (Count), Swedish

statesman and author: b. Dresden, 10 Oct. 1779; d. Stockholm, 6 Oct. 1847. He was educated in Germany, and in 1793 proceeded to Sweden to enter the army. At the storming of Dessau he received a severe contusion from a cannon-ball, but he was able, notwithstanding, to be present at the battle of Leipzig. He afterward con¬

cluded the capitulation of Liibeck with General Lallemand, and received the surrender of the fortress of Maestricht. He concluded with

Prince Christian Frederick at Moss the conven¬

tion which was followed by the union of Nor¬

way and Sweden. He published (The British

Rule in the East Indies) and (Theogony, Phi¬

losophy and Cosmogony of the Hindus1 (1843), and also some political writings.

BLAAS, bias, Eugene von, Austrian

painter, son of Karl von Blaas : b. Albano, Italy, about 1843. He studied under his father and at the Academy of Venice and later in Rome. He settled in Venice and was ap¬

pointed professor at the academy there. His works include Conversion of the Rhsetians by Saint Valentine1 ; (Cimabue and Giotto1 ;

(Scene from the Decameron1 ; (Dogaressa Go¬

ing to Church1 ; (Venetian Balcony Scene1 ; (Bridal Procession in San Marco1 ; (Venetian Masquerade1 ; (Journey to Murano1 (Vienna

Museum).

BLAAS, Julius von, Austrian painter, son

of Karl von Blaas: b. Albano, Italy, 1845. He studied under his father and also at Rome, where he painted many scenes from the Campagna. He was afterward popular as a portrait painter at the Austrian court, and was made professor at the Academy of Vienna. His best 30

known works include (Race of Intoxicated

Slavonic Peasants } and (Antlassrittp both in the Imperial Museum,

Vienna; (Fox Hunt in

the Campagna) (1877) ; (Market in Upper

Hungary > (1885) ; (Horse Fair in Bischofs-hofen) (1888).

BLAAS, Karl von, Austrian painter : b.

Nanders, Tyrol, 1815; d. 1894. He studied at the Academy of Venice, and in 1837 he was awarded the Roman prize at the Vienna Acad¬

emy. At Rome he was influenced by Nazarenes and began to devote himself to religious sub¬

jects. In 1850 he was made a professor at the Academy of Vienna, removed as professor to

the Venice Academy in 1855, but returned to Vienna in 1866. His noteworthy paintings in¬

clude (Jacob's Journey Through the Desert,*

in the Museum of Vienna; (Visitation, } in the Innsbruck Museum: (Charlemagne Visiting a

Boys' School,* which was awarded a prize at the Paris Exposition of 1855, now in the Venice Museum; (Tullia Driving over her Father's

Body* (1832) ; 'Rape of Venetian Brides in the Sixth Century* (1888), now in the Innsbruck Museum; 33 frescoes in the Altlerchenfeld

Church, Vienna ; 42 frescoes in the Vienna Arse¬

nal ; portraits of Francis Joseph and the Queen of Spain; 'Ekkehard Carrying the Duchess of Suabia across the Threshold of the Monastery.*

Consult his (Autobiography (Vienna 1876).

BLACAS, bla-ka, Pierre Louis Jean Casimir (Due de), French statesman: b. Aulps,

12 Jan. 1771 ; d. Goritz, 17 Nov. 1839. He was captain of dragoons in 1790 and served in the Vendee. He was cabinet minister in the time of Louis XVIII, and a confidential adviser of the Bourbons; twice Minister to Naples; Am¬

bassador to Rome to negotiate the concordat of 1817 ; went into exile upon the banishment of Charles X, and offered the King his for¬

tune, which was not accepted. He was so

faithful to the Bourbons as to be unpopular with the people. He was a large collector of antiquities and founded the Egyptian Museum at Paris. Consult Vicomte de la Boulage, 'Notice historique sur M. le due de Blacas) (Paris 1840).

BLACK, Adam, Scottish publisher: b.

Edinburgh, 20 Feb. 1784; d. there, 24 Jan. 1874.

In 1808 he began business as a bookseller, and later with his nephew, Charles B. Black, estab¬

lished a publishing house in Edinburgh. Their most famous publications were ' Encyclopaedia Britannica,* and the 'Waverly Novels.* Adam

Black was twice lord-provost of Edinburgh

and in 1856-65 represented that city in Parlia¬

ment. He declined the honor of knighthood

and a statue was erected in Edinburgh in recog¬

nition of his public services in 1877. Consult Nicolson, 'Memoirs of Adam Black) (London

1885).

BLACK, Alexander, American author: b.

New York, 7 Feb. 1859. He was educated at the grammar schools of Brooklyn, and at the age of 15 was a reporter on the Brooklyn

Times, was stenographer in Brooklyn courts

1882-86, literary editor of the Brooklyn Times 1885-95, and Sunday editor of the New York World 1905-10. From 1910 to 1913 he was

managing editor of Frank Seaman, Inc., and

since 1913 editor of Newspaper Feature Serv¬

ice. He invented (<picture plays® in 1893, and brought out first (<plays on a white sheet® in 1894. He has published 'The Story of Ohio) (1888) ; 'Photography Indoors and Out*

(1894); (Miss Jerry* (1895); (A Capital

Courtship* (1897); (Miss America) (1898);

'Modern Daughters* (1899); 'The Girl and

the Guardsman) (1900) ; (Richard Gordon)

(1902) ; 'Thorney' (1913). He edited Os¬

trander's (History of the City of Brooklyn

and Kings County.*

BLACK, Charles Clarke, American law¬

yer: b. Mount Holly, N. J., 29 July 1858. He was graduated at Princeton in 1878, studied law and was admitted to the New Jersey bar in 1881. He has since practised in Jersey City, was Democratic candidate for governor of

New Jersey in 1904, and judge of the Circuit Court of New Jersey 1908-14, and since 1914

judge of the Supreme Court of New Jersey.

He has published 'Proof and Pleadings in

Accident Cases) (1886); (New Jersey Law of

Taxation * (1893) ; (Law and Practice in Acci¬

dent Cases * (1900).

BLACK, Frank Swett, American lawyer

and politician : b. Limington, Me., 8 March 1853 ; d. 1913. He was graduated at Dart¬

mouth College in 1875 ; was editor of the Jour¬

nal in Johnstown, N. Y. ; studied law at Troy in the office of Robertson & Foster, and was admitted to the bar in 1879. He won much

popularity by his activity in prosecuting the men who murdered Robert Ross in the election riots in Troy in 1892. He continued in the practice of law at Troy until 1898 and after¬

ward practised in New York. In 1895-97, he was a member of Congress, and in 1897-99

governor of New York. He was a successful

party leader, holding all the elements of the Republicans together by his resourcefulness.

After his term as governor he resumed the

practice of law. He was also eminent as a po¬

litical speaker and at the Republican National Convention at Chicago in 1904 he placed in nomination the name of Theodore Roosevelt.

BLACK, James, American prohibitionist :

b. Lewisburg, Pa., 23 Sept. 1823; d. 16 Dec.

1893. He was educated at the Lewisburg Acad¬

emy, was. admitted to the bar in 1&46 and practised in Lancaster. He joined a temper¬

ance society at the age of 17, and throughout his life was a determined advocate of prohibi¬

tion and legislation for its enforcement. He was the first to propose the formation of a temperance party, was one of the committee

that called a national convention to organize the Prohibition party (q.v.) and was elected its president when the convention met in Chicago, 1 Sept. 1869. At the Columbus, Ohio, conven¬

tion, 22 Feb. 1872, he was made the first nom¬

inee of the party for President of the United States. His ticket received 5,608 votes in the election of that year. He published (Is There a Necessity for a Prohibition Party?) (1876); ‘History of the Prohibition Party* (1880) ; ‘The Prohibition Party) (1885).

BLACK, Jeremiah Sullivan, American

jurist and statesman: b. Glades, Somerset

County, Pa., 10 Jan. 1810; d. York, Pa., 19 Aug.

1883. At 17 years of age he entered the law office of Chauncey Forward, in Somerset, an eminent member of the bar, and was admitted to the courts in 1830, being still in his minority.

In April 1842 he was appointed by the governor president judge of the judicial district in which he resided, and confirmed by the senate upon a strict party vote. In 1851, when a change in the State Constitution made the judges elective, he was nominated as judge of the Supreme Court by the Democratic convention, before which he was not a candidate. Of the 10 candidates

named by the two parties, he obtained the

largest popular vote. Under the mode of draw¬

ing provided by the Constitution, a three years'

term was assigned to him, and he became chief justice of the court. In 1854 he was reelected to this place, by a majority of 47,000 votes, though the candidate for governor on the same ticket was defeated by 37,000. On 5 March

1857, while engaged in the discharge of his judicial duties at Philadelphia, he received a telegraphic dispatch from President Buchanan, tendering him the appointment of Attorney-General of the United States. He soon after appeared on behalf of the government, in a disputed land claim of California, involving an important principle upon which hundreds of similar cases depended. He achieved a great success, at once becoming famous as a jurist.

In December 1860 Mr. Black succeeded Mr.

Cass as Secretary of State. After the election of Lincoln, Judge Black retired to his law prac¬

tice. In 1868 he was counsel for President Johnson in the famous impeachment trial. In 1877 he appeared as counsel for S. J. Tilden before the Electoral Commission. Besides a

great jurist, Judge Black was a brilliant con¬

versationalist, classical scholar and powerful orator. Consult Black, C. F., (Essays and

Speeches of Jeremiah S. Black, with a Bio¬

graphical Sketch* (New York 1885).

BLACK, John, Scottish journalist: b. near

Duns, Berwickshire, 1783; d. 1855. Educated

at the parish school, he later obtained a clerk¬

ship with an accountant in Edinburgh and at¬

tended the university; went to London and

became (1810) reporter on the Morning Chron¬

icle, of which he was editor from 1817-43. He was on terms of intimacy with James Mill, who said of him that (<he was the first journalist who carried criticism and the spirit of reform into the details of English institutions® ; and was a useful ally and a congenial companion to Lord Melbourne. He had an eye for budding talent, which he liked to encourage, and it was under him that Charles Dickens began his

career as a reporter for the Chronicle.

BLACK, John Charles, American lawyer,

soldier and statesman : b. Lexington, Miss., 27

Tan. 1839; d. 17 Aug. 1915. He entered the Union army in 1861 as colonel of the 37th Illi¬

nois Volunteers ; was severely wounded ; and was brevetted brigadier-general. After the war he was elected Congressman-at-large from Illinois; was appointed commissioner of pensions by

President Cleveland during the latter's first term, and United States attorney for the north¬

ern district of Illinois during his second term.

BLACK, Joseph, Scottish chemist: b. Bor¬

deaux. France, 1728; d. Edinburgh, 6 Dec. 1799.

He studied medicine, and in 1754 delivered a thesis, (De Humore Acido a Cibis Orto, et Mag¬

nesia Alba,* in which he ascribes the difference between the mild and caustic alkalies to the presence of fixed air (carbonic acid) in the former. The discovery of carbonic acid is of interest not only as having preceded the other gases made by Priestley, Cavendish and others, but as having preceded in its method the ex¬

planation given by Lavoisier of the part played by oxygen in combustion. In 1756 he was ap¬

pointed professor of medicine and chemistry

in the University of Glasgow; and in 1766 to the same chair in Edinburgh. No teacher in¬

spired his disciples with a greater zeal for study; his lectures therefore contributed much to make the taste for chemical science general in England. Upon Lavoisier's proposal, the

Academy of Sciences in Paris appointed him

one of its eight foreign members. Black did not adopt the Lavoisierian system until he was satisfied that it was more accurate than that of which he had been so long a teacher. In his later courses, however, he taught the anti¬

phlogistic system. His (Lectures on Chemis¬

try* appeared in 1803.

BLACK, William, Scottish novelist: b.

Glasgow, 9 Nov. 1841 ; d. Brighton, England, 10 Dec. 1898. He first studied art, but event¬

ually became connected with the Glasgow press.

In 1864 he went to London, and in the follow¬

ing year joined the staff of the Morning Star, for which he was special correspondent during the Austro-Prussian War of 1866. His first

novel, (James Merle) (1864), was not a suc¬

cess, but his (In Silk Attire) (1869), (Kilmeny) (1870), (The Monarch of Mincing Lane,* and

especially (A Daughter of Heth* (1871), gained him an increasingly wide circle of readers. For four or five years he was assistant editor of the Daily News, but in 1874 his connection with journalism practically ceased. His other works include (The Strange Adventures of a

Phaeton* (1872), containing descriptions of

scenery much praised by Ruskin ; (A Princess of Thule) (1873) ;

(Madcap Violet* (1876) ; (Green Pastures and Piccadilly * (1877) ;

(Macleod of Dare) (1878) ; (White Wings)

(1880); (The Beautiful Wretch* (1881);

(Judith Shakespeare) (1884) ; (White Heather*

(1885) ; (The Strange Adventures of a HouseBoat* (1888); (In Far Lochaber* (1889);

(The New Prince Fortunatus) (1890) ; high¬

land Cousins) (1894) ; (Briseis) (1896) ; and (Wild Eelin) (1898). Black's novels have en¬

joyed much popularity, especially in the United States. His subjects are drawn from many

lands, but it is in dealing with the scenery of the Scottish Highlands that he is at his best.

He is especially happy in his portrayal of types of sprightly and unconventional womanhood.

A collected edition of his works was issued 1872-74. See Wemyss Reid, (William Black,

Novelist* (New York 1902).

BLACK, William Murray, American mil¬

itary engineer : b. Lancaster, Pa., 8 Dec. 1855.

A graduate of Franklin and Marshall College and of West Point, he was engaged principally in government river and harbor work, taught at West Point, and in 1898 had advanced to the grade of lieutenant-colonel and chief engineer of the United States Volunteers. After army service at Havana, in the Philippines and at the Panama Canal, he was appointed chief en¬

gineer of the Eastern Division of the United States in 1909, and when Brigadier-General

William H. Bixby (q.v.) retired in 1913 suc¬

ceeded as chief of the Engineer Corps.

BLACK ACTS. Acts of the Scottish

Parliaments from 1424 to 1594, so called from their being printed in black-letter. The term ((B!ack Act® is also applied to an act of George I with reference to the ˆBlacks,® a body of

armed deerstealers and poachers, who infested Epping Forest. The act was made permanent

in 1758, but was repealed in 1827 by George IV.

BLACK ART, the art or pretended art or

practice of producing wonderful effects by the aid of superhuman beings or of departed spirits or the occult powers of nature, called black because proficients in it were supposed to be in league with the powers of darkness. A large proportion of magical rites are connected with the religious beliefs of those using them, their efficacy being ascribed to supernatural beings.

There is, however, a non-spiritual element in magic which depends on certain imagined

powers and correspondences in nature, that can be utilized in various ways. In savage coun¬

tries the native magician is often sorcerer and priest, and sometimes chief of the tribe. Among the ancient Egyptians magic was worked into an elaborate system and ritual, and it was regu¬

larly practised among the Babylonians and As¬

syrians, as well as in Greece and Rome. Alex¬

andria, from the 2d to the 4th century, became the headquarters of theurgic magic, in which invocations, sacrifices, diagrams, talismans, etc., were systematically employed. This system,

influenced by Jewish magical speculation, had a strong hold in mediaeval Europe, and many distinguished names are found among its stu¬

dents and professors. The magic which still holds a place among the illiterate and ignorant classes has come down by tradition in popular folklore. The name ((natural magic® has been given to the art of applying natural causes to produce surprising effects. It includes the art of performing tricks and exhibiting illusions by means of apparatus, the performances of autom¬

aton figures, *etc.* See Alchemy ; Astrology ; Charm; Divination; Legerdemain; Witch¬

craft.

BLACK ASH, a mixture of 25 per cent of

caustic soda with calcium sulphide, quicklime and unburnt coal, obtained in the process of making sodium carbonate. The mixture of so¬

dium sulphate, chalk and powdered coal is fused in a furnace, gases escape and the residue is the black ash, which is lixiviated with warm water, and the solution, evaporated to dryness, yields soda ash, an impure sodium carbonate. See

Sodium.

BLACK ASSIZE, a judicial sitting of the

courts held at Oxford in 1577, and rendered historical by the pestilential and deadly fever which was introduced into the court from the jail, and swept away judges, jurymen and coun¬

sel and extended itself into the town and neigh¬

borhood. The superstitions of the age invested it with a special character, and it was remarked that no women nor poor people died of it. Con¬

sult Holinshed, (Chronicles) (London 1577 and 1807-08) ; Stow, ˆnnalesˆ (London 1580,

1631) ; Wood, (Athena? Oxonienses) (London

1691-92, Oxford 1848).

BLACK BASS, Duck, *etc.* See Bass;

Duck.

BLACK BEAUTY, His Grooms and

Companions, a story by Anna Sewall. It is

written in the form of a horse autobiography, and is really a tract on the proper treatment of horses. The story is told with simplicity and restraint, and its vogue has been great and its influence very wide.

BLACK BEAVER, Delaware Indian

leader, trader, guide and scout : b. near Belle¬

ville, Ill., in 1806; d. near Andarko, Okla., 8

May 1880. In his young manhood he spent

several years in the Rocky Mountain fur trade as a hunter and trapper. He was present as an interpreter at the council held with the Com¬

anche, Kiowa and Wichita tribes in the Red River country by Col. Henry Dodge, in 1834, and, from that time on, until the end of his life his services were in frequent demand by the government in dealing with the Indians of the Southern Plains. During the Mexican War he

raised a company of Indian scouts and guides which served with General Harney's command,

and he was ever afterward known as Captain Black Beaver. He served as guide with the

military escort commanded by Capt. R. B.

Marcy, which accompanied the large party of emigrants and gold seekers from Fort Smith, Arkansas, to Albuquerque, N. M., en route to California in 1849. His name occurs frequently in the official reports of army officers, Indian service authorities, government surveyors and explorers. Although he belonged to the small band of Delawares which dwelt in the Red

River region and far removed from the main body of the tribe, he held more or less frequent communication with the latter and appeared as one of its representatives in negotiations with the government. In 1861 he was chosen to

guide the retreating Federal garrisons of Forts Smith, Washita, Arbuckle and Cobb on their

march through the wilderness to Fort Leaven¬

worth. Between 1865 and 1875 he was several times called upon to serve as a mediator and pacemaker on behalf of the government in its dealings with the turbulent Comanche and

Kiowa leaders, by whom he was always re¬

garded with confidence and respect. He

claimed to have been the last custodian of a parchment copy of the treaty which had been given to the people of his tribe by William Penn at the Shakamaxon council, in 1682, and which he said was destroyed when his home on the Washita was burned by Confederate forces in 1861. In 1874-75 Black Beaver dictated the story of his life to Maj. Israel G. Vore, who wrote it down. This manuscript was acci¬

dentally destroyed in 1906. Consult hand¬

book of American Indians, } writings of Ran¬

dolph B. Marcy; Battey's (A Quaker Among

the Indians.* *etc.*

BLACK BEETLE, the English name for

a cockroach, especially the Oriental cockroach (q.v.) ; also less commonly for the dark-col¬

ored beetles of the bad-smelling genus Blaps.

BLACK-BELLIED PLOVER, or

BLACKBREAST. See Plover.

BLACK BELT, an agricultural region of

Alabama, 70 miles wide extending entirely

across the State, between 33° and 31° 40'; so called from the fact that the negroes greatly predominate in numbers, raising vast quantities of cotton from the richest of lands. It includes 17 counties, with over 500,000 inhabitants.

BLACK-CAP, the name of various birds

having the crown of their head black. In the United States it is given most often to the common titmouse, the chickadee (q.v.) ; and to a small fly-catching warbler, Sylvania pusilla, an olive and yellow bird with the top of the head crested with black. In England the com¬

mon ˆbrack-cap® (Curruca atricapilla) is a small warbler, closely related to the nightingale, and one of the sweetest of European song¬

birds and frequently kept in cages.

BLACK CAT, an American fur-bearing

animal. See Marten.

BLACK COCKADE, a badge first worn

by the American soldiers during the Revolu¬

tion, and later, during the hostility toward France occasioned by the X. Y. Z. Correspond¬

ence (q.v.), adopted by the Federalists as a patriotic emblem and as a rejoinder to the tri¬

colored cockade worn by the Republicans as a mark of affection toward France.

BLACK COHOSH. See Cimicifuga.

BLACK COUNTRY, name applied in

England to the district between Birmingham

and Wolverhampton, full of coal pits and fur¬

naces.

BLACK DEATH, The, one of the most

memorable of the epidemics of the Middle

Ages, was a great pestilence in the 14th cen¬

tury, which devastated Asia, Europe and Africa.

It was an Oriental plague, marked by inflamma¬

tory boils and tumors of the glands, such as break out in no other febrile disease. On ac¬

count of these boils, and from the black spots (indicative of putrid decomposition) which ap¬

peared upon the skin, it has been generally called the Black Death. The symptoms were

many, though all v/ere not found in every case.

Tumors and abscesses were found on the arms and thighs of those affected, and smaller boils on all parts of the body ; black spots broke out on all parts of the skin, either single, united or confluent. Symptoms of cephalic affection were frequent; many patients became stupefied and fell into a deep sleep, losing also their speech from palsy of the tongue; others remained

sleepless, without rest. The fauces and tongue were black, and as if suffused with blood. No beverage would assuage the burning thirst.

The plague spread very rapidly as it was com¬

municated from the sick to the healthy; con¬

tact with the clothes or other articles which had been used by the infected -induced disease, and even the breath of the sick, who expecto¬

rated blood, caused contagion far and near. As it advanced, not only men but animals fell sick and expired. In England the plague first broke out in the county of Dorset, whence it ad¬

vanced through the counties of Devon and

Somerset to Bristol, and thence reached Glou¬

cester, Oxford and London. Probably few

places escaped, perhaps not any, for the annals of contemporaries report that throughout the land only a tenth part of the inhabitants re¬

mained alive. From England the contagion was carried by a ship to Norway, where the plague broke out in its most frightful form, and

throughout the whole country spared not one-third of the population.

The sailors found

no refuge on their ships, and vessels whose crews had perished to the last man were

often seen drifting on shore. The whole period VOL, 4 — • 3

of time during which the Black Death raged with destructive violence in Europe was (with the exception of Russia, where it did not break out until 1351) from 1347 to 1350; from this latter date to 1383 there were various pesti¬

lences, bad enough, indeed, but not as violent as the Black Death. Ireland was much less

heavily visited than England, and the disease seems scarcely to have reached the mountain¬

ous regions of that land; and Scotland, too, would perhaps have remained free from it

had not the Scotch availed themselves of the discomfiture of the English to make an irrup¬

tion into England, which terminated in the de¬

struction of their army by the plague and the sword and the extension of the pestilence,

through those who escaped, over the whole

country. It may be assumed that Europe lost by the Black Death some 25,000,000 of people, or about one-fourth of her entire population.

That her nations could recover so quickly from this terrible loss without retrograding more than they did is a most convincing proof of the indestructibility of human society as a whole. In Hungary, and afterward in Ger¬

many, rose the brotherhood of the Flagellants, who undertook to expiate the sins of the people and avert the pestilence by self-imposed suffer¬

ings. While the wanderings of the Flagellants threw society into confusion and helped to

spread the plague, the horrors of the time were further heightened by the fearful persecutions to which the Jews were subjected, from a pop¬

ular belief that the pestilence was owing to their poisoning the public wells. The people rose to exterminate the Hebrew race, of whom, in Mayence alone, 12,000 were cruelly murdered.

They were killed by fire and by torture wher¬

ever they could be found, and for them to the terrors of the plague were added those of a populace everywhere infuriated against them.

In some places the Jewish people immolated

themselves in masses; in others, not a soul of them survived the assaults of their enemies.

No adequate notion can be conveyed of these horrors. To aggravate the pestilence, the

poison-panic made the people shut up their

wells. With terror of poison and of plague in a state of society rude at the best, but now disorganized, whatever means were available to mitigate or prevent the sufferings of the people were rendered altogether nugatory.

BLACK DUCK. See Dusky Duck.

BLACK EARTH, a deposit in South Rus¬

sia, extending over the steppes that border on the Black Sea and the depressed area to the north of the Caspian, with a breadth from

north to south of from 200 or 300 to nearly 700

miles. It varies in color from dark brown to black, and in thickness from a foot or two up to six or seven yards, occasionally reaching, it is said, even to 60 feet. It is composed chiefly of siliceous sand (about 70 per cent), alumina and other ingredients (23 per cent), and or¬

ganic matter (about 7 per cent). It appears to be unfossiliferous. It

bears the same relation to the glacial accumulations of Russia that the loess of the Rhine, the Danube, etc., does to those of central Europe, _ and is probably the fine-grained silt derived from the torrents and flooded rivers that escaped from the melting snows and glaciers of the glacial period. Ac¬

cording to some geologists, however, it may 34

owe its origin to the action of the wind. It is supposed by them to be simply an accumulation of wind-blown dust — the finely sifted material being fixed by the abundant grasses of those steppe regions.

BLACK-EYED SUSAN, the name of a

once popular comedy by Douglas Jerrold. It

appeared in 1829 and was founded on Gay's

ballad (Sweet William's Farewell to Black—

Eyed Susan.)

BLACK FISH, a species of the genus

Dallia (q.v.), D. pectoralis, which abounds in Sphagnum ponds, feeding on plants and worms, and forming the chief food of the natives of some parts of northern Alaska, where, with the exception of the Salmonids, it is the only fresh¬

water fish. Turner, its discoverer, says its vitality is extraordinary; that blackfishes will remain frozen in baskets for weeks, and when thawed are as lively as ever.

BLACK FLAGS, an organization of Chi¬

nese rebels who established themselves in the Red River Valley in Tonquin, after the suppres¬

sion of the Taiping Rebellion in southern

China (1850-54). From their warlike character and desperate deeds they were called Black

Flags as distinguished from the peaceable

Yellow Flags. They assisted the Tonquinese

and Chinese in opposing the French wars

(1873, 1882 and 1885), with signal results. Their principal object was plunder. They were re¬

sponsible for the appalling massacre, in 1884, of French missionaries and native Christians, to the number of 10,000. The chief of the organization, Luh Vinh Phuoc, was rewarded

for his services by the Chinese government.

The black flag was formerly the emblem of

piracy, bearing a skull and cross-bones. Tamer¬

lane displayed a black flag when a besieged city refused to surrender, to signify that no mercy would be shown, and that the place

would be utterly destroyed. In Great Britain it is customary to hoist a black flag over a prison immediately after an execution within its walls.

BLACK FLY, a gnat of the species of

the genus Simuliurn, the common black fly of northern New England, Canada and Labrador

probably being S. molestum. In this tormentor of travelers and fishermen the body is short and thick, the labrum is free, sharp as a dagger, and the proboscis is well developed and draws blood profusely. It is black, with a broad sil¬

very ring on the legs. The species are numerous.

The cylindrical larva is furnished with short antennae, and near the mouth are two flabelli-form appendages. The pupa has eight very long lateral filaments on the front of the thorax, and the posterior end of the body is enclosed in a semi-oval membranous cocoon, open in front,

and posteriorly attached to some submerged

plant such as eel-grass. The fly leaves the pupa l3eneath the water. She deposits her eggs on the rocks in a compact layer a few inches above the surface of the water. The eggs of the Hungarian or (<Columbacz midgeˆ are enveloped in a yellowish-white slime and deposited at the end of May or early in June upon stones or grass over which water flows, or in the brooks of the more elevated regions. The num¬

ber laid is variously estimated at from 500 to 5,000. The food of the larva of the buffalo-gnat has been proved to be carnivorous, and it is supposed that the larvae of all the species live on animal matter, though possibly in some cases on dead leaves. On hatching the larvae become attached to plants, . etc., or to each other, by a silken thread, forming long floating strings. When the fly issues from the sub¬

merged pupa-case she rises to the surface, then being protected by a fine silky covering of hairs. The adult fly in central New York issues about the first of April, and those apparently of a new brood the first of June; after this there is a succession of generations throughout the season ; the development of a single brood occupying about two months. The larva hiber¬

nates.

While the black fly of Maine, and presumabl}ˆ of Labrador, is of the species S. molestum, that of the Saint Lawrence Valley has been named N. invenustum, and is said to be differ¬

ent from that of Lake Superior. A remarkably large species is known as S. pictipes; its larvae and pupae were found in the rapids of the Au • Sable River, and also similar ones on the north shore of Lake Superior.

The black fly is mostly active in the bright sunlight, generally disappearing on cloudy days, but it is known to crawl under one's clothes and to bite in the night. The bite is often severe, the creature leaving a large clot of blood behind it. The best preventive is oil of tar, and the use of various ointments. Consult Bulletin No. 10, Division of Entomology, United States Department of Agriculture (Washington

1898).

BLACK FOREST (German, Schwarz—

wald) , a chain of mountains in the com¬

ponent states of Baden and Wurttemberg,

It is 1,844 square miles in extent, runs almost parallel with the Rhine from south to north, often only from 15 to 20 miles distant; is about 85 miles long, and from east to west in the southern part about 30 miles wide ; in the northern about 18. The Danube, as well as

many other rivers, rises in these mountains.

Those on the west side run into the Rhine ; those on the east side into the Danube. The Black Forest is rather a chain of elevated plains than of isolated peaks. The highest summit, the Feldberg, measures 4,900 English feet. Ex¬

cept from June to September, these mountains are generally covered with snow, and even dur¬

ing this period are not entirely free from it.

Among the many valleys of this chain, the

Murgthal is particularly celebrated for its

beautiful scenery. The whole chain consists of primitive mountains : its skeleton throughout is granite ; its higher points are covered with sandstone and other layers of less consequence.

On the western side, at the foot, appears gneiss.

Porphyry and clay-slate are found on several heights, as likewise

silver, lead, copper, iron, cobalt and other minerals. The forests are

extensive, and consist mostly of pines and simi¬

lar species. The raising of cattle is the prin¬

cipal branch of husbandry carried on in this district. The soil is not fertile, and the in¬

habitants scattered over the mountains live very frugally, and are very industrious. The vast quantity of timber growing here has long been a considerable source of revenue. The timber of the Black Forest was always highly prized by the Dutch, and the export to Holland is

still largely carried on, the trees being conveyed down the Rhine in the form of rafts. Many sawmills are kept at work cutting up the tim¬

ber; and the forests also give employment to charcoal-burners, potash-boilers, *etc.* The man¬

ufacture of the well-known wooden clocks, toys, etc., is another important branch of industry, in which many persons are employed. Watches are also made, as well as orchestrions and other musical instruments. Neustadt, Freiberg, Horn-berg and Furtwangen are central points of the manufacture of wooden wares, the commerce in which embraces all Europe, and extends to

America and Australia. The Black Forest has long been in favor as a tourist resort and tramping ground, and it is famous as the scene of many legends and folk tales.

BLACK FRIARS, friars of the Domin¬

ican order: so called from the color of their habit. See Dominicans;

Religious Orders.

BLACK FRIDAY, the name given in the

United States to two days that ushered in finan¬

cial panics. First, Friday, 24 Sept. 1869, when the attempt of Jay Gould and James Fisk, Jr., to create a corner in the gold market by buying all the gold in the banks of New York city, amounting to $15,000,000, culminated. For sev¬

eral days the value of gold had risen steadily, and the speculators aimed to carry it from 144

to 200. Friday, the whole city was in a ferment, the banks were rapidly selling, gold was at 16214, and still rising. Men became insane, and everywhere the wildest excitement raged, for it seemed probable that the business houses must be closed, from ignorance of the prices to be charged for their goods. But in the midst of the panic it was reported that Secretary Bout-well of the United States Treasury had thrown $4,000,000 on the market, and at once gold fell, the excitement ceased, leaving Gould and Fisk the winners of $11,000,000. The second was

19 Sept. 1873, when numerous failures on the New York Stock Exchange precipitated the

panic of 1873.

The term was first used in England, being

applied in the first instance to the Friday on which the news reached London, 6 Dec. 1745, that the young pretender, Charles Edward, had arrived at Derby, creating a terrible panic ; and finally to 11 May 1866, when the failure of Overend, Gurney & Company, London, the day

before, was followed by a widespread financial ruin. Good Friday is also known as Black

Friday in some countries, because of the use of black vestments and draperies in the churches.

Consult The Yale Review (Vol. Ill, New

Haven 1896) ; Andrews, {The United States in Our Own Time* (New York 1903) ; and

Julgar's (Short History of Panics) (New York 1893).

BLACK GUM. SOUR GUM, or PEP—

PERI DGE. See Tupelo.

BLACK HAWK, chief of the Sac In¬

dians: b. Kaskaskia, Ill., 1767; d. near Fort Des Moines, 3 Oct. 1838. He was made chief of the Sacs in 1788; and in 1804 repudiated the first agreement made by the Sacs and the Foxes with the United States to give up their lands east of the Mississippi. The possession of the territory was disputed for a number of years; in 1823 the majority of the two tribes moved across the river, and a treaty with the United States, ceding the disputed territory, was signed in 1830. Black Hawk, however, objected to the whites occupying the vacated territory, and in June 1831 he began the Black Hawk War by

crossing the Mississippi with a small fofee and attacked some Illinois villages. Driven off by the militia under General Gaines, he returned in the spring of 1832 with a larger force and began to massacre the white settlers. The Indians were however defeated by United States trooos in two battles near the Wisconsin River, 21 July 1832, and near the Bad-Axe River, 1-2 Aug.

1832. The war was brought to an end by the surrender of Black Hawk in the latter part of August. He was kept a prisoner till 1833, then rejoined his tribe on their reservation, near Fort Des Moines. Consult Drake, Wife of Black

Hawk* ; Patterson, Wife of Black Hawk*

(Boston 1834) ; Snelling, Wife of Black Hawk* ; Thwaites, (Story of the Black Hawk War*

(Wisconsin Historical Society (Papers, * Vol.

XII) ; Stevens, F. E., (The Black Hawk War*

(Chicago 1903) ; Wakefield, (History of the Black Hawk War* (edited by F. E. Stevens

for the Caxton Club, Chicago 1908).

BLACK HAWK WAR. See Black

Hawk.

BLACK HILLS. A small group of moun¬

tains known as the Black Hills rises several thousand feet above the plains in western South Dakota and eastern Wyoming. Having abun¬

dant rainfall it constitutes through its vegeta¬

tion and streams an oasis in the semi-arid region. The hills are carved from a dome¬

shaped uplift of the earth's crust and consist largely of rocks that are older than those form¬

ing the surface of the Great Plains. In these older rocks are extensive mineral deposits, which give the region great importance in the produc¬

tion 'of precious metals. The length of the Black Hills is about 100 miles and the greatest width about 50 miles. The hills rise abruptly from the plains to an elevation of about 4,000

feet. Of its total area of 6,000 square miles 1,900 square miles are now a United States for¬

est reserve. The salient features are an en¬

circling ((hogback** ridge, constituting the outer rim of the hills, the Red Valley, which extends completely around the uplift, then a limestone plateau with infacing escarpment, and finally a central area of high ridges culminating in the precipitous crags of Harney Peak at an altitude of 7,242 feet. Two branches of Cheyenne

River nearly surround the hills and receive from them many tributaries of running water, notably Spearfish, Rapid, Redwater and

Beaver creeks.

The rocks exposed comprise sandstones and

shales of Cretaceous Age, red shales of Per¬

mian and possibly Triassiac Age, limestones and sandstones of Carboniferous, Ordovician and

late Cambrian Age with a central nucleus of Algonkian granite and schist. In the latter are veins of gold ore, which have been extensively mined for many years. The largest mine is

the Homestake, at Lead, which produces from $6,000,000 to $6,500,000 in gold a year. Other minrs yield smaller amounts of gold and con¬

siderable lead, silver, lithia minerals, mica and wolframite are also produced. In the northern hills are many bodies of igneous rocks and on the northwest slope is Devil's Tower. The

largest cities in the Black Hills are Lead, largely sustained by the Homestake and other mines, and Deadwood, on the site of part of 36

the great free gold placers, the cause of the memorable stampede to the Black Hills, 1876-78.

N. H. Darton,

Geologist, United States Geological Survey.

BLACK HOLE, in 18th-century Calcutta,

the soldiers' name for the dungeon in the

East India Company's citadel, Fort William : 18X14 5/6 feet, with two heavily barred win¬

dows and a low veranda outside ; almost airless and meant only for two or three men. The

Subahdar of Bengal stormed the fort 20 June 1756, and believing it to hold vast hidden treas¬

ures, twice ordered the commandant, J. Z. Holwell, to disclose them; failing, he desisted till morning, but ordered all the company's serv¬

ants kept secure and obviously alive — outsiders knew no secrets and were not mentioned. The amazing sequel is Holwell's story, all others being derived from or simple echoes of his: The Subahdar's guards drove and locked all

the white inmates, non-combatants and all (later Holwell included a woman), numbering 146,

into this cell till morning, knowing all would probably die and their secret with them; and refused heavy bribes to ask their master for a larger room, in fear of waking him ! Packed standing, with 1 5/6 square feet per man, no new air, and fires in the fort making it worse, despite stripping themselves the flood of sweat soon began to madden them with thirst, and death came fast. Water brought by a guard

and passed in hats was mostly spilled, and the rest of little service. Suffocation and terror broke all restraints : the prisoners fought for places at the windows, and many were crushed or trampled out of life. By 11 one-third were dead; at 6 a.m., when the Subahdar called for them, only 23, including Holwell, were alive.

The potentate expressed neither concern for the tragedy, nor anger at the defiance of orders that might have robbed him of the treasure; but Holwell graciously acquits him of intending it, and later thought the guards revengeful for their losses in the storm. He and three others were sent prisoners to Muxadavad, the rest set free, and the corpses thrown into a ditch, now commemorated by an obelisk 50 feet high. The cell is now a storeroom. The story is suspicious on its face ; Holwell was given to lying and had motives for it here; his details are rife with contradictions and impossibilities, and at least much

decorated ; and a Calcutta Englishman,

J. H. Little, supported by scholarly Hindus, has lately denounced the whole story as a fic¬

tion. On his theory the Black Hole incident really occurred, but comprised only the com¬

pany's officers, nine in all, two already wounded, who died with one other; the guards therefore did not defy a master they so dreaded; his promise of sparing the prisoners' lives was fairly kept, and the other 114 dead lost theirs in defending the fort, and should be commemo¬

rated as heroes, not as spiritless victims of a cowardly massacre. The facts that the com¬

pany's council never sent home any account of the tragedy, that Clive and his army never at¬

tempted to revenge it and seem not to have known it till long after, and many other like fact, all cohere with these. On the other hand, the difficulties of admitting it are nearly as cogent and in some ways unanswerable, and

judgment as yet must be held in suspense. Con¬

sult the Calcutta Historical Society's magazine, Bengal, Past and Present, July-Septemb. r 1915

and January-March 1916.

BLACK HORSE CAVALRY, a term ap¬

plied to a coterie of Republican members of the legislature of New York State who were accused of selling legislative privileges and of extorting money from corporations either by

threats to introduce or the actual introduction of blackmailing legislation. The investigation of the conduct of Senator Allds in 1910 brought to light many disagreeable methods employed by these members.

BLACK JACK. (1) A term loosely ap¬

plied by miners to blende, the sulphuret of zinc, or to any other ore which resembles it in being obnoxious to them, if in no other respect.

(2) One of several small oak trees of the southeastern coast, especially Ouercus Mar' y-landica, which has a rough, dark, scaly bark and peculiar, broadly wedged-shaped, 3-5 lobed leaves, dark green and lustrous above, and

somewhat rusty beneath. (3) The name given

to a capacious drinking can or cup made of waxed leather or thin metal, the outside of which is japanned black.

BLACK KETTLE, a leading chief of the

Cheyenne tribe of Indians : b. near the Black Hills of Dakota about 1803; d. 27 Nov. 1868.

In the separation of his people into the North¬

ern and Southern Cheyenne tribes, about 1832, he cast his lot with the latter. His name did not appear among the signers of the treaty in which the Southern Cheyenne tribe joined at the Horse Creek council on the Platte, in 1851, but it did appear as that of the ranking chief of the tribe on the treaty which was negotiated at Fort Wise, Col., in 1861. In September 1864, he visited Denver at the head of a delegation of Cheyenne and Arapaho chiefs (their people having been at war with the whites during the summer) to ask for peace at the hands of Gov.

John Evans, who was also superintendent of

Indian affairs for Colorado Territory. This

request having been refused, Black Kettle and several of the other leaders took a large band of their people to Fort Lyon, Col., where they surrendered to the commander, Maj. Edward

W. Wynkoop, giving up their horses and arms as an earnest of their sincerity. Major Wyn¬

koop was relieved of his command of the post a few weeks later and his successor, returning the surrendered arms and horses to Black Ket¬

tle and his people, directed them to move their camp to a point on

Sand Creek, 40 miles dis¬

tant, where they could subsist by hunting.

Trusting implicitly in the good faith and in¬

tegrity of the military authorities, Black Kettle and his followers did as they were told, where¬

upon an expedition was organized at Denver

under the command of Col. John M. Chiving—

ton, marched to Sand Creek and attacked the Cheyenne camp, killing 161 of its people, re¬

gardless of age or sex, 29 Nov. 1864. Despite the evident treachery with which this massacre had been planned and executed, Black Kettle remained inclined toward peace, maintaining

his friendship with Major Wynkoop, former

Agent William Bent and other white nra

whom he could trust and who aided in nego¬

tiating a new treaty -in the council held ct ih?

mouth of the Little Arkansas, in October 1865, whereby the Sand Creek massacre was snerifi-cally disavowed by the government of the

United States and material reparation offered therefor. In the winter of 1866-67, Black Ket¬

tle visited Fort Harker, Kan., where he made an eloquent though ineffective plea against the extension of the C(iron road® across the plains, contending that it ((would drive away the buffalo and leave

the red children of the Great Father at Washington to starve.® He signed the treaty which was entered into at Medicine Lodge in October 1867, but a large part of his own tribe, resenting the building of the railways across the buffalo range and the increasing encroach¬

ments of white hunters, continued at war the following year. Black Kettle, however, re¬

mained peaceably near the tribal agency at Fort Larned. In the autumn, against the advice of Agent Wynkoop, he removed the encampment

of his band to the valley of the Washita, in the extreme western part of the Indian Territory, whence he made a journey to Fort Cobb to as¬

sure the commandant, Gen. William B. Hazcn, of his friendliness. A few days after his re¬

turn from Fort Cobb, his village was attacked and destroyed by the 7th U. S. Cavalry, under command of Gen. George A. Custer, Black

Kettle being among the slain, 27 Nov. 1868.

Consult (Annual Report of the Commissioner

of Indian Affairs* (Washington, D. C., 1864, pp. 216-58) ; also, (<Massacre of the Cheyenne Indians® (a special report of the Committee on the Conduct of the War, House of Representa¬

tives, 10 Jan. 1865).

BLACK KNIGHT, The, a name given by

romantic writers to various heroic characters.

In Scott's (Ivanhoe) Richard Coeur de Lion

masquerades as the Black Knight. The Knight Esplandian, son of Amadis of Gaul and Oriana, is also so called. In the Arthurian legend the Black Knight, Sir Peread, was one of the four brothers who kept the passage of Castle Dan¬

gerous.

BLACK LAW, in the United States the

name given to certain laws in force before the Civil War in many of the Northern and border States discriminating against free negroes who might become citizens. Such laws excluded

negroes from the public schools and from the militia, forbade them to testify in court against a white man or in any case in which a white man was interested. Consult Wilson, (Rise and Fall of the Slave Power in America.)

BLACK LETTER, that variety of type

otherwise designated Gothic or Old English,

and which in a modified form is the ordinary type made use of in Germany, although in

recent years there has been a tendency to

employ the Roman letter, the Gothic type being considered injurious to the eyes. It was intro¬

duced into England during the 14th century

and is the character generally used in the manu¬

scripts and first printed books. See Printing.

BLACK LILLY. See Fritillary.

BLACK LIST. See Blacklist, The;

Blacklisting.

BLACK MARIA, in American and Eng¬

lish slang, the prison van in which delinquents are conveyed between

court and prison. The

term is supposed to have originated in Phila¬

delphia in 1838; another tradition ascribes it to a powerful negress who kept a sailors' board¬

ing-house in Boston. She frequently assisted the police in handling violent cases. Her name was Maria Lee. In French a mud-barge is

called <(Marie-salope® — slovenly Maria.

BLACK MONDAY. (1) A name for

Easter Monday, in remembrance of the dreadful experiences of the army of Edward III, before Paris, on Easter Monday, 14 April 1360. Many soldiers and horses perished from the extreme cold. Also in 1351, there was a tremendous hailstorm on Easter Monday in which many

perished. (2) The 27th of February, 1865, a memorable day in Melbourne, Australia, when

a destructive sirocco prevailed in the surround¬

ing country.

BLACK MOUNTAINS, the culminating

group of the Appalachian system, named from the dark growth of balsam-firs and other ever¬

greens which cover their summits. Their posi¬

tion is in Yancey and Buncombe counties,

N. C., between the main central ridges on

the west and a portion of the Blue Ridge on the east. Unlike the other ridges of the Alleghanies, they lie for the most part transverse to the general trend of the range, and give this direc¬

tion to the great valleys and rivers included between them. They rise

from a district of great elevation, the height of the valley at Ashe¬

ville, on the French Broad River, being about 2,000 feet above the sea, and that of Toe River, at Burnsville, Yancey County, about 2,500 feet.

From this plateau the drainage is toward the Ohio in a northerly direction by the branches of the Great Kanawha, by those of the Holston and the French Broad toward the southwest,

and by those of the Yadkin and the Catawba into the Pedee and Santee toward the south¬

east. This position at the sources of streams flowing in such diverse directions long since pointed out this district as probably the most elevated east of the Rocky Mountains. The chief peaks are Mitchell, 6,710, and Clingman's Peak, Guyot's Peak, or Balsam Cone, Sandoz Knob,

Hairy Bear, Cat Tail Peak, Gibbe's Peak, Sugar Loaf, or Hallback Peak, Potato Top, Black

Knob, Bowler's Pyramid, Roan Mountain, all

of which are above 6,500 feet in height.

BLACK PRINCE (Edward, Prince of

Wales), the son of Edward III of England.

He is thus styled in history by reason of the color of his armor. He died in 1376 and his son became king in 1377 as Richard II.

BLACK-QUARTER, an apoplectic dis¬

ease which attacks cattle, indicated by lameness of the forefoot, one of the limbs swelling, and after death being suffused with black blood, which also is found throughout the body. The disease, which chiefly attacks young cattle, is due to undrained fertile pasture, or to the too rapid transference of the cattle from poorer to richer soils. It is difficult to cure, but may be prevented by thorough draining or by giving regular doses of nitre to all the animals. The usual treatment consists in blood-letting, cut¬

ting into the swollen parts, and administering first nitre and afterward ammonium acetate and purgatives. In the United States the disease is especially prevalent in Texas, Kansas, Ne¬

braska, South Dakota and Colorado.

BLACK RIVER, the name of several

American rivers. (1) A river* which rises in New York in Herkimer County, and after pass¬

ing through Oneida and Lewis counties, changes its course at a place called Great Bend, passes 38

by Watertown, and flows through Black River Bay into Lake Ontario. Near Turin, in Lewis County, it has a fall of about 63 feet. Below the fall it is navigable to Carthage, a distance of 40 miles. The whole length of the river is 125 miles, and its breadth at Watertown (six miles from its mouth) is 60 yards. (2) A river of Missouri and Arkansas, also known as the Big Black River, the largest affluent of the White River. It rises in the southeastern part of the former State, takes a southerly course, enters Arkansas, and joins the White River 40

miles below Batesville. During nine months of the year it is navigable for a distance of 100

miles from its mouth. Its entire length is about 400 miles. Trout and other excellent fish are caught in its waters in great abundance. (3) A river of Wisconsin. It rises in Marathon County and enters the Mississippi 15 miles above La Crosse, after a course of 225 miles. (4) A river of Vermont which rises in the town of Plymouth and is a tributary of the Connecticut. Its abundant water power is utilized by various manufactories along its course. (5) A portion of the Washita River in Louisiana between the mouth of the Tensaw River and the Red River; also sometimes styled Black River.

BLACK RIVER FALLS, Wis., city and

the county-seat of Jackson County, 171 miles northwest of Milwaukee. A fine water power is afforded by the falls of the Black River, and there are flour and lumber mills, wagon and other factories, foundries, machine shops and nurseries. There are iron mines in the neigh¬

borhood, and kaolin deposits from which fire¬

brick is manufactured. Pop. 2,000.

BLACK ROCK DESERT, a tract <?f

nearly 1,000 square miles, north of Pyramid Lake, in Nevada. In summer it is a barren level of alkali and in winter covered in places with shallow water. Called also ((Mud Lakes.

BLACK ROD, Gentleman Usher of the,

an officer of the House of Lords, and of the Order of the Garter, appointed by letters-patent from the Crown, and employed to execute or¬

ders for the commitment of parties in the Lords guilty of breach of privilege and contempt, to assist at the introduction of peers and other ceremonies ; and to summon the Commons to

attend in the House of Lords when the royal assent is given to bills. His deputy is called the yeoman-usher.

BLACK ROOD OF SCOTLAND, a

cross of gold in the form of a casket, believed to contain a splinter of the true Cross. It was brought to Scotland in the 11th century by Margaret, Queen of Malcolm III ; and was

bequeathed as a sacred relic. It was delivered to Edward I in 1291, but restored to Scotland after the Peace of Northampton in 1328. It was finally taken in battle by the English in 1346, and hung in the cathedral of Durham

until the Reformation, when it disappeared.

BLACK RUBRIC, a name given in the

Church of England prayerbook to the declara¬

tion asserting that by the practice of kneeling no adoration was intended to be implied toward any real or essential Presence in the Sacra¬

mental Elements, in other words, kneeling did not express any belief in transubstantiation.

The declaration was printed in black-letter in the revision of 1661 ; it had, however, been originally inserted in the edition of 1552, only three days before the day of publication, by order of the Privy Council, and against the wishes of Archbishop Cranmer. It is believed to have been the work of Peter Martyr, in¬

stigated by the Scottish reformer, John Knox, who had preached against kneeling at the re¬

ception of communion. The ((rubric)) had been omitted from the edition of 1559, and replaced in that of 1661, since when it has remained in the English prayerbook. In the 1789 revision for the American Episcopal Church it was

removed.

BLACK SATURDAY, 4 Aug. 1621; so

called in Scotland because a violent storm oc¬

curred at the very moment the Parliament w-as sitting to enforce episcopacy on the people. The name was also applied to 10 Sept. 1547, on which date the disastrous battle of Pinkie was fought, when Somerset defeated the Scots.

BLACK SEA (Lat. Pontus Euxinus), a

sea situated between Europe and Asia, and

bounded on the west by Turkey, Bulgaria and Rumania, northwest, north and east by Ukrania and Transcaucasia, south by Anatolia (Asia

Minor), being connected with the Mediter¬

ranean by the Bosporus, and with the Sea of Azov by the Strait of Yenikale. The area of the Black Sea and the Sea of Azov amounts to 168,500 square miles ; its length is 750 miles and breadth 385 miles. The water is not so clear as that of the Mediterranean, and, on account of the many large rivers w-hich fall into it, — the Danube, Dniester, Dnieper, Don, Kuban, etc., — being less salt, freezes more readily. The tempests on this sea are sometimes tremendous in w-inter, as the land which con¬

fines its agitated waters gives to them a kind of whirling motion ; but being practically clear of islands and rocks, its navigation is not diffi¬

cult on the whole. Tidal action is scarcely perceptible. A strong current, however, sets toward the Bosporus, and an undercurrent in the opposite direction from the 2Egean Sea. In 1854 one of its tremendous storms occasioned a very serious loss to the shipping of the allied British and French. The fisheries in the Sea of Azov and the Black Sea are not unimportant, various kinds of valuable fish both large and small being taken ; among others, several species of sturgeon. Caviare is made on the coast, as well as fish-glue, fish-oil, and, from the spawn of the sea mullet, botargo. The chief ports are Odessa, Kherson, Nicolaiev, Sebastopol, Novo-rossisk, Batoum, Trebizond, Samsun, Sinope and Varna. It contains no islands of any note.

After the capture of Constantinople (1453) the Turks excluded all but their own ships from the Black Sea till 1774, when the Russians obtained the right to trade in it, the same right being accorded to Austria in 1784, and to Britain and France in 1802. The preponderance thereafter gained by Russia wˆas one of the causes of the Crimean War. The sea wˆas declared neutral

by the Treaty of Paris in 1856. In 1871, how'—

ever, the sea was deneutralized by a conference of the European powers (France being un¬

represented) at London in response to a pro¬

test from Russia. Certain modifications were made at the Congress of Berlin in 1878 and continued dowm to the outbreak of the War of 1914. For the military and naval operations in BLACK AND TAN TERRIER — BLACKBIRD

this theatre see War, European — Campaigns

on Eastern Front and Naval Operations.

BLACK AND TAN TERRIER. See

Terrier.

BLACK TIN, tin ore when dressed,

stamped and washed ready for smelting, form¬

ing a black powder. See Tin.

BLACK-VOMIT, a form of vomiting oc¬

curring usually in severe cases of yellow fever, due to the presence of blood in the stomach, and which is regarded as a sign of approaching death. See Yellow Fever.

BLACK WAD, an ore of manganese,

used in making chlorine gas and as a drying ingredient in paints. It is an earthy variety of the dioxide found in lowlying districts, and is often mixed with oxides of cobalt or copper.

BLACK WALNUT. See Walnut.

BLACK WARRIOR, an American mer¬

chant vessel, seized and confiscated by Cuban customs officers in May 1854. This seizure was used as an excuse for proposed filibustering expeditions against Cuba. Spain, however,

made compensation for the seizure.

BLACK WARRIOR, a river of Alabama,

formed by the junction of the Sipsey, Locust and Mulberry forks. It flows into the Tombigbee near Demopolis, after a course of 300

miles, and is navigable in its lower course to Tuscaloosa.

BLACK WATCH, The, a famous Scot¬

tish regiment, originating as a body of High¬

landers, raised about 1668, for the purpose of keeping the peace in the Highlands, and so named from their dark dress. They were incor¬

porated at Aberfeldy in the regular army under the title of the 42d regiment in 1739. It first distinguished itself in the battle of Fontenoy (1745). From 1750 till 1767 the regiment was in America, and on its return it received the title of Royal Highlanders. It again served in America during the War of Independence. Few British regiments approach it in battle honors.

Consult Barton, (The Black Watch) (London

1910).

BLACK WATER STATE, a popular

nickname for Nebraska.

BLACKADDER, John, Scottish preacher:

b. 1615; d. January 1686. He was ordained to the parish of Troqueer in 1653. When, in 1662, the Episcopal form of church government was forced upon a people who were generally op¬

posed to it, Blackadder employed himself in exposing what he considered its unlawfulness, and, in his own words, entered his ((dissent in heaven® against it. He was obliged to demit his charge in favor of an Episcopal incumbent, was summoned before the Privy Council for

preaching at conventicles and in 1674 was out¬

lawed. In 1678 he sought refuge in Holland, returned in 1679, was afterward apprehended

and confined in the state prison upon the Bass Rock, where he died. Consult Crichton, (Life of Blackadder) (1823).

BLACKBERRY, various species of Rubus

in which the drupelets adhere to the receptacle after ripening. Two general types are com¬

mon: the trailing or dewberry (q.v.), and the upright, which is more generally known as the blackberry. The cultivated blackberries, de¬

veloped from species of Rubus . native in eastern North America, consist of numerous varieties and have become in America, but not elsewhere, an important commercial fruit. They are used chiefly as a dessert fruit, but are also preserved, canned and evaporated. The plants thrive best on a northern slope and on rather heavy, loamy soils retentive of moisture but well drained.

The soil must not be rich in nitrogenous food, since this tends to increase wood at the ex¬

pense of fruitfulness. On light soils the plants are likely to suffer from lack of moisture in dry seasons. Potash fertilizers are required in

abundance. Plants are usually propagated

from root cuttings or suckers, and when one season old the smaller varieties are set in the field usually three by eight feet apart, the larger four by ten or else in checks six by six feet or more. When set in checks cultivation may be given both ways. For cultivation, diseases, etc., see Raspberry. In Europe the bramble

(R . fruticosus) is called the blackberry. It is not extensively cultivated. Consult Bailey,

(Standard Cyclopedia of Horticulture) (1914) ; Card, (Bush Fruits) (1901).

BLACKBERRY LILY (Leopard Flow¬

er) (Gemmingia chinensis), a perennial herb of the family Iridacea, native of Japan and China and long cultivated as a garden plant for its orange, red-spotted flowers. Its popular names were suggested by the blackberry-like

clusters of roundish seeds and the spotted flow¬

ers. The fruiting heads are occasionally used for decoration with dried grass. The seeds may be sown in a sunny place where the soil is light and rich, and in after years the root¬

stocks may be divided.

BLACKBIRD, the name given to two dis¬

tinct species of birds: (1) The American

grakles (q.v.) of the family Icteridce, which consists of about a dozen species differing in size and color. (2) The English song-thrush or ˆmerle.® Four species are known in the

Eastern States, namely : the purple grakle, and rusty grakle, the red-winged blackbird and the cow-bird.

The most familiar American one is the crow-blackbird, more properly termed purple-grakle, because of the iridescent or metallic gloss on its plumage. This bird is found throughout the entire East, and as far west as Dakota. It is the largest variety, being 12 inches in length.

In the spring flocks of these grakles are found among the advance guard of the returning

hosts of the homeward-bound migrants, al¬

though many remain in the Southern States

throughout the entire winter season. Their

nests, located along the edges of the swamps, are rude, strong structures of sticks and reeds, placed among the branches of bushes, in the tops of tall pine trees or in holes of old tree-stumps. The eggs are remarkably varied in

size, shape and color, some being pointed,

others long and slender, while others are nearly globular, the length averaging about 1.25 by. .90

of an inch. The color is any shade of dirty white, light-blue or green, and the markings consist of confused blotches, scratches and

straggling .lines of various dark tints. A bird similar in its habits and mode of life to the purple-grakle is the rusty blackbird, lacking only the metallic hues, its plumage being rusty black. The marshes where they breed are

great centres of blackbird population, and they 40

collect in great flocks of young and old as the end of the season approaches. At this time they visit any neighboring fields of Indian corn, sometimes in hordes, to tear open the husks, feed upon the milky kernels and make them¬

selves obnoxious to the farmers, although, in¬

disputably, they are, on the whole, beneficial by their destruction of insects. The red-winged blackbird (Agelceus phoeniceus) , a variety of which is also found on the Pacific coast, varies in color from the bird of the Eastern States, in the fact that it has on the wing a dark, bloodred patch, bordered with pure white, the other possessing only the scarlet patches on each shoulder, from which it takes its name. The nests of the red-winged blackbird are placed near the ground, among reeds or in small

bushes and swamps. The eggs are smaller and lighter in color than those of the grakle, but resemble them in the scrawled markings. The French-Canadians call them <(officer-birds.<(The impression upon the beholder, as he gazes at the prodigious flocks of tens of thousands of these red-epauleted blackbirds, when gathered upon the marshes preparing for the fall migra¬

tions, and wheeling in regular lines as they fly, their epaulets glistening in the sun, is that of an army of soldiers. Besides these,

there is found in the Middle West the handsomest of the family, the yellow-headed blackbird (Xanthoce -

phalus xanthoce phalus) , in which the whole head and throat are rich orange-yellow. The females of many species are strikingly con¬

trasted in plumage to their mates, having only a streaked brown dress instead of glossy black and red or yellow of the males. The young resemble the females in their protected dullness of plumage. For the English blackbird, see

Song Thrush. For the cow-bird, see Cow—

Bird.

The name is given to various other birds,

prevailing black in plumage, as, for example, to the bobolink (q.v.) which is called <(skunk black¬

bird, J) because of the resemblance in its black and white markings to those of a skunk, and to the ani of Florida and the West Indies, which is commonly termed <(savanna blackbird.®

Consult Baird, Brunner and Ridgeway, (North

American Birds) (Boston 1874) ; Ingersoll,

(Wild Life of Orchard and Field) (1902).

BLACKBREAST, a local name among

American sportsmen for (1) the black-bellied plover (Charadrius sqnatarola) ; (2) the dun¬

lin (Tr'xnga alpina), also called ((blackheart.®

BLACKBUCK, the common small ante¬

lope (Antilope cervicapra) , of the plains of India and Assam. This is the typical antelope, with horns from 16 to 20 inches long, rising in

an elegant spiral from the top of the head. The body is blackish brown above, sharply con¬

trasted with white on the under parts, and with a conspicuous white ring around each eye. The doe is smaller in size. These handsome little antelopes go about ordinarily in family parties, but sometimes gather in large herds, and are a favorite object of sport in India, where they are usually chased on horseback with grey¬

hounds — sometimes also with the cheeta (q.v.) or by the aid of falcons. They are so swift that the best of dogs are required to catch them. They continue numerous because they

are never hunted by the native Hindus, on ac¬

count of religious prejudices. The name is also applied to the African sable antelope. Con¬

sult Baker, (Wild Beasts and Their Ways,5

and other writers upon the sport and natural history of India.

BLACKBURN, Joseph Clay Styles,

American lawyer and statesman : b. Woodford County, Ky., 1 Oct. 1838; was graduated

at Center College, Danville, Ky., in 1857 ; ad¬

mitted to the bar of Kentucky in 1858, and practised law in Chicago until 1860. During the Civil War he served in the Confederate army, and after the war resumed practice in Arkansas, and in 1868 returned to Kentucky.

In 1871 and 1873 he was elected to the Ken¬

tucky legislature, and in 1874 to Congress, serv¬

ing five terms in the House of Representatives; served in the United States Senate 1885-97, and was again elected for the term 1901-07, being elected chairman of the Democratic cau¬

cus of the Senate, which office carried with it the leadership of the

Democratic party in the Senate. He was a leader of the silver wing of the Democratic party, and took a conspicuous part in the fight for free silver in the National Democratic Convention of 1896, when his name was presented by the Kentucky delegation as its choice for President. In 1907 was appointed a member of the Isthmian Canal Commission

and was designated civil governor of the Canal Zone. Resigned in 1909. On 7 Feb. 1914 he was appointed by act of Congress the special resident commissioner of the construction of the Lincoln Memorial at Washington.

BLACKBURN, Luke Pryor, American

physician: b. Woodford County, Ky., 16 June 1816; d. 14 Sept. 1887; was graduated at Tran¬

sylvania University, Lexington, Ky., in 1834; began practising in the town of Versailles and gave his services free during the great epi¬

demic. In 1846 he went to Natchez, Miss., and in 1848, when yellow fever appeared in New Orleans, he established the first quarantine against New Orleans that had ever been known in the Mississippi Valley. During the Civil War he was a surgeon on the staff of General Price. In 1875, when yellow fever broke out in Memphis, he hastened to the city and or¬

ganized a corps of physicians and nurses, and in 1878 gave his services to the yellow fever sufferers at Hickman, Ky. He was elected

governor of Kentucky in 1879, and as such is remembered for his prison reforms. He

founded the Blackburn Sanitarium for Nervous and Mental Diseases in 1884.

BLACKBURN, William Maxwell, Amer¬

ican Presbyterian clergyman and educator: b.

Carlisle, Ind., 30 Dec. 1828; d. 1900. He be¬

came president of the Territorial University of North Dakota in 1884, and of Pierre University, South Dakota, in 1886 (now Huron College).

He wrote (Admiral Colignv and the Rise of the Huguenots5 ; (Ulrich Zwingli, the Patriotic Reformer5 ; historical Sketch of North and

South Dakota,5 and the (Uncle Alick5 series of juvenile stories.

BLACKBURN, England, municipal, par¬

liamentary and county borough in Lancashire, 24 miles north-northwest from Manchester.

There is a free grammar school, founded by Queen Elizabeth in 1557; a free school for girls founded by William Leyland in 1765, and a

technical school, The town-hall and, other pub-BLACKBURNE — BLACKIE

lie buildings, including the library, museum, Gothic Exchange and Drapers' Hall, are all

modern and handsome buildings. There are two public parks, one beautifully situated on ,the declivity of Revidge Hill. The railways all converge and pass through one large railway station belonging to the Lancashire and Y. Rail¬

way Company. The Leeds and Liverpool Canal

gives valuable connections. The corporation

owns all the public utilities. Blackburn is one of the chief seats of the cotton manufacture, there being upward of 140 mills, as well as works for making cotton machinery and steam-engines. Blackburn is believed to have been the birthplace of James Hargreaves, who in¬

vented the spinning jenny in the neighborhood in 1764; but the operatives, fearful for their employment, would have none of it, and a mob destroyed (1768) both his jenny and his loom.

Lord Morley of Blackburn is another dis¬

tinguished native. Pop. 133,052.

BLACKBURNE, Francis, Irish jurist: b.

1782; d. 1867. He was educated at Trinity

College, Dublin ; called to the English bar in 1805 and to the Irish bar in 1822. He was at¬

torney-general for Ireland in 1830 and 1841 ; master of the rolls, 1842; chief justice of the Court of Queen's Bench, 1846, and lord chancel¬

lor, 1852, 1866. He is remembered as having prosecuted Daniel O'Connell and as presiding at the trial of Smith O'Brien.

BLACKBURNE, Joseph Henry, British

chess champion : b. Manchester 1842. He was first a draughts player, and after taking up chess became a proficient in what is known as "blindfold® play. He began taking part in

tournaments in the late 60's, and thereafter competed in most of the outstanding matches with almost phenomenal success.

BLACKCOCK, or HEATHCOCK, a

large European grouse (Tetrao tetrix), so

called because of the glossy black color of the cock; also known as blackgrouse. The female is grayish, mottled in darker colors, and is called "grayhen,® or (<heathhen) ; the young are called "poults.® See Capercaillie.

BLACKFEET INDIANS, an important

Algonquin confederacy of the northern plains, inhabiting, until within recent historical times, the territory from the headstreams of the Mis¬

souri in Montana to North Saskatchewan, now in the provinces of Saskatchewan and Alberta, and from long. 105° to the base of the Rocky Mountains. They are now settled on reserves, three in Alberta and one in northwest Montana.

The origin of the name is disputed, but it is be¬

lieved to have reference to the discoloration of their moccasins by the prairie fires. They con¬

sist of three subtribes, the Siksika proper or Blackfeet, the Kainah or Bloods and the Piegan — the whole being known as Bloods, and in close -uHrance with the Atsing and Sarsi. They were— Ym4ng— -bu ff af-o hunters, warlike, without permanent habitations, having no arts and no agriculture, except the growing of some to¬

bacco. They have a great number of secret

societies and. many tribal dances; their dead were deposited in trees or laid on tepis erected on prominent hills. Mackenzie estimated their numbers in 1790 at 9,000; they have been re¬

peatedly decimated by smallpox ; the sudden

extinction of the buffalo in 1879 threatened disastrous results for them, but was met by prompt State action. Numbers (1911) 2,337 in Alberta, 2,195 in Montana.

BLACKFIN. See Bluefin.

BLACKFISH, any one of a variety of

dark-colored fishes, both of America and

Europe. For the American “blackfish,® see

Tautog, Seabass and Minnow. The English

“blackfish® is a kind of mackerel (Centrolophus niger), about two feet long. It occurs rather abundantly off the south coast of Europe, and is much esteemed as a food fish.

The name is also given to a small “killer®

whale of the genus Globicephalus, which goes about in shoals that often enter harbors. They are sought by fishermen for the sake of a small amount of oil, resembling sperm-oil, to be obtained from their fat, and also for the sake of their beef-like flesh. The common blackfish of the Atlantic is G. brachypterus, and that of the north Pacific G. scammoni. Sailors give the name “blackfish® to the “caaing,® or “pilot®

whale, and to the various other small ceta¬

ceans. Consult Bullen, (Cruise of the Cacha¬

lot) ; Scammon, (Marine Mammals of North America. }

BLACKGUARD, a term used in the 16th

century for the lowest menials of a noble house, the scullions who cleaned pots and pans. It was also used of the hangers-on of an army, camp followers, then of a rabble, and of vaga¬

bonds in general.

BLACKHEAD, the name for several ani¬

mals, characterized by the blackness of the head; especially in the United States: (1) the scaup duck; (2) a common minnow, the fat¬

head. The name is also applied to the accu¬

mulations of dirt found in the sebaceous

follicles.

BLACKHEATH, England, an elevated

heath in the county of Kent chiefly in the metropolitan borough of Lewisham. It bor¬

ders on Greenwich Park, contains 267 acres, and is a place of popular resort. In 1381

Wat Tyler and John Ball mustered their fol¬

lowers here. Jack Cade occupied the same

position twice in 1450. In 1497 the Cornish insurgents, under Lord Audley, were routed

there by the King's forces. Blackheath has

been the scene of many historical pageants

and processions. Henry IV met there (1400)

the Byzantine emperor, Michael Palaeologus ;

the corporation of London there met Henry

V, on his return from Agincourt ; and the

year afterward, the Emperor Sigismund. One

of the last was the reception of Anne of Clevcs, by Henry VIII, in 1541. The Roman road

to Dover crossed Blackheath. Consult Drake,

(History of Blackheath > (London 1886).

BLACKHORSE, a fish, one of the suck¬

ers of the Mississippi Valley (Cycleptus elongct-tus) ; also known as the Missouri or gourd-seed sucker. It is about two feet long, with a small head, suggesting, in profile, that of a horse, and becomes almost jet-black in spring.

See Sucker.

BLACKIE, John Stuart, Scottish poet,

litterateur and professor: b. Glasgow, 28 July 1809; d. 2 March 1895. He was educated at the universities of Aberdeen and Edinburgh;

subsequently went to Gottingen, Berlin and

Rome, where he continued his studies, which were chiefly connected with philology. In

1834 he published a translation of Goethe's (Faust,* and the same year became an advo¬

cate at the Scottish bar; in 1841 he was in¬

ducted to the chair of humanity in Marischal College, Aberdeen. This position he held until, in 1852, he was appointed to the professorship of Greek in the University of Edinburgh, a chair which he resigned in 1882. By his un¬

wearied efforts to preserve the Gaelic language, he succeeded in raising $60,000, with which sum a Celtic chair was endowed in Edinburgh University. He was one of the most popular Scotsmen of his time, his breezy, unconven¬

tional personality making him a favorite with all classes. Perhaps his most enduring work is the hymn he wrote on his honeymoon,

<(Angels holy, high and-lowly.® Among his

more important writings are (Lyric Poems) ; (Homer and the Iliad J ; (Hone HellenicaP ; <Self-culture) ; (Songs of Religion and Life*; (Lajrs of the Highlands and Islands) ; (Lay Sermons *; (Altavona) ; (Wisdom of Goethe*; and (Life of Burns.) His biography has been published (2 vols.) by Anna M. Stoddart.

BLACKING, the article employed in

blacking boots and shoes, usually contains for its principal ingredients oil, vinegar, ivory, or bone black, sugar or molasses, and strong sulphuric acid, though every manufacturer has his own recipe, and endeavors to turn it to best account by concealing its composition and puffing its merits. Blacking is used either liquid or in the form of a paste, but both are obtained from the same ingredients, the only difference being that in making the paste a portion of the liquid is withheld. Blacking was introduced into England from France in

the latter part of the 18th century. A cele¬

brated old English blacking consists of 18

ounces of caoutchouc dissolved in 9 pounds

of hot rape-oil, 60 pounds ivory-black, 45

pounds molasses, and 20 gallons vinegar, of strength No. 24, in wrhich one pound finely ground gum-arabic has been dissolved. The

whole mixture, after being carefully trit¬

urated in a grinding mill, receives 12

pounds sulphuric acid, in small successive

quantities, stirring strongly for half an hour.

The stirring is continued for half an hour daily during a fortnight, and then three

pounds of gum-arabic are added, after

which the stirring is resumed, and continued as before for another fortnight. This gives fine liquid blacking; the paste is obtained within a week by withholding 8 of the 20 gal¬

lons in which the gum-arabic is dissolved. Shoe blacking in liquid form may be made from

powdered graphite (1 pound), lampblack (1

ounce), rosin (4 ounces) and turpentine (1

gallon). Graphite is the principal -ingredient in many stove polishes. The solid cakes of stove polish are made by subjecting the pow¬

dered graphite, mixed with turpentine, to

great pressure.

BLACKLEG, a cattle disease. See

Black-quarter.

BLACKLEGS, a name commonly applied

in England to cheating gamblers ; during the labor agitation in 1889 and 1890 the name was given to non-unionist workmen by the mem¬

bers of trade unions. In this latter sense the word is now exclusively used, and corresponds with the American epithet “scabs.®

BLACKLIST, The, name applied to a

war measure adopted by the British govern¬

ment in accordance with an Order in Council of 23 Dec. 1915, prohibiting British subjects from trading with specified firms and persons residing or established in neutral countries.

From time to time lists of such proscribed firms had been published in the official London Gazette, and included a considerable number

of Japanese firms and business houses estab¬

lished in various countries of Europe, South America and Asia. On 18 July 1916 the

Gazette issued a list giving the names of 82

firms “domiciled® in the United States. Of

these, 72 were established in New York city, three in Pennsylvania, two in Texas, two in California, one in Seattle and one each in

Virginia and Florida. The names did not ap¬

pear in the London newspapers. The publica¬

tion of the “blacklist® in the American press created considerable sensation, and vigorous

protests were raised on the ground that the inhibition constituted an unwarrantable inter¬

ference with American trade. The govern¬

ment was called upon from many sides to

take .steps of a retaliatory nature if the offend¬

ing list were not repealed. On 22 July Mr.

L. W. Evans, Chief of the Department of

Foreign Trade of the British Foreign Office, informed a representative of the Associated

Press in London that the list had been com¬

piled with the sole object of prohibiting British citizens from supporting firms which were

strengthening the German enemy. He stated

that the test applied before placing a firm in the United States on the list “was : “Is that firm by its business operations strengthening our enemies? If so, then British firms may not support it.® As the prohibition extended to British shipping carrying freight for any such firms, and rendered their cargoes on

neutral vessels liable to prize court confisca¬

tion, shipping companies were unwilling to

take the risks involved. Thus on 20 July the Royal Dutch Mail Steamship Company, run¬

ning vessels to the West Indies, announced

that they would not accept any freight from shippers whose names appeared on the British blacklist, or take cargo for consignees

similarly placed. Many other neutral shipping firms

took the same course. The Teutonic Sons of America seized the opportunity to despatch a communication to the President, accusing him of “wavering,® recalling Jefferson’s words that “England is still our enemy,® and suggested an embargo on munitions and provisions. Brit¬

ish officials in Washington contended that no legitimate American firm or corporation would be injured by the blacklist, nor any German firm in the United States which had con¬

fined its operations to its own line of busi¬

ness; in short, that British subjects were pro¬

hibited from having any dealings with only

such firms as were known to be actually under German control ; whose profits went to Ger¬

many; or in cases where either German or

American firms in the capacity of agents had departed from their regular lines to trade with Germany. Thus, for example, the British gov¬

ernment knew that a German-American firm

in New York had shipped a large quantity of BLACKLISTING

nickel on the submarine Deutschland, yet that firm was not placed on the blacklist because dealing in such metal was part of its ordinary business. The Washington correspondent of

the New York Sun reported (25 July) that

the British list had not been published until the acquiescence of several banking institutions in New York had been obtained. <(The banks were convinced that the blacklisted firms had been maintaining Germany’s trade relations in South America, and that they were in a

posi¬

tion to do this only because they were domiciled in a neutral country … and that the only effect of the boycott would be to transfer the business of German to American firms.® The

Wall Street Journal (25 July) expressed a

hope that the government would not make a

protest, on the ground that the Allies exer¬

cised <(a power which belongs to every state, to regulate the conduct of its own citizens … For its own preservation, the (United States) government regulated the business af¬

fairs of its citizens in neutral countries when (in 1863) their activities might even indirectly aid an enemy. It was a legitimate exercise of its power.® Meanwhile, the Allies (for France had issued the same list) had searched Ameri¬

can records and discovered that on 16 Aug.

1861 President Lincoln issued a proclamation declaring that <(all commercial intercourse be¬

tween the States in insurrection and citizens of the United States is unlawful, and will re¬

main unlawful until such insurrection shall

cease.® In the following year (26 May 1862) an act of Congress authorized the Secretary of the Treasury to refuse clearance to ships where their cargoes, ((whatever their ostensible destination,® were intended for points or places in possession or under the control of insur¬

rectionists against the United States. From

these precedents, apart from other considera¬

tions, the British government maintained its right to forbid its own nationals to trade with persons who openly or secretly aided the

enemies of Great Britain. Acting State Sec¬

retary Polk instructed Ambassador Page (24

July) to inform the British Foreign Minister that the United States government must <(protest in the most decided terms® against the ˆarbitrary interference with neutral trade.®

The protest was presented on the 28th, and in his reply (10 Oct. 1916) Lord Grey of Fall-odon described the measure as <(a piece of purely municipal legislation … part of the belligerent operations designed to weaken the enemyˆs resources.® He pointed out ((that

many Germans in neutral countries have done all in their power to help the cause of their own country and to injure that of the Allies … ; that German houses abroad have in a large number of cases been used as an integral part of an organization deliberately conceived and planned as an engine for the furtherance of German political and military ambitions

… ; German business establishments in for¬

eign countries have been not merely centres of German trade, but active agents for the dis¬

semination of German political and social in¬

fluence, and for the purpose of espionage… .

Such operations have been carried out in the territory even of the United States itself.® The prohibition, he repeated, applied only to <(persons in the United Kingdom,® and that the

measure was (<simply one which enjoins those who owe allegiance to Great Britain to cease having trade relations with persons who are found to be assisting or rendering service to the enemy.®

Shortly before the American blacklist was

issued the Allies had held an <(Economic Con¬

ference® in Paris (14-17 June 1916), at which it was decided that (<The Allies will prohibit their own subjects and citizens and all persons residing in their territories from carrying on any trade with (1) the inhabitants of enemy countries whatever their nationality; (2) en¬

emy subjects wherever resident.® As a result of American representations, the names of sev¬

eral firms were removed from the blacklist; the prohibitive ordinance on British subjects was rigorously maintained. Several British

business men found guilty of indirect trading with the enemy were heavily fined and sen¬

tenced to terms of imprisonment.

The total number and distribution of firms

placed upon the blacklist were — Argentine and Uruguay, 95; Bolivia, 22; Brazil, 140; Central America, 5; Chile, 35; Columbia, 1; Cuba, 10; Ecuador, 69; Greece, 50; Holland and colo¬

nies, 190; Japan, 86; Morocco, 88; Norway,

83 ; Paraguay, 3 ; Persia, 56 ; Peru, 41 ; Philip¬

pines, 44; Portugal and colonies, 166; Spain, 167 ; Sweden, 72 ; and United States, 85. See Blacklisting.

BLACKLISTING. A method employed

in various countries to place upon record for the guidance of others the names of persons or firms whom it might not be desirable to employ or to have business relations with.

Lists of those against whom unsatisfied judg¬

ments are standing, or whose credit is poor, or who have given chattel mortgages on stock in trade and lists of a similar nature have been published by mercantile agencies and are not only regarded as of great benefit to the busi¬

ness world but also fair and lawful. The pub¬

lisher or compiler of such list must be careful that, in printing a person's name, he do not subject himself to a libel suit. He must be able to prove that his statements about the blacklisted person are true, or that they were correctly transcribed from some public record, or

that they constituted a fair and accurate report of some judicial proceeding, or that the information contained in the statements was

secured in a privileged manner, such as a

report of financial standing of a person or firm asking credit of another. But the black¬

list is more widely known for its use in labor controversies. For many years railroads kept lists of employees dismissed for any reason so that they could not be re-employed. Manufac¬

turers and dealers who have formed an asso¬

ciation or combination to control a certain line of industry have blacklisted others who refused to enter the association. The black¬

list of the early period of labor controversies was a printed list of the names of workmen, circulated among employers, who had previ¬

ously agreed not to employ those so listed.

Labor unions have kept lists of non-union

workmen with the object of preventing the

laborers or of employers of non-union

employment of the workmen or of boycotting

the employer. Such lists are now termed a

misdemeanor in the statutes of some States.

and offenders are punishable by a fine or im¬

prisonment. The central offices of employers'

associations keep a list from which informa¬

tion regarding workmen is exchanged, thus

coming within the law. See Blacklist ; Boy¬

cott; Strikes and Lockouts; Trade Union¬

ism ; Labor Legislation ; Libel ; Conspiracy.

BLACKMAIL, originally rent paid in la¬

bor, grain or baser metal as distinguished

from silver or white money; a certain rate of money, corn, cattle or the like, anciently paid, in the north of England and in Scotland, to certain men who were allied to robbers, to be protected by them from pillage. It was carried to such an extent as to become the subject of special legislation by the English Parliament in 1601, and also in Scotland. Blackmail was

levied in the unsettled districts bordering the Highlands of Scotland till the middle of the 18th century. In the United States, in common language and in general acceptation it is equiva¬

lent to and synonymous with extortion — the exaction of money, either for the performance of a duty, the prevention of an injury or the exercise of an influence. It supposes the serv¬

ice to be unlawful and the payment involuntary.

Not unfrequently it is extorted by threats, or by operating upon the fears or the credulity or by promises to conceal, or to expose, the weak¬

nesses, the follies or the crimes of the victim.

There is moral compulsion, which neither ne¬

cessity nor fear nor credulity can resist. The New York statutes upon the subject have been adopted in substance by many other States of

the Union. These statutes provide, substan¬

tially, that a person who, knowing the contents thereof, and with intent, by means thereof, to extort or gain any money or other property, or to do, abet or procure any illegal or wrongful act, sends, delivers or in any manner causes to be forwarded or received, or makes and parts with for the purpose that there may be sent or delivered, any letter or writing threatening to accuse any person of a crime, or to do any injury to any person or to any property, or to publish or connive at publishing any libel, or to expose or impute to any person any deformity or disgrace, is punishable by imprisonment for a term usually not exceeding five years. In New York and in various other States it is also a misdemeanor for any person who, under cir¬

cumstances not amounting to robbery, or an

attempt at robbery, with intent to extort or gain any money or other property, verbally

makes such a threat as would be criminal under the statute mentioned above ; and it is imma¬

terial whether a threat made as specified in the statute is of things to be done or omitted by the offender, or by any other person.

BLACKMAR, Frank Wilson, American

educator, economist' and author: b. West

Springfield, Pa., 3 Nov. 1854. He studied at the University of the Pacific, and at Johns Hopkins University where he became instructor in history 1887-88 and fellow in history and politics 1888-89. He was appointed professor of history and sociology at the University of Kansas in 1889 and became active in the uni¬

versity extension movement throughout the

West, writing and lecturing on history, sociol¬

ogy and economics. He organized the graduate school of the University of Kansas in 1897 and was elected its dean. In 1899 he was appointed professor of sociology and economics. He

edited the ‘Cyclopedia of the History of

Kansas) and is author of ‘Spanish Coloniza¬

tion > (1890); (Spanish Institutions in the Southwest } (1891); ‘History of Higher Edu¬

cation in Kansas) (1900); ‘Life of Charles

Robinson > (1900) ; ‘The Elements of Sociology >

(1905) ; ‘Economics for High Schools) (1907) : ‘Playgrounds and Parks) (1910).

BLACKMORE, Sir Richard, court phy¬

sician and poet: b. about 1650; d. 1729. He was educated at Westminster School and Saint Edmund Hall, Oxford; first took up teaching, but after graduating in medicine at Padua set¬

tled in London as a physician, holding appoint¬

ments in the court of King William and Queen Anne. He had a gift for writing epics, all lengthy and written on the most exalted themes.

He published ‘Prince Arthur* (1695) and six other lengthy poems before 1723. His ‘ Crea¬

tion } received high praise from such competent contemporary critics as Addison, Johnson and John Dennis, but the cooler judgment of pos¬

terity has pronounced all alike to be uniformly dull, heavy and tedious.

BLACKMORE, Richard Doddridge, Eng¬

lish novelist: b. Longworth, Berkshire, 7 June 1825; d. 20 Jan. 1900. His father, curate of Longworth, and a graduate of Exeter College, Oxford, was a man of scholarly character;

among his ancestors on his mother’s side Blackmore numbered Philip Doddridge, the Non—

Conformist divine. Blackmore was educated at Blundell's School at Tiverton and at his father's college, which he entered in 1843 with a good reputation for scholarship, and where he had a successful career. In one of his long vacations he began 'The Maid of Sker,* which was not published till 1872. He was graduated in 1847, with M.A. in 1852. In 1852 he married Miss Lucy Maguire, and while supporting himself in London read law in the Inner Temple. Ad¬

mitted to the bar the same year, he had some success as a conveyancer, but finding London life detrimental to his health, gave up his work and in 1855 became classical master at Wellesley House School, Twickenham Common. In 1853

he published his first volume, 'Poems by

MelanterP and a little later 'EpulliaP also an anonymous volume of verses. In 1855 appeared 'The Bugle of the Black Sea,* and in 1860 'The Fate of Franklin. * About this time a legacy from his uncle, the Rev. H. H. Knight, enabled him to build himself a substantial country house, Gomcr House, at Teddington, near Twickenham.

Here he lived the rest of his life, devoting his mornings to the raising of fruits and flowers, famous for quality but costing him an average loss of £250 a year. The remainder of his time he gave over to literature. A translation of two of the Georgies of Virgil, entitled 'The Farm and Fruit of 01d) (1862), was followed by 'Clara Vaughan* (1864) and 'Cradock

Nowell* (1866), neither very successful novels.

His third novel, 'Lorna Doone) (1869), after a somewhat slow start, became one of the great popular novels of the century; up to the time of Blackmore's death it had gone through nearly 50 editions, and has now assumed the place of a semi-classic. Uneven in structure, often prolix, exaggeratedly romantic, occasionally falling

into a false metrical prose, it nevertheless con¬

tinues to hold the interest of its readers through BLACKPOOL — BLACKS

the fine sense of the Devon country where the scene is laid, the very real and human country types and the essentially manly character of its hero, John Ridd. Up to the time of his death, Blackmore continued to produce novels at the rate of about two in five years. Of these the most important are (The Maid of Sker,* re¬

garded by the author as his best, <Springhaven) (1887) which he thought superior to (Lorna

Doonc,> (Alice Lorraine) (1875), and (Cripps the Carrier ; (1876). The other titles are

(Erema, or My Father's Siffi (1877) ; (Mary Annerley) (1880); 'ChristowelP (1882); (The

Remarkable History of Tommy Upmore*

(1884); (Kit and Kitty > (1889); (Perleycross) (1894); (Tales from the Telling House)

(1896), and (DarieP (1897). A volume of

verse, (Fringilla) (1895), completes the list of his published work. No life has as yet been published, and most of the commentary on him is to be found in magazine articles and reviews.

See Lorna Doone.

W. T. Brewster,

Professor of English, Columbia University.

BLACKPOOL, England, town and county

borough of North Lancashire on the west coast, between the estuaries of the Ribble and Wyre, 27 miles southwest of Lancaster, which attracts an annual average of 100,000 visitors by its ad¬

vantages as a watering place. It affords excel¬

lent accommodation for visitors in the numer¬

ous hotels, hydropathic establishments and

lodging-houses, and consists of ranges of lofty houses about three miles long facing the sea, in front of which extends an excellent

promenade and carriage drive. The town is

abundantly supplied with theatres, concert

rooms, fine winter gardens, aquarium, extensive pleasure-grounds, park of 60 acres, a great steel tower over 500 feet high a gigantic wheel and other attractions. There are a courthouse and three markets, several churches, six council schools, eight non-provided schools and

one for higher education, libraries and news¬

rooms. Blackpool was incorporated as a munic¬

ipal borough on 21 Jan. 1876, and as a county borough 1 Oct. 1904. Resident population

58,500.

BLACKS. Black pigments are of two

types : charcoal blacks or fixed blacks, and soot blacks. The charcoal blacks include those made by the carbonization of bones and ivory, as well as those made from charcoal of wood and

animal refuse. The soot blacks include carbon black or gas black, and lamp black.

Charcoal black is made by heating wood

in closed retorts till it is charred through and through, and grinding the residue, after which it is thoroughly washed. The finest grade of charcoal black is that made by carbonizing cork.

It is fine, smooth and of considerable body. A highly esteemed grade is Frankfort black, also known as drop black and vine black. It is made

by carbonizing twigs of grapevines, to which are added hop vines, peach and plum

stones, and sometimes chips and shavings of bone. Animal black is the name given to the pigment produced by charring the offal of

slaughter-houses. Cheap charcoal blacks are

of poor covering power, but are excellent as preservatives, and useful especially in making the gray or Head-colored® priming coat so

commonly applied to new work by painters.

Bone black is prepared by grinding the

carbonaceous matter resulting from the char¬

ring of bones in iron retorts. It contains about 15 per cent carbon; 78 per cent calcium phos¬

phate; and 7 per cent calcium carbonate,

alumina, silica and iron combined. It has a specific gravity of 2.7. The grinding does not produce a uniformly smooth powder, there being always more or less grit of hard charred bone.

Ivory black is made sometimes of ivory waste but more commonly of selected bone. It is a favorite with painters, having a “tooth® which is lacking in the soot blacks. It is, however, slow to dry, and a drier is usually added. Its lack of covering power is helped out by the addition of some rich velvety black, generally lamp black. The highest grade of plate ink used by printers is made from the choicest bone black with the addition of vine black and a little Prussian blue. To make the or¬

dinary paste in which form paints are usually marketed, bone black requires the addition of 50 per cent of its weight in oil. Large quan¬

tities of bone black are used by the sugar re¬

fineries to decolorize raw sugar in solution, no other substance having been discovered of equal or even approximate efficiency. After this

use the bone black goes generally to the fer¬

tilizer manufacturers, but a part comes into the paint industry.

Carbon black, a very pure form of carbon,

is made by the combustion of gas in a scanty supply of air. The flames are thrown against metal or slate slabs or upon revolving cylinders.

The accumulating black is scraped off and

ground. It has a granular texture and requires a great deal of grinding to make a smooth pigment. Carbon black has great staining

power and requires 82 per cent of its weight in oil to produce the paste form in which it is marketed — as “ground in oil.® In the dry form it was formerly packed in barrels, but was found to absorb moisture. This tendency has been overcome by packing it in paper sacks.

The best grades of carbon black are used in making black varnishes and printers’ inks.

With white, carbon black gives brownish-gray hues.

Lamp black is a nearly pure carbon made

by the combustion of oils in an atmosphere lacking in oxygen. The larger part of the com¬

mercial supply is made from the dead oils dis¬

tilled from coal tar and from wood tar, petro¬

leum, rosin, *etc.* The choice grades are made from seed oils. Any material which in a plenti¬

ful supply of oxygen gives a highly luminous flame will produce lamp black when the air sup¬

ply is cut down. The oils are ignited in a limited supply of air so that the combustion is imperfect and intensely smoky. The smoke is passed through a long series of chambers, and against and around many upright parti¬

tions on which the soot or lamp black is de¬

posited. In Germany lamp black is made by

passing the smoke from resinous wood through hanging woolen blankets. The soot is shaken from the blankets at intervals. Ordinary lamp black will weigh from 100 to 120 pounds to the (flour) barrel; the finest grade will weigh but 30 pounds to the barrel. It is required that lamp black test not more than 0.2 of 1 per cent of ash. To make the buttery paste in which the tinned lamp black is sold requires 75 to

76 pounds of oil to 24 or 25 pounds of lamp black. As a pigment lamp black is noted for its remarkable covering power. The cheaper

grades are made into common printing ink ;

the finer grades cannot be used for this purpose as they require more than the limit of 65 per cent oil, the utmost that can be permitted in printing ink.

According to the United States census of

manufactures for 1914 there were in operation 27 establishments devoted exclusively to the manufacture of bone black, carbon black and lamp black. These establishments employed

437 persons, of whom 339 were wage earners receiving annually $230,821 in wages. The

capital invested was $4,995,400, and the value of the year's output was $1,463,569, of which $777,-

329 was the value added by manufacture. In addition, there were 19 other establishments in which some of these products were made. The total production of blacks by all makers in 1914 was valued at $2,949,797 ; comprising

carbon black, $900,630; lamp black, $517,167; and bone black, $1,532,000. Among the States, West Virginia ranked first in production of blacks, turning out 54.5 per cent of the entire product of the country. Pennsylvania ranked

second. Both of these States make their

product from natural gas.

BLACKSNAKE, or BLACK RACER, a

common colubrine serpent (Zamenis con¬

strictor) found in eastern North America from southern Canada to Florida and west to the prairie regions of the United States. The

typical eastern blacksnake is uniform lustrous black above and slate-color beneath, the lower jaw, chin and sometimes upper edges of the lip-plates white, the tongue black. West of the Mississippi the typical form is replaced by a distinct variety, the ((blue racer,® slenderer and smaller. The young of the blacksnake,

under 18 inches in length, are pale gray above, with brownish blotches on the back, and numer¬

ous black spots on the side. The female is larger than the male, but rarely if ever exceeds six feet in length; length of tail 17ˆ2 inches.

This is one of the most numerous and vigorous of American snakes, making its home in hollow stumps and underground dens. At the approach of winter, many are likely to gather together in similar retreats and remain there in a torpid condition until spring, entangled into a ball, for the sake of mutual warmth. Its motions are of the swiftest, it being capable of moving with great rapidity and of scaling trees, some¬

times to a height of 100 feet above the ground, where it searches from branch to branch for birds' eggs, young squirrels, *etc.* It seeks much of its food in swamps and along streams,

mainly frogs, toads, eggs and young of birds, insects and other snakes, and is a fine swimmer.

The blacksnake is harmless, and its bite is no worse than that of a mouse. It is readily tamed, thrives well in captivity and shows some intelligence. It is unaggressive, alert in getting away from danger and will not fight unless cornered. The stories recorded of its scenting out copperheads and rattlesnakes and slowly

crushing them to death are fables, as it has no power of constriction, and will only attack snakes much smaller than itself. The black¬

snake breeds during the summer, the female

laying 15 or 20 eggs at a time in the hollow of a BLACKSTONE

sunny bank, or in the midst of a decayed stump, around which she stays, guarding her young

until they reach a considerable age.

Several other species of the genus belong to the southwestern United States, Mexico and

the West Indies, and the Texan whipsnake

is a near relative. The (<chainsnake® is

sometimes called <(mountain blacksnake.® Other blackish serpents known as blacksnakes in¬

clude a colubrine of Jamaica (Ocyophis ater) ; the death adders of Australia and Tasmania, and some others notable for dark hues. One of the most widespread of the native names of the East Indian Cobra de Capello has the meaning “blacksnake.®

BLACKSTOCKS HILL, South Carolina,

a locality where, on 20 Nov. 1780, the patriots of the State, under General Sumter, defeated Tarleton’s cavalry after a sharp encounter.

BLACKSTONE, William, early colonist

of New England: d. 1675. He left England

because of differences with the authorities of the Church of England and was the first white settler on the site of Boston, Mass., in 1623.

Disliking the arbitrary methods of the Puritans he sold his 800 acres for £30 in 1634 and re¬

moved to what is now Rhode Island where he was also the first white settler. Consult

Winsor, (Memorial History of Boston* (Bos¬

ton 1880).

BLACKSTONE, Sir William, English

lawyer, and the most popular writer on the laws and constitution of his country: b. London, 10

July 1723; d. 14 Feb. 1780. He was educated at the Charterhouse, whence in 1738 he was removed to Pembroke College, Oxford. He was much distinguished, both at school and at the university. Having chosen the profession of

the law, he was in 1741 entered at the Middle Temple, and on this occasion published the ad¬

mired verses called the (Lawyer's Farewell to His Muse,* which appeared in (Dodsley's Mis¬

cellany. * In 1744 he was elected fellow of All Souls College, Oxford, and in 1746 was called to the bar, and commenced the practice of law.

Being deficient in the art of elocution, and not possessed of the popular talents of an advocate, his progress was slow. Having attended the

courts of law at Westminster for seven years without success, he determined to quit the

practice of his profession and retire to his fellowship at Oxford. The system of education in English universities makes no provision for teaching the laws and constitution of the

country, Blackstone undertook to remedy this defect by a course of lectures on that important subject; and the manner in which he executed the task has conferred a lasting distinction on Oxford. His first course was delivered in 1753, and was repeated for a series of years with increasing effect and reputation. These lectures doubtless suggested to Mr. Viner the idea of founding, by his will, a liberal establishment in the University of Oxford for the study of the common law ; and Blackstone was appropri¬

ately appointed the first Vinerian professor.

His engagements at Oxford did not prevent his occasional practice as a provincial barrister; and in 1754, being engaged as counsel in a contested election for the county of Oxford, he was led into considerations on the elective franchise, which produced his work entitled Consideration BLACKSTONE — BLACKWELL

on Copyholders* (1758). In 1759 he published a new edition of the Great Charter and Charter of the Forest, with an historical preface; and during the same year, the reputation which he had obtained by his lectures induced him to resume his attendance at Westminster Hall,

when business and the honors of his profession soon crowded in upon him. In 1761 he was

elected member of Parliament for Hindon,

Wilts, made king’s counsel and solicitor-general to the Queen. About this time he married, and thereby losing his fellowship, was appointed principal of New Inn Hall (1761) which office he resigned in 1766. In 1765 he published the first volume of his Commentaries on the Laws of

England* ; a work of greater merit than any which had yet appeared on the subject, and which has brought him lasting fame. He was returned for Westbury in 1768. The real merit and talents of Blackstone, backed by political influence, now made him an object of minis¬

terial favor, and he was offered the post of solicitor-general in 1770, and, declining it, was made one of the justices of common pleas,

which station he held until his death, in his 57th year.

BLACKSTONE, Mass., town in Worces¬

ter County, on the Blackstone River, and on the New York, New Haven and Hartford Railroad.

It is an important manufacturing town, first settled in 1700, and is the centre of an extensive agricultural region. It has several churches, schools, library, weekly newspapers, electric lights and excellent water power. Pop. 5,648.

BLACKSTONE, Va., town in Nottoway

County, on the Norfolk and Western Railroad, 35 miles west of Petersburg. It is situated in a tobacco-growing and dairying region and has manufactories of tobacco, home-building mate¬

rials, fertilizer, excelsior, barrel-headings, a canning establishment and a creamery. It has two banks with total resources of about $1,-

000,000, assessed property valuation of $900,000, a girls' college, a military academy, high school, a music hall and five churches. It has also a water supply system, a sewer plant and electric¬

lighting plant. The government is on the gen¬

eral manager plan, with a mayor and seven

councilmen. Pop. (1920) 1,381.

BLACKSTONE RIVER, Mass., a river

of eastern New England; rises in Paxton and Holden townships, Worcester County, flows-southeast into the State of Rhode Island, and empties into the Providence River, near Provi¬

dence, where it is known as the Seekonk. It is over 50 miles long, and

falls over 700 feet, thus affording abundant waterpower, and for

a great part of its course flows through an al¬

most continuous line of manufacturing estab¬

lishments.

BLACKTAIL, the name of two different

species of western American deer, notable for the blackness of the tail as compared with the snowy white tail of the eastern or “white-tailed®

deer. One of them is more suitably called

“mule® deer, and is described elsewhere under that title. The other is the Columbian or Pa¬

cific Coast deer (Cervus , or Odocoileus, co-lumbianus) .

The Columbian blacktail is somewhat smaller

than the mule deer, with relatively shorter ears and finer hair. The general color in summer is red or reddish-yellow ; in winter the color is more varied. The coat is then brownish-gray, darkest along the spine ; top of head, chestnut and black; face gray, with a black spot on the forehead, passing backward as a stripe over each eye ; chin white, behind which is a black patch ; upper throat, posterior portion of under part, and base of tail, white; chest, sooty; legs, dark cinnamon, white inside, and rest of under parts covered with black; upper surface of the tail, black. The antlers of the buck resemble those of the mule deer. This deer is limited to the Pacific coast, from central California north¬

ward to Alaska, and does not pass east of the coast ranges of mountains. It is a deer of the woods, frequenting the foothills and valleys, especially those covered with small brush ; and its-habits and gait more nearly resemble those of the white-tailed deer than of the mountain-loving mule deer. Its hunting affords excellent sport, and its venison is highly prized. See also Deer. Consult Farrell in Shields’ (Big Game in North America) (Chicago 1890), and

VanDyke, (The Deer Family* (New York

1902).

BLACKTHORN, a shrub or small tree.

See Sloe.

BLACKWATER FEVER, an obscure

but very fatal infectious disease especially prev¬

alent in the low coastal regions of tropical Africa; but wide in its distribution, being known also in Asia, the West Indies, the

Southern States of the American Union, Italy and Greece. The disease is mainly confined to the white race. It is induced by the destruc¬

tion of the red blood corpuscles, which may be caused by the too free use of quinine or from exposure to cold. Weakening of the system

from frequent malarial attacks is also a con¬

tributory cause. The disease is accompanied by great prostration, vomiting, enlargement of

the liver and spleen and the passing of black urine. The patient becomes jaundiced in

color. An almost invariable symptom is

nephritis. The presence of a small annular

non-pigmented intra-cellular parasite has been detected in the blood of sufferers from the disease.

BLACKWELL, Alice Stone, American

reformer, editor and author: b. East Orange, N. J., 14 Sept. 1857. A graduate and later a trustee of Boston University, she was early associated with her father and mother in edit¬

ing The Womans Journal and from 1885 to

1905 also edited The Women's Column. As

chairman of the literature committee of the National American Woman Suffrage Associa¬

tion and a forceful contributor to the Political Equality series and to periodical literature she became prominent in the cause of woman suf¬

frage, and also worked on behalf of the op¬

pressed Armenians and others. Her published

works include (Armenian Poems) (1896) ;

< Songs of Russia) (1906); <Songs of Grief

and Joy) translated from the Yiddish of

Ezekiel Leavitt (1908). Her father was a

brother and she is the niece of the well-known physicians Elizabeth and Emily Blackwell

(q.q.v.) ; also edited (The Little Grandmother of the Russian Revolution; Reminiscences and Letters of Madam Breshkovskaya) (1917).

BLACKWELL, Mrs. Antoinette Louisa

(Brown), American woman suffragist and Uni¬

tarian minister : b. Henrietta, N. Y., 20 May 1825. A graduate of Obcrlin College (1847), she (<preached on her own orders,® at first

in Con¬

gregational churches, becoming at length a

champion of women's rights. She married

Samuel C., a brother of Dr. Elizabeth Blackwell (1856). She has written (Shadows of

Our Social System 5 (1855) ; (The Island

Neighbors5 (1871), a novel of American life; (Sexes Throughout Nature> (1875) ; (The Phy¬

sical Basis of Immortality) (1876); (The

Philosophy of Individuality5 (1893) ; (Sea

Drift, or a Tribute to the Ocean5 (1903).

BLACKWELL, Elizabeth, American phy¬

sician : b. Bristol, England, 3 Feb. 1821 ; d. Lon¬

don, 1 June 1910. In 1831 her father and

family came to New York and in 1837 settled in Cincinnati, where he died soon after. For some years Elizabeth helped her mother to sup¬

port eight other children by keeping a boarding school. In 1844 she resolved to become a phy¬

sician and overcoming much serious opposition obtained admission to Geneva Medical College, Geneva, N. Y., where she was graduated with highest honors 1849, being the first woman

to obtain a medical degree in the United States.

She studied later with her sister Emily in Paris, again overcoming all opposition, and to¬

gether in 1853 they started in New York, the Infirmary for Women and Children, the first institution of its kind conducted solely by women. In 1868 they founded the Woman's

Medical College of the New York Infirmary

which was afterward affiliated with Cornell

Medical College when that institution became co¬

educational. In 1869 Dr. Blackwell settled in London and assisted in founding the National Health Society of London and the London

School of Medicine for Women. She lectured

extensively on medical and educational topics and wrote among other books (The Physical

Education of Girls) (1852); (Moral Education of the Young5 (1879) ; (The Human Element

in Sex5 (1884) ; (The Influence of Women in Medicine5 (1889), and (Pioneer Work in

Opening the Medical Profession to Women5

(1895).

BLACKWELL, Emily, American phy¬

sician: b. Bristol, England, 1826; d. London, 8

Sept. 1910. Following the example of her sister Elizabeth, after being refused admission to

medical study at 11 different schools, including Geneva Medical School which had admitted her sister, she entered the Bellevue free hospital in New York city and later was received by the Western Reserve University where she com¬

pleted her course. She studied in Edinburgh and in Paris with her sister, and was associated with her through all her professional career.

BLACKWELL, George Lincoln, Ameri¬

can author and bishop of the African Methodist Episcopal Zion Church : b. Henderson, N. C., 2

July 1861. His parents were slaves. He was graduated from Livingstone College, Salisbury, N. C., in 1888, and from Boston University School of Theology 1892. He became dean of Livingstone College Theological School of the African Methodist Episcopal Zion Church

1893-96, general agent of the denominational publishing house and editor 1896-1900; general secretary 1900-04, combined with missionary

secretary (1904-08) and bishop 1908. He was the delegate of his Church to the Ecumenical Councils at London (1907) and at Toronto

(1911). He is the author of (The Model

Homestead5 (1893) ; (Cloaks for Sin5 (1904) ; (A Man Wanted5 (1907).

BLACKWELL, Lucy Stone. See Stone,

Lucy B.

BLACKWELL, Thomas, Scottish clas¬

sical scholar: b. Aberdeen, 4 Aug. 1701; d.

Edinburgh 1757. He was graduated at Marischal College in his 18th year, and was ap¬

pointed professor of Greek when 22, and prin¬

cipal in 1748. His works include (Inquiry into the Life and Writings of Homer5 in (1737) ; (Proofs of the Inquiry into Homer’s Life and Writings5 ; (Letters Concerning Mythology5

(anon., 1748), and (Memoirs of the Court of Augustus5 (Vol. I, 1753; Vol. II, 1755 and Vol.

Ill posthumously in 1764).

BLACKWELL, Okla., city in Kay County,

110 miles north of Oklahoma City, on the Chi-kaska River, and on the Atchison, Topeka and Santa Fe and the Frisco Lines. Oklahoma

State College (Baptist) is located here. In the neighborhood are large deposits of natural gas. The city's industries comprise brick, clay and glass works and flouring mills. Pop. 7,174.

BLACKWELL'S ISLAND, N. Y., an

island in the East River belonging to New

York city. It has an area of about 120 acres, and contains the penitentiary, almshouse, luna¬

tic asylum for females, workhouse, blind asy¬

lum, hospital for incurables and a convalescent hospital. Nearly all of these buildings were erected from granite quarried on the island, by convict labor, the style of architecture being of a turreted and battlemented design of feudal character. The island is bordered by a heavy granite sea wall, also built by the convicts, and a large amount of farming and gardening is carried on by inmates of the penitentiary.

BLACKWOOD, Adam, Scottish writer :

b. Dunfermline, 1539; d. 1613. Scotland, dur¬

ing his youth, was undergoing the agonies of the Reformation. He therefore found it no

proper sphere for his education, and went to Paris, where, by the liberality of his youthful sovereign, Queen Mary, then residing at the court of France, he was enabled to complete his studies, and to go through a course of civil law at the University of Toulouse. Having

now acquired some reputation for learning and talent, he was patronized by James Beaton, the expatriated archbishop of Glasgow, who recom¬

mended him very warmly to Queen Mary and

her husband, the Dauphin, by whose influence he was chosen a member of the Parliament of

Poictiers, and afterward appointed to be pro¬

fessor of civil law at that court. His first work was one entitled (De Vinculo Religionis et Im¬

perii, Libri Duo5 (Paris 1575), to which a third book was added in 1612. His next work was entitled (Apologia pro Regibus,5 and professed to be an answer to George Buchanan's work, (De Jure Regni apud Scotos.5 He next pub¬

lished, in French, an account of the death of his benefactress, Queen Mary, under the title, (Martyre de Maria Stuart Reyne d'Escosse5

(1588). At the end of the volume is a collec¬

tion of poems in Latin, French and Italian, upon Mary and Elizabeth, in which the unfortu-BLACKWOOD — BLADDER

nate Queen is praised for every excellence, while Elizabeth is characterized by every epithet ex¬

pressive of indignation and hate. In 1644, 30

years after his death, appeared his (Opera Omnia,* in one volume, edited by the learned Naudeus, who prefixes an elaborate eulogium

upon the author.

BLACKWOOD, William, Scottish book

seller, known as the projector and publisher of Blackwood's Magazine: b. Edinburgh, 20 Nov.

1776; d. 16 Sept. 1834. Ele settled in his native city as a bookseller in 1804, and soon added the trade of a publisher to his original business.

The first number of Blackwood's Magazine ap¬

peared on 1 April 1817, and from the first it was conducted in the Tory interest. It was started just at the time when the general peace which had been established in Europe was be¬

ginning to reanimate the hopes of the Whigs, and when it was all the more necessary for the Tories to defend by the press that preponder¬

ance which they still held in Parliament. Mr.

Blackwood was fortunate enough to secure as coadjutors in his new literary undertaking most of the leading authors of the day belonging to the Tory party, among them John Gibson Lock¬

hart, Hogg (the Ettrick Shepherd), Professor Wilson (Christopher North), De Quincey (the

English Opium-eater), and others. All that

was connected with the management of the

magazine he took into his own hands, and he himself selected the articles for each number —a task for which he was admirably qualified, for although he wrote little himself, he was an admirable judge of literary work. The new

magazine on its first appearance entered upon a campaign against the Edinburgh Review, com¬

bating both its political views and its literary decisions.- From the first it attracted a great deal of attention, and its success was decided by the appearance of the (Noctes Ambrosianae,* a series of articles in the form of dialogues, in which the current questions in politics and lit¬

erature were discussed with the most pungent sarcasm and inexhaustible humor. The bril¬

liant articles of Dr. Maginn added not a little to its reputation, and constantly, as the original contributors withdrew, new and valuable acces¬

sions were made to the staff of its supporters.

After his death his business continued to be carried on by his sons, and the magazine he founded still maintains the Tory tradition as wrell as the high literary reputation of its early days. Consult ˆWilliam Blackwood and His

Sons,* by Mrs. Oliphant and Mrs. Porter (3

vols., 1897-98).

BLACKWOOD. See Dalbergia.

BLACKWOOD'S MAGAZINE. See

Blackwood, William.

BLADDER, the muscular organ that in

man and the lower animals holds the urine.

The kidneys secrete urine constantly, the blad¬

der stores it and only empties itself at more or less definite intervals. In man the bladder is a flattened rounded to conical organ about the size of an orange, and holding under normal conditions about 16 ounces of urine (one pint).

It is situated in the lower portion of the ab¬

dominal cavity just behind the pubic bone,

which serves as a protection. Its general shape is rounded triangular, the flat side being above, the ureters leading from the kidneys entering at the corners ; the pointed end corresponding to the opening

into the urethra, through which canal the urine is voided. The walls of the bladder are made up of several layers; the outer wall is of peritoneum in part, or serous and connective tissue combined. The greater

part of the wall is made up of involuntary muscle fibres arranged longitudinally and cir¬

cularly; the innermost coat is thin and delicate, — the mucous membrane, — and is lined through¬

out by layers of regularly flattened squamous epithelial cells. The nervous supply of the bladder, by means of which it is emptied, is complex and probably threefold. It is under the influence of jhe vegetative nervous system of the hypagastric plexus; there are subsidiary centres in the spinal cord and higher up in the human cortex certain voluntary efforts have

their influence on the bladder control. The primary receptor nerve cells of the vegetative system are in the bladder wall. These cause the. bladder in the young infant, and also in the patient whose spinal cord control pathways are cut off, to be emptied and in the so-called irritable bladder .it is probable that this part of the mechanism is mostly affected.

There is a very marked relation between the skin activities and the kidney and bladder ac¬

tion, for while the skin is acting freely as in exercise in warm weather, a large amount of water is thus given off, which in cold weather is eliminated through the kidneys and thus by the bladder. This is noted daily when in cold

weather one leaves the warm house and shortly after walking in. the cold of the outside air, the desire to urinate becomes urgent. Irrita¬

bility of the bladder, particularly in children, and bedwetting is often a very troublesome

complaint. It may be due to a variety of

causes ; excessive irritation, however, would probably not result , in bedwetting, particularly in older children, if the control (inhibition) normally maintained by the brain were not cut off by deep slumber,

thus permitting unconscious trends of the child to come to the fore. These unconscious trends are usually of an erotic na¬

ture, hence the treatment by psychoanalysis is indicated. Infection of the bladder is very fre¬

quent following gonorrhea and leads to many serious complications. (See Cystitis). Stones also develop in the bladder. See Calculus.

Paralysis of the bladder per se is a rare af¬

fection ; paralysis of the sphincter that controls the outlet may result from a variety of causes.

It usually results in incontinence of urine. Re¬

tention is an opposite condition and is fre¬

quently due to loss of vegetative nerve action, such as follow labor, or an operation, or from the anaesthesia of opium, belladonna or similar narcotics. It may also be due to mechanical ob¬

struction, in old men, particularly being due to an hypertrophied prostate gland. In many

effeminate individuals weakness of the bladder is a symptom of conscious or unconscious

masturbation. Weakness of the bladder with

either retention or increased frequency of

urination is a frequent early sign of severe nervous disorders, such as paresis, tabes,

multiple sclerosis, tumor of the spinal cord.

Consult Jelliffe and White, (Diseases of the Nervous System* (1917).

Smith Ely Jelliffe.

BLADDER, Diseases of. These may be

classed as malformations, injuries and diseases proper. Occasionally the intestines and ureters enter a common pouch, cloaca, as in certain lower animals. Rarely the bladder is absent entirely. One of the most frequent malfor¬

mations is exstrophy, in which there is no front wall to the bladder, it opening directly, from failure of the anterior abdominal wall to close. The hind wall of the protruding blad¬

der becomes red and irritated and inflamed.

The treatment is exclusively surgical, save

when the exstrophy is slight or incomplete, when certain types of apparatus may be found efficient. Diverticulum of the bladder is an¬

other form of malformation. Here small

sacculations are present, which, usually filling with residual urine, give rise to a cystitis.

Hernia of the bladder consists in a displace¬

ment which may be congenital or acquired. It may occur at the site of other ruptures of the body, chiefly inguinal in man, and vaginal or femoral in women. Cystitis is the chief danger here as well and the treatment is surgical.

Wounds of the bladder are infrequent save in war times when they are apt to be extremely prevalent and usually complicated by splintered wounds of the pelvis. Infection is less apt to occur and most punctured

wounds of the blad¬

der are readily treated surgically. Rupture of the bladder usually results from severe crush¬

ing accidents. Occasionally, in the diseased bladder, the pressure of retained urine may cause rupture ; rarely this occurs during labor.

The initial symptoms are usually as if some¬

thing gave way on the inside. If the bladder has been greatly distended there may be a

momentary feeling of relief. Pain in the whole abdominal cavity soon develops. Shock is

added, the patient is prostrated and unable to walk. Treatment by surgical means is impera¬

tive.

Tumors of the bladder are frequent. They

are papilloma, carcinoma, myoma, fibroma and sarcoma. These tumors are usually accom¬

panied by intermittent bloody urination and by pain. Cystitis develops and even non-malignant tumors — i.e., those other than sarcoma or carcinoma, — may cause death from the changes which follow the cystitis, pus kidneys, *etc.*

Exact diagnosis of tumors of the bladder can usually be made by the use of the cystoscope, an instrument permitting an inspection of the interior of the bladder. Cancer of the bladder is usually accompanied by severe pains. Surgi¬

cal treatment is alone available for tumors of the bladder. The non-malignant tumors may

exist for many years and give rise to but slight inconvenience. The malignant tumors, chiefly

cancer, are fatal within a few years unless diagnosed early and properly treated.

Cystitis is the name given to an inflamma¬

tion of the lining membrane of the bladder.

The mucous membrane of the bladder is highly resistant to infection, hence a cystitis here is frequently something more than a mere in¬

fection of the bladder itself. The chief cause for a cystitis is gonorrhea. This is to be re¬

garded as an extension from the urethra. It is rare save in the predisposed bladder, hence certain authors speak of the rarity of a gon¬

orrheal cystitis. While this may be a technical distinction made by the specialist, for practical purposes, a gonorrheal cystitis is a cystitis.

The chief early symptom of a cystitis is the increased frequency of the desire to urinate.

This may be slight or it may consist of a per¬

sistent painful urge which accomplishes with agony the passage of but a few drops of urine.

Pain may be slight, save in the more marked cases, when it may be severe and persistent.

It is felt just behind the pubic bone, or in the perineum, shooting down the thighs, to the

testicles, and down the penis. Pain in the neck of the bladder is specially referred to the per¬

ineum and the end of the penis. In most

cases there is some fever, and constipation is the rule. Pus is found in the urine which latter is frequently alkaline in reaction.

An acute cystitis may persist' for from two to three weeks. Such is its usual course, but under unfavorable conditions it may persist

much longer or even progress to a chronic

cystitis which may continue for months or

years.

Stone in the bladder, stone in the kidneys, foreign bodies in the bladder, give rise to chronic forms of cystitis, in which the symp¬

toms just enumerated may be added to by the presence of blood in the urine; pus, shreds of mucus and other forms of bladder detritus are to be expected.

There is a type of true cystitis — an inter¬

stitial parenchymatous inflammation of the

bladder wall — which is more severe than the catarrhal variety of cystitis just described. It often results in localized abscess formation of this structure.

The treatment of cystitis requires very

skilled advice and careful technique. Ex¬

tension of the infection — usually gonorrheal —to the kidney results in serious kidney disease — pus kidney. All operative procedures — principally catheterization (prostatic disease in older men being one of the chief disturbing necessities) — should be done with the strictest aseptic precautions. All catheters should be cleansed, boiled and used before being soiled by any contacts. Rest in bed, a quieting sup¬

pository and irrigation are the chief means at hand for the actual treatment. Hip baths, hot applications are grateful, increased water drink¬

ing tends to make the urine less irritating.

Citrates, as in fruit juices or chemical com¬

pounds, are advisable. The diet should be

regulated. In the mild cases irrigation may not be needed, but in persistent pus states and foul urine, irrigation is desirable. The use of special drugs may be indicated by the trained physician.

Stone in the bladder is a particularly import¬

ant affection of this viscus. These stones may be composed of uric acid, oxalate of lime or of phosphates. The symptoms are pain, fre¬

quency of micturition, bleeding. The pain is apt to be colicky in nature, severe at the end of urination and referred down the penis or to the perineum or rectum. The bleeding is apt to be intermittent and often appears after much jolting. It may be a thin, blood-colored urine, or drops of clear blood may be expelled at the close of micturition. The treatment is by crushing by appropriate instruments. The

X-ray is of considerable value in the diagnosis.

Smith Ely Jelliffe.

BLADDER-NUT (Staphylea) , the type

genus of the family Staphyleacece, consisting of BLADDERWORM — BLAIKIE

about eight species of ornamental shrubs or small trees, natives of the northern hemisphere.

The common bladder-nut (S. pinnata) a native of Europe and Asia, which attains a height of 15 feet, and is often planted for ornament, bears panicles of whitish flowers in late spring.

The American bladder-nut (S. trifolia), which ranges from Quebec to Minnesota and south¬

ward to South Carolina and Missouri, bears

nodding panicles or umbel-like racemes of

white flowers and, like several of the other species, is used in shrubberies. The wood of the two species mentioned is white and hard and is used in turning. The flower buds are pickled like capers and the seeds sometimes eaten. The common name is suggested by the inflated capsule and the hard shell of the seed; the generic name by the resemblance of the raceme to a bunch of grapes, the staphyle of the Greek language.

BLADDERWORM, Cysticercus or im¬

mature stage of the tapeworm, the hydatid of physicians. See Tapeworm.

BLADDERWORT, Utricularia, a genus

of about 200 species of largely aquatic herbs of the family Pingaiculacece widely distributed

throughout the world, but especially abundant in the tropics. The aquatic species are remark¬

able for the little, sometimes valved, bladders which entrap and digest aquatic insects and other water animals. The bladders, which are at first filled with water, become inflated with air at flowering time so that the flower, in¬

stead of being submerged like the rest of the plant, is raised above the surface until after blossoming, when water again fills the blad¬

ders, the plants sinking to the bottom, where the seeds are ripened. These aquatic species, of which about a dozen with yellow or blue

flowers are natives of the United States, are common in ditches, ponds and marshes through¬

out the world. They are sometimes cultivated in aquaria more as curiosities than for any intrinsic beauty. In the marsh species the

bladders are less effective and numerous than in the pond species, and

in the terrestrial kinds they are small, abortive and useless.

These last have leaves of ordinary forms

and are often tuberous, where members

of the first group have much dissected foliage like other pond plants and are rootless. Some of the tropical species are showy and are cul¬

tivated in hothouses like orchids, with some of which they compare in beauty. Consult Bailey, < Cyclopedia of Standard Horticulture) (1914).

BLADEN, Frank Murcott, Australian

author: b. Hanley, England, 23 Dec 1858. He was graduated from Sidney University in 1858, winning the University gold medal for English verse and the Lord Rosebery medal for Eng¬

lish prose and graduating in law. In 1895 he became head of the Public Library of the state of New South Wales, a position he held for 10 years, when he was appointed chief state librarian. He has written exhaustively and

learnedly on Australian history on which he is a recognized authority; and he is the editor of the work historical Records' (7 vols.), which forms a complete record of the settlement and early history of Australia (1762-1811). He

represented the Australian Commonwealth at

the International Conference of Historians

held at Rome in 1902. Among his published

works are (China' (poem) ; (The Growth and Development of the Australian Colonies and

their Relation to the Mother Country' ; Euro¬

pean Archives' ; 'Peopling Australia' ; his¬

torical Notes,' and (The Early Governors' (of Australia).

BLADENSBURG, Maryland, small town

in Prince George County, on the east branch of the Potomac, about six miles east from Wash¬

ington, with a population in 1910 of 500. At the bridge over the Potomac west of Bladensburg, the battle with the English, which preceded the capture of Washington, took place toward the latter part of the War of 1812. General Ross and Admiral Cockburn, with about 5,000 men, appeared in Chesapeake Bay to attack Wash¬

ington. The American forces fell back to

Bladensburg and awaited the British. The

Americans numbered about 7,000, but were scat¬

tered and untrained. On 24 Aug. 1814, the

British advanced to the attack. The American artillery held them in check for a time, but the troops pushed forward. The Americans fled in wild disorder; the confusion spread and soon General Winder, the American commander,

gave orders for a general retreat. The Ameri¬

can loss was 76 men ; the British more than 500

killed and wounded. Bladensburg is famous in American history as the site of the duelling grounds where many famous duels growing out of quarrels in Washington were fought, as that in which Barron killed Decatur in 1820.

BLADENSBURG, Battle of. See Wash¬

ington, D. C., Campaign against and Burn¬

ing of.

BLAGOVESHTCHENSK, bla-go-vyesh'-

chensk, Russia, town on the Manchurian fron¬

tier of eastern Siberia, capital of the province of the Amoor, on the river Amoor, where it re¬

ceives the Zeya. Founded as a military post in 1856, it is now an important place, the seat of a bishopric, with flour mills, iron works and ship¬

building, and the centre of important gold

fields. In July 1900, the Chinese made an in¬

effective assault on the town ; in revenge some Chinese residents were massacred, and, under circumstances of great barbarity, thousands of Chinese were ordered across the river frontier and many of them drowned. Pop. 40,399.

BLAGUE, blag (French), humbug, brag,

intended to mystify; its earlier meaning, a tobacco pouch. Littre traces the word to the Gaelic blagh, to inflate, to blow.

BLAIKIE, William Garden, Scotch

clergyman : b. Aberdeen, 1820; d. 11 June 1899.

He was graduated at the University of Aber¬

deen ; ordained a minister of the Established Church in 1842; joined the Free Church in 1843, and was appointed professor of apologetics and pastoral theology in New College, Edinburgh, 1868-97. He took a leading part in the forma¬

tion of the Alliance of the Reformed Churches, and established a reputation as an editor of re¬

ligious periodicals. His writings include (Bible History in Connection with General History'

(1859) ; 'Bible Geography' (1860) ; 'Better Days for Working People' (1863) ; (Glimpses of ' the Inner Life of David Livingstone'

(1880) ; ‘Public Ministry and Pastoral Methods of Our Lord’ (1883); ‘Leaders in Modern

Philanthropy’ (1884), *etc.*

BLAINE, Ephraim, American soldier: d.

Carlisle, Pa., 1808. He entered the army as a colonel at the commencement of the Revolu¬

tionary War, and was subsequently made com¬

missary-general. His services were gallant and patriotic. He was with Washington in many of the most trying scenes of the Revolution, and enjoyed the confidence of his chief to the fullest extent. During the ((dark winter® at Valley Forge, the preservation of the American army from starvation was in a great degree owing to the exertions and sacrifices of Colonel Blaine.

James Gillespie Blaine, the well-known states¬

man, was his grandson.

BLAINE, James Gillespie, American

statesman: b. West Brownsville, Pa., south of Pittsburgh, 31 Jan. 1830; d. Washington, D. C., 27 Jan. 1893. His father was a Presbyterian of Scotch-Irish blood; his mother was a

Catholic. He was a lad of quick action and good memory, who excelled in spelling matches and debates. He began the study of law but he never practised. For about two years he was professor in the Western Military Insti¬

tute at Georgetown, Ky., and there he acquired a taste for political

life. We next get a glimpse of him in Philadelphia as a teacher and contrib¬

utor to the Daily Inquirer of that city. As a youth of 21 he became part owner of the Kene-bec Journal, published in Augusta, Me. His

work on this journal gained him a vast influ¬

ence and he quickly made his mark in Maine politics. The governor sent him on a mission to examine the prisons and penitentiaries of other States, with a view to the improvement of those of Maine; and he was a delegate to the Republican convention at Philadelphia

which nominated Fremont. His renown as an

orator and as a party organizer was now wide¬

spread. In 1858 he was elected a member of the Maine Legislature, and soon became

speaker of the House. In 1862 he was re¬

turned to Congress where his mastery of par¬

liamentary law and his eloquence in debate

soon won him distinction. The Civil War was still raging, but fortune was beginning to de¬

clare unmistakably for the North. Blaine's

name is not conspicuously written in any his¬

tory of the war, but he was among the fore¬

most in directing the policy and details of Reconstruction. Blaine was a born member

of Congress. His vigor, acumen, readiness,

and unfailing energy marked him out as a

party leader. He was elected speaker of the House of Representatives in 1869 — an office which he held till 1874 — a period of almost unequalled length. On all hands it was ad¬

mitted that in that difficult position he dis¬

played rare talents and judgment. Since Henry Clay there had been no more successful speaker.

His history for 10 years is really the history of Congress. He served on all the principal committees. He spoke often, and always with effect. Never was his ability questioned; un¬

fortunately his integrity was assailed on an occasion which cannot be passed over in any truthful biographical notice of Mr. Blaine. In 1876 an investigation by the Committee of the House of Representatives brought to light cer¬

tain letters — famous ((Mulligan Letters,® writ¬

ten bv him in 1869, when he was speaker of the House. We need not set out the text of these much controverted letters, or revive a controversy now forgotten. It is enough to

say that they contained expressions open to various interpretations and which demanded

explanation. The genuineness of these letters was not disputed, but over their signification all politicians, the press and the general public were greatly divided. It was urged by Mr.

Blaine's friends that the matter was absurdly magnified and distorted by those who resented his free, fearless speech. On 5 June 1876 Mr.

Blaine read the letters before the House, mak¬

ing explanations of them one by one. He

defeated his opponents in the debate immedi¬

ately following, and to all appearances clearly exonerated himself of all wrong-doing. But

the effect throughout the land was immense

and even in his own party many influential members lost their faith in him. This was

made manifest when his candidacy was put

forward at the Convention of 1876, where,

though he held the field for several ballots, he was in the end defeated

by Rutherford Hayes of Ohio, by only a small majority. Senator Morrill of Maine becoming Secretary of the

Treasury, Mr. Blane was chosen senator for

the unexpired term, and the following winter for the full term. He opposed the electoral commission on the ground that Congress was

conferring powers beyond its own ; opposed

Hayes' withdrawal of the troops that upheld the carpet-bag governments; opposed the Bland Silver Bill and the adoption of the gold stand¬

ard alike, believing bimetallism feasible and preferable ; advocated ship subsidies, and rigid prohibition of Chinese immigration. In 1880

the attempt at a third term for Grant was defeated by the Blaine forces, who gave him 284 votes on the first ballot ; but after six days and 35 ballots, seeing that Blaine could not be nominated, united with the Sherman party to nominate Garfield, by 399 to Grant's 306.

Blaine became Secretary of State, and in his short tenure he planned a Pan-American Con¬

gress, attempted mediation between victorious Chile and crushed Peru, and attempted to in¬

duce England to consent to a modification of the Clayton-Bulwer Treaty. The assassina¬

tion of Garfield, and the accession of Arthur, the lieutenant of Blaine's mortal enemy, Roscoe Conkiing, made his place untenable and he

retired from President Arthur's cabinet in De¬

cember 1881. Then came what for Mr. Blaine was a period of inactivity and of seclusion in his home at Augusta, varied by writing a book in two large volumes entitled (Twenty Years In Congress, } a work of considerable value, issuing the first volume in 1884, in time to do good work conciliating support for the next election. Again the presidential campaign

came round, and this time Blaine was nomi¬

nated at the Chicago Convention. Into the

contest, one of the bitterest in United States history, he threw himself with his usual energy.

At the election the Independent Republicans

deserted Blaine and voted for Cleveland.

Blaine was again doomed to disappointment.

He missed that which had been the aspiration of his political life. The chief reasons for his defeat were the hostility of Conkiing and his followers, the defection of the Independent

Republicans, and the fact that, although Blaine was well disposed toward his Cathoiic fellow countrymen, he had allowed the Rev. Samuel

D. Burchard to style the Democratic party

(< the party of Rum, Romanism, and Rebellion. ®

After his defeat he issued the second volume of his work (1886), and the next year a vol¬

ume entired (Political Discussions.) Again

a candidate in 1888, he was obliged to with¬

draw in favor of Harrison, and was made

Secretary of State once more; he resumed his Pan-American policy, made a futile attempt to induce Great Britain to join in preserving the seals from extermination, and favored a reci¬

procity commercial policy which made manv

of his old opponents draw toward him. He.

resigned in 1892, in hope of securing the next Republican nomination, but found it out of

the question. He died early the following

year, of Bright's disease. In the view of Mr.

Blaine's many friends he had no rival or second among his countrymen. They spoke, and no

doubt with perfect truth, of his generosity in private life; they scouted all suspicion of his integrity, in their eyes he was ((the peerless statesman,® uniting the best qualities of Henry Clay, Webster, Sumner and Henry Wilson.

Still, in spite of the warmth and multitude of his friends, he had to endure the distrust —perhaps exaggerated and unjust, but deep-rooted and lasting — of a large number of his countrymen, who persisted in viewing him as the representative of a type of politician with which they would fain forever have done.

Abroad his policy was not always thought

well of ; and his most searching critics, his relentless enemies, were certain members, and not the least honorable or powerful, of the Republican party. Consult the biography by

his kinswoman, Gail Hamilton (Norwich

1895) ; also the biography by Stanwood (Bos¬

ton 1905) ; id., (History of the Presidency) (ib., 1898) ; Conwell, (Life and Public Service of James G. Blaine) (Muskegon 1884) ; Craw¬

ford, (James G. Blaine) (Philadelphia 1893) ; Peck, Harry Thurston, (Twenty Years of the

Republic) (New York 1906-13) ; id., Ameri¬

can Party Leaders* (ib., 1914) ; Varigny, (Les Etats — Unis) (Paris 1892).

BLAINVILLE, blan'-ve', Henri Marie

Ducrotay de, French naturalist: b. Arques,

near Dieppe, 1777; d. 1 May 1850. He studied medicine and the allied sciences at Paris, and was for a time assistant to Cuvier, whose in¬

fluence helped to place him in the chair of anatomy and zoology in the Faculty of Sciences at Paris in 1812. Unfortunately misunder¬

standings soon arose between the master and his comparatively youthful rival, and ultimately terminated in open rupture. In 1825 Blainville was admitted to the Academy of Sciences, and in 1829 the department of mollusca, zoophytes and worms in the Museum of Natural History was committed to Blainville. In 1832 he be¬

came the successor of Cuvier in the chair of comparative anatomy in the same establish¬

ment. The following are among his more im¬

portant works: (De l'organisation des ani—

maux ou Principes d'anatomie comparee*

(1822) ; (Manuel de malacologie et de conchy-liologie) (1825) ; (Cours de physiologie generale* (1829-32) ; (Manuel d'actinologie*

(1834); (Sur les principes de la zooclassie >

(1847), and above all, the gigantic but unhap¬

pily unfinished work entitled (Osteographie ou description iconographiquc comparee* (1839-50).

BLAIR, Andrew Alexander, American

chemist : b. Kentucky, 20 Sept. 1848. He gradu¬

ated at the United States Naval Academy, 1866; was chief chemist to the United States com¬

mission to test iron, steel and other metals, 1875-78, and to the United States Geological Survey and 10th census, 1879-81. Since then he has been engaged in general practice. Be¬

sides reports to the government and contribu¬

tions to scientific journals he has published (The Chemical Analysis of Iron : Complete

Account of all the Best-Known Methods for

the Analysis of Iron, Steel, etc.* (Philadelphia 1888), which has passed through eight editions.

He is a member of the American Philosophical Society, the American Chemical Society, the

Institute of Mining Engineers, Society of

Chemical Industry (Great Britain) and fellow of the American Association for the Advance¬

ment of Science.

BLAIR, Andrew George, Canadian states¬

man : b. Fredericton, 7 March 1844; d. 1907.

He was educated at the College School, Fred¬

ericton, and called to the bar in 1866. He entered the New Brunswick legislature in 1878, becoming leader of the opposition in 1879. He was Prime Minister of the province 1883-96, and carried through a number of important re¬

forms. He joined the Laurier ministry in 1896

as minister of railways and canals, and became in 1904 first Dominion railway commissioner, retiring in the same year.

BLAIR, Austin, American lawyer: b. Caro¬

line, N. Y., 8 Feb. 1818; d. Jackson, Mich., 6

Aug. 1894. He was graduated at Union College in 1839; studied law in Oswego, N. Y., was admitted to the bar in 1841 and removed to Eaton Rapids, Mich., and was elected county clerk. In 1844 he removed to Jackson, Mich.: was elected to the legislature in 1846; became conspicuous in the convention which established the Republican party

in Michigan, and wras

elected governor of Michigan in 1860. He wras a member of the convention in 1860 that nom¬

inated Abraham Lincoln. Blair was reelected governor in 1862; was the first to be termed (<War Governor.® In 1866 he w7as elected to Congress, was reelected to the 41st and 42d Congresses, and in the latter, while chairman of the committee on claims opposed the Republi¬

can administration. He supported Greeley for the presidency in 1872 and wras chosen regent of the State University in 1883, retaining the position until 1890.

BLAIR, Francis Preston, American jour¬

nalist and politician: b. Abington, Va., 12 April 1791 ; d. Silver Spring, Md., 18 Oct. 1876. In early life he was a Jacksonian Democrat. He edited the Washington Globe from 1830 to

1845. Through his anti-slavery sentiments he became one of the founders of the Republican party, but in later years returned to the Demo¬

cratic faith.

BLAIR, Francis Preston, Jr., American

soldier and statesman (son of the preceding) : b. Lexington, Ky., 19 Feb. 1821 ; d. Saint Louis, Mo., 5 July 1875. He was a representative in Congress from Missouri (1857-59 and 1861-63) ; became a major-general in the LTnion army in the Civil War, taking an active part in

the Vicksburg campaign and Sherman's march

to the sea; was an unsuccessful Democratic

candidate for Vice-President in 1868 and

United States senator (1870-73).

BLAIR, Henry William, American legis¬

lator: b. Campton, N. H., 6 Dec. 1834; d. Wash¬

ington, D. C., 14 March 1920. He was admitted to the bar in 1859 ; served through the Civil War, becoming lieutenant-colonel of the 15th New Hampshire Volunteers, and was twice

wounded. After serving in both branches of the State legislature he was a member of Congress (1875-79 and 1893-95). and United States sena¬

tor (1879-89). He was the author of what is known as the <(Blair Common School Bill,®

designed to distribute a certain amount of Fed¬

eral money for educational purposes among the various Slates in proportion to the number of illiterates. He was a strong opponent of Chinese immigration, and when he was appointed and

confirmed United States Minister to China that government's objection to receiving him ended in his withdrawal. He was an active worker in the cause of temperance and other reforms. He published (The Temperance Movement.*

BLAIR, Hugh, Scottish divine: b. Edin¬

burgh, 7 April 1718; d. 27 Dec. 1800. He com¬

menced his academic career at Edinburgh Uni¬

versity in 1730. In 1741 he was licensed as a preacher, and the following year was ordained to the parish of Collessie, Fife, but a few months after he was elected to the second

charge of the Canongate, Edinburgh. In 1754

he received one of the city charges, that of Lady Yester's Church, and in 1758 one of the charges of the High Church. In 1759 he com¬

menced a course of lectures to students upon the principles of literary composition; and in 1762 he was made professor of rhetoric and belles-lettres in the University of Edinburgh, being the first that ever occupied this chair.

He continued the course till 1783, when he pub¬

lished his lectures, which received very high praise. In 1763 he published a dissertation on the (Poems of Ossian,* in the authenticity of which he firmly believed. It was not till 1777

that he could be prevailed upon to offer to the world any of those sermons with which he had so long delighted a private congregation. One of the sermons having been sent by Strahan, the King's printer, to Dr. Johnson for his opinion, Strahan received from him the following char¬

acteristic note : ((I have read over Dr. Blair's first sermon with more than approbation ; to say it is good is to say too little.® Strahan thereupon agreed to purchase the volume, with Mr. Cadell, for $500. The sale was so rapid and extensive, and the approbation of the pub¬

lic so high, that the proprietors voluntarily doubled the stipulated price. The volume

speedily fell under the attention of George III, and by royal mandate a pension of $1,000 a year was bestowed on Dr. Blair. During the sub¬

sequent part of his life Dr. Blair published three other volumes of sermons ; and it might safely be said that each successive publication only tended to deepen the impression produced by the first.

BLAIR, James, American clergyman and

educator: b. Scotland 1656; d. Williamsburg, Va., 1 Aug. 1743. In 1685 he was sent as a missionary to Virginia by Dr. Compton, bishop of London. There he secured the confidence of the planters, and proved himself far in advance of his contemporaries on the question of

slavery. In 1689 Sir Francis Nicholson ap¬

pointed him <(commissary,» the highest ecclesi¬

astical office in the colony. This office gave him a seat in the council of the colonial govern¬

ment ; he presided over the trials of clergymen, and pronounced sentence upon conviction of

crimes or misdemeanors. His great desire was to see a college established in the colony. The assembly and governor warmly sympathized

with his project; he went to England and laid his plan before William and Mary; and on 14

Feb. 1692, a charter for the college was granted, the bishop of London being appointed chan¬

cellor and Blair president, and the institution named (<William and Mary.® Its opening was

repeatedly delayed, and Blair did not enter on his duties as president until 1729, but his en¬

thusiasm never wavered, and his efforts were finally crowned with success. He left his library to the college. He wrote (Our Saviour's Divine Sermon on the Mount* (London 1722, 4 vols. ; 3d ed., 1740), a work highly considered through¬

out the 18th century.

BLAIR, John, Scottish chronologist and

geographer: d. 24 June 1782. He went to Lon¬

don about the middle of the 18th century. In 1754 the publication of a work in folio, entitled (The Chronology and History of the World

from the Creation to 1753 a.d.,) gained him great reputation. In 1757 was appointed chap¬

lain to the Princess Dowager of Wales, and mathematical tutor to the Duke of York, whom he accompanied, in 1763, on a tour of the Con¬

tinent, having already received several ecclesias¬

tical preferments. On his return to England he published, in 1768, a new edition of his Chron¬

ological Tables, * with 14 maps of ancient and modern geography annexed.

BLAIR, John Insley, American capitalist

and philanthropist : b. Belvidere, N. J., 22 Aug.

1802 ; d. 2 Dec. 1899. In early life he was employed in a country store at Hope, N. J. He settled in Blairstown and acquired an interest in the Oxford Iron Furnace, and became an asso¬

ciate in the pioneer attempt to manufacture iron with anthracite coal, in 1846; subsequently becoming the individual owner of more miles of railroad property than any other man in the world. With the Scranton brothers he con¬

structed the road now known as the Delaware, Lackawanna & Western. He acquired a very

large fortune; loaned the Federal government more than $1,000,000 in the early part of the Civil War; built and endowed at a cost of more than $600,000 the Presbyterian Academy in

Blairstown, N. J. ; rebuilt Grinnell College, Iowa; erected Blair Hall and made other gifts to Princeton University; was equally liberal to Lafayette College ; and had erected more than 100 churches in different parts of the West, be¬

sides laying out many towns and villages on the lines of his numerous railroads.

BLAIR, Montgomery, American lawyer :

b. Franklin County, Ky„ 10 May 1813; d. Silver Springs, Md., 27 July 1883. He was graduated at the United States Military Academy in 1835 ; resigned from the army, 1836; was admitted to the bar, 1839, and began practice in Saint Louis.

He was judge of the Court of Common Pleas, 1843-49; removed to Maryland in 1852; was

United States solicitor in the Court of Claims, 1855—58. He acted as one of the counsel in the widely known Dred Scott case. He changed

from the Democratic to the Republican party on the repeal of the Missouri Compromise, and

was president of the Maryland Republican Con¬

vention in 1861. In 1861-4)4 he was Postmaster-General under Lincoln. During his administra¬

tion the money order system was inaugurated, and the free delivery of mails in cities and the sorting of mails on postal railroad cars intro¬

duced. In 1876-77 he acted with the Democratic party in opposing Hayes' title to the office of President.

BLAIR, Robert, Scotch clergyman and

poet: b. Edinburgh 1699; d. Athelstaneford

1746. He was ordained, in 1731, minister of Athelstaneford, in East Lothian, where he spent the remainder of his life. He was a man of learning and of elegant taste and manners, and assiduous in discharging the duties of his cleri¬

cal functions. His best-known poem, 'The

Grave,' was chiefly composed before his ordina¬

tion. It was first printed in 1743, and is now esteemed one of the

standard classics of English poetical literature, in which rank it will probably remain longer than many works of greater con¬

temporary or even present fame.

BLAIR, Neb., city, county-seat of Wash¬

ington County, 25 miles northwest of Omaha, on the Chicago & Northwestern and the Chi¬

cago, Saint Paul, Minneapolis & Omaha rail¬

roads. Since 1914 Blair has a commission form of government. It is the seat of Dana College and the Crowell Memorial Home for retired

Methodist ministers. It has municipal water¬

works, canning, cider, vinegar, pickle and other domestic industries. Pop. 2,584.

BLAIRSVILLE, Pa., borough of Indiana

County, 50 miles east of Pittsburgh, on the Conemaugh River, and on the Pennsylvania

Railroad. It has a public library and is the seat of Blairsville College (Presbyterian). Its industries comprise foundries, machine shops, railroad repair shops, plate glass and lumber manufactories and enameling works. The

borough was settled about 1818 and was in¬

corporated a borough in 1825. It is governed by a mayor and council, the former being

chosen for a term of three years. The borough owns the waterworks. Pop. (1920) 4,391.

BLAKE, Edward, Canadian statesman : b.

Cairngorm, Ontario, 13 Oct. 1833; d. Toronto, 1

March 1912. He was educated at Upper Can¬

ada College and Toronto University; was called to the bar in 1859 and engaged in practice in Toronto. In 1867 he won seats in both the provincial and Federal houses; was leader of the opposition in the provincial legislature 1870-71, and Premier of Ontario 1871-72. When a law was passed prohibiting dual representa¬

tion he elected to sit in the Federal house and resigned his premiership; was Minister of Jus¬

tice in MacKenzie's administration 1875-77 ;

president of the Council 1877-78; and leader of the opposition 1880-87. The leader of the

equity bar of Ontario and perhaps the most brilliant intellect that has appeared in Canadian politics, his rise had been extremely rapid, and his onslaughts on the Macdonald administra¬

tion in connection with the Pacific scandal told strongly in the country and paved the way for the Liberal triumph in 1873. But he was some¬

what cold and distant in his manner, and lacked the personal magnetism that counts for so much in public life, and he suffered from indifferent health. After he had retired from Canadian

politics he represented the Irish constituency of South Longford in the British House of

Commons as a Nationalist member, but failed there to maintain the great reputation he had earned in Canada. He retired from public life in 1907.

BLAKE, Eli Whitney, American inven—

ventor: b. Westboro, Mass., 27 Jan. 1795; d.

New Haven, 17 Aug. 1886. He was graduated

at Yale University in 1816, and began business with his uncle, Eli Whitney, in the manufac¬

ture of firearms. In 1834 he founded, near New Haven, Conn., the pioneer factory for the manu¬

facture of domestic hardware. In 1857 he in¬

vented the widely-known stone-and ore-crusher called the Blake crusher, which introduced a new era in road-making and mining industries, and is used throughout the world. He wrote many scientific papers, including the well-known (Original Solutions of Several Problems in

Aerodynamics' (1882).

BLAKE, Francis, American inventor: b.

Needham, Mass., 25 Dec. 1850; d. 1913. He

served for 13 years on the United States Coast Survey (1866-79), part of the time engaged in field work and its reduction to determine differ¬

ences of longitude between the observatories at Greenwich, Paris, Cambridge and Washington.

Having devoted himself to the study of experi¬

mental physics, in 1878 he invented the famous Blake transmitter, which is the telephonic trans¬

mitter now most widely used throughout the

world. He has also patented other electrical devices.

BLAKE, John Laurie, American clergy¬

man and author: b. Northwood, N. H., 21 Dec.

1788; d. Orange, N. J., 6 July 1857. He was educated at Phillips Exeter Academy and at

Brown University. He first entered the Con¬

gregational ministry, but in a short time became an Episcopalian and

was ordained in that

Church in 1815. He settled in Pawtucket, and later in Hopkinton, N. H., and in 1822 removed to Boston. He continued rector of Saint Mat¬

thew's Church, Boston, till 1830, then devoted himself to literary work. He published several textbooks, prepared for his own classes, and was editor of the Gospel Advocate. His great¬

est work, a (Biographical Dictionary,' was first published in 1835. He also wrote a number of small books for children's libraries, including (Book of Nature Laid Open,' (Wonders of

the Earth' and WVonders of Art.'

BLAKE, Mrs. Lillie (Devereux) Umstead, American advocate of woman's rights

and novelist: b. Raleigh, N. C., 12 Aug. 1835; d. 30 Dec. 1913. Her first husband, Frank G.

Quay Umstead, died in 1859; she married Gren-fill Blake in 1866, who died in 1896. She wrote and spoke much on woman suffrage, and her

novels bear on this theme. She published

'Southwold' (1859) ; 'Rockford' (1863); 'Fet¬

tered for Life) (new ed., 1885) ; 'Woman's Place To-Day' (1883), a reply to Dr. Morgan Dix's 'Lenten Lectures on Women,' which at¬

tracted attention; 'A Daring Experiment'

(1894), *etc.* She was one of the promoters of (he movement to found Barnard College; was

president of the New York State Women's

Suffrage Association from 1879 to 1890 and of the New York City Woman's Suffrage League,

1886-1900. She was active in promoting legis¬

lation permitting women to vote in s'chool elec¬

tions in New York State, and proposed the law providing for matrons in the police stations of New York, and the law requiring merchants to provide seats for saleswomen. In 1900 she was president of the Civic and Equality Union

BLAKE, Mary Elizabeth (McGrath),

American poet and writer : b. Dungarven, Ire¬

land, 1 Sept. 1840; d. Boston, Mass., 27 Feb.

1907. In verse she has written (Poems5 (1882) ; (Youth in Twelve Centuries) (1886), *etc.* Of her travels may be named (On the Wing)

(1883) ; (A Summer Holiday.5

BLAKE, Robert, British admiral : b.

Bridgewater, Somerset, August 1599; d. 17 Aug.

1657. After attending the grammar school of his native place he was sent to Wadham College, Oxford, where he took the degree of B.A. in 1617. On his return to Bridgewater he lived quietly on the fortune left him by his father, and was led to embrace the principles of the Puritans, by whose interest he was elected mem¬

ber for Bridgewater in the Parliament of 1640, but lost his seat on the dissolution. He served in the Parliamentary forces during the Civil War as lieutenant-colonel ; he held Lyme against the Royalists in 1643, and captured and held Taunton, 164-4-45. In 1649 he was sent to com¬

mand the fleet in conjunction with Colonels Deane and Popham, and thus commenced his

naval career. He immediately sailed to Kinsale in quest of Prince Rupert, whom he attempted to block up in that port. The Prince escaped to Lisbon, where Blake followed him ; and being refused permission to attack him in the Tagus by the King of Portugal, he took several rich prizes from the Portuguese (against whom the Parliament declared war), and followed Rupert to Malaga, where, without asking permission of Spain, he attacked him and nearly destroyed the whole of his fleet. On his return to England he was made warden of the Cinque Ports, and soon after reduced the islands of Scilly and Guernsey. In 1651 he became a member of the Council of State. In 1652 he was made sole admiral, and on the 19th of May was attacked in the Downs by Van Tromp with a fleet of 45 sail, the force of Blake

amounting only to 23. He fought so pertinaciously, however,

against the heavy odds, that Van Tromp was obliged to retreat. He then continued his cruise, took a number of Dutch merchantmen, and after several partial actions drove the enemy off and returned to the Downs. On 29 November he

was again attacked by Van Tromp, whose fleet was now increased to 80 sail. Blake engaged this vast force with a very inferior number and an unfavorable wind; but, after every possible exertion, was obliged to retreat into the Thames.

After this engagement, according to a story which is entirely unsupported by contemporary evidence, Van Tromp was so much elated that he sailed through the Channel with a broom at his masthead, to signify that he had swept the sea of British ships. In the February following, Blake, having with great diligence repaired his fleet, put to sea with 60 sail, and soon after met the Dutch admiral, who had 70 sail and 300

merchantmen under convoy. During three days

a furious running fight up the Channel was maintained with obstinate valor on both sides, the result of which was the loss of 11 men-of-war and 30 merchant ships by the Dutch, while that of the English was only one man-of-war.

It was in April of this year that Cromwell assumed the protectorate — a change of status that did not affect Blake's loyalty. (<It is not for us,® said Blake to his officers, <(to mind state affairs, but to keep the foreigners from fooling us.® On 3 June he again engaged Van Tromp with dubious success; but, renewing the action the next day, he forced the Dutch to retire with a considerable loss in ships and men.

On his return he was received by Cromwell with great respect, and was elected member for

Bridgewater in the new Parliament. Aware of his affection for a republican government, the Protector was not displeased at having occasion to send him with a strong fleet, to enforce a due respect to the British flag in the Medi¬

terranean. He sailed first to Algiers, which submitted, and then demolished the castles of Goletta and Porto Ferino, at Tunis, because

the Dey refused to deliver up the British captives.

A squadron of his ships also blocked up Cadiz and intercepted a Spanish fleet from the river Plate. Being now very sick, he resolved to do one more service to his country before his death, and sailed with 24 ships to Santa Cruz, in Teneriffe, and, notwithstanding the strength of the place, burned the ships of another Span¬

ish Plate fleet which had taken shelter there, and by a fortunate change of wind came out without loss. His brother having failed in some part of duty during this service, he immediately removed him from his command. Finding his

disorder making rapid progress he then sailed for England, and expired while the fleet was entering Plymouth Sound. His body was

honored with a magnificent public funeral, and interred in Westminster Abbey, whence it was, with pitiful spite, removed at the Restoration and buried in Saint Margaret's churchyard. So disinterested was Blake that, after all his rich captures and high posts, he scarcely left behind him $2,500 of acquired property, freely sharing all with his friends and seamen, into whom he infused that intrepidity and spirit of enterprise by which the British navy has been ever since so highly distinguished. Consult (Lives5 by

Dixon (1852), S. Johnson (1792) and Steven¬

son (1910); and Gardiner's (History of the

Commonwealth and Protectorate5 (1894-1900).

BLAKE, William, English poet, painter

and engraver: b. London, 28 Nov. 1757; d. 12

Aug. 1857. At the age of 10 he was sent to a drawing-school, and four years later he was apprenticed for seven years to the engraver James Basire, for whom he drew from the

monuments in the older London churches and

Westminster Abbey. In 1778 he studied in the Royal Academy, and about this time he began to engrave for the booksellers, among his chief productions being plates after Stothard for the Novelists'

Magazine. To the first exhibition of the Royal Academy he sent a drawing entitled ‘The Death of Earl Godwin.5 He married

in 1782 Catherine Boucher, the daughter of a market gardener, and for the three years 1784-87 carried on a printseller’s shop in partnership with another engraver. From his earliest years Blake was a mystic. He believed that all things BLAKE — BLAKELOCK

exist in the human imagination alone, and had a wonderful power of imaginative vision which enabled him to see angels in trees and in fields, great men of past times, *etc.* His (Songs of Innocence,) verse and designs (1789), and the companion (Songs of Experience* (1794), were reproduced by himself and his wife by a process which he believed to have been revealed to him in a dream by a dead brother. Between 1793

and 1800 he produced a large number of de¬

signs, among them 537 illustrations for Young’s (Night Thoughts.) In 1800 he became ac¬

quainted, through Flaxman, with the poet Wil¬

liam Hayley, who gave him artistic commissions, and for three years he lived in his neighborhood at Felpham. He next produced the designs to Blair’s (Grave* (engraved by Schiavonetti),

which in imaginative power stand in the fore¬

front of his artistic work. In 1808 he sent to the Royal Academy the pictures (Christ in the Sepulchre Guarded by Angels) and (Jacob’s

Dream, > the last pictures he exhibited there.

From 1818 till his death he had a staunch friend and patron in the painter John Linnell. It was about this time that he executed the series of pencil drawings known as (Spiritual Portraits.*

The highly prized wood-cuts to Thornton’s

(Virgil* were executed in 1820, and in 1825 he produced for Linnell

his wonderful (Inventions to the Book of Job,* which, containing 22 en¬

gravings, 21 original designs in colors, with the original colored drawings by the artist (the property of the Earl of Crewe), sold in Lon¬

don, in 1903, for $28,000. He also executed a series of engravings and designs for the (Divina Commedia.* At the sale just mentioned 12

drawings in colors for <L'Allegro) and (I1

Penseroso* brought $9,800, and the original

colored issue of (America, a Prophecy, *sold for $1,475. Among Blake's other writings are (Poetical Sketches* (1783); (Gates of Para¬

dise* (1793); (Prophetic Books,) sadly in¬

coherent, but with splendid designs (1793-1804).

The only complete edition of his works is that of E. J. Ellis and W. B. Yates (3 vols., 1893).

(See Songs of Innocence and Experience).

Consult Gilchrist's (Life) (1863); Selincourt, (William Blake* (1909) ; (Works* by Swin¬

burne (1868), and Story (1893); Ellis, (The Real Blake) (1907) ; Yeats, W. B., (Essays of Good and Evil 5 (1903).

BLAKE, William Hume, Canadian jurist:

b. Kiltegan, county Wicklow, 1809; d. Toronto 1870. He was educated at Trinity College,

Dublin, studied medicine and afterward theol¬

ogy with a view to taking orders in the Angli¬

can Church, emigrated to Canada in 1832 and settled on a farm in Middlesex County. He

was called to the bar of Upper Canada in 1838, took an active part in

the reform movement, was returned to the Canadian assembly in 1847

as member for East York, was solicitor-general for Canada West, 1848-49, and chancellor of UppeK Canada, 1850-62. He was the father of Edward *BTa ke (q.v.).

BLAKE, William Phipps, American min¬

eralogist: b. New York, 1 June 1826. Graduat¬

ing at the Sheffield Scientific School in 1852, he joined the United States Pacific Railroad ex¬

ploring expedition (1853) as mineralogist and geologist. In 1861 he became mining engineer for the Japanese government, and with R.

Pumpclly organized the first school of science in Japan. As an expert in his specialty he was connected in important capacities with the Paris Exposition of 1867, the Vienna Exposition

(1873), United States Centennial Exhibition

(1876), Paris Universal Exposition (1878), and drafted the system of classification of United States ores and minerals at the Columbian Ex¬

position (1893). He has conducted important

explorations in Alaska, California and Nevada and the chief mining districts of the United States, frequently publishing his results in val¬

uable reports and scientific papers. Publica¬

tions : (Silver Ores and Silver Mines* (1861): California Minerals) (1863) ; ˆProduction of the Precious Metals) (1867) ; Uron and SteeP

(1873); Ceramic Art and Glass) (1878);

(History of the Town of Hamden, Conn.* ;

(Life of Captain Jonathan Mix.*

BLAKE, William Rufus, American actor :

b. Halifax, N. S., 1805 ; d. Boston, 22 April 1863.

He studied medicine but soon quitted it for the stage, making his first appearance on the Amer¬

ican stage at the old Chatham Theatre, New York, under the management of Mr. Barrere,

in 1825, as Frederic in (The Poor Gentleman,*

and in Elliston's favorite character in Che Three Singles.* His success was great. Jesse Rural, in (01d Heads and Young Hearts, 5 was one of his best parts. Mr. Blake was a fluent and effective speaker. He was stage manager of the Tremont Theatre, Boston, joint manager of the Walnut Street Theatre, Philadelphia, and stage manager of the Broadway Theatre, New

York.

BLAKELEY, Johnston, American naval

officer, b. near Seaford, county Down, Ireland, October 1781 ; lost at sea, 1814. His father emi¬

grated to the United States in 1783, and event¬

ually made his home in Wilmington, N. C.

Johnston was graduated at the University of North Carolina in 1800, and on 5 February of that year entered the navy as midshipman, and rose to the rank of captain. On 1 May 1814 he left Portsmouth, N. H., in command of the

new sloop-of-war Wasp , and very shortly ap¬

peared in the English Channel, spreading terror among the merchant ships and seaport towns.

On 28 June he fought and defeated the British sloop Reindeer, for which exploit Congress

voted him a gold medal. On 1 September he destroyed the Avon and on the 21st, near the Azores, took the Atlanta, which he sent home to

Savannah. On 9 October the Wasp was

spoken by the Swedish bark Adonis; and that was the last ever heard of the vessel and of those on board of her. It seems probable that, being heavily armed and sparred, the vessel foundered in a gale.

BLAKELOCK, Ralph Albert, American

landscape painter: b. New York, 15 Oct. 1847; d. Elizabethtown, N. Y., 9 Aug. 1919. Gradu¬

ated, City College in 1869. His art was self-acquired, and like Inness, Wyant and Martin, of whose work he was the best disciple, he inclined strongly to the Barbizon conception of land¬

scape. A feeling for color and tone dis¬

tinguishes his best work, and he ranked

as one of the foremost American land¬

scape painters. His theme was usually the

forest primeval with mysterious glades peopled by red men. For many years he suffered the most complete neglect, and the difficulties of 58

caring for a large family on his very slender earnings so affected his mind that it was neces¬

sary to confine him in an asylum, where he remained for many years. Friends exhibited

his pictures from time to time, and at last, in 1913, the National Academy bestowed a tardy recognition on his talent by making him an associate, the degree of academician following two years later. In 1916 he was released from the asylum. Among his works are (Indian

Girl, Uinta Tribe-* ; (Shooting the Arrow’

(1880) ; (Bannock Wigwam in Peaceful Vale) (1883); <Autumn) (Mrs. Kurtz, New York);

a beautiful moonlight scene, in the Lambert col¬

lection, Paterson, N. J. ; (Sunset, Nevarra Range) (W. T. Evans, New York) ; (The Pipe Dance) (perhaps his best picture), Metropoli¬

tan Museum, New York; (Colorado Plains,'

Corcoran Gallery, Washington, D. C. ; (October Sunshine, 5 Worcester Museum; the (Canoe

Builders, ' <Sunset) and (Moonrise,' in the

National Gallery of Washington; (The Cap¬

ture, ' in the Brooklyn Institute Museum;

(Moonlight,' in the Toledo Museum, *etc.*

BLAKESLEE, Albert Francis, American

botanist: b. Geneseo, N. Y., 9 Nov. 1874. A graduate of Wesle}ˆan University, Connecticut, he was assistant botanist at Harvard 1899-1900, instructor at Radcliffe College 1900-02, teaching fellow at Harvard 1901-03, and became director of the Connecticut Agricultural College Sum¬

mer School 1907. In 1903 he went to Vene¬

zuela as collector for the Harvard Crypto—

gamic Herbarium and in 1904-06 was investi¬

gator for the Carnegie Institute in Europe. He is the author of (Sexual Reproduction in the Mucorineae' (1904) and (Trees in Winter'

(1913). He is a brother of George Hubbard

Blakeslee.

BLAKESLEE, George Hubbard, Amer¬

ican educator, traveler and author : b. Geneseo, 27 Aug. 1877. A graduate of Wesleyan

University (1893) and Ph.D. Harvard Univer¬

sity (1903), he also studied at Johns Hopkins, Berlin, Leipzig and Oxford. He was instructor in history in Clark College in 1903 ; traveled in Hawaii, the Philippines, China and Russia 1906-OS; became professor of history in Clark Uni¬

versity, Worcester, Mass., and associated with president G. Stanley Hall founded and edited The Journal of Race Development, and organ¬

ized there the annual conference on inter¬

national problems. A contributor to The Out¬

look and other periodicals, he is also the author of (The Far East' (1909) ; (The Near East and Africa' (1910) ; (Japan' (1911) ; and editor of the Clark University lectures (China and the Far East) (1910) and (JaPan and Japanese-American Relations' (1912).

BLAKESLEY, Joseph Williams, English

clergy man : b. London, 6 March 1808 ; d. Lin¬

coln, 18 April 1885. He graduated at Trinity College, Cambridge, in 1831 ; was fellow there 1831-45, and select preacher 1840-43; became a member of the New Testament Committee on

Bible Revision in 1870; and dean of Lincoln in 1872. His publications include (Life of Aristotle) (1839) ; (Conciones Academicse' (1843) ; and an edition of <Herodotus) (2vols., 1852-54).

BLAKEY, Robert, English writer : b.

Morpeth, Northumberland, 18 May 1795; d. Bel¬

fast, 26 Oct. 1878. He bought the Newcastle Liberator in 1838, and got himself into trouble with the government on account of certain al¬

leged seditious articles which he published. In 1848 he became

professor of logic and meta¬

physics at Queen's College, Belfast. Among his works are (Treatise on the Divine and Human Wills' ; (History of Moral Science' ; historical Sketch of Logic) ; (Temporal Benefits of Chris¬

tianity' ; and a series of books on angling.

BLANC, bloii, Anthony, American prel¬

ate: b. Sury, France, 11 Oct. 1792; d. New Orleans, 20 June 1860. He was ordained to the Roman Catholic priesthood in 1816; went to

Annapolis, Md., in 1817; was appointed bishop of New Orleans in 1835, and became archbishop there in 1850.

BLANC, Jean Joseph Louis, French his¬

torian, publicist and socialist : b. Madrid, 29

Oct. 1811; d. 6 Dec. 1882. He studied with great success in the college at Rodez, and com¬

pleted his education at Paris. He was for a short time an attorney's clerk, afterward a teacher of mathematics and a private tutor.

Subsequently at Paris he devoted himself to the career of journalism, fighting stoutly in the ranks of the militant democracy. In 1839 he founded the Revue du Progres, in which first appeared his great work on socialism, (De l'Organisation du Travail' (separately published in 1840). In this work he condemns individual

and competitive rivalry in labor ; society should not be subjected to a perpetual combat, but should' form a harmonious whole, in which each member should contribute according to his abil¬

ities and be recompensed according to his needs.

In 1841-44 appeared his (Histoire de Dix Ans) (1830-40), in which he vigorously exposed the trickery and jobbery of the government of Louis Philippe, and which greatly contributed to bring about its downfall. On the outbreak of the revolution of 1848 Blanc was elected a member of the provisional government, and appointed president of

the commission for the discussion of the question of labor. He has been unjustly charged with creating and organizing the dis¬

astrous scheme of national workshops, a scheme which he strenuously opposed. After the closing of these workshops, and the June insurrection of 1848, he was prosecuted for conspiracy, but escaped to England, where he took up a length¬

ened residence. During this period he wrote the bulk of his famous (Histoire de la Revolu¬

tion Frangaise' (12 vols., 1847-62). His other works are (Lettres sur l'Angleterre' (1865-67) ; (Histoire de la Revolution de 1848) (1870) ; (Questions d'Aujourd'hui et de Demain)

(1873-74), *etc.* On the downfall of the second empire (1870) Blanc returned to Paris and be¬

came a member of the National Assembly in

1880. Here he pursued a consistently radical policy without embracing all his former social¬

istic theories. He is regarded as the founder of state socialism. He believed that individual liberty could only be had under a strong cen¬

tral government, but that industry should be co¬

operative.' Consult Fiaux, (Louis Blanc' (in ˆPortraits politiques contemporains,' Vol. II, Paris 1883), and Jonannet, A., (Les theories sociales de L. Blanc' (Dijon 1902).

BLANC, Ludwig Gottfried, German phi¬

lologist: b. Berlin, 19 Sept. 1781; d. Halle, 18

April 1866. He was educated at the French

Theological Seminary in Berlin, and ordained BLANC — BLANCHARD

as pastor at Halle. In 1811 he was accused of taking part in a conspiracy against the King of Westphalia, was imprisoned at Magdeburg, and later at Kassel, until released in 1813 by a Russian skirmishing corps. He was chaplain

in the Prussian army in the war of 1814-15; from 1822 was professor of the Romance lan¬

guages at the University of Halle ; and in 1860

was appointed preacher at the cathedral in that city. An authority on Dante, he wrote a (Dante Vocabulary1* (in French) ; (Attempt at a

Philological Explanation of Several Disputed

Points in the (< Divine Comedy®) ; and trans¬

lated the (Divine Comedy) into German. He also wrote (Grammar of the Italian Lan¬

guage } ; and a 'Handbook of the Most Remark¬

able Facts of Nature and the History of the Earth and Its Inhabitants.)

BLANC, Marie Therese ("Therese Bent—

zon®), French essayist and novelist: b. Seine-Port 1840; d. 1907. She visited the United States where she was a close student of social conditions. For several years she was a mem¬

ber of the editorial staff of the Revue des Deux Mondes. Her translations from English in¬

cluded works by Dickens, Bret Harte, Aldrich and Ouida. She wrote the novels (La vocation de Louise) (1873) ; (Sang mele) (1875) ; (Un remords1* (1878) ; (Yette, histoire dune jeune Creole1* (1882); (Yvonne) (1881); 'Tony>

(1884) ; (Jacqueline) (1893) ; (Une double

epreuve) (1896) ; 'Au dessus de l'abime5 (1905).

Her other works include the essays 'Litterature et moeurs etrangeres) (1882); (Les nouveaux

romanciers americains) (1885); the travel vol¬

ume (Nouvelle France et Nouvelle Angleterre : Notes de Voyage1* (1899) ; (Choses et gens d'Amerique1* ; (Questions Americaines) ; (Femmes dAmerique.1*

BLANC, Paul Joseph, French genre

painter: b. Paris 1846; d. Paris, 5 July 1904.

He studied under Bin and Cabanel. He won

the Grand Prix de Rome in 1867 ; the first-class medal of the Paris Salon in 1872; the decoration of the Legion of Honor in 1878; and the first-class medal in the Paris Exposition of 1889.

One of his best-known works is a series of decorative compositions depicting the consecra¬

tion, baptism and triumph of Clovis; 'The In¬

vasion } (1873) ; and 'Roger and Angelique) (1876). He also attained reputation by his por¬

traits of French public men.

BLANC, Mont. See Mont Blanc.

BLANCHARD, Amy Ella, American art

teacher and author : b. Baltimore 1856. After studying art in New York and Philadelphia she taught drawing and painting in Plainfield, N. J., and became known for her semi-historical tales, among others 'A Girl of '761* (1898) ; (A Heroine of 1812) (1901) ; 'A Frontier Knight >

(1904) ; and the (Corner J and (Little Maid>

series.

BLANCHARD, blon-shar, Emile, French

naturalist: b. Paris, 6 March 1819; d. 1900. He is especially renowned as an entomologist, and is the author of many scientific works, including Researches into the Organization of Worms)

(1837) ; ‘Natural History of Orthopterous and Neuropterous Insects) (1837-40) ; (History of Insects, etc.1* (1843-45) ; Agricultural Zoology*

(1854) ; ‘Organization of the Animal Kingdom*

(1854-64), *etc.*

BLANCHARD, Frangois, French aero¬

naut: b. 1753; d. 1809. He invented a hydraulic machine in his 19th year, and afterward con¬

structed a flying ship, which, by means of a counterpoise of six pounds, was raised to more than 20 feet from the ground. He eagerly

availed himself of the discoveries of the

brothers Montgolfier. After having made his

first aerostatic voyage, 4 March 1784, he crossed the Channel from Dover to Calais, 1785, with Dr. Jeffries, a gentleman of Boston. In the same year, at London, he first made use of a parachute invented by him, or, according to others, by Etienne Montgolfier. He visited the LTnited States in 1796, his 46th ascent being made in New York. His wife, Marie Madeleine Sophie Armant, continued (after his death) to make aerial voyages; but in June 1819 she -was killed in an ascent at Paris.

BLANCHARD, Jacques, French painter:

b. Paris 1600; d. 1638. He received the first lessons of his art from Bellori, his maternal uncle, studied some time at Lyons, and in 1624

repaired to Rome. After two years he visited Venice, studied the works of Titian and the other great colorists of his school, and executed several paintings which gave him a name. After his return to Paris he

executed a great number of works, which procured him the surname of “the French Titian.® His best piece, a ‘Descent of the Holy Spirit, 5 was painted for the cathe¬

dral of Notre Dame.

BLANCHARD, Newton Crain, American

legislator: b. Rapides Parish, La., 29 Jan. 1849.

He was educated at Louisiana State University and studied law at Tulane. He became a mem¬

ber of the Louisiana Constitutional Convention in 1879 and congressional representative from 1881 to 1893, when he was appointed to com¬

plete the unexpired term of E. D. White as United States senator. He became an associate judge of the Supreme Court of Louisiana in 1897 and governor of the State from 1904 to 1908.

BLANCHARD, Thomas, American in¬

ventor: b. Sutton, Worcester County, Mass., 24

June 1788; d. 16 April 1864. He joined his brother in the manufacture of tacks by hand, and at the age of 18 commenced his invention of a tack-machine, which in six years he brought to such perfection that by placing in the hopper the iron to be worked, and applying the motive power, 500 tacks were made per minute with better finished heads and points than had ever been made by hand. He sold the patent for $5,000. About this time various attempts were made in the United States armories to turn musket-barrels with a uniform external finish.

Blanchard undertook the construction of a lathe to turn the wrhole of the barrel from end to end, by the combination of one single self¬

directing operation. About three inches of the barrel at the breech was partly cylindrical and partly with flat sides ; these were all cut by the same machine, ingeniously changing to a vi¬

brating motion as it approached the breech.

He then invented an ingenious machine for

turning gunstocks, which, with improvements

and modifications, came to do the work of 13

machines, and is applied to a great variety of ob¬

jects, such as busts, shoe lasts, handles, spokes, *etc.* Blanchard was also interested at an early day in the construction of railroads and loco-60

motives and in boats contrived to ascend rapid rivers. He also invented a machine for cut¬

ting and folding envelopes, a steam wagon be¬

fore (he use of locomotives, and a process for bending heavy timbers.

BLANCHE, August Theodor, Swedish

dramatist and novelist: b. Stockholm, 17 Sept.

1811; d. Stockholm, 30 Nov. 1868. His com¬

edies and farces, — more particularly (Jenny, or the Steamboat Trip' ; (The Doctor > ; (The Rich Uncle,) and (The Foundling) — made all Sweden laugh ; while his realistic fictions, — among them (The Spectre) ; (Tales of a Cabman,* and

(Sons of North and South,) — are eagerly read.

His complete works were issued at Stockholm in 15 volumes (1889-92).

BLANCHE, Gustave, Canadian clergy¬

man: b. Josselin, France, 30 April 1848. He was called to the bar, fought in the Franco-Prussian War, joined the Eudist order in 1873,

and was consecrated vicar-apostolic of the Gulf of Saint Lawrence and titular bishop of Sicca, 28 Oct. 1905.

BLANCHE OF BOURBON, Castilian

Queen: b. 1338; d. 1361. She was the daughter of Peter, Duke of Bourbon, and in 1353 mar¬

ried Peter, King of Castile, surnamed the

Cruel. Don Frederick, Peter's natural brother, had been deputed to meet her at Narbonne and bring her into Spain, and she is said to have so far forgotten herself as to conceive a violent passion for him. Rumors to this effect had reached the King's ears, and though he cele¬

brated the marriage he soon showed that he had placed his affections elsewhere. He shortly after declared the marriage null, imprisoned the Queen in the castle of Medina-Sidonia, and is said to have gotten rid of her by poison.

Her fate became a favorite theme with poets and ballad makers.

BLANCHE OF CASTILE, French

Queen: b. 1187; d. Milan, November 1252. She was the daughter of Alphonso IX, married

Louis VIII of France and became the mother of Louis IX ((<Saint Louis®). On the death of her husband she anticipated the formal appoint¬

ment of a regency by procuring the immediate coronation of her son, and during his minority held the reins of government in his name with distinguished ability and success, breaking up a league of the barons and repelling English as¬

saults. In 1244, when Saint Louis joined the Crusade (which she strenuously opposed) and

took his departure for the Holy Land, she again became regent and gave new proofs of her

statesmanlike qualities. Consult Berger, (Histoire de Blanche de

Castile.*

BLANCHESTER, Ohio, town in Clinton

County, on the Baltimore and Ohio and the C.

M. and L. railroads, 30 miles northeast of Cin¬

cinnati. Its industrial establishments comprise pumpworks, rice manufactories, a creamery

and canning factory. The value of all taxable property is estimated at $2,000,000. The town has a public school. Pop. 1,800.

BLANCHING, the process which pre¬

vents or checks the formation of chlorophyll and other substances in plants by excluding light. Gardeners make frequent use of the

process. It alters the flavor as well as lightens the color of celery, sea-kale, asparagus, etc., and is generally accomplished by covering the plants with earth, boards, straw, paper, etc., or, in a small way, by inverted flower-pots, kegs, or barrels perforated at the top.

BLANCO, blan'ko, Antonio Guzman,

Venezuelan soldier: b. Caracas, 29 Feb. 1828; d. 28 July 1899. He became prominent in the Federalist revolts, 1859-63, and when his party triumphed, was made First Vice-President in

1863 under Falcon, who was deposed in the

revolution of 1868. Blanco led a successful counter-revolution in 1870, and was President, 1870-77, 1879-84, 1886-87. In 1893 he was ap¬

pointed Minister to France, where he resided virtual ruler and dictator of his country till his death. Under his absolutism education was

improved, economic resources were developed

and the finances strengthened.

BLANCO, Jose Felix, Venezuelan his¬

torian: b. Mariana de Caracas, 24 Sept. 1782; d. Caracas, 8 Jan. 1872. At different times he acted in the capacity of priest, soldier and statesman, and held the Ministry of War (1837) and Finance (1854). He was one of the leaders in the revolution at Caracas, 19 April 1810, and was the first editor of the great historical work in 14 volumes, (Documentos para la historia de la vida publica del Libertador,* *etc.*

BLANCO, Pedro, Bolivian statesman: b.

Cochabamba, 19 Oct. 1795; d. Sucre, January 1829. He served with the Spanish army in

1812, but soon joined the patriots, and served with them till the end of the revolution. In 1828 he became a general, and in the same year, when Sucre fell, was made President of Bolivia, but was superseded in the revolution of 31 Dec.

1828. He was shot in Sucre.

BLANCO, Ramon y Arenas, Marquis

de Pena Plata, Spanish soldier : b. San Sebas¬

tian, Spain, 1833 ; d. Madrid, 4 April 1906. He began his military career in 1855 as lieutenant , was promoted captain in 1858, and won the rank of lieutenant-colonel in the war with San

Domingo. From 1894 to 1896 Blanco served in the Philippines as governor of Mindanao. He was captain-general in Cuba in 1897-98, where his measures were those of repressive cruelty.

BLANCO, Cape (literally, <(white cape®),

a name given to a number of capes by the Spaniards, Portuguese and Italians, e.g., to headlands in Majorca, Anatolia, Tunis, Morocco, Syria, Peru and Costa Rica. It corresponds to the French cap blanc. The cape best known

by this name is a headland on the west coast of Africa, in lat. 20° 47' N., and long. 16° 58' W., the extremity of a rocky ridge which projects from the Sahara in a westerly direction, and then bending southward forms a commodious

harbor called the Great Bay. Cape Blanco was first discovered by the Portuguese in 1441.

The lofty headland on the westernmost point of Oregon, in Curry County, is called Cape Blanco or Orford.

BLANCO ENCALADA, Manuel, Span-

ish-American soldier: b. Buenos Aires, 5 Sept.

1790; d. 5 Sept. 1876. He distinguished himself in the Chilean war of independence. He was chosen President of Chile in July 1826, but soon resigned and was made general of the army.

He unsuccessfully invaded Peru in 1837, and was not allowed to retire till he had signed a treaty of peace. Chile annulled this treaty, and he was court-martialed but acquitted. In 1847

he vyas intendant of Valparaiso, and in 1853-58

Minister to France.

BLAND, Edith Nesbit (E. Nesbit),

English writer : b. London, 15 Aug. 1858. She was married to Hubert Bland, 1879. She has written several volumes of verse, as well as a series of charming and popular children's books and novels. Her published works include (Lays and Legends > (1886-92); (Leaves of Lif e)

(1888) ; (A Pomander of Verse) (1895) ; (Grim Talcsˆ (1893) ; (The Marden Mystery* (1896) ; cSongs of Love and Empire) (1897) ; (The

Story of the Treasure Seekers* (1899) ; (Pussy and Doggy Tales) (1899); (The Book of

Dragons* (1900); (Nine Unlikely Tales) ;

< Thirteen Ways Home> (1901) ; (Five Children and IP (1902); (The Red House* (1903);

cMan and Maid> (1906); (The House of

Arden) (1908) ; (Salome and thePIead) (1909) ; (Ballads and Lyrics* (1910); (The Wonderful Garden* (1911); (Wings and the Child) (1913); (Garden Poems.)

BLAND, John Otway Percy, English

author and journalist: b. Whiteably County, 15

Nov. 1863. He was educated in Switzerland

and at Trinity College, Dublin. In 1883 he joined the Chinese Imperial Maritime Customs.

For two years he was private secretary to Sir Robert Hart but resigned in 1896 to become secretary to the municipality for the foreign settlement at Shanghai. In 1906 he assumed

the post of representative in China of the Brit¬

ish and Chinese Corporation. He left China

in 1910, with the civil rank of the Order of the Double Dragon. He

was also Times corre¬

spondent at Shanghai 1897-1907 ; Peking 1907—10. Since returning to England he has been engaged in journalism and lecturing, in which capacity he came to Boston in 1912. His pub¬

lications include (Lays of Far Cathay *(1900) ; ˆHouseboat Days in China-* (1909) ; (China

under the Empress Dowager* (1910) ; (Annals and Memoirs of the Court of Peking* (1913) ; (Recent Events and Present Policies in China) (1912) ; (Li Hung Chang) (1917).

BLAND, Richard Parks, American legis¬

lator: b. near Hartford, Ky., 19 Aug. 1835; d.

Lebanon, Mo., 15 June 1899. He received an academical education, and, between 1855 and

1865, practised law in Missouri, California and Utah, and was engaged for some time in min¬

ing. In 1865 he settled in Rolla, Mo., and prac¬

tised there till he removed to Lebanon in the same State. He was a member of Congress in 1873-95 and from 1897 till his death. In 1896

he was a conspicuous candidate for the Presi¬

dential nomination in the Democratic National Convention, but on the fourth ballot his name was withdrawn and the vote of his State was cast for William J. Bryan. In the 43d Con¬

gress he opposed the bill for the demonetiza¬

tion of silver, afterward called by him ((the crime of ’73. ® Mr. Bland was best known as the leader in the lower House of Congress of the Free-Silver movement and the author of

the Bland Silver Bill of 1878, which, as amended by the Senate, was passed over the veto of President Hayes. It provided for the coinage of not less than $2,000,000 nor more than $4,-

000,000 worth of silver bullion monthly. The bill was repealed by the

Sherman Law of 1890.

At the time of his death he was a member of the committees on coinage, weights and meas¬

ures and expenditures on public buildings. He published (Proposed Annexation of Hawaii*

(1898). Consult Bywars, W. V., (An Ameri¬

can Commoner: The Life and Times of R.

Parks Bland) (Columbia, Mo., 1900).

BLAND, Theodoric, American military

officer: b. Prince George County, Va., 1742; d.

1 June 1790; he studied medicine in the Uni¬

versity of Edinburgh, and for a time practised in England. He returned home in 1764, wrote against Governor Dunmore under the name of

Cassius, and was active in his profession until the outbreak of the Revolutionary War, when he sided with the Colonists and became cap¬

tain of the first troop of Virginia cavalry. In 1777 he joined the main army as a lieutenant-colonel and later became a colonel. He dis¬

tinguished himself at the battle of Brandywine and was placed in command of the prisoners taken at Saratoga, who were marched to Char-lotteville, Va. In 1780-83 he was a member of the Continental Congress and was a repre¬

sentative from Virginia to the first Federal Congress in 1789. He was an intimate friend of George Washington. (The Bland Papers, 5

containing valuable historical material on the Revolutionary period, were collected and edited by Charles Campbell (Parkersburg 1840).

BLANDINA, Saint, virgin martyr in the

reign of Marcus Aurelius, a.d. 177. She was a slave and had been imprisoned with her mas¬

ter — also a Christian — for confessing to the faith. She was subjected to horrible tortures but remained steadfast throughout. Some of

the Christians were released on abjuration, but Blandina rejected the offer to purchase her life at the sacrifice of her faith. A series of fresh tortures then awaited her. With other co¬

religionists she was bound to a stake in the am¬

phitheatre at Lyons during some public games, but the wild beasts let loose in the arena failed to harm her. For some days she was com¬

pelled to wdtness the sufferings of her com¬

panions, and was then half-burnt, gored by a wild bull, and finally killed with a dagger.

Eusebius tells the story in a report from the church of Lyons to the churches of Asia Minor.

Her feast day is 2 June.

BLANDRATA, or BIANDRATA, Gior¬

gio, Italian physician and Unitarian propa¬

gandist: b. Saluzzo, Piedmont, about 1515; d.

about 1590. He practised for a time in Pavia, where he fell under suspicion of heresy; the freedom with which he expressed his religious views made it necessary for him to flee to Geneva in 1556, where he aroused the dogmatic wrath of Calvin, with whom he engaged in a violent controversy. Blandrata appears to have been worsted in theological hair-splitting, for his anti-trinitarianism made him so many ene¬

mies in Geneva that he migrated to Poland, where he spread the Unitarian doctrines. In 1563 he moved to Transylvania, where he con¬

verted the ruler, Prince John Sigismund, and became his physician. Here he took part in public disputations with learned opponents and attracted a large following. He eventually re¬

turned to the fold of the Roman Catholic

Church. It is said that he was strangled while asleep by his nephew. He wrote (Professioni di fede antitrinitaria,* an edition of which ap¬

peared in 1794. Consult Malacarne, (Commen-

tario delle opere di Giorgio Biandrata) (Padua 1814).

BLANK VERSE, verse without rhyme.

This was the invariable form of the poetry of the ancients, but it is now peculiar to the Italian, English and German languages. The

poetry of the Anglo-Saxons and the earliest English poetry was not rhymed, yet it is not generally called blank verse, as their versifica¬

tion had a peculiarity of its own called allitera¬

tion. When rhyme, however, was once intro¬

duced into English verse, it was for a long time regarded as the exclusive form of versi¬

fication, and the Earl of Surrey, who was be¬

headed by order of Henry VIII, in 1547, is said to have been the first to use blank verse in England, namely, in his translation of the sec¬

ond and fourth books of Virgil's <Hfneid.) The most common form of blank verse in English poetry is the decasyllabic, such as that of

Milton's (Paradise Lost) and the dramas of

Shakespeare. From the 16th century onward

the unrhymed decasyllabic (also called the

iambic pentametre or unrhymed heroic) has

been the regular measure of English dramatic and epic poetry. Dryden, indeed, after the

Restoration, introduced rhyme into his trage¬

dies, in imitation of the French rhymed plays; but after keeping the stage for a number of years, they became intolerable to the English ear, and the introduction of rhyme into the drama has never since been attempted in Eng¬

land. Shakespeare not uncommonly ends a

scene with a few lines of rhyme, although the rest of the scene is in blank verse, and in the subordinate play interwoven with the action of Hamlet blank verse is used throughout. The

first use of the term blank verse is said to be in Hamlet ii, 2 : <(The lady shall say her mind freely, or the blank verse shall halt for't.®

BLANKENBURG, Rudolph, American

public official : b. Lippe-Detmold, Germany, 16

Feb. 1843. He was educated in his native

city, and in 1865, in his 22d year, came to the United States, where, first as a traveling salesman and later as manufacturer, he ac¬

quired great wealth, retiring from business in 1909. From 1877 he interested himself in civic improvement and reform politics in Philadel¬

phia; in 1905 was elected county commissioner, and in 1911 and again in 1913 mayor of the city.

As an able administrator he contributed largely to improved local conditions. In earlier years he was a world-wide traveler. He also

became known by his numerous magazine and newspa¬

per articles on social, economic and religious questions.

BLANKET (that is <(fine white® goods),

a heavy bed or horse cover, of a fabric with a thick soft nap on both sides. Originally made entirely of wool, and still so in the finest grades, most of the medium and cheap blankets are now made with a cotton chain or warp and a wool filling, as cheaper, stiffer and almost as durable in good condition. In the finest grades of American blankets, the filling is Australian wool, the longest and softest fibre known ; the warp of American wool. The cheapest ones

have for filling the shorter combings of wool, shoddy, *etc.* ; ordinary horse blankets the same or still coarser half-cleaned wool, and largely animal hair. Of late also an immense quan¬

tity of all-cotton blankets are made, the nap be¬

ing cotton wool ; these have competed less with wool blankets than with comfortables, whose

sale for a time they cut in half. They are used for economy, where heavy blankets are not

needed, and to replace cotton sheeting in cold rooms for children, *etc.* The most famous

blankets in the world are those of the Mysore in India, so delicate that one 18 feet long can be rolled inside a hollow bamboo. In the United States they are a specialty in southwestern In¬

dian domestic manufacture, especially among

the quite civilized Navajos (q.v.), whose rough hand looms and stick shuttles turn out blan¬

kets weighing 20 pounds or more, and selling for $1 and $2 a pound, much prized by Alaskan and Klondike gold-seekers, also by tourists, as well as for decoration on account of the rich coloring. But of civilized manufacture, the

finest are from California, Nevada and Oregon and from Minneapolis; some of these retail

for $25 per pair with a weight of less than 10

pounds. Maine, Ohio and West Virginia also

produce very fine goods. Below the above

fancy price, of which much is loading for short runs, prices range for all-wool blankets from $20, the highest usually kept in stock, down to $7.50, and for cotton-warp down to $2, all¬

cotton, $1. Few blankets have been imported into this country since 1860. The early manu¬

facture here was <(a series of costly and futile experiments,® except a few coarse ones for

army or navy use and for slaves on plantations, for which in 1831 a mill was started in Pendle¬

ton, S. C. ; another to make <(Indian® blankets was opened in Buffalo the same year. But the first effective attempt was under the sharp tariff of 1842, soon swept away by the moderate one of 1847. The tariff bill of 1857, however, which formed one of the Southern counts for secession, taxed imported blankets so heavily that by 1861 importations had practically ceased.

In 1860 the United States' total manufacture was 616,400 pairs, mainly in New England,

Pennsylvania and California. In 1880 this had increased to 4,400,000, gross value $6,840,000, and the prices had dropped so much that the cheaper grades had gone out of use ; the foreign commissioners at the Centennial of 1876 re¬

ported that for weight, thickness, softness and perfection of surface nothing in Europe com¬

pared with the American, and that the Euro¬

pean cheaper grades could not be sold even to the Indians. But competition had so glutted the market that in 1878 a great auction was held in New York to clear them off, at heavy sacri¬

fice. In 1890 the manner of report was changed to square yards —

20.793,644 of (<house blankets®

valued at $7,153,900 and 5,507,074 of horse blankets, $1,721,516. For some reason, probably the larger use of comfortables, the use of the all or part-wool article fell off heavily in the last decade — to 18,155,505 square yards, valued at $5,200,959 — though horse blankets increased to 7,315,304, valued at $1,740,988, or about the same as before. The chief seats of manufac¬

ture were Pennsylvania for all-wool, and Mas¬

sachusetts for cotton-warp, though Indiana,

Minnesota, California and several other States furnished large quantities.

The nap is formed in the finest grades, and till recently was so altogether, by pulling up the fibre with teazles ; these have now been replaced BLANKET BALLOT — BLASHFIELD

in the cheaper makes with steel teeth or brushes on revolving cylinders, which, however, are

too inflexible and liable to tear the goods to be trusted with expensive ones. The use of Jac¬

quard patterns with two or three colors, in place of printed ones, is another change which has popularized blankets by increasing their beauty. Consult Hollister, (The Navajo and

His Blanket > (Denver 1903).

BLANKET BALLOT. See Ballot.

BLANKET VEIN, a term in use among

miners to indicate any nearly horizontal de¬

posit of mineral matter. It includes the term (<bedded vein,® which refers to any deposit parallel to the bedding of the enclosing rocks.

Many of the bedded veins are not true veins (fissure fillings) at all, but constitute layers laid down at the same time as the. enclosing rocks. Such are the iron formations of the Lake Superior region. See Vein.

BLANQUI, blan-ke, Jerome Adolphe,

French economist: b. Nice 1798; d. in Paris, 28

Jan. 1854. While studying medicine at Paris he made acquaintance with Jean Baptiste Say and was induced to devote himself to the study of economics. He succeeded Say in the Con¬

servatoire des Arts et Metiers as professor of industrial economy. Blanqui, who favored a

free-trade policy, published, among other works, (Precis Elementaire d'Economie Politique)

(1826) and (Histoire de l'Economie Politique en Europe) (4th ed., Paris 1860).

BLANQUI, Louis Auguste, French rev¬

olutionist : b. at Puget-Theniers, department of Alpes-Maritimes, 7 Feb. 1805; d. 1 Jan. 1881.

He made himself conspicuous chiefly by his

passionate advocacy of the most extreme po¬

litical opinions, for which he suffered with the pride of a martyr. He was one of the fore¬

most fighters in the French revolutions of the 19th century. In 1830 he was decorated for his valor at the barricades. In 1848 he figured as the chief organizer of the popular movement under the provisional

government. He took

the lead also in the revolutionary attentat of 15 May 1848, the aim of which was to over¬

throw the Constituent Assembly. At the head of an excited mob he demanded of the French representatives the resuscitation of' the Polish nationality, while one of his friends pronounced the dissolution of the Assembly. For his share in these disturbances he was sentenced to 10

years' imprisonment in Belleisle. In 1861 he was again imprisoned. After the downfall of the second empire in 1870, Blanqui resumed his revolutionary activity, and, in 1871, took a prominent part in forming the Commune. Be¬

ing too unwell to endure transportation to New Caledonia (the sentence imposed by the court for his final effort to regenerate society through terror), he was condemned to imprisonment

for life, from which he was released in 1879.

He spent nearly half of his life in prison. His (Critique Sociale,' published four years after his death, formulates the economic doctrine of French radical socialists or Blanquistcs.

BLANQUILLO, blan-kel'yo, a fish of the

Gulf of Mexico (Canlolatilus chrysops), re¬

lated to the tilefish. The name is also given in southern California to the yellowtail (q.v.).

BLARNEY, Ireland, a village seven miles

northwest of the city of Cork, near the stream of same name, here crossed by a handsome

bridge of three arches. It is a small but well-built place. Flax and cotton were formerly

manufactured to some extent, but both of these branches have now decayed. Spinning and dye¬

ing woolen yarn is, however, still carried on, and there is an extensive tweed manufactory.

Blarney Castle stands on an isolated limestone rock at the junction of the Blarney and Co¬

mane. Erected in the 1 5th century, it was the scene of several interesting historical events but derives its chief notoriety from a stone in its northeast angle, several feet from the top, bearing a Latin inscription recording the date of the erection and called the ((Blarney Stone.®

To this stone tradition ascribes the faculty of communicating to all who kiss it that species of most persuasive fluency of speech commonly called (<blarney.® The (<groves of Blarney® are extensive and interesting, and beneath the castle there are also some curious natural caves. In the summer season Blarney is visited by great throngs of tourists, many of whom risk the perilous ascent to the top of the castle in order to kiss the far-famed Blarney Stone.

BLASERNA, Pietro, Italian physicist and

public official: b. 1836; d. 26 Feb. 1918. He was professor of experimental physics in the Uni¬

versity of Rome and president of the Senate of the Kingdom of Italy. He wrote monographs

on the dynamic theory of heat, the conservation of force, the sound theory in relation to music, and other subjects.

BLASHFIELD, Albert Dodd, American

illustrator: b. New York, 31 July 1860; brother of Edward Howland Blashfield (q.v.). He was educated at the Brooklyn Collegiate and Poly¬

technic Institute and at Alexander Military

Institute. He studied art at the Art Students'

League, New York, and specializes in the illus¬

tration of periodicals.

BLASHFIELD, Edwin Howland, Amer¬

ican artist: b. New York, 15 Dec. 1848. He was educated at the Boston Latin SchocS.

studied in Paris under Leon Bonnat, was also advised by Gerome and Chapu, and began ex¬

hibiting in the Paris Salon in 1874. He re¬

turned to the United States in 1881, and has since distinguished himself by the execution of large decorative works. Among his note¬

worthy productions in this line are one of the domes of the Manufacturers' building in the World's Columbian Exposition, the great cen¬

tral dome of the Library of Congress and the new apartment of the appellate court in New York; besides ceiling and panel work in the residences of C. P. Huntington, W. K. Van¬

derbilt and George W. C. Drexel and in the Astoria ballroom and several clubhouses in

New York. Other works are the ceiling and

three lunettes in the Prudential Insurance

Company's building, Newark, N. J. ; court¬

room decorations in Baltimore courthouse ;

large panel in the Iowa State Capitol ; decora¬

tion of the entire chancel, Church of the

Saviour, Philadelphia; decoration in Great

Hall, College of the City of New York; also in the Wisconsin State Capitol, the courthouse and Federal building, Cleveland, and decora¬

tions in the South Dakota capitol and in the courthouse of Youngstown. Ohio. For the

two latter he received the gold medal of

boner of the Architecture' League ot New

York in 1911. He has lectured on art at

Columbia, Harvard and Yale universities and

in June 1912 was appointed member of the

National Commission of Fine Arts by Presi¬

dent Taft. He is joint author with Mrs.

Blashfield of (Italian Cities > (1900, new ed., 1913) ; and, with Mrs. Blashfield and A. A.

Hopkins, coeditor of Vasari's <Lives of the Painters y (4 vols., 1897), and sole author of { Mural Painting in America and the Modern

Tendency) (1913).

BLASIUS, Saint, or SAINT BLAISE,

bishop of Sebaste, in Armenia, is said to have suffered martyrdom about 316, at the time of the persecution under Licinius, when he was taken prisoner at the command of the gov¬

ernor, Agricolaus. His feast day is celebrated in the Greek Church on 11 February and he is commemorated in the oldest martyrologies

of the Roman Church. In the Roman Mar—

tyrology, 3 February is assigned to him. He is the patron saint of wool-

combers, his flesh having been torn by iron combs. He is espe¬

cially invoked in diseases of children and ani¬

mals, and ailments connected with the throat are more particularly in his province.

BLASPHEMY, is somewhat variously

defined. According to -the most general defini¬

tion, it means the speaking irreverently of the mysteries of religion ; and formerly, in Roman Catholic countries, it also included the speak¬

ing contemptuously or disrespectfully of the Holy Virgin or the saints. Public blasphemy has been considered by the Catholic Church

as an unpardonable sin, and it was formerly punished with death by the municipal laws.

The 77th novel of Justinian assigned this pun¬

ishment to it ; and the capitularies inflicted the same punishment upon such as, knowing

of an act of blasphemy, did not denounce the offender. The former laws of France pun¬

ished this crime with fine, corporal punish¬

ment, the gallows and death, according to the degree and aggravation of the offense. The

records of the parliaments supply numerous

instances of condemnation for this crime and many of punishment by death ; others of

branding and mutilation. A man was for

this offense condemned to be hanged, and after¬

ward to have his tongue cut out and the sen¬

tence was executed at Orleans as late as 1748.

But it is remarked by a writer in the French (Encyclopedie ModerneC that we should form

an erroneous opinion, from the present state of society, of the effect of this offense and the disorders it might introduce in former times ; for religion was once so intimately blended with the government and laws, that to treat the received articles of faith or religious cere¬

monies with disrespect was in effect to attack civil institutions.

By the common law of England, as stated

by Blackstone, blasphemy consists in denying the being and providence of God, contumelious reproaches of Jesus Christ, profane scoffing at Holy Scripture, etc., and is punishable by fine and imprisonment, or corporal punishment; the offense is also statutory, the Statute 9 and 10 William III cap. xxxii, declaring that if any one shall deny any of the persons of the Trinity to be God, or assert that there are more gods than one, or deny the truth of

Christianity or of the Scriptures, he shall be incapable of holding any office; and for a second offense be disabled from suing any action, or being an executor, and suffer three years' im¬

prisonment.

By the law of Scotland, as it stood under acts of 1661 and 1695, the punishment of blas¬

phemy was death. Blasphemy consisted of rail¬

ing at or cursing God, or of obstinately persist¬

ing in denying the existence of the Supreme Being, or any of the persons of the Trinity.

The early legislation of the American colo¬

nies followed that of the mother country, and in some of them the crime of blasphemy was punished with death ; but the penalty was miti¬

gated before the establishment of independence and imprisonment, whipping, setting on the pil¬

lory, having the tongue bored with a red-hot iron, etc., were substituted. Several penalties against blasphemy are to be found in the laws of some of the New England States, according to which it is provided that, if any person shall blaspheme, by denying, cursing or contumeliously reproaching God, his creation, govern¬

ment or final judging of the world, or by curs¬

ing or reproaching Jesus Christ or the Holy Ghost, or contumeliously reproaching the Word of God, consisting of the commonly received books of the Old and New Testament, he is liable to imprisonment for a term not exceed¬

ing five years. But in many States, the offense of blasphemy, not being a subject of special statutory provision, is only punishable either as an offense at common law, or a violation of the statute laws against profane swearing.

Such penal statutes against blasphemy as are not subversive of the freedom of speech or liberty of the press have, in the United States, been declared constitutional. Consult (Ameri¬

can and English Encyclopedia of Law,* Vol. IV, p. 582.

BLASSER, ble'ze, Gustav, German sculp¬

tor : b. Diisseldorf, 9 May 1813 ; d. Cannstatt, 20 April 1874. He was associated 11 years

with Rauch and for that time shared in all his work. In 1845 he went to Rome, but re¬

turned to Berlin when appointed to design

one of the groups for the ˆSchlossbriickeA

His group, (Minerva Leading a Young War¬

rior to Battle, > is thought to be the best of the series. Among his other works are a

statue of Saint Matthew in the church at Hel¬

singfors; the (Prophet Daniel*; Barussia in the new museum at Berlin ; the statues of

Jeremiah, Daniel and Charlemagne for the

church at Potsdam; the equestrian statue of Frederick William III at Cologne; hospital¬

ity J ; and many busts, including one of Lin¬

coln and one of Washington.

BLAST FURNACE, a mechanical struc¬

ture built of refractory material in which

metallic ores are smelted in contact with fuel and flux, the combustion of the fuel being ac¬

celerated by air under pressure. The materials are fed in at the top of the furnace, and after the ores are reduced, the metal, or in some cases the matte, and the resulting slag are tapped in a molten state at or near the bottom ; as a rule, the slags, being of less specific gravity than the metal, float upon it. The sizes of blast furnaces vary from a few feet to over 100 feet in height, a horizontal section through the structure showing either circular or rec¬

tangular interiors, the circular form being

adopted for the larger sizes, while those of smaller height are often made rectangular to permit of introducing a number of tuyeres with air nozzles into a narrow hearth.

A vertical section of a modern American

blast furnace shows at the lower part, the hearth or crucible of the shape desired, into which the air is admitted under pressure through tuyeres.

On this hearth is superposed an inverted frustum of a cone forming the boshes, and above

these the shaft of the furnace ascends in the form of a right cone. The shafts are enclosed by shells of sheet steel or by crinolines formed of bands and beams, and carried on columns.

The boshes are usually secured by bands and the crucibles by sheet and metal jackets, the jackets being made strong enough to resist the expansion of the brick work. Modern hearth

practice tends toward cast steel or iron hearth jackets with pipe-cooling coils cast integral with the sections of the jacket. When jackets are extended about four feet below the hearth line and banded together strongly, and thor¬

oughly water-cooled, the danger of <(break—

outs® is very slight. The materials are charged into the shaft so that layers of fuel alternate with layers of ore and flux, the taper of the shaft being sufficient to permit of expansion as the materials are heated, and facilitate their de¬

livery to the hopper formed by the boshes, where the fusing or reduction of ores takes place. The reduced ore, meeting the burning fuel near the tuyeres, is melted, and the liquid slag and metal drop into the hearth or crucible (the cinder or slag floating on the liquid metal), from which they are tapped out from time to time. By heating and drying the blast before it enters the tuyeres combustion is accelerated, and the furnaces produce increased quantities of metal with reduced fuel consumption per

unit of product.

The large blast furnaces smelt ores of iron or manganese, or of iron and manganese, and are from 40 to over 100 feet in height, a cross

section at the top of the boshes showing a circle from 10 feet to 23 feet in diameter. The blast is heated to 1,200°, and sometimes to 1,500°, or 2,000° F., and is forced into the crucibles or hearth through a set of tuyeres, at pressures from 8 to 18 and, at times, exceeding 20 pounds per square inch. The blast furnaces smelting silver or copper ores seldom exceed 30 feet in height, the horizontal section being rectangular, and the blast pressure but a fraction of a pound.

A large modern blast furnace will produce from 400 to 800 tons of pig iron daily, requiring from 1,200 to 2,500 tons of ore, fuel and flux. The cost for construction and equipment of one of these modern furnaces, with its necessary rail¬

road tracks, storage room and bins for receiv¬

ing the raw material, the mechanism for elevat¬

ing it to the top of the stack with sufficient blowing engines, boilers, hot blast stoves, etc., ranges from $500,000 to over $1,000,000.

As a rule, blast furnaces smelting other ores than those of iron have the top of the furnace stack open, while, in those producing iron, the top is usually sealed by a bell closing against a hopper, to distribute the stock in the wide throat of the furnace and to control the gases which are the result of the smelting operation, so as to employ the calorific value of these gases for heating the blast or for generating steam in vol. 4 — 5

boilers to operate machinery. The use of these gases for firing boilers and also for expansion in gas engines for power purposes is increasing.

The blast is heated in hot blast stoves, generally cylinders from 14 to 25 feet in diameter and from 50 to 115 feet high, filled with checker work of fire brick. These stoves are placed in series, large furnaces having as many as four stoves. The gas being admitted to and burned in a stove raises the temperature of the masonry, after which the gas is shut off and the blast forced through the highly heated checkers. By alternating a series of stoves on gas or blast, at intervals of one or two hours, a nearly uniform temperature is maintained.

The blast, after passing through the hot blast stoves, is conveyed in iron or steel conduits, lined with fire brick, to tuyeres, set in the walls of the crucible. These tuyeres are formed of an inner and outer shell with closed ends, water circulating between the two shells. The tuy¬

eres are mostly made of bronze or copper and are set in larger tuyere blocks (also water cooled) of iron or bronze. Nozzles connect the lined air conduits to the tuyeres. The cooling water required by a modern blast furnace

amounts to millions of gallons daily. A large furnace requires a boiler equipment of from 3,500 to 5,000 horse power for its blowing, pump¬

ing and elevating machinery, electric plant, *etc.*

Blast furnaces are numerous in all manufac¬

turing countries, but the United States leads in number and size. The Minnesota Steel Company has constructed two at Duluth, each of 280,000

tons annual capacity. In the Pittsburgh steel district are many large furnaces of over 500

tons daily capacity.

It is impossible to give the total number of blast furnaces in the United States, for the rea¬

son that the number of those used for producing copper, silver, etc., are not collated, but lists of the furnaces employed in reducing iron ores are carefully reported by the American Iron and Steel Association. There were in 1909, in the United States, approximately 450 blast furnaces, whose aggregate reported capacity amounted to over 25,000,000 long tons of pig iron, but as all of these furnaces are not active at one time (25

per cent being often idle, and sometimes 40

per cent), the total annual output is the only practical gauge of the industry. In 1914, which was a year of depression, 284 furnaces, belonging to 160 concerns, reported a pig iron production of

23,269,731 tons valued at $312,639,706; the other products of these establishments brought their total product up to a valuation of $317,-

559,053. The year 1915 saw a recovery of pig iron production, which rose to 29,916,213 tons, or a gain of 16.6 per cent over 1909. About a third of the country's blast furnaces are in Pennsylvania, about one-fifth in Ohio, other States having an important share in the indus¬

try being Alabama, Michigan, Illinois, New

York, Virginia, Tennessee and Wisconsin. Of

the pig iron produced 34 per cent is bessemer or low phosphorus, 40 per cent basic and 19

per cent foundry.

There are a little more than 200 plants in the United States manufacturing pig iron. In 1916 it is estimated that they gave employment to about 45,000 men, paying out wages of about $33,000,000, and adding almost $100,000,000 to the value of the ore and materials handled. See 66

Steel; Iron and Steel; Foundry Practice;

Blast Furnace Practice, Modern.

BLAST FURNACE GAS ENGINE. See

Internal Combustion Engine.

BLAST FURNACE PRACTICE, Modern.

The first requisite for the conduct of blast furnace practice is equipment.

The construction of the Duquesne blast fur¬

naces in 1902 and 1903 marked a great advance in the evolution of the modern blast furnace, for the labor of filling the furnaces, formerly-done by hand, was performed mechanically and their size far exceeded any previously built.

The capacity of 600 tons per day was fully 50

per cent greater than any other furnace produc¬

tion at that time. These furnaces were 100

feet high and were equipped with powerful

blowing engines of large capacity.

The ore was handled in and out of stock

pile mechanically by means of a large gantry crane equipped with a scraper bucket spanning the ore yard. The stock house was equipped with steel bins for ore, stone and coke, and the furnaces were filled by an inclined hoist, op¬

erating a cylindrical bucket, which was depos¬

ited in the stock house on a low car and trans¬

ferred to the bin chutes for filling.

This bucket was closed by a bell, to the rod of which the hoist rope was hooked, when the tub was hoisted, and this bell when lowered on top discharged the contents automatically into the receiving hopper, thus forming a complete ring in layers of material in this hopper each time a tub was hoisted.

The success of these stacks was followed

rapidly by the construction in different parts of the country of stacks of similar dimensions but differing somewhat in equipment, particularly in the charging mechanism. These furnaces for a while gave good results but later were a grave disappointment, owing to the almost universal failure of their linings after a few months' op¬

eration, while the Duquesne furnaces made over 1,000,000 tons on their first lining, a result due to the good distribution obtained by the me¬

chanical charging apparatus installed at the Duquesne Works. As a result, charging mech¬

anisms have been generally improved, and still larger furnaces are being erected.

The hoist and distributing mechanism in¬

stalled at Duquesne seemed to engineers, when built, more complicated and expensive than was necessary, and at the same time they aimed to make a still greater reduction in the labor em¬

ployed, but some failed to appreciate the im¬

portance of good stock distribution on top of the furnace and how it was accomplished by the Duquesne design.

The usual construction now adopted for

charging the furnace is mechanical stock hand¬

ling, storage bins and skip hoists equipped with single or double skips. These dumping skips are responsible for the short life of the fur¬

nace linings, for in discharging their load on top of the furnace they cause a sorting of the stock, the finer parts dropping down near the dumping point of the skip and the lumps going farthest away. It is quite possible to obtain a uniform layer in the furnace of coke, lime¬

stone and ore, but the fact that more of the lumps went to the side of the furnace farthest from the skip made the gases channel on that side and thus cut the inwall by concentrating the smelting action to that side of the furnace.

Good stock distribution may be obtained by

mechanically filled furnaces provided with any kind of skip hoists by the use of the rotary dis¬

tributor, of which there are three distinct types.

From the bins, a larry should weigh and

deliver the stock to the skip at the foot of the inclined furnace hoist.

When the plant is located on navigable water and receives its ore that way, the unloading machines operating grab buckets are arranged to deliver the material into the stock piles, from whence it is recovered by another grab bucket, operated by a gantry crane spanning the ore yard and delivering its load into an elec¬

trically driven transfer car serving the stock bins. When two or more large furnaces are

located away from navigable water, and hence receiving all the stock by rail, a mechanical car dumper is an economy.

Considering next the power equipment, the

water tube boiler gives the best results with waste gas as a fuel, but, for more than two furnaces, much greater economy is obtained by burning the gas direct in the cylinder of the gas engine and thus furnishing the electric power required to drive auxiliary machinery

about the plant, and in the gas-driven blowing engine the blast required for the furnace. In plants where the water-tube boiler is still in use, the steam engines are compounded and the exhaust steam condensed in a central condenser of large capacity.

Furnace gas is made much more efficient

under boilers if cleaned before use, and, if go¬

ing to internal-combustion engines, a thorough cleaning is absolutely necessary.

For use under boilers, the cleaning may be effected by the wet dust catcher of the contact type where the gas is repeatedly directed against a surface of water kept clean by circulation.

Such dust catchers remove 95 per cent of

the solid matter in the gas, absorbing less than 1 per cent of moisture and reducing the temper¬

ature about 5 per cent.

Dry Blast. — No furnace plant to-day is

complete without some means of regulating the amount of moisture admitted into the furnace in the blast, and the most satisfactory way to do this is to reduce the amount to the lowest possible minimum. This is accomplished by

refrigeration of the air admitted to the air cylinders of the blowing engines, a process pat¬

ented by James Gayley and accomplishing

greater economical results than was estimated possible in that direction.

In the Gayley process the air is passed in contact with cold pipes to relieve it of moisture by freezing. The dry air thus made is then blown through the tuyeres. When it is re¬

membered that in a large modern blast furnace, such as those used in the Pittsburgh district, about 40,000 cubic feet of air per minute is

required to maintain the tremendous combus¬

tion, it is easy to understand that on days when the humidity is high several hundred gallons of water per hour will be carried into the fur¬

nace if undried air is supplied. This water has to be steamed and decomposed, imposing

a burden of wasted energy on the furnace.

The critical point of temperature in the blast furnace is about 2750° F. If damp air is sup¬

plied at a temperature of 1500°, large fuel con-BLAST FURNACE PRACTICE

sumption is needed to maintain temperature

above the critical point at which the iron is fused. With perfectly dry air at 2000° F. the demand upon the coke fuel is markedly les¬

sened. Not only is fuel saved, but a higher temperature is so easily made that tendency to slow down is removed and production in¬

creased. There is a wider working margin of temperature. Hearth temperature with ordi¬

nary hot blast is about 1600 B. T. U. per pound of coke; with 50 per cent of oxygen it rises to about 2400 B. T. U., so that with 50 per cent oxygen blast an ore that would use 2,100

pounds of coke is fused with 1,400 pounds.

Iron Ores. — Such ores are smelted when

containing from 40 per cent and upwards of iron, and, in case of calcareous ores, even lower grade material has been treated profit¬

ably, but the costs of manufacture increase very rapidly as the yield of

metallic iron drops in the mixture. It is, therefore, important to give attention to the preparation of the ore before smelting, with the view of removing

objectionable elements. This concentration fre¬

quently removes considerable phosphorus which is practically unaffected by the smelting process, and occasionally reduces the sulphur, which is always a difficult and expensive element to remove.

In concentration, it is usually necessary to crush fine, and, as the ore grains decrease in size below what would stay on a 60-mesh sieve, the difficulty of smelting increases ; hence two methods are used to agglomerate this fine prod¬

uct and thus render it more easily and eco¬

nomically smelted.

One is briquetting either with or without

binder ; in the latter case, it is necessary to burn the product in a continuous furnace. The other is nodulizing, that is, agglomerating by use of the rotary kiln. This latter process practically removes all the sulphur that occasions any

trouble in the smelting, breaking up sulphates as well as sulphides. Ores carrying 6 per cent of sulphur contain, after such treatment, less than 3-10 of 1 per cent. Some ores, principally the soft brown hematites, found quite abun¬

dantly in the Southern States, are best concen¬

trated by washing.

Fuels. — For the blast furnace, coke (q.v.) is to-day the most commonly used, on account of the wide distribution of coking coals, but anthracite is still used largely by the plants within easy radius of the anthracite fields of Pennsylvania and charcoal is still used where timber is abundant.

The development of the retort oven, partic¬

ularly with the saving of by-products, has made possible the coking of coal that is practically non-coking in the ordinary beehive oven. At the same time, it has reduced the cost of cok¬

ing considerably, depending upon the nature of the coal and the market value of the by-prod¬

ucts at the ovens.

With fuel, as with ores, it is important to eliminate earthy impurities before the smelt¬

ing operation. It is therefore found advanta¬

geous to wash coal that is high in sulphur and ash.

By-product coke lacks the silvery color of

beehive coke and is not quite as efficient in the blast furnace, pound for pound of the carbon contents. It is also frequently high in moisture, due to faulty methods of quenching. But since the advent of higher blast temperatures these disadvantages are largely overcome and the use of this coke increases.

In order of efficiency in the blast furnace, charcoal comes first, next anthracite, beehive coke, retort coke.

Small furnaces operate with lower fuel con¬

sumption on anthracite than on coke, and it is always necessary to lighten the burden when changing such furnaces from anthracite to coke fuel. Other things being equal, the fuel with high combined carbon is more efficient in the blast furnace than one of lower carbon content.

For example, the best coke from the Pocahon¬

tas region is more efficient than the best Con-nellsville; the former, while a soft coke, has from 5 to 7 per cent of ash, while the latter, although hard and silvery, has from 10 to 12

per cent of ash.

Fluxes. — Purity is here a desideratum as

well as in ores and fuels, but the only way it can be obtained is by choosing as pure a de¬

posit as possible, then strip off the overlying earth carefully and, in quarrying, throw out stratas or dykes of silicious material.

It is important that the flux for the furnace be crushed to conform with the average of the stock, which ordinarily means broken to pass a three-inch ring.

Both dolomite and calcite are used as flux; the latter is a more active desulphurizing agent but does not make as fluid a slag, and this lack of fluidity offsets to a large extent its greater affinity for sulphur. The greater fusibility of dolomite slag increases the opportunities of calcium present to combine with the sulphur, and hence, as a rule, one flux is as efficient as the other, as a purifying agent in the blast furnace process.

Throughout the South dolomite is used when

basic pig is desired and calcite when foundry iron is sought. In other words, dolomite is found to give low silicon and low sulphur, while calcite gives higher silicon in the pig.

Blast Heating. — Each furnace should be

equipped with blowing engines capable of deliv¬

ering the full quota of air at 30 pounds pressure, if necessary, and provided with governors to give a constant speed without regard to the pressure of the blast. This practice has been one important cause of the very large produc¬

tion obtained for American blast furnaces, and has been adopted by some of the English iron masters after remodeling their plants.

The volume of the blast required for a mod¬

ern stack is 85 cubic feet per minute for each ton of pig made per 24 hours, and weighs

nearly one and one-half times all the solid materials charged into the furnace, hence any variations in the quantity or temperature of this blast acts quickly upon the smelting process going on in the furnace.

In the desire to return as much heat as pos¬

sible to the furnace, the use of the iron-pipe .

stove, where the maximum temperature of the blast is limited to 950° F., has been superseded by the firebrick stove, where the temperature is only limited by the refractory quality of the firebrick lining. The iron-pipe stoves have the advantage of maintaining a nearly constant

temperature of the blast so long as there is gas enough to fully supply the burners in the

stove setting, but has the disadvantage of cool¬

ing off very rapidly when blast is taken off the furnace for any purpose. Firebrick stoves drop in temperature from 50° to 250° F. from the beginning to the end of an hour's blow, the usual period, but hold their heat when closed up tightly during a shut-down of the furnace for a short period.

It is a good practice to maintain the temper¬

ature of the stoves 200° hotter than the blast going into the furnace as a reserve to be called upon should the furnace turn cold. With

blast at constant volume and temperature there is still another variable which needs controlling, and that is the humidity of this blast.

The humidity of the atmosphere may vary

from nine grains in the summer to as low as one grain in the winter, and between these extremes the humidity varies widely and

rapidly during even a few hours of any day.

Just the importance of this variable to furnace operation was never demonstrated until Mr.

James Gayley constructed at the Isabella fur¬

naces in the year 1904 his desicating apparatus to furnish dry air for that plant. This trial showed that with blast at less than two grains of moisture per cubic foot, a saving of 20 per cent of the fuel required per ton of coke was effected.

Gas. — The waste gases issuing from the

furnace consist principally of nitrogen, carbonic oxide (CO), carbonic acid (C02) and water

in the form of steam.,

The ratio CO and C02 indicates the char¬

acter of the combustion taking place in the fur¬

nace hearth, the larger percentage of C02,

the better the combustion and the lower the fuel consumption. A good average ratio for

the United States is CO-2 and C02-1, that is (2 to 1). In rare instances

it has been as low as \l/2 to 1, but with a hot furnace making foundry or high silicon pig, it may reach 4 to 1, or in speigle manufacture from 10 to 15 to 1, depending on the mixture being smelted.

To obtain the maximum economy in iron

smelting, every effort is made to utilize the heat units escaping in the waste gases. This is ac¬

complished in two ways. One portion is used in heating the blast, as already described, and the remainder is burned for power, either under water-tube boilers, for the generation of steam, or in the cylinder of gas engines, about 65 per cent of the total waste gas produced being usu¬

ally available for this purpose, and the balance, 35 per cent, going into the stoves for heating the blast.

The modern furnace is a large producer of

power in excess of its own requirements, es¬

pecially when the gas is utilized in gas-driven engines. Such engines may furnish the blast required and electrical energy for distribution . about the furnaces, providing also an excess for sale or distribution elsewhere, amounting to 800 H.P. per ton of pig per hour.

‘ Cinder or Slag. — This by-product in the manufacture of pig iron is a silicate of the oxides of the metals not reduced in the process.

Various attempts have been made to utilize

this material, and it is quite extensively used for road-making and for railroad ballast. For this purpose it is frequently run when hot onto an endless chain of cast-iron pans and dis¬

charged, broken and chilled, in cars for distri-

%

bution. This method has the advantage of mak¬

ing the surface of the slag vitreous and thus impervious to water.

The most remunerative use for furnace slag

of certain composition is in the manufacture of slag cement. For this purpose the slag must not be over 4 per cent in magnesia and from 12

to 14 per cent in alumina. Two kinds of slag cement are manufactured, the ordinary Puzzo-lan, made direct from the slag without rehurn-ing, and slag Portland cement, made by clinkering the slag in a rotary kiln and then grinding.

When slag is intended for cement purposes it is granulated, that is, run while hot into water, which breaks it up in the form of sand. Such material is also useful to replace sand in mak¬

ing concrete.

The quantity of slag made per ton of pig

produced varies from 600 pounds per gross ton of pig to 3,000 pounds and over. The slag has an important bearing on the quality of the pig made and is one of the great purifying agents of the blast furnace. The greater part of the furnace slag produced, however, is unutilized and is usually tapped into iron cars, called ladles, and hauled in the fluid state to the bank, where it is poured out.

Modern practice seeks to reduce the loss of iron in slag, which is considerable, consisting in part of metal chemically held in the slag as a leso oxide, and fine shots of metallic iron suspended in the slag.

Iron Product. — This metal is a crude car¬

bide of iron, containing about 94 per cent of metallic iron, from 3.25 per cent to 3.75 per cent of carbon and graphite, silicon varying usually from l/2 per cent to 4 per cent, and sulphur usually from .01 per cent to .10 per cent, while the phosphorus in Bessemer pig

is less than .10 per cent and in low phosphorus pig down to .03 per

cent, and in basic from .10

per cent to 3 or 4 per cent, depending on the ores used. In the manufacture of pig iron, it is possible to vary the percentage of carbon somewhat and the proportions of carbon to

graphite.

It is also possible to control the sulphur, and the silicon, but the phosphorus must be con¬

trolled solely by the choice of the materials charged. This choice also influences the for¬

mation of other elements under discussion, but in case of phosphorus, it is the only means for effecting such control or regulation.

Practically all of the phosphorus contained in the fuel flux and ore passes into the product, except a loss when making high silicon foundry iron of about 7 per cent by volatilization, and this loss may be increased to 10 per cent in the manufacture of speigle.

The usual way of handling the pig product

is to run the metal while hot into moulds made in sand, forming a runner called a sow and short branches about three feet long, called pigs.

In case of gray iron, this metal is broken hot, when it has first solidified, and then cooled with water and loaded into cars. This iron has considerable sand adhering to the surface of the pigs, and for that reason is unsuited to melt in the open hearth furnace, where the lining is made of basic material. In order to obtain iron free from sand, and to reduce the arduous work of breaking this product hot, and BLASTING

carrying same by hand into cars for shipment, various devices have been constructed.

The Uehling pig machine is the most com¬

mon device employed to make sandless pig. It consists of an endless chain of moulds, which are filled at one point and, after spraying with water, discharge the pig into a transverse pan conveyer, which carries the pig under water, where it is thoroughly cooled and afterward is delivered into cars for shipment.

Another form is provided with moulds and

pans made of soft flange steel, and these when filled pass into a tank where they are sub¬

merged, the metal cooled and then delivered into cars. Still another form consists of a sub¬

stantial turntable on which the moulds are

mounted.

When it is not necessary to obtain sandless pig, the mechanical pig breaker is used. In the operation of this device the metal is cast in sand and the whole bed is removed mechan¬

ically by a traveling crane or trolley to the breaker, where the pigs are broken and fall into cars.

With the pig machines the metal must be

first run into cars or ladles, from which it is poured into the machine ; but with the pig breaker no ladles are required, the metal going direct into sand beds, as when it is to be handled by hand. Sandless pig may also be obtained by equipping the cast house with cast iron moulds or ˆchills,® which are washed with loam while hot, thus making it easy

to lift the pig when it is cooled.

Blast Furnace Lines. — In the blast furnace the hearth represents the grate surface, and its area determines the amount of fuel burned per unit of time, hence, the production of the fur¬

nace. The top of the furnace controls the dis¬

tribution of the charged materials, and has an important bearing on the working of the fur¬

nace, the character of the combustion taking place in the hearth, and hence the burden or amount of charge the coke unit is capable of carrying in smelting.

The bosh determines to a large extent, de¬

pending upon its height and angle of slope, the regularity of the working of the furnace, by-assisting or retarding the descent of the charge in the smelting zone.

The largest furnaces in the United States

are built with the hearth and top diameters practically equal, 17 to 18 feet, while the diameter of the bosh is usually 22 to 23 feet, the bosh height 12 to 14 feet, and the angle of the slope approximately 78°.

The tendency of the last five years has been to increase the furnace diameters, while the bosh has been slightly lowered in proportional height. These changes seem to cause the stacks to work with greater regularity, and larger out¬

puts on burdens composed, largely, of fine ore, and, at the same time, the loss of ore in flue dust has been materially reduced.

Modern practice aims at increased efficiency in all directions. It seeks to increase the effec¬

tiveness of the hot blast stoves by reducing radiation ; for this purpose larger checker sur¬

faces are exposed to the gases than formerly.

The power plant utilization of gases formerly wasted is gaining more attention. There is also a tendency to save the heat lost in molten iron and slag, by using it to make steam for low-pressure turbines. Recovery of the flue dust of the blast furnace is more common. The

distribution of incoming ore at the furnace is found to be much more important than used to be supposed. Peculiar ores require to be dis¬

tributed through the mass, so that the furnace will have a uniform ore to work upon at all times, giving a more constant furnace bur¬

den. Improved bin systems are used for ore, coke and limestone flux. It is now universally recognized that to secure steady large product there must be an even distribution of lumps and fines in the furnace. This is accomplished by rotating furnace buckets and also by rotating the furnace top. The revolving principle secures a spiral distribution of the lumps and fines.

Workmen are subjected to less danger

around the blast furnace than formerly. The Carnegie Steel Company was the first to suc¬

cessfully plug the tap-hole of a blast furnace with a clay gun, using the blast of the furnace as power. The gun is mechanically swung into position, so that no workman need be near until the hole is well plugged. Other mechanisms

tending to increased safety of workmen are in use.

David Baker,

Consulting Metallurgical Engineer, Philadel¬

phia.

BLASTING, the technical term for split¬

ting and breaking up any object by means of gunpowder or some other powerful explosive.

The operation, which is of extensive use in quarrying, mining and other branches of en¬

gineering, is performed by boring a hole or tunnel in the substance to be exploded, by means of a drill, sometimes called a jumper, loading it with gunpowder, and igniting this by means of a fuse burning so slowly as to allow the parties employed to retire to a safe distance before the explosion takes place. At one time it was sup¬

posed that the force of the explosion depended on the firm packing of the gunpowder in the hole by means of small chips of stone, sand, *etc.* One of the most important modern im¬

provements in blasting is the firing of the charge by electricity. This mode is especially applicable to submarine blasting, and was first practised for that purpose by General Pasley, in 1839. The only thing necessary is to make an interruption in the conducting wire at the point where the explosive is placed. In passing the electric current, a spark produced at the inter¬

ruption fires the charge. The effect being in¬

stantaneous the operator can fire any number of charges on the same wire simultaneously.

Two classes of explosives are used in blast¬

ing: low explosives, fired by direct ignition; and high explosives, fired by an intermediate detonator. To the first class belong the ordi¬

nary black blasting powders. These differ from common gunpowder in being required to pro¬

duce a more rapid explosion. To this end a larger proportion of saltpetre is used. The quickest formula is 76 parts saltpetre, nine parts sulphur and 15 parts charcoal, in use in England and America. At the other end of

the scale is the blasting powder of Austria —61 parts saltpetre, 18 parts sulphur and 21 parts charcoal. Chief among the high explosives in use for blasting is dynamite, or some one of its many variations. Blasting gelatine and gela¬

tine dynamite are also in favor for certain 70

kinds of work. The first consists of 92 parts of nitro-glycerine and eight parts of collodion cot¬

ton ; the second of 80 parts of blasting gelatine and 20 parts of woodpulp or other similar ab¬

sorbent. Fatalities resulting from blasting in coal mines have led to the invention of a series of ex¬

plosives known as (<safety powders.® There are three classes of these ; the first containing large quantities of volatile salts — the water of crys¬

tallization of these salts lessening the tempera¬

ture of the explosion, as with the <(01iver Flameless Powder.® The second class are the nitrate of ammonia powders, which give very little flame. The third class are nitro-glycerine powders in which the explosive is so combined with other ingredients as to give a very short flame and a low temperature, as with ((Car-bonite.® As compared with black powder, car-bonite may be used with the same degree of safety in loads of 200 pounds as with one pound of common black blasting powder.

In mining work single-hand boring is the

common practice — that is, each miner holds his own drill as well as striking with the ham¬

mer. In quarries, however, and large excava¬

tion work sets of two or three men work to¬

gether, one handling the drill and the others striking. Where the holes are very deep the weight of a long drill rod is sufficient without the hammer, the rod being lifted two or three feet and allowed to fall. After each blow the drill is lifted a little and turned in the hole.

The dust is frequently lifted out to prevent choking. A better plan is to introduce a small running stream of water. For removing small volumes of rock in mines, quarries and other engineering enterprises at a single blast, small-shot blasting is the most common method em¬

ployed. This consists of drilling a small num¬

ber of holes in the rock from one and one-quarter to three inches in diameter and from 18 inches to several feet in depth which are then filled with dynamite or blasting-powder or some other safe and easily handled explosive, and properly connected by fuse, or with a

magneto-machine or electric battery by electric wires. The space above the explosive is then plugged up with sand, dirt, clay or other matter, and the charge exploded. For breaking the

rock into small pieces so as to be more easily removed (as in excavating for a foundation) the holes are drilled close together and heavily charged, but where it is unnecessary to break into small pieces (as in quarrying), and large shapely masses are more desirable, the holes are drilled in rows with greater distance between and filled with a smaller amount of explosive.

This will split the rock practically along one line and will not shatter it as in the first case. In excavating tunnels, it is in many cases desirable to remove a mass of rock the size of the tunnel cross-section, an object which is generally ac¬

complished by drilling and firing a small num¬

ber of converging holes, thus forming and re¬

moving a cone-shaped or wedge-shaped centre—

core. This central opening thus formed is en¬

larged by drilling and blasting successive rings of holes around it.

For removing vast quantities of rock or

blowing up ledges, the best method is mine blasting. For this purpose shafts are sunk

either vertically, or horizontally, or both, into the ledge to be removed; enormous quantities of powder, dynamite or other explosives are placed at the bottom or end of the shafts, which are then closed up by rocks, earth, etc., and the charge is fired either by fuse or by electricity, most generally the latter.

The first blasting on record was in 1627,

in a mine in Schemnitz, Hungary, by Caspar Weindl, a Tyrolese miner. From that locality the practice spread slowly, reaching England in 1670, and being introduced in the Cornwall mines in 1689.

One of the greatest mine blasting operations ever attempted was the removal of Flood Rock in that section of the East River, New York, known as Hell Gate. An entrance shaft was

sunk on the Long Island shore, from which

the reef projected. From this shaft nearly 20

tunnels were bored in all directions, and con¬

nected by lateral galleries. The rock covered about nine acres and the tunnels were made large enough fpr the broken roof to fall into them and leave 26 feet of water in the channel. The roof left above the tunnels varied from 10 to 18 feet in thickness. The charge consisted of 240,399 pounds of rackrock powder and 44,331

pounds of dynamite distributed in over 46,000

holes. The explosion was measurably success¬

ful, the dredging necessary aftenvard being

readily accomplished. Other great blasts on

record are: the blasting off of the face of the mountain of marble at Colonnata, in the Car¬

rara district of Italy, where eight tons of high explosives distributed in

tunnels dislodged 600,-

000 cubic yards of marble; a blast in a hill¬

side at Piedra, Cal., where 114,000 pounds of Judson powder and 11,400 pounds of Hercules 60 per cent dynamite threw down 350,000 cubic yards of rock; a blast at Tennino, Wash., to get rock for a government jetty, where 43,100

pounds of blasting powder and 1,200 pounds of 60 per cent dynamite broke out 220,000 cubic yards; and a blast at Tompkins Cove, N. Y., where 23,575 pounds of 60 per cent gelatine dynamite and 26,550 pounds of granulated nitro¬

glycerine powder broke out 210,000 cubic yards of bluestone.

Surface blasting is generally used to remove reefs and obstructions to navigation, high ex¬

plosives such as dynamite, gun-cotton or nitro¬

glycerine being the only effective agencies in an unconfined space, as the detonation is so sudden that the shock is instantly trans¬

mitted to the rock with which it is in contact.

Numerous important improvements have been

made in blasting by the substitution of rock boring machines for hand labor. Of such ma¬

chines, in which the jumper or drill is repeatedly driven against the rock by compressed air or steam, being also made to rotate slightly at each blow, there are many varieties.

In recent years blasting has been used scien¬

tifically in the improvement of farming land.

Stumps are blown out, boulders broken up,

hardpan shattered, subsoils loosened, drainage crevices opened in low and wet spots, ditches cut, gullies filled, *etc.* Holes are blasted out for

setting young fruit trees, loosening the sub¬

soil advantageously for several feet, and old trees are restored to vigorous growth and bear¬

ing by the judicious firing of blasts in the sub¬

soil between old orchard rows. Worn out land has been revitalized by blasts set 15 feet apart and three feet deep, at a cost of $18 per acre, the good results remaining for several years.

See also Explosives,

Bibliography.— Cosgrove, J. J., <Rock Ex¬

cavating and Blasting5 (Philadelphia 1913) ; Daw, A. W. and Z. W., (Blasting of Rock5

(London 1898) ; Du Pont de Nemours, E. I., Powder Company, (Blasting Supplies) ;

ˆFarmers' Handbook5 ; and (Safety Blasting

Explosives5 (Wilmington, Del., 1915) ; Gutt—

mann. O., (Blasting 5 (London 1906) ; Prelini, C., (Dredges and Dredging5 — Submarine blast¬

ing (New York 1912) ; Weston, E. M., (Rock Drills5 (New York 1910).

BLASTODERM. See Embryology.

BLASTOMERYX. See Merycodus.

BLASTOMYCOSIS, a rare skin disease

due to a fungus parasite. See Skins.

BLATCH, Harriet Stanton, American lec¬

turer and suffragist : b. Seneca Falls, N. Y., 20

Jan. 1856. She is a daughter of Henry Brew¬

ster and Elizabeth Cady Stanton. She was

graduated at Vassar College in 1878, and later studied in Berlin and Paris. In 1882 she was married to William Henry Blatch of Basing¬

stoke, England. She resided in England for 20

years and became interested in the work of the Fabian Society. She was also active in all women's organizations and particularly in the suffrage movement. She assisted Charles Booth in collecting facts on village life in England, and her studies in this field were embodied in a thesis for the degree of M.A. at Vassar in 1894. In America she has continued her

mother's work for the political enfranchise¬

ment of women. She is president of the

League of Self-Supporting Women and of the

Women's Political Union.

BLATCHFORD, Samuel, jurist: b. New

York, 9 March 1820; d. Newport, R. I., 7 July 1893. He was graduated at Columbia Univer¬

sity in 1837 ; became secretary to Gov. W.

H. Seward of New York, and practised law at Auburn, N. Y., as a member of the governor's firm, 1845-54. In 1854 he settled in New

York as head of the firm of Blatchford, Seward &

Griswold. Though he attained success in gen¬

eral practice, it was his application to admiralty law that gave him his widest repute. On 3 May-1867 he was appointed judge of the United

States District Court for the southern district of New York; in March 1878, judge of the

United States circuit for the second circuit; and in March 1882 he became an associate justice of the United States Supreme Court. Here he continued to give close attention to admiralty cases, and also rendered important decisions on bankruptcy, copyright, patent and libel cases.

He was highly esteemed for his learning,

courtesy, patience and skill. Publications: Re¬

ports of Cases in Prize in the Circuit and Dis¬

trict Courts for the Southern District of New York 1861-65 5 (1866) ; (Reports of Cases in the Circuit Court of the United States, Volumes 4—65 (1867-69) ; (Circuit Court Reports for the Second Circuit, 1 847—7 5 5 (12 vols. octavo); (Reports of the Circuit Courts of the United States, Second Circuit, Volumes 1 3—20 5 (8 vols., New York 1877-83) ; with E. Howland and E.

R. Olcott, ‘United States District Court Re¬

ports (Admiralty Cases Decided by Judge

Betts) for the Southern District of New York, 1827-475 (2 vols., New York).

BLATCHLEY, Willis Stanley, naturalist :

b. North Madison, Conn., 6 Oct. 1859. He was graduated at Indiana State University 1887, and was successively an assistant on the Arkansas Geological Survey 1889-90, a member of Scoville’s scientific expedition to Mexico 1891, and assistant on the United States Fish Commission in 1893.. In 1894 he was elected State geologist of Indiana, and reelected in 1898, 1902 and 1906. Besides his annual reports his scientific writings include (Gleanings from Nature5

(1899) ; ‘Locustidse and Blattidae of Indiana5

(1892) ; (Some Indiana Acrididse5 (1891-98) ; (A Nature Wooing5 (1902) ; ‘Orthoptera of In¬

diana5 (1903) ; (Boulder Reveries5 (1906) ; ‘The Coleoptera of Indiana5 (1910); Wood¬

land Idylls5 (1912) ; (The Indiana Weed

Book* (1913) ; ‘The Rhyricophora or Weevils of Northeastern America5 (1916).

BLATTIDZE, family of cursorial Orthoptera, of which the ordinary cockroach is the most familiar. The family are the oldest known insects, being found as fossils in the middle Silurian deposits of France. See Cockroach.

BLAUBOK, blow’bok, or BLUEBUCK,

a large antelope of South Africa (Hippo tragus leucophceus) . It was of a bluish hue, and had long, stout horns which swept back from its forehead like those of its relatives, the isabel and equine antelopes. It formerly occurred in large herds, but had a limited habitat, and is extinct since 1799. Only five mounted speci¬

mens are known, these may be seen in the

museums of Leyden, Paris, Stockholm, Upsala

and Vienna. Closely related to this buck is the sable antelope (Hippotragus nig’er) from the eastern Transvaal and Mashonaland. When

wounded or brought to bay it is a very danger¬

ous animal. It breeds readily in captivity and becomes quite tame. Another species is the

equine antelope (H. equinus), whose habitat is all Africa south of the Sahara, except the Kongo forest. It is of a pale-brown color with vari-

colored face. Baker's antelope (H . bakeri) is by some regarded as a subspecies of the equine, by others a distinct species.

BLAURER, blow'-rer, BLARER, or

BLAARER, Ambrosius, German reformer: b.

Constance, 12 April 1492; d. Winterthur,

Switzerland, . 6 Dec. 1564. Through the in¬

fluence of his brother Thomas he went over to the Reformation party and went to Constance in 1522, after a vain attempt to introduce the doctrines of Melanchthon and Luther into the monastery to which he then belonged. He be¬

gan to preach in Constance in 1525 and soon became the leader of the Reformation there.

He was very active. He was at the colloquy in Berne (6 Jan. 1528) at Memmingen (1528 and again the following year) ; and at a third meet¬

ing in the same place in 1531. Shortly after¬

ward in the same year he was at Ulm and after¬

ward at two separate conventions at Geislingen and at two others at Esslingen (1531 and 1532) ; and everywhere his ability to organize was of great value to the Protestant cause. The fol¬

lowing year he scandalized the Catholic party by marrying a former nun (1533). A year

later he was summoned (with Erhard Schnepf) to Wurtemberg by Duke Ulrich and was sent

to Tubingen; but in 1538 he lost his position through court intrigue. He went to Kempten

and later to Isny. The Spaniards finally took Constance (6 Aug. 1548) and crushed the

Reformation ; and Blaurer, forced to leave,

went to Biel (1551-59), Leutmerken and Winter¬

thur, where he preached and carried on a very extensive correspondence with the leaders of the Reformation which had considerable influ¬

ence in shaping its course and doctrine. In addition to his extensive prose works, which are all of an ecclesiastical or doctrinal nature, he also wrote a number of excellent hymns.

BLAUVELT, blow'velt, *Mme.* Lillian

Evans, American prima donna: b. Brooklyn,

N. Y., 16 March 1874, of Welsh, English and Dutch ancestry. When eight years old she

made her debut as a violinist. She studied (voice) with M. Jacques Bouhy of Paris, for three years. Her debut in opera was made at the Theatre de la Monnaie, Brussels, in

<Mireille.) Returning to the United States, her work was chiefly in concert and oratorio under Seidl, Thomas, Damrosch, *etc.* She has sung

before nearly all the crowned heads of Europe and possesses many royal decorations ; re¬

ceived decoration of the Order of Saint Cecilia in Rome, 7 April 1901 (only woman ever so honored). In 1902 sang by special command at Albert Hall, London, the Coronation Ode, re¬

ceiving the coronation medal from King

Edward VII. Appeared at Royal Covent

Garden, London, in the roles of Marguerite in (Faust, > Juliette in (Romeo and Juliette,*

Zerlina in (Don Giovanni* and Michaela in

(Carmen* in 1903; toured Great Britain and Ireland in 1904; Germany and Russia in 1905; and continued to make annual appearances in various European countries until the summer

of 1914 when through the great war she was not permitted to fill her engagements.

BLAVATSKY, bla-vats'ke, Helena Pe¬

trovna, Russian theosophist : b. Ekaterinoslav, Russia, 1831 ; d. London, 8 May 1891. She

traveled in all parts of the world and succeeded in entering Tibet. In 1873 she came to the United States, founded the Theosophical So¬

ciety in New York, and aided in establishing The Theosophist. She studied the East Indian esoteric doctrines and Buddhist philosophy,

and by her writings contributed to make this philosophy popular among foreigners and In¬

dians. Her miraculous pretensions have been

proven impostures by V. S. Solovyoff in (A Modern Priestess of Isis J (Eng. trans. by W.

Leaf, London 1895), and also by the investiga¬

tions of the Society for Psychical Research in 1884. Despite her imperfect knowledge of

Sanskrit, she wrote much on the ancient doc¬

trines of India. At the time of her death she had about 100,000 followers. She wrote (Isis Unveiled) ; (The Secret Doctrine) ; (Key to

Theosophy. * An abridgment of her works

was edited by Katharine Hillard in English

(New York 1907). Consult Olcott, (01d Diary Leaves* (New York 1895). See Theosophy.

BLAYDES, blads, Frederic Henry Mar¬

vell, English classical scholar: b. 29 Sept. 1818; d. 7 Sept. 1908. He was graduated at Christ's Church, Oxford, in 1840, was ordained to the priesthood, and held the living of Harring-worth, Northamptonshire, 1843-86. His leisure was absorbed in classical study, and he edited a series of works, with critical notes, emenda¬

tions and commentaries,, elucidating the plays of Aristophanes and Sophocles. He reckoned

that he had given more than 20 years of his life to the latter author, and, with intervals, more than 50 years to the former.

BLAZING STAR. Various hardy peren¬

nial plants. See Liatris.

BLAZONRY, the art of describing a coat

of arms in such a way that an accurate draw¬

ing may be made from the verbal statements given. To do this a knowledge of the points of the shield is particularly necessary. Mention should be made of the tincture or tinctures of the field ; of the charges which are laid immedi¬

ately upon it, with their forms and tinctures ; which is the principal ordinary, or, if there is none, then which covers the fess point ; the charges on each side of the principal one ; the charges on the central one, the bordure — with its charges ; the canton and chief, with all charges on them ; and, finally, the differences or marks of the cadency and the baronet's badve.

See Heraldry.

BLEACHING, the process of decolorizing

textile fibres and fabrics, papers, oils, waxes and other substances so as to leave them white.

The operations of bleaching are essentially

chemical, the whitening being accomplished in two ways: (1) By the oxidation of the color¬

ing matter in the substance to be bleached — in which case the coloring matter may be itself whitened or may only be rendered soluble, to be afterward washed away; and (2) by the

hydrolizing of the coloring matter, so that it forms a white or colorless compound, remain¬

ing harmlessly in the substance if it is in¬

soluble. In the first instance nascent (((new born®) oxygen is the agent employed; in the second, nascent hydrogen. Speaking in a gen¬

eral way the oxidizing processes are used for vegetable substances, and the hydrolizing proc¬

esses for substances of animal origin.

The chemical agents employed in commercial

bleaching fall naturally into these two classes.

Foremost of those which liberate active oxygen in the bleaching bath is chlorine, either as such or in combination as hypochlorous acid. Prac¬

tically all the cotton bleaching in the United States is done with this agent. Up to a very recent period the form in which it was applied was as the so-called “bleaching powder,® a

chloride of lime. The commercial production

of liquefied chlorine has led to the preferable use of sodium hypochlorite, formed in the bath by passing into a solution of soda ash or soda caustic the gaseous chlorine which vaporizes from the liquid form when the pressure is re¬

leased. This gives a clear solution free from the very objectionable sediment common to the lime bath. Other oxidizing agents in large use are the peroxides of hydrogen and sodium.

Both of these are very unstable, and require to be kept cold and in the dark until used. When warmed they give up their loosely combined

oxygen. Sodium perborate is a substance of

similar properties. Ozone, formed by passing a silent electric discharge through confined air, is an effective bleaching agent especially for yarns; it is discharged into the bath as it is made. The so-called electrolytic process con¬

sists in decomposing a bath of sodium chloride in which the goods to be bleached are immersed, by the passage of an electric current. The chlorine made in this way costs about one-fifth as much as that obtained from bleaching

powder. Potash permanganate is another

oxidizing agent, used extensively for bleaching straw, jute and even ivory. These substances acquire a brownish color in the process, but this disappears in a bath of sodium bisulphite.

The agents used in bleaching by the action of free hydrogen in the bath are sulphur diox¬

ide, the bisulphites of soda and potash, and the alkali hyposulphites.

Bleaching is now a very different procedure from what it was in the 18th century. At that period several months were required to bleach a piece of cloth. Manufactured linens were

then sent by the shipload to Holland in the spring of the year, to be bleached on the grassy plains of that country, not to be returned until fall. The process there consisted in boiling repeatedly at intervals in caustics and lyes, and exposing the fabrics to the sunlight between the boilings. After the discovery of the bleach¬

ing properties of chlorine gas by Berthollet in 1790, the time required for bleaching was re¬

duced from several months to a few days. To some extent, however, the old processes are still continued in certain localities.

In modern bleacheries the process is two¬

fold : First, a preliminary cleansing of the ma¬

terial to be bleached ; second, the actual whiten¬

ing.

In the case of fabrics the procedure in the bleaching of cotton cloth may be cited as a typical example. The steps are nine in number, as follows: (1) Singeing; (2) steeping; (3) boiling with lime; (4) souring; (5) boiling with soap; (6) boiling with lye; (7) chemicking; (8) souring; (9) washing thoroughly.

The singeing is to remove the long fibres

which protrude from the surface of the cloth and make it woolly. It is done by rapidly pass¬

ing the cloth very close to a gas flame. Steep¬

ing is for the purpose of fermenting certain organic substances in the walls of the fibre, and thus rendering them soluble. It is carried on with warm water (140° F.) for from 18 to 24

hours, and in some bleacheries diastase is

added to the bath to hasten the fermentation.

The cloth is well washed, and then boiled for 12 hours in milk of lime. This is to break down certain refractory compounds which were not affected bv the ferment. Again the cloth is washed, and then placed in the (<sour.):> This is a bath containing hydrochloric acid, which dis¬

solves any particles of lime remaining in the fibres. This occupies six to eight hours and then another washing ensues. There still re¬

main, however, substances which the lime did not remove, and these are attacked with a ((soap boiP* in which the active ingredient is a soda-ash and resin soap. The boiling in this bath is continued from six to eight hours, and is fol¬

lowed by another washing. The next boiling is still a part of the cleansing process, and is done with a mixture of caustic soda and potash lye in solution. When the cloth has been well washed again it' is ready for the bleaching proper, and goes into the ˆchemic.® In most bleaching

plants this chemic will be made of bleaching powder (hypochlorite of lime) with a little acid added. The chemical action which takes place is the setting free of hypochlorous acid in the bath, and this substance in the presence of organic matter (in this case the cotton fibre) parts with its loosely combined oxygen, which combines with the coloring matter remaining in the fibre, and either forms a soluble oxide which is washed out subsequently, or turns it into a white or colorless compound, which is not objectionable. The chemicking requires

from six to eight hours. The fabric is then washed, and placed in a ˆsour® made this time with dilute sulphuric acid. It is left here until every trace of lime has been dissolved out, and then the cloth receives a final and prolonged washing, or rather, series of washings in which one contains a little softening soap, and another a weak bluing. It then goes to the drying house as finished.

The bleaching of linen follows closely the

process used for cotton, but the solutions are made weaker, and the operation is prolonged by repetitions of the chemicking, alternating with alkaline baths. For linen yarns, the ozone process is especially adapted. A newly in¬

vented process for linen known as the Peckham process, from its

inventor, first boils the fibre in a solution of benzole in a soap made from cottonseed oil. It is then thoroughly washed and dried, and then bleaches rapidly in a very dilute solution of sodium hypochlorite. Hemp is well boiled with carbonate of soda, or an alkali silicate, or both, and is bleached in a chlorine bath. The operation is repeated sev¬

eral times until the fibre is white. For hemp, the strength of the chlorine bath is 2/10 of 1

per cent. Jute is first boiled in a warm soapy solution and then immersed in a weak alkali silicate, to avoid corroding the fibre. It is then bleached in a weak chlorine solution, not above a strength of 1/10 of 1 per cent.

The electrolytic method of producing chlor¬

ine in the bleaching bath is of special value in handling cotton and hemp and other vegetable fibres in the raw state, also paper stock, cellu¬

lose, *etc.*

For wool, the bleaching agents used are

those which liberate hydrogen in the bath, as sulphur dioxide, gaseous sulphurous acid,

sodium bisulphite, *etc.* A newer process uses hydrosulphurous acid. The oxidation process

is in use in some bleacheries, potash permanga¬

nate being employed, but there is danger that the liberated caustic may damage the fibre.

For silk, sulphur dioxide and sodium bisul¬

phite have long been the dependences. The

peroxides of hydrogen, sodium and barium

have also been employed. But in the latest practice neither sulphurous acid nor chlorine are permitted. The bleaching bath is made

with sodium peroxide, to which is added a little sulphuric acid. Hydrogen peroxide is formed

in the bath, and the coloring matter being ren¬

dered soluble is washed out in the subsequent washings. The same bath is used for mixed

goods of silk and cotton. Scouring the silk be¬

fore bleaching has been done away with by

the addition of glycerine to the bleaching bath.

Bluing the fibre' is now done before the bleach¬

ing, instead of afterward, as formerly.

Fats and animal oils are bleached with

sodium hydrosulphite, and this agent is equally effective with seed oils if a percentage of for¬

maldehyde is added. Wax is bleached by stirring 10 per cent of fuller's earth into the melted wax, and then raising the temperature to about 300° F., not higher. The same process is em¬

ployed for paraffin wax. Soaps are bleached by adding about 1/5 of 1 per cent of pure an¬

hydrous sodium hydrosulpnite, stirring it into 74

the boiling soap. As this salt does not keep, it must be freshly prepared when needed.

For feathers, hair, sponges, leather and

ivory the bleaching agent employed is hydrogen peroxide.

Bibliography. — Bottler, M., ˆ (Modern

Bleaching Agents and Detergents > * (London 1910) ; Carter, H. C., (The Bleaching, Dyeing and Finishing of Flax, Hemp and Jute Yarns and Fabrics) (London 1911) ; Huebner, J.,

bleaching and Dveing of Vegetable Fibrous

Material* (London 1912).

BLEACHING MATERIALS, the various

substances used in bleaching or fading out

coloring matters from cotton, linen, wool, silk or other fabrics. They embrace chloride of

lime or bleaching powder, chloride of soda, and other hypochlorites, hydrogen peroxide

(or dioxide), sodium and other peroxides (or dioxides) ; bisulphites of soda, lime, etc., chlorine, sulphur dioxide, lime-sulphur solu¬

tions, *etc.* The United States Department of Commerce reports 51 establishments engaged

in the manufacture of bleaching materials for sale in the United States in 1914. The total value of products made for sale in 1914 was $4,964,403, an increase of 54.4 over the cor¬

responding figure for 1909.

Hypochlorites constitute the most import¬

ant class, the production in 1914 aggregating 222,152,000 pounds,

valued at $2,578,269, and ex¬

ceeding that of 1909 by 90.2 per cent in quantity and 44.3 per cent in value. This class con¬

sists principally of chloride of lime, but also includes relatively small quantities of chloride of soda and other hypochlorites. A large

amount of these products is made electrically.

Of the establishments reported for 1914, four were located in New York, two in Michigan, and one each in New Jersey, Pennsylvania

and West Virginia.

Hydrogen Peroxide, or Hydrogen Diox¬

ide (H2O2) was produced to the extent of

32,594,807 pounds, valued at $1,303,596. There are nine establishments engaged in this branch of the industry in New York, three in New Jersey, two in Illinois, two in Missouri, and one each in California, Connecticut, Minne¬

sota and Pennsylvania.

Bisulphites of soda, lime, etc., are manu¬

factured by 14 establishments. The produc¬

tion in 1914 was 26,346,000 pounds, valued at $243,559, a decrease of 16.9 per cent in

quantity, but an increase of 7.7 per cent in value as compared with the output of 1909.

The 14 establishments are distributed as fol¬

lows: five in Massachusetts,, two each in New Jersey and Pennsylvania, and one each in

Delaware, Missouri, New York, Ohio and

Wisconsin.

The production of chlorine in 1914 was

12,217,000 pounds, valued at $472,836, by seven establishments, of which three were located

in New York, two in Michigan, and one each in Georgia and Illinois. The output of other bleaching materials, including sodium perox¬

ide, sulphur dioxide, lime-sulphur solutions, etc., in 1914 was valued at $366,143.

BLEAK, or BLICK (Alburnus alburnus),

a small river fish, six or seven inches long, of the carp family. It somewhat resembles

the dace. Its back is greenish, otherwise it is of a silvery color, and its silvery scales are used in the manufacture of artificial pearls.

It is a good food fish. It is common in the streams of England and the Continent,, spawns in May, and is a favorite in the aquarium.

BLEAK HOUSE, a novel by Charles

Dickens (1853). Its secondary theme is the

monstrous injustice and even ruin often

wrought by delays in the old Court of

Chancery, which defeated all the purposes of a court of justice. The name is that of the home of Mr. Jarndyce and is said to have been drawn from a house at Broadstairs, Kent,

which Dickens occupied in summer.

BLEASE, Coleman Livingston, American

public official: b. Newberry, S. C., 8 Oct.

1868. He was educated at Newberry College

and at Georgetown University where he re¬

ceived the degree of L.L,B., 1889. The same year he was admitted to the bar; from 1890 to 1898 was a member of the State legislature; senator from 1904 to 1908; and in 1910 and in 1912 was elected State governor. His

administration attracted considerable attention owing to his' opposition to negro education, his qualified defense of lynchings and his

wholesale liberation of convicts.

BLECHEN, bheHen, Karl Eduard, Ger¬

man landscape artist: b. Kottbus 1798; d.

1840. Until his 24th year he pursued a com¬

mercial career and then studied with Liitke in Berlin and for three years painted scenery for theatres. After studying art in Italy for some years he settled in Berlin in 1830 and became professor at the Academy of Fine

Arts there in 1835. The first representative of the Berlin landscape school, he painted (Villa Este* ; (Villa Borghese* ; (View Near Nemi} ; (View of Naples> ; (View at TivolP ; (Camp of the Semnones,* *etc.* The Berlin National

Gallery contains about 60 of his paintings and studies.

BLEDSOE, Albert Taylor, American

clergyman and writer: b. Frankfort, Ky., 9 Nov.

1809; d. Alexandria, Va., 1 Dec. 1877. He was graduated at West Point in 1830, became lieu¬

tenant of infantry, but resigned in 1832. He wras professor of mathematics at Kenyon

College and at Miami University, 1833-36, and also in the universities of Virginia and Mis-sippi. He wras assistant Secretary of War of the Confederacy, and successively an Episcopal and a Methodist minister. Besides editing the Southern Reviezv and contributing frequently to leading literary, scientific and theological period¬

icals, he wˆrote Examination of Edwards on

the Will* (1845) ; (Theodicy) (new ed., 1853) ; (Philosophy of Mathematics* (1868) ; Essay

on Liberty and Slavery* (1856) ; (Is Davis a Traitor?, or was Secession a Constitutional

Right previous to the War of 1861*? (1866), *etc.*

BLEDSOE, Jesse, American statesman: b.

Culpepper County, Va., 6 April 1776; d. near Nacogdoches, Tex., 30 June 1837. When a

hoy he emigrated to Kentucky and there studied at the Transylvania Seminary, where he be¬

came a fine scholar. He afterward studied law and practised with great success. In 1808 he became Secretary of State under Gov. Charles Scott, and in 1812 was a member of the

legislature. He was elected United States

senator from Kentucky and served from May

1813, till 1815. From 1817 to 1820 he was State senator. In 1820 he was a presidential elector, and in 1822 was appointed circuit judge in the Lexington district. Accordingly he settled in Lexington, where he also became professor of law in Transylvania University. Later he re¬

turned to the practice of his profession, in 1833

removed to Missouri, and in 1835 to Texas, where he was engaged collecting historical ma¬

terial at the time of his death.

BLEECKER, Ann Eliza, American poet,

daughter of Brandt Schuyler: b. New York,

October 1752; d. Tomhannock, near Albany, N.

Y., 23 Nov. 1783. She married, in 1769, John J.

Bleecker, and moved to Tomhannock, whence

she was driven by the news of the approach of Burgoyne's army. Her husband had already

left to provide means of escape, when she was obliged to fly on foot, in the midst of her family, and of a crowd of other helpless persons, for refuge from the advancing savages. After en¬

during great horrors and distresses, they made their escape to Albany, and thence by water to Red Hook, where they remained until the sur¬

render of Burgoyne enabled them to return to their home. Her poems were written as sug¬

gested by occasions, without a view to publica¬

tion. She possessed a sportive fancy, with

much tenderness of feeling, but the sad ex¬

periences of her life produced upon her such an effect, that she destroyed <(all the pieces that were not as melancholy as herself.® Her poems are to be found in the earlier numbers of the New York Magazine , and a collection of her stories and (<poetics® in a volume entitled Post¬

humous Works of Ann Eliza Bleecker in Prose and Versed edited by her daughter, Margaretta V. Fangeres (1793).

BLEEDING, the escape of blood from the

arteries or veins. Bleeding may be external, and thus readily seen and prevented by proper sur¬

gical measures, or it may take place internally, into one of the large body cavities, and is then a serious matter. The amount of blood that is in the human body varies from one-tenth to one-twelfth of the weight of the individual, and of this from 40 to 60 per cent may be lost without resulting in death from the direct effects of bleeding. Death may result in some individuals from the loss of much smaller quantities, but most persons can lose two-fifths of their blood and not die. Bleeding varies widely in its rapidity. Some wounds ooze, others well-up,

and again bleeding may be very rapid when a large vessel has been cut.

Bleeding from a vein or an artery may

be recognized by the dark color and regular flow from the former, and the brighter red and

spurting or throbbing flow from the latter. If bleeding is taking place while pressure is being applied to a cut, these differences may not be so pronounced. In emergencies bleeding from an

artery may be stopped by direct and hard pres¬

sure of the carefully cleaned finger immediately over the source of the

issuing jet of blood. This pressure must be hard and continued. This

will permit time to find the chief artery that is supplying the bleeding vessel, and as soon as this is found pressure upon it will further aid in suppressing the flow. Thus the brachial

artery can be found on the inside of the arm by feeling on the patient's well side, and firm pres¬

sure on it will stop all bleeding in the parts below, as in a cut wrist or cut hand. Pressure on the femoral artery in the groin will control all bleeding below the point of pressure. As pressure by means of the finger is difficult to maintain, an improvised apparatus may be made of a knotted napkin or large handkerchief. This may be placed about the arm or leg, the knot brought to press on the artery and then by means of a short stick the whole may be made to tightly compress the entire limb. (See

Tourniquet). Pressure of this kind should

not be too prolonged, or serious damage to the parts may result. Venous bleeding is usually controlled by direct pressure of the limb on the side away from the heart and by direct pressure of antiseptic gauze. In oozing, direct pressure of antiseptic gauze or direct application of hot water, 118-120° F., is most effective. Powders, cobwebs, iron, alum, etc., are not advisedly used.

Internal hemorrhage is extremely import¬

ant, since the blood cannot be seen, and one has to rely on the symptoms solely. These are

usually a beginning sense of faintness or weak¬

ness, and perhaps some nausea. The extremities commence to get cold and white, the face be¬

comes pale and anxious, and the patient may commence to have air-hunger. He desires the windows to be opened wide, thinking thereby to get more air. Thus the beginning symptoms

are very similar to those of a severe fainting spell. But as the bleeding

continues there is increasing restlessness with increased air-hunger; there may be cold, clammy sweat over the patient's body; there is sighing to gasping respiration, and the heart-beat is hard to hear and it may be impossible to feel the pulse beat.

The patient may die in convulsions, the face becoming deeply cyanosed, and the respirations spasmodic or convulsive in type. If the patient does not die he will have a long, tedious con¬

valescence. Prompt medical or surgical aid is imperative in all such cases. The best tempo¬

rary stimulant is an enema of hot (118-120° F.) salt solution, one teaspoonful to the pint, which is allowed to run in and out of the rectum, a quart or two at a time.

Bloodletting. — This procedure was one

much in vogue in former years, and while still a most desirable operation to perform for cer¬

tain types of disease, the conditions brought about by its use are now largely induced by other means. In conditions of poisoning, some cases of pneumonia, and in some apoplexies, bleeding is still performed by competent medical practitioners, and is advocated in most manuals of practice. It is its indiscriminate use for all ills that has fallen out of favor.

Bleeders. — Certain individuals have a ten¬

dency to bleed inordinately from even the

slightest wound. They are called <(bleeders,®

and are frequently found in families, most of the members of which have like traits. The pulling of a tooth is often followed by con¬

tinuous hemorrhage. The causes for this

idiosyncrasy are not all known. In some an in¬

sufficient quantity of calcium salts in the blood has been thought to be the most important

cause.

Smith Ely Jelliffe.

BLEEDING HEART. See Dicentra

BLEEDING HEART YARD, a squalid

locality in London, mentioned by Dickens in (Little Dorrit.) The origin of the name is unknown.

BLEEK, blak, Friedrich, German biblical

scholar and critic: b. Arensbok, Holstein, 4 July 1793; d. 27 Feb. 1859. He was educated at the University of Kiel, 1812-14, and at Berlin under De Wette, Neander and Schleiermacher. In

1818 he was appointed tutor in theology at Berlin, in 1823 professor extraordinary and in 1829 was appointed professor of theology at Bonn, and spent the remainder of his life there.

He was a thorough investigator, impartial in his judgments and clear in his presentations.

He was the first to hold the modern views of the Old Testament but clung to the traditional view of the New. His essays on the (Origin and Composition of the Sibylline Oracles > and (Authorship and Design of the Book of DanieP

attracted general notice. He also published a defense of the genuineness of the Gospel of Saint John, which is still regarded as the

strongest in the field. His (Introduction to the Old Testament* was translated into English

(2 vols., London 1869; reprinted 1 vol., 1875); also the Untroduction to the New Testament*

(2 vols., Edinburgh 1869) and (Lectures on the Apocalypse* (London 1875). The (Epistle to

the Hebrews* (3 vols., 1828-40) is untrans¬

lated. Subsequent editors of this work have ascribed to Bleek views which he certainly did not hold.

BLEEK, Wilhelm Heinrich Immanuel,

German philologist, son of Friedrich Bleek

(q.v.) : b. Berlin, 8 March 1827; d. Cape Town, 17 Aug. 1875. In 1855 he went to South Africa and devoted himself to the study of the lan¬

guage, manners and customs of the natives. In 1860 he was appointed public librarian at Cape Town, and his researches were rewarded with a pension from the civil list. He was principal author of the (Handbook of African, Austra¬

lian, and Polynesian Philology* (1858-63), his other chief productions being {The Library of Sir George Grey* (2 vols., 1858-59) ; Vocabu¬

lary of the Mozambique Language) (1856) ;

Comparative Grammar of South African

Languages* (1862) ; (Hottentot Fables and

Tales) (1864) ; and <The Origin of Language) (1868) ; specimens of Bushman Folklore)

(Eng. trans., 1911).

BLEIAZID. Until recently, fulminate of

mercury has always been used for detonators in torpedo-charges. The fulminate alone was first used in military pyrotechnics. Afterward it

was mixed with other explosive nitrates, such as trotyl, picric acid, tetranitro-methylaniline, etc., in order to increase the force of the initial impulse. In navies, principally, the fact that fulminate of mercury is very porous and cannot explode when wet is a great inconvenience.

That is, its easy absorption of moisture, due to its porosity, makes it decrease in density. In its natural state the sensitiveness of lead hydro¬

nitride or bleiazid to shock is the same as that of fulminate of mercury. Compressed, it is less sensitive in this regard than the fulminate. Its force of detonation, however, is twice as great.

It holds its detonating properties, even when compressed at 6,000 kilograms per square centi¬

metre, while fulminate loses this property at 700

kilograms. It resists high temperatures and is insoluble in water, of a white color, and dust¬

like in appearance. In making detonators,

tetranitro-methylaniline, or ((tetryl,** is added to both fulminate of mercury and lead hydro¬

nitride. It is a yellow explosive substance, in¬

soluble, stable like trotyl, and is obtained in¬

dustrially by the nitration of dimethylaniline.

BLEIBTREU, blip'troi, Georg, German

artist : b. Xanten, Rhenish Russia, 27 March 1828; d. Berlin, 16 Oct. 1892. He studied at the Diisseldorf Academy and under Theodor Hilde-brandt. His first important picture was the destruction of the Kiel Turner-Corps at Flens-burg) (1852) and his subsequent works are also battle pieces. Among them are (Episode from the Battle of

Waterloo) (1858); (Battle of

Koniggratz > ; (Surrender of Napoleon after

Sedan* ; (Attack of Saxon Corps at Saint

Privat* (1880). In the war with Austria (1866), he accompanied the Prussian armies and in

1870 he was attached to the suite of the Crown Prince.

BLEIBTREU, Karl August, German poet

and novelist: b. Berlin, 13 Jan. 1859. He is one of the foremost representatives of the youngest German school in literature, and a pronounced realist. All his views are radical, as shown by the very titles of his works ; for example, devolution in Literature) (1885) ; literature's Struggle for Life.* He also wrote dies Irae* ; (Napoleon at Leipzig) ; (Cromwell at Marston Moor.) His dramas are dord Byron *(1888) ; (The Day of Judgment* ; (The Queen's Neck¬

lace, J *etc.* He was one of the founders of the Freie Biihne in Berlin in 1889. His name was once coupled with that of Nietzsche as one of the most brilliant stars of the naturalistic school. His work shows power, but he has left no well-developed artistic production.

BLEICHRODER'S, blih're-der, a cele¬

brated banking house in Berlin, established in 1803 by Samuel Bleichroder, who died in 1855, continued by his son, Gerson Bleichroder, who died in 1893, and subsequently by the two sons of the latter. Under the patronage of Bismarck it entered into commercial relations with the: Prussian government, rendering material assist¬

ance in 1866 and again in 1871. Gerson Bleich¬

roder was raised to the hereditary peerage in 1872. The house is recognized as one of the most important private banking establishments in Europe.

BLEMMYES, blem’i-ez, or BLEMYES, a

people of ancient Ethiopia, who for several centuries after Christ gave much trouble to the Romans during their occupation of northern

Africa. Their influence extended to a period as late as the 7th century. Ancient authors have left us strange anecdotes of their customs, manners and savage appearance. The Ababdeh,

the Bisharin and other tribes are supposed to have descended from the Blemmyes.

BLENDE (German, Ho blind,® in allusion

to the fact that the mineral is easily mistaken for galena, and yet yields no lead). A native sulphide of zinc, having the formula ZnS, and known also as sphalerite. It crystallizes in tetrahedral forms belonging to the isometric system, and has a very perfect cleavage. It is commonly brown, black or yellow, but may

have other colors also, and may be nearly color¬

less when pure. Its hardness is from 3.5 to 4 , BLENHEIM — BLENHEIM HOUSE

and its specific gravity is about 4.00. It usually occurs massive, with dodecahedral cleavage, and is found commonly in connection with galena, and also in deposits of considerable extent in cavities in limestone. It is a valuable ore of zinc, and is mined in Cornwall (England), in Saxony, in the Hartz Mountains, and in various parts of the United States, notably in Illinois, Missouri (near Joplin), Wisconsin, Iowa and

Colorado. The miners of Cornwall call it

“mock lead® and “black-jack.®

BLENHEIM, blen’im, or BLINDHEIM,

Bavaria, village about 23 miles from Augsburg, the theatre of a great battle, fought 13 Aug.

1704 (also called the battle of Hochstadt, from another village of this name in the vicinity), in which Marlborough and Prince Eugene, com¬

manding the allied forces of England and the German empire, gained a brilliant victory over the French and Bavarians. The latter armies were drawn into the engagement under the

most unfavorable circumstances. Both these

armies amounted to 56,000 men, while the forces of Marlborough and Eugene were about 52,000.

The first had thrown their troops chiefly into the two villages of Blenheim and Kinzingen, which they considered as points of support for their wings, though at too great a distance in front of their main position. A large propor¬

tion of cavalry was in the centre, since each army, the Bavarian as well as the French, had their horse on their wings, and in this way those of two wings must necessarily join each other. Both the commanders would undoubt¬

edly have perceived and corrected this mistake, as Tallard, the French general, had in Blen¬

heim alone 27 battalions of infantry; but they expected so little to be attacked, that when the line of the allies began to move, 13 August, at 2 o’clock in the morning, they supposed them to be marching off. The greatest part of their cavalry was sent to forage. Even at 7 o’clock, when the heads of the eight columns with which Eugene and Marlborough advanced toward the

Nebelbach were to be seen, Tallard thought the whole a stratagem intended to cover the retreat ; but he soon saw his error. The dispersed

troops were recalled in the greatest hurry, and the cannons were drawn up in line. The

French and Bavarians made every exertion

to prevent the passage of the enemy over the small stream of Nebelbach, and the capture

of the two villages, the conquest of which was considered by Marlborough and Eugene

as decisive. Their line of attack was un¬

commonly long, about four and a half miles.

Marlborough, in order to secure his right wing, attacked Blenheim, but without success; he

then changed his plan, and threw himself with his principal forces into the wide interval be¬

tween the right wing and the centre of the enemy, leaving only as many troops before

Blenheim as were necessary to check the body which occupied this position. At 5 o'clock in the afternoon he succeeded, after great efforts, in passing the Nebelbach, by which his victory was decided. Tallard himself was among the

prisoners; his son was killed. Of 56,000 French and Bavarians, 14,000 were taken prisoners and 25,000 perished. The victors lost about 5,000

killed and 8,000 wounded. The consequences

of the battle were decisive. Bavaria, as Marl¬

borough had anticipated, fell into the power of Austria. Near Blenheim was fought another

battle in which the French defeated the Aus¬

trians 19 June 1800.

BLENHEIM HOUSE, the name of the

seat of the Duke of Marlborough, in the parish of Woodstock and county of Oxford. The

estate having been given by Queen Anne to

Marlborough for his eminent services, Parlia¬

ment granted the sum of half a million sterling to erect a suitable family seat. The building was entrusted to Sir John Vanbrugh, and called Blenheim, from the village where the Duke

gained his great victory. In this park once stood the royal palace of Woodstock, where

Alfred is said to have resided, and which was the favorite residence of Henry II, who erected a house in the park for his favorite mistress, Rosamond Clifford, whence the well-known

legend of Woodstock-bower, Queen Eleanor,

and the Fair Rosamond. Edward III was also much attached to this palace, in which his eld¬

est son, the illustrious Black Prince, was born, as well as his youngest son, Thomas, Duke of Gloucester, usually called Thomas of Woodstock, from that event. Richard II likewise kept his court here, at which time the poet Chaucer resided at Woodstock, in a house

which stood near the present entrance to the park. During the civil wars of the 17th cen¬

tury it was for some time defended for the King; but it ultimately surrendered, and was much injured and dilapidated by the parlia¬

mentarians. The usual approach to Blenheim

from Woodstock is through a triumphal arch

or portal. In front of the building stands a sculptured column 130 feet high, surmounted by a statue of the Duke, whose victories and

achievements are recorded on tablets round the base. The front of the house measures 348

feet from wing to wing, and although archi¬

tectural critics find many faults in detail, the general effect is in the

highest degree noble and commanding. The interior is extremely

magnificent ; the hall, supported by Corinthian pillars, is 67 feet high; and the ceiling was painted by Sir James Thornhill, the design

representing Victory crowning the Duke. The

gallery and bow-window room abound in por¬

traits by the most eminent masters, both foreign and English. On the tapestry of the latter are figured the various battles gained by the same great general, and more especially that of Blen¬

heim. The saloon, a noble and spacious apart¬

ment, communicates with the hall, and occupies the entire breadth of the centre. The lower part is lined with marble, and six of its com¬

partments are decorated with pictures by La Guerre, representing the inhabitants of the

different nations of the world in appropriate costume. On the ceiling is a representation by the same artist, of the victorious Duke arrested in his career by Peace and Time. The remain¬

ing principal subjects of admiration are the library, theatre, State drawing-room, blue and green drawing-room, grand cabinet, the din¬

ing-room, *etc.* In the chapel, which forms one of the wings, is a fine marble monument by Rysbrack, to the great Duke and his almost equally celebrated Duchess, Sarah. The gardens and grounds, which are exceedingly spacious, were laid out by Brown, who contrived to make a most admirable use of the small river Glyme in the formation of a lake, or piece of water, 78

which is justly deemed one of the greatest beauties of the place. It is crossed by several arches, and at the middle or grand approach is a magnificent bridge, the span of the centre arch of which is 101 feet. Consult Taunt,

(Blenheim and Woodstock > (Oxford 1909).

BLENK, James Hubert, American Roman

Catholic archbishop: b. Neustadt, Bavaria, 28

July 1856; d. New Orleans, 20 April 1917. He received his early education at Saint James Col¬

lege, Baltimore, and at Jefferson College, Con¬

vent, La. Admitted to the Society of Mary in 1874, he studied in the Irish and French

Marist seminaries and at the Catholic Univer¬

sity of Dublin ; was ordained priest in 1885 ; became professor at Jefferson College, and

president 1890-96; and in 1897-98 was rector of a church in Algiers, La. He served as

auditor and secretary to the Apostolic Delega¬

tion to Cuba and Porto Rico in 1899 and was appointed bishop of Porto Rico. In 1906 he was consecrated archbishop of New Orleans.

He was one of the organizers of the Catholic Winter School of America and chairman of its board of studies. He raised $30,000 for the re¬

lief of the hurricane victims in Porto Rico 1899, and was commissioned by President Mc¬

Kinley to distribute the funds and report the needs of the people to the United States gov¬

ernment. He erected several churches and

schools in New Orleans, many for the colored race. He founded Saint Joseph's Seminary

and received into his archdiocese many exiled French religious. He was a forceful speaker in English, French, German and Spanish and

an active promoter of Catholic educational and charitable societies. He contributed to various newspapers on religious, social and economic topics and to the (Catholic Encyclopedia. >

BLENKER, Louis, German-American sol¬

dier: b. Worms, Germany, 1812; d. 16 Oct. 1863.

He took an active part in the revolutionary movement of 1848 in Germany and was forced to leave his native land, emigrating to the United States. He organized the 8th regiment of New York Volunteers at the outbreak of

the Civil War, and was its' colonel. He was promoted to the rank of brigadier-general at the first battle of Bull Run, and in 1862 com¬

manded a division in western Virginia and was engaged in the battle of Cedar Keys. Soon

after he was superseded by General Sigel. He was mustered out of the service 31 March 1863

and died in October of wounds received while at Warrenton, Va.

BLENNERHASSETT, Harman, English

emigrant in America : b. Hampshire, England, 8 Oct. 1764; d. on the island of Guernsey, 2 Feb. 1831. He sprang from a wealthy and highly connected house which traced its an¬

cestry back to Edward III; was educated at Westminster School, London, and Trinity Col¬

lege, Dublin, graduating 1790. The youngest

of three sons, he studied for the law, but the death of his brothers soon after made him head of the family. Early in 1796 he privately mar¬

ried his sister's daughter, Margaret Agnew, a beautiful and highly accomplished girl of 18, also of excellent family, her father having been lieutenant-governor of the Isle of Man, and her grandfather an English officer killed at Germantown. This incestuous union brought

its ultimate punishment from nature in a family of physical and moral wrecks; but a more im¬

mediate one was entire social ostracism, which soon drove him to break his entail and sell his estates, except some reserved incomes, and come to America with his wife, bringing with him at the same time his library and philosophical ap¬

paratus. Arriving 1 Aug. 1796, he settled, in 1798, on a small island in the Ohio River a few miles below Parkersburg, W. Va., and spent

$60,000 on a house and grounds, pictures and statuary. This was for years the show place of America west of the Alleghanies, and drew a stream of notable guests, whom he entertained with lavish hospitality. Here he read, culti¬

vated music, which was his chief passion, and dabbled in feeble absent-minded scientific ex¬

periments. In 1805 Aaron Burr (q.v.) was one of his guests, who then or next year induced him to join in the scheme for a southwestern empire, to include Mexico, in which fantastic state Blennerhassett was to be prime minister and a duke, and perhaps ambassador to Eng¬

land. He was a timid, dreaming, futile, unad¬

venturous man, but like many such may have fancied himself a great statesman and hero in posse. He may have consented to Burr's pro¬

posal because Mexico was farther from Great Britain than the Ohio, and the canker of his life was fear lest chance should disclose his secret to his friends and children. His wife, much the stronger nature of the two, was cer¬

tainly ambitious for him, and he would not have embarked in such a venture without her approval. Anyway, he advocated Burr's <(colonization® plan in the papers, and invested a great sum in arms, ammunition, provisions, boats, etc., on the faith of obligations from Burr's son-in-law Allston, which were largely defaulted.

The scheme fell through; Blennerhassett was

twice arrested, imprisoned and tried for trea¬

son, but discharged in 1807 on the acquittal of Burr. His place, however, had been wantonly injured by the militia, and was seized by his creditors and turned into a hemp field. The mansion was converted into a granary and

was finally burned by accident. Blennerhas¬

sett now settled in Natchez, and soon after bought a 1,000-acre cotton plantation on the Mississippi, a few miles above Port Gib¬

son, which he called La Cache. It was un¬

successful, and the War of 1812 injured his commercial speculations; and in 1819 he sold it for $28,000 and removed to Montreal, prac¬

tising law in hope of obtaining a judgeship through his old schoolmate, the Duke of

Richmond. This failing, he returned to Eng¬

land in 1822 in hope of winning back his prop¬

erty by a reversionary action, and then of ob¬

taining employment through an influence

which no longer existed. In 1824 he came

back after his family. Everything failed him, though he and his wife were decently treated; at last his health gave way, and he died at Port Saint Pierre on the island of Guernsey.

He was generous with his money while he had it, and helped out of financial difficulties sev¬

eral of the musicians he consorted with. His wife, though disinherited, had always had an income paid her bv her sisters ; and in 1838 she received a property by the will of her husband's maiden aunt. In 1840 she came to the United States to push a claim before Congress for the island property, and indemnity for the ravages of the militia. Henry Clay favored it, and its BLENNY — BLEPHAROPLAST

passage was probable ; but before it came up she died in New York, 16 June 1842. The story of her being left penniless with a dependent family (the youngest was 19 at his father's death), and of her dying in poverty and being buried by sisters of charity, are fictions. She had

some literary ambitions, and while in

Montreal wrote two volumes of verse, (The De¬

serted Isle) (1822), and (The Widow of the Rock, and Other Poems) (1824). Consult

Therese Blennerhassett-Adams, (The True

Story of Harman Blennerhassett, > in the Cen¬

tury (Vol. 62, 1901) ; (The Blennerhassett

Papers> (1864) ; Safford, (Life of Blennerhassett} (1835) ; Pidgin, blennerhassettˆ a

romance (1902).

BLENNY. These small fishes of the spiny—

rayed marine family Blennidce, frequent rocky coasts and shallows, in seas of all parts of the world. Their elongated bodies, some of

which are scaleless, are remarkable for the abundance of slimy matter with which they

are covered. These fishes are extraordinary

in possessing but one dorsal fin, which in some species is deeply divided ; and in having the faculty of using their ventral fins to aid them in moving about among the rocks and

sea-weed. They are frequently deprived of

water, by the ebb of the tide, when they are capable of subsisting for some hours. Small crustaceans form their main food. In some

species the eggs are retained in the oviduct until they hatch, so that the young are pro¬

duced alive and capable of seeking their own food. They are not edible but owing to their tenacity of life and activity are generally sought for the aquarium. Because of their

ability to move about out of the water they are often known as lizard

skippers.

BLENORRHCEA, an old term signifying a

mucopurulent discharge from any mucous

membrane. This discharge is usually creamy

white and consists usually of water, mucus, epithelial cells, white blood cells, or pus cells, and bacteria. At the present time a blenorrhagic discharge is definitely named according to the structure involved. Thus a blenorrhcea of the eyes is termed a purulent conjunctivitis; of the vagina, leucorrhcea; of the urethra, gleet or urethritis; if a urethritis of infectious origin, gonorrhoea, *etc.* Treatment is usually local and general. Tonic stimulating applica¬

tions may be locally applied, and occasionally caustic stimulants, as nitrate of silver, and the general health built up as thoroughly as possible.

BLEPHARITIS, an inflammation of the

margin of the eyelids and hair follicles. It may consist of a very slight hypersemia or redness that causes itching and discomfort.

This form may be due almost entirely to eye-strain and proper glasses will usually cure it.

The disease may be more extensive, involv¬

ing the margin and the follicles, with redness and swelling and whitish scales. The eye¬

lashes may drop out, but usually are regrown, and there is much itching and discomfort.

This form may also result from refractive

errors, or may be the index of a bad consti¬

tutional state from poor food, bad surround¬

ings, or it may follow the infectious diseases, notably measles. A more

persistent form is

associated with ulceration and loss of the

eyelashes. This is usually a very chronic type and resistant to treatment. In the manage¬

ment of all forms, all errors of refraction should be corrected by properly adjusted

glasses, — not on opticians' prescriptions, — and the local treatment by stimulating ointments.

BLEPHAROPLAST. The blepharoplast

is the organ which gives rise to the cilia of sperms. While it cannot be said that all cilia are developed from blepharoplasts, it is

equally true that blepharoplasts do not occur except in connection with cilia. Usually, ble¬

pharoplasts are very small, of an

inch, or even less, in diameter; but in Ginkgo, the Maiden Hair Tree, they are much larger, and in the cycads they reach a diameter of ToVir an inch. The appearance and be¬

havior of the blepharoplast during the forma¬

tion of sperms is well illustrated by the com¬

mon liverwort, Marchantia (Fig. 1). Toward

Fig. 1.

Fig. 1. — .4, one of the cells which is to produce two sperms: n, nucleus; b, blepharoplast. B, division of the cell shown in A. C, the

two cells resulting from the division: these cells are very young sperms. D, the two sperms, a little older, each showing two cilia; (e), growing out from the blepharo¬

plast. E, a mature spetm.

the end of the spermatogenesis, in the cell which is to produce two sperms, two blepharo¬

plasts appear (Fig. 1, A), The two ble¬

pharoplasts give rise to the spindle fibers as the nucleus divides (B). After the nuclear division, the protoplasm divides obliquely and in each new cell the blepharoplast moves to one of the pointed ends (C). These two cells are the very young sperms. From the ble¬

pharoplast of each of the young sperms, two cilia grow out (D). The protoplasmic and

nuclear portions of the sperm now elongate

and become indistinguishable while the ble¬

pharoplast itself also becomes somewhat

elongated and very slender. At maturity the two cilia become much longer than the body of the sperm (E ; s, body of sperm; c, cilia).

In the ferns, the development of the sperm and the early development of the blepharo¬

plast are similar, but in later stages the ble¬

pharoplast becomes more elongated and gives

rise to a large number of cilia. In the scour¬

ing rush, Equisetum, the development of the blepharoplast is more complex. The early

stages are about the same as in the liverwort and the fern, but after the blepharoplast has begun to elongate, it breaks up into a large number of granules from which the numerous

cilia develop. The granules soon fuse again and form a solid band. The largest sperm in 80

either the plant or animal kingdom is found in the cycads, the most familiar representative of which is the Sago Palm (Cycas revoluta), whose rigid, dark green leaves are in such demand on Palm Sunday and on funeral oc¬

casions. The cycad sperm reaches a diameter of rlh an inch an(i consequently, is

visible to the naked eye. The blepharoplast, which in the spherical condition may reach a diameter of toW of an inch, breaks up into an immense number of granules ; the granules then fuse and form a spiral band from which thousands of cilia arise. Figs. 2 and 3 repre¬

sent the principal features of the process

in the African cycad, Stangeria. In Fig. 2, three of the pollen tubes show a rounded cell with two blepharoplasts surrounded by radia¬

tions.' In the lower right hand tube, the

rounded cell has divided, forming the two

young sperms. In Fig. 3, the blepharoplast

has developed into a spiral band bearing in¬

numerable cilia. The sperms, at this stage, are actively swimming and are just about to enter the eggs.

With the exception of the red algae, all

plants below this level have swimming sperms ; but in all the Gymnosperms, except the cycads and Ginkgo, and in all the Angiosperms, the swimming habit has been lost. It is worthy of note that the swimming habit reaches its highest and most complex development just

as it disappears.

It has long been debated whether the ble¬

pharoplast is a centrosome or not. In our

opinion, the blepharoplast is a centrosome

which, in its later stages, has assumed peculiar functions.

Bibliography. — Chamberlain, C. J., (The

Homology of the Blepharoplast5 (Botanical

Gazette, Vol. XXVI, 1898, p. 431) ; Ikeno, S, (Blepharoplasten in Pflanzenreich5 (Bio-logisches Centralblatt, Vol. XXIV, 1904, p.

211) ; Sharp, L. W., < Spermatogenesis in

Equisetum) (Botanical Gazette, Vol. LIV,

1912, p. 89).

Charles J. Chamberlain,

Professor of Botany, University of Chicago.

bl£r£, bla-ra, France, town in the de¬

partment of Indre-et-Loire, on the Cher, 15

miles east-southeast of Tours. It contains a notably fine 16th centuryˆ chapel. In the

vicinity is the Chateau Chenonceaux, built in the time of Francis I, and still in excellent preservation. It was given by Henry II to his mistress, Diana de Poitiers, who was dispos¬

sessed by Catherine de Medici on the death of Henry. In the latter part of the 18th cen¬

tury it was frequented by Fontenelle, Voltaire, Rousseau and all the wits of the time, who were drawn together by the then owner of the chateau, Madame Dupin, widow of a fermier-general who died in 1799. Consult Cook, (01d Touraine.5 Pop. (1911) 3,533.

BLES, bles, Henri, Flemish painter : b.

probably at Bonvignes near Dinant, about

1480; d. about 1550. Very little is known of his career. Even his name has been a subject of controversy. His only signed picture,

Adoration of the Magi5 is in the Munich

Museum. By the Italians he was called Ci—

vetta because of the peculiar monogram

usually affixed to his pictures. He is sup¬

posed to have resided in Flanders, perhaps at Antwerp, and also probably made a tour of

Italy. Many works have been attributed to

him but the one signed work mentioned above is insufficient from which to judge of his style.

Bles has the glory of having elevated land¬

scape painting into a distinct genre. Consult Bequet, A., (Henri Bles) (1865) ; Helbig,

Jules, (Histoire de la punture and pays de Liege5 (Liege 1873).

BLESBOK, bles'bok, one of the African

hartebeests (Alcephalus albifrons), now rare, which was distinguished by the violet color of its coat. See Hartebeest.

BLESSING, or BENEDICTION. The

expression of wishing one well soon gave

rise, in early ages, to a solemn act, accom¬

panied by symbolic signs ; this was the bless¬

ing or benediction which is coeval with the earliest expression of religious feeling. In patriarchal times, as among primitive races, when the authority of the head of a family included that of the priest and the civil ruler, the blessing of course appertained chiefly to him, on account of his venerable character, and when the priests began to form a separate class, became, in certain cases, a prerogative of theirs. As the authority of the father, in the infancy of every nation, is extremely

great, the idea soon sprang up that his prayers, BLESSINGTON — BLIGH

invoking the favor of the Deity, were more effectual than those of others, and that what¬

ever he blessed would be likely to receive the favor of God. The same importance was soon attributed to blessings conferred by a priest.

The heathen, the Jews, and many Christian

sects, have cherished this belief.' By the

Jewish institutions, certain benedictions were reserved to the priest and among the Hebrews the blessing of food came in later times to be a giving of thanks. In the Roman Catholic

Church different benedictions are appropriated lo different degrees of the clergy. The bishops alone can confer those benedictions which are connected with unction, and are called con¬

secrations, as, for instance, the consecration of kings and queens, of the cup and patera, the church and altar. To them also is confined the benediction of abbots and abbesses, of

knights and the holy oil. For the benediction of the holy vestments, etc., they may employ a substitute. Every Roman Catholic clergyman

may confer the benediction on the occasion of betrothment ; also the marriage benediction ; may bless the fruits of the earth, and the holy water. The benediction of a bishop is eagerly sought for by a faithful Roman Catholic, as contributing peculiarly to his spiritual welfare; and the Catholic clergy, in general, use the benediction as a salutation or reward for a service, *etc.* The Roman Catholic Church

blesses things animate and inanimate, the bene¬

dictions being generally accompanied with the sprinkling of holy water, and the use of in¬

cense, and universally with the sign of the cross. There are 12 benedictions proper in

the Anglican Prayer Book, two of these being of things, the blessing of the bread and wine in the prayer of consecration at communion, and the water in the baptismal offices. Among most Protestant bodies a blessing is pronounced at the conclusion of all religious services.

BLESSINGTON, Marguerite (Countess

of) : b. Knockbrit, near Clonmel, Ireland, 1

Sept. 1789; d. Paris, 4 June 1849. She was the daughter of Edmund Power, and at the age

of 15 was married (unhappily) to a Captain Farmer, who died in 1817.

A few months

after his death she married Charles John

Gardiner, afterward first Earl of Blessington.

In 1822 they went abroad together, and con¬

tinued to reside on the Continent till the Earl's death in Paris, in 1829, when Lady Blessington returned to London and took up her abode in Gore House, Kensington, which had been be¬

queathed to her by her husband. Here for

many years she held those celebrated reunions and soirees, at which the most distinguished literary characters in London were wont to

assemble. The fascination of her manners and conversation, with her genial warm-hearted¬

ness of character, rendered these gatherings most attractive ; but certain equivocal circum¬

stances in relation to her connection with

Count d'Orsay kept her in a manner ostracized by female society of the straiter sort. The Count had married a daughter of Lord Bless¬

ington by his first wife, and been separated from her shortly afterward, but after the

death of his father-in-law, resided with the Countess during the remainder of her life.

Lady Blessington had made her debut as an

authoress in 1822 by the publication of two vol. 4 — 6

volumes of (Sketches.) In 1832 she con¬

tributed to the New Monthly Magazine Con¬

versations with Lord Byron, 5 considered by

many as the best of her productions. She

also wrote numerous novels, including, among others, (The Belle of a Season 5 ; (The Two Friends) ; (Strathern) ; and (The Victims of Society.5 None of these have much literary

merit, but describe scenes in fashionable life with considerable power, and they enjoyed at the time a large share of popularity. She

acted as editress for several years of (Heath's Book of Beauty) and the (Keepsake, 5 and also of another annual, the (Gems of Beauty.5 In 1849 she proceeded to Paris, whither Count

d'Orsay had previously gone in the hope of obtaining an appointment under Louis Na¬

poleon, with whom they had been intimate dur¬

ing his exile in England. Consult Madden,

(Life of the Countess of Blessington5 (1855).

BLICHER, Steen Steensen, stan stan'sen

blm'er, Danish poet and novelist : b. Vium, Jutland, 11 Oct. 1782; d. Spentrup, 26 March 1848. His first work was a translation of

(Ossian5 (2 vols., 1807-09), and his first origi¬

nal poems appeared in 1814, but attracted little notice. He quickly won a national reputation with his novels, and in 1842 appeared his mas¬

terpiece of novel writing, (The Knitting Room,5

a collection of short stories in the Jutland dialect.

BLICKENSDERFER, George C., Ameri¬

can inventor: b. Erie, Pa., 1850; d. Sound Beach, Conn., 15 Aug 1917. He began life as a drygoods salesman, equipped only with a public school education. In 1892 he brought out the typewriting machine known by his name, the

essential principle of which was a type wheel which was rotated in

order to bring the desired letters or characters in position to make an impression on the paper. Being much simpler and cheaper than the machines then in use it achieved an immense popularity. Later the

inventor brought out an electric typewriter, which was extremely easy of manipulation. Mr.

Blickensderfer adapted the typewriter he in¬

vented to the Chinese langauge, an accomplish¬

ment which so interested the Japanese govern¬

ment that it revised its written language to adapt it to a typewriter keyboard. After the outbreak of the Great War in 1914 Mr. Blick¬

ensderfer devoted his attention to inventions of belt loading devices by which cartridges are automatically loaded into machine guns, and to a machine gun mount which facilitates the use of these engines of war. At the time of his death Mr. Blickensderfer was president of the Blickensderfer Typewriter Company.

BLIDA, ble-da', a fortified town of Algeria, 30 miles southwest of Algiers, with which it has rail connection. It is well built, with modern houses and public edifices, the centre of a flourishing district, and having a good trade. There are cedar and cork trees in the neighborhood and mines of copper and lead.

The principal exports are oranges, grain,

tobacco, raisins, *etc.* Pop. (1911) 35,461.

BLIGH, William, English navigator: b.

Plymouth, England, 9 Sept. 1754; d. 7 Dec.

1817. He acquired considerable celebrity from having been the commander of the ship

Bounty when the crew mutinied in the South 82

Seas and carried her off. She had been fitted out for the purpose of procuring plants of the bread-fruit trees and introducing these into the West Indies. Bligh, who had sailed with Captain Cook on his second voyage round the world, and served with Lord Howe before

Gibraltar in 1783, obtained the command, and in December 1787, left Spithead for Otaheitc, where he arrived, and remained till April 1789.

Having loaded his vessel wdth plants he set sail and was proceeding on his voyage for

Jamaica when he was seized in bed, bound and brought on deck. The launch was lowered, and Bligh, with 18 men supposed to be well disposed to him, were forced into it, with no other pro¬

vision than 150 pounds of bread, 32 pounds of pork, a little rum and wine, and 28 gallons of water. Thus scantily provided they found themselves in the open sea, not far from the island of Tofoa, in lat. 19° S. and long. 184°

E., and managed by admirable skill and per¬

severance, though not without enduring fear¬

ful hardships, to reach the island of Timor in 41 days, after running 3,618 miles without the loss of a single man. Ultimately 12 of the number reached England. Bligh in a second

voyage accomplished the object of the first by giving the bread-fruit tree to the West India Islands. When several of the mutineers were afterward tried at Portsmouth, sufficient evidence was obtained to show that Bligh him¬

self was not free from blame, and had on

many occasions been too much inclined to play the tyrant. This feature in his character was afterward manifested on a larger scale. In

1805 he was appointed governor of New South Wales, and acted so harshly that the other authorities interfered and -put him in confine¬

ment. After his return he became a rear-admiral. See Pitcairn Island.

BLIGHIA, bli’i-a, a genus of trees and

shrubs of the family Sapindacece, the principal species of which is B. sapida (Cupania sapida of some botanists), the akee tree indigenous to west tropical Africa and naturalized in the West Indies since the close of the 17th cen¬

tury. It is also planted in southern Florida.

The tree attains a height of 30 feet, bears pinnate ash-like leaves and very fragrant

whitish flowers, from which by crude distil¬

lation the colored people obtain a cosmetic and which -would probably yield a valuable

perfume under proper management. The

rich, red fruits, as large as goose eggs, are used for dessert and largely also in cookery.

BLIGHT, an indefinite term applied to

any diseased state of cultivated plants, but gradually being restricted to plant diseases caused either by bacteria or fungi. Among

the plants subject to blight are the apple, pear, potato, bean, strawberry, eggplant, currant,

grape and raspberry. See sections on diseases in. articles on various plants ; also Plants, Diseases of.

BLIGHT, American, an English and Aus¬

tralian name for the wooly apple louse or

“apple blight, ” one of the aphides. See Aphis.

BLIGHT-BIRD, a small insectivorous

bird (Zosterops ccerulescens) of New Zea¬

land, which devours the “blight® or plant-lice on fruit trees. It is one of the white-eyes (q.v.).

BLIGHTY, a name generally used in Brit—

tish India as a general designation for Europe.

During the War in Europe in 1914—18 the word was introduced on the western front by the Anglo-Indian troops and soon came into gen¬

eral use as a nickname for England.

BLIND, blint, Karl, German political agi¬

tator and waiter on history, mythology and

Germanic literature : b. Mannheim, 4 Sept. 1826 ; d. London, England, 31 May 1907. He was edu¬

cated at Heidelberg and Bonn, and from his student days till he settled in England in 1852

he was continually engaged in agitating or in heading risings in the cause of German freedom and union, and was frequently imprisoned. The democratic propaganda was afterward supported by his pen ; and he wrote political and bio¬

graphical works: (Fire-burial Among Our Ger¬

manic Forefathers’ ; ˆTeutonic Cremation’ ;

(Yggdrasil, or The Teutonic Tree of Exist¬

ence’ ; biographies of Freiligrath, Ledru Rollin and Francis Deak.

BLIND, Mathilde, German-English poet:

b. Mannheim, 21 March 1841 ; d. London, 26

Nov. 1896. She went to England in 1849, and won fame by her writings: (Thc Prophecy of Saint Oran' (1881); Wife of George Eliot'

(1883); (Madame Roland' (1886); (The

Heather on Fire,' a tale (1886) ; (Ascent of Man' (1888); (Dramas in Miniature' (1891);

(Songs and Sonnets' (1893); and (Birds of

Passage' (1895). Consult ˆPoetical Works of

Mathilde Blind,' with memoir (London 1900).

BLIND. See Blindness.

BLIND, Education of the. When it is

stated that prior to 1830 the blind of America were to be found "moping in hidden corners or degraded by the wayside, or vegetating in almshouses," it is the adult blind that is meant. Still blind children were occasionally found in these places, though it could scarcely be said that they were vegetating, as could be said of the untrained deaf children.

The British census of 1851 first showed the world that over 80 per cent of the blind are adults. American schools for the blind were started, first, because of the widespread inter¬

est in the results of educating the young deaf and dumb, which furnished inspiration for

new fields of educational endeavor ; secondly, because the country was coming to the con¬

viction that all the children of the state should receive education both as a matter of public policy and as a private right; and

thirdly, because reports of what had been

accomplished abroad in schools for the blind were being promulgated

in our land. By 1830

the more progressive States of the east were ready to give their blind children school train¬

ing. In that year the government first in¬

cluded in the national census the deaf and dumb and the blind. The work of the blind was to begin with scientific foreknowledge as to their number. In 1829 certain gentlemen

in Boston obtained the incorporation of the “New England Asylum for the Blind.” By a

most fortunate circumstance, the interest and services were obtained of a graduate of

Brown University, Dr. Samuel G. Howe, who,

after finishing his medical studies, had chiv¬

alrously gone to the aid of the Greeks. Dr.

Howe went at once to Europe to study meth-BLIND

ods of instruction. Upon his return, in 1832, the school was opened with six pupils. In New York the act of incorporation of the New

York Institution for the Blind was passed in 1831 ; but funds were needed and no one went abroad to study methods. This school opened in March 1832, antedating by a few months

the school at Boston. In the very same year a German teacher of the blind, a Mr. Friedlander, most opportunely came to Philadel¬

phia, in the hope of starting a school for the blind there. Having trained certain blind

children he exhibited their accomplishments,

first, to a few influential people, secondly, before a large audience

among whom he dis¬

tributed a leaflet, ˆObservations on the in¬

struction of blind persons.® A meeting of

public-spirited citizens followed, funds were liberally contributed, fairs held and the suc¬

cess of the cause was assured. The Pennsyl¬

vania institution for the instruction of the blind was opened in 1833, fully 10 months

before an act of incorporation was obtained.

The three schools at Boston, New York and

Philadelphia are called the pioneer schools.

All sprang from private effort and private

funds. All were incorporated as private in¬

stitutions, and remain so to this day. Three similar institutions for the blind have arisen in this country, at Baltimore, at Pittsburgh and at Hartford. As recently as 1912 an in¬

stitution for the deaf with a department for the blind was opened with private funds sup¬

plemented by an appropriation from the legis¬

lature, in Brattleboro, Vt. This department was discontinued in 1917.

Schools. — The origin of the State schools

differs from that of the type above given

only in that classes of trained pupils from the earlier schools were exhibited before the State legislatures as well as before the people. State appropriations followed and the institutions

were inaugurated as State institutions. The

new schools sprang into being with astonish¬

ing rapidity. There were, in 1917, 44 resi¬

dential schools for the blind in the United States. (For an account of the day schools of 13 cities, opened between 1900 and 1917

see below). Every State in the Union makes provision for its blind of school age either in its own school or in that of a neighboring State. In our sparsely-settled country, espe¬

cially west of the Alleghanies and south of Maryland, great efforts had to be made to

find the children and still greater efforts to persuade the parents to send them to school.

In certain States where the amount of the

public fund seemed to preclude a special grant for the blind, pupils of this class were brought together in connection with a school for the deaf and dumb, forming <(dual schools,® as

they are called. These institutions could not help being unfair to their blind contingent; for in nearly every such case the blind came to a school already established as a school for the deaf, and under the superintendence of a man especially interested in the educa¬

tion of the deaf ; moreover, the number of the deaf pupils usually far exceeded that of the blind. There are still a few of these dual schools, but wherever possible they have been divided into two distinct institutions. In

Northern schools the colored blind are edu¬

cated with the white; in Southern schools it is best for the colored to have schools of their own. Both the whites and they prefer this arrangement. The first school for the

colored blind was opened in North Carolina

in 1869.

All the institutions for the blind were in their very first inception schools. The pioneer schools imported literary teachers from Paris and handicraft teachers from Edinburgh. At

first only the brighter class of pupils came under instruction. Teaching them was easy.

They progressed with amazing strides ; all was enthusiasm ; exhibitions were called for and widely given (Dr. Howe's pupils gave exhibi¬

tions in 17 States) ; large editions of the various annual reports were exhausted. Soon, however, less bright pupils came to be ad¬

mitted ; then the curriculum of studies began to sober down to the practical and compre¬

hensive one prevailing to-day. Whatever

occupation the boy or girl expects to follow after leaving school, it is assumed he will fol¬

low it better and thus live more happily and worthily if he has a general education. When, as was formerly the case, the period or term of schooling allowed pupils was shorter than it is now, they were ,not admitted before the age of eight or nine. Now that kindergarten departments have been universally added to

the schools, the pupils are urged to enter at an early age ; because experience has shown that at home these little blind folks are cod¬

dled rather than trained, so much so in fact that by the time many of them come to school their natural growth of body and mind has

been so interfered with by inaction, that all the efforts of the schools cannot make up for lost time and opportunity. The principle of periodicity of growth has now come to be

understood and the importance of applying

the proper stimulus at the period most sensi¬

tive to it comprehended. Children with good sight and hearing have got along without

kindergarten training, and so have blind chil¬

dren, but of all the useful means of reaching and developing the average blind child none is so effective as the properly-conducted kin¬

dergarten. The practical knowledge of things comes to the blind

through the hand, their fingers being veritable projections of their brains. Thus must their hands not only be

trained to sensitiveness of touch but to be strong and supple, so that they may, indeed, be dexterous; for as their hands are so are their brains. The kindergarten cultivates ear and heart and hand and brain as nothing else does. Even color is not wholly omitted in

kindergartens for the blind. Many of the

children see colors, and those who do not

love to talk about them and certainly derive some indirect value from considering them.

Wise, resourceful kindergartners who have

either bought or made some Montesprri didac¬

tic material have not failed to utilize it with their newcomers or with their backward chil¬

dren. Of late years where institutions have either enlarged on the original site or rebuilt on a new, the kindergarten department has

been housed by itself as an independent unit, all living as a family and with classes under the same roof. This is a great advance.

Blind children with kindergarten training

are more susceptible to instruction than those without it. Above this department the course 84

of academic studies in American schools re¬

quires from seven to eight years, which means a primary, a grammar and a high school edu¬

cation; or instruction in object lessons, read¬

ing, writing, spelling, grammar, composition, arithmetic, history, physiology, botany, zool¬

ogy, geology, physics, algebra, geometry, civics, English literature, typewriting, bookkeeping

and simple business, and sometimes Latin

and modern languages. Not a few pupils

have fitted for college where they took the regular course with the seeing students, and from where they were graduated usually with distinction. Formerly much of the teaching

was oral, which, in many cases, was apt to be more pleasant than profitable to the pupil.

Since the general introduction of the em¬

bossed textbook and tangible writing, the pupil has been forced to depend more and more

upon himself, obviously with better results.

In fact, the work has been growing more and more practical, emphasis being put upon the vocational. The methods of teaching the

blind correspond in general to those of teach¬

ing other hearing children. The common

appliances have but to be raised and enlarged as in maps and diagrams, or simply made tan¬

gible, which may be done, for example, by

notching an ordinary ruler so that the grad¬

uations can be felt.

Industrial Trainings — Industrial training

has been an integral part of the school course from the beginning.

Recently educational

manual training has been generally introduced as preliminary to the trades. Sloyd has been found especially adapted to the blind. The

handicrafts — chair-caning, hammock-making,

broom-making, carpet-weaving, and a few

others, alone remain of all the many trades taught at one time or another in our schools.

Manual occupations of some kind will always be taught, even were it evident that none of them would be followed by the blind as trades ; for it is by doing and making that the blind especially learn best. Then, it is essential that they be kept occupied. A few institutions built on the cottage family plan require pupil par¬

ticipation in the daily housework, a policy which if wisely conducted is of not less developmental value than the school occupations, since it tends to build up social efficiency. A youth who is efficient in a community of youth is the more likely to be so in the community of adults. In the past, before the introduction of such va¬

rieties of labor-saving machinery as the last half century has seen, many of the discharged pupils followed some manual trade and suc¬

ceeded in subsisting by it. To-day this is less and less possible. The mind itself of the blind is least trammeled by the lack of sight; hence some pursuit where intelligence is the chief factor would seem to be best adapted to his con¬

dition. Music, of course, opens up his most de¬

lightful field. It is said that all the force of the superintendents of the early schools was required to prevent the institutions from becom¬

ing mere conservatories of music. To-day only those pupils pursue music in regular course who have talent for it; but even those are not al¬

lowed to neglect other studies for it. It is the experience of the American schools, as of the British, that the profession of music offers to the educated and trained musician who is blind a field in which he can work his way with least hindrance from his lack of sight, and many are they who have found in it a means of livelihood for

themselves and their families. A few in nearly every school are certificated annually as tuners of pianos. Indeed, piano tuning, often joined as it is with piano selling, has become one of the very best occupations yet developed for the men. The public school pianos of sev¬

eral of our cities are regularly kept in order by tuners who are blind.

Since 1900, when the Pennsylvania institu¬

tion moved to the suburbs of Philadelphia and laid out its play grounds and covered cloisters to invite open-air activities, increased attention to directed play and even to athletics by blind boys has been noticeable all over the country.

Most institutions now have a good gymnasium and several have swimming pools.

Prior to 1900 the only systematic schooling given the blind was in residential institutions.

Since then for various reasons, chiefly the sup¬

posed demands of the times, a number of cities have opened day classes for blind children in connection with the public schools. In such cases the blind pupils living in several school districts are united in one convenient centre or home-room under a teacher who coaches

them for recitation in the grade rooms with the other children. The plan is feasible enough and is found to be successful in proportion as the teachers and those responsible for it are alive to the needs of the individual child and do not try to make him conform to the usual hours and the limitations of the common school system. Keeping handicapped children all the time in the community where they live and not even a part of the time off in special residential schools, as used to be deemed necessary, is doubtless a move in the right direction. But it must not be forgotten that children handi¬

capped by lack of sight not only deserve but require enlarged and enriched opportunities of development ; for it takes them longer to do things than it does children who see, and more¬

over they are far more dependent for balance and poise upon whatever training they get at school. In some cities having such centres

private associations for the blind have tried to provide the needed supplementary training.

Teaching the adult blind at home called “home teaching® is carried on in 1.3 States. Two States now (1917) conduct summer schools for a limited number of adults, using their insti¬

tution plants for this purpose.

Books. — The American schools for the

blind were founded upon embossed books. Dr.

Howe states somewhere that the simple reading from embossed print did more to establish the schools in the country than any other one thing.

Extraordinary pains were taken by Dr. Howe

and his assistants to perfect a system which should be at once readily tangible to the fingers of the blind and legible to the eyes of their friends. The result was the small lower-case letter of Dr. Howe, the Boston line print, as it is often called. To this the jury gave prefer¬

ence before all other embossed systems ex¬

hibited at the great exhibition of the industry of all nations, in London, in 1851. Backed by such endorsement and all the authority of Dr.

Howe, the system was rapidly adopted into the American schools. It was then the theory that BLIND

the blind would be further isolated from their friends if their alphabets were dissimilar. The blind of themselves had devised a writable sys¬

tem — arbitrary and composed of dots or

points — one which they could both read and write. But the early superintendents would not countenance it. However, many of the blind

failed to read the line-letter system ; because to read it requires extreme nicety of touch, which all the blind by no means have. Characters composed of points, not of lines, are scientifi¬

cally adapted to touch reading. In the 33d re¬

port of the New York institution, Supt. William B. Wait wrote: ((Now, which is the more im¬

portant, that all the young blind should be able to read, thus being made, in fact, like the seeing, or that they should be taught an alphabet which in some sort resembles that used by the seeing, but by doing which only 34 per cent of them will ever be able to read with any pleasure or profit?® This attitude of the New York school was the outcome of statistics gathered from seven institutions, in which 664 pupils were in¬

volved, and of experiments made by Mr. Wait with his own pupils, using a system scientifi¬

cally devised by him, composed of points in arbitrary combination. This was in 1868. At the next convention of the American instruct¬

ors of the blind, it was resolved <(That the New York horizontal point alphabet as arranged by Mr. Wait should be taught in all institutions for the education of the blind.® Europe was a long time accepting a writable point system. That of Louis Braille, devised in 1829, though much used by individuals, was not officially adopted into the Paris school where it originated until 1854. In contrast, America devised, printed, spread and resolved to accept its writable sys¬

tem in less than one-half the time. The benefits of a tangible writable system are vast. It puts the blind more nearly on a par with the see¬

ing, particularly as pupils in school. Its adop¬

tion here, next to that of tangible printing, makes obtainable the ideal of American schools for the blind. Every tangible system has its defects. French <(braille® as adopted into Eng¬

land has antiquated abbreviations and contrac¬

tions for the use of adults; and is involved with rules allowing much bad use, like the omission of all capitals. The New York point as printed also laid itself open to much criticism as to <(good use.® The American braille, the latest system, combining the best features of French braille and of New York point, was devised by a blind teacher of the Perkins institution. It takes full account of «good use,® and those who use the system deem it very satisfactory. In 1892, when the American braille system was

adopted into several schools, a typewriter for writing braille was invented, and this was fol¬

lowed by the invention of another machine for embossing braille directly on plates of thin brass from which any number of duplicates

could be struck off on paper. Here was a

means of creating a new library at once. But the chief value of the invention lay in the fact that as the machine was simple and inexpensive and could be operated if necessary by a blind man, any institution could have a printing office of its own. And several schools immediately established such offices, from which they issued at once whatever their school classes demanded.

By co-operating in the selection of the books to be embossed these schools have created in a comparatively few years a library of books in American braille than which there is no su¬

perior in any system in any country, and they have added an immense amount of music in the braille music notation, which is the same all over the world. A typewriter and a machine for embossing brass plates in the New York point system promptly appeared also, and a

great library of both books and music has

rapidly been issued in this system, especially from the American Printing House for the

Blind at Louisville, Ky. ; so that in America we have the condition of two competing point sys¬

tems when but one would obviously be enough.

More than one system means duplication and

therefore lessening both the book production and the reading done by the blind themselves.

Seeking a way out of this dilemma, a group of especially competent blind people was created a (<uniform type committee.® For several years it conducted tests in many States and in several countries, the funds being subscribed by pri¬

vate individuals, by themselves, by other blind people and their friends and by school printing plants. To-day the country seems to be on the eve of uniformity.

The United States Bureau of Education

gives the number of embossed books in the

country in the year 1915 as 127,247. The greater part of these are in the school libraries, thou¬

sands belonging to departments for the blind in public libraries ; from both of these sources the circulation to the blind at home is surpris¬

ingly large. A fact mainly accountable for this is that such books pass through the mails post¬

age free. There are now, besides fiction in great variety, periodical magazines embossed

for finger reading, notably the Matilda Ziegler Magazine, a monthly appearing in no less than 15,000 copies. A journal of inter-communica¬

tion among all agencies in behalf of the blind, a quarterly in common print, called the Outlook for the Blind, has been issued since 1907 and is of far-reaching service to all interested in work for the blind.

Higher Education. — The Association of

American Instructors of the Blind, formed in 1871, has met biennially ever since, usually as guest of one or another institution. The pro¬

ceedings of each convention have been pub¬

lished. The principles underlying the scheme for educating the blind being to make them as little as possible a class apart from the rest of the community, it has not been deemed wise to attempt to establish a national college for the higher education of those capable of taking it, but efforts are making toward enabling the

brighter and worthier pupils to attend one of the colleges for the seeing, at the expense of the States or the schools from which they come.

Seven states have already (1918) made appro¬

priations of money for such higher education.

The school instruction of the blind is compara¬

tively an easy matter. That work is less of a science than the more difficult task of instruct¬

ing the deaf. But training them vocationally or for social efficiency is usually difficult, and it is becoming more and more so as society grows in complexity, and the places easily open to the blind become filled by them. Since 1900,

through the vastly increased attention given the'

adult blind by private associations and public 86

commissions, which have opened new shops for their employment and increased the kinds of occupations provided them, the schools have

made their curricula more definitely vocational, and moreover their superintendents have more and more actively assumed the responsibility not only of preparing their charges for some¬

thing definite but even of providing them wˆork or positions when leaving the shelter of school.

Vocational Statistics. — Blindness in itself

does not necessarily unfit its possessor for em¬

ployment or even self-support; and there are few occupations in which some blind person

has not made good. But while it is usually easy to equip a blind person for a vocation, it is always difficult to place him, as the average employer of labor does not want him. This

fact seriously militates against the potential ✓ economic success of the blind and has. always done so. It tends to superimpose idleness

upon blindness, which is tragedy indeed. And yet the blind are very properly classed as socially competent. The proposed plan of our government for doing its duty to those of its soldiers who are blinded in the great war, i.e., not only re-educating them but also finding or making places for those capable of filling them, is splendid and a most encouraging sign of the times. Even when back in 1878 an ex¬

haustive census of the graduates from all

over the country wTas compiled, it revealed the following facts : 16 became superintendents of other institutions; 214 became teachers or were otherwise employed in institutions ; 34 became ministers of the gospel; 84 authors, publishers or lecturers; 310 were engaged as teachers of music or were vocalists outside of institutions; 69 had been organists in churches; 125 piano tuners; 937 had been engaged as teachers, employees and workers in handicraft; 277 wrere storekeep¬

ers, *etc.* ; 45 became owners and managers of real estate; 760 (mostly women) were em¬

ployed at housework at home or in families, or at sewing with machines, or by hand, and 78

wTere in homes of employment. Further, ac¬

cording to the census of the United States, while there wrere about 55,000 blind in the land, but 2,560 wrere found in almshouses. What

proportion of these ever attended our schools will never be known, but it must be remembered that blindness is an affliction of old age.

Bibliography.— Anagnos, M., Education

of the Blind) (Boston 1882) ; Diderot, (Essay on Blindness) (Reprint, London 1895) ; En¬

cyclopaedia Britannica, *article ((Blindness**

(Vol. Ill, New York 1911); Haiiy, Valentin, Essay on the Education of the Blind* (Re¬

print, London 1894) ; Howe, Julia Ward,

(Memoir of Dr. Samuel G. Howe) (Boston

1877) ; Illingworth, W. H., (History of the Education of the Blind) (London 1914) ; La Sizeranne, Maurice, (The Blind as Seen

through Blind Eyes* (translated by F. Park

Lew'is, New York 1893) ; (The Blind Sisters of Saint PauP (New York 1907) ; Mell, Alex¬

ander, Encyclopaedisches Handbuch des Blin—

dcn-Wesens5 (Vienna 1899) ; (Nelson's En¬

cyclopedia^ article (<Blind, Training of the®

(Vol. II, New York 1910) ; Richards, Mrs.

Laura A., Eetters and Journal of Samuel G.

Howe) (Vol. II, (The Servant of Humanity,*

.(Boston 1909) ; Sanborn, F. B., (Dr. S. G.

Howe* (Newr York 1881) ; (Reports,* Ameri¬

can Association of Instructors of the Blind (1853-1915) ; State Commissions for the Blind (1906-16) ; United States Bureau of Education 1872, 1899, 1913, 1915 (Washington Gov¬

ernment Printing Office) ; International Con¬

ferences on the Blind (London 1902—14,

National Institute for the Blind) ; ‘American Encyclopedia and Dictionary of Ophthalmology *

(1913-16); Outlook for the Blind (Columbus

1907-15).

Edward Ellis Allen,

Director Perkins Institution and Massachusetts School for the Blind.

BLIND FISHES. See Cave Animals.

BLIND RIVER, Canada, town in the Al—

goma district of Ontario, on Lake Huron and Blind River, 70 miles east of Sault Sainte Marie and 80 miles west of Sudbury on the Canadian Pacific Railway. It has sawr and shingle mills and machine shops, and is in a rich mineral district. Pop. (1911) 2,558.

BLIND SPOT. The place of entry of the

optic nerve in each retina is insensitive to light.

Mariotte in 1668 first demonstrated the existence of the blind spot. Its existence may be easily showm as follows: Pin a large sheet of paper against the wall so that a cross marked thereon may be at the level of the eyes; fix the position of the head by means of a headrest (a ruler about 50 centimetres in length, held by the teeth at one end, the other end resting against the paper, is a convenient headrest) ; wdth one eye closed or covered, look steadily at the cross with th? other eye; move a pencil, that has been covered with paper so that the point only shows black, from the cross toward the temporal side of the field of vision; mark on the paper the position at w hich the pencil point disappears ; move the pencil farther and mark the position at which the point reappears. B}r moving the point in various directions near this place on the paper, and marking the positions where the pencil

point disappears, and reappears, a series of marks may be made which furnish an outline figure of the form of the blind spot. The di¬

ameter of the blind spot (1.5 mm.) corresponds to a visual angle varying from 3° 39’ to 9° 47’.

The average is about 6°. An image of light sufficiently small, thrown upon the optic nerve by means of the ophthalmoscope, gives rise to no sensations. These experiments show that at the blind spot wre see nothing, yet, as wˆe look at this page with one eye only the surface ap¬

pears to be covered with letters in the regular forms; there is no blank space corresponding to the blind spot. In binocular vision the blind spot of one retina is covered with a sensitive portion of the other retina. Why we should not be aware of our inability to see a continuous field wdth one eye is a problem for which there are two proposed explanations. The blind spot may be filled out by association, whose nature is determined by the character of the surround¬

ing field, or by eye movements which serve as retinal local signs for the insensitive region.

Probably the two processes are necessary and aid each other in presenting to the mind the continuous visual field. Consult Ladd, Ele¬

ments of Physiological Psychology* ; Helmholtz, H. Von, Ehysiologische Optik) (Hamburg

1911) ; Sandford, (Course in Experimental

Psychology* (ex. 113, 114); Wundt, (Physio-

logische Psychology (Leipzig 1910) ; Titchener, E. B., Experimental Psychology* (New

York 1901).

BLIND TOM (Bethune, Thomas), a

musical freak: b. about the middle of the 19th century; d. Hoboken, N. J., 13 June 1908. He was a negro slave in Georgia, ‘and was born blind and with very weak mental development.

He showed remarkable aptitude for music and after hearing a piece played once could repro¬

duce it accurately on the piano. He also per¬

formed other musical wonders, and for several years was exhibited in various cities. After playing he would generally spring up and ap¬

plaud himself. He reappeared on the stage in 1904—05, but being difficult to manage he was soon withdrawn. His lack of intellect developed into almost brutal idiocy.

BLINDAGE. See Camouflage.

BLINDNESS, a general term to denote

partial or complete loss of vision. It is never a disease of itself, but results from a number of extremely diverse diseases, either of the eye itself, or of the nervous pathways which convey light stimuli. It may be a congenital condition also, and here the defect may be due to a great variety of causes. It is comparatively rare; ac¬

cording to the statistics of 1900 there were about 65,000 blind in the United States, i.e., about 1 in 1,000 of the population. In a few cases blindness has an hereditary character; the •vast majority of the blindnesses result from accident or disease. Bullet wounds in war are the most frequent accidental causes. Disease of the cornea — inflammation (chiefly gonor¬

rhoeal) — is responsible for about one-fifth of the blindness in the community. This usually occurs at birth and is largely preventable.

Various other disorders of the eyestructures —other than the purely

nervous ones — cause blindness in a small number of cases. Actual injuries to the eyes in various occupations ac¬

count for a small number.

Disease of the nervous pathways, i.e., the

retina, optic tract, corpora quadrigemina, optic thalamus and occipital cortex result in various types of partial or complete blindness according to the localization of the disorder. Blindness from retinitis, i. e., inflammation or injury of the retina, may result from various poisons, alcohol, lead or certain infectious diseases, such as scarlet fever, typhoid, *etc.* Pressure within the brain from tumors may cause blindness. Injury to the optic nerves from tumor, from fracture of the skull, from the pressure of glaucoma, from bullet wounds, cause partial or complete blindness. Disease of the optic chiasm, chiefly hypophyseal tumors, causes a partial blindness —hemianopsia, as does injury to the receiving sta¬

tions of the sight pathways in the corpora quadrigemina and the occipital lobes of the brain.

A special type of night blindness is a rare hereditary condition. These patients see well in the daytime but lose their power to see in the dusk or at night. Color blindness is another special type of blindness to certain colors. See Amaurosis; Ambylopia; Asthenopia; Blind;

Eye, Diseases of; Hemeralopia; Nyctalopia.

Consult Jelliffe and White, (Diseases of the Nervous System) (1917).

Smith Ely Jelliffe.

BLINDS, screens or shutters to prevent

too strong a light from shining in at a window, or to keep outsiders from seeing in. Venetian blinds are made of slats of wood, so connected as to overlap each other when closed, and to show a series of open spaces for the admission of light and air when in the other

position.

BLINDSNAKE, a family of small ser¬

pents (Typhlopid(u) having worm-shaped bodies, only a few inches in length, very rigid, and suited for burrowing. These little snakes exist in all warm countries, and lead a subterranean life, worming their way through the loose top¬

soil, and feeding on earth-worms, grubs and insects. Their eyes, through disuse, have be¬

come minute and weak, and in many species

almost covered by overlapping plates. In India they sometimes come out upon the surface after showers, when they are regarded with super¬

stitious dread by the natives ; but they are per¬

fectly harmless. Many species inhabit Mexico and tropical America, two or three occurring in New Mexico and Texas, where they are

frequently found in ant-hills.

BLINDSTORY. See Triforium.

BLISS, Aaron Thomas, American poli¬

tician: b. Smithfield, N. Y., 22 May 1837; d. 16 Sept. 1906. He served in the Federal army during the Civil War, and was for six months a prisoner in Andersonville, Columbia, made his escape from the latter, and reached the Union lines after 18 nights of perilous travel through hostile territory. He rose to the rank of captain. In 1865 he settled in Sagi¬

naw, Mich., where he engaged in lumbering,

banking and other business enterprises. He was elected to the State senate and was a member of Congress, 1889-91, was elected governor of Michigan in 1900 and reelected 4 Nov. 1902.

BLISS, Cornelius Newton, American

merchant and statesman : b. Fall River, Mass., 26 Jan. 1833; d. 1911. He was educated in New Orleans; entered his stepfather's counting-room there; engaged in the commission business in Boston, and became head of the dry goods com¬

mission house of Bliss, Fabyan & Company,

New York, in 1881. He was a member of the Pan-American Conference; chairman of the

New York Republican State Committee, 1877—

78; and treasurer of the National Republican Committee in 1892, 1896, 1900 and 1904; de¬

clined to be a candidate for governor of New York in 1885 and 1891 ; and was Secretary of the Interior Department in President McKinley's Cabinet in 1897-98.

BLISS, Daniel, American missionary: b.

Georgia, Vt., 17 Aug.' 1823; d. Beirut, Syria, 28

July 1916. He graduated at Amherst College in 1852, and at the Andover Theological Seminary in 1855 ; was ordained a Congregational minister 17 Oct. 1855; engaged in missionary work in Syria in 1855-62 ; and in 1866 became president of the Syrian Protestant College of Beirut; president emeritus in 1902. His publications include (Mental Philosophy * and Natural

Philosophy,* both in Arabic.

BLISS, Edwin Elisha, American mission¬

ary: b. Putney, Vt., 21 April 1817; d. Constanti¬

nople, 29 Dec. 1892. He was graduated at Am¬

herst College in 1837, and at Andover Theo¬

logical Seminary in 1842 ; was ordained as a missionary in 1843, and joined the American 88

Mission in Turkey, being stationed at Trebizond, 1843-52; Marsovan, Armenia, 1852-56,

and at Constantinople after 1856. In addition to the ordinary work of a missionary he edited, 1865-92, the Messenger, published at Constanti¬

nople in the Turkish and Armenian languages, and compiled a number of textbooks, notably the (Bible Handbook,5 in Armenian.

BLISS, Edwin Munsell, American mis¬

sionary, editor and author: b. Erzeruin, Tur¬

key, 12 Sept. 1848; d. 6 Aug. 1919. Educated at Robert College, Constantinople ; High School, Springfield, Mass. ; Amherst College, A.B. 1871 ; Yale Divinity School B.D. 1877 ; D.D. Am¬

herst College 1896; assistant agent of the

American Bible Society for the Levant, head¬

quarters at Constantinople 1872-75, 1877-88;

traveled in Turkey, Persia, *etc.* ; associate editor The Independent 1891-1901 ; chairman commit¬

tee on publication on the press, Ecumenical Missionary Conference, New York 1900; sec¬

retary Bureau of Missions ; agent of the Amer¬

ican Tract Society for New England. After

1907 expert special agent Bureau of the Census, Washington, D. C. ; editor of the Encyclopaedia of Missions) (1891) ; author (The Turk in

Armenia, Crete and Greece 5 (1895) ; ‘A Con¬

cise History of Missions) (1897) ; ‘The Mis¬

sionary Enterprise) (revised edition of Con¬

cise History), (1907) ; editor (Census Report on Religious Bodies5 (1910) ; (Report on Benevo¬

lent Institutions) (1914); ‘ Summary of State Laws Relating to Dependent Classes) (1915).

BLISS, Frederick Jones, American ex¬

plorer: b. Mount Lebanon, Syria, 23 Jan. 1859.

In 1880 he was graduated at Amherst ; spent three years as principal of the preparatory de¬

partment of the Syrian Protestant College at Beirut. Later he studied theology at the

Union Theological Seminary but did not enter the ministry. He conducted private researches in Syria and in 1890 began his connection with the Palestine Exploration Fund. He had charge of excavations at Tell-el-Hesy and at Jeru¬

salem. He discovered the first cuneiform tablet uncovered in Palestine. He has also made an especial study of Syrian pottery. He was

Dean for men at the University of Roch¬

ester in 1911-1914. He has published ‘A

Mound of Many Cities) (1892) ; Ex¬

cavations at Jerusalem, 1894 — 97 > (1898) ; Ex¬

cavations in Palestine, 1898-1900) (1902) ; ‘The Development of Palestine Exploration5 (1906) ; ‘Religions of Modern Syria and Palestine5

(1912).

BLISS, George, American lawyer: b.

Springfield, Mass., 3 May 1830; d. near Wake¬

field, R. I., 21 Sept. 1897. He was graduated at Harvard College in 1851 ; studied for two years in Berlin and Paris and traveled in

Sweden, Germany, Switzerland, Italy, Spain

and Portugal, and after his return read law principally at the Harvard Law School. He

established himself in practice in New York.

In 1859-60 he was private secretary to Gov¬

ernor Morgan of New York; in 1861 he was

appointed to his staff ; in 1862 he became pay¬

master-general of New York; and in that and the following year organized three regiments of United States colored infantry under in¬

structions from the Secretary of War and rep¬

resenting in this service the Union League Club of New York. In 1866 he was appointed at¬

torney for the Metropolitan boards of excise and health; in 1872 United States attorney for the southern district of New York, and in 1881

a special assistant to the United States Attor¬

ney-general for the prosecution of the (<Star Route55 postal cases. In 1895 he was decorated by Leo XIII with the order of Saint Gregory the Great for' his defense of the Roman Catho¬

lic charitable institutions of New York before the Constitutional Convention of 1894. He

drafted the New York charter of 1873; drew up the New York Consolidation Act, and was

author of the first Tenement House Act for the city. Pie published

three editions of the Eaw of Life Insurance5 and four editions of the (Annotated Code of Civil Procedure.5 He was also a contributor to the North American Re¬

view.

BLISS, Howard Sweetser, American Con¬

gregational minister and educator: b. Mount

Lebanon, Syria, 6 Dec. 1860; d. 2 May 1920.

He was graduated from Amherst College in

1882, Union Theological Seminary, New York

city, 1887 ; studied at Oxford (Mansfield Col¬

lege), at Gottingen and Berlin. He was or¬

dained in 1890 ; until 1894 was assistant pastor of Plymouth Church, Brooklyn; pastor of the Christian Union Church in Upper Montclair,

N. J., 1894 to 1902, when he succeeded his father, Daniel Bliss, as president of the Syrian Protestant College in Beirut.

BLISS, Philip Paul, American musician

and evangelist: b. Clearfield County, Pa., 9 July 1838; killed in railroad accident, Ashtabula, Ohio, 29 Dec. 1876. He received some musical in¬

struction from G. W. Root, but was very largely self-taught. He became popular as a music

teacher in the West, and prominent in the musi¬

cal conventions conducted by Bradbury, Root

and others, afterward becoming a successful

conductor of such gatherings. His evangelistic work was done chiefly in conjunction with

Maj. D. W. Whittle and D. L. Moody, who

became his warm friend and admirer. He had a fine personal presence, a gift of ready and effective speech, and these, combined with his wonderful voice, which appealed strongly to the hearts of the multitude, gave him great power over his audiences. He frequently composed

both the words and the music of the songs which have made his name known throughout

Christendom. Of these the most popular are

(Hold the Fort, for I am Coming5 ; ‘Down

Life’s Dark Vale We Wander5 ; ‘Jesus Loves Me5; ‘Hallelujah! ’Tis Done,5 and ‘Pull for the Shore, Sailor.5 His services as a revivalist were in demand throughout the United States and Canada. His songs appeared in the follow¬

ing named collections: ‘The Charm5 (1871);

‘The Song Tree5 (1872); ‘The Joy5 (1873);

‘Gospel Songs5 (1874).

BLISS, Porter Cornelius, American jour¬

nalist and diplomatist : b. Erie County, N. Y., 28

Dec. 1838; d. New York, 2 Feb. 1885. He was educated at Hamilton and Yale colleges; be¬

came private secretary to James Watson Webb, United States Minister to Brazil, in 1861 ; ex¬

plored the Gran Chaco for the Argentine gov¬

ernment ; compiled the various Indian dialects and investigated the antiquities of that region ; and in 1866 became private secretary to Charles A. Washburn, United States Minister to Para-BLISS — BLISTER-BEETLE

guay. He was commissioned by President

Lopez to write a history of Paraguay, and while doing so war broke out between that country and Brazil, and he was imprisoned and tor¬

tured on suspicion of being a Brazilian spy. It required the presence of an American squadron to effect his release. In 1869-70 he edited the Washington Chronicle; in 1870-74 he was sec¬

retary of the United States legation in Mexico, and during that time made several archaeologi¬

cal explorations and wrote on the opportunities of American enterprise in that country. In

1874-78 he was an associate editor of (John¬

son's Universal Cyclopaedia* ; in 1877 was editor of (The Library Tabled and in 1879 went to South America as correspondent for the New

York Herald. He wrote numerous papers of

historical value and wrote a history of the Russo-Turkish War (1877).

BLISS, Tasker Howard, American soldier :

b. Lewisburg, Pa., 31 Dec. 1853. He was

graduated from the United States Military

Academy in 1875, and with honors from the

United States Artillery School in 1884. A

scholarly soldier, he has acted in numerous capacities involving technical capacity beyond the range of strategy and tactics. In 1884 he was nominated recorder to the board appointed by the President to report on the military value of the interior waterways of the United States; he was professor of military science at the United States Naval War College from 1885 to 1888; aide-de-camp to Lieutenant-General

Scho¬

field, and inspector of rifle practice 1888-95.

For the next two years he was on special duty with the Secretary of War, and military attache at the American legation at Madrid until the outbreak of the Spanish War. He served in

Porto Rico and Cuba, and subsequently became collector of customs at Havana and chief of the Cuban customs service. In 1902 he was

made brigadier-general and appointed member

of the Army War College Board, becoming

commandant of the college in 1903. After hold¬

ing commands in the Philippines he was ap¬

pointed assistant chief of staff in 1909, and spent some time in southern California on the Mexican border. Between 1911 and 1915 Gen¬

eral Bliss filled various important commands and again became assistant chief of staff in February 1915; a member of the Joint Army

and Navy Board in September, and major-gen¬

eral in November. On 22 Sept. 1917 General Bliss was named chief of staff of the army.

He was commissioned general 6 Oct. 1917 and was retired by operation of the law 31 Dec.

1917. He was a member of the Allied Con¬

ference, 1917, a member of the Supreme War Council in France, and a member of the Ameri¬

can Commission to Negotiate Peace which met in Paris, 1918-19, and drafted the Treaty of Versailles.

BLISS, William Dwight Porter, Ameri¬

can clergyman : b. Constantinople 1856. He

was graduated at Amherst College in 1878, and at Hartford Theological Seminary in 1882; was ordained a Congregational clergyman ; became

an Episcopal priest in 1887; organized the first Christian Socialist Society in the United States in 1889, and was president of the National Reform League. He edited The Dawn (1 889—96) ; The American Fabian (1895-96) ; and the 'Encyclopaedia of Social Reform, * and pub¬

lished a 'Handbook of Socialism. *

BLISS, William Julian Albert, American

physicist: b. Washington, D. C., 22 Jan. 1867.

He was graduated at Harvard University in

1888 and pursued a course of studies in electri¬

cal engineering and physics at Johns Hopkins, Baltimore, at which university he received the Ph.D. degree in 1894 and subsequently became assistant in physics 1895-98, associate 1898-1901, and professor in the latter year. He has published 'Manual of Experiments in Physics) (with J. S. Ames, 1897), and other works

bearing on his profession.

BLISTER, a local collection of blood

serum beneath the cuticle. Blisters may be

produced by a variety of agents. In all in¬

stances, however, there is irritation of the part ; this is followed by dilated blood vessels and an exudation of the serum from the blood vessels near the irritant. Medicinally, blistering agents or irritants may be classified in four principal groups, as follows : rubefacients, when redness alone is produced ; vesicants, when blistering is brought about ; pustulants, when the blisters are usually small and contain pus ; and eschar-otics, when burning or destruction of tissue may take place.

Heat is an excellent illustra¬

tion. Mild heat will cause redness ; tempera¬

ture above 125° to 400° F. will cause blister¬

ing; temperature above 400° will burn; and

high temperatures can char. The most com¬

monly used blistering agents are heat (the hot iron being lightly touched to the skin), mustard, capsicum, mezereum, turpentine and cantharides. The hot iron and cantharides are pre¬

ferred, because their action can be controlled.

Mustard mixed with cold water makes an ex¬

cellent rubefacient, but it is not advised to be used as a vesicant. Blisters are used to influ¬

ence deep-seated and chronic joint, muscle and tendon troubles. For general purposes of coun¬

ter-irritation rubefacients are more serviceable than vesicants.

BLISTER-BEETLE, or SPANISH FLY,

an oil-beetle of the family Meloidce, in which there is a small head and a distinct neck; the wing-covers and sides of the body are without any coadaptation, while each claw of the feet bears a long appendage closely applied beneath it. The integument is soft, flexible, and many of the species contain a substance which forms an active vesicant, called cantharadine. The Spanish fly (Lytta vesicatoria) is larger than any of our native species, being about an inch long, is of a bright shining green, and when powdered and applied to the skin raises blisters.

It inhabits the-south of Europe, and is usually imported from Spain. Our native blister-beetles, when dried, can also be used for producing blisters or making blister-plasters. They are black or gray, and occur on potato plants, on the flowers of the golden-rod, *etc.* Their trans¬

formations are wonderfully complicated, since they pass through more than one larval stage (see Metamorphosis). The females lay their

eggs in the earth ; the young, on hatching, are of a singular primitive shape, called a “tri-ungulin,® which is very active, entering the egg-pods and devouring the eggs of locusts. It soon molts, assuming a different but still active larval stage; it molts again, entering its third larval 90

stage, when it resembles the grub of a May beetle (scarabseid stage). In the fourth stage the grub is helpless, lying on one side ; it in¬

creases rapidly in size, and when fully grown leaves the remains of the egg-pod it has been living on and forms a small cavity near by.

Here it lies motionless on its side, but gradually contracting till the skin separates and is pushed down to the end of the body, disclosing the semi-pupa or coarctate larva, which hibernates.

In the spring the skin bursts -and discloses a sixth larval form like the fourth. In this stage it is again active, burrowing in the earth, but taking no food, and in a few days passes into the pupa state. Other species of the family pass through a similar hypermetamorphosis. It is gathered from its food-plants, privet, lilac, etc., at night, by beating the bushes and catching the aroused insects in a cloth. They are then killed by immersing them in hot fluids, usually vinegar and water, are dried and then bottled.

Administered internally cantharadine ($C_{10}H_{12}O_4$) causes serious inflammation of the throat,

stomach and intestines, and large doses are suffi¬

cient to cause death. Commercially there are various preparations of blister-beetles, such as cerate of cantharides, tincture of cantharides, plaster of cantharides, *etc.*

BLISTER-STEEL. See Steel Manufac¬

ture.

BLITHEDALE ROMANCE, The, the

third of Nathaniel Hawthorne's romances, pub¬

lished 1852. It was the outcome of an intimate acquaintance with the members of the Brook

Farm (q.v.) Community, and immortalized the

brief attempt of that little group of transcen-dentalists to realize equality and fraternity in labor. It is more objective and realistic than Hawthorne's other works, and therefore in a sense more ordinary. Its central figure is

Zenobia, a beautiful, intellectual, passionate woman ; drawn as to some outlines, perhaps, from Margaret Fuller. At the time it opens she has taken up her abode at Blithedale Farm, the counterpart of Brook Farm. The other

members of the community are Hollingsworth,

a self-centred philanthropist; a Yankee farmer, Silas Forster, and his wife; Miles Coverdale, the relater of the story; and Priscilla, who is Zenobia's half-sister, though of this fact Zenobia is ignorant. (The Blithedale Romance> is a

brilliant instance of Hawthorne's power as a story-teller. No scene in the whole range of fiction is more realistic than the finding of Zenobia's body in the dead of night; drawn from the dank stream, a crooked, stiff shape, and carried to the farmhouse where old women in nightcaps jabber over it. Nothing could be more in the manner of Hawthorne than his

comment that if Zenobia could have fores. _n her appearance after drowning, she would never have committed the act.

BLIZZARD, a peculiarly fierce and cold

wind, accompanied by a very fine, blinding

snow which suffocates as well as freezes men and animals exposed to it. The origin of the word is popularly conceded to the United States where there is evidence of its use as early as 1840; recent investigations have shown that it is used in the local dialect of Lancashire, Eng¬

land, where it has been traced back over several centuries and is generally written ˆbleasard.ˆ

It came into general use in American news¬

papers during the bitterly cold winter of 1 880 —81, and has been in more or less general use since 1888. Such a storm comes up very sud¬

denly and overtakes the traveler without pre¬

monition. The sky becomes darkened, and the snow is driven by a terrible wind which comes with a deafening roar. One of the most severe of these storms recorded in the West wras that of January 1888 which extended from Dakota to Texas. The thermometer in some places fell

from 74° to — 28° F., and in Dakota to — 40°.

The number of deaths amounted to 235. Chil¬

dren were frozen on their way home from

school, and farmers in their fields, and travelers were suffocated by the fine snow. The bhzzard which will long be remembered in the Eastern States began 11 March 1888, and raged until the 14th, New York and Philadelphia being the cities most affected. The wind at one time blew at the rate of 46 miles an hour. The streets and roads were blocked, railroad trains snowed up for days, telegraphic communication cut off and many lives were lost. Blizzards are due to a southward flow of a . large mass of cold air which is being pushed out from a centre of high barometric pressure. The flow pro¬

gresses regularly according to the differences of density and pressure on either side of its front line of advance. This regularity of ad¬

vance has been turned to account by the United States Weather Bureau, which is able to fore¬

cast with great accuracy the advance of a

blizzard, and thus in almost every cas-e the populations aff cted are amply forewarned.

BLIZZARD STATE, a nickname for¬

merly given to Dakota Territory.

BLOAT, HOVEN, or TYMPANITES,

a diseased condition of sheep or cattle, consist¬

ing of distension of the first stomach (rumen) and commonly caused by an overabundance of

leguminous diet. Animals unaccustomed to

graze in clover are liable to the malady, but overeating of grain may also produce bloat.

The use of cathartic remedies, such as Epsom salts or linseed oil, will often prove effective, except in severe cases. One pound of linseed oil or a pound of Epsom salts is the proper dose for a cow and one-fifth this amount for a sheep. Sometimes the accumulation of-gas in the rumen is so abundant and distressing that relief must be obtained by an incision made by a surgical instrument at a point on the left flank midway between the last rib and the lumbar vertebrae. This operation is generally per¬

formed by a veterinary surgeon.

BLOCH, Jean de, Russian financial ad¬

ministrator. pacifist and author: b. Radom

1836; d. 1902. His parents were Polish Jews.

He became government administrator of the

railway system connecting the Baltic and the Black seas, and besides extensive industrial and commercial activities was continually interested in the economic betterment of the poorer

classes. He also became widely known as an advocate of universal peace by his contribu¬

tions to French, German and English periodi¬

cals and by his museum at -Lucerne. In his great work, (The Future of War in its Techni¬

cal Economic and Political Relation) (7 vols..

Saint Petersburg 1898), translated and abridged by R. C. Long and published in England as (Is BLOCH — BLOCK SIGNAL SYSTEM

War Now Impossible ?) (1899), he contends

that under modern conditions a war would last so long that it would result in the exhaustion and starvation of the warring powers, in revo¬

lution and the destruction of the state, and therefore was not likely to occur.

BLOCH, Karl Heinrich, Danish painter:

b. Copenhagen 1834; d. 1890. He studied at the Copenhagen Academy and in 1852 went to Italy where he spent about 12 years. In 1883 he be¬

came a professor in the academy in which he had been trained. Although his chief paintings are historical, he was also successful in nature-studies, and some of his pictures are notable for their humorous characteristics. Among his works are Peasant’s Cottage) (1858) ; (Ro¬

man Street Barber) (1864) ; (James of Scot¬

land Visiting Tycho Brahe) (1871) ; (Christian IP (1871), and two frescoes in the Copen¬

hagen University. Consult Hannover, (Danische Kunst des 19ten Jahrhunderts) (Hanover 1907).

BLOCH, Marcus Eliezer, German natu¬

ralist: b. Anspach (of poor parents) 1723; d.

1799. In the 19th year of his age he understood neither German nor Latin, nor had he, with the exception of some rabbinical writings, read any¬

thing. Nevertheless he became tutor in the

house of a Jewish surgeon in Hamburg. Here he learned German and Latin, and besides ac¬

quired some knowledge of anatomy. He went

to Berlin and devoted himself to the study of ahatomy and natural history. His principal

work is the (Natural History of Fishes* (12

vols., Berlin 1785-99), adorned with many col¬

ored plates, and long the most comprehensive work in its field and still useful for its pictures.

BLOCK, or BLOK, Adriaen, Dutch navi¬

gator who visited Manhattan (now New York)

about 1613 and again in 1614 in the Tiger. This ship being accidentally burned, he built the Unrest, a craft of 16 tons, in which he coasted as far north as Nahant, discovering the Housatonic and the Connecticut rivers and the island which bears his name. See Block Island.

BLOCK, a mechanical contrivance con¬

sisting of one or more grooved pulleys mounted in a casing or shell which is furnished with a hook, eye, or strap by which it may be attached to an object, the function of the apparatus be¬

ing to transmit power or change the direction of motion by means of a rope or chain passing round the movable pulleys. Blocks are single, double, treble or fourfold, according as the number of sheaves or pulleys is one, two, three or four. A running block is attached to the object to be raised or moved; a standing block is fixed to some permanent support. Blocks also receive different denominations from their

shape, purpose and mode of application. See Tackle.

BLOCK BOOKS. Before, and for a short

time after, the invention of printing, books printed from wooden blocks, each the size of a page and having the matter to be reproduced, whether text or picture, cut in relief on the surface, were called block books. These popular blocks were adorned with crude paintings, (he makers of block books and card painters being the same till about the opening of the 1 5th cen¬

tury. As their work increased in favor they devised the process of block printing, cutting into wooden blocks or metal plates in such a manner as to leave letters and pictures in relief, and after applying color to these, taking impres¬

sions from them. One or both sides of the sheet were printed from these blocks. Sec also Printing.

BLOCK COAL, the name of certain kinds

of non-coking bituminous coal of Ohio and In¬

diana having a tendency to break into forms approaching the cube. See also Coal.

BLOCK ISLAND, an island in the Atlan¬

tic Ocean, midway between Montauk Point,

L. I., and Point Judith, R. I., eight miles long, and from two to five miles wide. It belongs to the State of Rhode Island, from the shore of which it is about 10 miles distant. It has be¬

come a noted summer resort, and constitutes the township of New Shoreham, Newport

County, R. I. There are lighthouses on its northern and southern extremities. The island was named by Adriaen Block, who reached

here in 1614. It was first settled in 1662 and was taken by French privateers in 1689. A

ship with emigrants from the Palatinate was wrecked here in 1720. The accident is recorded in Whittier's (The Palatine.* Pop. (1910)

1,314. Consult Livermore, (History of Block Island from 1614 to 1 876 } (Hartford 1877).

BLOCK PRINTING. See Printing.

BLOCK SIGNAL SYSTEM, the method

of protecting railroad trains in motion, through the dividing of the road into sections, or <(blocks,** in which but one train is allowed at a time on the same track. The system is operated through signals which have the effect of strict orders to the engineer and conductor in charge of any train.

The real benefits from the block system are increased safety for trains, and economy and increased facility in train operation. Increased safety is gained in three ways : (1) By keeping trains on. the road not less than a fixed min¬

imum distance apart, thus reducing to the low¬

est figure the risk of collision, either from trains overtaking each

other, or opposing trains meeting on single track; (2) by the responsible corps of signalmen, who have a full view of passing trains and of the tracks for consider¬

able distances, and are in regular communica¬

tion with the track-walkers and other watch¬

men, and are equipped to stop trains in time to save serious trouble from defective train appli¬

ances and roadbed; (3) by demanding of

trainmen and enginemen greater vigilance and the habit of being alert at all times for signals, which, under the block system, are compara¬

tively close together. Economy and increased facility in the operation of the train service are ensured by the fact that irregular trains are prevented from doubling up and causing block¬

ades at passing and other points where track room is limited. They also follow from the greater uniformity in the arriving of irregular trains at terminals, which distributes more

evenly the yard work of handling cars and

power, and thereby also reduces traffic expenses, as the yard work can then be done more eco¬

nomically than when there is a rush at one time and a standstill at another. All signal systems are required to provide for the diverse condi¬

tions existing on a single-track line and the double-track line. In double-track blocking

only the movements of trains in following each other have to be

provided for, while single-track blocking has to do this, and, in addition, guard against trains meeting head-to-head.

Therefore, double-track blocking may be dis¬

tinguished by the divisional title of ((non-fol¬

lowing block,® in contradistinction to that of ((non-meeting block,® for single-track blocking.

While single-track blocking must govern both the non-meeting and the non-following move¬

ments, its main object is to control the non¬

meeting (head-to-head) movements, which are

the more important. To accomplish this, it

should provide for holding a train at a passing siding while another train moving in the oppo¬

site direction is approaching that point. There are two principles in single-track blocking

which should always be kept in mind. First, all meeting and passing points must be at block stations. Second, for the non-meeting move¬

ments that section of the line between the passing sidings must be operated as one block, regardless of intermediate block stations.

In single-track operation where block sig¬

nals are not in use, trains on the main track are operated and passing points are fixed upon the authority of time-tables and train orders.

The problem is to safely move the maximum

number of trains in both directions on the same piece of track and so to fix their passing points as to cause the minimum amount of delay. In general, the movement of trains is made from one passing siding to another. The field of railroad signaling is one which has been pro¬

lific of a multitude of safety devices, arranged into many competing systems ; but the funda¬

mental wisdom of the establishment of ((blocks®

has been recognized by all inventors. On the practical side, the railroads have reduced the acceptable systems as proposed to a simple

classification of four variations: (1) The

manual system; (2) the controlled manual sys¬

tem; (3) the semi-automatic system; (4) the automatic system. In the manual system all

signals are made directly by an individual sig¬

nalman at the entrance to each block. As a rule he is in telegraphic or telephonic communi¬

cation with the signal operators at the farther ends of the block stations on either side of him.

In the controlled manual system the block is opened by the <(clear® signal given by the op¬

erator, but the setting of this signal electrically sets the signal at the farther end of the block at ((stop,® which, in turn, must be opened to Mlear® by the operator at that station. In the semi-automatic system the train entering a

block sets the signal at that point at (<stop® and holds it at that position until it has passed safely into the next block. It is then released, but the signal operator must set it at <(clear®

before the next train can enter that block. In the automatic system all signals are operated by the moving trains, without any attention from operators except at switching points.

Except in automatic blocking, the signals

are operated from signal towers, built beside the tracks, by means of levers resembling the reverse lever of a locomotive, which are con¬

nected with the signals by wires or pipe. If wire is used, there should be two lines for each signal, one for pulling it to <(danger® and the other for pulling it back to ((safety.® To ensure the signal being set at (<danger® in the event of the breaking of the wires, the blade should

be provided with a counterweight. Usually

there is a lever for each signal, but in some in¬

stances, as at an interlocked point, one lever may be used to operate several signals, by means of a device known as a selector.

Manual Blocking. — In manual blocking

each signalman controls the block signals at his station and, in the absence of other means, the code signaling between the block stations is done by means of electric bells. The more important lines use an indicator, giving a vis¬

ual indication of the condition of the block.

On the dial of the indicator appear the words (<line clear,® ((train on line® and ((line closed.®

By placing the hand of the indicator over any of these formulas the instrument at the other end gives a like indication. The instrument is not interlocked with the outdoor signals. The term ((line closed® means that the instrument is out of service as there is no traffic in the block for the time being. This is the normal position of the pointer, giving a negative indi¬

cation. In many of the larger signal towers the indicator is equipped with small red electric lamps which light up with the passing of trains into the block and remain alight until the block is again clear. In the Mozier manual system the passage of a train into a block is controlled by the train dispatcher, no train being allowed to enter a block without his permission. When a train enters a block the dispatcher is notified of the fact by wire and he then directs the signalman at the station in advance of the train what signal to display to the train on its arrival there.

Controlled Manual Blocking. — In con¬

trolled manual blocking the manipulation of

the outdoor signals at the entrance to a block is controlled, electrically, by the signalman at the block station in advance. In what

is some¬

times termed the automanual system there is at each block station a track circuit of at least two or three rail lengths, which is used in actuating an Mlectric slot® for automatically replacing the home signal to (<danger® when the rear end of a train passes that signal. The locking instruments are generally placed in

front of the signalman and over the levers with which they operate. Each block station has one of these instruments for each block, the two instruments at the opposite ends of a block being connected by an electric circuit.

The code signaling between the stations is

sometimes accomplished by bell.

In some instruments the signal-operating

levels are normally locked, except when un¬

locked by the signalman at the station in ad¬

vance, while in others the signals are locked only when the line is blocked by a train, thereby leaving them free to be thrown to

either Manger® or (<safety,® as may be de¬

sired, when the line is clear. In some instru¬

ments the electrical apparatus and the levers are connected electrically; in others they are connected mechanically.

The Mlectric slot® is an appliance for auto¬

matically cutting out the block signal from its actuating lever, and is used to automatically return the signal to Manger® behind a train.

It is actuated by a track circuit, as heretofore mentioned, placed ahead of the signal, and

forms a removable connection between the sig-BLOCK SIGNALS

1 Power signals

2 Clear Signal

3 Alternating Current Signals. Signal Location on Single Track 4 Tower Indicators

BLOCK SIGNALS

\

i

Fig. 2

Approach next Signal

Prepared to Stop

ABSOLUTE SIGNALS

Fig. 3

Proceed

Fig. 4

Stop (and Proceed)

Fig, 5

Approach next Signal

Prepared to Stop

Fig. 6

Proceed

PERMISSIVE SIGNALS

Fig.

Fig.

Signal Aspects and Indicators used in Automatic Block Signaling Fig. 2 Single Electro — Mechanical Slot Tonnage signal used m Absolute Permissive Block System to facilitate traffic on ascending grades The upper arm is the permissive signal; the lower arm is the “ tonnage ” signal Fig. 4 Three £ > sition Electric Motor Signal. Bottom Pole Type v

BLOCK SIGNAL SYSTEM

93

nal counterweight and the signal rod, which connection, if removed when the signal is in the Mlear® position, permits the signal to re¬

turn to Manger® by force of gravity. The

signal cannot again be placed at ˆsafety® until the signal lever has been placed in its normal (Manger®) position. This device, therefore,

prevents a signalman, after having allowed a train to enter a block, from carelessly and prematurely releasing the signal at the rear station while a train is in the block.

To ensure absolute safety for the main

track in a block, including the territory for at least 1,000 feet ahead of the home signal at the station in advance (or a greater distance on a down grade), the main track switches at such advance station (including those within the 1,000-foot limit), and all outlying switches in the block, must be electrically interlocked with the block station in the rear, so that the signals at the station in the rear, which con¬

trol the entrance to the block, cannot be placed at Mlear® when the main track is occupied, or is fouled by a train on a side track, or when a main track switch is thrown for a side move¬

ment, or a main track Mack up® signal is set for a backward movement. This system ap¬

plies only to the operation of trains under the absolute block system.

Trains may run up to, but not beyond,

home or advance signals at Manger.® They

must not proceed until the clear signal or proper authority to pass the Manger® signal is given. When a distant signal is at Maution®

trains may pass it under control, prepared to stop at the home signal. Home, advance and distant signals at ˆsafety® may be passed with¬

out reducing schedule speed. A train that is to be held at an advance signal must first be brought to a stop at the home signal. It may then be allowed to proceed, under control, to the advance signal. The clearing of a home signal, in any case, gives authority to proceed to the advance signal only. To avoid the

necessity of placing the home signal at <(clear®

for a train that is to be held at the advance signal, an auxiliary signal may be used. This is known as a Mailing on® signal, and is a short semaphore blade fixed upon the home

signal post below the home signal blade. When in the ˆsafety® position this signal gives a train authority to pass the home signal at Manger® and proceed under control to the

advance signal.

Automatic Blocking. — Automatic block

signals are operated through the agency of

electricity or of a combination of electricity and compressed air, by the passage of trains into and out of the block. A track circuit is generally used in automatic blocking, for con¬

veying the electric current to the signals. In arranging a track circuit, a gravity battery is commonly used, and is placed at the advance end of the block. A relay and the signal arc placed at the other end. Each line of rails is connected with a pole of the battery. The current passes along the rails of one side of the track, through the relay, thence along the rails of the other side of the track, thus form¬

ing a circuit. The relay controls a local cir¬

cuit which works an electro-magnet, which

in the simple electric system actuates the sig¬

nal, and in the electro-pneumatic system per¬

mits compressed air to actuate it. The electric power may be generated by a dynamo. The

use of storage batteries in electro-pneumatic interlocking permits of a closer regularity of the quantity and pressure of the current, and results in considerable economy in operation.

Automatic block signals are operated under

two plans: (1) the normal-safety plan, that in which the signals always show Mlcar® unless the block is obstructed either by a train or otherwise; (2) the normal-danger plan, that

in which the signals are at Manger® at all times except when cleared

by an approaching train, which can be done only when the block is clear of trains and other obstructions.

Automatic block signals are applicable to

junctions, railroad crossings and drawbridges if manual interlocking is used. Separate signals are provided for the interlocking. The same rules apply to the block signals here as else¬

where. If the interlocking and block signals both show Mlear;® trains may proceed with

speed. At a junction, where the route diverges, the block signals will show Mlear® when there is no train in the block ahead on the main line, and the interlocking signal is lowered for a train to continue on the main line, or when there is no train in the block ahead on the branch line and the interlocking signal for the branch is lowered.

The ordinary automatic block system provides protection for following movements, but for opposing movements it fails to meet the requirements of an ideal system for the reason that the block for opposing movements does

not extend from siding to siding, an inherent defect in the system.

In the absolute permissive block system the block for opposing movements is from siding to siding and the signals governing entrance to this block are in all cases absolute or stop-and-stay signals, hence the term ((absolute® in the name of the system. For following move¬

ments the block between sidings is divided into two or more sub-blocks, as traffic conditions may require, and movements into these sub¬

blocks are governed by intermediate signals

which may be absolute (stop-and-stay), or per¬

missive (stop-and-proceed) signals. Ordinarily, intermediate signals are permissive or stop-and-proceed signals as used on double track, hence the term <(permissive® in the name of the

system.

Absolute Permissive Block System. —

This system of automatic block signals is

adaptfed to meet the exacting requirements of single-track signaling. On double track, train movements on the same track are in the same direction. The fundamental requisite of double¬

track signaling is to so arrange the signals as to provide a space interval between trains cor¬

responding to a given time interval. For ex¬

ample, if the maximum traffic consists of trains operated at one-minute intervals and at a speed of 60 miles per hour, there would be a space interval between trains of one mile (less the train length). This space interval is divided into block sections so arranged as to permit trains to follow each other under adequate sig¬

nal protection.

On single track, train movements are in

both directions. The fundamental requisites

are two, one for following movements as in double track and the other for opposing move¬

ments. To accommodate following train

movements, the block sections are arranged to permit trains to follow as in double-track sig¬

naling. For opposing train movements the

block sections must be arranged to prevent the display of signal indications that would permit opposing trains to enter the same block section at the same time. These block sections should extend from one passing siding to the next.

This, however, is not a feature of the ordinary type of automatic signaling, but is one of the important features of the absolute permissive movements are governed by permissive signals, the block extending from signal to signal; (3) at meeting and passing points maximum signal pro¬

tection provides an efficient check against failure to observe meeting and passing points; (4)

flagging is reduced to a minimum, as following trains operate as in double track; (5) a reliable caution signal indication is displayed for every stop indication; (6) the minimum distance is reduced 30 per cent between following trains running under clear signals as compared with block system. Another requisite is that a re¬

liable caution indication be displayed for each stop indication. This is a vital point at passing sidings where opposing trains approaching each other must have ample warning of a signal in the stop position.

The system is flexible and can be easily ar¬

ranged to provide for the special requirements of any railroad. The chief advantages of the system are: (1) Opposing train movements are governed by absolute signals, the block extend¬

ing from siding to siding; (2) following train the ordinary system; (7) due to the protection against opposing trains ˆtonnage® signals, so called, may be used to eliminate the stoppage of tonnage trains on ascending grades where it would be difficult to start them ; (8) signals are restored to normal position as soon as the block section is clear, regardless of any sequence of movements; (9) minimum number of signal

appliances and line wires required.

Interlocking Signals.— Movements in the

reverse direction of traffic (or ˆbacking-upˆ

movements) are sometimes necessary and these BLOCK SIGNAL SYSTEM

must be guarded by separate signals provided for the purpose. The apparatus used at railroad crossings and junctions to ensure the proper display of the switch signals when the switches are changed from one position to another —that is, set for a different route — and to op¬

erate the switches and signals from a central point is known as an interlocking machine. The fundamental principle of the design of the in¬

terlocking machine is that when the switches and signals are set for any one route no switch or signal can be set for any conflicting route, or a route which would foul the route already “cleared.® In this way collisions at junctions and switches are effectually prevented. The

interlocking signals are not a part of the block system proper, but, as already stated, they should be arranged to work in connection there¬

with. The necessity of having the switches and signals co-operate in order to prevent such accidents as are apt to occur from the inde¬

pendent working of the switches from several points was early experienced by the railroads, switches being frequently set for one move and signals for another, causing innumerable

accidents.

Railroad Crossings and Junctions. — The

foundation principle of absolute blocking at crossings and junctions is that all the blocks intersecting at a junction or crossing frog shall be operated as one block. All junctions and crossings should be provided with block signals, interlocked switch signals and derail switches.

The latter are opened when the signals with which they are connected are set at “danger,®

so that a train running past a signal at “danger®

will be turned off the track before it can meet a train on another track at the fouling point.

Where the track is lower, the derail switch should be placed not less than 500 feet from the fouling point. On a grade descending

toward the junction or crossing, the derail should be placed far enough away to give the same degree of safety that it would on a level track at a distance of 500 feet. The block sig¬

nals, switches and switch signals should be so interlocked that a dear-block signal cannot be given when there is an intervening switch set for a different movement.

Each track must have its own block signals.

Where trains proceed in the same direction on different tracks, the signals relating to these tracks are generally placed on the same post or on a bridge spanning the tracks. In the for¬

mer case the post supports a cantilever bracket carrying short posts upon which are mounted the signals, the post carrying the main-track signal being higher than the others and nearest the main track. An arrangement of signals

for trains in the same direction on different tracks that is simpler is to have the signal governing the main-track movement on a high post by itself and all others on low posts. As all movements from and on side tracks are

made at comparatively slow speed, the position of low signals may be readily observed by those interested.

Outdoor Signals. — The physical means by

which signals are displayed in the block system are of several types, the most common being the semaphore. This is a flat blade or vane of wood or metal, 4 or 5 feet long and

10 to 12 inches wide. One end of this blade is supported by a pivot on the signal post, and thus the blade is free to be swung into differ¬

ent positions. In some systems two positions are arranged for, the horizontal and the in¬

clined — either upward or downward. In other systems the blade may be set at three positions — horizontal, inclined and vertical — the two latter either upward or downward. These po¬

sitions are visible only in the daytime, and, for nights, light are displayed automatically, which, by their differing colors, indicate the position of the semaphore blade. This is accomplished by a curved spectacle-like extension at the pivot end of the blade holding two (or three)

“roundels® or discs of colored glass before a lamp on the signal post, corresponding to the two (or three) possible positions of the

semaphore.

In all systems in which the semaphore is

employed, a horizontal position means that the block is occupied by a train and is equivalent to the order, “stop.® The roundel which in that position covers the lamp is red. In the two-position semaphore, the “block clear® sig¬

nal is made by dropping the outer end of the blade to an angle of about 70 degrees below the horizontal. The roundel which corresponds to this position is, in most cases, white ; but the larger railroads are, one by one, changing all “white® or “proceed® signals to green. In the three-position semaphore the horizontal posi¬

tion of the blade means “stop.® When the

blade is dropped to an angle of 45 degrees, or, in some systems, raised to an angle of 45 de¬

grees, the signal means “proceed with caution,®

and its equivalent light at night is generally green, though by the new color plan it is a brownish-yellow. In the third position the

blade is vertical — either upward or downward — signifying “block clear® or “proceed® ; and in the older scheme the light at night is white and by the new color plan it is green. The doing away of the white light makes for a larger degree of safety, for it was not an un¬

usual accident that the roundel should be broken and the light show white when it should have been red. Under the new color plan a white light will mean a broken roundel and hence “danger,® and will require a stop and exam¬

ination as to the position of the semaphore blade.

In the more highly organized signal systems two sets of signals are used, the “home® signal and the “distant® signal ; the former name re¬

lating to the signal at the entrance to the block, the latter to a signal which indicates the posi¬

tion of the signal at the entrance to the next block. Both are usually on the same post. As a means of distinguishing them, the outer end of the semaphore blade is deeply notched, like a fish tail. It is generally set lower on the signal post. Or, in some systems the “distant®

signal is shorter and narrower. The “distant®

signal has only two positions — horizontal, meaning “caution® (when approaching entrance

to the next block), and inclined, meaning that the next block also is clear. The colors of the lights displayed at night correspond to the “caution® and “clear® colors used on the sys¬

tem. The “distant® signal, therefore, is only a preliminary indication of the signal at the next block and is merely designed to facilitate the operation of a fast train service.

Another signal system which has a large

vogue uses the Misc® or <(banjo® device instead of the semaphore. The disc revolves on a

pivot, so as to show the full face when at danger and only the edge of the disc when the block is clear. A lantern mounted on top of the disc carries two roundels of different colors, showing red when the disc presents a full face and white (or green) when the edge indicates a clear block. A modification of the disc system is arranged so that the disc always presents a full face, with an opening in the centre. Across this opening are thrown col¬

ored roundels, red, green or yellow, as the case may be. This system is the one in use on nearly all subway and tunnel traffic and on many electric roads. On the last mentioned

the Hall Automatic system, an electric block system, is in extensive use. The instrument which displays the signals is contained in a case mounted on an iron or wooden post, the length of which may be varied to suit condi¬

tions. Within the case is mounted a disc of red silk, with a red glass on the opposite end of the arm carrying the disc. By day a white glass in the back of the home signal case is exposed through the glass-covered aperture in front so long as the large red disc is held out of sight. The front of the case being dark, the indication of safety is thus shown by a white disc in the centre of a dark ground.

The falling of the large disc before the glass produces the danger signal, by showing red, and at the same time cuts off the strong con¬

trast formed by the pure white light disc in the centre of the dark case. The front opening is larger than the disc proper, so that when the signal is at MangerM there is a band of white shown around the disc. At night the

clear signal is obtained direct from a lamp, showing a white light through the small open¬

ing in the top of the case. On the signal assuming the danger position, a ruby-glass lens is carried up before the small opening by grav¬

ity, giving a red light. When desired, the Mlear® night indication may be green instead of white. In this case the single glass disc is replaced by a double disc, one green, the other red, these being placed at right angles to each other. The distant signal is substantially of the same construction, but the disc is green, and the face of the case may be painted white, to distinguish this signal from the home sig¬

nal. When at danger the green disc presents a strong contrast to the white surrounding case.

At night a green (or orange) lens is used to indicate Maution.® At junctions, cross-overs, sidings, etc., a switch instrument is used, which, through its electrical connections, causes the block signal to display Manger® when a switch is not set for the required movement. A vis¬

ible indicator is placed at main-track switches to warn a trainman desiring to open a switch to let a train out on the main line. This indi¬

cator will show Manger® if an approaching

train shall have passed a point 1,000 feet or more in advance of the home signal next back of the switch. If the main track is clear and the trainman therefore opens the switch, this operation sets at Manger® the main-track home signal of the block in which the switch is situated.

Besides the three colors mentioned, it is

customary to mark the entrance to a curve in a subway or tunnel with a blue light, so that the running speed may be reduced to prevent undue wear of the rails.

In locating the home signal on single-track lines, care must be taken that the blocks do not overlap. In other words, the home signal governing the entrance to a block for trains running in one direction must be so placed that a train can go to it without encroaching on the

block for trains running in the opposite direction. This should be the arrangement of the home signals at every single-track block station, whether there is a passing siding there or not. The rule that a train leaving a block station has the right to proceed quite up to the home signal of the block station in ad¬

vance should always govern in the locating of home signals. Or, as a general proposition, it may be said of home signals for single-track blocking, that they must be so located that two trains moving in opposite directions to¬

ward a common point can be stopped at that point clear of each other, by those signals.

Machine blocking undoubtedly offers the safest method of single-track blocking, and is in

considerable use on electric roads. The prin¬

ciple involved is a modification of the English staff system. Staff or tablet machines are used, one being placed at each end of each block, and these machines are so constructed that

the withdrawal of a staff or tablet from one machine automatically locks the apparatus so that a second staff or tablet cannot be obtained at either end of the block until the first one is restored to one or other of the two machines of the block. The advantages of the electric train staff are (1) that a train can be sent forward from either end of the section with¬

out awaiting the arrival of the staff from the other end, a frequent source of delav under the old method, and (2) that greater security in working is obtained on account of the

impossibility of withdrawing a staff from the machine at either end of the section without the concurrence of the signalman at the

other end. A machine is placed at each end of the block, the two machines being connected by an electric circuit.

The rapid development of railway traffic

has created a demand for the power signal

in block signaling and interlocking. The power signal has also been developed to meet the increasing requirements and is an important

factor in the safe and economical operation of railway trains. In blocking or spacing

trains, the power signal in connection with a track circuit automatically indicates the

presence of a train in the block, a misplaced switch or a broken rail; in routing or switch¬

ing trains, in connection with electric inter¬

locking, the power signal under control of a leverman, and track circuit also when desired, may be located at any distance from the inter¬

locking tower so that the limits of the inter¬

locking plant are unrestricted; and as a dis¬

tant signal, in connection with a mechanical interlocking plant, . the power signal may be located at a sufficient distance from the home signal to afford proper braking distance for high speed trains.

Since the invention of the closed-track

circuit in 1872, the power signal has passed through successive stages of development:

Irorn the clockwork disc to the electro-pneu¬

matic semaphore; from the electro-pneumatic

semaphore to the enclosed disc; from the en¬

closed disc to the electro-gas semaphore ; and finally to the highly perfected electric motor semaphore.

The general features of the electro-pneu-

tipper one, according to the general practice, is the “danger^ or home signal, is painted red and governs the section immediately ahead ;

the lower one is the ^caution® signal, is painted green (or yellow) and works in harmony with the <(dangerw signal of the next section. Each semaphore is operated by a cylinder three

METHOD or ATTACHING INSULATOR PINS TO POLES

HIGH TENSION PIN

GALVANIZED MALLEABLE IRON

LON TENSION PIN

Ij LOCUST

TYPICAL JOINT-HIGH TENSION ALUMINUM L/NE

Construction Details — Transmission Line

matic system are (1) a rail circuit with its batteries and relays; (2) an air compressor with its pipes to the signal posts; (3) the signal posts themselves with their arms, air cylinders and electrically-controlled valves.

Two semaphore signals are placed on a post about 50 feet to the rear

of each section. The VOL. 4 — ‘7

inches in diameter, fitted with a piston, the rod of which is so connected as to move the signal to its ˆclear® position when air pressure from the main pipe line is applied to the pis¬

ton, by means of the electric valves, that be¬

ing the position of the signals when the track is clear for the movement of trains. Each

signal blade carries an appropriately colored lens, which covers a light when the blade is in the horizontal position, showing red if it is the upper signal, and green (or yellow) if it is the lower signal. A white (or green) light is exposed when the signal is in position to indicate that the track is clear.

The electro-gas apparatus is similar to the electro-pneumatic, except that it employs com¬

pressed carbonic acid gas instead of air. This gas when compressed is far more elastic than air, and works with a livelier action.

The electric motor mechanisms are con¬

sidered by the most advanced signal engineers to be the best all around power devices. The one considerable difficulty in their use is the absolute necessity to keep them free from

moisture. In spite of this drawback, not yet overcome, many miles of road are protected

by them and with a high degree of satisfaction.

History. — The actual operation of the

block signal system dates from 1839 when the Great Western Railway, of England, first

telegraphed the arrival and departure of its trains from station to station for short dis¬

tances near London. In 1841, separate instru¬

ments were introduced for each direction of traffic, showing whether the sections were clear or blocked, and telegraph bells were installed.

In 1842, Sir W. F. Cooke, an English engineer, published a series of

suggestions of the block system entitled (Telegraphic Railways } and

laid down the following principles : <(Every point of a line is a dangerous point, which ought to be covered by signals. The whole

distance, consequently, ought to be divided into sections, and at the end as well as the begin¬

ning of them, there ought to be a signal, by means of which the entrance to the section is opened to each train when we are sure that it is free.®

The constantly increasing volume of busi¬

ness on railroads necessitated improved means for securing safety in operation, and in 1851

the South Eastern Railway of England devised the method of signaling by electric bells, by sound only, without the use of needle instru¬

ments. In 1854, separate instruments for each track, with three positions of the needle, were introduced, and later the bell code was used in connection therewith. In 1875, the Sykes system of block signaling was invented and

brought into extensive use, not only in Eng¬

land but also in the United States. In this system the outdoor signals at a block station were controlled by the signalman at the station in advance, by means of electrically-operated locks, the locking apparatus at the two stations being connected by an electric circuit. This effected a decided check against mistakes or carelessness, for while each signalman oper¬

ated his own signals, he could not operate them until they had been unlocked by the

signalman in advance, on request of the first signalman.

The advance has been continually toward

the point of reducing the human element in signaling to a minimum, the ultimate goal

being the strictly automatic operation of all running signals. The selection by a railroad of any particular type of signal system depends primarily upon its cost to install. The auto¬

matic is the most expensive to set up, but the - BLOCKADE

least expensive to operate, and the trend is constantly toward expenditures which actually insure the road against heavy losses through accidents.

Out of the 220,801 miles of railroad track on which passenger trains were being operated in the United States on 1 Jan. 1916, 124,447

miles were protected by some form of block signals. Of this total, on 51,120 miles the sig¬

nals were of the automatic type, and on 73,327

miles they were of non-automatic types.

Bibliography. — (The Railroad Signal Dic¬

tionary* (New York 1911) ; Elliott, W. H., (The ABC of Railroad Signalling * (Chicago

1909) ; Latimer, J. B., (Railway Signalling*

(Chicago 1908) ; Lewis, L. P., (Railway Signal Engineering* (London 1912) ; Pigg, J., (Signalling) (London n.d.) ; Scott, R., (Automatic Block Signals* (New York 1908) ; Webb, W.

L., (Railroad Construction (1913); and the

annual reports of the Block Signal and Train Control Board of the Interstate Commerce

Commission.

Edward S. Farrow,

Consulting Civil and Military Engineer.

BLOCK TIN. An inferior variety of tin

in the form of blocks. When the metal is

reduced in a furnace it is poured into molds.

These ingots are later heated to the fusion point, the pure tin fusing first is drawn off, leaving the inferior quality which is now

melted at a higher temperature, poured into molds and called block tin.

BLOCKADE. The term blockade, prop¬

erly used, involves a state of war. The so-called pacific blockade is a form of reprisal or restraint short of war. A blockade is also distinct from domestic prohibition of inter¬

course or closure of ports. Blockade does not necessarily in later days have any relation to siege. In a general way, blockade is an attempt to cut off a port or coast of an enemy from maritime communication.

The idea as to what actually constitutes a blockade has varied according to the relation¬

ship of the belligerents and in different wars.

Prior to the 16th century blockades were some¬

times proclaimed when one belligerent wished to apprehend commerce bound for certain ports of the other belligerent. Gradually the idea became more clear owing to the development

of maritime commerce. A proclamation of

1630 mentions that it is in accord with ancient custom that neutral vessels and cargoes may be confiscated if going to, coming from or sail¬

ing near the enemy ports ((which are continu¬

ally held blocked by vessels of war at great cost.® There were many departures from the

principle set forth in 1630 and belligerents en¬

deavored to obtain the advantages of a blockade without assuming the obligations of its main¬

tenance. Usually, till the latter part of the 18th century, the belligerents proclaimed and en¬

forced blockades somewhat arbitrarily, even

going so far as to interdict any commerce with an enemy.

The action of the northern states of Europe in the armed neutrality of 1780, which was later approved by France, Spain and Austria, served to modify the extreme claims of bellig¬

erents which had been developing. Article IV

of the declaration of the armed neutrality

stated “that in order to determine what char¬

acterized a blockaded port, that name should be accorded only to a port where by act of the power making the attack vessels anchored suf¬

ficiently near should make it dangerous to en¬

ter.® In 1800 Russia and Sweden agreed that a notification to the neutral vessel by the block¬

ading force was necessary in order to render the neutral vessel liable to penalty.

The recognition of neutral rights secured by the armed neutralities of 1780 and 1800 was not continued in the early years of the 19th century, when by decrees and orders in coun¬

cil Napoleon and Great Britain tried to destroy all commerce. During the first half of the 19th century there was a tendency to extend the belligerent interference with commerce at the expense of neutrals. At times areas of great extent were declared blockaded and no considerable force was sent to maintain the blockade. In one case in 1816 the penalty of death by hanging at the yard-arm was men¬

tioned for the master or other principal officers of a vessel entering prohibited area. Against the extreme extension of the area of blockade President Monroe in 1816 protested, and in

following years other American Presidents pro¬

tested, in general endeavoring to secure large liberty for neutrals. Proclamations were is¬

sued by belligerents making the presence of military officers and merchants of the enemy on board, or presence within six miles of the coast with contraband on board evidence of

intention on the part of a vessel to violate a blockade. In 1825 Brazil proposed to require bonds from neutral vessels that they would not violate blockade. The United States replied

that <(A blockade must execute itself.® At¬

tempts were made to establish blockades which would allow ships of certain nationalities to pass while closing the ports to others and to continue a blockade for two months after the treaty of peace. While there were such great variations in proclamations, the differences in application of the principles were even greater.

There seems, therefore, as regards blockade, ample reason for the statement in the Declara¬

tion of Paris of 1856, signed by Austria, France, Great Britain, Prussia, Russia, Sardinia and Turkey, ((That maritime law in time of war has long been the subject of deplorable disputes.®

It was the aim of this declaration to establish a <(uniform doctrine® on certain points, among these, blockade. Accordingly the fourth article of the Declaration provides : “Blockades, in order to be binding, must be effective — that is to say, maintained by a force sufficient really to prevent access to the coast of the enemy.®

The United States, China, Mexico and Spain

did not become parties to this declaration.

Questions soon arose in regard to the inter¬

pretation of this clause which it had been hoped would end many of the “deplorable disputes.®

Apparently to make the clause more clear the British Admiralty Manual added “or, at any

rate, to create evident danger to ships attempt¬

ing ingress or egress.®

The Civil War in the United States put

some of the doctrines in regard to blockade to the test. The French had generally maintained that liability for violation of blockade was con¬

ditioned upon notification of the blockade to a vessel approaching the line by a vessel of the blockading force. Great Britain and the United States had contended that a general

public notification was sufficient. These ideas were therefore in conflict. Questions were

raised as to the effectiveness of a blockade which depended upon the cooperation of shore batteries or upon the closing of certain navi¬

gable channels by the sinking of vessels, stones or other obstructions.

The extent of coast line which might be blockaded effectively by such forces as the Northern States had at their dis¬

posal was in doubt. Great Britain in the case of the Helen in 1865 stated the British and American point of view at that time, saying, (<There are several conditions to be observed in order to justify the seizure of a ship for breach of blockade. The blockade must be effectual and (save accidental interruption by weather) constantly enforced. The neutral vessel must be taken in delicto. The blockade must be en¬

forced against all nations alike, including the belligerent one. When all the necessary con¬

ditions are satisfied, then, by the usage of nations, the belligerent is allowed to capture and condemn neutral vessels without remon¬

strance from the neutral state.® (1865, L. R.

1 A. & E. 1).

Certain principles became more definite

through the decisions in consequence of the Spanish-American War of 1898. As to the

number of vessels necessary, the Supreme Court of the United States said, ((As we hold that an effective blockade is a blockade so effective as to make it dangerous in fact for vessels to at¬

tempt to enter the blockaded port, it follows that the question of effectiveness is not con¬

trolled by the number of the blockading force.

In other words, the position cannot be main¬

tained that one modern cruiser though suffi¬

cient in fact is not sufficient in law.® (The Olinde Rodrigues, 174 U. S. 510). It was also stated that a captured vessel was not in condi¬

tion to dispute the effectiveness of the force which captured her, and further it was thought ((a sufficient compliance with the obligations of international law if the blockade made egress or ingress dangerous in

fact.® In the Russo-Japanese War, 1904-05, the Japanese regula¬

tions provided that :

“Blockade is to close an enemy’s port, bay or coast with force, and is effective when the force is strong enough to threaten any vessels that attempt to go in or out of the blockaded port or bay or to approach the coast.®

The duration of liability to capture had been subject to difference of opinion. Continental opinion has inclined to the side of liability only when taken in the act or when continu¬

ously pursued. British and American opinion

has made liability to begin upon departure on the voyage and to terminate with its comple¬

tion when the intent to violate a blockade is present, and if a vessel has escaped from a blockaded port the liability to capture continues until the vessel reaches her home port. An at¬

tempt was made by the International Naval

Conference of 1908-09 to reconcile in the Dec¬

laration of London these and many other dif¬

ferences of opinion upon details of instituting and maintaining a blockade. This naval con¬

ference represented the United States, Ger¬

many, Austria, Spain, France, Great Britain, Italy, Japan, Netherlands and Russia, the pow-100

ers especially concerned with the conduct of naval warfare. The

conclusions were declared <(to correspond in substance to the generally recognized principles of international law.® The articles relating to blockade in the Declaration of London numbered 21 and embody what up

to August 1914, when war broke out in Europe, was regarded as a satisfactory statement of the law of blockade. These articles are as follows: <(Article 1. A blockade must be limited to the ports and coasts belonging to or occupied by the enemy.

Art 2. In accordance with the Declaration of Paris of 1856, a blockade, in order to be bind¬

ing, must be effective — that is to say, it must be maintained by a force sufficient really to prevent access to the enemy coast.

Art. 3. The question whether a blockade is effective is a question of fact.

Art. 4. A blockade is not regarded as raised if the blockading forces are temporarily driven off by bad weather.

Art. 5. A blockade must be applied impar¬

tially to the ships of all nations.

Art. 6. The commander of a blockading

force may grant to a warship permission to enter, and subsequently to leave, a blockaded port.

Art. 7. In circumstances of distress, acknowl¬

edged by an authority of the blockading forces, a neutral vessel may enter a place under block¬

ade and subsequently leave it, provided that she has neither discharged nor shipped any

cargo there.

Art. 8. A blockade, in order to be binding, must be declared in accordance with article 9, and notified in accordance with articles 11 and 16.

Art. 9. A declaration of blockade is made

either by the blockading power or by the naval authorities acting in its name.

It specifies —

(1) The date when the blockade be¬

gins ;

(2) The geographical limits of the

coast blockaded;

(3) The delay to be allowed to neu¬

tral vessels for departure.

Art. 10. If the blockading power, or the

naval authorities acting in its name, do not establish the blockade in conformity with the provisions which, in accordance with article 9

(1) and (2), must be inserted in the declara¬

tion of blockade, the declaration is void, and a new declaration is necessary in order to make the blockade operative.

Art. 11. A declaration of blockade is noti¬

fied—

(1) To the neutral powers, by the

blockading power by means of a com¬

munication addressed to the govern¬

ments themselves, or to their represent¬

atives accredited to it.

(2) To the local authorities, by the

officer commanding the blockading force.

These authorities will, on their part,

inform, as soon as possible, the foreign

consuls who exercise their functions in

the port or on the coast blockaded.

Art. 12. The rules relative to the declara¬

tion and to the notification of blockade are applicable in the case in which the blockade may have been extended or may have been re¬

established after having been raised.

Art. 13. The voluntary raising of a block¬

ade, as also any limitation which may be intro¬

duced, must be notified in the manner pre¬

scribed by article 11.

Art. 14. The liability of a neutral vessel to capture for breach of blockade is contingent on her knowledge, actual or presumptive, of the blockade.

Art. 15. Failing proof to the contrary,

knowledge of the blockade is presumed if the vessel left a neutral port subsequently to the notification of the blockade made in sufficient time to the power to which such port belongs.

Art. 16. If a vessel which approaches a

blockaded port does not know or cannot be

presumed to know of the blockade, the notifi¬

cation must be made to the vessel itself by an officer of one of the ships of the blockading force. This notification must be entered in the vessel's log book, with entry of the day and hour, as also of the geographical position of the vessel at the time.

A neutral vessel which leaves a blockaded

port must be allowed to pass free if, through the negligence of the officer commanding the blockading force, no declaration of blockade has been sent to the local authorities, or if, in the declaration as notified, no delay has been indicated.

Art. 17. The seizure of neutral vessels for violation of blockade may be made only within the radius of action of the ships of war as¬

signed to maintain an effective blockade.

Art. 18. The blockading forces must not bar access to the ports or to the coasts of neutrals.

Art. 19. Whatever may be the ulterior des¬

tination of the vessel or of her cargo, the evi¬

dence of violation of blockade is not sufficiently conclusive to authorize the seizure of the ves¬

sel if she is at the time bound toward an un¬

blockaded port.

Art. 20. A vessel which in violation of

blockade has left a blockaded port or has at¬

tempted to enter the port is liable to capture so long as she is pursued by a ship of the block¬

ading force. If the pursuit is abandoned, or if the ‘ blockade is raised, her capture can no longer be effected.

Art. 21. A vessel found guilty of violation of blockade is liable to condemnation. The

cargo is also liable to condemnation, unless it is proved that at the time the goods were shipped the shipper neither knew nor could

have known of the intention to violate the blockade.®

At the outbreak of the European War in.

1914 the above articles were practically con¬

tained in the regulations of the belligerents, and certain blockades were proclaimed and

maintained in accord with these articles. One of the earliest of these proclamations was is¬

sued by Great Britain on 23 Feb. 1915, declar¬

ing the coast of German East Africa between certain points under blockade from midnight

28 February-1 March and allowing four days

of grace for departure of neutral vessels from the blockaded area. Similar proclamations

were issued for the Cameroons on 24 April

1915, and for the coast of Asia Minor on 1 Tune 1915.

The British and French proposed, in a note BLOCKHOUSE

of 1 March 1915, in retaliation for the war zone proclamation of Germany, to take meas¬

ures (<to prevent commodities of any kind from reaching or leaving Germany.® Under these

measures, it was said, (<The British and French governments will therefore hold themselves

free to detain and take into port ships carry¬

ing goods of presumed enemy destination, own¬

ership or origin. It is not intended to con¬

fiscate such vessels or cargoes unless they would otherwise be liable to confiscation.® Of this proposition the United States government, in a note of 5 March 1915, said: ((The first sentence claims a right pertaining only to a state of blockade. The last sentence proposes a treatment of ships and cargoes as if no block¬

ade existed. The two together present a pro¬

posed course of action previously unknown to international law.® Other correspondence fol¬

lowed upon this so-called blockade measure.

The United States, in a long note of 21 Oct.

1915, asserted that ((It is incumbent upon the United States government, therefore, to give the British government notice that the blockade which they claim to have instituted under the Order in Council of 11 March cannot be rec¬

ognized as a legal blockade by the United

States.® The reasons given were that the

British measures did not constitute ((a blockade in law, in practice or in effect.® Referring to the American contention that the British block¬

ade of Germany was not effective because Ger¬

man ports were open to Scandinavian trade,

the British note of 24 April 1916 advances the proposition that ((even if these measures were judged with strict reference to the rules appli¬

cable to blockades, a standard by which, in their view, the measures of the Allies ought not to be judged, it must be remembered that the

passage of commerce to a blockaded area across a land frontier or across an inland sea has never been held to interfere with the effectiveness of the blockade.® In the preceding paragraph, the same note says, ((that the rules applicable to a blockade of enemy ports are strictly followed by the Allies in cases where they apply, as, for instance, in the blockades which have been de¬

clared of the Turkish coast of Asia Minor, or the coast-line of German East Africa.® In the practice in regard to continental Germany there is

therefore admittedly a claim to extension of rights which at the outbreak of the war were not regarded as belonging to belligerents en¬

gaging in blockading operations. Of this Prof.

Sir Erie Richards has said <(It is certain that the rights with regard to blockade must be extended if the right is to continue.® The United States has, however, in objecting to innovations in practice during war said, <(It is of the highest importance to neutrals, not only of the present day but of the future, that the principles of international right be maintained unimpaired.® See Armed Neutrality; Decla¬

ration of London; International Law;

Merchant Vessels, Neutral, Rights of;

Neutrality; War, European.

George Grafton Wilson,

Professor of International Lazv , Harvard Uni¬

versity.

BLOCKHOUSE, in fortification, a house

made of beams joined together crosswise, and often double, with a covering and loopholes, large enough for from 25 to 100 men. In ad¬

dition to this, it is commonly covered with earth, to render it entirely bomb-and fire¬

proof. Forts of this kind are often fitted up to receive cannon. Blockhouses are gener¬

ally built in the form of a square or a cross.

Their use is to afford a feeble garrison of an important place, which is very much exposed, an opportunity of holding out against the

cannonade and assault of the enemy till they are relieved. They also serve for bombproof guardhouses and places of last resort, in the interior of intrenchments and in the covered passages of fortresses, where the cannon are stationed. Blockhouses were much employed

as a defense against Indians in America, by the French in Algeria and by the Spanish in Cuba, where a line of blockhouses connected by wire barricades was built across the island in 1898. See Fortification.

BLOCKS OF FIVE, a political expres¬

sion in the United States, originating in the presidential campaign of 1888. A letter pur¬

porting to have been written by the treasurer of the Republican National Committee to the chairman of the Indiana State Committee,

recommending securing (< floaters in blocks of five.® This was construed to mean the bribery of voters at wholesale rates. The Democratic managers circulated the letter as widely as possible, before election. Proceedings for

libel were afterward begun, but never brought to trial.

BLOCKSBERG, the name of several ele¬

vations in Germany, particularly the Brocken, forming the summit of the Hartz Mountains

and the highest point in the northern part of the empire. In old legends the Brocken is

the haunt of the witches, who there celebrated with orgies the first of May, Walpurgisnacht.

See Walpurc.a.

BLODGET, Lorin, American statisti¬

cian : b. near Jamestown, N. Y., 25 May 1823; d. Philadelphia, 24 March 1901. He was edu¬

cated at Hobart College ; appointed assistant professor at the Smithsonian Institution,

Washington, D. C., in charge of researches on climatology, 1851 ; was employed on the Paci¬

fic Railroad survey for the War Department, 1852-56; and was engaged in the United States Treasury Department, 1863-77. He was also

editor of the Philadelphia North American,

and secretary of the board of trade of that city, 1858-64. He is credited with having laid the foundation of American climatology. His

publications include (The Climatology of the United States* (1857), a work that met high favor in the United States and Europe; Com¬

mercial and Financial Resources of the United States) ; and about 150 volumes of reports on finance, industrial progress and kindred

subjects.

BLODGETT, Henry Williams, Ameri¬

can jurist: b. Amherst, Mass., 21 July 1821; d.

Waukegan, Ill., 9 Feb. 1905. He was educated at Amherst Academy; studied surveying and

engineering; was admitted to the bar in 1844; and settled in Waukegan, Ill., to practice, in the following year. He served in the lower house of the legislature, 1852-54, and in the State senate, 1859-65 ; and was United States district judge for the Northern District of Illinois, 1869-93, when he retired. He was

appointed one of the counsel on the part of the United States before the arbitration tri¬

bunal on the Bering Sea fur-seal controversy between the United States and Great Britain, in 1892.

BLODGETT, Samuel, American inven¬

tor: b. Woburn, Mass., 1 April 1724; d. Haver¬

hill, Mass., 1 Sept. 1807. He took part in the French and Indian War; was a member of the expedition against Louisburg in 1745; and sub¬

sequently became a judge of the Court of

Common Pleas in Hillsboro County, N. H.

He was the inventor of an apparatus by which he recovered a valuable cargo from a sunken ship near Plymouth, Mass., in 1783. His suc¬

cess led him to go to Europe for similar en¬

terprises. He met with no encouragement in

Spain, and in England proposed to raise the Royal George, which went down off Spithead

with 800 persons on board, but his proposition was not accepted. In 1793 he began the con¬

struction of the canal around Amoskeag Falls in the Merrimac, but did not live to complete the work.

BLOEMAERT, bloo'mart, or BLOM,

Abraham, Dutch painter : b. Gorkum, 25 Dec.

1564; d. Utrecht, 27 Jan. 1647, or more prob¬

ably 1657. He came to Paris about 1580 and there studied under Herry, Bassot and Franck.

After spending some time in Amsterdam,

where his father had become city architect, he settled at Utrecht in 1595. After 1600 he was prominent in Saint Luke's Guild of that city.

Up to an advanced age he continued to teach painting, to paint and to engrave. His paint¬

ings are reproached with various faults, yet he is distinguished by the brilliancy of his coloring and the richness of his invention. He painted all sorts of objects, but his landscapes are the most esteemed. Consult Van Mander,

(Le Livre des peintres) (1885). He had four sons, of whom Cornelius (b. Utrecht 1603;

d. Rome 1680), was a distinguished engraver.

BLOEMEN, Jan Frans van, Flemish

painter: b. Antwerp, 12 May 1662; d. Rome

1748. At first he studied under Gouban, was attracted to Italy and there came under the influence of Claude Lorrain and Dughet. He

was surnamed ˆOrizzonte,® an allusion to the great beauty of the coloring he put into his landscapes.

BLOEMEN, Pieter van, Flemish painter,

brother of Jan Frans: b. Antwerp 1651; d.

1720. He was made apprentice in 1667; be¬

coming master in 1674, he set out for Rome where he remained for 20 years and where he received the stirname of ˆStandaart.® Re¬

turning to his native city he was appointed dean of the Guild of Saint Luke there. His wrork is chiefly landscapes and military sub¬

jects.

BLOEMFONTEIN, bloom'fon-tin, Or¬

ange River Colony, South Africa, the chief

town and seat of government of the colony, 680 miles northeast of Cape Town, situated

in an elevated and healthy region. It stands on a plain surrounded by low hills, and is reg¬

ularly laid out, having a large market-square in the centre. It has several fine buildings, including the Anglican cathedral, the Dutch

Reformed church and other places of worship ; the presidency ; the town-hall ; the post office ; the library ; the national museum ; the new Raadzaal, or council-chamber of the legisla¬

ture; the old Raadzaal; Grey College and Saint Andrew's College for boys ; the Eunice Insti¬

tute for girls ; a government hospital and a cottage hospital ; a lunatic asylum, *etc.* It is on the main railway line of the Colony, which is continuous with the Cape Colony and Trans¬

vaal systems. In the war between Great

Britain and the South African and Orange

Free State republics in 1899-1902 it was the seat of important military operations. In June 1899, a conference was held here between

President Kruger of the South African repub¬

lic and Sir Alfred Milner, the British Com¬

missioner of Cape Colony, with a view of

averting war. After the appointment of Lord Roberts to the supreme command of the Brit¬

ish forces operating against the Boers, he led an expedition against the city and forced its surrender on 13 March 1900. Soon afterward

the republic was formally placed under Brit¬

ish administration, and it is now a part of the Union of South Africa. It is a centre of

trade which consists mainly of wool. The in¬

dustries include manufactories of aerated

waters, salt, flour mills and breweries. Pop.

about 15,000, half being whites.

BLOIS, blwa (anciently Blesum), France,

the capital of the department of Loir-et-Cher, 99 miles south-southwest of Paris, situated on the right bank of the Loire, from which it rises in the form of an amphitheatre. It con¬

sists of an upper town, with very narrow

and crooked streets; a lower town, with

many handsome houses, extending along a

handsome quay; and of several suburbs,

with one of which it communicates by a

stone bridge of 11 arches. The city is fur¬

nished with spring water through an old

Roman aqueduct, in excellent preservation.

Thierry, the historian, was born here. The

castle of Blois is rich in historical associa¬

tions. It was long occupied by the counts

of the name, and became a favorite resi¬

dence of the kings of France. Louis XII was born, Francis I, Henry II, Charles IX and

Henry III held their courts in it; and the Guises, by a cruel though not unjust retribu¬

tion, were murdered in it. When Maria de

Medici was, in 1617, exiled from the court, she resided, probably as a prisoner, in this castle, whence, 18 months later, she escaped through

a high window, which is also an object of curiosity. In 1814, on the approach of the European armies to Paris, the Empress Maria Louisa and the council of regency repaired

for a while to this place. Afterward the castle was entirely neglected and even used as bar¬

racks for cavalry. During the later years of Louis Philippe's reign, this curious specimen of architecture was carefully and tastefully restored. Blois has several literary and scien¬

tific societies, a botanical garden founded by Henry IV, a public library with 19,000 vol¬

umes, a departmental college and a diocesan seminary. It trades in wines, spirits, vinegar, staves and licorice, while it produces serges, hosiery and gloves, boots, shoes, biscuits, fur¬

niture, machinery, earthenware, cutlery and

hardware, and there are tanneries, foundries and vinegar works. Pop. (1911) 23.995. Con¬

sult Le Nail, (Le Chateau de Blois) (Paris 1874) ; Bournon, < Blois, Chambord et les

chateaux du Blesois) (Paris 1908).

BLOK, blok, Alexander Alexandrovich,

Russian poet and man of letters: b. Petrograd 1880. He is the son of Alexander Lev Blok, professor of political science at the University of Warsaw. He received his edu¬

cation at the University of Petrograd. His

first poems (Novi Puti) ((New Roads') and

cSyeverny Tzveti' ((Flowers of the North')

appeared in 1903 and were exceedingly well

received. Of his collective works the verses about the (Beautiful Lady' (1905), (Snow

Mask' (1907), (Unexpected Joy' (1907) an¬

nounced a virile poet with an extremely com¬

pound soul. His lyric dramas (Balaganchikp

(The King on the Market,' (The White

House,' (The Song of the Fates,' etc., showed a further development of his unusually vivid imagination. Blok's poetry represents some¬

thing entirely new in Russian literature ; his romantic lyricism has created new types, new shadows, a new world of sphinxes moving

about during the white nights on the celebrated Nevski Prospect in Petrograd. His is often

called by the contemporary critics a (<somnam-bulant" or ((lunatic" whose visions are different from those of any other ordinary mortal.

However, his powerful verses, his unique

figures of speech and his wonderful discovery of a new magic in the Russian language have deserved for him a high place in the contem¬

porary history of literature. Yet his dramas lack action and the dialogues in them are not as sparkling as his lyric verses. They are often too superficial to be called dramas, for

there is no idee maitresse in them nor a cohe¬

sive unity of action.

BLOMFIELD, Charles James, English

divine: b. Bury-Saint-Edmunds, Suffolk, 29

May 1786; d. Fulham, 5 Aug. 1857. He studied for the Church at Cambridge, where he took high honors; and after filling several curacies, and acting for a time as chaplain to the bishop of London, was presented to the rectory of Saint Botolph, Bishopsgate. In 1824 he was

made bishop of Chester, and in 1828 bishop of London. He acquired considerable renown as

a classical scholar from the editions published by him of several of the dramas of zEschylus, and he also published an edition of Callimachus, which is much esteemed. Along with Rennel,

he edited, in 1812, the (Musae Cantabrigienses,'

and in 1814, along with Monk, the 'Posthumous Tracts' of Porson, followed two years after¬

ward by the (Adversaria Porsoni.' In his

ecclesiastical capacity he displayed great

zeal and energy, more churches having been

built in London under his episcopate than

under that of any bishop since the Reforma¬

tion. He incurred, however, some animadver¬

sions on his proceedings in relation to the Tractarian controversy by a vacillating policy, which gave satisfaction to neither of the

parties. Consult the biography by Blomfield

(London 1863), and that by Biber (ib., 1857).

BLOMFIELD, Edward Valentine, Eng¬

lish clergyman (brother of the preceding) : b.

14 Feb. (788; d. 3 Oct. 1816. He studied at Cains College, Cambridge and excited the high¬

est expectations. Among several prizes which lie gained was a medal

assigned him in 1809 for his beautiful ode (In Desiderium Porsoni.' In 1812 a fellowship in Emmanuel College was

conferred on him, those of his own college be¬

ing full. In 1813 he visited Germany, where he acquired a good knowledge of the German

language, and became acquainted with Wolf

in Berlin, and Schneider in Breslau. After

his return he wrote in the (Museum Criticum,'

or (Cambridge Classical Researches,' remarks on German literature which were received with approbation. The University of Cambridge ap¬

pointed him one of the preachers of Saint

Mary's Church. He began a translation of

Schneider's (Griechisch-Deutches Lexicon,' but did not live to finish it. Matthiae's 'Griechische Grammatik,' however, he translated completely.

His translation was published by his brother and was everywhere well received. He was

in Switzerland in 1816 with his pupil, a young nobleman, and in his haste to return to Cam¬

bridge on hearing that he was appointed proctor for the following year, the fatigue of rapid traveling occasioned a sickness of which he died.

BLOMFIELD, Reginald, English archi¬

tect : b. 20 Dec. 1856. He was educated at Exeter College, Oxford. Among his many im¬

portant professional works are (Brocklesby

Park,' 'Caythorpe Court,' (Holbrook House,'

(New Buildings at Haileybury College,' 'Lady Margaret Hall,' (Portsea Institute.' He has

published 'The Formal Garden in England'

(1892); 'A History of Renaissance Architec¬

ture in England' two works of great value

(1897) ; (Short History of Renaissance Archi¬

tecture in England' (1900) ; 'Studies in Archi¬

tecture' (1906) ; (The Mistress Art' (1908) ; Architectural Drawing and Draughtsmanship'

(1912).

BLOMMAERT, blom-mart, Philipp, Flem¬

ish philologist: b. Ghent about 1809; d. 1871.

He did much for the literature of his country by an edition of the old Flemish poets of the 11th, 12th, 13th and 14th centuries, with glos¬

saries, notes and emendations. He also re¬

published the (Nibelungenlied,' translated into Dutch iambics. His best work, however, is the (Aloude geschiedenis der Belgen of Neder-duitschers,' in .which he vindicates the claims of his country to an independent national ex¬

istence and national literature. Blommaert also wrote French well, and was a contributor to the Messager des Sciences Historiques.

BLOMMAERT, Samuel, colonial patroon :

b. 1590; d. 1670. He bought of the Indians a tract of land almost equal in size to the present State of Delaware, extending from Cape Hen-lopen to the mouth of the Delaware River. The deed for this land given him by Peter Minuit and his Council at Fort Amsterdam in 1630

is the oldest deed for land in Delaware. He formed a company to provide for the settle¬

ment of this land, and a colony was started named Swaanendale, but destroyed by the In¬

dians after a few years in revenge for an act of the governor, Gillis Hosset.

BLOND, Jacques Christophe le, German

printer of engravings: b. Frank fort-on-thc—

Main 1670; d. Paris 1741. He studied in Italy and lived some years in Amsterdam as a

painter of miniatures, and later of larger por¬

traits. He then came to England. He con¬

ceived the idea of an establishment to print engravings in colors according to the Lostman method of copperplate reproduction of mezzo-104

tints, and, obtaining means, produced many

copies of engravings and pictures, which of course had defects, and the experiment failed.

He now devoted himself to producing the car¬

toons of Raphael in tapestry, but this failed also, and he soon after died miserably in a French hospital.

BLONDEL, a confidential servant and in¬

structor in music of Richard Cceur de Lion of England, about the year

1190. While his master was the prisoner of the Duke of Aus¬

tria, Blondel went through Palestine and all parts of Germany in search of him. He under¬

stood, it is said, that a prisoner of rank was confined in Durrenstein Castle, and hastened hither. Placing himself under a grated tower, he began to sing one of the French lays which he had formerly composed for Richard. Scarce¬

ly had he finished the first stanza when a voice from the dungeon of the tower responded.

Thus he discovered his King, returned with all speed to England, obtained Richard's ransom

and gained the name of the (<faithful Blondel.®

Gretry's fine opera, (Richard Coeur de Lion,*

is founded on this anecdote. The earliest trace of this legend occurs in the Chronicle of

Rheims) (13th century). No mention of it is found in Blondel's acknowledged poems (Vol.

XIX of Tarbe's ed.), Collection des pogtes

(Champenois) (Rheims 1862).

BLONDEL, David (1596-1655), a noted

French Protestant clergyman. In 1650 he suc¬

ceeded J. G. Vosius in the professorship of his¬

tory in Amsterdam. In this position he under¬

took deep researches. His works are many.

In some of them he shows a remarkable critical faculty, as, for instance, in his dissertation on Pope Joan (1647-57) in which he came to the conclusion, now universally accepted, that the whole story is a mere myth. His keen critical sense and his power of deep thought made him iconoclastic in other directions, so that he ex¬

cited considerable Protestant indignation, and became, for a time, very unpopular on account of this work on the Pope.

BLONDIN, blon-dan, Charles (real name

Jean Franqois Gravelet), French acrobat; b.

Saint Omer, Pas-de-Calais, 1824; d. Ealing,

London, 22 Feb. 1897. He was trained at

Lyons, where he made such rapid progress

that he was designated <(The Little Wonder.®

After making a several years' tour of the United States, on 30 June 1859, before a crowd of 25,000 persons, he crossed the Falls of Niagara on a tight-rope in five minutes; on 4 July he crossed blindfold, trundling a wheelbarrow ; on 19 August he carried a man on his back; on 14

Sept. 1860 he crossed on stilts in the presence of the Prince of Wales. His engagement at the Crystal Palace in 1862, where he performed on a rope 249 yards long and 170 feet from the ground, drew immense crowds. After several

years' retirement he reappeared in 1880, and in 1888 again visited the United States. When the New York city authorities refused him

permission to perform in Central Park, he

gave a series of exhibitions on Staten Island, performing many extraordinary feats, such as carrying a stove to the centre of the line and making an omelet on it. Later in the same year he performed in London. His final per¬

formance was given at Belfast in 1896.

BLONDIN, Pierre Edouard, Canadian

statesman: b. Saint Frangois du Lac, county of Yamaska, 14 Dec. 1874. He was educated at

the Seminaire de Nicolet and Laval University, Montreal, and was admitted a notary in 1910, and served as an alderman for Grande Mere.

He was elected to the House of Commons for the county of Champlain in 1908 and became prominently identified with the Nationalist wing of the Conservative party; was appointed

deputy speaker in 1911, Minister of Inland

Revenue in 1914 and Secretary of State in 1915; Postmaster-General on 8 Jan. 1917, from which office he resigned 21 March of the same year in order to raise a French-Canadian regiment for service overseas. His resignation, however,

was not accepted.

BLOOD, Thomas, English adventurer,

better known as Colonel Blood : b. about 1618, probably in Ireland; d. Westminster, 24 Aug.

1680. He was the son of a blacksmith in easy circumstances; of his early life little is known, except that he took the Parliamentary side in the Irish rebellion. Having visited England

about 1648, Blood married a Miss Holcroft of Lancashire and returned to Ireland. He was

made a justice of the peace by Henry Crom¬

well and had large assignments of land as pay¬

ment for his services and zeal. At the Restora¬

tion he was deprived of the lands and in re¬

prisal he associated with such of the Crom-wellians as were ripe for insurrection. Two of their designs were to surprise Dublin Castle and to seize the person of the lord-lieutenant, James Butler, Duke of Ormonde. Blood was

at the head of these enterprises, planned for 9

or 10 March 1663. Betrayed by one of his as¬

sociates, he managed to escape, although his chief accomplices were seized and executed.

He made a bold attempt to rescue them. He eluded pursuit by fleeing to the remote moun¬

tain fortresses of Ireland and at last, when the danger became urgent, he quitted Ireland, and crossed to Holland, where he found a welcome among the disaffected sectaries. His daring

spirit prompted him to return to England,

where he associated with the Fifth Monarchy men. Seeing little chance for the furtherance of his schemes, he removed to Scotland and joined the Covenanters in their revolt, remain¬

ing with them till after the defeat at Pentland Hills in November 1666. Four years later

Blood, with five companions, waylaid the

Duke of Ormonde in Saint James street and

tied him on horseback to one of the desper¬

adoes. Nothing less was intended than to hurry the Duke to Tyburn, and there hang him in re¬

quital of his having hanged others. The

Duke's attendants raised the alarm and

rescued their master after he had unhorsed his riding companion and was struggling with him on the ground. On 9 May 1671 Blood made his great attempt to Steal the crown jewels. Dis¬

guised as a clergyman and with three accom¬

plices he entered the tower and succeeded in overpowering the keeper, Edwards, and in

carrying off the jewels. They were immediately pursued, seized and thrown into jail. Instead of being executed for this attempt he met re¬

ward, being saved by his audacity. Blood

refused to make confession except to the King himself, and Charles, at the suggestion of

Buckingham, who was accused of having hired BLOOD

Blood to make the attempt on Ormonde, vis¬

ited Blood in prison. Blood threatened that his confederates would avenge his death, secured a pardon from Charles, together with his for¬

feited Irish estates of £500 annual value, and seemed to have interest at court, being often seen in the presence-chamber. Before long he quarreled with his protector, Buckingham, fell under accusation of conspiring to have him

charged with an atrocious crime and was com¬

mitted to prison. It is probable that it was a trick to ruin him. He found bail and returned to his home in Westminster. His health was broken and he died after an illness of 14 days.

He was buried at Tothill Fields. Rumors being circulated that it had been a sham funeral to keep the living man hidden, his body was ex¬

humed and identified. Scott introduces Blood in (Peveril of the Peak.* Consult Seecombe, (Twelve Bad Men* (New York 1896).

BLOOD, the bright red to very dark red

alkaline fluid that circulates through the heart, arteries and veins, carrying nutriment and oxy¬

gen to-the bodily tissues, and conveying away from them waste material. The composition

and character of the blood varies very widely in different animals, and hence this description is confined more particularly to the human

blood. From the standpoint of cell-structure the blood is a tissue made up of a liquid plasma and solid cells or corpuscles. It contains at least four separate and important ingredients, the plasma, or blood serum ; red cells, or erythrocytes ; white cells, or leucocytes ; and blood plates. About one-tenth to one-twelfth of the entire body is blood, of which nine-tenths is water.

Plasma. — The greater portion (56 per

cent) of the blood is plasma. This plasma is composed of 90 per cent water containing

gases, mineral salts, fats, nitrogenous bodies and carbohydrates in solution. It is a clear yellowish fluid. The mineral salts are sodium chloride, common salt, the most abundant ;

sodium carbonate, which renders the blood

alkaline; potassium chloride, potassium sul¬

phate, calcium phosphate, sodium phosphate,

magnesium phosphate and calcium chloride.

Traces of other inorganic salts are fre¬

quently found. The gases in the blood plasma are oxygen, nitrogen and carbon dioxide. Of the organic constituents the non-nitrogenous

ones are the fats and carbohydrates, with small amounts of fatty coloring matters, lipochromes, cholesterin and sarcolactic acid. The fats are present in variable quantities, being particularly abundant following a meal. They, are the

glycerides of stearic, oleic and palmitic acids.

The carbohydrates are at least three, glycogen, dextrose, or grape sugar, and animal gums.

The non-protend nitrogenous constituents of

the plasma consist largely of the waste extrac¬

tives. The most important of these are urea, kreatin, kreatinin, uric acid and hippuric acid.

Three ferments or enzymes are thought to be present in the plasma — a diastatic ferment, converting starches into sugars ; a glycolytic enzyme, breaking up sugar, and a lipase, or fat¬

splitting enzyme. In addition, there is the fer¬

ment that causes coagulation. Whether this is present in the serum or in the white cells is a matter of inquiry. The proteids of the plasma are scrum albumins, globulins (serum globulin and fibrinogen) and nucleo-proteids.

Red Cells. — These are the most abundant

of the formed elements of the blood, making up 99 per cent of the corpuscles. There arc thought to be in man as least 5,000,000 red blood-cells to everv cubic millimetre of blood; their size, therefore, is very small, averaging in man 7.8 m.mm. They are flattened circular discs, with double depressed centres, one-fourth as thick as broad. In the embryo and in cer¬

tain diseased states the red blood-cells have a nucleus, but the normal red blood-cell in man has lost this cell structure. Practically all of the mammals, save the camel tribe, have circu¬

lar red blood-cells; the camels and most of the lower animals have oval red blood-cells ; in the lower animals they are mostly nucleated.

There is also great variation in size in the red cells of the various animals, being largest among the amphibia (Amphiuma 75 m.mm.).

The red blood-cells are mostly manufactured

in the marrow of the long bones. The chem¬

ical structure of the red cells is complex, but they contain an iron compound, haemoglobin,

which is the most important constituent of

the blood in the process of respiration and oxidation; by it the complex processes of chem¬

ical interchange in the body (metabolism) are made possible. Poisoning of the haemoglobin

and the loss of its function means death by asphyxia. The haemoglobin gives the reddish-yellow tinge to the blood, and the differences in shade between the venous blood and arterial blood are due to the state of oxidation of the haemoglobin.

White Cells — Leucocytes. — These are

much less numerous than the red cells, varying in number from 5,000 to 20,000 to the cubic millimetre. At least five different forms of white cells are normally present in human

blood. These are large and small lympho¬

cytes, polymorpho-nuclear neutrophiles, eosinophiles and transitional forms. Mast cells

are another form of varying occurrence. The polymorph neutrophiles are the most numer¬

ous of the leucocytes and make up the greater mass in pus-cells. In shape and size these white cells differ, but all are spherical, some smaller than the red cells (6.7 m.mm.) but mostly larger (about 10 m.mm.), and all have one or more nuclei. The leucocytes are formed in a number of lymphatic tissues, the haemo-lymph glands, the spleen, etc., and are among the most interesting of the constituents of the blood, since one of their chief functions is to protect the body from disease-producing micro¬

organisms. They may be aptly termed the

human body's <(army of the interior® in the fight with disease-causing agents. They are

useful both physically (by eating, as it were, the bodies of invading bacteria — phagocytosis, q.v.) or chemically (in the elaborating of cer¬

tain counter-poisons — antitoxins, q.v.) or in the manufacture of specific immunizing bodies for the blood-serurm (See Immunity). Their

careful study in diseased conditions is very helpful in arriving at a diagnosis of the disease process.

Blood Plates. — These are of frequent oc¬

currence, but as yet little is known of their function. They are thought to be globulin¬

like in their nature and of use in the phenom-106

enon of coagulation; others claim them as

nucleo-proteids, made from the white blood-cells.

Functions of the Blood. — ‘These, as al¬

ready indicated, are numerous. Through the

haemoglobin, blood is the great oxidizing me¬

dium. It carries products for anabolism and products of katabolism, and is the great equal¬

izer, by arterial pressure, of the osmotic pres¬

sures of all the cells of the body. As a means of defense in the struggle with parasitic in¬

vaders the blood is the most important of the body’s bulwarks. See Anemia; Bleeding;

Chlorosis ; Circulation ; Hemophilia ; Leu—

cemia; Pernicious Anemia.

Bibliography. — Bayliss, (General Physiol¬

ogy } ; Cabot, (Clinical Examination of the BloocP (New York 1904) ; Ewing, c Clinical

Pathology of the Blood) ; Schafer, (Physiology > (Vol. I, 1898) ; Starling, (Human Physi¬

ology.)

BLOOD, Avenger of, in Scripture, the

nearest relation of any one that had died by manslaughter or murder, so called because it fell to him to punish the person who was

guilty of the deed. In the political law of Israel the practice of punishment by the near¬

est relative, which had always been prevalent, was allowed to continue, while rules were laid down to prevent the chief abuses connected

with it. The distinction was sharply drawn

between murder and manslaughter. For the

former no ransom or satisfaction was permit¬

ted. In the case of the latter, however, there were six cities set apart out of the number which the Levites occupied, placed at suitable distances over the extent of the land, three on each side of the Jordan, with roads lead¬

ing to them which were well kept up, and

these were cities of refuge to which the man-slayer might flee and within which he might dwell in safety without fear of the avenger.

But he was not permitted to return to his own place; in fact, he had no safety, if he left his place of refuge, until the death of the high-priest during whose term of office his misfor¬

tune had occurred. See Cities of Refuge.

BLOOD, Circulation of. The highly dif¬

ferentiated and marvelously regulated circula¬

tory system in man furnishes striking evidence of evolutionary development in response to

growing complexity of environmental de¬

mands. Unicellular animals and the lowest

metazoa obtain from the surrounding fluid in which they live oxygen and nutritive material and excrete waste materials into it directly, the whole surface performing these functions.

The movement of the fluid is maintained by the movements of the cell or body of the ani¬

mal itself and by the influence of nutritive ab¬

sorption. In the Polypi the movement receives aid besides from the action of cilia on the inner walls of the body. The division of physiologi¬

cal labor in the more complex and differen¬

tiated metazoa requires a special circulatory mechanism and a fluid which contains more

specifically respiratory and nutritive elements.

Therefore in the three-layered animal a cir¬

culatory system was evolved within a celom

or body cavity. The fluid within this cavity is still, however, in some coelenterates merely water containing organic elements, but this

gradually acquires a greater diversity of ele¬

ments making for coagulability, more complete respiratory function and better fitting it for supplying varying tissues in their nutritive and excretory needs. It is only, however, in the vertebrates that the blood exhibits a constancy of composition and circulates in a completely closed system. Birds and mammals alone have reached a complete separation of the arterial and venous blood. The Arthropoda and Insccta have a circulatory system which consists of a pulsating heart which sends its current through the arteries into open spaces or la¬

cunae within the body cavity where the blood and tissues directly interchange their contents.

The muscular movements of the body help to return the blood into a venous sinus from

which it reaches the heart by slitlike aper¬

tures in the latter provided with valves. Dur¬

ing its course the blood passes through the renals and gills. Capillaries are found instead of the lacunae in the annelids, as the earth¬

worm. The Mollusca have the heart provided

with an auricle and a ventricle, as in the snail and whelk; two auricles, one on either side of the ventricle, as in the fresh-water mussel; or two auricles and two ventricles, as in the ark shells. Among the ascidians, which stand low ’in that division of animals to which the mollusks belong, the remarkable phenomenon

is encountered of an alternating current, which is rh}qhmically propelled for equal periods in opposite directions. All veriebrated animals, except Amphioxus, have a heart which in most fishes consists of an auricle and a ventricle, but in the mud fishes (Lepidosiren) there are two auricles and one ventricle ; and this trilocular heart is found in the amphibians and in most reptiles except the crocodiles, which, like birds and mammals, have a four-cham¬

bered organ consisting of two auricles and

two ventricles. In the crocodiles, however,

the two blood streams are not yet wholly sep¬

arated because of a communication between

the right aorta containing arterial blood and the left aorta containing venous blood. In

the trilocular hearts the two currents are

mixed in the single ventricle but a separation is gradually established by the extension of the ventricular septum wffiich finally completely divides the ventricle.

History. — The correct knowledge of the

circulation of the blood in the human organ¬

ism dates from the investigations and discov¬

eries of Harvey published in 1628. In reality the discovery of the circulation was a gradual accretion but it was Harvey who finally placed this knowledge upon an accurate basis, re¬

moving certain mistaken theories which were

still accepted and demonstrating at last the cir¬

culatory process. Galen's physiological teach¬

ings had long held sw^ay even though they had come to be considerably modified. This an¬

cient physiologist distinguished, as others had already done, arteries from veins and exploded the still older theory that the arteries con¬

tained air. The veins, he believed, had their origin in the liver, proceeding from it in twro great trunks ; the portal vein carrying to the liver the food absorbed from the alimentary canal which -was there converted into blood containing nutritive (<natural . spirits, ^ and the vena cava wdiich divided into an ascending and a descending branch. The blood w-as carried to the right side of the heart where commu-BLOOD

nicating pores in the septum united the two ventricles and where the action of the innate heat of the heart and the air obtained through respiration united to produce the ((vital spirits®

which make the blood fit for higher functions.

The veins further carried the crude blood in an ebb and flow from the right side of the heart for the lower nutritive functions, while similarly the purer arterial blood from the left side supplied to the tissues their vital func¬

tions. From this arterial blood in the brain <(animal spirits® were elaborated which were carried along the nerves to produce movements and the highest functions of the body.

This is the outline of the crude Galenic

doctrine, and Vesalius, brilliant anatomist that he was, was content to accept it, although there are evidences that he was very skeptical re¬

garding much of Galen's physiological teaching.

It was particularly from the anatomical side that he was most skeptical ; namely, because of the lack of tangible holes between the two sides of the heart, which were so important to the Galenists. His skepticism was taken up by his pupils and was also felt by others, one of them, Michael Servetus, who published a re¬

markable book, the (Restitutio Christianismi,*

in which a much truer conception of the cir¬

culation of the blood was taught. This was as early as 1553. He rejected entirely the ancient doctrines and had grasped the true doctrine of the pulmonary circulation, the passage of the blood from the right side through the lungs to the left side. Servetus, however, was a theologian more than a physician and his early death probably prevented his further studies.

Realdus Columbus, of Cremona, must be re¬

garded as another link in the chain that led up to the final solution. He is thought to have been a tricky man, however, and one who

would not hesitate to poach on another's pre¬

serves, and there are indications of his copy¬

ing much from Vesalius' works and claiming

them as his own. He was vain and ignorant, but in his book, (De Re Anatomica) (1559), he described correctly the plumonary circula¬

tion, but he was unable to draw from it the lessons that it implied. This, by many his¬

torians, is taken as evidence that he was only a copier, and that probably the work of Ser¬

vetus had been seen by him and he had claimed the discovery as his own. Ctesalpinus, a noted botanist, was the first to appreciate the fact that on the contraction of the ventricles (sys¬

tole) the blood was thrown into the aorta and into the pulmonary artery, and at its diastole it received the blood from the vena cava and the pulmonary vein. He also seemed to have grasped the fact of the flow of the blood from the arteries to the veins and of the flow along the veins to the heart. This was in 1571 and 1593. Thus C?esalpinus had a true suggestion of the idea both of the pulmonary and sys¬

temic circulations. But Caesalpinus' work

seems to have been lost sight of, and another, Hieronymus Fabricius, had the honor to open the next door that led to Harvey's triumph.

Fabricius called renewed attention to the valves in the veins, but missed their real function, and, although he was Harvey's teacher, he was more of a Galenist than a modern.

It is to William Harvey's credit, not so

much that he was the discoverer of the physi¬

ology' of circulation, — this, it can be seen from this brief recital, was of gradual accretion, —but that he was the first demonstrator of the process. He was the first physiological experi¬

menter, and his work on the living animal has opened up to the world most of its priceless gilts in the field of medicine. It was by the faithful and prolonged study of many hearts of many animals that showed him that —" the motion of the heart consists in a certain universal tension, both of contraction in the line of its fibres, and constriction in every sense, that when the heart contracts it is emptied, that the motion which is in general regarded as the diastole of the heart is in truth its systole — that the true work of the heart is not that it sucked blood in, but that it drove blood out.

Csesalpinus guessed at this, or may be knew it, but Harvey proved it, and, what is more, read the consequences. He saw clearly, then, the real function of the auricles and the ventricles and of their valves, and

he applied the lessons of the lesser, or pulmonary circulation, to the greater, or systemic circulation, and thus

rounded out the true natural history of the process. In his own words :

" I frequently and seriously bethought me, and long revolved in my mind, what might be the quantity of blood which was transmitted, in how short a time its passage might be effected, and the like; and, not finding it possible that this could be supplied by the juices of the ingested aliment without the veins on the one hand becoming drained, and the arteries on the other hand becoming ruptured through the excessive charge of blood, unless the blood should somehow find its way from the arteries into the veins, and so return to the right side of the heart, I began to think might there not be a motion, as it were in a circle.

Now this I afterward found to be true; and I finally saw that the blood, forced by the action of the left ventricle into the arteries, was distributed to the body at large, and its several parts, in the same manner as it is sent to the lungs, impelled by the right ventricle into the pulmonary artery, and that it then passed through the veins and along the vena cava, and so round to the left ventricle in the manner already indicated, which motion we may be allowed to call circular."

Thus clearly and forcefully he set forth in 1616 — although his work did not appear until 1628 — the true doctrine, and it is of interest to record that he lived to see it adopted practi¬

cally by all scientists. Malphigi, in 1661, dem¬

onstrated, by means of the microscope, the

capillaries, thus filling out the last link in the chain of evidence.

Mechanics of Circulation. — 'The closed

circulatory system in man consists of the

heart, arteries, capillaries and veins. The

heart is a muscular pump which beats regu¬

larly about 72 times a minute, thus forcing the blood with considerable velocity and force through the arteries and capillaries and back through the veins to enter the heart once

more and so complete the circuit. The mam¬

mal heart, as we have seen, has become a dou¬

ble organ and each side consists of two cham¬

bers, the auricles and ventricles.

The auricles are the smaller, less muscular portions of the heart, since their function is merely to receive the blood and transmit it to the ventricles. The walls of the left ventricle are four times the thickness of those of the right ventricle, since upon the left ventricle falls the work of propulsion for the entire systemic circulation, while the right ventricle has but to send the blood through the pul¬

monary vessels. The direction of the course of the blood through the heart is maintained by the presence and arrangement of valves

which guard the orifices between auricles and ventricles and the opening of the aorta and of 108

the pulmonary artery. The tricuspid valve, con¬

sisting of three flaps of fibrous tissue, guards the right auriculo-vcntricular opening, and the bicuspid or mitral valve, consisting of two flaps, guards the left. Near the base of attach¬

ment these flaps are tough and able to withstand the pressure of the blood, while at the edges they are thin and delicate and yield to the force of the current. When the blood has passed

into the ventricle they form by their perfect apposition an effective guard against return of the blood to the emptied auricle. The muscular attachments of the valves at the same time extend the diaphragm formed by their closing into the ventricle sufficiently to contract the

ventricular chamber and so assist in expelling the blood. A backward eddy of the blood in the ventricle maintains the closure of the valves.

Similar arrangement guards the proper closure of the aortic and pulmonary valves.

There are in reality two circulations, the

pulmonary and the systemic. The dark, venous blood returned from the circuit through the body, the systemic circulation, where it has be¬

come charged with waste products and other

impurities is poured into the right auricle. This contracts, the tricuspid valve opens and the blood is discharged into the right ventricle.

Here it remains a small fraction of a secon.d, when this ventricle contracts, the tricuspid valve closes and the blood is driven through the pul¬

monary artery into the lungs where it is spread out through the millions of capillaries distrib¬

uted throughout the lung tissue. Here it is freed from its carbon dioxide, oxygenated and then returned through the pulmonary vein into the left auricle. The contraction of the left auricle discharges this oxygenated blood through the mitral opening into the left ventricle, whose powerful contraction sends it into the aorta to perform its systemic circuit, which distributes it to the arteries supplying all parts of the body by their continuation through the arterioles which end in turn in the capillaries distributed throughout all the tissues. Here the blood

through the thin capillary walls comes into con¬

tact with the intermediary fluid known as the lymph, which fills all the tissue spaces through which by osmosis an interchange takes place.

The blood exchanges its oxygen and nutritive elements for the waste matter of the body and effects that transference of chemical substances from the organs in which they are produced to those others in any way depending on their activity. This includes the transmission

not only of the elaborated products of digestion but likewise the internal secretions or hormones, the importance of which is coming to recog¬

nition. From the capillaries, after exchange of products with the tissues through the lymph has taken place, the blood is collected by venules into the veins, which finally unite into the vena cava which carries the blood back to the right auricle. The contraction of both sides of the heart is a simultaneous one. It consists in reality of a wave of contractions passing over the heart muscle, the period of contraction be¬

ing known as the systole, while the intervening period of rest and relaxation is known as the diastole. The complete cycle of contraction

and relaxation with the circulation of the blood through the body occupies about 22 seconds, and occurs in the adult normally about 72 times in a minute. The audible sound on examination is due to the closing of the auriculo-ventricular valves and those at the entrance of the aorta and pulmonary artery. The pulse which can

be felt in various superficial localities is due to the expansion of the distensible arterial walls. The elasticity of the arterial walls is an important factor in regulating the original force of the blood flow. Their distension changes the intermittent propulsive flow into a more steady current, while their ready contractility after distension regulates the distribution of the blood stream to the various organs.

Pressure is gradually diminished until in the veins there is merely a uniform flow of the returning blood. The contraction of the heart muscles is due to a series of complicated nerv¬

ous mechanisms. The heart musculature mani¬

fests in its arrangement its development from an original muscular tube which, while it

has been modified into the separate chambers of the mammalian heart, has yet retained its continuity in the band of muscular fibres dis¬

covered by His (auriculo-ventricular bundle)

which allows the contraction impulse to proceed successively from the root of this bundle in the right auricle to the ventricles. The excitation of the heart muscle seems to be due to the molecular concentration of

the fluid which

bathes the tissue. The heart is also under the control of a special innervation which adapts it to conditions of the organism and to changes in the arterial resistance. The vagus nerve from the medulla oblongata exercises an in¬

hibitory function while sympathetic fibres run¬

ning from the upper dorsal region of the spinal cord exercise a stimulatory function. Sensa¬

tions arising in the heart are carried through the sympathetic ganglia and the upper thoracic region of the spinal cord where they are re¬

ferred to the sensory nerves of adjacent regions with which they come into relation, so that cardiac pain is not recognized as such but as sensation in these regions. The walls of the blood vessels are also richly supplied with nerves which regulate their tonicity and thus adapt them to the changing conditions of the body organism. These are the vasomotor

nerves and consist of the vasoconstrictors which exert a tonic effect and bring about a contrac¬

tion of the vessels and the vasodilator nerves, which as the name implies dilate the vessels.

The heart has its special system of blood supply in the coronary vessels, the blood entering the coronary arteries from the aorta and passing into capillaries which surround all the fibres.

See Arteries ; Blood ; Blood Pressure ; Capil¬

laries ; Heart; Veins.

Smith Ely Jelliffe.

BLOOD, Council of, the name popularly

applied to the Council of Troubles, established by the Duke of Alva, in the Netherlands, in 1567. Although it had no charter or authority from any source, it was omnipotent and super¬

seded all other authorities. In the first three months alone its victims numbered 1,800, and soon there was hardly a Protestant house in the Netherlands that had not furnished a victim.

BLOOD, Diseases of the. Blood is a

very complex substance, . it is even called a tissue. It has two essential parts, the plasma, composing 60 per cent, and the corpuscles, 40

per cent : the latter are not in solution but BLOCK SIGNAL SYSTEM

from the clockwork disc to the electro-pneu¬

matic semaphore; from the electro-pneumatic

semaphore to the enclosed disc; from the en¬

closed disc to the electro-gas semaphore ; and finally to the highly perfected electric motor semaphore.

The general features of the electro-pneu-

upper one, according to the general practice, is the “danger^ or home signal, is painted red and governs the section immediately ahead ;

the lower one is the ^caution® signal, is painted green (or yellow) and works in harmony with the <(dangerw signal of the next section. Each semaphore is operated by a cylinder three

HIGH TENSION PlH

{ GALVANIZED STEEL

HIGH TENSION PIN

GALVANIZED MALLEABLE IRON

LOW TENSION PIN

lj LOCUST

S7GNAI TRANSFORMER TAP CONNECTION

g38SS33SSa3SS033333S33O

TTPJCAL JOINT -HIGH TENSION ALUMINUM L/NE

Construction Details — Transmission Line

matic system are (1) a rail circuit with its batteries and relays; (2) an air compressor with its pipes to the signal posts; (3) the signal posts themselves with their arms, air cylinders and electrically-controlled valves.

Two semaphore signals are placed on a post about 50 feet to the rear of each section. The inches in diameter, fitted with a piston, the rod of which is so connected as to move the signal to its ˆclear® position when air pressure from the main pipe line is applied to the pis¬

ton, by means of the electric valves, that be¬

ing the position of the signals when the track is clear for the movement of trains. Each

vol. 4 — 7

as

signal blade carries an appropriately colored lens, which covers a light when the blade is in the horizontal position, showing red if it is the upper signal, and green (or yellow) if it is the lower signal. A white (or green) light is exposed when the signal is in position to indicate that the track is clear.

The electro-gas apparatus is similar to the electro-pneumatic, except that it employs com¬

pressed carbonic acid gas instead of air. This gas when compressed is far more elastic than air, and works with a livelier action.

The electric motor mechanisms are con¬

sidered by the most advanced signal engineers to be the best all around power devices. The one considerable difficulty in their use is the absolute necessity to keep them free from

moisture. In spite of this drawback, not yet overcome, many miles of road are protected

by them and with a high degree of satisfaction.

History. — The actual operation of the

block signal system dates from 1839 when the Great Western Railway, of England, first

telegraphed the arrival and departure of its trains from station to station for short dis¬

tances near London. In 1841, separate instru¬

ments were introduced for each direction of traffic, showing whether the sections were clear or blocked, and telegraph bells were installed.

In 1842, Sir W. F. Cooke, an English engineer, published a series of suggestions of the block system entitled (Telegraphic Railways } and

laid down the following principles : ((Every point of a line is a dangerous point, which ought to be covered by signals. The w'hole distance, consequently, ought to be divided into sections, and at the end as well as the begin¬

ning of them, there ought to be a signal, by means of which the entrance to the section is opened to each train when we are sure that it is free.®

The constantly increasing volume of busi¬

ness on railroads necessitated improved means for securing safety in operation, and in 1851

the South Eastern Railway of England devised the method of signaling by electric bells, by sound only, without the use of needle instru¬

ments. In 1854, separate instruments for each track, with three positions of the needle, were introduced, and later the bell code was used in connection therewith. In 1875, the Sykes system of block signaling was invented and

brought into extensive use, not only in Eng¬

land but also in the United States. In this system the outdoor signals at a block station were controlled by the signalman at the station in advance, by means of electrically-operated locks, the locking apparatus at the two stations being connected by an electric circuit. This effected a decided check against mistakes or carelessness, for while each signalman oper¬

ated his own signals, he could not operate them until they had been unlocked by the

signalman in advance, on request of the first signalman.

The advance has been continually toward

the point of reducing the human element in signaling to a minimum, the ultimate goal

being the strictly automatic operation of all running signals. The selection by a railroad of any particular type of signal system depends primarily upon its cost to install. The auto¬

matic is the most expensive to set up, but the least expensive to operate, and the trend is constantly toward expenditures which actually insure the road against heavy losses through accidents

Out of the 220,801 miles of railroad track on wrhich passenger trains were being operated in the United States on 1 Jan. 1916, 124,447

miles were protected by some form of block signals. Of this total, on 51,120 miles the sig¬

nals were of the automatic type, and on 73,327

miles they were of non-automatic types.

Bibliography. — (The Railroad Signal Dictionary) (New York 1911) ; Elliott, W. H., (The ABC of Railroad Signalling) (Chicago

1909) ; Latimer, J. B., c Raihvay Signalling ’

(Chicago 1908); Lewis, L. P., (Railway Signal Engineering* (London 1912) ; Pigg, J., (Signalling) (London n.d.) ; Scott, R., (Automatic Block Signals* (New York 1908) ; Webb, W.

L., (Railroad Construction (1913) ; and the annual reports of the Block Signal and Train Control Board of the Interstate Commerce

Commission.

Edward S. Farrow,

Consulting Civil and Military Engineer.

BLOCK TIN. An inferior variety of tin

in the form of blocks. When the metal is

reduced in a furnace it is poured into molds.

These ingots are later heated to the fusion point, the pure tin fusing first is drawn off, leaving the inferior quality which is n@w

melted at a higher temperature, poured into molds and called block tin.

BLOCKADE. The term blockade, prop¬

erly used, involves a state of war. The so-called pacific blockade is a form of reprisal or restraint short of war. A blockade is also distinct from domestic prohibition of inter¬

course or closure of ports. Blockade does not necessarily in later days have any relation to siege. In a general way, blockade is an attempt to cut off a port or coast of an enemy from maritime communication.

The idea as to what actually constitutes a blockade has varied according to the relation¬

ship of the belligerents and in different wars.

Prior to the 16th century blockades were some¬

times proclaimed when one belligerent wished to apprehend commerce bound for certain ports of the other belligerent. Gradually the idea became more clear owing to the development

of maritime commerce. A proclamation of

1630 mentions that it is in accord with ancient custom that neutral vessels and cargoes may be confiscated if going to, coming from or sail¬

ing near the enemy ports ((which are continu¬

ally held blocked by vessels of war at great cost.® There were many departures from the

principle set forth in 1630 and belligerents en¬

deavored to obtain the advantages of a blockade without assuming the

obligations of its main¬

tenance. Usually, till the latter part of the 18th century, the belligerents proclaimed and en¬

forced blockades somewhat arbitrarily, even

going so far as to interdict any commerce with an enemy.

The action of the northern states of Europe in the armed neutrality of 1780, which was later approved by France, Spain and Austria, served to modify the extreme claims of bellig¬

erents which had been developing. Article IV

of the declaration of the armed neutrality

stated “that in order to determine what char¬

acterized a blockaded port, that name should be accorded only to a port where by act of the power making the attack vessels anchored suf¬

ficiently near should make it dangerous to en¬

ter.® In 1800 Russia and Sweden agreed that a notification to the neutral vessel by the block¬

ading force was necessary in order to render the neutral vessel liable to penalty.

The recognition of neutral rights secured by the armed neutralities of 1780 and 1800 was not continued in the early years of the 19th

century, when by decrees and orders in coun¬

cil Napoleon and Great Britain tried to destroy all commerce. During the first half of the 19th century there was a tendency to extend the belligerent interference with commerce at the expense of neutrals. At times areas of great extent were declared blockaded and no considerable force was sent to maintain the blockade. In one case in 1816 the penalty of death by hanging at the yard-arm was men¬

tioned for the master or other principal officers of a vessel entering prohibited area. Against the extreme extension of the area of blockade President Monroe in 1816 protested, and in

following years other American Presidents pro¬

tested, in general endeavoring to secure large liberty for neutrals. Proclamations were is¬

sued by belligerents making the presence of military officers and merchants of the enemy on board, or presence within six miles of the coast with contraband on board evidence of

intention on the part of a vessel to violate a blockade. In 1825 Brazil proposed to require bonds from neutral vessels that they would not violate blockade. The United States replied

that (<A blockade must execute itself.® At¬

tempts were made to establish blockades which would allow ships of certain nationalities to pass while closing the ports to others and to continue a blockade for two months after the treaty of peace. While there were such great variations in proclamations, the differences in application of the principles were even greater.

There seems, therefore, as regards blockade, ample reason for the statement in the Declara¬

tion of Paris of 1856, signed by Austria, France, Great Britain, Prussia, Russia, Sardinia and Turkey, “That maritime law in time of war has long been the subject of deplorable disputes.®

It was the aim of this declaration to establish a “uniform doctrine® on certain points, among these, blockade. Accordingly the fourth article of the Declaration provides : “Blockades, in order to be binding, must

be effective — that is to say, maintained by a force sufficient really to prevent access to the coast of the enemy.®

The United States, China, Mexico and Spain

did not become parties to this declaration.

Questions soon arose in regard to the inter¬

pretation of this clause which it had been hoped would end many of the “deplorable disputes.®

Apparently to make the clause more clear the British Admiralty Manual added “or, at any

rate, to create evident danger to ships attempt¬

ing ingress or egress.®

The Civil War in the United States put

some of the doctrines in regard to blockade to the test. The French had generally maintained that liability for violation of blockade was con¬

ditioned upon notification of the blockade to a vessel approaching the line by a vessel of the blockading force. Great Britain and the United States had contended that a general

public notification was sufficient. These ideas were therefore in conflict. Questions were

raised as to the effectiveness of a blockade which depended upon the cooperation of shore batteries or upon the closing of certain navi¬

gable channels by the sinking of vessels, stones or other obstructions. The extent of coast line which might be blockaded effectively by such forces as the Northern States had at their dis¬

posal was in doubt. Great Britain in the case of the Helen in 1865 stated the British and American point of view at that time, saying, “There are several conditions to be observed in order to justify the seizure of a ship for breach of blockade. The blockade must be

effectual and (save accidental interruption by weather) constantly enforced. The neutral vessel must be taken in delicto. The blockade must be en¬

forced against all nations alike, including the belligerent one. When all the necessary con¬

ditions are satisfied, then, by the usage of nations, the belligerent is allowed to capture and condemn neutral vessels without remon¬

strance from the neutral state.® (1865, L. R.

1 A. & E. 1).

Certain principles became more definite

through the decisions in consequence of the Spanish-American War of 1898. As to the

number of vessels necessary, the Supreme Court of the United States said, “As we hold that an effective blockade is a blockade so effective as to make it dangerous in fact for vessels to at¬

tempt to enter the blockaded port, it follows that the question of effectiveness is not con¬

trolled by the number of the blockading force.

In other words, the position cannot be main¬

tained that one modern cruiser though suffi¬

cient in fact is not sufficient in law.® (The Olinde Rodrigues, 174 U. S. 510). It was also stated that a captured vessel was not in condi¬

tion to dispute the effectiveness of the force which captured her, and further it was thought “a sufficient compliance with the obligations of international law if the blockade made egress or ingress dangerous in fact.® In the Russo-Japanese War, 1904-05, the Japanese regula¬

tions provided that:

“Blockade is to close an enemy’s port, bay or coast with force, and is

effective when the force is strong enough to threaten any vessels that attempt to go in or out of the blockaded port or bay or to approach the coast.®

The duration of liability to capture had been subject to difference of opinion. Continental opinion has inclined to the side of liability only when taken in the act or when continu¬

ously pursued. British and American opinion

has made liability to begin upon departure on the voyage and to terminate with its comple¬

tion when the intent to violate a blockade is present, and if a vessel has escaped from a blockaded port the liability to capture continues until the vessel reaches her home port. An at¬

tempt was made by the International Naval

Conference of 1908-09 to reconcile in the Dec¬

laration of London these and many other dif¬

ferences of opinion upon details of instituting and maintaining a blockade. This naval con¬

ference represented the United States. Ger¬

many, Austria, Spain, France, Great Britain, Italy, Japan, Netherlands and Russia, the pow-100

crs especially concerned with the conduct of naval warfare. The conclusions were declared ((to correspond in substance to the generally recognized principles of international law.® The articles relating to blockade in the Declaration of London numbered 21 and embody what up

to August 1914, when war broke out in Europe, was regarded as a satisfactory statement of the law of blockade. These articles are as

follows: (<Article 1. A blockade must be limited to the ports and coasts belonging to or occupied by the enemy.

Art 2. In accordance with the Declaration of Paris of 1856, a blockade, in order to be bind¬

ing, must be effective — that is to say, it must be maintained by a force sufficient really to prevent access to the enemy coast.

Art. 3. The question whether a blockade is effective is a question of fact.

Art. 4. A blockade is not regarded as raised if the blockading forces are temporarily driven off by bad weather.

Art. 5. A blockade must be applied impar¬

tially to the ships of all nations.

Art. 6. The commander of a blockading

force may grant to a warship permission to enter, and subsequently to leave, a blockaded port.

Art. 7. In circumstances of distress, acknowl¬

edged by an authority of the blockading forces, a neutral vessel may enter a place under block¬

ade and subsequently leave it, provided that she has neither discharged nor shipped any

cargo there.

Art. 8. A blockade, in order to be binding, must be declared in accordance with article 9, and notified in accordance with articles 11 and 16.

Art. 9. A declaration of blockade is made

either by the blockading power or by the naval authorities acting in its name.

It specifies —

(1) The date when the blockade be¬

gins ;

(2) The geographical limits of the

coast blockaded;

(3) The delay to be allowed to neu¬

tral vessels for departure.

Art. 10. If the blockading power, or the

naval authorities acting in its name, do not establish the blockade in conformity with the provisions which, in accordance with article 9

(1) and (2), must be inserted in the declara¬

tion of blockade, the declaration is void, and a new declaration is necessary in order to make the blockade operative.

Art. 11. A declaration of blockade is noti¬

fied—

(1) To the neutral powers, by the blockading power by means of a com¬ munication addressed to the govern¬ ments themselves, or to their represent¬ atives accredited to it.

(2) To the local authorities, by the officer commanding the blockading force. These authorities will, on their part, inform, as soon as possible, the foreign consuls who exercise their functions in the port or on the coast blockaded.

Art. 12. The rules relative to the declara¬ tion and to the notification of blockade are applicable in the case in which the blockade may have been extended or may have been re¬ established after having been raised.

Art. 13. The voluntary raising of a block¬ ade, as also any limitation which may be intro¬ duced, must be notified in the manner pre¬ scribed by article 11.

Art. 14. The liability of a neutral vessel to capture for breach of blockade is contingent on her knowledge, actual or presumptive, of the blockade.

Art. 15. Failing proof to the contrary,

knowledge of the blockade is presumed if the vessel left a neutral port subsequently to the notification of the blockade made in sufficient time to the power to which such port belongs.

Art. 16. If a vessel which approaches a

blockaded port does not know or cannot be

presumed to know of the blockade, the notifi¬

cation must be made to the vessel itself by an officer of one of the ships of the blockading force. This notification must be entered in the vessel's log book, with entry of the day and hour, as also of the geographical position of the vessel at the time.

A neutral vessel which leaves a blockaded

port must be allowed to pass free if, through the negligence of the officer commanding the blockading force, no declaration of blockade has been sent to the local authorities, or if, in the declaration as notified, no delay has been indicated.

Art. 17. The seizure of neutral vessels for violation of blockade may be made only wfithin the radius of action of the ships of war as¬

signed to maintain an effective blockade.

Art. 18. The blockading forces must not bar access to the ports or to the coasts of neutrals.

Art. 19. Whatever may be the ulterior des¬

tination of the vessel or of her cargo, the evi¬

dence of violation of blockade is not sufficiently conclusive to authorize the seizure of the ves¬

sel if she is at the time bound toward an un¬

blockaded port.

Art. 20. A vessel which in violation of

blockade has left a blockaded port or has at¬

tempted to enter the port is liable to capture so long as she is pursued by a ship of the block¬

ading force. If the pursuit is abandoned, or if the blockade is raised, her capture can no *

longer be effected.

Art. 21. A vessel found guilty of violation of blockade is liable to condemnation. The

cargo is also liable to condemnation, unless it is proved that at the time the goods were shipped the shipper neither knew nor could

have known of the intention to violate the blockade.®

At the outbreak of the European War in

1914 the above articles were practically con¬

tained in the regulations of the belligerents, and certain blockades were proclaimed and

maintained in accord with these articles. One of the earliest of these proclamations was is¬

sued by Great Britain on 23 Feb. 1915, declar¬

ing the coast of German East Africa between certain points under blockade from midnight

28 February-1 March and allowing four days

of grace for departure of neutral vessels from the blockaded area. Similar proclamations

were issued for the Cameroons on 24 April

1915, and for the coast of Asia Minor on 1 June 1915.

The British and French proposed, in a note BLOCKHOUSE

BLODGETT

101

of 1 March 1915, in retaliation for the war zone proclamation of Germany, to take meas¬

ures wto prevent commodities of any kind from reaching or leaving Germany.® Under these

measures, it was said, <lThe British and French governments will therefore hold themselves

free to detain and take into port ships carry¬

ing goods of presumed enemy destination, own¬

ership or origin. It is not intended to con¬

fiscate such vessels or cargoes unless they would otherwise be liable to confiscation.® Of this proposition the United States government, in a note of 5 March 1915, said: ((The first sentence claims a right pertaining only to a state of blockade. The last sentence proposes a treatment of ships and cargoes as if no block¬

ade existed. The two together present a pro¬

posed course of action previously unknown to international law.® Other correspondence fol¬

lowed upon this so-called blockade measure.

The United States, in a long note of 21 Oct.

1915, asserted that (<It is incumbent upon the United States government, therefore, to give the British government notice that the blockade which they claim to have instituted under the Order in Council of 11 March cannot be rec¬

ognized as a legal blockade by the United

States.® The reasons given were that the

British measures did not constitute (<a blockade in law, in practice or in effect.® Referring to the American contention that the British block¬

ade of Germany was not effective because Ger¬

man ports were open to Scandinavian trade,

the British note of 24 April 1916 advances the proposition that ((even if these measures were judged with strict reference to the rules appli¬

cable to blockades, a standard by which, in their view, the measures of the Allies ought not to be judged, it must be remembered that the

passage of commerce to a blockaded area across a land frontier or across an inland sea has never been held to interfere with the effectiveness of the blockade.® In the preceding paragraph, the same note says, ((that the rules applicable to a blockade of enemy ports are strictly followed by the Allies in cases where they apply, as, for instance, in the blockades which have been de¬

clared of the Turkish coast of Asia Minor, or the coast-line of German East Africa.® In the practice in regard to continental Germany there is therefore admittedly a claim to extension of rights which at the outbreak of the war were not regarded as belonging to belligerents en¬

gaging in blockading operations. Of this Prof.

Sir Erie Richards has said ((It is certain that the rights with regard to blockade must be extended if the right is to continue.® The United States has, however, in objecting to innovations in practice during war said, <(It is of the highest importance to neutrals, not only of the present day but of the future, that the principles of international right be maintained unimpaired.® See Armed Neutrality; Decla¬

ration of London; International Law;

Merchant Vessels, Neutral, Rights of;

Neutrality; War, European.

George Grafton Wilson,

Professor of International Law, Harvard Uni¬

versity.

BLOCKHOUSE, in fortification, a house

made of beams joined together crosswise, and often double, with a covering and loopholes, large enough for from 25 to 100 men. In ad¬

dition to this, it is commonly covered with earth, to render it entirely bomb-and fire¬

proof. Forts of this kind are often fitted up to receive cannon. Blockhouses are gener¬

ally built in the form of a square or a cross.

Their use is to afford a feeble garrison of an important place, which is very much exposed, an opportunity of holding out against the

cannonade and assault of the enemy till they are relieved. They also serve for bombproof guardhouses and places of last resort, in the interior of intrenchments and in the covered passages of fortresses, where the cannon are stationed. Blockhouses were much employed

as a defense against Indians in America, by the French in Algeria and

by the Spanish in Cuba, where a line of blockhouses connected by wire barricades was built across the island in 1898. See Fortification.

BLOCKS OF FIVE, a political expres¬

sion in the United States, originating in the presidential campaign of 1888. A letter pur¬

porting to have been written by the treasurer of the Republican National Committee to the chairman of the Indiana State Committee,

recommending securing ((floaters ‘in blocks of five.® This was construed to mean the bribery of voters at wholesale rates. The Democratic managers circulated the letter as widely as possible, before election. Proceedings for

libel were afterward begun, but never brought to trial.

BLOCKSBERG, the name of several ele¬

vations in Germany, particularly the Brocken, forming the summit of the Hartz Mountains

and the highest point in the northern part of the empire. In old legends the Brocken is

the haunt of the witches, who there celebrated with orgies the first of May, Walpurgisnacht.

See Wai.purga.

BLODGET, Lorin, American statisti¬

cian: b. near Jamestown, N. Y., 25 May 1823; d. Philadelphia, 24 March 1901. He was edu¬

cated at Hobart College ; appointed assistant professor at the Smithsonian Institution,

Washington, D. C., in charge of researches on climatology, 1851 ; was employed on the Paci¬

fic Railroad survey for the War Department, 1852-56; and was engaged in the United States Treasury Department, 1863-77. He was also

editor of the Philadelphia North American,

and secretary of the board of trade of that city, 1858-64. He is credited with having laid the foundation of American climatology. His

publications include (The Climatology of the United States) (1857), a work that met high favor in the United States and Europe; Com¬

mercial and Financial Resources of the United States 5 ; and about 150 volumes of reports on finance, industrial progress and kindred

subjects.

BLODGETT, Henry Williams, Ameri¬

can jurist: b. Amherst, Mass., 21 July 1821; d.

Waukegan, Ill., 9 Feb. 1905. He was educated at Amherst Academy; studied surveying and

engineering; was admitted to the bar in 1844; and settled in Waukegan, Ill., to practice, in the following year. He served in the lower house of the legislature, 1852-54, and in the State senate, 1859—65 ; and was United States district judge for the Northern District of Illinois, 1869-93, when he retired. He was

appointed one of the counsel on the part of the United States before the arbitration tri¬

bunal on the Bering Sea fur-seal controversy between the United States and Great Britain, in 1892.

BLODGETT, Samuel, American inven¬

tor: b. Woburn, Mass., 1 April 1724; d. Haver¬

hill, Mass., 1 Sept. 1807. He took part in the French and Indian War; was a member of the expedition against Louisburg in 1745; and sub¬

sequently became a judge of the Court of

Common Pleas in Hillsboro County, N. H.

He was the inventor of an apparatus by which he recovered a valuable cargo from a sunken ship near Plymouth, Mass., in 1783. His suc¬

cess led him to go to Europe for similar en¬

terprises. He met with no encouragement in

Spain, and in England proposed to raise the Royal George, which went down off Spithead

with 800 persons on board, but his proposition was not accepted. In 1793 he began the con¬

struction of the canal around Amoskeag Falls in the Merrimac, but did not live to complete the work.

BLOEMAERT, bloo'mart, or BLOM,

Abraham, Dutch painter : b. Gorkum, 25 Dec.

1564; d. Utrecht, 27 Jan. 1647, or more prob¬

ably 1657. He came to Paris about 1580 and there studied under Herry, Bassot and Franck.

After spending some time in Amsterdam,

where his father had become city architect, he settled at Utrecht in 1595. After 1600 he was prominent in Saint Luke's Guild of that city.

Up to an advanced age he continued to teach painting, to paint and to engrave. His paint¬

ings are reproached with various faults, yet he is distinguished by the brilliancy of his coloring and the richness of his invention. He painted all sorts of objects, but his landscapes are the most esteemed. Consult Van Mander,

(Le Livre des peintres) (1885). He had four sons, of whom Cornelius (b. Utrecht 1603;

d. Rome 1680), was a distinguished engraver.

BLOEMEN, Jan Frans van, Flemish

painter : b. Antwerp, 12 May 1662 ; d. Rome 1748. At first he studied under Gouban, was attracted to Italy and there came under the influence of Claude Lorrain and Dughet. He

was surnamed ˆOrizzonte,® an allusion to the great beauty of the coloring he put into his landscapes.

BLOEMEN, Pieter van, Flemish painter,

brother of Jan Frans: b. Antwerp 1651; d.

1720. He was made apprentice in 1667 ; be¬

coming master in 1674, he set out for Rome where he remained for 20 years and where he received the surname of ˆStandaart.® Re¬

turning to his native city he was appointed dean of the Guild of Saint Luke there. His work is chiefly landscapes and military sub¬

jects.

BLOEMFONTEIN, bloom'fon-tln, Or¬

ange River Colony, South Africa, the chief

town and seat of government of the colony, 680 miles northeast of Cape Town, situated

in an elevated and healthy region. It stands on a plain surrounded by

low hills, and is reg¬

ularly laid out, having a large market-square in the centre. It has several fine buildings, including the Anglican cathedral, the Dutch

Reformed church and other places of worship ; the presidency; the town-hall; the post office; the library; the national museum; the new

Raadzaal, or council-chamber of the legisla¬

ture; the old Raadzaal; Grey College and Saint Andrew's College for boys; the Eunice Insti¬

tute for girls ; a government hospital and a cottage hospital ; a lunatic asylum, *etc.* It is on the main railway line of the Colony, which is continuous with the Cape Colony and Trans¬

vaal systems. In the war between Great

Britain and the South African and Orange

Free State republics in 1899-1902 it was the seat of important military operations. In June 1899, a conference was held here between

President Kruger of the South African repub¬

lic and Sir Alfred Milner, the British Com¬

missioner of Cape Colony, with a view of

averting war. After the appointment of Lord Roberts to the supreme command of the Brit¬

ish forces operating against the Boers, he led an expedition against the city and forced its surrender on 13 March 1900. Soon afterward

the republic was formally placed under Brit¬

ish administration, and it is now a part of the Union of South Africa. It is a centre of

trade which consists mainly of wool. The in¬

dustries include manufactories of aerated

waters, salt, flour mills and breweries. Pop.

about 15,000, half being whites.

BLOIS, blwa (anciently Blesum), France,

the capital of the department of Loir-et-Cher, 99 miles south-southwest of Paris, situated on the right bank of the Loire, from which it rises in the form of an amphitheatre. It con¬

sists of an upper town, with very narrow

and crooked streets ; a lower town, with

many handsome houses, extending along a

handsome quay; and of several suburbs,

with one of which it communicates by a

stone bridge of 11 arches. The city is fur¬

nished with spring water through an old

Roman aqueduct, in excellent preservation.

Thierry, the historian, was born here. The

castle of Blois is rich in historical associa¬

tions. It was long occupied by the counts

of the name, and became a favorite resi¬

dence of the kings of France. Louis XII was born, Francis I, Henry II, Charles IX and

Henry III held their courts in it; and the Guises, by a cruel though not unjust retribu¬

tion, were murdered in it. When Maria de

Medici was, in 1617, exiled from the court, she resided, probably as a prisoner, in this castle, whence, 18 months later, she escaped through a high window, which is also an object of curiosity. In 1814, on the approach of the European armies to Paris, the Empress Maria Louisa

and the council of regency repaired

for a while to this place. Afterward the castle was entirely neglected and even used as bar¬

racks for cavalry. During the later years. of Louis Philippe's reign, this curious specimen of architecture was carefully and tastefully restored. Blois has several literary and scien¬

tific societies, a botanical garden founded by Henry IV, a public library with 19,000 vol¬

umes, a departmental college and a diocesan seminary. It trades in wines, spirits, vinegar, staves and licorice, while it produces serges, hosiery and gloves, boots, shoes, biscuits, fur¬

niture, machinery, earthenware, cutlery and

hardware, and there are tanneries, foundries and vinegar works. Pop. (1911) 23,995. Con¬

sult Le Nail, (Le Chateau de Blois) (Paris 1874) ; Bournon, (Blois, Chambord et les

chateaux du Blesois) (Paris 1908).

BLOK, blok, Alexander Alexandrovich,

Russian poet and man of letters: b. Petrograd 1880. He is the son of Alexander Lev Blok, professor of political science at the University of Warsaw. He received his edu¬

cation at the University of Petrograd. His

first poems (Novi Puti > ((New Roads') and

‘Syeverny Tzveti’ (‘ Flowers of the North’)

appeared in 1903 and were exceedingly well

received. Of his collective works the verses about the ‘Beautiful Lady’ (1905), (Snow

Mask* (1907), Unexpected Joy’ (1907) an¬

nounced a virile poet with an extremely com¬

pound soul. His lyric dramas ‘Balaganchik,’

(The King on the Market,’ (The White

House,’ ‘The Song of the Fates,’ etc., showed a further development of his unusually vivid imagination. Blok’s poetry represents some¬

thing entirely new in Russian literature ; his romantic lyricism has created new types, new shadows, a new world of sphinxes moving

about during the white nights on the celebrated Nevski Prospect in Petrograd. His is often

called by the contemporary critics a “somnam-bulant” or <(lunatic” whose visions are different from those of any other ordinary mortal.

However, his powerful verses, his unique

figures of speech and his wonderful discovery of a new magic in the Russian language have deserved for him a high place in the contem¬

porary history of literature. Yet his dramas lack action and the dialogues in them are not as sparkling as his lyric verses. They are often too superficial to be called dramas, for

there is no idee maltresse in them nor a cohe¬

sive unity of action.

BLOMFIELD, Charles James, English

divine: b. Bury-Saint-Edmunds, Suffolk, 29

May 1786; d. Fulham, 5 Aug. 1857. He studied for the Church at

Cambridge, where he took high honors ; and after filling several curacies, and acting for a time as chaplain to the bishop of London, was presented to the rectory of Saint Botolph, Bishopsgate. In 1824 he was

made bishop of Chester, and in 1828 bishop of London. He acquired considerable renown as

a classical scholar from the editions published by him of several of the dramas of vEschylus, and he also published an edition of Callimachus, which is much esteemed. Along with Rennel,

he edited, in 1812, the (Musae Cantabrigienses,'

and in 1814, along with Monk, the (Posthumous Tracts' of Porson, followed two years after¬

ward by the (Adversaria Porsoni.' In his

ecclesiastical capacity he displayed great

zeal and energy, more churches having been

built in London under his episcopate than

under that of any bishop since the Reforma¬

tion. He incurred, however, some animadver¬

sions on his proceedings in relation to the Tractarian controversy by a vacillating policy, which gave satisfaction to neither of the

parties. Consult the biography by Blomfield

(London 1863), and that by Biber (ib., 1857).

BLOMFIELD, Edward Valentine, Eng¬

lish clergyman (brother of the preceding) : b.

14 Feb. 1788 ; d. 3 Oct. 1816. He studied at Caius College, Cambridge and excited the high¬

est expectations. Among several prizes which he gained was a medal assigned him in 1809 for his beautiful ode (In Desiderium Porsoni.' In

1812 a fellowship in Emmanuel College was

conferred on him, those of his own college be¬

ing full. In 1813 he visited Germany, where he acquired a good knowledge of the German

language, and became acquainted with Wolf

in Berlin, and Schneider in Breslau. After

his return he wrote in the ‘ Museum Criticum,’

or ‘Cambridge Classical Researches,’ remarks

on German literature which were received with approbation. The University of Cambridge ap¬

pointed him one of the preachers of Saint

Mary’s Church. He began a translation of

Schneider’s ‘Griechisch-Deutches Lexicon,’ but did not live to finish it. Matthiae’s ‘Griechische Grammatik, ’ however, he translated completely.

His translation was published by his brother and was everywhere well received. He was

in Switzerland in 1816 with his pupil, a young nobleman, and in his haste to return to Cam¬

bridge on hearing that he was appointed proctor for the following year, the fatigue of rapid traveling occasioned a sickness of which he died.

BLOMFIELD, Reginald, English archi¬

tect : b. 20 Dec. 1856. He was educated at Exeter College, Oxford. Among his many im¬

portant professional works are ‘Brocklesby

Park,' 'Caythorpe Court,' 'Holbrook House,'

'New Buildings at Haileybury College,' 'Lady Margaret Hall,' 'Portsea Institute.' He has

published 'The Formal Garden in England'

(1892); 'A History of Renaissance Architec¬

ture in England' two works of great value

(1897); 'Short History of Renaissance Archi¬

tecture in England' (1900) ; 'Studies in Archi¬

tecture' (1906) ; 'The Mistress Art' (1908) ; 'Architectural Drawing and Draughtsmanship'

(1912).

BLOMMAERT, blom-mart, Philipp, Flem¬

ish philologist: b. Ghent about 1809; d. 1871.

He did much for the literature of his country by an edition of the old Flemish poets of the 11th, 12th, 13th and 14th centuries, with glos¬

saries, notes and emendations. He also re¬

published the 'Nibelungenlied,' translated into Dutch iambics. His best work, however, is the 'Aloude geschiedenis der Belgen of Neder-duitschers, ' in which he vindicates the claims of his country to an independent national ex¬

istence and national literature. Blommaert also wrote French well, and was a contributor to the Messager des Sciences Historiques.

BLOMMAERT, Samuel, colonial patroon :

b. 1590; d. 1670. He bought of the Indians a tract of land almost equal in size to the present State of Delaware, extending from Cape Hen-lopen to the mouth of the Delaware River. The deed for this land given him by Peter Minuit and his Council at Fort Amsterdam in 1630

is the oldest deed for land in Delaware. He formed a company to provide for the settle¬

ment of this land, and a colony was started named Swaanendale, but destroyed by the In¬

dians after a few years in revenge for an act of the governor, Gillis Hosset.

BLOND, Jacques Christophe le, German

printer of engravings: b. Frankfort-on-the-Main 1670; d. Paris 1741. He studied in Italy and lived some years in Amsterdam as a

painter of miniatures, and later of larger por¬

traits. He then came to England. He con¬

ceived the idea of an establishment to print engravings in colors according to the Lostman method of copperplate reproduction of mezzo-104

tints, and, obtaining means, produced many

copies of engravings and pictures, which of course had defects, and the experiment failed.

He now devoted himself to producing the car¬

toons of Raphael in tapestry, but this failed also, and he soon after died miserably in a French hospital.

BLONDEL, a confidential servant and in¬

structor in music of Richard Coeur de Lion of England, about the year 1190. While his master was the prisoner of the Duke of Aus¬

tria, Blondel went through Palestine and all parts of Germany in search of him. He under¬

stood, it is said, that a prisoner of rank was confined in Durrenstein Castle, and hastened hither. Placing himself under a grated tower, he began to sing one of the French lays which he had formerly composed for Richard. Scarce¬

ly had he finished the first stanza when a voice from the dungeon of the tower responded.

Thus he discovered his King, returned with all speed to England, obtained Richard's ransom

and gained the name of the "faithful Blondel.®

Gretry's fine opera, (Richard Cceur de Lion,*

is founded on this anecdote. The earliest trace of this legend occurs in the (Chronicle of Rheims) (13th century). No mention of it is found in Blondel's acknowledged poems (Vol.

XIX of Tarbe's ed.), Collection des pogtes

<Champenois) (Rheims 1862).

BLONDEL, David (1596-1655), a noted

French Protestant clergyman. In 1650 he suc¬

ceeded J. G. Vosius in the professorship of his¬

tory in Amsterdam. In this position he under¬

took deep researches. His works are many.

In some of them he shows a remarkable critical faculty, as, for instance, in his dissertation on Pope Joan (1647-57) in which he came to the conclusion, now universally accepted, that the whole story is a mere myth. His keen critical sense and his power of deep thought made him iconoclastic in other directions, so that he ex¬

cited considerable Protestant indignation, and became, for a time, very unpopular on account of this work on the Pope.

BLONDIN, blon-dan, Charles (real name

Jean Franqois Gravelet), French acrobat; b.

Saint Omer, Pas-de-Calais, 1824; d. Ealing,

London, 22 Feb. 1897. He was trained at

Lyons, where he made such rapid progress

that he was designated ((The Little Wonder.®

After making a several years' tour of the United States, on 30 June 1859, before a crowd of 25,000 .persons, he crossed the Falls of Niagara on a tight-rope in five minutes; on 4 July he crossed blindfold, trundling a wheelbarrow ; on 19 August he carried a man on his back; on 14

Sept. 1860 he crossed on stilts in the presence of the Prince of Wales. His engagement at the Crystal Palace in 1862, where he performed on a rope 249 yards long and 170 feet from the ground, drew immense crowds. After several

years' retirement he reappeared in 1880, and in 1888 again visited the United States. When the New York city authorities refused him

permission to perform in Central Park, he

gave a series of exhibitions on Staten Island, performing many extraordinary feats, such as carrying a stove to the centre of the line and making an omelet on it. Later in the same year he performed in London. His final per¬

formance was given at Belfast in 1896.

BLONDIN, Pierre Edouard, Canadian

statesman: b. Saint Frangois du Lac, county of Yamaska, 14 Dec. 1874. He was educated at

the Seminaire de Nicolet and Laval University, Montreal, and was admitted a notary in 1910, and served as an alderman for Grande Mere.

He was elected to the House of Commons for the county of Champlain in 1908 and became prominently identified with the Nationalist wing of the Conservative party; was appointed

deputy speaker in 1911, Minister of Inland

Revenue in 1914 and Secretary of State in 1915; Postmaster-General on 8 Jan. 1917, from which office he resigned 21 March of the same year in order to raise a French-Canadian regiment for service overseas. His resignation, however,

was not accepted.

BLOOD, Thomas, English adventurer,

better known as Colonel Blood: b. about 1618, probably in Ireland; d. Westminster, 24 Aug.

1680. He was the son of a blacksmith in easy circumstances; of his early life little is known, except that he took the Parliamentary side in the Irish rebellion. Having visited England

about 1648, Blood married a Miss Holcroft of Lancashire and returned to Ireland. He was

made a justice of the peace by Henry Crom¬

well and had large assignments of land as pay¬

ment for his services and zeal. At the Restora¬

tion he was deprived of the lands and in re¬

prisal he associated with such of the Crom-wellians as were ripe for insurrection. Two of their designs were to surprise Dublin Castle and to seize the person of the lord-lieutenant, James Butler, Duke of Ormonde. Blood was

at the head of these enterprises, planned for 9

or 10 March 1663. Betrayed by one of his as¬

sociates, he managed to escape, although his chief accomplices were

seized and executed.

He made a bold attempt to rescue them. He eluded pursuit by fleeing to the remote moun¬

tain fortresses of Ireland and at last, when the danger became urgent, he quitted Ireland, and crossed to Holland, where he found a welcome among the disaffected sectaries. His daring

spirit prompted him to return to England,

where he associated with the Fifth Monarchy men. Seeing little chance for the furtherance of his schemes, he removed to Scotland and joined the Covenanters in their revolt, remain¬

ing with them till after the defeat at Pentland Hills in November 1666. Four years later

Blood, with five companions, waylaid the

Duke of Ormonde in Saint James street and

tied him on horseback to one of the desper¬

adoes. Nothing less was intended than to hurry the Duke to Tyburn, and there hang him in re¬

quital of his having hanged others. The

Duke's attendants raised the alarm and

rescued their master after he had unhorsed his riding companion and was struggling with him on the ground. On 9 May 1671 Blood made his great attempt to steal the crown jewels. Dis¬

guised as a clergyman and with three accom¬

plices he entered the tower and succeeded in overpowering the keeper, Edwards, and in

carrying off the jewels. They were immediately pursued, seized and thrown into jail. Instead of being executed for this attempt he met re¬

ward, being saved by his audacity. Blood

refused to make confession except to the King himself, and Charles, at the suggestion of

Buckingham, who was accused of having hired BLOOD

Blood to make the attempt on Ormonde, vis¬

ited Blood in prison. Blood threatened that his confederates would avenge his death, secured a pardon from Charles, together with his for¬

feited Irish estates of £500 annual value, and seemed to have interest at court, being often seen in the presence-chamber. Before long he quarreled with his protector, Buckingham, fell under accusation of conspiring to have him

charged with an atrocious crime and was com¬

mitted to prison. It is probable that it was a trick to ruin him. He found bail and returned to his home in Westminster. His health was broken and he died after an illness of 14 days.

He was buried at Tothill Fields. Rumors being circulated that it had been a sham funeral to keep the living man hidden, his body was ex¬

humed and identified. Scott introduces Blood in (Peveril of the Peak.* Consult Seecombe, (Twelve Bad Men* (New York 1896).

BLOOD, the bright red to very dark red

alkaline fluid that circulates through the heart, arteries and veins, carrying nutriment and oxy¬

gen to the bodily tissues, and conveying away from them waste material. The composition

and character of the blood varies very widely in different animals, and hence this description is confined more particularly to the human

blood. From the standpoint of cell-structure the blood is a tissue made up of a liquid plasma and solid cells or corpuscles. It contains at least four separate and important ingredients, the plasma, or blood serum ;

red cells, or erythrocytes ; white cells, or leucocytes ; and blood plates. About one-tenth to one-twelfth of the entire body is blood, of which nine-tenths is water.

Plasma.— The greater portion (56 per

cent) of the blood is plasma. This plasma is composed of 90 per cent water containing

gases, mineral salts, fats, nitrogenous bodies and carbohydrates in solution. It is a clear yellowish fluid. The mineral salts are sodium chloride, common salt, the most abundant ;

sodium carbonate, which renders the blood

alkaline ; potassium chloride, potassium sul¬

phate, calcium phosphate, sodium phosphate,

magnesium phosphate and calcium chloride.

Traces of other inorganic salts are fre¬

quently found. The gases in the blood plasma are oxygen, nitrogen and carbon dioxide. Of the organic constituents the non-nitrogenous

ones are the fats and carbohydrates, with small amounts of fatty coloring matters, lipochromes, cholesterin and sarcolactic acid. The fats are present in variable quantities, being particularly abundant following a meal. They, are the

glycerides of stearic, oleic and palmitic acids.

The carbohydrates are at least three, glycogen, dextrose, or grape sugar, and animal gums.

The non-protend nitrogenous constituents of

the plasma consist largely of the waste extrac¬

tives. The most important of these are urea, kreatin, kreatinin, uric acid and hippuric acid.

Three ferments or enzymes are thought to be present in the plasma — a diastatic ferment, converting starches into sugars ; a glycolytic

enzyme, breaking up sugar, and a lipase, or fat¬

splitting enzyme. In addition, there is the fer¬

ment that causes coagulation. Whether this is present in the serum or in the white cells is a matter of inquiry. The proteids of the plasma are serum albumins, globulins (serum globulin and fibrinogen) and nucleo-proteids.

Red Cells. — These are the most abundant

of the formed elements of the blood, making up 99 per cent of the corpuscles. There arc thought to be in man as least 5,000,000 red blood-cells to everv cubic millimetre of blood; their size, therefore, is very small, averaging in man 7.8 m.mm. They are flattened circular discs, with double depressed centres, one-fourth as thick as broad. In the embryo and in cer¬

tain diseased states the red blood-cells have a nucleus, but the normal red blood-cell in man has lost this cell structure. Practically all of the mammals, save the camel tribe, have circu¬

lar red blood-cells; the camels and most of the lower animals have oval red blood-cells ; in the lower animals they are mostly nucleated.

There is also great variation in size in the red cells of the various animals, being largest among the amphibia (Amphiuma 75 m.mm.).

The red blood-cells are mostly manufactured

in the marrow of the long bones. The chem¬

ical structure of the red cells is complex, but they contain an iron compound, haemoglobin,

which is the most important constituent of

the blood in the process of respiration and oxidation ; by it the complex processes of chem¬

ical interchange in the body (metabolism) are made possible. Poisoning of the haemoglobin

and the loss of its function means death by asphyxia. The haemoglobin gives the reddish-yellow tinge to the blood, and the

differences in shade between the venous blood and arterial blood are due to the state of oxidation of the haemoglobin.

White Cells — Leucocytes. — These are

much less numerous than the red cells, varying in number from 5,000 to 20,000 to the cubic millimetre. At least five different forms of white cells are normally present in human

blood. These are large and small lympho¬

cytes, polymorpho-nuclear neutrophiles, cosi—

nophiles and transitional forms. Mast cells

are another form of varying occurrence. The polymorph neutrophiles are the most numer¬

ous of the leucocytes and make up the greater mass in pus-cells. In shape and size these white cells differ, but all are spherical, some smaller than the red cells (6.7 m.mm.) but mostly larger (about 10 m.mm.), and all have one or more nuclei. The leucocytes are formed in a number of lymphatic tissues, the haemo-lymph glands, the spleen, etc., and are among the most interesting of the constituents of the blood, since one of their chief functions is to protect the body from disease-producing micro¬

organisms. They may be aptly termed the

human body's ((army of the interior** in the fight with disease-causing agents. They are

useful both physically (by eating, as it were, the bodies of invading bacteria — phagocytosis, q.v.) or chemically (in the elaborating of cer¬

tain counter-poisons — antitoxins, q.v.) or in the manufacture of specific immunizing bodies for the blood-serum. (See Immunity). Their

careful study in diseased conditions is very helpful in arriving at a diagnosis of the disease process.

Blood Plates. — These are of frequent oc¬

currence, but as yet little is known of their function. They are thought to be globulin¬

like in their nature and of use in the phenom-106

enon of coagulation; others claim them as

nucleo-proteids, made from the white blood-cells.

Functions of the Blood. — ‘These, as al¬

ready indicated, are numerous. Through the

haemoglobin, blood is the great oxidizing me¬

dium. It carries products for anabolism and products of katabolism, and is the great equal¬

izer, by arterial pressure, of the osmotic pres¬

sures of all the cells of the body. As a means of defense in the struggle with parasitic in¬

vaders the blood is the most important of the body’s bulwarks. See Anemia; Bleeding;

Chlorosis; Circulation; Hemophilia; Leu¬

caemia; Pernicious Anemia.

Bibliography.— Bayliss, ˆGeneral Physiol¬

ogy > ; Cabot, (Clinical Examination of the BloocP (New York 1904) ; Ewing, (Clinical

Pathology of the Blood) ; Schafer, Physiol¬

ogy* (Vol. I, 1898) ; Starling, (Human Physi¬

ology. >

BLOOD, Avenger of, in Scripture, the

nearest relation of any one that had died by manslaughter or murder, so called because it fell to him to punish the person who was

guilty of the deed. In the political law of Israel the practice of punishment by the near¬

est relative, which had always been prevalent, was allowed to continue, while rules were laid down to prevent the chief abuses connected

with it. The distinction was sharply drawn

between murder and manslaughter. For the

former no ransom or satisfaction was permit¬

ted. In the case of the latter, however, there were six cities set apart out of the number which the Levites occupied, placed at suitable distances over the extent of the land, three on each side of the Jordan, with roads lead¬

ing to them which were well kept up, and

these were cities of refuge to which the man-slayer might flee and within which he might dwell in safety without fear of the avenger.

But he was not permitted to return to his own place; in fact, he had no safety, if he left his place of refuge, until the death of the high-priest during whose term of office his misfor¬

tune had occurred. See Cities of Refuge.

BLOOD,. Circulation of. The highly dif¬

ferentiated and marvelously regulated circula¬

tory system in man furnishes striking evidence of evolutionary

development in response to

growing complexity of environmental de¬

mands. Unicellular animals and the lowest

metazoa obtain from the surrounding fluid in which they live oxygen and nutritive material and excrete waste materials into it directly, the whole surface performing these functions.

The movement of the fluid is maintained by the movements of the cell or body of the ani¬

mal itself and by the influence of nutritive ab¬

sorption. In the Polypi the movement receives aid besides from the action of cilia on the inner walls of the body. The division of physiologi¬

cal labor in the more complex and differen¬

tiated metazoa requires a special circulatory mechanism and a fluid which contains more

specifically respiratory and nutritive elements.

Therefore in the three-layered animal a cir¬

culatory system was evolved within a celom

or body cavity. The fluid within this cavity is still, however, in some coelenterates merely water containing organic elements, but this

gradually acquires a greater diversity of ele¬

ments making for coagulability, more complete respiratory function and better fitting it for supplying varying tissues in their nutritive and excretory needs. It is only, however, in the vertebrates that the blood exhibits a constancy of composition and circulates in a completely closed system. Birds and mammals alone have reached a complete separation of the arterial and venous blood. The Arthropoda and Insecta have a circulatory system which consists of a pulsating heart which sends its current through the arteries into open spaces or la¬

cunae within the body cavity where the blood and tissues directly

interchange their contents.

The muscular movements of the body help to return the blood into a venous sinus from

which it reaches the heart by slitlike aper¬

tures in the latter provided with valves. Dur¬

ing its course the blood passes through the renals and gills. Capillaries are found instead of the lacunae in the annelids, as the earth¬

worm. The Mollusca have the heart provided

with an auricle and a ventricle, as in the snail and whelk; two auricles, one on either side of the ventricle, as in the fresh-water mussel; or two auricles and two ventricles, as in the ark shells. Among the ascidians, which stand low in that division of animals to which the mollusks belong, the remarkable phenomenon

is encountered of an alternating current, which is rhythmically propelled for equal periods in opposite directions. All vertebrated animals, except Amphioxus, have a heart which in most fishes consists of an auricle and a ventricle, but in the mud fishes (Lepidosiren) there are two auricles and one ventricle ; and this trilocular heart is found in the amphibians and in most reptiles except the crocodiles, which, like birds and mammals, have a four-cham¬

bered organ consisting of two auricles and

two ventricles. In the crocodiles, however,

the two blood streams are not yet wholly sep¬

arated because of a communication between

the right aorta containing arterial blood and the left aorta containing venous blood. In

the trilocular hearts the two currents are

mixed in the single ventricle but a separation is gradually established by the extension of the ventricular septum which finally completely divides the ventricle.

History. — The correct knowledge of the

circulation of the blood in the human organ¬

ism dates from the investigations and discov¬

eries of Harvey published in 1628. In reality the discovery of the circulation was a gradual accretion but it was Harvey who finally placed this knowledge upon an accurate basis, re¬

moving certain mistaken theories which were

still accepted and demonstrating at last the cir¬

culatory process. Galen's physiological teach¬

ings had long held sway even though they had come to be considerably modified. This an¬

cient physiologist distinguished, as others had already done, arteries from veins and exploded the still older theory that the arteries con tained air. The veins, he believed, had their origin in the liver, proceeding from it in two great trunks ; the portal vein carrying to the liver the food absorbed from the alimentary canal, which was there converted into blood containing nutritive <(natural spirits,** and the vena cava which divided into an ascending and a descending branch. The blood was carried

to the right side of the heart where commu-BLOOD

nicating pores in the septum united the two ventricles and where the action of the innate heat of the heart and the air obtained through respiration united to produce the <(vital spirits®

which make the blood fit for higher functions.

The veins further carried the crude blood in an ebb and flow from the right side of the heart for the lower nutritive functions, while similarly the purer arterial blood from the left side supplied to the tissues their vital func¬

tions. From this arterial blood in the brain wanimal spirits® were elaborated which were

carried along the nerves to produce movements and the highest functions of the body.

This is the outline of the crude Galenic

doctrine, and Vesalius, brilliant anatomist that he was, was content to accept it, although there are evidences that he was very skeptical re¬

garding much of Galen's physiological teaching.

It was particularly from the anatomical side that he was most skeptical ; namely, because of the lack of tangible holes between the two sides of the heart, which were so important to the Galenists. His skepticism was taken up by his pupils and was also felt by others, one of them, Michael Servetus, who published a re¬

markable book, the c Restitutio Christianismi,*

in which a much truer conception of the cir¬

culation of the blood was taught. This was as early as 1553. He rejected entirely the ancient doctrines and had grasped the true doctrine of the pulmonary circulation, the passage of the blood from the right side through the lungs to the left side. Servetus, however, was a theologian more than a physician and his early death probably prevented his further studies.

Realdus Columbus, of Cremona, must be re¬

garded as another link in the chain that led up to the final solution. He is thought to have been a tricky man, however, and one who

would not hesitate to poach on another's pre¬

serves, and there are indications of his copy¬

ing much from Vesalius' works and claiming

them as his own. • He was vain and ignorant, but in his book, (D'e Re Anatomica) (1559), he described correctly the plumonary circula¬

tion, but he was unable to draw from it the lessons that it implied.

This, by many his¬

torians, is taken as evidence that he was only a copier, and that probably the work of Ser¬

vetus had been seen by him and he had claimed the discovery as his own. Caesalpinus, a noted botanist, was the first to appreciate the fact that on the contraction of the ventricles (sys¬

tole) the blood was thrown into the aorta and into the pulmonary artery, and at its diastole it received the blood from the vena cava and the pulmonary vein. He also seemed to have grasped the fact of the flow of the blood from the arteries to the veins and of the flow along the veins to the heart. This was in 1571 and 1593. Thus Cresalpinus had a true suggestion of the idea both of the pulmonary and sys¬

temic circulations. But Caesalpinus' work

seems to have been lost sight of, and another, Hieronymus Fabricius, had the honor to open the next door that led to Harvey's triumph.

Fabricius called renewed attention to the valves in the veins, but missed their real function, and, although he was Harvey's teacher, he was more of a Galenist than a modern.

It is to William Harvey's credit, not so

much that he was the discoverer of the physi¬

ology of circulation, — this, it can be seen from this brief recital, was of gradual accretion, —but that he was the first demonstrator of the process. He was the first physiological experi¬

menter, and his work on the living animal has opened up to the world most of its priceless gifts in the field of medicine. It was by the faithful and prolonged study of many hearts of many animals that showed him that —" the motion of the heart consists in a certain universal tension, both of contraction in the line of its fibres, and constriction in every sense, that when the heart contracts it is emptied, that the motion which is in general regarded as the diastole of the heart is in truth its systole — that the true work of the heart is not that it sucked blood in, but that it drove blood out.

Caesalpinus guessed at this, or may be knew it, but Harvey proved it,

and, what is more, read the consequences. He saw clearly, then, the real function of the auricles and the ventricles and of their valves, and he applied the lessons of the lesser, or pulmonary circulation, to the greater, or systemic circulation, and thus

rounded out the true natural history of the process. In his own words :

" I frequently and seriously bethought me, and long revolved in my mind, what might be the quantity of blood which was transmitted, in how short a time its passage might be effected, and the like; and, not finding it possible that this could be supplied by the juices of the ingested aliment without the veins on the one hand becoming drained, and the arteries on the other hand becoming ruptured through the excessive charge of blood, unless the blood should somehow find its way from the arteries into the veins, and so return to the right side of the heart, I began to think might there not be a motion, as it were in a circle.

Now this I afterward found to be true; and I finally saw that the blood, forced by the action of the left ventricle into the arteries, was distributed to the body at large, and its several parts, in the same manner as it is sent to the lungs, impelled by the right ventricle into the pulmonary artery, and that it then passed through the veins and along the vena cava, and so round to the left ventricle in the manner already indicated, which motion we may be allowed to call circular."

Thus clearly and forcefully he set forth in 1616 — although his work did not appear until 1628 — the true doctrine, and it is of interest to record that he lived to see it adopted practi¬

cally by all scientists. Malphigi, in 1661, dem¬

onstrated, by means of the microscope, the

capillaries, thus filling out the last link in the chain of evidence.

Mechanics of Circulation. — 'The closed

circulatory system in man consists of the

heart, arteries, capillaries and veins. The

heart is a muscular pump which beats regu¬

larly about 72 times a minute, thus forcing the blood with considerable velocity and force through the arteries and capillaries and back through the veins to enter the heart once

more and so complete the circuit. The mam¬

mal heart, as we have seen, has become a dou¬

ble organ and each side consists of two cham¬

bers, the auricles and ventricles.

The auricles are the smaller, less muscular portions of the heart, since their function is merely to receive the blood and transmit it to the ventricles. The walls of the left ventricle are four times the thickness of those of the right ventricle, since upon the left ventricle falls the work of propulsion for the entire systemic circulation, while the right ventricle has but to send the blood through the pul¬

monary vessels. The direction of the course of the blood through the heart is maintained by the presence and arrangement-of valves

which guard the orifices between auricles and ventricles and the opening of the aorta and of 108

the pulmonary artery. The tricuspid valve, con¬

sisting of three flaps of fibrous tissue, guards the right auriculo-ventricular opening, and the bicuspid or mitral valve, consisting of two flaps, guards the left. Near the base of attach¬

ment these flaps are tough and able to withstand the pressure of the blood, while at the edges they are thin and delicate and yield to the force of the current. When the blood has passed

into the ventricle they form by their perfect apposition an effective guard against return of the blood to the emptied auricle. The muscular attachments of the valves at the same time extend the diaphragm formed by their closing into the ventricle sufficiently to contract the ventricular chamber and so assist in expelling the blood. A backward eddy of the blood in the ventricle maintains the closure of the valves.

Similar arrangement guards the proper closure of the aortic and pulmonary valves.

There are in reality two circulations, the

pulmonary and the systemic. The dark, venous blood returned from the circuit through the body, the systemic circulation, where it has be¬

come charged with waste products and other

impurities is poured into the right auricle. This contracts, the tricuspid valve opens and the blood is discharged into the right ventricle.

Here it remains a small fraction of a second, when this ventricle contracts, the tricuspid valve closes and the blood is driven through the pul¬

monary artery into the lungs where it is spread out through the millions of capillaries distrib¬

uted throughout the lung tissue. Here it is freed from its carbon dioxide, oxygenated and then returned through the pulmonary vein into the left auricle. The contraction of the left auricle discharges this oxygenated blood through the mitral opening into the left ventricle, whose powerful contraction sends it into the aorta to perform its systemic circuit, which distributes it to the arteries supplying all parts of the body by their continuation through the arterioles which end in turn in the capillaries distributed throughout all the tissues. Here the blood

through the thin capillary walls comes into con¬

tact with the intermediary fluid known as the lymph, which fills all the tissue spaces through which by osmosis an interchange takes place.

The blood exchanges its oxygen and nutritive elements for the waste matter of the body and effects that transference of chemical substances from the organs in which they are produced to those others in any way depending on their activity. This includes the transmission not only of the elaborated products of digestion but likewise the internal secretions or hormones, the importance of which is coming to recog¬

nition. From the capillaries, after exchange of products with the tissues through the lymph has taken place, the blood is collected by venules into the veins, which finally unite into the vena cava which carries the blood back to the right auricle. The contraction of both sides of the heart is a simultaneous one. It consists in reality of a wave of contractions passing over the heart muscle, the period of contraction be¬

ing known as the systole, while the intervening period of rest and relaxation is known as the diastole. The complete cycle of contraction

and relaxation with the circulation of the blood through the body occupies about 22 seconds, and occurs in the adult normally about 72 times in a minute. The audible sound on examination is due to th“ closing of the auriculo-ventricular valves and those at the entrance of the aorta and pulmonary artery. The pulse which can

be felt in various superficial localities is due to the expansion of the distensible arterial walls. The elasticity of the arterial walls is an important factor in regulating the original force of the blood flow. Their distension changes the intermittent propulsive flow into a more steady current, while their ready contractility after distension regulates the distribution of the blood stream to the various organs.

Pressure is gradually diminished until in the veins there is merely a uniform flow of the returning blood. The contraction of the heart muscles is due to a series of complicated nerv¬

ous mechanisms. The heart musculature mani¬

fests in its arrangement its development from an original muscular tube which, while it

has been modified into the separate chambers of the mammalian heart, has yet retained its continuity in the band of muscular fibres dis¬

covered by His (auriculo-ventricular bundle)

which allows the contraction impulse to proceed successively from the root of this bundle in the right auricle to the ventricles. The excitation of the heart muscle seems to be due to the molecular concentration of the fluid which

bathes the tissue. The heart is also under the control of a special innervation which adapts it to conditions of the organism and to changes in the arterial resistance. The vagus nerve from the medulla oblongata exercises an in¬

hibitory function while sympathetic fibres run¬

ning from the upper dorsal region of the spinal cord exercise a stimulatory function. Sensa¬

tions arising in the heart are carried through the sympathetic ganglia and the upper thoracic region of the spinal cord where they are re¬

ferred to the sensory nerves of adjacent regions with which they come into relation, so that cardiac pain is not recognized as such but as sensation in these regions. The walls of the blood vessels are also richly supplied with nerves which regulate their tonicity and thus adapt them to the changing conditions of the body organism. These are the vasomotor

nerves and consist of the vasoconstrictors which exert a tonic effect and bring about a contrac¬

tion of the vessels and the vasodilator nerves, which as the name implies dilate the vessels.

The heart has its special system of blood supply in the coronary vessels, the blood entering the coronary arteries from the aorta and passing into capillaries which surround all the fibres.

See Arteries; Blood; Blood Pressure; Capil¬

laries; Heart; Veins.

Smith Ely Jelliffe.

BLOOD, Council of, the name popularly

applied to the Council of Troubles, established by the Duke of Alva, in the Netherlands, in 1567. Although it had no charter or authority from any source, it was omnipotent and super¬

seded all other authorities. In the first three months alone its victims numbered 1,800, and soon there was hardly a Protestant house in the Netherlands that had not furnished a victim.

BLOOD, Diseases of the. Blood is a

very complex substance, it is even called a tissue. _ It has two essential parts, the plasma, composing 60 per cent, and the corpuscles, 40

per cent : the latter are not in solution but BLOOD.— The General Distribution of the Blood Vessels.

Arteries are shown in red. the veins in blue.

H, the heart. 1, left side, r, right side. Arising frorr the heart is the rrain artery, Aorta (A). The letter is ptjt on the vessel at some distance from the heart, near where it gives off the branches (in red) for the head and arms, and at the point where it arches backwards and downwards to pass through the chest and the belly till at A, it' gives branches for the legs. Running alongside the arteries are represented in blue, veins. At K, is represented the position of the kidneys and their veins. L, represents veins of the lung. J, jugular vein. Ch.

outlines of the chest.

arc floating about. Plasma containes 90 per cent water, albumen, fat, mineral salts, also at times peptone or digested food and sometimes parasites and bacteria. Corpuscles or blood-cells are red and white, the latter to the former as 1 to 300. There are 5,000,000 or more per c.m. of the former, 10,000 to 20,000 of the latter. When the blood clots, the clot contains corpuscles and fibrin, the serum which is

squeezed out contains the remainder.

Disease of the blood may exist from too

much or too little of any of its elements, also from the presence of elements which are for¬

eign to it. It is possible for the blood itself to be in such excess as to constitute the dis¬

eased condition called plethora. Full-blooded people have very red skin, are often stout, bleed easily and freely and are subject to apo¬

plexy. They are often benefited by the loss of a few ounces of blood and the observation of that fact doubtless led to the custom of bleed¬

ing as a remedial measure. For a long time it was used so irrationally that its valuable features were obscured, and for years it was practically abandoned as a therapeutic measure.

The albumen is decidedly the most impor¬

tant constituent of the plasma for it furnishes food for the cells. This may be deficient or it may pass through the kidneys in large quan¬

tities as in Bright's disease. Sugar is one of the products of the chemistry of the body

but it is alien to the blood and when it circu¬

lates with the blood the disease called diabetes is present. Fat may be in the blood in suffi¬

cient quantity to constitute the disease known as lipaemia. Fat is normally in the blood in two to four parts per thousand. During diges¬

tion and just afterward it is more abundant than at other times. In the condition of lipae¬

mia it can be seen on the surface of blood which has been drawn. The mineral salts may be deficient or excessive, the former when one has been deprived for a long time of chloride of sodium or of food which contains it. It is possible for the watery elements of' the blood to be excessive either actually or rela¬

tively. It is then commonly said that the blood is too thin, the condition being one of hydrae-mia and the indication is to increase the cor¬

puscles or blood cells, particularly the red ones.

This is a form of anaemia, and so is the condi¬

tion called oligaemia when the actual volume of blood is too small, which is the situation after every severe haemorrhage, or even after a

profuse and persistent diarrhoea. It is the condition which always exists in the different forms of cholera.

The corpuscular elements of the blood are

subject to many forms of disease which may be grouped in general under the term anaemia.

When the red corpuscles are deficient after severe haemorrhage or malarial poisoning or

cancer or many forms of sickness there is

great pallor of the skin and the . condition is specifically oligocythaemia. Sometimes, especi¬

ally in young girls, the skin has a greenish cast, this condition being known as chlorosis or the green sickness ; it is not uncommon at the age of puberty. If the anaemia becomes very profound, going on usually to a fatal issue and the red corpuscles are reduced to perhaps a tenth of their usual number, it is called pernicious anaemia. Besides decrease in the number of corpuscles there may be diminu¬

tion of the substance which is essential and vital to the red corpuscles because it carries the life-giving oxygen, and which is called haemo¬

globin. The condition in this instance is known as oligochromaemia. Changes may also take

place in the shape and size of the red corpuscles in various forms of disease, many of them

may be very large or very small or crenated or dentated, or they may have nuclei which is extremely unusual for red corpuscles, or they may undergo destruction as in serious

burns and in various kinds of poisoning. When this takes place and the liberated haemoglobin circulates in the blood we have a condition known as haemoglobinaemia. The white cor¬

puscles are also very susceptible to change and to disease. In suppurative processes they are greatly increased in number, the condition be¬

ing known as leucocytosis. In the very serious disease known as leucaemia or leucocythaemia their number is very greatly increased, so that their ratio to that of the red corpuscles instead of being 1 to 300 may be as high as 1 to 20.

When the white blood cells are greatly dimin¬

ished in number the condition is known as

leucopenia.

The coagulating property of the blood may

also be at fault and constitute disease. It has already been stated that the clot contains cor¬

puscles and fibrin, the latter being the product of constituents within the blood which are not brought in contact so as to produce fibrin and a clot until there is some injury to the inner wall of a blood vessel or the blood is arrested in its course or until it is discharged from a vessel or vessels into the tissues or cavities of the body or outside the body. There are per¬

sons called bleeders in whom the constituents of fibrin do not exist in

proper proportion or proper quantity and when bleeding takes place it is almost impossible to stop it because a clot does not form. Such persons may lose

their lives from the smallest injury like the pulling of a tooth or a scratch of the finger.

Disease may be present from extraneous or

abnormal elements in the blood like metallic poisons of various kinds, waste matters, for¬

eign bodies consisting of particles of various substances. If there is black coloring matter the condition is melanaemia, acetone in con¬

nection with diabetes produces acetonaemia, bile circulating in the blood causes cholaemia.

A very important and serious condition is

known as uraemia when waste material which

should be excreted through the kidneys, as

urea, is retained in the blood. Uraemic convul¬

sions result fatally in the majority of cases.

In ammonaemia ammonia is absorbed into the

blood from the decomposed urine in the blad¬

der.

Lithaemia indicates the presence of lithates in the blood in diseases like rheumatism. A disease of the blood once very common, but now less common because of the practice of antisepsis, is pyaemia when pus circulates freely in the blood current.

In septicaemia we have a general term for

blood poisoning from almost any source but

particularly from infectious material. We may have infectious germs of various kinds in the blood. One of the most important tests of

the blood, the Wassermann test, is for deter¬

mining the presence or absence of the germ of syphilis. Many other tests of the blood 110

have been devised for determining the pres¬

ence or absence of various diseases. There

are also many parasites to be found in the blood, the plasmodium of malaria, the filaria sanguinis hominis, the distomum haematobium,

the trichina, the organism of the sleeping sick¬

ness, *etc.* This portion of the subject is still undergoing active investigation and many im¬

portant facts relating to the physiology and pathology of the blood are being brought to light. Consult Gannett, ‘ Pathology of the

Blood) (Wood’s (Reference Handbook of the

Medical Sciences)) .

Andrew F. Currier, M.D.

BLOOD BAPTISM. In the early Chris¬

tian Church an unbaptized person who suffered martyrdom on account of the faith was held to have been baptized into that faith by a baptism of blood. It was also held that sev¬

eral passages of the Scriptures supported this doctrine as, for instance, Matt, x, 39; Luke xii, 50. As baptism was thought pretty generally to be an essential for a passport to Heaven, martyrdom was held to be a full substitute for it in this and all other respects.

BLOOD BROTHERHOOD. There were

two ways of entering into the ancient totem clan — by birth and by initiation. But both of these requisites could be satisfied arti¬

ficially by means of the transference of blood from the body of the candidate for admission into the clan, into the veins of several members of the clan, and, vice-versa from their veins into those of the candidates. This was sup¬

posed to actually supply or make, in the appli¬

cant, a community of blood with that of his chosen relations, the members of the new clan.

This infusion was effected by making cuts in the arms and joining the bleeding parts. Some¬

times each party sucked the blood from the wound of the others. Still another method

was to mix the blood of all and then all par¬

took of the mixture. A very symbolical method was employed when some animal was sacri¬

ficed with all due religious ceremony and the parties to the blood contract drank the blood of the slaughtered beast. Such a union has been called ((blood brotherhood.®

BLOOD CLAM, or BLOOD QUOHOG,

a local name given in Narragansett Bay to Area or S capharca, transversa, a common bivalve

ranging from Narragansett Bay to Georgia, in reference to the reddish spots on the inside of the edge of the shell, and to the reddish flesh-color of the ovaries. It is not used as an article of food.

BLOOD FEUD, the right of individual,

or family, vengeance in cases of bloodshed.

In a very primitive state of society the ten¬

dency toward private instrumentality in the

punishment of crime is largely unchecked. In passing from this stage to the highly organ¬

ized system of legal penalties enforced by

modern civilized governments, the regulation

of the blood feud was a marked step in the advancement of the race. It is true that the right of private vengeance was recognized, but it was put under, restrictions and gradually nar¬

rowed in its action. The slayer had the right of sanctuary, illustrated by the cities of refuge in Israel under the Mosaic economy, by the altars of pagan deities and by the churches of the Middle Ages. The danger of dragging entire clans into retributive warfare to avenge a single murder was averted by limiting the right of vengeance to the immediate family, or the next of kin to the one slain, and the privilege of purchasing exemption by the were-geld tended to check a blood penalty. The ac¬

ceptance of the blood-money was finally made obligatory. The amount of the fine imposed

upon the murderer varied among the Anglo-Saxons according to the rank of the victim.

The family feuds among the mountain whites

in certain sections of the United States form an interesting modern

instance of the survival of the primitive institution of blood feud. See Asylum, Right of; Avenger of Blood; Cities

of Refuge and consult Jenks, ‘Law and Poli¬

tics in the Middle Ages) ; Maine, ‘Ancient Law) (London 1905) ; ‘Lectures on the Early History of Institutions* (6th ed., London

1893) ; Pollock and Maitland, ‘History of Eng¬

lish Law* (2d ed., Boston 1899) ; Stephen, ‘History of the Criminal Law of England *

(London 1883).

BLOOD-FLOWER, or BLOOD-LILY,

a genus (Hccmanthus) of about 60 species of summer-and autumn-blooming bulbous-rooted

plants of the family Amaryllidacea ?, natives mostly of south Africa, named from the gen¬

eral color of their flowers, which are arranged in umbels arising on an often beautifully col¬

ored scape either before the foliage or from a rosette of radical leaves. The few species cultivated in American greenhouses have not

become widely popular, but are worthy of

more extended culture, since the individual

flowers are often two inches in diameter and the umbel sometimes a foot across. They may be cultivated like the nerine. Since some of the most attractive species reproduce slowdy, the bulbs are often cut in two horizontally and treated like hyacinth bulbs similarly cut.

Several new bulbs form around the margin

of the cut halves. Consult Bailey, ‘Standard Cyclopedia of Horticulture) (1915).

BLOOD INDIANS, or KINO IN¬

DIANS, a tribe of North American Indians

of the Siksika Confederacy, dwelling in the Northwest Territories of Canada.

BLOOD AND IRON: a phrase used by

Bismarck in the Prussian House of Delegates in a speech on the Constitution, 30 Sept. 1862: “Nicht durch Reden und Majoritatsbeschliisse

werden die grossen Fragen der Zeit entschieden — das ist der Fehler von 1848 und 1849 gewe-sen — sondern durch Eisen und Blut.® “Not

by speeches and majority resolutions will the great questions of the time be decided — that was the error of 1848 and 1849 — but by iron and blood.® (In the course of the same speech he said : “We are perhaps too cultured to en¬

dorse a Constitution… .**. In his Decla¬

mation es Quintilian uses the phrase, “sangui-nem et ferrum,® whilst the German poet Arndt (d. 1860) declared that the “brave proclaims himself master of the lands — with his iron, wdth his blood.®

BLOOD-LETTING. See Bleeding.

BLOOD-LILY. See Blood-flower.

BLOOD-MONEY, money paid to the next

of kin of a man who met with his death at the hands of another, accidentally or with pre¬

meditation. The Greeks called it ‘KOLvijy the BLOOD-PHEASANT —

Latins pezna, the Franks Allemanni anti Scan¬

dinavians-manbote , wehrgeld or wyrgilt, the British Celts named it saarhard and the Irish Celts eric. The institution still flourishes in many communities of Asia and Africa. In

English criminal law the term blood-money was also applied to rewards paid to informers

against highway robbers, thieves, burglars and utterers of false coin or forged bank-notes.

Laws empowering such payments were passed

between 1692 and 1742. In 1813 the total

amount paid in this way was £18,000. By this time a number of persons made a living out of these laws by entrapping unwary and fool¬

ish people into the commission of the crime of forging or uttering false coin and then inform¬

ing against them. As early as 1756 one Mc¬

Daniel had brought to the scaffold and earned the blood-money of no less than 70 victims.

Parliament, recognizing the abuses the system had engendered, repealed all the laws relating thereto, except in relation to the forgers of bank-bills, in which case the informer can still get his pecuniary reward. See Avenger of

Blood; Blood Feud; Outlawry.

BLOOD-PHEASANT, one of the small

quail-like pheasants of the Himalayan genus

Ithagenes, whose throat and breast are bloodred. See Pheasant.

BLOOD-POISONING. From the stand¬

point of bacteriology blood-poisoning may be of two distinct types. It may be due to the presence of the poisonous toxins taken, up by the blood, in which case it is called bacteri-semia or sapraemia, sometimes septicaemia ; or it may result from the toxins plus the micro¬

organisms in the blood itself, a true blood in¬

fection, in which case it is termed septicaemia or pyaemia. The bacteria most frequently found in the blood in cases of septicaemia or pyaemia are the Streptococcus pyogenes aureus, Staphy¬

lococcus pyogenes aureus, Diplococcus lanceolatus, in pneumonia; Bacillus typhosus, in ty¬

phoid, and occasionally others. See Pyemia.

BLOOD PRESSURE. This term refers

to arterial tension or to the pressure of the blood in the blood vessels. It depends upon the cardiac strength, the peripheral resistance, the elasticity of the vessel walls and the volume of blood. Three factors are to be considered — the maximum or systolic pressure, the mini¬

mum or diastolic and the difference between maximum and minimum or pulse pressure.

The pressure is indicated by the height of a column of mercury in a capillary tube or by air pressure upon a spring. The former method is altogether the more reliable, the air machines requiring correction from time to time by com¬

parison with a mercurial apparatus. The ap¬

paratus is called a sphygmo-manometre, which signifies measurer of the pulse.

Measurement of the pulse or blood pressure

is a procedure of comparatively recent recog¬

nition. Its importance was observed in Europe as early as 1828 but it was not until 1876 that the first sphygmo-manometre was made in this country, being that of Marey, which for a

considerable period was used principally in

physiological investigations and experiments.

The second period began in 1896 with the ap¬

paratus of Riva-Rocci, which consists of an inflatable rubber bag or cuff, five centimetres in width, surrounded by a band of firm cloth which is wound around the arm. To this is attached a rubber tube connected with a reser¬

voir of mercury, from which proceeds an up¬

right glass capillary tube by the side of which is a wooden scale graduated in millimetres.

The rubber bag is placed over the brachial artery above the bend of the elbow, secured by the band wound around the arm and inflated by means of a rubber bulb and tube until the pulse at the wrist has disappeared. As soon as the column of mercury comes to a rest, the point on the scale is noted and this is the maximum or systolic pressure. The air in the bag is then gradually released until the pulse clearly reappears and this becomes the mini¬

mum or diastolic pressure.

Many mercurial manometres have been de¬

vised since Riva-Rocci's, but they are only mod¬

ifications of his. Among the mercurial instru¬

ments which are worthy of mention and reliable are those of Cook, Stanton, Janeway and Nich¬

olson. One modification, and an important one, too, consists in a larger and wider cuff, and they are now made from 12 to 14

centimetres in width. Less than this width gives unreliable readings, especially in the upper register. The connections in any apparatus should be of non-distensible rubber tubing. The instrument must register both systolic and diastolic pressure, should not require more than two or three

minutes for the operation, should be as light and compact as possible and not too expensive.

The expense of most of the instruments has been such that many physicians have been dis¬

inclined to buy and use them and so familiar¬

ize themselves with an important means of

diagnosis.

In examining for blood pressure it is well to have the patient in the sitting rather than the reclining position. The cuff should be ap¬

plied at the level of the heart and therefore upon the brachial artery above the elbow. The cuff must be bandaged loosely about the arm to permit free inflation of the rubber bag.

Breathing should be natural, as deep breathing raises the pressure during expiration and low¬

ers it in inspiration. The cuff being adjusted and the valves of the apparatus open or closed as may be required on the machine which is being used, the bulb for pumping the air upon the reservoir of mercury is compressed and the mercury forced into the capillary tube. When the rubber bag has been sufficiently dilated to obliterate by its pressure the column of blood in the brachial artery, which is indicated by the disappearance of the pulse at the wrist, the column of mercury in the capillary tube is to be noted when it comes to a rest and the read¬

ing taken from the scale at its side. This is the maximum or systolic pressure. The air

in the bag is then slowly released and when the pulse reappears and becomes regular again this will be the diastolic pressure. The differ¬

ence between the two is the pulse pressure.

This is the method by palpation, the finger of the physician being kept constantly at the site of the radial artery.

If the auscultation method is used, the rub¬

ber bag is inflated as in the palpation method until the pulse at the wrist is obliterated, after which the bell of an ordinary binaural stetho¬

scope or the disc of a phonendoscope is placed over the artery at the elbow. The air pres-112

sure is then gradually released and when the cardiac beat first passes the constricting cuff it is announced by a loud sound which is the systolic pressure. As the pressure in the in¬

flated bag is released this sound is followed by a murmur and then by a second sound which gradually disappears. At this instant the col¬

umn of mercury shows the diastolic pressure.

The theory is that the blood pressure in

the aorta which is at the maximum when it receives its charge of blood from the left ven¬

tricle is sustained as the blood goes through the arterial system, then as it is forced through the capillaries the pressure is reduced to its minimum and becomes the diastolic pressure.

The blood pressure depends upon the contrac¬

tile force of the heart and the peripheral re¬

sistance to be overcome, the latter depending upon the contractility

and distensibility of the walls of the blood vessels. A weak heart nec¬

essarily will not have as high tension as a strong one, the time between the systoles will be shorter and the pulse pressure will be lower.

A strong heart will have a longer interval between the systoles and a higher blood pres¬

sure. The pulse pressure is the most impor¬

tant factor with reference to treatment of the heart and in differentiating a cardiac from a vascular origin of a given condition.

Many important facts relating to blood pres¬

sure are now available ; some of them are the following: The standards of blood pressure

vary in different individuals, in health as well as disease; in women the standard is 10 mil¬

limetres lower than in men. The lowest re¬

corded systolic pressure is 40; the lowest in which the patients have recovered are from

60 to 75. The systolic pressure, pulse pressure and pulse rate are increased after eating. The systolic pressure is lowered during sleep ; the pulse pressure is increased by exercise and low¬

ered by fatigue. Emotions and mental effort cause rise in diastolic pressure. It is better to take the pressure between meals. In con¬

ditions of disease the pressure may be high or low, continued high pressure meaning cardiac hypertrophy, changes in the arterial wall and danger of rupture. In arterio-sclerosis the

pressure is high, often the systolic is from 150

to 250 and the diastolic 110 to 130. In nephri¬

tis there is often a systolic pressure of 200 and a low diastolic, with danger of apoplexy. Dur¬

ing an attack of uraemia the blood pressure is high and falls when the conditions improve.

In cases of high intracerebral pressure the blood pressure may be as much as 300 to 400.

At the end of pregnancy the pressure is some¬

what higher than normal and should eclampsia or other toxaemia occur it would mount to a great height.

Diseases which have low blood tension are

pulmonary phthisis, cancer, syphilis, diarrhoea, peritonitis, *etc.* From the foregoing it will be apparent that much valuable information can

be obtained by the general practitioner, or, in¬

deed, by any physician, from records of blood pressure, particularly with reference to diag¬

nosis and prognosis. Janeway, who has prob¬

ably investigated the subject with as much

care as anybody in this country, is quoted as saying that blood pressure should always be taken at the first examination of all patients and at occasional intervals in cases of car-diavascular disease and nephritis. It should be a routine practice in examinations for life in¬

surance and athletic contests and it is desirable in obstetric, medical and surgical conditions in general. Consult Cook, H. W., (Blood-pres¬

sure in Prognosis) (New York Medical Record, 1 Nov. 1911); Nicholson, P., < Blood-pressure*

(Sajous Analytical Cyclopedia of Practical

Medicine, 7th ed., 1913) ; Janeway, T. C., (When Should the General Practitioner Meas¬

ure the Blood-pressure ?) (Medical Annals,

Albany, N. Y., March 1911).

Andrew F. Currier, M.D.

BLOOD-RAIN, showers of grayish and

reddish dust, mingled with rain, which occa¬

sionally fall, usually in the zone of the earth which extends on both sides of the Mediterra¬

nean westwardly over the Atlantic and eastwardly to central Asia, the red color being due to the presence of organisms containing a red oxide of iron. These organisms sometimes

impart a pink or reddish tint to snow. Black fungus sometimes gives rise to black rain in a similar manner. Such fungi and low plant forms grow usually in ponds in the Torrid

Zones; the ponds are dried up for the greater part of the year. From these basins the fine dust and fungi are raised by the wind and carried many miles. A decrease in tempera¬

ture causes rainfall, when the particles are carried to earth. See Rain.

BLOOD OF OUR SAVIOUR, an order

of knighthood, known also as the Order of

Our Redeemer, and the Precious Blood of Jesus Christ. It was instituted in Mantua, Italy, in 1608, by Duke Vincenzo Gonzaga and consisted of 20 members. Upon the collar was the legend Domine probasti me, and on the pendant Nihil isto triste recepto. The name originated in the tradition that certain drops of the Saviour's blood are preserved in Saint Andrew's Church, Mantua. Consult Laurence-Ascher, (Orders

of Chivalry) (London 1887), and Wahlen, (Ordres de Chevalerie) (Brussels 1844).

BLOOD-STAINS, in medico-legal inves¬

tigations, are subjects of some importance, par¬

ticularly when murder is suspected and so-called blood-stains are to be investigated. The first question to be determined is whether the suspected stain is blood of any animal ; secondly, is it human blood or that of a lower animal. To determine the first question certain tests have been devised. These are (1) the guaiac test, by which blood brought in contact with tinc¬

ture of guaiac and hydrogen peroxide develops a blue color (not, however, conclusive) ; (2) the haemin test, by which crystals are produced from the haemoglobin and identified under the microscope; (3) the spectroscope test, which gives a spectrum of haemoglobin ; (4) the mi¬

croscope test, by which the blood-corpuscles are identified. To answer the second ques¬

tion requires either (1) the microscopical ex¬

amination that determines the size, shape and qualities of the blood-corpuscles; or (2) a much more reliable serum test, by which human serum, if brought in contact with the blood of an alien animal, causes dissolution of the blood-corpuscles of that animal's blood. By

this serum test it is possible to detect any blood of any animal. The appearance of blood-stains varies, according to the character of the sub-BLOOD

arc floating about. Plasma containes 90 per cent water, albumen, fat, mineral salts, also at times peptone or digested food and sometimes parasites and bacteria. Corpuscles or blood-cells are red and white, the latter to the former as 1 to 300. There are 5,000,000 or more per c.m. of the former, 10,000 to 20,000 of the latter. When the blood clots, the clot contains corpuscles and fibrin, the serum which is

squeezed out contains the remainder.

Disease of the blood may exist from too

much or too little of any of its elements, also from the presence of elements which are for¬

eign to it. It is possible for the blood itself to be in such excess as to constitute the dis¬

eased condition called plethora. Full-blooded people have very red skin, are often stout, bleed easily and freely and are subject to apo¬

plexy. They are often benefited by the loss of a few ounces of blood and the observation of that fact doubtless led to the custom of bleed¬

ing as a remedial measure. For a long time it was used so irrationally that its valuable features were obscured, and for years it was practically abandoned as a therapeutic measure.

The albumen is decidedly the most impor¬

tant constituent of the plasma for it furnishes food for the cells. This may be deficient or it may pass through the kidneys in large quan¬

tities as in Bright's disease. Sugar is one of the products of the chemistry of the body

but it is alien to the blood and when it circu¬

lates with the blood the disease called diabetes is present. Fat may be in the blood in suffi¬

cient quantity to constitute the disease known as lipaemia. Fat is normally in the blood in two to four parts per thousand. During diges¬

tion and just afterward it is more abundant than at other times. In the condition of lipae¬

mia it can be seen on the surface of blood which has been drawn. The mineral salts may be deficient or excessive, the former when one has been deprived for a long time of chloride of sodium or of food which contains it. It is possible for the watery elements of the blood to be excessive either actually or rela¬

tively. It is then commonly said that the blood is too thin, the condition being one of hydrae-mia and the indication is to increase the cor¬

puscles or blood cells, particularly the red ones.

This is a form of anaemia, and so is the condi¬

tion called oligaemia when the actual volume of blood is too small, which is the situation after every severe haemorrhage, or even after a

profuse and persistent diarrhoea. It is the condition which always exists in the different forms of cholera.

The corpuscular elements of the blood are

subject to many forms of disease which may be grouped in general under the term anaemia.

When the red corpuscles are deficient after severe haemorrhage or malarial poisoning or

cancer or many forms of sickness there is

great pallor of the skin and the condition is specifically oligocythaemia. Sometimes, especi¬

ally in young girls, the skin has a greenish cast, this condition being known as chlorosis or the green sickness ; it is not uncommon at the age of puberty. If the anaemia becomes very profound, going on usually to a fatal issue and the red corpuscles are reduced to perhaps a tenth of their usual number, it js called pernicious anaemia. Besides decrease in the number of corpuscles there may be diminu¬

tion of the substance which is essential and vital to the red corpuscles because it carries the life-giving oxygen, and which is called haemo¬

globin. The condition in this instance is known as oligochromaemia. Changes may also take

place in the shape and size of the red corpuscles in various forms of disease, many of them

may be very large or very small or crenated or dentated, or they may have nuclei which is extremely unusual for red corpuscles, or they may undergo destruction as in serious

burns and in various kinds of poisoning. When this takes place and the liberated haemoglobin circulates in the blood we have a condition known as haemoglobinaemia. The white cor¬

puscles are also very susceptible to change and to disease. In suppurative processes they are greatly increased in number, the condition be¬

ing known as leucocytosis. In the very serious disease known as leucaemia or leucocythaemia their number is very greatly increased, so that their ratio to that of the red corpuscles instead of being 1 to 300 may be as high as 1 to 20.

When the white blood cells are greatly dimin¬

ished in number the condition is known as

leucopenia.

The coagulating property of the blood may

also be at fault and constitute disease. It has already been stated that the clot contains cor¬

puscles and fibrin, the latter being the product of constituents within the blood which are not brought in contact so as to produce fibrin and a clot until there is some injury to the inner wall of a blood vessel or the blood is arrested in its course or until it is discharged from a vessel or vessels into the tissues or cavities of the body or outside the body. There are per¬

sons called bleeders in whom the constituents of fibrin do not exist in proper proportion or proper quantity and when bleeding takes place it is almost impossible to stop it because a clot does not form. Such persons may lose

their lives from the smallest injury like the pulling of a tooth or a scratch of the finger.

Disease may be present from extraneous or

abnormal elements in the blood like metallic poisons of various kinds, waste matters, for¬

eign bodies consisting of particles of various substances. If there is black coloring matter the condition is melanaemia, acetone in con¬

nection with diabetes produces acetonemia, bile circulating in the blood causes cholaemia.

A very important and serious condition is

known as uremia when waste material which

should be excreted through the kidneys, as

urea, is retained in the blood. Uremic convul¬

sions result fatally in the majority of cases.

In ammonemia ammonia is absorbed into the

blood from the decomposed urine in the blad¬

der.

Lithemia indicates the presence of lithates

in the blood in diseases like rheumatism. A disease of the blood once very common, but now less common because of the practice of antisepsis, is pyaemia when pus circulates freely in the blood current.

In septicaemia we have a general term for

blood poisoning from almost any source but

particularly from infectious material. We may have infectious germs of various kinds in the blood. One of the most important tests of

the blood, the Wassermann test, is for deter¬

mining the presence or absence of the germ of syphilis. Many other tests of the blood 114

is plugged after an injury or after it has been tied by the surgeon with a ligature. The cut¬

ting off the circulation in the area supplied by the vessel is like depriving the soil of mois¬

ture, and unless the tissue in question is sup¬

plied by neighboring vessels which make new channels to take the place of those which have been obliterated, its nutrition suffers greatly.

If the vessel is one of considerable size or if it is a terminal vessel, the tissue dies and experiences gangrene or decomposition.

This is what happens not infrequently in

the lower extremities, especially in the aged, and in the disease known as diabetes, one or more of the toes or even the entire foot be¬

comes gangrenous and requires amputation.

A plug of this kind is called a thrombus, and the disease thrombosis and may occur either in arteries or veins. Besides the terminal

arteries of the lower extremities which are thus diseased this condition occurs in the terminal arteries of the kidneys, lungs, spleen and brain, with more or fewer ruptures, haemorrhages and destruction of tissue.

Friability or brittleness of the arteries is also a frequent form of disease, and particu¬

larly also in the aged. This is the condition known as arterio-sclerosis, when there may be a formation of new connective tissue in the

arteries increasing their density, or a deposit of mineral salts, especially of lime, causing them to break easily. Both of these conditions often terminate in cerebral haemorrhage or

apoplexy.

A very common form of disease affecting

arteries in particular, but sometimes veins, and sometimes resulting in communication between

an artery and a vein and the commingling of blood currents, is aneurism, in which one or more of the inner coats gives way, forming a larger or smaller tumor or bulge of the vessel. If this tumor ruptures, haemorrhage

takes place into the surrounding tissue until there is sufficient pressure or a sufficiently dense clot to arrest it. In the case of large arteries or arteries in vital structures like the brain the haemorrhage is not infrequently

fatal. Arteries that are diseased from syphilis or that are deficient in elastic or muscular tissue, or those that are subject to frequent and powerful strain, are often the seat of aneur¬

ism, and athletes, porters, truckmen and others who bear heavy weights are frequently victims.

Blood vessels like other tissues, are supplied with vessels, nerves and lymphatics for their nourishment and their functional activity. The nerve supply, especially that of the small arter¬

ies, is of very great importance, consisting of vasodilator fibres from the cerebrospinal and vaso-inhibitory fibres from the sympathetic

system. When one or the other apparatus

of this kind is diseased or out of order there is disturbance in the circulation of the vessels involved and in the tissues they supply, paraly¬

sis of the inhibitory nerves, meaning dilatation of the blood vessels and congestion of the tissues, and paralysis of the dilator nerves,

meaning constriction of blood vessels and anae¬

mia and pallor of the tissues.

The obscurity of most of the diseases of

the blood vessels makes their determination

very difficult until an accident, perhaps of seri¬

ous character, has occurred. We are able to detect hardening of the arteries by the physical characteristics and the recent studies in blood pressure are clearing up important questions in other particulars, but there remains much to be found out before the pathology of the blood vessels will be entirely elucidated.

Arteries may have acute or chronic disease, with or without inflammation. When an artery is inflamed its calibre may be diminished, or even obliterated (endarteritis obliterans) or it may be increased (endarteritis deformans).

Arterial diseases which are not inflammatory may be degenerative, fatty, amyloid or calca¬

reous. Tuberculosis rarely attacks the struc¬

ture of the arteries, and the very common con¬

dition known as atheroma, very often associ¬

ated with syphilis, is a chronic inflammation with degeneration. Atheroma often terminates

in ulcer with deposits of salts of lime in its vicinity.

Acute inflammation of an artery may be

caused by the irritation, and possibly the in¬

fection, of an embolus or plug, from the con¬

sequences of ligation, or by the extension of a neighboring suppurating wound or ulcer.

Inflammation of the arteries with enlargement of calibre is most often seen in the aged, the aorta being frequently attacked. With it may be associated atheroma, fatty degeneration or calcification. Fatty degeneration also usually accompanies atheroma and calcification. It is probable that the veins are less susceptible to disease than the arteries, though there are acute and chronic forms of phlebitis. Injuries to veins are rather more frequent than to arter¬

ies on account of the exposed position near the surface of those which constitute the super¬

ficial system of veins. They are also very subject to the formation of thrombi because of the fibrin in their walls. Acute phlebitis may be adhesive or suppurative and is one of the accompaniments of an infectious process

in pregnancy and childbed. A suppurative

phlebitis may be an extension of a suppurating process in tissues adjacent to a vein which is attacked, and in pyaemia the veins are filled with pus. An adhesive inflammation in veins may result from traumatism or from some

form of poison in the blood. The veins may be the seat of calcification and of ulcers as well as the arteries.

Tuberculosis is probably more frequent in

veins than in arteries, especially when it results from an extension of the disease in the neigh¬

boring lymphatics. See Arteries ; Atheroma ; Capillaries; Gout; Pyaemia; Rheumatism;

Syphilis.. Andrew F. Currier, M.D.

BLOODBIRD, a black honey-eater of

southern Australia, whose head, neck, breast and back (of the male) are scarlet red.

BLOODHOUND, a dog of the ˆhound®

build, commonly used for tracking fugitives.

It usually stands from 25 to 27 inches high at the shoulders and weighs about 90 pounds.

In appearance it is of a sedately noble expres¬

sion, with a wise-looking, wrinkled face. Its color is black, mingled with a rich tan on the legs; a few are all tan. Its coat is short and glossy, the ears large and pendant, and the eyes deeply sunken and showing a third lid or

“haw.® It has a somewhat loose skin for so muscular a dog and quite a dewlap in front BLOODROOT — BLOOMER COSTUME

of the throat. It has a wonderful power of scent, by means of which, aided by judicious training, it is enabled to follow the footsteps of a particular man, though they may be crossed and recrossed a thousand times by other foot¬

steps and though they lead over bare pave¬

ments. The true bloodhound suffers from an

unfortunate name, which seems to suggest

bloodthirstiness, a quality very far removed from his real disposition. The term ((bloodhound* originally meant simply that the dog was thoroughbred in the same sense that a

horse or other animal is of ˆblood® or

(<blooded)> stock. In the early days the Span¬

iards introduced into Cuba and South Amer¬

ica dogs which had some of the characteristics of the bloodhound but

were really a cross be¬

tween the ferocious war-dog of the ancients and the big Spanish pointer. These dogs had evil dispositions and were capable of great ferocity, and their sins have been visited on the real but innocent bloodhound. The true

bloodhound will trail a man to the last of its strength but will not voluntarily attack him.

When it has located him, it will keep guard and prevent his escape, and may, if attacked, use its great powers in self-defense, but not in the savage manner generally attributed to it; it is not in its nature to be cruel.

BLOODROOT. See Sanguinaria.

BLOODSTONE. See Heliotrope; Hem¬

atite.

BLOODWORM, the larvae of species of

Chironomns, gnats allied to the mosquito. The worms live in fresh-water pools and sluggish streams. They are long, slender and worm¬

like, and certain species are bloodred in color.

The flies have very feathery antennae and do not bite. The larvae usually have no tracheae.

The red color of these larvae is due to haemo¬

globin, a substance that has the power of at¬

tracting and storing oxygen and giving it off to the tissues as they require it. Such larvae are able to live in burrows which they con¬

struct in the mud. Some of them, provided

plentifully with haemoglobin, are in consequence able to live at great

depths (it is said even at 1,000 feet in Lake Superior) and come to the surface only occasionally. A few are even able to tolerate salt water and have been fished up from considerable depths in the sea. It is a remarkable fact that these physiological capac¬

ities differ greatly within the limits of the one genus, Chironomus, for some of these species are destitute of haemoglobin and have to live near the surface of the water; in these there is a well-developed tracheal system.

BLOODWORT. See Sanguinaria.

BLOODY ASSIZES, the name given by

the people to a series of trials held in England by Judge Jeffreys, in 1685, after the suppres¬

sion of the Duke of Monmoulh's rebellion.

Upward of 300 persons were executed after

ˆhort trials ; very many were whipped, impris¬

oned and fined, and nearly 1,000 were sent as slaves to the American plantations. See

Jeffreys, George.

BLOODY BILL, in American politics, an

act sometimes called the Force Bill, passed by Congress 2 March 1833. Its aim was to en¬

force the Tariff Law of 1832, which the legis¬

lature of South Carolina had declared null and void. See United States, Tariff in the.

BLOODY FALLS, the lowest cataract of

the Coppermine River in the Northwest Terri¬

tories of Canada, so named because of a mas¬

sacre here of Eskimos by Chippewa Indians in 1770.

BLOODY MARY, a popular designation

of Mary, Queen of England, on account of the persecutions of the Protestants during her reign (1553-58).

BLOODY SHIRT, a term used about

1880 in Congress to revive the memories of the Civil War by impassioned allusions as <(to wave the bloody shirt.

BLOODY TOWER, a term popularly ap¬

plied to that portion of the Tower of London in which Richard III is alleged to have caused the murder of his nephews, Edward V and the Duke of York.

BLOOM, the powdery or waxy protective

film upon fruits, as grape and plum, and upon leaves and stems, as cabbage. It is especially noticeable upon desert plants. See also

Xerophytes.

BLOOM, a lump of puddled iron, which

leaves the furnace in a rough state, to be sub¬

sequently rolled into bars or other form into which it may be desired to convert the metal.

Also a lump of iron made directly from the ore by a furnace called a bloomery. See Iron.

BLOOMER, Amelia Jenks, American re¬

former: b. Homer, N. Y., 27 May 1818; d.

Council Bluffs, la., 30 Dec. 1894. She was mar¬

ried in 1840 to Dexter C. Bloomer of Seneca Falls, N. Y., where for several years she and her husband were engaged in publishing a

semi-monthly periodical. In 1849 she began

publishing The Lily in the interests of temper¬

ance reform and women's rights; in 1853, on removing to Mount Vernon, Ohio, she resumed its publication there, and also became associate editor of The Western Home Journal. In 1855

the couple removed to Council Bluffs, Iowa, where Mr. Bloomer became an organizer of the Republican party in that State and a Federal official and a judge. She carried on her reform¬

atory work for many years. Mrs. Bloomer is remembered chiefly because of her personal

adoption and her active advocacy of a cos¬

tume which had been devised by Mrs. Eliza¬

beth Smith Miller and which became more

popularly known as the Bloomer cos¬

tume (q.v.).

BLOOMER COSTUME, a style of dress

introduced about the year 1849 by Mrs. Amelia Jenks Bloomer (q.v.), who proposed thereby to effect a complete revolution in female dress and add materially to the health and comfort of her sex. It consisted of a jacket with close sleeves, a skirt reaching a little below the knee and

a pair of Turkish pantaloons secured by bands around the ankles. Though adopted rather ex¬

tensively in America, it was unable to hold its ground against the united strength of prejudice and ridicule, and abroad it scarcely made fur¬

ther way than furnishing a favorite subject of burlesque on the stage and of ridicule in the pages of the comic papers. One or two “strong-minded® women who ventured to brave public

opinion in London by donning the new costume were persecuted by the mob. This movement,

however, led the way to more rational dress and to the divided skirt. The bloomer is now used for athletic and gymnastic exercises only.

BLOOMFIELD, Joseph, American sol¬

dier: b. Woodbridge, N. J., about 1755; d. Bur¬

lington, N. Y., 3 Oct. 1823. When the Revolu¬

tionary War broke out he was studying law

but joined the cause of the colonists with en¬

thusiasm. In 1776 he received a captain’s

commission in the 3d New Jersey regiment,

served with distinction throughout the war and was mustered out a major. Resuming his legal studies, he acquired a successful practice in Burlington, was elected attorney-general and

twice (1801, 1812) governor of the State. Dur¬

ing the War of 1812 he commanded a brigade.

From 1817 to 1821 he was a representative in Congress, and as chairman of the committee

on Revolutionary pensions he reported the bill granting pensions to soldiers of the Revolu¬

tionary army. In 1793 he was appointed a trus¬

tee of Princeton and during his eight years'

membership of the board did much to promote the interests of that college.

BLOOMFIELD, Maurice, American ed¬

ucator: b. Bielitz, Austria, 23 Feb. 1855. He studied at the University of Chicago, 1871-74; Furman University, 1876-77 ; fellow of Johns Hopkins, 1878-79; received degree of Ph.D.

from the latter in 1879 and from Berlin and Leipzig in 1879 and 1881, respectively; LL.D., Princeton University, 1896; has been professor of Sanskrit and comparative philology at Johns Hopkins since 1881 ; is member of the Royal Bohemian Society, honorary member Finno-Ugrian Society (Helsingfors) ; member of the American Oriental Society, the American Phi¬

lological Association, the National Institute of the Social Sciences; fellow of the American Academy of Arts and Sciences and member of the advisory council of the Simplified Spelling Board. He edited for the first time from the original Sanskrit manuscript the (Grihyas-amgraha) of Gobhilaputra, and the (Sutra of Kaugika) ; translated the (Atharva-Veda >

(1899) in the (Sacred Books of the East.* He published 'Uerberus, the Dog of Hades* (1905) ; (A Concordance of the Vedas) (1907) and (The Religion of the Veda) (1908) ; and has also contributed to numerous learned journals and reviews on subjects connected with the history, religion, language and literature of ancient India; on Sanskrit, Greek, Latin and compara¬

tive grammar; on ethnology and the science of religions.

BLOOMFIELD, Robert, English poet:

b. Honington, Suffolk, 3 Dec. 1766; d. Shefford, 19 Aug. 1823. He learned to read at the village school, and in 1781 was sent to learn the trade of a shoemaker with his brother in London.

The visiting of several places of worship, a de¬

bating society, Covent Garden Theatre, and

the reading of sundry books, called forth his faculties, and he became almost unconsciously a poet. Hearing him one day repeat a song which he had composed, his astonished brother prevailed on him to offer it to the London Magazine, and it was accepted. The piece was called (The Milkmaid. 5 A second, (The Sailor's Return,* likewise found a place in that journal.

Thomson's (Seasons,* (Paradise Lost,* and

other works of this kind, now became the sub¬

jects of his constant study. In the country, where he resided for a short time in 1786, he first conceived the idea of his poem, (The Farmer's Boy,* which is characterized by a

spirit of rural simplicity and innocence. It was written under the most unfavorable circum¬

stances, in a garret. It was first shown to Capel Lofft in 1798, who was so much pleased with it that, in conjunction with his friend Hill, he had it printed in 1800. Bloomfield was patronized by the Duke of Grafton, who be¬

stowed on him a small annuity and made him an under-sealer in the seal-office. This situa¬

tion he was forced to resign on account of ill health. He then worked again at his trade as a shoemaker, and employed himself in con¬

structing Hfolian harps. Engaging in the book trade he became a bankrupt, and in the latter part of his life was afflicted with violent head¬

aches and became nearly blind. He was grad¬

ually reduced to such a state of nervous irrita¬

bility that apprehensions were entertained of his becoming insane. These fears were termi¬

nated by his death. Consult Hart, Selections from Correspondence* (London 1870) and

Weston, (Works of Robert Bloomfield) (Lon¬

don 1824).

BLOOMFIELD, William Ernest, Eng¬

lish Baptist clergyman : b. Rayleigh, Essex, 23

Oct. 1862. He was minister of Elm Road Bap¬

tist Church, Breckenham, from 1884 to 1886, and minister of Turret Green Church, Ipswich, the following 10 years, and the Red Church, Coven¬

try, for the next 10 years. He is noted as a Hebrew and Greek scholar. He was fellow

Senatus Academicus (1897) for proficiency in those languages, especially with their relation¬

ship to the literature of the New Testament.

He was also first prizeman in the University of London (1900) at the Further Scriptural

Examination. Since then he has contributed

notable studies along the same lines.

BLOOMFIELD, Ind, town and county-seat of Greene County, 75 miles southwest of Indianapolis, on the Illinois Central, the Chi¬

cago, Indianapolis and Louisville and the

Evansville and Indianapolis railroads, and on the White River. It has an extensive trade in agricultural products, coal, lumber and live stock; contains a Carnegie library, flouring mills, lumber factories and manufactories of chairs, tools and novelties, of steel, iron, wood and clay. Pop. 2,069.

BLOOMFIELD, Iowa, city, county-seat

of Davis County, on the Burlington and the Wabash railroads, seven miles northwest of

Keokuk. It is the trading centre of a busy agricultural region and maintains municipal

water works and electric-lighting plant. It is the seat of the Southern Iowa Normal School, and has a Carnegie library and a fine high school building. Pop. 2,028.

BLOOMFIELD, N. J., a township in Es¬

sex County, on the Delaware, L. & W., and the Erie railroads, the Morris Canal, and trolley lines connecting with Newark, which it directly adjoins, the. Oranges, Jersey City and other cities, 10 miles northwest of New York. It was founded in 1675, under the name of Wat-sessing, and received its present name from Gen. Joseph Bloomfield in 1796. The First

Presbyterian Church, the oldest in the town, dates from this year. Bloomfield was a part of BLOOMINGTON — BLOOR

Newark until 1912, when it was incorporated as a separate township. It once ranked as an educational centre and is now the site of a German theological seminary (Presbyterian,

opened 1869). It has a fine Mountainside Hos¬

pital, the Jarvis Memorial Library, the Job Haines House for Aged

Men and Knox Hall.

The “commons,8 dating from Revolutionary

days, has been enlarged into a fine public park.

The town contains the residences of many New York business men; and is engaged in the man¬

ufacture of church and cabinet organs, woolen goods, hats, shoes, rubber goods, tissue and pho¬

tographic paper, saddlery, hardware, lamps,

pins, brushes, cod-liver oil, electric elevators and a variety of brass goods. The United

States census of manufactures for 1914 re¬

corded 57 industrial establishments, employing 4,100 persons, of whom 3,177 were wage earners, receiving annually $1,644,000 in wages. The

capital invested aggregated $8,793,000, and the year’s output was valued at $8,358,000 : of this $4,998,000 was added by manufacture. It has a national bank, daily and weekly newspapers, and an assessed property valuation of nearly $4,-

000,000. The government, under a charter of 1900, is vested in a mayor and town council.

Pop. (1920) 22,019. Consult ‘Bloomfield Old

and New,* edited by T. F. Folsom (Bloomfield 1912).

BLOOMINGTON, Ill., city and county-

seat of McLean County, situated near the geo¬

graphical centre of the State, 126 miles south of Chicago and on the Illinois Central, Chicago & Alton, Big Four and Lake Erie & Western railroads. Bloomington is in the heart of the famous Illinois corn belt, surrounded by

one of the richest and most productive agri¬

cultural sections in the world, where the largest nurseries in the State, comprising over 1,000

acres, are located. It is engaged in the manu¬

facture of farm implements, flour and feed, stoves and furnaces, brick and tile, canned goods, harness, store fixtures and portable

elevators; has a coal shaft lifting 700 tons of coal per day, ornamental iron works and cigar factories, a brewery and a pork-packing estab¬

lishment. There are seven banks — three na¬

tional and four State — with a combined capital and surplus of $1,815,000, and deposits of

$8,000,000. The city has three beautiful parks and is noted for its fine brick pavements and beautiful drives, having more than any other city of its size. There are 32 churches of all denominations, a fine public school system, with a high school, 12 grammar schools, three

parochial schools and several excellent private schools ; a commercial college, a college of oratory and three of music. Bloomington has one of the largest and best selected public libraries in the State and several law libraries.

The Illinois Wesleyan University (q.v.) and the Soldier's Orphan Home are located here, and the Illinois State Normal University (q.v.), which has long been known as one of the best institutions in the Union for the education of teachers, is situated at Normal, a suburb about two miles distant from the courthouse, and con¬

nected by electric railway. Among the public buildings are a large courthouse, four opera houses, and several commodious public halls.

The city was first settled by pioneers from New England and Kentucky and became a borough

in 1831 and was incorporated in 1851. The

government is vested in a mayor and a

board of four commissioners elected biennially.

The city has an electric railway system, operat¬

ing over 20 miles of track, and a well-trained fire department; is lighted by gas and electricity and controls its water works. Pop. (1920)

28,725.

BLOOMINGTON, Ind., city and county-seat of Monroe County, on the Chicago, Ind. &

L. and the Indianapolis Southern railroads, 50

miles south of Indianapolis. It is in a lime¬

stone and quarry region ; is the seat of the Indiana State University (q.v.) ; and besides its farming and quarrying interests has flour, saw and planing mills, and important manufactur¬

ing concerns, especially in the lines of leather, hardware, furniture, baskets, glass novelties, creosoted paving blocks, storage batteries and brooms. The United States census of manu¬

factures for 1914 recorded 40 industrial estab¬

lishments of factory grade, employing 1,180 per¬

sons, of whom 1,059 were wage earners, receiv¬

ing annually $581,000 in wages. The capital in¬

vested aggregated $2,407,000, and the value of the year's output was $2,329,000 : of this, $959,-

000 was the value added by manufacture. The city has the Monroe County Library, a court¬

house, theatre, hospital, a national bank, several daily and weekly periodicals, and a property valuation of over $1,500,000. It was settled in 1818 and was incorporated as a city in 1876.

The government, under a general State law, is vested in a mayor, elected every four years, and a council. Pop. (1920) 11,595.

BLOOMSBURG, Pa., town and coimty—

seat of Columbia County, on the Susquehanna River, the Pennsylvania Canal, and on the

Pennsylvania, the D., L. & W., the Philadel¬

phia & R., the Bloomsburg & S., and the Sus¬

quehanna, B. & B. railroads, 40 miles west of Wilkesbarre. It is in an iron and limestone region, and contains a number of iron furnaces and foundries, silk, carpet, hosiery and woolen mills, brick plants, machine and woodworking shops, match, broom and furniture factories.

There are three national banks with a combined capital of $3,500,000. Bloomsburg is the seat of the State Normal School and has an excel¬

lent public school system, including a high school and two grammar schools. There are

eight churches. Of interest are the town-hall, the public library, the courthouse and the athletic park and playground. Ten squares of the city's streets are paved, the others being of macadam. The water supply is from a moun¬

tain stream. The assessed property valuation is about $3,000,000. ‘ The government is by mayor and council, under a special act of the legisla¬

ture of 1870. Receipts in 1915 approximated $32,000, expenses $41,100. Pop. 7,413.

BLOOR, Alfred Janson, American archi¬

tect: b. 1828; d. Stonington, Conn., 19 Nov.

1917. He was one of the founders and a life member of the Metropolitan Museum of Art,

New York city, and designed many of the

largest buildings in that city half a century ago.

He became a fellow of the American Institute of Architects in 1861, and for over 50 years was actively engaged in its official capacities.

He was a member of the Willard Architec¬

tural Commission in 1886; a life member of the American Numismatic Society; an honor-118

ary and corresponding member of the Royal

Society of Portuguese Architects and Archae¬

ologists ; and of the English Royal Society of Arts. During the Civil War he acted as assist¬

ant secretary to the United States Sanitary Commission. He wrote Architectural and

other Art Societies of Europe, with Sugges¬

tions for an Architectural Art Society and

Branches in America) (1868) ; ‘Woman’s

Work in the Civil War > (1866) ; a large num¬

ber of monographs on various topics and trans¬

lations of poetry in several languages.

BLOUET, bloo-a, Leon Paul (Max

O’Rell), French lecturer and author: b. Brit¬

tany, France, 2 March 1848; d. Paris, 25 May 1903. In early life he was an officer in the French army, fought in the Franco-Prussian

War of 1870-71, but in 1873 went to England as newspaper correspondent. Later (1876-84)

he taught at Saint Paul’s School and in the University of London. After the publication

of his first book, ‘John Bull and His Island) (1883), he abandoned teaching and devoted

himself to literature. His works include ‘John Bull and His Daughters) (1884) ; ‘Friend

MacDonald) (1887) ; ‘Jonathan and His Con¬

tinent) (1888, with Jack Allyn) ; ‘A French¬

man in Americaˆ (1891) ; ‘John Bull & Co.*

(1894) ; English Pharisees and French Croco¬

diles * (1892) and similar works which had a wide circulation throughout the English-speak¬

ing world. His works, written in French, were translated by his wife. His works are humor¬

ous and truthful but are not careful studies.

In 1900, appeared his ‘Femme et artiste, * fol¬

lowed by ‘Sa Majeste l’Amour* (1901), and,

after his death, by ‘ConfidentieP (1904). In 1887 and 1890 he lectured in America ; in 1893

with his wife and daughter he made a round of the English colonies, his readiness as a speaker and lecturer ensuring him a welcome everywhere. In 1902 he settled in Paris as correspondent of the New York Journal and

wrote in the Figaro in support of the entente cordiale between England and France. Toler¬

ant, shrewd and impartial Blouet could mix

much flattery with his witty banter. Consult ‘Men and Women of the Time.*

BLOUNT, James H., American legislator :

b. Macon, Ga., 12 Sept. 1837 ; d. Macon, Ga., 9

March 1903. He was graduated from the Uni¬

versity of Georgia in 1857 ; studied law and was admitted to the bar in 1858. He first came into public notice in 1865, when, after having served in the Confederate army, he was a delegate to the Georgia Constitutional Convention. There¬

after he devoted himself to the practice of law until 1872, when he was elected to Congress from the 6th District of Georgia. He held his seat bv successive re-elections till 1893, when he declined a further term. As he finished his last term the House paid him the unusual honor of suspending its proceedings to give the mem¬

bers an opportunity to testify to their apprecia¬

tion of his worth. In his last term he was chairman of the committee on foreign affairs, and his familiarity with American relations with other countries led President Cleveland to ap¬

point him commissioner paramount to Hawaii

in March 1893, for the purpose of investigating the deposition of the royal government and the establishment of the American protectorate over the kingdom. On his arrival in Honolulu he at once caused the American flag to be hauled down from the Provisional Government House,

and the United States marines to be withdrawn from the locality. This proceeding led to con¬

siderable excitement in the United States ; the withdrawal of United States Minister Stevens from Honolulu; the appointment of Commis¬

sioner Blount as his successor; and a renewal both in Washington and Honolulu of the agita¬

tion for the annexation of Hawaii to the United States. On the completion of his mission

Minister Blount retired to his large Georgia es¬

tates. See Hawaii.

BLOUNT, William, American statesman :

b. Bertie County, N. C., 26 March 1749; d.

Knoxville, Tenn., 27 March 1800. He took part in the battle of Almanace in 1771, became an officer in the Continental army and was a mem¬

ber of the State assembly at intervals from 1780 to 1790. He was a delegate to the Con¬

tinental Congress in 1782, 1783, 1786 and 1787; a framer and signer of the Federal Constitu¬

tion of 1787; a member of the State Ratification Convention in 1789, and negotiated treaties with the Cherokee, Choctaw and Chickasaw Indians

in 1786. He served as governor of the territory south of the Ohio River and as superintendent of Indian affairs under Washington 1790-96.

In the latter year he was president of the Tennessee State Constitutional Convention and on the admission of Tennessee took his seat in the United States Senate, 5 Dec. 1796. In the Senate he was accused of criminal designs in projecting a conspiracy with Great Britain,

seeking to prevent Spain from ceding the terri¬

tories of West Florida and Louisiana to France.

He was expelled from the Senate, 8 July 1797, pending the trial of his case, which was finally dismissed in 1799. The scheme is known in

United States history as “Blount’s Conspiracy.®

Blount afterward served as State senator. Con¬

sult Wright, Marcus J., ‘Life and Services of William Blount* (1884) and article by Mrs. M.

J. Lamb in Magazine of American History

(Vol. XIII, New York 1884).

BLOW, John, English composer and musi¬

cian: b. North Collingham, Nottinghamshire,

1648; d. 1708. He was trained at the Chapel Royal under Capt. Henry Cooke; became or¬

ganist of Westminster Abbey at the age of 21, and in 1676 also organist of the Chapel Royal, and obtained the degree of doctor of music.

In 1680 he resigned his post in Westminster Abbey to his pupil Purcell. He was master of the choristers at Saint Paul's Cathedral from 1687 to 1693. In 1699 he was appointed com¬

poser to the Chapel Royal. He was a volumi¬

nous composer, but many of his works have

never been printed. Among his sacred pieces are upward of 100 anthems, 14 church services and various other compositions. He published 'Lessons for the Harpsichord) (1698). A

number of his secular compositions for one, two or three voices, with accompaniment, were pub¬

lished under the name of 'Amphion Anglicus) (1700).

BLOW, Susan Elizabeth, American edu¬

cator : b. Saint Louis, Mo., 1843; d. New York, 26 March 1916. She was educated in her native city and in Germany, where she studied the kindergarten system. She returned to the

United States in 1873, a staunch disciple of BLOW-FLY — BLOWING MACHINES

Froebel and his method. She was imbued with a feeling that public school kindergartens in this country were a necessity, and she estab¬

lished one in Saint Louis, which was soon ad¬

judged successful, and (<play, art, work® be¬

came an actuality for small children. The idea spread rapidly and Miss Blow opened in Saint Louis a school in which to train kindergarten teachers, with post-graduate courses for those interested in the deeper theories of child edu¬

cation. She kept at her work in Saint Louis until 1886 when she withdrew because of ill-health. During her enforced rest she wrote

(Symbolic Education.* When her health im¬

proved she began a course of lectures describ¬

ing her theories of child education. She con¬

sidered her work of true interest only to

teachers and other educators. She is considered to have been the (<mother of the kindergarten®

in the public schools of the United States, and, after Froebel, one of the greatest of child edu¬

cators.

BLOW-FLY, a common fly belonging to

the family Muscidce. It is the large, noisy fly which enters houses, and was named Calliphora vomitoria by Linnaeus. It is black on the head and thorax, while the abdomen is steel-blue. It is similar to the flesh-fly in habits, but instead of living larvae it deposits its eggs, which are long and cylindrical, in stacks (<(fly-blows®) on meat, cheese, *etc.* The larvae hatch in 24 hours ; they become fully grown in probably five or six days, and transform into pupae enclosed by a brown shell (puparium), formed by the drying and contraction of the larval skin. Oily or greasy substances are avoided by them, and by all other flies, and a cloth dipped in kerosene oil and suspended in a room will keep them from entering it. Another blow-fly is Calliphora erythrocephala, common to Europe and North

America. See Flesh Fi.y.

BLOWGUN, a weapon formerly used by

the Indians inhabiting the shores of the Gulf of Mexico, by the Iroquois of New York, and still employed by some of the Indian tribes of South America, and by the Malays of the East Indies, both in war and for killing game. It consists of a long, straight tube in which a small poisoned arrow is placed, and forcibly expelled by the breath. The tube or blowgun, called g ravatdna, puncuna, etc., is 8 to 12 feet long, the bore not generally large enough to admit the little finger. It is made of reed or of the stem of a small palm. A sight is affixed to it near the end. The arrows used are 15 to 18

inches long, made of the spines of another palm, sharply pointed, notched so as to break off in the wound, and their points covered with curari poison. A little soft down of the silk-cotton tree is twisted round each arrow, so as exactly to fit the tube.

BLOWHOLE. See Spouting Horn.

BLOWING MACHINES. The term

blowing machine or blower is applied to various forms of mechanical arrangements employed

for the production of artificial currents of air for ventilating purposes, for forced draught for furnaces, *etc.* They are also employed as ex¬

hausters for the removal of smoke and fumes from smelting works, foundries, etc., for the removal of sawdust and wood planings from

saw mills and planing mills, and for handling such material as emery, coffee, metal filings, *etc.*

The various forms of blowers may be con¬

veniently divided into the following general classes :

Bellows. — These comprise the earliest

forms of blowing machines and are also the most familiar at the present time. In their earlier forms, still used in some Oriental coun¬

tries, they consisted of simple bags of skin each equipped with a valve and nozzle. A more

elaborate application of the same principle is found in the ordinary domestic bellows and

those used in the blacksmiths' shops.

Piston Blowers. — The simplest form of a

piston blower consists of a square wooden

chamber with a close fitting piston working within it. When the piston is drawn backward, air is sucked into the chamber through a flap valve, and when the piston is pushed forward this air is compressed and forced out through the nozzle.

Blowing-Engines. — The air pump or air

compressor used for producing low pressure

represents the modern form of piston blowers.

Various types of these machines are extensively used for supplying the air blast to the cupolas of blast furnaces, Bessemer converters, *etc.*

They are driven by either steam, gas or water power, and are then commonly known as blow¬

ing-engines. A machine of this type usually consists of a power cylinder operating a piston either by steam or gas, and an air compressor cylinder which delivers the compressed air into the blast pipes. In the horizontal engines, the two cylinders are placed tandem to each other with the compressor cylinder in front. In the vertical engines, the compressor cylinder is usually placed on top of the power cylinder.

The pistons of both cylinders are carried on a common piston rod, and the engines are usually provided with heavy flywheels to insure steady operation.

In many forms of steam blowing-engines,

the power cjdinders are compounded, while

those of gas engine installations are often made double-acting, and sometimes two power cylin¬

ders placed tandem to each other and to the compressor cylinder are successfully employed.

The recent discovery of the suitability of

blast furnace gas, i.e., the gas which passes out of the top of blast furnaces employed for the smelting of iron ores, has greatly tended to¬

ward the development of large gas engines

specially adapted for blowing purposes. _ Up to the year 1900, the largest engine of this type was a Cockerill engine of about 600 horse

power, but since then, the capacities of these machines have been greatly increased, and

engine units developing many thousand horse

power are being built in the United States and in Europe for this purpose. See Internal

Combustion Engines.

Rotary Blowers. — This type of machines

includes various forms of disc blowers and

fans which are generally used for ventilating purposes. See Coal Mining Machinery.

The disc blowers are built in sizes ranging from one to ten feet in

diameter, and are ca¬

pable of delivering from 1,000 to 250,000 cubic feet of air per minute, according to their size and the number of revolutions per minute at which they are operated. _ .

Disc blowers are often called fans, but it is 120

well to understand that in the former the blades are Set at an angle to the axle, while in a fan blower proper the blades are set parallel to the axle on radial spokes in a manner similar to the setting of the paddles on a paddle wheel. These blades may be either flat or curved in both cases, and are arranged to revolve in a steel or cast iron casing or shell so designed that the air is sucked in through a larger or smaller orifice at the side and forced out through an outlet leading from the periphery.

The ordinary pressure blowers are merely

another form of fan blowers. They were orig¬

inally designed for use with cupola furnaces, and forges, but are also extensively used for producing mechanical draught for the furnaces of boilers, for use with, mechanical stokers, sand blast machines, pneumatic tube delivery systems, etc., or for any work requiring pressures as high as 16 ounces per square inch.

The fan wheels are usually made of thin

galvanized steel, and are enclosed in a shell of cast iron. The larger sizes are usually provided with two ‘driving pulleys, and are usually made to discharge horizontally at the bottom, but they can be built in any other of the four right Fig. 1. — Pressure Blower.

Positive Blowers.— These machines are a

more recent form of the rotary blowers, and are very extensively used for operating high pressure forges, blow-torches, gas furnaces, low pressure sand blasts, small pneumatic tube

systems, and similar purposes requiring a

capacity ranging from 25 to 150 cubic feet of air per minute at a pressure ranging from four io eight ounces. They can be driven by direct connection engines and electric motors, or by power driven belting, and the principle of rotary motion applied to air under hign pressure ap¬

pears to eliminate a great deal of the incidental friction, so that when high efficiencies can be obtained they are preferable to fans and blow¬

ing engines.

These machines consist of an outside casing or cylinder of cast iron provided with massive head plates which carry the journal boxes as shown by Fig. 2, which illustrates a horizontal blower geared to an electric motor on the same bed plate. Within this casing, two impellers revolve on horizontal shafts which are con¬

nected by gear wheels outside the casing,

thus giving them an invariable relative motion.

The contact surfaces of the impellers are

formed pn mathematically correct lines, and

they revolve together with uniform clearance and without metallic contact either with each other or with the enclosing casing, thus pre¬

venting internal friction. There are no waste Fig. 2. — Positive Blower.

spaces between the impellers to cause the

formation of air pockets, and no sharp corners or edges to produce sound vibrations, and as the impellers are symmetrical relatively to their shaft centres, they remain perfectly balanced at all speeds.

High Pressure Positive Blowers. — In this

type, where the heat of compression constitutes an element of danger, the entire casing and journal boxes are wrater jacketed, and complete water circulation is maintained through the im¬

pellers and the casing during operation in order to prevent expansion under the temperatures

due to the high pressures of compression. The water is forced into the impellers at one end through a hole drilled into the centre of the shaft, and out at the other through a similar passage.

These machines will maintain a pressure

ranging from seven to ten pounds per square inch. In some designs a spray of water is used to pack the machines so as to prevent the air from escaping backward, and also for the pur¬

pose of absorbing the heat due to compression.

This water is carried over into a separating tank and drained off automatically. This

method enables the attainment of an efficiency under high pressures fully as high as that at¬

tained under pressures ranging from three to four pounds. See Heating and Ventilating;

Air Compressor.

BLOWITZ, blo-vitz, Henri Georges

Stephane Adolphe Opper de, French journal¬

ist: b. Pilsen, Austria, ‘28 Dec. 1825; d. Paris, 18 Jan. 1903. He settled in France; was suc¬

cessively appointed professor of German in the Lycee of Tours and at Limoges, Poitiers and Marseilles; was naturalized a French citizen in 1870; and became the Paris correspondent of the London Times in 1871. Laurence Oliphant was then the correspondent at Paris, and de Blowitz became his assistant. During the war of 1870-71 Oliphant was excluded from Paris during the siege by the Germans, but de Blo¬

witz, by means of carrier pigeons, balloons and numerous ingenious devices, kept his chief out¬

side the city walls informed as to what was go¬

ing on within the beleagured city. For infor¬

mation sent to the French government which

aided in suppressing a Communistic rising in Marseilles, he was decorated with the Cross of the Legion of Honor. He was noted for his success in obtaining secret and important infor¬

mation long before it was ready for official BLOWPIPE — BLOWPIPE ANALYSIS

promulgation. He was one of the first to see the value of the ˆinterview® ; and his reputation was enhanced by interviews with exalted and eminent personages. Many of his disclosures in his letters to the Times, such as the text of the T reaty of Berlin, which he forwarded before it had been signed, created much excitement throughout Europe. He contributed more than

4,000 columns to the Times. He published

(Feuilles volantes) (1858); HAllemagne et la Provence) (1869); (Le mariage royal d’Espagne) (1878) ; (Une course a Constantinople) (1884). An English translation of his memoirs appeared in 1904.

BLOWPIPE, a tube or pipe arranged to

blow air or a gas against a flame, as of a gas-jet, so that it may be concentrated upon a small surface. Its most usual form is described in the article on blowpipe analysis (q.v.). It is employed by jewelers and goldsmiths in the

work of soldering, and by other workers on small metallic objects; by the glassblower in making thermometers, barometers and other

glass instruments ; by the enameler ; and in¬

deed wherever it is required to subject a small body to a strong heat. It has undergone a variety of improvements in the hands of the chemist, to whose researches it has proved an excellent auxiliary. Wollaston's portable blow¬

pipe is formed of three pieces fitted into one another when in use, but which may be taken down and made to slide within each other.

Most laboratory blowpipes have a hollow bulb or enlarged part at the end, to condense the vapor of the breath. To prevent corrosion from moisture, the bulb is made of silver, sheet-tin or the like. Sometimes two pipes are mounted on a table so that both may be directed on the same object, a bellows under the table furnish¬

ing the power. A little practice is necessary to enable the operator to keep up a constant blast for any length of time, the current of air be¬

ing propelled through the pipe by the muscular exertion of the checks, while respiration is carried on through the nose. But when the

process has to be long continued, the current of air is supplied by bellows. This is the form commonly used by glassblowers. The gas blow¬

pipe, commonly called the oxyhydrogen blow¬

pipe, is a very important and intensely powerful variety, whose structure is due to Mr. Newman of London. Sir Humphrey Davy suggested the

employment of other gases instead of common air, and Dr. Clarke of Cambridge adopted the suggestion. Dr. Clarke found that a mixture of two volumes of hydrogen and one of oxygen

produced an intense heat. These gases are con¬

tained in a bladder attached to the end of a pipe which leads into a vertical cylinder, in which is fitted a piston, working through a collar at the top. By the action of this piston the gas from the bladder is compressed into a copper chamber, and thence issues to the flame through an ordinary blowpipe nozzle. To guard against explosions, the gases are kept in separate holders, and by means of valves in the burner are mixed only at the instant of burning. There are various other forms of blowpipe, and many uses to which they may be applied. One of the most unique is the electric blowpipe, which sends a stream of air or gas particles from the point of a charged conductor. For information on the subject consult Plattner, (On the Blow¬

pipe,)

BLOWPIPE ANALYSIS, a branch of

chemical analysis in which the composition of the substance under examination is inferred

from its behavior when subjected to certain flame tests. The blowpipe itself commonly con¬

sists of a tapering brass tube about eight inches i°n&> provided with a bell-shaped mouthpiece at one end, and at the other with a nozzle that is turned at right angles to the general length of the instrument. The nozzle should be tipped with platinum, and provided with a very minute perforation through which the operator blows a tiny blast of air that drives the flame of his lamp against the object to be analyzed. The flame used in blowpipe work should not be

round and colorless, like those of spirit lamps and Bunsen burners, but should be flat and luminous, containing plenty of free, incandes¬

cent carbon. A large candle-flame serves very well, although it is not flat. Usually a gas-flame is employed, in connection with a burner formed by flattening a piece of brass tubing, and then cutting it off at the top, at an angle.

When the blowpipe is. in service its tip is in¬

troduced into the flame of the lamp, which the air-blast deflects laterally in the form of a long, almost non-luminous cone, which

consists of two visibly different portions. The inner part is somewhat brighter, and is richer in unoxidized gases. The outer layer, being more plentifully supplied with oxygen, consists almost entirely of completely oxidized gases. The outer por¬

tion of the blowpipe flame is called the Oxi¬

dizing flame,® since this part, when directed against the specimen under examination, heats it while it is in contact with the air, and causes it to oxidize, if it is capable of doing so at the temperature that is attainable by the blow¬

pipe. The inner portion of the flame is called the ˆreducing flame,® from the fact that when the specimen is exposed to this part, it is heated, not in contact with the air, but while surrounded with an atmosphere of partially unoxidized

hydrocarbon gases. Under these circumstances

many metallic oxides give up their oxygen to the hot hydrocarbon gases in which they are bathed, and are themselves reduced to the

metallic form. If a flame still richer in free carbon and unconsumed hydrocarbons is de¬

sired, the tip of the blowpipe is held just out¬

side of the lamp-flame, and a jet of flame with a luminous tip containing particles of solid carbon can easily be thrown down upon the

specimen.

In blowpipe analysis there is no recognized ˆscheme® to be followed out. The method is oftenest used for the determination of minerals, and in such cases the analyst usually has some sort of idea, in advance, of the elements that may possibly be present. The substance to be examined is usually first pulverized, and a por¬

tion of it heated in a tube that is open only at the upper end. If it carbonizes, it contains organic matter of some kind, and the odor that is produced is often a good indication as to whether the organic matter is of an animal or vegetable nature. If the substance, when heated in the closed tubes, gives off water which con¬

denses in the upper part of the tube, the moist¬

ure so condensed should be tested with litmus paper. If it is neutral, the substance is a hy¬

drated compound, or a hydroxide. An acid re¬

action indicates acid salts, and an alkaline one may usually be taken to indicate the presence 122

of compounds of ammonia. If the substance

melts but does not change its color, it is an alkaline or a hydrated salt. If it melts and turns yellow, remaining yellow even after cool¬

ing, it contains oxide of bismuth ; while if it melts to a yellow color, but turns red upon cooling, it contains oxide of lead. If it does not melt, but changes color, the indications are as follows: Yellow, both hot and cold, indi¬

cates stannic oxide ; if yellow while hot, but white when cold, zinc oxide; if black while hot, and reddish-brown when cold, ferric oxide; if black while hot, but bright red when cold, mer¬

curic oxide. If gas is evolved, its nature should be determined. Oxygen may be detected by the kindling of a glowing splinter of wood inserted into the tube ; carbon dioxide by its extinguish¬

ing such a spark promptly; carbon monoxide by the gas burning with a bluish flame when ignited at the mouth of the tube ; sulphur dioxide, ammonia and cyanogen, by the odor. Oxygen

indicates chlorates, peroxides, *etc.* ; carbon diox¬

ide indicates carbonates or oxalates; carbon monoxide indicates oxalates or formates; sul¬

phur dioxide indicates certain sulphites or sul¬

phates ; cyanogen indicates cyanides ; and ammo¬

nia indicates some compound of that substance.

If the gas is reddish-brown in color, bromides, nitrates or nitrites, are probably present ; if it is violet, an iodide is indicated. A sublimate may also be deposited upon the tube. If the sublimate is black, or nearly so, selenium or mercuric sulphide are indicated ; if yellow, sul¬

phur or a sulphide; if white, a salt of ammo¬

nia or mercury, a volatile organic acid or an oxide of antimony or arsenic. Gray metallic globules indicate mercury, and a metallic mir¬

ror may represent either antimony or arsenic.

When the substance is heated in an inclined tube, open at both ends, similar indications are to be observed; modified somewhat, however, by the fact that oxygen can now pass up through the tube and come in contact with the specimen under examination. Thus sulphides are com¬

monly oxidized in the open tube, arsenic will sublime as the trioxide and not as the metal, and selenium gives a sublimate that may be gray or red, and also a strong odor of horse¬

radish.

The color that the specimen communicates

to the non-luminous part of the flame is like¬

wise of great service in determinations by the blowpipe. A piece of platinum wire, bent at the end into a small loop, is dipped in hydrochloric acid and held in the flame, this process being re¬

peated several times until the analyst is con¬

fident that the wire itself is free from any sub¬

stance that can color the flame. The little loop at the end is then brought into contact with some of the finely pulverized specimen, and introduced into the flame again. Sodium gives a strong ˆsting yellow ; calcium an orange red ; litEIum and strontium a crimson ; potassium a lavender ; barium an apple green ; thallium, cop¬

per and boracic acid a brighter green ; lead and antimony a pale blue ; selenium a deep blue.

The yellow due to sodium is so powerful,

even when that metal is present only in slight amounts, that the colors due to the other metals present are sometimes difficult to observe by the unaided eye. Hence colored glasses are

often used, through which to take note of the flame color; the tint of the glass being selected so as to cut off the yellow light of the sodium, while allowing the particular color that is sought to pass through unobstructed. Cobalt

blue glass, for example, is used in this way in testing, by flame coloration, for potassium.

When a sample of the specimen to be ana¬

lyzed is heated upon charcoal, it is often possible to obtain some of the elements that are present, in the form of a metallic bead, by the reduction of their oxides or of the other compounds in which they were originally contained. Lead, tin and silver give beads that are white and mal¬

leable ; copper gives a malleable red bead ; anti¬

mony and bismuth give brittle beads ; and iron, cobalt and nickel may often be obtained in the form of gray, magnetic powders.

While the substance is being heated upon

charcoal, an incrustation commonly forms on

the charcoal, from the character of which useful inferences can be drawn. Thus antimony gives a white incrustation ; bismuth, an incrustation that is deep yellow when hot and lighter yellow when cold; lead, one that is light yellow when hot and deep yellow when cold, and is sur¬

rounded by a white border ; arsenic gives a white incrustation that is very volatile ; and with zinc the color is yellow when hot and white when cold.

Many metallic oxides are soluble in melted

borax, and valuable color indications are ob¬

tained by heating small quantities of the sub¬

stance in little beads of melted borax, that are held in the flame upon tiny loops of platinum wire. The phenomena that are observed in this way are quite complicated, however, and for an account of them the manuals on blowpipe analysis should be consulted. Consult Corn¬

wall, (Manual of Blowpipe Analysis5 ; Moses and Parsons, (Elements of Mineralogy, Crystal¬

lography, and Blowpipe Analysis5 ; Dana, (Min¬

erals and How to Study Them.5

Charles H. Cochrane.

BLUCHER, bl ii-Her, Gebhard Leberecht

von, (Prince of Wahlstadt, val'stat), Prus¬

sian soldier: b. Rostock, 16 Dec. 1742; d. Krie-blowitz, Silesia, 12 Sept. 1819. When 14 years of age he visited the island of Riigen, where the sight of some Swedish hussars aroused a desire to become a soldier, and in spite of the opposition of his parents and relatives he took service in a Swedish regiment as cornet. His first campaign was against the Prussians, and he was taken prisoner by the same regiment of hussars which he afterward commanded. The

commander of this regiment, Colonel vori

Belling, induced him to enter the Prussian

service. An exchange was agreed upon with

the Swedes, and Blucher was made lieutenant in Belling's regiment.

Discontented at the pro¬

motion of other officers over his head, he left ‘

the army, devoted himself to agriculture, and by industry and prudence acquired an estate.

After the death of Frederick II he became a major in his former regiment, which he com¬

manded with distinction on the Rhine 1793-94.

Orchies, Luxemburg, Frankenstein, Oppenheim

(16 Jan. 1794), Kirrweiler and Edisheim in the Palatinate, bear witness to his achievements.

After the battle of Kirrweiler, in 1794, which added greatly to his reputation, he was ap¬

pointed major-general of the army of observa¬

tion stationed on the lower Rhine. In 1802, in the name of the King of Prussia, he took pos¬

session of Erfurt and Miihlhausen. On 14 Oct.

1806, he fought at the battle of Auerstadt. He then, with the greater part of the cavalry, followed the retreat of the Prince of Hohenlohe to Pomerania. His squadron, moving on

the left of the main army, became separated from it, and the Prince of Hohenlohe was

forced to surrender at Prenzlau. Blucher, cut off from Stettin by this accident, threw himself into Mecklenburg, where he joined at Dambeck the corps of the Duke of Weimar, commanded by Prince

William of Brunswick-Oels. All

the troops, however, were too much fatigued to undertake any enterprise. Having the Grand

Duke of Berg on his left flank, the Prince of Ponte Corvo in his front and Marshal Soult on his right, Blucher was obliged to take post behind the Trave in order to draw off the three great divisions of the French forces from the Oder as long as possible. With this view he entered the territory of the free city of Liibeck, which was soon stormed by the French.

Although Blucher escaped with some troops he was obliged to surrender at Ratkau on 6 No¬

vember, but with a clause in the capitulation that he (<accepted it only from want of ammu¬

nition, provisions, and forage." He was soon exchanged for the French general Victor, and on his arrival at Konigsberg was placed at the head of a corps and sent to Swedish Pomera¬

nia to share in the defense of Stralsund and to assist the efforts of the Swedes. After the Peace of Tilsit he labored in the Department of War at Konigsberg and Berlin. He then

received the chief military command in Pomer¬

ania, but at the instigation of Napoleon was afterward dismissed from the service. In the campaign of 1812, when the Prussians assisted the French, he took no part; but no sooner did Prussia rise against her oppressors than Blucher, already 70 years old, engaged in the cause with all his former activity. He was appointed commander-in-chief of the Prussian

army and the Russian corps under General

Winzingerode, which at a later period was

separated from him. In 1813 he was created field-marshal. His heroism in the battle of Liitzen (2 May 1813) was rewarded by the

Emperor Alexander with the order of Saint

George. The battles of Bautzen and Hanau,

those on the Katzbach (26 Aug. 1813) and

Leipzig added to his glory. On the Katzbach Blucher defeated the army of Marshal Mac¬

donald and delivered all Silesia. On 3 October Blucher crossed the Elbe at Wartenburg, and encouraged the Bohemian army under Schwartzenberg. and the northern army under the

Crown-Prince of Sweden, to act with more

spirit. On 16 October he gained a signal ad¬

vantage over Marshal Marmont at Mockern,

forcing his way as far as the suburbs of

Leipzig. On the 18th, in conjunction with the Crown-Prince of Sweden, he contributed

greatly to the defeat of the enemy, and on the 1 9th his troops made the first assault upon Leipzig. His promptitude and peculiar manner of attacking had already procured him from

the Russians the name of “Marshal Forward.”

On 1 Jan. 1814, with the Silesian army, which now consisted of two Prussian, two Russian, one Hessian and one mixed corps, he crossed the Rhine at Kaub, took possession of Nancy on the 1 7th, gained (1 February) the battle of La Rothiere, and pushed forward toward Paris.

His detached corps were, however, checked by Napoleon; yet Blucher, though suffering heavy losses, effected his retreat toward Chalons, lie then crossed the Aisne at Soissons, joined the northern army, obtained (9 March) a victory over Napoleon at Laon, and, in connection with Schwartzenberg, at the close of the month,

pressed forward to Paris. The day of Mont¬

martre crowned this campaign, and on 31

March Blucher entered the capital of France.

For this triumph he was created Prince of

Wahlstadt, with a suitable income. In England, whither he followed the allied monarchs in

June of the same year, he was received with enthusiasm. He then

lived on his estates in Silesia till 1815, when the chief command was again committed to him, and he led his army into the Netherlands. On 15 June Napoleon

threw himself upon him, and Blucher, on the 16th, was defeated at Ligny. In this engage¬

ment his horse was killed, and he was thrown under his body. In the battle of the 18th Blucher arrived at the most decisive moment upon the ground, and, taking Napoleon in the rear and flank, assisted materially in complet¬

ing the great victory of Belle Alliance, or Waterloo (q.v.). He refused the proffered

armistice and forced Paris to surrender ; oppos¬

ing with energy, on his second conquest of the capital, the system of forbearance practised on the former occasion. As he was already a

knight of all the military orders of Europe, the King of Prussia, to reward his new services, created the new order of the Iron Cross ex¬

pressly for him. After the Peace of Paris he retired to his estate, where he died. On the anniversary of the battle on the Katzbach, a monument commemorating his glory, executed

by Schadow in Berlin, was erected at Rostock.

On that of Waterloo (18 June 1826) a bronze statue 12 feet in height, modeled by Rauch, was erected to his memory in Berlin. Blucher was not so eminent for military science as for ability in action. His simplicity, good nature and bravery endeared him to his soldiers, who loved him as a father. His addresses and proc¬

lamations are distinguished for their brevity, precision and simplicity. Consult (Blucher's

Life,* by Varnhagen von Ense (Berlin 1827) ; Scherr's (Bliicher's Life and Times) (Leip¬

zig 1862) ; and Henderson, (Blucher and the Part of Prussia Against Napoleon) (New

York 1911).

BLUE, Victor, American naval officer: b.

North Carolina, 6 Dec. 1865. He was grad¬

uated at the Naval Academy June 1887, and

serving through the grades of ensign and

junior lieutenant, was promoted lieutenant 3

March 1899. At the outbreak of the war with Spain he was ordered to the gunboat Suivanee, and while on duty off the Cuban coast captured two Spanish patrol sloops having on board a heliographic signal outfit. On 11 June 1898 he landed at Aserraderos, passed through the

Spanish lines, proceeded to the hills overlook¬

ing Santiago city and harbor, where he located the Spanish fleet commanded by Admiral

Cervera. On 25 June he made a further reconnoissance and mapped the position of the

Spanish ships. To accomplish these things he traveled a distance of nearly 140 miles, mostly through territory occupied by the intrenchments of the Spanish army. Admiral Sampson

highly commended the manner in which these

tasks had been performed and recommended

that Lieutenant Blue he advanced 10 numbers as a promotion. He was placed in command of the captured gunboat Alvarado, and on 12 Aug.

1898 bombarded the fortifications of Man¬

zanillo. Subsequently he served in China and the Philippines, and later

as flag lieutenant to Rear-Admiral Kempff in the Philippines dur¬

ing the insurrection 1900-01, and in North

China during the Boxer insurrection in 1900; was flag lieutenant to Rear-Adm. Philip H.

Cooper, commander-in-chief of the Asiatic

fleet, 1903-04. He was promoted lieutenant-commander 1905 ; commander 1909 ; and cap¬

tain 1914; served as executive officer of the Bennington and the North Carolina, and as

commander of the Yorktown ; chief of staff

of the Pacific fleet 1910—1 1 , with Rear-Adm.

Chauncey Thomas as commander-in-chief. On

duty with the general board of the navy 191 1—13, and appointed chief of bureau of naviga¬

tion, with temporary rank of rear-admiral 1913.

BLUE, one of the seven primary colors,

of the same shade as the clear sky and the turquoise, and located in the solar spectrum between the green and the violet. The blue pigments commonly employed by artists are

few in number, including native and artificial ultramarine, cobalt, indigo and Prussian blue.

Genuine ultramarine, prepared from the min¬

eral lapis lazuli, and ordinary cobalt blue, sold for artists' work, are permanent colors. They are used either alone, or mixed with other pigments, chiefly for skies and distances in landscape, and by themselves, or to make up grays and other mixed tints in figure painting.

Owing to the exceptionally high price of real ultramarine, the artificial color, which is of doubtful permanency, is usually substituted for it.

Prussian blue and indigo are highly useful colors, since it is only these that yield dark blues, and only from them, mixed with yellows or browns, that strong greens can be obtained.

It is unfortunate accordingly that both are more or less fugitive. All the blues above named are used both in oil or water color painting, but indigo less than the others in oil, since it is most apt to fade in that medium.

A number of different names are used in

commerce for what is essentially the same pig¬

ment, or for pigments closely resembling one another. The following statement gives some

explanation of these : Cobalt blues are mix¬

tures of cobalt with earthy or metallic bases, which have been subjected to the action of heat, and have received the following names : Cobalt blue, cerulean blue, royal blue, Du¬

mont's blue, Saxon blue, Thenard's blue, Leith-ner's blue, Hungary blue, Zaffre or enamel blue, Vienna blue, azure blue and Paris blue. The last name is also applied to a Prussian blue, and azure is also given to a variety of ultramarine blue. Smalt is a powdered cobalt glass used in illumination and flower painting. Arti¬

ficial ultramarine is also called French ultramarine, French blue, new blue and permanent blue. Coarse qualities of this color are largely used by. house painters. Intense blue is a refined indigo. Prussian blue (sesqui-ferrocyanide of iron) is otherwise named Berlin

blue, Paris blue and ferrocyanide of iron. The name Paris blue is also given to a cobalt color.

Antwerp blue is a variety of Prussian blue made lighter by the addition of an aluminous base, and not so permanent. Blue ochre (hy¬

drated phosphate of iron) is a subdued per¬

manent blue, but not much employed. Blue

verditer is a hydrated oxide of copper which changes and ultimately blackens by time. It is used in distemper work and paper staining.

Blue was adopted as their distinctive color by the Scottish Covenanters in the 1 7th century and is the usual color of the uniforms of the soldiers of the United States army for dress uniforms. A dark shade of this color is generally worn by the sailors of most

countries, whence the term navy blue is de¬

rived. The dyestuffs yielding a blue color are the following: Alizarin blue; aniline blue; an¬

thracene blue; chemic blue, a solution of in¬

digo ; Coupier's blue ; dahlia blue ; diamine blues ; ethyline blue ; indigo blue, now made synthetically ; logwood blue ; methylene blue ; night blue ; resorcine blue ; sulphur blues ; and Victoria blue.

BLUE, Prussian. See Dyes.

BLUE BEECH. See Hornbeam.

BLUE BOOKS, the official reports, papers

and documents printed for the British govern¬

ment to be laid before the Houses of Parlia¬

ment. They are so called simply from being stitched up in blue paper wrappers, and include bills presented to, and acts passed by, the houses; reports and papers moved for by mem¬

bers or granted by government ; reports of

committees ; statistics of trade, *etc.* The term is used also in a broad way as descriptive of special reports put forth by the government of any country or its various executive depart¬

ments. In the United States the published lists of government employees and the navy regula¬

tion manual are known as Blue Books and the foreign diplomatic correspondence is commonly issued in Red Books. French official

reports etc., are called Yellow Books; those of Italy are styled Green Books, and those of Spain Red Books.

BLUE BOY, The, a celebrated picture by

Gainsborough, dated 1679; its subject, a boy dressed in a blue satin 16th century costume.

BLUE COAT SCHOOL. See Christ's

Hospital.

BLUE CROSS FUND, a British organiza¬

tion registered under the War Charities Act and supported by voluntary contributions to

perform the same services for horses, dogs and mules on the battlefield as the Red Cross for soldiers. The fund established hospitals in

France equipped with veterinary surgeons and staffs, and sent medical and surgical supplies to Italy, Mesopotamia, Salonica and Egypt.

BLUE EARTH, Minn., city, county-seat

of Faribault County, on the Blue Earth River, and on the Chicago, Saint Paul, Minneapolis &

Omaha Railroad, 130 miles southwest of Saint Paul. Agriculture furnishes the principal in¬

dustries and the city maintains waterworks,

lighting plant and a public library. Pop. 2,319.

BLUE-EYE, a small and favorite species

of honey-eater (Entomyza cyanotis) with a

conspicuous patch of blue about the eyes. It frequents the eucalyptus trees, and has the curious _ habit of depositing its eggs in a neat depression on the top of the big, oven-shaped BLUE-FLAG

nest of a certain starling, whenever it can find a deserted one. Otherwise it constructs a nest lor itself. It is numerous in New South Wales.

Consult Campbell, (Nests and Eggs of Aus¬

tralian Birds' (1910), and Gould, <Birds of Australia' (London 1842-50). See Honey-Eater.

BLUE FLAG. See Iris.

BLUE GRASS, KENTUCKY BLUE

GRASS, JUNE GRASS, MEADOW

GRASS, SPEAR GRASS, a grass (Poa

pratensis) of the family Poacece, native of the cooler parts of the northern hemisphere. The plant is a perennial with very numerous root¬

stocks and long, soft radical leaves. The more or less leafy stems which rise from one to two feet are terminated by a loose pyramidal

panicle three to four inches long. Blue grass forms a dense sod, which

is very resistant to the trampling of stock, upon soils favorable to its growth, and is ranked as the best pasture and lawn grass throughout its range in districts and upon soils adapted to it. It attains its highest development upon limestone soils, and where found growing naturally, is considered to indicate a superior agricultural soil especially useful for stock raising. The Blue Grass re¬

gion of Kentucky, which also extends into Ten¬

nessee, and from which the former State de¬

rives one of its popular names, is of limestone formation, and is noted for its superior, strong¬

boned, well-formed stock, especially horses.

Upon soils other than limestone this grass does not produce so well and upon sandy soils it usually fails. Blue grass hay is of high quality, but is produced in too small amount to pay as well as other hay grasses. The hay cut when the seed is in the milky stage has the following composition: Nitrogen-free extract, 34.3; crude fibre, 24.5; water, 24.3; ash, 7.0; proteid mat¬

ter, 6.3; fat, 3.6. If the grass be allowed to mature its seed before being cut it is somewhat less nutritive because of the change in the relative proportion of nutrient material to non-digestible matter. The composition of the

fresh grass is as follows : Water, 65.1 ; nitrogen-free extracts, 17.6; crude fibre, 9.1 ; proteid mat¬

ter, 4.1; ash, 2.8; fat, 1.3. Blue grass may be propagated by sowing seed or by setting out pieces of sod. Since the seed of Kentucky blue grass is often of low vitality, and is frequently mixed with chaff, it should be sown rather thickly. A permanent blue grass pasture re¬

quires about three years to become established, after which, without much attention, beyond

ordinary fertilizing, it may remain profitable for half a century or more. In long settled dis¬

tricts there are occasional pastures of more than 75 years standing.

BLUE GRASS STATE, popular name

for Kentucky.

BLUE-GREEN ALGˆE. See Cyan-

OPHYCEˆE.

BLUE-LIEN STATE, popular name for

Delaware. During the War for Independence,

a certain popular officer of Delaware, named Captain Caldwell, asserted that a game cock to be unconquerable must be <(a blue hen's chicken."

This name was at once applied to his regiment and later to the State and its people.

BLUE HILL OBSERVATORY, near

Boston, Mass., a meteorological observatory at the summit of the Great Blue Hill, altitude 635

feet, founded by A. Lawrence Rotch in 1885, and maintained by him until his death in 1912, when the observatory and grounds became the property of Harvard University. The work

done by the observatory in furnishing continu¬

ous weather records is of incalculable value.

The records and the results of the investiga¬

tions are published in (Annals of the Observa¬

tory of Harvard College.' Consult Rotch, A.

L., (Sounding the Ocean of Air' (1900).

BLUE ISLAND, Ill., city of Cook County,

situated on the Calumet River and on the Illi¬

nois Central, the Chicago, Rock Island & Paci¬

fic, the Chicago & Grand Trunk and the Chi¬

cago & Chicago Terminal railroads. It forms a southern suburb of Chicago, about two miles south of the city limits, and is an important manufacturing, commercial and railroad centre.

Among its industries are brickmaking, stone-quarrying, *etc.* There are also smelting works, oil works and breweries. It was settled in 1833

and incorporated in 1872. Here in 1894 started the strike of railroad employees, which tied up the traffic of half the country and was quelled only by the prompt action of President Cleve¬

land in sending United States troops there.

The municipal organization provides for a

mayor with a term of two years, and a city council. The city operates its own waterworks and electric-light system. Pop. (1920) 11,424.

BLUE JAY. See Jay.

BLUE JOHN, a name for fluorite or

fluorspar (q.v.).

BLUE LAWS, a term generally applied to

any laws which impose vexatious restrictions and interfere with the ordinary life of a com¬

munity, or which seek to regulate the private morals of the members

of the community; the name is especially applied to the early enact¬

ments of several of the New England colonies, but more frequently limited to the laws of New Haven colony. The origin of the term is not exactly known. Various conjectures have been made, but the most probable derivation is that given by Professor Kingsley, who' thinks the epithet ((blue" was applied to any one who im¬

mediately after the Restoration of the Stuarts looked with disapprobation on the licentiousness of the times. Thus, in Hudibras,

For his religion, it was fit

To match his learning and his wit;

'Twas Presbyterian tiue blue.

That this epithet should find its way to the colonies was a matter of course. It was here applied not only to persons, but to the customs, institutions and laws of the Puritans, by those who wished to render the prevailing system

ridiculous. Hence, probably, a belief with some that a distinct system of laws, known as the blue laws, must somewhere have had a local habitation. The existence of such a code of blue laws is fully disproved. The only author¬

ity in its favor is Rev. Samuel Peters, whose (General History of Connecticut' (1781) is a spiteful, satirical work, full of exaggerations.

The traditions upon this subject, from which Peters framed his stories, undoubtedly arose from the fact that the early settlers of New Haven were uncommonly strict in their applica¬

tion of the ((general rules of righteousness."

Judge Smith, in his continuation of the history 126

of New York, published in (New York Histori¬

cal Collections) (Vol. IV), gives evidence

against the existence of the blue laws, which is particularly valuable, as it was put on record some 15 years before Peters' history was pub¬

lished. He writes : (<Few there are who speak of the blue laws (a title of the origin of which the author is ignorant), who do not imagine they form a code of rules drawn up for future conduct, by an enthusiastic, precise set of re¬

ligionists ; and if the inventions of wits, humor¬

ists, and buffoons were to be credited, they must consist of many large volumes. The

author had the curiosity to resort to them when the commissioners met at New Haven for ad¬

justing a partition line between New York and Massachusetts in 1767 ; and a parchment cov¬

ered book of demi-royal paper was handed him for the laws asked for, as the only volume in the office passing under this odd title. It con¬

tains the memorials of the first establishment of the colony, which consisted of persons who had wandered beyond the limits of the old charter of Massachusetts Bay, and who, as yet unau¬

thorized by the Crown to set up any civil gov¬

ernment in due form of law, resolved to con¬

duct themselves by the Bible. As a necessary consequence, the judges they chose took up an authority which every religious man exercises over his own children and domestics. Hence

their attention to the morals of the people in instances with which the civil magistrate can never intermeddle in a regular well-policied constitution, because to preserve liberty they are recognizable only by parental authority.®

Recent investigations, however, show that while many of the 45 statutes cited by Peters were not on the books of the New Haven colony, all except two or three are to be found, with slight modifications, among the codes of the various New England colonies. Consult Trum¬

bull, J. H., (True Blue Laws of Connecticut and New Haven, and the False Blue Laws In¬

vented by Rev. Samuel Peters } (Hartford

1876) ; Prince, (An Examination of Peters'

Blue Laws,* in Annual Report of the Ameri¬

can Historical Association for 1898.

BLUE LIGHT. See Bengal Light.

BLUE-LIGHT FEDERALISTS, a term

applied to the party in American politics which opposed the War of 1812. In 1813 Decatur

made several attempts on dark nights to escape from the blockaded port of New London, Conn.

He declared that his failure was due to signals of blue lights flashed from the shore to warn the British. This led to the opponents of the war, who were accused of having shown the

lights, being stigmatized as <(Blue-light Federal¬

ists.®

BLUE LODGES, a secret association of

advocates of slavery, organized about 1854, in Missouri, for the purpose of aiding the work of establishing slavery in Kansas. The members

of the order, although citizens of Missouri, crossed into Kansas in 1855 and forcibly de¬

posited their ballots for the pro-slavery candi¬

dates.

BLUE-MANTLE, one of the English pur¬

suivants at arms, connected with the Heralds'

College, so styled from the color of his robe.

BLUE-MASS. See Mercury.

BLUE MONDAY, a name formerly given

in Europe to the Monday before Lent, when the churches were decorated with blue. It was

kept as a holiday by classes whose ordinary avocation required them to labor on Sundays.

As this led to violent disturbances and excesses the custom was legally abolished. The term

now signifies a Monday of depression, or blue spirits, particularly among clergymen, but is very loosely used, and by hard-working persons is applied to Monday in general.

BLUE MOUNTAINS, (1) a beautiful

wooded range of mountains in Oregon, from

8,000 to 9,000 feet high, which, with the Powder River Mountains, separate the Columbia River Valley from the Great Basin; there are great forests of fir and pine on their slopes; (2) a mountain chain of

New South Wales, part of the great Dividing Range, is made up of sand¬

stone strata interspersed by canyons and gullies and with a precipitous east front. The highest peak is Mount Beemarang, which attains an

elevation of 4,100 feet above sea-level. The range is now traversed by a railway, which at¬

tains a maximum height of 3,494 feet and con¬

nects Sydney with the rich grazing and mining regions of the inland; (3) the Central Moun¬

tain Range of Jamaica, the main ridges of

which rise to 8,000 feet; (4) the second main ridge of the Appalachians, known also as the Kittatinny Mountains in Pennsylvania, as the Shawangunks in New York. This range should

not be confounded with the Blue Ridge (q.v.).

BLUE NILE. See Nile.

BLUE NOSE, a popular nickname for a

native of Nova Scotia, from the effect of the climate or from a potato called ((Blue Nose®

raised in that region.

BLUE PETER, a blue flag having a white

square in the centre, used to signify that the ship on which it is hoisted is about to sail, and for recalling boats. The term is a corruption of Blue repeater, one of the signal flags in the British code. A flag known as the cornet is used as a sailing signal in the United States in¬

stead of the blue peter.

BLUE-PILL. See Mercury.

BLUE POINT, N. Y., the southern ex¬

tremity of Patchogue Bay, Long Island, which lends its name to the well-known oysters, Blue Points.

BLUE PRINT, or CYANOTYPE PRO¬

CESS, a method discovered by Sir John Herschel whereby photographic pictures are ob¬

tained by the use of a cyanide. It is based on the reduction of ferric to ferrous salts by light, when they are in contact with organic matter.

This process is in common use by architects and engineers for copying plans, producing an image with white lines on a blue ground. Paper is made sensitive by brushing it over with a solu¬

tion of ferric oxalate (10 grains to the ounce) ; it is then exposed under the positive and treated with a solution of potassium ferricyanide, by which the image is developed. The color of the ground is deepened by subsequent washing with solution of potassium bisulphate. The details of the process have been varied in many ways.

BLUE RAPIDS, Ivan., city of Marshall

County, on the Missouri Pacific and the Union Pacific railroads, 65 miles northwest of Topeka.

BLUE RIBBON ARMY — BLUE-STOCKING

It contains a high school and a grade school, an opera-house, and two banks with aggregate resources in excess of $500,000. The value of the city's taxable property is estimated at $1,200,000. There are three establishments en¬

gaged in the manufacture of wall plaster. The government is vested in a mayor and a city council. Pop. 1,756.

BLUE-RIBBON ARMY, the name of an

English total abstinence society, so called from the color of the membership badge. The or¬

ganization grew out of the Murphy Movement

in America and dates from 1878. About five years later the Society became known as the Gospel Temperance Union. See Temperance

Societies.

BLUE RIDGE, the most easterly ridge of

the Alleghany or Appalachian Mountains, which extends from the Hudson River southwest to

Georgia. It first receives the name of Blue Ridge when it enters Virginia, the western por¬

tion of which it traverses. In south Virginia, the range becomes a broad plateau, which is at its widest in North Carolina, and is here crossed by the Black, Cowee, Nantahala and South

mountains, extending transversely to the axis of the Blue Ridge. The highest peaks of the range occur in the Black Mountain group,

where are found Mount Mitchell or Black

Dome, 6,710 feet; Guyot's Peak, Sandoz Knob, Gibbe's Peak and a few others over 6,000 feet.

In Virginia the Blue Ridge nowhere rises much above 4,000 feet and in Pennsylvania and New Jersey its height is much less. Several large rivers pierce the ridge, such as the Hudson in the Highlands, the

Delaware at the Water Gap and the Potomac at Harper's Ferry. See also Appalachians.

BLUE SKY LAWS. This term is applied

to certain statutes which have been enacted in a majority of the United States for the pro¬

tection of investors. They are designed

chiefly to regulate the sale of stocks, bonds and other securities, but in practice their applica¬

tion has been extended to a wide range of in¬

vestment enterprises. Thus, in North Carolina, a corporation which sold fig orchards was held to be within the statute, which by its terms ap¬

plies to any foreign corporation or company selling stocks, bonds or other evidences of prop¬

erty within the State.

These statutes, while differing from each

other in many details, are very much alike in their essential features. They usually con¬

tain a penal clause, prescribing a penalty for fraud in the sale or negotiation of securities, and vest in a certain State official or body, such as the insurance commissioner or a cor¬

poration commission, the power to investigate all transactions of this character for the pur¬

pose of uncovering fraud or questionable meth¬

ods in any promotion. Persons or corporations desiring to sell securities within the State are further required, as a rule, to file with the proper authorities a statement under oath, con¬

taining a list of such securities, with specific information concerning

them, and in some

States a license must be obtained upon the payment of a stated fee.

The first blue sky law in the United States was enacted in 1911, by the Kansas legislature, and nearly all similar statutes subsequently passed in other States were modeled after this one. The term (<blue sky law® is said to have originated in a remark made by a member of the Kansas legislative committee having the

subject under consideration, who is quoted as saying that the restriction to be placed on in¬

vestment concerns should be as far-reaching as the blue sky. Blue sky laws have been enacted and are now in force in the following States of the Union: Arizona, Arkansas, California, Connecticut, Florida, Georgia, Idaho, Iowa,

Kansas, Louisiana, Maine, Minnesota, Missis¬

sippi, Missouri, Montana, Nebraska, North

Carolina, North Dakota, Oregon, Rhode Island, South Carolina, Tennessee, Texas, Vermont,

Virginia, West Virginia and Wisconsin. The

New York Banking Act is sometimes referred

to as a blue sky law, but it does not strictly be¬

long in this category.

Because of the extreme rigor which char¬

acterized the earlier restrictive measures of this class, they were vigorously assailed by banking and investment interests on constitutional

grounds. The 1913 enactments of Iowa, Michi¬

gan and West Virginia were declared uncon¬

stitutional by the Federal District Courts. As a result of such adjudication, objectionable blue sky laws were repealed and new ones enacted in 1915 by the legislatures of Arkansas, Iowa, Kansas, Michigan, North Dakota, Oregon, South Carolina, South Dakota and West Virginia.

The following year, however, the new Michigan law was held invalid as impressing upon inter¬

state commerce a direct burden which was be¬

yond the limits of the police power. The same year the blue sky laws of Ohio and South

Dakota were declared unconstitutional. In Janu¬

ary 1917 the Supreme Court of the United

States upheld as constitutional the blue sky laws of Ohio, Michigan and South Dakota. The decision affected similar laws in 26 States, which had been held in abeyance pending the decision, which held that ˆPrevention of de¬

ception is within the competency of government.

The intangibility of securities, being represen¬

tatives of property in distant States and the in¬

tegrity of them can only be assumed by the probity of the dealers in them and the infor¬

mation they are required to give. This assur¬

ance the States deemed necessary for their

welfare to require, and that requirement is not unreasonable or inappropriate.

((We cannot stay the hands of government

upon a consideration of the impolicy of its legislation. Every new regulation of business meets challenge. But the policy of a State and its expression in laws must vary with circum¬

stances.

((The statutes burden honest business, it is true, but burden it only that under its forms dis¬

honest business may not be done. Expense may thereby be caused and inconvenience, but to arrest the power of the State by such considera¬

tions would make it impotent to discharge its functions. It costs something to be governed.®

BLUE-STOCKING, a pedantic woman; a

lady regarded as too fond of learning. The origin of this name is thus given by Boswell in his (Life of Johnson > : <(About this time (1780) it was much the fashion for several ladies to have evening assemblies where the fair sex

might participate in conversation with literary and ingenious men, animated with a desire to please. These societies were denominated blue-128

stocking clubs, the origin of which name was as follows: One of the most eminent members of these societies was Mr. Stillingfleet, who always w'ore blue stockings. Such was the excellence of his conversation, that his absence was felt as a great loss, and it used to be said, (We can do nothing without the blue stockings * ; and thus by degrees the title was established.® One of the most famous of these clubs was that which met at Mrs. Montague's. This was some¬

times honored by the presence of Dr. Johnson, and its principal members have been sketched and eulogized by Hannah More, in her poem

entitled the (Bas Bleu.1* An account of these assemblies is contained in the (Memoirs of

Elizabeth Carter) (London 1816). Consult

Tobban, (The Blue-Stockings) (in Blackwood's

Magazine , Vol. CLXXX, London 1906).

BLUESTONE, or BLUE-VITRIOL,

the commercial name for copper sulphate. See Copper.

BLUE THISTLE. See Bugloss.

BLUE-VITRIOL, called also BLUESTONE, the salt sulphate of copper, composed of sulphuric acid, oxide of copper and water.

It is a natural product of some mines of copper ores, and is also largely prepared for economi¬

cal purposes. See Copper.

BLUEBACK, the salmon of the Fraser

River, B. C., one of the most valuable of the Pacific salmon. The name is given to various other fishes having bluish backs. See Salmon.

BLUEBEARD, a famous hero of legend

and folklore, familiarized to English readers in the 18th centiinˆ through a translation from the French of Charles Perrault, 1697. Accord¬

ing to the story, the Chevalier Raoul, whose surname is due to the color of his beard, had married seven wives, six of whom had disap¬

peared mysteriously. The seventh is put to a strange test of obedience. Having to go away, Raoul gives her the castle keys, and grants her

free access to all parts of the castle except one chamber. She disobeys and on opening the

forbidden chamber is horrified by seeing the bones of her predecessors. Raoul discovers

her disobedience and is about to put her to death when she is rescued by her kinsmen, who slay Bluebeard. This tale of Bluebeard has been regarded by some as partly historic, of which the original was Gilles de Laval, Baron de Retz, who was burned at Nantes in 1440 for his cruelty to children, whom he is supposed to have enticed into his castle, where he sacri¬

ficed them to the devil. It is, however, really a marchen, and the leading idea of curiosity punished is world-wfide. The forbidden cham¬

ber is a counterpart of the treasure-house of Ixion, on entering which the intruder was de¬

stroyed, or betrayed by the gold or blood that clung to him; also of Pandora's box, as well as of Proserpine's pyx that Psyche opened in spite of the prohibition. There are several parallels among the German fairy-tales col¬

lected by Grimm ; and one feature at least is found in the Kaffir tale of the Ox (Callaway's 'Nursery Tales, of the Zulus*).. Variants are found in Russia, and among Gaelic popular

tales; and in the Sanskrit collection (Katha Sarit Sagara* the hero Saktideva breaks the taboo, and, like Bluebeard's wife, is confronted with the horrible sight of dead women. Possi¬

bly in the punishment following the breaking of the taboo may be a survival of some ancient religious prohibition ; among the Australians, Greeks and Labrador Indians, such an error

was regarded as the means by which death

came into the world. Frescoes of the 13th cen¬

tury have been found in Morbihan, Brittany, representing scenes from the similar legend of Saint Trophime. Tales similar to that related by Perrault are found in Straparola's 'Piacevoli Notti* (1569), and in

Abbatutis' HI Pentame-rone,* while a not very dissimilar tale is that of the Third Calendar in the (Arabian Nights En¬

tertainment.* Operas founded upon it are

Gretry's (Raoul Barbe-Bleue* (1789) ; Offen¬

bach's (Barbe-Bleue* (1866). The younger

Coleman brought out (Bluebeard; or, Female

Curiosity* (1798). Consult Abbe Bossard,

c Gilles de Rais dit Barbe-Bleue* (Paris 1886) ; Hartland, (<The Forbidden Chamber,** in Folk¬

lore Journal (London 1885) ; Perrault, 'Contes de ma mere l'Oye* (Paris 1875) ; Wilson,

(Bluebeard: A Contribution to History and

Folklore* (New York 1899).

BLUEBELL, BELLFLOWER, HAIR—

BELL or HAREBELL, Campanula rotundi—

folia, a plant of the natural order Campan-ulacece , native of the colder parts of the north¬

ern hemisphere. Its common name is suggested by the shape and 'color of its flowers, and its specific name from the shape of its root-leaves.

The stem leaves are lanceolate or otherwise than round. This is the bluebell of Scotland and of literature. It may be found peeping through the snow and ice which are supposed to be melted by the self-generated heat of these little plants. They have long been favorites in the hardy flower border and are of simplest culture. (See also Campanula). The name is

also applied to a species of Scilla (q.v.).

BLUEBERRY. See Vaccinium.

BLUEBILL, one of the most common of

American fresh-water ducks, which breeds

throughout Alaska and the northern part of

Canada generally, spending the cold months in the United States, but going only as far south as is necessary to avoid the freezing of the lakes and ponds. The head, neck and fore part of the body of the drake are black, the head with a green gloss. The back and sides are whitish with finely waved blackish markings.

The abdomen and speculum of the wing are

white. In the female the head and anterior parts are brown and the face pure white. The most distinguishing part of the bird is the very broad, spatulate bill, which is light blue, with a black nail. Hence the other names (<broadbill**

and <(scaup duck.** There are two species, the larger (Aythya marila nearctica) the one just described, which is regarded as a variety of the European scaup ducks; and the lesser (A. affinis), which is very similar to the preceding, but smaller, and rather more southerly in its distribution. These ducks are close relatives of the canvasback and redhead (qq.v.), and re¬

semble them in habits. Other local names for them are ((blackheads** and <(shuffler.**

BLUEBIRD, or the North American

thrush, is widely distributed throughout the United States, where it holds a similar place, in the hearts of the people, as. the redbreast in England. In fact, locally, it is sometimes

termed ˆblue-robin.® It is a smaller bird than the rest ot the thrushes. Its whole upper parts are sky blue, shot with purple, with its throat, neck, breast and sides reddish chestnut, and part oJ its wings and its tail feathers black.

The <(soft and agreeable warble® of the blue¬

bird is one ot the first and most welcome sounds of bird-music that we hear in the early spring. The male is remarkably attentive to his more protectively colored mate, and takes ex¬

uberant pride in their five or six pale-blue eggs, laid in holes in the trees of gardens, and often also in bird-boxes, and in the crevices in the walls of outbuildings. There arc often two

broods in a season. The bluebird fights hard to protect his small, neatly constructed nest from the house-sparrow, swallows, wrens and other birds which make his life miserable by their intrusion on his domestic privacy. Several

other sorts of birds, of other countries, pre¬

vailing blue in color, receive the name <(bluebird,® such as the ((Oriental fairy-bluebirds®

of the genus Irena, more particularly Irena puella , one of the East Indian bulbuls.

BLUEBIRD, The (<l'Oiseau bleu>). The

most generally acceptable play of Maurice

Maeterlinck is (The Bluebird,* which, since its first appearance in 1908, has achieved wide suc¬

cess upon the stage. Although it lacks the qualities for which its author is best known, and especially his dreamy, suggestive evocation of inarticulate fears, it is representative of a new tendency in the theatre. It is pictorial and symbolic, narrational rather than dramatic. As a piece of symbolism it should not be taken too seriously. Perhaps the acute critic may be

justified in perceiving here certain correspond¬

ences to the doctrines of Swedenborg, but it is doubtful if Maeterlinck had any more defi¬

nite intention than to tell a pretty story in spectacle and fairy-tale talk, and to indicate that those who engage in a quest for happiness are likely, after all their far wanderings, to find what they seek at home in an act of un¬

selfishness. The humble Mityl and Tyltyl who dream of roving through the land of Memory, the realm of Night, and the Kingdom of the Future, accompanied by Light, the Cat, and the Dog, and the souls of Fire, Bread, Sugar, and Milk, hunting for the bird that is ever blue, fail to discover it, although birds blue at first sight appear here and there. It is only when Tyltyl assents to the request of a neighbor that he give his turtle dove to her sick child that he captures true happiness for a moment. His dove turns deeply blue, yet flies away, leaving Tyltyl to ask its return of the audience. Deli¬

cate humor and insight into the nature of

children mark this fantasy, which has been

translated into English by A. Teixeira de

Mattos (1909). Discussions of the play ap¬

pear in the treatises upon Maeterlinck by

Gerard Harry, M. J. Moses, Edward Thomas,

Una Clark, and with fullest detail in Maeter¬

linck's Symbolism * (1911), by Henry Rose.

Frank W. Chandler.

BLUEBOTTLE FLY, a greenish-blue fly,

sometimes called by English authors (<green—

bottle® fly (Lucilia ccesar) . It closely resembles the blow-fly (q.v.),

but is smaller and entirely blue or green. These flies hibernate through the winter, appearing early in spring. Its eggs are deposited upon meat and decaying animal vol. 4 — Q

matter. The larvae are said to be indistinguish¬

able from those of the blow-fly. They are white, footless maggots, of an elongated conical shape, which transform in the ground. It is said that bluebottle flies do not commonly enter houses.

BLUEFIELD, W. Va., city of Mercer

County, on the Norfolk and Western Railroad, 105 miles west of Roanoke, Va. First settled m 1888 it received a charter of incorporation in 1893. It is the commercial centre of the great Pocahontas Coal bield, to the development of which its rapid growth is due, as well as to the exploitation of the iron-ore, lumber, limestone and clay of the surrounding region. Large de¬

posits of ˆ manganese have been discovered

near Bluefield. Besides its valuable coal-min¬

ing and allied interests, it has extensive rail¬

way shops, flouring mills and large wholesale distributing houses. A progressive city, its principal institutions include a handsome Fed¬

eral building, State normal school, high school, opera house and sanitariums. Bluefield early adopted the commission form of government

and from a population in 1890 of 1,775, it in¬

creased in 1918 to 16,000.

BLUEFIELDS (formerly written Blew—

fields) , Nicaragua, town on the Caribbean

coast and at the mouth of the Escondido or Bluefields River, in the

department of Chon-tales. Lat 12° N, long. 83° 44’ W. It was the capital of Mosquitia (see Central America).

In the latter part of 1847 the population was about 600, one-sixth white, five-sixths black.

Slavery was abolished in 1841. The King of Mosquitia, who resided here in one of the few houses built of boards, claimed sovereignty over a territory 235 miles wide and 340 miles long; also the districts of Talamanca and Chiriqui in Costa Rica. A British agent and consul-general also was stationed at Bluefields, the English government maintaining a protectorate over the Mosquito Indians until 1860. A German colony at Carlsruhe, adjoining Bluefields, was founded in 1844, but abandoned in 1849. The climate is moist and hotter than in the interior. The town is the shipping centre of an important fruit trade, principally bananas. It has steam¬

ship communication with the United States and is the seat of a consular agency of the United States. Pop. 4,706.

BLUEFIN, or BLACKFIN, a large cisco¬

like whitefish (Argyrosomns nigripinnis) of the deep waters of Lake Michigan and some other of the lakes of Wisconsin, Minnesota and New York, readily known from other species by its black fins.

BLUEFISH. The bluefish or «skipjack®

(Pomatomus saltatrix) is one of the most

widely distributed and abundant of sea-fishes, being found in the Atlantic from the Mediter¬

ranean and Nova Scotia to Brazil, and in the Pacific and Indian oceans. It is taken casu¬

ally at all seasons on the eastern coast of the United States, but becomes numerous irregu¬

larly in summer, when its presence or absence seems to be governed largely by the movements of its principal food, the menhaden (q.v.), when seeking their inshore spawning-grounds.

The only wonder is that both have not been exterminated many centuries ago, for of all the butchers of the sea the bluefish is the most wolfish and diabolical, snapping its prey in half for a mouthful and passing on in ruthless in-130

dustry. Little is known as to their method of reproduction. They do not spawn in inshore

waters of the United States and their real spawning grounds are unknown. It is beauti¬

fully shaped for swimming, built with the fine lines of the mackerel and the strength of the salmon. It is a near relative of the pompanos and horse-mackerels (family Carangidce) , but is set apart in a family (Pomatomidce) by itself, which Jordan considers an offshoot

toward the pericoids. In color it is steel-blue, and its flesh is very sweet and savory. The weight varies, five pounds being the common run, although 20 pounds are recorded.

The favorite method of fishing for it is

(<squidding," or casting from a platform built out into the surf, with a rod and line armed with a spoon, or a bone-baited hook. Its vo¬

racity makes it a free biter, and its tempera¬

ment makes it a fierce one, so that the angler may expect a fight from the strike to the death, and only by sheer strength can the prey be landed. The bluefish is also trolled for from boats, especially in Florida, and off the south coast of New England.

On our Pacific coast the <(California bluefish® (Cynoscion parvipinnis) is found from Santa Barbara to Guaymas and Mazatlan, and

is a near relative of the eastern weakfish (q.v.), locally called

<(totuava” (Cynoscion macdonal-di). In the Gulf of California it congregates at the mouth of the Colorado River and attains enormous size, having been taken in hand¬

lines as high as 170 pounds. Like other species of this genus, it is erroneously yet frequently called ((sea-bass.” The bluefish thrives on sar¬

dines and other small fish and destroys certain varieties of annelids and quantities of squid.

The diminution of these and of other grega¬

rious fishes constitutes an impartant factor in maintaining the balance of the various species.

The bluefish sometimes ascend large rivers as far as the tide sets. It is one of the very best table fish, about $300,000 worth being handled annually in New York.

Consult Cunningham, (Natural History of

Marketable Marine Fishes) (New York 1896) ; McFarland, (A History of New England Fish¬

eries’ (New York 1911) ; Herubel, (Sea Fisheries) (London 1912) ; Jordan and Evermann, (Food and Game Fishes of America’ (1902);

Goode, (Fishery Industries, Section P (10th census, Washington 1884) ; Mayer (editor),

(Sport with Rod and Cun’ (1892).

BLUEGOWNS, an order of paupers in

Scotland, called also the ((King’s Bedesmen,®

to whom the kings annually distributed certain alms on condition of their praying for the royal welfare. Their number was equal to the num¬

ber of years the king had lived. On the king’s birthday the bedesmen were each given a blue gown or cloak, a purse containing as many

shillings Scots (pennies sterling) as the years of the king's age, and a badge bearing the words ((Pass and repass,® which protected them from all laws against mendicity. Edie Ochil¬

tree, who figures prominently in Scott's novel (The Antiquary,' is a type of the class, but probably a favorable specimen as compared

to those who were to be met with in real life.

The practice of appointing bedesmen was dis¬

continued in 1833, and the last of them drew his last allowance from the exchequer in Edin¬

burgh in May 1863.

BLUETHROAT, an Old World bird re¬

lated to the European robin, and deriving its name from its bright blue throat, which is separated from the white below it by crescent shaped bands of rustred and white. It is one of the most highly migratory birds known,

spending its winters in tropical Africa and India, and during the summer breeding in

Scandinavia, northern Russia, Siberia and

western Alaska. It makes its nest in bushes and weeds along streams, as far north as 71

degrees. It is extraordinary in that it is never seen in the intermediate countries, between its summer and winter homes, so that it stands to reason that the journey is made at a single flight, either at night, or at an invisible altitude.

The blue-throat is celebrated for its fine sing¬

ing and powers of mimicry when in its sum¬

mer home, on account of which the Laplanders call it (<the bird of the hundred voices." It was formerly assigned to the genus Cyanecula, but is now included with the nightingale in the group Luscinia. Two species are known, one

with a white spot in the centre of the blue (Luscinia leucocyanca) , and the other (L.

suecica), with a red patch in the centre of the blue. Consult Giitke, (Birds of the Heligoland'

(English translation 1895) ; and works on

European, Siberian and Alaskan ornithology.

BLUEWING, a duck. See Teal.

BLUFFS, a term of American origin,

synonymous with cliffs. It has long been used to designate the high cliffs met with along the Mississippi River ; particularly those abrupt banks of loam on its eastern side below the mouth of the Ohio. These are continually

washed and undermined by the action of the river, while the opposite side, rising more gently back from the river, is but slightly washed by its waters. On the south shore of Lake Superior, near the Pictured Rocks, is a most remarkable bluff of. loose, blowing sand, which rises so steeply from the edge of the water to the height of 200 feet, that one would in vain endeavor to ascend it. The waves and the winds beat against it from the north, and keep its materials continually in motion ; but more sand appears to be always supplied to replace that which is borne away.

BLUFFTON, Ind., city, county-seat of

Wells County, on the Wabash River, and on

the Lake Erie and Western, the Toledo, Saint Louis and Kansas City and other railroads, 25

miles south of Fort Wayne. It is the centre of a farming and lumber trade with allied

industries, has municipal water works and

electric-lighting plants, and is administered by a mayor and council. _ Bluffton was settled in 1837 and incorporated in 1849. Pop. 5,391.

BLUING, a compound dissolved in water

and used to neutralize the yellow tinge of white clothes, but also for sugar and other food products. The indigo preparations once largely used have been extensively superseded by Prus¬

sian and coal-tar blues.

BLUING OF METALS, the process of

giving a blue color to metallic substances by heat. Iron, when heated, becomes first of a light, then of a darker gold color, and finally blue. Steel heated to redness and suddenly

cooled is rendered hard and brittle. It is restored to any degree of softness, by heating it up to certain temperatures and allowing it

to cool slowly. These temperatures are pre¬

cisely indicated by the color of the film of oxide which forms upon its surface. At 430°

F. it is straw yellow of the very hard temper suitable for lancets. At higher temperatures it appears successively a golden yellow, then brown, purple, blue and finally green. Pale blue at 550° is the temper for swords and watch springs. The common shade of blue, at 560°, is the temper for fine saws and dirks.. Deep blue, at 600°, is the soft quality of steel for large saws.

BLUM, blun, Ernest, French dramatist: b.

Paris, 15 Aug. 1836; d. 1907. He made his debut in 1852 with (Une femme qui mord.*

He was successively connected with Charivari, Rappel, Gaulois and other publications. Several of his dramatic works were written in colla¬

boration with Clairville, Flan, Monnier, Bris-barre, Labiche, *etc.* The drama of (Rose

MicheP (1877), of his own composition, en¬

sured his place among the most successful

French dramatists of the time. Among his

later compositions are (Adam and Eve)

(1886); (The Nervous Woman* (1888); (End

of the Century *(1890) ; (La rieuse* (1894) ; (Le CarillorP (1897); (Un soir d'hiver*

(1903) ; (Le jeu de l'amour et de la roulette) (1905).

BLUM, bloom, Hans, German publicist : b.

Leipzig 1841 ; d. 1910. He was a son of Robert Blum, was educated in the universities of Leip¬

zig and Bern, sat in the North German Reich¬

stag 1867-70, and was a barrister in Leipzig 1869-97. In the Franco-Prussian War he

served in the field as correspondent for Daheim and edited the Grenzboten from 1871 to 1879.

He wrote extensively on contemporary politics and among his works are (Die Lugen unserer Socialdemokratie* (1891); (Fiirst Bismarck

und seine Zeit* (1894-95); (Das erste Viertel-jahrhundert des deutschen Reichs* (1896) ;

(Personliche Erinnerungen an den Fiirsten

Bismarck) (1910) ; (Aus dem tollen ˆJahr*

(1901), dealing with the revolution of* 1848; dramas, short stories and novels, of which

(Bernhard von Weimar) is the most remark¬

able.

BLUM, Robert, German patriot: b.

Cologne, 10 Nov. 1807; d. Vienna, 9 Nov. 1848.

He served for a short time in the army, and became subsequently connected with the Leip¬

zig Theatre, of which he acted for some time as secretary and treasurer. He founded the

Schillerverein at Leipzig in 1840 and within the next few years was established as a book¬

seller and publisher there. About the year

1840 he began to come prominently forward

as the champion of the Liberal cause and ac¬

quired much renown as a popular orator. On the outbreak of the commotions of 1848 he

manifested great enthusiasm and became soon

the rallying-point of democracy in Saxony

and the leading member of opposition in the National Assembly at Frankfort, to which lie was sent that year as member for . Leipzig.

The events of October at Vienna inspired him with fresh energy and he proceeded thither

at the head of a deputation to express the sym¬

pathy of the German democrats in the Frank¬

fort Assembly with the Viennese. He took an active part in the conflict

of the citizens with the imperialists; but on the surrender of the capital to Windischgratz, was arrested with

several of his companions on 4 November.

Brought before a military tribunal, he pleaded in vain his privileges as a deputy from the German Diet and was condemned to be hanged, a sentence which was changed to death by the bullet. Consult Blum, Hans, (Robert Blum*

(Leipzig 1878).

BLUM, Robert Frederick, American

artist: b. Cincinnati, Ohio, 9 July 1857; d. 1903.

He became a lithographer's apprentice and at¬

tended night classes at a school of design in Cincinnati. He also studied at the Pennsyl¬

vania Academy of Fine Arts. In 1879 he re¬

moved to New York and became one of the

illustrators of Scribner's Magazine. After

1880 he made many annual trips to Europe.

He visited Japan in 1890 and spent three years in that country. Many fine pastels are the fruit of this period. .He became a National Academician in 1892. His best known work

in oil is (The Venetian Beadstringers* (1889), now in the Cincinnati Museum. In 1913 an

exhibition of his works was held in New York and included the (Ameya,* now in the Metro¬

politan Museum. Blum excelled as a pastellist and watercolorist. Consult The Studio (Win¬

ter Number 1900-01) and The International

Studio (Vol. XXI, 1903).

BLUME, Clemens, German hymnologist : b.

Billerbeck, Westphalia, 31 Jan. 1862. He was educated at the Jesuit Gymnasium, Feldkirch, Austria, Jesuit scholasticates in Holland and England and the universities of Prague and

Bonn. He entered the Society of Jesus in

1878, was gymnasium professor at Feldkirch

in 1887-90 and ordained priest in 1893. He has devoted himself to hymnological research, visiting most of the libraries of Europe since 1906. With Guido M. Dreves, he was coeditor of (Analecta Hymnica medii aevi* (1896-1905), and editor of (Analecta Hymnica medii aevi*

(to consist of 57 volumes, of which 53 have appeared, Leipzig 1886-1917). He is author

of (Das Apostolische Glaubensbekenntnis*

(1893); (Repertorium Repertorii oder kritischer Wegweiser durch Ul. Chevalier's Repertorium Hymnologicum* (1901) ; AVolstan von

Winchester und Vital von Saint Evroult*

(1903) ; (Cursus S. Benedicti Nursini und die liturgische Hymnen des 6. — 9. Jahrhunderts*

(1908) ; (Ein Jahrtausend lateinischer Hym—

nendichtung* ; (Eine Blutenlese aus den Ana¬

lecta Hymnica* (1909) ; (Ursprung des

Ambrosianischen Lobgesanges* (1912). He

collaborated in Buchberger's (Kirchliches

Handlexikon* and contributed to (Stimmen

aus Maria-Laach,* Die Kirchenmusik and the

(Catholic Encyclopedia.*

BLUMENBACH, bloo'men-baH, Johann

Friedrich, German naturalist of distinction: b.

Gotha, 11 May 1752; d. Gottingen, 22 Jan. 1840.

He studied at Jena and Gottingen, and was ap¬

pointed in the latter, in 1776, extraordinary pro¬

fessor of medicine and inspector of the museum of natural history, and in 1778 ordinary pro¬

fessor. In 1812 he was appointed secretary to the Royal Society of Sciences at Gottingen, in 1816 became physician to the King of Great Britain and Hanover, in 1821 was made a

knight-commander of the Guelphic Order, and

in 1831 was elected a member of the Academy of Sciences at Paris. In celebration of his 132

medical jubilee (1825) traveling scholarships were founded to assist talented young physi¬

cians and naturalists. In 1835 he retired. The first work which brought him into notice was the (De Generis Humani Varietate Nativa,* and from its publication in 1775 he continued almost for 60 years to exert a powerful influence on the progress of science. Among his numerous published works are the (Institutiones Physio¬

logicˆ (1787), long a textbook in many of the most celebrated schools of Europe; the (Handbuch der vergleichenden Anatomie) ((Hand¬

book of Comparative Anatomy,* 1805) and

(Collectio Craniorum Diversarum Gentium*

(1790-1828). The last work gives descriptions and figures of his collection of skulls, one of the most extensive in existence, and is still pre¬

served at Gottingen. Blumenbach held decidedly that the human race formed only one species, and had originally descended from a single

pair; but he divided it into the five varieties of Caucasian, Mongolian, Negro, American and

Malay. Consult Mark's (Memoir* (1840).

BLUMENTHAL, bloo'men-tal, Oskar,

German dramatist and critic : b. Berlin, 13

March 1852. He founded the Lessing Theatre, Berlin, in 1888, of which he was manager in 1888-97. Here contemporary farce and comedy

held the boards. Blumenthal at first tried to elevate the tone of the comedy stage but com¬

mercialism forced him to abandon his ideal for the production of hackneyed farces on current events. Sprightliness of dialogue is the most distinguishing character of his plays ; the most successful of them are (The Big Bell* ; (A Drop of Poison* ; (The Black Veil.* He has published several volumes of critical and miscel¬

laneous essays.

BLUMHARDT, Christian Gottlieb, Ger¬

man writer on theological subjects: b. Stutt¬

gart, 29 April 1779; d. 19 Dec. 1838. He became secretary of the

Christian (Protestant) Society at Basel in 1803, and was instrumental in found¬

ing the Bible Society the following year, and later on, the Maison des Missions (1815), of which he was the general head until his death.

Most of his published works consist of sermons, many of them of a controversial nature. Two of these, (Lazarus der kranke, sterbende, Auf-erweckte* (a series), and <Versuch einer allgemeinen Missionsgeschichte der Kirche Christi*

(5 vols., 1827-37).

BLUNDELL, (Mrs.) Francis (M. E.

Francis), English novelist: b. Dublin. She is the widow of Francis N. Blundell and has lived for many years in Lancashire, but more recently in Dorsetshire. Her writings, which have

steadily increased in popularity, both in England and the United States, include (In a North Country Village* (1893) ; (The Song of Dan*

(1894); (Town Mice in the Country, a Story for Children* (1894) ; <A Daughter of the Soil*

(1895); (Frieze and Fustian* (1896); (Among

the Untrodden Ways* (1896) ; (The Duenna of a Genius* (1898) ; (Yeoman Fleetwood*

(1899); (Pastorals of Dorset,* (North, South, and Over the Sea,* (The Manor Farm* (1902) ; (Christian Thai* (1903); (Dorset Dear* (1905); (Simple Annals* (1906) ; (Margery o' the Mill*

(1907); (Galatea of the Wheatfield* (1909);

(Our Alty* (1912) ; folly's Fortunes* (1914) ; (Dark Rosaleen* (1915).

BLUNDELL'S SCHOOL, a famous Eng¬

lish free grammar school in Tiverton, Devon¬

shire, founded in 1604 by Peter Blundell, who left his fortune to charities, the school being the most important of his benevolences. In

connection with it five Balliol College scholar¬

ships were founded and many persons who

afterward became eminent went to Balliol Col¬

lege, Oxford, from Tiverton School. Scholar¬

ships were also founded at Sidney Sussex Col¬

lege, Cambridge. The school is mentioned in the novel (Lorna Doone* as the scene of John Ridd's early education. In 1880 new buildings in the Tudor style were built for the school in the outskirts of the town. The late archbishop of Canterbury, Frederick Temple, was a student at Blundell's School. Other students who later attained eminence were Bishops Bull, Hayter

and Conybeare, Abraham Haywood, the essay¬

ist, and R. D. Blackmore, the novelist.

BLUNDERBUSS, a short, heavy, large—

bored firearm, often brass-barreled, and bell-or trumpet-mouthed. It was used to discharge a heavy load of slugs or small bullets at a short range, and was once generally employed as a weapon for the defense of houses against

burglars. As a military weapon, it was used occasionally on shipboard for repelling boarders, or pouring heavy volleys into boats, when at¬

tempting to cut vessels out from anchorage. It is now wholly disused. See Small Arms.

BLUNT, Edmund March, American au¬

thor: b. Portsmouth, N. H., 20 June 1770;

d. Sing Sing, N. Y., 2 Jan. 1862. He is remem¬

bered for his publication of the (American

Coast Pilot* (1796), describing all the coasts of the United States, and containing a vast amount of invaluable information for seamen. More

than 30 editions of this work have been pub¬

lished, and it was translated into many foreign languages. He also compiled a number of

nautical books and charts.

BLUNT, George William, American hydrographer : b. Newburyport, Mass., 11 March 1802; d. New York, 19 April 1878; a son of Edmund March Blunt (q.v.). He went to sea

when 14 years old and served as a sailor till nearly 21 ; and in 1822-66 was a publisher of charts and nautical books in New York. He

made original surveys of many American har¬

bors ; was one of the committee that organized the present system of pilotage for New York; made several revisions of the (American Coast Pilot* ; and was influential in causing the Fed¬

eral government to adopt the French system

of lighthouses and to organize the Lighthouse Board. He was a commissioner of immigra¬

tion in 1852-54, pilot commissioner in 1855 and became harbor commissioner in 1867.

BLUNT, James G., American soldier: b.

Trenton, Me., 1826; d. Washington, D. C., 1881.

He was graduated in 1849 at the Starling Medi¬

cal College, Columbus, Ohio, and settled as a physician in Anderson County, Kan., in 1856; became prominent in the contest over the intro¬

duction of slavery into that State, and was a member of the convention that framed its Con¬

stitution. Entering the Federal army as lieutenant-colonel of the 3d Kansas Volunteers, he became brigadier-general, 8 April 1862, and was assigned to the command of the military depart¬

ment of Kansas. As such he was engaged in the battle of old Fort Wayne, defeated Marma-BLUNT — BLYDEN

duke at Cane Hill, Ark., and, with the aid of General Herron, defeated Hindman at Prairie

Grove, and thus checked the Confederate ad¬

vance into Missouri. He was promoted major-general, 29 Nov. 1862, and in October 1864 gave the final blow to Price's invasion of Missouri.

BLUNT, Stanhope English, American

military officer: b. Boston, Mass., 29 Sept. 1850.

He was graduated at the United States Military Academy in 1872 and served in the army in the grades from lieutenant to colonel in the ord¬

nance department. He commanded the Rock

Island arsenal from 1897 to 1907 and the Springfield (Mass.) armory 1907-12. As lieutenant

and captain he served at a number of Western posts and was prominent in target practice in¬

struction in the army. In 1912 he retired from active duty at his own

request and is now president of the park commission and president of the Springfield Hospital, Springfield, Mass.

He is a contributor to Johnson's (Encyclo¬

paedia J and (Farrow's Military Encyclopaedia. '

He wrote (Rifle and Carbine Firing) (1885) ; (Firing Regulations for Small Arms) (1889) ; and numerous papers on the use of small arms.

BLUNT, Wilfrid Scawen, English poet

and traveler : b. Crabbet Park, Sussex, 17 Aug.

1840. He was British attache at various lega¬

tions ; supported Arabi Pasha in the revolt in Egypt in 1881 ; and was imprisoned in 1888 for his insurrectionary actions in Ireland. He is author of (Love Sonnets of Proteus) (1880) ; (The Future of Islam' (1882) ; (The Wind and the Whirlwind,' (political poems, 1883) ; (Ideas About India) (1885); (In Vinculis) (1889);

(A New Pilgrimage) (1889) ; (Esther) (1892) ; (Stealing of the Mare' (1892) ; (Griselda) (1893) ; (Satan Absolved) (1899) ; (Seven Golden Odes of Pagan Arabia) (1903) ; (Secret History of English Occupation of Egypt'

(1907) ; (Gordon at Khartoum' (1911) ; (The Land War in Ireland) (1912). His complete

poetical works were published in 1914.

BLUNTHEAD, a colubrine snake of Java

and the East Indies (Amblycephalus boa). It is about three feet in length, and purple in ground color, but this is almost entirely con¬

cealed by the brown markings and mottlings, and the cheeks and lip-plates are carnation-red.

It is perfectly harmless, and is welcomed by the natives to their houses as a vermin-de¬

stroyer. It owes its name to the squarish form of the head, which, as in many other species of the family, looks so much like that of a poison¬

ous snake as to deceive most observers. It has a prehensile tail and climbs with ease.

BLUNTSCHLX, blunt'shle, Johann Kaspar, Swiss jurist and statesman: b. Zurich, 7

March 1808; d. Karlsruhe, 21 Oct. 1881. He studied jurisprudence at Zurich, later under Savigny in Berlin, and at Bonn. He became

professor in the newly-founded University of Zurich in 1833 ; took an active part in the politi¬

cal struggles that divided his country, and at first inclined to the party of reform, until the events of 1839 induced him to join the Con¬

servatives, of whom he was, for a time, a leader. He was a councillor of state, and be¬

came a member of the government and of the Federal Directory, and afterward worked for

the formation of a moderate Liberal Conserva¬

tive party in Switzerland. In 1848 he went to Munich as professor of civil and international law. There he published his ˆllgemeines

Staatsrecht' (5th ed., 1876), on which his rep¬

utation as a jurisconsult chiefly rests;

(Deutsches Privatrecht' (3d ed., 1864) ; and, in conjunction with Arndt and Pozl, (Kritische

Ueberschau der deutschen Gesetzgebung und

Rechtswissenschaft' (6 vols., 1853-58). In 1861

he removed to Heidelberg University, and be¬

came a privy councillor of Baden, actively

forwarding all liberal measures in the

state. Liberty in ecclesiastical matters he

had equally at heart ; he acted several

times as president of the Protestanten—

verein, and it was after delivering a clos¬

ing speech at the general synod of Baden that he died suddenly at Karlsruhe. He was the

author of valuable histories of Zurich and of the Swiss Confederation and of a number of works on law, being especially an authority in international law. He was one of the founders and in 1875-77 was president of the Institute of International Law at Ghent. His library is now possessed by the Johns Hopkins University at Baltimore. Other works by him are (Das

moderne Kriegesrecht' (1866) ; (Das moderne

Volkerrecht' (1868), and (Die Lehre vom

Staat) (1875).

BLUSHING, a sudden reddening of the

face, neck and breast, caused by a rush of blood into the capillary vessels of the skin, resulting from a temporary vasomotor paralysis. A

blush is excited by confusion of mind, arising from surprise or diffidence, modesty or shame, or conscious guilt and apprehension, showing the influence of the passions and emotions on the nervous system and the circulation of the blood. Sudden fear and apprehension cause the blood to rush from the external surface to internal organs, leaving the bloodless lips quite pale and the whole face suffused with deathly pallor. It is a kind of inverse blushing; the one being a sudden flash of color in the face, the other a sudden flash of paleness. Consult Darwin, Expression of Emotions in Man and

Animals) (London 1872) ; Mitchell, 'About

Dreaming and Blushing) (Edinburgh 1905).

Viktor, German novelist : b. Zorbig, near Halle, 4 Jan. 1844. He has won high distinction as a writer for the young. Among his stories for boys and girls are (The Rogues' Looking Glass'

(1876) ; (The Battle of Frogs and Mice'

(1878), and with these is to be classed the let¬

terpress (verses) of O. Pletsch's (Picture

Books.' Of novels and romances he is author of a great many; for example, (The Peace

Breaker' (1883); (The Step-Sister' (1887);

(Madame the Countess' (1892) ; (Die Spiritis-ten' (1903) ; <Des Peterle von Niirnberg'

(1907), and (Mamma kommt' (1911).

BLYDEN, Edward Wilmot, a negro au¬

thor : b. Saint Thomas, West Indies., 3 Aug.

1832; d. 1912. After vainly seeking, in 1845, admission to some college in the United States, he went to Liberia and was graduated at the Alexander High School, of which he afterward was principal. In 1880 he became president of Liberia College. He held important govern¬

ment positions, and was commissioner of the Presbyterian General Assembly of the LTnited States in 1861 and 1880. He was proficient in many languages, including Latin, Greek, Span¬

ish, Hebrew and Arabic, He published (Ll-

beria's Offering* (1873); (From West Africa

to Palestine) (1873) ; (The Negro in Ancient History,* (Liberia, Past, Present and Future) (1869) ; < Christianity, Islam and the Negro Race* (1887) ; (West Africa before Enrope)

(1905) ; (The Three Needs of Liberia) (1908) ; (African Life and Customs) (1908) ; (The

Problems before Liberia) (1909).

BLYTHE, Herbert. See Barrymore,

Maurice.

BLYTHEVILLE, Ark., city and county-seat of Mississippi County, 65 miles north of Memphis, on the Arkansas Southern, the Frisco Lines and other railroads. Cotton and corn

are grown extensively in the vicinity. The city has a cotton compress and also manufactures hardwood and general lumber. Pop. 6,447.

B'NAI B'RITH, b'nl b'reth, Independent

Order of, an association of German Jews

formed in the United States in 1843. Its pur¬

pose is the moral improvement of the mem¬

bers. Its organization resembles that of the Free Masons, but it is not a secret society, and has no elaborate ceremonial. The organization has since been established in Germany and in the East. In 1918 it had 11 grand lodges, 428

subordinate lodges and 44,893 members. The

benefits disbursed during the last fiscal year amounted to $563,422.

BO, or BODHI TREE, the pipul or sacred

wild fig tree (ficus religiosa), under which Buddha is traditionally said to have attained en¬

lightenment and perfect knowledge. A bo-tree is planted near each Buddhist temple, and one is planted on the graves of Singhalese priests at Kandy. An ancient nine story temple marks

the site of the original bo-tree under which Buddha sat at Gaya (ancient Uruvela) in Be-har. A bo-tree at Anuradhapura, 80 miles

north of Kandy, is said to date from 288 b.c.

and to have grown from a branch of the moth¬

er tree sent from Gaya to Ceylon by King

Asoka. It is visited annually by thousands of Buddhist pilgrims who gather its leaves as

sacred relics.

BOA, a serpent of the subfamily Boincc

of the family Boidcu (q.v.) ; specifically, Boa constrictor.

The boas include the largest living snakes, but most of the species are of medium or small size. Their muscular power in the typical

forms is very great, enabling them to hang sus¬

pended, almost by the tail alone, from trees, and to seize and crush prey to death by swiftly coiling around it. Most of the 40 or 50 species in the subfamily are American, but some small species inhabit the warmer parts of Europe, Africa, Asia and Polynesia. Several of the

tropical American boas are huge snakes, the water-boa (Eunectes murinus) occasionally ex¬

ceeding 30 feet in length. (See Anaconda).

They attain sexual maturity, however, long be¬

fore completing their growth, and the females bring forth their young alive. These young

snakes are completely formed, resemble their parents and are able at once to take care of themselves, yet do not for some time wander far from the mother. The American boas in¬

habit forests and climb to the lower branches of the trees, where they seek or await their prey, usually above a path. There the serpent swings about in the air till some luckless ani'mal ap¬

proaches ; then, suddenly relinquishing his posi¬

tion, he seizes the victim and coils his body instantly round its throat and chest. The folds are then gradually tightened with enormous

force and speedily induce death. The animals thus destroyed by the larger boas are sometimes as large as tapirs, deer and even bullocks, but ordinarily much smaller mammals and birds.

Having crushed and rolled its prey until its bones are broken and it is compacted into the form of a sausage, the boa takes it into its mouth and slowly engulfs it, the action being facilitated by a copious flow of saliva ; but there is no truth in the reputed preparation of the prey by a covering of slime, *etc.* It is doubtful whether an animal larger than a capybara or goat could be swallowed, even after crushing.

The process of digestion is slow, and while it is proceeding the serpent is inert and easily killed or captured. Experience with large ex¬

amples in captivity show that a full meal once in six months or so seems all they ask or need ; and weeks elapse before the indigestible parts pass out.

Several of the larger species are well known and often seen in menageries, where they are easily distinguished by the dog-like shape of the head and by the well-defined patterns of the markings. These are exceedingly handsome in

most cases, the colors being yellow buff, chest¬

nut and varying browns, set off by black and white ; and the skins, which may be tanned into good leather with the scales on, are of high commercial value for making purses, belts and other ornamental articles. Among the best

known species are the common boa — the Boa constrictor proper (for that term is ignorantly given to all), which is one of the lesser forms, rarely exceeding 10 feet in length. Its home is the region of the Amazon and Orinoco rivers, and it is pale brown, with a chain-like series of dark-brown markings on each side of the spine, enclosing large oblong-oval spots, and a series of large dark spots along the sides, each with a light centre; on the tail the markings become brick-red. Several other species of this genus, some much, larger, inhabit South and Central America. One, the imperial or rainbow boa

(Boa or Epicratcs , cenchris), about seven feet, long, is remarkable iff that, although in the shade it appears a pale brown with darker

rings, in bright sunshine its skin shines with marvelous iridescence. It is called aborna in Mexico, and is believed to be the serpent ven¬

erated by the ancient Mexicans and worshipped with bloody sacrifices. Two species of true boas inhabit Madagascar; and three species, all small and of burrowing habits, are to be found on the Pacific coast of the United States. One of these is the stubby little rubber-boa or ((two-headed snake® (Charina botta ?), well known in California, which has amazing ability as a con¬

tortionist.

To a closely related genus (Eunectes) be¬

longs the gigantic water-boa whose habits are almost aquatic. (See Anaconda). Tree-boas

(genus Corailus) are confined to the forests of tropical America, except one species in Mada¬

gascar. They are long, slender serpents of

abnormal habits, lightning-like in their quick¬

ness in catching birds and naturally savage in disposition ; the color is brown except one bright-green Brazilian species. Another genus (Lichanura) has a few species that dwell in BOAS

L

pj^wjw

1 Wm

/<

fc\vWl§&

1 Boa Constrictor

2 Dog-Headed Boa (Xiphosoma Caninum)

the West Indies and Mexico, and are occasion¬

ally taken in Arizona and southern California; and small boas of this or an allied sort are fre¬

quently brought into our ports from Cuba,

tightly coiled about bunches of bananas. The genus Eryx, containing small, active, burrowing snakes, belongs to the deserts of northern Af¬

rica and Asia Minor.

Ernest Ingersoll.

BOABDIL, bo-ab-del', or ABU-ABDUL—

LAH, a'boo-abd-ool'ah, last Moorish King of

Granada. He gained the throne in 1481 by ex¬

pelling his father, Mulei Hassan ; but being attacked by Ferdinand of Aragon, was defeated and taken prisoner. His father having resumed his crown, Ferdinand set Boabdil at liberty and promised to assist him against his father, on condition of his agreement to become the vassal of Spain. He accepted the ignominious condi¬

tion and his father died of a broken heart.

Boabdil was not permitted to reign in peace.

By his tyranny he provoked the hostility of his own subjects, and Ferdinand, taking advantage of the dissensions which prevailed, laid siege to Granada. The Moors made a valiant defense,

and were prepared to bury themselves under

the ruins of the city, but Boabdil capitulated and retired to a domain of the Alpuj arras as¬

signed him by the victor (1491). When on

his way he turned round to take a last look of the city and burst into tears. “Right, my son,®

exclaimed his mother, Aixa, who was standing by him, ((weep like a woman for the throne which you had not the spirit to defend as a man and a king.® The spot is still called ((E1

Ultimo Sospiro del Moro® (the last sigh of the Moor). (See Granada). Boabdil soon after¬

ward passed into Africa and fell in battle while assisting the King of Fez in an attempt to de¬

throne the King of Morocco. Consult Dozy,

‘Spanish Islam) (London 1913), and Lane-Poole, ‘The Moors in Spain1* (New York

1886).

BOADICEA, more correctly, Boudicca,

Queen of the Iceni, a British tribe, inhabiting what are now the counties of Cambridgeshire, Suffolk, Norfolk and Hertfordshire. She died about 62 a.d. The celebrated earthworks still extant, known as the Devil’s Ditch, at Newmar¬

ket heath, and at Six-Mile bottom, are sup¬

posed to be the fortifications of this tribe, and perhaps of this Queen, against the Romans.

She was a contemporary of Nero, and was a woman of remarkable character, both for firm¬

ness and ability. Her husband, the King of the Iceni, Prasutagus, dying, left Nero and his own two daughters joint heirs to his great wealth, hoping thereby to preserve his family and king¬

dom from the rapacity of the conquerors. But immediately on his death his kingdom was

taken possession of by the Roman centurions.

For some real or imaginary offense, the British Queen was publicly scourged by the execu¬

tioners, and her daughters were abandoned to the lust of the slaves. Stung to frenzy by this outrage, taking advantage of the absence of Suetonius Paulinus, the Roman governor, from that part of England, Boadicea raised the whole military force of her barbarians, and bursting upon the Roman colony of London, reduced the city to ashes, and put to the sword in that and neighboring places, — of Roman citizens, trad¬

ers, Italians and other subjects of the empire, —at least 70,000 individuals. Suetonius lost not a moment in hurrying to the scene of action, although it was well known that the Queen of the Iceni was in command of 120,000 men,

which gradually increased to 230,000, according to Dion Cassius, while he could bring into the field in all less than 10,000 soldiers. It is true that absolute credit cannot be given to state¬

ments of prodigious numbers, such as the

above, but at all events the disparity of force was extraordinary. The legion, posted on

heights, where its flanks and rear were covered by woods, seems to have received the attack passively, sheltered from the missiles of the Britons by their large, oblong bucklers, until, when the darts and arrows of the barbarians began to fail, by one compact charge they car ried all before them. They spared nothing;

women, children, the beasts of burden, the dogs, were all cut to pieces. It is said that 80,000

Britons were butchered that day, while of the legionaries only 400 fell, and about as many more were wounded. It is believed that the action took place not far from Saint Albans, Verulamium, a Roman colony, which at the

first irruption had shared the fate of London.

The Queen, seeing that her cause was lost, com¬

mitted suicide, rather than submit to the con¬

queror. The victory was decisive as it estab¬

lished Roman authority in Britain. Beaumont

and Fletcher's play, 'Boadicea,* is founded

upon the resistance made by Boadicea against Suetonius. Boadicea's story is well known

through the poems of Cowper and Tennyson.

Consult Tacitus, 'Agricola* ; id., 'Annales*

(Furneaux's ed., Oxford 1891) ; Elton, 'Ori¬

gins of English History* (London 1882) ; Hav-erfield, 'The Romanization of Roman Britain*

(Oxford 1912) ; Rhys, 'Celtic Britain* (Lon¬

don 1882).

BOANERGES, bo-a-ner'jez, an appella¬

tion given by Christ to two of his disciples, the brothers James and John, perhaps on account of their fiery zeal. Like "Peter® it was not given at the time of the election of the Twelve, but did not remain in use as did "Peter.® For further explanations of the term consult Bur¬

kin, 'Earliest Sources of the Life of Jesus,*

and Harris, J. R., 'Boanerges* (1913).

BOAR, Wild, a ferocious, swift-footed

species (Sus scrofa) of wild swine, made

dangerous by its extreme courage and superior strength. It is found in marshy forest-grounds of Europe, Asia Minor and North Africa.

The boar is much larger than the domesticated swine ; and covered with short, grayish-black, woolly hair, thickly interspersed with stiff bristles, assuming the form of a crest along the spine. The great tusks of the lower jaw are formidable weapons in youth, but later become useless by curving over the snout, when the teeth of the upper jaw which protrude and curve out take their place as weapons. The boar seeks its food at night and feeds on roots, grain and small animals, birds' eggs, *etc.* Besides this species, several others exist, notable among which are Sus vittatus of Asia and Africa, Sus verrucosus of Java, and the Celebes and Sus barbatus of Borneo. No species of the genus Sus are natives of America or Australia. Boars were common in England until the time of

Henry II, when they seemed to disappear for the time being, reappearing again in the reign 136

of Charles I, when an attempt was made to raise them in New Forest. It resulted in fail¬

ure. Formerly the sport of hunting this animal with the aid of great dogs (boarhounds) was the favorite amusement of the nobles of France and Germany, but is now rarely followed except in a few estates in eastern Europe, where the animal is preserved for the purpose. In India, however, the chase of the wild boars of that country, usually called "pig-sticking,® is still foremost among the field-sports of the Anglo-Indians. Consult Harting, (British Animals

Extinct within Historic Times) (London 1880), and Johnston, 'British Mammals) (ib. 1903).

BOARD, the collective name applied to a

number of persons having the management,

direction or superintendence of some public

or private office or trust ; often an office under the control of an executive government, the business of which is conducted by officers

specially appointed, as board of admiralty, board of trade, *etc.*

BOARD OF MEDIATION AND CON¬

CILIATION, United States. A board of

commissioners created by act of Congress and approved 15 July 1913. Its purpose is to settle by mediation and conciliation all controversies concerning wages, hours of labor or conditions of employment that may arise between any car¬

riers engaged in transportation in or to the Lhiited States and their employees. The com¬

missioner is appointed by the President for a term of seven years. He is the executive offi¬

cer of the board, which consists of not more than two other officials appointed by the Presi¬

dent. In any case where an interruption gf traffic is imminent and fraught wfith serious detriment to the public interest, the board may offer its services to the respective parties. It is also required to bring to bear its best efforts to affect conciliation at the request of either party. If they cannot come to an agreement, the board endeavors to induce arbitration and makes arrangement for such whenever desired.

The office is independent of any political party.

The Department of Labor (see Labor, Depart¬

ment of) has also, through its secretary, the power of profering means of conciliation in labor or industrial disputes in other than traffic arrangements.

BOARDMAN, George Dana, American

missionary: b. Livermore, Me., 8 Feb. 1801; d. 11 Feb. 1831. He studied at Waterville Col¬

lege (now Colby University) and at Andover

Theological Seminary, and in 1825 was ordained in the Baptist Church. In 1825 he went to India, and in 1827 to Burma, where he labored assiduously in spreading Christianity. The mis¬

sion planted by him became the central point of all Baptist missions in Burma. His widow married the Rev. Adoniram Judson. Consult

King, A., (Memoir of George Dana Boardman) (Boston 1856).

BOARDMAN, George Dana, American

clergyman and author: b. Tavoy, British

Burma, . 18 Aug. 1828: d. Atlantic City, N. J., 28 April 1903 ; son of the American Baptist missionary of the same name. He wras educated in the United States, graduating at Brown Uni¬

versity in 1852, and at Newton Theological In¬

stitution in 1855. He was pastor at Barnwell, S. G; a flemard at Rochester „ N. Y., till 1864, — BOAT

\

when he became pastor of the First Baptist Church in Philadelphia. In 1899 he established a lectureship at the University of Pennsylvania, known as the “Boardman Foundation in Chris¬

tian Ethics. Besides sermons and essays, his chief works are (Studies in the Creative Week*

(1878) ; (Studies in the Model Prayer > (1879) ; ‘Epiphanies of the Risen Lord) (1879) ; ‘Studies in the Mountain Instruction (1880); ‘The

KingdonP (1899); (The Church* (1901); ‘The

Golden Rule* (1901).

BOARDMAN, Richard, English mission¬

ary: b. 1738; d. Cork, Ireland, 4 Oct. 1782. He became a member of Wesley's conference in

1763, and volunteered for service in America in 1769. He preached in New York and through

the Middle States till 1774, and then, returning to England, continued his itinerant ministry. He is known as one of the founders of Methodism in the United States.

BOARDS OF ELECTION. See Con¬

gress; Elections; Electoral Qualifications.

BOARFISH, a fish (Capros aper) of the

family Caproidcu, found off the southern coast of Europe. The body is small, oval, compressed and carmine in color, with seven transverse orange bands on the back, and has a long, hog¬

like snout. The flesh is held in small repute.

BOARHOUND. See Hound.

BOAR'S HEAD, The, a tavern in East—

cheap, London, destroyed in the great fire of 1666; it wTas rebuilt but was demolished to make way for an approach to London Bridge ; its site is now occupied by a statue of William IV.

The inn figures in Shakespeare's 'Henry IV) and 'Henry V* as the resort of Falstaff and his boon companions.

BOAS, bo*'as, Franz, German-American

ethnologist: b. Minden, Westphalia, 9 July 1858.

He studied at Heidelberg, Bonn and Kiel uni¬

versities, 1877-82 ; traveled in the Arctic regions, 1883-84; was assistant in the Royal Ethno¬

graphical Museum in Berlin, and privatdocent in geography at the university in 1885-86, when he became instructor in anthropology in Clark University. In 1886-88 he was a member of

the editorial staff of Science. In 1899 he be¬

came professor of anthropology at Columbia

University. In 1901 he became curator of the American Museum of Natural History. In

1907-08 he served as president of the American Anthropological Society and in 1910 of the New York Academy of Science. He has spent much time among various American Indian tribes ;

took part in the Jesup North Pacific Expedi¬

tion, the 'Reports) of which are edited by him.

His published works include 'Baffin Land*

(1885); 'The Central Eskimo) (1888); 'In¬

dians of British Columbia) (1888-92) ; 'The Growth of Children* (1896) ; 'Changes in Form of Body of Descendants of Immigrants*

(1911) ; 'Mind of Primitive Man* (1911) ;

'Kultur und Rasse) (1913).

BOAT, a term now indiscriminately used

for sea and river vessels of all kinds, but more properly applied to a vessel that can be hauled up on or launched from a beach. It may be propeled by oars, sails, steam or other motive power. From the earliest ages men have used buoyant contrivances to float them across

streams and lakes. The primitive log or num-WILD BOARS (Sus

porcus)

her of logs lashed tbgetiffif to forni a raft, of bundles of brushwood Of feeds used for the’

same purpose, early developed into the parent o! modern boats, the dug-out, which has been found in association with Stone Age remains and in Swiss lake dwellings. Bark canoes

and wickerwork frames covered with skins, such as the coracle of the ancient Celts, marks a further stage of development. There are differ¬

ences in the ways of laying on the planks in the modern small boat,- viz., the planks may be laid edge to edge so as to present a smdoth exterior; the boat is then said to be carvel-built ; the planks may overlap, and the boat is described as clinker-built.- Naturally the vari¬

ous types of boats are countless in number, for they vary iii every part of the world and in the same port for every different class of work and the character of the waters on which they are to sail. Some are needed swift, some roomy, some for pleasure, Some for rough weather;

the enumeration is endless. They are usually classed for racing purposes as open, half-decked and decked boats. The canoe, punt, skiff, gon¬

dola, dingy and outrigger are used on smooth water for pleasure and racing. The boats used by watermen vary greatly, according to the

locality. Whaleboats are sharp at both ends, and may be steered with an oar or ordinary rudder. Lifeboats are provided with air cham¬

bers which render them self-righting or self¬

bailing, or both combined. The following boats are used in the United States navy for rowing and sailing : barge, cutter, whaleboat, gig and dingy. Steamer and motor-boats are also used.

The cutter type includes the dingies and

launches and are square-sterned. Steamers

resemble cutters in build, but are much

heavier, are partly decked and some types

have rounded or pointed sterns ; motor-boats are of various types. Gigs are of

cutter build, but are longer, narrower

and of less depth than the cutters. They are now little used. Dingies have four oars; cutters and whaleboats from 6 to 14; gigs about 6; and launches 12 to 16. Masts and sails are supplied to be used when occasion requires or offers. Internal combustion engines are fast coming into general use for the propulsion of all types and sizes of boats. Boats are single-or double-banked, as they have one or two

oars to a thwart. The seats for the crew of a boat are called thwarts, the strip on which they rest is called the rising, the space abaft the after thwart the stern sheets, that forward of the first thwart the fore sheets, the spaces for the oars the rowlocks and the rim or upper edge of the boat the gunwale. Race boats differ much in shape from other boats; having only speed in view, they are built as light, narrow and sharp as possible. They are rowed with from two to 12 oars, and are from 15 to 70

feet in length, and generally not more than eight inches above water. The two-oared

boats are called shells, sculls or wherries; the larger ones sometimes barges. In. modern war vessels the boats are rested amidships on chocks or skid frames, but on merchant and passenger steamships boats are carried at the davits.

These are usually curved bars, the lower ends of which rest in a socket, with a collar around them higher up near the ship’s rail. The upper blocks of the boat-falls are secured to the curved arm of the davit and the lower blocks are fitted to rings in the boat. Mechanical davits are now coming into use on the larger’

ocean steamships. Every sea-going ship is by law required to carry a specified number of boats, according to the tonnage. Sea-going

ships carrying passengers must carry lifeboats and have sufficient boat accommodation for all the passengers carried. Owing to the impos¬

sibility of stowing away these on a large ship collapsible boats of various types are in use, also rafts with a large number of buoys. See Lifeboat; Rowing; Ship; Yacht.

BOAT CANALS. See Canals.

BOAT-FLY (Notonecta glauca), an aqua—

hemipterous insect which swims on its back; the hind-legs aptly enough resembling oars, the body representing a boat ; hence the name. It frequents stagnant waters, swimming rapidly on the surface, but diving below whenever the

water is disturbed. In color it is gray and black, with greenish elytra and white wings.

The small insects which constitute its food are devoured in very large numbers. The female

usually deposits the eggs on the stems and leaves of aquatic plants. See Water Bug.

BOATBILL, a South American heron

(Cancroma cochlearia) , having a remarkable

bill, suggesting in its broad, inflated shape an upturned boat, the keel of which is represented by the ridge of the culmen. The bird is about the size of a domestic fowl, but with shorter legs than most of the herons. Its general color is reddish-gray, with black and white markings.

The back of the head and neck are covered with elongated, erectile feathers. A naked gular pouch hangs beneath the lower jaw. Its habitat is in Brazil and Guiana. It feeds upon worms, crabs and other small aquatic animals caught in muddy shallows. Another species (Can¬

croma zclcndoni) inhabits Central America.

See Heron.

BOATSWAIN BIRD, or MARLIN—

SPIKE, either of two species of a sea-wander¬

ing bird, so called because of the long, pointed feathers in its tail, which resemble a marlin-spike, the boatswain's badge of office. One is the skua-gull (Stercorarius parasiticus) , and the other a tropic"bird (q.v.).

BOAZ, a wealthy Bethlehemite, who took

upon himself the duty of providing for Ruth, as the near relation of her dead husband,

Elimelech. From him Jesus Christ was directly descended.

BOB-WHITE. See Quail.

BOBAC, a European and central Asiatic

gregarious marmot (Arctomys bobac), resem¬

bling the American woodchuck in habits and

appearance, but smaller.

BOBADILLA, bo-ba-del'ya, Francisco de,

Spanish soldier: d. 29 June 1502. He was

commander of the Order of Calatrava and in the year 1500 he was selected as a commissioner to enquire into the condition of the new Spanish colony of Hispaniola, and especially into the complaints which had been made against the

administration of Columbus (q.v.). He was

entrusted with unlimited powers, which he im¬

mediately exercised by arresting Columbus,

putting him in chains and sending him to Spain.

He next abolished the regulations which had been ˆenacted by CoJumbus, and indulged the 138

colonists in all the excesses of power, and, above all, in boundless oppression of the natives. The unexpected outrage upon the most noted man

of the time excited general indignation in Spain, and was regarded as a national dishonor. Or¬

ders were accordingly sent for the recall of Bobadilla, and when Columbus, now reinstated in his honors and emoluments, made his fourth landing in Hispaniola on 29 June 1502 the fleet bearing Bobadilla and other enemies of Colum¬

bus started for Spain. A fearful tropical hurri¬

cane wrecked the ships, and Bobadilla perished.

BOBBIN, a reel or other similar contriv¬

ance for holding thread or yarn. It is often a cylindrical piece of wood with a flange, on which thread is wound for making lace ; or a spool with a flange at one or both ends, in¬

tended to have thread or yarn wound on it, and used in spinning machinery (when it is slipped on a spindle and revolves therewith) and in sewing-machines (applied within the

shuttle). Bobbins are usually manufactured by means of automatic machinery.

BOBBINET, a lace, with a hexagonal eye¬

let, manufactured by machinery, in imitation of the lace made on a pillow. See Lace.

BOBBIO, Italy, small town in the prov¬

ince of Pavia, 37 miles northeast of Genoa, the seat of a bishop, with an old cathedral, and formerly a celebrated abbey founded by Saint Columbanus in 612, in the library of w hich was a famous collection of manuscripts, made

known to moderns by Niebuhr and others, now divided between the Vatican and the Ambrosian Library at Milan. The population of the com¬

mune is about 5,000.

BOBOLI (bc/bo-le) GARDENS, the

grounds of the Pitti Palace at Florence, planned in 1550 under the patronage of Eleanora of Toledo and the direction of the sculptor Tribolo. They contain many fine statues and the Isoletto fountain, designed by Jean de Bologne.

BOBOLINA, bo-bo-le'na, , Greek heroine:

d. 1825. Her husband was put to death at Con¬

stantinople in 1812 by order of the Sultan, and Bobolina vowed revenge. At thˆ beginning of 1821 she fanned the flames oi insurrection

among the Greek population in Turkey, equipped at her own expense three ships, herself taking command of one bearing her flag, as admiral, and giving the others to competent captains, while her twro sons fought against the Turks on land. In September 1821 she attended the siege of Tripolitza, to meet the Peloponnesian leaders there assembled. She put her* ships at the disposal of the government and maintained the blockade of Nauplia for 14 months, until the Turks were forced to capitulate. She then proceeded, with a small

Greek fleet, which was entrusted to her charge, to the coasts of Morea, and during the siege of Monemvasia, when one of her nephews lost his life, she did qot even waste one hour upon him, but quietly drawing a cloak over his body, avenged his death by continuing to bombard the city. After the war she lived with her brothers at Spezzia. In 1825

her house was attacked by the friends of a young lady wdio was supposed to have been

dishonored by some member of her family, and she was killed by a rifle shot fired by one of the assailants.

BOBOLINK, an oriole of the family

Icterida, found in plains, prairie-lands, meadows and cultivated fields throughout the entire

United States, except on the Pacific coast. The male is 7.7 inches long, its tail taking up fully half of its length. It is distinguished from the blackbirds and other orioles by its pointed tail-feathers, long middle toe and variegated plum¬

age. The male has two distinct sets of plumage, a summer or breeding dress, and a winter one.

The former dress is lustrous black, with the neck, scapulars, rump and upper tail coverts buff, inclining to ochraceous on the neck, and ashy on the tail; the latter is similar to that of the female, who is protectively clothed in much-streaked yellowish-brown neutral tints ; the

young of both sexes also resemble her, until the young males reach maturity. The gay

summer dress of the male, especially the black part, is due to the black margins upon the feathers that come in with the spring renewal of plumage. These edges wear away, and thus, as the season advances, the brownish centres of the feathers are gradually revealed. The song of the male is a varying melody, an incessant outpour of ecstatic music, in which one detects distinctly enunciated the word ˆbob-o-link.® Its excited manners are as peculiar as its song, which often bubbles out of its beak as it flutters and dances in mid-air. As the summer advances and the plumage changes, the song diminishes, and

finally ceases altogether.

Their nests consist of grasses neatly and

skilfully entwined, and ingeniously hidden

among the stems and leaves of plants, and are guarded carefully and most jealously by the male, whose exuberant pride in the four or five dull-white, flecked and marbled eggs is remark¬

able. The bobolink goes in summer as far north as the banks of the Saskatchewan, but is most plentiful in the Northeastern States, where it renders good service by the destruction of in¬

sects and their larvae. It begins to migrate southward in August, and assembles in huge

flocks in early autumn in the great wild-rice marshes that border Delaware and Chesapeake

bays and their rivers, where they fatten on the wild rice, and are shot in vast numbers for market, under the name of ˆreedbird.ˆ Later in the season these birds advance southward and assail the cultivated rice plantations, where they are known as rice-birds and would ruin the crops, partly by eating, but mainly by break¬

ing the stalks and shaking out the grain, were they not constantˆ killed or scared away by thousands, by men and boys who are employed to shoot them. On their return from the

tropics in the spring they also attack the young plants. In consequence of this necessary per¬

secution in the rice fields the species has been seriously diminished of late years, and bobolinks are becoming rare in many parts of the United States and Ontario. On account also of their beauty and powers of song, many are caught, caged and sold in the bird-stores.

BOBORYKIN, bo-bo-ri'kin, Piotr Dmi¬

trievich, Russian man of letters (novelist,

playwright, scientist, actor, etc.) : b. Nizhni Novgorod, 15 Aug. 1836.

After having received in his grandfather's home a most careful pre¬

liminary education under competent instructors, he attended the courses in chemistry, medicine and law at the University of Kazan. After

having compiled and translated several books on chemistry and physiology he left Kazan and

came to Saint Petersburg (1861) with the inten¬

tion of dedicating his efforts to belles-lettres.

While still a student he wrote three dramas-.

'Fantazer,' <Rabyonok) ((Child J) , 'Odnodo-retz' ('Freeholder'); the last of which was published in the Biblioteka dlya chteniya (i.e., "The Library for Reading"). But Boborykin

tried rnany other fields, ancl when, after having inherited from his grandfather a vast fortune, he bought and edited the Biblioteka dlya

chteniya, published a great number of novels, short stories, etc., so that his collected works form a library of some 80 volumes compactly printed on 400 pages each. It was in this periodical that appeared his novels 'Put-DorogiP ('On the Way') and 'Zemskiya Sily) ('Earthly Powers'). When the magazine

ceased to exist (in 1865) Boborykin went abroad and spent about 10 years in Vienna, Paris, Lon¬

don and Italy, from where he sent to the

periodicals at home a great number of critical studies, theatrical reviews, *etc.* His love for dramatic art prompted him to publish (1872) his ‘Teatralnoe Iskustvo’ (‘Theatrical Art’), which earned him a great fame. But his prin¬

cipal field was the contemporary novel. En¬

dowed with unusual leisure and enriched with an enormous encyclopaedic knowledge, he wrote more than 30 novels, amongst which the fol¬

lowing were popular with his contemporaries : ‘Zhertva Vechernaya’ (‘Evening Sacrifice’),

‘Solidnyia Dobrodveteli’ (‘Solid Benefactors’), ‘Doctor Tzibulka’, ‘Iz Novikh’ (‘From

Amongst the New’), *etc.* All his novels excel in keen observation and have a fluid style. He has often drawn the portraits of his friends and acquaintances in Petrograd, Moscow, Nov¬

gorod and foreign towns with such an accuracy that one could easily recognize them if one had ever met them. But it would be exacting too much from a writer like Bobor3rkin if one ex¬

pected to find in his numerous works any depth of perception such as one encounters in Tolstoy or Dostoyevski. He is a photographer of char¬

acters rather than a master painter.

BOBRUISK, bo-broo’esk, Russia, a forti¬

fied town in the government of Minsk, on the right bank of the navigable Beresina, at its junction with the Bobruisk, 108 miles southeast of Minsk, with which it is connected by rail.

By steam navigation it is connected with sta¬

tions on the Dnieper and the Beresina. It has a departmental college and a military hospital.

It has manufactures of iron and flour, and its commerce consists in exports of timber and

grain. The place was fortified by Alexander I, and in 1812 was unsuccessfully besieged by the French, and the defenses were extended by

Nicholas I, who raised it to the position of a fortress of the first rank. In 1902 an extensive conflagration nearly destroyed the town.

BOBS, a nickname given by English sol¬

diers to the late Field-Marshal Earl Roberts (q-v.).

BOCAUE, bo-kow-a, Philippines, a town

in the province of Bulacan, Luzon, situated a few miles east of Manila Bay, near the city of Bulacan, and near the railroad line. Pop. 8,438.

BOCCACCINO, bok-ka-che'no, Boccac¬

cio, Italian painter: b. Cremona 1460; d. 1518.

Few details of his life arc known. He came under the influence of Mantegna and in his school in Cremona numbered Benvenuto Garofalo among his pupils. In 1497 he painted a series of frescoes in Saint Agostino in his na¬

tive city, but he is better known by his frieze in the cathedral. This represents the birth of the Virgin and various incidents in her life.

Among his paintings are 'Marriage of Saint

Catharine,' in the Venice Academy; 'Virgin

and Two Saints,' in San Quirilo, Cremona, and a 'Holy Family,' in the Louvre, Paris. Sev¬

eral works formerly attributed to Perugino,

Pinturicchio and Garofalo are now ascribed to Boccaccino. He committed suicide.

BOCCACCIO, bok-kach‘61, Giovanni,

Italian novelist: b. 1313, in Paris or Florence; d. Certaldo, 21 Dec. 1375. His family was

originally of Certaldo, but his father being en¬

gaged in commerce, removed to Florence,

where he amassed wealth and filled several im¬

portant public offices. Very early in life Gio¬

vanni displayed a remarkable aptitude for

learning, and before he was seven years old composed verses with perfect facility. He was placed under the care of an eminent master, Giovanni da Strada, but his father having de¬

termined on a commercial career for his son removed him from his tutor before his Latin course was completed, and as soon as he had acquired a sufficient knowledge of arithmetic apprenticed him to a merchant, with whom he remained six years. His master finding that he profited nothing, although he made in his company several commercial journeys, finally

in despair sent him back to his father, and was accustomed to regard him as a very nar¬

row-minded youth. His father discovering

that his son would never make a merchant,

thought that his studious habits might serve him in the legal profession. But the law

proved as distasteful as commerce, and the

father, finding that the law had little attrac¬

tion for Giovanni, forced him to return to commerce, and fix his residence in Naples.

The King, Robert of Anjou, a friend and pa¬

tron of Petrarch, was greatly devoted to liter¬

ature and thus drew to his court the most emi¬

nent scholars of Italy. Boccaccio was well

acquainted with Giovanni Barrili, a man of

erudition, and Paolo of Perugia, the King's librarian, and excited by their example and encouragement, he entirely abandoned com¬

merce and gave himself up to the pursuit of learning. His father gave his consent only

on the condition that he should study the

canon law, and although against his disposi¬

tion, he applied himself to it for some time, took his doctor's degree and after that found himself more at liberty to indulge his passion for poetry, while at the same time he devoted himself to the higher branches of philosophy, astrology, then a favorite study, and to the fathers of the Church. He remained eight

years in Naples and during his stay there was filled with desire of distinction by the visit of Petrarch on his way to Rome, where he had been decreed the honor of the laurel crown.

Boccaccio marked with delight the splendid re¬

ception given to Petrarch, his examination of three days, his noble oration and the applause which followed, but was far more pleased in after years to make the acquaintance of the 140

illustrious poet, with whom he formed a life friendship. Boccaccio was naturally fond of

gay company and fell in love with the Princess Mary, illegitimate daughter of King Robert,

and half-sister of the celebrated Joanna of Naples. She was married to

a Neapolitan

gentleman, but at once ardently returned Boc¬

caccio's love and became his avowed mistress.

At her instance, he composed his romance of (I1 Filocopo) and (L'Amorosa FiammettaP in

the latter of which his lady, under the name of Fiammetta, bewails the loss of Pamphilo, supposed to represent himself. The <Filocopo) is not skilfully constructed and is filled with spectres and visions of every kind and the powers of darkness are summoned before the

reader to account for its scenes and incidents.

Yet it contains passages of that wondrous

grace and vivacity afterward so signally dis¬

played in the Decameron,* and touches of

human nature in which the whole character is pictured in a single sentence. While thus em¬

ployed at Naples he was suddenly summoned

to Florence by the illness of his father. His separation from the Princess Mary appears

to have affected both lovers with violent sor¬

row, and it was only by the composition of the romance of (Ameto) that he could console himself during his absence. His father's re¬

covery and marriage set him again at liberty to return to the favors of his adored princess.

He was not only happy from his connection

with the Princess Mary, but possessed the

favor of Acciajuoli, who had great power in Naples, and even the regard of Queen Joanna herself. It is asserted on respectable author¬

ity that many of the most licentious passages in the (Decameron > were written in conform¬

ity with the taste and by the command of the Queen. His father died in 1350, leaving a son by his wife, Bice dei Bosticchi, who was also dead, to the care of Boccaccio. The poet

faithfully attended to his trust, and becoming acquainted with Petrarch, the latter's example and influence began very shortly to act upon the mind of his younger friend, who from the date of their friendship commenced to turn his thoughts more from licentious pleasures to

purer fame. Being now permanently settled

in Florence, Boccaccio, by Petrarch's advice, began to take some interest in the affairs of state. His motives were appreciated, however, and he was sent on an embassy to Padua, to invite Petrarch to accept the presidency of the university. Several other missions followed

and in April 1353 he took part in one to Pope Innocent VI, the papal court then residing at Avignon. In the same year was published his (Decameron) or (10 Days' Entertainment, }

one of the most extraordinary works of genius ever written, and which after the lapse of five centuries is still regarded as one of the purest specimens of Italian prose, as an inexhaustible repository of wit, beauty and eloquence, al¬

though unhappily marred with licentious de¬

scriptions. While occupied with these popular compositions, Boccaccio did not lose sight of higher pursuits in literature. Like Petrarch he was a devoted collector of ancient manu¬

scripts and a diligent student of the classics.

On one occasion Boccaccio visited Monte Cas-sino, within whose monastery he knew many

works had been collected, which had escaped the ravages of the barbarians, but found, to his amazement, that they were suffered to rot in a damp loft exposed to the weather, and that frequently when the monks were in want of money, they took some of the manuscripts, obliterated the writing, replaced it by copying on the parchment some part of the ritual, and then sold the new productions among the peo¬

ple of the neighborhood. To such collectors as Petrarch and Boccaccio, and to the latter pre-eminently, the world owes a debt of grati¬

tude for the rescue of many of the great

classic works which otherwise would have been irretrievably lost. In 1359 the author of the (Decameron } visited Petrarch at Milan, con¬

versed with him, as he informs us, at great length on the subjects of morality and reli¬

gion, and determined to devote himself more seriously to holy studies. This resolve re¬

ceived additional stimulus in 1362 from a sin¬

gular circumstance. A monk from the Car¬

thusian monastery at Siena came to visit him, saying that he was charged with a message to him from Father Petroni, who on his death¬

bed, although he had never seen Boccaccio,

declared that he knew him in spirit, and com¬

missioned the monk to exhort him to repent¬

ance. In order to prove the truth of his

words, the monk told Boccaccio of a circum¬

stance in his life which the poet thought

known only to himself. So great was the

effect of this warning, that he determined to abandon poetry, sell his library and lead a life of penance and meditation. With this view he wrote to Petrarch, supposing that his sudden purpose would meet with kindred enthusiasm,

but his friend answered in a strong, common-sense letter, instructing him to receive the warning to repentance, but informing him

that there was no necessitv for selling his books or abandoning his studies. Boccaccio

accordingly wrote in a strain altogether free from his former one, wThile he assumed the ecclesiastical habit and applied himself to the¬

ology. With disinterested generosity a large part of his means was dissipated in the collec¬

tion of Greek manuscripts, his emissaries vis¬

iting many parts of Europe to procure them.

His fortune was thus gradually impaired, and toward the decline of life he found himself poor and deserted by all his friends, except the noble-minded and constant Petrarch.

That great poet wished his friend to take up his abode with him, but Boccaccio preferred independence, and declined the offer, although he visited Petrarch whenever he found an

opportunity. In 1363 he was invited to Naples by the grand seneschal Acciajuoli, but was so hurt by his cold reception that he soon left and went to Venice to meet Petrarch. On re¬

turning to Florence he found its turbulent

state of society in little accordance with his wish of retirement, and took up his abode in a little cottage in Certaldo, in the vale of Elsa, dear to him as the birthplace of his family.

From this retreat he was soon summoned by

the chief citizens of Florence to undertake an embassy to Urban V at Avignon, and repair¬

ing to the papal court he experienced the most flattering reception. He was again sent to

Urban in 1367, after the pontiff had removed to Rome, when the character of Boccaccio

had so changed from his former looseness

that he was characterized by the bishop of Florence as one in whose purity of faith he BOCCAGE

BOCCHERINI

had the utmost confidence. He was now hon¬

ored by the Florentine magistrates with a

professorship founded in memory of Dante,

for the better explication of the (Divina

Commedia.) His lectures commenced in Oc¬

tober 1373 and continued until his death,

which was doubtless hastened by the demise

of Petrarch 10 months before his own. In

eloquent language he bewailed his loss. Boc¬

caccio wrote numerous works in Italian and

Latin, and both in prose and poetry, few of which are referred to at the present day; his great fame rests upon the (Decameron.* In

these hundred tales of love, displaying the most wonderful fertility of invention, the

reader is perpetually delighted with the beauty of the narrative and the variety of the scenes, whether of intrigue, wit or pathos — mo two stories, nor even their introductions, resem¬

bling each other. The author's fondness for involving friars in every imaginable scene of mischief and ludicrous mishap created great

scandal to the Church, and his famous romance, the 10th novel of the sixth day, in which (<Friar Onion promises some country people

to show them a feather from the wing of the angel Gabriel, instead of which he finds only some coals, which he tells them are the same that roasted Saint Lawrence, ® drew down the solemn anathema of the Council of Trent.

The editions of the (Decameron* are almost innumerable and translations exist in all the languages of Europe. The earliest editions

are extremely rare and of that of Valdarfer in 1471, only one copy is known. Boccaccio's poem, (I1 Teseide* is written in the ottava rima, of which he is usually considered as the inventor, and is the first Italian poem which presents a specimen of the epopee. Chaucer

borrowed from this poem his (Knight's Tale,*

and Shakespeare a part of his <Midsummer

Night's Dream.) The great English dramatist has also, in some measure, availed himself of Boccaccio's (Decameron, *as in Bymbeline*

and < All's Well that Ends Well.* With all his faults, we may consider Boccaccio one of the great revivers of learning and a benefac¬

tor to mankind, as well as worthy of the third place in that great triumvirate with Dante and Petrarch. Si'hich renders the 14th century so splendid an epoch in the history of literature.**

(See Decameron). Consult Cochin, Boccac¬

cio, etudes italiennes) (1890); Hutton, E.,

(Giovanni Boccaccio: A Biographical Study*

(New York 1910) ; Symonds, i Giovanni Boc¬

caccio as Man and Author* (1895); consult

also complete edition of Boccaccio's works by Moutier (Florence 1827-34) ; and the (De¬

cameron, * expurgated edition by Fornaciari

(Florence 1900).

BOCCAGE, bok-kazh, Marie Anne Fiquet

du (Le Page), French poetess: b. Rouen, 22

Nov. 1710; d. there. 8 Aug. 1802. She was ed¬

ucated in Paris, in a nunnery, where she mani¬

fested a love of poetry. Her first published work, a poem on the mutual influence of the fine arts and sciences, appeared in 1746 and gained the prize from the Academy of Rouen.

She next attempted an imitation of (Paradise Lost,* in six cantos; then of the (Death of AbeP ; next, a tragedy, (The Amazons) ; and a poem in 10 cantos, called (Th~ Columbiad.*

Madame du Boccage was praised by her con¬

temporaries with an extravagance for which

only her sex and the charms of her person can account. Forma Venus , arte Minerva , w'as the motto of her admirers, among whom were Vol¬

taire, Fontenelle and Clairaut. There is a

great deal of entertaining matter in the letters which she wrote on her travels in England and Holland. She was a member of the academies of Rome, Bologna, Padua, Lyons and Rouen.

Many of her works have been translated into English, Spanish, German and Italian.

BOCCANERA, bok-ka-na'ra, Simone,

first-Doge of Genoa; d. 1363. He was born of an illustrious noble family, but early took part with the democratic party and gained

great popularity by undertaking the defense of the people against the nobles. During a com¬

motion caused by the severity with which Philip of Valois had punished a mutiny on board some Genoese galleys in the service of France, the people wished to appoint Boccanera their abbe, an office which appears to have been similar to that of the tribunes at Rome. Boccanera de¬

clined to accept, on the ground that his noble birth would not allow him to become a plebeian magistrate. The excuse only made the people more determined to place him at their head and as he would not be abbe they by acclamation hailed him doge. During his

administration he successfully combated the various factions and secured a Genoese triumph over the Moors of Spain, the Tartars and the Turks. The office, thus introduced into Genoa for the first time in 1339, was exercised by Boccanera till 1344, when the ascendency of a faction opposed to him obliged him to abdicate and retire to Pisa.

He afterward regained the office in 1356, and had held it for seven years, when his enemies succeeded in destroying him by poison.

BOCCHERINI, bok-ka-re'ne, Luigi, Italian

composer of instrumental music : b. Lucca, 14

Jan. 1740; d. Madrid, 28 May 1805. He received his first instruction in music and on the violon¬

cello from his father and the Abbe Vanucci, music-master of the archbishop. He further

improved himself in the art at Rome, and after¬

ward went, with Filippo Manfredi, his friend and countryman, to Spain, where he met with but indifferent patronage and latterly suffered greatly from indigence. Previous to 1797 the King of Prussia, Frederick William II, who

was a great lover of the violoncello and ad¬

mired Boccherini's compositions, had paid him a pension on condition of his sending him

yearly some of his quartets and quintets. The compositions which Boccherini published him¬

self consist of symphonies, sextets, quintets, quartets, trios, duets and sonatas for the violin, violoncello and pianoforte. He never composed anything for the theatre; and of church com¬

positions we find but one, his (Stabat Mater.*

The adagios of Boccherini excited the admira¬

tion of the connoisseurs and the despair of the composers of his time. He may be regarded as a sort of minor Haydn, and he was the first who wrote instrumental quartets, of which all the parts are obbligato,

and determined the true character of this species of music. His melo¬

dies are more highly esteemed in England,

France and Spain than in Germany. Consult

Ceru, D. M., (Cenni intorno alia vita e le opere de Luigi Boccherini *(Lucca 1864) ; Picquot, L. , Boccherini* (Paris 1851) ; Schletterer, H.

M. , Boccherini* (Leipzig 1882).

BOCCONIA, or PLUME POPPY, a

genus of four or five species of plants of the family Papaveracece. B. cordata, a native

of Japan and China, is the only species of special merit. It is a hardy perennial herb with large leaves similar to those of bloodroot, and small, usually pinkish apetalous flowers borne in large terminal panicles rising like spires from four to eight feet above the dense foliage.

Where known, it is a favorite in borders and shrubberies and is also largely used upon lawns for its remarkable appearance. It is very much sought by bees, and should prove a valuable bee-forage, since it will thrive almost anywhere. It is readily propagated by seeds, divisions of the root and by suckers. If set in rich soil the plants will attain the greatest size and

attractiveness.

BOCHART, bo-shar, Samuel, French di¬

vine: b. Rouen 1599; d. Caen, 16 May 1667. He studied philosophy and theology at Sedan, vis¬

ited England and Leyden, and, returning to

France about 1628, became Protestant minister of Cae.n, a post which he held till his death.

He achieved fame as a controversialist in his dispute with the Jesuit Veron, from which the latter withdrew after an 11 days' contest, and an account of which he published. His next work, 'Geographia Sacra* added so much to his reputation that Christina, Queen of Sweden, in¬

vited him to Sweden, in which journey he had for his traveling companion the celebrated

Huetius, afterward bishop of Avranches.

Bochart's next great work is entitled (Hiero-zoicon, or an Account of the Animals men¬

tioned in Scripture.) It was scarcely completed when its distinguished author, while addressing the academicians of Caen, was struck with

apoplexy and died almost instantaneously. Be¬

sides the work above mentioned, he wrote sev¬

eral others, among which is a (Letter to Dr.

Morley,* written, it is said, at the request of King Charles II, in which he discusses the theological controversies of the day. His prin¬

cipal works are still standards on the subjects of which they treat.

BOCHE, a name employed with the sig¬

nification German, especially German soldier, by the Allies in France in 1914-17, and given currency everywhere through the widely pub¬

lished descriptions of the campaigns of the European War. It came to express war-engendered hatred of the Teutons, but is never¬

theless not a war-creation. On the contrary, for many years before the war it had been (first in the form Alboche) a familiar part of the Parisian popular vocabulary. Alboche may be called a <(telescope word,** like autobus (awfo-mobile and omni -bus joined in a single word of convenient brevity). By analogous

telescoping the Parisians made Alboche out of Allemand, the French word for German, and

caboche , slang or cant for Niead** (Low Latin boscia). It was speedily shortened to boche or Boche, and is a striking example of onoma¬

topoeia, the very sound of the word expressing French estimates of the invaders' character and giving to that one syllable vitality that is in¬

dependent of etymological association. Consult Paris Figaro (10 April 1915) ; London Spec¬

tator (4 Sept. 1915) ; Literary Digest (New York, 6 Novr. 1915, p. 1012).

BOCHER, bo'sha, Maxime, American

mathematician : b. Boston, 28 Aug. 1867 ; d. 12

Sept. 1918; educated at Harvard and Gottingen, became instructor 1891, assistant professor 1894, and professor of mathematics in Harvard 1904; 1908-10 he was president of the American

Mathematical Society. His published works in¬

clude (Introduction to Higher Algebra) (1907) ; (Introduction to the Study of Integral Equations> (1909) ; and he was one of the editors of the (Annals of Mathematics, * of the

'Transactions* of the American Mathematical

Society, and collaborator on the 'Encyclopadie der mathematischen Wissenschaften.*

BOCHNIA, boH'ne-a Poland, town in the

government of Lemberg, Galicia, near the Raba, 25 miles east-

southeast of Cracow. It is toler¬

ably well built, with several churches, a gym¬

nasium, a grammar and other schools and a

board for the regulation of mines and salt works. The salt mines here employ 500 persons, and yield 15,000 tons per annum. It is the seat of thriving industries and trade. Pop. of judicial district 47,987, including 3,000 Jews.

BOCHUM, bon'oom, Prussia, town in the

government of Arnsberg, province of West¬

phalia, five miles east-northeast of Essen and between 20 and 30 miles northeast of Dusseldorf. It is on the railway from Dortmund to Duisburg, and has important iron, steel and coal mining industries. It contains several

churches, a school of mining and metallurgy, a gymnasium and theatre. Among its indus¬

trial establishments are steel works, iron foun¬

dries, tin and zinc factories, carpet factories and paper roofing manufactories. The water¬

works are municipal property and the town

has a modern sewage system. The government

is vested in a municipal council of 24 members who elect an executive board of seven. Pop.

136,916.

BOCK, Jerome, German botanist, better

known under his Latin name of Cragus : b.

Heidesbach 1498; d. Harnbach 1554. He was

a schoolmaster, and then a physician. Bock

may be considered as one of the founders of modern botany ; he was the first who en¬

deavored to form a natural botanical arrange¬

ment. He is the author of a (Herbal of

German Plants.*

BOCK, Karl Ernst, German anatomist : b.

Leipzig 1809; d. 1874. He studied at the Uni¬

versity of Leipzig, and at the outbreak of the Polish revolution he went to Warsaw, where he acted as hospital physician, first in the Polish service and later in the Russian. In 1839 he was elected extraordinary professor in the Uni¬

versity of Leipzig. His title to fame rests chiefly on his 'Handbook of Human Anatomy.*

BOCK BEER, a strong beer, the first

drawn from the vats in the spring, when the winter's brew of lager beer is broached. See Beer Brewing.

BOCKLIN, berk-lm, Arnold, Swiss

painter: b. Basel, 16 Oct. 1827; d. 1901. He studied at the Dusseldorf Academy and also

at Brussels, Paris and in Italy, devoting

himself mostly to landscape painting. A con¬

tract to decorate the dining-hall of a villa sum¬

moned him to Hanover; in 1856 he went to

Munich, where Count Schack became his patron In 1858 he became

Weimar; in 1866-71 he was in Basel; in 1871

lie returned to Munich and lived also in Zurich and Florence. He is in the first rank of land¬

scape painters, showing a real poetic power and wealth of coloring, yet his most poetical con¬

ceptions in landscape painting are often marred by the figures introduced. Among his most

notable paintings are (Venus Reposing*; (Pan in the Rushes, *now in the Munich Gallery; 'Castle by the Sea Surprised by Corsairs* ; ˆ V ilia by the Sea* ; and 'The Isles of the Blessed,' in National Gallery, Berlin. Among public art collections the Schack Gallery, Mu¬

nich, has the largest number of Bocklin's works.

He is well represented, however, in the Basel Museum and the Freiherr von Heyl collection, Darmstadt. But very many of his best works are privatelv owned in Germany and Switzer¬

land. Consult Brockhaus, Heinrich, (Arnold

Bocklin* (Leipzig 1901) ; Lehrs, (Arnold Bocklin, ein Leitfaden zum Verstandnis seiner

Kunst) (Munich 1897) ; Ostini, in 'Kiinstler Monographien* (Bielefeld 1904) ; Wiirtemberger, (Arnold Bocklin* (Berlin 1912).

BOCLAND, BOCKLAND, or BOOK—

LAND, one of the original English modes of tenure of manor-land which was held by a

short and simple deed under certain rents and free services. It is contrasted with folcland, or land held by customary law and without

written title. Bocland differed from most other forms of tenure in that it derived all its qualities and incidents from the charter creating it. Every tenure of bocland might be different from

every other as to alienability, heritability, *etc.*

Consult Digby, ‘Introduction to the History of the Laws of Real Property) (4th ed., Oxford 1892) ; Pollock, ‘The Land Laws) (London

1887) ; Pollock and Maitland, ‘History of Eng¬

lish Law* (2d ed., Boston 1899) ; Kemble,

‘ Anglo-Saxons) ; Stubbs, ‘Constitutional His¬

tory of England.*

BOCOCK, Thomas S., American politi¬

cian: b. Buckingham County, Va., 1815; d. Ap¬

pomattox County, Va., 6 Aug. 1891. He was

graduated at Hampden-Sidney College, pursued

the study of law and after his admission to the bar practised law at Appomattox CourtHouse, Va. He was a member, for several years, of the Virginia house of delegates and was attor¬

ney for the State in 1845-46, being elected in the latter year a representative in the 30th Con¬

gress on the Democratic ticket. He sat for seven successive terms until the Ordinance of Secession was enacted. In 1861 he was elected to the Confederate Congress and speaker of

the Confederate House of Representatives on

its permanent organization, 18 Feb. 1862.

BOCQUILLON-WILHEM, bo’ke’yon’

ve’lan, Guillaume Louis, French musician: b.

Paris 1781 ; d. 1842. As superintendent of music in the public schools (1835), and in* the universities (1838), from the classes he then instituted, together with workingmen's evening classes later, arose the Orpheon and the French system of choral societies. He was a pupil of the Paris Conservatoire, composed music to

Beranger's lyrics, and was author of several valuable textbooks on singing.

BOCSKAY, boch'ko-e, Stephen, Hun¬

garian national leader: b. 1556; d. 1606. He was educated at the court of the Bathorys. In 1604, when the Emperor Rudolf IT attempted to suppress Protestantism in Hungary, a rebellion broke out, and Bocskay joined the malcontents and became their leader. He was well sup¬

ported by the people, drove back the Emperor's troops and was made Prince of Transylvania.

In 1606 he concluded the Peace of Vienna with the Emperor, and this secured religious free¬

dom to Hungary for a long time. It is sup¬

posed that Bocskay was poisoned by his chan¬

cellor. Consult Szilagyi, 'Monumenta Com—

itialia Regni Transylvanise) (Budapest 1879).

BODE, Boyd Henry, American philos¬

opher: b. Ridott, 111., 4 Oct. 1873. A graduate of Yankton College, South Dakota, and Ph.D.

of Cornell University (1900), he was assistant professor of philosophy at the University of Wisconsin until 1909, when he received the ap¬

pointment of professor at the University of Illinois. He is a member of the American Phil¬

osophical Association and was vice-president of the Western 'Philosophical Association, 1911—12. He is author of 'An Outline of

Logic) (1910).

BODE, bo-‘da, Johann Ehlert, German as¬

tronomer : b. Hamburg, 19 Jan. 1747; d. 23 Nov.

1826. He gave the first public proof of his knowledge by a short work on the solar eclipse of 5 Aug. 1766. The approbation which this received encouraged him to greater labors, and in 1768 appeared his ‘Introduction to the

Knowledge of the Starry Heavens) (11th ed., 1858). In 1772 the Berlin Academy chose him their astronomer, and 10 years after he was made a member of that institution. His best works are his ‘Astronomical Almanac) (com¬

mencing 1774) — a work indispensable to every astronomer, — and his large ‘Celestial Atlas) in 20 sheets, in which the industrious editor has given a catalogue of 17,240 stars (12,000

more than any former charts). In 1825 he was released, on his own wish, from his duties in the Academy ol: Science and the observatory in Berlin. His place was filled by Professor

Encke. His empirical law as to the distance of the planets is well known. See Bode’s Law.

BODE, Wilhelm von, German art-critic

and archaeologist: b. Kalvorde, Brunswick, 10

Dec. 1845. He first intended to become a law¬

yer, but was so attracted by the arts that he renounced this idea and took up the study of archaeology in Berlin, Gottingen and then in Vienna. In 1872 he became an assistant at the Royal Museum of Berlin, in the department of Christian plastics, having the directorship in it conferred on him in 1880. He had already given proof of his remarkable ability to build up a collection both in his own department and in that of paintings. In 1890 he was advanced to the position of director of the Picture Gal¬

lery, a place that he has since continued to fill with great distinction.

Bode was made

privy councillor in 1909 and was elevated to the hereditary nobility in 1914. He is a mem¬

ber of the academies of Amsterdam, Berlin and Munich. He acts in at least an advisory capac¬

ity for numbers of other art institutions in Germany, and his labors have gone so far afield as to include the cataloguing of the bronzes in the collection of Mr. J. Pierpont Morgan. His word is almost law among German art-lovers

and they have responded times without num¬

ber to his appeals for support when important art objects have come on the market — to go 144

almost inevitably to the enriching of the na¬

tional museums. An idea of the breadth of his attainments may be gained from the titles of the authoritative works he has published on such subjects as (Studies in the History of Dutch Painting) (1883) ; his editing of the 4th to 8th editions of Burckhardt's (Cicerone > ; (Donatello in Padua) (1883) ; Utalian Sculp¬

tors of the Renaissance) (1887) ; (Rembrandt) (with Hoffstede de Groot 1897-1900), and

(Rugs and Carpets of the Near East in Ancient Times) (1901).

BODENSTEDT, bo'den-stet, Friedrich

Martin von, German poet and miscellaneous

writer: b. Peine, 22 April 1819; d. 1892. He studied at Gottingen, Munich and Berlin, and became tutor to the young Prince Gallitzin at Moscow. In Moscow he made excellent trans¬

lations of poems by Pushkin, Kazlov and Ler¬

montov (1843). Having obtained an educa¬

tional appointment at Tiflis, he pursued Ori¬

ental studies under a Tatar teacher, Mirza-Schaffy. Later he published a work on the

peoples of the Caucasus (1848) and (A Thou¬

sand and One Days in the East) (1849-50),

which were very successful. In 1854 he was appointed professor of Slavic at Munich and in 1858 was transferred to the chair of Old Eng¬

lish. He subsequently was theatrical director at Meiningen and traveled and delivered lec¬

tures in the United States in 1881. Among the best of his poetical works are the (Songs of Mirza-SchaffyP purporting to be translations

from the Persian but really original, which have passed through more than 150 editions.

A continuation, (Aus dem Nachlass des Mirza-Schaffy) (1874), was less successful. He pub¬

lished translations from Marlowe, Ford, Web¬

ster, and other contemporaries of Shakespeare, translated Shakespeare's (Sonnets > and, with other writers, joined in a new translation of Shakespeare's dramatic works (9 vols., 1866-72). Consult his autobiographical (Erinnerungen aus meinem Leben) ; Baker, (Literary and Biographical Studies) (London 1908) ;

Stern, (Studien zur Litteratur der GegenwarD

(Dresden 1895).

BODE'S LAW, an empirical law formu¬

lated by the German astronomer Bode (q.v.)

to give the arithmetical relation subsisting be¬

tween the distances of the planets from the sun. It may be thus stated: Write, in the first instance, a row of fours, and under these place a geometrical series beginning with 3 and in¬

creasing by the ratio of 2, putting the 3 under the second 4, and by addition we have the series 4, 7, 10, etc., which gives nearly the relative distances of the planets from the. sun.

444444444

3 6 12 24 48 96 192 384

4 7 10 16 28 52 100 196 388

Thus, if 10 be taken as the distance of the earth from the sun, 4 will give that of Mercury, 7 that of Venus, and so forth. The actual relative distances are as follows, making 10 the distance of the earth :

&

i/i

• H

U

C/5

<1>

G

3

o

u

CP

</}

3

C

XJ

+■»

u

c/5

Jh

aJ

o

u

<D

4-»

<D

4->

*a

c

v«

3

3

a

3

•*-»

a

s

(1 >

>

aJ

w

VH

&

ir. !

<

3

1 — >

a

at

u

t>

<D

£

3.9

7.2

10

27.4

52.9

95.4

192

300

Close as is the correspondence between the law and the actual distances, no physical reason has been given to account for it, although there is little room for doubt that such exists. Kepler was the first to perceive the law, and Bode argued from it that a planet might be found between Mars and Jupiter to fill up the gap that existed at the time in the series. The discovery of the planetoids has proved, the cor¬

rectness of this prediction.

BODIE, or BODY'S ISLAND, N. C., an

island of sand in Dare County, between the Atlantic Ocean and Albemarle and Roanoke

sounds. The sand shifts often and inlets from the ocean appear and disappear. There is a lighthouse with a first-class light on the island, in lat. 35° 49' N. and long. 75° 33' W. and 155

feet above sea-level.

BODIERON, bo-di-e’ron, a fish (Hexa -

grammus lagocephalus) of Puget Sound, similar to the rock-trout but having greenish-colored flesh. The Indians of Cape Flattery term it boregat. See Rock-trout.

BODIN, bo-dan, Jean, French scholar and

innovator in economic and political theory : b.

Angers 1530; d. Laon 1596. He studied law

in Toulouse and after a lectureship in that then notable school attempted without distin¬

guished success the practice of law in Paris.

This he presently abandoned for political and economic study, lightened by the favor of

Henry III, with whom he was for a time in¬

timately associated, as afterward with the

King’s brother, the Due d’Alenqon, whom he

accompanied to England in his suit for the hand of Queen Elizabeth. His first book was a translation of Oppian’s ˆynegetigon,5 a

hunting manual, into Latin verse. The first of serious significance was the (Discours sur les causes de l’extreme cherte qui est aujourdhui en France) (1574). This was an enlightened

contribution to the theory of prices, a matter to which he recurred in the sixth book of his most notable work, (The Republic, } and in a refutation of the assertion of Malestroit that there had been no rise in prices for three cen¬

turies, the (Responsio ad paradoxa Males—

trettip which contains the first satisfactory ex¬

planation of the revolution in prices during the 16th century and

treats sanely of the rela¬

tion of money to prices and to wages. He

showed here that the amount of money in a land is no gauge of its wealth and was among the first to see the futility of prohibiting the export of gold and silver. In 1576 Bodin was made king's attorney and elected a member of the Third Estate for the States-General at

Blois. Here he defended brilliantly freedom

of conscience, under very difficult conditions, resisting both clergy and nobility in their de¬

sire to enforce conformity. He also resisted the desire of the King for authority to alien¬

ate public lands and so lost the royal favor by his defense of the people's rights. In 1577

appeared his (Six livres de la republiqueP a book often reprinted and regarded by some as entitling its author to rank, with Aristotle and Montesquieu, among the greatest of political philosophers. (The Republic,) though clumsy

in arrangement and inexact in citation, was the first attempt since Aristotle's <Politics) to build a complete system of political science. Note-BODKIN

worthy is the constancy with which the higher aims and purposes of society are kept in view.

He declared public finance to be ((the sinews of the state® and showed enlightened ideas on taxation and in the defense of the right of private property against the utopian theory of More. Governmental intervention in trade and commerce was approved. The study of the

effect of climate on society and government was novel and influenced Montesquieu. In

government he thought the will of the people should find orderly expression but that the sovereign should be ((absolute and subject to no law.® Finding on a visit to Oxford and Cambridge in 1581 that (The Republic was

known there only in a bad Latin version, he published a translation of his own in 1586.

That he was not wholly above the grosser

superstition of his time appears from the be¬

lief in witchcraft shown in his (Demonomanie des sorciers) (1580). He declared for the

League in 1589, for Henry IV in 1594 and died of the plague in 1596. He left unpublished a (Colloquium Heptaplomeron,* first printed

1847, a conversation between a Catholic, Lu¬

theran, Zwinglian, Jew, Mohammedan, Epi¬

curean and Theist, looking to the widest toler¬

ance consistent with public morals and the

national well-being. Consult Barthelemy,

(£tude sur J. Bodin) (Paris 1876) ; Dunning, (Political Theories from Luther to MontesquieiP

(New York 1905), and Fournol, (Bodin, pre—

decesseur de MontesquieiP (Paris 1896).

Benjamin W. Wells.

BODKIN, (1) an instrument used by

women of ancient times to fasten the hair, worn at the back of the head ; it was commonly em¬

ployed by the priests of Cybele and by the fe¬

male characters in Greek plays. The peasant girls of Naples still wear a form of bodkin, often of silver; (2) a sharp instrument-for piercing holes in cloth; (3) a blunt instrument with an eye, for drawing tape, etc., through hems; (4) a small tool used by printers.

BODLE, or BODDLE, a copper coin

formerly current in Scotland, of the value of two pennies Scotch, or the sixth part of an English penny. It is said to have been so called after a mintmaster named Bothwell of the

time of Charles II, when these coins were first issued.

BODLEIAN, bod-le'an, LIBRARY, the

public library of the University of Oxford, so called from Sir Thomas Bodley (q.v.) who re¬

stored it toward the close of the 16th century, many of the previous collections of books and manuscripts having been destroyed during the reign of Edward VI. Besides restoring the

building and providing a fund of $10,000 for the purchase of books, he presented a collec¬

tion which wras valued at $50,000, and left an estate for the maintenance of officers and for keeping the library in repair. For the govern¬

ment of the library he drew up certain statutes, which were afterward incorporated with those of the university. The library was first opened to the public 8 Nov. 1602. The liberal example of Bodley was soon followed by the Earl of Essex, who presented part of the Portuguese bishop Osorius' library, which had been captured by Essex in 1596. shortly after the expedition against Cadiz. After the death of Bodley, the Earl of Pembroke added a valuable collection VOL. 4 — 10

of Greek manuscripts procured by Baroccio, a Venetian. At later dates Sir Thomas Roe, Sir Kenelm Digby, the "learned Selden,® Gough

the antiquary, and Archbishop Laud made do¬

nations of valuable Greek, Oriental and Ger¬

man manuscripts to this magnificent library.

The library of the Hebrew scholar Oppenheim, rich in rabbinical lore, a great collection of Eastern manuscripts, of early editions of the Bible, original editions of ancient and classic authors, together with 50,000 dissertations by members of foreign universities, and an exten¬

sive collection of medals, coins, prints, etc., were also subsequently deposited in this library.

In 1809, Clarke, the traveler, gave to it some rare Greek and Latin manuscripts, including a (Plato> from the Isle of Patmos. In 1818 an exceedingly valuable collection of Hebrew,

Greek and Arabic manuscripts procured from

Venice was added, together with a portion of the famed library of Richard Heber (1834),

and lastly, the rare books, manuscripts and coins of the scholar, antiquary and Shakespear¬

ean commentator, Francis Douce. This re¬

nowned library, in fine, is rich in many depart¬

ments in which other libraries are deficient and forms altogether the noblest collection of which any university can boast. It is constantly increasing by donations, by copies of every work printed in the United Kingdom, as well as by books purchased from the fund left by Bodley, and by a proportion of fees received at matriculation. It is now estimated to con¬

tain upward of 1,000,000 bound volumes, and between 30,000 and 40,000 manuscripts. The

first catalogue of the printed books was issued by Dr. James in 1605. The library is open on lawful days from 9 till 5; but its admirable adjunct, the Ratcliff e Camera, in which most modern books are stored and which comprises a select library and reading room for students, is open from 10 a.m. till 10 p.m. Consult Macray, (Annals of the

Bodleian Library)

(Oxford 1888) ; Clark, (A Bodleian Guide to Visitors* (1906).

BODLEY, John Edward Courtenay, Eng—

glish historian: b. 6 June 1853. He was ad¬

mitted to the bar of the Inner Temple in 1874

and was graduated at Balliol College, Oxford, 1877. He was private secretary to the president of the local government board, 1882-85. His works include (France) (2 vols., 1898) ; (The Coronation of Edward VIP (1903) ; (The

Church in France) (1906) ; (Cardinal Man¬

ning and other Essays) (1912), *etc.*

BODLEY, Sir Thomas, English scholar,

and founder of the Bodleian Library (q.v.) at Oxford: b. Exeter 1545; d. London 1612. He was educated partly at Geneva, whither his

parents, who were Protestants, had retired in the reign of Queen Mary. On the accession of Elizabeth they returned home and he completed his studies at Magdalen College, Oxford, where he was graduated in 1563. He afterward be¬

came a fellow of Merton College and read let¬

ters on the Greek language and philosophy. He went to the Continent in 1576 and spent four years in traveling. His proficiency in languages led to his being employed in various embassies to Denmark, Germany, France and Holland. In 1597 he returned home and dedicated the re¬

mainder of his life to the re-establishment and augmentation of the public library at Oxford.

This he accomplished, procuring books and

manuscripts himself, both at home and abroad, at a great expense, and by his influence and persuasion inducing his friends and acquaint¬

ances to assist in his undertaking. Sir Robert Cotton, Sir Henry Savile and Thomas Allen,

the mathematician, were among the principal

contributors. The library was opened in 1602, the first public library in Europe. It received so many augmentations that Sir Thomas Bodley, who was knighted in 1604 by James I, was induced to erect an additional structure for the reception of the increasing quantity of valuable books and manuscripts. He was accorded an

elaborate funeral (for the expenses of which he left a sum of £666) in Merton Chapel. He bequeathed nearly the whole of his property to the support and augmentation of the library.

Consult (Reliquiae Bodleianae) (London 1703).

BODMER, bod'mar, .Georg, Swiss me¬

chanic: b. Zurich, 6 Dec. 1786; d. Zurich, 29

May 1864. He invented the screw and cross

wheels and made valuable improvements in

firearms and in various kinds of machinery, particularly in that of wool spinning.

BODMER, Johann Jakob, German-Swiss

literary critic: b. Greifensee, Switzerland, 19

July 1698; d. Zurich, 2 Jan. 1783. With Breit-inger from 1721-23 he issued the periodical Disburse der Maler, in which German poetry

was severely criticised for its servility to French models. Based on national and ancient stand¬

ards, he formed a German literary school in opposition to Gottsched of Leipzig, with whom he carried on a prolonged controversy to the final discomfiture of his opponent. He trans¬

lated Milton's (Paradise Lost,5 wrote poems

and dramas of no signal merit, but published valuable editions of older German poets. For 50 years he was professor of Swiss history and politics in Zurich. Bodmer was appointed pro¬

fessor of history at Zurich in 1725. Perhaps his greatest service to German letters were his •

editions of the Minnesingers5 and of part of the (Nibelungenlied.5

BODONI, bo-do'ne, Giambattista, Italian

printer and type-cutter : b. Saluzzo, Piedmont, 1740; d. Padua, 29 Nov. 1813. His father

owned a printing establishment at Saluzzo, and he began, while yet a boy, to employ himself in engraving on wood. In 1758 he went to Rome and was made compositor on the press of the Propaganda. He there made himself master

of Oriental languages and restored in place the types of several alphabets which had fallen into disorder. About 1766 Bodoni was placed at

the head of the Duke of Parma's private press, which he made the first of the kind in Europe, and gained the reputation of having far sur¬

passed all the splendid and beautiful produc¬

tions of his predecessors in the art ; but the in¬

trinsic value of his editions is seldom equal to their outward splendor. His Homer is a mag¬

nificent work ; indeed, his Greek letters are the most perfect imitations of Greek manuscript

that have been attempted in modern times. He printed the Lord's Prayer in 155 languages.

His splendid editions of Greek, Latin, Italian and French classics are highly prized.

BODY COLOR, a term applied to such

pigments as have body enough to be opaque, as distinguished from those which are trans¬

parent. As a rule, pigments have more body the nearer they approach to white, consequently the light parts of pictures in oil are in body color to give them brightness and strength, while the dark parts are transparent to give them depth. Watercolor painting, when exe¬

cuted by mixing the pigments with water after the manner of an oil painting, is said to be painted in body color.

BODY OF LIBERTIES. See Law.

BODY AND MIND, in philosophy, the

problems of the reality of mind and body, and of the relations conceived to exist between them. Mind and body, positing temporarily

their reality, may first be regarded from the point of view of correlated action. Generally experience reveals indisputably the intimate re¬

lation which exists between the constitution and modifications of bodily functions and the char¬

acter and alterations of consciousness. Con¬

sider the following: the dependence of certain forms of consciousness

upon the functioning of the senses; modifications due to injury by a blow, on lesion in the cerebral cortex; effect of loss of sleep upon attention ; effect of the use of certain drugs; pleasures and pains re¬

sulting from functioning of sense; feeling of effort which accompanies bodily work ; the phe¬

nomena of sleep; diseases of memory and will, double personality; phenomena of hypnotism,

hallucination, etc.; the evidence from heredity, sexual differences and other allied phenomena.

All these, as facts, afford an indisputable con¬

clusion concerning the correlated action of mind and body.

But difficulties arise as soon as we undertake to state the nature of the relations which exist between them. The general truth which the

phenomena referred to appear to establish, that every psychosis has its concomitant neurosis and every neurosis a concomitant psychosis, is not entirely borne out in fact. The former part of the statement is indubitable ; the latter by no means so. Mental activity always involves nervous activity, but the nervous system does work other than that connected with mind.

Moreover, the precise interconnections of men¬

tal fact with cerebral fact, and vice-versa, is not only not known, but the specific character of the neurosis concomitant with the psychosis is perhaps impossible of final analysis. But until these phenomena are understood, the na¬

ture of the relations of body and mind cannot be finally determined. However, physiological psychology has successfully established certain general conclusions concerning the existence

of uniform relations between concomitant psy¬

chical and neural processes. The most obvious of these is the time-order or synchronous occur¬

rence of the two series of events. The remain¬

der are concerned, in the main, with variations of intensity, quality, combination and complex¬

ity. Qualitative psychical differences, however, are not accompanied by corresponding differ¬

ences of molecular movement. These are quite different from the corresponding sensational

differences.

Philosophical systems, from the days of

Greek thought (see Anaxagoras; Aristotle)

down to the present, have taken up the prob¬

lem where psychology leaves off. These sys¬

tems may be divided into dualism and monism, BODY-SNATCHING — BOECE

According to dualism, the first and crudest theory of which was promulgated by Descartes, both mind and body are real existences, and their relations must accordingly be determined.

The problem assumes two forms, the epistemo¬

logical and the genetic. According to the for¬

mer of these a knowledge of both body and mind is posited. Various theories concerning their interaction then arise, such as the causal relation, parallelism, pre-established harmony, and occasionalism. The first of these is not only the most important but the philosophical conceptions concerning it may be said to strike at the inmost heart of the problem and their assumption determine the acceptance or rejec¬

tion of general theories. Physiological psychol¬

ogy has demonstrated the temporal concomi¬

tance of the psychosis with the intermediate central portion of the neurosis. But we have certain neuroses revealing physiological proc¬

esses devoid of conscious concomitant. Now,

the question arises : How may this partial

parallelism be accounted for? Is there a causal relation such as our initial phenomena seemed to indicate, or have we only the appearance of it in a general parallelism? Science has failed to afford precise answers to these questions.

According to it the series of nervous events is complete in itself and self-sufficient. Hence, since antecedent events fully account for con¬

sequent ones, consciousness can have no causal action upon the neural series. Consciousness, then, is a mere accident and without determin¬

ing power in any series. This gives us the doc¬

trine of human automatism, according to which all our nervous actions are determined, and con¬

sciousness is an unnecessary attachment. On

the other hand, others regard psychical phe¬

nomena as having a reality equal to that of physiological phenomena. They acknowledge

generally the conditioning effect of nervous processes upon mental ones, but they divide again on the question of the reality of causal connection. Finally the genetic view traces its distinction of mind and body upon the dualism which a development theory in general appears to demand; or it accepts it as an hypothesis, uncritically examined, but convenient for prac¬

tical purposes.

It is the attempted unification of mind and body which brings us to the doctrine of monism.

Under this general theory we find spiritual monism, materialism,

panpsychism, epiphenom-enon, mind-dust, *etc.* The most obvious means of reconciliation is that of resolving either one of the ultimate factors into the other. . The metaphysical conception of materialism is the doctrine by which all substance whatsoever is conceived of as being reduced to matter, of which conscious mind is but a. product. The chief objections urged against it are (D that it makes our mental states, which of all knowl¬

edge we know most immediately and directly, subordinate to our indirect and inferential

knowledge of things; (2) that consciousness is a reality distinct from material phenomena, and therefore incapable of being analyzed into it; and (3) that no external world is possible apart from a perceiving subject. Spiritualism, on the other hand, escapes these objections by positing mind as the primordial substance, and further regarding material things as in themselves es¬

sentially expressive of spirit. It encounters, however, certain difficulties in the concomi¬

tance and juxtaposition of its elements for which, as yet, it has afforded no adequate solu¬

tion.

According to Spinoza's doctrine of monism,

both spirit and matter, or the mental and the material, are posited as real, self-existent reali¬

ties, but not standing independent of each

other. There is a common "substance,® and in this, consciousness and extension, the funda¬

mental attributes of external reality, find them¬

selves connected. Hence the doctrine is neither purely materialistic nor purely spiritualistic, but includes both these theories. The parallelism which physiological psychology demonstrates,

then, in the two classes of phenomena, indicates not only their

ultimate inseparability, but the fact that they are but different modes of mani¬

festation of a common substance. Manifestly, then, this doctrine calls for no interaction theory and disposes of the troublesome ques¬

tion of causal connection above referred to.

There is no interaction, merely a parallelism.

This parallelism, indeed, extends throughout all material objects, all of which thus assume a certain mental aspect also. It is at this point especially that monism parts company, in its speculation, from the teachings of non-speculative psychology, according to which mind and consciousness are invariably coextensive.

Bibliography. — Bain, A., (Mind and Body)

(1873; new ed., 1897) ; Binet, A., (L'ame et le corps) (Paris 1905) : Busse, L., (Geist und Korper, Seele und Leib) (Leipzig 1903); James, W., (Psychology } (New York 1890) ; Kuelpe, W., (Outlines of Psychology* (London 1909) ; McDougall, W., (Body and Mind* (London

1911) ; Strong, C. A., (Why the Mind Has a Body* (New York 1903) ; Titchener, E. B.,

'Textbook of Psychology* (1910) ; Wundt, W., 'Human and Animal Psychology* (1901).

BODY-SNATCHING. See Resurrection¬

ists.

BOECE, bois, BOEIS, BOETHIUS, or

BOYCE, Hector, Scottish historian: b. Dun¬

dee, about 1465; d. 1536. Boece studied at Dundee and then at the University of Paris, and became professor of philosophy in the Col¬

lege of Montaigu. Here he became acquainted with Erasmus, who professed a high esteem

for him. About 1500 Boece quitted Paris to assume the principalship of the newly-founded University of King's College, Aberdeen. He

was also made a canon of Aberdeen. The

death of his patron in 1514 occasioned his first work — a history of the prelates of Mort-lach (the original see) and Aberdeen, includ¬

ing the life of Bishop Elphinstone, which oc¬

cupies about a third of the volume. It has been reprinted by the Bannatyne and New

Spalding clubs. Five years afterward appeared the work on which his fame chiefly rests, the 'History of Scotland. * The first edition is without date but a commendatory epistle bears the date of 1527. It was written in Latin. He is distinguished by a patriotic zeal to magnify the achievements of his countrymen and by an enlightened love of political liberty in advance of the age in which he lived. In 1527 Boece received an annual pension of 50 pounds

(Scots), which was to be continued "until the king should promote him to a benefice of 100

marks Scots of yearly value.® The pension

was paid till 1534, when it is supposed he re-148

ceived the promotion — a very unsafe infer¬

ence. The rectorship of Tyrie, which he held at his death, is, however, supposed to have been the promotion in question. Consult Burton,

(History of Scotland* (Edinburgh 1873), and Irving, (Lives of Scottish Writers> (ib. 1839).

BOECKH, bek, August, German classical

scholar: b. Karlsruhe, 24 Nov. 1785; d. Berlin, 3 Aug. 1867. In 1803 he entered the Univer¬

sity of Halle, where he was induced by the influence of Wolf to devote himself to the study of philology. After spending three years here and more than a year in Berlin, he re¬

turned in 1807 to his native state and in the same year became extraordinary and, two years later, ordinary professor in the University of Heidelberg. He had already acquired such re¬

nown as a scholar that in 1810 he was offered the chair of rhetoric and ancient literature in the newly-founded University of Berlin, and

here he remained, enjoying this and other im¬

portant offices and dignities, for the rest of his life. The works of Boeckh have made an

epoch in the history of philology and archaeol¬

ogy. In his studies of classical antiquities he set forth the principle that philology ought to be an historical method intended to reproduce the whole social and political life of any given people during a given period ; and in accord¬

ance with this he divided the science into two parts: (1) Hermeneutics and Criticism; (2)

the Practical and Theoretical Life of the An¬

cients. His views were vigorously attacked

in various quarters, but the majority of Ger¬

man scholars gathered around him and he him¬

self carried his views into effect in a number of important works. The most remarkable of

these are the following: An edition of Pindar (4 vols., 1811-22) ; (The Public Economy of the Athenians* (2 vols., 1817; 3d ed. by Frankel, 1886), which has been translated into English; (Metrological Investigations of the Weights, Coins and Measures of Antiquity,* and docu¬

ments Concerning the Maritime Affairs of At¬

tica. *Besides these he was uninterruptedly engaged from 1815 to the end of his life in making a collection of Greek inscriptions, which he published with the title (Corpus Inscriptionum Graecarum* and the first four volumes of which appeared at Berlin between 1824 and 1862. Other important works are (Philolaos'

des Pythagoreers Lehre) (1819); (Metrolo—

gische Untersuchungen fiber Gewichte, Mfinz—

ffisse und Masse des Altertums) (1838) ;

(Urkunden fiber das Seewesen des attischen

Staates> (1840) ; (Sophokles 'Antigone* (2d

ed., 1884) ; (Encyklopadie und Methodologie

der philologischen Wissenschaften* (1877; 2d

ed., 1886) ; dpigraphisch-chronologische Stu¬

died (1856), *etc.* The first three volumes of a collection of his minor works, edited by As-cherson, appeared during the lifetime of the author. Consult Sandys, (A History of Classi¬

cal Scholarship* (Vol. Ill, Cambridge 1908).

BOEHLER, be'-ler, Peter, Moravian

bishop: b. Frankfort-on-the-Main 1712; d.

London 1775. He was educated at Jena, joined the Moravians and was ordained to the min¬

istry in 1737 by Count Zinzendorf. He was

sent as a missionary to America and on his way stopped in England, where he made the

acquaintance of Charles and John Wesley. In America he worked among the negroes in Geor¬

gia, the Germans in North Carolina (who later settled Bethlehem, Pa.) and the Indians of

Pennsylvania. He went to Europe and re¬

turned to Bethlehem with a large number of Moravian colonists. The addition to the Beth¬

lehem colony led to the foundation of Naza¬

reth nearby. In 1742 he was made bishop of the Moravian churches in America, England,

Ireland and Wales. While on an episcopal

visit to his European charge he died in Lon¬

don. Consult Lockwood, T. P., cThe Memo¬

rials of the Life of Peter Boeliler* (London 1868).

BOEHM, Sir Joseph Edgar, Hungarian—

English sculptor : b. Vienna 1834 ; d. 12 Dec.

1890. He went to London in 1862 and lived there from that date, becoming a member of the Royal Academy in 1881. Among his im¬

portant works are the great statue of Queen Victoria at Windsor, statues of Bunyan at Bed¬

ford, Wellington at Hyde Park Corner, Dean

Stanley at Westminster Abbey, Drake at Ply¬

mouth, Carlyle on Thames Embankment, and

busts of Ruskin, Gladstone and Huxley. In

1889 he was knighted. He was the fashion¬

able sculptor of his time but much of his work fails to reach a high standard and his designs for the jubilee coinage of 1887 were very ad¬

versely criticized.

BCEHMER, Just Henning, German jurist:

b. Hanover, 29 Jan. 1674; d. Halle, 29 Aug.

1749. He studied law at Jena and became

professor at the Universit}ˆ of Halle (1701) and later counsellor of state to Frederick I of Prussia and president of the university. He acquired a reputation as one of the clearest and most original thinkers of his day, espe¬

cially on subjects such as ecclesiastical law.

Among his well-known works are Untroductio

in Jus Digestorum* (1704) and (Excercita—

tiones ad Pandectas* (6 vols., 1754—64). His writings have exercised a strong influence upon Prussian law and upon the legislation of the 18th century.

BOEHMERIA, a large genus of plants of

the family Urticcicecz, chiefly natives of tropi¬

cal Asia, where various species furnish fibres used in making rope, twine, thread and cloth.

B. niyea (China grass) is a nettle-like but non¬

stinging perennial herb which is propagated by seeds or root division. When once established three crops are obtained annually and the fibre removed by hand stripping, machinery or boil¬

ing in water or chemical solutions. None of these methods are wholly satisfactory, for

which reason China and India, those lands of cheap hand labor, still supplv the world. The fibre is used to make China-grass cloth. B.

tenacissima (ramie) or rhea is considered by some botanists as a

variety of B. nivea. At¬

tempts to establish the China-grass and ramie industries in the United States have not been very successful, not because the plants cannot be raised economically,' but because of the high price of labor in manufacture and the ineffi¬

ciency of machines and degumming methods.

Both species and several others of the genus are effective ornamental plants in borders and are hardy as far north as Washington, prob¬

ably farther. Consult Dodge, (Descriptive

Catalogue of Useful Fibre Plants of the

World) ; Royle, (Fibrous Plants of India.) BCEHRINGER — BOERHAAVE

BCEHRINGER, George Friedrich, Ger¬

man theologian: b. Maulbronn (Wiirtemberg), 28 Dec. 1812; d. Basel, 18 Sept. 1879.

After finishing his university education, he was forced to leave the country and went to Swit¬

zerland (1833) on account of his radical po¬

litical ideas. There he became pastor of a church in Glattfelden (1842 —53). This posi¬

tion he resigned to devote his time to historical studies. In his later years he became blind and his son Paul acted as his secretary and helper. He began a very ambitious attempt

at an ecclesiastical history (Die christliche Kirche und ihre Zeugen, oder cine Kirchenge-schichte in BiographietP (Stuttgart 1861-74,24

vols.), but death prevented his completing it.

BCEOTIA, be-6’shl-a, a country of ancient

Greece, bounded north by Phocis and the coun¬

try of the Opuntian Locrians, east by the Euripus or Strait of Euboea, south by Attica, Me-garis and the Alcyonian Gulf, and west by

Phocis. Its surface was estimated at 1,119

square miles, but the boundaries were not

always the same. In the north it is mountain¬

ous and cold and the air is pure and healthy, but the soil is less fertile than that of the other portion, which, however, is said to suffer from malaria. The mountainous part in the

north was called in earlier times Aonia. Among the mountains of Boeotia are several remarkable in history and mythology — Helicon (now Za-gora), the. mountain of the Sphinx, the Teu-messus, Libethrium and Petrachus. Hypatus

(modern name Samata) bounded the Theban

plain on the east. The feature of the country was Lake Copais, the district around which

is a valley completely surrounded by hills and connected with the Euboean Sea by subterra¬

nean passages. The lake was fed by the

Cephisus, the largest river in the country, and the w’ater was liable to accumulate more rap¬

idly than the natural drainage of the country could carry it off. Hence the early inhabit¬

ants suffered much from inundations, and at a period previous to historical annals subter¬

raneous channels were built to carry off the water, which indicate a very early civilization and recognized from the ruins which still re¬

main as among the greatest works of antiquity.

These works made Boeotia one of the most

fertile districts of Greece. Recently the lake has been drained at great expense and a large tract of land reclaimed. The chief occupation of the inhabitants was agriculture and the rais¬

ing of cattle. Boeotia was first occupied by the Pelasgian tribes. In the time of Boeotus (son of Itonus and grandson of Amphictyon,

from whom it is said to have derived its name) these were subject to the Hellenes. It was divided into small states until Cadmus the

Phoenician founded the government of Thebes.

In later times all Greece worshipped the Her¬

cules of Thebes. After the death of Xanthus, King of Thebes, most of the cities of Boeotia formed a kind of republic, of which Thebes was the chief city. Epaminondas and Pelopi-das raised Thebes for a time to the highest rank among Grecian states. In Boeotia are

several celebrated ancient battlefields, namely, Plataea (now the village Kokla), where Pau-sanias and Aristides established the liberty of Greece by their victory over the 300,000 Per¬

sians under Mardonius; Leuctra (now the

village Parapogia), where Epaminondas checked the ambitious Spartans ; Coronea, where the

Spartan Agesilaus defeated the Thebans, and

Chasronea (now Capranu), where Philip

founded the Macedonian greatness on the ruins of Grecian liberty. Near Tanagra, the birth¬

place of Corinna, the best wine was produced; here also cocks were bred of remarkable size, beauty and courage, with which the Grecian

cities, passionately fond of cock-fighting, were supplied. Refinement and cultivation of mind never made such progress in Boeotia as in At¬

tica. The Boeotians were vigorous but slow

and heavy. Several Thebans, however, were

worthy disciples-of Socrates, and Epaminondas distinguished himself as much in philosophy as by his military talents. The people were par¬

ticularly fond of music and excelled in it.

They had also some great poets and artists.

Hesiod, Pindar, the poetess Corinna and Plu¬

tarch were Boeotians. Boeotia is one of the nomes in the modern kingdom of Greece, with an area of 550 square miles. The capital is Livadia. Pop. 65,816 largely Albanian. Consult Bowner, (The Boeotian Federal Constitution

(in (Classical Philology, > Vol. V, Chicago 1910) ; W. M. Leake, (Travels in Northern

Greece,* chaps. 11-19 (London 1835); W. Rhys Roberts, (The Ancient Boeotians) (Cambridge

1895).

BOERHAAVE, boor-ha’ve, Hermann,

Dutch physician : b. Woorhout, near Leyden,

31 Dec. 1668; d. 23 Sept. 1738. Boerhaave re¬

ceived from his father a liberal education. In 1682 he was sent to Leyden to study theology.

In 1688 he received a gold medal from the city for an academic oration, in which he attacked the doctrines of Spinoza. In 1689 he received the degree of doctor of philosophy and main¬

tained an inaugural dissertation, (Destinctione Mentis a Corpore,* in which he attacked Epi¬

curus, Hobbes and Spinoza. He commenced,

at the age of 22, the study of medicine, first taking up anatomy, on which he afterward ex¬

ercised a salutary influence, as the use he made of mechanical illustrations induced anatomists to apply themselves to a more accurate study of the forms of the organs. He made a special study of Hippocrates, with whose superior ex¬

cellence and correct method he was forcibly struck. In 1693 he was made doctor of medi¬

cine at Harderwyck. In 1701 the University of Leyden chose him to deliver lectures on the theory of medicine. Boerhaave now began to

develop those great and peculiar excellences which make him a pattern to all who undertake the office of instruction. Pupils crowded from all quarters to hear him. His method was

eclectic, combining the speculations of opposing schools ; but this led him to attach too much im¬

portance to mechanical and chemical theories of vital actions. In 1709 the LTniversity of Ley¬

den appointed him to the chair of medicine and botany. The course of instruction to which Boerhaave was now devoted induced him to

publish two works, on which his fame still rests, namely, Unstitutiones Medicae* (1708), and (Aphorismi de Cognoscendis et Curandis

Morbis* (1709). In the former, which is a

model of comprehensive erudition and clear

method, he unfolds his system in its fullest ex¬

tent; in the latter he undertakes the classifica¬

tion of diseases and discourses separately on 150

their causes, nature and treatment. He ren¬

dered essential services to botany by his two catalogues of plants in the garden of Leyden by his description and delineation of new plants

and the introduction of new species. In 1714

he was made rector of the university and pro¬

fessor of practical medicine. In the latter of¬

fice he had the merit of introducing clinical in¬

struction, that is, of lecturing to his students at the bedside of patients in hospital, for the first time in Europe. On the death of Lemort he was appointed to the professorship of chemis¬

try, which science he had taught since 1703.

His (Elements of Chemistry) (1724), is still a highly valued book. So conspicuous was the

position occupied by Boerhaave that people

came from all parts of Europe to ask his ad¬

vice and he raised his university to a pinnacle of fame. It is said that a Chinese mandarin wrote to him with the address, ((To Boerhaave, the celebrated physician in Europe.® Boerhaave was a man of piety as well as learning. He used to say that the life of a patient, if trifled with or neglected, would one day be required at the hands of his physician. Consult Bur¬

ton, (Account of th$ Life and Writings of

Boerhaave) (London 1743) ; and the life by Johnson (ib. 1834).

BOERS, bo'ors (Dutch boer, a peasant or

husbandman), the name commonly applied to

the South African colonists of Dutch descent.

The Cape Colony was founded by the Dutch

in 1652, and about 1687 the colony was increased by a number of French Huguenot settlers who were later absorbed in the Dutch population.

The Dutch were at this period the leading mari¬

time power of Europe, and their African col¬

onies assumed great importance. When Hol¬

land was reduced to the last extremity by the invasion of Louis XIV serious thoughts were entertained of making the Cape Colony the

final refuge of Dutch independence, but this crisis passed away with the advancing power of William. During the 18th century the colony was administered in the most despotic fashion by the Dutch East India Company, whose policy was to isolate it in order to have entire control of all trade, and the colonists, forced to strug¬

gle against this oppression as well as against the natives and the wilderness, began to de¬

velop a character of their own. The troubles in which the parent state was involved by Eu¬

ropean wars now began also to affect them.

The colony was taken possession of by the

English in 1795, restored at the Peace of

Amiens in 1802, taken again in 1806, and finally ceded to England in 1815. The last change

was highly distasteful to the colonists. Natu-

' rally distrustful of a foreign government, they had formed from their experience of the coun¬

try and its inhabitants a policy and habits of their own, into which the newcomers could not be expected at once to enter. The Boers, more¬

over, were strongly conservative, believing that they understood the situation better than any¬

one else, and they had acquired in their strug¬

gles with the natives a reckless daring, which, added to the coolness and caution of the Dutch character, was likely to make them formidable opponents to any government which provoked

their hostility.

The policy of the British governors was not always adapted to the circumstances, and the attempts of the British missionaries, encouraged by the colonial government, to convert and civ¬

ilize the natives, excited the jealousy of the Boers, who thought their own interests com¬

promised by the encouragement given to the

converts. The government on various occa¬

sions sided with the Kaffirs against the Boers, which, whatever the* merits of the particluar disputes, was not calculated to conciliate the latter. The emancipation of their slaves in 1834, and the cession to the Kaffirs in 1835 of a frontier district of neutral territory in the east, filled up the measure of provocation, and the Boers resolved to place themselves by emi¬

gration beyond the British rule. What is known as the Great Trek started in 1835 and contin¬

ued until 1840, during which time 7,000 Boers emigrated from Cape Colony. A first band of (<voortrekers® set out as early as 1833 ; some pushed as far north as the Zoutpausberg, near the Limpopo River; others proceeded to Dela-goa Bay but died of hardship before they could form a settlement. Another band in 1835 set out for Natal, was attacked by the Matebele Kaffirs and obliged to fall back on the Modder River. After receiving reinforcements they

again advanced and, settling in the Orange River district, formed a commonwealth under Peter

Retief. Retief and a band of followers subse¬

quently crossed the Drakensberg Mountains into Natal, but a number of them, including Retief, were treacherously murdered by the Zulu chief Dingana, who had given them permission to

settle in the country. Those who escaped re¬

ceived reinforcements, made alliance with the English settlers at Port Natal, and under the leadership of Pretorius broke the Zulu power at the battle of Blood River in 1838. Two years later Dingana was slain. The Boers founded

Pietermaritzburg and made it the seat of their volksraad, but the British colonial government denied their right to form an independent com¬

munity in this district.

In 1842 a British force was landed and the Boers were compelled to retire from the coast and acknowledge the British sovereignty. Many of them recrossed the mountains and settled in the Vaal district. Further disagreements with the colonial government, which had now pos¬

session of Natal, led to another emigration to the north of the Klipp River. Here they strug¬

gled successfully with the Kaffirs till 1845, when the colonial government proclaimed the Buffalo River the north boundary of Natal. The Boers openly resisted, but finding their strength un¬

equal to the conflict, again emigrated to the Vaal country. In 1848 the colonial government likewise annexed by proclamation the Orange

River settlement. The Boers, headed by Pre¬

torius, took up arms, but being defeated, re¬

tired beyond the Vaal, and with the previous settlers formed the Transvaal republic. Those who remained continued their resistance to the British authority until, in 1851, on the outbreak of the Kaffir War, the British relinquished the Orange River territory, and by the Sand River Convention in 1852 recognized the independence of the Orange Free State. In 1877 the Trans¬

vaal was annexed by Britain, according to the wish of many of the people, but war broke out in 1880, British forces suffered more than one defeat, and in 1881 the country was accorded a modified independence. Paul Kruger was

elected president in 1883. He was a typical representative of his people, possessing many primitive virtues but intensely conservative, tenacious, doggedly independent, bigoted in his stern Calvinist religious belief. The discovery of gold in the Transvaal and the influx of Eu¬

ropeans following thereon created new sources of friction between the British and Boer popu¬

lation. Henceforth it was a common feeling

among the Boers that they and not the British must be predominant in South Africa, and in October 1899, after a defiant ultimatum, the united forces of the Transvaal and Orange Free State invaded Natal. After nearly three years of warfare the two republics were annexed by proclamation. The work of reconciliation be¬

tween the British and the Boers was under¬

taken by Lord Milner, with such success that in 1905 and 1906 constitutions were granted the Transvaal, the Boer general Botha being ap¬

pointed Premier. On 31 May 1910 the Trans¬

vaal, Natal, the Cape of Good Hope and Orange River Colonies were united under one govern¬

ment under the name of Union of South Africa.

That the reconciliation between the Boers and the British is a permanent one seems proved by the valuable services which the troops of the Union, under General Botha, have rendered

the British cause during the European War by the conquest of German Southwest Africa.

See Jameson; Kruger; Majuba Hill; Natal;

Orange River Colony; South African War;

Transvaal; Union of South Africa, *etc.*

Bibliography. — Cana, F. R., (South Africa

from the Great Trek to the Union) (London

1909) ; Chesson, F. W., (The Dutch Boers and Slavery in the TransvaaP (London 1869) ;

Cloete, H., <The History of the Great Boer Trek) (London 1899) ; Livingstone, D., (The Transvaal Boers > (Edinburgh 1881) ; Theal^ G.

McC., (History of South Africa since 1795 ’

(4 vols., London 1908); Tilby, A. W., (South Africa 1486-1913> (Boston 1914).

Henri F. Klein,

Editorial Staff of The Americana.

BOETHIUS, bo-e’thi-us, Anicius Manlius

Severinus, Roman statesman and philosopher :

b. about 480 a.d., in Rome or Milan ; d. 524. He was educated in Rome, in a manner well cal¬

culated to develop his extraordinary abilities.

Theodoric, King of the Ostrogoths, then master of Italy, loaded him with marks of favor and esteem and raised him to the first offices in the empire. He exerted the best influence on the administration of this monarch, so that the dominion of the Goths promoted the welfare

and happiness of the people who were subject to them. He was long the oracle of his sov¬

ereign and the idol of the people. The high¬

est honors were thought inadequate to reward his virtues and services. But Theodoric, as he grew old, became irritable, jealous and distrust¬

ful of those about him. The Goths now in¬

dulged in all sorts of oppression and extortion, while Boethius exerted himself in vain to re¬

strain them. He had already made many ene¬

mies by his strict integrity and vigilant justice.

These at last succeeded in prejudicing the King against him and rendering him suspicious of Boethius. His opposition to their unjust meas¬

ures was construed into a rebellious temper, and he was accused of a treasonable corre¬

spondence with the court of Constantinople.

He was arrested, imprisoned and executed at Pavia. He made many laborious translations

of the Greek philosophers, particularly of Aris¬

totle. These translations, and especially his commentaries on Aristotle, caused him to be regarded up till the 14th century as the highest authority in philosophy. His treatise, (De

MusicaP also supplied for many centuries the place of Greek originals. His fame now chiefly rests on his (Consolations of Philosophy, }

written in prison, a work of elevated thought and diction, and while piously theistic in its language, gives no indication of Christian be¬

lief on the part of its author. It is written partly in prose and partly in verse. The oldest edition of this work was published at Nurem¬

berg in 1473. It was translated by King Alfred and Chaucer, and was highly prized during the Middle Ages. Boethius also translated Euclid and other Greek mathematical works into

Latin, and wrote short treatises on algebra and geometry, which were used as school textbooks during the Middle Ages. The appearance in

these works of characters similar to Hindu

numerals has raised the question as to whether he was familiar with the works of the Hindu mathematicians. Consult Stewart, A. F.,

(Boethius: An Essay) (Edinburgh 1891).

BOETHUS, Greek sculptor: b. Chalcedon

early in the 2d century b.c. He is celebrated for his statues of children. (The Boy With the Goose) was his most famous work. A girl playing with dice and a boy extracting a thorn were subjects of other masterpieces by him.

According to Pliny he excelled in working in silver. Consult Journal of Hellenic Studies

(Vol. VI, p. 7) and Jahrbuch d. d. Inst. (1904, p. 212).

BOETTCHER, bet'ker, Jean Frederick

(his name is also spelled BCETTIGER), Ger¬

man alchemist, the inventor of Meissen porce¬

lain : b. Schleiz 1681; d. 1719. A man of dis¬

solute habits and dishonorable conduct, he is celebrated for his extraordinary adventures and his fortunate discovery of the famous Dresden porcelain. Apprenticed to an apothecary in

Berlin, he spent his time in the pursuit of al¬

chemy and pretended to have made gold. This discovery, as it was believed to be, exposed him to the danger of a prosecution for sorcery, to avoid which he fled. Such was the credulity of the time that the Prussian government was

anxious for his return, and the Elector of Sax¬

ony, then King of Poland, supplied him with the means of prosecuting his inquiries, and was entertained by his promises for three years. By the advice of Count Tschirnhausen, the Elector was induced to turn the real chemical knowl¬

edge and abilities of Boettcher to account in de¬

veloping the resources of the country. This sensible advice was

rewarded with the discovery of a red clay at Meissen, from which a beauti¬

ful porcelain could be made. Boettcher was en¬

trusted with the direction of the manufacture, but was so little trustworthy that he had almost to be detained a prisoner to prevent his divulg¬

ing the secrets of the process. He had actually entered into a negotiation with some Prussians to do so, and his death alone saved him from the punishment of his treachery.

BOEUF BAYOU, bef bi'oo, stream in

Arkansas and Louisiana, formed in times of

high water by overflow from the Mississippi, 152

when it affords nearly 100 miles of steamboat navigation. It is an affluent of the Washita River.

BOFFIN'S BOWER, in Dickens' (Our

Mutual Friend, > home of the Boffins. The

name was given by Mrs. Boffin, who did not approve of its former name, <(Harmon's Jail.)) BOG, an Irish word, literally meaning soft, applied in Great Britain to extensive dis¬

tricts of marshy land, such as we commonly call in this country swamps. They consist,

in Europe, so universally of peat, that this substance is there generally regarded essen¬

tial to a bog. . As we use the word, it is in the sense of a quagmire ;

any soft and wet spot into which a man would sink in attempt¬

ing to cross it, being called a bog. The true bog is most commonly found in northern

latitudes, and in districts where great hu¬

midity prevails. Their situation is not neces¬

sarily low, nor their surface level. Some of the great Irish bogs present even a hilly ap¬

pearance, which, perhaps, is the result of the spread of the mosses in their lateral growth from lower situations over intervening higher grounds. Bogs were formerly supposed to

owe their origin to the destruction of forests, and in particular to the obstructions of drain¬

age from fallen trees, causing lodgments of water, and favoring the growth of marsh

plants. This theory can only be partially

true. Fallen trees and also standing roots

are frequently found in a state of great pres¬

ervation in bogs, but the agency of felled trees in the production of bog has been com¬

pletely disproved, six or seven feet of bog being found under the roots of remaining

trees, showing the previous formation of the bog. The process of bog formation is thus

described: When a shallow pool induces

the formation of aquatic plants, they grad¬

ually creep in from the borders to the deeper centre. Mud accumulates round their roots

and stalks, and a spongy semi-fluid mass is formed, well suited for the growth of moss, particularly Sphagnum, which now begins to

luxuriate, continually absorbing water, and

shooting out new plants above as the old

decay beneath ; these are consequently rotted, and compressed into a solid substance, grad¬

ually replacing the water by a mass of vege¬

table matter. A lajˆer of clay, frequently

found over gravel, assists the formation of bog by its power of retaining moisture.

When the subsoil is very retentive, and the quantity of water has become excessive, the superincumbent peat has sometimes burst

forth and floated over adjacent lands. This happened near Killarney in 1896, and caused the loss of nine lives. Quagmires are caused by the decay of the roots of plants under¬

neath. The plants thus detached from the

bottom rise to the surface, and are kept

floating in moisture. Elastic under light

pressure, they yield suddenly to the weight of heavy bodies, their only strength consist¬

ing in the interlacing of their decayed fibres.

Throughout the country, along the sea¬

board to the Gulf of Mexico, bog-like swamps are of frequent occurrence. Their outer

portions are sometimes wooded swamps,

while within they present moss-covered

heaths, stretching, like the Western prairies, farther than the eye can see, and dotted oc¬

casionally with clumps or little islands of trees. In New England, the

Northwestern

States and Canada, the bogs furnish genuine peat, and some of those bordering on the

Great Lakes are of great extent. On Long

Island, near New York, the bogs present a

marked feature along the sandy coast.

British bogs are generally divided into

two classes — red bogs, or peat mosses, and black bogs, or mountain mosses. The former

class are found in extensive plains frequently running through several counties. The Chatmoss in Lancashire, and the Allen in Ireland, are examples of this class. Their texture is light and full of filaments, and is formed by the decay of mosses and plants of different kinds. The color becomes darker, and density increases with the depth of the bog. The lower parts, being more entirely decayed, approach nearer to the nature of humus than the upper portion. They are also more carbonaceous, and consequently more valuable for fuel. The

depth of the red mosses varies from 12 to 42

feet. The chief reasons of the unproductive¬

ness of this class of bogs are the acids in which the plants composing them abound, and which are noxious to the higher orders of vegetation, and the circumstance that the decomposition

of the plants takes place under water, where they are excluded from the action of the oxy¬

gen and nitrogen of the air, and consequently deprived of the power of evolving carbon

and ammonia. Black bog is formed by a

more rapid decomposition of plants. It is

heavier and more homogeneous in quality. It is common in Ireland and Scotland, but is

usually found in limited and detached portions.

In Ireland these frequently rest on calcareous subsoil, which is of great value for reclaiming them. The black bog is so frequently found at high elevations that its reclamation presents considerable difficulties, but when it is found in plains or gentle inclinations it may be re¬

claimed with comparative ease. The soil in

mountainous districts, being shallow, is not suited for cereals, but if the mistake of sow¬

ing these is avoided, they may be made into good pasture land. The reclamation of the

extensive red bogs found in various parts of the country, especially in Ireland, which has more than 1,500,000 acres of them, has long occupied attention ; but the progress of im¬

provement has been hindered by questions of land tenure, disposal of capital and other diffi¬

culties external to the practicability of the de¬

sired reformation. Many extensive experi¬

ments have, however, been made with encour¬

aging success, and while it is perhaps doubtful how far reclamation will repay the immediate improver, it appears from a national point of view to offer undoubted advantages.

In the reclamation of bog land three things require to be accomplished. The land must

be thoroughly drained, and a permanent system of drainage established. The loose and spongy soil must be mixed with a sufficient quantity of mineral matter to give the requisite firm¬

ness to its texture, and to fertilize its super¬

abundant humus. Proper manures must be

provided to facilitate the extraction of nutri¬

ment from the new soil, and a rotation of crops suitable for bringing it into permanent condi¬

tion adopted. The difficulties of reclamation BOG-BUMPER — BOGART

lie chiefly in the first and second of these requirements.

The materials best adapted for reclaiming

peat are calcareous earths, limestone gravel, shell marl and shell sand. Caustic lime, al¬

though it neutralizes the acids of the soil, causes too rapid a decomposition of the vege¬

table matter. These materials are frequently found in the subsoil or in the neighborhood, but the labor of raising them from' the subsoil is often greater than that of bringing them from other quarters.

Paring and burning, or removing a por¬

tion of the peat for fuel, when the subsoil is good, are other modes of facilitating improve¬

ment. The limited demand for peat fuel pre¬

vents the latter system being carried on exten¬

sively. Thoroughly reclaimed bogs are not

liable to revert to their former condition. (For further particulars see Chatmoss). It was

probably in bogs of a nature similar to those above described that much of our coal was

formed.

BOG-BUMPER, BOG-JUMPER, or

BOG-PUMPER, names-for the bittern (q.v.).

BOG-BUTTER, a fatty spermaceti-like

substance found in masses in peat-bogs, com¬

posed of carbon, oxygen and hydrogen, and

for years supposed to have been formed by

the decomposition of peat. In 1885 Macadam

proved that it is of animal origin, as all of the samples analyzed showed the presence of hairs identical with those of a cow ; the substance being, in fact, a variety of adipocere formed by the decomposition of animal substances out of contact with the air. It becomes liquid at 123.8° F.

BOG IRON ORE, a variety of limonite

formed in bogs and swamps by the reducing

action of decaying vegetable matter on soluble iron salts. It is generally loose textured and brown or brownish-yellow in color. The ore

usually contains such a high percentage of im¬

purities, especially sulphur and phosphorus, that it cannot be utilized for iron manufacture; it is sometimes so used, however, and it also finds limited application in the purification of illuminating gas. Deposits of bog iron ore are widespread. In the United States extensive

beds occur along the Atlantic coast from New York southward, and the first blast furnaces erected in this country were supplied from

them. Similar deposits occur in Great Britain and most of the countries

of Europe. In the Three Rivers district of Quebec such ore ac¬

cumulates so rapidly that a six-inch layer is said to be dredged from shallow lakes every 10 years.

BOG-MOSS. See Sphagnum.

BOG-OAK, trunks and large branches of

oak found imbedded in bogs and preserved by the antiseptic properties of peat, so that the grain of the wood is little affected by the many ages during which it has lain interred. It is of a shining black or ebony color, derived from its impregnation with iron, and is frequently converted into ornamental pieces of furniture and ornaments, as brooches, earrings, *etc.* .

BOG-TROTTER, a name contemptuously

applied to the lower classes of the Irish peas¬

antry on account of their ability to make their way across the bogs where no one else can find footing, which frequently gives them a means of escape from officers of police and other pursuers.

BOGAERS, bo'gars, Adriaan, Dutch poet :

b. The Hague 1795; d. 1870. He was educated in law at Leyden, practised his profession at Hoorn and from 1830 to 1851 was a judge at Rotterdam. He holds an eminent place among

the many disciples of Tollens and surpasses his master in correctness of taste. He long withheld his compositions from publication and not till 1832 did he become known to his coun¬

trymen ; he then published his first lyric poem, (VolhardeiV — an appeal to his countrymen to stand fast in the struggle with Belgium — to¬

gether with other patriotic pieces. His first poem of any considerable

compass, the epic

QochebedB and his masterpiece, <T.he Voyage

of Heemskerk to Gibraltar, > were first formally published in 1860-61, though they had had for many years a private circulation among friends.

He afterward published three volumes, bal¬

lads and Romances,* (Flowers of Poesy from Abroad* and (Poems. * Two posthumous

works of his were issued, entitled, respectively, (Philological Papers) (1872) and (Lexicon of Bilderdijk's Poetical Works* (1878). His col¬

lected poems were edited by N. Beets (2 vols., Haarlem 1871). Consult the biography by J.

G. Gleichmann (Amsterdam 1875).

BOGAN, or NEW YEAR RIVER, a

river of East Australia, rises in the Harvey Range, flows northwest and empties into the Darling River, about lat. 30° S. and long. 146°

E. ; length over 300 miles.

BOGARDUS, Everardus, second pas¬

tor of the church in New Amsterdam (New

York) : d. 27 Dec. 1647. He is noted as the husband of Anneke Jans, whose ownership of

60 acres of land in the business portion of New York has given her descendants occasion for almost continuous law suits, during 200

years, to recover possession of the property which is held by the corporation of Trinity Church. Bogardus was recalled to Holland to answer certain charges made by his ecclesias¬

tical superiors, but lost his life by shipwreck in the British Channel.

BOGARDUS, James, American inventor:

b. Catskill, N. Y., 14 March 1800; d. 13 April 1874. He was apprenticed to a watchmaker and early showed the bent of his mind by improve¬

ments in the construction of eight-day clocks and other improvements in timepieces, and by the invention of a delicate engraving machine.

The dry gas metre is his invention, as is also the transfer machine to produce bank-note

plates from separate dies; and in 1839 his plan for manufacturing postage stamps was accepted by the British government. Later he intro¬

duced improvements in the manufacture of

india-rubber goods, tools and machinery, and invented a pyrometer, a deep-sea sounding ma¬

chine and a dynamometer. In 1847 he built for his factory the first iron building ever erected in the city of New York. Later he introduced wrought-iron beams.

BOGART, John, American engineer: b.

Albany, N. Y., 8 Feb. 1836; d. 25 April 1920.

A graduate of Rutgers College, he entered

the engineering department of the New

York Central Railroad and State canals,

and as Federal engineer at Fort Monroe, Va., during the Civil War. He was chief engineer of municipal works in Brooklyn, N. Yl, Albany, New Orleans, Chicago, Baltimore, Rochester

and New York, and superintended work on the harbors of Venezuela, the hydraulic and elec¬

trical development plants at Niagara Falls, on the Saint Lawrence River, in British Columbia and in the South. He was government repre¬

sentative at the International Congress of

Navigation at Diisseldorf, Germany (1902) ; at Milan, Italy (1905); and at Saint Petersburgh, Russia (1908).

BOGATZKY, Karl Heinrich von, Ger¬

man devotional writer: b. Tankowa, Silesia,

1690; d. Halle 1774. His principal works are (Taglic.hes Schatz-Kastlein dor Kinder Gottes, 5

published in 1718. The former is familiar to English readers under the title of Bogatzky's (Golden Treasury. 5 Consult biography by

Kelly, published in London in 1889.

BOGDANOVICH, Ippolit Fedorovich,

Russian poet: b. 23 Dec. 1743 O. S. ; d. 1802.

From his earliest years he showed a great love for poetry, music and painting, but when, in 1754, his parents brought him to Moscow and forced him to study law at the university, he secretly tried to go on the stage. Heraskov, the director of the theatre, succeeded in dis¬

suading him from this purpose and urged him to dedicate himself to the literary field. His first attempts in the domain of lyric poetry ((A Useful Joy) and (Leisure Hours'*), al¬

though inferior, were published by the univer¬

sity periodicals. In 1764 he was appointed to a secretarial position in the Ministry for Foreign Affairs and two years later he was transferred to the Russian embassy at the Royal Court at Dresden. He later wound up his governmental career as president of the Imperial Archives in Saint Petersburg. His most productive period was in 1769-75, when in his <Lyre) he published his collective lyric poems, which were un¬

usually well received. For his momentous song, <Dushenka) ((Dear Little SouP) he drew the

inspiration, if not entirely borrowed, from La Fontaine's (Les Amours de Psyche5 and glori¬

fied the beauty of soul as imperishable and un¬

alterable while he spoke of exterior brilliance and beauty as being transitory and inconstant as smoke. <Dushenka) is replete with a light play of imagination and written in a distin¬

guished tone with many lively and exquisit: verses. The 15 editions of that poem arc the best proof of its popularity, which is partly due to the fact that nothing of the kind had been previously attempted in Russia. However, later criticism does not sustain the contemporary es¬

timate of this writer. Of his other poems (Thˆ

Slavs,5 (The Happiness of Nations5 were well received by contemporary critics. His collec¬

tive works (exclusive of his prose writings) were published by C. A. Vengerov (Saint

Petersburg 1893).

BOGDOOLA, bog-do-oo'la, or HOLY

MOUNT, a hill in Russia, in the government of Astrakhan, near the Aktuba and 14 miles east of Tchernoiarsk. It forms an isolated

cone nearly 500 feet high in the middle of a vast steppe. It appears to rest on limestone overlain by sandstone, which on the northeast side rises perpendicularly like a wall and is cut into deep clefts frequented by innumerable birds. The

sandstone is succeeded by alternate red md

white layers of clay and sand, which ha\e a very singular appearance. The summit is chiefly composed of masses of rock-salt. At the foot of the hill there is a salt lake called Bogdoin Dabassu.

BOGERMAN, bo'ger-man, Jan, Dutch

theologian: b. Oplewert 1570; d. 1637. He was professor c>f divinity at the University of Franeker (1633) ; participated in the Armenian controversy, and was president of the Synod of Dort, 1618. With four others he translated the Bible into Dutch ; this translation is at present the common Dutch version. He also wrote

(Annotationes contra H. Grotium,5 and trans¬

lated Beza's (Del a punition des heretiques.5

BOGERT, George H., American artist :

b. New York 1864. His first studies were made under Thomas Ealcins. He went to France in 1884 and studied in Paris under Raphael Col¬

lins, Aime Morot and Puvis de Chavannes. He won the Webb prize, 1898; the first Hallgarten prize of the National Academy of Design, 1899, and was awarded a bronze medal at the Paris Exposition, 1900. His studio is in New York.

BOGERT, Marston Taylor, American

ch mist, lecturer and writer: b. Flushing, N. Y., 18 April 1868. A graduate in 1890 of Columbia College, he was subsequently assistant, profes¬

sor and head of its department of chemistry.

In 1908, at the invitation of President Roose¬

velt, he was a member of two conferences on the conservation of national resources and de¬

livered important addresses on land, water, for¬

ests and minerals. In 1909 he received the de¬

gree of LL.D. from Clark University. He wras'

elected president of the American Chemical

Society 1907-09, and was a founder and presi¬

dent 1912-13 of the Chemists' Club. He is the author of numerous popular articles, reviews and scientific papers.

BOGGS, Charles Stuart, American naval

officer: b. New Brunswick, N. J., 28 Jan. 1811; d. 22 April 1888. He entered the United States navy in 1826; served on the Princeton in the Mexican War; was assigned to the gunboat

Varunct in Farragut's Gulf squadron in 1861.

In the attack on forts Saint Philip and Jackson, in April 1862, he destroyed six Confederate gunboats and two rams, and in the last moments of the fight his own vessel wˆas sunk. In 1869—70 he served with the European squadron; in the latterˆyear was promoted to rear-admiral, and in 1873 was retired.

BOGGS, Frank Myers, American artist:

b. Springfield, Ohio, 6 Dec. 1855. He received his art education at the Lcole des Beaux Arts and under Gerome in Paris. In 1882 the French government bought his picture, 'Place de la Bastille,5 for the Luxembourg Museum, and

in 1883 his Usigny5 for the Niort Museum. Hi pictures are to be found in many of the best French private collections, and in the museums at

Havre, Nantes and Dieppe. In the first prize fund exposition of the American Art Gallery, New York, he received a prize of $2,500 for his picture (A Rough Day, Honfleur, 5 now in the Boston Museum.

BOGHEAD COAL or TORBANITE, a

bituminous substance found at Boghead, near

Bathgate, Scotland. It is dark brown in color and partakes of the nature of cannel coal. It BOGLE — BOGOTA

contains a large amount of volatile substance, consequently is largely used in making paraffin and gas.

BOGLE, James, American artist : b.

Georgetown, S. C., 1817 ; d. Brooklyn, N. Y., 11 Oct. 1873. He came to New York in 1836

and entered the studio of Professor Morse, in¬

ventor of the telegraph and founder of the Na¬

tional Academy of Design. Mr. Bogle, confin¬

ing himself to portrait painting, soon achieved distinction in that department. In 1850 he was elected an associate of the National Academy, and in 1861 an academician. For many years his pictures occupied annually a prominent posi¬

tion a.t the Academy, but he exhibited only at rare intervals in the later years of his life, when the state of his health compelled him to live in the South. He executed portraits of John C. Calhoun, Henry Clay, Daniel Webster, Chief Justice Jones, Bishop Atkinson of North Carolina, DeWitt Clinton, Gen. John A. Dix

and Henry J. Raymond.

BOGNOR, bog'ner, England, watering-place on the coast of Sussex, nine and a half miles southeast of Chichester by railway.

There is a pier 1,000 feet long, constructed chiefly of iron, and also an esplanade. The place was brought into vogue toward the end of last century by Sir R. Hotham, who spent $300,000 on it. Pop. 8,142.

BOGO, Philippines, town situated on the

east coast near the northern end of the island of Cebu, 56 miles north of Cebu. It has a good harbor and is connected by canal with the op¬

posite shore of the island. Pop. 14,915.

BOGOMILES, a religious sect, said to

have been pretty widely spread in Thrace and Bulgaria as early as the 10th century. They were persecuted by the Byzantine Emperor,

Alexander Comnenos, and their leader, named

Basil, wras burned alive at Constantinople in 1118. The name of the sect is said to be com¬

posed of two Slavonic words, meaning <(God, have mercy.® The Bogomiles believed that God had two sons, Satanael and Jesus or Logos.

The former rebelled, and created the material world, and also man. God gave a soul to man, but he was left under the control of Satanael until the coming of the Logos. The law was given to Moses by Satanael, and is not recog¬

nized by the Bogomiles, who accept of the Old Testament only the Psalms and the Prophets.

The Logos, or Christ, came down from heaven to deliver man from the power of Satanael.

This sect, which held many extravagancies of doctrine, continued to exist for several cen¬

turies. They practised severe asceticism, re¬

jected the sacraments, or put new interpreta¬

tions on them, and made frequent prayers both by day and night. Despite the persecutions to which they were subjected the Bogomiles did not die out, and at the time of the Moham¬

medan conquest of Bosnia in the 1 5th century the greatest number of the Christians who

embraced Islam belonged to the sect. Adher¬

ents of the sect are still to be found. Consult Heard, (Thc Russian Church and Russian Dis¬

sent } (New York 1887).

BOGOS, bo'go-z, a people of Abyssinia,

occupying a district in the highlands north of Abyssinia, now part of the Italian colony of Eritria. The land is intersected by the broad and beautiful valley of the Anseba, and com¬

prises on the west the elevated and hilly region as far as the sources of the Barca, and on the east the slopes of the plateau of Mcnsa. The climate and vegetation are similar to those of Abyssinia. The rainy season lasts from March to September, when the Anseba overflows its banks and fertilizes the valley through which it flows. There is a great variety both in the flora and the fauna of the country. Large baobab trees, sycamores, and tamarinds overshadow the banks of the Anseba, which dre rendered almost impassable by the number of Euphorbiae and

creeping plants. At the same time there are to be found rhinoceroses, elephants, wild boars, buffaloes, antelopes, lions, leopards, wildcats, jackals, wolves, etc., in great numbers. The population is only about 10,000, which is en¬

gaged in agriculture and the raising of cattle, and carries on a trade with the neighboring places in corn, butter, ivory, skins, buffalo-horns

and ostrich-feathers. Their language,

which is akin to the Agow, is called by them¬

selves Bilin. Their countenance is Greek in its contour, their body light, powerful and well formed; the color of their skin dark olive-brown ; their lips are thin, the cheek-bones not prominent and they have generally bushy

whiskers. The patriarchal institutions of the Bogos are peculiar. The members of each

union of families are pledged to apprehend any one of their number who is charged with the commission of a crime. The laws relating to dowries, inheritance and murder are regularly codified. The religion is the Christian, but Mohammedanism, which is increasing, has a

considerable number of adherents.

BOGOSLOV, bo-go-slof', a small volcanic

island of the Aleutian archipelago, lying north¬

west of Unalaska. It was formed in 1795-96 by a series of volcanic upheavals; on the site pre¬

viously there had been low rocks and reefs.

It is a favorite haunt of sea lions.

BOGOTA, bo-go-ta', or SANTA FI£ DE

BOGOTA, the capital of the Republic of^ Co¬

lombia. Despite the fact that it is but 4° 41'

north of the equator, the elevation of the plateau on which it stands is so great (over 8,000 feet) that the breeze is cool and invigorat¬

ing. But there are, Colombians admit, many

damp days, and the rarefaction of the air is somewhat trying. A fertile plain or table-land of exquisite beauty extends for a distance of about

30 miles on three sides, while directly above rise two mountains of moderate height, and surrounding the whole scene are snow¬

capped peaks of the Andes — among them the extinct volcano of Tolima. Water is supplied by two mountain streams flowing through the town itself ; the supply, however, is not kept free from contamination, and is insufficient for the present needs of the city. Unfortunately the overcrowding of buildings occupied by the poorer classes, and the absence of a good sys¬

tem of drainage, offset the conditions otherwise favorable to health. Bogota is lighted by gas and electricity; its streets are well laid out; and the houses, though low, are substantially built.

There is a valuable library of over 50,000

volumes; and the university, founded in 1867, is considered the best in the Andean region north of Peru. On 12 Sept. 1902 the govern¬

ment decreed the establishment of a museum

and academy, to increase the popularity and efficiency of the National School of the Fine Arts. Founded in 1538 bv Gonzalo Ximenes de Quesada, a native of Santa Fe, a small town near the city of Granada, and in the Spanish province of that name, Bogota became the capi¬

tal of New Granada, as the country was first called by the Spaniards. For history, indus¬

tries, etc., see Colombia. In the volume

(Colombia, } by Phanor J. Eder (London 1913), we read that students from all. departments are attracted to the National University at the capital. ((There are 536 students, 232 attending the Law School, 202 the Medical School, 58 the School of Mathematics and Engineering, and 44

the Dental School. Not more than 25 or 30

per cent, however, complete their studies, but the attendance is rapidly increasing: in 1906, for instance, there were only 77 students in the Law School.® Mr. Eder says that the Art

School and the Conservatory of Music of

Bogota ((do remarkably good work considering the scanty resources they command. The

economic helplessness of the departments,

coupled with the fact that the governors, pre¬

fects, and alcaldes are appointed mediately or immediately by the President, causes all power to be centralized at the national capital. The new presidential palace is of an unpretentious exterior ; the interior is wholly charming, with a refreshing flower-filled court and fountain in ihe centre, the rooms bright, the offices possess¬

ing an air of dignity and quiet, constant activ¬

ity.® Pop., according to last census, 123,000.

BOGUE, bog, David, Scottish clergyman,

the originator of the London Missionary So¬

ciety: b. Hallydown, Berwickshire, 18 Feb. 1750; d. Brighton, 25 Oct. 1825. In 1771 he removed to London, and became minister of an Inde¬

pendent chapel at Gosport. In 1780 he became tutor to an establishment for directing the studies of young men destined for the ministry in the Independent communion. He now began

the formation of a missionary scheme, which afterward resulted in the London Missionary

Society and had intended, with some others, to engage in mission work in India, but the project was frustrated by the East India Company.

The influence which the establishment of this institution had on the

public mind was great, and the springing up of the British and Foreign Bible Society and the Religious Tract Society, at short intervals, proves how much good was effected b}ˆ the impetus it imparted. In the es¬

tablishment of both of these he took an active part, contributing to the latter body the first of a series of useful miblications. In 1815 he received the degree of doctor of divinity from Yale College. His more important works are

(An Essay on the Divine Authority of the New TestamenD (translated into many languages),

ˆDiscourses on the Millennium,) and a (Historv of Dissenters> which he undertook in conjunc¬

tion with his pupil and friend, Dr. Bennet — a standard work. Consult Morison, (Fathers and Founders of the London Missionary Societv)

(London 1846).

BOGUE, Virgil Gay, American engineer :

b. Norfolk, N. Y., 20 July 1846; d. 14 Oct. 1916; graduated Rensselaer Polytechnic Institute ; as¬

sistant engineer Prospect Park, Brooklyn, 1868, and for 10 years was in Peru on railway

work. During 12 years' service with the North¬

ern and Union Pacific companies, he discovered (<Stampede Pass® across the Rocky Mountains in 1881. In 1905 while established as a consulting engineer in New York city, he became chief engineer and vice-president of the Western

Pacific Railroad, and subsequently was con¬

sulted on improving the navigation of the

Columbia River, on the harbor plans for

Tacoma, Wash., and in the trans-insular rail¬

road for South Island, New Zealand.

BOGUSLAWSKI, bo-goo-slaviske, Adal¬

bert, Polish actor and dramatist : b. Glinna near Posen 1752; d. Warsaw, 23 July 1829. As com¬

poser of many original dramas of a national character he is looked upon as the founder of Polish drama, and he also translated plays and operas from the French, English and Italian.

From 1778 to 1809 when he finally settled as manager of the theatre in Warsaw, he traveled through Poland acting and establishing theatres in various cities. His plays were published at Warsaw in nine volumes, 1820-25 ; his original works were collected in three volumes, 1849-54.

BOGUSLAWSKI, Palm Henri Louis

von, German astronomer : b. Madgeburg, 7

Sept. 1789; d. Breslau, 5 June 1851. He was enrolled in the army for the campaign of 1806

and afterward studied astronomy. Called to

Berlin in 1809, made lieutenant in 1811, he con¬

tinued his astronomical studies under Bode, and through the latter was enabled to visit the prin¬

cipal observatories of Europe from 1812 to

1815. He was wounded at Culm, taken prisoner but escaped to Bohemia and joined his corps at Erfurt. He retired from military service after Waterloo and for many years his failing sight forced him to abandon his astronomical obser¬

vations. In 1831 he was appointed curator of the Breslau observatory, became professor at the university there in 1836 and director of the observatory in 1843. On 20 April 1835 he dis¬

covered the comet known by his name. His

principal work is <LTranus) (3 vols., Glogau 1846-48).

BOHA-EDDIN, bo-ha-ed'din, or BOHAD—

DIN, Arabian scholar and historian: b. Mosul, 1145; d. 1235. Having attained proficiency in Moslem law, he became, at the age of 27, a lecturer at Bagdad. In 1186 he made the pil¬

grimage to Mecca, and while in Damascus on his return, he was appointed cadi of Jerusalem and of the Moslem army camp by

Saladin, who was desirous of availing himself of the services and influence of so able a scholar, and a man of such reputed Moslem

piety and zeal. He accordingly brought his

learning and talent to the work of glorifying the wars of that ambitious monarch, in a

treatise on the (Laws and Discipline of Sacred WarP On the death of Saladin he transferred his attachment to the son, Malek-al-Dhaher,

whom he was instrumental in establishing in the succession to the throne. He was appointed

cadi of Aleppo, and there founded a college, at which he continued to give lectures until he was 90 years old. His great work was, how¬

ever, the ˆLife of Saladin, J which was pub¬

lished with a Latin translation at Leyden in 1732. Consult C. R. Conder's edition of the (Life of Saladin) with notes by C. Wilson

(London 1897).

BOHAN, Stone of. Erected in honor of

Bohan the Reubenite. It was situated in the Valley of Achor between Beth Arabah and

Debir. This stone afterward served as a

boundary mark on the frontier of Judah and Benjamin (Joshua xv, 6; xviii, 17) ; but

whether it was intended as a sepulchral monu¬

ment or erected to commemorate some great

exploit performed by this particular Bohan

(for there were several of the same name)

neither history nor tradition informs us.

BOHEME, La. Grand opera in four acts

by Giacomo Puccini (libretto by Giacosa and Illica, founded on a tale by Henri Murger) first produced at Turin, Italy, 1 Feb. 1896. It was the composer's fourth opera and at once placed him at the head of the younger Italian school aud gave him an international reputa¬

tion. The plot is constructed out of four

slightly connected scenes, each complete in

itself, presenting, in admirably contrasted light and shade, a vivid picture of the Latin Quarter of Paris of the period of 1830. The four

inseparables, Rodolphe, Marcel, Schaunard and Colline, poet, painter, musician and philosopher, Mimi, the frail grisette, and Musette, frivolous, but kind-hearted child of pleasure, form an appealing group, and the composer has, with unquestioned genius, given them a human touch unusual on the operatic stage. The music is melodious in the true Italian sense. There is a fine sincerity in the reflection of the pathos, ever near the surface, even when the charac¬

ters are at their gayest, and there is usually a satisfying psychological

fitness between the

melody and the underlying sentiment. The

composer's command of his medium is nowhere better shown than in the second act, the scene of the Cafe Momus with its rapid motion,

colorful ensembles and kaleidoscopic contrasts.

The orchestra, in which modern influences are plainly felt, is handled skilfully throughout.

Occasionally there are rude, uncontrolled out¬

bursts of passion, hallmarks of the ˆverismo®

school of which Mascagni's (Cavalleria Rus—

cicana) is the type; but more generally the music is softened and refined under the influ¬

ence of the later Verdi. The love scene in the first act, and even more, the duo in the last, contain moments of great lyric beauty, while there is dramatic intensity in the death scene and the brief succeeding orchestral finale. One of the most fluent numbers is Musette's Waltz Song in the second act.

Without any present indication of serious

rivalry with Verdi, the greatest of the Italians, Puccini has, nevertheless, made a definite place for himself, not only with the general operatic public, but with the musically elite as well.

(La Boheme) is one of the most popular operas in the repertory of European and American

opera houses.

Lewis M. Isaacs.

BOHEMIA, BOHMEN (anciently Bo—

heim), Czechoslovakia, a province formerly a kingdom bounded on the southwest by Bavaria, on the northwest by the state of Saxony, on the northeast by the province of Silesia and on the southeast by Moravia and the republic of Austria. It contains 20,065 square miles, and has about 6,850,000 inhabitants, of whom about three-fifths are Czechs, nearly 90,000 Jews and over 2,000,000 Germans. Under Austrian rule

Bohemia sent 130 representatives, or one for each 52,000 inhabitants, to the lower house of Parliament. Its provincial diet consisted of 262

members. Bohemia is surrounded on all

sides by mountains, possesses large forests and many small lakes or ponds. Its plains are re¬

markably fertile. The largest rivers are the Elbe and the Moldau. All sorts of grain, flax, hops (the best in Europe) and fruits are ex¬

ported. Wine is not abundant, but in the neigh¬

borhood of Melnik is of pretty good quality.

The raising of sheep, horses, swine and poultry is carried on to a considerable extent. The mines yield, silver, copper, lead, tin, garnets and other precious stones, iron, cobalt, arsenic, uranium and tungsten, antimony, vitriol, alum, calamine, sulphur, plumbago and coal in abun¬

dance. There are also numerous mineral springs.

The industry of Bohemia, favored by its

central situation, has long rendered it one of the most important states of Central Europe.

Spinning and weaving are extensively

carried on in the northern and southeastern dis¬

tricts ; manufactures of lace, ribbons, metal and wood work, chemical products and other

branches of skilled industry are also largely de¬

veloped. Pottery, porcelain, glassware, cutting of precious stones, give employment to many hands. The glassware of Bohemia alone, which is known all over the world, employs 50,000

workers. Large quantities of beer (Pilsener) of the kind known as lager are exported.

Prague, the capital, is the centre of the manu¬

factures and of the commerce of the country.

The largest towns are Prague, Pilsen, Reichen-berg, Budweis, Teplitz, Aussig and Eger. For internal intercourse there are excellent high¬

ways, extending to 10,000 miles, and several im¬

portant lines of railway leading both southeast to Vienna and northwest toward Dresden. The Bohemians of all ranks are distinguished for public spirit. Among the public establishments for education are a German and a Czech uni¬

versity at Prague, two technical high schools, four theological academies, many gymnasiums

and over 5,000 schools. The prevailing religion is the Roman Catholic; other sects, however, are tolerated. The language of the country is Bohemian, a dialect of the Slavonic ; in some districts, and in most of the cities, German is spoken. See Bohemian Language and Litera¬

ture.

History. — Bohemia received its name from

a tribe of Gallic origin, the Boii, who were ex¬

pelled by the Marcomans at the commencement of the Christian era; the latter were in turn obliged to give place to the Germans, and these to the Czechs, a Slavonic people who had estab¬

lished themselves in Bohemia by the middle of the 5th century. The country was at first di¬

vided into numerous principalities, which were temporarily united

into a monarchy in 627 under Samo, but the work of this prince did not sur¬

vive him. Charlemagne attempted the con¬

quest of Bohemia without permanent result, al¬

though he succeeded in rendering it tributary ; and the Emperor Louis had his army nearly

destroyed by the Bohemians in 849. Christianity was introduced into Bohemia in the reign of Borzwog I (894-902), a descendant of Przemysl, whose family held sway in Bohemia for about six centuries (722-1306). In 1092 Bohemia was finally recognized as a kingdom under Wratislas 158

II. Up to 1230 the monarchy was elective and then became hereditary; the right of election, however, was suspended, not abrogated. The

monarchs received investiture from the German Emperor, held one of the great offices in the im¬

perial court, and were recognized as among the seven electors of the empire. Separated from Germany, however, by a rampart of mountains, by origin, language and national customs, the Bohemians kept aloof from the general politics of the empire, and their kings frequently re¬

ceived dispensations from attending the Diet.

The peasantry were in a state of villenage, but there was a numerous and powerful nobility, the Diet assembled frequently and the nobles came armed to defend their rights. The royal au¬

thority was limited by the coronation oath. Bo¬

hemia was frequently at war with Poland, the Emperor or some of the surrounding states ; it was successively united and disunited with Hun¬

gary, Silesia, Moravia, etc., according to the course of wars and

alliances. Ottokar II

(1253-78) had extended his conquests almost

from the Adriatic to the Baltic, when he lost them and his life in contest with Rudolph, the founder of the too successful house of Hapsburg. His grandson Wenceslas III was assas¬

sinated at Olmiitz, and with him closed the dynasty of Przemysl. The house of Luxemburg succeeded in 1310, and governed Bohemia till 1437. Under Charles IV (1346-78), who also

held the sceptre of the German empire, Bo¬

hemia prospered, and advanced in civilization and science. Toward the close of this second dynasty civil wars were excited by the promul¬

gation of the doctrines of Huss and the perse¬

cution of his followers. These wars were pro¬

tracted by the genius of John Ziska, the leader of the Hussites, a man who, although latterly quite blind, has for military genius been com¬

pared to Hannibal. Ziska was rarely defeated, and his success inspired the utmost enthusiasm in his followers. He has been called the in¬

ventor of the modern art of fortification, and by his skill in this art he made Mount Tabor an impregnable fortress. After the death of Ziska the moderate party of the Hussites, who were called Calixtines, from their insisting on the retention of the sacramental cup for the laity, united with the Roman Catholics, and Sigismund was acknowledged king in 1433. The conditions of this compact being ill observed, George Podiebrad, a nobleman of the reformed party, was by them elected king in 1458. On his death in 1471 they chose Wladislas, son of Cassimir, King of Poland, who also obtained the crown of Hungary. His son Louis lost

both crowns with his life in the battle of Mohacs against the Turks, and Ferdinand of

Austria became, in 1527, sovereign of both

kingdoms. Bohemia later lost its separate ex¬

istence, becoming (1620) hereditary in the house of Austria. Its

subsequent history to 1918 per¬

tains to that of the Austrian empire. It was desolated by the Thirty Years' War, and it suf¬

fered severely from religious persecutions, by which, indeed, the Reformed faith was almost entirely suppressed in it. The Emperor Joseph II gave some protection to the Protestants. In 1848, when Europe was convulsed with revolu¬

tionary movements, a momentary attempt was

made to assert the ancient independence of Bo¬

hemia against the Austrian dominion; a conflict took place between the army and the people, Prague was bombarded and the insurrection

suppressed. From 1848 to 1918 there was a

constant 'struggle for ascendency between the Slavonic Czechs and the Germans. On the fall of the Dual Monarchy in 1918, _ as a result of the war, Bohemia, with Moravia, Silesia, Ru-thenia and adjoining small territories united in forming the Republic of Czechoslovakia.

Charles Leonard-Stuart,

Editorial Staff of The Americana.

BOHEMIAN BRETHREN. A Christian

sect which arose in Bohemia about the middle of the 1 5th century from the remains of the Hussites. Dissatisfied with the advances to¬

ward the Catholic Church by which the Calix¬

tines had made themselves the ruling party in Bohemia, they refused to receive the compacts, as they were called, that is, the articles of agree¬

ment between that party and the council at Basel (1433), and began about 1457, under the direction of a clergyman, Michael Bradatz, to form themselves into separate parishes, to hold meetings of their own and to distinguish them¬

selves from the rest of the Hussites by the name of Brothers, or Brothers' Union. Amidst the hardships and oppressions which they suffered from the Calixtines and the Catholics with¬

out making any resistance, their numbers in¬

creased so much, through their constancy in their belief and the purity of their morals, that in 1500 their parishes amounted to 200, most of which had chapels belonging to them. They re¬

jected the idea of transubstantiation, admitted only a mystical spiritual presence of Christ in the eucharist, and took the Scriptures as their sole doctrinal guide, and for this latter, but more especially for the constitution and discipline of their churches, received the appro¬

bation of the reformers of the 16th century.

They aimed at restoring the primitive purity of Christianity by the exclusion of the vicious from their communion, and their distribution of the members of their society into three classes — the beginners, the proficients and the perfect. Their strict system of superintend¬

ence, extending even to the minute details of domestic life, did much toward promoting this object. To carry on their system they had a multitude of officers of different degrees; or¬

daining bishops, seniors and conseniors, presby¬

ters or preachers, deacons, sediles and acolytes, among whom the management of the ecclesiasti¬

cal, moral and civil affairs of the community was distributed. Their first bishop received his ordination from a Waldensian bishop, though

their churches held no communion with the

Waldenses in Bohemia. They were destined,

however, to experience a like fate with that op¬

pressed sect. When, in conformity with their principle of not performing military service, they refused to take up arms in the Smalkaldic War, Ferdinand took their churches from them, and in 1548, 1,000 of their Society retired into Poland and Prussia, where they first settled in Marienwerder. The agreement which they con¬

cluded at Sendomir (14 April 1570) with the Polish Lutherans and

Calvinistic churches, and still more the Dissenters' Peace Act of the Pol¬

ish Convention (1572), obtained toleration for them in Poland, where they united more closely with the Calvinists under the persecutions of the Swedish Sigismund, and have continued in this connection to the present day.

Their brethren who remained in Moravia and

Bohemia recovered a certain degree of liberty under Maximilian II, and had their chief resi¬

dence at Fulneck in Moravia, whence they have been known as the Moravian Brethren. The is¬

sue of the Thirty Years' War, which terminated so unfortunately for the Protestants, occasioned the entire destruction of their churches, and their last bishop, Comenius, who had rendered important services in the education of youth, was compelled to flee. From this time they made frequent migrations, the most important of which took place in 1722, and occasioned the establishment in Saxony of the new churches of the Brethren by Count Zinzendorf (q.v.). Al¬

though the old Bohemian Brethren must be re¬

garded as now extinct, this Society will ever deserve remembrance, as a quiet guardian of Christian truth and piety, in times just emerg¬

ing from the barbarity of the Middle Ages; as a promoter of pure morals, such as the re¬

formers of the 16th century were unable to es¬

tablish in their churches; and as the parent of the esteemed and widely extended association of the United Brethren, whose constitution

has been modeled after theirs. See United

Brethren.

BOHEMIAN FOREST (Bo hmerwald) ,

a mountain range or ridge of central Europe, extending from the Fichtelgebirge southward

toward the confluence of the Ilz and the Dan¬

ube, and separating Bavaria from Bohemia.

Area about 4,400 square miles. The Bohemian forest in ancient times formed a part of the Silva Hercynia, the highest peaks being the Arber (4,840 feet high) and Rachel. The great abundance of wood has occasioned the estab¬

lishment of many glass houses, forges, etc., in this region. The inhabitants have acquired in their seclusion from the world many character¬

istic virtues and vices.

BOHEMIAN GIRL, The. Grand opera

in three acts by Michael W. Balfe (libretto adopted by Alfred Bunn). First produced at

the Drury Lane Theatre, London, on 27 Nov.

1843. An Irishman by birth, Balfe followed

Italian models in his music, influenced, no doubt, by Rossini, whom he knew. He wrote

a large number of operas which had great vogue for a time, but only (The Bohemian GirP sur¬

vives. It was easily the most successful of his works and was quickly translated into French, Italian and German. It was first produced in America within a year of its premiere and du¬

plicated its European success. In his younger days, Balfe was prominent and successful as a singer and therefore knew well from

personal experience how to meet the vocal requirements of the popular operatic performer. His music is tuneful, but insipid, and not of the sort that wears well. Nevertheless, he had the gift of melody, well illustrated in such ballads as ((I dreamed I dwelt in marble halls,® ((When other lips and other hearts,® ((Thc heart bowed

down,55 which abound in (The Bohemian GirP

and which have a certain persistent appeal in spite of — or, possibly, because of — the sentimenal words provided by the librettist.

Lewis M. Isaacs.

BOHEMIAN LANGUAGE AND LIT¬

ERATURE. The language of Bohemia, other¬

wise called Czech, is one of the Slavonic group of the Aryan or Indo-European family of

tongues, and accordingly allied to Polish, Rus¬

sian, Serbian, Bulgarian, *etc.* (See Slavs or Slavonians). The Czech (Bohemian) lan¬

guage or dialect was the first of the Slavonic idioms which was cultivated scientifically. It is spoken in Bohemia, Moravia, with slight

variations in Austrian Silesia, in Hungap" and in Slavonia. Three chief dialects of this lan¬

guage are recognized, namely, the Bohemian or Czech proper, the Moravian of Moravia and

Silesia and the Slovak of Hungary. The

Bohemian alphabet consists of 42 letters, ex¬

pressing a great variety of sounds. The English sound of ts the Bohemian expresses with c, the English y with g, the sh with .9X or j, the Italian ce or ci with c modified, the French re and gi with z. the

Italian n with y, the gn with n, the English w with w, particularly at the erd of words. The sound of entire words, rot that of the single letters which compose them, determines the roughness or smoothness of their pronunciation. The terminations of

the various declensions and conjugations are mostly vowels, or the smoother consonants. In general, the Bohemian has a natural melody

like that of the Greek.

The Bohemian language, moreover, has

much expressiveness and energy, as it is not weakened by a number of articles, auxiliary words, conjunctions and words of transition, but is able to represent the objects of imagina¬

tion, of passion and all the higher emotions of the poet and orator, in a lively manner; by its brevity, heaping together the most signifi¬

cant words, and arranging the connection of the parts of speech according to the degree of feeling to be expressed, so as to give the style, spirit and energy, or gentleness and equability.

Like various other tongues, it designates many objects by imitation of natural sounds. Thus the name of many animals are taken from their voices, as kruta, the turkey; kachna, the duck.

Many plants are named from their effects, as bolchlaw , hemlock (from headache). The con¬

ciseness of the language is increased by the absence of auxiliaries in the greater part of the verbs. The preterites, in the third person singular and plural, express a meaning still further condensed, as the variation in the last syllable is made to designate the sex ; for ex¬

ample, psal, psala, psalo, he, she, it, has written ; psali, psaly, psala, they have written. In like manner the Bohemian saves many prepositions

and much circumlocution of other kinds, by the use of the instrumental, agreeing with the

Latin ablative ; for instance, secenjm . mece hlawu mu st ’ al (t read like te), (<with a blow of the sword he has cut off his head.® This

language is, therefore, very well fitted for the translation of the Latin classics. By the use of the past participle active the Bohemian can designate, as well as the Greek, who has really performed the action contained in the predicate of the accessory clause, which the Latin, with its ablative absolute or participle passive, must leave always undefined and dubious. The same kinds of actions performed with different im¬

plements are often expressed by peculiar

words ; for example, the verbs zjti, strjhati, krdgeti, rezati, denote to cut with the scissors, with the sickle, with the knife and with the scythe. In the subtlety of grammatical struc¬

ture the Bohemian is like the Greek, and has the advantage over the Latin and other lan-160

guages. In speaking of two hands, two eyes, etc., the dual number is used ; for example, nice, oci, *etc.* The language is also capable of expressing the idea of duration, referring to an indefinite past time, like the Greek aorist ; for instance, kupowal dum, ale nekaupil ho, he was engaged in buying the house, and did not buy it. The language affords several preterite

tenses, distinguished with great subtlety, as kaupil, lˆe has bought once ; kupowal, he had purchased for a long time ; kupowdwal, he had purchased formerly several times ; kupowdwd-wal, he seldom had purchased in former times ; moreover, by adding the auxiliary verb byl, a time still longer passed may be expressed,

though this is very seldom used ; for instance, byl kupowdwal, he had purchased in times long past. Another advantage of the language con¬

sists in the various future tenses by which the Bohemian denotes not only the time but also the duration, and the more or less frequent repetition of the action; for instance, kaupjm, I shall purchase once ; budu kupowati, I shall be purchasing for a long time ; budu kupowdwati, I shall purchase several times ; and budu

kupowdwati, I shall be purchasing very often.

Not less manifold in signification, and equally subtle in the determination of time, are the participles and the participial constructions.

The determination of sex and number by the final syllable of the participle gives the Czech language no small advantage over others.

Small connective particles of speech the Bohe¬

mian has in common with the Greek. The

Greek alia, men, gar, de, te, etc., agree with the Bohemian ele, pak, wsak, li, z, t' ; only the three latter are always affixed to a word. Finally, the free, unrestrained arrangement of the

words contributes much to perspicuity, as the Bohemian is less fettered than almost any other modern language to a particular order.

Bohemian Literature has been divided his¬

torically into five periods. The first extends from mythological times to 1409. It affords no written documents of remote antiquity. We

know, however, that the language at an early period was similar to the present from the names of the gods, dukes, rivers, cities and mountains which have been preserved, such as Perun, Przemysl, Borzwog, Wltawa, Bila,

Praha, Tetin. The Slavonian apostle Method,

and the philosopher Constantine, called Cyril, made the Slavonians in Moravia acquainted

with Christianity. Thence it penetrated to

Bohemia, and thus the people of this country received the Graeco-Slavonic ritual in the year 845. The same Constantine invented for the

sounds of the Slavonic language the Cyrillo-Slavonic alphabet, borrowed mostly from the

Greek. In later times the Glagolitic alphabet sprang up, of which, however, less use was made. When the Latin Church supplanted the

Greek in Moravia and Bohemia the Latin

alphabet came also into use instead of the Cyrillic. In Bohemia the Cyrillic character re¬

mained in use only with the monks of Sazawa, who observed the Slavonic ritual. As the

Latins endeavored to annihilate all the writings of the old ritual, and the Slavonic language was, in many cases, obliged to give way to the Latin, Bohemian literature suffered incalculable injury; hence we possess from the earlier cen¬

turies but a few insignificant remains in the characters above mentioned. In the 10th cen¬

tury the Bohemians had a school at Kudet,

in which they learned Latin. Their most an¬

cient relic is the hymn (Hospodine Pomiluyny) of Bishop Adalbert (Wegtech), a native Bo¬

hemian, sung to the present day even by the Russians and Poles. The Bohemians possess

some remains of a collection of lyrico-epic national songs, without rhyme, which seem to have been of great merit. The manuscript ap¬

pears to have been written in 1290 and 1310.

Goethe found these national songs worthy of particular attention. Under the Emperor

Charles IV, who promoted the cultivation of the Bohemian language, the University of

Prague was founded in 1348. In the Golden

Bull he commanded the sons of the German

electors to learn the Bohemian language.

Under his son, the Emperor Wenceslas, all

decrees were written in Bohemian, which

formerly were in Latin. Prague was then not only the most populous city in this part of Europe, but also, on account of its splendid court and the wealth of its citizens, the centre of the arts and sciences. Almost all the in¬

tellectual currents of the West found entrance into Bohemia, and German literature in par¬

ticular had a powerful influence. The heroes of the Alexandrian and Arthurian cycles of

romance became familiar to the Czechs in their own language. Dalimil Mezericky wrote a

history of Bohemia in verse; Ondreg Z. Dube, a collection of Bohemian laws, in three vol¬

umes ; Warinec Z. Brezowa, a history of the Roman emperors, and translated Mandeville's

(Travels) ; and Pribik Pulkawa, a Bohemian

history. This period affords also many vocabu¬

laries, poems, songs and translations.

With Huss began the second period, from

1409 to 1500. The prevalence of religious dis¬

putes caused the Bible to be generally read and understood. Huss of Hussinetz translated

Wickliffe's book, (Trialogus,) into the Bohe¬

mian tongue, and sent it to the laymen as pres¬

ents. The (Treatise of the Six Errors) he

caused to be inscribed in Bohemian on the

walls of the chapel of Bethlehem. He wrote his first collection of sermons when at the castle of Kozy (1413), besides an (Appeal to the Pope, > Commentary on the Ten Command¬

ments, } an Explanation of the Twelve Ar¬

ticles, J two sermons on the Antichrist; the (Triple Cord,* and several excellent hymns.

His letters from the dungeon in Constance to the Bohemians were translated by Luther into Latin, accompanied with a preface, and printed at Wittenberg in 1536. He and Jakobellus-and Jerome improved and distributed the Bohe¬

mian Bible, of which several copies have been preserved to our times. Of Ziska of Trocnow, one of the greatest generals in history, several letters and his rules of war have been pre¬

served. From this period have come down to us several war songs of the Taborites, also some songs of Prague. Martin Lupac under¬

took, with the assistance of some learned men, the labor of retranslating the whole New

Testament. The church sendee was now per¬

formed entirely in the Bohemian language.

Mladienowic, an eye-witness of the execution of Huss, wrote an account of his life. This used to be read in the Bohemian churches.

Procopius continued the rhyming chronicles of Dalimil. Lodkowic related his (Journey to the Holy Sepulchre, > Sasek of Mezyhor wrote

(Notes and Travels Through Germany, Eng¬

land, France, Spain, Portugal and Italy of the Bohemian Baron Loew of Rozmital and

\ latna> (whom he accompanied), a contribu¬

tion to our knowledge of the manners of the 15th century, published in a German translation at Brunn (1824). M. Gallus, Albjlc, Chrislan, Zidek, J. Cerny, J. Blowic and Sindel wrote on medicine, astrology and agriculture. As early as 1447 we have an anonymous work on the

grafting of trees. We have also the rhyming legend of the 10,000 knights, a translation of the fables of 2Esop, the council of the beasts and the birds, in prose and verse, in three volumes (Placj Rada). Each lesson, which

flowrs in rhyme from the mouths of the animals, is preceded by the natural history of the

animals and the moral. It was printed three times in the Bohemian language, and published at Cracow in Latin verse (1521, 4to). Of the Bible 14 translations have come down to us, besides 10 of the New Testament. The oldest, of the year 1400, is in Dresden. The typo¬

graphic art made a rapid progress in Bohemia.

The first printed work was the Epistle of Huss from Constance, in 1459; the second, (The

Trojan War, > in 1468; the third, a (New Testa¬

ment, } in 1474; the whole Bible, in 1488; the first almanac, in 1489.

The third age, from 1500 to 1620, may be

called the golden age of the Bohemian lan¬

guage. The cultivation of learning — in other countries, with only a few exceptions, the

monopoly of the clergy — was in this favored land open to the whole nation. All branches of science were elaborated, and brought to an un¬

commonly high degree of improvement for

that time. Gregory Hruby of Geleni translated the work of Petrarch

(De Remediis utriusque FortunseP W. Pisecky translated from the

Greek the (Exhortation of Isocrates to De-

monikosP John Amos Comenius wrote 54

works, some of which were very excellent. He published his <Janua) and an (Orbis Pictus,*

which, translated in his lifetime into 11

languages, have passed through innumerable

editions. In all the north of Europe Comenius attracted attention by his projects for improv¬

ing education, which were deliberated upon

even by the Diet of Sweden and the Parliament of England. The hymns of this and the earlier ages, part of which have been translated by Luther, may serve as standards for all lan¬

guages. In Prague alone there were ‘ at this period 18 printing presses, in the country towns of Bohemia 7 ; and in Moravia also 7 ; many Bohemian books, too, were printed in foreign countries, as in Venice, Nuremberg, Holland, Poland, Dresden, Wittenberg and Leipzig.

The fourth period begins with 1620 and ends with 1774. After the battle at the White

Mountain, the whole Bohemian nation sub¬

mitted entirely to the conqueror. The popula¬

tion of most of the cities and of whole districts migrated in order not to be false to their faith.

More than 70,000 men, and almost the whole of the nobility, all the Protestant clergy, scholars and artists, in general the most culti¬

vated part of the nation, left their native country. Of these emigrants the greater part formed the flower of the army of Count Mans¬

field. Hence the Thirty Years' War depopu¬

lated Bohemia more than any other country,

since these fugitives endeavored to regain their VOL.. 4 — it

native country by repeated invasions. The

fugitives established at Amsterdam, Dresden,

Berlin, Breslau and Halle printing presses, and sent to their brethren in Bohemia, Moravia

and Hungary a number of books, mostly new

editions. Some Bohemians who observed the

decay of their language strove to remedy it; as Pesina Z. Cechorodu ; Joh. Beckowsky, who continued the Bohemian history to 1620; W.

Weseley, who wrote a work on geometry and

trigonometry, *etc.* ; but the decay was too great to admit of being checked ; the nobility had be¬

come strangers, and the government en¬

couraged only German literature. From this

time, therefore, the Bohemians wrote more in the German language.

In the fifth period, from 1774 to the present time, a new ray of hope shone on Bohemian literature, when, under the Emperor Joseph II, a deputation of secret Bohemian Protestants, trusting to his liberal views, made him ac¬

quainted with the great number of their

brethren of the same faith. He perceived the necessity of introducing toleration, and hun¬

dreds of thousands of Protestants in Bohemia and Moravia came to light : their concealed works were printed anew, their classical lan¬

guage was again acknowledged and cultivated.

Under this protection many men of merit,

mindful of the fame of their ancestors, en¬

deavored to cultivate anew all branches of the sciences, and to rival, if possible, the results attained by their more advanced neighbors.

From about the year 1820 great activity was manifested by the Bohemian writers in the

various departments of literature. A little be¬

fore this Milton's (Paradise Lost) was trans¬

lated into Bohemian, and subsequently Shakes¬

peare's dramas, or most of them, were like¬

wise translated, the native drama being also cultivated. Kollar and Chelakovsky distin¬

guished themselves in poetry, and perhaps

even more Hynek Macha, whose poem ((Mayw

is said to still maintain an influence over Bohe¬

mian poetry. Kollar and Chelakovsky were

advocates of the Panslavic movement. The

chief work of the former was (Slava's

Daughter, > a long lyrico-epic poem. Several writers became well known as novelists, some of them following the lead of Sir Walter Scott.

Jungmann (the translator of Milton) brought

out a valuable (History of Czech Literature^

and Schafarik his (History of the Slavonic

Language and Literature) and his (Slavonic

Antiquities.) Among more recent poets of note may be mentioned the names of Halek Hey-duk and Neruda, but it must be admitted that few Bohemian writers have become generally

known, even by name, to the European reading public.

Bibliography. — Dictionaries : Celakovsky,

(Additions to Jungmann's Dictionary) (Prague

1851) ; Gebauer, (Slovnik Staroceskv) (ib.

1901) ; Herzer, (B6hmisch-deutsches Worterbuch) (ib. 1901); Jonas, dictionary of the

Bohemian and English Languages* (Wisconsin

1891) ; Jungmann, (Slovnik yesko-nemecky*

(5 vols., Prague 1839) ; Kott, cBohmisch—

deutsches Worterbuch* (7 vols., Prague 1878—93) ; Rank, (Taschenworterbuch der bohmisch-deutschen Sprache) (6th ed., ib. 1895) ; Su-mavsky, (Bohmisch-deutsches Worterbuch*

(3d ed., ib. 1874). Grammars: Blahoslav,

(Grammatica Ceska* (1867) ; Dobrovsky,

(Lehrgebaude der bohmischen Sprache)

(Prague 1819) ; Gebauer, (Hlaskoslovi, jazyka ceskehcP (ib. 1876) ;

id., (Mluvnice 6eska pro skoly strednP (ib. 1890) ; id., (Historicka mluvnice jazyka ceskeho > (ib., 1896-98) ; Mas-arik, (Bohmische Schulgrammatik) (5th ed.,

Prague 1890) ; Vymazal, ˆohmische Grammatik fiir deutsche Mittelschulen und Lehrer-bildungs-AnstalteiP (Brunn 1881).

BOHEMOND I, the son of the. Norman

adventurer Robert Guiscard, who rose to be

Duke of Apulia and Calabria; b. 1056; d. 1111.

He became familiar with warfare when a mere boy, took a prominent part in various expedi¬

tions to Greece and Illyria against Alexis

Comnenus, and repeatedly defeated his troops with a very inferior force. As eldest son

Bohemond naturally expected to succeed his

father, but when the succession opened in 1085

Bohemond was absent in Greece, and his

younger brother Roger, having obtained posses¬

sion of the paternal inheritance, declared his determination to maintain it. A war between the brothers was followed by an arrangement which gave Bohemond nothing more than the

principality of Tarentum. While assisting his brother at the siege of Amalfi he resolved to become a Crusader, and without waiting to com¬

plete it he harangued the troops so effectually on the glory to be gained in the Holy Land that the great body of them at once joined his standard. Bohemond was soon on his march,

and after encountering considerable difficulties reached the scene of action. The Crusaders

had laid siege to Antioch, but had made little progress and were

beginning to despair of suc¬

cess, when Bohemond found means to gain over an Armenian renegade, who undertook to in¬

troduce him and his men by night, and that give them possession of the town. Bohemond

laid the matter before his fellow-chiefs, and in doing so stipulated that in the event of success he himself should be Prince of Antioch. The Armenian kept his promise, and accordingly in 1098 Bohemond was installed in his sovereignty, which he retained ever after, and at his death transmitted it to his son, who assumed the title of Bohemond II.

BOHLAU, be'low, Helene, German novel¬

ist: b. Weimar, 22 Nov. 1859. She traveled much in the East, married Omar al-Raschid Bey at Constantinople and settled down in Munich.

In 1888 her pictures of Weimar (Ratsmadelgeschichten) brought her a large measure of

fame. She shows now and then a leaning

toward the Romantic school, but on the whole her high power of description is realistic and her writings are imbued with passion. Among her works are <Novellen) (1882) ; (Es hat nicht Sein Sollen) (1891) ; (Das Recht der Mutter) (1896; new ed., 1903) ; (Neue Ratsmadel-und Weimarische Geschichten) (1897) ; (Halbtier)

(1899) ; (Sommerbuch) (1902) ; (Die Kristall-kugeP (1903) ; (Isebies) (1911).

BOHLEN, Peter von, German Orientalist;

b. Wiippels, Oldenburg, 9 March 1796; d. Halle, 6 Feb. 1840. He spent the first 20 years of his life in straitened circumstances, but his talents and perseverance attracted attention, and he obtained admission to the Hamburg gymnasium.

He afterward studied the Eastern languages at Halle and Bonn ; and he obtained an appoint¬

ment at Konigsberg, first in 1825 as extraor¬

dinary, and afterward in 1830 as ordinary

professor of Oriental literature. Bohlen has left many works which fully support his title to the high place which he held among; Oriental scholars. One of the most important is a work entitled (Das alte lndieiP (2 vols., 1830-31), not yet superseded by any other work on the same subject. Other publications of his are (Die Genesis historisch-kritisch erlauterD

(1835) and editions of Bhartrihari's (Sententi3e) (1833) and Kalidasa's ˆitusanhara* (1840).

The details of his life are given with great minuteness and honesty in an (Autobiography }

(Konigsberg 1841), which is full of interest, and cannot be read without producing a full conviction that he was no less distinguished by his amiability in private life than by his literary acquirements.

BOHM, Theobald, Bavarian musician: b.

Munich, 9 April 1798; d. there 25 Nov. 1881.

He was first flutist of the Munich Royal

Orchestra for several years but is best known for his improvements in the construction and fingering of the flute. He wrote (Ueber den Flotenbau und die neuesten Verbesserungen

desselben) (1847) and (Die Flote und das

FlotenspielP Consult Welch, (History of the Boehm Flute) (London 1883).

BOHM (bem) BAWERK, Eugen von,

Austrian economist and statesman : b. Brunn, 12

Feb. 1851. He studied law in Vienna and

political economy and social science at the uni¬

versities of Heidelberg, Leipzig and Jena. In 1880 he became privatdocent in the University of Vienna, later assistant professor at Inns¬

bruck and professor there in 1884. He was

next chief of department in the Ministry of Finance and in 1895 became Minister. In 1897

he was Ambassador at the German court and

in 1904 became, for the second time, Minister of Finance. In 1899 he was elevated to the Upper Chamber; in 1907 became vice-president and

in 1911 president of the Academy of Science.

He is honorary professor of political economy in the University of Vienna. Bohm-Bawerk's

greatest influence has been wielded in the field of economics to which he has contributed many works of the greatest merit, which have raised discussion to a high level and have been a con¬

stant and powerful stimulus to investigation in this important field. His (Geschichte und

Kritik der Kapitalzins-TheorienR was a notable contribution to the critical literature of

economic science. It was made available for English students in 1890 by Prof. William

Smart of Glasgow. In the United States it has had a great vogue. Abundant proofs of Bohm-Bawerk's influence are furnished by our litera¬

ture. A glance at the files of the Political Science Quarterly, the Quarterly Journal of

Economics and the Annals indicates that a

large proportion of the articles treating of economic theory are either

directly upon some phase of Bohm-Bawerk's work or theories, or have been clearly influenced, if not directly in¬

spired, by them. He is a proponent of the 'separate existence of the abstinence and the use theories of capital and interest and opposes the theory of productivity. His works include, in addition to the work mentioned above, (Karl Marx and the Close of His System* (a criticism, London 1898) ; (The Positive Theory of Capi¬

tal and its Critics* (in Quarterly Journal of BOHME — BOIARDO

Economics, April 1895) ; (Recent Literature on Interest, 1884-1899) (Eng. trans. by W. A

Scott, . New York 1903).

BOHME, be'me, or BOHM, Jakob, one

of the mosQ renowned mystics of modern

times: b. 1575, Altseidenberg, a village in upper Lusatia ; d. Gorlitz, November 1624.

Bohme, being the son of poor peasants, re¬

mained to his 10th year without instruction, and employed in tending cattle. Raised by con¬

templation above his circumstances, and undis¬

turbed by exterior influences, a strong sense of the spiritual, particularly of the mysterious, was awakened in him, and he saw in all the work¬

ings of nature upon his mind a revelation of God, and even imagined himself favored by di¬

vine inspirations. He became afterward a shoe¬

maker; and this sedentary life seems to have strengthened his contemplative habits. In 1594

Bohme became a master shoemaker in Gorlitz, married, and continued a shoemaker during his life, but withdrew himself more and more from the world. If we take into view his retirement, his piety, his rich and lively imagination, his imperfect education, his philosophical desire for truth, . together with his abundance of ideas, and his delusion in considering many of those ideas as immediate communications of the Deity, we have the sources of his doctrine and his works. His first work, (Aurora, oder die Mor-genroteB was written in 1616, and contains his revelations on God, man and nature. This gave rise to a prosecution against him ; but he was acquitted, and called upon from all sides to con¬

tinue writing. One of his most important

works is ˆDescription of the Three Principles of the Divine Being. } His works contain pro¬

found and lofty ideas, mingled with many

absurd and confused notions, but the basis of his thought is the theory that everything exists and becomes intelligible only through its op¬

posite. The first collection of his writings was made in Holland in 1675 by Henry Betke ; a more complete one in 1682 by Gichtel (10 vols., Amsterdam), from whom the followers of

Bohme, a religious sect highly valued for their silent, virtuous and benevolent life, have re¬

ceived the name Gichtelians. Another edition appeared in Amsterdam in 1730 under the title (Theosophia Revelata) (2 vols.) ; the most

complete in six volumes. In England, also,

Bohme's writings have found many admirers.

William Law published an English translation of them, two volumes. A sect, taking their name from Bohme, was likewise formed in

England, and in 1697 Jane Lead, an enthusiastic admirer of his, established a particular society for the explanation of his writings, under the name of the Philadelphists. In very recent

years his views have taken on fresh importance, his fundamental principle having been perceived as akin to that underlying the philosophical systems of Spinoza, Schelling and Hegel.

Consult Hartmann, (Life and Doctrines of

Bohme > (1893).

BOHN, bon, Henry George, English pub¬

lisher, of German parentage: b. London, 4 Jan.

1796; d. Twickenham, 22 Aug. 1884. On com¬

pleting his education he worked for a time under his father, but about 1831 started busi¬

ness on his own account as a second-hand book¬

seller, and in 1846 began the issue of his famous libraries, the first of a solid and instructive kind published in England at a popular price.

The first of these was the Standard, succeeded in the following year by the Scientific and the Antiquarian, in 1848 by the Classical, and from then till 1853 by the Illustrated, the Shilling, the . Ecclesiastical, the Philological and the British Classics libraries. The whole number of volumes contained in these series exceeded 600. In 1864 and subsequent years he sold all his copyrights and other business properties, thus realizing a sum of nearly $500,000. Among his own works were (The Origin and Progress of Printing* (1857) ; (Biography and Bibliog¬

raphy of Shakespeare-‘ (1863); (Dictionary of Quotations’ (1867); (Handbook of Provcrbs) ; (Handbook of Games*; (Guide to the Knowl¬

edge of Pottery and Porcelain) ; and editions of Lownde’s bibliographer’s Manual * and Ad¬

dison’s Works.

BOHOL, Philippines, an island belonging

to the Visayas or Bisayas group. It has an area of about 1,511 square miles and an esti¬

mated population (1903) of 243,148. The in¬

terior is mountainous ; Mount Copton, in the northeast, reaches 10,150 feet. Sugar-cane, rice, coffee and tobacco are grown and the island is reputed rich in gold deposits. The numerous rivers dry up after the rainy season. The most important town is Tagbilaran (pop. 12,000), a port on the southwest coast. The Visayas

dialect prevails throughout Bohol.

BOHOR, an East African antelope (Cer -

vicapra bohar), one of the larger reitboks. It ranges in East Africa from Abyssinia to

Rhodesia. See Reitbok.

BOHTLINGK, bet'lmk, Otto von, Rus¬

sian Sanskrit scholar : b. Saint Petersburg, 30

May 1815 ; d. 1 April 1904. He received his education in his native city, and in 1853 re-

'moved to Germany. In 1842 he returned to

Saint Petersburg, but subsequently lived much in Jena and Leipzig. His chief work is a

Sanskrit-German dictionary in seven volumes,

prepared in conjunction with Professor Roth

of Tubingen (1853-75). In 1879-89 he issued a smaller edition giving the meanings (with considerable additions), but omitting the quota¬

tions.

BOIAR. See Boyar.

BOIARDO, bo-yar'do, Matteo Maria

(Count of Scandiano), Italian poet: b. near Ferrara 1434; d. Reggio di Modena, 1494.

From 1488 to 1494 he was commander of the city and castle of Reggio, in the service of his protector, Ercole d'Este, Duke of Modena.

This accomplished courtier, scholar and knight was particularly distinguished as a poet. His (Orlando Innamorato) (1495) is continued to the 79th canto, but was incomplete. He im¬

mortalized the names of his own peasants and the charms of the scenery at Scandiano in the persons of his heroes and his descriptions of the beauties of nature. And the spirit of

chivalry is happily wedded with the spirit of the Renaissance. In language and versification he has been since surpassed by Ariosto, whom he equaled in invention, grace and the skilful con¬

duct of complicated episodes. Domenichi,

Berni and Agostini new-modeled and continued the work of Boiardo without improving it.

One continuation only will never be forgotten — the <Orlando) of Ariosto. In some of his 164

works Boiardo was led by the spirit of his times to a close imitation of the ancients — for example, in his (Capitoli) ; also in a comedy borrowed from Lucian's ˆimon5 ; and in his Latin eclogues and translations of Herodotus and Apuleius. In his sonnets and canzoni

(first printed at Reggio, 1499) he displayed great talents as a lyric poet. English transla¬

tions have been made by Toft (1589), and

Rose (1823).- See Orlando Innamorato.

BOIDZE, a family of serpents embracing

two subfamilies: (1) the Pythonince (pythons), and (2) Boince (boas). This family contains the largest snakes of modern times, besides some species of small size; and is characterized especially by possessing vestiges of hinder limbs, appearing externally in the larger species as claw-like spurs on each side of the vent. The scales ‘ of the upper surface are small and smooth, while those of the belly (crawling

scales) are narrower than in other serpents of similar size. The head is covered with en¬

larged flat scales or “shields,® especially in the pythons. The eyes are small and the pupils usually elliptical. The mouth is filled with strong recurved teeth borne on both the jaw¬

bones and on those of the palate. The body is thick and very muscular.

The subfamily Pythonince (pythons, carpet—

snakes, etc.) have a pair of supraorbital bones, the premaxillaries carry teeth and the subcaudal scales are mostly in two rows. They number about 20 species, and belong to the tropical parts of the Old World, with a single species in Mexico (see Python). They repro¬

duce by laying eggs which are brooded until the young hatch.

The Boince lack the supraorbitals, have no

teeth on the premaxillaries and a single row of subcaudal scales. They number 40 or more*

species, mostly American, but a few genera are to be found in scattered parts of the Old World tropics and in Madagascar, that island having two genera otherwise known only in

America. The extraordinary distribution of

this subfamily is one of the most interesting facts in zoogeography. The young in this sub¬

family are born alive, not from eggs as in the pythons. (See Boas). Consult Boulenger,

(Reptiles and Batrachians* (London 1914) ;

Gadow, (Reptiles) (London 1901) ; Ditmars, (Reptiles of the World* (New York 1910) ;

Gosse, (A Naturalist's Sojourn in Jamaica)

(London 1851) ; Moles and Ulrich, (Serpents of Trinidad> (in 'Proceedings* Zool. Soc. of London, pp. 499 et seq., 1894).

Ernest Ingersoll.

BOIELDIEU, bwal-dye, Francois Adrien,

French composer: b. Rouen, 15 Dec. 1775; d.

Grosbois, 8 Oct. 1834. He early displayed great musical talent, and at 18 wrote an opera, 'La fille coupable,* which was performed with great applause. In 1795 he went to Paris, and rose rapidly in reputation, producing several operas and various other pieces which have become

classical such as 'Les deux lettres) ; (La famille Luisse) ; (Calife de Bagdad* ; and 'Ma tante Aurore.* When the Conservatoire de Musique

was established he was nominated a professor.

In 1803 he went to Russia as maitre de chapelle to the Emperor Alexander, but returned to Paris in 1811, and subsequently composed 'Jean de Paris) (1812); (Le chaperon rouge* (1818);

(La dame blanche,* his masterpiece (1825);

‘Les deux nuits (1829). The ‘Calife de Bag¬

dad* ; (Jean de Parish and (La dame blanche *

still hold the stage and continue popular. Many other works were written in collaboration with Cherubini, Mehul, Kreutzer and others. Adam, Fetis, Labarre and Zimmermann were the most famous of his pupils. Consult Ferris, (Great Musical Composers * (New York 1887) ; Auge, (Boieldieu, biographie critique * (Paris 1908) ; and Pougin, A., (Boieldieu, sa vie et ses ceuvres) (Paris 1875).

BOIES, bois, Horace, American states¬

man : b. Aurora, N. Y., 7 Dec. 1827. He went to Wisconsin in 1844; and after working on a farm returned, studied law and was admitted to the bar in 1849. He practised at and near Buffalo till 1867, becoming active in Republican politics during this period; and in the last year removed to Waterloo, Iowa, where he continued law practice. His opposition to the tariff and prohibition policy of the Republican party

caused him to unite with the Democrats ; and, in 1890-94, he served two terms as governor of Iowa, being defeated for a third term in 1893.

He was a conspicuous candidate for the presi¬

dential nomination in the National Democratic conventions in 1892 and 1896;. and in the cam¬

paign of 1896 he supported Bryan.

BOII, bo’f-I, a Celtic people, who at first inhabited Transalpine Gaul. Their original seat is supposed to have been between the upper Saone and the higher parts of the Seine and Marne. They migrated to Cisalpine Gaul,

crossed the Po and established themselves be¬

tween it and the Apennines, in the country pre¬

viously occupied by the Umbrians. They are

found, 396 b.c., engaged along wfith the Insu-bres and the Senones, two other tribes of Cisal¬

pine Gaul, in the capture and destruction of Melpum, a neighboring city, of which the site and history are unknown. They united their

forces with the Etruscans, 283 b.c., after the de¬

feat of the Senones, and were defeated by the Romans at the Vadimonian Lake, the scene of a previous defeat of the Etruscans. After an¬

other defeat they made a peace with the

Romans, which was preserved for 45 years,

when the occupation of the territory of the Senones by the latter led to another war, in which the Boii were again defeated. At the commencement of the second Punic War, 218

b.c., they again attached the Romans and sup¬

ported Hannibal. From this period they were engaged in almost constant war with the

Romans till they were completely subdued by Scipio Nasica, 191 b.c. Many of them were put to the sword ; the remainder were at length compelled to migrate, and crossing the Alps found a refuge among the Tauriscans, a kindred tribe in the territory of modern Bohemia, to which the Boii have given their name. They were afterward driven out or exterminated by the Dacians (some say the Marcomans). Part

of them migrated about 58 b.c. to Bavaria.

The Boii, like the other Gauls, were a people of considerable civilization, possessing a strong'

love of independence, and formidable from

their military disposition and virtues.

BOIL, bo-el', or BUIL, Spanish Benedic¬

tine priest: b. about 1460; d. 1520. He was the first priest to visit the New World, accompany-BOIL

ing Columbus on bis second voyage 1493-94,

as apostolic vicar of the Indies under papal appointment, and celebrating the first mass in America, assisted by three other friars, Epiph¬

any Sunday 6 Jan. 1494. During the absence of Columbus 26 April to 29 Sept. 1494 extending his discoveries, Boil and three other commis¬

sioners were selected to administer the colony of Isabella, but with Margarit and other dis¬

affected ones returned to Spain and by their malicious reports led to the downfall of

Columbus.

BOIL, a superficial or deep localized in¬

flammatory process of the skin leading to the destruction of tissue and the formation of pus.

In practically all instances some form of in¬

fection by a micro-organism, usually the

Staphylococcus pyogenes aureus or albus, is

present in boils. In the superficial varieties, the bacteria enter the hair follicles or the sebaceous glands and travel down beneath the skin and here either set up a process of destruction or continue one already begun by a wound. There results a local swelling, with exquisite

tender¬

ness, and later a pointing and discharge of the purulent detritus from the boil. In the deep-seated varieties similar processes are in action, but the heading and discharge of the boil is de¬

layed. The marked tenderness is due to the involvement of the nerve fibres in the tissues immediately surrounding the inflammatory

centre. The predisposition to the formation of boils varies widely, some people being particu¬

larly prone to them. They are apparently more liable in those who are ((run down,® or in those whose tissues are non-resistant and appear in many disorders of depressing character. Their presence is due, however, to infection rather than to a state of the blood or other individual condition, which only offers favorable soil for their development. For this reason they are most common in boys and young men who are exposed to infection from barbers' fingers and implements, sweaters and other garments worn in athletic training, *etc.* It is probable that a favorable soil due to run down or other patho¬

genic condition favors the reinoculation which is the actual cause of the successive recurrence or «crop of boils® known as furunculosis. An occasional apparent epidemic is also due to re¬

peated infection in the same family or group.

A tonic and general hygienic treatment may be helpful but particular stress should be laid upon scrupulous cleanliness of the skin and all that comes into contact with it. In direct treat¬

ment of the boil the aim should be to prevent or at least to limit suppuration. If suppuration has already begun applications may be made

which will hasten it, but they should be strictly aseptic to prevent further infection. Surgical evacuation of the cavity, followed by surgical aseptic measures are advisable.

BOILEAU, Philip, American portrait

painter and illustrator: b. Quebec, Canada, June 1863; d. New York.

18 Jan. 1917. He was

educated in London, England, and showed a

talent for both painting and music. Later in life he became a finished pianist. At 23 he was sent to Milan, Italy to study art and there married a Russian singer, who died later. In 1897 he returned to the United States, making his home in Baltimore, and became a portrait painter. His work became well known in social circles, but about 1902 he came to New York, and through his work, which he exhibited in an art gallery, he attracted great attention. The artist had studied the effects which the hearing of music produces in changing the expression of the face. Among his early works he pro¬

duced four of his best known pastels, which bear musical names. In 1904 Mr. Boileau re¬

ceived the first prize ($500) in the New York Herald's Christmas art competition. (That

you, Santy?) was the title of the picture which won the prize. Until 1907 Mr. Boileau had

searched all his life to find his ideal type of feminine beauty. He finally found his ideal, who was Miss Emily Gilbert, of Philadelphia, then a student in the Sargent Dramatic School, and married her in October 1907. She was his model for the (Peggy Head,* (The Boileau

GirP and numerous other portrayals of his

ideal type of American beauty.

BOILEAU-DESPREAUX, bwalo da—

pra-o, Nicolas, French poet: b. Paris, 1 Nov.

1636; d. there, 13 March 1711. He applied him¬

self at first to the study of the law and after¬

ward of theology, but devoting himself

eventually to the pursuit of literature, he pro¬

duced, within the space of 40 years, a vast number of works, the most

important of which is the (Art poetique* (1664), in close imitation of the (Ars Poetica) of Horace, establishing an aesthetic code for all forms of poetical com¬

position. His satirical poem, (Le Lutrin)

(1674), and the (Dialogue des heros de roman, *

(1664), a satire on the poetical romances of his day must also be particularly mentioned. His other writings comprise translations of the

classics, miscellaneous effusions on art, music and poetry, and his famous epistles, of which those treating of (Le respect humain,* (La connoissance de soi-meme,* and (Plaisirs de la cam-pagne* are the best. When Boileau began to write, Montaigne, Pascal, Malherbe, Corneille, Moliere, La Fontaine and other eminent

authors had already made their appearance ;

yet the people were slow to appreciate the genius of the new school, to which they pre¬

ferred the previous mediocre and imitative

writers. Boileau's great achievement was to

cure this perversion of taste. He enunciated the principle that nothing is beautiful save what is true, and strenuously opposed all af¬

fectation and euphemism. Reason and good

sense were his guides ; but he was lacking in imagination. He was great as a satirist, and as a critic led the way in simplifying French literary taste. He was called the <(Lawgiver of Parnassus.® Like his friend Racine, he was historiographer of Louis XIV, and the recipient of an annual pension of 2,000 francs. His ad¬

mission to the French Academy did not take place before 1684, owing to his attacks upon some of the members. In his later years he became a Jansenist and engaged in disputes

with the Jesuits. He left the reputation of a genial, high-minded and generous man. The best edition of his works is by Gidel (1870— 73) . See Deschanel, (Le romantisme des classiques,* 4th series (1888) ; Faguet, (XVII Siecle, Etudes litteraires* (1887) ; Hemon, (Cours de litterature> (1889-95); Lanson, <Boileau> (1892);

Merillot, <Boileau) (1892) ; Walter, (Boileaus Wirkung auf seine englischen Zeitgeno.ssen*

(1911) ; and Wright, history of French Literature> (1912).

BOILER, in steam engineering, a closed

vessel for the generation of steam under pres¬

sure. In days when steam pressures did not exceed a few pounds to the square inch, many forms of boiler were used, that are now out of the question, on account of the intrinsic weakness of their forms. At the present time, when steam pressures are often carried as high as 150 or 250 pounds to the square inch, the strictest attention must be paid to every trifling detail of design and construction, in order to ensure the safety of the structure. The fanci¬

ful shapes that prevailed in the days of Watt and other early steam engineers have perforce disappeared, and given place to a limited num¬

ber of standard types that have been found to be capable of withstanding the severe condi¬

tions of modern practice. The types at present in use may be divided into two general classes, according as they are ((internally fired® or ((externally fired® ; that is, according as the fire which furnishes the energy for the formation of steam is contained within the general con¬

tour of the boiler, or is situated externally to it. Internally fired boilers are the rule in England, but a large majority of the boilers in use in the United States are fired externally.

Internally Fired Boilers. — The Cornish

and Lancashire boilers are the commonest in¬

ternally fired types. Each consists of a cylin¬

drical shell with flat ends or <(heads.® In the Cornish type the boiler is traversed from end to end by a large flue, which is often corru¬

gated, to increase its strength. The fire is aoooooooooo zˆJbooc

l.oooooooooooo oooo;

f 000000000004= oooq

fcoooooooooooo oooq

OOOOOOOOOOOf = OOOOl

pOOQQOOOOOOO oooq

.ooo*ooeooo©< =

roooooooooooo oooq

l.ooo o! = .oooq

too ..♦>** oooq

oooo

,00001

• OOOj

Fig. 1. — The “ Scotch,” or Cylindrical, Marine Boiler.

built within this flue, upon a suitable grate at one end of the boiler; and the gaseous products of combustion, after passing through the flue, are returned along the outside of the shell, so as to give up still more of their heat to the water in the boiler. The large flue in the Cornish type is an element of weakness, since the tendency of a flue to collapse through the action of an external pressure increases very rapidly with the diameter of the flue. To guard against collapse, the long flue is often provided with strengthening rings, which are riveted to it externally at short intervals. The Lan¬

cashire boiler differs from the Cornish type chiefly in having two comparatively small flues in the place of a single large one. Such a con¬

struction is intrinsically stronger, and since there is a fire in each of the flues, the fuel can be replenished, and the fires cleaned, alter¬

nately. This implies a greater steadiness of pressure, and less strain upon the boiler from the chilling action of the comparatively cold air that enters and strikes against the heated flue-walls when the fire doors are opened. The Cornish boiler is cheaper to build, and the Lancashire boiler is harder to fire, owing to the smaller size of its flues. The Galloway boiler does not differ in any essential particular from the Cornish or Lancashire types, except that its flues are crossed by conical-shaped water tubes, which serve the double purpose of increasing the heating surface, and of stif ¬

fening the flues that they traverse. The conical shape is adopted for the cross-tubes chiefly on account of the ease with which tubes of this form can be put in position, by passing the flange of the smaller end through the opening to which the larger end is to be riveted.

The Scotch, or cylindrical marine boiler,

shown in Fig. 1, is a very common type in marine practice. It contains several furnaces (three in the illustration), which are usually corrugated. These furnace-flues do not pass

through the entire length of the boiler, as in the Cornish and Lancashire types, but each is connected, within the boiler, to a

separate ((combustion chamber.® The products of com¬

bustion pass from the furnace back into the combustion chamber, and then return to the

front end of the boiler through banks of small tubes which occupy the water space of the

boiler, above the furnace. A ((breeching® (or hood) of sheet steel, secured to the front of the boiler, then receives them, and conducts them to the stack.

Among the kinds of internally fired boilers that are more familiar to the engineers of the United States, the vertical tubular boiler and the locomotive boiler deserve special mention.

The vertical tubular boiler consists of a cylin¬

drical shell, with flat heads at the top and bottom, and traversed by a large number of small vertical tubes. The Manning boiler,

shown in Fig. 2, is a good example of this type. At the lower end, the shell of this boiler is enlarged to provide a greater space for the fire-box than could be had if the shell were of the same diameter all the way. Another

object that the designer had in view, in increas¬

ing the diameter of the shell in this way, was to give the boiler a certain degree of elasticity.

The tubes are likely to be hotter, in service, than the outer shell; and hence they tend to expand more, and thus throw stresses upon the heads and the tube ends. The reversed flange by which the main shell is secured to the fire¬

box is supposed to yield sufficiently, under the bending stress thus thrown upon it, to relieve the more vulnerable parts of the boiler from the expansion strains to which they would

otherwise be subjected. The fire-box of the Manning boiler is surrounded by an annular

space (or <(water leg®) containing water, the inner plates of this space being secured to the outer ones by screw stay bolts that are spaced evenly, at short distances, so that they form the corners of a

system of small squares. These bolts are supposed to be screwed into each of the shells of the water leg, and afterward riveted over at both ends. They are also com¬

monly made hollow, or drilled lengthwise with a small central hole, so that if one of them should break or corrode away seriously, the

escaping steam or water would attract the at¬

tention of the fireman. Vertical tubular

boilers are particularly useful when the avail¬

able floor space in the boiler room is small ; but they are often hard to clean out, and hence are not to be recommended when the water

Fig. 2. — The Manning Boiler.

supply is known to form considerable deposits of scale matter. Such scale matter, m what¬

ever part of the boiler it is formed, will event¬

ually fall upon the lower tube sheet, or else into the water leg. That which falls into the water leg $dll do no great harm unless it allowed to accumulate to an unreasonable ex¬

tent. Handholes are provided along the bot¬

tom of the water leg, on the outer shell, and these should be opened as often as experience with the particular feed water that is used indi¬

cates to be necessary, and the water leg

thoroughly freed from scale and mud. Hand¬

holes should also be provided at or near the level of the lower tube sheet, for a like pur¬

pose ; but it is not so easy to remove the scale from this sheet as it is to remove it from the water leg. That which lodges around the edges of the tube sheet can be removed without any great trouble, but the deposit that lies toward the middle of the tubes can hardly be got at from the handholes. Yet it is of the highest importance that the tube sheet should be kept free from such deposits, because otherwise

the ends of the tubes will become overheated and loosened, and serious mischief, or even disastrous explosions, may follow.

The locomotive boiler is built in a great

variety of forms and proportions, but the fun¬

damental principles of design are substantially the same in most of them. Like the vertical tubular boiler, it has a fire-box that is sur¬

rounded by a water leg on all sides, though it is open at the bottom for the discharge of ashes, and for the admission of air for com¬

bustion. The inner and outer wralls of the fire-box are connected by stay-bolts, and the upper sheet of the furnace (technically known as the <(crown-sheet®) is supported in some efficient manner, so that the pressure of the steam shall not force it down out of position.

The support thus necessary for the crown-sheet is sometimes afforded by running (<sling stays®

from it to the neighboring parts of the outer shell, and sometimes by providing parallel, hori¬

zontal girders over the sheet, these being se¬

cured to the crown-sheet, at short intervals, by means of hangers, or long, thimbled rivets.

Not infrequently these two methods of sup¬

port are combined in the same boiler, as sug¬

gested in the illustration (Fig. 3). The prod¬

ucts of combustion pass forward from the

furnace, through a bank of small tubes that conduct them to a ((smoke-box® or <(extension®

at the front end, to which the stack is attached.

When the locomotive type of boiler is used in stationary practice, the draft required for com¬

bustion is provided by a chimney or tall stack, as in stationary boilers of other types ; but when used in railway service it is impossible to obtain the draft in this manner, and a (<blast-pipe® is therefore provided, through

which the exhaust steam from the engine cylin¬

ders is discharged up the stack. The gaseous products of combustion are expelled from the <(front extension® by the blast of steam, and an equivalent quantity of air is drawn up

through the fire. The draft produced in this way is quite powerful. ((Baffle plates® are therefore provided in the furnace, in many

cases, to deflect the hot gases that come from the fire, and bring them into contact with a considerable portion of the surface of the fire¬

box, before they pass out into the tubes. The weakest points about the locomotive type of boiler are the crown-sheet and the stav-bolting.

If sediment lodges upon the crowm sheet, and thereby keeps the water from direct contact with the metal there, overheating is sure to 168

occur, and the sheet may become so softened and burned as to lose its strength, tear away from its fastenings and permit the entire con¬

tents of the boiler to be discharged into the furnace. Many of the explosions of locomotive boilers are due to this action. The stay-bolting at the sides of the fire-box is likewise a source of frequent trouble, because it is found that the stay-bolts sometimes corrode away very

rapidly, so that they are in reality badly wasted and weakened, when the engineer in charge

believes them to be still sound and strong. As in the vertical boiler, the stay-bolts are com¬

monly made hollow, so that they may auto¬

matically give notice of breakage by leaking.

This artifice is helpful, but unfortunately it does not invariably work as it is intended to, and broken or badly corroded stay-bolts exist, not infrequently, without giving the alarm that they are supposed to give.

Externally Fired Boilers. — The common¬

est type of externally fired boiler, in the United States, is the horizontal tubular. A standard design of this boiler is shown, with its brick¬

setting. Three pairs of lugs are often pro¬

vided, but two pairs are sufficient except when the boiler is very long; and two pairs can be brought to a good bearing upon the side walls more readily than three. The boiler should be <(anchored® by the front pair of lugs, and the rear pair should be provided with rollers so that the boiler may expand and contract freely, without producing strains in the setting or in itself. The course of the feed-pipe, through which water is introduced into the boiler, is indicated quite plainly in the engraving. If there are several boilers set together in one battery, the main feed-pipe runs along the

fronts, just under the projecting ends of the boilers. From this main feed-pipe a branch

pipe is taken off for each boiler. The branch pipe is taken off on the left-hand side of the boiler, and near the main pipe it is provided with a ground union, or with a flanged connec¬

tion. Immediately above the union there is a check valve, and above this is the globe valve which controls the feed. The feed-pipe enters

the boiler just above the tubes, and passes down work (or <(setting®) partially torn away, in Fig. 4. It consists of a cylindrical shell, usually composed of three courses or (<rings® of plates, riveted together. The circular joints in these boilers are almost invariably single-riveted ; but the longitudinal joints are double-riveted,

triple-riveted or riveted in some even more substantial manner, according to the pressure that the boiler is to carry. The longitudinal joints, which are not shown in the engraving, should be high enough to be well out of the way of the hot gases from the furnace. A

multitude of tubes extend through the boiler from end to end, and the furnace gases pass from the furnace back underneath the shell of the boiler to the ((combustion chamber® at the rear, after which they rise and return to the front end through the tubes. They then enter the <(smoke box® at the front end, and finally pass upward into the flue that leads to the chimney. The weight of the boiler is sus¬

tained by means of cast-iron (or steel) pro¬

jections, or ((lugs,® that are not shown in the illustration, but which are riveted to the shell, and rest upon the side walls of the brick the boiler on the inside, nearly to the back head. It then crosses over to the right-hand side, and discharges downward between the

tubes and the shell. It is found by experience that when feed-water is introduced in this way it becomes heated almost to the temperature of the water in the boiler before it is discharged, so that the annoying and often dangerous

effects that are produced when the shell is chilled by cooler feed-water are entirely

avoided. On large boilers the feed-pipe should have a diameter of at least an inch and a half.

The blow-off pipe (which is used for drawing off the contents of the boiler) should be located at the rear end, and should enter the boiler at the bottom, and not through the back-head.

To strengthen the construction, the shell should be reinforced, where the blow-off enters it, by a ring of boiler plate securely riveted in place, about the point of attachment of the blow-off.

The neglect of this simple matter of reinforce¬

ment has led to many serious accidents, through the blow-off pipe pulling out and permitting the contents of the boiler to be discharged through the opening so made. As the blow-off BOILER

is exposed to the action of the fire, it is also important that it should be encased in some sort of a protecting sleeve. A piece of larger pipe, slipped over the blow-off, is often used for this purpose, but it has the disadvantage of rendering the blow-off itself inaccessible for Fig. 4 Stirling Boiler, representative of the semi¬

vertical water tube boiler.

examination. A piece of asbestos rope coiled about the pipe is equally satisfactory, and per¬

mits of easy inspection of the pipe. The blow-off pipe of a boiler that is properly cared for is not likely to burn nor to become otherwise injured. Most of the accidents from the burn¬

ing of such pipes have been primarily due to permitting the pipes to become choked up with mud or scale, so that water could not enter them freely from the boiler, to keep them properly cool. This may be almost certainly avoided by opening the blow-off (say) twice a day for a moment or two, until any sediment that may have fallen into it has been thoroughly swept out. The blow-off pipe is often so arranged that the elbow comes in the combustion cham¬

ber; but this is not good practice, and it is much better to carry the pipe down until it passes below the floor of this chamber. The pipe itself should be about two inches in

diameter. It should be provided with a plug cock or with a gate valve, but a globe valve should never be used upon it, since valves of this type do not have a straight passage through them, and are therefore likely to catch and retain pieces of scale, which often prove to be very troublesome impediments. It should be

mentioned that those parts of the heads of a horizontal tubular boiler

that lie above the tubes are intrinsically weak, and must there¬

fore be sustained in some manner. The neces¬

sary support is usually secured by running

braces from the heads to the side of the boiler shell, though sometimes the braces are run

through the entire length of the boiler, from one end to the other.

The horizontal tubular boiler has many

excellent points, not the least of which is that it is accessible for examination and cleaning in practically every part. No boiler can be ex¬

pected to work ideally when the feed water is bad, but the horizontal tubular type gives as good service, even under this trying condition, as can be had from any known type. Its weak points are (1) that it is not so well adapted to extremely high pressures as some of the water-tube types, of which one will be presently noticed; and (2) when it ruptures (as must happen occasionally with every type of boiler) the explosion is likely to be considerably more destructive than the explosion of a sectional boiler, because the large quantity of energy that it contains is liberated more suddenly.

Another class of externally fired boilers that is becoming more and more widely used, both in the United States and Europe, is the <(water-tube® type, which is characterized by the fact that its tubular elements contain water, instead of serving for the transmission of the furnace gases as in all the other forms that have been considered above. One of the best-known boil¬

ers of this class is the Babcock and Wilcox, which is shown in Fig. 5. This boiler is built up of lap-welded wrought-iron tubes, placed

in an inclined position, and attached, both at the front and at the rear, to an upper drum that is made of extra thick steel or iron plates, and double-riveted, or riveted with a butt-strapped joint. The tubes are not vertically over one another, but are ˆstaggered,® so that each tube comes directly over a space in the row below it. The boiler is

suspended from steel girders, which rests upon iron columns that are entirely independent of the brickwork; and hence the brickwork may be repaired, or may even be removed altogether, without dis¬

turbing the boiler itself. The fire is situated under the front or higher end of the inclined tubes, and the products of combustion are

guided by division plates and bridges so that after rising from the fire grate they pass be¬

tween the tubes to the combusion chamber of the drum, then downward among the tubes

again, and finally upward and to the chimney.

Fig. 5 Babcock & Wilcox Boiler equipped with chain grate stoker and Babcock & Wilcox steam superheater.

Representative of the horizontal water tube boiler.

This devious course as well as the staggering of the tubes, is intended to bring the hot gases into intimate contact with the tubes at every point. As the water in the boiler becomes

heated, it rises toward the higher end of the tubes, becoming meanwhile partially converted 170

into steam. The column of mixed water and

steam ascends into the drum, where its con¬

stituents separate, the steam remaining in the drum, while the water flows to the rear, where it passes down through the long, upright tubes, and so completes the circulation.

Water-tube boilers are now used to some

extent in marine work, and especially in the naval service. Attention was particularly di¬

rected to this branch of the subject by the recent elaborate investigations of the commis¬

sion appointed by the British Admiralty, for the purpose of recommending a standard type of boiler for use in the British navy. (Consult Engineering News, 4 Sept. 1902, p. 176).

The Belleville boiler, which has been somewhat extensively used in the past in the British naval service, consists essentially of a series of water-tubes, slightly inclined to the horizontal, and opening at the bottom into malleable iron col¬

lector boxes, and at the top into a drum to which the main steam pipe is attached. The feed water is introduced at the middle of the upper drum, and is injected under a pressure in excess of that which is carried upon the boiler itself. To prevent the comparatively

cool feed water from entering any of the tubes in which steam is generated, these tubes are caused to project at least eight inches into the drum. The feed passes down through return

pipes at the sides of the boiler, and enters the tubes below, after its temperature has been raised by the heat of the furnace sufficiently to prevent injury from contraction strains.

The proper regulation of the feed-water sup¬

ply is one of the difficult practical points about the Belleville boiler ; and to overcome it as far as possible an ingenious automatic feed device is provided. There is little or no true circula¬

tion in boilers of this type. The tube-groups discharge a mixture of steam and water into the drum, where the steam is supposed to be freed from the water by the aid of a system of baffle plates. An economizer is placed in the stack above the boiler in the most approved modern installations, the construction of the economizer being similar to that of the boiler itself, except that the tubes composing the elements are smaller.

All boilers are supposed to be provided with certain appliances intended to secure safety and uniformity of working. . Noteworthy

among these are the safety valve and the

gauges that indicate the pressure of the steam and the position of the water level. These are described under separate headings.

The <(horse power® of a boiler is often

spoken of ; but the term is a loose one, with¬

out any definite significance, because the horse power that can be realized from a boiler de¬

pends to a great extent upon the engine that is used to develop the power and upon how hard the boiler is forced. The Centennial

Commission adopted, as the definition of a

horse power (when that expression is used in connection with a boiler), the ˆevaporation of 30 pounds of water per hour, when the tem¬

perature of the feed water is 100° F., and the pressure of the steam is 70 pounds per square inch, as read from the gauge.®

Steam boilers may explode from any one

of a great variety of causes. Of these three are specially worthy of mention: (1) The

boiler may be poorly made or poorly designed, so that even when it is new it is not capable of safely withstanding the load that is put upon it. All boilers, however well made, should have a (<factor of safety® of five; that is, they should be able to sustain, without bursting, a pressure five times as great as the regular working pressure. (2) A boiler, originally

good, may be wasted away, either locally or generally, by corrosion or other form of de¬

terioration, or it may develop defects in serv¬

ice, which detract from its original strength sufficiently to lead to explosive failure. Com¬

petent periodical inspection will materially les¬

sen the liability to explosion from causes of this sort. (3) The water in the boiler may become low, through neglect or through the

failure of the feed-apparatus, so that the metal becomes overheated or burned and loses its

strength. This is the cause almost invariably assigned by the general public and even by minor (<experts,® when a boiler explosion oc¬

curs, and the attendant is frequently censured for his carelessness when the explosion was really due to some totallv different cause.

When an explosion is attended by great mani¬

festations of force and energy, it is safe to conclude that a plentiful supply of water was present ; for a boiler full of heated water contains vastly more energy than one that is merely filled with steam at the same tempera¬

ture. (Consult Thurston, (Steam Boiler Ex¬

plosions5). Pound for pound, steam contains

more energy than water, when the two are at the same temperature ; but cubic foot for cubic foot (and this is the way that the comparison should be made in reasoning about a boiler explosion), the water has an enormous advan¬

tage, owing to its greater density.

Bibliography. — Barr, (Boilers and Fur¬

naces5 (Philadelphia 1899) ; Bertin, (Marine Boilers5 (London 1898) ; Collins, (Boilers, Piping and Pumps5 ; Gebhardt, (Steam-power

Plant Engineering5 ; Gray, Practical Design

of Marine Single-Ended and Double-Ended

Boilers5 (London 1912) ; Haven and Swett,

(Steam Boilers and Pressure Vessels5 ; Hut¬

ton, F. R., (Mechanical Engineering of Power Plants5 ; Hutton, W. S., (Steam Boiler Con¬

struction5 ; Kent, (Steam Boiler Economy5

(New York 1910) ; Parsons, (Steam Boilers5

(ib. 1904) ; Peabody and Miller, (Notes on Steam Boilers5 ; Robertson, Leslie S., (Water Tube Boilers5 ; Skealy, (Steam Boilers5 (New York 1912) ; Thurston, R. H., (Steam Boiler Explosions5 ; the Code of the American So¬

ciety of Mechanical Engineers entitled Stand¬

ard Specifications for the Construction of

Steam Boilers5 ; and Steam Boiler Rules,5

formulated by the Massachusetts Board of

Boiler Rules.

Allan D. Risteen,

Director of Technical Research, The Travelers Insurance Company.

BOILER SHOP TERMS. The following

list includes the principal terms and phrases commonly employed in connection with the

work of the design, construction, and use of steam boilers.

Acidulated Water. — Water in which acids have been generated by the introduction of too much tallow into the boiler to prevent incrustation. Its use tends to produce boiler corrosion,

Air Casing. — The enclosed space which envelops the uptake of marine boilers and prevents the loss of h*tat therefrom by radiation,

Air Spaces. — The openings between the fire-bars of engine boilers and the like.

Anti-fouling Compositions. — See Incrustation.

Ash Pit.— That part of the furnace of a stationary boiler which lies below the fire-bars and immediately in front of the fire-door. It is provided for the reception of the ashes which fall through the bars, and constitutes the main draught entrance of the furnace.

Baffle Plates or Bafflers. — The plates provided in the fire-boxes and flues of steam boilers for throwing the flames and hot gases against the best heating surfaces; also to admit air above the fire, and to prevent the burning and buckling of the door of the furnace.

Ballooning. — The process which takes place within a steam boiler when a sediment of fine mud and scale is carried to the surface of the water by the ebullition of the bubbles of steam. Large boilers are provided with “scum-troughs” for collecting this sediment.

Banding or Bonding. — The securing of the lagging around steam cylinders and boilers with broad encircling bands of sheet-brass or

hoop -steel.

Bar-stays. — Solid screwed stays as distinguished from tube-stays or stay-tubes.

Bearing Ring. — - The ring which forms the support of the fire-bars in a vertical boiler.

Blast. — The volume of air forced artificially into the furnaces of boilers to quicken the combustion.

Bleeding. — The soaking of red streaks of rust through the scale adhering to the inner surfaces of boilers, indicating the presence of corrosion in the plates underneath.

Blisters. — Defects in boiler plates of poor quality, caused by the retention of cinders or sand therein during the rolling process.

Blow-off or Blow-off Cock. — The pipe and cock situated at the lower part of the boiler by which the boiler is blown-off or emptied of its contents to prevent incrustation.

In horizontal boilers of the Lancashire and Cornish type, a pipe called the blow-off bend connects the cock with the blow-off seating through which the boiler is blown-off into the ash pit.

Bear or Boiler Bear. — See Punching Bear.

Bottle-tight. — The seams, rivets, fittings and mountings of a steam boiler are said to be bottle-tight when the joints are so close and perfect that there is not the slightest leakage through them under the

application of the water or the steam tests.

Bottling-up. — The temporary confinement of steam in the tubes of a sectional boiler caused by its being generated too rapidly.

Bowling Hoop. — A ring of arch-shaped section, and pro¬

vided with flanges for the reception of rivets, employed for uniting the sections of furnace shells in horizontal boilers.

Breaking Joint. — The form of joint by which the longi¬

tudinal seams of the plates of the boiler are arranged so as to act as supports for each other.

Bridge. — The barrier of brickwork built upon a girder¬

like casing which stretches across the fire-box of an engine boiler at the rear end of the grate. It serves to throw the flames upward to the heating surface, and also prevents a too rapid escape of the heated gases.

Brine Pump.— A pump employed for periodically drawing off a certain amount of water from a marine boiler to prevent saturation.

Bunker Plate. — A sheet-iron plate which encloses the bunker or space which holds the coal or coke used in the furnace of an engine boiler.

Bursting. — • The destruction of a boiler by an excess of internal pressure, as distinguished from collapsing, or the failure of a boiler under the force of an external pressure.

Calorimetry.— The system of measuring the sectional area of a boiler flue, given in square inches.

Capacity. — See Heating Surface.

Carbonate of Lime. — The principal substance which causes the incrustation of steam boilers and water-pipes. It is held in solution in the water as a bicarbonate by the excess of carbonic acid. When the boiler is heated the excess of acid is driven off, and the carbonate is precipitated in the form of a muddy deposit which hardens in the presence of heat into the form of an injurious scale.

Caulking. — The process of burring or driving up the edges of boiler plates along the riveted seams to make them steam and water tight. The caulking of the joints between boiler shells and the flanges of cast-iron manholes, and safety and stop valve seatings, is accomplished by means of caulking-strips or strips of sheet metal interposed between the wrought-iron of the shells and the cast-iron of the pieces attached thereto. This is rendered necessary on account of the impossibility of caulking the cast-iron.

Chimney. — The tube or funnel through which the waste steam and smoke escapes from an engine or boiler into the open air. Its proportions bear a definite relation to the grate area, and vary in the different types of engines.

Circulating Tubes. — The cross tubes of vertical boilers, or the ordinary forms of tubes used in multitubular boilers or surface condensers.

Circulation. — The circulation in a steam boiler is caused by the bubbling up of the lighter boiling water from the heating surfaces through the heavier cooler water in the upper portions which descends and thus comes in contact with the heating surfaces.

Efficient circulation is necessary to the rapid generation of steam, and for the prevention of incrustation. It is promoted by the use of properly arranged water tubes.

Clinkering. — The removal of the clinkers or other vitrified material from the fire in the boiler, periodically.

Clothing. ; The jacketing or deadening covering placed around boilers to prevent loss of heat by radiation.

Coating. — Non-conducting compositions of felt, silicate cotton, asbestos, etc., which are smeared or placed around steam boilers while the substances are in a plastic state, and which become subsequently hardened by the heat, and prevent the loss of heat from the boiler by radiation.

Cold Water Test. — The hydraulic test, for pressure only, applied to steam boilers, as distinguished from the hot water test.

Collapse.— The destruction of the tubes and fire-boxes of steam boilers by external pressures, which cause them to fail by bending or crumpling inwardly.

Collector. — A cylindrical vessel enclosed in a steam boiler for the purpose of collecting the sedimentary matter contained in the water, which if allowed to remain in the water would produce injurious scale and incrustation.

The material thus collected is removed by being blown-out at intervals.

Combined Steam.— Dry and wet steam allowed to mingle together before being used. Its use, at a temperature not exceeding 310° Fahr.,

tends to diminish the evils of corrosion and priming.

Combustion Chamber. — That portion of a boiler flue in which the gases liberated by the action of the fire are burned. It lies between the grate and the smoke-flue.

Corrosion.— The rusting or oxidation of metals by contact and chemical union with oxygen in the presence of water.

Boiler corrosion is either internal or external. Internal corrosion is due to the presence of acidulated water, or to superheated steam in the steam-chamber. External cor¬

rosion results from leakage and from contact with damp foundations and seatings.

Corrugated Furnace Tubes. — Furnace tubes which are corrugated in their longitudinal sections. They are exten¬

sively used both in land and marine boilers. The elastic character of the corrugations absorbs the linear expansion of the tubes under the influence of heat, and thus prevents the strains which tend to bulge the end-plates of the boiler.

Cross-tubes. — The heating tubes in a vertical or cross-tube boiler. They pass through the fire-box, and therefore, being surrounded by the fire, materially assist in main¬

taining a rapid circulation of the water. They are cleaned through a mud-door placed opposite the end of each tube.

Crown. — The boiler crown proper is the uppermost plate in the shell of the boiler. It is formed either in the shape of a hollow disc flanged around the edges, and by which it is riveted to the outer shell-plates, or it is made flat and secured in place by means of stays. That portion of the crown which lies over the top of the furnace or inner shell is usually designated as the fire-box crown.

Damper. — The plate, cover or valve, employed for regulat¬

ing the amount of draught in a boiler or furnace flue. The contrivance is usually balanced with a weight called the damper-weight which assists in its adjustment.

Dead-plate. — The cast-iron plate which lies immediately within the furnace door of an engine boiler. It is provided for the reception, and for the partial coking, of the coal be¬

fore it is passed forward onto the grate.

Dead Water. — The water which lies below the heating surface of the boiler, and, therefore, is in comparatively slow circulation. In some forms of boilers the flues are brought forward under the bottom so as to heat the dead water and thus induce a more rapid circulation therein.

Dolly. — A riveting tool used by boilermakers for holding under the heads of rivets during the act of riveting.

Double-ended Boiler. — A marine boiler provided with furnaces and flue doors at each end, and therefore fired from each end.

Dry Steam or Saturated Steam. — Steam which has not been superheated, nor mixed with the water of priming.

It is the most suitable form of steam for use in engine cylinders.

Economizer. — An arrangement of pipes by means of which the feed-water for steam boilers is heated up to, or higher than, the boiling point.

Evaporative Value. — The relative capacities of the various types of steam boilers to vaporize water, expressed in horse¬

powers, units of work or in thermal units.

Expanding. — The operation of tightening boiler tubes in the tube plates by expanding or spreading their ends.

Expansion Hoop. — The metal ring which is used in the forming of an expansion joint provided in long boiler flues for the purpose of taking up the linear expansion due to heat.

Feeder. — - The mechanism by which the feed-water supply of a boiler is maintained. Usually, it is some form of force pump, or an injector.

Firk-bars. — The grate-bars of the furnaces of engine and piher boilers.

Fire-box. — A term which is specifically applied to the furnaces of locomotive and vertical boilers.

Firing.— Boilers are fired both internally and externally.

Internally fired boilers are those in which the fuel is con¬

sumed in a tube or arrangement of tubes within the boiler itself. The Cornish with one flue, the Lancashire with two flues, the locomotive boiler and other forms of boilers with many internal tubes, the vertical boilers with uptake and cross-tubes, and the marine boilers with return flues are of the internally fired class. Externally fired boilers are those which are not provided with internal fire-boxes or furnace flues. The egg-end, the balloon, the haystack and the wagon boilers are of this class. They are practi¬

cally obsolete.

Fire Tube Boiler. — A multitubular boiler, as distinguished from a sectional boiler or a water-tube boiler.

Fittings. — The fittings of a boiler comprise the manhole and mudhole doors, the fire-bars and their rings -and bearers, the furnace doors, the dampers and frames, *etc.*

Flame Plates. — The crown plates of a boiler flue or fire-box.

Flanging. — The bending over of the edges of the boiler plates so as to form narrow flanges by which they are attached to each other either by riveting or by welding.

Float. — A buoy employed to indicate the height of the water in the boiler. It is usually made of stone or of iron, and is rendered buoyant by means of a counterpoise the proportion of which, relative to the specific gravity of the float, renders the float quite as susceptible to the variations in the water level as a float of wood. Its movements are observed by means of the float gauge attached to the boiler.

Flash Boiler. — A steam boiler composed of a large number of small tubes which are kept red-hot, and unto which the water is fed in the form of a spray which is instantly con¬

verted into steam. They attain their highest development in connection with steam driven automobiles.

Flues. — The flues of a boiler are the arrangements or parts which carry off the waste gas and smoke, and produce the draught.

Flue Plates. — The ends of horizontal boilers to which the flues are attached, or the fire-box crowns of vertical boilers.

Flue Surface. — The area of the flues as distinguished from the grate-area.

Following Joints.— The lap joints of the rings which com¬

pose a cylindrical boiler. As all of the joints lap in the same direction, they are called following joints.

Fullering. — A mode of caulking boiler plates. It differs from caulking proper in that the entire edge of the plate is hammered over instead of only a portion of the edge.

Grate. — The series of bars which support the burning fuel in the furnace of an engine boiler. The grate-area is the number of square feet covered by the grate-bars or fire-bars which compose the grate. It is equal to the area over which full combustion can take place, and is usually estimated in relation to the weight of coal burned.

Grooving or Furrowing. — The cutting or corroding which takes place in the seams of improperly stayed boiler plates.

It is partly due to the leverage to which those parts are subjected, and partly to the action of acids in the lines of strain.

Gross Section. — The total number of inches contained in the circumference of a steam boiler.

Gusset or Gusset Stay. — A triangular piece of wrought-iron or steel employed to support the flat ends of boilers.

Large boilers are provided with five gusset stays at each end, which are secured to the end-plates and the shell by angle-irons.

Holes. — When the rivet holes in boiler plates are punched or drilled so inaccurately that they do not coincide within an amount equal to one-half their diameters when the plates are brought together, they are called half-lap or half-blind holes. When the holes do not correspond within the extent of a whole diameter they are called blind-holes. In riveting, such holes are either pulled together with a drift, or they are reamed out and larger rivets inserted.

Hand Holes. — Holes provided in the shells of steam boilers in cases where a mudhole is impracticable, through which the hand may be introduced for purposes of cleaning and repair.

Hard Water. — Water which contains a large percentage of carbonate and sulphate of lime. Its tendency to pro¬

duce calcareous deposits makes it very objectionable for use in steam boilers.

Heating Surface.— The entire surface of a steam boiler, comprising the surfaces exposed to the heat on one side and the surfaces in contact with the water on the other side.

Hogging.— A distortion or bending, as of the furnace tubes of boilers, sometimes caused by the expansion of the plates under the influence

of heat.

Honeycombing. — A form of boiler corrosion consisting of numerous blank holes or pits. It is due to the action of acids, to galvanic action or to a lack of uniformity in the quality of the plates.

Horizontal Boiler.; — One in which the longitudinal axis of the barrel is horizontal, such as the Cornish, Galloway and Lancashire boilers, and various forms of marine boilers.

Inclination. — Some forms of horizontal boilers are inclined forward about half an inch per ten feet of length so as to drain properly through the blow-off cock. Fire-bars arf inclined backward about one inch in 10 inches to permie of the fuel being moved rapidly away from the dead-plate.

Incrustation. — Coatings of carbonate and sulphate of lime and other solids formed on the internal portions of engine boilers by deposition from the feed water.

Injection.— The process of forcing water into a steam boiler by means of an injector.

Keelsons.— The wrought-iron or steel saddles which support marine boilers.

Laminated Plates. — Wrought-iron or rolled steel plates in which the several layers are imperfectly united. They are very apt to blister when used for boiler plates.

Leakage. — The loss of feed water due to the alternate expansion and

contraction of the plates under the influence of sudden heatings and coolings, which tend to start the rivets and open the seams.

Longitudinal Seams. — The plates which run lengthways of the boiler. They are always arranged to break-joint, and are never placed in line.

Manhole. — An opening provided in the shell of the boiler through which a man may gain access to the interior for pur¬

poses of examination, cleaning and repair. It is oval in form and is usually stayed either with a wrought-iron ring, or with a casting.

Marine Boiler. — A horizontal boiler of the return tubular type. They are of many different types, and vary in their arrangement to suit different conditions.

Mudhole. — An opening in the lower part of a boiler through which the sediment deposited by the water is removed.

When the boiler is being used, the mudhole is closed by a door called the mud-lid which is inserted within the hole and pulled up against its inner face by means of a bolt.

This bolt is attached to the door and passed through a bridge which spans the hole and rests against its outer face.

The bolt is tightened to the bridge by means of an ordinary nut.

Multitubular Boiler. — A boiler comp osed of numerous tubes, through which the hot gases pass from the fire-box to the chimney, and thus heat the water which is in contact with the outer surfaces of the tubes. The locomotive, horizontal and portable boilers are of this type.

Overheating. — The overheating of boiler parts is due either to

incrustation, or to an insuffi cient supply of water.

It tends to soften the plates so that they bulge or fracture under the force of internal pressures.

Overpressure.— The pressure developed in a steam boiler exceeding that which it is designed to sustain.

Patch. — A strengthening plate, made properly of steel, riveted or bolted to boiler plates, which have been injured by accident, or have become weakened by corrosion.

Pitting. — The corrosion of boiler plates in patches. See Honeycombing.

Plate. — In the manufacture of steam boilers the use of wrought-iron plates has been comple tely abandoned for those of steel. The steel plates are r oiled in larger sizes, thus reducing the number of riveted seams, and as they possess a much greater tensile strength, they permit of the development of the higher pressures required by modern engines.

Plate Furnace. — A reverberatory furnace used by boiler¬

makers for heating plates prepara tory to bending, flanging and welding.

Pressure. — The working pressures in steam boilers vary with the type of the boiler, the material of the boiler plates and the method of construction. They range from 45 to 60 pounds per square inch in those of the Cornish and Lancashire type; from 100 to 200 pounds in the marine boilers; and from 120 to 235 pounds in the portable and locomotive boilers.

Punching Bear or Boiler Bear. — A portable punching machine. The punch is actuated either by a screw, or by hydraulic pressure.

Return Flues. — The flues in horizontal boilers, which are brought from the back of the furnace to the front, and are then carried back again to the chimney.

Return Tubular Boiler. — A marine boiler in which the smoke tubes extend from the back of the boiler forward to the smoke-box. By this arrangement, the products of combustion are carried first to the back of the boiler through the fire-box, and then to the front of the boiler through the tubes.

Ribbed Tubes. — Tubes which are formed so as to present several deep radial ribs on their in ternal surfaces, and thus increase the area of the available heating surface. They were invented by M. Serve. The Purves tubes are ribbed or corrugated transversely. The use of these tubes is assumed to give much better results relative to the eco¬

nomical consumption of fuel and the increase in steam pressure than may be obtained by the use of the ordinary tubes with smooth surfaces.

Rings. — Metal rings used for uniting the shells and fire¬

boxes, for the jointing and caulking of seams and other similar purposes. They are either cast or welded.

Ring Seams. — The circumferential joints of a boiler shell.

Sali nometer.— An instrument employed for ascertaining the amount of salt in the feed-water of a marine boiler.

It is either a hydrometer graduated for degrees of saltness, BOILING POINT

and by which the specific gravity of the water is measured, or a thermometer by which the boiling point of the water is determined, and the percentage of salt in solution deduced therefrom.

Salting. — - The accumulation of deposits of salt on the plates of a marine boiler. It is not injurious to the plates unless excessive in quantity. The density of the feed-water should not exceed io ounces of salt per gallon.

Saturated Steam. — Steam which remains in contact with the water from which it has been generated, and therefore retains a quantity of water in suspension. Also called Dry Steam.

Scaling. — The process of removing the scale or deposits of carbonate of lime, etc., from the interior of boiler plates.

It is effected by a process of chipping with a keen-edged hammer called a scaling-hammer.

Sectional Boiler. — A boiler composed of a number of small independent heating tubes. The advantages of sectional boilers are the high pressures that may be developed in them, the strength of the small tubes, the prevention of explosions, the rapid transmission of heat, and the facility with which local injuries may be repaired.

Their disadvantages consist in the tendency to accumulate deposits in the flues, the tendency to overheating and the difficulty experienced in cleaning them out.

Scum Cock. — A cock inserted in the side of a marine boiler for discharging the dirt and scum carried to the surface of the water, and

which if allowed to remain in the water would deposit and form an injurious scale. See Ballooning.

Soot Door. — A square iron door built into the front ends of the brickwork flues of horizontal boilers, through which the accumulations of soot are removed periodically.

Stays. — Rods or tubes which connect and stay the flat ends of the boiler. They are made either of copper, wrought -

iron or steel. Bar stays and tube stays, also called screwed stays, are first screwed into the ends of the shells or fire-boxes, and then secured either with nuts or by riveting. Gusset stays are riveted.

Steam Room. — The area included between the highest water level in the boiler and the boiler crown. It is the space occupied by the steam.

Testing. — The strength of steam boilers or their capacity to withstand the stresses due to internal steam pressures are usually ascertained by the application of a pressure of water produced by means of a test pump. The pressure usually applied under test is about twice the working pressure.

Through Tubes. — The flue tubes of horizontal boilers, which pass from one end of the boiler to the other, and are attached to the end plates.

Tie Bolts. — Long screw bolts employed for the purpose of staying large, flat surfaces, which are inherently weak.

Transfer of Heat. — The transmission of heat from the furnace of a boiler to the water in the boiler. The rate of transmission or the number of heat units transferred per hour varies according to the amount of heating surface, and is directly proportional to the thickness of the plates.

Furnace area is more efficient than tube area.

Tube Plates. — The plates into which the tubes of multi¬

tubular boilers or surface condensers are inserted and secured.

Tubular Boilers. — Any of various forms of locomotive, marine, portable, horizontal, vertical and sectional boilers having tubes…

Uptake. — In a vertical boiler, the internal flue which leads from the furnace to the chimney; in a marine boiler, the return flue.

Vent. — The value obtained by multiplying the calorimeter of a boiler by its length.

Vertical Boiler. — A steam boiler of circular horizontal section. Vertical boilers are chiefly used in connection with small steam engines, and are not nearly as economical as those of the horizontal type, as the products of com¬

bustion pass from the fire-box too quickly into the chimney.

Water Bridge. — A form of bridge which is made of iron and is continuous with the boiler itself. It is hollow, and therefore assists the circulation of the water which passes through the interior of the boiler.

Water-Tube Boiler. — A boiler in which the water and not the fire is in the tubes, as the Yarrow, Thornycroft, Babcock and Wilcox, Belleville and others.

BOILING POINT, the temperature at

which a liquid boils, at the ordinary atmospheric pressure. When a liquid is freely exposed to the air, evaporation goes on constantly from

its surface, the heat required to make the change from liquid to gaseous form being absorbed

from surrounding bodies. If the liquid is arti¬

ficially warmed, the evaporation goes on at an increased rate; but as its temperature is in¬

creased by the application of heat, there comes a time when mere superficial evaporation does not use up all the heat supplied. Bubbles of vapor then form within the body of the liquid, and the liquid is said to have attained its ((boiling point. If the supply of heat be further in¬

creased, it is found that the temperature of the liquid remains stationary; bubbles merely form more rapidly, so that the rate of absorption of heat through evaporation is still maintained equal to the rate of supply. The temperature of boiling depends upon the pressure; for at an increased pressure the bubbles are formed in the interior of the liquid with greater difficulty, and therefore not until a higher temperature is attained. The variation from this cause is con¬

siderable. Thus the boiling point of water, under a pressure of one atmosphere, is 212° F., while under twice this pressure, or, as it is commonly stated, under a pressure of two

atmospheres, it is about 250° F. At the reduced atmospheric pressure prevailing on the tops of mountains, the boiling point of water is lower than 212° F., and advantage of this fact is taken for determining the heights of mountains by observations of the boiling point at their sum¬

mits. (See Hypsometry). When the liquid is

not open freely to the air, but confined in a closed vessel, its temperature can be raised indefinitely by the application of heat, but the vapor in the space above it is denser, and has a greater pressure, at higher temperatures. The correspondence between pressure and tempera¬

ture, under these circumstances, is very exact, although no simple law connecting the two

has been formulated. Rankine gave an empiri¬

cal formula expressing the relation between

them, of which computers of steam tables have made great use ˆMiscellaneous Scientific

Papers, } page 1) ; but the physical significance of this formula is unknown. The relation

between the pressure and boiling point of a liquid is commonly exhibited by means of a table in which the temperatures of ebullition are set down opposite the corresponding pres¬

sures. The phenomena described above in

connection with the free evaporation from a liquid exposed to the air are in general true, but certain qualifications must be made, under

certain special conditions. Thus, it is difficult to induce water to boil when it has been freed from dissolved air; and in the entire absence of such air De Luc found that water can be heated as high as 234° F., under ordinary atmospheric pressure, before boiling, if the experiment is performed with proper care. A liquid thus

heated to a temperature in excess of the normal boiling point corresponding to the pressure to which it is subjected is said to be ˆsuperheated.®

When boiling does finally occur in a superheated liquid, it takes place with almost explosive sud¬

denness, and the loss of vapor is exceedingly rapid until the temperature of the liquid has been reduced by this means to the normal tem¬

perature corresponding to the pressure prevail¬

ing at the time. The temperature at which

ebullition takes place is also influenced to a certain extent by the nature of the vessel in which the liquid is heated. Thus Marcet found that in a glass vessel which had been carefully washed out with sulphuric acid, and then well rinsed, pure water does not boil until a tempera¬

ture of 223° F. has been attained. All results of this kind are of an indefinite character, how¬

ever, since they relate to the temperature at which boiling first begins,

rather than to the 174

state in which the liquid and its vapor are in a condition of permanent thermal and mechanical equilibrum. Superheated water is in an un¬

stable state, and, according to some authorities, not a few boiler explosions have been due to the superheating of the water present, from some cause, and the subsequent explosive liberation of steam, as the water returned to its normal condition ; but this theory as to boiler explosions has never been substantiated by experiment or otherwise. A liquid has a higher boiling point, when it contains some substance in solution, than it has when pure. The effect of dissolving salt or any other electrolyte is complicated by the occurrence of dissociation; hut for dilute solu¬

tions of non-electrolytes, like sugar, the follow¬

ing law, first given by Raoult, holds true: If a series of dilute solutions of such substances be prepared, each solution containing, per unit weight of the solvent, an amount of solid pro¬

portional to the molecular weight of the solid, then the solutions so prepared will all boil at the same temperature. (See Solutions). For

marking the ((boiler point® upon thermometers, it is the universal practice to expose the ther¬

mometers to the steam rising from the boiling water, rather than to immerse them in the water itself ; for the temperature of the steam is in¬

dependent of the presence of traces of dissolved substances in the water, and also of the action of such accidental or irregular cause as the superheating of the water. See Evaporation ; Thermometry.

BOILLY, bwa'ye, Louis Leopold, French

painter: b. La Bassee, France, 1761; d. 1830.

His father taught him for some time but it is not known who his other masters were. He

was greatly influenced by the genre painters of the Dutch school. He is known as the

<(Little Master of the Revolution.® His pictures are small in size, accurate in design,- color and remarkable for their spontaneity. To his pro¬

lific brush are attributed about 5,000 paintings, chiefly historical. The period represented on his canvases ranges from the time of Louis XVI to the end of the Restoration. Among

his works are (Arrival of the Diligence)

(1803) ; and Hsabey's AtelierP Consult the

monograph by Harisse (Paris 1898).

BOIN2E. See Boa; Boim®.

BOIS, Jean du, Joannes a Bosco, or Bos—

cius, French preacher and diplomat: b. about middle of 16th century; d. in prison at Rome, 28 Aug. 1626. He entered the order of the Celestines, but he soon secured permission

from the Pope to leave it to take part in the Christian army of Henry III, the self-styled Emperor of the Monks. At the close of hostili¬

ties he again entered his order and became one of the most eloquent and renowned preachers of his day. Fie preached before Henry IV and became the closest friend of Seraphin Olivier whom he followed to Rome; and there, later on, he was destined to preach his funeral ser¬

mon. He became the bitter enemy of the

Jesuits and attacked them in his sermons. Sent to Rome (1611) on a mission for the French government, he was arrested on his arrival

there and confined in Saint Ange prison where he remained until his death 15 years later.

Most of his works, which are of a controversial nature, are in Latin.

BOIS D'ARC, bwa-dark, the osage orange

(q-v.).

BOIS DE BOULOGNE, bwa-de boo-lony', once a forest abounding with game near the gates of Paris, now a beautiful park belonging to the city; area, 2,250 acres. The greater part of the old trees were destroyed during the Revo¬

lution. When Napoleon chose Saint Cloud for a summer residence, he ordered young trees

to be planted, had the place enclosed with a wall and stocked with game. In 1815 the British troops under Wellington were stationed in it, and many of the trees were then cut down, but new ones were planted by Louis XVIII. In

1852 it came into the possession of the munici¬

pality, and is now one of the gayest holiday promenades. During the Franco-German War

of 1870-71 a large number of the trees were cut down by the French in preparing for the de¬

fense of Paris. During the Commune in 1871

several sanguinary encounters took place here.

In the Bois are the noted Auteuil and Long-champ race courses, and also the Jardin d'Acclimatation.

BOIS DE VINCENNES, bwa de van-sen,

the ancient hunting park of Louis IX; now a pleasure-ground of 2,250 acres on the outskirts of Paris. A large portion of it is devoted to the purposes of the Champ de Manoeuvres, drill-ground, a race course and polygone d'artillerie.

Its scenic beauty is quite equal to that of the Bois de Boulogne but it is less frequented by the beau monde.

BOIS-GUILBERT, bwii-gel-bar, Sir Brian,

a character in Scott's HvanhoeP He is a

Knight Templar whose passionate attachment

to the beautiful Jewess Rebecca, severe struggle with his pride and tragical death in the lists, form one of the most dramatic features of the romance.

BOIS-LE-DUC, bwa-le-duk (Dutch Hertogenbosch), the capital of the province of North Brabant, in Holland, 49 miles southeast of Amsterdam, at the confluence of the Dommel and the Aa, which form, by their junction, the Diest. It was a strong fortress up to 1876, but has ceased to be kept as such. It is intersected by canals, and among its buildings the chief is the cathedral, in late Gothic, built in 1458-98, with an old tower of the 11th century, and a chapel of the 13th, the whole now restored.

Other buildings are the town-hall, palace of jus¬

tice or courthouse, the episcopal palace and the government buildings. Bois-le-Duc has many

industrial establishments and an active trade.

Its chief manufactures are gold and silver

wares, cigars, mirrors, boots and shoes, *etc.* It was founded by Geoffrey III, Duke of Brabant, in 1184. Bois-le-Duc separated from the Dutch states suffered much in the religious wars of the 16th century, and was captured by the Dutch in 1629. On 14 Sept. 1794, the French defeated the English here, and on 9 October of the same year it surrendered to Pichegru. In January 1814, it was taken by the Prussians, but the cit¬

adel held out. Pop. 35,214.

BOISE, James Robinson, American

educator: b. Blandford, Mass., 27 Jan. 1815; d.

Chicago, 9 Feb. 1895. He was graduated at

Brown in 1840, and received an appointment

there as tutor in ancient languages. In 1850 he went abroad to study; in 1852 became professor BOISE — BOISSIEU

of the Greek language and literature in the Uni¬

versity of Michigan ; in 1868 took the same chair in the University of Chicago. Upon the establishment of the new University of Chicago, he was appointed professor emeritus of New

1 estament Greek. The numerous classical

textbooks edited by him were widely used. Be¬

sides these, he published (Notes on the Greek Text of Paul's Epistles to the Ephesians, Colos-sians, Philemon and the Philippians) (1884); (Notes on the Greek Text of Galatians and Romans 5 (1886).

BOISE, Otis Bardwell, American com¬

poser and music teacher: b. Oberlin, Ohio, 13

Aug. 1844; d. 2 Dec. 1912. After studying

music in Leipzig he settled in New York as a teacher of composition and for a time was

organist of the Fifth Avenue Presbyterian

Church. During 1876-77 he was again in

Europe studying and had the benefit of Franz Liszt's advice and criticism after which

he resumed teaching in New York. In 1881-88

he resided in New York, removed to Berlin in 1890 and there was a successful teacher of com¬

position. Returning to America in 1908 he be¬

came professor of composition at the Peabody Conservatory of Music. His compositions in¬

clude a concertstiick for piano and orchestra, a G minor piano concerto, a symphony and two concert overtures. He published (Harmony

Made PracticaP (1900); (Music and Its

Masters5 (1901), and many articles in journals devoted to music.

BOISE, Idaho, capital of the State and

county-seat of Ada County, on the Boise River and the Union Pacific Railroad, 45 miles south¬

west of Idaho City. It occupies the site of a former trading post of the Hudson Bay Com¬

pany; is in an agricultural and a rich mining region ; and is supplied with pure hot water from a flowing boiling well. The city is said to be the only one in the world having a natural supply of hot water. Boise has several import¬

ant industries of which the chief are lumber, dairying, meat packing and stock raising. Its manufactures include cigars and tobacco,

brooms, pipe, sashes and doors, harness. It contains several fine schools, a business college, a Carnegie library and a natatorium. In 1863

Major Tugabill established a military post here, which was organized as a city the year follow¬

ing. It is under the commission form of gov¬

ernment. Pop. (1920) 21,393.

BOISGOBEY, bwa-go-ba, Fortune Abra¬

ham du, French novelist: b. Granville, 11 Sept.

1821 ; d. February 1891. In 1844-48 he was pay¬

master in the army at Algiers, and began to write in 1868, somewhat on the lines of Emile Gaboriau. His novels were popular, and in¬

clude (The Scoundrels5 (Paris 1873) ; Chev¬

alier Casse-Cou5 (1873); (The Mysteries of

Modern Paris5 (1876) ; (The Demi-Monde

Under the Terror5 (1877); (The Old Age of

M. Lecoq5 (1878); (The Cat's Eye5 (1888);

and <The Cold Eland5 (1879).

BOISSEREE (bwa-sra) COLLECTION,

a number of pictures exhibited in Munich,

which were collected by the brothers Sulpice (1783-1854) and Melchior Boisseree (1786-1851) and John Bertram, men who, animated by love of the arts, began, at the time of the destruc¬

tion of the monasteries during and after the Erench Revolution, to purchase old pictures, and afterward completed their collection by the ad¬

dition of many valuable paintings of the old German school. By this collection the brothers Boiseree and Bertram happily realized the idea of a historical series of old German paintings.

It is to their endeavors that we owe the dis¬

covery that Germany possessed, as early as the 13th century, a school

of painters of much merit, which, like the Italian, proceeded from the old Byzantine school, but became, in the sequel, distinguished by excellences of its own.

We owe to these collectors, also, the restoration to favor of the forgotten Low German masters, and a just estimation of John van Eyck as the creator of the genuine German style of painting.

The most distinguished connoisseurs and artists, including Goethe, Canova, Dannecker and Thor-waldsen, have strongly expressed their admira¬

tion of this collection. It was first brought together and exhibited at Heidelberg (1810), and afterward removed to Stuttgart, where the King of Wiirtemberg. assigned it a suitable building. The collection remained there till 1828, when King Louis of Bavaria, having pur¬

chased it in the previous year for 120,000 thalers ($90,000), removed it to Schleissheim, and in 1836 most of the paintings were sent to Munich.

A lithographic work on this collection was

published in 40 parts between 1821 and 1840.

Consult (Sulpiz Boisseree5 (a biography, 1862).

BOISSIER, bwa-sya, Marie Louis Gaston,

French archaeologist and historian: b. Nimes, 15 Aug. 1823 ; d. 10 June 1908. After studying at the Ecole Normale he taught rhetoric in Nimes 1847-57 ; professor of Latin eloquence and literature at the College de France from 1861 ; was elected to the French Academy in 1876, and to the Academy of Inscriptions and Belles-lettres 1886. His literary style was much praised for its clearness and beauty. His works comprise (Le poete Attius5 (1857) ; (£tude sur la vie et les ouvrages de Terentius Varron5

(1861) ; (La religion romaine, d'Auguste aux Antonins5 (1883); (La fin du paganisme5

(1894); (Ciceron et ses amis5 (1892); and

(Promenades archeologiques : Rome et Pompei5

(1892) ; the two last named being marvelously accurate and vivid reconstructions of the an¬

tique spirit and atmosphere. Other works are (Roman Africa5 and (The Country of Horace

and Virgil.5

BOISSIEU, bwa-sye, Jean Jacques de,

French painter and engraver: b. Lyons 1738; d. there 1810. He was intended by his parents for the magistracy, but manifested such a de¬

cided inclination for drawing that he was al¬

lowed to follow it. After remaining for some time at Lyons and painting some excellent imi¬

tations of the Flemish school, he visited Paris, where his intimacy with the most celebrated artists of the time enabled him greatly to im¬

prove his style. On his return to L,yons he devoted his attention chiefly to engraving. He afterward accompanied the Due du Rochefou¬

cauld to Italy, and having studied the works of the great masters with the greatest assiduity, resumed painting; but as the use of oil injured his health, he, shortly after his return to France, abandoned it finally for engraving, in which his reputation soon became European, and his works were eagerly purchased by wealth)' and distinguished amateurs. His engravings amount 176

to 140 plates, among which that of (Le Char¬

latan,) after a picture by Karel Dujardin, is considered his masterpiece.

BOISSONADE, bwa-so-nad, Jean Fran¬

cois, French classical scholar: b. Paris, 12 Aug.

1774; d. Passy, 8 Sept. 1857. He was educated at the College d'Harcourt, and at the age of 18

was attached to the Ministry of Foreign Affairs.

He subsequently became a contributor to period¬

ical literature in the (Magasin Encyclopedique) of Millin and the Journal de I'Empire, the pre¬

cursor of the Journal des Debats. Ancient and modern literature, both French and foreign,

grammatical criticism, bibliography and natural sciences occupied his pen. In 1813 he was ad¬

mitted a member of the Academy of Inscrip¬

tions and Belles-Lettres. He afterward wrote about 150 articles for the (Biographic Univer-selleP He became, in 1809, assistant to Larcher, as Greek professor of the faculty of letters in Paris, and four years afterward he succeeded him both in the faculty and in the institute.

Finally, in 1828, he was called to the chair of Greek literature in the College de France. He gave a great impulse to the study of the ancient classics. He has produced no complete work in French, but is said to have written Latin with natural grace and elegance, and his editions of the classics are highly esteemed.

BOISSY D'ANGLAS, bwa-se dan-glas,

Frangois Antoine (Comte de), French states¬

man of the revolutionary period: b. Saint Jean-la-Chambre, near Annonay, 1756; d. Paris, 20

Oct. 1826. He studied at Annonay, and was

admitted as an advocate to the Parliament of Paris. In 1789 he was

elected to the States-General, where he was a moderate advocate of revolutionary principles. In 1792 he was re¬

turned as a deputy to the convention. He voted against the death of Louis XVI, and after the fall of Robespierre was appointed secretary of the convention and a member of the Committee of Public Safety (1794). He was created a

peer by Louis XVIII in 1814, but supported Napoleon during the Hundred Days, and was

consequently expelled from the peerage by a royal ordinance, but shortly afterward re¬

instated. He was the author of an essay on the life and writings of Malesherbes (1819-21) and (Ltudes Litteraires et Poetiques d'un Vieil-lard> (1825). The fame of Boissy d'Anglas

rests chiefly on a scene in the convention of 1795, when the hall was invaded by an angry mob demanding bread and the Constitution of 1793.

Called temporarily to take the chair, in the absence of the president, Boissy had presented to him the head of a deputy, Feraud, which had been cut off by the insurgents and placed on the end of a pike. He saluted it, and continued calmly facing the mob, and to his courage and firmness the safety of the convention at this crisis is attributed. Such is the popular version of a story of which the most various and contra¬

dictory accounts are given.

BOITO, bo-e'to*, Arrigo, Italian composer:

b. Padua, 24 Feb. 1842. His great work, the opera ˆefistofele,* occupied him for nearly

20 years. The garden scene was written while he was a student in the Milan Conservatory in 1856, and the score was finished for the stage in 1868, the composer having done much literary work in the interim and lived variously in France, Germany and Poland. On 5 March

1868 <Mefistofele> was sung at La Scala, Milan, the performance lasting six hours, much inter¬

rupted by hissing and applause, and its failure was evident. Boito then remodeled the opera, and in 1875 it was produced at Bologna with great success. It was sung in other cities with equal success, but it has never been a popular opera in the full sense of the word. In 1883

it was produced at the New York Metropolitan Opera House with Campanini and Nilsson in

the cast and was revived in 1896 and again in 1901. The opera is considered one of the most important of modern Italian operas, marking, as it does, the precise point where the modern school of Italian composition, illustrated by the later works of Verdi, Mascagni, Puccini, etc., diverges from the work of the Bellini and Doni¬

zetti school. Boito's other operas, (Ero e

Leandro,* ˆerone* and ˆrestiade,* have

never been sung. He wrote the libretti for Faccio's ˆmleto,* Ponchielli's <Gioconda) and for Verdi's (Otello) and <Falstaff,) and trans¬

lated several of Wagner's works. He also

issued novels under the pen name of (<Tobio Gorrio.®

BOIVIN, bwa-van, Marie Anne Victoire

(Gillain), French midwife, upon whom a

diploma of M.D. was conferred by the Univer¬

sity of Marburg, noted for her writings on obstetrics: b. Montreuil, 9 April 1773; d. 16

May 1841. She was educated in a nunnery,

where by her talents she attracted the attention of the sister of Louis XVI, Madame Elisabeth.

When the nunnery where she was placed was

destroyed in the course of the Revolution, she spent three years in the

study of anatomy and midwifery at Etampes. In 1797 she married an employee at Versailles, of the name of Boivin, but on being left after a short time a widow with a child and without fbrtune, undertook the office of midwife at the Hospital of the Maternity, and, in 1801, wras appointed chief superintendent of the institution, to which, in accordance with her suggestion, a special school of accouchement was added by Chaptal. Her

(Memorial de l'art des accouchements,* pub¬

lished in 1824, passed through several editions.

The Empress of Russia invited her to Saint Petersburg, but she declined. She also published (Memorial sur les hemorrhagies internes de

l'uterus) (1818) ; (Recherches sur une des

causes les plus frequentes et les moins connues de l'avortement) (1828) ; (Traite pratique des maladies de l'uterus et de ses annexes* (2 vols., 1833).

BOJACA, bo-zha'ka, Battle of, so called

from having been fought near the bridge of the small town of Bojaca, not far from the city of Tunja, between the Spaniards under Barreyro

and the united forces of Venezuela and New Granada, commanded by Bolivar. It occurred

7 Aug. 1819, and wras decisive of the independ¬

ence of New Granada. Among the Republicans, Generals Anzuategui, Paez and Santander dis¬

tinguished themselves ; and the Spaniards sus¬

tained a total defeat, their general, most of their officers and men, who survived the battle, together with all their arms, ammunition and equipments, falling into the hands of Bolivar.

So complete was the destruction of the Spanish army that the viceroy instantly fled from Santa BOJADOR — BOKHARA 17?

Fe, leaving even the public treasure a prey to the conquerors.

BOJADOR, bo-zha-dor', Cape, a promon¬

tory on the west coast of Africa; lat. 26° I'

10" N. ; long. 14° 29' W. It is one of the projecting points of the great desert of Sahara, and forms the west extremity of a rocky ridge called the Jebel-khal or Black Mountain. The coast north of this cape is extremely dangerous, being shallow to a great distance out, and con¬

stantly enveloped in a haze. It has been, in consequence, the scene of many a melancholy disaster. Cape Bojador was long the limit of navigation toward the south and was first

passed by the Portuguese in 1433, and from them received its name signifying "bulging,

rounded cape."

BOJAL, Philippines, an island north of

Mindanao, about 40 miles long by 30 miles wide.

It is woody and mountainous. Rice and gold are its chief productions. Pop. 187,000.

BOJER, Johan, Norwegian anti-intellec—

tualist author of plays and novels : b. Dront-heim 1872. He supported himself by commer¬

cial work while studying at the local Latin school, and secured an income sufficient to en¬

able him to continue his education by writing his first play, which won a scholarship. That play, entitled (A Mother,' was followed in 1895

by the story (Helga,' and afterward came

(Moder Lea) in 1900, (Troens Magt) in 1903, <Vortrige) in 1908, (Kjaelighetens Oine' in

1910, and (Liv' in 1911. The following titles complete his bibliography: <Theodora) (Kristiania 1902) ; <Brutus) and (Eventyr' (both Copenhagen 1904) ; (Et Folkatag' (Kristiania 1909) ; (Kjaerlighetens Oine' (Kristiania 1910) ; and (Fangen, som Sang) (Kristiania 1913).

Two of his works have been translated into French and bear the titles <Maternite) and

(Sous le Ciel Vide.' The psychological atti¬

tude of the writer, though sometimes bitter and paradoxical, is often very fine and just.

His most intelligent interpreter is Virgile Pinot, author of (Les Idees du Romancier Iohan

Bojer) (in La Revue du Mois, Tome XVII,

Paris 1914).

BOK, Edward William, American editor:

b. Helder, Netherlands, 9 Oct. 1863. He came to the United States in infancy, and was edu¬

cated in the public schools of Brooklyn. From 1884 to 1888 he was a stenographer. At 19 he edited the Brooklyn Magazine and from 1886

to 1891 he successfully conducted the Bok Syn¬

dicate Press. He has edited the Ladies' Home Journal since 1889, has been vice-president of the Curtis Publishing Company since 1891. lie has taken a leading part in various civic im¬

provements, and has published (The Young

Man in Business) (1895) ; (Successward'

(1895) ; (Why I Believe in Poverty> (1915).

BOKELMANN, bo'kel-man, Christian

Ludwig, German painter: b. Saint Jurgen

1844; d. 1894. He was a pupil of Wilhelm Sohn at Diisseldorf and became distinguished as a genre and portrait painter. Among his works arc Ulouse of Sorrow) ; Pawnbroker's Shop'; ˆOpening of the WilP ; Portrait of Klaus

Groths) ; (A Village Fire) ; Strike of Labor¬

ers' ; (North Frisian Peasant House,' and

(Alone.'

BOKER, George Henry, American poet,

dramatist and diplomatist : b. Philadelphia, Pa., 6 Oct. 1823; d. there, 2 Jan. 1890. He was the son of a banker; was graduated from Princeton in 1842 ; studied law ; and was United States Minister to Turkey in 1871-75, and to Russia in 1875-79. His plays include (Calaynos'

(1848) ; (Anne Boleyn' (1850); Pranoesca da RiminP ; (The Betrothed' ; and (All the

World's a Mask.' He published also Poems

of the War' (1864); (Konigsmark and other

Poems' (1869) ; (The Book of the Dead'

(1882); and (Sonnets' (1886). Prancesca' is

his best play and has been several times put upon the stage by Barrett and other actors.

BOKHARA, bo-ka'ra, a khanate of cen¬

tral Asia, practically vassal to Russia, bounded on the north by Russian Turkestan, west by Khiva and the Russian Trans-Caspian territory, south by Afghanistan and east by Russian Tur¬

kestan. It formerly occupied considerably more territory than now, having been reduced by the conquests and encroachments of Russia, which have been only partially compensated by some additions. The present area of the khanate is estimated at about 92,000 square miles. The country is to a great extent occupied by deserts and low and naked ranges of mountains, and the cultivated portions of it are confined to the val¬

ley of the rivers, especially the Oxus or Amoo Daria, which forms the southern boundary for a considerable distance, and then flows from southeast to northwest parallel to and not far from the frontier of the country. Bokhara lies between lat. 37° and 41° N., and in greater part is no more than 1,100 or 1,200 feet above the level of the sea, but in the extreme east is mountainous. The climate is subject to great extremes, being warm in summer and very cold in winter. There is very little rain, on which account it is necessary to resort to artificial irri¬

gation. Barley, rice, tobacco, wheat, cotton, flax and dye plants are raised in large quan¬

tities. Silk is also produced. The pastoral in¬

dustries are extensive. Manufactures are in a backward state and are confined mainly to cot¬

ton and woolen textiles of a coarse nature.

Leather goods and small metal articles are also produced. Gold, salt, iron and copper are

mined. Bokhara occupies an important place

in the commerce of central Asia. The trade is with India, Persia and Russia and is carried on by caravan and also by the Trans-Caspian Rail¬

way. Sugar, tea, indigo and drugs are the

principal articles imported while lamb skins, cotton, silk, fruits and

other agricultural prod¬

uce are exported. The government is an

absolute monarchy, the Emir having autocratic powers, which are delegated to several officials, who each administer a separate department.

The territory is divided into districts, each of which is administered by an official called a bek, who is under obligation to deliver a stated sum annually to the Emir's treasury. The sur¬

plus tax collections are retained by the bek, who for private gain often imposes exorbitant taxes on the population of his district. There is an army, consisting of a regular force and a militia. It is mainly made up of volunteers, but in case of a holy war every able-bodied follower of Islam is liable to military service.

The total population amounts to about 2,250,000

and consists of the Uzbecks, who are the ruling 178

race, and to whom the Emir belongs ; the

Tajiks, wha form the majority in the capital; the Kirghizes, less numerous than the Tajiks; about 60,000 Arabians, descendants of the sol¬

diers who were brought into the country by the third Caliph of Bagdad on the occasion of the conquest of Turkestan; Persians who have

chiefly been brought as slaves to Bokhara ; Turcomans, Hindus and about 10,000 Jews who live in the towns beyond the protection of the law and accordingly oppressed by the other in¬

habitants. Since the separation of Samarcand there are now only two towns of importance in Bokhara, namely, the chief town, Bokhara, with a population of about 60,000; and Karshi, with about 25,000. Besides these there are a few small towns and some hundred villages in the country. The capital, according to Vambery,

the centre of Tartar civilization, is ill built and has a gloomy aspect, and in luxury of dress and mode of life is far behind the towns of western Asia. Among the people there reigns the

utmost moral corruption along with a rigorous adherence to outward forms. The country is

distinguished from the other countries of cen¬

tral Asia by its numerous schools, and in the same proportion by the amount of culture dif¬

fused among the people generally; but the

women are even more degraded than in other Mohammedan countries. The rule of the Emir

is absolute, though he is to some extent under the influence of the clergy. The manufactures are unimportant, but there is a very consider¬

able caravan trade, cotton, rice, silk and indigo being exported, and woven goods, sugar, iron, etc., being imported. There is also now a trade by railway, since the making of the line from the Caspian to Samarcand. Bokhara is remark¬

able for its religious fanaticism, and various European travelers have been exposed to dan¬

ger. After Alexander Burnes had visited

Bokhara on a commission from the govern¬

ment of India in 1832, the British Ambassador in Teheran sent Colonel Stoddart in 1838 to obtain from the Emir Nasrulla the deliverance of the Russian prisoners that he had taken on his predatory incursions into Russian territory.

Nasrulla, however, irritated at the neglect to answer his letter to the Queen of England, ordered Colonel Stoddart to he thrown into

prison, and after treating him with great

cruelty, compelled him to acknowledge the Mo¬

hammedan creed. Captain Conolly, who had

been with a similar object in Khiva and Ivho-kand, came in 1841 to Bokhara, and after hav¬

ing to submit to the same treatment as Colonel Stoddart, was executed along with him in 1842.

Information of their fate was brought to

Europe by the missionary Wolff, who had been sent to Bokhara in 1843 for this purpose.

In 1850 the Russians established themselves

at the mouth of the Sir (Jaxartes), where it flows into the Sea of Aral, and in 1864 they found it necessary to proceed farther up the river. They made themselves masters of the

two towns Turkestan and Aulie-ata, and after bringing them into communication with one

another, invested Chemkend, Niazbek and

Chinab. The land thus occupied, which up to that time had formed the northern half of the khanate of Khokand, was, along with some

other districts that had previously been an¬

nexed to Russia, erected into the Russian gov¬

ernment of Turkestan, and incorporated with

the general government of Orenburg, by the

ukase of 14 Feb. (26) 1865. By a subsequent ukase, dated 11 July (23) 1867, this territory was constituted a general government. Soon

after the Khan of Khokand invaded the Russian territory, in consequence of which the Russians advanced still farther south and attacked Tashkend, which they took on 28 June 1865. They did not, however, incorporate Tashkend with

the Russian territory, but declared it an inde¬

pendent khanate under the protection of Russia.

This arrangement was opposed by Muzaffer-Eddin, Emir of Bokhara, whereupon the Rus¬

sian general Romanovski again assumed the

offensive and marching into Bokhara took Kho¬

jend by storm on 5 June 1866. In this way Russia came into the possession of the whole basin of the Sir. Not long after Tashkend

was incorporated with the Russian territory by the desire of the inhabitants. Meanwhile the war with Bokhara still went on, and peace was not concluded till the beginning of 1867. This peace, however, did not last long. The war was renewed in the spring of the following year, and it was only in July 1868 that the terms of peace between Russia and Bokhara were

finally agreed upon. Bokhara was to give up Samarcand and Katti Kurghan, along with the surrounding districts (constituting the tract of land watered by the Zerafshan), and at the same time promised to pay an indemnity to Rus¬

sia and to protect her trade. Since then the peace has not been broken, but the Emir of Bokhara has sunk more and more into a posi¬

tion of entire dependency on Russia. During the autumn the Russians intervened against the Emir's son, who had risen in revolt against him, and on 12 October in the following year the Emir sent an embassy with presents (tribute) to the Tsar at Saint Petersburg. In the meantime Muzaffer-Eddin had fallen into a dispute

with Afghanistan. Shere Ali Khan, of Kabul, had given a favorable reception to the rebellious son of the Emir, and Muzaffer-Eddin, probably in consequence of encouragement from Russia, now thought himself able to make good his for¬

mer claim to Badakshan and the territory lying about the sources of the Oxus, especially since the Khan of Kabul seemed to have but a slight hold of these parts. He had accordingly already sent out an army with the view of conquering those parts, when, toward the end of 1869, pres¬

sure being put upon him by Russia, he con¬

cluded a treaty with Kabul by which the Oxus was fixed as the boundary of the coterminous states, and this boundary was afterward recog¬

nized by Russia and England. After the Rus¬

sian expedition to Khiva in 1873 an agreement was made between Russia and Bokhara on 28

September of that year, according to which

Bokhara received a portion of the territory that had been ceded by Khiva to Russia, while the Russians received various privileges in return.

Muzaffer-Eddin died in 1885. and was succeeded by h;s son Abdul-Ahad. He abolished slavery in 1886, visited Petrograd seven years later and left there the heir to the throne to be educated along Russian lines. Abdul Ahad died 6 Jan.

1911; his son and successor, Sayid-Mir-Alim

Khan (b. 3 Jan. 1880), in April 1917 promised to grant a democratic constitution. No for¬

eigner can enter Bokhara without a Russian

passport; the troops, which were formerly ill trained and badly armed, have been drilled by BOKHARA

Russian instructors and armed with rifles. Con¬

sult Le Messurier, (From London to Bokhara) (1899) ; O'Donovan, (The Merv Oasis) (1880) ; Curzon, (Russia in Central Asia) (1889) ;

Shrine and Ross, (The Heart of Asia) (1889) ; Olafsen, (The Emir of Bokhara and His Country > (1911).

BOKHARA, the capital of the khanate of

the same name, in lat. 39° 48’ N. ; long. 64° 26’

E. It is eight or nine miles in circuit and is surrounded by a mud-wall. It is poorly built, consisting of extremely narrow streets and

paltry houses. The principal edifices are the palace of the Khan, crowning a height near the centre of the town and surrounded by a brick wall 70 feet high ; and numerous mosques, the largest of which is enameled with tiles of azure blue, and has a tower 210 feet high.

A canal’ crosses the city in many directions.

It is spanned at intervals by bridges.

Bokhara is a centre of Islam culture and con¬

tains about 60 high madrasahs and a great num¬

ber of lesser ones. The trade was formerly large with India, but has now been almost com¬

pletely absorbed by Russia. There are several manufacturing establishments producing blades, various metal articles, silks and cloth. The pop. (estimated) 70,000.

BOL, bol, Ferdinand, Dutch painter: b.

Dordrecht 1611; d. Amsterdam 1681. He was

the pupil of Rembrandt, and is best known by his admirable portraits, in the style of that mas¬

ter, though he likewise executed several histori¬

cal paintings of merit. Many of his works are still to be seen at Amsterdam. He also prac¬

tised etching with success. His best known

portrait is that of Saskia, the wife of Rem¬

brandt, now in the Brussels Museum. As a por¬

trait painter he was in great vogue at Amster¬

dam. His portraits include (Regents of the Leper Hospital > (1649), now in the town-hall, Amsterdam; (Regents of the Poor House>

(1657), in the Rijks Museum; (Portrait of Ad¬

miral de Ruyter) (1699), also in the Rijks Museum ; his religious pictures of note include (Repose on the Flight into Egypt) (1644) ; <Joseph Interpreting his Dream) ; (Women of the Sepulchre.*

BOLAN PASS, a celebrated defile in the

Hala Mountains, leading from Sind into Beluchistan. It is about 60 miles long, hemmed in on all sides by lofty precipices, and in parts so narrow that a regiment could defend it against an army. It is traversed by the Bolan River.

The crest of the pass is 5,900 feet high. For centuries it was the main route for travelers, invaders and the nomad hordes bent on the

invasion of India. A railway through the pass connects with Kandahar.

BOLAS (Sp. bola, ball), a form of missile

used by the Paraguay Indians, the Patago¬

nians, and especially by the Gauchos of Argen¬

tina. It consists of a rope or line having at either end a stone, ball of metal or lump of hardened clay. When used it is swung round the head by one end, and then hurled at an ani¬

mal so as to entangle its legs and hold it until the hunter comes up.

BOLBEC, bol-bek, France, town in the de¬

partment of Seine-Inferieure, 17 miles east-northeast of Havre; agreeably situated on the side of a hill, washed by the Bolbec, which

supplies water power for its mills, and at the junction of four valleys. It is a thriving and industrious place, and well situated for com¬

merce. Its printed cottons and handkerchiefs have long been held in high estimation. Be¬

sides these it produces linen and woolen stuffs, lace, cotton, velvet and thread, and has several dye works and tanneries, with a considerable trade in grain, horses and cattle. Pop. about 15,000.

BOLDINI, bo-l-de'ne, Giovanni, Italian

artist: b. Ferrara 1845. His father was a

painter of religious subjects. He studied at the Academy of Florence and for some time in London, and many of his paintings are found in American collections. He was very success¬

ful as a portrait painter in London, but removed to Paris in 1872 and has since identified himself with the progressive elements in French artistic circles. He is a chevalier of the Legion of Honor and has received many medals and other awards. His portraits have been especially com¬

mended. Among his works are (Gossips) ;

_(The Connoisseur) ; (Kitchen Garden* ; Span¬

ish Dancer.* In the Luxembourg he is repre¬

sented by 'Portrait of a Lady* and (Au Lux¬

embourg, * and in the Berlin National Gallery by a portrait of Menzel. In New York he is represented in the Metropolitan Museum by

Wadies of the First Empire, * and Wes Pari-siennes,* and by a portrait of Whistler in the Brooklyn Institute Museum.

BOLDREWOOD, Rolf. See Browne,

Thomas Alexander.

BOLE, a term applied to various clay-like

substances. They are chiefly hydrous silicates of aluminum and iron. It is of a dull yellow, brownish or red color, feels greasy to the touch and yields to the nail. It has a conchoidal frac¬

ture; its streak is shining, and it is opaque or slightly translucent. Bole is found in various localities, such as Armenia, Saxony, Tuscany, South America and the Isle of Skye in Scot¬

land. Bole is used as food by some tribes of South America and the Japanese use it to pro¬

duce leanness. Armenian bole is a bright red in color and is sometimes used as a dentifrice.

It is also used as a tonic and astringent, es¬

pecially in veterinary practice. Lemnian bole, from the island of Lemnos, when calcined,

washed and ground, is applied as a pigment and is variously known as Blois bole, yellow in color; Bohemian bole, which is yellowish red; French bole, pale red, and Silesian bole, pale yellow.

BOLERO, bo-la'ro, the name given by the

Spaniards to a number of their national dances of the ballet class, which in Spain are regu¬

larly performed in theatres between the differ¬

ent pieces. They are danced both by men and women, the male dancers who take part in

these performances being called boleros, while the females are called boleras. The dances of this class which are best known and most in vogue are known by such names as the Cachuca, Iota aragonesa, Madrilena. Ole, Ialeo de

Jerez, *etc.* They are danced by one or more couples, or, as in the case of the indecent Ole, by a single female dancer. The dancers wear the Andalusian costume, partly because of all the national dresses of Spain this is the richest 180

and most elegant, and partly because the greater number of the boleros are of Andalusian origin.

The music for these dances is always played by the orchestra, and is generally marked by rapid changes of time. The melodies are often very beautiful, and are always based upon some of the national airs. The dancers mostly beat time to the music with the castanets (castanuelas) .

These dances, when the performers are well

trained and handsome, have a very powerful

effect on the spectators, consisting as they do of graceful attitudes and movements of the body, and being strictly speaking not dances but pan¬

tomimes. The dancers endeavor to express by their gestures all the different phases of the pas¬

sion of love, and this often in a manner which passes far beyond the bounds of modesty. The dances of the common people, on which the

boleros are founded, are essentially distin¬

guished from the latter by the fact that the former are accompanied by singing, — partly

that of the performers, partly that of the spec¬

tators, — while the music is mostly supplied by the guitar, or in some cases by the tambourine.

They are very simple, but at the same time very graceful. The dancers beat time with the cas¬

tanets, as in the boleros properly so called.

BOLESLAS, the name of six kings of

Poland and three of Bohemia. The most cele¬

brated of them, Boleslas, surnamed the Great, and the first Polish sovereign who had the title of king, was son of Duke Mietchislaf, and suc¬

ceeded him in 992. He completed the work of introducing Christianity which his father had begun, contributed greatly to the progress of civilization and brought the army under regular discipline. The Emperor Otho III resolved to ascertain his real character by visiting him in person, and was so much pleased with the def¬

erence with which he was received that he

crowned him with his own hands in 1001, and exempted him from all homage and tribute.

Boleslas assumed all the splendor of his new dignity and became a powerful sovereign. He not only repelled an aggression on his terri¬

tories by the Duke of Bohemia, but became in his turn the aggressor and conquered Moravia.

Success awakened a desire for new conquests, and the Russians, who hitherto had always

been the aggressors, were attacked in their turn and were obliged to purchase peace by the ces¬

sion of large tracts of territory. He afterward turned his arms to the north of Germany and compelled the greater part of the northern sov¬

ereigns to become his tributaries. In 1012 a formidable league was formed against him by the Emperor of Germany and the Dukes of

Bohemia and Austria, but the allies were glad to conclude a peace with him in 1018. His last campaign was against the Russians, whom he

signally defeated in a great battle on the banks of the Bug. After 20 years of continuous war¬

fare he was permitted to enjoy peace and ef¬

fected numerous internal improvements, pro¬

mulgating excellent laws, and even putting a check upon his own

power by the appointment of a council of 12 to act as mediators between the sovereign and the people. This body was the germ of the Polish Senate. Boleslas died in 1025, after a reign of 26 years, which is one of the most glorious in the annals of Poland, and has handed down his name as one of the greatest sovereigns of his time.

BOLETUS, a genus of fungi of the family

Polyporacecp. The greater number of the

species are globulous, from which the Italians called them ovoli. The characters of the genus are broad, hemispherical cap, the lower surface formed of open tubes, cylindrical in form, and adhering to one another. The tubes can be

separated from the cap, and contain little cylin¬

drical capsules, which are the organs of re¬

production. Boletus edulis has the stem thick, especially at the base, and marked with red and pale white. The cap is also thick, smooth and fawn-colored. The tubes are very small,

rounded and pass from white to a greenish

yellow. It grows on the ground abundantly in woods during summer. The flesh is firm and has an agreeable nutty flavor. It is a consider¬

able article of commerce in France, particularly around Bordeaux. It is common in North

America. The other species of Boletus are

numerous. Most of them are edible but some are believed to be poisonous.

BOLEYN, biil'en, Anne, Queen of England,

one of the wives of Henry VIII : b. 1507 ; d. 19 May 1536. The name is also spelled Bullen and Bouleyne. Her father, Sir Thomas Boleyn, had been several times sent by Henry as Am¬

bassador to France, and her mother was a

daughter of the Duke of Norfolk. At the age of 11 years Anne accompanied to France as

maid of honor the Princess Mary of England, betrothed to Louis XII ; but when that princess three years later returned to England a widow, Anne did not follow her, but remained at the French court, the freedom and gaiety of which suited her natural disposition, and where she was admired for her beauty and wit. She

was attached to the household of Claudia, wife of Francis I, after whose death she was for a time in the service of the Duchess of Alengon, sister of Francis I. Young, gay and witty, she was an object of great attraction in the gallant court of Francis I. She returned to England about 1522, and became lady of honor to Queen Catharine, whom she soon supplanted in the

King's affections. The King found an un¬

expected opposition to his wishes, for Anne firmly declared that she could be had on no terms but those of marriage. She knew that the King already meditated a divorce from his wife, Catharine of Aragon ; but she also knew the difficulties that would require to be overcome for the execution of this design, through the opposition of the Church. Cranmer offered his services to bring about the accomplishment of the King's wishes, and thus was given the first occasion for the separation of England from the Roman Church. But the impetuous Henry

did not wait for the ministers of his new re¬

ligion to confirm his divorce; on the contrary, he married Anne in January 1533, having pre¬

viously created her Marchioness of Pembroke.

When her pregnancy revealed the secret, Cran¬

mer declared the first marriage void, and the second valid, and Anne was crowned Queen at Westminster with unparalleled splendor. In

1533 she became the mother of the famous

Elizabeth. She could not, however, retain the affections of the King, as inconstant as he was tyrannical ; and as she had supplanted her Queen while lady of honor to Catharine, she was now supplanted herself by Tane Sevmour. her own lady of honor. Suspicions of infidelity were

alleged, which appear to have had no founda¬

tion in truth, but were doubtless eagerly laid hold of by Henry as a pretext for his violent proceedings. In 1536 she was accused and

brought before a jury of peers. Smeaton, a musician, who was arrested with others, asserted that he had enjoyed the Queen's favors, and on 17 May 1536 she was condemned to death by 26 judges. Anne in vain affirmed that she had long before been contracted to the Duke of Northumbrian d, and therefore had never been the lawful wife of Henry. Cranmer in vain

declared the marriage void. The sentence of death was executed by the command of the

inflexible Henry, who esteemed it a great exer¬

cise of clemency to substitute the scaffold for the stake. The last day of the life of this un¬

happy woman, 19 May 1536, presents many

interesting moments. She sent for the wife of the lieutenant of the Tower, threw herself upon her knees before her and said, "Go to the Prin¬

cess Mary (daughter of Catharine) in my name, and in this position beg her forgiveness for all the sufferings I have drawn upon her and her mother. ® "She sent her last message to the king,® says Hume, (<and acknowledged the

obligations which she owed him in uniformly continuing his endeavors for her advancement.®

((From a private gentlewoman you have made

me first a marchioness, then a queen, and as you can raise me no higher in this world, you are now sending me to be a saint in heaven.®

Consult Strickland, (Queens of England* (Vol.

II, 1875-80) ; Dixon, (Two Queens* (1873-74) ; Friedmann, ‘Anne Boleyn* (1885).

BOLGRAD, Rumania, town on the river

Yalpookh, in the lower Budjak, colonial dis¬

trict of Bessarabia, 162 miles from Odessa and 30 miles from Ismail. It is celebrated for the frequent mention made of it in the discussions relative to the territorial difficulties of Russia with Turkey in the Treaty of Paris of 1856. It trades in grain and produces brick and tallow.

Pop. about 13,000, mostly Bulgarians.

BOLINGBROKE, Henry St. John, Vis¬

count, English statesman : b. Battersea in Sur¬

rey 1678 (baptized 10 October) ; d. Battersea, 12 Dec. 1751. He was the son of Sir

Henry St. John, afterward Viscount St.

John, of Battersea, and Mary, daughter of

Robert Rich, Earl of Warwick, thus be¬

ing (in Goldsmith’s words) of a family

«of the first rank, equally conspicuous for its antiquity, dignity, and large possessions.® As a child he was brought up in the house of his grandmother, a rigid Presbyterian, where his early and enforced studies of Dr. Manton’s

famous commentaries are supposed to have

<(prepared him to become a High Churchman.®

However, he went early to Eton, where he com¬

pleted his education, although it was long as¬

serted that he went to Oxford (Christ Church).

About 1698-99 he traveled abroad, and lived generally for a time, with all the avidity of youth and of high spirits, what is called a life of pleasure. He dabbled a little in literature; but his chief ambition seems to have been

distinction in dissipation. In 1700 he married Frances Winchescombe, daughter and co¬

heiress of Sir Plenry Winchescombe ; and en¬

tered Parliament for the family borough of

Wootton Bassett in Wiltshire. His brilliant ora¬

torical abilities speedily attracted attention; and he eventually cast in his lot with the then dominant Tories, of whom Harley (the

speaker) was the leader. In 1702 he received an honorary doctor's degree at Oxford. Two

years later, when Harley became Secretary of State, he was made Secretary at War, a post which he retained until February 1708, when upon the accession of the rival Whig party under Marlborough and Godolphin, he and

Harley went out together.

For the next two years he led a retired life.

But in August 1710 the political whirligig re¬

stored the Tories to power with Harley again at their head; and Bolingbroke, sitting in the nejv Parliament as member for Berkshire, be¬

came Secretary of State for Foreign Affairs.

In 1712 he was created Viscount Bolingbroke and Baron St. John of Lydiard Tregoze, and he bore a chief part in the Wile Utrecht Treaty,®

as Prior calls it, of March 1713. By this time his friendship for his temporizing, sluggish co¬

adjutor had greatly declined; and the last years of their political alliance were years of wrang¬

ling hostility, which Swift (the friend of both) strove vainly to mitigate. Then when at last, Bolingbroke had compassed the downfall of

Harley, and was intriguing for a Jacobite suc¬

cession, Queen Anne died suddenly in August 1714, and changed the aspect of affairs.

With the accession of George I, Bolingbroke's power passed away. The new King

dismissed him, and after a short time he found it expedient to fly to France. His impeachment and attainder speedily followed. In France,

where he remained seven years, he became Sec¬

retary of State to the Pretender, by whom also he was eventually dismissed for alleged neglect of duty. In October 1718 his first wife, with whom he had never got on very well, died ; and in 1722 he married Marie-Claire Deschamps de Marcilly, widow of the Marquis de Villette, by whose exertions, and interest with King

George's mistress, the Duchess of Kendal, he was ultimately allowed to return to England.

In 1725 his property was restored, but he could not recover his rights as a peer, and was thus excluded from the House of Lords. At this

date he resided at Dawley, near Uxbridge,

where he occupied himself in the preparation of philosophical treatises, and of political articles in the Craftsman, 1727-34, in opposition to Walpole. In 1735, finding it hopeless to re¬

enter political life, he retired again to France, where he lived at Chantelou in Touraine until his father's death in the spring of 1742. This brought him again to his paternal home at

Battersea. Here for nine years longer he for the most part resided until 12 Dec. 1751,

when he died of a cancer in the face, — the long torture of which he bore with exemplary forti¬

tude. His second wife, to whom he was tenderly attached, had died in the previous year. Both were buried at Battersea, where there is a mon¬

ument to them in the parish church, with

medallions by Roubiliac.

Bolingbroke's biographers have dwelt effect¬

ively upon his personal advantages, his hand¬

some presence, his mingled dignity and sweet¬

ness, his vivacity, his wit, his marvelous mem¬

ory and his quickness of apprehension. "His mind,® said Swift, who loved him, "was adorned with the choicest gifts that God has yet thought fit to bestow upon the children of men,® and he 182

refers especially to his (<clear judgment,® tthis most agreeable elocution® and his ˆinvincible eloquence.® Of his eloquence, whether in speech or script, there is no doubt, and writer after writer has spoken to its seductive charm. His patriotism, upon which he himself insisted, has also found sturdy advocates. But in the main he is now regarded rather as a brilliant and meteoric intriguer than a really great states¬

man with honest convictions ; while his boasted philosophy and his learning are held to be equally unsound and superficial. Pope, his pupil, in the (Essay on Man,* is the accredited mouth¬

piece of his religious opinions ; and it is a current criticism of Pope's cleverly executed thesis that it is an exposition of undeveloped doctrine by a disciple to whom it was unintel¬

ligible.

Apart from Bolingbroke's political tracts and contributions to the Craftsman , the bulk of his writings were published posthumously. The Letters on the c Spirit of Patriotism, *and the (Idea of a Patriot King* appeared in 1752 and 1749; the (Letters on the Study of History* in 1752; and the (Letter to Sir William Wind¬

ham,* a vindication of his conduct up to 1716, generally regarded as his best work, in 1753.

In 1754 his dependent, David Mallet, published his Philosophical Writings* in five volumes. It was this publication which gave rise to the celebrated utterance ascribed to Dr. Johnson about the ((beggarly Scotchman,® who was paid to let off Bolingbroke's blunderbuss against re¬

ligion and morality after his death. But John¬

son told Boswell that he had <(never read

Bolingbroke's impiety.®

Bibliography. — Bolingbroke's (Life* has

been written by Mallet (see above) ; Macknight (1863) ; Harrop (1884) ; Hassall (1889) and latterly (exhaustively and appreciatively) by Walter Sichel (1901-02). Consult also Poling-broke, a Historical Study,* by Churton Collins (1886).

Austin Dobson,

Author of cLife of Goldsmith, * (Life of Rich¬

ards o nR *etc.*

BOLIVAR, Colombia, a northern depart¬

ment of that republic, bordering the Caribbean Sea ; area, 23,938 square miles. It is bounded on the north by the department of Atlantico and the Caribbean Sea, on the east by the Mag¬

dalena River and department, on the south and southwest by Antioquia. The land is lowlying, except in that part which forms a wedge extending southward into Antioquia ; the cli¬

mate is tropical ; much attention is now being paid to agriculture, including the breeding of cattle, horses, *etc.* ; and 10 gold mines are be¬

ing worked. The provinces are Cartagena,

Carmen, Corozal, Chinu, Sincelejo, Sinu, Mompos, Manangue; and we note particularly the islands of San Andre de Providencia and

Providencia. Pop. 421,000.

BOLIVAR, Ecuador, a province of that

republic, bounded on the north by Leon, on the east by Chimborazo (prov.), on the south by Guayas and on the west by Los Rios. It em¬

braces the cantones of Guaranda (the capital), Chimbo and San Miguel. The products, be¬

side Peruvian bark and salt, are chiefly those of agriculture and cattle-raising. Pop. 65,000.

BOLfVAR, Mo., city and county-seat of

Polk County, 40 miles north of Springfield, on the Saint Louis and San Francisco Railroad.

The Southwest Baptist College is located here.

The city has a large trade in apples, eggs, cattle, horses, mules and poultry. Bolivar was settled in 1835 and was incorporated 20 years later. The city owns and operates the electric and water plants. Its government is vested in a mayor and city council, the former being elected for a term of two years. Pop. 1,975.

BOLIVAR, Venezuela, a state of that re¬

public, with an area estimated at 88,700 square miles. Its capital is Cuidad Bolivar. The dis¬

tricts and their capitals are Cedeno, capital Caicara ; Heres, capital Cuidad Bolivar ; Inde¬

pendence, capital Soledad ; Miranda, capital

Pariaguan ; Sotillo, capital Uracoa ; Sucre, capital Moitaco ; Tadeo Monagas, capital Arivi.

Pop. between 55,000 and 56,000.

BOLfVAR Y PONTE, bo-le'var, Simon,

South American liberator: b. Caracas, 24 July 1783; d. San Pedro Alejandrino, 10 Dec. 1830.

He was educated in Spain and when but 18

years old married in Madrid. His wife died soon afterward. The sources of the inspira¬

tion of his life's work were: (1) The spectacle of the French Revolution; (2) the example of the United States, which country he visited in 1809; (3) the personality of General Miranda, the leader of the revolutionary movement in Venezuela, who had openly and vigorously at¬

tacked Spain's colonial government. Bolivar

offered his services to the revolutionary junta a year before Venezuela declared its inde¬

pendence, which was on 5 July 1811.

The revolutionists being at first over¬

whelmed by the Spanish forces, Bolivar fled to Curasao. In September

1812 he was at

Cartagena ; next, we see him scoring against the Spaniards in New Granada; then marching-back into Venezuela with only 500 men, but winning so many recruits among the inhabit¬

ants that he could meet and defeat General Monteverde at Lastoguanes. He entered Ca¬

racas in triumph, 4 Aug. 1813, but suffered de¬

feat in July 1814, and Caracas was again a Spanish town. He then went back to New

Granada, succeeding at Bogota; failing at

Santa Marta ; resigning his commission and

sailing for Kingston, Jamaica, in May 1814.

Next, from Aux Cayes, Haiti, he set out with a little force that President Petion equipped; but this expedition, landing in Venezuela in May 1816, was a failure. Again reinforced at Aux Cayes, he landed (December 1816) in

Margarita, and (16 Feb. 1817) at Barcelona, for a three days' battle with General Morillo.

The latter was defeated. Bolivar was made

commander-in-chief, with headquarters at An¬

gostura. Offering to resign his command to

a migratory Congress (15 Feb. 1819), he was urged to continue the war ; reorganized the army; crossed the Cordilleras; joined

forces with Santander, republican leader in

New Granada; caught the Spaniards unawares;

entered Tunja July 1819, and on 7 August won the battle of Boyaca. On 17 Dec. 1819 Vene¬

zuela and New Granada were merged in the

new republic of Colombia, which included

both and absorbed Ecuador after the victory in Bombona — the union continuing until the close of 1830. Spain made another effort, send¬

ing General Torre to take command of her

forces; but Torre was defeated on the field of BOLIVIA

Carabobo, in the central part of Venezuela, 25

June 1821. The Constitution of Colombia was adopted, 30 Aug. 1821, and its government in¬

augurated with Bolivar as President and Gen.

Francisco de Paula Santander as Vice-Presi¬

dent.

But in that great region lying south of Co¬

lombia and north of Chile and Argentina Spain was still strong. At, the recpiest of the Con¬

gress of Peru, Bolivar sent reinforcements

under the command of Gen. Antonio Jose de

Sucre, and went in person to the scene of ac¬

tion. Quito was occupied in June 1822; next, the Liberator assumed the presidency at Lima; on 6 Aug. 1824 he triumphed at Junin. Before the end of that year Sucre gave the coup de grace to Spain's colonial system on the main¬

land (though at widely separated points hope¬

less resistance was offered a little longer), by capturing Viceroy Laserna, General-in-Chief

Aymeric and other Spanish commanders and

officers (see Ayacucho). In June 1825 Boli¬

var visited upper Peru, a region of vast ex¬

tent, which, in his honor, received the name Bolivia (q.v.) when it was organized as a

separate republic. In December 1826, returning. to Venezuela (where Gen. Jose An¬

tonio Paez and Admiral Jose Padilla had

destroyed the remnants of Spanish power on

the northern coast), he was reelected to the presidency, though manifesting great reluct¬

ance to retain an office the powers of which were wholly inadequate to the task of holding together in a permanent union three states

such as Venezuela, New Granada and Ecuador.

Then two important steps were taken: (1)

Leaders of the people assured him that he

alone could avert disaster and disruption; (2) he himself assumed and attempted to exercise such powers as, in his opinion, were necessary to control the situation. At the height of his fame and strength (for he was in his 47th year), on the eve, however, of a great failure, — for the tendency to disunion in the country freed and consolidated by him had grown be¬

yond control, — Bolivar resigned his command and died. He is often called the Washington of South America. The Congress of Colombia

caused his ashes to be removed in 1842 to Car¬

acas, where a monument was erected in his

honor. Bogota erected a statue of him in 1846, and Peru an equestrian statue at Lima in 1858.

A statue of Bolivar was erected in Central Park, New York, in 1884. Consult Ducoudrey-Holstein, (Memoires de S.' Bolivar) (London

1830) ; Mancini, Jules, (Bolivar et lemancipation des colonies

espagnoles des origines a 1815) (Paris 1912) ; Villanueva, Carlos A., (Bolivar y el general San Martin) (ib. 1911) ; (Cartas de Bolivar J (1799-1822), with notes by R. Blanco-Fombona and prologue by Jose

Enrique Rodo (ib. 1913) ; also official docu¬

ments connected with the career of Bolivar

issued in 22 volumes by the Venezuelan gov¬

ernment (1826-33) and his correspondence

(2 vols., New York 1865).

Marrion Wilcox.

BOLIVIA, bo-lev'ea. Topography and

Climate.— Bolivia, an inland republic of South America, is bounded on the north and east by Brazil, northwest by Peru, southwest by Chile, south by Argentina and Paraguay. It extends from north to south between lat. 10° 20' S.

and 2 2° 50' S. and from east to west between long. . 57° 47′ 40″ W. (Compare treaty with Brazil 17 Nov. 1903) and about 72° W. Ac¬

cording to Bolivian claims, asserted in 1916, the limits should be stated as follows : Long.

57° 29′ 40″ W. and 69° 33′ 35″ W., and, on the eastern side. lat. 9° 34′ 50″ to 25° 13' S.

and, on the western side. lat. 10° 56′ 40″ S. to 25° 00′ 5″ S. Area, exclusive of contested claims, estimated at 560,000 square miles ; but, including the Bolivian claims, it is officially stated to be 597,460 or 708,195 square miles.

The principal centres of population are now located in the mountainous region of the west¬

ern half of the country. The eastern districts, stretching away from the slopes of the Cor¬

dillera far into the torrid interior of the con¬

tinent, are but sparsely settled. Running

southeast through the departments of La Paz, Cochabamba and Potosi is the principal range of the Andes Mountains, called the Cordillera Real. Here are the rich mineral districts of Bolivia : the Cerro Rico de Potosi alone has produced up to the present time about $2,000,-

000,000 worth of silver. Here are some of the highest mountains of America and one of the greatest continuous snow-ranges in the world, having an altitude of 20,000 feet, with the su¬

perb peaks of Illimani, Sorata and Illampu

lifted two or three thousand feet still higher above their gigantic associates. (Consult Con¬

way, W. M., (The Bolivian Andes, } New York and London 1901). The western range of the Andes continues in a line parallel with the Pacific coast, rejoining the Cordillera Real near Bolivia's southern boundary. Between

these two ranges are the high plains, 12,000 to 13,000 feet, and Lake Titicaca, 12,488 feet above the sea-level. This great sheet of water, 120 miles long and from 30 to 50 miles wide, has an average depth of 100 fathoms. Lying southeast of Lake Titicaca are the two most famous cities of the republic, La Paz and

Sucre. Three lines of railway connect the

former and the principal cities of the high plateaus with the Pacific ports Mollendo, Arica and Antofagasta.

The many different altitudes in Bolivia

make it possible for the settler to choose his own climate. The tropical lowlands are prac¬

tically the only section at all unhealthful.

Residents of the upper plateau regions who

are unaccustomed to such high altitudes are in the habit of spending a part of each year on the coast. In the region 10,000 to 13,000 feet above sea-level the temperature ranges from

44° to 73° F. Below this, from 7,500 to 10,000, is a temperate region much like the valley of Mexico, with occasional frosts in winter and no extreme heat in summer. From 5,000 to

7,500 is the warmer temperate region of the uplands, and below this begins the hot coun¬

try, which becomes gradually warmer as the

real lowlying tropical lands of the coast are approached.

In the valleys known as Yungas, and in the regions of the plains and forests of the north and northeast, the cold of winter is unknown.

This, roughly speaking, is true of the entire eastern region which is divided into water¬

sheds — that of the Amazon basin and that of the Rio de la Plata-Parana-Paraguay river-system. In the latter are the Pilcomayo, the

Bcrmejo, etc.; in the former the Beni, the Gua-pore or Itinez and the Mamore — three great rivers forming, in the main, the Rio Madeira.

There are only two seasons in these parts : the summer, or rainy season, lasting from De¬

cember to May, and the winter, or dry season, lasting from June to November, But on the

high table-land are four seasons — spring,

which begins in August and ends in October, and is characterized by gales of wind with moderate temperature; summer (November-February), at first dry and hot, but, in the sec¬

ond period, rainy; autumn, the season of gentle heat, and here a brief season, extending over the months of March and April only; winter, including the months of May, June and July, the season of low temperatures, icy winds and snow. In these highlands, as at equal altitudes in other parts of the world, a traveler must make preparation, by physical training, to re¬

sist the attack of soroche (the local name for mountain-sickness), caused by the diminution

of oxygen in the air.

Political Divisions and Population. — The

following are the political divisions of Bolivia, with the census of 1910; and the estimated cen¬

sus of 1915, the latter of which has been made up by returns from the state governments:

	1910	1915
La Paz .	. 517,316	726,357
Cochabamba .		

. 366,395

534,901

Potosi .

. 395,738

530,748

Santa-Cruz .

. 210,000

341,640

Chuquisaca .

. 240,720

333,226

Tarija .

. 102,887

164,704

Oruro .

. 160,000

140,891

El Beni .

. 35,816

52,450

El Chaco .

13,085

Colonial territories .

51,968

Total .

. 2,028,872

2,889,970

There has been no official census taken of the whole of the republic for years as the pop¬

ulation of many parts of the country has to be estimated in any census taken, whether by the Federal government or by the states sep¬

arately. Fully 50 per cent of the population is Indian and from 10 to 15 per cent whites, the rest being mestizos. Of this population over 85 per cent lives on the highlands, where are situated all the larger cities and the Federal capital of the republic, La Paz (100,000 inhabit¬

ants). The only city of any importance sit¬

uated out of the highlands is Santa Cruz de la Sierra (20,000). Cochabamba has 45,000 and

Potosi, Oruro and Sucre, all state capitals, on the uplands, are also all very nearly equal in population, ranging between 23,000 and 30,000.

The other cities and towns of the republic are of relatively small importance, though as trade distributors to the rural villages, ranches and plantations, many of them enter largely into the activities of the nation, whose population is widely spread without proper means of com¬

munication. Most of the political divisions

have capitals bearing the same names as them¬

selves, the exceptions being : Chuquisaca, Sucre ; El Beni, Trinidad; El Chaco, Jacuiba; Colonial Territories, Cobija.

Labor. — One of Bolivia's greatest needs is labor for the development of her mines, her agriculture and her other industries. Owing

to the condition of the Indian throughout the country, wages are low and there are little or no inducements offered to foreign labor.

Owing to the 'great extremes of altitude in the country the hot-land Indians cannot well be used for mining on the uplands and, vice-versa.

Hence the government has, for several years, been making efforts to tap, with roads and railways, the mid-region from which labor may be brought to the uplands or down to the low¬

lands. It is also hoped that the extension of railway communication with neighboring

countries may result in a supply of upland In¬

dians from outside the republic. At the rate at which Bolivian mining and industries were pushed from 1910 to 1917 this additional sup¬

ply of labor from some source, whether /frorn the still untapped regions of the republic it¬

self or from without it, became evident in 1916; and the need of additional labor was still greater the following year ; for on it depend the continued development of the great mineral resources of the republic.

History. — The country was formed in 1825

from the province of upper Peru, and named in honor of the South American Liberator, Simon Bolivar (q.v.). Partly within Peruvian and

partly within Bolivian territory are the waters of Lake Titicaca, on the shores of which we find monuments of semi-civilization antedating the Inca conquest by more than 1,000, perhaps even several thousand, years. From the earliest times, therefore, Peru and Bolivia must have been united in civilization. The Incas of Cuzco overran this district in the 14th century, and 200

years afterward Hernando Pizarro added it to the conquest his brother had made at the heart of the Inca empire. Under the Spaniards, then, it was known as the district or territory of the high court of Charcas,

and remained subject to the viceroy of Peru until 1776, when it became a province of the new viceroyalty of Buenos Aires. Before the coming of Pizarro the Sierra supplied a large part of the gold used for the decoration of temples and palaces of the Incas; after the Spanish conquest the natives were driven to work, to continue or increase the out¬

put of precious metals for the benefit of masters whose ruthless severity was .conspicuous even in that age. There is no entirely trustworthy record of the numbers of those who perished in the mines, but we know that a large Indian population was reduced to its present propor¬

tions in the course of two centuries. Taxation was oppressive ; provincial governors became

monopolists, from whom the natives were

obliged to purchase their supplies ; here, as else¬

where in America, colonists were forbidden to raise any crops dr manufacture any articles which could interfere with the industries of the mother country. Commerce was so strictly

limited to Spain that even neighboring colonies were forbidden to have commercial dealings

with one another. Toward the end of the 18th century the resentment of the Indians was ex¬

pressed in several insurrections (1780-82) ; early in the 19th the provinces of Rio de la Plata and Peru aided the Bolivians in their struggle for independence (July 1809 to Au¬

gust 1825). General Santa Cruz was in com¬

mand of the expeditions from Lima which

failed to drive out the Spanish troops in 1823.

But in the following year General Sucre,

marching from the same country at the head of an army encouraged by the victory of Ayacucho, was favored by a rising in all the principal towns. By February 1825 La Paz was in the Pta.Manglaie:

8 < f £ < *U’n

- Hard,

tf LttTelj

‘•■•’•MSS

Atacamjggr “x*

Pta. Galera-j’

Muisnl

ZapotaVJ

Pedernalˆ J

Equator

Valdivi

ota(g

Sta.Eleni

76

D

E

72

G

H

64

Bahia

Caraqiiefy

VLake La Cocha

o Sm e

Concepcion

LOBOK DE—

Apcera

12

16

10

11

20

12

13

/ˆLambay <■< lˆWˆTT: .1.. .. gJ*yr

Caruaft’Sta. Anna „ . ..

o / Marabitanas

* S.\Marcellino j

aLJ aua ri t - _

”Juquira b I Gaia1;

$. Felippe)

. - : /# i

S&i is v

‘ fitf \ \

S’, Pedro* gio A, Thoniar

>*-‘ . t;#w° y ‘

i<MACUS y»’

<r/’

tz vx

S. Antonio de,Marapi

Puerto Chaudless o

•liiza*^ / Callanflˆ>-i

. ,) o ci<

n.€jr(DTiCYltQ

W

<5fc ‘

7 urruzruu \

y\%QACHim > .*&»% \ /

pi t ■ Ti, \ /

Lake

\Ainana

Lake

-I. Cupeia

/ LfiA-e Marimari L

oCatuuixi

Carauari <vT

-A

/V

N-A 8

Cigano ˆ✓TJsV”’”’-SXj

Jurua

-S’

VJ *

\ pdA*»M/?ys

Z y

CIPOS

V Cˆ—

PURUS

/

:V

f .• c 0 C A M A S

/

* ^“W-

* 0 UARU N A

Cumaria l

P I ft 0 S

u

TonquinQ

‘-ft ifl 1

. L> ___ v/ ˆ 1

San Lobbnzo IklaniJ’SEv’ LIMA *vV*>\ *HuanoajJi A*W“JP*lj£$>ealina A Bc™iWori”ˆJL%vi1y ,v

CeiTo aViV

Canetft

Cbincha&lt

Tambo de Motal

ESPINOS

/“V S<

\ NAM A’R4S

> Chandles

<(*« / *■

C<X”“

MAMORYS

V«**o,

/ Z2-

”jAMAMADYS’ “

Paui/nitn

bucuriam _ (‘ ^°QuicU ^ Hyutanˆiam,

Pue rto C h a n d 1 c ss

4 d\

yy ’ 7ˆ/

Fila’delfia

\Costa Rica

TahaafMˆ0

Carme:

?MfA Ao’SSˆkSiˆ”’&’ ˆ2yi,ih«c‘e

O ir3’«5oay7S,ca r ˆVˆ Wˆ‘ZA ? 6ta.Ani

‘’/j Prˆay A San’Mtˆ uefH \t

• > ”%*?* C \V a

O Arina ‘ (p„Za 1 Drubamba cˆr,

HUANol»lˆgˆ“ »rn#«{Tft”

*T5r*cSa > »o6?/ K < \$5ia’a?\ˆc3»?co

ara p ‘ Andabu\vla»~ˆpv2ˆarurSˆ’ %•, \

O y~\ Abaucayˆo \ 0TTf? cˆTT

- - –v\w»g vE < flotfnca San < J°® Tambobamba *Am.mavoW %if*

p*“c“ p”“‘’ « ,|/iW apur;ˆ.a cf Vs\

v’“««k 1 vˆaˆcjjcho MˆSSSS* /kTmH

Jaˆarfaar™ Baj/V ˆ j ”// V KTmf

ˆ « Vr *o* > \ *V*s4#Viloinot’a Cololo

Pta. Dona Mai UMA V%\ // «» Tt«.«» *sta io«a’vJT,6!»i* | i;_6

b.hz Is” (KnJfJSiJ / \A.»»g«o ~ ˆ

Tambo de MjoctCt ˆyireyi

Chinch a l8LANPk’g\\»*G Jlualia

Pisco Biti/oJjL 4

Pisco Bai/:

San G allan Island©ˆ

Toftcf Yellioi

&l Maparaua

IRINAS.

Cachoeira

Esperanzaˆ

/ o 3 A1

Monty;cristo &

Puertoˆ Rico A rnˆ poyfor ton £; . v (■ ■ .

Carn\en / < — ‘

sˆJˆS6‘6ˆ’1 i ■’

•enzo pA5 Can taro ’ ; /

La Are

JJ/aˆeiro

■$ >

T O

o sis o

(1 71

Fort do.‘I’rincipe

A’oi’a 1

,G R

a, Las\A°9un9‘ ’\?J J\

f ; 1

Sta. Rosa

GALAPAGOS ISLANDS

ECUADOR)

o

(To

Abingdonˆ)

Pt. AlbemiHRs.

90°

/ Sjo. Td

- ls“’ Wˆ pSK tA’pr,ltl cr

\pa ae S ˆ Cotahuasi 0# > « qlj.m Ws‘4iIMTsv,, ✓ - u Ca,vinas) { §7 J y{ˆ| <if\

e„.4## \ik.£,g

ˆ SJRamonP]

L«A-<. Ilogapua (\ Q g)* Jy] JOS

B *l p Sta-Anˆ V N* < , l\ “j a

Dolorev-fˆ •’ / rxConceioah dcVlkurefl

_ Zs**’ ˆjoS. PedroX V

Reyes r- - ˆ/\raˆ”\ . A i X, \

S. Borja £’ ‘ >ˆV \|ri“TU,l?d Carnien”

V,,. / \ S. Javier je Mo’jo

‘/^Apolobamba ~ S. Ignacioˆ /V-ˆ01610 - -‘\a-

•* ‘A

Tumu[)ˆa StaV.

!tl”“1? PˆMrfTr”““1ˆ S‘BOT%” ”’/ ˆTja’wJr ˆˆpy.

Pucara

luoomocd fpf.

m I

ON THE SAME SCALE

ECUADOR, PERU

AND BOLIVIA

AND

WESTERN PART OF BRAZIL

SCALES

3«.iS:;s \ ‘.*(\ )X 75

ChllilanL vwjo *iOU VCbulumaol X. \ rˆP /j) —XpLV „ˆViZoIrdpanyx \riini j| uligueroi

/T T-iHimaniy C\ OnC\H A B\A M Bi,fe \,

‘■X|M;)AmXJ Cuatˆ-bjas o

Lurˆˆˆ Ar nq’Jie ibl \ © SACog r 1

v, ix ■Wmˆ iU H|i’U”\/J* Cer’ro Tunari ˆwˆHAaA 1 c y

lap.

Cln PniT L -

0 2S £»0

Statute Miles, 140 = 1 Inch.

100 ISO 200

Kilometres,

2*25 = 1 Inch.

0

50

100

200

300

400

500

FOR EASTERN PART OF BOLIVIA SEE MAP OF BRAZIL

Rand -McNally’s 11 z H Map of Ecuador. Peru and Bolivia.

Copyright by Rand-McNally k Co.

12

ocia. Xofear

i«o. „n«o Punata ‘

‘^.igan Pedro V-’ “‘‘ …

lo’

Pazn&e „ . .

Colquechi

Challajiata 1

op,. I ^

Yocall)

^ L »P0TU

$0

fa. Cruz ©J

S 9 r/9~z

J/N. M

1 * a\f j [f VT»r

* \ Vallogrande

Pajca

a;

A ‘lAgunillas

O “

Saucesol1? \

20

Cotagaita ˆCamaTaqui

sˆSan Vincente *, A

ˆTupiza,

y. J uˆn o» R

ˆmcepcion

/ . Itaic

•PUs

A

80

c

75°

E

72

G

H

power of the revolutionists, and in March the Spaniards lost their only remaining stronghold, the province of Potosi.

Deputies of the various provinces met at the capital, and before the dissolution of this as¬

sembly (6 Oct. 1825) independence was de¬

clared. The constitution adopted then (subse¬

quently modified in important respects) was

prepared by General Bolivar, and in accord with the views entertained by the great Liberator at this period in his career, when he was master of Colombia and Peru as well, it vested the supreme authority in a President chosen for life. The first incumbent was General Sucre, who accepted the presidency for the space of two years only, and took the further precaution to retain 2,000 Colombian soldiers for his pro¬

tection. In 1827 he and his Colombians were actually expelled from the country.

Since 1827 Bolivia has had 70 presidents or dictators. In 1828 Santa Cruz came into power and was confronted with a revolution the fol¬

lowing year. In 1835, interposing in a quarrel of political factions in Peru, he defeated

Gamarra, and named himself protector of that country. Chile refusing

to consent to the pro¬

posed union of her neighbors, three years of fighting ensued. Santa Cruz was defeated

and exiled in 1839, but his party in Bolivia kept up the agitation and finally conferred the pres¬

idency upon General Ballivian. Meanwhile

Gamarra, wrho had become President of Peru, tried to annex the department of La Paz. He lost his life in this attempt, and then the Boliv¬

ians, in their turn, would have invaded Peru if Chile had not again intervened. Ballivian surrendered his thankless task in 1848. The next President, Belzu, was borne into office on the crest of a wave of revolution ; by a revolu¬

tionary storm his successor, Cordova, was

driven from office and from the land. Linares made himself dictator in 1858, and was deposed in 1861. President Acha, his successor, fell from power when his forces were defeated in battle by his political antagonist, Melgarejo (February 1865). The latter may be character¬

ized as a revolutionist until 1865; president from that time until 1869; dictator from 1869

to 1871. Morales, elected in the year last men¬

tioned, was succeeded in 1873 by President Bal¬

livian, who died after a twelvemonth had

passed. Frias, next to take office, was deposed two years later by the troops, who proclaimed General Daza President.

In 1879-83 Bolivia and Peru were at war

with Chile, and the defeat of the allies stripped from the weakest of the contestants her only possessions on the Pacific. Bolivia became a landlocked country. The national anger vented itself first upon the President, whom the army had lifted up, and who fled to escape assassi¬

nation. But Campero, whom Congress chose

to carry on the war, and who personally led the Bolivian troops in the field, was wholly unable to oppose Chile's demands alone, and Peru was an ally without power to aid. Bolivia saw herself obliged to acquiesce in an arrange¬

ment which some of her leaders hopefully re¬

garded as provisional and temporary. Her bit of coast line and most of the coveted nitrate of soda deposits in the districts of Cobija and Tarapaca, — territory aggregating 70,181 square miles, with about 6,000 inhabitants, — passed into Chile's keeping. (For an account of the War of the Pacific, see Chile; Peru).

Coincidentally, the failure in 1879-80, after years of effort, to secure the opening of a com¬

mercial outlet for Bolivian products to the At¬

lantic through the Amazon River and its great tributary, the Maderia, was a severe blow. The American contractors for the Madeira and

Mamore Railway of Bolivia and Brazil were

deprived of the funds necessary to the prosecu¬

tion of the enterprise by the withdrawal of the loan that had been placed in England in 1872

for the purpose of constructing this much-needed road. The undertaking was, neverthe¬

less, brought to a successful conclusion 35 years afterward.

The Constitution of 28 Oct. 1880 vested the legislative power in a Senate and House of Representatives, and the executive power in a president elected for four years by direct uni¬

versal suffrage. But little or no improvement in the political situation was .observed. Presi¬

dent Campero was succeeded by Gregorio

Pacheco, and then came Aniceto Arce (1 Aug.

1888). It was necessary to declare a state of siege in all parts of the republic in the summer of 1890. Attempts were made to overthrow

the government, and a number of political

leaders were arrested. The election of a suc¬

cessor to President Arce took place 3 May 1892.

Violent collisions between the rival factions again compelled the authorities to proclaim a state of siege — which was continued even after the inauguration of the new President, Baptista, on 6 August. Indian revolts also occurred in this year, originating in both the north and the south, and spreading rapidly through the entire country. The barbarous practices of the In¬

dians were, as is usual in this most repulsive species of warfare, matched by the repressive measures of the Bolivian troops.

Chile furnished arms and money to uphold

the Baptista government ; and the dependence of the country without sea coast upon the coun¬

try all sea coast for a while was painfully evi¬

dent. Bolivia had been placed in a position such that any one of her three powerful neigh¬

bors, — Chile, Argentina or Brazil, — could win her allegiance by conferring substantial favors, or even by a display of international courtesy.

Following Chile's diplomatic overtures, Argen¬

tina undertook to open up a wajr to the sea by a new railroad connecting the Sierra with her river system. Brazil's attitude remained in

doubt, until the treaty of 17 Nov. 1903 showed that Acre, competing with Brazil in the pro¬

duction of rubber, was demanded as the price of any concession of a

right of way.

When Fernandez Alonzo was elected to the

presidency in 1896 his opponents protested that the government had tampered with the returns in such a way as to change the expression of the people's will under the constitutional guar¬

antee of universal suffrage, and an uprising was successful in 1899. The revolutionists,

under Col. Jose Manuel Pando, defeated the

government forces in a pitched battle; Presi¬

dent Alonzo fled over the Andes into Chile, and reorganization of the government was effected, with Senor Pando at its head. > The Pando, Villazon and Montes administrations have de¬

voted themselves to the solution of economic problems, keeping the interests of the country 186

steadily in view and endeavoring with success to stabilize the national policy. Bolivia and Chile signed, in 1904, a treaty of amity that replaced the peace treaty dating from 1884 and removed in large measure Bolivia's fiscal and economic dependence upon Peru and Chile. The French writer, M. P. Walle, says that when President Villazon came into power the country was still suffering from the effects of a long economic crisis, the scarcity of capital being such that the most insignificant transactions were often paralyzed. It was then that Senor Villazon conceived the idea of attracting Euro¬

pean capital for the purpose of establishing a great bank, and thereby stimulating the indus¬

trial and commercial life of the country. The loan of $7,500,000, which was concluded in 1910

under the auspices of the Credit Mobilier

Frangais, made it possible to found the Bank of the Bolivian Nation. The results obtained are encouraging: in 1915 and 1916 the bank proved to be a source of strength for the vig¬

orous Montes administration.

Government. — The constitution adopted

28 Oct. 1880 provides for a government em¬

bracing a President, two Vice-Presidents, a

Cabinet of six ministers, a Senate and a Cham¬

ber of Deputies. The President and Vice-Pres¬

idents are elected for four years by popular vote. They are not eligible for re-election for the term immediately following. All unmarried males over 22, and married men over 18, who can read and write and own real estate, or have annual income of $40, are entitled to vote. The cabinet is appointed by the President. The Sen¬

ate consists of 16 members (two from each

department) elected for six years, one-third retiring every two years. There are 75 mem¬

bers of the Chamber of Deputies, elected for four years, one-half retiring every two years.

The Senate and Chamber meet annually for 60

days, or, when public business requires, for 90

days. During the sessions, senators and depu¬

ties receive $200 each month.

Education and Religion. — Education is

state-aided, compulsory and gratuitous. Schools are under the control of municipalities, except those, relatively few, which the Church con¬

trols. There are universities at La Paz and Sucre, where degrees may be obtained in law, medicine and theology; in the former city, the military academy, a normal school and a fac¬

ulty of commerce; American institutes, under American professors, at La Paz and Cocha¬

bamba ; a mining and engineering school at Oruro. In 1915 there were 426 elementary

schools with 3,960 teachers and 51,162 pupils.

For secondary instruction there were 21 col¬

leges, five clerical institutions and five private lyceos, with 180 teachers and 2,598 pupils. For superior education there were 19 establish¬

ments with 78 professors and 1,291 students.

At Sucre there is a second normal school for the training of teachers.

According to the constitution, the Roman

Catholic Church is recognized by the state, but in practice toleration is extended to other forms of worship.

Agriculture. — Bolivia contains all the nat¬

ural products of the world. Wheat, meat, fuel, building material, metals for the industries, gold and silver, all are produced within its borders.

The climate is such that several crops a year may be obtained with little effort in the warmer parts of the country. Bolivia has a varied flora and fauna. The alimentary plants include

wheat, corn, beans, manioc, bananas, potatoes, barley, rice, olives, almonds, peanuts, cocoa, coffee, nutmeg, rubber and cotton. Peruvian

bark, palm, cacao, bamboo and vegetable ivory are also plentiful, and balsam, vanilla, copal, tobacco, sugar and sarsaparilla are produced in considerable quantities. The forest growths in¬

clude acacias, myrtles, mahogany, _ rosewood, vegetable silk tree, Spanish cedar, lignum vitae, ebony and other woods suitable for various

industries. At the Panama-Pacific Exposition

of 1915 Bolivia exhibited more than 1,000 dif¬

ferent varieties of woods.

The views of the government of Bolivia on

agriculture, as expressed by the Minister of Finance in a formal communication to the

Financial Conference held in 1915 at Washing¬

ton, are these: (tIt may readily be acknowl¬

edged that our agriculture is still in an em¬

bryonic state, and that it is being carried on with no other object in view than that of obtain¬

ing from nature what she will give readily.

This applies not only to foodstuffs and cattle-breeding, but also to the production of rubber by a system that absolutely requires reorgan¬

ization, with a view to establishing plantations that will in future be capable of competing against the scientifically devised East Indian rubber plantations. The field of arts and manu¬

factures still remains virgin soil. The country may be said to be devoid of manufacturing

enterprises in any of the manifold and profit¬

able lines.® The government delegate to that conference, Senor Ballivian, writes that all Bolivia's energies have been employed in estab¬

lishing a <(complete railway net of communica¬

tion and developing her mineral resources. The agricultural products

have been insufficient to meet the demand of her domestic consumption.®

He adds : (<Bolivia and Brazil produce the best quality of rubber obtained from the trees of the Hevea or Syphonia Elastica, known in the market as Para rubber. But, owing to the fore¬

sight and persevering endeavors of the English government to acclimatize those trees in their Asiatic dominions, plantations have spread all through the Orient, causing deadly competition in spite of the superior quality of the South American product. Nevertheless it would be

wise for capitalists to undertake similar

well-organized plantations in the habitat of the rubber tree in Bolivia and Brazil

where lands can be easily acquired as well as estates where already exist fully ma¬

tured rubber trees ready for exploita¬

tion. In Bolivia there are new opportunities and inducements for such.plantations on account of the recent installation of the railway built with American capital in connection, at Porto Velho, with ocean steamers of 4,000 tons, dur¬

ing four months and of 2,000 tons all the year round.® It is true that the vegetation is poor and sickly on the lofty table-lands, but in the valleys which run from the sides of the eastern Cordillera into El Beni, Santa Cruz, Gran

Chaco and the National Territory, it is rich and varied, comprising rubber, quinine and other valuable products. The vast eastern plains will be the source of abundant agricultural products when the rivers of the Amazon basin and of BOLIVIA

the Rio de la Plata watershed can be fully utilized for transportation to the Atlantic.

Cacao and coffee are cultivated in the de¬

partments of La Paz and Cochabamba, while

other valuable vegetable products are produced in El Beni and Santa Cruz. Coca, from the leaves of which the alkaloid of cocaine is pro¬

duced, is one of the most valuable products of Bolivia. A large area of the republic is well suited to the cultivation of wheat, but this crop has been studied but little. The government has imported wheat of superior quality from the United States and Argentina for the pur¬

pose of supplying a high grade of seed to home growers. Cattle, sheep and llamas are abun¬

dant, and the government maintains a veterinary institute and agricultural school.

Nowhere else in Latin America has it been

possible to till the soil profitably at such an alti¬

tude as in Bolivia, where above the timber limit, at an altitude of 13,000 feet above the sea and over, barley, potatoes and peas are success¬

fully grown ; and yet, with all the labor that has been expended in the production of those crops, which are necessarily not of the best, the greater part of the food supply of these high regions must come from the lands below them as it has done for ages. The potatoes grown by the Indians on and above the timber line are dried and kept in this condition for years, thus forming a staple article of food.

The eastern slopes of the Andes of eastern and southern Bolivia have great stretches of rolling land well adapted to grazing and agri¬

culture, while in Santa Cruz and the other prov¬

inces great prairie lands afford pasturage of excellent quality for vast herds of cattle yet to come into them ; for the territory of Bolivia, after extending over many miles of the Andean Plateau from Lake Titicaca

southward, drops

down the eastern Cordilleras and spreads over the foothills into the very extensive tropical lowlands of the upper Amazon and river Plate country. So far are some of these lands from the centre of activity of the country that they have found an outlet for their crops through the neighboring countries rather than through Bolivia. It is the hope of the government that the new railway lines being built will bring a part, if not all, of this rich agricultural and mining region into touch with the life of the republic.

For some years past the alpaca wool in¬

dustry, which has been receiving encouragement from the Bolivian government, has been

growing steadily and promises to become one of the important industries of the country.

Alpaca wool, the production of which is limited to the Andean highlands of Peru and Bolivia, is adapted to the weaving of a great variety of materials, so the demand for it has become greater from year to year. This has led to an attempt on the part of the Bolivian government to improve the animals and to increase the out¬

put of the wool, of which there was exported in 1915 more than $1,000,000 worth from Bolivia alone.

Commerce. — Previous to the outbreak of

the European War a curious trade condition ex¬

isted in Bolivia. For years Great Britain

bought by far the greater part of Bolivian exports, especially rubber and tin, while at the same time Germany, through her thoroughly

organized commercial system, sold more goods to Bolivia than did all other countries combined.

But the advent of the war upset all the old con¬

ditions and, eliminating Germany from the field and bringing the

United States and neighboring Latin American nations into it with ever-increasing intensity from year to year, changed the whole aspect and direction of Bolivia's trade and quickened it with a new life. Great Britain alone of the European nations kept a fair share of her old trade with Bolivia. During the first quarter of 1916 the foreign trade of Bolivia showed signs of a very considerable revival, the exports being $16,071,400 and the imports $3,203,400 (only two months for the port of Cobija), a total of $19,274,800, as against $11,522,464 for the same period in 1915.

The duties collected during the first four months of 1916 were almost $1,000,000 more than for the corresponding period of 1915. In 1917 a commission was appointed to revise a revision of the Bolivian commercial code with a view to making it modern and suitable to the needs of the growing importance of the republic and its rapidly extending relationship with foreign na¬

tions. The exports of Bolivia that found their way to Great Britain previous to the outbreak of the war amounted to over 80 per cent of the total exports ; while at this same period only about % of 1 per cent of Bolivian exports went to the United States ($223,791 in 1913).

The following year the United States' bill for exports from Bolivia was $981,000 and in 1915

it had reached $10,007,240 out of a total of $38,084,140, of which $36,094,446 was derived from minerals, the largest item of which was tin to the amount of 39,312 metric tons, of which 35,360 metric tons were sold to Great Britain, notwithstanding the war, while the

United States took only 1,100 tons. In 1916, however, the United States took a much larger proportion of Bolivian tin and in 1917 about evenly divided this trade with Great Britain.

The following table shows the principal Bolivian mineral exports in 1914 and 1915:

1915 1914

Metric Metric

Minerals tons Value tons Value

Antimony . 13,085 $4,216,050 186 $11,909

Bismuth . 568 1,071,125 437 924,649

Copper . 17,872 3,820,821 3,874 921,659

Rubber . 5,486 4,521,032 4,485 3,221,063

Silver . 77 1,092,647 72 984,686

Tin . 39,312 19,268,862 37,259 16,524,656

Wolfram . 499 293,462 276 166,608

Bolivia's imports in cotton goods were valued in 1915 at about $1,000,000 a year. The growth of Bolivian trade shows an increase of over 300 per cent from 1905 to 1915.

Of the total of 5,081 tons of Bolivian rubber exported in 1915, practically all (4,645 tons) found its way to the United States. General

increases were also recorded in all other articles of export in 1915. On 30 Nov. 1911 the gov¬

ernment made free the importation of cattle during a period of five years, with a view to encouraging breeding to good stock. Exports

of hides were 613 tons in 1915 as against 374

in 1914; and the increase in 1916 was still pro¬

portionately greater. Coffee exportation in¬

creased from 38 tons in 1914 to 105 tons in 1915; coca from 348,000 kilos in 1914 to 389,000

kilos in 1915, of which 305,000 kilos went to Argentina and 771 kilos to the United States.

The shipment of cinchona bark almost doubled 188

in 1915 over that of the preceding year (84

tons to 46 tons).

The Bolivian market is difficult to cater to, because the demand for most classes of manu¬

factured goods is limited, the country difficult to travel through and the expenses relatively heavy. The municipalities are accustomed to

tax heavily, by means of a licensing system, all traveling salesmen. So most salesmen in Bo¬

livia carry a relatively large line of goods in order that the small sales in each line may sum up a respectable total.

The imports of Bolivia in 1914 were, in

part: Live animals, $765,170; food and bever¬

ages, $3,803,257 ; raw material and articles par¬

tially manufactured, $2,097,134; manufactured

goods, $8,106,928; gold and silver bullion and coins, $1,250,000; total, $15,904,489. Bolivia is becoming an increasingly good market for

United States flour, lard, other slightly manu¬

factured foods and canned foods.

In 1915 about two-thirds of the exports of crude rubber were diverted from Liverpool to New York. A very considerable part of the

Bolivian rubber which reached the United

States was credited not to its original source but to the final port of shipment in South America. Thus all the Bolivian rubber finding its outlet through Atlantic seaports and

through countries other than Bolivia herself lost its individuality before reaching its final destination.

While the United States has been taking

by far the largest part of the exports of Bo¬

livia, she has not followed this advantage up and secured the import trade which ought to go to the country taking the raw products.

After the Germans withdrew in 1914 there

was no organized attempt to get their trade, which was worth $8,000,000 annually.

Bolivia issues an official commercial code

((Codigo de ComercioU and a (Reglamento

General de Aduanas) ((Customs House Regu¬

lationsˆ which furnish information invaluable to the house doing business with the country and to the commercial traveler entering Boliv¬

ian territory. The increase in the national revenues during the same decade was 230 per cent. Valuable information in regard to for¬

eign commerce will be found in (Exporting to Latin America, } by E. B. Filsinger (New York 1916) and Proceedings of the First Pan

American Financial Conference) (Washington

1915).

Mining. — Tungsten ores averaging 70 per

cent sold in La Paz for 600 bolivianos ($233.58

at normal exchange) per quintal of 100 pounds; and vanadium and molybdenum are added to

the list of mineral assets. In the (Monografia de la Industria Mineral which President Villazon caused to be published, there were regis¬

tered, besides enormous tracts of argentiferous deposits, tin mines numbering 126; copper, 42; gold, 72; wolfram, 16; and bismuth, 3. The future prosperity of Bolivia depends upon

capital and ample facilities for smelting (espe¬

cially the tin ores) near the mines. Oruro is the centre of the mining industry. Lack of water power and inadequate transportation

facilities are the chief factors hindering de¬

velopment on a larger scale. Many mines send their products to the nearest railways by

llamas, which carry but 100 pounds and can be successfully handled only by Indians. A

few mines have hydro-electric plants. Oil

fields near Santa Cruz are being worked at a profit by the Sociedad Petrolifera de Bolivia, a corporation controlled largely by Chilean

capital.

Bolivia is the second largest producer of

tin in the world and only a fraction of her tin ores is being worked, and most of the mines that are being exploited lack modern machin¬

ery. The steady advance in the price of tin in 1915, 1916 and 1917 tended greatly to in¬

crease the output which was considerably larger in the latter two years than in 1915. The law of 17 Jan. 1914 did away with the 25 per cent export duty on non-concentrated copper ores

and exportation rose from 4,794 metric tons in 1914 to 17,945 tons in 1915; and this not¬

withstanding the fact that the concentrated

ores' exportation increased from 3,874 metric tons in 1914 to 5,868 tons the following year.

Of the 17,945 tons of non-concentrated ores exported in 1915, over 13,777 went to the United States and 4,000 tons to Great Britain, while the concentrated ores were nearly evenly

divided between these two countries. The

total exportation of 23,813 tons of copper was the largest, up to that date, in the history of Bolivian mining. Tungsten has also shown a

steady increase in output. In 1914 the export was 276 tons while in 1915 it was over 792, of which 436 tons went to the United States and 357 tons to Great Britain. In 1914 the exports of antimony from Bolivia were only 186 tons; but this had increased to 17,923 metric tons in 1916, the greater part of which went to Great Britain. The exportation of Bolivian bismuth and lead showed a very considerable increase from year to year from 1914—17. Of the total exportation of 82,459 tons of fine silver ex¬

ported from Bolivia in 1915, the United States took 47,220 tons and Great Britain 35,182 tons.

In the 7 years 1910-17 the output of silver in Bolivia declined 75 per cent. A very consid¬

erable decline also took place in exports.

Zinc reached its highest output in 1910,

when 11,897 metric tons were exported. In

1915 lead exports amounted to only 104 tons.

Yet the country is specially rich in zinc de¬

posits. Almost all the minerals exported from Bolivia contain small quantities of gold, yet only 393 pounds of gold were exported from the country in 1915. An export duty of $20 a kilo tends to keep the gold at home.

Bolivian tin carries certain peculiar impuri¬

ties which have made it very difficult to refine by ordinary methods. The high cost of fuel has rendered impossible smelting at the mines and the tin has been shipped to foreign coun¬

tries with generally not less than 25 per cent impurities which had to be transported for

long distances over land and then by sea. In 1917 the American Smelting and Refining

Company announced that it had discovered an electrolytic process for the refining of Boliv¬

ian tin. By this method a metal as pure as that produced anywhere can be obtained at or near the mines where there is plenty of water for the production of electric motor power.

This promises to give a still greater impetus to the mining of Bolivian tin, which, in 1917, stood second on the list of the world's produc¬

tion of tin. Tin is already the backbone of the industrial life and the system of public finances in Bolivia and the foundation on which all

foreign trade of the country has been devel¬

oped of late years, and the increased exporta¬

tion of tin to the United States from 1914 to 1917 is in line with the increasing interest of the latter country in the hermit republic.

Bolivia has already begun the manufacture

of shoes by machinery under an almost pro¬

hibitive import duty on foreign shoes; but the shoe business is growing rapidly and either more native factories will have to be estab¬

lished or shoes will have to be imported. Con¬

sult Pan-American Union; (Bolivia) (Wash¬

ington 1916) ; the Bolivian (Memorial y ;

Walle's (Bolivia.)

Banking and Finance. — The principal

banks are: Banco de la Nacion Boliviana (al¬

ready mentioned), Banco Mercantil, Banco

Nacional de Bolivia and the Banco Francisco Argandona. A gold reserve of 40 per cent is required by law. Under an act recently passed relating to the organization of the Bank of the Bolivian Nation, above mentioned, the said

bank has been granted the exclusive right to issue notes, the Nacional

de Bolivia, Mercantil and Francisco Argandona banks having been

deprived of such right, and directed to redeem the notes issued by them within five terms of six months each, beginning 1 Jan. 1913. The only foreign bank established in Bolivia is the Banco Aleman Transatlantico — the German

bank. The annual dividends declared by the

banks vary between 10 and 20 per cent. Four institutions doing business in the country con¬

fine their operations to loans on real estate, against which they issue mortgage bonds.

They are : Credito Hipotecario de Bolivia,

Banco Hipotecario Nacional, Banco Hipote¬

cario Garantizador de Valores and the Banco Hipotecario Mercantil.

All banks are compelled by law to issue

half-yearly statements of their profit and loss.

The three principal banks, at the close of 1916, showed profits for the six months preceding as follows: Banco de la Nacion, $520,025;

Banco Nacional, $116,607, and the Banco Ar¬

gandona $44,860.

Under a law passed by the Bolivian Con¬

gress on 27 Oct. 1916, the banks of Bolivia advanced to the government the sum of £96,500

sterling ($469,600), the amount advanced by

each bank being in proportion to its authorized capital. The purpose of this loan was to assist the government to meet its internal obligations, and especially to meet the interest due on its foreign debt. The amount was to be refunded to the banks not later than 31 Dec.

1916. The 31st having been a holiday, 4 Jan. 1917

was the first day upon which payment could be made to the banks. On that day the National Treasury of Bolivia transferred to the credit of the banks the sum of 1,206,250 bolivianos, which was the full amount due. The amounts advanced by the four banks participating, in the loan were: Banco de la Nacion Boliviana,

£45,800 ($222,875) ; Banco Mercantil, £22.500

($109,500) ; Banco Nacional. £18,800 ($91,475) ; Banco Argandona, £9,400 ($45,750).

According to a memorial of the Minister of Finance, the public debt of Bolivia on 30 June 1916 totaled 53,211,355 bolivianos ($20,71 5,180

at exchange of $0.3893) — 36,340,595 bolivianos ($14,147,395) as external debt and 16,870,760

bolivianos ($6,567,785) as internal debt.. The foreign debt is made up of the following items : Morgan loan, existing balance, 5,124,929 boliv¬

ianos ($1,995,135) ; French loan of 1910, exist¬

ing balance, 17,486,750 bolivianos ($6,807,590) ; French loan of 1913, existing balance, 12,117,-

250 bolivianos ($4,717,245) ; value of warrants issued in favor of the bankers of the 1910 loan, 337,500 bolivianos ($131,390) ; National City Bank loan, 1,274,166 bolivianos ($496,035).

Referring to this last-named obligation, the Minister of Finance gives account of the im¬

portant operation effected by the government, which, taking advantage of the high rate of international exchange, transferred the Na¬

tional City Bank debt to the Banco de la Nacion Boliviana. On 1 June 1916, the latter institu¬

tion paid the balance due the former, 1,390,000

bolivianos ($541,125), and the government is therefore under obligation to pay the Banco de la Nacion the monthly sum of 115,833 boliv¬

ianos ($45,095) in currency.

The internal debt on 30 June 1916 com¬

prised the following items: Compensacion Militar Acre y Pacifico, balance of bonds in circu¬

lation, 1,902,200 bolivianos ($740,525) ; Acre indemnity, 177,600 bolivianos ($69,140) ; inter¬

nal debt, 1,419,100 bolivianos ($552,455) ; 1914

bonds, 9,788,000 bolivianos ($3,810,470) ; gold banking loan, 1,206,250 bolivianos ($469,590) ; Banco de la Nacion, Koening Bros., and other obligations, 1,050,000 bolivianos ($408,765) ; Banco de la Nacion, advances on customs war¬

rants, 1,327,610 bolivianos ($516,840).

The national budget for 1915 estimated the

receipts at 16,985,000 bolivianos (say, $6,607,-

165) and the expenditures at 21,453,938 boliv¬

ianos (say, $8,345,271.88). Bolivia is ranked among the gold-standard countries, although

no gold has as yet been actually coined. To the theoretical monetary unit, “the boliviano, are assigned 100 centavos representing 0.63904

grammes of gold .91666 fine, or say .58579

grammes of fine gold (B12.50 to the £ sterling).

Its par value in terms of currency of the United States is $0.3893, and the value therefore of $1.00 United States currency, expressed in

terms of Bolivian currency, is Bs 2.5685. The normal rate of exchange

in Bolivia for 90-day drafts on London fluctuates around 18jˆd. per boliviano. This rate declined after 1 Aug. 1915

to 14jˆd. per boliviano, with remittances scarce and difficult to procure even on that basis. The quotations in Bolivia for exchange on New

York are more or less nominal, even under

normal conditions, and vary from Bs 2.60 to Bs 2.80 per $1.00 currency of the United States.

Cosby, J. T., (Latin American Monetary

Systems and Exchange Conditions,* New York

1915.

Transportation and Communication. — A

plan of railway construction has been adopted, the fundamental object of which is to facilitate traffic toward both the Atlantic and the Pacific by means of branch lines radiating from the principal railway system, the Antofagasta-Oruro-La Paz Railway. The lines from Mollendo and Arica were mentioned above. One

of the branch lines, running to Rio Mulato and Potosi, has been inaugurated. The Oruro-Cochabamba branch is designed to furnish an outlet for a department in which the soil is most fertile and the climate commendable. The Bolivian government is active in the construc¬

tion of railways, the establishment of automo¬

bile routes and the building of new trails lead-190

ing into the vast agricultural regions of eastern Bolivia. The labor supply of Bolivia is limited by the fact that the conditions of life are ex¬

tremely difficult in the regions where the min¬

ing centres are located, due to the high altitude of these regions and to the aridity which char¬

acterizes the highlands of Bolivia. The pur¬

pose of the government is to afford easy com¬

munication with the lowlands of eastern Bo¬

livia, and thus make available a constant and dependable supply of food to the highlands in which the mines are located.

The Atocha-Tupiza section of the Uyuni—

Tupiza Railway was all that remained to be constructed in 1917 of the line to connect La Paz with Buenos Aires, of primary importance in the development of commercial, political and social solidarity between these two countries.

It is believed that this route will attract a great deal of the business at present enjoyed by the Transandine Railway connecting Buenos Aires

with Santiago, the Bolivian route having the advantage of being open throughout the year.

A South American periodical says that the

saving in time by the Bolivian route in com¬

parison with the Transandine route would be two or three days during the summer months, that is, from September to March or April; but in winter, when the Transandine road is closed, and mails must go by way of the Strait of Magellan, the saving of time would be about 10

days. It is also believed that this through Bolivian route will become an important rival of the Panama Canal, since it will offer quicker and more direct transportation from Europe

to the west coast of South America. The com¬

pletion of the Madeira-Mamore Railway prom¬

ises to be even more important than the other achievements just mentioned, for this line af¬

fords an outlet to the Atlantic by way of the Madeira and Amazon rivers for the forest

products of an enormous region.

Bolivia forms a part of the Universal Postal Union. All the large towns are served. In the interior the mail is carried by postilions. Capi¬

tals of departments and some of the rural cen¬

tres of population are united by telegraph and have telephone service. There are 317 post

offices with 732 officials. In 1914, 5,215,501

pieces of postal matter were handled. The ex¬

tent of telegraph lines, both public and private, is 4,259 miles, operated by 216 officers. Wire¬

less telegraph stations are authorized at La Paz, Riberalta or Villa Bella, Cobija, Trinidad,

Santa Cruz, Puerto Suarez and Gran Chaco.

In 1917 the Bolivian government authorized

the contract of two loans of £1,000,000 each for the completion of the Potosi-Sucre and Atocha-Tupiza lines. The first of these is to connect Potosi with the capital, Sucre, and the second to form the last link between La Paz and Bue¬

nos Aires. The construction of La Ouiaca—

Tupiza line was being rapidly pushed in 1917

by French contractors and the government had in hand the funds necessary for its completion, a loan of £1,000,000 having been secured to that end in France in 1913. Another loan of $2,400,000 secured in New York was also being used for the construction of the electric line from La Paz to the Yungas provinces, which are rich in forests and mineral wealth, being the best gold regions of the republic. The Ochabamba-Oruro line, under construction for

several years, was finished in 1917. As the plan of the La Paz-Yungas line is to surmount the Cordilleras and tap the tropical regions, the great rubber belt will be given easy connection with the railways and the sea coast. Most of these roads will also be able to supply cheaper timber to the great stretches of timberless up¬

lands where bricks are now being used in many places for mining purposes. Extensive, tracts of the best agricultural lands in Bolivia will be opened up, through railway connection, with the outside world, thus making actual out of potential wealth. Yet, notwithstanding all these efforts of the Bolivian government, the vast extent of trackless country comprising the

greater part of its territory is still without rail¬

ways, for the mountainous nature of the coun¬

try makes their construction very difficult and their maintenance still more so.

Three lines of steamers provided regular

passenger and freight service to the ports of Mollendo, Antofagasta and Arica in 1917.

These were the Peruvian Steamship and Dock

Company, the South American Steamship Com¬

pany and the Pacific Steam Navigation Com¬

pany. Numerous tramp steamers also call at

these ports. Owing to the steady increase of Bolivian, Peruvian and Chilean trade from

1910-17, a Japanese, a Norwegian and a United States steamship line were being projected for the Pacific coast of South America in 1917.

In this latter year W. R. Grace and Company of New York announced that they were about to establish a line of new and fast steamers between New York and Callao, and that they expected to make the trip in 20 days. In 1916

a Japanese steamship line opened up a regular monthly service between Japan and west-coast ports of South America, via San Francisco and several other ports on the Pacific. The estab¬

lishment of a smelter at Tacoma by the Ameri¬

can Smelting and Refining Company called into being shipment facilities for the transportation of ores from South America with return car¬

goes of goods from the north.

Army. — Military service is compulsory, by

the law of 15 Dec. 1915, upon all males between 19 and 50 years of age. About one year is required to be spent in the ranks before reach¬

ing the age of 25; from this latter age to 30

the ((ordinary reserve® claims the Bolivian, after which he passes to the (<extraordinary reserve®

for 10 years, spending the last 10 years as a member of the Territorial Guard. The per¬

manent Bolivian army consists of four infantry regiments of 500 men each, one cavalry regi¬

ment 500 strong, one mountain artillery regi¬

ment (300), one field artillery regiment (300), one of four batteries (Schneider-Canet), one machine-gun regiment (150) ; a total, includ¬

ing officers and privates, of 4,000. The Boliv¬

ian model of the Mauser rifle of 1898 is the arm of the infantry. The ((Columnas,® bodies of men of from 100 to 200, guard the chief

towns of each department, and these, supple¬

mented by other forces of 300 each for garri¬

soning the northwest, southwest, north and

east, make a very considerable body, which is continually fluctuating but is capable of being expanded to battalions when necessary. The

army (active and first reserve, which numbers over 50,000) is trained by European officers.

Bibliography.— Adams, A. A., (The Pla-

teau Peoples of South America : An Essay in Ethnic Psychology) (London 1915) ; The Amer¬

icas (published monthly, New York 1914—

17); Bahivian, A., (Bolivia: Memorial from

the Gov't-Delegate, Pan-American Financial

Conference) (conclusion dated New York

1915) ; Bandelier, A. F., (The Islands of Titi¬

caca and KoatP (New York 1910) ; c Bolivia and the Opening of the Panama Canal > (New York 1912) ; (Brazil and Bolivia Boundary

Settlement > (New York 1904) ; Bulnes, G.,

(Guerra del Pacifico) (Valparaiso 1912-14) ; Fiore, P., (Remarks on the Arbitral Sentence Pronounced by the President, etcP (New York 1910) ; Medina, E. Diez de, (Bolivia) — (Resu-men) (La Paz 1914).

Monetary System:

Crosby, J. T., (Latin American Monetary Sys¬

tems and Exchange Conditions) (New York

1915), and Gonzales, V., (Modern Foreign Ex*

cha.nge) (New York 1914). Travel and De¬

scription: d'Orbigny, A., fragments d'un

voyage au centre de l'Amerique Meridionale)

(Paris 1845) ; Peixotto, E., (Pacific Shores from Panama) (New York 1913) ; Post, C. J., Across the Andes) (New York 1912) ; Walle, P. — charge de missions, du Ministre du Com¬

merce — (La Bolivie et ses Mines) (Paris 1913).

Other titles are given in the body of the article.

Marrion Wilcox.

BOLKHOV, bol-koT, Russia, capital of

a district of the same name in the government of Orel, on the Nugra, 200 miles from Mos¬

cow. It is a very ancient place, and is chiefly built of wood. It has manufactures of leather, glue, soap, etc., and a considerable trade in hemp, hemp-oil and tallow, amounting to more than $800,000 annually. Its harbor is at Kruto-gorye, a village on the Oka River 12 miles away. Pop. about 27,000.

BOLL (from the Saxon bolla, a bowl), an

old Scotch measure for corn, varying in dif¬

ferent districts and for different articles. A boll of wheat or beans was equal to four bush¬

els, a boll of oats to six bushels. A boll of canvas measures 35 yards.

The boll is still used in some parts of Scotland, birt is no longer legally recognized. It is also used in the north¬

ern counties of England and in the Isle of Man.

BOLL WEEVIL, Mexican. One of the

most conspicuous and harmful is the cotton

boll weevil, Anthonomns grandis. It is about one-fifth of an inch long and may be differ¬

entiated from related species by the fact that the tibiae of the first pair of legs are provided with two small spines. Immediately after

transforming from the pupal state the color is reddish but some time after emergence the color becomes considerably darker. The grub-like

larvae are considerably longer than the adults, strongly curved, white with pale yellowish

heads. The eggs are deposited in punctures

made by means of the beak of the female weevil in the buds (called squares) and bolls. The larvae devour the interior. Infested squares practically invariably fall to the ground but bolls always remain attached to the plant. In the case of the squares, of course, the fruit is ruined.

Later, as the bolls form, the weevils attack them also and lay eggs in them, and the larvae develop in the interior just as with the squares.

There is a constant succession of generations from early spring until frost, the weevils be¬

coming continually more numerous as well as both the larvae and pupae. A single female will lay her eggs for a considerable number of

days, so that by July there is an inextricable confusion of generations, and the insect may be found in the field in all stages at the same time. As stated, the bolls do not drop off as the squares do, but gradually become discolored, and by the time the larva becomes full grown generally crack open at the tip. While the square usually contains but

a single larva, as many as 12 have been found in a full grown boll. However, the hatching of only a single larva in a boll results in the destruction of the boll to such an extent that the fibre is useless.

Where no serious frost occurs in December all, or nearly all, of the insects reach maturity and enter hibernating quarters, although larvae have been found as late even as January.

The weevil, so far as known, originated

somewhere in Central America. In all proba¬

bility it has been in Mexico for hundreds of years. During the season 1892-93 it crossed over into Texas somewhere near Brownsville,

and in 1894 it was noticed in the cotton fields around San Diego, Alice and Beeville. Since that date to the present time it has spread over new territory, averaging annually more than

20,000 square miles. It now infests 9 of the 13 cotton States in an area estimated at 480,940

square miles. In Texas the weevil area is

estimated at 182,600 square miles, which is 69

per cent of the total area of the State. In the other States the territory infested is as follows : Louisiana, 40,800 square miles, or 84 per cent of the total area; in Oklahoma, 41,200 square miles, or nearly 59 per cent of the total area; in Mississippi, 46,340 square miles, or 98 per cent of the total area; in Alabama, 49,100 square miles, or 94 per cent of the total area ; in Georgia, 44,400 square miles, or 75 per cent of the total area. Besides, it has infested the whole of the cotton producing section of

Florida and nearly one-half of the cotton coun¬

ties of Tennessee. The spread of the weevil into new territory in 1916, estimated at 71,800

square miles, was second only in extent to the infestation of 1915 which was far greater than in any other year of the weevil's history.

The total loss in the production of cotton in the United States caused by the weevil has been estimated as in excess of 10,000,000 bales, which, at a value of only $50 per bale — not counting the seed — represents a loss of $500,-

000,000. This estimate covers only the loss incurred in area planted to cotton and not the total production due to the pest. In many

localities the appearance of the weevil has re¬

sulted in the abandonment, at least in part, of cotton growing by many farmers, which in¬

directly would account for an additional reduc¬

tion of millions of bales. On account of the destructive ‘effects of the boll weevil many farmers have abandoned entirely any attempt

to produce cotton, or have materially reduced the acreage formerly devoted to this crop.

This has deprived the majority of farm laborers of employment and resulted in their emigration to other places. In some counties as much as 65 per cent of the adult farm laborers have moved to other sections. It is claimed that because of this condition it would be impos¬

sible, even should the boll weevil leave the 19£

territory at once, to make a normal crop of cotton for a number of years. As the weevil has now spread eastward almost to the

Savannah River, there is little doubt that it will make its appearance in South Carolina in 1918.

Efforts to stay the progress of the weevil have been unavailing, but an effective method of mitigating its damage has been perfected.

The methods of destroying or controlling

recommended by the Department of Agriculture are the removal of the plants from the fields in the fall when there is no prospect of any

more fruit being allowed to mature; early planting, the use of early maturing varieties, the appli¬

cation of fertilizers and intensive cultivation.

See also Cotton Insects; Weevil.

BOLLAN, William, lawyer: b. England;

d. Massachusetts 1776. In 1740 he settled in Boston, Mass., married a daughter of Gover¬

nor Shirley in 1743, and became advocate-gen¬

eral. In 1745 he was sent to London as the colony's agent, a post of great responsibility and requiring considerable ability in the holder.

After three years of negotiating he secured from the English government the repayment

of £183,649 advanced by Massachusetts for

the Cape Breton expedition. In 1769 he

secured and sent over to Massachusetts 33 let¬

ters of Governor Bernard and General Gage,

denouncing and calumniating the colonists. He wrote a number of political tracts and pamph¬

lets favoring conciliation with the colonists.

Among them were (The Mutual Interests of

Great Britain and the American Colonies Considered) ; (Continued Corruption of Standing Armies) ; (The Free Briton's Memorial, in De¬

fense of the Right of Election) ; importance of the Colonies of North America and the

Interests of Great Britain with Regard to

Them Considered) ; (Petition to the King in Council, 26 Jan. 1774, with Illustrations In¬

tended to Promote the Harmony of Great Bri¬

tain and Her Colonies) ; (The Importance of Cape Breton Illustrated,5 *etc.*

BOLLANDISTS, a society of Jesuits

which published, under the title (Acta Sancto¬

rum, 5 the well-known collection of the lives of the saints of the Roman Catholic Church.

They received this name from John Bolland

(died 1665), who edited the first five volumes from materials already accumulated by Heri-bert Rosweyd, a Flemish Jesuit, whose collec¬

tions were entrusted to Bolland at his death in 1629. On the abolition of the society of Jesuits in 1773, it was removed to the monastery of Caudenberg, in Brussels. The abolition of the monasteries by Joseph II brought about its

dissolution. A new association was formed

in 1837 under the patronage of the Belgian government, and by it the publication of the great work was continued.

BOLLER, Alfred Pancoast, American en¬

gineer: b. Philadelphia, 23 Feb. 1840; d. 10

Dec. 1912. A graduate of the University of Pennsylvania and of the Rensselaer Polytech¬

nic Institute, he was in practice in New York city for over 50 years as a consulting engineer, especially for bridge construction. Central

bridge and viaducts over the Harlem River,

New York city, the Duluth and Superior Inter¬

state bridge, the Albany and Greenbush bridge over the Hudson, the Thames River Shore

Line bridge at New London, Conn., are the

chief of his works, and he also acted as ad¬

vising engineer to the Wabash Railroad, the New York City and the Brooklyn Rapid Tran¬

sit Company. He was author of (A Prac¬

tical Treatise on the Construction of Iron High¬

way Bridges) (3d ed., 1876), and (The Thames River Bridge5 1890.

BOLLES, bo'iz, Albert Sidney, American

lawyer, financial expert and author : b. Mont-ville, Conn., 8 March 1846. After admission to the Connecticut bar and election 1870 as judge of the Probate Court, he became editor of The Bulletin (Norwich), The Bankers'

Magazine, professor of mercantile law and

banking in the University of Pennsylvania, for eight years was chief of the Pennsylvania

Bureau of Industrial Statistics, and later lec¬

turer at the University of Pennsylvania and at Haverford College. He is the author of

financial History of the United States from 1774 to 17895 (1879); id., from 1789 to 1860

(1883); id., from 1860 to 1865 (1886); (Thc Conflict between Labor and Capital 5 (1876) ; (Industrial History of the United States >

(1878) ; Practical Banking) (1884) ; <The

History of Pennsylvania5 (1899) ; (American Finance) (1901) ; (The Modern Law of Banking) (2 vols., 1902).

BOLLES, Frank, author: b. Winchester,

Mass., 31 Oct. 1856; d. Cambridge, Mass., 10

Jan. 1894. He was graduated at Harvard Law School in 1882, and while there founded and became first president of what is now the Har¬

vard Co-operative Association. He was an asso¬

ciate editor of the Boston Advertiser until chosen secretary of Harvard University in 1886.

That office he made thoroughly human to the great gain of both students and faculty. He was in the truest sense the students' friend, and he endeared himself to hundreds, especially the diffident ones and those of limited means, by many acts of helpfulness. In a series of judi¬

cious and clear pamphlets he set forth the actual working of Harvard, its methods of instruction, the scope of its departments, etc., and did much to correct the impression that it was a rich man's college. He wrote three works of excep¬

tional literary merit: (Land of the Lingering Snow,) sketches written on an abandoned farm in the heart of the White Mountains; (At the North of Bear Camp Water5 ; and (From

Blomidon to Smoky, and Other Paper.5 In

his descriptions of nature and scenery he is absolutely impersonal, and impartial as a

scientist ; he never moralizes or indulges in sentiment.

BOLLEY, Henry Luke, American botan¬

ist and pathologist: b. Manchester, Ind., 1 Feb.

1865. He became instructor and biological as¬

sistant in Purdue University, his alma mater, and in 1888-90 was assistant botanist of the Indiana Agricultural Experiment Station.

After 1890 he was professor of botany and

zoology at the North Dakota Agricultural Col¬

lege and botanist and plant pathologist of the government experiment station, North Dakota.

Author of the North Dakota Pure Seed Law of 1908, he became seed commissioner of the State in 1909. His researches into plant diseases, notably potato scab, grain smut and flax wilt, with remedies and preventives, have been of incalculable value to American agriculture.

BOLLMAN, Eric, adventurer: b. Hoya,

Hanover, 1769; d. Jamaica, W. I., 9 Dec. 1821.

He studied medicine at Gottingen, practised

some time in Karlsruhe and was a physician at Paris during the Revolution, accompanied the refugee Count Narbonne to London in 1792.

In London he fell in with Lally-Tollendal, who induced him to go to Austria and endeavor to find out where General Lafayette was kept in confinement. To further this end he then es¬

tablished practice in Vienna. Finding it to be Olrnutz, he joined an American named Francis K. Huger in rescuing him. Communicating

with the prisoner through the prison surgeon, the two fell upon Lafayette's guards while he was taking exercise in a carriage, and suc¬

ceeded in getting him away on a horse;

but he rode in the wrong direction and

was recaptured. Bollman escaped to Prussia,

but was handed over to the Austrian author¬

ities by whom he was imprisoned nearly

a year in Austria, then released on con¬

dition of leaving the country. He came

to America, was in Philadelpia for years,

then joined Burr's conspiracy in 1806 and was his agent in New Orleans; was apprehended

and committed for treason in 1807, but dis¬

charged for lack of evidence. In 1814 he re¬

turned to Europe, finally settling in London.

He published (Paragraphs on Banks* (2d ed., Philadelphia 1811) ; (Improved System of

Money Concerns of the Union) (1816);

(Strictures on the Theories of M. Ricardo.*

BOLLMAN'S CASE, in United States

law. Eric Bollman (q.v.) was committed on

probable suspicion of treason, 27 Jan. 1807, by the Circuit Court of the District of Columbia ; the Supreme Court was moved for a writ of habeas corpus ad subjiciendum (the great writ • against illegal confinement) on the marshal to bring him before the court. The questions

were whether the court had the initial power to grant such writs, and if so, whether it could grant them against committals by the Circuit Court. John Marshall decided that it had such right both by common law, as the right of any superior court of record to guard the liberty of the citizen, and by express grant from Con¬

gress; and that the allegation of treason was immaterial, as the writ would be useless with¬

out the power to go behind the lower court's action and decide on the merits. William John¬

son dissented. On the marshal's return it was moved that Bollman be discharged, because no place of commission of the treasonable act was cited, and because the evidence was insufficient and the crime even if proved did not amount to treason. It was decided that there, must be an actual levying of war, not merely intent to do so, to constitute treason, that the evidence at best did not even prove that, but only a culp¬

able attempt against a power with which the United States was at peace.

BOLLWORM, a southern name for a

caterpillar which bores into cotton balls. In the north it is called ((corn worm.® See Cotton Insects.

BOLO, the national weapon of the Fili¬

pinos. The blade is about 18 inches in length by nearly three inches in breadth at its broadest dimension. It tapers from the middle toward the haft as well as toward the point, making it strongly resemble the ancient short sword. It

is not double edged, however, but tapers from a thick back to an extremely keen edge. The scabbard of the bolo is made of a native wood with rough outlined designs carved upon it.

The whole weapon is much more beautiful in outline and more formidable than the Cuban

machete.

BOLO, Paul, or BOLO PASHA, French

adventurer: b. Marseilles 1871; d. 16 April 1918.

After a checkered career which took him to Spain, South America, and again to France,

including two marriages and a prison term, he turned up in Switzerland in the beginning of 1915. Here he renewed his acquaintance with the former Khedive of Egypt, Abbas Hilmi,

whose financial adviser he had once been and who had conferred the title of “Pasha® upon him. For the next two and a half years Bolo disposed of large sums of money and made

frequent trips to Spain, Italy, Switzerland and one — in 1916 — to America. His financial ac¬

tivities meanwhile, had aroused the suspicions of the French authorities and an elaborate

investigation was made, which resulted in his arrest in September 1917 on the charge of hav¬

ing received huge sums from German sources

with which to corrupt or purchase French

newspapers with a view to discourage the

prosecution of the war and to inculcate a

desire for peace. He was admitted to bail but a close watch was kept on his movements. His re-arrest followed on 29 Sept. 1917 on the presentation of additional evidence — this time by the American authorities, who had been

asked by the French government to investigate Bolo’s activities during his stay in America in 1916. At the trial, which began in Paris on 4 Feb. 1918, evidence was adduced showing

that Bolo had received all told about $8,000,000

from German sources, of which sum 1,000,000

francs ($200,000) had been turned over to

Senator Humbert, proprietor of the Paris Jour¬

nal, for an interest in the paper. A feature of the evidence was the telegrams intercepted by the American authorities, in which the former German Ambassador to Washington informed

his government of the possibility of influencing France in a pacifist

direction with the aid of an important political personage. Monseigneur Bolo, a prelate and elder brother of the accused made an impassioned appeal to the court for the latter's acquittal expressing the conviction that his brother was insane. The trial ended on 14

Feb. 1918, when the jury returned a verdict of guilty, and Bolo was sentenced to death. He was executed at Vincennes. The disclosures of Bolo's activities also brought about the arrest of M. Caillaux, ex-premier of France, and

several French editors on charges of treason¬

able commerce with the enemy.

BOLOGNA, Giovanni di, sculptor and

architect: b. Douai, in Flanders, about 1524; d.

Florence 1608. At an early age he went to Rome, where he passed two years in studying the masterpieces of art. Going to Florence, he was attracted by the works of Michelangelo, and determined to pass the rest of his life there.

He rapidly rose to the foremost rank among sculptors, and few artists were charged with the execution of so many and such important

works. His surname of Bologna seems to have been derived from the celebrated fountain in that city, designed by himself, of which the 194

crowning colossal figure of Neptune is one of the wonders of the modern city. His fine

statue of Duke Ferdinand is said to have in¬

spired Browning's poem, (The Statue and the Bust.* Biographies by De Bouchard, (Jean de Bologne) (Milan 1906) ; Desjardins, (Vie et oeuvre de Jean Boulogne) (Paris 1901).

BOLOGNA, bo-lc/nya, Italy (anciently

Bononia), capital of the province of the same name. It lies at the foot of the Apennines, be¬

tween the rivers Reno and Savena, 190 miles north-northwest of Rome. Bologna is five or six miles in circumference, and is surrounded by an unfortified wall of brick. It is an arch¬

bishopric, and has a tribunal of appeal in the first instance, and of commerce. It has ex¬

tensive manufactures of silk goods, velvet,

artificial flowers, linen, glass, leather and ma¬

chinery. Good rail communications greatly

further the city's trade, which is very large.

The town consists of four quarters, the

older poorly, and the modern handsomely

built. There are colonnades along the sides of the streets affording shade and shelter to the foot-passengers. Bologna was long renowned

for its university, founded, according to tra¬

dition, by Theodosius the Younger in 425, but more probably not till 1088, which, in the cen¬

turies of barbarism, spread the light of knowl¬

edge over all Europe. It once had 10,000

students, but the number is now about 1,500

only. Here the famous Irnerius taught the civil law in the 11th century, and students were at¬

tracted from every quarter. Several learned

ladies have at different times been professors here, such as Laura Bassi, professor of mathe¬

matics and natural philosophy, and Matilda

Tambroni, professor of Greek, and the prede¬

cessor of the famous Cardinal Mezzofanti. The university formerly possessed so much influence, that even the coins of the city bore its motto —Bononia docet (<(Bologna teaches®)- The law

school enjoyed the greatest fame. Its teachers had the reputation of inculcating principles favorable to despotism, and were consequently rewarded by the favor of the emperors, and of the Italian sovereigns. Every new discovery in science and the arts found a welcome, and here Galvani discovered galvanism (1789). The

medical school is celebrated for having intro¬

duced the public dissection of human bodies, and the scientific journals prove that the love of investigation is still awake in Bologna. The university, indeed, still enjoys an excellent repu¬

tation, and is well provided with scientific col¬

lections, the anatomical collection being espe¬

cially extensive. It possesses in all five facul¬

ties. The university library numbers about

170,000 volumes, with 6,000 manuscripts. Since 1803 the university buildings have consisted of what was formerly the Palazzo Cellesi. The

original university building now accommodates the public library, of some 200,000 volumes. The city has a picture-gallery (in the Accademia delle Belle Arte) and a museum of archaeologi¬

cal and other objects. In the 16th century the famous painters and sculptors, Carracci, Guido Reni, Domenichino and Albani, founded a

school, to which their works have given great reputation. There were, even as early as the 12th and 13th centuries, great painters in

Bologna. Francesco Francia was famous in the 1 5th and early part of the 16th century. The city picture-gallery is rich in the works of these and other artists, the gem of the whole being Raphael's Saint Cecilia.

The chief square of the city, Piazza Vittorio Emanuele, formerly the Piazza Maggiore, with the Piazza del Nettuno at right angles, is

adorned by several venerable buildings ; among them are the Palazzo Communale (or Del

Governo), which contains some magnificent

halls, adorned with statues and paintings ;

Palazzo del Podesta (dating from 1201), now the town hall, chiefly remarkable as having been the prison of Enzius, King of Sardinia, and son of the Emperor Frederick II, who was cap¬

tured and kept here by the Bolognese for more than 20 years, till his death ; and the church or basilica of Saint Petronio, with its unfinished front and the meridian of Cassini drawn upon a copper plate in the floor. Among the hundred other churches, the following are distinguished : Saint Pietro (the cathedral), Saint Salvatore, Saint Domenico (containing the tomb of the

saint), Saint Giovanni in Monte, Saint Giacomo Maggiore, all possessed of rich treasures of art, and Saint Stephano, consisting of seven dif¬

ferent churches, and partly dating from the 10th century. The palaces are numerous, and were formerly enriched with numerous and valuable works of art. Many of these have now dis¬

appeared, though frescoes and other internal decorations still remain. The admired fountain of the Piazza del Nettuno is adorned with a Neptune in bronze, by John of Bologna; in the Piazza Vittorio Emanuele is an equestrian

statue of Victor Emmanuel II. The leaning tow¬

ers, Degli Asinelli, and Garisenda, dating from the 12th century, are among the most remark¬

able objects in Bologna. The former is square and of massive brickwork, built in three por¬

tions, and diminishing in diameter to the top. .

Its height is 321 feet, and its inclination from the perpendicular four feet. The Garisenda is 163 feet high, and inclines about 10 feet.

Bologna is famous for macaroni, sausage,

liqueurs and preserved fruits. The pilgrimage to the Madonna di S.

Luca, whose church is situated at the foot of the Apennines, three miles distant from Bologna, and to which an arcade of 640 arches leads, annually attracts a great number of people from all parts of Italy.

This and other places in the environs may be reached by steam tramway.

Bologna was founded by the Etruscans under

the name of Felsina, before the foundation of Rome. In 189 b.c. it was made a Roman colony, and called Bononia. On the fall of the Roman empire, it was taken by the Longobards, then it passed into the hands of the Franks, and was made a free city by Charlemagne. In the 12th and J 3th centuries it was one of the most floum ishing of the Italian republics; but the feuds between the different parties of the nobles dis¬

turbed the stable government of the city, and led to its submission to the papal see, and incor¬

poration in the states of the Church, in 1506.

Several attempts were made to throw off the papal authority, one of which, in 1831, was for a time successful. In 1849 the Austrians obtained possession of Bologna, and made it the head¬

quarters of their 2d Italian Corps. In 1860

Bologna was by popular vote annexed to the dominions of King Victor Emmanuel. Pop.

172,628.

BOLOGNA, University of. See Bologna.

BOLOGNA PHIAL, a small flask of un¬

annealed glass, which flies into pieces when its surface is scratched by a hard body or a sharp¬

ened body dropped into it. It is prepared by the glass-maker as a test of the condition of a pot of metal before he fashions it into bottles or glasses.

BOLOGNA STONE, or BOLOGNA

PHOSPHORUS. See Barium and Barite.

BOLOGNESE (bo-16-nyez) SCHOOL.

Despite a culture dating from the Etruscan

period, and an interest which led Martial to refer to the city in the 1st century b.c. as <(Culta Bononia,® we do not find a school of artists at Bologna until late in the Renaissance, and then — as the great eclectics — they are the least significant of the major groups of Italian painters. Before the middle of the 1 5th cen¬

tury, such men as Nicola Pisano, Jacopo della Quercia and finally certain Ferrarese artists had been summoned to Bologna when work of

importance was to be done. But the influence they had was not sufficient to bring about native production, or rather the Bolognese did not offer the material for the development of great artists. Even the workshops where

marqueterie was produced and for which the

city was famous were directed by foreigners.

Jacopo Raiboldini, called II Francia (1450—

1517), was the first real master of Bolognese painting, the first who extended the art of the city beyond its borders — instead of importing it from without. Francia had many pupils,

among them Timoteo Viti, who became the

teacher of Raphael. Another Bolognese name

connected with that master is Marc-Antonio

Raimondi, the engraver. A second Bolognese

school was founded by Ludivico-Carracci

(1557-1619), his cousin Agostino (1557-1602)

and the latter's brother Annibale (1560-1609), the best of the family. This school was a reaction against the Mannerists of the 16th century, which imitated, in a meaningless man¬

ner, the form of Michelangelo and Raphael.

The Eclectic school of Bologna was the mother of modern schools of design. Its program

was to unite the best points of the principal schools of the Italian Renaissance : Michel¬

angelo's form, Titian's color, Correggio's light and shade and Raphael's symmetry and grace.

The result of such training was a certain

technical skill, but a lack of originality. The school also placed weight upon the study of nature, especially from the nude, but not to the same extent as the Naturalists, by whom it was much influenced. From their school

went forth Guido Reni, Domenichino and

Guercino. Through them something of the

great tradition of Italian painting was carried on when all else in the peninsula, save a few latter-day Venetians, had ceased to live. Color fades with these later men, however, form

becomes academic and they mark the end of

Italian art. The best modern treatise on the Bolognese schools is <(Die Malerschule von

Bologna,® in Dohme, (Kunst und Kiinstler

Italiens> (Vol. Ill, Leipzig 1879). Consult

also Bolognini-Amorini, (Vite dei pittori ed artefici BolognesP (Bologna 1843).

BOLOMETER (<(ray-measurer®), an in¬

strument invented by S. P. Langley, secretary of the Smithsonian Institution, for detecting and measuring small quantities of radiant heat.

It consists essentially of a balanced Wheat¬

stone's bridge, one of whose arms is formed by a thin strip of platinum foil, blackened to facilitate the absorption of heat The bridge being in equilibrium, with no current passing through the galvanometer, a ray of radiant

heat falling upon the platinum strip warms it slightly, thereby increasing its electric resist¬

ance, destroying the balance of the bridge and causing an electric current to flow through the galvanometer. By comparing the current so

produced with that produced by a source of heat, the intensity of the radiation of which is known, an estimate may be formed of the quantity of heat received from the body under investigation. The instrument is so delicate that it can detect a change of temperature, in the platinum strip, amounting to less than the hundredth-thousandth part of a degree, Fah¬

renheit. Professor Langley considers that it is also capable of measuring small quantities of radiant heat with an error of not more than 1

per cent. Far more accurate results than this, however, have more recently been obtained, par¬

ticularly by C. V. Boys with the "Radio-micro¬

meter,® and by E. F. Nichols. The device of the former was sufficiently sensitive to measure the light received from a standard

candle at a distance of more than a mile, while the latter physicist succeeded in measuring such extraor¬

dinarily small amounts of heat as would be received from a standard candle 8 or 10 miles distant. It was by the latter observer that the heat received from certain of the stars was directly measured for the first time.

The bolometer was first devised for the

purpose of studying the distribution of heat in the solar spectrum, and it has yielded much valuable information on this subject, especially in the infrared regions, where Fraunhofer lines exist, although they are invisible to the eye and can only be photographed with difficulty. For more extended descriptions of the instrument, consult (Proceedings) of the American Academy of Arts and Sciences (1881, Vol. XVI, p. 342) ; also (Annals) of the Astrophysical Observa¬

tory of the Smithsonian institution (1900,

Vol. I).

BOLOR TAGH, bo-lor' tag, also BIL—

AUR, or BELUT TAGH, a mountain range

formerly imagined to exist in central Asia

between eastern and western Turkestan, as the axis of the continent. At that point, however, there is really a lofty table-land called the Pamir.

BOLSAS, a river of Mexico, which, after

flowing west, enters the Pacific Ocean, 225

miles southwest of Mexico City.

BOLSEC, bol-sec, Jerome Hermes,

French writer: b. early in the 16th century; d.

1585. He became first a Carmelite monk, but subsequently embraced the doctrines of the

Reformation. After retiring to Italy, and be¬

coming resident at Ferrara, he married, began the study of medicine, and afterward set up as a physician near Geneva, where he insin¬

uated himself into the good graces of Calvin.

A quarrel afterward took place, occasioned, it is said, by the opposition of Bolsec to the doc¬

trine of predestination. It resulted in his imprisonment and ultimate banishment from

Geneva. He was driven later on from Lau-

sanne through the influence of Beza. He lat¬

terly returned to France, and having formally abjured Protestantism, settled as a physician in Lyons. He acquired considerable notoriety by the violence of his philippics against Calvin and Beza, in which in the writing of their lives he has raked together and published all sorts of scandal.

BOLSENA, bol-sa'na, Italy, town on the

lake of the same name, 56 miles north-north¬

west of Rome. In the immediate vicinity stood the ancient Volsinium,

one of the most power¬

ful of the Etruscan cities. Some remains of its temples, including several granite columns, are still in existence. The lake of Bolsena, which is supposed to fill an ancient crater, exhales a deadly malaria during the summer season. It is about nine miles long, seven miles broad and 285 feet deep. The shores are formed by finely wooded hills, presenting much beautiful

scenery; it has two small islands, called Martana and Bisentina, believed once to have been floating. These islands were favorite retreats of the famous pontiff, Leo X. The Gothic

Queen, Amalasuntha, was exiled to Martana

and afterward murdered there by Theodahad,

her husband. The lake discharges its surplus waters into the Mediterranean by the Marta

River.

BOLSHEVIKI. See Maximalists.

BOLSONS, wide flat plains in south¬

western United States and in Mexico, which

are built in intermontane valleys by the wash from adjacent mountains. There are usually

no permanent streams and no drainage to the sea in these arid regions, and all the debris washed down from the heights lodges in the nearest low place. Bolson deposits usually

consist of roughly stratified sand, gravel and clay. Sometimes the lowest part of the plain is occupied part of the year by a lake in which mud and salt accumulate. As the lake dries up, broad mud flats are formed which crack into polygonal blocks, as drying goes on. Such lakes are called Playa lakes, and the flats are Pla}ras. They are very common in many parts of the arid west.

BOLSWARD, bol'svart, Holland, town in

the province of Friesland, 15 miles southwest of Lceuwarden, at the junction of several

canals, and intersected by canals crossed by numerous bridges. The parish church is said to be the largest and finest in Friesland. The trade of Bolsward consists chiefly in cattle, cheese and butter. Bricks and pottery are

among the chief manufactures of the town,

which in the Middle Ages was a member of the Hanseatic League. Pop. 7,500.

BOLSWERT, bol' svert, Boetius Adam,

called Bolswert after his native place in Fries¬

land, Dutch engraver: b. about 1580; d. 1634.

He was the author of many valuable engrav¬

ings after designs of Bloemaert and Rubens.

His younger brother, Scheltius Adam, rose to higher fame in the same art, especially distin¬

guishing himself by his prints after some of the best works of Rubens and Vandyke. Both brothers practised their art at Antwerp.

BOLT COURT, an alley in London, off

Fleet street, near Saint Bride's Church, in which Cobbett and Dr. Samuel Johnson lived

for some years.

BOLT-ROPES, ropes used to strengthen

the sails of a ship, the edges of the sails being sewn to them. Those on the sides are called leech-ropes, the others head and foot ropes.

BOLTI, or BULTEE, an edible chichlid

fish of the Nile.

BOLTING-CLOTH, a closely woven

•fabric, generally of silk, used for sifting flour.

See Flour.

BOLTON, Benjamin Meade, American

bacteriolytic specialist: b. Richmond, Va., 7

April 1857. His early studies at the University of Virginia, South Carolina College, were

broadened by subsequent courses at Heidel¬

berg, Gottingen and Berlin. He worked as

assistant at Johns Hopkins for two years, in 1888 was appointed professor at South Carolina College, in 1889 director of the bacteriological department of Hoagland Laboratory, and in

1892 associate at Johns Hopkins. He became

director of the Board of Health, Philadelphia, in 1895, professor at the University of Missouri in 1896, and from 1897 was expert in experi¬

mental therapeutics at the Bureau of Animal Industry, Washington. Widely known for his

experimental work in bacteriology and medi¬

cine, he is author of numerous bulletins of the Department of Agriculture, of ‘The Bacterioly¬

tic Power of the Blood Serum of Hogs)

(1907) ; and (Hygienic Water Supplies for

Farms > (1908).

BOLTON, Charles Knowles, American

poet and miscellaneous writer: b. Cleveland, Ohio, 14 Nov. 1867. He received his education at Harvard from which he was graduated in

1890. In 1884 he was appointed librarian at Brookline and has been librarian of the Boston Athenaeum Library from 1898. He is the author of works on library administration, on Ameri¬

can collections and American libraries generally.

He has written ‘ Gossiping Guide to Harvard) ; ‘Saskia, the Wife of Rembrandt5 (1893) ; (The Wooing of Martha Pitkin 5 (1894) ; (Love

Story of Ursula Wolcott5 (1895) ; ‘The

Private Soldier Under Washington 5 (1902) ;

‘Brookline, History of a Favored Town)

(1897). He edited (The Athenaeum Centenary 5

(1907) ; ‘The American Library History5

(1911).

BOLTON, Henry Carrington, American

scientific writer: b. New York 1843; d. Wash¬

ington, D. C., 17 Nov. 1903. He was graduated at Columbia University and studied abroad;

became professor of chemistry and natural

science at Trinity College, Hartford, Conn. In 1900 he was elected

president of the Chemical Society of Washington, D. C. He wrote (The Counting-Out Rhymes of Children, a Study in Folk-Lore5 (1888); ‘Literature of Manganese5 ; ‘Students’ Guide in Quantitative Analysis5 ; ‘The Evolution of the Thermometer, 1 592—1743 5 (1900).

BOLTON, Sarah Knowles, American

author: b. Farmington, Conn., 15 Sept. 1841; d.

Cleveland, Ohio, 2l Feb. 1916. She succes¬

sively held the positions of associate editor of the Congregationalist, assistant correspond¬

ing secretary of the National Woman’s Chris¬

tian Temperance Union and vice-president of

the American Humane Education Society. She

is the author of a number of books, including : ‘Girls Who Became Famous5 (1886) ; ‘Famous

American Authors) (1887); (Famous Ameri¬

can Statesmen* (1888); ‘F amous Types of

Womanhood) (1892); ‘The Inevitable and

Other Poems) (1895) ; ‘Our Devoted Friend, the Dog1 (1901); (How Success is Won)

(1884); ‘Famous Givers and Their Gifts)

(1896); ‘Memorial Sketch of Charles E. Bol¬

ton * (1907), *etc.*

BOLTON, Sarah Little, American poet :

b. Newport, Ky., 18 Dec. 1815; d. Indianapolis, 4 Aug. 1893. She is known for her patriotic and war poems, including ‘Paddle Your Own

Canoe* ; ‘Left on the Battlefield,* *etc.* Her collected ‘Poems* appeared in 1865 and 1886.

BOLTON, or BOLTON-LE-MOORS,

England, manufacturing town of Lancashire,

10 miles northwest from Manchester. It con¬

sists mainly of two divisions, Great Bolton and Little Bolton, separated from each other by the river Croal. The older portion of the two con¬

tains many narrow and irregular streets, but by far the larger portion of the town is modern.

About $2,500,000 has been recently expended in street improvements. The finest of the public edifices is the town hall, in the Grecian style, with a tower 220 feet high, fronting a spacious square, and erected at an expense of about $1,000,000. Among other public buildings are one of the finest market halls in England, cost¬

ing, with its approaches, nearly $500,000; a church institute ; a temperance hall ; commodi¬

ous baths ; savings bank ; two theatres ; two technical schools; a postoffice, gas offices, County Court, infirmary and children’s hospital ; orphanages ; Chadwick and Mere Hall

museums ; board schools ; poor-law offices, *etc.*

The religious edifices are numerous, and some of them of fine architectural appearance. Fore¬

most among these is Saint Peter's parish

church, a modern cruciform building in the

Decorated style, with a tower at the western end 150 feet high. The schools are numerous and well attended, and, under the school board, education is rapidly improving. There is a

free grammar school, founded in 1641. The

Bolton Free Public libraries (six in number) contain over 93,000 volumes. There are now

four parks and three recreation grounds be¬

longing to the town. In manufacturing indus¬

try Bolton is surpassed by few places in the kingdom, the cotton manufacture being its

staple. It contains some of the largest and finest cotton mills in the world. In the town itself there are some 370 factories, of which nearly 140 are cotton mills and establishments for the weaving of cotton fabrics. The yarns spun in Bolton are generally fine, and a great variety of fancy goods is produced, besides plain calicoes. Bleaching is also carried on to a great extent, there being over 20 bleaching grounds, some of them very large. There are also several large engineering works, iron

works, soap factories, employing a great many hands. Besides these there are collieries, paper mills, foundries, chemical works and various other works. Bolton is of considerable

antiquity, having been raised to the dignity of a market town in 1256. It returns two members to Parliament. Bolton has a long history as an industrial city. In 1337 Flemish immigrants established woolen manufactures, and in the

17th century the arrival of French Huguenots gave a fresh impetus to this industry. About 1750 velvets were first made here. Arkwright and Crompton, whose inventions revolutionized the textile industry, were natives of Bolton.

They met with considerable opposition at first but the results were beneficial to Bolton's pre¬

eminence as a centre of the textile industry.

Bolton was a pioneer in municipal enterprise, having a municipally owned water plant in 1847.

At present the gas works, street railways, elec¬

tric plant are owned by the city, which also operates markets, ice houses, *etc.* There is a sewage farm operated for the utilization of the sewage. It was incorporated in 1838, and be¬

came a county borough in 1888. Pop. 180,855.

BOLTON ABBEY, a famous English Ab¬

bey in Yorkshire, in a highly picturesque district on the river Wharfe, six miles east of Skipton, and 21 miles northwest of Leeds. Founded for Augustinian canons about 1150, it has been cele¬

brated by Wordsworth in 'The White Doe of

Rylstone> and 'The Force of Prayer.* The

eastern end is a ruin, but the nave is utilized for the purposes of a parish church. It is the property of the Duke of Devonshire, one of whose seats, Bolton Hall, is in the immediate vicinity.

BOLTZMANN, bolts'man, Ludwig, Aus¬

trian scientist and physicist: b. Vienna 1844; d.

there 1906. He became widely known for his valuable work on physical problems, thermo¬

dynamics, the kinetic theorv of gases, *etc.* A student in Vienna, Heidelberg and Berlin, his subsequent appointments were professor of

physico-mathematics, University of Gratz 1869; mathematics, Vienna 1873 ; chair of experi¬

mental physics, Gratz 1876; theoretical physics, Munich 1890, Vienna 1895, Leipzig 1900, Vienna again 1902. His published writings include

‘Vorlesungen fiber Maxwell’s Theorie der

Elektrizitat und des Lichts) (2 vols., 1891-93) ; ‘Vorlesungen fiber Kinetische Gastheorie) (2

vols., 1896-98) ; ‘Vorlesungen fiber die Prinzipe der Mechanik) (2 vols., 1897-1904) ; ‘Populare Schriften) (1905).

BOLUWAYO. See Bulawayo.

BOLYAI, bol’yo-e, • Farkas (German

Wolfgang Bolyai), a Hungarian mathema¬

tician : b. Bolya 1775 ; d. 1856. He obtained his early education in Enged, Klausenberg and

Jena, and for three years (1 796—99) studied at Gottingen, where he became intimate with

Gauss (q.v.). He later became professor of

mathematics at the Reformed College of Maros-Vasarhely, a position which he efficiently held for 47 years. He made several attempts to

prove Euclid’s postulate of parallelism, but it remained to his son to establish non-Euclidean geometry as a science in its own right. His chief work (published in two volumes in 1832-33) was entitled ” Tentamen juventutem studio -

sam in elementa matheseos purer … in-

troducendi? * Over his grave he wished that an apple tree should be planted, to commemorate the three apples — of Eve, of Paris and of Newton.

BOLYAI, Janos (German Johann

Bolyai): b. 1802; d. 1860. A Hungarian

mathematician, the son of the above. He was very precocious, and finished the Latin school at the age of 12. He became an officer of engi¬

neers, and was distinguished as a mathematician, a violinist and a swordsman. He is famous

as one of the discoverers of non-Euclidean

geometry, which he treated in a little 26 page appendix to the (Tentamen) of his father,

called (The Science Absolute of Space* (tr. by G. B. Halsted, Austin, Tex., 1891). His work remained almost unknown until R. Baltzos of Giessen called attention to it in 1867.

BOLZANO, bo4-tsa'-no, Bernhard, Bohe¬

mian Roman Catholic theologian and philoso¬

pher: b. Prague, 5 Oct. 1781; d. 18 Dec. 1848.

From 1805 to 1820 he was professor and chap¬

lain at the University of Prague, but was ac¬

cused of insidiously instilling into the minds of the students the heresies of Schelling and

Hegel, and was dismissed from his office. He left many writings, of which his (Wissen-schaftslehre) (1842) is the most important.

Consult (Autobiography } (1875).

BOMA, locally Mboma, Belgian Kongo,

river port, capital of the colony, on the Kongo, 60 miles from its mouth. Dutch, Portuguese, French and British traders established factories here in the 16th and 1 7th centuries, when it was a commercial centre for the slave trade of the lower Kongo. Its modern development dates

from the protectorate established in 1884 by the International Association of the Kongo. Sea¬

going vessels ascend the river to Boma which has regular steamship communication with

Antwerp and a large shipping trade in bananas.

The town consists of a residential section con¬

taining the government buildings and a business section. An American consul-general has re¬

sided here since 1906. Pop. about 5,000.

BOMARSUND, boTnar-soond, a narrow

channel between the islands of Aland and

Vardo, at the entrance of the Gulf of Bothnia.

The Russian fortifications to the harbor of Bomarsund were destroyed by the British and French fleets during the war of 1854. The

channels leading up to Bomarsund were

blockaded and the Russian commander, Gen¬

eral Bodisco, was compelled to surrender on 16

August, the allies continuing to occupy the island until the end of the month, when the whole of the fortification was blown up. Under the Treaty of Paris (1856) the fortress was not to be rebuilt.

BOMB, a hollow box, basket or shell, filled with gunpowder, or other explosive set off by means of a time-fuse or other device. For¬

merly the term applied only to the spherical shells thrown by a mortar, but with the use of aircraft in war the missiles dropped from them are called bombs; and the name is also applied to hand grenades and the larger grenades

thrown by catapults and trench mortars. The term is also used to designate the infernal machines contrived by common criminals to

accomplish murder and destruction of property.

The last named are generally an improvised

shell of gas or water pipe filled with explosives, and encased in a box so arranged that when the lid is lifted the charge is fired. More elaborate bombs of this sort have clockwork machinery which can be set to fire the bomb at any decided time.

The bombs used by aircraft are of five

types: (1) Heavy explosive bombs — for

destroying or damaging large structures, like dockyards and ships, munition <(dumps,® and

factories, railway stations, *etc.* ; (2) hand grenades — for attacking troops in masses, as in camp or on the march; (3) incendiary

bombs — for starting fires in oil-yards, store¬

houses or airship sheds; (4) aerial bombs —which have mechanism to change their direc¬

tion from vertical to horizontal after they have fallen a short distance — for attacks upon air¬

ships and balloons; (5) poison gas bombs — for attack upon trenches and troop masses.

In the British air service the Marten-Hale

bombs have been most largely used. They are of two types, shrapnel and high-explosive. The first is loaded with 321 to 340 steel balls, which with the fragments of the encasing shell pro¬

duce about 1,000 missiles effective over a space about 100 feet square. Its exploding charge is 4 pounds 21/ 2 ounces of trinitrotoluol. The second carries 6 pounds 3ˆ4 ounces of the same explosive, and weighs about 20 pounds in all.

It produces an enormous shattering effect if dropped from above 200 feet — a fall of that distance being required to bring the primer (by revolving vanes) within acting distance

of the charge. These bombs are pear-shaped, dropping with the large end down. To the

upper end is attached a streamer of some

textile material which steadies the bomb in falling. In order to overcome the tendency to bury itself in the earth before exploding, when dropped from a great height a small parachute is attached. This is sufficient to modify the speed, and also checks the forward trend im¬

parted by the flying plane, so that it drops almost vertically after release except for the windage. Incendiary bombs, as used by the

German air fleet, consist of an outer skin wound about with tarred rope, forming a chamber in which is packed resin, clippings of celluloid and similar combustible material, surrounding a central charge of thermit. An igniter sets off the thermit which burns fiercely. In some of the incendiary bombs dropped in London,

which failed to explode, was found amorphous phosphorus, which would not only spread fire, but also produce a cloud of asphyxiating fumes which would prevent the near approach of any one attempting to extinguish the fire.

Poison gas bombs, to be effective in pro¬

ducing either asphyxia or death must nec¬

essarily be filled with a gas at least twice as heavy as air, as otherwise the gas would be too quickly diffused into the atmosphere.

Chief among the heavy gases is the vapor of bromine, 5.53 times heavier than air. The

effect of bromine is to produce at first spasms of the glottis, with asphyxiation rapidly fol¬

lowing. It is believed that the asphyxiating bombs in use by the German aircraft in the European War were filled with liquid bromine, which was scattered upon the bursting of the bombs. Other gases which may have been used are phosgene, 3.49 times as heavy as air; nitro¬

gen tetroxide (nitrous acid), 3.17 times as heavy as air, chlorine and sulphur dioxide, respectively 2.45 and 2.21 times heavier than air. The effects of all these gases are the same, with the additional certainty of poison¬

ing of the wound if made with a phosphorus bearing bomb. See Ammunition; Grenade;

Projectiles.

BOMB LANCE, a harpoon used in whale

fishing which carries a charge of explosive ma¬

terial in its head. In one form of the weapon

the arrangement is that when the harpoon

strikes the fish, the bar, which is pivoted obliquely in the head of the instrument, shall serve to release a spring acting on the hammer, which then explodes the cap and bursts the charge chamber.

BOMBARD. See Bombardment.

BOMBARDIER, originally an artillery

soldier whose special duties are connected with the loading and firing of shells, grenades, etc., from bombards, mortars or howitzers. Bom¬

bardier is now the special title of a non-com¬

missioned officer in the British artillery ranking with a corporal.

BOMBARDIER-BEETLE, or ARTIL¬

LERY-BEETLE, an insect of the genus

Brachinus, and family Car abides. The head is narrow, the prothorax heart-shaped. While

certain other beetles have at the end of the body two glands which secrete a malodorous

fluid which they eject as a means of defense against their enemies, in the bombardier-beetle this fluid or spray appears to be charged with a gas, which, on coming in contact with the air, looks like smoke, and is ejected with an explosion like that of a miniature pop-gun.

This gas-like vapor and detonation baffles and discomfits the pursuer (most often some other predatory beetle) as if blinding it. When be¬

ing captured they will fire off this discharge several times. Several of the species (B .

fumans and allies) are yellowish-red, with

bluish and greenish elytra.

BOMBARDMENT, the act of throwing

bombs or shells into a town or fortress for incendiary purposes. A

bombardment is either desultory, when ships, field batteries or a proportionately small number of siege bat¬

teries throw shells into a place in order to intimidate the inhabitants and garrison into a hasty surrender, or for some other purpose ; or it is regular, and then forms one of the

methods of conducting the attack of a forti¬

fied place. The attack by regular bombard¬

ment was first introduced by the Prussians in their sieges in 1815, after Waterloo, of the fortresses in the north of France. The army and the Bonapartist party being then much

dispirited, and the remainder of the inhabit¬

ants anxiously wishing for peace, it was

thought that the formalities of the old me¬

thodical attack in this case might be dispensed with, and a short and heavy bombardment sub¬

stituted, which would create fires and ex¬

plosions of magazines, prevent every soul in the place from getting a night's rest and thus in a short time compel a surrender, either by the moral pressure of the inhabitants on the commander, or by the actual amount of dev¬

astation caused, and by outfatiguing the gar¬

rison. The regular attack by direct fire against the defenses, though proceeded with, became

secondary to vertical fire and shelling from heavy howitzers. In some cases a desultory

bombardment was sufficient, in others a regular bombardment had to be resorted to ; but in every instance the plan was successful ; and it is now a maxim in the theory of sieges, that to destroy the resources, and to render unsafe the interior of a fortress by vertical fire, is as important (if not more so) as the destruction of its outer defenses by direct and ricochet firing. A bombardment will be more effective against a fortress of middling size with nu¬

merous non-military inhabitants, the moral ef¬

fect upon them being one of the means applied to force the commander to surrender. Befor'

bombarding a town, it is customary to give 24

hours' notice thereof, to allow women, children and non-combatants to leave it. Modern bom¬

bardments have not usually been particularly destructive. During the siege of Paris, 187(b-71, some 500 shells were thrown into the city daily by the Germans, but relatively little mis¬

chief was accomplished by them. A similar

result was shown at the bombardment of San¬

tiago de Cuba by the American forces in 1898, and also in the long sieges of Ladysmith and Kimberley in 1899-1900. The recent bombard¬

ments of the European War have taught vari¬

ous lessons. The German forces reduced the

fortresses of Liege, Namur, Maubeuge and

Antwerp by furious and sustained bombard¬

ments in which fortifications of the most

modern kind were rendered untenable and use¬

less ; the damage to civilians and the moral effects playing no inconsiderable part in hasten¬

ing surrender. On the other hand the British and French fleets bombarded the forts of the Dardanelles in an effort to reach Constanti¬

nople. While the bombardment was incessant,

the deadliest of modern ordnance and ex¬

plosives being brought into use, but little damage was inflicted and little gained from a military viewpoint, compared to the expendi¬

ture of ammunition and the losses inflicted by the fire of the heavy land batteries, five capital ships and many lesser craft being destroyed, and other fleet units seriously damaged.

BOMBARDON, a large brass musical in¬

strument of the sax-horn kind, and the lowest of these instruments. It is made in more than one size, and the largest is generally of circular form and big enough to go around the body of the performer. It is not capable of very rapid execution.

BOMBASTES FURIOSO, a burlesque

opera by William Barnes Rhodes, produced in 1790 and intended as a parody of (Orlando

FuriosoP Its name is that of the principal personage, a braggart who kills his king,

Artaxominous, for a pair of jackboots.

BOMBAX (Silk Cotton Tree), a genus

of 50 tropical trees of the family Bombacaccce, with digitate leaves and large scarlet or white axillary flowers. B. cciba, the five-leaved silk cotton tree, attains a great height in tropical America, where it is native and where its im¬

mense trunks are scooped out for canoes. This species, B. munguba, a South American species, and B. malabaricum, the red silk cotton tree, so named from the color of its ˆcotton,ˆ bear pods which furnish a fibre useful for stuffing cushions ; hence the common name. All the

species yield useful bast employed in rope mak¬

ing, and have been suggested as possibly val¬

uable for paper making.

BOMBAY, bom-ba', a province or presi¬

dency of British India, stretching along the west side of the peninsula, and bounded on the north by Baluchistan, the Punjab, Rajputana; on the east by the native state of Indore, the Central Provinces, Berar and Haidarabad; on

the south by Madras and Mysore; and on the 200

West by the Arabian Sea. Politically the presi¬

dency consists of the British districts of Bom¬

bay, Sind and Aden, with an area of 123,059

square miles and a population of 19,672,642, and of a number of native states with an area of 63,864 square miles and a population of 7,-

411,676. Its geographical limits include also the Portuguese settlements of Din, Damaun

and Goa, and the important native state of Baroda, under the direct control of the Indian government. Most of the British territory was acquired by annexation from the Mahrattas,

and by the lapse of Satara state. Sind was con¬

quered in 1843. The chief cities are Bombay (Pop. 979,445), Poona (Pop. 158,856), Ahmed-adad (Pop. 216,777), Surat (Pop. 114,868) and Karachi (Pop. 151,903). The chief spoken lan¬

guages are Marathi, used by nearly half the population; Gujrathi, used by the commercial classes ; Kanarese and Sindhi. About three-fourths of the population profess Hinduism,

fully one-fifth are Mohammedans, the rest

being Jains, Christians, Sikhs, Parsees, ab¬

originals, *etc.*

The chief openings in the coast of Bombay

are the gulfs of Cambay and Cutch, sepa¬

rated by the peninsula of Kathiawar. The

chief harbors are those of Bombay and Karachi.

Physically the presidency consists of five dis¬

tinct divisions; Sind in the north, flat desert in part, and mostly unproductive when not under irrigation; Gujerat, a fertile alluvial plain, watered by the Taptee and Nerbudda rivers, the most populous region of the province ; the

Konkan, a mountainous country lying between

the Western Ghats and the sea; the Deccan, a plain, without sufficient rainfall and devoid of vegetation during most of the year; finally the highly cultivated Karnatik plain, south of the river Kistna. The chief mountain ranges are the Hala Mountains, west of the Indus, the Western Ghats, running north and south, near the coast, with an average elevation of 1,800

feet and peaks double that height, and the Sat-pura range, separating the basins of the Ner¬

budda and the Taptee. The most important

rivers are the Indus, Nerbudda and Taptee, all of which flow into the Arabian Sea ; the

Godavari and Kistna rise on the eastern slopes of the Ghats. Many short torrential rivers

traverse the Konkan coastal strip. The

forests of Sind consist chiefly of sisu, babul (a kind of acacia), bhan (a species of pop¬

lar) and tamarisk; while from the forests

of the western slopes of the Ghats are ob¬

tained teak, blackwood, ebony, ironwood,

babul, sandalwood and other valuable tim¬

bers. The cocoanut and date palms, mango,

jack, betel-nut, and myrobalans are other im¬

portant indigenous vegetable products. Among

the wild animals are the maneless lion of

Gujerat, the wild ass, leopard, tiger, black bear, bison, antelopes and venomous snakes.

The climate varies greatly from one dis¬

trict to another, two extremes being rep¬

resented by upper Sind, with great heat and little rain, and the Konkan, with excessive rainfall, especially from June to October.

About three-fourths of the population are

engaged in agriculture. The chief products are cotton, rice, millet, wheat, barley, dates, the cocoa-palm, oil-seeds, sugar and indigo. In

1912-13 the net area actually cropped was 25,-

180,263 acres. The growth of cotton in Bom¬

bay received a great impetus during the Ameri¬

can Civil War; and although the great demand did not prove lasting, cotton continues to be a highly important crop, part of the produce be¬

ing exported, and a considerable portion of it worked up in the cotton-mills of Bombay

city, Armedabad and Kandesh. Hand looms

are also largely employed. Other important

industries are silk-weaving, wood carving and metal working. The foreign trade of Bombay

is very great; its imports, chiefly cotton piece-goods, sugar, oils, metal and machinery, silks and other manufactures, exceed those of any other province in British India, while its ex¬

ports, consisting of raw cotton, seeds, wheat, opium, etc., are second only to those of Bengal.

In 1905 there were 7,980 miles of railway, ex¬

clusive of Sind ; the chief lines are the Bombay, Baroda and Central India, northwards; the

Great Indian Peninsular and Indian Midland,

eastward ; the Madras and Southern Mahratta, southeastward, of all of which Bombay city

is the terminus; and the Northwestern Railway, the terminus of which is the port of Karachi.

In 1912-13 the presidency expended $5,115,900

on education; there were 14,100 public educa¬

tional institutions with 906,827 students and 3,020 private educational institutions with

80,858 students. The University of Bombay,

one of the five in British India, was established in 1857. According to the census of 1911 the population in British territory numbered 19,-

672,643, of whom only 1,372,826 were literates.

The population of the native states was 7,411,-

675, of whom 487,667 were literates.

The government of the presidency is ad¬

ministered by a governor in council consisting of the governor as president, and two other members of the Indian Civil Service, all ap¬

pointed by the Crown. There is also a legisla¬

tive council of 48 members, 21 of whom are nominated, 21 elected, 4 ex-officio and 2 extra members. The native states are under the superintendence of British agents placed at the principal courts.

Bibliography. — Campbell, J., (Gazeteer of the Bombay Presidency) (26 vols., Bombay 1896); Douglas, J., (Bombay and Western India* (London 1893) ; Edwards, S. M., (The Rise of Bombay) (London 1902) ; Lee-Warner, Sir W., (The Presidency of Bombay) (London 1904) ; Malabari, B. M., (Bombay in the Making* (London 1910).

BOMBAY, India, city and the chief sea¬ port of western India, capital of the presi¬ dency of the same name, situated at the south¬ ern extremity of the island of Bombay, and con¬ nected with the mainland by causeways and breakwaters, and with the interior by exten¬ sions of the Bombay, Baroda and Central India and the Great Indian and Peninsula railway, the terminus of the latter being a splendid edi¬ fice which cost $1,500,000. Extensive water works have been constructed on the main¬ land at Lake Tanza, 65 miles north, including a dam two miles in length, and were opened in 1892. The town comprises two main portions, one known as the Fort, and formerly sur¬ rounded with fortifications, on a narrow point of land with the harbor

on the east side and Back Bay on the west ; the other known as the City, a little to the northwest. The European BOMBAY DUCK — BOMBERGER

population live mostly in villas surrounded with extensive areas, called compounds, in various parts of the island, the favorite location being the suburb of Malabar Hill. The native

quarters, with their handsome bazars, temples, carved and elaborately ornamented houses, and polyglot Asiatic population, are exceedingly

picturesque. Bombay has many handsome

buildings, both public and private, and a num¬

ber of fine streets, the latter being in many cases traversed by street railways. The castle, the government offices and almost all the

merchants' warehouses and offices are in the fort. On the esplanade facing southwest is a fine range of public buildings, including the secretariat, the courts of justice, the offices of the public works department, the post and

telegraph offices, *etc.* There are a cathedral and several other churches in Bombay, which is the see of the Anglican bishop. There are six hotels, including the Taj Mahal Hotel, opened in 1904, one of the finest in India. In 1857 a university was opened, and the university hall, library and clock tower are among the hand¬

somest buildings in the city. Other educational institutions are the governmental Elphinstone College, the Grant Medical College, two mis¬

sionary colleges, Sassoon's Institute, schools of art and law and the Victoria Jubilee Technical Institute. There are several fine hospitals and three English newspapers besides native ones.

Various industries, such as dyeing, tanning, metal, lacquer, gold and silver thread working, pottery and wood carving, are actively car¬

ried on, and there are now 83 cotton mills em¬

ploying 180,000 hands. The commerce of the

port was greatly benefited by the opening of the Suez Canal and is now very extensiveˆ by far the greater portion of the exports and im¬

ports of the presidency passing through Bom¬

bay. The chief article of export is raw cotton, the chief import cotton piece-goods, the com¬

merce being chiefly with Great Britain. The harbor is one of the largest and safest in India ; while its scenery and that of the neighbor¬

ing continent presents a rare combination of grandeur and beauty. It is situated be¬

tween the islands of Colabah, Bombay and

Salsette on the one hand, and the mainland and islands of Caranjah and Elephanta on the other. It is 14 miles long by five miles wide and is defended by numerous batteries armed with the most modern guns. There are large and commodious docks, chief of which are the Prince's dock, the Victoria dock, with a water area of 25 acres, and the new Alexandra dock, the largest in India, 50 acres in area, the foundation stone of which was laid in 1905, erected at a total cost of over $25,000,000 (in¬

cluding reclamation of land and new railway station). There is a large traffic with steam vessels between Bombay and Great Britain, and regular steam communication writh China,

Australia, Singapore, Mauritius, *etc.* A rail¬

way between Bombay and Tannah, on the island of Salsette, 20 miles distant, opened in 1853, was the first Indian railway constructed. The island of Bombay is about 11 miles long from north to south, and about three miles broad, formed by two ranges of rock running parallel to each other on opposite sides of the island.

The interior was formerly liable to be over¬

flowed by the sea, to prevent which substantial walls and embankments were constructed.

Bombay was obtained by the Portuguese

in 1534 from the Sultan Bahadur; by them it was ceded to Great Britain in 1661, as part of the dowry of the Infanta Catherine, bride of Charles II, and in 1668 it was transferred to the East India Company. The following year

the modern city was founded by Gerald

Aungier, president of Surat from 1669-77,

who fortified it, set up law courts and estab¬

lished freedom of trade and religion. During the American Civil War, Bombay became one

of the greatest cotton markets of the world and enjoyed immense prosperity, followed by

a financial crisis at the end of the war, from which however it quickly recuperated. Next

to Madras it is the oldest of the British pos¬

sessions in the East, and in trade and popula¬

tion it is only excelled by Calcutta, which owes its pre-eminence largely to the fact that Bom¬

bay has since 1891 been frequently decimated by the plague. The government of the city

consists of a municipal corporation of 72 mem¬

bers (of whom 16 are nominated by the gov¬

ernment, 36 by the rate payers, 16 by the justices of the peace, 2 by the senate of the university and 2 by the chamber of commerce), and a town council of 12 members (four of whom are nominated by the government and

the rest by the corporation). By the census of 1911 the population numbered 979,445, of whom 664,042 were Hindus, the remainder being

composed of Mohammedans, Parsees, Jains,

Europeans and Eurasians (16,082), native

Christians and Jews. Consult Drewitt, F.,

(Bombay in the Days of George IV> (London 1907) ; Karkaria, R. P., (The Charm of Bom¬

bay* (Bombay 1915) ; (The Gazeteer of Bombay City and Island, * compiled by D. M. Edwards (Bombay 1909-10).

BOMBAY DUCK. See Bummaloti.

BOMBAZINE, bum-ba-zen', derived from

bombyx, the Greek term for silk and silkworm, is a mixed tissue of silk and worsted, and was long woven both plain and colored. The latter, however, has gone into disuse, and the only color now used is black, for which there is an extensive demand in Spain and South America, where some of the religious orders use it, and it generally forms the material of the almost universally worn Spanish mantilla. The manu¬

facture was originally introduced into England by a colony of Dutch or Flemings, who settled in Norfolk, and long continued to have its principal seat at Norwich, the capital of that county, though it is now chiefly confined to Halifax and Kidderminster.

BOMBERG, Daniel, a famous Christian

printer of Hebrew books. He lived and worked in Venice between 1516 and 1549, during which time he changed the whole mode of procedure in Hebrew typography. Among his noteworthy

undertakings was the publication of the editio princeps (1516-17) of the Rabbinical Bible, con¬

taining Hebrew text with rabbinical com¬

mentaries, *etc.* Another of his notable works was the first complete edition of the Talmud (1520-23).

BOMBERGER, John Henry Augustus,

American ecclesiastical writer : b. Lancaster, 202

BOMBON— BONA

Pa., 13 Jan. 1817; d. Collegeville, Pa., 19 Aug.

1890. Educated at Marshall College and Mercersburg Theological Seminary, he was or¬

dained a minister of the German Reformed

Church in 1838. After having occupied several pulpits he was called to Philadelphia by the First Reformed Church (1854-70). He became

president of Ursinus College at Collegeville, Pa., in 1870. He exercised considerable in¬

fluence upon German Protestant thought in

America. Among his most notable works are

the translation into English of six volumes of Herzog's (Protestant Theological and Ecclesias¬

tical Encyclopedia) (condensed into 2 vols., 1856—58) , and the original books (Five Years at Race Street Church1 (1859) ; (The Revised

Liturgy) (1866) ; (Reformed not Ritualistic (1867)'.

BOMBON, Philippines, a large, fresh water

lake in the island of Luzon, about 50 miles south of Manila. It is 105 square miles in area. There is a small island in the centre, from which rises the volcano Taal, whose

height is only 850 feet. The waters of the lake find an outlet to the sea

through the Pansipit River.

BOMBPROOF, a structure intended to

resist or repel artillery shot and shell, generally underground or excavated in a hillside. When designed for permanency they are either of

masonry or caves cut into solid rock. In the light of recent developments under the action of high explosives bombproofs are excavations 30 to 40 feet below the surface reached by a shaft on an incline with several openings. The interiors are lined with concrete and in some cases roofed with railroad iron. Galleries

radiate in many directions, and the construc¬

tions are large enough to house a large force of men. See also Blindage.

BOMBS. See Pyroclastic.

BOMBYCID2E, bom-bis'i-de, a group of

genera comprising some of the largest and most regal of moths. Their thick, heavy bodies and small sunken heads, the mouth parts often ob¬

solete, the tongue either wholly or partly

atrophied ; the broadly pectinated antennas ; the broad, often falcate, wings; and their sluggish habits, afford good characters for distinguish¬

ing them. The larvae are silkworms, or

"spinners.® They are often thick, usually more hairy or spiny than those of other groups of moths, or as in the Chinese silkworm, smooth ; while in the large Attacus ablas, Telea poly-phemus, Sarnia cecropia and Tropcea lima, the worms are short, fat, fleshy and sluggish. They spin a more or less dense cocoon of silk to pro¬

tect the enclosed pupa from sudden changes in the weather. Although the name Bomby cider

is confined to the small group represented by the silkworm (Bombyx mori), all the typical spinners are referred to as bombycine moths.

The most typical families are the Notodontidce Sphingicampidcc, SaturniidcB and Remileucida.

Of these the Sphingicampidce, however, like the Sphingidce, to which they may have given origin, spin no cocoon and transform in the earth, the pupa being subterranean. (See also Silk¬

worm). Consult Packard, (Monograph of the

Bombycine Moths of America1 ; (Memoirs of

the National Academy of Sciences1 (Vol. VII, Washington 1896) ; Beutenmiiller, (Descriptive Catalogue of the Bombycine Moths within Fifty Miles of New York City ' ((Bulletin1 Ameri¬

can Museum of Natural History).

. BOMFORD, bum-ferd, George, American

soldier: b. New York 1780; d. Boston, Mass., 25 March 1848. He was. graduated at West

Point in 1805 and was assigned to the engineer corps. Between 1805 and 1812 he worked on

the fortifications of New York harbor, the de¬

fenses of Chesapeake Bay, and was superintend¬

ing engineer of the works on Governor's Island.

During the War of 1812 he was brevetted lieu¬

tenant-colonel for distinguished service in the ordnance department. He introduced bomb

cannons, made on a pattern of his own inven¬

tion, which were called Columbiads, a kind of heavy gun combining

the qualities of gun,

howitzer and mortar. On 30 May 1832 he was appointed chief of ordnance, and on 1 Feb. 1842

became inspector of arsenals, ordnance, arms and munitions of war, in which duty he con¬

tinued until his death. Consult Cullum, Offi¬

cers and Graduates of the United States Mili¬

tary Academy1 (Vol. I, 1868).

BOMPAS, William Carpenter, Canadian

clergyman: b. in London, England, 20 Jan. 1834; d. 1906. In 1865 he offered himself for work in the northwest ; was ordained Anglican bishop of Athabasca, 3 May 1874; and (on the division of his diocese) was bishop of Mackenzie, 1884—91, and of Selkirk, 1891-1905.

BON MARCHE', bon mar-sha', one of the

large department stores of Paris, situated on the Rue de Bac and Rue de Sevres. It was founded in 1853 by Aristide Boucicault as a small store in the Rue de Bac and grew little by little to be the great establishment it now is.

The present building was begun in 1869, was first used in 1872, and has been enlarged at various times since then. The management is co-operative, pensions are awarded to the em¬

ployees and there is a regular system of pro¬

motion. It is thought that this organization has contributed largely to the success of the store.

BONA, Giovanni, Italian cardinal : b. Mondovi, Piedmont, 10 Oct. 1609; d. Rome, 27 Oct.

1674. He was renowned for his piety and

learning, a collaborator in the (Acta Sanc¬

torum,1 the author of (Rerum Liturgicarum

Compendium,1 which is an authority on the

service of mass, and of (De principiis vitae Christianae,1 — a book which has frequently been compared to the Umitation of Christ,1 and of which a French translation has appeared

(1855). His (Manducatio ad Coelum1 was

translated into English (London 1672; 7th ed., 1712). A translation was made by L'Estrange, (A Guide to Eternity1 (London 1900). His

complete works in Latin were published in

Antwerp (2 vols., 1677). Consult the life by A. Ighina (Mondovi, Italy, 1874).

BONA, Algeria, fortified seaport city of

Constantine department on a bay of the

Mediterranean at the base of a hill near the mouth of the Sebus, 135 miles by rail northeast of Constantine. The town, divided into upper and lower Bona, dominated on the summit by Fort Cicogne, was greatly improved and

modernized after the French occupation in

1832. The principal buildings are the quasi-Byzantine cathedral of Saint Augustine, con-

taining the right arm relic of the Saint brought from Pavia in 1842,

and the Great Mosque on the Place d'Armes built from the ruins of

ancient Hippo. 1 he town has good bazars,

banks, hotels, theatre, manufactures of native clothing, tapestry, saddlery, a thriving trade in grain, wool, hides, phosphate, wax and coral and regular steamboat service with Algiers,

Tunis and Marseilles. Occupying the site of ancient Aphrodisium connected by canal with

the once famous city of Hippo * Regius, the favorite residence of the Numidian kings, and the bishop's see of Saint Augustine, who died there 430, nearby are interesting remains of this early centre of Christian civilization and commerce in northern Africa, celebrated for

its schools, theatres, aqueducts, palaces and temples which were converted into churches

and monasteries. It was destroyed by Moham¬

medans under Caliph Osman, 646. Pop. 35,000.

BONA DEA, the good goddess, a myste¬

rious divinity of the Roman mythology, the wife or the daughter of Faunus. Her worship was secret, performed only by women; men were

even required to ignore her name. Her sanc¬

tuary was in a cavern in the Aventine Hill, but her festival, which occurred 1 May, was cele¬

brated in a separate room in the dwelling of th-e consul who then had the fasces. No man was allowed to be present, and all male statues in the house were covered. The wine used at this festival was called milk, and the vessel in which it was kept, mellarium. After the sacrifices, bacchanalian dances were performed. Accord¬

ing to Juvenal, licentious abominations marked these festivals. The snake was the symbol of the goddess, and this would point to her being considered as possessing a curative, medical power, and in her sanctuary various herbs were offered for sale. By the Greeks the Bona Dea was identified with Hecate, Semele and other divinities.

BONA-FIDE ((<in good faith®), a technical

legal expression, to which the law of Great Britain and this country Las annexed a cer¬

tain idea. It is a term used in statutes in Eng¬

land and in acts of the legislatures of all the United States, and signifies a thing done really, with a good faith, without fraud or deceit, or collusion or trust. The word ˆbona-fide® is restrictive, for a debt may be for a valuable consideration and yet not bona-fide. A debt must be bona-fide at the time of its commence¬

ment or it can never become so afterward. If a contract be made with good faith, subsequent fraudulent acts will not vitiate it, although such acts may raise a presumption of antecedent

fraud and thus become a means of proving the want of good faith in making the contract.

BONALD, bo-nal, Louis Gabriel Am—

broise, (Vicomte de, ve-coiit de), French phi¬

losopher: b. 1754; d. 1840. During the Revolu¬

tion he joined the Royalist army under the Bourbon princes. He returned to France under Napoleon; became coeditor of the Mercure

with Chateaubriand and Fievee. and in 1808

was appointed Minister of Public Instruction.

After the Restoration, — as the deputy for his department, — he voted with the Ultramontane or Theocratic party in the Chambre Introuvable, and in his political career, as in his phi¬

losophical works, was the ardent advocate of absolutism, of the infallibility of the Pope and of the Jesuits. In 1830 he refused to take the oath ol allegiance to the new dynasty.

BONANNO, bo-nan’no, Italian architect

and sculptor. In 1174 he commenced, with

\ ilhelm of Innsbriick, th-e famous Leaning Tower of Pisa. He was also the designer of the celebrated bronze doors of the cathedral of that city.

BONANZA, bo-nan’za, Spanish for (<prosperity,® a term applied to any rich mass of ore suddenly discovered by a fortunate stroke and furnishing a continuous run of prosperity.

It came into American and English use during the early exploitation of California mines and diggings and now popularly describes any

fortunate* wealth-producing source. The title of Bonanza mines was applied to the great

silver yields of the Comstock Lode (q.v.) in Nevada in 1876.

BONAPARTE, or BUONAPARTE, the

name of a Corsican family now famous in

history. It was spelt Buonaparte by the Em¬

peror Napoleon’s father and the Emperor him¬

self till 1796, though the more usual, modern form also occurs in old Italian documents.

Several families are mentioned as early as the 12th century who bore the name of Bonaparte, and took a position of some prominence in

Italy. In 1122, for instance, a Bonaparte was banished from Florence as a Ghibelline. Cor-rado Bonaparte is mentioned in 1170 and

Jacopo Bonaparte in 1210 as knights of the Order of the Golden Spur. The office of

podcstd, was held by Nordio Bonaparte in

Parma in 1272, by Pietro Bonaparte in Padua 1285, and by Giovanni Bonaparte in Florence 1333. In 1250 a Bonaparte was syndic of Ascoli, and in 1440 Cesare Bonaparte was chosen as head of naval affairs at Sarzana. A Gio¬

vanni Bonaparte is said to have married a niece of Pope Nicholas V in 1404, but this seems doubtful for chronological reasons. It is

however certain that about 1454 Niccolo Bona¬

parte was ambassador of this Pope to several courts, and vicar of the Holy See in Ascoli.

Another Niccolo Bonaparte, professor at San

Miniato in the 16th century, is stated to have been the author of the comedy (La Vedova)

(Florence 1568) ; and a work on the Sack of Rome in 1527 is attributed to the Tuscan Gia¬

como or Jacopo Bonaparte, who was an eye¬

witness of the event. The connection between these different Bonapartes is by no means well established; yet in 1771 the relationship of the Corsican Bonapartes with the Florentine Bona¬

partes was judicially recognized. In Corsica itself a Messire Bonaparte appears as witness to an act executed by Berengar II of Italy as early as 947, and it is therefore not improbable that the family originally emigrated from this island to the mainland, and that a branch of the Genoese line returned to their old home in the 16th century. From the time of Gabriel Bonaparte, who settled at Ajaccio in 1567 and took part in the naval expeditions against the Moors, the Bonapartes ranked as a patrician family of that town. In 1576 Girolamo Bona¬

parte was elected deputy of Aiaccio in the senate of Genoa, and in 1614 Francesco was chosen captain of his native town. In 1757

Joseph, the grandfather of Nanoleon I, re¬

ceived a formal patent of nobility from the Grand Duke of Tuscany. About the middle of 204

THE BONAPARTE FAMILY (Male Issue).

CHARLES BONAPARTE.

(1) Joseph,

King of

Spain,

(1808-14),

died 1844.

(2) Napoleon I,

1804-1814;

died 1821.

Duke of

Reichstadt

(Napoleon II),

died 1832.

Lucien,

Cardinal,

died 1895

(3) Lucien,

Prince of Canino,

died 1840.

Charles, Paul, Louis Pierre, Antoine,

died 1857. died 1827. Lucien, died 1881. died 1877.

| died 1891. |

Charles, Roland Jeanne

died 1899.

(4) Louis, (5) Jerome, King

King of Holland, of Westphalia,

died 1846. died 1860.

Napoleon

Charles,

died 1807.

| Prince Napoleon,

Louis died 1891.

Napoleon

(Napo- | |

leon III.), Victor.

1852-1871, Louis.

died 18/3.

Louis.

Napoleon Louis

(Prince Imperial),

died 1879.

the 18th century there remained three male

representatives of the family of Bonaparte at Ajaccio, the archdeacon Lucien Bonaparte, his brother Napoleon, and their nephew Charles,

who became father of the Emperor Napoleon I and of a numerous family of princes.

BONAPARTE, Charles, father of the

Emperor Napoleon I ; b. Ajaccio, Corsica, 29

‘March 1746; d. Montpellier, 24 Feb. 1785. He was carefully educated, studied law at Pisa, and soon after his return married without the con¬

sent of his relatives Letitia Ramolino, a beau¬

tiful patrician. He fought under Paoli for the independence of Corsica, but resistance to the French proving useless he went over to their side.. In 1771, when Louis XV caused 400

Corsican families to be selected who alone

were to be considered noble, the Bonaparte

family, — and consequently Charles, — was

among the number. By the influence of the

French governor, Marboeuf, who was very

friendly toward the family, he was (1773)

named royal councillor and assessor for the town and province of Ajaccio. As a member

of the deputation of Corsican nobles sent to the court of France in 1777 he resided several years at Paris and was fortunate enough to secure a free admission for his eldest son, Jo¬

seph, to the seminary at Autun, another for his second son, Napoleon, to the military school of Brienne, and a third for his daughter, Maria Anna, to the educational institution at Saint Cyr. He returned to Corsica in 1779, and

afterward went to Montpellier for the benefit of his health, but did not recover. By his mar¬

riage with Letitia Ramolino he left eight chil¬

dren ; Joseph (see Bonaparte, Joseph), King

of Spain; Napoleon I, Emperor of the French (see Napoleon I) ; Lucien (see Bonaparte,

Lucien), Prince of Canino; Maria Anna, after¬

ward called Elise, Princess of Lucca andPiombino, and wife of Prince Bacciocchi (see Bacciocchi, Felice Pasquale) ; Louis (see Bona¬

parte, Louis), King of Holland; Carlotta,

afterward named Marie Pauline, Princess Borghese (q.v.) ; Annunciata, afterward called

Caroline, wife of Murat (see Murat), King

of Naples; and Jerome (see Bonaparte,

Jerome), King of Westphalia. See also Bona¬

parte, Letitia Ramolino; Napoleon III.

BONAPARTE, Jerome, youngest brother

of Napoleon: b. Ajaccio, Corsica, 15 Nov

1784; d. near Paris, 24 June 1860. At an early age he entered the French navy as a midship¬

man. In 1801 he was sent out on an expedi¬

tion to the West Indies, but the vessel being chased by English cruisers, was obliged to put in to New York. During his sojourn in Amer¬

ica, Jerome Bonaparte became acquainted with Miss Elizabeth Patterson, the daughter of the president of the Bank of Baltimore and a de¬

scendant, as is asserted, of (‘01d Mortality,)}

immortalized by Sir Walter Scott. His ad¬

dresses to this young lady having been ac¬

cepted, they were married 24 Dec. 1803, accord¬

ing to the Roman Catholic ritual, in the cathe¬

dral of Baltimore, and in 1805 embarked for Europe. This marriage did not meet with the approval of the Emperor Napoleon, whose am¬

bitious views it thwarted, and he accordingly, after an ineffectual application to Pope Pius VII to have it dissolved, issued a decree de¬

claring it to be null and void. On 12 Aug.

1807, Jerome married Catherine Sophia, Prin¬

cess of Wurtemberg, and a few months after¬

ward was created King of Westphalia and

crowned with great pomp at Cassel, 1 Jan. 1808.

His government was not marked by either

judgment or prudence; little regard was paid to national feelings; and the finances of the state, both from mismanagement and the fre¬

quency of hostile incursions, became hopelessly embarrassed. The battle of Leipzig put an

end to Jerome's reign and he was obliged to take flight to Paris. On the conclusion of the Treaty of Paris he left France and proceeded first to Switzerland, thence to Gratz and in the beginning of 1815 to Trieste. On his

brother's return from Elba he again proceeded to Paris and was nominated a peer of France.

At the battles of Ligny and Waterloo he was actively engaged, displayed considerable brav¬

ery and received a wound in the arm. On

Napoleon's overthrow he retired first to Switz¬

erland, then to Wurtemberg and from this

period up to the fall of Louis Philippe, in 1848, resided in different parts of Europe under the title of the Comte de Montfort; latterly chiefly in Florence. On the outbreak of the revolution of February 1848 he returned to

Paris and was appointed (23 December) gov¬

ernor-general of the hospital of the Invalids and in 1850 a marshal of France. In 1852 he was made president of the Senate. Reference has already been made to the two marriages contracted by Jerome Bonaparte. From his

union with Miss Patterson only one son pro-BONAPARTE

ceeded, Jerome (see Bonapartes of Balti¬

more). By his second wife Jerome Bonaparte

had three children. The elder son, Jerome

Bonaparte, b. 1814; d. 1847; Mathilde Bon¬

aparte, Princess of Mont fort (b. Trieste, 27

May 1820; d. Paris, 2 Jan. 1904), married the Russian Count Anatol Demidoff, and lived at the court of Louis Napoleon during his presi¬

dency ; the younger son, Napoleon Joseph

Charles Paul Bonaparte, commonly known

as Prince Napoleon (b. Trieste, 9 Sept. 1822; d. 17 March 1891), passed his youth in Italy; entered the military service of Wurtemberg in 1837 ; afterward traveled in several countries of Europe; and was banished from France

(1845) on account of his intercourse with the Republican party. After February 1848 he was elected to the National Assembly. He com¬

manded an infantry division at the battles of Alma and Inkermann. In 1859 he married the Princess Clotilde, daughter of Victor Em¬

manuel, by whom he had two sons (see Bona¬

parte Pretenders) and a daughter. After the tall of the empire he took up his residence in England, but returned to France in 1872. On the death of the . Prince Imperial, son of the Emperor Louis Napoleon, in Zululand in 1879, the eldest son of Prince Napoleon became the heir of the Bonapartist hopes. When, in 1886, the chiefs of the Bourbon family were, by a vote of both chambers, expelled from France, Prince Napoleon and his eldest son were ex¬

iled also as pretenders to the throne.

BONAPARTE, Joseph, eldest brother of

Napoleon I: b. Corte, Corsica, 7 Jan. 1768; d.

Florence, Italy, 28 July 1844. He was educated in France at the college of Autun, returned to Corsica in 1785 on his father's death, studied law, and in 1792 became a member of the new administration of Corsica under Paoli. In

1793, after Paoli had called in English aid, he emigrated to Marseilles, and became brother-in-law to Bernadotte, afterward King of

Sweden, by marrying one of the daughters of a wealthy banker named Clari. In 1796 he ac¬

companied the army of Italy as commissary,

in 1797 was elected a Corsican deputy to the Council of Fve Hundred, and shortly after was sent by the Directory, as ambassador to the Pope. He returned abruptly, and had not long resumed his seat in the Council of Five Hun¬

dred, when his brother having become 1st

Consul he was made councillor of state, and em¬

ployed to negotiate a treaty with the United States. Shortly after, in 1801, he negotiated the peace of Luneville with the Emperor of Ger¬

many, and in 1802 that of Amiens with Great Britain. Napoleon having now begun to parcel out kingdoms among his family, Joseph was

made King of Naples and Sicily in 1806, but had reigned only two years when his brother recalled him and sent him to Madrid to be King of Spain and the Indies. His seat at Naples had not been comfortable, and he now found himself on a bed of thorns. His kingship lasted nom¬

inally for five years, but he was chased once and again from his capital, and the third time, in 1813, fled not to return. In these appoint¬

ments Joseph was merely a tool in his brother's hands. In 1814, after the fatal expedition to Russia, Napoleon on setting out for the army made him lieutenant-general of the empire and head of the council of regency. After the

battle of Waterloo he sailed for the United States and lived for some years at Bordentown, N. J., where he employed himself in agricul¬

ture, and was highly esteemed by his neighbors.

During his exile he assumed the title of Count de Survilliers. In 1832 he went to England and after residing there for some time repaired to Italy, and spent his closing days in Florence.

His wife appears to have been prevented by ill health from accompanying him to the United

States. She survived her husband but a few months. There were two daughters. The elder became the wife of the eldest son of Lucien Bonaparte, and the younger was married to the second son of Louis Bonaparte.

BONAPARTE, Laetitia Marie Wyse,

Madame de Solms-Rattazzi-de Rute, French

author: b. Waterford, Ireland, 1829; d. Paris, 1902. Her mother, Letitia, who claimed to be the daughter of Lucien Bonaparte by his second wife, married Thomas Wyse, an Irishman.

Laetitia, who married Frederic de Solms in

1850, four years later separated from him, as¬

sumed the tide of Princesse de Solms, settled in Savoy, then independent, and established there the famous literary circle Les matinees d'Aix in 1853. Victor Hugo, Kossuth, Eugene Sue,

Lamartine, Dumas, Rochefort and Sainte Beuve were numbered in her acquaintance. Under the pseudonym of (Baron Stock } she was a con¬

tributor to the Constitutionnel. When Savoy

was annexed to France she established a salon in Paris, which became a popular literary and social shrine. After De Solm's death, she

married the Italian statesman U. Rattazzi ;

when he died she married Senor de Rute, a Spaniard whom she outlived. Besides a great amount of miscellaneous writings, she wrote

the novels (Les Manages de la creole) (1866) ; (Si j'etais reine — If I were queen) (1866), largely autobiographical ; the first book was re¬

printed as (La chanteuse) (1870).

BONAPARTE, Letitia Ramolino, mother

of Napoleon, and hence known by the name of Madame Mere: b. Ajaccio, Corsica, 24 Aug.

1750; d. Rome, 2 Feb. 1836. She was married in 1764 to Charles Bonaparte (see Bonaparte, Charles). Left a widow in 1785, she contin¬

ued to reside in Corsica till 1793, when she re¬

moved to Marseilles. In this city she lived in straitened circumstances. After her son be¬

came 1st Consul, she fixed her residence at Paris, had a separate establishment assigned to her, but had little taste .for ostentation. All things considered, she conducted herself with great discretion, performing her part becom¬

ingly in the station to which she had been so unexpectedly elevated, and never allowing her¬

self to forget that the sudden rise of her family might one day be terminated by an equally

sudden fall. She joined the Emperor in his exile in Elba in 1814, and after Waterloo she retired to Rome and resided in the household of her step-brother, Cardinal Fesch. There she

collected most of the surviving members of her family around her and lived to the advanced age of 86.

BONAPARTE, Louis (Count of Saint

Leu), second younger brother of the Emperor Napoleon I and father of Napoleon III : b.

Ajaccio, Corsica, 2 Sept. 1778; d. Leghorn, Italy, 25 July 1846. He was educated in the 206

artillery school at Chalons, accompanied Na¬

poleon to Italy, and afterward to Egypt. He subsequently rose to the rank of a brigadier-general, and in 1802 married Hortense Eugenie Beauharnais, Napoleon's step-daughter (see

Beauharnais, Hortense Eugenie), from whom

he separated in 1810. In 1806, on Schimmelpen-ninck, grand pensionary of Holland, demitting his office, Louis Bonaparte was compelled by his brother, notwithstanding his protestations, to accept the Dutch crown. The difficult situa¬

tion in which he was placed rendered it impos¬

sible for him to be anything else than a mere viceroy of Napoleon; but to his credit it must be recorded that he exerted himself to the ut¬

most in promoting the welfare of his new sub¬

jects. With all his efforts, however, he found himself unable to restore the finances of the country to a healthy condition : a quarrel took place between him and his brother relative to the continental system maintained by the latter, which had proved most injurious to Dutch com¬

merce, and on 1 June 1810 he abdicated the sovereignty and retired to Gratz under the title of the Count of Saint Leu. Holland was there¬

upon annexed to France. In 1814 Louis paid a visit to Paris and strongly counseled his brother to make peace with the allies. After the Restoration he took up his abode at Rome ; in 1826 he removed to Florence, and from

thence, a short time after his son's escape from the fortress of Ham, to Leghorn.

BONAPARTE, Lucien (Prince of Canino), next younger brother of Napoleon I: b.

Ajaccio, Corsica, 21 March 1775; d. Viterbo, Italy, 29 June 1840. He emigrated to Marseilles in 1793, and made himself conspicuous as a hot¬

headed Republican by addressing revolutionary clubs and publishing bombastic pamphlets.

Shortly after, having been appointed to a situa¬

tion in the commissariat at the small town of Saint Maximin in Provence, he married the inn¬

keeper's daughter. He made a narrow escape

during the Reign of Terror, and in 1796 was appointed commisary at war, and on his elec¬

tion as a member of the Council of Five Hun¬

dred, took up his residence in Paris. He is said to have written to his brother in Egypt complaining of the incapacity of the executive Directory, and urging his return; and in 1799, when the council wished to outlaw Napoleon, Lucien, who was president, after manfully re¬

sisting the motion, slipped quietly out of the chair in the confusion and sent in soldiers who cleared the hall. The revolution thus mainly accomplished by his decisive procedure led to the establishment of the consular government, and Lucien was a member of the commission

which framed its constitution. Afterward ap¬

pointed Minister of the Interior, he was active in the encouragement of education, art and

science and organized the prefectures. As Am¬

bassador to Madrid (1800) he contrived to

gain the confidence of King Charles IV and his favorite, Godoy, and to undermine the Brit¬

ish influence, which had until then been para¬

mount at the court of Spain. On his return to Paris in 1802 he was a member of the tribunate, and then a senator, and having lost his first wife, married a stockbroker's widow. This

marriage, and other concurring causes, appear to have given deep offense to Napoleon, and in the enactment fixing the succession to the

crown, while Joseph and Louis were named

eventual heirs, Lucien and Jerome were not

mentioned. The crowns of Italy and Spain

were offered Lucien on condition of his divorc¬

ing his wife, but he refused them and chose a retired life, devoting himself to art and science.

He fixed his residence at Rome, where he ap¬

pears to have gained the good graces of Pius VII, who created him, in 1814, Prince of Canino. During Napoleon's haughty treatment of

the Pope, Lucien freely expressed his displeas¬

ure, and apparently despairing of a reconcilia¬

tion with his brother, or perhaps not caring to ask for it, he embarked for the United States in 1810, but had not proceeded far when he was captured by a British cruiser and carried to Malta. Ultimately he was brought to Eng¬

land and allowed to reside on parole near Lud¬

low Castle. Here he emploj^ed much of his

time in writing a poem entitled (Charlemagne ou l'figlise SauveeP After the battle of Water¬

loo his brother appointed him his extraordinary commissioner to the chamber of deputies. He showed no lack of zeal in endeavoring to arouse a feeling of sympathy, but found the attempt vain and had to leave matters to take their course. He afterward returned to Italy. Be¬

sides the poem (Charlemagne, > which has been translated into

English, he wrote another, called (La Cyrneide ou la Corse SauveeP and an auto¬

biography, published during his lifetime.

By his first wife, Lucien had two daughters; by his second nine children. His eldest son, Charles Lucien Jules Laurent Bonaparte,

Prince of Canino and Musignano : b. Paris, 24

May 1803; d. 30 July 1857, achieved a consider¬

able reputation as a naturalist, chiefly in or¬

nithology. He published a continuation of Wil¬

son's (Ornithology of America) (1825-33) ; the Uconografia della Fauna Italica) (1832-41) ; his chef d'oeuvre, *etc.* During the later years of his life he took a prominent part in Italian affairs as a supporter of the Liberal party. One of his sons was Cardinal Lucien Bonaparte

(1828-95). Paul Marie Bonaparte, the sec¬

ond son, b. 1808, took part in the Greek war of liberation and died by the accidental dis¬

charge of a pistol in 1827. The third son, Louis Lucien Bonaparte (b. Thorngrove, England,

1813; d. 1891), early devoted himself with equal ardor to chemistry, mineralogy and the study of languages, and became an authority of the first rank in Basque, Celtic and comparative philology generally. His election for Corsica in 1848 was annulled, but he was sent to the Constituent Assembly for the Seine department next year, and was made senator in 1852. The total number of separate books written either by himself or at his instigation and encourage¬

ment amounted to no less than 222. Among

these are a translation of Saint Matthew's ver¬

sion of the parable of the sower into 72 lan¬

guages and dialects of Europe (1857); a lin¬

guistic map of the seven Basque provinces,

showing the delimitation of the (<Euscara,):> and its division into dialects, sub-dialects and varieties (1863); a Basque version of the

Bible in the Labourdin dialect (1865) ; a

treatise on the Basque verb (1869), *etc.* A great work produced under his patronage from 1858 to 1860 was a version of the Song of Sol¬

omon in 22 different English dialects, besides four in Lowland Scotch and one in Saxon. He

lived long in England, where a Civil List pen¬

sion of $1,250 was granted to him in 1883.

The fourth son, Pierre Napoleon Bonaparte

(1815-78), passed through many changes of for¬

tune in America, Italy and Belgium and re¬

turned to France in 1848. In 1870 he shot a journalist, Victor Noir, a deed which created great excitement in Paris; and being tried, was acquitted of the charge of murder, but con¬

demned to pay $5,000 to Victor Noir's relatives.

The youngest son, Antoine Bonaparte (1816—

77), fled to the United States after an affair with the papal troops in 1836, and returned to France in 1848, where he was elected to the National Assembly in 1849.

ˆ BONAPARTE, Napoleon. See Napoleon

BONAPARTE PRETENDERS. Of the

Emperor Napoleon I and his brothers, Joseph and Louis, male issue is now extinct. The

Emperor's brothers, Lucien and Jerome, are

represented by the following living descendants, and they constitute the present imperialist house of France :

Prince Victor Napoleon (of the house of

Jerome) : b. 18 July 1862, is the son of the late Prince Napoleon and the Princess Clotilde, sis¬

ter of King Humbert of Italy. The Prince has been recognized by his party as the undisputed head of the Bonaparte family. He married in 1910 Princess Clementine of Belgium, has one son, Louis, born in 1914, and resides in Brussels.

His only brother, Prince Louis Napoleon, born in 1864, is an officer in the Russian army. His sister, born in 1866, is the widow of Prince Amadeus of Italy, by whom she had a son,

Prince Humbert, born in 1889.

Prince Charles Napoleon, brother of the

late Cardinal Bonaparte, who died 12 Feb. 1899, was the last representative of the eldest son of Napoleon's brother, Lucien, in the male line.

He was born in 1839 ; was married and had two daughters — Marie, wife of Lieutenant

Giotti, of the Italian army, and Eugenie, un¬

married. He had four sisters, three of whom were married, respectively, to the Marquis of Roccagivoine, Count Primoli and Prince Gabrelli.

Prince Roland Bonaparte is the only living

male cousin of Prince Charles Napoleon. He is a son of the late Prince Pierre Napoleon Bona¬

parte (1815-81) ; was born in 1858; married in 1880 the daughter of Blanc, the proprietor of the Monte Carlo gambling establishment. He

has been twice president of the French Geo¬

graphical Society, is keenly interested in scien¬

tific research and travel, and has written books on those subjects. His wife died in 1882, leav¬

ing him a daughter, Marie, and a fortune. His daughter was married in 1907 to Prince George, second son of King George I of Greece. He has one sister, Jeanne, born in 1861, and mar¬

ried to the Marquis de Villeneuve.

BONAPARTES OF BALTIMORE, the

branch of the family residing in Baltimore, Md., and derived from the marriage of Jerome Bona¬

parte, brother of the Emperor Napoleon I, with Elizabeth Patterson, daughter of William Pat¬

terson, an eminent merchant in the city of Baltimore. Elizabeth was born 6 Feb. 1785, and was scarce 18 years of age when Jerome Bona¬

parte in command of a French frigate landed in New York in 1803. She, at that time, was distinguished by uncommon personal beauty,

and is said, moreover, to have strikingly re¬

sembled the Bonaparte family. The fame of

Napoleon ensured for his brother Jerome a dis¬

tinguished reception in America, and wherever he went he was most hospitably entertained

On visiting Baltimore he saw Miss Patterson, and soon became much attached to her, a par¬

tiality which she readily returned, and being ambitious in her views of life, she at once ac¬

cepted his offer of marriage, and was united to him 24 Dec. 1803. The marriage ceremony was performed by the bishop of Baltimore,

John Carroll, brother of Charles Carroll of Carrollton, the signer of the Declaration of Independence, and in accordance with the ritual of the Roman Catholic Church. The marriage

contract, considered of importance, was drawn up by Alexander J. Dallas, subsequently Secre¬

tary of the T reasury, and witnessed by several official personages, including the mayor of Bal¬

timore. Jerome Bonaparte remained in America for a full year, visiting, with his wife, various parts of the country. They embarked for

Europe in the spring of 1805, in the American ship Erin, and arrived safely at Lisbon. The news of the marriage proved very distasteful to the dictator of France, partly because Jerome had dared to marry without his consent, and partly on account of his own wish to unite all his brothers to European princesses. Before

the newly wedded pair could reach Europe an order went forth to every port under French authority forbidding them to land. The hopes of the fair American were now forever blighted, as Napoleon sternly refused to recognize her marriage. Jerome left her at Lisbon and

hastened to Paris, hoping by a personal inter¬

view to soften the Emperor, directing the ves¬

sel to proceed to Amsterdam, as the state of his wife's health would not admit of her under¬

going a long land journey, even if a passport could be obtained for her, which was very

doubtful. On the Erin's arrival at Tcxel roads, Madame Bonaparte found that an order had

been awaiting her coming, which prohibited her from landing. She was obliged to sail at once for England, where she established her abode, and at Camberwell, near London, gave birth to a son. She never saw her husband again, ex¬

cept in a casual meeting many years after their separation. Jerome, who was originally much

attached to his wife, in vain petitioned the Emperor to recognize her, and was finally

obliged to marry the Princess of Wiirtemberg.

After the downfall of Napoleon, Madame Pat¬

terson (as she was styled for a long period) visited Europe, and is said to have encountered Jerome Bonaparte with his wife in the gallery of the Pitti Palace in Florence. On meeting, Jerome started aside, and was overheard to

say to the Princess: ((That lady is my former wife.® He instantly left the gallery, and next morning departed from Florence. Napoleon I

never succeeded in inducing Pope Pius VII

to declare Jerome's first marriage null and void.

Madame Bonaparte, after the birth of her son, generally resided in Baltimore, in the possession of abundant wealth. Notwithstanding her treat¬

ment by Napoleon, she always expressed the

highest admiration for him, and prophesied that her grandson would eventually succeed him as Emperor of the French. Jerome Napoleon, son of the preceding: b. Camberwell, England, 7

July 1805; d. Baltimore. 17 June 1870. His 208

mother returned to the United States during his boyhood, and he was raised in Baltimore.

He entered Harvard College, and graduated

from that institution in 1826. He studied for the bar, but never practised law. He was mar¬

ried to Miss Susan Mary Williams, daughter

of Benjamin Williams, originally of Roxbury, Mass. Miss Williams was a lady of very large fortune, which, united with Bonaparte's own

property, made him one of the wealthiest citi¬

zens of Baltimore. After his marriage he

devoted his time to the management of a large estate, and partly to agricultural pursuits. For many years, Bonaparte received a handsome

allowance from his father, with whom he was on terms of intimacy in his several visits to Europe. During the reign of Louis Philippe, Bonaparte was permitted to sojourn in Paris, but for a short period only, and under his mother's name of Patterson. Although travel¬

ing incognitOj he attracted much attention from his singular likeness to the great Emperor. He was thought to resemble him more than any of the monarch's own brothers did. He was on

good terms with Napoleon III, and visited the French court with his son, by the invitation of the Emperor. Bonaparte tested his legal

standing in the French courts by lodging a claim to share with the offspring of the second mar¬

riage in the property of his father; but judg¬

ment was given against him. Jerome Napoleon, grandson of Jerome Bonaparte: b. Baltimore,

5 Nov. 1832; d. Pride's Crossing, Mass., 4

Sept. 1893. He was educated at Harvard Col¬

lege and West Point Military Academy, but

resigned his commission in the United States army to enter the French

service in 1854. He served with distinction in the Crimean War

and in the Italian campaign. Charles Joseph, grandson of Jerome Bonaparte: b. Baltimore,

9 June 1851 ; d. there, 28 June 1921. He was graduated from Harvard University in 1871

and the Flarvard Law School in 1874. In

1904 he was appointed a member of the Board of Indian Commissioners. In 1905 he

was appointed Secretary of the Navy by

President Roosevelt and in 1906 became

Attorney-General, remaining in this position

until 5 March 1909. Was trustee of Catholic University from 1904, and a member of the coun¬

cil of National Civil Service Reform League.

BONAR, Andrew Alexander, Scotch ec¬

clesiastical writer: b. Edinburgh 29 May 1810; d. Glasgow, 30 Dec. 1892. He studied theology in his native place and became minister at Collace (1838—56) and of the Finnieston Church, Glasgow (1856-92). He joined the Free Church in 1843 and became moderator in 1878. He

visited Palestine, in company with R. M.

McCheyne, in 1839 to inquire into the condition of the Jews there, and he embodied the result of his investigations in (A Narrative of a Mis¬

sion of Inquiry to the Jews from the Church of Scotland in 1839 } (Edinburgh 1842). Among his other published works are a biography of R. M. McCheyne (1845); Commentary on

Leviticus* (1846) ; Redemption Drawing Nigh*

(1847); Christ and His Church in the Book

of Psalms* (1859) ; and many minor biog¬

raphies, tracts, pamphlets and controversial ar¬

ticles. A. A. Bonar was a younger brother of Horatius Bonar (q.v.).

BONAR, Horatius, Scottish ecclesiastical

writer and elder brother of A. A. Bonar (q.v.) : b. Edinburgh, 19 Dec. 1808; d. Edinburgh,

31 July 1889. He was educated in his

native city where he studied theology and

became minister at Kelso (1837-66) and

at the Chalmers Memorial Church, Edinburgh

(1866-89). Like his brother he went over to the Free Church in 1843, and like him he was also a pronounced premillenarian and his views run all through his works, among the principal of which are (Prophetical Landmarks* (London 1847) ; <The Night of Weeping* (1846) ; Cod's Way of Peace* (1862) ; (The W hite Fields of France* (1879) ; and Rife and Work of G. T.

Dodds* (1884). Much of his miscellaneous

work appeared in the Quarterly Journal of

Prophecy , which he founded in 1849. He is best known as a hymn writer. His poetical

works appeared in four different editions:

(Hymns of Faith and Hope* (3 vols., 1857-66) ; (The Song of the New Creation and Other

Pieces* (1872) ; (Hymn of the Nativity*

(1878); (Songs of Love and Joy* (1888);

(Until the Daybreak and Other Hymns* (1890).

BONAR LAW, A. See Law, Andrew

Bonar.

BONASONE, bo-na-so'na, Giulio, Italian

painter: b. Bologna 1510; d. 1574. He studied under Marcantonio Raimondi, but did not equal his master in execution. Although best known by his engravings, which reproduce the works of Raphael, Michelangelo and Giulio Romano,

specimens of his paintings are to be found in the churches of his native city.

BONASUS, a species of wild ox, the

aurochs (q.v.).

BONA VENTURA, Saint (properly John

of Fidanza), Italian philosopher: b. Tuscany 1221 ; d. 1274. In 1243 (or 1248) he became a Franciscan monk; in 1253 teacher of theology at Paris, where he had studied ; in 1256 general of his order, which he ruled with a prudent mixture of gentleness and firmness. At the

time of his death he was a cardinal and papal legate at the Council of Lyons. His death was hastened by his ascetic severities. On account of his blameless conduct from his earliest

youth, and of some miracles ascribed to him, he enjoyed during his life the greatest venera¬

tion, and was canonized by Pope Sixtus IV.

The elevation of thought in his writings pro¬

cured him the name of ((The Seraphic Doctor.**

The Franciscans oppose him as their hero to the Dominican scholastic Thomas Aquinas. He

wrote for the honor and improvement of his order, for the promotion of the worship of the Virgin, on celibacy, transubstantiation and other doctrines. He is, on the whole, distinguished from other scholastics by perspicuity, avoid¬

ance of useless subtleties and greater warmth of religious feeling. Among his writings are Utinerarium Mentis in Deum* ; (Reductio Artium in Theologiam* ; (Centiloquium* ; and

(Breviloquium.* His whole works were pub¬

lished 1588-96, at Rome, in seven folio volumes, and there are several modern editions. Many pieces attributed to him are not genuine.

BONAVISTA, Newfoundland, the name

of a bay, cape, district and town on the east coast of the island. The greatest width of the bay is 39 miles. Navigation is rendered dan-

gerous by the rocky islands with which it is studded. There is a lighthouse at the entrance of the harbor. The town stands near the cape, about 70 miles north by west of Saint John's, is a port of entry and one of the oldest fishing stations in Newfoundland. Pop. (1911) 3,971.

BONBRIGHT, Daniel, American educa¬

tor: b. Youngstown, Pa., 1831; d. 28 Nov. 1912.

He was graduated at Yale (1850) and was tutor there (1854—56). Between 1856 and 1858 he

studied at the universities of Berlin, Bonn and Gottingen, and upon his return to America be¬

came professor of the Latin language and litera¬

ture in Northwestern University, Evanston, Ill.

From 1899-1902 he was dean of the faculty of liberal arts. During 1900-02 he was acting

president of the university.

BONCHAMP, bon-shan, Charles Melchior

Artus, (Marquis de, mar-ke de), Vendean

leader: b. Anjou, 10 May 1760; d. 17 Oct. 1793.

He served as a volunteer in the American Revo¬

lutionary War, and was a captain in the French army at the outbreak of the French Revolution.

A strong Royalist, he naturally disliked the Revolution, and consequently lived in retirement until chosen leader of the Anjou insurgents. In conjunction with La Rochejacquelein and Cathe-lineau he fought wfith great bravery and fre¬

quent success, but his superior knowledge of military tactics was not sufficiently made use of by the insurgent army. In the encounter at Cholet, 17 Oct. 1793, Bonchamp received a fatal shot in the breast, and when his followers vowed to avenge his death on 5,000 Republican pris¬

oners, the dying hero exclaimed : <(Spare your prisoners. I command it P This last command was obeyed.

BONCI, bon’che, Alessandro, Italian

tenor : b. Cesena in the Romagna 1870. After early training and

successes in Italy and later in the great European capitals, in 1906 he came to New York as principal tenor of Hammer-stein's Manhattan Opera House, and in 1908

was engaged by the Metropolitan Opera Com¬

pany. In 1910 he resigned and took up concert work. Endowed with a perfectly trained voice of beautiful quality and flexibility he is con¬

sidered by many critics the best modern ex¬

ponent of bel canto.

BOND, Sir Edward Augustus, English

scholar: b. Hanwell 1815; d. 1898. In 1867 he was placed over one of the departments of the British Museum, and in 1878 became head li¬

brarian, retaining the post for 10 years. He was one of the founders and for many years the president of the Palscological Society, edit¬

ing in this connection facsimiles of Ancient Charters in the British Museum > (1873).

BOND, George Phillips, American astron¬

omer (son of William Cranch Bond, q.v.) :

b. Dorchester, Mass., 20 May 1825; d. 17 Feb.

1865. He assisted his father in the Harvard College Observatory, and at the time of the latter's death was appointed director. He dis¬

covered independently 11 new comets, and was the author of an elaborate memoir on the

appearance of Donati's comet in 1858, and of important investigations on the subject of per¬

turbations of cometarv orbits, as well as an investigation into the theory of the constitution of Saturn's rings. His drawing of the nebula in Orion, of which a fine steel-plate engraving vol 4. — 14

was made, was also remarkable work, and

astronomical photography received its first im¬

pulse at his hands.

BOND, Sir Robert, Newfoundland states¬

man: b. Saint John's, N. F., 25 Feb. 1857. He was educated at Queen's College, Taunton, Eng¬

land; entered the Newfoundland legislature in 1882; elected speaker 1884; was Colonial Secre¬

tary 1889-97 ; and has been Premier and Colo¬

nial Secretary since 1900. He negotiated the Bond-Blaine convention of 1892, and the Hay-Bond Treaty of 1902, providing for reciprocity with the United States, both of which failed to secure ratification. He is opposed to the incor¬

poration of the colony in the Dominion of

Canada, and was created K.C.M.G. in 1901.

BOND, William Bennett, Canadian cler¬

gyman: b. Truro, England, 10 Sept. 1815; d.

1906. He was appointed rector of Saint George's Church, Montreal, 1862 ; was consecrated An¬

glican bishop of Montreal, 25 Jan. 1879; in 1901

he became archbishop and metropolitan of Can¬

ada, and in 1904 primate of all Canada.

BOND, William Cranch, American astron¬

omer: b. Portland, Me., 9 Sept. 1789; d. 29

Jan. 1859. Beginning as a watchmaker, he con¬

structed the first ship's chronometer made in the United States. He established a private observatory at Dorchester, Mass., which was at the time the finest in the country. Invited to move his observatory to Cambridge, he accepted the invitation of the Harvard College authori¬

ties, and in 1840 was appointed astronomical observer to the college, and later to the director¬

ship of the observatory erected there in 1843-44.

He was the inventor of the method of register¬

ing the beats of a clock by galvanic circuit, together with the observed transits of stars over the wires of a transit instrument, upon a chron¬

ograph, and he invented the spring governor, in which part of a train of clockwork is regu¬

lated by a pendulum with a dead-beat escape¬

ment, and the other, receiving its motion

through an elastic axis, is made to run uni¬

formly by a balance-or flywheel, and thus time is visibly measured to a small fraction of a second. The plan of recording observations

by electro-magnetism, known in Europe as the American method, was first brought into prac¬

tical working by Sears C. Walker, through

Bond's assistance.

BOND. See Building; Masonry.

BOND, a written acknowledgment or bind¬

ing of a debt under seal. The person who

gives the bond is called the obligor, and he to whom it is given the obligee. A bond may

be single, as where the obligor obliges hims:lf, his heirs, executors and administrators, to pay a certain sum of money to another at a day named, or it may be conditional (which is the kind more generally used) that if the obligor does some particular act, the obligation shall be void, or else shall remain in full force, as pay¬

ment of rent, performance of covenants in a deed, or repayment of a principal sum of moner borrowed of the obligee with interest, which principal sum is usually half of the penal sum specified in the bond. There must be proper parties, and no person can take the benefit of a bond, except the parties named therein, except, perhaps, in some cases of bonds given for the performance of their duties by certain class s

of public officers. A man cannot be bound to himself even in connection with others. The bond must be in writing and sealed, but a seal¬

ing sufficient where the bond is made is held sufficient though it might be an insufficient sealing if it had been made where it is sued on.

It must he delivered by the party whose bond it is to the other. But the delivery and accept¬

ance may be by attorney. The date is not

considered of the substance of a bond, and therefore a bond wThich has either no date or an impossible date is still valid, provided the real day of its being dated or given can be proven. The condition is a vital part of a conditional bond, and usually limits and deter¬

mines the amount to be paid in case of a breach, but interest and costs may be added (12 Johns.

350). The recovery against a surety in a bond for the payment of money is not limited to the penalty, but may exceed so far as

necessary to include interest from the time of the breach.

So far as interest is payable by the terms of the contract, and until default made, it is lim¬

ited by the penalty, but after breach it is re¬

coverable, not on the ground of contract, but as damages, which the law gives for its viola¬

tion. On the forfeiture of the bond, or its becoming single, the whole penalty was for¬

merly recoverable at law, but here the courts of equity interfered, and would not permit a man to take more than in conscience he ought, that is, his principal, interest and expenses in case the forfeiture accrued by non-payment of money borrowed, the damages sustained upon

non-performance of covenants, *etc.* And the

similar practice having gained some footing in the courts of law, the statute of 4 and 5 Anne, c. 16, at length enacted, in the same spirit of equity, that in case of a .bond conditioned for the payment of money, the payment or tender of the principal sum due with interest and costs, even though the bond were forfeited and a suit commenced thereon, should be a full satisfaction and discharge (2 Bl. Com. 340). If in a bond the obligor binds himself without adding his heirs, executors and administrators, the execu¬

tors and administrators are bound, but not the heir (Sheppard's Touchstone, 369), for the law will not imply the obligation upon the heir (Coke, Lift. 209a). If a bond lie dormant for 20 years it cannot afterward be recovered; for the law raises a presumption of its having been paid, and the defendant may plead solvit ad diem to an action upon it (1 Burr. 434; 4 Burr.

1963). When chartered most corporations are

empowered to issue bonds, which must bear a fixed interest and run for a definite period.

Such bonds are either registered or coupon

bonds, the former issued to individual owners listed on the corporation's books who when

disposing of them, must authorize the transfer to the purchaser. Coupon bonds are payable

to bearer and attached to them are a series of coupons, which are promises of the payment of interest at stated periods. These coupons as they fall due are cut from the bond and pre¬

sented for payment. Corporation bond issues

are often secured by a mortgage made to a trustee for the bondholders on the property of the issuing corporation, and which may be fore¬

closed in the usual way upon default of pay¬

ment.

Government bonds are not secured by any

mortgage and their security rests upon the con¬

fidence of the purchaser in the issuing govern¬

ment. In many States the bonds of the State gov¬

ernment and in all States the issues of school, county and city bonds are covered by constitu¬

tional provisions which impose a limit to in¬

debtedness through bond issues. See Bonds,

Investment; and consult Cook, (Treatise on

Stock and Stockholders > (3d ed., Chicago 1894) ; Dillon, (Law of Municipal Bonds) (Saint Louis 1876) ; Hainer, (Modern Law of Municipal

Securities> (Indianapolis 1898) ; Short, (Law of Railway Bonds and Mortgages) (Boston

1897).

BONDAGE. See Villeins.

BONDED WAREHOUSE, a place where

taxable imports or manufactures may be left in government custody, under bond for payment

of the duty, till the importer or manufacturer is prepared to make full payment of duty. The system was designed to promote commerce and certain manufactures by lessening the pressure on the importer or manufacturer by means of instalment payments of duty.

BONDERS, a class of independent land¬

holders in Norway and Sweden. They are at

once burgesses and aristocrats, being descended from the old leaders, and sometimes from the princes, of the nation, yet being also cultivators of the soil, they equal in rank the farmers of America or the yeomen of England. They

number seven-ninths of the whole population, and are the principal electors of representatives to the National Assembly, in which their power predominates over that of the nobles and

clergy.

BONDI, bon'de, Clemente, Italian poet:

b. Mizzano, Parma, 1742; d. Vienna, 20 June 1821. Joining the Jesuits shortly before the suppression of the order in Italy, he was ap¬

pointed professor of eloquence in the University of Parma. He afterward provoked the hos¬

tility of the order by publishing an ode in praise of their suppression, and was obliged to seek an asylum in the Tyrol, where the Archduke Ferdinand took him under his protection, ap¬

pointed him his librarian at Briinn, and en¬

trusted him with the education of his sons, one of whom afterward succeeded to the duchy of Modena. In 1816 Bondi was appointed pro¬

fessor of history and literature at Vienna and died there. He was an easy and elegant versi¬

fier, and cultivated with success almost all the varieties of poetry — lyric, didactic, satirical and elegiac. Among the most important are

(La Giornata Villereccia,* (La Conversazione) and (La FelicitaP He also executed a metrical version of the 2Eneid, which some consider his best work.

BONDMAN, The, one of Hall Caine's

best-known romances (1890), abounding in

action and variety. The action turns upon the blind attempts of a young man at doing new wrongs to revenge old ones, which are over¬

ruled by Providence for good; and at the last, no longer against his will but by the develop¬

ment of his own nature, he fulfills his destiny of blessing those he has sworn to undo.

BONDS, Investment. — Investment bonds

are usually classified under the following gen¬

eral heads : Government, Municipal, Railroad, Public Utility, Industrial.

Government Bonds. — As indicated by the

name, a government bond is a bond issued by a government in exchange for money borrowed.

For the prompt payment of its bonds a govern¬

ment pledges its full faith and credit, and such a bond usually has back of it the unlimited power of the government to levy taxes to pro¬

vide funds for the payment of principal and interest.

Municipal Bonds. — Under the heading

Municipal bonds there are usually grouped not only the bonds of cities but also those of other political divisions, such as counties, school dis¬

tricts, townships, etc., and even including bonds of the States themselves. There are sometimes issued by cities, towns, etc., what are known as special assessment bonds payable by their terms solely from the levy of special taxes on certain property benefited by the improvement for

which the bonds were issued, but generally

speaking Municipal bonds are issued as the

direct obligation of the entire municipality and all of the property within the municipality is subject to the levy of sufficient taxes to pay prin¬

cipal and interest of the bonds. In nearly all of the States of the United States there are constitutional limitations governing the amount of bonds which may be issued by the cities, counties, etc., within the State, the limitations being usually a certain percentage of the as¬

sessed valuation of taxable property, but it is sometimes provided that the limitations of

debt shall not apply to bonds issued by a city for the construction or purchase of a support¬

ing property, for example, a water system,

docks, *etc.* In addition to the constitutional or statutory limitations of the amount of indebted¬

ness which may be incurred, the issuance of Municipal bonds is further safeguarded in

most of the States by laws which carefully pre¬

scribe the purposes for which they may be

issued as well as the steps which must be taken by the properly constituted authorities prelim¬

inary to and in connection with the issuance of the bonds, including, in most cases, the holding of an election and the levying of a tax to pro¬

vide for payment of principal and interest and advertisement of the bonds for some specified time. Municipal bonds are free from the oper¬

ation of the Federal Income Tax Law, and in many States Municipal bonds, issued within the State, are free from personal property tax.

Railroad Bonds. — Railroad bonds consti¬

tute the best known and most widely distributed type of bond issued by corporations. Practi¬

cally all of the railroad systems in the United States have bonds outstanding, and through the medium of their bond issues they obtain a large part of the money used in the construction of their properties. These bonds are held in large amounts by savings banks, national banks, trust companies, insurance companies and private in¬

vestors. In addition to their bonds secured by mortgage on the railroad property, some of the roads have outstanding a type of obligation known as Equipment bonds secured on certain of their cars or locomotives. An issue of

Equipment bonds is usually paid off in annual or semi-annual instalments covering a period of from 10 to. 20 years.

Public Utility. — During the past 25 years

in which there has been such a marked develop¬

ment and expansion of the properties supplying street railway, gas, electric light and telephone service, the bonds of companies supplying these public necessities have become widely known as a proper channel for conservative investment.

A large number of States have had for some years public service commissions which not only supervise the general operation of public utili¬

ties in the matter of the character of service, rates, etc., but also have authority to pass upon the issuance of securities by such companies.

In States haying public service commissions

with jurisdiction extending to the issuance of securities, the public utility companies may issue bonds only in such amounts and for such purposes and at such prices as the commission may approve.

Industrial.— Under this heading are

grouped the bonds of nearly all corporations except railroads and public utilities, as, for ex¬

ample, the United States Steel Corporation.

Designation, How Secured, *etc.* — Munici¬

pal bonds usually bear a designation indicating the purpose for which they were issued, as for example, water works bonds, school building, refunding, *etc.* Bonds issued by corporations also usualy bear a designation, as for example, first mortgage, refunding mortgage, general

mortgage, *etc.* The body of a Municipal bond in addition to acknowledging receipt of the face amount of the bond, and the promise to repay that amount on a certain date, contains a reference to the law under authority of which the bond is issued, the purpose of issue and a statement that it is one of a certain number of bonds aggregating a certain amount. It states the time and place of payment

of the principal and interest. The bond is ordinarily payable to bearer and the coupons attached representing the interest payments (usually semi-annual) are also payable to bearer. The bond is of course signed by the proper officials and bears the seal of the municipality. A fully registered bond is one which, instead of being payable to bearer, is payable to the designated owner. No in¬

terest coupons are attached to a fully registered bond, the interest being payable by check to the registered owner. Bonds are also sometimes

registered ((as to principal only,):> the bearer interest coupons being left attached to the bonds.

Bonds issued by the railroads and other cor¬

porations are also usually in the denomination of $1,000 in coupon form payable to bearer, al¬

though in many cases provision is made for issuing bonds fully registered or registered as to principal if desired by the holder.

Bonds issued by corporations are usually

secured by a mortgage on the property of the company, a trust company being named in the mortgage as trustee for the bondholder. For example, the board of directors of a company which does an electric light and power busi¬

ness may authorize an issue of $50,000,000 5 per cent bonds to be secured by mortgage on its property. Perhaps $5,000,000 of the bonds will be issued and sold, the remaining $45,000,000

bonds being held unexecuted and unissued by the trustee. The mortgage may provide that

additional bonds may be issued, for example, to cover 75 per cent of the cost of future addi¬

tions and extensions to the property usually with certain conditions that no additional bonds may be put out unless the company, is earning a certain surplus over and above its interest charges. If in

connection with the growth and development of its business, the company later 212

on expends, for instance, an additional $1,000,-

000 for new construction and its earnings have met the requirements of the mortgage, the trus¬

tee on presentation of the proper certificates would certify an additional $750,000 bonds and deliver them to the company to be sold to its bankers.

Walter E. Bell,

Of Harris, Forbes & Co., New York.

BONDU, bon-doo, a country of West

Africa, belonging to the French territory of Senegal, on the west of the Faleme, a tributary of that river. Its length is about 115 miles, its breadth about 100. Its surface is but little diversified, and the land as a whole is not very fertile, nor is the climate good. The ordi¬

nary African animals occur, but the lion is scarce. The ass is the chief domestic animal.

The population, which consists of Fulahs and other tribes, is rather sparse, having been re¬

duced by frequent wars, but under French rule the country is prospering and the population, numbering about 30,000, is increasing. Along well-watered river lands agriculture is being developed; crops of corn, cotton, rice, and millet are produced, and indigo is exported.

The natives wear cotton fabrics ; gold and iron ores abound, and

mining operations are increas¬

ing. Mohammedanism is the prevailing re¬

ligion. Bulibani, the capital and the residence of the native King, has a population of about 2,500.

BONDUCA, a tragedy by John Fletcher

(1579-1625), published in 1647. Its title was changed several times after its first production, which occurred before 1619. One of these titles was <Caractacus) ; the plot of the tragedy deals with Queen Boadicea's futile defense of Britain against the Roman legions of Suetonius Paulinus. The title (Bonduca) has also been used dramas by Charles Hopkins (1697) and Richard Glover (1753).

BONDY, Forest of, France, an historical

wooded region outside the northern walls of Paris, frequent allusions to which are found in French literature. It was formerly a notorious haunt of bandits. The powder factory of Sev-ran is located here and as an outpost Fort Auberviliers commands all the approaches to

Paris north of the forest.

BONE. See Bona.

BONE, the compact hard material making

up the skeleton of mammals, most of the birds, reptiles and amphibians, and the bony fishes.

It is also found in some lower forms. Chem¬

ically bone is complex. It is essentially organic substances, 30 to 35 per cent, infiltrated with inorganic mineral salts, 65 to 70 per cent ; to the former its toughness is due and to the latter its hardness. The organic substances of bone are ossein (collagen, gelatine), small

quantities of elastin, proteids and nuclein from the cells and small quantities of fat. The in¬

organic salts are calcium carbonate, calcium phosphate, calcium fluoride, magnesium phos¬

phate, calcium chloride and small quantities of sulphates and other chlorides. The percentages of both inorganic and organic constituents vary widely in the bones of different animals, and also in the different bones of the same animal.

These differences vary widely if the age varies, but are fairly constant for the same animal of the same age. Thus the amount of water may vary from 13 to 45 per cent in the different bones of the human body, being greater in

amount in the spongy bones and less in the compact bones, and as the bones grow older the percentage of water diminishes. In the living body many of the bones, particularly the ribs, and the heads of all the long bones, contain a substance termed marrow. This is an import¬

ant substance in the human economy, being the source of much of the blood-building material.

In soups this marrow makes one of the most important factors. This bone marrow is per¬

vaded by a network of white fibrous connective tissue and in the meshes are contained the cells, myeloplaxes, that make many of the blood cor¬

puscles, particularly the polymorph neutrophiles and the eosinophiles. In the red marrow the red corpuscles are developed. The bone mar¬

row is very rich in proteids, nucleo-proteids, extractives, globulins, fats and compounds of iron. Prepared “bone marrows are therefore

highly nutritious, and the modern ((grilled

bone,)J which is usually rich in marrow, is a toothsome and valuable dietary addition. The histological structure of bone is very intricate ; in the young developing animal, cartilage first makes its appearance from modified connective tissue cells. In this cartilage certain points of ossification appear, which subsequently develop bone and the bone from several points coalesces to make the completed bone structure. The bone cells in the cartilage, the osteoblasts, thicken and form a

distinct cell wall in which the inorganic salts are deposited and osteoblast by osteoblast the structure of bone is made up. Bone is also formed by the periosteum, which is a covering, first of the cartilage and then of the developing bone. Bony tissue contains arteries, veins,

nerves and lymphatics, and is a distinct tissue, largely modified by the deposition of mineral salts. In a section across a long bone, at its centre, say the thigh bone or femur, there is on the outside the thin tough layer, the periosteum with its vessels and nerves and lymphatics ; within this is the compact bone and in the centre the cavity usually filled with marrow at the ends. A very thin section of the compact bone viewed under the microscope shows a

number of cavities, the Haversian canals ; these contain blood vessels or were the sites of for¬

mer blood vessels in the developmental stage.

Around these Haversian canals, one sees regu¬

lar lamellae, not unlike the rings about a tree trunk; these are the Haversian lamellae and indicate the regular growth of bone cells from the centre. Scattered between the lamellae are numerous small spaces, containing living bone cells, the lacunae, all of which are probably in communication with one another by minute

canals, or canaliculi. Thus the entire bony sys¬

tem is pierced throughout by an extremely fine and exceedingly rich network of canals. As

these are filled with lymph the bone substance is constantly bathed in this living life-giving fluid.

The different bones of the body show minor variations in structure. The bones of the human body are grouped according to their shape,

as long bones, flat bones, short and irregular bones. They approach one another at the

joints, where they are protected by cartilages, smooth synovial membrane, and bathed in a

synovial fluid. The long bones consist of a

shaft and two expanded ends or epiphyses, and are found in the limbs. They give support and leverage for motion and are usually slightly curved in one or two directions to give greater elasticity. Flat bones are found in the skull, pelvis, scapula, and are usually so disposed as to afford protection to the internal viscera; they also offer considerable surface for muscu¬

lar attachment and hence give a good leverage for the long bones. Short bones are found in the wrist and ankle. Strength and freedom of motion are their attributes. Irregular and mixed bones are the vertebne and some of the bones of the skull. They each have varied and spe¬

cially adaptive functions. Many bones, especially those of the skull, are composite. They de¬

velop separately, and finally unite. Thus the bones of the skull are separated until late in life, and in some individuals, some of the bones never develop thoroughly. This is frequently the case in the growth of the lower jaw, where failure to unite produces the well-known de¬

formity of cleft palate or hare lip.

Bone is slightly heavier than water, its

specific gravity varying from 1.80 to 1.90. The spongy bones, because of the large amount of air contained, float in water. The bones of birds are remarkable for their strength and lightness. The twofold nature of bones is read¬

ily demonstrated by two simple experiments : If one bone is placed in acid, 20 per cent hydro¬

chloric, the acid will attack and dissolve out the mineral salts, after which the bone may be bent and its shape altered at pleasure, nothing but the organic matter remains ; another simi¬

lar bone may be placed in a furnace and the heat will burn out the organic matter entirely; that which remains will be the mineral matter.

It will retain the shape of the original bone, will be white, but will break down into powder at the least pressure.

Uses of the Bones. — In dietetics bones

make a substratum for soups. These are im¬

portant carriers of salts to the body. As for the gelatine alone, it is a tissue sparer, the body cannot use it for purposes of anabolism, but it spares katabolism of proteids. It is a useful menstruum for foodstuffs. Bone marrow is

highly nutritious, contains iron and is a super¬

lative food, and thought to be particularly valu¬

able as a blood maker. The uses of bone in the arts are numerous. See Fertilizers. Consult

Syminowitch, (Histology J ; Gray, (Anatomy > ; MacEwen, (Growth of Bone> (New York

1912). See Anatomy; Kinetogenesis ; Oste¬

ology.

BONE BLACK. See Blacks.

BONE-CAVES, caverns containing depos¬

its in which are embedded large quantities of the bones of animals (many of them extinct), dating from the Pleiocene or later geologic periods. See Cave.

BONE DISEASES. See Osteomyelitis;

Periostitis ; Osteitis.

BONE-DOG. See Bone-shark; Dog¬

fish.

BONE-DUST, bones ground to dust to be

used as manure. See Fertilizers.

BONE-FISH. See Lady-fish.

BONE-SHARK, or BASKING-SHARK,

a comparatively rare species of pelagic shark, found in th ‘ Arctic seas, and southward as far as Portugal and New York. It obtains the

name ((bone-shark® from the resemblance of its slender, long and close-set gill-rakers to whale¬

bone. It is also known as (<basking-shark,® be¬

cause of its habit of remaining quiet for hours in one place. It reaches a length of 40 feet and its skin is rough and covered with small spikes.

It is usually seen in the brooding season, slug¬

gishly swimming in groups, on the surface of the water, and undisturbed by the approach of boats.

BONEBREAKER, the great fulmar-pe¬

trel (Ossifraga gigantea) of the islands and coasts of the south Pacific and Atlantic oceans.

It is as large as the albatross, and feeds mainly upon the carcasses of dead seals and cetaceans, whose bones it is capable of breaking with its vulture-like beak.

BONER, Ulrich, the most ancient Swiss

fabulist, a Dominican friar at Bern, in the first half of the 14th century. His collection of fables under the title (Der Edelstein) ((The GenP), is distinguished by purity of language and picturesque simplicity of description. The first editions of these fables were by Bodmer and Eschenburg. Benecke published a very

good edition with explanatory notes and an ex¬

cellent vocabulary (1816) ; that of Pfeiffer appeared in 1844, and a recent imprint is found in Reclam's (Universal BibliothelP (1895).

BONESET, or THOROUGHWORT

(Eupatorium perfoliatum) , a stout, ill-smelling perennial herb of the natural order Composite e, native of America, common in moist soils.

The plants, which attain a height of sometimes eight feet, are often planted as ornamentals in low ground. In midsummer when the profu¬

sion of purplish or white flowers are in full blow they are striking objects. The foliage and flowers have been used as tonic and sudorific in domestic medicine ; their intensely bitter taste also acts as an emetic. See Eupatorium.

BO'NESS, a contraction of the older form

Borrowstounness, a parish and seaport in

Linlithgowshire, Scotland, distant 24 miles

west by north of Edinburgh by rail. It

is situated on a low peninsula washed

by the Forth, and possesses three prin¬

cipal streets running from west to east, one of them a continuation of the other two. The

chief industrial establishments are potteries, iron foundries, engineering shops, chemical

manure works, sawmills, timber yards, salt

works, distilleriess, brick fields, etc., and in the vicinity are very extensive collieries. A new dock has recently been constructed and the old harbor improved, hydraulic hoists and other

appliances being provided. Adjacent to Bo'ness are remains of the Roman wall of Antoninus.

Pop. 10,862.

BONET, bo-net', Juan Pablo, Spanish

teacher of the deaf and dumb of the 17th cen¬

tury, distinguished as one of the earliest teach¬

ers of this class, and the author of a remark¬

able work, (Reduccion de las letras y artes para ensenar a hablar a los mudos, * published in Ma¬

drid, 1620. It explained his method of instruc¬

tion, containing the first alphabet for the deaf and dumb, and was of good service to Dal-garno, Wallis, and, a century later, to_ the Abbe de l'Epee, who acknowledged his indebtedness to Bonet's labors.

BONET-MAURY, bo'ne-md're', Amy—

Gaston-Charles-Auguste, French Protestant

divine and author: b. Paris, 1842. A student of the Lycee Henri IV,

Paris, and in Geneva and Strassburg, from 1868 to 1872, he was pastor of Walloon churches in Belgium and of churches at Beauvais and Saint-Denis. In 1879 he was appointed lecturer in church history in the Paris Protestant School of Divinity, and later as librarian of the Musee Pedagogique was

active in making the history of French Protestanism better known. He is the author of

numerous books including (Role des heresies

au moyen age' (1879) ; (Arnauld de Brescia, unreformateur au XIIe siecle' (1881) ; Eng¬

ines du christianisme unitaire chez lcs Anglais) (1881) ; (Le Congres des religions a Chicago en 1893 J (1895) ; (Histoire de la liberte de conscience depuis l'edit de Nantes jusqu 'a juillet 1870) (1900) ; (L'Islamisme et le Christianisme en Afrique) (1906) ; L'unite morale des religions) (1912).

BONFIGLIO, bcm-fe'lyo, or BUONFIG—

LIO, Benedetto, Italian painter: b. 1425 (?) ; d. 1496 (?). His chief work was the frescoes of the Palazzo Comunale at Perugia, where he lived. These frescoes placed him in the first rank of the painters of the Umbrian school. It is believed that he also assisted Pinturicchio in decorating the Vatican.

BONGABONG, Philippines, a town in the

southeast part of Luzon. It lies in a moun¬

tainous district, and attained military import¬

ance as the headquarters of a United States regiment. The town has a municipal govern¬

ment based upon popular election. Pop. about 23,000.

BONGAR, bon'gar, a serpent of the genus

Bungarus. See Krait.

BONGHI, Ruggero, rood-ja'ro-bon'ge,

Italian scholar and publicist: b. Naples, 21

March 1828; d. near Naples, 22 Oct. 1895. The commencement of his brilliant career indicated scholarly activities only, for he made fine stud¬

ies aud versions of Aristotle and Plato ; but latterly he took up such subjects as 'The Finan¬

cial History of Italy, 1864— 68 ' (1868) ; (The Life and Times of Valentino PasinP (1867);

'Pius IX and the Future Pope) (1877) ; his¬

tory of Rome) (1884), and 'The Life of Jesus) (1890) ; (The Roman Festivals' (1891) ; the popularity and value of these and other works giving him great prominence. He held pro¬

fessorships in several Italian universities; was Minister of Public Instruction in 1874-76; was a member of the Chamber of Deputies nearly continuously from 1860; founded the Stampa,

the leading Turin journal, and the magazine Cultura, of which he was editor at the time of his death; and presided over the International Peace Congress held in Rome in 1891.

BONGO , or OBONGO, the name of a

negroid people in the basin of the Ogowe

River, in the French Kongo. They live by the chase, grazing and agriculture, and are skilled workers in iron.

BONGO, a large West African bushbuck

(q.v.).

BONHAM, bon-am, Milledge L., Ameri¬

can lawyer and soldier : b. Edgefield, S. C., 25

Dec. 1815; d. White Sulphur Springs, N. C., 27

Aug. 1890. He was graduated at South Car¬

olina College, 1834; was admitted to the bar 1837, and served as a representative in Con¬

gress 1840-44. In 1836 he was major and adju¬

tant-general of the South Carolina Brigade in the Seminole war in Florida, and colonel of the 12th United States Infantry during the Mexican War. In 1856 he was elected to Congress as a State Rights Democrat, and reelected in 1858, but left Congress 21 Dec. 1860, when the South Carolina delegation withdrew. Commissioned

a brigadier in the Confederate army, 19 April 1861 ; he commanded Beauregard's centre at the first battle of Manassas, but gave up his com¬

mission to enter the Confederate Congress, 27

Jan. 1862. He was governor of South Carolina 1862-64, when he was again commissioned a

brigadier-general, and was serving with Gen¬

eral Johnston at the time of the latter's sur¬

render. In 1868 he was a delegate to the Na¬

tional Democratic Convention in New York.

BONHAM, Tex., town and county-seat

of Fannin County, situated on the Texas & P.

and the Denison, Bonham & New Orleans rail¬

ways, 75 miles northeast of Dallas. It is the seat of Carlton College and the Masonic Fe¬

male Institute. As the centre of an agricultural region it has a large export trade, especially in cotton, fruit, grain, flour and live stock. Its chief manufacturing industries are flour mills, cotton-gins, machine shops, carriage and wagon factories, tobacco factories, a creamery, ice fac¬

tory, planing mills. Pop. (1920) 6,008.

BONHEUR, bo-ner, Frangois Auguste,

French painter, brother of Rosa Bonheur: b.

Bordeaux, 4 Nov. 1824; d. 23 Feb. 1884. The beauty of his landscapes has been much praised.

He was made Chevalier of the Legion of

Honor in 1867 and received numerous medals.

BONHEUR, Jules Isadore, French

painter and sculptor, brother of Rosa

Bonheur (q.v.) : b. Bordeaux, 15 May 1827.

In the Salon of 1848 he exhibited both

paintings and sculpture but in later years

confined himself to sculpture. Medals were

awarded him in 1865 and 1867. Among noted

works of his are (The Zebra and Panther) ; and ‘The Tiger Hunter.’

BONHEUR, Marie Rosa, French artist

of distinction, widely known as a painter of animals : b. Bordeaux, 22 March 1822 ; d. Fon¬

tainebleau, 25 May 1899. Of Jewish origin, she received her earliest instruction in art from her father, himself an artist of repute, and when only 18 years old exhibited at the Salon two pictures, ‘Goats and Sheep,) and ‘Two Rab¬

bits,) which gave clear indications of talent.

In 1849 her fine work, ‘Labourages Nivernais,’

was purchased by the French government and

placed in the Luxembourg collection. In 1855

(The Haymaking Season in Auvergne ‘ was

hung at the Universal Exposition in Paris, and in the same year she sent the ‘Horse Fair’ to the French Exhibition in London, where it was the centre of attraction for the season. It was offered by her to Bordeaux for $6,000, but the offer being declined it was sold in England for $20,000. It was subsequently purchased by Cor¬

nelius Vanderbilt for the Metropolitan Mu¬

seum in New York. She made a quarter size replica which is now in the National Gallery in London. After this work she stood at the

very head of delineators of animal life, showing a wonderful power of representing spirited ac¬

tion. Her work is, however, marred by a de¬

ficient sense of atmosphere. Near her studio she had an antechamber as a stable for the convenient study of animals, of which she col¬

lected some noble specimens. She also attended horse markets and

fairs, generally wearing

masculine dress, which was not unbecoming to her strong and marked features. After 1849

she directed the Free School of Design for \ oung Girls in Paris. During the siege of Paris the Crown Prince of Prussia especially ordered that her studio and residence at Fon¬

tainebleau should be spared and respected. She received a first-class medal at the French Salon in 1849 and another in 1855, and the decoration of the Legion of Honor in 1865. In 1892 a celebrated painting by her, entitled (Horses Threshing Corn,5 was sold for $60,000. It is the largest animal picture ever painted, show¬

ing 10 horses large as life. In 1896, on her 74th birthday, she furnished a painting repre¬

senting the historical combat between two stal¬

lions to which Lord Godolphin invited his

friends in 1734. Characteristic samples of her work — (Deer in the Forest,5 (A Limier-Briquet Hound) and AVeaning the Calves) —

are in the Metropolitan Museum of Art, New York, and (Deer Drinking5 is hung in the Pub¬

lic Library of that city. Consult Larnelle, (Rosa Bonheur, sa vie et ses ceuvres) (1885) ; Peyrol, (Rosa Bonheur: Her Life and Works5 ; Stranahan, (A History of French Painting5

(1899), and the monograph by Klampke (Paris 1908).

BONHOMME, bo-noW, Jacques, a term

of ridicule used by the French nobility to designate the common people, especially the

peasants.

BONHOMME RICHARD, the flagship

of John Paul Jones (q.v.), in the most remark¬

able naval victory on record, 23 Sept. 1779; originally the Durcis, a worn-out, unseaworthy merchant Indiaman assigned to him by the

French government because none of their own naval officers would serve under a foreigner, and renamed by Jones from Franklin's (Poor

Richard,5 because he obtained her by following one of its maxims. She had 21 guns on a side, mainly 12-pounders, with three 18-pounders aft near the water line ; and a mongrel crew of Americans, British, Portuguese and other

classes. With three other vessels in the squad¬

ron Jones intercepted, off Flamborough Head, on the east coast of England, a British fleet of naval stores from the Baltic, convoyed by the Serapis (Capt. Richard Pearson) and the

Countess of Scarborough. The latter was cap¬

tured by one of Jones' squadron; the former about 7 o'clock on a moonlight night joined battle with the Richard, having 25 guns on a side, 10 18-pounders — a much greater weight of metal than its foe, and with far more pene¬

trating power than the 12-pounders of the

American ship. To neutralize this advantage

Jones' policy was to fight at close range; and in the attempt to rake the Serapis the two ves¬

sels swung broadside to and were lashed to¬

gether by Jones, and fought the rest of the battle so close that the guns could not be run out full length, their muzzles touched and the rammers of each had to be thrust into the port¬

holes of the other to load. Only those of the starboard side of each could be used. Two of Jones' 18-pounders burst at the first fire; his lighter guns were gradually silenced by the Serapis; the entire sides of his vessel were shot away, so that the Serapis' shot passed through without touching anything; she caught fire in several places ; she had been leaking at the outset and now had several feet of water in the

hold ; and an under-officer in affright let the 200 or 300 British prisoners loose and ran to tear down the colors, but finding the flag-pole gone began to shriek for quarter. Lieutenant Dale with immense presence of mind set the prisoners at the pumps, not only saving a guard but releasing the pumpmen to fight; Jones broke the officer's head with a pistol-butt, and in answer to Pearson's inquiry if he was ready to surrender, replied, ((I have not begun to fight yet,55 though the Serapis was firing heavily and his own guns were nearly still. Meantime, how¬

ever, the deadly musket fire from the Richard's top gear had made the service of the upper guns of the Serapis almost sure death, and they too were silenced ; a cannon-shot brought down her mainmast; the combustibles thrown from the

Richard wrapped her upper deck in fire ; at last a bucket of hand-grenades flung down her

hatchways set off a mass of cartridges strewn along the decks, killing or wounding nearly all those around and wrecking five guns; and just then Jones' ship, the Alliance — whose timid, half-insane French captain had been tacking

about, occasionally firing grapeshot at random into both vessels, came near, and Pearson struck his colors, though four of his guns were still firing and his ship was sound. Jones put Dale aboard the Serapis, and tried to navigate the Richard to a friendly port; but at 9 o'clock of the 25th she had to be abandoned, and she sank about an hour later.

BONI, bb'ne, a district, formerly a king¬

dom, in the island of Celebes, Dutch East In¬

dies, with an estimated area of about 1,000

square miles. This territory is mountainous, but, though contiguous to the great volcanic belt of the archipelago, exhibits no traces of volcanic action. Lompoo-Batang (great pillar), its highest peak, and the loftiest in Celebes, attains an elevation of 8,200 feet above the level of the sea. Lake Labaya, or, as called by the natives, Taparang-Danau, in the northwest cor¬

ner of this territory, is a beautiful sheet of water, 24 miles long and 13 broad, with an aver¬

age depth of six fathoms, and abounds in fish.

It is bordered on all sides by a luxuriant and richly diversified tropical growth, except at the mouths of the numerous little streams that

empty into it, where clearings and beautiful, picturesque little villages, attest the industry, skill and civilized tastes of the Bugis people.

Boni was formerly the most powerful state in Celebes, but since 1859 has been practically a Dutch dependency. In the north the scenery is fine and the soil fertile — rice, sago, cassia, coffee and tobacco being produced. The lan¬

guage of the inhabitants is allied to that of the Macassars, with a literature of its own. Their towns and villages dot the. coast, and as enter¬

prising merchants and sailors the Bugis are found in every port of the East Indian Archi¬

pelago; they also engage in agriculture and horse breeding, and in the manufacture ot

cotton and articles of gold and iron, in which they have a large trade. They are well built, active and brave, and are lighter skinned, as well as superior in honesty and morality to other Malay races. Their institutions, said to be very ancient, partake of the character of a constitu¬

tional monarchy. The British have twice at¬

tacked the Bonese for injuring their commerce and selling the crews of British ships into slavery. In the second attack, in 1814, the Bonese King was killed. The number of the

population is unknown, estimated from 200,000

to 300,000.

BONI HOMINES, ho'mi-naz, a title

borne by several monastic brotherhoods, the

most noted of which is the Order of Grammont or Grammontensians, the Sack Brethren

and the Canons Regular of San Giorgio. A

later addition to the Boni Homines was the Order of San Salvador. In Portugal there

were 14 houses of the order and missions were maintained in India and Ethiopia. Still later the Minims also joined the order. The title is an old one of Latin origin which was per¬

petuated in various ways in Italy. The 12 men selected to restore order in Florence in the 13th century after the withdrawal of the

Ghibellines were called ((buoni uomini,® and a like title was given to the overseers of the 13

city districts of Rome in the following century; while the Grammontensians were called <(bons hommes® at Vincennes and probably in other

parts of the country.

BONIFACE, Saint, the apostle of Ger¬

many, who first preached Christianity : b. Cred-iton, England, 680; d. Dokkum, West Friesland, 5 June 755. His original name was Winfrid.

In the cloister school at what is now Exeter he received his first lessons in secular and religious training, and at the age of 18 he entered the Benedictine monastery in South-hamptonshire and shortly after received the

habit of Saint Benedict. In his 30th year he was consecrated a priest. A great part of

Europe at this period was inhabited by heathen peoples, and several missionaries set out from England and Ireland to convert them. Among

these was Boniface, who in 718 went to Rome, where Gregory II authorized him to preach

the gospel to the nations of Germany. He

commenced his labors at Thuringia and Ba¬

varia, passed three years in Friesland and jour¬

neyed through Hesse in Saxony, baptizing

everywhere and converting the pagan temples

to Christian churches. In 723 he was invited to Rome, made a bishop by Gregory II and

recommended to Charles Martel and all princes and bishops. His name Winfrid he changed to Boniface. He destroyed the oak sacred to

Thor, near Geismar, in Hesse ; founded

churches and monasteries; invited from Eng¬

land priests, monks and nuns, and sent them to Saxony, Friesland and Bavaria. In 732 Greg¬

ory III made him archbishop and primate of all Germany and authorized him to establish bishoprics, the only existing bishopric being the one at Posen. He founded those of Freising, Ratisbon, Erfurt, Baraburg (transferred after¬

ward to Paderborn), Wurzburg and Eichstadt.

In 739 he restored the episcopal see of Saint Rupert at Salzburg. After the death of Charles Martel he consecrated Pepin the Short, King of the Franks, in Soisspns, by whom he was named archbishop of Mainz. He held eight

ecclesiastical councils in Germany, founded the famous abbey of Fulda and undertook, in 754, new journeys for the conversion of the infi¬

dels. In Fulda a copy of the gospels, in his own handwriting, is to be seen, and there is a statue to him also. At the place where Boni¬

face built, in 724, the first Christian church in North Germany, near the village of Altenburg, in the Thuringian forest, a monument has been erected to his memory. The most complete

collection of the letters of Boniface was pub¬

lished at Manz 1789, folio; and of his entire works, 2 volumes, Oxford 1845. Consult

(Lives) by Pahler (1879), Werner (1875),

Ebrard (1882).

BONIFACE, the name of several Popes.

Boniface I, elected 418 by a party of the clergy and confirmed by the Emperor Honorius, who

declared the anti-Pope Eulalius a usurper. Bon¬

iface condemned Pelagianism and extended his authority by prudent measures. In a contest with the Emperor Theodosius, who endeavored

to take from the bishops of Thessalonica their canonical jurisdiction over Illyria, he success¬

fully vindicated the primacy of the Roman see.

He died in 422. Boniface II, elected 530; d.

532. The death of his rival, the anti-Pope Dioscorus, a few days after his election, left him in quiet possession of the papal chair.

During his pontificate Saint Benedict laid the foundations of monasticism in the west. Boni¬

face III, chosen 607, died nine months after his election. Boniface IV reigned 608-15. He consecrated the Pantheon to the Virgin and all the saints. Boniface V, a Neapolitan, was

Pope 619-25. He confirmed the inviolability

of the asylums and endeavored to diffuse

Christianity among the English. Boniface VI, a Roman, elected 896,

died a fortnight after.

Boniface VII, anti-Pope, elected 974, during the lifetime of Benedict VI, whose death he was suspected of having caused. Expelled

from Rome, he returned on the death of Bene¬

dict VII and found the chair occupied by John XIV, whom he deposed and threw into prison, where he died. Boniface died 11 months after his return. Boniface VIII, Benedict Gaetano : b. Anagni of an ancient Catalonian family;

elected Pope 24 Dec. 1294. He studied juris¬

prudence, was a canon at Paris and Lyons,

advocate of the consistory and prothonotary

of the Pope at Rome. After Martin IV had

elevated him to the dignity of a cardinal (1281) he went as legate to Sicily and Portugal, and was entrusted with the charge of reconciling the King of Sicily with Alphonso of Aragon and Philip the Fair with Edward I of Eng¬

land. After Coelestine V had resigned the

papal dignity at Naples, in 1294, at the insti¬

gation of Boniface, the latter was chosen Pope.

He met with opposition from the cardinals of the family Colonna, whose antagonism followed him throughout his entire pontificate. His in¬

duction was magnificent. The Kings of Hun¬

gary and Sicily held his bridle on his way to the Lateran and served him at table with their crowns on their heads. Boniface, however,

was not successful in his first efforts for the increase of his power. He first opposed Albert of Austria in his contest for the imperial title, but finally yielded and crowned him emperor.

He was equally unsuccessful in his attempt to BONIFACIO — BONIN

arbitrate between England and France. The

bulls which he issued at this time against King Philip the Fair of France obtained no consid¬

eration. This was also the case with the inter¬

dict which he pronounced against him at the Council of Rome in 1302. Intimidating the

clergy in France, Philip refused to yield to the Pope's decrees. The Pope was accused of

duplicity, of simony, of usurpation, of heresy, of unchastity, and it was resolved to condemn and depose him at a general council at Lyons.

Philip went still further; he sent Nogaret to Italy in order to seize his person and bring him to Lyons. Nogaret united himself for this pur¬

pose with Sciarra Colonna, who with his whole family was bitterly inimical to Boniface. Boni¬

face fled to Anagni, where Nogaret and Co¬

lonna surprised him. Boniface acted with

spirit. ((Since I am betrayed,® said he, <(as Jesus Christ was betrayed, I will die at least as a Pope.® He assumed the pontifical robes and the tiara, took the keys and the cross in his hand and seated himself in the papal chair.

But the insignia of his holy office did not save him from seizure. Colonna even went so far as to use personal violence. Boniface remained in imprisonment for two days, when the Anag-nese took up arms and delivered him. After this he departed to Rome, where he died, a month later, in 1303. Boniface IX, Pietro

Tomacelli of Naples, succeeded Urban VI at

Rome (1389) during the schism in the Church, while Clement VII resided in Avignon. He

was distinguished for the beauty of his person and the elegance of his

manners rather than for a profound knowledge of theology and

canon law. Even the counsel of his experi¬

enced cardinals could not save him from the commission of gross blunders. He made the

annates a regular tax in 1392. Many abuses in the sale of benefices were indulged during his pontificate. A notable event in his reign was the suppression of the rebellion in Rome in favor of a republic. He supported the pre¬

tensions of Ladislaus to the throne of Naples and during the greatest part of his pontificate was engaged in negotiations at Avignon with his rivals, Clement VII and Benedict XIII. He died 1404.

BONIFACIO, Strait of, the Fretum Gal—

licum of the Romans, lies between Corsica

and Sardinia, and at the narrowest part is only seven miles wide. The navigation is difficult owing to the rapid current and the great num¬

ber of rocks, which, however, are favorable to the production of coral.

BONIFAZIO, bo-ne-fa'tse-o, the name of

three 16th-century Italian painters. Two were brothers and the third was presumably the son of one of them. Nothing is known of their early history nor even their baptismal names.

The surname of ((Bembo,» formerly applied to the elder Bonifazio, belonged to a painter of a much earlier period and a different school.

The real family name was di Pitati. For con¬

venience they are here numbered I, II and III.

Bonifazio I, the <(Veronese®; according to

Vasari, B. "Veneziano* : b. Verona (?) about 1490; d. 1540. He settled

early in Venice and studied under Palma Vecchio, whose most bril¬

liant pupil he became, for his works were fre¬

quently confounded with those of his master and even those of Titian, Giorgione and Paris Bordone. It is only during recent years that this remarkable painter has, so to speak, ((come into his own.® While his work is essentially Venetian in color and feeling, his lively im¬

agination and the gracefulness of his figures proclaim his Veronese origin. His most im¬

portant production is the well-known (Dives and Lazarus > and reveals a rare poetic imagi¬

nation. Despite repainting and restoration this picture (in the Venice Academy) still retains much of its original gorgeous coloring. His judgment of Solomon) is a wonderful study

in expression of the faces of the two mothers; the (Massacre of the Innocents) shows dra¬

matic power, and an (Adoration of the MagP

exhibits a splendor of color and a fine land¬

scape. Several of his canvases are in the Royal Palace at Venice, and the Brera (Milan) con¬

tains his famous (Finding of Moses, > which had long been credited to Giorgione. An un¬

finished work representing the c Visit of the Queen of Sheba to Solomon* shows that in

technical treatment he followed Giorgione by preparing his subject in tempera and complet¬

ing it with transparent oil-glazes. Consult

James, R. N., (Painters and Their Works)

(London) ; Layard, A. H., Htalian School of Painting* (6th ed., London 1907) ; MacFall, H., (History of Art* (London 1 909—) ; Vasari, (Lives of the Painters.*

Bonifazio II, younger brother of the pre¬

ceding: b. Verona (?); d. Venice 1553. He

probably also studied under Palma Vecchio

and certainly imitated his brother's style, so that pictures by him often pass for those of the former. It is believed that he assisted in painting the (Finding of Moses, } on the ground that in parts the touch of a less skilful hand may be detected. Though he never acquired

the technical skill of his famous brother in refinement, expression or richness of color, he nevertheless produced two large works which

for years were attributed to Titian — the tri¬

umph of Science) and the (Triumph of Reli¬

gion, } in the public gallery, Weimar.

Bonifazio III, <(Veneziano® : b. Venice, be¬

tween 1525 and 1530; death unknown; was liv¬

ing in 1579. He was probably the son of one of the two brothers of this name. As in the case of the second Bonifazio, his works not infrequently pass for those of the elder painter B., though they are easily distinguished by their less brilliant coloring and absence of that fine poetic sentiment which characterizes the first Bonifazio. ((Veneziano® painted numerous

groups of saints for religious institutions in 1562; these are preserved in the Venice Acad¬

emy, together with a fine altar piece represent¬

ing the Madonna in the clouds with saints

beneath. There is also a (Last Supper* in the church of Santa Maria Mater Domini.

BONIN (bo-nen') ISLANDS, several

groups of volcanic islands, numbering 20 in all and of a total area of 27 square miles, north Pacific Ocean. The northwest island of the

most northern cluster, called Parry Group, is 500 miles south of the Japanese mainland. Cof¬

fin or Bailey Island is in the south, with Beechey Island between. The largest of the

chain is Peel Island, on the west side of which is a good harbor called Port Lloyd. Almost every valley has a stream of water. Green

turtle abound in the sandy bays. Sharks are 218

numerous and fish of several kinds plentiful.

Peel Island is inhabited by some English, Amer¬

icans and Hawaiians, who cultivate maize,

vegetables, tobacco and the sugar-cane. It is frequently visited by vessels in want of water and fresh provisions. The islands were dis¬

covered by the Japanese in 1593 and since 1876

have been in the possession of Japan. Pop.

about 3,595.

BONINGTON, or BONNINGTON, Rich¬

ard Parkes, English painter : b. 25 Oct. 1801, at Arnold, a village near Nottingham, where his father was a painter and lace manu¬

facturer; d. London, 23 Sept. 1828. When

Richard was in his boyhood the family re¬

moved to Calais and afterward to Paris. He early displayed a decided predilection for art, and entered as a student at the Louvre and was

also for a time in the studio of Baron Gros. His genius displayed itself in landscape¬

painting and he rapidly rose to great eminence in this department, first in Paris and afterward in England, to whose Royal Academy exhibi¬

tion he contributed several pictures which cre¬

ated a great sensation. He worked at first entirely in watercolor, but from about 1825

he also used oil. A brilliant career was in prospect for him, when he was cut off by pul¬

monary consumption. Consult Muther, ˆHis¬

tory of Modern Painting) (1896).

BONITO, bo-neffo, a fish of the mackerel

family (Scombridcc) nearly related to the gi¬

gantic tunny but smaller, longer in body and without teeth on the vomer. There are two

American species. One (Sarda sarda) lives in the open seas, except at spawning time, from Cape Cod to Cape Sable and occasionally in the Gulf of Mexico, where it weighs 10 to 12

pounds. In color it is dark steel blue above, with numerous dark narrow strips obliquely

downward and forward from the back, and the under parts silvery. The California bonito or skipjack (Sarda chiliensis) is heavier and is found from San Francisco northward to Japan.

In the tropics the bonito is known as the worst foe of the flying-fish. On the Rhode Island coast the fish is called abbicore.

BONITZ, bo-nits, Hermann, German

classical scholar: b. Langensalza, 29 July 1814; d. Berlin, 25 July

1888. He was professor in the University of Vienna 1849-67, director of a gymnasium at Vienna from 1867 and a mem¬

ber of the Academy of Sciences. He was a

profound student of Plato and Aristotle and was the author of (Uber die Kategorien des Aristoteles) (1853) ; (Platonische Studien)

(1858-60); 'Aristotelische Studien' (1862-67).

BONN, Germany, a city of the Prussian

province of the Rhine, formerly the residence of the Electors of Cologne, on the left bank of the Rhine, over which there is a magnificent new bridge, erected at a cost of $1,000,000, with a central span of 600 feet. It is a flourishing place and has been greatly extended and im¬

proved in recent years, though it still has many narrow, irregular streets. The town hall, com¬

pleted 1782, is one of the handsomest of its edifices. Another important building is the

cathedral, cruciform in plan and forming an •imposing and picturesque example of the late Romanesque style of architecture. The greater part of it dates from the 13th century. But all other buildings and institutions are eclipsed by the celebrity of the university, the charter of which was given 18 Oct. 1818, at Aix-la-Chapelle by the King of Prussia, who at the same time endowed it with an annual income of about $60,000. The former residence of the Elector of Cologne was bestowed on the uni¬

versity and was fitted up at great expense, being surpassed in extent and beauty probably by no university building in Europe. The uni¬

versity possesses a library of more than 275,000

volumes, 1,235 incunabula and 1,376 manu¬

scripts ; a museum of antiquities, a collection of casts of the principal ancient statues, a col¬

lection of coins, observatory, botanic garden, *etc.* The paintings in the Academical Hall

(among others, the great allegorical picture, the (Christian Church >) were executed by some pupils of Cornelius. In the front of the uni¬

versity is an extensive garden, with fine old avenues of trees, while from this quarter runs westward a broad, straight avenue, half a mile long, planted with horse-chestnuts, passing the observatory and leading to the botanic garden and natural history collections of the univer¬

sity, and to the chemical laboratory, the anat¬

omy building, *etc.* In this quarter also are grounds and buildings for the use of the agri¬

cultural institute. Particular advantages are afforded for the education of young men in¬

tended for instructors. Many men distin¬

guished in various branches of science have been connected with the university, including Arndt, A. W. Schlegel and the historian Nie¬

buhr. The exertions of the government to

collect in Bonn all the means of instruction, united with the charms of the place and the beauties of the scenery, have made the place famous. In 1901 the students numbered over

2,400. The city in recent years has become very prosperous commercially. Besides having

an active trade, it manufactures machinery,

earthenware, chemicals, jute, pianos and or¬

gans, porcelain wares, artificial flowers, cement and many other articles. Wessel's porcelain

and stoneware factory employs 1,000 men. It dates from 1775. The means of communica¬

tion are ample, both by the steamers which ply upon the Rhine and by the railways. Prince Albert studied at Bonn and Beethoven was

born there, the house of his birth being now a museum. There are statues of Beethoven and

Arndt, a monument commemorative of the war

of 1870-71, a monumental fountain, *etc.* The antiquity of Bonn is considerable, and, as the residence of the Electors of Cologne, it is of historical importance. Pop. about 88,000.

BONN, University of. See Bonn.

BONNASSIEUX, bo-na-sye, Jean, French

sculptor: b. Pannissieres 1810; d. 1892. He studied in Paris and in 1836 received the Prix de Rome. He gained the favor of the French clergy by refusing to model a statue of Voltaire for the facade of the Louvre and thereafter did much work for churches. He was commis¬

sioned in 1857 to model a colossal statue of Notre Dame de France for the valley of Puy from the bronze cannon taken at Sevastopol.

Other important works of his are ‘ Amour sc coupant les ailes> ; ‘David Berger, 1814, > and ‘Meditation, > for which last he received the cross of the Legion of Honor.

BONNAT, boˆ-na, Leon Joseph Florentin,

French painter: b. Bayonne, 20 June 1833.

When a young man he spent several years in Spain and Italy. He studied under Madrazo

at Madrid and under Leon Cogniet at Paris, first gaining recognition at the Paris Salon in 1861, when he received a second-class medal.

The list of his honors is a large one, including the medal of honor at the Salon of 1869. In the Legion of Honor he was made chevalier in 1867, officer in 1874 and commander in 1882.

He paints portraits and genre subjects; many of these are reminiscences of his visits to Italy and Egypt. He became a member of the In¬

stitute in 1874 and was chosen chief professor of painting in the Ecole des Beaux Arts in 1888. His work shows the influence of Velas¬

quez and Ribera and his portraits, such as those of Thiers, Victor Hugo and Don Carlos, are remarkable for their realism. He has painted the portraits of many Americans and his por¬

trait work is well known in this country. There are several of his works in American galleries, especially in the Metropolitan Museum, New

York. Consult Claretie, (Peintres et sculpteurs contemporains> (1884); Van Dyke (editor),

‘Modern French Masters) (1896).

BONNE TERRE, Mo., city in Saint Fran¬

cois County, 60 miles south of Saint Louis, in the foothills of the Ozark Mountains, on the Mississippi River and Bonne Terre Railroad.

It contains a lead mine and concentration mill, railroad shops and is the headquarters of the Saint Joseph Lead Company and the Mississippi River and Bonne Terre Railroad Company.

The two local banks have combined resources amounting to $80,000. The city contains a

Federal building, public grammar and high

schools and a Catholic parochial school. The city was settled in the sixties. It has adopted the commission form of government. Pop.

4,080.

BONNECHOSE, bon-sho-z, Francois Paul

Emile Boisnormand de, French poet and his¬

torian : b. Leyerdorp, Holland, 1801 ; d. 1875.

He was librarian of the palace of Saint Cloud for some years and subsequently held similar posts. His one notable poetical composition

is (The Death of Bailly) (1833). Besides a ‘History of France, > he was author of ˆRe¬

formers Before the 16th Century Reformation*

(1844) ; ‘The Four Conquests of England)

(1851); (History of England) (1859); Bert¬

rand du Guesclin) (1866).

BONNEMERE, bon-mar, Joseph Eugene,

French historian: b. Saumur, 21 Feb. 1813; d.

1893. In early life he wrote a number of plays but owes his reputation to a series of histori¬

cal publications, (Historv of the Peasants-*

(1857); (Vendee, in 1793* (1866); ‘Popular

History of France) (1874-79) ; (History of the Religious Wars in the Sixteenth Century*

(1886), *etc.*

BONNER, Carey, English clergyman: b.

Upton, England, 1 May 1859. General secre¬

tary Sunday School Union since 1900 and joint secretary World’s Sunday School Association

since 1907. He was minister of the Union

Church Sale, Manchester, England, from 1884

to 1885 ; honorary secretary, Lancashire and Cheshire Baptist Association (1893-95); min¬

ister Portland Chapel, Southampton (1895—

1900). Among his many publications are (The Blind Man of Bethany,* ‘A Garden in the

Desert,* (Christ and the Children of China,) (A Tree of Life,* (Ridley Lectures,* ‘The

Christ, the Church and the Child, *(Hymns and Translations,* ‘Part Songs, > ‘Anthems

and Songs,* ‘Cantatas, *‘Child Songs,* ‘Sun¬

day School Hymnary. *

BONNER, Edmund, English prelate: b.

about 1500; d. London, 5 Sept. 1569. For his skill in canon law he was patronized by Cardi¬

nal Wolsey, on whose death he acquired the favor of Henry VIII, who made him one of

his chaplains and sent him to Rome on busi¬

ness connected with his divorce from Queen

Catharine. In 1535 he was made archdeacon

of Leicester. In 1538 he was nominated bishop of Hereford, being then Ambassador at Paris, but before his consecration he was translated to the see of London. In 1 542 — 43 he was am¬

bassador to the Emperor Charles V. After

Edward Vi’s accession in 1547 he was deprived of his bishopric for non-obedience in connec¬

tion with the injunctions and the ‘Book of Homilies.* He was shortly afterward restored, but still continuing to act with contumacy, he was,

after a long trial, once more deprived of his see and committed to the Marshalsea

(1549), from which prison, on the accession of Mary, he was released and once more re¬

stored in 1553. During this reign a most san¬

guinary persecution of the Protestants took

place, many of whom Bonner was instrumental in bringing to the stake, though it appears he was hardly severe enough to meet the wishes of the King and Queen. When Elizabeth suc¬

ceeded he went with the rest of the bishops to meet her at Highgate, but was coldly re¬

ceived. He remained, however, unmolested

until his refusal to take the oath of supremacy, on which he was committed to the Marshalsea (1560), where he remained a prisoner for

nearly 10 years, until his death. He was buried at midnight, to avoid any disturbance on the part of the populace, to whom he was extremely obnoxious.

BONNER, Geraldine, pseudonym from

her novel, Hard Pan, American novelist and

playwright : b. Staten Island, N. Y., 1870. Her early life was spent in Colorado mining camps.

Later she went to San Francisco; in 1887 she first contributed to The Argonaut and became its dramatic critic and foreign correspondent.

Her stories also appeared in Harpers Weekly, Collier's Weekly, Harper's Monthly and Lip-pincott's Magazine, and among her novels are 'Hard Pan) (1900) ; 'Tomorrow's Tangle)

(1902) ; 'The Pioneer* (1905) ; 'The Castle-court Diamond Case* (1906) ; 'The Book of

Evelyn) (1913) ; 'The Girl at CentraP (1914) ; 'The Black Eagle

Mystery* (1915). She also

wrote the plays ‘Sham) (with Elmer B. Harris, 1908) and ‘Sauce for the Goose* (with Harry Hutcheson Boyd, 1900).

BONNER, Robert, American publisher:

b. near Londonderry, Ireland, 28 April 1824; d.

New York, 6 July 1899. Coming to the United States in 1839, he learned the printer’s trade on the Hartford Courant and gained the reputa¬

tion of being the most rapid compositor in Con¬

necticut. In 1844 he removed to New York

and seven years later had saved enough money to buy the plant of the Merchants’ Ledger, a small business periodical. Changing its name 220

to the New York Ledger, he turned it into a literary publication, printing the most popular kind of stories. This, combined with sensa¬

tional advertising methods and the unprece¬

dented prices paid to famous contributors, soon gave the Ledger an enormous circulation.

Henry Ward Beecher was paid $30,000 for his <Norwood) ; Tennyson received $5,000 for a

short poem, and Dickens the same amount for a short story. At times $25,000 a week was spent in advertising the paper. Retiring in 1887, the rest of his life was spent in indulging his taste for fast horses. It was his ambition to own the fastest trotters in existence, and whenever he purchased a record breaker the

animal was immediately withdrawn from public racing. His expenditures for fast horses ex¬

ceeded $600,000. Some of them and their cost were : Dexter, $35,000 ; Rarus, $36,000 ; Maud S., $40,000; Sunol, $41,000.

BONNER SPRINGS, Kan., town in Wyan¬

dotte County, 17 miles west of Kansas City, on the Union Pacific, the Chicago, Rock Island and Pacific and the Atchison, Topeka and

Santa Fe railroads. It contains a flour mill, ice plant, electric plant, municipal waterworks and natural gas works. The value of its taxable property is about $1,000,000. There are three banks, a high and graded schools, churches, city hall and a Masonic and Odd Fellows hall.

The government is vested in a board of aider-men. Pop. 2,030.

BONNERS FERRY, Idaho, town and

county seat of Boundary County on the Great Northern, the Spokane International and the

Kootenai Valley railroads, at the head of navi¬

gation on the Kootenai River, 80 miles north of Cceur d'Alene. It is the centre of the log¬

ging industry of northern Idaho and of a dairy¬

ing and stock raising district. There also are several producing lead and silver mines in the neighborhood. The principal industries are

those connected with lumbering and agriculture.

The two local banks have combined resources aggregating $656,000, and the value of all tax¬

able property amounts to $500,000. The town has two public schools and a high school, a county court house and five churches. The mu¬

nicipal expenditures for general purposes

amount to $7,500 annually, exclusive of $3,000

for sewer improvements. The government is

vested in a board of five trustees, elected every two years. Pop. 2,000.

BONNET, bo-na', Charles, Swiss natural¬

ist and metaphysician: b. Geneva, 13 March

1720; d. Genthod, 20 May 1793. His essay (On Aphides,5 in which he proved that they propa¬

gate without coition, procured him in his 20th year the place of a corresponding member of the Academy of Sciences at Paris. Soon after¬

ward he partook in the discoveries of Trembley respecting the polypus and made interesting

observations on the respiration of caterpillars and butterflies and on the structure of the tape¬

worm. Bonnet was a close and exact observer.

He carried religious contemplations into the study of nature. In his views of the human soul many traces of materialism are to be

found; for instance, the derivation of all ideas from the movements of the nerve fibres. Of his works on natural history and metaphysics there are two collections, one in nine volumes 4to, the other in 18 volumes 8vo (Neuchatel 1779). The most celebrated are (Traite cTIn-sectologie5 ; (Recherches sur l'Usage des Feuilles dans les Plantes5 ; Considerations sur les Corps organises5 ; Contemplation de la Na¬

ture5 ; (Essai analytique sur les Facultes de l'Ame5 ; (Palingenesie Philosophique,5 and

(Essai de Psychologies

BONNET, Jules, French writer: b. Nimes

1820; d. April 1892. He began life as a uni¬

versity professor but resigned his position on account of religious

opinions and turned to law.

He became editor of the official organ of the Society of Protestant History in France and secretary of the Society. He was instrumental in having published the letters of Calvin in two volumes (1854). Among his published works

are (Vie d'Olympia Morata5 (1850—65) ; (Aonio Paleario5 (1862) ; (Recits5 (1864) ; (Nouveaux recits5 (1869) ; (Derniers recits5 (1875) ; (La famille de Curione5 (1870) ; and (Souvenirs de l'Eglise reformee de la Calmette5

(1884).

BONNET, in fortification, an elevation of

the parapet at a salient angle, designed to pre¬

vent the enfilading of the adjoining front of the work, where it is situated. The bonnet accomplishes, however, only part of this object, and is subject, at least in field works, to the dis¬

advantage, that the men destined for its defense are too much exposed to be taken in flank by the fire of the enemy, on account of the neces¬

sary elevation of the banquette, a fault which cannot occur in the works of a fortress which are well laid out. The term also denotes a covering for the head, now especially applied to one worn by females. In England the bon¬

net was superseded by the hat as a head-dress two or three centuries ago, but continued to be distinctive of Scotland to a later period.

BONNET-HEAD, a small shark of the

genus Reniceps, frequenting warm seas and

related to the shovel-heads.

BONNET MONKEY. See Macaque.

BONNET-PIECE, a Scotch coin, so called

from the king's head on it being decorated with a bonnet instead of a crown. It was struck by James V, and is dated 1539. Bonnet-pieces are very rare and in high estimation among anti¬

quaries.

BONNET-ROUGE, bo-na-roozh, an em¬

blem of liberty during the French Revolution, and worn as a head-dress by all who wished to show themselves sufficiently advanced in democratical principles. It is said by some to have been adopted in imitation of the Phrygian cap of the same color which was worn by those who had obtained emancipation from slavery, while others maintain that it had a much more lowly origin, and was borrowed either from the Mar¬

seillais bands that flocked to Paris, or from a few Swiss soldiers who, having been sentenced to the galleys for insubordination, obtained their liberty on the acceptance of the Consti¬

tution in 1790. Having returned in a kind of triumphal procession, wearing the red cap,

which had formed part of their galley dress, the fancy of the people was struck, and the bonnet-rouge was considered indispensable to

every true patriot. Even the unfortunate Louis XVI wore it when paraded through the streets, after narrowly escaping with his life from the mob which had burst into his palace. After it BONNEVAL — BONNIVARD

had ceased to be generally worn, it became the distinctive badge of the men of the Mountain.

During the storms of more recent periods at¬

tempts have repeatedly been made to bring it again into fashion. These have not been suc¬

cessful, but the revolutionary cap rejected by France has met with a more favorable reception abroad, particularly among the newly-formed

republics of America, where it is often stamped upon coins, or used as an emblem upon seals.

Under the restoration of the Bourbons the sou¬

briquet of bonnets-rouges was applied to indi¬

viduals who either had figured in the Revolu¬

tion or were supposed to hold revolutionary principles.

BONNEVAL, bon-val, Claude Alexandre

(Count de or Achmet Pasha), French ad¬

venturer : b. Coussac 1675 ; d. Constantinople 1747. In the war of the Spanish Succession he obtained a regiment and distinguished him¬

self by his valor as well as by his excesses. He was, in 1706, appointed major-general by Prince Eugene, and fought against his native country.

At the Peace of Rastadt in 1714, by the inter¬

ference of Prince Eugene, the process against him for high treason was withdrawn, and he was allowed to return to his estates. In 1716

he was lieutenant field-marshal of the Austrian infantry, and distinguished himself by his valor against the Turks at Peterwarden (1716). In 1718 Bonneval was made a member of the

imperial council of war, but his licentiousness and indiscretion induced Prince Eugene to get rid of him by appointing him in 1723 master-general of the ordnance in the Netherlands.

To revenge himself on Eugene, he sent com¬

plaints to Vienna against the governor, the Marquis de Prie; but the latter received an order to arrest Bonneval, and to imprison him in the citadel of Antwerp. Bonneval being

afterward ordered to appear at Vienna and give an explanation of his conduct spent a month at The Hague before he chose to comply with the summons. He was therefore confined in the

castle of Spielberg, near Briinn, and condemned to death by the imperial council of war; but the sentence was changed by the Emperor into one year's imprisonment and exile. Bonneval now

went to Constantinople, where the fame of his deeds and his humanity toward the Turkish

prisoners of war procured him a kind re¬

ception. He consented to change his religion, received instruction in Islam from the mufti, and received the name of Achmet, with a large salary. He was made a pasha of three tails, commanded a large army, defeated the Aus¬

trians on the Danube, and quelled an insurrec¬

tion in Arabia Petraea. His exertions, as com¬

mander of the bombardiers, to improve the

Turkish artillery, were opposed by the jealousy of powerful pashas, the irresolution of Mo¬

hammed V, and the dislike of the Turkish

troops to all European institutions. He enjoyed, however, the pleasures of his situation. The memoirs of his life under his name are not genuine.

BONNEVILLE, bon-vil, Benjamin L. E.,

American soldier and explorer: b. France about 1795; d. Fort Smith, Ark., 12 Tune 1878. He graduated from West Point 1815, became a

captain of infantry 1825; and in 1831-36 engaged in an exploring

expedition to the Far West, across and beyond the Rocky Mountains. His

journal and other manuscripts were edited and enlarged by Washington Irving, who published them under the title of (Adventures of Captain Bonneville, U. S. AP (1837). He fought with gallantry in the Mexican War, taking part in the siege of Vera Cruz, the battle of Cerro Gordo, the capture of San Antonio, battle of Churubusco, where he was wounded, the battle of Molino del Rey, the storming of Chapultepec, and the ensuing assault and capture of the city of Mexico. In 1857 he commanded the Gila

expedition, and in 1861 was retired from active service, <(for disability resulting from long and faithful service, and from sickness and exposure in the line of duty.® In 1865 he was brevetted brigadier-general in the regular army (<for long and faithful services.® Consult Cullum, Of¬

ficers and Graduates of the United States Mili¬

tary Academy) (Vol. I, 1868).

BONNEVILLE, Lake, a lake of the

Pleistocene epoch that twice filled a now desert basin of Utah. At its greatest dimensions it had an area of 20,000 square miles, and was 1,000 feet deep. Consult (United States

Geological Survey, Monograph No. P (1890).

BONNEY, Charles Carroll, American

lawyer: b. Hamilton, N. Y., 4 Sept. 1831; d.

Chicago, Ill., 1903. In 1850 he removed to Peoria, Ill., took an active part in establishing the present educational system of that State ; was admitted to the bar 1852, settled in# Chicago in 1860, and acquired a large and successful practice. He was one of the originators of the law and order movement and was president of the National Law and Order League 1885-93.

In 1893 he was the organizer and general presi¬

dent of the World's Congresses held at the Co¬

lumbian Exposition ; there were over 200 of them, and they proved a marked feature of

the World's Fair. Besides numerous pamphlets, addresses and essays on public questions he has written (Rules of Law for the Carriage and Delivery of Persons and Property by Railway) (1864) ; (Summary of the Law of Marine, Fire and Life Insurance) (1865) ; (Our Remedy in the Laws* (1887); (The Present Conflict of

Capital and Labor* (1886); (The Executive

Power and the Enforcement of the Laws)

(1890) ; and edited A. W. Arrington's < Poems*

(1860).

BONNEY, Thomas George, English

geologist: b. Rugeley, 27 July 1833. He was president of the Geological Society of London 1884-86 and president of the British Associa¬

tion 1910-11. He has written (Outline Sketches in the High Alps of Dauphine) (1865) ; (The Alpine Regions) (1868); (The Story of Our

Planet* (1893) ; (Charles Lyell and Modern Geology* (1895); (Ice Work* (1896); (Volcanoes) (1898); (The Building of the Alps>

(1912) ; (Present Relations of Science and Re¬

ligion (1913), *etc.*

BONNIE BLUE FLAG, a popular Con¬

federate ballad first sung in public at the Va¬

rieties Theatre in New Orleans in 1861.

BONNIVARD, bon-ne-var, Francois de,

Swiss patriot, a younger son of a family which held large possessions under the house of

Savoy: b. Svssel about 1496; d. Geneva 1570.

In 1513 he bacame prior of Saint Victor at Geneva, but falling under the suspicion of the Duke of Savoy, was taken prisoner by him in 222

1519. After 20 months' imprisonment he was

set free, but in 1530 he was again seized and taken to the castle of Chillon at the east end of the Lake of Geneva, where he was im¬

prisoned for six years, the last four in that subterranean vault which Byron has made

famous by his poem on the sufferings of (The Prisoner of Chillon. *He left the town his books, which were the nucleus of the Geneva library. His chief works are his (Chroniques de Geneve* (written in 1551, published 1831

and 1867), and (De l'Ancienne et Nouvelle

Police de Geneve* (1555). See Gribble, (Lake Geneva and Its Literary Landmarks* (1901).

BONNY, a river of Nigeria, West

Africa, one of the mouths of the Niger. The town of the same name is situated on the east¬

ern bank of the river near its mouth. It has a good harbor and does a considerable trade in palm-oil, but the climate is unsuitable for

Europeans. Pop. about 9,000.

BONONCINI, bo-non-che'ne, or BUO—

NONCINI, Giovanni Battista, Italian com¬

poser: b. Modena about 1660; d. about 1750.

His proficiency on the violoncello gained him admittance into the band of the Emperor Leo¬

pold at Vienna, where, at the age of 18, in emulation of Scarlatti, he wrote an opera ˆcalled (Camilla,* which was favorably received. In England for several years scarcely any opera was tolerated which did not contain some of Bononcini's airs, and upon the almost simul¬

taneous arrival of himself and Handel in Lon¬

don, notwithstanding the superiority of the lat¬

ter, two parties, the one for Bononcini and the other for Handel, were formed, between whom an exciting contest was waged for several years.

Gradually, however, Bononcini's popularity

waned, and having been detected in an act of musical plagiarism, he left England in 1733, found his way to Paris and Vienna, and finally went to Venice, where all traces of him are lost.

BONONE, bo-no'na, Carlo, Italian

painter: b. Ferrara 1569; d. 1632. He studied the works of the Caracci and Veronese, and shows the influence of both styles in his own work. He taught painting in Ferrara, having many prominent painters of the town under

his instruction. Among his paintings are (The Arisen Christ* and (Patriarchs and Prophets.*

BONPLAND, bon-plan, Aime (Jacques

Alexandre), French naturalist, noted as the

friend of Humboldt, and the companion of his wanderings: b. Rochelle, 22 Aug. 1773; d. Corrientes, Argentina, May 1858. He studied medi¬

cine, and served for a while in the French navy as surgeon. Having returned to Paris to con¬

tinue his studies, he there made the acquaint¬

ance of Humboldt, then a young man actively engaged in the pursuit of scientific knowledge at the French capital. On the latter projecting his journey to the New World, Bonpland read¬

ily agreed to accompany him, and shared in all the adventures and toils of that celebrated ex¬

pedition. In the course of it he collected up¬

ward of 6,000 plants, previouslv unknown, and on his return to France in 1804 presented his herbarium to the Museum of Natural History, and had a pension granted him by the Emperor Napoleon. A great friendship subsisted between him and the Empress Josephine, who frequently endeavored to cultivate in her garden at Mal-maison the flowers whose seeds he had brought from the tropics. On the Restoration he pro¬

ceeded to South America, and became professor of natural history at Buenos Aires. He sub¬

sequently made an extensive journey across the Pampas to the foot of the Andes, and ascended the river Parana into Paraguay, but was ar¬

rested by Dr. Francia, the governor of Para¬

guay, as a spy, and detained a prisoner for eight years, till 1829. He afterward settled at San Borja, near Monte Video, and after 1850 lived at Corrientes.

BONSTETTEN, bon-stet'en, Karl Victor

von, Swiss publicist: b. Bern, 3 Sept. 1745; d. Geneva, 3 Feb. 1832. He studied at Leyden, Cambridge and Paris; entered the council of Bern, and became district governor, and, in 1795, a judge in Lugano. He

lived in Italy and at Copenhagen from 1796 to 1801, and after his return settled at Geneva. Among his larger

works are (Recherches sur la Nature et les Lois de l'lmagination* (Geneva 1807) ; (Pensees Diverses* (1815) ; (Etudes de L'Homme* (1821), and 'L'Homme du Midi et L'Homme du Nord*

(1824), an examination of the influence of cli¬

mate. Several volumes of his correspondence

have been published.

BONTEBOK, bon'te-bok, a small South

American antelope (Bubalis pygargus) closely allied to the blessbok (q.v.), but of slightly larger size, and having the continued white blaze on the face to the root of the lyrate horns. See Hartebeest.

BONUS BILL, an act reported to the

United States House of Representatives by

John C. Calhoun, 23 Dec. 1816, appropriating (<as a fund for constructing roads and canals**

the $1,500,000 paid by the United States Bank as a bonus for its charter privileges, and all future dividends from its stock. The real

object was to build the Erie Canal, which New York did not feel able to do alone. Its man¬

agers, — De Witt Clinton, Gouverneur Morris, etc., — • relying on the administration holding the same ideas which Jefferson and Gallatin had formerly voiced, formed a ((log-roll** in Congress with various local interests, and car¬

ried the bill by 86 to 84 in the House, and 20 to 15 in the Senate, the opposition being scatteringly local rather than sectional, or constitu¬

tional ; but Madison vetoed it on strict-construction grounds. The apparent injury was to New York: the real injury was to the South. New York went on and built the canal herself, giving her an

irresistible advantage over her rivals, while the South was not rich enough to build the canals from the Chesapeake to the Ohio, enriching Maryland and Virginia, nor from the Santee to the Tennessee, enriching the Carolinas and Tennessee, and if the general gov¬

ernment had helped the Erie it must have helped the others also.

BONVALOT, bon-va-lo1, Pierre Gabriel,

French explorer: b. Epagne, Aube, 1853. He

received his education at the Troyes Lycee.

With LJjfalvv he went on a tour of explora¬

tion to the interior of Asia in 1880 and six years later visited Persia, Turkestan and the Pamirs, Siberia and Tonking. In 1897 the

government sent him on a special mission to Antoto, Abyssinia. He has written <En Asie

BONVIN

Centrale'; (De Moscou en Bactriane) (1884);

(Du Kohistane a la mer Caspienne) (1885) ; 'Du Caucase aux Indes a travers le Pamir >

(1888); (De Paris au Tonkin a travers le

Tibet inconniP (Eng. trans., 1891, tinder title (Across Thibet*); (L'Asie inconnue) (1896).

BONVIN, bon-van, Frangois Saint,

French genre painter: b. Vaugirard, 22 Sept.

1817 ; d. Saint Germain-en-Laye, 18 Dec. 1887.

He was self-taught, exhibited often at the

Paris Salon and received the medal of the

Legion of Honor in 1870. For a long period his work was not popular, but his paintings are now much prized by collectors on account of their rich coloring and sober tone. Among them are (Charity } (1852) ; (Regimental

School* (1853) ; (Corner in a Church * (1880).

BONWICK, James, Australian author

and historian: b. London 1817; d. 1906. He went to Tasmania in 1841. He traveled ex¬

tensively in almost every habitable part of Australia ; and lived many

years in Victoria.

He so identified himself with the life of the country that he came to be looked upon as an Australian. He has to his credit a long list of books relating to the early history of

Australia.

BONY-FISH. See Menhaden; Ten-

TOUNDER.

BONY, or GAR PIKE. See Gar.

BONZANO, bon-za-no, Giovanni, Italian

Roman Catholic prelate : b. Vigevano, Italy, 1867. He was educated at the Seminario di

Vigevano and at the Propaganda College,

Rome. He was ordained to the priesthood in 1890 and from 1891 to 1897 was engaged in the China missions. In 1899 he was made

vicar-general of the diocese of Vigevano and in 1901 professor of theology at the seminary there. In 1904 he became rector of the Urban College of Propaganda, Rome, remaining in

this relation until 1 Feb. 1912, when he was named by Pius X apostolic delegate to the

United States in succession to the late

Cardinal Falconio. He was made domestic

prelate to his Holiness in 1904 and on 3

March 1912 was consecrated titular arch¬

bishop of Mitilene.

BOOBY, a name given long ago by Brit¬

ish sailors to several of the smaller tropical species of gannet (q.v.), because of their

“stupidity,” which consisted simply in their fearlessness when visited upon their island

breeding places. Having had no acquaintance

with man they had no reason to fear him.

Most of the species are widespread, and, in their haunts, abundant. One species (Sula

variegata) is, however, confined to the coasts of Peru, where it contributes largely to the valuable guano deposits on the islands there.

BOOK. Used without qualification, the

term currently implies a printed literary com¬

position in many sheets; but in law and cus¬

tom it has received three extensions, one of form and two of matter. The form includes

anything bound like a book — volumes of

accounts, or of blank leaves for keeping them or for indexing, etc., and even “books” of gold-leaf, 25 thin strips in a cover. The mat¬

ter includes — by English statute law, <(every volume, part or division of a volume, pam¬

phlet, sheet of letterpress, sheet of music, map, chart, or plan separately published” ; in liter¬

ary usage, the written compositions of ancient times on whatever material, if of some

volume.

Historically, it is curious that primitive at¬

tention has invariably seized first on, and named the writing after, neither form nor

matter, nor even the method of writing, but the material on which the writing was ex¬

ecuted ; every name in common use, present or past, refers to this. “Book,” A.-S. hoc, is from an old Teutonic boks, that is, “the

beeches,” tablets of beech-bark on which runes were cut or painted ; Latin liber, whence

French livre and our “library,” was the same thing, the inner bark of a tree, and the name was later given to the papyrus tissue from its bark-like appearance; codex or caudex, our

“code,” and still used in its Latin form for old texts, meant the trunk of a tree, then wooden tablets, then square volumes like

wooden blocks instead of those in scrolls ; the Greek byblos, our “Bible,” was another name for the papyrus ; and modern usage clings to the same connection of ideas — we speak of reading <(a paper” before an audience. On the other hand, the words (<write,” “inscribe,” and “scripture,” and the various “-graphs,” all

from words meaning to cut, commemorate a

time when all writing was by scoring lines on some hard substance. Of course special terms refer to various aspects of the book: (<volume”

(Latin volumen, from volvo, to roll) was the wooden roller around which a convenient sec¬

tion of a long composition was twisted;

Home” means a cutting — of the book into

parts, exactly the same as <(section.”

It is difficult to say at just what point the ancient writings may properly be called

“books.” It is evident that mere scorings or paintings of short compositions on a single surface — runes, hymns, poems, -epistles, proc¬

lamations, business documents or what not

— cannot be called books, even if the surface is large ; though Lord Macaulay facetiously

speaks of a rising young Assyrian architect who (<published a bridge and four walls in honor of the reigning emperor.” On the other hand, long compositions carried over many

tablets, grouped in numbered or lettered pages and divided into ((volumes” or shelves, and even sometimes with the owner’s book-plate

(q.v.) attached, cannot be denied the name; nor can extensive compositions on papyrus like the (Book of the Dead,* dating back well

toward 2,000 b.c. if not earlier, nor the famous (Papyrus Prisse,* the oldest volume known to exist. The Babylonian and Assyrian books

were drawn on clay tablets or polygonal

cylinders (afterward hardened) with an iron

stylus, producing the wedge-shaped or

“cuneiform” characters, some of them so

small and skilfully executed that they suggest the use of a magnifying glass — quite likely a ball of crystal. These about the 7th century b.c. had begun to be gathered into royal or temple libraries, to the inestimable service of modern historical research ; the vast majority of our knowledge of old Babylonia and

Assyria comes from two great libraries, that of Ashurbanipal (Sardanapalus : 668-626 b.c.) at Nineveh, and that of the Temple of Bel at Nippur. Yet, oddly, while our civilization as a whole is a direct heir of the Babylonian, and 224

its details owe to that, through the Greek and Latin, a score of items to one of the Egyptian, our books have no connection with the Baby¬

lonian and are the immediate progeny of the Egyptian ; an unbroken sequence can be main¬

tained from the volume in the reader's hand to the (Papyrus Prisse,* perhaps more than 2,000 years before Christ, and containing the still older composition, regarded as the oldest extant book in the world, the (Maxims of

Ptah-Hotep,* dating probably from 2500 b.c.

Owing to the cheap and easy preparation of the papyrus tissue, by pulping the pith and spreading it out to dry, essentially like our paper, and its wonderful adaptability to liter¬

ary use beyond anything discovered for many ages, — its thinness and lightness, yet hard, smooth, glossy surface showing off inks and pigments so beautifully — -its use spread to Greece before the time of Herodotus at least, and to Rome, and maintained its position as a book material down to the 10th century a.d.

Ali ibn el Azhad in 920 describes the different kinds of pens required for writing on paper, parchment and papyrus (see Karabacek's (Das

arabische Papier,* 1887). Unhappily, how¬

ever, it had one insuperable defect for laws, records or whatever else needed perpetuity:

it was very' sensitive to dampness, and dis¬

solved and crumbled away in a few genera¬

tions. Hence it is not merely probable but certain that the great mass of classical

literature is lost forever, disintegrated and gone with its material record. The only place where any considerable finds are still pos¬

sible is Egypt, whose dry climate can preserve such things for countless ages, and whose

libraries had vast quantities of the best Greek and Roman works : some remarkable dis¬

coveries have already been made there, and

more may be hoped for. But for this reason, papyrus was largely supplanted for public uses, and with the wealthier collectors or authors, or for very popular books, by parchment, fine dressed skin, the material used by the Jews, Persians and other Oriental nations. When

the book had outlived its popularity or a

more exigent use was found for the parch¬

ment, which was costly, the former writing

was rubbed off or in, and a new book copied on, and this process was repeated sometimes six or seven times. Thanks to the fact that the erasure always left the outline of the old characters possible to revive by certain chemi¬

cals, and that for clearness the new book was written crosswise to the old, so that the imper¬

fectly erased words should not show up

through and cause confusion, these palimpsests have yielded us many treasures supposed to

have been extinguished.

As the very name “book® shows, however,

paper-pulp and skin and clay were not the

only materials used for books by the ancients ; in fact, it would be hard to cite any common smooth-surfaced article not so used. Animal, vegetable and mineral substances have all been drawn on ; metals, wood, wax, ivory, leaves, bark, *etc.* Wooden books were common

among both Greeks and Romans ; part of one containing Solon’s laws

was preserved at

Athens till the 1st century. For the more

important purposes, laws and edicts, they em¬

ployed (before the general accession of parch¬

ment) ivory, bronze, etc.; Hannibal engraved an account of his campaigns on bronze plates, which if they could be supposed existent,

would be worth excavating all South Italy

for, especially as the writing must have been in Carthaginian. The antiquary Montfaucon

in 1699 bought at Rome a book of six thin leaden leaves, about 3x4 inches, with covers and hinges of lead; it contained Egyptian

hieroglyphics, *etc.* For the common needs of business and social life, however, — contracts and wills, etc., — the Romans used diptycha and tabulae or pugillaria — sheets covered with wax, to be written on with a stylus, and pro¬

tected from contact by a raised margin, or opposite projections in the centres. Two of these, of date 169 a.d., were discovered early in the 19th century in Transylvania, and one of 1301 is preserved in the Florentine Museum.

In the University of Gottingen is a Bible of palm-leaves, containing 5,376 leaves. Among

the Kalmuck Tartars was found a collection

of books made of long narrow leaves of

varnished bark, the ink black on a white

ground.

The shape of wooden and metal books,

wraxen and ivory tablets, and those of other hard substances, was square ; but the thin

flexible papyrus was too liable to dog's-ear and tear from handling in such form, and a method was adopted which has left deep

traces on our book terminology — of rolling the sheets on wooden cylinders, very much in the fashion of a modern mounted map. They

were written on one side only, fastened to¬

gether at the edges, and glued or otherwise attached to the roller, which was called in Egyptian a tama , in Greek a kulindros

(cylinder), in Latin a volumen (roller), our "volume.® We still speak of a piece of writ¬

ing poetically as a -'scroll.® Some of these were of huge size : specimens of Egyptian

book-rolls still exist extending to 20 and even 40 yards (see Birt's (Das Antike Buchwesen,*

p. 439) ; but the great inconvenience of con¬

sulting such enormous sheets, and the injury to themselves in the process, caused the break¬

ing up of lengthy literary productions into sections, each on a separate roll. Certain

handy sizes became normal, like the ordinary novel or essay volume of to-day; and this con¬

ventional length of roll exercised great in¬

fluence on the length of what are still called the "books® — that is, chapters — of the clas¬

sical authors, one of these being about enough to make a roll or volume of. At each end of the roller was the umbilicus (navel) or cornus (knob), a boss to turn it by, and the volume was read by unrolling the scroll to expose successively the sheets or paginae (things

"fastened® together). The title was generally written in red, on fine vellum, and pasted on the outside, which was dyed with cedrus or saffron. Much labor and expense was often

involved in the ornamentation of books, and pleasant conceits were

sometimes conveyed by their color. The practice of perfuming the

pages to which Martial alludes, “when the

page smells of cedar and mantles with royal purple,® was not abandoned till very modern times. Lord Burghley, instructing the vice-chancellor of Cambridge concerning the

proper presentation of some volumes to Queen Elizabeth, cautions him to “regard that the book had no savor of spike® (spikenard),

<(which commonly bookbinders did seek to add to make their books savor well.® It seems

an odd lure to book-buyers ; but in this age we can hardly realize the important part

played by perfumes in ages when pretty much everything and everybody smelt ill, when filth and the lack of washing or changing of

clothes assailed all noses with evil stenches, and an agreeable scent was one of the greatest and rarest luxuries of life. In Egypt the rolls were kept in jars holding nine or ten each; in Rome they were kept in wooden boxes or canisters, often of costty workmanship, or in parchment cases. The change from scrolls to codices, or square books, seems to have taken place generally in the ancient world after the adoption of parchment or vellum ; they appear to have been coming into general use in Mar¬

tial's time (last half of the 1st century a.d.), as he alludes to their advantages. The name codex is still used for the more important ancient MSS., as the <(Codex Alexandrinus.®

Not all the parchments were folded or ar¬

ranged in small square sheets as now, how¬

ever : M. Santander owned a beautiful Hebrew Pentateuch written on 57 skins of Oriental

leather, sewed together with threads or strips of the same material; it formed a roll of 113

French feet (120.45 English) long. And

practicallv the same arrangement of successive surfaces had been enforced in the use of the clay or wooden tablets, from the nature of the articles. The form remained substantially

unaltered throughout the Middle Ages, and

being even more suitable for paper than for vellum, was ready on the invention of print¬

ing to facilitate its full development ; though important differences in bulk, arising as well from the condition of the art and its materials as the fashion of the times, distinguish books of the earlier periods of printing from those of to-day.

Production and Prices. — It is assumed

that until the invention of printing, books were of excessive rarity and costliness. This is mostly true of the Middle Ages, when the only trained chirographers were in the monasteries — working at free will and leisure and caring solely for quality, and with the express object of making the books costly. It was not so, however, in classic times, owing to that so¬

ciety being based on skilled slave labor. From this cause, the greatest extremes of price pre¬

vailed side by side, extreme cheapness and

almost incredible dearness. When but few

copies of a book were made, either by an

author of slender means or by a wealthy

amateur to give to friends, they were either given away, or if sold might command any

price an unexpected favor of a rich man's

fancy dictated; and from, the same cause

<(unique copies® — most likely such were the three books of Philolaus the Pythagorean, for which the not rich Plato paid about $1,600, and the few books of the philosopher Speusip-pus for which Aristotle paid three Attic

talents or some $3,500 — were much com¬

moner than now. On the other hand, Anaxag¬

oras' works could be had for a drachma

(about 18 cents) even when dear — -a thing

the more strange that two pieces of papyrus for copying an account cost in 407 b.c. 2

drachmae 4 oboli, or about 45 cents. Perhaps there was a difference in the paper. In this VOL. 4 — 15

same year a diptychon , or pair of wooden

account tablets (passbook), cost a drachma;

but in Demosthenes' time, three quarters of a century later, one (probably smaller) cost only two chalci ((<coppers®), less than a cent. All these contradictions are probably due to the lack of any regular publishing market.

The long agonies of dissolution of the

Roman empire annihilated the book trade ;

and for centuries the only makers of books were the monk scribes, in whom the import¬

ant conditions of skill, leisure, love and

patience were all fulfilled. Learning had be¬

come the exclusive privilege of a class, a privilege of which they were at once proud and jealous; and they surrounded the means

of its acquisition with a pomp and circum¬

stance that precluded the multitude from

familiarity with it. In the earliest times books had received the adorning aid of ornamental art ; but in the Middle Ages they reached the acme, if not of beauty and convenience, at least of cost. The favored works of the time, principally of the Christian writers, were

laboriously transcribed by patient penmen, in scriptoria liberally maintained in the monas¬

teries, and specially devoted to that purpose.

In the process of preparation their books re¬

ceived the most careful attention in regard to accuracy, elegance and solidity. In the

monasteries also the work was completed; for not only were the monks transcribers, illu¬

minators and binders, but the same individual frequently combined the triple function in his own person. From the hands of the scribe,

whose solemn adjuration at the conclusion of his task was evidence not only of his own care but of his desire that others should

imitate his example, the book passed to the illuminator, whose gorgeous colors still de¬

light the bibliophile; and from him to the binder, by whom its ponderous proportions

were encased in massive covers of wood and leather, studded with knobs and bands, often of gold and silver, and closed with broad

clasps — to unfasten which, letting the covers swing open on their stout hinges, was a

privilege to which not every one was per¬

mitted to aspire. For, as said Richard De

Bury, Haymen, to whom it matters not

whether they look at a book turned wrong

side upward or spread before them in its

natural order, are altogether unworthy of any communion with books.® Precious metals and

the less crude but equally costly productions of art contributed to swell their value, in re¬

spect of which they stood at times on an

equality with houses and lands. When pub¬

licly exposed, they were frequently secured

by chains ; they were protected by special

statutes; were subjects of grave negotiation; solemnly bequeathed by will, and lent only to the higher orders, who were compelled to

deposit ample pledges for their return. Even so late as 1471, Louis XI was compelled by the faculty of medicine at Paris to deposit a

valuable security, and give a responsible en¬

dorser, in order to obtain the loan of the works of Rhasis, an Arabian physician. In¬

stances of the immense prices of special books are familiar, as of King Alfred's giving eight hides (perhaps 500 acres) of land for one

book, but England was well-nigh bookless

then; of the Countess of Anjou giving 200

sheep and other articles for a book of homilies of a bishop — an enthusiastic lady might do so if she liked the bishop; and of other fancy prices for very tine books, not however more than modern collectors might for superb

copies. The form in these cases often counted for more than the matter, just as now. On the other hand, in 1431, shortly before the invention of printing, Peter Lombard's works sold at Caen for seven francs, or $1.30, prob¬

ably equal to about $10 now ; but he was the most popular and widely circulated author in the Christian world before Thomas a Kempis, and it was to the interest of the Church to multiply his works. Making all allowances,

books were very scarce and costly.

Arrangement of a Book. — The first page

or recto of the first leaf or ((folio® is techni¬

cally known as a bastard or half-title page; the next page or verso of the first folio is left blank. (The term olio,® however, as usually employed by printers, means simply page num¬

ber). Then follows the titlepage proper,

usually with a blank page at the back. In many books there intervene a preface or

introduction, a dedication and a table of con¬

tents, before the main body of the book be¬

gins ; the table of contents is sometimes be¬

fore and sometimes after the introduction and preface. If anv portion of the book is out of place, there are two ways by which the true order may be discovered. At the outer corner, or in the centre above the reading matter, or in pages with a chapter heading usually in the centre at the bottom of the page, is a numeral either Arabic or Roman

— 1, 2, 3, or i, ii, iii ; the almost universal custom now is to use the Roman numerals for prefaces and introduc¬

tions, and the Arabic for the body of the text, and in catalogues these are indicated thus : pp. xxxvii, 325 — • that is, 37 pages introduction paged with Roman letters, and 325 of text

paged with Arabic. As a guide to the bind¬

ers in gathering the sheets, also each ((form)) as printed on the press — the number of pages printed on one sheet, to be folded and cut later into the proper order of reading — has at the bottom of its first page a number or letter in sequence through the book; that is, if each sheet as printed has eight pages on it, then pages 1, 9, 17, etc., — the outside sheet of each form, which lies on top and visible when the sheet is folded, — will have the numbers 1, 2, 3, etc., or the letters A, B, C, etc., called <(signatures,® to show the binder in what order the folded sheets are to be assembled. If the

forms outnumber the ‘letters of the alphabet when these are used, the signature series con¬

tinues either as AA or 2A, *etc.* When two

sections of a book begin printing simulta¬

neously for expedition, and as it is uncertain where the first will end, the second has its page folios begun by guesswork — if the first runs over it is necessary to duplicate a certain number of the closing pages of the first sec¬

tion, as 480A, 481A, etc., or else to continue the closing number, as 496A, 496B, etc., or if only one or two, 496*4 , 496ˆ.

Sizes of Books. — The copyists made up

their paper or vellum books by folding four, five or six sheets and placing one within the other, making quires or gatherings of 8, 10

or 12 leaves, known respectively as quater¬

nions, quinterns or quinternions, and sexterns, or in Greek tetradia, pentadia and hexadia.

The first printers adopted the same method, printing one page at a

time and only on one side of the sheet; the register or collation of the quires for guide to the binder was given in the colophon (q.v. below), and only later supplanted by a signature on each quire, at first inserted by hand, and first printed at Co¬

logne in 1472. When more than one page was printed at once, the number of times the

paper had to be folded was a fair guide to the dimensions of the page, at a time when (and for ages later) the paper was made by hand, on frames whose size was held closely alike by the exigencies of human arms ; and folio, quarto, octavo, duodecimo, etc., ex¬

pressed not only the absolute fact of folding, but the constructive fact of size. These names were conveniently abbreviated, except the first, to 4to, 8vo, 12mo ; and when improved ma¬

chinery and larger sheets of paper enabled

still more sheets to be printed at once, the Latin names to correspond were not used at all, the terms 16mo, 24mo, 32mo, being em¬

ployed at once. All these names still survive, though — with the advent of great paper-mills and machinery which make any size desired

for an edition, so long as it is an ((engine run,®

the actual printing on large editions of 64

pages at a time, and minute calculations which figure to an eighth of an inch margin — they have ceased to express any fact worth know¬

ing; and in the United States it is now more usual to give on catalogues the height and breadth of pages. But in Europe the old

fashion still prevails. So far as the names now mean anything, a 12mo indicates the

usual size of a popular volume or essay

volume, and an octavo the stately and dignified memoir or volume of travel or ((complete

works® or cyclopaedia ; but in fact even these are rarely printed in less than 16s. A sheet folded in the middle forms two leaves or four pages ; and a book composed of such sheets is styled a folio, whether

it measure a foot and a half or four feet high. When the sheet is again folded it makes a quarto. In hand-made paper (that used in nearly all the small special editions and those of bibliographical interest) the water line runs either across or down the page, according to the number of foldings.

The following scheme is serviceable: Folio,

folded once, 4 pages, water line perpendicular; quarto, twice, horizontal ; octavo, four times, perpendicular; duodecimo, six times, hori¬

zontal; 16mo, horizontal; 18mo, perpendicu¬

lar; 32mo, perpendicular; 36mo, 48mo, 64mo,

horizontal ; 72mo, 96mo, perpendicular. In

Great Britain for a long period printing paper was chiefly of three sizes — royaJ, demy and crown ; and the book was large or small ac¬

cording to which was used. Demy was the

commonest, and the demy octavo was the

established form of standard editions. Among books as among men there are giants and

dwarfs. The British Museum has the largest

and the smallest in the world. The former is an atlas seven feet high, of the 15th century, completely concealing a tall man between the pages, with a binding and clasp which make it look as solid as the walls of a room; the latter is a tiny (<bijou® almanac less than an inch square, bound in red morocco, easily to be carried in the finger of a lady’s glove.

Certain church books in the Escurial are

described as six by four feet ; and the

((Antiquity® volumes of the Napoleonic

(Description de l'Egypte* are 37ˆ inches

high. The Thumb Bible or Toy Bible, on the other hand, was one by one and a half inches; it was not really a Bible, but an abstract, printed in 1693 and dedicated to the Duke of Gloucester, and repeatedly reprinted. Hoepli's (Divina Commedia) (1878) is less than 2ˆ4 by 2x/z inches ; and Pickering's diamond edition of Tasso measures 3l/2 inches high by V/% wide.

Colophons. — These originated with the

Assyrian scribes in the 7th century b.c. at latest : Ashurbanipal's in the Nineveh library put at the end of the last column of their cylinders a register of the documents com¬

posing the book.® The early printers fol¬

lowed the same style, using the last paragraph of the last page — now called by English book¬

men the colophon (Greek, apex or terminus), by French the souscription, by Germans the

schliiss Schrift — to give details about the book, which we should now assign to the titlepage, or merely for a sort of envoi or ˆsend-off.®

The usual terminus of books was (<Explicit,®

<(Hic Finis,® <(Finis,® (<Here Endeth,® or some¬

thing of the sort ; but some printers expanded it into elaborate

epilogues or postfaces. Caxton is notable for this ; see examples in Blade's <Caxton,) and for others see Legrand's

bibliographic Hellenique) (1885). With

development of the titlepage, the colophon

disappeared, though instances are found well into the 16th century..

Title Pages. — It is curious that while the early development of printing ran to enormous and elaborate titlepages, Caxton has none at all, except one to a work not certainly his, (The Chastising of God's Children } (? 1491) ; and even that contains only three lines of ordinary print. But in Venice as early as

1474 a <Calendario) by John de Monteregio

was issued by Pictor, Loslein and Ratdolt,

with a quaint rhyming titlepage, with place, date and names at the foot. A facsimile is given in Bouchot's (The Printed Book.* The

treatment of the titlepage has varied enor¬

mously with different periods. In the 16th

and 17th centuries it was at its worst; the object apparently being to make it a digest of the entire contents of the book (Nares' (Life of Burleigh,* of which Macaulay says that

<(the title is as long as an ordinary preface,®

is a mild example in the 19th), and half

destroying the very object of the title by making it difficult to wade through and come at the real theme. Frequently it gave a

laudatory description of the book, a plan

which if adopted to-day would save the re¬

viewers the trouble of reading the preface: (<A Book Right Rare and Strange,® <(Very

Necessary to be Known,® <(Very Pleasant and Beneficial,® etc., are

familiar to the student of early printing. Modern titles are thought to violate both good taste and good business judgment in going beyond a short plain

sentence or name ; but they sometimes do

worse by misleading the cataloguer, as when Ruskin's < Notes on the Construction of Sheepfolds) is classed among works on live stock.

Double titles, as where a subtitle is given of a seemingly different purport from the main one, aie also perilous. As to the frequent practice of reissuing an old book under a new title, it is pure fraud, wasting the money of libraries and private buyers on what they

have already or do not want, throwing cata¬

logues out, and making confusion all around.

The punishment of using a title already ap¬

propriated, even unknowingly, is direct and

by law, for the title of a book is protected by law as much as any other part of the con¬

tents. For the lore and facsimiles of titlepages, see Andrew Lang's ((01d French TitlePages® in books and Bookmen * ; Le Petit's brincipales Editions originales d'Ecrivains

frangais* (1888) ; and Ivonnecke's bilderat—

las> (1887).

Dating of Books. — One of the most ex¬

asperating traits of the early printers, like the monkish scribes, was its rarely occurring to them to put dates to their books. Only five out of 21 of the known works of Colard

Mansion, Caxton's master, are dated, and

more than two-thirds of Caxton's own are

dateless. On the other hand, in the colophon to the (Moral Proverbs) and in the book

of the Knight of the Tower,* the dates are set down with excessive minuteness, even to the month and day. Modern publishers only

fail to date a work when it is out of date and the fact is to be concealed from the

buyer; a common deception of the trade is

to reissue an old work with a new titlepage and usually a new copyright date, sometimes shifting the introductory matter so as to

change the pagination or (<folioing.® The

usual and now universal date is either by

Roman numerals (an antiquated annoyance it

would be better to abolish), or by Arabic

numerals, which for some inscrutable reason

are held a trifle underbred. In the earlier books some queer freaks are indulged in.

One is to put Roman lower-case numerals

before some of the capitals as multipliers; unfortunately, others use exactly the same as signs of subtraction, and others still use cap¬

ital letters as subtractors, so that the reader's guess needs confirming from outside. For

example :

M CCCC iiijXX VIII (1488: 1000 +400 +4 X 20 + 8).

M iiiiC iiiiXX Viij (1488: 1000 4-4 Xioo+4 X20 + 8).

M iiijD (1496: looo +500 — 4).

M HID (1497: isoo — 3).

Sometimes the early printer used odd

chronograms or titles in which a date is ex¬

pressed by the numeral value of the letters contained in or marked in it ; in some cases repeating in this a date already given on the titlepage. For instance, (De spIrltaLI

IMItatlone ChrlstI saCrae et VtILes plls

Ill LVCeM Datse a R. P. Antonio Van den

Stock Societatis Jesu, Ruraemundae, Apud

Gasparem du Pres* — >a book with two chron¬

ograms on 1658 in the title, but a superfluity in the centre, and containing in the text over 1,500 on the same date. Two modern vol¬

umes of chronograms are Hilson's (1882 and

1885).

The date is often determined approxi¬

mately by the water-marks on the paper; but this is one of the most persistently forged of all things and demands the greatest knowl¬

edge and judgment.

Place of Publication. — This is not always

instantly apparent even when printed, as the various local forms and their varied Latiniza-228

tions or the use of obsolete terms often make a bewildering complexity for a single place; or a punning or pseudo-classical translation may be used, not a true ancient form ; or the same Latin or Greek form may mean one of two or three places ; or it may be used expressly to throw the inquirer off the track. The latter is of course undiscoverable except by outside evi¬

dence, which however in forthcoming in a sur¬

prising number of cases. The motive may be anything from sincere religious or patriotic zeal to the most bestial criminality; most “shady®

modern literature has either no assigned place of publication or a false one, and some are “published® an immense distance from where

they are printed — a common enough thing in legitimate publication in modern times, though practically unknown in early ones, printer and publisher being the same. Hundreds of Euro¬

pean books are nominally published at Pekin, or Tokio, or Calcutta; the unsavory products of Parisian presses are usually fathered on some Dutch or Belgian city; and Sir Richard Burton’s unexpurgated ‘Arabian Nights) was

accredited to Benares, India.

The following list of un-English forms of

the chief centres of past publication will be use¬

ful (for a full one, see (Dictionnaire de Geo¬

graphic Ancienne,* Paris 1870).

Argentoratum: Strassburg.

Augusta, Augusta Vindelico—

rura: Augsburg.

Basilea: Basle.

Bipontum: Deux-Ponts, Zwei—

brticken.

Bnezieh: Venice.

Bononia: Bologna or Bou¬

logne.

Cadomum: Caen.

Caesaraugusta: Saragossa.

Cantabrigia: Cambridge.

Ceulen: Cologne.

Civitas Tricassina: Troyes.

Colonia, Colonia Agrippina,

in civitate Coloniensi: Co¬

logne.

Corona: Cronstadt.

Cuelen: Cologne.

Dordrechum or Dortracum:

Dort.

Eboracum: York.

Eleutheropolis (“Free¬

town”): Freistadt, Fran-

cavilla, Francheville, *etc.*

Also a disguise name.

Enetiai (Greek): Venice.

Gippesvicum: Ipswich.

Gratianopolis: Grenoble.

Hafnia: Copenhagen.

Hala: Halle.

Herbipolis (“plant-town”):

Wurzburg.

Holmia: Stockholm.

Insula or Insulae (“the Isle,”

l’lsle) : Lille.

Irenopolis (“ City of Peace ”) :

Bercea, properly, but used

as a disguise name.

Ispalis: Seville.

Keulen, Kuelen: Cologne.

Leodicum: Lege.

Leucopetra (“Whitestone”)

Weissenfels.

Lipsiae: Leipzig.

Lugdunum : Lyons.

Lugdunum Batavorum:

Leyden.

Lutetia: Paris.

Massilia: Marseilles.

Matisco: Macon.

Mediolanum: Milan.

Mleczi, Mljetka, Mnezik:

(Slav.) Venice.

Moguntiacum: Mainz.

MonsRegalis: Mondovi.

Mussipons: Pont-a-Musson.

Neapolis: Naples.

Neapolis (“Newtown”)

Casimiriani: Neustadt on

the Hardt.

(Enipons: Innsbruck.

Olisipo: Lisbon.

Oxonia: Oxford.

Petropolis: Saint Petersburg.

Probatopolis (“Sheeptown”):

Schaffhausen.

Pontimussum : Pont-a- Musson.

Regiomontium (“Kings—

mount”): Konigsberg.

Rotomagus: Rouen.

Sarum (i.e., Sarisbariae) :

Salisbury.

Tarvistum: Treviso.

Tornacum: Tournay.

Trajectum: Utrecht.

Trecae: Troyes.

Tridentum: Trent.

Turoni: Tours.

Ulisipo, Ulyssipo, Ulyssopolis:

Lisbon.

Ultrajectum: Utrecht.

Venetia, Venetiae, Venezia,

Venedig, Wenez (local dia¬

lect) : Venice.

Pagination. — Books were printed at first

exactly like manuscripts, without numbering the pages. Soon the unhandiness of this method, and the difficulty of making references, forced a numbering of the leaves; which was shortly succeeded by numbering the pages, and in some cases — of very large, closely printed books — by numbering the columns, which is occasionally done for like reasons in modern times. Books of more than one volume are usually paged

separately, but in many large sets the paging is carried consecutively from beginning to end, especially where it is likely to be issued in more than one edition and divided into differing num¬

bers of volumes ; since in that case one index will answer for all, instead of having to be made over for each. In the old folios and quar¬

tos, letters were often inserted on the margin, to break the page or column into separate por¬

tions without interfering with the continuity of the text; these marginal references from the first editions of classics are often left in the modern editions, forming a convenient method of reference from one to the other. Essentially the same method is followed in some modern books, but usually by numbers instead of letters, dividing off the text into tens and fives of lines, for convenient citation and reference; in some editions of the Bible the chapters and conven¬

tional verses are marked off in the same way, to keep the original paragraphing and continu¬

ous narrative and yet be easy of comparison with the common Bibles.

Prefaces, Dedications, *etc.* — An intro¬

duction is properly a part of the body of the text, outlining its theme and the main divisions of the argument or narrative, or setting forth the general conditions from which the special theme is isolated and enlarged for study; the preface (for which among certain ultra-Teutonists the disagreeable affectation “foreword,®

German Vorwort, is substituted) is properly the author’s introduction of himself or his work to the reader, explaining his general purpose, the need or place of his book, personal thanks, or comments, etc., and all such matter as needs to be stated yet is not pertinent to the exact subject. In old times it was like the prologue or epilogue to a play, a method of ingratiating one’s self with the reader, bespeaking his indul¬

gence or removing any unfavorable impressions with which he might begin the book; and was addressed to the “courteous reader® or the

((gentle reader® (which properly meant an as¬

sumed feminine reader), *etc.* The dedication, in times when there was no general book-market and an author must depend on the patronage of some person of rank (that is, down to the 18th century, and well into that), was an integral and indispensable part of the book: it meant

that the author asked the patron to give him money and place in return for being celebrated, just as the old chiefs did their bards. He must have his Mjecenas ; without him he would

starve, with him he could disregard the masses.

Sometimes, with men of hard, bold natures and a keen scent for the worst side of human life, like Martial or Aretino, they used disguised (very little disguised) threats and virtual black¬

mail as a supplement to appeal, and fawned and snarled alternately. In those times it was often nauseous with fulsome laudation; it is now of the simplest form, a mere survival used to ex¬

press the author's liking or gratitude for some one, or acknowledgment of inspiration or en¬

couragement, or in humorous books often a

joke like the text.

Printers' Emblems.— These are the "book¬

plates® of the publishers, used not to imply ownership of the copies, but the credit of the work. They have been treated by Berjeu in

'Early Printers) (1866), by Silvestre in

'Marques Typographiques> (2 vols., 1867), and BOOK CLUB

there was an old work of Roth-Scholtz (Nurem¬

berg 1730) ; it has also been touched on by John Hill Burton in his (Book-Hunter. 5 Among

them may be cited the three-masted ship of Mathis van der Goes of Antwerp, 1472-94; the windmill of Andrew Myllar, Edinburgh, 1508

and later; the curious wild men and fruit-laden tree of Thomas

Davidson of Edinburgh, in

1541 ; the Stephenses' olive-tree, and the Elze¬

virs' sphere. Often there is a punning allusion to the publisher's name; Froschover (Frosch in German is frog) has frogs; Le Chandelier, a seven-branched candlestick; and Nicholas Eve

has a picture of Eve giving Adam the forbidden fruit. Others use instead the armorial bearings of their cities ; Leeu, the castle of Antwerp ; R.

Hall, Geneva's half-eagle and key on a shield; Stadelberger, the lion rampant of Heidelberg, and the diapered shield of Zurich. Ascensius, 1462-1532, has a most vividly accurate represen¬

tation of his great printing press, with a press¬

man pulling a proof. His device bore the in¬

scription, <(Prelum Ascensianum® ; and it was adopted by Josse Bade of Paris, 1501-35, who added his initials at the foot ; by De Gourmont, 1507-15; Le Preux, 1561-87 ; and in a modified form by De Marnef, 1567, and De Roigny, 1565.

The Aldi had an anchor and a dolphin, which was employed by Turrisan, De Chenney, Bril-lard, Tardif and Coulombel — sometimes, as in Coulombel's case, with the divided Aldus.

Decoration. — Besides the illustration of

the text by pictures, either as frontispiece or interleaved, there are certain artistic forms which are merely decorative accessories to the book as such. The titlepage may have some of its lines or letters printed with colored inks; the printer's emblem or some suitable vignette may be inserted ; or even the whole title may be engraved, as often in the 16th and 17th cen¬

turies, when it was frequently an exceedingly elaborate and costly affair, and in some modern editions-d e-luxe these engraved titlepages are works of extraordinary beauty. There are also ornamental initials, as with the illuminated manuscripts ; head and tail pieces, in the blank at the head of a chapter or the space left at the end. The first printers often left the initial letters off altogether, or put in a small one

as a guide to the artist, who inserted them by hand, using red ink, from which he was called a rubrisher; he also used his taste in other deco¬

rative details, being in fact the illustrative artist of the time.

Technical Terms. — The sale and collec¬

tion of books are too large subjects to be treated here, but a few of the names used in the second-hand book trade may be mentioned.

ˆUnique,® <(rare® and ((very rare,®, are intel¬

ligible as names, but need judgment in their ac¬

ceptance. A book may be unique because it

was not worth keeping, like disused textbooks ; the term does not imply any special value. Or it may be so because the original edition was limited to enhance its value, a very common device. In all such cases there must be knowl¬

edge and sense to estimate properly the intrinsic or factitious worth of the book. ˆEdition®

means nothing whatever ; properly it should

mean all the issue of a book that the publisher thinks the market will bear at one time, and once it did mean that, but it has long ceased to have any definite connotation. As above, the wedition)) may be artificially limited to a small number of copies with a promise to destroy the plate ; on the other hand, a popular novel may sell many thousands and each thousand be

called an ˆedition,® so that it may be said to have passed through 50 ˆeditions.® (<Thousand®

is the honester word, and is now more used by the larger houses. ˆCurious® is a euphemism for a much less dainty word. (<Foxed® means damaged by brown or yellow spots. ((Uncut®

does not mean that the leaves have not been opened with a paper-knife, but that the original size of the leaves has not been cropped by the binder. The French use non coupe for the

former, and non rogue for the latter.

Bibliography.— Birt, (Das antike Buchwesen in seinem Verhaltnis zur Litteratur5

(ib. 1893) ; Duff, (Early Printed Books) (Lon¬

don 1893) ; Pollard, (Early Illustrated Books5

(London 1893) ; Madan, (Books in Manuscript5

(ib., 1893) ; Pollard, (Early Illustrated Books5

(London 1893) ; Putnam, (Authors and their

Public in Ancient Times5 (New York 1893) ; id., (Books and their Makers in the Middle Ages5 (ib. 1896). See also Bookbinding;

Bookselling; Printing Manuscripts, Illu¬

mination of, and consult works referred to

under these titles.

George Edwin Rines.

BOOK CLUB, a private association print¬

ing books for a limited number of subscribers.

The members are usually learned men, and in this way render accessible rare books and manu¬

scripts. The earliest of these clubs was the Roxburghe Club (instituted 1813), which was

convivial as well as literary, and imposed on each member the cost of reprinting one publica¬

tion. Its work was comparatively unimportant.

With the Bannatyne Club, founded by Sir

Walter Scott in 1823, began the reprinting of really important works. Other English clubs

of this sort have done excellent and valuable work, among them the Camden Society (1838), whose publications relate to English history, the Percy Society (1840-52), the Hakluyt So¬

ciety (1846) and the Early English Text So¬

ciety (1864).

In America there were in Colonial and Rev¬

olutionary times a number of literary societies which published the writings of their own mem¬

bers ; such was the Junto founded by Franklin in 1726. The first association established for the purpose of publishing was the 'Seventy-six Society formed in 1854, whose publications re¬

late to the American Revolution. This Society existed for three years only, and was followed by <(The Club® in New York, and by the Brad¬

ford Club. In 1858 the Prince Society of

Boston was established, and it still continues its work of publication. From 1858 to 1876 a large number of clubs were formed whose

work was neither important nor valuable. In 1876 the Brooklyn Historical Printing Club

was established, continuing its operations until 1902. It did most excellent work on historical lines. The foremost of all American clubs of this sort is the Grolier Club of New Tork, formed in 1884 with 50 members, now number¬

ing about 400. Its beautiful club-room forms an ideal meeting place for the scholar and the bibliophile. Its publications are of a literary and bibliographical character and are noted

for their elaborate and artistic make-up.

BOOK OF COMMON PRAYER, the

name given to the service book of the Angli¬

can churches both in England and in all coun¬

tries where Anglican communities are estab¬

lished. Such a book is more than a mere

prayer book, and this fact is made plain in the title which reads (Book of Common Prayer and Administration of the Sacraments and other

Rites and Ceremonies of the Church. , Toward the middle of the reign of Henry VIII an at¬

tempt was made to simplify the equivalent

books of the Catholic Church by turning them into English and excluding from them all that the Reformers considered (<superstitious and

ungodly.® But it was not until the reign of Edward VI (1549) that the first complete book embodying all the changes thus far made was compiled and published. It was the work of 13

ministers, at the head of whom were Ridley and Cranmer. But it was not until the follow¬

ing year that the ordination service was added.

Great care was taken to change as little as pos¬

sible the form of the services of public worship to which the people had become accustomed.

Therefore this first attempt did not satisfy the more radical of the

Reformers. So a new re¬

vision of the prayer book took place in 1552.

In this, owing to the reform influences at work, numerous of the ancient Catholic ceremonies

retained in the first revision were cut out. The modern ritualistic party appeals for sanction to the first revision of the reign of Edward VI, with all its ceremonies, forms and vestments.

Among the changes made in this second re¬

vision was the omission of prayers for the dead, which the reformers looked upon as pagan.

Other changes were introduced in the Book of Common Prayer in the reign of Elizabeth

(1559). The Queen threw her influence in the scale for a return to the ceremonies admitted in the first revision, and a return to some of these was the result. Some more of these were restored under James I (1604). Under the

Commonwealth the Book of Common Prayer

was not only not used as a part of the state re¬

ligion, but its use was strictly prohibited. The restoration of the monarchy saw another re¬

vision in the prayer book in 1662, in which the Anglican party showed little disposition to pla¬

cate the Puritans or to heal the divisions that separated the Protestant bodies in England.

To this revision dates the present form of the Book of Common Prayer, which has under¬

gone some minor changes since then. Many

Puritans and people with Puritan sympathies

left the Established Church sooner than accept the prayer book in its new form and the prac¬

tices exacted therein. Nevertheless this revised work was used in Scotland and Ireland sub¬

stantially as in England. But in 1878 the Irish Church made some changes which accentuated

the anti-Catholic feeling which has ever dis¬

tinguished the Protestant party there. The

prayer book in use in the Episcopal Church of the United States is practically that adopted by the General Convention of 1789, which was a unit in its determination to preserve the doc¬

trine, discipline and worship of the Church of England. The Athanasian creed was omitted,

certain prayers were added and the use of the cross in baptism was made optional. A very careful revision of the prayer book was made in 1892. Consult Dix, (Lectures on the First Prayer Book of Edward VP (New York

1881); Maskell, William, (Ancient Liturgy of the Church of England* (1882); Garrison, J.

H., (The American Prayer Book* (1887) ;

Huntington, W. R., (Short History of the Book of Common Prayer* (1893) ; Benton, J. H.,

'Book of Common Prayer and Books Con¬

nected with its Origin and Growth* (1914).

BOOK OF DAYS, The, a noted work

edited by Robert Chambers, 1863. It has for its subtitle CA Miscellany of Popular Antiquities in Connection with the Calendar. } In bringing it out the editor expressed a desire to preserve interest in what is ((poetical, elevated, honest and of good report, in the old national life® —recognizing the historical, and even the ethi¬

cal, importance of keeping this active and pro¬

gressive age in touch with obsolescent customs, manners and

traditions. Beginning with 1 Jan¬

uary each day of the year has its own curious or appropriate selection, and its allowance of matters connected with the Church Calendar,

— including the popular festivals, saints' days and holidays — with illustrations of Christian antiquities in general.

BOOK OF THE DEAD, The. The lit¬

eral translation of the hieroglyphic title is : PERT EM HR— U

((Coming Forth by Day.® Modern Egyptolo¬

gists have adopted the name given by Lepsius : Das Aegyptisclie Todtenbuch, ((The Egyptian

Book of the Dead.® That title, however, is con¬

sidered unsatisfactory, for the simple reason that it is not one single book dealing exclusively with funeral ritual, but is a collection of books and chapters treating of psychostasia in the <(Double Hall® before Osiris; the peregrinations of the Ka in the <(valley of the shadow of death® ; the Osirian doctrine of resurrection, *etc.*

No better laconic definition of the Book of the Dead can be given than that of the late Sir Peter le Page Renouf. He says: ((It is not a book in the usual sense of the word; it is not a literary whole, with a beginning, middle and end; it is a mere unmethodical collection of religious compositions (chapters) as independ¬

ent of each other as the Hebrew Psalms.®

Part of the Book of the Dead is of remote antiquity, dating back to the pre-dynastic period.

There are numerous late copies of it in the museums of Europe and of this country, but the best and most complete copy is the Papyrus Ani, in the British Museum. It contains 186

chapters, and is beautifully illuminated; and, although about 3,400 years old (belonging to the XVIII Dynasty), it is well preserved. A facsimile of that Papyrus was published by

order of the trustees of the British Museum, and translated (1895) by the eminent Egyptolo¬

gist, Dr. E. A. Wallis Budge. Several excellent translations have been made into French, Ger¬

man and English of various papyri of the Book of the Dead. There are several versions of MERCHANT KENNA WEIGHED IN THE BALANCE IN THE

DOUBLE HALL OF JUSTICE

MERCHANT KENNA JUSTIFIED

the book extant. That of Heliopolis, which was subjected to numerous modifications and re¬

censions, is considered the most ancient ; then the Theban version of which the Papyrus Ani is an example — dating from the middle of the XVIII Dynasty. These two versions are writ¬

ten in hieroglyphics, in vertical columns and in cursive linear style. Two other versions of a later period are written in hieratic as well as in hieroglyphic characters. Complete translations of the Book of the Dead were made by Birch, Brugsch, Pierret, Pleyte, Massy (Davis, from the French translation by Pierret), Le Page Renouf and Budge.

The style of writing and the vignettes, repre¬

senting embalming, funeral processions, weigh¬

ing of the heart, etc., have undergone great changes in the course of time, and the texts of some of the Theban school in the XVIII

Dynasty differ materially from later produc¬

tions; i.e., the Papyrus Ani (Theban recen¬

sion), contains 186 chapters, and the Turin papyrus, of a later period, contains only 165

chapters.

The late Sir Peter le Page Renouf, for

many years keeper of the Egyptian antiquities in the British Museum, says : ((Out of many manuscripts which are extant, no two contain exactly the same chapters or follow exactly the same arrangement.®

The earliest texts before the XVIII Dy¬

nasty are fragmentary, inscribed on the walls of tombs, monuments, sarcophagi, mummy car-tonages, *etc.* The plate is one of' the humerous presentations upon the walls of the Egyptian tombs of that period, many of which have been faithfully reproduced in the magnificent vol¬

umes of the Description de l'Egypt, and in Lepsius, *etc.* It represents part a of tomb XXIV, now in the Sepulchral Chamber of the Royal Museum, Berlin, showing Prince Merab,

son of Khufu, the builder of the great Pyramid of Gizeh (about 4000 years b.c.) enjoying him¬

self after his beatification with the same good things he was accustomed to have in his for¬

mer life.

The sum and substance of the Book of the

Dead is chapter CXXV, generally considered

the most ancient. It is always connected with a vignette, which depicts the beatification of ((The Osiris,® in the presence of the presiding deities in Amenti, when the ((Negative Confes¬

sion® and the weighing of the heart of the dead before the supreme deity in the nether¬

world takes place.

Before proceeding with the description of

psycho stasia, it is necessary to say a few words concerning the deities taking part in the weigh¬

ing of the heart in the supreme tribunal of Osiris, called (<The Double Hall,® represented in this plate.

The name which every dead Egyptian as¬

sumed was that of the chief deity of Amenti, called <(Osiris.® As Osiris was considered the type of life after death, it was only natural that in the development of their mythology he should become the chief god of Amenti — the Justifier of the dead.

Osiris, according to Egyptian legend, was a prehistoric king, the embodiment of goodness.

His brother, the wicked Set, becoming envious, treacherously killed him, cut the corpse in pieces and hid them in different parts of the land. Osiris' sister-wife, Isis, accompanied by her sister Nephthys, collected the scattered parts^ which were then embalmed by the god Anubis. By means of magic, which Thoth, the god of letters and science, taught Isis, she re¬

suscitated the body. Finally, Horns, son of Osiris and Isis, avenged the death of his

father, by engaging Set, or Typhon, in com¬

bat and killing him. In the course of time Isis, Horus, etc., came to be considered as gods, and Osiris became identified with Turn, the setting sun symbolizing death; and Horus on the horizon (Her-emkhu, sometimes called

Her-em-Khuti) , the type of birth and resur¬

rection.

Thus the Ka, whilst wandering through the

regions of darkness and molested by demons, is the dead Osiris. After the weighing of his heart and if found not wanting, he is beatified and obtains new life. He is no more Osiris the dead, but Osiris Horus, the resurrected.

Plate b represents the weighing of the heart in the tribunal of the

netherworld, Amenti ; presided over by the supreme deity Osiris

(Ausar). On the extreme right and left of the hall are two massive pillars, carved to imitate bundles of lotus stalks, fastened together near the top of the column. The deceased at the entrance to the hall is in an adoring attitude ; his uplifted arms are supported by Maat, the goddess of truth and justice. She is always present in the Judgment Hall and is represented headless, with an ostrich feather in place of the head. Her figure, sometimes only the feather of her headgear, is placed in the scale-pan, opposite the one containing the vase with the heart.* The jackal-headed Anubis and the

hawk-headed Horus superintend the weighing.

In the scale-pan to the right is the weight in the shape of the goddess Maat. This scale is adjusted by another divinity unnamed in the hieroglyphic text. In the scale-pan to the left is a jar containing the heart of the departed.

Upon the beam of the balance sits the dog¬

headed ape deity called Hapi. The little figure seated on the crook to the left represents the new birth after the justification of the ((Osiris.®

Close to the balance stands the ibis-headed scribe Thoth, with his tablets, recording the re¬

sult of the weighing. Close in front of him, upon a shrine, sits the adversary (the Egyptian Cerberus) , called in hieroglyphics Amemit , the devourer of the dead, in the shape of a strange being composed of three beasts : hippopotamus, lion and crocodile, ready to destroy the Ka in case he should, after weighing, be found want¬

ing. Immediately facing the throne is an altar full of sacrifices, consisting of bread, geese, onions, lotus flowers, buds and burning incense.

Beneath the altars are jars containing wine and other liquids for oblations. At the head of the hall is Osiris himself, sitting upon a throne which is richly decorated with ankhs, emblems of life and uas, emblems of purity. He is close¬

ly shrouded, and wears the white crown of

upper Egypt, called Atef, ornamented with two ostrich feathers, the symbols of truth and jus¬

tice; his hands crossed upon his breast, on his wrists are bracelets. He holds in his right h‘1“‘1

the Nekhekh , scourge; and in his left, Hek, the *Many of the Pharaohs adopted her name in their royal titles, i. e., Ramesis II styled himself Se Ra Usur Ma, “Son of the Sun, the Keeper of Truth.”

crooked staff, symbolical of justice. Above are the 42 divine assessors, seated in two rows of 21 each, with different type of head, such as the heads of apes, serpents, crocodiles, etc.,

adorned with the feather representing truth

and justice, and each holding in his hand a sharp-pointed knife. The Ka of the deceased stands, in beseeching posture, with hands

raised, in front of each row of the judges.

The same chapter (125) contains the con¬

fessions of the deceased. Every one of the 42 judges whom the deceased called by their proper names had to pronounce him innocent, he emphatically affirming before each of them in turn that he did not commit any of the 42

sins. The negative confessions are very inter¬

esting but space forbids the mentioning of

more than a few of them. The judge having to consider the crime of theft was addressed by the deceased as follows : wO Devourer of Shades, coming out of the orbits … I

have not stolen® ; another was addressed : (<0

Eyes of Flames, coming out of the shrine …

I have not played the hypocrite® ; (<0 Cracker of Bones, coming out of Snten Khent (Bubastis) … I have not told falsehoods®; (<0

Swallower, coming out of Khncm … I have

not blasphemed® ; (<0 Eater of Hearts, coming out of the thirty … I have not made con¬

spiracies® ; (<0 Eye in the Heart, coming out of the land of Sahu … I have not defiled the river,® *etc.*

Among other sins denied are : ((I am not

sluggish ; I have not made to weep ; I am not a landgrabber; I committed not adultery; I am not a slayer of man; I tamper not with the balance ; I do not cheat,® *etc.*

Howsoever absurd the Egyptian Pantheon

may appear to our eyes, we must acknowledge from the evidence of these 42 confes¬

sions, that they possessed a superior code of morality, a code which included not only our decalogue, but much of the ethical teachings and humanity of modern civilization.

The vignettes of this chapter, as we have

already remarked, vary. The finer illuminated papyri made for royal personages or high

priests and priestesses are exquisitely illumi¬

nated and the texts are unabridged. For

instance, the Papyrus of Nu is more than 65

feet long. The Papyrus of Ani is 78 feet long by one foot and three inches wide.

Most copies of the Books of the Dead are

defective, others betray gross ignorance on the part of the scribe or copyist. The common

people who were unable to purchase a well—

written and illuminated text for their dead had to be satisfied with a cheaply, badly written, abridged copy. The scribes must have possessed a large stock of blanks on hand, containing spaces to be filled with the deceased (Osiris') name. Some of the Egyptian scribes were as dishonest as most of the embalmers. As the papyrus was to be placed with the mummy, the mercenary scribe or embalmer substituted a

spurious for a good one.

BOOK-LICE, wingless members of the

family Psocidce, order Platyptera. These

minute insects would be easily mistaken for aphides, both the wingless as well as the winged individuals. Their bodies are oval, the head free from the prothorax, which is small and partially concealed by the unequal wings. The eggs are laid in patches on leaves, bar or other objects, and are covered with a web. Atropos divinatorius is a small pale, louse-like insect, seen running over books and in insect cases, where it does considerable injury. It is one of the worst museum pests, especially injurious to the smaller lepidoptera. The same habit is also possessed by the well-known Psocus domes ticus.

Another species of atropos, probably pulicarius , has been found in Missouri, infesting the egg-mass of the cottony maple scale (Pulvinaria in-numerabilis) . See Death-tick; Death-watch.

BOOK OF MORMpN. A work first pub¬

lished by Joseph Smith in 1830, and alleged to be the English

translation of an ancient record, embodying the history and more particularly

the religious beliefs and practices, of the aboriginal peoples of the American continent.

The period covered by the main history is ap¬

proximately 1,000 years, beginning with 600

b.c., in which year a small company of Israelites left Jerusalem by Divine direction, under the leadership of the prophet Lehi. These people reached the Arabian shore, where they con¬

structed a vessel in which they crossed the waters to the Western continent. The colony developed into two opposing nations, Nephites and Lamanites, named after their respective

chieftains, Nephi and Laman. The Nephites

cultivated the arts of civilization and kept a written history which was engraved by a suc¬

cession of scribes on thin plates of gold. The Lamanites led a nomadic life, depended for

subsistence mainly upon war and the chase,

and in time degenerated into the dark-skinned race of which the American Indians are said to be the descendants. The Nephites were

exterminated by their Lamanite foes about

400 A.D.

The voluminous Nephite records were

abridged and summarized by Mormon, one of

the later prophets, who gave to the abridgment his own name: hence the title ((Book of

Mormon.® The original classification into

distinct books, each designated by the name of its principal author,

was preserved by Mormon in his shorter history; and the modern version appears as a compilation of 15 such books.

Mormon's son, Moroni, survived the destruc¬

tion of his people long enough to continue the record left by his father, with which he incor¬

porated the (Book of Esther, > which appears as an abridged history of a colony that had been miraculously brought to America from the

Tower of Babel soon after the dispersion.

Moroni deposited the records together with

certain other articles of sacred import in a stone box, and this he buried in a hill near Palmyra, Wayne County, in the State of New York, which hill is called in the text Cumorah.

Joseph Smith, founder of the Mormon

Church, the official designation of which is "The Church of Jesus Christ of Latter-day

Saints,® solemnly affirmed that in September 1823 the existence of the records was made known to him by an angelic visitant, who an¬

nounced himself as Moroni, the last historian and prophet of the extinct Nephite nation, and that four years later Moroni delivered to him the plates of gold with the commission to trans¬

late certain portions, for which labor he had been qualified through the gift and power of BOOK OF THE DEAD

JUDGMENT OF THE DEAD

BOOK OF NONSENSE — BOOK OF THE WARS OF THE LORD

God. With the plates were two stones, set in the ends of a bow of metal ; these, as Moroni explained, were the Urim and Thummim ; and

Joseph Smith averred that by their aid he was enabled to translate the ancient characters into English. The (Book of Mormon) comprises

623 pages, averaging 425 words to the page.

From the English version translations have

been made into 15 tongues.

Among the many assumptions advanced in

purported explanation of the origin of the

Book of Mormon and in hostile denunciation

of Joseph Smith's avowal, the most generally known is the Spaulding story. This repre¬

sented the Book of Mormon as an adapted

version of a romance written by Solomon

Spaulding, a clergyman of Amity, Pa. The

claim has been thoroughly disproved. The

original manuscript of the Spaulding romance is preserved in the library of Oberlin College, Ohio, where it was deposited by the president of that institution, James W. Fairchild, who published an attestation of its genuineness and a statement to the effect that no assumption of its relationship to the (Book of Mormon) is tenable. See Mormons; Smith, Joseph.

BOOK OF NONSENSE, A, a nursery

classic by Edward Lear. It is made up from four minor collections published at intervals during a long life. The author began as an artist

; colored drawings for serious purposes were supplemented by others for the amuse¬

ment of the groups of little ones he loved to gather around him ; and the text added to them has proved able to endure the test of time with¬

out the aid of drawing, and much of it has become part of the recognized humorous lit¬

erature of the language.

BOOK-SCORPION, or FALSE-SCORPION, an arachnid animal of the family

Chernetidce ; known by its large maxillary

palpi, like the scorpion's claw. The abdomen is 11-jointed, flattened, without any appendage, and the living forms are minute; they breathe by tracheae. They are found running about

dusty books and in dark places and feed on mites and Psoci. They are often found at¬

tached to the leg of some fly or other insect by which they are transported about. The female chelifer bears the eggs, 17 in number, in a little bunch under her abdomen. Meuge has

observed a pseudo-scorpion cast its skin in a light web made for that purpose, where it re¬

mained five days in the web after its metamor¬

phosis, and did not assume its dark colors for four weeks; three months after it returned to the same wreb for hibernation. Meuge describes eight species from the Prussian amber, belong¬

ing to genera still living, and Corda one (Micro -

labris Sternberg i) from the coal formation in Bohemia, an inch long. Schiodte has found a curious blind species in the caves of Adelsburg, and several kinds occur in American caves. In chelifer there are no eye $,7 C. can oroides is dark brown, with many short spines on the

thorax.

BOOKSELLING. The earliest history

of bookselling is extremely obscure. The

tablets and cylinders of Assyria and Babylonia will be found treated under Book, and the

article Book of the Dead should also be con¬

sulted. About the middle of the 6th century b.c. is found in ancient Athens an approxima¬

tion to a systematized book-trade as it has been understood in modern times. Pisistratus with funds from the municipal treasury, paid scholars for preparing a standard text of Ho¬

mer and Hesiod for copyists' use. The books then made were very costly. Diogenes Laer¬

tius states that for three books of Philolaus (q.v.) Plato paid three Attic talents- ($3,240), money being then, of course, worth far more than it now is. The first booksellers prepared by their personal labor the scrolls they sold; then capitalists came to employ and organize staffs of copyists. About 250 b.c. Alexandria became one of the great book-centres of the world. In this it was favored by having at its disposal the scholars of the university and the facilities for distribution which the commerce of Alexandria afforded. Skilled scribes were also carefully trained there. The book-trade of Rome commenced about the 2d century b.c.

Slaves who could write Greek were rated high¬

ly. The great publisher of Cicero's time, At-ticus, is well known. His editions were famed for their accuracy. In addition to his central publishing house he had distributed in various portions of Rome and in provincial centres

tabernarii, or retail dealers. Horace's publish¬

ers were the Sosii in the Vicus Tuscus. Argile-tum, Martial says, was the street of the book¬

sellers, as it was, likewise, of the tailoring shops of fashion. By the close of the 1st cen¬

tury a.d., the Roman book-trade was extensive and well organized. Papyrus was imported in great quantities from Egypt, and large staffs of copyists were kept busy preparing editions of various works, the average edition for the gen¬

eral public running from 300 to 1,000 copies.

Very considerable shipments were made to the provinces. During the Middle Ages bookmak¬

ing and selling belonged to the monasteries.

The different monasteries transcribed the par¬

ticular manuscripts treasured in their libraries, and their editions came to have a peculiar value, depending upon the character of the original text and the accuracy of the copy. At the be¬

ginning of the new learning, the manufacture and sale of books passed to the universities, within which the manifolding of manuscripts

was done by an organized guild. Outside the universities, however, there was a considerable trade in manuscripts, beginning with the end of the 14th century. The invention of printing naturally revolutionized the book-trade. The

publications of Gutenberg, Fust, Froben of

Basel, Aldus Manutius of Venice, Estiennes

(Stephani) of Paris, Caxton of Westminster,

Plantin of Antwerp and the Elzevirs of Leyden and Amsterdam are well known. For further

information, see the article Book, above re¬

ferred to; and Publishing, American.

BOOK OF SNOBS, The, a series of

sketches by William Makepeace Thackeray. It

appeared first in Punch , and was published in book form in 1848. The idea of the work may have been suggested to Thackeray when, as an

undergraduate at Cambridge in 1829, he con¬
tributed to a little weekly periodical called The Snob.

BOOK OF THE WARS OF THE

LORD, an ancient work known to the Hebrews but not preserved in the sacred canons.

Several such ancient works are known to have existed in the time of Moses, and it is sup¬

posed that he drew upon them for his own

writings in the Pentateuch. This (Book of the Wars of the Lord,* is quoted or alluded to by Moses in Numbers xxi, 14.

BOOK-WORM, the “book-worm® of li¬

brarians is probably the larva of a boring bee¬

tle (Anobiitm paniceum), one of the family Ptinidce. These worms are small white grubs like those of weevils, which live in various drugs, dried meat, *etc.* It also burrows in hard biscuits, resulting in the weevily biscuits com¬

plained of on shipboard. It more commonly

bores in old furniture, causing it to be “worm-eaten.® These grubs become the beetles known as “death-ticks® or “death-watches.® Consult

the various works on entomology and Blade’s (Enemies of Books. >

BOOKBINDING, the art of arranging,

fastening together and covering sheets of

paper composing a book, including the orna¬

mentation or decoration of the covers. Follow¬

ing the use of rolls of papyrus or wax-covered tablets, leaves of parchment were introduced, and it became necessary to fasten or bind them together. This improvement in form is, on

somewhat doubtful authority, attributed to

Attains II, King of Pergamus, about 150 b.c.

The monks were the early bookbinders, up

to the time of the invention of printing, and examples in the British Museum dating as far back as 700 a.d. illustrate the great labor be¬

stowed on their most precious manuscripts. .

All the early specimens were bound in heavy boards, strong metal clasps and bands, and the material used in covering varied from the

parchment and iron to ivory, enamels and

jeweled silver and gold.

The invention of printing made a great

change in the art of bookbinding, the delicate, beautiful specimens, the workmanship of Jean Grolier and many nameless Italian and French binders employed by Grolier, Macoli and others contrasted strikingly with the rather clumsy, inartistic work of the monks.

It was not until 1820 that cloth was intro¬

duced as a covering, invented, it is said, by Archibald Leighton, one of the most enterpris¬

ing and successful of London binders. In the Bookseller of 4 July 1881 there is an interesting account by Robert Leighton of the invention of cloth by his father. The embossing of book¬

binding cloth was suggested to the late Mr.

de la Rue, and was carried out so admirably by him, with the appliances he possessed for em¬

bossing paper, that his process remains com¬

paratively unaltered. The desired pattern was engraved on a gun-metal cylinder, and trans¬

ferred in reverse to one made of compressed paper, strung upon an iron spindle, and turned in the lathe the exact circumference of the gun-metal one, and these two being worked to¬

gether in a machine, and the pattern transferred from one to the other, the cloth was passed between them and received the impress of the pattern.

Extra work and edition work are the two

classes into which bindings may be divided ; extra work being bound with greater care, and largely by hand methods, forming a small por¬

tion of all books bound ; edition work being the binding of quantities, principally by ma¬

chinery.

The following description will apply to extra work, and methods in vogue do not differ

greatly from the process of hundreds of years ago, although the use of the press and plow, hammer and backing boards is giving way to the trimming, smashing and backing machines.

The first process takes the sheets from the printing press, folds them in sections of 8, 16

or 32 pages, done generally by a girl pressing each fold down with a

bone folder in such a manner that the pages come in consecutive

order. If a book contains 320 pages it will be seen that 20 sections or signatures are required to complete it. When all the sections are

folded, they are gathered up in order and col¬

lated, that is, examined to see that each signa¬

ture follows in proper sequence. Smashed or hammered, the book is then ready to sew.

Throughout the world in binderies given up

to extra work will be found a frame of peculiar make called a sewing-bench. On this are

stretched bands or cords of soft twine in a ver¬

tical position, and to these the signatures are attached by passing the needle and thread

through the middle of the signature and around each band or cord, and the raised bands show¬

ing on back of book inform how many cords the book has been sewn on, although in many cases grooves are sawed in the back of the book into which the cords fit, and false bands are pasted on back to show the raised band effect.

The book is taken down from the sewing

bench and an inch or more of twine is left on each side to be later laced through holes

punched in the boards. Before this is done the marble or colored linings are pasted on the front and back of book inside the first fly leaf.

Leather or cloth joints in some cases are added.

The book is then trimmed in a cutting or

trimming machine ; formerly the edges were

trimmed by a knife called a plow while the book was clamped firmly in a press. Before cutting the back is struck forcibly against an iron plate, to square up the signature, then placed against gauge, set to position desired and clamped, knife descending and cutting book while under pressure. After trimming the

three sides the book is again carefully knocked up and a thin coating of glue, sometimes flex¬

ible in character, is well rubbed in between signatures, for unless this is done the signatures will show a tendency to split open, where one signature joins another. The book is then

rounded by drawing or shaping the curve, at same time beating in a peculiar manner with a flat-faced hammer, then clamped in pair of

jaws, and the joints drawn over by repeated taps of hammer, or in some shops by a heavy roller set in a machine called a backing ma¬

chine, which clamps the back under treadle

movement. Many extra forwarders round the

book before trimming, then knock the round

out. After cutting, the book will spring back to its former round, leaving the front concave.

In most particular classes of work the boards are laced to book before it is cut. The book is now laced to boards forming the cover and the ends of cords glued down on the inside of the cover. If the edges are to be marbled, gilt or colored, they must go through that process

before books are rounded,

Marbling. — Prepared colors are thrown in

a shallow trough containing gum tragacanth,

on which the colors float and spread as desired.

The pattern is formed by various combs that mingle the colors. The edges of the book are dipped into the liquid just deep enough for the colors to adhere, and when removed from trough, a sizing is drained over the edges, re¬

moving the surplus gum and fastening the col¬

ors more securely to edge. After edˆes are thoroughly dry they may be burnished with an agate or stone burnisher. Gilding is done by laying thin sheets of gold leaf on the edges of books previously scraped and smoothed with

steel scraper and fine sandpaper and sized

heavily with a preparation of white of egg.

When dry it is then burnished with blood¬

stone, flint and agate burnishers.

Colored Edges. — Mix aniline colors with

alcohol, adding a little ammonia to drive color in, spread over surface of edges with a fine sponge. If desired, then clamp in press and burnish. The book is then ready for the headbands, linings and cover. The headbands are merely ornamental and are woven with a col¬

ored silk, by machine or made over cords with muslin. The older process was to work over a piece of parchment with colored silks and partially fasten to back of book in the weav¬

ing or sewing. The back is then lined with strong paper glued on, the amount of stiffen¬

ing varying with the size of book and style of binding, most books being made with loose

backs on which false bands are glued.

Coverings. — • The leather cover is dampened and covered with paste, then drawn smoothly over and turned in, over boards which have previously been laced to the book. After

leather has dried, clean out joints and paste against covers the lining papers.

Finishing. — Artistic taste of the highest

order finds employment in this branch of book¬

binding and an expert finisher must be at once artist and craftsman of much ability. The

ornamentation and lettering of fine bindings all are done by hand, the finisher bringing into use many tools and ornaments, cut on brass and fastened into small wooden handles, much de¬

pending on the manner of cutting and shaping the tools. The leather must first be prepared with paste wash and a glair or sizing generally made from the white of an egg, over which the gold leaf is laid and the tools which are heated over a gas burner are then impressed on the gold leaf, the surplus gold being brushed off with a piece of crude rubber. Upon the most careful preparation of leather, the proper heat of tools and the tooling of book before sizing is too dry, depend the brilliancy or gloss of the impression.

Ornamentation without gold is called ((blind tooling^ and is produced by rubbing or stamp¬

ing the hot tool on the dampened leather. Few books bound now have such a wealth of orna¬

mentation and so great an amount of time given to the finishing as was common in Grolier's time, although there are still many novel effects produced by the use of inlaid colored leathers, incised leather, *etc.*

After the period of Grolier, the taste for magnificent binding in France ran riot and

many indulged in most sumptuous bindings and designs were prepared under the superintend¬

ence of the most celebrated artists.

During the 16th and 1 7th centuries bindings were produced in England which compared

favorably with the contemporary masterpieces

of French. Italian and German bibliography,

but in the 18th century England took the lead¬

ing place in the workmanlike forwarding and artistic finishing of books.

EDITION WORK.

So slow was the process of hand folding,

2,500 signatures of three folds being a fair day's work, a single 16-folding machine was built with steel points set about 15 inches apart, over which the sheet is placed, registered exactly on the points, or holes punched into the sheet as it was being printed; a knife de¬

scending makes first fold, carrying through

rollers to gauges, when the second knife drops, forcing sheet through second roller, and third knife likewise, making three complete folds, and dropping them in a trough at the rate of 10,000 a day, or in other words, one machine doing the work of four hand folders.

It was soon found possible to build double 16-folding machines doing nearly 20,000 sheets daily, and at present in some of the larger edition binderies, special machines have been built which will take a sheet

nearly 40x60

inches in size, and will turn out 40,000 signa¬

tures of 16 pages each, equivalent to the work of 16 girls folding by hand.

When the books are found complete, they

are put through a powerful machine called a smashing machine, which compresses and

makes solid the book, then to the sewing ma¬

chine, where each signature in turn is laid over the arms, is carried to a position under a row of curved needles, punches concealed

w'ithin the arms first make an incision through which the curved needle carries a thread meet¬

ing a looper which fastens each stitch. The first and last sheets are pasted before they are placed over the arms and when finished the book is cut apart from the following book and the thread is held by the pasting of signature from unraveling.

Following the sewing, books are re¬

smashed, the linings and cloth joint pasted in and books are ready for trimming. If it is to be marbled or gilt, the back is tipped with glue to keep the signatures from getting out of square or becoming irregular.

Trimming. — To remove the rough and un¬

even edges of the signatures, the book should be cut or trimmed. This may be accomplished in the straight cutter, a machine using one knife which, making a clean, smooth cut, de¬

scends while book is clamped, in some ma¬

chines with a hand clamp, in others, automati¬

cally. This machine, while very satisfactory in its results, has given way for the trimming of editions of books to automatic trimmers of various makes, which, unlike the process of trimming in the straight cutter, trims the edges of the top, front and bottom of book without removing from machine. An improvement on

the automatic trimmer is a machine using two knives with each cut of machine, and while the output of this machine is very large, there has just been installed in one of our large schoolbook binderies a continuous cutter which permits the books to be constantly fed into the machine, and the output is so large, the ma¬

chine is in a class by itself.

After trimming and gilding, marbling or

coloring, it is glued over back with thin coat¬

ing of glue well rubbed in between the signa¬

tures to prevent the breaking between signa¬

tures, which, while not taking from the strength of binding, looks as if poorly bound; just be¬

fore glue is dried too thoroughly, book is fed against the gauges of the rounding and back¬

ing machine, the front rolls of machine draw¬

ing or rolling the round under pressure, then carried to back part of machine where a back¬

ing plate rotates against the back and forms the joints. This machine will do the work of six to eight men.

After the process of rounding and backing,

headbands are prepared by forming muslin

over a cord or twine; the backs of books are thoroughly glued, headbands affixed at top and bottom of back, crash lining cut to extend about one inch or more over the joints, is rubbed on with a bone folder, heavy manila paper is then glued against the book and well rubbed in, after which books, when thoroughly dried, are ready to case in, or in other w'ords, put in the covers which have previously been prepared.

Boards called binder's boards are cut in

rotary cutters to proper size for books ; cloth is cut sufficiently large to overlap about one-half to three-quarters of an inch and fed over a cylinder which, revolving, carries it against glue rollers, which place a thin coating of glue thereon. This glued piece of cloth is carried to a certain part of machine and awaits the laying thereon of boards and strip of back lining paper which has been forwarded by a clever device from the rear part of machine.

Grippers then carry it through rollers after end and side slides have turned in the cloth over the board and a rubber belt delivers it on stand completely finished.

Stamping. — The ornamentation of both

cloth and leather covers for most bindings

other than single books or single sets is rapidly and neatly accomplished by a process called stamping. Stamping was introduced to over¬

come the difficulty in hand tooling the cotton cloth and principally for reason of the need of a much cheaper and quicker method for

lettering and ornamenting the increased quan¬

tities of books sold when the muslin or cloth was introduced as a binding for books.

The process of casing, as it is called, con¬

sists in pasting the outer end leaves of a book, placing in proper position on cover and cover then is drawn over and book shifted to secure evenness of squares or margins, then built up on press boards with brass rims which press into the joints, and after several hours' pres¬

sure, sufficient time being given to thoroughly dry, the books are removed from press, opened up and examined, wrapped and boxed for de¬

livery.

Bibliography. — Adam, Paul, Practical

Bookbinding5 (New York 1903) ; Battershall,

(Bookbinding for Bibliophiles5 (Greenwich,

Conn., 1906) ; Brassington, (History of the Art of Bookbinding5 (London 1894) ; Cockerell,

Douglas, (Bookbinding and the Care of Books5

(New York 1912) ; Coutts, H. T., and Stephen, G. A., (Manual of Library Bookbinding, Prac¬

tical and Historical5 (London 1911) ; Dana, T. C., (Notes on Bookbinding for Libraries5

(1910); Nelson, (Works on Bookbinding from

the S. P. Avery Collection5 (New York 1903) ; Zaehnsdorf, Joseph, (Bookbinding5 (London

1906) ; Westendorf, (Die Kunst der alten Buch-binder5 (Halle 1909).

Edwin S. Ives.

BOOKKEEPING. Bookkeeping is the

art or science of recording business transac¬

tions in a systematic and convenient form. The objects of the record are, not merely to state what transactions took place and when they

occurred, but more particularly, to determine the amounts and sources of the profits or

losses during any financial period; and to

show, at the end of the period, the nature and value of the assets, or things owned, and the nature of the liabilities, or things owed; and the amount of the net worth or capital.

The form of the record is columnar ; col¬

umns for date, explanation and amount or

money value being the least number used.

Fundamental Equation. — If a person as¬

signs a mone}' value to all of his assets and liabilities and if the assets are in excess of the liabilities, the difference is called that person's net worth or capital. Expressed as an equa¬

tion ; assets minus liabilities equal net worth ; or, in an equivalent form, assets equal lia¬

bilities plus net worth. In symbols, A = L +

N. W. This is the fundamental equation of

bookkeeping and all records are made so as to maintain its equality although the amounts of the various terms are changed by every

transaction. This equation may be affected by any of the following six occurrences; (1) in¬

crease of assets; (2) decrease of assets; {3) increase of liability; (4) decrease of liability; (5) increase of net worth; (6) decrease of net worth. An increase of assets would cause an amount to be added to the left side of the equation. A decrease of assets would necessi¬

tate the subtraction' of an amount from the left side of the equation ; but in bookkeeping subtraction is always avoided by adding the amount to the opposite side; so a decrease of assets would be represented by adding the

amount of the decrease to the right side of the equation. Similarly, an increase of lia¬

bility would be an amount added to the right side of the equation, and a decrease of liability would be an additive term on the left side ; an increase of net worth would be an addition to the right side, while a decrease of net worth would be added to the left side. In other words, to keep all the terms of the equation positive and avoid subtractions, the six occur¬

rences which may affect the equation must be grouped thus :

ADD TO

Left side Right side

Increase of assets Decrease of assets

Decrease of liabilities Increase of liabilities Decrease of net worth Increase of net worth Every business transaction involves two

elements of equal amounts and of opposite

nature from the point of view of each of the parties concerned — a giving and a receiving of something of value by each of them. Or, put in the language of the above equation, every business transaction involves at least two of the six occurrences, one in each of the above groups, or one affecting each side of the funda¬

mental equation. Thus, if merchandise be sold for cash, the asset, cash, is increased and the asset, merchandise, is decreased; or, if mer-

chandise be bought on credit, the asset, mer¬

chandise, is increased and the liabilities are increased, therefore, the equality of the two sides of the equation is maintained no matter what transaction takes place.

Double Entry. — Any system of recording

both the opposite elements or the two occur¬

rences of a transaction is called double entry bookkeeping. Double entry means, not that the same transaction is entered twice, but that both elements of the transaction are recorded.

It is sometimes said that there is another system of bookkeeping called single entry. But it will be shown below that single entry is not really a different system but only an incomplete record or partial double entry. In the language of bookkeeping, additions to the left side of the equation are called debits ; and additions to the right side are called credits. Since every trans¬

action affects both sides of the equation by the same amount, we may say that in double entry bookkeeping, to every debit there is an equal credit and vice-versa.

Journal and Journalizing. — The analysis

of a business transaction into its two or more elements or occurrences and the recording of them so as to maintain the equation or to show equal debits and credits is called journal¬

izing ; and the book in which such records are made is called a journal. The journal is a book of original entry in which the transactions are recorded in chronological order. In its usual form the journal is ruled as shown in the illustration No. 1. The name of the debit element of the transaction is written first in the explanation column with the amount in the left hand money column; the credit item is written on the next line, indented a little, with the amount in

the second money column. A

complete explanation should be written under each journal entry.

Rule for journalizing; analyze the transac¬

tion into its elements or occurrences and

then

Debit that element which represents an in¬

crease of assets, or a decrease of liability, or a decrease of net worth;

Credit that element which represents a de¬

crease of assets, or an increase of liability, or an increase of net worth.

Other rules for journalizing have been given, such as : debit whatever comes into the business or costs the business value; credit whatever goes out of the business or produces value for it. Debit the account that receives the benefit ; credit the account that yields the benefit.

In the journal, transactions affecting the

same person or thing during a given period, because of their chronological arrangement,

will appear on many different pages and inter¬

mingled with transactions affecting entirely

different persons or things. In order to deter¬

mine the condition of the business at any time and to tell to what extent it has been a suc¬

cess and why, or to wrhat extent and why it has failed to succeed, it is

necessary to collect into one place or group those elements of the trans¬

actions which have affected the same person or thing. The best form into which such groups of occurrences may be put is the account.

Account. — An account is a systematic ar¬

rangement of financial facts of the same or opposite tendencies affecting the same person or thing and leading to a conclusion. Increase and decrease are the opposite tendencies and the facts must be arranged so as to separate the increases from the decreases in order to arrive at the conclusion. For every occurrence affecting an account, the date, explanation and amount are needed. The usual form of an

account is illustrated by the

CASH ACCOUNT

Jan.

1

E. H. Cobb, investment

C

2

2200

Jan.

3

Expense

C

3

30

2

A. C. Robins

C

2

120

—

4

Notes Payable

C

3

500

—

5

Mdse sales

C

2

175

—

8

Foss & Co.

c

3

600

—

10

Notes Receivable

C

2

800

—

12

Commission

c

3

40

—

10

Interest

C

2

4

—

13

J. M. Pike

c

3

85

—

11

K. M. Clark

C

4

230

—

15

Rent

c

5

75

—

13

Mdse sales

C

4

200

—

15

Balance

2399

—

3729

—

3729

—

Jan.

15

Balance

2399

On the left or debit side appear the

amounts of cash received, the increases, and on the right or credit side the amounts paid out, the decreases. The balance or conclusion of the account is the amount of cash on hand.

Accounts may be divided into two classes, (1) real and (2) nominal. Real accounts are those which show the financial condition or net worth of a business. They represent real values

which definitely exist and may be subdivided into asset accounts (positive values) and liability accounts (negative values). They are some¬

times called financial accounts. Such accounts are : cash, real estate, machinery, etc., and ac¬

counts with persons. Nominal accounts are

those which show' changes in financial condi¬

tion or net worth. They may be divided into profit or income accounts and loss or expense accounts. They are sometimes called explana¬

tion accounts because they explain the sources of gains and losses. Such accounts are : in¬

terest, discount, commission, wages, *etc.* They are subdivisions of or subsidiary net worth or proprietorship accounts and are eventually com¬

bined with the proprietor's capital account.

Some accounts may be partly real and partly nominal, such as the general merchandise ac¬

count, and are called mixed accounts. It is best not to keep such accounts but to separate them into their component parts which are wholly real and wholly nominal. Sometimes accounts

are classified as personal and impersonal ; that is, accounts dealing with persons and those dealing with tangible and intangible property.

Real accounts may be either personal or im¬

personal, while nominal accounts are all im¬

personal. The proper classification of accounts is one of the most important tasks of keeping books.

Ledger.— The book in which the elements

of the transactions are recorded in classified groups or accounts is called the ledger. In the journal the unit is the transaction, while in the ledger the unit is the account. The ledger is the most important book of any set of books.

In it the records of all other books are collected and classified so as to show results. If the pro¬

prietor or manager wishes to know how much any person owes the firm or how much the firm is in debt to anyone, he turns to the proper ledger accounts; if he wishes to know the

amount of any kind of expense for a period or the income from any particular source, he will find it in the ledger. From it he can ob¬

tain quickly and easily the effect upon the busi¬

ness of any class of transactions and a compre¬

hensive view of the business as a whole.

Legally, however, the journal or book of orig¬

inal entry is the more important one because it is the first record and less easily falsified. It holds a higher place in court in case of dispute.

The process of transferring the items of the journal entries to the proper accounts in the ledger is called posting. In posting it is im¬

portant that the connection between the ledger and the book of original entry should be indi¬

cated. This is accomplished by placing in the folio column of the journal opposite each entry the page of the ledger to which the posting was made; and in the folio column of the ledger account the journal page from which it came.

All entries in the ledger must be posted from some other book, never made directly.

Books Used. — In theory the journal and

ledger described above are the only books

necessary for the double entry system. In

actual practice and especially in a large busi¬

ness, it is impractical to keep only one book of original entry for all transactions. Therefore the journal has been subdivided into many

books, each of which is used to record a par¬

ticular class of transactions. It is convenient and saving of space and time to employ a sales journal or sales book in which to record only those transactions concerning merchandise sold.

Other books of first entry which are split off from the journal are: Purchase Book,

Notes Receivable Register, Notes Payable Reg¬

ister, Sales Return Book, Purchases Return

Book, Cash Book, the names of which indicate their particular uses.

Since every book of original entry is used to record a particular class of transactions in each of which one element is the same, that element is not recorded for every transaction but only at the end of a period and then as a total of all the opposite elements. Thus, in the sales book illustrated each customer is debited for the amount of his purchase at the time it is made, but sales credited only at the end of the period

and then for the total sales. This saves many postings to the ledger and although the Illustration 1. — Form of Journal. (Double entry) Jan. 1, 1916.

L. F.

E. H. Cobb began this day a general merchandise business at 297 Main St., investing;

Building and Lot

2

1500

—

Merchandise

4

1600

—

Cash

3

2200

—

Foss & Co.

10

200

—

Notes Payable

7

100

—

E. H. Cobb, Cap.

1

5000

—

(To record the assets and liabilities of the business and the capital)

Merchandise

4

1500

-

Foss & Co.

10

1500

-

(Bought mdse of them on 30 days credit)

- 2 -

Expense

15

30

Cash

5

30

–

(Bought a desk and chair for cash)

- 3 -

A. C. Robins

20

200

Merchandise

4

200

-

(Sold him mdse on a/c)

- 4 -

Notes Receivable

8

400

-

Merchandise

4

400

.

(Sold mdse to M. Cutts on his 30 da. note) ‘ 5

Cash

5

120

Merchandise

4

120

(Sold mdse for cash)

- 6 -

Expense

15

40

Cash

5

40

—

(Paid rent for month)

- 8 -

Merchandise

4

600

Notes Payable

7

600

-

(Bought mdse of P & T Co. on our 30 day note, interest 5%)

form of the entries differs from that of a single journal entry, yet they are of the same nature and maintain the equality of the fundamental equation. It is an invariable rule that every entry in any book of first entry is of the nature of a journal entry.

In addition to the principal books of first entry, from which postings are made to the ledger, another class of books, called auxiliary books, is sometimes employed, such as invoice book, order book, check book, inventory book, *etc.* No postings are made from them and they are kept merely for convenience of reference or for statistical purposes and to supply more de¬

tails than are put in the principal books. Often the notes receivable and notes payable regis¬

ters are used as auxiliary books and then no postings are made from them.

To prevent the ledger becoming too cumber¬

some and to enable several clerks to make the postings simultaneously the ledger is divided into several volumes. The personal accounts

taken out. Such an account is called a con¬

trolling account. A controlling account is,

therefore, a summary account in the general ledger, to which are posted in totals the debits and credits which are posted in detail to various separate accounts in some subsidiary ledger.

In order to post to a controlling account in the general ledger the total of those items which have been posted separately to some subsidiary ledger, it is necessary to use special columnar books of original entry; that is, books in which there are separate columns for all the items which belong to particular subsidiary ledgers.

These columnar books vary in form according to the number of controlling accounts kept, the nature of the business and the amount of infor¬

mation desired in the records.

The details of columnar books cannot be

considered in this article, but the general theory involved does not differ from that of the use of the simple journal and ledger.

Opening a Set of Books. — To open a

Illustration 2. — Form of Sales Book

Date

Account and Explanation.

Terms.

L. F.

Extensions.

Total.

Jan.

1

A. C. Robins

20 bbls. potatoes @ $6. —

100 bu. wheat @ 1.10

net 30 days

20

120

110

r

230

—

3

C. E. Hall

1000 bu. corn @ .85

2/10, N/30

21

850

—

10

K. M. Clark

100 bbls. flour @ $8. —

net 10 days

24

800

—

11

G. King

500 bu. wheat @ $1.15

2/10, N/30

25

575

—

30

Ross & Co.

800 bu. oats @ .60

700 bu. corn @ .90

2/10, N/30

28

480

630

—

1110

31

J. M. Pike

50 bbls potatoes @ $6. —

net 30 days

29

300

31

Sales, Cr.

3865

—

are usually separated from the real and nom¬

inal accounts and further divided into cus¬

tomers' and creditors' accounts. The custom¬

ers' accounts are kept in a separate ledger (or if they be numerous in several ledgers), called sales or customers' ledgers, and the accounts with creditors are kept in the purchases or creditors' ledgers. The real and nominal ac¬

counts are kept in what is called the general ledger. Some accounts of a confidential

nature which reflect the really vital facts of the business are often kept in a private ledger, to which only the proprietors or the manager have access. These accounts would require very little bookkeeping work and concern the investments, profit and loss, trading and capital of the firm.

Controlling Accounts. — In order that the

general ledger may always be in balance so that a trial balance may be taken from it. alone without balancing all of the accounts in the other ledgers, a single account is substituted in the general ledger for each class of accounts which has been taken out of it and put into a separate volume. Thus, a single account, called accounts receivable account, takes the place of all the customers' accounts which have been double entry set of books a statement of the kind of business and the name of the firm, with the articles of agreement or incorpora¬

tion, is made on the journal, followed by an entry which debits the proper accounts with the value of each asset invested, and credits an account for each liability assumed by the business and also credits the capital accounts for the difference between the total assets and the total liabilities.

Trial Balance. — After all the transactions

of a period have been entered in the books, it is necessary to know whether or not the postings to the ledger accounts have been correctly

made; that is, whether the equality of the fun¬

damental equation has been maintained. The

test of this is called taking a trial balance.

Since every transaction has been entered in the journal or other books of first entry with equal debit and credit sides, and since every debit and credit entry has been posted to the corre¬

sponding side of its proper account in the led¬

ger, therefore, if the postings have been made correctly, the sum of the debits of the accounts in the ledger which are not closed must equal the sum of the credits of all those accounts.

Or the total of the debit balances of the open ledger accounts must equal the total of the credit balances. A trial balance may be defined as a list of the names of the ledger accounts, the page of each, and their debit and credit footings or balances at any specified time placed in two separate columns. (See illustration

No. 3).

The fact that the two columns of the trial balance add up to the same amounts is not absolute proof of the accuracy of the records.

The trial balance would not show that a posting had been made to the wrong account, or that a transaction had been omitted, or that the wrong figures had been entered, or any errors of prin¬

ciple in the classification of accounts. It simply shows that the ledger is in balance ; that the debits and credits of the original entries were equal and posted to the proper side of some ledger account. It is a summary of the ledger and forms the basis for the various financial

statements and is a necessary preliminary to closing the books.

Closing the Books. — The process of ascer¬

taining the total amount of the gains or losses during a given period and of determining the condition of the business, that is, the nature of the assets and liabilities and the amount of the net worth at the end of the period, is called closing the books. Facts affecting some of the assets and the amounts of some of the liabilities have not been recorded on the books and do not appear on the ledger. For example, furniture and fixtures and buildings and machinery, etc., may have depreciated and their former or book values should not be used in determining the true net worth. Entries are made in the jour¬

nal allowing for depreciation and adjusting the values of such assets. In a trading business inventories of goods unsold must be made and placed on the books by journal entries. The inventories, sales and purchases accounts are then transferred to one account, called the trad¬

ing account, in order to ascertain the gross profit on trading. Income which has been

earned but not received because not yet due, such as interest on unmatured notes receivable, and expenses incurred but not yet paid, such as interest on notes payable at some future date, must be computed and the proportionate amount assigned to the period under consid¬

eration and recorded on the books in order to show the true condition. Such items are called accruals. That part of prepaid expense items, such as taxes and insurance paid in advance, properly belonging to future periods, is entered as a deferred debit item or deferred asset. In¬

come received in advance is similarly treated as a deferred credit or deferred liability.

After the adjusting entries have been made

and posted to the ledger the closing entries are made. Since the transactions and facts which affect the net worth or proprietorship

have been recorded under various nominal accounts, it is necessary to combine these in order to obtain the net increase or decrease in the proprietor's interest. The closing entries are made to trans¬

fer or close out to a temporary account, called the profit and loss account, the sundry debit and credit balances of these nominal or proprietor¬

ship accounts. The balance of this profit and loss account is then closed into the proprietor's account.

After the closing entries are made, another trial balance, the proof trial balance, is drawn off to prove the final equilibrium of the ledger.

Since the nominal accounts have all been closed into the proprietor's account, the proof trial balance contains only asset and liability ac¬

counts and the net worth. And since the net worth was obtained independently and must

equal the balance of the assets and liabilities, a check on the records is furnished which is the fundamental characteristic of double entry.

Balance Sheet. — A balance sheet is a state¬

ment of the assets, liabilities and net worth of a business at a specified time, compiled from a set of double entry books, which are in balance after the books have been closed. (See illus¬

tration No. 4). It is the final expression of the fundamental equation after its terms have been affected by the transactions of a financial period. In content it does not differ from the Proof trial balance. The difference between a Illustration 3. — Trial Balance

of E. H. Cobb Company December 31, 1916.

Capital

1

15000

-

Mdse (1/1/16)

3

4500

—

Purchases

10

27300

—

Sales

12

56340

—

Sales Returns

13

4250

—

Accounts Receivable (as per schedule)

15

13500

—

Accounts Payable (“ “ “)

17

7300

—

Notes Receivable

18

8000

- -

Notes Payable

19

5000

—

Real Estate

2

12000

—

Mortgage Payable

8

6000

—

Notes Receivable Discounted

20

2500

—

Interest & Discount

21

330

—

Cash

7

4400

—

Salaries

22

5800

—

Salaries of Salesmen

23

2800

—

Selling Expenses

25

4175

—

Discount on Purchases

26

365

—

Discount on Sales

27

550

—

General Expense

30

3400

—

Advertising

31

1500

—

92505

—

trial balance and a balance sheet is that a trial balance is taken from the ledger before the nominal accounts have been closed ; a balance sheet is taken from the ledger after the nom¬

inal accounts have been closed. There are sev¬

eral standard methods of arrangement of bal¬

ance sheets. In the account form (as shown), one method is to list the assets on the left, in the order of their permanence, fixed assets, quick or current assets and deferred debit items; the liabilities follow a similar order on the right side, capital, secured liabilities, current liabili¬

ties, deferred credit items. A second method is almost the reverse of the first, the assets and liabilities running from the most current to between the two balance sheets. The profit and loss statement must not be confused with the profit and loss account, which is a summary account in the general ledger, although in its more primitive form it may be constructed from the profit and loss account and not differ much from it. Usually the statement is prepared

from the nominal accounts. Their balances are classified and arranged so as to distinguish the various sources of the profits and income and to show the amount and nature of each kind of loss or expense. The profit and loss statement may be exhibited in either the account or the (< report form® and is often divided into different sections, as manufacturing section, trading sec-Illustration 4. — Balance Sheet of E. H. Cobb Company as of December 31, 1916.

CURRENT ASSETS:

Cash

Accounts Receivable

Notes Receivable

Less — Discounted

8000

2500

4400

13500

5500

23400

DEFERRED ASSETS:

Prepaid Advertising

500

TRADE ASSETS:

Merchandise Inventory

2540

FIXED ASSETS:

Real Estate

12000

38440

CURRENT LIABILITIES:

Accounts Payable

Notes Payable

DEFERRED LIABILITIES:

Interest on Mortgage

FIXED LIABILITIES:

Mortgage Payable

TOTAL LIABILITIES:

CAPITAL AND SURPLUS:

Capital

Surplus

7300

5000 12300

100

6000

18400

15000

5040

38440

the most permanent. English methods of ac¬

counting regard the balance sheet as a state¬

ment of account rendered by the business to the proprietor and place the liabilities and capital on the left with the assets on the right.

The <(report form® of balance sheet consists of a list of the assets, usually on journal-ruled paper, with the total carried into the second amount column, followed by a list of the liabili¬

ties, the total of which subtracted from the total assets gives the net worth at the bottom. This form is becoming popular because more easily undersood by those unfamiliar with accounts.

A balance sheet must be distinguished from

a statement of assets and liabilities, although they may be exactly alike in form. The latter may be prepared from single entry or any rec¬

ords or no records at all, while a balance sheet can be prepared only from a set of double entry books.

Profit and Loss Statement — The profit

and loss statement, sometimes called income or revenue statement, or loss and gain statement, is a classified and detailed arrangement of the income and profits made and the expenses and losses incurred during a given period. It is of equal importance and a necessary supple¬

ment to the balance sheet. The balance sheet shows the status of the business at a certain moment of time, it is a cross section, as it were, of the business at that moment. The

profit and loss statement, on the other hand, covers a whole period of time between two

successive balance sheets. It shows the result of all the factors which have been operating during that period and explains the difference

tion, administrative section and profit and loss section. (See illustration No. 5).

Single Entry. — The simplest and purest

form of single entry bookkeeping has for its object the keeping of accounts with persons only; it shows how much is due the proprietor from his customers and how much he owes his creditors. The books kept are a journal (or daybook) and a ledger. The journal may have only one money column; if it has two columns, the left hand one is used for partial amounts and the right hand one for totals. If goods are sold on account, an entry is made in the journal debiting the customer but no opposite entry is made. When the customer pays his

bill, an entry is made crediting his account, but no account is debited.

Likewise, when goods are bought on credit, an entry is made crediting the seller, and when he is paid his account is debited. It is necessary to write Dr. or Cr.

after each entry in order to show to which side of the corresponding ledger account the amount should be posted. If no debit or credit to a personal account is involved in a transaction, no entry is made. The ledger contains only ac¬

counts with customers, showing the amounts

due from them; and accounts with creditors, showing the amounts owed to them ; and

usually the proprietor's accounts, showing his investment and withdrawals. No property or

nominal accounts are kept ; therefore, no trial balance can be taken. It has been said that in single entry only one entry is made for any transaction, while in double entry two entries are made for every transaction. It would be more accurate to say that single entry records

only one of the two elements or occurrences of a transaction, while double entry records both of them.

Sometimes a record of all the transactions

of the business is kept in diary form and only those entries involving accounts with persons are posted to the ledger. Some sets of single entry books include a cashbook. Then it be¬

gins to encroach upon double entry because

both sides of every cash transaction are record¬

ed. But only those entries in the cashbook which involve personal accounts are posted to the ledger. Other sets of single entry books in¬

clude sales and purchase books as well as a cash book and keep in the ledger some property accounts and such accounts as sales, purchases, expenses, etc., thus more closely approaching the double entry system. Such records may

truly be called <(incomplete double entry.®

From the single entry ledger it is impossible to construct a balance sheet as that statement is peculiar to double entry. But a statement of assets and liabilities can be made. The ledger furnishes the amount of the accounts receivable and accounts payable ; the cash book, if one be kept, shows the amount of cash on hand or in the bank; all other information must be found outside the books.

Since the single entry ledger contains no

nominal accounts, the only way to ascertain the profit or loss is to find the difference be¬

tween the net worth as determined by the state¬

ment of assets and liabilities at the end of the period and that at the beginning of the period, taking into account also all withdrawals or ad¬

ditions of capital which may have taken place during the period. Since the profit or loss cannot be found independently, there is no

check on the correctness of the amount.

The disadvantage of single entry is its in¬

completeness and lack of check on the accu¬

racy of the entries, and on the truth of the statement of assets and liabilities and profit and loss; and lack of sources of profit and loss and of cost or other statistical data. However, single entry suffices for professional men, trus¬

tees, institutions and small retail firms inter¬

ested principally in cash receipts and payments and personal accounts and not involved in

transactions which might produce profit or loss from many various causes.

Historical. — The origin of . bookkeeping is obscure and difficult to determine. There ex¬

ist Babylonian records as early as 2600 b.c.

written on small slabs of clay with a stylus ; and Egyptian records written on papyrus and pictures of scribes writing down the quantities of grain brought into and removed from the government storehouses. But these are mere

narratives. Money values were not recorded

because money had not been invented. Neither could the effect of transactions upon the busi¬

ness nor the financial relations of one business to another have been expressed. The earliest example of a record kept in three columns, date, explanation and amount, is in the Advo¬

cates' Library at Edinburgh and dated 1697.

But double entry was in use long before that.

Illustration 5. — Profit and Loss Statement — E. H. Cobb Company, For the Year ending Dec. 31, 1916.

Trading,

Total sales

Less — Returns

56340

4250

—

Gross income

Inventory (1/1/16)

Purchases

4500

27300

-

52090

—

Less — Inventory (12/31/16)

31800

2540

—

. Cost of Goods sold

29260

—

Gross profit

Selling Costs,

Salesmen’s Salaries

Selling Expenses

Advertising 1500 —

Less — Prepaid 500 —

•

2800 —

4175 —

1000 —

22830

Total selling costs

Administration Costs,

Salaries

General Expense

5800 —

3400 —

7975

•

Total administration costs

9200

Total selling & administration costs

17175

—

Prime operating profit

Other Income,

Purchase Discount

5655

365

■ -

Charges to Income,

Sales Discount

Interest & Discount

Interest Accrued

550

330

100

—

6020

Total charges to income

980

—

Net profit

5040

—

BOOKPLATE

About 1494 a book was published in Venice, entitled (Everything about Arithmetic, Geome¬

try and Proportion, > and contained an exposi¬

tion of the principles of double entry. The authorship of this book has been variously as¬

cribed to Luca Paciolo, Luca dal Borgo, de Bergo and others, all Tuscan friars. The sys¬

tem had probably been in use for about 200

years at that time. The first English book was published in 1543 in London by John Gough or Hugh Oldcastle. All the evidence shows that the development of the double entry system

accompanied the rise in trade of the Italian merchants of Genoa, Florence and Venice dur¬

ing the 14th and 15th centuries. On this ac¬

count it is sometimes called the Italian method.

Modern Improvements and Mechanical

Devices. — Although the essential principles of bookkeeping have not changed since the theory was first developed, the practice of the art has been modified and technical methods devised

with remarkable rapidity during the past few years with a view to reducing the routine

drudgery of the clerical work and increasing the speed with which the records are made and the results obtained. The method of trans¬

ferring the chronological record to the ledger was one of the first modifications made. Not only has the descriptive, untechnical memorial or daybook almost entirely disappeared, but

the journal, from which each entry is posted to the ledger, is now generally used only for un¬

classified items and the adjusting and closing entries.

Many books of first entry instead of one

are employed and numerous columns are pro¬

vided in which items of a smaller nature, as, for example, cash, discounts and merchandise are placed in separate columns. The totals of these columns, not the individual items, are posted to the ledger. The voucher system,

used extensively by manufacturing corpora¬

tions, railroads and governmental departments, is a device for eliminating from the ledger many accounts with individuals. At the same time the special columns of the voucher record make possible as elaborate a classification of expenditures as is desired. These columnar

records decrease the labor and time required in the preparation of detailed statements and facilitate the comparison of like items of in¬

come and expense of several different periods.

Slip systems are often employed, especially for sales and orders, which enable a facsimile du¬

plicate to be made by the aid of a carbon sheet.

Postings are made from the original slips

which may be sorted out in any convenient

order to determine the total sales of each kind of article and then filed away for reference.

An important improvement in the form of

the ledger has been the substitution of cards or loose leaves in place of a bound book. The advantages of this are : the elimination of dead accounts ; the ease of keeping the accounts in alphabetical order; the

facility of expanding with a growing business, and of employing

many clerks to do the work simultaneously, and the ability to make the record with a type¬

writer or ledger posting machine. Some per¬

sons are prejudiced against cards and loose leaves on the unsupported ground that they

make fraud more easy. And in some countries, as, in France, the law does not attach validity to any accounts not kept in a bound book.

The mechanical improvements and devices

include various kinds of machines which re¬

lieve the bookkeeper of mathematical calcula¬

tions and render inaccuracy less frequent. Cash sales registers not only record each sale and furnish a receipt to every customer but also total the sales whenever desired. There are various kinds of adding machines and many

others which do multiplying and dividing as well as adding and subtracting. Card and

loose leaf ledger and voucher record posting machines consist of a writing and adding ma¬

chine mounted on tracks so that it may be easily moved into a position to enter the

amounts in the proper columns. Order writing and billing machines designed for the records peculiar to each kind of business are used by many large mail-order and retail merchandise houses, banks, railroads and manufacturing cor¬

porations. The mechanical tabulator used by

the United States census office, railroads and insurance companies is a machine which classi¬

fies and tabulates statistics by means of cards with holes punched in them. The position of each hole varies according to the facts, as the

number and amount of the policy, the age of the insured, term of the insurance, premium, *etc.*

The punched cards are run through the machine and by means of an electrical connection made whenever a hole appears the cards are sorted, the facts tabulated and certain computations made. See Accounting.

George M. Brett,

Department of Political Science, College of

City of New York.

BOOKPLATE, a printed or engraved

label, usually decorative, placed on the inside cover of a book as the owner's symbol. In a certain sense, any individualized label is en¬

titled to the name ; but as usually understood, the term is restricted to those with some spe¬

cial artistic design, which, however, may range from the simplest to the most elaborate and ornate composition. The elements are — the

owner's name; his coat of arms if he has one, usually, but not invariably; allegorical em¬

blems or compositions; landscape designs;

mottoes; quotations, *etc.* In purpose they are probably very ancient: some of the small tab¬

lets found in Assyrian libraries are intelligible only as book-plates, and they are accredited to Japan in the 10th century. Our modern

book-plates, however, are of German descent

and seem to have been nearly contemporaneous with printing, one being mentioned as of the mid-15th century; the earliest actually known, however, is a hand-colored heraldic wood-cut of about 1480,

in some books and manuscripts presented to the monastery of Buxheim, Swa¬

bia. The earlier ones were all mere indices of ownership, rough wood-cuts with no. artistic design ; they were permanently raised into the domain of an art by the great Albrecht Diirer (1471-1528), the <(father of the book-plate.ˆ

He made two for Bilibald Pirckheimer, prob¬

ably before 1503 — one a mixture of armorial and allegorical elements and the other a large bold portrait of the famous Nuremberg sena¬

tor; but his earliest dated one is for Hierony¬

mus Ebner of the same city, in 1516. Several of the great German artists of that age — .Hol¬

bein, Cranach, Amman and others — designed

book-plates ; indeed, since Diirer's time the best have not disdained this branch of art and 244

wealthy collectors have vied with each other in costly designs.

The idea was soon adopted in other Euro¬

pean countries. The French wrought with

great delicacy and beauty, but with too elabo¬

rate and profuse decoration. The English were very late in adopting the fashion : the number of examples which have come down from be¬

fore the Restoration is singularly few and the first engraved one we possess is that of Sir Nicholas Bacon, father of the chancellor, dated 1574; though an old folio volume from Henry VIlI's library, now in

the British Museum,

contains an elaborately emblazoned drawing

which formed the book-plate of Cardinal

Wolsey, with his arms, supporters and car¬

dinal's hat. But after the Restoration they multiply so rapidly that owing to the great number of wealthy English collectors, they

far outnumber all the rest of the world and some of them have considerable historical in¬

terest. Pepys had several, one with initials and crossed anchors probably as early as 1668, one with his portrait not earlier than 1685.

Among other English names highly prized by

book-plate collectors may be mentioned Bishop Burnet, William Penn, Robert Harley, Mat¬

thew Prior, Lawrence Sterne, David Garrick,

Horace Walpole, John Wilkes and Charles

James Fox. Among the artists who have en¬

graved them are William Marshall and Robert White, Hogarth, Bartolozzi, Bewick and Ver-tue. Bewick at one time was regularly em¬

ployed in their production. One of the prettiest of book-plates is that designed in 1793 by Agnes Berry for the Hon. Mrs. Darner and engraved by Francis Legat.

The style of design, naturally, has varied

with the taste of the age and is no mean index of its characteristics. The chief English styles have been classified by Lord de Tabley, the leading modern authority, as follows : Early English, entirely armorial, with profuse mant¬

ling and large full-rounded curves surround¬

ing three and often four sides of the shield; Jacobean, from about the

time of James II to 1745, with a heavy carved appearance, an even balance of proportions, always a regular out¬

line and often a carved molding around it

which makes a massive rectangular frame — a dignified and reposeful if rather formal style.

The Chippendale succeeded, lighter and more

graceful, with rich curves and airy scrolls, the helmet gone, no set form of shield and a pro¬

fusion of careless sprays and garlands, *etc.*

This degenerated with poor artists into an in¬

congruous mass of overdone and rococo orna¬

mentation, a heap of all the unrelated objects of nature and art and the most artificial frivoli ties of design, portraits and castles and ruined abbeys, Watteau shepherdesses and shepherds,

lambs and dragons, dogs and ships, *etc.* About 1770 came in the Ribbon and Wreath, with a shield decorated as the name implies, much

simpler and more tasteful.

The American settlers for more than a cen¬

tury made no attempt at book-plates of their own manufacture: the richer colonists looked to England for everything, especially luxuries and articles of culture, and the others had no time or taste for superfluities. Naturally

enough, most of these early plates belong in the southern colonies, where there was more of

leisure and cultivation of the decorative side of life; but for the same reason, their more in¬

timate connection with England and preference for its wavs, as well as superior taste, they con¬

tinued to use its book-plates almost exclusively long after American engravers were actively

employed upon this branch of work. Very few of the old southern plates are of American de¬

sign and consequently they are much less val¬

ued by collectors (except for the owner's sake, as with Washington's) than the northern ;

though the latter are much cruder in heraldry, design and execution. The earliest dated and signed American plate by a native engraver is that of Thomas Dering, engraved in 1740 by Nathaniel Hurd of Boston; the next is of John Burnet (1754), by Henry Dawkins, who set¬

tled in 1730-77, the best of our early engravers, though there is no doubt that an earlier one of Hurd's was that of Edward Augustus Hol¬

yoke, Philadelphia and later in New York;

then comes that of Benjamin Greene (1757),

by Hurd ; then of the Albany Society Library (1759). Paul Revere also engraved book¬

plates; as did Amos Doolittle of New Haven, Peter Maverick of New York, Alexander An¬

derson of New York (the first American wood engraver, sometimes called the <(American Be¬

wick0) and others, in the Northern States, es¬

pecially around the great centres like Boston, New Haven, Philadelphia and Baltimore.

They worked mainly in the Chippendale style till it gave place to the Ribbon and Wreath, and originated no new style.

The earliest book-plates were of large size, as if made specially for folios; but a smaller size soon became general and was used for

books of all sizes. Some owners, however,

have used different plates for different sizes ; some of Sir William Stirling-Maxwell's were

of gigantic proportions.

The collection of book-plates is a very mod¬

ern amusement, but has risen to enormous

proportions. The first collector known was

Dr. Joseph Jackson Howard and his collection numbered over 100,000. Sir Augustus Wollas¬

ton Franks of London had one of some 200,-

000, which he left to the British Museum. A German nobleman, Count Karl Emich zu

Leiningen-Westerburg, had also an exceedingly fine one. A number of large and valuable ones exist in the United States, including that of the Grolier Club, which gave in 1894 the first American public exhibition of them. There is a cosmopolite association of collectors and

connoisseurs, the Ex Libris Society of London (1890), which from 1881-1908 issued a monthly journal Ex Libris , and there are also period¬

icals devoted to it in France, Germany and the United States. The American Book-plate

Society was founded 1 Feb. 1913. There are regular (<prices current0 of book-plates among dealers and auction sales as of books. The process-reproduction of drawings has some¬

what ˆcheapened0 the book-plate, but notwith¬

standing this the expert graver is in good de¬

mand. E. D. French of New York, K. W. F.

Hopson of New Haven and J. W. Spenceley

of Boston in the United States, and C. W.

Sherborn and G. W. Eve in England, are

famed for their designs. The intelligent

study of them is based on the work of the English poet John Byrne Leicester Warren,

afterward Lord de Tabley (1835-95), who

published, in 1880, his (Guide to the Study of BOOKS

Book-Plates,) which has no rival and whose classifications are universally accepted.

Bibliography. — Special works are, among

others, C. D. Allen, (American Book-Plates*

(New York 1894) ; Castle, (English Book-Plates) (London 1892) ; Fincham, (The Artists and Engravers of British and American Book-Platesˆ (ib. 1897) ; Guigard, (Nouvel armorial du bibliophile > (Paris 1890) ; Hamilton,

‘French Book-Plates* (London 1892); and

(Dated Book-Plates> (ib. 1896) ; Hardy, <Book-Plates) (ib. 1893) ; Labouchere, (Ladies’ Book-Plates* (id. 1895) ; Poulet-Malassis, (Les Ex Libris frangais* (Paris 1875) ; Stone, (Women Designers of Book-Plates) (New York 1902) ; Wernecke, (Die deutschen Biicherzeichen)

(Berlin 1890).

BOOKS, Censorship of. Unless we con¬

sider the burning of condemned books under

the Roman emperors as a censorship, the es¬

tablishment of this institution must be at¬

tributed to the popes ; but it cannot be denied that it would have sprung up in a thousand other places even if it had not existed in their dominions. Soon after the invention of print¬

ing, the popes perceived the influence which this art exerted over the diffusion of knowl¬

edge. It was besides doubly dangerous at a time when the authority of the Church had

been assailed, and was shaking under the load of its abuses. They endeavored therefore to prohibit first the reading, and secondly the printing, of certain literary works. They en¬

forced the ancient decrees of the Church

against the reading of heretical books, and in¬

troduced an ecclesiastical superintendency of the press in 1479 and 1496, more completely es¬

tablished by a bull of Leo X in 1515. In this the bishops and inquisitors were required to ex¬

amine all works before they were printed, and thus to prevent the publication of heretical opinions. They went still farther : as this papal decree could not be carried into execution in all countries on account of the Reformation, they prepared an index of books which nobody was allowed to read under penalty of the cen¬

sure of the Church. This index was com¬

menced by the Council of Trent, in the fourth session of which (1546) the decree of the cen¬

sorship was renewed ; but it was not executed, and was finally left to the popes (25th session of 1563), by whom several such < Indices Librorum Prohibtorum* have been published.

Works of an established character, which could not well be prohibited, it was determined to expurgate. The Duke of Alva caused such an (Index Expurgatorius) to be prepared in the Netherlands; another was drawn up at Rome

in 1607; but there are serious difficulties in ex¬

purgating books. The papal government still

continues the policy of prohibiting to the faith¬

ful the reading of works deemed dangerous,

and the Congregation of the Index has still its place and functions at Rome.

In Germany the politico-theological contro¬

versies gave the first occasion for the introduc¬

tion of this institution, as they were carried on with the greatest violence on both sides.

The decree of the German Diet in 1524 pro¬

hibited them. By the Diet of 1530 a more severe superintendence of the press was established; and this was confirmed by later laws of the empire in 1541, 1548, 1567 and 1577, *etc.* It was also provided by the Peace of Westphalia, 1648

(Osnabr. Instr. cap. v, sec. 50), that the states should not suffer attacks on religious parties.

From that time the emperors have promised, in their elective capitulations, to watch strictly over the fulfilment of this article. In the capit¬

ulations of the Emperor Leopold II, 1790, and of the Emperor Francis II, it was further ad¬

ded (art. vi, sec. 8), (<that no work should be printed which could not be reconciled with

the symbolical books of both Catholics and

Protestants, and with good morals, or which might produce the ruin of the existing consti¬

tution, or the disturbance of public peace.® It was, however, not difficult in most Protestant countries for individual authors or literary journals to obtain an exemption from the cen¬

sorship ; and many institutions, academies, uni¬

versities, etc., were privileged in this way as far as concerned their regular professors. The

governments sometimes protected their subjects with great energy; as for instance, that of Hanover, in the case of Putter and Schloezer.

Censorship was first abolished in England. It was formerly exercised by the well-known

Star Chamber, and, after the abolition of this court in 1641, by the Parliament. In 1662 it was regulated by a particular statute, but only for a certain number of years. This statute was renewed in 1679, and again in 1692 for two years more. In 1694 the right of the Crown to render the printing of writings, journals, etc., dependent on its permission, — that is, the censorship, — ceased entirely. In Holland, and even in the Austrian Netherlands, a great lib¬

erty, if not an entire freedom of the press, pre¬

vailed. All that was not permitted to be

printed in France appeared in the Netherlands or in Switzerland, at Lausanne and Geneva, to the great advantage of the Dutch and Swiss book-trade.

In Sweden, by an edict of 1766, and accord¬

ingly under the aristocratical constitution, the abolition of the censorship was ordered; yet Gustavus III, personally a friend of the liberty of the press, was obliged to retain the censor¬

ship, and even to execute it with severity, dur¬

ing the aristocratical machinations which dis¬

turbed his reign, and which were but imper¬

fectly counteracted in the Revolution of 1771.

Gustavus IV issued an edict soon after he as¬

cended the throne, by which the censorship was retained only in matters of religion, and was administered by the consistories. This,

how¬

ever, was not permanent ; at first penalties were enacted, and in 1802 the censorship was entirely re-established, committed to the chancellor of the court and executed with severity. French and German books were prohibited. King

Charles XIII immediately after his ascension to the throne abolished it entirely by a pro¬

visional order of 12 April 1809, which was confirmed as an article of the constitution (sec.

86) 6 June 1809. In Denmark, by a royal re¬

script of 14 Sept. 1770 (under the minister Strnensee), the censorship was wholly abol¬

ished; neither has it been restored, though the laws by which the liberty of the press has been regulated have been changing, and have some¬

times been very oppressive. In France the cen¬

sorship, which had belonged to the department of the chancellor and been administered by royal censors was annihilated by the Revolution. All 246

the constitutions, from 1791 to the Charte Con-stitutionelle in 1814, declare the liberty of the press one of the fundamental laws. During the republic there was no censorship, but the revo¬

lutionary tribunals took its place. Napoleon re¬

stored it in another form by the decree of 5

Feb. 1810 (Direction de l'lmprimerie). Since the Restoration it has also undergone various changes. Books of more than 20 sheets have always remained free, but the censorship has been exercised over pamphlets and journals

at different periods. Under the government of the Emperor Napoleon III the censorship was re-established with new penalties and is still maintained.

In the kingdom of the Netherlands the cen¬

sorship was abolished by a fundamental statute of 24 Aug. 1815 (art. ccxxvi), and this statute is still in force in the kingdom of Holland. By art. xviii of the constitution of Belgium, 1831, it is declared that the press is free and that no censorship can ever be established. In the German states the liberty of the press was much restrained till 1806, the state-attorney having till then had control over it. After 1814

several states abolished the censorship, though with very different provisions as to the respon¬

sibility of authors, printers and booksellers.

In accordance with the unhappy decrees of

Carlsbad, 1819, and the resolutions of the Ger¬

man Diet of 20 Sept. 1819, the censorship in all the states of the German confederation became one of the conditions of union, but only with regard to books of less than 20 sheets and jour¬

nals. These laws were repealed in 1849, but in the course of a few years they were gradually introduced, although in a modified form, and in this form they still exist in most of the separate German states as well as in the empire. In Russia and Austria there is naturally a despotic censorship. In the United States of America a censorship has never existed, though a power somewhat akin to censorship is vested in the Post Office authorities, based on the statutory exclusion from the mails of all gambling, fraud¬

ulent and obscene publications.

Besides the different degrees of severity

with which the censorship is exercised in differ¬

ent countries, it may be tiivided into different kinds, according to the field which it embraces : (1) A general censorship of the book trade

and of the press, under which even foreign books cannot be sold without the consent of the cen¬

sors, exists in Russia, Austria, Spain, *etc.*

(Austria has, in the censorship of foreign

books, four formulas: (a) admittitur, entirely free; (b) transeat, free but without public ad¬

vertisements for sale; (c) erga schedam, to be sold only to public officers and literary men on the delivery of a receipt; (d) damnatur, en¬

tirely forbidden). (2) A general censorship of the press, extending only to books printed in the country, exists in Prussia (edict of 19

Sent. 1788; order of the cabinet of 28 Dec.

1824; law of 12 May 1851). (3) A limited

censorship, only over works of less than 20

sheets and journals, is at present the law in the states of the German empire, but these old laws have for many years remained a dead letter, no publisher being ever required to present a work for inspection before publication, as is rigidly demanded in Russia. Since the out¬

break of the war special restrictions on printed matter have been established in Germany and Austria, applying especially to periodical liter¬

ature. See Drama, Censorship of; Motion

Pictures, Censorship of; Press, Liberty of

the.

BOOLAK, or BOULAK, a suburb of

Cairo. See Bulak.

BOOLE, George, English mathematician

and logician: b. Lincoln, 2 Nov. 1815; d. Cork, 8 Dec. 1864. Educated in his native place, he opened a school in his 20th year and by private study gained such proficiency in mathematics that in 1849 he was appointed to the mathemat¬

ical chair in Queen's College, Cork, where the rest of his life was spent. In mathematics he wrote on differential Equations J ; (General Method in Analysis } ; (The Comparison of

Transcendents, } *etc.* In logic he wrote (An Investigation of the Laws of Thought > (1854), an amplified edition of his earlier Mathemat¬

ical Analysis of Logic) (1847), a profound and original work, in which a symbolic language and notation were employed in regard to logi¬

cal processes.

BOOM, in fortification, and in marine de¬

fenses, a strong chain or cable stretched across the mouth of a river or harbor to prevent the enemy's ships from entering, and having a

number of poles, bars, etc., fastened to it, whence the name, as, to cut or burst the boom.

It often denotes a long pole employed to extend the sails of a ship, as the main boom, jib boom, *etc.* The term is also applied to a pole set up as a sea mark to point out the channel to sea¬

men when navigating in shallows. The word

also designates a hollow, roaring sound, as the boom of a cannon, the reverberating cry of the bittern. In recent years it is often used to denote a sudden rise in the market value of real estate, stocks or commodities ; an enthusi¬

astic popular movement in favor of any person, cause or thing, as a real estate boom, a political boom, a boom in sugar.

BOOMERANG, a weapon peculiar to the

aboriginal natives of Australia, used as a mis¬

sile. It is made from hard wood in the green state and is from two to four feet long, formed to a curve which may vary from an arc of 20

degrees to one of 90 degrees, or there may be a distinct angular bend in the arc. The width of the boomerang is from two and one-half to

three inches, and its thickness about three-fourths inch or less. The edges are finished sharp; one surface is flat and the other convex, the greatest thickness being at one-third of the width back from the outer edge of the curve.

The ends or “wings® are warped over a bed of hot coals, and upon the degree and twist of this warping depends the figure of flight which the boomerang will describe when thrown.

During the perfecting of the instrument many experimental flights are tried. The ends are not warped symmetrically, one end being espe¬

cially adapted to the hand, and the boomerang cannot be thrown by the other end. All efforts by the most skilful mechanics to imitate the boomeranq have failed. Boomerangs are of

different kinds, some being used in war, others in the chase, others for amusement. One form can be hurled so as to turn while in the air and come back almost to the place whence it was thrown. It is this peculiarity that has made BOONE

the boomerang so famous, though the returning boomerang is used chiefly for amusement and rarely to bring down birds. In throwing, the weapon is grasped by one end, and, being held in a vertical position, the concave side of the arc forward, is hurled somewhat to the right of the thrower, being given a revolving motion at the same time. For a distance of perhaps 50 yards it travels a straight course ; then, in¬

clining with the top over toward the left, it takes a horizontal position

and moves obliquely upward into the air. After a time it curves round, and if he so intends, comes back

close to the thrower. It may move for a

considerable distance at only a few feet above the ground and then suddenly rise verti¬

cally upward with great velocity. The pecu¬

liarly irregular character of its path through the air and the rapid change in its direction of movement render it a very efficient weapon for killing birds. There is also a special boom¬

erang for killing birds capable of being

thrown in a straight course of 200 yards. The Australian natives often throw the boomerang in such a way as to cause it to strike the ground about 30 feet off ; this is said to impart in¬

creased velocity, and the weapon may even hit the ground a second time and rebound into the air. The war boomerang is larger and heavier than that used in hunting and requires a strong man to throw it effectively. It is warped dif¬

ferently from the sport boomerang, travels a perfectly straight course at great speed and at 500 feet can break a man's arm or even inflict a fatal body wound. Weapons similar to the boomerang, or kiley, as the Australians also call it, but lacking the property of returning, have been and still are used by other races, notably the ancient Egyptians and the modern Abyssinians, and also in southern India. The Hopi tribe in Arizona have a similar weapon.

Sir Samuel Baker describes the latter as about two feet long and made of a piece of flat hard¬

wood, whose end turns at an angle of 30 de¬

grees. Various derivations of the word have been suggested, one connecting it with a root meaning strike or kill and another with the native word for wind.

BOONE, Daniel, American pioneer: b.

Bucks County, Pa., 11 Feb. 1735; d. 26 Sept.

1822. He was one of 11 children. His father emigrated from England and when Daniel was

very young removed with his family from

Bucks into Berks County, not far from Read¬

ing, then a frontier settlement exposed to In¬

dian assaults. It abounded with game, and thus Daniel became accustomed to a life in the

woods and formed an intense love for unculti¬

vated nature. His education was confined to a knowledge of reading, writing and arithmetic.

When he was about 18 his father removed to North Carolina and settled on the Yadkin.

Here, in 1755, Daniel married Rebecca Bryan and for some years followed the occupation of a farmer, but about 1761 his passion for hunt¬

ing led him, with a company of explorers,

along the wilderness at the headwaters of the Tennessee River. In 1764 he joined another

company of hunters on the Rock Castle, a

branch of the Cumberland River. He had be¬

come dissatisfied with life in North Carolina.

The customs of the colony were becoming lux¬

urious, the rich were exempt from the neces¬

sity of labor and the people were much op¬

pressed by taxes. Boone imbibed a chronic

hatred of law forms which lasted through life, and his neglect of these, in securing his titles to land, reduced him to poverty on more than one

occasion.

In 1767 a backwoodsman named John Fin¬

ley made an excursion farther west than had before been attempted and returned with glow¬

ing accounts of the border region of Kentucky, which he represented as a hunter's paradise.

Boone headed a party of six for its explora¬

tion, leaving his Yadkin home 1 May 1769. On 7 June, in the same year, they reached an ele¬

vation from which they beheld the whole region watered by the Kentucky River and its tribu¬

taries. At this point on the waters of the Red River, a branch of the Kentucky and supposed to be within the present limits of Morgan

County, they halted and hunted until Decem¬

ber without seeing a single Indian, although they were continually on the alert for them.

They then separated into parties, Boone and a man named Stewart keeping company, and on

22 December these two were surprised and

captured by Indians, who robbed them and kept them prisoners for seven days, when they man¬

aged to make good their escape. Early next month Boone and Stewart were gratified by

the arrival in the wilderness of Daniel's

younger brother Squire and another hunter

from North Carolina, bringing tidings of the family at home and a much-needed supply of powder and lead. Soon after this event Stew¬

art and Boone were again attacked by Indians.

Boone escaped but his companion was shot and scalped, and the man who came with Squire

having perished in the woods, the two brothers were left alone together. On 1 May it was decided that Squire should return for supplies, while Daniel remained to take care of and in¬

crease the store of peltry. They parted, and until 27 July, when Squire returned, Daniel remained in utter solitude, without bread, salt or sugar. The brothers then continued their explorations over other parts of Kentucky until March 1771, when, taking as much peltry as their horses could carry, they returned to their families on the Yadkin, Daniel having been

absent about two years, during which time he had seen no human beings but his hunting

companions and the hostile Indians. He was

now anxious to remove to Kentucky, and al¬

though his wife and children were easily per¬

suaded to do so, two years elapsed before he could make the necessary arrangements. He

sold his farm, and on 25 Sept. 1773, the two brothers, with their families, set out for Ken¬

tucky. At Powell's Valley, through which their route lay, they were joined by five families and 40 men well armed, but on approaching Cum¬

berland Gap, near the junction of Virginia, Kentucky and Tennessee, they were attacked by Indians and were forced to retreat 40 miles to Clinch River, leaving six of their party slain, among whom was Boone's eldest son, James.

The emigrants were much disheartened and

Boone remained at Clinch River until Tune

1774, when Governor Dunmore sent him a mes¬

sage to proceed to the wilderness of Kentucky and conduct thence a party of surveyors who were believed to be in danger from the In¬

dians. This undertaking was successful, but no 248

incidents ot it have been preserved excepting that Boone was absent 62 days, in which he traveled on foot 800 miles. While he was gone to Kentucky the Shawnees and other Indians

northwest of the Ohio River became hostile.

Boone was appointed to the command of three contiguous garrisons, with the commission of captain, and, having fought several battles and defeated the Indians, he returned to his fam¬

ily on Clinch River and spent the next winter in hunting. He was shortly after employed by the Transylvania Company, established to pur¬

chase lands in Kentucky, to explore, mark and open a road from settlements on the Holston to the Kentucky River. In the face of great dangers this was accomplished, and on 1 April 1775, a site having been selected on the bank of the Kentucky River, the party erected a stock¬

ade fort and called it Boonesborough. Boone soon removed his family to the new settlement, his wife and daughters being the first white women that ever stood on the banks of the Kentucky. The winter and spring of 1776 wore away without any particular incident, as the Indians, though by no means friendly, made no direct attack. On 14 July a daughter of Boone and two female companions were captured by

a party of Indians, but next morning Boone and his companions followed the trail and sur¬

prised the Indians so suddenly that they had not time to murder their captives and the three girls were restored to their families. During the whole of 1777 Boone was employed with

his command in repelling the attacks of the Indians, who were incited to the most savages deeds of cruelty by the British during the Rev¬

olutionary War. His services were of incal¬

culable advantage to the new settlements. On 1 Jan. 1778, the people suffering greatly for want of salt, he headed a party for the lower Blue Licks to manufacture it, and on 7 Feb¬

ruary, while at some distance from the camp, he was surprised and made prisoner by a party of 100 Indians. Again in this instance his con¬

summate knowledge of the red man's charac¬

ter saved him and his friends. He ingratiated himself in their regard and obtained favorable terms for his party at the Licks, who became prisoners of war under the promise of good treatment. He knew that the Indians would

march to attack Boonesborough and that if he and his party resisted they would all be mur¬

dered and those at the fort massacred, as no warning could reach them. He was conducted

to old Chillicothe and thence to Detroit, where he was kindly received by the English com¬

mander, Governor Hamilton. In order to baf¬

fle his captors he pretended to be very much pleased with his mode of life among the In¬

dians, went through the form of adoption by them, having his hair pulled out excepting the scalp-lock, <(his white blood washed ouU in the river and his face painted. On 16 June he went out to hunt and, when out of view, started di¬

rect for Boonesborough, more than 160 miles distant, which he traveled in less than five days. He reached Boonesborough in time to

warn the garrison. All supposed him dead, and his wife, under that impression, had returned with her children to North Carolina. The fort was at once put in complete order for defense, and on 8 August it was besieged by 444 In¬

dians, led by Captain-Duquesne and 11 other Canadians, having French and British colors.

Summoned to surrender, Boone replied with

defiance, and after a savage attack upon the fort the assailants, six times greater in number than the garrison, raised the siege, leaving 37

of their party killed and many more wounded.

Boone was now promoted to tfle rank of majuL

In 1778 he went to North Carolina to see his family. The next year, having invested nearly all his little property in paper money to buy land warrants, and having, besides his own, large sums of money to invest for other people, he was robbed of the whole, about $20,000, on his way from Kentucky to Richmond, where

the court of commissioners was held to decide on Kentucky land claims. In 1780 he returned with his family to Boonesborough, and in Octo¬

ber of that year his brother, on a hunting ex¬

cursion with him, was killed and scalped by the Indians and Boone himself narrowly es¬

caped. The Indians being exceedingly trouble¬

some, a large party of militia was formed to follow and punish them, who, against Boone's counsel, suffered themselves to be drawn into an ambuscade, and the disastrous battle of the Blue Licks followed, in which Boone lost an¬

other son and had a brother wounded. At the close of the Revolutionary War Colonel Boone returned to the quiet life of his farm and to his passion for hunting. In 1792 Kentucky was admitted into the Union as a sovereign State and as courts of justice were established, liti¬

gation in regard to land titles commenced and was finally carried to great lengths. From de¬

fective titles, Boone, with hundreds of others, lost the lands he possessed, with their valuable improvements, and thus after the vigor of his life was spent he found himself without a sin¬

gle acre of the vast domain he had explored and fought to defend from savage invaders.

Disgusted with his treatment, he resolved to abandon Kentucky and move to the Far West, which he did in 1795. He settled first on the Femme Osage, about 45 miles west of Saint

Louis, where he remained until 1804; he then removed to the home of his youngest son until 1810 and finally went to live with his son-in-law, Flanders Callaway. As the country at the time of his removal was under the dominion of Spain, on 11 July 1800, he was appointed commandant of the Femme Osage district; and as his fame had preceded him, 1,000 arpents, or about 850 acres, of choice land were marked out on the north side of the Missouri River and given to him for his official services. This princely estate he also subsequently lost because he would not take the trouble to go to New Orleans to complete his title before the imme¬

diate representative of the Spanish Crown.

Having left Kentucky in debt, he was much

troubled for a while by ill success in hunting, but at length he obtained a valuable store of peltry, turned it into cash, went to Kentucky, without book account, paid every one what was demanded and on his return to upper Loui¬

siana with but half a dollar left, said that he was ready to die content. In 1812 he petitioned Congress to confirm the title to his claim of 1,000 arpents of land, which he had neglected to have done in proper form and was in dan¬

ger of losing as he had everything else. He sought the aid of the Legislature of Kentucky and his petition was successfully urged in

gress, in requital for his eminent services. He continued to hunt occasionally as long as his strength remained but was obliged to give up his rifle several years before his death. Ches¬

terˆ Harding, who in 1820 painted the only por¬

trait of him ever taken, informs us that his first sight of the old

pioneer found him lying ill his bunk in the cabin, engaged in cooking a Venison steak on a ramrod. His memory of

immediate events was very defective but of

past years as keen as ever, He was quite feeble but able to walk out with Harding every day.

This portrait now hangs in the State House at Frankfort, Ky. He died surrounded by his

children and descendants, some of the fifth gen¬

eration, in the 88th year of his age. On 20

Aug. 1845 the remains were deposited with

appropriate ceremonies in the cemetery at

Frankfort. In all the relations of private life Boone was a model for imitation. In spite of his many Indian encounters he was a lover of peace, modest in disposition, of incorruptible integrity, moral and temperate. Consult

Sparks' (American Biography) (New York

1856), and Thwaites, R. G., (Life of Daniel Boone) (ib. 1902).

George Edwin Rines.

BOONE, William Jones, American

bishop: b. Walterborough, S. C., 1 July 1811; d. Shanghai, China, 17 July 1864. He was

graduated from South Carolina College in 1829, was admitted to the bar, but, deciding to devote himself to a missionary life, he prepared for orders at the Virginia Theological Seminary

and was ordained priest in 1837. In order to equip himself thoroughly for his work, he took a course of medical study and received the de¬

gree of M.D. from the South Carolina Medical College. He sailed for

China in July 1837 ; in 1844 he was chosen the first American Protes¬

tant Episcopal missionary bishop to China and was consecrated at Philadelphia, 25 Oct. 1844.

The remainder of his life, save for an occa¬

sional visit to the United States for rest or health, was spent in the work of his diocese.

He came to be well known for his knowledge of the Chinese language. He began his trans¬

lation of the Prayer Book into that tongue in 1846 and later was one of a committee ap¬

pointed to secure an accurate translation of the Bible into Chinese.

BOONE, Iowa, city and county-seat of

Boone County, on the Chicago & N. W., the Chicago, M. & Saint Paul and the Fort Dodge, D. M. & S. railroads, 43 miles northwest of Des Moines. It is an important milling, manu¬

facturing and coal-mining centre and in the vicinity are large deposits of fire and pottery clays. The chief industries are the manufac¬

ture of clay products, hardware specialties, cement tile machines, hair tonic and toilet sup¬

plies, hosiery, artificial ice, blankbooks and the mining and shipping of coal. The United

States census of manufactures for 1914 re¬

ported 33 industrial establishments of factory grade, employing 364 persons, of whom 256

are wage-earners, receiving annually $139,000

in wages. The capital invested totalled $875,-

000 and the year’s output was valued at $908,-

000; of this, $419,000 was added by manufac¬

ture. There is also an extensive trade

in agricultural produce, grain and live¬

stock, and the shops of the Chicago &

N. W. and the Ft. D„ D. M. & S. rail¬

roads are located here. The city has five banks, with assets aggregating $5,000,000, six ward schools, a grammar school, a high school cost¬

ing $275,000, Lutheran and Catholic parochial schools, a business college and a Bible college.

Among the public buildings may be noted the courthouse, the library, the hospital, O. E. S.

Home, Swedish National Old Peoples' Home,

Masonic Temple, Y. M. C. A. building, the

post office and the armory. Boone was settled in 1848 and incorporated in 1866. The govern¬

ment is vested in a mayor, five councilmen and two councilmen-at-large. The government re¬

ceipts average about $280,000, the expenses

$260,000. The value of taxable property is

$9,000,000. The water works, costing $350,000, are owned by the municipality. Pop. (1910)

10,347; (1915) 12,253.

BOONTON, N. J., town of Morris County,

situated 30 miles from New York, on the Dela¬

ware, L. & W. Railroad, the Morris and Essex Canal and the Rockaway River. Boonton has

a picturesque situation and is noted as a su¬

burban residential town. Its manufactures in¬

clude hats, paper, bronze, rubber, silk and storage batteries. It has a good public library, an opera house and a lyceum. In 1831 the New Jersey Iron Company established a factory

here, and in the old town, about one mile dis¬

tant, were established one of the first iron foundries and slitting mills in North America.

Pop. 5,000.

BOONVILLE, Ind., city, county-seat of

Warrick County, on the Southern Railway, 17

miles northeast of Evansville. It is a farming centre, with flour mills, manufactures of snuff and tobacco, municipal water supply and, near¬

by, profitably worked deposits of fire and pot¬

tery clay, coal and lumber growth. Pop. 4,000.

BOONVILLE, or BOONEVILLE, Mo.,

city and river port, capital of Cooper County, on the right bank of the Missouri River, here crossed by a fine railway bridge, 43 miles north¬

west of Jefferson City. It is built on a health¬

ful site about 100 feet above the river. It has an important river commerce and manufac¬

tures soda-water, flour, brick, pottery, carriages, pipes, harrows, *etc.* The city has some reputa¬

tion as a summer resort. It is the seat of the State Training School for Boys and Kemper

Military School, contains Harley Park and a fine county courthouse.

Founded in 1818, it was incorporated in 1839 and is now governed under a charter of 1896, which provides for a mayor, elected every two years, and a city council. On 16 June 1861, a Confederate force under Marmaduke was put to flight here by

Federal troops under Lyon. Pop. (1920) 4,665.

BOORDE, or BORDE, bord, Andrew,

English traveler and physician : b. near Cuck-field, Sussex, about 1490; d. 1549. He entered the Carthusian order at the Charterhouse, Lon¬

don, and in 1521 was appointed suffragan

bishop of Chichester. The rigor of the Car¬

thusian discipline was too much for him, and about 1528 he obtained a dispensation reliev¬

ing him from his vow. He then studied medi¬

cine on the Continent, returning to England in 1530, but soon afterward again visited the Con¬

tinent, where he studied at the chief medical 250

schools, including those of Orleans, Poitiers, Toulouse, Montpellier and Wittenberg. His

journey extended to Rome and Compostella,

and in 1534 he was' again in England. His next journey was undertaken at the instance of Thomas Cromwell, in order to ascertain

continental opinion about Henry VIII. In 1536

he was in Scotland, studying and practising ((in a lytle vnyuersyte or study named Glasco,"

and he speaks of Scotchmen as deceitful and inveterate haters of the English. During the years 1538-42 he was again on the Continent and this time he went as far as Jerusalem.

While staying in Winchester his open immoral¬

ity got him into trouble and he was afterward lodged in the Fleet Prison, London. Boorde, who jocularly calls himself Andreas Perforatus, was the author of several works, among which are the following: (Fyrst Boke of the Introduction of Knowledge) (about 1547) ; a ˆHandbook of Europe,' the first of its kind; a (Dyetary) (1542); a medical treatise entitled (Breuyary of Health) (1547) ; (Boke of

Berdes,' a condemnation of the beard, known only through an extant portion of a reply by another writer; a book on (Astronamye ; ' an (Itinerary of England' ; an (Itinerary of Eu¬

rope' ; (Boke of Sermons,' *etc.* His (Fyrst Boke' contains the first printed specimen of the Gypsy language. Many other works, such

as (The Merry Tales of the Mad Men of

Gotham,' have been ascribed to Dr. Boorde.

Dr. Furnivall edited his introduction' and

his (Dyetary' for the Early English Text So¬

ciety in 1870.

BOOROOJIRD, BURUJIRD, or BOO—

ROJERD, boo-roo-jerd, Persia, a town in the province of Irak Sjemi, capital of a district of same name, 190 miles northwest from Ispahan, with a castle and several mosques. It lies in a fertile and well-cultivated valley. Pop.

25,000.

BOOT, a lengthened kind of shoe, which

is among the most ancient articles of attire.

The form has varied quite as much as the

material of which it is made. These differ¬

ences of form and material are not merely due to caprices of fashion but owe their existence in great part to climatic conditions and to the necessities of the daily life and occupations of the wearers. The lightest sandal, which simply defends the sole of the foot, is appropriate for conditions amid tropical sands, while a Greenland winter demands the closest, most

warm and water-tight foot-covering that can

be devised. From the elementary covering of the sandal grows up the slipper, in which straps are dispensed with and a sufficient ((upper" of leather or other material provided to keep it on the foot. The short shoe is the next stage, being laced, buttoned or otherwise fastened on the foot; and in the boot the upper is continued so as to embrace more or less of the leg. An¬

cient foot-coverings were mostly of the sandal type and the development of these is described in the article Shoes. Here are given a few historical particulars respecting boots regularly so called. In mediaeval times shoes with long, pointed toes were worn by the high-born, and toward the end of the 14th century these points became ridiculously elongated, so that there appeared to be a long strap projecting from each foot. Different kinds of half-boots were worn by the Anglo-Saxons and Anglo-Nor¬

mans; and in the reigns of Edward IV, if not earlier, the boot proper, with tops and spurs, was established as an article of knightly dress.

In the reign of Charles I, a species of boot, exceedingly wide at the top, made of Spanish leather, came into use; and with Charles II the highly-decorated French boot was intro¬

duced as an article of gay courtly attire. Mean¬

while, the jackboot, as it is called, had become indispensable in the costume of cavalry sol¬

diers and horsemen generally, and by William III and his followers it was generally natural ized in England. This huge species of boot remained in use in British cavalry regiments until comparatively recent times, and, in a somewhat polished and improved form, it is

still worn by the Horse-Guards. The jackboot is almost entitled to be called the parent of the top-boot and some other varieties. Boots with tops of a yellow color were so commonly worn by gentlemen in the 18th century as to become a peculiarity in the national costume of the English. When Philip, Duke of Orleans, and other revolutionists of note, affected to imitate the sentiments and manners of the

English, they ostentatiously wore top-boots.

Among jockeys and fox-hunters, top-boots are likely to remain in permanent use. What per¬

haps contributed to break up their general use was the introduction of the Hessian boot as an article of walking dress. Worn over tight

pantaloons, the Hessian boot was a handsome piece of attire, giving, - undoubtedly, an elegant appearance to the nether costume. Boots of

this shape were worn by English general offi¬

cers in the early part of the French war and somewhat later. At length they were super¬

seded by the well-known Wellington boot,

which, as its name imports, was introduced

by the great Duke as a simplification under the loose military trousers. When the name of Blucher was given to a half-boot, the Wel¬

lington was almost entirely abandoned in Eng¬

land in consequence of the universal use of short ankle-boots. It is still largely used in some continental countries and in the rural districts of the United States. At present

boots are worn by cavalry and horsemen gen¬

erally, though leather leggins, known as puttees, are fast becoming general. Boots are made

of rubber and cloth, and in such forms are much used by those who work in water or damp

places. See Boots and Shoes.

BOOTAN. See Bhutan.

BOOTES, bo-6’tez (<(ox-driver,” from Gr.

bous, an ox), a northern constellation, situated to the east of Ursa Major, called also by the Greeks Arctophylax. Arcturus was placed by

the ancients on his breast, by the moderns on the skirt of his coat. Fable relates that Philo-melus, son of Ceres and Jason, having been robbed by his brother, Plutus, invented the plough, yoked two bulls to it and thus sup¬

ported himself by cultivating the ground. Ceres, to reward his ingenuity, transferred him, with his cattle, under the name of Bootes, to the heavens, e and £ Bootis are fine double stars, the former an orange star of the third and a greenish-blue star of the sixth magnitudes; the latter’s components are of magnitudes 4.6 and 6.6 respectively, the former yellow and the latter purple.

BOOTH, Abraham, English clergyman :

b. Blackwell, Derbyshire, England, 20 May

1734; d. 27 Jan. 1806. He was a dissenting local preacher who, when the Baptists were

first called into churches, became noted as a speaker of power and an organizer of ability.

He continued to make his living by running a private school even after he had become super¬

intendent of the Kirby-Woodhouse congrega¬

tion, who wished to make him their minister.

Sometime later he became a Calvinist and left the original body of Baptists to which he had belonged from boyhood. In 1768 he published (The Reign of Grace, } and from this time on his literary activities continued unabated until his death. His works were immensely popular in Baptist religious circles and many editions of his most noted works were published. Some of them were translated into the languages of most of the countries of Europe where Baptist propaganda was then being carried on. Even

to-day they are looked upon in England as the most important word on the Baptist question.

Booth was ordained 16 Feb. 1769, and at once took charge of a congregation. The following year he published (The Death of Legal Hope) and (Life of Evangelical Obedience.* These

were followed by works of a devotional, con¬

troversial or philosophical nature. Among

these were (An Apology for the Baptists)

(1778); (Psedobaptism Examined) (1784);

(Glad Tidings to Perishing Sinners> (1796) ; (Pastoral Cautions* (1805) ; < Commerce in the Human Species) (1792); numerous sermons,

addresses and occasional works.

BOOTH, Ballington, American reformer:

b. Brighouse, Yorkshire, England, 28 July 1859.

He is second son of the late William Booth, founder of the Salvation Army. He was edu¬

cated in a private school in Bristol, subse¬

quently in Taunton Collegiate Institute and

Nottingham Seminary, England. After a suc¬

cessful term in Australia as administrative head of a large evangelistic body, Commander Booth came to the United States in 1888 to take

com¬

mand of the American branch of the work of which his father was the head. Subsequently, as is known to the American public, Mr.

Booth's connection with his father's work

ceased, and on urgent representations of prom¬

inent citizens of the United States he inaugu¬

rated the new movement — The Volunteers of America, which has assumed national propor¬

tions. The Volunteers of America was incor¬

porated 6 Nov. 1896. Mr. Booth has been twice elected as president and general-in-chief by the directors and members of the organization. He is internationally known as a writer, public speaker and philanthropist. He is also the

author of a number of well-known hyfns.

BOOTH, Barton, English actor: b. 1681;

d. Hampstead, May 1 733. He was of a Lan¬

cashire family, related to Henry Booth, Earl of Warrington, was educated under Dr. Busby, at Westminster School. An early attachment

for the drama was fostered by the applause he met with while performing a part in Terence's (Andria* at the annual exhibition in that semi¬

nary. He ran away from school at the age of 17, and joined Ashbury's company of stroll¬

ing players, with whom he went to Dublin.

After performing three years in the Irish capital with great applause, he returned in 1701 to London, and, engaging with Betterton, met

with similar success as Maximus in (Valentinian.* On the death of that manager he

joined the Drury Lane Company and there was a great success in 1708 as the ghost in

(Hamlet, *and on the production of (Cato* in April 1713, raised his reputation as a tragedian to the highest pitch by his performance of the principal character. It was on this occasion that Lord Bolingbroke presented him from the stage box with 50 guineas — an example which was immediately followed by that nobleman's

political opponents. Declamation, rather than passion, appears to have been his forte, though Cibber speaks of his Othello as his finest char¬

acter, Other roles in which he excelled were Brutus and Henry VIII. He became a patentee and manager of the theatre in 1713, in conjunc¬

tion with Wilks, Cibber and Doggett, and re¬

tired in 1728. He was buried in Westminster Abbey, where there is a monument to his

memory. He was the author of (Dido and

yEneas,* a mask, various songs, etc., and the translator of several odes of Horace. Con¬

sult Cibber, ((Lives and Character of Barton Booth,® in (Lives and Characters of the Most Eminent Actors and Actresses) (London 1753) ; Galt, (Lives of the Players) (ib. 1831) ; Genest, (History of the Stage) (Bath 1832) ; Victor, (Memoirs of the Life of Barton Booth)

(London 1733).

BOOTH, Charles, English sociologist: b.

Liverpool, 30 March 1840. He was educated at the Royal Institute School, Liverpool, and is chairman of the Booth Steamship Company.

He was president of the Royal Statistical So¬

ciety, 1892-94; a member of the Tariff Com¬

mission, 1904, and was made a privy councillor in 1904. He has devoted great attention to the statistical aspects of social questions, and in the course of prolonged investigations has

shown the close relationship that exists between casual employment and poverty and depravity.

In the case of London this was illustrated by a remarkable series of street maps. His re¬

searches and the conclusions drawn therefrom had no little part in the passing of the British Old Age Pension Act, granting a weekly allow¬

ance of 5/- per week to the aged poor. He is the author of <Life and Labor of the People in London* (1891, 1897, 1903); Pauperism: a Picture) (1892) ; {The Endowment of Old

Age* (1892) ; Condition of the Aged Poor*

(1894) ; (01d Age Pensions) (1899).

BOOTH, Edwin Thomas, American actor

(4th son of Junius Brutus Booth, q.v.) : b.

near Belair, Md., 13 Nov. 1833; d. New York, 7 June 1893. His first scholastic instruction was received from Miss Susan Hyde; subse¬

quently, despite a desultory attendance at school he acquired a fairly good English education.

Early in life he accompanied his father on the latter's theatrical tours and upon Edwin de¬

volved the duty of caring for the health and comfort of the eccentric actor. His early

association with theatrical life and his inherited talent drew him toward the stage. Overcom¬

ing his father's opposition, he made his first appearance as Tressel at Boston in 1849, and thereafter appeared in various roles in his father's company. Tn 1851 the elder Booth was billed in Richard III at the National Theatre, New York, and being suddenly indisposed, his 252

place was successfully assumed by Edwin. In 1852 he went to California with his father to join his brother, J. B. Booth, Jr. He remained some years in California, where his financial success was indifferent. In 1855 he made a successful tour of Australia, New Zealand and the Sandwich Islands, returning to the United States the following year and making a tour of the South. Early in 1857 he scored an im¬

mense success as Sir Giles Overreach in (A New Way to Pay Old Debts,5 and in May of the same year made a brilliant success as

Richard III in New York. In 1860 he was

married to Mary Devlin of Troy, N. Y. She died in 1863. In 1861 he went to England, where his Shylock and Sir Giles were coldly received, but his Richelieu achieved wide popu¬

larity. Henry Irving was a member of his com¬

pany at Manchester during this English tour.

After a visit to Paris he returned to America and in 1862 he opened the season at the Winter Garden, New York; later, with J. S. Clark, he purchased the Walnut Street Theatre in Phila¬

delphia. A year later, with Clark and William Stuart, he took a lease of the Winter Garden Theatre, New York. Here his fame as Hamlet was at once established. After the assassination of Lincoln by his brother, John Wilkins Booth, he retired temporarily but in 1866, at the urgent solicitation of his friends, he reappeared in New York. In 1869, he married Mary Mc-Vicker, who died in 1881. In the loss of the Winter Garden by fire in 1867, Booth lost many articles of value, and all his properties. For two years he traveled to raise money for

((Booth's Theatre,® which he erected on 23d street and 6th avenue, New York, at a cost of over $1,000,000. It was opened in 1869 with (Romeo and Juliet.5 For a time the enter¬

prise was an artistic and financial success, but it fell on evil days in the panic of 1873 and Booth became bankrupt. He amply restored

his fortunes by his tours of the South, West and East in the remaining years of the 70's. In 1880, and again in 1882 he visited Europe and was received with great acclaim in England

and Germany. After his return to America he repeated his former successes, touring with

Helena Modjeska in 1890. In April 1891, he retired to the Players' Club, which he founded and to which he gave more than $250,000.

Hamlet was Booth's most popular role, closely followed by his Lear and Othello. While of small stature his frame was compact and his carriage graceful. He had complete control of his voice to such an extent as to be able to express any shade of feeling or sentiment.

Consult Grossman, Edwina Booth, (Edwin

Booth ; Recollections by his Daughter, and

Letters to Her and to his Friends) (New York 1894) ; Clarke, Asia Booth, (The Elder and the Younger Booth5 (Boston 1882) ; Clapp, Henry A., Reminiscences of a Dramatic Critic5

(Boston 1902) ; Hutton, Lawrence, and Mat¬

thews, Brander, (Actors and Actresses of Great Britain and America5 (New York 1886) ;

Winter, William, (The Life and Art of Edwin Booth5 (New York 1894).

BOOTH, James Curtis, American chem¬

ist: b. Philadelphia, 28 July 1810; d. West Haverford, Pa., 21 March 1888. He was

graduated at the University of Pennsylvania in 1829, spent one year at the Rensselaer Poly¬

technic Institute, and in December 1832 went to Germany and entered the private laboratory of Prof. Friedrich Wohler in Cassel, being, it is thought, the first American student of analytical chemistry to study in Germany.

Later he studied in Berlin and made a practical study of applied chemistry in European manu¬

facturing centres. Returning to Philadelphia

in 1836 he opened a laboratory for instruction in chemical analysis and applied chemistry, the first institution of its kind in the United States.

This soon became widely known and attracted students from all parts of the country. Among the many distinguished chemists who studied

at this institution were : Campbell Morfit, R. E.

Rogers, J. F. Frazer, Thomas H. Garrett and R. T. McCulloh. In 1836 he was made pro¬

fessor of chemistry applied to the arts in the Franklin Institute; during 1837-38 he had

charge of the geological survey of Delaware, and assisted in that of Pennsylvania; in 1849

he was appointed melter and refiner at the United States mint in Philadelphia, an office he held until his resignation, 7 Jan. 1888. His studies of the nickel ores of Pennsylvania led, in 1856, to the adoption of nickel as one of the components of the alloys used in the coinage of the 1857 cent. Publications: (Annual Re¬

port of the Delaware Geological Survey5

(1839) ; (Memoirs of the Geological Survey of Delaware5 (1841); (Encyclopaedia of Chem¬

istry, Practical and Applied5 (1850) ; Recent Improvements in the Chemical Arts5 (Wash¬

ington 1851) ; and he edited, with notes, a translation of Regnault's (Elements of Chem¬

istry5 (2 vols., Philadelphia 1853).

BOOTH, John Rudolphus, Canadian lum¬

berman : b. Shefford County, Quebec province, 5 April 1826. He was educated at Waterloo, settled in Ottawa in 1857 and built a small shingle mill on the site of what is now his immense lumber mill. He is one of the largest owners of timber limits in Canada, and one of the most extensive manufacturers of lumber,

and is the owner of great planing mills and box factories at Burlington, Vt. He has

also great pulp and paper and railroading in¬

terests, his first success in the latter field being his purchase of the Canada Atlantic Railroad from Montreal to Parry Sound. He is one of the founders, a life governor and has been a munificent benefactor to Luke's Hospital, Ot¬

tawa, to which he built and presented a new wing in 1915.

BOOTH, John Wilkes, American actor

(son of Junius Brutus Booth, q.v.) : b. Hart¬

ford County, Md,, 1839; d. 1865. He sided

with the Confederates in the Civil War, and to avenge the defeat of their cause he organized a conspiracy against the life of President

Lincoln, and his plot embraced also the design to assassinate the Vice-President and the mem¬

bers of the Cabinet. He mortally wounded the President while the latter was attending a per¬

formance in Ford's Theatre, Washington, 14

April 1865 ; in escaping from the building he broke his leg, and concealed himself in Virginia till the 26th, when, on being discovered, and refusing to surrender, he was shot.

BOOTH, Junius Brutus, English trage¬

dian: b. London, 1 May 1796; d. December 1852.

After fulfilling engagements at Deptford, near London, and other places, and even performing BOOTH — BOOTH-TUCKER

at Brussels, in 1814 he made his debut at Covent Garden Theatre, London, as Richard

III. His personal resemblance to the crook—

backed tyrant conformed exactly to the tradi¬

tions of the stage, and his personification of the character was in other respects so striking that he competed successfully with Edmund

Kean, then just rising into fame. In 1821 he made his first appearance in the United States, at Petersburg, Va., and in New York, at the Park Theatre, in the succeeding year, on both of which occasions he assumed his favorite

character of Richard III. From that time until the close of his life he acted repeatedly in many theatres in the United States. During the

latter part of his life he resided with his family at Baltimore, making occasional professional

excursions to other cities. He had just re¬

turned from a lucrative tour to California

when he died. The range of characters which Booth assumed was limited, and was confined almost exclusively to those which he had

studied in the beginning of his career. He is most closely identified with that of Richard, in which, after the death of Edmund Kean, he had no rival. Among his other most familiar personations were Iago, Shvlock, Hamlet, Sir Giles Overreach and Sir Edmund Mortimer.

In his peculiar sphere, — the sudden and ner¬

vous expression of concentrated passion, — as also in the more quiet and subtle passages of his delineations, he exercised a wonderful

sway over his audience, and his appearance

upon the stage has been known to awe a

crowded and tumultuous house into instant

silence. His presence and action, notwith¬

standing his short stature, were imposing, and his face, originally molded after the antique type, was capable of wonderful expression

under the influence of excitement. Several of his children inherited a portion of his dramatic talent, and became prominent actors on the

American stage.

BOOTH, Mary Louise, American jour¬

nalist and author: b. Yaphank, Long Island, N. Y., 19 April 1831 ; d. New York, 5 March 1889. She was widely known as the editor of Harper's Bazaar, which place she held from

1867 till her death. Her (History of the City of New York) was the first complete work

upon the subject and is still one of the best.

It was published in 1859, a second edition in 1867, a third, thoroughly revised, in 1880. No book has been a greater favorite of local col¬

lectors. One copy was extended to nine large volumes and enlarged by many thousand illus¬

trations; another, owned by the author, had 2,000 illustrations inserted ; and a third was extended to 22 volumes. Miss Booth's trans¬

lations number over 30 volumes. They are

chiefly from the French of About, Victor

Cousin, Mace Gasparin and Laboulaye. The

most pretentious is Henri Martin's (History of France,* six volumes of which she finished.

BOOTH, Maud Ballington, a leader of the

Volunteers of America: b. near London, 1865.

She was active in the work of the Salvation Army in England, and

established a corps of the Salvation Army in Switzerland. In 1887

she married Ballington Booth, and in 1896

joined him in seceding from the Salvation

Army and organizing the Volunteers of

America. She has been active in work for

prisoners, both during their imprisonment and after their release. She is author of <Branded) (1897) ; and (Look Up and Hope,* (After

Prison — What?) (1903); 'Twilight Fairy

Tales> (1906).

BOOTH, William, founder of the Salva¬

tion Army: b. Nottingham, England, 10 April 1829 ; d. London, 20 Aug. 1912. He was edu¬

cated in his native town, and from 1850 to 1861 acted as a minister of the Methodist New Connection. He was from the first a zealous evangelist, but his unconventional methods

shocked old-fashioned Christians. He suc¬

ceeded in touching a class that had drifted away from church connection, and one of the first fruits of his new method was to organize a ((star company® of converted criminals. The departure which led to the creation of the Salvation Army (q.v.) on military lines began in 1865 with mission work among the lower

classes in the East End of London. Since 1877

Booth's movement has been known as the

Salvation Army, of which he was the main¬

spring and controlling power, directing its

movements at home and abroad from his head¬

quarters in London. His enthusiasm and or¬

ganizing power gave life to the religious mil¬

itary system of which he was “general® and which had for its primary object the evangeli¬

zation and social uplift of the “submerged

tenth.® The late King Edward VII gave him

valuable support. In 1890 he published

(Darkest England and the Way Out, * in which he advocated a scheme for the reclamation of unemployables by means of farm colonies. The scheme, however, for which funds were raised, did not realize expectations, but valuable work was done in the way of aiding emigration.

<(General® Booth’s funeral, to Abney Park

cemetery, evoked a wonderful demonstration of popular sympathy. His wife (nee Catherine

Mumford) was, until her death in 1890, a

tower of strength to her husband in all his undertakings ; it was she who suggested the adoption of a distinctive uniform for the mem¬

bers of the Army, and she designed what is known as the <(Hallelujah bonnet.®

BOOTH, (William) Bramwell, Salvation

Army leader: b. Halifax, Nova Scotia, 1856.

After advancement in various capacities to be chief counsellor to his father, the founder of the Salvation Army, by the latter’s will he suc¬

ceeded as general and commanding officer, at his death in 1912.

BOOTH-TUCKER, Emma Moss, a

leader in the Salvation Army : b. Gateshead, England, 8 June 1860; d. Dean Lake, Kan., 29

Oct. 1903. She was a daughter of William

Booth, the organizer of the “Army® ; in 1880-88, she had charge of international training homes; in 1888 she married Commander Booth-Tucker,

went with him to India, and in 1896 came to the United States. She held the rank of consul in the Salvation Army, and had joint authority with her husband in the United States. She was killed in a railroad wreck.

BOOTH-TUCKER, Frederick St.

George de Lautour, American evangelist : b.

Monghye, Bengal, 21 March 1853. He held

important official posts in India, but resigned them in 1881 to join the Salvation Army. Upon his marriage with Emma Moss Booth, daughter of <(Gen.® William Booth of the Salvation

Army, he prefixed Booth to his own name of 254

Tucker. From 1896-1904 he was commander

of the Salvation Army in the United States, but resigned to become secretary of all the branches of the Army outside of Great Britain in 1904. He returned to India as special com¬

missioner for India and Ceylon in 1907. His works include (Life of General William Booth y (1898) ; (Favorite Songs of the Salvation

Army) ; (Monograph for the Paris Exposition on the Work of the Salvation Army in the

United States) (1900) ; (Farm Colonies of the Salvation Army> (1903).

BOOTHBY, Guy Newell, English novel¬

ist : b. Adelaide, South Australia, 13 Oct. 1867 ; d. Boscombe, England, 27 Feb. 1905. In 1891

he crossed Australia from north to south, and also traveled in the East. His first work (On the Wallaby, } was published in 1894. He wrote some 55 novels, mainly of a sensational type, including (A Bid for Fortune) ; (Beautiful White Devil > ; (Dr. Nikola) ; (Fascination of the Iving) ; (Billy Binlcs, Hero) ; (Across the World for a Wife) ; (Pharos, the Egyptian* ; (Love Made Manifest * ; (Dr. Nikola's Ex¬

periment ; (A Sailor's Bride* ; (A Maker of Nations*; (My Indian Queen) ; (Farewell

Nicola) (1901); and (The Viceroy's Protege.*

BOOTHIA FELIX, a peninsula on the

northern coast of North America, in which is the most northern part of the continent, Mur¬

chison Point, lat. 73° 54' N. It is joined to the mainland by Boothia Isthmus, is bounded on

the north by Bellot Strait, and to-the east is separated from Cockburn Island by Boothia

Gulf (q.v.) It was discovered by Sir John

Ross (1829-33), and named after Sir Felix

Booth, who had furnished $85,000 for the expe¬

dition. Here, near Cape Adelaide, Ross dis¬

covered the magnetic pole, lat. 70° 5′ 17″ N. ; long. 96° 46′ 45″ W. Consult Ross, (Narrative of a Second Voyage in Search of a Northwest Passage> (London 1860).

BOOTHIA, Gulf of, a southward contin¬

uation of Prince Regent Inlet in the northern part of Canada, lying between Boothia Felix on the west and Cockburn Island on the east.

BOOTLE, England, a municipal and

county borough in Lancashire, near the mouth of the Mersey, and adjoining Liverpool, the docks of which great seaport extend into the borough, covering 370 acres and constructed at a cost of £2,500,000. The principal buildings are the town hall and municipal buildings,

school-board offices and hospital. The trade of the town is almost exclusively connected with shipping, timber being the chief import ; most of the American steamers have their loading berths here. Therre are large jute-mills, corn-mills, foundries, *etc.* Bootle has ample railway facilities and an excellent tramway system.

The Leeds and Liverpool Canal passes through it. There is a municipal electrical station. The history of the place is included in that of Liver¬

pool. It was incorporated in 1868. Pop.

69,876.

BOOTON, BOUTON, or BUTUNG, an

island of the Malay Archipelago, separated by a narrow strait from the southeast ray of

Celebes, and from the island of Muna. Area, 1,700 miles. It is high, but not mountainous, and thickly wooded ; produces fine timber, rice, maize, sago, *etc.* The people are Malays. The Sultan, who resides at Bolio, is in allegiance to the Dutch, an under-resident being stationed on the island. Pop. 17,000.

BOOTS, or BOOTIKIN, instruments of

torture used in former times in the endeavor of the authorities to extort a confession from a suspect or, in the case of a witness, who might prove recalcitrant, to secure evidence.

The instruments originated in Scotland, but

the date of their introduction is unknown. It is well known, however, that this mode of tor¬

ture was in frequent use in the latter half of the 16th century. Thus there exists a record of the torturing of a clergyman and an attor¬

ney in a forgery case in 1579, and Father Holt, a Jesuit, was sentenced by Walsingham to be (<put to the boots.** After being little used for a generation this diabolical instrument was.

again put to frequent use during the Rebellion of the Covenanters. From then on until 1689

it was frequently used, the last recorded case being that of Neville Payne in 1689. The in¬

strument was made of iron, or of wood and iron and fastened tightly to the leg of the vic¬

tim, after which an official introduced wedges between the boot and the leg and drove these home with a mallet. The victim was interro¬

gated after each blow and the torture continued until the information elicited was satisfactory or the victim fainted.

BOOTS AND SHOES. Boots and shoes

are the two general terms denoting footwear or covering for the feet and lower leg.

Specifically, a shoe is an article of footwear extending not above the ankle, while a boot not only extends above the ankle, but may

reach the knee or even the upper leg. In

women's footwear, this distinction is main¬

tained, but, for men, as a general rule, any article of footwear, high or low, if buttoned, laced or otherwise closed, is known as a shoe, while

boot is the term used to denote footwear extending to the knee more or less, without lateral opening and with a stiff top.

History. — The sandal, the simplest and

most ancient article of footwear of which we have record, was a protection merely to the soles of the feet, rather than an adornment.

It is evidenced in the art, archaeology and literature of all ancient peoples, and is found even to-day as the footwear in a great part of the Orient. As culture and aesthetics in¬

creased, ornamentation was added to the sandal, and, little by little, other parts were attached, until what was the original simple protection of the sole of the foot became the sole of the modern shoe or boot. It is true, however, that in the routine of everyday domestic life it was the general custom to go with the feet bare, as is shown by "the sculptures, paintings and other records. But enough evidence is at hand to showT that other kinds of footwear were

known and worn by the ancients. On the walls of the tombs of Thebes are paintings of the different steps in the making of footwear —from the tanning and other preparation of the leather or other material to the finished sandal or shoe, as then known. The currying knife, awl, lapstone and other tools used by the

Egyptian sandal-maker were not dissimilar to the tools used by the cobbler of to-day. The emblem of the trade was a prepared skin

suspended with specimens of the finished

sandals in view of the public. The sandal-maker of Egypt was an important personage.

Like the bootmaker of to-day, he hqd to cater to fashion. The

Egyptians — a nation of great culture — .paid great attention to the niceties of and distinctions in raiment, of which foot¬

wear was an important element. The aristoc¬

racy, and women generally, wore a sandal

with a turned-up toe, pliable to the position of the foot. The lower orders wore sandals with rounded or pointed toe, or following the form of the foot. They were generally held secure by a strap extending between the great and second toes and secured at the instep to a strap attached at either side. The materials used were generally woven palm leaves or

papyrus stalks or leather, with coloring and ornamentation differing according to the

social position of the wearer. Shoes — of which many examples are found at Thebes — were of late date and are supposed to have originated with the Greeks. With the exception of the soles, which were thick, they were similar in appearance to the moccasin of the American

Indian. The Assyrians had a sandal having a counter, attached to the foot with a number of laces tied across the instep, in some cases the sole extending forward barely to the ball of the foot. With the ancient Hebrews the sandal was likewise worn by all classes, and was made of leather or rawhide, cloth, felt or wood, secured to the feet by thongs or Hatchets,® as mentioned in the Bible, in which source are found many references to this article of attire, sometimes spoken of as shoe. In certain in¬

stances they were mentioned for their beauty, being dyed, embroidered and often ornamented with precious metals and jewels. With the

Greeks,* the usual footwear was the sandal, from which was evolved the shoe, of which

there were many styles — each worn by a dif¬

ferent order of society. The Spartan patrician wore a red shoe ; courtezans wore a white

shoe ; tragedians, a buskin, known as a

cothurnus ; and comic actors a shoe called the baxa. Numerous art remains, along with the

rich Grecian literature, indicate that almost every style of foot covering known to the

ancients was worn at one time or another in Greece.

For everyday wear the sandal was used by

the Romans — similar in form and material to that of the Greeks. Due, however, to a more extended world intercourse, the Romans came

into contact with other nations and peoples, and from these they absorbed, among other

things, a diversity of dress, including footwear.

Shoes, boots and buskins were common. The

boot, with greavelike top — often faced with metal — was worn by the Roman soldier and was known as the caliga (diminutive, caligula).

It was from this word that the Emperor

Caligula received the cognomen by which his¬

tory knows him — from his military career.

Like the Greeks, each order of society affected a different style of footwear. The middle

classes wore the calceus, the name that became generic for the shoe of every style. As is the custom among Eastern nations to-day it was

the custom to remove the shoes while indoors, particularly while reclining at the table, from which was derived the expression ((calceos

ponere® — to put on the shoes — meaning to rise from the table. Similarly, <(calceos

mutare® — to change shoes — signified becom¬

ing a senator, the shoes of the latter being of a special style, reaching to the middle of the leg, colored red, and bearing a silver crescent (lunata pellis, or patricia tuna) just above the foot. The shoes of men were generally black, while those of the women were of various

colors. Red shoes for men usually indicated the holder of some public office. The soccus (whence the English word ((sock®) — a slipper¬

like shoe — was worn by comedians, and the cothurnus, a heavy-soled buskin, similar in

form and name to that of the Greeks, was

worn by tragedians. From this we have the

expression ((sock and buskin,® signifying com¬

edy and tragedy. Similar to the soccus was the crepida, a sandal shoe, and the baxa or baxea, derived from the Greeks, originally of plaited leaves, twigs and strips of willow and as such worn by both comedians and philosophers ;

later, when made of purple leather embroid¬

ered with gold, worn by women. With both the Greeks and Romans we find in the tragedian's buskin the forerunner of the modern heel.

Tertullian (de S pectaculis) finds much offense in the (<lofty buskin, impiously striving to add a cubit® (1.4505 feet) to the tragedian's stat¬

ure. The Romans, probably from their inter¬

course with the Lombards, wore a stocking of wool, known as the tibialia, a footwear acces¬

sory that, when once known, has been found indispensable wherever boots and shoes are

worn.

It is in the Middle Ages, with its Crusades, Feudalism and Renaissance of art and culture, that modern footwear had its beginning. In

the cold northern climes where protection

against the elements was a necessity, substan¬

tiality and warmth of costume were of prime importance, and the heavy boot, with its thick sole and the beginning of the heel, was one re¬

sult. Feudalism, with its detached communi¬

ties, chivalry, with its trappings, and the begin¬

ning of the guild system of artisan activity were incentive of individuality and improve¬

ment — by each baron having craftsmen for

his every need, through feudal rivalry and by the development of the master and apprentice system, the basis of true workmanship. To

appreciate this, one may with advantage exam¬

ine the paintings, illumination, wood-cuts and other art remains illustrative of the beginnings and growth of modern Europe. To specify the styles of footwear alone would be to catalogue the ever-changing needs and whims of individ¬

ual communities and degrees of societv. The peasants, as a rule, where footwear was re¬

quired, wore a simple moccasin-like shoe fitted to the foot by thongs — crudely tanned or of rawhide, sometimes with the hair side within.

The Bayeux Tapestry shows King Harold on

his journey to Bosham, on horseback, wearing a heelless slipper-like shoe with spurs. A

Saxon chief is shown in an ancient illumination with similar footgear topped by a leggin simi¬

lar in appearance to the modern puttee, while other persons of prominence are shown (Cot¬

ton MS, Claud. B. 4) with ankle-high shoes with sharp or turned-up point. During the

time of Edward II we find low shoes, with heels and larsre buckles; and in the reign of Richard II high, tight boots, a different color for

each leg, without heels and with pointed toes so long that they were frequently attached 256

to the knee, were worn by courtiers. Follow¬

ing armor and its attendant protection, boots extending to the knee or higher came into

vogue as a prerogative of the knights. This chivalric footgear has endured until the pres¬

ent, being worn by Marshal Brissac's Dragoons in 1660 and the French Dragons-Gardes and

English Horse Guards of to-day. This boot,

known in English as the ((jack boot,® originated in Spain for the use of men of rank. Due to its finish, from its peculiar method of tanning and treatment, the leather (originally goatskin) from which it was made took the name "cordo¬

van,® from Cordoba, and the name has been

retained, being now used, as the designation of tanned horsehide. Likewise, the term

((cordwainer® — a worker in cordwain, a shoe¬

maker — is derived from the same source. It was in France, however, that the greatest lib¬

erties were taken in footgear styles and the court shoemaker of the various French kings became an important personage. Every con¬

ceit that luxury could suggest was lavished on footwear. The court slipper and the low shoe were brought to a relative perfection — the name <(Louis® or French heel being that used to-day with the most popular style of ladies'

shoe. Silk stockings, fancy garters, jeweled buckles and similar ornaments were added re¬

finements. However, from the standpoint of

foot-comfort there was little improvement un¬

til the middle of the 19th century. It was only around 1785 that "right® and Heft® lasts were introduced into England, formerly a boot or shoe suiting either foot. In addition, the "bespoken,® or custom-made shoe or boot,

while durable, was made without consideration of the anatomical principles to which it should conform.

Due to the utilization of mechanical proc¬

esses, beginning in the early half of the 19th century, a standardization in manufacture and styles has resulted generally. Notwithstand¬

ing this, there are many parts of the world where, due to racial or other prejudices, little change has been made. In China the sandal, made of woven reeds, is still worn by the labor¬

ing classes, while merchants and others of the higher classes wear a loose, thick-soled, quilted slipper. It is the custom yet, to some extent, for women, their feet forcibly cramped from childhood, to wear diminutive shoes that

throw the weight of the body upon the toes, incapacitating their wearers from any strenu¬

ous activity. The people of India, Turkey and Arabia, in their daily life, still cling to the ornamental sandal and low shoe, often of ex¬

pensive leather and highly ornamented, that

their ancestors wore. In Russia and the Bal¬

kan States, the high, heavy top-boot, made by hand, is yet worn by both men and women —heavy, weather-proof footgear being a neces¬

sity of northern Europe. In Holland, Bel¬

gium, France and Germany, wooden shoes

(known as (<sabots®) and leather shoes with wooden soles are worn

largely by laborers —both men and women — a form of footwear

ideally adapted for wearing in dairies and other damp places. They arc even beginning to be manufactured in large quantities in the United States for domestic use. In parts of Spain are worn sandals, slippers and shoes made of “esparto® grass (Stipa tenacissima) , light in weight and enduring for a generation or more.

However, throughout Europe and America,

the machine-made boot and shoe have sup¬

planted all others, with a resulting standardi¬

zation of styles, a reduction in prices and a comfortable and relatively durable product.

Shoemaking has been called <(the gentle

craft.® Its patron saint is Saint Crispin, one of the early Christian martyrs, whose day on the Church calendar is 25 October, the anni¬

versary of his excommunication. Crispin and

his brother Crispianus were of noble Roman

lineage. Due to persecutions during the reign of Diocletian they fled into Gaul, settling at Augusta Suessionum (now Soissons, France),

where they followed the trade of shoemaking, at the same time spreading word of Christian¬

ity and doing deeds of benevolence. It is said that these brothers stole leather to make shoes for the poor. About the year 300 a.d., they were martyred by being beheaded. In the

processions of the mediaeval guilds, the shoe¬

makers’ patron — master of ceremonies — was known as King Crispin. From this word

comes the adjective ((crispin,® as applied to the shoemaking trade.

In America the introduction of shoemaking

was coincident with the earliest settlement of the colonies. Among the party that came to Plymouth on the Mayflower was a shoemaker

— Thomas Beard — provided with supplies and materials for supplying the little band of Pil¬

grims with shoes. Accredited to the governor of the colony, he was allowed a salary of $50

per annum and given 50 acres of land. A few years later — in 1636 — Philip Kerkland began the manufacture of shoes and boots at Lynn, which city has since been interested largely in the industry — at first supplying the needs of Boston and neighboring towns and later those of the entire colony. Other colonies each had their individual shoemaking industries, but

from the start New England led. During the Revolutionary War Massachusetts manufac¬

tured the greater proportion of all ready-made shoes for the 13 colonies and those used by the Continental army, it being recorded that these latter were <(for quality and price … quite as good as those imported from England.®

Following the Revolution there were heavy im¬

portations from England, which hurt the do¬

mestic industry. The increasing home de¬

mand, however, soon overcame this and the

industry, already established, proved its right to continue and grow. In 1795, 300,000 pairs of women's shoes — the labor of 200 master workmen and 600 journeymen — were manu¬

factured in Lynn. So rapid was the growth at this period that certain makers, particularly in Lynn, Braintree and Reading — all in the State of Massachusetts — supplied only the wholesale trade. Boots and shoes were shipped to Bos¬

ton, New York, Philadelphia, Charleston and

Savannah and even to the West Indies. An

important branch of the trade was the making of heavy “brogans® — a specialty at Milford and other Worcester County towns — for the use of the slaves of the Southern States. The supremacy of the New England product was

unquestioned. There was very little variety in the leathers used — all being subjected to* the slow tanning process. For uppers, pebble-fin¬

ished goat leather was the most popular, later developed into the “brush kid® finish, the fore¬

runner of the “vici® finish of to-day. Shoes BOOTS AND SHOES

intended for hard service were always pegged or nailed and frequently hobnailed. Those

intended for the better trade were hand welted and shoes for women and children were mostly <(turned® bottom. The straight, <(rocker-bottom® last — ensuring at that time the maximum of comfort — was the prevailing style, the only concession to fashion (in women’s shoes) seemingly being the variety of materials used for tops, comprising serges, plain and bro¬

caded, and other cloths.

Machines. — Despite the successful attempt

to establish the ready-made shoe and boot trade, it is well within the memory of those living that the village or itinerant shoemaker — mak¬

ing the shoes of entire families — was an im¬

portant factor in the production of footwear.

Except the making of high grade custom work, or in the repair (cobbling) of boots and shoes, the shoemaker is today supplanted by

machine methods. The earliest machine-made shoe was

that made on the machine invented in England in 1810 by Isambard M. Brunei. It mechanically nailed or tacked the sole to the upper fitted over a last, the nails being clinched. By this method 100 pairs of ((strong and well-finished® shoes —at a contract price of 6s. 6d. ($1.56) — were made per day. At the time great hopes were entertained at the success of this method, but in shoes made by it for the English soldiers it was found that the nails penetrated through the sole into the foot. In 1818 Joseph Walker of Massachusetts invented the wooden shoe-peg machine, where individual pegs of wood

were substituted for the metal nails used

previously. From this has been developed a

variety of pegging machines — some using the individual wooden pegs, and others using long strips of wood or metal, cutting the same into suitable lengths and driving them into the sole automatically. Two forms of these — <(pegged) and ˆscrewed® are used to-day for heavy,

cheap boots and shoes. These improvements —developed one at a time — made it possible for one or several of the operations to be completed quicker than the others, resulting in a division of labor. It was at first the custom to send out the various parts to be cut and joined and later assembled at a factory on the automatic machines. With the growth of manufacturing

plants, it was found more expedient to have all operations finished at the factory, which system has, in turn, again changed somewhat in the direction of specialty houses producing the in¬

dividual parts of a shoe, the ultimate manufac¬

turer merely assembling them in the finished product.

The great stride in the manufacture of

shoes was that resulting from the invention in 1857 of the McKay stitching machine — a slow operation as previously done by hand. Intro¬

duced into active use in 1861-62, it was an im¬

portant factor in supplying the Union troops during the Civil War. This method, which is in use to-day — see statistics at end of this article — and which for some purposes is pre¬

ferred over all others, makes possible the auto¬

matic sewing of the outer-sole to the inner-sole _ the edges of the upper being between the two — with a strong chain stitch, a furrow or chan¬

nel being cut in the outsole to protect the part of the thread extending, to the bottom. Tts principal inconvenience is the fact that the threads extend through the insole, making a vol. 4 — 17

perceptible ridge which must be covered with a (<sock® lining, a thin piece of leather or cloth covering the insole. Other machines for ef¬

fecting separate operations were invented at about the same time or subsequently. The

leather rolling machine was introduced about 1845, for pressing the leather and giving it the proper consistency, an operation formerly

laboriously effected on the lapstone. Following this came the various types of leather sewing machines for stitching the uppers, using wax thread. In 1855 the automatic splitting ma¬

chine was first used — for dividing leather or reducing it to a uniform thickness — follow¬

ing which came the (<dieing-out® machine for cutting the soles and various other parts of the shoe by pressure on a fixed pattern. ‘Improve¬

ments were made in pegging and nailing ma¬

chines, particularly in the feeding of a continu¬

ous cable, cutting the same off at required lengths. The most important of these is the one used to-day, known as the ((rapid standard screw machine.® Devices were perfected for

making the individual lifts of the heels, as¬

sembling and nailing them together and on the corresponding part of the sole and finishing the whole. Other machines have been perfected

for practically every operation in the making of footwear, one large factory of the United States producing machinery adapted to 170

distinct operations on a single pair of shoes, 210 pairs of hands being required. The greatest advance, however, from the standpoint of

shoe-comfort, has been the so-called (<Goodyear welt sewing machine,® which, with the manifold improvements of form introduced by last man¬

ufacturers, has produced a shoe with a per¬

fectly smooth interior adapted to feet with irregularities. At the present time there are seven methods of attaching the outer sole to a shoe by machinery: (1) McKay stitching; (2) Goodyear welt stitching; (3) turn shoes (sew-rounds — the sole sewed to the upper outside in and then turned), McKay machine used; (4) pegging with wooden pegs; (5) ˆstandard

screw®; (6) nailed, with inside clinching; and (7) welt attached to upper, sewed direct to edge of outsole by Goodyear stitch.

Leather. — In the making of footwear an

important consideration is the kind and quality of leather, depending more or less upon the methods of tanning and finishing adapted to specified requirements. Flexibility, tensile

strength and the possibility of absorbing mois¬

ture are the most important elements. Upon

these depend the qualities of wear and com¬

fort — in a word, the reputation of the manu¬

facturer. Of all sole-leathers ox-hide is unde¬

niably the best, followed by pig-skin, camel-hides and horsehides. Likewise, for the uppers of heavy shoes calfskin is the standard, while for light shoes goatskin has the preference, closely followed by sheepskin. The term

((hides® is applied to the larger full-grown ani¬

mals of the bovine group, and to horses and camels, while ((kips® is the term used with re¬

lation to the skins of the smaller animals, some of which belong also to the bovine class. In addition to the foregoing the skins of the kan¬

garoo and many other animals, and even fish, have been utilized. Of the latter, the porpoise and shark seem most suitable, and the United States government is at present making a series of experiments with a view of utilizing shark-258

skins on a large scale. Lately efforts have been successfully made to use composition soles — of rubber mixed with a large proportion of fibre — and for uppers, canvas and other cloths

have been found a suitable substitute for

leather.

Processes of Manufacture. — The opera¬

tions of the Goodyear welt process of shoemak¬

ing are substantially as follows : On the re¬

ceipt of each order, the specifications are en¬

tered in the corresponding order book and given a number. Tags, one for each case of shoes, bearing the same number, with details, are sent to the foreman of the cutting room; others to the sole room, and a third lot to the “bottom¬

ing,® or assembling, room. The foreman of the cutting* room selects and has the material for the uppers cut to the required measurements.

This cutting to size is done by steel dies under heavy pressure on what is known as a “clicking®

machine. In addition to cutting, they also mark the leather as a guide for assembling. The next operation is that of “skiving,® or beveling the edges, after which they are coated with cement and folded on a “folding® machine. For orna¬

mental purposes, perforations are generally re¬

quired — particularly on the tips, or toe-caps, and on the upper stitching edge of the vamp.

This is done respectively with an automatic “tip punching® or “perforating® machine. Either is capable of making these perforations in the form of designs, the latter being similar in operation to a sewing machine. In the mean¬

time, the linings of cloth or leather, having been cut according to instructions and stamped with order number, are given, along with the other, outer parts of the upper, to the stitchers, who, on sewing machines specially adapted to the purpose, sew the whole upper together. For

laced shoes the next operation is the placing of the eyelets, on an automatic “eyeletting® ma¬

chine, both sides mathematically correct at the same time. These “eyelets® are of metal, with smooth, flanged top and a diminutive “barrel,®

which, during the operation, becomes clinched on the inner side of the shoe. This operation finished, the upper, completed, is sent to the “bottoming,® or assembling room, to be joined with the remaining parts of the shoe. In the meantime, in the sole room the outsole and the insole are roughly “died out,® an operation sim¬

ilar to the “clicking,® or cutting, of the parts of the upper; then trimmed to exact size on a “rounding® machine to the pattern of the sole.

The outsole is then passed under heavy pres¬

sure through the “rolling® machine, the fibres being compressed and the leather being made capable of greater wear. This is the old opera¬

tion indifferently done on the shoemaker’s lapstone by beating the leather. It is then put through a “splitting® machine, for the sake of uniformity of thickness. The unit of measure is an “iron® — 48

“irons® being equal to 1 inch.

The insole is treated in like manner, in addition to which, near the edge of what will be its eventual lower side, a slit of about one-half inch, extending toward its centre, is cut by a “channelling® machine. At the base of the re¬

sulting “lip,® or flap, and nearer the centre of the insole a groove is cut during the same op¬

eration. As will be seen later, the groove and slit are for the purpose of accommodating the stitching operation uniting the insole, upper and outsole. The “lip® is now forced at right angles to the insole by a “lip turning® machine, for the purpose of forming a lip, or shoulder, against which the welt is to be sewed, the groove on the inner side serving as a guide for sewing. Dur¬

ing these operations the heel has been as¬

sembled in another part of the sole room, the different pieces of leather, or “lifts,® being cemented together and subjected to great pres¬

sure. The “counters® and ’“toe boxes,® respec¬

tively the stiffeners for the shoe “quarter® —the part of the upper at the back and sides of the heel — and for the toe cap, are also made ready in the sole room. With the completion of all these, they are sent to the “bottoming,® or assembling room.

In the bottoming room, the first operation is the automatic lacing of the upper (stitched to¬

gether and eyeletted) on a “lacing® machine.

‘This ensures the proper positioning of the upper upon the last with relation to the sole. The “counter® and the “toe box® are then properly positioned upon the last, over which the upper is then drawn. On the “last”— the wooden form corresponding to the shape of the foot — there has already been attached the insole — automati¬

cally secured by an “insole tacking® machine —in proper position. The upper being drawn over the last and attached to the insole, the operator verifies the position of the heel seam, on which depends the

proper balance of the remaining parts. An “assembling® machine then drives two tacks part way through the upper into the last, on which another operator, on the “pulling-over® machine, with automatic pincers that

grasp the “bottom® edges of the upper of the shoe at different points, and, pulling the edges with firm and uniform tension, press the

leather of the upper against the last, through other movements adjusts the upper as desired.

Another movement, with the pincers again pull¬

ing inward, and three tacks are partly driven in at each side and one at the toe, the upper be¬

ing now in the proper position with relation to the insole. The next operation is by the “last¬

ing® machine, the edges of the upper being au¬

tomatically drawn by small pincers into their ultimate position on the last, each portion, as pulled into place, being automatically tacked part way — the operation being effected so uni¬

formly that every shoe of each order number is the same. To properly last the toe and heel, a “wiping® motion is imparted to these parts, smoothing and securing the wrinkles resulting from the surplus stock. The tacks driven

through the heel part are permanently clinched on the insole against the iron heel of the last, the remaining tacks being driven in only partly, in order to be again removed. An “upper trim¬

ming® machine trims off the surplus leather at the toe and heel, after the “wiping® operation, the remainder being pounded smoothly upon the last, the leather at the sides and around the “toe box® and “counter® being made to conform to the last. A “tack pulling and resetting® ma¬

chine now pulls the lasting tacks, driving in others as necessary, or supplying other means for holding the edges of the upper flush with the insole edge and bent at right angles to con¬

form with the “channel lip,® or shoulder as pre¬

viously described for the insole. The “welt® is next attached. This is a narrow strip of leather extending from side to side of the heel around the toe between the upper and the outsole, its outer edge being flush with the latter, the two BOOTS AND SHOES

being apparently one piece. By means of an ingenious device known as the (<welt sewing®

machine the welt, positioned with its inner edge Hush to the angle of the “upper® edge against the ‘channel lip,® just described, is stitched se¬

curely to the upper and the insole. This is ef¬

fected by means of a curved needle adapted to making a stitch extending from the (<groove®

of the insole, through the ((channel lip,® the “upper,® and diagonally through the inner edge of the “welt,® by a single motion, securing all three together. The upper securing tacks and those holding the insole to the last being with¬

drawn, the protruding portions of the welt, up¬

per and channel lip, left after the welt sewing operation, are trimmed away, and the welt is hammered in a “welt beating and slashing ma¬

chine® to cause it to stand out evenly from the shoe, special attention being required for the toe part to overcome the tension. A rubber cement is then applied to the face of the insole and welt, a “filling,® of leather, cork or other material, having been provided to occupy the horizontal space from side to side between the perpendicular “channel lips,® and in turn like¬

wise coated with cement. The character of this “filling® is sometimes a determining factor in shoe quality. Leather scraps, if used, are apt, through their friction, to produce “squeaking®

in walking, for which reason other materials devoid of this fault are preferred. A metal, or other “shank support® is also laid on the shank

part of the insole, corresponding to the arch of the foot. At the same time, the outsole,

trimmed to correspond with the last and welt, is also coated with rubber cement on the flesh side of the leather, and in the “sole laying® ma¬

chine — in a rubber form, pressing every por¬

tion of the outsole surface — the upper and sole are brought together under heavy pressure until the cement sets. This finished, the sole — now consisting of the outsole and the welt, cemented together — is “rounded® and “channelled® on a machine performing these two operations.

Rounding consists in trimming the sole to width required, and thinning same — for example, the edges of the “shank.® ’“Channelling® is the same operation as noted in the preparation of the insole — a diagonal slit near the edge of the “face® side of the outsole, the “channel,® being, on a line with the stitching desired, which latter when completed is covered from sight and wear by the “channel lip® cemented back in place.

Rounding and channelling have to do only with that part of the outside covered by the welt, the “heel seat® being untouched. This is fol¬

lowed by the sewing of the outside to the welt, the “channel lip,® before noticed, being turned out for the purpose. The stitches — with waxed thread — are extremely fine and durable, being known as the “lock-stitch.® The thread used is cotton or linen, the former for footwear liable to exposure to dampness. Due to lack of uni¬

formity in the fibres, hemp, the favorite thread for custom-made shoes, cannot be used success¬

fully on stitching machines. The “channel lip®

is then cemented in its original position ; the sole is then “levelled® under heavy pressure, to remove any unevenness on its bottom.

The heel — the “lifts® having been cemented together in the sole leather room. — is positioned on the “heel seat® and the required number of nails are automatically driven through it, the “heel seat,®

and the insole, the points being turned back into the heel where they are

clinched. The heads of the nails are left pro¬

truding to accommodate the “face,® or toplift, which is put on last. Special care is made in the selection and preparation of the “face® on account of the wear to which it is subjected, brass or other “slugs® being generally inserted on its edges. The heel is then trimmed, the “breast” — the front face — is squared across or hollowed out, and the whole is scoured with sandpaper moulded to shape. The edge of the sole receives its final trimming and a coat of blacking, while the upper side of the welt is indented with little notches to indicate the stitches and then burnished, along with the edge of the sole. The succeeding operations all relate to the finish of the shoe, and, while varied, are not peculiar other than that most of them are performed by machinery — “buffing,®

the polishing off of discolorations resulting from handling, “cleaning,® “blacking,® “polish¬

ing,® “creasing® — across the toe part, to take the place of irregular lines that might result from wear — stamping of name or trade mark, *etc.*

It will be noticed that the “last,® on which the upper is fitted, and on which it is retained throughout the making is an important ele¬

ment. It is the basis of style and fit, intended, as it is, to represent as nearly as possible the foot for which the shoe is ultimately intended.

Their making is a distinctive profession, being known to the ancients, mention being made of lasts by the Greek authors. It is only within the period of machine-made footwear, however, that they have attained to anything near

perfection. Due to their general similarity to¬

day, based upon the anatomy of the foot (q.v.), certain standards have been evolved giving

commercial sizes in length and width (or rather girth) of the foot. There are three general sys¬

tems of measurement — the English, used in the British dominions and by many manu¬

facturers of the United States ; the American, used only in the United States; and the French, used generally throughout Europe and metric

system-using countries. The measurements

comprise both length and girth of the foot — length from the heel, at the beginning of the tendon of Achilles, to the tip of the great toe, and girth, around the foot at the ball in a line at right angles to the direction of the second toe. For custom-made work measure¬

ments are taken around the foot' — from the instep — under the arch, to the point of the heel, and horizontally around the ankle. With machine-made footwear these latter, while con¬

sidered by the last-maker and manufacturer, are treated by the retailer and customer as a matter, of comfort or style. The French unit of length is the "Paris point,® equaling 2/$ of a centimeter, or approximately 4/15 of an inch, 15 "points,®

or sizes, being about 4 inches. The English and American measure is Rj inch, the former counted from the 4-inch mark of a standard rule, while the latter is counted from the 3-11/12 inch mark. At the annual meeting of the National Boot and Shoe Manufacturers' As¬

sociation held at New York on 15—16 Jan. 1918, it was recommended that the English system of numbering for length be used entirely ; that being generally known and having low numbers, had a more genteel sound, particularly for women's 260

shoes. Taking the English measure, the sizes run from 1 to 13, for children and youths, and, for adults, continue in a new series from size 1 on. A youth's size 13 is therefore 4 plus (13xV3) inches, or 8% inches long, while an adult's size 5 — in the second series — is 4 plus [(13 plus 5)x1A] inches, or 10 inches long.

Breadth (or girth) — known as "the last® — is indicated in the English system by numerals, the standard average being 3 ; the

American system, used in the United States, being that of letters, the standard average being C (the equiv¬

alent of the English (<3>)), the smaller widths being B, A, AA and AAA, and the larger D, E, EE and EEE (or W), the triple lasts being ex¬

tremes. The standard of difference between

each “last® letter and its next in order is *4

inch, for the same length of shoe; and between the same last letter of two shoes one size apart is ˆ4 inch, and for 54 size apart, 5 4 inch. From these gradations it is possible, a specified size and last being known, to figure out any other.

The standard model for men’s wear is size 7, last C; that of women, size 4, last B. Size 7

indicates a length of 1054 inches, and the girth of its C last is 854 inches; size 4 and its last B, are respectively 954 and 754 inches. From this, it will be noted that the <(last)) is almost exactly 8/10 of the length of the “size.® The rule for measuring is to measure the length of the foot, adding — for play of shoe — 1/12 inch for each inch or major fractional part thereof, the result being the length of the shoe, or ((size.)) This figure, multiplied by .8 (the ratio of the girth at the ball of the foot) gives the “last,® in inches. From these two figures, by the applica¬

tion of the rule for measurement by the English system, and by the rule for the determination of “last® differences, the size and “last® required may be found. Example : The length meas¬

urement of a given foot is 10 inches ; girth at ball, SVs inches. The length, 10, plus 10/12

inch, equals 10 10/12 inches — the “size® —which,, multiplied by .8 (the girth ratio for the C last) gives 8.66 inches, say 8ˆ4. Ten and ten-twelfths inches in length, English system, indi¬

cates a size of 754, the C, or standard last of which is 8ˆ4 inches. The actual girth measure¬

ment, 8)4 inches, being 54 inch less, a unit representing one “last® letter, is to be subtracted from “last® C, indicating “last® B — the width required for size 754.

The Industry. — As an industry, the manu¬

facture of footwear is important. Of the manu¬

factures of the United States considered in the tabulations of the statistics of 1914 — 344 in all — boot and shoe manufacturing, including cut stock and findings, ranked sixth in number of wage earners and ninth with regard to gross value of products. It is a distinctively Ameri¬

can industry, due to the pre-eminence of Ameri¬

can inventions, methods and machinery. So

evident is this fact, that imports of footwear since 1870 have been almost negligible. On the other hand, shoes made in the United States have found a market in every land, their ex¬

cellence being a standard of durability and style. New England, particularly Massachusetts, is (1914) the chief manufacturing centre of the United States, followed by New York, Missouri, Pennsylvania, Ohio, Wisconsin, Illinois. New

Jersey, Minnesota and Michigan. The follow¬

ing table gives the leading statistics of the in¬

dustry for 1899, 1909 and 1914, in the United States :

1899 1909

Number of estab¬

lishments … . 2,253 1,918

Capital . $110,363,000 $222,324,000

Cost of materials $191,456,000 $332,738,000

Value of prod¬

ucts . $290,047,000 $512,798,000 $590,028,000

Salaried employ¬

ees . 8,348 15,788

Salaries . $8,159,000 $18,629,000

Wage earners

(average num¬

ber) . 151,231 198,297

Wages . $61,924,000 $98,463,000

Proprietors

(number) …. (Not given) 1,838

1914

1,960

$297,609,000

$382 ,111,000

19,815

$25,473,000

206,088

$112,973,000

1,702

As to the number of pairs manufactured, the government statistics of the census of 1910 and the Shoe and Leather Reporter of 27 Sept. 1917, give the following figures :

Kind 1899 1909 1914

Boots and shoes

(total) . 195,589,173 247,643,197 252,516,603

Men’s . 67,742,839 93,888,892 98,031,144

Boys’ and youths’ 21,030,479 23,838,626 22,895,719

Women’s . 64,972,65 3 86,595,314 80,916,239

Misses and chil¬

dren . 41,843,202 43,320,365 48,322,395

Fiber . 2,351,106

Slippers (total) _ 17,092,841 17,507,838 17,733,689

Men’s, boys’ and

youths’… _ 4,446,965 4,802,841 3,666,972

\ A/ y-v /in * fl m ˆ

v v UiilCll illiOuCo

and children's. 12,645,876 12,704,993 14,066,717

Infants' shoes and

slippers (total) . (Not reported

separately) 15,000,721 15,476,763

All other . 5,283,405 4,865,429 6,939,413

Of the total number manufactured in 1909,

43.2 per cent were of the McKay type, 35.3 per cent machine or hand welted, 10.6 per cent turned, 8.8 per cent wire-screwed or metal-fastened, and 2.1 per cent wooden-pegged.

Since 1914 there is estimated to have been an increase of about 25 per cent in the produc¬

tion of footwear over that of 1914, with a slight increase in the number of manufacturing plants — principally in the Middle West. Due to abnormal conditions resulting from the war many changes have been made in the industry and others are under consideration - — chiefly with a view to uniformity and standardization.

In 1914 the domestic per capita consumption of men's shoes was 2.9 pairs, as against an esti¬

mated consumption of 2.6 pairs for 1918; wo¬

men's, 1914, 2.6 pairs, 1918 estimated, 4 pairs.

The increase in the latter has been ascribed in part to the short skirts that women are wearing, necessitating greater attention to shoe style.

The relative decrease indicated for men is more than overcome by the shoe requirements for the army, contracts for 21,000,000 pairs for the lat¬

ter being placed by the United States govern¬

ment during the year 1917. Of these, 8,000,000

pairs are marching shoes, 11,000,000 pairs field or trench shoes and 2,000,000 pairs naval or marine shoes. The contracts were apportioned to over 50 different shoe factories, located in different parts of the country, the price ranging from $4.33 to $5.84 — the average being about $4.90. All shoes must be of the Goodyear welt type, and conform to the “Munson® last, sup¬

plied to the makers by the government. In ad¬

dition, the contracts from foreign countries were large.

The exports of boots, shoes and slippers

amounted in 1906 to 5,672,249 pairs, valued at BOOTT — BOPP

$9,142,748; 1912, 9,040,343 pairs, valued at $16,-

009,002 ; and 1916, 20,557,785 pairs valued at $47,454,846 — the separate classes in 1916 being as follows :

Exports of boots, shoes and

slippers, 1916 Pairs Value

Children’s . 2,722,209 $2,224,791

Men’s . 12,800,183 36,959,966

Women’s . 4,836,080 8,040,053

Slippers . 199,313 230,037

Bibliography.— (Crispin Anecdotes) (Lon¬

don) ; Dooley, William H., ‘A Manual of Shoe¬

making and Leather and Rubber Products)

(Boston) ; Hall, J., (Book of the Feet: A His¬

tory of Boots and Shoes) (London) ; Hall, E.

P., (Peerage of Poverty) (London) ; (Lives of Distinguished Shoemakers) (Portland) ; Pluck-nett, J., ‘Introduction to the Theory and Prac¬

tice of Boot and Shoe Manufacture5 (Lon¬

don). Consult also the files of the trade jour¬

nals, Shoe and Leather Reporter (Boston) and Superintendent and Foreman (Boston) ; Speci¬

fication No. 1269> of the War Department

(Washington, 10 Sept. 1917) ; Statistical Ab¬

stract of the United States (Washington, an¬

nually) ; (Abstract of the 13th Census of the United States5 (Washington 1914) ; various

reports on the export boot and shoe trade, issued by the Bureau of Foreign and Domestic Com¬

merce (Washington) ; also booklets issued by the United Shoe

Machinery Company of Boston and like concerns; (Goodyear Welt Shoes —How they are Made,5 and general works on the history of costume, painting, sculpture of vari¬

ous periods. For military footwear consult

(The Footwear of Soldiers5 (Boston) ; and for “Munson55 last consult (The Soldier’s Foot and the Army Shoe5 (Washington 1908). For de¬

scription of special machinery used prior to 1880

consult Knight, (Mechanical Dictionary5 and

‘Supplements5 (Boston).

W. B. Graham.

BOOTT, Francis, American musician and

composer: b. Boston, Mass., 1813; d. 1904. He issued his first compositions under the name of Telford. His works comprise a mass for

voices and instruments, a Miserere, Te Deum, Maria Mater and numerous songs including

‘The Sands of Dee,5 a setting of Kingsley’s poem. He was an honorary professor of the

Academy of Fine Arts and bequeathed to Har¬

vard University $10,000 as a prize fund for compositions by native composers.

BOPP, Franz, German philologist: b.

Mainz, Germany, 14 Sept. 1791 ; d. Berlin, 23

Oct. 1867. He has been called “the founder of comparative philology,55 and it seems wholly true, as was said at the time of his death, that, but for him, the science of language might not have

elevated itself so soon or so indisputably to a height deserving the title of science. A distinguished English scholar who had studied under Bopp showed in the following tribute

how deeply the merit of his old instructor was appreciated : “Bopp must, more or less, directly or indirectly, be the teacher of all who at the present day study, not this language or that language, but language itself — study it either as a universal function of man, subjected, like his other mental or physical functions, to law and order, or else as an historical development, worked out by a never ceasing course of edu¬

cation from one form into another.55 (Consult Martineau, R., ‘Obituary of Franz Bopp,5 in Transactions of the Philological Society, Lon¬

don 1867, pp. 305-14). He received the higher portions of his education at Aschafifenburg, de¬

voting himself specially to the study of the lan¬

guages of the East because correct reasoning made it clear that, if anything was to be dis¬

covered respecting the relations of languages and races, investigation of the oldest accessible forms of speech offered the best prospect of success. At Aschaffenburg his instructor was Windischmann, but to study Sanskrit Bopp

went to Paris in 1812. There he spent five years of laborious study, almost living in the libraries of Paris and unmoved by the tur¬

moils that agitated all the world around him, comprising Napoleon’s escape, the Waterloo

campaign and the Restoration. Antoine Leon¬

ard de Chezy was his chief instructor then.

I n 1816 he had made sufficient ‘progress to pub¬

lish a treatise ‘On the System of Conjugation in Sanskrit, compared with the Greek, Latin, Persian and German Languages,5 which is par¬

ticularly interesting because it shows the early adoption of the essential principles that were fully worked out much later in his

famous

‘Comparative Grammar.5 For some time in

1817 he resided in London and used the li¬

braries there; in 1818 he went to Gottingen and continued his studies in the library of its university; and he received, in 1821, his ap¬

pointment as professor of Oriental literature and general philology at the University of Ber¬

lin. He held this post till death. Estimating, and with intimate acquaintance appreciating, his former teacher’s achievements, Russell Mar¬

tineau wrote : “Bopp’s Sanskrit studies and

Sanskrit publications are the solid foundations upon which his system of comparative gram¬

mar was erected, and without which that could not have been perfect. For that purpose, far more than a mere dictionary knowledge of

Sanskrit was required. The resemblances

which he detected between Sanskrit and the

Western cognate tongues existed in the syntax, the combination of words in the sentence and the various devices which only actual reading of the literature could disclose, far more than in the mere vocabulary. As a comparative

grammarian he was much more than as a

Sanskrit scholar,55 and yet “it is surely much that he made the grammar, formerly a maze

of Indian subtilty, as simple and attractive as that of Greek or Latin, introduced the study of the easier works of Sanskrit literature and trained (personally or by his books) pupils who could advance far higher, invade even the most intricate parts of the literature and make the Vedas intelligible. The great truth which his ‘Comparative Grammar5 established was

that of the mutual relations of the connected languages. Affinities had before him been ob¬

served between Latin and German, between

German and Slavonic, etc., yet all attempts to prove one the parent of the other had been found preposterous.55 Fortunately we have

Bopp's own opinion on this subject, expressed in his own words ; for in an English essay he declared his views as follows : "I do not believe the Greek, Latin and other European languages are to be considered as derived from the Sanskrit in the state in which we find it in Indian books; I feel rather inclined to consider them altogether (obviously meaning all to¬

gether) as subsequent variations of one orig-262

inal tongue, which, however, the Sanskrit has preserved more perfect than its kindred dia¬

lects.® Appended to the cited paper in the <Transactions) is a list of the writings of Pro¬

fessor Bopp, the titles grouped as 21 main items with 11 entries of later editions or trans¬

lations. We mention a few representative

works: Bopp, F., (Ausfiihrliches Lehrgebaude der Sanskrit-Sprache) (Berlin 1827) ; Com¬

parative Grammar of the Sanskrit, Zend, Greek, Latin, Lithuanian, Gothic, German and Slavonic Languages,) translated by E. B. Eastwick (2d ed., London 1856) ; (Uber das Conjugation-system in Vergleichungˆ *etc.* (Frankfurt-a-M.

1816) ; (t)ber die Verwandtschaft der Malay-isch-Polynesischen Sprachen mit den Indisch—

EuropaischerP (Berlin 1841) ; (Vergleichendes Accentuations-system des Sanskriti und Griech-ischen) (Berlin 1854) ; and (Vergleichende

Zergliederung des Sanskrits und der mit ihm verwandten Sprachen > (Berlin 1824). On the

50th anniversary of the publication of his first work, his colleagues and scholars founded the Bopp Foundation in Berlin (1866) to promote the study of comparative philology.

BORA, Katharina von, wife of Luther:

b. Klein-Laussig, near Bitterfeldt, Saxony, 29

Jan. 1499; d. 20 Dec. 1552. She took the veil very early in the nunnery of Nimptschen, near Grimma ; but becoming imbued with Reforma¬

tion doctrines, and feeling very unhappy in her situation, she applied, with eight other nuns, to Luther, whose fame had reached them.

Luther gained over a citizen of Torgau, by the name of Leonard Koppe, who, in union

with some other citizens, undertook to deliver the nine nuns from their convent. This was done the night after Good Friday, 4 April 1523.

Luther brought them to Torgau and from

thence to Wittenberg. At the same time, to anticipate the charges of his enemies, he pub¬

lished a letter to Koppe, in which he frankly confessed that he was the author of this en¬

terprise and had persuaded Koppe to its exe¬

cution ; and he also exhorted the parents and relations of the virgins to admit them again into their houses, who, however, declined to receive them. Some of them were received by citizens of Wittenberg; others who were not yet too old Luther advised to marry. Among the latter was Katharina, whom Philip Reichenbach, at that time mayor of the city, had taken into his house. Luther proposed to her several of his friends. She declined these

proposals, but declared her willingness to be¬

stow her hand on Nicholas von Amsdorf, or

on Luther himself. Luther, who in 1524 had laid aside the cowl, was

not averse to matri-mony, yet appears to have been led to the resolution of marrying by reason rather than by passion. His marriage (13 June 1525) gave rise to many disadvantageous rumors, some of them as shameful as they were unfounded.

Three sons and three daughters were born of the union. After Luther's death Katharina

removed from Wittenberg to Leipzig, where

she was compelled to take boarders for her support. She afterward returned to Witten¬

berg and finally removed to Torgau, where she died. In the church of Torgau her tombstone is still to be seen, on which is a life-size image of her. Consult <Lives> bv Hofmann (1845) ; Kroken (1900); Stein (1879); and Thoma

(1900).

BORACIC (-ras'-) ACID, or BORIC

ACID (from (<borax®), a compound of boron

with oxygen and hydrogen, having the formula HsBOa, and possessing feebly acid properties.

It occurs free in nature in an impure state in the crater of Vulcano, one of the Lipari

islands, and in the crater of Stromboli. It is also found plentifully in Tuscany, where it issues from fissures in the soil, together with sulphurous exhalations, ammonia and other

substances. On account of its having been ob¬

tained at Sasso, the acid is called by mineral¬

ogists Sassolite. In the United States the

fumes of boracic acid are found in emanations from fissures in Nevada and California. They are also found in Nova Scotia. In South

America at many localities along the western coasts boracic acid occurs in immense quanti¬

ties as boronatrocalcite, particularly in the great lagoons covering 2,000,000 acres near Ma-ricunga. Concentrates of this deposit are be¬

ing regularly shipped to England. The prin¬

cipal supply of boracic acid is obtained from Tuscany, the exhalations above referred to be¬

ing passed through water which absorbs the

acid. The preparation of boracic acid from

these aqueous solutions is an interesting proc¬

ess on account of the natural obstacles which have to be surmounted. The apparently sim¬

ple operation of concentrating the solution, so as to obtain the acid by crystallization, in real¬

ity involves great practical difficulties, because in Tuscany the fuel supply is limited. This drawback has been overcome by utilizing the volcanic heat of the district to concentrate the solution. Around the cracks in the soil (called <(fumaroles® or <(soffioni®), from which the steam containing the acid issues, and enclosing the small lakes or lagoons in which it con¬

denses, brick tanks are built on different levels, but communicating with each other. These

are supplied with cold water, in which the steam is further condensed. When the water

in the tanks is sufficiently saturated, it is run off into a deep vessel, where it is allowed to stand until the black mud mechanically sus¬

pended in it falls to the bottom, and then the clear fluid is run into a series of shallow evaporating pans of lead. These pans are

heated by steam from the soffioni, the steam being made to pass under them by a system of flues. As the evaporation proceeds the

fluid becomes richer in boracic acid, and when it attains a certain specific gravity, it is passed into a deep vat, where it is allowed to cool.

Boracic acid then crystallizes out. The first crop of crystals is quite

impure, but it is im¬

proved by re-crystallization, and the second crop as thus obtained is packed in casks and exported. Commercial boracic acid sometimes

contains as much as 25 per cent of foreign matter, consisting largely of clay, salts of cal¬

cium and magnesium, and sulphates and other salts of the alkalis. About 2,000 tons of crude boracic acid are exported from Tuscany per

annum. The South American product, con¬

taining 55 to 60 per cent of pure boracic acid, has become a serious competitor of the Italian product in the markets of Europe. In the

American market California's large production of colemanite (calcium borate) is an import¬

ant factor. Persia has also recently become a source of boracic acid of excellent quality.

Boracic acid is also prepared artificially fly BORACITE — BORAX

decomposing a hot solution of borax with

sulphuric acid. The proportions are three

parts of borax in 12 parts of hot water, and one part of sulphuric acid. The boracic acid separates out upon cooling. Boracic acid is a white, lustrous substance, of soapy feel, slightly soluble in cold water and considerably more soluble in hot water. It possesses strong anti¬

septic properties, and is used as a preservative for meat. It is also used for glazing porce¬

lain, and in the manufacture of certain kinds of glass. Boracic acid forms salts called

"borates® with various metallic bases, of which borax is the most important. See Boron.

In medicine, boracic acid is used very widely.

It is a mild antiseptic, and its solutions are use¬

ful for cleansing the eyes, nose, mouth, bladder, *etc.* It forms with aromatic oils the basis of most mouth washes and nasal sprays. Boracic acid is also very useful in the nursery for keeping rubber nipples free from bacteria, and it is of great service in washing out nursing-bottles, babies' mouths and eyes, and the

mother's nipples while nursing. Large doses, however, may prove poisonous.

BORACITE (from "borax®), a mineral,

tetrahedral and isometric in external form, but orthorhombic in molecular structure, and be¬

coming isotropic only when heated to 510° F.

It closely resembles a fine-grained white marble.

It has the composition 6Mg0.MgCl2.8B203, and a little iron is also occasionally present, prob¬

ably as an impurity. It occurs in beds of an¬

hydrite, gypsum and salt, notably at Stassfurt, Prussia, also in crystals at Luneberg, Hanover and Westeregeln, Saxony. The most exten¬

sive commercial workings of boracite are in Asia Minor, near the Tschataldga Mountains.

The deposit occurs in a basin of the Tertiary Age. The colemanite of California is a variety of boracite. The mineral has been prepared

artificially by melting together 10 parts of boracic acid, 100 of sodium chloride and 5 of magnesium borate. Boracite is strongly pyro¬

electric. Its molecular structure has been the subject of much study, on account of its ex¬

hibiting double refraction, although the mineral is apparently

isometric in crystalline form.

BORAGE, bur'azh (Borago), a small

genus of plants, typical of the family Boraginacece, the species of which are most numerous in the Mediterranean region. Common borage

(Borago officinalis) , a coarse growing annual herb, is about two feet tall with erect stem, rough hairy leaves, and blue flowers arranged in racemes. Like many other innocuous plants, borage was highly valued medicinally, but is now not so employed. It is occasionally raised in Europe as a pot herb or salad plant, its young leaves being palatable. The flowers are still used to make the beverage known as cool tankard, a mixture of wine, lemon, sugar and water. The plant's chief use, however, is as bee pasturage, its flowers being rich in nectar.

BORAH, bo'ra, William Edgar, American

legislator: b. Fairfield, Ill., 29 June 1865. He studied at Southern Illinois Academy and the University of Kansas, and in 1889 began prac¬

tice as lawyer at Lyons, Kan., two years later removing to Boise, Idaho. He was elected to the United States Senate for the term of 1907-13, and was a member of the Republican

National Committee 1908-12. He was re¬

elected United States senator for the term

1913-19. A forcible speaker, he has been

prominent in opposition to the growth of im¬

perialism, in the discussion of the income tax and other questions of national importance.

BORAS, boo-ros', or ras', Sweden, town in

the province of Elfsborg, 36 miles east of Gothenburg. It was founded by Gustavus

Adolphus in 1632. There are some cotton and linen manufactures, and also some dye works.

Pop. 21,997.

BORASSUS, a genus of palms, containing

a single species (B. flabellifer) which is widely distributed in tropical Asia and Africa. The Borassus or Palmyra palm is one of the most important members of the palm family since

it is of remarkably wide distribution, usually forming the most conspicuous feature of the vegetation of the regions in which it grows, and since it is of great economic importance.

A poem in the Tamil language is said to

enumerate 801 of its uses without exhausting the subject. The wood is useful and the

leaves are employed for endless purposes ; from the flower clusters palm wine is made, and the fruits and young seedlings are used as food.

From the sap palm sugar is obtained, which is exported in large quantities to Europe.

BORAX, a compound of the metal sodium

with boracic acid (q.v.). The formula of

boracic acid may be written HB02 + H20 ; and if the hydrogen of the HB02 is replaced by sodium, a compound known as sodium borate

is formed, which crystallizes as NaB02 + 4H20.

Fused borax is this salt deprived of its water of crystallization, and combined with boron

trioxide in the form 2NaB02+B203, or

NaoBXb. Common borax, when crystallizing

from aqueous solution, however, contains 10

molecules of water. Other forms of borax

are easily obtained, crystallizing with different quantities of water. Borax occurs native, both as a saline efflorescence on the soil, and as monoclinic crystals. Until recent times the

principal borax supply of the world was ob¬

tained from the salt lakes of Tibet. It was brought to Europe in the crude state, under the name of tincal. Enormous quantities of

borax are now obtained from California and

Nevada. Borax Lake, some 80 miles north

of San Francisco, was discovered in 1856. It contains borax in solution, and crystals of the mineral also occur in the surrounding mud and marshes. The crystals are occasionally quite large, weighing as much as a pound each. It is also found in large quantities at Borax Lake in San Bernardino County, Cal., and it occurs abundantly as an efflorescence in Death Valley, Inyo County, Cal. Borax bearing clavs are

found in the beds of many extinct lakes of arid Western United States. They are believed to be residues from the evaporation of borax lakes. At other points borax is believed to be precipitated from hot gaseous volcanic emana¬

tions. The chief refining plants for borax are at Alameda and Searles, Cal., and in New

Jersey. The crude material is dissolved in

water and heated in conjunction with sodium carbonate. This solution is next placed in cool¬

ing tanks in which are suspended steel rods, on which the borax forms. For added degrees of purity successive crystallizations are em¬

ployed until the desired degree is reached.

Different methods of refining are employed in various countries depending on the form of

the crude material. Borax is extensively used in the household, and it is used also as an antiseptic and preservative. Like boracic acid, it is employed in glazing porcelain and in mak¬

ing enamels. Its property of dissolving metallic oxides makes it of great value in blowpipe analysis (q.v.) and as a flux in the soldering of metals. In the United States commercial

borax is chiefly derived from the colemanite deposits of California. About 55,000 tons

valued at $1,600,000 are produced annually in California. Chile is the second largest pro¬

ducer of borax, the ore being a sodium cal¬

cium borate.

Borax is of toxicological interest because it is widely used as an antiseptic, a preservative for meats and other foodstuffs, and also as an abortifacient. In large doses there is marked gastro-enteritis, in addition to which there are symptoms of collapse, coldness of the skin, bad pulse, psychical depression and diminution in the quantity of urine eliminated. Similar symp¬

toms may occur from the use of borax in

washing out large abscess cavities. Singultus and general motor paralysis are the symptoms in fatal cases. Borax certainly has a toxic action on the kidneys when taken in large

amounts. There is albumen in the urine, casts, pain in urination, and even bloody urine. While the kidneys are markedly affected by large

doses it is questionable whether borax, in the small amounts used in food preservation,

causes any grave symptoms of kidney irritation, even when taken for a considerable length of time. It may well be that certain individuals have an idiosyncrasy to boron salts, in which case their use would prove detrimental. Con¬

sult (Mineral Resources of the United States) (Washington, annually) and (Annual Bulletin

No. 24, California State Mining Bureau. > See Borgan; Mineral Productions of the United

States.

BORCHGREVINK, borH-gre-vink, Car—

sten Egeberg, Norwegian explorer and lec¬

turer : b. Christiania 1864, his mother being Eng¬

lish and his father a Scandinavian. He went to sea at an early age but returned to go to college. In 1888 he went to Australia, joined the survey department and scaled Mount Lind¬

say, and was for a time instructor in languages at Cooerwell College, New South Wales. In

1894-95 he was in Antarctic waters, a region more fully explored by him in 1897, when he attempted to reach the South Pole without suc¬

cess. In 1899 (17 February) he had, however, reached Robertson Bay. Returning to London

in 1900, he reported having reached lat. 78.50

S., long. 165.50 E., the farthest point south ever reached by man. Antarctic fauna and flora

were studied on the expedition and the south magnetic pole reported to be in lat. 73° 20’ S.

and long. 146° E. Consult his work, (First on the Antarctic Continent. y

BORDA, Jean Charles, French engineer

and afterward a captain in the French marine, famous for his mathematical talents : b. Dax, department of Landes, 4 May 1733; d. 20 Feb.

1799. In 1756 he was chosen a member of the Academy of Sciences and occupied himself in making experiments on the resistance of fluids, the velocity of motion and other topics relating to dynamical science. In 1767 he published a dissertation on hydraulic wheels and afterward one on the construction of hydraulic machinery.

In 1771, with Verdun de la Crenne and Pingre, he made a voyage to America to determine the longitude and latitude of several coasts, isles and shoals, and to try the utility of several as¬

tronomical instruments. In 1774 he visited the Azores, the Cape Verde Islands and the coast of Africa for the same purpose. In the Ameri¬

can war he was very useful to the Count

d'Estaing by his knowledge of navigation.

Borda was the founder of the schools of naval architecture in France. He invented an instru¬

ment, of a very small diameter, which measures angles with the greatest accuracy and which has been used in measuring the meridian ; the re¬

flecting circle, which has made his name im¬

mortal, besides an instrument for measuring

the inclination of the compass-needle, and many others. On the establishment of the National Institute he became one of its members and was occupied with other men of science in fram¬

ing the new system of weights and measures adopted in France under the republican govern¬

ment. Among the latest of his labors was a series of experiments to discover the length of a pendulum which should vibrate seconds in the latitude of Paris. His principal writings are (His Voyage) and (Tables Trigonometriques

BORDEAUX, bor'do', France, capital of

the department of Gironde, is situated on the left bank of the Garonne, about 70 miles from the sea and 284 southwest of Paris. It is built in a crescent form round a bend of the river, which is lined with fine quays for more than three miles and is crossed by a magnificent stone bridge of 17 arches, finished in 1821 at a cost of $1,200,000. There is another bridge, a fine iron structure, for the railway from Paris. Bordeaux consists of an old and a new town, the boundary between them being formed by a wide and handsome street which, com¬

mencing at the quay near the centre of the crescent, stretches across the city from east to west. The objects chiefly deserving of notice in the old town are the arch called the Porte de Bourgogne at the extremity of the bridge, forming the principal entrance to the town ; the cathedral, a fine Gothic edifice built at different periods ; Saint Michael's Church, with a lofty detached tower and a superb front of florid Gothic ; the church of Saint Croix, a specimen of gorgeous Romanesque ; the bourse or ex¬

change ; the custom-house ; the Hotel de Ville, once the residence of the archbishops of Bor¬

deaux, and the Palais de Justice. The new

town is not so rich in public buildings. The most conspicuous are the library (200,000 vol¬

umes and 1,563 manuscripts, including one of Montaigne's <Fssays)), the museum and the the¬

atre, a Grecian structure, regarded as the hand¬

somest edifice in Bordeaux. Among the benefi¬

cent establishments the first place is due to the grand hospital or infirmary, which occupies the highest site in the town and is admirably arranged. Few cities are so well supplied with extensive and finely-planted promenades. Bor¬

deaux is the seat of a court of appeal, of courts of the first instance and of commerce, and has an academy of science, literature and art; a

a lyccum ; a normal school for female teachers; a school of hydrography and navigation; a

school of painting and design ; a botanic gar¬

den, an observatory, various literary and scien¬

tific associations and a branch of the Bank of France. There are consuls resident here from all the states of Europe and America. The

position of Bordeaux gives it admirable facil¬

ities for trade and enables it to rank next after Marseilles and Havre in respect of the tonnage employed. Large vessels can sail up to the town, which by railway, river and canal com¬

municates with the Mediterranean, with Spain and with the manufacturing centres of France.

The chief exports are wine and brandy ; drugs, dyes, bottles and fruits are also largely ex¬

ported. Sugar and other colonial produce and wood are the chief imports. Shipbuilding is the chief branch of industry and there are also sugar refineries, woolen and cotton mills, pot¬

teries, soap works, distilleries, cooperages and rope factories. The famed Bordeaux wines

have a world-wide reputation and are exported in immense quantities. The best known are

Chateau-Lafitte, Chateau-Latour, Haut-Brion,

Barsac, Graves, Sauterne and Langon.

Bordeaux is the Burdigala of the Romans.

In the 5th century it was in possession of the Goths, and it was pillaged and burned by the Normans. By the marriage of Eleonor, daugh¬

ter of the last Duke of Aquitaine, to Louis VII, it fell into the hands of France. But in 1152

the Princess was repudiated by her husband and married to Henry of Anjou, who ascended the throne of England in 1154, as Henry II, and transferred Bordeaux to that crown. After the battle of Poitiers, Edward the Black Prince, carried John, King of France, prisoner to Bor¬

deaux, where he resided 11 years. Under

Charles VII, in 1451, it was restored again to France. In 1548 the citizens rebelled on account of a tax on salt, and the governor, De Morems, was put to death, for which the Constable of Montmorency inflicted a severe punishment on the city. During the Revolution it was devas¬

tated, as the rendezvous of the Girondists, by the Terrorists, almost as completely as Lyons and Marseilles. The oppressiveness of the con¬

tinental system to the trade of Bordeaux made the inhabitants disaffected to the government of Napoleon, so that they were the first to declare for the house of Bourbon, 12 March 1814. In 1870 Bordeaux was the seat of the government of National Defense and in the following year the National Assembly met there for the first time. It is the birthplace of Rosa Bonheur.

The Roman poet, Ausonius, was a native of

Bordeaux. Montaigne and Montesquieu were

born in the neighboring country, and the latter lies buried there in the church of Saint Ber¬

nard. Pop. about 265,000.

BORDEAUX, University of, French uni¬

versity, founded in 1441 at a time when Bor¬

deaux was in English hands. Convent and

cathedral schools and a school of medicine

were combined to form a university. Louis

XI confirmed its autonomous privileges, which it held until the reign of Francis I, who had it placed under state control. Faculties of science and letters were added in 1808 during the Napoleonic educational reforms. In 1870

a faculty of law and in 1878 a faculty of medi¬

cine and pharmacy were added. Its annual

budget totals 300,000 francs; its student enrol¬

ment is about 2,500, of whom about 800 are in medicine and an equal number in law. The library contains about 10,000 volumes. The

Marine Zoological Laboratory of Archachon is connected with the university.

BORDEAUX MIXTURE. See Fungi¬

cides.

BORDEAUX WINES. The finer red

wines of the country around Bordeaux are the best which France produces. They contain but little alcohol, keep well and even improve by removal. As the original fermentation is com¬

plete, they are, if judiciously managed, less sub¬

ject to disorder and acidity than the Burgundy wines. None of the very best quality, however, is exported pure ; a bottle of the best Chateau-Margaux or Haut-Brion is a rarity hardly to be procured in Bordeaux itself at the rate of six or seven francs a bottle. For export, the secondary growths of Medoc are mingled with the rough Palus. The red wines of Bordeaux are known in America under the name of

claret. They have less aroma and spirit but more astringency than the Burgundy wines.

They are the safest wines for daily use, as they are among the most perfect of the light wines and do not easily cause intoxication. In this respect they contrast with the Burgundy wines, which have more generous qualities than those of Bordeaux, although these wines have some¬

times been accused of producing the gout, but this disparagement is without reason. Persons who habitually drink madeira, port, etc., and indulge in an excess of claret may indeed be visited in that way, because a transition from the strong, brandied wines to the lighter is al¬

ways followed by a derangement of the digest¬

ive organs.

The principal vineyards are those of Medoc, Graves, Palus and Vignes Blanches; after these, those of Entre-deux-Mers, Saint Emilion and

the Bourgeais are the most important. The

first growth of Medoc are the famous wines of Chateau-Margaux, Lafitte and Latour. The.

Lafitte is characterized by its silky softness on the palate and a perfume partaking of violet and raspberry. The Latour is fuller, has more aroma but less softness. The Chateau-Mar¬

gaux is lighter than the Latour and delicate like the Lafitte, but has not so high a flavor. Of the second growth we may mention the Rauran and the Leoville. The soil of Medoc is a

sandy and calcareous loam. The gravelly lands (les Graves) to the south and west of Bor¬

deaux produce the Graves. The first growth of the red Graves is the Haut-Brion, which rivals the first growth of Medoc ; it has more color and body but is inferior in aroma and taste.

The principal white Graves are Saint Bris and Carbonieux. The best Medoc ought to be kept three or four years before removal, the Graves

five or six. The wines of Palus, which is a bed of rich alluvial deposits, are inferior to the preceding; they are stronger and more deeply colored than those of Medoc. Being hard and rough, they are improved by a voyage and are principally sent to the East Indies and America as vins de cargaison, or are mixed with Medoc which is intended for exportation. By the voy¬

age they become more light and delicate but are not to be compared with the growths of. Medoc and the Graves. The best are Quevries and

Mont Ferrand. The former are deeply colored 266

and have much body. Age gives them an agree¬

able aroma, resembling that of a raspberry.

Among the white Bordeaux wines, besides

those already mentioned, the finest growths are Sauternes, Preignac, Barsac and Bommes. Mar-tillac and Saint Medard are of a good quality and have lightness and body. Dariste, formerly Dulamon, is equal to Saint Bris and Carbonieux.

Among other red wines are the Bourgeais,

which are of a fine color and acquire by age lightness and an agreeable almond aroma ; of all the Bordelais wines they most resemble the Burgundy wines. The first growths are De¬

bosquet, Chateau-Rousset, Tajac and Falfax.

The Bourgeais wines were formerly preferred

to Medoc. The wines of Saint Emilion have

been much esteemed. The Fronsac and Canon

are the best. Those of Entre-deux-Mers be¬

come agreeable with age. The vins des Cotes are good vins ordinaires ; they are generally fermes and hard, and improve by age. The

best are those of Bassens and Cenon. Consult Henderson's (History of Ancient and Modern

Wines. }

BORDELUMIANS, a religious sect which

had its origin at Bordelum (Sleswick) in 1739

under the leadership of David Baehr. The

original score of persons composing the sect claimed to be Paints® who had received special gifts from God. They looked with contempt

upon the sacrament and declared that the

churches were the houses of the devil. They rejected marriage in favor of free-love and held property in common. By an edict of

Christian VI (11 June 1739) the leaders were condemned to imprisonment, but they escaped

by flight. Baehr fled to Jena, but, being driven out of there, he went to Holstein and was finally imprisoned at Gluck. He died a cripple from his prison treatment in 1743.

BORDEN, Sir Frederick, Canadian Min¬

ister of Militia: b. Nova Scotia 1847; d. To¬

ronto, 5 Jan. 1917. A medical man by profes¬

sion, he took his degree at Harvard and became assistant surgeon in a militia battalion. In 1874 he entered the Dominion Parliament, rep¬

resenting King's County, N. S., till 1911. Ap¬

pointed Minister of Militia in the Laurier

cabinet in 1896, he held that office till 1911.

Under his administration the expenditure for land defense increased five-fold, and the naval program had his zealous support. He was a

member of the Imperial Council of Defense

and assisted every movement toward coopera¬

tion between the Imperial and Canadian forces.

In 1901 he was appointed honorary colonel of the Canadian Army Medical Corps. •

BORDEN, Gail, American inventor : b.

Norwich, N. Y., 6 Nov. 1801 ; d. Bordon, Tex., 11 J an. 1874. His parents were of New Eng¬

land descent and in 1814 they emigrated from New York, settling in Covington, Ky., and later in Madison, then in the Territory of Indiana.

In 1822, finding his health impaired, he removed to Mississippi, where he taught and also filled the positions of county surveyor and United States deputy surveyor. In 1829 he went to Texas. He was elected delegate to the con¬

vention that, in 1833, petitioned the Mexican government for separation, and he was also in charge of the official surveys of the colony, compiling the first topographical map of Texas.

The land office at San Felipe was under his charge up to the time of the Mexican invasion.

In 1835, with his brother, Thomas H., he estab¬

lished the Telegraph and Texas Land Register at San Felipe, which was afterward transferred to Houston, and was the first and only news¬

paper published in Texas during the war for the independence of that colony. After the

establishment of the republic of Texas he was appointed by President Houston first collector of the port of Galveston. That city in 1837

had not been laid out and its first surveys were made by him. From 1839 to 1857 he was agent of the Galveston City Company, a

corporation owning several thousand acres of land on which the city is now built. About 1849 his atten¬

tion was drawn to the need of more suitable supplies for emigrants crossing the plains, and after some experimenting he produced the

pemmican® which Dr. Kane carried with

him on his Arctic expedition. The (<meat bis¬

cuit,® the most simple, economical and efficient form of portable concentrated food, was in¬

vented by him. This gained for him a medal at the London World's Fair of 1851 and he was elected an honorary member of the London

Society of Arts. Meeting with opposition from the army contractors, he was unsuccessful in the manufacture of his biscuit and lost his en¬

tire means. He then removed to the North and turned his attention to the preservation of milk, and in 1853 applied for a patent for produc¬

ing concentrated sweet milk by evaporation

in vacuo, the same having no sugar or other foreign matter mixed with it,® but failed of securing it until 1856. Later, the New York Condensed Milk Company was formed and

works were established at Brewster's Station, N. Y., and at Elgin, Ill. During the Civil War his condensed milk was extensively used in

the army and navy. Condensed meat juices

were then experimented upon and he produced an extract of beef of superior quality, which at first he made in Elgin but later at Borden, Tex. Later he produced excellent prepara¬

tions of condensed coffee, cocoa and tea, and in 1862 patented a process by means of which fruit-juices, such as apples, currants and grapes, could be reduced to one-seventh of their orig¬

inal bulk. Borden amassed a great fortune

from his patents.

BORDEN, Robert Laird, Canadian states¬

man : b. Grand Pre, Nova Scotia, 26 June 1854, the son of Robert Borden, schoolmaster and

farmer, and Eunice Laird Borden. He is de¬

scended from Samuel Borden, surveyor, who

came to Falmouth from the American colonies in 1760. He was educated at Acacia Villa

Academy, Horton, and afterward taught school in his native province and at Glenwood Insti¬

tute, New Jersey. In 1874 he returned to Nova Scotia and began the study of law and was called to the bar in 1878. He soon acquired a large practice in the courts of Nova Scotia and the Supreme Court of Canada, and was

engaged in several cases before the Judicial Committee of the Privy Council. He became

a Q.C. in 1890. He was president of the Nova Scotia Barristers' Society, 1893-1904. At first identified with the Liberal party, he seceded in 1891 on the question of reciprocity with the United States. He was elected to the Dominion House of Commons for Halifax in 1896. but

was defeated in 1904. He was elected for

Carleton in 1905 and in 1908 was returned for both Carleton and Halifax but elected to sit for Halifax. In 1901, on the retirement of Sir Charles Tupper from the leadership of the

Liberal-Conservative party he was elected to the vacant position. His policy, enunciated in the Halifax platform of 1907, embraced pro¬

vincial autonomy, civil-service reform, placing of the government railways under an independ¬

ent commission, nationalization of telegraphs and telephones and preferential trade within the empire. An innovation was introduced in

Canadian public life by the Laurier adminis¬

tration in 1905, when an additional sessional indemnity of $7,000 was voted to the official leader of the opposition in the Dominion Par¬

liament. Mr. Borden, on the Laurier Naval

Service Bill of 1910, advocated the contribu¬

tion to the imperial authorities of an amount sufficient to purchase two dreadnoughts. He

offered strenuous opposition to the Taft-Fielding reciprocity agreement, and in the general election of 1911 on that issue he was returned to power, and entered office as Prime Minister 10 Oct. 1911. The Liberal-Conservatives had

also in that election received the support of the Nationalists of Quebec, who resented what they regarded as Laurier's imperialistic naval policy. In 1912 Mr. Borden became a member of the Imperial Privy Council. His Naval

Service Bill of 1912, which provided for the contribution to the imperial navy of three bat¬

tleships of the largest class, at a cost of $35,-

000,000, passed the House of Commons but was rejected in the Senate.

The outbreak of the European War in Au¬

gust 1914 was followed by the calling of an emergency session of the Canadian Parliament, when, with the loyal cooperation of Sir Wil¬

frid Laurier and the opposition, men and

money were pledged to aid Great Britain in the struggle with the Central Powers. Within three months of the declaration of war a force

of 33,000 men was sent overseas; and up to Tune 1917, 430,000 men were raised bv volun¬

tary enlistment. During the continuance of

his* first ministry the Avar held the predominant place in public affairs. In addition to the mag¬

nificent contribution in men, large loans were raised and a great new munitions industry es¬

tablished. There was, however, strong criticism of administration in several departments, and notably in the Militia Department.

Sir Robert Borden — he was created G.C.

M.G. in June 1914 — visited England and the western front in the summer of 1915 and re¬

ceived, among other honors, the freedom of the city of London and the Grand Cross of the Legion of Honor. The creation of an Over¬

seas Minister of Militia in the following year led to some sharp correspondence with Sir

Sam Hughes, the Minister of Militia, and a demand (9 November) for that Minister's res¬

ignation. The urgency of the war situation

led to an extension of the life of the Parlia¬

ment for one year, to October 1917. In the spring of 1917 an adjournment of Parliament was made to permit the Prime Minister to go to England to confer with the British authori¬

ties and with other representatives of the self-governing dominions. On his return he inti¬

mated the government's intention of passing

through Parliament a conscription act to pro¬

vide adequate reinforcements for the Canadian armies overseas. Negotiations were, in the

beginning of June, opened with Sir Wilfrid

Laurier, the Liberal leader, with the view to the formation of a union government by the fusion for war purposes of the two great par¬

ties. Those proposals were declined by Sir

Wilfrid, partly on the ground that the policy of the proposed government was announced

prior to the extension of the invitation to him to join it, and he himself was in favor of a referendum before so drastic a measure was

carried through. For the time being the effort at fusion failed, but the Military Service Bill, together with a Canadian Northern Railway

purchase bill, passed through Parliament. A

second attempt to form a union ministry —

made by Sir Robert Borden on the dissolution of Parliament prior to the general election which became inevitable on the cleavage pro¬

duced by the conscription bill — was more suc¬

cessful, and in October a union government

was formed which, with the exception of Sir Wilfrid Laurier and representatives of the

Liberalism of Quebec, was fairly representative of both great political parties in all the prov¬

inces. This government, pledged among other

things to enforce conscription, to make better provision for soldiers and their dependents and to free the civil service from the evils of the patronage system, was divided into two cabi¬

nets, each presided over by the Prime Minister, for War and Reconstruction. As a union

ministry it went before the country at the general election held on 17 Dec. 1917. He

resigned the premiership in 1920. See Canada.

BORDEN, Simeon, American inventor

and surveyor: b. Fall River, Mass., 29 Jan.

1798; d. 28 Oct. 1856. He instructed himself in mathematics and devised successful survey¬

ing instruments. The first American geodetic survey was his work. In 1848 he began the construction of railroads. He published (A

System of Useful Formulae Adapted to the

Practical Operations of Locating and Con¬

structing Railroads) (1851). He also accom¬

plished the feat of stringing a telegraph wire at a height of 220 feet from the Palisades to Fort Washington across the Hudson, a distance of more than a mile.

BORDENTOWN, N. J., city in Burling¬

ton County, on the Delaware River, the Dela¬

ware and Raritan Canal and the Pennsylvania Railroad, 57 miles southwest of New York.

The city is the seat of the Bordentown Mili¬

tary Institute, the Saint Joseph's Academy for girls (Roman Catholic) and the Bordento\vn

Female College. It carries a large trade in the agricultural products of the surrounding district and contains several important indus¬

trial establishments, such as steam _ forge and iron works, foundry and machine shops,

worsted mills, shirt factory, canning factories, a shipyard and other industries. The city was incorporated in 1849. For many vears Joseph Bonaparte, brother of Napoleon I, lived near Bordentown as did also Marshal Joachim

Murat. The city in 1913 adopted the commis¬

sion form of government. Consult Woodward,

(Bonaparte's Park and the Murats) (18/9).

Pop. 4,500.

BORDER RUFFIANS, a name given,

after the Kansas-Nebraska Bill of 1854, to

the pro-slavery Missourians who acted as the 268

allies of the slave element in Kansas, crossing the boundary to vote, by which means they

organized the first government against the

bona-fide free-labor residents by a vote of nearly double the inhabitants of the Territory.

They kept the State in anarchy for three years, terrorizing the inhabitants by murder, arson, the sack of towns and other outrages. The

most graphic comment is the fact that they adopted this term of their enemies and prided themselves on it as an excellent joke. See Kansas-Nebraska Bill. Consult Thayer, E.,

(A History of the Kansas Crusaded

BORDER STATES, before the Civil

War, the line of slave States lying next the free States: Delaware, Maryland, Virginia,

Kentucky and Missouri. The term was some¬

times improperly made to include North Caro¬

lina and Tennessee, probably because their

mountain districts held so large a proportion of loyalists ; and Arkansas, for no special rea¬

son. Their political position was dictated by the facts that: (1) After the prohibition of the slave trade one of their chief industries was breeding slaves for exportation to the

cotton, rice and sugar plantations of the south¬

ernmost States. In the Virginia convention

of 1832 it was said to be the most profitable in the State. (2) From their position they were the chief sufferers from the escape of fugitive slaves ; in 1850 this was estimated at a loss of $3,000,000 a year, and these States were the most insistent advocates of the Fugitive Slave Law and its enforcement ; and in 1860 a Mis¬

souri senator urged the creation of a Federal police to patrol the border line for this purpose.

(3) In case of war they would be the chief battlefield. They therefore furnished the back¬

bone, if not the genesis of every political move¬

ment to stop the slavery agitation or conciliate the sections. The strength of the Know-Noth¬

ing party of 1856 and the Constitutional Union party of 1860 (Bell-Everett) was almost exclu¬

sively in the border States; the Peace Confer¬

ence of 1861 and the proposed Crittenden Com¬

promise were the work of these States. They tried to prevent the outbreak of hostilities, and when the war began the governor of Ken¬

tucky went so far as to attempt making his State a neutral power outside both govern¬

ments, and forbade either of them occupying it without the consent of the State authorities.

Finally, however, they split up according to their natural affinities ; the three not border States at all — North Carolina, Tennessee and Arkansas — seceded, with Virginia; while in Kentucky, Maryland, Delaware and Missouri,

the loyal element, with government help, pre¬

vented the State from going out. They never gave up hope through the war, however, of

reconciling differences by a convention of all the old States, North and South.

BORDER WAR, a name given during the

struggle for Kansas to the intermittent civil war in that Territory, about 1854-58, between the free-soil and the slavery parties. It was begun by the attempt of the Missouri slav-holding party ((<Border Ruffians, }) q.v.) to reclaim by violence what the actual settlers had won by colonization ; many of the worst atrocities were perpetrated, and all the tempo¬

rary success of the slavery side won, by bodies of men who were not residents of Kansas at all. This caused John Brown (q.v.) to move there from northern Ohio with his sons, and fight against them. Of the other partisan

leaders on that side, the most notable was James Montgomery, who, however, was a bona-fide settler. The most efficient leaders among the Missourians, or border ruffians, were David R. Atchison of Missouri and Gen. B. F. String-fellow.

BORDES, Charles, French organist, com¬

poser and author: b. Vouvray sur Loire 1861.

He was a pupil of Cesar Franck; in 1890 be¬

came organist of Saint Gervais in Paris and in 1898 founded the Saint Gervais School Can-torum which became famous for its choral ren¬

ditions of Bach and other sacred works. Be¬

sides his compositions he wrote (Archives

de la tradition basque) (1890) ; (Du sort de la musique religieuse en France) (1906); and is editor of the (Anthologie des maitres religieux primitifsP

BORDIER, bor'de'a, Henri Leonard,

French historical writer: b. Paris, 8 Aug. 1817; d. there, 31 Aug. 1888. He graduated in law, making a special study of palaeographic archives (1840), and continued to devote his energy to historical studies. He became successively as¬

sistant to the historian Auguste Thierry; assist¬

ant in the Academy of Inscriptions ; secretary of the Lcole des Chartes; member of the

Commission of the Departmental Archives be¬

longing to the office of the Minister of the Interior (1846) ; archivist of the national archives (1850). On the establishment of the empire he lost his position ; but in 1872 he became honorary librarian in the department

of manuscripts in the National Library. For many years he was a member of the committee of the French Protestant Historical Society

for which he prepared many noteworthy wrorks.

Among his published books are (Histoire

generale de tous les depots d'archives existant en France) (1855) ; (Les figlises et monasteres de Paris) (1856) ; Latin text with French

translation of the (Libri miraculorum aliaque opera minora) of Gregory of Tours (4 vols., 1857-64) ; and also a translation into French of his (Historia FrancorunV (2 vols., 1859-61) ; (Les inventaires des archives de l'Empire >

(1867); (Une Fabrique de faux Autographes)

(1869) ; (Chansonnier huguenot du seizieme

siecleP (1869) ; (L'Allemagne aux Tuilleries, de 1850 a 1870, collection de documents tires du cabinet de l'Empereui0 (1872) ; (Le Saint

Barthelemy et la critique moderne) (Geneva

1876) ; (Nichalas Castellin de Tournay* ;

(L'ecole historique de Jerome Bolsec) (Paris 1880) ; description des peintures et autres ornements contenus dans les manuscrits grecs de la Bibliotheque Nationale) (1885).

BORDIGHERA, bor-de-ga'ra, Italy, town

on the Mediterranean coast, in the district of San Remo and province of Porto Maurizio,

on the Riviera, 91 miles southwest of Genoa and seven miles from the French frontier, a favorite winter residence for invalids, having been made fashionable by the visits of the members of the English royal family. Few

places on the Riviera are better fitted for the accommodation of invalids and tourists. In ad¬

dition to the usual facilities for the entertain¬

ment of strangers, the town has a library, museum, a theatre and a fine promenade. The snowfall is very slight. The town has been

repeatedly the victim of earthquakes, the last serious visitation taking place in 1887. Pop.

4,229.

BORDONE, bor-do-na, Paris, Italian

painter of the Venetian school: b. Treviso

1500; d. 1571. Under Titian he made rapid

progress in painting. The execution of many works for his native city and for Venice spread his fame as far as France, whither he was invited by the King. The galleries of Dresden and Vienna possess several of his pieces. The New York Historical Society also possesses

one of his paintings. His most famous picture is the (01d Gondolier presenting a Ring to the Doge) ; it is considered one of the masterpieces of the Venetian school. Other examples of his work are (Prophecy of the Tiburtine Sibyl,*

in Florence; (Combat of the Gladiators, *in Vienna, and (The Chess Players,* in Berlin.

Consult Berenson, (Venetian Painters) (New

York 1909) ; Bailo and Biscaro, for his life and works (Treviso 1901).

BORE, or EAGRE, words of Norse origin

(from bora, hole; 2Egir, sea-god) ; designating the inflowing phenomenon which occurs in some rivers in springtides. At such times as the tide advances the water is suddenly thrown in as if in a mass, and then pursues its course up the river, and in opposition to the current, pre¬

senting a volume of water moving with great rapidity and resistless force, and with a height varying from two or three feet, as in the Severn, Trent, Solway and Seine, to more than 12 feet in the Brahmapootra and Tsien-Tang-kiang. The last is said to have a rise of 20

feet, and advances with a loud roar, at the rate of 10 miles an hour. The tide in the Bay of Fundy creates the great bores which rush up the river channels of the bay. ((Ware

Eagre® is still a warning cry on European

rivers to herald the bore’s advance. The bores are caused by the disproportion between the volume of the tidal wave and the receiving power of the rivers up which they flow.

Consult Darwin, (The Tides) (Boston 1898).

BORE, the cavity of a steam engine cylin¬

der pump barrel, pipe, cannon, barrel of a fire¬

arm, *etc.* In mechanics it is expressed in inches of diameter; in cannon formerly in the weight in pounds of solid round shot adapted thereto, but since the introduction of modern rifled ord*

nance of the breech loading pattern, _ the bore of cannon is always expressed in inches of diameter or in the equivalent of inches.

BOREAS, the north wind, worshipped by

the Greeks as a deity; residing in a cave of Mount Haemus in Thrace, and represented

with wings, which, as well as his hair and beard, were full of flakes of snow; instead of feet he had the tails of serpents, and with the train of his garment he stirred up clouds of dust. Boreas, according to Hesiod (Theogony

379), was the son of Astraeus and of Eos, brother of Hesperus, Zephyrus and Notus. When

Apollo and his favorite Hyacinthus were once playing at quoits, he blew the quoit of the former, of whom he was jealous, upon the

head of the youth, who was killed by the blow.

By Oreithyia, daughter of Erechtheus of

Athens, he was father of Cleopatra, Chione, Calais and Zetes. The last two took part in the Argonautic expedition.

BORECOLE, a pot-herb. See Kale.

BO REG AT. See Rock Trout.

BORELLI, Giovanni Alfonso, Italian

physician and scientist: b. Naples 1608; d.

Rome, 31 Dec. 1679. After studying medicine he both practised and professed it at various places, but particularly at Pisa and Messina, and distinguished himself as the leader of those who have been called mathematical physicians, from regarding the human body as a kind of hydraulic machine, and then attempting to

explain all its motions and functions in accord¬

ance with the principles of mathematics. He appears to have possessed very original and inventive powers, and made various discoveries, among which may be mentioned that of an

apparatus apparently of the nature of a diving-bell, by which persons could descend into the water, remain in it and move about or rise and sink at pleasure, and of a boat by which two or more persons might row themselves beneath the water in any direction. His works discuss many important subjects in medicine, mathe¬

matics and philosophy; but the great work on which his fame rests, though not published

till after his death, is entitled (De Motu Ani-malium* (Eng. trans. (The Flight of Birds*), and in so far as it relates to mere animal mechanics is full of interest and instruction ; but when he attempts to apply his mathematical principles he falls into egregious blunders, and stumbles at every step.

BORELLI'S COMET. See Comet.

BORER, Round-headed and Flat-headed,

insect enemies of several trees. See Apple.

BORGHESE, bor-ga'sa, the name of a

patrician family of Siena, Italy, which has been more or less distinguished since the middle of the 15th century. A jurisconsult, of the name of Marco Antonio Borghese, who was

employed by the papal court in the early part of the 16th century, appears to have laid the foundation of its fortunes at Rome. His third son, Camillo, became Pope Paul V in 1605,

and he lavished the honors and riches which his place enabled him to command on his rela¬

tives. For a son of his elder brother, named Marco Antonio Borghese, he procured the

princedom of Sulmona and a grandeeship in

Spain. His brother, Francesco, he made the

leader of the troops sent against Venice in 1607, to maintain the papal cause against the opposition of that republic. Scipione Caffarelli, a nephew, he created cardinal. Paolo, the son of Marco Antonio, married Olympia Aldobrandini, the only child of the Prince of Rossano, and grandniece of Clement VIII, and thus

introduced the wealth of the Aldobrandini into the Borghese family. The son of Paolo, named Giovanni Battista, was the ambassador of

Philip V to the court of Rome, where he died in 1717. His son, Marco Antonio, was viceroy of Naples in 1721, and another of the same name, descended from him, became a noted

collector of works of art, with which he

adorned his sumptuous villa on the Pincian

hill. See Borghese, Camillo Filipo.

BORGHESE, Camillo Filipo Ludovico,

formerly Duke of Guastalla, Prince of France, etc.: b. 1775; d. Florence, 10 April 1832. When the French invaded Italy he entered

their serv¬

ice and showed great attachment to the

cause, in particular to General Bonaparte,

whose sister, Marie Pauline, he married. In 270

1804 he became a French prince and received the grand cross of the Legion of Honor, and at the outbreak of war against Austria, 1805,

became commander of a squadron of the

imperial guard. After its termination his

wife received the duchy of Guastalla and

he was created Duke of Guastalla. After

having served in 1806 in the campaign

against the Prussians and Russians, and

after having been sent to Warsaw to pre¬

pare the Poles for a revolt, the Emperor ap¬

pointed him governor-general of the provinces beyond the Alps. He fixed his court at Turin and became very popular among the Piedmont¬

ese. After the abdication of Napoleon he

broke up all connection with the Bonaparte

family and separated from his wife. The

Prince sold to the French government for the sum of 8,000,000 francs 322 works of art which ornamented the palace of his ancestors, known under the name of the Villa Borghese. Among them were several masterpieces ; for example, the (Borghese Gladiator,* the (Hermaphrodite,*

the <Silenus,) the 1 Dying Seneca,* (Amor and Psyche.* Bonaparte provided for the payment

out of the national domains in Piedmont, which the King of Sardinia confiscated in 1815; at the same time, in consequence of the second invasion of France, the Prince received back part of these treasures of art. In 1818 he sold Lucedio, in Savoy, for 3,000,000 livres. In the kingdom of Naples he possessed the princi¬

palities Sulmone and Rosano. He was one of the richest Italian princes.

BORGHESE, Marie Pauline (Princess),

sister of Napoleon: b. Ajaccio, 20 Oct. 1780; d.

9 June 1825. When her first husband, General Leclerc, was sent to Saint Domingo with the rank of captain-general, Napoleon ordered her to accompany her husband with her son. She embarked in December 1801, at Brest, and sup¬

ported with courage the hardships of a cam¬

paign that ended in the withdrawal of the

French troops. After General Leclerc's death she married, at Morfontaine in 1803, the Prince Camillo Borghese. Her son died at Rome soon after. With Napoleon she had many disputes

and as many reconciliations, for she would not always follow the caprices of his policy. Yet even the proud style in which she demanded what her brothers begged made her the more attractive to her brother. Once, however, when she forgot herself toward the Empress, whom she never liked, she was obliged to leave the court. She was yet in disgrace at Nice when Napoleon resigned his crown in 1814. Before the battle of Waterloo she placed all her dia¬

monds, which were of great value, at the dis¬

posal of her brother. They were in his carriage which was taken in that battle, his intention having been to return them to her. She lived afterward separated from her husband at Rome, where she occupied part of the palace Borghese and where she possessed, from 1816, the Villa Sciarra. Her house, in which taste and love of the fine arts

prevailed, was the centre of the most splendid society at Rome. When she

heard of the sickness of her brother Napoleon, she repeatedly requested permission to go to him at Saint Helena. She finally obtained her request, but the news of his death arrived im¬

mediately after. A marble portrait statue by Canova, representing her as Venus, is now in the Borghese collection at Rome.

BORGHESI, Bartolommeo (Count), Ital¬

ian numismatist and epigraphist : b. Savignano, near Rimini, 11 July 1781; d. San Marino, 10

April 1860. Son of a learned father whose

hobby was collecting coins, he made valu¬

able additions and followed the study of numis¬

matics as a branch of historical research. The coins in the Vatican were entrusted to him to arrange and catalogue, and he became prac¬

tically the founder of modern epigraphy. He published (New Fragments of the Consular

Fasti of the Capitol* (2 vols., 1820), and in the monumental (Corpus Inscriptionum Latinarum,*

completed by the University of Berlin, directed by Mommsen, was achieved the publication of a collection of all ancient Roman inscriptions, originated by Borghese. His correspondence

and contributions to periodical literature

formed an immense mass of material, and after his death Napoleon appointed a commission to collect and publish his works, which appeared as {CEuvres completes* (10 vols., 1862-97).

BORGI, bor-je, Giovanni: b. Rome 1732;

d. 1798. A philanthropist who, though poor, inspired the founding of

societies for the edu¬

cation of vagrant children.

BORGIA, bor'ja, Cesare, Italian ecclesias¬

tic and soldier: b. 1476; d. 12 March 1507. He was the natural son of Rodrigo Borgia and a Romayi lady named Vanozza. His father, who

in 1492 became Pope, with the title of Alexan¬

der VI, made him a cardinal. When Charles

VIII of France made his entry into Rome,

Alexander was obliged to treat with him and delivered Cesare Borgia into his hands as a hostage, but he escaped a few days later. In 1497 Alexander bestowed the duchy of Benevento on his eldest son, Giovanni, who had already received from the King of Spain the duchy of Gandia. Giovanni died shortly after his investiture and Cesare has been accused of murdering his brother out of jealousy, but historical proof of this charge is utterly lack¬

ing. His father permitted him to abandon his ecclesiastical office and devote himself to the profession of arms and sent him to France to carry to Louis XII the bull for divorce and dispensation for marriage which he had long desired to obtain. Louis rewarded Borgia with the duchy of Valentinois, a bodyguard of 100

men and 20,000 livres a year, and promised to aid him in his projects of conquest. In 1499

Cesare married a daughter of King John of

Navarre and accompanied Louis XII to Italy.

In two successive campaigns he made himself master of the Romagna, Perugia, Piombino and the duchy of Urbino. His vaulting ambition

planned a reconstructed kingdom of central

Italy with himself at its head, and a powerful league was formed against him. His own offi¬

cers attempted to arrest his progress, but he misled them by a feint,

divided them, invited them to Sinigallia and there passed on them sentence of death (December 1502). The death of his father on 17 Aug. 1503 materially altered his prospects; the accession of Julius II to the papal throne was followed (January 1504) by his renunciation in favor of the Pope of all claims to the Romagna, which he had governed with justice and integrity, earning the re¬

gard of his subjects. Borgia was subsequently arrested; spent two years as a prisoner in Spain; made his escape to his brother-in-law, BORGIA — BORGLUM

the King of Navarre, whom he accompanied

in a campaign against Castile, and was killed by a shot before the castle of Viana. His ac¬

tive career was lived within four years ; but his boundless ambition, indomitable energy, disre¬

gard of all laws, genius in war and skill in administration have rendered him one of the most extraordinary figures in the period of the Renaissance. Consult Creighton, (History of the Papacy) (London 1897) ; Fyvie, (Story of the Borgias5 (New York 1913) ; Villari, (Machiavelli5 (London 1892); Yriarte, (Cesar Borgia5 (Paris 1889).

BORGIA, Francisco, or Saint Francis

(Duke of Gandia), Spanish ecclesiastic: b.

Janda, Spain, 28 Oct. 1510; d. Rome, 30 Sept.

1572. He was eminent as a soldier and states¬

man and enjoyed the confidence and friendship of Charles V, who appointed him viceroy of Catalonia. While very young he married a

noble Portuguese lady, Eleonora de Castro, by whom he had a large

family. He was always very strict in his morality and exact in his religious duties. After the death of his wife he entered the Society of Jesus and was or¬

dained priest in the 40th year of his age. On 2 July 1565 he was elected general of the So¬

ciety and remained in office until his death.

Several bishoprics and the dignity of cardinal were repeatedly pressed upon him but he re¬

fused them all. Clement X signed the bull for the canonization of Saint Francis Borgia on 20 June 1670.

BORGIA, Lucrezia, daughter of Rodrigo

Borgia, who ascended the papal throne in 1492

under the name of Alexander VI, and sister of Cesare Borgia (q.v.) : b. 1480; d. Ferrara, 24 June 1519. When a mere child she was

betrothed to a gentleman of Aragon, but her father, on attaining the popedom, thought the match beneath her, and broke the engagement, marrying her to Giovanni Sforza, lord of

Pesaro. After she had lived with him for four years, Alexander dissolved the marriage on the ground of the husband's impotency, and gave her to Alphonso, Duke of Bisceglia, natural son of Alphonso II of Aragon. Two years after

her husband was assassinated in a quarrel with Cesare Borgia. Within the course of a year she married Alphonso d'Este, son of Ercole, Duke of Ferrara. Here she became a liberal pa¬

troness of poets, who endeavored to repay her benefactions by lauding her as the pattern of every virtue. The character of Lucrezia Borgia has been the subject of much controversy, but recent historical researches have placed her in a much fairer light and it has been shown be¬

yond dispute, that after her marriage to

Alphonso d'Este her life was a model of virtue and beneficence. Consult Corvo, (Chronicles of the House of Borgia5 (New York 1901) ;

Fyvie, (Story of the Borgias5 (ib. 1913) ; Grego-rovius, (Lucrezia Borgia5 (Stuttgart 1875) ; Mathew, (Life and Times of Rodrigo Borgia,

Pope Alexander VI5 (New York 1912) ; Pastor, (Geschichte der Papatc5 (3 vols.).

BORGIA, Rodrigo. See Alexander VI.

BORGIA, Stefano, Italian ecclesiastic: b.

Velletri, 3 Dec. 1731 ; d. Lyon, 23 Nov. 1804.

He was brought up by his uncle, Alexander

Borgia, archbishop of Fermo, and in 1750, on becoming a member of the Etruscan Academy

of Cortona, commenced at Velletri to form a museum which has since become one of the

richest private collections in existence. In 1759

he was appointed by Benedict XIV governor of Benevento, and in 1770 he became secretary

to the College of Propaganda, which brought him into immediate relation with missionaries to all parts of the world, and enabled him, at comparatively little expense, to enrich his

museum with manuscripts, coins, statues, idols and all the other rarities which each country possessed. In 1789 Pius VI made him a car¬

dinal, and at the same time appointed him

inspector-general of the foundling hospital, into which he introduced extensive reforms. In 1797

the revolutionary spirit which had broken out in France extended itself to Rome, and the Pope, as the best means of counteracting it, gave all his confidence to Borgia and installed him as dictator. The situation was extremely dif¬

ficult, but he showed himself worthy of the trust, and gained such ascendency over the pub¬

lic mind that tranquillity and good order re¬

mained uninterrupted till 1798. By this time the French were at the gates, and the popular party, becoming dominant, established a repub¬

lic. The Pope was compelled to depart, and Cardinal Borgia, at first arrested, was ordered, on obtaining his liberty, to quit the papal states.

After disembarking at Leghorn he repaired to Venice and Padua, and continued regularly to discharge his functions in connection with the Propaganda as if nothing had occurred to inter¬

rupt them. He returned to Rome with the new Pope, Pius VII, who treated him with the same confidence as his predecessor. Afterward, when Pius VII was carried off to France, Borgia was ordered to accompany him, and he accordingly set out, but had only reached Lyons when he was seized with a serious illness, and died. He was the author of several antiquarian and his¬

torical works including (Memorie istoriche

della pontificia citta di Benevento dal secolo VIII al secolo XVIII5 (3 vols., 1763-69), and deserves honorable mention for his liberal pa¬

tronage of arts and artists. It is said that he once sold a gold plate from his collection to defray the expense of printing San Bar¬

tolommeo's (Systema Brahmanicum.5

BORGLUM (John) Gutzon (de la

Mothe), American sculptor and painter : b.

Idaho, 25 March 1867. He studied at the San Francisco Art Association, and the Julian

Academy of Paris 1890-93. In 1893 he returned to California, removing to London in 1895.

From 1896 to 1901 he exhibited both painting and sculpture in Paris

and London, and was elected to the Royal Society of British Artists and to the Societe Nationale des Beanx-Arts.

He settled in New York in 1902. A determina¬

tion to produce American art, chiefly mani¬

fested by choice of subject, gained for him a considerable section of the public. His success in other circles is obtained by his skilful manipulation of his material, due to thorough schooling and a judicious adoption of the free technique of Rodin. He is an able representer of movement, as in his (Mares of Diomedes5 at the Metropolitan Museum in New York, though he uses the quality rather in the manner of an illustrator than of a creator of sculptural de¬

sign. Gutzon Borglum is a member of the

Architectural League of New York, and the

American Numismatic Society. He has re-

ceived the gold medal of the Association of Western Arts, and one from the Saint Louis Exposition of 1904. Well-known works by him are the Sheridan monument, Washington, D. C. ; the colossal head of Lincoln at the Capitol ; Collis P. Huntington, New York; Wyatt Me¬

morial, Raleigh, N. C. ; (Pursued, ' two youth¬

ful figures upon horseback (in possession of the Kaiser); (The Boer,' an eqestrian figure; the small and characteristic figures of John Ruskin (Metropolitan Museum), and Nero; a

number of highly original gargoyles for Prince¬

ton University; the colossal figures of the 12

apostles for the cathedral of Saint John the Divine, New York; statue

of Lincoln, Newark, N. J. ; statue of Henry Ward Beecher, Brook¬

lyn ; Altgeld statue, Chicago ; and the marble figures (Wonderment of Motherhood' ; Mod¬

ern Atlas' ; (Night' ; (Babes in the Wood.'

His paintings include (Captive Pan' ; Aban¬

doned' ; (Iago and Cassio' ; and mural decora¬

tions in Leeds and Manchester, England.

BORGLUM, Solon Hannibal, American

sculptor: b. Ogden, Utah, 22 Dec. 1868. He spent his youth in Fremont, Neb., and his early manhood on a cattle ranch. At the age of 24

he turned to art, spent two years with his brother Gutzon in California, and in 1895

entered the art school of Cincinnati. His first group, a (Horse Pawing a Dead Companion,'

won a special prize, and in 1897 he won a scholarship which brought him to Paris. There he studied under Louis Rebisso and Fremiet.

He achieved honorable mention with his Tame Horse' in the Salon of 1899, and attracted much attention by the originality of his subjects, taken from the life of the western frontier, which he himself had experienced. His art has perpetu¬

ated vanishing types — the cowboy, the ranch¬

man, Indian and the animals of the plains, with truth and inspiration and shows little French influence, even in technique. After 1900 he was active in New York. He became a member of the National Sculpture Society in 1901 and was made an associate of the National Academy in 1911. Among other awards he has received

an honorable mention at the Salon of 1899, a silver medal from the Pan-American exposition of 1901, and a gold medal at Saint Louis in 1904

Among his principal works are (On the Bor¬

ders of White Man's Land' and (Bulls Fight¬

ing' (Metropolitan Museum, New York) ;

busts of C. A. Schieren, Simon Newcomb and the Packer Memorial (Brooklyn Institute

Museum) ; equestrian statue of General

Gordon (Atlanta, Ga.) ; Soldiers and Sailors'

Monument (Danbury, Conn) ; (Stampede of

Wild Horses' (Cincinnati Museum) ; (The Last Roundup' (Metropolitan Museum, New York) ;

(Burial on the Plains' ; (Tamed' ; (Just Born' ; (Evening' ; and The Bucking Broncho.' His

later works include an equestrian statue of Captain O'Neill (Prescott, Ariz., 1907) ; por¬

trait reliefs of Civil War generals in the Vicksburg National Park and ˆPrivate Jones of the Confederate Army,' a bronze statute in

Lynchburg, Va.

BORGNE, bor-ne, Lake, Louisiana, a body

of water situated in the southeastern part of the State. Though termed a lake, it is strictly the termination of that large arm of the Mexi¬

can Gulf known as Pascagoula Sound, being

united to that by a pass or strait crossed by a line of small islands and faced on the east by Grand Island. Lake Borgne is also con¬

nected with Lake Pontchartrain by the Rigolet Pass and approaches within 15 miles of New Orleans. Its greatest extent is in a northeast and southwest direction, in which its length is about 30 miles. Lake Borgne forms a part

of the western boundary of the Mississippi

Delta.

BORGOGNONE, bor-gon-yo*‘na, Ambrogio di Stefano, also called Ambrogio da Fossano, or il Bergognone, a distinguished Italian (Lombard) painter: b. at or near Fossano

about 1445; d. 1523. The best studies of his life and works are by L. Beltrami and G. Zappa, and the substance of their accounts is clearly restated in Thieme-Becker, (Vol. IV, pp. 358-60). The year of his birth is not known, the earliest notice of him being in the records of the Milan ((Universita dei Pittori,” where his name appears as (<magister” in 1481 ; and his earliest known painting dates from the same period, roughly speaking. His last signed work known to us, painted for the church at Ner viano and now in the Brera at Milan, is dated 1522. Shortly before that time the most ad¬

mired of all the paintings by this (<gentle and pious master” — the great apse fresco of the (Coronation of the Virgin’ in San Simplici-ano, Milan, was created and this represents most perfectly and most nobly the old Lom¬

bard art traditions. It has been customary for art critics to deny that Borgognone was at all subject to the influence of the contemporane¬

ous Leonardo school ; Zappa, however, finds in the figures of some of Borgognone’s paintings (for example, the four pictures at Lodi repre¬

senting scenes from the life of the Virgin) intimations of precisely that influence, though in only a slight degree. But in general it may be said that Borgognone held aloof from the newer art tendencies and preserved in his

works the expression of deeply-felt religious experience, his spirituality contrasting with those manifestations of interest in physical charm which characterized much of the art of his time. During the years 1488 to 1494 or 95

Borgognone executed for the Certosa of Pavia a series of paintings only less famous than the San Sitnpliciano fresco. Consul his biog¬

raphy by Bona (Fossano 1897).

BORGOGNONE, bor -go-nyo-ne, Jacopo

Cortesi, or, more properly, Jacques Courtois, —in Italian Giacomo or Jacopo Cortesi — called Borgognone, French painter: b. Burgundy

1621 ; d. Rome 1675. He studied in Italy and painted there, probably with success, until (<in the full flower of his virility, he went to live with the Jesuits at Rome," as P. T. Venturi writes in L'Arte (Vol. XIII, p. 216. Roma

1910). His name has been overlooked hitherto by the editors of other v/orks of reference, even those devoted exclusively to artists and the fine arts.

BORGU, bor-goo', Africa, a district in the

western Sudan, lying about lat. 10° N., and stretching from the meridian of Greenwich east to the Niger. It is hilly in parts, but much of it is well watered and extremely fertile. Among its numerous productions are rice, grain, indigo, cotton, bananas and citrons. The inhabitants (chiefly Fulahas and pagan negro Bariba) are, in the eastern part, under the protection of BORIC ACID — BORING

British officials of northern Nigeria, while, in the western part, they are subject to that of the French colony of Dahomey. Bussa, on

the Niger, is the main settlement.

BORIC ACID. See Boracic Acid.

BORING, a species of circular cutting in

which a cylindrical portion of a substance is gradually removed. When tubes of metal are

to be formed, a cast is, in some cases, made in solid metal, and the whole of the bore is pro¬

duced by the boring-machine : in others the cast is made hollow at first, and the borer is only used to give uniformity and finish to the inside of the tube. In boring cannon sometimes the tool is made to revolve while the cannon is at rest, and sometimes the cannon is made to

revolve while the tool is at rest. By the latter arrangement the bore is said to be formed with more accuracy than by the other method of

putting the borer in motion.

In the jewelry and small metal industries,

hand drills, which consist of a spindle with steel bits, to which reciprocating rotation is given, are the implements for piercing small holes.

The boring of holes in metal plates is effected by means of drills driven by machinery. The drill is inserted in the end of a vertical spindle, which revolves in a fixed frame and is driven by the bevel wheels. The metal to be bored is placed on a table or other support, below the drill ; and the up and down motion, or end pres¬

sure and off action, of the drill is effected by the hand gear turning the screw ; which, being coupled to the top of the spindle, presses it down or raises it, according to the way it is turned. The spindle slides vertically in the collar forming the axis of the bevel wheel, but is carried round with it by means of a pin which projects into a groove.

As applied to the earth and to rocks, boring embraces two classes of operations — boring of shot-holes for blasting, and the sinking of bores in prospecting for minerals and in forming wells for water, brine and mineral oils. Blast-holes in rocks are made from one to two — sometimes more — inches in diameter, and may pierce to the depth of nine feet. Such holes are most simply made in hard rock by a steel-pointed drill, struck by a hammer, and turned partly round after each blow to make the hole cylin¬

drical. The addition of a little water serves to preserve the temper of

the boring tool, and makes the hole more easy to cut. In soft rock, whenever the hole is to be vertical, a jumper is used. This is a weighted drill, which acts merely by its own weight when let fall from about a foot in height. The powdered stone is removed at intervals by a scraper. But in all great engineering undertakings rock-boring

machinery now supplants hand work. The

machines are principally devised to imitate the percussive action of the hand drill, the boring chisel being worked and rotated by compressed air, and sometimes directly by steam. The com¬

pressed-air machines possess the great advan¬

tage of aiding in the ventilation of the work¬

ing— often a most important consideration,

seeing the operations are chiefly carried on in confined spaces where large volumes of poison¬

ous gases are evolved from explosions. The

earliest practical rock-boring machine was that of Sommeiller, one of the engineers of the Mont Cenis tunnel, at which undertaking the apparatus was first used. Now the forms of vol. 4 — 1 8

percussion machines arc very numerous, im¬

provements being directed toward lightness and simplicity of parts, and to the method — auto¬

matic or otherwise — of advancing the boring-tool as the work proceeds. Among the best

known machines are the Barrow, Burleigh,

Darlington, Ferroux, Ingersoll and McKean

rock-borers. Diamond drills working in the

manner described below are also used. Brandt’s rotatory borer is an apparatus similar in action to the diamond drill, but with a crown of hardened steel in place of cutting diamonds.

The tool is pressed against and rotated by water power. An apparatus similar in principle to the brace and bits of the carpenter is used with advantage in uniform rock, such as slate.

The bores for deep wells of all kinds, and for discovering the mineral contents of a

region, come under one category. As a pre¬

liminary operation in mining, boring is of the utmost importance for discovering the position, thickness and dip of mineral strata or lodes, and for ascertaining the nature of the overlying deposits. Bores are made by three classes of implement — (1) boring-rods, (2) rope

borers, and (3) diamond drills.

The rod-boring instrument consists of an

iron shank having a cross-bar at the top and a hollow screw at the bottom ; to this all the suc¬

cessive boring instruments are fastened. A

simple chisel is first attached to the screw, and one or two men press upon the cross-bar, and, at the same time, force it round like an auger ; while another workman, by means of a lever erected overhead, with a chain descending from it to the cross-bar, gives an up-and-down

motion to the instrument. When the chisel

becomes clogged, from the accumulation of

material which it has loosened, it is exchanged for a cylindrical auger, provided with a valve, which scoops out the separate material ; and thus by alternate chopping and scooping the work is carried on. The nature of the strata is determined with considerable facility and certainty by examining the fragments brought up by the auger. As the work advances, suc¬

cessive lengths of rod are screwed on at the upper end. A derrick pole is erected over the bore hole for the purpose of elevating the rods, to permit the change of the tools.

The rope method of boring has been long

in use among the Chinese. By it the great loss of time arising from the screwing and un¬

screwing of the rods at each elevation of the chisel or auger is saved. The chisel and scoop-instrument are fastened to a rope, which is alternately elevated and allowed to descend by the simple force of gravity; the instrument thus forces its way through the ground. In the softer rocks of the newer formations this method has been successfully employed in

boring for artesian wells. The rope-boring

machinery of Mather and Platt, of Salford,

England, in which a flat hempen rope is em¬

ployed, is in extensive use.

For deep well-sinking, as in the Pennsyl¬

vania oil region, where depths of 2,000 feet and more have to be reached, and for mineral pros¬

pecting, the diamond drill has of late years largely superseded all other borers. With this apparatus the earth can be pierced at any angle, which is a great advantage in investigating mineral deposits ; and, moreover, the drill pro¬

duces solid and continuous cores of the strata

through which it passes, so that a complete section of any bore can be exposed to view.

The diamond drill consists of a crown, or

cylinder of steel, around one edge of which are fixed a series of black diamonds. These dia¬

monds are so set that they project alternately a little beyond the outside and inside edge of the cylinder. This crown is screwed to lengths of iron tubing as it cuts its way by rotation into the rock, and it makes, as it descends, an annular cutting somewhat larger than the

thickness of the continuous tube, which the crown and its shaft form. Thus a core of

rock is cut out and held within the tube, and the pieces may be lifted out from time to time as the work proceeds. The detritus

resulting from the abrasion of the ring of rock is continuously washed away by a current of water, forced down within the tubing. Dia¬

mond drills are made of many sizes, from 1 1/$

up to 18 inches in diameter. The prototype of the diamond drill was M. Fauvelle's hollow boring-rod with steel crown, described at the British Association meeting in 1846. See

Drills and Drilling.

BORIS FODOROVICH GODUNOV, bo¬

res' go-doo-nof', Tsar of Russia: b. about 1551 ; ascended the throne 1 Sept. 1598; d. 15 April 1605. He was a descendant of a Tartar noble¬

man Chet, and began his military service under Ivan the Terrible. When in 1581 the Tsar, in a fit of anger, murdered his elder brother Ivan, and the right to the throne was left to his younger brother Feodor, Boris was appointed a guardian of the young ruler. Through intrigue and clever diplomacy Boris gradually assumed great authority and in 1587 obtained officially the right of communicating personally with the sovereigns of other countries. Not having any experience in nor any liking for wars, Boris directed the foreign affairs of Russia in a peace¬

ful and most astute manner and avoided armed conflicts with Sweden, the Tartars and the

Turks. With Great Britain he established

favorable commercial relations and in the

country many flourishing colonies and townships were founded. In 1589 Boris instituted a

patriarchate and assumed the throne of the first patriarch, thus placing himself above the metro¬

politan of Kiev. Other important reforms in ecclesiastical affairs were also made during his rule as regent. When, in 1591, the second heir to the throne, Tsarevich Demetrius, died under mysterious circumstances, which largely incrim¬

inated Boris, this omnipotent and ambitious

regent not only denied a participation in the deed, but, in order to distract the public atten¬

tion, set Moscow on fire and won the hearts of the people by great deeds of charity to the suf¬

fering population, which he knew how to show in a most theatrical manner. After the death of Tsarevich Feodor in 1598, Boris displayed all his astuteness and all the might of his unusual mind in a series of cleverly, though not honor¬

able, arranged coups ; inclining, or forcing, the Queen mother Irene and her brother to retire to a monastery and causing the clergy and Zemski Sabor (Parliament) to request him unan¬

imously to ascend the imperial throne, which he finally agreed to do with a cleverly simulated reluctance. In order to gain the confidence and love of his subjects completely, Tsar Boris inaugurated at once a rule of good will ; grant¬

ing privileges and concessions, and suppressing crimes, thefts and other vices. His rule was in reality one of prosperity and progress in many respects. He established high schools in Mos¬

cow for which he supplied good teachers from Germany, Austria, England and France. His

foreign affairs were even more peaceful and flourishing than during the regency and his rela¬

tions with the Swedish and Danish courts were especially cordial on account of the prospective marriages of Boris' children into those royal families. From 1601, for three years, a famine raged in Russia ; the half-insane population rushed in hordes to Moscow and men and

women were dying in the streets ; their corpses soon accumulated and spread pestilential germs and other evils, while wholesale murders,

robberies and depositions grew apace. Boris

fought the misfortune with an iron hand; dis¬

tributing food and money in great, but insuf¬

ficient, quantities. Toward the end of the

famine (1604) the audacious ataman, Khlopka

Kosoplap, appeared with huge hordes before

Moscow but was routed by Boris's armies. At that time a certain Polish adventurer proclaimed himself Tsarevich Demetrius (known as

ˆSamozvanetz® or ˆSelf-styledˆ) and, claiming the right of that prince, gathered a mighty army and attacked Moscow but was defeated by the imperial armies. Boris died soon afterward

leaving his shaken throne to his son Feodor.

Consult Pavlov, (Ob istoricheskom znachenii

tzarstvovania Borisa Godunova) (2d ed., Saint Petersburg 1863) ; Byelov, (0 Sinerti Tzare-vicha Dimitria) (Saint Petersburg 1873).

BORIS GODUNOV. Under the influence

of historical studies, chiefly Karamzin's

(Russian History* and Shakespeare's chronicle dramas, Pushkin tried to give an objective ac¬

count of the troubled period in Russian history, from February 1598, to June 1605, and for his subject matter he accepted Karamzin's version, which was based on a doubtful popular convic¬

tion that Boris Godunov had been guilty of the death of the False Demetrius. As a drama

(Boris Godunov* was a failure from the start, and has not been able to maintain itself on the stage, but as a literary production it is the greatest truly national historic tragedy dealing with those troubled times, and neither Schiller, nor Ostrovski, nor Alexis Tolstoy, who have treated the same subject, can compare with

Pushkin's production as regards historic verac¬

ity or vividness of individual scenes or splendid delineation of characters. The language of the poem-drama is a close imitation of that of the old chronicles. Certain passages in it have justly become classical, such as the introductory scene, in which the monkish scribe Pimen in humility and simple faith expresses his pro¬

found respect for the imperial power and his love for his country. Of similar interest are the domestic scenes, in which Tsar Boris ap¬

pears at his best, and the popular scenes, such as that describing the saintly fool, in which Pushkin followed closely the historical annals.

There are numerous German and French trans¬

lations of (Boris Godunov. * A study of the play, with synopses and specimen translations, will be found in N. H. Dole's (Shakespeare and the Russian Drama) (in Poet Lore, Vol. I, pp.

497-507, Vol. II, pp. 113-25, and his (Push-BORIS GODUNOV — BORMANN

kin's Boris Godunof : the Closing Episodes)

(in Vol. Ill, pp. 551—64) .

Leo Wiener,

Professor of Slavic Languages and Literatures, Harvard University.

BORIS GODUNOV, grand opera in

three acts (often subdivided differently in per¬

formance) by Modeste Petrovich Moussorgski

(libretto based on a drama by Pushkin). First produced at Saint Petersburg 24 Jan. (new style 6 Feb.) 1874. Moussorgski was one of a group of amateur musicians whose life purpose was the formation of a Neo-Russian school of

music. They all labored unceasingly and left their ineradicable mark on the musical life of Russia. Boris is a national music drama in the truest sense. It concerns itself with one of the most sensational episodes of Russian his¬

tory — one that is familiar to every Russian —and is full of dramatic interest. The period is about 1600 and the story is that of the regent Boris, who, after doing away with the younger brother of the weak heir to the throne, the only obstacle in his path, usurped the crown and ruled for many years, until the false Dmitri appeared, causing him to give way suddenly in a paroxysm of remorse and madness strikingly portrayed in the opera. Moussorgsky was

musically not a thoroughly trained artist and his extraordinarily imaginative genius was

handicapped by a craftsmanship unequal to the demands upon it. His lifelong friend and asso¬

ciate, Rimsky-Korsakov, undertook a revision

of the orchestral score after the composer's death and that is the version now used in per¬

formance. The music of Boris has a powerful magic of its own. The composer shows a strik¬

ing aloofness from the prevailing musical in¬

fluences of his day and, in his effort to give practical expression to the slogan (<Russian music for the Russians,® he even swung, at times, in the direction of musical nihilism ; but his music is always vital,

original and realistic.

Boris has none of the conventional divisions and ensemble numbers of Italian opera, nor the usual distribution of arias. In spite of the com¬

manding figure of Boris and the magnificent monologues which the composer has provided

for him, the chief interest is centered in the chorus. The introduction of the third scene suggesting the bells of the Kremlin is strangely prophetic of the music of the ultra-modern

French composers. This, and the great choruses in the first, third and last scenes, and the song of the hostess of the Inn, folklike in character, may be singled out as the finest portions of the work. Lewis M. Isaacs.

BORISSOGLEBSK, bo-re'so-glepsk, Rus¬

sia, a town in the government of Tambof, 120

miles south of the town of that name, and capital of the government. _ It has a good harbor which greatly aids its commerce. It

has a school for railway mechanics. Through its rail and water connections (canal and river) it ships quantities of grain, lumber, petroleum, fish and caviar to Moscow, Petrograd and other points. It was founded in 1646 as an outpost to hold back the Crimean Tartars. •

BORISSOV, bo-re'sof, Russia, a town in

the government of Minsk, 50 miles northeast of the town of that name, on the left bank of the Beresina. Not far from it took place the disastrous passage of the Beresina by the

French in 1812. Its principal manufactures

are flour and tobacco and there is a large trade in grain and live stock. The town dates from the 12th century and has been in Russian

hands since 1795. Pop. 15,000, mostly Jews.

BORJESSON, ber'ye-son, Johan, Swedish

poet and dramatist: b. Tanum, 22 March 1790; d. Upsala, 5 May 1866. From 1828 until his death he was pastor of the church of Week-holm near Enkoping. His first and best drama (Erik XIV* (1846; German translation by

Winterfeld 1855) was succeeded by others in which Shakespeare's influence is clearly traced.

His poems appeared as (Karlek och poesP

(1849), and (Blommor och tarar pa en dotters graP (1854) ; his collected works, edited by Dietrichson (Stockholm 1873-74).

BORLAND, Solon, American senator : b.

Virginia 1811; d. Texas, 31 Jan. 1864. He was educated in North Carolina, studied medicine and settled in Little Rock, Ark. During the Mexican War he served as major in Yell's

cavalry, and was taken prisoner in January

1847. After his discharge in June 1847 he

served as a volunteer aide to General Worth until the end of the campaign. After serving in the United States Senate (1848-53), he was ap¬

pointed Minister to Central America. When

returning to the United States after his resig¬

nation he was assaulted at San Juan de Nica¬

ragua for interfering to prevent the arrest of a person charged with murder at Puntas

Arenas. For this insult the sloop-of-war

Cyane bombarded and destroyed the town,

under instructions from the United States

government, 13 July 1854. During the Civil

War he was a brigadier in the Confederate

service, and before his State seceded, raised troops and seized Fort Smith, by order of

Governor Rector, 24 April 1861.

BORLASE, William, English mineralogist

and antiquarian: b. Pendeen, Cornwall, 1696; d. 1772. He studied at Oxford, entered orders and became successively rector of Ludgvan

and vicar of Saint Just. The richness of Corn¬

wall in mineral products and antiquities gave a direction to his studies, and he began making collections with the view of afterward giving a description of his native county. In 1750

he was elected a fellow of the Royal Society, to which he had communicated a valuable

paper on the spars and crystals of the Cornish mines, and for many years after he continued to write in its transactions.) In 1754 he pub¬

lished his (Antiquities of Cornwall, J and in 1758 he completed the work by publishing his (Natural History of Cornwall. } He kept up a correspondence with the most eminent men of his day, and was on intimate terms with Pope, whom he furnished with materials for his

grotto at Twickenham. Dr. Borlase's name,

formed out of crystals, is still to be seen there.

BORMANN, bor'man, Edwin, German

poet : b. Leipzig, 14 April 1851 ; d. 1912. He was educated at the Polytechnic Institute of Dresden, and at Leipzig and Bonn. His first success was won by a series of humorous

poems in the Saxon dialect which appeared in the Fliegende Blatter. In the last 20 years of his life he published several works in sup¬

port of the Bacoqian origin of Shakespeare's plays. His other works are in High German ; 276

they include (Seid umschlungen, Millionen)

(1879); a book of humorous songs, (Schel—

menlieder) (1883); (Das Biichlein von der

schwarzen Kunst,} (1886) ; (Liederhort in Sang und Klang) (1888) ; (Klinginsland, Minne-lieder und Spielmannsweisen) (1891); (Das

lustige Buch) (1900) ; (Ut de Franzosentid) (1905).

BORMANN, Eugen, Austrian classicist

and epigraphist : b. Vienna 1842. Professor

of classical philology, ancient history and

epigraphy in Vienna, he is author of (Fastorum Civitatis Tauromenitanae Reliquiae Descriptae et Editae) (1882) ; (Inscriptiones 2Emiliae Etruriae Umbriae Latinae) (1888) and with O. Benndorf of (Archaologischepigraphischen Mitteilungen

des Oesterreich-UngariP (1885). He was as¬

sociate editor of the monumental (Corpus Inscriptionum LatinarumP and corresponding

member of the Imperial Academy of Sciences, Vienna.

BORMIO, bor'me-o (Ger. Worms,

voormz), Italy, town in Lombardy, near the

Adda in the province of Sondrio ; pop. about 2,000. *In its vicinity are the salt baths called Bagni di Bormio, much frequented by tourists.

These baths were known to Pliny and the

remains of Roman bathing establishments may

still be seen. The temperature is 99° 5'. Bor¬

mio is distant 20 miles from Tirano, the nearest railway station. General Dessolles achieved

here a victory over the Austrians, 26 March 1799. The beautiful galleries of the road

which leads over the Wormser Joch (an Alpine mountain), from Tyrol to Italy, were destroyed by the Italians in 1848.

BORN, born, Bertrand de, French trou¬

badour and warrior: b. in the Castle of Born, Perigord, 1140; d. about 1209. He dispossessed his brother of his estate, whose part was taken by Richard Cceur de Lion in revenge for De Born's satirical lays. Dante places him in the (Inferno) (XXVIII) because his verses in¬

tensified the quarrel between Henry II and his sons. There are two editions of his works by Stimming, A. (Halle 1879) ; Thomas, A.

(Toulouse 1888). Consult Diez, (Leben und

Werke der Troubadours) (Zwickau 1829, pp.

179-233) ; Barlow, H. C., (The Young King

and Bertrand de Born) (London 1862) ;

Cledat, (Du role historique de Bertrand de

Born) (Paris 1879).

BORN, Ignaz von, Austrian metallurgical

expert and technical author : b. Karlsburg,

Transylvania, 1742; d. 1791. He pursued legal studies at Prague but entered the department of mines in 1770 and in 1776 was appointed

curator of the imperial mineralogical collec¬

tions in Vienna. He introduced numerous

practical improvements in mining, salt working and chemical bleaching, among others amalga¬

mation for smelting, and cupellating for ex¬

tracting silver. His principal writings are

(Lithophylacium BornianunP (2 vols., 1772—

75) ; (Ueber das Anquicken der Erze) (1786) ; <Bergbaukunde> (2 vols., 1789-90).

#•

BORNE, ber'ne, Ludwig, German political

writer and satirist: b. Frankfort-on-the-Main, of Jewish parents (his real name was Lob

Baruch), 6 May 1786; d. Paris, 12 Feb. 1837.

He founded, and for three years conducted

(1819-21), Die Wage, a journal devoted to

civics, science and art. Of his numerous

satirical sketches, all full of humor and wit, these are perhaps the most brilliant: Mono¬

graph on the German Postal Snail,) (The Art of Becoming an Original Author in Three

Days,* Memorial Address to Jean PauL ; and Menzel, the French Devoured (Franzosen-fresser). Fierce animosity toward the dynas¬

tic policies of Germany permeated whatever

he wrote ; even his literary and dramatic criti¬

cism was biased by this passion. He and

Heinrich Heine were in bitter antagonism.

His Complete works, > in 12 volumes, were

published in 1863.

BORNEENE. See Borneol.

BORNEIL, Giraud de, zhe-ro de bor-na-e,

a Provenqal troubadour of the 12th century : a native of Exideuil, Dordogne. His contem¬

poraries bestowed on him the sobriquet

“Master of Troubadours.)} Some 80 of his

songs are extant ; among them the charming

song of the morning, “Alba.®

BORNEMANN, Ferdinand Wilhelm

.Ludwig, German jurist and peer: b. Berlin

1798; d. 1864. One of the chief authorities on Prussian civil law, he was the author of

(Systematische Darstellung des preussischen

Civilrechts) (6 vols., 1834—39) and of (Die Rechtenwicklung in Deutschland und deren

ZukunfD (1856). After serving as Minister

of Justice in the Camphausen cabinet, and as second president of the Superior Court at

Berlin in 1848, the following year he was

elected member of the First Chamber of the Prussian Diet and in 1860 of the House of Peers.

BORNEMANN, Wilhelm, vil'helm bor'neman, German dialect poet: b. Gardelegen 1766; d. 1851. He is one of the foremost representa¬

tives of modern Low German poetry. His

works are (Low German Poems) (1810), re¬

published in a 10th edition in 1891 ; (Pictures of Nature and the Chase) (1829) ; (Humorous Hunting Songs. >

BORNEO (a corruption of Burni, and

this from Beruni or Bruni, the capital of the ancient sultanate of Bruni), the great island of the Malay Archipelago, and the second

largest island in the world, following New

Guinea. It is rudely triangular in outline, with the apex toward the north. It has the Sulu Sea and the Strait of Macassar on the east, the Java Sea on the south, and the South China Sea along the northwest. It lies between 7° N. and 4° 20' S. lat., the equator crossing it at about its widest part, and so that about two-thirds of its area lies in the northern hemisphere. Its greatest length is about 850

miles, and its greatest width about 600 miles, and its total area is about 290,000 square miles.

Political Divisions. — Having never en¬

joyed a political entity, the island of Borneo has not had a native name. The title Borneo or Burnei (Brunei) in fact properly applied only to the Malay kingdom on the northwest coast ; and Kalamantan or Kalamantin, some¬

times quoted as a general appellation, is also of limited purport. Borneo originally included

nearly the whole of the northwest of the island.

The Sultan had absolute authority. In 1847 he undertook not to surrender any of his territory to any other power without the sanction

British government. Its area was reduced to about 4,000 square miles by the erection of Sarawak, toward the southwest, into a prac¬

tically independent principality by Sir James Brooke (1841-68), and by the establishment of the British North Borneo Company as a recog¬

nized governing body. The company's charter, granted in 1881, transferred to them rights originally obtained by an American in 1865, and they successfully appropriated and de¬

veloped on the northeast of Brunei a territory having an area of 31,106 square miles, with a coast line of 900 miles. This is now divided into the East Coast Residency and the prov¬

inces of Dent, Keppel and Alcock, and has its capital at Elopura or Sandakan, the largest settlement, with 5,000 inhabitants. Sarawak

has an area of about 42,000 square miles, and a mixed population numbering about 500,000.

The three states, British North Borneo, Brunei and Sarawak are under British government or protectorate and constitute British Borneo.

They comprise about one-fourth of the total area of the island. The remaining three-fourths — about 212,737 square miles — is ruled directly or indirectly by the Dutch, who have divided it into the residency of the Western division of Borneo, with a population of 450,930, and that of the Southern and Eastern Borneo, with a combined population of 782,722, the former

having Pontianak as the seat of government, the latter Banjermassin. Besides a number of smaller dependencies, the western division con¬

tains the kingdom of Landak, Tayan, Mampawa, Sukadana, Simpang, Matan, Sekadow,

Sintang and Sambas. Among the separate

states which go to form the southern and

eastern divisions are Kotaringin, Banjermassin and Martapura. In consequence of a decree of the Sultan of Banjermassin, the district

watered by the Great Dyak or Kahayan is pre¬

served for the native tribes, who in 1879 were estimated at 18,000 souls ; Chinese, Malays, etc., are forbidden to ascend the river higher than the Kanpore Pilany. The same is the case

with the basins of the Kapuas, Mururg, known as the Little Dyak district. The population of the whole of the Dutch portion of the island is estimated at 1,280.000, of whom about 1,600

are Europeans, 56,000 Chinese, 3,300 Arabs and miscellaneous Orientals. Among the so-called

natives are included from 200,000 to 300,000

Malays settled along the coast, who used, for¬

merly, to be counted among the strangers. The island of Labuan, off the coast of Brunei, has belonged to the British since 1846.

Topography. — Although the neighboring

islands are distinctly of volcanic origin,

Borneo consists of ancient igneous rock masses, showing small traces of volcanic activity.

With the exception of Kina Balu (13,700 feet), the principal mountains form several massive chains with here and there a peak rising to nearly 10,000 feet above the sea level, the ele¬

vations diminishing toward the southward.

Chief among these is the Tibang-Iran chain

which constitutes the backbone of the island, ranging irregularly southwestward through its northern half, and continued south of the

equator by the Schwaner range. Batu-Tibang

(9,800 feet) is the highest peak of the former, and 5.300 feet is the highest elevation found in the latter. A second chain crosses the island

from cast to west about 60 miles north of the equator. These two chains practically divide the island into four main watersheds. The

northwestern basin constitutes the territory of British Borneo. The other three basins com¬

prise Dutch Borneo. In almost all sections of the island the land along the coast line is a low swampy belt, made up of the alluvial wash of the central highlands. This belt is from 10 to 50 miles in width, the larger extensions being found in the southern section, and upon the southerly portion of the east coast. Be¬

tween the swampy coast lands and the interior heights lies an irregular zone of hill country with an average elevation of 1,000 feet above the sea, and having occasional peaks rising to 5,000 and even 6,000 feet. These uplands are of blue metamorphic limestone overlaid by a thick series of sandstones, conglomerates and clay shales. Piercing these are dykes of gran¬

ite and porphyry. The upper layers have, in many places, been worn away, leaving exposed solitary crags of limestone. It is believed that up to a recent period of geologic time Borneo was a part of the mainland of Asia. This

theory receives confirmation in the fauna of the island, which includes many species of

Asiatic animals, notably the rhinoceros, the elephant, certain wild cattle, several species of deer and swine, the tiger cat and civet cat, with others of the cat tribe, the small black bear, the scaly anteater, several Asiatic lemurs and monkeys, and of greater significance than all, two of the anthropoid apes — the gibbon and the orang-outang. The prevalence of

volcanic activity past and present in the

archipelago offers a highly probable explana¬

tion of a subsidence which carried down the connecting country, of which Java and Sumat¬

ra also were highlands. It has been established that these three islands rest upon a submarine bank about 500 to 600 feet below the present sea level, and a little east of Borneo the sea bottom plunges down abruptly to a great

depth. It is evident that before the alluvial plains were formed, Borneo must have pre¬

sented an outline not unlike that of Celebes and Gilolo, a group of peninsulas radiating from the central highland.

Borneo is the best watered country in the

world ; on every side there are numerous rivers with abundant flow. Most of them, however,

are partially obstructed by mudbanks and

stranded tree-trunks and they carry a heavy burden of silt, which is deposited in great deltas at the sea line, thus continually extend¬

ing the alluvial swamps which border the

island. Owing to the great width at their

mouths some of the rivers have tidal bores which heap up bars and shoals at the entrances from the ocean. The largest river of British Borneo (the northwestern basin) is the Rejang, navigable by small steamers for 170.

miles. It issues into the sea by five mouths, forming with the Igan a delta covering 1,200

square miles. In the southwestern section is the Kapuas River, longer than the Rejang and with a delta 70 miles across. In the south¬

eastern basin the largest river is the Barito : in the rainy season the delta of this river cov¬

ers 11,000 square miles. In the eastern basin the most important river is the Koti or Ma-hakkan, also with an extensive delta. Nearly all of the 40 rivers which empty into the sea are navigable for many miles with vessels

drawing not more than 12 feet of water. As far up as the foothills the rivers are practi¬

cally without current, but in the hilly section they are a succession of great rapids and cat¬

aracts. Above this first barrier, however, in many cases there are long stretches of slug¬

gish water available for local navigation.

There are many lakes in the numerous val¬

leys, but none remarkable for unusual size.

The great Kina Balu lake of the early ex¬

plorers, if it ever existed, cannot now be found.

Climate. — The climate of the whole island

is warm and humid and very equable. Snow

is sometimes seen upon the tops of the high¬

est mountains. The rainfall is very abundant throughout the year, but somewhat heavier

from October to February and least during

April and May. The maximum record has

been 225 inches and the minimum 102 inches, with 160 inches as the average. The largest month's record is 69 inches and the largest day's record 15 inches. Thunder storms are

frequent and of great severity, but wind

storms are rare. The temperature ranges nor¬

mally between 72° and 93° F., occasionally

reaching 100°, but the heat is tempered by the sea breezes, which, however, do not penetrate the forests. The continuous heat and mois¬

ture promote the decomposition of the vege¬

table debris in the marshes and forests, with the production of poisonous miasmas, render¬

ing many parts of the island very unhealthful, particularly for white men.

Population. — The population of the entire

island numbers about 1,845,000 according to

conservative estimates — there has never been a census. Of the whole, only about 3,500 are Europeans. The bulk of the population con¬

sists of three classes, the Dyaks or Dayaks, who are the aboriginal heathen inhabitants and con¬

stitute the great majority; the Mohammedans

or Malays — for this name is extended so as to include all professors of Islam, whether true Malays, Buginese, Javanese, Dyaks, or Arabs; and the Chinese. The Dyaks are of two groups ; those of the coast country and those of the interior. The former have a strong admixture of Malay blood with some Chinese and Buginese strains. They are less nomadic in character than the purer race of the interior and carry on a certain amount of trading with the coast dwelling Malays with whom they fraternize.

They are energetic and successful fishermen.

The Dyaks of the interior employ themselves with hunting and tillage, and the collecting of gutta-percha, rubber, resin, gums, rattans, gold dust and wax. They are diveded into numerous tribes. The pure Dyak has a physique superior to the Malay races. They have regular features skin of a clear yellow tint, a flat nose and prominent lips. While some of the coast Dyaks have become Mohammedans, those of the in¬

terior have a peculiar religion which includes a supreme creative spirit and a multitude of evil spirits. They regard all animated nature as souls with a mortal envelope. The practice of head-hunting has been

subdued in the coast dwellers, but still exists in the interior. The Malays (taking the name ethnographicallv)

dwell on the coast, are traders and bold sailors.

They are more civilized than the Dyaks, culti¬

vate the grounds around their houses, lay out gardens, keep cattle and live partly by fishing.

The Chinese, chiefly from Canton, have pene¬

trated far into the interior. They engage in trade and mining, are unwearied in their efforts to make money, and then return to their native country. They have always endeavored to live as independent communities (kong-si) under

chiefs chosen by themselves, and according to Chinese laws. In 1857 the Chinese living in Sarawak rebelled, and were nearly extermina¬

ted. The Dutch were also compelled to put

them down by force of arms, and have imposed a poll tax. The women of Borneo, except the Dyak, weave cotton fabrics, make earthenware, baskets and mats of beautiful designs and

colors. In the district of Banjermassin are factories of weapons. The principal exports

are gold, gold dust, diamonds, coal, petroleum, rattans, rubber, edible nests, wax, timber, dyewoods, mats, resins, sandalwood, camphor,

cutch, copra, dried fish, sago flour, trepang, gambier, *etc.* ; the imports, earthenware, iron, steel and copper work, piece-goods, yarns,

woolen and silk fabrics, medicines, provisions, wines, spirits, rice, flour, sugar, tea, tobacco, opium, gunpowder, *etc.* There is one railway in Borneo, running out of Brunei. With its

branches it extends about 130 miles. Practically all transportation is carried on by boats.

Products. — Practically the whole of Bor¬

neo, even the tops of the highest mountains, is covered with dense forests standing, for the most part, in carpets of thick moss. On the lower levels the trees reach to heights of 150

to 200 feet ; on the highest mountains they are somewhat stunted. Nearly 500 distinct species of trees have been recognized, and many of them yield valuable timber. Some varieties are so hard and close-grained that they will not float in water. Among the most important of the forest products are ironwood, bilian, teak, ebony, sandalwood, gutta-percha, dyewoods,

benzoin, wax, dragon's-blood, sago, rattans,

various resins, oil nuts and gums. The cam¬

phor of Brunei is the best in Asia. The

mohor-tree, well adapted for making native

boats, attains a height of 80 feet, and the kala-dang, suited for large masts, of 200 feet. Nut¬

megs, cloves, cinnamon, pepper, betel, ginger, rice, millet, sweet potatoes, yams, cotton in Amuntai, sugar-cane in Sambas and Montrado,

indigo, tobacco, coffee in Sambas, pineapples, cocoanuts, etc., are cultivated. The mountains and forests contain many monkeys, among which is the orang-outang. Tapirs, a small kind of tiger, small Malay bears, swine, wild oxen or banteng and various kinds of deer abound, and panthers are very numerous. The flying fox

and flying squirrel are plentiful. The elephant is found only in the north and the rhinoceros in the northwest. The rhinoceros and wild

cattle, however, have nearly disappeared and the orang-outang would be extinct if it were not for government protection. The few

domesticated animals are water buffaloes, sheep, goats, dogs and cats. A few horses are seen in Banjermassin. Among the birds are eagles, vultures, argus pheasants, peacocks, flamingoes, pigeons, parrots, and also the swifts (Collocalia esculenta) which construct the edible nests prized by the Chinese for making soup. The rivers, lakes, and lagoons swarm with croco¬

diles, and many kinds of snakes, including a 20-foot python, frogs,

lizards and leeches. Fish is plentiful, including mackerel, herring, barbel, soles, mullet, crabs and shrimp, and the coasts BORNEOL

arc rich in tortoises, pearl mussels, oysters, and trepang. Brilliant butterflies and moths are in great variety, and swarms of mosquitoes and sting flies. Ants, scorpions and centipedes

abound, and the jungles are noted for the din created by the multitudes of noisy insects and frogs. Among the mineral products are bi¬

tuminous coal, gold and copper, especially in Montrado ; large quantities of antimony, iron, tin, platina, nickel, arsenic, mercury, diamonds and other precious stones, rock crystals, porce¬

lain clay, petroleum of good quality and sul¬

phur. The diamond mines are chiefly in Landak and Pontianak; Sambas produces the

greatest quantity of gold; the kingdom of

Brunei, Kute'i and Banjermassin, the largest amount of coal. The Pengaron coal field

worked by the Dutch government, is one of

the most important.

History. — Borneo was engaged in com¬

merce with China as early as the 5th century, but it is not certain that the Chinese had settlements there until the 12th century. The Malay kingdom of Borneo proper dates back

to the 13th century. Later, Brunei and the Sulu Islands were joined under one sultan

who was first resident at Brunei, and afterward at Sulu. Another

Malay settlement of later

origin, Sambas, was at first dependent on

Johore in the Malay Peninsula. Sukadana was founded by Hindu Javanese from the kingdom

of Majapahit (see Java) and spread its in¬

fluence on the whole southern part of the west coast. Mampawa was a Buginese settlement,

and Pontianak was founded as late at 1771 by a colony of Arabs, Malays and Buginese. Islam began to be preached by Arabs from Palem-bang in the 16th century.

The Spaniards first visited Borneo in 1521

landing at Brunei, and in 1576 sent an armed force to take possession of that kingdom. The Portuguese came in 1526, and after 1530 kept up regular communication with Brunei for

many years. In 1609 they effected a settlement at Banjermassin ; .from thence they were, how¬

ever, soon expelled. The Dutch succeeded in concluding a treaty of commerce with the

princes of Banjermassin. They erected a fort and factory in 1643, and a second in 1778 at Pontianak. They resumed attempts at colon¬

ization in 1816, meeting the opposition of the Chinese who had established themselves near

the mines of Landak and Montrado on the east coast. A war finally ensued (1853-56) result¬

ing in victory for the Dutch, who gradually extended their possessions by conquest and

treaty. The British made unsuccessful attempts in 1702 and 1774 to effect a settlement in Bor¬

neo, but during the 19th century they acquired a preponderating influence on the northwest

coast. They drove off the Spaniards and for some time disputed with the Dutch for exclu¬

sive possession of the island. The struggle ended in 1892 with an agreement which divided the island according to the boundaries which now obtain.

BRITISH NORTH BORNEO.

British North Borneo comprises the north¬

ern tip of the island of Borneo — a triangular area of about 31,100 square miles. Along its base it has Brunei on the southwest and the eastern division of Dutch Borneo on the south¬

east. A large part of the terrain is covered with jungle, but the interior is mountainous and includes the highest land on the island. The population was officially estimated in 1911 at 208,183, of which 26,000 were Chinese, 5,700

Filipinos, 5,500 East Indians, 1,600 Malays and 355 Europeans. Of the 170,000 natives, the

Dusuns numbered about 88,000; the Muruts,

25,300, and the Bajaus, 22,600. The chief town is Sandaken, with a population of about 6,000.

The. territory is under the jurisdiction of the British North Borneo Company, and is held

under grants from the Sultans of Brunei and Sulu. It is administered by a governor resi¬

dent in Borneo and a council of directors in London. Since 1888 the state has been under a protectorate of the British government. For purposes of administration the territory is di¬

vided into five residencies, and these are sub¬

divided into districts, each controlled by a jus¬

tice of the court.

A railway 130 miles in length runs from a point on Brunei Bay northward along the coast for a short distance and then into the interior.

There are a telegraph line and several wireless stations. Most of the trading is carried on through Singapore and Hongkong. The an¬

nual tonnage of shipping entering the ports of the territory is about 290,000. For the year 1915 exports amounted to $4,109,425, and im¬

ports to $2,488,785. The exports were princi¬

pally: rubber, $1,306,771 ; tobacco, $1,311,234; timber, $461,925; coal, $184,096; cutch, $163,410; fish, $121,756; gum damar, $78,279; copra, $49,-

835; rattan, $49,258; birds' nests, $43,877, and camphor, $30,453. The chief imports were :

rice, flour and grain, $621,063; cloth, $283,190; provisions, $202,862; treasure, $201,384; iron¬

ware, $126,630; tobacco, $107,501 ; machinery and vessels, $103,631 ; spirits and wine, $93,280; sugar, $85,690; opium, $65,956, and kerosene oil, $63,693. A very small amount of the foreign trade of Borneo reaches the United States : in 1915 the value of such exports was $17,364. To the Philippines the exports were valued at

$58,277. Mail to or from the United States via Hongkong requires one month for transit;

if via Singapore, two months.

Bibliography. — Cabaton, A., (Java and the

Dutch East Indies* (London 1911) ; Furness, W. H., 'Home Life of the Borneo Head Hunt¬

ers* (Philadelphia 1902) ; Gould, S. B., and Bampfylde, A., (History of Sarawak) (London 1909) ; Hose, C., and McDougall, W., (The

Pagan Tribes of Borneo) (London 1912) ;

Molengraaff, G. A. F., (Borneo-Expedition :

Geological Explorations in Central Borneo) (2

vols., Leyden 1902) ; Walker, H. W., (Wanderings among the South Sea Savages) (London

1909).

BORNEOL, or BORNEO CAMPHOR,

a crystalline organic compound, often used as a substitute for common or laurel camphor.

Borneol is obtained from a tree indigenous to Sumatra, Borneo and Labuan, being deposited

in crystals in cracks in the wood. To obtain it the tree is cut down and the longitudinal fis¬

sures are opened and the camphor removed.

Large trees often yield from three to 11

pounds ; and owing to the reckless manner in which the trees have been destroyed without the planting of others, the Sumatran forests now contain few that are worth working.

Borneol has the chemical formula CtoHn.OH,

and it may be prepared from common camphor by the action of reducing agents. It is not so volatile as common camphor, and is also hard¬

er. It is but slightly soluble in water, although it dissolves freely in

alcohol and ether. When distilled with phosphorus pentoxide, borneol is converted into one or more terpenes, prominent among which is borneo-camphene or borneene

(CioHis). Pure borneol sinks in water, while common camphor floats.

BORNET, bor'nae, Jean Baptiste Edou¬

ard, French marine botanist: b. Guerigny,

Nievre, 1828; d. 1912. After studying medi¬

cine and botany in Paris, he went to Cherbourg with Thuret where they interested themselves chiefly in the study of marine algae. His prin¬

cipal works, some in collaboration with Thuret, are (Recherch.es sur la structure de l'ephebe pubescens) (1852) ; Recherches sur la fecon-dation des Floridees> (1867) ; Recherches

sur les gonidies des Lichens> (1873) ; (Notes algologiques, recueil d'observations sur les

Algues) (1876-80) ; (Les algues de Schonsboe) (1892), and in collaboration with Flahault, Re¬

vision des Nostocacees heterocystees) (1886-88).

BORNHOLM, a Danish island in the

Baltic Sea, nearly surrounded with rocks ; situ¬

ated in lat. 55° 10' N. ; long. 15° E. ; about 24

miles long and 16 broad; pop. 41,364. It is stony but fertile; yields oats and butter; has excellent pastures ; and also mines of coal, marble quarries and fisheries. The island has long been famous for its rock-crystals. The capital, Ronne, on the west coast has over 8,000

population, and is connected by a railroad 22

miles long with Nekso on the eastern coast. It fell into Danish possession about 1000 a.d., but was taken by Liibeck in the 16th

century, and finally regained by Denmark in 1660.

BORNIER, bor-ne-a, Henri (Viscomte

de), French dramatist: b. Lunel, 25 Dec. 1825; d. Paris 1901. He was educated at Montpellier and came to Paris to enter on the study of law.

He published Rremieres feuilles) about 1845, and his play, (Le mariage de Luther,* was

accepted by the Comedie Frangaise in the same year. He soon after began his long connection with the Bibliotheque de 1' Arsenal, becoming its administrator in 1889. In 1893 he became an Academician. His plays are notable for splen¬

dor of diction. They include (Le monde renverse* (1853); (Dante et Beatrice* (1853);

(Agamemnon) (1868) ; (La fille de Roland*

(1875); R'apotre* (1881); <Mahomet* (1890);

(Le fils de l'Aretin* (1895). He also is the author of several successful novels and ro¬

mances and numerous poems.

BORNITE, a native sulphide of copper and

iron, containing these metals in various propor¬

tions. The mineral crystallizes in the isometric system, and its crystals have the formula

3Cu2S.Fe2S3. It is reddish brown in color when freshly broken, but speedily takes an iridescent tarnish. Tts hardness is 3, and its specific grav¬

ity from 4.9 to 5.4. The massive varieties con¬

tain from 50 to 70 per cent of copper, and the mineral constitutes a valuable ore of that metal.

Bornite occurs abundantly in a copper-mine at Bristol, Conn. Bornite occurs in many western copper mines, as at Butte, Mont., and in Colo¬

rado, bp5ng at tiroes frghly argentiferous. It abounds in Chile, Peru, Mexico, Canada and

many other countries.

BORNOU, or BORNU, formerly a Su¬

danese kingdom. The native independent state had an area of about 50,000 square miles, one portion of which is now included in northern Nigeria (British) and other portions to Ger¬

many and France; lying between lat. 10° and 15° N., and long. 12° and 16° 30' E. From March to July the heat is extreme, the ther¬

mometer rising to 107° and rarely falling below 86° F. ; during this time scorching winds from the south prevail. As in other tropical coun¬

tries the seasons are divided into the dry and rainy: the latter continues from March to Oc¬

tober, when the air becomes milder and fresher.

The country is populous, containing 13 princi¬

pal towns. These are generally large and well built, with walls 40 feet high and about 20 feet thick. The houses consist of several court¬

yards, with apartments for slaves, habitations for the different wives and several turrets con¬

nected by terraces, forming the apartments of the owner. The Bornou people, or Kanuri,

have negro features; they are peaceable and industrious, practising agriculture and various mechanical arts. The government is an abso¬

lute monarchy, with certain constitutional

forms, and the Sultan of Mai can, it is said, muster a well-equipped army of 25,000 or 30,000

men, partly cavalry, armed with musket, rifle, sabre, *etc.* Indian corn, cotton and indigo are the most valuable productions of the soil.

Fruits and vegetables are also raised. The do¬

mestic animals are asses, camels, horses, dogs, sheep, goats and oxen. Lions, leopards, hyenas, jackals, elephants and buffaloes roam the for¬

ests. The crocodile and hippopotamus are

considered a luxury. The ostrich, pelican,

crane and guinea-fowl abound. Locusts often

appear in great clouds, and are eaten by the natives. The capital until 1908 was Kuka, near the shore of Lake Chad. Its population is

about 60,000. The present capital is Maidugari, where the Sheku, or native ruler resides. In the 12th century Bornou was invaded by the Mohammedans, and a fierce struggle ensued

for 200 years in which the natives were brought completely under the Moslem yoke. The king¬

dom prospered and reached its greatest degree of expansion toward the close of the 16th cen¬

tury, after which a decline set in. The Fel-latahs conquered it early in the 19th century, but were expelled by Mohammed el Kanemi,

who set up his government at Kuka, and took the title of Sheik. His son Omar succeeded him and he in turn was succeeded by Abu Bekr in 1882. Barth, Nachtigal and other travelers are about the sole sources of our information of Bornou and its people. Pop. about 5,000,000.

BORO BUDDOR, bo-ro bood-or, or

BORO-BOUDOUR (the «Great Buddha»),

the ruin of a temple in Java, near the junc¬

tion of the Elio and Progo, the most elaborate monument of the Buddhist style of architecture anywhere existing. Javanese chronicles assign the building to the 7th century, but these docu¬

ments were composed long after the events de¬

scribed and are to a large extent fictitious. Dr.

C. Leemans, in his valuable Roro-Boudour

dans Lisle de Java* (Leide 1874), expressed the view that the construction of this temple falls % the 9th, perhaps even the 8th century, after BORODIN - BORON

Christ.® It rises from a low hill between four vast volcanoes which supplied the blocks of trachyte of which ihe edifice is built ; its height to the cupola is 118 feet. It is a pyramid of a square form, each side at the base measuring 600 feet, and consists of seven walls, which are built like the steps of a stair, up a hill. Between the walls are narrow terraces running round the building; in each is an arched doorway leading to the next higher terrace. These walls are richly ornamented with statuary. Outside are over 400 niches topped with fantastic domes, and each occupied by a large statue of Buddha.

Between each of these are bas-reliefs, including figures of the god seated, and architectural or¬

naments and carvings of all sorts. Below the niches, on the lower story, is an immense bas-relief running round the whole building, rep¬

resenting scenes from the life of Buddha and religious subjects. The inner faces of the

building are also profusely ornamented with

bas-reliefs, representing battles, sea-fights, pro¬

cessions and chariot races, carried to an extent unrivaled by any other building in the world.

Of the large reliefs alone there are over 2,000; and most of them are as vigorously designed as they are carefully executed. Within the

upper square terrace are three circular ones, the outer ornamented

with 32, the next with 24 and the upper with 16 small bell-shaped shrines (daqops), each containing a seated statue of Buddha, which can be seen through the open works of their roofs. The whole is surmounted by a cupola, the principal and probably the most ancient part of the structure. It is now empty, a sunken chamber, 10 feet deep, representing what was, no doubt, a dog op intended to contain the precious relic for which this splendid tem¬

ple was erected. The niches containing the

cross-legged figures have been supposed to be a copy, in durable architecture, of the cells of a Buddhist monastery, each occupied by a shaven priest ; the cupola is rather to be classified with the topes or stupas of Afghanistan. The struc¬

ture is thus a compound of a tope with a copy, in durable architecture, of the frail cells of a vihara.

BORODIN, bo-ro'den, Alexander Por—

firyevich, Russian composer: b. Saint Peters¬

burg, 12 Nov. 1834; d. there, 27 Feb. 1887.

He studied medicine and chemistry and was

made professor of chemistry at the Medico—

Surgical Academy of Saint Petersburg and in that capacity took a prominent part in pro¬

moting the higher education of women and

gave them gratuitous instruction in medicine.

He was at the same time an excellent musician, one of the chief representatives of the new Russian school. His chief works are two sym¬

phonies and (In Central Asia,> (<a musical pic¬

ture,)} and the most widely popular of his works.

His opera, (Prince Igor,> which he had not completed at his death, was finished by Rim¬

sky-Korsakoff and Glazounoff, and was

brought out in Saint Petersburg in November 1890. An English translation by R. Newmarch of his <Life) by Habets appeared in

1897.

BORODINO, bo-ro-de'nd1, Russia, village

70 miles west of Moscow, on the Kaluga, an affluent of the Moskwa. It gave name to the great battle fought between the French army under Napoleon and the Russians under Kut-usoff, 7 Sept. 1812. The battle of Borodino was one of the most obstinately disputed in history and the loss on both sides was almost equally great. Out of 257,000 men engaged,

between 70,000 and 80,00 were killed and

wounded. The Russians retreated on the fol¬

lowing day, but in the most perfect order, and therefore claim this battle as a victory and in 1839 erected a splendid mausoleum on the battlefield. The French, who name the battle from the Moskwa, have always maintained a

similar claim, which it is difficult to deny them as they took possession of the battlefield and subsequently advanced on Moscow. Marshal

Ney received the title of Prince of Moskwa.

For a good description of the battle consult Tolstoi's (War and Peace) (Eng. trans. by

Leo Wiener).

BOROGLYCERIDE, or BOROGLYC¬

ERINE, -glis'- (from (<boron® and ((glycerine®), an antiseptic substance, soluble in al¬

cohol and in 40 parts of water and containing about 25 per cent of borate of glycerine

(C3H5BO3), the remaining 75 per cent con¬

sisting of free boracic acid and glycerine in equivalent proportions. It is prepared by

heating together 92 parts of glycerine with 62 parts of boracic acid at a temperature of 360° F. Boroglyceride is considered harm¬

less and is used in the preservation of fruits and wines and other articles of food.

BORON (from ((borax®), one of the non-metallic elements. In nature it is never found in the uncombined or elementary statft, though it occurs abundantly in combination with other elements, especially in regions that are or have been volcanic. The principal com¬

pounds of it that are found in nature are borax and boracic acid (qq.v.). It is a con¬

stituent of numerous other minerals, but most of these have but little commercial importance.

Boron was first obtained in the elementary

state about the year 1808 by Gay-Lussac and Thenard in France and by Sir Humphry Davy

in England. Gay-Lussac and Thenard pre¬

pared the element by heating boracic acid very strongly until all its water was expelled and then heating the resulting substance (now

known as boric oxid) with metallic potassium.

The potassium removed the oxygen from the

boric oxid, setting the element boron free.

When thus prepared boron is an opaque amor¬

phous powder of a greenish-brown color. It

has neither taste nor odor, but it stains the fingers strongly. Owing to its finely divided condition it is apt to take fire spontaneously; but if it is consolidated by pressure it is not affected by the air at common

temperatures, though it burns with a reddish light when

heated. It is not affected by water save that water will dissolve a slight amount of it when it is freshly prepared. Strong nitric acid will dissolve it in the cold and hot sulphuric acid attacks it also. It is one of the few sub¬

stances that will combine directly with nitro¬

gen, which it does when heated in that gas.

The atomic weight of boron has not been de¬

termined with satisfactory precision, but

Clarke gives 10.97 as the best result obtainable from the existing data. The amorphous boron described above is soluble in melted aluminum, from which it crystallizes out on cooling.

The crystals so obtained were formerly

thought to consist of pure boron, but it has been shown that they always contain a definite amount of aluminum. These crystals may be

obtained of such hardness that they will

scratch both corundum and the ruby, the dia¬

mond being the only substance that exceeds

them in this respect. The specific gravity of amorphous boron has not been satisfactorily

determined, but it appears to exceed 1.84.

The specific gravity of the crystals obtained as described above is said by Miller to be 2.68. The specific heat of boron varies con¬

siderably with the temperature. At 250° C.

it is .37 and at 1,000° C. it is probably 0.5.

Boron is a non-conductor of electricity.

BOROR6S, bo-ro-rd's', a tribe of South

American Indians of the Tupi or Guarani

stock, variously reported from a few hundred to a thousand, living in southwestern Brazil around the headwaters of the Parana and

Paraguay, the small remnants of a once pow¬

erful race, thinned by old Portuguese slave raids and disease. They live in villages and do some planting, but live mainly by hunting with long bows and bone-tipped arrows. They are exceptionally tall, averaging over five feet eight inches, and athletic, and are reported to practice both polygamy and polyandry, but little is really known of them. Their language is of the Otuquian family. Consult Fric and Radin, in the Journal of the Royal Anthro¬

pological Institute (1906); Chamberlain, in the American Anthropologist (1912) ; also (I

Bororos-Coroadosdel Matto) by the Salesian

missionaries (Turin 1906) ; Cook, in Mis¬

cellaneous Collections) (of the Smithsonian

Institute, Vol. V, p. 50, Washington 1907).

BOROUGH, in England, either an incor¬

porated municipality with an organized gov¬

ernment and a charter of special privileges (municipal borough), or a district which,

either by itself or in conjunction with other boroughs, returns a member of Parliament

(parliamentary borough). The burh (hill)

was originally a hill-fort ; then the settlement around it, with its own court, and head officer called a ((port-reeve.® Under the Norman

kings the port-reeves were replaced by royal officers and the boroughs gradually received special charters and were governed by their leading guilds. As their support came to be needed by the governing factions thev were

given representation in Parliament ; and under the Tudors, especially Mary, small boroughs

in great profusion were created expressly to return members in the government interest.

This practice was put a stop to under Eliza¬

beth. Besides these many of the older bor¬

oughs decayed till they had little or no popu¬

lation, but were allowed to retain their par¬

liamentary power to strengthen the aristocratic and landowning interest, the proprietors of the sites returning whom they chose : these were called <(rotten boroughs,® and the chief was ((01d Sarum® (that is, Old Salisbury),

wdth not a single inhabitant but two members of Parliament. Others had only one. Those

somewhat larger, but still so small as to be.

at the dictation of some one person or family, were called (<pocket boroughs.® The Reform

Bill of 1832 swept away the worst of these anomalies.

In the United States the term is now re¬

stricted to certain incorporated villages below the rank of cities in four States — Connecti¬

cut, New Jersey, Minnesota and Pennsylva¬

nia ; and is practically synonymous with

<(town® in most other States and with <(village®

in Ohio. At the beginning of colonization the natural idea was to transplant the English

borough system to America ; but the condi¬

tions of settlement and government made it

generally inapplicable. In Virginia the term was applied in the sense of ˆparliamentary

borough,® to districts made up of hundreds

and plantations, having representation in the house of burgesses, of which in 1619 there were 11; but the municipal borough did not take root there. Lord Baltimore and William Penn were empowered to establish the latter in their colonies of Maryland and Pennsyl¬

vania ; but the former did not avail himself of it at all and the latter very little, nor his heirs after him. After the Revolution, how¬

ever, the Pennsylvania legislature granted spe¬

cial borough charters freely and in 1834 passed an act empowering courts of quarter sessions to grant them; in 1851 a general act for their creation and regulation was passed. In New

Jersey they were created by special charters as early as the beginning of the 18th century and in 1818 a general act was passed. In Con¬

necticut they have always been created by

the legislature in special acts. In Minnesota and Pennsylvania the boundaries of the bor¬

ough are conterminous with the township,

forming one of the primary county divisions: in Connecticut and New Jersey the borough

is only a village government within a town, which in all cases is a separate body including the borough ; the latter being only the thickly settled portion within the range generally of the postal, fire, etc., departments and gov¬

erned by a warden and burgesses, correspond¬

ing to the mayor and single-chamber council of a city.

A still further extension was given to the term by the New York legislature in 1897,

when the city of Greater New York was con¬

stituted of five ((boroughs® — Manhattan,

Brooklyn, Queens, The Bronx and Richmond.

See Burgh.

BOROUGH-ENGLISH, in law, a mode

of descent in some ancient parishes and man¬

ors, in which the owner's youngest son, or his youngest brother (if he has no issue), is the heir. A posthumous son was entitled to this privilege and dispossessed his elder brother.

One reason assigned for it is that the young¬

est son, on account of his tender age, is not so able to take care of himself as his elder brothers; while Blackstone derives it from

the usages of pastoral life, where the voungesl son remained to look after the household.

Its origin is much disputed, but may be a cus¬

tom of Saxon origin and so named to distin¬

guish it from the Norman customs. It still holds in a few places.

BOROWSKI, bo-roFski, Felix, American

musician, composer and critic: b. Burton, Eng¬

land, 10 March 1872. His father, a Pole, taught him piano and violin and he completed his

studies at the Conservatory of Cologne. He

taught four years in Aberdeen and three years in London, from 1890 to 1897, and in the latter year came to the United States and settled in

Chicago. While acting as professor of compo¬

sition in the Chicago College of Music he be¬

came musical critic of the Chicago Evening

Post and after 1908 wrote the analytical pro¬

grams for the Theodore Thomas orchestral

concerts. He joined the staff of the Chicago Record-Herald in 1909. His compositions in¬

clude numerous works for violin, piano, organ, songs, two orchestral suites, a (Marche Triom-phale) and (Eugene Onegin, } a symphonic

poem.

BORROMEAN (bo-ro-ma'an) ISLANDS,

four small islands in a bay of Lago Maggiore, north Italy, and named after the Borromeo

family, and named respectively Isola Bella,

Isola Madre, Isola dei Pescatori and LTsolino.

The Isola Madre lies farthest from the shore of the lake. It is laid out in seven terraces, rising one above the other, with charming

walks and a mansion on the top. The Isola Bella contains a handsome and extensive pal¬

ace, with private chapel and picture gallery, the fine gardens adjoining being laid out upon 10

terraces rising above each other. The island was formerly little more than a barren rock and much soil required to be brought from the mainland. The Isola dei Pescatori is mostly occupied by a fishing village. Magnificent

views of the surrounding scenery are obtained from these islands. Pop. 300.

BORROMEO, bo-ro-ma'o, Carlo

(Count), saint and cardinal of the Roman

Catholic Church: b. Arona, Italy, 2 Oct. 1538; d. 3 Nov. 1584. He came from an illustrious family,.his father being Count of Arona and his mother a Medici. He studied law at Pavia;

was in 1559 made doctor, and in 1560 was suc¬

cessively appointed by his uncle Pius IV apos¬

tolical prothonotary, referendary, cardinal and archbishop of Milan. As legate over Romagna, the March of Ancona and Bologna, he had a great share in the civil government : as protec¬

tor of Portugal, of the Netherlands of Switz¬

erland, of the Franciscans, Carmelites and of the Knights of Malta, he administered several important branches of the spiritual government of the Pope, who created him his grand peni¬

tentiary, and did nothing of importance without his advice. The reopening and the results of the Council of Trent, so advantageous to the papal authority, were chiefly effected by the great influence of Borromeo and he took a

principal part in drawing up the celebrated (Catechismus RomanusP

He did much for the

embellishment of the papal buildings, employing even his own fortune for that purpose, and established many excellent institutions as arch¬

bishop of Milan. His rigid morality and de¬

termination to maintain ecclesiastical discipline drew on him the hostility of the monastic or¬

ders, and in 1569 a wretch of the order of the Umiliati shot at him while the archbishop was at prayer in his chapel. He founded in 1570

the Helvetic College in Milan for the training of priests for the conversion of Switzerland, and formed an alliance of the seven Catholic cantons known as the Golden Borromean

League. He may also be regarded as the

founder of the modern Sunday school ; estab¬

lished schools, seminaries, an order of secular priests (oblates), libraries and hospitals and was indefatigable in doing good. During the pestilence which raged in Milan in 1576 he dis¬

tinguished himself by his heroic devotion to his flock. As soon as the scourge appeared in the city he hastened from a distant part of the diocese, where he was making a pastoral visi¬

tation, and spent all his energies in giving bodily aid and spiritual consolation to the plague-stricken inhabitants. All his virtues, however, could not save him from persecution and calumny ; he was severely attacked by the government for vindicating the rights of the Church, but no charge could be proved against him. Miracles were said to have been wrought at his tomb immediately after his death, and his canonization took place in 1610.

A colossal statue to his memory was raised in 1697 near his birthplace on the west bank of the Lago Maggiore. Consult (Lives > by Stack-pole-Kenney (1911), Sylvain (1884), and

Thompson (1893) ; also, Cantono, (Un grande reformatore del secolo XVI > (Florence 1904).

BORROMEO, Federigo (Count), car¬

dinal and archbishop of Milan, nephew of Saint Charles: b. Milan 1564; d. 2 Sept. 1631. He founded the Ambrosian Library at Milan in

1609, and devoted to it most of his fortune. He sent emissaries to several countries to collect manuscripts for it. He added to it a printing establishment, and founded academies, schools and charitable institutions. When Milan was

desolated by a pestilence in 1630, Federigo showed the same heroism as his uncle Carlo had done during that of 1576.

BORROMINI, bor-ro-me'ne, Francesco,

Italian architect: b. Bissone 1599; d. 1667. He studied sculpture in Milan and architecture in Rome under Maderno, architect of Saint Peter's.

After Maderno's death he was a pupil of Ber¬

nini, by whom he was employed on various

parts of Saint Peter's. He built the church of San Ivo alia Sapienza, the oratory and clois¬

ter of San Filippo Neri, the fagade of the church of Santa Agnese in the Piazza Navona and the interior of San Giovanni in Laterano.

He was one of the chief representatives of the baroque style. Borromini conceived an unrea¬

soning hatred for his instructor Berini and determined to surpass him in his art, but mad¬

dened by the latter's success he committed

suicide.

BORROW, George, English traveler, lin¬

guist and writer on gypsy life: b. East Dere¬

ham, Norfolk, 1803; d. Oulton Broad, Suffolk, August 1881. On his father's side he was de¬

scended from a Cornish family, and his moth¬

er was of Norman extraction. His father was a recruiting officer, who was constantly chang¬

ing his residence, and thus Borrow's early years were passed in various parts of the United Kingdom. Pie received part of his education in Edinburgh High School, and in 1820 was

articled to a Norwich solicitor. It was about this time that he laid the foundation of his lin¬

guistic knowledge (he attained proficiency in 20 languages) under the guidance of William Taylor, a friend of Southey. After his father's death he went to London, where he lodged

in the same house as Benjamin Disraeli, and earned his livelihood bv literary hackwork and edited the Newgate Calendar; but, soon tiring of this, he set out on a series of journeys through England, France, Germany, Russia and other countries, acting latterly as agent of the

British and Foreign Bible Society and making gypsy life and customs a special study. During the seven years or so prior to his engagement by the Bible Society he seems to have suffered great privations, but of his movements at that time he has told us nothing. He married in 1840 and settled on a small estate of his wife's at Oulton Broad, in the northeast of Suffolk, where he died. He maintained to the last his strong sympathy for gypsy life, and not only permitted but encouraged the gypsies to en¬

camp on his estate. His best-known work is (The Bible in Spain) (3 vols., 1843) ; and his other publications include (Targum: or, Metri¬

cal Translations from Thirty Languages and

Dialects) (1835) ; (The Zincali : or, an Account of the Gypsies in Spain 5 (1841) ; (Lavengro, the Scholar, the Gypsy, the Priest5 (1851), a sort of idealized autobiography; (The Romany Rye,5 a sequel to (Lavengro) (1857) ; (Wild Wales, Its People, Language and Scenery5

(1862), and (Romano Lavo-LiP (1874), a dic¬

tionary of the gypsy language. Borrow was a strong, manly character, aggressively Protest¬

ant, delighting in horseflesh, boxing and the free, open-air existence of the gypsies whose life he knew so well, and despising heartily all affectation and false gentility. His later works, by their outspokenness, lost him much of the reputation earned by his (Bible in Spain.5 Con¬

sult the (Life, Writings and Correspondence5

by Dr. Knapp (2 vols., London 1899) ; T.

Watts-Dunton's reminiscences in the Athe—

ncBiim for September 1881, and studies by Red-fern (Manchester 1913) ; Shorter (London

1914) ; Thomas (ib. 1912) ; and Walling (ib.

1908). See Bible in Spain, The; Lavengro.

BORROWING DAYS, the last three days

of March, Old Style ; the popular notion be¬

ing, in Scotland and some parts of England, that they were borrowed by March from

April. The fiction is of great antiquity and probably arose in the observation of a fre¬

quent wintry relapse about the end of March.

Consult Buchan, (Handy Book of Meteorol¬

ogy5 (Edinburgh 1868).

BORROWSTOUNNESS. See Bo'ness.

BORSIPPA, a very ancient city of Baby¬

lonia, on the west bank of the Euphrates, which site is marked by the ruins Birs Nimrud. The chief deity was Nabu, the god of wisdom. His temple was E-Zida, to which pilgrimage was

made at the New Year's festival.

BORSTELL, bor'stel, Karl Heinrich Lud¬

wig von, Prussian military commander and

humanitarian: b. Tangermiinde 1773; d. 1844.

As commander-in-chief in Pomerania in 1812,

he largely prevented the excesses of the

French; in 1813, on his own initiative, his bold move at Dennewitz gained the victory and he and his brigade were the first to enter Leip¬

zig during the battle of 16-19 October. As lieutenant-general with Billow's corps in Hol¬

land in 1814 he was left in command of the country with 10,000 men. In 1815 rebellion

in his command of the 2d Prussian army

corps broke out at Liege and Bliicher ordered seven leaders to be shot and the flags to be burned of the revolted battalions. Borstell

suspended the order and was sentenced to

four years' military imprisonment. The King

pardoned him a few months later and made

him commander at Magdeburg.

BORT, a rounded, translucent variety of

diamond, harder than the distinctly crystallized gem variety. It is of much value as an abra¬

sive.

BORTNYANSKI, bort-nyan-ske, Dmitri

Stepanovitch, Russian composer: b. Gluk¬

hov, Ukraine, 1751 ; d. Saint Petersburg, 2 Oct.

1825. He received his education at Moscow

and at Venice and other Italian cities, under Galuppi. In 1779 he returned to Russia and was appointed director of the Imperial Chapel, devoting himself to the improvement and train¬

ing of the choir. His compositions are almost entirely church music, which he reduced to a system, including 35 sacred concertos, a lit¬

urgy for three voices and a collection of psalms.

His music, combining the spirit of both the Slavic and the Italian, is thoroughly . original, devotional in feeling and made an epoch in Russian Church music.

BORY DE SAINT VINCENT, van-son,

Jean Baptiste George Marie, French natub

ralist : b. 1780; d. 1846. About 1800-02 he vis¬

ited the Canaries, Mauritius and other African islands. He afterward served for a time in the army, being present at Ulm, Austerlitz and

Waterloo, and conducted scientific expeditions to Greece and to Algiers. Among his chief

works are (Annales des sciences physiques5 (8

vols., 1819-21) ; (Voyage dans les quatre prin¬

cipals lies des Mers d'Afrique5 (3 vols., 1804); Expedition scientifique de Moree5 (3 vols.,

1832) ; T'Homme, Essai zoologique sur le

genre humain5 (2 vols., 1836).

BORYSTHENES, bo-ris'then-es, the an¬

cient name of the Dnieper.

BORZOI, or RUSSIAN WOLF¬

HOUND, a hunting-dog of northern Europe,

substantially the same as the ancient long¬

haired greyhound of the Arabs and Persians, whose coat has lengthened in adaptation to a cold climate. It is a lithe, active dog, standing 28-31 inches high at the shoulders and weigh¬

ing from 75 to 105 pounds. Its hair is silky and loose, especially so on the tail, which, con¬

trary to the other greyhound characteristics, is leathered55 longer than is the setter's, which it very much resembles. It has large padded feet.

In color the borzois are combinations of black, white and tan. These dogs are popular, es¬

pecially as stately attendants upon ladies, and good specimens may be seen at the prin<?ipal kennel shows in the country.

BOS, Lambert, Dutch philologist: b.

Workum, Friesland, 23 Nov. 1670; d. 6 Jan.

1717. Lie was instructed by his father in Greek and Latin. Vitringa, the

distinguished Oriental scholar, was professor at Franeker, and thither young Bos went to pursue his philological stud¬

ies. Not long after he was chosen Greek pro¬

fessor in that university. He is best known by his work entitled ˆEllipses Graecae5 (1702), though he was the author of several others, among which may be mentioned an edition of the Septuagint and (Animadversiones ad Scriptores Graecos.5

BOSA, seaport on the west coast of Sar¬

dinia, province of Cagliari, built partly on the side of a hill crowned by an old castle and partly in an unhealthy plain. It has a cathedral

and other churches, a theological seminary and is the residence of a bishop, suffragan to the archbishop of Sassari. It is in a wine and oil producing region and carries on coral fishing and tanning. It has fortnightly steamer com¬

munication with the mainland. Bosa was

founded by Malaspina in 1112. Pop. 6,875.

BOSANQUET, bo'san'ka', Bernard, Eng¬

lish philosopher: b. Alnwick 1848. He was

educated at Oxford ; was lecturer at Univer¬

sity College there, 1871-81, and from 1881 to 1897 was much engaged in university exten¬

sion lecturing and charity organization. In

1903 he served as professor of moral philoso¬

phy at Saint Andrews University. He has

written (Logic, or Morphology of Knowledge*; (History of ˆEsthetic * ; (Knowledge and Real¬

ityˆ; (Essays and Addresses*; Civilization of Christendom *(1893) ; Essentials of Logic*

(1895); (Aspects of the Social Problem*;

Psychology of Moral Self* ; Companion to

Plato's Republic, for English Readers* ; edu¬

cation of the Young in Plato's Republic*;

Philosophical Theory of the State* (1912) ; Che Value and Destiny of the Individual*

(1913).

BOSANQUET, George Stanley, English

naval officer: b. 1835; d. 1914. He was trained at the Royal Naval Academy of Gosport. He

served in the Crimean War and was in China during the Taiping rebellion, where he was twice wounded. In recognition of his distin¬

guished services he was made commander. He

commanded the Northumberland in the Egyp¬

tian War of 1882 and was made aide-de-camp to Queen Victoria in 1884. The Chinese and Turkish governments gave him several medals.

BOSC, Louis Augustin Guillaume, French

naturalist: b. Paris, 29 Jan. 1759; d. there, 10

July 1828. Employed in various public offices until 1793, his political sympathies made him ob¬

noxious to the terrorists, and concealing him¬

self in the forest of Montmorency, he resumed there, under the greatest difficulties, his favorite science botany, having already previously

gained some distinction as a naturalist. On returning to Paris after the fall of Robespierre he was sent in 1796 as French consul to the United States ; but, not recognized in this posi¬

tion by the American authorities, he explored the country for scientific purposes. In 1799 he was appointed chief of the administration of prisons, but lost the office on the 18th Brumaire. Applying himself thenceforward to lit¬

erary labors, he made numerous contributions to natural science. His (Histoire Naturelle des Coquilles* (5 vols., 2d ed., Paris 1824) and (Histoire des Vers et des Crustacees* (2 vols., 2d ed., Paris 1829), and his studies on the vines of France are his principal achievements. He was made a member of the Academy of

Sciences, of the Central Agricultural Society, and finally, after having been inspector of the gardens at Versailles, he became professor at the Jardin des Plantes at Paris. Roland, under whose administration he had served, and who perished with his wife on the guillotine, made him guardian of their daughter. Bose published memoirs of the celebrated Madame Roland, and succeeded in obtaining for Mile. Roland the confiscated property of her unfortunate parents.

BOSCAN ALMOGAVER, bos-kan-almo-ga-var, Juan, Spanish poet : b. Barcelona, about 1493; d. near Perpignan, April 1542. His parents, who belonged to the most ancient no¬

bility, gave him a careful education. He fol¬

lowed the court of Charles V and in 1526 was attached to it for some time in Granada. His noble manners and character gained him the

favor of the Emperor, and the education of the Duke of Alva was committed to him. After his marriage Boscan lived at Barcelona, oc¬

cupied in publishing his works, together with those of his deceased friend Garcilaso, in

which task he was employed at the time of his death. Boscan first naturalized Italian measures into Spanish, which were popularized by his successor De Vega and thus became the creator of the Spanish sonnet. His poems are still esteemed, the best edition being that published at Madrid in 1875. Among his works are Le¬

andro y Hero* and (La Allegoria.*

BOSCAWEN, Edward, British admiral:

b. Cornwall, England, 19 Aug. 1711; d. near Guildford, Surrey, 10 Jan. 1761. He was the 3d son of the 1st Viscount Falmouth. Hav¬

ing entered the navy he distinguished himself at Porto Bello (1740) and Cartagena (1741),

where he stormed a battery at the head of a part of his crew. In 1744 he was promoted to the Dreadnought, a 60-gun ship, in which he took the French frigate Medea and became

known in the navy as ((01d Dreadnought.**

He commanded at the Nore during the Jacobite troubles in 1745. Three years afterward he

signalized himself under Anson at the battle of Cape Finisterre. Toward the close of this year he was appointed commander-in-chief by sea

and land in the East Indies, and was despatched thither with a squadron. He failed in attempts on Mauritius and Pondicherry, and in 1750 re¬

turned to England, where (1751) he obtained a seat at the Admiralty Board. In 1755 he be¬

came vice-admiral and sailed for North

America, and in action with a French squadron two ships of the line fell into his hands. As one of the commissioners of the admiralty

he signed the immediate order for the

execution of Byng in 1757. In 1758 he was promoted to the rank of admiral of the blue, and in conjunction with Lord Amherst, who

commanded the land forces, he was present at the capitulation of Louisburg. The year follow¬

ing, having then the command in the Mediter¬

ranean, he pursued the Toulon fleet, under De la Clue, through the Straits of Gibraltar,, and coming up with it in Lagos Bay, completely defeated it, burning two ships and taking three.

For these services he received the thanks of Parliament and $15,000 a year, with the rank of general of marines, in 1760.

BOSCH, bos, Hieronymus, Dutch painter:

b. S'Hertogenbosch, Brabant, about 1450; d.

1516. His name is often given as Hieronymus van Aeken, which probably means that his

family came from Achen (Aix-la-Chapelle).

The painter's residence, at least for many

years, was S'Hertogenbosch (Bois-le-Duc),

Brabant. We have in the register of a re¬

ligious brotherhood of that city a few dated references to the artist, which, with some few records of pictures ordered from him by

various patrons, is all that we possess as his¬

torically certain material about Bosch. The

fact that numbers of his works went to Spain at an early period brought about the idea that 286

the painter himself lived there. (At the

Escurial we still find his Paradise,* the (Seven Capital Sins) and three other works, and at the Prado, Madrid, (The Adoration of the Kings) and (The Fall of the Rebel Angels*). No docu¬

mentary confirmation of the theory exists how¬

ever, and the birthplace, schooling and in fact the whole life history of Bosch remain a

mystery. That he merits a high rating as a creative artist will be evident if we consider the art of the Low Countries at this time. In the neighboring cities of Belgium, painting had, to be sure, reached a marvelous technical de¬

velopment — which the Dutch were far from

equaling. Bosch was one of the first men

across the border to reach anything like the level of the Flemings, and at his best he ap¬

proaches them quite nearly. It is perfectly safe to say that a born painter like Pieter Brueghel would never have studied Bosch as he did if the latter's beautiful art had not been used to embody his wild fancies. It is for these, how'ever, that he is most remembered and there is not, in the range of European art, a more teeming imagination, a more astonishing in¬

ventiveness and fancy than that of the painter of the scenes of (Heaven and Hell,5 (the Last Judgment * (Vienna Academy), the (Garden of

Pleasures* and the various (Temptations of

Saint Anthony.* In the former royal palace, Ayuda, Lisbon, is his well-known (Temptation of Saint Anthony,* the most copied of all his pictures. The museum of Princeton University possesses his (Christ before Pilate.* When he approaches religious subjects like the Martyr¬

dom of Saint Julia* at Vienna, it is with a beautiful and naive sincerity which makes them impressive. The landscape which he loves to introduce into his work shows the true Dutch affection for nature. As a technician, an

imaginer and an expresser of national feeling Bosch adds to his own excellence the quality of the forerunner as is proved by many copies of his works made during his lifetime or soon after. The engravings after his works, for¬

merly believed to be by Bosch himself, are now accredited to other hands. Paintings by Bosch are hung in galleries of Brussels, Berlin,

Lisbon, Naples, Antwerp and New York. Con¬

sult Schubert, Soldern, (Hieronymus Bosch

und Pieter BreugeP (Vienna 1903) ; and Won Jan van Eyck bis Hieronymus Bosch > (Strassburg 1903) ; and Gossart, (Jerome Bosch)

(Lille 1907).

BOSCH, Hieronymus de, Dutch Latin

poet and anthologist : b. Amsterdam, 23 March 1740; d. Leyden, 1 June 1811. His (Poemata) (Leyden 1803; 2d ed., 1808) are ranked among the best Latin poems of modern times. His

principal work is (Anthologia Grseca* (4 vols., Utrecht 1795-1810; 5th vol. by Van Lennep,

1822), which contains a hitherto unpublished metrical translation by Grotius. He also wrote critical and literary treatises of high value, was one of the founders of the Dutch Institute of Science and Art and curator of the Leyden University.

BOSCHBOK, the Dutch form of the

English name “bushbuck,® given to several

South African antelopes, specifically the

Tragelaplius sylvaticus. It is prized for its venison.

BOSCHVARK, the bush-hog or bush-pig

of South Africa (Cheer opotamus or Potarno—

chocrus africanus) , one of the swine family, about five feet long, and with very large and strong tusks. The Kaffirs esteem its flesh as a luxury, and its tusks, arranged on a piece of string and tied round the neck, are considered great ornaments.

BOSCOBEL, England, a parish on the

eastern verge of Shropshire, unimportant in

itself, but remarkable historically as the hiding place of Charles II for some days after the battle of Worcester, 3 Sept. 1651. Boscobel House belonged at the time to a stanch royalist, and as it was judged a convenient place of retreat, Charles at once proceeded in that

direction, and hid himself during the day in the thickest part of the wood. After making one attempt to escape through Wales, he was compelled to return again to his former hiding-place, and concealed himself among the

branches of a pollard oak in Boscobel Wood, where it is related that he could actually see the men who were in pursuit of him and hear their voices. The “royal oak® which now

stands at Boscobel is said to have grown from an acorn of this very tree. An account of Charles’s adventures after the battle of Wor¬

cester was published in 1662, with the title, (Boscobel, or the Compleat History of his

Sacred Majestie’s most Miraculous Preserva¬

tion after the Battle of Worcester.* This

history is attributed to Thomas Blount.

BOSCOVICH, Ruggiero Giuseppe, Ital¬

ian Jesuit, mathematician, astronomer and phi¬

losopher: b. Ragusa, 18 May 1711; d. Milan, 12 Feb. 1787. After elementary education he entered the Society of Jesus in his 15th year

and during a novitiate marked by brilliancy in mathematics and philosophy, before grad¬

uation, was appointed professor of mathematics in the Collegium Romanum in 1740. The re¬

mainder of his life was passed in scientific pur¬

suits and important diplomatic missions. He

visited London in 1760 and was elected a mem¬

ber of the Royal Society. In 1774 he went to Paris when the Jesuit order was suppressed; in 1783 he returned to Bassano to supervise the printing of his works and finally retired to Milan where insanity supervened on melan¬

cholia and he died four years later. He was the first Italian to advocate Newton's theories; in his (Philosophiae Naturalis Theoria) (Vienna

1758) he expounds a molecular theory of

matter. He wrote numerous treatises on

astronomy and other branches of physical

science; his didactic poem, (De Solis ac Lunse Defectibus> (London 1764), was translated into French by the Abbe de Barruel (Paris 1779) ; his narrative of his journey from Constanti¬

nople to Poland appeared in French in 1772, in German in 1779 and in Italian in 1784; he published annotated editions with supplements of Noceti's works on the rainbow and the

aurora borealis, and of Benedict Stay's poems on the Cartesian and other modern philo¬

sophical systems ; and his complete works ap¬

peared as (Opera Pertinentia ad Opticam et Astronomiam* (5 vols., Bassano 1785). Con¬

sult Oster, M., (Roger Joseph Boscovich als naturphilosoph) (Bonn 1909).

BOSELLI, Paolo, Italian statesman, his¬

torian and economist: b. Savona, 18 June 1838.

At 22 he had graduated, taken his LL.D. degree at the University of Turin, and begun his

literary career on the Italia Letteraria, then recently founded and edited by Angelo de

Gubernatis. His style was of a nervous yet flexible and vigorous quality, with a terse and deliberate conception accompanied by an in¬

nate faculty for grasping intricate problems and presenting them concisely to the reader.

After a few years of this experience he entered the civil service, and in 1867 acted as secretary-general for the Italian section at the Paris Universal Exhibition. Even before he was

first elected to Parliament — in 1870— by his native town he had been appointed a member of the Permanent Committee of Finance. He

quickly gave evidence of a masterly compre¬

hension of those subjects primarily within

the scope of government, such as finance, agri¬

culture, education, shipping, taxation, commer¬

cial treaties, *etc.* He published numerous

works on these subjects, contributed important speeches in the Chamber of Deputies, and

labored earnestly to improve the condition of the working classes.

Born in a seaport town, he had early realized the immense value of shipping to an industrial community. It was mainly due to his efforts that a mercantile marine board was created, of which he was

made president in 1881. During his tenure of this office he was specially active in negotiating commercial and navigation treaties with other countries. Premier Crispi sent him to Paris as a confidential agent to treat directly with M. Rouvier, the French Premier. The fol¬

lowing extract from a letter written by Signor Boselli in Paris to his chief in Rome during the first week of September 1887 is not without interest 30 years after the event. He informs Crispi that Rouvier (<declares that the under¬

standing between France and Russia concern¬

ing the Egyptian question gave rise to the supposition that the relations between the two countries were more intimate than is really the case, for no written contract exists be¬

tween them, whereas something in writing does exist between Germany and Italy. He is

aware that our understanding with Germany

concerns only a war of defence on the part of Germany, a war, he adds, which will never

take place, for France will not open hostilities against Germany. (These words must, of

course, be taken simply for what they are

worth). The party, so-called, of revanche,

and of war against Germany, represents, so

Rouvier says, but a very small minority in France; and as for Italy, no Frenchmen, or at least very few, either wish for war with her or would seek to bring it about.®

From 1888 to 1891 Signor Boselli was

Minister of Instruction — his first cabinet post.

Two years later he became Minister of Agri¬

culture, and subsequently Minister of Finance, which office he held until 1896, and for a second time from 1899 to 1900. Side by side with his political activities he pursued the studies of his early literary career and for a time he occupied the chair of financial science in the University of Rome. For some years

prior to the European War Signor Boselli had taken no prominent part in the Chamber de¬

bates. In January 1916 King Victor Emman¬

uel conferred a signal mark of confidence and favor upon him by bestowing the Collar of the Annunziata, which carries with it the title of <(Cousin ol the King.® In June 1916 the Salandra Cabinet fell ; by a direct vote of con¬

fidence the government were defeated by 197

to 158, the adverse majority being composed of Giolittians, Radicals, Official Socialists, Conservatives, Republicans and the so-called

Interventionist Socialists. Premier Salandra

resigned with his cabinet on 12 June, and

Signor Boselli was called to' the helm of the state within two days of his 78th birthday.

He quickly formed a strong coalition cabinet and justified the confidence reposed in his moderating influence to hold together a

heterogeneous ministry. His retention of

Baron Sonnino at the Foreign Office was

highly satisfactory to the Allies. After having been already at war with Austria for 15

months, Italy declared war on Germany two

months after the accession of the Boselli

Cabinet.

The great Austro-German drive against

Italy in October 1917 had the effect of produc¬

ing a ministerial crisis. A vote of confidence was defeated in the Italian Chamber of

Deputies by 314 to 96 on 25 October. Signor Boselli resigned with his cabinet and was suc¬

ceeded by Signor Orlando. See Italy.

BOSH, a pure Turkish word meaning non¬

sense, useless, vain, empty, void of meaning, loose, unemployed, let go, divorced; also used in numerous combinations with other words.

This word, generally regarded as slang, is now quite at home in the English language, and has even acquired still more interpretations. As an interjection it expresses foolish talk or opinions, humbug, worthless, contemptible non¬

sense, *etc.* It became popular in England in 1834, when it appeared in Morier's novel

ˆyeshaP and may be found in the writings

of Kingsley, Dickens and Miss Yonge. To

((bosh® a job is to spoil it; in this sense the word is also used. In 18th century English, it meant to swagger, flaunt, to ((cut a bosh.® The word bosh is used in smelting works to desig¬

nate the lower part of a blast furnace shaft; also a kind of cooling trough.

BOSHER, Kate Langley, American

novelist: b. Norfolk, Va., 1 Feb. 1865. Her novels distinguished by clever humor and

sentiment achieved wide popularity and include (Mary Cary> (1910) ; (Miss Gibbie Gault)

(1911) ; (The Man in Lonely Land) (1912) ; and (The House of Happiness) (1913).

BOSIO, boz'yo, Francois Joseph

(Baron), French court sculptor: b. Monaco,

19 March 1769; d. Paris, 29 July 1845. He was brother of the historical and portrait painter Jean Frangois Bosio; at first a pupil of Pajou in Paris ; later a devoted student of the antique.

His masterpiece is the bronze equestrian statue of Louis XIV in the Place des Victoires. After the completion of this he was appointed, 6 Nov.

1822, chief sculptor to the king. Well-known busts by him are those of Napoleon, at Ver¬

sailles, of Josephine, Hortense and Charles X.

BOSNA-SARAI, or SARAJEVO (ancient

Tiberiopolis), capital of Bosnia, situated on the Miljacka, which is here crossed by a hand¬

some stone bridge, 122 miles southwest of

Belgrade, and 570 miles west-northwest of

Constantinople. The town was founded about

1263. It is well built, and although most of the houses are of wood, has a gay and pleasant appearance from the number of towers and

minarets with which it is embellished. It con¬

tains a serai or palace, built by Mohammed II, to which the city owes its name ; many mosques, great and small ; churches, monasteries, two large bazaars, schools, baths and charitable insti¬

tutions. It was formerly surrounded with walls, but these are now completely decayed ; and its only remaining defense is a citadel, built on a rocky height at a short distance east from the town, mounted with cannon. Sarajevo is the chief mart in the province, the centre of com¬

mercial relations between Turkey, Austria and South Germany ; and has, in consequence, a con¬

siderable trade. It is connected by rail with the chief points of the peninsula. It has

manufactures of arms and utensils of copper; ironware, woolen and worsted stuffs, morocco leather, cottons, *etc.* There are also several tanneries in the city, and at a short distance from it several important iron mines ; and on a plain which stretches to the west the baths of Sarajevesko Polje. Here on 28 June 1914, the Archduke Franz Ferdinand, heir presump¬

tive to the Austrian empire, was assassinated.

This foul deed was the proximate cause of the European War. Pop. 51,919.

BOSNIA (Serbian Bosna) and HERZE¬

GOVINA, the extreme northwestern prov¬

inces, or pokraine of the Balkan Peninsula, bounded north by Croatia and the river Sava, west by Dalmatia and the Adriatic, east by Serbia, from which they are separated by the river Drina, and south by Montenegro, are now constituent parts of the Serb-Croat-Slovene

State. The area of the m-ovinces is 51,199

square kilometers. The principal rivers are

the Vrbas, the Una and the Drina, all tribu¬

taries of the Sava. Through Herzegovina flows the river Neretva. With the exception of the Sava and the lower course of the Drina, none of these rivers is navigable. The northern part of Bosnia is level and very fertile but the south, and especially Herzegovina, is very mountain¬

ous and picturesque. The provinces are divided into six departments, which are subdivided into 50 “kotars® (districts.) The capital of Bosnia is Sarajevo (51,919 inhabitants) where is the seat of the local government and where, on 28 June 1914, Archduke Franz Ferdinand

and his consort were assassinated by two fanatic Austrian malcontents, which precipitated the

great European War. Other important towns

are Mostar (20,000 inhabitants), Banjaluka,

(numbering about 1,900,000), are almost exclu¬

sively Serbians, but there are also Turks,

Greeks, Jews, Gypsies, *etc.* They are partly Orthodox (856,158), partly Roman Catholic

(451,686), and Mohammedan (626,649). The

language of the population is most predomi¬

nantly Serbo-Croatian, but other languages

(German, Turkish, etc.) are also spoken. The Bosnian Serb is the best conserved type of the entire Serbian race. The women, like the men, are well and strongly made and mostly good-looking with their dark eyes and complexion.

Industry. — Agriculture, mining and for¬

estry are the principal occupations of the popu¬

lation. The annual harvest amounts to about 1,000,000 quintals of wheat, 9,000,000 quintals of hay and great quantities of potatoes, prunes and raisins. The annual value of the mineral exports amounts to about $3,000,000 and that of the timber export to about $6,000,000.

The breed of cattle is excellent and the moun¬

tains furnish good iron of which a great part is manufactured in the country into guns and blades. The other articles manufactured are

leather, morocco andˆcoarse woolen cloth. The wines of Herzegovina are renowned for their excellence and the salt beds at Tuzla consti¬

tute one of the chief resources of national wealth. There is a sugar refinery at Doboj and at Sarajevo there are several mills produc¬

ing beautiful and well-made carpets and rugs.

History. — Bosnia and Herzegovina, have

been constituent parts of the Roman empire

known as Illyricum. .In the course of the 10th century, Bosnia formed a distinct bandom, or principality, suzerain to the Croatian crown, but the first Ban who succeeded in securing a form of independence for his province was

Boris, the illegitimate son of Koloman, King of Hungary. Yet the true history of Bosnia begins only with the rule of her' Ban Kulin (1180-1204), the contemporary of the Serbian Grand 2upan Nemanja, who extended the

boundaries of his territory to a considerable degree and accepted and spread throughout his realm the Bogumil heresy. His son Stefan

continued the spread of Bogumilism, an act

which not only alienated the friendship of the Serbian rulers who prosecuted that heresy, but which gave rise to a vehement influence from Rome and Hungary.

The pope Honorius VI (and later Gregory

VII) made several alliances with the Hun¬

garian princes and started crusades against

the Bogumils. The country was devastated

and the majority of the heretics extermi¬

nated; those who survived took refuge in the mountains inaccessible to the Magyar horsemen.

Ban Pavle Subic (banus Croatorum et Bosnice dominus) annexed Herzegovina to Bosnia but

both provinces were conquered and incorporated in the Serbian empire by Emperor DuSan the Mighty. It was only after the death of this Serbian Emperor (1355) that Ban Stefan

Tvrtko (1353-91) detached definitely Bosnia

from the Serbian empire and proclaimed him¬

self king. Ban Tvrtko also conquered Dal¬

matia with exception of Dubrovnik (Ragusa)

and his kingdom reached its summit in de¬

velopment as an independent state. How¬

ever, this did not save Bosnia from her final downfall, for Sultan Mohammed II, after hav¬

ing utterly defeated the Magyars, turned with his 150,000 men against Bosnia (1463) and dev¬

astated the land. Bosnia's Ban Stefan VII

Tomic was taken prisoner and both Bosnia and Herzegovina became Turkish vilayets. Through¬

out the 1 7th and 18th centuries there were con¬

tinuous wars between Austria and Turkey for Bosnia and Herzegovina, until 1831 a national insurrection took place under the leadership of Hussein-Bey in the course of which Rashid-Pasha was chased out of the land and the in¬

surgents threatened the Sublime Porte with a definite separation from the Ottoman empire.

This, however, was frustrated by Kara—

Mahmud-Pasha who, with his army of 60,000,

drove Hussein-Bey to Austria and severely

punished the restless population ; 30,000 boys of seven years of age were taken away to Con¬

stantinople Jo the celebrated military training schools which furnish the irresistible hord

oi Janissaries to the Sultans of Turkey. A state of anarchy ensued and Bays became

almost independent of Constantinople; there

were some who openly advocated the exter¬

mination of the Christians. Such a state of af¬

fairs alarmed the Sublime Porte which immedi¬

ately sent one of its best generals, Omer-Pasha, at the head of a huge army to restore order and the sovereignty of the Sultans. A wholesale Ottomanisation of the Serbian population made the existence of the Christians almost impossible and the numerous deputations to Constantinople imploring protection remained without avail.

The landlords embraced the Koran and be¬

came absolute feudal lords of the enslaved popu¬

lation. This unbearable state of things led directly to a revolution (in 1875) in Herzego¬

vina which speedily spread over all Bosnia

under the leadership of the ever-watchful

Catholic priests who obtained support from

Rome and, more especially, from covetous

and Catholic Austria. The Turks immediately

started a campaign against the insurgents but a fresh insurrection was kindled in Montenegro which involved Turkey in a fierce war with that principality and with Serbia. As the

movement of the Christians spread even in the Tartar Bulgaria, the Russian Tsar intervened and, in 1877, declared war on Turkey which ended successfully for the Christians by the Treaty of Peace at Saint Stefano (1878). By virtue of that treaty Bosnia and Herzegovina obtained autonomy and a Christian governor;

but the Treaty of Berlin changed completely the position of those provinces, for Austria was allowed to occupy the territories with her

troops for the purpose of introducing order among the insurgents and establishing an equit¬

able administration of the country. The occu¬

pation was, however, bitterly opposed by the Bosnian Serbs under the leadership of their native general Hadzi-Loja. Herzegovina, de¬

riving its name from Herzog, or Duke (<(Duke of St. Savafl* i.e., Stefan VukHc, who ruled the province independently in 1448) was oc¬

cupied without any serious opposition on

the part of the population. As early as

1879 the Austrian Reichsrat wished to ef¬

fect a definite annexation of Bosnia and

Herzegovina, but the Sublime Porte ener¬

getically and successfully defended its sov—

eign rights over the provinces on the basis of the fact that such an action does not

belong to the competence of the Austro-Hungarian government but to all the powers

signatory of the Treaty of Berlin. Yet in wanton violation of that treaty and upon the advice of her ally, Germany, Austrian sovereignty

was formally announced on 5 Oct. 1908, which act nearly led to an armed conflict between the dual monarchy and Serbia. Russia, which was utterly unprepared to intervene, counselled

Serbia to patience and moderation and war was avoided, or rather postponed. The political life previous to the annexation consisted chiefly in the struggle for autonomy of the Orthodox and Moslem Serbs against the proselytizing

Austrian regime. In order to give some satis¬

faction to the seditious population, whose na¬

tional dream it was for centuries either to obtain an autonomy or to effect a political union with the Serbian kingdoms of Serbia and Monte¬

negro into one homogenous state, Austria

granted a sort of charter which could hardly be VOL. 4 — 19

called constitution, for the electoral system, provided by that instrument, was based on a di¬

vision of the electors according to their relig¬

ious belief, and the ballot was public so that it was absolutely subjected to the influence and control of the Vienna government. The Home

Diet (Sabor) had a purely local authority and was not permitted to deal with the matters bear¬

ing upon imperial affairs, such as the establish¬

ment of the military contingent, customs regu¬

lations, foreign affairs and commerce, amend¬

ments of the constitution, etc., nor could the bills be discussed in the Sabor to which the im¬

perial government was in no wise responsible.

The president of the Sabor, who was appointed by the Emperor upon the recommendation of

the government, exercised practically absolute power over the sessions. As an intermediary between the central government and the Sabor there was a Country Council (Zemaljsko

Viece) , the deputies for which were chosen from amongst the members of the Sabor. This council acted as an advisory board to the

Vienna government. In the Council of the

Empire and the Imperial Parliament Bosnia

and Herzegovina were represented by the Aus¬

trian Imperial Minister of Finance, who was, at the same time, Minister of Home Affairs for Bosnia, and it was in this latter capacity alone that he was responsible to the sovereign.

After the fall of the Austro-Hungarian empire in 1918 as a result of the World War, Bosnia and Herzegovina joined Serbia, Montenegro,

Croatia, Dalmatia and Slovenia to form the new republic of Jugoslavia.

Bibliography. — Report on the Administra¬

tion of Bosnia and Herzogovina, published an¬

nually by the Common Ministry of Finance in Vienna; Asboth, J. de, (An Official Tour

through Bosnia and Herzegovina) (London

1890) ; Bertolino, G., (Tre Mussulmani e Slavi in Automobile a traverso Bosnia ed Herzegovina) (Milano 1909) ; Curtis, W. E., ‘The Turk and his lost Provinces, Greece, Bulgaria, Serbia and Bosnia) (Chicago 1903) ; Cvijic, J., L’annexion de la Bosnie et la question Serbe) (Paris 1909) ; Davis, W. M., (An Excursion in Bosnia, Herzegovina and Dalmatia) (Bulletin

Geographical Society of Philadelphia, Vol. Ill, 1901) ; Evans, A. J., (Through Bosnia and Her¬

zegovina on Foot, August and September 1875 }

(London 1877) ; Henderson, Maj. P. E., (A

British Officer in the Balkans: a journey

through … Bosnia and Herzegovina)

(London 1909) ; Holbach, Maude, (Bosnia and Herzegovina: some Wayside Wanderings)

(London 1910) ; Hutchinson, F. K., (Motoring in the Balkans … Bosnia and Herzegovina) (Chicago 1909) ; Kohn-Abrest, F., (Un printemps en Bosnie) (Paris 1887) ; Krunsky, B., (L’annexion de la Bosnie et de Herzegovine en 1908: etude de droit international et d’histoire diplomatique) (Paris 1912) ; Marge,

Pierre, (Voyage en Dalmatie, Bosnie-Herzegovine) (Paris 1912) ; Maurer, F., (Eine Reise durch Bosnien > (Berlin 1870) ; Meylan, A., (A travers l’Herzegovine) (Paris 1876) ; Oransz, M., (Auf dem Rade durch Kroatien und die

Herzegovina und Bosnien) (Vienna 1903) ;

Roskiewicz, J., (Studien fiber Bosnien und die Herzegovina) (Leipzig 1868) ; Sainteˆ Marie, E., ‘L’Herzegovine : Etude geographique, historique et statistique) (Paris 1875) ; Schweiger-Lerchenfeld, A. von, (Bosnien, das Land und 290

seine Bewohner> (Vienna 1879) ; Smolle, L., (Die neuen Reichslande Oesterreich-Ungarns'

(Vienna 1909); Stillman, W. J., (Herzegovina and the late uprising) (London 1877) ; Yriarte, C. E., (Bosnie et Herzegovine' (Paris 1876).

Woislav M. Petrovitch,

Chief of Slavonic Division, New York Public Library.

BOSPORUS, or BOSPHORUS (that is,

"Oxford®), the strait, joining the Black Sea with the Sea of Marmora, and separating the continents of Europe and Asia, called also the Strait of Constantinople. It is 18 miles long, and varies in width from about 2,000 feet in the middle to about 2 miles at the northern entrance. The depth is from 20 to 66 fathoms.

The swiftness of the currents, and occasional fogs, make navigation dangerous. The strait

is defended by a series of strong forts, and by agreement of the European powers in 1841,

confirmed by the Treaty of Berlin in 1878, no ship of war belonging to any nation shall pass the strait without the permission of Turkey.

At the northern end lies the Golden Horn, one of the finest natural harbors in the world, on either side of which Constantinople is built.

Over the middle of the channel Darius con¬

structed a bridge of boats, on his expedition against the Scythians.

During the European War and the unsuccess¬

ful Dardanelles campaign (1915-16), the gauntlet of the Bosporus was run by British submarines which attacked Constantinople. See Gallipoli.

The Cimmerian Bosporus was the name

given by the ancients to the strait that

leads from the Black Sea into the Sea of

Azov, now the Strait of Kerch or Yenikale, the other Bosporus being distinguished as

the Thracian Bosporus. There was anciently

a Greek kingdom of the name of Bosporus,

so called from the Cimmerian Bosporus,

on both sides of which it was situated.

The capital of this kingdom was Panticapaeum (represented by the modern Kertch), in the

Tauric Chersonese, the ancient name of the

Crimea. This kingdom was founded about

480 b.c. Spartacus was among the first kings.

Under a successor, Satyrus, the kingdom was extended to the coast of Asia, and his son Leucon farther extended it by the conquest

of Theodosia. He improved the commerce

of the country (in particular by the exporta¬

tion of corn to Athens/ also of fish, fur, skins, bees-wax and slaves). From him his descend¬

ants were called Leuconidae. Leucanor became tributary to the Scythians 290 b.c., and the tribute was finally so oppressive that Parisades, the last of the Leuconidae, preferred to sub¬

mit to Mithridates, King of Pontus, who van¬

quished the Scythians under Scilurus 116 b.c., and made his son King of Bosporus. At the death of Mithridates the Romans gave the

country, 64 b.c., to his second son, Pharnaces, who was afterward

murdered. The Romans

placed different princes successively upon the throne, who all pretended to be descendants of Mithridates. When this family became ex¬

tinct, 259 a.d., the Sarmatians took possession of the kingdom, from whom it was taken by the Chersonesians in 344. The Tauric Cher¬

sonese then belonged to the Eastern Empire, till it was seized by the Chazars, and after¬

ward by the Tartars, under the Mongol

princes. Consult Goryainov, (Le Bosphore et

lcs Dardanelles: etude historique sur la ques¬

tion des detroits' (1910) ; Minns, E. H.,

(Scythians and Greeks-* (Cambridge 1907) ;

Sallet, A. von, (Beitrage zur Geschichte und Numismatik des Cimmerischen Bosporus)

(Berlin 1866).

BOSQUET, bos-ka, Pierre Frangois,

French soldier: b. Mont de Marsen, France,

8 Nov. 1810; d. Toulouse, 5 Feb. 1861. In 1829

he entered the Polytechnic School and in

1833 became a sub-lieutenant in the artillery.

In 1835 he went with his regiment to Algeria, where he served in 20 campaigns, especially distinguishing himself in the campaign of

Kabulia. By 1848 he had risen to be a

brigadier-general. In 1854 the Emperor Na¬

poleon III raised him to the rank of general of division, and enrolled him in the staff of the army of Marshal St. Arnaud. He was with

the French army in the Crimea, distinguished himself at Alma and Inkerman, and took a

leading part in the capture of the Malakoff tower at the siege of Sebastopol, where he was badly wounded. In 1856 he was made a

marshal of France and a senator.

BOSS, Lewis, American astronomer: b.

Providence, R. I., 26 Oct. 1846; d. 5 Oct. 1912.

He was graduated at Dartmouth College, in

1870; astonomer of the Northern Boundary

Survey for the determination of the line be¬

tween the western part of the United States and British America; and, since the comple¬

tion of that work, director of the Dudley Ob¬

servatory, Albany, N. Y. He was chief of the United States party sent to Chile in 1882 to observe the transit of Venus; was State super¬

intendent of weights and measures of New

York from 1883 to 1906; was elected a mem¬

ber of the National Academy of Science in

1889 and an honorary foreign associate of the Royal Astronomical Society in 1890. After

1909 he edited the Astronomical Journal and in 1911 the Paris Academy of Sciences

awarded him the Lalande prize. He is best

known for his work upon star declinations,

undertaken in connection with his work on

the boundary survey, which is the most com¬

plete investigation of the kind ever executed, and for his (Catalogue of 8,241 Stars' —which was a part of the (Co-operative Cata¬

logue' prepared by leading astronomers of

Europe. His other works are (1 79 Southern Stars' (1898) ; (Solar Motion and Related

Researches' (1901) ; Positions and Motions

of 627 Standard Stars' (1903) ; Preliminary General Catalogue of 6,188 Stars' (1910) ;

'Catalogue of 1,059 Standard Stars' (1910).

BOSS, Dutch baas, master or superin¬

tendent, a master or overseer, a term often applied to the superintendent of a gang of workmen. In American politics, the term

came into use after the exposure of the Tweed Ring, to designate the leader of a political or¬

ganization who retains his power by unscru¬

pulous methods and the use of public offices as rewards for his supporters.

In Gothic architecture the protuberance in

a vaulted ceiling formed by the junction of the ends of several ribs, and serving to bind them together ; usually elaborately carved and ornamented. The meaning has been extended

to mean any knob-like projecting carved or¬

nament resembling a vault-rib keystone.

In geology, see Batholith.

BOSSCHA, bos'sa, Johannes, Dutch

scientist; b. Breda 1831; d. Delft 1911. After studies in Deventer and Leyden, he received the appointment of director of the Delft Poly¬

technic School in 1878. He was the first

physicist who demonstrated (in 1885) the

feasibility of sending two telegraphic mes¬

sages simultaneously over the same wire, and the results of his investigations on the rapid¬

ity of sound waves, the mechanical theory of electrolysis and galvanic polarization were of great importance. His writings were pub¬

lished as (Verspreide Geschriften) (3 vols., Leyden 1902).

BOSSE, bos' se, Abraham, French en¬

graver and etcher: b. Tours 1605 (?); d. there 1678. He lived most of his life in Paris, studied under Jean St. Igny and Claude Mel-lan, and was professor in the Royal Academy of Painting there. He prepared about 800

plates representing festivals and various

scenes in the life of the people. He wrote also (Traite des manieres de graver en taille douce sur l'airain par l'eau forte et les vernis durs et

molsP A catalogue of his works was pub¬

lished by Duplessis, Georges (Brussels 1859).

Consult his biography by Valabreque (Paris

1892).

BOSSE, Robert, German statesman : b.

Quedlinburg 1832; d. 1901. He studied law at Heidelberg, Halle and Berlin, held different offices in Prussia and in 1876 he entered the Prussian ministry. In October 1889 he became Under-Secretary of State in the imperial De¬

partment of the Interior and in this capacity had an important part in framing the laws

for the insurance of workingmen and in de¬

fending them in the Reichstag. In 1891 he

became secretary in the Department of Jus¬

tice and was president of the commission to frame the new Civil Code. In 1892 he again entered the Prussian ministry as Minister of Education. He was editor of the (Monats-schrifte fur deutsche Beamte) ; and he wrote (Kommentar zum Invaliditats — und Alter-versicherungsgesetz5 (3d ed., 1891) ; (Eine

Dienstreise nach dem Orient* (1900) ; and

several articles in sociological and legal

periodicals.

BOSSI, bos-se, Enrico Marco, Italian

composer: b. Salo 1861. He was educated at the Milan Conservatory, was organist in the Como cathedral and instructor in organ-play¬

ing at the Naples Conservatory. He served

as director of the Venice Conservatory, 1895—1902 and in 1902-13 as director of the Bo¬

logna Music Lyceum. He is considered one

of the foremost of Italy's living composers.

His musical compositions include an organ

concerto, HI Cieco,* an opera, and (Canticum Canticorum,* a sacred cantata, a requiem and some chamber music. He has written (with

Tebaldini) (Method of Study for the Mod¬

ern Organ.*

BOSSI, Giuseppe Carlo Aurelio, Italian

politician and poet: b. Turin, 15 Nov. 1758; d. Paris, 20 Jan. 1823. When only 18 years old he made a successful debut as a dramatist.

In 1792 he was sent on a diplomatic mission to Berlin and a few months later to Saint Petersburg. In 1796 King Charles Emanuel

IV appointed him his agent near General

Bonaparte. He acted a somewhat conspicu¬

ous part in the various changes imposed upon the Sardinian states by the directory and the consular government of France; and finally

was, with Carlo Giulio and Carlo Botta, a

member of the triumvirate which governed

Piedmont previous to its annexation in 1802.

Some two years later he entered the French civil service and was appointed prefect of

Ain.. In 1810 he was made a baron of the empire and promoted to the prefecture of

Manche, which post he kept on the first res¬

toration; but having, in March 1815, adhered to Napoleon, he was dismissed on the second return of the Bourbons. He wrote some

lyrical poems and also (L'Indipendenza

Americana,* cLa Olanda pacificata, 5 in two

cantos, and ˆromasia,* in 12 cantos, giving a description of the principal events in the French Revolution.

BOSSI, Luigi (Count), Italian historian

and archaeologist: b. Milan, 28 Feb. 1758; d.

there, 10 April 1835. After studies in jurispru¬

dence and natural sciences at the University of Para he became a canon of Milan Cathedral.

When Napoleon invaded Italy he was appoint¬

ed agent of the French government in Turin and after Sardinia was annexed in 1803, keeper of the archives of the kingdom of Italy. His

writings comprise over 80 works on archae¬

ological, scientific and historical subjects, in¬

cluding Observations sur le vase que Ton

conservait a Genes sous le nom de Sacro

Catino* (1807) ; (Storia della Spagna* (8

vols., 1821) ; Hstoria dltalia) (20 vols., 1819-23) ; Untroduzione alio studio delle arti del disegno) ; an elaborated edition in Italian of Roscoe's (Life of Leo X* (12 vols., Milan

1816-17), a volume of dramas, besides con¬

tributions to periodicals and academic an¬

nuals.

BOSSUET, bos-swa', Jacques Benigne,

bishop of Meaux: b. Dijon, 27 Sept. 1627; d.

16 April 1704. While attending the Jesuit

College at Dijon he got possession of a Latin Bible, which made an indelible impression

upon him. At the age of 15 he was sent to Paris, where he entered the College of Na-

\arre, the president of which, Nicholas Cor¬

net, took pleasure in forming his mind. Bossuet, under the direction of this worthy

teacher, studied Greek and the Holy Scrip¬

tures, read the ancient classics and investigated the Cartesian philosophy. He was made doc¬

tor of the Sorbonne and canon in Metz in

1652. Here he edified his hearers by his

preaching and example ; was commissioned by

his bishop to refute the catechism of the

Protestant minister Paul Ferry and did it in such a way that even his antagonists were

obliged to respect him (1655). The Queen-mother (Anne of Austria) was induced, by

this work, to employ Bossuet in the conver¬

sion *of the Protestants in the diocese of Metz.

Meantime his fame as a preacher was rising.

The sermon which he delivered in 1668, on

the occasion of Marshal Turenne's joining the Roman Church, was followed by his appoint¬

ment to the bishopric of Condom (1669). In 1670 the King charged him with the educa¬

tion of the Dauphin. In consequence of this appointment he resigned his bishopric in 1671, 292

because he thought it inconsistent with his duty to retain it during a continual absence from this diocese. At this time he delivered his sermon at the funeral of the Duchess of Orleans, which established his fame in this class of oratory, in which he stands supreme.

His last sermon of this kind (at the tomb of the great Conde) is considered as a master¬

piece. The manly vigor which characterized

his orations is seen also in the (Discours sur l'Histoire Universelle,* designed for the in¬

struction of his royal pupil. The care which he took of the education of this prince — an obstinate, stupid youth, who had no intellect to develop — was rewarded in 1680 by the

office of the first almoner of the Dauphin. In 1681 he was made bishop of Meaux ; in 1697

he obtained the dignity of a councillor of state and a year afterward that of the first almoner of the Duchess of Burgundy. His practice

and his doctrine were equally severe. All his time was divided between his studies and the execution of his official duties ; he seldom allowed himself any recreation. The learned

Benedictines of the Brotherhood of Saint

Maur published a complete edition of the

works of Bossuet in 43 volumes 8vo (Ver¬

sailles 1815-19) ; the best edition is that edited by Lachat (31 vols., 1862-66).

Bossuet was unrivaled as a pulpit orator,

and greatly distinguished for his strength and acumen as a controversialist. He was the

leader of the Gallican church in the dispute between King and Pope, and to his eloquence was due the adoption of the compromise of

1682. He was a strong supporter of the con¬

servative tradition; the object of his philo¬

sophical writings was to provide authority

with a rational basis. Among the most cele¬

brated of his works are his (Oraisons Funebres) ; (Histoire des Variations des Eglises ProtestantesP in which he contrasts the unity of the Catholic Church with the inconsisten¬

cies and variations of Protestantism; Poli¬

tique tiree des propres Paroles de l'Ecriture SainteP He has described his own life at

length. For his dispute with the archbishop of Cambrai, Fenelon, see Fenelon and

Quietism. Consult Lear, (Bossuet and his

Contemporaries) (London 1874) ; Currier,

(Nine Great Preachers) (Boston 1912) ; Sir

J. Stephen in (Horae Sabbaticae) (London

1892).

BOSSUT, bos'sti', Charles, French mathe¬

matician : b. Tartaras, in the department of the Rhone, 11 Aug. 1730; d. 14 Jan. 1814. He

was educated at the Jesuit College, Lyons, and having met with the (Eloges of FontenelleP

was smitten with so eager a desire to imitate the distinguished individuals therein de¬

scribed, that he wrote to Fontenelle himself on the subject. That veteran, now 90 years of age, not only answered the letter, but ex¬

pressed such an interest in the future progress of his young correspondent, that Bossut re¬

paired to Paris and was introduced by Fon—

lenelle to Clairaut and D'Alembert, the latter of whom he appears to have particularly ad¬

mired and studied to imitate. In 1752 he was appointed professor of mathematics to the

school of Mezieres and held that office for 16

years, during which he gained several prizes offered by the Academy of Sciences. He was afterward (1768) admitted a member of that

bod}' and was at the same time appointed ex¬

aminer of candidates for the artillery and en¬

gineers. At the Revolution he was deprived

of all his appointments and afterward lived in retirement till his death. His most im¬

portant works are a (Course of MathematicsP

which was long in repute as a textbook; a treatise on Hydrodynamics > ; the (Intro¬

ductory Discourse to MathemathicsP and

various other articles in the Encyclopedic ; and a (History of MathematicsP He also edited

the works of Pascal.

BOST, Paul Ami Isaac David, Swiss

ecclesiastical writer: b. Geneva, 10 June 1790; d. La Forge, France, 14 Dec. 1874. He studied theology at the University of Geneva, grad¬

uating in 1814. After four years spent as a minister in Switzerland, he began his ((Missionary Journeys® under the auspices of the London Continental Society, a work he was

destined to continue for 35 years. Withdrawing from the Geneva society, he was expelled

from France and entered upon a roving, pov¬

erty-stricken life, the difficulties of which were increased by the burden of a large fam¬

ily. Expelled from France on account of his views, he preached in Offenbach, Frankfort,

Hanau, Friedrichsdorf, Karlsruhe and other

places. He was pastor of the free church of Bourg-le-Tour in Geneva (1825-26), where

he published (Defense de ceux des fideles de Geneve qui se sont constitues en eglises inde-pendantes) (1825). He was tried for slander and fined 500 francs. He resigned his pas¬

torate and founded a new congregation at

Carouge which he discontinued after two

years to establish L'Esperance, a religio—

political magazine (1838). Two years later

he was admitted to the ranks of the clergy of Geneva without retracting any of his views and he became successively pastor at Asnieres

and Bourges (France) and chaplain of the

prison of the Maison Centrale at Melun. This he resigned in 1848, after which he was in Geneva, Nimes, Neuchatel, Jersey and Paris,

coming finally to La Force. In addition to his reputation as a hymn writer, Bost has to his credit works of considerable interest in con¬

nection with the religious movement of which he forms an integral part. These include

(Geneve religieuse) (Geneva 1819) ; (Histoire des Freres moraves) (2 vols., 1831, London

1834) ; (Sur la primaute de Pierre et son Episcopal (1832) ; (Histoire general de l'etab-lissement du ChristianisirP (4 vols., 1838; a translation and revision of Blumhardt's great work) ; (Les prophetes protestants) (Melun

1847) ; and (Memoires pouvant servir a l'histoire de reveil religieux) (Paris 1854—55).

BOSTANJI, a class of men in Turkey,

numbering about 600, originally the Sultan's gardeners, but now also employed in several ways about his person, as mounting guard at the seraglio, rowing his barge, etc., and like¬

wise in attending the officers of the royal house¬

hold. Their chief is called Bostanji Bastri, holds the rank of pasha and is chief of the police of the capital and governor of the Sul¬

tan's residences. They perform military duty.

BOSTON, England, a municipal and par¬

liamentary borough and port of Lincolnshire, BOSTON

situated on the river Witham, about five miles I rom the sea, 30 southeast from Lincoln. It derived its name (a corruption of Botolph's town) from Saint Botolph, who founded a mon¬

astery here about the year 650. Its chief inter¬

est for Americans lies in the fact that it was the English home of the most influential of the settlers of Boston, Mass. The port had for¬

merly a flourishing trade, but owing to various causes, and especially the fact that in dry sea¬

sons the river became choked up with sand

brought in by the tides, this trade greatly de¬

clined. In 1881 a new channel was constructed so as to bring the town within three miles of the sea by navigable water ; and a new dock of seven acres area, capable of admitting ves¬

sels of 3,500 tons at the highest tides, was opened three years later. Boston contains some fine buildings, notably the parish church of Saint Botolph, the Cotton chapel and various other places of worship, a grammar school dat¬

ing from 1554, the Athenaeum, the Guildhall and the Assembly rooms, under which are ar¬

ranged the butter-market, poultry-market and

the police-station. Saint Botolph's Church is a very large and handsome Gothic structure, with a tower, known as Boston Stump, 282 feet high, containing a carillon of 36 bells cast at Louvain.

In the upper part of the tower, octagonal in shape, lights used to be suspended for the guid¬

ance of mariners at sea and travelers crossing the fens by night. The town is now well sup¬

plied with water brought from a reservoir dis¬

tant about 14 miles. The leading industries comprise iron and brass foundries, the manu¬

facture of farm implements, sails, ropes and bricks, and tanning, brewing and malting.

Fishing also gives occupation to many of

the inhabitants, and there is steam com¬

munication with Hull and London. Pop.

(1911) 16,673. The borough returns one mem¬

ber to Parliament.

BOSTON, Mass., the capital of the State,

and, according to the United States census of 1920, seventh city in population in the United States. It is situated on the western shore of Massachusetts Bay.

History. — The settlement from which it

has grown was made in 1630 by members of

the Massachusetts Bay Company, bearing with

them the charter granted to this organization by Charles I. The leader of the first expedition of settlers who landed at Charlestown, 17 June 1630, was Gov. John Winthrop, a Puritan

gentleman. In his fleet came others of like condition, Sir Richard Saltonstall, Isaac John¬

son and his wife, the Lady Arbella, daughter of the Earl of Lincoln, together with a com¬

pany of sturdy Puritans, chiefly from Lincoln¬

shire. They landed 700 or 800 strong, a num¬

ber soon increased to 1,000 and then to 2,000 by later arrivals — the most considerable settle¬

ment on the American coast. At the end of the first summer, a season

of hardship, they moved across the Charles River to the promontory, of Shawmut — an Indian word translated Hiving

fountains.® This headland, with ample water—

supply, was called by the English settlers Tri¬

mountain. from the three-peaked hill, now

Beacon Hill, which formed its highest emi¬

nence. On 17 Sept. 1630 it was voted to

change its name to Boston, after the Lincoln¬

shire town from which some of the chief

settlers had come. The original settler of the land, the Rev. William Blackstone (q.v.), a scholar who had left England to avoid the

ˆlord-bishops,® sold the newcomers his land and moved on to Rhode Island, in order to escape the Hord-brethren.®

From the first the power of the Puritan

clergy was important. Church and State were practically one. Trained in the English univer¬

sities, the ministers set a true value upon edu¬

cation. A free public school was established in 1633, and in 1636 the General Court pro¬

vided for the beginnings of Harvard College.

The government of both town and colony was purely democratic, having for its unit the town¬

meeting, which in Boston itself maintained its sway, with the single interruption of British military rule at the outbreak of the Revolution, until the town became a city in 1822. Besides the training in self-government thus acquired, Boston had the advantage of virtual independ¬

ence through its early years. At first the Crown was fully occupied with its own problems in England; and when Cromwell came into power, so strongly Puritan a settlement was naturally left much to its own devices. Thus the charter of the Bay Company and the liberties enjoyed under it became very dear to the people of Bos¬

ton. When Charles II came to the throne there were grave fears that these liberties would be seriously curtailed. In 1664 four royal com¬

missioners came from England to adjust diffi¬

culties in several colonies. Their mission to Boston was a failure, and for some years to come the town was secure under its original system of government.

Under James II came the dreaded change.

Complaints of the Boston spirit of independ¬

ence and religious intolerance were borne more frequently to the English court, and before the death of Charles II the Court of Chancery

voted the Massachusetts Bay charter vacated.

In the summer of 1686 the original government of the colony came to an end. Before the close of this year, Sir Edmund Andros, the new gov¬

ernor appointed by the king, the first chief magistrate in Massachusetts not chosen by pop¬

ular election, arrived in Boston. Probably no¬

body in his peculiar place could have satisfied the people at this time. Within less than three years from his arrival a bloodless revolution in Boston, a well-organized uprising of the people, removed him from office. Early in 1690 he

was sent back to England, where Increase

Mather, the leading minister of Boston, had already been for nearly two years, trying to have the old charter restored, or to get the best possible substitute for it. This he suc¬

ceeded in doing, after the accession of William and Mary, and had the

further satisfaction of choosing the first governor under the new

instrument making Massachusetts a royal prov¬

ince. With this governor, Sir William Phipps, Mather returned to Boston in the spring of 1692.

By this time Boston had grown to import¬

ance as the leading seaport, and in many

respects the foremost town of America. Before the end of the 1 7th century its population was approximately 7,000. In another half century this number was more than doubled. A good

idea of certain aspects of the town in this 294

period is given by an Englishman, Daniel Neal, who wrote in 1719:

“The bay of Boston is spacious enough to contain in a manner the navy of England. The masts of ships here, and at proper seasons of the year, make a kind of wood of trees like that we see upon the river of Thames about Wapping and Limehouse, which may easily be imagined when we consider that by computation given into the col¬

lectors of his Majesty’s customs to the governor upon the building of the lighthouse, it appeared that there was 24,000

ton of shipping cleared annually.

“At the bbttom of the bay is a noble pier 1,800 or 2,000

foot long, with a row of warehouses on the north side for the use of merchants. The pier runs so far into the bay that ships of the greatest burthen may unlade without the help of boats or lighters. From the

head of the pier you go up the chief street of the town [now State Street], at the upper end of which is the town house or Exchange, a fine piece of building, containing, besides the walk for the merchants, the Council-Chamber, the House of Commons, and another spacious room for the sessions of the courts of justice. The Exchange is surrounded by booksellers'

shops which have a good trade. There are five printing presses in Boston, which are generally full of work, by which it appears that humanity and the knowledge of letters flourish more here than in all the other English Plantations put together; for in the city of New York there is but one bookseller's shop, and in the Plantations of Virginia, Mary¬

land, Carolina, Barbadoes, and the Islands, none at all."

As in the 17th so in the 18th century, the clergy and ecclesiastical affairs loomed large upon the local horizon. The prominence in

Boston records of what is known as the "Mather dynasty® — of which Increase and his son, Cot¬

ton Mather, were the chief figures — bears wit¬

ness to this condition. The younger of these Puritan priests is remembered largely for his connection with the witchcraft delusion, which had its worst effects in Salem, but in tem¬

poral matters and humanitarian work he im¬

pressed himself no less forcibly on the life of his time. Of the devout laity, educated at Har¬

vard College, giving themselves to public serv¬

ice, living private lives of dignity and piety, Samuel Sewall, whose diary preserves the true flavor of ancient Boston, stands as an admir¬

able type. In contrast with the background of lives like his, the society of which royal gov¬

ernors were the central figures presents a less austere picture. About the governors, estab¬

lished from 1716 onward in a sort of vice-regal state in the Province

House, gathered the more worldly element of the place — prosperous mer¬

chants, officials of the Crown, members of the King's Chapel congregation and the two other Anglican churches established before the mid¬

dle of the century. Under the province charter religious liberty was increasing, and churches of various denominations — including even the Quakers, whose first representatives in Boston were hanged on the Common — had come into being. Meanwhile the constant friction between the governors and the General Court, always meeting in Boston, kept the spirit of political in¬

dependence wide awake. A fruitful source of trouble was the annual grant voted by the court to the governor. A salary the people steadily refused to pay to an official not of their own choice ; and the amount of the grant varied ac¬

cording to the personal popularity of the chief magistrate. Through all these years, moreover, the town-meeting was educating the people in self-rule, so that when the time was ripe for active opposition from American colonists to the colonial government of England, the men of Boston were ready to take a leading part in the struggle.

In 1761 James Otis, advocate-general of the province, resigned his position under the Crown in order to contest the Writs of Assistance, which permitted customs officials to enter any house, search for smuggled goods, and on sus¬

picion seize what they might find. The argu¬

ment against these writs was the first of many conspicuous acts of resistance to royal author¬

ity. In 1765 the Stamp Act, taxing many

articles of daily use in the colonies, was passed by Parliament. Its principle was bitterly re¬

sented in Boston, where riotous outbreaks soon took place. A mob completely destroyed the

house of Thomas Hutchinson, chief justice of the province, and was

properly denounced by respectable citizens. In the next year the re¬

peal of the act was joyfully celebrated by all classes. In 1770 occurred the (<Boston Massa¬

cre® (q.v.), the result of friction between the inhabitants and the British troops stationed in the town. In the use of (<a word which his¬

torians apply to such events as Cawnpore or the Sicilian Vespers® — the word “massacre® to de¬

scribe <(the careless shooting of half a dozen townsmen® — John Fiske finds (<all the mildness of New England civilization brought most

strikingly before us.® The town-meeting was

even more typical of this civilization, and from its training Samuel Adams, at about this time, stepped into virtual leadership of the revolu¬

tionary cause in Boston. The Committee of

Correspondence was formed upon his motion,

and out of it grew by degrees the union not only of towns, but of colonies, in their opposi¬

tion to the throne. On 16 Dec. 1773, occurred the ((Tea Party,® a cleverly planned and exe¬

cuted plot for throwing into Boston harbor, by men disguised as Mohawk Indians, the cargoes of three vessels bearing tea upon which the people of Boston would not pay the hated tax.

Parliament retaliated by passing the Boston

Port Bill, which closed the harbor and brought the chief industry of the town, its maritime trade, to a standstill. A military governor, General Gage, took the place of Hutchinson, who had been acting as the chief civil magis¬

trate, and open hostilities were at hand.

The events of 19 April 1775 — the warning ride of Paul Revere, the escape of John Han¬

cock and Samuel Adams, the fights at Concord, Lexington and along the road between the two towns — are the commonplaces of American

history. They belong to Boston in so far as the Boston revolutionary leaders were concerned in them, and as the British troops set forth from the town and returned to it defeated. The bat¬

tle of Bunker Hill in Charlestown, 17 June 1775, bears much the same relation to Boston history.

On 3 July Washington arrived in Cambridge

and took command of the American army,

which from that time until the following March kept the British closely within the lines of the siege of Boston. Many of the inhabitants were permitted early to depart. Those who remained suffered hardships and privations besides wit¬

nessing the destruction of much American prop¬

erty, and such scenes of destruction as the use of the Old South meeting-house as a riding-school. On the night of 4 March 1776 Wash¬

ington made his memorable seizure of Dorches¬

ter Heights (now South Boston), and on the 17th Howe with all his army and a large fol¬

lowing of American Tories sailed for Halifax.

Thereupon Washington entered the city, and

even before the signing of the Declaration of BOSTON

Independence Boston ceased to be a scene of active warfare in the

long conflict. Yet John Adams, Hancock and other Boston men bore

an important part in the counsels of the young nation, in whose army and navy the town was fully represented.

The recovery from the effects of the siege was slow. To take the place of the departed Tories, and to occupy their spacious houses, there was in the remaining years of the 18th century a gradual immigration from the neigh¬

boring country (where Tories were few) of

families possessing wealth, energy and qualities of leadership. Local government by town-meet¬

ing was resumed. In 1780 a State government for Massachusetts was formed, and John Han¬

cock was chosen the first governor. In the gen¬

eral readjustment maritime affairs took their previous place of importance. Cut off by Brit¬

ish legislation from the West India trade, the Boston merchants looked farther abroad. The

prospects of the fur trade on the northwest coast of America became known through Cap¬

tain Cook's journals, published in 1784. In 1787

two small vessels, the Columbia and the Wash¬

ington sailed from Boston to attempt this trade.

Before her return in 1790 the Columbia had cir¬

cumnavigated the globe — the first of American vessels to accomplish this feat. The furs col¬

lected in the Northwest had been sold in China, and the example thus set led the way to an important trade with the East in which Boston long maintained the American supremacy. In

such a seaport as Boston, Jefferson's Embargo and the War of 1812

were naturally unpopular.

The Federalist party, moreover, had much of its best strength in Boston. The powerful

mercantile class saw its best interests in a strongly centralized government and conditions of general stability. The opinions of this class colored the influential feeling of the community to an extent which laid Boston open to charges of something very near disloyalty to the na¬

tional government. The crippling of com¬

merce, however, had the good effect of turning capital and energy toward manufacturing. In

1814 Francis C. Lowell, of Boston, made the first American use of the power-loom in his mill at Waltham at almost the same time with its introduction into England. The growth of the great cotton industry at Lowell followed rapidly upon this invention. With the spread of manufactures Boston itself was growing. In 1820 its population was over 43,000. The old form of town government had become unwieldly. For some years efforts had been mak¬

ing toward the adoption of a city charter. In 1822 this was finally achieved.

From the time of this change in local gov¬

ernment to the present, the outward growth of the city, as figures can speak for it, has been unbroken. In matters not computed in this

way, the development has been in several im¬

portant respects unique. With Boston, for ex¬

ample, the Unitarian movement in America is especially associated. Before the town became a city there were divisions among the clergy of Congregationalism — practically the established order in New England — on various doctrinal noints, notably that of the Trinity. Under the leadership of William Ellery Channing the

ˆliberal® clergy and most of the older and more influential religious societies turned from Cal¬

vinism to the new theology. Especially between 1820 and 1830, an acute controversy took place.

Between 1840 and 1850 the Unitarian body it-sell was disturbed by differences between the more conservative element and the radicals, of whom Iheodore Parker was a type. The result of the successive controversies has been a lib¬

eralizing of religious beliefs not only in what came to be Unitarian Boston, but in the many Protestant bodies which now acknowledge an

important debt to Unitarianism. Another far-reaching movement which had its headquarters in Boston was that of anti-slavery. Here in 1831 William Lloyd Garrison established his

journal, the Liberator. A year later the first anti-slavery society in America was established in Boston. The agitation of the Abolitionists was for a long time opposed to the conservative class, which resorted even to mob violence in the hope of suppressing the reformers. But to Garrison and his associates it was due, as Mr.

J. F. Rhodes has said, ((that slavery became a topic of discussion at every northern fireside. »

W hen the Civil War broke out, the cause of the Union, perhaps even more than that of ab¬

olition, enlisted the enthusiastic support of the Boston community; yet, as if in fulfilment of the work which Garrison began, it was from Boston that Governor Andrew sent forth the

first regiment of colored troops raised in the North.

With Boston and its immediate vicinity,

moreover, are associated the names which stand for the most important contribution of the 19th century to American literature. Prescott, Ticknor, Bancroft, Motley and Parkman ; Emerson, Hawthorne, Lowell, Longfellow, Holmes and

Whittier, — these and their associates, bound together with many ties of sympathy and friend¬

ship, constituted a group of writers which gave the place a unique

distinction in letters. The Atlantic Monthly , founded in 1857, became the vehicle for much of their most characteristic utterances. The influences of Transcendental¬

ism (largely a local movement, culminating in the forties), of anti-slavery feeling, of creative expression, combined to give to this utterance as a whole something of the distinction which the individual writers won each for himself.

During the 19th century two important

changes in the Boston landscape affected the future of the city, in the regions both of resi¬

dence and of business. The first of these was the filling in of the Back Bay, an arm of the Charles River which spread between the Com¬

mon and the hills of Brookline, running south and east as far as the Neck or narrow strip of land connecting Boston and Roxbury. From

the early years of the century changes in the shore line of Boston had been wrought by cut¬

ting down the principal hills and filling out the irregularities of the harbor front. The first step in the series of events which led to the conversion of the Back Bay from water into land was the granting of a charter in . 1814

to the Roxbury Mill Corporation, permitting

the building of dams across the Back Bay and confining its water for mill purposes. To these rights the Boston Water Power Company suc¬

ceeded in 1832. At about the same time the Boston & Providence and Boston & Worces¬

ter railroads invaded the Back Bay with their bridges. Moreover the waters became unsani¬

tary through lack of drainage, and to solve the problem, hygienic and legal, a State commission 296

was appointed and made a full report in 1852.

Its recommendations to create the whole tract of land now known as the Back Bay did not at once satisfy the various conflicting interests, but in 1858 the actual work of filling up the waters was begun. The result was a large en¬

richment of the State treasury, and the addition to the city of the whole district occupied by the residences, clubs, churches, hotels and other institutions connected with the most prosperous life of the city. The original peninsula of Bos¬

ton contained 783 acres. Through its encroach¬

ments upon water, largely in the Back Bay, it has grown to 1,829 acres. With the accessions of outlying districts, the total area of the city is now 29,158 acres.

The second great change in the outward as¬

pect of Boston resulted from the great fire of 9 and 10 Nov. 1872. From the beginning of its history Boston had been afflicted by serious fires. This greatest of them all destroyed 776

buildings, all but 67 of which were of brick and stone. It devastated Summer street (both

sides), Washington street from Summer to

Milk, Milk street to the post office, Devonshire street, Water (both sides), Congress, Lindall and Oliver streets to the harbor. From the corner of Washington and Franklin streets the shipping at the wharves was in clear view.

Nearly 2,000,000 feet of land were burned over.

The total loss was estimated at more than

$75,000,000. Yet by private enterprise and State aid the recovery was immediate. The oppor¬

tunity to widen and straighten streets in the business district was seized. Statelier buildings rose in the place of those destroyed, and a

new business region, corresponding to the new dis¬

trict of residences, was created.

The Metropolitan District. — He who

would understand modern Boston must dis¬

tinguish the city proper from the metropolitan district of which it is the centre. Where the Charles, Mystic and Chelsea rivers meet and flow into Boston Flarbor, nature, materially aided by man, has formed three converging

points of land. The northeastern, practically an island, is occupied by East Boston ; the tip of the western is the Charlestown district; and the southern, out of which rises Beacon Hill, is the real heart, the business and administrative centre of Boston. South and west of this cen¬

tre lie the South Boston, Roxbury and Dor¬

chester districts. Inland on the southern bank of the Charles, and cut off from Boston by Cambridge on one side and the town of Brook¬

line on the other, lies the Brighton district.

These districts form the present city, a com¬

munity whose population in 1915, according to the decennial State census, was 745,439, and whose total land area is 29,158 acres.

But this city, both in area and in population, is only part of the New England metropolis.

The cities of Somerville and Cambridge reach almost to the centre of Boston; the independent town of Brookline is almost wholly within the city. The State enumeration made in 1915 put the population of the cities and towns lying within 10 miles of Boston at 942,480, giving the metropolitan district, as defined in the Federal census of 1910, a population of 1,687,919. In¬

deed, the State's centre of population lies with¬

in the metropolitan district.

Local Travel.— In this situation Boston

faces a problem of the first order. Ferries, au¬

tomobiles, steam and electric railways bring daily into the city thousands of these people.

This fact can be easily illustrated. In the year ending 30 June 1914 the Boston, Revere Beach & Lynn Railroad, a narrow gauge suburban

railroad, carried 13,817,292 passengers into and out of the city, or practically 7,000,000 each way, which equals more than 20,000 for each working day. In the same year the three lead¬

ing railroads entering the city carried over 60,-

000,000 passengers into and out of the city, most of this business consisting of the transporta¬

tion of “commuters,® who come to the city each day. The Boston Elevated system carried an

even larger number into the cities and towns of the metropolitan district. These people from the suburbs come to work and to play. The city must provide transportation for them; it must clean its streets and regulate traffic for their convenience ; it must give them police pro¬

tection; it must educate many of them; it must be ready to serve their every want as if they were citizens. Ample evidences of these facts may be found in school, hospital and police records. Over one-third of the persons ar¬

rested annually in Boston do not have their residences in the city.

On the other hand, this condition has its

compensations for the city. The commerce

and industry of the city are thereby greatly in¬

creased. This, in turn, has its effect on prop¬

erty values. The assessed valuation of real estate in Boston in 1914 was $1,237,473,100, of personalty, $312,573,509, total over a billion and a half. This equals a per capita assessed val¬

uation of $2,061.84, which exceeds New York's per capita valuation by almost $300 and every other city in the country by over $600.

Population. — The population of the city

proper has grown steadily since 1790. Immi¬

gration and the annexation of other towns

have probably been the most important fac¬

tors in this growth. In 1790 Boston had

18,320 people; in 1810, 33,787; in 1830, 61,392; in 1850, 136,881; in 1870, 250,526; in 1890, 448,477; in 1910, 670,585; and in 1920 (U. S.

Census) 748,060. Immigration has been

largely from Ireland. Following the famine

in Ireland in the 40's, a considerable stream of Irish immigration set in toward the United States, and much of it found its way to Bos¬

ton. In 1846, when the city is said to have had about 120,000 people, there were already about 24,000 Irish among the population.

This stream of incomers continued through

the century, until the home of the Puritan and the birthplace of Unitarianism has come to be dominated politically by the Irish-Ameri¬

cans. In 1910 there were in Boston over

150,000 persons of Irish birth or Irish parent¬

age. To be sure, other nations have also con¬

tributed to Boston's foreign population, espe¬

cially in recent years. In 1910, 69,000 of its people were of Canadian birth or parentage, less than 5,000 of these being French-Canadian ; 19,000 were of English birth or parent¬

age; 19,000 German; 49.000 Italian; and 63,-

000 Russian, mainly Jewish. In addition

there were thousands of persons in the city one of whose parents was of foreign birth.

All told, less than 25 per cent of the neonlc of Boston in 1910 were native born of native parentage and many of these could claim but

J Trinity Church

2 Public Library

3 South Station

BOSTON, MASS

MUSEUM OF FINE ARTS

BOSTON

a single generation of American parentage

behind them.

Churches. — Church statistics go far to

confirm these figures, for of 345 churches of all denominations listed in the city directory of 1915, 65 were Roman Catholic and 38 Jew¬

ish. Among others, the Baptist denomination

had in the same year 35 churches within the city; the Congregational-Trinitarians had 36; the Congregational-Unitarians, 24; the Meth¬

odist Episcopal Church, 31; the Lutherans, 12; the Presbyterians, 11; and the Episcopalians, 36. When one considers the history of New

England, these statistics are, indeed, surpris¬

ing. Among the various other denominations

which have a footing in Boston is the Chris¬

tian Science Church, whose temple, or

mother-church, is one of the architectural

landmarks of a city which boasts many famous and beautiful buildings.

Commerce. — With the growth and diver¬

sification of the population has come a cor¬

responding increase in commerce and manu¬

factures. Boston is not a city of one domi¬

nant manufacture, nor is its import and export business highly specialized in one line. Never¬

theless, in the manufacture of boots and shoes, clothing, pianos and organs and a number of specialties, Boston is one of the leading cities of the Union, and as a wool market it stands first. The United States census of manufac¬

tures for 1914 recorded 3,138 industrial estab¬

lishments of factory grade, employing 96,913

persons, of whom 78,894 were wage earners,

receiving annually in wages $49,444,000. The capital invested aggregated $214,735,000, and the year's output was valued at $284,802,000: of this, $134,234,000 was the value added by manufacture.

The port of Boston is firmly established

as the chief port of New England and as one of the largest in the United States. With

exports of $71,961,259 and imports of $162,-

998,471, total $234,959,730, Boston's foreign trade in 1914 was surpassed by that of only two other American cities, New York and

New Orleans. The tonnage of vessels, in for¬

eign trade which entered and cleared in the year 1913 was over 5,000,000, in 1914 slightly under 5,000,000. The coastwise trade was also considerable, as was the number of passengers coming and going on the steamship lines

which make regular sailings from the port.

Boston's rank among American cities was

officially summed up in < Boston Statistics, 1915,) as follows: (< First in value of property per capita, first in municipal assets per capita, first in banking power per capita, the first shoe and leather centre, the first wool mar¬

ket, the second importing seaport, the second textile centre, third in

foreign trade, also in amount of bank clearings, the fourth postal district, fourth (close to third) in total as¬

sessed valuation, fourth (probably) in popu¬

lation, the fifth exporting seaport, and sev¬

enth in the value of its manufactures.®

Transportation. — A few words .should be

said about the transportation and terminal

facilities of Boston. There are two main rail¬

road stations in the city, the North and South stations. Into the former come all the trains of the Boston & Maine system, which covers especially northern Massachusetts, New

Hampshire and Maine. Passengers on the

Boston & Maine to and from Boston in the

year 1913-14 numbered over 25,000,000. The

South station, reputed to be the largest rail¬

road station in the world, is the main ter¬

minal for two railroads, the Boston & Albany, now a New York Central line, and the New

York, New Haven & Hartford. This station

handles annually even more passengers than

does the North station. Within the city Bos¬

ton has an excellent system of elevated, sur¬

face and sub-surface electric railways, now

under the single management of the Boston

Elevated Railway Company and giving both

local transportation and rapid transit into ad¬

jacent cities and towns. The subways are

owned, and were built, by the city, sometimes in cooperation with other cities, and are

leased to the Boston Elevated company at

fixed annual rentals. There are now many

miles of subway and extensions are continually being made. Without subways and elevated

lines, the older parts of Boston would be

hopelessly congested during the rush hours

of the morning and evening.

With the new century, Boston awoke to

the necessity of developing her harbor facili¬

ties to more efficiently handle the growing commerce. In the past 15 } rears the Federal, State and city governments have cooperated

on a scheme of development, which, though

held up at times by unforeseen delays, has gone steadily on toward the goal of comple¬

tion. One of the main channels of the har¬

bor has been deepened and widened ; an im¬

mense drydock has been constructed ; several large new piers have already been completed, at an expense of millions of State money;

and still other works are in process. When this work shall have been all completed and the two main railroad stations more closely linked up with one another and articulated

with the means of local transportation, espe¬

cially the Boston Elevated system, Boston will have solved its chief transportation and ter¬

minal problems for some years to come.

Points of Interest. — The city and its en¬

virons offer to the visitor and sightseer a variety of points of interest almost if not quite unequaled in an equal space anywhere

in the United States. The city^ and the State have taken care to preserve many of the more famous buildings of an earlier day. Among

those which remain are the Old State House and Faneuil Hall, dating from 1748 and 1742, respectively, and a group of the old meeting¬

houses, including Christ Church (1723), the

Old South Meeting-house (1792), and King's

Chapel (1749). In the Navy Yard in Charles¬

town lies the old frigate Constitution, exem¬

plifying the preparedness of another day.

Bunker Hill, its monument, and Dorchester

Heights are all within the present city limits.

Changes. — In growing from a town to a

metropolis, Boston has undergone fundamental

changes, perhaps not all for the better. Like most American cities, it suffers from much

bad architecture. But since the middle of the last century and especially in the past 30

years, many improvements have been made

in the appearance of the city. The old part of the city still suffers from crooked, narrow, poorly-planned streets, some steep grades and other

hindrances to traffic, but with the filling in of the Back Bay district, the city took the 298

first step toward the development of a real city plan. Ample width was given to the

streets and the blocks were laid out on the rectangular plan. Later the Fenway district

was made a place of architectural beauty by the locating in it of the Museum of Fine

Arts, the Harvard Medical School and other

buildings of note. Elsewhere in the city

there have been other acts of replanning, as at Copley Square, upon which fronts the

splendid Public Library. In 1913, by the

erection of the Custom House Tower, the skv-line of the city was entirely changed ; this splendid tower of stone-masonry, standing in the business district and close to the wharfs, rises high above the buildings in its vicinity and can be seen from afar on all sides of the city. A building-heights law prohibits other buildings from even approaching it in height.

No enumeration of the better buildings about Boston would be complete which did not

mention the State House, which stands on

Beacon Hill, fronting the Common, and has

been greatly enlarged since its original (<Bulfinch Front® was built in 1795-97.

Parks, Playgrounds, *etc.* — The parks and

playgrounds movement may fairly be said to

have had its beginning for Americans in Bos¬

ton. The city still stands at the head of those communities which have actually achieved

their aims in this direction. There are within the city 3,574 acres of land devoted to park and playground purposes, over one-tenth of

the total land area of the city. Of this area, 2,692 acres are under control of the city and 882 acres under control of the State. The

Common, with an area of 48 acres, and the Public Garden, with an area of 24 acres, lie almost at the centre of the city. No district is without its park or its playground, no part of the community without an easily accessible breathing spot. Yet here again we must con¬

sider not Boston alone, but the metropolitan district. A State-appointed Metropolitan

Park Commission has developed in the en¬

virons of the city a supplementary system of parks and reservations which is perhaps the most complete in America. Almost every part of the whole system can be reached from any part of the city on payment of a five-cent fare. North of the city lies the Middlesex Fells Reservation, containing over 3,000 acres of woodland and hills. South of the city

lies the Blue Hills Reservation, containing

4,232 acres. The ocean beaches north and

south of the city have been preserved and

equipped with bathing facilities. Both banks of the Charles River have been included in the general scheme for a number of miles

inland. And finally, all the important units in the system have been linked up one with another by means of a system of well-kept

boulevards. Indeed, in every respect, in plan¬

ning as well as in maintenance, in the equip¬

ment of playgrounds and the provision of

bathing facilities and in the more especially educative features provided at the Marine

Park, the Franklin Park Zoo and the Arnold Arboretum, the park system of Boston and

of the metropolitan district may be said to be excellent.

Education — The facilities offered by the

city for education in all the arts and sciences are ample and of high order. At the base lies an extensive system of kindergartens and

primary grade schools, above which are the

grade schools, junior high schools and high schools. In addition there were in 1914 30

night schools of all grades, with 451 teachers, 77 playgrounds with 133 instructors, 87 school physicians and 35 school nurses. The total

number of teachers in day schools was 3,108, of whom 451 were men. The cities of Massa¬

chusetts have a large amount of local auton¬

omy in school affairs and Boston has made

full use of this privilege. The city spends al¬

ready $6.89 per capita for the support of

schools, therein leading all the cities of the United States, and would undoubtedly spend

more were there not legal restrictions on the amount which may be spent for school pur¬

poses. Indeed, this financial restriction upon the powers of the city has had the bad effect in the last few years of necessitating a larger number of pupils per teacher, the ratios in 1914 being 43 to 1 in the grade schools, 29 to 1 in the high schools and 26 to 1 in the kin¬

dergartens. The annual expenditures for all

purposes in 1914 were $84.69 per attending

pupil in the day high schools and $41.36 per attending pupil in the day elementary schools.

The city itself offers no higher education

except through its library, which now has

over 1,000,000 volumes in its collection and maintains 30 branch libraries and reading-rooms. It circulates annually over 2,000,000

volumes. Instruction in the arts is given by the School of Drawing and Painting, housed

in the Museum of Fine Arts, and in music

by the New England Conservatory of Music,

as well as by a number of other schools and private teachers. Boston University (q.v.)

is within the city limits and just across the river lies Cambridge, which has been the seat of Harvard College, now Harvard University

(q.v.), for nearly 300 years, and to which the Massachusetts Institute of Technology (q.v.)

is moving in 1916. The Lowell Institute,

founded in 1838 with an endowment of

$237,000, offers each year a number of

courses of free lectures of a high order. The Boston Symphony Orchestra has already edu¬

cated a large group of people to an appre¬

ciation of the best in music.

Legislation. — The constitution of Massa¬

chusetts puts almost no restrictions upon the power of the legislature

to make laws for

cities. The legislature, meeting annually in the city of Boston, and observing the rising im¬

portance of the metropolis in the affairs of the State, has seen fit to keep in its own hands al¬

most the whole legislative power in the city's affairs. The legislature enacts each year a large number of bills for the government of Boston alone or for the metropolitan district. In 1897

it was asserted that in the past 75 years the leg¬

islature had passed 532 special acts affecting the city or the towns which have been annexed to it; another count showed over 400 from 1885 to 1908. The number of such special acts seems to increase rather than decrease. Some affairs

have been taken entirely out of the control of the city, such as the police department. The State legislature is, in a real sense, the chief governing body of the city.

Government. — Boston had no charter as

a city until 1822, when its population was al¬

ready approaching 50,000 and town government BOSTON

was no longer possible. Between 1822 and

1909 the city had many minor changes of gov¬

ernment, but it was through a large part of that period governed by a mayor with little power, a small board of aldermen and a large council. From the first the mayor was an elec¬

tive officer and the tendency was for his powers to increase at the expense of those of the coun¬

cil. The large, double-chambered council came to be thoroughly discredited because of its in¬

efficiency and its tendency to play politics. In 1909, following an investigation of the financial methods and condition of the city, the legisla¬

ture enacted a new charter framed by a com¬

mittee of citizens, which gave more power and responsibility to the mayor, and substituted for the old unwieldy council a body of nine men elected at large for three-year terms. The

mayor now serves a four-year term, but may be recalled at the end of his second year. His salary is $10,000 annually. He has extensive power over the annual budget, for the council only may reduce it, and that only upon a two-thirds vote. His appointments to the chief

places in the administration require no alder-manic confirmation, but may be rejected by the State Civil Service Commission. Most minor

positions are filled under civil service rules laid down by the State commission. Members

of the council receive $1,500 per year. As a body they may reduce the budget and they

have also the ordinance power, including the power to create and to abolish city departments.

The city's school system is under two boards.

The school committee, composed of five mem¬

bers elected at large, has charge of the cur¬

riculum and the staff of teachers. The school-house commission, which has charge of the

physical plant and the erection of new build¬

ings, is composed of three members appointed by the mayor.

Elections come annually. Nominations are

by petition. At present 3,000 signatures of bona-fide voters are required to nominate a candidate for the mayoralty, 2,000 signatures for a place in the council or on the school com¬

mittee. The nominations and the elections are non-partisan, Boston being the first large city in the country to use this feature, and second only to San Francisco in the system of election at large for the council.

Problems of government and administration

in Boston are in a number of cases ‘of deep concern to more than the city. Many of them are truly metropolitan problems. For this rea¬

son the legislature of the State has deemed it wise to take out of the hands of the city gov¬

ernment, as such, the control of the police, the water supply, the main drainage system and

the park system. Each one of these depart¬

ments is controlled by State-appointed officers, and their annual budgets are practically manda¬

tory upon the city. The police system has at its head a single commissioner appointed by the governor for a five-year term. His police jurisdiction extends only to the bounds of the city proper. Parks, water supply and the main drainage and sewerage system are under State commissions whose jurisdictions cover more

than the city, including, indeed, many cities and towns in the metropolitan district.

The city is thus hedged about on all sides by the control of the State. It has also been compelled to assume a very large portion of the metropolitan debt. On 1 July 1914, the city was carrying 77 per cent of the metropolitan water debt, 59 per cent of most of the park debt, 43 per cent of most of the sewer debt and also some minor debts of the larger district, the total metropolitan debt borne by the city being over $35,000,000. On 1 Feb. 1915, the total net debt of the city was

$81,974,576, or about $110

per capita. The city of New York alone among American cities exceeded this per capita in¬

debtedness. This rising tide of municipal in¬

debtedness, coupled with a steady increase in the annual payments for current expenses, has recently given people both within and outside the city the idea that Boston is the most ex¬

pensively governed city in the United States.

In 1913 the per capita payments for all gov¬

ernmental costs amounted to $45.06. New

York, with per capita expenditures of $46.78, was the only American city to exceed Boston in expenditures. The average for all cities of over 500,000 population was $37.56. When put upon a basis of expenditures per $1,000 of as¬

sessed valuation, Boston and New York both

make much better showings, Boston's being

even better than New York's. The tax rate

in 1914 on 100 per cent valuation was $17.50, of which $13.57 was for municipal purposes.

Over $24,000,000 of the net debt of the city is for rapid transit purposes, mainly subways, and is self-paying. Nevertheless, when all possible deductions and allowances are made, the city's financial operations during the past 20 years have laid themselves open to much criticism.

From 1903 to 1907, inclusive, public borrow¬

ings increased by almost $6,500,000 annually.

These criticisms bore fruit in 1907 in the cre¬

ation of the finance commission, which was

in 1909 made a permanent State commission,

though the city continues to pay the bills. This commission has done a great deal to point out defects in the city's financial operations and its reports are of considerable value to the student of municipal government. It serves

also to educate the more intelligent among the voters. It was the work of this commission in its first two years which brought about the important changes in the government of the

city which were effected in 1909.

M. A. De Wolfe FIowe,

Author of (Boston : the Place and the Peopled BOSTON, a game of cards played by four

persons, with two packs of cards. Counters

are used generally of three colors and values, and each hand is settled for as soon as finished.

The entire first pack is dealt out by fours and fives, and the second pack is cut for trump, the suit of the card turned being <(first prefer¬

ence, w the other suit of the same color ((second preference,® and the other two ((plain suits.®

If the first player can make five tricks, he says, <(I go to Boston® ; and his competitors may overbid him by saying, ((I go 6, 7, 8, 9, 10, 11, 12 or 13,® as the hand of each may warrant.

Should either of them fail to make the number of tricks he <(bids® for, he must pay to each competitor a forfeit regulated by a card of prices, which must be prepared beforehand.

Without such a card Boston cannot be played.

He may also bid to lose twelve tricks, after discarding one card that is not shown, which bid is called <(little misere® ; or to lose all tricks, which is called ((grand misere.® If he 300

wins all tricks it is a ftgrand slam.® Players who do not bid the first time may outbid the others only in <(miseres.® If a player should take more tricks than he bids for, he is paid for the extra tricks, but on a lower scale than if he had bid and taken the higher number of tricks. If no bid should be made, a ((misere partout® is played, the trump being turned

down, and each player trying to take as few tricks as possible. It is one of the most com¬

plicated of games. It is said to have been introduced into France by Dr. Franklin, who gave it the name of his native city.

BOSTON AND ALBANY RAIL¬

ROAD. See New York Central Railroad.

BOSTON CASE, in the history of slav¬

ery, a case where a Georgia slave hid or was hidden on the ship Boston returning from

Georgia to Maine and on her arrival escaped to Canada. The governor of Georgia issued a

requisition to the governor of Maine for the surrender of the captain to the Georgia author¬

ities as a slave-stealer and fugitive from jus¬

tice, and on his refusal the Georgia legislature demanded that Congress pass a law obligating the governor of Maine and all others in sim¬

ilar cases to comply with the requisitions. The resolution was never reported on. In his next it represents fully 125 distinct units, ranging from a four or five-mile line, like the Troy &

Bennington, to a great 400-mile <(system,® like the Fitchburg division. Some of its branches were incorporated as far back as the early thirties, while others are creations of the last 15 or 20 years.

To bring together all of these different and sometimes conflicting transportation units un¬

der a single management represents a feat of financiering probably unique on this continent.

Of the 2,302 miles now operated by the Boston & Maine Railroad no less than 1,544 miles

represent roads leased by the parent company.

One of these, the Troy & Bennington, is leased in perpetuity, and the lease having the longest term to run is that of the Vermont & Massa¬

chusetts road, which expires in 2873. The Massawippi Valley road lease expires in 2869, the Fitchburg road lease in 1999, and the one to first expire was that of the Suncook Valley road, 1 Jan. 1916.

To give a clearer idea of the full extent of the Boston & Maine Railroad system the fol¬

lowing table, showing the leased roads, with the dates of their incorporation, the beginning and expiration of leases, and mileage has been prepared under the direction of Vice-Presi¬

dent William J. Hobbs:

Name of Road

f

r.

Date of

Incorporation

Date of Lease

Date of

Expiration

Miles of

Road

Lowell & Andover .

Feb.

5, 1873

Oct.

18, 1875

Dec.

1, 1973

8.85

Kennebunk & Kennebunkport .

Aug.

16, 1882

June

18, 1883

May

15, 1982

4.50

Manchester & Lawrence .

June

30, 1847

June

1, 1887

Sept.

1, 1937

22.39

Boston & Lowell . 1 .

June

8, 1830

June

22, 1887

April

1, 1986

111.27

Nashua & Lowell .

April

16, 1836

Nov.

10, 1880

Oct.

1, 1979

14.50

Stony Brook .

March

26, 1845

Sept.

30, 1884

Jan.

1, 1989

13.16

Wilton .

Dec.

28, 1844

Feb.

1, 1884

Oct.

1, 1982

15.50

Peterboro .

July

7, 1866

April

1, 1893

April

1, 1986

10.50

Northern .

Dec.

27, 1844

Dec.

30, 1889

Jan.

1, 1989

172.32

Connecticut & Passumpsic .

Nov.

10, 1835

June

1, 1887

Tan.

1, 1986

110.30

Massawippi Valley .

1862

Dec.

27, 1871

July

1, 2869

27.46

Connecticut River,

Northampton & Springfield .

March

x, 1842

Jan.

1, 1893

Jan.

1, 1992

88.36

Greenfield & Northampton .

Jan.

25, 1845

Concord & Montreal,

Concord railroad .

June

27, 1835

June

29, 1895

April

1, 1986

339.47

Boston, Concord & Montreal .

Dec.

27, 1844

Concord & Portsmouth .

1845

May

26, 1862

Jan.

1, 1961

39.87

Suncook Valley .

July

1, 1863

March

11, 1870

Jan.

1, 1916

17.41

Pemigewasset V alley .

July

9, 1874

March

31, 1883

Feb.

1, 1982

22.93

New Boston .

Feb.

19, 1891

June

21, 1893

June

19, 1992

5.19

Franklin & Tilton .

Aug.

4, 1887

Oct.

8, 1895

April

1, 1986

4.95

Fitchburg .

March

3, 1842

June

30, 1900

July

1, 1999

394.14

Vermont & Massachusetts .

March

15, 1844

Jan.

1, 1874

Jan.

1, 2873

58.58

Troy & Bennington .

March

27, 1851

Oct.

12, 1872

Perpetuity

5.04

Total mileage .

1487.69

message the governor of Georgia recommended

that <(all citizens of Maine who should there¬

after come within the jurisdiction of Georgia on vessels, either as owners, officers or mar¬

iners, should be considered to have done so with intent to commit the crime of seducing negro slaves from their owners and be dealt with accordingly by the officers of justice.®

BOSTON CORNER. See Boundaries

of the United States.

BOSTON AND MAINE RAILROAD.

The Boston and Maine system, as it stands

to-day, is one of the most remarkable examples of railroad evolution and consolidation to be found in the world. Including the constituent roads owned, leased, controlled and operated, While it is impossible to give anything like a complete history of such a complicated sys¬

tem as that of the Boston & Maine Railroad in such a brief sketch as this must be, it is important to note some of the events in its history which stand out most conspicuously.

For example, it is certainly worthy of record that the original railroad — the acorn from which the present great Boston & Maine sys¬

tem has sprung — was first conceived in the brain of its founder, Hobart Clark, of An¬

dover, Mass., in the fall of 1832.

Mr. Clark, after traveling over the Albany

& Schenectady Railroad, then the only line

west of the Hudson River, saw the utility of a branch railroad to Andover, tapping the Bos-BOSTON MASSACRE

ton & Lowell road (then under construction) at Wilmington.

The road was, in 1833, granted a charter

under the name of the Andover & Wilmington Railroad, the first directors being Hobart Clark, Abraham Marland, Amos Abbott, John Smith

and Merrill Pettingill, all residents of Andover.

The capital stock was $100,000.

Hobart Clark was elected president, and the road was surveyed under the direction of

Col. Loammi Baldwin, of Charlestown, Mass.,

the well-known civil engineer.

Work was commenced in the spring of 1835,

and the first section of the road was opened to Andover 6 Aug. 1836. By the fall of 1837 it had been opened to the Merrimac River, at

Bradford; by 1840 to Exeter; by 1841 to

Dover and by 1843 to South Berwick Junction.

In 1835, a second charter had been obtained allowing the extension of the road to Haver¬

hill, and the name was changed to the Andover & Haverhill Railroad ; and a little later in the same year a charter was obtained from the New Hampshire legislature for a road from the

Massachusetts line through New Hampshire to

the Maine State line, under the name of the Boston & Maine Railroad.

In the following year the Maine legislature granted a charter extending the line to Port¬

land, and thus was finally organized the orig¬

inal Boston & Maine Railroad, which to-day

serves a very large section, annually transports over 43,000,000 passengers and nearly 23,000,-

000 tons of freight, earns $46,405,035 a year, owns 23,900 freight cars and 1,953 passenger cars, carries a veritable army upon its payrolls, and operates in five States and one Canadian province.

The system had its beginning in the day of small things, and to-day it exists in an era of great ones, as far as railroad policies are concerned.

The slow but certain process of amalgama¬

tion which has resulted in the present vast transportation system under one management

has been an exceedingly interesting one, but its history would require too much space to be given even in outline here.

It has been attended by many exciting epi¬

sodes, legislative and financial, particularly with reference to the leasing of the Connecticut River road in 1893, the Concord & Montreal in 1895 and the Fitchburg in 1900. These

leases were hotly contested by minority stock¬

holders or opposing interests, but most of the leased lines were absorbed without much show of opposition. It has for some time been the policy of the company to purchase outright its leased lines, whenever that has been practi¬

cable. In view of the present highly-organ¬

ized condition of railroad operation it is note¬

worthy that when the original Boston & Maine road was first built and operated the tele¬

graph had not been invented and double tracks were essential for the safe operation of trains.

Moreover, civil engineering was then in its infancy and surveying instruments were clumsy and primitive, the transit not even having been produced at that time.

Few of those who were engaged in building

the road had ever had any experience in such work, for railroads themselves were very new then, and there is a tradition that fully 75 per cent of the surveying for the line was done without instruments and by purely visual work.

Ihere were no time fuses to aid in blasting, and not even friction matches had come into ex¬

istence.

Aside from the relocation of a part of the Central Massachusetts division, made necessary by the construction of the great Wachusett res¬

ervoir, the only considerable piece of railroad in the territory now controlled by the Boston & Maine which has ever been actually aban¬

doned was part of the original Portsmouth &

Concord road. This line once ran between

Suncook and Candia, and that portion of it was afterward given up for a more favorable location.

According to the financial report issued by the company for the year ending 30 June 1910

the total earnings of the road during the

previous 12 months were $43,357,175. Deduct¬

ing operating expenses, $31,336,324, left the net earnings $12,020,851, an amount that was further increased to $12,809,863, by the addi¬

tion of $789,012, which represented the road's income from other sources.

The report for the year ending 30 June

1915 showed a total operating revenue of

$48,430,485 against total operating expenses

$37,270,726, leaving net earnings of $11,159,759.

Other expenses and deductions, however, re¬

vealed a net loss of $476,440. This, neverthe¬

less, improved on the year preceding, 1914, when the net loss revealed was $2,169,554. A new board of trustees appointed 17 Oct. 1914, after a study of the situation, found that the trouble was fundamental and suggested its

correction by slight increases in freight and passenger rates and by a financial reorgani¬

zation, which would keep the system intact as a whole and restore its credit.

BOSTON MASSACRE, a riot in Boston,

5 March 1770, provoked by the British regi¬

ments quartered there. On Friday the 2d, some rope-makers started a war of insults with pass¬

ing soldiers and on being challenged to a box¬

ing match, used sticks instead, to which the soldiers retorted with cutlasses ; several persons were hurt when the fray was stopped by out¬

siders. Early Monday evening the soldiers

passing to their posts from the main guard, at the head of King (State) street, were met by a crowd armed with canes and sticks, who re¬

fused to make way and shouted insults; the soldiers were about to force a passage when an officer came up and ordered them into the yard, but the alarm-bell had called out the citizens; the hot-heads wished to assault the main guard, and apparently they and the boys set to harrying the sentinel in front of the custom-house opposite the main guard, who

about 9 o'clock hit a specially annoying boy with the butt of his musket. The boy ran off and brought a crowd to the spot, headed by one Crispus Attucks (q.v., apparently a half-breed Indian), and pointed out the sentinel, at which they shouted, <(Kill him ! Knock him

down P The sentinel retreated up the steps and loaded his gun amid a shower of snowballs and other missiles ; told Henry Knox, who was passing and counseled him not to fire, that he would if they touched him ; leveled the gun and warned off the crowd, and called for help from the main guard across the street. A ser¬

geant and seven men were sent to his help and 302

BOSTON MOUNTAINS

BOSTON TEA PARTY

he came down and took his place in line; soon afterward Col. Thomas Preston joined them,

making 10 in arms. They loaded; the crowd

jeered, hooted, taunted them as cowards, dared them to fire and closed about them ; the sol¬

diers drove them back with clubs and bayonets; Preston, in turn warned by Knox, rushed

among his men, and either with or without his orders they fired, killing Attucks and two

others and mortally wounding two more. The

crowd fell back and Preston prevented the men firing again and rejoined the main guard. The drums beat to arms and the vicinity was soon thronged with divisions of soldiers and masses of enraged citizens. Lieutenant-Governor

Hutchinson quieted the tempest by having Pres¬

ton bound over to trial, placing the implicated soldiers under arrest and inducing the officers to order the companies back to barracks ; but the next day a town-meeting forced Hutchin¬

son to have the regiments removed to the Cas¬

tle in the harbor. Preston was tried in October and the soldiers in November before the Su¬

perior Court and defended by Robert Auch—

muty, assisted by John Adams and Josiah

Quincy, who took their futures in their hands from professional duty. Preston was acquitted, six soldiers were brought in not guilty and two found guilty of manslaughter, branded in the hand and discharged. There is much differ¬

ence of opinion with respect to the massacre, some regarding it as a lawless affair and some as the (<first act of the Revolution.® The day was annually commemorated in Boston until

1783, and in 1888 a mdnument was erected to the memory of the 10 victims. Consult Kidder, (History of the Boston Massacre) (Albany

1870), and Winsor, (Memorial History of Boston) (Vol. Ill, Boston 1880-81).

BOSTON MOUNTAINS, a range in

western Arkansas, extending into the Indian

Territory; highest summits 3,000 feet above the sea.

BOSTON NEWS LETTER, the first

real newspaper of America, edited by John

Campbell (q.v.), a Scotch bookseller and post¬

master of Boston, who had been actively writ¬

ing and sending <(news letters® of European occurrences to New England governors for a

year or more and thought it would save trouble to print them for all. With official permission he issued on 24 April 1704, the first number of a weekly consisting of a single leaf, 8 x 12, printed on both sides and dated <(From Mon¬

day, April 17, to Monday, April 24, 1704.® It was printed by Bartholomew Green, for many

years one of the best printers of Boston, who in 1722 became its editor. Dying in 1732, he was succeeded by his son-in-law, John Draper, who conducted it till his death in 1762 and made it a representative of the best interests of the province; he was a journalist of the highest character. His son, Richard Draper,

considered the best news compiler of his day, though in feeble health, edited the paper till his death in 1774, when his widow succeeded him and carried it to the end. Draper had been an ardent loyalist and firmly supported the mother country in the stormy times of the previous decade; his widow naturally shared

his feeling, and when the young man, Robert Boyle, whom she installed as editor, showed sympathy with the Revolution, she replaced him by John Howe, who conducted it till the British

evacuated Boston, 17 March 1776, when he

and Mrs. Draper left with them and the paper ceased to exist. The British government gave her a life pension. There are only three copies of the first number extant: in the Massachu¬

setts Historical Society at Boston, the Ameri¬

can Antiquarian Society at Worcester, Mass., and the New York Historical Society at New York. A facsimile of the first page is given in the (Memorial History of Boston, 5 Vol. II, page 389. See American Newspapers. Con¬

sult Weeks, L. H., Bacon, E. M., (An Histori¬

cal Digest of the Provincial Press 1689—1783 ˆ

(Vol. I, Boston 1911).

BOSTON PORT BILL, of 31 March

1774, was Great Britain's retort to the destruc¬

tion of the tea in Boston Harbor, 16 Dec. 1773.

(See Boston Tea Party). The maintenance

of English authority by force, or abdication in favor of a party which would maintain it, were the only alternatives left to the government.

The King's Speech of 7 March 1774 charged

the colonists with attempting to injure British commerce and subvert the Constitution, and on the 18th Lord North brought in the Port Bill, providing that there should be no further <(landing or discharging, lading or shipping of goods, wares and merchandise at the town and within the harbor of Boston® till the town paid for the tea and promised submission to the laws; that the colony's seat of government should be re¬

moved to Salem and Marblehead made a port

of entry, the act to take effect 1 June. Even some of the best friends of America in Par¬

liament at first approved it as moderate and reasonable, as the town could end the punish¬

ment at any moment by paying for legitimate merchandise destroyed by riot and allowing law and order to have their course ; but the Whig opposition soon collected itself and the bill was fought in its various stages by Burke, Barre, Pownall and others. In spite of them it became a law 31 March, without a division in the Commons and by unanimous vote in the Lords. The fleet and army were, of course, to join in enforcing the blockade; Boston was

filled with troops and Gage made commander-in-chief. The immediate results were a flood of contributions from the other New England towns, of grain and provisions, so great that the Boston leaders boasted that it would be¬

come the chief grain port of America if the act were not repealed; and finally a general congress, the first Continental Congress, was called to discuss this and other obnoxious acts passed in the same year and to devise measures of relief. Consult Frothingham, <Rise of the Republic (Boston 1872) ; Pickering, (Statutes at Large5 (Vol. XXX, London 1842) ; Halsey, (Boston Port Bill5 (New York 1904).

BOSTON TEA PARTY, 16 Dec. 1773.

Till shortly before the Revolution, imported teas paid a shilling a pound duty at English ports, but the merchants received a drawback of three-fifths on exports to the colonies, who were charged the remaining 4%d. in the selling price. As they obtained it more cheaply by smuggling from Holland, there was no English tea trade. In 1767, as part of a series of duties to raise revenues for paying the colonial execu¬

tives and judiciary, to make them independent of popular control, this duty was reduced to BOSTON TEN TOWNS

BOSTON TERRIER

3d., but to be collected at American ports. This was done with the threefold object of aiding the straitened East India Company to market its tea, substituting a small collectible duty for a larger uncollectible one and helping to break up the illicit free-trade which was the life of the colonies. The political purposes made

Americans invincibly hostile to it. Associa¬

tions were formed to abstain from the tea, merchants who handled it lost custom and the Dutch smuggling went on. In 1770 the other new duties were repealed but that on tea re¬

mained. In 1773 the East India Company, with 17,000,000 pounds of unsalable tea stored in London warehouses because of this non-impor¬

tation and in imminent danger of a failure most disastrous to English financial and po¬

litical interests, asked Parliament for a colonial drawback of the entire shilling, to undersell the Dutch. This was granted 10 May; tea ships were sent to Boston, New York, Philadelphia and Charleston and consignees or "tea com¬

missioners® appointed in each place. But the colonies were now resolved that no taxes, ex¬

ternal or internal, should be paid except under their own control, and set themselves to pre¬

vent the collection of the duty. In the cities other than Boston this was done by forcing the consignees to resign and in New York and

Philadelphia the ships were sent back without unloading. In Charleston the duty was left

unpaid for 20 days, when by law the customs officers seized it and offered it for sale to pay the charges, but as no one dared buy it, it spoiled unused. In Boston the tax was de¬

feated by the refusal of the consignees — two sons of Governor Hutchinson and three loyal¬

ist friends of his — to resign. On Sunday, 28

November, the Dartmouth , under Captain Hall and owned by the

Quaker, Francis Rotch, ar¬

rived with 114 chests of tea and was moored at Griffin's wharf. The Committee of Corre¬

spondence, which really governed the province, induced Rotch to defer its entry until Tuesday and on Monday morning called a great mass

meeting at the Old South Church, which re¬

solved that Rotch would enter the tea at his peril. The captain was cautioned to let none be landed and a watch of 25 men was stationed at the wharf. The consignees, asked to send the tea back, replied that it was not in their power but they would store it till they could hear from their constituents. Tuesday after¬

noon, however, Rotch and Hall agreed to return it without its touching land or paying duty, and the owners of two other ships which ar¬

rived shortly after, the Eleanor and Beaver, made the same promise. These ships were

moored at the same wharf, so that one guard might serve for all. But by law the ships could not be cleared till the cargo was discharged, and Hutchinson refused to give the owners

permits to pass the Castle, had the guns loaded and Admiral Montagu guarded the mouth of

the harbor with two warships, though curi¬

ously neither of them put a guard on the tea ships. At midnight on the 16th, the Dart¬

mouth's 20 days would expire and the Ameri¬

can victory be practically won by the seizure of the tea for unpaid duty, since none of it 'ould come on the market. But the object of the Boston leaders was not merely to prevent the English exchequer profiting but to commit the colony to open disobedience of English or¬

ders and have some issue to unite upon with the other colonies. On

the 14th Rotch was

again ordered by a meeting at the Old South to apply for a clearance, and several leading patriots escorted him to the custom-house to see that he did so. The collector refused to give an answer till the next day, when, upon a final visit from Rotch and his volunteer body¬

guard, he definitely refused unless the teas were discharged. At 10 the next morning

Rotch appeared before another huge meeting at the Old South and reported the refusal. He was directed to protest against it at once and apply to Governor Hutchinson for a permit to pass the Castle. Hutchinson was at his house on Milton Hill, some eight miles out, and it was 6 p.m. before Rotch returned with the news that the governor also refused. Meantime

some 7,000 people had gathered in and about the Old South, probably half of them from

neighboring towns ; addresses were made by

Samuel Adams, Josiah Quincy and several

other leaders, and it was unanimously resolved that the tea should not be permitted to land.

Hutchinson's refusal had been discounted, and 40 or 50 men, disguised as Indians, with paint and gear, had gathered in the back room of a printing office nearby, waiting for an agreed signal, and the meeting continued in session till long after dark, awaiting Rotch's report.

On receiving it Samuel Adams gave the ap¬

pointed signal, ((This meeting can do nothing more to save the country,® and a shout from the porch was answered by a war-hoop from

the "Mohawks,® who at once rushed to the

wharf followed by a thousand or so of others and with perhaps a hundred of them boarded the ships, and for three hours worked steadily with hatchets, breaking open the chests and throwing the tea into the harbor. The entire 342 chests on the three ships, valued at about £18,000, were destroyed, without a sound from the mob, which

then dispersed. Meantime a

fourth tea ship was wrecked off Cape Cod.

The immediate result of this was the Boston Port Bill (q.v.) ; but, as the Bostonians had ex¬

pected, the whole country rallied to their

support.

BOSTON TEN TOWNS. See Bound¬

aries of the United States.

BOSTON TERRIER, a breed of dogs,

resembling bull-dogs without their eccentrici¬

ties, which originated in Boston about 1870, and soon became popular for its admirable

qualities as a companion. This terrier has a shapely bull-dog-like head, and the straight legs and active manners of the old bull-terrier.

Those truly bred always have a white muzzle, a white blaze on the face and on the chest and feet, with a fine coat, short and bright, and a deep broad chest. Light-class ones weigh

from 15 to 23 pounds, and the heavy from 23

to 30 pounds. The breed arose from a cross between Robert C. Hooper's "Judge® (a dog

three-quarters English bull and one-quarter

white terrier, which was a rich dark brindle with a white flare on his face), and Burnett's "Gyp,® a pure white bitch low on the legs and stockilv built, not unlike the old-fashioned bull-terrier. The product was Wells' "Eph.®

He was born in Boston about 1870 and was

bred to Tobin's "Kate,® an old-fashioned bull-terrier, and the result, Barnard's "Tom,® may 304

be said to be the first of the real new breed, for he developed the typical screw tail of the present Boston terrier. This dog has a most affectionate disposition, is well knit in build and is stylish.

BOSTON UNIVERSITY. This institu¬

tion was chartered by the Commonwealth of

Massachusetts in 1869. The three men named

in the charter as the original corporators were Isaac Rich, Lee Clallin and Jacob Sleeper. The power to hold and administer funds, estab¬

lish departments of instruction, appoint offi¬

cers, and, in general, to direct the administra¬

tion, vests in the corporation, whose legal title is <(The Trustees of Boston University.® The body consists of the president of the Univer¬

sity, ex officio, and five classes of trustees elected from year to year for the term of five years. The president of the University and the deans of the several departments constitute

the University Council. To it belongs, among other duties, that of securing a harmonious adjustment of all interdepartmental questions of administration. The members of the Uni¬

versity Council, together with all the regular professors in the different schools and the College of Liberal Arts, constitute the Uni¬

versity Senate. All promotions to degrees are in the name of this body and of the corpora¬

tion. This body consists of all persons who have acquired any degree or diploma of gradu¬

ation in the University. Every promotion to a degree, or to the status of a graduate, is accordingly, promotion to membership in the

Convocation, with defined privileges of repre¬

sentation in the government of the University, rand with corresponding duties. Boston Uni¬

versity consists of the following departments: a College of Liberal Arts (organized 1873) ; a College of Business Administration (organ¬

ized 1913) ; a School of Theology (organized 1839, made a department of Boston University in 1871) ; a School of Law (organized

1872) ; a School of Medicine (organized

1873) , and a Graduate School .(organized

1874) . The faculty numbers 294. The enrol¬

ment for the scholastic year 1920-21 was

6,665. The University is coeducational through¬

out. Boston University confers the usual aca¬

demic and professional degrees for resident

study, but has never conferred any honorary degrees. Since its organization Boston Uni¬

versity has had three presidents : William Fairfield Warren (1873-1903), William Edwards

Huntington (1903-1911), Lemuel Herbert

Murlin (1911).

BOSTONIANS, The, a novel of Ameri-

-can life, by Henry James, published in 1886.

Written in a satirical vein, it presents with unpleasant fidelity a strong-minded Boston

woman possessed by a “mission,® “who takes

life hard,® is never so happy as when strug¬

gling, striving, suffering in a cause which throughout the novel is the emancipation of women.

BOSTROM, bos’trem, Christoffer Jacob,

Swedish philosopher: b. Pitea 1797; d. Upsala 1866. His life was practically spent in teach¬

ing at the University of Upsala where, after preparatory study, he received the appointment in 1838 of adjunct professor of philosophy and from 1840-63 was professor of practical philos¬

ophy. His writings, comparatively few in

number, edited by Edfelt, were published

(Upsala 1883). “The most important systematic thinker of his country,® according to Falckcn-berg, his philosophy that of “rational idealism”

as he termed it has exercised great influence in Sweden. Reality is presented only as spiritual : God as an absolute, self-conscious unity, in which all living beings are eternally and un¬

changeably contained, according to degree.

The highest aim of humanity should be the

conduct and behavior according to reason in harmony with the Divine ; that of the state, like the individual should exist solely in God, and in its most perfect form should consist in the harmonious obedience of all its members to a constitutional monarch ; while ultimate perfection

should be an all-embracing system of such states governed in obedience to Uni¬

versal Reason.

BOSTWICK, Arthur Elmore, American

librarian and author: b. Litchfield, Conn., 8

March 1860. A student of Yale University, he received his Ph.D. degree in 1883, and taught for a short time, before engaging in literary work on Appleton's (Cyclopedia of American

Biography,) Appleton's (Annual Cyclopedia, }

Funk & Wagnall's (Standard Dictionary)

and, with J. D. Champlin, edited a popular (Young Folks' Cyclopedia of Games and

Sports* (1890). He received the appointments of chief librarian New York Free Circulating Library in 1895; of the Brooklyn Public

Library in 1899 ; of the circulation department of the reorganized New York Public Library

in 1901 ; and of the Saint Louis Public Library in 1909 when he also became president of the American Library Institute. He is the author of (The American Public Library * (1910) ;

(The Different West, as seen by a Trans¬

planted Easterner* (1913) ; (Earmarks of

Literature) (1914) ; (The Making of an Amer¬

ican Library) (1915).

BOSWELL, James, English writer, the

biographer of Samuel Johnson: b. Edinburgh,

29 Oct. 1740; d. London, 19 May 1795. He

was the son of a Scotch judge, Lord Auchinleck, who took this title from the name of his estate. He was educated at Edinburgh and

at Glasgow, and early displayed literary tastes.

In 1763, when on a visit to London, he was introduced to Johnson, and though this first meeting was not very hopeful for the future, a warm friendship soon sprung up between

them. During a year spent on the Continent, he made the acquaintance of Voltaire, Rous¬

seau and other prominent men of the day.

Returning in 1766 he was admitted an advo¬

cate, but the practice of his profession was little to his taste. In 1768 he published a his¬

tory of Corsica, with a lively account of his own experiences in the island. The same year he again met Johnson in London, and his in¬

tercourse with him was kept up by many sub¬

sequent visits to the metropolis; while Tohnson himself came to Scotland in 1773, when the pair made their famous journey to the Heb¬

rides. This year also Boswell became a mem¬

ber of the famous Literary Club, with various members of which, such as Burke and Rey¬

nolds, he was on terms of intimacy. In 1769

he had married, but he continued mainly de¬

pendent on his father till the latter's death in 1782, when he succeeded to the estate. In BOSWELL'S LIFE OF JOHNSON - BOT-FLY

1784 he met Johnson for the last time at a dinner at Sir Joshua Reynolds'. Two years

after (1786) came out his (Journal of a Tour io the Hebrides with Samuel Johnson, LL.D.'

(Johnson's own account of the tour had ap¬

peared in 1775). Having latterly been admitted to the English bar, he went on circuit and held lor a year or two the recordership of Carlisle; and from 1788 onward he mostly resided in

London. In 1791 appeared his (Life of John¬

son, ' a work which he had been long preparing, and which at once gave readers the same de¬

light as it has ever since inspired. A second and enlarged edition came out in 1793. By

this time Boswell's health had greatly suffered from his too convivial habits, and he died in London, having been a widower since 1790.

Boswell was a singular compound of sense

and folly, of genuine ability and foible border¬

ing on craziness. His good nature was uni¬

versally admitted; his vanity and want of self-respect and self-control were his most evident faults. His weaknesses were easily seen, but the man who enjoyed the sincere affection of Dr. Johnson and the enduring friendship of

Burke and Reynolds had better stuff in him than appeared to the superficial observer. His life of Johnson is such a masterly performance as only a genius for life-portraiture could have produced. Among editions of the Life

may be mentioned that of Croker (10 vols.) and those of Rev. A. Napier (Bohn's Standard Library, 6 vols.), and Dr. Birkbeck Hill (Clar¬

endon Press, 6 vols.), all containing the Tour.

See Johnson, Boswell's Life of. Consult

Macaulay's essay, and the much more humane

and penetrating essay by Carlyle. Consult

also his (Life) by Fitzgerald (London 1891) ; Rogers, (Boswelliana) (ib. 1874) ; Bissell,

Boswell as a Biographer) (New York 1905).

Boswell left two sons. The elder, Alexan¬

der, born in 1775, succeeded to the family estate, sat for a year or two in Parliament and was created a baronet in 1821. He wrote several well-known Scottish songs and various other things in verse and prose, and also set up a private press from which issued reprints of rare old works in the Auchinleck library.

In 1822 he met his death in a duel with a Mr.

Stuart, against whom he had made some severe attacks in a political journal. James, the

second son, born in 1779, died in 1822, was the editor of an improved edition of Malone's

Shakespeare, generally known as the (Variorum Shakespeare' (21 vols., 1821).

BOSWELL'S LIFE OF JOHNSON.

See Johnson, Boswell's Life of.

BOSWORTH, Francke Huntington,

American physician: b. Marietta, Ohio, 25 Jan.

1843. He was educated at Yale and at Belle¬

vue Hospital Medical College, and in 1898 be¬

came professor of diseases of the throat at the latter institution. He became consulting physi¬

cian to the Presbyterian and Saint Vincent's hospitals, New York. He is an authority on diseases of the nose and throat. He retired in 1906. His publications include a (Treatise on Diseases of the Nose and Throat' (2 vols., 1893) ; (TextBook of Diseases of the Nose and Throat' (1896) ; (The Doctor in Old New York' (1898) ; (A Study of Nasal Catarrh'

(1882); (Growths in the Nasal Passages';

(The Th ree Tonsils' ; (Malignant Disease of the Upper Air Tract' ; (Taking Cold.'

BOSWORTH, Joseph, English philolo¬

gist: b. Derbyshire 1789; d. 27 May 1876. He was educated at Repton, Aberdeen and Trinity College, and was ordained deacon in 1814 and, alter occupying several livings in England, was British chaplain at Amsterdam and Rotterdam

from 1829ˆ40, and translated the Book of Com¬

mon Prayer into Dutch. He devoted much

time to researches in Anglo-Saxon and its cog¬

nate dialects, the result of his studies appear¬

ing from time to time. His chief works are his (Anglo-Saxon Grammar' (1826) ; c Dic¬

tionary of the Anglo-Saxon Language' (1838), and 'Compendious Anglo-Saxon and English

Dictionary' (1848). In 1857 he was presented to the rectory of Water Shelford, Bucking¬

ham, and next year was appointed Rawlinson

professor of Anglo-Saxon at Oxford, a post

which he held till his death. In 1867 he gave $50,000 to establish a professorship of Anglo-Saxon at Cambridge. He left a certain amount of materials that he had accumulated for a new edition of his larger x \nglo-Saxon dic¬

tionary, and these were utilized and added to by Professor Toller of Manchester in the

(Dictionary' which has been published under his editorship by the Clarendon Press.

BOSWORTH, or MARKET-BOSWORTH, England, a small town in the

county of Leicester, 12 miles west by south of Leicester; two miles south of it is Bosworth Field, where was fought, in 1485, the memor¬

able battle between Richard III and the Earl of Richmond, afterward Henry VII. This bat¬

tle, in which Richard lost his life, put a period to the long and bloody Wars of the Roses be¬

tween the houses of York and Lancaster. Market-Bosworth has a grammar-school, dating

from 1593, in which Dr. Samuel Johnson was at one time usher. Pop. 729.

BOT-FLY, name common to several dip¬

terous insects of the family Oestridcr which are parasitic in their early stages upon .or within certain domestic or wild animals. The body is stout, hairy, like the humblebees, and they are easily recognized by having the opening of the mouth very small, with rudimental oral organs.

The middle part of the face is exceedingly narrow and the minute antennae are inserted in rounded pits. The eggs hatch very soon

after laying, and Riley thought, from the tes¬

timony of three independent witnesses, that

the sheep bot-fly is viviparous, the larvae hatch¬

ing within the body of the parent, who deposits in the nostrils of the sheep the perfectly formed and living grub.

The larvae are, in general, thick, fleshy, foot¬

less grubs, consisting of 11 segments, exclusive of the head, which are spined and tuberculated, the former in rows, which enable them to move about readily when living under the skin or in the frontal sinus and thus greatly irritate the animals on which they live. The stigmata are placed in a scaly plate on the thickened posterior end of the body. The mouth of the cutaneous larvae consists simply of fleshy tubercles, while in those species that live in _ the stomach and frontal sinuses of their hosts, it is provided with horny hooks. While in this state they moult twice and then attain their full size. They feed 306

on the purulent matter originating from the irritation produced by the movements of their bodies. Just before assuming the pupa state, the larva leaves its peculiar habitat, descends into the ground and there becomes a coarctate pupa. (See Pupa).

Besides the horse bot-fly (q.v.), the ox bot¬

fly (q.v.) and the sheep bot-fly (q.v.), there is included in the genus Dermatobia the <(ver

macaque® of Cayenne and Mexico, which is

found beneath the skin of man in tropical

America. It is disputed* whether it be a true indigenous “CEstrus ho minis ® or one that orig¬

inally attacked the monkey, dog or other mam¬

mal. In Cayenne the species attacking man is called the <(ver macaque,® in eastern Brazil (Para) <(ura,® in Costa Rica <(torcel,® in Co¬

lombia <(gusano peludo® or (<muche.® The <(ver moyocuil® (D . noxialis) lives on the dog, sheep, cattle and man, and is found in Mexico and New Granada. The larvae are long, cylindrical, S-shaped, differing greatly in form from others of this family. The flies are closely allied to those of the preceding genus.

Leidy states that several specimens of the

larva of a bot-fly were obtained in Honduras (by Le Conte). They were usually found be¬

neath the skin of various parts of the body and the eggs were suspected to have been intro¬

duced while the persons were bathing. The men were not aware of the circumstance, and the presence of the larva gave them comparatively little uneasiness. According to Krefft, a species of Batrachomyia is parasitic upon four species of Australian frogs. The larvae are found be¬

tween the skin and the flesh behind the tympa¬

num. When they quit the frog the latter dies.

The change to the pupa state is usually effected on the lower surface of a piece of rock in some damp locality. The perfect insect emerges in 32 days. Consult Packard, (Guide to Stndyr of Insects) (1889); Brauer, (Monographie der Oestriden) (Vienna 1863) ; Osborn, Unsects

Affecting Domestic Animals) (Bulletin No. 5, N. S. Division of Entomology, United States Department of Agriculture, Washington 1896,

which also contains an extensive bibliography of the Oestridce.)

BOTANICAL GARDENS. The term

botanical garden is used to designate a limited area of ground on which is grown a collection of plants including a large number of species brought together to subserve scientific, educa¬

tional, aesthetic or economic purposes. In the broadest sense, it is a museum of plants and one of its chief ends is to represent, by means of living specimens so far as possible, the prin¬

cipal types of vegetation of the earth. It is impossible to cultivate more than a few thou¬

sand species on any given area under the nat¬

ural conditions of soil and climate, and the open-air plantations are generally supplemented by collections grown under shelter, in glass houses and in specially prepared soils. It has been found practicable to grow in this manner as many as 12,000 or 15,000 species of the higher plants in the botanical gardens at Saint Louis and New York, at Kew, near London,

England, and at Berlin, Germany. A proper

selection of this number may be made to rep¬

resent somewhat fairly the principal forms of plants, which include about 250,000 species.

That is to say, it is possible to grow in one place about one species out of every 17 in existence.

Living plants cultivated in the open air are most suitably arranged in plantations according to their general habit and in such manner as to show their general relationships. Then special groups are often made of certain families, such as the conifers, the willows and poplars, the grasses, ferns or mosses. The most common

arrangement of plantations includes the her¬

baceous grounds, the aquatic plants, alpinum, viticetum, fruticetum, arboretum and economic plantations. Some institutions bring together collections for the purpose of illustrating the local flora or the flora of any given geographi¬

cal district.

The herbaceous plantations are intended to

include the representatives of small soft-bodied plants which die down to the soil during the winter or resting season, and which may or may not have a perennial underground stem-formation of some kind. Many of the species are annuals and must be grown from seeds

every year.

The pools for aquatic plants are arranged

to afford suitable means for the culture of forms which float or root in ponds and streams of fresh water, and include a wide variety, such as the water-lily, pondweeds, Philotria, water-hyacinth, *etc.*

An alpinum is a special plantation generally arranged to afford means of cultivation of

species from cold climates on mountain-tops or in higher latitudes. Plantations of this kind are often termed rockeries, and are in the form of a ridge or hill covered with boulders. In such plantations precautions must be taken to give lime-loving plants a place among limestone

rocks, and with the necessary low temperatures.

The viticetum is a plantation devoted to the cultivation of climbing and trailing vines, and may take almost any form demanded by the

exigencies of practical gardening. Among the necessary features are trellises or supports for twining and tendril climbing forms.

The fruticetum includes all woody perennial

plants which do not form a central trunk six feet in height, and which are therefore not trees. These are most effectively grouped when the individuals of the separate species are placed in the ground separately

in a scheme of general arrangement by which every plant may be in¬

spected from all sides and is unshaded by its neighbors.

The arboretum includes trees, and these may be variously arranged, singly or in groups, al¬

ways with respect to their mutual relationship.

On account of their great size and compara¬

tively slow growth and greater permanency, the placing of trees in any given landscape scheme in a garden is attended to with the greatest care.

The economic plantations may include useful

plants arranged according to their relationships, and grouped according to the use or nature of the derivative. Thus a division may be made in which only species used for medicine, foods or clothing are included, or a division may be made to include plants which yield starches, oils, gums and resins.

Special plantations of selected families must depend for their constituency upon the loca¬

tion of the garden. Thus it would be possible BOTANICAL GEOGRAPHY — BOTANY

to form a collection of palms in a tropical garden and one of pines or willows in a temper¬

ate climate. Geographical plantations may take any given district by variously arranged plan¬

tations.

Still another group of plantations is being made in some gardens to illustrate types of habit and structure. Some of the principal

groups to be illustrated in this manner are parasites, which draw nourishment from the

living bodies of other organs; saprophytes,

which live on decaying organic matter ; xerophytes, plants adapted to living under the

driest conditions ; plants with structures serv¬

ing as a protection against animals. Forms of propagation and reproduction, methods of dis¬

semination of spores and seeds, etc., also serve as subjects to be illustrated by separate groups.

The collections grown under shelter and in

conservatories are generally grouped in such manner that species are partly assembled with regard to their climatic requirements, and partly according to their relationships. Thus a house may be devoted to tropical plants, or to tem¬

perate plants, or may contain only orchids, palms, ferns, cacti or succulents, or other special groups.

The part of the vegetable kingdom which

may not be cultivated may be represented in a museum by dried specimens, material in pre¬

serving-fluids and dissections of various kinds.

Here again the arrangement may be upon the basis of natural relationship, or upon the basis of economic usefulness. The species which

formed the vegetation of the previous geological periods are represented by fossil specimens, completing the history of the plant-world so far as it is known, and yielding suggestions as to the descent of the present types.

Two general educational purposes are served by an institution of this character. Its collec¬ tions are arranged to present information on the form, relationship, mode of life, habit and general biological character of the principal types of vegetation, in such manner as to be capable of comprehension by persons unac¬ quainted with the technical aspects of the sub¬ ject. Further interpretation of such facts may be made by means of books, journals, lectures, etc., devoted to this branch of work and study.

The material accumulated for the exploita¬ tion of popular knowledge of plants also af¬ fords an excellent basis for the induction of students into the more strictly scientific aspects of botany; and when such material is supple¬ mented by laboratories furnished with appara¬ tus, microscopes and other instruments of precision, the activities of these students may be carried beyond the frontiers of the subject into the investigation and discovery of new facts and phenomena. This extension of the boundaries of knowledge concerning the plant-world may be carried on to advantage only when a library is at hand containing all of the more important literature bearing upon the subject.

Botanical gardens owe their origin to the

needs of medical science, in accordance with which species showing valuable medicinal prop¬

erties were grown in convenient places.

The first authentic record of the introduc¬

tion of medicinal plants into cultivated plots of ground dates no farther back than the

time of the elder Pliny (23-79 a.d.), who

writes of the garden Antonius Castor, at Rome, in which were grown a large number of

medicinal plants. This step, however, may

have been taken much earlier by the Greeks, Chinese or Mexicans. Later the Benedictine

monks of northern Italy paid great attention to the growing of remedial herbs, and devoted an important proportion of the monastery gar¬

dens to this purpose. This practice was also carried beyond the Alps, and in 1020 a garden was in existence at the monastery of Saint Gall, in Switzerland, not far from Lake Con¬

stance, which contained 16 plots occupied by medicinal plants. A garden of this character was founded 1309 at Salerno, and another at Venice 1330.

The 16th and 1 7 th centuries witnessed the foundation of many gardens in England,

France, Germany, Holland and Sweden, some

of which have had a continuous existence to this day. The garden of Bologna was founded 1568; Leyden, 1577 ; Leipzig, 1579; Montpellier, 1596; Paris, 1597. The last named was organ¬

ized for the determination of (<what variations were possible in the style of bouquets worn at the royal courts.® Then followed the estab¬

lishment of the gardens at Giessen, 1605 ;

Strasburg, 1620; Jena, 1629; Oxford, 1632;

Upsala, 1667 ; Chelsea, 1680.

The number of these institutions at the

present time is nearly 300, only a few of which, however, are devoted to the more important

purposes named above. Many botanical gar¬

dens are merely municipal parks in which

some attempt is made to exhibit special groups of plants, and are devoted chiefly to floricul¬

ture. Others are almost entirely experiment

stations for the exhibition and testing of eco¬

nomic species, while still others find their chief usefulness as an aid in teaching botany in schools and colleges. For the educational value of botanical gardens, consult Monroe,

(Cyclopedia of Education. J

D. T. MacDougal,

Department of Botanical Research , Carnegie

Institution, Washington.

BOTANICAL GEOGRAPHY. See

Plant Geography.

ˆ BOTANICAL SOCIETY OF AMER¬

ICA, established 1893, an outgrowth of the

Botanical Club of the American Association

for the Advancement of Science, a national

scientific association including many of the best known botanists and scientists of the

United States.

BOTANY. That branch of biology, or the

science of living organisms, which deals with plants, and is thus distinguished from zoology, which deals with animals. An individual plant, considered as a living or once living organism, may be studied in two ways — with reference to its structure or with reference to its functions.

These represent the two great subdivisions of pure botanical science — anatomy and physiology respectively. All other phases of botanical sci¬

ence are special developments of one of these two, either alone or in combination with the other, or in relation additionally to some other branch of knowledge. Anatomy and physiology

are thus the primary elements, as it were, of botany, which in varying combinations with each other and with the elements of other sciences

constitute the branches of botanical science actually in existence, such as taxonomy, ecology, cytology and pathology. The term plant anat¬

omy is restricted frequently in actual use to gross anatomy and is often called structural bot¬

any. In this sense is covered about as much of the whole of anatom}'- as can be studied by the unaided eye or with a lens. Minute anatomy, or histology, covers the minute structure of plants, the principal instrument in its study being the compound microscope. A study of the rela¬

tionships of plants on the basis of anatomical re¬

semblances constitutes comparative anatomy, or morphology. The classification of plants, known as taxonomy or systematic botany, is in the main a specialized branch of morphology, for the principal means by which plants may be grouped so as to indicate their genetic relationship is a comparison of their structural differences and resemblances. In its actual study plant physi¬

ology is closely associated with plant histology because most of the functions of the plant are intimately connected with the structure of plant cells, and the physiologist must of necessity understand these structures. A special branch of botanical research which has to do with the complex structure and activities of the plant cell is known as plant cytology. The study of the diseases of plants, whether they are due to fungi or other plant organisms, or are purely physiological, is plant pathology, sometimes

called vegetable pathology.

History. — Among the ancients, Aristotle,

the Greek philosopher (384 to 322 b.c.), The¬

ophrastus, his pupil (about 372 to 287 b.c.), the Roman naturalist, Pliny the Elder (23 to 79

a.d.), and the Greek physician, Dioscorides (of the 1st or 2d century

a.d.), left botanical records of historical interest, but botany as a modern science has developed in the last four centuries, dating from the Reformation. The writing, par¬

ticularly by the Germans, of herbals, or treat¬

ises on economic and medicinal plants, and the founding of botanical gardens, occupied most of the 16th century, but in the year 1583 Cesalpino, an Italian physician, published the first formal and comprehensive classification of

plants. This, though artificial, formed the basis of all generally recognized classification to and including the time of Linmeus in the latter part of the 18th century. The 1 7th century was chiefly notable for advances not in the classifi¬

cation of plants, but in their structure and vital processes. Malpighi, an Italian, and Grew, an Englishman, almost simultaneously published

their researches on the gross anatomy and the cellular structure of plants, the first of which were presented in 1671. To the work of these men in plant anatomy little of importance was added in more than a hundred years. The

other important discovery of the century was the demonstration by Camerarius in 1691,

through direct experiment, of the sexuality of plants. The 18th century was marked especially by advances in classification. In the year 1700

Tournefort published his (Institutions, > in which for the first time genera were systematic¬

ally named and described. During this century Linnaeus, the great botanical compiler and sys¬

tematizeˆ brought out his successive works, cul¬

minating in the (Species Plantarum,* in 1753.

It was later in the same century, too, that bo¬

tanical exploration came to be recognized as an important department of the voyages of geo¬

graphic and scientific discovery in which the nations of Europe became engaged. In 1789 A.

L. de Jussieu published his (Genera Plantarum,*

in which was first systematically formulated a comprehensive classification of plants according to their natural relationship, as opposed to the artificial systems followed by Cesalpino and Linnaeus. In the last two decades of this cen¬

tury were laid the foundations of our present knowledge of the important part played by the air in the nutrition of plants, a proper concep¬

tion of which was possible only in the light of the new developments which took place, at that time in chemistry. The 19th century witnessed enormous strides in plant anatomy and plant physiology, the latter largely contributed to by workers in chemistry and physics, and the

former rendered possible by improvements of

the compound microscope and accessory in¬

struments, especially those which came into

general use about 1840. From this movement

has been derived most of our knowledge of the life-history and relationship of the lower

groups of plants, the fungi, algae and lichens, and the assignment of the pines and their rela¬

tives to their true position next above the ferns.

The whole realm of botanical research was pro¬

foundly affected by the work of Darwin, begin¬

ning with the publication of his (Descent of Man, > in 1858, which gave a new point of view for all subsequent work. In systematic botany the principle of the development of species from a common ancestor was substituted for

the old view of the constancy of species. The remarkable adaptations for cross fertilization in the coloration, odor and structure of flowers

was given its true and significant explanation as a means for originating and perpetuating species. Darwin's work gave a new philosophi¬

cal basis for the interpretation of observed phe¬

nomena and facts.

Progress in the United States. — At the

beginning of the 19th century the advancement of botany in North America was largely in the hands of physicians, through their requirement of a knowledge of plants as materia medica.

Professors of botany were unknown. Linnaeus

and other great botanists in Europe had had American correspondents, and geographic expe¬

ditions accompanied by European botanical col¬

lectors had touched the margins of the conti¬

nent. Some botanical explorations, chiefly by European visitors, had been effected east of the Alleghany Mountains. The centre of botanical activity was at Philadelphia, among the mem¬

bers of the American Philosophical Society.

With Lewis and Clark's expedition across the continent to the mouth of the Columbia, in 1803-06, began a series of American explora¬

tions of the great interior, directed first to the Louisiana Purchase, then to Oregon and finally to California. These were supplemented on

the north by the British expeditions of Sir John Franklin and others in quest of a North¬

west Passage. In the fifties began the Pacific Railroad surveys and these were followed by the geological surveys. All these contributed ma¬

terials for the discovery, description and order¬

ly arrangement of the North American flora, the collections going largely into the hands of Thomas Nuttall at Harvard University, John

Torrey at Columbia, Asa Gray, who was Nut—

tail's successor, and George Engelmann, a phy¬

sician of Saint Louis. Meanwhile appeared a BOTANY

new factor which was destined to play an im¬

portant part in the development of botanical science in America, the establishment of agri¬

cultural colleges in the late sixties. These institutions created a demand for a class of botanists who did not exist in the United States or anywhere else, botanists who had brought a critical scientific training to bear on the hard problems of agriculture. For the succeeding

two decades the universities of the country, including some of the agricultural colleges

themselves, were busily engaged in educating the required men, a movement which resulted in the preparation of many who were competent not only to act as teachers of botany in the agricultural colleges but, a still more important matter, to act as investigators in agricultural experiment stations, one of which was estab¬

lished in each of the States and Territories in the late eighties. The branch of botany which received its greatest impulse was pathology, the science of the diseases of plants. Plant pathol¬

ogy has already been carried to a point of high scientific development and practical appli¬

cation attained in no other country. Syste¬

matic, or, as it is now more commonly known, taxonomic, botany has made rapid strides for¬

ward in the past two decades, largely through the application of methods developed and

perfected by American botanists. These

methods differ from others chiefly in a full con¬

sideration of the geographic relationships of plants and the examination of very large series of specimens. A revision of the whole North American flora along these lines and accom¬

panied by systematic botanical exploration is now under way. For the future two lines of inquiry are likely to be conspicuous in Ameri¬

can botany, first, the principles of heredity in plants and the applied phase of the subject, plant breeding on a scientific basis ; and second the correlation of plant functions with plant structures, a work which will have far-reaching importance in broadening our understanding of the processes of nature. Forestry has assumed an unrivaled importance with the exploration of Alaska, the botany of the semi-arid region is being studied, and bacterial botany occupies some of our best minds. The geographic loca¬

tion of American botanical research has under¬

gone a profound change as a result of the Spanish-American War. The area to which up to that time the energies of American botanists had been chiefly directed was the north temper¬

ate belt of one hemisphere, but they now must deal in addition with botanical problems in the tropics of both the New World and the Old World.

Classification. — The plant kingdom is divis¬

ible into five great groups, the Myxophyta, or slime molds; the Thallophyta, including the

bacteria, algae, fungi and lichens ; the Bryophyta, including the liverworts and mosses; the

Pteridophyta, including the ferns and their al¬

lies, and the Spermatophyta, or flowering plants.

The first four of these are often jointly desig¬

nated as the Cryptogams, or cryptogams, in con¬

tradistinction to the Phanerogams,, an older name for the flowering plants.

The Myxophyta, or slime molds, known also

as the Myxomycetes, Mycetozoa and Myxothal—

lopliyta, are organisms which though usually treated as belonging to the vegetable rather than the animal kingdom, have no cellulose

walls covering the cells of which they are com¬

posed; pass a part of their life as plasmodia, or masses of naked creeping protoplasm similar to the animals known as amoebae ; and are repro¬

duced without even the simplest method of

sexual regeneration. Most of them resemble

fungi in that they grow upon decayed animal or vegetable matter. The Thallophyta include a wide variety of plants, associated with each other by exclusion, on the one hand, from the animal-like Myxophyta, and, on the other, from the Bryophyta and higher plants. The plant

body is commonly not differentiated into stem and leaf and may even be unicellular; a cell wall is usually present ; chlorophyll is often wanting and frequently sexual reproduction

does not exist. Among the important groups

belonging to the Thallophyta are the Schizomycetes, or bacteria; the Schizophyccs, or blue-green algae ; the Euphyces, or true algse, includ¬

ing the diatoms, desmids, green algae, stone-worts, brown algae and red algae; the Eumycetes, or true fungi, and the Lichenes, or lichens.

The Bryophyta, or liverworts and mosses, are small plants, having in

their life cycle a sexual generation in which the sexual organs are borne on a plant body usually differentiated into stem and leaves, followed by a non-sexuaf genera¬

tion, which consists of a stalked or sometimes sessile spore-bearing capsule remaining attached to the plant body of the preceding generation.

The female organ of reproduction consists of an oosphere in a sac called an archegonium, the walls of which are made up of many cells, much more complex structurally than the

female organ of the Thallophyta. The male or¬

gan consists of motile antherozoids produced from an antheridium. The group consists of

the Hepatics, or liverworts, some of which

have a flat scale-like body called a thallus, and of the Musci, or mosses. The Pteridophyta,

represented by the ferns, resemble the Bryo¬

phyta in their sexual organs, but differ in “the possession of what is known as vascular, as opposed to merely cellular, tissues, and also in that the asexual generation becomes a large plant and maintains a separate existence inde¬

pendent of the earlier generation. The group includes, besides the true ferns, the grape-ferns, jointrushes, clubmosses, quillworts and a few others. The Spermatophyta, or flowering plants, also known as Anthophyta or Phanero¬

gams, find their essential difference from the Pteridophyta, not in the production of flowers, but in the relationship of the sexual and the asexual generations and in the character of the sexual organs and their embryonic product. In an ordinary fern the sexual generation is a small flat green organism, resembling a thallose liverwort, growing on the ground or other sub¬

stratum and deriving its nourishment from it, but in the Spermatophyta the sexual generation is reduced to almost microscopic dimensions, and leads to independent existence but is en¬

closed within the body of the non-sexual gen¬

eration, the male portion consisting of the pol¬

len grain and the tube that grows out of it when the pollen grain germinates, the female portion consisting of a minute cellular struc¬

ture within the embryo sac of the ovule. It is to be noted that no motile bodies are produced, as in the two preceding groups, and that the fertilization of the ovule results in the develop¬

ment of an embryonic plant called a seed, which 310

is produced by none of the lower groups of plants. The Spermatophyta are divided into

two groups, of which the lower is the Gymno-sperma ?, including the cycads, the cone-bearing trees and a few related families. In these the ovules are borne not in ovaries but naked

among the floral bracts, and the sexual genera¬

tion of the female is still comparatively com¬

plex before fertilization and bears considerable resemblance to that of some Pteridophyta. In the other group, the Angiospermce, the ovules are borne in ovaries, and only the simplest rem¬

nant of a sexual generation persists. In this group are the Monocotyledoncs , including the grasses, palms, lilies, orchids and their relatives, and the Dicotyledones, including the great ma¬

jority of flowering plants. The dicotyledonous and the gymnospermous plants were at one

time classed as a group Exogence, in contradis¬

tinction to the group Endogence , which con¬

sisted of the monocotyledonous plants. This

grouping of the flowering plants into exogens and endogens, however, is no longer main¬

tained, it having been shown from embryological studies that the gymnosperms should stand next above the ferns. The old division of

dicotyledonous plants into Apetalce, Gamopctalce and P olypetalce is also now discarded, the fam¬

ilies included under Apetalce appearing not to constitute a real group. They have therefore been interpolated among the families of the re¬

maining two groups, most of them going with the P olypetalce. All three of the old names have been abandoned, the name Archichlamy-dece being now used for the apetalous and poly-petalous plants jointly, and the name Sympetalce for the gamopetalous plants. The known

species of plants as based on recent standard and conservative enumerations of the various large groups are approximately as follows :

Myxophyta . 400

Thallophyta . 59 , 000

Bryophyta . 8 , 000

Pteridophyta . 3 , 5 00

Spermatophyta . 120,000

190,900

Plants in Relation to Geology. — Plants

play an important part in the configuration of the earth's surface by the prevention or retarda¬

tion of erosion. This is accomplished by the direct binding action of roots on the soil, by obstructing the run-off of water as it filters through a layer of decaying vegetable matter and by hindering the melting of snow under the shade of a forest cover. Wind erosion of sand or dust soils both on beaches and in arid regions is prevented chiefly by vegetation. In the

building up of peat deposits, such as the sphag¬

num bogs of the Northern States, or the Dis¬

mal Swamp, Okefinokee Swamp or the Ever¬

glades, plants are the principal factors. De¬

posits of coal and petroleum are of vegetable origin. The disintegration of rocks is hastened by the presence of living mosses and other plants. The fertility of soils is largely depend¬

ent on the admixture of decayed vegetable

matter, or humus ; and the so-called nitrifying organisms of the soil, which change nitrates, which cannot be taken up as food by plants, to nitrites, which are readily absorbed, belong to a group of microscopic plants known as bac¬

teria. A very important role in soil fertilization is played by a certain group of plants, the Leguminosce, including the clovers, beans and peas. One of the essentials of plant food is nitrogen. Ordinary plants have not the power to take free nitrogen from the air, where it ex¬

ists in almost unlimited quantities, but absorb their nitrogen from certain nitrogenous sub¬

stances in the soil. This element of soil fertil¬

ity is soon exhausted. Leguminous plants, how¬

ever, produce on their roots small tubercules containing bacteria which have the power to take free nitrogen from the air in the soil and put it into a form suitable for plant food. By the death and rotting of the plant the nitrogen thus absorbed from the air is incorporated in the soil and is available as food for all sorts of vegetation. In this way

the leguminous plants are almost indispensable for the rehabilitation of soils worn out by excessive cropping.

Plants in Relation to Geography. — Most

of the land surface of the earth is covered by a green mantle of vegetation, which varies

in its makeup at different points in accordance with several factors, the most general of

which in its variation is temperature. Certain areas of the north polar and south polar re¬

gions, permanently or almost permanently

covered with snow or ice, and various simi¬

larly cold areas on mountains of higher and higher elevation in lower latitudes, are devoid of vegetation. Next to this is an area of suf¬

ficient warmth in summer to produce a vege¬

tation of herbaceous plants and shrubs but

devoid of trees — the Arctic, Antarctic and Al¬

pine vegetation. Then come the temperate

areas of the earth, characterized by a vegeta¬

tive covering able to withstand freezing dur¬

ing a portion of the year, yet sufficiently warm to permit an abundant growth of trees. Next follows the tropical area, with a vegetation not subjected to frost and characterized es¬

pecially by forests made up in part of palms.

A factor of probably even greater importance, but more broken and restricted in its distri¬

bution, is moisture. The four great tempera¬

ture categories outlined above are cross—

hatched by moisture lines parallel with the lines of equal precipitation. With too little moisture forests cannot exist and we have

plains and deserts of grass or brush. Neither do forests exist in a soil too persistently moist and poorly drained and thus we have moors, bog, natural meadows and savannas. The ex¬

treme of moisture is reached in the plants called aquatics, growing either in fresh water or in the ocean, often wholly submerged.

Each of the other factors in plant growth, light, air, food and the complex mechanical relations of the plant, varies greatly from one locality to another and in their various com¬

binations with different degrees of heat and moisture they furnish an almost endless va¬

riety of environments. Each of these com¬

binations of conditions has its characteristic association of plants, which, adapted to the conditions, and to each other, form a com¬

munity. The study of plants in their detailed relation to these local surroundings forms a branch of geographic botany known as plant

ecology. North America furnishes a good

series of geographic areas with sufficient

climatic differences to necessitate different floras. The vegetation of the continent is

divided bv Merriam into the following zones : BOTANY

Arctic, Boreal, Transition, Upper Austral,

Lower Austral, Tropical. The Arctic zone

extends from northern Labrador northwest¬

ward across the northern edge of the con¬

tinent to Bering Strait, dipping southward

along the shores of Bering Sea to Bristol

Bay, Alaska. The vegetation of this zone

consists of herbaceous or of depressed woody plants, trees being absent. Over large areas, known as tundras, the ground is permanently frozen underneath, a few inches of the sur¬

face thawing each summer and permitting the growth, in a cold, wet soil, of an often luxuri¬

ant but low vegetation. The Arctic zone is represented southward as far as southern Cal¬

ifornia and northern Arizona by certain Alpine plants on the summits of mountains high

enough to have a timber line, approximately 12,000 feet in that latitude. The Boreal zone, sometimes subdivided into a northern, or

Hudsonian, belt and a more southerly, or

Canadian, belt, extends from the Arctic zone southward to a line traversing the northern part of New England, Ontario, Michigan and

Minnesota, jumping to the higher elevations

of the Adirondack and Appalachian Mountain

systems, then continuing westward across

North Dakota and Assiniboia to British

Columbia, dipping south in the higher eleva¬

tions of the Rocky Mountains nearly to Mex¬

ico, in the Cascades and Sierra Nevada to

southern California and along the shores of the Pacific to northern California. The most characteristic feature of this zone is forests of spruce or balsam fir. The Transition zone rovers most of New England, New York,

Michigan, Minnesota, North Dakota, about

half of South Dakota and the southern part of Assiniboia, thence extending southward

through the Plateau and Great Basin to Ari¬

zona, New Mexico and California, in the

southern parts of those States reaching down to an elevation of about 6,000 feet. The most characteristic tree of the eastern, humid part of this zone is the white pine; of the west¬

ern, arid part, the }Hlow pine. The Upper

Austral zone, as represented in the eastern United States by the so-called Carolinian

flora, covers the lower Hudson Valley, south¬

ern New Jersey, Delaware, eastern Maryland,

the Piedmont section of the South Atlantic

States, middle Tennessee and Kentucky and

most of Ohio, Indiana, Illinois, Iowa and Mis¬

souri, northwestern Arkansas, southeastern

South Dakota and eastern Nebraska and

Kansas. It is especially characterized by its forests of certain species of oak and hickory.

The flora of the western part of this zone, known as the Upper Sonoran, covers the prin¬

cipal part of the arid western plains, from Washington and Montana southward through

the Mexican plateau. The flora is devoid of trees and is commonly characterized by sage¬

brush or bunchgrass. The Lower Austral

zone is divided, like the last, into an eastern humid and a western arid

part. The eastern, containing the Austroriparian flora, covers

the coastal plain from Chesapeake Bay to

middle Texas, extending northward in the

Mississippi Valley to extreme southern Illi¬

nois and Indiana. One of the most charac¬

teristic wild plants is the cane, while cotton is the most conspicuous cultivated plant. In the arid region of western Texas, the great valleys of New Mexico and the deserts of

southwestern Arizona, southern Nevada and

southeastern California, lies the western part of the Lower Austral zone, containing the

flora known as the Lower Sonoran, charac¬

terized especially by the creosote bush and the mesquite. This flora has large extensions into northern Mexico. The Tropical zone

covers the lower third of the Florida Penin¬

sula, enters the extreme southern point of

Texas and on the Pacific coast reaches north on the east side of the Gulf of California to the lower Colorado and Gila rivers. From

these northern extremes the tropical flora ex¬

tends southward through Mexico, Central

America and the West Indies. Various gen¬

era and species of palms form the most con¬

spicuous and characteristic features of this flora.

Plants in Their Economic Relation to

Man. — Every savage race is intimately asso¬

ciated with the flora of its region. Having no means by which to

supply the ordinary

necessaries of life through foreign trade, as do many civilized races, the savage has

learned from necessity to know the precise

qualities of the plants about him as foods, textiles, poisons, dyes, tans, fuels, *etc.* In connection with the making of a single

aboriginal instrument, such as a bow or a

fire-drill and block, there is required on the part of the savage a knowledge of the

strength, elasticity, texture and other qualities of all the kinds of wood occurring in the range of his travels, such as is not possessed by one person in a thousand among highly

civilized races. The economic value of a cor¬

rect and discriminating record of the uses of plants among aboriginal peoples is evident.

The influence of a familiar flora in attracting a savage race to a wider geographic range or that of a strange flora in limiting migration in any direction is a natural outcome of the savage's exact knowledge of the plants of his native region. The practice of some of the migratory races of prehistoric man to trans¬

port their cultivated plants with them has re¬

sulted in the wide extension of these plants from the regions they naturally occupied.

From this association it turns out that a crit¬

ical study of the origin and distribution of the plants cultivated by aboriginal races

throws important light on their prehistoric

migrations. Some of these botanical facts

appear to be of very great antiquity, perhaps even antedating those furnished by aboriginal arts or by language. This study of the rela¬

tion of primitive man to his plant environ¬

ment is called ethnobotany, or aboriginal bot¬

any. Some of the processes of plant life are important to man as being fundamental to

his existence. The plant is an engine which through the energy furnished bv sunlight is capable of transforming inorganic substances

into organic compounds, without which animal life could not exist. The ordinary economic relations of plants to civilized man are many and enter as important factors into such arts and industries as agriculture, horticulture,

medicine, manufacture and commerce. The

production and elaboration of plant products and their transportation from those parts of the world in which they can be and are pro¬

duced to other parts in which they are needed 312

occupy probably the largest part of the en¬

ergies of the human race. See Anatomy of

Plants.

Bibliography. General. — Bailey, L. H.,

(Cyclopedia of American Horticulture) (New

York 1900) ; Britton, N. L., and Brown, A., illustrated Flora of the Northern United

States and Canada) (3 vols., New York

1913) ; Figuier, G. L., (The Vegetable World) (Paris 1865) ; Kerner, A. J., and Oliver, F.

W., (Natural History of Plants) (2 vols.,

New York 1902) ; Lindley, J., and Moore, T., (Treasury of Botany) (London 1876) ; Rol-land, E., (Flore Populaire) (10 vols., Paris 1896-1913).

Morphological. — Atkins, W. R. G., (Some

Recent Researches in Plant Physiology)

(London 1906) ; Bose, J. C.f (Plant Response as a Means of Physiological Investigation >

(London 1906) ; Caldwell, O. W., (Handbook

of Plant Morphology5 (New York 1904) ;

Curtis, C. C., (Nature and Development of

Plants) (New York 1914).

Histological. — Chamberlain, C. J., Meth¬

ods in Plant Histology) (Chicago 1915) ;

Clute, W. N., laboratory Manual and Note¬

book in Botany5 (Boston 1913) ; Kraemar,

H., (A Course in Botany and Pharmacognosy5

(Philadelphia 1910) ; Winton, A. L., (The

Microscopy of Vegetable Foods5 (New York

1916) ; Zimmermann, A. W., (Botanical Mi—

crotechnique) (New York 1901).

Cytological. — Darwin, C. R., insectivor¬

ous Plants5 (New York 1900) ; Dixon, H. H., (Transpiration and the

Ascent of Sap in

Plants5 (London 1914) : Haas, P., and Hill, T. G., introduction to the Chemistry of

Plant Products5 (London 1913) ; Loeb, J.,

(Dynamics of Living Matter5 (New York

1906) ; Mother, D. M., (Fecundation 5 (Car¬

negie Institution of Washington, Pub. 15) ; Vries, H. de, (Plant Breeding5 (Chicago

1907) .

Ecological. — Arnold, A. F., <The Sea

Beach at Ebb Tide5 (New York 1901) ; Ful¬

ler, G. D., Evaporation and Soil Moisture

in Relation to the Succession of Plant Asso¬

ciation5 (Chicago 1914) ; Johnson, D. S.,

(The Relation of Plants to Tide Levels5

(Carnegie Institution of Washington, Pub.

206) ; Shreve, F., (A Montana Rain-Forest5

(Carnegie Institution of Washington, Pub.

199).

Medical. — Henkel, A., (American Medic¬

inal Leaves and Herbs5 (United States

Bureau of Plant Industry Bulletin 219) ;

Schneider, A., (Pharmacal Plants and Their

Culture5 (California Forestry Board Bulletin

2, Sacramento 1912).

Economic. — Candolle, A. L. P. P. de, Ori¬

gin of Cultivated Plants5 (New York 1902) ; Dixon, R., (The Human Side of Plants5

(New York 1914) ; Pickering, C., Chrono¬

logical History of Plants5 (Boston 1879) ;

Rogers, J. E., (The Book of Useful Plants5

(Garden City, N. Y., 1913) ; Sargent, .F. L., Clants and Their Uses5 (New York 1913).

Historical. — Arber, A., (Herbals: Their

Origin and Evolution5 (Cambridge 1912) ;

Darling, C. A., (Handbook of the Wild and Cultivated Flowering Plants5 (New York

1912); Green, J. R., (A History of Botany: 1860-1 9005 (Oxford 1909) ; Pickering, C.,

Chronological History of Plants5 (Boston

1879); Sachs, J. von' (History of Botany:

1530-1860 5 (Oxford 1890).

Frederick V. Coville,

Chief Botanist, United States Department of

Agriculture.

BOTANY BAY, New South Wales, Aus¬

tralia, so called by Captain Cook on account of the many strange plants found growing there.

Cook landed at Botany Bay on his first voyage in 1770, and took possession of the country in the name of his sovereign. The penal settle¬

ment, founded in 1788, and popularly known by the name of Botany Bay, was established on Port Jackson, where the city of Sydney now stands.

BOTANY BAY GUM, a gum resin pro¬

duced by Xanthorrhcea hastilis of Australia.

BOTARGO, a relish made of the salted roe

of the mullet or tunny, used on the Mediter¬

ranean coasts.

BOTETOURT, bot-e-toor, Norborne

Berkeley, a conspicuous actor in American

colonial history: b. England 1718; d. Williams¬

burg, Va., 15 Oct. 1770. He was the descendant of John Berkeley, the cavalier, who was en¬

nobled by Charles II in 1660. He was sent to Virginia as royal governor in 1768, just eight years before the Declaration of

Independence.

He had full instructions from the Crown and directions to assume more dignity than had

been the wont of colonial governors, and ac¬

cordingly he paraded the streets of Williams¬

burg with guards, a coach and other requisites of vice-regal pomp. Conflicting duties to the King and the people made his situation most unpleasant. In 1769 the assembly took into

consideration the incipient troubles with Eng¬

land, and on 16 May passed firm but respectful resolutions remonstrating against parliamentary taxation and the right claimed to send them to England for trial. So firm were they that Lord Botetourt summoned the speaker and

burgesses before him and dissolved them. The result was that a convention met in a private house and took the incipient steps for the rev¬

olution. The convention did not attempt to

legislate, but simply remonstrated with Parlia¬

ment, sending its resolutions to the other colo¬

nies and to England. Under the influence of these resolutions Lord Hillsborough wrote a

letter to Lord Botetourt, assuring him that it was not the intention of the government to tax the colonies, and that the obnoxious imposts would be withdrawn, which letter Lord Bote¬

tourt communicated to the assembly. All these anticipations, however, were destroyed by the policy of Lord North, who succeeded Charles Townsend, and the promise was not fulfilled in full, the duty on tea being retained. Botetourt was deeply mortified, and soon died of disease aggravated by mental suffering. He was de¬

plored by men of all classes in the colony, and the legislature erected a marble statue to his memory, which is still standing in the College of William and Mary.

BOTH, John and Andrew, two Flemish

painters, were born in Utrecht about the year 1610, Andrew being the elder. They were the sons of a glass painter, who instructed them in the rudiments of drawing. They afterward

made further progress in the school of Abra-BOTHA — BOTHWELL

ham Bloemaart, and went at an early age to¬

gether to France and Italy. John, attracted by the works of Claude Lorraine, chose him for his model ; Andrew preferred the painting of the human figure, and imitated the style of Bamboccio. But although their inclinations led them in different directions, their fraternal af¬

fection often united their talents in the same works. Thus Andrew painted the figures in

the landscapes of his brother; and their labors harmonized so well, that their pictures could not be suspected of coming from different

hands. The ease and fine coloring in the beau¬

tiful figures of John cannot be overlooked in spite of the excess of yellow sometimes found in them. Andrew was drowned in Venice in

1650. John, inconsolable for his loss, aban¬

doned Italy and returned to Utrecht, where he died shortly after.

BOTHA, bo'ta, Christian, Boer com¬

mander: b. the Transvaal; d. Kokstad, Griqua-land West, 8 Oct. 1902. At the opening of the Boer War in 1899 he led a command into Natal and was active in the siege of Ladysmith and at the defense of the Tugela crossing. After the relief of Ladysmith he retreated to Laing's Neck, where he was left by his brother, Louis Botha, in command of

the Boer forces. By

opening negotiations with General Buller he

delayed that general's advance for several days, and after the fall of Pretoria he was placed in command of all the Boer forces in the south¬

eastern Transvaal. His frequent raids into

Zululand effected the diversion that allowed Louis Botha and De Wet to continue the war.

BOTHA, Louis, Boer soldier and states¬

man: b. Greytown, Natal, 27 Sept. 1862; d.

Pretoria, 28 Aug. 1919. He began life as a farmer, and as a young man had a share in the establishment of the Transvaal Republic.

Fie was a member of the first Volksraad

at Pretoria. LTpon the outbreak of the Boer War with England in 1899 he was given

a subordinate command, and upon the death of General Joubert in March 1900 he became com¬

mander-in-chief of the Boer forces. He won

the victories of Spion Kop and Colenso, and after the fall of Pretoria organized the Boer forces to meet the campaign of attrition be¬

gun by the British. He was the chief represen¬

tative in the peace negotiations in 1902, and on the cessation of hostilities visited Europe to raise funds to permit the Boers to resume work on their farms. In the grant of responsible government to the Transvaal he became (1907) Prime Minister of the colony, and in 1910 first Premier of the Union of South Africa. On the outbreak of the European War, a rebellion, in¬

stigated by Germany, broke out, which he

promptly suppressed, and in 1915 he conducted a successful campaign

against the Germans in Southwest Africa, receiving the surrender

of that colony on 9 July. He worked steadily for race cooperation between Dutch and Eng¬

lish, and but for him South Africa, during the course of the European War, might have

ceased, at least temporarily, to be a British colony.

BOTHIE (Gael, bothag, a cot), a house,

usually of one room, for the accommodation of a number of work people engaged in the same employment; especially, a house of this kind in parts of Scotland, in which a number of un¬

married male or female farm servants or labor¬

ers are lodged in connection with a farm.

Bothies are most common in the northeast of Scotland, and are chiefly for the accommoda¬

tion of unmarried male farm servants engaged on the larger farms, who as a rule have to do their cooking and keep the bothie in order for themselves. The bothie system has often been condemned.

BOTHNIA, the name formerly given to a

country of northern Europe, extending along

the east and west shores of the Gulf of Bothnia, the east portion now being comprised in Fin¬

land and the west in Sweden.

BOTHNIA, Gulf of, the northern part of

the Baltic Sea, which separates Sweden from Finland. It commences at

the island of Aland, lat. 60° N., and extends to 66° ; its length is about 450 miles, its breadth from 90 to 130, and its depth usually from 20 to 50 fathoms. As its water contains little salt, it freezes over in the winter, so as to be passed by sledges and carriages. It abounds in salmon and other

fish and also in seals.

BOTHRIOCEPHALUS, a genus of ces¬

toid worms which is found very abundantly in the intestines of predaceous fishes, and one species of which is sometimes found in the in¬

testinal canal of man. It belongs to the same family as the tapeworm (Taenia solium), but it is distinguished from it by having its segments broader than they are long; by wanting the four discs which surround the head of the

tapeworm, and having in their place two lateral longitudinal openings ; and thirdly, by having the sexual organs on one of the flat surfaces of each segment instead of at the edges of the segments. The two longitudinal openings

(whence the worm receives its name, from

bothrion, a little pit, and kephale, the head) do not seem to be organs of nutrition, but merely a kind of suckers by which the worm is enabled to attach itself to the intestines of the animal which it infests, while it is nourished by ab¬

sorption throughout its whole length. Al¬

though, as already stated, this worm generally infests the bodies of predaceous fishes, it is capable of being transmitted to all vertebrate animals, and especially it is found in those birds which live upon fish. The only species which is found in the intestines of man is the Bothriocephalus latus, and it is rare to find even this species except among the inhabitants of two distinct parts of Europe, the north and the centre. It is found, on the one hand, in Russia, in Norway and in Sweden, and on the other hand, in Switzerland, the north of Italy, some provinces in Germany and some depart¬

ments of France, but rarely elsewhere. It has been remarked that this

worm is common

where the Taenia or true tapeworm is rare, and vice-versa. It is rare in the United States, but with the increase of emigration from the

regions of Europe where it abounds, its occur¬

rence may be looked for.

BOTHWELL, James Hepburn, Earl of,

is known in Scottish history by his marriage to Queen Mary. He was the only son of the 3d earl: b. about 1536; d. 1578. He succeeded his father in 1556, thus obtaining important offices and estates, and by 1566 he had attained to high favor with the Queen. The plot by which Darnley lost his life in 1567 was of his con-

trivance, and the Queen was suspected of con¬

niving at it. Bothwell was charged with the crime and underwent a mock trial, being of course acquitted. After the death of Darnley he seized the Queen near Edinburgh, and carry¬

ing her a prisoner to Dunbar Castle, prevailed upon her to marry him. Before this he had divorced his own wife, Jean Gordon, sister of the Earl of Huntley. Though seemingly secure in the possession of power, and though created Duke of Orkney by the unfortunate Queen, he soon found that his conduct had aroused the indignation of the kingdom. A confederacy

was formed against him by the barons, the

Queen was liberated from his power and he

escaped to the Orkneys and afterward to Nor¬

way. The Danish authorities kept him impris¬

oned for some time at Malmo, latterly at

Drangholm in Zeeland, where he died insane.

See the various histories of Scotland, and the (Life of Bothwell' by Professor Schiern (Eng¬

lish translation 1880).

BOTHWELL, Scotland, village of Lanark¬

shire, on the north bank of the Clyde. It is situated eight miles southeast of Glasgow and about one mile beyond it stands Bothwell

bridge, where a decisive battle was fought in 1679 between the Scottish Covenanters, com¬

manded principally by their clergy, and the royal forces, commanded by the Duke of Mon¬

mouth, in which the former were totally

routed. Near the village are the fine ruins of Bothwell Castle, once a stronghold of the

Douglases. Pop. 3,452.

BOTOCDOS, or AYMORES, a Brazilian

race of Indians. They live 70 to 90 miles from the Atlantic, in the virgin forests of the coast range (Serra do Mar or Serra dos Aymores), on the borders of the forests of Minas-Geraes and Espirito-Santo, especially on the Rio Doce.

They receive their name from the custom which they have of putting a slit in their under lip and in the lobes of their ears, and inserting in these, by way of ornament, pieces of wood shaped

like the bung of a barrel (Portuguese botoque).

They have oblique eyes and projecting cheek¬

bones. Their color is a dirty brown. They go quite naked and paint

their bodies, and a

Botocudo warrior with his lip and ear plugs, his body painted black and red and his face bright red, strongly reminds one of a denizen of the infernal regions. They are very skilful with the bow and arrow, and live chiefly by hunting. They now number only a few thou¬

sands and are decreasing.

BOTOSHANI, bo'to-shan'y. Rumania,

town and department capital of Moldavia, on an affluent of the river Jija, 60 miles by rail northwest of Jassy. The commercial centre

of a rich farming and pastoral region, it has an extensive domestic and export trade with Tur¬

key and England in grain, cattle, lumber and petroleum, large flour and starch mills, sugar and glass factories. The town takes its name from Batus Khan, a Tatar chief, grandson of Generhis Khan, who invaded the country in the 13th century. Pop. (about two-thirds Arme¬

nians and Jews) 35,000.

BOTRYCHIUM, bd-tre'chi-um, a genus of

fern (adder's-tongue), of the suborder Os—

mundece and tribe Ophioglossacece , character¬

ized by its distinct thecae in a compound sp'ke attached to a pinnate or bipinnate frond. The common American species are : B. lunaria,

common moonwort, which grows on elevated

lands and pastures where other ferns are seL

dom found. It was once supposed to possess great virtues, both magical and medicinal, and was carefully gathered by the light of the moon.

B. virginicum, the largest of the species, is known by the name of

rattlesnake fern, from growing in places frequented by that dangerous reptile. It abounds in many parts of the United States, Mexico and Australia and in the Him¬

alaya Mountains in Asia. In Europe it is found only in Norway. B. lunaria is found from New England to Colorado and Lake Superior. B.

simplex abounds from California and the Yel¬

lowstone to Lake Superior. Other generally

diffused species are B. lanceolatum, B. lunar-ioides and B. ternatum.

BOTRYTIS, bo-tri-tis, a genus of fungi

belonging to the section Hvpomycetes and

familiar by name to cultivators from its con¬

nection with the potato disease. The genus con¬

tains a number of those minute plants known as molds and mildews, and of these some have the peculiar habit of growing in the tissues of living vegetables. The threads of which their growth consists creep among the loose cells of the under side of leaves and send up their fertile shoots through the stomata. Many kinds of Botrytis are extremely destructive to vari¬

ous plants, but many fungi diseases formerly ascribed to species of Botrytis are now known to be caused by other genera. The decay of the leaves and stem in the potato disease is now charged against Phytophthora infestens, but old writers attribute the troubles to B. infestens.

Though extremely injurious to the farmer,

these molds are sometimes very serviceable by-destroying weeds. Various agricultural pests

may often be seen looking yellow and un¬

healthy, when an examination of the under side of the leaves will show that this is owing to the ravages of these minute parasites.

BOTSFORD, George Willis, American

scholar: b. West Union, Iowa, 9 May 1862; d.

New York, 13 Dec. 1917. He was graduated

from the University of Nebraska in 1884 and received his Ph.D. degree from Cornell in 1891.

He was instructor in Greek and Roman history at Harvard from 1895 to 1901, became adjunct professor of history at Columbia University in 1903 and full professor in 1906. Professor

Botsford was recognized as the leading Amer¬

ican scholar in the domain of ancient history; his textbooks are regarded as standard authori¬

ties on the subject. He spent several years in historical research in Italy and was a member of the board of editors of the Political Science Quarterly. Among his numerous works are

(A History of Greece for High Schools> ; <The Story of Rome) ; (History of the Ancient

World) ; (Hellenic Civilization ; develop¬

ment of the Athenian Constitution ; <An An¬

cient History) ; (A Source Book of Ancient History.'

BOTTA, Carlo Giuseppe Guglielmo,

Italian statesman, historian and poet: b. San Giorgio del Canavese in Piedmont, 6 Nov.

1766; d. Paris, 10 Aug. 1837. During the

time of the French Revolution he was a

student of medicine at Turin, and adopting

revolutionary opinions with enthusiasm, he

suffered for his zeal by two years' imprison-BOTTA — BOTTESINI

ment (1/92-94). After passing as a physician he entered the French service and accom¬

panied the expedition which Napoleon sent to Corfu and he was soon after elected as a

member of the provisional government of

Piedmont. When this territory was, in 1803, annexed to the French empire, Botta was

elected a member of the Corps Legislatif,

where his behavior was characterized by a

bold opposition to the Emperor. During the

((Hundred Daysw he was rector of the acad¬

emy at Nancy and after the second return of the Bourbons he went in a like capacity to R.oue.n-The greater part of the remainder of his life was passed by him as a private gen¬

tleman at Paris. His chief works belong to the department of history. Among these are

(Storia della Guerra dell' independenza degli Stati Uniti dAmerica) ; (Storia d'ltalia dal 1789 al 1814' (10 vols.). He also furnished a continuation to Guicciardini's Italian History from 1490-1534, bringing it down to 1789.

BOTTA, Paul Emile, French traveler

and archaeologist: b. about 1805; d. Poissy, April 1870. He was a son of Carlo Giuseppe Botta (q.v.). While still very young he made a

voyage round the world, traversed the

western portion of America and took part as physician to Mehemet Ali in an expedition

which set out from Egypt to Sennaar, of

which he took advantage to make a consider¬

able zoological collection. At a later period he was appointed French consul at Alexan¬

dria and from this place he undertook a

journey to Arabia in 1837, the scientific re¬

sults of which he communicated to the world in his (Relation d'un voyage dans le Yemen. *

His chief service to science consists in his having discovered the ruins of ancient Nine¬

veh, a discovery made by him in 1843 in the course of excavations in the neighborhood of Mosul, which he conducted with great energy and ability while acting as consular agent for the French government at that town. As the result of investigations made upon the spot he published two important works, one on

the cuneiform writing of the Assyrians,

(Memoire de l'ecriture cuneiforme Assyri—

enne,* and the other upon' the monuments of Nineveh, (Monuments de Ninive) (5 vols.,

folio, with drawings by Flandin, Paris). The latter is a work of great splendor and marks an era in Assyrian antiquities. From 1847 to 1857 Botta lived as French consul-general in Jerusalem and from 1857 to the end of his life in the same capacity at Tripoli.

BOTTA, Vincenzo, Italian scholar: b.

in Piedmont, 11 Nov. 1818; d. New York,

5 Oct. 1894. He was elected to the Sardinian Parliament in 1849 and

in 1853 was sent to the United States on a mission to investigate the American educational system. New York

pleased him so well that he settled there and was appointed professor of the Italian lan¬

guage and literature in the University of New York. In 1855 he married Anne Charlotte

Lynch ; their home became a meeting place for literary people and artists. She founded at the Academie Franqaise a quinquennial prize of

$1,000 for the best essay on (<The Condition of Woman.® She died 23 March 1891. Botta

published c Dante,) (Modern Philosophy in

Italy,* a life of Cavour and other studies.

. BOTTALLA, bot-tal'la, Paolo, Italian

historian: b. Palermo, Sicily, 1823. After

education at the Jesuit colleges in Palermo and Rome he held professorships in theology and church history in both cities and later at the College of Saint Bruno, Wales, and in

Poitiers. His works written in Italian,

French and English include (Corso di storia e di geografia universale* (1860); (Pope

Honorius before the Tribunal of Reason and

History > (1868) ; 'The Pope and the Church considered in their Mutual Relations* (2 vols., 1868-70) ; (The Papacy and Schism ' (1869) ; (La composition des corps d'apres les deux

principaux systemes qui divisent les ecoles

catholiques* (1878); <L'autorita infallibile del Papa nella Chiesa e le sue relazioni collo stato* (1880).

BOTTARI, Giovanni Gaetano, Italian

prelate: b. Florence 1689; d. 1775. After

completing his studies he was admitted a

member of the Academy della Crusca and

spent six years in preparing the celebrated dictionary of that body. After having been

in charge of the grand-ducal printing office, he left Florence in 1730 and settled in Rome, where Pope Clement XII appointed him pro¬

fessor of ecclesiastical history and polemics in the Collegio della Sapienza; the same year he was appointed palatine prelate. He as¬

sisted the geometer Manfredi in examining

the course of the Tiber from Perugia to the mouth of the Nova, with the view of render¬

ing it navigable and providing a remedy

against its devastating inundations. The ex¬

cellent report on the subject, though signed by Manfredi, is said to have been drawn up by Bottari. He was rewarded by the appoint¬

ment as keeper of the Vatican library.

Among his works are (Lectures on Boccaccio, Livy and Dante* ; a splendid edition of Virgil with a learned preface and notes and a cor¬

rected edition of Vasari's (Lives of the

Painters.*

BOTTESINI, bot'te-ze'ne, Giovanni,

Italian musician: b. Crema, Italy, 24 Dec. 1823; d. 7 July 1889. He was taught the double-bass in Milan, by Luigi Rossi, according to the method of Andreoli and Dragonetti, and soon became a first rate

performer, meanwhile

studying musical composition under several dis¬

tinguished masters. When scarcely 23, he was engaged as contrabassist for the Italian opera in Havana, where in a few seasons he rose to the post of maestro and musical director of the company. Here he produced in 1846 his first opera, (Cristoforo Colombo.* During the five years of his stay in Havana, he paid occasional visits to the United States, where he secured considerable fame by his wonderful perform¬

ances in the concert room. His masterly han¬

dling of the huge instrument took everybody by surprise, while his style, at once elegant and impressive, won the admiration of all critics and amateurs. His success on his return to Europe in 1851 was not less complete; the con¬

certs he gave in London and Paris established his reputation as the first living contrabassist.

In 1853 he returned to the United States with M. Jullien, and afterward accompanied Madame Sontag to Mexico. Subsequently he became di¬

rector of the orchestra at the Italian opera in Paris, where his opera (L'Assedio di Firenze*

was successfully performed during the spring of 1856. Other works are (Ali Baba) (1871) ; (Ero e Leandro) (1879) ; (Garden of Olivet5

(1887), an oratorio. He also published numer¬

ous overtures, symphonies and quartettes.

BOTTICELLI, bot-tT-che'le, Sandro, Ital¬

ian painter of the Early Renaissance : b. Flor¬

ence, probably in 1444; d. there, 17 May 1510.

The son of a tanner, his real name was Ales¬

sandro di Mariano dei Filipepi. According to Vasari, young Sandro derived the name of

Botticelli from a goldsmith named Botticello, whose name he assumed. Modern research,

however, tends to show that an elder brother, Antonio, was a goldsmith and gold-leaf-beater, and it is believed that the boy was first put to work with him. The eldest brother, Giovanni, a prosperous broker, appears to have cared for the boy. Giovanni bore the sobriquet of <(Botticello® or ((Little Barrel® and from him the young artist was named Botticelli. As he gave evidence of a strong bent towards art, the youth was apprenticed in 1458-59 to the painter Fra Filippo Lippi (q.v.), with whom he remained for eight or nine years. During that period he was undoubtedly employed with other pupils upon Lippi's greatest masterpiece, the series of frescoes in the church of the Pieve at Prato.

This work was completed in 1465 and Botticelli returned to Florence. He did not accompany

Lippi when the latter went to Spoleto in 1467

to decorate the cupola of the cathedral at Spo¬

leto, though it is probable that he assisted' the master in preparing his designs. After Lippi's death, his natural son, Filippino, then nine years old, entered Botticelli's studio in Flor¬

ence and received his early training from his father's most distinguished pupil. Botticelli had meanwhile become connected with the

brothers Pollainolo (q.v.), whose influence is most strongly marked in his work of that pe¬

riod. The brothers had executed six panels

for the tribunal of the Mercatanzia represent¬

ing six Virtues. To these Botticelli added the seventh, Fortezza (Fortitude), about 1470, pre¬

senting a young woman partly clad in armor, seated in a recess on a throne of colored marbles. The attitude and expression of the figure have won the admiration of all art crit¬

ics for their fine, imaginative conception. To this period also belong two small panels of Judith and Holofernes, now in the Uffizi Gal¬

lery in Florence. In his youth Botticelli came under the spell of ancient mythology and there are extant several works by him on classical subjects, the finest being his (Birth of Venus) in the LTffizi and (Venus and the Graces) in the Florence Academy. Two smaller examples

of this style are in the National Gallery, Lon¬

don, which also contains one of his earliest pictures extant, the (Adoration of the Magi.5

In 1473-74 he was commissioned by Lorenzo

dei Medici to paint a (Saint Sebastian) for the church of Santa Maria Maggiore. In this work the serene beauty of the martyr's face reveals the poetry and mystic elevation of the artist's thought. The fine landscape background, with steep rocks and towers on the shore of a dis¬

tant sea, was to serve as a model for many of his contemporaries and followers in future days.

In the early years of his rising fame Botti¬

celli became acquainted with another young

Florentine painter, his junior by eight years, Leonardo da Vinci, then growing up in the

workshop of Andrea del Verrocchio, goldsmith, painter and sculptor. The long lost (Chigi Ma¬

donna5 of Botticelli, which was rediscovered nearly 40 years ago in a dark corner of Prince Chigi's palace in Rome, is a beautiful expres¬

sion of charming naivete, refinement and deli¬

cacy. The picture is now the property of Mrs.

John Lowell Gardner of Boston, Mass. A

more ambitious (Adoration of the Magi5 than that already referred to is the painting now in the Uffizi. It was painted probably about 1470, to order; it contains over 70 figures cleverly arranged and shows Botticelli as a master of portraiture, for the kings and their satellites were at once recognized as Cosimo de' Medici, Botticelli himself and various members of the Medici family and Florentines of high rank.

About this time the painter secured the patron¬

age of the powerful Medici and other great families. Pope Sixtus IV called him to Rome in 1481 to assist in the decoration of the new chapel in the Vatican, now known as the Sistine Chapel. Associated with him in this work were some of the leading artists of the time, Ghir¬

landaio, Cosimo Roselli, Perugino and Pinturicchio. Internal evidence shows that Botticelli did much work on the series of papal portraits in the niches between the windows. He also spent 18 months on three frescoes — (Life of Moses,5 (Temptation of Christ5 and destruc¬

tion of Korah, Dathan and Abiram.5 About

1484 Botticelli returned to Florence and contin¬

ued to execute works for the great families of Florence. His fame was now widespread, and

in 1490 Lorenzo the Magnificent appointed him on a commission to complete the cathedral

fagade. The famous <Nativity) in the Lon¬

don National Gallery belongs to this maturer period and the tax list of 1498 shows him the possessor of <(a gentleman's villa.® He was buried in the family vault in the church of Ogni Santi. He is said to be one of the engrav¬

ers of a celebrated series of illustrations exe¬

cuted by Florentine artists toward the close of the 1 5th century, notably a set of designs for the (Divina Commedia) of Dante, of which 686

are in the Berlin Mjiseum. His works are to be found in various European galleries, his Ma¬

donnas being especially characteristic of his style. In these the Virgin appears peculiarly slender and with a melancholy expression as if oppressed by forebodings. He was greatly es¬

teemed by his contemporaries, but subsequently fell into disfavor. Although opinions as to his merits differ widely, Botticelli is to-dav very popular and forms the theme of much art dis¬

cussion. Consult Ulmann, (Sandro Botticelli5

(1893); Pater, (Studies in the History of the Renaissance) (1873) ; Phillimore, (Botticelli >

(1894) ; Berenson, Florentine Painters of the Renaissance) (1898) ; Supino, (Sandro Botti¬

celli J (1900) ; Steinman, (Botticelli 5 (English translation 1901) ; Kroeber, Fie Einzelportrats des Sandro Botticelli5 (1911).

BOTTIGER, Karl August, German ar¬

chaeologist: b. Reichenbach, Saxony, 8 June

1760; d. Dresden, 17 Nov. 1835. A student

and teacher at Leipzig, in 1791 through Her¬

der's influence he became director of the

Weimar gymnasium and acquainted with

Goethe, Wieland, Schiller and others. In

1804 he went to Dresden as special lecturer BOTTLE — BOTTLE-TREE

on classical antiquities and art. Two years before his death he was elected a member of the French Institute. His literary output

was enormous. His principal work is a study of the domestic life of Roman women (Salina, oder Morgenscenen einer reichen Romerin >

(2 vols., Leipzig 1803; 3d ed., Munich 1878).

BOTTLE, a vessel designed to hold

liquids, constructed of various materials and in various forms according to the necessities of local manufacture and the demands of the kind of liquid to be enclosed. It is now un¬

derstood to mean a vessel made of glass,

with a more or less narrow neck and mouth.

In ancient times, however, the bottle was

nothing more than a skin of some animal.

Thus the Biblical aphorism concerning the

putting of new wine into old bottles as an illustration of folly means that it would not be wise to trust a new wine, while yet active with

fermentation, to the chance of bursting a leathern vessel necessarily weakened by use and age. In Spain, Turkey, India and some

parts of South America to this day, various skins, and especially that of the goat, are used for containing wine and water. The

hide is stripped from the animal as entire as possible and the various natural openings

having been sewed up, with the exception of that of one of the legs, which is retained as a nozzle, the vessel is ready, after a certain preliminary curing of the skin, for the re¬

ception of the wine. The peculiar taste of Amontillado sherry is supposed to be owing

to the fact of its being kept in leather. The ordinary bottle is, however, of glass. The

various bottles used for different well-known purposes are generally distinguished by pecu¬

liar shapes and sizes, as, for example, the English wine, beer, ale and soda bottles, the French champagne, Burgundy and claret, and

the Rhenish wine bottles. Port wine is oc¬

casionally put into very large bottles, called magnums, and acids in still larger ones termed carboys. Until 1880 bottles wTere made by

hand. The bottle blower gathered the molten glass on the end of his blowpipe through

which he blew with his mouth, producing a

hollow ball. When this was large enough it was placed in an iron mould to shape it and was then blown into its permanent shape.

The molds were made of brass or iron kept at nearly a red heat when in use. A common form was of the two sides hinged together.

The invention of blowing machines has rev¬

olutionized the industry by enabling greater numbers to be produced and by greatly reduc¬

ing the cost. In machine operation the glass is melted in the usual way

in a furnace and is then run into a revolving pot about 20 feet in diameter. The object is to have a constant fresh surface of hot glass into which the

gathering mold is dipped. The gathering

molds are affixed to a revolving table and are generally in three pieces, a bottom and two hinged body sections. The proper quantity

of glass is placed in a mold which is auto¬

matically closed as the table revolves. It

comes next under a plunger by which the

mold is firmly closed, the neck of the bottle formed and the bottle blown to the desired shape by compressed air which is automat¬

ically admitted at the correct moment as the mold-table revolves. In the next stage the

mold is automatically opened and the hot

bottle removed when the mold proceeds to the next cycle of operations. The bottle is then placed in an annealing oven and is allowed to cool very gradually. The average bottle ma¬

chine has a capacity of over 100 gross a day as compared with 15 gross a day for three men and three boys under the old hand sys¬

tem.

BOTTLE CHARTS, maps of the ter¬

minal points of the voyages of sealed bottles thrown into the sea and either drifting to land or picked up afloat. These bottles had long been used by the victims of shipwreck to convey messages or record their fate, or by travelers or seamen for joke or experi¬

ment ; but the first serious note taken of them was by Lieutenant Beecher of the British

navy, who in 1843 published in the Nautical Magazine a Mercator chart of the Atlantic

coast from lat. 6° S. to 63° N., or say from Cape Saint Roque, in Brazil, to Hudson

Strait, with straight lines from start to finish of a number of bottle voyages he had noted, the length of these lines, time elapsed since set afloat, *etc.* Of course some bottles leak and founder and others are crushed ; but he was able to collect 119 bottles, one of which had traveled 3,900 miles in a straight line, and of course far more in fact, and four over 2,000, while the time of voyage varied from three days to 16 years. This chart has been repeatedly freshened up with new facts, re¬

engraved and republished in the Nautical

Magazine. Later, several government depart¬

ments, of which the United States Hydrographic Office is by far the chief, have used this method systematically for the study of ocean currents. The office furnishes shipmasters

with papers for inclusion in bottles, contain¬

ing requests in several different languages for their delivery, with date and circumstances of finding, to the nearest United States consul, who will forward them to Washington. By

this means three or four hundred new bottle voyages have been registered, with curious

results. In general, their track is remarkably uniform, given the same local conditions. Of two bottles thrown out from the Blonde with¬

in five days in 1826 (one of Beecher's list), one was picked up 14 and the other 16 years after at the same spot on the French coast.

Yet the effect of local winds is so great that of two set afloat simultaneously at the same spot, one was picked up on the Shetlands, the other on the west coast of France. Just north of the Azores, the surface conditions are so variable that of five bottles thrown out in one summer within 100 square miles, one drifted to the coast of Norway, two to the west coast of Ireland, one to France and one to Spain.

The longest recorded voyage was about 8,500

miles, from the Allertons, south of the Falk¬

land Islands, to the shore of the great Aus¬

tralian Bight, in a little less than three years.

See Chart; ˆIap.

BOTTLE-TREE, a medium-sized Aus¬

tralian tree (Sterculia rupestris) of the fam¬

ily Sterculiacece. From the top of the globu¬

lar stem, as from the mouth of a bottle, the branches extend. They bear lanceolate leaves two to four inches long and axillary panicles

of inconspicuous flowers followed by leathery six-seeded follicles. The soft brittle wood

is of little economic value, but the stems are said to contain much water, which is fre¬

quently obtained by the natives and by trav¬

elers. Some other allied species, also called bottle-tree, furnish edible mucilaginous roots which are largely used by the aborigines.

BOTTLENOSE, or BOTTLEHEAD, a

small Arctic and north Atlantic whale (Hy—

peroddon ro stratum) closely allied to the sperm whale, and so called from the dolphin¬

like shape of its head or snout, where the two pointed teeth are in the lower jaw.

Placed farther back than ordinarily, and in smaller proportion, is a dorsal fin; the skin is smooth and glossy, lead-colored on the

back, graduating into white on the belly. The largest are 30 feet long. These whales travel in small bands, generally keeping just south of the Arctic ice, and moving northward dur¬

ing the breeding season. They feed mainly

on deep-water squids, for which they dive

to great depths. Their chief value lies in the amount of oil and spermaceti that they yield.

BOTTLING, the process of enclosing

liquids in bottles, including the operation of stopping or corking. The use of bottles for re¬

taining liquids involves three requisites : that they shall be clean enough not to injure the purity, taste or looks of the contents, or the looks of the bottle, or to cause chemical action which will do so ; shall be strong enough to resist probable pressure; and shall have stoppers which will not be disintegrated or corrode and will be tight enough not to let air in or volatile substances out, the degree of such precaution varying with the liquid. For scientific prepara¬

tions, which include chemical analysis in crim¬

inal cases, an indispensable condition is that the bottle shall contain no impurities which would cast doubt on the result ; hence chemists in such cases use only new bottles, cleanse them thoroughly with some preparation to remove

external substances and expose them to a red heat before using. For common household use, as there is no bottling under pressure, the kind or weight of glass is of no importance. For cleaning, it is best to shake up with warm water and caustic soda and clean with a bottle¬

brush ; to clean out gummy residues like paraf¬

fine from naphtha and gasoline bottles, shake up with sulphuric acid.

The material of the stopper is of the first importance. For scientific use, only glass is possible; as also to retain corrosive acids and perfumes that would pass through the pores

of a cork, in which latter case also nice taste as well as security is a desideratum. In general family use, for volatile fluids like gasoline and naphtha and ammonia which might soak up

and disintegrate the cork and let its gas escape, rubber is the usual stopper. In commercial

bottling on a large scale, of beer, wine, mineral waters and carbonated beverages generally, the only stoppers used are cork and rubber, except in the case of siphons with valves. For wine, the old-fashioned long cork, driven deep in and pulled with a corkscrew, still holds the field.

The common stopper for < <soft) drinks, and in part for beer, is a ˆterraced" rubber one fas¬

tened to the under side of an iron cap and attached to the neck of the bottle by a wire loop whose leverage forces the rubber tightly into the mouth of it, and can be easily thrown off and the stopper removed. But in the United States, for beer even the rubber stopper is rap¬

idly being displaced by a patent cork made in Baltimore, consisting of a crimped metal cap lined with cork, which a machine tightens

around the neck of the bottle. It is easily lifted off by an iron ring, thrown over the neck and pulled up by a short handle ; is much cheaper than the permanent rubber, and nearly as

handy; and is cleaner, as good houses use only new ones. Indeed the use of old corks re¬

cleaned belongs to a low grade of goods. For milk bottles and others of which the corks are to last but a few hours and need no strength, pasteboard or woodpulp is much used.

Old bottles, however, are used over and over ; and here thorough cleanliness is a prime requi¬

site, both for salability and because dregs of old liquor might ferment and ruin the new. If any corks have been driven in, they are ex¬

tracted by machinery ; for the rest, in the large establishments, the bottles are placed in rows of pockets on the surface of a large drum, which their weight, as the upper rows are ad¬

ded and the emerging ones taken off, causes to revolve slowly through a vat of hot solution of caustic soda, which enters the open mouths and eats out the sticky remnants of the last filling.

They are then taken out and placed by sets, inverted, in a frame over revolving brushes, now consisting almost entirely of two or three rubber prongs held apart by strings or centrifu¬

gal force, — the old bristle brushes being dis¬

used because they wear out and leave bristles in the bottles, — at a speed of from 2,500 to 3,000 times a minute; then rinsed in frames of from two to four dozen vertical sprinkling

tubes, over which the bottles are set, and jets of hot water forced into them. The filling is done by siphonage or air or gas pressure. A simple form for small breweries is an open trough filled from a barrel and supplying sev¬

eral siphon tubes which the operator starts by sucking them, shifting the bottles as fast as filled ; the siphon is tilted up by the weight of the bottle enough to give a flow and the liquid in the trough is kept at a constant level by a float. But in the larger ones, a row of barrels or hogsheads is drawn upon by a set of rubber pipes with stop-cocks, to which the bottles are held and filled by means of air or gas pressure, one pipe having several branches. With car¬

bonated beverages there is danger of the bottles bursting, and they are filled in iron cages open only at the top, to protect the workmen; with heavily charged waters in siphons, the latter are of tougher glass and are tested before¬

hand, and the men sometimes wear rubber cov¬

erings for face, hands or body. With flavored or sweetened drinks, the syrup is fed into the bottle from one spout while the carbonated

water comes from another; in small works,

however, the syrup is put in first and the bottle filled right-side up.

The recrimping of patent corks has been de¬

scribed; the old-fashioned long corks are

shaped by a compressor and driven into the bottles by a plunger, operated either by hand or foot, or a self-feeder which can do 2,000 an hour. The corks are previously thrown into a hollow revolving drum for several hours, to rub BOTTOME

against and batter each other, which knocks off the loose chips and shakes out the dust; then soaked and rinsed. There are wiring machines for either the small wires over the long corks, or the hinged wires with the rubber stoppers.

The bottles when filled and corked are labeled by a machine, usually the bottles being laid in a crib with expansible sides and a plunger forcing them down against the label, which at the same time is picked up and moved under the bottle across a paste roll ; sometimes the label is pressed against the bottle. The speed of this process is practically limited only by the ability of the workman to feed bottles to the machine.

A special label is sometimes fitted over the cork, for security against refilling the bottles of a reputed firm with inferior liquors. Sometimes the corks have a stamp or brand burnt into them with a hot die pressed down by a machine.

Finally, the corks are often covered with tin-foil or caps of some kind; the former is done by hand.

Much capital is invested in this business,

and there is a national association composed of manufacturers. Returns are made by nearly all these firms and companies to the association, from which it appears that this industry em¬

ploys nearly 30,000 persons ; it serves 4,489,038

customers, owns 22,940 horses, employs a capi¬

tal of nearly $51,000,000 and owns bottles to the value of $12,747,633. Its loss of bottles annually is $3,522,804. In this line are con¬

sumed annually, besides bottles, corks in great number, wire, patented arrangements for clos¬

ing bottles, paper boxes for holding bottles, sealing wax and labels. The cost of these ma¬

terials is given at $7,937,001. The capacity of corking-machines reaches 2,000 bottles per hour; that of labeling-machines 12,000 bottles daily.

Consult Dreesbach, (Beer Bottler's Handy

Book5 (Chicago 1906) ; Goosmann, (The Car¬

bonic Acid Industry5 (ib. 1906) ; Sulz, trea¬

tise on Beverages5 (New York 1888).

BOTTOME, Margaret McDonald, Amer¬

ican writer: b. New York, 29 Dec. 1827 ; d. 1906.

She was long engaged in religious work in

Brooklyn, N. Y., where her father held an offi¬

cial position. She accompanied him to alms¬

houses and prisons and began to systematically visit the poor and sick of Brooklyn. After her marriage to Rev. Frank Bottome she be¬

gan to give her whole time to this kind of work. For more than a quarter of a century she gave Bible talks in New York homes to the society women of the city. Out of these grew the order of the King's Daughters, which was destined to become a great organization of which she was annually chosen president

until her death. In 1896 she was elected presi¬

dent of the woman's branch of the Medical

Missionary Society, and she edited <(Mrs. Bottome's Heart to Heart Talks with the King's Daughters55 department in the Ladies' Home

Journal. Among her published works are

(Crumbs from the King's Table5 ; (A Sunshine Trip to the Orient5 ; (Death and Life5 ; (Seven Questions After Easter.5

BOTTOMLESS t PIT, The. The trans¬

lation of the Greek aftvcoog-in the Authorized Version of the Scriptures, in the New Testa¬

ment and Apocrypha. It is itself a translation of the Hebrew omn. It means hell or the

abode of evil spirits.

BOTTOMLEY, Horatio, English finan¬

cier and journalist. He was for a number of years connected with a large financial under¬

taking in the city of London and was a pioneer of gold mining in West Australia. He founded the Financial Times, but is most widely known as the proprietor and editor of John Bull, in which he has long advocated a (<business gov-ernmenD for the United Kingdom. His ex¬

posures of financial and other schemes of a doubtful character in its columns have involved him in successive lawsuits, in which he has sometimes, and with great skill, conducted his own defense. He sat as a Liberal in the House of Commons. 1906-12 and since 1918.

BOTTOMRY is the hypothecation or

pledge of a vessel for the payment of a debt.

The creditor has no right to take possession of the ship until the expiration of the time for which the loan is made, and then (under a bottomry contract in the usual form) only by the intervention of an admiralty court. If the loan is not repaid at the stipulated time, the lender applies to an admiralty court, which (the truth of the claim being established) de¬

crees a sale of the ship to satisfy the debt. The conditions of such a contract usually are that, if the ship is not lost or destroyed by those risks which the lender agrees to run, the debt is to become absolute. The risks assumed by the lender are usually the same as are enumer¬

ated in a common policy of insurance. If the ship is wholly lost in consequence of these risks, the lender loses his loan. In case of a partial damage, the bottomry bond usually pro¬

vides that this damage shall be borne by the lender in the proportion of the amount loaned to the value of the ship. If this amount is equal to half the value of the ship, the lender is to bear half the amount of such loss, *etc.*

As the lender thus assumes a certain risk, he is justly entitled to a greater interest than if he did not thus take the hazard of the loss of the whole loan ; and this is called ((marine in¬

terest.55 He is entitled to the usual rate of interest on his loan, in addition to the usual premium of insurance for the same voyage or period. The stipulation for such a rate of marine interest is not a violation of the laws against usury, for it is not merely a compen¬

sation for the use of the money lent, but also for the risk assumed. The shipowner may

borrow money on bottomry whether his vessel be in port or at sea. But the captain of the ship, as such, cannot so borrow when in the port where the owner resides or near enough to consult him on any emergency. In any

other port he may pledge the ship on bottomry for the purpose of raising money necessary for repairing, supplying and navigating her, if he can obtain it in no other way. If he borrow thus without necessity the bond is void and the lender can look only to the personal re¬

sponsibility of the captain.

BOTTS, John Minor, American legis¬

lator: b. Dumfries, Va., 16 Sept. 1802; d. Cul¬

pepper, Va., 7 Jan. 1869. He studied law and in 1833 entered the Virginia legislature. He was elected to Congress in 1839, where he

served three terms — (1839-43) and (1847-49).

Upon the outbreak of the Civil War he as¬

serted his devotion to the Union and in 1862

he suffered imprisonment on that account. Af-320

ter the war he published (The Great Rebellion, Its Secret History, Rise, Progress and Disas¬

trous Failure> (1866); .was one of Jefferson Davis' bondsmen, and attended the convention of Southern Loyalists in Philadelphia.

BOTULISM, bot'u-lism, a form of poi¬

soning due to the eating of tainted sausages, ham, head-cheese or other impure meats. It

is really due to a specific saprophytic bacillus, B. botulinus. Other organisms occurring in

diseased or decomposed meat, and giving rise to similar symptoms, are B. enteritis, B. coli and Proteus vulgaris. These generate toxins, some of which are responsible for the symp¬

toms, which are those of acute gastro-intestinal irritation. There is usually a period of from 12 to 24 hours (even 48 hours) after the eat¬

ing of the meat before symptoms develop. The symptoms are various ; they may be intense

muscular weakness, with sudden nausea and

vomiting; chills, small rapid pulse, cold extrem¬

ities, headache and pain are also present. Fol¬

lowing the chilly sensations the temperature may rise, even to 103° or 104° F. Cramps, delirium, hallucinations, diarrhoea and intense prostration may also be present. In some sud¬

den and severe cases death has resulted with cholera-like symptoms. The eating of putrid

meat and fish is common in many countries, but it is only when a specific bacillus happens to be present that toxic symptoms arise. Re¬

covery is very protracted. Many of the cases resemble internal haemorrhage, and great diffi¬

culty sometimes exists in the diagnosis. There are, however, more intestinal symptoms as a rule in meat poisoning (ptomaine poisoning).

Abstaining from all tainted meats is the sole preventive. See Poisons.

BOTURINI BENADUCI, bot-u-re'ne

ba-na-doo'che, Lorenzo, Italian antiquarian :

b. Milan, about 1702; d. Madrid, about 1750.

In 1736 he went to Mexico and traveled there among the Indians, collecting a large number of their writings and valuable Spanish records; these finally came into the possession of the Mexican government and have been mostly lost or destroyed. He afterward lived in Spain,

where he held the office of historiographer for the Indies. He wrote (Idea de Una Nueva

Historia de America, > which includes a valu¬

able catalogue of his collections.

BOTZEN, or BOZEN (Italian BOL¬

ZANO), bol-tza'no, Italy, a district and a

town in the Tyrol, south of Innsbruck, at the confluence of the Talfer with the Eisack. The town is well built, flourishing and surrounded by a wall two miles in length, built to protect it from a mountain torrent close by. The par¬

ish church is a Gothic building of the 14th century with an elegant spire; adjoining it is the new cemetery. The other oljects worthy

of notice are the church of Saint Nicholas, a gymnasium, custom-house, two monasteries, a

normal school and a nunnery. Across the

Talfer from Botzen is the winter resort of Greis. Botzen has an important transit trade and has four annual fairs, resorted to by

commercial travelers from all parts of Italy and Germany. In the environs wine and fruits are produced. Pop. about 24,126.

BOUCH, botisch, Sir Thomas, English

civil engineer: b. Thursley, Cumberland, 22

Feb. 1822 d. Moffat, 30 May 1880. He was

early attracted to engineering studies, and in 1839 began his apprenticeship to a civil engi¬

neer in the north of England. He was a resi¬

dent engineer on the Stockton & D. Railway for a period of four years, and in 1849 went to Scotland as manager and engineer of the Edinburgh & Northern Railway. While in the

service of this company he devised a sort of floating railway for carrying goods trains

across such estuaries as those of the Forth and Tay. After this he. was for a time en¬

gaged in railway construction in England. He was engineer of the first railway bridge across the Tay, which was completed in September

1877 and opened in May of the following year.

For this he received the freedom of Dundee and in 1879 the honor of knighthood. On 28

December of that year the bridge gave way

during a stormy night, while a train with some 70 passengers was crossing. All were drowned, and the accident caused such severe mental dis¬

tress to Sir Thomas that it undoubtedly has¬

tened his death.

BOUCHARDON, boosh-ar-don, Edme,

French sculptor: b. Chaumont-en-Bassigny

1698; d. Paris, 27 July 1762. He was a pupil of his father, Jean Baptiste Bouchardon, sculp¬

tor and architect, and then went to Paris and entered the school of the younger Coustou. In 1722 he gained the highest prize and was made royal pensioner at Rome. There he executed

a number of busts, including that of Pope

Clement XII. After nine years' absence, the Duke d'Antin recalled him to Paris and gave him a studio at the Louvre. He assisted in repairing the fountain of Neptune at Versailles and executed 10 statues which adorn the church of Saint Sulpice. The fountain in the Rue

de Grenelle, which the city of Paris ordered to be constructed in 1739, was made by him and is considered his masterpiece. The execu¬

tion of the greatest monument of that period, the equestrian statue of Louis XV, which was erected by order of the city of Paris, was committed to him. He labored 12 years on

this with inconceivable perseverance, and has left in the horse a model which may be ranked with any work of antiquity. His pieces

bear the character of simple grandeur, but, in gen'

eral, more fire is to be desired in his sculpture.

Latterly he adopted a more polished, delicate manner, to suit the taste of the age. Caylus has written his life. His brother, Jacques

Philippe Bouchardon, was court painter to the King of Sweden, and modeled a great number of figures for the Royal Palace at Stockholm.

BOUCHER, boo-sha, Alfred, French

sculptor: b. Bouy-sur-Orvin 1850. He studied under Dumont and Paul Dubois. He was

awarded the second Roman prize in 1876. His (Au Bout,* now in the Luxembourg, was

awarded a gold medal in 1886. Other works

of note are <A la Terre, > (Repose) and <Diana Surprised.* In 1900 he won the Grand Prix

at the Paris Exposition.

BOUCHER, boo-sha', Francois, French

painter: b. Paris, 29 Sept. 1703; d. 1770. He was the son of a designer of embroideries, who was his first teacher. Later he studied with Lemoyne and then took up engraving as a

means of livelihood at 20 he won the first prize at the Academie. In 1723 he won the BOUCHER — BOUCHES-DU-RHONE

Grand Prix dc Rome and in 1725 he made a journey to Italy, in

company with Carle Van Loo, and remained there for six years. The painters of decadence, with their lightness and skill, were the ones who most influenced him, and he is in a manner their continuer, — their art freshened, however, by his youth and the national quality of grace of the Frenchman. His success on returning to Paris was immediate and orders for work of all kinds flowed in on him. He painted religious and mythological

subjects, landscapes, decorations and especially portraits, being the favorite of his period among the courtiers and wealthy people, particularly for women's portraits. Despite a life in which the pleasure-seeking of his time played a very large part, he was industrious to a degree —the number of his drawings being, at his own estimate, about 10,000. He was in high favor with Madame de Pompadour, whose portrait

he painted and who engraved some of his

works. He was made inspector of the Gobelins factory in 1755 and court painter in 1765. His Watteau-like style and graceful voluptuousness gave him the title of the Anacreon of painting.

The Louvre gives a sufficient idea of his style in such well-known works as the (Rinaldo and Armida,' (Toilette de Venus,' (Shepherd and

Shepherdesses' and the (Artist's Portrait.' At Amiens we find his (Rape of Europa,' at Fon¬

tainebleau his (Venus and Cupid' ; the Metro¬

politan Museum in New York has his (Arion

Rescued' ; at the Stockholm Museum is his

(Leda and the Swan,' while the Wallace col¬

lection in London possesses a (Diana leaving the Bath,' by him. Among Boucher's many

pupils was Fragonard. After the Revolution,

with David in authority, Boucher was pitilessly scorned, his works were considered the very type of falsity and they fell to the most ab¬

surdly low prices. To-day we esteem him once more — in a fashion nearer that of his con¬

temporaries. He is absolutely the man of his century : light but of consummate grace. Con¬

sult Mantz, (Boucher, Lemoyne and Natoire'

(1880) and the monograph by Kahn (Paris

1905).

BOUCHER, bow'cher, Jonathan, English

clergyman: b. Blenoog, 12 March 1738; d. Ep¬

som, 27 April 1804. He came to America about 1754 as private tutor in a Virginia family. He continued teaching and tutoring for several

years, during which time he counted among

his pupils the stepson of George Washington.

He returned to England, where he received

Episcopal ordination in 1772. He came back

to America and had charge of several eccle¬

siastical parishes in Virginia, Maryland and Carolina. He was on intimate terms with many of the prominent leaders of the colonies, among them being Washington, with whom he often

dined and discussed the affairs of the country.

Boucher's loyalty to the English Crown was

uncompromising, and when the Revolutionary

War broke out he denounced from the pulpit the revolutionary doctrines then popular in the colonies. So strong was the popular sentiment against him that he preached his last sermon with pistols on his pulpit cushion. He broke with Washington and his other American

friends, and finally he was forced to resign his parish and return in 1785 to England, where he found himself as popular as he had been

unpopular in America. His loyalty to the

Crown was rewarded with a government pen¬

sion and the vicarship of Epsom, Surrey, which he retained till his death. Boucher was con¬

sidered one of the best preachers and orators of his time both in England and the colonies.

Under the title (A View of the Causes and Consequences of the American Revolution' he

published, in 1797, 15 sermons delivered be¬

tween 1763 and 1775. These he dedicated to Washington, notwithstanding the break in their friendship. These sermons are interesting on account of the political anecdotes they contain.

Boucher left, at the time of his death, the un¬

completed manuscript of a (Glossary of Archaic and Provincial Words' upon which he had

spent 14 years. Several unsuccessful attempts were made to publish this manuscript, which, it is said, finally became the property of the publishers of (Webster's English Dictionary.'

BOUCHER, boo-sha, Pierre, French

pioneer in America: b. Perche, France, 1622; d. Boucherville, Canada, 20 April 1717. He

came to Canada in 1635, took part in the wars with the Iroquois and was sent to France in 1660 as a deputy for the colony of New France.

He was later made governor of Three Rivers.

He wrote (Histoire veritable et naturelle des moeurs et des productions de la Nouvelle

France' (1663). Shortly before his death he addressed to his children (Les adieux du grand-pere Boucher.'

BOUCHER DE CREVECCEUR DE

PERTHES, Jacques, French anthropologist:

b. Rethel, 10 Sept. 1788; d. Abbeville, 5 Aug.

1868. Through his father, an active botanist, he came under the notice of Napoleon and

was employed in numerous missions to Italy, Germany, Austria and Hungary. After the

Restoration he lived at Abbeville, wdiere he was most active as president of the Society of Emulation. He wrote travels, poems and

an early apology for free trade, but only his works on the archaeology of man are of con¬

sequence now. The first, (De la Creation' (5

vols., 1839-41), already brought him some rep¬

utation, but his long investigations on stone weapons and other remains of early human

civilization in the Tertiary and older Quater¬

nary Diluvial strata made him famous. His

most striking discovery was that of a fossil human jawbone in the quarries of Moulin-Quignon, near Abbeville, in 1863. Other works of great value are (Antiquites celtiques et antediluviennes' (3 vols., 1846-65) ; (De

fhornme • antediluvien et ses oeuvres' (1860).

Consult (Recollections of M. Boucher de

Perthes' in Lady Prestwich's (Essays Descrip¬

tive and Biographical' (London 1901).

BOUCHES-DU-RHONE, boosh dii ron

((<Mouths of the Rhone”), France, department in the south, in the ancient government of Provence, bounded north by Vaucluse, west by Gard, east by Var and south by the Mediter¬

ranean. Chief town, Marseilles. Area, 2,025

square miles, of which about half is under cul¬

tivation, the remainder being occupied by for¬

ests, heaths, wastes, water, *etc.* Between the Rhone and the lagoon of Berre is the great plain of La Crau. Its borders are tolerably well cultivated and support a number of cat¬

tle, but the centre is little better than a desert of stones and pebbles, affording, however, win-322

ter pasture for sheep. The Rhone is the prin¬

cipal river ; near Arles it divides into two branches which enclose an island called La

Camargue. Several canals facilitate transport and are especially useful for irrigation. The climate is generally very warm, with little rain during the summer. A cold and generally vio¬

lent wind, called mistral, always blows from the Cevennes after rain. It lasts from 3 to 9, sometimes, though rarely, even 12 days, and dries up the ground with astonishing rapidity.

The soil of the department is for the most part arid and unproductive without irrigation.

Vines, however, thrive and almonds, figs, capers, nuts, cereals, grapes, vegetables, mulberry trees, silkworms, and particularly olives, are exten¬

sively cultivated. The minerals are of little commercial importance ; lignite, iron, lime,

building stone, cement and marble are obtained.

Salt is extensively manufactured from the

lagoons, and the saltworks of Berre are cele¬

brated both for the quality and quantity of their product. The articles manufactured, besides

salt, are principally soap, brandy, olive oil (the best in France), soda, chemicals, vinegar, scents, leather, glass, *etc.* The fisheries are productive.

Shipbuilding, metal-founding and distilling of oil are also important industries. The depart¬

ment includes the three arrondissements of

Marseilles, Aix and Arles. Pop. 805,532.

BOUCHETTE, Joseph, French-Canadian

engineer: b. 1774; d. 1841. He entered the naval service in 1791, served during the War of 1812 and rose to the rank of colonel ; went to England in 1814, where he published in

1815 his (Topographical Description of Lower Canada, with Remarks upon Upper Canada. }

He was engaged as surveyor-general of Que¬

bec in delimitating the disputed eastern bound¬

aries of Canada with the United States.

BOUCICAULT, boo'se-ko, Dion, origin¬

ally called BOURCICAULT, Irish dramatic

author and actor : b. Dublin, 26 Dec. 1822 ; d. New York, 18 Sept. 1890. He was educated at London University and wrote his first play, 'London Assurance, > under the pseudonym

of "Lee Morton" when he was only 19 years old. This was produced at the Covent Gar¬

den Theatre in London and won immediate

success. He made his first appearance as an actor in 1852 in his own play, (The Vampire) ; in 1853-60 he was in the United States, where his success on the stage was as great as it had been in England. He founded a theatre

in Washington and reconstructed the Metro¬

politan Theatre in New York, but was not

very successful as a manager. Returning to

London in 1860 he brought out ‘The Colleen BawnR one of his best-known plays, and was at one time joint manager of the Adelphi and manager of a new theatre, the Westminster.

The latter venture was unsuccessful, but he shortly afterward brought out a number of

very popular plays. . In 1876 he came to New York, where he lived until his death. He

continued his work as both actor and play¬

wright, and also opened the New Park Theatre on Broadway. Boucicault wrote about 400

plays, many of which were adaptations; among the best not already mentioned are ‘Old

Heads and Young Hearts) ; ‘Love in a Maze> ; ‘Used Up1* ; ‘Corsican Brothers> ; ‘The Octo¬

roon, > dealing with the condition of the slaves in the United States; ‘The Streets of Lon¬

don ‘The Shaughraun’; ‘Daddy 0’Dowd) ;

and ‘Foul Play/ a dramatization, of Charles Reade’s novel of the same name. In ‘The

Colleen BawiP he created one of his favorite types, the Irish hero that appears in many of his plays. He also rewrote and adapted ‘Rip Van Winkle* especially for Joseph Jeffer¬

son’s use. While writing his numerous plays he found time to engage

in a political con¬

troversy with Lord Beaconsfield over the rights and liberties of the Irish people. He intro¬

duced many improvements in the staging of

plays, being the first to use carpets on the stage and moving scenery.

BOUCICAULT, Mrs. Dion, English act¬

ress: b. 1833; d. 6 Nov. 1916. Before her marriage to Boucicault in 1853 she had won success as Agnes Robertson in ‘Our Clerks *

and other plays. After her marriage she came with her husband to the United States, but returned with him to London in 1860 and took important parts in several of his plays. She again came to the United States and was later separated from her husband.

BOUDIN, boo-dan, Eugene, French

painter: b. Honfleur, 12 July 1824; d. 8 Aug.

1898. He lived in Paris for most of his life, traveling somewhat in Brittany and Holland.

He was devoted to the painting of seaports and river scenes, the gray expanses of French skies and waters, the picturesque confusion of ships in harbors. Among his works are ‘Fishing* ; ‘The Meuse at Rotterdam * ; ‘Low Tide> ;

(High Tide) ; (Getting Under SaiP ; ‘A Dutch Bark at Antwerp) ; and ‘Bordeaux Harbor.)

BOUDINOT, boo’di-not, Elias, Ameri¬

can philanthropist : b. Philadelphia, 21 April 1740; d. Burlington, N. J., 24 Oct. 1821. He studied law at Princeton with Richard Stockton, and in 1760 commenced practice at Eliza¬

bethtown, N. J. He early became a devoted

advocate of the patriot cause, and in 1774

was a member of the Provincial Convention

which took the control of New Jersey out of Governor Franklin's hands. Congress ap¬

pointed him commissary-general of prisoners,

15 May 1777; he was elected to Congress in 1777, 1780, 1781 and 1782, and was chosen its president 4 Nov. 1782, and as such signed the treaty of peace with Great Britain. He was director of the mint at Philadelphia 1795-1805, being appointed by Washington, whose trusted friend and counsellor he was throughout the Revolution and afterward. From 1772 to 1805

a trustee of the College of New Jersey

(Princeton), he founded its cabinet of natural history with a liberal contribution. He was active in the organization of the American

Bible Society, becoming in 1816 its first presi¬

dent. By his will he left the bulk of his large estate to various institutions and chari¬

ties. He wrote 'The Age of Revelation)

(1790), to counteract Paine's 'Age of Rea¬

son * ; 'Oration 4 July 1 793, } before the New Jersey Society of the Cincinnati; 'Second

Advent of the Messiah* (1815) ; 'The Star

of the West* (1816), an attempt to identify the North American Indians with the descend¬

ants of the lost tribes of Israel.

BOUDINOT, Elias, Cherokee Indian: d.

10 Tune 1839. He was one of three Cherokee BOUDINOT-BOUGAINVILLE

youths brought before Elias Boudinot (1 740—1821) in 1818, and he received that philan¬

thropist's permission to assume his name. He was educated at the mission school at Corn¬

wall, Conn., and married a white lady of that place. He became a man of considerable

talent and ability, and of influence among his people. In December 1835, he, with others

of his nation, was persuaded to make a treaty with the United States. He was thereupon

accused of having betrayed his country and

was murdered by the John Ross party west

of the Mississippi. He published (An Ad¬

dress to the Whites? (1826), delivered at

Philadelphia, 25 May 1825, and edited the

Cherokee Phoenix, 1828-34.

BOUDINOT, Elias Cornelius, Cherokee

lawyer, soldier and legislator : b. near Rome, Ga., August 1835 ; d. Fort Smith, Ark., 27 Sept.

1890. The maiden name of his mother was

Harriet Gold. Her father was a prominent

citizen of Cornwall, Conn., where his father, Elias Boudinot

(Galagina), a Cherokee In¬

dian, had been educated. Left an orphan by the death of his mother in 1836 and the assassina¬

tion of his father in 1839, he was reared under the guardianship of his step-mother (who, like his mother, was of New England parentage and birth) and of his uncle, Stand Watie. His edu¬

cation was begun in the tribal schools of the Cherokee Nation and completed in New Eng¬

land. Because of the factional troubles of the Cherokee Nation, in which his family had been so tragically involved, he located in Arkansas, where he read law and engaged in newspaper work. He was sent from Washington County

as a delegate to the Secession Convention which met at Little Rock, 4 March 1861, and was chosen as secretary of that body. During the Civil War he represented the Cherokee Nation in the Confederate Congress at Richmond part of the time and was also in the military service, attaining the rank of lieutenant-colonel of the regiment known as the Cherokee Mounted

Rifles. He took an active and prominent part in the protracted and fruitless Indian peace council which was held at Fort Smith, Ark., in September 1865, as also in the negotiation of the new treaties between the government of

the United States and the Indians of the five civilized tribes, at Washington, D. C., during the spring and summer of 1866. He subse¬

quently became an attorney for the Atlantic &

Pacific Railway Company, in which capacity he took a radical stand in favor of the proposed individual allotment of the lands of the several reservations in the Indian Territory and the opening of the surplus lands to white settle¬

ment. B3' this course he incurred the bitter enmity of his fellow tribesmen and virtually exiled and expatriated himself from citizenship and residence in the Cherokee Nation. He was a man of fine literary taste and talent, excelling both as a writer and as a speaker. During his later years he continued in the active practice of the law at Fort Smith and at Washington, D. C.

BOUFFLERS, hoo-flar, Louis Frangois

(Due de), French soldier: b. 10 Jan. 1644; d.

Fontainebleau, 20 Aug. 1711. He saw active

service under Conde, Turenne, Crequi, Lux¬

embourg and Catinat, and was created a mar¬

shal of France in 1693. His defense of Na¬

mur in 1695, and of Lille in 1708, are famous.

The siege of the former place was conducted by King William in person, and cost the allies more than 20,000 men. The latter was con¬

ducted by Prince Eugene. An order was sent from Louis XIV, signed by his own hand,

commanding Boufflers to surrender ; but he

kept it secret until all means of defense were exhausted. The retreat of the French after

their defeat at Malplaquet, under the direction of Boufflers, was more like a triumph than a defeat.

BOUFFLERS, Stanislaus, Chevalier de,

French soldier and author (son of the Mar¬

chioness of Boufflers, mistress of Stanislaus, King of Poland) : b. Luneville, 31 May 1738; d. Paris, 18 Jan. 1815. He entered the army, was soon appointed governor of Senegal and

while in this office made many useful regula¬

tions. After his return he devoted himself to that light kind of literature which distinguished the age of Louis XV. His reputation gave

him a seat in the States-General, where he was esteemed for his moderation and his good intentions. After 10 Aug. 1792 he left France and met with a friendly reception at Reins-berg from Prince Henry of Prussia, and Fred¬

erick William II. A large grant was made

to him in Poland for establishing a colony of French emigrants. In 1800 he returned to

Paris, where he devoted himself to literary pursuits which in 1804 procured him a seat in the French Institute. He lies buried near the Abbe Delille, and on his tomb is this in¬

scription, written by himself and characteristic of his lively disposition : ((Mes amis, crovez que je dors.® His works were published in

1815. Consult Uzanne, (Notice sur la vie de Boufflers* (Paris 1886).

BOUGAINVILLE, boo-gan-vel, Louis

Antoine de, French navigator: b. Paris, 11

Nov. 1729; d. there, 31 Aug. 1811. He aban¬

doned law for military service ; at 25 published a treatise on integral calculus; in 1754 went to London as secretary of the French em¬

bassy; in 1756 served in Canada as aide-decamp to Montcalm against the British ; was

wounded at the capture of Ticonderoga in

1758; and during the siege of Quebec in 1759

commanded 1,500 troops at Cap Rouge. I11

1763 he left the army with the rank of colonel and entered the navy. He undertook at gov¬

ernment request to establish a colony in the Falkland Islands, but

owing to Spanish ob¬

jections, he sailed for the Straits of Magellan and from 1766 to 1769 circumnavigated the

globe, making numerous important scientific

and geographical discoveries. When the French took part in the American war of Independ¬

ence, Bougainville was appointed commander

of a ship of the line, and greatly distinguished himself in the battle between De Grasse and Admiral Rodney. He was promoted chef d'es-cadre ; re-entering the army he was made

marechal de camp ; he obtained the rank of vice-admiral in 1791 ; and in 1795 was elected an miginal member of the French Institute.

Late in life Napoleon honored him with a

senatorship, made him count of the empire

and member of the Legion of Honor. His

name is geographically perpetuated in different parts of the world and scientifically by the South American climbing plant Bougainvillea.

/

He was the author of 'Voyage autour du

monde) (2 vols., Paris 1771-72) and Parkman gives his Canadian journal high praise for its historical value.

BOUGAINVILLE ISLAND, an island

in the Pacific Ocean, belonging to the Solomon group and under

Australian mandate; situ¬

ated in about lat. 6° S. and long. 155° E. ; area 3,860 square miles. It is separated from Choi-seul Island by Bougainville Strait. It is well wooded, densely populated and contains two

active volcanoes, one of which, Mount Balbi, rises to a height of over 10,000 feet. The name Bougainville is also applied to a strait in the New Hebrides group between the island of

Marina and Mallicolo, a cape on the northwest coast of Australia and a cape on the south coast of New Ireland. Pop. about 60,000.

BOUGAINVILLEA, a genus of woody,

spiny vines of the family Allioniacece, consist¬

ing of a dozen species, natives of South Amer¬

ica. Two of the species, B. spectabilis and B.

glabra, are commonly cultivated in hothouses because of the beauty of the large red or pur¬

plish bracts which enclose the flowers and re¬

main upon the plant for a long time. In Cali¬

fornia and Florida they are grown out-of-doors, as elsewhere in tropical America, and they are probably the most showy vines grown in those regions.

BOUGHT AND SOLD NOTES, written

memoranda of a transaction, made by the broker in the case and delivered by him to his princi¬

pals. They state respectively that the broker has bought for the vendee, and sold for the vendor, the subject of the transaction. When the broker has not exceeded his authority, both parties are bound thereby (4 Esp. 114; 2 Camp.

337). No particular form is required, but there are four kinds: (1)

“Where the broker pro¬

fesses to act for both parties, whose names are disclosed in the note. (2) Where the broker does not disclose in the bought note the name of the vendor, nor in the sold note the name of the buyer, but still shows that he is acting as broker and not as principal. (3) Where

the broker on the face of the note appears to be the principal. (4) Where he professes to •sign as broker but is really the principal® (4

Am. & Eng. Enc. Law 751). The bought and

sold notes, however, do not constitute the con¬

tract. They may, however, be accepted as evi¬

dence of the contract, and not the original contract, when so established by the usage of trade.

BOUGHTON, ba’ton, George Henry,

English painter: b. near Norwich, England,

1833; d. London, 19 Jan. 1905. His parents came to the United States in 1839 and settled in Albany. He studied art without a master and in 1856 made a sketching tour through

England, Scotland and Wales. In 1860 he went to London and Paris to continue his studies.

After 1862 he resided in London. His best pic¬

tures were (The Idyl of the Birds, > ‘Hay—

Harvest in Brittany, > ‘The Scarlet Letter,*

‘Wayside Devotion,* (Puritans Going to

Church,* (Snow in Spring) and ‘The Return

of the Mayflower.* He became a member of

the National Academy in 1871; associate of

the Royal Academy, London, in 1879, and mem¬

ber of the Royal Academy in 1896. He also wrote for the magazines and illustrated his stories. Consult Baldry, A. L., ‘G. H. Bough-ton: His Life and Work) (London 1904).

BOUGHTON, Martha Arnold, American

author: b. Corunna, Mich. She was graduated at the University of Michigan, 1880; taught in public schools and high schools at Saint Clair, Mich., and Detroit, 1880-84; was delegate to the World Congress of the Women’s Christian Temperance Union, London, 1906. She pub¬

lished (Memoir of J. M. Arnold, D.D.* (1885) ; ‘The Quest of a Soul and Other Verse* (1911), and is a contributor to various publications.

BOUGHTON, Willis, American educator

and lecturer: b. Victor, N. Y., 17 April 1854.

He was graduated at the University of Michi¬

gan 1881, and later received degree of A.M.

from Dickinson College 1891, and Ph.D. from Ohio University 1900, and from Columbia Uni¬

versity a higher diploma. He was lecturer on English, University of Pennsylvania, 1891-92; professor of rhetoric and English literature, Ohio University, 1892-99; teacher of English, Erasmus Hall High School, Brooklyn, since

1899; lecturer for New York University (extra¬

mural), for the Brooklyn Institute of Arts

and Sciences, for the Brooklyn Teachers’ As¬

sociation and for the Board of Education, New York; president of the department of philology, Brooklyn Institute, 1914. Editor Tennyson’s

Udylls of the King) (1906) ; Irving’s (Life of Goldsmith1* (1903), and

Milton's 'Short Poems) (1909). Author of (Mythology in Art) (1890); 'History of Ancient Peoples) (1896) ; 'Chron¬

icles of Erasmus Hall Academy* (1906) ; 'His¬

tory of English Literature in Outline) (1913) ; 'Ode to Learning) (1912) ; joint editor of the Journal of Pedagogy (1890-92).

BOUGIE, boo-zhe', Algeria, a port on the

Bay of Bougie, 120 miles east of Algiers.

Bougie was the Saldae of the Romans and in the 5th century was a chief seat of the Vandals.

Under the Arabs it was raised to such import¬

ance that it was called Little Mecca and was the entrepot of the trade between Christendom and North Africa, but after various vicissitudes it had sunk to a small village in 1833, when the French captured the place. Their extensive

works have since rendered it a strong fortress and a commercial centre of some value. Pop.

about 19,000.

BOUGIE (Fr. taper, also wax candle), in

surgery, a smooth cylindrical rod, designed to widen the canals of the human body by its introduction therein or to apply medicaments to a particular part of the interior of the body.

It is distinguished from a catheter by being solid, while the latter are hollow and open at the ends for the purpose of affording a passage for fluids. Bougies are generally

pointed at one end and grow gradually thicker toward the other end, but in some cases they are of the same thickness throughout their

whole length, the ends being only rounded off.

They are made sometimes of linen dipped in wax and then rolled up,

sometimes of a kind of plaster and linen, also of caoutchouc or gutta¬

percha, or of metal, such as lead, silver or Ger¬

man silver.

BOUGUER, boo-ga', Pierre, French

scientist: b. Croisic, Brittany, 16 Feb. 1698; d.

15 Aug. 1758. He studied the elements of math-BOUGUEREAU — BOUILLIER

ematics under his father, who was an able

hydrographer and is well known as the author of an excellent (Treatise on Navigation.* In 1727 he gained a prize at the French Academy for the best essay on the masting of vessels.

He gained similar prizes in 1729 and 1731, and added still more to his fame by a work enti¬

tled (Traite de la gradation de la lumiere,* in which he endeavors to ascertain the quantity of light absorbed by transparent bodies, explains the construction of several ingenious instru¬

ments which he had invented for the purpose of facilitating such investigations, and maintains that the light of the sun is more intense at its centre than on the edges of its disc, while in the moon the reverse is the case. About this time the figure of the earth was the subject of frequent discussion in the Academy of Sciences, and for the purpose of ascertaining exactly how much it was elevated at the equator and flat¬

tened toward the poles, it was proposed to measure the length of a degree at each of these positions and at the same time make other

observations and experiments of importance to astronomy and navigation. An expedition was

accordingly fitted out, in which Bouguer was associated with Godin and La Condamine. The main burden of the task fell upon Bouguer, who published the results in a work entitled (Theorie de la figure de la terre.* A quarrel with La Condamine concerning the honors of the

work embittered the latter part of his life and probably hastened his death.

BOUGUEREAU, boog-e-ro', Adolphe

William, French painter: b. La Rochelle, 30

Nov. 1825; d. Paris, 20 Aug. 1905. He was opposed in his desire to become an artist by his father, but through the assistance of a rela¬

tive he was enabled to study, coming to Paris in 1845, where he entered the Ecole des Beaux-Arts, remaining there till 1850, when he divided the Grand Prix de Rome scholarship with

Baudry and thereupon spent the customary

four years in Italy, remaining until 1854. A comrade of Bouguereau's at this period has

left us an account of the industry he displayed as a student. At the Salon of 1857 he received a first medal and was made a member of the Legion of Honor in 1856, officer in 1876, com¬

mander 1885 and grand officer in 1903. From 1856 on he won all the honors which the French government awards, as well as many others.

A new generation has not dealt kindly with Bouguereau. His work has been severely criti¬

cized by the partisans of a new and fresher style of art. Of his paintings the best known are (The Martyr's Triumph* ; (The Birth of Venus) (1879) ; (La Vierge Consolatrice)

(1877) — all in the Luxembourg. The mural

decorations in Sainte Clothilde and Saint Au¬

gustin, Paris, are from his hand, as also those in the Opera at Bordeaux. Consult Bavard,

E., (William Bouguereau) (in Monde Moderne,

1897); Hamerton, (French Painters) (1885);

Vendryes, Catalogue illustre des oeuvres de

Bouguereau *(Paris 1885). His works are to be seen at the museums of Antwerp, (Portrait of the Artist* ; Birmingham, (Charity) ; Mon¬

treal, (The Crown of Flowers) ; Amsterdam,

(The Lamb-* ; and the Metropolitan Museum,

New York, (Brother and Sister.*

BOUILHET, boo-e-ya, Louis Hyacinthe,

French poet: b. Cany, 27 May 1822; d. Rouen, 19 July 1869. He first achieved fame with

(Meloenis,) a poem in five cantos. It deals with Roman manners in the days of the Em¬

peror Commodus. (The Fossils,* a series of

delineations of antediluvians, attracted atten¬

tion on account of the attempt which the au¬

thor makes in it to use a scientific topic as a subject for poetry. His versified dramas,

(Mme. de Montarcy) (1856) ; (Dolores* (1862), and especially (The Conspiracy of AmboiseP

are elegant in style, rich in imagery, perfect in melody, but lack compactness of structure and are open to moral censure. The same

faults are found in his comedies, (Uncle Million) (1861) ; (Faustine) (1864), and his post¬

humous (M'lle AisseP

BOUILLlf, Frangois Claude Amour

(Marquis de), French soldier: b. Cluzel Castle, Auvergne, 19 Nov. 1739; d. London, 14 Nov.

1800. He distinguished himself in the Seven Years' War; was appointed governor of Guad-aloupe in 1768, and conquered Dominica, Saint Eustatia, Tobago, Saint Christopher, Nevis and Montserrat. After the Peace of 1783 he re¬

turned to Paris and was appointed lieutenant-general. He afterward traveled in England,

through Holland and a great part of Germany, until he was made chief of the province Trois-E veches, now named Verdun, Metz and Toul.

In the Assembly of Notables (1787-88) he

declared for the proposed reforms of Calonne, which, however, were defeated by Cardinal

Brienne. He was opposed to the plan of Necker for the union of the provinces. At the breaking out of the Revolution he supported the existing government, both in his former province and in Lorraine, Alsace and Franche-Comte. It was

only at the urgent desire of the King that he swore allegiance to the constitution of 1791. He repressed in 1790 the rebellion of the garrisons of Metz and Nancy; and although the National Assembly decreed him a vote of thanks for the bravery and ability he had displayed on this occasion, still the revolutionists distrusted him.

Shortly afterward he made preparations to

assist Louis XVI in his escape. Bouille had made his arrangements well, and had not the King forbidden any bloodshed he certainly

would have rescued him. Being thus compelled to leave the King at Varennes to his fate, he fled from the dangers to which he himself was exposed by the attacks of the revolutionists.

From Luxembourg he wrote a threatening let¬

ter to the National Assembly, and then exerted himself to excite the foreign powers against the republic. He succeeded well at Vienna,

gained over Gustavus III, and obtained the promise of 30,000 men from the Empress Catherine II, to be put under the command of the King of

Sweden and the French general. But Gustavus was murdered, the Empress forgot her promises and Bouille went over to England in 1796.

Here he wrote his (Memoirs of the Revolution,*

which appeared in an English translation

(London 1797), and, after his death, in the original. Consult Gabriel, (Louis XVI, le

Marquis de Bouille et Varennes) (Paris 1874).

BOUILLIER, boo'ya, Francisque, French

philosopher: b. Lyons 1813; d. there 1899. A student at the Normal School, Paris, he was appointed professor of philosophy in the Uni¬

versity of Lyons 1839; was dean of the faculty from 1849 to 1864, and director of the Normal 326

School 1867 to 1870. His principal works, dis¬

tinguished by sound scholarship and perfect

style, are (Histoire et critique de la revolution cartesienne5 (1842) ; (Theorie de la raison im-personnelle) (1844); (Le principe vital et

fame pensante5 (2d ed., 1873) ; (La vraie conscience) (1882) ; (Du plaisir et de la douleur5

(4'h ed., 1891). Consult his autobiographical, (Souvenirs d'un vieil universitaire5 (1897);

Latreille, (Francisque Bouillier, le dernier des Cartesiens5 (Paris

1907).

BOUILLON, boo-e-yoh, the name of one

of the most distinguished historical families of France. The last Duke of Bouillon of the first line, the famous Godfrey of Bouillon, had sold the duchy to the bishop of Liege, but a new line arose toward the end of the 15th century.

It originated with a cadet of the house of Marck, which, at the commencement of the

15th century, possessed the principality of

Sedan. In 1842 William de la Marck, well-known as <(The Boar of Ardennes,® seized the territory of Bouillon, belonging to the bishopric of Liege, and conferred it on his brother

Robert. The bishop of Liege attempted by

force to regain it, but this Robert, and a son of the same name who succeeded him, were suc¬

cessful in resisting; and at the end of the war, which was brought to a close in 1492 by the mediation of the King of France, Robert the younger remained virtually, if not formally, Lord of Bouillon. The 3d Robert succeeded his father last mentioned; and having, like his predecessors, entered the service of France, was made prisoner with Francis I at the battle of Pavia. He afterward obtained a marshal's

baton, and under the name of Marechal de

Fleuranges, which w.as the title he assumed, is known as the author of very curious memoirs.

Robert IV, son of Robert III, appears to have been temporarily dispossessed by the bishop of Liege, but recovered possession, and not only became marshal of France, but received the title of duke, and thus became the 1st Duke of

Bouillon of the new line. He was taken by the Spaniards at the siege of Hesdin in 1553; and three years after, when he had been liberated on parole for the purpose of procuring the 60,000 crowns at which his ransom had been fixed, died by poison. His wife was a daughter of the

celebrated Diana of Poitiers. His son, Henry Robert, lost Bouillon, which, by the

Treaty of Chateau-Cambray, returned to the

bishop of Liege, but he still preserved the title, and transmitted it to his son William Robert, who died in 1588 without having married. The male line thus became extinct. He was survived by a sister, who married Henri de la Tour cfAuvergne, Viscount Turenne, but died without children in 1594. She had, however, bequeathed her possessions to her husband, and thus the two powerful houses of Turenne and Bouillon were merged into one. This new Duke of

Bouillon was one of the most distinguished per¬

sonages of his time. He was at first devotedly attached to Henry IV while he was fighting his way to the throne, but afterward leagued with his enemies ; and, being implicated in the conspiracy which cost Marshal Biron his life, was long obliged to live in exile. He was restored to favor in 1606, and figured much dur¬

ing the intrigues in the subsequent part of the following reign and, having embraced the doc¬

trines of the Reformed Church, became one of its most distinguished leaders. He died in 1623, leaving two sons, the younger of whom was the celebrated Marshal Turenne. The elder, named Frederic Maurice, after serving with distinction in the Low Countries, returned to France, be¬

came a Roman Catholic, served Louis XIII,

then joined the insurrection against him headed by the Count of Soissons, and helped him to gain the battle of Mur fee. During the Fronde he joined the princes and took a prominent part in the civil war, but was reconciled to the court in 1651, obtained the title of prince, and re¬

ceived large accessions of territory in exchange for the principality of Sedan. He died in 1652, leaving interesting memoirs of his life and times. He was succeeded by Godefroi Maurice, who figured much in the wars of the period and became great chamberlain to Louis XIV, and

who died in 1721. One of his brothers was the celebrated Cardinal de Bouillon, who was born in 1644, obtained the cardinalate when only 26

years of age, was long the representative of the Gallican Church at Rome, made himself noto¬

rious by his vanity, ambition and intriguing spirit, and died in 1715. Consult Marsollier, cLife of Henry, Duke of Bouillon5 (3 vols., Paris 1726) ; Ozeray, (Histoire de Bouillon5

(Luxembourg 1827).

BOUILLON, originally a German duchy,

now a large district in the province of Lux¬

embourg, Belgium, 9 miles wide and 18 long, on the borders of Luxembourg and Liege.

This woody and mountainous tract consists of the town of Bouillon with 2,800 inhabitants, and 25 villages with 20,000 inhabitants. The town was once the capital of the duchy of the same name. This ancient place lies in the

midst of hills, on the left bank of the Semois, which abounds with fish, 40 miles from Liege and 8 from Sedan. It has a strong castle upon a rock, which, however, is commanded by the neighboring mountains. Godfrey of Bouillon

once possessed the dukedom of this name. He was Duke of Lower Lorraine, and Bouillon

was bestowed upon him as belonging properly to the county of Ardenne. In order to supply himself with funds for his expedition to the Holy Land, Godfrey mortgaged his duchy of

Bouillon in 1095 to the bishop of Liege. After the estate had been held for many years bv the bishopric, the houses of la Marck and La Tour d'Auvergne laid claims to Bouillon, but in 1641 relinquished their pretensions to the bishop of Liege for 150,000 Brabant guilders.

In the war of 1672 France conquered Bouillon, and Louis XIV gave it in 1678 to the Che¬

valier La Tour d'Auvergne, his chamberlain.

After this time it belonged to the house of La Tour until the Revolution, when it was

taken from them in 1792. The last possessor, Godfrey Charles Henri de la Tour d'Au¬

vergne, died December 1812. By the Peace of Paris, in 1814, the dukedom was included in that of Luxembourg, which had fallen to the King of the Netherlands. The title of Prince of Bouillon was assumed in 1792 by Philip

d'Auvergne, captain in the British navy, and he continued to bear it till his death in 1816.

The congress which met at Vienna in 1815

appointed commissioners to investigate the

comparative claims of this nobleman and

Prince Charles of Rohan. Thev decided in

favor ol the latter. By him it was sold to the Netherlands in 1821, and on the division of the kingdom at the revolution of 1830 it fell to Belgium. Consult Ozeray, (Histoire

de Bouillon) (Luxembourg 1827).

BOUILLY, boo-e-ye', Jean Nicolas,

French dramatist: b. Coudraye, 4 Jan. 1763; d. Paris, 14 April 1842.

He made his debut with the comic opera (Pierre le Grand) in 1790 for which Gretry wrrote the music. Dur¬

ing the Revolutionary Period he was judge

and prosecuting attorney at Tours, and then was called to Paris to assist in organizing the primary school system. He retired from pub¬

lic life in 1799. He was a man of ancient Roman virtue, and his character is reflected in all his works. His comedies and comic operas (music by the first masters) were eminently successful as well in Germany as in France, particularly, (L'abbe de 1'epeeP (Les deux

journeesP (Mme. de SevigneP He also wrote

(Conseils a ma fille > (1809) ; (Contes offerts aux enfants de France) (1824) ; (Les adieux du vieux conteur) (1835) ; and (Contes a ma fille > (1835).

BOULAINVILLIERS, boo-lati-ve-ya,

Henri de (Comte de), French historian: b.

Saint Saire, Normandy, 11 Oct. 1658; d. 23

Jan. 1722. He studied at the College of Juilli, entered the army, but shortly after became

devoted to historical and antiquarian pursuits.

He wrote a number of works in connection

with the history of France, but is perhaps best known by his (History of MohammedP

in which he writes in a very Oriental style, lauds the Prophet and seems almost disposed to become a believer in the Koran. He is said to have been much addicted to astrology. He wrote (Histoire de l'ancien gouvernement de

France) ; (Histoire des ArabesP *etc.*

BOULANGER, boo-lon-zha, Georges

Ernest Jean Marie, French soldier: b. Rennes, 29 April 1837 ; d. Brussels, 30 Sept. 1891. He went to Algeria in 1853, where his coolness under fire was very noticeable. In 1859 he was severely wounded at the battle of Turbigo, and was awarded the cross of the Legion of Honor. In the war with Prussia he distin¬

guished himself at both sieges of Paris. He was sent to the United States in 1881 as head of the French delegation sent to offer con¬

gratulations on the centenary of Yorktown.

As director of infantry (1882) he effected

some salutary reforms. Appointed a general

of division in Tunis in 1884, his resignation was precipitated by a conflict with the civil authority. In 1886 he became Minister of War in Freycinet's Cabinet, and the fact that a new man was in possession of that portfolio was speedily felt. He introduced many needful

reforms, insisted on the adoption of a repeat¬

ing rifle, caused important experiments to be made with high explosives, reduced the period of service in the army from five to three years and became the hope of the disaffected ele¬

ments and the promoters of the policy of la revanche. In the ministerial crisis of 1887 he lost his portfolio and was appointed to the command of the 13th army corps, but as he had become a menace to the republic, he was retired, 28 March 1888. In January 1889 he was elected deputy to the National Assembly by 81,000 majority, in consequence of which the Floquet ministry resigned. In August

1889 he was charged with embezzlement, trea¬

son and conspiracy, and found guilty by the Senate ; the elections in the 12 cantons were annulled, and he was sentenced to deportation.

He had been the tool of Royalists, Bonapartists and extreme radicals, the sinews of war for his propaganda being provided — as re¬

vealed in the Paris Figaro — by the Royalists.

He committed suicide by shooting himself on the grave of *Mme.* de Bonnemaine, his mis¬

tress.

BOULANGER, Gustave Clarence Rodolphe, French artist: b. Paris 1824: d. there 1888. A pupil of Jollivet and Delaroche, he won the Prix de Rome in 1849 and profited by the three years' course of study and travel in Italy. His art was devoted to classical and Oriental subjects, he won several medals and was elected a member of the Institute in 1882.

His best known work owing to its public dis¬

play is the series of 20 panel portraits of dancers decorating the foyer of the New

Opera, Paris. His paintings distinguished by excellent taste and imaginative power include (CcEsar at the Rubicon) (1865) ; (Promenade in the Street of Tombs, PompeiP (1869) ;

(Slave Market > (1888).

BOULANGER, Louis, French painter:

b. Verciel, Piedmont, 11 May 1806; d. Dijon, 5 March 1867. He studied under Guillon-Lethiere and Deverias ; became intimate with Victor Hugo and illustrated many of his

works; also taking subjects for many of his paintings from the poems of Hugo and Cha¬

teaubriand. Among his paintings are (Ma—

zeppaP (The Spanish Mule Drivers, > (The

Triumph of Petrarch) and (MacbethP

BOULAY DE LA MEURTHE, boo-la-e

de la mert, Antoine Jacques Claude Joseph

(Count), French lawyer and politician: b.

Chamousey, Lorraine, 19 Feb. 1761 ; d. Paris, 2 Feb. 1840. During the Revolution he served as a volunteer in the army, and as a judge on the bench, until the Reign of Terror, when he was outlawed. After the 9th Thermidor

he was appointed presiding judge of the Civil Court, and afterward held the office of at¬

torney-general at Nancy. He sat in the

Council of Five Hundred, was active in the coup d'etat of the 18th Fructidor and aided in the revolution of the 18th Brumaire. Being ap¬

pointed chairman of the legislative section in the Council of State, he took an active part in digesting the Code Civil. On the first restora¬

tion he kept aloof from public affairs; during the Hundred Days he was again a minister of state; on the abdication of Napoleon I he

caused the latter's son to be proclaimed as Napoleon II, and was appointed Minister of

Justice by the commission of government. He was, of course, outlawed by the returning

king, and for four and a half years was an exile. In 1819 he was permitted to return to France.

BOULAY DE LA MEURTHE, Henri

George, Count, son of the preceding,

French statesman: b. Nancy, 15 July 1797 ; d.

1858. He took an active part in the revolution of 1830. In 1837 he was elected to the Cham¬

ber of Deputies. In 1843 he voted for the repeal of the decree of banishment against, the Bonaparte family. In February 1848 he sided

with the moderate Republicans, was elected to the Constituent Assembly, and there again

supported the motion for the return of the Bonaparte family. When Louis Napoleon was

elected President the name of Boulay de la Meurthe was placed by him at the head of

the list of candidates for the vice-presidency; and the assembly almost unanimously chose

him. After the coup d'etat of 1851 he was made a member of the Senate.

BOULDER, Col., city and county-seat of

Boulder County, situated on Boulder _ Creek, and on the Union Pacific and other railroads, 30 miles north of Denver. It was settled in 1858 and received a city charter in 1871 ; is the seat of the State University; and has three national banks, a Carnegie library, a business college, daily and weekly periodicals, and a property valuation of over $1,000,000. The

famous Boulder Canon is an object of wide

interest to the tourist. Boulder is noted as a summer and health resort, medicinal springs

being near, and a sanatorium in the city. _ It is an agricultural stock raising and mining region, and has flour mills, sampling works, lumber mills, cutlery and food product fac¬

tories, and manufactories of clay and kaolin products. A large number of oil wells have been drilled within a radius of two miles of the city. The government is vested in a

mayor, chosen for two years, and a city

council. The waterworks are the property of the city. Pop. 10,000.

BOULDER, a rounded water-worn stone

of some size; in geology, applied to ice-worn and partially smoothed blocks of large size lying on the surface of the soil, or embedded in clays and gravels, generally differing in composition from the rocks in their vicinity, a fact which proves that they must have been transported from a distance, probably by ice.

When lying on the surface they are known as (<erratic blocks.®

BOULDER CLAY. See Till.

BOULEVARD, bool-var (O. Fr. boule—

vart, a wTord derived from the German boll-werk , the same as the English ˆbulwark®).

The word was formerly applied to the ram¬

parts of a fortified town, but when these were leveled, and the ditches belonging to them

filled up, and the whole planted with trees and laid out as promenades, the name (<boulevard®

was still retained, and thus came to have its present signification. The most famous boule¬

vards are those of Paris, especially those

which, in the time of Louis XIV, took the place of the fortifications on the northern side of the city, and became first a promenade and then a street. Modern usage has applied the word to many streets which were not orig¬

inally ramparts, but which have been cut

through the older and denser parts of the

town, or have been laid out in the new

quarters. All that the more modern boule¬

vards have in common with the older ones in that they are broad and are planted with trees.

The modern boulevards are for the most part situated at some distance from the bustle of the town, and are therefore less frequented than the older ones, which are in the very heart of the city, and in the neighborhood of the chief resorts of amusement and pleasure.

In the United States the name is applied to wide avenues planted with shade-trees, and

with more or less ornament in the way of

statuary, flower-beds, lawns, *etc.* The Thames Embankment, in London, though not usually

called a boulevard, is of this order. See City Planning; Paris.

BOULGER, Demetrius Charles, English

writer: b. 14 July 1853. He is an authority on military topics and with Sir Lepel Griffin founded the Asiatic Quarterly Review in 1885

and edited it for nearly five years. He has published (England and Russia in Central

Asia* ; (Central Asian Portraits) ; (The His¬

tory of China> ; (Central Asian Questions) ; (Life of Sir Stamford Raffles> (1897) ; (Thc Congo State> (1898) ; (India in the 19th

Century* (1901); (Life of Sir Halliday

Macartney) (1908) ; (Holland of the Dutch)

(1913); England's Arch-Enemy1* (1914); and

five books on Belgium and the Belgians.

BOULGER, George Simonds, English

botanist : b. Blechingley, Surrey, 5 March 1853.

He has been professor of botany and geology at City of London College from 1884 and has published (Familiar Trees* (1886-89) ; (The

Uses of Plants* (1889) ; (Biographical Index of British and Irish Botanists,* with Britten (1893) ; (The Country, Month by Month,*

with Owen (1894-95) ; (Elementary Geology*

(1896); *Flowers of the Field* (1900);

(Wood* (1902) ; (Botany* (1912) ; (Plant

Geography* (1912) ; (British Flowering

Plants* with Mrs. Henry Perrin (4 vols.,

1914).

BOULOGNE-SUR-MER, boo-lon stir

mar, France, a fortified seaport of northern France, 22 miles southwest of Calais, at the mouth and on the right bank of the river

Liane, with the suburb of Capecure on the

left. The town proper consists of an upper and lower town. The former is surrounded

with old and well-planted ramparts, now

fashionable boulevards ; the latter, which is the business section, has straight and well-built streets and is semi-English in character, many of the signboards being in English, the shops having an English air, and much English being spoken. The church of Notre Dame (begun

in 1827, consecrated in 1866) has a magnifi¬

cent high altar, and a crypt, part of which dates from the 12th

century. Among the

churches, some of which are handsome edifices, there are several for the English population.

The castle, which dates from 1231, is a mas¬

sive structure, communicating with the upper town by a bridge. Here Louis Napoleon was

imprisoned in 1840 after his attempted resur¬

rection. Other noteworthy buildings are the

Hotel de Ville, the Palais de Justice, the large and handsome bathing establishment, the ex¬

clusive public library, the museum of natural history and antiquities, *etc.* Boulogne carries on various industries, is one of the chief French seaports and is a great fishing centre.

There is a large passenger traffic between

Boulogne and Folkestone. Boulogne still ex¬

hibits some Roman remains. The Northmen

took it in 882 and massacred the inhabitants.

In 1544 the town was taken by Henry VIII

of England after a siege of six weeks. The English retained it till 1550, when Edward VI

sold it to France for 400,000 crowns. The

Emperor Charles V demolished it in 1553.

During the first republic Boulogne received

the name of Port de l'Union. Bonaparte, with a view to the invasion of England, ordered the harbor to be made deeper, and a number of vessels to be built in order to transport his army. A large army was encamped here for

many months waiting to embark ; but upon

the breaking out of hostilities with Austria in 1805 they were called elsewhere. Pop. 53,128.

BOULOGNE-SUR-SEINE, san, France,

town in the department of the Seine, south¬

west of Paris, of which it is a suburb. Saint-Cloud is on the opposite bank of the Seine and is connected with it by a stone bridge. It contains linen bleacheries and manufactures

perfumes. The famed amusement and play¬

ground centre of Paris, the Bois de Boulogne, is named after Boulogne-sur-Seine. The

place was formerly known as Menus-les—

Saint-Cloud. Pop. 57,027.

BOULTON, Charles Arkoll, Canadian

soldier and statesman : b. Cobourg 1841 ; d.

1899. He entered the British army in 1858

and served for 10 years. During the first

Manitoba insurrection in 1870 he fought

against the rebels and was captured and con¬

demned to death ; when the second rebellion broke out in 1885 he commanded a corps

organized by himself and known as Boulton's Scouts. He became a member of the Canadian Senate in 1889. He wrote (Reminiscences of the Northwest Rebellion. >

BOULTON, Matthew, English engineer :

b. Birmingham, 3 Sept. 1728; d. Soho, 18

Aug. 1809. After being educated at a gram¬

mar school he was instructed in drawing by Worlidge, and he also studied mathematics.

He engaged in business as a manufacturer of hardware, and as early as 1745 he is said to have invented and brought to great perfection inlaid steel buckles, buttons, watch-chains,

etc., of which large quantities were exported to France, whence they were repurchased with avidity by the British as <(the offspring of French ingenuity.® In 1762 Boulton, finding

his manufactory at Birmingham too confined

for his purposes, purchased a lease of the Soho, about two miles distant, in the county of Stafford. This spot, then a barren heath, was gradually converted into an extensive

manufactory and school of the mechanical

arts, where ingenious men found ample em¬

ployment for their talents from the liberal patronage of the proprietor. The completion

of the steam-engine, at Soho, led to a con¬

nection between Boulton and James Watt, of

Glasgow, who became partners in trade in

1769. The introduction of the steam engine

at that time was entirely due to the enterprise of Boulton, who almost reduced himself to

bankruptcy during the 15 years of strenuous devotion before the machine became a com¬

mercial success. (See Watt, James). Con¬

sult Smiles' (Lives of Boulton and WatC

(London 1865).

BOUNCING BET, or OLD MAID'S

PINK, an oldtime garden flower common as

a weed. See Soap-plants.

BOUND BROOK, N. J., borough of

Somerset County, situated on the Raritan

River and on the Baltimore & O., and Central N. J., the Lehigh Valley and the Philadelphia & Reading railroads. It has a large lumber trade, and manufactures woolen goods, electric dynamos, paint, roofing-paper, motion-picture

films, asbestos products, stove polish, *etc.*

During the Revolutionary War it was the

scene of a surprise of the American troops by Cornwallis. The Americans, being largely

outnumbered, were forced to retreat after a short battle. There is a public library. Bound Brook was first settled in 1700, but was not incorporated until 1892. It is governed by a mayor, chosen for two years, and a council.

Pop. (1920) 5,906.

BOUNDARIES OF THE UNITED

STATES, Exterior and Interior, and Dis¬

putes Regarding. As laid down by the

United States Supreme Court in the insular

decisions of 1901 (see Insular Cases), the

term United States has three applications, (1) to the combined area of

the States of the Union ; (2) to the combined area of the States and the Territories which Congress has incor¬

porated into the Union; and (3) to the com¬

bined area of the States, Territories and de¬

pendencies. Hence, under the last interpreta¬

tion, the United States includes not only the continental States in the middle of North

America, but also Alaska, the Canal Zone and the islands in the Atlantic and Pacific oceans.

Sea Boundaries. — International law gen¬

erally concedes that a country's jurisdiction extends out to sea three nautical miles from low-water mark and this applies also to that

country's dependencies. (See International

Law; High Seas; Mare Clausum). There

may be some exceptions to this rule, however, as in the case of a bay more than six miles wide. Thus the waters of Delaware and Chesa¬

peake bays, as first clearly stated in 1793 and never since disputed, are included in the juris¬

diction of this country, though their mouths are more than six miles wide. Long Island

Sound is nowhere more than three miles wide between islands and therefore United States

jurisdiction over it has not been disputed.

Until 1893 the United States claimed that the eastern part of Bering Sea was a closed sea under the boundary limits described in the

Russian treaty of 1867, and therefore that

foreign vessels might be seized either within or without the three-mile limit. But the arbi¬

tration tribunal in its decision of 15 Aug. 1893

ruled against the United States. See Bering Sea Controversy.

Lake and River Boundaries. — Lakes

wholly enclosed by the territory of the United States come entirely within its jurisdiction, but lakes and rivers constituting a part of the boundary line between the United States and foreign countries come under the joint juris¬

diction of both parties, and the entire breadth of the dividing waters is available for naviga¬

tion by the citizens or subjects of both powers.

Citizens of the United States have the right to use the Saint Lawrence below the boundary

and its canals substantially on the same terms as Canadians. On 4 Sept. 1890, Congress passed an act under the terms of which the Federal courts have criminal jurisdiction over the Great Lakes and connecting waters as far as the mid¬

dle boundary line, and the States mav legis-330

late regarding the fisheries within these limits.

Most of these river and lake boundaries have been laid down by a series of conventions and findings of commissioners appointed to deter¬

mine such matters. Thus Isle Royale in Lake Superior belongs to the United States and

Point-au-Pelee Island in Lake Erie belongs to Canada, but in the main the dividing line is in the middle of the Saint Lawrence River and the Great Lakes. A similar division has been made of the islands lying in the Rio Grande River and in that part of the Colorado River which

forms .the international boundary. On 9

Dec. 1850, an agreement was reached by the American Minister at London and the British Foreign Secretary to readjust the Canadian

water boundary, the rocky area at the entrance of Niagara River, known as Horseshoe Reef,

being ceded to the United States as a site for a lighthouse.

Island Boundaries. — The United States

possesses numerous islands, large and small, in both the Atlantic and Pacific oceans (see the general descriptive article United States), and the exterior boundaries of all extend three nautical miles out to sea from low-water mark.

The ownership of the San Juan Islands in

Puget Sound was in dispute for 25 years, but in 1872 the Emperor of Germany, as arbitrator, awarded the group to the United States. Asso¬

ciated with this controversy were the claim of the United States that the line of the 49th parallel in Puget Sound terminated half way between Point Roberts on the west side of

Boundary Bay and the western coast and the British claim that the line terminated half way between the point where it first struck tide water and the British coast on the west. The contention of the United States was upheld.

The Philippine Islands were taken from Spain after the war of 1898. In the treaty of peace terminating the war all islands within a series of geographical lines described by the treaty were transferred to the United States, but this did not confer jurisdiction outside the three-mile limit. Later a small group of islands to the south was found to be cut off by this line and in 1901 Spain ceded any of the Philippine group lying outside the prescribed geographical lines, particularly Cagayan, Sulu and Sibutu.

Tutuila, one of the Samoan Islands, was an¬

nexed in 1899 ; by the treaty of 2 Dec. 1899

with Great Britain and Germany the 171st me¬

ridian west of Greenwich was constituted the dividing line between the territory of the United States on the eastward and of Great Britain and Germany on the westward, but this treaty did not extend jurisdiction beyond the three-mile limit.

Panama Canal Zone. — Under Article II

of the treaty of 18 Nov. 1903, Panama granted to the United States ((in perpetuity the use, oc¬

cupation and control of a zone of land and land under water … extending to the distance of five miles on each side of the centre line of the route of the canal® and three marine miles out to sea from mean low-water mark at each end, not including the cities and harbors of Panama and Colon ; but other lands outside the zone necessary for canal purposes are to be used, occupied and controlled in perpetuity. Panama also granted <(in perpetuity the use, occupation and control of all islands within the limits of the zone above described, and in addition

thereto the group of small islands in the Bay of Panama named Perico, Nacs, Culebra and

Flamingo.® See Canals.

Alaska Land Boundary. — On 28 Feb.

1825, Russia and Great Britain concluded a

treaty which described the boundary of Alaska from the Arctic Ocean to the Pacific Ocean, and when Russia sold Alaska to the United

States 30 March 1867, the treaty of cession quoted the boundaries as given in the Anglo-Russian treaty. This treaty practically ex¬

cluded the British from possession of an un¬

broken strip of coast lands and waters of

Alaska from Mount Saint Elias to Portland

Canal. Comparatively little was heard of the boundary line until the discovery of gold in the Klondike. As given in the treaty the line was

the 141st degree west from Greenwich as far south as a mythical mountain range along which the line ran parallel with the coast to the south¬

ern point of Prince of Wales Island, or about 50° 40'. Under the conventions of 22 July

1892, 3 Feb. 1894 and 20 Oct. 1899, commission¬

ers were appointed to determine the line but they could not agree, and finally terminated negotiations. In 1898 Canada claimed the ports of Dyea and Skagway on Lynn Canal under the novel plea that a line defined as running 10

leagues parallel with the sinuosities of the coast or heads of tide-water inlets should run parallel to the coast itself. Canada contended that the eastern line left the heads of several inlets within Canadian territory, whereupon a controversy arose which was adjusted 29 Oct.

1899, when the United States fixed a provisional line about the head of Lynn Canal, thus giving Canada temporary possession of the places

claimed to be within American jurisdiction. In July 1900, this was marked by a joint survey.

On 20 Oct. 1903, the Alaska Boundary Commis¬

sion rendered a decision which practically sus¬

tained the American claim, but the British

contention with regard to Portland Canal was upheld and the small Wales and Pearse Islands at its head were awarded to Canada. On 21

April 1906, a convention was signed providing for a commission to run the meridian line on the 141st degree west. See Alaska Boundary

Commission.

Boundaries of the Original Possessions.

— The date on which the United States may properly be said first to have had national boundaries is 4 July 1776, when the 13 original

colonies declared their independence of Great Britain and formed a union. When this act

was consummated the area of the colonies ex¬

tended along the seacoast from the eastern

boundary of Maine (then part of Massa¬

chusetts) to the southern boundary of Georgia; and thence inland so far as these communities extended. Under the proclamation line of 1763

the divide of the Appalachians was supposed to constitute the western limits, but the United States contended that the Mississippi River

rightfully was the western boundary, this claim being recognized in the Treaty of Paris (1783) terminating the Revolution which defined the boundaries as follows :

The following are and shall be their boundaries, viz., . e noi*thwest angle of Nova Scotia, viz , that angle which is formed by . a line drawn due north from the source of the St. Croix River to the high lands which divide those rivers that empty themselves into the River St. Law-BOUNDARIES OF THE UNITED STATES

rence, from those which fall into the Atlantic Ocean to the northwesternmost head of Connecticut River; thence drawn along the middle of that river to the forty-fifth degree of north latitude; from thence by a line due west on said latitude, until it strikes the River Iroquois or Cataraguy; thence along the middle of said river into Lake Ontario; through the middle of said lake, until it strikes the communication by water between that lake and Lake Erie; thence along the middle of said communication into Lake Erie; through the middle of said lake until it arrives at the water communication between that lake and Lake Huron; thence through the middle of said lake, to the water communication between that lake and Lake Superior; thence through Lake Superior northward to the isles Royal

and Philipeaux to the Long Lake; thence through the middle of said Long Lake, and the water communication between it and the Lake of the Woods, to the said Lake of the Woods; thence through the said lake to the northwesternmost point thereof, and from thence a due west course to the River Mississippi; thence by a line to be drawn along the middle of the said River Mississippi, until it shall intersect the northernmost part of the thirty-first degree of north latitude; south, by a line to be drawn due east from the determination of the line last mentioned, in the latitude of thirty-one degrees north of the equator, to the middle of the River Apalachicola or Catahouchee; thence along the middle thereof, to its junction with the Flint River; thence straight to the head of St. Mary's River and thence down the middle of St. Mary's River to the Atlantic Ocean; east, by a line to be drawn along the middle of the St. Croix from its mouth in the Bay of Fundy to its source, and from its source directly north to the aforesaid highlands, which divide the rivers that fall into the Atlantic Ocean from those which fall into the River St. Lawrence, comprehending all islands within twenty leagues of any part of the shores of the United States, and lying between lines to be drawn due east from the points where the aforesaid boundaries between Nova Scotia on the one part, and East Florida on the other, shall respectively touch the Bay of Fundy and the Atlantic Ocean, excepting such islands as now are or heretofore have been within the limits of the said province of Nova Scotia."

Northeastern Boundary. — The north¬

eastern boundary controversy lasted 59 years (1783-1842). The chief cause of trouble was the looseness with which the boundary was de¬

scribed. Under the Jay treaty concluded in

1794 a joint commission was appointed to

settle the first part of the boundary on the northeast, the most vexatious question being the identity of the Saint Croix River. On 25

Oct. 1798, the river was identified and a monu¬

ment placed at its source but the exact location of the <(northwest point of Nova Scotia® could not be agreed upon nor the situation of the (<high lands® mentioned in the treaty. After several years of

wrangling Rufus King con¬

cluded the convention of 1803, under which a joint commission was appointed to ascertain the northwest angle of Nova Scotia, to run a line from the monument at the source of the Saint Croix to this northwest angle ; also to deter¬

mine the northwesternmost head of the Con¬

necticut River, and to run a line from it to the corner of Nova Scotia. Unfortunately, how¬

ever, Jefferson's purchase of Louisiana in 1803

complicated matters and the commissioners ac¬

complished nothing. Article V of the treaty of Ghent (q.v.), concluded in 1814, provided for the appointment of two commissioners to settle the dispute, and in 1817 the work of sur¬

veying began. The surveyors traced a meridian from the source of the Saint Croix to a high elevation at Mars Hill, thence into the valley of the Saint John River, then to the summit of a ridge parting the waters flowing into the Saint John and those reaching the Restigouche, and 143 miles from the point of beginning met a ridge on the northern slope of which are the headwaters of the river Metis which enters the Saint Lawrence. The Americans claimed that

the. point at which the meridian crossed the crest of this ridge was the northwest angle of Nova Scotia, but the British agent contended that this ridge was a mere watershed and could not be accepted as the highlands designated in the treaty. As they could not agree on any of the disputed points the surveyors adjourned in November 1821, after presenting their diver¬

gent reports.

Seven years later the dispute was referred

to the King of the Netherlands as arbitrator.

In his decision of 10 Jan. 1831, he drew a line due north from the source of the Saint Croix to the middle of the Saint John, up that river and the Saint Francis to the source of its most southwesternmost

branch, and then cut

the disputed territory in half, awarding the northern part to Great Britain and the

southern to the United States. This award

aroused great indignation in Maine, whose

legislature on 28 Feb. 1831 refused to submit to the decision. Massachusetts too was an

interested party, and on 15 Feb. 1832, her legislature resolved that any act purporting to deprive a State of any territory was null and void and not obligatory upon the government or people of the State. Meanwhile Great

Britain agreed, if necessary, to modify the line in any manner agreeable to the two gov¬

ernments. For many months propositions

were bandied back and forth without any ap¬

preciable result and finally the Massachusetts legislature called upon the President to hasten the settlement. Shortly afterward Congress

appropriated $20,000 to survey and mark a line due north from the source of the Saint Croix River.

At this stage of the controversy the nego¬

tiations were almost upset by the so-called Aroostook War. The Aroostook country was

in the most northerly part of Maine and along the Aroostook River Great Britain had no

jurisdiction. Every year land agents of

Maine and Massachusetts would sell timber

in this region, grant permits to cut down trees and expel trespassers. In 1838, however, the trespassers refused to depart and a force of 150 men under a land agent, Rufus McIntyre, was sent to the mouth of the

Aroostook where 300 armed trespassers were found prepared to resist, but they retreated toward New Bruns¬

wick and later McIntyre was arrested. On

13 Feb. 1839, Lieut. -Gov. John Harvey of New Brunswick denounced the presence of the

Maine troops as an invasion of British terri¬

tory, demanded their removal and ordered the militia to be ready for action. Gov. John

Fairfield of Maine refused, and instead hurried reinforcements to the scene of conflict, the legislature appropriating $800,000 for the

military defense of the State. Congress up¬

held Maine by authorizing the enlistment of 50,000 volunteers to repel invasion and ap¬

propriating $10,000,000 for that purpose. But on 27 Feb. 1839, Secretary of State Forsyth and the British Minister, H. S. Fox, agreed to arbitrate the dispute, and Gen. Winfield Scott was ordered to Augusta. On his arrival he

proposed to Harvey that, if he would not at¬

tempt the military occupation of the disputed territory or seek to expel the Maine troops, Fairfield would not disturb New Brunswick in her possession of the settlements on the

Madawaska River or seek to dislodge the

British by force of arms. Both governors

assented to this proposition, the troops were sent home and war was averted. This

hastened the final adjustment.

In the spring of 1842 Lord Ashburton was

sent to negotiate, but before his arrival Sec¬

retary Webster obtained Maine's consent to a conventional line in return for certain con¬

cessions. Webster had been placed in posses¬

sion of a letter written by Benjamin Franklin to Vergennes 6 Dec. 1782, and a map on which Franklin had marked (<with a strong red line the limits of the United States as settled by the preliminaries between the British and the American plenipotentiaries.® As regards the

Maine boundary the line almost exactly con¬

formed to the British contentions, and if the map were authentic, Maine's claim was ground¬

less. Accordingly Webster used this to compel Maine to modify her demands and to accept a conventional line, but in the subsequent nego¬

tiations with Ashburton he kept secret the

existence of such a map. On 9 Aug. 1842, the Webster-Ashburton treaty was signed; as a

result of which Maine was forced to accept 893 square miles less territory than the King of the Netherlands had awarded her. As

stated in the treaty this line was exceedingly complex but in brief was as follows: From

the monument at the source of the Saint

Croix the line runs north to the Saint John River, up the middle of this river to the mouth of the Saint Francis, and up the middle of this river and of the lakes through which it flows to the outlet of Lake Pohenagamook ; thence southwesterly in a straight line to a certain point on the northwest branch of the Saint John River, from that point in an irregular line to the southwest branch of the same river, and

along this branch to the neighboring high¬

lands which form the watershed; thence along these highlands to the head of Hall's Stream, and down this stream to the 45th degr'ee of north latitude, which was understood to be the line of actual division between Canada and the States of New York and Vermont; and

thence along said dividing line to the Saint Lawrence. This line has remained the north¬

eastern boundary to the present time. On 18

June 1822 the line from the intersection of the Saint Lawrence and the 45th parallel west¬

ward to the Neebish Rapids was laid down by a commission. Up to 1827 agreements were

made regarding portions of the line from Saint Mary's River to the Lake of the Woods and under the treaty of 9 Aug. 1842 the northern boundary line was finally settled as follows.

See Canada — Diplomatic Relations of the

United States With.

The Northern Boundary. — By the treaty

of 1783 the northern boundary was defined as a line due west from the northwestern point of the Lake of the Woods to the Mississippi. To draw such a line was almost impossible, since the Mississippi did not rise sufficiently far northward and a joint survey was agreed upon but never made. In 1803, when Rufus King

concluded his convention, the boundary was

defined as the shortest line from the north¬

west corner of the Lake of the Woods to the Mississippi. Fortunately this convention was

never ratified and the Louisiana purchase com¬

plicated the question. Various propositions

were made but nothing was done, nor could

commissioners appointed under the treaty of

Ghent reach an agreement. The chief causes

of disagreement were the question of the

ownership of Saint George's Island, lying in the water communication between Lake Huron

and Lake Superior, and the question of a

proper boundary through the water communi¬

cation from Lake Superior to the Lake of the Woods. Accordingly in 1818, when discussing

a new commercial treaty to supersede the

convention of 1815, Richard Rush and Albert Gallatin proposed that the northern boundary be a line due north or south from the most northwestern point of the Lake of the Woods to the 49th parallel and thence due west to the Pacific. Great Britain was willing to ac¬

cept this boundary as far as the Rockies blit-insisted on a joint occupation of the territory west of them lying between the 45th and 49th parallels. The matter was compromised on

20 Oct. 1818, by the acceptance of the line suggested by the Americans as far as the

Rockies, west of which the country claimed

or possessed by either was to be occupied

jointly for 10 years. All these points were finally settled in the Webster-Ashburton treaty of 1842, Article II of that treaty stipulating that

"from the place where the joint commissioners terminated their labors under the sixth article of the treaty of Ghent, to wit, at a point in the Neebish Channel, near Muddy Lake, the line shall run into and along the ship-channel between St. Joseph and St. Tammany Islands, to the division of the channel at or near the head of St. Joseph's Island;

thence, turning eastwardly and northwardly around the lower end of St. George's or Sugar Island, and following the middle of the channel which divides St. George's from St. Joseph's Island; thence up the east Neebish Channel, nearest to St.

George's Island, through the middle of Lake George; thence, west of Jonas' Island, into St. Mary's River, to a point in the middle of that river, about one mile above St. George's or Sugar Island, so as to appropriate and assign the said island to the United States; thence, adopting the line traced on the maps by the commissioners through the river St. Mary and Lake Superior, to a point north of He Royale, in said lake, one hundred yards to the north and east of lie Chapeau, which last-mentioned island lies near the northeastern point of lie Royale, where the line marked by the commissioners terminates; and from the last-mentioned point, southwesterly, through the middle of the sound between lie Royale and the northwestern mainland, to the mouth of Pigeon River, and up the said river, to and through the north and south Fowl Lakes, to the lakes of the height of land between Lake Superior and the Lake of the Woods; thence along the water commu¬

nication to Lake Saisaginaga and through that lake; thence, to and through Cypress Lake, Lac du Bois Blanc, Lac la Croix, Little Vermilion Lake and Lake Mamecan and through the several smaller lakes, straits, or streams, con¬

necting the lakes here mentioned, to that point in Lac la Pluie, or Rainy Lake, at the Chaudiere Falls, from which the commissioners traced the line to the most northwestern point of the Lake of the Woods; thence, along the said line to the said most northwestern point, being in latitude 49° 23′ 55″

north and in longitude 95° 14' 38" west from the observatory at Greenwich; thence, according to existing treaties, due south to its intersection with the 49th parallel of north latitude and along that parallel to the Rocky Mountains."

Hence this line, like the previous ones, was a compromise, the United States gaining the valley of the Red River of the North but sac¬

rificing to Great Britain that portion of the Louisiana Purchase which was watered by the head streams of the Missouri.

The Northwestern Boundary. — West of

the Rocky Mountains was the so-called Oregon region. The United States based its claim to this territory on the discovery (11 May 1792) and exploration of the Columbia River by

Capt. Robert Gray, the exploring expedition

of Meriwether Lewis and William Clark in

1804-06, the establishment of the first trading settlement at Astoria in 1811 (see Astor,

John Jacob), and the first permanent agricul¬

tural settlements soon after 1830, all of which claims were disputed by Spain, Russia and

Great Britain. On 20 Oct. 1818, a treaty was concluded (renewed 6 Aug. 1827) providing

for the joint occupancy of the territory for 10 years. Under the treaty of 22 Feb. 1819, for the purchase of Florida, Spain conveyed to the United States all her rights, claims and pretensions to the territory north of the 42d parallel and west of the Rocky Mountains.

The treaty of 1803 for the purchase of Louisi¬

ana was regarded as one of the strongest

claims and was persistently urged by our

diplomatists who held that under the principle of “continuity of territory® Oregon was in¬

cluded in the Louisiana purchase and that the French had so regarded it. But in 1829 M.

Barbe Marbois, who negotiated the Louisiana

treaty, declared that while, according to

ancient documents, the bishopric of Louisiana was to extend to the Pacific Ocean, these

limits at best were merely a matter of hope and expectation and their spiritual jurisdiction was not concerned with the question of

dominion or ownership. Most writers agree

that the purchase of Louisiana gave the

United States no clear title to the Oregon country. The British based their claims on

Drake's visit to the coast in 1580, the ex¬

plorations by Capt. James Cook in 1778, the fact that the coast had been made a trading place jointly with Spain by a convention in 1790, and the surveys of the coast and adjacent islands by Captain Vancouver in 1792 to 1794.

Great Britain also denied Spain's claim to the territory on the ground that the latter could not hold the territory by force and thus make good her claim. By the treaty of 17 April 1824 Russia had relinquished her American

claims south of 54° 40' north latitude and as Spain had conveyed her claims north of the 42d parallel the .strip between the two con¬

stituted the territory in dispute. The United States was willing to continue the boundary along the 49th parallel from the Rockies to the Pacific, but Great Britain objected because the United States thus would possess the

lower end of Vancouver Island and the im¬

portant straits of San Juan de Fuca to the south of the island. Finally, by the treaty of 15 June 1846, both nations accepted the 49th parallel as the boundary from the Rockies to Puget Sound and thence a conventional line

through Puget Sound and the Straits of San Juan de Fuca to the ocean. The first part of the line was easy to survey and mark, and the maps and surveys of this part were approved by a joint declaration dated 24

Feb. 1870, but a dispute arose over the line from Puget

Sound to the sea. In the first place there was a question whether the line of the 49th parallel terminated where it first reached tide water on the eastern side of Boundary Bay or

crossed the bay and Point Roberts to the

open sound. Until this was decided the sur¬

veyors could not determine the middle of the channel separating Vancouver Island from the continent ; and upon the determination of that middle line depended the solution of the ques¬

tion as to what constituted the middle of the channel down to the Straits of Fuca, the

settlement of which would determine the

ownership of the San Juan Islands. Finally, by the treaty of Washington, 8 May 1871, the matter was referred to the Emperor of Ger¬

many, who on 21 Oct. 1872 decided in favor of the United States. Thus the northwestern dispute was terminated and the entire northern boundary was complete. See Oregon Ques¬

tion ; San Juan Question.

The Southern and Southwestern Bound¬

aries. — The preliminaries of peace to ter¬

minate the French and Indian War (signed at Fontainebleau 3 Nov. 1762 and ratified 10

Feb. 1763) divided French possessions in the United States into two parts. The dividing

line was the Mississippi from its source to the Iberville, thence through lakes Maurepas and Pontchartrain to the sea. All east of this line was given to England and all west to Spain. Thus, so far as it included the ter¬

ritory west of the Mississippi and the Island of Orleans, Louisiana was

ceded to Spain by France in 1763. At the same time France

acknowledged Great Britain as the lawful

possessor of Louisiana east of the Mississippi with the exception of the Island of Orleans.

Out of this territory Great Britain formed two provinces. A line was run from the junction of the Mississippi and Yazoo rivers due east to the Appalachicola and down that river to the Gulf ; all of the country east of the Ap¬

palachicola (including the present State of

Florida) was called East Florida ; West

Florida consisted of all of Spanish Florida west of the Appalachicola and of Louisiana

east of lakes Maurepas and Pontchartrain and south of the 31st degree of north latitude.

This was the situation when peace negotiations were undertaken to terminate the Revolution¬

ary War. The second article of the treaty

of peace stated that the boundary should start on the south at a line drawn along the middle of the Mississippi until it intersected the northernmost part of the 31st degree north

latitude ; thence <(to the middle of the river Apalachicola or Catahouche ; thence along the middle thereof, to its junction with the Flint River; thence straight to the head of Saint Mary's River, and thence down the middle of Saint Mary's River, to the Atlantic Ocean.®

South of this line lay Florida, coveted by Great Britain, wherefore a secret article was inserted in the treaty of peace providing that, should she be in possession of West Florida at the end of the war, the southern boundary of the United States should be a line running due east from the confluence of the Yazoo (or Yassous) and the Mississippi to the Appalachi¬

cola. Thus the boundary would be 32° 30'

instead of 31°. But as the British were unable to dispossess the Spanish from West Florida, the 31st parallel remained as the boundary.

News of this secret article stimulated Spanish ill-feeling toward the United States, and on 25 June 1784, Spain announced that the free navigation of the Mississippi would be dis¬

continued until the limits of Louisiana and the two Floridas had been determined. Nego¬

tiations in 1785 and 1792 accomplished nothing, but finally on 27 Oct. 1795, Thomas Pinckney concluded the liberal treaty of San Lorenzo el Real, which recognized the 31st degree as the southern boundary of the United States.

On 1 Oct. 1800, the treaty of San Ildefonso was signed between France and Spain by

which Louisiana was retroceded to France.

This treaty was very ambiguous in its descrip¬

tion of the territory ceded, merely giving to France “the colony or province of Louisiana with the same extent it now has in the hands of Spain and that it had when France pos-334

sessed it and such as it should be after the treaties subsequently entered into between

Spain and other States.® Here no definite

boundaries are given and the same obscurity obtains in the Louisiana purchase treaty of 30 April 1803, which ceded Uhe said territory, with all its rights and appurtenances, as fully and in the same manner as they have been

acquired by the French Republic, in virtue of the above-mentioned treaty, concluded with

His Catholic Majesty,® thereby leaving the

boundaries still to be determined. See

Louisiana Purchase, The; United States —

Territorial Expansion; United States —

The Louisiana Purchase; United States —

The Westward Movement; Annexation.

Louisiana having been purchased, Jefferson

set about obtaining West Florida. Though the territory embraced therein had nothing to do with the Louisiana cession to France, Jeffer¬

son argued that as Spain owned West Florida which was once a part of Louisiana, and as Spain had ceded Louisiana to France, West

Florida was included in the cession, and there¬

fore* as Louisiana had been purchased from

Napoleon, West Florida now belonged to the

United States. On 24 Feb. 1804, a bill, known as the Mobile Bill, became law, nominally

giving effect to the laws of the United States within the ceded territory. One section em¬

powered the President (<to erect the shores, waters and inlets of the bay and river of Mobile and of the other rivers, creeks, inlets and bays entering in the Gulf of Mexico, east of the said River Mobile and west thereof to the Pascagoula, inclusive, in a separate dis¬

trict.® This angered the Spanish Minister, and accordingly, 20 May 1804, Jefferson issued a proclamation the effect of which was to

destroy the force of the Act. In 1804 there-

■ fore Monroe was sent to Madrid to persuade Spain to acknowledge the Perdido as the

eastern boundary of Louisiana, to endeavor to buy the Spanish possessions east of the

Perdido for $2,000,000 and to insist upon the right of the United States to Texas, but after months of fruitless negotiations he returned 26 May 1806, and nothing was done for some years.

In the summer of 1810 the American set—

lers in West Florida revolted against Spain, established an independent government and

requested to be annexed to the United States.

On 27 Oct. 1810, President Madison issued a proclamation stating that he <(deemed it right and requisite that possession should be taken of the said territory in the name and behalf of the United States,® and sent William C. C.

Claiborne to take possession. Congress passed a bill (signed 15 Jan. 1811) authorizing the President to take and hold East Florida also, if the local authorities were willing or if a foreign power should attempt to occupy it.

Thus the United States claimed all the ter¬

ritory from the Mississippi to the Perdido, though her authority did not extend to Mobile and she was not even ready to enforce author¬

ity to the Pearl. On 20 Feb. 1811 a bill was signed by the President authorizing the Ter¬

ritory of Orleans to form a constitution and apply for admission as a State. The con¬

stitution was framed and the act to admit

Louisiana was passed 8 April 1812. The

eastern States objected, whereupon Congress

(14 April 1812) passed an act enlarging the State. Acting on the principle that West

Florida, which had been seized because it was a part of Louisiana, should be treated as con¬

quered territory, Congress divided the district into two halves at the Pearl River and annexed the western half to Louisiana. The eastern

portion was incorporated in the Mississippi

Territory by an act approved 14 May 1812.

Soon a revolution was organized and the city of Fernandina was seized and occupied, but

though Spain protested she was too weak to do more and as the War of 1812 occupied the

attention of the United States, the matter

rested in abeyance for a long time, the situa¬

tion being further complicated by Jackson's

capture of Pensacola in 1814 and 1818, the Amelia Island imbroglio, the Seminole War,

and the Arbuthnot-Ambrister affair. Finally

on 22 Feb. 1819, a treaty was concluded with Spain to purchase Florida (though not rati¬

fied by Spain until 24 Oct. 1820), and on 3

March 1821, Congress authorized the Presi¬

dent to take possession of East and West

Florida and to establish a government therein.

Thus for $5,000,000 and the abandonment of

all claims to Texas, the United States secured full title to both East and West Florida and thereby settled the southern boundary dispute.

As defined in the treaty, the boundary line between the two countries, west of the Missis¬

sippi, was to begin at the mouth of the Sabine River (the present western boundary of

Louisiana), up that river to the Red River, and along that river to the

100th meridian ; from that point due north to the Arkansas

River, and following the southern bank of

that river to its source in latitude 42° north and thence by that parallel of latitude (the present northern boundary of California) to

the Pacific Ocean. All the islands in the

Sabine, Red and Arkansas rivers were to

belong to the United States.

There was a widespread feeling in the

United States that the government could have claimed Texas to the Rio Grande as a part of the Louisiana Purchase. Attempts were made

by Clay when Secretary of State and later by President Jackson to substitute the Rio Brazos, or the Rio Colorado, or even the Rio Grande as a boundary in place of the Sabine, or to purchase a part of Texas east of the Colorado, but Mexico, having then become independent

of Spain, rejected all offers, and the boundary remained unchanged and uncontroverted until

after Texas had entered the Union. As a

republic Texas claimed the Rio Grande as its boundary, but as a previous state of the

Mexican Republic it extended only as far as the Nueces River. In 1800 the Rio Grande

constituted the old boundary of Texas and

as Texas still claimed it, the American gov¬

ernment re-asserted it and the denial of the claim by Mexico was the immediate cause

of the Mexican War of 1846-48. (See also

United States — The Annexation of

Texas; United States — The Mexican

War). The war was terminated by the

treaty of Guadalupe-Hidalgo 2 Feb. 1848,

under which, on the payment of $15,000,000, Mexico ceded to the United States all territory north of the Rio Grande and Gila rivers, in¬

cluding Arizona, New Mexico, California,

Utah, Nevada, and parts of Colorado and

Wyoming, in all about 525,000 square miles.

One part of the boundary was to run along the western boundary of New Mexico, but

as it proved difficult to locate the boundaries of old New Mexico that part of the line was never run, but under the so-called Gadsden

treaty (q.v.) of 30 Dec. 1853 the boundary between the two countries was to begin —"in the Gulf of Mexico, three leagues from land, opposite the mouth of the Rio Grande, as provided in the fifth article of the treaty of Guadalupe-Hidalgo; thence, as defined in the said article, up the middle of that river, to the point where the parallel 31° 47' north latitude cresses the same; thence due west one hundred miles; thence south to the parallel of 31° 20' north latitude; thence along the said parallel of 31° 20' to the 111th meridian of longitude west of Greenwich; thence in a straight line to a point on the Colorado River twenty English miles below the junction of the Gila and Colorado Rivers; thence up the middle of the said river Colorado until it intersects the present line between the United States and Mexico."

Thus the southern and southwestern boundaries of the United States

were completed and the only boundary difficulty still to be adjusted is a local question on the Rio Grande.

Interior Boundaries.

The internal divisions of the United States are founded on one or other of the following bases: . (1) Boundaries between the colonies of the different European nations in territory now possessed by the United States; (2) co¬

lonial subdivisions made by powers other than England; (3) colonial subdivisions made by the English government ; (4) boundary agreements

between English colonies and States; (5) State and territorial boundaries by act of Congress.

Boundaries Between Colonies of Diff¬

erent European Nations. — The boundary of

Maine on the east and north corresponds with the line of division between the French colony of Acadia and the English settlements prior to 1713. The boundary line between Georgia and Florida follows the supposed dividing line be¬

tween the English and Spanish colonies pre¬

vious to 1763. The channel of the Mississippi and the line between Alabama and Mississippi on the north and sections of Florida and Louis¬

iana on the south were from 1782 until 1803

the boundary between the Spanish colonies and the United States. From 1819 to 1845 the

national boundary line on the southwest fol¬

lowed the present boundaries between Louisiana and Texas and between Texas and Oklahoma.

From 1819 to 1848 the 42d parallel, which forms the southern boundary of Idaho and Oregon,

constituted the dividing line between Spanish (later Mexican) territory and the claims of the United States and was changed as explained above by the Mexican War and the Gadsden

treaty. The boundary between New York and

Connecticut nearly coincides with that decided upon 19 Sept. 1650, by arbitrators appointed by Governor Stuyvesant of the Dutch colony

of New Netherland and the United Colonies

of New England. The boundary between New

Netherland and the colony of New Haven was to begin at Greenwich Bay and to run north¬

erly 20 miles into the country and beyond ((as it shall be agreed," but nowhere was it to ap¬

proach the Hudson nearer than 10 miles. Dela¬

ware's present western boundary in the main follows the subdivision between the Dutch

colony of New Sweden and the English colony of Maryland.

Colonial Subdivisions by Powers Other

than England.- In 1655 Governor Stuy¬

vesant of New Netherland forcibly annexed

New Sweden, the Swedish colony on the Dela¬

ware, to New Netherland, and in 1664 the Eng¬

lish, having taken possession of the colonv, asserted their authority over the Swedish

colony, naming it <(Delaware Territory." But New Netherland never

possessed definite

boundaries and was not subdivided, wherefore the present map bears no impression of changes made. The Illinois country was at first a part of Canada, but the French later annexed it to Louisiana. When the Floridas were in pos¬

session of the English (1763-82) the Appalachicola River constituted the boundary be¬

tween the regularly established English colonies ;md East and West Florida, and the upper wa¬

ters of that river now form a part of the bound¬

ary line between Georgia and Alabama. Dur¬

ing the period of Spanish ascendency in East and West Florida (1782-1803) the dividing

line was the Perdido River, and on the north the 31st parallel comprised the boundary; hence the present boundary between Florida and Ala¬

bama, particularly the Perdido River. Spanish and Mexican subdivisions within their own

territories are scarcely discernible on the

present map, save that the Red River, now con¬

stituting most of the southern boundary of

Oklahoma, conforms nearly to the boundary

line between Spanish Louisiana and Texas.

The southern boundary of California from the Colorado to the Pacific corresponds with the old Spanish dividing line between Upper and Lower California.

Subdivisions by the English Government

or by Agreements Between Colonies and

States. — • The cavalier manner in which

European monarchs laid claim to and granted away American lands resulted in vexatious

and extended disputes, which may best be

described by dealing with the colonies and

States as nearly as possible in geographical order, though all disputes between States cannot be amplified.

Under the grant to the Plymouth Company

the Earl of Stirling claimed land on the coast of Maine which was afterward granted to the Plymouth Company and by order of James I

that company issued a patent <(for a tract of the main land of New England, beginning at Saint Croix and from thence extending along the seacoast to Pemaquid and the River Kenne-beck." Stirling's heirs sold this to the Duke of York in 1663. In 1622 the Plymouth Com¬

pany granted to Sir Ferdinando Gorges and

Capt. John Mason a tract called Laconia be¬

tween the Merrimac and Kennebec rivers, which included New Hampshire and all the western

part of Maine. In 1629 Mason and Gorges

divided their territory in two by the Piscataqua, Gorges taking the territory east of the river and calling it Maine. In 1639 Charles I granted to Gorges a charter which virtually confirmed the Plymouth patent of 1622. Grants of part of Maine were made to the Duke of York in 1664 and 1674 ; on 19 Sept. 1686, Pemaquid and its dependencies, forming Cornwall County,

under the jurisdiction of New York, were an¬

nexed to the New England government; and

in 1691 the provinces of Maine and Acadia (or Nova Scotia) were incorporated with the

colonies of Massachusetts Bay and Plymouth

into the royal province of Massachusetts Bay.

The right of government thus acquired over the district of Maine was exercised by Massa¬

chusetts until 1819 when Maine took steps to be admitted as a State.

The northern and eastern boundaries of

Maine were settled by the United States and Great Britain (see subtitle Northeastern

Boundary) but the western boundary was a

source of contention with New Hampshire,

which had been erected into a province in 1679.

In 1731 commissioners from New Hampshire

and Massachusetts failed to settle the dispute, but in 1837 commissioners appointed by neigh¬

boring provinces fixed the boundary substan¬

tially as it is to-day:

“Beginning at the entrance of Pascataqua Harbor and so to pass up the same to the River Newhichawack and thro’

the same into the furthest head thereof and thence run north 2 degrees west till 120 miles were finished, from the mouth of the

Pascataqua Harbor or until it meets with His Majesty's other governments."

On 5 Aug. 1740, this was confirmed by the King, but after Maine's admission as a State in 1820 a dispute arose and in 1829 commis¬

sioners surveyed the line which was accepted by both States. Between 1828 and 1858 the

forest lands through which the boundary line ran were cleared and forest fires swept large tracts of territory, resulting in the obliteration of the line markers. Hence in 1858 the two States provided for a new survey from Frye-burg to the Canada line. In 1874 the line was surveyed and marked.

The dispute over the boundary between

Maine and New Hampshire involved also the

settlement of a dispute regarding the boundary between the latter province and Massachusetts.

Commissioners being unable to agree in 1731, another board of commissioners met in 1737 , and submitted a report to the King who in 1740 declared —" That the northern boundary of the province of Massa¬

chusetts be a similar curve line pursuing the course of the Merrimac River, at three miles distance, on the north side thereof, beginning at the Atlantic Ocean and ending at a point due north of the Pautucket Falls, and a straight line drawn from thence, due west, till it meets with His Majesty's other governments."

New Hampshire claimed as her southern

boundary a line due west from a point on the sea three miles north of the mouth of the Merrimac, but Massachusetts contended that

the King meant three miles north of any part of the river. In 1741-42 New Hampshire pro¬

ceeded to run and mark the line, but in 1774

an investigation, based on actual surveys,

showed that the previous line had run so far north of west as to deprive New Hampshire

of a large tract of land. In 1825 commissioners were appointed to run the line and monuments were erected accordingly. In 1885 the line was resurveyed and marked, but a dispute arose

over the boundary west of Pawtucket Falls. In 1742 Richard Hazen had marked this part of the boundary, running the line from a point three miles north of Pawtucket Falls, across the Connecticut River to the supposed boundary

line of New York, on what he believed to be a due west course from the place of beginning.

When the matter was adjusted in 1894 the

Hazen line was settled upon and remarked

from Pawtucket Falls to the northwest corner of Massachusetts.

New Hampshire also asserted her ownership

o(the territory now embraced within the State of Vermont, thus coming into conflict with New York, which colony claimed all the country west of the Connecticut River under the Duke of York's charters of 1664 and 1674. On appeal to the King an order in council was issued 20

July 1764 declaring (<the western banks of the river Connecticut, from where it enters the province of Massachusetts Bay, as far north as the forty-fifth degree of northern latitude"

to be the boundary line. Despite this ruling the controversy continued, but the line was finally accepted and now constitutes the boundary be¬

tween Vermont and New Hampshire.

On 15 Jan. 1777, Vermont declared herself

independent of New York and claimed all

territory west' to the Hudson, and from its source north to the international boundary, in¬

cluding a tract along the west shore of Lake Champlain. A part of New Hampshire, too,

sought to join Vermont at one time. Massa¬

chusetts assented to Vermont's independence in 1781, in 1782 Vermont settled her differences with New Hampshire, on 6 March 1790 New

York passed an act assenting to Vermont's ad¬

mission to the Union and defining her bound¬

aries, and in 1791 she was admitted. In 1814

the line between New York and Vermont was

surveyed and marked by a joint commission,

but in 1876 the line was changed (and ratified by Congress 7 April 1880) by a cession of a small tract from Vermont to New York com¬

prising that part of Fairhaven, Rutland

County, west of the middle of Poultney River.

The boundary between Massachusetts and

Rhode Island was a subject for dispute for more than 200 years and twice was before

the Supreme Court. As early as 1642 the line was marked in part and in 1710-11 commis¬

sioners from both colonies agreed upon the

north line of Rhode Island, their report being approved by the respective legislative bodies.

In 1719 this line was surveyed, but subsequent investigations showed numerous irregularities.

In 1741 the line between Massachusetts and the eastern part of Rhode Island was fixed by com¬

missioners but Rhode Island was dissatisfied and appealed to the King who, on 28 May

1746, affirmed the report of the commissioners.

Under this decree the line was run to the sup¬

posed southern boundary of Massachusetts and in 1748 the Rhode Island legislature appointed commissioners to continue the line to the Con¬

necticut corner. Various ineffectual attempts were made to secure an agreement, and in 1832, all other measures having failed, Rhode Island by a bill in equity brought the matter before the Supreme Court, which in 1846 decided in favor of Massachusetts. Meanwhile in 1844

commissioners were appointed by both States

to mark the boundary, part of the. line as marked being accepted by both States and

monuments erected thereon ; but Massachu¬

setts would not ratify the agreement regard¬

ing the other part and therefore brought suit in the Supreme Court for an adjudication. In 1860, however, both States agreed upon a con¬

ventional line which was confirmed by a decree of the Supreme Court in 1861. Further dis¬

cussion regarding the matter occurred, but it was finally settled in 1880-81 when both States decided to erect monuments on the conventional line.

Massachusetts entered also into contro¬

versies with Connecticut and New York re-

garding boundaries. In 1713 commissioners

from Massachusetts and Connecticut agreed

upon a line which gave to Massachusetts cer¬

tain northern frontier towns (Woodstock, Suffield, Enfield and Somers), but in 1749 Con¬

necticut asserted that the colonies had no legal right to transfer territory without the King's approval, and as the line had not been approved by the King, the towns were again under her jurisdiction. Massachusetts appealed to the

King but he sustained Connecticut. In 1791

a fruitless attempt was made to settle the line but not until 1803 was it surveyed and marked. In 1826 the line between Connecticut and Massachusetts east of the Connecticut

River was surveyed and marked by commis¬

sioners from both States. New York claimed

that her charters of 1664 and 1674 extended her territory to the west bank of the Connecticut River while Massachusetts claimed to the South Sea. Many attempts at adjustment wTere made and finally in 1787 commissioners appointed by Congress ran the line as follows : <(Beginning at a monument erected in 1731 by commission¬

ers from Connecticut and New York, distant

from the Hudson 20 miles and running north 15° 12′ 9″, east 50 miles 41 chains and 79 links to a red or black oak tree marked by said com¬

missioners, which said line was run as the magnetic needle pointed in 1787.® On 16 Dec.

1786 a joint commission from the two States settled the Massachusetts claims to western

lands, that State relinquishing the territory to New York and receiving in return the right of soil and pre-emption right of Indian purchase west of the meridian passing through the 82d milestone of the Pennsylvania line, excepting certain reservations on Niagara River. The

title to a tract known as ((The Boston Ten Towns® lying east of this meridian, previously granted by Massachusetts, was confirmed. In

1853 a small tract of land in the southwest corner of Massachusetts known as <(Boston

Corner® was ceded to New York, Congress con¬

firming the cession two years later.

In 1703 Rhode Island's western boundary

was settled by commissioners from that colony and Connecticut, but when the line was run Rhode Island refused to accept it and ap¬

pealed to the King, who in 1726 confirmed the agreement of 1703. Two years later the line was run as agreed. In 1839 the two States appointed commissioners to survey the line

and erect monuments and their report was

ratified in 1846.

A dispute arose between Connecticut and

New York over their boundary line, New York claiming as far east as Connecticut River under the Duke of York's charter of 1664. Commis¬

sioners appointed by the King determined that Connecticut's southern boundary was Long

Island Sound, and its western boundary Mamaroneck River and a line drawn north-north¬

west frorh the head of salt water in. it to Massachusetts. In effect this was a line .20

miles east of the Hudson with a. starting point at a place on Mamaroneck River. Neither

party being satisfied, joint commissions were appointed several times to fix the line but no action was taken until a question of jurisdiction arose which Connecticut in 1855 proposed to settle by a new survey. Several sets of com¬

missioners were appointed and finally, in 1860

the line was run by New York commissioners vol. 4 — 22

alone, following a survey made in 1731. In 1880 both States appointed commissioners who ratified the line surveyed in 1860 and this agreement was confirmed by Congress 26 Feb.

1881.

The Duke of York's grant to Sir George

Carteret in 1664 plainly defined the boundary line between New York and New Jersey, but

the line remained unsettled until 1769 when commissioners appointed by the King fixed it substantially where it is to-day. On the south the only thing to do was to find the beginning of 43° north latitude where the Delaware

crossed it and then run a line westward. In 1774 New York and Pennsylvania appointed

commissioners for this purpose; the work was finished in 1787 and ratified in 1789. In 1781

New York surrendered all her claims to lands west of her present western boundaries, and in 1792, in order to get an outlet on Lake Erie, Pennsylvania purchased from the United States the triangle bordering on that lake. Connecti¬

cut also disputed with Pennsylvania the posses¬

sion of the so-called Wyoming Valley in the latter colony, but when the Articles of Confed¬

eration went into effect Congress decided the dispute against Connecticut. There were also disputes between New Jersey and Pennsylvania, New Jersey and Delaware (particularly regard¬

ing jurisdiction over Pea Patch Island), Mary¬

land and Delaware, and Delaware and Pennsyl¬

vania, all of which were settled without great difficulty, but the details cannot be given here.

Virginia was first dismembered by the grant of Maryland to Lord Baltimore and her protest was of no avail. In 1668 commissioners marked the present boundary across the peninsula, but in so doing ran the line so far north of east as to rob Maryland of 23 square miles of her ter¬

ritory. The grant by Charles II of the ((northern neck,® or the region between the Rappa¬

hannock and Potomac rivers, which region was inherited by Lord Fairfax, gave rise to other disputes regarding the southern boundary, of Maryland. Lord Baltimore's charter described

the southern boundary as marked by the far¬

ther, that is, southern, bank of the Potomac from the Chesapeake to the farthest source of the river, the western line to run from this point to the 40th parallel. In 1736 commissioners were appointed to ascertain the true sources of the Rappahannock and Potomac rivers, a line being run 10 years later in accordance with their report. The Fairfax stone was set up at the source of the north branch of the Potomac, but Maryland contended that her lands ex¬

tended to the source of the south branch. In her constitution of 1776 Virginia surrendered all claim to territory within the charter limits of Maryland, but claimed and exercised juris¬

diction over all lands up to the northern

branch. A joint commission, appointed in 1795, accomplished

nothing, but finally, in 1852, Mary¬

land conceded Virginia's claim for the northern branch of the Potomac and the Fairfax stone as the starting point of the line. In 1854 Vir¬

ginia appointed a commission but the work was interrupted by the Civil War and the. creation of the new State of West Virginia relieved the old commonwealth of the controversy, a suit between West Virginia and Maryland being

instituted subsequently to secure an adjust¬

ment. On 21 Feb. 1910 the Supreme Court

decided that the boundary began at a point BOUNDARIES OF THE UNITED STATES

where the north and south line from the Fair¬

fax stone crosses the Potomac and (<running thence northerly" to the Pennsylvania border - — thus recognizing the old Deakins line. The location of the eastern part of the Maryland-Virginia line was also a source of friction. In 1668 the line from Watkins Point eastward was begun but never finished, and the line from Watkins Point westward across the bay to the Potomac was not touched until the meeting of commissioners at Mount Vernon in 1785 when

an agreement was reached that the waters of the Chesapeake and Potomac should be mutually free to the citizens of each State. By that agreement Smith's Point at the mouth of the Potomac, rather than Cinguack of the Maryland charter, farther south, was made the western end of the line dividing the bay. In 1858 com¬

missioners were appointed to run the line from Watkins Point to the Atlantic, the portion of the line between the Pocomoke River and the Atlantic being run, but the exact location of Watkins Point being too difficult to determine.

In 1867 Virginia claimed that the line across the bay should include the Virginia settlements on Smith Island and extend through the

north¬

ern portions of Watkins Point. In 1874 the question was submitted to arbitration, the com¬

mission in 1877 confirming Maryland's right to the Potomac and its southern bank, granting Virginia's claim to a part of Smith Island, dividing the rights to Tangier and Pocomoke sounds, designating the southernmost part of Watkins Point as the boundary, and dividing the Pocomoke River between the States up to the old Calvert-Scarborough line, run in 1668.

On 31 May 1910 the Supreme Court decided

that, consistent with the continued previous ex¬

ercise of political jurisdiction, the uniform southern boundary of Maryland was at low-water mark on the south bank of the Potomac to the intersection of the north and south line between Maryland and West Virginia, thus

establishing West Virginia's proprietary right on the south shore to low-water mark.

Maryland also disputed with Pennsylvania

over the boundary. According to Penn's char¬

ter the southern boundary of Pennsylvania was to be drawn at a radius of 12 miles from New¬

castle and continued westward from the point where the southern end of this segment cut the 40th parallel. Such a line was impossible as Newcastle was some distance below this

parallel ; nevertheless Penn contended for it.

He also induced the Duke of York to grant him the Delaware peninsula which was inside Balti¬

more's possessions and then forced Baltimore to divide this land with him. In 1732 Penn's sons secured from Baltimore a written agree¬

ment conceding the northern boundary as des¬

ignated by them, but on learning that this agree¬

ment signed away 2,000,000 acres he refused to yield. In 1760 the dispute terminated and seven years later Charles Mason and Jeremiah Dixon were employed, to mark the line, the result be¬

ing the famous Mason and Dixon line (q.v.).

It was resurveyed in 1901.

The dismemberment of Virginia on the

south began with the Carolina charter of 1663, amended and reissued in 1665 so as to include all lands between 36° 30’ and 29° extending westward to the South Sea. The line between Virginia and Carolina was not established until 1728. In 1779 the survey was again taken up to extend the line to the Tennessee River. The North Carolina officers declared the line to be too far south and began a survey two miles farther north, running the so-called Henderson line as far as the Cumberland Mountains. The Virginia officers continued the old southern line, known as the Walker line, as far as the Tennessee. The people living between the two lines were uncertain to whom they owed al¬

legiance, and in 1801 the two States appointed a joint commission to determine the true bound¬

ary. Both accepted the compromise line as

recommended, which ran half way between the old lines from White Top Mountain (the north¬

east corner of Tennessee) to Cumberland

Mountain (the southwest corner of Virginia).

In 1856 the line was remarked but the work was rejected by Virginia and in 1892 she

brought suit against Tennessee in the United States Supreme Court to have the new line

placed nearer latitude 36° 30’. The decision went against her, but in 1900 a commission was ap¬

pointed to re-mark the boundary, the report being rendered in 1903. An interesting feature was the cession of the north side of Main street, Bristol, Tenn., to Virginia by the Ten¬

nessee legislature.

The continuation of the Walker line west

of the Cumberland Mountains as the boundary between Kentucky and Tennessee became a

source of controversy, Kentucky claiming the line to be too far north. When the two States began to divide the lands west of the Cumber¬

land, they found that the Walker line struck the Cumberland 16 miles north of 36° 30’ (the northern charter boundary of Carolina) thus

giving Tennessee 2,500 square miles. Ken¬

tucky did not demand a new survey but secured a m.ore southerly boundary to the west.

Virginia also had a controversy with Weˆt

Virginia over the possession of Berkely, Fred¬

erick and Jefferson counties. When the latter State was organized Union troops were in pos¬

session of those three counties, and in May 1862

the <(restored government” of Virginia provided that these counties might join West Virginia whenever their voters should ratify the consti¬

tution of that State, which arrangement was confirmed by Congress in March 1865. In 1865, however, the reconstructed Virginia legislature repealed the act of 1862 and to settle the case brought suit against West Virginia in the

United States Supreme Court. In 1870 thaf

court decided against Virginia.

As first established by a joint colonial com¬

mission (1735-46), the boundary line between North and South Carolina began at Goat-Island (33° 56'), ran northwest to 35° and then west to the old Salisbury and Charleston road near the Catawba River and along this road to the southwest corner of the Catawba Indian lands. In 1764 this line was resurveved and in 1772 continued in its present location to a point near the Blue Ridge. In turn the ter¬

ritory of South Carolina was decreased by

the Georgia charter of 1732. In 1762 a dispute arose over the boundary between the two

States, which was decided in 1787 in favor of Georgia by a convention at Beaufort, S. C., when the present line between the two States was agreed upon.

In 1787 South Carolina ceded to the United States her claim to a strip of land between the Tugaloo River and the North Carolina

boundary, 12 or 14 miles wide and 200 miles long, extending to the Mississippi. In 1802

the National government gave to Georgia that part of the territory now in the State of Georgia and recognized the line of 35° as the northern boundary of the cession. Walton

County was organized in the newly acquired

district but the line dividing it from North Carolina was not

scientificallv determined. In 1806 Georgia appealed to Congress to adjust the line and rejected a survey made in 1807

but as the trend of opinion was so much in favor of North Carolina the dispute was

dropped. In 1817 Georgia and Tennessee ap¬

pointed a commission to establish the line of 35° along their border and the report of 1819

was acceptable to both States, but an inde¬

pendent survey made a few years later showed that the existing line was 35 chains south of the real 35° line. Nothing was done until

after the war. In 1887-89 and 1893 both

States appointed commissioners to establish

the line but nothing was accomplished, and a tradition still exists in Georgia that Tennes¬

see wrongfully exercises jurisdiction over

some of her territory.

In 1819 the line of 35° was run from the Alabama to the Mississippi River, the survey being known as the Winchester line, but 10

years later Mississippi, coveting the rich

country about the Chickasaw Bluffs (Mem¬

phis), contended that the line was too far south.

In 1831 a report was rendered showing that the line was too far north, but in 1837 a new survey by a joint commission established the true line so far south of the Winchester line that Tennessee received nearly 200 square

miles and this survey is the present boundary.

The purchase of Florida in 1819 occasioned

t\yo boundary controversies, the first being over the line between Georgia and Florida.

The line of the cession of 1763 extended from the junction of the Chattahoochee and Flint rivers to the source of the Saint Mary's and along that stream to the Atlantic, which line was confirmed in 1795 by a treaty between

Spain and the United States. In 1798 Andrew Ellicott made a survey of the line between Spanish and American dominions and estab¬

lished a mound at what he considered the

head of Saint Mary's River. In 1802 and

again in 1818 new surveys were made, Georgia contending for the Watson line which ran

south of Ellicott's mound. Three different

surveys were made and in 1850 Florida filed suit in the Supreme Court, but in 1857 both States agreed to make a new survey. Work

was begun in 1859 but in 1861, when the new boundary (the Orr and Whitney line) was

found to be north of the line she contended for, Georgia repudiated the survey. Finally

in 1866 both States agreed to accept the Orr and Whitney line and Congress ratified this action in 1872.

When the question of statehood for Mis¬

souri was under discussion, the people re¬

quested that the western and northern bound¬

aries be the same as the surveys of 1808-16

in accordance with the Indian treaty of 1808.

Congress assented, mentioning certain falls

in the Des Moines River as the eastern ter¬

minus of the survey. In 1837 three men, sent bv Missouri to locate the northern boundary, after exploring the Des Moines for about 100

miles, determined upon what they thought was the rapids and then surveyed a line to the Missouri, thus adding to the State a strip 100

miles wide and 200 miles long. Congress dis¬

regarded that survey and admitted Iowa with the old Indian boundary, but in 1848 Missouri brought suit against Iowa only to have her complaint dismissed.

The enabling acts of Louisiana and Mis¬

sissippi included within their boundaries some islands within three leagues of the coast of both States. The peninsula of Saint Bernard and the adjacent hummocks were claimed by

both; the joint boundary commission of 1901

could not reach an agreement, and appeal was made to the Supreme Court. In 1906 that

tribunal awarded the territory in dispute to Louisiana, declaring that the enabling acts

did not conflict since the grant of lands within three leagues of the coast of Mississippi re¬

ferred to a line of sea islands extending from Mobile, Ala., to Cat Island, Miss., and that the deep water channel from the mouth of the Pearl River through the islands and penin¬

sulas to the open waters of the Gulf ‘of Mex¬

ico is the boundary between the two States.

A part of the North Carolina-Tennessee

boundary was somewhat obscure. The sur¬

veyors intended to follow the line of the high range of mountains lying between the States but south of the Tennessee River the range divides into two branches (Hangover Ridge

on the east and Fodder Stack on the west) which unite 10 miles away. A dispute arose over which branch was the proper line but in 1900 the United States Circuit Court decided in favor of Hangover. There was a similar

break in the boundary range between County

Corners and Bryson's Gap and in 1902 the

same court decided in favor of the western spur.

Water courses have occasioned many in¬

terstate disputes, especially regarding juris¬

diction over the shore line, questions of

. boundary, property rights and jurisdiction caused by change of channels. When Georgia

surrendered her western lands in 1802 she

stipulated that her boundary extend Svest

of a line beginning on the western bank of the Chattahoochee River, where the same

crosses the boundary between the United

States and Spain, running up the said river and along the western bank thereof.® In its lower course the river frequently rises and overspreads its banks as much as a half-mile.

Alabama held that its rights extended to the low-water line, but Georgia claimed juris¬

diction to the high-water mark. After a long controversy Alabama sued Georgia in the

Supreme Court, but the decision of 1859 went against her, the court holding that the bed of a river <(is that part of the soil alternately covered and left bare® by the water. In 1877

an extraordinary changq occurred in the

course of the Missouri River at a point be¬

tween Omaha, Neb., and Council Bluffs, Iowa, as a result of which Nebraska claimed that the boundary between the two States was the new channel of the river. Suit against Iowa to establish the new boundary was brought

in the Supreme Court, but the court held that neither gradual changes in the channel of a river, caused by accretion or decretion, nor r.

sudden break and a complete transformation,

rendering the old river bed dry land, would change the boundary. The Supreme Court

has rendered similar decisions in disputes be¬

tween Missouri and Kentucky over the pos¬

session of Wolf Island; between Arkansas

and Mississippi over Island No. 76; between Tennessee and Arkansas over lands near

Devil's Elbow, above Memphis ; between Mis¬

souri and Nebraska over McKissick's Island;

between Kentucky and Indiana over Green

River Island; and between Washington and

Oregon over the ship channel in the Columbia and the ownership of Sand Island. A suit

between Arkansas and Tennessee over an

island in the Mississippi is still pending in the Supreme Court.

In 1893 a dispute was decided by the Su¬

preme Court between Iowa and Illinois re¬

garding the taxation of bridges over the Mis¬

sissippi. Iowa claimed that Illinois taxed all bridges and other structures on the river not to the middle of the stream but to the middle of the steamboat channel where navigation

was possible and that in one case at Keokuk, Iowa, she had taxed so much of the bridge as extended to a point 941 feet west of the middle of the main arm or body of the river at that point. The Illinois Supreme Court

had declared that primarily a river is a me¬

dium of navigation and as a channel might

be on either side of the thread of the stream it would be unjust to subject the channel to the control of another State when the free navigation of the river was essential to com¬

merce. Accordingly, in deciding the case, the United States Supreme Court held that the

true line in navigable rivers between States is the middle of the main channel — that is, the thread of the stream, the thalweg or mid¬

channel, or in case there be several channels, the middle of the principal one or the one usually navigated.

On 11 Jan. 1805, Congress erected the Ter¬

ritory of Michigan out of <(all that part of the Indiana Territory which lies north of a line drawn east from the southerly bend, or

extreme, of Lake Michigan, until it shall in¬

tersect Lake Erie, and east of a line drawn from the said southerly bend through the

middle of said lake to its northern extremity, and thence due north to the northern bound¬

ary of the United States.® When the exact

location of the southerly bend of Lake Michi¬

gan became known Michigan's southern

boundary was found to overlap the territory assigned to Ohio, and a serious dispute arose over a wedge-shaped strip across Ohio, aver¬

aging six miles in width, embracing 468

square miles and including the lake port of Toledo and the mouth of the Maumee River.

On 20 May 1812, Congress passed an act to determine the boundary but owing to the war the lines were not run for some time and

then not satisfactorily. Another act was

passed 14 July 1832 under which surveys were made and reports rendered in January 1834

and November 1835. In the summer of 1835

the disputed territory was the scene of much disorder and some gunpowder was wasted in

what was known as the Toledo War. The

governor of Ohio appointed a commission to

mark, under armed protection, the line claimed by that State, but Governor Mason gave or¬

ders that the militia should be called out and the Ohio commissioners arrested ((the moment they stick the first stake in the soil of Michi¬

gan.® The Ohio surveyors attempted to run

the line and were arrested and the militia was called out by both States, but no human blood was shed and the matter was settled by politicians. In December President Jackson

submitted the controversy to Congress which

gave the disputed tract to Ohio and by an act of 15 June 1836 offered Michigan the whole of what to-day is her upper peninsula. A

convention held in December 1836 approved

the proposition and on 26 Jan. 1837 Michigan was admitted with the territorial limits she possesses to-day.

Article V of the Ordinance of 1787 pro¬

vided that the southern boundaries of Michi¬

gan and Wisconsin were to be an east and

west line drawn through the southerly bend

of Lake Michigan — 41° 37′ 7.9″, according to Talcott's survey. In 1815 Illinois applied for admission to the Union with a northern boundarv of 42° 30', which would give her

an additional strip 61 miles, 19 chains and 13

links . in width, embracing 8,500 square miles and including numerous lake and river ports.

In the act of 1836 erecting Wisconsin Terri¬

tory, the boundary was given as 42° 30', as in the Illinois enabling act of 1818, but Wiscon-son requested a readjustment of the line to conform with the Ordinance of 1787, claim¬

ing the 14 northern counties of Illinois. In two State constitutional conventions attempts were made to have the dispute referred to the United States Supreme Court and to admit

Wisconsin with indefinite boundaries, but

they failed and the State was admitted in

1848 minus the 8,500 square miles in dispute.

Michigan at first cared little about her

upper peninsula, wherefore Congress proposed

to give it to Wisconsin. After that territory was formed Congress ordered a survey of

the line between the two to be made but soon learned that the boundary could not be run because as laid down by Congress it did not agree with the topographical features of the country. Wisconsin demanded the territory in question, threatening secession and hinting

that force might be used, but when Congress on 6 Aug. 1846 provided for her admission to the Union, the boundary line was changed

only in a manner to make it conform more

closely to the actual geographical features.

State and Territorial Boundaries by Act

of Congress.— Art. IV, Sec. 3, 2 of the

constitution provides that <(the Congress shall have power to dispose of and make all need¬

ful rules and regulations respecting the ter¬

ritory or other property belonging to the

United States,® and under this power the

United States has defined and altered the

boundaries of territories and has admitted

new States under the boundaries defined in

the enabling acts. When the Ordinance of

1784 was under discussion to provide a gov¬

ernment for the Northwest Territory, Jeffer¬

son suggested a plan of dividing the territory into 10 States, but this ordinance never went into effect and as defined by the Ordinance of 1787 the Northwest Territory nearly coin¬

cides with the States from Ohio to Wisconsin.

The present State of Oklahoma was formed

by the combination of the former Territory

of Oklahoma and Indian Territory. Oregon,

W ashington and Idaho nearly conform to the old ierritory of Oregon. When Arizona and

New Mexico entered the Union in 1912 they

were admitted with their previous territorial boundaries. All the Congress-made States

have parallels or meridians or both as their boundaries, Colorado and Wyoming being

bounded by four straight lines. Most of Cal¬

ifornia's eastern boundary is a straight line running approximately southeast to north¬

west. Through most of their course, the

Ohio and Mississippi form State boundaries,

and sections of the boundaries of a few

States are formed by the Missouri, Arkan¬

sas, Des Moines, Wabash, Red, Colorado and

Columbia rivers. East of the Mississippi and west of the Appalachians, a group of nine

States are nearly of a size, varying from 36,-

000 to 58,000 square miles, and on the west side of the Mississippi there is a group of five States laid out on about the same scale (save Missouri, which is larger). West of

these to the Pacific the States are larger, the smallest (Oklahoma, North Dakota and

Washington) averaging 70,000 square miles,

while seven of the States embrace more than 100,000 square miles, California rising to 158,-

000. Texas is the largest with 265,000 square miles. Few of the outlying territories of the United States are large enough to be sub¬

divided. Congress has divided Alaska into

four districts, Porto Rico into seven and the Philippines into 27 provinces, besides separate areas for the Moros and other wild tribes.

Bibliography. — Exterior Boundaries. — Ad¬

ams, Henry, ‘History of the United States)

(8 vols., New York 1889-90) ; Adams, E. D., (Lord Ashburton and the Treaty of Wash¬

ington (in American Historical Review,

Vol. XVII, pp. 764-82, New York 1912) ;

Balch, T. W., (The Alasko-Canadian Fron¬

tier (Philadelphia 1902) ; Bancroft, H. H., ‘Northwest Coast, * (Oregon) and ‘Washington, Idaho and Montana) (San Francisco

1884-90) ; Bicknell, Edward, territorial Ac¬

quisitions of the United States, 1787— 1904 >

(Boston 1904) ; Bruce, H. A., the Romance

of American Expansion (New York 1909) ;

Callahan, J. M., the Alaska Purchase and

Americo-Canadian Relations) (in (West Vir¬

ginia University Studies in American His¬

tory, * Series I, Nos. 2-3, Morgantown, W.

Va., 1908), Neutrality of the American

Lakes and Anglo-American Relations) (in

(Johns Hopkins University Studies, * Series XVI, Nos. 1-4, Baltimore 1898), ‘American

Relations in the Pacific and the Far East*

(in ‘Johns Hopkins University Studies,*

Series XIX, Nos. 1-3, Baltimore 1901) ;

Chambers, H. E.: ‘West Florida and Its Re¬

lation to the Historical Cartography of the United States) (in ‘Johns Hopkins Univer¬

sity Studies, 5 Series XVI, No. 5, Baltimore 1898) ; Chadwick, F. E., delations of the

United States and Spain — Diplomacy) (New

York 1909) ; Donaldson, Thomas, ‘The Pub¬

lic Domain) (Washington 1884) ; Ewin, W.

H., ‘Report on the United States and Mexi¬

can Boundary Survey) (House Ex. Doc. 135,

34th Cong., 1st sess., 1857) ; Fuller, H. B..

(The Purchase of Florida, Its Historv and

Diplomacy) (Cleveland 1906) ; Ficklen, T. R., (Texas and Louisiana Purchase) (in Publi¬

cations of the Southern History Association, Vol. V, pp. 351-88, 1901); Gannett, Henry,

‘Boundaries of the United States and of the Several States and Territories* (United States Geological Survey Bulletin 226, Washington

1904) ; Garrison, G. P., (Westward Exten¬

sion’ (New York 1906) ; Greenhow, R., Ore¬

gon and California* (Boston 1844) ; Hart,

A. B., ‘Foundations of American Foreign

Policy* (chap. Ill, New York 1901), and

‘Epoch Maps* (rev. ed., New York 1910) ;

Hermann, Binger, ‘The Louisiana Purchase,

with a Review of Annexations by the United States* (Washington 1898) ; Hinsdale, B. A., ‘Bounding of the Original United States* (in Magazine of Western History, Vol. II, pp.

401-23, September 1885) and ‘The Establish¬

ment of the First Southern Boundary of the United States* (in Annual Report of the

American Historical Association for 1893,

pp. 331-66) ; Henderson, J. B., ‘American

Diplomatic Questions* (New York 1901) ;

Hincks, Sir F., ‘The Boundaries Formerly in Dispute between Great Britain and the United States* (Montreal 1885) ; Langford, N. P.,

‘The Louisiana Purchase and the Preceding

Spanish Intrigues for the Dismemberment of

the Union* (in Minnesota Historical Society

Collections, Vol. IX, pp. 453-508, Saint Paul 1902) ; MacDonald, William, ‘Select Docu¬

ments* (New York 1898, 1904) ; Moore, J. B., ‘Digest of International Law* (Washington

1906) and ‘History of International Arbitra¬

tions* (Washington 1898) ; Mowrey, W. A.,

‘Territorial Growth of the United States*

(New York 1902) ; Martin, W. F., ‘History

of the San Juan Water Question* (London

1869) ; Marshall, W. I., ‘Acquisition of Ore¬

gon* (Seattle 1911) ; Ogg, F. A., ‘Opening of the Mississippi* (New York 1904) ; ‘Pro¬

ceedings of the Alaskan Boundary Tribunal*

(Washington 1904) ; Reeves, J. S., ‘American Diplomacy under Tyler and Polk* (Baltimore

1907) ; Sprague, J. F., ‘Northeastern Boundary Controversy* (Bangor 1910) ; ‘The South in

the Building of the Nation* (Vols. I-IV, Rich¬

mond, Va., 1909) ; Stanton, S. B., ‘The Ber¬

ing Sea Controversy* (New York 1892) ;

Schaefer, J., ‘British Attitude toward the

Oregon Question, 1815-1846* (in American

Historical Review, Vol. XVI, pp. 273-99, Jan¬

uary 1911) ; Schuyler, R. L., ‘Polk and the Oregon Compromise of 1846* (in Political

Science Quarterly, Vol. XXVI, pp. 443-61,

September 1911) ; Scaife, W. B., ‘America,

Its Geographical History, 1492-1892* (in

‘Johns Hopkins University Studies,* Vol.

XIII, Baltimore 1892) ; Snow, Freeman,

‘Treaties and Topics in American Diplomacy*

(Boston 1894) ; Schuyler, Eugene, ‘American

Diplomacy* (New York 1886) ; Twiss, Trav¬

ers, ‘The Oregon Question* (London 1846) ;

United States Mexican Boundary Commission,

‘Report on the Boundaries between the

United States and Mexico* (1891-96, 1905

and 1913) ; United States-Mexican Arbitra¬

tion Tribunal, ‘Charrizal Arbitration* (1911) ; United States Northern Boundary Commis¬

sion, ‘Report upon the Boundary between the United States and the Provinces of Great

Britain* (1878); Wharton, Francis, ‘Digest

of International Law* (Washington 1886) ;

Wiley and Rines, ‘The Lhiited States* (11

vols., New York 1912-13) ; Willcox, W. F., ‘Report on Boundaries of Territorial Acqui-342

BOUNTIES

sitions5 (United States Census Bureau Bulle¬

tin 74, Washington 1901) ; Winsor, Justin,

(Mississippi Basin) (Boston 1895), (Westward Movement (Boston 1897), Carto¬

graphical History of the Northeastern Bound¬

ary 5 (Cambridge 1887) and (ed.) Narra¬

tive and Critical History of America1* (Vol.

VII, pp. 527-62, Boston 1888).

Interior and State Boundaries. — Adams,

H. B., (Maryland’s Influence in Founding a National Commonwealth) (in Maryland His¬

torical Society Fund Publications, No. 11,

Baltimore 1877) ; Alden, G. H., New Gov¬

ernments West of the Alleghanies1* (in Uni¬

versity of Wisconsin Bulletins in Economics, Political Science and History, Vol. II, No. 1, Madison 1897) ; Battle, K. P., (The Georgia-Tennessee Boundary5 (in Report of the

Georgia Bar Association, 1901) ; Bowen, C.

W. , boundary Disputes of Connecticut5

(Boston 1882) ; Caffey, F. G., Annexation of West Florida to Alabama5 (in Proceedings

of the Alabama Bar Association, Vol. XIX,

1901) ; Farrand, Max, (Indian Boundary

Line5 (in American Historical Revie iv, Vol.

X, pp. 782-91, New York 1905) ; Gannett,

Henry, boundaries of the United States and

of the Several States and Territories5 (United States Geological Survey Bulletin No. 226,

Washington 1904) ; Green, S. A., <The North¬

ern Boundary of Massachusetts in its Rela¬

tion to New Hampshire5 (Worcester 1891) ;

Goodloe, D. R., (The North Carolina and

Georgia Boundary5 (Raleigh 1904) ; Hinsdale, B. A., (The Old Northwest* (2d ed., New

York 1899) ; Hyde, C. C., Notes on Rivers as Boundaries5 (in American Journal of In¬

ternational Law, Vol. VI, pp. 901-09, New

York 1912) ; Larzelere, C. S., boundaries of Michigan5 (in Michigan Pioneer and His¬

torical Society Collections, Vol. XXX, pp.

1-27, Lansing 1906) ; Lay, G. C., (Historic Border Disputes between States of the Middle-West5 (in Journal of American History, Vol.

V, pp. 274—92, New Haven 1911) and (The

Boundary Dispute between Washington and

Oregon5 (in Ibid, Vol. VII, pp. 1153-67,

Greenfield, Ind., 1913) ; Mason and Dixon

Resurvey Commission, beport on the Re¬

survey of the Maryland-Pennsylvania Bound¬

ary5 (1909) ; McClurg, (The State of

Louisiana versus the State of Mississippi5 (in Mississippi Historical Society Publications,

Vol. Ill) ; New York Regents, beport on

the Boundary of the State of New York5

(1-874-84) and beport on the New York and

Pennsylvania Boundary5 (1886) ; Noble,

John, (An Incident in the Boundary Line

Dispute between Massachusetts and Rhode

Island5 (in Massachusetts Historical Society

Proceedings,5 Series II, Vol. XIX, pp. 20—

34, Boston 1906) ; Paxson, F. L., boundaries of Colorado5 (in LTniversity of Colorado

Studies, Vol. II, No. 2, Boulder 1904) ; Riley, F. L., boundaries of Mississippi > (in Mis¬

sissippi Historical Society Publications, Vol.

VIII) and (Demarcation of the Mississippi—

Louisiana Boundary5 (in Ibid, Vol. XI, Ox¬

ford 1910) ; Shepherd, W. R., ‘History At¬

las5 (New York 1911) ; Soule, A. N., South¬

ern and Western Boundaries of Michigan5

(in Michigan Political Science Association

Proceedings, Vol. II, No. 2, Ann Arbor

1896) ; Th waites, R. G., boundaries of Wis¬

consin5 (in Wisconsin Historical Society Col¬

lections, Vol. XI, pp. 451-501, Madison 1888) ; Texas Boundary Commission beport5

(House Ex. Doc. 21, 50th Congress, 1st ses¬

sion, 1887); Turner, F. J., (Western State-Making5 (in American Historical Review,

Vol. I, pp. 70, 251, 1895) ; Whealton, L. N„

Maryland and Virginia Boundary Contro¬

versy 1668-1 894 5 (New York 1905) ; Way,

W. V., 'The Facts and Historical Events of the Toledo War of 18355 (Toledo 1869) ; and the following cases before the United States Supreme Court and some of the State courts : Mo. vs. Iowa, 17 U. S., 337; Mo. vs. Kan., 312

U. S., 78; Mo. vs. Neb., 196 U. S., 23 and 197

U. S., 577; Mo. vs. Ky„ 11 Wall., 395; R. I.

vs. Mass., 12 U. S„ 883; 13 U. S., 429; 14 U.

S., 81 ; 16 U. S., 883 ; Iowa vs. Ill., 147 U. S., 1, 7—14 ; 202 U. S., 59; Neb. vs. Iowa, 143 U.

5., 359; Kan. vs. Col., 206 U. S., 46, 116; 185

U. S., 125; Ind. vs. Ky., 136 U. S., 479; Nielson vs. Ore., 212 U. S., 315; Wash. vs. Ore., 211

U. S., 127, 136; 214 U. S., 205; La. vs. Miss., 202 U. S., 1; Va. vs. W. Wa, 206 U. S.„ 290; 11 Wall., 39; Va. vs. Tenn., 148 U. S., 503; 191 U.

S., 64; Ala. vs. Ga., 23 Howard, 505; Coffey vs. Groover, 123 U. S., 1 (Fla.-Ga.) ; Moore vs. McGuire, 205 U. S., 215 (Ark.-

Miss.) ; La. vs. Texas, 176 U. S. ; Stockley vs.

Cissna, 119 Fed. Rep., 812; Handly's Lessee Anthony, 5 Wheat., 374; Buttenuth vs. St.

Louis Bridge Co., 123 Ill., 535 ; St. Louis vs.

Rutz, 138 U. S., 226, 249; Norton vs. White-side, 188 Fed. Rep., 356, 359; Cooley vs.

Golden, 52 Mo. App., 229; McBane vs. John¬

son, 155 Mo., 191 ; Keokuk and Hamilton

Bridge Co. vs. The People, 145 Ill., 596; 167

111., 15; 175 U. S., 626; Morris vs. U. S., 174

U. S., 196; Md. vs. W. Va., 217 U. S., 1, 577.

Irving E. Rines,

Author ' History of the United StatesB

BOUNTIES, a term applied to a grant or

benefaction from the government to those

whose services directly and indirectly benefit it, and to whom, therefore, it desires to accord some recompense, or at least recognition.

Nature and Operation. — In law or com¬

merce a fiscal bounty is a premium paid by the government to the

producers, importers or ex¬

porters of certain articles or to those who em¬

ploy ships in certain trades. This is done either to foster a new industry during its infancy or to protect an old one which is supposed to be of especial importance to the country. When the treasury actually pays a certain sum for each unit of goods produced or exported, the bounty is direct or open. It is an indirect or concealed bounty when the government grants

some favor which reduces the cost of produc¬

ing or marketing the goods, e.g., where goods for export are transported by government-owned railways at specially low rates, in which case the reduction given virtually constitutes a bounty. Sometimes imperfect methods of ad¬

ministration result in an unintentional grant of a bounty, especially in connection with draw¬

backs on duties.

In effect a bounty encourages the production or export of the article upon which it is paid, and differs from a protective duty in that it enables the producer to sell at a lower price than he could afford otherwise and to recoup his losses at the expense of the treasury instead BOUNTIES

of the consumer. Thus unless nullified by for¬

eign countervailing duties a bounty aids in both foreign and domestic markets, while protective duties facilitate sales only in the home market.

Bounties bring to the industries affected capital and labor which otherwise would probably be employed in other channels of industry. If the bounties be applied to industries subject to di¬

minishing returns, additional products arc ob¬

tained at enhanced cost, and the consumer

receives less benefit than might be obtained if the same capital and labor had been employed in other industries. In the case of industries subject to increasing returns, the converse

would be true. Hence it is said that greater • benefits might accrue to consumers if com¬

modities subject to diminishing returns were taxed and a part of the taxes used as bounties for commodities subject to increasing returns.

Some bounties may be justified on other than purely economic grounds, such as bounties to shipbuilding and navigation, in the interest of national defense.

All bounties or premiums are not offered for the encouragement of domestic talent and in¬

dustry to the exclusion of foreign competition.

The British and French governments and also private associations offer many of their boun¬

ties to competitors indiscriminately; and where the object is universal improvement, the offer of a bounty is one of the appropriate modes of encouragement, though others concur with it, such as the monopolies of copyrights and pat¬

ents, and the honors and distinctions conferred on those who make any important improve¬

ment. The productions of extraordinary skill and ingenuity may also properly be made the subjects of bounties or premiums, since in this way a competition is excited by which none suffers and all the effects of which are bene¬

ficial to a community.

Federal and State Bounties. — The na¬

tional government has encouraged industries in two ways by direct grants of money to private concerns, namely, ship subsidies and bounties, but since ship subsidies have usually been

granted to encourage mail transportation lines, they may best be discussed elsewhere. (See

Ship Subsidies; Shipping; Commerce). Under

the operation of the tariff, drawbacks have been paid on exports, but since, in its final analysis, a drawback is merely the refund of a duty it cannot be considered a contribution from the treasury.

Under an act of 1790 a bounty was paid on dried and pickled fish exported from American fisheries, the sum of 10 cents per quintal being paid on the former and 10 cents per barrel on the latter. In reality this amounted to a draw¬

back on the salt which was subject to duty and the so-called bounty was repealed in 1807. The most noteworthy recent example was the bounty on domestic sugar production constituting a

part of the McKinley tariff act of 1 Oct. 1890.

The act provided that between 1 July 1891 and 1 July 1895 the treasury should pay a bounty of two cents a pound to producers of cane, beet and sorghum sugar grown in the United States, provided the sugar tested not less than 90

degrees by the polariscope, and for sugar test¬

ing between 80 and 90 degrees the bounty was one and three-fourths cents. The bounty was in the nature of a contract (made with each and every person in the United States engaged in cultivation of such varieties of sugar) pro¬

viding that, if their produce attained a given standard of saccharine strength, they would

receive the bounty provided therefor by the appropriation from the treasury. It was neces¬

sary also that the producer secure a license and file various statements concerning the amount of his crops. While the act greatly stimulated

the sugar industry in the country, the bounty was repealed by the act of 27 Aug. 1894. Dur¬

ing the years 1892 and 1897, while the bounty act was in force, $36,041,134 was disbursed to sugar growers, most of which went to the pro¬

ducers of cane sugar in Louisiana, the beet sugar producers receiving only about $2,000,000, while an insignificant amount was paid to sor¬

ghum and maple sugar producers.

Bounties have been granted freely by the

States, not only of lands and money to canals and railroads, but also of large sums for irri¬

gation purposes, roads and various other public works. In order to induce industrial and man¬

ufacturing firms to locate in some city or State, taxes for a period of years have sometimes been remitted. Many States give bounties for the extermination of destructive and dangerous animals, nearly all the Western States offering liberal sums for dead coyotes, wolves and

mountain lions. Many cities too have granted bounties, such as franchises to street railway companies and to water, lighting and other pub¬

lic service corporations.

Army and Navy Bounties. — Even in

colonial times money was paid to encourage

men to join the army or to extend their serv¬

ice. In general the bounty has been given to volunteers, the amount varying with the need and difficulty of procuring recruits. The New England militia which joined the British army to invade Canada received a money bounty as did those who wintered at Louisburg in 1760.

The Continental army received small grants of money and land from Congress, but as the

enemy was paying £10 apiece for recruits

Washington feared the loss of his army unless Congress was more liberal. The States gave

bounties of varying values, Virginia and New York offering land; but in 1780 conditions

came to such a pass that Washington had to offer $200 each to retain his veterans, and finally, in order to disband the army in 1783, induced Congress to grant the officers five years'

full pay.

During succeeding wars the soldiers were

subsidized by land grants as will be shown later, but in the Civil War, after 1861, all vol¬

unteers received bounties, the towns and States competing with each other and with the Fed¬

eral government, while many individuals hired substitutes to take their places at the front. To prevent desertion the bounty was paid by in¬

stalments, $400 being given to veterans who re-enlisted. By 1865, owing to the magnitude of the war and the difficulty of securing re¬

cruits, as much as $1,500 was offered, and these high prices resulted in much of the so-called bounty-jumping. (See Bounty-Jumper). Dur¬

ing the war the States paid nearly $300,000,000

in bounties. Congress has not approved bills for the ˆequalization of bounties® by subsequent Federal payments.

The United States laws formerly author¬

ized various forms of prize money, including a-bounty for the sinking

or destruction of an 344

enemy’s vessel, but such bounties were abol¬

ished by the act of 1899, so that both army and navy are on an equal basis as concerns pay. But there are some forms of bounty, such as in¬

creased pay for re-enlistmcnt, accompanied for the navy by allowance of four months’ pay, extra pay, prizes for marksmanship and for the engineers of a successful cruiser and gratuities for winners of a medal of honor.

Land Bounties. — The practice of granting

lands to soldiers goes back to colonial times.

By royal proclamation of 7 Oct. 1763, American colonial governors were prohibited from mak¬

ing land grants west of the sources of the rivers flowing from the west or northwest into the Atlantic. This was to quiet the apprehen¬

sions of the Indians in the Ohio regions that their lands were to be granted out. But Lord Dunmore of Virginia was empowered to offer

bounties of land to all officers and soldiers who had served in the French and Indian War, and should personally apply to him for warrants —5,000 acres to each field officer, 3,000 to captains, 200 to subalterns or staff officers and 50 to pri¬

vate soldiers — up to 200,000 acres, from the King’s domain either in Canada or Florida, or the <(Crown lands.® This was understood by

Americans to mean precisely the above western lands, and those who had the ability and fore¬

sight selected choice tracts beyond the Alleghanies provisionally in hope that the gov¬

ernment would validate them later. Washing¬

ton, for example, by himself and his land agent Crawford, had surveyed 70,000 acres and se¬

cured patents in his own and other officers'

names for 63,000, of which his own share was 32,000. Dunmore began to give these warrants on his own responsibility as early as July 1773, and on 21 Jan. 1774 notified all gentlemen, '

officers and soldiers to have their surveyors assemble at the mouth of the Great Kanawha River and proceed to survey their claims. The land agents and surveyors who went down the river were stopped and in some cases attacked by the Indians, and this was one of the agencies in bringing about Dunmore's War, although

trouble had been brewing for a long period owing to white settlement and Indian mur¬

ders. The name (<bounty lands® has been

defined as pertaining to the Northwest Terri¬

tory lands belonging to the States, because on 16 Sept. 1776 Congress offered land bounties to volunteers in the Revolution (assessing the

money to buy them on the several States, to which Maryland objected because the other

States had lands and she had none, and so would be unfairly taxed) ; but it does not ap¬

pear that the phrase was ever used of them at the time.

When Virginia ceded her claims to the

Northwest Territory, a large tract north of the Ohio River was reserved, and the present land titles in that section date back to the beginning of bounty lands. Besides the gifts from the States the Revolutionary soldiers were granted bounties of land by the Federal government.

Four million acres of bounty lands were given to the soldiers of the War of 1812, while Con¬

gress, by the laws of 1847, 1850, 1852 and 1855, recognized the claims of survivors of the Mexi¬

can and Indian wars, 58,652,450 acres under 530,203 warrants being granted prior to 1883.

Under the act of 1862 land scrip worth $1.25

per acre waˆs distributed for 9,600,000 acres.

Under the provisions of the Homestead Act land was given not only to civilians but also to sol diers, the latter being given the more advantage oils terms, while it is possible even now for a soldier's widow to secure homestead land on a shorter residence than other people. Much of the early bounty land was located by scrip which was transferable, thus making it a more attractive investment for land buyers and spec-

• ulators, because they could seek out the more valuable tracts. Revolutionary soldiers formed the Ohio Company of 1788, but they purchased their lands outright with evidences of public debt. The Federal government has steadily

pursued a policy of divesting itself of the pub¬

lic land, but there are many forest reserves and national parks that will be permanent. See

Public Domain; Lands, Public: Homestead

and Land Laws, *etc.*

Bibliography. — Ballagh, J. C., (Introduc¬

tion to Southern Economic History: The Land System,) in the (Annual Report* of the Amer¬

ican Historical Association for 1897 (1898) ; Cherington, P. T., < State Bounties and the Beet Sugar Industry* (in Quarterly Journal of Eco¬

nomics, Vol. XXVI, pp. 381-86, 1912) ; Don¬

aldson, Thomas, (The Public DomaiiP (1884) ; Eggleston, Melville, (The Land System of the New England Colonies) (in (Johns Hopkins

Studies, * Series IV, Nos. XI-XII, 1886) ; Hart, A. B., (Practical Essays on American Govern¬

ment (1893); Hatch, L. C., Administration

of the American Revolutionary Army* (1904) ; Marshall, Alfred, Principles of Economics*

(6th ed., 1910) ; Sato, S., (History of the Land Question in the United States) (in (Johns Hop¬

kins University Studies in Historical and Polit¬

ical Science, *Series IV, Nos. VII-IX, 1886) ; Treat, P. J., /National Land System* (1910) ; Upton, E., (Military Policy of the United

States) (1907) ; Navy Department, Paws Re¬

lating to the Navy* (1898) and (Navy Regulations) (1909); War Department, ˆMilitary

Laws > (1908).

Irving E. Rines,

Author (History of the United States?

BOUNTIFUL, Utah, city in Utah County,

10 miles north of Salt Lake City and seven miles south of the county seat, on the Salt Lake and Ogden and the Utah Light and Traction

Company electric lines and one mile east of the Oregon Short Line and the Denver and Rio

Grande railroads. Truck gardening, dairying

and brick making are the principal industries.

Its two banks have combined resources amount¬

ing to $700,000, and its taxable property is val¬

ued at $600,000. The city has a postoffice, opera house, three churches, a high school and two graded schools. The municipal receipts exceed $12,000 annually. The government is vested in a mayor and five councilmen. The recorder

and treasurer are elected by popular vote, but the city attorney, justice and marshal hold ap¬

pointive offices.' Pop. 2,100.

BOUNTY-JUMPER, a term used dur¬

ing the Civil War in the United States to de¬

note one who enlisted in the United States mil¬

itary service to secure the bounty paid by the government for volunteers, and then deserted.

Some of these enterprising individuals carried on a regular business of enlisting in one place under, a certain name, hurrying to the front.

. receiving the bounty, deserting at once upon its BOUNTY LANDS — BOURBAKI

receipt and reappearing in some other place under a different name, only to re-enlist and repeat the process. The risks were great, but as the bounty was, in some cases, quite large, the practice found many votaries. Consult

v\ ilkeson, 'Recollections of a Private Soldier'

(New York 1887).

BOUNTY LANDS. See Bounties.

BOUNTY MUTINY. See Bligh, Wil¬

liam.

BOUQUET, boo-ka, Henry, British officer

in the French and Indian wars: b. Rolle, Swit¬

zerland 1719; d. Pensacola, Fla., 23 Aug. 1765.

He entered the army of the States-General of Holland, then served in the Sardinian army

against France and Spain but returned to the Dutch service in 1748 as an officer of the Swiss Guards. When war broke out between France

and England in 1755 Bouquet was made lieutenant-colonel of an English regiment known

as the Royal Americans. He reached Phila¬

delphia in 1756 and in 1757 was ordered to Charleston with a small detachment of his regi¬

ment; but in 1758 returned to Pennsylvania and was made second in command of an expedition against Fort Duquesne in which George Wash¬

ington also took part. The French deserted and set fire to the fort before the expedition reached there. 1 his gave the control of Pennsylvania to the English, but Bouquet ‘ remained in the province, mostly at outlying posts. In 1763 the Indians united in an attempt to expel the Eng¬

lish ; they massacred many settlers, coming within a few miles of Lancaster, and blockaded Fort Pitt. There was no time to raise provin¬

cial troops if the fort was to be saved, so Bouquet set out with a force of 500 regulars, made his way through the forest, taking every precaution against surprise, and defeated the Indians at Bushy Run, within 20 miles of Fort Pitt. The number of the Indians that attacked him was as great as his own force, and his soldiers had never seen Indian warfare, but by skilfully feigning a retreat Bouquet drew the Indians from their cover and completely routed them by a sudden charge. In the following

year he led a force of regulars and provincial troops to the forks of the Muskingum River, 150 miles west of Pittsburgh. The Indians,

overawed by his former victory and by his

boldness in penetrating so far into the wilder¬

ness, were ready to make peace and surrender their white prisoners. He was subsequently

made brigadier-general and commandant of the Southern Colonies of British America and went to Pensacola where he died. Consult Parkman, Conspiracy of Pontiac' (Boston 1867) ; Penn¬

sylvania Magazine of History and Biography

(Vol. Ill, Philadelphia).

BOUQUET DE LA GRYE, boo-ka-de-lagre', Jean Jacques Anatole, French hydrographical engineer: b. Thiers, Puy-de-Dome,

20 May 1827 ; d. 1909. He studied at the Poly¬

technic School, whence he wa'S graduated in 1847 in the hydrographical engineers, and in 1866 he became their engineerin-chief. He be¬

came a member of the Institute; commander of the Legion of Honor and a member of the

Academy, elected in 1884. He was also a mem¬

ber of the bureau of longitudes and vice-presi¬

dent of the committee on hydrography. A proj¬

ect which he had long urged was to make

Paris a seaport by means of a ship-canal up the Seine. He is also known as an inventor and improver of astronomical instruments. He

wrote (Paris as a Seaport' ; (Notes on Sound¬

ings of the Sea' ; (A Hydrographic Study on the Bay of Rochelle,' *etc.*

BOUQUET OF WINE, a pleasant, non—

spirituous aroma characteristic of good wines, and named on account of its real or fancied resemblance to the odor of flowers and fruits.

The precise chemical nature of the substances that give rise to the ((bouquet" is not known.

They consist partly, without doubt, of a mix¬

ture of compound ethers, derived from fatty acids that are produced by the oxidation of al¬

buminous substances and vegetable fats or oils.

Essential oils of various kinds must also be in¬

cluded among them. According to some au¬

thorities, the kind of yeast that is used in the fermentation has much to do with the bouquet that is developed. Fruit blossoms are occasion¬

ally added to the must on account of the ((ferment oil" that is developed by their fermenta¬

tion, and which communicates a fruity smell to the wine. Elder flowers, when added to the must in this way, give rise to an aroma of Muscatel bouquet.

BOUQUETIN, boo-k'tan', a wild goat of

the Alps and Pyrenees. See Ibex.

BOURASSA, Henri, French-Canadian Na¬

tionalist and journalist, the son of Napoleon Bourassa (q.v.) : b. Montreal, 1 Sept. 1868. He sat for Labelle in the Dominion House of Com¬

mons 1896-1907, and has been a member of the Quebec provincial legislature from 1907-11. Pie was called to the bar in 1899, and is the founder and editor-in-chief of Le Devoir, a newspaper devoted to the furtherance of French-Canadian interests. He organized a campaign in 1910

against the Naval Service Bill of the Laurier administration. Both in the press and on the platform he is considered to be the most brillian exponent of the French Nationalist posi¬

tion, and on this subject he has written several pamphlets.

BOURASSA, Napoleon, French-Canadian

author and architect : b. L'Acadie, Quebec, 21

Oct. 1827; studied art at Quebec and Toronto and also at Florence and Rome ; a conspicuous example of his architectural work is the church of Notre Dame de Lourdes, Montreal. He is

the author of (Jacques et Marie,' (Nos Grand'

Meres' and several volumes of lectures.

BOURBAKI, boor-ba-ke, Charles Denis

Sauter, French general: b. Pau, 22 April 1816; d. Bayonne, 22 Sept. 1897. He entered the army in 1836, served for some time in Algeria and rose to the rank of brigadier-general in 1854.

He fought in the Crimea where he won distinc¬

tion at the Alma, the Inkerman and in the as¬

sault on Sebastopol, and also participated in the Italian campaign of 1859. In 1870 he com¬

manded the Imperial Guard at Metz, whence

he was sent to England on a secret mission to the Empress. Under Gambetta he organized

the Army of the North and commanded the

Army of the Loire. His attempt to break the Prussian line at Belfort, though ably conceived, ended in disastrous failure; in a series of desul¬

tory attacks on a much inferior force, 15-17

Jan. 1871, he lost 10,000 men. In the wretched retreat to Switzerland that followed on the 27th, reduced to despair by the ill success of his

plans, he attempted to commit suicide. From 1873 to 1879 he commanded the 14th Army

Corps at Lyons, and in 1881 he retired from service. Consult Grandin, (Le general Bour-bakP (Paris 1897).

BOURBON, Antoine de (Duke of Vendome, and afterward King of Navarre) : b. 22

April 1518; d. 17 Nov. 1562. He married, in 1548, Jeanne d'Albret, only child of Henry II, King of Navarre, and assumed the title of king in her right. After the accession to the throne of France of the young King Francis II, he endeavored to obtain the control of the affairs of that country, but failed through his want of energy and perseverance. On the death of Francis II, in 1560, he was made lieutenant-general of the kingdom and adviser to the

Queen-mother (Catherine de Medici) during

minority of her son after that; he definitely embraced Catholicism. Upon the breaking out

of the civil war, in 1562, he commanded the royal forces, and died of a wound received at the siege of Rouen. His son, Henry of

Navarre, became King of France, as Henry IV

(1594).

BOURBON, Charles (Duke of Bourbonnais) , French general known as Constable

de Bourbon ; son of Gilbert, Count of Montpensier and Clara of Gonzaga : b. 17 Feb. 1489; d. 6 May 1527. He received from Francis I, in the 26th year of his age, the sword of Constable.

By the coolness with which he faced death in posts of the greatest hazard he excited the ad¬

miration of his fellow-soldiers. When viceroy of Milan he won all hearts by his frankness and affability. His fame was not yet tarnished when the injustice of his king deprived him of his offices, banished him from France and brought the family of Bourbon into disgrace, in which state it continued until the conclusion of the reign of Henry III. Whatever may be the true cause of her conduct, it is certain that the Duchess of Angouleme, mother of Francis I,

strove to invalidate a formal donation of

Louis XII. The Constable, enraged at see¬

ing himself deprived of his estates by the mother of the king whom he had served with so much fidelity and zeal, listened to proposals made him by Charles V and the king of Eng¬

land. He experienced the usual fate of de¬

serters ; he was well received while his services were needed, but narrowly watched to secure his fidelity. Exposed as he was to the con¬

tempt of the Spanish nobility and the jealousy of the generals of Charles V, nothing remained to him but his courage and repentance. His ability, however, induced the emperor to be¬

stow upon him the command of an army, and to treat him with honor. In 1523 Francis I sought an interview with him, and offered him restitu¬

tion, but Bourbon doubted the good faith of the King and made his escape. His flight was a misfortune to France; the expedition of Fran¬

cis into Italy was arrested. Having been ap¬

pointed to the command of the imperial troops, he made an unsuccessful attack upon Marseilles, but contributed greatly to the victory of Pavia.

When Francis was carried a prisoner to Madrid he went there in person, that he might not be forgotten in the treaties between the two monarchs; but Charles V delayed concluding

them, and Bourbon discovered that he could not trust the Emperor, who had even promised him his sister in marriage. Compelled to smother his resentment, he returned to Milan, main¬

tained possession of Italy by the terror of his arms, and obtained so much authority as to become an object of suspicion to the Emperor, who, in order to weaken him, refused to grant him the necessary supplies. In order to pre¬

vent the. dispersion of his army he led the sol¬

diers to the siege of Rome, the plunder of which city he promised them. He was the first to mount the breach, and was killed by a ball, shot, it is said, by Benvenuto Cellini. His body being conveyed to Gaeta, his soldiers erected over it a splendid monument, afterward de¬

stroyed. Consult Coignet, (Francis the First and His Times) (London 1888) ; Hare,

(Charles de Bourbon, Constable of France*

(ib. 1910).

BOURBON, Louis, Spanish prelate: b.

1777; d. 19 March 1823. He was the son of Louis, brother of King Charles III of Spain, and the Duchess of Chinchon. The marriage

was concluded with the royal assent ; neverthe¬

less, it was doubted, after the death of Charles III, whether the prince

would be lawful heir to the throne, if a male descendant of the old line should be wanting. He therefore entered the Church, was appointed archbishop of

Seville in 1799, and of Toledo in 1800. A car¬

dinal's hat was also given him in 1800. After the imprisonment of Ferdinand VII at Valen-gay, he joined the party of the Cortes, and became very influential. He offered, in 1814, the constitution of the Cortes to Ferdinand VII for his signature; and the King having altered his determination, Bourbon lost favor. After the events which took place on the insurrection of the army at the island of Leon, he engaged in the revolution, and was president of the pro¬

visional junta before which the King swore, at Madrid, 9 March 1820, to abide by the constitu¬

tion of the Cortes of 1812.

BOURBON, Louis Henri (Due de),

French courtier, Prince of Conde: b. Versailles 1692; d. Chantilly, 27 Jan. 1740. As chief of the Council of Regency and superintendent of the king's education, he robbed the public treas¬

ury and . extorted huge bribes. Made prime minister in 1723, he persecuted the Protestants and granted exorbitant privileges to the India Company, in which he held shares. He was

entirely controlled by his mistress, the Mar¬

quise de Prie.

BOURBON, Isle of. See Reunion, Isle

DE LA.

BOURBON (bor-bon) FAMILY. The

founder of this family, which has governed

France, Spain, the two Sicilies, Lucca and

Parma, was Robert the Strong, who, in 861, became Duke of Neustria and in 866 lost his life in a battle against the Normans. Some trace his descent from Pepin l'Heristal, others from a natural son of Charlemagne and others from the kings of Lombardy. It is certain

that the two sons of this Robert were kings of France. The elder, named Eudes, ascended the throne in 888 and died in 898 ; the younger, Robert, in 922 and died in 923. The eldest son of this Robert was Hugh the Great, Duke of the Isle of France and Count of Paris and Orleans. Hugh Capet, son of Hugh the

Great (great grandson of Robert the Strong), BOURBON

founded the 3d French dynasty in 987. One of his descendants, named Robert, was the root of the elder line of the dukes of Burgundy, which became extinct in 1361. A descendant of this Robert, Henry of Burgundy, was first regent of Portugal in 1095, where his legitimate de¬

scendants became extinct in 1383. Pierre de Courtenay, a descendant of Hugh Capet, in the fifth generation, was father and ancestor of many emperors of Constantinople. The house

of Anjou descended from Hugh Capet, in the eighth generation, possessed the throne of

Naples for two centuries and for some time that of Hungary. Another descendant of

Hugh Capet, in the 10th degree, founded the house of Navarre, which continued from 1328

to 1425. A second family of Anjou, descended from Hugh Capet, in the 13th degree, gave

some distinguished princes to Provence. In

the same degree, the younger line of the pow¬

erful dukes of Burgundy derived its origin

from him. This line became extinct with the death of Charles the Bold, in 1477, whose suc¬

cessor, Maria, married Maximilian, Archduke

of Austria, and became grandmother of

Charles V. Robert, Earl of Clermont, second son of Saint Louis, married Beatrice, Duchess of Bourbon. In this way the city of Bourbon l'Archpmbault, or Bourbon les Bains, in the department of Allier (formerly Bourbonnais),

became the birthplace of the house of Bour¬

bon and Louis I, Duke of Bourbon, son of

Robert and Beatrice, its founder. Two

branches took their origin from the two sons of this Louis, Duke of Bourbon, who died in 1341. The elder line was that of the dukes of Bourbon, which became extinct at the death of the Constable of Bourbon in 1527, in the assault of the city of Rome. The younger was that of the counts of La Marche, afterward counts and dukes of Vendome. Of these,

Charles, Duke of Vendome, who died in 1537

and who had been the head of the house of Bourbon since the death of the Constable, had two sons, Anthony and Louis, founders respec¬

tively of the royal line of Bourbon and of the line of Conde. ' Henry, the son of Anthony, obtained the throne of France as Henry IV, when the house of Valois became extinct in 1589 by the murder of Henry III. His father had obtained the kingdom .of Navarre through his wife, who inherited it, and Henry now

added it to the French dominions. Anthony's younger brother Louis, Prince of Conde, was the founder of the line of Conde. There were, therefore, two chief branches of the Bour¬

bons — the royal and that of Conde. The

royal branch was divided bv the two sons of Louis XIII, the elder of whom, Louis XIV,

continued the chief branch, which, through his son, Louis (the Dauphin), and grandson,

Philip V, was separated into the elder or royal French branch and the younger or royal Span¬

ish branch; while Philip, younger son of Louis XIII, founded the house of Orleans, when he received the duchy of Orleans from Louis

XIV. The kings of the elder or French line of the house of Bourbon are as follows: Henry IV, Louis XIII, XIV, XV, XVI, XVII,

XVIII and Charles X. The house of Bourbon

consists of the following branches and mem¬

bers :

The Elder French Royal Line of Bour¬

bons as Distinguished from the Younger

Branch or House of Orleans. — The last

sovereigns of this line were three brothers, Louis XVI, Louis XVIII and Charles X (Louis

XVII, son of Louis XVI, never obtained the crown), all of whom were grandsons of Louis XV. Louis XVIII had no children, but

Charles X had two sons, namely : Louis An¬

toine de Bourbon, Duke of Angouleme, who

was Dauphin till the revolution of 1830 and died without issue in 1844, and Charles Fer¬

dinand, Duke of Berry, who died 14 Feb.

1820, of a wound given him by a political fanatic. The Duke of Berry had two chil¬

dren, (1) Louise Marie Therese, called

Mademoiselle d'Artois, and afterward by mar¬

riage Duchess of Parma, died at Venice, 1

Feb. 1864; and (2) Henri Charles Ferdinand

Marie Dieudonne, born in 1820, and at first called Duke of Bordeaux, but afterward Count de Chambord. Flis mother was the Princess

Caroline, daughter of Francis I, King of the two Sicilies. Charles X, having abdicated in favor of his grandson Henri, above mentioned, in 1830, and the Dauphin having renounced his claims on the French throne also in favor of the latter, the Count de Chambord was until his death in 1883 looked upon by his party as the legitimate heir to the crown of France, and was styled by them Henri V.

The Branch of the Bourbons Known as

the House of Orleans. — This branch raised to the throne of France by the revolution of 1830, and deprived of it by that of 1848, derives its origin, as already mentioned, from Duke Philip 1 of Orleans (d. 1701), second son of Louis XIII, and only brother of Louis XIV. By his second wife, Charlotte of the Palatinate, he left as his successor in the dukedom his son Philip, known as Duke of Chartres during his father's lifetime, and was regent of France dur¬

ing the minority of Louis XV. Philip, second duke, was succeeded by his son, Louis Philip (b. 1703), who married a princess of Baden and died in retirement in 1752, leaving a son of the same name, Louis Philip, Duke of Or¬

leans, who was born in 1725 and died in 1785.

The son of the last-mentioned duke was Louis Joseph Philip, the Duke of Orleans, whose

name figures in the first French revolution, who perished on the scaffold in 1793, after he had laid aside his princely name the year

be¬

fore and assumed that of (<Citizen Egalite.®

He left four children: (1) Louis Philip, be¬

fore the revolution Duke of Chartres, after his father's death Duke of Orleans, from 1830

to 1848 King of France, died 26 Aug. 1850, leaving a numerous family; (2) the Duke of Montpensier, who died in England in 1807 ;

(3) the Count de Beaujolais, who died at Malta in 1808; and (4) a daughter, Adelaide,

Mademoiselle d'Orleans, born in 1 777, died 31

Dec. 1847. The eldest son of King Louis

Philip was Ferdinand, Duke of Orleans (b.

1810, d. 1842), who married a daughter of

Frederick Louis of Mecklenburg-Schwerin and

left two sons: (1) Louis Philip, Count de

Paris, b. Paris, 24 Aug. 1838; and (2). Robert, Duke of Chartres, b. Paris 1840. Louis Philip having abdicated in favor of the former in 1848, the Comte de Paris till his death in 1894

was looked upon by the Orleanists as the true heir to the throne. He was married to his cousin, Isabella, a daughter of the Duke of Montpensier, and left issue. His son, the Di ke 348

of Orleans, is now regarded by the Monarchists as the legitimate heir to the throne.

The Spanish-Bourbon Dynasty. — In 1700

Louis XIV placed his grandson Philip, Duke

of Anjou, on the Spanish throne, who as Philip V founded the Bourbon dynasty in Spain. Philip V was succeeded in 1746 by his son, Ferdinand VI, who, dying in 1759 without heirs, was suc¬

ceeded by his brother, Charles III. To him succeeded (1788) his son Charles IV, who, in 1808, resigned the throne in favor of a successor nominated by Napoleon, and died at Naples in 1819. His son Fernando, Prince of the Astu¬

rias, obtained the crown on the fall of Napoleon and reigned as Ferdinand VII, dying 29 Sept.

1833, and leaving behind him two daughters by his third marriage, the elder of whom succeeded him as Isabella II. She was married, in 1846, to her cousin Francisco de Assis. In 1868 she had to leave Spain in consequence of the revo¬

lution, and in 1870 she renounced her claims to the throne in favor of her son Alphonso, who became Alphonso XII, and died in 1885, his son, Alphonso XIII, succeeding him.

The Royal Line of the Two Sicilies. —

The Two Sicilies being then a possession of the Spanish monarchy, in 1735 Don Carlos, the younger son of Philip V of Spain, obtained the crown and reigned over Sicily and Naples as Charles III. In 1759, however, he succeeded his brother Ferdinand VI on the Spanish throne

when he transferred the Two Sicilies to his third son Fernando (Ferdinand IV), on the

express condition that this crown should not be again united with Spain. Ferdinand IV

had to leave Naples in 1806; but after the fall of Napoleon he again became king of both

Sicilies under the title of Ferdinand I. He was succeeded by his son Francis I in 1825; Francis was succeeded by his son Ferdinand II in 1830; and the latter was succeeded by his son Francis II in 1859, who was deprived of the kingdom in 1860.

The Ducal Line of Parma. — This line,

like that of the Two Sicilies, was founded by a son of Philip V of Spain, namely: Don

Philip, his youngest son, who obtained the

duchies of Parma and Piacenza in 1748. Louis, grandson of Don Philip, obtained Tuscany like¬

wise (1802), with the title of King of Etruria.

The family did not long retain this honor, how¬

ever, being soon forced by the power of France to give up not only Etruria, but also Parma and Piacenza ; and it was not till 1847 that there was again a Bourbon Duke of Parma.

In 1859 the reigning Duke, Robert, had to leave his dominions, which were soon incorporated

in the kingdom of Italy. Consult Coiffier

Demoret, (Histoire du Bourbonnais et des

Bourbons5 (1824) ; Achaintre, (Histoire Chron-ologique et Genealogique de la Maison Royale de Bourbon) (1825); Coxe, (Memoirs of the

Kings of Spain of the House of Bourbon5

(1815) ; Lehes, (Genealogie des Bourbons de France, d'Espagne, de Naples, et de Parme5

(1880) ; Bingham, (The Marriages of the Bour¬

bons5 (1890) ; Dussieux, <Genealogie de la

Maison de Bourbon de 1256 a 18695 (Paris

1869) ; Stenger, (Le Retour des Bourbons5

(Paris 1908).

BOURBON-LANCY, lan-se, French water¬

ing place, department Saone-et-Loire, 52 miles south-southeast of Nevers by rail, famous for its thermal springs, containing chloride of sodium and iron. Its situation is notably fine, and by the Romans it was called Aquae Nisineii or Nis-ienses. Remains of the Roman baths are still to be seen here, and the town contains a hospi¬

tal, built by the Marquis d'Aligre, with 400 beds.

Pop. 4,469.

BOURBON-VENDEE. See Roche-sur-

YON-LE.

BOURBON WHISKY, a term applied to

Kentucky whisky made from a mixture of corn, rye and malt, of which the corn constitutes the larger part. In its distillation some of the oils and acids are allowed to remain. These, with age, undergo chemical action and are converted into aromatic ethers.

BOURBONNAIS, boor-bon-na', France,

a province and government of old France, with the title, first of a county and afterward of a duchy, lying between the Nivernais, Berry and Burgundy. It now forms the departments of

Allier, Cher and Nievre. It derived its name from the small town Bourbon l'Archambault,

from which the Bourbon family received their title. It formed the duchy of Bourbon for 200

years after 1327, and at the end of that period was annexed by the Crown. In 1661 the king gave it to the noble house of Bourbon-Conde, from whom it was taken at the Revolution.

Consult Montegut, (En Bourbonnais et en

Forez) (1880) ; Mauve, (Le Bourbonnais sous la Seconde Republique5 (1909).

BOURBONNAIS, Ill., village in Kanka¬

kee County, 56 miles south of Chicago, the seat of two important Roman Catholic schools,

Notre Dame Academy and Saint Viateur's Col¬

lege, opened in 1865. Pop. 611.

BOURBONNE-LES-BAINS, boor-bun—

la-ban, a town of France, department of Haute Marne, 21 miles east-northeast of Langres, with hot springs, which were resorted to by the Ro¬

mans. They contain much chloride of sodium, with a temperature which varies from 140° to 150° F., and frequented by some 3,000 invalids annually. The town has a 12th-century church, a large military hospital and interesting ruins of an ancient chateau. Saw and plaster mills represent the town's principal industries. Pop.

3,707.

BOURBOULE, boor-bool, La, France, a

health resort in the department of Puy-le-Dome, 22 miles southwest of Clermont. It is pictur¬

esquely situated amid striking scenery and its mineral thermal springs are visited by over 7,000 persons yearly. Its waters when bottled are extensively exported for medicinal use.

Pop. 1,314.

BOURCHIER, boor'chi-er, Arthur, Eng¬

lish actor: b. Speen, Berkshire, 22 June 1864.

He is a graduate of Oxford University, where he was prominent in amateur theatricals, and in 1889 went upon the stage. He has played in leading theatres in England and the United States and took the Royalty Theatre, London, in 1895, when he brought out one of his own adaptations, (The Chili Widow,5 which ran 300

nights, and the Garrick Theatre in 1900, where he produced Barrie's play, <The Wedding

Guest.5 In 1910 he joined Sir Herbert Tree at His Majesty's Theatre, where they produced some important and highly successful Shakes¬

pearean revivals, Since then he has toured

with his own company. In 1894 Mr. Bourchier married Miss Violet Vanbrugh, a talented

actress, who has since been generally associated with him as leading lady.

BOURDALOUE, boor-da-loo, Louis, the

founder of genuine pulpit eloquence in France: b. Bourges, 20 Aug. 1632; d. Paris, 13 May 1704. He was 16 when he entered the Society of Jesus, and his instructors successively en¬

trusted to him the chairs of polite letters, rhetoric, philosophy and moral theology. In

1669 he entered the pulpit and extended his reputation by attacking, with a powerful and religious eloquence, the passions, vices and errors of mankind. The dignity of his deliv¬

ery and the fire of his language made him dis¬

tinguished, even among the master-spirits of the arts and of literature in the time of Cor¬

neille and Racine. Louis XIV invited him, in 1670, to preach before the court, and Bourdaloue acquitted himself with so much acceptance that he afterward received invitations at 10

different times. After the repeal of the Edict of Nantes, he was sent to Languedoc in order to explain to the Protestants the doctrines of the Roman Catholic faith, with a view to win¬

ning them over, and in this delicate mission he showed remarkable address, and he suc¬

ceeded in this difficult business in reconciling the dignity of his office with the rights of man¬

kind. In his latter days he devoted himself to the care of hospitals, prisons and religious institutions. He well knew how to accommo¬

date his manner to the capacity of those to whom he gave instruction, advice or consola¬

tion. Beloved alike by men of diverse creeds and classes, he exercised authority over the minds of all, and no consideration could make him give up his openness and integrity of char¬

acter. His (Sermons and Moral Discourses'*

appeared in English (3d ed., 1855), and (Mar¬

ried Life: Its Obligations and Trials) (1897).

Consult Anatole Feugere, (Bourdaloue, sa

predication et son temps) (1874) ; J. B. E.

Tousserat, (Etude genealogique sur les Bourdaloue) (1900).

BOURDILLON, Francis William, Eng¬

lish poet: b. 22 March 1852. He has taught private pupils for many years and as a poet is widely known as the author of the lyric, (The Night Has a Thousand EyesP His published

works include (Among the Flowers) (1878) ; < Aucassin and NicoletteP edited and translated (1887); (Ailes d'Alouette> (1890); <A Lost

God> (1891); (Sursum Corda> ; <Nephele,> a

much admired musical romance (1869) ; (Min—

uscula) (1897) ; 'Through the Gateway*

(1902); and (Preludes and Romances) (1908).

BOURDON, boor'don, Sebastien, cele¬

brated French painter: b. Montpellier 1616; d.

1671. Being poor and without occupation, he enlisted as a soldier. After receiving his dis¬

missal, he visited Italy and studied under Pous¬

sin and Claude Lorraine. After his return to Paris, he firmly established his reputation by his (Martyrdom of Saint Peter) (Louvre Gal¬

lery) and became one of the 10 original mem¬

bers and rector of the Academy of Painting.

In 1652, driven from France by the religious troubles, he was appointed first painter to Queen Christina of Sweden. He afterward be¬

came distinguished in his own country by many great works, among which are the following: The (Descent from the Cross,* the (01d Kings of Burgundy in the Senate-house at Aix,* the (Adulteress. * As an artist his conception is good and his view far-reaching, but he lacks

in brilliancy of coloring effects. He was a good engraver on copper. He died while en¬

gaged in painting the ceiling of the Tuileries.

BOURDON, named after the inventor, a

barometer consisting of an elastic flattened tube of metal bent to a circular form and exhausted of air, so that the ends of the tube separate as the atmospheric pressure is diminished and approach as it increases. The Bourdon is com¬

monly known as the metallic barometer, al¬

though the aneroid is also metallic and both holosteric.

BOURDON DE L'OISE, lwaz, Francois

Louis, French revolutionist: b. Saint Remy,

about 1750; d. Cayenne, Guiana, after 1797. tie figured in the attack on the Tuileries, 10 Aug.

1792, and did much to bring to pass the execu¬

tion of the king and the fall of the Girondists, but from July 1794 adopted the side of the nobles and clergy. In 1795 he was sent as a commissioner to Chartres, where he behaved

harshly and brutally. After joining a Royalist club, he was proscribed and transported to

Cayenne in 1797, where he died not long after.

BOURG-EN-BRESSE, boorg-an-bres,

France, town, capital of the department of

Ain, situated 232 miles southeast of Paris, on the Reyssouse and the Cone. It is well built and ornamented with public fountains, one of which was erected to the memory of General Joubert. The streets are

narrow and clean.

On the Promenade du Bastion is a bronze

statue of Bichat, the celebrated anatomist, who pursued his early medical studies in the hos¬

pital here. The parish church of Bourg-en-Bresse is a handsome edifice of the 16th cen¬

tury. Outside the town is a magnificent hos¬

pital, surrounded by gardens, and the beautiful Gothic church of Brou, built by the direction of Margaret of Austria, daughter of Maxi¬

milian I. In front of the portal stands a curi¬

ous elliptical sundial, reconstructed by the celebrated astronomer Lalande, who was a na¬

tive of this place. Bourg-en-Bresse has a

library, a museum, a lyceum, seminary, two

hospitals, a lunatic asylum, some manufactories of linen and hosiery, tanneries, a cotton mill, grain market, *etc.* Its trade in grain, cattle, horses and wine is considerable. Pop. 20,545.

Consult Charvet, (Les fidifices de Brou a

Bourg-en-Bresse) (1897).

BOURGAULT-DUCOUDRAY, boor'go'-

du'-koo'dra', Louis Albert, French musical

critic and composer: b. Nantes, 2 Feb. 1840; d.

July 1910. He became a lawyer, but with a talent for music studied composition under A.

Thomas at the Paris Conservatory. With his

cantata, 'Louise de Mezieres,* he won the Prix de Rome in 1865 and took the three years'

study and travel course in Italy. In 1868, on his return to Paris, he founded a choral society to sing the works of older masters. His visit to Greece in 1872 to study the music of the Greek Church resulted in the publication of (Souvenirs d'une mission musicale en Grece,*

(Trente melodies populaires de Grece et

d'Orient* and (Etudes sur la musique ecclesiastique grecque.* He became professor of the 350

history of music at the Paris Conservatory in 1878. Among his works are the comic operas (L'atelier de Prague} 1858; (Michel ColomlP

(1887) ; (Thamara, > a grand opera (1891) ; a (Stabat Mater > ; choral works with orchestra, and orchestral compositions.

BOURGELAT, boorzh'la Claude, French

lawyer, founder of the veterinary schools and creator of the art of veterinary surgery in France: b. Lyons 1712; d. 3 Jan. 1779. He es¬

tablished the first veterinary school in his native town in 1762 and by his works on the veteri¬

nary art furnished the world with a complete course of instruction both in its theory and in its practice; they include (Elements d'hippi-atrique, ou nouveaux principes sur la con—

naissance et sur la medecine des chevaux)

(1750-53) and (Traite de la conformation ex-terieure du chevaP (1776) ; (Reglement sur les ecoles veterinaires de France} (1777).

BOURGEOIS, boor-zhwa, Charles Arthur,

Baron, French sculptor: b. 1838; d. 1886. He was a student of Duret and M. Guillaume.

Among the more notable of his works are the (Arab Washerwoman) ; the (Greek Actor, > in bronze; (Saint Agatha > ; (The Slaved (Hero and LeanderP in plaster; (The Delphic Pythos) and several busts in marble, (Saint Joachim }

and (Religion, > two stone figures for the church of Saint Eustace and the church of the Sorbonne, respectively.

BOURGEOIS, Leon Victor Auguste,

French politician : b. Paris, 29 May 1851. After holding several positions of importance, he be¬

came director of the ministry of the interior in 1886 and in 1887 prefect of police. He was minister of the interior in 1889, minister of public instruction 1892-93 and prime minis¬

ter 1895-96. He was for a time in 1898 Min¬

ister of Public Instruction for the second time, and in 1899 was at the head of the French delegation to the peace conference at The

Hague. In 1902-04 he was president of the

Chamber of Deputies and in 1906 was appointed Minister of Foreign Affairs under Sarrien as premier. In 1907 he was again at the head of the French delegation at The Hague. M. Bour¬

geois represented France on the commission

that drafted the Covenant of the League of Nations and was made first president of the Council of the League. In 1920 he became

president of the French Senate.

BOURGEOIS, Sir Peter Francis, English

painter: b. London 1756; d. 8 Jan. 1811. He is said to have descended

from a family of some importance in Switzerland. The father

intended the boy for a military career, but he was determined to be an artist. In this he was encouraged by Reynolds and Gainsborough.

Under the tuition of De Loutherbourg he early acquired a reputation as a landscape painter.

Between 1779 and 1810 he exhibited 103 pic¬

tures in the Royal Academy. In 1787 he was elected associate and, in 1793, full member of the Royal Academy. King Stanislaus of Po¬

land appointed him court painter and conferred upon him the honor of Knight of the Order of Merit in 1791, and George III made him his own personal landscape painter in 1794 and, about the same time, knighted him. Bourgeois lived with Joseph Desenfans, a picture dealer with wide connections, who was employed by

Stanislaus to collect for him works of art, the greater part of which ultimately remained on his hands. These were left by will to Bour¬

geois, who added to the collection, which is now known as the Dulwich Gallery, which had its origin in a bequest of 371 pictures made by Bourgeois to Dulwich College. With this

bequest went £12,000 for the maintenance of the collection and the repair of a wing of the college. Mrs. Desenfans and the college au¬

thorities added a like sum and a new building was erected, in which was a mausoleum erected to the memory of Bourgeois. Though pre-emi¬

nently a landscape painter, Bourgeois also has left a number of historical paintings and numer¬

ous portraits.

BOURGEOIS, bur-jois', a size of printing

type between brevier and long primer.

BOURGEOISIE, boor-zhwa-ze (derived

from bourg, a town), a name applied in France to citizens of towns who do not belong to the nobility or clergy, and in a narrower sense to townspeople occupying an independent position — merchants, tradesmen, independent artisans, lawyers, *etc.* In the early period of the Middle Ages this class was much oppressed and, as a consequence, it was poor and possessed little culture and refinement. In subsequent centu¬

ries it succeeded in raising itself in all these respects ; and latterly, attaining a position of political equality with the nobility and clergy, came to be spoken of as the <(third estate® (tiers etat). The word is now used in a somewhat vaguer sense than formerly and may be taken to correspond with the equally vague English appellation the (<middle classes.® The adjective signification of the word has, at the hands of some modern writers, come to signify a more or less unthinking conservatism. Bourgeois is also used in the sense of a civilian, or one not a soldier, of a master, a burgess or a ship¬

owner. The form bourgeoisie is generally used for citizenship, commonalty and, in a political sense, for the freedom of a city. Bourgeois also has the sense of rustic, as opposed to the polish of court society.

BOURGEOYS, Marguerite, French reli¬

gious teacher: b. Troyes, 17 April 1620; d. 12

Jan. 1700. In 1653, at the suggestion of Paul de Maisonneuve, she went to Canada to engage in teaching and opened the first school in Mon¬

treal in 1657. In 1659 she founded the Con¬

gregation of Notre Dame.

BOURGES, boorzh, France, capital of the

department of Cher, 124 miles south of Paris, on the canal of Berry and the Central Railroad, in an extensive plain at the confluence of the Auron and the Yevrette. When the Romans

invaded Gaul it was known as Avaricum, the capital of Biturigescubi. It was taken by Caesar, 52 b.c., and almost all its inhabitants slaugh¬

tered. Under the name of Bituriges, it was for 475 years the metropolis of Aquitania. During the Middle Ages many councils were held here.

The French clergy assembled here in 1438 to receive the famous charter known as the Prag¬

matic Sanction, by which the liberties of the Gallican Church were secured. Jacques Cceur

and Louis XI were both born here. The for¬

mer established here in 1463 a university, where Cujas taught during the 16th century.' It was abolished in the Revolution. Bourdaloue, the

famous preacher, was born here in 1632. Don Carlos resided here from 1839 to 1845, when he signed the abdication in favor of his son. The trial of Louis Blanc, Albert and others took place before the Supreme Court at Bourges, 7

March to 2 April 1849. The city is partly sur¬

rounded by a thick wall, flanked with lofty towers; its streets are irregularly laid out, while the houses are generally mean-looking, with

their gables to the street. Among the old build¬

ings which it contains are the magnificent

cathedral, larger than Notre Dame cle Paris, and one of the finest Gothic monuments of

Europe; the city hall, built at great cost by Jacques Coeur as a dwelling-house and now oc¬

cupied as the Palais de Justice; and the palace of the archbishop. The establishments of pub¬

lic instruction, including the imperial college, the theological seminary and the normal school, are well patronized. Bourges has manufac¬

tories of fine and coarse cloths, iron foundries and tan-yards. Government gun and powder

works add much to its prosperity. It has a large trade in wine, grain, cloth, cattle, hemp and millstones. Consult Archelet, (Au pays

de Jacques Coeur: Bourges) (1909). Pop. about 45,000.

BOURGET, boor-zha' Ignace, Canadian

clergyman : b. 1799; d. 1885. He was Roman Catholic bishop of Montreal, 1840-76. His con¬

demnation of the (Year Book) of the Institut Canadien in 1868 on account of its liberalizing tendencies, and his subsequent refusal of Chris¬

tian burial to Joseph Guibord, a member of the Institut, gave rise to a cause celcbre which was only finally decided on appeal to the British Privy Council.

BOURGET, Paul, French novelist: b.

Amiens, 2 Sept. 1852. After a brilliant course at the Lyceum of Clermont-Ferrand, where his father was professor of mathematics, and the College of Sainte Barbe, he graduated with

high honors in 1872. He began to write in 1873, but it was 10 years before he found his true work, though he contributed, the while, numerous articles to the magazines and pub¬

lished three volumes of striking verse, (La Vie Inquiete5 (1875) ; (EdeP (1878) ; and (Les Aveux5 (1881). His <Essais) (1883) was the

first indication of his strength. The second series, (Nouveaux essais de psychologie contemporaine) (1886), was a singularly subtle and

exceedingly searching inquiry into the causes of the pessimism then widely prevalent in

France. Bourget's first novel, P'irreparable5

(1884), was followed by (Cruelle enigme)

(1885); (Un crime d'amour5 (1886); (Andre

Cornells5 (1887), and (Mensonges) (1887).

The keen insight into the hidden springs of human motive and the marvelous, subtlety of psychological analysis of these stories, together with their clearness and refinement of style, have lifted Bourget into the front rank of contemporary French novelists. His intimate

knowledge of English and Latin life, and his travels in Spain and Morocco, gave him the material for ˆSensations d'ltalie5 (1891), and (Cosmopolis5 (1892); and he recorded his im¬

pressions (1894) of travel in the United States.

Other novels are (Le disciple,5 (Notre coeur,5

(La terre promise,5 (Un saint,5 (Antigone,5

(Drame de famille5 0900) ; (Un homme d'af¬

faires5 (1901); (Le fantome5 (1901). Bourget was admitted to the Academy in 1894. Among other and later works of his are (L'emigre'

(1907); (L'envers du decor5 (1911); (La

Crise5 and Pages de critique et de doctrine5

(1912). Consult Giraud, (M. Paul Bourget'

(1911), and Plat, c Figures de ce temps'

(1913).

BOURGOIN, boor-gwan, France, town,

capital of a canton in the department Isere in southeastern France. It is situated on the

river Bourbre and was called by the Romans Bergusium. It contains important paper, linen and woolen industries. Pop. 5,623.

BOURGOING, boor -gwan, Jean Francois,

French diplomatist: b. Nevers, 20 Nov. 1748; d. Carlsbad, 20 July 1811. While at a military school in Paris his talents were so marked that he was educated by the government at the

University of Strassburg for the diplomatic

service. After four years spent in Germany

on diplomatic missions, he went to Madrid in 1777 and was secretary of legation there seven years, writing in that time his noted (Nouveau voyage en Espagne, ou tableau de l'etat actuel de cette monarchic5 (1789). In 1791 he was Minister Plenipotentiary to Spain, Minister to Saxony in 1808, and was at various times em¬

ployed on diplomatic missions to Germany and Holland. Besides the work above named he

wrote (Memoires historiques et philosophiques sur Pie VI5 (1789), and (Voyage du due du Chatelet en Portugal5 (2 vols., 1808).

BOURIGNON, boo-re-nyon, Antoinette,

Flemish visionary: b. Lille, 13 Jan. 1616; d.

Franeker, 30 Oct. 1680. She was born so ugly that her parents held a consultation to deter¬

mine whether it would not be better to destroy her as a monster. She was spared, but her infancy was spent in neglect and solitude. The first books she put her hands on were lives of early Christians and mystical tracts, which she read eagerly. She entered a convent and was subsequently in charge of a hospital at Lille, but was obliged to leave on account of her re¬

ligious vagaries. She now traveled through

various countries, her enthusiasm gaining for her many proselytes. She held that religion consists in internal emotion and is independent of knowledge or practice. Her views were

adopted by large numbers of Protestants and Roman Catholics, and in the 17th and 18th cen¬

turies Scottish Presbyterian ministers were for a long time compelled to renounce Bourignian-ism at their ordination. Her works were edited by Poiret (19 vols., Amsterdam 1680-86; 2d

ed., 1717). Several of her works have been translated in English, e.g., <Treatise of Solid Virtue5 (1699) ; (The Light of the World'

(1696, in English 1863) ; Restoration of the Gospel Spirit5 (1707).

BOURINOT, boo're-not, Sir John George,

Canadian publicist: b. Sydney, Nova Scotia, 24

Oct. 1838 ; d. 14 Oct. 1902. He was educated at Trinity College, Toronto; founded and edited the Halifax Reporter ; became clerk of the Do¬

minion Parliament in 1880; in 1892 became

president of the Royal Society of Canada, and was created K.C.M.G. in 1898. His publica¬

tions include (The Intellectual Development of the Canadian People5 (1881) ; (Manual of Con¬

stitutional History5 (1888); Parliamentary

Government in Canada5 (1892) ; Parliamentary Procedure and Practice5 (1884) ; Tow Canada 352

is Governed> (1895) ; (Canada's Intellectual Strength and Weakness5 (1893) ; (Canada

Under British Rule) (1900) ; (Cape Breton and Its Memorials of the French Regime5 (1892); (Lord Elgin5 (1903).

BOURMONT, boor-mon, Louis Auguste

Victor (de Chaisnes, Comte de), marshal of

France: b. 2 Sept. 1773, at the castle of Bourmont in Anjou; d. there, 27 Oct. 1846. At an early age he took part in the campaign in La Vendee. Afterward he went to England as

the envoy of the anti-revolutionary party. On the collapse of the Royalist struggle in La Vendee in 1799, Bourmont led a guerilla band, but was soon forced to surrender. He won

Napoleon's favor but, becoming suspected of

intrigue, was imprisoned at Besangon. He es¬

caped to Lisbon, where Junot found him, and on his plighting his good faith he was again restored to favor and was advanced by Napo¬

leon, under whom he had distinguished himself at Dresden and Nogent, to the rank of general of division. Bourmont switched his allegiance many times from Napoleon to the Bourbons

and back again. Some years after, as com¬

mander of the army of intervention in Spain, he obtained some brilliant successes. His

greatest victory was the conquest of Algiers, which procured him a marshal's staff in 1830.

After the revolution of July 1830, he followed the banished dynasty into exile. In 1833, Dom Miguel, king of Portugal, placed him at the head of his troops which were to act against the adherents of Dom Pedro, but he was un¬

successful. He afterward sought to act in the interests of the Carlists in Spain, and when he at last returned to his native country, found that he had almost entirely lost his popularity and accordingly retired for the rest of his life to his estate in Anjou.

BOURNE, Edward Gaylord, American

educator: b. Strykersville, N. Y., 24 June 1860; d. New Haven, Conn., 24 Feb. 1908. He was graduated at Yale in 1883 and was professor of history there from 1895. He wrote (The

History of Surplus Revenue of 1837, 5 was one of the editors of the Yale Review and pub¬

lished a collection of his writings on historical subjects under the title of (Essays in Histor¬

ical Criticism5 (1901. 1913). Among his other works may be cited (Historical Introduction to the Philippine Islands) (1903) ; (Spain in America5 (1904) ; (Life of J. L. Motley5

(1905) ; (Discovery, History and Conquest of the Philippine Islands5 (1907) ; also transla¬

tions of the (Narrative of De Soto5 (1904), and the (Voyages of Champlain5 (1905).

BOURNE, Francis Cardinal, English

Catholic clergyman : b. Clapham, 23 March

1861. His father was a convert to the Church, and the future archbishop was educated at

Ushaw; at Old Hall, Ware; at Saint Sulpice, Paris, and at Louvain University. He was or¬

dained in 1884 by Bishop Coffin and spent

the next five years as assistant priest at Blackheath, Mortlake and West Grinstead, where,

having the spiritual care of boys, he showed that interest in their

training and fortunes which had been fostered by a stay with the Salesians in Turin. Already devoted to the

education of priests in its earlier stages, he left the orphan boys at West Grinstead in 1889, at the call of Bishop Butt, to found the dio¬

cesan seminary at Wonersh. He retained the

rectorship there till 1898, together with the chair of moral theology and Holy Scripture, and made the institution so much of a model that it became, in a sense, the precedent for separate diocesan seminaries and the best illus¬

tration of arguments he himself set forth in a series of still quoted articles in The Tablet.

In 1896 he was consecrated titular bishop of Epiphania and coadjutor to the bishop of South¬

wark, whom he succeeded in 1897. In Septem¬

ber of that year the new bishop took a lead¬

ing part in the Saint Augustine celebrations at Ebbsfleet and a little later he accompanied Cardinal Vaughan to Arles, a journey of mem¬

orable impressions. In the Southwark diocese a nexus of social and (<rescue55 enterprises was formed under his rule. He enlisted lay co¬

operation in rescue work, and, adopting Car¬

dinal Vaughan's watchword of (<personal serv¬

ice,55 he established two ladies' settlements for work amongst the poor. The development of

Catholic boys' brigades, which marked his stay in Southwark, was the outcome of his old in¬

terest on boys' behalf. While yet the young¬

est member of the English episcopate, he

was translated to Westminster as Cardinal

Vaughan's successor in August 1903. As the

fourth of a glorious line — Wiseman, Manning, Vaughan, Bourne — he has a heritage of great traditions, understood, respected, yet interpreted and tempered in accord with the needs and

ideals of a new generation. A strong man in his quietness and confidence, he made that

strength felt, to the admiration of all England, in his conduct of the Eucharistic Congress of 1908, and especially in his handling of the diffi¬

cult position created by the action of the gov¬

ernment in regard to the proposed procession of the Blessed Sacrament in the public streets.

At the consistory held in November 1911, the archbishop assumed (<the hire of Westmin¬

ster,55 his elevation to the cardinalate being hailed with joy by his flock and with satisfac¬

tion by his countrymen in general. In 1914 he assisted, with Cardinal Gasquet, at the conclave which elected Benedict XV to the see of Rome.

BOURNE, George, American clergyman

and anti-slavery writer: b. Westbury, Wiltshire, England, 1780; d. New York, 14 Dec. 1845.

In 1804 he settled at Harrisburg, Pa., where he set up a printing office. He was an earnest advocate of the total and immediate abolition of slavery, a position which aroused consider¬

able opposition to him, and in 1815 he formed a church composed of non-slaveholders. His

ultra-radical views at last obliged him to re¬

move to Germantown, Pa. Afterward he re¬

sided for intervals at Sing Sing, N. Y., Quebec and New York, where

he founded a paper,

The Protestant Vindicator. He wrote (The

Book and Slavery Irreconcilable5 (1815) ;

‘Lectures on Ecclesiastical History5 (1822) ; (Pictures of Quebec5 (1830); ‘Slavery Illus¬

trated in Its Effects upon Women5 (1834).

BOURNE, Hugh, founder of the sect of

Primitive Methodists in England: b. Fordhays, Staffordshire, 3 April 1772; d. Bemersley, Staf¬

fordshire, 11 Oct. 1852. The revival of camp meetings, following American practice, by him¬

self and others, was considered inadvisable by the authorities of his church; in 1808 he was expelled; two years later the disruption was

complete. Mr. Bourne and his friends 20 in number formed a separate organization and

Hugh Bourne was acknowledged their elder.

The name of Primitive Methodists was

adopted in 1812, but by their opponents they were long styled ˆRanters.® The sect is now a powerful body in England, numbering, in 1916

205,000 members. In 1844 Bourne visited the United States, where his preaching excited

much attention. He also visited Canada, Scot¬

land and Ireland, where he met with great

success in his work. For the greater part of his life Bourne worked as a carpenter and

builder, while pursuing his religious vocation.

He published a (History of the Primitive

Methodists5 (1823), and founded, in 1824, The Primitive Methodist Magazine. See Primitive

Methodists.

BOURNE, Jonathan, American legislator :

b. New Bedford, Mass., 23 Feb. 1855; after a short course of study at Harvard University in 1877, he went to sea, was shipwrecked on Formosa, saved and taken to Oregon, where

he practised law, became president of various mining and commercial corporations and en¬

gaging actively in Republican politics, was

elected member of the Oregon House of Repre¬

sentatives 1885, 1896, 1897 and to the United States Senate for the term 1907-13. He was a prominent advocate of reform and became

chairman of the PostOffice Committee whoso

final work inaugurated parcel post service. He was defeated in the 1912 nomination for re-election to the national senate.

BOURNE, Vincent, English poet: b. 1695;

d. 2 Dec. 1747. After studying at Westmin¬

ster, he entered Trinity College, Cambridge, at the age of 19. He took his master's

degree in 1721, and was later appointed usher in the Westminster

School. His poetical career was not very fruitful, and is best expressed in a volume of Latin verse OPoemata5) pub¬

lished in 1734, and since enlarged and repub¬

lished. Bourne seems to have possessed some classical charms as a versifier, for both Cowper and Charles Lamb admired his rhymes and even rendered some of them into English. Be¬

sides being simple and graceful, as classical poetry invariably was, Bourne's production was characterized by considerable pathos, a thing the earlier classical writers never fell in with.

Some of his enthusiastic admirers have even gone so far — rather too far, it seems — as to class Bourne with Tibullus, Propertius, An-sonius, and almost any of the classical writers save Ovid. His epitaphs, however, are models of their kind.

BOURNEMOUTH, born'muth, a famous

watering-place in the south of England, 30

miles southwest of Southampton, on the Eng¬

lish Channel, at the southwest corner of Hamp¬

shire, near the boundary of Dorsetshire. It is within the limits of the parliamentary bor¬

ough of Christchurch, but forms a municipal borough by itself, incorporated in 1890. It is situated on a semicircular bay at the mouth of a small stream, the Bourne, whence it derives its name. Owing to its picturesque scenery and mild and equable climate it is a favorite winter¬

ing resort for persons of the well-to-do class who are afflicted with pulmonary complaints.

It is to a large extent laid out in villas and de¬

tached houses. The Westover Gardens in the

centre of the town are a favorite resort; they include a winter garden, where orchestral con¬

certs are regularly given. There are two piers, three arcades, assembly rooms, baths, electric cars, *etc.* The buildings include hospitals, a sanitorium, home for consumptives and some

handsome churches, among the latter being the new Bennett Memorial Church and Saint

Peter's Church, both beautiful Gothic buildings.

In the churchyard of the latter lie buried Will¬

iam Godwin, Mary Wollstonecraft, and their

daughter, the wife of Shelley. The centre of a few fishermen's huts as late as 1838, Bourne¬

mouth had in 1911 a population of 78,674.

BOURNONITE, a lead-copper sulphanti—

monite belonging to the orthorhombic system

of crystals. It occurs both crystallized and un¬

crystallized, has considerable metallic lustre and generally is of steel-gray color. It is found chiefly in the Harz Mountains, Bohemia, Mex¬

ico, Chile and the United States (in Colo¬

rado, Arkansas and Arizona).

BOURRIENNE, boo-ryen, Louis Antoine

Fauvelet de, French historian and diplomatist: b. Sens, 9 July 1769; d. Caen, 7 Feb. 1834. He was educated with Bonaparte at the school of Brienne, where a close intimacy sprang up be¬

tween them. On their separation in 1785. when Bonaparte set out to attend the ficole Militaire in Paris, they vowed an eternal friendship. At the age of 19 he proceeded to one of the Ger¬

man universities, with the view of studying law and languages. He returned to Paris in 1792, and renewed his early friendship with Bonaparte, who employed him in drawing up,

together with General Clarke, the text of the Treaty of Campo Formio. From this period

BoUrrienne's diplomatic career commenced. He

accompanied Bonaparte as his private secre¬

tary on his expedition to Egypt, and afterward continued in that capacity on his elevation to the consulate. His avarice had already brought him to the verge of ruin, but, nevertheless, in 1804 he was nominated by the Emperor his

Minister-Plenipotentiary at Hamburg. Here his duty was to maintain a close watch on the methods of enforcing the Continental System.

He removed about 1,000,000 francs from the

public treasury and this led to his recall and removal. In the end of 1813 he returned to France, where he received the appointment of director of the posts, and in 1814 was made prefect of police. On the abdication of Na¬

poleon he paid his court to Louis XVIII, who, on his restoration, nominated him a minister of state. The revolution of July 1830, and the loss of his private fortune affected him so much that he lost his reason. He was removed

to Normandy, and spent the last two years of his life in a lunatic asylum at Caen, where he died. His (Memoires sur Napoleon, le Directoire, le Consulat, l'Empire et la restauration,5

edited by Villemarest (1829-31), contain many interesting particulars of the youth of Napo¬

leon, and also of the history of the Directory and consulate, although they are blamed for want of accuracy in many points of detail.

BOURSAULT, boor-so, Edme, French

writer: b. 1638; d. Montlugon 1701. Having

gone to Paris and engaged in literature, he both gained and lost the favor of royalty, and produced pieces for the stage with permanent success; among others, (Esope a la ville,5 and 354

Esope a la cour,* which still continue on the stage. His two tragedies (Marie Stuart* and <Germanicus> are forgotten. Boursault had the misfortune to quarrel with Moliere and Boileau.

He wrote a severe criticism on the Ecole des femmes) under the title of (Le portrait du peintre.* Moliere chastised him in his (Im¬

promptu de Versailles.* To revenge himself on Boileau, who had ridiculed him in his satires, he wrote a comedy called Eatyre des Satyres.*

His name was later taken off after a recon¬

ciliation with Boileau. Consult Taillandier, St.

Rene, Etudes litteraires* (Paris 1881).

BOURSE, boorz, the name applied to a

stock exchange in European countries. The

most important of these bourses are, naturally, in the principal cities — at Paris, Berlin, Vienna, London and Petrograd. Some of them are

lodged in very costly buildings. The Paris

Bourse, for instance, is built in Grecian style of architecture, with handsome Corinthian pil¬

lars. See Exchange.

BOUSSA. See Bussang.

BOUSSET, boos'set, Johann Franz Wil¬

helm, German religious historian and critic : b.

Liibeck 1865. He studied in Erlangen, Liibeck, Gottingen, Leipzig and Heidelberg, and became professor of New Testament exegesis at Got¬

tingen in 1896. In 1903 he became definitely identified with the publication of literature relating to biblical criticism, though he had been, as early as 1897, one of the editors of the Teologische Rundschau and he joined the editorial staff of Forschungen zur Religion und Litteratur des alten und neuen Testaments

in 1903. He was a frequent and important

contributor to the Encyclopaedia Biblica) and other publications of a like nature treating of a wide variety of biblical subjects, and doing his most important work in apocalyptic litera¬

ture, history, eschatology and Gnosticism. His published works include (Jesu-Predigt in ihrem Gegensatz zum Judentum* (1892) ; JText-kritische Studien zum neuen Testament (1894) ; <Antichrist) (1894) ; (Kommentar zur Offen-barung Johannis) (1896) ; (Die Religion des Judentums im neutestamentlichen Zeitalter*

(1903) ; (Das Wesen der Religion) (1903) ; Eauptprobleme der Gnosis* (1907) ; (Die

Bedeutung der Person Jesu fur das Glauben

(1910) ; Eaith of a Modern Protestant* (New York 1913).

BOUSSINGAULT, boo-san-go, Jean Bap¬

tiste Joseph Dieudonne, French chemist:

b. Paris, 2 Feb. 1802 ; d. there, 12 May

1887. He was educated at the School of

Mines of Saint Etienne. He went to South

America in the employment of a mining

company, where, in addition to making ex¬

tensive travels and valuable scientific re¬

searches, he also served under General

Bolivar in the South American war of inde¬

pendence. Returning to France he became pro¬

fessor of chemistry at Lyons ; in 1839 was made a member of the Institute, was appointed to the chair of agriculture in the Conserva¬

toire des Arts et Metiers in Paris, and then made Paris his chief residence. In 1857 he was made commander, and later grand officer of the Legion of Honor. Boussingault pub¬

lished numerous valuable papers embodying the results of his scientific researches. His works deal chiefly with agricultural chemistry, and in¬

clude Economic rurale) (translated into Eng¬

lish and German), (Memories de chimie agricoLe et cte physiologie) ; (Agronomie, chimie agricole et physiologies *etc.* (8 vols., 1860-91).

BOUSSINGAULTITE, boo-san-go'tit, a

native hydrated sulphate of magnesium and

ammonia, having a formula (NHˆSCh.MgSCh

-f-6H2O. It has a specific gravity of about 1.7.

It occurs with boracic acid (q.v.) in the Tuscan lagoons, especially at the fumaroles of Mount Cerboli. Artificial crystals are prisms belong¬

ing to the monoclinic system. A related mineral occurs in soft, white, granular masses in So¬

noma, Cal.

BOUSTROPHEDON, a kind of writing

found on Greek coins, and in inscriptions of the remotest antiquity. The lines do not run in a uniform direction from the left to the right, or from the right to the left ; but the first begins at the left and terminates at the right ; the second runs in an opposite direction, from the right to the left; the third, again, from the left; and so on alternately. It is called boustrophedon (that is, turning back like oxen) because the lines written in this way succeed each other like furrows in a ploughed field. The laws of Solon were cut in tables in this manner. Consult Roberts, E. S., (An Introduction to Greek Epigraphy,* part ii (Cam¬

bridge 1887).

BOUTELLE, bow-tel', Charles Addison,

American sailor, editor and congressman : b.

Damariscotta, Me., 9 Feb. 1839; d. 21 May

1901. He saw early service in the merchant marine and from 1862 in the South Atlantic blockading squadron during the Civil War, tak¬

ing part as lieutenant in command of the

Nyanza in the capture of Mobile. In 1870

managing editor and in 1874 proprietor of the Bangor Whig and Courier , he interested him¬

self in politics, was appointed delegate to Re¬

publican national conventions in 1876, 1880, 1884

and 1888, and was elected member of the Na¬

tional House of Representatives from the 48th to the 56th Congress (1880-1901). In the 51st, 54th and 56th Congresses he was chairman of the House Committee on Naval Affairs and

the upbuild of the new United States navy was largely due to his efforts.

BOUTERWEK, bou'-ter-vek, Friedrich,

German philosopher: b. 15 April 1766, at Oker, a village not far from Goslar, in North Ger¬

many; d. Gottingen, 9 Aug. 1828. He was at first a follower of Kant but finally attached himself to Jacobi. In 1791 he became lecturer at Gottingen and six years later was appointed to the chair of philosophy there. His (Ideen zu einer allgemeinen Apodiktik) was the immedi¬

ate fruit of his intimate acquaintance with the philosophical views of Fr. H. Jacobi. This

work was published in two volumes, 1799. It was afterward completed by the (Manual of

Philosophical Knowledge* (1813), and by the

(Religion of Reason * (1824). In this work, as well as in his (Aesthetik) (1806-24), he had to contend with many powerful antagonists.

Bouterwek has gained a permanent reputation

by his (Geschichte der neuern Poesie und

Beredsamkeit* (History of Modern Poetry and

Eloquence) (1801-19), a work which, though

unequal in some respects and in parts, espe¬

cially in the first volume, partial and superficial, is an excellent collection of notices and origi-BOUTMY — BOUTS RIMES

nal observations and may be considered one

of the best works of the kind in German lit¬

erature. Among his minor productions, a selec¬

tion of which he published in 1818, are many essays, which are superior to the best of his larger speculative works ; for instance, the in¬

troduction to the ‘History,’ in which he gives an account of his literary labors until that period with great candor and with almost ex¬

cessive severity against himself. His (History of Spanish Literature’ has been translated into Spanish, French and English. He has also

written ‘Paulus Septimus’ (1795) ; ‘Graf

Donamar’ (1791) ; and Ramiro’ (1804) ; ‘Aesthetik > (2 vols., 1806); ‘Kleine Schriften,’

with his autobiography (1818).

BOUTMY, boot’me, Emile, French author

and educator: b. Paris, 1835; d. 1906. For a time he was a journalist and in 1865-69 was professor of the history of civilization and also of the comparative history of architecture at the Ecole Speciale d’Architecture. In 1872 he was one of the founders of the Ecole Libre des Sciences Politiques, and for many years was professor of comparative constitutional

history there. In 1898 he was elected to the Academy of Moral and Political Sciences. He has published many works which are standard in their field, including (Introduction au cours d’histoire comparee de l’architecture’ (1869) ; ‘Etudes de droit constitutionnel : France, Angleterre, Etats-Unis’ (1885) ; ‘Developpement de la constitution en Angleterre’ (1886); ‘Les

Latins’ (1894) ; ‘Essai d’une psychologie po¬

litique du peuple anglais au XIXe siecle (1901; Eng. trans., 1904) ; (Elements d’une psychologie politique du peuple americain’ (1902).

BOUTO, booto, or TUCUXI, Indian

names for the dolphin (Inia geoffrensis) of the Amazon. The color variations are extraor¬

dinary, some individuals being wholly pink,

others black above and pink below. They are seven or eight feet in length.

BOUTROUX, boo'troo', Etienne Emile

Marie, French philosopher: b. Montrouge

(Seine), 2$ July 1845. He was educated at

the Lcole Normale Superieure and at Heidel¬

berg, became professor of philosophy at Mont¬

pellier in 1874 and subsequently professor of philosophy at the University of Paris. He was elected to the French Academy in 1912. In

1913 he received the degree of LL.D from

Princeton University. From an analysis of

logic and of cause he contends that the former allows us to perceive permanency, immobility and fatality alone, while the latter enables us to distinguish motion, finality, contingency and progress. His writings include (De la contingence des lois de la nature' (1874; 6th ed.

1907) ; 'De l'idee de la loi naturelle dans la science et la philosophic contemporaine' (1895; English translation, 1911) ; (Questions de mo¬

rale et d'education' (1895; 4th ed., 1905; Eng¬

lish translation, Education and Ethics,' by

Fred Rothwell 1913); 'Pascal' (1900; 4th ed., 1907; English translation, 1902); ' William

James' (1911; 2d ed., 1912; English transla¬

tion London 1912); ‘Henri Poincare’ (1913).

He also published a translation of the ‘Philos¬

ophic der Griechen’ by Eduard Zeller (Vol. I, 1877; Vol. II, 1882).

BOUTS, Dierick or Thierry, early Dutch

painter: b. Haarlem, probably about 1420; d.

Louvain, 6 May 1475. For a long time hq was confused with a contemporary painter of Lou¬

vain named Stuerbouts, but recent studies have disentangled the two personalities. It is thought that Bouts may have studied with Roger van der Weyden. While history is silent about

most of the facts of his life, we know that he was in Louvain in 1447, for he was mar¬

ried there in that year. In 1468 he received the title of municipal painter. In 1473 he re¬

married, still in Louvain, where he died two years later. His long residence there, together with the character of his work, would almost force us to include him in the Flemish school.

His two sons, Thierry II and Albrecht, con¬

tinued his work without inheriting his genius.

The altar of one of the chapels of Saint Peter’s at Louvain is probably to be considered Bouts’

most important work, although only the centre panel, ‘The Last Supper,’ now remains there, the wings having been carried off to the Munich Gallery. In Saint Peter’s, also, is a second altar by him, representing the ‘Martyrdom of Saint Erasmus.’ Other important works by

the master are to be seen at Berlin (‘The Cru¬

cifixion’). The ‘Head of a Man’ in the Met¬

ropolitan Museum of New York is an admir¬

able example of his portraiture. We may no¬

tice, beside, ‘The Virgin with the Infant Christ’

at Antwerp. ‘The Martyrdom of Saint Hip—

polyte’ at Bruges, ‘The Lamentation over the Body of Christ’ in the Louvre and ‘The Cruci¬

fixion’ at Granada. Of his pictures for the Town Hall of Louvain, two survive in the

Brussels Gallery — ‘The Unjust Judgment of

Emperor Otho IIP and ‘The Punishment of

the Guilty Empress.’ It is not possible to overlook the art-historical point of view in studying Bouts, as his period was one in which the means of the painter were being developed, and in this respect we must notice the progress he made in the knowledge of representing space.

Neither the van Eycks nor Van der Weyden

equalled Bouts in this. But from the aesthetic point of view he is even more remarkable. His idea of form and composition is an elevated one, but we must take him as a colorist to find his greatest excellence. “Beyond a doubt Hans Memling, Gerard David, Geertgen van Sint

Jans and Quentin Metsys were indebted to

Bouts for important impulses toward the pure painter-qualities and for a more intimate con¬

ception of nature.” Consult Friedlander,

‘Meisterwerke der niederlandischen Malerei

der 15 und 16 Jahrhunderts’ ; Heiland, ‘Dirk Bouts und die Hauptwerke seiner Schule’

(Strassburg 1902), and Fierens-Gevaert, ‘Les

primitifs Flamands’ (Brussels 1908).

BOUTS RIMES, boo-re-ma (French),

words or syllables which rhyme, arranged in a particular order and given to a poet with a subject, on which he must write verses ending in the same rhymes, disposed in the same order.

Menage gives the following account of the or¬

igin of this ridiculous conceit, which may be classed with the eggs and axes, the echoes, acrostics and other equally ingenious devices of learned triflers. “Dulot (a poet of the 17th century) was one day complaining, in a large company, that 300 sonnets had been stolen from him. One of the company expressing his aston¬

ishment at the number, ‘Oh,’ said he, ‘they are blank sonnets or rhymes (bouts rimes) of 356

all the sonnets I may have occasion to writer 55

This ludicrous statement produced such an

effect that it became a fashionable amusement to compose blank sonnets, and in 1648 a 4to volume of bouts rimes was published. Sarra-zin’s (Dulot vaincu, ou la defaite des Bouts Rimes5 is an amusing performance. Etienne

Mallemans wrote sonnets on the basis of

rhymes furnished him by the Duchess of

Maine. Addison ridicules the amusement in

the Spectator, No. 60.

BOUTWELL, bout’well, George Sewell,

American statesman : b. Brookline, Mass., 28

Jan. 1818; d. Groton, Mass., 27 Feb. 1905. He was admitted to the bar in 1836, served in the State legislature in 1842-51, was leader of the Democratic party in his State and Governor of Massachusetts 1851-52; was an organizer of the Republican party in 1854, and was appointed the first commissioner of the newly established Department of Internal Revenue in 1862. He

was representative in Congress 1863-69, one

of the managers of the impeachment trial of President Johnson; Secretary of the Treasury in 1869-73 and a United States senator in

1873-79. In 1877 he was appointed by Presi¬

dent Hayes to prepare a codification of the statutes-at-large. The result was the second edition of the (United States Revised Statutes) (1878). He was an overseer of Harvard and

secretary of the Massachusetts Board of Edu¬

cation, and he prepared many valuable reports.

Besides numerous speeches, he published Edu¬

cational Topics and Institutions 5 (1859) ; Man¬

ual of the United States Direct and Revenue Tax5 (1863) ; (The Taxpayer's ManuaP

(1865) ; ˆSpeeches and Papers5 (1867) ; (The Constitution of the United States at the End of the First Century) (1896) ; (The Crisis of the Republic 5 (1900) ; (Reminiscences of Sixty Years in Public Affairs5 (1902). After 1898

he was especially prominent as a leader of the Anti-Imperialists and vigorous opponent of the Philippine policy of the administration.

BOUVARD, boo-var', Joseph Antoine,

French architect: b. Saint-Jean-de-Bournay, 19

Feb. 1840. He was a pupil of Constant Dufeux, whom he assisted in his work connected with the Pantheon, the Law School and the Palace of the Luxembourg. He was appointed inspec¬

tor of public works in Paris and, in 1879, was city architect, making himself famous by his work on the Theatre Lyrique, the church of Saint Lawrence and the barracks of the Re¬

publican Guard. He transformed the old grain market into a bourse, constructed the railway stations of Sainte Etienne and Marseilles, was architect of the Pavilion of the City of Paris at the Exposition of 1878 and created the mag¬

nificent central dome of that of 1889. He had charge of the decoration of Paris at the time of the visit of the Emperor of Russia and won great popularity by the magnificence of the festivals which he arranged. In June 1897, he was appointed director of the newly created administrative direction of architecture and

promenades. He took an important part in the preparation for the Universal Exposition of

1900.

BOUVARDIA (named in honor of Bouvard, physician to Louis XIII and superintend¬

ent of the Royal Gardens in Paris), a genus of about 25 species of American shrubs or per¬

ennial herbs of the family Rubiacece, natives mostly of tropical Mexico, some of Ari¬

zona and Texas. Several horticultural varieties are largely cultivated in greenhouses for their terminal cymes of long four-lobed tubular

white, red or yellow, sometimes perfumed

blossoms which are very useful as cut flowers during late fall and early winter. The fruit is a two-celled capsule. Bouvardia triphylla

in some of its cultural forms is a favorite in borders, producing flowers from June till

November.

BOUVART or BOUVARD, Alexis, Swiss-

French astronomer: b. Les Contamines (Haute—

Savoie) near Mont Blanc, 27 June 1767 ; d.

7 June 1843. Taking an early interest in the stars, in 1785 he went to Paris to attend the free lectures at the College de France, became employed in the observatory, was made a mem¬

ber of the bureau of longitudes in 1804, and through the influence of Laplace, whom he

assisted in the (Mecanique celeste5 was elected member of the Academy of Sciences. In 1808

he published new tables of Jupiter and Saturn and in 1821 of Uranus whose irregularities he was the first to point out and explain. He also discovered eight comets. The discovery of Neptune by Leverrier and Adams in 1846 con¬

firmed Bouvart's hypothesis made in 1821.

BOUVET, boo'va, Joachim, French mis¬

sionary : b. Mans, about 1662 ; d. Pekin, China, 28 June 1732. Sent by Louis XIV to China

to study the customs and institutions of that country, he sailed from Brest 3 Mar. 1685, and sojourning for a time in Siam, reached Pekin in 1688. He was received with favor at the imperial court at Pekin, employed by the Em¬

peror in directing various constructions, in¬

structed him in mathematics, and was allowed to build a church even within the palace. He returned to France in 1697, with permission to take back with him to China as many mis¬

sionaries as would undertake the voyage. He presented to Louis XI V 49 works in the

Chinese language, and in 1699 departed again for China with 10 associates, among whom was the learned Parennin. He labored for nearly 50 years with indefatigable ardor to promote the progress of the sciences in that empire. He gave an account of the state of China in sev¬

eral treatises and letters, and made a dictionary of the language.

BOUVET, Marie Marguerite, American

writer: b. New Orleans, La., 14 Feb. 1865, of French parents; d. Reading, Pa., 27 May 1915; spent childhood in France; was educated in

the United States ; a noted linguist and writer of books for young people. The later years of her life were spent in Reading, Pa. She published (Sweet William5 (1890) ; (Little

Marjorie's Love Story5 (1891) ; (Prince Tip Top> (1892); <My Lady5 (1894); <A Child

of Tuscany5 (1895); (Pierrette5 (1896); (A

Little House in Pimlico) (1898) ; (Tales of an Old Chateau5 (1900) ; (Bernardo and Laurette5

(1904); <Clotilde5 (1908); (The Smile of the Sphinx5 (1911).

BOUVIER, boo'vya', John, American

jurist of French birth: b. Codognan, in the department of Gard 1787; d. Philadelphia, 18

Nov. 1851. He was of a Quaker family, which BOUVINES — BOVID.®

emigrated to this country and settled in Phila¬

delphia, when he was in his 1 5th year. He obtained employment for several years in a

book store, became a citizen of the United States in 1812, published a newspaper for a short time at Brownsville in the western part of Pennsylvania, studied law and was admitted to the bar in 1818. During his studies he made a complete analysis of Blackstone's

(Commentaries. > In 1822 he began the prac¬

tice of law in Philadelphia, in which city he resided till his death. In 1838, he became asso¬

ciate judge of the Court of Criminal Sessions.

He published, in 1839, a (Law Dictionary,

adapted to the Constitution and Laws of the United States of America, and of the several States of the American Union, > the fruit of 10 years' labor. In 1841 he published a new edition of Bacon's Abridgement of the Law.) His greatest work, published two months be¬

fore his death, was the institutes of American Law. }

BOUVINES, or BOVINES, a French vil¬

lage within a short distance of Lille, celebrated for the victory gained by Philip Augustus of France, over Otho IV of Germany, and his

allies, 27 July 1214. Philip of Valois defeated here, in 1340, 10,000 English troops; and, on 17

and 18 May 1794, the French here defeated the Austrians.

BOVEE, George, American politician : b.

Saint James, La., 1840; d. El Paso, Tex., 1903.

He was one of the first native whites to join the Republican party. He was elected Secre¬

tary of State in 1868, but quarreled with Gov¬

ernor Warmoth, the head of the administration, and it was this quarrel and the removal of Bovee by Warmoth which led to the political complications in Louisiana, and the dual State government of 1872 to 1876.

BOVES, Jose Tomas, military adventurer

in Spanish America ; d. 5 Dec. 1814. At the age of 30 he was employed as a naval officer to guard the American coast, but betrayed his

trust, and was condemned and imprisoned.

After his release, he joined the royal forces, but began to wage war on his own account

after the defeat of Cagigal at Maturin. Boves established himself at Calabozo, Venezuela, and with 500 men, many of whom were slaves, de¬

feated Marino, the dictator of the eastern prov¬

inces. He overcame the independents twice,

slaughtered all his prisoners, and gained for his army the name of the Infernal Division.

He was defeated by Rivas, and a part of his army, being taken captive, were put to death ; but he quickly recovered his strength, resumed the offensive and in 1814 defeated Bolivar

and Marino at La Puerta. The struggle was

prolonged with alternate successes and reverses, and with incessant cruelties. Boves advanced toward Valencia, where the independents were strongly fortified, and after a blockade forced the town to capitulate. To give a more solemn sanction to the terms of capitulation, a mass was celebrated between the two armies, and at the moment of the elevation, the royalist gen¬

eral promised a strict and faithful observance of the treaty; but having entered the town, he ordered the republican officers and a large number of the soldiers to be shot. Boves was again victorious at Anguita, and obliged Boli¬

var to retreat to Carthagena. He now entered Caracas, and shortly after gained a new victory, and killed or wounded 1,500 of the independ¬

ents. His last triumph was at Urica; he was struck by a lance, and died upon the field of battle. His funeral was celebrated amid bloody commotion, while his troops were putting to death the men, women and children whom they had made prisoners.

BOVEY, Henry Taylor, Canadian engi¬

neer: b. Devonshire, England, 1852; d. 1912.

He was educated at Cambridge University and took up the profession of civil engineering. He was professor of civil engineering and applied mechanics in McGill University in Montreal

in 1887-1909. He was the author of Applied Mechanics > (1882) ; (Theory of Structures and Strength of Materials) (1893) ; (Hydraulics>

(1895).

BOVIDiE, one of the most extensive

and important families of mammals, charater—

ized pre-eminently by the possession of hollow persistent horns in both sexes, and the

form of digestive apparatus which involves

chewing the cud. The family consists of the large herbivorous animals with cloven hoofs, which are most prominent as game, and which have supplied nearly all our domestic animals, except horses and camels. This family includes all of the ruminants, except the deer, giraffes and pronghorn, and embraces five sections or subfamilies, namely: the antelopes (Anti-lopinae) ; the goats (Caprinse) ; the sheep (Ovinae) ; the musk-ox (Ovibovinae) ; and the oxen (Bovinae). Although in a general way

the members of these sections are easily recog¬

nized, all are connected by intermediate ex¬

amples whose position is assigned with diffi¬

culty, so that a general structural likeness covers even such different examples as the

delicate antelopes and the heavy cattle. A

conspicuous common character is found in the nature of the horns, which gave the name

Cavicornia to the group in the early classifica¬

tions. These horns are always in pairs, and consist of sheaths of horn growing from the skin and covering ˆcores,® which are pro¬

tuberances of bone from the frontal bones of the skull, varying in form in the different groups, and contain hollow spaces, which are extensions of the frontal sinuses. These horns begin to grow soon after the animal is born, and increase until they attain their full size with the maturity of the individual ; with very few exceptions they are worn by both sexes, but those of the males, especially among sheep, are often considerably larger and more effective as weapons than those of the females. No ani¬

mal outside of this family possesses hollow horns of this character, except the pronghorn, and in this case they are branched, and are an¬

nually shed, neither of which conditions ever occurs among the Bovidae.

The Bovidae are distributed throughout the

whole world, except Australia and South

America. They are in the main gregarious,

and where the nature of their habitat permits, as on the plains inhabited by most antelopes and certain bison, they gather into enormous herds. The sheep, goats, and some of the

antelopes, are confined to mountain ranges ; most of the oxen dwell in forests; and the musk-ox is restricted to Arctic lands. Most of these animals, however, show great adaptability 358

to new climates and conditions, have a high degree of variability, and are susceptible of taming and domestication. In consequence

they have furnished to mankind the most im¬

portant of his aids to agriculture, as the cattle, sheep and goats, which he has been able to take with him to every part of the world, to train to his service, or to develop by careful improve¬

ment into the great resources of food and

clothing, which they have become. See Ani¬

mals, Domestic, and the names of the various groups and species composing the family.

BOW, the earliest instrument known, and

the most generally diffused, among all savage and barbarous people for the propulsion of

missiles in the chase or in war. There are two forms of the bow, the long-bow and the cross¬

bow, the former of which is the earlier, the more general and by far the more celebrated, as being the weapon of the famous English

archers of the Middle Ages, who were pop¬

ularly said to carry at their belts the lives of four-and-twenty Scots, that being the number of clothyard arrows in their quivers. The

long-bow passed out of use as a military

weapon with the improvement of firearms; but there were men yet alive in the beginning of last century who remembered that the High¬

landers, in the Jacobite rising of 1715, carried bows and arrows ; and at the capture of Paris, in 1814, Bashkirs and Circassians, in the serv¬

ice of Russia, were seen in the streets of that city, armed in chain-

mail, with bow-cases and quivers. Some of the North American Indians, especially the Comanches and the Apaches,

were very expert with the bow. Whatever the substance of which the bow is made, whether of wood, horn or steel, its figure is nearly the same in all countries, having generally two inflexions, between which, in the place where the arrow is fixed, is a right line. The Grecian bow was somewhat in the form of the letter 2 ; in drawing it, the hand was brought back to the right breast, and not to the ear. The Scythian bow was distinguished for its remark¬

able curvature, which was nearly semicircular; that of the modern Tartars is similar to it.

The materials of bows have been different in different countries. The Persians and Indians made them of reeds. The Lycian bows .were

made of the cornel-tree; those of the Ethio¬

pians of the palm-tree. That of Pandarus was made from the horn of a mountain goat, 16

palms in length ; the string was an oxhide thong. The horn of the antelope is still used for the same purpose in the East. The long¬

bow was the favorite national weapon in Eng¬

land. The battles of Crecy (1346), Poitiers (1356), and Agincourt (1415) were won by this weapon. It was made of yew, ash, etc., of the height of the archer. The arrow being usually half the length of the bow, the clothyard was only employed by a man six feet high. The arbalist, or cross-bow, was a popular weapon with the Italians, and was introduced into

England in the 13th century. The arrows shot from it were called quarrels.

Of the power of the bow, and the distance to which it will carry, some remarkable anec¬

dotes are related. Xenophon mentions an Ar¬

cadian whose head was shot through by a

Carduchian archer. Stuart mentions a random

shot of a Turk, which he found to be 584

yards; and Mr. Strutt saw the Turkish Ambas¬

sador shoot 480 yards in the archery ground near Bedford Square in London. Lord Bacon

speaks of a Turkish bow which has been known to pierce a steel target or a piece of brass two inches thick. In the journal of King Edward VI it is mentioned that 100 archers of the King's guard shot at a one-inch board, and that some of the arrows passed through this and into another board behind it, although the wood was extremely solid and firm. It has

been the custom of many savage nations to

poison their arrows. This practice is men¬

tioned by Homer and the ancient historians ; and we have many similar accounts of modern travelers and navigators from almost every

part of the world. Some of these stories are of doubtful authority, but others are well

authenticated. Some poison obtained by Condamine from South American savages pro¬

duced instantaneous death in animals inoculated with it. The poisoned arrows used in Guiana are not shot from a bow, but blown through a tube. See Air-gun; Archery; Arms; Bows

and Arrows.

In music it is the well-known implement by the means of which the tone is produced from viols, violins and other instruments of that kind. It is made of a thin staff of elastic wood, tapering slightly till it reaches the lower end, to which the hairs (about 80 or 100 horse¬

hairs) are fastened, and with which the bow is strung. At the upper end is an ornamented piece of wood or ivory called the nut, and fastened with a screw, which serves to regulate the tension of the hairs. It is evident that the size and construction of the bow must cor¬

respond with the size of the species of viol-instruments from which the tone is to be pro¬

duced.

BOW BELLS, the peal of bells belonging

to the church of Saint Mary-le-Bow, Cheapside, London, and celebrated for centuries. One

who is born within the sound of Bow Bells is considered a genuine ˆcockney.®

BOW ISLAND, an island in the south

Pacific Ocean, near the eastern extremity of the Society Isles, in lat. 18° 6’ S. and long.

140° 51’ W. It is a low island, of coral forma¬

tion, about 30 miles in length and 5 miles in breadth. It derives its name from its shape, which is bow-like, the outer edge only being of land, and encircling a great central lagoon. It was discovered by Bougainville in 1768.

BOW LEGS, a deformity of the legs in

which the knees are far apart and the leg is bowed outward. It is technically known as

genu varum and is the opposite of knock-knees, or genu valgum. Two forms are common, in

one the bow is a gradual one, practically the entire leg being bent, in the other the bend takes place quite suddenly just above the ankle.

Sometimes the bow is front and back instead of sideways. Bow leg is the commonest of the deformities, making fully 10 per cent of all orthopedic cases. It may be congenital ; it is usually due to rickets (q.v.) and perhaps may occur in strong and heavy children who stand too much while very young. In the majority of cases it is outgrown,

but in pronounced in¬

stances it can be cured only by prolonged cor¬

rection by means of appropriate braces.

BOW PORCELAIN. England's first por¬

celain factory was established, at Stratford-le-Bow, in the outskirts of London at that time, probably as early as 1730. From 1744 to 1755

it would appear, from documentary evidence,

that this ware was made from unaker (an im¬

ported American clay) and glass. In 1750 the works were acquired by Weatherby & Crowther.

Weatherby died 1762, and Crowther, though

bankrupt, continued the works. The factory

was called the ((New Canton.® The great popu¬

larity of the new Derby ware (see Derby)

killed the Bow sales and caused financial ruin.

William Dusebury, owner of the Derby works, purchased the Bow plant and transferred it to Derby in 1776. Running for over 30 years with prolific output (in 1760 300 persons, including 90 painters, were employed) yet authenticated pieces are very rare.

Decoration. — Early product followed, of

course, the prevailing taste for Chinese style (blue-and-white) . The

decoration was under¬

glaze. Raised white (blanc de Chine) flower motifs belong to this early period. Later, red, green, yellow and blue overglaze colors appear.

The gold on early Bow was matt. Sprig deco¬

ration was favored in the underglaze blue, and the <(quail® or partridge pattern was frequent as a <(chinese taste® motif. Some extant Bow pieces have transfer-print decoration, in both over and underglaze decoration ; some trans¬

fers filled in by hand.

Characteristics. — Chelsea copied Bow fre¬

quently, therefore, some pieces are difficult to place as to provenance. Glaze and paste qualities help here. As Derby took Bow

artisans and patterns, the same difficulty also follows the collectors here, from similarity of design and decoration. Bow ware was largely experimental, hence many pieces are defective — crazed or showing black spots in the glaze, from faulty firing. The Bow ((ceiling-wax®

red has a tendency to powder off. Bow glaze shows age yellowish, even iridescence, at times, from decay.

Paste. — The body is heavy and sometimes

thick ; but many cups and saucers are of egg¬

shell variety. The paste is hard with close fracture.

Glaze. — Laid on thick, Gears® sometimes

appear below. Some authorities claim Bow

ware has whiter surface than Chelsea ; it is a lead glaze and transparent.

Product. — Table ware, salt cellars, sweet¬

meat shells, vases, bowls, mugs, toys, well-modeled figures (early figures are in the

white) ; animals, knife handles, epergnes, chan¬

delier ornaments, essence pots, *etc.*

Marks. — First came triangle mark im¬

pressed (Chelsea claims it also) ; then bow or bow and arrow, violin bow, dagger, anchor in red (like Chelsea) ; crescent with anchor and dagger (in blue) ; Mercury alchemistic sign.

Workmen's signs: T. F. for Thomas Frye;

To for Tebo; A for Askew, *etc.*

Bibliography. — Bemrose, William, (Bow,

Chelsea and Derby Porcelain) (London 1898) ; Burton, William, (A History and Description

of English Porcelain > (London 1902) ; Church, Sir Arthur Herbert, (Handbook to the China made in England during the XVIII century)

(London 1904) ; Hobson, Robert Lockhart,

ˆPorcelain, Oriental, Continental and British) (London 1908) ; Mew, Egan, (01d Bow) (Lon¬

don 1910); O'Neill, Dr. W. O., <Bow and

Chelsea China) (London 1899) ; Solon, M. L., (Brief History of Old English Porcelain >

(London 1903) ; Tiffin, Walter F., (Chronograph of Bow, Chelsea and Derby Porcelain Manufactories) (Salisbury 1875).

Clement W. Coumbe.

BOW-WINDOW, in architecture, properly

a window forming a recess or bay in a room, projecting outward, and having for the outline of the plan a segment of a circle. This term is, however, often confounded with bay-window and oriel, which properly designate, the first a similar window with a straight-sided plan, and the second a projecting window not on the

ground-floor, and supported on a corbel or

other molded base.

BOW-WOOD. See Osage Orange.

BOWDICH, bou'dich, Thomas Edward,

African traveler, one of the victims of the at¬

tempts to explore the interior of the Dark Con¬

tinent : b. Bristol, June 1791; d. 10 Jan. 1824.

He was sent to Oxford, but was never regularly matriculated. At an early age he married, and engaged in trade at Bristol. Finding the details of business irksome, he obtained the appoint¬

ment of writer in the service of the African Company, and set sail for Africa in 1814. In 1816, it being thought desirable to send an em¬

bassy to the negro King of Ashantee, Bowdich was chosen to conduct it and he executed with success the duties of his situation. After re¬

maining some time in Africa he returned home, and soon after published his (Mission to Ash¬

antee, with a Statistical Account of that King¬

dom, and Geographical Notices of other Parts of the Interior of Africa.* Having offended the company in whose service he had been

engaged, and having, therefore, no prospect of further employment, yet, wishing ardently

to return to Africa for the purpose of visiting its hitherto unexplored regions, Bowdich re¬

solved to make the attempt with such assistance as he could obtain from private individuals.

He, however, previously went to Paris to im¬

prove his acquaintance with physical and

mathematical science. His reception from the French literati was extremely flattering. A

public eulogium was pronounced on him at a meeting of the Institute, and an advantageous appointment was offered him by the French

government. To obtain funds for the prosecu¬

tion of his favorite project, Bowdich also pub¬

lished a translation of (Mollien's Travels to the Sources of the Senegal and Gambia, * taxi¬

dermy * and (British and foreign expeditions to Teembo* ; by the sale of which he was enabled, with a little assistance from other persons, to make preparations for his second African ex¬

pedition. He sailed from Havre in August

1822; stopping at Lisbon, he made a careful study of all the Portuguese discoveries, and published a work entitled (An Account of the Discoveries of the Portuguese in Angola and Mozambique* (1824), and arrived in safety in the river Gambia. A disease, occasioned by

fatigue and anxiety of mind, here put an end to his life.

BOWDITCH, Charles Pickering, Amer¬

ican archaeologist : b. Boston, 30 Sept. 1842 ; d.

there, 1 June 1921 ; a brother of H. P. Bowditcli.

He was graduated at Harvard University, and while encaged in important manufacturing and 360

commercial pursuits, also cultivated an interest in archaeology, and was elected member of

numerous scientific societies. He is the author of (Maya Nomenclature* (1906) ; (Maya Nu¬

meration, Calendar and Astronomy * (1910);

(Bacon's Connection with the First Folio of Shakespeare* (1910), and numerous pamphlets

on Central American archaeology.

BOWDITCH, Henry Ingersoll, American

physician, son of Nathaniel Bowditch : b. Salem, Mass., 9 Aug. 1808; d. 14 Jan. 1892. He re¬

ceived his degree at Harvard in 1832 and spent several years in study in Paris; was professor of clinical medicine at Harvard in 1859-67 ; chairman of the State Board of Health in

1869-79 ; physician at the Massachusetts General Hospital and the Boston City Hospital from

1868 to 1872 ; and president of the American Medical Association in 1877. He announced

the law of soil moisture as a cause of consump¬

tion in New England; introduced several new features in surgical treatment, and was author of many general and special works in medical science. He was the first to practise chest-puncture in cases of pleurisy. He was a member of the National Academy of Sciences. Some

of his principal publications are (Life of Na¬

thaniel Bowditch) (1865) ; (The Young Stetho-scopist* (1848) ; (Public Hygiene in America*

(Centennial Address, Philadelphia 1876) ; and translations of (Louis on Typhoid) (1836);

(Louis on Phthisis) (1836) ; and (Maunoir on Cataract* (1837).

BOWDITCH, Henry Pickering, Amer—

can educator : b. Boston, Mass., 4 April 1840.

He was graduated at Harvard in 1861, and sub¬

sequently studied chemistry and medicine, and, after the Civil War, in which he reached the rank of major in the Union service, he took a special course in physiology in France and Ger¬

many. In 1871-76 he was assistant professor of physiology in the Harvard Medical School, and in 1876 was elected to the full chair but resigned on 9 May 1906. He is a member of the American Academy of Arts and Science's, as well as of numerous medical societies, and has published many papers on physiological

subjects, including (The Growth of Children) (1877) ; (Is Harvard a University ?) (1890) ; Advancement of Medicine by Research)

(1896) ; (Hints for Teachers of Physiology) (1899).

BOWDITCH, Nathaniel, American mathe¬

matician : b. Salem, Mass., 26 March 1773 ; d.

Boston, 16 March 1838. The son of a cooper he went to school till 10 years of age, when he entered his father's shop. Later he was appren¬

ticed to the ship chandlery business, which he followed till he went to sea. He studied inces¬

santly, during intervals of business and in morning and night hours. Mathematics was the science in which he was most interested, and he mastered algebra and Latin unaided. He had

a teacher for French, and in later life he took up Spanish, Italian and German. He learned

navigation and was an omnivorous reader. In 1795 he made his first voyage as clerk, as supercargo (1796-98) and in the course of five long voyages rose to be master in 1802. His work (The New American Practical Navigator)

(1802, 1912) was made the standard authority of the United States Navy Department on the subject of navigation, and under the direction of the Secretary of the Navy was revised in 1880, 1903 and 1911. A new and revised edition of his (Useful Tables from the American

Practical Navigator* was also issued in 1912

under orders of the department. Harvard

College gave him a degree of M.A. and offered him the professorship of mathematics, which he declined, as he also did a similar offer from the University of Virginia and the United States Military Academy. Between 1814 and 1817 he

translated Laplace's (Mecanique celeste,* and appended to it an elaborate, commentary. He contributed largely to scientific periodicals, his articles being principally on mathematics and astronomy. He was admitted as a fellow to

the Royal Society of London.

BOWDITCH'S PRACTICAL NAVI¬

GATOR, a work on navigation of the highest value and utility to seamen, written by Na¬

thaniel Bowditch (q.v.) and published in 1802.

BOWDLER, bo’dler, Thomas, English

expurgator : b. near Bath, 11 July 1754; d.

Rhyddings, South Wales, 24 Feb. 1825. At the age of 16 he went to Saint Andrews to study medicine, but graduated medical doctor at

Edinburgh in 1776, and, after some years of travel, settled in London, devoting himself

mainly to charitable work. He lived for 10

years at Saint Boniface, Isle of Wight, and for the last 15 years of his life at Rhyddings, near Swansea. In 1818 he published (The Family

Shakespeare, * in 10 volumes; in which nothing is added to the original text; but those words and expressions are omitted which cannot with propriety be read aloud in a family. The work had a large sale, and was long popular, despite the ridicule it brought down upon the head of its over-prudish editor, who had the happiness or unhappiness to add permanently to the Eng¬

lish tongue the word <(bowdlerism** as a

synonym for senseless expurgation. The last

years of Bowdler’s life were given to the task of preparing an expurgated edition of Gibbon’s (History.*

BOWDLERISM. See Bowdler, Thomas.

BOWDOIN, bo’don, James, American

statesman: b. Boston, 8 Aug. 1727; d. there, 6

Nov. 1790. Graduating from Harvard in 1745, he inherited in 1747 a large fortune from his father, a wealthy merchant, and was thus pro¬

vided with means to gratify his taste for

scientific investigation. In 1751 he visited Franklin, who explained to him the results of his electrical researches. A correspondence

ensued that lasted many years, and Franklin read Bowdoin's letters before the Royal So¬

ciety of London. He was a prominent figure in the politics of his State, being elected a mem¬

ber of the General Court 1753-56, and the

Council 1756-69. He presided over the Consti¬

tutional Convention in 1779, and to him was due the form of some of the most admired sections of the constitution it drew up. As governor, 1785-86, he quelled Shay's Rebellion. In 1788

he was a delegate to the Federal Constitutional Convention. He was a fellow of Harvard Col¬

lege from 1779 to 1785 and to it he left a legacy of £400. He was a liberal patron of the Massa¬

chusetts Humane Society. A founder and first president of the American Academy of Arts

and Sciences, he bequeathed it his very valu¬

able library. The degree of doctor of laws

was conferred upon him by the universities of ale and Edinburgh. Bowdoin College in

Brunswick Me., was named in his honor.

He wrote a poetical paraphrase of Dodsley's (Economy of Human Life) (1759), and several papers which may be found in the first volume of the American Academy's (Memoirs.) To

the (Pietas et Gratulatio,* a volume of poems published by Harvard on the accession of

George III, he contributed an English poem and two Latin epigrams.

BOWDOIN, James, American statesman

(son of the preceding) : b. Boston, 22 Sept.

1752; d. Naushon Island, Buzzard's Bay, 11 Oct.

1811. He was graduated from Harvard in 1771, studied at the University of Oxford and

traveled in Europe. At the outbreak of the Revolution he returned home and became suc¬

cessively a member of the assembly, the State senate, and a delegate to the State Constitu¬

tional Convention, 1779. In Jefferson's adminis¬

tration he was appointed Minister Plenipoten¬

tiary at the court of Spain, and associate Minis¬

ter to France. During his residence abroad he accumulated a valuable library, a collection of paintings and drawings by old and modern

masters, a cabinet of minerals and fossils, to¬

gether with models of crystallography, all of which he bequeathed to Bowdoin College, of

which he was the earliest patron. During his lifetime he gave it 6,000 acres of land and £1,100, and at his death it became, by will, his residuary legatee. He translated Daubenton's

(Advice to Shepherds,) and was the anon¬

ymous author of (Opinions respecting the Com¬

mercial Intercourse Between the United States and Great Britain. }

BOWDOIN COLLEGE, located at Bruns¬

wick, Me. It is the oldest institution of higher learning in the State, having been incorporated in 1794, while Maine was a part of Massa¬

chusetts. It was named for James Bowdoin,

governor of Massachusetts, whose son gave

largely to the college. It was not opened to students until 1802. It is non-sectarian in gov¬

ernment and instruction. In addition to the college proper, the organization includes the Medical Schopl of Maine, founded in 1820.

The college confers the degree of A.B. and B.S. for the completion of the regular four years' course. The work is almost entirely

elective after the freshman year. The campus consists of 40 acres, one mile from the Andros¬

coggin River, about three miles inland from Casco Bay. The buildings include Massa¬

chusetts Hall (the original building), King

Chapel, Memorial Hall, Mary Francis Searle

Science Building, Walker Art Building, Hub¬

bard Hall (the library), Adams Hall, Obser¬

vatory, the Gymnasium, the Hyde Athletic

Building, the Bowdoin Union and the Dudley

Coe Memorial Infirmary. The library, in 1916, contained 113,418 volumes; the students num¬

bered 457 and the faculty 89. A number of Bowdoin graduates have been distinguished in literary and public life; among them are Long¬

fellow and Hawthorne, Thomas B. Reed and

Melville Weston Fuller (chief justice).

BOWELL, Sir Mackenzie, K.C.M.G.,

Canadian statesman : b. Suffolk, England, 27

Dec. 1823 ; d. Belleville, Ontario, 10 Dec. 1917.

When he was 10 years old his parents emi¬

grated to Canada and settled on a farm. At the age of 12 the youth was apprenticed in the printing department of the Belleville Intel¬

ligencer, of which paper he later became editor and proprietor, the connection lasting from

1834 to 1878. He was elected to the House of Commons for North Hastings, Ontario, in

1876, was Minister of Customs in 1878, Minister of Militia 1892 and Minister of Trade and

Commerce 1893-94. He was Premier of

Canada from 1894 to 1896. He held several

other government offices and was a prominent advocate in educational affairs.' He entered the Senate in 1893 and acted as chairman of the Colonial Conference in 1894. He relin¬

quished cabinet office in 1896 and in 1897 de¬

clared his independence of all party affiliation.

Bowell assisted in raising a rifle company in 1857 ; he served on the frontier during the American Civil War and again during the

Fenian raids of 1866. As late as March 1906

he was still leader of the Opposition in the Senate, when he resigned, in his 83d year.

BOWEN, Francis, American educator and

author: b. Charlestown, Mass., 8 Sept. 1811; d. Cambridge, Mass., 21 Jan. 1890. He was

graduated from Harvard in 1833, and for a

time taught mathematics in Phillips-Exeter

Academy. He became instructor in natural

philosophy and political economy at Harvard, 1835; studied in Europe, 1839ˆ-1, meeting

Sismondi and De Gerando. Returning to Cam¬

bridge in 1843 he took charge of the North American Review, as editor and proprietor, and conducted it with great ability for nearly 11

years. On account of his having taken the un'

popular side in the Review on the Hungarian question, the overseers of Harvard refused to concur with the corporation in appointing him professor of history in 1850. W hen Dr. Walker became president of Harvard in 1853, Professor Bowen was elected Alford professor of natural religion, moral philosophy and civil polity, and held that chair until 1888, when he became professor emeritus. He opposed the doctrines of Darwin and accepted those of Sir William Hamilton, and in philosophy upheld the views of Locke and Berkeley against those of Cousin, Comte, Fichte, Kant and Mill. He was a clear, forceful, independent thinker, and possessed a style notable for its energy and precision. As a writer he was most industrious, treating with success widely varying topics. The following is a selected list of his publications: (Documents of the Constitutions of England and America, from Magna Charta to the Federal Constitu¬

tion of 1789) (1854) ; (The Principles of Meta¬

physical and Ethical Science applied to the Evidences of Religion } (1855) ; (Dugald

Stewart's Philosophy of the Human Mind, with Critical Notes) (1854) ; Principles of Political Economy) (1856) ; (The Metaphysics of Sir

William Hamilton* (1862); <De Tocqueville's

Democracy in America, edited with tiotes)

(1862) ; (Logic, or the Laws of Pure Thought*

(1864) ; (American Political Economy * (1870).

BOWEN, Sir George (Ferguson), Eng¬

lish colonial administrator: b. Ireland 1821; d.

21 Feb. 1899. He was graduated at Charterhouse, and Trinity and Brasenose Colleges,

Oxford. He was president of the University

of Corfu 1847-51, and chief secretary of the Ionian Islands in 1854. He was first governor of the colony of Queensland, 1859-67 ; gov-362

ernor of New Zealand, 1867-73; governor of

Victoria, 1873-79 ; of Mauritius, 1879-83 ; and of Hongkong, 1883—87. He was the author of (Ithica in 1850) ; (Mount Ethos, Thessaly, and Epirus5 (1852) ; and of his official dispatches, full of observation, graphic description and political insight, a selection was made and edited by Stanley Lane-Poole in 1891 under the title (Thirty Years of Colonial Government.5

BOWEN, Henry Chandler, American

editor and publisher: b. Woodstock, Conn., 11

Sept. 1813 ; d. 24 Feb. 1896. He received a common school education. In 1833 he removed to New York, where he became a member of

the drapery and silk firm of Bowen and

McNamee. In 1848 he helped to found the

Independent, in New York, becoming, in 1861, its editor and proprietor, and making the paper famous for its advanced views on public

topics. His open denunciation of the Fugitive Slave Law caused his firm to be boycotted in the South in 1852. He declared at that time that his firm had <(its goods but not its principles for sale.®

BOWEN, Herbert Wolcott, American

diplomatist : b. Brooklyn, N. Y., 29 Feb. 1856.

He was educated at Yale University and at

the Columbia Law School. He was appointed

United States consul at Barcelona in 1890 by President Harrison, and in 1894 President Cleve¬

land made him consul-general of the same port.

At the opening of the Spanish-American War he remained at his post as long as was prac¬

ticable, and at the conclusion of the war was appointed by President McKinley consul-gen¬

eral at Teheran, and in May 1901 Minister

Plenipotentiary to Persia. He was subsequently appointed Minister to Venezuela, but was

retired in 1905. He has published (Verses) ; ‘Losing Ground) ; ‘In Divers Tones5 ; ‘De

Genere Humano) ; ‘International Law.1’

BOWEN, John Wesley Edward, Amer¬

ican theologian: b. New Orleans, 3 Dec. 1855.

He was graduated at Boston University in 1878, and in 1885 received the degree of Ph.D., from the University of New Orleans. He held pas¬

torates in Newark N. J., Boston, Baltimore and Washington, 1882-92. He was professor of

church history and systematic theology in Mor¬

gan College, Baltimore, 1888-92 ; professor of Hebrew, Howard University, Washington, 1891—92, and since 1893 has been president and pro¬

fessor of the history of theology in Gammon Theological Seminary, Atlanta, Ga. Publica¬

tions: <Sermons) ; (Africa and the American Negro) ; (Discussion in Philosophy and Theo¬

logy) ; Struggles for Supremacy between the Church and State during the Middle Ages5 ;

(The Catholic Spirit of Methodism5 ; ‘The

Theology and Psychology of the Negro Plan¬

tation Melodies5 ; ‘The Psychological Process in the Revelation of Doctrine5 ; ‘The Religious History of the Negro5 ; (The Education of the Negro5 ; ‘The United Negro,5 *etc.* Dr. Bowen is a recognized leader in all movements for the advancement of the negro.

BOWER, Archibald, Scottish writer : b.

near Dundee, 17 Jan. 1686; d. London, 3 Sept.

1766. He was educated at the Scottish College in Douai and entered the order of Jesuits in 1706. At Macerata (1723-26) in Italy, accord¬

ing to his own account, he was counsellor or judge of the Inquisition. In 1726 he quitted the order of Jesuits and went to Perugia,

whence he fled secretly to England and pro¬

fessed himself a convert to the Protestant faith.

He obtained respectable patronage, was engaged as a tutor in a nobleman’s family and employed by the booksellers in conducting the Historia Liter aria, a monthly review of books, and in writing a part of the (Universal History,5 in 60 volumes. The money which he gained by

these occupations he is believed to have given or lent to the society of the Jesuits, and thus to have purchased his readmission among them about the year 1744. Subsequently repenting

of the engagement he had made with his old associates, he claimed and recovered the prop¬

erty he had advanced. In 1748 he published the first volume of a (History of the Popes,5 which was continued to seven volumes and character¬

ized by the utmost zeal against Roman Catholic¬

ism. This work was reprinted in Philadelphia 1844-45, with a continuation in three volumes by Dr. S. H. Cox. His money transac¬

tions with the Jesuits being at last brought to light, he was generally believed to be a man destitute of moral or religious principle; so that toward the end of his life he had hardly a friend or patron left except Lord L}rttelton He is said to have died a Protestant.

BOWER, Frederick Orpen, English botan¬

ist: b. Ripon, 4 Nov. 1855. He was educated at Repton and Trinity College, Cambridge, and has been regius professor of botany at Glasgow LTniversity since 1885. His works include

(Course of Practical Instruction in Botany5

(3d ed., 1891) ; ‘Practical Botany for Be¬

ginners5 (1894) ; ‘The Origin of a Land Flora5

(1908) ; (Plant Life on Land5 (1911), *etc.*

BOWER-BIRDS, a group of birds dwell¬

ing in Australia and the neighboring islands, remarkable for the construction of bowsers or “play-houses55 in addition to their ordinary breeding-nests. They were formerly con¬

sidered as members of the family of the birds-of-paradise, but now the numerous genera and species are placed in the family of Ptilonor-hynchidce. There are 14 genera, embracing

about 37 species. All are moderate size, of dark and plain plumage, having few ornaments of color and none of feather characteristic of other birds-of-paradise, although, like them, they are of arboreal habits, feed mainK upon fruits, and construct rather rude nests for their eggs in branches of trees. The birds were

first described by Dr. John Gould, the orni¬

thological explorer of Australia, in 1840. In addition to the nest proper, the males of all the bower-birds build upon the ground bowers or shelters of various forms, which serve as places _ for assembling and holding the series of antics or dances, in rivalry with each other, and as a display of their respective attractions to the females, in which these birds indulge during the season of courtship. These build¬

ings always occupy a little space in the forest which is first carefully cleared of every ob¬

struction, so that they look like small cultivated lawns. A few species are content with such a lawn, but most erect buildings which varv in form according to the species. The satin-bird (Ptilorynchus viola cens) of southern Australia, the most familiar of these, is about the size and somewhat the shape of a jackdaw, but the sexes BOWERBANK — BOWERS

are dissimilar, the males having a plumage of satiny black, while the females and young are grayish green. It forms of twigs, a few inches in length, an oblong, dome-shaped hut, open at each end and floored with twigs. The sides of this hut are formed of slender twigs, planted upright, and leaning inward to form a roof.

Its floor, and the ground all about it, are strewn with highly colored feathers and bright ob¬

jects of all sorts, which the bird brings, day by day, sometimes from a great distance, to add to his store, replacing dull or faded pieces with something better as he finds them. The people of the region are accustomed to search these collections for such lost articles as bits of bright jewelry, which the birds frequently seize and take there. The spotted bower-birds, of the genus Chlamydera, form <(runs® or avenues about three feet long, formed of a dense plat¬

form of sticks fenced in on each side by a hedge of upright twigs, and place near it hun¬

dreds of white pebbles, pieces of bleached bone, shells and bright

objects, which they rearrange with incessant activity. The regent bird, Seri-calus chrysocephalus, which has a rather

limited range in the region north of Sydney, and breeds along the Brisbane River, gathers snail-shells exclusively. Another species make several little huts — a miniature of a village of the black fellows. The most remarkable of

these structures, however, is that of a New Guinea species (Amblyornis inornatus) which is called ˆgardener-bird® in the books. This bird clears a space around the base of a small tree, and then piles up around its base a cone of moss, about 18 inches in height. Outside of this, and at a distance of four or five inches, it plants a circle of twigs, some of which are two feet in length, so that they form a conical hut, covering and enclosing the inner cone.

Two doors are left in this outer hut at opposite sides. The twigs of which this ((wigwam® is composed are always the thin stems of an

epiphytal orchid, which retain their leaves and remain alive and blooming for a long time; and it is believed by Dr. Beccari, who first described this bird, that the orchids are chosen because they will remain alive. He says, how¬

ever, that this apparent attempt to provide flowers is not restricted to the cabin. Directly in front of the entrance is made a miniature meadow of soft moss, which is kept smooth

and clean, and upon which are scattered flowers and fruit of different colors, bright fungi and brilliantly colored insects, so that the place reminds one of an elegant little garden. More¬

over, when these objects have been exposed so long as to become wilted they are taken

away and replaced by others, so that it seems impossible to believe that the birds do not take a real delight in the freshness of their flowers, and the brightness and color of their orna¬

ments. The activity and curiosity of all these bower-birds are strong characteristics, and they seem to derive great amusement, not only from their architectural arrangements, but in gather¬

ing, placing and rearranging their treasures, and in keeping the premises in the neatest and prettiest condition possible. It is_ difficult to understand how any other purpose is served by these structures

than simply that of providing a convenient place for the lively movements by which they display themselves to the females, as has been alluded to above, and for the duels which frequently take place between rival

males, sometimes with fatal results; but to this must be added the gratification of an inherited instinct of acquisitiveness, and a real delight in beautiful things. The species of another genus (Prionadura) make similar (<bowers®

four to six feet high.

Detailed descriptions of these and several

other similar birds and their works will be found in the books relating to the ornithology of Australia and New Guinea, and especially in the writings of the Italian naturalists, Beccari and Salvatori. An excellent resume may be

read in Lydekker's (Royal Natural History,*

Vol. Ill (London 1885). Several species have been brought alive to Europe and may usually be seen, with their curious bowers, in the zoological gardens of London, Paris and else¬

where; while the museums in New York and

Washington contain models of some of their

ornamental structures.

BOWERBANK, James Scott, English

geologist: b. 1797; d. 1877. A partner in a London distillery, his leisure was absorbed by geological research, and he was one of the founders of the <(London Clay Club® (1836), the members of which devoted themselves to

the task of examining the fossils of this for¬

mation. In 1840 he published (Fossil Fruits of the London Clay,* which is still the ac¬

knowledged authority on the subject. In 1847

he was one of the founders of the Palaeonto¬

logical Society. His most important work, (A Monograph of the British Spongidae,* the fruit of immense labor, was published in four vol¬

umes (1864-82). His magnificent collection

was purchased by the British Museum.

BOWERS, Elizabeth Crocker, American

actress: b. Ridgefield, Conn.. 12 March 1830; d. Washington, D. C., 6 Nov. 1895. She made her first appearance on the stage at the Park Theatre, New York, in 1846, and in 1847 mar¬

ried David P. Bowers. Later she appeared in Philadelphia as Donna Victoria in (A Bold

Stroke for a Husband. > She was a stock

member of the Arch Street Company in Phila¬

delphia until her husband's death in 1857. She was married in 1860 to J. C. McCollom, and the next year made a professional trip to Eng¬

land with great success. She returned to New York in 1863, and, after fulfilling several en¬

gagements, retired from the stage. In 1884

she returned to the stage in (La Charbonniere,*

and in 1886 began a series of performances with her own company at the 14th Street

Theatre in New York. She played with Rose

Coghlan in <A Woman of No Importance, *

in 1893, and supported Olga Nethersole in her first appearance in the United States in 1894.

Her last impersonation was that of Lady Mar¬

grave in (The New Woman* in the early part of 1895.

BOWERS, Lloyd Wheaton, American

lawyer: b. Springfield, Mass., 9 March 1859; d.

9 Sept. 1910. A graduate of Yale University 1879, and of Columbia Law School 1882, he set¬

tled in Winona, Minn., and soon achieved dis¬

tinction in his profession, receiving the appoint¬

ment of general counsel of the Chicago and Northwestern Railway Company in 1887.. The

adjustment of relations of great public service corporations, notably the Standard Oil and To¬

bacco trusts, to the general public welfare, was 364

his special forte. He was appointed solicitor-general of the United States by President Taft in March 1909, and during the 17 months prior to his death prepared for trial 37 cases, of which 33 were successfully prosecuted.

BOWERS, Theodore S., American soldier :

b. Pennsylvania, 10 Oct. 1832; d. Garrison's Station, N. Y., 6 March 1866. At the outbreak of the Civil War he was editor of a Democratic paper in Mount Carmel, Ill. After the battle of Bull Run he raised a company for the 48th Illinois Infantry, but declined its captaincy on account of the taunts of former political asso¬

ciates, and went to the front as a private. On 25 Jan. 1862 he was detailed as a clerical as¬

sistant at General Grant's headquarters. That officer found him invaluable and kept him near him until the close of the war. He went

through the campaigns of Forts Henry and

Donelson, and while the army was absent on the Tallahatchie expedition Bowers was left in charge of the department headquarters, having received a regular staff appointment as captain and aide-de-camp. When Van Dorn seized the

headquarters at Holly Springs 20 Dec. 1862, Bowers destroyed all the departmental records that would have been of value to the Confed¬

erates, refused to give his parole and made his escape during the night. He was brevetted col¬

onel and brigadier-general for gallant and mer¬

itorious services, and after the war General Grant retained him on his personal staff, having procured his appointment as assistant adjutant-general with rank of major in the United States army, 6 Jan. 1865. He was killed while board¬

ing a moving train.

BOWERY, The, a street in New York. Its

original name, the Bouwerie, was derived from the estates of the governor, Peter Stuyvesant, whose farm and orchards, embracing the region lying about the upper part, were called the Great Bouwerie. It begins at Chatham Square and terminates at Cooper Union, and runs par¬

allel to Broadway. It was long notorious for the resorts located along its length, but its char¬

acter has undergone improvement. It is still characterized by the heterogeneity of its popu¬

lation and a multitude of cheap shops and

boutiques.

BOWFIN, a fish (Amia calva) of the

Mississippi Valley. See Mudfish.

BOWHEAD, the Greenland or right whale,

taking its name from the arched outline of its head. See Greenland Whale.

BOWIE, bo'e, James, American frontiers¬

man: b. Burke County, Ga., about 1790; d. 6

March 1836. He took part in the revolt of Texas against Mexico, and fell in the Alamo massacre. He gave his name to the bowie-knife (q.v.).

BOWIE, Tex., city in Montague County,

65 miles north of Fort Worth, on the Chicago, Rock Island and Gulf and the Fort Worth and Denver railroads. It contains cotton gins, oil compresses, a refrigerating plant and has a large trade in cotton, grain and live stock. The city owns the waterworks. Pop. 2,874.

BOWIE-KNIFE, a long knife shaped like

a dagger, but with only one edge, named after Col. James Bowie (q.v.). Its use as a weapon was originally confined to Texas, but it is now used in almost all the States of the Union. Col¬

onel Bowie is said to have had his sword broken down to within about 20 inches of the hilt in a fight with some Mexicans, but he found that he did such good execution with his broken blade that he equipped all his followers with a similar weapon. According to another story

Bowie made his first knife from a file. As a knife of very similar form had been in use throughout the Latin American colonies, it

seems probable that Bowie got the idea of the knife that bears his name from the Mexicans in Texas and along the Mexican border.

BOWKER, bow'ker, Richard Rogers,

American author : b. Salem, Mass., 4 Sept. 1848.

He was graduated at the College of the City of New York in 1868, and has been prominent in politics as an independent and was the orig¬

inator of the independent Republican move¬

ment of 1879. He has edited the Publisher's Weekly, the Library Journal and the American Catalogue , and has published (Work and

Wealth* ; (Economics for the People) ; Copy¬

right : Its Law and Its Literature) ; (Primer for Political Education* ; electoral Reform) ;

(The Arts of Life) ; Civil Service Examina¬

tion.)

BOWLDERS, detached masses of rock of

varying size. When very small, they are more properly called pebbles. Bowlders are' of vari¬

ous origins. Frost-work acting in joints

wedges off angular blocks of rock that accu¬

mulate near where they are formed. (See

Talus). Further weathering may round these

blocks. Solution along joints and bedding

planes may isolate and round blocks known as bowlders of weathering. Such bowlders are

often transported by rivers, either rolled along the bottom or frozen into floating cakes of ice.

River or wave-worn bowlders are usually well rounded and polished. Particularly striking in glaciated regions are the erratic bowlders that lie strewn over the surface of the ground.

These glacial bowlders usually vary from sub-angular to rounded and are not infrequently strongly striated. They are often composed of rock substance totally foreign to the region in which they occur, having been brought by the ice from distant points.

BOWLES, bolz, Francis Tiffany, Ameri¬

can naval constructor: b. Springfield, Mass., 7

Oct. 1858. He was graduated at the United

States Naval Academy in 1879, studied at the Royal Naval College, Greenwich, England, and was appointed a member of the United States naval advisory board in 1882, and has ever since been prominent in the work of naval construc¬

tion, with special reference to the rehabilitated United States navy. He has been in charge of construction at the navy yards in Norfolk and Brooklyn, and was made chief constructor of the navy with the rank of rear-admiral in 1901.

He resigned in 1903 to become president of the Fore River Shipbuilding Company, from which

he has since retired. He is a member of the London Institute of Naval Architects.

BOWLES, Richard Finch, Canadian

preacher and educator: b. near Brampton, On¬

tario, 1864. He was educated at Brompton

High School and Victoria University, at which he graduated B.A. in 1885. He was ordained to the Methodist ministry in 1888, and has held, among other charges, those of Sherbourne

street (twice) and the Metropolitan, Toronto,

and Grace Church, Winnipeg. In 1905 he was appointed professor of homiletics in Victoria University and became in 1913 chancellor of the university.

BOWLES, Samuel, American journalist:

b. Springfield, Mass., 9 Feb. 1826; d. 16 Jan.

1878. He edited the Springfield Republican for over 30 years. This journal had been estab¬

lished by his father, and under the 3ˆounger Bowles soon became a leader in New England journalism. He traveled all over the United States and took great interest in good govern¬

ment. He published (Our New West (1869) ;

(Across the Continent, > and (The Switzerland of America.* Consult Merriam, (The Life and Times of Samuel Bowles) (1885).

BOWLES, William A., Indian agent and

chief : b. Frederick County, Md. ; d. 23 Dec.

1805. When 13 years of age he ran away from home and joined the British army at Philadel¬

phia. He afterward joined the Creek Indians, married an Indian woman and was one of the English emissaries to excite the Creeks against the Americans. After the war he went to Eng¬

land, and on his return to America his influence among the Indians was so hostile to the Span¬

iards that they offered a price of $6,000 for his capture. He was taken in July 1792,, sent to Madrid and afterward to Manila. Having ob¬

tained leave to visit Europe, he returned among the Creeks and instigated them to renewed hos¬

tilities. He was betrayed again into the hands of the Spaniards in 1804 and died in Morro Castle, Havana. His biography was published

in London in 1791.

BOWLES, William Lisle, English poet :

b. King's Sutton, Northamptonshire, 1762; d.

Salisbury, 7 April 1850. He was educated at Winchester and Oxford. In 1804 he became

vicar of Bremhill, Wiltshire, and a prebendary of Salisbury Cathedral. Coleridge and Words¬

worth, seeking for new and more natural

chords of poetry, were affected to such an ex¬

tent by his (Fourteen Sonnets) that Bowles is considered to have created, by his influence, the Lake School of Poetry. In 1806 he issued a critical edition of Pope, which led to a mem¬

orable controversy (1809-25), in which Byron and Campbell were his opponents. His other

works include (The Grave of Howard*

(1790); (Coombe Ellen* (1798); <The Battle

of the Nile) (1799) ; (The Spirit of Discovery*

(1804), his longest poem; and (Saint John in Patmos* (1832). Consult Gilfillan, (Poetical Works, * with memoir (ed., Edinburgh 1855).

BOWLING (bo'ling) GREEN, Ky, city

and county-seat of Warren County, 114 miles southwest of Louisville, of prominence as an educational centre. Here are situated Ogden

College, founded in 1877 ; Potter College for women, opened in 1889; the Southern Normal

School ; Saint Columba's Academy and a busi¬

ness college. The city is surrounded by a fer¬

tile agricultural region, has an important trade in hogs and mules and one of the largest horse markets in the State. The region produces

corn, hay, wheat, oats, vegetables and tobacco.

It contains two parks, one of 42 acres, and owns and operates its waterworks and electric¬

lighting establishment. It was incorporated in 1812 and is governed by a mayor elected every four years, and a city council. At the time of the Civil War Bowling Green was of much

strategic importance to the Confederate army.

Pop. 9,638.

BOWLING GREEN, Mo, city and

county-seat of Pike County, 90 miles northwest of Saint Louis, situated on the Chicago & A.

and Saint Louis & H. railroads. It was set¬

tled in 1820 and incorporated in 1838. Its pres¬

ent government is vested in a mayor, elected biennially, and a board of aldermen. Pike Col¬

lege and a sanatorium are here located and among the industries of the place are flour and pipe manufacturing. There are also stone

quarries nearby. Pop. 1,965.

BOWLING GREEN, Ohio, city and

county-seat of Wood County, situated on the Cincinnati, H. & D. and the Toledo & O. C.

railroads, 22 miles south of Toledo. It carries on a trade in farm produce and is the centre of a region producing oil and natural gas.

Among the other industries are iron smelting, canning and glass-cutting, motor trucks, marine engines and underwear. Private companies

operate waterworks, gasworks, an electric¬

lighting system and a hot water heating plant.

The city was settled in 1832 and incorporated as a borough 1855 and city in 1900. It is gov¬

erned by a mayor biennially elected and a board of public service of five members. Pop. 6,000.

BOWLING GREEN, a park in New York

city, consisting of a triangular strip at the be¬

ginning of Broadway. It was a parade ground in the Dutch period and was bounded on the south by Fort Amsterdam, the site of which is now occupied by the custom house. In the colonial period the green was surrounded by fashionable dwellings, which in the modern

city have been replaced by towering skyscrap¬

ers. A statue of George III was erected on the green in 1770, but six years later was melted into bullets for the Revolutionary army.

BOWLING, an American indoor game ;

also much played in Great Britain, and prob¬

ably a modification of the English game of skittles (q.v.). It is played in a covered alley of carpenter's work from 65 to 70 feet in length and about 3 feet 6 inches wide. The alley has a gutter on each side and is slightly convex in the centre and regularly beveled toward the gutters. At the farther extremity 10 pins,

generally of ashwood, about 12 inches high, and shaped somewhat like a champagne bottle with a slightly tapering base, are set up in the form of a triangle having its apex toward the bowler; that is, with four pins on the rear or fourth line, three on the third, two on the second and one on the first line, all being 12 inches apart.

The pins are uniform in weight. The balls may never exceed 27 inches in circumference; but smaller sizes are optional. The bowler is en¬

titled to two (formerly three) balls, which he rolls at the pins, the object being to knock down as many pins as possible, the number

displaced being registered to the bowler's credit.

The first record of a match seems to have been made on 1 Jan. 1840, at the Knickerbocker Al¬

leys, New York, but it was not until 1875 that the bowlers of the principal cities held a con¬

vention for the purpose of framing rules for the game, and it was 20 years later when the American Bowling Congress brought the sport

into anything like systematic order. The rules of the game in all its varieties are published by the Congress.

BOWMAN, Alexander Hamilton, Ameri¬

can soldier: b. Wilkesbarre, Pa., 15 May 1803; d. there, 11 Nov. 1865. He graduated from the United States Military Academy at West Point, 1825, and entered the engineering corps. For a year he was assistant professor of geography, history and ethics at the academy. He acted as assistant engineer in the construction of the defenses and of the improvements to harbors and rivers on the Gulf of Mexico, 1826-34, and was superintending engineer of the construc¬

tion of Fort Sumter, 1838-51. Later he was chief engineer of the construction bureau of the United States Treasury, and employed in build¬

ing custom houses, post offices, marine hospi¬

tals, *etc.* During the Civil War he was super¬

intendent of the United States Military Acad¬

emy, and from 20 June 1865 till his death was a member of the board of engineers to carry out in detail the modifications of the defenses in the vicinity of Boston, Mass. He attained his lieutenant-colonelcy in the engineering

corps 3 March 1863.

BOWMAN, Edward Morris, American

organist: b. Barnard, Vt., 18 July 1848; d. 27

Aug. 1913. His musical education was thorough and varied. He studied in New York under

Dr. William Mason, in London under Dr.

Bridge, in Berlin under Weitzmann and Ben—

del and in Paris under Guilmant. He was

conspicuously successful as an organist, choral conductor and teacher. In 1895 he took charge of the Temple Choir in connection with the Baptist Temple, Brooklyn, N. Y., and suc¬

ceeded in making popular a high standard of music, both ecclesiastical and secular. In 1891

he succeeded Dr. F. Ritter as professor of music at Vassar College, and in 1892 was ap¬

pointed examiner to Evelyn College, Princeton, N. J. After 1906 he was musical director of Calvary Baptist Church, New York. He was

a founder and for eight terms president of the American College of Musicians. His compo¬

sitions comprise songs, part songs, anthems and orchestral numbers. He published ‘Bowman-Weitzmann Manual of Musical Theory > (1877) ; (Harmony: Historic Points and Modern

Methods) ; (Formation of Piano Touch) ; (Relation of Musicians to the Public.*

BOWMAN, Thomas, American Methodist

bishop: b. Berwick, Pa., 15 July 1817; d. 3

March 1914. He was graduated at Dickinson

College 1837, and entered the ministry in the Baltimore conference of the Methodist Episco¬

pal Church. In 1848 he organized the Dickin¬

son Seminary at Williamsport, Pa., and was its president for 10 years. In 1858 he was elected president of Indiana Asbury University (now

DePauw University), remaining there until

May 1872, when he became a bishop. He was chaplain to the United States Senate in 1864-65. In 1899 he became chancellor emeritus of DePauw University. He visited all the confer¬

ences in the United States, Europe, India.

China, Japan and Mexico and was distinguished for his fine pulpit eloquence.

BOWMAN, Sir William, English anato¬

mist and ophthalmic surgeon: b. Nantwich, 20

July 1816; d. London, 29 March 1892. He

studied at the General Hospital, Birmingham, at King's College, London, and on the Con¬

tinent. In 1840 he was appointed junior dem¬

onstrator of anatomy at King's College ; in the same year assistant surgeon, and in 1856 full surgeon; in 1851 full surgeon in the Royal Ophthalmic Hospital, Moorfields. In 1848 he

was elected to the chair of physiology and of general and morbid anatomy at King's College.

He gained the Royal Society's royal medal for physiology in 1842. In 1880 Cambridge, and in the following year, Edinburgh, conferred on

him the degree of LL.D. He was connected

with a large number of scientific societies, both British and foreign, was collaborator with

Todd in the great work on the (Physiological Anatomy and Physiology of Man* (5 vols., 1845—56), and he also wrote (Lectures on the Eye*

(1849); (Collected Papers) (1892), edited by J. B. Sanderson and J. W. Hulke, with a mem¬

oir by H. Power. His baronetcy was con¬

ferred on him in 1884.

BOWMAN ACT, an act of Congress

which became a law 3 March 1883, under the provisions of which any

claim or matter re¬

quiring investigation may be referred to the Court of Claims by either house of Congress or any of its committees, though Civil War claims or claims barred by law are not in¬

cluded. The court does not enter judgment

but merely reports its findings which are con¬

tinued from Congress to Congress until final action is taken. Four years later an act, known as the Tucker Act, was passed by Congress

granting to the court (should it be satisfied of its jurisdiction) the privilege of rendering judg¬

ment in any case referred to it under the Bow¬

man Act and of reporting its proceedings to Congress, which report also includes any facts bearing on the removal of legal obstacles to the liquidation of a claim. Any claim that under the Bowman Act may be dismissed for want of jurisdiction may be referred under the Tucker Act. Consult Hinds, A. C., <Precedents)

(1899) ; House Document 576, 55th Congress, 2d session (1899).

BOWMAN'S ROOT, Porterantlius stipu—

latus, a hardy perennial herb of the family Rosacea, two to four feet tall, found in rich woods from New York to Georgia and some¬

times planted in shrubberies for its graceful foliage and numerous terminal clusters of

white or rose-tinted flowers. The name is also applied to its close relative, P. trifoliatus, which has the same range and bears a rather close resemblance to it. Both species are also called Indian physic, American ipecac, Indian hippo, and have been used as tonics and

emetics. They are the only species of their genus.

BOWMANVILLE, Canada, a town in

Durham County, Ontario, on north shore of

Lake Ontario, 42 miles northeast of Toronto, on the Grand Trunk, Canadian Pacific and

Canadian Northern railways. It has import¬

ant industries, tire and rubber works employ¬

ing 700 hands, piano manufactory, foundry,

flour and barley mills, a glove factory and canning works. Pop. 2,814.

BOWNE, bown, Borden Parker, Ameri¬

can philosophical writer : b. Leonardville, N.

J., 14 Jan. 1847; d. 1910. He was graduated at New York University in 1871 and studied at Halle and Gottingen. He was religious

editor of the New York Independent 1875-76.

becoming professor of philosophy at Boston

University in 1876. He wrote (Philosophy of Herbert Spencer) (1874) ; ‘Metaphysics*

(1882) ; ‘Principles of Ethics> (1892); ‘The Christian Life* (1878) ; ‘The Atonement*

(1900) ; ‘The Immanence of God) (1905) ;

‘Kant and Spencer, a Critical Exposition*

(1912).

BOWRING, Sir John, English statesman

and linguist: b. Exeter, 17 Oct. 1792; d. there, 23 Nov. 1872. While still very young he en¬

tered a business house in his native town and in 1811 became clerk to a London firm, on whose business he traveled to Spain. Soon

afterward he started on his own account and made many journeys to the Continent. Hav¬

ing extraordinary linguistic ability he made use of his residence in foreign countries to acquire . the different languages and his first publications consisted of translations, especially of the popular poetry of many of the countries he had visited. At the same time he appeared as a supporter of the Radical politics of the time and of the views of Jeremy Bentham,

whose works he edited, and acted as first editor of the Westminister Review from 1824 till 1830.

His public life began in 1828, when he was sent to Holland to make a report on the public ac¬

counts of that kingdom. His letters from there, which appeared in The Morning Herald and

were afterward translated into Dutch, procured for him the degree of doctor of laws from the University of Groningen. He afterward

received similar commissions to France, Swit¬

zerland, Italy, Egypt, Syria and Germany and the Blue-books which appeared from his pen

on these separate occasions are considered as models of their kind. He was member of Par¬

liament for the Kilmarnock burghs from 1835

to 1837 and for Bolton from 1841 to 1849.

In the year last mentioned he accepted the lucrative post of consul at Canton and his services during the four years that he held this post were so appreciated by the ministry that in 1854, the year after his

return, he received the honor of knighthood and was appointed

governor of Hongkong. As governor of

Hongkong he acted with the same energy that he had manifested when consul at Canton; but the step which he took in ordering Canton to be bombarded to punish the Chinese for an

insult offered to the British flag, although ap¬

proved by Lord Palmerston, then at the head of the government, led to his recall March 1857. The last public commission he received was in 1860, when he was sent to Italy to report on the commercial relations with the new

kingdom. He published ‘The Kingdom and

People of SianP; and his ‘Autobiographical

Reminiscences) appeared in 1877. He will,

perhaps, be longest remembered as the author of the familiar hymn, ‘Watchman, Tell Us of the Night.*

BOWS AND ARROWS. These weapons

were used for distant attack and for hunting.

Bows are differentiated into two classes : Sim¬

ple and composite, according to whether they are composed of one piece or made up of sev¬

eral parts or pieces. The history of bows and arrows dates back to prehistoric times and

their use can be termed universal. In modern nomenclature bows made of a single piece

have been termed “self-bows®; when con¬

structed by gluing several strips together they are known as “union® bows. True African

bows are of the simple kind as are also those in South America. The

composite bow belongs to Europe, Asia, North Africa, North America and to the Arctic dwellers.

The bow of ancient Greece was composed

of two curved ibex horns jointed together by a straight handle-piece. The Romans did not arm their soldiery with bows but they employed the notedly expert Cretan archers as auxiliary troops. Bows were used by the ancient As¬

syrians and Chaldeans and Egypt shows her

archers in Thebes bas-relief. The Syrians,

Huns and Parthians used bows, but Franks,

Germans, Goths held the bow and arrow in

low esteem for defense. As Mohammed raised

the use of bows and arrows to a religious duty, it became the favored defensive and offensive weapon of the Persians, Turks and Arabs.

See Arms.

In the Middle Ages Europeans, in general,

used the bow mostly for the chase. But with the English the long-bow has ever been a

favorite weapon of the soldiery. The English archers were one of the most effective forces, with their long-bows, in the successful cam¬

paign in northern France. The English long¬

bow was formed of yew and was five feet in length, having a range of 240 yards, discharg¬

ing sharp, barbed arrows. Twelve shots a

minute was the usual expert's speed. They

used "bracers® on the forearm to protect from injury by the bow-

string. The maker of ar¬

rows (arrowsmith) for the army was known as a fletcher, from which trade arose the family name.

The material from which bows were made

varied with regional conditions. In the far North most bows are of birch and pine com¬

bined. Turkish-Indian bow construction was

of layers of wood, horn and sinew attached firmly together. Some bows have been found

made entirely of whalebone.

One of the constellations is known as Sagitta (the arrow). The zodiacal sign Sagit¬

tarius is an archer. In ancient mythology the bow is Apollo's and Diana's weapon. In art Cupid is ever armed with a bow and quiver of arrows. In Christian art the arrow is sym¬

bol of pestilence, death and destruction; it is the attribute of the saints Sebastian, Ursula and Christian. In ceramics a bow is one of the marks of the Bow porcelain factory.

Bibliography. — Bulanda, Edmund, 'Bogen

und Pfeil bei den Voelkern des Alterthums)

(Vienna 1913) ; Karutz, R., 'Die afrikanischen Bogen, Pfeile und Kocher im Liibecker-Museum* (in Lubeck-Mus. Festschrift 1900) ;

Luschan, Felix von, 'Ueber den antiken Bogen) (in Festschrift fiir Otto Bendorf 1808) ; Mason, Otis Tuften, 'North American Bows,

Arrows and Quivers* (in Smithsonian Inst.

Report, 1893, Washington, D. C, 1894) ; Meyer, Hermann, 'Bows and

Arrows in Central Bra¬

zil* (in Smithsonian Inst. Report. 1896, Wash¬

ington, D. C., 1898) ; Tregear, Edward, ‘The Polynesian Bow* (in Smithsonian Inst. Report, 1892, Washington, D. C., 1893).

Clement W. Coumbe.

BOWSER, Edward Albert, American

mathematician : b. Sackville, New Brunswick,

18 June 1845; d. 1910. He was graduated at Rutgers College in 1868 and in 1871 was ap-368

pointed professor of mathematics and engineer¬

ing there. In 1875 he became director of the United States Coast and Geodetic Survey of

New Jersey. He published (Analvtical Geometry) (1880; 10th ed., 1888); (Differential and Integral Calculus* (1880; 9th ed., 1887); Ana¬

lytical Mechanics) (1884) ; (College Algebra) (1888); Academic Algebra) (1888); (Plane

and Solid Geometry) (1890) ; (Elements of

Trigonometry *; (Treatise on Trigonometry*

(1892) ; (Logarithmic Tables* (1895) ; (Hydro-mechanics) (1885); (Roofs and Bridges*

(1898).

BOWSER, William John, British Colum¬

bia statesman : b. Rexton, N. B., 3 Dec. 1867.

He was educated at Mount Alison Academy

and at Dalhousie University, Halifax, N. S. ; became a barrister of New Brunswick in 1890; removed to British Columbia and qualified in that province in 1891. He was elected as a Conservative for Vancouver to the provincial assembly in 1904, appointed attorney-general

1907, became acting minister of finance 1909-10 and premier in 1915, holding office until the defeat of his ministry in the elections of 1917. He was succeeded by H. C. Brewster.

BOX (Buxus), a genus of about 30 species of evergreen shrubs or small trees of the family Buxacece, natives of northern Africa, southern Europe, Central America and similar climates in Asia. The species have small opposite leaves, inconspicuous monoecious flowers in terminal

or axillary clusters, and nearly globular fruits containing six shining black seeds. Several

species are planted for ornament as edgings of borders, as hedges and as individual specimens, especially for trimming into fantastic shapes, for which purpose some of them are particu¬

larly adapted since they stand shearing well.

They are of slow growth and are not very

hardy where the winters are at all severe. They are propagated by cuttings. B. semperuirens, which attains a height of 25 feet or more, has developed several cultivated varieties of which dwarf box, a favorite edging plant, is probably the best known. The very hard, heavy, light yellow wood, exported largely from Spain and Portugal, is highly valued for turning, carving and engraving and for making musical instru¬

ments such as flutes, clarionets, *etc.* The bright yellow wood of B. balearica, a larger species than the preceding, native of Turkey and

cer¬

tain islands of the Mediterranean, is largely ex¬

ported from Constantinople for similar pur¬

poses to those of the first mentioned, but is inferior. The leaves are sometimes used medic¬

inally.

BOX AND COX, a farce by John M.

Morton, the chief characters being the two men from whom the play takes its name. Box and Cox rent from a certain Mrs. Bouncer the same room, but for some time remain ignorant of the fact, as one works by day and the other by night. A holiday discloses the situation, which mutual agreement leaves unaltered.

BOX-CRAB, a large thick-shelled crab

(Calappa flamma) , occurring from North Car¬

olina southward, and not uncommon on the

Florida reefs. It is four or five inches across, about an inch and a half deep, with large broad, flat claws, which are folded closely in front. It is admirably adapted to resist the violence of the surf.

BOX-ELDER, or ASH-LEAVED MA¬

PLE, trees of the family Aceracece , common from the Atlantic coast to the Rocky Moun¬

tains. They sometimes attain a height of 70

feet, bear pendulous corymbs of staminate flow¬

ers and drooping racemes of pistillate blossoms before the pinnate leaves appear. The wood is inferior for any purposes except for making wood pulp, bowls, pails, *etc.* It has become very popular in the

western United States for windbreaks, fuel and shade, for which its rapid growth and hardiness especially adapted it. It is excellent also to protect other trees until they can care for themselves.

BOX TURTLE, or TORTOISE. In the

chelonians of the genus Cistudo, and to a less extent in Emys, the plastron or lower shield is not rigidly attached to the carapace or upper shield, but is jointed to it by an elastic cartil¬

age. Furthermore, the plastron itself is made up of a front and a rear part, hinged together with cartilage. The animal is consequently

able to enclose itself in a sort of box, and is hence known as a box turtle or tortoise. In Cistudo this box is almost perfectly sealed.

Emys contains two species, both semi-aquatic in habits, Blanding's or the semi-box turtle in the northeastern part of the United States, and the European pond turtle in central and south¬

ern Europe, the northern edge of Africa and Asia Minor. Cistudo is found in the central and eastern parts of the United States, with the exception of one Mexican species. It is com¬

pletely terrestrial, but the hind feet, which pos¬

sess three or four claws, show traces of webs.

There is a superficial resemblance between the box turtles and the species of Tcstudo, the true tortoises, in the arched shell, the stumpy fore¬

legs and the slow gait. (See Turtle.) Con¬

sult Ditmars, R. L., (Reptiles of the World*

(New York 1910).

B'OXBERRY. See Gaultheria.

BOXER, The. See Enterprise, The.

BOXERS (and Boxer Rebellion), the

name given to the members of a powerful

secret society in China. Its avowed object is the driving out from China of all Europeans or other foreigners. The Chinese name for the association is I-ho-ch'uan, which is variously rendered in English. The active efforts of

American and European missionaries and the

constant encroachments upon Chinese territory by European countries appear to be responsible in great measure for the establishment of the society. The events which precipitated the first demonstrations of the Boxers were the occupa¬

tion of Kiao-Chau by Germany, the acquisition of Port Arthur by Russia, the taking of Wei-Hai-Wei by England and the French seizure

of Kwang-Chau. Thus the Boxer movement

presents itself largely under the aspect of a patriotic uprising against foreign aggression, a fact which goes far to account for the rapidity and thoroughness of its operations in 1900.

Early in that year the native population in Shantung were found to be rallying around the standard of the Boxers and adopting its motto, "Uphold the dynasty, drive out the foreigners*

The diplomatic corps at Peking called upon the imperial government to suppress the movement.

This the court professed its readiness to do, although there was a

suspicion, voiced by the British Minister, that the Empress Dowager had fallen under the influence of a native party led by T'ung Fuhsiang and Yu-hsien, and was tem¬

porizing with the Boxers. In May 1900 the

Boxers began a concerted movement upon the

Chinese capital, which, notwithstanding the pro¬

tests of the diplomatic corps, remained un¬

checked by the military forces of the empire.

These forces being Manchu troops, their loyalty was open to question and their sympathies were alleged to be with the Boxer movement. This, at any rate, was the only explanation offered by the Chinese government for its failure to cope with the uprising. The situation had been ren-

* dered additionally threatening by the action of the allies in opening fire upon the forts at Taku. On 17 June the warships of the powers were in force at that port ; when fired upon by the Chinese they opened a bombardment. The

demonstration before Taku had been depre¬

cated by the United States commander, Ad¬

miral Kempff, who did not participate in the bombardment. His warnings that hostilities

would unite Chinese against the foreigners were justified by events.

In June 1900, Peking was reduced to a state of siege by the Boxers. The position of the foreigners in the capital became precarious.

The entire diplomatic corps was cut off from communication with the outside world. In the emergency the powers hurried military and

naval forces to the scene, and an international relief column, under the command of Admiral Seymour of the British navy, moved upon

Peking. This force was, however, compelled

to retreat, when a short distance beyond Tien-Tsin, with a loss of 300 men. The position of the capital now became desperate. Cut off from communication with the rest of the world,

Peking was a scene of turbulence and the cen¬

tre of wild rumor. It was reported that on 7 July the entire diplomatic corps had fallen a prey to Boxer fury. This rumor was later

discredited, the aspect of affairs having been rendered incomprehensible by the receipt of a despatch purporting to emanate from United

States Minister Conger, and bearing date 18

July. According to this despatch the diplo¬

matic corps had taken refuge in the British embassy, where they remained in a state of siege by the Boxers, anticipating massacre un¬

less speedily relieved. Meanwhile the allies had concentrated their forces upon Tien-Tsin, cap¬

turing the place in the middle of July, but suf¬

fering severe loss. The 9th Regiment, United States army, had many casualties, including the loss of its colonel and other officers. The movement had spread in all directions among the Chinese, who on 16 July invaded Siberia.

Russia at once proclaimed a state of siege in its Asiatic dominions. The powers did not, as yet, give formal recognition to a state of war, chiefly in consequence of the attitude of the United States, which took the ground that the Chinese government had been overpowered by

an insurrectionary movement. On 20 July the powers made a categorical demand to be placed in communication with their diplomatic repre¬

sentatives. The authorities at Peking professed their readiness to comply at the earliest possible moment. The international situation was more clearly defined on 23 July by the appeal of vol. 4 — 24

China to the United States for the good offices of the latter in dealing with the powers. See China.

BOXING, as now practised and popularly

defined, is a contest of skill, endurance and pluck between two contestants striking at each other with the closed hand, or fist, covered with a soft leather glove stuffed with horsehair.

Contests of this nature in various forms are probably coeval with man. The sport was

much in vogue among the Greek and Roman

athletes, but in place of the modern tendency to deprive it of its more brutal characteristics, as by the use of gloves, the ancients made the punishment as severe as possible by arming the fists of the combatants with strips of rawhide (the cestus), which were often knotted and

loaded with lead or iron. In the first half of the 18th century rules were formulated to gov¬

ern such contests in England, and from that time onward the practice of fighting with the fists for prizes or for championships has been reduced well-nigh to a <{ science.® Methods of striking, ring tactics, etc., have developed until mere brute force has had to give way before intelligence; in other words, the head has de¬

feated the hands.

In 1719 one Figg, an English pugilist, who attained such celebrity as to have his portrait painted by Hogarth, brought about some sys¬

tem in the conduct of the prize-ring. His work was continued by Broughton, himself for many years champion of England and a great up¬

holder of the sport. Regular contests were

held, with prizes of money and an emblem of championship, usually a belt, which was held on the condition of meeting all comers, on pen¬

alty of surrendering it if declining the trial or beaten by the adversary. The use of a belt as such emblem is of very ancient origin, dating back at least to the time of the siege of Troy.

Homer, in describing the games at the funeral of Patroclus, mentions a belt in this connec¬

tion. There is an unbroken record of cham¬

pionships from the time of Figg down. But

since 1860, when the British champion, Tom

Sayers, fought the American John C. Heenan, fighting with bare knuckles, which had hitherto been the custom, was suppressed, and in its place the use of gloves was adopted. The laws were, however, frequently evaded by the use of skin-tight gloves. At the present time gloves weighing four ounces are used for champion¬

ship matches.

With the use of gloves came also the adop¬

tion of new rules, named, from their fram¬

er's title, the Marquis of Queensbury's rules.

Under these wrestling and hugging (which had previously been permitted) were prohibited; the time of each round was limited to three min¬

utes, with intervals of one minute between

each round; and the former space of 30 seconds within which a man knocked off his feet might recover himself and be brought back to the fighting line was reduced to 10 seconds.

Under the new conditions boxing has taken

a leading rank as a sport and exercise. In the former aspect legislation has been found neces¬

sary to restrict its tendency to degenerate into brutality and to lend its aid to gambling and other vices. As an exercise, however, it holds a high place. It is considered the best system of gymnastics for bringing all the limbs under 370

perfect command; rendering every part of the body pliant, flexible and firm ; acquiring a per¬

fect power of keeping the true centre of grav¬

ity in every position, and of extending the body and limbs to the extreme length and recover¬

ing again without pause or difficulty; and de¬

veloping the power of breathing and the “stay¬

ing® qualities. The practice of boxing also gives to those proficient in it a remarkable power of calmly looking danger in the eye, and preserving both the temper and the courage

under trying circumstances unruffled. It is

alleged by the defenders of this sport that it encourages individual and therefore national

courage; that it leads to a general sense and sentiment of fair play and honor, and that it discourages and renders infamous the use of the knife and other deadly weapons.

Amateur boxers are divided into seven

classes considered according to weight — 105

pounds, 115, 125, 135, 145 and 158 pounds, all over the latter weight being classed as “heavy®

weights. Among the lighter weights the classes are sometimes termed “bantam® weights,

“feather,® “light® and “middle® weights. The term ((catch weights® implies no restriction as to weight.

The laws governing the practice of the sport vary in different States of the Union and in Great Britain and cannot be accorded space

here. For the rules and history of boxing con¬

sult Doran, B. J., ‘Science of Self-Defense) (Toronto 1893) ; Earl, (Handbook of Boxing) (1893) ; Egan, P., ‘Boxiana, or Sketches of Ancient and Modern Pugilism) (4 vols., Lon¬

don 1818-24) ; Lynch, ‘The Complete Amateur Boxer5 (London 1913) ; Mitchell, C., ‘Boxing5

(Badminton Library 1889) ; Spalding’s Athletic Library, ‘Boxing5 (New York, published an¬

nually).

BOXING THE COMPASS, the recital of

all the points of the compass in their proper order, and is among the lessons which a young sailor has to learn.

BOXING-DAY, in England, the day after

Christmas, so called from the practice of giv¬

ing Christmas-boxes or presents on that day.

It was made a bank holiday by the act of 1871.

The practice has of recent years been consid¬

ered a nuisance and in 1836 was actually legis¬

lated against, so far as government employees were concerned. Consult Brand, ‘Popular

Antiquities5 (ed. by Ellis, 3 vols., London 1843).

BOXTHORN. See Lyceum.

BOY BISHOP, a boy chosen on Saint

Nicholas' Day, 6 December, by the votes of his fellow-choristers, to act the part of bishop, retaining office until Saint Innocent's Day, 28

December. This custom of the mediaeval

Church, as practised in England, extended to the schools of Winchester and Eton. Dressed in the episcopal vestments, with mitre, crozier and ring, the youthful bishop went about at¬

tended by a dean and prebendaries and fol¬

lowed by children ; went through the forms of blessing and of preaching, more to the enter¬

tainment than edification of his hearers. Boy bishops dying during their incumbency were

buried in their episcopal attire. The custom of electing a boy bishop came to an end in England during the reign of Queen Elizabeth.

Consult Walcott, 'Sacred Archaeology5 (Lon¬

don 1868).

BOY SCOUTS. These are organizations

of boys and youths between the ages of 12 and 18 years and upwards, which aim to develop character, to aid in furnishing equipment for a career and to train in service for others, physical health and efficient citizenship, by utilizing the natural activities and interests of the adolescent period.

The development of the boy scout move¬

ment in England is due to Lieut.-Gen.

Sir Robert S. S. Baden-Powell (q.v.), who,

during the siege of Mafeking (1899), had seen the boys, under Lord

Edward Cecil's com¬

mand, organized and drilled into an efficient*

messenger service. When Baden-Powell re¬

turned to England, in 1902, the idea was fos¬

tered and received popular support and a gen¬

eral plan of organization was adopted. The

first boy scouts' organization was formed in 1908 and a royal charter of incorporation was granted in 1910, the organization being recog¬

nized as a "non-military, public service body.®

In the United States, Daniel Carter Beard,

with his "Sons of Daniel Boone,® Ernest

Thompson Seton, with the "Woodcraft In¬

dians® (1902), and others had much to do with the early success of the movement, their ideas, in conjunction with those of Sir Robert, form¬

ing the basis of the Boy Scouts of America.

This organization was incorporated under the laws of the District of Columbia 8 Feb. 1910.

The Boy Scouts of America is non-military

and interdenominational in character, the

movement being supported by Catholics,

Protestants and Jews alike. Of late it has also been given consideration as an educational adjunct by well-known educators, some schools adopting the scout program in part or as a whole, while a number of universities and col¬

leges conduct special courses for scoutmasters and scout officials.

The administration of the Boy Scouts of

America is in the hands of a National Council, working through an executive board. The

Council includes many men of national promi¬

nence and has the President of the United

States as honorary president and the ex-Presidents of the United States as honorary vice-presidents. The national headquarters is at

200 Fifth avenue, New York city, where are issued the official publications, Boys' Life, the Boy Scouts' magazine, issued monthly, and

Scouting , a semi-monthly bulletin for scout officials.

Local councils are organized to supervise

and extend the movement in communities upon application by representative citizens to national headquarters. Each local council works

through an executive committee and a com¬

missioner, with a paid executive employed

when development makes it necessary for one man to give his entire time.

The scouts themselves are organized into

patrols of eight boys, three or four patrols forming a troop under a scoutmaster. Each

troop has also a committee of three or more men, representing the school, church, settle¬

ment house, playground or other institution

with which it is connected. This committee

recommends the selection of the scoutmaster

to the local council, or to the national head-BOYACA — BOYAR

quarters direct when there is no local council, and co-operates with him. Any boy of 12 or older may become a scout upon fulfilling cer¬

tain conditions. These include taking the

scout oath, which reads as follows : ((On my honor I will do my best — (1) To do my duty to God and my country, and to obey the scout laws; (2) To help other people at all times; (3) To keep myself physically strong, men¬

tally awake and morally straight.® He also

subscribes to the 12 points of the Scout Law.

A Scout is trustworthy, loyal, helpful, friendly, courteous, kind, obedient, cheerful, thrifty, brave, clean and reverent. The motto of the organization is ((Be prepared,® and the prin¬

ciple, (<Do a good turn daily,® is kept con¬

stantly before the boys.

Scouts are divided into three classes —

tenderfoot, second class and first class scouts.

Promotion in these classes is conditioned on passing certain requirements, after which the goal is the attainment of merit badges given for special proficiency in such subjects as first aid, lifesaving, civics, tracking, signaling, cycling, nature study, seamanship, campcraft, woodcraft, the handicraft, *etc.* In all 57 merit badges are provided. When a first class scout earns merit badges for first aid, physical de¬

velopment or athletics, personal health, public health and lifesaving or pioneering, he be¬

comes a life scout. When a first class scout qualifies for 10 merit badges, including the five badges of the life scout, he becomes a star scout ; and when a first class scout has quali¬

fied for 21 merit badges, including first aid, lifesaving, personal health, public health,

cooking, camping, bird study, path-finding,

pioneering, athletics or civics, physical devel¬

opment and any 10 others, he becomes an eagle scout. Special honor medals in bronze, silver and gold are given for lifesaving.

A book department is maintained by the

national organization which, with the assist¬

ance of a library commission composed of ex¬

pert book men, makes available reliable advice as to worth-while books for boys and, under the leadership of this department, arranges

with publishers for reprint editions of the best books for boys at low prices. The results of this department in the shape of definite lists carefully subdivided are made available with¬

out any charge to librarians, local councils, troops and parents of boys throughout the

country. Many hundreds of parents are al¬

ready being given special advice as to courses of reading for their boys.

In 1914, in Great Britain and the British

colonies, there were over 200,000 scouts and scoutmasters ; and in the United States there were, on 15 May 1916, 174,000 scouts registered with the national headquarters and in good

standing, together with 8,323 scoutmasters and about 34,000 other scout officials, all in good standing, making a total of about 215,000 scouts and scout officials. Scouting is established in nearly every country of continental Europe,

with a total membership numbering more than 1,000,000.

BOYACA, boˆ-ya-ka', Colombia, a depart¬

ment of that republic containing 17,654 square miles, bounded on the north by Santander and Venezuela, on the south by Meta and on the west by Cundinamarca and Antioquia. It lies chiefly on the high plateau of the eastern Cor¬

dillera, with a narrow prolongation on the

plains between Venezuela and Meta. The cap¬

ital is Tunja, of 8,500 inhabitants. The land is extensive in prairies, covered with marshes and forests, with scattered pastures and cul¬

tivated ground, watered by tributaries of the Orinoco and the Meta. The lowlands are fer¬

tile and among the mountains various minerals are found and the emerald mines of Murzo

have long been famous. The people have rude manufactures of cotton, wool, straw, etc., but cattle raising is the chief occupation. The in¬

habitants, chiefly Indians and Mestizos, occupy only a small part of the state and number about 586,500.

BOYACA, town of Colombia, South

America, 25 miles south of Tunja, in the state of Boyaca, and about 60 miles northeast of Bogota. It is inhabited mostly by Indians,

contains extensive lime-kilns and was the

scene of a battle, 7 Aug. 1819, between the Spaniards and General Bolivar, which resulted in the defeat of the former and the establish¬

ment of Colombian independence. A college

was established here in 1821. Pop. 7,000.

BOYAR, or BOIAR, among the Slavic

nations, a free landowner independent of any sovereign. It is synonymous with cech, lech or bajarin, used by several Slavic tribes, such as the Bohemians and Poles. The word Boyar was at first especially used by the Bulgarians, Serbs and Russians and then was adopted by the Mol¬

davians and YVallachians. It represented the highest social condition, corresponding in cer¬

tain respects to that of an English peer. In ancient Russia, the boyars were the next after the princes of the blood, or knazia , who were all originally petty sovereigns. The boyars

formed a kind of supreme political body in the state and acted as the council (duma) of the grand dukes. All the higher offices, civil and military, including the lieutenancies in the provinces, were held by them. While Russia

was still divided into several petty sovereign¬

ties, the boyars enjoyed the right of choosing for themselves and for their dependents the prince whom they wished to serve and to leave the service at their pleasure, without any pre¬

vious notification. When the grand dukes of Vladimir and of Moscow stripped these petty princes of their sovereign rights and trans¬

formed them from vassals into subjects, the dignity of boyars was granted to their families.

The boyars had their own military retinue and their clients ; and their influence on the masses of the people often equaled that of the grand dukes. The sovereign ukases always contained the sacramental words, ((ordered by the Grand Duke (subsequently it was (by the Tsar'),

and approved by the boyars.® Precedence

among the boyars was reckoned according to

the date of the title, which was hereditary, and the observance of it was carried so far that in the 16th and 17th centuries any boyar of an older creation refused to serve under a younger one. This struggle for rank was

ended by the Tsar, Alexis Michailovitch

Romanoff, who destroyed the official records and diplomas of the boyars, but thev retained their place among the nobility. Peter the

Great wholly abolished their power and official privileges and the name now remains only as 372

a historical distinction and a recollection of the past, in families which once possessed the dignity. In Rumania boyars still exist, though the title has only the significance of the English ˆsquire,® or owner of an estate.

BOYCE, James Petigru, American clergy¬

man: b. Charleston, S. C., 11 Jan. 1827; d. Peau, France, 28 Dec. 1888. He was graduated at

Brown University in 1847 and studied theology at Princeton from 1849 till April 1851. He was ordained to the ministry in December of the latter year and settled at Columbia, S. C. In 1855 he became professor of theology in Far-man University. He was elected professor in the Southern Baptist Theological Seminary at Greenville, S. C., February 1858, and entered upon the duties of the office in October 1859.

The operations of the seminary having been

practically suspended during the Civil War, he entered the confederate army as a chaplain and served in that capacity for six months. He was elected to the legislature of South Caro¬

lina in 1862 and reelected in 1864. In* 1863 he devised a plan for extinguishing the Confeder¬

ate debt and was appointed a special commis¬

sioner to secure its adoption. After the war he gave his attention to the resuscitating and re-establishing the Southern Baptist Theological Seminary in Kentucky, and in 1874, secured

pledges to the amount of $90,000 for the sup¬

port of the seminary. For several successive years he was president of the Southern Baptist Convention. He contributed frequently to cur¬

rent literature and published several volumes of sermons and addresses. He received the

degrees of S.T.D and LL.D. from Columbian

and Union (Tenn.) Universities, respectively.

BOYCOTT. What is popularly known as

the boycott is a form of coercion by which a combination of many persons seek to work

their will upon a single person, or upon a few persons, by compelling others to abstain from social or beneficial business intercourse with such person or persons. Carried to the extent sometimes practised in aid of a strike it is a cruel weapon of aggression and its use immoral and anti-social, and the concerted attempt to accomplish it is a conspiracy at common law and merits and should receive the punishment due to such a crime. It is attempted to defend the boycott by calling the contest between em¬

ployers and employees a war between capital and labor and pursuing the analogies of the word to justify thereby the cruelty and illegality of conduct on the part of those conducting a

strike. The analogy is not apt and the argu¬

ment founded upon it is fallacious. There is only one war-making power recognized by our institutions and that is the government of the United States and of the States in subordination thereto when repelling invasion or suppressing domestic violence. War between citizens is not to be tolerated and cannot in the proper sense exist. If attempted it is unlawful and is to be put down by the sovereign power

of the State and nation.

The practices common in a boycott would

be outside the pale of civilized war. In civ¬

ilized warfare, women and children and the

defenseless are safe from attack and a code of honor controls the parties to such warfare which cries out against the boycott. Cruel and cow¬

ardly are terms not too severe by which to characterize it.

The name was first given to an organized

system of social and commercial exclusion em¬

ployed in Ireland in connection with the Land League and the land agitation of 1880 and sub¬

sequently. It took its name from Capt. James Boycott, a Mayo landlord, one of its earliest victims, who as agent for Lord Erne evicted many tenants. A landlord, manufacturer or

other person subjected to boycotting faces a combination to prevent his buying from or sell¬

ing to anyone employing labor, etc., and those refusing to join in a boycott are often threat¬

ened with similar interference, loss or injury.

Boycotts have been frequently employed in the United States as a means of coercion in labor difficulties. The attitude of courts is not alto¬

gether uniform in regard to such combinations.

A boycott accompanied by violence is a crim¬

inal offense and such conspiracy is sometimes declared unlawful even when not marked b}r

threats and violence.

English courts recognize the legality of the boycott, no matter how much injury it may in¬

flict on its victims, and punish only acts of violence or intimidation that may be incidental to the boycott. In the United States, however, the courts usually take a strong attitude against boycotting and in Alabama, Colorado, Illinois.

Indiana and Texas it is especially prohibited by legislation, regardless of what its object may be or whether it is accompanied by vio¬

lence. Many cases have been brought before

the United States Supreme Court under the

Sherman Anti-Trust Act, notably the Danbury

Hatters' and the Bucks Stove Company cases.

In both cases the court decided that boycotts were <(in restraint of trade, M therefore illegal.

Bibliography. — Smith, Jeremiah, (Crucial

Issues in Labor Litigations) in the Harvard Laiv Review (Vol. XX, pp. 253, 345, 429,

1907) ; Laidler, H. W., (Boycotts and the Labor Struggle) (1913).

BOYD, Andrew Kennedy Hutchison,

Scottish clergyman and author : b. Auchinleck, Ayrshire, 3 Nov. 1825; d. London, 2 Nov. 1899.

He was educated at King's College, London,

and Glasgow University; was ordained in 1851, and was incumbent successively of the parishes of Newton-on- Ayr, Kirkpatrick-Irongray, in

Galloway, Saint Bernard's, Edinburgh, and at the university city of Saint Andrews. He early became known as a contributor to Fraser's

Magazine, under the signature <(A. K. H. B.):*

Many of these contributions were reprinted in book form under the title (Recreations of a Country Parson, > of which three series ap¬

peared. In 1890 he was moderator of the Gen¬

eral Assembly of the Church of Scotland. He also published (Graver Thoughts of a Country Parson,) (Counsel and Comfort Spoken from

a City Pulpit, > (Present-Day Thoughtˆ Me¬

morials of Saint Andrew's Sundays, } (Toward the Sunset, > (What Set Him Rights (The

Best Last,* (Twenty-Five Years of Saint An¬

drews,) (Saint Andrew's and Elsewhere,) *etc.*

BOYD, Sir John Alexander, Canadian

judge: b. Toronto, 23 April 1837. Educated at Upper Canada College and Toronto Univer¬

sity, where he was graduated in 1860. He be¬

came Chancellor of Ontario 1881, and presi¬

dent of the High Court of Justice for Ontario BOYD — BOYDELL

1887. He is the author of a (Summary of

Canadian History,* and was created K.C.M.G.

in 1901.

BOYD, John Parker, American soldier :

b. Newburyport, Mass., 21 Dec. 1764; d. Bos¬

ton, 4 Oct. 1830. His father came from Scot¬

land and his mother was a descendant of Tris-tarn Coffin, the first of that family who emi¬

grated to America. He entered the army in

1786 as ensign in the 2d regiment, but peace service did not suit his adventurous spirit and in 1789 he went to India. Under Nizam Ali khan he was given an important command in

Madras and at one time had an army of 10,000

men at his disposal. He remained in India

several years, in a sort of guerilla service, and obtaining much favor. Returning home in 1808, he was appointed colonel of the 4th regiment, United States army. He took part in the bat¬

tle of Tippecanoe, November 1811; was made

brigadier-general, 26 August, and held that

rank throughout the War of 1812. He was at the capture of Fort George and in the battle of Chrysler's Field, Canada. In 1816 he went to England to secure indemnity for the loss of a valuable cargo of saltpetre captured by an English cruiser, but procured only a single in¬

stalment of $30,000. President Jackson ap¬

pointed him naval officer at Boston in 1830, but his services were almost immediately cut short by his death. He published a pamphlet, docu¬

ments and Facts Relative to Military Events During the Late War* (1816).

BOYD, Linn, American statesman : b.

Nashville, Tenn., 28 Nov. 1800; d. Paducah, Ky., 16 Dec. 1859. While he was a boy his parents removed to Trigg County, Ky., where he was brought up to work on the farm and could only attend school in winter. At 26 years of age he had a farm of his own in Calloway County, and, notwithstanding his slender edu¬

cation, was elected to represent that county in the legislature for successive terms from 1827

to 1830. Returning to Trigg County, he was again sent to the legislature in 1831-32. He was a Democrat in politics and, after a defeat by a Whig candidate in 1833, was elected to Congress in 1835. He was defeated for the

25th Congress but elected for the 26th, and from 1839 till 1855 regularly reelected to the national House of Representatives. His native abilities soon made him prominent in the House and he became chairman of the Committee on Territories, and on 31 Dec. 1851 was chosen speaker, which office he held until 1855. He was lieutenant-governor of Kentucky for a

year before withdrawing from political life, and when he finally retired it was with a high reputation for faithfulness in every public trust.

BOYD, Thomas Duckett, American edu¬

cator: b. Wytheville, Va., 20 Jan. 1854. He was graduated at Louisiana State University

in 1872 and held important posts in the faculty of that institution 1873-88. He was president of the Louisiana State Normal School 1888-96.

Since 1896 he has been president of the Louisi¬

ana State University. He has been an active member of various State and national educa¬

tional associations.

BOYD, Zachary, Scottish divine : b. Ayr¬

shire, about 1586; d. about 1653. He received the rudiments of* his education at Kilmarnock School and took the academical course in the University of Glasgow. About 1607 he went

abroad and studied at the College of Saumur, France. He was appointed a regent in this

university in 1611 and is said to have been of¬

fered the principalship, which he declined. He spent 14 years in France, during four of which he was a preacher of the gospel. In conse¬

quence of the persecution of the Protestants he was obliged to return home in 1621. There he lived successively under the protection of Sir William Scott of Elie and of the Marquis of Hamilton at Kinneil, it being then the fashion for a pious person of quality in Scotland to re¬

tain one clergyman at least as a member of his household. In 1623 he was appointed minister of the large district in the suburbs of Glasgow, styled the Barony parish, for which the crypts beneath the cathedral church then served as a place of worship. In this charge he continued for the rest of his life. He filled the office of rector of the University of Glasgow 1634-35

and 1645. In 1629 he published his principal prose work, (The Last Battell of the Soule in Death ; whereby are shown the Diverse Skir¬

mishes that are between the Soule of Man on his Deathbed and the Enemies of our Salva¬

tion carefully digested for the Comfort of the SickeP This was reprinted at Glasgow in 1831, with a life of the author by Mr. Neil. He published various other works, chiefly devo¬

tional, and left a large quantity of manuscript writings, which are preserved in the Glasgow College library. Among the latter is one en¬

titled (Zion's Flowers,* consisting of poems on select subjects of Scripture history. It is pop¬

ularly called (Zachary Boyd's Bible,* and al¬

though it abounds in homely and ludicrous

passages, it is not without a fine strain of devo¬

tional feeling. Boyd left a large legacy to the Glasgow College.

BOYDELL, John, English engraver, more

distinguished as an encourager of the fine arts than on account of his own productions: b.

Darrington, Shropshire, 19 Jan. 1719: d. 12

Dec. 1804. He was intended for his father's occupation, which was that of land-surveyor.

Accident having thrown in his way Baddeley's (Views of Different Country Seats,* he con¬

ceived so strong an inclination for engraving that he determined to adopt it as a profession; and accordingly, when above 20, he bound him¬

self apprentice for seven years to W. H. Towns, a London engraver. In 1745 he published six small landscapes, and afterward executed as

many more views of places in and near London as formed a volume, which he published by

subscription. With the profits of this work he established himself as a printseller, and by his liberality to artists in general established a high reputation as a patron of ingenious men. Wool-let was employed by him to engrave the cele¬

brated pictures of Niobe and Phaeton, and he furnished other eminent artists with occupa¬

tion, and was thus enabled to carry on an extensive foreign trade in English prints, which tended greatly to his own emolument and to the credit and advantage of his native country.

Having at length established what may be

termed an English school of engraving, he

next turned his attention to the improvement of the art of painting. With that view he engaged the first artists in the kingdom to fur¬

nish the collection of pictures forming the well-374

known Shakespeare Gallery. The wars arising

out of the French Revolution having obstructed his continental trade, he was induced in 1804

to solicit an act of Parliament to permit him to dispose of his gallery and paintings by lot¬

tery. This he obtained, and lived long enough to see every ticket disposed of, but died before the lottery was drawn. In 1782 he was elected alderman and in 1790 Lord Mayor. Sir Joshua Reynolds called him (<the commercial Maecenas of England.®

BOYDEN, Seth, American inventor : b.

Foxboro, Mass.. 17 Nov. 1785; d. Middlcville, N. J., 31 March 1870. He was brought up on a farm, and attended a district school. Mechan¬

ically inclined, he spent much time experiment¬

ing in a blacksmith shop. His first invention was a machine for making nails, and in 1809 he undertook to manufacture both nails and files.

Soon afterward he invented a machine for split¬

ting leather, and in 1815, he took it to Newark, N. J., where he engaged in the leather busi¬

ness. In 1816 he invented a machine for cut¬

ting brads, and followed this by the invention of patent leather, which he manufactured till 1831, when he began making malleable iron

castings, on a system of his own. Another in¬

vention was one for making hat bodies and a process for making Russia sheet iron. In 1835

he turned his attention to steam engines ; sub¬

stituted the straight axle for the crank in loco¬

motives ; and invented the cut-off now used instead of the throttle valve. In 1849 he went to California, but was unsuccessful, and re¬

turned to New Jersey, where he applied him¬

self to farming, and developed a variety of strawberry previously unequaled in size or qual¬

ity. In 1890, a statue was erected to his memory in Washington Park, Newark, N. J.,

where he spent the greater part of his life.

BOYE, Martin Hans, Danish-American

chemist and genealogist : b. Copenhagen, Den¬

mark, 6 Dec. 1812 ; d. 1909. He was a graduate from the University of Copenhagen and from

the medical department of the University of Pennsylvania in 1844. He came to the United States in 1836 and jointly discovered several chemical compounds, as well as perchloric ether in 1841. In 1845 he discovered the first process of refining cottonseed oil. He was professor of chemistry at the Central High School in Philadelphia, 1845-59, retiring in the year last named. He published (Pneumatics, or the

Physics of Gases) (1856); (Chemistry, or the Physics of Atoms) (1857).

BOYER, bwa-ya, Alexis, French surgeon:

b. Uzerches, Limousin, 1 March 1757 ; d. Paris, 25 Nov. 1833. Although in his younger years he had to struggle against poverty and disease, he attended the lectures of Louis and Desault and after a brilliant career as a student, obtained the degree of master of surgery in 1787. He became successively surgeon to the Hopital de la Charite and to the Hotel-Dieu ; was profes¬

sor, first of operative and then of clinical sur¬

gery, at the Ecole de Sante, and was appointed first surgeon to Napoleon, receiving at the same time the title of baron of the empire, with a dotation of 25,000 francs. He became a mem¬

ber of the Institute in 1825 and was consulting surgeon to Louis XVIII, Charles X and Louis Philippe. His chief works are (Traite d'anatomie) (1797-99) ; (Traite des maladies chirurgicales et des operations qui leur conviennenU

(11 vols., 1814-26). He also contributed to the (Journal de medecine) and the (Dictionnaire des sciences medicales.'

BOYER, Jean Pierre, President of the

republic of Haiti: b. Port-au-Prince, 28 Feb.

1776; d. Paris, 9 July 1850. He was a mulatto by birth but came early to Europe, where he obtained a European education. In 1792 he

entered the army and joined the blacks, who had risen against the French. After the Com¬

missioners of the French Convention had pro¬

claimed the freedom of the blacks in Haiti (1793) he fought with distinction against the English in San Domingo but was nevertheless obliged to evacuate the island, to which he did not return till 1802. At first he acted as leader of the mulattoes in the war against the negroes, but afterward effected a union between these in order to prepare the way for the complete independence of the island. When Petiop es¬

tablished a free state in the western part of the island, Boyer undertook the command of

the troops which were concentrated in Port-au-Prince. After the death of Petion, Boyer was elected president in 1818. By his skilful mili¬

tary operations, not less than by his adroit diplomacy, he finally succeeded in uniting the eastern part of the island with the republic and thus effecting the complete separation of the island from France and Spain in 1825. He

also purified the internal administration, raised the financial condition of the republic and be¬

stowed particular care upon its educational in¬

stitutions. The contest between mulattoes and negroes, however, still went on and in the end the latter rose in rebellion against him and compelled him to leave the island in 1843. He never returned to the place of his birth and of his long-continued activity, but lived for the rest of his life, first in Jamaica and afterward in Paris.

BOYESEN, boi'e-sen, Hjalmar Hjorth,

Norwegian-American novelist and writer: b.

Frederiksvarn, Norway, 23 Sept. 1848; d. New York, 4 Oct. 1895. After completing his uni¬

versity studies at Christiania, he came to the United States in 1869 and was editor of a Nor¬

wegian journal in Chicago. He returned to

Europe in 1872 and studied Germanic philology at Leipzig two years ; then, returning to this country, he was professor of German in Cor¬

nell University (1874—80) and then of Germanic languages and literature in Columbia College till his death. His story of Norwegian life, (Gunnar,' published in the Atlantic Monthly

(1873) and his (Idyls of Norway and Other

J'oems' (1883), give proof of his rare imagi¬

native faculty and his deep human sympathies.

Besides these, he wrote (Tales from Two Hem¬

ispheres' (1875) ; (A Norseman's Pilgrimage'

(1876) ; (Falconberg' (1878) ; (Goethe and

Schiller: Their Lives and Works' (1878);

Ulka on the Hill-Top' (1881, dramatized 1884) ; ˆQueen Titania' (1882) ; (A Daughter of the Philistines' (1883); (Story of Norway' (1886).

Some of his works have been translated into German, *etc.* He was a founder of the New

York Authors' Club.

BOYLE, Charles (4th Earl of Orrery),

English physicist: b. Chelsea 1676; d. 28 Aug.

1731. While a student at Christ Church, Ox-lord, he published a new edition of the

epistles of Phalaris, of which Dr. Bentley ques¬

tioning the authenticity, he wrote an answer entitled cDr. Bentley's Dissertation on the

Epistles of Phalaris Examined, } which pro¬

duced the famous Boyle and Bentley contro¬

versy. On leaving the university in 1700 he was chosen member for Huntingdon, and on

the death of his brother succeeded to the earl¬

dom, fought at Malplaquet, was made major-general and was soon after elected a knight of the Thistle. He was subsequently raised

to the dignity of a British peer, under the title of Lord Boyle. He retired from court soon

after the accession of George I, and in 1722

was sent to the Tower on suspicion of being concerned in Layer's plot, but was discharged after six months' imprisonment. He constantly attended the House of Peers as before but

never spoke, though often employed in drawing up protests. Besides the edition of Phalaris, he published a comedy called (As You Find

It,* a copy of verses to Dr. Garth upon his dispensary and a prologue to Southerne's play of the (Siege of Capua. > His name of Orrery was given to an astronomical instrument in¬

vented by Mr. George Graham, whom he pa¬

tronized.

BOYLE, David, Canadian ethnologist : b.

Greenock, Renfrewshire, Scotland, 1 May 1842; d. 1911. He went to Canada in 1856 and was first a blacksmith and then a teacher. He later took up geology and discovered the fossils

murchisonia boylei', named in his honor. He was for 25 years curator of the Archaeological Museum at Toronto. He wrote (Notes on

Primitive Man in Ontario) and similar works.

BOYLE, Horatio Temple Stannage, Cana¬

dian educator: b. Saint Catherines, Ontario, 1875. He was educated at Trinity University, Toronto, where he was graduated in 1898, and at Montreal Theological College. Ordained in the Anglican Church in 1900, after holding

assistantships at Shawville and Montreal, he was rectof of Wingham, Ontario (1905), and

Chatham (1908); in 1910 became professor of church history and liturgies at Trinity Univer¬

sity, and in 1915 principal of King's College, Halifax, N. S.

BOYLE, John (Earl of Cork and Orrery),

son of Charles Boyle: b. 1707 ; d. 1762. His earliest publication was a translation of two odes of Horace in 1742, which work was fol¬

lowed in 1751 by his translation of the Epis¬

tles of Pliny the Younger, with Observations on Each Letter, and an Essay on Pliny's LifeP

This translation advanced his reputation as a polite scholar, but has since been eclipsed by the superior version of Melmoth. In 1754 he made the tour of Italy and employed himself in collecting materials for a history of Tus¬

cany, which he intended to write in a series of letters, 12 only of which have been published since his death. They are written in an agree¬

able manner and contain some curious infor¬

mation respecting the Medici family.

BOYLE, Richard (Earl of Cork). Eng¬

lish statesman: b. Canterbury, 13 Oct. 1566; d.

15 Sept. 1643. In 1588 he went to Dublin with strong recommendations to persons in power,

whose patronage he obtained. The state of

Ireland at that time having rendered land very cheap, he took advantage of the circumstance to make some considerable purchases, among

which was the estate of Sir Walter Raleigh, consisting of 12,000 acres in the counties of Cork and Waterford, which he obtained on

easy terms. He was then appointed clerk of the council under Sir George Carew, the presi¬

dent of Munster, whom he accompanied in vari¬

ous expeditions against the Irish insurgents in opposition to the English government. On

these and other occasions he distinguished him¬

self by his talents and activity, and rapidly aug¬

mented his political power and influence. King James I appointed him privy-councillor for

Munster and afterward for the kingdom of

Ireland; in 1616 he was made a peer of that realm by the title of Baron Boyle of Youghall, and in 1620 was created Viscount Dungarvan

and Earl of Cork. He was now at the height of his prosperity, living in his castle of Lismore in a style of grandeur more resembling that of a sovereign prince than of a private individual. In 1629 he was made one of the lords justices of Ireland and, in 1631, lord-treasurer of that kingdom. Like most of the English rulers of the sister island, he seems to have employed his power rather for the subju¬

gation than the advantage of the native Irish.

He built and fortified towns and castles and introduced among the people arts and manu¬

factures, but put in force the severe laws of Queen Elizabeth against the Roman Catholics

and transported multitudes of the ancient in¬

habitants from the fertile province of Leinster to the bogs and deserts of Kerry, supplying their place with English colonists. In 1641 the Earl went to England as a witness against

Lord Strafford, then under impeachment, hav¬

ing quarreled with that nobleman during his viceroyalty. Soon after his return home the insurrection of the Irish broke out, on which event he displayed his accustomed activity, en¬

listing his tenantry under the command of his sons and taking other measures for the defense of the country. Lord Cork is principally mem¬

orable as the founder of a family, several in¬

dividuals of which have highly distinguished themselves as cultivators of literature, science and the arts ; yet it should not be forgotten that he attained a high degree of contemporary fame and was designated in the age in which he lived — ((The great Earl of Cork.®

BOYLE, Robert, English philosopher: b.

Lismore Castle, in the province of Munster, Ireland. 25 Jan. 1627; d. London. 30 Dec. 1691.

He was the seventh son and 14th child of

Richard, the great Earl of Cork. He was sent to Eton at the age of eight and in 1638 to Geneva, wbere he continued to pursue his

studies for several years, returning to England in 1644. During this period his father had died, leaving him considerable property. He

now went to his estate at Stalbridge, where he devoted himself to the study of physics and chemistry. He was one of the first members of a learned society founded in 1645. which at first went under the name of the Philosophi¬

cal College. On account of the political dis¬

turbances this society retired to Oxford, but was revived after the Restoration under the name of the Royal Society. Boyle occupied

himself at Oxford in making improvements in the air-pump. Like Bacon, he esteemed obser-376

vation the only road to truth. He attributed to matter merely mechanical properties. Every year of his life was marked by new experi¬

ments. We are indebted to him, indirectly, for the first certain knowledge of the absorption of air in calcination and combustion, and of the increase of weight which metals gain by oxidation. He studied the chemical phenomena of the atmosphere, and was thus a predecessor of Mayow, Hales, Cavendish and Priestley.

In all his philosophical inquiries he displayed an accurate and methodical mind, relying

wholly upon experiments. While endeavoring

to settle his faith, he found those defenses of the Christian religion which had been pub¬

lished before his time unsatisfactory. In order, therefore, to read the original works which are considered the foundation of Christianity he studied the Oriental languages and formed connections with Pococke, Thomas Hyde, Sam¬

uel Clark, Thomas Barlow, *etc.* The result of his studies was a conviction of its truth, which was manifested not only by his theological

writings, but by his benevolence and generous disinterestedness. He instituted public lectures for the defense of Christianity, devoting an annual sum to the payment of a lecturer. Boyle did much for the support of the mission in India and caused Irish and Gaelic translations of the Bible to be made and printed at his own expense. To his religious principles were united the purest morals, a rare modesty and an active benevolence. Three successive kings of England conversed familiarly with him, and no stranger of note visited England without seeking an interview. He was interred in West¬

minster Abbey. Birch published his life and an edition of his works, five volumes, folio, London 1744; 2d ed., 6 vols., 1772. Latin edi¬

tions of his works were issued at Geneva in 1677, 1680 and 1714; at Cologne in 1680-96; at Venice 1695, and in French at Paris in 1679.

BOYLE, Roger (Baron Broghill and 1st

Earl of Orrery), English statesman, soldier

and dramatist, third son of the 1st Earl of Cork : b. Waterford, 25 April 1621 ; d. 16 Oct.

1679. When only seven years old he was cre¬

ated Baron Broghill, by which title he is usu¬

ally known. He commanded a troop of cavalry raised by his father, was employed in the de¬

fense of the castle of Lismore and displayed his courage and ability on many occasions in the service of Charles I, on the cessation of whose authority he acted under the Parlia¬

mentary commissioners in Ireland. When the

King was put to death, he retired for a while from public life, but being courted bv Crom¬

well, he accepted a commission from him and assisted him materially in reducing the Irish to subjection. He served his new master with zeal and fidelity, and few persons were more trusted or distinguished by him. Oliver, be¬

coming Protector, made Lord Broghill one of his privy council and a member of his House of Lords. In 1656 he sent him to Scotland, with a commission to govern there with abso¬

lute authority for one year, and his conduct was such as proved satisfactory both to the Scots and the Protector. On the death of

Cromwell, becoming aware of the approaching

restoration of regal power, he exerted himself with such dexterity and success in promoting it as to obtain much credit for his conduct.

Charles II rewarded him with the title of Earl of Orrery and he was appointed one of the lords justices for Ireland. Among his dra¬

matic writings are ‘Henry V, 5 (Mustapha, the Son of Solyman the Magnificent, 5 ‘Tryphon.5

His comedies include (Guzman) and ‘Mr.

Anthony. 5 He also wrote several poems, one of them being on the death of his friend, Abra¬

ham Cowley.

BOYLE, Virginia Frazer, American poet

and novelist: b. near Chattanooga, Tetin. ;

daughter of the late Charles Wesley Frazer, a prominent lawyer and Confederate officer; edu¬

cated Higbee School ; married Thomas R.

Boyle, lawyer, of Memphis. Holds office of

poet laureate of United Confederate Veterans’

Association created for her by change in con¬

stitution, wnich forbade a woman holding office, 1910. Member Colonial Dames, Daughters of

American Revolution, United Daughters of

Confederacy, Ladies’ Confederate Memorial

Association and organizer of the Junior Con¬

federate Memorial Drum and Fife Corps. Au¬

thor (The Other Side5 (1893) ; ‘Brokenburne5

(1897); (Devil Tales5 (1900); ‘Serena5

(1905) ; ‘Love Songs and Bugle Calls5 (1906).

Wrote a series of negro folk-tales for Harper’s Magazine and a series of negro plantation

tales for the Century Magazine ; has contrib¬

uted prose and verse articles to various maga¬

zines. Wrote prize centennial ode, Tennessee 1896; Jefferson Davis Centennial ode for U.

C. V. Association 1908; Abraham Lincoln ode for the centenary celebration of the Philadel¬

phia Brigade Association 1909 ; Robert Edward Lee — The South's Gift to Fame, U. C. V.

Association ; Dream of the Alabama, centennial of Admiral Semmes, C.S.N., for the Confed¬

erated Memorial Associations 1909; commem¬

oration ode for the 125th anniversary inaugu¬

ration of Washington, for G. A. R. of Pennsyl¬

vania, 1914.

BOYLE, Ireland (Ir. Manistir na Buille,

monastery of the Boyle), town in county Ros¬

common, on the river Boyle, one mile north¬

east of Loch Gara and the same distance west of Loch Key, on the Midland Great Western

Railway. It has a large trade in grain, butter and poultry products. It is a favorite angling centre. Boyle was a noted monastic centre

from the 5th to the 1 5th centuries. The ruins of a Cistercian abbey, dating from 1161, are well preserved and are of considerable archi¬

tectural interest. 'The Annals of Boyle,5 in Latin and English (420-1245), have been pub¬

lished. Pop. 2,691.

BOYLE LECTURES, a series of dis¬

courses so named from the founder, Robert

Boyle (q.v.), who left a bequest amounting to $250 annually for this purpose, the theme of the lectures to be Christian apologetics. The first series was given in 1692 by Richard Bent¬

ley. The lectures of this course are given annually in a series of eight at the church of Saint-Marv-le-Bow, London.

BOYLE'S FUMING LIQUOR, so called

from having been invented by Robert Bovle

(q.v.), a fetid, yellow liquid, obtained by dis¬

tilling sal ammoniac with sulphur and lime. It is sometimes used in medicine under the name of liquor futnans boy Hi.

BOYLE'S LAW. See Gas Illumination.

BOYLSTON, Zabdiel, American physi¬

cian: b. Brookline, Mass., 1680; d. Boston, 1

March 1766. He studied medicine, settled in Boston and acquired a prosperous practice. In spite of the almost unanimous opposition of the medical profession and part of the public, he introduced the practice of inoculation for smallpox, having become a firm believer in it.

Out of 286 persons inoculated in 1721-22 only six died, and he had the satisfaction of seeing the practice become general in New England

long before it became so in England. He vis¬

ited England in 1725 and was elected a fellow of the Royal Society. Besides some papers

published in the (Transactions > of that So¬

ciety, he wrote ‘Historical Account of the

Smallpox Inoculated in New England, Upon

All Sorts of Persons, Whites, Blacks, and of all Ages and Constitutions * (2d ed., 8vo, Lon¬

don 1726; reprinted, Boston 1730).

BOYNE, the chief river of the province of

Leinster, Ireland, which rises in the Bog of Allen, county Kildare, and flows northeast

through Meath to Drogheda, below which it

enters the Irish Sea. Its course is 70 miles in length and it is navigable for barges up to Navan. The Boyne will ever be memorable in English history for the important victory gained on its banks about two miles west of Drog¬

heda, 1 July (new style, 11 July) 1690, by the forces under the command of William III over those of James II. Though James’ personal

courage was beyond all question, he, on this occasion, allowed the prudence of the sovereign to outweigh the impulses of the soldier. Of his troops 1,500 were killed and wounded, while William lost barely 500 men. In 1736 an obe¬

lisk, 150 feet high, was erected at Oldbridge, on the site of the battlefield, in commemora¬

tion of this victory. The Orange celebration of the battle takes place on July 12, the date of the battle of Aughrim. _ See Orangemen.

BOYNE CITY, Mich., city of Charlevoix

County, at the mouth of Boyne River, at the head of Pine Lake and on the Boyne City,

Gaylor and Alpena Railroad, 180 miles north of Grand Rapids. Its fine natural harbor per¬

mits of a thriving transit trade in lumber, fruit and the products of its factories, leather, bar¬

rels, handles, chemicals, extracts, clay products, veneer and flavoring. It also has foundries, railroad repair shops and municipally-owned

waterworks. Pop. 4,284.

BOYNTON, Henry Walcott, American

literary critic and author: b. Guilford, Conn., 22 April 1869. A graduate of Amherst College in 1891, for several years he was head of the English department at Phillips-Andover Acad¬

emy. From 1901 he did excellent book review work for the Atlantic Monthly and the New

York Times, edited several secondary school

textbooks and an edition of Poe's (Poetical Works. > Since 1912 he has been attached to the staff of the New York Evening Post

and Nation. His published works include short biographies of 'Washington Irving) (1901);

<Bret Harte) (1903); 'A Reader's History of American Literature, > with T. W. Higginson (1903) ; 'Journalism and Literature and Other Essays* (1904) ; 'The World's Leading Poets) (19H) ; 'Griselda,* a comedy (1908) ; and

with Margaret Deland, 'Dr. Lavendar,> a play (1913).

BOYS' CLUBS, organizations in which

boys constitute the membership. Among clubs

formed by boys on their own initiation, those for games and athletics seem to predominate very largely. Clubs for hunting, fighting, etc., are also popular. Sometimes the organizations have a distinctly literary or musical character and sometimes they are chiefly social in their nature. Numbers of clubs are formed for in¬

dustrial purposes, but judging from statistics, secret societies do not meet with as great a degree of favor as would naturally be supposed.

These societies for boys are organized by

adults ; the aims are in general to keep boys from bad surroundings and stimulate them to nobler ideals of life, to refine their taste and encourage them in habits of thrift, industry and study. Such clubs also try to foster a habit of reading good books. Clubs in large cities sometimes have hundreds of members

and provide fine buildings, in which opportu¬

nity is offered for a variety of activities rang¬

ing from manual training and other forms of instruction to social entertainment. The reli¬

gious interests of the boys are also cared for in various ways. The clubs connected with social settlements are often small, thus affording a better opportunity for reaching the boys per¬

sonally, an end difficult of achievement in so¬

cieties with large membership. About 200,000

boys in America and 25,000 in England are

members of such clubs. See Forbush, ‘How

to Keep Boys) (1900) ; Forbush, ‘The Boy

ProblenP (1901) ; Newman, ‘The Boys’ Club

in Theory and Practice* (1900) ; Buck, ‘Boys’

Self-Governing Clubs> (1903) ; Russell and

Rigby, ‘Working Lads’ Clubs* (1908) ; For¬

bush, ‘The Coming Generation (1912) ; Mc—

Keever, W., ‘Training the Boy) (New York

1914).

BOZ, boz, a pseudonym used by Charles

Dickens in the publication of ‘Sketches by

Boz,* which appeared in book form in 1836.

That the pronunciation of this name now in vogue is not correct is shown by Dickens’ ex¬

planation of its origin. A younger brother of the author had in childhood received from the latter the nickname Moses, “which being face¬

tiously pronounced through the nose became

Boses, and being shortened became Boz.**

BOZEMAN, boz’man, Mont., city and

county-seat of Gallatin County, on the Northern Pacific Railroad, in the midst of a region of valuable ores, such as gold, silver, coal and iron. Its industries are breweries, flour and lumber mills, brickyards, stone quarries and the like, and it contains the State College of Agriculture and Mechanic Arts, opened in

1893, a public library and county and municipal buildings. A canal of about 20 miles in length has been constructed both for irrigation and as a waterway. Pop. 6,000.

BOZEN. See Botzen.

BOZMAN, John Leeds, American his¬

torian and jurist: b. Talbot County, Md., 25

Aug. 1757; d. there, 23 April 1823. He studied law and practised in his native .state. He wrote a ‘Historical and Philosophical Sketch of the Prime Causes of the Revolutionary

War,* in which he praised Washington, and

condemned Franklin ; but it was suppressed.

During the administrations of Washington and the elder Adams, he wrote much in the journals 378

of the day, and at a later period in Dennie’s < Portfolio. } His literary reputation rests chiefly on his (History of Maryland, from the Earliest Settlement in 1633, to the Restoration in 1660,-* a posthumous work, published in

1836.

BOZRAH, boz’ra, Heb. <(a fortification, w

the name of several places in Biblical history : Bozrah of Edom, a city of great antiquity; El-Buseireh, seven miles southwest of the an¬

cient Tophel, on the main road north from

Petra, is probably the modern site. Bozrah in Moab is identified by some scholars with Bezer, but the great city Bozrah esh-Sham in Hauran is advocated by others. There is considerable conflict of opinion as to the exact locations.

The Bozrah, east of the Jordan, about 80

miles south of Damascus, was the capital of Og, King of Bashan, and subsequently be¬

longed to the tribe of Manasseh. Early in the Christian era it became a flourishing place and was long a great emporium of trade. It is now a scene of ruins.

BOZZARIS, bo'tsa-res, Marcos, a hero of

the Greek war of independence against the

Turks: b. Suli, in Epirus, about 1790; d. Missolonghi 1823. He was descended from a Suliote family renowned for its bravery, and after the fall of Suli retired to the Ionian Islands, from whence he made a vain attempt to deliver his native country. He then entered an Al¬

banian regiment in the French service and in 1813 became a member of the Hetaeria, a society formed for national regeneration. In 1820,

when the Turks were carrying on war against Ali Pasha, the latter sought aid from the exiled Suliotes and Marcos Bozzaris returned to Epi¬

rus. On the outbreak of the war of independ¬

ence he at once joined the Greek cause and distinguished himself as much by his patriotism and disinterestedness as by his military skill and personal bravery. In 1822 he took part in the war which was going on in western Greece and acquired special renown by his defense of Missolonghi. In the summer of 1823, when he held the commandin-chief of the Greek forces in that port, he was dangerously wounded at a night attack on the camp of the Pasha of Scutari, near Karpenisi, and died soon after.

His deeds are still celebrated by the Greeks in many popular songs. Through Halleck's

spirited poem, (Marco Bozzaris,) his name and fame have been made familiar to several gen¬

erations of American schoolboys.

BRABANQONNE, bra-ban-sun, the na¬

tional song of the Belgians during the revolu¬

tion of 1830, composed by Jenneval, at that time an actor at the theatre of Brussels, and set to music by Campenhout. Each verse of

the song ends with the refrain:

“La mitraille a brise l’orange

Sur l’arbre be la liberte”

BRABANQONS, bra-ban-son, a class of

adventurers and lawless soldiers in the Middle Ages, ready to fight for pay on either side and in any quarter. They derive their name from Brabant, the chief nursery of these troops, and were particularly notorious in France in the 12th century.

BRABANT, Belgium, a province bounded

by Amsterdam on the north, Liege and Limburg on the east, East Flanders on the west, Hainaut and Namur on the south. It has an area of 1,268 square miles and includes the cities of Brussels, Louvain, Aerschot, Tirlemont, Nivelles and Wavre. The Dyle, Dewer and Senne are

the principal streams. The soil is level and is well cultivated. Pop. 1,469,677. The province suffered greatly in the autumn of 1914, when the German armies invaded Belgium in order to

strike swiftly at France. Louvain was burned, its library being an irreparable loss. The prov¬

ince was entirely occupied by the invading

forces, placed under martial law, and its civil affairs, as in the case of the other occupied provinces, administered by a governor-general, resident at Brussels. For history see Brabant, Duchy of.

BRABANT, Duchy of, bra’bant, or bra—

bant’, the central district of the lowlands of Holland and Belgium, extending over an area of 4,341 square miles, from the left bank of the Waal to the sources of the Dyle and from the Meuse and the plains of Limburg to the lower Scheldt. In the Middle Ages it formed a separate independent duchy, called Lower

Lorraine. It is divided at present between the kingdoms of Holland and Belgium, into three provinces: (1) Dutch or North Brabant, with an area of 1,980 square miles; (2) the

Belgian province of Antwerp, with an area

of 1,093 square miles; (3) the Belgian province of South Brabant, with an area of 1,268 square miles. The country is comprehended in a plain, gently sloping to the northwest, occupied in the north by heathy and marshy tracts and in the south passing into the gentle rising ground which forms the first ascent of the forest of Ardennes. It is copiously watered by the

Meuse in the north and the Scheldt in the south, in the former of which the internal tran¬

sit is furthered by means of canals, among others the South William and the Breda canals, and in the latter by railways which have their point of union at Mechlin. Under the influ¬

ence of a northerly, indeed, and moist but in general healthful and mild climate, the great fertility of the soil renders agriculture and the raising of cattle the principal and most profit¬

able employment of the inhabitants. With this is associated the general diffusion of an active industry which supports an extensive trade,

consisting chiefly of lace, cotton, woolen and leather goods.

Through Caesar’s campaigns the Romans be¬

came acquainted with the inhabitants of Bra¬

bant as a mixed race of Germans and Celts The Menapians, particularly, inhabiting the

country between the Rhine, the Meuse and the Scheldt, made, as the most powerful and war¬

like among the various tribes, a gallant though ultimately ineffectual resistance to the Roman arms, by whose conquests this portion of lower Germany was incorporated with the province

of Gallia Belgica. In the 5th century the Franks gained possession of Brabant, which in the 6th was, at the partition of the Frank kingdom, assigned to the primitive country of Austrasia ; in the 9th century it was united to Lorraine, and on the division of the latter, in 870. becairm the property of France, from which, however, in the commencement of the 10th century, :t was transferred by Henry I again to Lorraine; in 959 to Lower Lorraine and thus to Germany.

In the beginning of the 11th century it was separated from Lorraine, on Duke Otho, the

son of Charles the Fat, who had been invested by the Emperor Otho with Lower Lorraine,

dying childless in 1005. After this, several counts of Ardennes and Godfrey of Bouillon

possessed it till 1076; the Emperor Henry V

mortgaged it to Godfrey the Bearded, of the family of the counts of Louvain and Brussels, whose house reigned over Brabant to the mid¬

dle of the 14th century. As early as 1190 we find the title of Duke of Brabant, in which the former title of Duke of Lower Lorraine or

Lothier was gradually absorbed. Under the

government of its own dukes Brabant gained

rapidly in power and independence, but was

engaged in numerous contests with its neigh¬

bors and shifted much in its leanings between Germany and France. Of the six dukes of

Brabant, Henry I, II and III and John I, II and III, there are more especially to be men¬

tioned John I, who, by the celebrated battle of Woringen (1288), united Limburg to Bra¬

bant, and is also renowned in Germany as a minnesinger or troubadour, and John III, who, in 1349, received from the Emperor Charles IV

the important privilege of a free judicature, under the name of the Brabantine Golden Bull, in consequence of which his subjects ceased to be amenable to any foreign jurisdiction.

With John III, the male heirs of the family of the counts of Louvain became extinct in 1355, and, by the bequest of his daughter Jo¬

anna, who reigned till 1406 and married Wen-ceslaus of Luxemburg, Brabant came into the possession of the house of Burgundy and in the first instance to Antony of Burgundy, Jo¬

anna's grandnephew and second son of Philip the Bold. On Antony's death at the battle

of Agincourt, in 1415, and his two successors, his son, John IV, and his brother Philip, Count of Saint Pol, dying childless respectively in 1427 and 1430, Brabant, as the inheritance of Philip the Good, became formally incorporated with the dominions of the house of Burgundy.

In this state, however, it did not long continue, and, by the marriage of Mary of Burgundy

with the Emperor Maximilian, was transferred to the house of Austria and subsequently to the Emperor Charles V, who abdicated in favor of his son, Philip II of Spain. The persecuting edict of the latter, and the Duke of Alva's cruelties, excited a revolt in Brabant, but it was only the northern portion (Hertogenbosch)

w'hich succeeded in asserting its independence, and in 1648 was incorporated with the United Provinces under the name of the

Territory, while South Brabant remained till 1714 in the possession of the Spaniards. On the extinction of the Spanish-Austrian line in the latter year, Brabant, with the other southern provinces of the Netherlands, reverted to the imperial house of Austria, which, however, was unable long to retain it in peace. On a violent contest breaking out under the Emperor Joseph II, as to the explanation of the provincial privi¬

leges which Brabant possessed under the Joy-euse Entree (q.v.), and the consequent dismis¬

sal of the assembly of the states of Brabant and Limburg, the Brabantines assembled of

their own authority, and boldly pronounced the separation of Brabant from the supremacy of the house of Austria. Leopold II settled the dispute after Joseph's death by granting their ancient privileges to the people of Brabant. At the close of the Napoleonic wars the whole of Brabant was included in the Kingdom of the Netherlands, and was divided into three prov¬

inces. After the revolution of 1830 the prov¬

inces of Antwerp and South Brabant became

parts of Belgium. The eldest son of the King of the Belgians bears the title of Duke of Brabant. Consult Omond, (Brabant and East

Flanders) (1907). See Belgium.

BRACCIO (bra'cho) DA MONTO'NE,

Andrea, Italian captain : b. Perugia of the il¬

lustrious family of the Fortebracci 1368; d.

1424. He early embraced the profession of

arms, and entered the service of Ladislas,

King of Naples, under the promise that he, if successful, would make him master of Peru¬

gia ; but when the Perugians, determined to keep out Braccio, offered to open their gates to Ladislas, if he would retain it for him¬

self, he broke faith with Braccio, and ac¬

cepted their terms. Braccio next served

under Florence, afterward attaching him¬

self to Pope John XXIII, who, on repairing to the Council of Constance, wdiere he was deposed, entrusted Braccio with the defense of Bologna. Ladislas being now dead, and the

church without a head, Braccio saw that the moment for which he had waited had arrived ; and allowing the Bolognese to redeem their

liberty by a money payment, suddenly, in 1416, pounced on Perugia. The Perugians vainly en¬

deavored to resist, and saw themselves com¬

pelled to receive Braccio as their lord. His rule, though firm and occasionally severe, was milder than might have been anticipated; and he soon showed that his wisdom as a statesman was not less than his ability as a captain.

Though Braccio had now gained the great

object of his life, ambition led him to attempt the conquest of Rome, and he gained several advantages over Sforza, who had long been his rival. Ultimately, however, the new Pope,

Martin V, proved more than a match for him.

A truce was patched up between them and soon after Braccio became High Constable of Naples.

He took Capua, of which he was made prince in 1421. Three years later he invaded Campa¬

nia and Apulia, took Bari and laid siege to Aquila, but was here made prisoner and

severely wounded. He took the disgrace seri¬

ously and would neither take food nor allow his wounds to be examined. Consult Spirito, Lorenzo (L’altro Marte* (Vicenza 1489).

BRACCIOLINI, bra-choˆle’ne, Poggio Gio¬

vanni Francesco, Italian classical scholar:

b. Terra Nuova, near Arezzo, 11 Feb. 1380; d. Florence, 30 Oct. 1459. In 1416 he under¬

took the laborious task of searching the

ancient monasteries for manuscripts, and suc¬

ceeded in recovering seven orations of Cicero, and a great number of other classical writ¬

ings. Having impoverished himself in these

researches, he accepted an invitation of

Cardinal Beaufort to go to England, but,

disappointed in his hopes of preferment, and in the literary atmosphere of the country, re¬

turned to Italy in 1421, and became apostolic secretary to Martin V and to several succeed¬

ing popes, having served not less than eight popes in the same capacity. On the appear¬

ance of the plague at Rome in 1450, he with¬

drew to Florence, where he was chosen chan-

cellor three years afterward. His (History of Florence5 (translated by his son Jacopo, from Latin into Italian) comprises the period from 1350 to 1455. Among his most finished pro¬

ductions is his (Dialogue on Nobility. > His writings are on moral, philosophical and con¬

troversial subjects, and comprise many trans¬

lations, orations and letters, the latter deriv¬

ing peculiar interest from their reference to contemporary life. His works have not yet

been properly collected, the Basel edition of 1538 being considered imperfect. His biogra¬

phy, by Rev. William Shepherd (1802), was

translated into Italian, German and French.

BRACE, Charles Loring, American author

and philanthropist: b. Litchfield, Conn., 19 June 1826; d. Campier, Switzerland, 11 Aug. 1890.

He was graduated at Yale in i846, and studied theology, but held no pastorate. In 1850 he made a tour through Great Britain and later through Hungary. Afterward, he studied the

school systems of Switzerland, England and

other countries. He devoted himself to philan¬

thropy in New York, where he became secretary to the New York Children's Aid Society, and lectured, wrote and worked to enlist aid for the children of the poor. His books include (Hungary in 1851 5 (New York 1852) ; (Home Life in Germany5 (1853) ; (The Norse Folk5

(1857) ; (Short Sermons to Newsboys) (1861) ; <The Dangerous Classes of New York and

Twenty Years' Work Among Them5 (1872,

3d ed., 1880) ; (Free Trade as Promoting Peace and Good Will Among Men5 (1879) ; (Gesta

Christi5 (1883), a review of the achievements of Christianity from the earliest days in bet¬

tering the moral and social condition of the world; and (To the Unknown God5 (1889).

Consult his life, edited by his daughter (New York 1894).

BRACEBRIDGE, Canada, in the Muskoka district, Ontario, six miles from the

famous Muskoka Lakes, on the Grand Trunk

and Grand Trunk Pacific railways, 120 miles north of Toronto. It has woolen and linen

mills, tanneries, saw mills and planing mills, sash factory, boat-works, brickworks, *etc.*

Pop. 2,776.

BRACEBRIDGE HALL, a series of

studies of English life by Washington Irving, published in 1822 with the pseudonym (Geoffrey Crayon, Gent.5

BRACELET, an ornament usually worn

on the wrist, the use of which extends from the most ancient times down to the present, and be¬

longs to all countries, civilized as well as un¬

civilized. The word has come to us from

the French and is ultimately derived from

brachium, the Latin word for the arm. Brace¬

lets were in use in Egypt at a very remote period. They were of different colors, painted on them in enamel in very bright as well as very delicate shades. They were also then as now frequently made of gold, enchased with

various kinds of precious stones. They were not always worn, as with us, on the wrist, but frequently on the upper part of the arm. The ancient Medes and Persians were well known

to be extremely fond of this method of adorn¬

ing themselves; and in the Bible the bracelet is frequently mentioned as an ornament in use among the Jews, both men and women. Among

the ancient Greeks, in historical times, bracelets do not appear to have been worn by the men ; but, on the other hand, they were worn by the Greek ladies, made of every variety of ma¬

terial, and in every possible form. A prefer¬

ence was generally given to the spiral form, and a bracelet of this kind is described by Homer in the Iliad. Very frequently the spiral brace¬

lets were made to assume the appearance of snakes, which went round the arm twice or

thrice, or even a greater number of times.

Among the ancient Italian tribes bracelets were also an ornament of the men. The Sabines

often wore very heavy ones on the left arm.

Among the Romans it was a frequent practice for a general to bestow bracelets on soldiers who had distinguished themselves by their

valor. Roman ladies of high rank frequently wore them both on the wrist and on the upper arm. The Arabs and the Orientals generally

use them, chiefly as an ornament for women.

Among the ancient heathen Germanic tribes

they formed the chief and almost only orna¬

ment, as is shown by their being so often found in old graves. The men seem to have used

them even more than the women, for bracelets have been found in dozens on the arms of

the former. The spiral was the favorite form with the ancient Germans as with the ancient Greeks.

BRACHET, bra'sha, Auguste, French phi¬

lologist and journalist: b. Tours 1845; d. 1898.

A pupil of Diez and Littre, he became pro¬

fessor of Romance philology at the Ecole des Hautes Etudes, Paris, in 1870, and was ex¬

aminer of German in the Ecole Polytechnique, 1872-74. His best-known work, the first of its kind, is (Grammaire historique de la langue franqaise5 (1867; English translation by Kit-chin, Oxford 1869), which was adopted as a text by the principal English and American

universities and of which over 30 editions have appeared. He also published (Dictionnaire

etymologique de la langue franqaise5 (Paris

1870), and with Gaston Paris and Morel-Fatio translated into French Diez's (Grammaire des langues romanes5 (1873-76). His controversy

with the Italian Premier Crispi and Ambas¬

sador Nigra is historically significant. In

(L'Italie qu'on voit et l'ltalie qu'on ne voit pas5 (1887) Brachet contended that the Italian youth was being educated antagonistic to

France in favor of Germany which was

strenuously denied.

BRACHIAL (bra'ki-al) ARTERY. See

Arteries.

BRACHIAL PLEXUS. See Nerves.

BRACHIOPODS, or BRACHIOPODA,

the class of shelled worms, formerly placed among mollusks. The class is named Brachiopoda from the feet-like arms, fringed with tentacles, coiled up within the shell, and which correspond to the lophophore of the Polyzoa and the crown of tentacles of the Sabella-like worms. The shell, which lives attached to

rocks, is in shape somewhat like an ancient Roman lamp, the ventral and larger valve, be¬

ing perforated at the base for the passage through it of a peduncle by which the animal is attached to rocks. The shell is secreted by the skin (ectoderm), and is composed of car¬

bonate (Terebratulina) or (Lingula) largely of phosphate of lime.

The body of Brachiopods is divided into

two parts, the anterior or thoracic, comprising the main body-cavity in which the arms and viscera are contained, and the caudal portion, that is, the peduncle. The part of the body in which the viscera lodge is rather small in pro¬

portion to the entire animal, the interior of the shell being lined with two broad lobes, the free edges of which are thickened and bear setae, as seen distinctly in Lingula. The body-cavity is closed anteriorly by a membrane which

separates it from the space in which the arms are coiled up. The pallial chamber is situated between the two lobes of the mantle (pallium) and in front of the membrane forming the

anterior wall of the body-cavity. In the middle of this pallial chamber the mouth opens,

bounded on each side by the base of the arms.

The latter arise from a cartilaginous base, and bear ciliated tentacles, much as in the worm Sabella. In Lingula, Diseina and Rhynchonella, they are developed, in a closely wound spiral, as in the genuine worms (Amphitrite) .

In Lingula the arms can be partially unwound, while in Rhynchonella they cannot only be un¬

wound but protruded from the pallial charftber.

In many recent and fossil forms the arms are supported by loop-like solid processes of the dorsal valve of the shell, but when these proc¬

esses are present the arms cannot be pro¬

truded beyond the shell. The tentacles or cirri on the arms are used to convey to the mouth particles of food, and they also are respiratory in function, there being a rapid circulation of blood in each tentacle, which is hollow, com¬

municating with the blood-sinus or hollow in each arm, the sinus ending in a sac on each side of the mouth.

The digestive system consists of a mouth,

oesophagus, stomach, with a liver-mass on each side, and an intestine. The mouth is bordered by two membranous, highly sensitive and mov¬

able lips. The stomach is a simple dilatation of the alimentary canal, into which empty the

short ducts of the liver, which is composed of masses of caeca. The liver originally arises as two diverticula or offshoots of the stomach.

The short intestine ends in a blind sac or in a vent, and is, with the stomach, freely suspended in the perivisceral cavity by delicate membranes springing from the walls of the body.

The nervous system consists of two small

ganglia above, and an infracesophageal pair of larger ganglia, and-
there are two elongated ganglia behind the arms, from which nerves

are given off to the dorsal or anterior lobe of the mantle.

The larva is top-shaped (trochosphere) and

is quite active, swimming rapidly about in every direction.

While in their development the Brachiopoda

recall the larvae of the true worms, they

resemble the adult worms in the general ar¬

rangement of the arms and viscera, though they lack the highly developed nervous system of the Annelids, as well as a vascular system, while the body is not jointed. On the other hand they are closely related to the Polyzoa, and it seems probable that the Brachiopods and

Polyzoa were derived from common low vermian ancestors, while the true Annelids prob¬

ably sprang independently from a higher an¬

cestry. They are also a generalized type, hay¬

ing some molluscan features, such as a solid shell, though having nothing homologous with the foot, the shell gland or odontophore of mollusks.

In accordance with the fact that the

Brachiopods are a generalized type of worms, the species have a high antiquity, and the type is remarkably persistent. The Lingula of our shores (Glottidia pyramidata) lives buried in the sand, where it forms tubes of sand around the peduncle, just below low-water mark from Chesapeake Bay to Florida. It has remarkable vitality, not only

withstanding the changes of temperature and exposure to death from

various other causes, but will bear transporta¬

tion to other countries in sea-water that has been unchanged. Living lingulae have been

carried from Japan to Boston, Mass., the water in the small glass jar containing the specimens having been changed but twice in four months.

The living species of this cosmopolitan genus differ but slightly from those occurring in the lowest fossiliferous strata. Between 80 and 90

living species are known, most of them living, except Lingula, which is tropical, in the tem¬

perate or Arctic seas, while nearly 2,000 fossil species are known. The type attained its

maximum in the Silurian Age, and in Palaeozoic times a few species, as Atrypa reticularis, ex¬

tended through an entire system of rocks and inhabited the seas of both hemispheres. Con¬

sult Zittel-Eastman, (Textbook of Palaeontology) (New York 1900).

BRACHT, braHt, Felix Prosper Eugen,

German artist : b. Morges, Switzerland, 1842.

He is best known as a landscape artist. He studied at Karlsruhe and Dusseldorf under H.

Gude, and in 1882 was appointed a professor in the Berlin Academy and professor at the Dres¬

den Academy in 1901. His early work con¬

sisted of landscapes of the Liineburg Heath and the Baltic shore, which brought him into gen¬

eral notice. His well known works are

(Stormy Evening on Riigen) ; (Giants' Grave in Htimling) ; (Mount SinaP ; (The Brook

KidronP and (Nightfall on the Dead Sea,;

the last named his greatest work. Other im¬

portant works are (The Tomb of Cecil

Rhodes) ; Hannibal's Grave) and (Three

Towers of GauerthalC Consult Osborn,

(Eugen BrachP (1909).

BRACH VOGEL, braH'fo-gel, Albert

Emil, German novelist and dramatist: b.

Breslau 1824; d. 1878. He at first studied en¬

graving and modeling, but abandoned these for the drama and fiction fields ; wrote several dramas and a large number of works of his¬

torical fiction. He is best known by his

drama, <Narcisse) (1857), which attained many editions and was translated into various Euro¬

pean tongues. (Beaumarchais) (1865);

(Benoni) (I860) ; and (Glancarty) (1872) ;

(Der deutsche Michael > (1868). Consult

Mittelmann, (Albert Emil Brachvogel und

seine Dramen) (1910).

BRACHYDACTYLY, a condition of ab¬

normal breadth of palm and shortness and

thickness in the fingers resulting from a

diseased condition, during growth, of the pi¬

tuitary body, a gland situated beneath the

brain. It may be hereditary or may be ac¬

quired, when it is symptomatic of excessive secretions of this gland. Consult Osborn,

(Origin and Evolution of Life) (New York

1917). DolicJiodactyly is the opposite condi-382

tion of abnormally prolonged hands and fingers, owing to insufficient secretions of the pituitary gland.

BRACHYLOGUS, bra-kiro-gus, a 12th

century compilation of unknown authorship,

containing a systematic exposition of the later Roman law, based principally on the Institutes of Justinian , although largely drawn from the Digest and other parts of the Corpus Juris.

The earliest existing edition was published in 1549 at Lyons.

BRACKENBURY, Sir Henry, English

soldier : b. Bolingbroke, Lincolnshire, 1 Sept.

1837 ; d. 20 April 1914. He entered the Royal Artillery in 1856, supervised aid to the wounded during the Franco-Prussian War in

1870, served in the central Indian,, Ashanti and Zulu cam¬

paigns and the Nile campaign of 1884-85; and was made lieutenant-general in 1888, and di¬

rector-general of ordnance at the War Office, 1899-1904. He was the author of (Fanti and AshantP (1873) ; (Narrative of the Ashanti

WaU (1874) ; (The River Column* (1885).

BRACKENRIDGE, Henry Marie, Amer¬

ican author and lawyer: b. Pittsburgh, Pa., 11

May 1786; d. there. 18 Jan. 1871. He was

educated by his father, H. H. Brackenridge

(q.v.) and admitted to the bar 1806. In 1811

he descended the Mississippi River in a (<keel-boat® to New Orleans, and was soon appointed deputy attorney-general for the then territory of Orleans, becoming district judge in 1812.

In 1817 he was secretary to the commission sent to the South American republics, and in 1821

was appointed United States judge for the

western district of Florida, holding it until he removed to Pittsburgh in 1832. In 1841 he was commissioner under the treaty of Mexico.

His knowledge of the French and Spanish

languages and laws made him of considerable service to the government in all affairs con¬

nected with the Louisiana and Florida pur¬

chases. He wrote (Views of Louisiana in

1810 > (1812); (Letter to Mr. Monroe by an American) ; (Voyage to South America in

1817-18) (1818) ; (History of the Late War [1812] between the United

States and Great

Britain* ; (Recollections of Persons and Places in the West) (1834) ; Essays on Trusts and Trustees) (1842); (History of the Western

Insurrection) (1859), a vindication of his

father's share in that affair.

BRACKENRIDGE, Hugh Henry, Amer¬

ican jurist: b. near Campbelton, Scotland, 1748; d. Carlisle, Pa., 25 June 1816. He came with his father to the United States at the age of five, and was graduated from Princeton in 1771.

For five years he taught at Princeton and in Maryland, writing for his pupils a drama

(Bunker Hill, > published in 1776, in which year he went to Philadelphia as editor of the newly founded United States Magazine. Dur¬

ing the American Revolution he was a chap¬

lain in the army. After being admitted to the bar he removed to Pittsburgh, became promi¬

nent in his profession, and during the <(Whisky Insurrection® (1794) was influential in bring¬

ing about a settlement between the government and the malcontents. In 1799 he was appointed to the supreme bench of Pennsylvania. A man of literary tastes, he wrrote a number of pieces much thought of in their day. At his graduation he wrote (with Philip Freneau) a poetical

dialogue (The Rising Glory of America. * Other works by him are incidents of the Insurrection in Western Pennsylvania) (1795) ; Eaw Miscellanies) (1814) ; (Modern Chivalry, or the Adventures of Captain Farrago and Teague

O'Regan, His Servant, * a political satire and his best work (1st pt. 1796; 2d, 1806). Consult Trent, (American Literature) (New York

1903).

BRACKENRIDGE, Pa., borough of Al¬

legheny County, 25 miles from Pittsburgh, on the Allegheny River, and on the Pennsylvania Railroad. It contains glass factories and steel mills and has plentiful deposits of coal, oil and natural gas. Pop. 3,421.

BRACKETT, Anna Callender, American

educator: b. Boston, 21 May 1836; d. 1911.

She taught in various normal schools, being the first woman principal of such an institution, and was principal of a private school for girls in New York for 20 years. This was the first girls' school in New York State requiring

Latin for all students and placing German in the regular curriculum. She published Educa¬

tion of American Girls) (1874) ; (Philosophy of Education,* from the German (1886) ; tech¬

nique of Rest> (1892) ; (Woman and the Higher Education * (1893).

BRACKETT, Frank Parkhurst, Amer¬

ican mathematician: b. Provincetown, Mass., 16

June 1865. He graduated at Dartmouth College in 1887, and since 1890 has been professor of mathematics and astronomy at Pomona College, Claremont, Cal. He has written several

important mathematical and meteorological

papers. He was a member rof the Smithsonian Astronomical Expedition to Africa 1911, and to Mount Whitney 1913.

BRACKETT, John Quincy Adams, Amer¬

ican lawyer: b. Bradford, N. H., 8 June 1842; d. Arlington, Mass., 6 April 1918. He was

graduated at Harvard College in 1865, being orator of his class : was graduated at the Har¬

vard Law School in 1868, and was engaged in the practice of law in Boston for many years.

Was a member of the Boston common council

1873-76, inclusive, being its president in 1876.

Was a member of the Massachusetts legislature 1877-82 and 1884-87, being speaker of the house 1885-87. Was lieutenant-governor 1887-90 and

governor of Massachusetts 1890-91. Was one

of the delegates-at-large from Massachusetts to the Republican National Convention in 1892 and in the convention was the member of Massa¬

chusetts of the committee on platform. Was

first presidential elector-at-large for Massachu¬

setts in 1896 and chairman of the meeting of the Massachusetts electors then chosen. Was

again presidential elector-at-large in 1900.

BRACQ, Jean Charlemagne, American

college professor and author: b. Cambrai,

France, 3 May 1853. He came to the United States in 1871, graduated in 1881 from McGill University, Montreal, and completed his studies at the Newton Theological Institution, in Edin¬

burgh, and in Paris. From 1885 to 1891 he was secretary of the American McAll Association, Philadelphia, and then joined the Vassar

faculty as associate professor and in 1892 as professor of Romance languages. He edited

the Huguenot Quarterly from 1896 to 1903

and wrote extensively on French questions and international relations, his (French Rights in Newfoundland,1 read before the Academy of

Moral and Political Sciences in Paris forming the basis of settlement of the long-standing in¬

ternational dispute. He is also the author of (France under the Republic (1910).

BRACQUEMOND, brak-mon, Joseph

Felix Auguste, French artist and engraver:

b. Paris 1833. He was a pupil of Guichard.

He first exhibited in the Salon of 1852 and his etchings and reproductions of noted masters

speedily brought him into notice. His portrait work and studies of animal life also brought him a large measure of fame. His portraits are especially prized and as an etcher he is rep¬

resented by over 800 plates. He introduced a new method of decoration about 1867 and five years later became connected with the painting department of the Sevres porcelain factory.

Later he removed to the suburbs of Paris

where in his ceramic studio he did much work for a Limoges porcelain house.

BRACT, a much reduced leaf, especially

from the axil of which a flower or flower-stalk develops, and thus distinguished from the ordi¬

nary leaf, from the axil of which a leaf-bud usually proceeds. Bracts may thus be entirely similar to the ordinary leaves of a plant, in which case they are called leafy bracts ; but very commonly they are somewhat changed in form, and although they may be some¬

times divided, they are for the most part

entire even when the ordinary leaves are

divided. In some cases they are so much

changed in form as to be mere scales or

threads, and sometimes they are not developed at all, in which case the inflorescence is said to be ebracteate. When the flowers of a plant are sessile, the bracts are often applied closely to the calyx, and are thus apt to be confounded with it ; and when the bracts are colored, they are apt to be mistaken for parts of the corolla.

When the inflorescence of a plant is branching, subordinate flower-stalks proceeding from one main flower-stalk, bracts are often seen at the base of the former, and these are called brac-teoles. A spathe is a kind of large bract.

BRACTON, or BRATTON, Henry de,

English ecclesiast and judge: d. 1268. Born at Bretton-Clovelly, Devonshire, educated at Ox¬

ford where he took the degree of doctor of laws, in 1244 he became one of the traveling circuit judges and 10 years later chief justice of England, an office which he held for 20

years. His fame rests on his (De Legibus et Consuetudinibus Angliae,1 the earliest compre¬

hensive treatise on English law, characterized by Pollock and Maitland as <(the crown and flower of English mediaeval jurisprudence.®

BRADBURY, John Buckley, English

physician and author: b. Saddleworth, York¬

shire, 27 Feb. 1841. He was educated at King's College, London, and Caius and Downing Col¬

leges, Cambridge. He is Downing professor of medicine at Cambridge University. His works

include (On Vertigo1 (1870) ; (On Some New VasoDilators,1 *etc.* (1895) ; (On Some Points connected with Sleep, Sleeplessness and Hyp¬

notics1 (1899).

BRADDOCK, Pa., borough in Allegheny

County, on the Monongahela River, and on the Pennsylvania, the Baltimore and Ohio and the Pittsburgh & L. E. railroads, 10 miles above Pittsburgh. There are extensive blast furnaces and manufactories of steel rails, steel wire, pig-iron, cement, plaster, *etc.* The four banks and two trust companies have a combined capitali¬

zation of $1,250,000. Braddock has the first Carnegie Free Library established in America, a daily newspaper, a hospital, numerous

churches and public and high schools. The

borough was first settled in 1795 on the site of Braddock's defeat and was incorporated in

1867. The government is vested in a burgess and a council of 12 members elected for three years. The waterworks are owned and operated by the borough. Pop. (1920) 20,879.

BRADDOCK, Edward, British general:

b. Perthshire, Scotland, about 1695; d. Great Meadows, Pa., 13 July 1755. Through his

father, an officer in the Coldstream Guards, he became in 1710 an ensign in that famous regi¬

ment. Appointed captain in 1736, he rose to lieutenant-colonel by service on the Continent 1742-45, including the battle of Fontenoy in 1745, where the Coldstreams covered themselves with glory; and in 1754 was made major-general of the line. In that year an expedition to de¬

stroy the French power in America was resolved on; and on 24 September Braddock was made

generalissimo of all the forces there. But

his experience made him overrate formal dis¬

cipline, and underrate (not only in action but in expert counsel) both foes and allies who lacked it ; he could not fully realize new dangers nor appreciate methods of meeting them;

he was hot of temper, rough of speech, over¬

bearing in argument, obstinate in opinion ; and these defects, with the martinetism natural

enough in an officer of 60 after 43 years of the Coldstreams, and which were not vital in a drilled service, fatally alienated those in the new land on whom he had to depend for safety.

Yet he was quick to recognize ability and warm in acknowledging it; he regarded Washington

and Franklin, the former but 22, as the greatest men in the colonies ; and when the royal order of 1754 ranking colonial commissions below

English ones prevented Washington from join¬

ing him, he sent a handsome letter asking the latter to be one of his military family, and promised to use his influence in securing him a regular English commission. Landing at Hamp¬

ton Roads, Va., 20 Feb. 1755, he attempted to collect men and stores for his expedition against Fort Duquesne (Pittsburgh), but was baffled

for many weeks by the sloth, rapacity and

unpatriotic local factions of the colonists, who did their best to justify the contempt with which he heartily if injudiciously visited them. The lack of men, supplies, transportation and money delayed the expedition to its ruin. He tried to secure a large body of Indians for scouts and allies, but only obtained 40 or 50. He let all but eight of them go through bad judgment, and disgusted those who remained so greatly by his manners that one of them deserted, and the rest warned their friends against coming near. The famous Indian hunter, Captain Tack, wished to join him. but Braddock refused un¬

less he would conform to military discipline, which the old scout would not do. Finally the expedition started from Fort Cumberland (now Cumberland, Md.) the first week in June, with 384

2,150 men. The march was most toilsome and slow, involving cutting roads, bridging streams, making causeways, passing through swamps,

etc.; and on the 18th, at Little Meadows, 1,200

picked men were chosen to continue the expe¬

dition, the rest being left behind under Dunbar.

On the night of 4 July he halted two days about 25 miles from his destination, to await the re¬

ports of his Indian scouts and convoy of pro¬

visions from Dunbar's camp — to his destruc¬

tion but not to his blame. Reaching Turtle (now Rush) Creek the road suddenly ended

at a precipice impassable for artillery and wagons, and he decided to quit the ridge, where ambuscade was impossible, and make a double fording across an elbow of the Monongahela.

Meantime the French commander, Contrecceur,

had decided to withdraw without a blow, but a Captain Beaujeu asked leave to take a detach¬

ment and resist the passage of the second ford, eight miles off. He was given about 200 white troops, and by a brilliant appeal on the morning of the 9th to the Indians, who at first hung back, obtained several hundred of them also.

When he came in sight of the English, they had already crossed and advanced so that both their flanks were exposed for some 200 yards to an enemy who occupied the deep ravines, thick with tangled forest growth and vines, that

seamed the river bluff. Braddock's ruinous er¬

ror was in not beating up ahead on his flanks, as Col. Sir Peter Halket urgently besought him to do the night before ; and he thereby marched straight into the worst of ambushes. Into

these the Indians glided, while the white troops barred the English path in front; and the head of the advance column went down under a

storm of lead. Shaken for a moment, the van¬

guard moved against the concentric ring; and after another terrible discharge, returned it with a volley that swept away every enemy in sight, and struck Beaujeu and a dozen others dead. The Indians turned to fly; rallied by the other French officers, they returned to cover, and under their unerring fire the English ad¬

vance broke and retreated; mixing with the

rear in the narrow path, both became mingled in a mob which Braddock could not restore to order. Huddled into a 12-foot road, shut in by a forest resounding with yells and filled with an invisible foe, they lost all sense of perception, and twice shot down bodies of their own men who had gained slight vantage points, taking their smoke for the enemy's. Fifty Virginians were thus slain at one volley. The regulars refused to charge, though Braddock, with four horses shot successively under him, and the other officers strove to hearten them to invade the wood; the provincials sought to fight Indian fashion behind trees and logs, but Braddock with furious threats and blows drove them

back into rank again, where they fell in scores.

Washington and Halket begged to have them

allowed to leave the ranks, but Braddock still refused. The ammunition began to fail ; the baggage was attacked; all Braddock's aides but Washington were shot down, three-fourths of

the officers and three-fifths of the entire army; and only then would the ill-judging but heroic Braddock give the signal for retreat. Shortly afterward Braddock received a ball through the lung0; not one of the English soldiery would stay to carry him off the field, but one English and two American officers took him from the field to a spot half a mile across the river. Here the dying hero tried to establish a camp for a rallying place, and to care for the wounded and wait for Washington's return from Dunbar; but although the French and Indians had not fol¬

lowed them across, the 100 English soldiers he had induced to stop there stole away again and fled. The officers with their commander marched on till 10 p.m. on the 10th, when they halted and met the convoy from Dunbar, Brad¬

dock never ceasing to give calm, skilful and humane orders; on the 11th he reached Dun¬

bar's camp, where the news of the rout had set his soldiers also deserting and fleeing in wild panic. Giving up all hope of the expedi¬

tion in any hands now, he had the stores

destroyed to keep them from the enemy, save enough for a flying march ; and the remnant of the army proceeded toward Great Meadows, where Braddock expired, leaving his favorite horse and body servant to Washington. Of

1,460 men in the battle, 456 were killed and 421 wounded ; 63 out of 89 commissioned officers were killed or injured, and every field officer.

The enemy's casualties were about 60. The en¬

tire borders were left defenseless and desolated by a fearful Indian war. Consult Winthrop

Sargent, (History of the Expedition against Fort Du Quesne in 1 755, 5 edited from the original manuscript (Philadelphia 1855).

BRADDON, Mary Elizabeth (Mrs. John

Maxwell), English novelist: b. London 1837;

d. Richmond, 4 Feb. 1915 ; daughter of

a London solicitor. She received her edu¬

cation at home, and at the age of 18

was contributing to a Brighton newspaper.

After publishing some poems and tales, in 1862

she brought out (Lady Audley's Secret,) which was almost instantly popular and the first of a long series of clever sensational novels, her total output reaching to over 60. She had an admirable gift in invention and was a born story teller. She conducted the London maga¬

zine Belgravia for a number of years and

some of her stories first appeared there. Her husband was a well-known publisher and her

son, W. B. Maxwell, is a distinguished novelist.

BRADENTOWN, Fla., city and county-seat of Manatee County, on the Manatee River, and on the Seaboard Air Line and the Atlantic Coast Line railroads. It is about five miles from the shores of Tampa Bay. The surround¬

ing district produces quantities of winter vege¬

tables and citrus fruits and the city has a large trade in these and contains two banks, county high, grammar and primary schools, courthouse, city hall, 16 miles of paved streets, a complete system of sanitary sewers, municipally owned waterworks, a public library, fruit " packing houses, and an electric light system. The value of taxable property is $4,500,000. The city's receipts in a recent year amounted to $212,208

and the expenditures to $207,917. Pop. 4,000.

BRADFORD, Alden, American historian

and journalist: b. Duxbury, Mass., 19 Nov.

1765; d. Boston, 26 Oct. 1843. Originally a Con¬

gregational minister he became secretary of

State of Massachusetts (1812-24), and editor of the Boston Gazette (1826). He wrote

(History of Massachusetts, 1764-18200

Speeches of the Governors of Massachu¬

setts from 1765 to 1775 > (1818); <History of BRADFORD

the Federal Government5 ; (Life of Jonathan Mayhew) (1838) ; (New England Chronology5

(1843).

BRADFORD, Amory Howe, American

clergyman and author : b. Granby, Oswego

County, N. Y., 14 April 1846; d. 1911. He was graduated at Hamilton College 1867, Andover

Theological Seminary 1870; studied at Oxford University, England, and became pastor of the First Congregational Church, Montclair, N. J., in the year last named. In 1896 as a member of the deputation from the American Board

of Foreign Missions to investigate mission

work he visited Japan and became president of the American Missionary Association in 1904.

He wrote (Spirit and Life) (1888) ; (01d Wine, New Bottles 5 (1892) ; (The Pilgrim in Old England) (1893) ; (Heredity and Christian

Problems) (1895); 'The Growing Revelation*

(1897); (Art of Living Alone5 (1899); (The

Return to Christ5 (1900) ; 'Age of Faith5

(1900); Spiritual Lessons From the Brown¬

ings5 (1900) ; (Ascent of the Soul5 (1902) ; (My Brother5 (1910) ; (Preludes and Inter¬

ludes5 (1911).

BRADFORD, Andrew, American printer,

son of William Bradford (q.v.) : b. Philadelphia about 1686; d. 23 Nov. 1742. He was the

only printer in Pennsylvania from 1712 to 1723.

He published the first newspaper in Philadel¬

phia, 22 Dec. 1719, called the American Weekly Mercury. It was by him that Benjamin Frank¬

lin was first employed, on his arrival in Phila¬

delphia in 1723. In 1732 he was postmaster; in 1735 he kept a book store at the sign of the Bible in Second street. In 1738 he removed to No. 8 South Front street, to a house which in 1810 was occupied as a printing house by his descendant, Thomas Bradford, publisher of

True American.

BRADFORD, Gamaliel, American writer

and politician: b. Boston, Mass., 15 Jan. 1831; d. Boston, Mass., 20 Aug. 1911. He was prom¬

inent in politics as an independent, being a strong opponent of the Philippine policy of the administration, and published (Lesson of Popu¬

lar Government5 (1898).

BRADFORD, Gamaliel, American author:

b. Boston, Mass., 30 Oct. 1863. He was tutored privately until 1882, when he entered Harvard University, but was obliged to leave almost immediately on account of ill-health. With the exception of a little tutoring and lecturing he has occupied himself mainly with literary pur¬

suits since 1886. He is a member of the So¬

ciety of the Cincinnati, the Massachusetts His¬

torical Society and the National Institute of Arts and Sciences. He is the author of ‘Types of American Character5 (essays 1895) ; ‘The Private Tutor5 (1904); ‘A Pageant of Life5

(1904) ; Between Two Masters5 (1906) ;

‘Matthew Porter5 (1908) ; ‘Studies of Robert E. Lee5 (1912) ; ‘Confederate Portraits5

(1914) ; Union Portraits5 (1916), and many

general essays.

BRADFORD, John, Protestant martyr

and theologian: b. Manchester about 1510; d.

Smithfield, London, 1 July 1555. He obtained a situation in the commissariat, and having been guilty of some defalcation, known only to himself, was so impressed by a sermon of Lati¬

mer on restitution, that he determined not only vol. 4 — 25.

to sell everything he had in order to make up the defalcation, but to renounce an employment which exposed him to dangerous temptations.

He afterward studied at Cambridge, where he received the degree of M.A., and on taking orders was appointed chaplain to the bishop of London, and canon of Saint Paul's. From this time he devoted himself to the duties of his office with so much zeal and success that he became one of the most popular preachers of his day. In 1552 he was appointed chaplain to Edward VI, but under the reign of Queen Mary became a marked man. On the charge of

preaching sedition he was committed to the

Tower (occupying the same room with Ridley, Cranmer and Latimer), and being brought to

trial, was condemned to death as an obstinate heretic. His life is said to have been offered to him if he would only promise to refrain from preaching, but even this he had the manliness to refuse, and he was burned at the stake at Smithfield. A complete edition of his works, which include sermons, meditations, various

treatises and a biography was published 1848-53, edited by Rev. Aubrey Townsend.

BRADFORD, Royal Bird, American naval

officer: b. Turner, Me., 22 July 1844; d. Wash, ington, 4 Aug. 1914. He was graduated at the United States Naval Academy in 1865 and re¬

ceived promotion through various grades to the rank of commander. He made a specialty of

equipment, and in 1897 became chief of the Bureau of Equipment at the Navy Department

in Washington, where he remained until his

retirement as rear-admiral in 1906.

BRADFORD, Samuel, English bishop: b.

Saint Anne's, Blackfriars, 20 Dec. 1652; d.

Westminster, 17 May 1731. He left the univer¬

sity without a degree on account of religious scruples ; and though he had a strong religious bent, he took up the study of medicine. In 1680 he was ordained d-eacon and priest in 1690. He was a frequent preacher before the corporation of London and his sermons were

always as strongly Protestant as he was him¬

self Whig in politics. In 1698 he became one of the royal chaplains to William III ; in 1708

he was made a prebendary of Westminster; in 1718 he was elected bishop of Carlisle and in 1723 he became bishop of Rochester and dean of Westminster. Two years later he became

the first dean of the revived order of the Bath.

He is buried in Westminster Abbey.

BRADFORD, William, American colonial

governor and author: b. Austerfield, York¬

shire, England, 1590; d. Plymouth, 9 May 1657.

He joined the Separatists or Brownists in 1606; persecutions followed ; an attempt to reach

Holland was frustrated; he was imprisoned,

but ultimately reached Zealand and became

apprenticed to a French Protestant silk manu¬

facturer. He sailed with the Mayflower from Southampton (5 Sept. 1620) and was one of

the signers of the celebrated compact signed on board; and, in 1621, on the death of the first governor, John Carver, was elected to the same office, which he continued to fill (with the ex¬

ception of a brief period when he declined re-election) until his death.

His administration was remarkably efficient and successful, espe¬

cially in dealing with the Indians. One of his first acts was to adopt measures to confirm the league with the Indian sachem Massasoit, In

the beginning of 1622, when the colony was subjected to a distressing famine, a threaten¬

ing message was received from the sachem of Narragansett in the form of a bundle of ar¬

rows bound with the skin of a serpent. The governor sent back the skin filled with powder and ball. This decisive reply finished the cor¬

respondence. The Narragansetts were so ter¬

rified that they returned the skin without even inspecting its contents. In return for his kind¬

ness and attentions to Massasoit in a dangerous illness, the sachem disclosed to the colony a dangerous conspiracy among the Indians and

it was suppressed. He opposed the system of communal holdings, the change to severalty

being made in 1623 ; a council was appointed in 1624 ; he was given the title for the Plymouth Plantation in 1629 (relinquished 1635) ; and in 1634 saw representative institutions established in the infant colony by the sending of dele¬

gates from the towns. His (Diary of Occur¬

rences, J covering the first year of the colony, was published in 1622. He left a number of religious compositions in verse ; and historical prose writings of great value which are the principal authorities for the early history of the colony, the most important being his (History of the Plymouth Plantation from the forma¬

tion of the society in England, in 1602, down to 1647. This was for many years stored in Old South Church, Boston, disposed during

the American Revolution, but was found in the library of Fulham Palace, England, in 1858, and in 1898 was returned to the United States and placed among the archives of Massachu¬

setts. His works have been published in the Collections of the Massachusetts Historical

Society. The shorter writings of Bradford

will be found in Young's (Chronicles of the Pilgrims* (Boston 1841). See Cotton Mather,

<Magnalia) for life of Bradford; also Tyler, (History of American Literature 1607-1765 *

(New York 1898) ; Walker, (Ten New Eng¬

land Leaders) (New York 1901).

BRADFORD, William, the first printer in

Pennsylvania : b. Leicester, England, 20 May 1663; d. New York, 22 May 1752. A Quaker, he emigrated with Penn in 1682 and landed

where Philadelphia was afterward built, be¬

fore a house was begun. He went back to

England, but returned in 1685, in which year he printed an almanac. In 1686, with some

German colonists, he established near Phila¬

delphia the first paper mill in America. The writings of George Keith, which he printed, having caused a quarrel among the Quakers,

he was arrested in 1692 and imprisoned for libel and his press and types seized. On his trial, when the justice charged the jury to find only the fact as to the printing, Bradford main¬

tained that they were to find also whether the paper was really seditious and that <(the jury are judges in law as well as the matter of fact.**

He was not convicted, but having incurred the displeasure of the

dominant party in Philadel¬

phia, he removed to New York in 1693. In

that year he printed the laws of the colony.

On 16 Oct. 1725, he began the first newspaper in New York and the fourth in America, called the New York Gazette. Being temperate and

active, he reached a great age without sickness and walked about on the very day of his death.

For more than 50 years he was printer to the government of New York and for 30 years the only one in the province. Consult Wallace,

(An Address at the Celebration by the New

York Historical Society of the 200th Birthday of William Bradford) (Albany 1863).

BRADFORD, William, American jurist,

attorney-general of the United States and a great-grandson of William Bradford, the

printer: b. Philadelphia, 14 Sept. 1755; d. 23

Aug. 1795. He was graduated at Princeton

College in 1772 and commenced the study of the law. In the spring of 1776, upon the

breaking out of the war with Great Britain, he joined the militia, in which he attained the rank of lieutenant-colonel. In consequence of ill-health he was obliged to resign at the end of two years and was admitted to the bar in Philadelphia in 1779. In 1780 he was appointed attorney-general of Pennsylvania. Under the

new constitution he was appointed a judge of the Supreme Court 22 Aug. 1791. Upon the

promotion of Edmund Randolph to the office

of Secretary of State he received from Wash¬

ington the appointment of Attorney-General of the United States 28 Jan. 1794. In early life he wrote some pastoral poems in imitation of Shenstone ; but his principal literary produc¬

tion was an (Inquiry how far the Punishment of Death is necessary in Pennsylvania * (1793).

BRADFORD, England, manufacturing

city and municipal, county and parliamentary borough, in the West Riding of Yorkshire,

eight miles west of Leeds, on the Bradford Canal and the Midland, Northeastern, Great

Northern and Lancashire & Yorkshire railways.

It is pleasantly situated on a feeder of the Aire, at the junction of three extensive valleys, and consists of an ancient and a more modern portion, the latter with spacious, well-built streets. The appearance of the town has been almost completely changed since 1861, the cor¬

poration having, at a great expenditure of

money, effected most extensive street improve¬

ments, widening the principal thoroughfares,

improving the gradients and opening up new

streets. Spacious covered markets have been

erected at a great cost. Among the public

buildings are the town hall (1873), in French Gothic style; the parish church of Saint Peter, in the Perpendicular style, dating from 1485; the Cartwright Memorial Hall, containing an

art gallery and museum, opened in 1904, to commemorate the inventor of the power-loom

and combing machine ; Saint George's Hall,

erected in 1853, and capable of accommodating about 4,000 persons ; an exchange, containing a statue of Cobden ; a temperance hall, the

first of the kind in England, erected in 1837 ; a mechanics' hall, with lecture-rooms and library; a technical college, opened in 1882; free library (1872). The schools include the free grammar school, endowed by Charles II, the girls' gram¬

mar school and the board schools. In Airedale College young men are trained for the minis¬

try among the Independents and there is also a United Independent college (1888). Among

the charitable institutions may be noticed the infirmary, the eye and ear hospital, the chil¬

dren's hospital, Saint Catharine's Home, an

institution for the blind, and almshouses.

There is a fever hospital, to which patients are admitted at moderate charges, and when per¬

sons are too poor to pay, the corporation bears BRADFORD—BRADLEY

the cost. There is also a smallpox hospital.

Bradford has several public parks, some of

them finely laid out, besides Baildon Moor

(600 acres) reserved for recreation purposes.

There is an extensive system of waterworks

by gravitation, representing an outlay of more than $18,000,000, and water, gas and electric supply undertakings are owned by the munici¬

pality. In 1907 a municipal railway was

opened, extending into the Nidd Valley, from whence the main water supply of the city is obtained. Bradford is the headquarters in

England of the worsted yarn and stuff trade, which is the principal industry, the alpaca and mohair manufactures (with which Sir

Titus Salt's name is connected), having been transferred to the village of Saltaire, near Shipley. There are also manufactures of silk and velvet (the Manningham Mills of Lister

& Company), mixed cotton and silk goods;

and some cotton factories. In 1916 goods to the amount of $14,452,210 were shipped from Bradford to the United States, the largest

items being woolen dress goods, $1,067,108,

and piece-dyed cotton cloth, $4,754,972. In the neighborhood are quarries and ironworks.

The town was incorporated in 1847 and its

affairs are managed by a lord mayor (dignity conferred in 1907), 21 aldermen and 63 coun¬

cillors. It was accorded the rank of a city in 1897. A United States consulate is established here. Pop. 288,505. Consult Ogden, (Bradford) (London 1910) and The Bradford An¬

tiquary, journal of the Bradford Historical

and Antiquarian Society (Bradford 1888 to

date).

BRADFORD, Pa., city in McKean County,

on several railroads, 15 miles northwest of Smethport, the county-seat, and 75 miles south of Buffalo, N. Y. It is in an extensive coal, oil and natural gas region and is principally engaged in industries connected therewith, be¬

sides having machinery, chemical, boiler,

vacuum cleaner, furniture, gas-engine, cutlery and brick and tile works. The city has electric street railroads, daily and weekly newspapers, three national banks, large hospital, several libraries, an

opera house, driving park, and is lighted and heated by natural gas. Bradford was settled in 1823, chartered as a city in 1879

and adopted the commission form of govern¬

ment in 1914. The waterworks are owned and operated by the city. Pop. (1920) 15,525.

BRADFORD-ON-AVON, England, an

ancient market-town in Wiltshire, beautifully situated 28 miles northwest of Salisbury, on both banks of the lower Avon, here crossed by two bridges — a very old one of nine arches in the centre of the town, and a modern one, Barton Bridge, of four. The town chiefly

consists of three regular streets, containing many handsome houses. There is a good par¬

ish church of the Holy Trinity, in the Norman and subsequent styles ; a town hall, in Eliza¬

bethan style ; and some interesting old build¬

ings. Among the latter is the small but unique church of Saint Laurence, the only complete specimen of Anglo-Saxon architecture still

existing and of great archaeological interest. It is believed to have been built in the 8th cen¬

tury by Saint Aldhelm and consists of a chan¬

cel, a nave and a porch on the north side.

Woolen cloth is manufactured, but this indus¬

try has declined. Bradford was of some note in Anglo-Saxon times, Saint Dunstan having

been elected bishop of Worcester at a synod held here. Pop. 4,501. Consult Perkins, (Ab¬

bey Churches of Bath, Malmsbury, and St.

Laurence 5 (1901).

BRADLAUGH, brad-la, Charles, English

secularist : b. London, 28 Sept. 1833 ; d. 30

Jan. 1891. In his youth a private soldier, he made himself known by his free thought and republican writings and lectures, and more es¬

pecially by his efforts to gain admission to Par¬

liament. Being elected for Northampton in

1880, he claimed the right to make affirmation simply, instead of taking the oath which mem¬

bers of Parliament take before they can sit and vote, but being a professed atheist this right was denied him. Though repeatedly reelected by the same constituency, the majority of the House of Commons continued to declare him

disqualified for taking the oath or affirming; and it was only after the election of a new Parliament in 1885 that he was allowed to take his seat without opposition as a representative of Northampton. He was for many years editor of the National Reformer. Not long before his death Parliament erased from its records its resolutions prohibiting him from taking the

oaths. Consult <Life> (1894) by his daughter, Mrs. Hypatia B. Bonner, and J. M. Robertson.

BRADLEY, Andrew Cecil, English edu¬

cator and author. He was educated at Chelten¬

ham College and at Balliol College, Oxford.

He was made a fellow of Balliol in 1874, and was lecturer there from 1876 to 1881, when he was appointed professor of modern literature at University College, Liverpool. In 1889 he went to Glasgow University as professor of

English language and literature, remaining in that relation until 1900,

when he was appointed professor of poetry at Oxford. He has pub¬

lished (A Commentary on Tennyson's In Me—

moriam5 (1901) ; (Shakespearean Tragedy 5

(1904) ; (Oxford Lectures on Poetry) (1909).

BRADLEY, Arthur Granville, English

author, son of George Granville Bradley (q.v.) : b. 11 Nov. 1850. He was educated at Marl¬

borough and Trinity College, Cambridge, and

has published (Life of Wolfe) (1895) ;

(Sketches from Old Virginia) (1897) ; high¬

ways and Byways of North Wales5 (1898) ;

(The Fight with France for North America)

(1900) ; highways and Byways of the English Lake District5 (1901) ; highways and Byways of South Wales) (1903) ; (Canada in the

Twentieth Century 5 (1903) ; (The March and Borderland of Wales5 (1905); hound About

Wiltshire5 (1907); (Life of Guy Carleton5

(1907); (The Romance of Northumberland5

(1908) ; <The Making of Canada5 (1910) ; (The Wye5 (1910) ; (Britain Across the Seas, Amer¬

ica5 (1911) ; (The Gateway of Scotland5

(1912); (Other Days5 (1913); (Clear Waters5

(1915).

BRADLEY, Edward (Cuthbert Bede),

English author and clergyman : b. Kidder¬

minster 1827; d. Lenton, 12 Dec. 1889. He was graduated at Durham University, and was rec¬

tor of Denton, Stretton and finally Lenton from 1883 until his death. He contributed to Punch and other London periodicals, and published the (Adventures of Mr. Verdant Green, an Oxford 388

Freshman) (London 1855), a humorous picture

of college life. His other works include (Mr.

Verdant Green Married and Done For} (1856) ; (The White Wife,* a collection of Scottish

legends (1864); (Little Mr. Bouncer and His Friend, Verdant Green* (1873-74) ; and sev¬

eral books of travel.

BRADLEY, Francis Herbert, English

writer on philosophy : b. Glasbury 1846. He was educated at Cheltenham and at Marl¬

borough College. He is a fellow of Merton

College, Oxford, and has written many works on philosophical subjects. His publications in¬

clude (The Presuppositions of Critical History) (1874) ; (Ethical Studies) (1876) ; (The Principles of Logic) (1883) ; (Appearance and Reality) (1893) ; cEssays on Truth and Reality) (1914).

BRADLEY, George Granville, English

clergyman, dean of Westminster Abbey, 1881—

1902; b. 11 Dec. 1821; d. London, 12 March 1903. He was educated at Rugby and Univer¬

sity College, Oxford, and took orders in the Anglican Church. He was assistant master at Rugby 1846-58; master of Marlborough College 1858-70; master of University College 1870-81.

From 1874 to 1876 he was honorary chaplain to the Queen. In the last named year he became a canon of Worcester and succeeded Dean Stan¬

ley as dean of Westminster. He published

(Recollections of Arthur Penrhyn Stanley >

(1883) ; (Lectures on the Book of Job) (1884) ; (Lectures on Ecclesiastes) (1885). He resigned the deanery of Westminster a few months be¬

fore his death.

BRADLEY, Henry, English scholar and

lexicographer : b. Manchester, England, 3 Dec.

1845. Successively teacher, commercial clerk

and foreign correspondent and journalist, he has twice been president of the Philological Society and has been joint editor of the (Ox¬

ford English Dictionary) from 1889. He has

published (The Story of the Goths) (1888) ; (The Making of English) (1904) ; and con¬

tributed important articles to the dictionary of National Biography) and elsewhere.

BRADLEY, James, English astronomer :

b. Sherborne, Gloucestershire, 1693; d. Chalford, Gloucestershire, 13 July 1762. He was educated at Balliol College, Oxford, and took orders, but his taste for astronomy soon led him in a different direction, and in 1721 he was appointed Savilian professor of astronomy at Oxford. Seven years afterward he made known his discovery of the aberration of light. But although this discovery gave a greater degree of accuracy to astronomical observations, yet slight differences remained which he studied during 20 years with the greatest perseverance, and finally discovered that they were fully ex¬

plained by the supposition of an oscillating motion of the earth's axis, completed during a revolution of the moon's nodes, that is, in about 18 and a half years. He called this phe¬

nomenon the ((nutation of the earth's axis® ; and published his account of it in 1748, for which he received the Copley medal. By these two discoveries astronomers were, for the first time, enabled to make tables of the motions of the heavenly bodies with the necessary accuracy.

Bradley had already, in 1726, explained the method of obtaining the longitude by means of the eclipse of Jupiter's first satellite. In 1742, at the death of Dr. Halley, he received the office of astronomer royal, and removed to the ob¬

servatory at Greenwich. Here he spent the re¬

mainder of his life, entirely devoted to astro¬

nomical studies. His observations in manu¬

script appeared under the title of (Astronomical Observations made at the Observatory at

Greenwich, 1750-62 > (1798, 1805). From this rich mine have been taken thousands of obser¬

vations on the sun, moon and planets of the highest astronomical value. The value of these observations was enormously increased by Bes¬

sel, who undertook their systematic reduction and extracted from them the catalogue of 3,222

stars which he published under the title of (Fundamenta Astronomiae.*

BRADLEY, John Edwin, American edu¬

cator: b. Lee, Mass., 8 Aug. 1839; d. 7 Oct. 1912.

He was graduated from Williams College in

1865, and was successively principal of high schools in Pittsfield, Mass., 1865-68; Albany, N. Y., 1868,-86. He was superintendent of

schools at Minneapolis 1886-92, and president of Illinois College 1892-1900. He is the author of (Science and Industry* ; (School Incentives) ; (Healthfulness of Intellectual Pur¬

suits } ; (Work and Play) ; (Talks With Stu¬

dents. }

BRADLEY, Joseph Philo, American ju¬

rist: b. Berne, N. Y., 14 March 1813; d. Wash¬

ington, D. C., 22 Jan. 1892. He was graduated at Rutgers College in 1836; admitted to the bar in 1839, and became a justice of the United States Supreme Court in 1870. As a member of the electoral commission he cast the vote which gave the presidency to Hayes in 1877. He de¬

voted much time to mathematical study. His

Miscellaneous Works and Correspondence*

was published in 1832.

BRADLEY, William O'Connell, Ameri¬

can lawyer and legislator : b. near Lancaster, Garrard County, Ky., 18 March 1847 ; d. 23 May 1914. Admitted to the bar in 1865 and serving at prosecuting attorney of Garrard County in 1870, as presidential elector in 1872, he came into nation-wide prominence at the Republican convention of 1880, making the speech second¬

ing the nomination of Grant for President;

again in 1904 in a powerful speech seconding the nomination of Roosevelt for President. In 1888 he had received 105 votes for Vice-Presi¬

dent in the national convention, and in 1896 was endorsed for President by the Kentucky State convention. From 1895 to 1899 he was gov¬

ernor of Kentucky, and was a member of the Republican National Committee during 17

years. He was elected United States senator for the term 1909-15. He was one of the most eloquent and popular orators at national con¬

ventions, and only a few days before his death made a three hours' speech opposing the Pan¬

ama Canal tolls repeal bill, which was consid¬

ered a particularlv forcible presentation of the case.

BRADSHAW, John, English judge and

regicide: b. Cheshire, England, 1602; d. Lon¬

don, 31 Oct. 1659. He studied law at Gray's Inn, and obtained much chamber practice from the partisans of the Parliament, to which he was zealously devoted. When the trial of the King was determined upon, the resolute char-BRADSHAW — BRADSTREET

acter of Bradshaw pointed him out for presi¬

dent of the high court of justice, which office, alter a slight hesitation, he accepted. His de¬

portment on the trial some described as lofty and unbending, others as harsh and overbear¬

ing. He was subsequently appointed permanent president of the council of state, and chan¬

cellor of the duchy of Lancaster; he also re¬

ceived a grant of estates worth £2,000 per an¬

num. He rendered himself obnoxious to Crom¬

well, when the latter seized the protectorate, and was deprived of the chief justiceship of Chester. On the death of Cromwell in 1658

and the restoration of the Long Parliament, he obtained a seat in the council and was elected president. He died in 1659, and on his death¬

bed asserted that, if the King were to be tried and condemned again, he would be the first to agree to it. He was magnificently buried in Westminster Abbey, from which his body was

ejected and hanged on a gibbet at Tyburn, with those of Cromwell and Ireton, at the Restora¬

tion.

BRADSHAW, William, Puritan minister:

b. Market Bosworth, Leicestershire, England,

1571 ; d. 1618. After graduation from Cam¬

bridge College (1595) he became tutor in the family of Sir Thomas Leighton, governor of

Guernsey, where he came under the influence of Thomas Cartwright, the famous Puritan

leader, who was preaching in the neighborhood.

Later he entered the ministry, became fellow in Cambridge and was forced to leave the uni¬

versity on account of having distributed the writings of John Darrel. He preached for a time at Chatham, where he was very popular; but he was suspended on a charge of teaching unsound doctrine. He found a friend in the bishop of Coventry, who granted him a license to

preach in any part of his diocese. Brad¬

shaw was very much opposed to ceremonies,

which he declared to be unlawful in themselves and imposed by prelates without due authority and he published anonymous tracts against

them. In 1605 he published (English Puritan¬

ism,' in which he strongly advocated the inde¬

pendence of congregations and the purification of the Church. He also held that no clergyman should hold any civil office. This book stirred the Church authorities against him ; and he was forced to go to Derbyshire where he found a safe retreat. From there he continued fight¬

ing for the cause he had so much at heart and his views were carried far and wide by his own publications and those of his friends and fol¬

lowers. His remarks, which are generally of controversial nature, are very numerous. His (English Puritanism' went through several edi¬

tions and was translated into Latin and since into several modern languages. Consult Neal, (History of the Puritans'; Barclay, (Inner

Life of the Religious Societies of the Common¬

wealth' (1876).

BRADSTREET, Anne, American poet: b.

Northampton (probably), England, 1612; d.

Andover, Mass., 16 Sept. 1672. She was the daughter of Gov. Thomas Dudley and married

the future governor, Simon Bradstreet, in 1628.

She went with him to New England in 1630.

She was the first woman of letters in America, her verse being written in the intervals of household cares and by her contemporaries was styled <(The Tenth Muse." Her volume of

poems was published in London in 1650. A

more complete edition appeared at Boston in 1678, containing, among other additional com¬

positions, her best poem entitled Contempla¬

tions.' A third edition was published in 1758.

She was the mother of eight children, to whom she makes the following allusion :

I had eight birds hatch't in the nest;

Four cocks there were, and hens the rest;

I nurs't them up with pains and care,

For cost nor labor did I spare;

Till at last they felt their wing,

Mounted the trees and learned to sing.

Her complete works, edited by J. H. Ellis, were reprinted in Boston in 1867, and again in 1897.

Consult Tyler, (American Literature' (1898) ; and Wendell, (A Literary History of America'

(pp. 36, 40, 119, New York 1900).

BRADSTREET, John, English soldier in

America: b. 1711; d. New York, 21 Oct. 1774.

In 1745 he served in the Louisburg expedition as lieutenant-colonel in Pepperell's regiment and later in the year was raised to the rank of captain. He was, in 1746, lieutenant-gov¬

ernor of Saint Johns, Newfoundland, and in

1755 became adjutant-general under General

Shirley. In 1756, when it was considered

highly important to keep open the communi¬

cation with Fort Oswego, on Lake Ontario, he was placed at the head of 40 companies of boatmen, raised for the purpose of supplying it with stores from Schenectady. On his re¬

turn, 3 July 1756, with 300 of his force he was attacked from an ambuscade, on the Onondaga River, but repulsed and routed the enemy with great loss. In 1758 he took part in the attack on Fort Ticonderoga and immediately there¬

after became quartermaster with the rank of colonel. In the same year, he commanded a

force of 3,000 men in the expedition against Fort Frontenac, which was surrendered 27

August, with all its military stores, provisions and merchandise, on the second day after he commenced the attack. In 1764 he advanced

with a considerable party toward the Indian country during the conspiracy of Pontiac and made a treaty of peace with the various tribes at Detroit. He was appointed major-general

in 1772.

BRADSTREET, Simon, American colo¬

nial governor: b. Horbling, Lincolnshire, Eng¬

land, March 1603 ; d. Salem, Mass., 27 March 1697. Left an orphan at the age of 14, he was brought up under the care of Thomas Dudley (q.v.), whose daughter Anne he married. For a time he was steward to the Earl of Lincoln and later to the Countess of Warwick. He,

with Dudley and Winthrop, determined to emi¬

grate and form a settlement in Massachusetts.

Embarking with his wife on the Arbella, 29

March 1630, they anchored off Salem on 12

June. In 1631 Bradstreet was one of those

who commenced building at Newtown, now

Cambridge, and he resided there for several years. In 1639 he was granted 500 acres of land at Salem. He was also one of the first settlers of Andover, building in 1644 the first mill on the Cochichewick. After the death of his wife in 1672, he seems to have spent his time mainly in Boston and Salem. He was

the colony's first secretary, one of the first commissioners of the United Colonies in 1643

and in 1653 vigorously opposed making war

on the Dutch in New York and on the In¬

dians ; and it was prevented by his steady and conscientious opposition • and the decision of the General Court of Massachusetts. He was

deputy governor from 1672 until his election as governor in 1679, in which office he con¬

tinued until 1686. When Charles II demanded the colony's charter, Bradstreet thought it

better that it should be surrendered than that it should be taken away by judgment. He op¬

posed the arbitrary proceedings of Andros,

and when, in 1689, the people put down his authority, they made

their former governor

their president and he continued as the head of the administration till May 1692, when Gov.

William Phipps arrived, bringing the new

charter, in which Bradstreet was named as first assistant. For 62 years he had been in the service of the colony, and he lived to be the (<Nestor of New England,® for all who came over from England with him died before him.

He was a popular magistrate and official, a man of integrity and piety and one of the few who stoutly opposed the witchcraft delusion

of 1692. Consult New England Historical and Genealogical Register (Vol. I, pp. 75-76, and Vol. VIII, p. 325) for a reprint of his journal, 1664-83. >

BRADWARDINE, brad'wer-dm, or

BREDWARDINE, Thomas (Doctor Pro¬

fundus), English scholar: b. Flartfield, Sus¬

sex, about 1290; d. 1349. He was distinguished for his varied learning and more particularly for his treatise, 'De Causa Dei Contra Pela-gium,5 an extensive work against the Pelagian heresy, for centuries a standard authority. He was chaplain and confessor to Edward III,

whom he accompanied to France, being present at Cressy and the capture of Calais. Being appointed archbishop of Canterbury, he has¬

tened to England, but died of the black death on reaching London. Other works by him

are 'De Geometria Speculativa) ; (De Propor-tionibus5 ; 'De Quadratura Circuli5 ; (De

Arithmetica Practical Consult Hahn, 'Thomas

Bradwardinus) (Munster 1905).

BRADWARDINE, Baron, a character in

Scott's novel of <Waverly.) He is represented as a rather opinionated retired soldier, living at his seat of Tully Vedlan.

BRADY, Cyrus Townsend, American

clergyman : b. Allegheny, Pa., 20 Dec. 1861 ; d. 24 Jan. 1920; graduate, United States Naval Academy 1883; LL.D., Saint John's College,

Md., 1902; was in railway service with the Missouri Pacific and Union Pacific roads for several years ; studied theology under Bishop Worthington of Nebraska; deacon 1889, priest 1890, of the Protestant Episcopal Church ; rec¬

tor of Protestant Episcopal churches in Mis¬

souri and Colorado and archdeacon of Kansas until 1885 and archdeacon of Pennsylvania un¬

til 1899 ; rector of Saint Paul's Church, Over¬

brook, Philadelphia, 1899-1902 ; was engaged

in literary work 1902-05; rector of Trinity Church, Toledo, 1905—09 ; Saint George's

Church, Kansas City, Mo., 1909-13 ; Church

of the Ascension, Mount Vernon, N. Y., 1913—14; special preacher at Saint Stephen's Church, New York, after 1914; was chaplain 1st Penn¬

sylvania Volunteer Infantry in the Spanish-American War ; member S. A. R. Military Or¬

der of Foreign Wars, Society of Colonial

Wars, *etc.* ; author of the following books, many of which have been filmed: (For Love

of Country5 (1898); (For the Freedom of the Sea5 (1899); (The Grip of Honor) (1899);

‘Stephen Decatur5 (1900) ; ‘Recollections of a Missionary in the Great West) (1900) ;

‘American Fights and Fighters) (1900) ;

‘Commodore Paul Jones) (1900) ; ‘Reuben

James) (1900) ; ‘When Blades are out and

Love’s Afield) (1901) ; ‘Under Tops’ls and

Tents) (1901); ‘Colonial Fights and Fighters5

(1901); ‘The Quiberon Touch5 (1902);

‘Hohenzollern5 (1902); ‘Woven With the

Ship5 (1902); ‘In the Wasp’s Nest5 (1902);

‘Border Fights and Fighters5 (1902) ; ‘Tittle¬

bat Titmouse5 (1903); ‘The Southerners5

(1903) ; ‘The Bishop5 (1903) ; ‘Sir Henry Mor¬

gan, Buccaneer5 (1903) ; ‘A Doctor of Philos¬

ophy5 (1903) ; ‘A Corner in Coffee5 (1904) ; ‘The Records5 (1904) ; ‘A Little Traitor to the South5 (1904) ; ‘A Midshipman in the

Pacific5 (1904); ‘Indian Fights and Fighters5

(1904) ; ‘Conquest of the Southwest5 (1905) ; ‘The Two Captains5 (1905); ‘Three Daugh¬

ters of the Confederacy5 (1905); ‘My Lady’s Slipper5 (1905); ‘The Patriots5 (1906);

‘The True Andrew Jackson5 (1906) ; ‘Richard the Brazen5 (1906) ; ‘The Free Lances5

(1907); ‘Gethsemane and After5 (1907);

‘Northwestern Fights and Fighters5 (1907) ;

‘The Love Test5 (1908) ; ‘The Blue Ocean’s Daughter5 (1908) ; ‘The

Adventures of Lady

Susan5 (1908) ; ‘By Wild Waves Tossed5

(1908) ; ‘The Ring and the Man5 (1909) ;

‘On the old Kearsarge5 (1909) ; ‘The Island of Regeneration5 (1909) ; ‘South American

Fights and Fighters5 (1910) ; ‘The Better

Man5 (1910) ; ‘Bob Dashaway, Privateers¬

man5 (1911) ; ‘As the Sparks Fly Upward5

(1912) ; ‘The Chalice of Courage5 (1912) ; ‘The Master of Repartee5 (1912) ; ‘Bob Dash¬

away, Treasure Hunter5 (1912) ; ‘The Fetters of Freedom5 (1913) ; ‘The Island of the

Stairs5 (1913); ‘Bob Dashaway in the Frozen Seas5 (1913); ‘A Christmas When the West

Was Young5 (1913) ; ‘The Sword Hand of

Napoleon5 (1914) ; ‘Britton of the Seventh5

(1914) ; ‘The Little Angel of Canyon Creek5

(1914) ; ‘The Eagle of the Empire5 (1915) ; ‘A Baby of the Frontier5 (1915) ; ‘The Island of Surprise5 (1915) ; ‘By the World Forgot5

(1917) ; and ‘When the Sun Stood Still5

(1917).

BRADY, Edwin J., Australian poet : b.

Carcoar, N. S. W., 7 Aug. 1869. He was

graduated from Sydney University and entered journalism, becoming

editor of the Native

Companion Magazine. He developed a dis¬

tinctive, forcible style that soon attracted at¬

tention and made him one of the favorite

young writers of Australia. So excellent has been his work that a serious English critic qualified his ‘The King’s Caravan5 as “un¬

doubtedly quite the best book yet written in Australia.55 It gives a very picturesque ac¬

count of roving life on the Australian high¬

road. It is vivid and bears about it an atmos¬

phere of reality that is racy of the country.

Among Brady’s other works are ‘The Ways of Many Waters5 ; and the ‘Earthen Floor.5

BRADY, James Henry, American legis¬

lator: b. Indiana County, Pa., 12 June 1862; d. 13 Jan. 1918; educated, State Normal School.

Leavenworth, Kan. ; removed to Idaho in 1894, became president of the Idaho Consolidated

Power Company and also president of the

Western Development Association. In politi¬

cal life he accepted the chairmanship of the advisory board of the

National Council of

Women Voters; from 1904 to 1908 was chair¬

man of the Idaho Republican State Central

Committee and governor of Idaho 1909-11. In 1913 he was elected United States senator for the unexpired term to 1915 of the late Weldon B. Heyburn, and reelected 3 Nov. 1914 for the term ending 3 March 1921.

BRADY, James Topham, American law¬

yer: b. New York, 9 April 1815; d. there, 9

Feb. 1869. He was educated by his father, an eminent jurist, and admitted to the bar in 1836.

His eloquence, skill and ability at once brought him reputation and a fine practice. In 1843

he was appointed district attorney for Now

York County and, in 1845, corporation counsel of New York. Conspicuous for his knowledge

in all departments of law, he won verdicts from judges and jurors alike in important patent cases, such as Goodyear v. Day; cases involv¬

ing questions of medical jurisprudence, like the Allaire and Parish will cases, the Huntington forgery case and Cole homicide case ; divorce cases, like that of Mrs. Edwin Forrest, and civil actions of all kinds. He was at his best in criminal cases, where he usually appeared on the side of the defense. At one time he de¬

fended successfully in a single week four clients charged with murder. In 1859 he was counsel for Daniel E. Sickles in his trial for the assassi¬

nation of Philip Barton Key, his opening ad¬

dress for the defense being one of his most notable forensic efforts. In 1860 he was the candidate of the pro-slavery Democrats for

governor of New York. Though a States—

rights advocate before the war, he supported Lincoln's war measures, making speeches which had considerable influence. He contributed

largely to newspapers and magazines.

BRADY, Tex., city and county-seat of

McCulloch County, 105 miles northwest of

Austin, on the Gulf, Colorado and Santa Fe and the Frisco Lines railroads. Cotton, cattle, mohair and wool are important products of the region. The city's industries include cotton gins,' compresses, cottonseed-oil mills, planing mills, a creamery and a refrigerating plant.

The city was incorporated in 1906, and owns the electric-lighting plant . and waterworks. The government is vested in a mayor and board of aldermen. Pop. 2,669.

BRAGA, Theophilo, Portuguese philolo¬

gist, critic and statesman : b. San Miguel, Azores, 24 Feb. 1843. He was educated at the University of Coimbra and became professor

of literature in the Curso Superior de Letras in Lisbon. He is a very voluminous writer

and takes important rank as a historian of the literature of the Iberian Peninsula. He is also noted as an exponent of the Comtian philoso¬

phy. In politics he has been prominent as an active democrat and became the first President of the republic of Portugal, 5 Oct. 1910. His philological work has been confined to the lan¬

guages and literatures of the Spanish Peninsula, to which he has made several important con¬

tributions. Among his works may be men¬

tioned <Stella Matutina> (1863); <Tempestades Sonoras) (1864); (Torrentes) (1868), and a

collection entitled (Alma Portugueza> (1893).

Of his other works may be noted (Historia da Litteratura Portugueza) (1870-81) ; (Manual

da Litteratura Portugueza) (1875); (Parnaso

Portuguez Moderno) (1877); a volume on

Camoens (1880); (Tragos Geraes de Philosophia Positiva} (1883) ; (Systema de So—

do Povo Portuguez) (1883) ; (Systema de So¬

ciology (1884) ; (Historia da Universidade de Coimbra> (1892).

BRAGA, bra'ga, Portugal, town in the

province of Minho and its capital, situated on a rising ground between the Cavado and D'Este, about 32 miles north-northeast of Oporto. It is surrounded by walls flanked with towers and defended by a castle. The houses are old, the streets broad but not well laid out. It is the seat of an archbishop who is primate of Portu¬

gal, and contains an archiepiscopal palace, a richly ornamented Gothic cathedral of the 13th century, parish churches, monasteries, a college, *etc.* The manufactures are of some importance.

Hats, arms, textiles and gold and silver articles are produced. Braga is supposed to have been founded by the Carthaginians and there exist remains of a Roman temple, amphitheatre and aqueduct. On a hill some distance east of the town stands the famous pilgrimage church of Bom Jesus do Monte. Braga was the capital

of Lusitania, and two councils were held here in the 6th century at which the Arian and Pris-cillianist heresies were respectively condemned.

Pop. about 25,000.

BRAGANgA, bra-gan'sa, the name of two

considerable towns in Brazil: (1) A seaport of Para, State, at the mouth

of the Rio Caite.

It is 110 miles northeast of Para, with which it is connected by rail. Pop. of town and dis¬

trict 6,000. (2) An inland city of about 10,000

inhabitants, 50 miles northeast of Sao Paulo, with which it is connected by rail, and about 200 miles to the west of Rio de Janeiro.

BRAGANgA, or BRAGANZA, Portugal,

the capital of a district (of the same name) in the province of Traz-os-Montes. It was in

former times the capital of the province and is a place of considerable importance. It has the ruins of an ancient castle, one of the finest feudal remains in Portugal. It is the see of a bishop and there is an extensive manufactory of velveteens, printed calicoes and woolens.

Braganga has given its name to the present royal family of Portugal. Pop. about 5,500.

BRAGANgA, or BRAGANZA, House of,

the reigning house of Portugal from 1578 to 1910, derived from Affonso, Duke of Braganga, a natural son of Joao I, King of Portugal.

The constitution of Lamego, 1139, declared

that no foreign prince could succeed to the throne; consequently in 1578, on the death of the Portuguese hero, Sebastian, in Africa, with¬

out issue, his people had recourse to the ille¬

gitimate line of Braganga. Philip II of Spain, however, claimed the throne and supported his pretensions by an army under the Duke of

Alva, who, though in disgrace, was summoned from his retreat for this

express purpose. In 1668 the Portuguese shook off the Spanish yoke.

In 1801 Napoleon I declared that the line of the Braganga sovereigns had ceased. John, re¬

gent of the kingdom, withdrew to Brazil in 392

1807 but returned in 1821. At his death in 1826, his son Dom Pedro, resigned the throne in favor of his daughter, Maria da Gloria, pre¬

ferring to remain Emperor of Brazil, to which office he had been elected by the Brazilians, 18

Nov. 1825. Although the male line became ex¬

tinct both in Portugal and in Brazil, the female line (Saxe-Coburg-Gotha-Braganza) was rep¬

resented on the Portuguese throne until the expulsion of Manoel II (q.v.) and the procla¬

mation of the republic of Portugal, 5 Oct.

1910.

BRAGG, Braxton, Confederate general : b.

Warren County, N. C., 22 March 1817 ; d. Gal¬

veston, Tex., 27 Sept. 1876. After gradua¬

tion at West Point in 1837, he was appointed second lieutenant in the 3d Artillery (1 July 1837) ; served in the Seminole War in Florida in 1837-39 and 1841ˆ42 ; took part in the mili¬

tary occupation of Texas 1845-46; and distin¬

guished himself during the Mexican War under General Taylor, being brevetted captain (9 May 1846), major (23 Sept. 1846) and lieutenant-colonel (23 Feb. 1847), respectively, for bravery and gallantry at Fort Brown, Monterey and

Buena Vista. After this war he was on garri¬

son duty at various places, declining promotion to major of the 1st Cavalry 3 March 1855, and on 3 Jan. 1856 resigned his commission and became a sugar planter in Louisiana, from

1859-61 serving as commissioner of public

works of Louisiana. At the beginning of the Civil War he joined the Confederate army

and was rapidly promoted, becoming brigadier-general 7 March 1861, major-general 12 Sept.

1861 and lieutenant-general 12 April 1862. At first he was placed in command of the troops stationed at Pensacola for the purpose of op¬

erating against Fort Pickens and on 8 Oct.

1861 broke up the Federal camp on Santa Rosa Island, Fla. ; but early in 1862 was sent

west to act under Gen. A. S. Johnston (q.v.), commanding the Army of the Mississippi, and played an important part in the bloody battle of Shiloh (q.v.) 6-7 April. After Johnston's death Bragg was promoted general, placed in command of the Army of the Mississippi and shortly afterward superseded Beauregard (q.v.) in command of the Western department. In

August 1862 he began his campaign to win the adherence of Kentucky to the Confederate

cause, captured Munfordsville 17 September,

moved on Bardstown and Frankfort but was

beaten in the race for Louisville by the Federal general, D. C. Buell (q.v.). On 8 October

Bragg practically defeated Buell at Perryville (q.v.), but owing to the arrival of heavy Fed¬

eral reinforcements was compelled to abandon his dead and wounded, a large part of his spoils and hastily, to withdraw into Tennessee. This brought him into disfavor, but, though some urged his removal, President Davis always sus¬

tained him and continued him in his command.

At Stone River or Murfreesboro (q.v.), 31

Dec. 1862 to 2 Jan. 1863, he was defeated by the Federal forces, then under Gen. W. S.

Rosecrans (q.v.) ; he fell back upon Tullahoma, but by the summer of 1863 had been

outgeneraled by Rosecrans (see Tullahoma

Campaign) and once more retreated. On 1920 September, however, he turned upon Rose¬

crans at Chickamauga (q.v.) and inflicted a serious defeat upon the Federal army, only, in turn, to be disastrously defeated at Chatta¬

nooga (q.v.) 23-25 November, by Grant, who

compelled his withdrawal to Dalton. On 2

Dec. 1863 he was removed from command,

but on 24 Feb. 1864 was appointed to the office of military adviser to President Davis. In

the following November he assumed command

of the Department of North Carolina, in De¬

cember defended Fort Fisher against the Por¬

ter-Butler attack, later led an unsuccessful ex¬

pedition into Georgia against Sherman and in February 1865 was placed in active service

under Gen. J. E. Johnston (q.v.), with whom he remained until his surrender. In 1869 he was superintendent of the New Orleans water¬

works, later was chief engineer of the State of Alabama (in which

capacity he supervised the work of improving the river, harbor and bay of Mobile) and in 1874 was chief engineer of the Gulf, Colorado and Santa Fe Railroad.

BRAGG, Edward Stuyvesant, American

legislator: b. Unadilla, N. Y., 20 Feb. 1827; d.

20 June 1912. He was educated at Geneva

(Hobart) College and admitted to the New

York bar 1848. Removed to Fond du Lac, Wis., and was admitted to the Wisconsin bar 1850, to that of Illinois 1869, and to that of the United States Supreme Court 1877. He served in the Union army during the Civil War and won his way to the rank of brigadier-general. He was a member of the Union convention at Phila¬

delphia in 1866, representative in Congress in 1877-85 and a delegate to the Democratic Na¬

tional Conventions of 1872, 1884, 1892 and 1896.

In the convention of 1884 he seconded the

renomination of Grover Cleveland, when he

uttered the memorable phrase, ((We love him for the enemies he has made.® In 1888 he was appointed minister to Mexico; from 15 May to 15 Sept. 1902, consul-general in Havana; from 1902 to 1906, at Hongkong.

BRAGI, bra'je, the Scandinavian god of

poetry. He is represented as an old man with a long, flowing beard, like Odin, yet with a serene and unwrinkled brow. His wife was

Idun.

BRAHE, Tycho, tl'kd bra, or bra, Swedish

astronomer: b. Knudstrup, near Lund. 14 Dec.

1546; d. Prague, Bohemia, 24 Oct. 1601. The district where he was born was then a province of Denmark, but the family was of Swedish

origin. He was sent at the age of 13 to the University of Copenhagen with the intention

that he should be educated for government serv¬

ice. He evinced great promise as a Latin

scholar, but an eclipse of the sun turned his attention to astronomy. His uncle sent him

later to Leipzig to study law, but Brahe, while his tutor slept, busied himself nightly with the stars. He succeeded, as early as 1563, in detect¬

ing grave errors in_ the Alphonsine tables and the so-called Prutenic (that is, Prussian) tables, and set about their correction. The death of an uncle, who left him an estate, recalled him to his native place in 1565; but he very soon became disgusted with the ignorance and arro¬

gance of those moving in the same sphere with himself, and went back to Germany. At Wit¬

tenberg, where he resided for a short time, he lost part of his nose in a duel with a Danish gentleman ; but for the lost organ he ingen¬

iously contrived one of gold, silver and wax.

BRAHILOW

BRAHMANAS

which fitted admirably. After two years spent in Augsburg, he returned home, where, in

1572, he discovered a new and brilliant star in the constellation Cassiopeia. In 1573 he mar¬

ried a peasant girl. After some time spent in travel. Brahe received from his sovereign, Fred¬

eric II, the offer of the small island of Hven or Hoene, in the sound, 10 miles from Copen¬

hagen, as the site for an observatory, the king also offering to defray the cost of erection, and of the necessary astronomical instruments, as well as to provide him with a suitable salary.

Brahe accepted the proposal, and, in 1576, the castle of Uraniborg (((fortress of the heavens®) was begun. Here, for a period of 20 years, Brahe prosecuted his observations with the

most unwearied industry. Here, also, he was visited by astronomers, mathematicians, phi¬

losophers, theologians and princes, among the latter being the future James I of England, who took a lively interest in the astronomer's work.

Asking Brahe what gift he should make in

return for the other's courtesy, the scholar replied, ((Some of your majesty's own verses.®

So long as his munificent patron, Frederick II, lived, Brahe's position was all that he could have desired, but on his death in 1588 it was greatly changed. The petty prejudices of the nobles who felt that he had disgraced their order, and the jealousies of physicians, who were aggrieved because Brahe gave medicine

gratis to the poor, tended to render his position insecure. Under Christian IV Brahe was

barely tolerated; but in 1597 his situation had grown so unbearable that he left the coun¬

try altogether, having been the year before deprived of his observatory and emoluments.

After residing a short time at Rostock and at Wandsbeck, near Hamburg, he accepted an invi¬

tation of the Emperor Rudolph II — who con¬

ferred on him a pension of 3,000 ducats — to Benetek, a few miles from Prague, where a

new Uraniborg was to have been erected for him, but he died shortly after. On his death¬

bed he solemnly confided his system to his cele¬

brated pupil Kepler, then but 28 years old.

Brahe sought to combine the Copernican

system with the old Ptolemaic system of the universe. The planets were considered as re¬

volving round the sun, which with the stars revolved round the earth, the latter being fixed in space. Brahe rediscovered the variation

and annual equation of the moon, first dis¬

covered by the Arabian Abul Wefa. His works include (Astronomise instauratae Progymnas-mataC edited by Kepler (2 vols., Prague 1603) ; (Astronomiae instauratae Mechanica) (Wands¬

beck 1598), containing an account of his life and discoveries and a description of his in¬

struments. Complete editions of his works

were issued at Prague in 1611 and Frankfort in 1648. Consult Bertrand, (Les Fondateurs

de l'astronomie moderne) (Paris 1873) ; Big-ourdan, (L'Astronomie ; Evolution des Ides

et des methodes) (Paris 1911) ; Brewster,

(Martyrs of Science) (London 1841) ; Bryant, (History of Astronomy) (London 1907) ;

Dreyer, (Picture of Scientific Life and Work of Tycho Brahe) (ib. 1890) ; Gassendi, (Vita T.

BraheP (Paris 1655) ; Lodge, <Pioneers of

Science) (London 1904) ; (Tychonis Brahe

Dani Opera Omnia) (tom. i, ed. by Dreyer,

Copenhagen 1914).

BRAHILOW, BRAILOW, bra'e-low, or

BRAILA, bra'e-la, Rumania, town and port on the left bank of the Danube. See Braila.

BRAHMA, the first person in the Triad,

or Trimurti, of the Hindus, which consists of Brahma the creator; Vishnu the preserver or redeemer ; and Siva the destroyer. He is rep¬

resented with four heads and as many arms, holding in his four hands a manuscript book containing a portion of the Vedas, a pot for holding water, a rosary and a sacrificial spoon.

1 he swan is consecrated to him and in the cave temple of Elephanta he is represented as sitting on a lotus, supported by five swans. He is the god of the fates, master of life and death, and, by some, has been represented as the supreme eternal power; but he is himself created and is merely the agent of Brahma (a neuter noun), the universal power or ground of all existence. He is considered as the author of the Vedas and the lawgiver and teacher of India. The worship of Brahma is regarded

as the oldest religious observance in that coun¬

try. In modern Hindu religion, however, it

has been practically 'superseded by the worship of Vishnu and Siva. The epithets applied to this divinity are very numerous, some of the most usual being Swayambhu, the self-existing; Parameshti, who abides in the most exalted

place; Pitamaha, the great father; Prajapati, the lord of creatures ; Lokesa, the ruler of the world. See Hinduism ; India.

BRAHMA FOWL, a popular meat bird,

the result of a cross between the Gray Cochin or Shanghai, and the gray Chittagong. It has become established as a pure breed faithfully reproducing its own type. See Poultry.

BRAHMACHARIN, ((religious student,®

the first of the four orders or stages of life through which the pious brahmin is directed to pass in order to attain immortality. See Brahmin.

BRAHMAGUPTA, Hindu astronomer

and mathematician: b. Probably toward the

close of the 6th century a.d. His (Brahma—

sphuta-siddhanta) (the Improved System of

Brahma) is said to be an earlier work recast; portions of it have been translated into English.

BRAHMAKUNDA, or PARASURAM—

KUNDA, a famous gorge of Assam, in Lak—

himpur district, through which the southernmost branch of the Brahmaputra flows. From time

immemorial it has been held in reverence by the Hindus and although the journey to reach it is both difficult and dangerous, it is visited by thousands of devotees annually.

BRAHMANAS, the ancient theological

writings appended to the original four Vedas by the Brahmans, or priests, for the purpose of very greatly magnifying their own office as a caste entrusted with the conduct of sacrifices of every kind. There are some 13 of them, with attachments to different parts of the origi¬

nal four Vedas. The Satapatha-Brahmana is

the most important and valuable. It is called Satapatha, or ((of the hundred paths,® because it consists of 100 lectures. It has a very minute and full account of sacrificial ceremonies in Vedic times, and many legends and historical allusions. Nothing could be more wearisome

reading; yet the information which can be

gleaned in regard to sacrifices, the priestly 394

caste, and many features of the social and mental development of India, is very valuable.

A devout belief in the efficacy of invocation and sacrifice appears in the Vedic hymns. This was taken advantage of by the Brahmans to

arrange a regular use of these hymns in the two liturgical Vedas, and to establish a proper offering of sacrifices conducted by themselves.

The Brahmanas are their endlessly repeated

explanations and dictions about sacrifice and prayer.

The third, fourth and fifth books of the

great work presented in these five volumes deal very particularly with the Soma-sacrifice, the most sacred of all the Vedic sacrificial rites.

It concerns the nature and use of (<a spirituous liquor extracted from a certain plant, described as growing on the mountains.® (<The

potent

juice of the Soma plant, which endowed the feeble mortal with godlike powers and for a time freed him from earthly cares and troubles, seemed a veritable God — bestower of health, long life, and even immortality.® The moon

was regarded as the celestial Soma, and source of the virtue of the plant.. Another branch of the story of sacrifices relates to the worship of Agni, the Fire. It fills five out of 14 books, and the ideas reflected in it are very important for knowledge of Brahman theosophy and cos¬

mogony. The ritual of the Fire-altar was

brought into close connection with that of the Soma ((fiery® liquor.

BRAHMAPUTRA, bra'ma-po'tra, a large

river of Asia, whose sources, not yet explored, are situated near Lake Manasarovara, in Tibet, near those of the Indus. In Tibet, where it is called the Sanpo, it flows eastward north of the Himalayas and, after taking a sharp bend and passing through these mountains, it

emerges in the northeast of Assam as the

Dihong; a little farther on it is joined by the Dibong and the Lohit, when the united stream takes the name of Brahmaputra, literally (<the son of Brahma.® After entering Bengal it

joins the Ganges at Goalanda and farther on the Meghna, and their united waters flow into the Bay of Bengal. The Brahmaputra is navi¬

gable by steamers for about 800 miles from the sea, its total length being, perhaps, 1,800

miles and its drainage area about 361,200 square miles. Through the last 60 miles of its course it is from four to five miles wide and studded with islands. Its waters are thick and dirty; its banks are mostly covered with marshes and jungles and are subject to annual inundations.

During the season of the overflow, from the middle of June to the middle of September, the level districts of Assam are almost wholly submerged, so that travel is impossible except on causeways 8 or 10

feet high. The vol¬

ume of water discharged by the river at such times is immense. Even in the dry season

it is equal to 146,188 cubic feet a second, while in the same time and under the same circum¬

stances the Ganges discharges only about 80, T

000. The river ranks next after the Ganges in commercial and agricultural value ; large cargo steamers and a daily service of small passenger steamers ply on the Brahmaputra

between Goalundo and Dibrugarh. The down¬

ward traffic consists mainly of tea, coal, tim¬

ber, oil seeds, raw cotton, lac and hides from Assam; also jute, rice, tobacco and grain from eastern Bengal.

BRAHMIN, a term used to indicate the

sacerdotal and, from an early period, the dom¬

inant caste of the Hindu community. The

origin and rise of the Brahmin is shrouded in the mists of obscurity. Long before any period known to history the Brahmin was a power in Hindustan. The Brahmins, from an early pe¬

riod, left all wealth and temporal power in the hands of other castes. According to their Scrip¬

tures, the Brahmin is not allowed to own prop¬

erty, should not engage in trade or any other pursuit in life the object of which is to gain wealth; and the slightest infraction of the rules was visited with the direst of results. At one time, evidently, the Brahmins strictly followed the tenets as embodied in the Codes of Mann or the Grihya Sutras. The Brahmin's life is divided into four stages. At a tender age he becomes initiated by a ceremony known as

U panayana, after which he is to be a Brahma-charin or a student and seeker after knowl¬

edge. Next he marries and becomes a Grihastha. The third stage is called V anaprastha, an intermediate stage between mixing in the world's affairs and complete renunciation. The fourth stage is one in which he becomes a Sanyasin and completely gives up the world

and all mundane ties, devoting himself entirely to good deeds and contemplation of the divine.

The whirligig of time has brought about radi¬

cal changes in the Brahminical ideal, which has become impossible under modern condi¬

tions. The Brahmin, however, has remained

the dominant caste for over 30 centuries. Even to-day, as Mr. Sherring says in his (Hindu Castes and Tribes, > <(Light of complexion, his forehead ample, his countenance of striking

significance, his lips thin and mouth expressive, his eyes quick and sharp, his fingers long, his carriage noble and almost sublime, the true Brahmin, uncontaminated by European influ¬

ence and manners, with his intense self-con¬

sciousness, with the proud conviction of supe¬

riority depicted in every muscle of his face, and manifest in every movement of his body, is a wonderful specimen of humanity walking on God's earth.® Whether he has lived his

day remains to be seen. To-day he is the life and soul of every important movement in

India.

BRAHMO-SOMAJ. See Hinduism.

BRAHMS, Johannes, German composer:

b. Hamburg, 7 May 1833 ; d. Vienna, 3 April 1897. His father was a double-bass player in the Stadt-Theatre of his native town and from him he received his first instruction in musical technique, but his

artistic taste was developed under the guidance of the eminent musician, Eduard Marsden, of Altona. At the age of 14-years he made his first public appearance as a pianist at Hamburg, playing a set of variations composed by himself. In 1853 he traveled with the noted Hungarian violinist Remenyi on a

concert tour of Germany as piano accompanist ; this tour was critical for his whole career. In the program of the concert given at Gottingen was Beethoven's Kreutzer Sonata. The piano

was a half, tone below the true pitch, but Brahms straightway remedied the defect, play¬

ing the part from memory and transposing it BRAIDED STREAM — BRAILA

from A to B-flat — a feat which won the ad¬

miration of the celebrated violinist Joachim, who was in the audience, and who after the performance made himself known to the young musician; thus commenced a warm friendship

which lasted during Joachim's life. He gave the young man commendatory letters to Liszt, then at Weimar, and to Schumann at Diisseldorf, and advised him to give up the concert tour. Brahms acted instantly on this counsel, visited Schumann and showed him some of his compositions, with the result that Schumann

recognized in the young artist supreme musical genius, and in his enthusiastic admiration hailed him in an article entitled <(Neue Bahnen,® pub¬

lished in his Neue Zeitung fiir Musik, as al¬

ready a master, the great composer of the

future, and, in the words of John the Baptist (Matt, xi, 3) as rendered in the Latin vulgate, as ('he that is to come.® Brahms, he declared, had not attained mastership by a gradual de¬

velopment, but had ((burst upon us fully

equipped as Minerva sprung from the head of Jupiter.® Yet at this time the young maestro had produced but very few works — a string quartet, a scherzo in E-flat and a few songs, among them the dramatic ˆiebestreueP

His eminent gifts were now generally recog¬

nized and, after giving a concert in Leipzig, two music publishers made an engagement with him to publish his compositions ; and in 1854

he was appointed music master and choir con¬

ductor to the Prince of Lippe-Detmold. From 1858 to 1862 he resided first in Hamburg and then in Zurich, making musical tours and pur¬

suing his musical studies. Going to Vienna in 1862, he was director of the Singakademie there in 1863, but after a few months resigned that office and quitted Vienna to resume his con¬

cert tours throughout Germany. He took up

his residence again in the Austrian capital in 1872 and thereafter till his death Vienna was his home, though for some years he made

musical tours occasionally ; but toward the

close of his life he devoted himself almost exclusively to the work of musical composi¬

tion. In 1877 the English University of Cam¬

bridge apprised him of its senate's intention to honor him with the degree of doctor of music, but Brahms seems to have ignored the intended courtesy.

By his (German Requiem, > produced in the

cathedral at Bremen in 1868, at a solemn re¬

ligious function commemorative of the Ger¬

man soldiers who died in the war with Austria, he fully justified the

prophetic utterance of Schumann and won for himself a place in the hearts of the whole German people. He called it the (German Requiem) to indicate the differ¬

ence in tone and spirit between it and the tradi¬

tional requiem, which echoes the doleful strains of the (Dies IrseP In the (German Requiem*

buoyant hope and assurance of God's infinite mercy is the keynote. It is one of a class of sacred compositions, 12 in number, among them the <Triumphlied) (song of triumph), com¬

memorating the German victories in the war

with France in 1870-71, also some choral songs and motets. His other compositions, number¬

ing about 150 pieces, are his secular choral works, among these Schiller's <Nanie> and the (Gesang der Parzen* (song of the Parcae) ; concerted vocal works, among them the (Liebes-lieder) (lays of love) ; orchestral works, among them four symphonies ; chamber music ; piano¬

forte solos; four books of Hungarian dances arranged for pianoforte duet. He never seems to have even attempted to compose an opera and confessed a distaste for that combination of music and drama. He seldom visited the

theatre, and on the rare occasions on which he attended operatic performances he nearly al¬

ways retired before the completion of the last act.

Brahms is ranked with the classic masters

of music as the peer of Beethoven and Men¬

delssohn and inheritor of the traditions of the great school of the German composers. Tem¬

peramentally and in his mental habit he is es¬

sentially modern, original and spontaneous ; he possesses the warmth of imagination and the quick emotionalism which are assumed to be

characteristic of the romantic school, and to these he gives free play. But his creations are cast in the classic molds, or rather they appear to come to the birth naturally in classic forms; hence there is no shadow of incongruity be¬

tween the matter and the form. Consult Deiters, translated by Newmarch, (Brahms: a Biograph¬

ical Sketch) (1888) ; Dietrich and Widmann, translated by Heclet, (Recollections of Johan¬

nes Brahms* (1899) ; Erb, J., Brahms-* (Lon¬

don 1905) ; Fuller-Maitland, J., <Brahms> (ib.

1911) ; Imbert, H., (Johannes Brahms: sa vie et son ceuvre) (Paris 1906) ; Kalbeck, Johan¬

nes Brahms) (6 vols., Berlin 1904-13), the

standard biography of Brahms ; May, F., (The Life of Johannes Brahms) (London 1905) ;

Perger, R., <Brahms) (Leipzig 1908) ; Reimann, H., Johannes Brahms> (Berlin 1911) ; Thomas-San Galli, W., Johannes Brahms) (Munich

1912) ; Widmann, J., Johannes Brahms in

Erinnerungen) (Berlin 1910). Consult also

Correspondence: Johannes Brahmes im Briefwechsel,* edited by M. Kalbeck and others (7

vols., Berlin 1906-12) ; Evans, E., (Historical, Descriptive and Analytical Account of the En¬

tire Works of J. Brahms) (London 1912) ;

Burkhardt, M., Johannes Brahms: ein Fiihrer

durch seine Werke) (Berlin 1912) ; Hammer—

mann, W., Johannes Brahms als Liederkom—

ponist* (Leipzig 1912) ; Knorr, J., and Rei¬

mann, H., Johannes Brahms, Symphonien und

andere Orchesterwerke erlautert* (Berlin

1908).

BRAIDED STREAM. A stream that is

overloaded with sediment tends to deposit and choke up its own channel until the water is forced to break out and find a new course. If many such interlacing channels are formed the network is called a braided stream. The Platte affords a good example. Most streams flowing away from melting glaciers are braided. See also Valley Train.

BRAILA, bra-e'la, IBRAILA, or BRAILOW, Rumania, town and chief port of Wallachia, on the left bank of the Danube, about 100

miles northeast of Bucharest and about 100

miles above Sulina at the river's mouth. Grain is the principal article of export and its indus¬

tries include flour and rolling mills, cement, soap, rope and candle factories. Electric street railroads connect with the state-owned mineral springs and mud baths at Lacul Sarat (Salt Lake), annually visited by hundreds of health-396

seekers. Braila's history is largely that of Wallachia. It suffered severely from the Turk¬

ish wars in the 18th century, was taken by the Russians several times and finally burned down in 1770. Since the treaty of Adrianople in 1829

it has continued to form part of Wallachia but no longer a fortified town. Braila was taken by the German armies, under the command of General Mackensen in November 1916. The

great stores of grain in the city and also in the city of Galatz, which had just been sold to England were added to the booty captured by the invader. Very many of the inhabitants had fled previous to the entrance of the Germans, saving what little they could of their belong¬

ings. Pop. 60,300.

BRAILLE, bra-e, Louis, French educator

of the blind: b. Coupvray 1806; d. 1852. He invented a system of writing with points, used extensively in institutions for the blind. Him¬

self blind almost from birth, at the age of 10

years he was admitted to the Institute for the Blind in Paris, where he soon became proficient in both science and music. In instrumental

music he attained a very high rank, becoming one of the most distinguished organists of Paris and also excelling as a violoncellist. At the age of 20 he had formed the idea of modify¬

ing M. Charles Barbier's system of writing

with points so as to render it practicable and convenient, and not long afterward it was in¬

troduced into the Royal Institute, although no account of it was published till 10 years later.

It was subsequently adopted in most of the continental schools and a little later in the United States, where it continues, with some modifications, in successful use. The signs of the original system are 43 in number, embracing the entire alphabet, all the diphthongs and marks of punctuation. Ten fundamental signs

form the basis of all the rest. These signs, rep¬

resenting the first 10 letters of the alphabet and the 10 Arabic numerals, are as follows:

ABCDEFGH IJ

• • •• •• •• •• • • •

1 2 3 4 5 6 7 8 9 0

By placing one point under the left side of each fundamental sign, the second series is formed, comprising the next 10 letters. By

placing two points under each fundamental sign, the third series, comprising U, V, X, Y, Z, C

(C soft), L, A, L, U, is formed. By plac¬

ing one point under the right side of the funda¬

HUMAN BRAIN

FIG. 1. - HEAD AND NECK, SECTION FROM FRONT TO BACK.

1, Windpipe; 2, Larynx; 3, Spinal marrow; 4, Pharynx; 5, Tongue or Hyoid bone; 6, Epiglottis; 7, Tongue; 8, Hard palate; 9, Soft palate; 10, Bridge of the nose; 11, Frontal cavity; 12, Sphenoid cavity; 13, Nasal cavity; 14, Skin of the skull; 15, Bony skull; 16, Hypophysis; 17, Corpus cal¬

losum; 18, Septum lucidum; 19, Straight sinus; 20, Cere¬

bellum; 2 1 , Cerebrum, right hemisphere; 22, Lobes of the Medulla; 23, Pons Varolii; 24, Medulla Oblongata; 25, Zone of the Epistropheus; 26, Vertebrae; 27, Spinal continuation of the Vertebrae.

FIG. 2. - BRAIN, CROSS-SECTION FROM LEFT TO RIGHT.

1, Thalamus; 2, Skull; 3, Cerebral membrane; 4, Cerebral hemisphere; 5, Lateral ventricle; 6, Optic lobe; 7, Septum lucidum; 8, Longitudinal sinus; 9, Great longitudinal fissure; 10, Corpus callosum; 11, Median cerebral cavity; 12, Cere¬

bral hemisphere; 13, Gray matter; 14, White matter; 15; Corpora Albicantia.

FIG. 3. - BRAIN VIEWED FROM ABOVE.

1, Occipital convolution; 2, Occipital lobe; 3, Inner mental signs, the fourth series, embracing A, E, 1, 6, U, E, I, U, CE, W, is formed. Three supplementary signs represent I, 2E and O.

The marks of punctuation are the fundamental signs placed two lines below. The system has been applied to musical notation in such a man¬

ner as to make the reading and writing of music much easier for the blind than for those who see. The seven notes are represented by the last seven of the fundamental signs, and each of these notes may be written in seven different octaves by merely prefixing a sign peculiar to each octave, and thus the necessity of designating the key of each musical sentence in the ordinary way is avoided. The mode of writing is very simple. The apparatus consists of a board with a surface grooved horizontally and vertically by lines one-eighth of an inch apart. Over this board a frame is fitted like that of the common map delineator, and one or more sheets of paper being placed over the board, the points are made with a bodkin

through a slip of perforated tin, ::, which contains all the changes used in the system.

As the sheet must be reversed to be read, the writing should be from right to left, that it may be read from left to right. Of course, several copies may be made by one operation.

For many years books have been printed in

points in various countries. See Blind.

BRAIN, that portion of the nervous system

contained, for the most part, within the skull.

It is usually divided into two parts. The larger mass is termed the cerebrum, the smaller the cerebellum ; from the lower end of the cerebrum the medulla oblongata tapers down into the

spinal cord. The brain is, as it were, the great central station of the nervous system. From the surface of the entire body nerve fibres pass into the spinal cord, up the cord and into the brain; these carry impressions of all kinds —touch, taste, sight, hearing, pain, temperature, *etc.* — from the surface of the body, external as well as internal, to the brain. Starting in the brain mass itself, there is a corresponding series of fibres that run down into the medulla and spinal cord, out into the nerves and end in some muscle or organ of special character.

There are literally millions of incoming fibres, millions of outgoing fibres and millions of minute cells in direct association with these fibres. Thus it may be seen that the brain is merely a collection of nerve ganglion cells and (See Illustration).

parietal convolution; 4, Left cerebral hemisphere; 5, Inner frontal convolution; 6, Right cerebral hemisphere; 7, Frontal lobe; 8, Longitudinal fissure; 9, Median frontal convolution; 10, Occipital centre convolution; 11, Frontal centre con¬

volution; 12, Outer frontal convolution; 13, Outer parietal convolution; 14, Median parietal convolution.

FIG. 4. - BASE OF THE BRAIN.

1, Eleventh or spinal accessory nerve; 2, Right hemi¬

sphere of cerebellum; 3, Twelfth or hypoglossal nerve; 4, Ninth or glosso-pharyngeal nerve; 5, Eighth Or auditory nerve; 6, Seventh or facial nerve; 7, Medulla Oblongata; 8, Fifth or trigemenus (trifacial) nerve; 9, Central lobe; 10, Fourth or trochlear nerve; 11, Sixth or abduceus nerve; 12, Pons Varolii; 13, Right frontal lobe of the

cerebrum; 14, Lobes of the medulla; 15, Optic chiasm; 16, Second or optic nerve; 17, Left frontal lobe; 18, First or olfactory nerve; 19, Sylvian fissure; 20, Third or oculomotor nerve; 21, Tenth or pneumogastric nerve; 22, Left hemisphere of the Cerebellum,

For explanation of figures, see article Brain BRAIN

their associated fibres, both of which have a characteristic appearance as seen by the naked eye ; that portion of the brain that preponder¬

ates in cells is the ((gray matter® and that por¬

tion richer in fibres is the ((white matter.® It thus represents a central switchboard, which binds all parts of the body together and puts the entire body in touch with its surroundings, that it may act as a distributor or transmitter of the vast sources of cosmic energy which is constantly beating upon the human body from the environment.

Cerebrum. — The larger brain mass, the

cerebrum, consists of two symmetrical halves, the hemispheres, separated above by the great longitudinal fissure and held together at the bot-ton of the fissure by a firm band of fibres, the callosum, and at the base by the cerebral

peduncles, which unite below to form part of the pons, and the medulla. All of the fibres passing to and fro go up and down in the peduncles, separating into each hemisphere. The surface of the hemispheres is divided by fissures into several larger areas and a number of

smaller ones. Thus in the lower side there is a large fissure, the fissure of Sylvius, below it there are three lobes, the first, second and third

temporal lobes. Running from the great longi¬

tudinal fissure, making an angle of about 65°

with the Sylvian fissure, the second most marked fissure, that of Rolando, is found. This divides off an anterior region in which the first, second and third frontal convolutions are to be found.

Immediately around the fissure of Rolando are grouped the anterior and posterior parietal

lobes, and at the back end of the hemispheres the occipital lobes are situated. All of these lobes are divided into smaller areas by the fissures, the chief end subserved by these fis¬

sures being to increase the amount of outside surface of the hemispheres and thus make room for the enormous number of cells that are lo¬

cated in this outermost gray layer, the cortex.

A further function seems to be expressed by this division into lobes and convolutions,

namely, a localization of function, a concen¬

tration of energy as it were, certain types of brain activity being relegated to certain brain areas. Thus it is assumed that the main func¬

tion of the frontal lobes is largely that of the reasoning faculties and higher intellectual proc¬

esses. It is very well established that the cells in the cortex that are grouped up and down both sides of the fissure of Rolando are the cells that govern the motor acts of the body ; irri¬

tate these, and muscular convulsions in certain groups will occur; destroy them by accident or disease, and paralysis, or loss of muscular func¬

tion, will result. The localization for certain muscle groups, such as those for the head, arm, eyes, leg, etc., are very well known. In the oc¬

cipital lobes, particularly in certain areas about the angular gyrus, are the centres . for sight memories. Their destruction may result in

mind blindness (see Aphasia). In much the

same manner the memories of sound are lo¬

cated in the temporal convolutions, and there are a large number of areas thus localized.

These different areas are all brought into con¬

nection, the one with the other, by hosts of fibres, and as already indicated the two hemi¬

spheres of the cerebrum are connected by

millions of fibres that are in the callosum.

Thus in the adult normal cerebrum all parts of the cortex are brought into close connection with one another and with the other half of the cerebrum ; the connections with the cerebel¬

lum and with the cord are established as well.

The richness of association is an index of the education and intelligence of the individual.

These cortical connections are not a helter-skelter, hit-or-miss system, they are all care¬

fully laid down, constituting the human brain one of the most remarkable (<switchboards® ever made. Modern anatomy is busy unraveling all the fibre and bundles of fibre tracts, and it will not be many years before the map of the brain will be as well known as that of New York. When that time arrives there will be clearer knowledge of the mechanism through

which normal effectual adaptation to the ex¬

ternal world is attained. Such light is already shining more fully upon these and the darker problems of failure in adaptation through

psychical misdirection of the brain mechanism or organic lesion of the machine which prevents adequate psychical expression.

In addition to the cortical ganglionic masses of cells, there are a number of similar masses of cells located within the substance of the brain mass. These are subsidiary stations, as it were, for many of the fibre tracts going to and coming from the cortex. These are the

caudate and lenticular nuclei, the optic-thala¬

mus, and a number of smaller ones.

Cerebellum. — The cerebellum, or little brain is situated behind and almost beneath the cere¬

brum, which partly overlaps it. It is attached to the brain stem by penduncles and its connec¬

tions with the cerebral centres and those of the cord are many and complex. In minute struc¬

ture the cerebellum has a number of character¬

istic features by which it may be recognized under the microscope, but fundamentally the

nerve cells are similar, the interstitial connective tissue is the same in kind as in the cerebrum and the blood vessels, veins and lymphatics have similar properties. The chief function of the cerebellum is that of adaptation to space rela¬

tions.

Membranes. — Surrounding the entire brain

mass and extending down over the spinal cord there are three coverings. These are an out¬

side strong and thick dura mater, and two inside delicate membranes, the arachnoid and pia

mater.

Cavities. — The brain is not a solid organ.

It is really a flattened-out expansion of nervous tissue peculiarly grouped about a central cavity.

This central cavity at one time was as simple almost as the space occupied by the graphite in a lead pencil, but in the adult brain there are lateral ventricles, third and fourth ventricles, all of which are too complicated to be described here. The ventricles contain a fluid, the cerebro¬

spinal fluid, which also bathes the outside of the brain. The cavities of the brain are continuous with the central cavity of the spinal cord.

This modern conception of the brain as a

complicated automatic switchboard may be elab¬

orated to any amount of detail. If one should trace, however, the path of a single impulse from the outside world, be it one of sight, smell, taste, touch, pain, etc., one would trace it, say for pain — first from the point of con¬

tact, for instance, of the finger, whence the

special nerves of sense would carry it to the spinal cord; here it travels up definite tracts in the cord (for the upward paths for the pas¬

sages of sensations and the downward ones of messages to act are as definitely known as are the railroads from New York to Chicago) ;

from the cord it passes into the medulla, still in a well-defined path, where only it and its kind travel (about here the fibre tract crosses to the opposite side of the medulla) ; then through the pons, through the cerebral pe¬

duncles, up to the secondary centres, to the cere¬

bellum and the sensory area in the cortex, which is supposed to be situated just behind the motor area. As soon as the sensory impulse reaches the cortex it is felt as pain and re¬

ferred to the spot in the skin in contact with the irritant. Immediately on the perception of pain, so intimate are the connections of the sensory areas with the motor areas from these motor cells, a conscious impulse is flashed down another series of fibres, down the peduncles to the medulla (where the fibres also mostly cross to the opposite side), down the spinal cord, out on a motor nerve to the muscle to cause a muscular act of pulling the hand away from the harmful irritant. This is the long, conscious series. There may also have been a shorter reflex cycle whereby the impulse passed to the spinal cord and an immediate motor connection was made that caused a quick jerking away of the hand, even before the perception of the sensation had taken place. This is the reflex cycle. See Reflex Action.

The study of the comparative anatomy and

physiology of the nervous system is one of the most enchanting departments of human knowl¬

edge. To trace the gradual development of this intricate and marvelously adjusted regulator of the entire body, from its simplest terms of (<protoplasm irritability® through the isolated gang¬

lionic masses in such animals as the starfish, the gradual chaining of one mass to another as in the worms and insects, thus bringing a certain relation of one part to another, up to the fusion of different ganglionic masses to form a chief mass, the brain, and secondary masses, the

spinal cord — this is a story of so many chap¬

ters and volumes that it cannot even be sketched here ; but it is very certain that the gradual evolution of the nervous system shows the ex¬

treme complexity of man's activities. Although throughout the entire series, nerve cells are alike, it is only in the great multiplicity of co¬

ordinations and connections that man's brain differs from the nervous system of a j ellyfish or a worm. It is only in the animal series beginning with Amphioxus that a distinct brain mass commences to be seen. But from this

point forward the modification in form, size and complexity is gradual. While man has the most complex brain, he has not the

heaviest brain, although in comparison with his size it is the heaviest. The brain of man is usually heavier than that of woman, although at birth and at the age of 14 the female brain is heavier.

The average weight of the male brain is about 48 oz., of the female 43ˆ4 oz. Taller and heavier persons have usually heavier brains.

Weight of brain, however, has no direct rela¬

tionship with intelligence, as idiots' brains are known that have weighed as much as those of many of the ablest of men. Intellectual capac¬

ity, as already said, consists in the great multi¬

plicity of nerve cell connections. In which con¬

nection it might also be added that the shape and size of the outside skull bears no constant relation to the shape and size of the inside brain. Cuvier's brain weighed 64ˆ2 ounces.

Gambetta's only 39 ounces. While it is true that a number of celebrated men of recognized brain power have had large brains, there are many more of equal capacity whose brain

weights have not been remarkable. (See

Nervous System; Speech Centres). Consult

Barker, (The Nervous System) ; Dejerine, (An¬

atomy of the Nervous System) (French) ;

Herrick, (The Nervous System) (1916) ; Jelliffc and White, c Diseases of the Nervous System) (1917). Smith Ely Jelliffe.

BRAIN, Diseases of. These are so many

and so diverse that a general article cannot readily be written upon them. In general they may be divided into: (1) Developmental de¬

fects. These are considered under idiocy, im¬

becility (qq.v.), *etc.* (2) Acute infections in which the brain itself or its surrounding mem¬

branes are attacked by some form of bacterium, such as influenza bacillus, the pneumococcus, that ordinarily is the main cause of pneumonia, the typhoid organism, or certain forms of cocci.

These diseases are discussed under the heads, encephalitis, meningitis, cerebral abscess, epi¬

demic cerebrospinal meningitis (qq.v.). (3)

Acute and chronic poisoning, including delirium tremens in alcoholism (q.v.), toxic manias,

etc. (4) Diseases of the blood vessels of

the brain. The condition generally known

as apoplexy arises from disease of the cere¬

bral vessels. This manifests itself in three different forms due to cerebral haemorrhage, cerebral thrombosis or cerebral embolism.

These are discussed here. In all, the symptoms are much alike, as similar areas in the brain may be affected by each. In haemorrhage

there is a bursting of one of the cerebral blood vessels, with pouring out of blood into ad¬

jacent brain tissue and destruction. A cer¬

tain blocking of the artery also results. In thrombosis, the walls are diseased and a soft mass collects on the inside of the blood vessel in the brain and blocks it up. This shuts off the circulation in a certain area supplied by the artery and there is degeneration in that area with softening perhaps and cyst formation. In embolism some foreign body from some other

part of the arterial system is swept into a blood vessel of the brain and blocks it up. In all three forms of apoplexy the attack may be

very slight, if the cause is slight, a temporary loss of consciousness, or a paralysis in one limb, or a hemiplegia that is transitory — these may be all that is noted. But the usual attack of apoplexy is much more

severe. The patient

is rendered unconscious, the face is purple or congested, there may be voiding of urine and feces, the breathing is slow and snoring in character, the pulse is usually slowed to 50, and often soft and full ; nausea and vomiting and lowered temperature may also occur. The pupils may be dilated and the eyes may appear crossed. There is usually noted a difference in the two sides of the face, one side of the body is different from the other, and on lifting the limbs there is a change in their resistance. The patient may remain in this condition and die BRAIN, DISEASES OF

Fig. 5. Cyst of Brain following Abscess … ….

F;g. 6. Brain Atrophy due to Encephalitis and resulting in epileptic convulsions and imbecility F g 7 The Brain of a Paretic showing the destructive changes in the brain cortex of syphilitic origin Fig. 8. Cyst of the Hypophysis oi Pituitary — Patient showed blindness and obesity Fig. 9. Hemorrhage of the Brain Meninges due to a blo,,r on the head BRAIN, DISEASES OF

Fig. 3. Syphilitic Disease of the Cortex of the Brain Causing Epileptic Convulsions. One of many causes for such convulsions (Telliffe and White)

Fig. 4. Brain of Healthy Individual (left) and Brain of Idiotic Child (right). The latter due to congenital svDhilis of the brain (Jelliffe and White) J

BRAIN, SYPHILIS OF THE

very soon, or he may have a rising temperature for a week and then die, or he may recover consciousness to find that one entire side of his body is paralyzed, or incapable of being moved by the wish. If the right side is involved the patient usually has defects in his speech

(aphasia, q.v.). After a few days, this

paralysis may pass away, but it usually persists for life in some form or other. Almost in¬

variably the paralyzed limbs improve greatly ; at first the leg and later the arm, and the im¬

provement may be very great so that only a slight trace of what was a disabling affliction remains. The shades and variations in symp¬

toms and in the outcome are numberless. The treatment of an attack of apoplexy requires prompt attention. Heat to the extremities,

mustard bath to the feet, absolute quiet, removal of constricting bands about the neck, placing the patient on the non-paralyzed side, in many cases blood-letting ; these are the generally recognized things to do. The outlook is always serious. Haemorrhage is apt to occur in those over 50, thrombosis is those affected with

syphilis, and may occur at any age, embolism usually accompanies some infectious disease,

such as pneumonia, rheumatism, scarlet fever, childbirth fever, etc., and may affect old or young. (See Diplegia; Hemiplegia; Mon¬

oplegia). (5) Accident or injury to the brain.

These may occasion various forms of hem¬

iplegia; diplegia, particularlv in the injuries of childbirth; epilepsy, *etc.* (6) Tumors of the brain. (See Brain, Tumors of the). (7)

Organic disease of the brain functions. This gives rise to various forms of psychoses.

Softening of the brain is a term denoting either a dementia (q.v.) of old age, or the progressive dementia known as general paresis (q.v.).

The insanities in their various forms and

phases are treated in their appropriate rela¬

tions under one inclusive head. (See Insanity) .

Consult J elliff e and White, (Diseases of the Nervous System) (1917).

Smith Ely Jelliffe.

BRAIN, Syphilis of the. The subject of

brain syphilis is a broad one, and furthermore it is one that escapes all attempts at narrow descriptive control. Of all brain conditions it is the one most frequently seen by physicians and leads to the most disastrous results. The World War will bring about widely extended

infections among the soldiers and brain syphilis will be greatly on the increase by reason of its ravages, which will be as severe as the actual wounds of war. The underlying pathological

processes are either meningeal, arterial or

infiltrative, that is gummatous, and these

processes may either exist alone or in various combinations, so that an extremely variable, complex and confusing series of clinical syn¬

dromes may arise, depending upon the inter¬

relationship of the pathological trends and the anatomical paths or centres implicated or

destroyed.

So far as the therapy of syphilis of the

brain is concerned, these confusing clinical pictures are fortunately of minor interest. Yet.

it is desirable to obtain as clear a clinical grasp of a cerebral syphilis as possible, for such an insight is often extremely valuable from the standpoint of therapy.

Following a classification which the writer

has followed in (Diseases of the Nervous

System > (2d ed., 1917), the subject will be discussed here under the following clinical

iorms: (1) Syphilis of the cranial bones; (2) syphilis of the basal meninges; (3) syphilis of the convexity; (4) cerebral syphilis, arterial types; (5) meningoencephalitis, paretic and

taboparetic types; (6) syphilitic psychoses; (7) hereditary syphilis of the brain.

In a discussion of syphilis of the nervous system, the forms of syphilis of the spinal cord which accompany that of the brain might properly be included, but are excluded from this article by reason of its title.

1. Syphilis of the Cranial Bones. — Only

those which cause symptoms of brain involve¬

ment are mentioned here. In the works of the early clinicians of the middle of the 16th century, syphilis of the cranial bones was very frequently described, and it would seem that throughout the 16th, 17th and 18th centuries brain involvement through extension of gummata of the dura and of the bones was more frequent than at the present time. This

diminution in cases observed is probably due to the better treatment to which syphilis is now subjected.

In discussing syphilis of the bones of the skull, gummata are practically the only path¬

ological forms of interest. They are usually circumscribed and, when large enough to cause symptoms, give rise to the picture of a tumor of the brain (q.v.). The exact trend of symp¬

toms depends largely upon the location. Not infrequently they give rise to epileptiform con¬

vulsions. When impinging upon the motor

areas they have been known to give rise to various forms of monoplegia, hemiplegia,

aphasia, or even sensory eye signs. The gum¬

mata of the frontal region which protrude into the frontal lobes may give rise to a psychotic picture, at times accompanied by (<Witzelsucht.®

The general symptoms of brain tumor, such

as headache, nausea, vomiting, sleeplessness

and choked disc are to be expected. In autopsy records one is struck with the frequency with which these cases are treated as epileptics.

Not infrequently cranial bone gummata involve the base with caries, the upper vertebrae often affording complications. Here stiffness and

rigidity of the neck are not infrequent signs.

It is important to bear in mind that many of these gummata are best attacked by surgical means. It is futile to attempt to get rid of them by antisyphilitic measures, especially

when they are large and dense.

2. Syphilitic Meningitis of the Base. —

This is a very frequent form of cerebral

syphilis. The optic chiasm is involved quite often in the very early stages of the meningitis.

Spreading in all directions from here, the

thickening of the meninges and the infiltration of the gummatous growth brings about a very complicated symptomatology. The gummatous

masses invade the brain structure, grow about the emerging and entering cranial nerves, and may even involve the bones of the base and the upper cervical vertebrae. The diffuse type making up a gummatous meningoencephalitis

is most frequent, but at times a syphilis of the base will consist of an isolated vascular disease, or of circumscribed gummata, or possibly even simpler manifestations of the disease, giving rise to very simple pictures, such as a primary 400

optic neuritis, or paralysis of a single cranial nerve, or a mild headache and rigidity of the neck.

The general picture, however, is apt to be more complex. In its initial phases headache, increasing stupidity, increasing emotional

apathy, forgetfulness, negligence of personal appearance or business engagements create the impression that a paretic process is in course of development, but as the infiltrating or gum¬

matous growths increase the cranial nerves are involved, thus introducing certain variants

which permit a diagnosis. Headache is a fre¬

quent sign, is often boring or stabbing in nature, the head showing tenderness on per¬

cussion, especially over the occiput. Optic

nerve changes develop in from 20 to 40 per cent of the cases, one eye or the other showing choked disc or atrophy. The sixth nerve is mostly frequently involved. As it has a long pathway on the base of the skull it is most likely to be caught in the gummatous infiltra¬

tion. Internal squinting is thus a frequent sign. The third nerve in some of its branches is also often implicated. Ptosis in one eye develops early, then rectus palsies follow, one pupil commences to dilate, or becomes ir¬

regular, then loss of pupillary reflex shows with final development of an Argyll-Robertson syndrome. This is apt to be incomplete, and not as in those forms of cerebral syphilis of a more ideal paretic, or taboparetic nature.

Painful flashes in the side of the face,

changes in sensibility, point to implication of the trigeminus ; facial palsy may result in others. The IX, X, XI and XII nerves may

be caught in the syphilitic exudate, with changes in the respiration, irregular heart action,

hemiatrophy of the tongue, etc., as their char¬

acteristic symptoms. The mental picture, as

already outlined, is striking. There is a half dull, apathetic psychosis that not •infrequently suddenly gets worse, with coma or unconscious¬

ness, with periods of acute confusion, possibly of violent delirium. The marked variability in the dullness, apathy or coma is very character¬

istic of basal syphilis. Certain patients show a mild delirium, others are fairly violent,

resembling an acute attack of meningitis, or a manic depressive psychosis. Many of these

cases suddenly clear up, apparently from no reason whatever. This is a not infrequent

situation in these basal syphilitic cases. At times the patients show depressed phases, again they are confused; still others would pass for dements, while others again would be diagnosed as manic depressives. A few show persecutory notions, and in the language of the descriptive psychiatry of 10 or 15 years ago these

would be called by the names already indicated.

Present day psychiatry regards them solely as kaleidoscopic mental picture variations of one disease, namely, syphilis. This point of view has come about through careful studies, and through the gradual extension of knowledge of the cytology and serology of the blood and cerebrospinal fluid. Naturallv this point of view aids to a much more enlightened therapy, for one does not attempt a treatment of

mania, or dementia, or melancholia which are names solely, when after all one should treat syphilis which is a definite affair.

3. Syphilitic Meningitis of the Convexity.

— It is largely because of variations in the trend of the symptoms, rather than from any fundamental pathological difference, that this subdivision is made. In many individuals

syphilitic meningitis of the base is accompanied by one of the convexity as well, and practically all cases of syphilitic convexity meningitis show some signs of syphilis elsewhere. The

only question here is of a greater predominance of localization of pathological processes in the convexity rather than in the base.

4. Cerebral Syphilis, Arterial Types. —

Here one distinguishes two very pronounced

types, although intermediate forms are the rule.

One speaks of (a) cerebral syphilis of the smaller vessels, Heubner type, or (b) cerebral syphilis involving the larger vessels with em¬

bolism, thrombosis, or even haemorrhage, giving rise to the classical hemiplegias. In the former type, that of cerebral syphilis of the smaller vessels, one has presented the classical picture, in the mild grades, of persistent headaches with slight mental changes ; in the severer grades, the picture of a general paresis. The patients show various forms of acute convulsive at¬

tacks, comatose periods due to softenings in this or that portion of the cerebral cortex, the picture often resembling that of a pro¬

nounced senile dementia or a pronounced

paresis, with aphasia, word blindness, astereognosis, monoplegias, *etc.*

There is a great multiplicity in the syn¬

dromes present in cerebral syphilis of this type.

One characteristic feature is that of the remis¬

sions, which are also so frequent in paresis.

In cerebral syphilis of the larger vessels, the characteristic apoplectiform results that mark hemiplegias or hemianaesthesias, thalamic syndromes are found.

All of these forms of syphilis are character¬

ized by local minor injuries.

Headache is usually present, often paroxys¬

mal, at times migrainous in character, fre¬

quently increasing in nocturnal severity. Local pains on percussion, and tenderness are fre¬

quently found. Symptoms of general brain

pressure are apt to be less here than in basal meningitis, but there may be nausea, vomiting and giddiness. The optic nerve changes are

less liable to be found. Epileptiform convul¬

sions are not infrequent, and simply indicate the localization of the process. When the at¬

tacks are Jacksonian in type, the presence of an isolated gumma may be suspected. Aphasic attacks, especially of motor aphasia of the Broca variety, are also to be reckoned among the isolated symptoms, and speech difficulties which do not develop into true aphasias are not

infrequent. Monoplegias or hemiplegias

may develop, with or without sensory disturb¬

ances, hemianaesthesia, astereognosis, *etc.*

When the layers of the cortex are involved as well as the meninges, one sees the gradual development of a mental picture closely re¬

sembling that of paresis, in fact, in a certain percentage of cases a clinical differentiation is impossible. Here one finds a slowly increasing apathy, forgetfulness, indifference and all the signs characteristic of general paresis (q.v.).

The application of Nonne's four reaction tests gives valuable insight into the process more or less by the comparatively rapid appearance of the symptoms following infection. Basal

syphilis, convexity syphilis, syphilis of the small arteries or hemiplegic syndromes, due to in-BRAIN, SYPHILIS OF THE

volvement of the larger vessels, thrombosis, etc., may come on as early as from three to six months after an initial infection. The average time, however, varies from one to three years, the maximum possibly expressing itself about the third year, whereas, as is well known from the studies of Fournier, Kraepelin, Junius,

Arndt and others, paresis is apt to come on much later, the maximum paretic development

showing about the 10th year. Still, cerebral syphilis, in certain of the forms here described, may occur many years after infection, certain cases being reported as late as 40 years after infection. This, however, is a marked excep¬

tion.

Treatment. — The treatment of these forms

may be discussed in one paragraph, as the ob¬

jects are practically the same, namely, to kill the syphilis organism as rapidly as possible, and to reduce the effects of the pressure symp¬

toms due to the gummatous or inflammatory

exudates. This is not the place to discuss pre¬

vention. Individual prophylaxis also is out

of place here. The treatment is very satis¬

factory, especially if the diagnosis is made early, and the patient has never received much treatment, but in old long-standing cases, which have been much treated, and yet seem to pro¬

gress in spite of treatment, the outlook is not very hopeful. This latter result is often due, we feel, to insufficient and half-hearted therapy.

Cerebral syphilis is usually accompanied by

spirochetes, and the object is to poison them as rapidly as possible. This can be done by arsenic, by mercury and by the iodides, but these

remedies have a very definite variation in their spirochetal toxic properties. Arsenic is the most active, mercury next, while the toxic ac¬

tion of the iodides, although positive, is very slight. The treatment of cerebral syphilis

should be most energetic, because small lesions may involve very important areas and result in great deprivation to the patient. The nervous and mental structures are of the greatest im¬

portance to the individual in his struggle for existence, therefore, syphilis of the brain is always an extremely dangerous disease. A

complete sterilization is desirable, but this is often difficult to bring about, especially in nervous tissues, for reasons as yet not com¬

pletely understood.

Space is not available for a complete discus¬

sion of the treatment of cerebral syphilis, but it would seem that the trend of modern opinion is to attack it very actively.

Combined salvarsan and mercury treatment

has seemed to give the best results. The

patient should be given a dose of calomel by injection on the 1st day, to be followed by a similar dose on the 3d day. On the 5th day he should be given 0.6 gram of salvarsan or neo-salvarsan by the intravenous method. The 7th and 9th days, intramuscular injections of calo¬

mel, the 11th day another dose of salvarsan, the 13th and 1 5th days, two injections of calomel, the 17th another of salvarsan, and this should be continued for at least six weeks, unless specific indications of mercurial poison¬

ing arise which render it necessary to cut down the amount of calomel. In this case a less active form of mercury can be given, such as salicylate or cyanide, but at least five grams of salvarsan should be used in the therapy. To give one, or two, or three doses of salvarsan

invites failure, and, we are tempted to believe from more recent studies, tends to permit the development of the more feared metasyphilitic processes of paresis and taboparesis. This is an outline of an energetic antisyphilitic therapy.

For years it has been the custom to praise the use of mercurial inunctions in the treatment of cerebral syphilis, and clinical experience seems to show that they are of much value, but similar experience seems also to indicate that thus far the inunction treatment has not been sufficiently prophylactic with reference to the more severe forms of cerebral syphilis. It is hoped that the combined method of mercury

and salvarsan will provide this prophylaxis.

Mercurial injections may be substituted for the combined method, or for the method of inunc¬

tion, but these do not seem to be as radical as the method already outlined. In the later

stages of the treatment, daily doses of from 30

to 40 grains of potassium iodide may be given for from four to six weeks.

After such a complete <(cure® has been in¬

stituted, the patient should be allowed to rest untreated for about three or four months. A Wassermann should be then taken and a cere¬

brospinal-fluid examination made and if the

biological and cytological reactions indicate that the spirochetes are still active, or have renewed their activity, the patient should be put through a similar cure. This can be repeated again after an interval of five or six months.

Ideally, one can check the effect of the treat¬

ment by reason of the Wassermann reaction;

practically, however, this seems to be unneces¬

sary, if not utopian.

5. Cerebral Syphilis of the Paretic and

Taboparetic Type. See General Paresis.

6. Neuroses and Psychoses. — These will

be discussed under the head of Psychoses,

Syphilitic.

7. Hereditary Syphilis. — This is of tre¬

mendous importance in its effects upon the

nervous system. Statistical studies show that at least 66 per cent of the children of syphilitic parents — without counting the immense num¬

ber of abortions and of still-born children —show the taint in some form. Fournier places the ratio as high as 98 per cent, and says that 68.5 per cent of the children die. Hochsinger reports that to 70 families, out of a group of 72, in which there was paternal syphilis alone, only 31 healthy children were born, and these in all save four instances were the latest born.

Of the remaining 276, 110 were still-born, 166

were syphilitic.

Mott, Mendel and others tell the same tale of the children of paretics and tabetics —either no children, or many abortions, many dead children, and a few living of whose fate there is as yet no certainty. Probably more than half are doomed to some disease or dis¬

order of the nervous system.

Apparently the commonest effect of heredi¬

tary infection is the reduction of resistance in the body, and of the powers for full develop¬

ment, in both the general body and nervous tissues. In a manner analogous to the influence of alcohol on the germ cell, syphilis diminishes the vital energy of the plasm prior to conjuga¬

tion, causing pathological variations in nervous structures, just as it can transmit the disease through the germ cell. In the result, Fournier's classical formula of abortion, dead child, early 402

death, living healthy child, might be amended to read complete sterility, miscarrige, abortion, still-births, children dying in infancy or convul¬

sions, marasmus, meningitis, hydrocephalus,

comparatively healthy children who will prob¬

ably in later life develop late hereditary

syphilis. On this point, a study of Mott's family trees will prove valuable and instructive.

Whether syphilis can be transmitted to the

third generation has been a much discussed

question. Very suggestive material has of late years pointed to the probability that this occurs.

Mott of London has shown some very pertinent hereditary material before the Royal Society which is reported in their <Transactions) for 1912.

The logic of this is clear in the light of the recent observations made bv Levaditi, Bab and others that Treponema pallidum may be found in the ovum, and in an apparently resting stage, similar to the resting stages known for other flagellate protozoa, closely allied to the organ¬

ism causing syphilis. Jonathan Hutchinson is sceptical as to this, but he was also sceptical as to juvenile tabes and paresis — possibly in medicine ultra conservatism is psychologically an interesting individual idiosyncrasy rather than a sound pragmatic instinct.

The necessity for the use of all available biological tests in the matter of congenital syphilis is very great, because statistics and opinions uncontrolled by them and unsupported save by clinical observations are not only inse¬

cure and insufficient approximations, but, if relied upon in the negative, may retard the progress of thought and delay the relief of

sick humanity.

Without losing sight of the immense import¬

ance, and the striking and ofttimes grewsome character of the congenital cases which appear in later life, if the physician would place him¬

self in the right attitude toward the therapeutics of this disease, he must focus his attention on the preponderating number of miscarriages,

still-births and early syphilitic births. The psychological control, the so-called ethical at¬

titude toward sexual freedom as one of the burning factors in the present cultural struggle for more efficient sexual adaptation, is a prob¬

lem too large to be entered into here.

Congenital syphilis may occur at any age.

It is not infrequently a cause of death of the foetus, and gives rise to a great variety of in¬

trauterine cerebral diseases which, if the child is born alive, result either in early death, or in early disease, or the later development of vari¬

ous congenital syphilitic manifestations, chief of which are idiocy, imbecility, feeble-minded¬

ness, epilepsy, deafness, optic atrophy, tabes and paresis.

The symptoms are a duplication of those

found in the adult types, and the clinical picture is apt to be conglomerate and difficult of analysis. Endarteritis, leptomeningitis,

pachymeningitis, gummata, diffuse degenerative changes in the cells

of the spinal cord, in the basal ganglia, or in the cortex, all are found and in varying combinations. Consideration

will be given here to those trends which are sufficiently accentuated to permit of definite nosological terminology.

Hydrocephalus. — This condition, resultant

from congenital syphilis, has been suspected for over two centuries, and was so reported by Haase, Cruveilhier, Von Rosen and Virchow in the last century. In its congenital form, it arises chiefly from syphilitic disease of the cere¬

brospinal fluid producing structures — choroid, ependyma — or from definite obstructive factors in the cerebral foramina, gummata, vascular

swelling obstructing the iter, *etc.* It frequently follows after congenital syphilis, and is without doubt much more frequent than is commonly

realized. Hochsinger cites 10 per cent of hydro¬

cephalus in 362 cases of congenital syphilis. In the series recorded by him, and which gives a fairly average review of the whole situation, the hydrocephalus was sometimes foetal, and

usually began from the 3d to the 11th month after birth. Up to the time that his report was written absence of nervous symptoms were noted in only 11 of the 362 individuals. In the others the phenomena ranged through rest¬

lessness, sleeplessness, chronic vomiting, con¬

vulsions, contractures, nystagmus and feeble¬

mindedness.

The ordinary clinical picture is that of an infant of from three to six months old who, apparently without reason, or it may be from a slight blow on the head, or a trivial gastrointesti¬

nal or bronchial disturbance, develops within a few days grave cerebral disturbances. The child is very irritable and sleepless,

screaming and kicking. The head is usually drawn back, the eyes and the fontanelles are apt to bulge. There is frequent vomiting, and there are signs of oculomotor involvement. Internal strabismus

resulting from paresis of the external rectus is a usual sign which is frequently preceded by or accompanied by nystagmus and irregular

pupils — often not responding to light. The child cries and struggles, and ofttimes with spasmodic or convulsive movements of the arms it seems to try to brush away the source of the pain which is present in the head ; pulling the hair, grasping and rolling the head. It is some¬

times possible to demonstrate spasticity, rigid¬

ity and other signs of intracerebral pressure.

As a rule there is no heightening of temperature, and such signs of epidemic cerebrospinal menin¬

gitis as herpes and flushed and spotted skin are absent. There is great difficulty in the diagnosis of all these infantile meningeal disturbances.

Feeble-mlindcdness. — The very large role

played by syphilis in the production of mental defectives has been realized only of late years.

Early statistics are comparatively worthless.

Even recent works — particularly English

studies, excepting always those of Mott and his coworkers — show a tendency to minimize its importance, showing an unconscious desire to suppress disagreeable truths.

The intimate correlation between syphilis and feeble-mindedness was first definitely brought out by Fournier, the conclusions being forced upon him by his clinical observations on para-syphilis. Following him the early English, Ger¬

man and American figures varied from 0.01

to 17 per cent, but since the introduction of exact serological

investigation they have gone as high as 40 per cent. Feeble-mindedness is thus shown to be the result of more than one cause, but as we are not here dealing with it in its larger aspects we limit ourselves to that of purely syphilitic origin. This may date from intrauterine life, but rarely. Children who are BRAIN, TUMORS OF THE

infected thus early usually die, and Plaut

(loc . cit.) is authority for the statement that so far as syphilis is concerned, feeble-minded¬

ness may be regarded as the result of extrauterine syphilitic disease, incurred in infancy. In some there are signs of an acute brain disease; some cases of recovered hydrocephalus later

show signs of havoc in their inability to develop normally. Many simply fail to develop. There are many recorded observations of mental de¬

fect of very gradual development, without

convulsions or fever, or other signs of organic disease, arriving at a definite termination and leaving behind as a result entirely stationary, perhaps even improvable, idiots or imbeciles.

The Wassermann reaction is frequently

shown in Fournier's (<enfants arrieres,® the type of hereditary syphilitic children described as unintelligent, simple, silly, limited children, al¬

ways behind.

Nonne's reported cases of general irritable

weakness of the nervous system, and the re¬

searches of others, convince one that a less marked grade of mental defect, along more

restricted or special lines, is closely allied with this broad group as a result of congenital syphilis. The patients are highly excitable, show extreme nervousness and moodiness,

suffer from headaches, irregularities of appe¬

tite and sudden fits of passion — without other epileptiform analogies. Mercury and the

iodides worked wonders for Nonne's cases.

Many so-called psychopathic children are

also to be included in this broad group of con¬

genital syphilitics. These children are intel¬

lectually bright, but show marked ethical de¬

fects, and one can conceive of the mental de¬

fect in terms of limited cortical control to the affective response of the sexuality, and to the nutritional instincts. They want, and indulge their wants, without taking the circuitous routes devised by cultural standards. Anatomically one can posit, on the basis of the syphilitic poison¬

ing, a defect or destruction of certain corti-cocortical association areas. Consult <(Treatment of Syphilis of the Nervous System" (in White and Jellifife, (Modern Treatment of

Nervous Mental Disease,* Vol. I, Philadelphia and New York 1913).

Smith Ely Jelliffe.

BRAIN, Tumors of the. Tumors of the

brain are relatively infrequent. They occur

at all ages, are found in every conceivable loca¬

tion within the cranial cavity and are of a greatly varied pathology. Extensive monographs have been published, and no feature of disease of the nervous system has attracted more atten¬

tion not only by reason of its practical im¬

portance, but also because of the contributions to cerebral localization and function.

The causes for certain tumors, such as tuber¬

culoma, syphiloma, actinomycoses, are well

known. For both syphilitic and tuberculous

tumors, and possibly other tumors, accident

may be an additional element for localization.

Metastic tumors follow from their primary

sources. Certain teratomata, dermoids, angio¬

mata are congenital conditions, while cholesteomata, chordoma, chondroma, lipoma and

myxoma are also developmental anomalies.

The chief forms met with may be classified as (1) true tumors, (2) infectious tumors, (3) parasitic cysts, (4) aneurisms, (5) vascular cysts.

True Tumors. — Of these, gliomata are the

most frequent. They preponderate over any

other class in adults. Gliomata occur through¬

out the brain as circumscribed or as diffuse tumors, and are extra-as well as intracerebral.

The general tendency is toward diffuseness,

and degeneration with haemorrhage, and fatty and cystic formations take place. Thus the

symptoms are apt to develop slowly and inter¬

mittently in cortex or basal ganglia, occasion¬

ally from the ependyma. They may invade an entire hemisphere.

Sarcomata are less frequent, restricting the term sarcoma more strictly than is usual, and rejecting the compromise gliosarcoma. Nearly

all gliomata show elements indistinguishable

from sarcoma. They usually develop slowly

in the brain.

Chloromata are leukemic in origin and are

rare. They involve the periosteum or the base and thus cause compression phenomena which

often persist for some time.

Fibromata (neurofibromata) are compara¬

tively common brain tumors. They develop

chiefly about the cerebellopontine angle (acous¬

tic), but may develop along other cranial

nerves. Occasionally they are multiple. They develop slowly.

Endotheliomata are comparatively frequent.

They seem to confine themselves chiefly to the anterior fossae. They

are usually small and multiple, develop slowly and chiefly in the falx region.

Chordomata are infrequent, and only rarely

reach a considerable size.

Carcinomata, closely related to the endothe¬

liomata are usually secondary (metastic),

rarely primary.

Psammomata, chordomata, lopomata, en—

chondromata, angiomata, osteomata, adenomata,

cholesteomata, teratomata (pineal) and der¬

moids are among the rarities.

Infectious Tumors. — These are tubercu¬

lous, syphilitic, actinomycotic.

Tuberculomata are possibly the commonest

of all tumors, certainly in children. They are extremely rare after 40 years. They are fre¬

quently conglomerate or multiple in type, hence giving rise to mixed syndromes. There may

be a few very small miliary tubercles or a large broken-down tubercle mass, with every

conceivable intermediary stage. They develop

chiefly in the cerebellum, peduncle, basal

ganglia, pons and cortex. They have a bad

prognosis.

Syphilomata. Gummata are not infrequent

They are practically limited to adults, and are not recorded from congenital syphilis. They

may appear from one year to 30 years after in¬

fection. They occur chiefly as flat, infiltrating, irregular masses, less often as definite nodular masses, chiefly at the base of the brain.

Actinomycosis of the brain is a rarity.

Parasitic Cystic Tumors. — Cysticercus of

the brain is a rarity and is secondary.

Aneurismal Tumors.— Aneurisms are very

frequent in cerebral vessels. They are mostly small, but large aneurisms occur at times and give symptoms of pressure. They occur in

patients usually from 40 to 70 years old, and are mostly of the basilar artery. They cause pressure symptoms at times, with obstructive symptoms — basilar syndrome — or they rupture and produce symptoms of cerebral haemorrhage.

Symptoms. — Brain tumors, even of a large

size, may be found at autopsy, and yet not have given rise to any recognized symptoms. Tuber¬

culomata are thus frequently found in children.

With more precise investigation such latent

tumors are becoming rarer, especially since the importance of mental symptoms-psychoses, so-called hysterias, *etc.* — unaccompanied by sen¬

sorimotor syndromes, is becoming recognized.

Many small tumors, especially osteomata, psam¬

moma, slowly developing and circumscribed

g.iomata, cholesteomata cause very few symp¬

toms. Occasionally a tumor will show mono—

symptomatically as by epileptic convulsions,

mild speech disturbances, mild sensory defects, optic, olfactory, auditory hallucinations or hem¬

ianopsia, without being recognized. The symp¬

toms are best considered as (1) general and (2) local or focal.

The general symptoms are indicative of the

effects of the tumor as a whole, irrespective of its special nature or localization. They are due to the effects of increased pressure within the brain which appear in certain tumors,

notably of the posterior fossa and cerebellum, and are usually marked even with small tumors, whereas tumors elsewhere often may show little of such pressure symptoms. Sometimes the

focal symptoms appear before the general ones.

General symptoms rarely have any localizing

diagnostic value as many of them lie remote from the site of the tumors. Some of the gen¬

eral symptoms of pressure, such as palsies of the muscles of the eyeballs, facial palsy, etc., may even tend to mislead one as to a localizing diagnosis.

The chief symptoms of general value are

headache, nausea, vomiting, dizziness, disturb¬

ances of breathing and of the heart beat, meta¬

bolic changes, mental signs with sleeplessness, sometimes drowsiness and optic nerve changes, and convulsive phenomena. These general

symptoms have a tendency to be progressive, but may vary considerably in their intensity from time to time, especially in syphilomata, tuber¬

culomata and gliomata. At times they remain stationary, again they may regress and dis¬

appear.

Headache. — This is frequent. Most patients

will have headache, especially if the tumor is of protracted growth. Headache is an early

sign. Practically every patient with a headache should be questioned and examined for the

possibility of its being caused by a brain tumor.

The headache usually starts more or less ir¬

regularly, is frequently intermittent in the early stages and then becomes persistent, being dull or severe ; if dull, with periods of excruciating exacerbation. Daily variations may be noted, and emotional excitement or general causes for increasing pressure within

the skull increase it, often with additional symptoms, such as dizziness, vomiting or even agitated or comatose confusions. Migraine-like headaches are very

frequent in early stages, particularly in basal cases, hypophysis, basal gummata, neurofibro¬

mata, or there may be migraine-like exacerba¬

tions on a dull, heavy, gray background of pain. Children usually respond to such varia¬

tions by attacks of screaming, pulling the hair or beating the head. The headache of tumor of the brain is mostly diffuse, but it may be localized, in which case it may serve to indicate the general site of the tumor. Such is rendered more probable if further substantiated by per¬

cussion tenderness, a highly important pro¬

cedure, percussion dullness and X-ray shadows.

The site of a headache is a very uncertain guide for localization purposes, however. Frontal

tumors often give rise to headaches in the back of the head, and vice-versa; right-sided tumors to left-sided pains and vice-versa.

Nausea, vomiting and dizziness are frequent

in late stages of tumor of the brain, and more often found in children and in those patients with rapidly increasing signs of intracranial pressure-posterior fossa tumors particularly.

Such vomiting may occur spontaneously — pro¬

jectile in type — or as an accompaniment of the headache crises, especially when migrainous in type. Vomiting often is absent entirely even with large tumors. When present it more often occurs in the morning.

Cardiac and Respiratory Signs. — Slowness

of the pulse, at times marked — 30 to 40 — is a general sign of intracranial pressure, and more especially in marked grades. Hence it is apt to be a late rather than an early symptom, unless one of direct irritation of the vagus (medulla pressure). The bradycardia, at times arrhythmia, may appear periodically during

headache exacerbations, or at times independ¬

ent of the same (acute swelling reaction).

Tumors cause respiratory changes, at times

slowness, again irregularity, and Cheyne-Stokes — with acute pressure symptoms (hydroceph¬

alus internus). Hiccoughs, yawning and related respiratory signs are occasionally present.

Metabolic Disturbances. — These are irregular

in their development and evolution. Fever is infrequent save as a complication of the late stages. Cachexia and marasmus are present

with certain carcinomata, and marked adiposity.

Ovarian, and in particular testicular aplasia, are frequent in certain hypophyseal (pituitary)

tumors or those causing internal hydrocephalus by possible implication of the infundibular

region through general pressure (pineal and

corpora quadrigemina tumors).

Mental Sings. — These are of great value,

both general and localizing, in from 60 to 85

per cent of the cases. They vary considerably, and are particularly prominent late in the

disease, although here masked under the general symptoms of apathy, confusion or coma.

Tumors of any region, large and small, inde¬

pendently of their pathological nature, may

cause psychical changes. Certain localities

cause special psychical alterations to be dis¬

cussed under focal and localizing symptoms.

In the early stages, slight impairment of at¬

tention, with slowness and difficulty in grasp, retardation in motor response and a confusion or bewilderment may be present. Ready for¬

getting, slight aesthetic lapses and moral breaks — with the telling of shady stories, showing of bad taste, exhibitionistic fancies, even gross lapses — such as open masturbation, *etc.* —occur. These are the precursors of a more

marked grade of retardation of mental func¬

tion, leading to apathy, listlessness, lack of initiative, at times with confusional episodes —getting lost — fugues, fussiness, emotionalism, *etc.*

Later stages show typical pictures, not dis¬

tinguishable from those of arteriosclerotic

dementia, or paresis — i.e., so far as the purely mental picture is concerned.

BRAIN, TUMORS OF

10 Tumor of Multiple Sarcoma of Brain

11 Tumor of Third Ventricle

12 Tumor of Frontal Lobe

13 Tumor — Teratoma of Pineal Gland

14 Syphilitic Disease of Blood Vessels — Frequent cause of brain hemorrhage or apoplexy by

rupture of such diseased blood vessels

BRAIN, TUMORS OF

Fig. 1. Cyst of the Hypophysis (Jelliffe and White) Fig. 2. Gliosarcoma of the Brain. A form of infiltrating tumor (Jelliffe and White) BRAIN, TUMORS OF THE

405

Certain less general symptoms often present

themselves and are of a certain localizing value.

Hallucinations of smell speak for olfactory

lobe or olfactory tract involvement, those of sight for occipital cortex localization, those of sound for temporal lobe trouble.

The tendency to joke, be facetious, show

manic-idea associations, even flight of ideas with euphoria, is at times present. This is more often found in prefontal tumors,

especially left-sided, but may occur in tumors of other regions, usually, however, all reaching to and involving the cortex. These symptoms are possibly thalamic over-responses from

thalamocortical interference at cortical levels.

Certain patients show definite depressed

states — with hypochondriasis or even melan¬

cholic suicidal ideas. Others show maniacal

pictures with wild flight or marked maniacal delirium. Certain patients develop delirium

during certain of their headache paroxysms.

Paranoid trends also manifest themselves in a few instances. So-called hysterical symptoms

are frequently encountered. Emotionalism and

delirium are incorrectly termed hysterical be¬

cause of a loose application of the term

hysteria.

Optic Nerve Changes. — These are of the

greatest importance in diagnosis of brain

tumor. From 60 to 80 per cent of all patients show optic nerve changes, which vary largely, depending upon the grade of intracranial pres¬

sure and the size and location of the tumor.

Those tumors causing great intracranial pres¬

sure (posterior fossa particularly) naturally cause choked disc and optic neuritis earlier and in more marked degree. Optic nerve changes

may be absent even with large tumors, and

small tumors of the pons, medulla, motor area, basal ganglia, corpus callosum and hypophysis may give rise to no optic nerve changes. The optic nerve changes develop gradually. They

are unilateral, later bilateral or develop bi¬

laterally synchronously. As a rule tumors of one side show beginning nerve changes on the same side earlier and more markedly than on the opposite side.

The visual power may not be lost even with marked grade of swelling or of atrophy, but there is later a gradual loss of vision often seen in early signs by the irregularity of the color field loss (interlacing phenomena, scoto¬

mata, etc.).

Motor Phenomena. — These are local or

general. Epileptiform attacks are frequent —particularly in children. When limited Jackson¬

ian attacks are present, the localizing value in the motor cortex is evident, save for the few exceptions of pontine, cerebellar and pedun¬

cular Jacksonian attacks. Petit mal attacks are also not infrequent. Some patients die in the convulsive seizures.

Focal or Local Symptoms. — These may be

among the first of the symptoms encountered, especially in circumscribed cortical tumors, but, as a rule, the focal symptoms develop after the general ones ; again they advance together.

They are best considered with reference to the areas involved, such as the symptoms of the frontal localizations, central convolutions,

parietal lobes, temporal, *etc.* Frontal lobe

tumors are those located ahead of the pre¬

central sulci. Those of the frontal poles, foot of third frontals, are frequently termed pre¬

frontal tumors. The functions of the frontal areas . are chiefly those of co-ordination of psychical, chiefly intellectual, processes. They contain motor areas for the innervation of the muscles of the neck, throat and abdominal

muscles and the third frontal convolution. The symptoms of tumors lying within the frontal lobes may show considerable variation accord¬

ing to their size and site. Many small tumors located deep in the cortex are apparently symp¬

tomless from the neurological point of view.

Paranoid states, occasionally seen from such tumors, are readily overlooked, also mildly de¬

pressed states which are called neurasthenia.

One symptom of special importance is a tend¬

ency to make jokes [Witzelzucht] or a tend¬

ency to talk or answer beside the point — at times an apparently intentional effort to mis¬

lead. One does not necessarily locate a tumor in the frontal lobes by reason of this tendency to joking aloud. At times the behavior is

infantile and childish, and diagnosed hysteria.

Again patients are irritable, excitable, churlish, even have furious outbreaks of wrath and are violent, capricious or the picture of gradually advancing stupidity, with inability to grasp ; loss of initiative, slowness of power of appli¬

cation is seen. In right-handed tumors, the psychical disturbances are more frequent.

Orientation for the external world, time and space, is apt to be involved more than personal orientation. Complete disorientation, as in

Korsakow's syndrome, is met with. At times

hallucinations of smell appear from pressure on the olfactory pathways, or hallucinations of sight, photomata, from similar pressure on

optical pathways at the base. Vertigo, with a drunken gait, may be ascribed probably to the higher association of space perceptions and

indicates frontal involvement of cerebellar com¬

ponents, the gait being closely related to that of cerebellar syndromes — the patient staggers to the tumor side : adiadokokinesia and asynergia are usually absent here, however.

Involuntary defecation or urination occurs

at times; most frequently with somnolent

patients.

Apractic disturbances are occasionally met

with in frontal tumors, and those involving or pressing upon Broca's convolution, left side, cause mild (paraphasic), or severe motor

aphasias in right-handed individuals, usually of gradual onset and often remittent in char¬

acter.

Other motor signs are stiffness in the neck with forward and backward fixations of the

hand and tendencies to tremor of the hand on the tumor side. In a third of the cases, epi¬

leptiform attacks, often Jacksonian, occur,

from pressure on the motor area.

Central Convolutions. — The functions chiefly

involved are those of the voluntary muscular activity, hence paresis, paralysis, spasms. Tu¬

mors of this region are never latent. Irritative phenomena, spasms, convulsions, speak for

cortical locations ; paralysis for deeper-seated lesions involving the pyramidal paths from the motor areas. Small tumors cortically located cause isolated Jacksonian attacks; the more

extended the tumor the more widespread the

muscular involvement ; even small tumors, how¬

ever, may cause widespread Jacksonian or

grand mal symptoms. Often the first observed motion accompanied by tingling affords a clue 406

as to the more definite localization of the tumor; again an orderly and uniform progres¬

sion in the development of a Jacksonian attack is of value in localization.

Monoplegias and monopareses are not infre¬

quent from small lesions, and in the beginning of the tumor growth. The slow extension of the paresis or paralysis is of diagnostic moment.

Advancing hemiplegia is often accompanied by the vasomotor phenomena seen in haemorrhage, especially in deep-seated lesions. The usual signs of an organic paralysis are present. See Paralysis.

Psychical symptoms of general nature are

not infrequent. Occasionally large tumors will cause a Korsakow syndrome. Catatonia may

also appear. Sensory phenomena are frequent

in postcentral convolution tumors. Central

convolution tumors are among those more

readily localizable, and usually more accessible to operative relief.

Parietal Lobes. — When the tumors press

forward toward the posterior central lobes

sensory signs are produced. Left-sided tumors, in right-handed persons, especiallv of the in¬

ferior parietal lobes, cause cortical sensory aphasia of Wernicke of various grades. Alexia and agraphia may also be found in left-sided lesions.

Epileptic attacks with hallucinatory auras

of taste occur; also a general Korsakow syn¬

drome may develop. Other pathways from the

sensory areas may be cut off by tumors in this region ; hence either hemianopsias, optic ag¬

nosias or optical aphasias (gyrus angularis).

Apractic disturbances are of value in localizing left-sided tumors. Katatonic syndromes, con¬

fusion, apathy or general loss of orientation may be encountered but are equally present in right-sided and left-sided cases.

Occasionally parietal tumors give rise to

ptosis, paresis of the lateral movements of the head and the conjugate motion of the eyes to the opposite side. Deep-seated lesions may

impinge upon or involve the motor pathways.

Temporal Lobes. — The cortical end sta¬

tions of the auditory pathways which are both crossed and uncrossed are chiefly contained in the first and second temporal lobes. Cortical deafness is practically impossible in unilateral lesions but has resulted from bilateral involve¬

ment. Word-deafness is the most striking

result in left-sided lesions. This is a progres¬

sive affair, often beginning with difficulty in finding words, paraphasia, and resulting in

more severe forms in alexia, agraphia, log—

orrhcea and total word-deafness. Large tumors also cause indirect symptoms and may lead, by pressure on motor areas, to total aphasia and epileptiform convulsions. Auditory hallucina¬

tions are not infrequent, showing as aurse in generalized grand mal attacks. Gustatory and olfactory phenomena of similar nature result from hippocampal or closely related lesions-uncinate fits. Tumors of the under surface may cause hemianopsia, through pressure on the

optic tracts, and by pressure on the pyramidal or fillet tracts cause hemiparesis or hemianses-thesia.

Occipital Lobe. — The end-projections of

the optic tracts are located here particularly in and about the calcarine fissure. Complete

homonymous hemianopsia is the chief symptom

of tumors of this area. This hemianopsia

usually spares the papillomacular bundles

and is often unperceived by the patient.

Quadrant hemianopsia is also found. Tu¬

mors may exist and hemianopsia be ab¬

sent. It is most often present with tumors of the median aspect of the occipital, also with those lying on the convex surface, and hence the more readily removable. Various stages of blindness may also result, and there may exist a mind-blindness from left-sided tumors, also alexia, agraphia and sensory aphasia. Tumors on the inferior surface, by compression of the cerebellum, will cause cerebellar signs, and occasionally palsies result from tumors lying on the external surface of the occipital lobe.

Diagnosis. — Multiple sclerosis, paresis,

arteriosclerotic disease, all forms of headache, tuberculous meningitis, chronic hydrocephalus

and hysteria are the chief conditions causing difficulty. Multiple sclerosis, if the patches, are solely cerebral, may cause confusion, especially in the acute cases, as described by Marburg and others. The bitemporal pallor of the discs in this disorder differs from the usual pressure changes in the disc. Nystagmus is not a fre¬

quent brain-tumor sign. Other signs of pyra¬

midal tract implication may be identical. Head¬

aches are usually absent, also nausea and

vomiting. Pseudoparetic and arteriosclerotic

psychical syndromes (Korsakow's psychosis)

are frequently confused with cerebral tumor, i.e., the cause of the mental picture is over¬

looked. Thus a tumor, which might have been removed, has been missed under the psychotic disguise. Eye-ground changes are usually posi¬

tive in these cases, yet may be absent. Head¬

ache should always be scrutinized carefully. A postinfluenzal occipital headache which is very frequent and extremely severe and persistent is frequently highly suggestive of brain tumor.

The headaches from lead poisoning, anaemia

and nephritis are also to be excluded. Brain abscess and tuberculous meningitis must be ex¬

cluded on the ground of their difference in development of symptoms. Symptomatically

speaking they may be considered as tumors.

This is also true of chronic hydrocephalus.

Cerebral puncture, withdrawing a small plug of brain tissue through a trephine opening, and canula is often of great aid in diagnosing very puzzling cases.

Prognosis. — No definite prognosis can be

laid down. Everything depends on the site

of the tumor. In general, apart from surgical relief and from medical treatment of syphi¬

lomata, the outlook is pessimistic. Sudden

death is not infrequent and lumbar puncture is an extremely dangerous procedure with brain

tumor, often leading to sudden collapse and death, especially with tumors of the posterior fossa. Syphilomata and gummata of the brain have a fair prognosis. Better results are ob¬

tained with mercury by inunction and by

iodides than by salvarsan in the beginning

treatment. Salvarsan may be used later to

attempt to kill off all the spirochetes, but with well-advanced

syphilomata, salvarsan is apt to set up a dangerous reaction. Round, hard

gummata do not absorb, as a rule, and are best considered surgically.

Treatment. — Medical treatment, excepting

for syphilomata, is useless, and involves a waste of valuable time. The chief objects to be attained are early diagnosis, immediate ex-BRAIN FEVER — BRAINSTONE CORAL

elusion of syphilis by serological tests, eye-ground examination with particular study of

the color fields, exact localization as soon as possible, and surgical removal or palliation (decompression) to save the eyesight or to

gain time for a more exact localization.

The details for applying these principles

have already been noted. The results to be expected in any particular case are prob¬

lematical, yet from 10 to 20 per cent of all brain tumors (seen in the large) have been removable, with at least in 10 per cent practical recovery. Even with such chances against him the patient should have the benefit of the doubt ii a competent surgeon is available. Surgical skill is a very large factor in the results ; a good abdominal surgeon is not necessarily a good brain surgeon. The brain is semi-fluid and an intricate switchboard of highly important structures ; there are no unimportant areas in the brain ; many surgeons have treated it in the past as though it were an abdominal viscus.

The results have been disappointing. Most

brain operations are best done in two stages.

Decompression, usually subtemporal, alone is

often the only possible procedure. It often relieves a recently acquired blindness. The

situation referable to brain surgery for cerebral tumors is rapidly advancing, and better results are being obtained and regions hitherto im¬

possible to reach (hypophysis, etc.) have been approached with results which a decade ago

would have been impossible. Notwithstanding

all this, the general attitude should be one of extreme caution. Consult Jelliffe and White, (Diseases of the Nervous System* (1917).

Smith Ely Jelliffe.

BRAIN FEVER. See Encephalitis;

Meningitis.

BRAINARD, David Legge, American

army soldier and explorer: b. Norway, N. Y., 21

Dec. 1856. He received his education in the common schools and in the State Normal

School, Cortland. In 1876 he joined the United States army as a private and served under

General Miles in several Indian campaigns. In 1881-83 he was with the Lady Franklin Arctic Expedition as 1st sergeant. Soon after his re¬

turn he was transferred to the Signal Corps and later received his commission of 2d lieutenant in the 2d United States Cavalry. In 1897 he was with the Alaska relief expedition, attained the rank of colonel in the following year and in 1900 was despatched to the Philippines as major of the commissariat department. He was ap¬

pointed deputy commissary-general of the army in 1905 and in 1914 went as military attache to the United States embassy in Argentina.

BRAINE, Daniel Lawrence, American

naval officer: b. New York, 18 May 1829; d. 30

Tan. 1898. He entered the United States navy in 1846 and became a rear-admiral. He served with distinction through the Mexican and Civil wars. In 1873 he obtained the surrender by Spain of 102 survivors of the Virginias pris¬

oners.

BRAINERD, David, a missionary to the

Indians: b. Haddam, Conn., 20 April 1718; d.

Northampton, Mass., 9 Oct. 1747. Early im¬

pressible by religious influences, he felt himself suddenly converted while taking a walk, 12

July 1739, and the same year entered Yale Col¬

lege to prepare himself for the ministry. In¬

stead of graduating in the regular course he was expelled from the institution in 1742 for having said, in his zeal, of one of the tutors, that he had no more of the grace of God than a chair.

He was, however, licensed in July as a preacher, and received an appointment from the Society for the Propagation of Christian Knowledge, as missionary among the Indians near Stockbridge, Mass. He was ordained in 1744, and took up his work among the Indians at the forks of the Delaware in Pennsylvania, making two

visits to the Indians of the Susquehanna. Pie met, however, with but little success, until, after a year, he went to reside among those at Crossweeksung, near Newark, N. J. Here he is said to have produced a great change among the savages, and to have baptized 78, of whom

38 were adults. Having worn out his health by his labors, he set out on a journey to Boston in the spring of 1747, and thence to Northamp¬

ton, where he died after a short stay in the family of Jonathan Edwards, by whom his

biography was soon afterward written. His

published works are (Wonders of God Among

the Indians,* and (Grace Displayed.*

BRAINERD, Thomas, Ame rican clergy¬

man: b. Leyden, N. Y., 17 June 1804; d. Scran¬

ton, Pa., 21 Aug. 1866. He taught school,

studied law and finally turning to theology, he was graduated from Andover Theological Sem¬

inary (1831) . Two years' preaching at Cincinnati made for him a reputation as an orator. But he left his charge to become editor of the Cincinnati Journal. In 1836 he was appointed commissioner to the General Assembly and the following year he was called to Pine Street Church, Philadelphia, a position he was des¬

tined to hold till his death. He was closely connected with Dr. Lyman Beecher whose <(new school® theological movement he enthusiastic¬

ally supported. His published works include

(Life of John Brainerd* and numerous

sermons.

BRAINERD, Minn., city and county-seat

of Crow Wing County, 115 miles west of

Duluth, situated on the east bank of the Mis¬

sissippi River, and on the Northern Pacific and the Minnesota Int. railroads. It lies in a fertile farming region and trades in grain, hay and other agricultural produce. Lumber and furs

and iron are also exported. Here are situated the extensive shops of the Northern Pacific Railroad. There are foundries, flour-mills, a large sawmill, lumber yards, cigar factories, paper and pulp mills. The Coyuna iron range extends through the city. There is a United States signal service station, a hospital for employees of the Northern Pacific Railroad, and another for lumbermen, a courthouse, Carnegie library, Y. M. C. A. building, a public park and electric street railway. The city is governed by a mayor, elected biennially, and a city coun¬

cil. Water power is furnished by a dam across the Mississippi. The waterworks and electric-light plant are operated by city. Pop. 10,000.

BRAINSTONE CORAL, a madrepore of

the genus M eandrina, so named from the gen¬

eral resemblance to the brain of man exhibited in its large rounded mass and numerous wind¬

ing depressions. When the hemispherical mass is broken, the ridges which bound its furrows (each of which represents the place of a polyp) may be traced inward through its substance.

BRAINTREE, Mass., town in Norfolk

County, on the New York, N. H. & H. Railroad, 10 miles south of Boston. It contains the vil¬

lages of South and East Braintree; is connected by electric street railroads with the principal neighboring towns and villages, and its indus¬

tries include granite-quarrying and metal

working, and the manufacture of rails, tacks, shoes, wool, rubber goods, fans, conductors'

punches, *etc.* Thayer Academy and Thayer

Public Library are situated in South Braintree.

John Adams, John Quincy Adams and John

Hancock were born in a part of Braintree now within the limits of Quincy, which until 1792

was included in the township of Braintree.

Randolph was also included therein until 1793.

The town was settled about 1634, from land belonging to Boston and called Mount Wollas¬

ton. Here, at (<Merry Mount,® Thomas Mor¬

ton (q.v.) had, in 1625, established a settlement which had greatly scandalized the Pilgrims of Plymouth, and was later abandoned. Braintree was incorporated in 1640. The government is by town meetings. The waterworks and electric-light plant are owned by the municipality. Pop.

10,554. Consult Adams, C. F., 'Three Episodes of Massachusetts History) (Boston 1892) ;

Pattee, W. S., (History of Old Braintree and Quincy* (Quincy 1878) ; Wilson, D. M.,

‘Quincy, Old Braintree and Merry Mount*

(Boston 1906).

BRAINTREE RESOLUTIONS, instruc¬

tions given by the town of Braintree, Mass., on 24 Sept. 1765, to its representative in the Massachusetts General Court, Ebenezer Thayer, relative to his action in the matter of the Stamp Act. They were drawn by John Adams, one of a committee appointed by the Braintree town meeting for that purpose, accepted unanimously and published in the Boston Gazette. Some 40

Massachusetts towns subsequently adopted them verbatim as their instructions to their own representatives; and John Adams says that

Samuel Adams copied several paragraphs into

his own draft for the Boston town meeting.

The resolutions declared the tax, even if legal, an unbearable burden and a vexatious inter¬

ference with the business of a poor and sparsely settled province ; that, moreover, it was con¬

trary to British common law, and the “founda¬

tion principles of the British constitution, that we should be subject to any tax imposed by the British Parliament, because we are not repre¬

sented in that assembly in any sense, unless it be by a fiction of law® ; that to put the cases in the decision of one judge without a jury was “an alarming extension of the power of courts of admiralty,® and repugnant to the

Great Charter itself, especially as the judges held office only during the pleasure of the Crown, and moreover had a commission on the goods condemned. They enjoin the Braintree

representative to “comply with no measures or proposals® for executing the law, but “by all lawful means® to obstruct it; to favor entering on the public records “the most clear and ex¬

plicit assertion of our rights and liberties® ; and — most significant of

all — -“to agree to no steps for the protection of the stamped paper or the stamp officers, because any addition to the laws for preserving the peace would only exasperate the people and endanger public

tranquillity.®

BRAMANTE

BRAITH, brit, Anton, German painter: b.

Biberach, Wiirtemberg, 1836; d. 1905. He was educated at the Stuttgart Art School and the Munich Academy, and soon obtained distinction by his skill in landscape and animal painting.

Among his best works are (A Yoke of Oxen) ; ‘A Grazing Herd) ; ‘Going to Drink) ; ‘Herd Overtaken by a Storm *; ‘After the Storm* ; ‘The Peasant Woman’s Pet* ; and ‘A Bright

Morning. >

BRAKE, BRACKEN, common names for

a fern (Pteridium aquilinum) of the family Polypodiacece, widely distributed in Europe,

Asia and North America, where it often dom¬

inates the vegetation of heaths, neglected

meadows, *etc.* It does not fall when the top is killed by frost, and affords excellent cover for small game. From its long, creeping root¬

stocks, naked stalks, 6 to 20 inches in length, or sometimes much larger, are sent up. Each stalk produces three branches with numerous

fern-like pinnate leaves, along the covered

edges of which are borne the sori, or spore-producing organs. The rootstock, which is

bitter, has been used as a substitute for hops in beermaking, and is

still somewhat employed

in dressing chamois and kid leather. The tops are often used for bedding animals, and are sometimes mixed with hay as fodder. Al¬

though land covered with brake is considered inferior, many such soils, when cultivated, are found to be good. By frequent mowing, or by plowing, the land is readily freed from brake.

Several other species of Pteridium have been called brake and bracken, and some are culti¬

vated as ornamental plants in greenhouses and window-gardens. The rootstocks of a New

Zealand species (P . esculentum) are often used for food, and are better suited for such use than those of the first-named species, which have served such a purpose only when ordinary food-supply has been scarce.

BRAKE, a mechanical device for retarding

or arresting by means of friction the motion of a wheel or shaft. A wood or metal block, so arranged as to be pressed by levers against the rim of a wheel, constitutes a shoe-brake, the kind used in checking ordinary vehicles, such as wagons. A band passing around a wheel, and which, by tightening, retards its motion, forms a band-brake. The air-brake is the form of mechanism generally used on railroads. See

Air-brake.

BRAKLONDE, Jocelin de, English

chronicler : b. Bury Saint Edmunds, in the 12th century. He was trained as a novice under

Samson of Tottington; in 1182 became chaplain to Samson was elected abbot in that year and was later successively guest master (1196-1200) and almoner (1212). In 1173 he entered the convent of Saint Edmunds and began his

chronicle which extends over a period of nearly 30 years. This was edited by J. G. Rokewood for the Camden Society. The character of

the abbot Samson, described in these annals, in¬

fluenced Carlyle in the writing of ‘Past and Present.*

BRAMANTE, bra-man’te, Donato d’Agnolo, Italian architect : b. Monte Asdroaldo, near Urbino, about 1444; d. 11 March 1514.

He applied himself first to painting, but his passion for architecture soon gained the as¬

cendency and he shares with Brunelleschi the BRAMATHERIUM — BRANCH

credit of restoring this art. While yet a young men he went to Milan, where his time was

mainly spent at the cathedral. Pope Alexan¬

der VI named him as his architect and Julius II made him superintendent of his buildings.

At the command of the latter he united the Belvidere with the palace of the Vatican. He persuaded the Pope to order the church of

Saint Peter to be torn down and another to be erected in its place, which should be without an equal in the world. In 1513 the foundation of the present Saint Peter’s was laid, accord¬

ing to the plan of Bramante. It yet remains the greatest achievement of modern architec¬

ture. Bramante did not live to see this work completed. He had begun the edifice with in¬

credible dispatch, but his successors, Raphael, Julius of San Gallo, Peruzzi and Michelangelo, altered the original plan and left nothing of Bramante’s workmanship standing except the

arches which support the tower of the dome.

His writings, in prose and verse, first discov¬

ered in 1756, were printed in the same year at Milan.

BRAMATHERIUM, a genus of antilo—

pid < 2, consisting of a gigantic species with four horns arranged in two pairs, the posterior

larger and palmated ; the neck is short and the limbs equal. It is allied to sivatherium, which also is four-horned. Both occur in the Upper Miocene, or Lower Pliocene beds of the Se-walik Hills in India.

BRAMBACH, bram'baH, Kaspar Joseph,

German composer: b. Bonn, 14 July 1833; d.

there 1902. He was a pupil at the Conserva¬

tory of Cologne (1851-54) and at Frankfort-on-the-Main he studied under Ferdinand

Hiller. In 1859 he became a teacher at the Cologne Conservatory and in 1861 went to

Bonn as state musical director. Giving up that position in 1869, he devoted himself to the work of composing and private teaching. His best works are his cantatas, including 'The Eleusinian FestivaP ; (A Hymn to Spring) ; 'The Power of Song) ; (Alcestis) ; Prome¬

theus) ; 'Columbus* ; and 'Lorelei.* He also wrote an opera, 'Ariadne* and several minor pieces, which were very popular and still hold the stage.

BRAMBLE, a common, but, in America,

little used name for various thorny species of the genus Rubus, including blackberry, rasp¬

berry and dewberry.

BRAMBLING, or MOUNTAIN FINCH,

a large migratory finch (Fringilla montifringilla), found throughout Europe and in Asia, where it breeds in the northern parts. It is a brightly colored bird and nearly related to the chaffinch.

BRAMPTON, Canada, the county-seat of

Peel County, Ontario, is situated on the Grand Trunk and Canadian Pac. railways, 21 miles

west of Toronto. It has boot and shoe manu¬

factories, flour, wool and knitting mills, brick yards, preserve factories and six cut-flower establishments. Pop. 3,412.

BRAMWELL, Byron, English physician:

b. 18 Dec. 1847. He was educated at Chelten¬

ham College and graduated M.B. at Edinburgh University in 1869. After serving as house

surgeon in Edinburgh Royal Infirmary, he en¬

gaged in general practice in North Shields and held important public appointments which he

resigned in order to return to Edinburgh. He was appointed pathologist to Edinburgh Royal Infirmary in 1882 and is now consulting physi¬

cian in the same institution. He has been

president of the Royal College of Physicians, Edinburgh. His publications include ‘Atlas

of Clinical Medicine* (3 vols.) ; ‘Studies in Clinical Medicine* (8 vols.) ; ‘Diseases of the Spinal Cord* ; ‘Practical Medicine and Medical Diagnosis* ; ‘Lectures on Aphasia,* *etc.*

BRAMWELL, John Milne, English physi¬

cian and author: b. Perth, 11 May 1852. He graduated at Edinburgh University in 1873,

engaged in private practice at Goole, York¬

shire, which he abandoned in order to pursue hypnotic researches. He has since published a number of works, mainly dealing with hyp¬

notism as applied to medicine.

BRAN, the husks of ground wheat, rye,

corn or other cereals, separated from the flour.

The nutritive value of these husks increases as we proceed from the outside of the grain toward the interior. The outer skin, or coarse bran, is very indigestible, owing to the pres¬

ence of silica. The inner skins, called pol¬

lards, are more nutritious, containing from 12

to 15 per cent of nitrogenous matter and from 20 to 50 per cent of starch. Unless ground very finely, however, they have been known

to occasion irritation of the bowels and, in some cases, diarrhoea. Though rich in nitrogen, bran appears to possess but little nutritive value as human food. It may be of use to the well-fed, who need a laxative, but to the poor who need nourishment it is of very little use. It is, how¬

ever, of some commercial value, being largely employed in the feeding of horses, cattle and other live stock. The preponderating volume

of bran on the market is wheat bran, which is produced at the rate of 45 pounds for every barrel of flour manufactured. The analysis of wheat bran shows it to be composed of starch, 52 per cent; gluten

(gliadin and glutenin), 14.9

per cent ; fat, 3.6 per cent ; sugar, 1 per cent ; wood fibre, 9.7 per cent ; salts, 5 per cent ; water, 13.8 per cent. As compared with flour, wheat bran contains one-fourth less starch ; one-fourth more gluten; three times as much fat ; and seven times as much mineral salts.

Rice bran contains twice as much fat as wheat bran but less proteids and as a rule has a pro¬

portion of the siliceous rice hulls which are liable to cause fatal digestive ailments in live stock. Another commercial use for wheat bran is brightening goods during the process of dye¬

ing and calico printing.

BRANCH, John, American statesman : b.

Halifax County, N. C., 4 Nov. 1782; d. En¬

field, N. C., 4 Jan. 1863. He was graduated at the University of North Carolina (1801), studied law, became a judge of the superior court, State senator (1811-17). He was gov¬

ernor of his State (1817-20) and a member

of the United States Senate (1823-29). He

was appointed Secretary of the Navy by Presi¬

dent Jackson and held this office till the break¬

ing up of the Cabinet in 1831. In 1835 he was a member of the convention to revise the State constitution and in 1843 was appointed gov¬

ernor of the Territory of Florida, serving un¬

til the election of a governor under the State constitution, when he retired to private life.

Consult Lanman, (Biographical Annals of the Civil Government of the United States. >

BRANCH, that portion of a plant pro¬

duced from a lateral leaf bud on the primary axis or stem. It is looked upon as part of the stem and not as a distinct organ. A branch generally produces secondary branches and

these give rise to minor ramifications, called branchlets or twigs. Branching is exhibited

both by Cormophytes and by Thallophytes. It may be dichotomous, where every branching

is a bifurcation of an already existing growing-point or monopodial, by the formation of new growing-points. True dichotomy is rare in

flowering plants, if present at all. Dichotomy may or may not be equal ; if one branch con¬

tinually predominates at each bifurcation, as in Selaginella, an apparent principal axis

called a sympodium results. On the other hand, as in the lilac, the suppression of the principal axis at each point of branching may cause a monopodial branching to assume the form of

a dichotomy, or even of a polytomy. This is known as false dichotomy or polytomy. Sym-podia may be formed in monopodial branching by the suppression of the terminal buds, as in the lime and the beech. In some trees, such as the pine, the original axis remains predomi¬

nant throughout the life of the plant, while in others, such as the elm, the lateral shoots are as strong as the axis, or even stronger.

BRANCHID2E, the name of an hereditary

family, the descendants of Branchus; also of a place founded by them. Their original seat was a little south of Miletus in Ionia, where was the famous temple of Apollo Didymeus. After the destruction of the temple, probably toward the close of the 5th century b.c., an attempt was made to rebuild it, but on so colossal a scale that the project was never completed. Its ruins are of great interest to archaeologists.

Some of the statues, formerly erected along the road leading to the temple, have been re¬

moved to the British Museum.

BRANCHIOPODA, a division of Crustacea

of the suborder Entomostraca. They are for the most part miscroscopic, and are chiefly distin¬

guished by having the gills attached to the legs, which are generally numerous. There are three families containing about a half-dozen genera.

The body is sometimes naked, but more fre¬

quently is enveloped by a buckler, which in some covers only the head of the thorax, and in others the whole body. Some have two

or even three eyes, but a greater number have one only. They are all free and continually in motion. Among the Branchiopoda are the

water-fleas and brine shrimps, and some also rank the trilobite among them.

BRANCHIOSAURUS, an extinct genus of

Amphibia (q.v.), whose remains have been

found very abundant and very perfectly pre¬

served in the Permian shales of Saxony. It is of especial interest among fossil amphibians because it has been possible to study every stage of its development from embryo to adult. The animal was but a few inches long, proportioned like a salamander, with four limbs and five toes on each foot. Like the modern tadpole, the larva breathed by

external gills which were replaced by lungs in the adult.

BRANCO, RIO, a river of North Brazil, the

chief tributary of the Rio Negro. It is 400

miles in length, but 250 miles from its conflu¬

ence with the Rio Negro navigation is blocked by fans. It rises near the frontier of Vene¬

zuela in the Parima Mountains, flows south¬

west and is navigable by light draught vessels.

BRAND, Sir Jan Hendrik, Boer states¬

man: b. Cape Town, 6 Dec. 1823; d. 15 July 1888. He studied law in Leyden and in 1849

began to practise in the Supreme Court at

Cape Town. In 1853 he became professor of

law in the South African College. He early be¬

came prominent in public affairs, his sympathies being strongly pro-British. His influence pre¬

vented any participation of the Orange Free State in the movement to check British policy in South Africa. In 1863 he was elected presi¬

dent of the Orange > Free State and was re¬

elected every five years until his death. Queen Victoria knighted him in recognition of his aid.

Brandford was named in his honor and Lady—

brand was named in honor of his wife.

BRANDE, William Thomas, English

chemist: b. London, 11 Feb. 1788; d. Tunbridge Wells, England, 11 Feb. 1866. He was educated at Westminster School, studied medicine and

became an assistant to Sir Humphry Davy,

succeeding him in 1813 in the chair of chemistry at the Royal Institution. In 1828 he became a superintendent in the mint. From 1816 to 1836

he and Faraday were joint editors of the Quar¬

terly Journal of Science and Art. In 1853 he received the honorary degree of D.C.L. from Oxford. He wrote several standard books on

chemistry. His chief works are (A Manual of Chemistry,* (Outlines of Geology,* and an

Encyclopaedia of Literature, Science and Art*

(1842).

BRANDEGEE, Frank Bosworth, Amer¬

ican legislator: b. New London, Conn., 8 July 1864. A graduate of Yale University, he be¬

came a lawyer, was elected to the Connecticut house of representatives in 1888, and in 1899

acted as speaker. He was corporation counsel of the city of New London during 10 years, and was selected as delegate to four Republican national conventions. To fill an unexpired

term in 1902 he was elected to Congress and was reelected in 1903 and again in 1905, when he was elected United States senator to fill the unexpired term of the late O. H. Platt; in 1909 he was reelected for the term to expire in 1915 and again in 1914 for the term to expire in 1921. He was chairman of the committee on

Pacific railroads and member of committee on interoceanic canals, interstate commerce judi¬

ciary, patents, *etc.*

BRANDEIS, bran'dis, Frederick, Amer¬

ican organist: b. Vienna, Austria, 1835; d. New York 1899. At Vienna he studied under Fis-chof, Czerny and Rufinatscha. He toured Amer¬

ica in 1849 as a member of the Wallace Opera Company. In 1851 he settled in New York, and between 1865-98 filled positions as organist at the Catholic churches of Saint John the Evan¬

gelist and Saint James, and the 44th Street Synagogue and the church of Saint Peter and Saint Paul in Brooklyn. He wrote a prelude to (Maria Stuart * ; (The Sunken Cloister0 ; a suite for string orchestra, and numerous other pieces, instrumental and vocal. He is best re¬

membered for his song, (My Love is Like the Red, Red Rose.*

J

BRANDEIS, Louis Dembitz, American

jurist: b. Louisville, Ky., 13 Nov. 1856. He was educated in the Louisville public and high schools, at the Annen Realschule, Dresden,

1873-75, and at Harvard University, where he received the degree of LL.B. in 1877. He was admitted to the bar the following year. From 1879 to 1916 he practised in Boston, being a member of the firm of Warren & Brandeis

until 1897, and of Brandeis, Dunbar & Nutter, 1897-1916. In 1910 he was counsel for Luther B. Glavis in the Ballinger-Pinchot investiga¬

tion; in 1911 counsel for shippers in the ad¬

vanced freight rate investigation before the In¬

terstate Commerce Commission; in 1913-14

special counsel for the Interstate Commerce

Commission in the second advanced freight rate case; in 1915 he was special counsel for the government in the Riggs National Bank case.

In 1914 he was counsel for the people in the proceedings involving the constitutionality of the women's ten-hour laws in Oregon and Illi¬

nois, the California eight-hour law and the min¬

imum wage law in Oregon. He was also coun¬

sel for the people in the preservation of the Boston municipal subways system and the es¬

tablishment of the Boston sliding scale gas system and the Massachusetts savings bank

insurance. In the years between 1906 and 1913

he was people's counsel in opposing the New Haven monopoly of transportation in New Eng¬

land. He was also chairman of the arbitration board in the New York garment workers'

strike in 1910. In 1914—15 he was chairman of the provisional committee for general Zionist affairs. In 1916 he was nominated by Presi¬

dent Wilson justice of the Supreme Court of the United States, and despite considerable

opposition the nomination was confirmed by

the Senate. He is the first man of his race and creed in the Supreme Court of the United States. His writings include articles on public franchises in Massachusetts, life insurance,

wage-earners' life insurance, scientific manage¬

ment of labor problems and the trusts and

Zionist and Jewish problems.

BRANDENBURG, Germany, a province

of Prussia, surrounded mainly by Mecklenburg and the provinces of Pomerania, Posen, Si¬

lesia and Prussian Saxony. The soil consists in many parts of barren sands, heaths and moors, yet the province produces much grain, as well as fruits, hemp, flax, tobacco, etc., and supports many sheep. The forests are extensive. The

principal streams are the Elbe, the Oder, the Havel and the Spree. There are between 600

and 700 lakes, and some of them are connected by qanals with the great rivers. Brandenburg carries on an active trade in manufactured

articles, containing extensive silk, woolen, linen and cotton cloth and yarn mills, also establish¬

ments for dyeing, spinning and printing of tex¬

tiles, machine shops, cigar and cigarette fac¬

tories, glass and chemical works. Beer and

liquors are produced in large quantities. It includes, besides some other districts, the

greater part of the former Mark of Branden¬

burg, which formed the cradle of the Prus¬

sian monarchy and the centre round which

the present extensive kingdom has grown

up. It is divided into the three administrative divisions of Berlin, Potsdam and Frankfort,

and has a total of 15,381 square miles.

The most of the inhabitants are Lutherans;

the rest are chiefly Roman Catholics and

Jews. From 1685 to 1688 many French

refugees, Walloons and inhabitants of Lor¬

raine and of the Palatinate settled in the Mark. At present Brandenburg is the most

important of the Prussian provinces, includ¬

ing as it does the capital (Berlin), and the governments of Potsdam and Frankfort. The

first people who are known to have inhabited Brandenburg were the Suevi. They were suc¬

ceeded by the Slavonians, a barbarous people, whom Henry I conquered and converted to

Christianity in the early part of the 10th cen¬

tury. The government was first conferred on a Saxon count, and did not become hereditary until the time of Albert, whose son succeeded to the dignity of elector in 1180. This race becoming extinct, Charles IV assigned the elec¬

torate to his son Sigismund, who became em¬

peror in 1415, and sold the region to Frederick, Burgrave of Nuremberg, the ancestor of the

present reigning family. Frederick William the Great made various accessions to the territory of his ancestors, and obliged the King of Po¬

land, in 1656, to declare Prussia an independent state. The Old Mark was ceded to Napoleon

in 1807, and formed part of the kingdom of Westphalia, but it was restored to Prussia in 1814. The Elector of Brandenburg held the

seventh rank among the electors of the empire and had five votes in

the Council of Princes.

Pop. about 4,000,000. See Prussia.

BRANDENBURG, Germany, Prussian

city in the administrative district of Potsdam and province of Brandenburg, on the Havel, 35

miles west of Berlin, formerly the residence of the reigning family of Prussia. The Havel

here expands into a lake and divides Branden¬

burg into the Old Town, the New Town and

the Cathedral Island, the last containing a castle and the cathedral. The latter is a late Roman¬

esque building (1170-1318), restored in the 19th century. The industries embrace woolen yarn, silk goods, baskets, leather, hosiery, paper, beer, linen, etc., and the building of boats is also carried on. Pop. about 55,000. It became the seat of a bishopric in 949. From 27 Nov. to 5

Dec. 1848, Brandenburg was the seat of the National Assembly of Prussia.

BRANDENBURG, Confession of, a con¬

fession of faith issued in 1614 by the Elector of Brandenburg. It was an attempt to reconcile the religious controversies growing out of the differences in Lutheran and Calvinistic doc¬

trine. It had authority in the churches of Brandenburg until the union of the Lutheran and Reformed churches in 1817.

BRANDENBURG, New. See Neu

Brandenburg.

BRANDES, bran'des, Carl Edvard Cohen,

Danish author : b. Copenhagen 1847. A brother of the celebrated literary critic Georg Brandes, he also became known as a novelist, dramatist and writer on drama and philosophy. Among

his novels are (Das junge Blut) (1889) ; (Ein PolitikeD (1889) ; and his dramatic works in¬

clude (HeilmitteP (1880); (Lagemidler)

(1181); (Ein BesuclP (1882); (Ein BrucfP

(1885); <Liebe) (1887); <Under Loven)

(1890); {Untcr dem Gesetz* (1890); (Hos

SighriC (1902).

BRANDES, Georg Morris Cohen, Danish

literary critic of Jewish family: b. Copenhagen, 412

4 Feb. 1842. He was graduated at the Univer¬

sity of Copenhagen in 1864, and taught there 1872-77. Several books on aesthetic and phil¬

osophic subjects brought on him a charge of skepticism which was not removed by an epoch-making series of lectures, delivered before

large audiences, and published under the title (The Main Literary Currents of the Nineteenth Century) (1872-82) ; for his description of the later intellectual position of Europe, as broken away from the

orthodoxy and romanticism of

the beginning of the century, brought on him the bitter attacks of all the reactionary forces in Denmark. His (Danske Digtere,* a mas¬

terpiece of psychological analysis, appeared in 1877 ; but the hostility of his enemies induced him in the same year to leave. Denmark and settle in Berlin, where he published, among other works, critical biographies of Lassalle (1877) ; Esaias Tegner (1878), and Lord Beaconsfield (1879). Then a lecture tour through Norway and Denmark brought a powerful party to his side, and in 1882 he returned to Copen¬

hagen, his countrymen having guaranteed him

an income of $1,000, with the one stipulation that he should deliver public lectures on literature.

Among his later works are (Den Romantiske

Skole i Frankrig) (1882) ; a biography of Lud¬

vig Holberg (1885) ; a valuable study of

Shakespeare, published in an English transla¬

tion in 1899; (Impressions of Russia) (1888) ; <Poems) (1899) ; ˆBerlin as an Imperial CourD

(1884). Brandes is not only the foremost critic of Denmark, but one of the great literary

critics of his age. His works have been trans¬

lated into German and also into English and French. Brandes is known as the scientific critic of literature, which he considers as a mirror of life itself. Recent works from his pen are <Poland) (1903); (Recollections of My Child¬

hood and My Youth> (1906); (Erinnerungen)

(1908); (Ferdinand Lassalle) (New York

1911).

BRANDING, a form of punishment once

in use for various crimes by the Greeks and Romans and adopted by the canonists and by our Anglo-Saxon ancestors, but abolished in

England in 1823. It was performed by means of a red-hot iron and the part which was

branded was the cheek, the hand or some other part of the body. When the practice of arrest¬

ing judgment in criminal cases by Benefit of Clergy was in force, it was customary to brand on the left thumb any layman who received this benefit, since it was not permitted to a layman to enjoy it more than once. During the reign of James I this punishment was meted out to women convicted of petty larcenies. In later legislation, under William III, it was provided that these offenders be branded on the cheek, but this barbarous custom was repealed under Anne's reign. It was also practised to some extent by the early colonists in America, but is now obsolete. Even after branding had been abolished in all other cases it was for a long time retained in the army as a punishment for desertion, the letter D being marked on the left side of a deserter two inches below the armpit.

It was not, however, properly speaking, branded on his side, but marked with ink, gunpowder or some other substance which would leave a stain that could not be obliterated without de¬

stroying the skin at the part. This also has been abolished. lit mercantile law the term refers to the stamping of some distinguishing mark upon manufactured articles. (See Trade

Mark). In cattle-raising districts in the

United States, Australia, etc., cattle are branded with the mark of the owner. Until quite re¬

cent years incorrigible rogues were branded on the forehead in Russia with the letter B, sig¬

nifying ˆbradyeva** — vagabond.

BRANDIS, Christian August, German

philologist and historian of ancient philosophy: b. Hildesheim, 13 Feb. 1790; d. Bonn, 24 July 1867. After a course of philological and philo¬

sophical studies at Kiel and Gottingen, he was graduated at the University of Copenhagen in 1812 and for a short time delivered lectures on philosophy. He was induced bv Niebuhr in

1816 to accompany him to Rome as secretary to the Prussian embassy. From 1819 to 1821

he was engaged in conjunction with Immanuel Bekker in collecting materials for a new edi¬

tion of Aristotle, published in four volumes at Berlin (1831-36). In 1821 he was appointed

ordinary professor of philosophy at Bonn,

where he edited Aristotle's (Metaphysics, } Vol.

I (Berlin 1823) ; (Scholia in Aristotelem*

(Berlin 1836) ; and (Scholia Graeca in Aristotelis Metaphysicam* (Berlin 1837). His pro¬

fessional duties at this university were con¬

tinued during the rest of his life, being inter¬

rupted only by a residence of three or four years in Greece, where he was acting as cabinet counsellor to King Otho. After his return from Greece he published an interesting and in¬

structive work, for which his residence in that country had furnished him with materials, en¬

titled (Mittheilungen fiber Griechenland)

Communications on Greece* (1842) and at the same time resumed his professorship at Bonn.

His two most important works are his (Handbuch der Geschichte der griech.-rom. Philosophie) (3 vols., Berlin 1835-66) ; and (Geschichte der Entwickelungen der griech. Philosophic *

(Berlin 1862-64).

BRANDIS, Sir Dietrich, English forest

administrator and botanist: b. Bonn 1824; d.

29 May 1907. Educated in his native city and in Copenhagen, he was appointed superintend¬

ent of the teak forests of Pegu in Burmah in 1852. These by his energetic measures he saved from rapid depletion and was afterward given control of all the forests in the state. He was inspector-general of forests for the Indian

government, 1864-83, and from 1887-96 super¬

vised the practical continental training of Eng¬

lish students in forestry — a scheme that was extended to include students from the United States. He was the author, among other

works, of (Forest Flora of Northwest -and

Southern India* (1876) ; and of an exhaustive treatise on (Indian Trees1* (1906).

BRANDON, Canada, city in Manitoba on

the right bank of the Assiniboine River, 132

miles west of Winnipeg, on the Canadian Pa¬

cific, Canadian Northern and Great Northern

railways. The name was given first in 1794

to Brandon House, a trading-post on the As¬

siniboine, 13 miles east of the present location, and also to the range of hills to the south.

Brandon is the railway centre for a fertile farming country, and is the second city in size and importance in the province. It stands on the

gravelly slopes of the south bank of the river and has excellent sewerage and water

systems. Both the business and residential

sections are well-built. Brandon College,

(Baptist) and a hospital are the chief public in¬

stitutions. Its manufacturing industries include a large binder-twine factory, brick and cement works, machine works and woolen, flour and

saw mills. Across the valley is the Manitoba Experimental Farm, 670 acres in extent; and on the same side of the valley, the Indian in¬

dustrial school, and one of the provincial asy¬

lums for the insane. Pop. 13,839.

BRANDON, Vt., township of Rutland

County, 16 miles northwest of Rutland and 183

miles from Boston, on the Rutland Railroad, near Otter Creek, 16 miles from Lake Cham¬

plain. It is in the midst of a fertile farming section, noted for its horses, stock and dairy farms, the principal crops being hay, potatoes, corn and oats ; while the picturesquesness of the environing country make it an attractive residence and summer-resort. It contains an

academy, two parks, a fine hotel and private residences, a town-hall, good graded and dis¬

trict schools, a public library and five churches.

There are two national banks, with combined resources of $695,291 ; an assessed property valuation at 1 per cent between $19,000 and $20,000; a marble mill and quarries, wood¬

working plant, pasteurizing milk station and a tub factory. Pop. (1920) 1,631.

BRANDT, Heinrich von, Prussian general

and military author: b. Lakin, West Prussia, 1789; d. 1868. He studied law in Berlin, but joined the army in 1807; fought in the. Spanish and Russian campaigns, and was wounded and

captured by the Russians at the battle of Leipzig.

He was made a member of the general staff of the Prussian army, took part in the Polish re¬

volts of 1831 and 1848, and with the rank of general of infantry retired from the army in 1857. He had been elected a member of the Prussian Upper Chamber in 1849 and of the

Erfurt .Parliament in 1850. His fame is per¬

petuated by his books, chief of which are

‘Geschichte des Kriegswesens) (Berlin 1830—

35) ; (Grundziige der Taktik der drei WaffeiP

(1883) ; ‘Der kleine Krieg (2d ed., 1850).

Consult his biography by his son, ‘Aus dem Leben des General Brandt) (2 vols., Berlin 1882).

BRANDT, Hermann Carl George, German-American educator : b. Vilsen, Germany, 15

Dec. 1850. He was graduated from Hamilton

College, Clinton, N. Y., in 1872; was instructor there (1874-76) ;

associate professor of German at Johns Hopkins University (1876-82), and

since 1883 professor of German at Hamilton.

He has published a ‘German-English and Eng¬

lish-German Dictionary5 (1879) ; ‘German

Grammar’ (1884); a ‘German Reader5 (1889),

and an edition of Lessing’s (Nathan der

Weise) ; (German Science Reader) (1897).

BRANDT, Josef von, Polish painter : b.

Szczebrzeszyn, 11 Feb. 1841. He first studied engineering in Paris, then took up painting at Munich as a pupil of Franz Adam and Karl

Piloty and opened his own studio. His pictures mostly illustrate the soldier life of the 17th cen¬

tury, though he has painted also some excellent pictures of Polish peasant life. His works

include ‘’Polish Peasants at the Inn,5 ‘Episode of the Thirty Years’ War,5 ‘The Battle with the Turks, near Vienna, 12 Sept. 1683, 5 Cos¬

sack Camp,5 ‘Tartar Battle,5 ‘Cossacks on the March,5 ‘Cossacks’ Triumphal Song5 and ‘De¬

fense of a Farmyard by Polish Cavalry,5 and ‘The Runaway,5 which in 1900 received a prize in the National Academy, New York.

BRANDT, Nicholas, German chemist of

the 17th century, usually considered the discov¬

erer of phosphorus. Leibnitz mentions him as a chemist of Hamburg, who, during a course of experiments on urine, for the purpose of dis¬

covering a solvent which would convert silver into gold, accidentally

produced phosphorus, in 1667 or 1669. He communicated or sold his

discovery to Kunkel, who showed it to Leib¬

nitz. Boyle, securing a piece of the phosphorus, and knowing from what material it had been obtained, after various experiments succeeded in preparing it and thus made an independent discovery of the method.

BRANDY, the name commonly applied to

the spirit distilled from the juice of the grape, but also given to liquors distilled from other fruits, such as apples, cherries, peaches, *etc.*

All these brandies differ from each other only in the essential oil which they contain and which gives to each its different flavor and aroma. The alcohol in brandy generally con¬

stitutes 50 per cent of the whole, the remaining substances being water, amyl, propyl and

isobutyl, alcohols, glycerol, *etc.* A brandy

highly esteemed is Cognac, exported from south¬

western France, and obtained by distilling white wines of the finest quality. An inferior kind of spirit is frequently prepared from the "marc55

of grapes and the refuse of wine vats. When first distilled it is as colorless as alcohol, and continues so if kept in bottles or jars. When stored in casks, however, it acquires from the wood a pale amber tint, and in this state is sold as pale brandy. The dark color of brown brandy is produced artificially, to please the public taste, by means of a solution of caramel, and this is frequently added in excess to give a rich appearance to a brandy of low quality. A large proportion of the brandy sold in the United States is simply raw grain spirits fla¬

vored and colored. The spirit is imported into France, where it is redistilled and converted into French brandy. Brandy improves in flavor by being kept but loses in strength. Of late years the development of viticulture in the west¬

ern States, particularly in California, has en¬

abled American enterprise to produce a brandy that is a formidable rival to the French article.

Imitation brandy is prepared either by flavoring highly rectified spirit with essence of Cognac or by distilling the spirit with bruised prunes, acetic ether, argol and a little genuine brandy and adding to the distilled spirit tincture of catechu and spirit coloring. See Alcohol ;

Beverages ; Distilled Liquors ; Liquors.

BRANDY STATION, Va., a village of

Culpeper County, 56 miles southwest of Alex¬

andria, notable as the scene of several minor battles during the Civil War. The earliest, on 20 Aug. 1862, was distinguished by a fierce cav¬

alry charge on the Federal side; the second, 9

June 1863, resulted in the defeat of the Fed¬

eral cavalry under Generals Buford and Pleas¬

anton by the Confederate commander Stuart.

(See Fleetwood, or Brandy Station, Battle

of). Other battles were fought near here 13

Sept. 1863; 11 Oct. 1863; and there were also several skirmishes here. That of 9 Tune 1863

is also known as the battle of Beverly's Ford.

BRANDYWINE, Battle of the, in the

American Revolution. After the battle of

Princeton (q.v.), the American and British

armies retained their respective positions until early summer of 1777, employing the interim in foraging and plundering expeditions and in recruiting their forces. Finally, in June, Howe left New Brunswick and evacuated the Jer¬

seys, but in July set sail from New York in a fleet and late in August landed at the head of the Elk River, with the intent of making a direct descent on Philadelphia. As the British advanced Washington retreated across Brandy¬

wine Creek, which flows into the Delaware at Wilmington, taking post opposite Chad's Ford.

On 11 Sept. 1777 the British advanced in two columns, the right under Knyphausen and the left under Cornwallis. While the former en¬

gaged in an artillery duel with the Americans at the forks of the creek, Cornwallis crossed above the forks, attacked Sullivan's troops at Birmingham Church, near Dilworth, and

forced them to retire. Washington sent

Greene's brigades to support Sullivan but

Greene found Sullivan in full flight and could only cover the retreat. Meanwhile Knyphausen attacked Wayne at Chad's Ford and drove his troops back in disorderly flight. Hence Wash¬

ington retreated to Chester and the next morn¬

ing to Philadelphia, unmolested by the British, who were too weary to continue the pursuit.

The American loss was 300 killed, 600 wounded (among them Lafayette) and 400 prisoners,

while the British loss was not more than 600

killed and wounded. Consult Stone, W. D.,

(The Battle of Brandywine* ; Fisher, S. G., (Struggle for American Independence) (Vol.

II, pp. 10-29) ; Carrington, H. B., (Battles of the Revolution* ; Gordon, William, (American Revolution* (Vol. II) ; Stedman, Charles,

American War* (Vol. I) ; Trevelyan, Sir

George Otto, (American Revolution (Vol.

IV) ; Tower, Charlemagne, (Marquis de la

Fayette in the American Revolution * ; Lossing, (Field-Book of the Revolution (Vol. II) ;

Lowell, E. J., (Hessians in the Revolution ; Stifle, C. J., (Wayne and the Pennsylvania Line) ; Wiley and Rines, (The United States) (Vol. Ill, pp. 52-58); and biographies of

Washington, Greene, Knox, Morgan, Reed and

others engaged.

BRANDYWINE CREEK, a small river

of Pennsylvania and Delaware, formed of two forks, the east and the west, which effect a junction in Chester County of the first-named State and, taking a southeasterly course, emp¬

ty into Christiana Creek two miles below

Wilmington.

BRANFORD, Conn., borough in a town¬

ship of the same name of New Haven County, situated on Long Island Sound and on the

New York, N. H. & H. Railroad, about seven miles southeast of New Haven. The harbor

admits small vessels. The oyster-beds of

Branford form an important industrial feature.

Among other occupations are the quarrying of granite, fruit raising and the manufacture of locks and iron-fittings. The Blackstone Me¬

morial Library, one of the most notable of the smaller American public library buildings, is located here. The place is picturesquely situ¬

ated and is a popular summer resort. The town of Branford, originally called Totoket, and

deriving its present name from Brentford,

England, was settled in 1644 by colonists from Wethersfield, Conn., augmented some years

later by families from Southampton, L. I.,

under the leadership of the Rev. Abraham

Pierson; in 1667 a large number of the inhabit¬

ants removed to New Jersey, settling at

Newark. The borough was incorporated in

1893. Pop. township, 6,047 ; borough, 3,000.

Consult Rockey, J. L., (History of New Haven County) (New York 1892).

BRANGWAINE, the name of the nurse

of Yseult in the legend of Tristan. The name appears as Brangane in Wagner's opera Tris¬

tan und Isolde.*

BRANGWYN, Frank, English painter and

illustrator: b. Bruges, Belgium, 13 May 1867.

In 1877 he returned to London, where he

studied art under William Morris and subse¬

quently traveled extensively in Asia Minor and the Near East. He has been a leader in the modern reaction toward color, painting with a truly Eastern gorgeousness and is regarded as one of the most individual products of British contemporary art. His etchings, like his paint¬

ings, bold and sharp in their contrasts, are conceived in surfaces and not in lines. His paintings include (The Baptism of Christ *

(Stuttgart) ; (Sailor's Funeral * (Glasgow) ; (Venetian FuneraP (Leeds) ; (Buccaneers* ;

(Convict Ship) ; (Moorish Goatherds) ; (Gold, Frankincense and Myrrh* ; (The Miraculous

Draught of Fishes* ; (Moorish Market Place by the Shore) (now in the Luxembourg) ;

(Mars and Venus* (Dublin). His mural

paintings include (Modern Commerce * (Royal

Exchange) ; and (King John Signing the

Magna Charta) (courthouse at Cleveland,

Ohio). His etchings best known are (01d

Houses, Ghent * ; *London Bridge* ; (The Saw¬

yers } ; (The Building of Kensington Museum *; and (The Paper Mill.* An exhibition of his etchings was held in the Public Library of New York in 1914. He received a gold medal at Chicago for (The Convict Ship.* He was

commissioned to decorate the East Pavilion at the Panama Exposition of 1915 at San Fran¬

cisco. He also served as president of the

Royal Society of British Artists and is a

member of the Royal Academy. See Shaw—

Sparrow, (Frank Brangwyn and His Work >

(London 1910).

BRANICKI, bra-nits'ke, Jan Klemens,

Polish statesman: b. 1688; d. 9 Oct. 1771. In his youth he served in the French' army. In 1715 he returned to Poland. He rose to the highest dignities, was an opponent of Augus¬

tus II and the zealous champion of the nobility.

After the death of Augustus III he officiated as great constable and first senator of the kingdom, and stood at the head of the Republi¬

can party, but defended the privileges of the nobility. He was offered the crown by a great majority of the nobles who constituted the

nation. But the party of the Czartoryskis,

backed by Russia, was triumphant. Poniatowski was elected and Branicki was outlawed and

escaped to Hungary. As his wife was a sister of the new king, he soon returned and recov¬

ered his dignities. He was called by the nation the last patriot, and at his funeral was per¬

formed for the last time the mediaeval ceremony of the ancient chivalry, that of breaking the BRANK — BRANT

i oat ol arms and entombing it with the body of the last member of a noble line.

BRANK, an instrument formerly in use for

the punishment of scolds. It consisted of an iron frame which went over the head of the offender like a common horse-bridle, and had in front an iron plate, which was inserted in the mouth, where it was fixed above the tongue and kept it perfectly quiet. Such instruments are still preserved in the Ashmodean Museum, Oxford, the National Museum of Antiquities

at Edinburgh, and in other museums, municipal buildings and churches in England and Scot¬

land.

BRANN, Henry Athanasius, American

clergyman: b. Parkstown, county Meath, Ire¬

land, 15 Aug. 1837. He came with his family to the United States in 1849, was educated at Saint Francis Xavier's College, New York,

Saint Sulpice, Paris, and the American College, Rome. He was ordained priest in Rome by

Cardinal Patrizzi in 1862. For two years he was professor of theology and philosophy in Seton Hall College, South Orange, N. J. ; was next successively a missionary in New Jersey; director and professor at the seminary of

Wheeling, W. Va. ; pastor at Fort Washington, N. Y., 1870-89, and rector of Saint Agnes'

Church, New York after 1890. He built a num¬

ber of churches in New York city, was a mem¬

ber of the Union League Club and author of (Curious Questions) ; (The Age of Unreason) ; (Life of Archbishop Hughes) ; ˆHistory of the American College, Rome* ; (The Henry George Land Theories) ; (The Popes, Champions of

Popular Liberty* ; (Martin Luther* ; (The Spir¬

ituality and Immortality of the Human Soul.*

He contributed to the Catholic World, the

Catholic Quarterly Review, the Messenger, the North American Review, the (Catholic Encyclo¬

pedia, * *etc.*

BRANNAN, John Milton, American sol¬

dier: b. Washington, D. C., 1819; d. New York, 17 Dec. 1892. He was graduated at the United States Military Academy in 1841, and entered the 1st Artillery. During the Mexican War he took part in the battles of Cerro Gordo, Con¬

treras and Churubusco and in the siege of Vera Cruz and the capture of the City of Mexico, where he was severely wounded. He was

brevetted captain for gallantry and meritorious conduct at Contreras and Churubusco. He

served against the hostile Seminoles in Florida, and at the outbreak of the Civil War com¬

manded the forces engaged in the reduction of the Confederate works on Saint John's River, compelling the evacuation of Jacksonville. He commanded a division in the Army of the Cum¬

berland 1863-64, taking part in the advance on Tullahoma, served through the Atlanta cam¬

paign and all its operations, and was in the bat¬

tles of Hoover's Gap, Chickamauga, Missionary Ridge, Kenesaw Mountain and the siege of At¬

lanta. On 13 March 1865 he was brevetted

major-general of volunteers for gallant and

meritorious services during the war. He was stationed at various posts from 1866 until his retirement, 19 April 1882, as colonel of the 4th Artillery.

BRANNER, John Casper, American geol¬

ogist : b. New Market, Term., 4 July 1850. He graduated at Cornell University in 1882, and in 1885 took his degree of Ph.D. at the Univer¬

sity of Indiana. He was assistant geologist of the Imperial Geological Survey of Brazil 1875—78; special botanist for Thomas A. Edison in South America 1880-81 ; special agent of the United States Department of Agriculture for

investigating cotton and the insects affecting it in Brazil 1882-83; topographical geologist of the Pennsylvania Geological Survey, anthracite district 1883-85 ; professor of geology at the University of Indiana 1885-91 ; State geologist of Arkansas 1887-92. In 1892 he was elected professor of geology at Leland Stanford Jr.

University and was its vice-president from 1899

to 1913, when he was made its president. He retired 31 Dec. 1915 and was made president emeritus. In 1915 he was a member of the

committee of the National Academy of Science to report to the President of the United States upon the landslides on the Panama Canal. He has written a large number of papers and re¬

ports on geology and physical geography, and is associate editor of the Journal of Geology.

BRANNON, Henry, American jurist: b.

Winchester, Va., 26 Nov. 1837 ; d. 24 Nov. 1914.

He studied law and practised his profession in West Virginia 1859-81, becoming circuit judge in 1880, and judge of the State Supreme Court in 1888. He published (Treatise On Rights and Privileges Under the 14th Amendment to the

Constitution of the United States. *

BRANT, Joseph (Thayendanegea), Mo¬

hawk chief: b. Ohio, about 1742; d. 24 Nov.

1807. He was sent by Sir William Johnson to a school at Lebanon, Conn., from which grew Dartmouth College. Joining the Episcopal

Church, he taught religion to the Mohawk In¬

dians, translating into their language parts of the New Testament and the Prayer Book. His services against Pontiac and in the French and Indian War were highly valued. After the

death of Sir William Johnson (who had mar¬

ried his sister Molly), Brant became, in 1774, secretary to Guy Johnson, superintendent of

Indian affairs, and when the American Revolu¬

tion began he incited the Indians against the colonies. His presence at the massacre of

Wyoming is authoritatively disproved, but he took part in that of Cherry Valley and in other savage engagements. He was received with

great distinction on his tour to England in 1786

and was attached to the military service of Sir Guy Carleton in Canada. He opposed the con¬

federation of the Indians which led to the ex¬

pedition of General Wayne, and did all he could to prevent peace between the Indians and the United States. He was zealously devoted to

the welfare of his own people, a brave warrior, loyal to his friends and merciful to his cap¬

tives. In England he collected funds with which he built the first Episcopal church in Upper Canada. Brantford, Ontario, is named in his honor. One of his sons, John Brant (1794-1832), in the War of 1812, was the leader of a body of Canadians and Indians against the United States. The life of Brant was written by W. L. Stone (new ed., Albany 1865). Con¬

sult also Eggleston and Seelye, (Brant and Red Jacket* in (Famous American Indians)

(New York 1879).

BRANT, brant, or BRANDT, Sebastian,

German poet and satirist : b. Strassburg 1457 ; d. there, 10 May 1521. He studied law at Basel, took the doctor's degree and delivered lectures 416

on jurisprudence for many years. In 1501 he was state councillor at Strassburg and state recorder in 1503. Some of his writings brought him to the notice of Emperor Maximilian, who entrusted him with several important commis¬

sions in the interests of the state. He trans¬

lated Virgil, Terence and other Latin writers, and wrote a number of law treatises as well as poetry, in both German and Latin. In (The Ship of Fools5 ((Das Narrenschiff }), first pub¬

lished in Basel 1494, he satirizes the vices and follies of his age. It became immediately pop¬

ular ; four editions appeared in one year and it was translated into Low German, Latin,

French and English. In Germany it was so

esteemed that the celebrated preacher, Geiler of Kaisersburg, delivered public lectures on it from the pulpit at Strassburg. Later editions have been printed, of which the best are by Zarncke (1854)

and by Goedecke (1872). Its

influence was never considerable on the litera¬

ture of Germany and of other Germanic coun¬

tries. The English translations are by Alexan¬

der Barclay (1509) and by Henry Watson, the latter reprinted in 1874.

BRANT, a small wild goose of the genus

Branta. The most familiar species, the (<common brant® (Branta bernicla) is found widely distributed throughout the United States. Its plumage, chin and cheeks are glossy black, fad¬

ing into gray at the sides, with its under parts entirely white and white streaks on the sides of the neck. In its markings it is distinguished from the ((black brant® (Branta nigricans) of the Pacific coast, which is entirely black under¬

neath. Brants generally travel in flocks, and their comparative sluggishness enables the gun¬

ner to procure a larger number in the short time they are present than of any other sort of goose. They feed on vegetable matter, their chief food consisting of the <(eel-grass,® for which they dive at low tide. The brant is chiefly a marine bird, rarely seen in the interior of the United States, and breeds in the far North, well within the Arctic Circle. Its nest is made on the ground from grass, mosses, etc., and its four eggs are dirty white in color. The name is sometimes given to other species of goose, as, for instance, the (<snow goose® which is sometimes termed ((white brant® because of its similarity in size. See Geese.

BRANT-BIRD, or BEACH-ROBIN,

common names among American gunners for

the shore-bird {Strep silas interpres) , called <(turnstone® by British sportsmen and in most books, because of its habit of moving aside

pebbles in order to get at the beach-fleas and other small creatures hiding beneath them, upon which it feeds. It also feeds upon the eggs of the (<horsefoot,® or king crab, which it scratches out of the sand; hence it is known to some as ((horsefoot snipe.® It stands between the plov¬

ers and sandpipers, having a comparatively

short bill and legs and less active manners than most of the latter. It is, perhaps, the most beautiful of the beach-birds, having a highly variegated plumage much alike in both sexes.

The bill is black, feet orange ; head and sides of neck black and white with a black band across the breast ; throat, lower parts and tail-coverts, white; remainder of the plumage chest¬

nut and brown, mottled with black and set off by a white band on the wing. This is one of the most cosmopolitan of birds, wandering to all parts of the world, yet nowhere, perhaps, numerous.

BRANTFORD, Canada, citv, port of entry

and county-seat of Brant County, Ontario, on the Grand River at the junction of several branches of the Grand Trunk Railway, 80 miles southwest of Toronto and 60 miles east of

London. It is named from the Mohawk chief, Joseph Brant (q.v.), to whose memory a colos¬

sal statue has been erected. The Grand River is navigable to within about two miles of the city and is connected therewith by a canal, affording water communication with Lake Erie.

A United States consular agent is stationed here. The city is lighted by electricity and has handsome churches, schools and private build¬

ings, a stone courthouse, hospital, house of refuge, *etc.* It was at Tutela Heights, near the city, that Alexander Graham Bell, the inventor of the telephone, made, in 1876, his first suc¬

cessful experiments, and a monument has been erected in celebration of the event. It is the seat of the Ontario Institution for the Educa¬

tion of the Blind and of Wickliffe Hall. Brant¬

ford is the trade centre of a large and fertile agricultural region. The buildings and shops of the Grand Trunk Railway occupy more than 12 acres. The manufactures comprise metal

and stone ware, engines, machinery, sash and blinds, agricultural implements, felt and rubber, *etc.* Pop. 23,132.

BRANTOME, bran-tom, Pierre de Bour—

deille (Lord of the Abbey of Brantome) : b.

Perigord, Gascony, about 1540; d. 1614. Being the younger son of a nobleman, he was des¬

tined for ecclesiastical preferment but left the Church' to become a page at the court of Mar¬

garet of Navarre. In his epitaph, composed by himself, he relates in a vaunting manner how he first bore arms under the great Francis of Guise and afterward served the king, his mas¬

ter. He studied in Paris and was gentleman of the chamber to Charles IX. He visited Scot¬

land as escort of Mary Stuart. He also spent some time at the courts of Henry III and

Henry IV. After the death of Charles IX, he withdrew to his estates, where he wrote his memoirs, which have a great deal of vanity and self-complacency, mingled with much that is

interesting. Brantome was personally ac¬

quainted with the great characters of the time and an eye-witness of all the important events which then took place, and in some was an actor. He was a courtier, regardless of right or wrong, who does not blame the great but observes and relates their faults and crimes as ingenuously as if he were uncertain whether they deserve praise or blame; as indifferent about honor and chastity in women as about integrity in men. He places us in the middle of that century when expiring chivalry was

contending with the forming and as yet unset¬

tled manners of later times. Brantome, in

the midst of his wandering life, had acquired more learning than most of his fellow soldiers.

He has left (Vies des grands capitaines franCais) ; {Vies des grands capitaines etrangers5 ; *Vies des dames illustres,5 and (Vies des dames galantes5 (together called (Recueil des dames5), besides other works. All his manuscripts were collected by the Ecoles des Chartes in 1904.

Consult Lalanne, (Brantome, sa vie et ses

ecrits> (Paris 1897) ; Wormeley, K. P., Hllustrious Dames of the Court of the Valois Kings*

(New York 1912).

BRANTS, Victor Leopold Jacques Louis,

Belgian educator and writer on economics and sociology: b. Antwerp, 23 Nov. 1856. Since

1878 he has been connected with the faculty of Louvain University, being at present profes¬

sor of political economy and statistics and Bel¬

gian history. He is president of the School of Commercial, Consular and Colonial Sciences

of Louvain, member of the superior council of labor and permanent

secretary of the Belgian Society of Social Economy. He is correspond¬

ing member of the Institut de France and

member of the Royal Academy of Belgium.

His published works include (La morale du

desinteressement rationed) (1877) ; (Sur l'histoire des classes rurales en Belgique jusqu'a la fin du XVIIIe siecle* (1881) ; (Au pays des Ruthenes* (1889) ; (Le travail du dimanche en Autriche) (1896) ; (Les grandes lignes de l'eco-nomie politique* (3d ed., 1901; 5th ed., 2 vols., Louvain 1908) ; (La petite industrie contemporaine) (3d ed., Paris 1912) ; (Le travail de nuit des enfants en Belgique) (1906) ; (La faculte de droit de l'Universite de Louvain a travers cinq siecles, 1426-1906) (Louvain and Paris 1906); (La lutte contre l'usure dans les lois modernes) (ib. 1907), and various gov¬

ernmental reports on economic and sociological matters. He is a contributor to Reforme sociale (Paris), Revue generate (Brussels), Re¬

vista interngzionale >di science sociali (Rome), BRASHEAR, brash'er, John Alfred,

American astronomer and manufacturer of

•scientific instruments : b. Brownsville, Pa. in 1840; d. Pittsburgh, Pa., 8 April 1920; educated, public schools of his native city ; learned machin¬

ist's trade and was a mechanical engineer from 1860 to 1870. In the latter year he began the construction of astronomical and physical in¬

struments, and was actively engaged in the con¬

struction and manufacture of same after 1880.

He received the degree of D.Sc. from the

Western University of Pennsylvania and from

Princeton in 1911; the degree of LL.D. from "University of Wooster 1896, and from Wash¬

ington and Jefferson; and D.Eng. from Stevens Institute of Technology in 1912. He was acting director of the Allegheny Observatory 1898—1900, and was acting chancellor of the Western University of

Pennsylvania. He was a fellow of the Royal Astronomical Society of Great

Britain, of the British Astronomical Associa¬

tion, of the Societe astronomique de France, the Societe Beige d'Astronomie and the Astronom¬

ical Society of America ; also honorary mem¬

ber of the American Society of Mechanical

Engineers and the Royal Astronomical Society of Canada.

BRASHEAR CITY. See Morgan City.

BRASHER, Abraham, American army

officer: b. New York, 22 Dec. 1734; died in exile during the Revolution, in 1782. He was one of the most active associates of the ˆliberty boys® of his native city. He wrote many of the popular ballads of the Revolutionary period, and was a constant contributor to the newspapers of his day. Among his poetical productions

were c Another New Year's Address,* and the (General's Trips to Morristown,* both of which were favorites in the American camp.

BRASIDAS, Spartan general who distin¬

guished himself in the first half of the Pelo¬

ponnesian War by his courage and his military skill : d. 422 b. c. He first distinguished him¬

self by repelling the attack of the Athenians on the fortress of Mcthone (431 b.c.). In 429 he was sent to assist Cnemus and participated in the unsuccessful attack on the Piraeus ; in 427

accompanied the admiral Alcidas to Corcyra ; in 425 was severely

wounded in the assault on Pylos ; and subsequently was elected by his fellow-countrymen to be the leader of an ex¬

pedition intended to carry the war into Thrace.

In 424 he relieved Megara, and passing through Thessaly effected a junction with Perdiccas of Macedon. Within a short time he had gained possession of Arrhibseus, Acanthus, Stagira,

Amphipolis, Torone and Scione. In 423 a

truce was agreed upon, and in the same year Mende revolted and Brasidas immediately

seized the town. The Athenians had, however, sent a new armament into the field consisting of two armies, and Brasidas, receiving no re¬

inforcements from Sparta, was later forced to surrender the town to one of these armies.

Cleon, the leader of the second army, allowed himself to be drawn into a battle at Amphipolis, and was totally defeated, he himself being in the number of the slain. But the Spartan vic¬

tory was purchased with the loss of their gen¬

eral, who received a fatal wound during the engagement. Brasidas was buried at Amphipolis, within the walls, and long after his death his memory was honored as that of a hero, by the celebration of yearly sacrifices and games.

The Greek writers speak highly of Brasidas.

Thucydides notices his eloquence, unusual in a Spartan, his justice, liberality and wisdom, while Plato compares him to Achilles ; but cir¬

cumstances show that he was endowed with as much Spartan duplicity as Spartan courage.

BRASS, Sally, in Dickens' (01d Curiosity

Shop,* an evil and cruel woman who was her brother's law partner and assisted him in carry¬

ing out his schemes.

BRASS, Sampson, in Dickens' (01d Curi¬

osity Shop,* an attorney of evil reputation, whom Quilp uses as a tool.

BRASS. The quality of brass depends upon

the proportions of its two constituents, copper and zinc. The greater the quantity of zinc the lighter the color and the more brittle and springy the alloy, while, on the other hand, the greater the quantity of copper, the redder the color and the tougher but softer the alloy.

Technically, the term brass is extended to in¬

clude compounds of copper and tin, as in brass ordnance, the brasses or bearings of machinery, *etc.* ; but such alloys of copper and tin, though styled hard brass, are more strictly varieties of bronze. Brass foil, frequently not more than 1-50,000 of an inch in thickness and known as Dutch leaf, is made by beating out sheets of very thin brass containing a large proportion of copper. Copper and zinc alloy's resembling brass are well known in the trade as gilding metal, Mannheim gold, pinchbeck, bath metal, Bristol brass, Muntz sheathing metal, spelter solder and mosaic gold.

In the manufacture of brass, either of two processes may be followed. The direct method is to fuse the zinc in a crucible and gradually add the copper in pieces. But this process is 418

attended with disadvantage, owing to the vola¬

tile and oxidizable nature of zinc. The indirect method of forming brass is generally followed; it consists in heating in crucibles or pots a mixture of calamine (carbonate of zinc), char¬

coal and thin pieces of scrap or grain copper.

For ordinary purposes brass is first cast into plates of about 100 pounds weight (Ft to ˆ2

inch thick) which can be readily broken up, remelted and cast in a mold of any desirable shape or size.

The following are the usual proportions in

the several varieties of brass: Red brass — 4

parts copper to 1 part zinc; yellow brass — 2

parts copper to 1 part zinc; Muntz metal — 3

parts copper to 2 parts zinc ; Spelter solder — 1

part copper to 1 part zinc. For brass wire the mixture generally used is five parts copper to three parts zinc, but the proportions vary

greatly according to the purpose for which the wire is to be used. For some purposes, such as the manufacture of pins, where rigidity is of more importance than toughness, and cheapness is essential, it is possible to use Muntz metal, while for drawing into very fine gauges and weaving into the gauze that is used largely in paper-making machinery, much richer grades

are employed.

The alloying of copper and spelter is per¬

formed in crucibles, generally made 16 inches in depth and 10 inches in diameter at the top, tapering to about 9 inches in diameter at the bottom, the thickness of the walls being about one inch. These crucibles are heated in ((wind furnaces.® This furnace is fired with solid fuel and has a natural draft, the height of the chim¬

ney stacks varying from 40 feet, where each furnace has its separate stack, to 150 feet where a number of furnaces are connected to one

stack. Gas furnaces are also used in combina¬

tion with generators, in which case producer gas, or sometimes water gas, is burned in place of the solid fuel; in these it is usual to heat 10

or 12 crucibles in one furnace or chamber. Re¬

verberatory and tilting furnaces are employed for large castings in sand molds, but for cast¬

ing ingots in metal molds it is usual to employ a crucible furnace of the <(wind furnace® type, the fuel commonly used being coke. Tilting

furnaces are largely used in America. The

oldest method of making brass, still largely used, is as follows : The metal is cast into long narrow ingots of about 1 cwt. each and from 3 to 4 inches wide. The molds are generally made of cast-iron, cast in halves, which are clamped together with wrought-iron rings. The molds are placed below the surface of the floor of the casting shop and are supported against the side of the pit at an angle of about 60

degrees. Boards are placed across for the caster to stand upon while pouring the metal from the crucible into the mold. The metal, after careful skimming, is poured into the mold at the top and when it has set the rings are slipped off the mold and the upper half removed, leaving the casting or ingot exposed. Before the metal is poured into the mold the inside of the mold is well brushed and dressed with resin and cottonseed oil to prevent adhesion, or carbon in a fine state and whale oil are used, which give the mold an even surface. The ingots are next rolled when cold between ordinary flat rolls until the desired thickness is obtained.

The best process of slitting commonly em¬

ployed in America for grades of brass which can only be rolled cold, consists of casting the brass in the form of long bars, either square or round, from 1*4 to 1}4 inches thick. Each of these bars is rolled down separately in the cold state into a rod about Y inch in diameter, or sometimes less, which is afterward drawn into wire. . Pieces weighing from 60 pounds to 70

pounds can thus be obtained. The advantage of this process over the old one is that longer lengths are obtained and labor in the drawing is to some extent saved. A process brought out some years ago in the north of England con¬

sisted in casting in a centrifugal mold about 18 inches in diameter and

mounted on a vertical axis revolving at a high speed, so as to produce a casting in the form of a hoop. This was rolled down in open-ended rolls brought to¬

gether with hydraulic pressure and working in the same manner as those used for rolling out the tires for locomotives and other railway stock. A large thin hoop about three inches wide resulted, which was then cut in circular shears helically, forming a long strip, and this was drawn in the usual way. The great advan¬

tage of this method lay in the fact that a heavy piece was obtained, at the same time having a small section ready for drawing. In France a method often employed of making the ((slittings®

is to roll the metal down into large sheets, which are cut into strips spirally. Another method tried in America consists in casting a solid billet, which is pierced with a suitably constructed mandril to form a cylinder, which is afterward cut up helically and drawn in the usual way.

In recent years continuous drawing machines

have come very much into use. With these

machines, instead of winding the wire on to a block after drawing through one die at a time, the wire is drawn through one die, then wound two or three times round a block and taken through another die, and so on, the friction on each drum being sufficient to carry the wire forward and the circumferential speed of the drums being varied to suit the elongation of the wire. Owing, however, to brass being very quickly hardened by drawing, it is not possible to carry on this process ad infinitum unless the wire be annealed periodically. When once it has been annealed it is possible to effect a very large reduction at one draught, the actual

amount varying with the composition of the

brass, the larger the proportion of copper the greater the reduction at one draught. See

Copper and Brass Industry.

The following table shows the weight in

pounds of sheet brass of various thicknesses: Thickness in

Weight of

sheets per

Thickness in

Weight of

sheets per

inches

square foot

inches

square foot

2.7

It’s

45 95

5.41

1

48 69

8.12

3

51 4

10.76

i . .

54 18

13.48

54

56 85

16.25

■f .

59 55

19.

7

62 25

21.65

65

24.3

9

67 75

27.12

5

70 35

29.77

fl

73

32.46

75 86

35.18

13

78 55

37.85

7

81 25

40.55

II

84

43.29

2 .

86.75

BRASS AND BRONZE WORK — BRASSEY

419

BRASS AND BRONZE WORK. Sec

Bronze and Brass Work.

BRASS ARTS, or BRASSARDS, jointed

plates of steel, protecting the upper arm from the shoulder, which were covered by pauldrons, to the elbows, where they were met by

the gauntlets. These pieces of armor were not

used in the chivalric ages, or in full suits of knightly armor, but in the half armor worn dur¬

ing the wars of Gustavus Adolphus, Wallen¬

stein and the Low Countries, in the times of Cromwell, when plate armor was going out of use.

BRASSES, called also monumental brasses

and sepulchral brasses. From the 13th to the 18th century a certain method of decorating Sir John Eppingham's (1370) Brass at Bloomfield's, Norfolk, England.

graves of European dignitaries consisted of in¬

laying the horizontal upper stone slab with a thick plate of metal called latten, a species of hard brass. The metal had incised inscriptions (epitaphs), usually on the border. The main decoration of the metal, however, consisted of an engraved depiction of the person interned, giving a minute graphic depiction of the cos¬

tume, armor, etc., the deceased wore on state occasions. Connoisseurs and antiquarians are

greatly indebted to these metal engravings for the accurate knowledge they convey as to the costume during the different historical periods of leading members of society.

Experts classify brasses under the follow¬

ing denominations : Monastic brasses, palimp¬

sest brasses, bedstead brasses, heart brasses, canopies, *etc.* As their terms imply, the en¬

graved depictions consist of the following

classes: Monks, friars, abbotts, priors, vowesses are on the monastic

monuments. Some

brasses have been inverted, after years of

usage, and the effigy of a later interred person has been engraved on the opposite surface.

These are palimpsests. ˆBedstead® brasses are those dedicated to women who died in child¬

birth and depict a bedstead, also the infant.

Some brasses are shaped in the form of a

conventional heart ; they commemorate the in¬

terment of the deceased's heart alone. Certain brasses frame the effigy in a ((tabernacle® or canopy supported by tall, slender shafts.

Monumental brasses, so common in the dif¬

ferent periods, have since suffered at the hands of fanatics and ignorant mobs, so much so as to be already extinct almost in France and rare in Germany. English churches, with records

of 150,000, recently had but 4,000 surviving and these rapidly disappearing.

Bibliography. — Boutell, C., (Monumental

Brasses and Slabs) (London 1847) ; Cotman,

J. S., Engravings of Sepulchral Brasses in

Norfolk and Suffolk* (London 1839) ; Mac—

lin, Rev. H. W., (Monumental Brasses> (Lon¬

don 1891); Ward, J. S. M., <Brasses) (Cam¬

bridge 1912) ; Creeny, Rev. W. F., ˆook of Facsimiles of Monumental Brasses of the Con¬

tinent of Europe) (London 1884).

BRASSEUR DE BOURBOURG, bra-ser

de boor-boor, Charles Etienne, French writer on American history, archaeology and ethnol¬

ogy: b. 1814; d. 1874. He entered the priest¬

hood, was sent to North America by the Prop¬

aganda and lived and traveled here and in Cen¬

tral America for a number of years, partly in the performance of ecclesiastical functions.

Among his works are (Histoire du Canada, >

(Histoire des nations civilisees du Mexique

et de l'Amerique Centrale,* (Gramatica de la Lengua Quiche,* (Monuments anciens du Mex¬

ique, } (Etudes sur le systeme graphique et la langue des Mayas.)

BRASSEY, Thomas, English engineer and

railroad contractor: b. Baerton, Cheshire, 7

Nov. 1805; d. Hastings, 8 Dec. 1870. After re¬

ceiving an ordinary education he was, at the age of 16 years, apprenticed to a surveyor, whom he succeded in business. After building parts of the Grand Junction and the London and Southampton railways, he contracted, in

1840, in partnership with another, to build the railway from Paris to Rouen. In a few years he held under contract, in England and France, some 10 railways, involving a capital of $180,-

000,000 and employing 75,000 men. In partner¬

ship with Betts and Peto he undertook the

including the great bridge at Montreal. His army of men were employed in nearly every

part of Europe, South America, Australia, In¬

dia, *etc.* He amassed great wealth, but con¬

tinued to be generous to the needy and modest and simple in his tastes and manners. Sir Ar¬

thur Helps wrote his <Life) (London 1872).

BRASSEY, Thomas, Earl, English politi¬

cian, 1st Baron of Brassey: b. Stafford, 11 Feb.

1836; d. London, 23 Mar. 1918. He was ed¬

ucated at Rugby and University College, Ox¬

ford, and entered Parliament for Devonport in 1865, subsequently sitting for Hastings 1868-85.

He served as civil lord of the Admiralty 1880-84

and was secretary to the Admiralty in 1884—85.

In 1886 he was elevated to the peerage as Baron Brassey and was created an earl in 1911. From 1895 to 1900 he was governor of Victoria. He was an expert yachtsman, held a board of trade master's certificate and traveled over 400,-

000 knots in his yacht Sunbeam. He pub¬

lished Work and Wages5 (1872) ; (The Brit¬

ish Navy> (1881-83) ; 'Foreign Work and Brit¬

ish Wages) (1879) ; (Sixty Years of Progress) (1904).'

BRASSICACEJE (often known also as

Cruciferce), a large family of dicotyledonous plants, the mustard family, consisting of herbs and a few low shrubs with pungent and stimu¬

lating but not poisonous properties. The flow¬

ers have four usually deciduous sepals and four regular, hypogynous petals arranged in such a way as to suggest the form of a cross. Of the six stamens two are shorter than the others and have a lower insertion. The fruit is a two-celled pod, known in its long form as a silique, in its short form as a silicle v>r pouch and, when articulated and separating at the joints, as a loment. The seeds are without albumen ; leaves alternate and exstipulate. The characters of the genera depend upon the pods and seeds. There are about 215 genera and

about 2,000 species of these plants dispersed throughout the temperate regions of the globe.

They are most abundant in Europe and Asia

Minor. Many useful vegetables belong to this family, such as the cabbage, cauliflower, kale, Brussels sprouts, broccoli and kohlrabi, the va¬

rious kinds of turnip and the radish. The

horseradish (Armoracia armoracia) has long

been known as a condiment. The watercress

introduced from Europe now grows wild in

America. The seeds of the white mustard

(Brassica alba) and the black mustard (B .

nigra) are ground for use as a condiment and also for medicinal purposes. Various well-known ornamental flowers belong to the fam¬

ily, such as the wall-flower, the stock, the rocket candytuft, sweet

alyssum, honesty, *etc.* The

curious plant known as the rose-of- Jericho or resurrection-plant (q.v.) is also a member of this family.

BRATIANU, bra-te-an'e, or BRATIANO,

Ion, Rumanian statesman : b. Pitesci, Wallachia, 2 June 1821; d. 16 May 1891. He studied in Paris and on his return to Bucharest was active in the revolution of 1848, which led to the overthrow of the Hospodar, George Bibesco.

Strenuous in his efforts to establish Rumania as an independent kingdom, when Russia and

Turkey intervened, he and others were impris¬

oned and exiled. He lived in Paris until the Treaty of Paris (1856) had adjusted the trou¬

bles of the Danubian principalities. In 1866, when Prince Charles of Hohenzollern became

King of Rumania, Bratianu was appointed

Minister of State but resigned in 1868. From 1876 to 1888 Bratianu was leader of a Liberal cabinet, which on 21 May 1877 proclaimed the independence of Rumania and effected its es¬

tablishment as an independent kingdom 26

March 1881. He resigned as president of the ministry in 1888. He \vas author of 'Memoire sur 1' empire d'Autriche dans la question d'Orient5 (1885) ; (Reflexions sur la situation) (1856) ; 'Memoire sur la situation de la Mol-davie depuis le traite de Paris) (1857), and 'La Question religieuse en Roumanie> (1886).

BRATISLAVA, Czecho-Slovakia, until 1919

the name of the city formerly known as Press-burg (q.v.).

BRATTLEBORO, Vt., town in Windham

County on the Connecticut River, in the south¬

eastern part of the State, on the Boston &

Maine and Central Vermont railways. The

town was first settled in 1724 at Fort Dummer by a garrison from Massachusetts. The settle¬

ment at Fort Dummer was the first permanent civilized settlement in Vermont. The town was chartered in 1753 and incorporated as a village in 1832. Its present form of government is by a board of three selectmen elected annually in March and three village commissioners, elected annually in May. The town is situated in a picturesque, rich farming region; is the trade centre of southeast Vermont and contains the State Asylum for the Insane, Brooks Public

Library and has many fine churches, Brattleboro Academy and an excellent system of high and graded schools. The city has four banks and one trust company, with a capital of $100,-

000, surplus $56,000; two national, with a capi¬

tal of $300,000, deposits $3,500,000; two savings, deposits $6,500,000, surplus $2,000,000. Brattleboro has many manufactories, chief of which is the factory of the Estey Organ Company.

Pop. (1920) 7,324.

BRAUN, August Emil, German archaeolo¬

gist and writer on art : b. Karlsruhe, 19 Aug.

1809; d. Rome, 12 Sept. 1856. He received his early education at his native town and con¬

tinued his studies at Gottingen and Berlin.

From 1832 to 1833 he resided at Dresden,

whence he went to Rome in company with Ger¬

hard, with whom he had formed a close inti¬

macy. In the same year he was appointed first librarian and then assistant secretary to the Archaeological Institute, and in 1834 became editor of the Bulletino and in 1837 of the An-nali of that institution. His views on the sub¬

ject of religion and art are summarized in this, that the principles which have permeated West¬

ern civilization have their derivation in Egypt.

His chief works are (The Judgment of Paris> ; (The Artistic Representations of the Winged

Bacchus 5 ; ‘Ancient Works in Marble,5 1st and 2d decades; ‘The Greek Doctrine of the Gods5 ; (The School of Art Mythology,5 with 100 cop¬

perplate engravings, translated into English by Grant; ‘The Ruins and Museums of Rome,5

constituting an excellent guidebook for artists and antiquarians.

BRALTN, Ferdinand, German physicist

and wireless telegraph specialist : b. Fulda 1856.

After studies at Fulda, Marburg and at Berlin, where in 1872 he gained the degree of Ph.D., kc filled positions at Wurzburg, Marburg,

Strassburg and at Tubingen, where he was

professor of physics for 10 years. He became director of the Physical Institute and profes¬

sor of physics at the University of Strassburg in 1895, refusing later a request to succeed the late Gustav Wiedemann at Leipzig. His ex¬

periments in electricity led to many notable improvements in radio-telegraphy, chief of

which were a method for increasing at will the power of the sending station and a method by the arrangement of the antennae to gain con¬

trol of the direction of effective radiation. Pie received the Nobel Prize for physics, with

Marconi, in 1909.

BRAUN, Julius, German archaeologist, lec¬

turer and author : b. Karlsruhe 1825 ; d. Munich 1869. After studies at Heidelberg and Berlin, he became a lecturer in the University of Hei¬

delberg, at Tubingen and lastly at Munich in the Academy of Arts. His books based on his lectures include (Studien und Skizzen aus den Landern der alten Kultur' (1854) ; (Naturgeschichte der Sage) (1865) ; (Historische

Landschaften) (1867) ; (Gemalde der moham—

medanischen Welt) (1870) ; (Geschichte der

Kunst in ihrem Entwicklungsgange, *etc.* '

(1873), in which he contends that the Ger¬

manic and other northern races derived the

fundamental principles of art and religion

through Semitic, Greek and Roman channels

from early Egyptian sources.

BRAUN, Karl, German liberal leader and

author: b. Hadamar, Nassau, 1822; d. 1893.

His early studies included classical philology and history at Marburg, and law and political economy at Gottingen. In 1859, as one of the founders, he was elected permanent president of the V olkswirtschaftlicher Kongress; from

1859 to 1866 was president of the Nassau Cham¬

ber of Deputies, and in 1863 founded the

Vierteljahrschrift fur V oik swirts draft und Kultur gesdridrte, which he edited until 1887.

Elected to the Reichstag as deputy, he asso¬

ciated himself with the National Liberal, Seces¬

sionist and German Liberal parties, which advo¬

cated German unity and industrial freedom.

A prolific writer, his best known works are (Bilder aus der deutschen Kleinstaaterei' (5

vols., 3d ed., 1881) ; (Mordgeschichten' (2 vols., 1874) ; (Eine turkische Reise) (3 vols.,

1876-78).

BRAUN, Louis, German war painter: b.

Schwabisch Hall, Wiirtemberg 1836. His teachers were his brother and Bernard Nelser in Munich and Horace Vernet in Paris. He saw active

service in the war with Denmark in 1864; the Austro-Prussian War of 1866; and the Franco-German War of 1870-71, and his experiences

were reflected in his works notably in his panoramas of the (Battle of Sedan,' the (Battle of Mars La Tour) and the 'Battle of Liitzen.'

Among his other works are 'Entranceof the

Germans into Orleans' ; (The Germans in Ver¬

sailles' ; 'Entry of the German Army into Paris'

and the ‘Panorama of the German Colonies.’

BRAUNSBERG, Prussia, town in the

province of eastern Prussia, and government

of Konigsberg, on the Passarge, about four

miles from its junction with the Frisches

Haff. It is the residence of the bishop of Er-meland, and has a Roman Catholic Lyceum, a gymnasium, a seminary for priests, a normal school ; and manufactures of linen, woolens, soap, felt, yeast and leather; and a good trade in flax and grain. Steamers ply regularly to Pillau and Konigsberg. . Braunsberg was

founded by the Teutonic Knights in 1250, and came under Prussian rule on the first partition of Poland in 1772. Pop. about 14,000.

BRAURONIA, (1) a name sometimes

given to the Greek goddess, Artemis, from her shrine at Brauron, Attica; (2) a Greek festival in honor of Artemis held every four years at Brauron, in which every Attic woman must

take part, before she could marry. The rites were performed by girls from 5 to 10 years old, and a part of the ceremony consisted in their imitation of the actions of bears.

BRAUWER, brou’er, or BROUWER,

Adrian, Dutch painter : b. Haarlem, or Oude-narde in East Flanders, 1608 ; d. Antwerp 1640.

He made designs of flowers and birds, which were stitched upon caps and bonnets sold by his mother, a poor woman, to the peasants.

Franz Hals, a distinguished painter of Haar¬

lem, happening to see some of these, was so struck by the talent which they evinced that he invited the young artist to receive instruc¬

tions at his house, where he kept him hard at work in a garret, and appropriated to him¬

self the proceeds of his pictures. Here Brauwer remained for many months, ignorant of

the estimation in which his talent was held abroad, until by the assistance of his fellow pupil, Adrian van Ostade, he was enabled to escape to Amsterdam. The discovery of the

reputation he had acquired seems to have

crushed rather than incited his ambition. Per¬

ceiving the prices which his pictures com¬

manded, and his own facility in executing them, he yielded to a natural taste for gross pleas¬

ures, and painted only when it was necessary to procure money to indulge in dissipations.

During the wars with Spain he started on a journey to Antwerp, but being unprovided with a passport he was imprisoned on suspicion of being a spy. The Duke d'Aremberg, a fellow prisoner, recognizing his talent, induced him to paint something. The subject was a group of soldiers playing at cards which the artist sketched from his prison window, and the

picture being shown to Rubens he at once pro¬

nounced it a work of Brauwer, whose release he immediately procured, and whom from ad¬

miration of his genius he received as an in¬

mate into his house. Brauwer's longing for

his old life, however, soon induced him to leave his protector, and after a brief career of reck¬

less dissipation he died in the public hospital of Antwerp. His coloring is good, his facility of execution remarkable and his characteriza¬

tion excellent; so that his composition is nearly always good. He is one of the greatest of the Dutch painters. Among his most notable

works are (Peasants Feasting' ; (Peasants of Moerdyck' ; 'The Smoker' (in the Louvre) ; 'The Drinker' ; (The (little) Smoker' ; tav¬

ern Interior' ; 'Quarrelling Players' ; 'The Politicians' ; 'Spanish Soldiers at Dice' ; Haar¬

lem Tavern Scene' ; several portraits of him¬

self and numerous brilliant landscapes. His

biography by Schmidt-Degeener appeared in

Brussels in 1908. See also Bode, (Great Mas¬

ters of Dutch and Flemish Painting5 (New

York 1909).

BRAVI, bra've, the name formerly given

in Italy, and particularly in Venice, to those who were lˆady to hire themselves out to per¬

form any desperate undertaking. The word

had the same signification in Spain, and both the word and the person designated by it were found in France in the reign of Louis XIII and during the minority of Louis XIV. At the end of the 15th century they are described as being armed to the teeth, with an arquebuse in their hands, a cutlass at their side, masked by a bushy beard and enormous moustaches, and

wearing a long and thick forelock called a ciuffo, which they used to bring down over their face when they wished to conceal it en¬

tirely.

BRAVO, Leonardo, la-o-nar'db1 bra'vo,

Mexican revolutionary patriot : b. near San Luis de Potosi 1766; enlisted in the revolutionary cause, and died of prison fever, in the hands of the Spaniards, in the City of Mexico, in 1812.

BRAVO, bra'vo, Nicholas, Mexican states¬

man: b. Chilpanzingo 1790; d. 22 April 1854.

He participated in the revolution against Spain (1810-21), and later aided Iturbide in establish¬

ing a republic, and supported him until 18 May 1822, when Iturbide proclaimed himself em¬

peror. To this step Bravo was opposed, and he contributed in no small degree to Iturbide's deposition. He again became a member of the provisional government from 1 April 1822 till 10 Oct. 1824, when the Federal constitution took effect, under which he was elected to be Vice-President until 1 April 1829, Guadalupe Vittoria being President. Politicians of Mexico had

now become involved in a controversy in which the order of free masons, divided into two par¬

ties, one known as the Escoses and the other as Yorkinos, contended, the one for a central¬

ized, and the other for a Federal, form of gov¬

ernment. Bravo was grand master of the Scotch division, and when the Federal system prevailed he became a leader of the opposition. Notwith¬

standing this, he had been elected Vice-Presi¬

dent ; but when, on 23 Dec. 1827, the standard of revolt was raised he

became the head of the movement. The purpose of the pronunciamiento was to replace the actual members of the execu¬

tive government with men of the Escoses, and to dismiss Mr. Poinsett, then United States Minister in Mexico, who was charged with too actively favoring the other party. Bravo was defeated and expelled, but was recalled in 1830

by President Bustamante, and sent by him

against the insurgent, Guerrero, who was taken in arms and executed by Bravo's orders, 14

Feb. 1833. After this Bravo remained in retire¬

ment until July 1839, when, as president of the council, he wras charged with the supreme ad¬

ministration of the government during an in¬

terim of a week. Again from 26 Oct. 1842, till March 1843, he was substituted as President in place of Santa Anna, during the latter's ab¬

sence at the head of the army. For the last time he held executive power as temporary

President from 29 July to 4 Aug. 1846, when he was deposed by a revolution. On the com¬

mencement of the war between Mexico and

the United States, he took up arms in behalf of his country, and participated in the battle of Cerro Gordo. In the autumn of 1853 he

was accused by the ministers of Santa Anna of having secretly joined Juan Alvarez in the insurrection he had set on foot ; but he denied the accusation and declared he had retired

from public life forever.

BR AVO-MURILLO, bra'vo-moo-re'ly6,

Don Juan, Spanish statesman: b. Badajoz,

June 1803; d. Madrid, 11 Jan. 1873. In 1825, he entered the College

of Advocates at Seville, and showed great devotion to the monarchy.

When the Progressionists came into power he went to Madrid, and founded a law magazine, the Boletin de Jurisprudencia. With others, he also established later the conservative papers El Porvenir and El Piloto. In 1836, he be¬

came secretary of the Department of Justice under Senor Isturiz, but was proscribed after the revolution of 1840 and took refuge in

France. He returned in 1843 on the downfall of Espartero and in 1847 became Minister of Trade and Public Instruction, and, in 1849-50, of Finance. In 1851 he formed a cabinet, with himself as Premier, but, in 1853, it was super¬

seded by that of General Lersundi. The op¬

pressive measures adopted by Bravo-Murillo

and his successors led to the revolution of 1854, which caused him to leave Spain again, but he was recalled by Narvaez in 1856. In 1868

he was again of the cabinet, but in the fol¬

lowing year went with the Queen when she

was forced to flee to Bayonne.

BRAVURA (bra-voo'ra) AIR, an air so

composed as to enable the singer to show her skill in execution by the addition of embellish¬

ments, striking cadences, *etc.* It is sometimes used to denote the style of execution.

BRAXTON, Carter, signer of the Declara¬

tion of Independence: b. Newington, King and Queen County, Va., 10 Sept. 1736; d. 10

Oct. 1797. He inherited several plantations and passed the early part of his life in the enjoy¬

ment of his fortune, in his native State and in England, where he resided some years. He

was educated at William and Mary College. In 1765 he took an active part in the eventful session of the house of burgesses of Virginia, in which the resolutions of Patrick Henry

were adopted, and in the subsequent assemblies which were dissolved by the governor. He

was next a member of the conventions which were the first step toward the substitution of popular for the royal government, and on 15

Dec. 1775 was elected delegate to the Conti¬

nental Congress, as successor of Peyton Ran¬

dolph, and as such affixed his name to the Dec¬

laration of Independence. He did not remain long in Congress, but served in the legislature of Virginia until 1786, when he became one of the executive council. The close of his life was embittered by pecuniary embarrassments

and the entire wreck of his fortune. Consult Sanderson, (Biography of the Signers of the Declaration of Independence5 (5 vols., Phila¬

delphia 1829).

BRAXY, BRACK, BRECK, BRASCES,

BRAXET. Dysentery in sheep, inflammation

of the coats of the intestines. Spinal apoplexy (in sheep); rapid and fatal; very prevalent in Scotland, England, Norway and France. It is often preceded by diarrhoea and attended by BRAY — BRAZEN SEA

fever and constitutional disturbances. The

word ubraxyw is used to denote several differ¬

ent diseases in animals. The root meaning is generally given as from break, but this is very doubtful; it is more probably derived from the Scotch, middle and northern English, brast,

brasten, bresten — to hasten, to be quick, which is cognate with the Norwegian name brassot.

A sudden change of pasturage, more particu¬

larly from a succulent to a high and dry pas¬

ture, is one of the most frequent causes, and to this may be added exposure to wet and cold after traveling. It is a much more serious disease than simple diarrhoea and often becomes fatal in the course of a few days. The name is also applied to a blood disease resulting from plethora, which is considered by some to be the true braxy. In this case also a sudden change of pasturage is the most frequent cause of the disease, but the change which generally pro¬

duces it is the reverse of that which produces the former, namely, a change from a low diet to rich and nourishing food. This disease is even more fatal than the former, and runs its course in a few hours. As there is no means of saving an animal which is once attacked, the only course is to avoid the causes which lead to the disease.

BRAY, Anna Eliza, English woman of let¬

ters : b. London, 25 Dec. 1790; d. there, 21 Jan.

1883. Her maiden name was Kempe ; she

studied for the stage, but in 1818 was married to Charles A. Stothard, son of the famous

artist, and, after his death, became the wife of the Rev. Edward A. Bray, vicar of Tavistock.

From 1826 to 1874 she wrote a series of novels, one of which, (The Talba, or the Moor of

Portugal, } brought her the acquaintance of

Southey. In 1884 they were collected in a 12-volume edition. She

wrote the (Life of Thomas Stothard) (1856), and many books of travels.

Her letters addressed to Southey, on the super¬

stitions and scenery of Tavistock, entitled (The Borders of the Tamar and the Tavy} (1836;

new ed., 1879), and (A Peep at the Pixies; or, Legends of the West) (1854), are much

esteemed. Mrs. Bray's (Autobiography) ap¬

peared in 1884, edited by Kempe (London 1884).

BRAY, Frank Chapin, American editor

and educator : b. Salineville, Ohio, 1866. Ap¬

prenticed early to a printer, he entered

Wesleyan University, working his way through as printer and reporter, and graduated in 1890.

The year following he became city editor of the Herald (Middletown, Conn.) ; 1892-94 was managing editor of the Morning Despatch of

Erie, Pa. ; for six years was on the staff of the Literary Digest, editing the (Topics of the Day) department; and from 1899 until its incorpora¬

tion with the Independent in 1914 was editor of The Chautauquan, the organ of the Chautauqua Literary and Scientific Circle. In 1906 he was made editor manager of the Chautauqua Press which publishes the study courses of the

Chautauqua circle. He is the author of (A

Reading Journey through Chautauqua) (1905).

BRAY, Sir Reginald, English architect : d.

1503. He was the second son of Sir Richard Bray, one of Henry VPs

privy councillors, and stood high in the favor of Henry VII at whose coronation he was created Knight of the Bath.

Afterward he received the Order of the Garter and was made constable of Oakham Castle. He also received other important appointments and was one term in Parliament. At Blackheath

he won distinction and was given a large estate and created a knight banneret. He is under¬

stood to have designed, if he did not actually execute, the beautiful chapels of Henry VII at Westminster. Another of his works, and now

his final resting-place, is the almost equally beautiful chapel of Saint George's at Windsor.

BRAY, Thomas, English clergyman : b.

Marton, Shropshire, 1656; d. London, 15 Feb.

1730. In 1678 he was graduated at Oxford and soon after appointed as vicar of Over-Whit-acre and the rectory of Sheldon. Having

entered the ministry of the Established Church he founded in 1698 the Society for Promoting Christian Knowledge and in 1700 organized the Anglican Church in Maryland. In the follow¬

ing year he secured a charter for the Society for the Propagation of the Gospel in Foreign Parts. He was rector of Saint Botolph's, Aid-gate, London, from 1706. He devised a system of lending libraries for parish purposes and in 1723 established the still existing Society of Associates of Dr. Bray, which carries on his benevolent undertakings. He published a

(Directorium MissionariunP (1726) ; (An Essay Toward Promoting All Necessary and Useful

Knowledge) (1697), and several lesser works.

In 1901 the Maryland Historical Society pub¬

lished a selection of his writings dealing with Maryland.

BRAY, a maritime town of Ireland, partly

in county Dublin and partly in Wicklow, though mainly in the latter, picturesquely situated on both banks of the Bray, which here forms

the boundaries of these two counties, 12 miles southeast of Dublin. , The town, which has been popularly designated (<the Irish Brighton, w has been much improved in recent years, new houses being built, and a broad esplanade formed.

Pop. about 7,000.

BRAYERA, also known as Cusso or Kousso,

a handsome ornamental tree of Abyssinia be¬

longing to the rose family. Its scientific name is Hagenia Abyssinica. The leaflets number 6

to 12 to each leaf, and its stamens are in sepa¬

rate flowers from its pistils. The bunches of pistillate flowers, made into an infusion, are used in medicine for the expulsion of worms, especially the tape worm. The taste is bitter and unpleasant. The active principle is kosin, which is sometimes given by itself.

BRAYMAN, Mason, American soldier and

lawyer: b. Buffalo, N. Y., 1813; d. 1895. He learned the printer's trade in early life, but took up the study of law and was admitted to the bar in 1836. Removing to Illinois he was em¬

ployed by that State to settle the difficulties with the Mormons of Nauvoo, and secured their removal in 1844. He served in the Federal army during the Civil War, and at its close was brevetted major-general. He was territorial

governor of Idaho 1876-81, and after the last named date practised his profession at Ripon, Wis., until his death.

BRAYTON ENGINE. See Internal

Combustion Engine.

BRAZEN SEA, the copper basin or vase

which King Solomon placed in the priest's

(1) court for the uses of the servitors. It was 5

cubits high and 30 in circumference, and was supported on 12 oxen facing outward. It seems probable that its original purpose was symbol¬

ical rather than practical. King Ahaz removed it to a stone pedestal and it was finally destroyed by the Chaldaeans, who carried off the copper to Babylon.

BRAZEN SERPENT, a bronze or copper

figure which Moses is said to have made and set up before the Israelites for the healing of all who had been bitten by venomous serpents. As this was subsequently superstitiously adored by the Israelites it was destroyed by King Heze-kiah. Among the Phoenicians the serpent was regarded as the symbol of the god of healing.

BRAZIL (Estados Unidos do Brazil, land

of red dyewood, derived through the Portu¬

guese braza, burning coal), is a federal republic bordering upon all of the South American

countries except Chile, and bounded on the

east, northeast and southeast by the Atlantic Ocean. It is nearly three times as extensive as any other Latin American country, and its natural resources are very great. Brazil re¬

quires, for the development of her resources, immigration and new industrial enterprises;

for, in the vast equatorial and Amazonian

regions, rank vegetation defies the efforts of casual settlers. In the following treatment the republic, with its political divisions, history, government, industries, etc., is treated under the following heads:

1. Typography and Climate 7. Commerce

2. Political Divisions and 8. Manufacturing and Min-Population ing

3. History 9. Banking and Finance

4. Government 10. Transportation and Com-

5. Education and Religion munication

6. Agriculture and Forest 11. The Army and the Navy Products

1. TOPOGRAPHY AND CLIMATE.

— The country extends between lat. 4° 22’

N. and 33° 45’ S. and long. 34° 40’ and

73° 15’ W. and the total area is 3,292,000

square miles. Nearly the entire population of the republic is still found on a comparatively narrow strip of land extending southward

along the Atlantic coast from Para, below the mouth of the Amazon, to the line of Uruguay, or on the banks of the Amazon and its chief northern and southern affluents. The white

people have clung to the fringe of the continent which their ancestors took possession of in the 16th century; and (except on the southeastern plateau and along the main water-courses) no civilizing conquest and occupation of the

interior, such as occurred in North America, have been effectively undertaken. The two

largest Brazilian states have less than one in¬

habitant per square mile.

A vast table-land of irregular structure lies behind the seaboard of the south Atlantic,

running from Cape S. Roque to the neighbor¬

hood of the Rio de la Plata, and covering the eastern half of the republic. Beyond this, toward the interior, across immense plains of sandy soil lies the central depression of South America. Toward the

north, from a low, and very ancient, nearly effaced continental divide or watershed, extends the basin of the

Amazon; and toward the south that of the

Parana. In the north the Amazon basin be¬

longs to Brazil; in the south the Parana and Paraguay rivers are Brazilian only in their upper reaches. South Brazil is limited to the belt of table-land. In the north the Amazon, both at its mouths and along the greater part of its basin, is a Brazilian river while to the south Brazil does not even reach the Rio de la Plata, the common estuary of the Uruguay,

the Parana and the Paraguay. The high plains of the interior have never been of economic importance, for the valley of the Amazon has been developed, of late years, to a very slight extent, and its population is as yet small. It is therefore the table-land of the Atlantic sea¬

board, from Ceara to Uruguay, that consti¬

tutes the soil of historic Brazil. Through its length of from 1,800 to 2,200 miles this table¬

land presents the greatest variety of aspect and has no hydrographic unity. Its height is greater in the south, where it reaches 3,200 feet ; and this general slope from south to north is re¬

vealed by the course of the Sao Francisco. In Brazil the name Borburema is employed to de¬

note the northern portion of the plateau. The dry season there is long and the Borburema gives a scant supply of water to the small sea¬

board rivers that flow, fan-wise, into the Atlan¬

tic over a plateau sloping gently to the ocean.

In southern Brazil, on the contrary, the seaward face of the plateau is a huge bank 2,500 to 3,000

feet in height, separating a narrow strip of coast from the inland regions. This long bank or watershed, the Serra do Mar and Serra

Geral, is a barrier which, for a great distance below Sao Paulo, no river pierces. The

streams which rise upon its landward side,

almost within sight of the Atlantic Ocean, cross the whole width of the plateau before they join the Parana or the Uruguay. The Serra

do Mar is not properly a mountain range, al¬

though from the ocean it has the appearance of one. Beyond the serra is Minas, a confused mass of mountain groups. The Mantequeira, a colossal backbone of granite, crosses southern Minas. Across the Sao Paulo frontier there is no more granite, and the landscape grows

tamer. Primitive measures of gneiss and

granite, out of which the Serra do Mar is carved, are hidden under a bed of sedimentary rocks. The topography of the country changes with the geologic structure. The outcrops of sandstone crossed in traveling westward cut

the table-land into successive flats. Irregular ranges turn their abrupter slopes toward the east; and these cliffs of sandstone are locally known as the serrinhas. In Santa Catharina

and Rio Grande do Sul great eruptions of

basaltic rocks cover a portion of the plateau ; the basalt has even reached the seaboard, and south of the island on which Desterro., or Florianopolis, is built, it overlies the granite of the Serra do Mar. The southern flank of the plateau overlooking the prairies of Rio Grande, where the Pampas of Argentina and

Uruguay commence, is also basaltic.

The various regions of Brazil owe their

peculiar character above all to the vegetation.

The forests are concentrated in two regions —the Amazon Valley and a long strip of sea¬

board on the Atlantic coast, from Espirito

Santo southward, where the Serra do Mar,

“receiving the humidity of the ocean winds

upon its dripping flanks, produces far to the south the conditions which have made the

65°

r

B

Marnwhaaa’^

guara/uk

D

V

55

E

50”

G

H

45’

K

VENEZUELANSˆ*

.CV

J KjV-ahmatti

‘-ˆtliariiienbWl

ˆˆBKITIS”

mt7bora|MAj > tK3 ˆ r Waraputa’

sV.i - **

FERD.

0ff£M4]/iMO8

Xlyx-J-T*

4«.

c/t »4 /tkx «rs ˆ

——x **•*’<,*

BaramaX gr Ar (y

Jr (f* A, ˆ

l ‘V$$%

,Pw//# ˆ v*«

js%’ . 1 {,

y v

■CA A’ /

P—

arV

4?. V Mas,

_ ˆ-LˆS. Bento1’

v* /)Wu.

Cu ratio ‘

(dutch g

ACURIAS

Capo d’ Orange

,Cape Cachipur

A TLA

N

0 5

equato’r

5°

de Moz

Ante Alegre

, V eirl

ˆAhTIcSe: s™“’ˆ ■ > ■»•*

> “Plnhelr$ >,“ 1 VM

ita. C»uz/ > Aiveiro Anauhiraby J***? \®8

PJ “

$£ > , .

, a-’f . »13’ (ft:

-,. / v- - - Ttaboe a Cataracts

Village I V.’, CARKMBUS] ‘

®’ 5 TauisigGrandc

Yuruna

Village .Yuruna 4/M/M.S

\ Village ‘,

VCachoeira* \ y, \c> V* . ?■

t/a® Capoeiras \ -fe, ,

;l\ . -£v:

‘-i, ClAJABI’S

&«lB80lr p ;A K) E q s~i s

* «… 10, r Jr—

oria Channel

«vf

ˆTurlun Channel of ˆ gl*

flCabo do Norte At* <(,1ˆ

p

TPta. Grossa .ˆv—

nl. Bailique ‘

ˆ] , 0ˆ,0.

nc;!’ ■» d» S’V’: v? . v

O C E A

vxv;

&sˆ

ˆ ‘

ˆCalror]

‘Mocajubr

＞Baiao

1 Patos ;

k k’obmja

U Artaol’

, Montes Aureoa

Ab**W 8 ”“M,W

;\ (f’v. / V Ubimal Vi ana

A’ x • A \ « / ‘v ˆ jPcualva

Jfl A yu/yˆra,ˆ

lˆsvX ＞ y

H’®g Aij.Sag'.*i»t A £＜► AyiL &

A nnoAa ,V 7 ˆ V’ yy t ˆ

A.

asurir O Tutoja o

Arary, 3no BernmAo “ /’>”l fjnri inV T J ■&

iVitlorlav do Parnbao .”a 7 \kˆc$’

iuˆn,hi”,y)Bati|| VSo!

Biejo0 c&～’-

-AssuTˆ

GuimaracSu,

TIC

N

EQUATOR

CaWract

S. Joao daa duns

i #?x-

— ^ rET.1-) nlx*i nmnbim0,

v o C IE®""}- . HR ■ _

1 Lana '■%> fDdopondeueioc»4'hoel™<'«V>r^, o >" © / C'ear»-MctiiA f. JSx'.remo*

f ^^MHcIalp^raira ° /y : ^TrLuxnj.Ko tijAnu* do MaUoa^NHTw' _ i I ^ V Jagp.riwmlr.y 1^'° GRA^°^D?*NORTE S ' Io"] de VdsnAa^As laJS^wSSi — - — J 7""ra*J p.

'^yS. Mntbeua , / ,^'CajazeiraB _ J\ lo^od V— ,4

>rs>' Vf;.. UrJvMff^f. Ja°r*a4hj ba£#I

Vista

.noa-^f

C A# R fAUi 4^/SchMWo. <

Yuruna Village ! | / I xsk

CatoBi

' g

S?TT

“Aogicee 1 Cape Sao Roque

piArro0 Telxˆlra •-ˆ<m< >Cii>

B U /C 0<tse6queira

ˆt«lbo . ®Ur’LUfc0»r*Dhni

MAN IT- .

SAUAS

ˆ Conceicao ˆ AntoniiK ˆ

,) de Baures deˆuarajua\ ˆ

, ˆ > \ jˆCarmon do Mcijos vs \?»

ˆi”td»aB W K >a I V

_ i%—

\o > Urubioba

io

8. Rafael 8’ Ma”a8f

Xarayes

8. Fernando |”

L. Concepcion L . ‘,

S— •,“aD L. Gaib,

Piarao ‘ *

I E

r ˆ Piquirttlh’Zn.

ci Milagro

20r

12

13

25°

14

15

30° e.

10

ninura \ ‘c Salinas els .

^^SSljy’ t 4-aWtasrdff

— KˆSauceBo MISS i one SJ ˆ

ai—\s7lAcis - -

O Pomabam baa q ueˆ;

Coun^

QUAYCURUS

pto. Vargas

^■■kc^“uTn rv V««,

o^cjssxssi-

6 S. FranoiBoo

8; LorenzooTarija °Pto. de Magarinoo

VI *% ®Itaqrt^

Jj Ao Ro 1 ^J) A

**”” ,,0one®V°‘o’y’ Cara|)arf

c. ^ ■) Bom

sa- .4^. ft; kjesua _ , _

T‘”””^s«-Kr“ ‘AC

f Porto Naeionapp vjCarnKˆ i

Ann */ V-x%.b-a)o-

x . ?a

4ˆˆ

SrA. ANNVOR:

Ba.VANAI?!. Sj

’sf* -＝** nrs

-i ;

Porto

Alegre,

Agiio* BoIIrs

n8ros«＞“’)rf - °

5 jaw’ltix —v*Gzr,-‘:aM*w.?F°r°

~ ritfeEsSs ALAGOASr&VZ lt,

Dcremo.bˆ,/^^ s. SIi,orf ˆAUgotTej

■“ — ITˆKTr*l„pˆ/ J ~

6ERGIPE ‘ˆSfcˆ.a<ˆafl9aijufi6uv

,t»l„«o “O-.-TVs;,, F™«<n««i

icada

do Formosa

rrelroB

vfto Cairo

Potto das Pe3rS%

‘yova ~~

l<5nba v -A,

lonte Santo , X_

LJ ‘ / Xito2>ysl.)>J.>oiubal’ˆrV ■ on , 8, of *•

H y ˆItapieWiˆiˆa ri8t0ˆ<

Z.H

An’ * ˆ ˆ

v vW TˆT

» ˆ - i S LJardim j; ■ -e\

Angical ~)o | = *”ˆ -

” Macau bar

‘SO

SSei

b.0”*

BAK AIRIS (_u I » r < -3 .» ‘&■» »•

fevp V’ * \ˆ ♦>

ˆ — afeA, ft ˆ y 8-.,ˆˆ?ˆ“”“

.tUoio p*»»iTe. ˆ ˆ r s&i ˆ 1

l Slt >

Bom Ifesus \,-JˆSIoao Riacbo Arn***??ˆ ,

il?a°Marfl«n Are sVcSˆ/

ˆ Crubu

oSta./Anni dos

Rio de CdntR3

Caefctfe”

ˆMallibda 0

0Mohte AliˆT.

X-r

v Ss Antonio,

Salvador

(Bahia)

<r«/frnnr*m„

‘rc*’\0*0jMarahll

Matto Qrosso _> V 4&. ˆ

6 “•

% V.

.£4 . .

„ , s .. „

\c ‘ ˆ ; J 5 ‘ .. fjfi. otVEmreri-

‘PMA’ / ► < ■?*?§> v,. -‘ ,‘4’,° MomnhosQ &/ ‘Y)V

s# •’?•• 0 D»t“ 4 a VttJ» j?y e«tadd*

o‘1. X ata. rs/p

Paraoatu

i\zraoati*

Alegreeo

M„ll A; .S’

ˆ cAraaSBuahjˆt

l1 GˆivR - A T SˆS

AlTˆtBI

•\ A*’

eAl Sta. Anna do

N Paranahyba

y ~*au} po Graude.Morada Pjova o| Papagaio ; o S. AntoniˆdoB Patos & >Brm. dt/Pm h..ik-Iw ˆ — - wˆ. ˆ

gemo o Pati-nnin in 1 = N. .9l Concetam SjMlguel -ˆ-Recftnha/ e tVurvello j °J‘ Flgueiraˆ-ˆ- cov

, « -A-Cuilhe0 ,> A

Uberabartraxao ˆeJ/o

. tun Anna „ , r. 8-Sacramento

°Patrocinio

Alrnete

Dorea do IndaiaQ _j | \ 1 1 W ˆf

,Am. I,. ,. .Sia3ˆhˆu W»» .

SBarra do R. de Contas*

/ilbeos

lOlivenca

Couiandatuba

] Cauna vieras

Belmonte

Santa Crut

Iˆorto Segura

”rancoso

JE.S.8S8) >V jtˆ‘ry

Std. Antonio wj - ‘

■*.* ♦*

v’lcoˆaj.

Porto Alegre

ˆBarra de S_. Matheu/

. Matbeus

-Bambuhyˆ

\ ˆ Anbaiduhv Cachcb i

‘/-•v- - i IJrubu-

Punga |J

I Doe Don rad ob

Amambahy’k ■ j ImambaAjj,

Plateau 1 1 Campos dt

0ˆ/ VaeariaSj

Tt’ Vacariai

4,

MBARACA/

Guarapuava Grossi

_Rivgr

-v— -_s~. y Pa/mctras.

Gboplm

J2l

I ˆ»bapuana and R.’

i’Bdrra dol Sao Joao

0

\

CAPRICORN

ParauaiiaTiemaˆˆot1 …

Monte\Alegr,e o ˆ ■ˆ‘Tp’ iab;

Tibagji. (Cpto y’

iSJ ksmˆnˆh£%.

tt-Sft?e,TC°

“-‘Versco

V

ˆ

PaBBO Fundir

ccar!

R*A’

NovaAMe»rbik)li

5Taquei

‘Domingo dafl Torres

BRAZIL and

GUIANA

AND

EASTERN PART OF BOLIVIA

p fiacapava Encrazllbadal/.1

8ta. Anna Sta. •-•«*— ˆ -1

Jagub’ i

jgxKy’

D

55

Ido

dostarda’s

dos j Patos

Scales.

Statute Miles, 240 = 1 luelt.

200 300

Kilometres, 386 = 1 Inch,

Joˆe do Norte I

Graude do Sul

70°

75°

10

Mirim

,agoa da

ranguetra

Victoria -

Palmar

50

longitude West from Greenwich

G

Rand McNally’ 9 New 11 x 11 Map cf Brazil and Guiana.

Copyright by Rond McNally Ac Oo.

20°

12

13

25°

14

15

30°

16

H

45°

K

35

330

s

Amazonian basin the home of the equatorial

I orest." The same impenetrable growth lines the slopes of the serra for a distance of 1,200

miles and encircles Rio. Far inland, or at a distance west of the coast ridge, the basins of the Rio Doce and the Parahyba, as well as the southern and western parts of Minas

Geraes, are afforested. Also in the states of Sao Paulo and Parana forests are found

beyond the serra; and on the plateau they

alternate with prairies. Beyond the agricul¬

tural regions, toward the interior, is the Sertdo, a great land without house or trail.

In his (New Discovery) ((Nuevo Descubri—

miento') Acuna wrote that the climate on the Amazon itself and in all the adjacent country is temperate : to such an extent that there is no heat to prove disagreeable, no fatiguing cold (m frio-que fatigue), nor variations in tem¬

perature. This does not apply to districts in which the mitigating effects of the trade winds are less apparent. The whole interior of Brazil has only steady heat, with a very slight range in temperature throughout the year somewhat

modified by well-defined dry and rainy seasons.

The rainy season begins in September or Oc¬

tober, bringing with it the time of plenty, and for the herds of cattle an abundant pasturage.

March brings back the drought. The vast

regions of the dry and rainy seasons extend toward the south beyond the Tropic of Capri¬

corn ; still farther south the variations of tem¬

perature become more marked. In southern

Brazil frosts occur from June to September.

On the ocean side of the serra there is no alternation of seasons; all the months of the year are alike ; and there are no strictly cool, cold or dry periods.

Observing the action of the trade winds on the temperature of the Amazon Valley, a larger and more characteristic equatorial region,

Mozans writes : <(Although our course was

almost directly under the equator the thermom¬

eter rarely rose above 75° F. One entry in my diary, made near Tabatinga, reads as fol¬

lows: (Temperature at 7 a.m. 68° F. ; at 10 a.m.

67° F. — 'cool enough for a light overcoat. >

Another entry, made near Obidos, reads: (Very cool all day. Temperature from 68° F. in the morning to 66° F. in the afternoon. > Still another observation at 6 o'clock in the evening, on board our steamer in mid-river, gives the remarkably low temperature of 62° F. at Para, which is sometimes supposed to be a place

where one gasps in a fierce, unintermitting, intolerable heat. The maximum heat en¬

countered at the chief towns between Iquitos and Para is never so high as it often is in New York and Chicago, notwithstanding the

difference in latitude of nearly 3,000 miles.®

Entries in the diary of the author of this article give, for various points in equatorial Brazil, a somewhat higher range of tempera¬

tures, with a maximum of 86° F. at noon on a single occasion.

Bibliography. — Acuna, C. de, (Nuevo Des—

cumbrimiento del Gran Rio de las Amazonas)

(Madrid 1641); Denis, P., (Le Bresil au XXe Siecle) (Paris 1909) and (BraziP (trans., with historical chapter by Mr. Miall and a supple¬

mentary chapter by Mr. Vindin, London 1911) ; Hartt, C. F., (Geology and Physical Geography of Brazil > (Boston 1870) ; Mello, H. de, and Mello, F. H. de, (Atlas do Brazil > (Rio de Janeiro 1909) ; Mozans, H. J. (pseud, for

Zahm, J. A.), (Along the Andes and Down the Amazon* (New York and London 1911) ;

Reclus, E., (Nouvelle geographic universelle) (Vol. XIX, Paris 1894); Roosevelt, T.,

(Through the Brazilian Wilderness* (New

York 1914). See Bibliographies subjoined to

other articles in Brazilian series.

Marrion Wilcox.

2. POLITICAL DIVISIONS AND POP¬

ULATION. — The Federation of Brazil con¬

sists of 20 states, the Federal district and the territory of the Acre. In alphabetical order, with their areas and populations, capitals and populations in 1912 they are as follows:

Area

(in square

State miles)

Alag6as . 22,583

Amazonas . 732 , 439

Bahia . 164,643

Ceard . 40,247

Espirito Santo . 17,312

Goyaz . 288,536

Maranhao . 177,561

Matto Grosso . 532,683

Minas Geraes . 221,951

Para . ; . 443,903

Parahyba . 28,854

Parand . 85,451

Pernambuco . 49,573

Piauhˆ . 116,523

Rio de Janeiro . 26,634

Rio Grande do Norte . 22,195

Rio Grande do Sul . 91,333

Santa Catharina . 28,632

Sao Paulo . 112,307

Sergipe . 15,093

Federal District . : . 538

Acrd Territory … ‘ . 73 , 000

Population

848,526

378,476

2,746,443

1,179,197

362,402

428,661

683,645

191,145

4,628,553

809,886

630,171

554,934

1,649,023

441,350

1,325,927

424,308

1,682,736

463,997

3,700,350

426,234

975,818

86,638

The number of inhabitants in the entire

country is approximately 27,000,000, the incre¬

ment being, therefore, 14,000,000 in 27 years, the population in 1890 having been 14,333,915.

The estimated population in 1915 was 26,600,000.

The rate of growth in Sao Paulo is noteworthy.

That state had 837.000 inhabitants in 1872 ; in 1890 it had 1,384,000; in 1900 it had 2,280,000; and during the next 16 years the increase was over 2,000,000. The state capital, also called Sao Paulo, with only 35,000 inhabitants in 1883, grew with the growth of the coffee-trade and the general prosperity of the state so rapidly that in 1907 the number of its inhabitants was 340,000, and in 1916 about 400,000. The growth of population in Acre territory's seringa

forests is also rapid. But such increment as is noted seems slight in view of the fact, emphasized in Bryce's (South America,* that ((taking Brazil as a whole, no great country in the world owned by a European race possesses so large a proportion of land available for the support of human life and productive industry.®

The same observer is authority for the state¬

ment that one can hardly reckon the true

Brazilian white nation at more than 7,000,000, the other elements being negro, colored, ab¬

origines of the Amazonian forests, half-breeds, *etc.* ; and, finally, the

foreign element, more im¬

portant by reason of its energy and industry than on account of numbers, since it probably little exceeds 1,000,000. Substantial increase may be anticipated at Porto Alegre, Pelotas, and the city of Rio Grande do Sul, the three gateways on the Atlantic coast giving access to the rich agricultural plateau of the southern¬

most Brazilian state.

For abstracts of census reports of popula-

tion, consult the Brazilian Year Book5 and

publications of the Pan American Union; for descriptions of the inhabitants of large cities and towns, and for studies of native races, the accounts of travel or exploration mentioned in bibliography under History.

The number of immigrants entering Brazil

from 1908 to 1916 was 926,282. These include 354,820 Portuguese, 190,767 Spaniards, 153,950

Italians, 49,477 Russians, 41,534 Turco-Arabs, 33,578 Germans, 21,843 Austrians, 15,773

Japanese and 9,207 French.

Brazil has for years past welcomed foreign

immigrants and has made considerable effort

to turn the tide of European emigration to her own shores. From 1820 to 1915 the number of immigrants officially entering Brazil is given as 3,363,456, or an average of 35,400 per year.

But this official statement covers only a part of the immigration, that part entering the

country through the ports of entry; but it takes no account of the population that is and has always been coming across the borders of the country from neighboring Latin-American

nations during the past century. In all cases of population it is probable that the government estimate is rather under than over the mark owing to the fact that vast stretches of the inland territory of the republic are never visited by the census taker. The Old World immi¬

grants entering Brazil in 1915 were as follows: Portuguese, 15,118; Spaniards, 6,895; Italians, 5,778; Russians (principally Poles), 640;

Syrians, 514; French, 410; English, 311 ; Austro-Hungarians, 104. The total officially reported immigration during the year was 30,287. But here again the Latin-American immigrants are not recorded. Help in the way of subventions was extended to 17,709 of the officially reported immigrants by the Brazilian government, which has for some years past expended considerable money and effort to attract the better class of immigrants. Since 1825 Germans have been

going to Brazil where they have helped to

develop the coffee and rubber interests, among various other activities. In the southern states of Rio Grande do Sul, Santa Catharina and

Sao Paulo, they have formed important colonies which have been fostered by the Brazilian and German governments and the German steam¬

ship company. To these and to other immi¬

grants the Brazilian authorities in the latter part of the 19th century extended free passage from their homes in Europe to their destina¬

tion in Brazil together with cheap land ($1 to $2 per acre) and seeds, provisions and imple¬

ments for the first crop. They had from 7 to 10 years in which to pdv for the land. But Germans, Poles, Italians, Portuguese and

Spaniards flooded into the country, and the government soon began to restrict the privileges and inducements offered to immigrants. Finally it gave a different complexion to the immigra¬

tion question by the passage of an immigration law encouraging the formation of strong

colonization companies to whom vast stretches of land were offered at very cheap prices on the condition that they should be settled with immigrants at the expense of the operating

company which was to receive a subvention of $320 for each family brought into the country and settled on these lands. To encourage the opening of ways of communication a subven¬

tion of $700 per mile was offered for roads built. Political troubles two years later inter¬

fered with immigration and discouraged the

numerous colonization companies which had

taken advantage of the new law. Since then immigration into Brazil has been slow com¬

pared wth the vast extent of the country,

though some years, as 1911, for instance, re¬

corded many newcomers (136,000). Lately

the Brazilian government has begun to extend help to immigrants once more.

J. H. Cornyn.

3. HISTORY — Brazil was discovered in

1500 by a companion of Columbus, Vicente

Pinzon, who made no settlement, and, indeed, would not have been justified in doing so. The bull of Pope Alexander VI (4 May 1493) had bestowed upon Portugal the lands which should be found cast of the line of demarcation, and commissioners of Spain and Portugal had

agreed, on 7 June 1494, that the position of the line of demarcation should be changed so that it should pass, north and south, 370

leagues west of the Cape Verde Islands, instead of at a distance of only 100 leagues west of those islands, where the Pope had established it. Accordingly Spain was precluded by her

own act from claiming the eastern portion of the continent of South America. A Portuguese commander, Pedro Alvarez Cabral, when on

his way around the Cape of Good Hope to the Far East, in 1500, encountered severe storms which drove his vessels from their course; and through this mischance he reached the Brazilian coast in April. Mass was celebrated there on Easter Day; the country wras declared a de¬

pendency of Portugal, and a stone cross was erected. There Cabral himself embarked for

India, but first sent a vessel to Lisbon wfith a report of this important discovery. As soon as practicable after receiving the account of his new possession, Dom Manoel placed three vessels under the command of Amerigo Ves¬

pucci, instructing this Florentine to make good Portugal's claim to the land which a Spaniard had discovered. Thus, from the beginning,

Brazil was marked out as a field for inter¬

national competition. Vespucci's first voyage being unsuccessful, a second was undertaken

with better results. He remained for five

months at a point he named ((A11 Saints,® and when it became necessary to return left 12 men as a garrison in a small fort. The impression created by the experiences of the early ad¬

venturers was not highly favorable. Poor and unattractive, indeed, did this land seem in com¬

parison with India and Africa. During the

years that followed Portuguese merchants dis¬

patched vessels to trade for Brazil-wood, and the Portuguese government jealously resisted

French and Spanish attempts to gain a foothold or carry on commerce eastward of the line of demarcation ; but the court at Lisbon continued to prefer the profits to be won along the course that Vasco da Gama had opened up. The first settlements, therefore, were not made by the government, but by grantees whom the govern¬

ment induced to colonize by assigning to each leader a splendid possession, or ˆcaptaincy® —no less than 50 leagues of coast, with feudal powers and the privilege of extending his

domain as far inland as he desired. Thus the province of Sao Paulo was settled by an expe¬

dition under Piratininga; next Affonso de

Sousa explored the coast from Rio de Janeiro (so called because it was discovered 1 Jan.

1531) to the Rio de la Plata. Lopez de-Sousa received two allotments of 25 leagues each, one being near Pernambuco and Parahyba. Fer¬

nandez Coutinho and Pedro da Campo Tourin—

ho established themselves near the spot where Cabral landed. Francisco Pereiro Coutinho

received a grant of a captaincy, extending from Rio Sao Francisco to Bahia. ‘The captaincy of Pernambuco was given to Duarte Coelho

Pereira; and so the most attractive portions of the coast were

distributed. Cattle and sugar¬

cane being introduced from Madeira, the

systematic cultivation of the latter began.

Enormous difficulties were encountered from

the first by proprietors and planters. Only men of large means, among them adventurers

who had amassed fortunes in India, were able to equip and maintain such a considerable force as was necessary to make these undertakings successful. The natives were, as a rule, ex¬

tremely mistrustful, savage and little inclined toward civilization. In fact the task of civiliz¬

ing them seemed utterly hopeless. Yet one

striking exception to the general experience may be noted. The first settler in Bahia was Diogo Alvarez, a young man of noble family, who was wrecked on the shoals near that port.

(<Part of the crew,® says Southey, ((were lost, others were eaten by the natives.® Diogo

secured the favor of the Indians by recovering things from the wreck. Afterward he led them in battle, using his musket to such good effect that he became their sovereign, and took

daughters of the chiefs of the savages to be his wives. ((The best families in Bahia,® we are told, ((trace their origin to him.®

By the middle of the 16th century the

captaincies of those men whose names have

been mentioned, and those of other adventurers, were scattered along the coast from the mouth of the Amazon to that of the Rio de la Plata.

The great mineral wealth of the country had not been discovered at that time, and the

settlements were chiefly devoted to the cultiva¬

tion of sugar. What with savages surrounding these widely separated posts ; Spaniards

threatening them from the rear (the Spanish troops then holding the regions afterward to be known as Paraguay and Argentina) ; and

the French from time to time attempting to establish themselves on the coast ; it was found necessary to provide for the common defense by concentrating the Portuguese power in the hands of a governor-general. The feudatories had to submit to the revocation of some of their privileges, though they remained on the soil which they owned.

The first governor-general was Trome da

Sousa, and his capital was Bahia. In 1549 he was reinforced by a fleet of six vessels with 320 soldiers and officials, 400 convicts, 300 free colonists and 6 Jesuits. At different times wards of the Crown, female orphans of good family, were sent out, provided with portions from, the royal estates, and given to the

provincial officers in marriage. The establish¬

ment of the College of Sao Paulo in Piratininga followed hard upon the arrival of the first bishop of Brazil in 1552, and of a number of Jesuits in 1553. Avowed friends and protec¬

tors of the natives, these members of the

Society of Jesus took upon themselves the

pioneer's task, and their college became a

centre of influence. Intrusive French settlers at Rio de Janeiro were driven out by the

governor, and a Portuguese colony was founded there in 1567. But the progress of Brazil, in so far as it was dependent upon the aid of the mother country, was checked, if not entirely arrested, during a period of 60 years. Philip II of Spain acquired the crown of Portugal in 1578-80, and the union of the two countries —or rather, the subordination of the weaker

nation — 'Continued until 1640. Brazil received little attention during

all these years, in part because she was identified with Portugal, but still more for the reason that her inferiority to the Spanish possessions in mineral wealth was taken for granted. The transfer of al¬

legiance invited attack by English fleets. In 1586 Witherington sacked Bahia; Cavendish,

in 1591, burned San Vicente ; Lancaster, in 1595, captured Olinda. A futile attempt to

found a permanent colony was made by the

French (1612-18), and the Dutch dispatched a fleet against Bahia in 1624.

The Dutch in Brazil. — Most important

were the efforts made at this time by an asso¬

ciation of Dutch merchants, the famous Dutch West India Co., which commissioned Count

Maurice of Nassau to promote the interests of his countrymen in South America. The enor¬

mous power of this corporate company, which, as Bancroft says, was ((given leave to appro¬

priate continents,® and, when (<invested with a boundless liberty of choice, culled the rich territories of Guiana, Brazil, and New Netherland,® was exerted in a large part of the region lying between Maranhao and Bahia. After the revolution of 1640, Brazil was, indeed, no longer Spanish, but the new Portuguese executive of the house of Braganga was too poor and weak to adopt such vigorous measures as were re¬

quired. Accordingly a suggestion offered by

a native of Madeira named Vieyra was wel¬

comed, inasmuch as this plan relieved the gov¬

ernment of the obligation to fight the Dutch West India Co. Vieyra proposed the estab¬

lishment of a commercial company at Lisbon

similar to that which had its headquarters at Amsterdam. The Brazil Co. of Portugal was

organized, and in 1649 sent out its first fleet.

After five years of severe fighting, the Portu¬

guese merchants overcame the Dutch mer¬

chants.

For half a century Brazil was permitted to remain at peace. In 1710, however, a French squadron under Duclerc attacked Rio de Janeiro and suffered defeat. On 12 September of the following year Admiral Duguay Trouin arrived off Rio with a new fleet and 6,000 men. The governor was compelled to capitulate and to pay a large sum of money. A great change in the industrial conditions of the southern dis¬

tricts was produced by the discovery of

diamonds at this time (1710-30), and by the rush to the gold regions opened up by the enter¬

prise of the colonists of Sao Paulo, a hardy race, with a large admixture of Indian blood, much addicted to adventurous raids into the interior. Their explorations extended westward into Paraguay and northward into Minas,

Goyaz and Cuyaba in the state of Matto

Grosso. Gold was discovered in the regions

last mentioned; by the beginning of the 18th century there were five towns of considerable 428

importance in Minas Geraes ; and that state is now one of the most

populous of all. Laborers were withdrawn from the sugar industry by the superior attractions of mining, and Brazil lost her leading position as a sugar-producing

country. The conspiracy of Minas in 1789 was the first sympathetic movement in Brazil occa¬

sioned by the Revolutionary War in North

America. Inspired by the success of the English colonies in achieving independence, the inhabit¬

ants of Minas formed a project to throw off the Portuguese yoke, but the plot failed, the leader was hanged and the conspirators were banished to Africa, from which continent slaves were being imported in large numbers. It was an un¬

profitable exchange for America. The French

Revolution, among its extraordinary conse¬

quences, promoted Brazil from the humble posi¬

tion of a colony to be the seat of government of the Portuguese power, and the only Ameri¬

can monarchy. In 1807 the threat of the inva¬

sion of Portugal by Napoleon sent the prince regent, afterward King John or Dom Joao VI, across the ocean (29 November). With him

went the Queen, the royal family, the great officers of state and members of the nobility.

He created many new offices, and otherwise

made the machinery of government in Brazil

much more elaborate than it had ever been ; and, to meet the increased expenses that these

changes involved, at first imposed new taxes, and afterward, by debasing the money standard, inaugurated the long period of financial error that impeded the advancement of the country.

On the other hand, Brazilian ports were de¬

clared open to the commerce of all nations at peace with Portugal. Thus John favored in¬

dustrial development and injured it at the same time. Numbers of artisans and manufacturers

from England, Germany, France and Sweden

came to take advantage of the new opportunity.

In 1816 the School of Fine Arts was founded by French painters and sculptors. The occupation of Portugal by French troops was offset in the new world by the incorporation of French

Guiana with Brazil (1809) ; but the treaty of Vienna in 1815 restored Guiana to France. On 16 Jan. 1815, the title of kingdom was conferred upon Brazil ; and an important extension of the domain of this unique American monarchy was effected six years afterward, when Uruguay was united with it under the title of the Cis-platine State. But this union, like the occupa¬

tion of French Guiana, was destined to be tem¬

porary, owing to the policy adopted by Argen¬

tina. See Argentina.

Independence Proclaimed. — The general

movement in favor of independence that trans¬

formed the Spanish colonies north, south and west of Brazil into republics produced con¬

spiracies and plots in Bahia and Pernambuco.

Troops were brought out from Portugal to

restrain every violent manifestation of the re¬

publican spirit. Meanwhile, however, in Portu¬

gal itself the revolution of 1820 had led to a modification of the old

autocratic system, and the forces from that country, openly sympathiz¬

ing with the aspirations of the Brazilian

people, compelled King John to yield. The

latter withdrew from America soon afterward

(26 April 1821), leaving his son, Dom Pedro, to work out the problem in Brazil as best he might. The attitude of the Cortes of Portugal in this crisis was exceedingly unwise: instead of offering concessions, it directed the dissolu¬

tion of the central government, and ordered Dom Pedro to return to Portugal. Assured of the support of the people of Rio de Janeiro and Sao Paulo, who requested him to disobey this command, Dom Pedro proclaimed the independ¬

ence of Brazil, 7 Sept. 1822. He became con¬

stitutional Emperor the following month. In

the hostilities which ensued the Brazilians were so successful that independence was assured

before the end of 1823. The constitution of the empire was adopted on 25 March 1824. But a peculiar situation in the ruling family re¬

mained to be disposed of. Since October 1822, Dom Pedro had been Emperor of Brazil, while his father was King of Portugal. The dramatic climax occurred 25 Aug. 1825, when a treaty was signed in London by virtue of which King John first assumed the title of Emperor of Brazil and then immediately abdicated in favor of his son. As the popularity of Dom Pedro I was due to the disposition he showed at first to accede to the wishes of the liberals, so it is necessary to ascribe his loss of popularity in the years 1826-31 to his unwillingness to trust the people more and more, as their demand for participation in the government steadily in¬

creased. The statement found in some recent histories, to the effect that Pedro I was a brutal tyrant, whose reign ended in public disgrace, is incorrect. It was his tact that saved the mon¬

archy in 1821 ; but the growth of republicanism in the next decade was much more rapid among the people than at his court, and finally

the breach became so wide that no course was left to him but to surrender his crown before the succession of his son, the 2d Pedro, should be disputed, and to take ship for Lisbon, where it had become a duty to defend the claim of his daughter, Maria II, to the throne of Portugal.

At any time after 1810 outrageous tyranny on the part of Portuguese rulers would have

thrown Brazil into the advancing column of

revolutionary states. The significant facts are, that Pedro I was able to postpone the inevitable change for 10 years, and that Pedro II (whose majority was proclaimed 23 July 1840) suc¬

ceeded in maintaining the monarchical form in America until 15 Nov. 1889. The regency by which the affairs of Brazil were administered (1831—40) was much like a republican govern¬

ment, especially after 1834. Probably it would have been impossible to revert to a monarchy if the weakness and misconduct of the regents had not brought discredit upon everything

savoring of democracy.

The suppression of the revolution of 1848;

discontinuance of the importation of slaves, in 1853 ; and the creditable part taken by Brazil in thwarting the ambitious designs of the

Argentine dictator, Rosas (see Argentina) —

these are the chief events before 1855. In that year a Brazilian squadron was sent to settle a dispute with Paraguay as to the right of way for Brazilian vessels on the Parana River. This river which rises in Brazil, flows beside Para¬

guay, and finally through the territory of Argen¬

tina, it was declared should be open to the com¬

merce of all three nations equally. The war¬

ships failed to accomplish the desired result, and for a decade

and the United States. In 1865 an outrage by Lopez, the dictator of Paraguay, brought on a war in which Brazil, Argentina and Uruguay

were allied against the offending country (see Paraguay). This bitter struggle, protracted

until 1870, cost Brazil the lives of many thou¬

sands of her citizens, and about $300,000,000. In the year following the restoration of peace a law was enacted for the abolition of slavery, the growth of which had been checked in 1853.

It was provided that thenceforth every child born of slave parents should be free.

Brazil a Republic. — A bloodless revolution

terminated the reign of Dom Pedro II, and the Federal republic was proclaimed, 15 Nov. 1889.

A provisional government, instituted for this purpose, published (24 Feb. 1891) the consti¬

tution of (<The United States of Brazil,® re¬

sembling that of the United States of America in nearly every respect, though Brazilian

senators serve for nine years, like those of Argentina, while the President's term of office is but four years. Marshal Deodora da Fon¬

seca, head of the provisional government, was confirmed in the presidency by the Constitutional Congress, and Gen. Floriano Peixotto was

elected Vice-President. The next President (15

Nov. 1894) was Prudente de Moraes Barros.

The 3d President, Dr. Manoel Ferraz de

Campos Salles, was elected for the term be¬

ginning 15 Nov. 1898. His successor, Senor

Francisco de Paula Rodrigues Alves, inaugu¬

rated 15 Nov. 1902, made a statement of the national policy in his inaugural address which may be summarized as follows: A good

financial condition in the republic is of prime importance ; but scarcely less essential are re¬

forms in the laws applicable to civil suits and elections. Agricultural and commercial condi¬

tions must be improved, and endeavors made to attract immigration and capital. Modern

systems of sanitation must be installed at the ports, including Rio de Janeiro. The aug¬

mentation of the army and navy may be under¬

taken when the condition of the treasury war¬

rants such expenditures.

It will be readily understood that the cir¬

cumstances to which reference has been made in this sketch, such as the issuance of large amounts of paper currency, which it was for¬

merly the fashion to call irredeemable ; the change from the basis of slave to free labor; the overthrow of the monarchy; foreign wars, and rebellions in one state after another, have combined to depress Brazilian credit and retard industrial development. To these unfavorable

influences must be added the decline in the prices of coffee, Brazil's staple product, and of sugar, her chief reliance in times past. On the oilier hand there is observable a tendency toward greater stability in

the national policy; a large amount of paper money was, before

1903, called in and destroyed; and interest has been shown recently in efforts to develop the enormous natural resources of the country and to maintain standards of health in the chief ports. In November 1903 the dispute with Bolivia in regard to the Acre region was ter¬

minated, Bolivia surrendering her claims to

73,750 square miles on or near the Acre River in return for 886 square miles on the affluents of the Madeira and Abuna, 335 square miles on the left bank of the Paraguay, and the sum of $10,000,000 which Bolivia has expended with excellent results for the construction of rail¬

ways.

Brazil, by virtue of the same agreement

(Treaty of Petropolis, Article 7), was placed under an obligation which has been scrupulously discharged, namely, (<to build on Brazilian terri¬

tory, by herself or by a private company, a rail¬

way® which, in brief, supplies an outlet to the Madeira and Amazon for Bolivian products.

In June 1914 the dispute with Great Britain over the frontier of British Guiana was ended by the award of the arbitrator, the King of Italy, who gave 14,000 square miles to Brazil and about 19,000 square miles to the other con¬

testant. In 1906 Dr. Alfonso Penna was elected President. An international conference was

held at Rio de Janeiro 23 July to 27 Aug. 1907.

The occasion was made memorable by the

formal visit of Elihu Root, Secretary of State of the United States. President Penna de¬

creed, 13 Jan. 1908, a reduction of the tariff duties on several American products, in return for the favor shown by the United States

to Brazilian coffee. An arrangement was made

with the Imperial Emigration Company of

Tokio for bringing over 3,000 Japanese colonists within two years at the expense of Brazil (see article Labor). President Penna died 14 June 1909 and was succeeded by Vice-President

Peganha. Marshal Hermes da Fonseca was

elected to the presidency 1 March 1910. On 22 November the crews of the warships Minas Geraes and Sao Paulo mutinied in the harbor of Rio. These vessels were surrendered to the government 27 November. Baron Rio Branco

died in 1912, and was succeeded as Foreign Minister by Gen. Lauro Muller. In 1913

relations between the United States and Brazil were strained in consequence of the action

filed by the administration of the former

country against the Brazilian committee in

charge, of the valorization of coffee. After the dismissal of the valorization suit, Brazil restored the preferential tariff on American products, which had been suspended during

the dispute, and Gen. Lauro Muller returned Secretary Root's visit. In 1914 Vice-President Wenceslao Braz was elected President. In

May 1915 a treaty of alliance was signed at Buenos Aires by representatives of Brazil,

Argentina and Chile. Three months later

Brazil was associated with the United States, Chile, Argentina, Uruguay, Bolivia and Guate¬

mala in efforts to restore law and order in Mexico. In 1916 Brazil continued to feel, more than other Latin American countries, the ex¬

tremely injurious effect of the scarcity of ships, withdrawal of credits, soaring prices and de¬

clining rate of exchange which the European War occasioned. This

subject is examined in its proper connection and relations in the

articles Commerce and Banking and Finance.

War with Germany. — When Germany an¬

nounced her program of unrestricted submarine warfare in February 1917 the Brazilian govern¬

ment protested, stating at the same time (13

February) that the German government would

be held responsible to Brazil for all the conse¬

quences thereof and threatening to break dip¬

lomatic relations in the event of a subma¬

rine attack against a Brazilian vessel. On 4

April the Parana, a Brazilian vessel, was tor¬

pedoed without warning, and six days later the Brazilian government severed diplomatic rela-430

tions with Germany in accordance with the

terms of its note of 13 February. On 28 April 1917 Brazil issued a proclamation of neutrality with regard to the war between the United

States and Germany. The Brazilian Congress

met on 3 May 1917 and on the 22d of the same month the President in a message recommended the revocation of the proclamation of neutrality, wishing to emphasize the solidarity of Brazil with the United States. Other sinkings of

Brazilian vessels aggravated the situation be¬

tween Germany and Brazil. On 29 May the

President was authorized by Congress to with¬

draw the decree of neutrality and to utilize the German ships which had been taken in charge about a month before. On 29 June the decree of neutrality of 4 Aug. 1914 with regard to the war between Great Britain and Germany was

withdrawn. American and Entente warships

were now free to enter Brazilian ports and an American fleet visited Rio, where it received a great ovation. Brazil's navy cooperated with that of the United States in patrolling the south Atlantic. On 25 October President Braz sent a message to Congress stating that Ger¬

many had virtually brought a state of warfare on Brazil and recommended that Congress au¬

thorize a formal declaration of a state of war.

On the 26th, therefore, by a vote of 149 to 1

and a unanimous vote in the Senate, such a declaration was authorized and a state of war was proclaimed on 27 October. See Latin

America and the War.

Bibliography. — Acuna, C. de, (Nuevo Des—

cubrimiento del Gran Rio de las Amazonas)

(Madrid 1641, reprint, 1891) ; the same in 'Voyages and Discoveries in South America)

(London 1698) ; Agassiz, L., and Mrs. Agassiz 'A Journey in Brazil5 (Boston 1896) ; Baldaque da Silva, A. A., <0 Descobrimento do Brazil por Pedro Alvares) Cabral (In: Acad, real das sci. da Lisboa. — com. portugueza da Exposigao Colombina, Lisbon 1892) ; Bates, H. W., (The Naturalist on the River Amazon 5 (London

1875) ; Bennett, F., 'Forty Years in BraziP

(London 1914) ; (Brazil and Bolivia Boundary Settlement5 ; treaty

signed 17 Nov. 1903 (New York 1904) ; Brown, C. B., and Lidstone, W., ‘Fifteen Thousand Miles on the Amazon and

its Tributaries) (London 1878) ; Bruce, G. J., ‘Brazil and the Brazilians) (New York 1914) ; Bryce, Viscount James, (South America; Ob¬

servations and Impressions) (New York 1912) ; Buley, E. C., (North BraziP (New York 1914) ; Buley, ‘South BraziP (London 1914) ; Clemenceau, G., (Notes de voyage dans l’Amerique du Sud) (Paris 1911); Cook, W. A., ‘Through the Wilderness of Brazil by Horse, Canoe, and Float5 (New York 1909) ; Denis, P., (Le Bresil au XXe Siecle5 (Paris 1909), and ‘Brazil5

(trans., with historical chapter by Mr. Miall and a supplementary chapter by Mr. Vindin, London 1911) ; Fabius, A. N. J., ‘ Johan Maurits, de Braziliaan) (Utrecht 1914) ; Glass, F. C., ‘With the Bible in BraziP (London 1914) ; Grossi, V., (Storia della Colonizzazione Europea al Brasile e della Emigrazione Italiana) (Milan 1914) ; Lange, A., (In the Amazon Jungle5 (New York 1912) , and (The Lower Amazon> (ib. 1914) ; Levasseur, E., avec la collaboration de MM. de Rio Branco, E. Prado… (Le Bresil5 (Paris

1889 and 1890) ; Oakenfull, J. C., (Brazil in 1913 > (Frome, England 1914) ; Pedro I, Em¬

peror of Brazil, (Corresp. de D. Pedro Premier avec le feu roi de PortugaP (Paris 1827) ; Reyes, R., ‘The Two Americas5 (New York

1914) ; Robinson, G. W., ed., ‘Brazil and Portu¬

gal in 18095 (Cambridge 1913) ; Roosevelt, T., ‘Through the Brazilian Wilderness5 (New

York 1914) ; Southey, R., ‘The History of

BraziP (3 vols., London 1817-22) ; Stade,

(Captivity Among the Wild Tribes of Eastern BraziP (Hakluyt Society 1874) ; Tomlinson, H.

M., ‘The Sea and the Jungle5 (London 1912) ; Vespucci, Amerigo,

(The First Four Voyages5

(reprinted in facsimile and translated from the rare original edition, Florence 1505-06, London 1893); also (Mundus Novus: ein Bericht A.

Vespucci's an Lorenzo de Medici fiber seine Reise nach Brasilien in den Jahren 1501-02 5

(Strassburg 1913) ; Wallace, A. R., 'A Narra¬

tive of Travels on the Amazon and Rio Negro5

(London 1853) ; Walle, P., (Au Bresil du Rio Sao Francisco a l'Amazone5 (Paris 1910), and (Au pays de l'or noir5 (Paris 1909) ; Whiffen, T. W., (The NorthWest Amazons5 (London

1915) ; Wilberforce, E., 'Brazil Viewed

Through a Naval Glass5 (with notes on

slavery, etc., London 1856) ; Woodroffe, J. F., 'The Upper Reaches of the Amazon5 (London

1914) ; Zahm, J. A. (H. J. Mozans), 'Through South America's Southland5 (New York and

London 1916).

Marrion Wilcox.

4. GOVERNMENT OF BRAZIL. The

system of government established after the

bloodless revolution of 1889, and under the constitution of 1891, has already been men¬

tioned and in part characterized (see History).

The official title of the nation, The United States of Brazil (Estados-

Unidos do Brazil), conveys at a glance the correct impression that we are dealing with a Federal rather than a centralized republic; but its constitution re¬

sembles that of the United States of America, and the rights of the states of Brazil are em¬

phasized, probably somewhat over-emphasized ;

so a situation has been created similar to that which would be found in the United States .

of America if the question of broad or strict construction of the constitution, that dividing line between political parties, had been deter¬

mined chiefly in favor of the states' rights.

The President and Vice-President are elected by direct vote for a term of four years, and may not be reelected for the term immediately fol¬

lowing. The President's salary is 120,000 milreis (or about $38,000). He is assisted by a cabinet of eight ministers whom he appoints. The

ministries correspond to the departments of

Justice, Interior and Public Instruction, Foreign Relations, the Navy, War, Communications and Public Works, Finance and Agriculture^ In¬

dustry and Commerce. The legislative power is vested in the National Congress, which em¬

braces the Senate (63 members, three for each state and three for the Federal district, elected by district vote for nine-year terms : member¬

ship renewed by thirds every three years) and the Chamber of Deputies (elected in the same manner as the senators, but for terms of only three years, and in the proportion of one for every 70,000 inhabitants, no state, however, being represented by less than four deputies).

Congress meets annually on 3 May for four

months, but may be prorogued or called in

extends to all male citizens over 21 years of age, duly enrolled, except beggars, illiterates, soldiers actually serving and members of mo¬

nastic orders under vows of obedience. The

President must be a native of Brazil over 35

years, of age. In legislation relating to taxes, the initiative belongs to the Chamber of

Deputies. There is a Supreme Federal Court

of Justice at Rio de Janeiro, and a Federal judge in each state. The former consists of 15

justices appointed by the President with the advice and consent of the Senate; the Federal judges are appointed upon the Supreme Court's recommendation, justices and judges alike hold¬

ing office for life. There are also, for purely local or unimportant matters, municipal magis¬

trates and justices of the peace who are elected for four years.

State governments resemble the Federal in

having separate administrative, legislative and judicial branches; and the design has been to prevent loss of independence by any one of these, or the subordination of all to the national executive. The latter, accordingly, has not the extensive powers of appointment and control

which are exercised by presidents of some of the more centralized South American republics.

Governors of states and members of state leg¬

islatures hold elective offices, and to the former is assigned the appointment of magistrates who are not removable from office save by judicial sentence. Each state is governed in accord¬

ance with its own constitution and laws.

These must, of course, never conflict with the constitutional principles of the Union; and it is provided that, in case of such infringement by state authorities, the Federal government shall, by force of arms if necessary, intervene to con¬

trol the offending state. But not otherwise is intervention conceded as a Federal right. The Federal district is administered by a council elected by qualified voters, and the municipal executive authority there is exercised by a pre¬

fect appointed for four years by the President of the republic.

The tendencies referred to receive consid¬

erate treatment at the hands of M. Denis

(<Le-Bresil,) etc.). <(The States — the one-time provinces,® he writes, <(enjoy a very large degree of independence. Each of them forms an actual nation, with its elective authorities and its autonomous administration.® He finds that

individual states ((freely negotiate contracts with foreign companies or syndicates for

the execution of public works or raising

loans. They have their systems of justice

and of public education. Some of them

have representatives in Europe who play the part almost of diplomatists; who have been

known to hold conferences and to sign conven¬

tions without the intervention of any Federal authority. The Constitution has afforded

them an important source of revenue in allow¬

ing them to establish export duties. I believe there is no State budget which does not place export duties in the first rank among its re¬

ceipts. The export duty on coffee swells the budget of Sao Paulo, as the export duty on mate swells that of Parana. Thus Brazil has a double line of custom-houses, one facing out¬

ward, one inward. The duties collected upon foreign merchandise entering the country being a Federal matter, depends upon the central gov¬

ernment ; but the export duties are State prop¬

erty. In equilibrium with the States the Con¬

stitution erects the Federal government.® Now, the Union (if we adopt the shorter name, pre¬

ferred by the people themselves), by the regu¬

lation of monetary questions and by the settle¬

ment of the customs tariff, exercises a deeply felt influence over the national life; and al¬

though at first very narrowly confined to speci¬

fied functions, a tendency has become manifest to exalt its authority and dignity. ((In the first place the Union acquired its own territory — the Territory of Acre, which was ceded by

Bolivia (q.v.) by the treaty of Petropolis. This territory is a considerable portion of the Ama¬

zonian plain, and one of the chief rubber-pro¬

ducing countries. Instead of making a new

state of Acre, it has been kept by the Union as a kind of dower. The Union collects the export duties on rubber, which duties, except in this Federal Territory, go to the treasuries of the States. The revenues of Acre were insuffi¬

cient in the three years to pay off the indemnity to Bolivia. To-day they are added to the other sources of Federal revenue, and form a

notable addition to the Union's budget.® An indication that the Union has begun to ((find itself® is this : it decided to intervene, or to impose its will upon the more shiftless states, in respect to education and the colonization of immigrants.

Viscount James Bryce writes that ((the im¬

mense size of the country and its want of homogeneity suggested a Federal system, the

basis for which already existed in the legisla¬

tive assemblies of the provinces. Since then Brazil has had its full share of armed risings and civil wars. At first the States were allowed the full exercise of the large functions which the constitution allotted to them, including the raising of revenue by duties on exports and the maintenance of a police force which in some States was indistinguishable from an army.

Presently attempts were made to draw the reins tighter, and these attempts have continued till now.® His observations and impressions in this field are to the effect that the national govern¬

ment ((has latterly endeavored to exert over the States a greater control than some of them seem willing to accept. Nor is this the only difficulty. While some of the States, and es¬

pecially the southern, have an intelligent and energetic population, others remain far behind, their citizens too ignorant and lazy, or too un¬

stable and emotional, to be fit for self-govern¬

ment. Universal suffrage in districts where the majority of the voters are illiterate persons of color suggests, if it does not justify, extra-legal methods of handling elections. One ille¬

gality breeds another, and there is perpetuated a distrust of authority and a resort to violence.®

In many regions it is quite true that the Bra¬

zilian constitution, as M. Georges Clemenceau writes in his (South America of To-day, >

<(enjoys a chiefly theoretic authority.® Viscount James Bryce

continues: ((In the Brazilian poli¬

tics of to-day there are many factions, but no organized parties nor any definite principles or policies advocated by any group or groups of men. Federal issues are crossed and warped

by State issues, State issues confused by Fed¬

eral issues, and both sets of issues turn rather on persons than on general doctrines or specific practical proposals. One source of dissension is, however, absent — that struggle of the Church and clericalism against the principles of re-432

ligious equality which has distracted the Spanish-American republics. In Brazil the separa¬

tion of Church and State is complete, and

though the diplomatic corps enjoys the presence of a papal Nuncio as one of its members, this adherence to tradition has no present political significance. The absence or the fluidity of parties makes the executive stronger than the legislature both in National and State politics.

There are many men of talent, especially ora¬

torical talent, and many men of force, but not enough who show constructive power and the

grasp of mind needed to handle the enormous economic problems which a country so vast, so rich and so various presents.® He concludes, however, that it is too soon to be despondent, inasmuch as the country has been free from the taint of slavery only since 1888, and has been a republic only since 1891. Consult Bryce, J., (South America) (New York 1912). See bib¬

liographies under History and other titles in the Brazilian series.

Marrion Wilcox.

5. EDUCATION AND RELIGION. The

central government has been hitherto prevented by the constitutional restrictions already men¬

tioned from making education compulsory in

the states ; but some of the latter have them¬

selves taken this step, and wherever the gov¬

ernment can offer it at all and make it free, education is free. Distributed unevenly

throughout the states are more than 13,000

schools. Brazil has no university. The ex¬

cellent schools of law, medicine and engineering in several of the large cities do not supply this deficiency. But all advocates of the establish¬

ment of a national university have encountered the opposition of leaders who represent the States' Rights doctrine. The founding and

maintenance of a great national university,

such as the country needs and would appre¬

ciate, are steps toward centralization which State politicians are wholly unprepared to

take. The Union, however, occasionally ex¬

tends pecuniary assistance to states, munici¬

palities or individuals by way of cooperation in the maintenance of industrial schools, or colleges of agriculture. Sao Paulo leads among the states in educational progress : its Faculty of Law and Polytechnic College are both praise¬

worthy; and the range of scientific courses carried on at its museum is striking. However, this state does little for secondary education.

It ((contains three public secondary schools, one in the capital, one at Campinas and one at Ribeiraon Preto; but the pupils are few in number. There is a host of private schools, many of which are kept by religious orders.

The private schools are for the most part

boarding-schools,® many of them situated in

the country. (<The education given in such

schools is very unequal and usually second—

rate. Not only in Sao Paulo but throughout Brazil the question of secondary education is to-day one of extreme gravity. It is to primary education that the state of Sao Paulo devotes its resources. The budget appropriation is

liberal, amounting to $2,000,000, and some of the schools have the appearance of palaces.®

Mackenzie College at Sao Paulo has an ex¬

cellent standing among foreign institutions

which supplement by their work the state and national systems of instruction ; and there are many foreign schools in the republic. The

great educational value of free libraries has not been overlooked: there are many small

collections of books; and the National Library in Rio de Janeiro, containing several hundred thousand items — perhaps nearly half of a

million manuscripts and printed works — is the most interesting large collection that the writer has visited in any part of Latin America.

Finally, as a field for educational endeavors, Brazil has elements of exceptional promise.

((The Brazilians, who never forget that they were for a time, during the French invasion of Portugal, their own mother country, and head of the whole Portuguese people, cherish their national literary traditions with more warmth than do the Spaniards of the New World, and produce quite as much in the way of poetry and belles-lettres as do the writers of Portugal.

They have a quick susceptibility to ideas, like that of Frenchmen or Russians.® Such is the tribute in Bryce's (South America > ; but it is promptly qualified as follows : (<One can hardly be surprised that learning and the abstract side of natural science are undervalued in a

country which has no university, nothing more than faculties for teaching the practical sub¬

jects of law, medicine, engineering and agri¬

culture.®

Educational steps taken in recent years are (1) The decree of 5 April 1911, which con¬

ferred upon a Federal Board of Education

authority to establish primary schools in the various states;' (2) The inauguration, on 4

July 1913, of a superior school of agriculture and veterinary medicine at Rio de Janeiro; and (3) The decree of 15 April 1914, which created a class of practical schools of agriculture and which was followed by other decrees establish¬

ing preparatory schools of agriculture and ex¬

periment stations. Thus legal provision has

been made for a system of agricultural educa¬

tion under the control of the central govern¬

ment. In 10 different, widely separated

localities, this pacific invasion of the states by a movement unquestionably beneficial, though

also unquestionably in contravention of strict-constructionist theories (see Government) has already taken place.

Religion in Brazil has been subordinated

during so long a period that to-day the Church exerts little influence upon the thought and conduct of laymen. Colonel Roosevelt writes

((Through the Brazilian Wilderness*) that ((thc Positivists are a really strong body in Brazil, as they are in France®; and again: (<Brazil possesses the same complete liberty in matters religious, spiritual, and intellectual as we do.®

But of course laymen in Brazil had never, in the manner of the Puritans, adopted an inde¬

pendent (Congregational) form of church

government. The latter were free to exercise their own chosen form of worship ; the former, when the connection between church and state was abolished and absolute equalit}ˆ declared among all forms of religion, quite naturally were freed from the restraints and the inspira¬

tion of religion to a very much greater ex¬

tent. The Church has retained its buildings, properties and income ; religious orders share fully in the general toleration; the Brazilian men as a rule are still nominally — and Bra¬

zilian women as a rule are devoutly — Catho¬

lics. High officials of the Catholic Church are : BRAZIL — AGRICULTURE AND FOREST PRODUCTS (6) 433

The cardinal, at Rio de Janeiro, archbishops at Bahia, Rio, Sao Paulo, Para and Mariana, and 25 suffragan bishops. Consult Report of the Commissioner of Education (Department of Interior, Bureau of Education, Vol. I, Wash¬

ington 1915) and works by Bryce, Clemenceau, Denis and others in which are chapters dealing with present educational conditions.

See bibliography under History.

Marrion Wilcox.

6. AGRICULTURE AND FOREST

PRODUCTS. Coffee, rubber, herva matte,

sugar and mandioca receive special attention on account of the importance of these Brazilian products; but the southern plateau in the states of Rio Grande do Sul, Santa Catharina and

Parana produces all the cereals and fruits of temperate zones and many of those of the

tropics as well. We find here wheat, Indian corn, rye, potatoes and such vegetables as are grown in the United States; while rice, cof¬

fee, oranges, bananas and pineapples thrive in the lowlands along the coast. In many places grapes are grown and attention is given in the south to the production of native wines.

Coffee. — The great coffee-producers of the

world are the Paulistas — the people of the state of Sao Paulo. The celebrated terra roxa (red earth) in which the coffee-trees flourish best is found in other parts of the republic, but the Paulistas were the first to demonstrate its extraordinary value for coffee-culture.

(<The history of what Linnaeus named Coffea Arabica, in its long migrations from the wild forests of Abyssinia and Mozambique to the

carefully cultivated fazendas of Sao Paulo, is a most interesting one. It is a far cry from its first restricted use as a drug in the East to its present status as one of the world's most popular beverages; from the time when its

production in the West was prohibited and

gave rise to as absurd conflicts as attended the introduction of tobacco into Europe. … It is scarcely 80 years since the production of coffee in the state of Sao Paulo received its first impetus. Before that time it was rarely found outside of a drug store. But after

that the development of the industry was so rapid and so extraordinary that it stands forth as one of the marvels of economic history.®

Of course the circumstance that in Sao Paulo the coffee-trees do not require shading (that is, are not, as in Porto Rico and parts of Mex¬

ico, etc., grown and cultivated under the pro¬

tecting shade of larger trees) contributes to this ˆmarvellous® success. (<In 1851 the amount of coffee exported from Sao Paulo was some¬

thing more than 100,000 sacks of 132 pounds each. Thenceforth the export of this' staple increased with rapidity until, in 1896-97, the amount produced reached more than 15,000,000

sacks. This, with what was collected in other parts of the republic, gave Brazil 85 per cent of the world's total production. That year

the state of Sao Paulo produced fully three times as much coffee as all the other states of Brazil combined. But this enormous crop was more than the market could bear. The supply had gone beyond the demand. The price of

coffee fell until it threatened coffee-growers and the state itself with financial disaster. But the Paulistas were equal to the emergency. In

order to support, the market and to protect the VOL. 4 — 28

coffee industry, they had recourse to the much criticized measure known as coffee valorization.

The operation seemed like a gambler's risk, but there was so much at stake that the gov¬

ernment of Sao Paulo did not hesitate to act.

This measure achieved the end in view. They also began to direct their surplus energy into other channels, cultivating rice, cotton, etc., and planting such rubber-producing trees as

manicoba and mangabeira ; establishing new

industries and devoting more attention to man¬

ufactures. The average annual coffee crop of Brazil is about 12,000,000 sacks of 132 pounds each. In 1915 the estimated produce was

9,497,553 sacks.

Cattle-Raising. — Cattle-raising in Sao

Paulo is commented upon by Mr. Ling, in The Americas, November 1915: (<From the time of leaving Sao Paulo city we passed through a gently rolling country ; the characteristics are pastoral and agricultural. In the pastoral sec¬

tion fine bunches of native cattle and of cross¬

breeds between native and Hereford were seen in such quantities as to give the impression that the number far exceeds the generally ac¬

cepted statement. Statistics show that the

number of cattle, horses, sheep, etc., has more than doubled in the past 10 years.® Mr. Ling was informed by the large fazenda managers

that increased interest was being given to cat¬

tle-raising. In 1913 there were in Brazil 30,-

705,080 cattle, 18,399,000 swine, 10,653,000

sheep, 7,289,050 horses and 3,208,000 mules. In July 1917 these had increased to a total of 80,330,000 head. As the returns are confessedly incomplete and as, in many states, it is cus¬

tomary to report only a part of the growth of stock, to avoid the payment of state taxes, the real figures may be taken as considerably

larger than the official, which are based on the census returns for taxation purposes.

By a decree of 7 March 1917 The Swift

Packing Company was authorized to carry on

a packing business in Brazil under the name of the Companhia Swift do Brazil with a de¬

clared capital of $500,000 United States cur¬

rency.

A modern slaughter-house and cold storage

plant was erected in Santos in 1917 under the name of the (tCompanhia Frigorifica do San¬

tos,® with a capital of $250,000 United States currency and working under a charter author¬

izing it to do business in cattle and meat and the products of its refrigerating machinery.

It has a capacity of 500 head of cattle a day.

Of late years there has been an appreciable diminution in the production of jerked beef in Brazil with the growth of wealth and the de¬

sire for fresh meats. This has opened up a very wide field for the packing-house. The

impetus given to the refrigerated beef busi¬

ness in Brazil through conditions induced by the European War is shown in the exports of the month of January 1916 as compared with those of January 1917, the former being

2,593,180 pounds and the latter 15,142,322.

All the exports of refrigerated beef in January 1916 were shipped through the port of Santos, while during the corresponding month of 1917

over 56 per cent of the exports were shipped through Rio de Janeiro.

Rubber. — Among forest-products, the first

is rubber, — with respect to which a recent pub¬

lication of the Pan American Union (see

BRAZIL — AGRICULTURE AND FOREST PRODUCTS (6) Bibliography, (Brazilˆ etc.) says ((India rub¬

ber, as it is generally called in textbooks and official reports, is a native of Brazil and grows wild there. Although efforts at cultivation

have been successful with the seed in other countries, and even in Brazil, by far the

greater part of the rubber exported from the republic is gathered from the forests of the northern interior of the country ; no system¬

atic preparation of the ground has ever been necessary and the entire care of the rubber gatherers has been given only to obtain the juice from the rubber trees and getting it to market. This essential factor of modern in¬

dustrial life was utilized first by the natives of America and they found some place for it in their domestic economy as a waterproof

covering for clothing, boats and their kind of bottles. Cauchu, or, in the aboriginal, cahu-chu, from which comes the corruption

caoutchouc, is the earliest word applied to rubber. The Brazilian speaks of borracha

and this refers particularly to the product of the hevea, the rubber tree par excellence. It is indigenous to the region of the river Ama¬

zon and in the tributary areas of Peru, Bo¬

livia, Ecuador, Colombia and Venezuela.

Hevea is a large tree, of slow growth and long life. It has been found 12 feet in cir¬

cumference. It requires lowlying, rich, deep soil and abundant moisture. It grows wild in Brazil, but not in clumps, being found rather scattered through the tropical forest, but it is well adapted to cultivation and has been

planted in the East Indian Islands with suc¬

cess. Manihot produces the Ceara rubber of

commerce, but its habitat is a high, stony and arid country. This also is native to Brazil, but in the region south of the Amazon. [Cas-tilloa, next to Hevea the best known rubber producer, has its principal range in Central America and southern Mexico]. Other trees,

shrubs and vines (lianas) yield rubber… , Rubber is not the sap but the cream from the juice, the milk or latex of these trees, shrubs and vines.® In 1915 the rubber crop was 36,-

750 tons and about 37.000 tons in 1916. The total exports of crude rubber from Para,

Manaos and Itacoatiara during 1916 amounted

to 72,836,393 pounds. Shipments to the United States aggregated 48,874,578 pounds and to

Europe 23,961,815 pounds.

After the opening of the European War

the export of Brazilian rubber began to flow toward the United States in ever increasing quantities until, during the first quarter of 1917, the American market received more

than two-thirds of the Brazilian output. Dur¬

ing the months of March and April 1917 the exports of Brazilian rubber from the ports of Para, Manaos and Itacoatiara to the United

States was 9,918,412 pounds, while to all Old World ports it was only 4,633,774 pounds. In the following month 5,447,610 pounds reached the United States markets from Para alone

and an additional 2,243,206 pounds from

Manaos, making a total of 7,691,037 pounds

from these two ports as against 1,528,789

shipped to all European ports.

Mate. — Another forest product is the mate

which to Brazilians is known as herva matte or mate, to other South Americans as yerba or yerba mate, and to foreigners as Brazil or Par¬

aguay tea. The chief mate-producing state,

that of Parana, adjoins the great coffee produc¬

ing state, Sao Paulo, and exports many mil¬

lion pounds of this Brazilian ((tea® annually.

The mate tree (in appearance not unlike a

small evergreen oak or ilex with a heavy and fleshy leaf) grows freely in the forest, entirely without cultivation ; and in the forest the leaves undergo, as soon as they are plucked, a first preparation which both diminishes their weight before transportation and also keeps them from fermenting. They are dried at a fire, and then packed in sacks which are sent to the mills at Curitiba which reduce the leaves to powder and separate the various qualities. Aromatic prop¬

erties retained in the dried and powdered

leaves are extracted by means of infusion. As a stimulating and wholesome beverage habitu¬

ally used throughout a large part — especially the southern part — of the continent, mate might well be called, not by the competing names Brazilian or Paraguayan, but more

simply the South American tea. The exporta¬

tion of this South American tea, then, is to the state of Parana what the exportation of coffee is to the vastly more important neighbor state, the basis, practically, of economic achievement.

In 1915 yerba mate was exported to the extent of 75,885 metric tons.

Sugar. — But the basis of economic achieve¬

ment in Brazil was formerly the exportation of a product the cultivation of which, on a large scale, was dependent upon slave-labor. Sugar, during a long period, held the position in the country's economic life now occupied by coffee, rubber and South American tea. At the pres¬

ent time the sugar-cane, besides being grown in the chief sugar centres, is a staple crop, com¬

monly used for the production of an alcohol, or sometimes the crude variety of sugar called rapa dura. Sugar is no longer in the first rank of. exports, however; and a study of its decline brings to attention the most interesting phase of the story of the manumission of slaves.

Denis says that the planting of sugar created, as early as the 17th century, not only a long-enduring industry but also long-enduring

wealth ; and all over Brazil the cultivation of the sugar-cane was connected with slave-labor.

As early as 1875 the decay of the sugar industry had become manifest in all parts of the country, and a severe drought hastened its downfall.

Naturally there was a rapid fall in the market value of slaves. «At the same time the prov¬

inces of the south, which were then nearing the height of their development, could not obtain sufficient labor, and, while recruiting the first white immigrants, they made a last effort to renew their staff of slaves. There was thus a heavy exportation of slaves from the north to the south.® Now, ((as has often happened, the institution of slavery, made less harsh by custom, did not arouse public opinion ; but the spectacle of a commerce in slaves did violently arouse it. The departure of those human car¬

goes for the south was regarded with indigna¬

tion.® The abolitionists succeeded in rendering such shipments impossible; and then the value of the slaves, for whom there was no adequate employment, decreased rapidly. ((When their

enfranchisement was determined upon it was

possible to buy them out at reduced prices ; less on account of the violent propaganda of the abolitionists than because [so many of] the sugar plantations had disappeared.®' In 1915, BRAZIL —

59,074 metric tons (2,204.6 lbs.) of sugar were exported from Brazil.

Wheat.— Brazil has plenty of wheat lands

but few of them are used for wheat growing.

Yet where experiments have been tried of grow¬

ing wheat on the Brazilian uplands, more es¬

pecially in the southern states, they have

proved successful. Brazil imported, in 1916, flour and wheat to the value of over $60,000,000; yet official investigation made in that year showed that pure wheat bread is a thing prac¬

tically unknown in Brazil, where the bakers adulterate the wheat flour with mandioca,

bread-fruit flower or corn-meal. Mandioca is the most common adulterating mixture for the making of ((Brazilian bread,® which ((generally consists of mandioca and wheat flour in about equal parts® ; though often the proportion of the former is greater than the latter. Were the law to insist on the bakers selling pure wheat flour bread, Brazil would require to grow, to supply her own needs, wheat to the value of from $60,000,000 to $100,000,000 per year at the prices prevailing in 1916.

Vegetable Oils. — Already in 1917, the state of Sao Paulo, which had previously been a

heavy importer of vegetable oils, had reached a position where it had begun to export these oils instead of importing them. Several mills had been established, one of them of large capacity and most modern type, for the manufacture of cottonseed oil. Previous to the establishment of these mills most of the cotton seed from the 1,000,000 bales or more raised annually in the country was left to rot in heaps where it had been extracted from the cotton. Already large shipments of Brazilian cottonseed oil had been made in 1917 to

Argentina, where it brought, in the market, the same prices as the best foreign oils. In 1913 the state of Sao Paulo imported 2,304,823 pounds of cottonseed oil, and in 1916

only 244,794 pounds. The problem before the oil manufacturers in 1917 was the getting of the cotton seed to the mills from the widely dis¬

tributed cotton territory which is yearly ex¬

tending itself. Castor oil is another business which has already begun to interest the manu¬

facturers of vegetable oils in Brazil. Several castor mills were in operation in the state of Sao Paulo in 1917, and orders had been placed in the United States for an extensive modern castor mill for the city of Sao Paulo.

The castor bean grows well over a considerable part of Brazil, and the oil from most of the castor districts is good.

The growing of flax is on the increase in Brazil, the state of Sao Paulo taking the lead in this as in other oil products. In 1917 several factories had already turned their attention to the production of flaxseed oil and were also experimenting with peanuts for their oil quali¬

ties. In Brazil peanuts grow luxuriantly and are of a peculiarly oily quality. The crop is abundant for six months in the year and the beans can be handled by the same machinery used to manufacture the castor bean and other oils. Brazil possesses many oil-bearing nuts, all of which have as yet been little exploited.

Among these are the cashew, ucuba, copra and babasu. Some of these are already used in the manufacture of soap.

Beans. — No other Brazilian crop increased

in such relatively large proportions as that of the brown or black bean from 1914 to 1918. In 1914 there was practically no exportation of Brazilian beans and the bean crop of Sao

Paulo was only worth $6,700 in 1915. But Sao Paulo produced for export beans valued at

$2,204,000 in 1916, out of a total bean crop of $3,500,000 exported. About three-fourths of this went to the United States. As Rio de Janeiro handles the constantly increasing bean crop of the agricultural colonies of the Brazilian Rail¬

way Company and other colonies in the states of Parana, Santa Catharina and Rio Grande do Sul, she had already, in January 1917, outdis¬

tanced other Brazilian ports in bean exports.

The rapid increase in the exportation of beans from Brazil is shown in the following table: Year Pounds

1914 . 9,770

1915 . 607,549

1916 . . 100,299,667

1917 (5 months) . 127,785,528

Other Important Crops. — The cultivation

of cotton, cacao and tobacco may be said to in¬

crease very gradually, in view of the extent of the country and the excellence of the products.

The wool crop exported reached 4,198,630

pounds in 1912 and was valued at $571,276. In 1915 it fell to 997,630 pounds valued at $193,065.

Cotton is grown principally in Pernambuco,

Parahyba, Rio Grande do Norte, Ceara, Alagoas, Maranhao, Sergipe, Sao Paulo and Minas Geraes. The average cotton crop in recent

years is close to 1,000,000 bales of 176 pounds each. Exports of cotton have decreased as the home consumption has increased. Mandioca,

or farhina de mandioca, primarily the food of aborginal tribes, has been to such an extent cul¬

tivated that mandioca flour has become actually the staple food of Brazilians. The Pan Amer¬

ican Union's (Brazilˆ mentioned above, says: ((It is a shrub about four feet high which has been induced to change its root into a veritable tuber. In its raw state mandioca is an irritant, not infrequently a deadly poison, but properly prepared it becomes a richly nutritive food, esteemed by Brazilians high and low, and forms a staple for bread throughout the country. All Brazil grows the plant, but it is used chiefly along the littoral and on the lower plateaus.

From June to September is the best planting season, the root being gathered eight months to two years afterwards.® Great care is exer¬

cised in treating it in such a way that the pois¬

onous starchy contents shall be changed into healthful and edible starch. The natives are most expert in their methods of doing this; and they cannot be regarded as procrastinating workers, inasmuch as in the course of a single day — the day on which the tubers are gathered — all the various processes of grating, desicca¬

tion and roasting must be completed.

The question of labor, which affects agricul¬

ture and the manufacturing industries alike, will be briefly discussed, as we pass from the former subject to the latter. Brazil's achievements, commendable though they seem in certain re¬

spects, are still almost as nothing compared with agricultural possibilities in a region so vast and singularly favored by nature. The

Brazilians realize and admit their long con¬

tinued neglect of wholly exceptional opportu¬

nities ; and in 1916 showed that they had been stimulated to renewed efforts by the withdrawal of food supplies formerly received from Europe and by other war conditions.

Bibliography. — The Americas (New York,

published monthly, 1914-18) ; Grossi, V.,

(Storia della Colonizzazione Europea al Brasile e della Emigrazione Italiana nello Stato di S.

Paulo) (Milan, Rome, Naples 1914) ; Pan

American Union, (Brazil: General Descriptive

Data) (Washington 1915) ; Wear Book, Bra¬

zilian (Rio de Janeiro). See also studies of this subject in the books by Denis and Walle mentioned in other articles of the Brazilian ser*es’ Marrion Wilcox.

7. COMMERCE OF BRAZIL. The new

civil code of Brazil which went into effect on 1

Jan. 1917 contains numerous provisions favor¬

ing certain classes of American business. Mr.

O. P. Austin, after referring to improved com¬

mercial conditions in South America generally in 1915, writes (in The Americas , Vol. II, No.

2) that the improvement was less sharply

marked in Brazil than in Argentina (<by reason of the fact that prices of the articles which form Brazil's chief exports, coffee and rubber,®

were lower in 1915 than in 1914. Reports cov¬

ering the seven months ending with July 1915

showed, as the total value of the exports for those months, $132,800,000 against $149,500,000

in the same months of 1914. Imports for the seven months amounted to but $81,000,000.

against $130,000,000 in the corresponding period of 1914, and $199,000,000 in the same months of 1913. <(Details of the trade of Brazil, like those of Argentina,® Mr. Austin continues,

(<are more favorable to the United States than to the other countries, especially in imports.

The United States is, in fact, the chief country from which the imports show an increase.

The total value of imports from the principal countries for the six months' period ending with June 1915 are, from Great Britain, $15,-

375,000 against $25,850,000 in the same months of 1914; from Germany, $1,875,000 against $23,-

700,000; from France, $3,230,000 against $10,-

123,000, while from the United States the total for the six months of 1915 was $18,250,000

against $16,300,000 in the corresponding period in 1914. Exports in the six months ending with June 1915 are, to Great Britain, $17,957,000

against $21,500,000 in the same months of last year; to France, $13,180,000 against $11,970,000; to Holland, $11,290,000 against $7,100,000, and to Norway, Sweden and Denmark, $13,400,000

against $1,400,000. To the United States, the exports of the six months of 1915 are $44,500,-

000 against $49,500,000.® The total value of the foreign commerce of Brazil was, for 1912: $671,038,586 (imports, $308,243,736 and exports $362,794,846) ; for 1913, $641,593,196 (imports, $326,428,509 and exports, $315,164,687) ; for 1914, $387,026,430 (imports, $165,556,950 and ex¬

ports, $221,469,480) ; and the tendencies of the country's foreign trade when effects of the European War were most keenly felt are seen when these figures are placed in immediate con¬

nection with those relating to 1915, as given above. The depression and the reasonably

prompt reaction are full of interest. We add now observations made during a longer period, namely, 10 months, in 1915, which show a large increase in the proportion of Brazilian trade held by the United States :

In 1913, 1914 and 1915, respectively, the

United States took 32 per cent, 40 per cent and 41 per cent (in value) of Brazil's exports. In the same years 16 per cent, 15 per cent and 29

per cent, respectively, of Brazil's imports were drawn from the United States. Thus, the

share of the United States in Brazil's total pur¬

chases nearly doubled in 1915.

Official statistics of Brazil's foreign trade for January-September 1916 give the value of the imports during that period as $137,858,200, contrasted with $106,683,400 for the first nine months of 1915 and $149,542,675 during the first nine months of 1914. Exports totaled $187,-

160,725 in Januaˆ-September 1916, against

$173,446,925 and $168,726,425 for the same period in 1915 and 1914 respectively. The principal exports for the 1916 period were :

coffee, $96,-

035,500; rubber, $26,507,825 ; hides, $12,570,175; cocoa, $9,041,950; tobacco, $6,822,825; yerba mate, $6,686,575; manganese, $5,664,600; frozen meats, $5,275,275, and sugar, $4,019,725. The total imports of wheat flour into Brazil for the first six months of the calendar year 1916 were 143,104,300 pounds, valued at ports of shipment as the equivalent of $4,155,743 United States gold. Of this total quantity Argentina and

Uruguay supplied 81,754, 134 pounds, value $2,-

123,205, and the United States, 59,783,684

pounds, value $1,967,317.

The rapid increase in the frozen-meat in¬

dustry and the permanent character of this de¬

velopment are clearly shown by the following figures of exports for the first 11 months of 1916 as compared with the corresponding

months of 1915: In 1915, 14,686,280 pounds, valued at $1,159,291, were exported; in 1916, 71,268,556 pounds valued at $6,606,732. Of this total of 71,268,556 pounds 30,832,904 pounds were exported from the port of Rio de Janeiro and 40,435,662 pounds from the port of Santos.

The destination of this meat was: To United States 5,469,220 pounds; France, 9,779,853 ; Great Britain, 11,935,748; Italy, 33,446,732 ; Gibraltar (to order) 10,637,013 pounds. Preliminary data of the republic's commerce for 1916, recently issued by the Brazilian Statistical Bureau, give the value of the exports as $267,706,000 (United States currency) and that of the imports as $196,057,000, making a total foreign trade of $463,376,000, which is larger than in either of the two preceding (<war years.® The balance of trade ($71,649,000), however, is lower than in 1915, because of increased importations dur¬

ing the following year.

The statstical details of Brazilian trade for 1915 show the change in proportional represen¬

tation of the United States, England and Ger¬

many in Brazil's inbound and outbound com¬

merce as follows :

Imports 1914 1915

United States . 17.5 per cent 32. 1 per cent England . 23.7 per cent 21.9 per cent

Germany… 16.1 per cent 1 .5 per cent

Exports 1914 1915

United States . 40.9 per cent 41 . 7 per cent England . 14.4 per cent 12.1 per cent

Germany . 9.9 per cent .

The exports of the chief products of Brazil were :

1913

1914

1915

Cotton, tons .

37,424

30,434

5,228

Sugar, tons .

5 , 367

31,860

59,074

Rubber, tons .

36,232

33,531

35,165

Cocoa, tons .

29,759

40,767

44,980

Coffee, 1,000 bags .

13,267

11,270

17,061

Hides, tons .

35,075

31 ,442

38,324

Tobacco, tons .

29,338

26,980

27,096

Herva matt6, tons .

65,415

59,354

75,885

BRAZIL — MANUFACTURING AND MINING (8)

437

The adverse exchange situation cut down

Brazil’s receipts for her commodities. The

value of her money, in commerce, decreased.

Her exports, measured by quantity, were larger than those of 1913, but she got only $265,000,-

000 (in round numbers) for all of them, against $320,000 000 in 1913, although in her own mar¬

kets, commodities ruled generally higher, and she paid much higher prices for what she im¬

ported. Consult The Americas (New York

1914-17) ; Brazilian Year Book) (Rio de Ja¬

neiro) ; Pan American Union, (BraziP (Wash¬

ington 1915) ; Filsinger, E. B., (Exporting to Latin America) (New York 1916). See gen¬

eral bibliography under History.

Marrion Wilcox.

8. MANUFACTURING AND MINING.

Labor. — Labor problems, with good reason and in a very special sense, claim the attention of all who would study intelligently the present conditions of Brazilian agriculture and manu¬

facturing industries. The government, in order to encourage immigration from Europe, guar¬

antees free passage and a homestead to bona-fide settlers, the ultimate aim being to build up a class of peasant proprietors whose services may, at least in part, replace the migrating hordes of landless workingmen. In the north¬

ern states of Amazonas, Para, Maranhao,

Piauhy, Rio Grande do Norte, Parahyba, Per¬

nambuco, Alagoas and parts of Matto Grosso

and Goyaz, a large part of the food must be imported or brought from the southern states, paying high freight rates. The cost of living is, therefore, high and labor correspondingly ex¬

pensive. In the central states labor is more abundant, the cost of living is not so high, and naturally there is a lower rate of wages. In the three southernmost states the lowest rate of wages prevails ; labor there is both plentiful and satisfactory; a large part of the working class is of Italian or German origin. In Brazil, as in Latin America generally, skilled labor, workmen of experience in mechanical indus¬

tries, are scarce. ((New industries are nearly always started with imported labor under con¬

tract, the foreign foreman having to train men for the work which they are expected to do.

This is noticeably the case in the textile in¬

dustry, which is largely manned by English or other contracted foremen and headweavers.

The lighter work of these factories to a large extent is carried on by women.8 For the erec¬

tion of large machinery ((it has always been the practice for the contractors to send their own engineers and skilled mechanics. In most

cases the buyer contracts with the machinery-maker for the permanent service of one or more competent mechanics.® Graduates of those pub¬

lic institutions in Rio de Janeiro, Sao Paulo and other large Brazilian cities in which the skilled trades are taught have seldom been appointed to the highest positions in the factories. (<The Brazilian agricultural laborer is generally the descendant of slaves or an Indian half-breed, and although ignorant is a fairly good worker.®

It has not been found convenient, as a general rule, to entrust the Brazilian laborer with the running and care of machinery because it is a business to which he has never been trained.

Yet Latin America has produced excellent en¬

gineers, and trained natives are being success¬

fully employed as engineers of locomotive and stationary engines on railways, in factories, on plantations, in mines and electric-light plants where these are owned and operated by

natives.

Manufacturing Industries. — The restric¬

tions indicated in the foregoing paragraph are, to some extent, offset by the determined efforts of national and state governments, with the co¬

operation of foreign investors. Resultant

achievements, although actually small for a land so great and naturally so rich, have nevertheless attained proportions which surprise visitors

from the north. The manufacturing industries of the country as a whole are varied and con¬

stantly increasing, and every city of importance in Brazil has its manufacturing plant of one kind or another. It is only 20 years since the first Brazilian textile mill was started. This industry has increased remarkably in the two decades, owing to improvement in machinery

and to new transportation facilities which bring the mills, the cotton-fields and the consumers closer together. <(In most of the large cities the necessities of domestic life are made in fac¬

tories, and foundries for simple metal-work ex¬

ist, but, as a rule, complicated machinery, pre¬

served foods and the so-called luxuries are still imported. The textile industry is perhaps mak¬

ing greater progress than any other. Five of the larger cotton mills in the Federal district employ 8,000 operatives and have a yearly out¬

put of over 80,000,000 yards. Another mill em¬

ploys 1,500 operatives and utilizes 1,500 horse power. Four mills in Petropolis manufacture

an average of 18,000,000 to 19,000,000 yards, while 24 mills in Sao Paulo produce 83,00,000

to 84,000,000 yards. In the district of Rio de Janeiro the establishment of new and the en¬

largement of existing factories have caused the Rio de Janeiro Tramway, Light and Power

Company to enlarge its plant from 50,000 to 80,000 horse power to meet the increasing de¬

mand.® Sao Paulo compares favorably with

Rio de Janeiro in industrial importance. In addition to the power plant of the Sao Paulo Tramway, Light and Power Company at Para¬

hyba, which has a capacity of 32,000 horse power, the construction of a new plant of 62,500

horse power was begun several years ago for the purpose of supplying additional power to the city of Sao Paulo and neighboring towns and cities. The importation of modern Amer¬

ican machinery has given a new impetus to the lumber industry in the state of Parana, where large sawmills have been recently erected.

Brazil produced in 1915 linen to the amount of 66,632 metres of crude textiles and 223,265 of finer dyed textiles, for the manufacture of the greater part of which the raw material was imported. However, under the encouragement

of the government flax growing has already

begun in the southern part of the republic where it gives signs of being able within a few years to supply the home demand. Linen weav¬

ing is carried on in Brazil principally by the cotton factories ; but one large factory. Companhia Tecido de Linho Sapopemba, is devoted altogether to the linen industry.

Mineral Resources. — Brazil's mineral re¬

sources have from the first been questioned, doubted. Amerigo

Vespucci navigated, in the

course of his third voyage, from 5° below the equator to a region well south of the Tropic of 438

Capricorn, practically from Rio Grande do

Norte to Rio Grande do Sul, as the regions are now called. He wrote as follows : ((On this coast we saw nothing of value except an in¬

finite number of dyewood and cassia trees, and those which beget myrrh and other wonders of nature which cannot be recounted… .

And seeing that in this land we found nothing whatever of mineral wealth, we decided to

hasten away.® Better luck in this respect at¬

tended the efforts of the 18th century explorers; but such thorough exploration and exploitation as took place in the Spanish South American holdings was impossible in the Portuguese ; and regions suspected of concealing mineral treas¬

ure have remained in a measure mineral regions <(of doubt.® D. A. Vindin (in Denis's (Brazilˆ

English version, supplementary chapter) writes that, although there is official record of the production of gold valued at more than $500,-

000,000 and of diamonds to the value of many millions; and although Brazil also produces sil¬

ver, platinum, lead, copper, iron, manganese, mercury, coal, monazite, graphite and many

varieties of precious stones and rare marbles; nevertheless the mining industry adds very lit¬

tle to the country's wealth at present. (<I have no doubt,® he says,

<(after having made a visit of inquiry and looked up all available informa¬

tion, but that Brazil will, within a few years, demand considerable attention from mining

men, as there are few countries in which there are greater opportunities for profitable invest¬

ment. Hitherto very little attention has been given to mining by either the Federal or state governments, with the exception of the state of Minas Geraes, the result being an absence of much-needed mining laws for the guidance of those wishing to engage in mining on busi¬

ness lines. I understand that there is a likeli¬

hood of the states waking up to the import¬

ance of encouraging the development of their latent mineral wealth. Most of the gold won by the early settlers in Brazil came from the banks of rivers or from near the surface of the soil. The amount of development of reefs at any (considerable) depth has been very slight, and it is this work in the future that promises well. It is the need of capital and the necessity of waiting for returns that disincline the Bra¬

zilians to undertake mining operations ; it is consequently to European and American in¬

vestors that the work will fall. The fact that most of the mining lands are the property of private owners, and that, under the Federal and state constitutions, all minerals are the prop¬

erty of the freeholders and not liable to any government tax, renders any systematic search¬

ing or prospecting for minerals almost of no avail. The owners of these lands are not sym¬

pathetic toward mining at the present time; they will not themselves mine and they will offer no aid to others; in fact, in most cases, mining prospectors would be warned off the

ground as trespassers. There appears to be an almost unlimited scope for profitable mining in Minas Geraes ; but it is at all times difficult to obtain the right class of men to conduct opera¬

tions; and in a country like Brazil the success or failure of any mining venture largely de¬

pends upon the type of man in charge of af¬

fairs. Apart from technical ability, a knowl¬

edge of the language and the people and unfail¬

ing patience and tact are necessary.® The facts that in Minas Geraes gold has been mined prof¬

itably since 1830, and that Rio Grande do Sul is the scene of recent gold-mining enterprises are mentioned; then the account deals with

iron in the following terms : (<A number of eminent mining engineers from the United

States, Canada and Europe have visited Brazil in order to examine and report upon the iron deposits of the country, which are considered to be the richest and greatest in the world. The ores are mostly oxides; the carbonates are rare and usually associated with carbonate of cal¬

cium.® They occur in (<practically all that por¬

tion of Brazil lying south of 15° S. In Minas the ore is in some cases found in actual moun¬

tains, the analyses of which have yielded extraor¬

dinarily high percentages. Coal exists in Santa Catharina and Rio Grande do Sul at various places.® Deposits of talc and kaolin are of fre¬

quent occurrence in crystalline rocks, which are of wide distribution in Brazil. Some of these, more favorably situated in relation to transpor¬

tation and markets, are now being worked. Of these are the following: (1) Near Rezende,

state of Rio de Janeiro, a pure white talc, re¬

quiring little treatment before being available as a cosmetic. (2) Near Lorena, state of Sao Paulo. (3) Near Santo Amaro, state of Sao

Paulo, not far from the city of Sao Paulo.

Massive talc, or steatite, occurs in different parts of the country, as near Itaberaba, muni-cipio de Ouro Preto, Varzea near Dores de Boa Esperanqa, and near Jacuhy in the western part of Minas Geraes. At these places its principal use is in the manufacture of cooking utensils, which are turned out on the lathe from the solid block of soapstone. Pans and pots of this

material are specially prized in Brazil for cooking rice. It also occurs in Ceara and

Goyaz.

Classed between common bituminous and the

lignite of Germany, Brazilian coal contains ash and impurities (20 per cent) and in specimens examined, sulphur. (<Reports on different sam¬

ples show that this coal, when made into bri¬

quettes, is little inferior to Cardiff coal in the same form:®

In the Jacuhy district, in the state of Rio Grande are vast deposits of coal. In August 1917 the Central Railway of Brazil opened a large crushing plant at Barra do Pirahy at a cost of more than $500,000, with a view to reducing this native coal to a commercial com¬

modity. As the experiment was a success, it is expected to give an added impetus to coal¬

mining in Brazil. In addition to the large coal mine at Jacuhy, which is in part owned by the government, there is another large mine at Sao Jeronymo. The latter mine, which is only 12

miles from river transportation, has its own railway to bridge the distance ; and the gov¬

ernment was constructing, in 1917, a railway 37

miles long to give similar facilities to the Jacuhy coal district, which was producing 12,000

tons a month toward the close of 1917, with the prospect of a very considerable increase of this output in 1918.

By an executive decree of 23 May 1917 the Brazilian government authorized the Minister

of Transportation and Public Works to enter into a contract with the Sao Paulo-Rio Grande Railway Company for the construction and

lease of a railway line from some point on the branch line Paranapanema to the coal fields in the valley of the Peixe River, tapping on the way the coal fields of Barra Bonita, in the state of Parana. The contract called for the completion, of the road in one year. When

completed it is to be under the control of the government. In the same month the govern¬

ment also made a contract with the same com¬

pany for the construction and lease of a rail¬

way 50 miles long from Port Tubarao to the Ararangua in the state of Santa Catharina. The contract provides that the road shall also be in operation in one year from date of contract.

The high price of coal in Brazil has helped to retard industries of various kinds and forced the railroads for the most part to burn wood wherever available, because the native coal, in lump, does not burn well in the engines ; but the recent experiences in crushing it have

proven that, in its crushed state, it answers all the purposes of foreign coal ; so other crushing plants were being planned in the fall of 1917.

Since the development of the Kim¬

berley mines in South Africa, diamond-mining in Brazil has received comparatively little at¬

tention; nevertheless valuable stones are often found and <(it must be borne in mind that Bra¬

zilian diamonds are considered to be of much finer grade than those from South Africa.®

Brazil produces some of the finest specimens of beryl ; amethysts and agates are also plentiful.

Consult (Brazilian Year Book) (Rio de

Janeiroˆ and Denis, P., (Brazil* (trans. Miall, London 1911). See general bibliography under History.

Marrion Wilcox.

9. BANKING AND FINANCE. The

principal banks in Brazil are : Banco do Brazil, Banco Nacional Braziliero, Branch of the Na¬

tional Citv Bank of New York, British Bank of South America, Limited, Brasiliansche Bank fur Deutschland, London & Brazilian Bank,

Limited, London & River Plate Bank, Limited, Banco Espanol del Rio de la Plata, Banco

Commercial do Rio de Janeiro, Banco Allemao Transatlantico, Banco do Commercio, Banco

do Estado do Rio de Janeiro, Banco Nacional Ultramarino. All of the foregoing are in Rio de Janeiro; the Banco Francesco e Italiano per 1' America del Sud is in Sao Paulo. The mon¬

etary system is nominally based on the gold standard. The milreis, the gold unit, which is divided into 1,000 reis, weighs 0.89645 grammes

of gold .917 fine, or .82207 grammes of fine gold, and its par value in terms of the cur¬

rency of the United States is $0.5463. One dol¬

lar, currency of the United States, is there¬

fore the equivalent of 1$831 gold milreis. The reader will notice that the sign $ for milreis is placed after the units and before the deci¬

mals. The circulating medium, and the only

legal money in Brazil, consists of government notes guaranteed redeemable at the rate of

i6d. per milreis. This rate is maintained

through a conversion fund known as the Caixa de Conversao (Compare: Argentina — Bank¬

ing). The theoretical unit of the paper circu¬

lation represents 0.48816 grammes of fine gold, and its equivalent in terms of the currency of the United States is $0.32444. The par value of $1, currency of the United States, is there¬

fore 3$08226 expressed in terms of Brazilian paper currency. The method of quoting ex¬

change rates in Brazil under normal conditions (consult (Latin American Monetary Systems

and Exchange Conditions,* by Joseph T.

Cosby) is the following:

London . 16-3/32d. = l$000

Berlin . 1 Mark = .730

Paris . 1 Franc = . 593

Sight

London . 15-7/8d.l$000

Berlin . 1 Mark = . 740

Paris . 1 Franc = .600

New York . $1.00 U. S. Cy. = 3$113

Exchange fell to 14d. on receipt of the news of the outbreak of the European War. A bank holiday (15 consecutive days) was declared,

specie payment was suspended by the Caixa de Conversao, and the rate of exchange remained at 14d. (more or less nominal) until the banks reopened on 18 August. After that date the rate declined steadily until early in October, wThen a low point of lOd. was reached. The principal factors in bringing about this heavy decline were : First, the action taken by the Caixa de Conversao, second, the closing of

London credits in favor of Brazil, and, third, the fact that the government authorized an

issue of treasury notes amounting to $81,-

120,000 or 250,000 contos (one conto = 1,000

milreis; 1,000 milreis = $324.44 currency of the United States). During February 1916, the

rate for bankers' 90 days' sight drafts on Lon¬

don varied from ll7/16d. to 11 15/I6d., the closing rate on 29 Feb. 1916 being ll%d., as compared with 11ˆ4d. on 31 January. The

rate for 90 days' sight commercial bills was lljˆd. on 24 April 1916.

By executive decree, promulgated 23 Dec.

1916, the exchange of the notes of the Caixa de Conversao (Conversion Office) for gold was

to continue suspended until 31 Dec. 1917, ex¬

ception being made in favor of the exchange of notes by order of the government to attend only to the service of the external debt of the Union.

The aggregate cash balances of the princi¬

pal banks in Rio de Janeiro at the end of Feb¬

ruary 1916 showed a decrease of about $1,325,-

000 as compared with those at the end of Jan¬

uary. Discounts during February in the same year showed an increase of $265,000, approxi¬

mately. The rate obtainable for first class paper was about 7ˆ2 per cent. The Federal

Treasury 6 per cent (paper) bills commonly

called (<sabinas,® issued in 1915, commenced to fall due. The government availed itself of

its option of renewing the bills for one year, paying interest in cash. Custom House re¬

ceipts, both at Rio and at Santos, showed an increase for the first two months of 1916 as compared with the same period in 1915. The commercial situation in Sao Paulo, 15 March 1916, was reported to be

very sound. The

large commercial houses in England and the

United States who sent out agents discovered that the difficulty was rather in the execution than in the obtaining of orders. Credits of three or four months were given, whereas, a year before, practically all business was done on a cash basis. The question of tonnage

continued to absorb attention, freights remain¬

ing very high. The greater part of the ship¬

ments went to the United States. Cotton mills 440

reported progress, several companies showing

comparatively prosperous situations.

Brazil in 1915 confronted the absolute neces¬

sity of mending the national finances, but de¬

clined to make the mistake of marking up

taxes and imposts on the supposition that

higher charges would necessarily produce

greater revenue. During the five years, 1910

to 1914, inclusive, every year had brought a deficit of increasing size. Excellent judgment wTas shown by those who favored the lowering of export duties and the reduction of the

rate of port-charges exacted by companies hav¬

ing concessions for operating port-works, the position being taken that Brazil's products

should be allowed to compete effectively in foreign markets wTith those of other lands.

At this time it was stated that the general expenses of moving goods through certain

Brazilian ports were five times to twenty times greater than those of moving goods through

North American to European ports.

The Brazilian budget law for 1917 estimated the general receipts at 116,310,204 gold milreis ($62,807,510) and 327,300,333 paper milreis

($78,552,080) ; the revenue with special applica¬

tion was placed at 12,025,000 gold milreis ($6,-

493,500) and 12,838,000 paper milreis ($3,081,-

120). The total revenue, when expressed in

American currency, showed an increase of $7,-

365,839 over 1916. The budget law fixed the expenses for 1917 at 98,532,945 gold milreis ($53,207,790) and 407,426,730 paper milreis ($97, 782,408), showing a deficit of $55,995 for the year, and an increase of $8,169,205 over the ex¬

penses of 1916.

The European War did not by any means

originate the critical depression. The with¬

drawal from Brazil of British supplies of capi¬

tal in the Balkan money stringency (1913-14) had occasioned a financial revulsion before the shock of war was added. ((Brazil was feeling the depression badly in the first six months of 1914,® says a writer in The Americas (Vol. I, No. 8, page 33). ((The foreign trade of Santos port, which is typical of all Brazil, showed a decline of 44ˆ per

cent in imports for those months as compared with the corresponding

period of 1913, and the second half of the year showed a drop of 6OE3 per cent as compared with the corresponding period of 1913. In

exports, the decline of the first half of the year had been only 6ˆ2 per cent. The drop in the second half — the wrar period — was 48.2

per cent. Very heavy declines in the imports of machinery of all kinds (60 per cent) show the effect of the cutting off of the European capital supply® — that is, Continental as well as British. Moreover, Brazil's chief commodities held a less controlling position in the markets of the world at that time. ((Plantation rubber undercut in price the wild rubber of the Am¬

azon. Coffee dropped sharply in export price from 1912 on. In 1914 it was nearly 40 per cent below the 1912 price.® In view of the hard facts that the Federal government had

large debt maturities and that its revenues (chiefly derived from imports) had fallen off nearly one -half, owing to the derangement of trade resulting from the war, there was nothing to occasion surprise in the circumstance that a settlement was made with the holders of

Brazilian securities by which the maturities were extended for 13 years.

Credit was then granted only with the great¬

est reserve. (<The Federal, state and municipal governments figured in the mercantile credit situation very gravely because it was necessary during the most critical part of the months just subsequent to the declarations of war for these to extend official help to the general situ¬

ation and to finance the orderly continuation of their (own) necessary activities through re¬

ciprocal mercantile credits. The government

was said to owe about $75,000,000 distributed among leading business houses over the coun¬

try, and these were severely handicapped by its inability to settle

accounts in a way to per¬

mit them to realize without loss of principal.

The Rio de Janeiro Chamber of Commerce

held several largely attended meetings in which protesting resolutions were sent to the govern¬

ment, against the latter's payment of local accounts for supplies in treasury notes when these could not be disposed of at more than 75 per cent of face value… . Profes¬

sional and party politics were as active in Bra¬

zil, and with the same effects, as they have been during like trying times in the United States.

It was, however, gratifying to note a dis¬

tinctively forward movement in which Meas¬

ures, not men) were increasingly sought for by a very important section of the population.

Production, with a view to export, was the problem toward which all eyes were turned as being the chief hope of the Republic. The

remarkable part which Argentina has been

called upon to play since the outbreak of the war, as a supplier of wheat and frozen meat to the rest of the world, has not been without its lesson.® The depreciation of Brazilian

paper money in exchange transactions proved

to be highly disadvantageous to her. Thus, the official statement of the republic's imports and exports during the first five months of 1915, issued by the Director of Commercial Statis¬

tics, Ministry of Finance, shows the largest credit balance Brazil has had in foreign com¬

merce in five years. But, although 7,095,000

bags of coffee were exported, as against 4,643,-

000 in the corresponding period of 1914, and in paper currency of the locality the total value was 253,657 contos, as against 190,328 contos, the actual value when converted into United States currency was only $68,155,000, as against $63,445,000 the year before. The domestic price of rubber was higher in terms of the paper currency, but the amount credited in exchange was only $15,665,000 against $20,720,000, a drop of 25 per cent.

In Proceedings of the First Pan-American

Financial Conference) (Washington 1915) is

a summary by Hon. John Bassett Moore of a very full Brazilian report dealing with the financing of transactions involving the impor¬

tation and exportation of goods, with local and commercial banking and with various questions of trade and of commerce. It recommended

that greater prominence should be given, in the public schools and other educational institu¬

tions of the United States, to the study of the Central and South American countries, their

geographical location, natural resources, gov¬

ernment and languages ; that emphasis should be given to the necessity of greater liberality in the interpretation of customs regulations by the United-States and Latin America ; and it calls attention to the need of more effective

protection of trade-marks, of the facilitation of reciprocal business relations between mer¬

chants and manufacturers of the United States and of those of Latin America. It urges the granting of such reasonable credits and busi¬

ness information in both directions as may be safe and desirable. It advocates the establish¬

ment of a system of direct exchange between the United States and Latin-American coun¬

tries based on the dollar unit of the United States; and; in order to facilitate the inter¬

change ol products adapted to the needs of American countries, the formation of bureaus of standards of the respective countries, to standardize, in so far as possible, the require¬

ments of each country; the extension of recip¬

rocal tariff concessions between the United

States and Latin-American countries (such

concessions as characterized the Cuban reci¬

procity treaty), and the inauguration of a

rapid, frequent and dependable marine trans¬

portation service, to provide adequately for the maintenance and development of commerce be¬

tween the countries of North, Central and

South America. It affirmed that the postal

rates existing within the United States should be extended to include the Latin-American

countries and made reciprocal, and that a gen¬

eral international parcels-post and money-order system should be established, and direct tele¬

graphic service, wireless or cable, should be made between all parts of North, Central and South America under the exclusive ownership

and control of and operated by American in¬

terests. The report also advocates the estab¬

lishment of a more comprehensive and reliable international system for the exchange of im¬

portant news by and to the press of all the interested countries.

Budget deficits had become chronic in Bra¬

zil previous to 1914, on which date an attempt was made to relieve the situation by floating a new loan in Europe, but the European War

rendered this attempt a failure and Brazil was forced to default in payments due on her for¬

eign debts. Two months later a funding

scheme was carried through with the coopera¬

tion of the Rothschilds, by which the interest of 12 of the 18 foreign loans was funded for three years and the sinking funds on them and another loan were suspended for 10 years more.

These 12 loans comprised over 90 per cent of the external debt, which, by this funding ar¬

rangement, was very considerably increased.

This was followed by a reduction in the ex¬

penses of the government and an increase in taxation was made. The tariff was so modi¬

fied as to encourage imports where, in many instances, the old tariff had had the contrary effect. Thus the budget deficit of more than $63,000,000 was reduced to $38,000,000 in 1915

and to an estimated $9,000,000 in 1917. By a decree of 9 May 1917, the Brazilian govern¬

ment issued an additional 20,000,000 milreis ($4,800,000) of treasury notes, thus making a total of $75,600,000 issue of the $84,000,000 au¬

thorized on 28 Aug. 1915 to meet the deficits of the budget, to provide aid and preventive measures against drought and to assist the

Banco do Brazil with funds at 3 per cent to develop its operations. On this date the amount of paper money in circulation was 1,157,527,725

milreis ($277,806,650) . This had been increased by September 1917 to an equivalent in milreis of $319,025,985, United States currency. On 31

Dec. 1916, the external Brazilian debt was

$533,577,000 United States currency, and the consolidated internal debt $216,000,000. This had increased to $220,498,425 by 1 April 1917.

On the latter date the treasury reserve was somewhat more than $15,000,000 gold. The

foreign trade balance in favor of Brazil was, for the first quarter of 1917, $76,000,000, while the imports show a steady increase since 1915.

In 1916 this increase was over 30 per cent, and that of the first quarter of 1917 was 52ˆ per cent above the income for 1915. The state of Sao Paulo profited more than any other part of the country by this prosperity, its exports being nearly one-half of the total exports of the republic.

In 1916 the Brazilian government redeemed

gold bonds to the value of $17,000,000, leaving a balance of $7,000,000, out of the $24,000,000

overdue, still to be redeemed.

In 1917 the state of Sao Paulo led the way in the establishment of state savings banks in Sao Paulo, Campinas, Santos and Ribeirao

Preto with the avowed object of encouraging the people of the state to save and invest their savings. The main savings banks above men¬

tioned are empowered to establish, in conformity with the provisions of the law, branch banks throughout the state as occasion may require.

The investment of the deposits in these savings banks is carefully restricted and safeguarded by law. These are the first savings banks estab¬

lished in Brazil on a practical basis. As early as 1860 Federal savings banks were in operation, but as these were in reality dependencies of the public treasury, the regulations governing their investments never

invited public confi¬

dence, so they failed to accomplish the end of their being.

Bibliography. — financial Conference, Pro¬

ceedings of the First Pan American) (Wash¬

ington 1915) ; (Long Credits and the New

Banking AcU (reprinted from <Bulletin) Pan

American Union, Washington) ; Lough, W. H., (Financial Developments in South American

Countries> (Washington 1915) and (Banking

Opportunities in South American Countries)

(Department of Commerce, Washington 1915).

For currency, etc., consult Cosby, J. T., (Latin American Monetary Systems and Exchange

Conditions) (New York 1915), and Gonzales,

V., (Modern Foreign Exchange) (New York

1914).

Marrion Wilcox.

10. TRANSPORTATION AND COM¬

MUNICATION. Brazilian railways had a

total length of 16,294 miles open to traffic on 1 Jan. 1916. The government owns and

administers 2,929 miles; 5,716 miles were pri¬

vately leased ; 3,447 miles held by government concessions, granted

to various enterprises ; and 3,897 miles operated by private corporations under state concessions in 1914. The design of the entire system is such that, when completed, the Brazilian lines will connect with the very important railway system of Argentina and

those of Paraguay and Uruguay.

Railway construction in Brazil dates back

to 1854 when a line nine miles long connecting Porto do Maua with Ruiz do Serra was com¬

pleted. But it was not until four years later that the first government road was opened for 442

 traffic. Since then the government has taken an active part in the railway construction of the republic. The railways of Brazil are al¬

most all in the states bordering on the coast or the great rivers; and, for the size of the country and the extent of its population, they form an inadequate means of transportation.

The vast interior stretches of the country suffer most in this respect, many of them having no railway communication whatever except an oc¬

casional short, privately owned line used gener¬

ally for industrial purposes. There was, in 1917, through railway connection from Rio de Janeiro to Montevideo in Uruguay over the

Rio Grande do Sul and the Rio de Janeiro

systems. These two systems which have many

branch lines, extensive though they are, cover but a small part of the southern Atlantic coast country of Brazil. Another railway system

with Bahia for its headquarters supplies trans¬

portation facilities northward to Cape Saint Roque, with Pernambuco as the most import¬

ant northern terminus. On the northern coast some 300 miles of railway connect the port town of Ceara with Milagres, almost due south¬

ward in the mountains. Still further north

Para is connected with Braganga on the sea coast by rail. All these systems, except the two first mentioned, are as yet unconnected with one another. And even if they were they would form but a fringe ornamenting, at inter¬

vals, the skirt of Brazil where it touches the Atlantic. Over a stretch of 2,500 miles due east and west, and for a distance of almost 2,000 due north and south through the heart of great central Brazil, not a railway exists.

It is a land rich in possibilities which only transportation can help to realize ; for it is capable of growing almost every known prod¬

uce of tropic, sub-tropic and temperate lands.

The Brazil Railways Company was reor¬

ganized in Paris in August 1917 on a plan providing for the extension of all bond issues to the uniform date of 1969; the placing of all interests upon an income basis; a uniform system of sinking-fund payments beginning in 1922 for all series of bond issues; the dis¬

charge in full of all floating debt to secured creditors through new secured debentures sub¬

ordinate to the other issues; and the raising of new capital of 80,000,000 francs by the issue of 25-year 6 per cent prior lien bonds. The first issue, 21,000,000 francs, was taken by the French banks.

The chief Atlantic ports of Brazil are:

Rio de Janeiro, Santos, Pernambuco, Bahia,

Puerto Alegre, Rio Grande, Ceara and Para—

nagua; the most important Amazonian ports

being Manaos (on the Rio Negro near its con¬

fluence with the great river) and Para. At these ports are registered many transatlantic lines — about 50 in all; and the merchant navy of Brazil which consisted in 1916 of 377

steamers of 290,637 tons and 290 sailing vessels of 60,728 tons net, all of which, together with all coasting and river vessels, must by law be Brazilian. This has been added to materially since, for the Brazilian government undertook, when German and other European shipping

failed her, to fill the field with native vessels.

The Brazilian Lloyd, which had long maintained a monthly service between Rio de Janeiro and New York, established a line connecting Portu¬

guese, English and Brazilian ports. When the Brazilian government seized, in 1917, the 43

German vessels interned in Brazilian ports (a total of 221,000 tons), a part of this tonnage was added to the Lloyd Brasileiro, which thus, with the fleets of the Commercio.e Navegagao and the coast lines had early in 1917 over 375,000 tons under its direction. Since the beginning of 1915 the policy of the Brazilian government has been to build up, at all sacri¬

fice, the merchant navy and to encourage, by liberal subventions, independent river and

coast shipping. The efforts of the. Brazilian government to replace shipping facilities lost through the war include the chartering of

native and foreign vessels for a wide variety of destinations, including home, Latin Ameri¬

can, United States and European ports. The

shipping service to Montevideo, Buenos Aires and New York was largely reorganized and

a much more efficient and frequent service

connected Rio de Janeiro, Santos, Montevideo, Bahia and Pernambuco, which had suffered

greatly from lack of shipping facilities during the first two years of the

European War.

Arrangements were also entered into with

Japanese steamship lines for largely increased facilities for shipping between Brazil and Ori¬

ental ports; and encouragement was given, to the Japanese lines to increase the immigration of Japanese to Brazil. Among the lines in¬

cluded in this agreement were the Oriental

Navigation Company and the Japanese Com¬

mercial and Navigation Company.

For several years past the Brazilian govern¬

ment has encouraged the national shipping by subsidies and other privileges. The amounts

thus paid out and the favors extended have in¬

creased from year to year. In 1917 $1,854,487

were provided in the budget for these, shipping subsidies, almost 60 per cent of which went to the Lloyd Brasileiro Company which is

owned by the Brazilian government. The other companies receiving subsidies from the govern¬

ment were: the Coast Navigation Company,

the Amazon River Navigation Company, the

Empreza Viagao do Sao Francisco, the River

Paranhyba Steamship Company, the Marana—

hao Steamship Company, Empresa Fluvial

Piauhyense, Cia. Estradas do Ferro do Norte do Brazil, the Baixa San Francisco Navigation Company, the Bahiana Navigation Company

and the Pernambucana Steamship Company.

Some of these companies also receive subsi¬

dies from one or more of the Brazilian states.

The budget law of 1917 empowers the Presi¬

dent of the republic to <(concede a premium of $12 per ton displacement from 80 up to 500

tons; of $19.20 per ton from 500 to 1,500 tons and of $24 per ton from 1,500 to 6,000 tons to all vessels constructed in the ports of Brazil.®

Vessels constructed or acquired abroad and

brought under the Brazilian flag, provided they are of more than 1,500 tons burden, receive a premium of $6 per ton displacement. In his report of 30 June 1916, the Brazilian Minister of Transportation and Public Works fur¬

nishes a confessedly incomplete list of 659 ves¬

sels under the Brazilian flag with a total capac¬

ity of 316,587 tons. Of this tonnage, the Lloyd Brasileiro furnished 126,000 tons with 66

steamers; the Companhia Commercio e Nave¬

gagao, 55,500 tons with 20 vessels ; the Com¬

panhia Nacional de Navegagao Costeira, 17,500

tons with 18 steamers ; and the Amazon Steam BRAZIL

• 4 -f ˆv‘

.

i , ■•••• •• *1 -‘W •: M‘* ‘ xr ‘ ;

–

Copyright, Newman Traveltalks and Brown & Dawson, N. V.

President's Palace, Rio de Janeiro

BRAZIL

Copyright, Newman Traveltalks and Brown & Dawson, N. Y.

1 The Municipal Theatre at Rio de Janeiro 2 Avenida Rio Branco, Rio de Janeiro 443

Navigation Company, 15,655 tons with 33 boats.

Oi these only the Lloyd Brasileiro and the Companhia Commercio y Navegagao were regu¬

larly engaged in overseas trade in 1917. They also carried on a coast and river business.

The attention paid by the Brazilian govern¬

ment to the encouragement of the merchant

navy and native shipping in general has resulted in giving Brazil a much larger body of domes¬

tic shipping than is possessed by any other Latin-American nation. The significance of

this will be readily recognized when it is re¬

membered that the country as a whole is de¬

pendent upon its rivers and coastal shipping for the greater part of its transportation. In 1915 there entered the ports of Brazil 22,059

steam and sailing vessels, carrying 19,494,771

tons, while 22,504 cleared, with a tonnage of 19,471,800.

An overland mail service for letters and

small packages was established by the Brazilian government in March 1917, between Rio de

Janeiro and Buenos Aires, in Argentina. This mail route passes through Santa Maria, Rivera, Livramento, Uruguayana and Montevideo. In

1915 there were 3,603 post offices in the re¬

public, and they handled during the year a total of 7,915,124 pieces of mail. Since then a con¬

siderable number of postoffices have been es¬

tablished, more especially in the interior of the country.

The telegraphy system, which is under the

control of the government, had 725 offices in 1915, which handled 3,853,405 messages.

An extensive wireless system, in the process of completion in 1917, included 15 new sta¬

tions already erected along the Amazon and

the Paraguay rivers and five on the coast.

Telephone lines are generally found in the

larger towns and cities, and telephone facilities are being rapidly extended in the centres of population.

By a decree of 28 March 1917, official ap¬

proval was given to a plan for the linking up of the various telephone lines in the Federal district and the states of Sao Paulo and Rio de Janeiro, and the work of carrying the de¬

cree into effect was at once proceeded with.

The two telephones concerned were the Com¬

panhia Rede Telephonia Bragantina and the

Interurban Telephone Company of Brazil.

John H. Cornyn.

11. THE ARMY AND NAVY. Army —

Military service is obligatory on all male citi¬

zens from the 21st year to the 44th, inclusive, with numerous exceptions, such as that made in favor of men who demonstrate skill in

marksmanship. Instruction by French officers

has produced excellent results for the military police of Sao Paulo. Terms of service are

two years in the ranks, seven in the reserve — or, as it is called, the active reserve — seven in the territorial army and the remaining years

in the national guard. The country is divided into military zones, embracing 21 districts.

Reservists are called out for one month of training each year; territorialists for two weeks or more annually. Units of the active army are 15 regiments of infantry, 12 of cavalry (of four squadrons) and five of two squadrons

besides the cazadores; five regiments of field artillery (nine batteries, each with four guns) ; nine horse artillery, five howitzer and six moun¬

tain batteries; five battalions of engineers and nine of garrison artillery. Total in the service, 94 batteries, of which 36 are in fortifications.

The Brazilian artillery owes the beginning of its organization to the Conde de Eu, a brilliant officer in the time of the Emperor Dom Pedro.

Of more practical and modern seeming, in the engineer's class, are the 17 sections of men skilled in telegraphy, construction of bridges, railways and aeronautics. The military zones or territorial districts supply men for five stra¬

tegical and three cavalry brigades which are stationed near the frontiers of Argentina, Para¬

guay and Uruguay. The total peace strength

of Brazil's land forces is about 25,000, to which may be added a gendarmerie of 20,000. In time of war the number may (it is sometimes as¬

serted) be increased to 60,000 or even five times that number if equipment can be found.

Navy. — The naval contingent is composed

of 7,500 to 8,000 men in all, and the squadron of the following units: The dreadnoughts

Minas Gcraes and Sao Paulo (each having dis¬

placement 19,281. principal armament 12 guns of 12 inch and 22 of 4.7 inch, H.P. 23,500 and nominal speed 21); the old battleships Deodoro and Floriano (each with displacement

3,200, principal armament two guns of 9.2 inch and four of 4.7 inch, H.P. 3,400 and nominal speed 14) ; protected cruisers Bahia, Rio Grande do Sul and Ceard (each having displacement

3,500, principal armament 10 guns of 4.7 inch and H.P. 18,000) ; the old Barrozo (displace¬

ment 3,450, six guns of 6 inch, four of 4.7

inch and two torpedo tubes), and T ammandare (displacement 4,500, 10 guns of 6 inch, two of 4.7 inch and two torpedo tubes) ; also five torpedo gunboats and four first-class torpedo boats, 10 Yarrow destroyers and four destroy¬

ers, a mine ship of 1,500 tons, a small vessel (1,200 tons) for hydrographic service, three submarines and other vessels, the total num¬

ber being 52. The naval school is at Rio de Janeiro. Ladario, in Matto Grosso, has a river arsenal ; other arsenals are at Rio and Para.

Marrion Wilcox.

BRAZIL, Ind., city and county-seat of Clay

County, 16 miles northeast of Terre Haute, on the Central Ind., the Chicago & E. Ill. and the Vandalia railroads. It is an important rail¬

road centre and in its vicinity are rich mines of block coal. Inexhaustible deposits of clay and shales are also found here, and the city contains manufactures of pumps, tiles, machin¬

ery, clay products, tin products, wire fence, brick, sewer pipe, pianos, *etc.* The United States census of manufactures for 1914 reported 30

industrial establishments of factory grade, em¬

ploying 677 persons, of whom 583 were wage-earners, receiving $367,000 annually in wages.

The capital invested was $1,639,000, and the year's output was valued at $1,471,000; of this, $514,000 was the value added by manufacture.

Brazil was settled in 1856, incorporated in 1873; is governed by a mayor, elected quadrennially, and a city council ; has a Carnegie library and controls its own waterworks. Pop. 10,000.

BRAZIL-CABBAGE, or CHOW CARA-

IBE (Caladium sagittifolium or Xanthosoma

sagittif olium) , a West Indian plant of the nat¬

ural order Aracece, widely cultivated in the tropics for its starchy edible tubers, which are used like potatoes, and its succulent leaves,

which are cooked like spinach. The plant al¬

most entirely lacks the acridity which charac¬

terizes other members of the order. It is ex¬

tensively grown in Porto Rico under the name Yautia.

BRAZIL-NUT, CASTANEA, CREAM

NUT, NIGGER-TOE, PARA NUT, the

seeds of two species of Brazilian trees, the only ones of their genus, of the natural order

Myrtacece . The better-known species, Berthol-letia excelsa, is a tree

which often attains a height of 150 feet and a diameter of four feet.

It has bright green, leathery leaves, two feet long and six inches wide, and cream-colored flowers followed by very hard-shelled fruits about six inches in diameter, containing about 20 three-sided, wrinkled seeds which are largely exported from Para and from ports of French Guiana. They are used for dessert and con¬

fectionery and for the manufacture of an ex¬

pressed oil used in oil painting, lubricating and lighting. Though of stately dimensions, the

tree is of little decorative use. It covers exten¬

sive tracts in northern Brazil and is especially abundant along the Amazon and Orinoco rivers.

The seeds of the monkey-pot tree, known as sapucaia nuts, are considered superior to Bra¬

zil-nuts, but are not yet commercially import¬

ant, owing to the distance they must be trans¬

ported from the interior country.

BRAZIL TEA, a drink prepared from the

leaves of Ilex pdragucnsis.

BRAZILIAN GRASS, an incorrect name

popularly applied to a substance used in the manufacture of a very cheap kind of hats,

known as Brazilian-grass hats and also as chip hats. It consists of strips of the leaves of a palm, Chamcerops argentea, which are imported for this manufacture and chiefly from Cuba.

BRAZILIAN PEBBLE, a colorless and

transparent variety of quartz, used for high-grade lenses.

BRAZILWOOD. A dark red or brown

dyewood exported from the West Indies, Bra¬

zil and other South American countries. Va¬

rious grades appear in the market under diverse names, such as Pernambuco wood (Ccesalpinia echinata), Saint Martha wood and All Saints'

wood, which are most valued. Except in a

few cases, botanists have not definitely deter¬

mined the species which furnish the different grades, but large quantities are derived from C. brasiliensis , a small tree, bipinnate leaves and flowers in panicles. It is indigenous in rocky ground, especially in the West Indies.

The valuable part is the heart-wood, of which there is but little when compared with the thick, valueless sap-wood. This useful part is at first light colored, but when exposed to light, air, alcohol or ether readily yields up its red coloring-matter, called ˆbrazilin.® Formerly it was largely used in dyeing, but coal-tar dyes and other manufactured dyes have generally

supplanted it. It is still used in red ink-mak¬

ing. The name is said to be derived from

Braxilis, not Brazil, since sappan wood, which is believed to be identical, was used prior to the discovery of America.

BRAZING, or BRASS-SOLDERING,

the process of uniting two pieces of brass, two pieces of copper or one of each by means of a hard solder, that is, a solder which fuses at a comparatively high temperature. The solder

usually consists of alloys of copper and zinc (though sometimes tin and other metals arc

added) which have been melted and fused and, after cooling and hardening, are filed down to the form of a coarse powder. It is always mixed with borax to prevent the oxidation of the metals soldered together. It is usual to moisten this mixture with water before spread¬

ing it over the surfaces to be joined. When the solder has been applied in this state, the pieces of metal are slowly heated, by which the water is made to evaporate, leaving a crust of the solder on the parts where it is required. The pieces are then exposed to a stronger heat until the borax melts and fluxes the solder, which suddenly flushes the joints of the pieces of metal and thus unites the two surfaces, making them into one piece. The whole is now allowed to cool and is afterward dressed with a file.

Pieces of metal united in this way are held together as firmly as if they were only one piece.

BRAZOS, bra'zos, formerly called BRAZOS-DE-DIOS, a large river in Texas, formed by the junction of the Clear and Salt forks, in Young County, once known as the Staked

Plain, between the parallels of 33° and 34°. It flows southeastward between the Colorado and Trinity, and after a course of about 900 miles falls into the Gulf of Mexico, between Quin¬

tana and Velasco, 40 miles west-southwest of Galveston. It is navigable by steamers during the wet season for about 300 miles and at all seasons to Columbia, 40 miles from its mouth.

Among the towns on its banks the chief is Waco, about halfway from its mouth, now an important railway centre. The cotton planta¬

tions on the Brazos are highly productive.

BRAZOS DE SANTIAGO, Tex., village

30 miles east of Brownsville, on the northern bank of the Rio Grande, in Cameron County.

The battles of Palo Alto and Resaca de la Palma, in 1846, were fought about half way between Brazos and Matamoras. It carries on much coasting and foreign trade, although a shifting sand-bar is a serious obstacle to its commerce.

BRAZZA, brat'sa (ancient Brachia), an

island ip the Adriatic Sea, off the coast of Dalmatia, pf which it constitutes a sepa¬

rate administrative district 170 square miles in extent (the largest of the Dalmatian

Islands), and is separated from the mainland by a channel 12 miles broad which affords ex¬

cellent anchorage for shipping. The island is mountainous and well wooded, and in the val¬

ley vines are grown from which are made the best wines of Dalmatia. It produces also good oil, almonds and saffron, and grain in small quantity, and the fisheries are valuable. Much attention is paid to the cultivation of bees and silkworms. There are important marble quar¬

ries. The chief town, Saint Pietro di Brazza, has a small port, defended by a mole. Pop.

22,697.

BRAZZA-SAVORGNAN, brat -sa-sa-vor—

nyan, Pierre Paul Francois Camille, French

explorer: b. on board ship, off Rio de Janeiro, Brazil, 26 Jan. 1852; d. Dakar, French West Africa, 15 Sept. 1905. He entered the French navy in 1875, after becoming a naturalized

French citizen, and during 1876-78 explored

the Ogowe and Kongo regions of Africa, dis¬

covering a practical route to the sea, and made treaties between France and the natives. In 1879 he had reached Stanley Pool (afterward Brazzaville), where Stanley met him, and was astounded at the simplicity of his equipment.

Fie was the only European in his expedition.

In 1886 he was made governor of the French Kongo and Gaboon colonies, which he had thus secured. After a sojourn in France, he re¬

turned to Africa in 1888 as commissioner—

general of the whole of French Kongo. The

next six years were spent in explorations and in the consolidation of French power in cen¬

tral Africa, after which, in 1897, he returned to France. It was while returning from an in¬

vestigation into alleged scandals in the admin¬

istration of the French Kongo that he died.

He was singularly happy in his relations with the natives, and to him France owes her pos¬

sessions in the Kongo region.

BREACH, in military siege operations, the

aperture or passage made in the wall of any fortified place, by the ordnance of the besiegers, for the purpose of entering the fortress.

They should be made where there is the least defense, that is, in the front or face of the bastions.

In order to divide the resistance of the besieged, breaches are commonly made at once in the

faces of the attacked bastions and in the rave¬

lin. This is effected by battering and, at such places as the cannon do not reach, by the aid of mines. The breach is called practicable if it is large enough to afford some hope of suc¬

cess in case of an assault. This is generally considered to be the case if it allows a passage of 14 men abreast. Frequently, however, a

breach of much less extent, even of half that width, may be entered. See Fortification ;

Siege.

BREACH, in lazv any violation of a legal

obligation. A continuing breach is one where the condition of things constituting a breach continues during a period of time, or where the acts constituting a breach are repeated at brief intervals. In pleading, a breach is that part of the complaint in which the violation of the de¬

fendant's contract is stated. It is usual in as¬

sumpsit, where the common-law rules of plead¬

ing are still in force, to introduce the statement of the particular breach, with the allegation that the defendant, contriving and fraudulently intending craftily and subtilely to deceive and defraud the plaintiff, neglected and refused to perform, or performed the particular act, con¬

trary to the previous stipulation. In debt, the breach or cause of action complained of must proceed only for the non-payment of money

previously alleged to be payable; and such

breach is very similar whether the action be in debt on simple contract, specialty, record or statute.

Breach of Contract. — The failure to per¬

form a thing which one has contracted to per¬

form. In all cases a failure to perform is not a breach of contract, because if he who under¬

takes to perform a certain thing can show that he acted in good faith and has substantially fulfilled his contract, a small deviation is not held to constitute a breach. Formal refusal, therefore, to a demand for performance is not the sole requisite to a breach, as the default of itself constitutes a breach. See Contract;

Damages; Tort; and consult the authorities un¬

der those articles.

Breach of Promise of Marriage. — An ac¬

tion lies for this on the part of either man or woman, though, as a rule, only the latter is believed to be substantially injured or to de¬

serve damages. There must be a legal and valid consideration, but as there are always mutual promises they are a sufficient consideration for each other. The minds of the parties must

meet ; that is, there must be a request or propo¬

sition on the one side and an assent on the other. If the communications between the par¬

ties are verbal, the only questions which usually arise relate to evidence and proof. The exact words or time or manner of the promise need not be proved, but it may be inferred from the conduct of the parties and from the circum¬

stances which usually attend a promise to

marry. (15 Mass. 1; 2 Penn. St. 89). When the parties are at a distance from each other, and the offer is made by letter, it will be pre¬

sumed to continue for a reasonable time for the consideration of the party addressed, and if accepted within a reasonable time and before

it is expressly revoked, the contract is then complete.

A promise of marriage is not within the

third clause of the fourth section of the statute of frauds relating to agreements made upon

consideration of marriage; but if not to be per¬

formed within one year it is within the fifth clause and must therefore be in writing in order to be binding. If no time be fixed and agreed upon for the performance of the contract, it is in contemplation of law a contract to marry within a reasonable period after request and either party may call upon the other to fulfil the engagement, and in case of default may bring an action for damages. If both parties lie by for an unreasonable period and do not treat the contract as continuing, it will be deemed to be abandoned by mutual consent.

The defenses which may be made to an action for breach of promise of marriage are, of

course, various, but it is only necessary to no¬

tice in this place such as are in some degree peculiar. Thus, if either party has been con¬

victed of an infamous crime or has sustained a bad character generally and the other was ignorant of it at the time of the engagement ; or if the woman has committed fornication and this was unknown at the time to the man who promised to marry her; or if the woman is deeply involved in debt at the time of the en¬

gagement and the fact is kept secret from her intended husband; or if false representations are made by the woman, or by her friends in collusion with her, as to her circumstances and situation in life and the amount of her fortune and marriage portion, — any of these facts, if properly pleaded, will constitute a good defense.

If after the engagement either party is guilty of gross misconduct, inconsistent, with the charac¬

ter which he or she was fairly presumed to possess, the other party will be released. If the woman insists upon having her property settled to her own personal use, it is said that this will justify the man in

breaking off the engagement.

So, if the situation and position ot either of the parties as regards his or her fitness for the marriage relation is materially and permanentlv altered for the worse (whether with or without 446

the fault of such party) after the engagement, this will release the other party.

Breach of Warranty. — In sales of personal

property an express warranty is one by which the warrantor covenants or undertakes to insure that the thing which is the subject of the con¬

tract is, or is not, as there mentioned; as that a horse is sound, that he is not five years old, *etc.*

An implied warranty is one which, not being expressly made, the law implies by the fact of the sale. For example, the seller is understood to warrant the title of goods he sells when they are in his possession at the time of the sale.

(1 Ld. Raym. 593). In general there is no im¬

plied warranty of the quality of the goods sold.

The rule of the civil law was that a fair price implied a warranty of quality. This rule has been adopted in Louisiana and South Carolina.

There may be an implied warranty as to char¬

acter, and even as to quality, from statements of the seller or a purchase for a specified pur¬

pose. Any substantial failure, in the article supplied to the buyer in pursuance of the con¬

tract of sale, to come up to the quality war¬

ranted, amounts to a breach of the warranty, and proof of it establishes the buyer's right to an action therefor. This rule applies to all cases where the remedy sought is by an action on the warranty for damages or by way of set¬

off in a suit for the purchase-money; in such cases the buyer is bound to prove the breach and the damages suffered by him in conse¬

quence of it and can recover only to the extent of the damage so proved. A warranty of sound¬

ness does not extend to a visible defect. A vendor of personal property is not liable for latent defects, known to him but unknown to the purchaser, unless he has used some artifice to deceive the purchaser in regard to such de¬

fects or has warranted the article. Where an article is warranted as fit for a certain purpose, the seller is liable for an injury sustained by the vendee in consequence of its unfitness. Un¬

der an executory contract to sell goods in tran¬

situ, the vendor is obliged to tender a merchant¬

able article. On a sale of an article known to be intended for food there is an implied war¬

ranty that it is sound, wholesome and fit to be used as an article of food. (15 Hun 504). The authority of an agent to warrant goods sold will be implied where it is usual in the market to give a warranty on the sale of such goods ; such authority, however, will be implied only as to goods sold at the time of the warranty, which will not extend to subsequent sales in the ab¬

sence of express warranty.

Breach of Duty. — The non-performance of

a duty, or the performance of it in such a man¬

ner that injury is done to one's employer, through want of integrity or due diligence and skill. It is assumed that there is an implied contract between an employer and the person that he employs, according to

which the latter agrees to perform the duties entrusted to him in such a manner that the interests of his em¬

ployer shall not suffer. In case of breach of duty, what is called an action in assumpsit —that is, an action for the recovery of damages for the non-performance of a promise, which, though not under seal, is yet founded on proper consideration — ‘may be brought by the one who has sustained an injury against the persons by whom the breach has been committed.

Breach of Peace. — The taking part in any

riot, affray or tumult which is destructive to the public tranquillity, or the causing others to do anything to injure the public tranquillity.

The former are actual, the latter constructive breaches. In both cases the breach of the peace may be either felonious or not felonious. The felonious breaches of the peace are three in number: (1) The riotous assembling of 12 or more persons and not dispersing upon procla¬

mation; (2) the riotous demolishing of

churches, houses, buildings or machinery; (3) maliciously sending, delivering or uttering, or directly or indirectly causing to be received, knowing the contents thereof, any letter or writing threatening to kill or murder any per¬

son. The remaining offenses are not felonious and include: (1) Affrays; (2) riots, routs and unlawful assemblies, which must have at least three persons to constitute them; (3) tumultu¬

ously petitioning; (4) forcible entry or de¬

tainer, which is committed by violently taking or keeping possession of lands or tenements with menaces, force and arms and without the authority of the lawT ; (5) riding or going armed with dangerous or unusual weapons, terrifying the good people of the land; (6) spreading false news; (7) false and pretended prophecies, with intent to disturb the peace. Finally, there are two constructive breaches of the peace, namely, challenging another to fight, or bearing such a challenge, and the making public by either printing, writing, signs or pictures, malicious defamations of any person, especially a magis¬

trate, in order to provoke him to wrath or ex¬

pose him to public hatred, contempt and ridicule.

Breach of Trust. — A violation of duty by a trustee, executor or any other person in a fidu¬

ciary position. A trustee is not permitted to manage an estate entrusted to him in such a manner as to derive any advantage to himself, and at the same time he is bound to manage it in such a manner that the person for whom he has it in trust shall reap from it the greatest possible advantage. Accordingly money held in trust by a trustee must be invested by him in government stock, or in certain other special securities, for the behoof of him for whom he has the money in trust ; and if he has not done so he is, as a general rule, liable for interest on the trust funds. Formerly it was the duty of the trustee to invest money in government se¬

curities alone, but under certain acts (unless the trust deed expressly forbids) a number of other sound investments are allowed. A trustee who has grossly mismanaged his trust may have to repay money lost, with interest, and some¬

times compound interest. (See Trustee). The

Court of Chancery has adopted two rules to guide the decisions with respect to the liability consequent upon a breach of trust. The pur¬

port of the first is, that, with a view not to strike terror into persons acting for the benefit of others, the court will deal leniently with trustees who have endeavored fairly to dis¬

charge their duty, and in case of any misap¬

plication of the trust money the court will not hold the trustees liable on slight grounds. The second rule is, that care must be had to guard against any abuse of their trust on the part of the trustees. A fraudulent misuse of trust

funds is punishable as a misdemeanor with fine and imprisonment.

BREAD AND BREAD MAKING

BREAD AND BREAD MAKING.

Historical. — Baking is probably the very

oldest industry man engaged in. Wheat

Hand-mill of the Lake Dwellers (5,000 years ago) (Prom Livingstone “ Missionary Travels.”)

and barley, the oldest cereals known

to have been cultivated, have been found

together with the ploughshare fashioned of

wood and the stone hand-mill consisting of a hollowed stone and a stone ball-shaped crusher among the remains left by prehistoric man de¬

posited in his burial places or found embedded in the earth over or near which he had his dwelling places. These implements, together

with arrow heads, spear heads and battle axes, all of flint or stone (Stone Age of man)

gave evidence that man at that time was unac¬

quainted with the use of metal, and that his primitive culture must have dated back some five to ten thousand years before the beginning of the Christian era.

Food of Primitive Man. — While the finding

of the remains o*f wheat and barley and the ploughshare gave evidence of agricultural pur¬

suit; the bones of domestic animals and wild animals and the remains of clams and oysters indicated that his diet was quite a variegated Ancient mode of ploughing in Egypt (Rawlinson) one; that he employed the domestic animals to ease his own work, while remnants of woven fabrics, especially from flax fibre, indicated that he had learned to cultivate plants for other than food purposes.

Oldest Form of Baking. — The oldest bread

was made in the form of cakes or fritters, simply prepared by mixing wheat or barley

meal to a batter with water and milk, and bak¬

ing these batter cakes, of, may be, the size and form of our present day griddle cakes, on hot ashes or over redhot coals, or a hot stone which represented the first bread pan and oven com¬

bined. Salt was probably the only other in¬

gredient besides the meal and water and milk, as there certainly was no baking powder and yeast was not used until brewing beer from germinated barley had become known, though

sour dough bread was probably as well known as sour milk products.

The Egyptians, as the remains found in the tombs of the pyramids show, had perfected

both baking and brewing 1,500 years before the beginning of the Christian era, and the Old Testament makes mention of a mill known to the Assyrians. These occupations had become

organized industries. In Egypt, in brewing

as well as in baking bread, the grain was crushed, mixed with water to a dough and fer¬

mented by the addition of fermenting bread

mash, which was then baked. The fermented

beverage was simply prepared from slightly

sprouted barley or other grain, by crushing it, mixing with water to a mash, slightly baking the dough, breaking the bread, making a mash with water and adding fermented mash once

more for fermentation. The fermenting bever¬

age then supplies the yeast for baking.

From Handicraft to Industry. — How bak¬

ing developed from a simple handicraft, with a stone hand-mill furnishing the grist or meal, and the baking of a batter of meal and water on ashes, or over redhot coals, or on a hot flat stone, into a highly developed art, through the ages, and then into one of the most important industries engaged in by man, would indeed form an interesting story for this article, would space permit. Man learned to use bronze metal to fashion his tools, utensils, weapons, long before he had found iron. The bronze age of man, which lasted probably upward of a thousand

years, preceded that of the iron age. In this period iron took the place of bronze and stone.

Unlike the use of bronze which had spread

westward and northward from Asia and Africa iron was first discovered and made use of by the Celts in northwestern Europs, from where it spread eastward and southward.

Primitive Baking Pans. — Flat sheets of

iron, rounded and provided with a wooden

handle, early in the culture of our European ancestry took the place of the hot stone, hot aohes or coals in baking flat cakes, and this led naturally to the development of the bread pan and the employment of these singly or in larger number to the development of the bakers' oven, 448

which in the time of the Egyptians was

fashioned out of clay with a flat bottom and arched roof, of varying size for household and shop use.

Modern Bakery Shops, Products, Mate¬

rials. — Modern bakery shops in America,

equipped with costly and intricate machinery, have attained to the dignity of factories with a daily consumption of flour ranging from 20 to 200 barrels, and a daily output of over 5,000 to 50,000 loaves of bread. Bread, rolls, biscuits and cakes are all produced on a large scale and of such quality and price that it is no longer an object of the housewife in our larger cities to have the baking of these products done at home, excepting perhaps out of sentimental

promptings, say the wedding cake or the birth¬

day cake. Wheat bread is the chief product of the modern bakery, then rye bread, then soda biscuits, rolls, cake and sweet biscuits. Over 50,000,000 barrels of wheat flour are consumed in the manufacture of wheat products in the United States annually, of which about 35,000,-

000 go into wheat bread ; 5,000,000 into soda biscuits ; 2,500,000 into rolls, 2,500,000 into cakes and sweet biscuits. The amount of rve flour for rye bread and other uses is approxi¬

mately 10,000,000 barrels. Into the making of various products the following materials enter: Wheat bread. — For one barrel of wheat

flour, 196 pounds, about 110 pounds of water; 2 to 4 pounds of shortening (lard, fat or vege¬

table oil) ; 2ˆ2 to 4 pounds of salt; about 5 to 6

pounds of cane sugar; \l/2 pounds of malt ex¬

tract ; 2x/2 pounds of pressed yeast, small quan¬

tities of milk.

Whole rye bread (pumpernickel). — For one

barrel of whole rye flour of 196 pounds, about 90 pounds of water ; 2x/2 to 4 pounds suet ; about 2 pounds cane sugar; 1 pound compressed

yeast. The dough is aerated by employing sour dough for leavening, the leaven being daily mixed with more dough, the mass ripening again in 24 hours or over night to more leaven ; the process being kept up indeterminately often

without adding yeast, as this develops in the sour dough.

Mixed rye bread. — Generally rye flour is

mixed with from 25 to 50 per cent of wheat flour, in order to improve color and aeration.

Naturally the characteristic quality of rye bread is lost with a larger percentage of admixture Rolls. — The same material as for wheat

bread is used, with larger quantities of milk.

Soda biscuits. — Wheat flour, 1 barrel; water, 100 pounds ; salt, 2 pounds ; yeast, x/2 pound ; bicarbonate of soda in sufficient quantity to neutralize acidity formed in the dough. The brittle nature of the soda biscuit as compared with bread is due entirely to the process of manufacture.

Cake. — Wheat flour 10 pounds and milk or

milk and water 5 pounds or in the proportion like wheat bread; butter or lard, 2 pounds per 10 pounds of flour; eggs, 2 pounds; a little salt; sugar, 2-3 pounds ; baking powder, 2 ounces or less.

Merits of Various Cereal Flours and Other

Materials Scientifically Considered. — Wheat

and rye and barley have been, for ages, the cereals from which European peoples have

baked their bread. Whether wheat is the oldest cereal used is not known ; they have been dis¬

covered together in the most ancient burial places of man so that barley at one time seemed equally as important as wheat, but it was

gradually superseded by the latter. It is still employed when wheat is scarce or expensive, as at present (1918) in the United States, where the food administration requires the employ¬

ment of wheat substitutes to the amount of 25

per cent or more in the baking of wheat bread or

Victory bread in the production of which

various substitute flours enter, such as barley flour, rye flour, corn flour, rice flour, potato flour, the relative value of which now becomes more clearly evident through the test of practi¬

cal results. Barley flour has been found to be less serviceable than the other substitutes. The American barlev differs greatly from the

European barley in character, as has recently been pointed out by the Wahl Institute of Food Research, Chicago. American barley flour pro¬

duces darker bread; a smaller loaf that is apt to be soggy, that is, insufficiently aerated. Oat meal and flour and resultant bread have much of the characteristics of barley flour and bread.

Corn meal and corn flour , rice meal and rice flour in quantities of 25 per cent, if properly processed, will give a white bread of equal quality as whole wheat, and the employment of these substitutes probably will become a

permanent feature in the American baking in¬

dustry. Potato flour may be blended with

good results with corn meal to the extent of 10 to 20 per cent of the latter.

Some Scientific Principles Underlying

Baking . — The peculiar elasticity of wheat and rye flour doughs, which render them capable of retaining, better than dough from other

sources, the gas generated by dough fermenta¬

tion, so that the gas is held uniformly dis¬

tributed in dough and bread, is due to the peculiar nature of the proteins of wheat and rye. In wheat flour these are termed gliadin and glutenin, which somewhat partake of the nature of the white of an egg. These bodies are gradually broken down through the processess accompanying yeast fermentation, re¬

sulting gradually in the proper ripening of the dough, which takes from five to six hours, and without which the finished product would be too tough — more or less rubberlike.

Rye flour contains similar bodies to an

almost equal degree, and these are broken down so that the dough becomes ripened properly by employing the sour-dough principle. The

acidity developed in the sour dough aids ma¬

terially the yeast fermentation processes in bringing the dough to the proper stage of ripen¬

ing. In American barley flour the proteins

(hordeins) are quite dissimilar in nature. The ripening process does not develop in the same way as with European barley, which is of the two-rowed mellow type, whereas the American

is of the six-rowed, hard, flinty type. Neither corn flour nor rice flour contain proteins of the nature of those of wheat or rye, although the gluten either contains to a considerable ex¬

tent has a somewhat similar chemical composi¬

tion. The bread from corn flour or rice flour alone shows no elasticity. It is too short, while corn or rice flour, as well as potato flour, may be

properly used to reduce an all too great elasticity of wheat bread. Water — soft, pure, cool water, such as that which our Great Lakes supply, is best suited for baking. Hard water, BREAD AND BREAD MAKING

such as well water, generally containing car¬

bonate of lime and magnesia, are less suited.

These waters neutralize the souring principle, produced in yeast-or sour dough-fermentation, and therefore act detrimental. Animal or vege¬

table fats give bread and other baking products a distinctive flavor, and aid in shortening wheat bread. Salt, that is, table salt, is necessary for seasoning bread, rolls and biscuits, for the same reason that it is required as an addition in the preparation of most of our foods. Slightly too large quantities of salt interfere with proper doupfli aeration.

The sour-dough principle is the ancient

method of aerating the dough and bread, still used to this day in the making of rye bread The sour dough may be obtained in. the first place by letting dough prepared in the usual way with an addition of yeast get over-ripe or sour; then using this sour dough in place of yeast, retaining a small part of the sour dough to mix with unyeasted dough in the proportion desired to obtain new leaven or sour dough within the desired period. Two fermentations proceed in the development of sour dough ; yeast fermentation producing mainly carbonic acid

gas and some lactic acid gas ; and lactic fermen¬

tation producing lactic acid, but very little car¬

bonic acid gas. It is the lactic acid that ripens the dough, the gas that aerates it.

The yeast generally employed in the form

of pressed yeast cakes or bricks or mixed with corn meal and dried is composed of minute

vegetable organisms, consisting of single cells, which are plainly visible as such under the microscope, but are invisible to the unaided eye.

A speck of yeast just about visible contains as much as a hundred individual yeast organ¬

isms. The yeast, being a living organism, re¬

requires food for its sustenance, growth and reproduction. In utilizing this food it produces out of the sugar in the dough the gas which aerates the bread, an dthis fermentation is the aerating principle. Bakers' yeast is now

specially prepared by yeast factories, where it is gained hv the fermentation of malt and corn mashes under the influence of intense aeration.

The yeast is allowed to settle, is then centri¬

fuged and pressed and employed in the bakery within a few days. Dried yeast will keep serv¬

iceable for a long time.

Sugar and malt extract are added to the

dough, not so much for sweetening purposes

as for the necessity of these bodies for yeast fermentation. The sugar is decomposed in

dough fermentation by the yeast into alcohol and carbonic acid gas ; the latter is held in place by the tenacity of the above mentioned protein particles, which permits of thorough and uni¬

form aeration ; the malt extract contains sub¬

stances besides sugar which, like the aminobodies and phosphates, are utilized by the yeast as foods, which causes a more vigorous fer¬

mentation. Saccharose (cane or beet sugar),

maltose, glucose, solid or in syrup form, are employed.

In the use of baking powders the aeration is accomplished on quite a different principle.

Baking powders are composed of a weak acid, generally tartaric acid or cream of tartar, and bicarbonate of soda. Through the interaction of these two ingredients, in the presence of water, the carbonic acid contained in the bicar¬

bonate of soda is liberated, and the aeration vo L. 4—29

ensues. Baking powders are usually employed

in the preparation of quick-rising products, like homemade cakes or biscuits, griddle cakes, *etc.*

Baking Process, Wheat Bread. — Mixing. —

In making wheat bread on a large scale the various ingredients, flour, water, salt, sugar and malt extract, lard or oil and yeast, are mixed in a mixing machine, the yeast being previously dissolved by stirring or whipping it in water.

After mixing thoroughly to a homogeneous

mass, the dough is placed in a trough, con¬

structed of wood or sheet iron, the dimensions of the trough varying from 2 to 3 feet in width; depth about the same; length from 5 to 10

feet, in which dough fermentation gradually sets in and progresses for about 2 to 2ˆ2 hours to the extent of causing the dough to rise in the trough to treble and more its original volume.

Now the dough is punched in the trough or kneaded and worked until

it has fallen back to nearly its original volume; it is again left to rise. The second dough fermentation being

finished in about 1ˆ2 hours, when it receives its second punch, that is, it is again kneaded and worked until it has fallen down. It is again allowed to ferment, this time for about 45

minutes, when it receives its third punch, and is then ready, after about 10 minutes more, to go to the bench, that is, in hand-operated bakeries, the dough is placed on a large flat, oaken table, is kneaded, cut into pieces, weigh¬

ing 10, 12, 16, 21 ounces, or other denominations.

These pieces are properly molded in loaf shape and are placed, flattened out, into the bread pans. These are placed on racks that are con¬

veyed on rollers to the steam, or proofing cabinet, usually constructed of sheet iron, filled with an atmosphere of steam, where the pans are left for about 50 minutes. The dough

here achieves its last rise, filling the pans quite to the level of the rim. Then they are taken out and placed in the oven, where they remain for about 35 minutes, which is usually the time of a bake. Here the bread increases its volume once more, mainly through expansion of the

gases caused by the high temperature of the oven. This is the spring, the proper volume of which is very important to the quality of the bread, and should be one-fourth of the con¬

tents of the pan, increasing the volume of the bread by one-fifth of the whole loaf.

Soda Biscuits. — Wheat flour and water, salt and yeast, are mixed as in the manufacture c .

wheat bread. The dough is allowed to ferment for about 20 hours, in order to break down the gluten of the wheat entirely. During this pro¬

longed fermentation, lactic acid acidity develops, this being the agency to break down the gluten.

Now a sufficient amount of bicarbonate of soda is added to neutralize the acidity; at the same time carbonic acid gas is developed through the interaction of lactic acid and the bicarbonate of soda, both neutralizing one another, so that no acid taste nor soda taste is noticeable. In order to invigorate the fermentation, a small amount of malt extract is employed in mixing the

dough.

For sweet soda biscuits and graham biscuits, an adequate amount of sugar is used in mixing.

The finished dough is rolled out in flat sheets of the desired thickness. These are cut, or divided, the dough pieces placed in pans and baked.

Temperatures. — The temperature of a

freshly mixed dough should be about 79 to 80°.

During dough fermentation in its three stages, the temperature gradually rises to about 85° hut should not exceed this. During the proofing stage, the temperature rises to about 90°. In the oven the temperature is maintained 400 to 500°

F. but the temperature in the interior of the loaf does not reach a higher degree than about 110—112. (A new bake may be made in the same oven in case of emergency each hour, but

generally the oven is recharged every second hour). After taking the bread from the oven it is placed on the cooling racks, where the loaves rest in compartments provided with screen bot¬

toms, on which the loaves are placed to allow of cooling and to

prevent sweating, that is, con¬

densation of the vapor expelled from the hot loaf in striking cold solid surfaces. _ While cooling, or when cooled, the bread in most modern shops is wrapped in paraffin paper for the double purpose of avoiding direct touch of the hands, and of keeping the bread fresh, as changed values are given to materials and

processes ; as new methods or processes are in¬

troduced, or new requirements are made on

the baker to meet government or food admin¬

istration regulations.

The structure is usually of brick — two

stories and a basement, with large windows, so that the process of bread making can be seen from the outside. Spacious offices, shipping rooms, retail sales room, wrapping rooms — the bread is never touched by hands except those of the white-gloved packers where automatic wrap¬

ping machines are not yet used, — separate sani¬

tary lavatories for all departments, mixer rooms, dough cutting, weighing and molding ma¬

chinery rooms, proofing and oven rooms, boiler and oven-firing rooms, are all well ventilated and lighted so that there is no dark corner in the entire plant. All interior walls are kept white with enamel or granite paint, also the white framework of all machinery used, includ-yvwu

TO3

-ZZZZZZZZZZZZZZZZL

—a

222ZZ

masiemzmm

ywnam

y/// /////// 777T7.

\ W/MMZVZWTPZBt.

Flour milling and storage at bakery of The Ber halter Health Foods Co., Chicago, Ill. Richard Griesser, Architect.

the impervious paper prevents the moisture of the bread from escaping.

All rye bread, excepting as pumpernickel,

which is whole rye flour bread, is now made with bolted rye flour from which the bran and germ have been largely removed, is mixed with 25-35 per cent of wheat flour, water, salt, leaven, sugar, lard or other shortening; the dough is left to ferment in the trough; it is punched and the manufacture proceeds as with wheat bread.

A mixed rye bread, that is, bread from rye flour with an admixture of from 35 to 50 per cent of wheat flour, is prepared with yeast like wheat bread.

Bakery Construction and Equipment. —

Space does not permit to go into the details of the various types of machines and apparatus, ovens, proofers, troughs and other accessories of a modern bakery. Changes in construction and equipment have become necessary from

time to time as baking technology progresses; as ing the proofing cabinets, while the brick or metal face of the ovens is white glazed or glass enameled. Everything is done with a view to add attractiveness to the place, so as to educate the visitor to give preference to the modern baker}- output, as everything suggests sanitation and wholesomeness.

The mixing room is generally on the second floor, adjoining the flour warehouse, in which a considerable quantity of flour is always kept on hand to ensure proper ageing, since new flour will not give as good a loaf. The flour hopper or mixer feeder, with a capacity of five barrels of flour or more which is to feed the mixer, is portable, and may be conveyed to the various bin cone sifters from which the supply is taken. The hopper is run to one of the mixers, emptying its contents into it, and re¬

turning to the same or another bin for another charge of flour. Into the mixer are carefully weighed the flour; the water; the shortening

(lard or vegetable oil) ; salt; yeast, dissolved in water; sugar, usually in the form of cane sugar; malt extract. Metal dough troughs on wheels receive the mixed dough which is given time to ferment (usually 5 to 5ˆ2 hours), the dough being kneaded or punched in the trough three times (see above). Then the troughs are wheeled to a chute in the floor and let down to the dividing machine, which is so arranged that it can cut any loaf from about 10 to 40 ounces.

The dough is carried to the rounder auto¬

matically, and from thence to the proofer, where it rests for about 10 minutes in a temperature of about 80°. The pieces of dough are now let down by a conveyor to the molding machine

where they are molded into the form of loaves which are placed in the bread pans. These are loaded upon conveyor racks and wheeled into the proof cabinets, where they remain from

20 to 40 minutes, according to the individual notion of the baker, in an atmosphere of steam, at about 90°. The conveying racks are rolled from the proofer to the oven, which, according to capacity, receive a charge of 100 to 500

loaves of bread, the average baking period be¬

ing 35 minutes, after which the loaves are taken out by a long, wooden pole, formed at the end like an oar blade, on which the pans are caught, an implement called a peel, or the pans are passed automatically to the front in those types of ovens called rotary ovens. The loaves are again loaded on the wheeled racks, are dumped on tables and after cooling are packed into cartons or paraffin paper and reach the delivery truck-wagon to be shipped to the different

stores.

Whole Wheat Meal Baking Plants. —

Quite a number of. modern baking plants man¬

ufacture bread and other bakery goods from

whole wheat meal, which has become more

extensively employed since the introduction of wheat substitutes by food administration ruling, as the wheat bread prepared from substitutes generally lacks the quality of whiteness anyway.

Whole wheat bread, containing as it does the bran and the germ finely ground, or more

coarsely in some meal, is darker in color —yellowish gray to yellowish brown. These

products are made, aerated and also not aerated.

In some whole wheat bakeries a milling plant is installed. The whole wheat is run into storage bins from the car; from these it reaches a blower and sifter that takes out the chaff and larger-than-wheat particles, like corn and other coarse impurities ; then it passes over a set of screens which take out the smaller-than-wheat particles, like rye and other small

seeds, leaving the wheat clean and pure

to go into the roller mills, where it is crushed between a set of two corrugated rolls traveling in opposite directions, the fineness of the meal depending upon whether the roils are set closer together or farther apart. The fine meal is employed in the production of whole wheat

aerated bread, whole wheat cakes, pies ; whereas the coarse meal is employed for non-aerated bread. Whole rye bread generally goes with

whole wheat bread.

Whole Grain, Contra Refined Flour

Products. — A movement has set in that seems constantly growing to retain in the flour as much of the valuable nutrient ingredients of the whole grain kernel as possible, be this wheat, rye, corn, barley or other cereals; that is, to use a less refined flour, or as some have it, a less denatured flour or meal, a product that contains the valuable ingredients and qualities inherent in the germ and in the bran, which is rich in nutrients, including oil, and which is replete with valuable gluten and phosphates, while in patent flour or highly refined flour these nutrients are removed through milling

and bolting as much as possible, simply to ob¬

tain whiteness and better color. Thus we now have whole wheat flour, resulting from the mill¬

ing of wheat without the removal of more than say 1 to \l/2 per cent of the wheat in the form of bran or germ, besides graham flour, which is the unbolted wheat meal made from clean, sound wheat with only the coarse bran particle removed, by screening. Bolted wheat flour, so called, is produced by grinding of wheat with not more than 10 per

cent of the weight re¬

moved in the form of bran or germ, whereas with patent flour about 30 per cent of bran and germ particles are removed by bolting.

The United States Department of Agricul¬

ture has suggested, but has not yet adopted, cer¬

tain standards of flour, in part as follows: Straight flour, made from hard spring, soft spring, hard winter, Durum or soft winter

wheat. This is the fine, clean, ground, un¬

bleached product made from wheat meal by

bolting or other process accomplishing the same result from which none of the purified mid¬

dlings flour shall have been removed, and which does not exceed 97 per cent of the total flour produced, and contains not less than a speci¬

fied percentage of nitrogene 1.50 to 1.75 per cent; of fibre not more than .50 per cent; ash, .44 to .65 per cent calculated to a moisture con¬

tent of 11 per cent and differing for the different varieties of wheat. Patent flour is made from wheat as qualified for straight flour from the meal by bolting, and produced by the reduction of the best purified middlings, with a specified percentage of ash of .42 to .55 per cent. First clear flour is a straight flour made from such wheat from which the patent flour or a portion of the purified middlings has been removed

with a specified percentage of ash of .70 to 1.0

per cent. Thus, patent flours are chiefly made from the inner portions of the berry farthest removed fr.om the outer bran layer and the germ, and containing least of the component parts of either, both bran and germ being gray¬

ish in color. The flour most devoid of particles of these is naturally the whitest. They are also lowest in gluten and ash, two valuable nutrients of flour. The straight flours contain more

particles of bran and germ, and consequently the flour is darker, but richer in gluten and ash, and the bakery products from these straight flours are more nutritious. The clear flours contain still more particles of bran and germ, and are still darker in color and contain more gluten and ash. Graham flours already men¬

tioned have only the coarsest parts of the bran and in whole wheat meal or flour only the im¬

purities (chaff, foreign seeds, dust) are re¬

moved, that is, the whole wheat, after cleaning and scouring, is ground to meal of different de¬

grees of fineness.

Robert Wahl,

Research Director, Wahl Institute of Food

Research.

Arnold Wahl,

Technical Director .

BREAD-FRUIT, a genus, Artocarpus, of

trees of the family Moracece, consisting of 40

species, natives of the East Indies but now widely cultivated in tropical regions. The plants are large or small trees, with milky juice,

their leaves large and handsome, entire or deeply lobed; the fruit is a large fleshy mass, with a rough surface, 4 to 18 inches or more in

diameter and sometimes weighing 30 to 40

pounds. The common bread-fruit (A. incisa)

is well known for its edible fruits which are a staple article of food in the islands of the south Pacific, being roasted before eating. The jack-fruit (A. integrifolia) is a closely related species with larger fruits which, also, are used for food.

BREADMAKING. See Bread.

BREAD-NUT (Brosimum alicastrum) , a

tree of the natural order Urticacece, a native of the West Indies and closely related to the bread-fruit. The tree, which is very large, bears shining lance-shaped leaves ; globose cat¬

kins of male and female flowers on different trees; and yields a gummy, milky juice from its bark. The round, yellow fruits (drupes), which are about three inches in circumference, contain each a single seed. When roasted or boiled they are used like bread, and, having a flavor which resembles hazel nuts, form a pleasant food. In the United States the tree has not been cultivated.

BREAD-ROOT (Psoralea esculenta) , a

leguminous plant with edible, farinaceous tu¬

bers. It is the pomme blanche or pomme de terre of the French pioneers. It is common on the higher prairies from Texas to Iowa and Wisconsin.

BREADALBANE, Scotland, a district in

Perthshire, in the centre of the Grampians, stretching from Lochaber and Atholl on the

north to Strathearn and Menteith on the south.

This district is a complete mixture of high and low hills, yielding pasture for large flocks of sheep and shelter for game, with intermediate valleys, some of which are susceptible of culti¬

vation, while others are merely areas of peat and heath. Loch Tay lies in the centre of the district. Kenmore and Killin are the largest villages. The district gives the title of Marquis to a branch of the Clan Campbell.

BREADTH, a term in art, used to denote

means or effects whereby an artist becomes dis¬

tinguished for largeness and mastery of treat¬

ment. Breadth of style in art is shown in work which gives the impression of these qualities, manifested in simplicity, comprehensiveness and due subordination of detail. In a work of art possessing the true characteristics of breadth, the eye, passing from one feature to another, takes in, as it were, the whole subject and meaning at a single glance.

BREAK-CIRCUIT CHRONOMETER,

the name applied to a box-chronometer to which a device has been attached for breaking an electric circuit at stated intervals, usually once in two seconds.

BREAKER. See Coal Mining.

BREAKESPERE, brak’sper. See Adrian

IV.

BREAKING BULK, the act of breaking

open of a bundle, parcel, etc., and taking the contents so as to constitute in law a conversion or the like.

BREAKWATER. See Harbors.

BREAL, bra al, Michel Jules Alfred,

French philologist: b. Landau (Bavaria) 1832.

His parents were French and he studied at

Weissenburg, Metz, Paris at Lycee Louis le

Grand, and in Berlin under Bopp. In 1862 he won the prize of the Academy of Inscriptions with his (Etude des origines de la religion ZoroastrienneP He became professor of com¬

parative grammar at the College de France in 1864; a member of the Academy of Inscrip¬

tions and Belles Lettres in 1875; from 1879 to 1888 was an inspector-general of higher educa¬

tion ; and in 1890 was made commander of the Legion of Honor. Among his writings are

(Le mythe d'GEdipe) (1864) ; ˆictionnaire

etymologique latin) (1885; 5th ed. 1902);

(Deux etudes sur Coethe) (1898); (Pour

mieux connaitre Homere) (1906) and (Essai

de semantique : science des significations >

(Paris 1897; 3d ed., 1904; English translation by Mrs. Cust, with preface by Portgate, Lon¬

don 1900), a work which ranks Breal as the founder of the science of

semantics or semasi¬

ology which treats systematically and scien¬

tifically the development of the meaning of words.

BREAM, a sluggish fresh-water fish (Abra -

mis brama) of the carp family, common in

European lakes and rivers, and especially numer¬

ous in the English fens, where it finds all the conditions most favorable, and reaches a weight of seven or eight pounds. It is edible but too lethargic to afford sport. Another species (A.

blicca) is smaller, silvery white, and a favorite with those who enjoy quiet angling. In the United States the term ˆbream® is given rather indefinitely to several minnows and sunfish ; and to various marine fishes, better known as sea-breams.

BREAST, in female animals, a glandular

structure, containing structures for the secretion of milk, and excretory ducts, wdiich open by-small orifices in the nipple, and discharge the secreted fluid for the nourishment of the young.

At the centre of each breast there i§ a small projection, the nipple, and this is surrounded by a dark ring termed the areola. The nipple is the part which the infant seizes in its mouth, and through the passage of which the milk flows into the mouth of the child in the act of suc¬

tion. The glandular structure of the breast is covered by fat, except at the forepart of the nipple and the integument. The breast is liable to many diseases, from irritation during nurs¬

ing, bruises of the part, undue pressure from tight clothes and from constitutional causes.

Inflammation of the breast is very common dur¬

ing nursing, chiefly resulting from uncleanli¬

ness, i.e., infection. This may bring about eithei a local irritation, sore nipples, etc., or by ex¬

tension into the substance of the breast cause abcess. Cancer frequently develops in the

breast and usually manifests itself in its early stages, as a painful, hard nodule. Such nodules should be examined by a surgeon when ob¬

served. All nodules are not cancerous. See

Mammary Glands.

BREAST-WHEEL. See Water-wheel.

BREASTED, James Henry, American

orientalist and historian : b. Rockford, Ill., 27

Aug. 1865. A.B. Northwestern College, 1888;

studied at the Chicago Theological Seminary

(particularly Hebrew), 1888-90; A.M. Yale,

1892; Ph.D. University of Berlin, 1894;

hon. B.D. Chicago Theological Seminary, 1898; orientalist at University of Chicago since 1894; professor of Egyptology and Oriental history, director of the Haskell Oriental Museum, and chairman of the department of Oriental lan¬

guages and literatures. Collecting for Uni¬

versity of Chicago in Egypt, 1894-95 ; Thomas lecturer, Richmond (Va.) College, 1897; was

appointed (1900) on mission to the museums of Europe by the commission of Royal Academies of Germany (Berlin, Leipzig, Munich, Got¬

tingen), to copy and arrange the Egyptian in¬

scriptions in those museums in preparation for the Egyptian dictionary, for the completion of which the Academies were commissioned and

endowed by the German Emperor; director of

the Egyptian Expedition, University of Chicago, 1905-07 ; corresponding member of the Royal

Academy of Sciences, Berlin, 1907. Morse lec¬

turer Union Theological Seminarv, 1912. As¬

sistant editor American Journal of Semitic

Languages. Vice-president of the American

Oriental Society, 1915-17; president of the

Egyptian Research Account (American Branch),

1915; member of the American Institute of

Social Science. Author (De Hymnis in Solem

sub Rege Amenophide IV Conceptis) (1894) ;

(A New Chapter in the Life of Thutmose IIP

(1900); (Ancient Records of EgypP (5 vols., 1905) ; (A History of EgypP (1905, 2d ed.

1909, German ed., 1911, French and Russian edi¬

tions delayed by the War; edition for the

blind, 1911) ; < Egypt Through the Stereoscope J

(1905); (The Battle of Kadesh) (1905) ; (The Temples of Lower Nubia} (1906) (A History

of the Ancient Egyptians* (1908) ; (The Monu¬

ments of Sudanese Nubia) (1908) ; develop¬

ment of Religion and Thought in Ancient

Egypt * (1912) ; (A Short Ancient History >

(1914); (Ancient Times: A History of the

Early World) (1916). Also articles in Zeitschrift fur Aegyptische Sprache; Proceedings

of the Society of Biblical Archceology, London; the American Journal of the Semitic Languages ; The Nation; American Historical Review;

Journal of the American Oriental Society.

BREASTPLATE, a piece of defensive

armor covering the breast, originally made of thongs, cords, leather, *etc.* (hence lorica, cui¬

rass), but afterward of brass, iron or other metals. It may be considered as an improve¬

ment of the shield or buckler, which was borne on the left arm and moved so as to protect successively all parts of the body. It being per¬

ceived that the free use of both hands in the employment of offensive weapons was import¬

ant, the defensive armor was attached to the body and received different names from its

position, use, etc., as, for instance, breastplate, cuisses, greaves. These different species of defensive armor are of little use against fire¬

arms and have therefore generally fallen into disuse in modern war. (See Cuirass). Breast¬

plate, in Jewish antiquity, was a folded piece of rich, embroidered stuff worn by the high-priest. It was set with 12 precious stones bear¬

ing the names of the tribes. It was also called the breastplate of

judgment, because is con¬

tained the Urim and Thummim. See Costume,

Ecclesiastical.

BREASTWORK, in military art, every ele¬

vation made for protection against the shot of the enemy. Wood and stone are not suitable for breastworks on account of their liability to splinter. The best are made of earth ; in some circumstances, of fascines, dung, gabions, bags of sand and of wool. The thickness of the work must be in proportion to the artillery of the enemy. In general it ought not to be less than 10, nor more than 18, or at most 24 feet thick. The rule of Cugnot is, that the breast¬

work should be so high that nothing but the sky and the tops of trees can be seen within cannon-shot from the interior of the intrenchments. If this rule cannot be followed on ac¬

count of the height of neighboring mountains, the interior of the fortification ought to be secured by traverses.

BREATH (A.S. braed, odor, breath). The

ordinary breath has a slight odor and contains nitrogen, oxygen, carbon dioxide, ammonia, wa¬

ter and organic impurities. In quiet breathing it probably never carries microbes. In diseases of the mouth and teeth, nose, throat, lungs and stomach, in constipation and in fevers, the breath may become offensive. Should a simple antiseptic mouth-wash or a laxative fail to re¬

move the trouble, an underlying disease must be sought out and treated. A suitable mouth¬

wash is Dobell's solution or listerine. Deodor¬

izers, like coffee, cardamon, cloves, etc., may be resorted to for temporary sweetening of the breath, but they have little effect in permanently removing the condition.

BREATHING AND HEALTH. Essen¬

tial to continuance of physical being are food, water and air, and the most important is air.

The supply of food may be cut off for days or weeks and life remain in the body. The quality may be poor and amount reduced, and while

it affects health and perhaps reduces strength, life will not go out for a long time. Cut off the supply of air completely for 14 minutes and life becomes extinct. Change from purity of air to that which is only slightly contaminated and in an hour vitality lessens. Headache and nausea appear, and unless there is return to fresh and pure air, disintegration of tissue and physical breakdown follow. These facts are

patent to all, and are referred to as a starting point to consider how breathing may be used for the establishment and continuance of per¬

fect health. The diseases most dreaded by

the medical fraternity are those of a pulmonary nature. They are, in many cases, the result of insufficient air supply and inefficient means of securing it. Diseases affecting digestion fol¬

low close upon those relating to the lungs, and these, too, can be regulated by and through breathing. Nervous disorders, likewise, suc¬

cumb very readily when breathing is properly ordered.

The act of breathing is, then, so important that it should have the attention of every in¬

dividual. To use it to its best advantage every¬

one must know something of its action and of the parts directly affected by it. There is in¬

stinctive breathing and mentally directed breath¬

ing. Every one breathes. Instinctive breathing begins at birth and continues through life. If 454

we could always be in fresh air and have little to do we would need no more knowledge of the operation than has any animal. Even for great physical activity instinctive breathing would be sufficient, because every physical exertion would increase the rapidity and breath of the instinc¬

tive act. But we are thinking animals, and we live in conditions requiring more than ordinary physical action. Excitement, nervous move¬

ments, high living and attributes of mind cause us to throw off poisons and gases which the breathing apparatus must take care of. To dis¬

pose of these we must go beyond instinctive breathing and adopt mentally directed action.

Breath is air taken through the nose and

mouth into the lungs, which are elastic sacks made of microscopic vessels suspended on the bronchial tubes in the chest. They expand and collapse as they are acted upon by organs made of muscle. When they expand they draw air

into the body; when they collapse they expel air. The muscles which operate them are those of the chest. The chief one is the floor of the chest, called the diaphragm. Those next in im¬

portance are the costal muscles, located in the ribs. The next, the dorsal muscles, located in the back. Last, the pectoral muscles in the upper chest in front. The muscles already noted are those which dilate the lungs and draw air into the body. Their action produces inspira¬

tion of breath, and that action expands the chest. Their return to normal position permits the collapse of the air-cells of the lungs. Such return is, however, insufficient to cause complete collapse of air-cells and the expulsion of all air. Return is assisted, and expulsion made complete, by calling into use the abdominal muscles and those in the ribs below the dia¬

phragm. It becomes, then, very important to know the location of the

diaphragm. This organ is attached in front to the end of the breast bone. One should find this location by pressing with his fingers. Men find it easily because the ribs spread quickly where they leave the breast bone. Women find it less easily as the ribs are close together. But follow up to the point where the very end of the breast bone is

located. The diaphragm attaches at the sides to the ribs. One can tell where by placing the hand flat on the side and inhaling a deep breath ; that which pushes first against the hand from within is the diaphragm, which is from one to two inches lower than the level of the end of the breast bone. It attaches to the sides all around and into the small of the back, where it is a little lower than at the sides. One should study the location of the diaphragm day after day, until it is definitely fixed in mind. Many who have supposed they knew how and where

to take breath by using the diaphragm will find their conception has been that it is lower than it is. The real reason for having the correct location clearly in mind is to avoid desultory and, possibly, harmful practice. The reason for repeating the examination of location so many times is that the mind may go instantly to it in order to direct voluntary inspiration and ex¬

piration. Another common error is to suppose the lungs to be located in the upper chest. Ask one if his lungs are sound and he will pound high in front. The largest portion of the lungs is in the sides and back. He pounds over the space occupied by the heart. This common

error leads many who practise voluntary breath¬

ing into misdirected effort, which is liable to be harmful.

Breathing divides into inspiration and ex¬

piration. Inspiration (breath taking) is in¬

stinctive and involuntary. The latter is like the former, but it is greatly amplified and ex¬

tended. Our attention now goes to voluntary inspiration. Its primary physical act is expan¬

sion of the diaphragm. Evidence of that is dis¬

covered wherever that organ connects with

outer parts of the chest, in the generous ex¬

pansion of those parts, and by quite a little expansion of parts of the body below the dia¬

phragm. The latter action is caused by the pressure of the centre of the diaphragm (quite in the middle of the body) downward upon the abdominal viscera. Deep breathing, or taking large draughts of air, is always accompanied by generous spread of the body at the level of the diaphragm, and considerable spread of the por¬

tion just below that level. Few adults will do this upon the first attempt at mental direction of inhalation, because they have lost the natural habit. If they will study for a few minutes quiet instinctive (not directed) breathing, they will find they really do breathe as described above. But this is not enough for <(breathing for health.® It must be amplified through

mental direction ; on the line of instinctive breathing, only much more extensively.

The custom of taking deep breath can be

developed into habit in a short time, and it should be used daily. Direct the thought during inhalation to generous expansion of the body in the neighborhood of the diaphragm, and after such expansion has begun, enlarge the sides and back above the diaphragm. Fill the lungs fully, retain the air a few seconds and exhale com¬

pletely. Such complete exhalation implies that breath shall be forced out by drawing in the abdomen. After repeating the act of inspiration and expiration four or five times, which, by the wav, should never be done violently, one can feel the more active rush of blood through the bodv. This demonstrates that the cleansing process of the circulatory system is accomplish¬

ing its work. When a good glow is established refrain from further exercise for the time, but resume it when quietness is again restored. Five or ten minutes given to this practice every morning and evening will, in a month, establish physical strength. Followed through a term

of years it will rebuild the body and make it almost invulnerable against the attack of disease.

Persons with weak lungs or sluggish circulation can, by this means, become rugged and very active. So far-reaching is the result that great physical strength is acquired. Even the usually expected elements of decay, as manifested in carious teeth and falling hair, are arrested or prevented. The success of all physical treat¬

ment lies in the regularity and persistence with which it is followed. In a few weeks or even in one week, the benefit will be observed, but the rebuilding of a body requires persistent prac¬

tice for a year at least.

Practice of the above nature increases the

lung space. Probablv no new air-cells can be created, although some authorities claim that there are; The expanding power of existing

air-cells is enlarged, and the muscles which cause the expansion greatly increase their

power. Such expansion can be measured. It

is well to take the bust measure, passing the tape-measure around the body just below the arm pits, and take measurement on the first day of each month thereafter. Comparison

with previous measure will show constant in¬

crease for a full year. How great an increase to expect depends upon the person. From two to five inches in a year is usual. A more per¬

fect measure of development is given by the spirometer which, as its

name implies, is a breath-measure. It records the vital capacity of the lungs. Test measurements in over 500

students proved that every one gained in size of lungs, and many made marvelous changes

in their physical condition. The spirometer

records the cubic inches of air space in the lungs. . Such capacity varies in accordance with the height, and is greater in men than in women.

Tall people have largest lungs, ordinarily, and those who are slim, rather than stout, increase most through practice. Records show that the increase in air capacity in one year averages from 25 to 33 per cent. All this has direct bearing on health. In the lungs the air-cells are surrounded by minute blood vessels. All the blood, after its course through the body, passes to the lungs to discharge its gatherings and to receive the supply of oxygen necessary for life. It is evident that if the air supply is increased 25 per cent, cleansing and oxygenation take place more quickly and more thoroughly.

It js recognized among physicians that the

purity of the blood is the most important ele¬

ment in keeping well. Meeting the attack of bacilli is the triumph of medical science. The germ of disease is found in the blood, and in modern science inoculation for destroying such germ is the keynote. In the practice of breath¬

ing every individual has nature's method of doing what medical science does. It goes be¬

yond that, in that breathing provides prevention as well as cure. The ounce of prevention is the most valuable. Disease germs can hardly find lodgment, and they certainly cannot propagate, in a body which is perfectly well. A feeling of lassitude and (<run down® is the admonition which shows that germs are at work. Your

doctor tells you to take long walks in the open air. He says in other words that oxygen must be supplied to the lungs. Much surer are we to respond to health-laws if such training as all can have has made the taking of large draughts of air possible.

Above is described inhalation and exhalation.

While no attempt has been made to formu¬

late a complete system of training, enough has been said to show what may be done. At first, daily practice should be gentle. This will bring into correct use all physical organs which gov¬

ern breathing. When one realizes ease in action he should make the dual act of inspiration and expiration more generous. Expiration should

now be made more complete. That is, make

exhalation forceful by drawing in the abdom¬

inal muscles and lower ribs greatly. This will also cause broader inspiration. Thus the two sets of muscles will be powerfully increased, and the expanding power of the lungs will be enlarged.

When breath is imbibed in large quantities it should be retained a little time that it may purify the blood. Three or four seconds are long enough at first, but the time may be in¬

creased gradually until one can hold it 30 or more seconds. The physical act of holding the breath consists of arresting the inspiratory mus¬

cles when they have drawn breath in and re¬

fusing to allow them to return to their relaxed position. The very act of thus commanding

adds to their strength. It is one of the con¬

tributing factors toward strengthening the

whole body. The tendency of modern life to greater physical activity accentuates the need of symmetrical development of the lungs and their controlling forces.

BREAUX BRIDGE, La., town in the

parish of Saint Martin, 40 miles southwest of Baton Rouge, on the Union Pacific Railroad.

It contains two churches, a convent, convent-school, a high school. It has an icemaking establishment, a municipal water plant, concrete sidewalks and an electric-light and power

plant. The government is vested in a mayor and council. The municipal revenues amount

annually to $10,000 approximately. Pop. 1,800.

BREBEUF, bre-bef, Jean de, French

pioneer missionary in North America: b. Conde-sur-Vire, Normandy, 25 March 1593; d. near

Georgian Bay, Canada, 16 March 1649. He

entered the Society of Jesus (Jesuits) in 1617

and in 1625 arrived in Quebec. He at once took up his abode in the Indian wigwams and has left us an account of a winter's experience with the aborigines. In the spring of 1626 he set out with the Indians on a canoe journey to Lake Huron, accompanied by Father de Noiie.

He established his first mission at Ihonatiria, near Georgian Bay, but his efforts met with little success and in 1628 he was recalled to Quebec because of the dangers which then

threatened to exterminate the colony. On the surrender to the English in July 1629, Brebeuf returned to France, but returned after the res¬

toration of the colony to France in 1633. The next 16 years of labor among the savages were a series of privations and sufferings. In 1640

he set out with Chaumonot to evangelize the Neutres, a tribe that lived north of Lake Erie, but his labors there during a terrible winter brought no success. In 1642 he was given the care of the Indians at the Sillery Reservation.

During the Huron-Iroquois War Brebeuf suc¬

ceeded in reaching the Huron country after

Bressani and Jogues had failed. In 1648 dis¬

aster after disaster befell the missionaries —their establishments were burned and the mis¬

sionaries slaughtered. During the attack on

Saint Louis, Brebeuf and Lallemant, who had remained when they might have escaped, were seized and dragged to Saint Ignace. Brebeuf had scalding water poured on his head in mock¬

ery of baptism, and other unspeakable tortures were inflicted upon him while tied to a stake with a fire lighted under him. His head is still kept as a relic at the Hotel-Dieu, Quebec. Con¬

sult Bancroft, (History of the United States) (Boston 1853) ; Charlevoix, (Histoire de la Nouvelle France > (Eng. trans. by Shea, New York 1871); Rochemonteix, (Les Jesuites et la Nouvelle France* (Paris 1896).

BRECCIA, bre'cha, connected with breach

and break, a conglomerate composed of angular pieces of the same or of different rocks, united by a cement or matrix, which, according to its nature, forms the several varieties of calcareous, 456

silicious, *etc.* The cementing material may

consist of calcite, iron oxide, quartz or various kinds of clay. The conglomerate known by

the name of pudding-stone differs from that of breccia only in having the composing frag¬

ments rounded. Calcareous breccia is often

found in the form of fine marble, apparently composed of fragments

produced by some dis¬

rupting force, and then united by the infiltra¬

tion of carbonate of lime among them. The

angular form of the fragments seems to indicate that they have never been exposed to much fric¬

tion, and have therefore probably originated at no great distance from their present site. In some cases a kind of spurious breccia has been formed by the breaking up of calcareous beds, and their subsequent union by means of infil¬

tration, without any change of their original position. Marble breccia thus formed is re¬

markable for the size of its fragments. In the calcareous districts of many countries caverns and extensive fissures are seen filled with a red¬

dish mass, composed of lime, sand and oxide of iron, enclosing angular fragments of different rocks, and a great number of bones more or less broken. To such masses the name of os¬

seous breccia has been given. They are most frequently met with on the shores of the Medi¬

terranean. Brecchia is formed by the breaking of rock into angular fragments by dynamic

action and cementation ; by angular blocks

thrown from volcanoes and afterward consoli¬

dated ; by a process similar to that of conglom¬

erate; by the hardening and breaking into

fragments of the surface of a lava flow and its subsequent burial in the soft magma; by the cementation of the loose fragment, always

angular in form, of screes or talus slopes; by fragments broken from the walls of intruding igneous rocks and caught in the molten mass.

BRECHE DE ROLAND, bresh de ro-lan’,

<(the breach of Roland,® a defile in the Pyre¬

nees, between France and Spain, which, accord¬

ing to a well-known legend, was opened up by Roland, one of the paladins of Charlemagne, with one blow of his sword Durandal, in order to afford a passage to his army in the fight at Roncevalles. It is an immense gap between

the walls of a mountain barrier rising to the height of 9,500 feet above the level of the sea, and from 300 to 600 feet above the bottom of the defile. The defile itself varies in width from 200 to 300 feet. It lies about 43 miles north of Huesca, from which it can at times be seen.

BRECHIN, breH’n, Scotland, a parlia¬

mentary and municipal burgh in Forfarshire,

romantically situated on the left bank of the South Esk, \2]/2 miles northeast of Forfar, and eight west of Montrose. It is a very ancient royal burgh, and was formerly walled. The

chief industry is the manufacture of linens; there are also distilleries, and the neighborhood exports a considerable quantity of grain. In ancient times there was an abbey of Culdees in this place, and in 1150, when Brechin was constituted an episcopal see bv David I, it is supposed that the site of this establishment was that chosen for the foundation of the

cathedral. The cathedral church of Saint

Ninians, which now forms the parish church, is situated on the north edge of a precipitous ravine, which separates the burgh-lands from those of Brechin Castle, the seat of the Earl of Dalhousie. The ancient round tower,

which is the leading architectural feature of the town, stands at the southwest angle of the church. Such towers are common in Ireland,

but are seldom seen in Scotland. The Mechan¬

ics Institution is a handsome building, with a beautiful hall, and there is a valuable public library. Dr. Thomas Guthrie, the celebrated

preacher, was a native. Pop. 8,439.

BRECK, James Lloyd, American clergy¬

man: b. Philadelphia, 27 June 1818; d. Benicia, Cal., 30 March 1876. He was graduated at the University of Pennsylvania in 1838, and at the General Theological Seminary, New York, in

1841. The same year he went to Wisconsin, and aided in the formation of the diocese there in 1847. He was one of the founders of the

Nashotah Theological Seminary, remaining as

instructor there until 1850, when he went to Saint Paul, Minn., as a missionary. There he established an associate mission, and assisted in supplying mission stations for 80 miles

around. From 1852 to 1857 he was engaged in missionary work among the Chippewa Indians.

In 1858 he established church services at Fari¬

bault, Minn., and founded the Seabury Divinity School. He prepared the way for building

church institutions there, and was the fore¬

runner of Bishop Whipple. In 1867 Dr. Breck went to Benicia, Cal., where he established church enterprises similar to those at Nashotah and Faribault.

BRECK, Samuel, American soldier: b. •

Middleborough, Mass., 25 Feb. 1834; d. 23 Feb.

1918. He was descended from Edward Breck,

who came to Dorchester, Mass., about 1630.

He was graduated at West Point 1855, and

took part in the Seminole War of 1855-56.

During the Civil War he was assistant adjutant-general of McDowell's division, and afterward of the 1st Army Corps, being engaged in the occupation of Fredericksburg and in the

Shenandoah Valley expedition, to intercept the retreat of the Confederate forces under Gen¬

eral Jackson in 1862. From July 1862 to 1870

he was assistant in the adjutant-general's office at Washington, in charge of rolls, returns, books, blanks and business pertaining to the enlisted men of the regular and volunteer

forces, and engaged in the preparation and pub¬

lication of the (Volunteer Army Register. J He became brigadier-general and adjutant-general

in 1897, and was retired by operation of law, 25

Feb. 1898. He published (Genealogy of the

Breck Family* (1887).

BRECKENRIDGE, Hugh Henry, Amer¬

ican artist: b. Leesburg, Va., 6 Oct. 1870.

Studied in the schools of the Pennsylvania

Academy and with Bougereau, Ferrier and

Doucet in Paris. Instructor in drawing and

painting in the Pennsylvania Academy of the Fine Arts, Philadelphia, since 1894. Awarded European scholarship, Pennsylvania Academy;

first class Toppan prize, Pennsylvania Academy; medal, Atlanta Exposition, 1895; honorable

mention, Exposition Universelle, Paris, 1900 ; medal, Pan-American

Exposition, Buffalo, 1901 ; Corcoran prize, Society of Washington Artists, 1903; gold medal, Art Club of Philadelphia, 1907 ; first prize, Washington Water Color Club, 1908; silver medal, International Exposition, BRECKENRIDGE

Buenos Aires, S. A., 1910; gold medal, Panama-Pacific International Exposition, San Francisco, 1915. Member of the jury of selection for the Pan-American Exposition, Buffalo, 1901 ; mem¬

ber of the New York Water Color Club; the Philadelphia Water Color Club; the fellowship of the Pennsylvania Academy of the Fine Arts; the Philadelphia Sketch Club; associate of the National Academy of Design; member of the

jury of selection, United States section, de¬

partment of art, and of the international jury of awards, Universal Exposition, Saint Louis, 1904; member of the municipal art jury of

Philadelphia; member of the advisory com¬

mittee for Pennsylvania and the Southern

States, and of the jury of selection, department of art, Panama-Pacific International Exposi¬

tion, San Francisco, 1915. Represented in the Saint Louis Club, Saint Louis ; University of Virginia ; Art Club of Philadelphia ; University of Pennsylvania; Memorial Hall, Hartford,

Conn.; University Club of Indianapolis; Jeffer¬

son Medical College, College of Physicians,

College of Pharmacy, Historical Society, Penn¬

sylvania Hospital, Philosophical Society and in the city hall,

Philadelphia ; courthouse, Read¬

ing, Pa.; State Normal School, West Chester, Pa., and in collections in New York, Chicago, Pittsburgh, Cleveland, *etc.*

BRECKENRIDGE, Lester Paige, Amer¬

ican mechanical engineer : b. Meriden, Conn., 17 May 1858. He completed his studies at the Sheffield Scientific School of Yale University where in 1909 he became professor of mechani¬

cal engineering, after having been instructor in Lehigh University in 1882; professor of me¬

chanical engineering at the Michigan Agricul¬

tural College, 1891-93; professor at the Univer¬

sity of Illinois, 1893-99, and director there 1905-09 of the engineering experiment station.

The dynamometer car was designed by him in 1897-99, and he invented an automatic recording machine in 1901. Among his writings are

(High Speed Tool Steels* (1905) ; (Fuel Tests with Illinois CoaP (1908) ; (Steaming Test of Coals and Related Industries) (1912) and (An Extension of the Dewey Decimal System of

Classification Applied to the Engineering Industries) (1899: 6th ed., 1912).

BRECKENRIDGE, Minn., village and

county-seat of Wilkin County, on the Red River of the North, about 50 miles south of Fargo, N. D. It is reached by the Northern Pacific and Great Northern railroads and is the centre of a very fertile region. It contains flour mills, grain elevators, etc., and steamboats ply be¬

tween it and the Red River towns in Manitoba.

The waterworks and electric-lighting plant

are the property of the municipality. The vil¬

lage is under the commission form of govern¬

ment. Pop. (1920) 2,401.

BRECKINRIDGE, Clifton Rodes, Amer¬

ican legislator and diplomatist; b. Lexington, Ky., 22 Nov. 1846. He is a son of John Cabell Breckinridge (q.v.), and received a public

school education and served in the Confederate nrmy and navy. After the war he attended

Washington College (now Washington and Lee

University) for three years, and engaged in mercantile business in Pine Bluff, Ark. He

was elected to Congress in 1882 as representat've-at-large. as a Democrat; was reelected in 1884, 1886, 1889, 1890, 1892 and 1894, and served on the Committee on Ways and Means during

the greater part of his congressional life. He was United States Minister to Russia 1894-97, and from 1906 to 1916 president of the Arkan¬

sas Valley Trust Company.

BRECKINRIDGE, or BRECKEN¬

RIDGE, John, American statesman : b. Au¬

gusta County, Va., 2 Dec. 1760; d. Lexington, Ky., 14 Dec. 1806. In 1795 he was made at¬

torney-general of the new State of Kentucky, and he served in its legislature from 1797 to 1800. He entered the United States Senate in 1801, becoming four years later Attorney-Gen¬

eral in Jefferson's Cabinet, in which office he died.

BRECKINRIDGE, John, American clergy¬

man : b. Cabell's Dale, Ky., 1797 ; d. 4 Aug. 1841.

He entered the Presbyterian ministry, and was chaplain of the National House of Represen¬

tatives, 1819-21. He was pastor at Lexington, Ky., 1823-26, and in Baltimore 1 826—3 1 . He was professor of theology at Princeton Theological Seminary (1836), afterward held official posts in Presbyterian Church, and was chosen presi¬

dent of Oglethorpe University, Georgia, just prior to his death. He is remembered for a famous theological debate held with Rev. John Hughes, subsequently archbishop of New York, published under the title (Roman Catholic Con¬

troversy } (1836).

BRECKINRIDGE, John Cabell, Vice-President of the United States, grandson of John Breckinridge : b. near Lexington, Ky., 21

Jan. 1821 ; d. Lexington, Ky., 17 May 1875. He practised law in Lexington until 1847, when he was chosen major of a volunteer regiment for the Mexican War. He sat in Congress in 1851—55, and in 1856 was elected Vice-President, with James Buchanan as President. In 1860 he was the pro-slavery candidate for the presidency, receiving 72 votes, and being defeated by Abra¬

ham Lincoln. A United States senator from

March to December 1861, he then entered the Confederate army, was appointed a major-general in 1862. At the battle of Shiloh he commanded the reserve, fought at Murfrees¬

boro and at Chickamauga in the spring of 1864, defeated Sigel near New Market, was with

Lee in the Wilderness, and Early's second in command in the Shenandoah campaign. He

was Secretary of War in Jefferson Davis'

Cabinet, at the close of the struggle, and escaped to Europe, whence he returned in 1868, and resumed his law practice.

BRECKINRIDGE, Joseph Cabell, Amer¬

ican military officer, nephew of John Cabell Breckinridge: b. Baltimore, Md., 14 Jan. 1842.

He practised law in Danville, Ky., till the be¬

ginning of the Civil War, when he joined the Union Army. He was made a first lieutenant in the regular army 1863, captain in 1874, briga¬

dier and inspector-general in 1889, and major-general of volunteers, 4 May 1898. He served in the Santiago campaign and had a horse shot from under him. He was inspector-general of the United States army from 1899 until 1903, in which year he retired. He has since traveled extensively in Europe and Asia.

BRECKINRIDGE, Robert Jefferson,

Presbyterian clergyman and theological writer, brother of John Breckinridge: b. Cabell's Dale., 458

Ky., 8 March 1800; d. 27 Dec. 1871. He was originally a lawyer and in that capacity was for three terms a member of Kentucky legislature.

On his conversion in 1828 he studied for the Church; was president of Jefferson College in 1845-47 ; from 1847-53 he was pastor at Lexing¬

ton, Ky., and from 1853-69 professor of the Presbyterian College at Danville, Ky. He was an old-school leader in the division of the Presbyterian Church in 1837 into old and new schools. He was a strong supporter of the

Union during the Civil War. His chief works were (Knowledge of God, Objectively Considered) (1857) ; (Knowledge of God, Sub¬

jectively Considered) (1859).

BRECKLING, Friedrich, German the¬

ologian : b. Hanved 1629 ; d. at The Hague, 16 March 1711. He was educated at Arndt,

Konigsberg, Rostock, Helmstadt, Wittenberg,

Leipzig, Jena and Giessen. He made a deep

study of theosophy. Later he went to Hamburg where his studies impressed him with the belief in a priestless Christianity. He finally became his father's assistant after wandering about for some years in search of knowledge; but

through the influence of the priesthood he was dismissed and imprisoned (1660). He escaped

and went to Amsterdam and found a charge

at Zwolle, where again he was deprived of office through the same agency. He remained there, however, until 1672, when he went to Amster¬

dam (1670-90) and finally to The Hague (1690-1711), where he spent his time in writing and keeping up a correspondence with Spencer and Gottfried Arnold, the latter of whom he helped in his Church history. He paved the way, with his studies and theories, for Spencer whom he greatly influenced, and for the Pietistic move¬

ment.

BRECON, or BRECKNOCKSHIRE,

Wales, an inland county with an area of 719

square miles. It is one of the most mountain¬

ous counties of the principality, and presents much bold and magnificent scenery. Near its centre rises the mountain called the Van or Beacon, belonging to the Black Mountains,

which traverse its southern portion. It has a height of 2,901 feet, and is the culminating point of South Wales. The river Wye forms

a natural boundary between this county and

Radnor, and the Usk, rising in the Black Moun¬

tains, crosses the county and flows through a fine valley toward the town of Brecon. About two miles east from the latter is Brecknock Mere, one of the largest lakes in South Wales, abounding in otters, pike, tench, perch and eels.

A considerable quantity of agricultural produce is sent to the markets in the neighboring Eng¬

lish counties. The chief manufactures are

coarse woolen, stockings and other worsted

stuffs ; there are also extensive ironworks.

Coal, iron and lead are mined. Chief towns, Brecon, Builth, Crickhowell, Hav and Llanelly.

Pop., half of whom speak Welsh, 65,999.

BRECON, or BRECKNOCK, Wales, the

capital of Brecknockshire, an inland county, stands in an open valley at the confluence of the Honddu and Usk, and consists chiefly of three principal and several minor streets. Three bridges span the Honddu and one the Usk. The principal edifices are the county hall, county jail, barracks, Christ's College (an important educational institution on the model of the large public schools), and the Independent

Theological College. Saint John's Church is

a fine old building, cruciform, with a massive tower, partly early English, partly in later style. At Brecon the celebrated actress, Mrs.

Siddons, was born, as was also Dr. Thomas

Coke, the first Wesleyan missionary bishop in America. Pop., municipal borough (1911)

5,776.

BREDA, Holland, town in the province of

North Brabant, 24 miles southwest of Bois-le-duc, on the Merk. Being a strong frontier fort¬

ress, it was formerly of the greatest importance to Holland, as the chief point of the line of fortresses in front of the Meuse. The fortifica¬

tions consisted of 15 bastions, as many ravelins, and five horn-works, besides the citadel. These being removed, the chief strength of the place now lies in its marshy environs, which may easily be laid under water. Breda received city rights in 1534; and since that time has often been a subject of contention between the Dutch, Spaniards and French. It was delivered by

treachery into the hands of the Duke of Parma in 1581, but was retaken by Maurice of Orange in 1590. The latter capture was accomplished by means of a boat loaded with turf, in which 70 Dutch soldiers were concealed. Spinola took Breda in 1625, after a siege of 10 months, but it was retaken by the Dutch under Frederick

Henry of Orange, in 1637. During the French Revolutionary War Dumouriez made himself

master of the city and fortress in February 1793, and wrould thereby have prepared the way for the conquest of Holland had he not been forced, by the loss of a battle at Neerwinden, to evacuate the city and fortress, 4 April. In September 1794 Breda was attacked by the army of Pichegru, but did not surrender till all Hol¬

land was conquered, in the winter of 1795. On the approach of the Russian vanguard, under General Benkendorf, in December 1813, the

French garrison made a sallv, and the patriotic citizens, profiting by the occasion, rose en masse, shut the gates and prevented the French from returning into the town. A peace was con¬

cluded at Breda between England and Holland in 1667. Breda has manufactories of carpets, cloth, cigars, and its good harbor has greatly aided its trade development. Pop. about 28,000.

BREDA, Declaration of, a proclamation of

amnesty issued by Charles II of England, 4

April 1660. It was the only guarantee which the English nation demanded when taking back

their ejected kings of the faithless race of Stuarts. It was read in Parliament with an ef¬

fusive display of respect and thankfulness. In it Charles promised a general amnesty and lib¬

erty of conscience, with such exceptions and limitations only as the Parliament should think fit to make. All delicate questions, among

others, the proprietorship of confiscated estates, were in like manner referred to the decision of Parliament, thus leaving the King his lib¬

erty while diminishing his responsibility.

Though fully asserting the ancient right of the Crown, Charles announced his intention to as¬

sociate the two Houses with himself in all great affairs of state. Consult Guizot, (History of Richard Cromwell and the Restoration.*

BREDAHL, bra-dal', Christian Hviid,

Danish poet: b. Hellestrup 1784; d. 1860. He was educated at the gymnasium and the Uni-BREDENKAMP — BREED

versity of Slagelse. Owing to his love for an outdoor life, he turned his attention to agri¬

culture and in 1824 he bought a small piece of land near Soro, which he cultivated himself.

His great work is (Dramatiske Scenery which was published in six volumes, the first volume appearing in 1819. He also published several polemical works, directed against the Danish romanticism and the realistic writings of the time. In all his works, he shows a love for nature and the natural conditions of life, and a dislike for modern culture; his (Dramatiske

Scener) attacks both the nobility and the priest¬

hood. A new edition was published in 1885 in three volumes at Copenhagen.

BREDENKAMP, Konrad Justus, German

Lutheran theologian : b. Basbeck, Germany, 26

June 1847 ; d. Verden, 25 March 1904. Educated at the universities of Erlangen, Gottingen and Bonn, he became pastor at Kuppentin (1872 —78), Gottingen (1879) and Erlangen (1880-83), when he was appointed professor of the¬

ology at Greifswald (1883-89). He then went to Kiel as professor of Old Testament exegesis (1889-1904). Among his published works are

‘Der Prophet Sacharja erklarC (1879) ; ‘Vati-cinium quod de Immanuele edidit Jesaias)

(1880) ; (Gesetz und Propheten) (1881) ; and ‘Der Prophet Jesaias erlautert (1887).

BREDOW, bra’do, Adalbert von, German

soldier-hero: b. Berlin 1814; d. 1890. He dis¬

tinguished himself at the battles of Trautenau and Sadowa as cavalry commander during the

War of 1866, but his most brilliant feat which is commemorated in song and story occurred in 1870 when as commander of the 5th Cavalry

Division, with barely six squadrons, he led the desperate charge at Mars-la-Tour during the

Franco-Prussian War, which made a large

division of the French army powerless to as-

• sume the offensive. Bredow was made lieu¬

tenant-general in 1871.

BREDOW, Gabriel Gottfried, German his¬

torian : b. Berlin, 14 Dec. 1773; d. Breslau, 5

Sept. 1814. He was for a time professor at Eutin and a colleague of the celebrated Voss; afterward professor at Helmstadt, and (1809) at Frankfort-on-the-Oder, whence he went to

Breslau on the removal of the university to that place. He was distinguished for his

patriotism and his literary works. His ‘Handbuch der alten Geschichte) ((Manual of Ancient History }) passed through five editions, the fifth of which appeared in 1825. He was the author of ‘Chronik des neunzehnten Jahrhunderts)

((Chronicle of the 19th Century*); ‘Epistolse Parisienses* ; ‘Untersuchungen fiber Geschichte, Geographic, und Chronologie) ((Researches in History, Geography,, and Chronology*) ; and of the very useful ‘Historische Tabellen* (‘^His¬

torical Tables*) , which were translated into English.

BREE, bra, Matthaeus Ignatius van, Bel¬

gian painter: b. Antwerp 1773; d. there 1839.

He chiefly excelled in historical painting. His characteristics are said to have been originality and vigor of conception and patience in execu¬

tion; and he excelled in sculpture and lithog¬

raphy. His first work which attracted attention was the (Death of Cato. 5 Among his principal works are ‘Rubens Dictating his Dying Testa¬

ment J ; ‘The Tomb of Nero at Rome; ‘Death of Count Egmont* ; Wan der Werff Address¬

ing the Famished Populace During the Siege of Leyden. * He was appointed professor in the academy at Antwerp in 1804, and director in 1827.

BREECH and BREECH-LOADER. See

Artillery; Musket; Rifle; Small Arms.

BREECHES, a garment for the legs, espe¬

cially, as distinguished from trousers, for cover¬

ing the upper portions of the legs. In England they were formerly called hose. Breeches or hose were in use even among the ancient Baby¬

lonians, and with them were made so as to cover the foot and supply the place of stock¬

ings. In Europe we find hose first used among the Gauls, hence the Romans called a part of Gaul breeched Gaul (Gallia braccata). In the 5th century they had become fashionable in

Rome. In the time of Queen Elizabeth and

James I the breeches had assumed enormous

dimensions, being stuffed out with various

materials, as wool, hair, *etc.* King James’

partiality for such breeches is well known, and we find him

represented in an old engraving with wide stuffed breeches tapering to the

knee, slashed and adorned with lace. In the reign of Charles I they took the form of short trousers, loose at the knee, and ornamented with ribbons, lace, *etc.* In the time of William III the tight knee-breeches came in, and have been supplanted by trousers only in the 19th century.

BREECHES BIBLE, a name given to the

Geneva version of the Bible, published in 1560, and so called from the reading of Gen. iii, 7 : ((They sowed figge tree leaves together and made themselves breeches.® As a matter of

fact this Bible has no more distinctive right to the name than Wyclif's version, in which the same words are also found. It was the com¬

mon English version until its supersession by the authorized version in 1611.

BREECHES BUOY. See Life Saving

Service.

BREED, David Riddle, American Presby¬

terian divine, author and hymnologist : b. Pitts¬

burgh, Pa., 10 June 1848. A graduate of Hamil¬

ton College, 1867, and of Auburn Seminary,

1870; after pastorates in Saint Paul and Chi¬

cago, he became pastor of the First Presby¬

terian Church of Pittsburgh in 1894. He re¬

ceived the appointment of professor of prac¬

tical theology in Western Theological Seminary, Allegheny, Pa., in 1898, and was prominently identified with the denominational Board of

Missions for Freedmen. His works on hym—

nody include ‘History and Use of Hymns and Hymn Tunes* frequently reprinted; among

other writings are ‘Abraham, the Typical Life of Faith* (1886) ; ‘History of the Preparation of the World for Christ) (1891) ; ‘Heresy and Heresies) (1891) ; ‘Preparing to Preach’

(1911); and chief of numerous tracts is the widely circulated ‘More Lights

BREED, Robert Stanley, American biol¬

ogist: b. Brooklyn, Pa., 17 Oct. 1877. He

studied at Amherst College, the University of Colorado and Harvard University; was ap¬

pointed professor of biology at Allegheny Col¬

lege, and became secretary of the faculty 1907—10. His articles in scientific journals on the public milk supply and his studies on the post-embryonic development of insects made him

widely known. He is the author of (The

Changes which Occur in the Muscles of a

Beetle during Metamorphosis } (1903).

BREEDE, a river in Cape Colony, which

rises in the Warm-Bokkeveld, and flows chiefly in a southeasterly direction through the district of Zwellendam, entering the Indian Ocean at Saint Sebastian's Bay, about 60 miles northeast of Cape Agulhas, the most southerly point of Africa. It is navigable for vessels drawing not more than 10 feet of water to a distance of 40

miles, and drains a very fertile district.

BREEDING, the process of organic pro¬

creation. In this article the physiology of the matter is not to be considered, however, but only the methods and results as applied to the reproduction of domesticated animals and plants on varietal lines in accordance with human

requirements or fancy — that is, selective breed¬

ing. When men first began to keep flocks and herds and pet-animals, which were subjugated rather than domesticated as yet, reproduction was no doubt left wholly to nature, as still is the case on the vast cattle ranches of South Africa, Argentina and in America. But very

early in the history of pastoral life (which, doubtless, was the first rise above savagery) selective influences must have begun to operate, especially in the case of those animals which are most closely associated with their owners, and therefore most constantly under observa¬

tion and control. Not only from the earliest times of Egyptian and Oriental record, but

long previous, as shown by sub-fossil remains, distinct varieties of dogs, horses, camels and cattle had been produced from their original wild stocks. This might have come about in part naturally as a result of migration of bands to novel climates and food, to inbreeding and to other influences entailed by even a semi-domesticated condition ; yet, no doubt, a rough sort of selective breeding began with the

earliest domestication of live stock, poultry, *etc.*

Favorites would be preserved when, in times of stress, others were killed for food. Owners fancying bigness, or speed, or a special color or some other quality in certain of their animals would try to get more of that particular kind.

In both cases the saving of these better ones would, when they came to breed, strengthen the collection until a noticeable strain had been evolved without any definite intention or action by the owner.

It is probable, moreover, that observation

and reasoning — in neither of which faculties was the primitive herdsman deficient within the limits of his experience — would soon suggest to him some advantageous choice of mates

among his animals ; and there is no question that selective breeding was understood in a practical way at the dawn of history. It is most strik¬

ingly manifested in the care taken in ancient as in modern times in southwestern Asia, and in northern Africa, to keep pure and perfect the standard breeds of horses and camels. Little progress was made in Europe in this direction, for various reasons, previous to or during the Middle Ages, and no one with influence made any study of the principles that underlie that proverb of contented credulity — (<Like begets like.® Men were accustomed to choose as

progenitors the best specimens available of the type they preferred, and were thankful when they got satisfactory progeny. The first at¬

tempt at scientific treatment of the matter was that of Robert Bakewell in England, who, about the middle of the 18th century, studied and formulated the peculiarities of certain breeds of cattle, and showed how a male and a female excelling alike in the one or more selected characteristics must be used if the offspring were to progress along that desired line. Thus was begun the now familiar practice of sys¬

tematically (<breeding for points® — that is for the standard characteristics by which a breed (that is, an artificial variety) of any animal is distinguished. Such a breed, when finally at¬

tained, continues to perpetuate its distinctive form, or, as they say, (<breeds true,® by virtue of the lav/s of heredity. These laws cannot be discoursed of here, but a few words of explanation may be

permitted. While it is

true in general that Hike begets like,® it is not so in all particulars. No two young are pre¬

cisely like their parents, or exact duplicates of one another. Individual variations appear in size, color, proportions and temperament. Some differences are rarely noticeable, for some phys¬

ical features are apparently too fundamental to suffer any perceivable alteration — teeth or eyes (except as to color) for example; other more superficial and plastic features frequently show diversities. The art of the breeder, who desires an improvement in a certain kind of domestic animal, either for increased usefulness, or for some fanciful end, is to recognize and profit by emphasizing some one of the plastic features, and to cultivate it at the expense of other fea¬

tures. To do this he selects a pair that show a little more than others the desired quality.

Some of their offspring are likely to exhibit this quality better than others of the litter, and these are mated. So progressive generations

go on advancing the desired feature and

eliminating undesirable ones. See Herepity ; Menpel's Law.

Now the theory of this is that the qualities of the parents are transmitted to the young in virtually the same proportion as they exist in the parents, but not with exact equality. Some young, either of the same or in successive births, will get a little more of quality A, others a little more of quality B, than the rest. If in the next generation one with a superabundance of quality A mates with one having an excess of quality B, the balance will be restored ; and this is what usually happens in nature, so that variations are almost sure to be speedily ex¬

tinguished. If, however, sovereign man sees to it that A mates with another A, then their young will be doubly endowed with that

quality; and if the process is continued that quality will finally predominate, and will be maintained so long as outside mating is pre¬

vented.

In practice, however, the matter is not quite so simple. Some animals resist change, or may be modified up to a certain point, and no further in that direction, as in the well-known case of the blue Andalusian chickens, which will not breed true. It must be remembered, also, that negative as well as positive characters are transmissible, the weaknesses as well as the strength. Sometimes a fault seems inseparable from the sought-for virtue, as in the prevalent deafness of white cats,

The evidence as to inheritance of disease is too conflicting to be determinative. Probably no disease or its resulting lesion is transmitted ; but a weakness of resistance, which amounts to a tendency, or at least a susceptibility to that disease, often develops in the descendants of animals afflicted with certain ailments, as ring¬

bone in horses. Domestication has an effect on the procreative ability, or, at any rate, on the fecundity of animals, sometimes reducing it, but more often increasing it, owing, no doubt, to safer conditions and better food than the same creatures had in the wilderness ; and the production of special breeds has occasionally been followed by exaggerations of this tendency.

In varieties produced by hybridizing it is almost a rule that they are sterile. The more perfect in show-points is a kennel of toy-dogs the more delicate in health are they, and the harder it is for them to beget and nurture their puppies.

The mere production of a fixed artificial

variety of animal is one thing, and the making of a strong, useful and valuable breed is quite another. It is probable that few new ones of practical importance will be effected.

Plant-breeding, or the establishment of new

forms of plants, depends on essentially the same principles as have been outlined. The principal difficulty in producing a new variety of flower or fruit is to prevent mixture by the introduc¬

tion of foreign pollen — the fertilizing element; but this may be guarded against. One source of a new variety is by seizing upon some con¬

spicuous accidental variation in a plant, called by horticulturists a “sport,® isolating it, and per¬

petuating it by some of the methods presently to be mentioned. Many well-known flowers

and fruits have originated from such sports.

“On an ordinary orange tree, not so many

years ago, a single bud produced a branch

which bore only seedless fruit, … cor¬

related with the presence of a tiny accessory orange embedded almost wholly in the larger; that branch was grafted, as were the resulting branches ; and this is the origin of … the navel orange® (Ganong) .

Reproduction by grafting or by cuttings is

one method, then, of plant-breeding; but more commonly the new variety is originated or

brought to perfection, or both, by artificial pollination — transferring by human agency

desirable pollen to the stigma of the plant to be affected, whence it descends and fertilizes the seed. This is done in most cases by touching the anthers of a ripe flower with a soft, camel’s-hair brush, and then touching the

stigma to be affected, to which the con¬

veyed pollen will stick. In some special cases the pollen of the plant's own flower is used; this ensures non-variability, and is called "inbreeding® ; but as a rule the pollen from an¬

other plant of the same kind is taken. This is "cross-pollination,® and tends to make an equally true and more vigorous stock, with an in¬

creased tendency to (controllable) variation.

Thirdly, the breeder may pollinate a given

stigma from a different variety, or even (but not always) from a different species of plant.

This is "hybridization,® and the result is a "hybrid® — the source of many of the remark¬

able varieties of plants that Luther Burbank and other scientific gardeners and experimenters have given us. It is the rule, however, as among animals, that these hybrids do not pro¬

duce seeds, and must be perpetuated by planting bulbs or cuttings, or in the case of trees, by grafting, generation after generation. Success in these methods can be obtained only by pre¬

venting all access to the stigma, and thence to the seeds of the plant operated on, of any pol¬

len except of the one kind needed. This is most usually accomplished by simply enclosing the blossom to be treated in a cap or bag of paper or light gauze, so that no flying pollen or pollen-loaded insects can reach it.

In this review of methods the writer has

necessarily given an impression of extreme

simplicity, but the road to success abounds in difficulties and often tries the patience of the experimenter by its length.

Bibliography — Darwin, Variations of

Plants and Animals under Domestication }

(London 1885) ; Castle, (Heredity in Relation to Evolution and Animal Breeding* (New

York 1911) ; Davenport, Principles of Breeding) (Boston 1907) ; Ewart, (The Principles of Breeding and the Origin of Domesticated

Breeds of Animals) (Annual Report of the

Bureau of Animal Industry , United States

Department of Agriculture, 1910) ; Kronacher, (Grundziige der Ziichtungs-Biologie> (Ber¬

lin 1912) ; Marshall, Preeding Farm Animals*

(Chicago 1911) ; Pearl, (Inheritance in Poul¬

try* (several Bulletins of the Maine Experi¬

ment Station) ; Wilson, Principles of Stock Breeding* (London 1912).

Ernest Ingersoll.

BREEDING, Plant. See Plant Breeding.

BREED'S HILL, Mass., a slight elevation

in the Charlestown district of Boston, about 700

yards from Bunker Hill. Although the famous engagement of 17 June 1775 is known as the Battle of Bunker Hill, the fighting was done on Breed's Hill. Here w'as located the American redoubt, against which the British made their three historic charges, and here Warren fell.

Bunker Hill monument stands on Breed's Hill.

BREESE, Kidder Randolph, American

naval officer; b. Philadelphia, 14 April 1831; d.

1881. He entered the navy in 1846 and served in the Civil War. In 1861 he commanded the third division of Porter's mortar flotilla in the attacks on New Orleans and Vicksburg; in 1863

and 1864 he was lieutenant-commander on the Mississippi and took part in the most important engagements ; in 1865 he wras fleet-captain at the attack on Fort Fisher. He became captain in 1874.

BREEZE-FLY. See Bot-Fly.

BREFELD, bra'felt, Oskar, German bota¬

nist : b. Telgte, Westphalia, 19 Aug. 1839. He wras educated at Halle, Munich and Wurzburg.

In 1875 he was a lecturer at Berlin ; in 1878 he became professor at Eberswald, in 1884 at

Munster and in 1898 at Breslau. He retired in 1907. His investigations have been chiefly in mycology and he introduced a number of new methods in the study of this science, particularly the use of "gelatine cultures.® He has written (Researches in the Field of Mycology * (1872).

BREGENZ, bragents', a town of western

Austria, in Vorarlberg, 77 miles west by north of Innsbruck. It occupies a beautiful site on a slope which rises from the Lake of Constance and terminates on Mount Gebbard, where the

ruins of the ancient stronghold of the counts of Montfort are still seen. It consists of an old town, very poorly built, and a modern, which is more attractive. Among its edifices are three churches and two monasteries, a town-hall, and a museum of Roman antiquities, found in the vicinity. Its chief manufacture is framework and other wooden fittings for houses, and it trades in corn, fruit, wine, butter and cattle.

There are saltpetre works, blast furnaces and coal mines in the vicinity. Pop. of the district in 1910 was 34,743. Under the name of Brigantium the town was a Roman station, and in the Middle Ages, the seat of the powerful

counts of Bregenz. In the 16th century, it passed to the house of Hapsburg. Consult Hel-brook, (Die Bevolkerung der Stadt Bregenzˆ

(Innsbruck 1912).

BREGMA. The point on the surface of

the skull at the junction of the coronal and sagittal sutures. This situation is known as ftbregma,)) and is taken as a landmark in med¬

ical and anthropological measurements.

BREGUET, bra'ga, Abraham Louis, Swiss

watchmaker and mechanician: b. Neuchatel,

10 Jan. 1747; d. 17 Sept. 1823. He originated the use of rubies in pivot holes and became celebrated for the perfect workmanship of his pocket chronometers, marine timepieces, sym¬

pathetic pendulums, metallic thermometers and mechanism of telegraphs. He established a

manufactory in Paris, was appointed chronom¬

eter maker to the navy, member of the bureau of longitudes and member of the Institute.

BREGUET, Louis Frangois Clement,

French mechanical watchmaker, grandson of

Abraham Louis Breguet: b. Paris, 22 Dec. 1804; d. there 1883 ; maintained the reputation gained by his father and grandfather in the construc¬

tion of nautical and other instruments of pre¬

cision. He was placed in 1826 at the head of the chronometer department of the navy

founded by his grandfather; invented the sys¬

tem of electrical clocks for the distant trans¬

mission of time, and supervised the establish¬

ment of the first telegraphic line in France. He is the author of (Telegraphie electriqueP

BREHM, bram, Alfred Edmund, German

naturalist and traveler : b. Reuthendorf, 2 Feb.

1829; d. there, 11 Nov. 1884. Under his father Christian Ludwig (q.v.) he studied natural

history and ornithology; traveled extensively from 1847 to 1854 in Egypt, Nubia, the Sudan, Abyssinia, Spain, Lapland and Siberia ; became director of the zoological gardens, Hamburg, 1862, and from 1867 to 1874 was director of the aquarium, Berlin. His Ullustrirtes Thierleben*

(6 vols., Hildburghausen 1863-69), was the

most important work published in that line

at that date. He also wrote (Das Leben der VogeP (Glogau 1860-61; 2d ed., 1867; English translation, (Bird Life* by H. M. Labouchere and W.

Jesse, 4 parts, London, 1872). His

books of travel include (Reiseskizzen aus

Nordostafrika) (3 vols., Jena 1855-63) ; and (Ergebnisse einer Reise nach Habesch) (Ham¬

burg 1863).

BREHM, Christian Ludwig, German

divine and ornithologist : b. Schonan near

Gotha 1787; d. 1864. From 1807-09 he studied theology in Jena, and afterward was pastor of BREHON

several churches. He became widely known by his writings on bird life and by his collection of 9,000 European birds, in 1897 acquired for the Rothschild museum at Tring. His principal

works are (Beitrage zur Vogelkunde) (3 vols., 1821-22) ; (Lehrbuch der Naturgeschichte aller europaischen VogeP (2 vols., 1823-24) ; (Ornis) (3 parts, 1824-27) : (Handbuch fur Liebhaber der Stuben-Haus und aller der Zahmung werten VogeP (1832) ; (Der vollstandige Vogelfang*

(1855) ; (Die Eier der europaischen Vogel nach der Natur gemalt (collaborated with Baedeker and Passler, 1855-67).

BREHON (Irish, breitheamh, a judge), the

name given to a magistrate among the ancient Irish. These magistrates seem to have been

hereditary, and before the introduction of

Christianity probably combined the offices of judge and priest. They administered justice

to their respective tribes — each tribe had one brehon — seated in the open air upon some sods placed on a hill or eminence. The poet

Spencer, in his (View of the State of Ireland, *

refers to the Brehon law as an unwritten code handed down by tradition. He was, however,

mistaken in regarding it as an unwritten code.

Patriarchal as was the administration of the Brehon law, its transmission was not left to tradition. In the earliest manuscripts extant it is said to have been revised by Saint Patrick and other learned men, who expunged from it the traces of heathenism and formed it into a code called the Senchus Mor, about 440, and it is implied that a previous written code, written in the ancient Irish tongue, existed. There is a great similarity between the Brehon laws and the laws of the Druids as explained by Caesar in his Commentaries. The Brehon law was ex¬

clusively in force in Ireland until 1170. Various ineffectual attempts were made by the English government to suppress it, and it was finally abolished by James I in 1605. The Brehon laws, like other laws passed at the same period of European history, contained, with some rude

principles of justice, many barbarous institu¬

tions. The state of society indicated in them seems to be a sort of transition from the com¬

munal ownership and periodical reparation of the land found among several Teutonic nations, to a manorial organization. Several distinct social ranks are indicated, ranging from the nobles to the serfs. They had regular courts, with the right of appeal from lower to higher ones. Most offenses, even including murder,

could be commuted by fines, which were fixed with minute precision ; but the fines were paid in kind, since coined money was unknown. The laws also carefully provide for and regulate the raising of the children of the upper classes by members of the subordinate classes. The

marriage laws were of a very loose character, and the law of inheritance is obscure and com¬

plicated. Women were free to own property

and to enter into contracts concerning it. Until recently these laws

have been involved in great obscurity. A commission was appointed in 1852

to superintend the publication and translation of the ancient laws of Ireland; and between 1865 and 1885 an edition of the (Senchus Mor) was published in five volumes. Consult Arbois de Jubainville, (Etudes sur le droit celtique*

(Paris 1895) ; Joyce, (Social History of An¬

cient Ireland) (Vol. I, London 1903), and

Maine, (Early History of Institutions) (Lon¬

don 1875).

BREISACH, bri-zaH, or ALT BREI¬

SACH, town of Baden, on an isolated basalt hill (804 feet) on the right side of the Rhine, 14 miles west of Freiburg. The Mons Brisiacus of Caesar, it was taken by Ariovistus when he invaded Gaul ; being regarded as the key to western Germany, Breisach had a chequered

history during the Middle Ages, passing under successive masters and being the battleground of Austrian and Frenchman in the wars of the 17th and 18th centuries. The town was burned by the French in 1793 and 12 years later they ceded it to Baden. The minster is a 13th cen¬

tury structure. It carries on an active trade in lumber and cattle, and manufactures beer, wall paper, wine, *etc.* Pop. about 5,000. Consult Coste, (Notice historique sur la ville de Vieux-Brisach* (1860).

BREISGAU. See Brisgau.

BREITENFELD, village of Saxony, five

miles north of Leipzig. Here two battles were gained by the Swedes during the Thirty Years'

War. In the first, fought on 7 Sept. 1631, Gustavus Adolphus, joined by the Saxons, defeated Tilly and Pappenheim ; in the second, on 2 Nov.

1642, Torstenson, who had succeeded on the

death of Baner to the command of the Swedish army in Germany, again defeated the Imperial¬

ists under the Archduke Leopold and Picco—

lomini, who had advanced to the relief of

Leipzig, invested by the Swedes. Leipzig sur¬

rendered after the battle. Breitenfeld was also the scene of a portion of the battle of Leipzig, won by the allies against Napoleon, 16-19 Oct.

1813.

BREITHAUPT, brit'howpt, Johann Au¬

gust Friedrich, German mineralogist: b.

Probstzella, Thuringia, 1793; d. 1873. He

studied at the University of Jena and at the Academy of Freiberg where, in 1813, he was appointed lapidary and teacher, and in 1827

professor. His painstaking examination of all the known minerals of his time, including over 3,000 measurements of calcite alone, contributed largely to increased knowledge of crystallog¬

raphy, and the opening of the vast coal fields of Zwickau, Saxony, was due to his efforts.

His close researches resulted in almost total blindness toward the end of his life. His chief works are (Ueber die Echtheit der Krystalle)

(1816); (Vollstandige Charakteristik des

Mineralsystems) (1820, 3d improved ed., 1832) ; (Die Bergstadt Freiberg* (1825, 2d ed., 1847) ; (Die Paragenesis der Mineralien) (1849), com¬

pleting the work; he also contributed five

chapters to Hoffmann's valuable (Handbuch der Mineralogie) (3 vols., 1836-47).

BREITHAUPT, Joachim Justus, Ger¬

man Protestant minister and poet: b. Hanover, 2 Feb. 1658; d. 16 March 1732. He was an orator of note and attracted the attention of the court. His poetry, which is for the most part sacred in character, was popular in his day and had some influence on the development of Ger¬

man literature. Breithaupt was professor of

theology in Halle, and in this capacity he in¬

fluenced, to a considerable extent, the theologi¬

cal thought of his generation in Germany.

Among his well-known works are (Theses

credentorum et agendorum fundamentale*s)

(1700); (De perfectione partium* (1704);

(Peologie der Wiedergeborenen,* (Vollkom—

menheiP and (Poemata miscellanea) (1720).

BREITKOPF, brit'kopf, Johann Gottlob

Immanuel, German printer and publisher : b.

Leipzig 1719; d. 1794. He was educated in the university of his native

city, and following out a scientific study of printing, he evolved im¬

provements in musical notation and in German text. To him is probably due the present form of modern printed music. In 1764 he estab¬

lished in Leipzig the publishing house known from 1795 as Breitkopf & Hartel. He was

the author of (Ueber die Geschichte der Erfin-dung der Buchdruckerkunst* (1779); (Ueber

den Druck der geographischen Karten* (1777—

79).

BREITMAN, Hans, hants brit'man. See

Leland, Charles Godfrey.

BREMA, Marie (Minny Fehrman), oper¬

atic singer: b. Liverpool, 28 Feb. 1856; father German, mother .American. In 1874 she mar¬

ried Arthur Braun of Liverpool. Studied under (Sir) George Henschel ; made her debut in

Schubert's (Ganymed,} 1891, at a concert; in the same year sang the part of Lola in (Cavalleria Rusticana) on its first production in Eng¬

land (19 October). Introduced to *Mme.* Wag¬

ner in 1894, she was engaged for the part of Ortud at Baireuth ; also appeared as Kundry in c Parsifal. * As Briinnhilde in (Die Walkiire) she toured America (1894), and appeared again in Wagnerian roles at Baireuth in 1896 and 1897 ; in Brussels and Paris as Orphee, Dalila and Amneris. Perhaps her most notable achieve¬

ment in the English Musical Festivals was the part of the Angel in Elgar's (Dream of Gerontius) (Birmingham 1900). Originally a

mezzo-soprano, her vocal compass has increased to the extent that she

is able to take soprano parts.

BREMEN, bra'men, Germany, a port and

free city, and an independent member of the empire, one of the three Hanse towns, is sit¬

uated on the Weser, about 50 miles from its mouth, in its own small territory of 98 square miles, besides which it possesses the town and port of Bremerhaven at the mouth of the river.

The town is divided into the old town (Alt-stadt), on the right bank of the river; the new town (Neustadt), on the left bank of the river, and the extensive suburbs (Vorstadte). The

first is separated from the suburban quarters adjoining by the ramparts of the city, now con¬

verted into walks and pleasure-grounds, and

forms a sort of semi-circle on the right bank of the river. The new town lies on the left bank of the river opposite the old, with which it is connected by three bridges, two of them cross¬

ing the main stream and the third crossing the arm of it called the Little Weser, besides a railway bridge. Extensive suburbs lie on this side also. The streets of the old town are gen¬

erally narrow and crooked and lined with

antique houses in the style of the Middle Ages.

This is the business quarter of the city and contains the chief public buildings, including the cathedral, the old Gothic council-house, with the famous wine cellar below it, the modern town-hall, the Schiitting or merchants' house, the old and the new exchange, *etc.* The new town has straight, well-built streets, lined 464

mostly with dwelling-houses and shops. The

suburbs also consist chiefly of dwelling-houses, and as these often have gardens in front, the streets have a very pleasant aspect. The chief ecclesiastical building is the cathedral, a Ro¬

manesque edifice, founded in 1044, subsequently added to at various times, and in 1888-93 pro¬

vided with two new western towers. There

are several other old and interesting churches, as those of Saint Ansgar, Saint Stephen and Saint John. Among buildings of recent erec¬

tion are the courthouse, savings bank and rail¬

way station. There are several squares and

open spaces, and besides the pleasure-grounds formed from the ramparts, a large public park has been laid out on the north side of the town.

Bremen is well supplied with schools and other educational institutions, and possesses a mu¬

seum, a library (120,000 volumes), an observa¬

tory, *etc.* The manufacturing establishments

include tobacco and cigar factories, sugar-re¬

fineries, rice-mills, iron-foundries and machine wrorks, rope and sail works, and shipbuilding yards. It is from its commerce, however, that Bremen derives its importance. Its situation renders it the emporium of Hanover, Bruns¬

wick, Hesse and other countries traversed

by the Weser, and next to Hamburg it is

the principal seat of the export and im¬

port trade of Germany. The Weser has

been deepened so that sea-going ships draw¬

ing 17 feet of water can now ascend to the Bremen docks, but the great bulk of the

shipping trade centres in Bremerhaven and

Geestemiinde. Bremerhaven is now a place of over 18,000 inhabitants, and is provided with excellent docks capable of receiving the largest vessels; it is connected by railway with Bremen, where the chief trading companies, merchants and brokers have their offices. The greater portion of the German trade with the United States passes through Bremen, and it is the chief port of emigration on the Continent. The chief imports are tobacco, raw cotton and cot¬

ton manufactures, wool and woolen manufac¬

tures, rice, coffee, grain, petroleum, wines, tim¬

ber, hemp, dyewoods, skins etc., which are of course chiefly exported to other parts of Ger¬

many and the Continent. The exports are woolen goods, linens, glass, rags, wool, hemp, hides, oil cake, wooden toys, *etc.* Next to Liverpool, Bremen is to-day the leading European cotton market. Before the organization of the cotton exchange in 1872, the German merchants had

been getting their product chiefly from Havre and Liverpool, very little being imported direct.

To become independent of British ports, it was necessary to get the patronage of the inland spinners. This proved no easy task. Not until a decade had passed did the Bremen exchange cease to be a local institution and acquire a standing of national importance ; but ever since the development has been phenomenal. While

the importation of cotton in the year 1870

amounted to only 157,689 bales, it ran up to 397,998 bales in the year 1880. Ten years later there were 812,538 bales and when the great war broke out in 1914 had reached enormous figures. The new cotton exchange opened in

1902 is not only one of the most imposing struc¬

tures of this nature in the world, but also the most complete in the appointments necessary

for carrying on the business of buying and sell¬

ing cotton and supplying the leading merchants and brokers with office and sample rooms. The city owns its gasworks, waterworks and elec¬

tric plants. The municipal management of

these has been a great benefit, yielding an in¬

creasing annual net income to the city treasury.

The public schools are maintained and controlled by the city. Bremen spends almost twice as much on education as on its police force.

Bremen first rose into note about 788, when it was made the seat of a bishopric by Charle¬

magne. It was afterward raised to the dignity of an archbishopric, and by the end of the 14th century it had become virtually a free imperial city. At the Treaty of Westphalia in 1648 the archbishopric was secularized and became a

duchy under the supremacy of Sweden. In

1731, when the Elector of Brunswick gained

possession of the duchy, the privileges of Bre¬

men as a free city were confirmed. From 1810

to 1813 it formed part of the French empire.

The constitution is in most respects republican.

The legislative authority is shared by the sen¬

ate, a body of 16 (11 of whom must be lawyers and five merchants, elected for life) and pre¬

sided over by two of their own number alter¬

nately, who have the title of burgomaster ; and by an assembly of 150 citizens elected for six years. The executive power is entrusted to the senate and senatorial committees. Pop. of the total territory (including

Bremerhaven) about 248,000.

BREMER, bra'mer, Fredrika, Swedish

novelist: b. Tuorla, Finland, 17 Aug. 1801; d.

Arsta, 31 Dec. 1865. At 17 she was taken on a tour through Germany, Switzerland and France.

In 1828 appeared the first volume of her

(Sketches of Everyday Life,5 but the second volume, 'The H. Family5 (1833; English

transl., 1844), first revealed her power. From this time she devoted herself to writing stories that quickly became popular in translations far beyond the bounds of Sweden, and she varied her literary labor by long journeys in Italy, England, the United States, Greece and Pales¬

tine, which supplied the materials for her

'Homes of the New World > (1853), and 'Life in the Old World) (1862), full of fine descrip¬

tions of scenery and vivid pictures of social life, with sound views on political and moral ques¬

tions. The admirable translations of Mary How-itt had preceded her in the United States as well as England, and insured her an equally warm welcome on both sides of the Atlantic. On her return to Sweden she gave herself up to philan¬

thropy, but more particularly to the education and emancipation of women, and the conse¬

quent propagandist character of her later

novels, 'Bertha5 and (Father and Daughter5

(1859), was detrimental in no small degree to their literary value. Her religious views she set forth in her 'Morning Watches> (1842).

She has been called the Jane Austen of Sweden.

Of her stories perhaps the most perfect is 'The Neighbors5 (1837).

‘The Diary,5 ‘The

President’s Daughters,5 ‘Brothers and Sisters5

and ‘Strife and Peace or Scenes in Dalecarlia,5

are only less popular. ‘Lives5 were published in 1868 and at Copenhagen in 1892 bv Petersen.

See Home, The.

BREMERHAVEN, bra’mer-ha-ven, Ger¬

many, the port of Bremen, on the east shore of the Weser estuary, nearly 10 miles from the BREMERTON — BRENET

open sea and 39 miles north-northwest of

Bremen. It was founded by Bremen, in 1827, on ground acquired from Hanover, and rapidly became a thriving place. A second dock was opened in 1866, a third in 1874, and in 1888 a great port, with docks, was undertaken at Nor-denham, on the opposite bank. The workshops and dry docks of the North German Lloyd

Steamship Company are at Bremerhaven.

Shipbuilding and shipping are the principal in¬

dustries. Bremerhaven was the scene, in 1875, of a dynamite explosion on board a mail steam¬

ship, by which 60 persons were killed. The Geeste separated Bremerhaven from Geestemiinde. Pop. about 25,000.

BREMERTON, Wash., city in Kitsap

County, 25 miles southwest of Seattle, on

Puget Sound. Here is located the Puget Sound Navy Yard, covering about 250 acres and valued at $15,000,000. There is also a very large dry dock, 827 feet long. The city has a public library, several parks, including an athletic field, a skating pavilion and several theatres and churches. It has among its industrial establish¬

ments a creamery, an ice plant, sheet-metal works, paint works, machine shops, saw mills and cigar factories. Pop. (1920ˆ 8,918.

BRENDAMOUR, bran-da-moor, Franz

Robert, German engraver : b. Aix-la-Chapelle, 16 Oct. 1831. He was educated in his art in Cologne under Stephan. In 1856 he went to

Diisseldorf and established a xylographic

studio, which rapidly became well known and one of the leading institutions of its kind. He later set up similar studios in Berlin, Leipzig, Brunswick, Stuttgart and Munich, to conduct¬

ing which he devoted most of his time. Among his best works are a collection, 112 engravings, after drawings by Rudolf Elster; illustrations for several works, including Immermann's

(Der Oberhof5 and Count YValdersee's (Der

Jager5 ; (The Odyssey,5 after drawings by Prel-ler and eight frescoes in the Rathhaus at Aix-la-Chapelle.

BRENDAN, or BRENAINN, Saint, <?f

Clonfert : b. 484 at what is now Tralee in Kerry; d. 577. He was educated under his

relative, Bishop Ere, and Saint Jarlath of

Tuam, and was ordained by the former.

Shortly afterward he went on a seven years'

voyage in search of ((the mysterious land far from human ken®; but

without definite result.

Later he visited and lived in Brittany for a time, and after his return he again set out to seek the distant paradise, which he ultimately found. When he again reached Ireland he

founded the monastery of Cluain Fearta (Clon¬

fert), and he seems to have visited the West¬

ern Isles of Scotland at this time. His two voyages form the basis of the celebrated mediae¬

val legend of the Navigation of Saint Bren¬

dan 5 ; but in the legend they are united into one and combined with other stories. Where

Brendan's voyages really led him to we do not know. The (Book of Lismore5 contains a life of Saint Brendan. Consult O'Donoghue, (Brendaniana) (Dublin 1893), and Schroder, B. C., (Sanct Brendan) (Erlangen 1871).

Another Irish saint of the same name was

born about 490 and died in 573. He was a friend of Columba, and founded a monastery

at Birr (Parsonstown) in King's County.

BRENDEL, bren'del, Heinrich Albert,

German painter: b. Berlin, 7 June 1827; d. 1895.

He studied at the Berlin Art Academy under Krause, and in Paris as a pupil of Couture and Palizzi. After traveling in Italy and Sicily, he lived in Paris, 1854-64; he then returned to Germany and lived in

Berlin and Weimar, be¬

coming director of the art school at the latter place. He devoted himself almost entirely to animal painting, and his pictures of sheep are considered especially fine. His works include (Peasant's Farm,5 (Interior of Sheep Stable,5

(Sheep Leaving Stable.)

BRENDEL, Karl Franz, German musical

author, editor and critic: b. Stolberg-am-Harz, Prussia, 1811; d. 1868. He studied at the uni¬

versities of Leipzig and Berlin; lectured on the history of music in Freiberg and Dresden; in 1844 became instructor in musical history and aesthetics at the Conservatory of Leipzig, and at the same time editor of the Zeitschrift fur Musik, founded by Schumann in 1834. Early

favoring the reform movement originated by

Wagner and Liszt, when they, he and others in 1861 founded the (Allgemeiner Deutsche

Musikverein,5 he made the Zeitschrift the or¬

gan of reconciliation for the contending fac¬

tions. Until his death he was president of the Society, and published a second periodical,

Anregungen fur Kunst, Leben und Wissenschaft. He also wrote (Grundziige der Geschichte der Musik) (1848) ; (Geschichte der Musik in Deutschland, Italien und Frankreich5

(1852); (Die Musik der Gegenwart und die

Gesamtkunst der Zukunft5 (1854).

BRENEMAN, Abram Adam, American

chemist : b. Lancaster, Pa., 28 April 1847. He was graduated at Pennsylvania State College in 1866, and after service as an instructor was full professor of chemistry 1869-72. From

1875 to 1882 he was assistant, lecturer and pro¬

fessor of industrial chemistry at Cornell.

Since then he has resided in New York, en¬

gaged in professional work as a writer, analyst and chemical expert. He is the inventor of the Breneman process of rendering iron non-corro¬

sive and has made a special study of water and its contaminations. He edited the Journal of the American Chemical Society in 1884—93,

and served as expert member of the municipal explosives commission of New York city in

1906-09. He has written (Manual of Introduc¬

tory Laboratory Practice5 (1875) ; (Report on the Fixation of Atmospheric Nitrogen) (1890), and numerous contributions to chemical and

other journals.

BRENET, bre-na', Michel, properly BO—

BILLIER, Marie, French musical historian

and author: b. Luneville, 12 April 1858. A valued contributor to several • leading musical periodicals, also to the Grande Encyclopedic and the Rivista musical e italiana, she resided for some time at Metz and at Strassburg, set¬

tling in Paris in 1871. Her writings show evi¬

dence of much original, independent and

erudite research ; her published works include (Histoire de la Symphonie a orchestre jusqu'a Beethoven5 (1882) ; (Gretry, sa vie et ses oeuvres5 (1884) ; (Jean dOkeghem5 (1893) ;

(Claude Gondimel5 (1898) ; Notes sur l'histoire du luth en France5 (1899) ; (La jeunesse de Rameau5 (1903); (Palestrina5 (1906);

(La plus ancienne methode frarujaise de musique> (1907).

BRENHAM, Tex., city and county-seat of

Washington County, on the Gulf, Colorado

and Santa Fe and the Houston and Texas

Central railroads, 72 miles northwest of Hous¬

ton. It is the centre of an agricultural and cotton region and has two cotton compresses, a cotton factory and a cottonseed-oil mill, machine shops, a creamery, ice factory, as well as other manufacturing interests. It is the seat of the Blinn Memorial and Evangelical

Lutheran colleges, Sacred Heart Convent and

the Normal and Industrial College for Ne¬

groes ; has a library, two parks and fair grounds. It was settled in 1845, was incor¬

porated in 1866 and its government is vested in a mayor, elected for two years, and a city council. Pop. (1920) 5,066.

BRENKENHOF, bren'ken-hof, Friedrich

Balthasar Schonberg von, Prussian military

organizer and administrator : b. Reideburg,

near Halle, 1723; d. 1780. He received the ap¬

pointment of equerry to Prince Leopold of

Anhalt-Dessau and achieved great reputation

with the authorities during the Seven Years'

War by his secret and rapid system of com¬

missariat and supplies, notably cavalry, which allowed Frederick the Great to make his swift marches and unexpected attacks. He entered

the Prussian service and was appointed to ad¬

minister the devastated eastern provinces.

Settlements were founded, cities rebuilt, in¬

dustries fostered, roads and canals constructed and he satisfactorily restored order and pros¬

perity. His estates were confiscated at his death owing to irregularities in his accounts, but later were restored to his family. Consult Meissner, (Leben Brenkenhofs)- (Leipzig

1782).

BRENNAN, Louis, Australian inventor:

b. Ireland 1852. Having emigrated to Australia in boyhood, he was apprenticed to a civil en¬

gineer at Melbourne and here the future tor¬

pedo of England's navy was first conceived in the mind of its inventor when he was but 22.

Thirteen years later, in 1887, the government, by the advice of the admiralty, bought the in¬

vention for $550,000. A more recent triumph of Mr. Brennan is an adaptation of the gyro¬

scope to the monorail — a device which he dem¬

onstrated before the Royal Society in 1907, and which secured the highest award of the Japan-British Exhibition of 1910.

BRENNER, Victor David, American

medalist and sculptor : b. Shavly, Russia, of American parents, 12 June 1871. In 1890 he came to the United States and worked for sev¬

eral years as a die-cutter. He went to Paris in 1898, studied under Roty and was awarded prizes for his exhibits at the Paris Exposition and Salon of 1900. He also received awards for his work at the Pan-American Exposition in Buffalo in 1901 and at the Louisiana Pur¬

chase Exposition in Saint Louis in 1904. The Paris Luxembourg, the Munich Glyptothek and

the New York Metropolitan Museum contain

examples of his work. His portrait medals of Theodore Roosevelt, Whistler, Carl Schurz,

Collis P. Huntington and W. M. Evarts are

well known by illustrated reproductions ; he designed the Lincoln cent, and among other

work the seal of the Fine Arts Federation of New York and of the New York Public Li¬

brary. Representative of his sculpture is the bust of Charles Eliot Norton in the Fogg

Museum, Harvard University.

BRENNER PASS, a mountain pass in the

Austrian Tyrol on the route between Bozen

and Innsbruck. It is the lowest pass over the main ranges of the Alps. The summit, 25

miles south of Innsbruck, is 4,470 feet above the sea and on the line dividing the watersheds of the Black and Adriatic seas. This pass was used by the Romans; in 1772 it was made avail¬

able for carriages and in 1867 a railway was opened. This railway passes over 67 bridges and through 22 tunnels, the longest of the lat¬

ter being 2,800 feet long. This line links up the Austrian and Italian railway systems and is the quickest route from central Germany

to Italy. It was projected by Austria at a time when she controlled Venetia in order to make Venice the port of South Germany and

also as an aid in military operations. De¬

spite the political changes of the 19th century hereabout the railway has been of ever in¬

creasing importance as a factor in the com¬

mercial relations of Austria, Germany and

Italy. The village of Brenner near the sum¬

mit gives its name to the pass. Consult Riehl, (Die Kunst an der Brennerstrasse) (Leipzig

1908) and Wanka von Rodlow, (Die Brennerstrasse) (Prague 1900).

BRENNUS, the name or title of several

princes of the ancient Gauls, supposed to be derived from the Kymrian brenhin, a king. A leader of the Senones, a Gallic nation in the upper part of Italy, the most famous person¬

age who is mentioned under this name made

an invasion into the Roman territory about the year 390 b.c. A battle was fought near the river Allia, the Romans were totally defeated and Brennus took possession of the city, which had been previously abandoned by the inhabit¬

ants. The capitol only was provided with a garrison, but several aged citizens of rank, amounting in the whole to about 80, had re¬

solved to remain in the city and devote them¬

selves to the infernal deities. Attired in their sacerdotal, consular and triumphal robes, they seated themselves in their chairs of office in the middle of the forum, awaiting death.

When Brennus arrived at the forum, he was

struck with astonishment at their venerable

aspect. The Gauls looked upon them as so

many statues of deities and feared to go near them, but ultimately they were all massacred.

Rome was sacked and all the inhabitants who yet remained in their houses were slain. Bren¬

nus then assaulted the capitol and being re¬

pelled with considerable loss, he set fire to the city and leveled it to the ground. While

the garrison of the capitol was in great distress Brennus attempted a surprise by night, in

which he would have succeeded had not the

cackling of the geese, sacred to Juno, alarmed the garrison, in consequence of which the

Gauls were repulsed. After six months Bren¬

nus offered to raise the siege and leave the Roman territory for 1,000 pounds of gold.

When the gold was weighed, Brennus threw

his sword into the scale beside the weights and cried out, <(Woe to the vanquished!® Accord¬

ing to Polybius the Gauls returned home in BRENT — BRENTANO

safety with their booty. According to the

Roman legend followed by Livy, Brennus was

defeated and his army entirely destroyed by Camillus, a distinguished Roman exile who

had retired to the city of Ardea and who ar¬

rived with succor in time to save the capitol.

Another Brennus in 279 b.c. advanced into

Greece with an enormous force, said to have amounted to 150,000 foot and 61,000 horse.

After ravaging Macedonia he entered Thes¬

saly and marched toward Thermopylae, where

an army of 20,000 Greeks was assembled, sup¬

ported by an Athenian fleet on the coast. The Gauls were repulsed in a sanguinary battle, but, in order to separate the Greeks, they dis¬

persed themselves to plunder the country.

Brennus himself attacked the temple of Del¬

phi, which was defended by only 4,000 men, but was again repulsed and carried out of the battle fainting with his wounds. Unwilling

to survive his defeat, he put an end to his life by copious draughts of wine. The Greeks

attributed their victory to the assistance of Apollo.

BRENT, Charles Henry, American cler¬

gyman: b. Newcastle, Ontario, 9 April 1862.

He received the degree of B.A. at the Univer¬

sity of Trinity College, Toronto (with classical honors) 1884; M.A.

1889; D.D. 1901; D.D.

King's College 1910; D.D. Harvard University 1913; was made deacon 1886; priest 1887; was assistant minister at Saint Paul's Cathedral, Buffalo, 1887; at Saint John the Evangelist, Boston, 1888-91 ; associate rector of Saint

Stephen's, Boston, 1891-1901. He was elected bishop of the Philippine Islands by the Protest¬

ant Episcopal general convention, 1901. He

was on the editorial staff of The Churchman, New York, 1897-1900; member of Philip¬

pine opium investigating committee, 1903-04;

Paddock lecturer, General Theological Semi¬

nary, New York, 1904; William Belden Noble

lecturer at Harvard University, 1907. He de¬

clined the bishopric of Washington in 1908. He was chief commissioner of the United States and president of the International Opium Com¬

mission, 1908-09; chairman of the United States delegation to the International Opium Confer¬

ence at The Hague, and president of the con¬

ference 1911-12; was elected bishop of New

Jersey in 1914 and declined. Author of (With God in the World) (1899) ; (The Consolations of the Cross5 (1902); (The Splendor of the Human Body5 (1904); (Adventure for God)

(1904); (Liberty and Other Sermons5 (1906);

(With God in Prayer5 (1907) ; (The Mind of Christ5 (1908); leadership5 (1908); (The

Sixth Sense5 (1914); Presence5 (1911); (The

Revelation of Discovery5 (1908); Prisoners

of Hope5 (1915) ; (The Inspiration of Respon¬

sibility5 ; (A Master Builder (Life and Letters of Bishop Satterlee) 5 ; (The Conquest of

Trouble.5

BRENT, Richard, American politician :

b. Virginia; d. Washington, D. C., 30 Dec. 1814.

He was a representative in Congress from 7

Dec. 1795 till 3 March 1799, and again from 7

Dec. 1801 till 3 March 1803. He was elected a senator from Virginia and served from 22

May 1809 until his death.

BRENT GOOSE. See Brant.

BRENTA (ancient Medoacus Major), a

river in North Italy. Its source is Lake Cal-donazzo in the Trentino, Italy, eight miles southeast of Trent, whence it flows southeast through the Sugana Valley, then south through Venetia, with a winding course of 106 miles, and falls into the Adriatic through the canal of Brenta-nova or Brentono, at Brondolo. For¬

merly its embouchure was at Fusina, opposite Venice. The old course has been formed into a canal and is the chief means of communica¬

tion between Padua and Venice, the new chan¬

nel being comparatively little used. It is navi¬

gable for 56 miles.

BRENTANO, bren-ta'no, Clemens, Ger¬

man poet: b. Ehrenbreitstein, 8 Sept. 1778; d.

Aschaffenburg, 28 July 1842. He studied at

Jena, and resided by turns there and at Frank¬

fort, Heidelberg, Vienna and Berlin. In 1818

he joined the Catholic church and retired to the convent of Diilmen, in Munster, and the latter years of his life were spent at Ratisbon, Munich and Frankfort-on-the-Main. These

frequent changes were due to a restless dispo¬

sition, combined with morbid and misanthropic views, which gave a peculiar character to his writings. Toward the end of his life he showed plain traces of mental derangement. With a

powerful imagination, his genius was tinged

with mysticism, eccentricity, and a strong tend¬

ency to sarcasm. He was the brother of

Elizabeth von Arnim, Goethe's <(Bettina.55 Among his principal works are (Satires and Poetical Fancies5 (1800) ; (The Mother's Statue5

(1801), an ultra-romantic production, which he himself calls a very wild romance; (The Joy¬

ous Musicians5 (1803) ; (Ponce de Leon5

(1804) ; (The Founding of Prague5 (1816),

said to be his most successful drama, and over¬

flowing with humor; (Gokel, Hinkel und

Gakeleia5 (1838), a satire on the times; his¬

tory of the Brave Caspar and the Beautiful An-nerl5 (2d ed., 1851), esteemed as a novelette masterpiece.

BRENTANO, Franz, German philoso¬

pher: b. Marienberg, 16 Jan. 1838. He was

professor of philosophy at Wurzburg, but in 1873 resigned his position on account of the doctrine of the infallibility of the Pope; and was professor at Vienna, 1874-80. He has writ¬

ten Psychology of Aristotle,5 (New Riddles5

and Psychology from an Empirical Stand¬

point5 (in agreement with Lotze and the Eng¬

lish empirical psychologists) ; (Neue RatseP

(1878) ; Worn Ursprung Sittlicher Erkennt—

niss5 (1889, English trans., 1902); (Unterspch-ungen zur Sinnespsychologie5 (1907); (Aristoteles und seine Weltanschauung5 (1911);

(Aristoteles Lehre vom Ursprung des mensch—

lichen Geistes5 (1911) ; Won der Klassification der Psychischen Phanomene5 (1911).

BRENTANO, Lorenz, German-American

politician: b. Mannheim, 4 Nov. 1813; d. Chi¬

cago, 18 Sept. 1891. He studied law at Heidel¬

berg, represented Mannheim in the Lower

House of Baden, and was a member of the

National Assembly in 1848. He withdrew from this body with the majority of the Radical party in 1849. He was placed at the head of the revolutionary government of Baden, but sus¬

pected of treachery to his party, was forced to flee to Switzerland. In 1850 he came to the United States, lived for a time on a farm in Michigan, and then went to Chicago. Here he practised law and established the Illinois

Staatszeitung , which he made one of the most influential papers in the Northwest in the in¬

terest of the Federal government, and which rendered great service during the Civil War.

He was a member of the Illinois legislature in 1862 ; United States consul at Dresden 1872—76, and member of Congress from Illinois in 1876.

BRENTANO, Lujo, German political

economist : b. Aschaffenburg, Bavaria, 18 Dec.

1844. He studied at Dublin and at four Ger¬

man universities, and, after attaining a post in the Royal Statistical Seminary in Berlin, went, with Ernst Engel, to England to study the con¬

dition of the working classes and especially trades' associations and unions. The outcome of this was his work (On the History and De¬

velopment of English Guilds > (1870) ; (Die Arbeitergilden der GegenwarD (1871-72). He

has been professor at Breslau (1873), Strassburg, Vienna, Leipzig, Munich (1891). He

supports the (<Socialists of the Chair® (Kathe -

dersozialisten) against the German free-trade school, and has written works on (Wages)

(1877); (Labor in Relation to Land) (1877) ; (Compulsoiy Insurance for Workmen } (1881) ; (Agrarpolitik) (1897) ; <Erbrechtspolitik)

(1899); (Die Schrecken der iiberwiegende In—

dustriestaaC (1901); (Die Entwickelung der

Wertlehre) (1908) ; (Die deutsche Getreide—

zolle) (1911).

BRENTFORD, England, the county town

of Middlesex, seven miles west of London. It has a weekly market and two annual fairs.

Here Edmund Ironside defeated the Danes un¬

der Canute in 1016, and Prince Rupert a part of the Parliamentary forces under Colonel Hol¬

lis in 1642. Sion House, the magnificent edi¬

fice of the Duke of Somerset, where Lady Jane Grey resided, now belonging to the Duke of Northumberland, was built south of Brentford on the site of a suppressed nunnery. Brent¬

ford has malt-kilns, a soap manufactory and extensive sawing and planing mills. Pop.

16,571.

BRENTON, William, colonial governor:

b. England, early in the 17th century; d. New¬

port, R. I., 1674. His family came to Massa¬

chusetts in 1634 from Hammersmith, England,

but removed to Portsmouth, R. I., five years later. He was one of the nine original pro¬

prietaries of Rhode Island; he selected and surveyed the site of Newport and built a large brick residence where Fort Adams now stands.

Brenton's Point and Brenton's Reef in Narragansett Bay preserve his name. Between 1635

and 1669 Brenton was the colony's representa¬

tive at Boston, lieutenant-governor, president of the colony and governor under the Charles II charter 1666-69. Consult (Rhode Island

Colonial Records, > Vols. I and II, passim.

BRENZ, Johann, yo'han brents, German

reformer: b. 1499; d. 1570. Under the influ¬

ence of Luther he reorganized his church at Hall, Swabia, but at the time of the Smalkaldic War in 1546 he was obliged to flee to Wiirttemberg. He was appointed minister of the Col¬

legiate Church of Stuttgart in 1553 and is said to have been the first exponent of the Refor¬

mation there. He was one of the authors of the Syngramma Suevicum, bearing upon the

controversy with Zwingli and CEcolampadius

on the subject of the Lord's Supper. One of his teachings was that the body of the Lord is everywhere present, hence his followers were called Ubiquitarians. He was the most reso¬

lute among the opponents of the killing of Anabaptists and other heretics who did not

belong to his party. His works appeared in eight volumes at Tubingen (1576-90). Consult his life by Hartmann and Jiiger (2 vols., Ham¬

burg 1840-42), and Kohler, (Bibliographia

Brentiana) (Berlin 1902).

BRERETON, Austin, English journalist:

b. Liverpool, England, 13 July 1862. He went to London in 1881, was dramatic critic of

The Sphere from 1901—06 ; and prior to that time was connected with The Stage, The The¬

atre, Sydney (N. S. W.) Morning Herald and the Illustrated American (New York). He has published a large number of works, chiefly

about famous players and theatrical history.

BRESCIA, bre'sha (Latin, Brixia), Italy,

an episcopal city of Lombardy. It is situated at the foot of the Alps, 40 miles northwest of Verona, on a fertile and beautiful plain on the banks of the rivers Mella and Garza. It is the capital of the province of the same name and is a handsome and flourishing city, of a square form, about four miles in circuit, and sur¬

rounded by walls. Its streets are spacious and its public buildings numerous, particularly its churches, which are further remarkable for the number and value of the paintings with which they are enriched. A few of them only, how¬

ever, have much pretension to architectural

beauty; among those that have are the cathe¬

dral, a handsome structure of white marble, and the church of San Domenico. But, how¬

ever plain in exterior appearance most of the Brescian churches may be, they are all richly decorated within with the most beautiful fres¬

coes and other creations of taste and art. The other buildings most worthy of notice are the Palazzo della Logia and the Broletto. The

first wras intended for the palace of the munici¬

pality or city hall. It is composed of the rich¬

est marbles and was worked upon by the first architects of the 15th and 16th centuries suc¬

cessively. The Broletto, the ancient palace of the republic, combines

the characters of for¬

tress and city hall, and is surmounted by a great towrer, whose deeply cleft Italian battle¬

ments produce a singularly grand effect. The wEole is in a colossal style and marked by the peculiar characteristics of the age in which it rose — supposed to be about the end of the 12th and beginning of the 13th century. The city contains also a lyceum, two gymnasia, an athe¬

naeum, a college, with a museum of antiquities, and a botanic garden ; a public library, with 30,000 volumes ; a theological seminary, a hand¬

some theatre, a corn exchange, an extensive hospital and other educational and charitable establishments. There are 72 public fountains in the streets and squares, besides some hun¬

dreds of private ones. Outside the town is a cemetery, begun in 1815, designed by Vantini.

Brescia is a place of considerable trade and manufacturing industry. Near it are large iron¬

works and its firearms are esteemed the best that are made in Italy. It has also silk, linen and paper factories, tan-yards and oil-mills, and is an important mart for raw silk. But it de¬

rives its greatest interest from its fine Roman BRESHKOVSKAYA — BRESLAU

remains, having been at one time the seat oi a Roman colony. These first attracted attention in the 17th century, although, so far as regards inscriptions, they had been objects of especial care to the citizens of Brescia for two centuries before this period, but it was not till 1820 that any very earnest efforts were made to bring the buried remains of entire buildings to light.

Since that period some remarkable discoveries have been made,

embracing, besides numerous

statues and inscriptions, the beautiful marble temple of Vespasian and a number of noble

and magnificent Corinthian columns, with many fragments of moldings and ornaments, some

gilt and all of great elegance. Brescia was the seat of a school of painting of great merit, to which many eminent artists belonged, includ¬

ing Alessandro Bonvicino, commonly called (<I1

Moretto,® who flourished in the 16th century and was remarkable for the deep devotional

feeling which he threw into his sacred subjects, as well as for his excellence as a portrait painter. The city is of great antiquity, having been the chief town of the Cenomani, a Gallic tribe, who were conquered by the Romans. It became the seat of a Roman colony under Au¬

gustus about 15 b.c., and afterward a munici-pium. In the year 412 it was burned by the Goths and was soon afterward destroyed by

Attila, but was rebuilt about the year 452. It was taken by Charlemagne in 774. In 936 Otho I of Saxony declared it a free city, and it so remained for nearly three centuries, taking an active part in the feuds of the Guelphs and Ghibellines, and ultimately put itself under the protection of Venice in 1426. In 1796 it was taken by the French and was assigned to Aus¬

tria by the general treaty signed at Vienna 9

June 1815. In 1849 it was involved in the com¬

motions of continental Europe ; its streets were barricaded but the city was eventually captured by the Austrians under General Haynau. It

was ceded to Sardinia by the Treaty of Zurich in 1859, and in 1860, with the remainder of Lombardy, it was added to the kingdom of

Italy. Pop. 83,338.

BRESHKOVSKAYA, Ekaterina Con—

stantinovna, Russian revolutionist: b. 1843.

The daughter of well-to-do parents, she was brought up and educated in the country. She early evinced a deep sympathy with the poor and illiterate peasants around her, dispensing charity and teaching them to read. As a young girl she was married to a nobleman of similar liberal disposition to herself, by whom she had a son. According to her own statement, she came to Saint Petersburg, Moscow and Kieff

at the age of 25 and became an active mem¬

ber of the revolutionary party. She left her husband and child to devote her life to ((preach the gospel of liberty.® At 29 she was arrested and sentenced to 22 years' imprisonment _ in Siberia, whither she was sent after spending four years in various prisons. She returned to Russia in 1896 and started a society called the Socialist Revolutionists. For the next 11

years she traveled over the empire spreading-revolutionary doctrines. In 1904 she visited America. On her return she was again ar¬

rested and exiled to Siberia. The successful revolution of 1917 opened the prison doors for thousands of political prisoners and Breshkovskaya was recalled from Siberia with many

others. She was welcomed to Petrograd with

great public enthusiasm and almost royal

honors. Her first task was to establish print¬

ing presses in populous centres of Russia for further propaganda among the peasants. She

fervently exhorted her compatriots to stead¬

fastly continue the war, and desired even to go to the front in order to talk to the troops (<who are so dark in their minds that they think this is a war for the Tsar and the capitalists.®

See Russia, Revolution. Consult Blackwell,

Alice S., (The Grandmother of the Russian

Revolution5 (New York 1917) ; the Outlook

(21 Nov. 1917).

BRESLAU, bres'low, Germany, city rank¬

ing third after Berlin and Cologne in popula¬

tion; capital of the province of Silesia. It is situated in a spacious plain at the confluence of the Ohlau and the Oder, the latter dividing it into two main portions (the largest on the left bank), which, with islands in the river, are connected by a large number of bridges. The streets of the older quarters are narrow, those of the newer broad, connected by electric and other street railroads. The public squares and buildings are handsome. The fortifications

which surrounded the old or inner city were converted into pleasant promenades and the

ditch into an ornamental sheet of water. The cathedral, built in 1148-1680 and restored in 1875; the Protestant churches of Saint Eliza¬

beth (13th century), Saint Mary Magdalene

(14th century), Saint Michael (19th century); the synagogue; the Rathhaus or city hall, a Gothic structure of the 14th and 1 5th centuries; the municipal buildings ; the government build¬

ings ; the building for the provincial Diet ; the royal residence, courthouses, exchange and

university are among the most remarkable

buildings. The university was founded in 1702

as a Roman Catholic institution, with which was combined the Protestant university at

Frankfort-on-the-Oder, transferred hither in

1811. The university has attached to it a mu¬

seum of natural history, a cabinet of antiqui¬

ties, a library of several hundred thousand volumes, including many old works and manu¬

scripts, an observatory, a picture gallery, a botanic garden, *etc.* The number of students is about 1,500. There are numerous other edu¬

cational institutions, as well as hospitals and asylums. Gas, electric lighting and power plants, and modern waterworks are operated by the

municipality, which also built an up-to-date sys¬

tem of sewers with sewage farms. Breslau

carries on an extensive trade in the products and manufactures of Silesia, principally in corn, wool, metals, glass, coal and timber. The Oder is navigable and there is a connection with Berlin by the Oder-Spree Canal. The indus¬

tries comprise iron-founding, bell-founding,

the manufacture of machinery, railway car¬

riages, organs and other musical instruments, cigars, oil, spirits, etc., brewing and glass-paint¬

ing. There are two annual wool fairs which are largely attended. Breslau was the seat of a bishopric by the year 1000, an independent duchy from li63 to 1335, was ceded to Austria, after many wars and calamities, in 1527. It was conquered by Frederick II of Prussia in 1741. It was from this time the scene of fre¬

quent warfare, being successively attacked by Austrians, French, Russians and Prussians. It 470

was twice occupied by the French, in 1807 and 1813. Its fortifications were destroyed by Na¬

poleon in 1807, but it finally remained in the hands of Prussia. Pop. 514,000.

BRESSANI, bres-sa'ne, Francesco Giu¬

seppe, Italian missionary : b. Rome, 6 May 1612 ; d. Florence, 9 Sept. 1672. He became a noviti¬

ate of the Jesuit-order in 1626, in 1642 minis¬

tered to the French settlers in Quebec and in 1643 was missionary to the Algonquins at Three Rivers. In 1644 he was captured by the Iro¬

quois while on his way to the Huron mission, cruelly tortured by them and was ransomed

by the Dutch at Fort Orange. On his return from France he joined the Huron mission, and, after its destruction, accompanied (1649) the Huron refugees to Saint Joseph Island. In

1650, his health being indifferent, he returned to Europe. He is the author of (Relazione

dei missionari della compagnia de Gesu nella Nuova-Francia) (1653), of which an English

edition appears in Thwaite's edition of the (Jesuit Relations. J

BRESSAY, bres'sa, one of the Shetland

Islands, lying east of the mainland and sep¬

arated from it by Bressay Sound, about six miles long and one to three in breadth. Its line of coast is rocky and deeply indented; the interior is hilly, rising in the Wart of Bressay to 742 feet, and is to a great extent covered with peat-moss. There are slate and stone

quarries. On the south there are three bold headlands, the Ord, the Bard and the Hammar.

Hosiery is the only manufacture. Bressay

Sound forms a safe harbor, one mile or more in breadth, having

Lerwick on its west side.

Pop. about 1,000.

BRESSLAU, Harry, German historian: b.

Dannenberg, Hanover, 1848. He was educated

at the universities of Berlin and Gottingen, and in 1870 became professor at the Realschule

of the Jewish congregation in Frankfort-on—

Main. In 1872 he was transferred to the

Andreas Realschule at Berlin, becoming at the same time private lecturer at the University of Berlin and in 1877 extraordinary professor at the latter institution. In 1888 he was nom¬

inated to the directorate of the Monumenta

Germanise Historica and from 1888 to 1903

was editor of the Neues Archiv der Gesellschaft fiir dltere deutsche Geschichtskunde. In 1890

he became professor of history at Strassburg and was rector of the university there in 1904-05. His publications include (Diplomata Cen
—

tmn) (1872) ; Qahrbiicher des deutschen Reichs unter Kaiser Heinrich IP (Vol. Ill, 1875) ; (Jahrbiicher des deutschen Reichs unter Kon¬

rad IP (2 vols., 1879-84) ; (Zur Judenfrage, Sendschreiben an Heinrich von Treitschke >

(2d ed., 1880) ; (Handbuch der Urkundenlehre) (2d ed., 1912) ; (Das Tausendjahrige Jubilaum der deutschen SelbstlandigkeiP (1912).

BREST, France, a fortified seaport and

naval station, in the department of Finisterre, in the former province of Brittany, situated at the mouth of the Penfeld, 320 miles south by

west from Paris. It has one of the best har¬

bors in France and a safe roadstead, capable of containing 500 men-of-war in 8. 10 and 15

fathoms at low water, and it is the chief sta¬

tion of the French marine. The coast on both sides is well fortified. The entrance to the roads, known as Le Goulet, is narrow and dif¬

ficult, with covered rocks that make it danger¬

ous to those not well acquainted with it. There are immense magazines, workshops, barracks,

roperies, etc., and the dockyard employs from 8,000 to 9,000 men. Several docks are cut in the solid rock. It is fully equipped with float¬

ing and graving docks, quays, piers and a break¬

water. Brest, which in the Middle Ages was of so much importance that it was said ((He is not Duke of Brittany who is not lord of Brest, w had sunk by the beginning of the reign of Louis XIII to little more than a village. Riche¬

lieu resolved to make it the seat of a vast naval arsenal, but little was done till the be¬

ginning of the reign of Louis XIV, when

Duquesne came to superintend the works. Vauban followed him and fortified it. In 1694 the combined fleets of England and Holland dis¬

embarked a force which attempted to take

Brest, but was repulsed with great loss. On 1 June 1794 the French fleet was beaten off Brest by the British under Howe, who took

from them six ships of the line and sunk a seventh. Brest has naval schools, a naval li¬

brary, several hospitals, a free library, lyceum and botanical gardens. The trade in wine, coal, timber, flour, fruit and vegetables is very large.

It has also mills and foundries, chemical fac¬

tories, boot and shoe manufactories and linen factories. There is a submarine cable to the United States. Pop. 90,540.

BREST-LITOVSK, brest-le-tofs'k, Rus¬

sia, a fortified town in the government of Grodno, on the Bug, 120 miles east of Warsaw.

Brest-Litovsk was a possession of Poland till 1795 and is one of the oldest Slav towns. At church congresses here in 1590, 1594 and 1596, the union of the Eastern and Western churches, under the supremacy of the Pope, was pro¬

claimed. The place is an important railroad centre and of considerable commercial import¬

ance because of its situation, and has a large trade in cloths, leather and soap. It is a for¬

tress of the first rank, with vast magazines and military stores. It was taken by the German armies under Von Hindenburg and 26 Aug. 1915, after a stubborn resistance of many months.

The town was the meeting place of the German and Bolshevik envoys in the fall of 1917 and here was signed the peace treaty between the two countries. See War, European — Eastern

Front. Pop. about 50,000.

BRETAGNE. See Brittany.

BRETEUIL, bre-te-y', Louis Charles Au¬

guste le Tonnelier (Baron de), French diplo¬

matist: b. 1730; d. 2 Nov. 1807. After a period of military service he became, in 1758, Minister Plenipotentiary at Copenhagen and afterward

occupied similar posts in Sweden, Austria,

Naples and again in Vienna. His embassy to Vienna explains his attachment to the Queen Marie Antoinette. As minister and Secretary

of State after Necker's dismissal in 1789, he was a zealous defender of the monarchy; he was therefore considered as one of the great¬

est enemies of the Revolution. After the cap¬

ture of the Bastile he escaped to Switzerland.

In 1790 Louis XVI entrusted him with secret negotiations for his restoration to the throne, at the principal northern courts. The conven¬

tion issued a decree against him. In 1802 he returned, with the permission of the govern¬

ment, to France.

BRETHREN, Bohemian, a Christian sect

of Bohemia, formed from the remains of the stricter sort of Hussites in the latter half of the 15th century. They took the Scriptures as the ground of their doctrines throughout. Be¬

ing persecuted, they fled into Poland and Prus¬

sia. See Bohemian Brethren ; Moravian

Church ; United Brethren.

BRETHREN, Plymouth. See Ply¬

mouth Brethren.

BRETHREN OF THE COMMON

LIFE, a mediaeval semi-monastic order

founded by Gerard Groot of Deventer (1340—

84), a deacon, as an intermediate stage between monasticism, which he considered the highest life, and the life of the people. He established at Deventer and elsewhere communities where¬

in men, or in some cases women, might live together piously and perform good works.

These brotherhoods and sisterhoods had no

formal vows but, like strictly monastic com¬

munities, lived without private property and devoted themselves to the care of the poor and sick, to the copying of books and to teaching.

They wore special black and gray garments,

and lived according to a strict discipline. At first they met with strong opposition on the part of the established monastic orders. They seem to have held no peculiar doctrines, except in so far as they maintained that translations of the Bible should be put into the hands of laymen. Their educational labors were not

carried on by special schools founded by the order, and the schools in which they taught in time fell into the hands of the Jesuits. The order founded several reformed monasteries,

among which were the Augustinian foundation

at Windesheim and that at Mount Agnes,

near Zwolle, where Thomas a Kempis

(q.v.) was a monk. During the Reformation

some Brother-houses, such as that at Wesel, went over to Lutheranism. Consult Cruise, Sir Francis, (Thomas a Kempis: a Visit to the

Scenes in which His Life Was Spent) (Lon¬

don 1887); Gem, S. H., (Hidden Saints: the Brethren of the Common Life5 (London 1907) ; Grube, K., (Groot und seine Stiftungen) (Co¬

logne 1883) ; Kettlewell, (Thomas a Kempis

and the Brethren of the Common Life) (Lon¬

don 1885).

BRETHREN OF THE FREE SPIRIT,

a sect which sprang up on the upper Rhine near the beginning of the 13th century. They are frequently confounded with the Lollards, Beghards or Beguins. They held that the uni¬

verse was a divine emanation; that man, so far as he gave himself to the contemplative life, was a Christ and, as such, free from law, human or divine (Romans viii, 2, 14). Many edicts were published against this sect, but it continued to exist under various names, such as Picards and Adamites, till about the first quarter of the 15th century.

BRETHREN OF THE HOLY TRIN¬

ITY, a religious society, founded in France near the close of the 12th century, whose mem¬

bers pledged themselves to give a third part of their revenues to procuring the redemption of Christians who had fallen captive to the infi¬

dels and were in Mohammedan slavery. It

was established by John of Matha, a Parisian theologian, and Felix de Valois,

BRETHREN OF THE LORD, The.

Great controversy has existed concerning the expressions in the New Testament relating to the ((brethren of Jesus,55 and theologians have been divided on the question of the perpetual virginity of Mary, the mother of Jesus. The term <(brethren of the Lord® occurs but once in the New Testament (1 Cor. ix, 5), but

there are several other passages that refer ap¬

parently to actual brothers of Jesus (Gal. i, 19; Matt, xii, 46-50, etc.). Some have claimed that the brethren referred to were later sons of Mary by Joseph, the reputed father of Jesus; others have contended that they were sons of Joseph by a former marriage, and others again have sought to prove that these brethren were sons of Alphaeus, the husband of a sister of Mary, and therefore the cousins of Jesus.

BRETHREN, RIVER. See River Breth¬

ren.

BRETHREN OF THE STRICT OB¬

SERVANCE, the stricter Franciscans, or

Regular Observatines.

BRETIGNY, bre-ten-ye, France, village

in the department of Eure-et-Loire, six miles southeast of Chartres, on the Paris & Orleans Railroad. By the treaty of Bretigny, concluded on 8 May 1360 between Edward III of Eng¬

land and John II of France, the latter, who had been taken prisoner at the battle of Poitiers, recovered his liberty on a ransom of 3,000,000

crowns (about $8,000,000), to be paid in six years. Edward renounced his claim to the

crown of France and relinquished a portion of his conquests and possessions in that country, including Anjou and Maine and the greater

part of Normandy, receiving the cession in

independent sovereignty of the duchy of Aqui¬

taine, with all its dependencies, Gascony, Poi¬

tou, Saintonge, Aunis, Agenois, Perigord,

Limousin, Quercy, Rouergue, Angoumois, to¬

gether with Calais, the counties of Ponthieu and Guines and the viscounty of Montreuil.

Consult Lavisse, (Histoire de France) (1902).

BRETON, Jules Adolphe, French painter:

b. Courrieres, Pas de Calais, 1 May 1827 ; d.

Paris, 5 July 1906. He was educated at Saint Omer and at Douai, and studied under Felix Devigne and at Drolling' s atelier in Paris. The subjects of his earlier pictures, such as (Misere de Desespoir5 (1849), were taken from the

French revolutionary period, but he soon turned to the scenes from peasant life which he has treated in a most poetic and suggestive man¬

ner, with an admirable union of style with realism. He has been likened' to Millet in the depiction of the life of the fields. In 1853 he exhibited the (Return of the Harvesters5 at the Salon ; and this notable painting was fol¬

lowed by the cLittle Gleaner,5 now in Brus¬

sels; (The Day After Saint Sebastian's Day5

(1855); (Blessing the Fields5 (1857); (The

Return of the Gleaners5 (1859, Luxembourg) ; (Women Mending Their Nets5 (1876, Douai

Museum); (A Gleaner5 (1877, Luxembourg);

(The First Communion5 (1881), which brought

$45,000 at the Morgan sale at New York in 1882; the (Pardon of Kergoat5 (1891, Metro¬

politan Museum, New York). Breton has been

a favorite with collectors in the United States ; some 25 of his works are in this country, of which a notable example is the (Song of the 472

Lark* in the Art Institute of Chicago. He

also attained to some celebrity in prose and poetry, and is the author of two books of autobiography — (Life of an Artist* (1890); (Un peintre paysan) (1895). He was elected

a member of the Institute in 1886 and was made a commander of the Legion of Honor in 1889. Consult Vachon, (Jules Breton) (Paris

1899).

BRETON, bra-ton, de los Herreros, Don

Manuel, Spanish dramatist : b. Quel, province of Logrono, 19 Dec. 1800; d. Madrid, 13 Nov.

1873. He was the most notable Spanish poet of the first half of the 19th century. He was a writer of amazing fecundity and gave to the Spanish stage 150 plays, some of them original, others derived from ancient Spanish sources

or translated from French or Italian. In him the old French comedy finds not so much an imitator as its last true representative. He is irresistible in his handling of comic situations.

Among his best original comedies are (I'm

Going Back to Madrid, *(Here I am in Madrid,*

(This World is all a Farce, *(Die Once and You'll S ee.* He was less successful in the historic drama than in comedy. He held at

different times government appointments, but

his liberal views led to supersessions.

BRETON LITERATURE. Breton forms

with Cornish and Welsh the Cymric or south¬

ern division of the Celtic group of languages.

For the purpose of freeing themselves from

the Saxon domination, an emigration from

Britain to Armorica (Brittany) took place in the 5th and 6th centuries of our era, and the tongue of the immigrants thus became the lan¬

guage of this part of France. The Breton

language is still spoken by upward of a mil¬

lion people, chiefly in the departments of Finisterre and in the western portions of Cotes du Nord and Morbihan. It has numerous dialects — 'those of Vannes, Quimper, Treguier and

Leon being the chief. The last-named, as the literary medium, is the most important.

Old Breton literature from the 6th to the

14th centuries is closely identified with the work of the British bards. The material that has survived is lacking in diversity, being made up of miracle plays, a prayerbook and monas¬

tic cartularies. The language of the aristoc¬

racy of the province in the Middle Ages was French, and the Breton dialect accordingly

sank to the level of a patois. Modern Breton — in which there is a great adhesion of French words — may be said to date from the publi¬

cation, in 1659, of a manual with reformed spelling by Fabien Maunoir, a Jesuit priest.

The beginning of the 19th century witnessed a marked revival in interest in the Breton lan¬

guage, due largely to the work of Legonidec, who, as an exile in Great Britain at the time of the French Revolution, fell under the in¬

fluence of the Welsh literary movement. He

published his (Grammaire celto-breton> in

1807 and his (Dictionnaire breton-frangais* in 1821. He had a successor in La Villemarque, whose (Barzaz Breiz,* while by no means a

faithful rendering of the oral and floating folk-poetry of the province, and raising a storm of controversy almost as celebrated as that raised by the publication of Macpherson's <Ossian,>

acted as a stimulus to new investigators. F.

M. Luzel (1821-95), the foremost of the Bre¬

ton collectors of folklore, left for his contri¬

bution a series of books of great value. Marc'

Larit Fulup, the last of the oldtime wandering folk-singers of Brittany, died in 1910. Consult Loth, (Chrestomathe bretonne* (1890); (Vocabulaire vieux-breton* (1884); Ernault, (Dictionnaire etymologique du moyen-breton*

(1898); (Glossaire moyen-breton) (2 vols.,

1895-96) ; Luzel, (Veillees bretonnes) (1879) ; (Legendes chretiennes de la basse-Bretagne)

(1881) ; (Contes populaires de la basse-Bretagne) (1887); Henry, (Lexique etymologique

du breton moderne) (1900); Le Goflic, (L'ame bretonne) (Vols. I, II, 1908-12). See Celtic Languages ; Celtic Literatures ; Gaelic Lit¬

erature.

BRETONNE, Restif de la, Nicolas Edme.

See Restif de la Bretonne, Nicolas Edme.

BRETS, BRETTYS or BRITS, Britons,

the name given to the Welsh or ancient Britons in general ; also to those of Strathclyde, as dis¬

tinguished from the Scots and Piets.

BRETSCHNEIDER, bret'shni-der, Hein¬

rich Gottfried von, Austrian writer : b. Gera, 6 May 1739; d. 1 Nov. 1810. He was educated at the Institute of Herrnhuters at Ebersdorf, entered the army as a cornet, was present at the battle of Kolin, afterward became captain of a Prussian free-corps and was made pris¬

oner by the French. During his forced stay in France he acquainted himself with the language and absorbed the spirit of the people. On his return he was appointed governor of Usingen in Nassau, afterward traveled in England and France, and was employed by Vergennes in

diplomatic missions. He joined the service of Austria, and in 1778 became librarian to the University of Buda. Here his hostility to the monks, and especially to the Jesuits, got him into trouble, and that though the Emperor

Joseph II, who held the same views, declared himself his protector. He was obliged to retire from Buda, and was appointed librarian at

Lemberg. His views were liberal and some¬

what sceptical, and, with his active opposition to the monastic orders, gained him many

enemies. His principal works are (Reise nach London und Paris*

(1817); (Almanach der

Heiligen) (for the year 1788) ; (Wallers Leben und Sitten* (1793).

BRETSCHNEIDER, Karl Gottlieb, Ger¬

man theologian: b. Gersdorf, Saxony, 11 Feb.

1776; d. Gotha, 22 Jan. 1848. He studied

theology at Leipzig, was appointed pastor at Schneeberg in 1807, general superintendent at Gotha in 1816, and afterward councillor of the Upper Consistory there. Bretschneider estab¬

lished a reputation as a sound and judicious thinker on <(rational supernaturalist® lines, who gave the first place to reason in the interpreta¬

tion of dogma. In 1820 appeared his (Pro—

babilia de Evangelii et Epistolarum Johannis Apostoli Indole et Origine,* an attack upon the Johannine authorship from internal evidence;

and in 1824 his (Lexicon Manuale Graeco-Latinum in Libros Novi Testamenti.* Another

work of importance is his (Handbuch der Dog¬

matic (4th ed., 1838).

BRETTEN, town of Baden, Germany, the

birthplace of Melanchthon on the Saalbach, 16

miles east-northeast of Karlsruhe by rail. The house in which Melanchthon was born belongs BRETTS AND SCOTS — BREVET

now to a foundation bearing his name for the support of poor students, established in 1861.

A monument was erected in 1867. It has manu¬

factures of japanned goods and machinery.

Pop. 6,025.

BRETTS AND SCOTS, Laws of, the

name given in the 13th century to a code of laws in use among the Celtic tribes in Scotland, the Scots being the Celts north of the Forth and Clyde, and the Bretts being the remains of the British inhabitants of the kingdom of

Cambria, Cumbria or Strathclyde and Reged.

Edward I issued in 1305 an ordinance abolish¬

ing the usages of the Scots and Bretts. Only a fragment of them has been preserved and

has been printed in ‘Acts of the Parliament of Scotland) n844) in three languages, Latin,

French and English. The French version is

from a manuscript of 1270 and is the oldest; the manuscript is preserved in the register house in Edinburgh. The fragment thus pub¬

lished of the (<laws of the Bretts and Scotts® is similar in character and probably of the same origin as the ancient laws of the Anglo-Saxon, Welsh, Irish and other principalities. They

deal principally with and are aimed at crimes of violence. Minute and definite provisions

are laid down as the penalties of such crimes and the terms on which they might be com¬

muted. From the king down to the churl, the cro or price at which every man was valued according to is degree was fixed in the event of

his being slain. This price had to be paid to his kindred by the slayer or his kindred. The cro of the king was valued at 1,000 cows; of the king's son or of an earl at 150 cows; of an earl's son or of a thane at 100 cows ; of a thane's son at 66ˆ3 cows ; of the nephew of a thane, or of an ogthiern, 44 cows and 21ˆ pence; and of a villein or churl, 16 cows. All persons of a lower degree than a thane's nephew, or an ogthiern, were accounted villeins or churls. The penalty or fine for a blow causing effusion of blood was fixed according to the degree of the person wounded and the place of the wound, in a chap¬

ter entitled ((of blood-drawing,® which corre¬

sponds with the "blodwyte® of the Anglo-Saxons. See Avenger of Blood; Blood Feud;

Blood-Money.

BRETWALDA, bret'val-da, a title of su¬

premacy applied to one among the Anglo-Saxon tribal chiefs or kings, who, it is supposed, was from time to time chosen by the other chiefs, nobility and ealdormen to be a sort of dictator in their wars with the Britons. The follow¬

ing are mentioned by Bede, but Hallam and

other historians doubt whether any sovereign in those early times possessed such authority: 492 ad.. Ella, King of Sussex; 571, Ceawlin, King of Wessex; 594, Ethelbert, King of Kent; 615, Redwald, King of the West Angles; 623, Edwin, King of Deira; 634, Oswald, King of Bernicia; 643, Oswy, King of Bernicia. The

title appears in different forms as "brytem-valda,® ((bretenanwealda,)) and from the Anglo-Saxon verb wealdan, to wield, to rule, means most probably "wielder,® "ruler,® or "lord of the Britons.® This ((bretwaldship)) seems to have been an ephemeral type of dignity, because the consolidation which a prince or king of genius and force won for his territory usually disappeared with his death. Consult Freeman, E. A., 'History of the Norman Conquest? (Ox¬

ford 1877) ; Green, J. R., 'The Making of England) (London 1897) ; Kemble, J. M., 'The

Saxons in England* (London 1876) ; Rhys, J., ‘Celtic Britain* (London 1884) ; Palgrave, F., ‘The Rise and Progress of the English Com¬

monwealth > (London 1832).

BREUGHEL, bre-Hel, the name of a cele¬

brated Dutch family of painters, the first of whom adopted this name from a village not far from Breda. See Bruegel.

BREUIL, France, a village of the depart¬

ment of Seine-et-Marne, and the arrondissement of Meaux, celebrated historically as

Prodilus or Brodolium in the agricultural dis¬

trict of Brie. It was the scene of the retire¬

ment and miracles of Saint Fiacre. Here in the 7th century the saint withdrew and built a monastery which he dedicated to the Holy Virgin and to which he added a small house for guests. Among the latter was Saint Kil¬

lian, when he returned from a pilgrimage to Rome. Saint Fiacre lived, died and was buried at Breuil, whence his relics were removed in 1568, during the religious wars, to the Ca¬

thedral of Meaux. In this neighborhood the

Germans were driven back with heavy losses

during their advance on Paris in 1914 and forced to retreat to the Aisne. See Fiacre, Saint.

BREUL, Karl Hermann, English-German

scholar: b. Hanover, 10 Aug. 1860. He was

educated at the universities of Tubingen, Strassburg, Berlin and Paris. He was university

reader in Germanic, 1899-1910, and has been professor of German in the University of Cam¬

bridge since 1910. He was president of the Modern Language Association, 1910, and is the author of ‘Sir Gowther, a Middle English

Metrical Romance) (1883); ‘Handy Biblio¬

graphical Guide to the Study of the German Language and Literature> (1895) ; ‘The Teach¬

ing of Modern Foreign Languages * (1909) ;

and numerous contributions to educational,

scientific and literary works.

BREVE, brev, a note of the third degree of length, and formerly of a square figure, as H; but now made of an oval shape, with a line per¬

pendicular to the stave on each of its sides : -&-\ The breve, in its simple state, that is, without a dot after it, is equal in duration to one-quarter of a large, or to two semi-breves, and is then called imperfect; but, when dotted, it is equal to three-eighths of a large, or to three semi¬

breves, which being the greatest length it can assume, it is then called perfect. It is now chiefly used at the close of passages or com¬

positions.

BREVE, in law (from the Latin brevis or

breve), a diminutive of “brief,® as expressing briefly the intention of the framer, usually a short writ or formal order of royal or legis¬

lative issue. In the ‘Corpus Juris) the word generally means a summary or report. The

earliest mention of the breve is by Paulus, C., 220 a.d., in ‘Ad edictum de brevibus,* quoted in the ‘Vatican Fragment par. 310. See Brief; Writ.

BREVET, a term borrowed from the

French, and applied in the United States and Great Britain to rank in the army conferred upon officers on account of special, long or distinquished service, and higher than that for which regimental pay is received. Thus a

brevet-major serves as captain in his regiment, and draws pay as such.

BREVIARIUM OF EUTROPIUS, the

only existing work by Eutropius. It is a treatise in 10 brief books or chapters, recounting the history of Rome from the foundation of the city to the time of Valens, 364 a.d. Its style is notably good and the work, which was ex¬

panded by Paul Diaconus, has been much drawn upon by later writers. The best critical editions of (The Breviarium > are those by Droysen

(1879) and Ruehl (1898).

BREVIARY (from the Latin breviarium) ,

a summary or abridgment of prayers. The

breviary is the book containing the daily offices which all who are in orders, or enjoy any Catholic benefice, are obliged to read. It is an abridgment of similar offices previously in use.

The breviary contains prayers or offices to be used at the seven canonical hours of matins and lauds prime, tierce, sext, none, vespers and compline. It is not known at what time the use of the breviary was first enjoined. In the Acts of the Apostles we find the third, sixth and ninth hours especially mentioned. From

Clement of Alexandria, Tertullian, Cyprian and others, we learn that the observance of these hours was general among Christians. Saint

Basil, Saint Jerome and Saint Ambrose speak of the seven hours called canonical. The serv¬

ices in use in the convents and monasteries in the early ages were very exhausting from their great length. A council held at Tours in 567

enjoined that matins and vespers should never have less than 12 psalms each and that the former should have 30 in Lent. It was under Pope Gregory VII (1073-85) that the abridgment of the offices began to be considered necessary. In 1241 a breviary revised by Haymon obtained

the approbation of Gregory IX, and was in¬

troduced in all the churches of Rome under Nicholas III. In 1568 Pius V published a

breviary which has remained, with few modifi¬

cations, to the present day. The Roman

breviary, however, was never fully accepted by the Gallican Church, which persisted in main¬

taining its own offices. The Ultramontane

party there had long struggled in vain fey the introduction of the Roman breviary, but from 1840 to 1864, by a final and vigorous effort, the opposition of the Gallican party was overcome, and the uniformity of usage established, with the following exceptions: (1) Milan Breviary, originating in the time of Saint Ambrose; (2) Monastic, and in use by the Benedictines and Cistercians; and (3) the Dominican.

The Psalms occupy a large place in the brevi¬

ary, the order of the reading being so arranged that in general 100 psalms shall be recited in a week. Passages from the Old and New Testa¬

ment and from the fathers have the next place.

All the services are in Latin, and their arrange¬

ment, which is adapted to the various seasons and festivals of the Church, is very complex.

The office for the dead is one of the most vener¬

able parts of the breviary. The English Book of Common Prayer is based on the Roman

breviary; the latter, however, excludes the

Eucharistic office and services for special occa¬

sions, such as baptisms and marriages, and

contains lessons and hymns for every day of the year. The breviary must be read aloud, and this duty takes at least two hours. A move¬

ment is on foot for its condensation. There is a translation of the breviary into English by the Marquis of Bute (London 1879; new edition,

New York 1910). Consult Battifol, WIistory of the Roman Breviary) (London 1921).

BREVIARY OF ALARIC, a compendium

of Roman law dated from the first decade of the 6th century and compiled at the command of Alaric II, King of the Visigoths. It con¬

sisted of abridgments of the code and novels .of Theodosius, the institutes of Gaius, etc., and contained a detailed commentary styled the

(Interpretation It was intended for the Roman subjects of the Visigothic ruler, and must not be confused with the (Forum JudicunP • or

(Judicum Liber,) which Alaric put forth for his barbarian vassals. Consult Lee, historical

Jurisprudence) (1900).

BREVIPENNES, a family or subdivision

of birds, but occupying a different position in different systems. Cuvier makes it a family of the order Grallce or waders. In more modern systems it corresponds to the order of Cursorial birds or Ratitce. It includes at least two genera, the ostrich and the cassowary. The Dodo and Apteryx are also referred to it. The Brevi-pennes have a resemblance in several of their distinctive characteristics to the Gallinacece.

Their pectoral muscles are reduced to extreme tenuity, and the sternum has no ridge, while the muscles of the thighs are of great strength and thickness. They are thus fitted for walk¬

ing or running, rather than for flying. As their name implies their wings are short.

BREVOORT, James Renwick, American

artist: b. Westchester County, N. Y., 20 July 1832; d. 15 Dec. 1918. He studied art chiefly in Europe and spent several years sketching scenes in England, Holland and Italy. In 1861

he was elected an associate of the National Academy, and in 1863 a full member. In

1872 he was made its professor of perspective.

He lived six years in Italy and sketched much in Germany, Holland and England. His spe¬

cialty as a painter was landscape work, and the following pictures of his are well known: Wake of Como) (1878) ; (Storm on English Moor)

(1882); <New England Scene) ; (Morning in

Early WinteD (1884); <The Wild November

Comes at Last) ; (Windv Day on a Moor)

(1886).

BREWER, David Josiah, American jurist:

b. Smyrna. Asia Minor, 20 June 1837; d. 28

March 1910. He was graduated at Yale Col¬

lege 1856, at Albany Law School 1858. He

studied law under his unde, D. D. Field, and was admitted to the bar in New York in 1858.

Removing to Kansas, he became prominent in

his profession. He was judge of the Supreme Court of Kansas 1870-81, and was appointed

United States judge for the 8th circuit in 1884.

He rendered a memorable decision on the

Kansas Prohibition Law, affirming the right of liquor manufacturers to compensation, for

which he was severely criticised by the Pro¬

hibitionists. While on the State bench he gave an opinion sustaining the Maxwell land grant, the largest private grant sustained in th

United States ; and a dissenting opinion on the question of the power of a municipality to issue bonds in assistance of railways. Pres¬

ident Harrison elevated him to the Supreme

ourt of the United States in 1889. He was nade a member of the Venezuelan commission

by President Cleveland in 1896, and was chosen its chairman. His publications include (The

Pew lor the Pulpit' (1897) ; 'American

Citizenship' (1902); (The Mission of the

United States in the Cause of Peace' (1909).

BREWER, Ebenezer Cobham, English

author: b. 2 May 1810; d. near Newark, 6

March 1897. He was educated at Trinity Hall, Cambridge, graduated in 1835, and was or¬

dained in the Anglican Church 1836. He was the author of a series of useful reference books, including (Guide to Knowledge'

(1848) ; 'Dictionary of Phrase and Fable'

(1870); 'Errors of Speech and of Spelling'

(1877); 'The Reader's Handbook' (1880);

'A Dictionary of Miracles' (1884) ; 'The

Historic Notebook' (1891).

BREWER, John Hyatt, American musi¬

cian: b. Brooklyn, N. Y., 18 Jan. 1856. He studied piano, organ and theory under local teachers, particularly Dudley Buck. He was

organist at the church of the Messiah and the Clinton Avenue Congregational Church, Brook¬

lyn, and since 1881, musical director and

organist at the Lafayette Avenue Presbyterian Church in that borough, and professor of

music, Adelphi College, 1899-1906 ; also fellow of the American Guild of Organists, 1902;

fellow of the Brooklyn Institute of Arts and Sciences, 1906; conductor of the Apollo Club of Brooklyn since 1903, succeeding Dudley

Buck. His compositions include church music, vocal music and works for the piano, organ and orchestra.

BREWER, John Sherren, English his¬

torical writer: b. Norwich 1810; d. 1879. He was educated at Queen's College, Oxford, and was ordained deacon in 1837. In 1839 he was appointed lecturer in classical literature in King's College, London, and professor of Eng¬

lish language and literature in 1855. He suc¬

ceeded F. D. Maurice as principal of the

Working Mens' College. He was for a time

editor of the London Standard, retiring in

1856 in order to prepare a calendar of the state papers of Henry VIII, which work he

continued until his death. He was appointed rector of Topplesfield, Essex, in 1877. His 'English Studies' were reprinted from the

Quarterly Reviezv under the editorship of Dr.

Wace (1881). His second son was Ebenezer

Cobham Brewer (q.v.).

BREWER, William Henry, American

agricultural scientist : b. Poughkeepsie, N. Y., 14 Sept. 1828; d. 1910. He was graduated from the Sheffield Scientific School, New Haven, in 1852, and was appointed professor of agricul¬

ture there in 1864. He was a member of the National Academy of Sciences from 1880, of

the Connecticut State board of health from

1892, and of the State board of agriculture for a long period. He was one of the most

prominent American leaders in agricultural

research and was a valued authority on all related topics. He did much survey work in the Sierras, one of the peaks of which is known as Mount Brewer. He went to the Arctic

regions in the Miranda in 1904 and two years later was appointed to the United States

Forestry Commission. Besides contributing to

the 'Report on Cereal Production' in the

United States Tenth Census (1883) he edited the 'Botany of California' (1886).

BREWERTON, Henry, American soldier :

b. New York 1801; d. Washington, D. C., 17

April 1879. He was graduated with the class of 1819 at West Point. Commissioned 2d

lieutenant in the corps of engineers, he first served as assistant in determining the 45th degree of North latitude at Rouse's Point, N. Y.

He was assistant and professor of engineering at West Point (1819-21). Thereafter he was

almost continuously engaged in such important engineering works as repairing the fortifica¬

tions in New York harbor, construction of

Fort Jackson, La., of Fort Adams, Newport,

R. I., of the defenses of Charleston harbor, S. C., of the fortifications and improvements of Baltimore harbor (1861-64), and of Forts Monroe and Wool, for the defense of Hamp¬

ton Roads, Va. He was brevetted brigadier-general in the United States army, 13 March 1865, for long, faithful and meritorious serv¬

ices, and was retired from active service 7

March 1867, “having been borne on the Army Register more than 45 years.” Dickinson Col¬

lege conferred the degree of LL.D. upon him, 8 July 1847.

BREWING AND MALTING. Beer is

one of the greatest industrial products of many of the foremost nations. America produced

during a recent twelve month about 60,000,000

barrels of beer, representing a market value of about $400,000,000, and providing a revenue to the government of approximately $90,000,000

for the year.

Brewing is the process of preparing hopped, fermented beverages, such as lager beer, ale, stout, weiss beer, the materials usually em¬

ployed being barley-malt, hops and water.

Malting is the process of preparing cereals, usually barley, through germination, for pur¬

poses of mashing and fermentation in brewing, distilling, vinegar-and yeast-making industries.

Prehistoric. — One of the earliest fer¬

mented beverages known to tradition, mead,

was prepared from honey-water, that is, the washings of honey combs, hence, according to Arnold, the Latin designation for beer, “Cere-visia” originated from the Celtic Keirwysg

(Keir-wax; Wysg-water), and not from

Ceres-cereals and vis-vigor; “this word

was simply retained after cereals were used with the honey and even after cereals were used alone.” J. P. Arnold, ‘Origin and History of Beer and Brewing’ (Chicago 1911).

What Beer Was and Is. — There is no

legallv fixed definition of the article or term “beer” ; its manufacture and sale come under the provisions of the United States Food and Drug Act of 1906. where it is classed as a “food.” National and State committees and

associations on food standards have wrestled with the problem of what beer is long and often, but their labors to propose a satisfactory standard have thus far been fruitless, and all beer standards have therefore remained ten¬

tative ones up to the present time.

Beer of Old — Norsemen, Teutons, Ger¬

mans. — From ancient times down to the present, the beverage that passed by the name of

beer has been undergoing so many changes as to material employed, qualitatively and quanti¬

tatively, equipment, processes of manufacture 476

and character of product, that it is impossible to fix a standard from usage alone that will not allow the widest latitude as to choice of materials or processes. With the older Norse and South Teutonic, or Germanic tribes, beer was a tart fermented beverage in which honey was a prominent constituent, and about the 11th century the employment of hops became gen¬

eral on the Continent because of its bitter and aromatic and antiseptic principles and tonic effect. Later this ingredient became universal.

Cereal Base. — As to cereal base, barley

undoubtedly took the lead from the first, as it was the great staple article of food before wheat displaced it in breadmaking. But other cereals have had their importance in beermaking in ancient as well as modern times. So China made its beer 3,000 years before the Christian era from rice and millet besides

barley, and in Egypt, probably as early as the building of the pyramids, millet was employed along with barley. In modern times, the

variety of cereals used is much the same. In many countries, notably the United States and Great Britain, unmalted cereals like rice and corn are generally employed and sugars are

favored by some. In Germany wheat is em¬

ployed for some beers, and in France, Belgium and Scandinavian countries various cereal

products besides barley malt, such additions to barley malt in these countries being made to secure, especially, better keeping quality and to tone down the satiating effect or richness of all-malt beverages.

The idea that the only pure beer is an all¬

malt beer is thus seen to be false, both actually and historically, and beer may therefore be defined as follows :

((Beer is an effervescent beverage resulting from the thorough alcoholic fermentation of a hopped solution, in potable water, of the ex¬

tractive substances principally of barley malt, together with, if desired, other prepared cereals or their natural equivalents.® (Address before the Second International Brewers' Congress,

Chicago, Ill, 1911).

This definition includes the German lager

beers, such as Pilsencr, Wiener, Muenchner ; the English beers, such as Mild ales and Stock ales, Porter, Stout ; and American beers which are usually designated as draught beers and bottle beers and are mostly patterned after German lager beers, from which they usually take their names, like Pilsener style, Muench¬

ner style, etc, the Pilsener style being light in color and more strongly hopped ; the

Muenchner style being dark in color and with a more pronounced malt flavor. Weiss beer is a special German brew, light in color and

gravity and tart to the taste.

About 95 per cent of the output of American beers is of the lager beer character, with an alcoholic content of 3 to 3ˆ4 per cent by weight, and brewed on the average with lOy to 12p2

per cent of extract. Tonics are bottle goods, quite high in extract, and usually with low-alcohol content, with highly nourishing qualities.

In prohibition States in the United States, there is a considerable output of near-beers with less than ˆ of 1 per cent of alcohol, which, according to the ruling of the Internal Revenue Department, are tax-free. In prohi¬

bition Canada, 2y2 per cent proof spirits or about \% per cent of

alcohol by volume is allowed. In European countries, lower alcoholic beers are privileged in regard to taxation, like Norway with lowest rate for beers up to 21/ ‘2

per cent of alcohol by weight or approximately 3 per cent by volume. In Denmark beers up to 2% per cent by weight or 2.85 per cent by volume are tax-free and considered non¬

intoxicating. The tax on beers with more than y2 per cent of alcohol by volume, which has been $1.00 per barrel of 31 gallons for years in America, was raised in 1915 to $1.50, and in 1918 to $3.00, the latter being a war measure.

By presidential proclamation the brewers are required during 1918 to reduce the amount of grain heretofore employed by 30 per cent, and to reduce the alcoholic content of all beers, other than ales and porters, to at least 2ˆ4 Per cent by weight.

Technically, that is, in respect to its man¬

ufacture, lager beer may be defined as follows: Lager beer is an effervescent sparkling

beverage, properly brewed from sound ma¬

terials, principally barley-malt, with, if desired, prepared cereals like corn or rice or their natural equivalents, hops and potable water ; with the resulting brew or wort thoroughly

fermented by culture bottom yeast and the fer¬

mented product stored in refrigerated cellars for sedimentation; clarified, if desired, by filtra¬

tion, and properly sterilized, when bottled, by pasteurization.

MALTING.

Malting is the process of preparing cereals through germination or growth for purposes of mashing and fermentation. Barley is the grain commonly used for making malt for lager beer, ale, stout, vinegar and

yeast-makers' or dis¬

tillers' mash, etc., while wheat malt is used to a large extent in the production of weiss beer.

The barley is first cleaned in order to remove foreign seeds, straw, broken kernels, etc., by means of sieves and blower fans. As the

character of the beer depends largely upon that of the malt, and as the latter's character can be determined during malting, it follows that there are various methods of details in malting. The following are the general manipulations em¬

ployed :

Steeping. — Malting is in reality an artificial or forced growth of a seed, the changes taking place being similar to those when the seed is planted in the soil. The first requisite is mois¬

ture. This is given to the grain by placing it in steep tanks containing water of a certain temperature. Steep tanks are cylindrical iron vessels having conical bottoms so that all the grain will drop out when tank is emptied.

They are generallv placed on the top floor of the malthouse. The grain remains in the steep tank until it has absorbed the desired amount of water, the time differing for different kinds and quality of grain or the process of the malt¬

ster. For barley the duration of steeping is generally from 36 to 60 hours, averaging about 48 hours.

Growing or Germinating Floors. — The

malthouse usually consists of several floors.

The water in the steep tank is drained off and the wet barley dropped upon these floors be¬

low. The barley is now spread in heaps of about 12 to 14 inches high (occupying rather more than one-third and less than one-half of

the floor space). The barley now dries out somewhat and begins to sprout or grow and

small hair-like fibres, called rootlets, begin to show. . As heat is generated during growth, which is undesirable above a certain tempera¬

ture, and. as further proper growth requires pure air, it is necessary to aerate the growing barley (now called green malt). This is done by what is called ((turning the heap,® which con¬

sists of reshoveling the green malt in such a manner that the lower kernels of the old heap will be at the top in the new heap. (During Floor Malt House with Power Shovel, and Bucket Elevator for Green Malt.

turning, the green malt is thrown through the air in a thin sheet or stream, whereby it is aerated and cooled. The new heap now oc¬

cupies a larger floor space, is consequently of less height on the floor). This turning is re¬

peated at regular intervals so that at the end of the growing period the heap covers the

entire floor to a height of from five to six inches. This growth usually takes about five days, during which time water is sprinkled

upon the heap whenever it becomes too dry.

Kilning or Drying.— After the green malt

shows the desired degree of sprouting, it is necessary to quickly check further growth.

This is done by drying it upon the kiln. The green malt is shoveled by means of a power shovel to one end of the floor where it drops through an opening into a bucket elevator and is conveyed to the kiln. The kiln usually has two floors placed one above the other made of strips of wire or perforated sheet metal and heated by means of an open fire from below.

Above the upper floor, in the dome, drafts are placed to carry off the vapors, but in modern constructions suction fans are used to promote drying. The green malt is spread evenly upon the upper kiln floor about 18 inches high, where it remains for 24 hours, during which time it is only partially dried. It is now dumped or

dropped upon the lower floor (commonly by

mechanical dumping floors which turn open in sections on an axis or bearing like the grate in a. furnace). The malt on this lower kiln is again spread evenly and then subjected to a higher temperature until the desired degree of dryness is obtained, which usually takes from 20 to 24 hours.

Malt Cleaning. — The malt as it comes

I rom the lower kiln is not yet suitable for brewing as it contains the rootlets and some kernels that were crushed or injured on the floors or during conveying. The malt now

passes through cleaning machines consisting of sieves and blowers which remove the rootlets, dust and small and broken kernels.

Mechanical Malting. — As floor malting is

restricted to only the cooler months of the year and possesses other disadvantages as to cost of labor and buildings, mechanical systems are coming more and more into use. The steeping of the grain as well as the kiln drying, however, remain generally the same as in the floor sys¬

tem.

Pneumatic Floor Malting.— This system

employs box-shaped compartments to hol'd the grain during the growing period. Through

this receptacle air that has been purified and given the proper degree of moisture, as well as cooled or warmed to the proper temperature, is circulated. The conditions of temperature and humidity can thus be made the same all the year round no matter what the conditions of weather may be outside. The green malt in this system is not turned by hand, but by a series. of screws or propellers driven by power, traveling through it at regular intervals.

Drum Malting. — The advantages here are

similar to those stated above. The drums con¬

sist of two concentric cylinders having the same ends. In the space between the cylinders the steeped grain is placed, this space not be¬

ing filled quite full. The cylinders are per¬

forated with small holes so that moistened or heated or cooled air can be forced through the grain from the centres or sucked through from the outside. By revolving the drum the grain is constantly tumbling, that is, the kernels nearest the inside cylinder fall against the out¬

side cylinder, and this in connection with the air current passing through gives the same

turning and aeration to the grain as in turning a heap in floor malting, and requires no labor.

There are several systems of malting drums, differing principally in the manner in which the air is warmed and moistened and the di¬

rection in which it is forced through the

drum.

Brewing Materials, Operations and Equip¬

ment, Especially for the Production of

Lager Beer. — Beer is produced from the

materials, mainly barley-malt, hops, water and yeast, through the processes of cleaning and crushing the malt, mashing of the malt (with or without other cereals) ; straining or filtering the resulting solution, which contains the ex¬

tractive substances of the materials from the grains or insoluble portion : washing out the grains with hot water; boiling this solution, which is now termed wort, together with hops ; straining or filtering the hopped wort from the spent hops; cooling of the wort; adding yeast for fermentation ; drawing off the fermented beer ; clarifying and giving life to the beer ; racking the beer into trade packages.

Besides these operations, which more par¬

ticularly concern the character of the finished product, there are many supplementary oper¬

ations necessary as precautionary measures to ensure freedom of the beverage from taint or contamination of any kind, such as foreign

odors or ferments, by varnishing of all large 478

wooden receptacles, such as tanks and casks ; staining or otherwise coating iron vessels, such as hop-jack; pitching the wooden trade pack¬

ages, such as barrels and kegs ; thorough

cleansing of all beer receptacles and utensils, aseptic or antiseptic treatment of all wort or beer conduits and of cellar floors, walls and ceilings by applying suitable washes, paints or calcimine ; treatment of brewing and boiler-feed water, *etc.*

Brewing Materials. — The materials used

in the United States are principally the follow¬

ing: Barley malt is the most important and generally used. It gives to the beer not only its substances, but also to a great extent its character. Malt also supplies peptase and

diastase, two substances that change the nature of certain other constituents during mashing.

Peptase changes the insoluble albuminoids of the malt into soluble or desirable ones. Dias¬

tase changes the unfermentable starch con¬

tained in the malt and other materials into fer¬

mentable sugars and dextrins.

Caramel and black malt, consisting of or¬

dinary malt that has been treated differently during malting, are used to impart color to the wort in order to produce darker beers, also to impart to the beer a more pronounced malt

aroma or flavor. Only a small amount, propor¬

tionately, of these are used mixed with other materials.

Malt adjuncts or other starch containing

materials and brewing sugars are used for the triple purpose: of producing more durable

beers, since these adjuncts contain very little albumen; of producing paler beers than could be made with malt alone ; and for reducing the cost of production. These are rice and corn products, such as corn grits, corn meal, corn starch, corn flakes and brewing sugars, glucose, *etc.* Flakes are made by steaming corn grits and passing them through hot steel rollers in order to change them so as to dissolve better during mashing. Flakes and sugars, such as

grape sugar, glucose, etc., are sometimes used, instead of corn grits or rice (which require cooking) when a cooker is not installed.

Flakes are added directly to the mash in the mash tub and sugars to the wort in the kettle.

Brewing sugars are used to a moderate extent only as a brewing material for lager beers, finding more extended use in the production of English beers such as ale, stout, *etc.*

Hops are added to the boiling wort for the purpose of imparting (1) tannin, which aids in the elimination of undesirable albuminoids in the wort; (2) hop oil, which gives the beer its hop aroma, and (3) hop resin, which gives the beer its bitter taste and furthermore tends to preserve it. Water acts as a solvent for the substances contained in the beer. Its com¬

position has considerable influence on the

character of the beer produced. It must con¬

tain certain mineral substances. See Hops.

Equipment and Operation. — Modern

breweries are usually divided into three depart¬

ments, namely, the elevator or millhouse where the materials are prepared and weighed; the brewhouse, where the wort is produced, and

the cellars where the wort is fermented and treated to produce the finished beer. The ar¬

rangement is on the gravity plan, that is, in each department the material of wort or beer is elevated or pumped only once to the top and from there descends through the different

stages of manufacture by gravity.

Elevator or Millhouse.— Here the malt

is cleaned and stored. The desired amount of malt for the beer is weighed out in a scale hopper, and from thence passes through the

malt mill where it is crushed so as to loosen the starch in the kernels. The crushed malt is then transferred to the storage hoppers in the brewhouse ready for use. Rice and corn goods are either stored in the millhouse, weighed in bulk and elevated to a storage hopper in the brewhouse, or dumped (usually in smaller

breweries) directly from the sacks into the cooker.

Brewhouse. — The brewhouse generally con¬

tains the following vessels: hot and cold water tanks; malt and cereal (rice or corn) hoppers; BREWING AND MALTING

the cereal cooker, mash tub, kettle and hop jack and cooler.

Mashing in Cereal Cookers. — Cookers are

of two kinds — open ones or, as they are usually called, rice tubs, and closed or pressure cookers.

In these vessels rice or corn (grits or meal) is boiled for a certain length of time in order to loosen up or soften the hard flinty condition of their starch so as to render it able to be more completely dissolved or acted upon in the mash tub. Crushed malt to the amount of about one-quarter the weight of corn goods is added in the open cookers. The mashing method in the open cooker varies somewhat among different

brewers, the following being about the average method: The materials are mixed with water

so as to have a temperature of 30° R. (100° F.).

The mash is held at this temperature for about 15 minutes then run up to 56° R. (158° F.), and held for 30 minutes, then heated quickly to

boiling and boiled from 45-75 minutes for corn goods, depending on the fineness of the material, and 30 minutes for rice. The cereal mash is Cooker, showing Stirrer and Steam Connection.

then run down to the mash tub where the mash is finished. Pressure cookers are used to some extent, but not generally, in American brewer¬

ies. They differ from the open cookers in that, being closed, the mash can be boiled under pres¬

sure and, consequently, at a higher temperature than in open cookers. Hereby a more complete softening or dissolving of the starch is obtained and consequently a better yield or extraction of the materials.

Mashing in Mash Tubs. — The mash tub,

like the open cooker, has a stirrer, and a heating coil, but is further supplied with a strainer or perforated false bottom for clarifying the wort, and a sprinkling device or sparger for ty-Wonr ouTLtr

Mash Tub with Foremasher, Liquid Gauge, Attemperating Device and Three-way Cock.

washing out the grains. In the mash tub the mash is started and, when the mash from the cooker has been added, the combined mash is finished. The mashing method here varies con¬

siderably, depending upon the character of the beer that is to be produced, and is consequently 480

one of the most important of the brewing

operations.

The method of mashing for the production of a beer of average character is approximately as follows : The crushed malt and water are mixed so as to have a temperature of 30° R. (100° F.) and the mash allowed to rest at this temperature Brew Kettle, showing Liquid Gauge, Steam Jacket, and Steam Connections.

for one hour. The temperature of the mash

is now raised to 54° R. (153° F.) to 55° R.

(156° F.), in about 15 to 20 minutes, by running in the boiling corn or rice mash from the cooker (with the addition of steam should same be necessary). This temperature is held for 10 to 15 minutes, during which time the stirrer is operated continuously. It is at this stage that the diastase in the malt inverts or changes both the starch contained in the malt as well as that in the corn or rice into unfermentable dex¬

trin and fermentable sugars.

The mash is now heated with steam and hot water, in 15 to 20 minutes, to 59° R. (165° F.) and the stirrer stopped. The mash is now al¬

lowed to rest from 30 minutes to one hour in order to allow the hulls of the malt to settle so as to act as a filtering material for the wort, after which the wort is run into the kettle.

After the wort has run off, the solid substances remaining in the mash tub, called grains, are washed out or sparged with water in order

to recover as much of the wort contained in them as possible. The grains are then thrown out of the mash tub and sold as cattle feed.

Boiling the Wort in Kettle. — The kettle

consists of a pear-shaped copper vessel having a double or jacketed bottom for heating the wort, and a vent pipe to roof for conducting off

the vapors generated during boiling. The steam

outlet of the coil or jacketed bottom is con¬

nected to a steam trap which automatically dis¬

charges the water condensed in the coil or jacket without materially reducing the pressure of the steam. The wort as soon as it runs clear from the mash tub is collected in the kettle.

Steam is turned on in the kettle as soon as the jacketed bottom is covered with wort. Ihis wort and that continuously running in is then heated to and kept at about 70° R. (190° F.) in order to destroy the action of the diastase and prevent further saccharification in the wort taking place. When the kettle is full or nearly so, steam is further turned on and the wort brought to boiling and boiled for one hour when it should show a good ˆbreak.ˆ During this boiling the undesirable albuminoids are precipitated in finely divided form, rendering the wort turbid. Upon continued heating these albuminoids unite or lump together and leave the wort between these lumps clear and trans¬

parent. This clarification is called the ((breaking}) of the wort.

Hops are now added, usually about two-fifths of the total amount used, after which addition the wort again becomes turbid due to the further precipitation of albuminoids by the tannic acid contained in the hops. After about 40 minutes further boiling the wort should again clarify or show its second break, when another two-fifths of the hops are added and the wort boiled about 20 minutes. The remaining one-fifth of the hops is added and the wort run out of the kettle into hop jack immediately.

This last quantity of hops is usually of a better quality and is not boiled with the wort as its addition is for the purpose of imparting the hop aroma to the wort. This aroma is due to the hop oil of the hops which is volatile at boil¬

ing temperature and would escape, and be ren¬

dered useless, if the wort were boiled for any considerable time. All or part of this last hop addition is sometimes placed in the hop jack and

the boiling wort run upon it.

Wort in Hop Jack. — The hop jack con¬

sists of a round or square iron tank, having a perforated false bottom or strainer and a

sparger or sprinkler similar to that of the mash tub. The wort, with the hops, is run into the hop jack and allowed to rest until the hops have settled so as to form a filtering material for the clarification of the wort. As soon as this takes place the wort is pumped to the sur¬

face cooler or beer tank located at the top of the cellars. After the wort has all been re¬

moved the hops are washed out or sparged

with hot water in order to recover as much of the absorbed wort as possible.

Surface Cooler and Beer Tank.— The sur—

tace cooler consists of a shallow iron pan of a length and width very large in proportion to its depth so as to give the wort as much surface as possible. Hereby the wort is cooled quite rapidly and aerated.

The beer tank, an iron -cylindrical vessel, closed at the top, is rapidly supplanting this cooler, since the latter, by the large surface it presents, exposes the wort to infections by impurities or germs always more or less pres¬

ent in the air. As soon as the wort on the sur¬

face cooler or in the beer tank cools to about 50° R. (145° F.) the danger of its infection by impurities, bacteria, # etc., begins. From this stage until the beer is finally marketed, months later, it requires the daily, almost hourly, vigi¬

lance of the brewer to keep it pure and free from contamination.

Baudelot Cooler. — This consists of a series of pipes or tubes arranged in vertical tiers, over the outside of which the wort flows, while through them the cooling medium is circulated.

It is usually made in two sections, the upper being of copper tubes, containing cold water, and the lower of steel containing ammonia.

The Cellars. — The wort after cooling

enters the cellars, where it is fermented, stored, kraeusened, bunged, fined, filtered and racked ready for the market.

Fermentation of Wort. — The wort as it

comes from the cooler is run into fermenting tubs in which the yeast has previously been placed. Sometimes the yeast is added after the tubs are filled with wort. The yeast, from one to one and a half pounds to the barrel of wort, is usually given, not in its natural state, but first mixed with an equal quantity of wort and thor¬

oughly aerated.

The fermentation now begins. Within 15 to

24 hours white bubbles appear on the surface around the sides of the tub. ‘ The wort at this time is covered with a head of thick, lumpy consistency composed largely of albuminoid

matter. The whole surface now soon becomes

covered with a fine white froth, which soon changes to a frizzled appearance called <(kraeusen}) stage. The froth head then moves toward the centre, the fermentation becomes more

active, the froth head rises higher and becomes darker and the fermentation now passes into the (<high kraeusen® stage, generally after about 70 to 80 hours. This stag© is maintained for about 48 to 72 hours when the head begins to collapse and deepens in color to the end of the vol. 4 — 31

fermentation. The temperature is then grad¬

ually reduced by means of cooling attcmperators to 3° R. (39° F.) in the next three or four days. Total duration of fermentation, 10 to 11 days.

Storage of Beer. — After the wort is fer¬

mented the beer is filled into storage vats (closed at the top) where it is stored at a tem¬

perature near the freezing point for about two or three months. During this storage period there is a slight progress of secondary or after fermentation and the yeast settles, and, what is most important in bottle beer that is to be pas¬

teurized, there is a further precipitation of albuminoids.

Chip Cask Treatment. — When sufficiently

matured in storage the beer is run or pumped into the chip casks, so called because in them wooden chips are placed to retain the sediment produced by the finings. In the chip cask, two properties must be imparted to the beer that it did not possess during storage, namely, life or proper amount of carbonic-acid gas contents

and brilliancy. Life is given the beer by addi¬

tion of 8 to 10 per cent of kraeusen (that is, young beer in the first or kraeusen stage of fer¬

mentation). This when added to the old ((flat®

storage beer continues to ferment, and, as the casks are closed, the gas generated gives life to the whole amount of beer contained therein.

For bottle beer, kraeusen made from grape

sugar is used, as grape sugar contains no albu¬

minoids as does the kraeusen from regular fer¬

menting worts.

Brilliancy is given to the beer by removing the yeast and other particles in suspension by means of finings made from isinglass. After bunging the cask, a certain pressure only

(4ˆ4-5 pounds) is desired and any excess pres¬

sure generated above this is automatically re¬

moved by an automatic blow-off device called the bunging apparatus.

Filtration of Beer. — Although beers will

generally become clear in the chip cask if they are left there long enough, they are now almost universally filtered after they have become mod¬

erately fine (clear) in the chip cask. Thereby much time is saved, also a large part of the finings and chips. Furthermore, filtration fur¬

nishes a more brilliant beer than can generally be obtained by chip cask treatment only. Mod¬

ern beer filters differ considerably in construc¬

tion, but all are alike in that they contain several or many compartments or cells filled with filter mass or pulp (a substance similar to blotting paper) through which the beer is

forced. The filter mass or pulp can be used again and again, being washed after each use to remove the beer and sediments it collects dur¬

ing filtration. The operation of filtration is as follows : The bunging apparatus is discon¬

nected and air pressure (15 to 20 pounds) is put on the chip cask and the beer thereby forced through the filter.

Racking of Beer. — From the filter the

beer passes to the racking bench which must be placed at a higher level in order to cause a back pressure upon the filter and prevent foam¬

ing. The racking device consists of two or more faucets of which one is always open so as to give a steady flow of beer.

Carbonating. — Beer is often carbonated.

This is the mechanical forcing of carbonic acid

gas into the beer by which time, labor, space and cost of chip casks are saved, besides ob¬

taining a more durable beer.

Pitching and Varnishing. — In order to

prevent the beer in wooden vessels from soak¬

ing into the wood, they are coated on their insides with an inert or

insoluble substance.

This is shellac varnish for the large brewery vessels and pitch for the trade packages.

Bibliography. — Relating to American

Beers and Malting, and Americanized Methods

of Producing English Beers: LeClerc-Wahl,

(Chemical Studies of American Barleys)

(United States Bulletin 124) ; Year Book of the United States Brewers' Association (1909—16) ; Documentary History of the United

States Brewers' Association (1896); Proceed¬

ings of the Second International Brewers'

Congress (Chicago 1911) ; Wahl, Robert, and Henius, Max, (The American Handy-Book of

the Brewing, Malting and Auxiliary Trades 5

(Chicago, 3d ed., 1908) ; in German, Hantke, (Handbuch fiir den amerikanischen Brauer u.

Malzer) (Milwaukee 1897) ; Wahl-Henius,

(Brauereibetrieb in Amerika) (1812).

English Beers and Malting as Practised in

England and English Colonies: Sykes, Walter

J., and Ling, A. R., Principles and Practice of Brewing) (London 1907) ; Faulkner, Frank,

(Theory and Practice of Modern Brewing)

(London 1888) ; Wright, Herbert E., (A

Handy Book for Brewers5 (London 1897) ;

Southby, E. R., Practical Brewing5 (London

1889) ; Thatcher, Frank, Prewing and Malt¬

ing5 (London 1898) ; Briant, Lawrence F.,

Paboratory Textbook for Brewers5 (London

1898) ; Moritz and Morris, (Textbook of the Science of Brewing5 (London 1896).

In German Language : Thausing, Julius E.,

Pie Theorie und Praxis der Malzbereitung

und Bierfabrikation5 (6th ed., Leipzig 1907) ; Prior, Eugen, (Chemie und Physiologie des

Maizes und Bieres5 (Leipzig 1896) ; Windisch, W., Pas Chemische Laboratorium des

Brauers5 (Berlin 1907) ; Fasbender, Franz,

(Mechanische Technologie der Bierbrauerei

und Malzfabrikation5 (Vienna 1881-90) ;

Klocker, Albert, <Gaehrungsorganismen) (Stutt¬

gart 1906) ; Jorgensen, Alfred, Pie Mikro—

organismen der Gaehrungsindustrie> (Berlin

1909) ; Linder, P., (Mikroscopische Betrieb—

skontrolle in den Gaehrungsgewerben5 (Berlin

1909) ; Leyser, E., Pierbereitung5 (Stuttgart 1910) ; Lafar, <Technische Mykologie5 (Jena

1897) ; Delbrueck, Max, Plustrirtes Brauerei-Lexikon5 (Berlin 1910) ; Hansen, Emil Chr., (Gaehrungsorganismen5 (Jena 1911).

English Translations: Thausing, Julius E.,

(Theory and Practice of the Preparation of

Malt and the Fabrication of Beer5 (translated from the German by William T. Brannt, re¬

vised with addition of American methods by

A. Schwarz and H. A. Bauer) (Philadelphia

1882) ; Jorgensen, Alfred, (Micro-organisms

and Fermentation5 (translated from the Danish by Alex. K. Miller and A. E. Lennholm) (Lon¬

don 1900) ; Hansen, Emil Chr., Practical

Studies in Fermentation5 (translated from the Danish by Alex. K. Miller) (New York 1896) ; Kloecker, Albert, Permentation Organisms5

(London 1903).

Robert Wahl,

President and Director, Wahl-Henius Institute of F ermentology, Chicago.

BREWING INDUSTRY IN AMERICA.

To narrate the history of the art of beermaking is to tell a story that is as old as the human race. To trace the art of brewing from its early days down to the present time it is necessary that one should pass through all the ages of antiquity, for the art that was practiced so crudely by the prehistoric peoples was fol¬

lowed with less primitive methods by both the Egyptians and Assyrians. Later, the Greek

and Romans made their brews, while, from

the earliest recorded times, the Teutonic races have pursued this art so successfully that praise of their skill has long taken the form of poem and prose, in song and story, while the tributes of esteem that are everywhere paid to Gam-brinus, the acknowledged patron saint of brew¬

ing, is but another method by which the lovers of beer strive to testify their appreciation of the beverage for which his name stands synony¬

mous.

As far as America is concerned the history of the brewing industry may be traced to 1620, for when the Pilgrim Fathers landed on Ply¬

mouth Rock they brought with them consid¬

erable knowledge as to the best methods of making their favorite beverages, the fiery po¬

tions which even they loved to drink, ((and not a man afraid,55 as well as the lighter, but still sturdy, brews with which every true English¬

man sometimes made (<merrie.55 Homebrewed

as this beer was in the beginning, the natural growth of the colonies soon suggested that it be put to a more practical use, and it was thus that their knowledge of the brewing craft

finally resulted in the establishment of the in¬

dustry of beermaking.

In the New England colonies, where people

were more addicted to the use of stronger spir¬

its than beer, the colonial lawmakers adopted a statute by which they granted immunity from taxes and an additional prize in money to any brewer who should be sufficiently energetic to manufacture more than 500 barrels of <(honest beer55 in a single year, for they held that

beer was a beverage which not only added to the prosperity of the country by giving the farmer a profitable market for the grain he might be able to raise, but which supplied the people with a drink of such mild form that, instead of leading to intoxication, it actually contributed to the spread of that temperate spirit upon which the <(good order55 of the colony so much depended. It was thus that the infant brewing industry was established and fostered by the colonial officials of Massachusetts, and, though the growth of the industry was slow compared to what one would imagine it should have been, it had expanded sufficiently by 1795 to produce nearly 2,000,000 gallons of beer per annum.

The great adversary against which the brew¬

ing industry, has been obliged to contend has almost invariably been the result of matters of legislation. Ever since the days of the Egyp¬

tians the growth or decline in the art of beer¬

making may be traced directly to this cause.

Under liberal laws, intelligently administered, the-industry prospered, while legislative enact¬

ments have hampered the expansion of the

trade more seriously than it could have been retarded by any other influence. Thus, while we have no reason to believe that any laws directly adverse to the brewing craft were

passed prior to 1795, the fact that the legisla-BREWING INDUSTRY IN AMERICA

tion that was enacted was more favorable to the cheap distribution of distilled liquors had a tendency to give an advantage to the manu¬

facturers and dealers in strong beverages

against which the makers of the milder beers found it difficult to

contend. It is true that some of the leading men in the country held the opinion that the brewing industry was

an aid to the promotion of national tem¬

perance and sought to aid it in every way in their power, but they were opposed by strong influences from several quarters, from the few who were opposed to the drinking of even such a mildly alcoholic beverage as beer, to the strong clique which represented the interests of the manufacturers of and dealers in the more potent liquors. During the Washington

administration, Congress, in its consideration of the first Federal revenue law, recognized the importance of fostering the brewing industry as an aid to public morality ; again, in 1789

Madison publicly expressed the hope that the industry of brewing would extend its influence into every State of the Union, while Thomas Jefferson's firm stand in regard to the liquor question will never be forgotten. <(No nation is sober,® he said, <(where the dearness of fer¬

mented drinks substitutes ardent spirits as a common beverage.®

Prior to the middle of the 19th century, the term (<beer® in the United States generally im¬

plied that beverage that became more com¬

monly known to us as ((ale.® In 1810, when the production of malt liquors in this country amounted to less than 6,000,000 gallons per an¬

num, the 129 breweries which were manufactur¬

ing this product made practically, nothing but ale and porter, and it was not until about 1846, when the increasing German immigration

created the demand for the favorite beverage of these people, lager beer, that any brewer found it necessary to manufacture such a

drink. With them, of course, the Germans had brought a practical knowledge of the art of lager beermaking, and as they were not satis¬

fied with the native brews of the Americans, it was not long before

lager beer breweries be¬

gan to spring into existence in every commu¬

nity in which the German population was suffi¬

ciently numerous to support such an enterprise.

In the beginning, of course, the. Americans were inclined to be suspicious of this new beverage.

It was milder than their brews, and, at first, they did not take kindly to it, but, gradually, as time passed, their prejudices were overcome until finally beer, or in other words, lager beer, became so popular as a beverage that the pro¬

duction of ale and porter in the United States did not exceed 1,000,000 barrels a year when prohibition went into effect.

It was the outbreak of the ‘Civil War that brought about the financial exigencies which resulted in the adoption of . excise measures more favorable to the production of the. lighter beverages. To raise a revenue sufficient to save the government from the disasters which threatened required heroic measures. What was required was money, and, as the result, the in¬

ternal revenue laws were created. As these

threw burdens of taxation chiefly, upon the manufacturers of ardent spirits, the industrv of brewing took a new lease of life, and the effect of the passage of these laws, in July 1862, could be seen in the development of the industry even up to the advent of prohibition.

It was in 1862, at the moment when it was seen that there was to be an opportunity for the advancement of the brewing industry,

that the Brewers’ Association was formed.

While this organization owed its existence

partly to selfish interests, to the desire for self¬

protection and the better advancement of the trade, it declared its

fundamental purpose was a more patriotic one, and its members pledged themselves to aid the government in the perfec¬

tion of the revenue laws so far as they applied to the manufacture of malt liquors, and to as¬

sist by their influence in the collection of such revenues, as well as to secure themselves against the possibility of unjust discrimination. After the outbreak of the World War in August

1914, and the decline in imports from Europe consequent thereon, Congress greatly increased the revenue tax on beer and all other alcoholic beverages. Further increases were levied after the entry of the United States into the conflict, but within a few months the necessity for con¬

serving the cereal supply for breadstuffs for the Allies caused the Federal government to limit the output of the breweries. The subioined table shows the output of the breweries year by year from 1863 to 1916, the last normal year: BEER PRODUCTION IN THE UNITED STATES FROM 1863 UP TO

THE END

OF THE FISCAL YEAR 30 JUNE,

1916, IN BARRELS

1863 .

. 2,006,625

1890… .

. 27,561,944

1864 .

. 3,141,381

1891… .

. 30,497,209

1865 .

. 3,657,181

1892… .

. 31,856,626

1866 .

. 5,115,140

1893… .

. 34,591,179

1867 .

. 6,207,402

1894… .

. 33,3 62,373

1868 .

. 6,146,663

1895… .

. 33,589,784

1869 .

. 6,342,055

1896… .

. 33,859,250

1870 .

. 6,574,617

1897… .

. 34,462,822

1871 .

. 7,740,260

1898…

. 37,529,339

1872 .

. 8,659,427

1899… .

. 36,697,634

1873 .

. 9,633,323

1900… .

. 39,471,593

1874 .

. 9,600,897

1901… .

. 40,614,258

1875 .

. 9,452,697

1902… .

. 44,550,127

1876 .

. 9,902,352

1903…

. 46,720,179

1877 .

. 9,810,060

1904…

. 48,265,168

1878 .

. 10,241,471

1905… .

. 49,522,029

1879 .

. 11,103,084

1906… .

. 54,724,553

1880 .

. 13,347,111

1907… .

. 58,622,002

1881 .

. 14,311,028

1908… .

. 58,814,033

1882 .

. 16,952,085

1909…

. 56,364,360

1883 .

. 17,757,892

1910…

. 59,544,775

1884 .

. 18,998,619

1911…

. 63,283,123

1885 .

. 13,185,953

1912… .

. 62,176,694

1886 .

. 20,710,933

1913…

. 65,324,876

1887 .

. 23,121,526

1914…

. 66,189,473

1888 .

. 24,680,219

1915...

. 59,708,217

1889 .

. 25,119,853

1916...

. 58,565,532

Whereas, in 1810, there were but 129 brew¬

eries in the United States, there were 1,959

such establishments in 1899, ranging in output from about 1,000 barrels annually, to the enor¬

mous beer manufactories with an individual

output of more than 1,500,000 barrels per an¬

num.

After 1899, the number of breweries steadily decreased, partly through prohibition . enact¬

ments, partly through the combination of

smaller plants or companies into larger organ¬

izations, leading to. the dismantling of the smaller or less efficiently equipped plants, and also to the erection of new plants, to take over the combined output of the individual units.

Thus, in 1910, the number of breweries had declined to 1,568; down to 1915 there was a further decline, the number of breweries ac¬

cording to the Internal Revenue Report being 1,345. On 1 Jan. 1916, six more States were added to the prohibition column, with a total

number of breweries of 62, increased by Vir¬

ginia's six after 1 Nov. 1916, so that the num¬

ber of breweries operating at the close of 1916

had been reduced to 1,277, to which must be added the breweries of Michigan in 1918 and Montana in 1919, there being then 26 States in which State-wide prohibition had been

adopted. In 1917 Congress decreed that a con¬

stitutional amendment be submitted to the

States providing for the abolishment of the manufacture and sale of alcoholic beverages, to be ratified within six years. This amend¬

ment received the ratification of the necessary 36 State legislatures by 16 Jan. 1919; was proclaimed a part of the Constitution the same month, and under the terms expressed therein went into effect on 16 Jan. 1920.

The beer production in the United States

showed a marked increase during the 20 years from 1894 to 1914, the output nearly doubling during that time. During the fiscal year 1914

to 1915 there was a decrease of over 6,000,000

barrels, but during the year ending June 1916, notwithstanding the closing of 62 breweries in six more prohibition States, the output of beer was 58,565,532, or approximately that of 1915, and 20,000,000 barrels higher than 20 years be¬

fore.

Some of the breweries put out of com¬

mission by prohibition are operating their

plants as best they can by producing <(near-beers® or beverages intended to resemble beer as closely as possible but containing less than one-half of 1 per cent of alcohol, which may be sold without a tax and are exempted like¬

wise from the payment of special taxes by

dealers in malt liquors. The law does not pro¬

hibit the driving off of alcohol from a fermented beverage in the brewery, according to latest rulings of the Internal Revenue Department.

Many other brewers have converted their

plants so as to produce other products, candies, beet sugar, *etc.* Other have been dismantled and the brewing equipment shipped to other

countries.

Some few of the breweries made ale, or

porter, but the greatest number made nothing but the favorite drink of the Germans, the lager beer which, notwithstanding the inroads of prohibition, continued to be considered as one of the great commercial factors in the United States. Moreover, while the American brewers formerly catered exclusively to a restricted local market, within the years after 1880 the art of beermaking had attained such a point of perfection that this product could be shipped, both in barrels and in bottles, from one end of the country to the other, while a further idea of the immense importance of this trade may be gathered from the facts that while the capital invested in this country in the beer in¬

dustry was not less than $671,158,000, according to the figures reported by the 1913 United States Statistical Abstracts census, the annual output of the country showed an aggregate

value of more than $350,000,000. More than

66,000 men were directly engaged in the inter¬

ests of brewing, and its contributions to the support of the United States, in internal reve¬

nue taxes alone, amounted in 1913 to more than $65,000,000 per annum, while $95,596,000 repre¬

sented the cost of materials used in that year.

That the bottling branch of the industry had also assumed proportions which entitled it to serious consideration is shown by the fact that the product of one brewery alone in 1916

amounted to more than 150,000,000 bottles per annum.

While such figures are available in the sense that they are reliable manifestations of _ the growth of the brewing industry, there is a deeper and broader side to the question of its development that is a matter of far greater importance, for the modern brewer, while proud of the fact that his craft had grown to be one of the great industries of this great nation, took even greater pride in the knowledge that the science of brewing had made more marked scientific advancement during the past 50 years of its history than it had made in all the years that had previously elapsed since those days of <(merrie England® when Falstaff and his coterie of jolly fellows joked together over their

gen¬

erous tankards of some foaming brew.

For example, it may be said that it was only within the 50 years preceding prohibition that anything approaching scientific principles were applied to the art of brewing. After 1870, however, the establishment of brewers' schools to teach the higher knowledge of the craft brought theory and nractice into such close association that a field of competition was opened that had never existed prior to that time. Thus, during the sixties the principles governing the production of beer were practically the same as those which had been followed by our fore¬

fathers in their breweries in 1805, for while every branch of apolicable science, including chemistry, botany and mechanics had experi¬

enced marvelous development, these changes

meant nothing to the art of brewing, except in the general sense that they were preparing the foundation upon which the more scientific art might be constructed.

The first great improvement in the art of

brewing, and especially that portion of it to which the physiology of fermentation may be applied, was the result of the labors of Pas¬

teur in Paris and Hansen at Copenhagen. Pas¬

teur discovered that spoiling of wine, beer and vinegar were due to similar causes, that is, to infection by bacteria or bacilli, and found proper remedies, not only saving those industries in France alone millions of francs annually, but he became the founder of medical science by realizing through his studies on fermenta¬

tion that contagious diseases in animals and man were due to microbial infection likewise, and thus Pasteur was led to his discoveries of antitoxin treatment. From the earliest days

beer had been known to be a perishable product, but the character of

the causes which made it spoil was a problem that nobody had been able to solve. By his discoveries of the physiology of the organisms of fermentation Pasteur not only proved that these diseases of beer might rationally be traced to a sort of bacteria but indicated the manner in which such diseases might be avoided through the application of a process of wort cooling and fermentation, while Hansen went a step farther by not only finding another cause for such diseases in the brewers' yeast, which might easily become, by contact, under certain circumstances, with sim¬

ilar organisms closely resembling it, far more injurious than any bacteria, but brought its labors to a most logical conclusion by devel¬

oping a process of cultivating yeast in large BREWSTER

quantities and in such absolute purity from a single germ that he prevented the introduction of wild yeast into the brew. The immediate adoption of these innovations by the leading brewers of the United States resulted in some very material changes in the practical opera¬

tions of the breweries. Thus the discovery of the principle of preventing infection brought about the substitution of suitably closed ap¬

paratus in place of the old-fashioned open

cooler, but this improvement was simply one step in the efforts of the manufacturers to meet the requirements of the new scientific methods of brewing. It was followed by more ingeniously constructed machinery, all tending toward a cleaner and better product. There

were processes for the production of filtered air; there were other processes for the steril¬

ization of water, for everything that now

entered into the product had to be germ-proof, absolute protection against infection being the keynote of the new science. Under these

methods, therefore, from the very moment that the beer left the brew-

kettle to pass over the coolers, and through the process of fermenting and lagering, and even up to the very moment that it was served as a refreshing and reviving beverage, no effort was spared to protect it from infection. See Brewing; and Malting.

Physiology and theoretical chemistry have

also exerted their influence to bring about the present wonderful development in the science of brewing. During the past few decades the most complicated processes in the malting of barley, in mashing and in fermentation have been so thoroughly explored that the knowl¬

edge derived from these researches has cre¬

ated a magnificent foundation upon which the maltster and the brewer have been able to build more solidly than ever before in the history of the craft. In this connection, moreover, reference must be made to an invention which has effected more radical changes in the brew¬

ing industry than almost any one single factor, for without it many of the innovations and im¬

provements which are regarded as of such vital importance to-day could never have been

made. This invention is the ice-machine, with¬

out which artificial refrigeration unon any ex¬

traordinarily extensive scale, such as exists in many of the big brewing plants at this time, would have been entirely impracticable. It

was since 1870 that the imperfect icemaking machine which was shown by the French in¬

ventor, Carre, was regarded as so great a curiosity that persons who were interested in such things traveled long distances to inspect it.

To-day, however, conditions have changed so

materially that it is only the very insignifi¬

cant brewing establishments that are not

equipped with model ice-machines.

One of the distinctly American innovations

which tended so greatly to improve the science of brewing during the past few decades was the new method of collecting and utilizing all the carbonic-acid gas formed during the process of fermentation. By the discovery of this purely American method, which has been adopted in

Europe, it was made possible to abandon the old-fashioned ((kraeusen» process of carbonat¬

ing, which was formerly the only method in general use. In other words, the finished prod¬

uct of the brewery may now be charged with the best and purest natural carbonic-acid gas that it is possible to obtain, and as this method of collecting this by-product of fermentation produces such an abundance of the carbonic-acid gas that it may readily be liquefied, there is no reason why every other product of that kind should not eventually be crowded out of the market.

Another distinctively American discovery

is the treatment of bottled beer and rendering the same chillproof through the application of the principle of digesting the colloidal albumen of beer by means of proteolytic enzymes in the finishing cask, thus giving the bottled product almost unlimited durability.

As this is not the only occasion upon which the American ingenuity has solved problems

relating to the science of brewing over which some of the greatest European authorities

have experimented vainly for many years, it is not strange that the brewers of the United States should be able to produce some of the best and, at the same time, some of the most durable beer in the world. Not only have the latest and most scientific methods in

brewing that can be credited to the European investi¬

gators been in use in the country, almost from the very moment of their discovery, but several of the processes which have actually originated in this country have since been accepted by foreign scientists as the most rational methods known. In 1893 Professor Delbrueck of Berlin and Professor Schwackhoefer of Vienna were

sent to America by their respective govern¬

ments to make a detailed inspection into Ameri¬

can brewing methods. Naturally every facility was offered them, and in their special report they gave the brewers of the United States much of the credit which they deserve for hav¬

ing developed the primitive craft to such a high standard of perfection.

In 1911 an International Brewers' Congress

was held at Chicago in connection with an In¬

ternational Brewers' Exhibit of brewers' ma¬

chinery, equipment and materials in which the United States Agricultural Department was

conspicuously represented.

Revised by Robert Wahl.

BREWSTER, Benjamin Harris, Amer¬

ican lawyer: b. Salem County, N. J., 13 Oct.

1816 ; d. Philadelphia, 4 April 1888. He gradu¬

ated at Princeton in 1834, was admitted to the Philadelphia bar (1838), and for nearly half a century practised with ardor and success the profession he loved. In 1846 he was one of a commission to

adjudicate the claims of the

Cherokee Indians against the United States ; in 1867 he became attorney-general of Pennsyl¬

vania, and in December 1881 President Arthur made him Attorney-General of the United States.

Shortly after the death of President Garfield, Attorney-General Wayne MacVeagh retained

Brewster to assist in the prosecution of the (<Star Route® conspirators. ‘In boyhood he was severely injured by burns received while brave¬

ly attempting to rescue his sister from a fire into which she had fallen. He was an impres¬

sive orator, and possessed scholarly attainments of a high order. Both Princeton and Dickin¬

son colleges conferred the degree of LL.D upon him.

BREWSTER, Chauncey Bunce, Amer¬

ican bishop : b. Windham, Conn., 5 Sept. 1848.

He is a direct descendant of Elder Brewster of 486

Plymouth colony fame. He was graduated at

Yale in 1868, Berkeley Divinity School 1872, and was ordained priest 1873. He was rector of Christ Church, Rye, N. Y., 1873-81 ; Christ Church, Detroit, 1881—85 ; Grace Church, Balti¬

more, 1885-88; Grace Church, Brooklyn, N. Y., 1888-97. On 8 June 1897 he was elected coad¬

jutor-bishop of Connecticut and consecrated in New Haven, 28 Oct. 1897. Upon the death of Bishop Williams, in 1899, Bishop Brewster be¬

came diocesan of Connecticut. Besides sermons and pastoral charges, he has written (The Key of Life5 (1885) ; (Good Friday Addresses)

(1894) ; (Aspects of Revelation) (1901), being the Baldwin lectures before the University of Michigan; (The Catholic Ideal of the Church) (1905) ; (The Kingdom of God and American

Life5 (1912); also addresses, *etc.* Yale Uni¬

versity, Wesleyan University and Trinity Col¬

lege have conferred the degree of D.D. upon him.

BREWSTER, Sir David, Scottish natural

philosopher: b. Jedburgh, 11 Dec 1781; d. Al-lerby, near Melrose, 10 Feb. 1868. He entered the University of Edinburgh, was educated for the ministry and was licensed by the Presby¬

tery of Edinburgh ; but gave up the ministry to engage in scientific pursuits. His first inves¬

tigations were on the subject of polarization of light, upon which he communicated some im¬

portant observations to the transactions of

the Royal Society of Edinburgh.5 In 1881 he be¬

came editor of the Edinburgh Encyclopedia, 5

to which he contributed a number of valuable articles. In 1816, while repeating the experi¬

ments of Biot on the action of fluids on light, he made those observations which resulted in the invention of the kaleidoscope. In 1819, in conjunction with Jameson, he founded the Ed¬

inburgh Philosophical Journal, of which he was sole editor (1824-32). Brewster was one of

the founders of the British Association, whose first, meeting was held in York in 1831, and he presided over it on the occasion of its 20th meeting held at Edinburgh in 1850. In 1832

he received the honor of knighthood along with a pension from the government. Both before

and after this time his services to science ob¬

tained from many quarters the most honorable recognition. The French Institute, of which he had been a corresponding member since 1825, appointed him one of its eight foreign associ¬

ates in 1849. From Prussia he received the Order of Merit in 1847, and in 1855 the cross of an officer of the Legion of Honor was be¬

stowed on him by Napoleon III. From 1838

to 1859 he was principal of the united colleges of Saint Leonard's and Saint Salvador at Saint Andrews, and in the latter year he was unani¬

mously chosen principal of the University of Edinburgh — an office which he held till his death. His chief works are (Treatise on the Kaleidoscope) ; (Letters and Life of Euler5 ; (Letters on Natural Magic) ; (Treatise on

Optics) ; (Martyrs of Science) ; (More Worlds than One) ; (Memoirs of the Life, Writings and Discoveries of Sir Isaac Newton) (1855).

Consult Gordon, (The Home Life of Brew¬

ster } (Edinburgh 1869).

BREWSTER, Frederick Carroll, Amer¬

ican lawyer: b. Philadelphia, Pa., 15 May 1825; d. Charlotte, N. C., 30 Dec. 1898. He was graduated from the University of Pennsyl¬

vania, read law with his father and was ad¬

mitted to the Philadelphia bar, 1844, of which he became a leader and one of its brightest ornaments. He was elected city solicitor

(1862); judge of the Court of Common Pleas (1866-69) ; attorney-general of the State (1869-70). He was successful as counsel in the

famous Stephen Girard will case, and secured the decision in the Chestnut street bridge case, wherein a decree was entered in the United States Supreme Court allowing the city of

Philadelphia to cross the Schuylkill River by bridge. He published (Reports of Equity,

Election and other Cases in the Courts of the County of Philadelphia) (1869) ; (Digest of Pennsylvania Supreme Court Cases) (1869) ;

(Brewster's Blackstone, with Annotations of

Decisions on the Rule in Shelly's Case) (1887) ; (Brewster's Reports) (4 vols., 1869-93) ; (A Treatise on Practise in the Pennsylvania

Courts5 (1887-88).

BREWSTER, Harlan Carey, British

Columbia statesman: b. Harvey, New Bruns¬

wick, 10 Nov. 1870. He early migrated to

British Columbia, where he was for a time pur¬

ser on board a vessel, and afterward manager of the Clayoquet Sound Canning Company be¬

fore engaging in business on his own account.

He was returned to the local legislature for Alberni in 1904 and for Victoria in 1907, for some years led the opposition, and on the de¬

feat of the Bowser government in 1917 became Premier of the province.

BREWSTER, William, elder of the

Plymouth Pilgrims: b. Scrooby, England, 1560; d. Plymouth, Mass., 16 April 1644. He was

educated at Cambridge and entered the service of William Davison, Ambassador in Holland,

but presently retired to Scrooby manor house in Nottinghamshire, where his attention was

chiefly occupied by the interests of religion.

He was one of the company who with William Bradford attempted to find an escape to Hol¬

land and were thrown into prison at Boston.

Having obtained his liberty, he first assisted the poor of the Society in their embarkation and then followed them to Holland. Here he

opened a school at Leyden for instruction in English and also set up a printing press. He was chosen a ruling elder in the church at Ley¬

den, and came to New England in 1620 with the first company of the Pilgrims. Until 1629 the principal care of the church at Plymouth de¬

volved upon him, though as he was not a regu¬

lar minister, he could never be persuaded to administer the

sacraments. Consult Steele,

‘Chief of the Pilgrims5 ; ‘Life of William Brewster5 (1857).

BREWSTER, William, American or¬

nithologist : b. Wakefield, Mass., 5 July 1851 ; d.

11. July 1919. A graduate of the Cambridge High School, he was curator of the collection of birds and mammals of the Boston Society of Natural History, 1880-87; curator of the de¬

partment of mammals and birds 1885-1900, and after the latter year, of birds alone at the Cam¬

bridge Museum of Comparative Zoology, his

own private museum of ornithology also occu¬

pying a great deal of his attention. He is author of ‘Bird Migration5 (1886); (The

Birds of the Cape Region of Lower California5

(1902) ; ‘The Birds of the Cambridge Region of Massachusetts5 (1906).

BREWSTER’S LAW. See Light; Re¬

flection ; Refraction ; Dispersion.

BREWTON, Ala., city and county-seat

of Escambia County, 102 miles southwest of

Montgomery, on the Louisville and Nashville

Railroad. It has wood manufacturing interests and a large trade in truck farm products. It is the seat of Brewton Collegiate Institute and an industrial school for girls. Pop. 2,685.

BREYMANN, biTman, Hermann, Ger¬

man philologist and pedagogue: b. Oker, near Harzburg, 1843 ; d. 1910. He studied languages at Gottingen, Bonn, Marburg and Paris; lived in Manchester and London 1867— 75 ; in the lat¬

ter year was appointed professor of French and English in the University of Munich, and

came to be recognized as one of the leading authorities on educational questions in relation to modern languages. From 1890 he was editor of the Miinchener Beit rage zur romanischen und englischen Philologie. He is the author of (Bearing of the Study of Modern Languages

on Education at Large) (1872) ; (On Provengal Literature) (1875) ; (Diez, sein Leben, seine Werke) (1878); 'Marlowe's Dr. Faustus)

(1889); 'Die neusprachliche Reform-Litteratur

1876-93 (1895) ; 1894-99> (1900); (Die phonetische Litteratur von 1876—95) (Leipzig 1897) ; 'Calderon Studien) (1905).

BRIALMONT, Henri Alexis, distin¬

guished Belgian military engineer: b. Venloo, 25 May 1821 ; d. 21 Sept. 1903. The son of a general, he studied at the £cole Militaire under French officers and entered the Belgian army (engineer corps) in 1843. He devoted himself entirely to the theory and construction of for¬

tifications and came to occupy in the modern history of fortifications the high place held by Marshal Vauban (q.v.) in the 17th century.

By 1855, despite his French training, he had aban¬

doned French models and leaned to the Ger¬

man theories, rejecting the old star-shaped forts with bastioned ramparts and intricate outworks, for the German type of long front and detached forts. In 1847 Ire constructed the fort works at Diest and later served three years as secre¬

tary to the War Minister, General Chazal.

Brialmont's first great work was the fortifica¬

tion of Antwerp, completed in 1868. His revo¬

lutionary plans for fortifying vulnerable points in Belgium were unfavorably received during

his term (from 1875) as inspector-general of fortifications and of sappers and miners in Belgium. Discouraged at meeting opposition,

Brialmont accepted an invitation .from the late King of Rumania to design the proposed gigan¬

tic defenses of Bucharest, whither he went in 1883. Owing to representations made by Aus¬

tria-Hungary to the Belgian government, Brial¬

mont was retired from the Belgian army for undertaking foreign service without permission.

In 1884, however, he was 'restored to his rank, and in the following year, when he had reached the age limit, his services were nevertheless retained to complete the defense works of the Meuse Valley in the forts of Liege and Namur.

He achieved the task by 1892, while in the meantime he continued to direct the Rumanian defense works. Brialmont's typical fort is

adapted to meet long-range rifled guns and

high-angled shell fire. Whereas the military engineer of pre-artillery days piled his towers and turrets high into the air, the advent of heavy guns compelled them to be built ever lower to earth. Brialmont's forts are buried underground with disappearing cupolas in

which the guns are mounted. All that is nor¬

mally visible is a low mound, surrounded by a deep ditch. The mound is cased in concrete and heavy masonry, roofed with concrete and

covered with earth and sods. The top is broken by circular pits, in which the cupolas or gun-turrets slide up and down with just enough movement to bring the gun muzzles above the level of the ground. Internally the mound re¬

sembles a vast molehill containing numerous

passages and chambers, divided into quarters for the garrison, machine rooms and munition stores. An inclined tunnel forms the entrance to the fort. The German invasion of Belgium in 1914 demonstrated the futility of fortifica¬

tions as a defense against modern long-range heavy guns. The Liege forts were reduced in two days and Namur fell in a few hours. Brial¬

mont also wrote many works on military his¬

tory and tactics. In 1850 he founded the Jour¬

nal of the Belgian Army and published ‘Precis d’art militaire) (1850) ; ‘Considerations politiques et militaires sur la Belgique) (1852) ; ‘Histoire du Due de Wellington } (3 vols.,

1856) ; ‘fitudes sur la defense des etats et sur la fortification J (3 vols., 1863) ; ‘Situation militaire de la Belgique* (1888) ; about 30

other books and some 60 pamphlets on political and military subjects.

BRIAN (surnamed “Boroimhe or Boru,

“of the tribute®), King of Ireland: b. 926; d.

23 April 1014. He was the son of Kennedy, King of Munster. At first chief of Thomond, or north Munster, Brian became King of Or¬

monde on the death of his brother in 976. He rose step by step until his authority was un¬

disputed throughout all Munster, whose chiefs became his tributaries and his allies. The

Danes he had repeatedly chastised, and in 1002

he took up arms against Malachy (Maolseach—

lainn), the Ard-Ri, or High King, and com¬

pelled him to abdicate in his favor. Brian was now the chief king of all Ireland and estab¬

lished his court or fort at Ceann Coradh

(Kincora), on the banks of the Shannon, a

few miles above the city of Limerick. Malachy's deposition and the consequent elevation of Brian gave Ireland the greatest of her high-kings and the country for some years enjoyed unbroken peace. War came when the discord¬

ant elements coalesced. Brian had alienated

the Leinster men by reviving the Boroimhe, or tribute; he had crushed the Danes of Limerick and Waterford; and these, with the Danes ot the Isle of Man and those of Sweden and the Scottish Isles, joined together and, on 23 April 1014, their united hosts faced Brian at Clontarf, on the north shore of the Bay of Dublin. The victory gained by the latter was decisive, the Danes being put to utter rout and their power in Ireland broken for all time. It was a dearly-bought victory, however, for Brian, his son and grandson were among the slain at the

close of the day. Brian was no less distin¬

guished as a peace administrator; by establish¬

ing harmony among the various discordant ele¬

ments of his native land, thus permitting

education and the arts to be practised and developed, he contributed in no small degree to the progress of civilization. His surname, 488

*of the tribute, ˆ was bestowed on him from the circumstance of his having revived the an¬

cient tribute exacted by the high-king from the rulers of the provinces. Fact and fiction have in the course of the centuries become so inter¬

mingled that at this distance it is difficult to form a just estimate of Ireland's warrior chief.

BRIANCHON, bre-aii-shoii, Charles

Julien, French mathematician: b. Sevres 1785; d. 1865. Besides some important papers con¬

tributed to French mathematical journals, he has left small treatises on lines of the second order (1817), and the application of the theory of transversals (1818). He is best known by a theorem, the correlative of Pascal's which he published in 1806. The theorem is : If a hexa¬

gon is circumscribed to a conic, the straight lines joining the three pairs of opposite ver¬

tices are concurrent.

BRIANQON, bre-aii-son, France, town in

the department of Hautes-Alps, on the right bank of the Durance, 35 miles northeast from Gap, and near the Italian frontier. It is a for¬

tress of the first class, occupying an eminence at the foot of the Col de Genevre, 4,284 feet above the level of the sea, and has sometimes been called the Gibraltar of the Alps, forming, as it does, a central point from which troops can be marched to all their most important passes. It manufactures silk, cotton, hosiery and cutlery. Briangon is a town of great an¬

tiquity. According to Pliny it was founded

by the Greeks. In Roman times it was known as Brigantium, on the direct route from Italy to Embrun and Gap. It was fortified by the French in 1722. Pop. 7,888.

BRIAND, Aristide, French Premier: b.

Nantes 1863. Educated for the law, he spent 15 years of a wandering life as barrister, as journalist connected with such journals as

L'Humanite, La Lanterne and La Petite Republique, as trade-unionist, as orator, political organizer, congressman and as general secre¬

tary to the French Socialist party. An optimist feeling acutely the injustice of the social state toward the proletarian victims of our economic system, he won widespread popularity with

the masses by his sympathetic attitude. To his oratorical gifts Briand owes his rise to public prominence. The possessor of a penetrating

voice, audible in its lowest tones at the remotest corner of the chamber, it is called the most seductive voice heard in the Palais Bourbon since Gambetta's. In 1902 he was elected to the Chamber of Deputies; in 1906 he became Minister of Public Instruction and Worship,

administering the law with tactful wisdom, al¬

though accused of being anti-clerical. In 1909, in 1913 and in 1916 he was Prime Minister; in 1910 earning much adverse criticism and sus¬

picion of having become anti-socialist, through his efficacious suppression of a widespread

strike of railroad employees, by calling them all to the colors, thus exposing the persistent strikers to charges of insubordination and

breach of military discipline. As (Briand the Brilliant* he was one of the foremost strong men on whom France relied during the World War crisis. In 1920 he again was made premier.

BRIAND, Jean Olivier, Canadian clergy¬

man: b. Plerin, Brittany. 1715; d. 1794. He was elected vicar-genera! of Quebec in 1760; was bishop of the diocese 1766-84, and in the trying period following the cession of Canada to the British Crown showed both tact in deal¬

ing with the new rulers and a due sense of the rights of the Church.

BRIANSK, bryansk, Russia, town in the

government of, and 70 miles west-northwest

from Orel, on the right bank of the Desna.

It is surrounded with an earthen rampart, con¬

tains 16 churches, a monastery, with a seminary and two poorhouses. It has a considerable trade in grain, hemp, hemp-oil (sent to Petrograd and Riga), honey and wax; and in linen, cables and cordage, ironware, bark, mats, lime and tar, which are sent to Kherson, Odessa and other ports of the Black Sea. It contains imperial building-yards, for which the oak forests in the neighborhood supply material. Near it are a cannon foundry and a manufactory of small arms. In the neighborhood is situated the

monastery of Svensk-Uspensk, dating from the 13th century. Pop. about 24,000.

BRIARE, b re-ar, France town in the de¬

partment of Loiret, on the Loire, 25 miles south of Montargis. The canal, to which the town is indebted for its importance, is the oldest work of the kind in France, having been begun in the reign of Henry IV, though it was not finished till 1740. It establishes, by means of its junction with the canal of Loing at Mon¬

targis, a communication between the Loire and the Seine and conveys the various products of the province, watered by the former, to Paris.

Pop. 5,700.

BRIAREUS, brl-a'reus (also called

ZEgˆon), a giant with 100 arms and 50 heads, the son of Uranus and Gsea. His two brothers, Cottus and Gyes, were formed in a similar

manner, and their formidable appearance struck their father with such terror that he imprisoned them at their birth in the bowels of the earth.

In the war with the Titans, Jupiter (Zeus) set them free and by their

assistance gained the victory. When Juno, Neptune and Minerva

conspired to bind the sovereign of the gods, Thetis brought Briareus from the depths of the sea (how he came there is not known) to the relief of the trembling Jove. Virgil places Bri¬

areus in the vestibule of hell. He was em¬

ployed with his hundred-handed brothers in

watching the Titans in Tartarus. Various

other fables are told of these gods, who are stipposed to be personifications of the extraordi¬

nary phenomena of nature manifested in vol¬

canoes, earthquakes and other commotions.

BRIBE, a reward given to a public officer

orˆ functionary to induce him to violate his official duty for the benefit or in compliance with the wishes of the party by whom or on whose behalf the bribe is given or promised.

Bribery, at common* law. is the receiving or offering any undue reward by or to any “per¬

son whomsoever, whose ordinary profession

or business relates to the administration of public justice, in order to influence his be¬

havior in office and to incline him to act contrary to his duty and the known rules of honesty and integrity. Certain writers limit bribery at common law to persons concerned in the administration of justice. The offense is much broader than this according to the weight of authority. It is said by Bishop to be the vol-BRICE

BRICK

lintary receiving or giving of any thing of value in payment for an official act done or to be done, and that it is not confined to judicial officers or other persons concerned in the administration of justice, but that it extends to all officers con¬

nected with the administration of the govern¬

ment — executive, legislative and judicial, and, under the appropriate circumstances, military.

In nearly all of the States of the American Union, however, the offense is now defined by statute, so that a resort to common law is not often necessary, except for general principles.

Bribery may be committed with respect to offi¬

cers de facto as well as officers de jure. The offense of the giver and of the receiver of the bribe has the same name. For the sake of dis¬

tinction, that of the former — that is, the briber — might be called active bribery; while that of the latter — that is, the person bribed — might be called passive bribery. The thing offered or accepted need not be money, but may be prop¬

erty, services or anything else of value. It must be of some value, but as the essence of the of¬

fense is its tendency to prevent justice in any of the departments of government, executive, legislative or judicial, the degree of value of the bribe is not essential. It has been held, however, in Indiana, under a statute prohibit¬

ing the giving or receiving anything of value, that an officer who received a note could not be convicted, because the note, not being enforce¬

able, was of no value.

At common law and under the statutes, in

order to constitute bribery there must be a cor¬

rupt intent to influence the officer or other per¬

son, or on his part, to be influenced, in the discharge of his official duties. It is not essen¬

tial, however, unless specially required by a statute, that the act induced, or sought to be induced, shall favor, aid or benefit the person giving the bribe himself. The act which is in¬

duced or sought to be induced by the bribe must be an act in discharge of a legal duty. It is not bribery if the act is in discharge of a mere moral duty. Bribery is regarded in the United States as being of such a serious nature that it is made a felony in nearly all of the States, and the punishment for the various spe¬

cies of bribery may be, in New York and many other States, imprisonment for a period not ex¬

ceeding 10 years. ((Bribery at common law, in a judge in relation to a cause pending before him, was regarded as an offense of so grave a nature that it was sometimes punished as high treason before the 25 Edw. Ill, and at this day is certainly a very high offense and punishable not only with forfeiture of the of¬

fender's office of justice, but also with fine and imprisonment,® *etc.* Bribery in England is pun¬

ished in inferior officers with fine and imprison¬

ment, but in judges, especially the superior ones, it has always been looked upon as a heinous offense. In the United States in many juris¬

dictions bribery at elections, either effected or attempted, is a disqualification for office, and an election procured by bribery is void. An at¬

tempt to bribe, though unsuccessful, has been held to be criminal and is punished in many States as severely as the substantive offense.

The reason for the law is plain. The offer is a great temptation to the weak or depraved.

It tends to corrupt, and as the law abhors the least tendency to corruption, it punishes the act which is calculated to debase, and which may affect, viciously, the morals of the community.

See Corrupt Practices Act.

BRICE, Saint, French prelate: b. Tours;

d. there, 13 Nov. 447. He is commemorated on 13 November. On the death of Saint Martin

he was made bishop of Tours. Saint Brice's Day, 1002, is memorable in old English history for a great massacre of the Danes. It was be¬

lieved that it was a concerted attempt to exter¬

minate all the Danes in England ; but, failing of its bloody purpose, it led to reprisals by the Danish King Sweyn. To him is attributed the foundation of many churches, great success in converting the pagans and numerous miracles.

Consult Gregory de Tours, (Historia Franco—

rum5 (bk. II), and (De Gloria Martyrum5

(Vol. I, p. 95) ; Baillet, (Vie des Saints5 (Paris 1701, Vols. Ill and XII), and (Gallia Chris¬

tiana5 (Vol. XIV, pp. 10-11) ; (La Grande

Encyclopedic5 (Vol. VIII).

BRICK, Jefferson, a figure in Dickens'

(Martin Chuzzlewit,5 intended as a caricature of an American journalist of 60 years ago.

BRICK, a rectangular mass of clay and

sand, dried in the sun or baked in a kiln and used for building purposes. To mold wet clay into cubes for the erection of walls and houses was one of the first efforts at architecture.

There still exist in perfect preservation sun-dried bricks made by the Babylonians and

Egyptians over 4,000 years ago. On some of these are inscriptions relating to the cause of their making, family history, *etc.* In many

cases, straw was mingled with the clay in order to give it greater coherence. The story of the Egyptian taskmasters and the brickmaking

Israelites, told in Exodus i, 14; v, 4-19, is too well known for further reference here. Scarcely less ancient than these Babylonian and Egyp¬

tian bricks are the <(adobe55 bricks of Yucatan and Mexico. There are in Colorado, Arizona, New Mexico, Texas and California hundreds

of these ’dobe houses, some of them more than 300 years old and still inhabited. The Aztecs and other American aborigines were adepts at using this material and constructed wonderful architecture out of it. The present Indian

town of Laguna, in New Mexico, illustrates the decadence of this art, which the Spanish found so perfect in old Mexico.

Bricks are made of clay and sand, molded

and dried or burned. Sometimes a proportion of other substances may enter into their com¬

position. Iron is usually present in clay soils, and the iron oxide gives the red color famil¬

iarly seen in common brick. A brick may be darkened by overburning, or if underburned it is known as salmon brick from its light color.

By introducing lime as a constituent the color may be lightened, and the sand-lime brick is nearly pure white. A little magnesia in the mixture yields a brown brick. A number of

the mineral oxides may be mixed with the raw materials to secure the different popular tints.

Rough-faced bricks have come into consider¬

able use as affording a pleasing contrast to the once popular smooth or pressed brick.

In New England brick are commonly made

734 x 33yi x 214, which when laid with a quarter inch of mortar, gives walls of 12 or 16 inches. Western brick are more usually

8 *4 x 4 y$ x 2>2, giving a slightly thicker wall, but popular where most of the construction is the length of a single brick or two courses.

Good brick should be uniform in size and

color. If a brick is overburned, it is not only darker but smaller and may shrink as much as 3/16ths of an inch. Well-made brick should

not absorb more than 1/ 10th of its weight of water, but some are so porous that they absorb 25 per cent; such are suitable only for filling and should never be exposed to the weather.

A first-quality brick should withstand a weight of 1,600 pounds placed on it centrally when the ends are supported under one inch of the length or when laid over a 554-inch gap ; brick have been made that would bear almost five tons under such a test.

Brick clay consists largely of hydrated sili¬

cate of alumina, with iron in varying quantities, and sand or free silica. It varies greatly in adhesiveness, hardness and value. The hand

method of working the clay into brick is still used by many small yards in the United States.

One or two men can mold and kiln about 50,-

000 rough bricks in a season, though under favorable conditions they

may make consider¬

ably more. The clay is usually dug in the autumn and allowed to freeze and thaw until spring, thus disintegrating the mass thoroughly through the action of frost. It is then either spaded until all lumps are removed or put into a horse-power pug-mill, where it is ground up more thoroughly. The mold is simply a box, open at both ends, the size of the brick desired.

The protruding clay is planed off with a

straight-edge, and the cube of wet clay is then allowed to dry in sheds for some hours before it is placed in a kiln for firing. This latter process usually takes from 10 to 15 days and must be carefully attended to, so that the brick shall not become cooled until the operation is finished. After cooling, stacking and counting, they are ready for the market.

Of the 4,215 concerns in the United States that may properly be termed manufacturers,

about 50 per cent use what is known as the <(stiff plastic® process. If the material to be worked is of a hard or flinty nature (shale), it is first ground in a <(dry-pan,® after which it is raised by means of a cup elevator and passed through a screen to the pug-mill, or mixer, the tailings from the screens being re¬

turned to the dry-pan. If the material is suf¬

ficiently open, as good brick clay should be, it can be run direct to the pug-mill with little disintegration or grinding. The pug-mill is

usually 10 or 12 feet long and contains a series of mixing knives, by which the clay and water are mixed to a proper consistency. From this mixer the clay passes into the brick machine, where it is compressed by a heavy auger into a solid and continuous column, being forced on to the cutting-table through a die of proper size. The cutting is done by fine steel piano-wires on a revolving wheel, working automatic¬

ally. One of these machines is capable of turn¬

ing out an average of 100,000 bricks per day.

A belt traveling a little faster than the column in moving separates the

severed cubes and car¬

ries them to the repress. This latter squares their corners and edges, givqs them a smooth, polished surface and imprints upon them any lettering or design desired. The cubes are not put through the repress unless intended for front or face-brick. The common, rough brick go immediately from the cutting-table to the dryer, which may consist of a series of tunnels built of brick 4 feet wide and 5 feet high by 120 feet long. These tunnels are heated by a furnace underneath, by steam pipes or (in large plants) by a blower which conveys the waste heat from the cooling kiln. The cubes are

loaded on little cars and run into these tunnels, where they remain till drawn out at the end of 24 hours thoroughly dried. Each tunnel

holds about 5,000 bricks. The bricks are then ready for the kilns, which are of various de¬

signs. The down-draft is a favorite modern

method of construction. This requires small

structures, round, 10 or 12 feet high and 30 feet in diameter, held in place by heavy iron bands to prevent warping from the intense heat. The floors are made of perforated blocks. Super¬

heated air from the furnaces is forced from the top down through the brick piled within, through the floor, and either out through a chimney or into other kilns or dryers. The interior of these kilns under fire is a solid sheet of twist¬

ing flame and heat, turning the brick a cherry red, if of common clay. This is kept up for from 6 to 10 days, when the fires are drawn and the mass allowed to cool. The continuous kiln of from 16 to 22 chambers has produced economical results. This stiff plastic method enables the handling of the clay cubes as they leave the cutter without preliminary drying.

This and its simplicity make it very popular.

There are three methods of brick manufac¬

ture, the <(soft-mud® process, <(stiff-mud® proc¬

ess and (<dry-clay® process. The stiff mud Is most widely used, the soft mud almost as ex¬

tensively and the dry clay claims only a small percentage of the output. Soft-mud brick, be¬

ing made with a very trifling pressure, are less dense than stiff-mud brick and theoretically seem weaker and less calculated to withstand the weather, but in practice, when well made, they last indefinitely. The stiff-mud brick, though more solid, may contain laminations or planes of separation that weaken them. The

soft-mud brick requires more time to dry but is easier to burn. The stiff-mud brick process seems to have a little preference because the bricks are dryer and can go to the kiln more quickly.

About 40 per cent of the manufacturers use the soft-mud process. Clays of a short, sandy nature, or those with a disposition to excessive lamination, are readily treated by the soft-mud process, and beautiful sand-faced brick results.

As a rule the Hudson River yards use this system, as well as many in New England and the Middle West. The clay passes first through the separator to free it of lumps, whence it is elevated to the pug-mill compartment of the brick machine. In the pug-chamber it is thor¬

oughly mixed and water added to make it of the proper consistency to mold easily. The

machine presses it into wooden molds, which are sanded to prevent adhesion of the clay to the mold, and are removed automatically. They are then placed on a revolving dumping-table, where they are dumped on to pallets, the empty mold being again sanded and passed to the

machine for use again. Then the brick goes to the dryer and afterward to the kiln. It takes BRICK-LAYING — BRICKMAKING MACHINERY

much longer to make brick by this mold method, but a very fine brick is produced, with a per¬

fectly homogeneous body to it.

Not more than 10 per cent of the manufac¬

turers can or do use the expensive <(dry-press®

or (< dry-cl ay® method, which takes the finer clays and presses them with a force of 20,000

pounds to. the square inch into steel molds.

The clay is nearly dry when this is done, so that the cakes can be handled with ease at once.

The objection urged by some against this

method is that the brick resulting is too porous and apt to absorb moisture, and <(sweat)> or disintegrate. Still, for the finer clays this method possesses undoubted advantages. The

beautiful clays of Staten Island and in portions of New Jersey and Pennsylvania are nearly

white, very fine and smooth in texture. These work up into most artistic front and face-brick for the exterior of fine buildings or for dec¬

orative mantel and chimney work in the in¬

teriors. Hollow brick is much used for par¬

titions. It is made in large sizes and so can be erected very rapidly. It is inexpensive, and since it provides considerable air space is a good non-conductor, thus tending to keep in the heat as well as to keep the cold out of a building. Paving brick, which were once very common, are going into disuse because the

concrete pavement is more sightly, more satis¬

factory and more permanent.

Tiles, being made of the same material as

brick, are commonly produced in the same es¬

tablishments. Tile is really nothing but vitri¬

fied or glazed brick. This gives a beautiful surface for interior decoration and a water-resisting surface for roof-tile and sewer-pipes.

The. United States census classes the brick and tile industry as one, and in the 1910 census lists 4,215 factories. It is probable that there are several thousand more small makers of brick using hand processes who escape notice and

are not listed. Those included in the census report give employment to 85,746 people, have an invested capital of $174,673,000, make prod¬

ucts valued at $92,776,000, of which $69,040,000

is value added to the materials in course of manufacture. Illinois is the leading State in the brick industry, with 340 factories ; Indiana, Iowa, Missouri, Georgia, Kansas, California

and Alabama follow in the order named. For further information regarding the uses of brick, see Building Materials ; Brickmaking Ma¬

chinery; Clay-working Machinery; Ma¬

sonry.

BRICK-LAYING and BRICKWORK.

See Masonry and Building.

BRICKMAKING MACHINERY. Ma¬

chines and structures employed to prepare, mold and dry plastic clay into rectangular blocks of various sizes. These blocks, after being hard¬

ened by baking in ovens or kilns, are commer¬

cially known as bricks and aTe extensively used for building and other purposes. For infor¬

mation relative to the sizes, composition, qual¬

ities and various uses of bricks, and the general history of brick manufacture, see Brick. The types of brickmaking machines are exceedingly numerous, but they may be conveniently divided into three classes — soft-clay process, stiff, tempered-clay process and dry-clay process. In the soft-clay process (Figs. 1 and 2), which is also known as sand-molding process, clay taken directly from the bank is pulverized, mixed with water and tempered in the machine and then pressed into sanded molds which are fed in beneath the press box. The molds thus filled under pressure are then moved forward to a Fig. 2. — Sand Mold, soft mud, Brick Machine with Pug Mill attached.

delivery table, where they are emptied and then returned for refilling. This process makes

bricks of a fine homogenous quality but is slow and the machines are, as a rule, used by the smaller manufacturers. Of late years improve¬

ments have been made in machines for this

process, raising the capacity to 5,000 bricks an hour for each machine, and may be capable of further development.

Die-working machines (stiff, tempered-clay

process — Figs. 3 and 4) are of two types —Fig. 4. — Auger Brick Machine.

those in which the clay is moved out continu¬

ously by means of a rotating auger and those in which the clay is pressed out in bars of specific lengths by the reciprocating motion of a plunger. In machinery for the stiff, tempered-clay process of brickmaking, the product of which is, perhaps, that most generally approved by brickmakers, builders, engineers and archi¬

tects, the bar of clay is cut up into bricks of the required size by wires

which, according to the mechanical contrivances adopted to operate them, give to these machines the additional designations end-cut and side-cut or, generally 492

speaking, wire-cut. The machine for this proc¬

ess is an expressing device for forcing the prepared material through a die (Fig. 6) and forming it in a continuous column to the de¬

sired size and shape. The latest types consist of a continuous screw in a case, of such diam¬

eter and pitch as will give greatest efficiency, with suitable mechanism for driving the screw.

The die is at the end of the screw and adja¬

cent to it, and determines the size and shape of the column of clay which issues continu¬

ously from it. In front of the die is located a cutting device (Fig. 5) carrying a series of wires so spaced as to cut up the column of clay into the desired sizes. The spacing of these wires determines the other dimension not de¬

termined by the die, and provision is made for the cutting section to move with the bar of clay while in the act of cutting and for its return to starting position after the cut has been made, these cycles being repeated auto¬

matically as long as the column of clay is issuing from the die. Since, in accordance

with the laws governing the movement of fluids under pressure, the clay as it moves through the die is retarded by friction at the corners and moves more freely at the centre, to obviate this a lubricant is applied to the column at the angles of the die to secure an uninterrupted and uniform flow throughout the cross-section of the bar of clay and ensuring square and well-defined corners to the column.

Of the various devices employed to cut the clay bar, thus formed, into bricks the auto¬

matic side-cut wire cutter is probably the best.

(Fig. 5). It consists of a regulating frame Fig. 5. — Automatic Brick Cutter,

or table on to which the bar of clay is car¬

ried from the die and by which the cut-off is controlled. The belt carrying the bar of clay runs around a measuring wheel which deter¬

mines the exact thickness to be cut according to the desired size of bricks. The cut-off wires are strained on spring holders to a tension which, while sufficient to cut, yet yields readily to obstructions such as stones, either cutting around them or springing over them, and op¬

erate automatically and without any trouble.

A broken wire may be replaced at once, gen¬

erally without stopping the machine.

Off-bearing belts are of the endless type

and are usually arranged to carry the bricks cut off from the continuous clay bar to any reasonable distance. The bricks are then trans¬

ferred from this belt to dryer-cars. An auger side-cut machine of this tvpc is capable of an average daily product of 10,000 to 150,000 brick, according to the size of the unit. Its weighs complete is from to 15 tons, apd it is

equipped with a friction-clutch driving-pulley.

Of side-cut devices, the rotary automatic cut¬

ter is perhaps the most simple in construction and the most reliable in operation. Its action is entirely automatic and extremely sensitive to regulation. It produces bricks of uniform Fig. 8. — Interior detail of Auger Brick Machine, showing Liners, Augers, *Etc.*

thickness and smooth angles. All obstructions are pushed from the surface into the body of the bar, thus preventing the ruffled edges com¬

mon to many side-cut bricks. The measuring

section trips the clutch which furnishes the power for operating the cutting mechanism at the proper interval of time and automatically adapts itself to any changes of speed in the movement of the clay bar. The bar of clay is supported on #the bottom face and at one side, thus ensuring a smooth, sharp cut. The slit through which the wire passes is just wide enough to accommodate the thickness of the

wire used. An auger machine equipped with

the side-cut device of the type described has a capacity of from 50,000 to 150,000 bricks per day.

Of the various forms of cutting devices, the board-delivery cutting-table may be described as a general third type. This table cuts 12

bricks at a time, automatically drawing a

smooth board under the bricks as they are cut.

Cutting-sections of the table travel forward upon a track while the wires are being drawn through the bar of clay, thus compensating for its forward motion, while a slight pressure upon the lever during its return stroke brings the table to its original position and places the board, loaded with bricks, ready for removal.

The apparatus weighs about 900 pounds and

measures about nine feet in length, including hand-lever in operating position. Modifications of this table are employed for cutting chimney blocks and hollow-ware of large section. To facilitate the handling of bricks in their green condition and to prepare them for the drying and burning processes, various appliances are employed which ensure more or less economy

in time and labor.

Repressing is a process employed to pro¬

duce bricks suitable for fronts of buildings, BRICK MAKING MACHINERY

Fig. 1 Sand Mold Brick Machine

Fig 3 Plunger Type of Brick Machine

Fig. 6 Hand Power Brick Repress

Fig. 7 Power Brick Repress

BOTANY — STEM-STRUCTURE, ETC,

Figs. 1-10 Epidermal Appendages 11, 12 Outer Bark of Birch 13 Longitudinal section of vascular bundle in the Balsam. 14 Cross and longitudinal sections of vascular tissue in a Fern 15 Do. of young Alder root 16, 17 Root-hairs 18, 19 Ideal cross section of a Dicotyledonous stem 20 Cross section of a vascular bundle in do. 21 Cross section of stem ot uiemausˆ 22. 23 Network of Vessels from stem of Sow-thistle 24 Cross section of Black Currant Bark 25, 26 Cross and longitudinal sections of liber in Lime-tree 27 Ideal section of a Dicotyledonous stem 28 Id leal snucture of Exogenous stem 29 Medullary ray of Oak 30, 31 Ideal cross section of Endogenous stem 32 Cross section of a Monocotyledonous vascular bundle 22 Longi jainal section of Root stock of Iris 34 Vertical section of Beech leaf BRICKS WITHOUT STRAW— BRIDE

ornamental tablets and corner-pieces with de¬

signs in relief, or intaglio, and other shapes of any desired design; also paving brick and blocks, fire-clay brick, blocks and tile. The great many varieties of machines used for this purpose are called represses and are operated either by steam or hand power. The hand

press shown in Fig. 6 is equipped with a very powerful operating lever and has a steel-lined box with a top plate and plunger faced with steel, conveniently arranged for refitting whenever necessary. It weighs about 900

pounds, occupies floor space 20 inches by 3 feet 6 inches, exclusive of the lever, and may be readily moved upon the rollers under the for¬

ward end from place to place about the works.

Power represses are made with one or two

sets of plungers or pressure plates.

For repressing paving brick, fire brick and face brick by power (Fig. 7), a power-operated machine is employed, covering various sizes of ware. For repressing face and fire brick a capacity of 18,000 to 20,000 bricks daily is the average. When repressing paving brick with

round corners that will stand rapid handling, the presses may be speeded so as to obtain an average of 30,000 daily from each machine.

The larger size machines are for larger ware, which must be handled more slowly, hence the daily output in number of pieces is less in pro¬

portion to the size and shape of the ware.

One of the most marked improvements in

brickmaking is the invention and introduction of the mechanical brick-setter, which takes the brick from the dryer-car and sets them in the burning kiln. (Figs. 14 and 15). This work had always been done by hand until the intro¬

duction of the Penfield setting system in the larger yards of the country. Hand-set brick was a slow task. A setting gang was composed of tossers, who took the brick from the car and tossed them, four at a time, to the setters, who placed them in the kiln. The speed was limited to 10,000 brick per man per day and many brick were damaged by careless handling.

The Penfield setting system handles an entire dry-car load of brick at a time without dam¬

age. A thousand brick a minute can be ham died by this mechanical device. The use of the mechanical brick-setter does not interfere in any way with any other department of the plant. The brick are taken from the off-bear¬

ing belt and are hacked on dry-cars just as of old, except that each car is hacked on a stand¬

ard plan as a kiln unit, leaving a small space between the bricks of the bottom row to pro¬

vide an entering space for the arms of the set¬

ting machine. Each dry-car is loaded with 800

to 1,000 brick, which are called a unit. The setting machine handles a full carload of brick at each lift, touching only the bottom rows and doing the work without dropping, chipping or injuring the brick. The preparation neces¬

sary for the installation of the Penfield setting system in the plant is to equip the kiln shed with an overhead electric crane. The tracks upon which this crane runs should be built through the entire length of the kiln shed, or as much of it as is desired for machine-set brick, in order that the setting machine may operate freely over the top of the kiln. To this overhead crane the brick-setting machine is attached. The setting machine is built

throughout of steel and has a number of pre¬

hensile arms which enter the spaces left be¬

tween the bottom rows of brick as hacked on the dry-cars. Each stack or carload having

been built on a uniform plan, it is easy for the operator of the crane to run the carrier up to the dry-car and the arms of the carrier enter the spaces left to receive them. The crane then starts to raise the load, and the weight of the load on the carrier causes a series of grip-plates on the arms of the carrier to close automatically, putting just sufficient pressure on the bottom rows of brick to hold them firmly. The bulk of the weight of the load is carried by the heavy steel arms, as the Fig. 9. — Dry Press Brick Machine.

third course of brick from the bottom is built crossways of the arms. The lower row of

brick having been automatically clamped, the load is raised and is successfully carried to any part of the kiln, where it is set accurately in any position desired on any bench of the kiln. When the load has been lowered into

position in the kiln and the weight is no longer on the machine, the pressure is automatically released from the grip-plates and they release their hold on the bottom rows of brick so that the craneman can back the carrier out from under the load and return with the carrier to the dry-cars for another lift.

In addition to brick being made by the soft-mud process and the stiff-mud process, both of which have' been described, they are also made by the dry-press process, by which the clay is ground to a powder and pressed in prac¬

tically a dry condition. This machine is shown in Fig. 9.

Davis Brown,

The American Clay Machinery Company.

BRICKS WITHOUT STRAW, a novel

by Albion W. Tourgee, containing a modern

application of the Biblical phrase. The words are an allusion to the darkest days of the He¬

brew bondage in Egypt, when the toilers were ordered to furnish their own straw without

diminishing the number of bricks produced in a given time.

BRIDAL WREATH. A deciduous shrub,

very popular in temperate countries. See

Spir/Ea.

BRIDE, Saint. See Bridget.

BRIDE OF ABYDOS, The, a poem by

Lord Byron, published in 1813. From this a melodrama was adopted a few years later by Dimond.

BRIDE AND BRIDEGROOM, words of

Anglo-Saxon origin applied from very early

times to a newly-married wife and husband,

the more common form at present being

bride and groom. It has been usual from the earliest period of antiquity to pay especial honors to a bride and groom, and in every age and among every people the wedding-day has

been devoted to joyous and solemn ceremonies.

It was celebrated among the Athenians by of¬

ferings made in the morning to particular divin¬

ities, to Zeus and Hera, and especially to Arte¬

mis, who was thought to look with disfavor upon marriages. At nightfall she was con¬

ducted to the bridegroom's house in a chariot drawn by a pair of mules and furnished with a kind of couch, on which she sat between her husband and one of his nearest friends. The bridal processon moved on, greeted and accom¬

panied by friends bearing nuptial torches and singing songs. Then followed the marriage

feast, to which, contrary to the usual Greek practice, women as well as men were invited ; and at its close the bride was conducted by the bridegroom to her apartment, where a law of Solon required that they should eat a quince together. On the day after the marriage, pres¬

ents were made to the newly-married couple

by their friends. Among the Romans the same custom prevailed, in memory of the rape of the Sabines. The wedding day was fixed, at least in early times, by consulting the auspices.

The Roman marriage was usually, though not

always, unattended by religious rites. The

bride was conducted to the house of the bride¬

groom by a procession and bore in her own hands the emblems of diligence, a distaff and a spindle with wool. The bridegroom received her within with fire and water, a symbol, per¬

haps, of purification, and the ceremonies of the day were concluded by a repast given to friends and relatives. The bridal apartment, to which she was conducted by matrons who had not

had more than one husband, was magnificently decked with flowers, and minstrels and friends sang without during the night.

In the days of our ancestors various cere¬

monies, often ((more honored in the breach than the observance,® were followed. The bride was undressed and put to bed by the bridemaids, and the bridegroom submitted to the same opera¬

tion at the hands of the groomsmen. Then the posset, a drink made of milk, wine, yolks of eggs, sugar, cinnamon and nutmeg, had to be served. Then there was sometimes another dila¬

tory proceeding in the sewing of the bride in a sheet. The arraying of the bride in white, the wedding feast and the giving of presents are ancient customs. As early as the time of James I, the presents received by the bride of Sir Philip Herbert amounted in value to $12,500, a notable expenditure of the kind for those days, but frequently surpassed at the present time by the value of a single bridal gift. The bridal kiss is of unknown antiquity. The old missals, which date long before the ((common prayer book,®

enjoined it as an essential part of the marriage ceremony. Moreover, it was always done in

church. The priest, too, at one time enjoyed the privilege of kissing the bride. Groomsmen

claimed and took it for a long period. The ordinary accessories of the weddings of our days may mostly be traced to ancient times. The marriage ring probably encircled the finger of the wife of the first Pharaoh, and was certainly used in the Roman ceremonies under the

emperors. Its heathen origin nearly led to its abolition by the Puritans of Cromwell's time.

The wedding ring is always put and worn on the fourth finger of the left hand, because it was supposed in ancient times that an artery ran from this part directly to the heart. The bride¬

cake is no less sanctified by antiquity than the ring. It is a symbol of plenty, and is intended to express the hope that the newly married pair may be always supplied with a,n abundance of the good things of this life. In ancient days wheat was sprinkled upon the head of the bride with the same intent. At present this custom is superseded by the scattering of rice upon the bride and groom as they leave the house after the reception. The throwing of an old shoe after the couple

shows traces of an old super¬

stition. Passing bits of the cake through the wedding ring nine times, and putting them under the pillow to dream upon, was a practice in vogue long before our great-grandmothers lived and loved. Putting up the slices in white paper boxes is. an innovation of later times. Wine was an invariable accompaniment of all mar¬

riages, long before the marriage feast at Cana.

In times past it was customary to drink it in the church, the priest having first blessed the cup, however, to suit it to the holiness of the place. The Jews universally hold to the custom of wine-drinking on the occasion of a marriage.

After the bride and groom have drunk from

the glass it is broken to remind them of

mortality.

Modern custom lengthens out the privileges

of bride and bridegroom beyond the wedding

day. In former times, when the religious cere¬

mony and the attendant festivities were over, all bridal honors ceased. These are now prolonged by the bridal tour. The term honeymoon, for¬

merly applied to the first month of married life, is. now more vaguely used and is sometimes given to the entire period of the bridal tour, even when that is extended over many weeks.

BRIDE OF LAMMERMOOR, The, by

Sir Walter Scott, one of the group of (Waverley NovelsJ called (Tales of my Landlordˆ

The scene is laid on the east coast of Scotland, in the year 1700. The

hero is Edgar, Master of Ravenswood, a young man of noble family, pen¬

niless and proud. He has vowed vengeance

against the present owner of the Ravenswood estates, Sir William Ashton, lord keeper, whom he considers guilty of fraud; but forgoes his plans on falling in love with Lucy, Sir William's daughter. There is a secret betrothal ; the ambitious Lady Ashton endeavors to force her daughter to marry another suitor ; and in the struggle Lucy goes mad, and Ravenswood,

thinking himself rejected, comes to an untimely end. The most famous character in the book is the amusing Caleb Balderstone, the devoted old steward of Ravenswood, who endeavors

constantly to save the family honor and to conceal his master's poverty by ingenious devices and lies, and whose name has become the sym¬

bol of <(the constant service of the antique BRIDEWELL — BRIDGE

world. ® Though sombre and depressing, the

' Bride of Lammermoor) is very popular, and the plot has been used by Donizetti in the opera 'Lucia di LammermoorF Consult Lon¬

don Monthly Revieiv (Vol. XXXIX, p. 387).

BRIDEWELL. The name originally be¬

longed to a well dedicated to Saint Bride be¬

tween Fleet street and the Thames, which has given its name successively to a palace, parish and house of ˆcorrection. Henry VIII built on this site, in 1522, a palace for the accommoda¬

tion of the Emperor Charles V, which became a residence of Wolsey. Under Edward VI

it was, in 1553, converted into a workhouse for the poor, and a house of correction for the idle and vicious. From this originated the gen¬

eric term, ((a bridwell® — a house of correction.

It was governed by a keeper who was independ¬

ent of the sheriff of London. Queen Mary con¬

firmed the gift, and it was formally taken pos-sssion of by the lord mayor in 1555. It at last became a place of punishment until its removal in 1864.

BRIDGE, a game of cards of the whist

family. It is similar to the Turkish and Egyp¬

tian “Khedive® ; to a Danish game of the middle 19th century; and to the (<Dutch whist® played in London in 1884. The Russian variety,

“Yeralash® or “Biritch® was accepted by the London clubs in 1894 as ((Russian whist® or <(Biritch® and corruption of the Russian word to ((bridge® followed. As ((Bridge Whist® the game rapidly replaced whist. In 1904 ((Auction bridge® was suggested but was not taken up until 1907, when it was adopted by the Bath Club and quickly superseded Bridge whist.

Auction Bridge. — The outstanding char¬

acteristic of Auction is the determination of the trump or no-trump declaration by bidding.

There are four players, forming two sets of partners, and the ordinary pack of 52 cards is used, the cards ranking from ace to two, with the ten lower than the knave. The entire pack is dealt, singly and to the left ; the game is played with trumps or no-trumps, and the bid¬

ding continues until three players ((pass.® The dealer has the first bid, but is not compelled to bid, and if all four players ((pass® the deal passes to the next player. The bid is for the number of tricks above six the bidder contracts to take. Any bid may be “doubled® by any

player — doubling its value in points if won, and doubling the penalty

if the bidder loses —and the original bidder may ((redouble,® quad¬

rupling the first values. Doubling and redoub¬

ling may occur at any stage in the bidding, with¬

out affecting the value of the bids themselves or deterring further bidding. The trump or

no-trump declaration passes to the highest bid¬

der, known as the declarer, and the player on his left leads. The declarer's partner then places his cards on the table, face upwards, and takes no further part in the play, except that he may call attention to an improper play, to an error in the score, question his partner as to a "revoke® — renounced suit — and partici¬

pate in any discussion of the play or the score.

The declarer plays his own and his partner's hand, as in dummy whist, and the play is the same as in whist (q.v.). The value of the different suits, as fixed by the Whist Club of New York, November 1913, is as follows:

Clubs, six; diamonds, seven; hearts, eight;

spades, nine; no-trumps, 10. <(Honors® are

credited to the original holders and constitute the five highest cards in trumps, and the four aces in no-trumps; their value is rated by the trump suit and is not altered by doubling.

Three honors between partners count twice the value of a trick in that trump ; four honors, three tricks; five honors, four tricks; four honors in one hand, eight tricks ; four honors in one hand and the fifth in a partner's hand, nine tricks; five honors in one hand, 10 tricks.

In no-trumps three aces between partners count 30; four aces count 40; and four aces in one hand count 100. The Grand Slam — taking all 13 tricks — counts 100; the Little Slam, 50; and winning the rubber — two games out of three — counts 250. The score is kept on

paper and <(game® and "honor® points are kept separately. The game is for 30 points and all over six tricks count towards it. Only the de¬

clarer and his partner score towards the game, the penalties awarded the adversaries when the declarer loses being credited in the “honors®

column. When the declarer loses, the adver¬

saries score 50 points for each extra trick he contracted to take, 100 for each doubled extra trick, and 200 for each redoubled extra trick.

When the declarer wins in spite of double he scores 50 points for filling his contract and 50

for each extra trick; if he redoubled, 100 points for his contract and 100 for each extra trick.

After the rubber is played honor and game

scores are added and the difference between the scores of the two sets of partners is the number of points won. In scoring the points won in excess of those necessary to win the game count towards the score, but not towards the next game. All hands must be played out ; but if two games in succession are won by one set of partners the rubber is then complete.

“Nullos® are not officially recognized, but

when played they are valued at eight points, outranked by hearts ; the bidder undertakes to force his adversaries to take a certain number of tricks over six. A revoke is penalized by 100 points for each offense if against the adver¬

saries; and by 100 points, or three tricks, if against the declarer, but for a second or third offense in the same deal the declarer must take points only. Such tricks count toward con¬

tract, but do not carry bonus in case the con¬

tract had been doubled.

Bridge Whist. — Bridge differs from Auc¬

tion chiefly in that the making of the trump or no-trump declaration rests with the dealer and may be passed to his partner but not to the

adversaries. This was a signal departure from whist, in which the trump was the last card turned. The value of the suits also was a departure from whist. They are: Spades, two; clubs, four; diamonds, six; hearts, eight and no-trumps, 12. The Grand Slam counts 40 ; the Little Slam, 20. If a player possesses no card of the trump suit he makes “Chicane,® which counts twice the value of a trick in the trump suit. Doubling and redoubling may take place after the trump is declared. The rubber counts 100 and honor values are determined by that of the trumps. The reckoning of the score is the same as in Auction. Consult Dalton, W., (Complete Bridge> (1906) ; Foster, R. F.,

(Bridgc Manual* (1907) ; Work, M. C. Auc¬

tion of To-Day) (1913) and (Auction Developments) (1913), ‘Foster on Bridge) (1919).

BRIDGE. In its broadest sense, the term

signifies any kind of an independent connecting structure. Specifically, it designates a struc¬

ture erected for the purpose of continuing a roadway over a stream, valley or any other natural or artificial obstruction without closing the way beneath as with an embankment.

The origin o[the term is difficult to trace, and the art of bridge-building itself is so ancient, that its beginning lies in the efforts of primitive man who felled trees, or swung jungle vines across the streams to facilitate his movements on his hunting trips, or when en¬

gaged in trade or travel from village to village.

The construction of a bridge, however, as an engineering structure, although quite elemental in its engineering features, may be traced back more or less accurately to the Chinese who ap¬

pear to have been the first people to employ the masonry arch for the purpose of continuing roadways across streams.

The art of bridge-building, however, as

developed in the various countries was not

evolved from the earlier Chinese practice, but independent effort characterizes its develop¬

ment in each country, and by the very nature of the structures built in the past, the present-day investigator is enabled to formulate very clear and accurate ideas as to the character, customs and importance of the peoples who

built them.

Whether the Egyptians were bridge-builders

is conjectural for no bridges have survived among the structures of their ancient civiliza¬

tion. Some brick arches of crude construction have been found in ruins along the Nile,

ascribed to the period 2900 b.c. It is not known that they were bridge arches. Similar condi¬

tions appear to have obtained among the

Babylonians and the Assyrians, and the earliest examples that remain, other than those of the Chinese, appear to belong to the (<Hittite® and ˆPelasgic® tribes, who inhabited the shores of the Mediterranean Sea during a prehistoric

period antedating that of the building of Troy.

Their engineering methods appear to have been imitated by the Cretans, whose cities in Asia Minor, Greece and Italy, and in the

countries bordering on the Mediterranean, were con¬

nected by macadamized roads which required

bridges that were constructed by a high order of engineering skill. They were somewhat

similar to the one built about 425 b.c. across the Euripus in Euboea, a province of Greece, and consisted of massive abutments and piers of masonry with a connecting superstructure of

planks. The typical Greek method is shown by the bridge at Assos, in which parallel stone lintels doweled together are employed to con¬

nect the piers and abutments.

On the other hand, the engineering genius

of the ˆPelasgic® tribes was inherited and de¬

veloped by the Etruscans and the Romans in the application of the basic principles of the arch.

The bridges at Vulci, Bieda and Cora, in

Italy, were not true arches, the stone courses having been corbeled out to meet at the centres of the spans. These were built during the

7th and 6th centuries b.c. The true Roman

semicircular arch did not appear for an¬

other century. From that time onward the

Roman bridge-building methods were carried

through stages of greater and greater excellence until the 4th century b.c., when the Roman policy of constructing great military roads to bind their possessions together permitted the highest development of their engineering skill, in structures of this kind.

The brilliant and unrivalled career of bridge and viaduct construction thus inaugurated by the building of the famous Via Appia, and cul¬

minating in the erection of the eight great bridges of Rome, has furnished models for all the succeeding centuries, and is applicable to¬

day to the construction of stone structures.

Some of the bridges of the Republican

period still remain. Of these, the Ponte Lupo and the viaduct for the Anio Vetus aqueduct were built about 143 b.c., and consists of great stone arches of tufa and travertine; while the viaduct near Gabii, built about 122 b.c., con¬

sisting of seven arches about 292 feet long, is still in use. Within Rome itself, the Hvmilian bridge, built in 179-142 b.c. across the Tiber, is supposed to have been the first stone bridge to span that stream, all the others having been constructed of wood, a material which con¬

tinued in use until quite a late period for bridges across wide rivers. Another, the

Sublician Bridge built 621 b.c. by Ancus Martius across the Tiber between the Janiculum and the Aventine Mountain was famous for its defense by Horatius Codes against the great army

under Lars Porsenna. The only one of the

urban bridges of Rome that remains intact is the Fabrician Bridge, or <(Ponte Fabricio,® built in 62 b.c., but the greater part of the most magnificent of them all, the 2Elian Bridge, or <(Ponte Sant' Angelo,® built by Hadrian in

136 a.d., also remains. The former consists of two round Roman arches of 80 feet span built of peperino and tufa, faced with massive

blocks of travertine ; the latter of eight arches, arranged to grade upward toward the centre of the structure, thus adding greatly to its archi¬

tectural effect.

Of the important bridges built on the great military roads of the Empire — the Appia, the Aurelia, the Flaminia, the Via Salaria or Ponte Salaro, the Cassia, the Valeria, the Latina and the 2Emilia, those built during the Augustan period were the most remarkable. The

Flaminia commenced at the Mulvian Bridge

and ended at the Ariminium (Rimini) Bridge.

The latter, .which consists of five great arches with a total length of 236 feet, is the best pre¬

served of them all ; but vestiges of a great many others still remain, the most important being those near Narni and Borghetto, the great one of Vincenza, rebuilt at Verona, and those near Aosta and Calzi.

With the expansion of the empire many

bridges were built upon the fine macadamized roads which connected the various provinces

with the Eternal City, by the Roman legions under the direction of their skilful military engineers. Of these, the greatest was the

bridge across the Danube, built in 103 a.d., by the engineer Apollodorus, to enable the Em¬

peror Trajan to conquer Dacia. It consisted of 20 massive stone piers, 60 feet square, con¬

nected together by a superstructure of wood with arches of 170 feet span. It had a height of 150 feet and a total length of 4,770 feet.

It was subsequently destroyed by Hadrian, but the great piers are still standing. They were built in caissons in 18 feet of water, and illus-
BRIDGE

trate effectively the consummate daring of the Roman engineer.

Prior to its construction, intervals of such enormous length had been spanned by tem¬

porary bridges of boats, a practice handed

down from a period reaching farther back than that of Xerxes, Darius, Hytarpus or Cyrus —in the 6th century b.c. It is interesting to note in this connection, however, that the most cele¬

brated bridges built by the Romans were not generally distinguished for the great span of their arches, their great total length or the peculiar lightness of their piers, but for their excellence of construction, and durability. The span of their arches seldom exceeded 70 or 80

feet, and their height was nearly half the span, thus giving the arches a semicircular form, or, more exactly, a segment of that form.

In all the countries which formed the

provinces of the Roman empire, with the ex¬

ception of the Spanish Peninsula, most of the bridges built by the Romans were allowed to fall to pieces during the Dark Ages, so that very few of them have survived. The ruins

and foundations of some still exist near

Vaison, and Chateau Neuf, in France, but are not of sufficient size to convey much of an idea of the special characteristics of the struc¬

tures. In Spain, however, the high culture of the Moors ensured the preservation of these superb examples of Roman engineering. Of

these, the best examples are the bridges at Cuenca, Evora, Martorell, Merida, Chaves, Al-conetar, Orense, Olloniego, Almazan, Ona and Salamanca. The greater number of them were

built by Trajan, and that of Salamanca is the most magnificent of all. Many of these struc¬

tures were adorned by triumphal and memorial arches at each end, or in the centre, which, while adding greatly to their architectural ef¬

fectiveness, also served the purpose of a toll gate, or a fortification. Interesting examples of these are the bridges at Saint Chamas, in France, and the Ponte Salaro at Rome.

The Moors not only preserved the Roman

structures, but imitated them and built many bridges fully their equals in size and elaborate¬

ness of design. The bridge at Cordova, across the' Guadalquivir, is of 16 spans and is one of the most notable examples of their work, and also that of Alcantara, across the Tagus, built by Lacer during the reign of Trajan. It con¬

sists of six granite arches, the largest, 115 feet span. It has a total length of 600 feet, with a width of 26 feet, and carries the roadway at a height of 45 feet above the level of the river.

The early history of Oriental bridge-build¬

ing appears to extend back to the days and works of Semiramis, who is credited by Dio¬

dorus Siculus with the construction of a bridge across the Euphrates at Babylon about 776 b.c., and is described by him as a movable draw¬

bridge, 30 feet wide, supported by stone piers.

The earliest existing examples of Oriental

work, however, appear to be the Persian

bridges at Dizfel 1,250 feet long, and at Shus¬

ter 1,700 feet long, which were probably built during the rule of the later Achaeminid Kings over Iran, about 350 b.c. Their design em¬

bodies the flat-pointed arch characteristic of later Mohammedan architecture, and they are

still in a fair state of preservation.

• It is noteworthy, that, while the culture and continuity of the Byzantine and Mohammedan

civilizations maintained in good condition the bridges already built, and created new ones of equal usefulness and magnitude, the science and art of bridge-building was practically lost in the European countries during the six centuries

(500-1100 a.d.) which comprised the Dark

Ages. In the 12th century, however, the archi¬

tectural and engineering sciences felt the

awakening impulses which culminated in the

magnificent structural creations of the Renais¬

sance. The revival was first experienced in Italy and France. Bridges were built not only by the governing authorities but also by the churches — ■ the building of a bridge being con¬

sidered in the nature of a pious undertaking by a religious order of the Benedictines,

known as the (<Brethren of the Bridge. ˆ

Bridges were built at Tours, Orleans and

Vienna, and many other large cities, and the Rhone was spanned at Lyons and Avignon by

two fine bridges, the last named being about 3,000 feet in length. It was built during the years 1178-88, by Benezet. It is remarkable on account of the elliptical curvature of the arches, the radius of which is shorter at the crown than at the haunch, and, therefore, conforms more nearly to the linear equilibrated arch, than the modern elliptical arch which has the longer radius at the crown. It consisted of 19 arches.

The span of the largest arch was 110 feet 9

inches with a height of 45 feet 10 inches. Four of the arches still remain.

The bridges built in southern France were

particularly fine. The bridge at Espalion is re¬

garded as the oldest — built in 780 — and it was probably the first with the pointed arch. The Saint Esprit, the Beziers, the IVIontauban and the Pont Valentre, over the Lot at Cahors, are some of the best examples of those built dur¬

ing the period covered by the later part of the 13th and the earlier part of the 14th centuries.

The application of the system of end and

central towers for purposes of fortifications received the highest development at this time.

This was especially true in France where the mediaeval social conditions made such forti¬

fications an absolute necessity. In this respect, Germany and Spain were far behind France,

although the monumental bridge of 15 semi¬

circular arches across the Danube at Ratisbon, built by the Germans in 1135, and the bridge of 18 semicircular arches across the Elbe at Dres¬

den, were very fine examples of this kind. The Spanish bridges at Zamora, Tudela, Lograno,

and Palencia, built during the period 1135 to 1192, are of the pointed arch type, some of them consisting of as many as 20 arches.

Of the Italian bridges built during this

period, the best examples are the Ponte Vecchio in Florence, originally

built in 1177 and re¬

built in 1362, the bridge at Mantua, and the Rialto Bridge over the Grand Canal in Venice, built in 1588. These bridges were of the covered type, that is, they had a covered gallery which was flanked by a double line of booths and small shops in which all kinds of merchandise were exposed for sale. In Italy, the use of wood as a material of construction was gener¬

ally adhered to until the 13th century, although in France, and in the other countries of north¬

ern Europe it had been generally supplanted by masonry. Yet, at the close of the 1 5th century, Italy had some fine stone structures —498

the bridges at Mossa and Signa in Tuscany, and the Ponte del Diavolo near Lucca, with one span of 120 feet; while France had many large wooden bridges at several important

points.

The engineers of the Renaissance returned

to the round arch typical of the Roman bridges, but they showed great boldness in their designs, by increasing the span of the arches. The bridge across the Adda at Trezzo, built under the orders of Bernabo Visconti, Duke of Milan,

during the latter part of the 14th century, con¬

sisted of a single arch of granite with a span of 251 feet, and a radius of 133 feet, while the bridge over the Ticino at Pavia consisted of seven pointed arches of brick work, each 70

feet in span and 64 feet rise.

Of the smaller Italian bridges, the most

famous is the Bridge of Sighs at Venice, built during the latter part of the 16th century, to connect the Ducal Palace with the prison.

In England, the use of stone as a material of bridge construction dates back to the bridge over the East Dart at Dartmoor, believed to be over 2,000 years old. A stone bridge at Bow over the river Lea is the earliest English bridge of that type of which there are records. It was built about 1110. An old bridge over the

Thames was in existence in 978, and in some records of 1014 there is mention of another.

By existing records it appears that a triangular pointed arch stone bridge at Croyland, Lincoln¬

shire, was chartered in 943. The present

structure, known as the Croyland Bridge, how¬

ever, although one of the oldest stone bridges in England, appears to have been built about the latter part of the 14th century. It is also triangular in form, and consists of three pointed arches wrhich span the waters of the Welland, the Nyne and the Catwater drain. On account of its steep grade it can be used only by foot passengers.

The work of the (<Brethren of the Bridge®

order carried the art of bridge-building up to the 1 7th century, and a great many fine struc¬

tures were built in all parts of Europe. In France, the most important were the Trilpot, Tours, Gignac, Neuilly and Blois bridges, and in England, the Blackfriars, Westminster, Wins¬

ton and Kelso. The date of the building of the first London bridge across the Thames is quite uncertain ; but, there is very little doubt that it was built of timber and had to be frequently reconstructed. The so-called great London

Bridge was built of stone, between the years 1 176 and 1209, by an architect sent from France for that purpose. It had a covered gallery vdiich wras lined on both sides by shops, like a regular street. It

consisted of 19 or 20 pointed arches, varying from 20 feet to 9 feet in span, and had a total length of 940 feet. It was supplanted by the structure now known as (<01d London Bridge,® in 1831. This structure con¬

sists of five elliptical arches, of which the centre arch has a span of 152 feet, with a height of 29y2 feet above high-water mark. The two

next are 140 feet, and the two shore arches 130

feet in span, with a height of 27l/2 feet. The total length of the structure is 1,005 feet, and it carries a roadway 53 feet wide between the parapets. The Blackfriars Bridge across the

Thames was built between the years 1760 and 1768. It comprised nine elliptical arches. The central arch had a span of 100 feet, and the others decreased gradually from 98 feet in those next to the centre, to 70 feet in those at the ends. This bridge was replaced in 1865 by a cast-iron bridge of five spans. The Westmin¬

ster Bridge was built between the years 1738

and 1750. It consists of 15 semicircular arches, of which the centre arch is 76 feet in span, and the span of the others decreases at the rate of four feet for each succeeding arch, except the two shore arches, each of which has a span of 25 feet. It is 1,164 feet long. Other notable English stone bridges built during the 18th century are the Winston Bridge over the river Tees, and the Kelso Bridge over the Tweed.

The former has a superb arch 109 feet in span, while the latter consists of five arches, each of which are 72 feet in span. Perhaps the most notable stone arch bridge built in any country during the 18th century is the Pont-y-Prydd, across the river Taff in Wales. It was built by William Edwards, a clergyman, after¬

ward a stone mason, in 1750, after two failures due to excessive weight of the haunches, which in the third and successful attempt were light¬

ened by the introduction of pierced spandrels.

It consists of a segmented arch 150 feet in span, with a height of 35 feet, and its most curious feature is the gradual increase of its width by offsets, from 14ˆ2 feet at the crown of the arch to 16 feet at the abutments.

The most remarkable bridges constructed in

France during the 18th century were the work of the famous Department of Ponts et Chaussees, established in 1715. The best examples of their work are the Blois Bridge over the Loire, the construction of which was com¬

menced in 1720, and which consists of 11 ellip¬

tical arches, ranging from about 55 feet to 68

feet in span ; the bridge over the Loire at Tours, the construction of which was com¬

menced in 1755, and which consists of 15 ellipti¬

cal arches, each 80 feet in span, and separated by piers 16 feet thick; the Trilport Bridge over the Marne, built in 1760, consisting of three skew arches, the middle arch of which has a span of 81 feet, and the side arches, spans of ‘about 77 feet; the Neuilly Bridge across the Seine, built between the years 1768 and 1774, and which consists of five elliptical arches, each 128 feet in span ; and the Gignac Bridge over the Herault, built in 1793, and which consists of an elliptical centre arch 161 feet in span, flanked by two semicircular arches, each of which have a span of 72 feet.

Although the masonry and stone arch bridges of the 19th century cannot be considered as showing much, if any, structural improvement over those of preceding times, it is a fact that the engineers of the 19th century used their better knowledge of the theory of those struc¬

tures, obtained from the progress of the science of statics, to increase the spans of the arches far beyond the limits set by the earlier practice.

Of these later productions, the largest stone arch in the world at the time was that of the Luxemburg Bridge, completed in 1901 ; it is 277

feet in span, with a rise of 102 feet and a clear height of about 138

feet above the level of the water. It is surpassed in span by the Plauen Bridge which crosses the valley of the Syra, a flat, elliptical arch 295 feet in span with 58

feet rise, and a width of 56 feet. Other modern BRIDGE

stone arches of magnitude are the Grosvenor Bridge over the river Dee at Chester, the

largest span in England, consisting of a single arch with a span of 200 feet, and the Waterloo Bridge across the Thames, of nine elliptical arches of Aberdeen granite, of 120 feet span each, with a rise of 34 feet. The total length of the structure, including the approaches, is 2,456 feet, and it carries a horizontal roadway 41ˆ/2 feet wide between the parapets.

In America the earliest notable stone bridge structure was the Tempoalo aqueduct near

Huauchinango, Mexico, built between 1553 and 1570. It consists of 68 semicircular arches, the largest span being 58 feet. Its maximum height was 124 feet. Another Mexican stone

aqueduct bridge of note was a part of the water supply system of the city of Queretaro, built by the Spaniards between 1726 and 1735. It has 74 spans of 50 feet each, and a maximum

height of 92 feet.

The earliest stone bridge in the United

States of which there is definite record was that at Ipswich, Mass. It has two spans of 28 feet each. The Rochester aqueduct begun in 1820, and the Washington aqueduct (over the Po¬

tomac) begun in 1837 were the first important stone bridges in the country. High Bridge,

carrying the Croton aqueduct across the Harlem River, surpassed all previous constructions.

This bridge has 15 arches, the eight crossing the water being 80 feet wide, and the seven land spans being 50 feet wide. The height in the clear is 100 feet above high water, and the parapet is 116 feet above the same level. Its total length is 1,460 feet. It was built between 1837 and 1842. Cabin John Bridge, carrying the Washington (city) aqueduct, was built between 1857 and 1864. It is a single arch of 220 feet span — and a 110-degree segment of a circle whose radius is 134 feet. The rise of the arch is 57 feet. For many years it was the longest stone arch in the world.

Beginning with 1835, many of the early

wooden railroad bridges in the United States have been replaced by stone bridges. The first was the Carrollton Viaduct, carrying the West¬

ern Maryland Railroad across the Patapsco

Creek. In 1847 the Starucca Viaduct was built to carry the Erie Railroad over the Starucca Creek. This was of sandstone, in 17 flat arches of 51 feet span, 1,200 feet long, and the floor 110 feet above the creek. At first it accommo¬

dated only a single track, but it was afterward doubled on the original plan, for a second track. In 1881 a stone-arch viaduct of five 70-foot spans was built for the Philadelphia and Reading Railroad over Wissahickon Creek, and a similar bridge for the Lake Shore and Michigan Southern Railroad over the Grand

River at Painesville, Ohio. In 1881 a stone-arch bridge notable for its length was begun over the Mississippi River at Minneapolis. It was of 22 spans, four of which were 100 feet, fif¬

teen of 80 feet, and one each of 71 feet, 43 feet and 40 feet. It carried union tracks at a height of 65 feet above the water. In 1888 the Pennsylvania Railroad Company began to re¬

place its wooden and iron bridges with more permanent structures of stone and concrete,

and some of these are of notable dimensions.

The largest is the bridge over the Susquehanna at Rockville, Pa., begun in 1901. It has 48

spans of 70 feet each, and is in all 3,820 feet in length. The facings are of masonry, and the body is filled in with concrete. Many other stone bridges were built on other railroads in the period 1900 to 1910. Since then the use of concrete as railroad bridge material has come into great favor. The more recent stone bridges in the United States have been ornamental

structures for architectural effects in parks and cities. They are mostly arches of comparatively small dimensions.

About the beginning of the 19th century,

metal began to be extensively introduced as a material of construction, and although the

masonry arch was superior in beauty and dura¬

bility, the metal bridge gave greater strength in proportion to the weight of the structure; was capable of being built more quickly and cheaply, and therefore, being better adapted to keep pace with the tremendous activity of modern railway construction, it soon almost completely sup¬

planted the stone structures.

The first structure in which the new material was used exclusively appears to be the bridge across the Severn near the town of Ironbridge, Shropshire, England. It was built by Abraham Darby, the owner of the ironworks of Coal-brookdale, in 1779, and consists of a single arch 100 feet in span, with a rise of 45 feet. The arch is composed of five cast-iron ribs in the form of a segment of a circle. The successful construction of such a structure being thus clearly demonstrated, several others, of bolder design, were built during the last quarter of the 18th century, of which the Wearmouth Bridge, over the Wear at Sunderland, completed in

1796, is the most elegant example of the type.

As originally -constructed, it consisted of a single hingeless arch 236

feet in span, with a rise of 34 feet above the springing lines, which were 65 feet above the level of the river.

From these beginnings the evolution of vari¬

ous types of metal arch structures was rapid.

A large percentage of wrought iron was em¬

ployed in the material of construction, affording greater flexibility in the methods of construc¬

tion and design, and the capability of spanning greater intervals with single spans. The most notable of the structures built about this time (the early part of the 19th century) was the Southwark Bridge across the Thames, com¬

pleted in 1819. It consists of three arches, of which the central arch is 240 feet in span, the largest cast-iron span ever built, and the side arches 210 feet each. They are composed of massive cast-iron arch ribs, which being set without any provisions to counteract the effects of expansion, and being much heavier than is necessary to sustain the loads to which they are subjected, gives a structure which is merely the imitation of one of stone, with the additional fault of a great wastefulness of material. Its construction, however, served a valuable pur¬

pose in the development of metal arch engineer¬

ing. It suggested the principle of hinged arches, which was subsequently taken under considera¬

tion by the mathematicians of Europe in 1841, and developed into a perfect theory, which made the' metal arch a statically determinate structure on absolutely immovable foundations, and one that was provided against distortion and rupture under conditions of varying temperature.

Although the fine cast-iron bridges such as the Westminster and the Blackfriars, built

across the Thames during the period covered 500

by 1860 to 1870, consisted of arches with spans as great as 185 feet, the metal hinged-arch bridges built since 1873 have surpassed them greatly, not only in the length of the spans, but in the economy of the material of construction.

An exception to this statement, however,

must be noted in the case of the cast-steel Eads Bridge across ‘the Mississippi, at Saint Louis, Mo., which was completed in 1874. It consists of three unhinged structures, the centre arch being 520 feet in span. Of the hinged-arch bridges the following are the most notable : The Alexander III Bridge across the Seine at

Paris, built in 1899, consisting of a single arch with a span of 353 feet, composed of arch-ribs made up of wedge-shaped cast-steel sections

bolted together; the steel-arch railway bridge across the Niagara River, finished in 1896, con¬

sisting of a single arch with a span of 550 feet; and the highway and foot-bridge completed in 1899 across the Niagara Gorge, just below the Falls, consisting of a single steel arch with a span of 840 feet, which made it the largest single span steel-arch bridge in the world until surpassed by the Hell Gate Bridge.

Some of the other handsome and important

structures of the metal hinged-arch type well worthy of mention are the following: The

Washington Bridge over the Harlem River, at New York, completed in 1889, which consists of two magnificent arches, each 510 feet in span, flanked by four masonry arches at one end, and three at the other, each 50 feet in span; the Detroit-Superior Bridge, a three-hinge steel-arch truss of 591 feet span, with a double deck for pedestrians, vehicles and electric cars ; the Old Trails Arch Bridge over the

Colorado

River, below Needles, Cal., a three-arch span of 592 feet ; the German steel-arch bridges across the Rhine at Bonn and Dusseldorf, the former with a central arch of 614 feet span, and two side deck arches each 307 feet in span, and the latter with two central arches each 595 feet in span ; the Pia Maria Bridge over the Douro at Oporto, Portugal, consisting of a main steel arch of crescent design, 525 feet in span with a rise of 123 feet ; and the steel arch on Garabit Viaduct over the Truzere, in central France, which has a span of 540 feet with a rise of 170

feet, and the deck 406 feet above the water.

As the tensile strength of wrought iron and steel was greatly increased by improved proc¬

esses of manufacture, great feats of bridgeconstruction were dared by the bridge engineers, and various types of suspension and cantilever bridges, especially suitable for very long spans, were designed and successfully erected. The

first wire suspension bridge in any country was the Schuylkill River Bridge at Philadelphia, built in 1816. It had a span of 408 feet and was but 18 inches wide. It was supported by cables of six Yˆ-moh wires. But even the more important wire cable and chain structures of the early 19th century, such as the bridge across the Menai Strait, between the Island of Anglesey and Carnarvonshire, in Wales, com¬

pleted in 1826, with a span of 580 feet, and Fribourg Bridge, in Switzerland, built in 1834, with a span of 870 feet, were completely over¬

shadowed by the works of the American en¬

gineers during the period dating from 1848

onward. Of these magnificent structures, _ the most notable are the following: The bridge

at Wheeling, W. Va., erected by Cffcirles

Filet, in 1848, with a suspension span of 1,010

feet; the Niagara Bridge, built by John A.

Roebling, in 1855, with a clear span of 825

feet, and particularly distinguished as the first railway suspension in the world; the Cincinnati and Covington Bridge, built by the same en¬

gineer, in 1867, with a clear span of 1,057 feet, and a total length of 1,692 feet; and the last creation of the same engineer, the first New York and Brooklyn Suspension Bridge, across

the East River, which was completed in 1883.

This bridge connects Park Row, Manhattan,

with Sands and Washington streets, Brooklyn.

It was begun in 1870, and completed in 1883, at a cost of $9,000,000. It has been altered, re¬

paired and extended so that its total cost in 1920 was about $25,094,577, including the cost of land for approaches. The original struc¬

ture consisted of a main suspension span of 1,595ˆ2 feet, and two shore spans of 930 feet each. With the approaches it had a total length of 5,989 feet, but these approaches have been extended so that the total length of the bridge with extensions is now 7,580 feet. The four steel wire cables are each 15ˆ4 inches in

diameter, and support the roadway and the

stiffening trusses at a height of 135 feet above high-water level, at the centre of the span. The combined supporting strength of the cables is 48,000 tons. The cables are carried over saddles at the tops of two stone towers, each 278 feet above high water, and anchored at each end in solid cubical structures of stone masonry 119x132 feet, which rise to 90 feet above high water. The width of the bridge is 85 feet, and there are four tracks, two of which carry the cars of the elevated road, and two for surface trolley cars. There are also two driveways and a footway. The traffic on this bridge, as shown by official counts made in October 1920, aver¬

ages 3,844 elevated railway cars, 5,856 surface cars, 5,188 vehicles

and 1,928 pedestrians daily.

The Williamsburg Bridge is noteworthy as

being the first great suspension bridge to em¬

ploy steel instead of masonry towers, and as having the longest suspended span built up to 1912. It connects Delancey street, New York, with South Fifth and Sixth streets, Brooklyn, and was completed in 1904, requiring eight years for construction. It has a clear span of 1,600

feet and a total length of 7,308 feet. Four steel wire cables, each 18% inches in diameter, swung from two steel towers, each 333 feet above high water, support the roadway platform and the stiffening trusses at a clear headway of 140 feet above high water level, at the centre of the span. The width of this bridge is 118

feet and the roadways are on three levels, so that it has greater carrying capacity than the Brooklyn Bridge, though the traffic is less. On the lower level are four tracks ; on the second, two vehicle ways and two footways ; on the third, tracks for elevated cars. The tower

foundations were sunk 66 feet on the New

York side and 107 feet on the Brooklyn side, at the lowest points, so that the extreme height of structural work is 440 feet. There are 17,403

miles of wire in the cables, and the four cables with suspenders weigh 4,900 tons. The weight of steel and iron in the main bridge is 23,800

tons, and in the approaches 16,600. Its carrying capacity is 38,770 tons. The anchorages meas-BRIDGE

ure 149 x 128*4 feet at the top and contain 112,-

800 cubic yards of masonry. The cost, exclu¬

sive of land, was $14,000,000.

The Queensborough or Blackwell's Island

Bridge crosses the East River from New York to Brooklyn at the southern end of Blackwell's Island, on which rest two of its piers. The main bridge is a continuous cantilever and the spans are 1,052, 630 and 1,182 feet respectively from west to east. The total length from Second avenue to Crescent street is 7,449 feet. Con¬

struction was 'begun in 1901 and completed in 1909, the cost (excluding land) being $13,496,-

500. The width is 90 feet, the roadways being 53 feet, with 16-foot sidewalks. There is 135

feet clear space under the main span for a width of 400 feet, this being practically identical with the vessel-space under the other New York and Brooklyn bridges. The total of steel and iron employed is 73,800 tons. The carrying

capacity is 89,800 tons. The towers bear obser¬

vation balconies on Blackwell's Island which reach a height of 333 feet above high water and are reached by stairways and elevators.

The Manhattan Bridge connects the Bowery

and Canal streets, New York, with Nassau

street, Brooklyn. Work was begun in 1901 and completed in 1911. The structural expense was $14,104,900, and it has the greatest transporting capacity of any bridge up to its date. It is of the suspension type, having a river span of 1,470 feet, with the shore spans of 725 feet. The total length with approaches is 6,855 feet. It is 122f4 feet in width and is double-decked, and this tremendous 'roadway requires for its sup¬

port four of the largest cables constructed to date, each 21*4 inches in diameter. The total ultimate strength of these cables is 120,000

tons, or two-and-a-half times that of the Brook¬

lyn Bridge cables. The cables run over the steel towers at a height of 322 feet above high water, and with their suspenders they weigh 7,950

tons.

There are 37 strands in each cable and 256

wires in each strand, making a total of 9,472

wires in each of the four cables. As each wire is more than half a mile in length (3,2 23ˆ4

feet), the total1 length of wire is 23,858 miles, sufficient to girdle the earth at the equator.

The weight of steel in each anchorage is 1,300

tons, and of each side span 5,000 tons. The main span weighs 8,000 tons, the Manhattan

approach 8,500 tons and the Brooklyn approach 8,000 tons. The excavation for each pier was about 40,000 cubic yards, and the masonry and concrete in each of the anchor piers totaled approximately 115,000 cubic yards, by far the heaviest ever laid. The towers weigh 6,300

tons each, and the three spans weigh 19,000

tons. On the lower deck are two subway

tracks, driveways and footwalks. Above are

four railway tracks to accommodate surface

and elevated cars. The carrying capacity is 57,820 tons. The above-described four great

bridges over one river, within a distance of five miles, erected at a total cost (without land and approaches) of $90,229,429, constitute the most marvelous achievement the world has recorded in bridge-building.

Another remarkable bridge crosses the East

River at Hell Gate, a few miles north of the group just described. This bridge, carrying the New York Connecting Railroad and comprising

the largest steel arch in the world (1916), has a span of 977*4 feet, made up of 23 panels 42ˆ2

feet between centres. The depth of truss at the ends is 140 feet, at the centre 40 feet and at the quarters 66 feet. The upper member of the arch truss shows a reverse curve when nearing the abutments, to afford head room for trains : it also adds much to the beaut}T of the struc¬

ture. The rise of the arch is 220 feet. The lower chord is rectangular, 7 feet in width, 10ˆ4 feet deep at the abutments and 7}4 feet at the crown. The weight of the bridge averages 26 tons to the lineal foot. The direct thrust of the arch is upon solid walls of concrete. The clearance at the centre when the closing chord was put in place was 3j4 inches. This was closed by lowering the jacks on the main posts trom 15 to 20 inches. This final work was con¬

ducted through a multi-party telephone system, with stations at the centre, at each backstay jack, at each counterweight and at the office —all stations being directly connected with all the others. The foremen at the telephones “listened in® and each heard all the orders given and all comments made as the work progressed. The

bridge contains 18,000 tons of steel. Its de¬

signer was Gustav Lindenthal.

The Spokane-Portland Railway finished in

1909 a drawbridge over the Willamette River below Spokane, which has a draw span of 521

feet, being one of the longest ever built. The total length of the bridge is 1,762 feet, and the piers are of reinforced concrete.

The most noteworthy bridge of the far

North is that over Copper River, Alaska, com¬

pleted in 1910 for the Alaskan Railway. No such difficult bridge engineering has been un¬

dertaken before in such a cold climate. Owing to the nearness of large active glaciers, which at times filled the river with great masses of broken ice, the bulk of the construction work had to be completed within a few months' time.

Four steel camel-back spans totaling 1,550 feet constitute the bridge proper, the two longest of these spans being 450 feet each. Three con¬

crete piers were sunk in the river, and the en¬

tire work completed at the remarkably low cost of less than half a million dollars.

The Erie Railway completed in 1910 a steel viaduct in Jersey City, N. J., having a length of 1,776 feet, and leading up to a cut in Bergen Hill. This involved bridgework of structural steel, resting on concrete. Owing to the soft nature of the ground, which was largely wet sand, it was necessary to sink many concrete caissons, and where the sand was more solid to use concrete piles.

Recent Foreign Construction. — The Que¬

bec Bridge a cantilever truss, having the longest span (1,800 feet) of any bridge to date (19164

surpasses the Forth Bridge (Scotland) by 90

feet, and the Williamsburg Bridge by 200 feet.

It was designed to carry two railroad tracks loaded with the heaviest modern traffic and two footways. The live load was figured at 5,000

pounds per lineal foot, with two E-60 locomo¬

tives. The wind pressure is figured at 30

pounds per square foot of both trusses and 300

pounds per square foot of trains. The main posts of the cantilevers over the piers are of four separate columns latticed together, 9

feet by 10 feet each, standing on a shoe 19 feet high and 22 feet by 26 feet at its base and 502

weighing 400 tons. The maximum cross sec¬

tion of the posts is 1,903 square inches, and they weigh 1,500 tons each. The members next to the posts are 7 feet 2 inches deep by 10 feet 4

inches wide, and have a cross section of 1,902

square inches. They are composed of four

webs 7 feet deep, each web being of four plates riveted together, having a total thickness of 3ˆ4

inches. The suspended span, 640 feet long and 88 feet wide, was assembled on a pile trestle nearby and six scows floated under it at the panel points and sunk on prepared foundations.

Cross girders and bracing were built up on the scows, at low water the scows were drained, and at high water the span floated free of the trestle. It was lifted to its place from the river by eight 1,000-ton hydraulic jacks, two at each of the corners of the cantilever arms. There has not been any such remarkable bridge build¬

ing in the Old World. Two new bridges were completed over the Rhine at Cologne in 1908, one having 492 feet of span and the other 550

feet. The Risorgimento Bridge, across the

Tiber at Rome, was completed in 1911. It has a span of 328 feet, and is chiefly noteworthy because of its historic site, and from the fact that the false work on which the arch rested during construction was built of steel and con¬

crete, instead of wood.

The Swiss Sitter River Viaduct, which was

completed in 1911, is only 400 feet long, but is notable because it crosses a gorge at a height of 1,130 feet. At -Auckland, New Zealand, was completed in 1910, the largest concrete arch in that part of the world, having a span of 320

feet, the minor spans giving the bridge a total length of 960 feet. In Africa the Sudan Rail¬

way has built a bridge over the Blue Nile at Khartum, which was completed in 1909, and

which rests on 20 steel cylinders, each 16 feet in diameter, and carried down as far as 60 feet below low water. The seven largest spans of this interesting bridge are each 218ˆ4 feet. In Tonkin, Indo-China, French interests have

built a bridge over the Red River, a cantilever, of 19 spans, having a total length of 5,544 feet.

The longest span is 429 feet. The Yunnan Sys¬

tem Railway will use the bridge.

The suspension principle has been far more

extensively employed in America, and especially in the United States, than in foreign countries.

Some of the European suspension bridges, how¬

ever, are of great beauty of design, such as the structure across the Danube at Buda-Pesth in Austria-Hungary, which is considered to be the handsomest bridge in the world, but they are entirely outclassed in magnitude by the almost marvelous creations of American engineering

genius already described.

Bridges built on the cantilever or balanced-span principle rank with

those of the suspension and girder-and-arch type for the purpose of spanning great intervals.

In order to trace the evolution of the canti¬

lever-bridge from the girder, and to understand its relation to the truss, a brief mention of the tubular bridges which were originated by Robert Stevenson, engineer of the Chester and Holy-head Railway, England, to carry that railway across the Menai Strait is necessary.

A series of experiments conducted by Ste¬

venson, in conjunction with Fairbairn, demon¬

strated that a rectangular tube with a cellular top and bottom gave a girder in which the greatest strength was derived from the least amount of material. The result was the con¬

struction of the Conway and Britannia bridges, the former across the Conway River and the latter across the Menai Strait, in 1846 and 1847, respectively. The Conway tube consisted of a single span of 400 feet, and the Britannia of four spans, two of 460 feet each, and two of 230 feet each in the clear. The example set by Stevenson was followed in a few other

cases, the most important of which was the Victoria Bridge across the Saint Lawrence,

near Montreal, Canada, built in 1854. It con¬

sisted of 24 spans ranging in length from

242 to 247 feet each, and one span of 330 feet.

It had a total length of 9,144 feet, or nearly one and three-quarter miles, and required

about 9,000 tons of iron for the construction of the tubes. It was replaced in 1898-99 by a pin-connected truss bridge of 24 spans of 254

feet each, and one span of 348 feet, which repre¬

sented a total weight of 20,000 tons of steel, but which was capable of sustaining a load five times greater. The Victoria Bridge was the

last important structure of this type, which dis¬

appeared from engineering practice when the

special conditions which developed it ceased to exist ; but it led the way to the plate girder bridges. It taught the engineer to cut away all the useless material in the plans of his struc¬

tures and retain only the effective working skeleton, and thus inaugurated a truly scientific method of metal construction, by which the

weight of the structure was greatly reduced, and consequently its cost of construction.

In the meantime, the principle of the truss, first enunciated by Palladio, the famous Italian architect, about 1560, and subsequently de¬

veloped still further, and without doubt inde¬

pendently, bv such geniuses as Ulric Grubermann, Timothy Palmer, Lewis Wernway,

Theodore Burr, William Howe, Wendall Bollman, and others of equal merit, during the period extending from 1754 to 1854, was di¬

verted from its application to wooden bridges, and used in the construction of metal struc¬

tures. The combining of the truss and the

girder was the next logical step in the evolu¬

tionary process, and to Roebling belongs the credit of demonstrating the practicability of building long span braced girder or truss

bridges with iron and steel as the material of construction. As the cantilever bridges are a class of structures actually composed of hinged continuous braced girders, their intimate rela¬

tion to the girder and truss bridges is quite obvious. They were,

however, not much used

until the last quarter of the 19th century. The construction of the Kentucky Viaduct in 1876, and the Niagara cantilever in 1883 demon¬

strated the ease with which they could be built without the use of costly false work, and soon afterward many bridges were built both in

Europe and America. The most important of

these are: the bridge across the Hudson at Poughkeepsie, N._ Y., built in 1889, which

consists of five river spans ranging from 525

to 548 feet in length, and a total length of 6,767 feet; the Red Rock Cantilever Bridge

across the Red River in California, built in 1890 with a centre suspended span of 30 feet, the shore and river cantilever arms being each 165 feet, and a total length of 990 feet; the BRIDGE

Memphis Bridge across the Mississippi River at Memphis, Term., built in 1892, with a truss span of 621 feet, and two cantilever spans of 700 feet each, which are the longest of the kind in the United States; the Saint John River cantilever in New Brunswick, built in 1895, with a main span of 477 feet, and a total length of 813 feet ; the great Forth Bridge across the Firth of Forth, in Scotland, which was com¬

pleted in 1890, and consists of two shore spans of 680 feet each, and two main spans of 1,710

feet each, which are exceeded only by the

Quebec cantilever across the Saint Lawrence, the new construction of which began in 1911, and has a clear span of 1,800 feet.

All bridge structures, regardless of the ma¬

terials of construction, may be classified as to type : arch, suspension, cantilever, truss or girder, or a combination of these types. In de¬

signing them the problem of first importance is to make them strong enough to withstand the forces brought to bear upon them. These in¬

clude the stresses of <(dead load,® the weight of the bridge itself ; the live, or moving load, of the traffic over the bridge ; impact and vibration from the moving load ; wind pressure ; the mo¬

mentum of a stopping train; and, if the bridge be built on a curve, centrifugal force. The wind pressure is not one of the least of a bridge's burdens. It is figured at 30 pounds per square foot of one girder in girder bridges, or on one truss of through bridges, or on two trusses in deck bridges, and the floor in truss bridges ; and in addition, 300 pounds per lineal foot of any train which may pass -over the bridge.

For spans of less than 25 feet, rolled beams are commonly used; from 25 feet up to 100

feet, plate girders; from 100 feet up to 150

feet, riveted trusses; above 150 feet, pin-con¬

nected trusses. The depth of a plate girder is usually from one-twelfth to one-eighth of the span; of a truss, one-sixth of the span.

Outside of the economic purposes of the

bridge itself, modern taste demands attention to the environment, and it is expected that the engineer will contrive a structure which shall be pleasing to the eye as well as useful.

Bridges are also classified as to their eco¬

nomic uses, as : Railway Bridges and Highway Bridges; and as to their structural peculiari¬

ties, as Movable Bridges, Pontoon Bridges,

Modern railway bridges are almost exclu¬

sively constructed of steel and consist of trusses or plate girders designed to sustain uniform loads ranging from 3,000 to 4,800 pounds per linear foot of track, according to the length of span and the service required. There are about 80,000 of such bridges in the United States ag¬

gregating 1,400 miles in length and represent¬

ing a cost of $800,000,000. All steel bridges, however, must be regarded as temporary, with a life limited to the crystallization of their metal. Many of them are being replaced by

reinforced concrete.

Highway bridges include all bridges used

for roadway purposes alone. They may be

constructed of wood, metal, masonry or con¬

crete and are usually designed to sustain uni¬

form loads ranging from 1,000 to 1,800 pounds per linear foot of track, according to the length of span and the service required,

Movable bridges or drawbridges include the

various types of structures over rivers, that can be moved in order to allow a clear passage¬

way for vessels.

The modern structures of this type may be

divided into the following classes: (1) Swing Bridges; (2) Rolling

Bridges; and (3) Lift

Bridges; of which the first are the most com¬

monly used.

A swing bridge consists of a wooden or

metal truss supported at the centre by a pier located in the middle of the stream, so that when the bridge is closed the ends of the truss rest upon abutments on the shores on either side. It is operated by a turntable, upon which it rests, which is revolved by a rack and pinion arrangement worked by hand power, steam or

electricity.

A rolling bridge consists of a single truss mounted on rollers, and which is pushed out from one side across the span, or of two trusses, on each side of the span which are pushed out and connected at the centre of the span where the water ends are locked together when the bridge is closed. It is operated by the rope and drum method. This type is not used to any great extent.

Lift bridges are of various kinds — the

((vertical lift,® the ((hinged lift® or (<bascule,®

and the <(rolling lift® bridges. The simplest is the vertical lift bridge consisting of a truss which is raised vertically to the desired height, both ends rising in guides arranged on towers.

A typical example is the highway bridge over the Louisville and Portland Canal at Louisville, Ky. The lift span is a Pratt truss 210 feet long. It lifts 40 feet, giving 55 feet clearance.

It is operated by crane-like trusses counterweighted with concrete masses, pivoted on the main posts of the approach spans. The lift span is raised by electric power in one minute.

Another notable lift bridge with several unique features is that at Pine Bluff, Ark., across the Arkansas River. The river at this point is

normally 2,000 feet wide and the channel is liable to shift to almost any section of that width. Six of the channel spans are 239 feet long and one of them is arranged to lift by towers attached to the ends of the two adjoin¬

ing spans. In case of a shift of the channel, the towers can be moved and any other of the six spans converted to lift. The counter¬

weights are of cast iron of the expanding type to balance the heavy sprocket chains used to operate the lift. The motive power is elec¬

tricity. The hinged lift bridge is raised by being revolved in a vertical plane around hinges at one end. The rolling lift bridge is also lifted in a vertical plane, but has in addition a limited rolling motion. All lift bridges usually have a counterweight to assist the lifting effort, and are generally designed to move quickly — one minute being frequently specified as the time limit for opening or closing at points where land and water traffic is heavy.

The longest swing bridges ever constructed

are the Interstate Bridge at Omaha, Neb.,

which has a total length of 520 feet; the Thames River Drawbridge at New London, Conn.,

which has a length of 503 feet; and the Arthur Kill Drawbridge between Staten Island, N. Y., and New Jersey, which has a swing span of 496 feet.

The most notable of the hinged or pivot—

bascule bridges in Europe is the Tower Bridge across the Thames, near the Tower of London, England, which consists of a suspension and drawbridge combined with a central bascule

span of 200 feet, formed by two leaves or trusses, hinged at the opposite towers. The United States has many examples of the bas¬

cule type of bridge, one of the principal ones being a great single-leaf bridge at Chicago, carrying three tracks of the Chicago and North¬

western Railway across the Chicago River.

This bridge is 185 feet long, covering with one leaf nearly as great a span as the London Bridge does with two leaves. The largest bas¬

cule bridge in the world is that carrying the Canadian Pacific Railway from Sault Sainte

Marie, Ontario, to Sault Sainte Marie, Mich., over the United States Ship Canal. This

bridge is of the heel trunnion type, 330 feet long, in two leaves. When closed it forms

virtually a simple fixed span, with a compres¬

sion joint at the top of the truss and a tension joint at the bottom. The counterweights are of concrete, each of 550 cubic yards and weigh¬

ing 1,000 tons. One of the largest bascule bridges is that at Salmon Bay, Seattle, carrying the Great Northern Railway. It is of the

Strauss low trunnion type and is a single span of 200 feet. Its total movable weight is 2,350

tons, which is counterweighted by a mass of concrete measuring 21 feet by 34 feet by 28

feet — 735 cubic yards in all. The wind pres¬

sure of this bridge when open is calculated at 6.955.500 foot-pounds.

The modern pontoon bridges are a develop¬

ment of the ancient bridge-of-boats principle.

A notable example of the type is the pontoon bridge built in 1873 across the Hooghly River, at Calcutta, India. It is 1,530 feet in length between the abutments on each bank of the

river and consists of a superstructure carried on 14 pairs of rectangular iron pontoons with rounded bilges and wedge-shaped ends. These

pontoons are 10 feet wide, 8 to 11 feet deep and 160 feet long and are built in 11 water¬

tight compartments. They are held in position across the river by means of l^-inch chain cables laid across and anchors laid up and down the stream. The superstructure consists of

trestle-work, which carries a plank roadway and footpath platform having a total width of 62

feet at a height of 27 feet above the surface of the river. This height is sufficient to allow ordinary boat navigation, but the passage of large vessels is provided for by arrangements which permit the opening of a span 200 feet wide, by the temporary removal of four of the pontoons and the superstructure carried on

them. A pontoon bridge over the Golden Horn at Constantinople is 1,531 feet long and 82 feet in width. An opening span gives 205 feet clear¬

way : it is pivoted at one side and swings through an arc of 180 degrees. The longest pontoon bridge in existence is the railroad bridge over the Mississippi River at Prairie du Chien, Wis.

It is 7,000 feet long and crosses an island.

There are two pontoon sections, one 2,000 feet long to the east of the island and another 1.500 feet long west of it. This bridge was rebuilt in 1898. The pontoon bridges of the United States army are of two kinds : one

built of wood throughout and the other a wood frame with canvas covering. The pontoons are 31 feet long,. 5 feet 8 inches wide and 3 feet deep. The wooden type weigh 1,600 pounds

apiece, the canvas ones 510 pounds.

Military bridges are temporary structures

erected to facilitate the movements of troops, their supplies and their

armament, during the course of extensive field operations. The

proper equipment of a modern army includes

the material required for the construction of pontoon bridges of a limited length. This ma¬

terial consists of the necessary cables and pon¬

toons of canvas, the metal or wooden frames of which are capable of being <(knocked down®

and packed for transportation. Spar bridges

are usually made with round timbers cut near the location of the bridge. The most efficient and useful are those built in the form of tres¬

tles consisting of timber frames on which the stringers carrying the roadway are placed. The most notable examples of military bridge con¬

struction in the United States are the pontoon bridge built across the Potomac at Harper's Ferry, under the direction of General Banks, in February 1862, which was composed of 60

boats, and the trestle 80 feet high and 400 feet long, built at another period of the Civil War across the Potomac Creek, Virginia, for rail¬

road purposes.

Concrete Bridges. — While definite knowl¬

edge derived from experience in the endurance of concrete under the demands of bridge

service was lacking, engineers were slow to adopt it in place of the well established stone and iron construction. But more and more of late years confidence has grown in the relia¬

bility of concrete as bridge material, and now concrete bridges of every type are to be found in all parts of the world. Such failures as have been recorded have been due to faulty handling of the material. The actual proof of the de¬

pendability of concrete was contributed by an experiment upon a German bridge (at Diisseldorf) about to be replaced by a larger one.

This bridge was but a few years old and had a span of 92 feet. It was loaded with 18 times the load for which it had been designed, and then showed only a few small cracks. The ex¬

periment ended at that point and the bridge was demolished with dynamite. The concrete

in this bridge had been mixed in the proportion of 1 part cement, 4 parts sand and 4 parts sharp chipped stone.

The considerable expense formerly incurred

in building timber centres for concrete arches has been largely done away with by the use of light steel truss supports hinged at the centre of the arch. These need to be strong enough only to support the material used in construct¬

ing the arch rib, as this in turn will support all the structure above it. Other advantages of concrete construction for bridges are that the work is more speedily accomplished and that the plant required is simpler and that the ulti¬

mate cost is less — with small bridges very much less.

The simplest form of concrete bridge, in use only for short spans, is the girder type. This is sometimes constructed upon a skeleton I-beam, but more ■ commonly the reinforcement is of substantial rods mainly along the tension side of the beam, arranged in the conventional lines of stress. Such a bridge may be sup¬

ported on piers or on trestle bents, also of concrete. A notable example of the concrete BRIDGE

girder structure is the double-deck viaduct, 1,700 feet long, at Kansas

City, crossing the tracks of 32 railroads which use the Union Station in the Kaw Valley. A peculiar feature of this viaduct is that the upper deck is on a grade of 5.527 per cent and the lower deck is of three different grades beginning at 2.34 per cent and rising to 3.47 per cent. The 12th Street Viaduct in Saint Louis is another exam¬

ple. It is 1,481 feet long and 79 feet wide, built in 36 slab and girder spans. It is in two separate sections longitudinally, one inch apart, each section being carried on a double row of piers.

A reinforced concrete through truss bridge

has recently been erected near Merthyr, Wales.

It is of two spans of 94 feet each. The trusses are of the Warren type, 10 feet deep and in 11-foot panels. The pier and abutments are of skeleton structure, remarkably light in weight.

The lower chord has a cross section 10 by 18

inches and the upper chord is 18 by 18 inches.

The web members are 10 by 10 inches. The

reinforcement of the lower chord is of 12 1*4-inch rods in two sets of six, overlapping be¬

yond the panels to which they are apportioned and terminating in hooks.

A notable example of the concrete canti¬

lever truss type is the bridge carrying the Vic¬

toria (Australia) sewer across the Barwon

River and its flats. It is 2,424 feet long, in 13

spans of 176 feet and one of 136 feet. The suspended spans are 40-foot girders, free to move at one end.

The prevailing type of concrete structure,

however, is the arch. While in many instances the forms of the arch usually seen in masonry have been closely followed, a peculiar flat form has been developed as the typical concrete arch.

A striking example of this type is the Risorgimento arch over the Tiber at Rome. It is the longest concrete arch yet (1916) constructed —a span of 328 feet 1 inch. The rise is 32 feet.

The structure is cellular, of seven arched ribs 6 feet 6 inches wide at the key, expanding to 10 feet at the piers. The ribs are 4 feet deep at the key and 10 feet at the piers. Another remarkable bridge of the same slender type is the Pont Mativa over the river Ourthe, at

Liege, Belgium. It is a span of 180 feet with a rise of but 12 feet and only 14 inches deep at the centre. This flat arch type is used princi¬

pally for low bridges. For high-level bridges a high arch is generally chosen, sometimes

reaching the deck with its centre, but often carrying the deck on a series of spandrel

arches footed on the main arch. The open

spandrel arch saves much in material and

weight, besides lending itself to most pleasing architectural designs. The latest development of this type of bridge is a main arch composed of separate ribs, above which rise the spandrel arches on pillars, instead of the solid through and through walls of earlier constructions.

Among notable long-span arches must be men¬

tioned the 315-foot span of the Langwies Via¬

duct on the Chur-Arosa electric railway (Swit¬

zerland), rising 134 feet above the spring of the arch and 203 feet above the valley; the Auckland (New Zealand) arch, a clear span

of 320 feet with a rise of 84 feet; the Larimer avenue (Pittsburgh) arch, a clear span of 300

feet 5 inches, the longest in the United States ; the Stein-Teufen arch (Switzerland), a span

of 259 feet; and the Walnut Lane (Philadel¬

phia) arch, a clear span of 232 feet. The bridge at Luxembourg has a concrete span of 250 feet, but is sprung from masonry abut¬

ments.

Of multiple-arch structures in concrete the

Tunkhannock Railway Viaduct holds first place.

It is 2,375 feet long and carries the Lackawanna Railroad across the valley of Tunkhannock

Creek. The arches are semicircular, 10 of

them being of 180 feet span and two of 100

feet. They are supported on piers 36.5 feet by 43.5 feet. Each of the main arches is com¬

posed of two ribs on which rest the spandrel columns which carry the deck at a level of 242

feet above the bed of the creek. The concrete in this viaduct measures 167,000 cubic yards, making it the largest concrete bridge structure in the world (1916). The second largest as to cubical content of concrete is the viaduct at Cleveland, Ohio, spanning the Cuyahoga River.

This has 12 quadruple arches, averaging 140

feet in span, and contains 106,900 cubic yards of concrete. The river channel is spanned by a double-deck steel arch truss 591 feet long, with a clear headway of 96 feet above the river. The Martin's Creek Viaduct, carrying

three tracks of the Lackawanna Railroad, is 1,611 feet long, supported by seven three-cen¬

tred arches of 150 feet span with spandrel arches above. The deck is 48 feet wide and is at a level 150 feet above the creek. The Saskatoon Viaduct crosses the Saskatchewan

River with 10 arches, four of which are of 150-foot span. The bridge is constructed of two 16-foot arch rings, 15 feet apart, and the floor of girders and beams is carried on span¬

drel walls and columns. A very high arch

viaduct carries a highway over the Cuyahoga River gorge near Akron, Ohio, at an elevation of 190 feet. There are five main arches, each of 127 feet. The three high piers are hollow.

The bow-string type of bridge has been

very successfully constructed of concrete, re¬

placing worn-out timber and iron bridges on highways.

Other concrete constructions have been used

in special cases. The concrete bridge over the Miles River at Easton, Md., 1,075 feet long, was cast in sections at Baltimore, 60 miles dis¬

tant. Piles were driven in sets of three across the river, and upon each set was cast a cap of concrete. On these were laid the floor slabs, four abreast, and they were united into a mono¬

lith by pouring cement. These slabs were 20

feet long, 5 feet wide and 18 inches thick. The side railings and ornamental facings were cast in special molds. Eleven bridges carrying trains in Kansas City were recently erected of con¬

crete blocks, some of them weighing 48 tons, and molded seven miles from where they were placed. One of the latest forms of concrete construction is the arch built up of separate precasted voussoirs which are placed on a

centre from suspension cables swung from

construction towers on the river banks.

A great advance has been made within a few years in the ornamental

phase of concrete as used in bridges. Besides an improvement in

the general design, success has been attained in the surface appearances, both as to texture and color. Surfaces are tooled or bush-hammered, and in some instances the green concrete has been scrubbed with wire brushes to expose

the aggregate, and by a judicious selection of the aggregate for such finishing, highly satis¬

factory results are secured. Variation in color is obtained by using colored sand, broken tile and bricks and black oxide in the concrete mixture. Cast ornamental slabs have been

used with effect on park bridges, where also, the railings offer especial opportunities for ar¬

tistic finishing. Some excellent examples of this work are the Q Street Bridge over Rock Creek at Washington, the Sixty-sixth Avenue

Arch in Philadelphia and the Long Island Rail¬

road Viaduct at Forest Hills, L. I. In the An¬

derson Memorial Bridge at Harvard, over the Charles River, a most pleasing result has been attained by the use of brick trimmings with the concrete. For additional information on

concrete bridge construction see Concrete

Bridges.

For further information see articles entitled Bridge Construction, American ; Bridge Con¬

struction, Modern Methods of; Bridges, Lift ; Foundation, *etc.*

Bibliography. — Burr, W. H., Suspension

Bridges) (New York 1913) ; Davies, M. W.,

ˆTheory and Practice of Bridge Construction

(London 1908) ; Fidler, J. C., Practical Trea¬

tise on Bridge Construction > (London 1909) ; Foster, W. C., (A Treatise on Wooden Trestle Bridges and their Concrete Substitutes } (New York 1913) ; Hool, G. A., (Reinforced Con¬

crete Construction (New York 1916) ; Ketchum, M. S., (Design of Highway Bridges*

(New York 1912) ; Kunz, F. C., ˆDesign of Steel Bridges) (New York 1915) ; Leonard, J.

B., and Day, W. P., (The Concrete Bridge*

(San Francisco 1913) ; Melan, J., (The Theory of Arches and Suspension Bridges) (London

1913) ; Rings, F., (Reinforced Concrete

Bridges) (London 1913) ; Skinner, F. W.,

(Types and Details of Bridge Construction*

(New York 1904—06) ; Tyrrell, H. G., his¬

tory of Bridge Engineering) (Chicago) and

(Artistic Bridge Design (Chicago 1912) ;

Wells, M. B., (Steel Bridge Designing) (Chi¬

cago 1913).

Richard Ferris,

Editorial Staff of The Americana.

BRIDGE-BUILDING BROTHER¬

HOOD, a fraternal religious order formed in the 12th century in southern France. Its ob¬

ject was the building of bridges and the keep¬

ing of ferries. Tradition connects its origin with Saint Benezet, through whose efforts a bridge across the Rhone at Avignon was be¬

gun in 1117. After the completion of this

bridge in 1185 the order received the sanction of Clement III. The order was dissolved by Pius II.

BRIDGE CONSTRUCTION, American.

The application of scientific principles to the construction of bridges is more complete to-day than ever before. This statement applies to the specified requirements which the finished struc¬

ture must fulfil, the design of every detail to carry the stresses due to the various loads im¬

posed, the manufacture of the material compos¬

ing the bridge, the construction of every mem¬

ber in it, and finally the erection of the bridge in the place where it is to do its duty as an instrument of transportation.

A close study of the economic problems of

transportation in the United States and the experimental application of its results led the railroad managers to the definite conviction that, in order to increase the net earnings while the freight rates were slowly but steadily mov¬

ing downward, it was necessary to change the method of loading by using larger cars drav/n by heavier locomotives, so as to reduce the cost of transportation per train mile. While these studies had been in progress for a number of years and there was a gradual increase in the weight of locomotives, it is only within the years 1885-90 that the test was made, under favorable conditions and on an adequate scale, to demonstrate the value of a decided advance in the capacity of freight cars and in the weight of locomotives for the transportation of through freight. The test was made on the Pittsburgh, B. & Lake Erie Railroad, which was built and equipped for the transportation of iron ore from Lake Erie to Pittsburgh and of coal in the opposite direction.

When the economic proposition was fairly

established, it was wonderful to see how rail¬

road managers and capitalists met the situation, by investing additional capital for the newer type of equipment and for the changes in road bed and location necessarily involved by that in the rolling stock. Curves were taken out or diminished, grades were reduced, heavier rails were laid and new bridges built, so that prac¬

tically some lines were almost rebuilt. The process is still going on and money by the hun¬

dred millions is involved in the transformation and equipment of the railroads. Some impres¬

sion of the magnitude of the change in equip¬

ment may be gained from the single fact, that one of the leading railroads has within a few years expended more than $20,000,000 for new freight cars alone, all of which have a capacity of 100,000 pounds.

The form of loading for bridges almost

universally specified by the railroads of this country consists of two consolidation locomo¬

tives followed by a uniform train load. These loads are frequently chosen somewhat larger

than those that are likely to be actually used for some years in advance, but sometimes the heaviest type of locomotives in use is adopted as the standard loading. The extent to which the specified loadings have changed in late years may be seen from the following statement

based on statistics compiled by Ward Baldwin and published in the Railroad Gazette :

Of the railroads whose lengths exceed 100

miles, located in the United States, Canada and Mexico, only 2 out of 77 specified uniform train loads exceeding 4,000 pounds per linear foot of tracks in 1893, while in 1901, only 13

out of 103 railroads specified similar loads less than 4,000 pounds. In 1893, 37 railroads speci¬

fied loads of 3,000 pounds and 29 of 4,000

pounds, while in 1901, 4,000 pounds was speci¬

fied by 50, 4,500 pounds by 14 and 5,000 pounds by 17 railroads. The maximum uniform load

rose from 4,200 in 1893 to 7,000 pounds in 1902.

In a similar manner in 1893 only one rail¬

road in 75 specified a load on each driving wheel axle exceeding 40,000 pounds, while in 1901 only 13 railroads out of 92 specified less than this load. In 1893 only 21 of the 77 rail¬

roads specified similar loads exceeding 30,000

pounds. The maximum load on each driving

wheel axle rose from 44,000 pounds in 1893 to 60,000 pounds in 1901.

BRIDGE CONSTRUCTION

In 1916 on the majority of railroads the pre¬

vailing practice is to design the bridges for axle loads of 60,000 pounds and practically no

bridges are being built for lighter axle loads than 50,000 pounds. Bridges designed in ac¬

cordance with present standards of details will safely carry an overload of 50 per cent in regu¬

lar service without restriction in speed, and a still larger load with restricted speed.

The unusual amount of new bridge construc¬

tion required since 1890 caused a general re¬

vision of the standard specifications for bridges, the effect of which was to include the results of recent studies and experiment, and to elim¬

inate some of the minor and unessential items formerly prescribed.

Meanwhile another movement was in prog¬

ress. Experience having shown the great ad¬

vantage of more uniformity in various details and standards relating to the manufacture of bridges both in reducing the cost and the time required for the shop work, an effort was be¬

gun to secure more uniformity in the require¬

ments for the production and tests of steel, which is the metal now exclusively employed in bridges.

With greater uniformity in the physical,

chemical and other requirements for steel, as determined by standard tests, the unit stresses to be prescribed for the design of bridges will naturally approach to a corresponding uniform¬

ity. To what extent this is desirable may be inferred from the fact that the application of several of the leading specifications to the de¬

sign of a railroad bridge under a given live load yields results which may vary by an amount ranging from zero to 25 per cent of the total weight.

In the revision of specifications a decided tendency was observed to simplify the design by making an allowance for impact, vibration, etc., by adding certain percentages to the live load according to some well-defined system. It needs but relatively little experience in making comparative designs of bridges under the same loading, to show the advantage of this method over that in which the allowance is made in the unit stress according to any of the systems formerly adopted in such a case. Not only are the necessary computations greatly simplified, but the same degree of security is obtained in every detail of the connections as in the princi¬

pal members which compose the structure.

In 1907-08 a series of experiments were

made under the auspices of the American Rail¬

way Engineering Association to determine the proper percentage of the live load to be added for the effect of impact. Experimental trains were operated over bridges at different speeds and the actual stresses in different members of the bridge trusses were measured by special instruments designed for the purpose. The

results were published in 1911 in the Proceed¬

ings of the Association. >

In 1914 a series of large-size tests of steel columns was begun by the United States Bu¬

reau of Standards in cooperation with several of the national engineering societies to deter¬

mine accurately the variations in the strength of built-up columns due to the form of cross-section, the manner in which the structural shapes are connected, the ratio of slenderness, the quality of material, *etc.* A number of

tests have also been made by the bureau for consulting engineers and bridge companies in which different alloy steel-s were used. The latter test columns were one-half of the actual sizes as designed for several long-span bridges.

The American Railway Engineering Associa¬

tion in 1903 made the first successful attempt to standardize American railroad bridge specifica¬

tions. These specifications, revised at inter¬

vals, are now recognized as standard and are generally used not only as the basis for the design of new metal bridges, but also as a basis for determining the strength of bridges con¬

structed under other specifications.

A movement which has done much good

since 1890 and promises more for the future is that of the organization of bridge departments by the railroad companies. The great economy of making one design rather than to ask a num¬

ber of bridge companies to make an equal num¬

ber of designs, of which all but one are wasted, is the first advantage; but another of even greater significance in the development of

bridge construction is that which arises from the designs being made by those who observe the bridges in the conditions of service and who will naturally devote closer study to every de¬

tail than is possible under the former usual con¬

ditions. The larger number of responsible

designers also leads to the introduction of more new details to be submitted to the test of service, which will indicate those worthy of adoption in later designs. In order to save time and labor and secure greater unformity in the design of the smaller bridges, some of the rail¬

roads prepare standard plans for spans varying by small distances. For the most important

structures consulting bridge engineers are more frequently * employed thaii formerly, when so much dependence was placed upon comparative

designs made by the bridge companies.

An investigation was made in 1901 by a com¬

mittee of the Railway Engineering Association in regard to the present practice respecting the degree of completeness of the plans and specifi¬

cations furnished by the railroads. It was

found that of the 72 railroads replying defi¬

nitely to the inquiry, 33 per cent prepare ((plans of more or less detail, but sufficiently full and precise to allow the bidder to figure the weight correctly and if awarded the contract to at once list the mill orders for material® ; 18 per cent prepare <(general outline drawings showing the composition of members, but no details of

joints and connections®; while 49 per cent pre¬

pare «full specifications with survey plan only, leaving the bidder to submit a design with his bid.® If, however, the comparison be made on the basis of mileage represented by these 72

railroads, the corresponding percentages are 48, 24 and 28 respectively. The total mileage rep¬

resented was 117,245 miles. A large majority of the engineers and

bridge companies that

responded were in favor of making detail plans.

The shop drawings, which show the form of

the bridge, the character and relations of all its parts, give the section and length of every member and the size and position of every de¬

tail, whether it be a reinforcing plate, a pin, a bolt, a rivet or a lacing bar. All dimensions on the drawings are checked independently so as to avoid any chance for errors. The systematic manner in which the drawings are made and

checked, and the thorough organization of every department of the shops, make it possible to 508

manufacture the largest bridge, to ship the pieces to a distant * site, and find on erecting the structure in place that all the parts fit together, although they had not been assembled at the works.

The constant improvement in the equipment

of the bridge shops and the increasing experi¬

ence of the manufacturers who devote their

entire time and attention to the study of better methods of transforming plates, bars, shapes, rivets and pins into bridges, constitute import¬

ant factors in the development of bridge con¬

struction.

In 1911-15 a new tendency in bridge con¬

struction was shown in the introduction of

various alloy steels of considerably higher

strength than the grade of structural steel which has been the recognized standard during the previous decade. Nickel steel was used for some members of the Municipal Bridge at

Saint Louis and the new Quebec cantilever

bridge, Mayari steel in the second Memphis

cantilever bridge, high carbon steel in the Hell Gate Arch and the continuous truss bridge at Sciotoville, and silicon steel in the Metropolis Bridge.

As the length of span for the different

classes of bridges gives a general indication of the progress in the science and art of bridge building, the following references are made to the longest existing span for each class.'

In plate girder bridges the girders, as their name implies, have solid webs composed of

steel plates. The longest plate-girder span is 130 feet 6j/2 inches between centres of bearings, was erected in 1916 at 79th street, Chicago, where the Nickel Plate Railroad crosses the tracks of the Illinois Central Railroad. The bridge is a part of the scheme to eliminate grade crossings at Grand Crossing. Previous

to that the longest span was 128 feet 4 inches, located on the Mahoning division of the Erie Railroad and erected in 1902. The longest

ones in a highway bridge are those of the via¬

duct on the Riverside Drive in New York,

erected in 1900, the span being 126 feet. The heaviest plate girder is in the skew span of the Boston & Albany Railroad where it crosses the

New York, New Haven & Hartford Railroad at Worcester, Mass. A single girder weighs 170

tons, is 122ˆ2 feet long and 10J/2 feet deep. In 1901 the heaviest girder weighed 103 tons.

The large amount of new construction and

the corresponding increase in the weight of rolling stock have combined to secure a more extensive adoption of plate girders and the de¬

signs of many new details for them. These

affect chiefly the composition of the flanges, the web splices, the expansion bearings and the solid floor system. Solid bridge floors, in which the ordinary ballasted track is carried by trans¬

verse metal troughs, were introduced in 1887, while those in which reinforced concrete was first used were built in 1903. Recent develop¬

ment in solid floors relates mainly to those types in which steel beams supply the necessary strength and concrete protects the beams and supports the ballast. Solid floors may not only be made much shallower than the ordinary open type, thereby reducing the total cost of the track elevation, but they also permit the ordi¬

nary track construction with cross-ties in ballast to be extended across the bridge, thus avoiding the jar which otherwise results as the train enters and leaves the bridge, unless the track is maintained with extraordinary care.

The necessity for bridges of greater stiffness under the increased live loads has also led to the use of riveted bridges for considerably longer spans than were in use formerly. The use of pin-connected trusses for spans less than about 150 feet is undesirable for railroad

bridges, on account of the excessive vibration due to the large ratio of the moving load to the dead load or weight of the bridge itself.

While riveted bridges are now quite gener¬

ally used for spans from 100 to 150 feet, they have been employed to some extent up to 425

feet. The recent forms of riveted trusses do not, however, conform to the general charac¬

ter of European designs, but embody the dis¬

tinctively American feature of concentrating

the material into fewer members of substantial construction. With but rare exceptions the

trusses are of the Warren, Pratt and Baltimore types with single systems of webbing. At a distance where the riveted connections cannot be distinguished, the larger trusses have the same general appearance as the corresponding pin bridges.

When a bridge extends over a valley it often consists of a series of plate-girder spans sup¬

ported by towers, while the stream may be

crossed by one or two plate-girder or simple truss spans. Such a structure is known as a viaduct.

The recent examples of viaduct construction

with their stiff bracing of built-up members and riveted connections exhibit a marked contrast to the older and lighter structures with their adjustable bracing composed of slender rods.

The longest as well as the highest viaduct in America is located on the Crow's Nest line of the Canadian Pacific Railway at Lethbridge,

Alberta. Its length is 5,327.6 feet and its height 314 feet from the base of the track-rail to the bed of the river. The tower spans are 67 feet and the intermediate spans 100 feet in length.

It was completed in 1909 and accommodates a single track. The longest double-track rail¬

road viaduct is 2,558 feet long and carries the Chicago and

Northwestern Railway across the

valley of the Des Moines River. It was built in 1901. Along with this viaduct should be men¬

tioned the viaduct terminal of the Chesapeake and Ohio Railroad at Richmond, Va., whose

length, including the depot branch, is 3.13 miles.

A large part of this is not very much higher than an elevated railroad in cities. The excel¬

lent details and clean lines of this substantial structure give it a character which is surpassed neither in this country nor abroad.

While the elevated railroads which have been built recently also embody many of the charac¬

teristics of the best viaduct construction, spe¬

cial study has been given to improve their aesthetic effect. The use of curved brackets, of connecting plates whose edges are trimmed into curves so as to reduce the number of sharp angles, and of rounded corners of posts, con¬

stitute some of the means employed. The re¬

sults are seen in the structures of the Boston Elevated Railroad and in some of the latest construction in Chicago.

The longest simple truss-bridge span (not

continuous over supports) having trusses with BRIDGE CONSTRUCTION

riveted connections throughout is in the ter¬

minal railroad bridge at Kansas City over the Missouri River. The length of span is 425 feet 6J/2 inches between centres of bearings. This is a structure with a highway on the upper deck and a double-track railroad on the lower deck. The bridge was completed in 1911.

The longest simple truss-bridge span with

pin-connected trusses is 720 feet long. It is in a bridge to accommodate the Burlington, Illi¬

nois Central, Louisville and Nashville and

Frisco railroads in crossing the Ohio River at Metropolis, 111., and was completed in 1917. It would have been slightly more economical to use a cantilever bridge for three of the spans, but the deflections for the simple trusses are smaller and determined the choice. Next in

size are the spans of the Saint Louis Municipal Bridge over the Mississippi River. The three river spans are each 668 feet long and were erected in 1912. The bridge is designed to carry a double-track railroad on the lower deck and a highway on the upper one. This is one of the earliest bridges in which nickel steel was employed, the loading being very heavy.

In the same year (1912) another bridge was completed at Louisville, Ky., replacing a canti¬

lever bridge over the Ohio River to New Al¬

bany, Ind., the longest span in which is 615

feet 2j4 inches. It accommodates a double¬

track railroad between the trusses and high¬

ways outside of the trusses, supported by canti¬

lever brackets.

The recent changes in the details of pin-connected truss bridges have been mainly the result of efforts to eliminate ambiguity in the stresses of the trusses, to reduce the effect of secondary stresses and to secure increased stiff¬

ness as well as strength in the structure. Double systems of webbing have been practically aban¬

doned so far as new construction is concerned.

The simplicity of truss action thus secured per¬

mits the stresses to be computed with greater accuracy and thereby tends to economy. Be¬

fore 1900 very few through bridges, and those only of large span, were designed with end floor beams in order to make the superstruc¬

ture as complete as possible in itself and inde¬

pendent of the masonry supports. Now this

improved feature is being extended to bridges of small spans. Similarly dropping the ends of all floor beams in through bridges so as to clear the lower chord and to enable the lower lateral system to be connected without producing an excessive bending movement in the posts has likewise been extended to the smaller spans of pin bridges and is now the standard practice.

The expansion bearings have been made more

effective by the use of large rollers and of bed¬

plates so designed as to properly distribute the large loads upon the masonry. In the large spans of through bridges the top chord is

curved more uniformly, thereby improving the aesthetic appearance.

The stiffness of truss bridges has been se¬

cured by adopting stiff bracing in the lateral systems and sway bracing instead of the light adjustable rods formerly used. At the same

time, adjustable counter-ties in the trusses are replaced by stiff ones, while in some cases the counters are omitted and the main diagonals designed to take both tension and compression.

Some of the same influences referred to

above have led to much simpler designs for the portal bracings by using a few members of

adequate strength and stiffness, conforming in general character to those of the trusses.

The corresponding development of short—

span highway bridges was long delayed. The

conditions under which highway bridges were

purchased by township and county commission¬

ers were decidedly unfavorable to material im¬

provements in the character of their design and construction. It is a comparatively rare occur¬

rence that the commissioners employ a bridge engineer to look after the interests of the tax¬

payers by providing suitable specifications, mak¬

ing the design, inspecting the material and ex¬

amining the construction of the bridge to see that it conforms to all the imposed require¬

ments. These provisions are only made in some of the cities, and accordingly one must exam¬

ine the new bridges in cities to learn what progress is making in highway bridge building.

The most important advance in the construc¬

tion of highway bridges outside of cities is due to the organization of State highway depart¬

ments in many of the States, which include the organization of bridge

departments for the preparation of suitable specifications, standard plans for different types of bridges, as well as special plans, and which furnish competent in¬

spection during construction. The most note¬

worthy change is due to the extensive adoption of slab and beam bridges of reinforced con¬

crete and of reinforced-concrete arches instead of the flimsy steel truss bridges formerly used.

Where steel trusses are employed they are

carefully designed for long service and ulti¬

mate economy. This movement is promoted

largely on account of the extensive use of automobiles and of auto-trucks.

The longest span of any cantilever bridge

in the world is that of the bridge over the Saint Lawrence River near Quebec. Its length between centres of towers is 1,800 feet. The cantilever arms project 580 feet from each

tower and support between them the suspended span 640 feet long. The anchor spans outside of the towers are 515 feet long. The main posts in the towers are 310 feet high. The trusses have a unique <(Iv system® of bracing, which was adopted because it greatly facilitates the method of erection and at the same time gives greater regularity in the deflection of the truss joints under moving loads. In the canti¬

lever span nickel steel is employed except in the floor system and a part of the cantilever arms. Friction brakes with a capacity of 250,-

000 pounds are provided to take up the expan¬

sion at both ends of the suspended span. The bridge accommodates a double-track railroad

and also highway traffic. It was completed in 1917. The span of this bridge is larger than that of any other class of bridges. The next in size of cantilever spans in America is that of the Queensboro Bridge over

the East River at New York, completed in 1909. Its span

length is 1,182 feet.

Many bridges with trusses continuous over

one or more piers have been built in Europe but exceedingly few in America. Until it was replaced by simple trusses in 1913, the Canadian Pacific Railwav Bridge over the Saint Lawrence River at Lachine, near Montreal, had the long¬

est spans. 408 feet. It then seemed as if no 510

other bridge of that type would be built in this country, but this expectation was not re¬

alized. In 1917 a double-track bridge was built across the Ohio River near Sciotoville by the Chesapeake and Ohio Northern Railway hav¬

ing two spans, each 775 feet long. All the connections of the trusses are riveted. As the rock foundations are practically on the same level across the river, the conditions were favorable for a continuous bridge. For other long bridges, see Bridge.

One of the most interesting developments

relating to the subject under consideration is the construction of a considerable number of metallic arch bridges in recent years and the promise of their still greater use in the future.

On account of their form they constitute one of the handsomest classes of bridges.

The first important steel bridge in the world was completed in 1874. It is the arch bridge which in three spans crosses the Mississippi River at

Saint Louis. Its arches are without hinges and their ends are firmly fixed to the piers. This is one of the most famous bridges in existence. It is the longest span in America for any arch bridge without hinges.

The longest span of any metallic arch bridge with two hinges is that of the Hell Gate Bridge.

Its length is 977*4 feet between the centres of end hinges. It is on the line of the New York Connecting Railroad, which connects the Penn¬

sylvania with the New York, New Haven and

Hartford at New York. It is a four-track

bridge with ordinary ballasted tracks laid on a solid floor of metal and concrete. It con¬

tains a number of unusual features in its de¬

sign and is notable for its beauty of form as well as its magnitude. The curved bottom

chord has a rise of 220 feet. It is 7 feet wide and varies in depth from 7*4 to 1014 feet, and thus compares closely in size with the bottom chord of the Quebec Bridge. It was completed in 1917. Next in length of span is the upper arch over the Niagara River, built in 1898.

Its span is 840 feet.

The largest arch with three hinges is in the highway bridge over the Colorado River at

Needles, Cal., the span being 592 feet and the rise 100 feet. The roadway is suspended from the arch near the centre and supported by posts near the ends. It was opened to traffic in 1916.

The steel arch span in the Detroit-Superior Viaduct in Cleveland, built in 1916, has a span only one foot shorter. See Bridge.

Since 1900 an unusual development has taken place in the construction of reinforced-concrete arches. Not only has a very large

number of such bridges been built in this country, but the greatest span now exceeds that of any stone arch bridge in the world. The largest clear span in America is 300 feet 47/g inches, that of the Larimer Avenue Bridge in Pittsburgh, Pa., completed in 1912. The floor system of slabs and beams is supported by columns resting

upon the two arch ribs, which are braced to¬

gether by horizontal struts, all constructed of reinforced concrete. The largest span in which plain concrete is used in the arch rings is 281

feet and is in the highway bridge at Monroe street, Spokane, Wash., completed in 1911.

The largest concrete arch viaduct in the

world is located on the Delaware, Lackawanna and Western Railroad at Nicholson, Pa.-, and is known as the Tunkhannock Viaduct on ac¬

count of the name of the creek which it crosses.

It contains 10 spans of 180 feet and 2 spans of 100 feet, the total length being 2,230 feet.

It is a double-track structure and was com¬

pleted in 1915. It is not the longest but the largest in total mass. It contains approxi¬

mately 4,509,000 cubic feet of concrete and 2,-

280,000 pounds of reinforcing steel. Its height is 242 feet above the bed of the stream.

It is the smaller steel structures which are destined more and more to be replaced by arches of this material. The steel bridges require re¬

painting at frequent intervals, constant inspec¬

tion, occasional repairs and finally replacing by a new structure after a relatively short life, on account of rust and wear, unless it is required

even sooner on account of a considerable in¬

crease in the live load. The concrete arch re¬

quires practically no attention except at very long intervals.

The safety of operating the traffic makes it desirable to have as few breaks as possible in the regular track construction of a railroad, and this constitutes an additional reason why con¬

crete or stone arches are being substituted for the smaller openings. The decreasing cost of concrete tends to an extension of this practice to openings of increasing size. In 1901, how¬

ever, a bridge was completed which marks a decided departure from previous practice. The Pennsylvania Railroad built a stone bridge,

consisting of 48 segmental arches of 70 feet span, at the crossing of the Susquehanna River at Rockville, Pa. It is 52 feet wide, accom¬

modates four tracks and cost $1,000,000. This bridge has not only the advantage of almost en¬

tirely eliminating the cost of maintenance, but it also has sufficient mass to withstand the floods which occasionally wreck the other

bridges on that river. In 1903 the same rail¬

road built a similar bridge over the Raritan River at New Brunswick, N. J.

The longest span of a stone arch bridge in America is that which carries the Washington aqueduct and a highway over Cabin John Creek, near Washington, D. C. The span is 220 feet long in the clear.

Of movable bridges the largest swing span

existing was erected in 1908 over the Willa¬

mette River at Saint Johns, near Portland, Ore.

Its length is 521 feet between centres of end supports, and is located on the Northern Pa¬

cific Railway. The Illinois Central Railroad Bridge over the Missouri River at East Omaha, Neb., has a span one foot shorter and was completed in 1893. Both of them are double¬

track bridges.

In a direct-lift bridge a simple truss span is lifted vertically to permit boats to pass. The largest span is 220 feet and is in the Oregon-Washington Railroad and Navigation Com¬

pany's bridge over the Willamette River at

Portland, Ore., completed in 1912. This is a double-deck structure with the highway on the upper and the railroad tracks on the lower deck. In the lift span the lower deck is sus¬

pended from the trusses and may be lifted 46

feet independently of the truss span to give a clear height above low water of 72 feet. When more clearance is required, the truss span is also lifted. The upper deck has a lift of 93

feet, thus giving a total clearance of 165 feet above low water or 144 feet above high water.

In the Kansas City bridge referred to as hav-BRIDGE CONSTRUCTION

ing the longest simple trusses with joints riv¬

eted throughout, there is one span, 428 feet long, which has only the suspended railroad deck movable. In 1916, 33 direct-lift bridges had been built in the United States and Canada.

In cities where dock room is very valuable, there are serious

objections to the swing bridge, which requires so much room in which to turn.

In narrow streams like the Chicago River and its branches the centre or pivot pier also in¬

terferes seriously with the waterway and forms an obstruction to navigation. The bascule

bridge was introduced to obviate these diffi¬

culties. It acts somewhat like a trap-door

hinged at one end. One type of bascule, known as a rolling lift bridge, was first built over the Chicago River at Van Buren street in 1895.

Another type is known as a trunnion lift

bridge. The longer spans have two leaves,

while the shorter ones have only one leaf. The largest double-leaf bascule bridge has a span of 336 feet, built in 1913, over the Sault Sainte Marie Ship canal on the Canadian Pacific Rail¬

way. In closing, the leaves of this span come together at the centre and interlock so as to form a simple-truss bridge when closed. The lower chords are joined like railroad cars but with a double coupler that can transmit a high tensile stress.

The longest span with a single leaf is 235

feet, built in 1913. It is at the crossing of the Calumet River, South Chicago, by the Balti¬

more and Ohio Railroad and is a double-track bridge. The Canadian Pacific Railway Bridge

over the Kaministiquia River has two decks, accommodating a double-track railroad on the lower deck and a highway on the upper deck.

Its span is 186 feet long and was built in 1913.

The Lake Shore and Michigan Southern Rail¬

way Bridge over the Portage River at Port

Clinton, Ohio, is a four-track bridge, two tracks being supported between and two outside of

the trusses. Its span is 118 feet and was com¬

pleted in 1914.

Several other improved forms of hinged—

lift bridges have also been designed and built in Chicago and elsewhere. In a small bridge erected in 1896 on the Erie Railroad in the Hackensack Meadows there is only a single

leaf hinged at one end and lifted by a cable attached to the other end. The counterweight rolls on a curved track so designed as to make the counterbalance equally effective in all stages of opening and closing the bridge.

A novel bridge was built in 1902 over the ship canal at Duluth, which is different from any other type in this country. The general scheme is similar to that of a design made by a French engineer who built three of the struc¬

tures in different countries. It consists of a simple truss bridge 393 feet 9 inches long, sup¬

ported on towers at a clear height of 135 feet above high water. Instead of supporting the usual floor of a highway bridge, it supports the track of a suspended car which is properly stif¬

fened against wind pressure and lateral vibra¬

tion, the floor of the car being on a level with the docks. This ferry is.operated by electricity.

The loaded car, its hangers, trucks and ma¬

chinery weigh 120 tons. In the French design a suspension bridge was used instead of the simple truss bridge.

The longest span of any suspension bridge,

not only in America but in the world, is 1,600

feet. It is that of the Williamsburg Bridge over the East River at New York city and was completed in 1904. The span of the famous

Brooklyn Bridge, completed in 1883, is 1,595*4

feet. The very handsome Manhattan Bridge,

located between these two, has a span of 1,470

feet and was completed in 1909. A critical observation of these three bridges illustrates what can be done to improve the aesthetic fea¬

tures of monumental bridges.

A bridge across the Charles River between

Boston and Cambridge deserves especial men¬

tion and marks a decided advance in the growing recognition on the part of municipal au¬

thorities of the importance of aesthetic consid¬

erations in the design of public works. It consists of 11 spans of steel arches whose lengths range from 101 *4 to 18854 feet. Its width is 105 feet between railings. It is claimed that this bridge <(will be not only one of the finest structures of its kind in this country, but will be a rival of any in the Old World.® Its length between abutments is 1,76754 feet, and it was estimated to cost about $2,500,000.

The problems incident to the replacing and

strengthening of old bridges frequently tax the resources of the engineer and demonstrate his ability to overcome difficulties. Only a few ex¬

amples may be cited to indicate the character of this work. In 1900 the Niagara cantilever bridge had its capacity increased about 75 per cent by the insertion of a middle truss with¬

out interfering with traffic. In 1897 the entire floor of the Cincinnati and Covington suspen¬

sion bridge was raised four feet while the traffic was using it. It may be of interest to state that the two new cables, 1054 inches in diameter, which were added to increase the capacity of the bridge, have just about three times the strength of the two old ones, 1254 inches in diameter, and which were made a little over 30

years before. In the same year the old tubular bridge across the Saint Lawrence River was

replaced by simple truss spans without the use of falseworks under the bridge and without interfering with traffic. On 25 May 1902, the Pennsylvania Railroad Bridge over the Raritan River and canal at New Brunswick, N. J., was moved sidewise a distance of 1454 feet. Five simple spans 150 feet long and a drawbridge of the same length, weighing in all 2,057 tons, were moved to the new position and aligned in two minutes and 50 seconds. The actual

times that the two tracks were out of service were respectively 15 and 28 minutes. On 17

Oct. 1897, on the same railroad near Girard Avenue, Philadelphia, an old span was moved away and a new one, 235 feet 7 inches long, put in exactly the same place in two minutes and 28 seconds. No train was delayed in either case.

Henry S. Jacoby,

Professor of Bridge Engineering, Cornell Uni¬

versity.

BRIDGE CONSTRUCTION, Modern

Methods of. A bridge is a structure designed to carry traffic over (a) a natural depression in the earth's surface, (b) a water way, (c) a highway or railroad track. The traffic or mov¬

ing load is known as the Hive load,® and the weight of the bridge itself as the ((dead load.®

Bridge structures may be divided into four

general classes, viz.: (a) girder bridges, (b) 512

truss bridges, (c) suspension bridges and (d) arch bridges.

Girder and truss bridges have vertical re¬

actions, i.e., exert only vertical pressures upon their supports or abutments. More than 90

per cent of modern bridge structures are girder or truss bridges. The longer spans are built of steel, while timber or reinforced concrete is sometimes used for the shorter spans.

A truss is composed of members or parts

joined together at their intersections to form a rigid framework. The most rigid form of

framework is the triangle, as it is the only figure the shape of which cannot be altered without changing the length of its sides. It is therefore the <(truss element® and all trusses, no matter how complicated in construction, con¬

sist of a series of triangles and may be treated as such. The members of a truss are designed to resist the forces or loads which it supports and which tend to lengthen or shorten the sev¬

eral members. A truss member resisting a ten¬

dency to lengthen sustains a stress known as tension, while one

resisting a tendency to

shorten sustains a stress known as compression.

The joints must be designed to resist shear, i.e., the tendency of the member to pull away from or slide through the joint.

A truss bridge consists of two or more

trusses which support the roadway or floor

system. Truss bridges are of three kinds in theory and design. (1) A simple truss rests upon two supports and is not connected rigidly to any adjacent span. (2) A continuous truss rests on more than two supports, i.e., is con¬

tinuous over one or more supports. (3) A

simple cantilever truss is fixed at one end and without support or free at the other.

Simple Trusses. — Probably over 90 per cent of all bridge trusses are simple trusses. They have the advantage of not being dependent

upon absolutely unyielding supports and the

stress distribution throughout the various mem¬

bers can be more definitely ascertained than in other types. Fig. 1 is a skeleton diagram of a Pane! ˆ Upper Chord / Counter Tie

Mariner Strut lower Chord -

->

Tension Members :

Fig. 1. — Simple Truss.

simple bridge truss. The upper chord is a

compression member, and the lower chord a

tension member. The truss members between

the two chords are known as (<web® members, being designated as struts or ties accordingly as they are in compression or tension. In Fig.

1 the diagonal members are all in tension ex¬

cept the end posts. In some trusses the counter¬

ties are omitted and the diagonal members de¬

signed to resist both tension and compression.

Types of Simple Trusses. — The Pratt truss,

Fig. 2, is the type most commonly used in Amer¬

ica for spans under 250 feet. Its advantages are simplicity, economy of metal and suitability for connecting to the floor and lateral systems.

The counter-ties indicated by the dotted lines may be omitted as noted above. When the

upper chord is inclined, this type of truss is known as a Parker truss, Fig. 3, and is then adaptable for somewhat longer spans.

The Baltimore truss, Fig. 4, is a modifica¬

tion of the Pratt truss and can economically be used for longer spans than the latter. Long panels make an uneconomical floor system, and

in the Baltimore truss, by the addition of a short diagonal and suspender, the short panel length for the floor system is obtained, while the main diagonals and posts are not increased in num¬

ber beyond the economic limit, as in this truss they extend over two panels of the floor svs-tem. Similarly, the Pennsylvania truss, Fig.

5, is a modification of the Parker truss and is economical for still longer spans. The Balti¬

more truss and the Pennsylvania truss are fre¬

quently referred to as Pettit trusses.

The Warren truss, Fig. 6, is principally used for short spans in elevated railroad construc¬

tion, being preferable to a plate girder since it furnishes less obstruction to the light. This type of truss with verticals added, Fig. 7, is extensively used for short spans, for all classes of traffic.

The Double Intersection Warren truss, Fig.

8, is still occasionally used, but the uncertainty of the actual distribution of the stresses has led to its gradual disuse. This truss, with sub¬

verticals added as indicated by the broken lines, Fig. 8. — Double Intersection Warren.

is economical of metal, but the objection noted above, together with its less sightly appearance in comparison with other types, has prevented its being adopted except in rare instances.

The Howe truss, Fig. 9, is confined to struc¬

tures built partly of timber, and is therefore BRIDGE CONSTRUCTION

limited to short spans or to comparatively light traffic. Unlike the Pratt truss, the counters (in this case counter struts) cannot be omitted, as the diagonals are designed to bear against the joints and cannot take tension.

The Lenticular truss, Fig. 10, is rarely seen in America. In fact, with one striking excep¬

tion, no truss of this type has been built here for many years, but there are some of early construction still in use. Although somewhat pleasing to the eye, it is very wasteful of metal, Fig. 10. — Lenticular Truss.

as the long web members have very little stress, but must of necessity contain a certain amount of metal.

The K truss, Fig. 11, is a new type intro¬

duced into America in 1915, which seems likely to come into favor in the future. It has the .advantage over the Pettit trusses of having more uniformity of deflection.

Continuous Trusses. — Continuous trusses are

-seldom built except for swing bridges, Fig. 12.

While economical of metal as compared with

the same number of simple truss spans, a slight yielding of the supports would develop addi¬

tional and unprovided-for stresses in many of ithe truss members. The use of continuous

trusses is therefore confined to sites where there is an absolute certainty that the supports will be unyielding. Fig. 13 shows the longest and one of the very few continuous bridges of any considerable span that have ever been built. There may be a greater development of this type in the future.

Movable Bridges. — One type of movable

bridge has already been mentioned, i.e., the swing bridge. A circular track provides the two centre supports, A and B, Fig. 12, and the bridge may be rotated on this track, becoming a balanced cantilever when opened, while when closed it is generally continuous for the live load.

Another type in which the movable span

is raised at one or both ends is the bascule bridge. . One form of bascule bridge is illus¬

trated in Fig. 14. By means of the operating pinion which is geared to the strut, and to which in turn is geared the operating mechanism, the bridge may be raised or lowered, the bal¬

ance being maintained by the concrete counter¬

weight. When closed this bridge acts as a

simple span under live load, and in this par¬

ticular the single leaf type of bascule is pref¬

erable to the double leaf, operated from both ends ; for without expensive interlocking de¬

vices the latter cannot be made to act as a simple span, but becomes either an arch or cantilever structure under live load. The truss of a bridge of this kind may have various arrangements of the web members. The direct lift bridge (Fig. 15) is more economical than a bascule except for comparatively short spans, while its operating mechanism is more simple.

When the movable span is only part of the whole bridge structure, the towers may be con¬

structed upon and as part of the trusses of the adjacent spans.

Cantilever Trusses. — The development of

the cantilever bridge was an attempt to avoid the disadvantages of the continuous structure, and unlike the latter, a slight settlement of the supports is not followed by a great increase in stresses. It is not suitable for short spans where the live load is large in comparison with the dead load, for in such a structure the stresses in the anchor arm as the load travels on the structure require a large amount of metal. As the ratio of dead load to live load increases, the cantilever becomes more eco¬

nomical, for some of the dead load stresses are large enough to prevent reversal by the live load. Hence the cantilever system is best vol. 4 — 33

adapted for use in long spans, or where the simple truss or arch is difficult of erection, for the cantilever may be erected with very little falsework by building it out panel by panel. In form the chords of the anchor and cantilever arms may be straight, like those of Fig. 16, or curved to give the appearance of flnc/ > or CaoG/evcr G'ltspe/ic/ecG Gt/rfi/erer PrcAor yfr/7} *Vr*7 7 Soos? *7S*7? *kr*77

< - - x - x — - - x - x - >

Fig. 16. — Cantilever Bridge.

vision may be made to carry street railway tracks. Reinforced concrete slabs and girders have also been used for short-spay railroad bridges, where a permanent and artistic struc¬

ture was desired, but where the vertical clear-HU;

G/rs/er

A

• » • •

M-M

S/<?2>

\ r

-

9=

k i i i

■ r? _

~oor £}<s<7/77

Fig. 19. — Reinforced Concrete Through Girder Bridge.

a suspended structure, and various arrangements of the web members are to be found in modern trusses. The suspended span is usually one of types of simple trusses heretofore described.

Girder Bridges. — The simplest form of a

girder bridge consists of two timbers spanning an opening and supporting a plank floor. For more permanent construction, longer spans or heavy traffic, modern girder bridges are built either of steel or reinforced concrete.

Rolled steel shapes, such as I-beams and

channels, are used as girders or beams for short J~ S& ‘<7/7? eT/ £<5VZ‘7<S’/

S~<5c:7f/‘c>/7 3ec7/0s?

P/onje P/afe

P/a/?ye P/7f/(s.

tˆ—/r/of7pe P/vfe

Fig. 17. — Plate-Girder Section.

spans, and built up sections known as plate-girders consisting of rolled steel plates and angles have been used for spans as high as 130 feet. (See Fig. 17). The plate-girder indi¬

cated in the figure is a comparatively light sec¬

tion. For heavy traffic additional angles and plates may be added to the flange and web plates may be increased in number.

ance or the soil conditions would not allow the construction of a concrete arch.

Both steel and reinforced concrete girders

may be used in continuous and cantilever con¬

struction, while the former is often used for the leaf of a bascule or the movable span of a direct lift bridge.

Bridge Floors and Floor Systems. — The

floor is that part of a bridge which directly supports the live loads. The floor system is that part of the structure which supports the floor and transfers the loads to the trusses, girders or arches. In a ((deck bridge® the floor system is attached to the upper chords of the trusses at the panel points, or to the upper flange or top of the girders, while in a <(through bridge® the floor system is supported at the lower chord, or near the lower flange or bottom of the girders. There are some instances where a bridge has two floors, and such a structure is known as a <(double deck bridge.®

In railway bridges two main classes of floors are used viz., the open floor and the solid floor. The usual type of open floor consists of cross-ties separated five or six inches and supported on <(stringers® in the case of through spans and in most deck truss spans, and on the girders or trusses in the case of short deck spans. Where stringers are used they transfer the loads received from the cross-ties to ((floor-beams® which are supported either between or upon the trusses or girders. With short panels the stringers may consist of I-beams, but

usually both stringers and floor beams are

plate-girders. Fig. 20 is a skeleton diagram of a portion of the open

floor and floor system of a through railway truss bridge.

1 ˆ Cb/7C/’<£>7$2 *T*&///7J

‘Sc rcT Gos/ˆ/ao

r

V-.-r ~ .

kf Corrcre/e

M

It

14

tS/al

1 i

U l

y C S < f//?^ > rce/7?C/G

1 1

ˆG/rc/s/zs — ˆ

k ii

Hi

7r＜/SS - 4 ˆ

g

s — * qq

c

Track &?/. — *-4

Grass 77 ＜s -

Goan/

TroSs —

HliEliXCEICIIU

uvu

nun

uuuuuuuu

Fig. 20. — Open Floor.

Fig. 18. — Reinforced Concrete Deck Girder Bridge.

In the last decade reinforced concrete girders (see Figs. 18 and 19) have been used exten¬

sively for short spans. They make a more

rigid and more permanent structure than those built of steel, although their first cost is usually somewhat greater. The sections illustrated are such as are used for heavy country highway traffic. Reinforced concrete slabs without girders are often constructed for the shortest, spans.

The deck type may be widened to any desired width, sidewalks may be supported on canti¬

lever brackets or additional girders, and pro-Solid floors indicate by their name a non¬

open construction, and usually carry ballast such as is used on the rest of the track. Where no provision need be made for drainage a solid flooring of creosoted timbers may be laid on the stringers, girders or trusses and upon this is spread the ballast in which the track ties are laid. Various kinds of so-called trough floors were among the first types of solid floors to be built. These (see Fig. 21) were built up of

different steel shapes and sections and resting upon the stringers, floor beams, girders or trusses, either carried the ties directly or BRIDGE CONSTRUCTION

supported the ballast in which the tics were laid. Floors of this kind are seldom constructed at the present time. The latest trend has been toward a type where concrete is the predominant feature.

In through girder bridges where more ex¬

amples of this tjrpe of floor are to be found, there are two general systems. In one the

floor beams which are rolled I-beams are

- /r -

O - O-!

■Cr” Hr

— O _ Q..-.

rtyJ S“_

•<o

1

1

1

Fig. 21.

spaced very close together (from 12 to 24

inches) and completely encased in concrete.

The beams are designed to carry the whole

load and the concrete serves as protection and filling only. In the other the floor beams are somewhat farther apart and support a rein¬

forced concrete slab. In either case there is a surface of concrete upon which the ballast and ties may be laid.

Previous to 1900 few highway bridge floors

were made of other material than wood. A

common type of floor for country highway

rTTTl

Fig. 22. — Wooden Floor.

bridges is illustrated by Fig. 22. Planks rest¬

ing directly on the stringers were fastened down by nails to nailing pieces which were bolted to the stringers. In some cases a floor was laid as indicated by Fig. 22 and another one, called a wearing floor, was put on top of it.

All wooden floors have the disadvantage of

being difficult to attach to the stringers so that they will remain secure and not be jarred loose by traffic.

Fig. 23 illustrates another type of floor

which allows the pavement of the adjacent

Concrete.

I 1 1 1 -1—

7*-

1 1 ‘~r=r=L

[Creosc?&c/ 77/77 Sey-s ”7T- £}easr7 SzT-zneers T~ ‘ -

Fig. 23. — Brick Floor.

roadway to be carried without a break across the bridge. Creosoted timbers packed close

together are bolted on the stringers and sup¬

port the pavement and intermediate sand

cushion. A more modern and more permanent

floor can be made by the substitution of a reinforced concrete slab in place of the floor timbers, and except in instances where the addi¬

tional dead load weight of such a slab would be markedly disadvantageous, this type is pre¬

ferred.

A large number of floors are built as indi¬

cated by Fig. 24, with the I-beam stringers spaced somewhat closer together than in the type shown by Fig. 23, and designed as in the — | TFarf 7/ Cc/s%/0f? i —rjr9 > vrvrws,D , m 9 } t/j /j ryjr/ ; //jj ftp// ; }

— F— P?-P~-

t-77.

//& 77od

Fig. 24. — Plain Concrete Floor.

case of railroad structures to carry the whole load, the concrete serving merely as protection to the beams. The concrete may be covered

with earth for a depth of a few inches or any type of modern pavement may be used.

As shown by Figs. 18 and 19, the floor of a reinforced concrete girder

bridge is similar to one of the floors described above, the slab being part of the bridge itself.

Bracing. — Between the two or more trusses

or girders forming a bridge a large number of struts, or ties and struts, are required to hold the truss in position and make the structure stiffer and less subject to vibration. In modern practice most of the bracing is designed to take both tension and compression as experience has shown that greater stiffness is obtained in this manner.

The bracing between the end posts of

through bridge trusses is known as the ((portal bracing® while the vertical or inclined bracing between other web members of one truss and the corresponding members in the other truss is called the ((sway bracing.® The horizontal brac¬

ing between the chords of the trusses is re¬

ferred to as the ((upper lateral system® or <(lower lateral system® respectively.

In a through truss bridge, when the depth

of the trusses is not sufficient to permit the construction of the portal, sway and upper

lateral bracing, the trusses are known as <(pony bridge trusses.® Such bridges have very little lateral stiffness and consequently are used only for light traffic and short spans.

In through girder bridges the floor system

itself is constructed to serve the function of the lower lateral system and the upper flanges of the girders are stiffened by riveting heavy brackets or gussets to the tops of the floor beams and the sides of the girders. In deck bridges the portal and sway bracing are often referred to as (<cross-frames,® and extend the full depth of the trusses or

girders.

Suspension Bridges. — Fig. 25 shows the

skeleton diagram of a suspension bridge. Cables anchored at the ends are carried over towers and the bridge floor is hung from the cables by means of vertical suspenders. In the mod¬

ern suspension bridge the bridge floor cannot be hung directly from the cables, for the mov¬

ing of a heavy load across the bridge would cause the cables to sag first at one point and then another, giving a kind of wave motion as the load passed over the structure. A more 516

equal distribution of the load is effected by the use of stiffening trusses. (See Fig. 26).

These trusses are hung from the cables and the bridge floor or floors is supported on them.

When well braced together such a system resists the horizontal swinging which may be caused by the wind.

The lack of rigidity of a suspended struc¬

ture generally renders it unsuitable for short spans except for light traffic. While the addi¬

tion of stiffening trusses and bracing may

result in sufficient stiffness, the increased ex¬

pense usually makes the cost of the structure greater than that of simple trusses. Even for longer spans the proper degree of stiffness

can¬

not be secured except at such an expense as to render it more costly than a cantilever. Since long spans cannot economically be built for light traffic, the suspension system seems to have its principal economic advantages for

long spans under heavy traffic where the dead load is large in comparison with the live load, and consequently assists in making the structure a rigid one.

The suspension bridge can often economi¬

cally be constructed for foot traffic, or where the possibility of future heavy traffic is de¬

batable. In the latter instance considerable ex¬

pense may be saved by constructing this less rigid type, which may satisfactorily care for the traffic for many years.

Arch Bridges. — A beam or truss bridge

under vertical loads has only vertical reactions, provided proper provision is made at one or more of the supports for a horizontal move¬

ment due to the deflection of the bridge and to changes in temperature. When the reactions are inclined under vertical loads the bridge be¬

comes an arch. The vertical loads on an arch produce a horizontal thrust at the ends equal to the horizontal component of each inclined reaction. The thrust may be resisted either directly by the abutments or by a tie uniting the two supports.

Steel arches are divided into three classes, based on the number of hinges each truss or rib contains. The simplest form has three

hinges, one at each support and one at the crown. When two hinges only are employed

they are placed at the skewbacks or supports.

The third class of arches has no hinges and Fig. 27. — Spandrel-Braced Arch.

its ends are usually fixed rigidly to the abut¬

ments or piers.

The form of three-hinged arch most fre¬

quently adopted for bridges is a horizontal upper chord and a bent lower chord united by vertical and diagonal web members as indicated in Fig.

37. Such an arch is designated as spandrel-braced. The hinge at the crown is generally placed in the lower chord and only infrequently in the upper chord or midway between them, although in either of the latter positions the stresses throughout the structure are somewhat less. The explanation of the above lies in the fact that the placing of the hinge in any posi¬

tion other than in the lower chord seems to detract from the good appearance of the struc¬

ture, due to the necessary arrangement of the web members.

In another form of three-hinged arch both

upper and lower chords are curved, being con¬

nected together by web members like a truss in some arches and by a solid web plate in others. (See Fig. 28). An arch of this form is referred to as an arch rib, and two or more ribs constitute the bridge structure. Where the solid web plate is used, the section of the rib is similar to a section of a plate girder, and the chords are often called flanges. With the solid section the rib is generally made a constant depth throughout, although with this section, as well as where web members are used, the depth may vary. The theoretical outline of the rib would be narrow at the springing and crown, with greater depth at the haunches. Such an outline is not graceful, however, and is seldom

used. In some of the more recent and heavy structures the ribs gradually increase in depth from the crown toward each springing or skewback, having the maximum depth at the latter points. Such an arch presents a graceful ap¬

pearance, and the loss in economy is not great.

The floor of the bridge is supported either on columns carrying the load down to the

ribs or on suspenders hung from the ribs.

Two-hinged arches are somewhat stiffer in

the vicinity of the crown than the three-hinged type, and on this account are preferred by some engineers for heavy traffic. In a three-hinged structure the crown is free to rise and fall due to the expansion or contraction caused by temperature changes without producing any bending stresses in the members, but with the crown hinge omitted, such bending stresses may be large. The additional material required to resist these stresses may be considerable, so that generally the three-hinged arch is the more economical. In form the same general out¬

lines are employed for both the two and three-hinged types.

The no-hinged arch is seldom used in

America. It is much stiffer than any other type, but this fact in itself is a disadvantage on account of the very large bending stresses caused by changes in temperature, particularly at the supports. Another disadvantage is the difficulty in constructing absolutely unyielding supports, for any movement of these produces additional bending stresses throughout the arch.

Consequently arches of this type are not

adapted for spans of any great length, and there are few in existence.

Concrete Arches. — For the shorter spans

where the supports can economically be made unyielding, the concrete arch presents a struc¬

ture not only very pleasing to the eye but at the same time of more permanent character

than one of steel. Earth-filled arch bridges (see Fig. 29) are suitable for short spans or Fig. 29. — Earth-Filled Arch.

for long spans of relatively low rise, where the dead load weight of the earth fill is not excessive. For the longer spans of higher rise the open spandrel construction (see Fig. 30) is usually adopted. Here a reinforced concrete structure, similar to those shown in Figs. 18

and 19, is supported on columns which carry the load to the arch itself. While more complicated in construction, the saving in dead load weight may be considerable, and the opportunity

afforded for artistic treatment is increased. In some instances the arch ring extends the full width of the bridge, while in others the struc¬

ture consists of two or more ribs, each carry¬

ing its proportion of the floor load, and braced together so as to act as one structure. See Concrete Construction.

The arch rib may or may not be strengthened by the embedment of steel reinforcement in

the concrete. Where used, this reinforcement may consist of a steel arch, built up of rolled steel sections, or single rolled sections, or of reinforcing bars. The modern trend has been *fbac* > vay S/a%

i I

CoA/mn

CTross-S < sc~iL/

Fig. 30. — Open Spandrel Arch.

toward the use of the reinforcing bar and the elimination of the more complicated forms of reinforcement.

In arches of relatively high rise, the stress under dead load only is at every point com¬

pression. Where the dead load is comparatively large the possible tensile stresses due to the live load and changes in temperature may not be sufficient to cause the resultant stress to be tension at any point. In such arches no rein¬

forcement is needed, except such as may be placed to prevent local shrinkage and tempera¬

ture cracks.

Flat arches, and those where the dead load is not predominant, are subject to tensile

stresses at some points under certain combina¬

tions of the loads and changes in temperature, and hence must be reinforced with metal, as concrete alone is capable of resisting but a slight amount of tension.

Details of Steel Trusses. — Members of steel trusses are usually constructed of rolled steel shapes either singly or in combination. Pin-connected trusses have at each panel point or joint a steel pin or round bar passing through holes in the chord and web members, and trans¬

ferring the stresses from one member to an¬

other, by means of the shearing and bending stresses generated in it. Riveted trusses have their members joined together by rivets, which either pass directly through the several members at the intersecting joint, or which join each member to a common special connecting plate or plates. Such a joint has great stiffness, and when the truss deflects,* this stiffness, since it prevents the members from rotating sepa¬

rately at the joints, causes large additional stresses in these members. Such stresses are known as ˆsecondary stresses.ˆ

In the early days of steel bridge con¬

struction, with the comparatively light traffic and slow speed of that time, the pin-connected structure was the more suitable for all but the shortest spans. As the weight of the traffic and its speed increased, the vibration of the pin-connected structure of short span became a

serious factor, and the maximum span of

riveted trusses has steadily increased. The

length of span at which it seems desirable to select a pin-connected truss is dependent upon the relations of dead and live load. Where the dead load is comparatively large, the vibra¬

tions caused by the moving load may not be serious and the pin-connected truss with its low secondary stresses may be preferred. Where the traffic is very heavy the riveted truss may be desirable, and by bending the members be¬

fore erection, so that under the maximum stress from the live load they will assume their normal positions, the maximum primary and secondary stresses can be prevented from occurring simul¬

taneously. Such bending of the members is,

however, very costly, while the connecting

plates for heavy and long trusses must be

enormous, so that pin-connected trusses with heavier members may be the more economical.

The longest riveted simple truss in America at present has a span of 425 feet, while one in Europe has a span of 610 feet. The continuous span shown in Fig. 13, each span being 775

feet, has riveted connections throughout. Such riveted spans are, however, somewhat longer

than the average maximum limit for this con¬

struction, but the tendency in the direction of long riveted spans is steadily growing.

For riveted trusses the members are built

either of rolled steel angles or channels, or of combinations of angles and plates. Fig. 31

is a partial detail drawing of a riveted truss bridge of a rather simple type. In heavier 518

and longer trusses the sections of the members are correspondingly heavier, and composed of a larger number of plates and shapes riveted together in various forms. Pin-connected

trusses omit the plates indicated at the joints through a pin, having its bearing in a shoe.

The shoe is either of cast steel or built up of plates and angles like the one shown in Fig. 31.

Arches have the same general details as

trusses. The hinges consist of a pin against in Fig. 31 and substitute the pin or round bar referred to above, while the members subject to tension only are composed of one or more eye-bars. (See Fig. 32). Almost all trusses and some girders transfer the load to their supports which the arch or half-arch has a semicircular bearing and around which it is free to rotate.

The steel most frequently used for bridge

structures at the present time is commercially known as (<structural steel.® Technically, this BRIDGE DESIGNS, RAILWAY

grade is a rather low <(medium steel® and is capable of withstanding a stress of about 60,000

pounds per square inch before failure. There is no reason why a true medium steel having an ultimate strength of about 66,000 pounds per Fig. 32. — Eyebar.

square inch could not be used, except that the steel manufacturers prefer to furnish a softer steel.

In some of the longer structures an alloy

steel has been used. A nickel chrome alloy known under the name of Mayari steel which is manufactured from Cuban ores containing

both nickel and chrome very nearly in the

right proportion to produce bridge material of excellent quality has been found satisfactory.

Nickel steel is artificially produced by the addi¬

tion of from 3 to 4 per cent of nickel. Both of these alloy steels are capable of with¬

standing a stress of more than 100,000 pounds per square inch, but they are somewhat more expensive per pound.

Bibliography. — Burr, W. H., Suspension

Bridges) (New York 1913) ; Hool, G. A., Rein¬

forced Concrete Construction (Vol. Ill, New

York 1916) ; Ketchum, M. S., (The Design of Highway Bridges* (New York 1908) ; Johnson, Bryan and Turneaure, (Modern Framed Structures) (New York 1916) ; Kirkham, J. E.,

Structural Engineering) (Chicago 1914) ; Kunz, F. C., ‘The Design of Steel Bridges* (New

York 1915) ; Marburg, F. Edgar, (Framed

Structures and Girders) (New York 1911) ;

Merriam and Jacoby, Roofs and Bridges >

(Vols. I-IV, New York 1905-17) ; Spofford, C.

W., (Theory of Structures) (New York 1913) ; Tyrrell, H. G., ‘History of Bridge Engineering) (Chicago 1911) ; Usborne, P. O. G., (The Design of Simple Steel Bridges* (New York 1912) ; Waddell, J. A. L., ‘Bridge Engineering* (New York 1916).

L. C. Urquhart,

Instructor in Civil Engineering , Cornell Uni¬

versity.

BRIDGE DESIGNS, Railway. Bridges

have been in use from prehistoric times. Even the scientific forms, now looked upon as most modern, were developed in a crude way by the ancients, timber cantilever structures being built by the Chinese in the time of Confucius.

Bridge design, of necessity, continued in an elementary stage as long as timber and masonry were the only materials in use, and long spans were impracticable with such materials,, though the “Towne® lattice spans, built entirely of plank connected with hardwood pins, were as nearly perfect as was possible without, the use of iron, and some of these spans are still doing effective duty after 90 years of continued use.

The earliest use of iron in bridges began

with the use of cast-iron posts and cast-iron arches, but this material was not found entirely satisfactory for long-span bridges. The first real development began with.the use of wrought iron, which was first used in this country in vertical tension members in the Rowe® truss about 1840, and in inclined tension members in the “Pratt® truss about 1845. The use of wrought-iron tension members with wood and

cast-iron compression members continued until about I860, when Howard Carroll, an Irish

engineer, assistant to Chief Engineer Gray of the New York Central, introduced the riveted lattice bridge, built entirely of wrought iron, which was developed by his successors on that road and used until very recent years.

Wrought-iron plate girders were also first built about 1860.

J. H. Linville, between 1850 and 1860, in¬

troduced on the Pennsylvania Railroad a type of truss with flat diagonals and hexagonal

rolled-iron posts, and about this same time Bollman and Fink introduced on the Baltimore &

Ohio their multiple suspension types of trusses with flat diagonals and vertical iron posts.

John W. Murphy adopted Whipple's ideas and

developed a truss on Whipple's lines with cast-iron posts and square bar tension members with loop eyes.

A long step in the evolution of properly

designed compression members was made by

David Reeves about 1864, when he began the use of the rolled iron, round segmental "Phoe¬

nix® column, and about that date he also de¬

veloped the hydraulic upset-end on tension

members, which were made by the Phoenix Iron Company, first on round rods and afterward

developed ' into eyes on flat bars, and these two features were combined in the "Phoenix®

bridge, which was far in advance of any bridge construction at that date and quickly came into very general use. While it still preserved the use of cast iron for connections, it permanently did away with any further use of cast iron for compression members, and its simplicity and

ease of erection made it by far the best type developed up to that time. Many of these

bridges are still in use, and those that have been replaced have generally been removed on account of the great increase of rolling loads to be carried, and not on account of inherent defects in the design.

With the use of "eye bars® the pin-con¬

nected type of truss came into practically uni¬

versal use in this country, since it had great advantages over riveted bridges in many re¬

spects ; but owing to its ease of erection, it was in many cases carried to ridiculous ex¬

tremes, and spans as small as 25 and 30 feet were constructed with individual members so

light and insignificant that the structure had no rigidity. In recent years there has been a very general disuse of this type of construction for spans under 150 feet, and the best engi¬

neering practice now calls for riveted structures for small spans, though American engineers

still use the pin-connected type for long spans almost universally.

The general principles of railroad bridge

construction have not undergone much change

in the last 20 years, as practically all spans are built on the general lines of the “Pratt® truss, with vertical compression members and inclined tension members, or on the lines of the “War¬

ren® truss, with all main web members inclined ; but the constantly increasing weight of the loco¬

motives in use has tended to the use of heavier and more rigid structures with long panels and as few members as possible, more substantial details, solid floors, stiff lateral and vibration bracing and other features of present engineer-520

ing practice, which reduce vibration and add to the rigidity of the structure.

The rapidly increasing capacity of American

bridge-building shops and their ability to fabri¬

cate and handle single members of sizes im¬

possible to obtain a few years ago, has enabled the American engineer to design bridges with practically no shop limitations, and he has thus been free to make designs solely with the idea of producing a structure with the maximum

strength and rigidity and the minimum weight of material.

The rapid advance thus brought about would

have been impossible had not the ingenuity of the erecting engineer kept pace with that of the designing engineer, but this specialty of erection has reached such an advanced stage that spans of 1,800 feet, with single members weighing 120 tons, are now erected as rapidly as any smaller span.

One of the recent tendencies of American

practice has been to substitute plate-girder spans for all short bridges, in place of the vari¬

ous types of lattice girders and pin-connected spans heretofore in general use, and very few engineers use any type of steel structure except a plate girder for spans under 90 or 100 feet.

Some engineers prefer this type for spans as long as 125 feet. To summarize general prac¬

tice, it can be said that this type of span is used for spans from 20 to 100 feet, spans under 20 feet being either arches or rolled beams, and spans over 100 feet running into riveted trusses.

Plate girders are frequently built with solid floors, with the ties bedded in ballast, and the latest floors of this kind are built of reinforced-concrete slabs or arches, as the older trough floors and buckle-plate floors have been found unsatisfactory, owing to the impossibility of preventing rapid deterioration from rust. Plate-girder spans over 70 feet long generally rest on pin bearings at each end, to

allow for deflec¬

tion, and have cast-steel end shoes.

The usual present practice is to build all spans between 100 feet and 175 feet with riv¬

eted trusses, and the old style, multiple-intersection riveted span has entirely given way to the riveted, single-intersection truss with long panels. For deck spans, the old practice of supporting the ties directly on the upper chord has largely disappeared, and either a solid bal¬

lasted floor is used, or a regular floor system is laid, consisting of cross floor beams resting on the upper chords, and logitudinal stringers framed between floor beams.

For through spans the ordinary practice is

to use a floor system with cross floor beams riveted in between the vertical posts and longi¬

tudinal stringers riveted between the floor

beams, but in many cases a solid ballasted floor is used, in which case the lower chords are re¬

inforced against bending by supporting them

at their middle points from a sub-panel in the truss or by making deep lower chords capable of withstanding the bending in addition to the direct stress.

Spans over 175 feet are usually built with pin connections and, where the span is long, the upper chord is generally curved so as to give a maximum depth at the centre and truss depths are proportioned so as to give a prac¬

tically uniform upper chord section throughout.

Upper and lower laterals and transverse brac¬

ing are now universally built of riveted mem¬

bers, and the older form of tension rods used for purposes of wind and vibration bracing

has entirely disappeared. Simple truss spans of this character have been built to a maximum length of 710 feet, which is the length of the channel span of the bridge over the Ohio River at Metropolis, Ill.

Such spans could and would be built of

much greater length if it were not for the fact that in navigable rivers of a magnitude requir¬

ing such spans, the government will not allow the waterway to be even temporarily obstructed with falsework, so that for long spans it is often necessary to use a cantilever or some other type of structure that can be erected without placing any obstruction in the main channel.

Spans continuous over one or more piers

have not been generally adopted in this coun¬

try, though they are used to a considerable extent in Europe. The two notable American

examples of this type of construction are the Queensborough cantilever at New York, which

is a five-span continuous structure, and the bridge over the Ohio River at Sciotoville, which is built with two spans of 775 feet, continuous over the centre pier.

In draw spans, the recent changes in prac¬

tice have been in the same direction as for through spans, as far as the trusses, floor and bracing are concerned. The practice of coun¬

ter-bracing the trusses by means of diagonal counter-rods has been

abandoned, and stiff riv¬

eted diagonals are used, capable of carrying either tension or compression where reverse

stresses occur. For draw spans of short span or in cities or other situations where there is not plenty of room for a swing bridge, the ((rolling lift® bridge has been adopted and has proved most efficient. For long draw spans, the centre pier revolving span is still the type in common use, and for spans up to 400 feet a central pivot bearing is generally used. For spans over 400 feet a rim-bearing turntable drum rolling on a circle of conical cast-steel wheels has been found most satisfactory, and for very heavy spans two concentric drums and circles of wheels are used.

The use of steam as an operating power for swing bridges has almost disappeared, being

replaced by electric motors, which are more economical and do away with many difficulties encountered in the use of steam engines and their boilers, though gasoline engines are in general use where electricity is not readily obtainable.

The metal arch bridge is a type of structure developed almost wholly in recent years, and there are various modifications of this type, some being built as spandrel arches, in which the web members connect a horizontal top

chord with an arched lower chord, having the floor system supported on the top chord or framed in between vertical posts at the top chord level, while others are built as braced ribs, having both chords arched and connected together with the web members and the floor supported on vertical posts resting on the

braced rib at panel points. Each of these types of arch spans is further varied by being built by some engineers with two pin bearings at BRIDGES

1 Hell Gate Bridge over East River: New York Connecting Railroad 2 Sciotoville Bridge, over Ohio River: Chesapeake and Ohio Northern

1 Double Leaf Trunnion Bascule for Heavy Traffic 2 Direct Lift Bridge in the Act of Opening BRIDGE DESIGNS, RAILWAY

the two supports, and by others with the addi¬

tion of a third pin bearing at the crown. It is contended by the advocates of two hinges that the omission of the centre hinge adds con¬

siderably to the rigidity of the span, but it has not yet been conclusively demonstrated that the third hinge adds appreciably to the vibration, type of bridge; the Brooklyn Bridge having

stone towers, the Williamsburg Bridge steel

towers, and the most modern, Manhattan Bridge, rocking steel towers. The Williamsburg Bridge is the longest suspension bridge in the world, having a span of 1,600 feet. Fig. 2 shows the design for the proposed bridge over

Fig. 1. — 977-foot 6 inches Arch over East River, New York City. Hell Gate Bridge.j and this third hinge disposes of the great un¬

certainty of temperature stresses and allows the exact calculation of the true stresses and sections by static methods, so that it haˆ con¬

siderable advantage and is more in use than the two-hinged type. Many long spans have

been built of this type, the longest span being the Pennsylvania Railroad bridge over Hell

Gate, New York, which is a two-hinged span¬

drel arch carrying four tracks, with a span of 977 feet 6 inches as

shown on Fig. 1. Sus¬

pension bridges have not been used for railroad spans to any great extent, as with wire cables and a stiffening truss along the floor line it is difficult and expensive to give them the neces¬

sary rigidity for such heavy moving loads.

However, for very long spans where the dead load exceeds the live load they can be advan¬

tageously used, and in the most modern designs the cables have been designed of eye-bars in place of wire, which enables the stiffening trusses to be built along the cable and thus saves a very large portion of the weight. The depths of such stiffening trusses can be so de¬

signed that neither of the chords will carry compression, so that the only compression mem¬

bers will be the comparatively light web

the North River at New York, with a span of 2,880 feet to carry eight tracks and two road¬

ways ; this design shows the stiffening trusses along the cables.

The cantilever bridge has come into very

general use in recent years, not because of the economy in metal required, as this type weighs more than a simple truss or an arch of equal span, but because of the great advantage that it can be erected without putting falsework in the main channel. Since the government pro¬

hibits falsework unless there are several spans with sufficient channel depth for navigation this type is practically mandatory for long spans, as, if any other type is adopted, the span must be erected with additional material, causing it to act temporarily as a cantilever, and this additional erection material overbalances the saving of any type adopted. For this rea¬

son the cantilever has become the standard

type for spans where falsework cannot be

used, though for very long spans the sus¬

pension type is probably more economical.

It is impossible to set a limit as to when the suspension type is lighter, but for ordinary railroad loads the cantilever is probably more economical up to spans of about 2,000 feet, and Fig. 2.— 2,880-foot Suspension Span. Proposed North River Bridge, New York.

members. Recent designs for suspension

bridges also use rocking or flexible steel towers with the cables made fast to their tops in place of rigid towers with cables supported on roll¬

ing shoes. The three suspension bridges over the East River between New York and Brook¬

lyn are excellent types of the evolution of this beyond that the suspension type would probably prove the better. The cantilever over the Saint Lawrence River at Quebec, having a span of 1,800 feet, is the longest span of any kind in the world.

Cantilever bridges are comparatively new,

but even in the few years in which they have 522

been in use they have been greatly improved in their general arrangement, details and erec¬

tion devices. The capacity of the bridge shops to manufacture eye-bars as large as 16 inches by 2 inches and 83 feet long, centre to centre of eyes, with pin holes 13 inches in diameter, and heads as large as 36 inches in diameter, as well as to build and ship single compression members weighing 100 tons, together with the ability of the erecting

gangs to put these huge pieces in place, with moving travelers, has given the designing engineer practically unlimited op¬

portunities, and has brought about the con¬

struction of several very large spans of this type in the last two years, notably the 1,800-foot span at Quebec, the 1,182-foot span at Blackwell's Island, N. Y., and the 812-foot span over the Monongahela River at Pitts¬

burgh, Pa. The first two bridges are described elsewhere, and the Pittsburgh cantilever is

shown in Fig. 3.

Stone arch bridges are an excellent type

for short spans, where the owners can afford the first cost, as the repairs are practically nothing, but this type has not changed in recent years, though in the modified form of the

reinforced concrete arch it is being introduced quite generally for ornamental bridges in parks and cities where the aesthetic requirements are more important than economy, and it is an

excellent type for this use, but cannot be eco-DRAW SPANS

520 feet — Draw over the Missouri River at Omaha, Neb.

503 feet — Draw over the Thames River at New London, Conn.

491 feet — Draw over the Saint Louis River at Duluth, Minn.

415 feet — Draw over the Harlem River, New York.

336 feet — Double lift bridge over Sault Sainte Marie, Mich.

ARCHES

97 7 1 feet — Arch over Hell Gate, New York.

840 .feet — Arch over Niagara River at Niagara Falls, N. Y.

721 feet — Arch over Viaur River, France.

614 feet — Arch over Rhine at Bonn, Germany.

595 feet — Arch over Rhine at Diisseldorf, Germany.

591 feet — Arch Kaiser Wilhelm Bridge over Wuppur River, Mungsten, Germany.

550 feet — Arch over Niagara River at Niagara Falls.

541 feet — Arch Garabit Viaduct over Truyere River, France.

CANTILEVERS

1,800 feet — Cantilever over Saint Lawrence River at Quebec, Canada.

1,710 feet — Cantilever over Firth of Forth, Scotland.

1,182 feet — Cantilever over Blackwell's Island channel. New York city.

820 feet — Cantilever, Lansdown Bridge, India.

812 feet — Cantilever over Monongahela River, Pittsburgh, Pa.

SUSPENSION BRIDGES

1,600 feet — Span of Williamsburg Bridge, New York city.

1,595 feet — Span of Brooklyn Bridge, New York city.

1,470 feet — Span of Manhattan Bridge, New York city.

The Viaur Arch in France is not a true arch, as it is a combination of an arch over the cen¬

tral opening, counterbalanced by two semi¬

arches extending back over each of the shores.

The Arch spans over the Rhine at Bonn and Fig. 3. — -812-foot Cantilever Bridge over

nomically used for long spans carrying heavy loads.

The many wide navigable rivers in this

country have given the American bridge engi¬

neer unequalled opportunities to show his abil¬

ity in the design, construction and erection of long spans, and that he has made good use of these opportunities is proved by the fact that the longest span of every type of bridge has been, or is being, constructed by American

bridge engineers. In all probability the maxi¬

mum length of span has not yet been reached, as it has been proved to be practical to build spans up to 1,800-feet, and there is nothing to prevent the construction of much longer spans, if they are found to be paying investments.

The following is a partial list of the largest spans of various types of steel bridges now built or building:

TRUSS SPANS

710 feet — Span over the Ohio River at Metropolis.

668 feet — Span over the Mississippi River at Saint Louis.

640 feet — Suspended span of the cantilever over the Saint Lawrence River at Quebec, Canada.

630 feet — Fixed span of the Blackwell's Island cantilever.

New York city.

621 feet — Fixed span of the cantilever over the Mississippi River at Memphis, Tenn.

550 feet — Span over the Ohio River at Louisville, Ky, Monongahela River at Pittsburgh, Pa.

Diisseldorf are through spans with the floor suspended from the arch ribs, while all the other arches are deck structures with the floor above the crown of the arch.

This list might be indefinitely extended and many structures might be added which are

notable for particular features, such as the extremely flat arch of the Alexander III Bridge in Paris, having a span of 362 feet with a rise of less than 19 feet. Many viaducts might also be added, which are notable not from any great length of spans, but from the extreme heights above the gorges they cross. The greatest of these is the Gokteik Viaduct in Burmah, where the track is 825 feet above bottom of gorge.

Henry W. Hodge,

Consulting Engineer, New York.

BRIDGE FOUNDATIONS. See Foun¬

dations.

BRIDGE SHOPS AND SHOP PRAC¬

TICE. The working plant of a bridge build¬

ing company is composed of shops and depart¬

ments so arranged in their relation to each other that the movement of the material

handled by them is continuous and in one direc¬

tion — - the rough material entering at one end BRIDGE SHOPS AND SHOP PRACTICE

of the plant and passing out as a finished prod¬

uct at the other. This arrangement ensures

the reduction to a minimum the time lost in handling, and also the greatest possible economy in the cost of production.

Each of these shops is under the immediate charge of a foreman or superintendent who re¬

ports daily to the general superintendent or manager of the plant, who makes out the pro¬

gram of work, and prescribes the dates upon which the different pieces of work are expected to be completed, the desideratum being to keep the various shops continually working, and to complete the various parts of the bridges in the order in which they are required at the place of erection.

The buildings of the various shops are usu¬

ally of fireproof construction and conform to the requirements of larger size, good lighting, heat¬

ing and ventilation. They are connected by

narrow-gauge railway tracks, which run length¬

wise through them so as to facilitate the trans¬

portation of the material from one part of the works to another with the least amount of

handling. Ample yard-room is provided at the ends of the buildings

and also around them for the storage of partially completed material

awaiting its turn for the finishing touches before shipment. These yards are usually laid out so that the carrying distance is as short as possi¬

ble, and the work of carrying is accomplished by overhead traveling cranes.

These shops may be designated and described as follows :

(1) ((Power Plant,® consisting of large bat¬

teries of boilers for generating steam, and en¬

gines for driving the dynamos through which power and light are furnished to all parts of the works, and other engines for operating the air-compressors which furnish the power for the portable pneumatic drills, riveters, hammers

and reamers, and also the compressed air used for the draft of rivet furnaces, and blacksmith forges; for the cleaning of finished material, and for painting them by means of spraying devices.

In some cases, the hydraulic pumps and ac¬

cumulators which supply the water to the hy¬

draulic presses and riveters are also located in the buildings of the powder plant, all the machinery of which is installed in duplicate so that an accident would not necessitate the

shutting down of the entire plant during the time consumed in making repairs.

Although the first cost of a centralized

power plant is comparatively high, its advan¬

tages over that of a scattered system may be briefly summed up as follows : Cheap grades of fuel may be used under the boilers, and mechanical stokers may be employed and thus reduce the number of firemen required by the several boilers of the scattered plants. The number of engine attendants is also greatly re¬

duced, their places being filled by a few elec¬

tricians to keep the wiring and motors in work¬

ing condition. The power may be transmitted to every part of the plant with the smallest amount of loss.

(2) ((Receiving Yard,® where the material

for each bridge is properly selected, classified and stored.

(3) ˆStraightening Department,® where the

irregularities in the material, due to the short¬

comings of the rolling mill processes, are cor¬

rected by more accurate methods. The buckles in the plates and the deviations from true alignment in the plates are eradicated by pass¬

ing them through a series of rolls usually con¬

sisting of six sets. These rolls are so arranged that the vertical distance between them can be made less at one end than at the other, so that by passing a plate through them several times, it can be stretched unequally and any imper¬

fections in the alignment of its edges thus corrected. Beams, channels, Z-bars and other odd shapes are best straightened by the applica¬

tion of local pressure to the parts out of line either by screw presses, or by the action of a plunger operated by a power-driven cam.

Badly sprung shapes and plates may be

straightened by being hammered cold, or after being heated; it is, however, very destructive to the material and dangerous to put into actual use.

(4) ((Templet and Pattern Shop,® in which

the templets for striking the positions of the rivet and pin holes and the mold patterns for iron and steel castings are made.

A templet is usually a board or framework

of boards, one side of which is a representation of one of the sides of the metal shape or piece required to be made. On it the positions for all the rivet holes, pin holes, bevels and notches are accurately marked, and these are subse¬

quently transferred to the metal piece by punch¬

ing, scratching or other means, preparatory to the final operations of punching, drilling, ream¬

ing, beveling, shearing, *etc.* Templets are

usually made of soft white pine boards % inch in thickness. When very accurate fitting is required, they are laid out full size on the floor of the shop ; but, for small and general work, they are made in separate pieces from the detail drawings. As a rule, as many parts as possible of a structure are designed to be in duplicate so that the number of templets required will be as small as possible, and the final fitting and assembling of the work facilitated and simpli¬

fied.

(5) <(Laying-out Shop,® where each indi¬

vidual metal shape, plate and piece is accurately marked in accordance with the templets.

(6) ((Punch and Shear Shop,® where the

various plates, shapes and pieces are sheared or cut to the required length and bevel, and the holes marked from the templets are punched by suitable machines. See article under title

Metal Working Machinery.

When the thickness of the pieces is greater than the diameter of the punch, punching will unduly strain the material, and the holes will not be straight and smooth. The holes in such plates and shapes are usually drilled, although the process is much slower and more expensive.

Single and gang drills are used for this purpose.

Since the punching of a series of holes in a line tends to distort or twist the steel, it is good practice to stagger the holes, also to punch every other hole first, and then the intermedi¬

ate holes, which permits gang-punching.

Wrought iron and soft and medium steel

when of the proper thinness may be easily

punched ; but hard steel must always be drilled as it cannot be punched without cracking.

Since the diameters of the edges of a

punched hole correspond to the diameters of the punch and die respectively, and gives the hole a tapering instead of a cylindrical form, the 524

practice is to require all important holes, and especially those in the tension members, to be reamed to a diameter l/% inch larger than that of the punch, so as to remove all of the material injured by the process of punching.

After passing through this shop, all the

material is completely ready to be fitted together and riveted to form the final bridge members for which they were designed to form a part.

Each piece when completed is marked with a number or letter designating its proper position in the finished member, and all the pieces be¬

longing to the same structure are marked by a job number so that they may be easily identified in the assembling shop.

(7) ((The Assembling Shop.® This is usually arranged so that all the heavy work is handled on one side, and the light work on the other.

All the different pieces which make up the various members are assembled, fitted and

bolted together, and then turned over to the (8) “Riveting Shop® where the riveting is

accomplished by various forms of compressed—

air, steam and hydraulic riveters.

When a bridge-member exceeds 10 tons in

weight, it is more economical to use portable riveters than stationary riveting machines. As a rule, hydraulic riveters are the most efficient.

They do not get out of order easily, and always exert their full pressure upon the rivets; but in their portable form they are very cumber¬

some, and, therefore, the pneumatic portable riveters are found to be the most convenient in such cases.

Rivets are made of soft steel, and their

lengths ought to be such that when put into the holes they will project enough to furnish a sufficient amount of metal to fill the holes com¬

pletely when they are compressed. Before in¬

sertion they are heated to a cherry red, great care being taken, however, not to burn the metal in the heating, and thereby render them hard and brittle. On the other hand, if driven when they are too cold they will not fill the holes completely, and although apparently all right will be weak in the head. All rivet heads ought to be smooth and free from cracks, and con¬

centric with their holes.

(9) ((The Machine Shop® is equipped with

an endless variety of metal working machines such as planers, boring and turning machines, etc., which are employed to finish the bearing surfaces of the riveted members and other parts which are used in their construction, such as pins, rollers, beds and sole plates, anchor bolts and the various bearing parts of turntables.

The material for the pins and rollers as

usually received from the mills has a diameter % inch greater than that of the finished

pins, and has to be turned down to the required size, and the threads cut on the ends for the pin nuts. The planers are employed to smooth off the faces of the bed and sole plates of the ex¬

pansion joints.

(10) “The Forge Shop® is equipped to turn

out three classes of work — the manufacture of rivets, the general smith-work required in a steel structure and the forging of eye-bars.

The soft-steel bars of which the rivets are made are first heated and then passed into the rivet-making machine where they are upset,

headed and cut into the required lengths at one operation. The rivets most generally em¬

ployed in structural work range from ˆ4 to ˆ

inch in diameter.

The operations designated as general smith-work consist of the bending of plates, shapes and angles in accordance with the requirements of the drawings, the upsetting of the ends of adjustable tension members, the making, of

devices and loop eye-rods, and all forgings such as punches, drift-pins and riveting cups that may be needed by the plant.

All the large tension members of pin-con¬

nected structures are made in this shop. The steel flats from which these eye-bars are made are handled as follows: About four feet of one end of the bar is heated to a cherry red in the forge and then placed in the upsetting machine which forms a solid head very nearly the size of the finished head. It is then reheated and placed in the die of the steam hammer and hammered out to the proper size and thickness, and a hole punched in the centre of the head to facilitate the finish boring. A careful watch is kept for flaws, and all of those discovered are cut out since they prevent a perfect weld, and are, no matter how small, a source of weakness in the bar. The head on the other end of the bar is formed in a similar manner. A number of bars are then placed in the annealing furnace and brought gradually to a cherry red temper¬

ature, after which they are allowed to cool gradually so as to remove local stresses that might have been induced by the processes em¬

ployed in upsetting and forging the head. The exactitude required in

this work is indicated by Cooper's Specifications, 1901, according to

which, chord pins are required to fit the pin holes within of an inch for pins less than 414 inches diameter; while for larger pins, the clearance may be %2 of an inch. It is also re¬

quired that the bars must be bored to lengths within %4 of an inch for each 25 feet of the total length.

(11) "The Painting and Shipping Depart¬

ment® consists of sheds and yards where the material, after being inspected and stamped, is painted and prepared for shipment.

The facility with which bridge work is

carried out depends very much on the character of the drawings supplied. Bridge designers

cannot be familiar with the preferred practice in all shops, as these differ; they cannot cer¬

tainly know what concern is to do the work. It is therefore best not to attempt the smaller details for the first set of designs, and after the work is awarded to a shop allow them to make their own shop drawings in duplicate,

adapting them to their own equipment and

methods. This is an economy. Those respon¬

sible for a bridge, however, require to be care¬

ful that the builder does not cheapen construc¬

tion at the cost of strength. There is a con¬

tinual temptation to do this, as seen in the lamentable fall of the Quebec Bridge in 1907, where a badly weakened beam passed inspection, and precipitated the fall of the entire structure.

Shop designers will know enough to position rivets so as to permit of gang punching. They will avoid beveled cuts and hand riveting,

which add to cost ; and they will not mark holes for reaming where the strength does not require it. They will avoid the use of side plates, which are always a nuisance ; when work is to be left for field riveting they will look out that the BRIDGE — BRIDGEPORT

rivets may be driven from the top; and in the case of box-shaped columns or the like they will position the angles or channels outward so they may be power-riveted. They will bear in mind that a solid web is stronger, simpler and cheaper than close lacing. Such drop drawings should be carefully marked with all necessary informa¬

tion, as size of rivet holes both before and after reaming, the manner of finishing the edge of webs, *etc.*

After leaving the shops, and before ship¬

ment, the material is carefully examined in de¬

tail to see that it conforms in every particular to the drawings and specifications, by the in¬

spectors of both the bridge company and the purchaser. A large percentage of this work is done by inspection companies. These companies employ a large number of inspectors who are sent from one place to another to examine the work on hand. The inspection companies bid

for the inspection work at so much per ton of material. Although these companies usually

keep a permanent inspector at the works of a large bridge concern, and are therefore able to greatly reduce the cost of inspection to the pur¬

chaser, the system is subject to many objections, the principal one being the fact that the actual inspector is personally unknown to the pur¬

chaser. The exceedingly satisfactory services rendered by these

companies, however are

clearly demonstrated by the large amount of work handled by them, and their high profes¬

sional reputation.

The general method of inspection may be

briefly stated as follows : When the inspector of the purchaser arrives at the works of the bridge company, he is furnished with a set of the plans and drawings of the bridges to be inspected, and starts in at once to familiarize himself with the shops and working methods of that particular plant. He then ascertains the rolling mills from which the rough material for the structures will be obtained, and begins the work of actual inspection at that point. All the material is carefully examined for flaws and surface defects, and tested for strength, and when found satisfactory is stamped by him with a hammer, and then forwarded to the works of the bridge company. Subsequently, he keeps a general oversight of the material as it passes through the various shops and departments of the bridge works until it has passed out of them and is ready for the final examination.

BRIDGE, Horatio, American naval officer:

b. Augusta, Me., 8 April 1806; d. Athens, Pa., 18 March 1893. He was graduated at Bowdoin College in the famous class of 1825, which included Longfellow, Hawthorne, J. S. C.

Abbott and G. B. Cheever. He was admitted

to the bar in 1828, and for 10 years was in practice at Skowhegan and Augusta, Me. In

1838 he entered the United States navy as pay¬

master; made a cruise in the Cyane (1838-41) ; in the Saratoga on the coast of Africa (1843-44), some account of which was published in 1845 under the title ‘Journal of an African Cruiser, > edited by his friend, Hawthorne.

From 1854-69 he was chief of the bureau of provisions and clothing.

In 1873 he was retired as pay-director with the relative rank of com¬

modore. He wrote ‘Personal Recollections of

Nathaniel Hawthorne) (1893).

BRIDGE, Sir (John) Frederick, English

organist and composer: b. Oldbury, Worcester¬

shire, 5 Dec. 1844. He was successively organ¬

ist of Trinity Church, Windsor; Manchester

Cathedral ; and in 1875 became organist of

Westminster Abbey. He has also been pro¬

fessor of harmony at Owens College, Man¬

chester, and at the Royal College of Music.

Among his works are the oratorio, ‘Mount

Moriah > ; the cantata, (Boadicea) ; the cantata, ‘ Callirrhoe) ; the oratorio, (The Repentance of Nineveh, > *etc.* He has set many hymns to

music, notably Gladstone’s Latin version of

‘Rock of Ages,* as also such poems as Kipling’s (The Flag of England* and (The Ballad of the CamperdownP He was knighted in 1897.

BRIDGE OF ALLAN, Scotland, a town in

Stirlingshire, on the border of Perthshire, on the banks of the Allan, about three miles north of Stirling, with which it is connected by the Caledonian Railway and a line of tramway

cars. The chief buildings are the Hydropathic and Macfarlane Museum of Fine Art and Natu¬

ral History. The Strathallan Gathering, the

most popular athletic meet in Mid-Scotland, is usually held here. Owing to the mildness of its climate and the beauty of its situation, Bridge of Allan is a favorite spring and summer resort for invalids. It is built partly on a plateau of considerable height and partly on low ground on the banks of the river, and is finely laid out with trees and public walks. It is frequented partly on account of its mineral wells. The in¬

dustries include bleaching, dyeing and paper¬

making. Airthey Castle, standing in a fine

park with a lake, adjoins the town on the south¬

east. Pop. 3,240.

BRIDGE OF SIGHS, a bridge in Venice,

dating back to 1597 built by Antonio Contino.

It spans the Rio della Paglia, connects the ducal palace with the prisons, and forms a graceful structure 32 feet above the water, en¬

closed at the sides and arched overhead. It contains two passages, through which prisoners were led for trial, judgment or punishment.

Byron mentions it in the opening lines of

‘Childe Harold) (Canto IV). Thomas Hood

has written a poem with this title. It is also used to denote a bridge connecting the Tombs prison, New York, with the court rooms.

BRIDGE-WHIST. See Bridge.

BRIDGEPORT, Conn., city, port of entry

and county-seat of Fairfield County, on Long Island Sound, and on the New York, New

Haven and Hartford Railroad, 54 miles north¬

east from New York city, 17 miles southwest from New Haven. It is the second city in the State in population. The city and town are coterminous, about 15 square miles in area.

Bridgeport harbor is the estuary of a small river, the Pequonnock, and a tidal inlet, called Yellow Mill Pond, with a peninsula between.

The lower part of the harbor is about a mile wide and extends about a mile to the Sound.

The two arms of the harbor divide the city into three parts ; the main city and chief business centre lies west of the harbor ; the section called East Bridgeport with a secondary business street occupies the peninsula ; and Summerfield and Newfield sections lie east of the harbor.

Rising from the plain along the Sound are

three elevated districts; the nearest, Golden Hill, one of the oldest and finest residential sections, farther back are Old Mill Hill to the northeast and North Bridgeport to the north, both commanding fine views of the Sound.

Bridgeport is called <(Park City® from its

numerous breathing places. The principal

parks are Seaside, Beardsley, Washington and Pembroke. Seaside Park contains about 75

acres with a two mile boulevard along the

Sound protected by a strong sea-wall. Here

are the Soldier's and Sailor's monument and monuments to Elias Howe and Phineas T.

Barnum, the sewing machine of the one and

the business enterprise of the other having been largely instrumental in the development of the city. Beardsley Park is in the northeastern part of the city and contains about 150 acres, to which river and lakeside, woods and hills give the charm of nature. Washington Park,

about four acres, lies in the centre of the east side. Pembroke Park is a long broad green, an expansion of the Old King's highway from New York to Boston. The finest cemetery is Mountain Grove, about 75 acres, near the west¬

ern boundary. The finest residence sections

are Golden Hill, central, Fairfield avenue, the main thoroughfare to the west, Seaside park vicinity in the south, Brooklawn (new) and

Clinton avenue in the northwest, Seaview

avenue along the Sound in the southeast, and Mill Hill and North Main street with their splendid views. The most notable buildings

are the government building, with the postoffice and custom house ; the Barnum Memorial Institute, bequeathed to the Historical Society and the Scientific Society in common ; The

Young Men's Christian Association, the Bur¬

roughs Library, the Burroughs Home for

Women, the Sterling Widows' Home, the

Protestant Orphan Asylum and the Bridgeport

and Saint Vincent's Hospitals, and a new high school. The public school system has a high school and 25 grammar school buildings.

There are about a dozen private and parochial schools. In 1912 the public schools enrolled 15,733 pupils and employed 375 instructors. A free public library established in 1881 now con¬

tains about 60,000 volumes. The religious life of the city centres around some 90 churches.

The leading denominations are Roman

Catholic, Congregational, Protestant Episcopal, Methodist Episcopal, Baptist, Lutheran and

Presbyterian. There are many social clubs

and secret societies. Chief among the clubs are The Seaside, The Algonquin, The Brooklawn Country Club, The University, The

Bridgeport Yacht Club. The oldest Masonic

lodge, Saint John's, dates from 1762.

Industries, *etc.* — Bridgeport is the leading manufacturing city of Connecticut, standing

first in the value of products and in the num¬

ber of employees. It is called the ˆIndustrial Capital.® The manufactured products are in

great variety, the diversity is shown by the fact that the Board of Trade has found it literally impossible to make a list of them.

New ones are being invented constantly and

at least 15,000 articles which may properly be called different have already been counted.

Principal among its manufactured articles are cartridges and shells, corsets, sewing machines, heavy ordnance, brass goods, electrical ap¬

paratus, silver-plated ware, automobiles, tor¬

pedo boats, bicycles, gas and gasoline motors, graphophones, typewriters, machine tools,

boilers, cutlery, compressed gas capsules, hats, taps and dies and hardware. Among the

largest manufacturing establishments are the

Remington Arms and Ammunition Company,

whose plant has a combined floor area of

1,104,200 square feet, and employs 16,000 men, Singer Sewing Machine Company (Wheeler &

Wilson) with 10 acres of works, Warner

Brothers Corset Company, Crane Valve, Amer¬

ican Tube and Stamping, Holmes and Edwards

Silver-plating, American Graphophone, Union

Typewriter Company, Bridgeport Brass Com¬

pany and the Lake Torpedo Boat Company.

The Union Metallic Cartridge Company has an ammunition park of 425 acres here. At the

end of 1914 there were in operation 403 estab¬

lishments capitalized at $81,482,000. These

establishments employed 34,586 persons, paid

$23,206,000 in salaries and wages and used

materials to the value of $44,730,000 which were turned into finished products with a value of $85,123,000. In 1916 the payroll was esti¬

mated at $1,200,000 a week, or $62,000,000 for the year. In 1915 new buildings to the value of $9,181,419 were erected, equipped for works of peace as well as for the production of munitions, the demand for which during the

European War increased the population of

Bridgeport by 50 per cent. The city by its loca¬

tion has excellent transportation facilities. The railroad trackage is ample. A new station has recently been built and the tracks elevated through the city at a cost of over $3,000,000.

The harbor admits quite large vessels. There are daily steamers to New

York and across the Sound to Port Jefferson, L. I., and much

coasting business. The river, creeks and harbor arms are spanned by a half dozen large bridges.

Electric railway service is thoroughly de¬

veloped, continuous lines running to New York and to New Haven, and thence to Boston.

Government and Population. — The gov¬

ernment of the city is committed to a mayor, elected every two years, a board of 24 aider-men, 2 from each district, a board of educa¬

tion, 12 members, elected at large 4 members each year, a board of apportionment and taxa¬

tion, appointed by the mayor. The mayor

also appoints members of the police board,

board of health, fire commissioners, library board, park commissioners, board of charities, a city engineer and a director of public works.

The city's assessed valuation of property is $137,621,212, its debt $1,578,691 and its tax rate about 15 mills per $1,000. The annual outlay is nearly two millions, about a half million being for schools. There are four national

banks, five savings banks with deposits of over $30,000,000, two trust companies and a number of private banks. Notwithstanding the proxim¬

ity of New York the retail business along all lines is extensive. The city has a cosmopolitan population consisting basically of the old New England stock, balanced with the thoroughly

Americanized families from Ireland, Germany

and Scandinavia. Later additions have been

drawn largely from the southern countries of Europe. The growth of population has been as follows: (1810) 1,089; (1820) 1,500; (1830)

2,800; (1840) 3,294; (1850) 7,560; (1860)

13,209; (1870) 18,969; (1880) 27,643; (1890) 48,866 ; (1900) 70,996; (1910) 102,054; (1914) 115,289; (1920) 143,538.

History. — The first settlement was made in 1639, on lands bought from the Paugusset

Indians, who in 1659 were relegated to a reser¬

vation on Golden Hill. It wras called Pugh-quannock or Pequonnock, and formed a parish in the towns of Fairfield and Stratford, where the inhabitants went to church till they built their own first one in 1695. In 1694 they peti¬

tioned to have it renamed Fairford; the legis¬

lature chose Fairfield Village instead; they rejected it and the next year fixed on Strat-field, which, however, was not legalized until 1701. In 1703 the first school building was erected, previous teaching having been in the church on week-days. In 1707 the first services of the Episcopalians were held; in 1748 their first church was built. In 1775 a company

from here joined Arnold's expedition to

Quebec; and there was much privateering from this place in the Revolution. In 1795 the first newspaper, the American Telegraph, was

issued. In 1800 the borough of Bridgeport was incorporated, including the village of Newfield, which had grown up at the waterside, the old settlement being along the Boston artd New York turnpike, or (<01d Stage Road,®

now in part North avenue. In 1806, the first bank, Bridgeport Bank,

was organized. In

1821 the town of Bridgeport was set off, hav¬

ing then 1,700 inhabitants, 218 dwellings, 73

stores and warehouses, and an assessed valua¬

tion of $24,701. On 28 Sept. 1824 the first steamer ran from Derby past Bridgeport to

New York; 16 April 1832, the first Bridgeport steamer, the Citizen, began regular trips. The Housatonic Railroad was opened to New Mil¬

ford in February 1840; the New York, New

Haven and Hartford began running to Fairfield, 2 Sept. 1848, to New York, 1 Jan. 1849.

This ushered in the period of real city de¬

velopment, 1850-60. Gas was introduced De¬

cember 1861 ; water, 1854-55 ; P. T. Barnum bought large tracts of land in East Bridgeport and opened it up after 1850; in 1856 the

Wheeler & Wilson Company removed here

from Watertown and greatly enlarged their

plant ; the Howe Company came in 1863, and the Union Metallic Cartridge Company in

1865. In 1870 the city annexed a part of Fairfield ; in 1899 Summerfield, and West Stratford across Pembroke Lake. Consult Orcutt's

(History of Stratford and Bridgeport (New

Haven 1886) ; Waldo, (The Standard's History of Bridgeport (Bridgeport 1897).

BRIDGEPORT, Ohio, village of Belmont

County, opposite Wheeling, W. Va., on the

Ohio River, and on the Baltimore and Ohio

and the Pennsylvania railroads. It is situated in a coal-mining district and has extensive interests in this commodity. The principal in¬

dustrial establishments are glass factories,

sheet-metal and tin works. The city is gov¬

erned by a mayor and council. Pop. 3,974.

BRIDGEPORT, Pa., borough of Mont¬

gomery County, 17 miles north of Philadelphia, on the Schuylkill River, and on the Philadel¬

phia and Reading Railroad. It is a port 6f call on the Schuylkill Navigation Company's

line. Valley Forge, prominent in the Revolu¬

tionary campaign, is six miles distant from Bridgeport. Its industrial establishments com¬

prise cotton, flour, paper and woolen mills, brick works and steel works. Pop. 3,860.

BRIDGEPORT, Texas, city in Wise

County, about 11 miles east of the county-seat, Decatur, and 43 miles north of Fort Worth.

It is on the Rock Island Railroad; and the principal industries are coal-mining and brick¬

making. There are two banks whose com¬

bined resources amount to $420,000. The pub¬

lic buildings include two high schools and a city hall. The government is in the hands of a mayor and council. Pop. (1920) 1,872.

BRIDGER, James, trader, explorer, scout

and guide : b. Richmond, Va., 1806 ; d. Washing¬

ton, Jackson County Mo., 1881. In 1820, at the age of 16 he was already known as a scout and successful hunter, and was soon admitted as a partner in the Rocky Mountain Fur Company,

which he furnished with the pelts obtained by himself and a band of men that he led in the pursuit of game through the mountain regions of Montana, the Dakotas, Wyoming, Idaho and the Utahs. A pioneer explorer and discoverer, gifted as a topographical cartographer, ((Jim Bridger's lies® became almost proverbial over the descriptions he was the first to give of the geysers and natural wonders of the Yellowstone Park and the Great Salt Lake, until they were verified by subsequent travelers. Fort Bridger on the Black fork of the Green River in Uin¬

tah County, Wyo., is the site of the stock¬

ade and residence which he built and where he lived with his Shoshone Indian wife for sev¬

eral years. The town of Bridger nearby on

the Union Pacific Railroad is also named after him. During 1832-35 he served as guide to the exploring expedition described in Captain Ben¬

jamin Bonneville's journal, edited by Wash¬

ington Irving. In 1862 he was guide to the military escort of the two judges appointed to the territorial supreme court of Utah. In 1868

he acted in an advisory capacity to General Sheridan in his campaign against hostile In¬

dians. Bridger passed the last years of his life chiefly in Missouri. Besides Fort Bridger and the town of Bridger, Wyo., his name is per¬

petuated in Bridger's Peak of the Gallatin

Range, Gallatin County, Mont., 9,000 feet high ; and Bridger's Pass, a defile 2,500 feet deep in the Rocky Mountains in southwestern Wyo¬

ming. Styled (<the Daniel Boone of the Rocky Mountains,® he was a prominent figure for

half a century in the early modern history and development of the region. Consult Dodge,

Gen. M. Grenville, (Life of James Bridger*

(1900).

BRIDGER'S PASS, a Rocky Mountain

defile in southwestern Wyoming, several miles in length and having a high elevation. Its walls, almost perpendicular, rise from 1,000 to 2,500 feet. Before the opening of the Pacific Railroad it was a feature of the overland

stage route.

BRIDGES, Concrete. See Concrete

Bridges.

BRIDGES, Land. See Land-Bridges

ACROSS THE OCEAN.

BRIDGES, Lift. Among movable bridges

the so-called lift bridges claim a constantly increasing importance, especially in locations where the waterways are narrow, and the popu¬

lation congested. In such circumstances they 528

are in many cases supplanting the existing

swing bridges. The chief advantages which

lift bridges possess over swinging bridges are: First, they afford a wide channel free from the centre pier and its protective outwork; second, they are more economical of valuable docking space, occupying only their own width, whereas the swing bridge on a narrow waterway re¬

quires more than its length; third, they are much more rapid in operation, in many in¬

stances passing the river traffic when only partly opened.

The earliest lift bridges were of the hinge type, and were raised by chain or wire cables running from the loose end of the bridge over pulleys at the top of towers at the hinge joint and attached to the compensating weights. To obviate the difficulty of overbalance when the bridge neared the upright position, the weights were made to slide or roll down a curving track which approached more and more the

horizontal as the bridge structure approached a vertical position. An interesting variation of this early type was the ˆjackknife® or fold¬

ing lift bridge, in which the floor of the bridge was jointed at the middle and the lifting cables attached on the inner side of the joint. The outer end of the bridge was supported by

fixed cables. When the bridge was raised the centre was lifted, the outer end folding down¬

ward as both halves came to an upright position against the towers.

Modern lift bridges are of two general

classes, the bascule or balanced bridges ; and the vertical lift or elevator bridges. In the former, the bridge structure is a cantilever with unequal arms, which is swung or rocked through a vertical arc of 90 degrees ; in the latter, the movable span is lifted bodily in its normal hori¬

zontal position by mechanism acting upon both end simultaneously.

Bascule Bridges. — The bascule bridges fol¬

low one of three distinct types: (1) The trun¬

nion type — in which the weight of the bridge together with its counterweight is supported while opening and closing on a trunnion or pivot shaft; (2) the rolling-lift type — in which the counterweight short arm of the cantilever is in the form of a quadrant of a circle, on the circumference of which the bridge is rocked backward and upward; (3) the roller-bearing

type — in which the trunnion idea dominates, but the bearing is expanded to a circle of con¬

siderable size which rolls in a socket filled with roller bearings. All of these types are repre¬

sented in single-leaf bridges, of which one shore end is raised; and also in double-leaf bridges in which the two midstream ends of the leaves are raised. In the trunnion and roller-bearing types the centre of rotation is a fixed point, and placed as nearly as possible at the centre of gravity of the moving weight.

In the rolling lift type the centre c?f rotation changes, the centre of gravity moving in a horizontal line backward away from the chan¬

nel. In the endeavor to overcome the inherent difficulties of the bascule type of bridge a num¬

ber of different designs have been brought for¬

ward by engineers ; and as a consequence there are Strauss, Page, Brown, Chicago City and

Waddell & Harrington bridges of the trunnion type ; Scherzer and Rail bridges of the rolling lift type; and Cowing and Waddell bridges

of the roller-bearing type.

Trunnion. — In the Brown bascule bridge,

the lifting is done by the oldtime method of hoisting cables, which are attached to the span s

Diagram of Brown Bascule Bridge. P, pivot; C, cable; T, curved track guide for cable; W, counterweight; S, sheave.

near the hinge joint, and thence guided around an iron form so curved that the pull of the counterweight shall always exactly balance the weight of the bridge.

In the Strauss bridge the specific peculiarity lies in the fact that the counterweight is not made a part of the short arm of the cantilever, but moves upon a secondary pivot, acting

through a parallelogram of links, or struts, which cause the counterweight to move always in. parallel with its original position, thus main¬

taining the leaf in equilibrium at all times.

Diagram of Strauss Heel Trunnion Bascule. The figures 1, 2, 3, 4 mark the comers of the characteristic parallelogram of links, the main trunnion being at 1, and the counterweight trunnion at 2. X and Y represent the lever arms respect¬

ively of the bridge and the counterweight, G being the centre of gravity of the bridge, and G, of the counterweight.

There are two forms of the Strauss bascule, one with the counterweight below the floor of the bridge in a shallow pit; the other with the counterweight elevated upon a tower — in which case no pit is necessary. A distinct variation of the latter type is the ˆHeel-trunnion® bas¬

cule, in which the counterweight is carried by one end of a trussed frame rocking on the secondary or counterweight trunnion at the

top of a stationary tower.

The Page bascule makes use of a movable

approach span as a counterweight. This ap-

Diagram of Page Bascule Bridge— One half of double-leaf bridge. P, pivot; T, track form down which roller R travels; S, uplifting end of shore span; A, anchoring strut.

proach span is pivoted at the shore end, and its outer end is weighted, and arranged to travel down a curved track fixed upon the short arm,

of the bascule cantilever. As the leaf lifts, it is accurately counterbalanced by the varying gravity pressure exerted by the weighted shore span upon the curved track member — the

curves being calculated to govern the pressure utilized.

In the Chicago City bascule the trunnions

supporting the trusses are in the line of the lower chord, and on the shoreward side of the centre of gravity of the moving span. The

counterweights are fixed rigidly to the short arm of the cantilever, and as the bridge is opened thev sink into a pit.

In the Waddell & Harrington bascule the

trunnions are high above the roadway, in the line of the upper chord of the truss, and the bearings are on tower-like structures. The

counterweight is rigid with the truss and over¬

head, and is so placed relative to the centre of Diagram of Waddell & Harrington Bascule Bridge — One half of double-leaf bridge. T, overhead trunnion; W, counterweight.

rotation that the moving span is always in equilibrium. The bridge is swung on its pivots, instead of being rocked, as in the other bas¬

cules, and the operating is done with a system of cables instead of with the usual rack and pinion mechanism.

Rolling Lift. — It is claimed for the roll¬

ing lift type of bascule bridges that besides being more scientific in supporting the weight directly on a foundation instead of on pivots, they are much more economical, saving 12 per cent in length, 24 per cent in the amount of steel used, 45 per cent in the amount of coun¬

terweight and over 50 per cent in the weight of the machinery necessary to operate them.

The only considerable objection which has been brought against the rolling lift type is that the strains upon the foundation are shifting, being on the channel end when the bridge is closed, and on the shore end when it is open.

That this difficulty is overcome in practice is evidenced by the fact that the type is a favorite one with engineers, and that more of the roll¬

ing lift bridges are being installed than of all other forms of bascules put together.

In the Scherzer bascule bridge the outer sur-voi. 4 — 34

face of the quadrant-shaped shore end of the bridge has large steel cogs which engage in massive steel racks fixed upon the foundation piers. As the centre of gravity of the bridge is at the centre of the

quadrant, the span is perfectly balanced in any position, and requires only power sufficient to rock it on the foun¬

dation. The counterweight is generally fixed, either forming a part of the quadrant — in which case no pit is required ; or carried on an extension of the shore end of the quadrant — in which case a shallow pit is provided to re¬

ceive it. In some instances, where the ground will not afford a substantial support for the foundation, it becomes necessary to spread the strains over a large surface, and the counter¬

weight may be suspended from towers, relieving the rack from so much of the weight. This is a common form of bridge for electric railways and in such instances is very cheaply operated by electricity. Larger bridges are operated by steam or hydraulic power. The operating mech¬

anism is of the rack and pinion type and acts upon the top chord of the truss.

In the Rail bascule the trunnions are large and the bridge rolls on them instead of swing¬

ing or rocking. When the bridge is closed it roller-trunnion: L, coupling lir.k; S, lifting strut; W, counter¬

weight.

rests upon a pivot, which is connected by

a swinging strut with a second pivot. As the bridge opens it turns upon the first pivot. The connecting strut comes into play to stop that rotation, the trunnions roll backward upon the track girders, and the channel end of the

bridge is pulled upward, the second pivot acting as a fulcrum.

Roller Bearing. — The two extant types of

the roller-bearing bascules are so nearly alike that charges of

infringement of the Waddell Diagram of Waddell Roller-Bearing Bascule Bridge — One-half of double-leaf bridge. RR, bed of rollers. C, centre of rotation: W, counterweight.

patent have been urged against the Cowing pat¬

ent granted a year later. The general idea is the same — the counterweight member of

circular outline, having its centre at the centre 530

of gravity of the moving leaf, rolls on its cir¬

cumference through an arc of 90 degrees in a nest of rollers held in a socket-shaped bearing.

In the Waddell bridge the structure turns upon seven compound rollers, each made up of a

large roller surrounded by 11 small rollers.

In the Cowing bridge the structure turns upon 29 solid simple rollers. There is also a differ¬

ence in the distribution of the counterweight : in the Waddell bridge it is overhead; in the Cowing bridge it is divided, part being below the deck.

Vertical Lift Bridges. — The vertical lift or direct-lift bridges do not exhibit the wide variety in design seen in the bascule bridges. The sali¬

ent feature of construction in the vertical lift bridge is the skeleton tower at each end of the lift span with its suspended counterweight. In some bridges the tops of these towers are con¬

nected across the waterway by trussed girders.

The chains or cables which carry the counter¬

weights pass over single or double sheaves at the top of the tower structure. The counter¬

weights balance the lift span when it is closed.

As the span is lifted the weight of the sus¬

pending chains is added to the counterweight, and as the span approaches the top of the lift it is more and more overbalanced. To obviate this difficulty two devices are in common use : the counterweight is made in sections which are automatically and consecutively caught by brackets on the tower as the weight descends ; or counterbalancing chains are hung in loops on the channel side of the tower, and picked up loop by loop as the span ascends.

The Straus.s direct-lift bridge is distinct

from all others in its employment of the paral¬

lelogram of links to raise the span, as in the Strauss bascule, thus avoiding the cables or chains of the other types of vertical lift bridges.

These great trussed lever arms at the top of the triangular tower structure display an out¬

line wholly different from all other types.

The relative economy of the vertical lift

bridge may best be shown by a few compara¬

tive figures. The largest swing bridges are about 500 feet long, and weigh about 3,000

tons. They afford a fairway of about 220

feet on each side of the centre pier. A rolling-lift bascule to give the same clear waterway of 220 feet would weigh about 2,000 tons. A ver¬

tical lift bridge affording a free waterway of 220 feet would weigh

about 1,500 tons, includ¬

ing its counterweight. One of the largest ver¬

tical lift bridges in operation is a double deck bridge across the Missouri River at Kansas

City. The lifting span is 413 feet in the clear, and rises to a height of 55 feet above the water. This bridge is peculiar in that only the lower deck is lifted. The same idea is embodied in a vertical lift bridge across the Willamette River at Portland, Ore., but in

this case the upper deck also may be lifted.

The lower deck is raised to a clearway of 51

feet above high water, for ordinary traffic, and the entire span is raised 93 feet more — a total of 144 feet clearway — to accommodate the

ocean steamers using that harbor. Consult

Waddell, J. A. L., (Bridge Engineering) (2

vols., New York 1916).

Richard Ferris,

Editorial Staff of the The Americana.

BRIDGES, Robert, American ironworker.

Extremely little is known of him personally.

He settled at Lynn, Mass., and in 1643 organized a company to work the deposits of <(bog iron-oreˆ in that vicinity. He went to London, and organized a <(Company of Undertakers for the Iron Works, w comprised of wealthy English¬

men, who advanced £1,000 for the work. Foun-drymen were brought from England and Scot¬

land, a plant was established on the Saugus River, and for several years furnished most of the iron used in this country, though ulti¬

mately the undertaking failed, owing to the scarcity of money and difficulty of making col¬

lections. In 1645 Bridges was a commissioner to confer with the governors of the French provinces in Canada. The Colonial records

show him to have been a member of the Gen¬

eral Court, and its speaker in 1646.

BRIDGES, Robert, English poet: b. 23 Oct.

1844. Educated at Eton and Corpus Christi

College, Oxford, he afterward studied medicine and held several hospital appointments, retiring from the active exercise of his profession in 1882. He is one of the most scholarly of

modern English poets and has published, usually privately, eight plays and several collections of poems. He succeeded Alfred Austin as Poet

Laureate in 1913. Among his works are (Prometheus) ; (Achilles in Scyros) : (Eros and Psyche } ; (Shorter Poems } ; Milton's Pros¬

ody. } Selections of his more outstanding verse were published in three volumes, 1898-1900, and his complete poetical works, excluding his

plays, appeared in 1913.

BRIDGES, Robert, pseudonym Droch,

American author and poet : b. Shippensburg,

Pa., 13 July 1858. A graduate of Princeton, for some time he was connected with the New York Evening Post and became assistant editor of Scribner's Magazine in 1887. His sparkling reviews

contributed to Life and signed ((Droch)) attracted wide attention. He is the author of (Overheard in Arcady* (1894) ; Suppressed

Chapters and Other Bookishness* (1895);

(Bramble Brae,* a volume of poems (1902);

(The Roosevelt Book) (1904).

BRIDGET, the name of two saints in the

Roman Catholic Church.

1. Saint Bridget, or Saint Bride: b.

Fochard, Armagh, Ireland, about the beginning of the 6th century. She was exceedingly beau¬

tiful, and to avoid the offers of marriage and other temptations to which this worldly ad¬

vantage exposed her, implored God to render her ugly. The prayer was granted, and, retir¬

ing from the world, Bridget built herself a cell under a large oak, hence the name Kill-dara or Kildare, the cell of the oak. Hither she was followed by numerous other virgins, and an

order of nuns was established which spr.ead into different countries and flourished for

centuries. Saint Bride is one of the chief Irish saints, and was held in great reverence in Scotland.

2. Saint Bridget, Birgit, or Brigitte,

daughter of a Swedish prince: b. about 1302; d.

Ropie 1373. At the age of 16 she married Ulf Gudmarssen, afterward seneschal of Nericia,

by whom she had eight children. Her husband and she then made a vow of mutual continence.

On her husband's death she founded the con¬

vent of Wadstena, in East Gothland, under the rules of Saint Augustine. She made a pilgrim¬

age to Palestine, and died on her return. She BRIDGETON — BRIDGEWATER

was canonized in 1391. She had left, under the title 1 Revelations,* a series of mystic writings, which, after due examination by the proper

authorities, were pronounced inspired by

Gregory XI and Urban VI. These writings

have been translated into Latin and French.

The order of Saint Bridget, called also some¬

times that of Saint Salvator, or the Holy

Saviour, continued in Sweden till the Reforma¬

tion, and still includes some religious houses in Italy, Portugal and other countries. Her

youngest daughter, Catherine, was also canon¬

ized and became the patron saint of* Sweden.

BRIDGETON, N. J., city, port of entry

and county-seat of Cumberland County, at the head of navigation on the Cohansey River, and on the New Jersey C. and the West Jersey

& S. railroads, 38 miles south of Philadelphia.

It is a very old settlement, having been a place of considerable importance before the Revolu¬

tionary War. Its surroundings are agricultural, and it has manufactures of glass, gas-pipe, nails, machinery, flour, oil-cloth, woolen goods, shoes, shirts, clothing, candy, carriages and wagons, boilers and lumber and also large fruit and vegetable canning interests, dyeing and finishing works. It has a public park, Tumbling Dam, which contain a picturesque lake, and a fine field for athletics. The city contains a public library, county and government buildings, two hospitals, insane asylum, the South Jersey Institute, the West Jersey Academy, Ivy Hall Seminary,

Seven Gables Seminary, a public high school, two national banks, good water and sewerage systems, and electric lights and street railroads.

Its excellent climate and scenic attractions have made the city a popular resort for summer tour¬

ists and residents. Bridgeton was made a port of entry in 1790, and incorporated in 1865. It has a modified form of commission govern¬

ment. The municipality owns and operates the waterworks. Pop. 14,209. Consult Nichols,

I. T., (The City of Bridgeton, N. JP (Philadel¬

phia 1889).

BRIDGETOWN, the capital of the island

of Barbados, in the West Indies. It extends along the shore of Carlisle Bay, on the southwest coast of the island, and is nearly two miles long, and about a half mile broad. The town con¬

tains a handsome square called Trafalgar

Square, in which there is a bronze statue of Lord Nelson, placed there in 1813. The prin¬

cipal buildings include the church of Saint Michael, now the cathedral of the diocese; the church of Saint Mary; the Jewish synagogue; the Central School ; Harrison’s Free School ; a handsome market-place ;

the barracks at the

south extremity of the city ; and the military hospitals. The trade in aloes, molasses, sugar and oil amounts to about $5,000,000 annually.

Bridgetown is the terminus of Barbados' only railroad. Pop. 16,648.

BRIDGEVILLE, Pa., borough of Alle¬

gheny County, on Chartins Creek, near the

Washington County line and on the . Pitts¬

burgh, Cincinnati, Chicago and Saint Louis, and the Pittsburgh and West Virginia railroads. It has a city hall and a graded school, a trust com¬

pany, and a national bank with resources

amounting to $1,500,000. It has extensive coal interests, glass factories, a steel box factory, iron foundries and a vanadium establishment.

The value of the borough's taxable property is $2,000,000. Pop. 3,200.

BRIDGEWATER, Francis Egerton

(3d Duke of), British nobleman: b. 1736;

d. 8 March 1803. He was the youngest son of Scroop, 4th Earl and 1st Duke of Bridgewater, and succeeded his elder brother, the 2d duke, in 1748. His estate of Worsley contained valu¬

able coal mines, and with the view of establish¬

ing communication between these and Manches¬

ter, seven miles distant, he conceived the idea of a navigable canal. Having accidentally made the acquaintance of James Brindley, and

per¬

ceived his great engineering talents, he employed him in the construction of this work, which, after encountering much opposition and ridicule, was at last triumphantly carried through. The canal extends from Worsley to Salford, Lan¬

cashire, and is carried over the Mersey and Irwell at Barton by an aqueduct 39 feet above the surface of the water, and 200 yards long.

To the execution of this scheme the Duke de¬

voted all his energies and fortune, restricting his expenditure for many years to £400 per annum. He was also a liberal promoter of the Grand Trunk Navigation; and he thus gave the impulse to the extension of the canal system of England.

BRIDGEWATER, Francis Henry Eger¬

ton (8th Earl of), English clergyman: b.

London, 11 Nov. 1756; d. Paris, 11 Feb. 1829.

The son of John Egerton, Bishop of Durham, and grandnephew of the 1st Duke of Bridgewater, he succeeded to the earldom in 1823.

He was educated at Oxford, becoming fellow

of All Souls College 1780. He was a prince of the Holy Roman Empire ; held several prefer¬

ments in the English Church, but his later years were spent in Paris, where he lived with a family of cats and dogs dressed as men and women, who accompanied him upon his drives.

By his will he left $40,000 to be invested in the public funds to be awarded to the author of the best treatise (On the Power, Wisdom and Goodness of God as Manifested in the Crea¬

tion. } The selection of the author was left to Davies Gilbert, then president of the Royal Society, who decided to divide the sum among eight persons for as many treatises on various aspects of the theme. The Earl was the author of several scientific, historical and other works, and bequeathed all his manuscripts to the

British Museum with $60,000 to keep up

and extend the collection. See Bridgewater

Treatises.

BRIDGEWATER, or BRIDGWATER,

England, a municipal borough and port, 33

miles southwest of Bristol in the county of Somerset, on the river Parret. Although the town is about 10 miles from the sea, vessels drawing 19 feet of water can come up to the quay at springtides ; but great inconvenience is sometimes caused by the bore. The river di¬

vides the town into two parts, which are con¬

nected by an elegant iron bridge of one arch.

The houses are generally well built, and chiefly of red brick. Among the chief buildings are the parish church (Saint Mary Magdalene's),

a handsome ancient structure, with a tower and spire; Saint John's Church and the town hall, a handsome building in the Venetian style. There is a free grammar school, an infirmary and almshouses. A considerable shipping trade is 532

carried on, chiefly coastwise. The imports are timber, grain, coal, tallow, esparto, linseed, *etc.* ; exports, timber, bricks, *etc.* The chief manu¬

facturing industry is that of bath-bricks which are made here (and indeed nowhere else in

great quantities. Bridgewater obtained its

name, Burgh-Walter, from its having belonged to Walter de Douay,

one of William the Con¬

queror's followers. In the Civil War the in¬

habitants embraced the cause of Charles I and defended the town resolutely against the Parlia¬

mentarians, but surrendered (1645) to Fairfax.

In the castle built by King John, the Duke of Monmouth lodged, and was here proclaimed

king in 1685 before the battle of Sedgemoor, which was fought about three miles from the town, and succeeding Bridgewater became the

theatre of Feversham's and Jeffreys' barbar¬

ities. Up till 1870, when it was disfranchised for bribery, Bridgewater returned two members to Parliament. Pop. 16,802.

BRIDGEWATER, Mass., town in Plymouth

County, on the New York, N. H. & H. Railroad, 27 miles south of Boston. It contains five vil¬

lages and has a State Normal School, the State farm, State almshouse, a public library, a sav¬

ings bank and manufactures of iron, nails, tacks, boots, shoes and brick. The first settlement was in 1645 as a plantation of Duxbury. In 1656 it became a separate township and dis¬

carded its aboriginal name of Nunkatateset.

East, West and North Bridgewater (the latter now Brockton), have since been cut from it.

Pop. 8,000.

BRIDGEWATER TREATISES, The,

works which grew out of a singular contest in compliance with the terms of the will of the last Earl of Bridgewater, who died in 1829. He left $40,000 to be paid to the author of the best treatise (On the Power, Wisdom and Goodness of God, as Manifested in the Creation. > The judges decided to divide the money among the authors of the eight following treatises whereby each received £1,000 with the copyright of his own treatise. (The Adaptation of External

Nature to the Moral and Intellectual Constitu¬

tion of Man} by Dr. Thomas Chalmers (1833) ; (Chemistry, Meteorology and the Function of Digestion considered with reference to Natural Theology, } by William Prout (1834) ; (History, Habits and Instincts of Animals,) by Wil¬

liam Kirby (1835) ; (Geology and Mineralogy, >

by Dean (William) Buckland (1836); (The

Hand… as Evincing Design, > by Sir Charles Bell (1833); (The Adaptation of External

Nature to the Physical Condition of Man,* by John Kidd, M.D. (1833) ; (Astronomy and Gen¬

eral Physics, *by William Whewell (1833) ; (Animal and Vegetable Physiology,* by Peter

Mark Roget (1834). All these essays were pub¬

lished as tracts for the London Times, and have had a great circulation and influence in the development of liberal thought on important

questions governing humankind.

BRIDGMAN, Elijah Coleman, American

missionary: b. Massachusetts 1801; d. Shang¬

hai, China, 1861. He was graduated from

Amherst College, 1826, and from Andover Theo¬

logical Seminary, 1829, and immediately joined Dr. Morrison at Canton. He soon attained a wonderful mastery of the Chinese

language,

becoming in 1839 official interpreter to Imperial Commissioner Lin, and in 1844 interpreter and secretary to the United States Minister, Caleb Cushing. He founded The Chinese Repository,

a magazine of the greatest value and interest for all subjects relating to the Flowery King¬

dom. He compiled a Chinese (Chrestomathy)

in the Canton dialect, a quarto volume of 734

pages, and the first practical manual of that dialect prepared in China. His life has been written by his widow, Mrs. E. J. Bridgman, under the title (The Pioneer of American

Missions ip China) (New York 1864).

BRIDGMAN, Frederick Arthur, Amer¬

ican genre and historical painter: b. Tuskegee, Ala., 10 Nov. 1847. He studied at the Brooklyn Art School and at the Academy of Design in New York. From 1863-66, he was a steel en¬

graver for the American Bank Note Company.

In the latter year he went to Paris where he attended the Ecole des Beaux-Arts and studied under J. L. Gerome. In 1871 he went to Al¬

giers and travelled extensively in northern

Africa, Egypt and Nubia. He then began to

paint subjects of Oriental tone, somewhat in the manner of Gerome, but with more mastery of color. He has long resided in Paris, and has exhibited his works with much success both in Europe and in the United States. He was elected to the National Academy of Design in 1891, and in 1900 was made chairman of the department of American Art in the Paris Ex¬

position. He is an officer of the Legion of Honor (1907) and of the Bavarian Order of

Saint Michael, and has received many medals.

As a composer of orchestral music, he has writ¬

ten several fine things; a few symphonies; and is author of several works in English and

French on art subjects. Among his best paint¬

ings are (An American Circus in Normandy) ; <L'Arabe) ; <Pharo) ; (The Diligence) (Liver¬

pool Gallery) ; (The Destruction of Pharaoh's Host> (1892, Academy of Arts, Petrograd) ;

(Ars Dramatis) ; (Procession in Honor of

Isis } ; (The Bocher, Biskra> ; and the (Greek Girl.*

BRIDGMAN, Herbert Lawrence, Amer¬

ican journalist and explorer: b. Amherst,

Mass., 30 May 1844. Graduating at Amherst

College in 1866, he entered journalism and

became business manager of the Brooklyn

Standard Union. In 1894 he accompanied and

wrote an account of the Peary auxiliary ex¬

pedition; in 1897 he was with Professor Libbey of Princeton when the latter scaled the ((Enchanted Mesa® of New Mexico; and in 1899

he commanded the Peary auxiliary expedition

on the steamship Diana, and in 1901 a second Peary auxiliary expedition on the Erik. In

1905 he traveled extensively in Egypt and the Sudan and in 1913 in the Balkans. He received the honorary degree of M.A. from Amherst

College in 1904; was made chevalier of the Order of Leopold II by the King of Belgium in 1909; is a member of the International Polar Commission; has been chairman of the Pub¬

lishers' Association of New York since 1911

and was elected president of the American

Newspaper Publishers' Association in 1914.

Has published (The Sudan-Africa from Sea to Centre) (1905).

BRIDGMAN, Laura Dewey, American

blind deaf-mute: b. Hanover, N. H., 21 Dec.

1829; d. 24 May 1889. She was a bright, in¬

telligent child, blit at two years of age her sight, hearing and smell were entirely de¬

stroyed by fever. Yet she learned to find her way about the house and neighborhood, and

even to sew and to knit a little. In 1839 Dr.

Samuel G. Howe, of Boston, undertook her

care and education at the Perkins Institution.

The first attempt was to give her a knowledge of arbitrary signs, by which she could inter¬

change thoughts with others. Then she

learned to read embossed letters by touch ; next, embossed words were attached to dif¬

ferent articles, and she learned to associate each word with its corresponding object. The next step was to procure her a set of metal types, with the letters cast at the ends, and a board with square holes for their insertion, so that they could be read by the finger. In six months she could write the names of most

common objects, and in two years had made

great bodily and mental improvement. Her

touch grew in accuracy as its power increased; she learned to know people almost instantly by touch alone. In a year or two more she was able to receive lessons in geography, algebra and history. She received and answered let¬

ters from all parts of the world, and was al¬

ways employed, and, therefore, always happy.

She learned to write a fair, legible hand, to read with great dexterity, to think and reason well, and at last became a teacher to others afflicted like herself. Consult Lampson, (Life and

Education of Laura Dewey Bridgman) (Bos¬

ton 1878) ; Mrs. Elliott and Hall, (Laura

Bridgman) (Boston 1903).

BRIDLE, the headstall, bit and reins, by

which a horse is governed. It is an instru¬

ment of high antiquity. Pliny ascribes the

invention of the bridle to Pelethronius, King of the Lapithse. The first horsemen guided

their horses with a rope or stick, and the sound of the voice. A cord drawn through

the nose is sometimes used for other animals.

The ancient Thessalian coins often represent a horse with a long rein trailing on the ground.

The Romans were trained to fight without

bridles, as an exercise in the manege. On

Trajan's Column soldiers are thus represented at full speed. The parts of a modern bridle are the snaffle or bit ; the headstall, or leathers from the top of the head to the rings of the bit ; the fillet, over the forehead and under the foretop ; the throat-band, which buttons under the throat ; the reins ; the nose-band, buckled under the cheeks ; the trench, the cavesan, the martingal and the chaff-halter.

BRIDLINGTON, or BURLINGTON,

England, town of Yorkshire, incorporated in

1899. It is situated on a beautiful bay, 37 miles northeast from York, on the Hull and S.

Railroad, and consisting of one principal and several smaller streets. It is a favorite water¬

ing-place, with a fine harbor. The parish

church forms part of an ancient priory of

elegant architecture, but now much defaced.

There are several Dissenting chapels and a

free grammar school. A considerable trade is carried on in corn. Pop. about 15,000.

BRIDPORT, England, seaport and munic¬

ipal borough, in Dorsetshire, lying between the rivers Bride, or Brit, and Asker, in a fertile valley surrounded by hills, 15 miles west from Dorchester and about lj/2 miles from the sea.

The Bride and Asker unite a little below the town, the united stream being called the Brit, and form a safe and commodious harbor for

vessels not over 250 tons. Bridport consists mainly of three spacious streets, containing many well-built modern houses, chiefly of brick.

In the centre of the town is the town hall and market-house, a handsome building in the Gre¬

cian style. The parish church of Saint Mary's is a beautiful structure, cruciform, with a cen¬

tral tower, and contains a fine organ. At the northern entrance to the town is the more

recent and less attractive Saint Andrew's

Church. There are, besides, several Dissenting chapels, schools, a library and scientific insti¬

tute ; and extensive manufactures of shoe—

thread, ropes, cordage, sail-cloth, fishing-nets, *etc.* Bridport was a considerable town even

before the Norman Conquest, and a parliamen¬

tary borough from the reign of Edward I to the passing of the Redistribution Act of 1885, when it was disfranchised. Pop. 5,919.

BRIE, bre, a former county or district of

France lying between the Seine and the Marne, and now contained in the departments of Aisne, Marne and Seine-et-Marne. It was divided into Brie Frangaise, Brie Champenoise and Brie

Poilleuse. The latter was the largest of the divisions and had for its capital Meaux. Its chief wealth was in vineyards and pastures ; and its butter and cheese acquired and still retain a wide celebrity. Brie Frangaise produced grain in great abundance, and was likewise a good grazing country. In ancient times this district was partly covered by a vast forest, portions of which are still to be seen. It was subjugated by the Franks, who annexed it to the kingdom of Neustria. In the 9th century it was ruled by its own counts. One of these, having obtained the earldom of Troyes or

Champagne, in 968 united the two countships, which thenceforth shared the same fortunes.

Both passed into the possession of the Crown in 1361.

BRIEF (from the Latin brevis , short), a

brief or short statement or summary, particu¬

larly the summary of a client's case which the solicitor draws up for the instruction of coun¬

sel. In American practice a brief is an abridged statement of a party's case. It should give the names of the parties to the action, their resi¬

dence and occupation, and tell the character in which they sue and are sued, and wherefore they prosecute or resist the action. It should contain an abridgment of all the pleadings ; a chronological and methodical statement of the facts, in language easily understood; a sum¬

mary of the questions in issue, and of the evi¬

dence which is to support each of the issues ; the names of the witnesses by whom the facts are to be proved, or if there be written evi¬

dence, an abstract of such evidence ; a descrip¬

tion of the personal character of the witnesses, whether morally good or bad, whether they are naturally timid or over-zealous, firm or waver¬

ing, and the like. It should contain also a summary of the evidence of the opposite party, if known, and such facts as are adapted to oppose, confute or repel it. The object of the brief is to inform the person who tries the case of the facts important for him to know.

In some of the State courts and in the Supreme Court of the United States it is customary or requisite to prepare briefs of cases for the perusal of the court. These are usually printed.

Briefs vary according to the purposes for which they are to be used. The points in a brief intended for the court should be printed in a bold, heavy-faced letter, although subordinate matter may be put in capitals, italics and com¬

mon type, according to its importance. The

word has a different meaning in Great Britain, where it is the duty of the attorney to prepare the case only, and that of the barrister to plead the case before court. A brief, under the Eng¬

lish practice, is the concise statement of the case as it leaves the hands of the attorney, and serves as a guide to the barrister as well as his instructions for proceeding in open court. A brief intended for the court must be in decorous language and respectful to a judge from whose decision an appeal has been taken, and to the opposite party and counsel and all other persons named therein. Consult Abbot, N., (Brief Mak¬

ing and the Use of Law Books) (Saint Paul 1906). The phrase <(Brief of Title® is some¬

times employed in the place of the usual term ((Abstract of Title® to denote the concise state¬

ment of the deeds, conveyances and changes in ownership which may have occurred in the

history of the title to a certain piece of real estate.

BRIEF, Papal (cf. German Brief , a letter), a pastoral letter in which the Pope gives his decision on some matter that concerns the party to whom it is addressed. The brief is an official document, but of less public character than the bull. It usually deals with matters compara¬

tively private and subordinate, not, as the bull, with matters affecting the Church at large or an entire nation. It is not signed by the Pope himself, but by an officer called (<I1 Segretario de' Brevi,® and is sealed on red wax with the Pope's private seal, the fisherman's ring. Briefs are of two kinds : apostolic, those which issue from the Pope

himself ; and penitentiary, issu¬

ing from the office which bears that name.

The form of address is ((Dilecte Fili® (((beloved son®) ; it is superscribed (<Papa® and concludes with the words <(Datum Romse sub annulo pis-catoris® (((given at Rome under the seal of the fisherman®).

BRIEG, breg, Germany, town of Prussian

Silesia, on the left bank of the Oder and on the railway between Vienna and Breslau, 27

miles southeast of the latter town. Beautiful promenades cover the site of the encircling ramparts destroyed by the French in 1807. The castle residence of the old counts of Brieg is the most interesting of its public buildings.

Brieg's cattle fairs are the most important in the province and a thriving trade is carried on in its manufactures of linen, woolens and cot¬

tons, tobacco, cigars, starch, *etc.* Brieg has an interesting history dating from ancient days when it was styled Civitas Altce Riper. Pop.

30,000.

BRIEGER, bre'ger, Johann Friedrich

Theodor, German Protestant historian : b.

Greifswald, 4 June 1842. After studies at

Erlangen and Tubingen, he became professor

of Church history at Marburg in 1873 and at Leipzig in 1886. A specialist in the history of the Reformation period, he is editor of the Zeitschrift fiir Kir chcng eschichte and his pub¬

lished works include (Quellen und Forschungen zur Geschichte der Reformation) (1884); (Die theologischen Promotionen auf der Universitat Leipzig 1428-1539 (1894).

BRIEGLEB, brek'lap, Hans Karl, German

jurist and historian: b. Bayreuth 1805; d. 1879.

In 1842 he became professor of law at Erlangen and in 1845 at Gottingen. Through his re¬

searches in the literature of the Middle Ages, he attained celebrity by establishing an histori¬

cal basis for the theory of civil procedure. His principal work is (Ueber exekutorische Urkunden und Exekutivprozess* (1839) ; and he also wrote (Summatim Cognoscere, Quid et Quale

Fuerit apud Romanos1* (1843) ; (Rechtsfalle

zum akademischen Gebrauch) (1848-50) ; (Ein—

leitung in die Theorie der summarischen Pro-zesse) (1859) ; (Vermischte Abhandlungen)

(1868).

BRIEL, brel, or BRIELLE, bre-el', some¬

times The Brill, a fortified seaport town on the north side of the Island of Voorne, near the mouth of the Meuse, in the province of South Holland, Netherlands. It contains a govern¬

ment arsenal and military magazine and pos¬

sesses a good harbor. The tower of Saint

Peter's Church serves as a lighthouse. Saint Catherine's Church contains the tomb of Ad¬

miral Philippus van Almonde. Its male inhabit¬

ants are chiefly engaged as pilots and fisher¬

men. Briel may be considered as the nucleus of the Dutch republic, having been taken from the Spaniards by William de la Marck in 1572.

This event was the first act to open hostility to Philip II and paved the way to the complete liberation of the country from a foreign yoke.

The celebrated admirals De Witt and Van

Tromp were natives of Briel. Pop. about 4,000.

BRIENNE, bre-en, John of, celebrated

crusader: b. 1148; d. 1237. He was the son of Erard II, Count of Brienne; was present at the siege of Constantinople in 1204, and afterward, in 1209, married the granddaughter and heiress of Amaury, King of Jerusalem. Brienne thus

obtained an empty title, and having been crowned at Tyre in 1210, defended himself, though with a very inferior force, against the attacks of the Saracens. The Emperor Frederick II, having

engaged to join the Crusade, provided the sov¬

ereignty of the Holy Land were ceded to him, Brienne abdicated in his favor and gave him his eldest daughter, Yolande, in marriage. He afterward, in 1222, married Berengaria, sister of Ferdinand of Castile, as his second wife, and retired from the East; but the state of affairs there again brought him on the stage. He was crowned Emperor of the East in 1231, and con¬

tinued to defend his dominions against all

aggressors, more especially against the united forces of Vataces, Emperor of Nicaea, and

Azan, King of Bithynia.

BRIENNE, or BRIENNE-LE-CHATEAU, le-sha-to, or BRIENNE-NA—

POLEON, na-po-le-on, a small town of

France, department of Aube (Upper Cham¬

pagne), about 23 miles northeast of Troyes, was the seat of the military academy at which Napoleon received his first instruction in the militarv art, entering the military school here in 1779, when he

was 10 years old, and re¬

maining until 1784. Brienne-le-Chateau was

afterward celebrated as the scene of a portion of the final struggle in 1814, in which the em¬

pire was overthrown, Napoleon being here

defeated by the allies under Blucher. Consult Jaquot, (Notice historique sur Brienne) (Paris 1832).

BRIENZ, bre -ents, Switzerland, town in

the canton of Bern, beautifully situated on a narrow ledge at the foot of the Bernese Alps and on the northeast shore of the Lake of Brienz. Its church, built in 1215, together with some old ruins and a handsome school, is

finely situated on a height. Brienz is noted for its cheese and as the centre of the Oberland wood-carving industry. The Lake of Brienz,

one of the most picturesque in Switzerland, is formed by the river Aar and discharges its water through the valley of Interlaken into Lake Thun, lying 24 feet below it. The lake has daily steamboat service between Brienz and Interlaken, and by this route many tourists visit the famous Giessbach Fall. Pop. 2,518.

BRIER CREEK, a small stream rising

in Warren County, Ga., flowing southeast for about 100 miles and entering the Savannah

River a few miles east of Jacksonborough. It is noted for a battle during the Revolutionary War. After the American victory on Kettle

Creek, in February 1779, General Ashe was

sent at the head of about 1,500 troops to drive the British from Augusta. The British, under command of General Campbell, evacuated the

city, retreated to Brier Creek and after cross¬

ing destroyed the bridge. Ashe pursued them, arrived at the creek 27 February, and there, 3

March, he was surprised by 1,800 British under General Prevost. The American troops were

hastily called to arms and as the British ad¬

vanced opened upon them a heavy fire, but an unfortunate movement in their line gave the enemy an advantage which decided the fortune of the day. The Americans were put to flight, many were drowned in trying to swim the

Savannah, or were lost in the swamps. Their total loss was about 200 killed and wounded and as many others were taken prisoners. The British had only 5 killed and 11 wounded.

The victory restored Augusta to the British and reinstated temporarily the royal government of Georgia.

BRIERLEY, Benjamin, Lancashire di¬

alect writer: b. Failsworth, near Manchester, 26 June 1825; d. Harpurhey, near Manchester, 18 Jan. 1896. In boyhood a bobbin-winder and in manhood a silk-warper, he was consumed by a passion for reading, and first attracted atten¬

tion by his articles in the Manchester Spectator entitled ((A Day's' Out® (1857). He took up journalism in 1863, joining the staff of the Old¬

ham Times, and from 1869-91 published Ben

Brierley's Journal. He was one of the found¬

ers of the Manchester Literary Club. His works include (The Laycocks of Langleyside) (1864) ; (Ab-o'th 'Yate in London *(1868) ; (Ab-o'th 'Yate on Men and Things) (1868) ; (Ab-o'th 'Yate Dictionary1* (1881) ; (Ab-o'th 'Yate

Sketches1* (1896) : Collected Works* (1 882—86), and (Home Memories* (an autobiography

1886).

BRIERLEY HILL, England, a market-town of Staffordshire, on the Stour, nine miles west of Birmingham. It has several churches, a town hall and a free library. The district abounds in coal, ironstone and clay. The in¬

habitants are mostly employed in the iron roll¬

ing-mills and boiler-works, and in the making of bricks, nails, chains, anchors, spades, glass, pottery, *etc.* Pop. 12,300.

BRIERRE DE BOISMONT, bre'er de

bwas'moii', Alexandre Jacques Francois,

French physician and alienist: b. Rouen 1798; d. 1881. After taking his medical degree in 1825. he won in 1831 a gold medal from the Institute for a treatise based on his study of the cholera in Poland. Establishing an asylum for the insane, henceforth his life was devoted to the study and alleviation of mental disease.

He wrote (La pellagre et la folie pellagreuse*

(1836); (La menstruation* (1842); (Le delire aigu* (1844) ; cLes hallucinations* (1845) ; (Le suicide* (1854).

BRIEUX, bre-e, Eugene, French drama¬

tist: b. Paris 1858. He became a journalist and ultimately drifted into play-writing in 1890 with (Menage d'artistes,* which at once became

very popular. Previous to this he had made several more or less unsuccessful efforts in this field.

After his first success (at the Theatre Libre), he became, almost immediately, one of the best known dramatists of France, and he produced play after play, all distinguished by a deep in¬

sight into the social problems of the day and keen satirical qualities, and yet he handles tenderly the foibles of mankind and the weak¬

nesses of the characters he meets in the cosmo¬

politan life of Paris. With his characters, how¬

ever rough gems they may be, he is ever sym¬

pathetic; but his shafts are always keen and sure for hypocrisy, cant and sham. The shams and shortcomings of the educational system of France, the rottenness and temptations of pub¬

lic life, the insincerity and uselessness of fash¬

ionable charity and slumming, the doctrine of heredity, the unhappy life of girls of the middle class, owing to the restraints imposed upon them by custom, divorce, gambling and betting, the many injustices worked by the law, the life of the Parisian shop girl, the unfortunate women who become mothers without the law, all form subjects of his dramas and powerful agents for his reform zeal to which he owes his brilliant success rather than to notable qualities as a lit¬

erary artist. He was elected member of the Academy in 1909. Among his popular plays

are (Blanchette* (1892) ; (M. de Reboval*

(1892) ; (L'Engrenage* (1894) ; (Les Bien—

faiteurs* (1896); <L'Evasion* (1896); (Les

trois Filles de M. Dupont* (1897) ; (Le Resultat des Courses* (1898) ; (Le Berceau* (1899) ; (La Robe Rouge* (1900); <Les Rempla^antes*

(1901); (Les Avaries* (1901); (Petite Amie*

(1902); <Maternite* (1903); (Les Hannetons*

(1906); (La Francaise* (1907); (Simone*

(1908) ; (Suzette* (1910) ; (La Foie* (1912), and (La femme seule* (1912). (Les Avaries*

(< Damaged Goods*) was given in New York

in 1913 with great success. See Red Robe, The.

BRIG, a square-rigged vessel with two

masts. The term is sometimes used as equiva¬

lent to brigantine, but modern American usage makes a difference. See Brigantine.

BRIGADE, in general, an indeterminate

number of regiments or squadrons. In the

British army a brigade of infantry is generally composed of three regiments ; a brigade of

horse, of from 8 to 12 squadrons; and one of artillery, of five guns and a howitzer. A number of brigades form a division and several divisions an army corps. A brigade-major is the chief of the brigade-staff. A brigadier-gen¬

eral commands a brigade. In the United States army three regiments of infantry or cavalry usually constitute a brigade, but there may be two rigiments only, or more than three. The American brigade, like the British, is com¬

manded by a brigadier-general. The brigade

combination was introduced by Gustavus Adol¬

phus, whose example was followed by Turenne, who formed brigades of 3,000 to 4,000 men.

The use of the term in the French service is somewhat equivocal. In the gendarmerie, as

formerly in the cavalry, a brigade is the small fraction of an army under the command of a subaltern officer. In the regular army a bri¬

gade now contains two or three regiments of infantry or cavalry or else a mixed body.

BRIGADIER-GENERAL, a military

officer of intermediate rank between a major-general and a colonel; the officer in the army of the United States who commands a brigade.

In the English and European armies generally the brigade commander is usually a colonel or a lieutenant-colonel, who for a brief period or for some particular service and largely because of his seniority is placed on brigade duty.

BRIGANDINE, a piece of mediaeval

armor, consisting of thin jointed scales of plate, generally sewed upon linen or leather, the

whole forming a coat or tunic. It was lighter than the corselet, more effective than the hau¬

berk and cheaper than either, so that it came into common use. The name came from the

brigands, a light-armed irregular soldiery of the 14th and 1 5th centuries, resembling the Turkish Kurds and Bashi-bazuks, and, like

them, addicted to marauding and pilfering:

hence the English word “brigand.® It did not come into use until the 1 5th century.

BRIGANDS, a name first given during

the imprisonment of King John in Paris (1358) to the mercenaries who held the city, and whose misbehavior rendered them obnoxious. Frois¬

sart applied it to a kind of irregular foot sol¬

diery, from whom it was transferred to simple robbers. It is now used especially of such of these as live in bands in secret mountain or forest retreats. In this sense the pest has been common to most countries by whatever name

the robbers may have been known — whether

the escaped slaves and gladiators of Rome, the pre-Islamite brigands of Arabia, English out¬

laws and highwaymen, German robber nobles,

the later banditti of Mediterranean countries and of Mexico, American stage-coach robbers, Australian bushrangers or the dacoits and hill robbers of Asia. It has ever flourished under weak or corrupt governments, and patriotism

at times has swelled its ranks, always largely recruited from those disposed readily to join in any political movement, and has transformed them into guerrilla companies, who have car¬

ried on a bitter warfare against the invader.-

Such Spanish bands harassed the French dur¬

ing the Peninsular War; in Italy the Austrian troops were frequently engaged in expeditions against the banditti led by the daring Bellino ("77 Passatore ®), and in Greece the Klephts rendered brave and worthy service in the war of independence. In Cuba, in 1888, political dis¬

content was made the excuse for the brigandage then rampant in the island, where four prov¬

inces were on this account declared in a state of siege. Religious persecution also has en¬

couraged brigandage ; in Bosnia, which has

always produced the most perfect specimens of bandits, it was formerly very common, the un¬

happy Christians, who were reduced by the

Turks to the condition of serfs, frequently tak¬

ing to the mountains in despair, and then

wreaking vengeance on their oppressors. Gen¬

erally speaking, in countries with a notably scanty population, which is yet in many districts as notably overcrowded, brigandage will be

found still in existence. Vigorous steps have been taken during the last 50 years to repress the practice, and in some countries with signal success. In Greece, organized companies of

brigands, as distinguished from bands of high¬

way robbers, fortuitously collected, have dis¬

appeared ; and, in Italy, the chiefs with whom princes made treaties are found only in history.

Nevertheless, brigandage is by no means obso¬

lete. In Hungary, where it has flourished from time immemorial, and where even the free towns in the 1 5th century enrolled companies for or¬

ganized rapine, and thus raised it to the height of an institution, it has found a stronghold in the shades of the Bakony Forest, whose swine¬

herds are said to be in league with the betyars, and even do an occasional stroke of business on their own account. In Sicily it is to be feared that this is still the only trade which really prospers in the island (see Mafia) ; and the bands that infest the Turkish frontier are notoriously dangerous to the wayfaring mer¬

chant and the defenseless tourist. In 1887 spe¬

cial attention was attracted by the boldness of brigands . in the Pyrenees, Tuscany, Serbia, Macedonia, Asia Minor and Mexico.

BRIGANTES, bri-gan'tez, the name of the

most powerful of the old British tribes, in¬

habiting the country between the Humber and the Roman wall.

BRIGANTINE, a sailing-vessel with two

masts, the foremast rigged like a brig's, the mainmast rigged like a schooner's ; also called "hermaphrodite brig.® The term is applied to different kinds of vessels by mariners of differ¬

ent countries. The term "brigantine® was for¬

merly applied to a light, flat, open vessel, with 10 or 15 oars on a side, furnished also with sails, and able to carry upward of 100 men.

The rowers, being also soldiers, had their mus¬

kets lying ready under the benches. Brigan¬

tines, being very fast sailers, were frequently made use of, especially in the Mediterranean, for the purpose of piracy, from which fact they

derived their name.

BRIGGS, Charles Augustus, American

clergyman and author: b. New York, 15 Jan.

1841 ; d. 8 June 1913. For a number of years he was pastor of the Presbyterian church at Roselle, N. J. In-1874 he was appointed pro¬

fessor of Hebrew in Union Theological Semi¬

nary, New York. He was tried for heresy in BRIGGS — BRIGHAM

537

1892, and was acquitted. In 1897 he formally severed his connection with the New York

Presbytery and became a clergyman of the

Protestant Episcopal Church. He was one of

the foremost Biblical scholars in the world, and the Episcopal Church in this country might be searched in vain to find his equal as a teacher of Hebrew and the cognate languages and as an authority in that department of learning, or even one who is entitled to be put in the same class with him. Among his works are Ameri¬

can Presbyterianism5 (1885) ; (The Bible, the Church and the Reason5 (1892) ; (The Higher Criticism of the Hexateuch) (1893); (The

Messiah of the Gospels) (1894) ; (The Messiah of the Apostles) (1895) ; (General Introduction to the Study of Holy Scripture) (1899) ; (The Incarnation of the Lord5 (1902) ; (The Ethical Teaching of Jesus> (1904) ; (Church Unity)

(1909); (Theological Symbolics5 (1914). He

was one of the authors of the (New Hebrew Lexicon5 (1906).

BRIGGS, Charles Frederick, American

author and journalist: b. Nantucket, Mass.,

1804; d. Brooklyn, N. Y., 20 June 1877.

Throughout his life he was engaged in journal¬

ism in New York, and under the pseudonym of <(Harry Franco® was widely known. In 1844

he founded the Broadway Journal, and for a time Edgar Allen Poe was his associate editor.

He was connected with Putnam's Magazine

(1853-56) ; the New York Times, the Evening Mirror, the Brooklyn Union (1870-74), and the Independent. Publications: (Harry Franco: a

Tale of the Great Panic) (1837); (The Haunted Merchant (1843) ; (Working a Passage)

(1844) ; (Trippings of Tom Pepper5 (1847) ; (Seaweeds from the Shores of Nantucket5

(1853) ; and in collaboration with Augustus Maverick, (The Story of the Telegraph and a History of the Great Atlantic Cable5 (1858).

BRIGGS, Frank Obadiah, American leg¬

islator : b. Concord, N. H., 12 Aug. 1851 ; d. 8

May 1913. A graduate from the United States Military Academy in 1872, he resigned from the army in 1877 to accept a position with the Roebling Company of Trenton, N. J., soon be¬

coming its assistant treasurer. He was elected mayor of Trenton, 1899-1902; State treasurer of New Jersey, 1902-07, and United States

senator, 1907-13. He was chairman of the Re¬

publican State Committee of New Jersey for

nine years, 1904—13.

BRIGGS, George Nixon, American poli¬

tician: b. Adams, Mass., 13 April 1796; d. Pitts¬

field, Mass., 12 Sept. 1861. He was governor of Massachusetts from 1844 to 1851, and one of the founders in that State of the Republican party. He studied law, was admitted to the bar in 1818, and soon established a reputation as one of the best criminal lawyers in the State.

From 1831-43 he was a representative in Con¬

gress, serving through one Congress as chair¬

man of the postoffice committee. Pie was

subsequently a judge of the Common Pleas

(1851-56). During his term as governor ex¬

traordinary efforts were made to induce him to pardon Professor Webster, the murderer of Dr.

Parkman, but he refused to interpose. For 16

years he was a trustee of Williams College, and at all times a noted advocate of temperance.

His death was the result of an accident received from a gun. Consult Richards, W. C., (Great in Goodness5 (Boston 1866).

BRIGGS, Henry, English mathematician :

b. Warley Wood, Yorkshire, 1561 : d. Oxford, 26 Jan. 1631. He entered Saint John's College, Cambridge, and distinguished himself by his ac¬

quirements in mathematics. In 1596 he was

appointed first lecturer on geometry in the newly erected establishment of Gresham House or College, London, and in 1619

became in like manner first Savilian professor of geometry at Oxford, which he resigned in 1620. In 1616 he went to see Napier in Scotland, who had orig¬

inated the general idea of logarithms. He de¬

voted many years to the study of logarithms, his system being still known as ((Briggs' Loga¬

rithms.55 Briggs' great works are his (Loga-rithmorum Chilias Prima5 (1617) ; (Lucubra—

tiones et Annotationes in Opera Posthuma J.

Neperi5 (1619); (Arithmetica Logarithmica5

(1624) ; (Trigonometria Britannica5 (1633).

BRIGGS, Le Baron Russell, American

educator: b. Salem, Mass., 11 Dec. 1855. He was graduated from Harvard University in

1875, was assistant professor of English there, 1885-90, and professQr from 1890. He was

dean of the university 1891-1902, and is dean of the faculty of arts and sciences since 1902, and Boylston professor of rhetoric and oratory since 1904. He has also been president of Radcliffe College since 1903. He has written (01d Fashioned Views of Modern Education5 ;

Original Charades5 ; (School, College and

Character.5

BRIGGS, Lyman James, American scien¬

tist : b. Assyria, Mich., 7 May 1874. After study at Michigan Agricultural College, the

University of Michigan and Johns Hopkins, he was given charge of the physical laboratory, Division of Soils, in the United States Depart¬

ment of Agriculture in 1896, and became physi¬

cist in charge of the physical laboratory of the Bureau of Plant Industry. He is the author of (The Mechanics of Soil Moisture5 (1897) ;

(The Centrifugal Method of Soil Analysis5

(1904); (The Moisture Equivalent of Soils5

(1907) ; (Dry Farming in Relation to Rainfall and Evaporation5 (1910) ; The Wilting Coeffi¬

cient for Different Plants and its Indirect De¬

termination5 (1912), published as Bulletins of the Department of Agriculture.

BRIGGS, William, Canadian clergyman

and publisher : b. Banbridge, county Down,

Ireland, 9 Sept. 1836. He was educated at

Liverpool and, emigrating to Canada while a young man, was ordained to the Methodist min¬

istry in 1863. After successful pastorates in various charges, he held the secretaryship to the conference in 1876-77, and was its presi¬

dent in 1885. He was first elected book steward of the Methodist Book and Publishing House

in 1879, and thus became the head of the pi¬

oneer book publishing house in Toronto, now the largest in the Dominion.

BRIGHAM, brig'am, Albert Perry, Ameri¬

can geologist and author : b. Perry, N. Y., 12

June 1855. He studied at Colgate College,

Hamilton Theological Seminary and Harvard

University ; was ordained Baptist minister ; be¬

came pastor at Stillwater, N. Y. (1882-85), and Utica (1885-91) ; was appointed professor of geology at Colgate in 1892 ; for several sessions 538

instructed in the Harvard Summer School of

geology; was professor in the Cornell Slimmer School 1901-04; professor at the University of Wisconsin 1906; was appointed lecturer in the School of Geography, Oxford University, 1908; and examiner in New York State Education

Department 1911-13. He edited the Bulletin of the American Geographical Society, and among his published works are (A TextBook of

Geology* (1900) ; (Geographic Influences in American History* (1903) ; ‘Student’s Labora¬

tory Manual of Physical Geography* (1904) ; (From Trail to Railway through the Appalachians) (1907); Commercial Geography*

(1911).

BRIGHAM, Amariah, American physician ;

b. New Marlborough, Mass., 26 Dec. 1798; d.

Utica, N. Y., 8 Sept. 1849. He began practice at Enfield, Mass., about 1821, but soon removed to Greenfield, where he became widely known for his skill as a surgeon. In 1828 he went to Europe and spent a year studying in the hos¬

pitals. In 1831 he settled in Hartford, Conn., and in 1840 was appointed superintendent of the retreat for the insane there. Two years later he accepted a similar position at the State Lunatic Asylum, Utica, N. Y., where he re¬

mained till his death. He was a skilful busi¬

ness man, an able physician, and was frequently called to act as an expert in the courts. Publi¬

cations : 'Treatise on Epidemic Cholera*

(1832); Unfluence of Mental Cultivation on

the Health* (1833) ; Unfluence of Religion

upon the Health and Physical Welfare of Mankind) (1835) ; Unquiry Concerning the Dis¬

eases and Functions of the Brain, the Spinal Cord, and Nerves) (1840) ; 'The Asylum Sou¬

venir J (1849) ; 'Mental Exertion in Relation to HealtlP (1866). Consult Goodrich, C. E., 'Ser¬

mon on the Death of Amariah Brigham)

(1850).

BRIGHAM, Sarah Jeannette (Lathbury),

American illustrator and writer for young

people: b. Manchester, N. Y., 5 March 1835.

She was for many years a contributor to

juvenile publications, and as artist has illus¬

trated in color. She was married to J. R. Brig¬

ham in 1854. She has written 'Under Blue

Skies) (1886) ; 'Leopold and His Wheel*

(1896); 'In Daisy Time) (1896); 'The Pleas¬

ant Land of Play) (1898) ; ‘Twinklenose and Yellow Feather* ; ‘Little Brer Rabbit.*

BRIGHAM, William Tufts, American

ethnologist: b. Boston, Mass., 24 May 1841, was graduated from Harvard 1862, and admitted

to the Massachusetts bar in 1867, was for a year botanical instructor at Harvard and

served for six years on the Boston school board.

He removed to Honolulu in 1888, and has since been in charge of the Bishop Museum of

Ethnology and Natural History there. He has been sent around the world to study museums and their methods, the results published by the Museum Press, fully illustrated. He is an honorary member of the Royal Anthropologi¬

cal Institute of Great Britain and Ireland; correspondent of the Berlin and Hamburg

Anthropological Societies, and of the Italian Anthropological Society, also of the Imperial Academy of Sciences, Petrograd, and of the

Philadelphia Academy of Natural Sciences.

In 1905 Columbia LJniversitv conferred upon

him the degree of honorary Sc.D. He has made the museum of which he is director respected throughout the scientific world. He has pub¬

lished ‘Cast Catalogue of Antique Sculpture* ; ‘Guatemala, the Land of the Quetzal* ; ‘Vol¬

canic Manifestations in New England* ;

‘Hawaiian Feather Work) ; ‘Index to the

Islands of the Pacific) ; ‘Ancient Hawaiian Stone Implements* ; ‘Hawaiian Mat and Bas¬

ket Weaving) ; ‘Old Hawaiian Carvings) ; ‘The Ancient Hawaiian

House) ; ‘The Volcanoes of Kilauea and Manna Loa) ; ‘Ka Hana Kapa :

The Making of Bark Cloth in HawaiP (1896—

1912).

BRIGHAM, Utah, city and county-seat of

Box Elder County, 20 miles north of Ogden, on the Oregon Short Line and the Southern

Pacific railroads. It has a public library, fruit¬

canning and cement factories, lumber yards

and planing mills. The city has a large fruit trade, especially in peaches. It owns the elec¬

tric-lighting plant and the waterworks. Pop.

(1920) 5,282.

BRIGHAM YOUNG UNIVERSITY,

Provo, Utah, a coeducational institution

founded by Brigham Young in 1875, and by

a deed of trust administered by the Latter Day Saints. It has high school, normal and collegi¬

ate departments, library, a faculty of 38 mem¬

bers, and an average enrolment of students in recent years of approximately 900.

BRIGHT, Charles, English civil engineer :

b. London, 25 Dec. 1863. He is the youngest son of Sir Charles Tilston Bright, wrho laid the first Atlantic cable, and has been himself

employed in cable-laying expeditions in many parts of the wTorld, as well as on various sur¬

veying expeditions. He has published ‘The

Story of the Atlantic Cable* ; ‘The Life of Sir Charles Bright* ; ‘Imperial Free Trade* ; ‘Imperial Telegraphy * ; ‘Engineering Wonders of the World) (joint author) ; ‘Telegraphy

and War.*

BRIGHT, Sir Charles Tilston, English

telegraphic engineer: b. Wanstead 1832; d. 1888.

He was the first to establish telegraphic cable communication between America and Europe,

succeeding, 5 Aug. 1858, after two failures, in laying the 2 030 miles of cable which connect Ireland and Newfoundland. He was coinventor

with Latimer Clark of the asphalt composition coating for submarine cables and superintended the laying of submarine cables in different parts of the world. He was Liberal member of Parliament for Greenwich 1865 to 1868 and

president of the Institute of Electrical Engi¬

neers 1886-87.

BRIGHT, James Franck, English histori¬

cal writer : b. London, 29 May 1832. He was educated at Rugby and University College, Ox¬

ford, and was master at Marlborough College for 16 years. He was master of University

College, Oxford, 1881-1906. He has written

‘History of England to 1880) ; ‘Joseph IP

(1897); ‘Maria Theresa) (1897).

BRIGHT, Jesse D., American politician:

b: Norwich, N. Y., 18 Dec. 1812; d. Baltimore, Md., 20 May 1875. He received an academic

education, was admitted to the Indiana bar

(1831), and became a circuit judge, State sena¬

torˆ and lieutenaitt-governor. From 1845 to

1857 he was a United States senator and presi¬

dent of the Senate during several sessions. Re-BRIGHT

elected in 1857, he was expelled for alleged dis¬

loyalty, 5 Feb. 1862, the chief evidence against him being a letter addressed to «His Excellency, Jefferson Davis, President of the Confedera¬

tion of States,® recommending a friend who

had an improvement in firearms to dispose of.

Bright maintained that at the date of the letter (March 1861) he had no idea that there would be war, and wrote it to get rid of the inventor.

Subsequently, he settled in Kentucky, and in 1866 was elected to the State senate.

BRIGHT, John, English statesman and

orator: b. Greenbank, Rochdale, Lancashire, 16

Nov. 1811; d. 27 March 1889. His father,

Jacob Bright, who belonged to a Quaker family originally connected with Wiltshire, migrated to Rochdale early in the century, and there established himself as a cotton-spinner and man¬

ufacturer. John Bright, who was the second

of 10 children, was educated at Rochdale, Ack-worth, \ork, and finally at Newton, near

Clitheroe. At the age of 15 he entered the cotton-spinning business of his father, where, even at that early age, he showed much shrewd¬

ness and practical energy. Not satisfied, how¬

ever, with merely mercantile affairs, he took an enthusiastic interest in such public questions as the abolition of slavery and the Reform Bill of 1831-32, while he diligently educated himself in public speaking at the debates of the Roch¬

dale Literary and Philosophical Society. In

1835 he traveled in Greece,. Egypt and Pales¬

tine, and gave an account of the journey in a series of lectures delivered in his native town; but his career as a notable public speaker began with the free-trade movement. To relieve the pressure upon the working population of Eng¬

land occasioned by commercial depression and a bad harvest, it was proposed to cheapen bread by the repeal of the corn duty, and in an asso¬

ciation formed for this purpose at Manchester in 1838 Mr. Bright was made a member of

committee. In the following year this associa¬

tion, at a meeting in London, was widened into the famous Anti-Corn Law League, in which

Richard Cobden and John Bright were the two most prominent members. Yet it was not until after the death of his first wife, in 1841, that, on the personal appeal of his friend Cobden, the former put all his strength into the repeal cam¬

paign. In the autumn and winter of that year he organized branches of the league and ad¬

dressed meetings in nearly all the large towns of England. It was inevitable that such a prom¬

inent politician should find a place in Parlia¬

ment, and in 1843, he was elected as member for the city of Durham. He made his maiden speech in August of the same year on a motion in favor of carrying out the recommendations of the Import Duties Commission of 1840.

Thereafter he seized every opportunity to press this question of repeal. The opposition from both of the great parties in the House was dogged, and the controversy might have been prolonged but for the widespread sympathy oc¬

casioned by the Irish famine. In January 1846

Parliament was summoned, and Sir Robert Peel announced that his government was prepared to reduce and almost abolish the corn duties. This resolution was carried; but on the question of Irish coercion the government was defeated,

and at the general election which followed

(1847), John Bright was elected for Manches-

(er-The corn duty question having been satis¬

factorily settled, he now turned his attention to such subjects as a reform in the affairs of Ireland and India, extension of the suffrage, voting by ballot, and the establishment of a national system of education. At the dissolu¬

tion of Parliament in 1852 he was reelected for Manchester, but through his strenuous de¬

nunciation of the Crimean War (1854), and his equally decided disapproval of the Chinese War (1856), he was rejected by his constituency at the general election of 1857. This result was made known to him at Florence, where he had retired to recruit after a serious illness, but the disappointment which it caused him was miti¬

gated in a few months by his election for Bir¬

mingham, and in 1858 he returned to public life after an absence of two years. During the American Civil War he sturdily advocated the abolition of slavery and gave his passionate adherence to the cause of the North, although as a Lancashire cotton-spinner his business suf¬

fered severely from a continuance of the

struggle. About this time also his name be¬

came closely identified with electoral reform and he had the satisfaction of seeing the prin¬

ciples for which he had contended embodied in the Reform Bill (1867) passed by Mr. Disraeli.

He had no desire for office, but his prestige in the Liberal party was so great that it was de¬

sirable to include him in the cabinet, and he was constrained to accept the presidency of the Board of Trade in Mr. Gladstone's government (1868). In this office he gave powerful assist¬

ance in passing the act for the disestablishment of the Irish Church, the Irish Land Act and the Elementary Education Act. Owing to ill-health he retired from office in 1870, but re¬

entered the ministry as chancellor of the duchy of Lancaster in 1873. When the Liberal party returned to power in 1880 he again accepted this office ; but two years later he resigned as he was opposed to armed intervention in Egypt. At

this time and for some years previously he had not appeared often upon public platforms, but in 1883 he delivered a notable address when installed as lord rector of Glasgow University, and another in Birmingham in the same year when celebrating the 25th anniversary of his connection with that city. In 1886 he opposed the Home Rule Bill introduced by Mr. Glad¬

stone, and until his death he strongly identified himself with the Unionist party in its efforts to defeat the Home Rule policy. This opposition was weighted with the same characteristics

which had secured for him in previous contro¬

versies the respect of the country — a trans¬

parent sincerity of purpose which found its fearless exposition by pen and speech in direct, racy, idiomatic English. As an orator his plat¬

form manner was remarkable for its ease and unstudied simplicity; the richness and lucidity of his diction, abounding in happy epithets, often edged with irony or glancing with humor; a spirit of outspoken truthfulness breathing through all his utterances ; while he was pos¬

sessed of a voice which laid a spell upon his audience by its clear, round, sonorous fullness.

Perhaps the most splendid expression of his sympathetic nature is found in the speeches in which he pleaded for justice to the oppressed populations whether in Ireland or India, while the same broad humanity, even more than the 540

doctrines which were his Quaker birthright,

animated his denunciations of war. He opposed the factory legislation with which the name of Lord Shaftesbury is identified and viewed with disfavor the restriction of hours of labor, especially of adults. He was a member of the Society of Friends, and was married first to a Miss Priestman, who died in 1841, and again to a Miss Leatham, who died suddenly in 1878.

His life and speeches in two volumes were pub¬

lished in 1881 by G. Barnett Smith, and his public letters by H. J. Leech in 1885. Consult also Robertson, (Life and Times of John

Bright-* (London 1902) and Trevelyan's biog¬

raphy (London 1913).

BRIGHT, Richard, English physician : b.

Bristol, 28 Sept. 1789; d. 16 Dec. 1858. He studied at Edinburgh,

Berlin and Vienna, and after 1820 was connected with Guy's Hospital, England. His name is associated with Bright's disease (q.v.), he being the first who investi¬

gated its character. He published (Original Researches into the Pathology of Diseases of the Kidney* (1827) ; and a book of (Travels through Lower Hungary* (1818), which con¬

tains a valuable account of the gypsies.

BRIGHT, William, English Church his¬

torian : b. Doncaster, 14 Dec. 1824 ; d. 6 March 1901. He graduated at University College, Ox¬

ford, in 1846, and was ordained to the Anglican priesthood in 1850. He was theological tutor at Trinity College, Glenalmond, 1851-58, and in 1868 became Regius professor of ecclesiastical history at Oxford and canon of Christ Church.

His chief historical works are history of the Church, a.d. 315 — 451 } (1860) ; (Early English Church History* (1878) ; (Lessons from the

Lives of Three Great Fathers) (1890) ; (Way-marks of Church History) (1894) ; (The Roman See in the Early Church* (1896) ; (The Age of the Fathers* (posthumously 1903). He takes

high rank as a hymnwriter, the noble com¬

munion hymn (And now, O Father, mindful

of the love,* and the evening hymn, (And now the wants are told,* being characteristic ex¬

amples of his devotional spirit.

BRIGHT EYES (Susette La Flesche),

Omaha Indian writer and lecturer: b. Nebraska, 1850; d. Lincoln, Neb., 1902. She was the eldest child of Eshtamaza or Joseph La Flesche, a former head-chief of the Omaha Indians. She attended the

Presbyterian mission school on

the Omaha reservation, and through the interest of a teacher was sent to a private school in Elizabeth, N. J., where she made rapid progress in her studies. She afterward taught with

great success among the young members of the tribe in a government day school on the Omaha reservation. In 1877-78 the Ponca were forcibly removed from their home on Niobrara River,

South Dakota, to Indian Territory, where

Susette soon afterward accompanied her father when he went to help his sick and dying rela¬

tives among the Ponca. The heroic return of Standing Bear, the Ponca chief, and his band, 600 miles to their northern home amid incred¬

ible sufferings, the imprisonment and release of Standing Bear, led to public investigations of Indian removals. Accompanied by Susette La

Flesche and her brother, Standing Bear visited the principal cities of the United States under the direction of Mr. T. H. Tibbies, to tell the story of the Ponca removal. Under the name of ((Bright Eyes** Susette commenced her pub¬

lic work. Her clear description of the injustice of the case, her eloquent appeals for humanity toward her race, her grace, well-bred diction and dignity of bearing aroused the interest of the thousands who listened to her, with the result that the government was petitioned to make no more removals of tribes, and wherever practicable this request was respected. In 1881

Bright Eyes became the wife of Mr. T. H.

Tibbies, and later with her husband visited England and Scotland on a lecturing tour. She lived in Lincoln, Neb., an active publicist in the interests of her race until her death.

BRIGHTLY, Frederick Charles, Amer¬

ican lawyer : b. Bungay, England, 26 Aug. 1812 ; d. Germantown, Pa., 24 Jan. 1888. He came to the United States in 1831, and was admitted to the Philadelphia bar (1839). In 1870 he retired to devote himself to

legal writing and compila¬

tion, for which he had pre-eminent gifts. His private law library of 5,000 volumes was one of the best collections in America. Publications: (Law of Costs in Pennsylvania* (1847) ; (Re¬

ports of Cases Decided by the Judges of the Supreme Court of Pennsylvania* (1851) ;

(Equitable Jurisdiction of the Courts of Penn¬

sylvania* (1855) ; (Analytical Digest of the Laws of the United States, 1789-1869* (1865—69) ; (Digest of the Decisions of the Federal Courts* (1868-73) ; (Bankrupt Law of the

United States* (1871) ; (Leading Cases on the Law of Elections* (1871) ; (Digest of the Laws of Pennsylvania, 1700-1883* (1883) ; and other works.

BRIGHTON (formerly Brighthelm—

stone), England, maritime town and favorite

watering-place in the county of Sussex 50ˆ

miles south of London. It is situated on

a gentle slope, and is a clean and well-built town, with handsome streets, terraces, squares, etc., and a massive sea-wall, with a promenade and drive over three miles in

length, one of the finest in Europe. The

buildings of note are not numerous. The only ancient church is that of Saint Nicholas. Holy Trinity Church is memorable for the incum¬

bency of F. W. Robertson, the celebrated

preacher. The most remarkable is the Pavi¬

lion, built by George IV (then Prince of

Wales), between 1787 and 1825. It cost upward of $5,000,000. It is a building in the Oriental style of architecture, with a handsome stone front 300 feet in length, and a large Oriental dome 84 feet high in the centre. To George IV is due the rise of Brighton as a fashionable resort. The Pavilion was discontinued as a

royal residence by Queen Victoria in 1841, and was purchased from the Crown by the town of Brighton in 1850 for $260,000. The aquarium is world-famous, and Dyke Road Museum con¬

tains a remarkably fine ornithological collec¬

tion. Owing to the salubrity of its climate, it is a great centre for boarding schools, and its popularity with Londoners is such that it is frequently, called London-super-mare. The

town received its charter of incorporation in 1854; water, electric light, street cars and race course are municipally owned; and it returns two members to the House of Commons. A

fishing village up till 1780, Brighton has a population of 131,237.

BRIGHT'S DISEASE. See Kidneys.

BRIGITTINES, or ORDER OF OUR

SAVIOUR, a branch of the Augustinians,

founded about the year 1344 by Saint Bridget of Sweden, and approved by Urban V in 1370.

The first monastery, which was also the mother house of the order, was on the founder's estate at Vadstena, on the eastern bank of Lake

Vettern, southwest of Stockholm. Some

were maintained in Germany, Flanders and

others countries; most of them, including the parent house, were destroyed at the Reforma¬

tion. There are two rich convents of Brigittines at Genoa, into one of which only ladies of high family are admitted. The only house of the order in England was the rich institu¬

tion known as Sion House, founded by Henry V

on the Thames, 10 miles from London. It was one of the first suppressed by Henry VIII. In 1861, some of their successors returned and established themselves at Spetisbury, Dorset¬

shire. Later on they moved to their present site, Chudleigh, near Exeter. Only four con¬

vents of the original order are now found —one in Bavaria, at Altomiinster, two in Hol¬

land and the one mentioned in England. All the houses of the order are subject to the bishop of the diocese, and no new one can be founded with¬

out express permission of the Pope. For the his¬

tory of the order in Sweden consult (Scriptores Rerum Svecicarum Medii AveniP (Vol. I,

Stockholm 1871) ; also (History of the English Brigittine Nuns) (Plymouth 1886) ; Steele,

(Story of the Bridgettines) (New York 1911).

BRIL, the name of two Dutch painters

(brothers), who distinguished themselves as

landscape artists. (1) Mattys, b. Antwerp,

1550; d. 1584. When a very young man he went to Rome, and was so much esteemed by Gregory III that he was employed on the galleries and salons of the Vatican. (2) Paulus, b. about 1556; d. about 1626. He was much superior to Mattys, and hearing of his success at Rome

joined him there. The two brothers appear

for some time to have worked together on the same pieces; but after Mattys' early death

Paulus was employed by Sixtus V, and executed six large paintings in his summer palace. The poetic charm of his work may be seen as a setting to some figure paintings by Annibale Carracci and Rubens. He was also employed

by Clement VIII. His works in oil and fresco may be seen in many of the Roman churches.

He did many frescoes in the Vatican, the

Lateran, the Scala Santa and Santa Maggiore.

Of his panel paintings, the best are in Florence, Brunswick, Montpellier, Munich, Paris, Parma

and Vienna. Consult Roose, (Geschiedenis der antwerpsche SchilderschooP (Antwerp 1887-90) ; Eisler, in London, Burlington Magazine (1905) ; Mayor, (Das Leben und die Werke der Briider Mattheus und Paul BrilP (Leipzig

1910).

BRILL, Abraham Arden, American physi¬

cian and writer upon psychoanalysis : b. Aus¬

tria, 1874. He came to America while a small boy, and received the degree of Ph.B. at New York University in 1901, and that of M.D. at Columbia in 1903. Heˆ was an assistant in the clinic of psychiatry in Zurich, Switzerland, and is at the present the head of the clinic of psychiatry at Columbia University, New York.

Brill is considered the leading exponent in America of Freud and Freud's theory of the interpretation of dreams. Besides being a lec¬

turer and writer on psychoanalysis, he is also the English translator of Freud's writings. Brill has written many treatises, and his book,

(Psychoanalysis, Its Theories and Application*

(1909), is the standard American work upon

the subject. He has also translated Freud's (Selected Papers on Hysteria) (1910) ; (Three Contributions to the Sexual Theory* (1910);

(Interpretation of Dreams) (1913) ; Psycho¬

pathology of Everyday Life* (1914).

BRILLAT-SAVARIN, bre'ya' sa'va'ran,

Anthelme, French gastronomic author and

judge: b. Bellay, 1 April 1755; d. Paris, 2 Feb.

1826. He is famous for his Physiologie du

gout* (Paris 1825; English translation, (Gas¬

tronomy as a Fine Art,* London and New

York 1877), a work distinguished as the finest literary analysis of the art of eating and drink¬

ing, abounding with wise comment relieved by sparkling wit and humorous anecdote. He was deputy to the States-General in 1789; judge of the Court of Cassation in 1792; mayor of Bellay in 1793 when to escape the Revolution he fled to New York and earned a living as tutor of French and music and as member of a

theatre orchestra. He returned to Paris in

1796 and until his death was a judge of the Court of Cassation. He was also a miscel¬

laneous writer on archaeology, political and social economy. See Physiology of Taste,

The.

BRILLIANT. See Diamond.

BRILLIANT SECOND, a phrase used by

the German Emperor William II in a telegram addressed to Count Goluchowski, the Austrian Foreign Minister, after the close of the Algeciras Conference. It was published in

Vienna on 13 April 1906. Referring to

Austria's support at that conference, the

Kaiser wrote — <(You have proved yourself to be a brilliant second on the duelling ground, and you may be certain of similar service in similar case from me also.® The message was not favorably received in Austria, and caused especial annoyance in Italy, the third party to the Triple Alliance (q.v.).

BRIMSTONE. See Sulphur.

BRINDABAN, bnn-da-bun', or BINDA—

BAN, India, town in the United Provinces, in the district of Muttra, and 35 miles north-northwest of Agra, near the right bank of the Jumna. It is famous as the scene of the youth¬

ful sports of Krishna. Brindaban is one of the sacred Hindu cities and is dependent for its prosperity on pilgrims ; it is surrounded by sacred groves of trees, has 1,000 temples and has benefited by the munificence of wealthy Hindus, who have built costly shrines. Among these is a cruciform pagoda, with vaulted roof, which is one of the most massy and elaborate of Brahmanical buildings. The American Meth¬

odist Church has a mission here. Pop. 30,000.

BRINDISI, brin'de-se (ancient Brundusium), a seaport and fortified town in the province of Leece in southern Italy, situated on a small promontory in a bay of the Adriatic Sea, 45 miles east-northeast of

Taranto. In ancient times Brundusium was one of the most important cities of Calabria. It was one

of the chief cities of the Sallentines, and the excellence of its port and commanding situation 542

in the Adriatic were among the chief induce¬

ments to the Romans to attack them. Having conquered the city in 267 b.c., the Romans made it a naval station, and it was the scene of im¬

portant operations in the war between Caesar and Pompey. In 230 b.c., Brindisi was the

starting place of the Roman troops that took part in the first Illyrian War; and from this point the Romans nearly always directed sub¬

sequent wars with Macedonia, Greece and Asia.

Pacuvius was born there. Horace, who made

a journey there in 38 or 37 b.c. has made the visit one of his satires (Sat. I, 5). Virgil died here 19 b.c. On the fall of the Western empire it declined in importance. In the 11th century it fell into the possession of the Normans, and became one of the chief ports of embarkation for the Crusades. Its importance as a seaport was subsequently completely lost, and its

harbor blocked. In 1870 the Peninsular &

Oriental Steam Navigation Company put on a

weekly line of steamers between Brindisi and Alexandria, and Brindisi is now an important station for passengers and mails to and from India and the East. There is also a trade with British, Austrian and other ports. Latterly, the harbor accommodation has been considerably

improved. It is used now (1918) as a torpedo station for the Italian navy. The chief exports are wine, olive-oil and figs ; the chief import,

coal. The principal buildings are the cathedral, where the Emperor Frederick II was married

to Yolande in 1225 ; and the castle, commenced by Frederick II and finished by Charles V.

Chief among the ancient remains is a column 62 feet high, one of two, which, tradition says, marked the end of the Appian Way. Pop.

25,317.

BRINDLEY, James, English engineer: b.

Thornsett, Derbyshire, 1716; d. Turnhurst,

Staffordshire, 30 Sept. 1772. At 17 he became apprentice to a millwright, and on the ex¬

piration of his indentures began business as an engineer, and in 1752 displayed great talent in contriving a water-engine for draining a coal¬

mine. Several important inventions introduced him to the patronage of the Duke of Bridgewater, then occupied in planning a communica¬

tion between his estate at Worsley and the towns of Manchester and Liverpool by water.

This immense work, ridiculed bv scientific men of the period as impracticable, Brindley under¬

took and carried out by means of aqueducts over valleys, rivers, *etc.* The first portion of the Bridgewater Canal (to Manchester) was

opened in 1761, the whole system being com¬

plete in the end of 1772. He also commenced the Grand Trunk Canal and completed the

Birmingham, Chesterfield and others. Consult

Smiles, Samuel, (Lives of the Engineers)

(Vol. I, London 1861-ˆ62).

BRINE SHRIMP, the only animal, except

a species of fly (Ephydra), which lives in the Great Salt Lake of Utah. It is a phyllopod crustacean, with stalked eyes, a delicate, slender body, which is provided with 11 pairs of broad, paddle-like or leaf-like feet. It is about one-quarter of an inch long. Similar forms live in brine vats in various parts of the world. Arte-mia fertilis abounds in Great Salt Lake. It may often be seen swimming about in pairs and has a nauplius young like that of the brine shrimp of Europe. It produces young by budding

(parthenogenesis), as well as from eggs. A

species observed near Odessa produced females alone in warm weather; and only in water of medium strength were males produced. The

eggs of A. fertilis have been sent in moist mud from Utah to Munich, Germany, and

specimens raised from the eggs by Siebold,

proving the great vitality of the eggs of these Phyllopods, a fact paralleled by the similar vitality of the eggs of the king-crab. A. gracilis of Verrill has thus far only been found in tubs of concentrated salt water on railroad bridges in New England. This species is able to ac¬

commodate itself to changes in the density of water. They can be brought to a state in which they resemble closely Branchipas stagnalis, a fresh water brachiopod. This is cited often as a proof of the effect of environment on the structure of animals and its bearing on the theory of evolution is an immediate corollary.

BRINK, Bernhard Ten, German philologist

and expositor of English literature: b. Amster¬

dam 1841 ; d. Strassburg 1892. He studied at Munster and Bonn ; from 1870 to 1873 was

professor of modern languages at the Univer¬

sity of Marburg, and from 1873 to 1892 pro¬

fessor of English at Strassburg. From 1874

he edited Quellen und Forschungen zur Sprach-und Culturgeschichte der germanischen Volker.

His published works include (Geschichte der

englischen LitteratuU (Vol. I, Chaucer to

* Wiclif 1877 ; English translation by H. M.

Kennedy, 1883; Vol. II, from Wiclif to the accession of Elizabeth, 1896), considered to be one of the best histories of early English litera¬

ture. He also wrote Chaucer's Sprache und

VerskunsD (1884; 2d ed., 1899; English trans¬

lation (The Language and Metre of Chaucer*

by M. B. Smith, 2d rev. ed., 1901) ;

(Beowulf, Untersuchungen) (1888); Shakes¬

peare, Fiinf Vorlesungen) (1893) ; English

translation (Five Lectures on Shakespeare) by Julia Franklin (1895).

BRINK, Jan Ten, Dutch scholar and

author: b. Appingedam 1834; d. 1901. He

received a theological training at Utrecht ; in 1860 was a tutor in Batavia and in 1862-84

served as instructor of the Dutch language and literature at the Hague Gymnasium. In 1884

he became professor at Leyden. He is the

author of several studies in literary criticism and stories, including (Bulwer Lytton, Biographie en Kritiek) (1873); (Letterkundige

schetsen) (2 pts., 1874-75) ; (Geschiedenis der Noord-Nederlandsche letteren in de XIX.

eeuw) (3 vols., 1888-89; new ed., 1904);

(Romans en novellen* (13 vols., 1885). His complete works in belles lettres have appeared in 17 volumes as <Litterarische schetsen en kritieken> (Leyden 1882-88).

BRINKERHOFF, Roeliff B., American

lawyer, banker, philanthropist and prison re¬

former: b. Owasco, N. Y., 28 June 1828; d.

4 June 1911. He received a public school

education ; for three years was a tutor in the home of President Jackson; became a lawyer

at Mansfield, Ohio, in 1852; was editor and proprietor of the Mansfield Herald 1855-59;

and enlisted in the volunteer army in the Civil War. From first lieutenant he advanced to

the rank of colonel, and was made brigadier-general for meritorious service. He resumed

law practice until 1873 when he became a

banker. He was the leading figure in the

National Prison Congresses for several years and was an active propagandist for prison

reform. Besides numerous contributions to

periodical literature on his favorite subject, his published writings include (The Volunteer

Quartermaster* (1883) and (Recollections of a Lifetime> (1900). Consult (Gen. Roeliff Brink-erhoff m Memoriam> (Columbus, Ohio, 1911).

BRINKLEY, Frank, English editor: b.

Ireland 1844; d. 28 Oct. 1912/ He entered the army, and went to Japan in 1867 with the

battery of Royal Artillery sent to protect the European residents. He was subsequently lent to the Japanese army for instructional purposes and became professor in Tokio Military School.

He founded the Japanese Mail in 1881, and con¬

tinued to edit it till his death. He was the author of Qapan) (1901); (Japan and China)

(1903) ; and an (Unabridged Japanese-Chinese Dictionary.)

BRINTON, Daniel Garrison, American

surgeon, archaeologist and ethnologist : b.

Thornbury, Pa., 13 May 1837; d. Atlantic City, N. J., 31 July 1899. He was graduated at

Yale in 1858 and at Jefferson Medical College in 1861, and subsequently studied at Paris and Heidelberg. During the Civil War he was a

surgeon in the Union army, and from 1867 to 1887 was editor of the Medical and Surgical Reporter. In 1884 he was appointed professor of. ethnology at the Academy of Natural

Sciences in Philadelphia ; and, in 1886, pro¬

fessor of American linguistics and archaeology in the University of Pennsylvania. In 1894 he was president of the American Association for the Advancement of Science. Among his many

works are notes on the (Floridian Peninsula) (1859) ; (The Myths of the New World) (1868, 3d ed., 1896) ; (American Hero Myths) (1882) ; (Aboriginal American Anthology) ; (Primer of Mayan Hieroglyphics) (1896); (Religions of

Primitive Peoples) (1897) ; (The Basis of

Social Relations) (1902). He edited (The

Library of Aboriginal American Literature) in eight volumes (1882-85), and was a high

authority on all American archaeological topics.

Just before his death, he gave his entire library to the University of Pennsylvania.

BRINTON, John Hill, American surgeon:

b. Philadelphia 1832 ; d. 1907. He was grad¬

uated at the University of Pennsylvania (1850), and at the Jefferson Medical College (1852), serving through the Civil War as a surgeon.

In 1882 he was appointed professor of the

practice of surgery and clinical surgery at Jefferson Medical College. He has written

Consolidated Statement of Gunshot Wounds)

(1863); with J. H. Porter, (History of the Organization of the Medical Department of the United States Army) (1864), a MS in the

surgeon-general's library at Washington ;

description of a Valve at the Termination of the Right Spermatic Vein in the Vena Cava) (1856) ; (Operative Surgery in General)

(1881); (The March of Surgery) (1882).

BRINVILLIERS, braiive-ya, Marie

Madeleine Marguerite d'Aubray (Mar¬

quise de), French poisoner: b. Paris, about 1630; executed 16 July 1676. She was the

daughter of a civil-lieutenant of Paris, and married in 1651 the Marquis of Brinvilliers.

About 1659 the Marquis introduced to his house a young cavalry officer, named Godin de

Sainte-Croix, for whom his wife conceived a violent passion. The Marquis, occupied with

his own pleasures, seemed indifferent, but her brothers remonstrated, and her father, scandal¬

ized at her misconduct, had Sainte-Croix

openly arrested in 'her carriage and taken

to the Bastile in 1665. Sainte-Croix remained in prison about a year, and made there the acquaintance of an Italian, who taught him the art of preparing poisons. On his liberation he imparted his discoveries to Madame de Brin¬

villiers, who had in the meantime assumed an air of piety, visiting the hospitals and minister¬

ing to the sick, and had thus reconciled herself to her family; but the affront offered her by her father remained in her mind, and she had resolved to avenge it. Sainte-Croix, apparently from cupidity, seconded her design. He sup¬

plied her with poisons, with which she ex¬

perimented first on the patients in the hospital.

She occupied eight months in administering

poison to her father, and at last killed him suddenly without being suspected. By the aid of Lachaussee, an old domestic of Sainte-Croix, whom she caused to enter their service, she also succeeded in poisoning her brothers. She is said to have attempted her husband, with a view to marry Sainte-Croix, but did not suc¬

ceed. Sainte-Croix died suddenly, it is said from the falling off of a mask of glass which he used to protect himself in preparing a subtle poison. A packet addressed to Madame Brin¬

villiers, containing poisons labeled with descrip¬

tions of their effects, revealed their conspiracy.

Among a number of letters there was one con¬

taining a promise of $6,000, which Sainte-Croix had exacted as the price of his assistance.

Madame Brinvilliers fled to Liege, and took refuge in a convent. Her extradition being

obtained, she was inveigled from the convent by a pretended lover, brought to Paris, and on the evidence of Lachaussee, together with her owp confession, condemned to be beheaded and afterward burned. Her exposure soon led to the discovery of the famous poisoner La Voisin. Consult Pirot, (La Marquise de Brin¬

villiers) (Paris 1883).

BRION, bre-on', Friedrike, Elizabeth, Ger¬

man lady: b. Niederrodern, Alsace, 1752; d.

1813. To her Goethe dedicated several lyrics and she is the supposed original of Maria, in (Gotz von Berlichingen,) as well as of Gretchen in (Faust.) She figures in a well-known epi¬

sode in Goethe's (Dichtung und Wahrheit,) and is often styled from her place of residence, ((Friederike von Sesenheim.)) Consult Diintzer, (Frederike von Sesenheim in Lichte der Wahr¬

heit) (Stuttgart 1893), and Bielchowsky, A., (Frederike und LilC

(Munich 1906).

BRION, Gustave, French artist: b. Rothau,

Alsace, 24 Oct. 1824; d. Paris, 4 Nov. 1877. He studied at Strassburg with Gabriel Guerin and the sculptor Andreas Friedrich. He is noted for his Alsatian scenes and many of his works are to be found in American collections.

Among them are (A Marriage in Alsace) and

(The Sixth Day of Creation.) He illustrated Hugo's (Les Miserables) and (Notre Dame de

Paris.)

BRION, Luis, Colombian admiral: b.

Curasao, 6 July 1782; d. 20 Sept. 1821. He was sent at an early age to Holland to receive his education, his father being a native of that country, and there entered the Dutch army.

He was offered a commission in 1799, but being recalled by his parents, returned to Curasao.

Receiving permission from his parents, he

visited the United States, where he studied navigation. Upon the death of his father, who bequeathed him a large fortune, he bought a vessel and made several voyages ; entering into speculation on his own account, he was very successful, and returned to CuraQao in 1804, where he established a mercantile house. The political events in Venezuela of 1808-10 brought Brion rapidly into notice ; he volunteered his services to the republic of Caracas, and in 1811

was appointed captain of a frigate. He now devoted all his resources and his energies to the patriotic cause. At his own expense he fitted out a fleet of vessels, and attacked the Spanish forces at the Island of Marguerite, where he gained a signal victory. Brion dis¬

tinguished himself at the conquest of Guiana, and also at Santa Marta and Cartagena. He

sat in the Congress of Angostura which pro¬

claimed the independence of Colombia. During a residence at Savanilla he reduced the custom¬

house duties; this coming to the ear of Bolivar, he directly countermanded the order, which so preyed upon the mind of Brion, that he became ill, and leaving the squadron returned to

Curasao, and soon died in poverty.

BRIOSCO, bre-os'ko, Andrea, Italian

sculptor and architect: b. Padua 1470; d. 1532.

He designed the church of Santa Giustina at Padua as well as a celebrated candelabrum in the church of San Antonio there ; and the

Delle Torre tombs in San Ferno at Verona.

BRIOUDE, bre-ood, France, town in the

department of Haute Loire, capital of the arrondissement of the same name, situated near the left bank of the river Allier, on the site of the ancient town of Brivas. To Americans the

town is of interest as the town nearest Cha-vagnac, the birthplace of Lafayette. A con¬

siderable traffic in grain, hemp and wine is car¬

ried on here. Pop. 5,000.

BRIQUETTES, a form of fuel artificially

molded from coal dust and fragments, peat

powder, lignite, etc., with the addition of some combustible binding material. The coal waste or slack is first wTashed and then dried in a rotating drum at a temperature ranging up to 500° F., until not more than 2 per cent of mois¬

ture remains. It is then subjected to a blowing process which carries off most of the impurities — and in some cases considerable fine coal dust which is caught in baffle bins. The binder is added in proper proportion while the coal is hot, and the mass is mixed thoroughly by

paddles and then sent into a heavy edge-runner mill where the constituents are ground into an intimate mixture. As it passes through this process it is kept hot by injections of live steam. The hot mixture is then passed to the molding rolls where it receives the desired shape at a pressure of from 3,500 to 5,000 pounds per square inch. The <(fins>:> remaining from inexact registering of the molding rollers are broken off by shaking on a revolving screen, and the briquettes are then allowed to cool and are ready for shipment.

Many substances have been used as binders,

and most of them have been discarded for

various reasons: they were too soft and melted down on the fire; or they made a heavy black smoke ; or gave off an offensive smell ; or burnt out too fast, leaving the coal unconsumed. The binders most commonly used by briquette manu¬

facturers in the United States are coal-tar pitch, asphaltic pitch or a mixture of the two. A comparatively new binder is the residuum of petroleum distillation known as hydrolene oil.

This substance is solid up to 160° F., and only 5 per cent of the weight of the coal is needed to make the briquettes — as compared with 10

per cent in the case of pitch. These hydrolene briquettes give off very little smoke, which is quickly dissipated, and their heat value is higher than anthracite. They are particularly well

suited to domestic use. In briquetting lignite coal no binder is needed,

the natural bitumen being developed by the process into a sufficient binder.

Production. — There were 15 briquetting

plants in operation in the United States in 1916, with a combined output of 295,155 tons, valued at $1,445,662. Of the whole, 65,337 tons were of anthracite culm ; 136,358 tons were of semi¬

anthracite, semi-bituminous and bituminous

slack; and 88,731 tons of lignite and oil-gas residuum. The quantity of binders added ac¬

counts for the remainder of 4,929 tons. The production and use of briquetted fuel is much larger in Europe, the annual output being

about 10,000,000 tons. Nearly the whole Eng¬

lish product is exported. Consult Franke, G., (A Handbook of Briquetting) (London 1917).

See Fuel.

BRISACH. See Breisach.

BRISBANE, Abbott Hall, American mil¬

itary engineer : b. South Carolina ; d. Summer¬

ville, S. C., 28 Sept. 1861. He was graduated at the United States Military Academy in 1825, and appointed 2d lieutenant of the 3d

artillery, serving on topographical duty in the city of Washington, and afterward with the

engineer, Bernard, on the South Atlantic coast until the close of the year 1827, when he re¬

signed. He served in the Florida War against the Seminole Indians in 1835-36 as colonel of South Carolina volunteers, and was engaged in

the skirmish of Tomoka, 10 March 1836. After the war he turned his attention, as engineer, to a projected railroad from Charleston, S. C., to Cincinnati, Ohio, having especially entrusted to him the examination of the mountain-passes through which it was to run. He received the appointment of constructing engineer of the pro¬

jected road, which place he held from 1836 till 1840. He was also chief engineer of the

Ocmulgee and Flint Railroad, Ga., in 1840-44.

In 1847-48 he was superintending engineer of an artesian well for the supply of water to the city of Charleston, and he then accepted the chair of belles-lettres and ethics in the South Carolina Military Academy, occupying the place from 1848 to 1853, after which he retired to his plantation near Charleston. He was the

author of a political romance, (Ralphton, or the Young Carolinian of 1776.)

BRISBANE, Arthur, American newspaper

editor: b. Buffalo, N. Y., 12 Dec. 1864. He re-BRISBANE — . BRISRIS

ceivcd his education in the public schools and spent five years in France and Germany. He began his newspaper career in 1882 as a re¬

porter on the New York Sun, of which journal he was afterward London correspondent. He

edited the Evening Sun for some time and for seyen years was managing editor of different editions of the New York World. In 1897

began his connection with the Hearst papers as editor of the New York Evening Journal.

The immense circulation of the Hearst chain of newspapers has given Brisbane the widest and most far-reaching influence of any editor in the United States. By the plutocratic element he is regarded as the

wielder of a pernicious influence on the less educated masses of the people while among the great masses he is

regarded as a kind of apostle of industrial and political freedom. He lectured in the School of Journalism of Columbia University in 1913 and has published (Editorials from the Hearst

Papers) and (Mary Baker Eddy) (1908).

BRISBANE, Sir Thomas MacDougall,

Scottish general and astronomer : b. Brisbane, near Largs, the seat of his family, 23 July 1773; d. there, 27 Jan. 1860. He entered the army and in 1793 took part in all the engagements of the campaign in Flanders. In 1796 he was sent to the West Indies, and in 1812 commanded a

brigade under the Duke of Wellington in Spain.

He took part in the battles of Vittoria, Orthes and Toulouse, and received the thanks of

Parliament for conspicuous bravery at the battle of the Nive. On the abdication of Napoleon he was sent to America. In 1821 he was appointed governor of New South Wales, which post he continued to occupy for four years. His admin¬

istration was active and intelligent, and tended greatly to promote the prosperity of the colony.

He introduced at his own expense a good breed of horses, and promoted the cultivation of the vine, as well as of sugar, cotton and tobacco.

At the same time he devoted himself with great diligence to the study of astronomy. He had an observatory erected at his residence of Para¬

matta, and catalogued 7,385 stars, until then scarcely known to astronomers. For this great work, known as the (Brisbane Catalogue of

Stars,) he received the Copley medal of the Royal Society. Immigration began at this

period but he unwisely gave so much power to the immigrants that general confusion resulted and he was recalled at the end of 1825. On his return to Scotland he devoted himself en¬

tirely to science. He had an astronomical, and later a magnetic, observatory established at his residence at Makerstoun. The observations

which he made there, with the aid of able assistants, fill three large volumes. He was made a baronet in 1836, G.C.B. in the follow¬

ing year; received from Oxford the degree of D.C.L. and succeeded Sir Walter Scott as

president of the Royal Society of Edinburgh.

He founded two gold medals for scientific

merit, one in the gift of the Royal Society, the other in that of the Society of Arts.

BRISBANE, the capital of the colony of

Queensland, Australia, on the Brisbane River, about 25 miles by water from its mouth in Moreton Bay, and about 500 miles north of

Sydney. It was named in honor of Sir Thomas Brisbane (q.v.). Of the four parts into which the town is divided, North Brisbane is situated

in the heart of the city, on the north bank of the river, and South Brisbane faces it on the south. Fortitude Valley is a large division on the north bank, to the east and northeast of North Brisbane, mostly situated on a peninsula formed by the winding of the river. The fourth division. Kangaroo Point, is on the south bank, comprising a point of land projecting between North Brisbane and the above peninsula. The streets are laid out as regularly as the tortuous course of the river will permit. The chief buildings are situated in North Brisbane, among them being Parliament House, where the legis¬

lature sits ; Government House, in the Botanic Gardens ; the government offices ; the Supreme Court ; the postoffice ; the technical

college ; the treasury buildings, a large structure of great architectural beauty; the old and the new town-hall; and the customs-house. Many of the

banks have fine edifices, particularly the Queens¬

land National Bank. The chief educational in¬

stitutions are the Normal School, the boys' and girl's grammar schools and the school "of the Christian Brothers. Other buildings and insti¬

tutions are the masonic and temperance halls; the School of Arts, with a good library; the museum; the Queensland Club; the large gen¬

eral hospital, and several special hospitals; an orphanage and a large jail in South Brisbane; the opera house, one of the best theatres in Australia. The Victoria Bridge connects South with North Brisbane. It cost upward of

$555,000, and replaces an older one destroyed by a flood in 1893. It consists of six steel spans supported on five cast-iron cylinders filled with concrete, the abutments being of masonry and concrete ; and the total length is about 1,041

feet. Much of the cross-river traffic is carried on by the ferries. The leading parks and gar¬

dens are the Botanic Gardens, with the Queen's Park, in North Brisbane, at the river-side, finely laid out; Victoria Park, to the north of North Brisbane; Albert Park, Mount Coot-tha, Bowen Park and the gardens of the Acclimati¬

zation Society in Fortitude Valley; and Mus-grave, Dutton and Woolloongabba parks in

South Brisbane. There is extensive wharf ac¬

commodation, and South Brisbane has a drydock. There is regular steamer connection with Sydney, London and elsewhere, and adequate

railway communication with Sydney and other

chief towns in Australia. The climate is dry and healthy, but the temperature is often very high during the summer. Among the industrial establishments are a sugar-refinery, tobacco fac¬

tories, flour-mills, boot factories, breweries, tanneries. The trade is

important, among the exports being gold, wool, sugar, *etc.* Originally founded as a penal settlement in 1825, and abandoned in 1839, its growth began in 1842

with the arrival of free settlers, and in 1859 it became the capital of Queensland. South Bris¬

bane became a separate municipality in 1888

and a city in 1903. A United States consul is stationed here. Pop. about 145,000.

BRISCOE, Margaret Sutton. See Hop¬

kins, Margaret Sutton Briscoe.

BRISEIS, a girl of Lyrnessus, called also

Hippodamia. When her country was taken by

the Greeks, she fell to the share of Achilles in the division of the spoils. When Agamemnon

was obliged to restore Chryseis to her father, he took Briseis from Achilles in recompense 546

and Achilles thereupon made a vow to absent himself from the field of battle at Troy. This incident Homer makes one of the moving

features of his (Iliad.)

BRISGAU, brez'gow, or BREISGAU, a

district of the state of Baden, between the Rhine and the Black Forest,

which, with the district of Ortenau, formerly constituted a

landgraviate in the southwestern part of

Swabia. This is one of the most fertile parts of Germany. Though chiefly in possession of Austria since the 15th century, it was governed by its own laws. The earliest recorded Count is Birtilo (962-95), ancestor of the counts and dukes of Zahringen. At the Peace of

Luneville (1801) Austria ceded Brisgau, one

of the oldest possessions of the house of Hapsburg, to the Duke of Modena, after whose

death it fell to his son-in-law, the Archduke Ferdinand of Austria, as Duke of Brisgau. By the Peace of Presburg (1805) it was divided between Baden and Wiirttemberg, and in 1810, it was ceded entirely to Baden with the excep¬

tion of a small part, and still belongs to that state.

BRISSAC, bre-sac, Comte de. See Cosse,

Charles de.

BRISSON, bre-son, Barnabe, French

jurist: b. 1531; d. 15 Nov. 1591. Henry III commissioned him to collect and edit the ordi¬

nances of his predecessors and his own, which appeared under the title (Code de Henri IIIP

He was made King's advocate in 1575 and eight years later president of a rural tribunal. He was sent on several diplomatic missions, one to England to arrange for the marriage of

Elizabeth and the Duke of Anjou. Brisson re¬

mained in Paris in 1588, after Henry III

had fled and made an earnest attempt to settle the trouble between

the King and the Com¬

mons. In 1589, he was made first president of the Parliament, and after Henry's death, in August of the same year, proclaimed the Due de Mayenne, the chief of the League, lieutenant-general of the kingdom. Brisson soon after

became suspected by the faction of the ((Sixteen,® who ruled in Paris, and who thought that he was favorable to Henry IV. He was accordingly arrested and summarily hanged.

Among his works of importance are (De Ver—

borum quae ad Jus Pertinent Significatione,

etcP (1557) ; (Observationum Divini et Humani Juris Liber > (1564) ; (De Formulis et Solemni-bus Populi Romani Verbis, etc.p (1583), still in use, last edited by Conrad 1781 ; (Opera Minora) (1606). Consult Le Bas, (Dictionnaire encyclopedique de la France) (Vol. Ill, Paris 1835-63).

BRISSON, Eugene Henri, French poli¬

tician and journalist: b. Bourges, 31 July 1835.x He entered the Chamber of Deputies in 1871, and won much attention by urging amnesty for the Communists and other political offenders.

Since then he has been one of the foremost members of the Radical party. He was elected president of the Chamber in 1881, and retained that office until the overthrow of the Ferry ministry, in 1885, when he accepted the pre¬

miership. He was reelected to the presidency of the Chamber in 1894, and, in 1895, he retired from the ministry and was a conspicuous candi¬

date for the presidency of France. In 1898 he again accepted the premiership, but his cabinet was soon overthrown. On 8 June 1906 he was elected president of the House.

BRISSON, Mathurin Jacques, French

savant: b. Fontenay-le-Comte, 30 April 1723; d.

Croissy, near Paris, 23 June 1806. He was

instructor to the children of the royal family of France in physics and natural history. His works on natural history include (Le Regne

animaP (1756). He was also censor royal,

member of the Academy of Sciences and of the Institute, and succeeded Nollet in the chair of natural philosophy at the College of Navarre.

He translated Priestley's work on (Electricity, >

although he opposed his theories, and still more those of Franklin. The most able of his writ¬

ings are on specific gravity and on ornithology.

Buffon quotes frequently from Brisson's (Orni¬

thology (1760). He published in 1800 a (Dictionnaire raisonne de physique. >

BRISSOT DE WARVILLE, bre-so de

var-vel, Felix Saturnin, French animal painter: b. Lens 1818. He entered the Ecole des Beaux-Arts in 1835 and studied with L. Cogniet. His paintings are renowned for their truthful repre¬

sentations of nature, their scenes being laid chiefly in Touraine and Normandy, or in the forests of Fontainebleau and Compiegne. Among them are <The Thicket > (1881) ; (Return of the Flock) (1885) ; (A Corner of the Sheepfold) (1888). He has also published an album of

lithographs representing <The Principal Scenes in the Forest of Compiegne. }

BRISSOT DE WARVILLE, Jean Pierre,

French political writer, and one of the leaders of the Girondists (q.v.) : b. Ouarville, near Chartres, 14 Jan. 1754; d. Paris, 30 Oct. 1793.

He took the name D'Ouarville, which he after¬

ward anglicized into De Warville, from the

village of Ouarville, where he was born. He was designed for the law, and placed with a procurator in Paris ; but early turned his at¬

tention to public affairs, associating himself with such men as Petion, Robespierre, Marat, *etc.* In 1780 he published his (Theorie des lois criminellesP and two years afterward an im¬

portant collection called the (Bibliotheque des lois criminellesP During this period he edited for a time, at Boulogne-sur-Mer, the Courier de r Europe, a translation from an English

journal. He also visited England, where he

endeavored to found a lyceum and establish a journal in connection with it. Failing in this enterprise, he returned to Paris, where his works had already classed him among the

philanthropic theorists of the day. He was

suspected of the authorship of an anonymous pamphlet, and thrown into the Bastile. On his liberation he engaged with Clavieres and

Mirabeau in some works on finance, which ap¬

peared under the name of the latter.

Threatened with a new arrest, he escaped to England, . and being there introduced to the Society for the Abolition of Negro Slavery, resolved to form a similar society in Paris.

This society, which numbered many distin¬

guished names among its members, and ulti¬

mately accomplished its object, he founded

along with Clavieres, Mirabeau and others, and undertook a voyage to the United States to study on its behalf the problem of emancipa¬

tion. On his return the Revolution was about BRISSOTINS

to break out, and Brissot embraced it with ardor. He was not a member of the States-General, but was elected to the National As¬

sembly for Paris and to the Convention for the department of the Eure et Loir. He established a journal, Le P at riot e Frangais , which at once became the recognized organ of the Republi¬

cans. As leader of the Girondist party, his history belongs henceforward to the history of France. He voted, out of policy, for the death of Louis XVI, but urged a confirmation by the vote of the people; and he caused war to be declared against Holland and England in

February 1793. This was his last political act.

Until the close of his career he was engaged in defending himself against the Montagnards.

When the Jacobins came into power, he was

guillotined with 20 other Girondist leaders.

Brissot was inferior to Vergniaud as an orator, but his writings exercised a powerful influence on the Revolution. In the early part of his career his opinions were very extreme. In a passage, afterward used against him, he carried his advocacy of individual rights so far ast to justify not only theft, but cannibalism. Proud¬

hon was accused of having borrowed from him the maxim, ((La propriete e'est le vol.® His (Memoires pour servir a l'histoire de la Revo¬

lution J appeared in 1830 at Paris in four vol¬

umes (new edition by Lescure, 1877). Consult Desmoulins, (The History of the Brissotins)

(translated from the French, London 1794).

BRISSOTINS, bre-so-tan. See Giron¬

dists.

BRISTED, Charles Astor, American

author: b. New York 1820; d. Washington,

D. C., 15 Jan. 1874. He was the son of the Rev. John Bristed and grandson of John Jacob Astor, founder of the Astor Library. He was graduated with high honors at Yale in 1839, and then spent five years at Trinity College, Cambridge, England, where he took a number

of prizes and became a foundation scholar. He traveled extensively and contributed many

papers on light social topics and ephemeral subjects to the magazines of England and

America under the signature ((Carl Benson.®

His wide culture and exact scholarship made his work attractive to all cultivated readers.

He wrote Selections from Catullus } (1849) ; (Letters to Horace Mann> (1850), a reply to certain attacks on Stephen Girard and J. J.

Astor; (The Upper Ten Thousand) (1852);

(Five Years in the English University* (1852), his most important book; (Pieces of a Broken-Down Critic) (1857)); Setter to Dr. Henry

Halford Jones (that is, Dr. J. G. Holland), editor of the Wintertown Democrat (that is, Springfield Republican) , concerning his habit of giving Advice to Everybody and His Quali¬

fications for the Task) (1864) ; (The Interfer¬

ence Theory of Government (1867).

BRISTLETAILS, wingless insects of the

order Thysanura. These agile creatures have a long flattened body, with metallic scales, in form somewhat like those of butterflies. The antennae are very long, setiform, many-jomted; the mouth-parts are free, with long palpi, the maxillary palpi being seven-jointed and the

labial palpi four-jointed. The mandibles are stout, sunken in the head and armed with teeth for gnawing. The prothorax is very large, and all the rings of the body are of much the same size, so that the insect bears a general resem¬

blance to the myriapods. The anal stylets are long and large, which, with the smaller ones inserted on the subterminal rings of the abdomen, aid greatly in locomotion, though these insects run with great rapidity and do not leap like the P oduridee , and thus remind us, as well as in their general appearance, of certain wing¬

less cockroaches. Like cockroaches in one of its habits also is Tliermobia domestica, which abounds in the chinks and crannies of the

rooms of houses, and comes out at night, shun¬

ning the light. The ((silver witch® (Lepisma saccharina) is not uncommon in old, damp

houses, where it has the habits of the cock¬

roach, eating cloths, tapestry, *etc.* In general form, Lepisma may be compared to the larva of Perla, a net-veined neuropterous insect. The body is long and narrow, covered with rather coarse scales and ends in three many-jointed anal stylets, or bristles, which closely resemble the many-jointed antennae, which are remark¬

ably long and slender. They undergo no meta¬

morphosis. Consult Packard, (Our Common

Insects) (1873) ; Sharp, Unsects* (1899).

BRISTLES, the stiff hairs which grow on

the back of the hog and are used to a great extent in the manufacture of brushes. They

are of several varieties of color and quality, distinguished as black,

gray, yellow, white and lilies. The last is the soft, silvery quality used for shaving-brushes. Russia and Germany are

the chief sources of supply, but they are also obtained from France and Belgium and bristles of inferior quality have recently been received from China, which constitute from 60 to 75 per cent of all the bristles used for paint brushes in this country. The quality of bristles depends on the length, stiffness, color and straightness — white being the most valuable. The best bristles are produced by hogs that inhabit cold coun¬

tries, for these are leaner. In the summer the hogs are driven in herds through the forests to feed on soft roots, etc., when they shed their bristles by rubbing up against trees. In Ameri¬

can slaughter-houses the hog bristles form a by-product, but those from the modern hog are very inferior. In 1916 the imports of bristles into the United States amounted to 3,936,461

pounds and were, valued at $3,627,042.

BRISTOL, Charles Lawrence, American

biologist : b. Ballston Spa, N. Y., 29 Sept. 1859.

A graduate of New York University, he be¬

came instructor in science at Riverview Acad¬

emy 1884-87, and professor of zoology at the University of South Dakota 1887-91. After

further study at Clark University and the Uni¬

versity of Chicago, he was appointed professor of biology at New York University in 1894, and became widely known in connection with

zoological work in the Bermudas and the trans¬

portation of live tropical marine animals to the New York Aquarium. He is author of ‘The

Metamerism of Nephelis) (1899), and ‘Treas¬

ures of the New York Aquarium* (Century

Magazine, 1899).

BRISTOL, Frank Milton, Methodist

Episcopal bishop : b. Orleans County, N. Y., 4

Jan. 1851; pastor successively of Trinity

Church, Chicago; First Church, Evanston, Ill.; Metropolitan Church, Washington. He was

elected bishop in 1908. Among his numerous

works are (Addresses, } (Shakespeare and

America,* (Providential Epochs* and (The

Ministry of ArtP

BRISTOL, Conn., city in Hartford County,

on the New York, N. H. & H. Railroad, 18

miles west of Hartford. It has a public library, a high school and 12 grammar schools,

two parochial schools, a business college,

15 churches, electric light and street rail¬

road plants ; national and savings banks.

Among the public buildings are the town-hall, the emergency hospital, postoffice, Masonic Temple, Red Men's and Odd Fellows' halls and the armory. There are manufactures of clocks, watches, hardware, castings,, shears, steel

springs, saws, lamps, cow stanchions, glass cut¬

ters, paper boxes, silverware, underwear, mon¬

umental w'orks and cigars ; steel-rolling mills, iron and brass foundries. The value of tax¬

able property is $15,633,841. Bristol was incor¬

porated in 1785, as a borough in 1893, and as a city in 1911; in which year it adopted the com¬

mission form of government. The government

expenses amounted in 1915 to $498,191, the re¬

ceipts to $510,587. Pop. 20,620. Consult Sou¬

venir History of the Town of Bristol, Connecti¬

cut (Meriden 1897).

BRISTOL, England, a city and seaport,

situated partly in Gloucestershire, partly in Somerset, but forming a county in itself. It stands on the confluence of the rivers Avon and Frome, whence the Avon pursues a course of nearly seven miles to the Severn. The Avon is a navigable river and the tide rises in it to a great height. Bristol is 118 miles due west from London, or three hours by rail. It stands partly on a number of eminences, partly on the lower ground at their foot. The manufacturing and business parts are on the lower levels, while the hills are now almost wholly covered with private houses. The districts of Clifton, Redland and Cotham, situated within the limits of the borough and in the midst of charming scenery, are studded with mansions and villas, the attractions of these portions of the city being greatly increased by the Clifton and

Durdham Downs. The bed of the river Avon

is situated about 315 feet below the summit of Clifton Down, from

which a handsome suspen¬

sion bridge is thrown across the river, uniting the two counties. Its length from the centres of the piers is 703 feet, its height above high-water mark 245 feet.

Area. — By the Boundaries Extension Bill

of 1904 the city covered an area of 17,004 acres: The area of the present county borough is 17,-

460 acres, and according to the census of 1911

it had a population of 357,048. In 1915 the pop¬

ulation was estimated at 363,312, with a rat¬

able value of £1 ,862,522 ($9,312,610). As com¬

pared with the period of the Municipal Cor¬

porations Reform Act of 1835 when the area was increased from 755 to 4,461 acres, it will be seen that the size of the city has increased nearly fourfold in less than three-quarters of a century.

Geology. — The geological features of

Bristol are of varied interest. Within a radius of five miles a complete series of rocks from the upper part of the old red sandstone to the top of the coal measures, and from the new red sandstone to the inferior oolite, is directly accessible to study in numerous quarries and the fine cliffs of the Avon Gorge. The geology of Bristol may be studied in the (Memoirs of the Geological Survey for 1876} in Sanders's Geological Map of Bristol, and in the Geolog¬

ical Survey Maps.

Churches, Hospitals, *Etc.* — Bristol is rich

in ancient architecture, both ecclesiastical and domestic. The cathedral, founded in 1142, was originally an abbey church. It

exhibits various styles of architecture, the chapter house and its vestibule being Norman; the Lady chapel early English ; the chancel and choir, the Berkeley and Newton chapels decorated; the groining

of the transepts, the central tower and clois¬

ters perpendicular. The nave, its aisles and western towers are modern additions, having

been erected at intervals since 1865. There are several fine old churches, but they are all ex¬

celled by Saint Mary Redcliffe, perhaps the finest parish church in the kingdom. It is commonly said to have been founded by Simon de Burton, about 1293, but part of it is con¬

siderably older than this and is believed to be as old as 1200. It is cruciform, with western tower and spire 285 feet. The western door is the principal entrance, but there are also

porches on the northern and southern sides.

The south porch, the south transept, the tower and much of the lower part of the church be¬

long to the decorated style, and the exterior of the north porch is an excellent specimen of it, the interior being very beautiful early Eng¬

lish. The remainder of the church, including the Clerestory, is of the Perpendicular Period.

William Camynge, five times mayor of Bristol, whose name is so prominent in the Chatterton controversy, is said to have restored this church about 1445-47. Other churches worthy of men¬

tion are Temple Church, with its leaning tower; Saint Stephen's, All-Saints', Saint Mary-le-Port, Saint Phillip's, Saint James and Saint John. Under the tower of this last church was one of the entrances to the ancient city of Bristol, and the gateway still exists. The Independents, Baptists and Wesleyans have some noteworthy

chapels. The Roman Catholics have a pro¬

cathedral in Clifton and several chapels and convents ; altogether between 200 and 300 sep¬

arate buildings in the city are dedicated to the cause of Christianity.

Saint Peter's Hospital adjacent to the church of Saint Peter, the seat of the poor law admin¬

istration, is a very fine example of early do¬

mestic architecture. The buildings of various banks and insurance offices in Corn street and Clare street are worthy of notice from a mod¬

ern architectural point of view.

Libraries. — The most modern public build¬

ing is the Bristol Central Library adjoining the Bristol Cathedral, completed in 1906, from de¬

signs by Mr. Percy Adams, F.R.I.B.A. A

public library existed in Bristol early in the 15th century, and as no other record can be found of any such library prior to this in any part of England, the claim of the earliest in the kingdom must belong to Bristol. The

library was that of the Kalendars, a brother¬

hood of clergy and laity who were attached to the church of All-Hallows or All-Saints', still standing in Corn street. In 1613 the existing City Library was founded.. Dr. Tobias Mathew, archbishop of York at this time, gave a num-BRISTOL

ber of books, to which he added subsequently a considerable portion of his library ((for the free use of merchants and shopkeepers of the city.®

In 1740 the building still standing in King street was erected, minus the wing. In 1874

the Public Libraries Act was adopted and two years later the building was opened under the act as the Bristol Central Library. The year 1906 saw the opening of the New Central Libra¬

ries in Cottage Green, a palatial building

erected by the munificent bequest of a wealthy citizen, Mr. Vincent Stuckey Lean. The salient features of the historic King Street Library are preserved in this building in the (<Bristol Library,® an apartment exactly reproducing the original room in King street with the self¬

same old oak presses and wonderfully carved chimney piece of Grinling Gibbons. Here are shelved books dealing with the history of the city; the books of Archbishop Mathew, and

other notable gifts of books by Bristol citizens, amongst them being the Collectanea of

Proverbs, Folklore, etc., collected by Mr. Vin¬

cent Stuckey Lean and presented to the city by his executors. This collection is made acces¬

sible by means of an exhaustive catalogue com¬

piled under the direction of the city librarian of Bristol, Mr. E. R. Norris Mathews, F.R.

Hist.S.F.R.S.L. ; the early printed books and illuminated manuscripts being separately cata¬

logued. The public library movement in Bris¬

tol has advanced with rapid strides from

small beginnings. The system is extended by means of commodious branches to all parts of the city, nine branches serving respective wards and circulating 750,672 volumes in the course of a year, whilst the various newsrooms and read¬

ing-rooms are visited annually by a number of persons exceeding 2,500,000.

Art Galleries. — The Bristol Art Gallery

was presented to the city by Sir William Henry Wills, now Lord Winterstoke. The building

adjoins and communicates with the museum

and was opened to the public in February

1905. Internally a large and lofty top-lighted central hall is surrounded by rooms on the ground floor devoted to the display of antiqui¬

ties; a spacious marble staircase leads to picture galleries which form a splendid suite of com¬

municating apartments.

Museum. — The Bristol Museum, originally

a private proprietary institution, became the property of the citizens of Bristol in 1893. It is especially rich in objects illustrative of min¬

eralogy, geology and palaeontology; no less than 200 <(types® and figured fossils are preserved here, described by such men as Agassiz, Riley, Stutchbury, Fitton, Huxley, Owen and many

others. The zoological collections are likewise of importance.

Electric Lighting. — The Bristol Corpora¬

tion is responsible for the electric lighting of the city. The first instalment of public street lighting in 1893 consisted of 96 lamps, the total number now is 677 arc lamps. For private

lighting purposes the demand has reached the total of 185,897 lamps. The use made of elec¬

tricity for power purposes is increasing rapidly.

The electric tramways of Bristol are controlled by a private company. The overhead trolley

system is in use, and a service of motor cars has recently been instituted to connect the sec¬

tions, and to open up outlying districts.

Industries, *Etc.* — Bristol has long been

famous for its glassworks, potteries, soap—

works, tanneries, tobacco factories, chocolate factories, sugar refineries, shoe factories, copper, lead, iron and chemical works, as well as for shipbuilding and machinery yards. Coal is

found and worked extensively within the limits of the borough. Bristol carries on an export and import trade with all parts of the world.

Cereals and flour are the most important im¬

ports, others being oils, tallow, cheese, butter, bacon, cattle, sugar, timber, petroleum, hides.

The total value of imports and exports in 1911

was $77,786,530 and $20,084,680, respectively.

The total tonnage entered and cleared at Bris¬

tol in 1913 was 2,663,000. The present dock system comprises a dock of 19 acres at Avonmouth on the Gloucestershire bank of the

Avon, and of 12 acres (deep water area) at Portishead on the Somerset bank of the river, two miles below Avonmouth; and a floating

harbor of 70 acres in the heart of the city.

The latest enterprise in dock construction is that of the Royal Edward Dock at Avonmouth which covers an area of 30 acres and provides accommodation for vessels much larger than

any afloat. The first sod was cut on 5 March 1902; it was opened in 1908. The depth of water on the inner sill is at mean spring tides 40 feet and at mean neap tides 30 feet. The length of the dock is 1,120 feet and the width 1,000 feet. The entrance lock is 875 feet long and 100 feet wide. On each side are piers at which steamers land mails and passengers, who reach London over an almost straight line in two and a half hours. Bristol traders colonized Newfoundland and

established commerce with

the West Indies and the American colonies.

The city has long been known for its ship building interests, and the Great Western , the first steamship to cross the Atlantic, was built at Bristol in 1838. A United States consul is stationed here.

Education. — The principal institution for

the higher education is Bristol University, char¬

tered in 1909, and possessing in 1913—14 150

teachers and 650 students, the nucleus of which is the University College, opened in 1876. The university claims the honor of being the first to open its doors to women students.

The Grammar School dates from pre-Reformation days. In 1532 it was endowed by Robert and Nicholas Thorne. The Cathedral School

likewise dates back to the Reformation, it being part of the Cathedral Corporation established by Henry VIII in 1538. The City School, or Queen Elizabeth's Hospital for boys, was

founded in 1586, and owes its existence to John Carr, a wealthy Bristol citizen. The Red

Maids School for girls is the foundation of Alderman Whitson by bequest in 1627. The

Clifton College, opened in 1862, has for many years ranked high as an English public school.

The college buildings and grounds occupy a

large area east of Clifton Downs. • The Mer¬

chant Venturers' Technical College was origi¬

nally a trade school. In 1875 the endowed schools'

commissioners appointed the Society of Mer¬

chant Venturers as trustees. The building — a monument to the liberality of that Society —was almost totally destroyed by fire in October 1906, and is now in course of re-erection. Other educational establishments are : The Clifton

and the Redland High Schools for girls ; Clergy Daughters' School ; about 45 Council schools 550

directed by the education committee of the

Bristol Corporation, inclusive of three higher grade and science schools ; a day industrial school; a school for cookery; truant school, and an institution for the deaf and dumb. The Congregationalists erected in 1906 a commodi¬

ous college building at Cotham for the training of students for the ministry.

Charity. — The charitable institutions oi

Bristol are so numerous and of such import¬

ance that adequate mention of them here is impossible. The invested funds devoted to

charitable work yield a revenue exceeding

$300,000 per annum, which sum supports alms¬

houses, asylums, homes and schools, and pro¬

vides for pensions and gifts of all descriptions.

The name most familiar in a long list of bene¬

factors is that of Edward Colston, whose name is handed down to successive generations by three great commemorative societies instituted to perpetuate his grand philanthropy. These

societies are instrumental in raising funds by voluntary subscriptions amounting to upward

of $15,000 per annum. The charities, formerly regulated by the Corporation, are now by de¬

cree of the charity commissioners adminis¬

tered by trustees. The Merchant Venturers'

Society, which as early as the 7th year of Ed¬

ward IV claimed to be an ancient guild, has endowed and supports others, whilst denomina¬

tional bodies are mainly responsible for the remainder, one of the most remarkable being the Ashley Down Orphanages, founded in 1836

by the Rev. George Muller.

Government. — The city is governed by a

council consisting of 22 aldermen and 66 coun¬

cillors, the former being elected for a term of six years, and the latter for a term of three years, agreeably with the provisions of the Municipal Corporations Act. The mayoral list of Bristol extends in unbroken sequence from the year 1216, when ((the King (Henry III) with his counsellors and tutors came to Bristol as to a safe place, at which time he permitted the town to choose a mayor after the manner of London.® In June 1899, or more than 600

years after the institution of the office, Queen Victoria was graciously pleased to direct that the mayor of the city of Bristol should in future bear the style and title of lord mayor.

History. — The Celtic name of Bristol was

Caer Oder, or the City of the Chasm (namely, through which the Avon flows). The name

Bristol is derived from the Anglo-Saxon bricg, a bridge, and stow, a

place. It was early a place of commerce, and received its first charter from Henry II in 1172. Between 1239 and 1247 a new channel was dug from the Frome in order to provide better accommodation for ship¬

ping. In the reign of Edward II Bristol re¬

belled against the royal authority and was held by the citizens against the sovereign for four years. In 1373 it was constituted a county of itself, by Edward III. It was made the seat of a bishopric by Henry VIII in 1542. During the civil war between Charles I and the Par¬

liament it declared in favor of the latter, but was stormed and taken by the Royalists under Prince Rupert. After the battle of Naseby

it was taken by Fairfax, and its formidable castle was razed to the ground. In 1831 the Reform agitation gave origin to riots that lasted for several days. The rioters destroyed various public and private buildings, among which was the bishop's palace, and a number of them lost their lives. Bristol was united as a bishop's see to Gloucester in 1837. The first bishop of Bristol and Gloucester united was James Henry Monk, created in 1837. By the Bristol Bishop¬

ric Act Bristol was again separated from Glou¬

cester and Dr. Forrest Browne was enthroned, 28 Oct. 1897. Sebastian Cabot, Chatterton,

Southey and the painter Lawrence were natives of Bristol. The city returns four members to Parliament.

Bibliography. — (British Association Hand

Book) (Bristol 1898) ; Corry, J., (History of BristoP (Bristol 1816) ; Harvey, A., (Bris¬

tol, a Historical and Topographical Ac¬

count of the City} (London 1906) ; Hunt, W., (BristoP (London 1902) ; Latimer, (Bris¬

tol) (Bristol 1898) ; ib., (Annals of BristoP

(various periods) ; Masse, (The Cathedral

Church of BristoP (London 1901) ; Nicholls

and Taylor, (Bristol Past and Present* (Bristol 1881-82) ; Reports of the Bristol Chamber of Commerce; (The Little Red Book of BristoP

(Bristol 1900).

E. R. Norris Mathews,

L. Ackland Taylor.

BRISTOL, N. H., town in Grafton County,

30 miles north from Concord. It is at the junc¬

tion of the Pemigewasset and New Found

rivers; is the terminus of the Bristol branch of the Boston & M. Railroad, and has become a place of summer resort. It has a public library and flannel, woolen and paper manufactories, pulp mills, grist mills and woodworking shops.

There are a national and a savings bank and a town and union school district. The assessed property valuation is $1,000,000. The govern¬

ment is by selectmen. Receipts in 1915 amounted to $35,472; expenses to $33,266. Pop. 1,500.

BRISTOL, Pa., borough in Bucks County,

on the Delaware River, the Pennsylvania Rail¬

road and the Pennsylvania and Lehigh Canal, 21 miles northeast of Philadelphia. It has a national bank, high school, electric-light and street railroad plants and manufactories of

carpets, hosiery, worsted, steel and leather goods, cast-iron pipe, wall-paper and foundry products. The United States census of manu¬

factures for 1914 reported 32 industrial estab¬

lishments of factory grade, employing 1,920

persons, of whom 1,809 were wage-earners, re¬

ceiving annually $811,000 in wages. The capital invested aggregated $4,213,000 and the value of the year's output was $5,037,000; of this $900,-

000 was the value added by manufacture. It is in a rich fruit and truck farming region and is the centre of considerable trade. Bath

Springs, famous in the 18th century and still frequented, are just outside the borough limits.

It was originally called Buckingham and was settled in 1681 and incorporated in 1720. A ferry connects it with the town of Burlington on the New Jersey side of the Delaware. Un¬

der a charter revised in 1905, the burgess holds office for four years and appointments are made by the borough council. Pop. 10,000.

BRISTOL, R. I., town, port of entry and

county-seat of Bristol County, on Narragansett Bay, the New York, N. H. & H. Railroad and the Providence & N. Y. steamship line, 15 miles southeast of Providence. It has an excellent BRISTOL — BRISTOL EARTHENWARE

harbor, facilitating a large daily passenger and freight service for Fall River and Providence.

It is the seat of the widely-known Herreshoff shipbuilding works, where a number of note¬

worthy sailing and steam yachts and torpedo boats have been constructed, and also of the Saunders & West yacht-building works. The

town has a handsome brownstone library build¬

ing containing some 15,000 volumes, eight

churches, 17 public schools, large market gar¬

dening and coast trade interests and manufac¬

tories of rubber, wroolen and cotton goods. A State soldiers' home and homes for aged men, old ladies and children are located here. Bris¬

tol is the site of the Narragansett village, Mount Hope, the residence of King Philip, the great Naragansett chief. It was first settled by the whites in 1680 and was incorporated as a town in 1746. In 1775 it was bombarded by the Brit¬

ish, and was visited again by British troops and partially destroyed in 1778. Pop. (1920) 11,375. Consult Miller, W. J., (Celebration of the Two-Hundredth Anniversary of the Settle¬

ment of the Town of BristoP (Providence

1881) ; Munro, Ulistory of BristoP (Provi¬

dence 1880).

BRISTOL, Tenn. and Va., a city in Sulli¬

van County, Tenn., and Washington County,

Va., incorporated 1856. Its location on the State line, with the population being about equally divided between these two States, has necessitated two separate municipal govern¬

ments, each conforming to the State constitu¬

tion under which it exists. Otherwise Bristol is in reality one city. Bristol, Tenn., has the commission form of government. The city is a terminal point for five railroads, the connections forming trunk lines in three directions. These roads have brought Bristol in touch with the rich mineral and timber resources of that region, especially the iron and coal deposits. To de¬

velop these resources, Bristol has become the headquarters of a number of companies. Bris¬

tol has four banks, 45 wholesale mercantile houses, 47 manufacturing plants; its principal industries including iron, lumber, barytes, belt¬

ing, leather, tanning extract, paper, pulp, flour, foundry and car shops and silax industry. Its business aggregates $16,000,000 annually. The United States census of manufactures for 1914

recorded 57 industrial establishments of fac¬

tory grade for the combined city, employing 1,385 persons, of whom 1,129 were wage-earn¬

ers, receiving $450,000 annually in wages. The capital invested aggregated $2,941,000 and the year's output was valued at $3,398,000; of this, $1,311,000 was the value added by manufacture.

There are one weekly, one semi-weekly and

one daily newspaper ; two colleges for women, one for men and one for colored people. Its churches represent practically all denominations.

Pop. (1920) 14,776.

BRISTOL, Vt., town in Addison County,

20 miles northeast of Middlebury, on the Bris¬

tol Railroad. It has manufactories of caskets, wood boxes and turned woodwork. The value

of its taxable property is placed at $1,368,452.

It contains a graded <school. Holly Hall and a free public library. Pop. (1920) 4,251. .

BRISTOL BAY, an arm of Bering Sea,

lying immediately to the north of the peninsula of Alaska. It receives the waters of two large lakes, by which communication with the interior is opened up for a considerable distance.

BRISTOL BRICK, or BATH BRICK, a

kind of brick used for cleaning steel, manufac¬

tured for some years exclusively in Bridgewater and Bristol, England. A small vein of the sand required for this purpose was found near Liv¬

erpool but was soon exhausted. One of the

owners or operatives who had been concerned in the works at Bristol visited the United States in 1820, where by accident he discovered that the same kind of sand which was used for the Bristol bricks might be procured at South

Hampton, N. H. Since that period bricks fully equal to the imported article have been manu¬

factured in this country.

BRISTOL CHANNEL, an arm of the

Irish Sea, extending between the southern

shores of Wales and the western peninsula of England and terminating in the estuary of the Severn. It is about 90 miles long and from 5

to 50 miles wide, the greatest breadth being between Saint Gowan's Head and Hartland

Point. It is remarkable for its high tides and the rapidity with which they rise. At Chepstow spring tides rise as high as 47 feet. It has an irregular coast of 220 miles on which are situ¬

ated the towns of Cardiff, Swansea, Ilfracombe, Tenby, *etc.* It receives the waters of the Usk, Severn, Wye, Avon, Parrott, Taw and Torridge rivers. At the entrance of the channel is Lundy Island. Large ocean vessels can ascend the

channel to the heart of the city of Bristol, which is nearer to London than either Liverpool or Southampton.

BRISTOL EARTHENWARE. Records

show an active pottery existed at Bristol, Eng¬

land, late in the 13th century and another in the 16th century. The oldest known piece of Bristol pottery existing is dated 1703. Richard Frank ran a delft works, at Redcliffe Bank, till 1777, and Joseph Ring (from 1784) continued the factory till (early in the 19th century), Wedgwood ware killed the delft demand. By

1786 Ring had started making (<cream color®

or Queen's ware and other Staffordshire kinds.

Joseph Flower started a delft factory in Frank's time. A very interesting feature concerning

Bristol delft is that great quantities were shipped to America and the United States pos¬

sesses most of the extant Bristol pieces, though many admiring owners do not know its origin.

Common stoneware was also made in Bristol.

Characteristics. — Flower's pieces are said

to have better paste, glaze and color than those of Frank or Ring. Bristol blue is darker than most English wares. Bristol cream-color ware has <(stronger yellow color® than the Stafford¬

shire.

Product. — Plates, dishes, ((Dutch® tiles

for fireplaces and walls, teapots, punch-bowls, *etc.*

Decoration. — Blue-and-white decoration

is usual. Simple patterns painted in white, more opaque than the greenish-blue surface

white ground (bianco sopra bianco), on dish and plate borders was confined to Bristol ware in England. The pictures are usually <(Chinese taste.® No transfer prints till 1797. Favored motifs were wreaths of flowers and leaves,

Chinese pictures, landscapes, *etc.*

Glaze. — Specimens show an unpleasant

<(blue or blueish-green tone comparing unfavor-552

ably with true delft of good quality® and also (<thicker, muddier and less brilliant® than Lam¬

beth or Liverpool (Burton).

Paste. — Dark and coarse.

Clement W. Coumbe.

BRISTOL PORCELAIN. Richard

Champion, of Bristol, in 1770, was producing porcelain from <(Cornish stone® under Cookworthy's (see Plymouth) patent in the firm

name of Cookworthy & Co. He purchased the

patent outright in 1773. The patent expiring, he obtained an extension

(after Wedgwood's

contest in Parliament), but Cookworthy's aims at art products were too ambitious for financial success. He sold out to a factory at New Hall, Staffordshire.

Characteristics. — Bristol style tended to¬

ward Meissen (Dresden) ideals, whereas Ply¬

mouth leaned to Oriental taste. Biscuit almost equal to Derby (see Derby). Figures are

<(thickset, lack grace, coloring poor® (Binns).

Forms often warped in oven.

Product. — Tea, coffee and dessert serv¬

ices, figures, bouquets of flowers after Vin¬

cennes style, ((cottage ornaments,® vases, candle¬

sticks. Champion's biscuit (unglazed) plaques were delicate and beautiful ; decorated often with coats-of-arms and wreaths of flowers

(Adams style) carefully molded in green

shaded with brown and black and attached

(sprigged). The figures of Franklin (his

friend) and Washington appear on larger

plaques.

Decoration. — Colors used were blue,

green, lilac and red mostly; ground colors

(rare) yellow and green. No underglaze

colors. Motifs were wreaths (see above),

ˆexotic birds® sprays of flowers in medallions.

Glaze. — Good and evenly distributed, but

has minute holes and black specks (defects of firing). Glaze shows a ((cold, white glitter.®

Paste. — Soft paste was used till 1770 (of unaker, American clay) in experiments, then

hard paste. Surface shows spiral ridges

(termed often <(whorls®). Bristol cups and

saucers very translucent, with yellowish tinge when held up to the light. Consult Compton, F., (William Cookworthy5 (London 1895) ;

Trapnell, A., (Catalogue of British Porcelain5

(Bristol 1898).

Marks. — Tin enamel (delft) plates have,

sometimes, E above MB and 1760 below it.

Ring's cream-color has a mark E R with 1786

beneath, at times. Another mark is (<BRISTOL® on a band with two crossed palm leaves above and scroll-work beneath. When Cham¬

pion used the Dresden ((cross-swords® mark

(always under glaze) he added some sign, as a dot or something between the hilts and a number beneath, and overglaze + sign on this mark. Early (soft paste) experimental pieces are marked <(Bristoll® impressed (rare). From 1770 a + was the mark or a letter B. Early pieces show the Cookworthy (Plymouth)

alchemists' tin symbol with a cross.

Clement W. Coumbe.

BRISTOW, Benjamin Helm, American

lawyer: b. Elkton, Ky., 20 June 1832; d. 22 June 1896. He was graduated from Jefferson Col¬

lege, Pa., in 1851 and was admitted to the bar in Kentucky in 1853. He served with distinc¬

tion in the Civil War, reaching the rank of colonel, and at its close was appointed United States district attorney of Kentucky. In 1874

he became Secretary of the Treasury and made his name memorable by the exposure and prose¬

cution of a notorious whisky ring. He re¬

moved to New York in 1876 and had an exten¬

sive legal practice there. Consult Wilcox, D., (Memorial of Benjamin Helm Bristow5 (Cam¬

bridge 1897).

BRISTOW, Joseph Little, American pol—

itican : b. Flemingsburg, Ky., 1859. He was educated for the ministry, but became editor of the Salina, Kan., Republican, and soon after entered politics. He was secretary of the Re¬

publican State Committee in 1896, and in 1898

was appointed fourth assistant Postmaster-General. In 1900 he became active in exposing frauds in the Post Office Department and re¬

organized the Cuban postal service. President Roosevelt appointed him special commissioner

of the Panama Railroad in 1905. He was

elected to the United States Senate in 1909 and in 1912 was an active supporter of the Roose¬

velt Progressive Party. He served on many

important committees of the Senate. In 1915

he was elected chairman of the Kansas Utilities Commission for a term of three years.

BRISTOW, Okla., city in Creek County, on

the Saint Louis and San Francisco Railroad.

It contains cotton gins, cotton-oil mills, oil re¬

fineries, glass works and lightning and oil tank protectors. It has four banks with total re¬

sources amounting to $1,800,000, and an assessed property valuation of $1,056,000. It has also two graded schools and a high school, a city hall and masonic temple. The municipal reve¬

nues amount annually to about $18,000. The

government is vested in a board of aldermen.

The city has an ample supply of pure water and has also extensive agricultural interests. A large gas field nearby furnishes an ample supply of cheap fuel. Pop. 3,500.

BRISTOW STATION, now BRISTOE,

Va., a village in Prince William County, four miles southwest of Manassas Junction on the Southern Railway. On 27 Aug. 1862 a drawn

battle took place here between the Federal army under General Hooker, and a Confederate one under General Early and on 14 Oct. 1863, the Federal troops under General Warren repulsed with severe loss a Confederate attack under Gen. A. P. Hill.

BRITAIN. See Great Britain.

BRITAIN, Ecclesiastical History of,

by the Venerable Bede, or Baeda (673-735). A history of England from the earliest Roman

occupation to 731 a.d. The sources were Roman writers, native chronicles and biographies,

public records and documents, and oral and

written contemporary accounts. It was written in Latin; first printed at Strassburg about 1473; King. Alfred translated it into Anglo-Saxon; and it has had several editions and English versions in recent times. For bibliography see Bede.

BRITAIN, New. See New Pomerania.

BRITANNIA, the ancient name of

Britain. Under the name of Britannia, Great Britain is personified as a helmeted woman

seated on a globe or an insulated rock, leaning with one arm on a shield, and the other grasp¬

ing a spear or trident,

BRITANNIA METAL, an alloy that has

come into very general use in modern times, many domestic utensils, such as spoons and tea¬

pots, being made of it. Such articles are com¬

monly electro-plated, and made to resemble

real silver. It consists chiefly of tin and anti¬

mony, but often contains also a small quantity of copper zinc and bismuth. A common pro¬

portion is 140 parts of tin, 3 of copper, and 9 of antimony; but the best alloy is com¬

posed of 90 parts of tin and 10 of antimony.

The copper is used mainly to impart color to the combination. The manufacture of the metal was introduced into England about 1770.

Queen's metal is one of the varieties of

Britannia metal.

BRITANNIA TUBULAR BRIDGE, an

iron tubular bridge across Menai Strait, which separates Anglesea from Wales, about one mile from the Menai suspension bridge. It has two principal spans of 460 feet each over the water, and two smaller ones of 230 feet each over the land ; constructed 1846-50. See Bridge.

BRITANNICUS, the son of the Roman

Emperor, Claudius, by Messalina : b. about 42

a.d. ; poisoned 55 a.d. He was passed over by his father for the son of his new wife Agrip¬

pina. This son became the Emperor Nero,

whose fears that he might be displaced by the natural successor of the late Emperor caused him to murder Britannicus.

BRITH ABRAEIAM, Independent

Order, a Hebrew mutual benefit fraternity

society, the largest and foremost Jewish order in the United States, with headquarters in New York city. The society was founded in 1887

as an offshoot of the Order Brith Abraham, founded in 1859. In the pursuit of charity, fraternity and other noble aims, a splendid spirit of unity and harmony, support and -co¬

operation, has been shown by officers and

members in all matters involving the welfare of the order. Democratic principles promoting the general interests of the institution, inaugu¬

rated by the administration, under the leader¬

ship of untiring champions of American

Judaism, have actuated its movements and

enterprises, and the formation and develop¬

ment of its cultural and humanitarian institu¬

tions. The lodges not only offer pecuniary

benefits, advantageous rates of insurance, etc., and serve as social centres, but they have also contributed largely to the machinery for na¬

tional Jewish organization throughout the

United States, to combat all anti-Semitic proj¬

ects. In 1915 there were 759 lodges and 17

separate ladies' lodges in the United States ; 26 new lodges were instituted. The total

number of members was 200,142, of which

104,173 were males, 95,969 females. The

number of deaths was 1.502; $42,049 were dis¬

bursed in charity; $13,875 in disability cases; $743,890 in death benefits ; covered by endow¬

ments, reserves funds and other receipts. The order and lodges also contributed liberally to the' relief movement started in the United

States for the benefit of the stricken Jews in the countries devastated by the great European War.

BRITISH AMERICA, the general name

for the whole northern part of the North

American continent beyond the territory of the United States extending from lat. 41° to 78°

N., and from long. 52° to 141° W. The frontier line between British America and the United States was determined by the conventions of 1839 and 1846. It is bounded east by the Atlan¬

tic Ocean, Davis Strait and Baffin Bay; north by the Arctic Ocean ; northwest by Alaska ; west by the Pacific Ocean ; and south by the United States. In its broadest sense British America includes all the Canadian provinces, the Hudson Bay and Northwestern territories, Nova Scotia, Newfoundland, Cape Breton,

Prince Edward Island and New Brunswick,

with Vancouver Island in the Pacific, and all British possessions on or near the American continent. Each of these is treated under its own title.

BRITISH ASSOCIATION FOR THE

ADVANCEMENT OF SCIENCE, a society

first organized in 1831, mainly through the exertions of Sir David

Brewster. Its first

meeting was held at York, 27 Sept. 1831. Its objects described in the preamble to the rules of the Association are : <(To give a stronger impulse and a more systematic direction to

scientific inquiry ; to promote the intercourse of those who cultivate science in different parts of the British empire with one another and with foreign philosophers ; to obtain a more general attention to the objects of

science and a .removal of any disadvantages of a public kind which impede its progress.® The second meeting took place at Oxford in 1832, under the presidency of Dr. Buckland, and

since then a meeting has been held every year up to the present. All the principal towns of the United Kingdom have on one or more oc¬

casions formed the place of rendezvous, a

different locality being chosen every year. In 1884 the meeting took place at Montreal, in 1897 at Toronto, and in 1902 the 72d annual meeting was held in Belfast, Ireland. It has also met in Winnipeg, and once in South

Africa where the session was divided between Cape Town and Kimberley. It also met in

1914 in Australia, where a five weeks' visit, the beginning of which was coincident with

the outbreak of the European War, included

in its itinerary Perth, Adelaide, Melbourne, Sydney and Brisbane. In 1916, the Association met at Newcastle under the presidency of

Sir Arthur Evans. The sittings extend gen¬

erally over about a week. The Society is

divided into sections, which, after the presi¬

dent's address, meet separately during the

sittings for the reading of papers and con¬

ference. Soirees, conversaziones, lectures and other general meetings

are usually held each evening during the meeting of the Association.

The sections are: A. Mathematics and Physics; B. Chemistry; C. Geology; D. Zoology; E.

Geography; F. Economic Science and Statis¬

tics ; G. Mechanical Science ; H. Anthropology ; I. Physiology; K. Botany; and L. Educational Science. Local committees are formed to ar¬

range for meetings, *etc.* The important

national benefits conferred by the labors of various members of the Association have long been duly recognized. Among these may be

mentioned more especially the experiments on electricity and magnetism which have achieved such important consequences in the establish¬

ment of the electric telegraph and a more

thorough knowledge of the laws which govern the weather and other meteorological phe¬

nomena. In mechanical science also the labors of members of the British Association have

been productive of the most important results.

As the funds which the Society collects at each meeting are more than sufficient to cover its expenses, it is enabled each year to make direct grants for the pursuits of particular scientific inquiries, which otherwise could not be con¬

ducted so efficiently, if at all ; but besides this direct encouragement, its indirect influence on the promotion of science is undoubtedly great

in many ways. Among the presidents of the

Association have been many distinguished men, including Dr. Whewell (1841), the Earl of

Rosse (1843), Sir John Herschel (1845), Sir R. Murchison (1846), Sir David Brewster

(1850), Sir George Airy (1851), Sir Richard Owen (1858), Prince Consort (1859), Lord

Armstrong (1863), Sir Charles Lyell (1864),

Sir J. D. Hooker (1868), T. H. Huxley (1870), Lord Kelvin (1871), J. Tyndall (1874), Sir

John Lubbock (1881), Lord Rayleigh (1884),

Lord Playfair (1885), Sir William Huggins

(1891), Sir. A. Geikie (1892) and Sir. W.

Crookes (1898).

BRITISH CENTRAL AFRICA. Name

changed in 1907 to Nyasaland Protectorate

(q-v.).

BRITISH COLUMBIA, the most west

erly province of the Dominion of Canada, lies on the Pacific Ocean, and has a series of coast¬

line fiords or passages unexcelled on any shore in the world. The province extends from south to north from lat. 49° N. to lat. 60° N. Its eastern boundary follows the crest of the Rocky Mountains as far as 55° N. and then follows long. 120° W. up to lat. 60° N. British Co¬

lumbia has a total land area of 355,855 square miles, almost exactly three times the extent of the British Isles. There are in addition 16

inland lakes with an area of 2,439 square miles.

It is the third province of Canada in size.

Climate. — The climate of British Colum¬

bia is varied. The Japan current on the Pacific Ocean acts in the same way as the Gulf Stream on the Atlantic, and on the coast region makes a mild though at certain seasons a very wet climate. But the damp breezes from the Pacific Ocean having deposited their moisture on the west slope of the Coast Range pass over east¬

ward as dry Chinook winds, so that 150 miles from the coast are found the Okanagan and

Thompson River valleys where irrigation is

required. As water is plentiful on the mountain slopes, fruit growing is carried on successfully in this irrigated region. Every variety of

climate is thus obtainable in British Columbia, from the humid flats of the Pacific islands and coast mainland to the dry plains of the interior, and then to the icy cold and perpetual snow of the Rocky Mountain slopes. The valleys thus grow cereals in some parts, on the lower lands luxuriant grasses, and fruit of every kind in many places. The climate of Vancouver Island and the mainland coast is dry in summer, some¬

what rainy in winter, but never hot nor ex¬

tremely cold. This region is a favorite resort for people from the prairie country seeking a more balmy climate.

Physical Geography and Mining. — The

greater part of British Columbia is made up of mountains, elevated plateaus and valleys — in¬

cluding the Rockies and Selkirks on the east and the Coast and Island ranges on the west, with an average height of about 8,000 feet. To the west of the great ranges there is a wide and elevated plateau in which is to be found extensive agricultural areas. From and

through these great mountains run several

large rivers — the Columbia, the Fraser, the Skeena, the Stikine, the Liard, the Peace and their tributaries. Naturally the initial resources and development of such a region would be

minerals, timber, fish and similar products. The total mineral products of the province up to and including 1916 has been $559,000,000. The first gold production was in the placer-mining period from 1862 onward, when the banks of the ((goldenw Fraser and other creeks or rivers yielded some $50,000,000. Then commenced

(about 1895) the serious lode mining which is now running into $5,000,000 yearly. The total production of placer and lode gold up to the end of 1916 was $165,500,000; that of silver, $441,400,000; of lead, $36,000,000; of copper, $115,200,000; of coal and coke, $166,500,000; of zinc, $6,800,000; besides lime, building stone, brick, *etc.* The total production of the mines in 1895 was $1,266,954; in 1900 it was $4,732,105; in 1911 it was $23,499,072, in 1916 $43,000,000.

The country is divided into districts. Koo¬

tenay has an area of 17,000,000 acres and con¬

tains a large amount of agricultural land, some of it requiring irrigation. The name is syn¬

onymous with the idea of mineral wealth and its mountains are rich in gold, silver, coal, lead, copper and zinc. In the last 20 years a number of towns have grown up around and in connec¬

tion with these mines — Revelstoke, Nelson, Kaslo, Rossland, Traill, New Denver, Sandon, Slocan City, Fernie, Cranbrook, Golden, *etc.*

Yale has about the same area and includes the rich valleys of the Okanagan, the Nicola, the Similkameen and the Kettle River country. It has large cattle ranges and fruit farms as well as the Boundary mineral region. Lillooet con¬

tains some 10,000,000 acres, is bisected by the Fraser River and well adapted for cattle raising and dairying. Big game is common and there is still some placer mining. Westminster is about half the size of Lillooet and includes the eraser River Valley, which has one of the

largest compact areas of agricultural land in the province. Lumbering is an important in¬

dustry and salmon-canning its best known

business. Cariboo was the centre of the great placer mining excitement of the sixties, when so much gold was taken out of its creeks.

Hydraulic mining is now conducted on a con¬

siderable scale. Cassiar is largely unexplored.

There have been gold discoveries in Omenica, in the vicinity of Dease Lake, in the Atlin country and Skeena.

Comox includes the northern part of Van¬

couver Island and contains one of the chief logging camps of the province. It is rich in timbers, fish, minerals and agricultural land, though as yet very sparsely populated. This latter description, outside of Victoria and its vicinity, will apply to the whole of Vancouver Island. The gross output of provincial collieries in 1916 was 2,500,000 tons.

There are vast areas of coal in the Ground Hog district in the northern part of the prov-

•Lakt Ut,

u.rfs >

Tii'i!. ij/ Irllif

Mt Wr,opIe

h./.t

briogvii

‘s,‘»»:uny

“‘HAN!

aincsj

%bln«

iBeur t.ui

c,*t«’ Mt’

Stew art

PlilXCE

Kill do

REVfLL/O

-Vahlin

B’Own

(WALLS

yai-tfci

Sy&ACOF

island’

Si’ll In Lake

Itemnenr

St oU’h

fttaj

‘SLAND

rf No** Bay

Ka»s Harbour

Hltchlf

Dor roc n ,i

Moricctow ill

i, MrLtod Lake

rVjTiKl.ty\X»-

/ Kvolyii\A(r

iac Kntlily ii\It

8mltlltr»\V\ii

Tot low WY

Telbv.tipN >

tiu burl

JItirJI

’C, Charon.

‘renihleuriLake

PlttnooVlW.

i rp Lakt

| ‘anarsdolV/

It.-ymkeluiVˆy,

Ani.tbunv

/7\s. I t.’-Clu

A-rroce

Wioou Di-

8 limin’

‘Hobart Bay

“mS “rrtio

Sooi« l)u.

ˆ Ln helve l

?-OT lb I.

_ >Valcotr

Barrett Ul

t*Mc Pt

£jff

f\iiA-Lab*.

tgS-gijili,

STKrytExtˆV

r…

Bum‘1 Lhi kul L.

Ewi upton

g < .i > |K!Si4S

sm

BRITISH

COLUMBIA

C. GcorpeVˆ

! Oocsbev*

Browning But,

£SS£

; hiK uIr CKiljlo!

rxveald

■ *> 1 t;toV > »rr»*

[Mita”lC*d

u o*W*r

!iv,.l > l8S

r Mudge

L—toveU— — ~T

ulU’ln’”

VarU.

Hopkins PU

WcC*i

Chest alto i.akt

IKSOVRV I.

/■<! «rj

yteturtK a!

Chilnhv

Xatalkns

\ˆUk<

fifin’ Cariboo*

W i*.<»»‘out*»

Howes

WcrUvUcn _

ilonO «««**

Jasper

It* ˆSp’i fr.

ˆ Rbruslirlu

.. Jhin

Hun

Foul

f Bu.Ufr Pi

Kiiliii,,

Black water’

Bulsul L

««rlr ft U

-JsefjpCh onQ

IlthvKH rl

«Vw rr CAa„

rummer -Sxf”

KllloUe LaKt

Statute Miles, 68 = 1 Inch.

Otter

usage tj

EsTkv

Barkt

Mal‘9ne

h’atuen Lake

PRINCESS’

[KOVAL

ISLAND {

icliv-1

Bu<I McXaIIj’ *»«• II f U Mtp ol Ofltnh Columbia Copjfl*bl tj Ru>4 MoN»ilj S Co.

Tfilhiku:

<Jtu t ,

MORESBY

1 Lanka /?„*

Oo.Rie

ttorilegC

TioE-Itir Ijiai

Keitbicjˆ

Knris<|iii

Crvek”

‘Suilh

i,iwr ry ;

0*m.ra Ivlamw*

AUI5TAZAULe)i

.Quvsncl Fori

Alexandria!

Trrrj| Sound

pnv.tBV 1.

}ˆi‘hiillle’Inlet

klbrctl*

ISLAND1

V Puy pt;ˆ

Bella Coo la

fit Harper’s0”

Pn Camp

VV >‘soo

bio c a r

150 Ml’e House

Ho*** FV.W

vjrruiiˆ

“Tsj H.clO’

IˆoKVm’ W

Bauds well IsA

Ttlstc Crick

CA’II’UKlij;

C St.

L» Itarlie.

Cioo Mi I;

Tiilla-

’/yT ^^Alc’fjl

lo**’ /j.

IcMuri’I’J /N

jmtnty

,ake\

Choe[<l”<“l

L«he<^

Olncr/R’”’”

Hkcati

ilC.a’iV

Mlt Olirj

Calve nth.

■ Cliw Cliu»

Mt Bowrrui

Flat Mt.

Chi III A

ygAuh Cr.

Clinton .

Mt Lowo ˆ

v(.ariao.iV

C.ra.

‘U.r.llj

I Siuil.iJ’

‘jf’ Jrer *U«°n \

ˆ.aleAˆiioii’ l-3‘1

t 7 . o“f t ■ B

1 B»try».n ˆ "

\

Mt.RodeM

VVlttl-D

Hiu-E

Mt.

Wood

I KVHifarEf

Ms- .

Clf ir’\’\JPl v,,lirl X|

ffk0Abr

,vVnp’ roil« 0ˆ“k’

str4 dLP

y\ erUf>® tmnbjl

o™“““»

/yiongL*’}’ ai

iiiy Aina 1 /

foWnnayanJˆI! 4

„bjH.X

■m. M. tl.ro

Sjund

hit Srr’nU

/nut*

/Intel

Ml. M’ B”’

Powelli^^^

irvr:

Cower I’oln^

larf’-‘ 1

.‘ape I’ulincri.loiS

V Topkiiol 1*1.

Yuncoti

CollinF

GouIQ/^-n,

!* Dome C-

3 > ^Ciiaf3/i/o Sound •

tA«rn > ut > en

— ˆ Mt *

Oenman I

Bun/ i’vMi _ 1

/ Ciavjvt’a j]

),tlHnrl 1

Bahuni

ftuckˆBoj: 0ˆ

\UIIooet L.

JCIaAklno Intel

S Brook* [/In

\Okanag > i’

Slf r\

’often*)

ITon L >

ijI'.IUlY _

rwnisJu

tamVrK,ˆfif<

K j iii|Hut 1'

Quatlna; k i ,Cˆ?aA

/A.mlhr IlM

' • U Rl»»* X

• • Altxndra P K.

iW-tQna.

toil

'Mt chwth'l' \

VFA wiollultl

1 a jj ton llnrh

JTuk»5 »Wr

rc.Tˆ

i > loV’e ˆ

fxi.Uuli’-Jg

O.lX.” ■

Tulfbu

Eupcrnnza Inlet

Ferrer l*tJ

Lyudoo

LMn»‘l| 5 <

‘vol-“n

Atl.aiit»‘n

l

N E W

■ Cnrin’

iVUcn‘1

Vsu

E vi-run ii;

ttH* rtseu

R Mj Aib*itsmia«n

Buttle r.,«dw«“lC”iHOiˆj.

ˆaxkoinˆ

SaLIaxo

fVansn

Birch Bail

d-tkaI

foeior

l»«n niamll i- ~i

1 8’unjwmV Fs

Knli’d’

I BrudiliawXi

.] ktlinda

llluglinii

Central;

V/VmiCOU)^

\Y«wi min

MAltHiU’ ft»-Ht:

U H* W

u;; Koiiiil“‘0

UV^MI. S—S”cU;nc;,r

lA^niwymilli f ./,,|\ mill

Mrtallni

Fall*

Wlokorsliaiir

Clayoqiiol Sound

p,n OulAic

e0 < xv bdu*

.OJocict

A®phluli« Plˆ C’.

SauirN Oaovr.-’ ■

Barkley So*

“Mitre

VICINITY OH

VICTORIA AND

VANCOUVER

Faehtna Boy l_

Carmanali

i.-rsliai”

OrcHt*

Booillo TV

ictoIria

VICTORIA 7

yST ■

Ws8Hˆ/

.¥ v ™

Y Can**,

%>

— %

.

.

‘ • I.

*

•

•

.

. ‘

*

✓

*

\

.

-

ince, at present not accessible for want of rail¬

way communication. Large areas of low grade gold gravels are found in the Cariboo district awaiting some cheap method of hydraulic

mining. There are large deposits of zinc in the Slocan district associated with lead and silver. This was formerly regarded as a nui¬

sance by the silver lead smelters. European War prices, with better methods of separation and refining, have made these resources valu¬

able. The operators are now working over the dumps where zinc blende was formerly thrown away. Every zinc prospect in the Kootenay is now worked to its full capacity. The value of zinc produced in 1915 was $6,000,000; in 1916

nearly $7,000,000. Iron ore is found distributed over the province with large deposits on Tex-ada Island, from which small quantities of ore have been taken for export. In 1917 it was ex¬

pected that active measures would be taken for the further exploration and development of

these resources. The output of metalliferous mining in 1916 was over $32,000,000, an increase of 54 per cent over the previous year. While this increase is partly due to higher prices there was a gain in quantities of lead, copper and zinc. It is estimated that the value of the mineral product for 1917 will exceed $50,000,000.

Lumber. — The timber resources of British

Columbia are enormous. With 50,000,000 acres, containing 400,000,000,000 foot board measure¬

ment, the province has more saw timber than any other in the Dominion. The chief commercial woods in the order of importance are Douglas fir, red cedar, spruce, yellow pine, western larch, western hemlock, but maple, oak, alder and other woods of less commercial value

abound. The total value of forest products in 1916 was $35,528,000, an increase of $6,000,000

over the previous year. This included lumber to the value of $21,000,000; pulp $3,500,000; shingles $4,500,000 ; boxes $1,800,000. More than two-thirds of the lumber cut of 1,280,000,000 feet was Douglas fir which is not found elsewhere in Canada. This remarkable wood, produced

from the largest trees in the Dominion, makes the finest structural timber obtained in Amer¬

ica. It is equal in quality for building pur¬

poses to the Southern or Georgia pine, and can be obtained in much

larger sizes. This makes it .useful for building wharves and trestles.

Squared sticks 70 to 100 feet long and 3 to 4

feet in section are shipped. The province has a considerable export trade in lumber under

normal conditions, and efforts are now made to introduce this product to markets not yet reached. At present the chief market for

boards outside of the province is in the Prairie provinces of Alberta, Saskatchewan and Mani¬

toba, though there is a considerable trade in shingles with the United States. Most of the Douglas fir is grown in the Coast district and the islands. The logs are brought to the sea board or the rivers, and rafted to mills on the coast and inlets. Some of the principal saw¬

mills are at the mouth of the Fraser River, and one of these claims to be the largest in the world. There are sawmills also in the interior, on the western slope of the Rocky Mountains, where lumber, chiefly spruce, is manufactured for the Prairie market. Pulp and paper mills have been established at Powell River and else¬

where, and this industry is becoming one of the most important in the province.

Fisheries. — British Columbia has for some

years led all the other provinces of the Do¬

minion in the value of its fishery products, and in the fiscal year ending March 1916 yielded 40

per cent of the Canadian total. The value of fish produced in the province in 1916 was $14,-

538,000; of chief importance among these fish is the salmon. In 1916 the salmon catch was valued at $10,700,000. This included 350,000

hundredweight of fish sold fresh, valued at $2,422,000; and 1,133,381 cases of canned salmon of the value of $7,933,667. There are several kinds of salmon, of which the one known as the ˆsockeye® is preferred for canning, while the (<spring salmon** is considered the best fresh table fish. Great Britain is the largest market for canned

fish, but they are shipped to many countries. Second in importance is the halibut.

It was valued in 1916 at $1,972,000; herring, cod, oulachons, clams, sturgeon are also pro¬

duced in merchantable quantities. Whale fish¬

eries are prosecuted with some success. The seal industry has been discouraged by inter¬

national arrangements.

Agriculture. — While a large part of the

province is unsuitable for farming, there are fertile valleys and plains, and in the north a considerable area of prairie east of the Rocky Mountains. The Okanagan Valley, the Thomp¬

son Valley and much of the coast country is suitable for fruit growing, and British Co¬

lumbia fruit has acquired a considerable reputa¬

tion abroad. The delta of the Fraser is ex¬

ceedingly rich, producing phenomenal crops of fruits, hay and cereals. It is no uncommon thing to harvest over 100 bushels of oats to the acre on these lands, while 20 tons of pota¬

toes is not regarded as an extraordinary crop.

The valleys are well adapted to dairy farming, and the Ashcroft district is renowned for the quality of its potatoes. The Peace River dis¬

trict, which is yet mostly unsettled awaiting railway extension, is a prairie country suitable for wheat growing. The total value of farm products in 1916 was computed to be $32,000,000.

Industrials — British Columbia cannot be

considered as yet a manufacturing province ex¬

cept in special industries such as lumbering, mentioned above, fish canning, the smelting of metals, the manufacture of pulp and paper, and of late, shipbuilding. In 1917 there were under construction or contract at Vancouver, Victoria and their neighborhoods 10 or 12 steel ships and at least 20 wooden ships. The latter are mostly auxiliary sail and power vessels.

Commerce and Transportation. — For the

year ending March 1914, the imports through the ports of British Columbia were valued at $58,-

000,000; exports $34,000,000. The trade fell off during 1915 by reason of the war and other causes to $36,000,000 imports and $34,000,000

exports. For the fiscal year 1916 it is consider¬

ably larger, but the returns are not available.

In proportion to population, British Columbia has in existence and under construction more railway mileage than any other province, and perhaps more than any other country in the world. This is partly due to the fact that it is on the transcontinental highway, and partly also to the, perhaps excessive, ambition of its people and government ta open up the

country for settlement as rapidly as possible.

Three transcontinental lines, the Canadian Pa¬

cific, the Canadian Northern and the Grand

Trunk Pacific, pass through the province, the latter with its terminal at Prince Rupert in the north, the other two reaching the ocean at

Vancouver, and the Canadian Northern having

extensions on Vancouver Island. The Cana¬

dian Pacific has branches along several of the valleys, a second main line through the Rocky Mountains, into the Kootenay country, a system of Railways on Vancouver Island, extensions

into the United States, lines of boats on the Okanagan lakes, the Kootenay lakes and on the coast, as well as between Vancouver and Vic¬

toria, with ocean lines to Asia. These main lines of course run east and west. Another important railway, the Pacific Great Eastern, under construction and near completion, runs north and south connecting the port of Van¬

couver with the Grand Trunk Pacific and is expected to extend into the Peace River country, farther north and east. The Great Northern

Railway of the United States has extensions to Vancouver, where in 1917 extensive terminals were in preparation. In 1907 the railway mile¬

age in the province was 1,686. In 1915 it was 3,100, in 1917, about 3,600, with at least 500

miles under construction. The province has

guaranteed the principal and interest of bonds to the extent of some $50,000,000 for the Ca¬

nadian Northern and Pacific Great Eastern

railways. The British Columbia Electric Rail¬

way system includes street lines in Vancouver and Victoria with suburban extensions and a line from Vancouver through to New West¬

minister, to Chilliwack on the Fraser River, the whole including 225 miles of track.

Finance. — The estimated provincial rev¬

enue for the year 1917-18 is $9,868,325 ; and the estimated expenditure $10,800,804, including

in the latter case $2,032,225, charged to capital.

The chief sources of revenue are Dominion sub¬

sidies $623,000; timber licenses, royalty and leases $2,300,000 ; taxes on real and personal prop¬

erty $3,000,000; income tax $1,090,000; succes¬

sion duty $400,000; with numerous fees, *etc.*

The real estate income and property tax was largely increased in the budget of 1917, and the expenditures reduced. In the previous two

years there were large deficits. The expendi¬

tures include interest on the debt, the cost of civil government, administration of justice, with an expenditure of $150,000 for agriculture, and $1,800,000 for public works. The debt of the province in 1916 was computed to be $15,000,000, which is largely represented by roads and

bridges constructed through this mountainous

country. There were certain assessments in

the form of uncollected royalties, taxes and amounts due for lands. Besides the above in¬

debtedness there was a contingent liability on railway guarantees.

Population.' — The population of British

Columbia was in 1871, 36,247; 1881, 49,459; 1891, 98,173; 1901, 178,657; 1911, 392,480. In 1911 there were 251,619 males and 140,861

females. Of the male population in 1911,

68,963 over 21 years of age were foreign born.

Of these 12,188 were naturalized and 56,755

alien. By origin 133,186 were English; 40,642

Irish; 74,493 Scottish; 8,907 French; 11,880

German; 7,015 Austro-Hungarian; 15,968

Scandinavian ; ’ 6.896 Russian ; 9,721 Italian ; 20,134 native Indian. The Oriental popula¬

tion included 19,568 Chinese, 8,587 Japanese and 2,292 Hindus. Of the total population in 1911, 170,000 were born in Canada; 107,000 in the British Isles; 125,000 in foreign

countries, including 40,000 born on the

European continent and 38,000 in the United States. Of the foreign-born Europeans, Austria-Hungary contributed over 6,000, Italy over

8,000, Scandinavian countries, nearly 11,000.

Classified by religions, 101,000 were Anglicans, 82,000 Presbyterians, 58,000 Roman Catholics, 52,000 Methodists, 19,000 Lutherans, 17,000

Baptists, 3,600 Greek Church ; while 26,000 are recorded as of Eastern religions, that is,

Buddhists, Mohammedans, Hindus, *etc.* The

population was more than half urban, viz.,

203,687 urban to 188,796 rural. The chief

cities are : Vancouver, population (1911) 100,401, the fourth city in Canada ; Victoria, the

capital, 31,600; New Westminster, the former capital, 13,199; Nelson, 4,476; and Prince

Rupert (which commenced its existence in

1911), about 10,000.

Educational. — The educational system and

methods of British Columbia are quite ambi¬

tious. The provincial treasury in various ways contributes $2,000,000 a year, or $5 per head, toward public education. The University of

British Columbia, situated near Vancouver,

has faculties in arts, applied science and agri¬

culture. There are two normal schools and

30 high schools, with night schools for tech¬

nical instruction. The system is non-sectarian, with English as the only language of instruc¬

tion. The law provides for compulsory at¬

tendance. There are 419 schools and colleges altogether, the total enrollment during 1916

being 64,570 pupils, of whom 31,523 were in graded city schools, 15,350 in rural municipal¬

ity schools and 12,927 in rural and assisted schools. The total number of teachers em¬

ployed was 2,064, of whom 162 were in high schools, 845 in city graded schools, 499 in rural municipality schools and 558 in the rural and assisted schools.

Government. — The administration is vested

in a lieutenant-governor, and a cabinet, com¬

prising the Premier and seven heads of depart¬

ments, writh two or three other members of the executive. The heads are Minister of

Finance, Attorney-General, Provincial Secretary, who is also Minister of Education, Ministers of Lands, Mines, Public Works and Agriculture.

There is a single chamber legislature of 47

members, elected by manhood and womanhood

suffrage. Women were admitted to full citizen¬

ship in 1917, after a popular referendum.

Justice is administered by a Court of Appeal, composed of a chief justice and four other judges; the Supreme Court, comprising a chief justice and five others, 10 County Courts, each with one judge, except that of Vancouver

which has three. There are also minor courts and juvenile courts.

Early History and the Hudson's Bay

Company; — When Sir Francis Drake sailed

up and down the Pacific coast of North Amer¬

ica in 1578-79 and took possession of what is now the State of California, in the name of Queen Elizabeth, he is said to have sailed as far north as the entrance of the Strait of Juan de Fuca. In 1592 the Spaniard whose name is borne by those straits entered them and sailed a good distance up the Strait of Georgia, be-BRITISH COLUMBIA

1 City of Victoria from Parliament Buildings 2 House of Parliament

i

*

v

)

BRITISH COLUMBIA

tween Vancouver Island and the mainland of

British Columbia. Juan Perez, another Span¬

iard, in 1774 and Behring, the Danish naviga¬

tor, in 1748, touched at points of this territory.

But it remained for Captain Cook in 1778, under instructions from the British government, to really explore its coast and give names to places since well known to history.

Other explorers followed — Hanna, Meares,

Portlock, Dixon, Haro, Duncan and Barkley

— -until in 1792 Cap. George Vancouver came with instructions to carry out a thorough sur¬

vey of the intricate coast lines of the future province. After this period, for many years, Great Britain ceased to show any interest in the country. To the aggressive, enterprising traders of the Pludson's Bay Company was due the fact that the British flag was kept flying at all and that it was not eventually replaced by that of the United States, as in Oregon and Washington. In this connection the arrival of the company's steamer Beaver by way of Cape Horn, in 1835, marked an important era in the history of the province. Of the overland ex¬

plorers the chief were Sir Alexander Macken¬

zie, 1793, Lewis and Clark, 1804-06, Thompson in 1807, Simon Fraser in 1808, the Astor ex¬

pedition of 1810-11. From this time until the middle of the 19th century the history of what v, as then called New Caledonia is a record of Hudson's Bay fur-trading, occasional inter¬

national or inter-company disputes, the build¬

ing of dozens of forts, the maintenance of law and order amongst the Indians. Exclusive

trading privileges were given the company in 838, Alaska was leased by it in 1839, the Jregon boundary was fixed in 1846, and Van¬

diver Island was ceded in 1848 for a brief period.

Gold Discoveries and Early Constitu¬

tional History. — In 1858 a rumor reached

San Francisco that gold had been found in the Fraser River. A party left at once for that region and the result of their success was a stampede from the Pacific coast city to the golden banks of the Fraser. The Horsefly dis¬

coveries and the rich bars of the Quesnelle were the next attractions. In 1861, the cele¬

brated Williams' Creek was found and turned out to be one of the richest discoveries of the kind in history. Many claims paid dividends of from $20,000 to $60,000 a year, and all its diggings paid well. One claim of 300 feet of ground produced $300,000. For a time the

placer mines of Cariboo repeated the history of California in 1849, and then came a gradual exhaustion, not, however, before some $50,000,-

000 worth of gold had been extracted.

Meanwhile, and up to 1849, the government

of Vancouver's Island and the mainland of

New Caledonia had been that of the great

fur-trading company under its royal charter of 1670. In 1849, however, special terms were

made with the company as to Vancouver Is¬

land and it was declared a Crown colony. A governor was appointed

with a council of

seven members and with authority to call an assembly elected by the inhabitants. This legis¬

lature, which first met in 1856, had full power to impose taxes and regulate affairs subject to and with the final assent of the governor. Mr.

R. Blanshard was the first holder of this post, but from 1851 to 1856 the practical ruler of the country was Mr. (afterward Sir) James

Douglas, a man of remarkable character and

capacity, and who combined in himself the

functions of chief factor of the Hudson's Bay Company with those of acting — and from

1856 to 1864 actual — representative of the Crown. On 17 Nov. 1866 the mainland, which was now known as British Columbia and had

been under separate government since 1858,

was united with Vancouver Island. The first legislature of the united province met in Vic¬

toria in 1868, though, as yet, it was only partially elective in composition.

Confederation with Canada. — During this

period the British colonies on the Atlantic and on the great lakes of British America had

combined in 1867, after prolonged agitation, in a confederated system. Ambitious extension had brought them by purchase in 1869-70, the rights and territory of the Hudson's Bay Com¬

pany in Rupert's Land and the western

prairies. Further and greater ambition was

expressed in current expectation of a trans¬

continental line to the Pacific coast. At this point British Columbia came into consideration.

Isolated behind an apparently insuperable bar¬

rier of great mountain ranges and with vast plains stretching for 800 miles between those mountains and the outposts of Canadian civili¬

zation, union was a dream without the prospect of a railway. With it the subject became

practicable.

After much discussion of the subject

throughout the province, the passing of reso¬

lutions by the provincial legislature and pro¬

longed consideration at Ottawa, the terms of union agreed upon included six members in the House of Commons and three in the Senate ; construction, to be commenced by the Domin¬

ion within two years, of a railway connecting eastern Canada with the Pacific coast ; a land grant from the province to the Dominion gov¬

ernment through the entire extent of British Columbia for the railway and not to exceed 20

miles on either side of the line; payment in return of $100,000 per annum to the province for the use of these lands ; assumption by the Dominion of the charge of the Indians and

their lands ; complete responsible government and an entirely elective assembly to be estab¬

lished in the province whenever desired by the people. In November 1870 a provincial election was held and the terms of union approved.

The new legislature met on 5 Jan. 1871, the proposals were unanimously ratified and, on 20

Jan. 1872, British Columbia entered confedera¬

tion. The constitution was then reorganized

upon a popular basis and in 1871 the elections under the new system took place.

Later Political Events. — Hon. J. W.

Trutch was appointed the first lieutenant-gov¬

ernor and Hon. J. F. McCreight the first

Premier. Succeeding prime ministers were

Amor de Cosmos, G. A. Walkem, A. C. Elliott, J. Walkem, Robert Beaven, Wm. Smythe,

A. E. B. Davie, John Robson, Theodore Davie, J. H. Turner, C. A. Semlin, Joseph Martin, James Dunsmuir, E. G. Prior, Richard Mc¬

Bride, Sen. W. J. Bowser and H. C. Brewster.

Following the entry into confederation came

prolonged and at one time acute differences with the Ottawa government over the non¬

completion of the Canadian Pacific Railway.

For some eight years, while that great under¬

taking was in the struggling stages of inception and preliminary construction, the discontent in the province was very great. _

Meantime, however, construction went on

slowly and surveys continuously. The im¬

perial authorities were appealed to and mis¬

sions came from eastern Canada and others

went to London. Finally, Lord Carnarvon, as Colonial Secretary, suggested terms of settle¬

ment which were agreed to by both parties and which involved the construction and com¬

pletion of the Canadian Pacific Railway by 1

Jan. 1891. It wras completed in 1885. A visit of Lord Dufferin, as governor-general, to the coast in 1876 had, meantime, done much to

smooth asperities and promote the settlement of this vexed and vital question.

Beyond the ordinary domestic questions,

the chief political and social problem of

British Columbia at the beginning of the 20th century was that of Oriental immigration. Of the 39,000 Asiatics in Canada in 1911, over 30,000 were in British Columbia, and this num¬

ber was nearly doubled in the next four years.

Most of these immigrants are men of working age, so that they would be approximately one-third of the male working people. Chinese

were at first admitted free by Canada. In

consequence of local protest a head tax on immigrants was imposed, beginning at $100

and increased to $500. This did not diminish the movement, for in 1913, Chinese immigra¬

tion was 7,455, but in 1915 it was stopped altogether. Incidentally this deprived the

province of a revenue of $1,750,000; since one-half of the tax was paid by the Dominion to the provincial treasurer. By the treaty between Great Britain and Japan, the Japanese were

permitted to settle in British countries. Canada had the right to say that this agreement would not be applicable to the Dominion, but the Do¬

minion government assented to the treaty. In 1907 Japanese arrived in large numbers; there was a strong protest in Vancouver city where a small riot occurred and damage was done to Japanese property. Afterward compensation

was paid and the Canadian government entered into an arrangement with Japan under which

the Japanese authorities refused permission for more than a limited number of Japanese to em¬

igrate to Canada. A little later a considerable Hindu movement into British Columbia took

place. This has been checked by regulations requiring direct sailing from India. In 1914

there was some trouble over the arrival of a shipload of Hindus arriving in violation of this arrangement, and they were returned in the

same ship to India. The second decade of the century witnessed in British Columbia, as well as elsewhere in Canada, a period of eager and rapid railway construction, of speculation in real estate and of material development of

many kinds. Land prices advanced rapidly,

especially in cities and townsites along the lines of new and proposed railways. Reaction fol¬

lowed, with a drop of prices and a period of financial stringency, from which in 1917 the province was rapidly recovering. At the be¬

ginning of the war in 1914 the people of British Columbia responded quickly to the call for vol¬

unteers, and by the end of 1917, over 50,000 out of the population of 400,000 had enrolled for overseas service. See Canada and consult

works there referred to.

Bibliography. — (Official Reports of the

various Departments of the Provincial Gov¬

ernment ; (British Columbia Year Book) (Vic¬

toria, annually) ; Brown A. G., (British Colum¬

bia : Its History, People, Commerce, Industries and Resources > (London 1912) ; Fairford, F., (British Columbia) (ib. 1914) ; Gosnell, R. E., (Year Book of British Columbia) (London) ;

Thornhill, J. B., (British Columbia in the Making) (London 1913).

S. Dunn Scott,

Editor of News-Advertiser, Vancouver.

BRITISH EAST AFRICA, a name de¬

fining a vast district between Tanganyika Terri¬

tory and the Italian protectorate of Somali¬

land. With a coast line of about 400 miles, it extends from the Indian Ocean inland to the Belgian Kongo and contains the valley of the upper Nile and the mountainous region of

equatorial Africa. Included within its area

are the East Africa Protectorate, the Uganda Protectorate and the islands of Zanzibar and Pemba. The total area is estimated at over I, 000,000 square miles, and the population at between seven and eight millions, largely com¬

posed of Bantu tribes, among which are the Waganda and Wangoro, Masai and Galla

tribes; Swahali and Arabs on the coast, and negroes on the Nile. The coast is unhealthful for Europeans, but the interior highland

plateaus are salubrious, and of great fertility.

With the suppression of slavery and the slave trade and the construction of roads, railways, telegraphs, telephones, etc., the government is gradually opening up the interior to civilization.

Ivory, gum, india rubber, cocoa nuts, copra, coir maize, rice and hides are exported. Coffee plantations, stock raising and ostrich farming are the chief of modern developments (See

East Africa Protectorate ; Uganda Protector¬

ate; Zanzibar). Consult Drumkey, Y. S. A.,

(YearBook for British East Africa) (Bom¬

bay) ; Playne, S., < British East Africa) (London 1910) ; Stigand, C. H., (The Land of Zinj — An Account of British East Africa> (London

1913).

BRITISH ECONOMIC ASSOCIA¬

TION. See Royal Economic Society.

BRITISH EMPIRE, the aggregation of

states, self-governing colonies, dependencies and protectorates which is subject in the last resort to the British Parliament. Officially it was not entitled to the name till 1876, when Queen Victoria assumed the title Empress of India; but the term was in current use long before.

It is the largest body of land and of people under any one jurisdiction on the globe, com¬

prising about one-fourth of the earth's sur¬

face, and one-fourth of its inhabitants : over II, 500,000 square miles, exclusive of Egypt, and Egyptian Sudan, or 12,500,000 with them, and 400,000,000 population. Extensive portions of it lie in each of the five grand divisions of the globe: about 121,000 square miles in Europe, 3,700,000 in America, 1,880,000 in Asia, 2,700,000

in Africa, 3, 1 75,000 in Australasia. Its organiza¬

tion is entirely different from that of any other “empire® in history. The control of the central government over the outlying sections varies from autocracy to a merely nominal control; BRITISH EMPIRE

the most valuable parts are the least controlled, and have become the most valuable largely by that freedom. None of them pay any taxes into the imperial treasury, and the mother country derives her profit from them solely through trade relations and as furnishing employment for the overflow of British youth. Indeed,

movements for independence are forestalled by the concession of whatever privileges are

claimed by the self-governing colonies, even to the imposition of discriminating duties on Brit¬

ish goods; and it is a postulate of British poli¬

tics that no forcible resistance shall be offered if any of these wishes to withdraw altogether.

The nucleus of the empire is the United

Kingdom of Great Britain and Ireland, ruled nominally by a hereditary sovereign ; actually by a Parliament with one chamber popularly

elected and the other composed of hereditary peers. Even the latter in practice almost invar¬

iably yields to the popular house when that body is firmly set on a given policy.

The subordinate portions fall under six

classes: (1) Wholly self-governing commu¬

nities : their sole ties to the mother country be¬

ing an ornamental governor whose real func¬

tions are social and argumentative, the right of appeal from their Supreme Courts to the Eng-ish Privy Council (even that curtailed in Aus¬

tralia), and the home government's nominal

right of vetoing their laws, which, in fact, is never exercised. Canada, Australia and the

Union of South Africa are the chief exemplars.

(2) Those where the home government appoints part of the legislative body as well as the gov¬

ernor. This is entirely composed of the Chan¬

nel Islands, Malta, Cyprus, Ceylon, Mauritius, Jamaica, the Leeward Islands, British Guiana and Rhodesia. (3) <(Crown colonies,® where

the ruling body, an executive and council

(sometimes two councils, executive and legis¬

lative), are wholly oppointed by the home gov¬

ernment, without local representation, and are directly responsible to the Colonial Secretary, except India, the greatest of this type,

which is under a special secretary of state and home council. Of the others, the chief are the British settlements on the west coast of Africa — Sierra Leone, Nigeria, the Gold Coast, Gambia and Lagos ; the Straits Settlements and Hong¬

kong; in America, British Honduras, Trinidad, the Windward and Falkland islands ; in Austral¬

asia, Fiji. The titles of these imperial rulers and of the group following are various : gover¬

nor, commissioner, high commissioner, resident, *etc.* (4) Those administered by a single official under the Colonial Secretary, without a council.

Such are Gibraltar and Aden, Ascension (under the control of the Admiralty) ; in Africa, Basu¬

toland, Bechuanaland, and the protectorates of British Central and Eastern Africa and British Somaliland — administered respectively by the consul-general at Zanzibar, a resident commis¬

sioner and a consul-general at Berbera; and Egypt, a protectorate over which was assumed in December 1914 under a high commissioner.

(5) Government by a trading corporation,

licensed and supervised by the home govern¬

ment, formerly the chief colonial system in Europe, and the only intelligible object of col¬

onization. Great Britain has now but one de¬

pendency of this type: British North Borneo, where the company's governor must be con¬

firmed by the Colonial Secretary. (6) Mere con¬

trol of a native government by a resident com¬

missioner, or power to interfere if judged ad¬

visable, or sometimes scarcely more than the marking out of a (<sphere of influence® within which other nations are debarred from med¬

dling. The chief types of this class are some 40

native states of India, Zanzibar, Uganda and the native states of the Malay Peninsula.

In detail, the components of the empire, the dates and methods of acquirement and the title by which they are held, are as follows :

Europe. — (1) The United Kingdom. Eng¬

land in its modern sense, though much re¬

stricted toward the north, first owned a com¬

mon overlord in 827 ; broken up by the Danes, it became a wholly Danish kingdom in 1013, again an English one in 1042, part of an Anglo-French system in 1066, and was practically re¬

stored to itself in 1214, with its northern limits as now. Wales was finally subjugated by

Edward I, after a long war with Llewellyn ap Jorwerth, in 1284. Scotland, a kingdom own¬

ing overlordship to England, received a king by English arbitration in 1291, revolted and was conquered, revolted again and won its inde¬

pendence in 1314; with the accession of its King, James I, to the English throne in 1603

the two crowns were united, and in 1707 the Scottish Parliament was abolished and Scotland incorporated with England. The Isle of Man, a Scandinavian lordship, was ceded to Scotland in 1266 and to England in 1290. The Orkneys and Shetlands were pledged by Denmark to

James III of Scotland in 1468 as security for his wife's dowry, and never redeemed. Ireland was invaded by Strongbow in 1169, and nomi¬

nally annexed to England by right of conquest in 1172; but only a small cantle of it, (<the Pale,® was effectively occupied till the time of Elizabeth, and the island as a whole was first effectively subjugated by Cromwell. It was

governed by its own Parliament till 1800, when the Act of Union incorporated it with Great Britain. (2) The Channel Islands (Guernsey,

Jersey, etc.), in the bay of Avranches off the French coast, are the sole remnants of the French possessions of the Angevin house. (3) The fortress rock of Gibraltar and the small plain at its foot on which the town is built were taken from Spain in 1704, during the war of the Spanish succession. (4) Malta, with

Gozo, etc., islands south of Sicily, were taken from France in 1800, during the Napoleonic

wars. Malta is the chief British naval station in the central Mediterranean.

Asia. — (1) India, with Burma. For the

component parts of this mighty possession,

three-fifths the size of the United States without Alaska, and for its government, see its name.

Its nuclei were the three factories of the East India Company : Fort Saint George, row

Madras, built 1639; Bombay, received from

Portugal in 1662 as part of the dowry of

Catharine of Braganza, Queen of Charles II ; and Fort William, now Calcutta, founded by

Job Charnock in 1686. The attempt of the

French to build a colonial dominion on the ruins of the Mogul empire, in the 18th century, forced the company's local officers to act in self-defense, with the result that northeastern India fell into their hands, the decisive event being the battle of Plassey (1757). Wars,

cessions, annexations, protectorates, residencies, etc., have gradually brought all the rest of the peninsula under English control. The company ceded its rights to the English government in 1858. (2) Ceylon, the tip of the Indian pen¬

insula, is independently governed. It was taken by England from the

Dutch in 1796, during the French wars, but not ceded to her till the Peace of Amiens in 1802. (3) Cyprus, an island south of Asia Minor: was ceded by Turkey in 1878, as a result of the Russo-Turkish War, in return for a treaty by which Great Britain agreed to defend Turkey against further territorial de¬

mands from Russia. (4) Aden, on the south

coast of Arabia: was taken by the British in 1839 as a coaling station, in compensation for the maltreatment of shipwrecked British sail¬

ors by the natives. The island of Socotra to the east, off the mainland of Africa, was an¬

nexed in 1888; and the two — with Perim

Island at the mouth of the Gulf of Aden and the Kuria-Murias on the east coast of Arabia —form one administration, a dependency of the Bombay presidency. (5) The Straits Settle¬

ments : This group, comprising the end of the Malacca Peninsula, was transferred in 1867

from the control of the Indian government to that of the Colonial Secretary. It consists of (a) Penang, formerly called Pulo Penang and later Prince of Wales Island, originally re¬

ceived by a British adventurer as dowry with a native chief's daughter, then turned over to the East India Company in 1786; (b) Malacca, occupied by the British in 1795, but not formally ceded to them by the Sultan of Johore till 1824, along with (c) the island of Singapore, the capital of the whole. Some of the native Mal¬

accan states are also under British protection.

(б) Hongkong, China, was occupied by the

British in 1841 as a result of the opium war, and ceded to them in 1843. (7) Labuan, an island off Borneo, of which Great Britain obtained the cession in 1846, with great hopes of its coal mines and harbor not borne out by experience; it has also been a convict settlement. (8) Brit¬

ish North Borneo, ceded to a commercial com¬

pany by native sultans in 1877, but taken under British protectorate in 1888. (9) Brunei and Sarawak, southwest of the above, are governed by native rulers, but under British protection.

(10) The Siamese states of Kedah, Perles, Kel-atan and Trengganu, covering an area of 15,000

square miles, were added to the British sphere of influence in 1909.

Africa. — (1) Sierra Leone, on the west

coast, was begun as a settlement of freed negro slaves in 1787 ; transferred to the Crown in 1807. (2) The Gold Coast: settlement of 1672

by the Royal African Company, made a de¬

pendency of Sierra Leone on the dissolution of that company in 1822, formally ceded by the Dutch in exchange for trade privileges in 1872, and made a Crown colony in 1874. (3) Gambia: settlement united with Sierra Leone in 1822, like the Gold Coast; made a separate colony 1843, reunited to Sierra Leone 1868, then in¬

cluded in the British West African Settlements colony till 1888, when it was again made a separate colony. (4) Lagos, West Africa: the town was an old slave mart destroyed by the British in 1851 ; the colony was ceded to them by the native rulers in 1861. (5) Nigeria: the Niger coast protectorate was constituted in

1884, old trading rights having been previously exercised for generations ; the present protec¬

torate of Nigeria was set up 1 Jan. 1901. (6) The Union of South Africa, comprising (a)

Cape Colony: taken possession of as a derelict in 1795, the settlement having thrown off Dutch rule; administered for seven years, then re¬

turned to the Dutch; again captured in 1806, Holland having become

part of Napoleon's em¬

pire; retained till the general peace .of 1815, then bought from Holland for $30,000,000. (b) Natal and Zululand: taken from the Dutch set¬

tlers and annexed 1843. (c) Basutoland: an¬

nexed to Cape Colony 1871, as the result of an appeal by the Basutos from the claims of the Orange Free State; separated as a special pro¬

tectorate 1884. (d, e) The Transvaal and the Orange River Colony: conquered 1900. (7)

Zanzibar and Pemba. Pemba was ceded to the British East African Company in 1888 by the Sultan of Zanzibar. The latter island was

given over to a German protectorate in 1886 by an Anglo-German convention ; in 1890 trans¬

ferred to England in exchange for the Island of Heligoland off the German coast, possessed by England and a thorn in the German flesh.

(8) East Africa protectorate: recognized by

Germany and France in 1890, with that of Zan¬

zibar, for considerations as above and trading rights, and the recognition of the French pro¬

tectorate over Madagascar. (9) Central

Africa protectorate, organized 1891 from the territories of the British South Africa Com¬

pany. (10) Bechuanaland, constituted a protec¬

torate over native South African tribes in 1895

and a part of the province of Cape of Good Hope.

(11) Rhodesia: the territories of the British South African Company, chartered in 1889,

were brought under the colonial office in 1898, with Matabeleland and Mashonaland. (12)

British Somaliland, completing the circle

around Africa up to Socotra and Aden ; protec¬

torate under the East India Company 1884, con¬

stituted a Crown colony 1898. (13) Egypt,

nominally under Turkish suzerainty, but vir¬

tually controlled by the British government

since 1882, was formally declared a British protectorate in December 1914.

North America. — (1) The Dominion of

Canada is the chief. Its nucleus was the terri¬

tory which fell under British sway by the

French and Indian War 1755-60, definitely

ceded in 1763. The greater part of this was divided in 1791 into Upper Canada and Lower Canada, the former as a real settlement

founded by loyalist refugees from the United States, who also founded New Brunswick.

England also held north of the United States: (a) Nova Scotia, conquered from the French in 1713, after a previous occupancy 1654-67; (b) Cape Breton, conquered 1748, and restored to France; conquered again in 1758 and ceded by France in 1763, when it was annexed to Nova Scotia; again separated 1784, again united 1820; (c) Prince Edward Island, till 1799 called Isle Saint Jean or Saint John's Island, then

changed in honor of the Duke of Kent; cap¬

tured from the French 1745, restored, again taken and held in 1758,

ceded 1763 and annexed to Nova Scotia; in 1773 again separated, (d) Newfoundland, an old fishing station, ceded by France in 1713. In 1841 Upper and Lower Can¬

ada were united. In 1867 the united province BRITISH AND FOREIGN SCHOOL SOCIETY — - BRITISH ISLES

561

was joined with Nova Scotia and New Bruns¬

wick into the Dominion of Canada. In 1871

this was joined by British Columbia, formed 1866 out of the older British Columbia and Vancouver Island, the former organized 1858

from the old Hudson Bay territory of New

Caledonia ; the latter a Hudson Bay territory made a Crown colony in 1849. In 1873 Prince Edward Island also came into the Dominion.

Meantime, in 1869, it had acquired the North¬

west Territories, and in 1870 set off Manitoba and at once admitted it into the Dominion. The provinces of Saskatchewan and Alberta were

created in 1905. There remain the Northwest Territories, north of the Prairie provinces, and the Yukon Territory in the extreme northwest of the Dominion. (2) Newfoundland, which

still refuses to join the Dominion: its history is outlined above. Labrador forms a part of

Newfoundland for administrative purposes.

(3) The Bermuda Islands: settled 1609. (4)

The Bahama Islands: ceded by Spain 1783,

after alternate conquest and reconquest. (5, 6) The Windward Islands and the Leeward

Islands : taken by the English in the general agreement with France for partitioning the

West Indies in 1660. (7) Jamaica, with Turk's Island and Caicos Island: taken from the Span¬

iards in 1655. (8) Barbados : colonized 1625, made a Crown colony in 1663. (9) Trinidad, with Tobago: captured in 1797 during the

French wars. (10) British Honduras: settled

early in the 18th century, but not ceded to Great Britain by treaty from Spain till 1783, formerly known as Balize or Belize. (11) British

Guiana: partitioned off from the other Guianas in 1803, and formerly ceded by treaty in 1814.

South America. — The Falkland Islands,

east of the southern tip of the continent : fought for by British, French and Spanish for many 3rears ; then nominally controlled by Argentina till 1833, when the British took possession of them for a finality, and established a colony in 1851 ; it includes also South Georgia to the eastward.

The South Atlantic. — In the No-Man's

Land between South America and Africa, and

unrelated to either, the British hold three islands.

(1) Saint Helena: definitively secured from

the Dutch by the East India Company in 1673, transferred to the home government in 1834.

(2) Ascension : 700 miles northwest of Saint Helena, settled in 1815 after Napoleon's depor¬

tation. (3) Tristan d'Acunha : a triad of little islands about halfway from the Cape of Good Hope to South America, garrisoned by the

British in 1816 while Napoleon was at Saint Helena.

Australasia. — (1) The Confederation of

Australia, formed 1901. The first colony in Australia was the convict settlement of New South Wales, made a self-governing colony in 1841. Western Australia was founded in 1829, South Australia in 1836. Victoria, settled in 1835 as Port Philip, was set off from New South Wales in 1851. Queensland was settled from Moreton Bay in 1825. Tasmania was a

convict settlement of the Island of Van Die¬

men's Land from 1803 on, but in 1852 the con¬

vict deportation there was stopped, and the col¬

ony made self-governing under the name of

Tasmania. (2) New Zealand was colonized in

1845. (3) The Fiji Islands came under British sway in 1874 by voluntary cession from

Thakombau, the leader of the native chiefs.

(4) British New Guinea was delimited and

formally annexed in 1884. (5) There are a

considerable number of islands in the western Pacific which have come into British hands at various periods, by occupation. The largest

are the Tongas, part of the New Hebrides and the Solomons, Ellice, Gilbert, Union, Cook and Monahiki. (See Great Britain; War, European-Peace Treaties). Consult Dilke, C. W.,

(The British Empire', (London 1898) ; Gold¬

man and others, (The Empire and the

Century ' (1905); Payne, (Colonies and

Colonial Federations' (Oxford 1905) ; Seele}', J. R., (The Expansion of England' (London

1883) ; (The Growth of British Policy' (2

vols., London 1895).

D. S. Douglas,

Editorial Staff of The Americana.

BRITISH AND FOREIGN SCHOOL

SOCIETY, an organization which arose out

of a society founded by Joseph Lancaster

(q.v.) and two of his supporters in 1808, for the purpose of educating the poor children of the realm. In 1814 the Society separated from Lancaster and adopted the name it now holds.

The aim of the Society was reformed to in¬

clude the encouragement of the formation of local committees to found schools, train teach¬

ers, maintain the voluntary basis and to teach the Bible on undenominational lines. The So¬

ciety had representatives in all parts of the world. It founded normal schools, kindergar¬

tens, published textbooks and spread propa¬

ganda for the advancement of education. It

still supports some 1,500 schools, its chief work being in the training of teachers for elementary schools. Consult Binns, H. B., (A Century of Education, 1808-1908' (London 1908).

BRITISH GUIANA, ge-an'a. See Gui¬

ana.

BRITISH GUM. See Dextrin.

BRITISH HONDURAS. See Hon¬

duras.

BRITISH INDIA. See India.

BRITISH ISLES, or BRITISH IS¬

LANDS, a popular name applied to the United Kingdom of Great Britain and Ireland, most

frequently, though incorrectly, called <(England." The name ((Great Britain," strictly

speaking, means only England and Scotland, and was first used by James VI of Scotland when he acceded to the English throne. In official writings that term has since been employed to designate the whole country — the United

Kingdom, of which the genetive and adjectival form is the word ((British," in the same sense as ((American" signifies ((of the United States."

The official form, <(Britannic," is not commonly used except in such phrases as ((His Britannic Majesty's Consul-General," *etc.* In compound

words, where the name of the United Kingdom comes first, the adjective ((Anglo" is used; when last, the term ((British" is employed, e.g., ((Anglo-American," ((Franco-British." The ab¬

sence of any strict definition has at times given rise to some local

jealousy; hence the term (<British" may be regarded as a compromise to include the English, Irish, Scottish and Welsh peoples, and ((British Islands' as a convenient name for the region covered by the United

Kingdom. Beyond that region, ((British Em¬

pire® and <(Greater Britain® are popular expres¬

sions denoting all the self-governing dominions, colonies and protectorates which acknowledge

the British Crown. Thus the official title of the sovereign is ((George V, R.I., by the Grace of God, of the United Kingdom of Great Britain and Ireland and of the British Dominions

beyond the Seas, King, Defender of the Faith, Emperor of India.® This title was declared by proclamation 9 May 1910, under the Royal

Titles Act, 1901.

The British Islands are composed of two

large islands, Great Britain (England, Scotland and Wales) and Ireland, and over 5,000 smaller islands and rocks, with a total area of 121,633

square miles, inhabited (1911 census) by a pop¬

ulation of 45,370,530. The United Kingdom

represents in area about an 80th part of the British Empire exclusive of India; it has just 1,000 square miles less than the State of New Mexico, and comes eighth in order of size

among the European countries. The whole

land and sea area of the British Islands lies practically within a quadrilateral of 10 degrees of latitude and longitude. They are situated at the northwest corner of Europe, with which

Britain was at one time connected. There is evidence that Britain was inhabited before that connection was severed. It is a matter of con¬

jecture whether these primitive people died out entirely. Their successors must have come by sea, and consequently must have been sufficiently advanced to construct and navigate large boats.

The coast, where the white cliffs of Dover are plainly visible from the other side of the straits, was close enough to the Continent to tempt the adventurous and to offer a refuge to fugitives from the hostility of stronger neighbors. Both Britain and Ireland thus became inhabited in one way or another about which history fur¬

nishes no dates. Though Aristotle knew of

the existence of the islands, nothing beyond a few casual notices have come down to us until the Roman conquest in b.c. 55. Some 300 years before that epoch the Greek colonist Pytheas from Massilia had discovered and sailed along the east coast of Britain, and was able to report that the inhabitants practised agriculture,

brewed beer and mined tin. Successive in¬

vasions by Celtic tribes occurred across the channel, and when Caesar arrived he found the coast inhabited by the Belgae, while less civilized Celts in the interior were already being pressed toward the western mountains. For several

centuries after the departure of the Romans Britain was exposed to raids and invasions.

Then came the Norman Conquest (1066), and

England was brought into closer touch with

the Continent, yet the natural insularity of the people so influenced their foreign rulers that 200 years later the Norman or French de¬

scended Edward I (q.v.) was thoroughly Eng¬

lish, and it was he who began the task of unit¬

ing Britain. Not until three centuries later was that task completed.

Ireland is separated from Britain by an arm of the sea which in places is no wider than the Straits of Dover, yet this dividing sea has doubtless contributed in no small measure to keeping the people of Ireland much more apart from England in character

and sentiment than the Scots and the Welsh.

The geographical situation of Ireland made it inevitable that she should be politically united with the larger island in some shape or form.

If Ireland had lain nearest to the Continent, it might have fallen under the control of France as easily as under England: it would in either case have been a bone of contention between the two. That there exists in fact so much hostility to England among the Irish people is an unfortunate illustration of the power which sentiment can exert to override the natural tendencies due to geographical and other con¬

siderations of common interests.

The historic event that most profoundly

affected the British Isles geographically was the discovery of America. A statue of Colum¬

bus in Sefton Park, Liverpool, bears the in¬

scription, <(The man who discovered America

made Liverpool.® In a wider sense, that dis¬

covery shaped the future greatness of the

islands. Up to 1492 the geographical position of those islands was rather a disadvantage than otherwise. Their insularity was no safeguard against invasion ; that later attempts, such as that of the Spanish Armada, were frustrated was due mainly to good luck and fortuitous circumstances. Furthermore, the islands were

geographically the northwestern cul-de-sac of Europe ; mariners who visited the shores

of Britain had perforce to return the way they came, since there was no beyond. The dis¬

covery of America, however, at one stroke

transformed an outlying ((blind alley® into the most important station on the ocean highway between the Old World and the New. From that moment an overwhelmingly powerful fleet, in

other words, command of the sea, became a

logical necessity dictated by the first law of nature and a highly vulnerable position. In an ideal world, where wars are unknown, such

necessity would obviously not arise. But neither the newly-created geographical position nor the subsequent maritime capacity of its people

could alone have built the foundations of

Greater Britain without the natural mineral

wealth of the islands- — the vast resources of coal and iron. Another equally important —and purely geographical — feature is the great natural harbors around the British Isles : Liv¬

erpool, Portsmouth, Southampton, Glasgow,

Leith, Plymouth, Belfast, Hull, London, *etc.*

The accident of geography gave the 13 original States of the American Union a vast and solid ˆhinterland® of over 2,000,000 square miles for future expansion ; less favored in regard to original area, it was primarily the accident of geographical position and its influence upon the inhabitants of the British Islands that made possible the creation of Great and Greater

Britain. See British Empire; Great Britain;

Ireland; Scotland; Wales.

BRITISH LEGION, The, a corps raised

in Great Britain in 1835, numbering 10,000

men, under the command of Gen. De Lacy

Evans, to assist Queen Isabella of Spain in the war with Don Carlos.

They rendered much

assistance to the Queen, defeating her Carlist rivals in several battles, notably at Ayetta, dur¬

ing the two years of their campaign. General Evans was himself defeated at Hernani in 1837, but subsequently captured that place and also several others. Fie acted in conjunction with a naval force under Lord John Hay.

Ty biter/

?= yˆXatheroa

‘ /Berriedale

Olelinsdale

”ˆsSi.ourie.

/ˆVjKvc V1/ Peninsula •»,

[Stornoway *

d>. Erxsvrt « f

HEBRIDES

XaRANSa ‘

jjSe;DE4RCfˆ:

i

Sound of

North Uist k

Lochhroodi’J!

Woch J “

＞H?Tˆerbargb

,fC*V P|t3ligj

‘ l— — q Peterbeau

Ellon/ Buchan Neal.

/ f l’ than It~

\/ Aberdeen.

dnlocnewe

./HiajwaUj

lAchnasheen

,*lIJfe’au|v/C

4＝＞0ronav

■KNBECULA

N

sj Bracaˆ

ISLA

r/^^TGlenclg

Minoulav

jOraˆBCN ‘

BaHachulisli’

vAberfeld’

iberinorjJ

fLTay

‘MORE’

III Bunion i

«JraDieuioutb > c > J

FalUrkˆ — .

, COIN BUR

Pn«sl < *.v > ˆgL4SG0Wˆ

. Ru th c rgl e i (M ˆ ‘r

le*«/ llumiHoiiKˆi!

Lautul

Kilmarnock

laltcoat

i X * ˆ Ellen •

«-v_ Campbell to\

Rirˆ A (

idonagb / V

iimcraun r —

ˆQurm.ock ˆ

DalmellingtonL: : 1

S ˆ VK M!V I > umfr.«l4n ,.

Wklirls®

Wiirlck

Inmoutb

,etb

kewblggin

[South Blytb

Bingham **

ˆTˆrˆBedUngtol

-jilNewrnsj/,

Aran

mill SM« bl

lun«lcrlu>»«l

i ˆ V rˆKUren V. ˆ ˆ.\>‘e\lton Silcwari

ITli&lymenn V „ NT {

•Zy-gA°W” tSfrSiftrgu. \K ,V, ,‘C

‘TrˆRELFAiT “”•i’”’ ˆ S\V’“CTA

(/E®3fesˆVk \ /

inˆr<\5Jˆi Liab4 \ \ Muii of <? -.

9J Tvx?ˆo’Lu Jan Galloway <y» **

ˆrˆ%.milotn \ //ˆl Polllt uf A-ˆt

-＞Axmagh’Y ˆwnpatriugˆljsf . „ /

lonaghan Hilltown

Keady

Hexham ‘v\ 5/As.

O j A

‘ V S»nfc»pe cˆj \ V

I’*’.»fldˆeton:h-ˆQ＞0? ‘

\ˆcesdale HtL ‘

5’ ˆ ; siorUton on Teˆv

A‘1’ OˆarUsley//?/

Mnryport \xft

wj/ Penrith X

‘// Cockermouth TA

£ˆp\Kˆfcky

C Cle&tOlf MoorAˆpiy

s&ˆsiiiwsJSasiS

Rowan Pt. Ardara I

Rathun O’Birnb CMheUgwti Cistlc-lerg,

Kncwˆ®ˆˆfODC)?ai

4-. , Donegal

ˆ vC ˆ“ygonnellj

rOepool

Hartlepool

/ˆRicbmond

V

tSuiale-1’ •

|Sligo

— Hamilton &PP*r\^

Cwllooneri L. Erne\

pvBalJjconnell

rWougn

,r *EIIIalnV*Dro™‘ >re

(BaUIca \

lamsej

5(ynhndrum B.

‘Newcastle

‘MOURNE MTS.

louglas

J Newport ,. ~s7r— tjt

^53 cMtlobl,S^r/T’

B «K| l”“’as“ Dn,„a

‘ iia i Tt t-.n 1 j rjie j, Caatlorengh I ,£®5jfntri*/t~? \ j

*•£ JW«Af 0 °u,n;aKIaBo’X5!ˆ»/o]aioSr~ˆ

wa /oTuam Mount ”,«bCj5 cEallai

CS\ ?e,i8w

f \ .lhaseragh GortJ.tVthloneC.

Ify7 J p Aughriru\|ˆS/ \

I ‘VBailrvi? ,‘C”’,rtd Woodfo!jpKˆ)ff«0 > Zr’°l!/°1

V1*’ goˆ f%ˆ_ˆ£pOfrvt\ n \ 5 RoBcrea’ˆr > _ ‘lorjrh IotTO > iEnnla $ “FHvi

TiwJ? o J. °.lU1“ A!b“”’:

astlcliland0 Newmarket ˆy’ ‘

ˆˆKillarnrj.,,

an /uo *flH Cuf!d y 3 Reek*.

een -/ x ˆ‘Jacroonj r. ˆ

Cooteliii]

ˆCHILlT

Cla re I.

Iaisiiturjˆ,

/.M8HBOF1.V — .

Castletown

llngford Calf or Man o’

YorV

/° Cavan

|V irginia

1 oQblcaath

oCooIe’N^^

, Kells

V Mullingar

Shannon

KlngscourH ,

\ Duai&V’^o’f,/*

uii^/ft’JghetU y.

SNavan ‘.Balbrlggan

I oidtow^A. olambay j.

^ontar^

X) How tb Head

y Dublin Bay

DKlngstown

t\Bray

mgford

iterard ■

Gali

Cormeis

-Majnooth

Horncastlc

VTalntlee > o .

\ Xs_/y > ‘yV*orir.i)icij . ifhesterbcl.V

J^CbeSer A *a.MacClestielU* £j P

Con|lcton7 (Mansfield

J ^-*C*ipon Trent A°Lon^n / U’

fV4 - * % blteohiirchX OleltU > ibwbrsfy

Otjswestty Burtom/ LuugbX ‘ l - j,

ˆrr-Zo) Stafford 7ˆ T”ˆuVb<Jrovigb>-\ˆ gtamford Lichfield Lclcoiterb Seatoh/ˆ

ifiasps\<i 4iew

V> >V (jlverbamptonVˆ/ BruiuVlch, mon x

>F /BtRMINOtdM Jj; .

Sleafoid

Huustactonˆ

|G ran tb am

/wVicklow

0.W MT.

/Redcrosi

Arklow

alshnm 1

RlSˆLjn*

- O

SpaldlUg

Wisbech o

Braicb-y-pwllˆ

Barosev

jlgelly-Tˆ .

•Welshpool,

ivtˆ

AWrdoˆ

Duvuy It.

CAB DIG AX

Aberystwith

BA Y /

Aberaeron/

Now Wuay/j/v X

iwestoft

ICroom

Cannon

crus) Cahore Point

iniˆ.rthy

4 Wexford *

. Harbor /y

/jGreenore Point *

/Tu«kar Rock A V

L‘f”“ < > n \V

.v\ >

0 8‘-D‘ˆ J

ˆ St. Davids Head

y Ramsey I.

ˆ Bf. Brides

Skomer l.‘ > eS < H

A/t7/ord

a Vˆe*

8t.Gov an*

oSxelford

z % /

Clonmel

Huntingdon

OiewmarKe*

Lldeburgh

Rossˆ;

trˆVt. /) W exfortjlˆ

Sl.E«lnmnd8

Cnestertou/D,

ˆ/“n, fˆr-lnCBS

Ui*ˆ.

V al um-le-Soken

Sudbury

1 ‘ross 1

Colchester

j tort ford

Chelm?

Dunmanwaj

(no try6*” /

|Haverfordjij)8f

ller ford

V iTnttenh .t

• Wycombe <

Southr

Greenwfcl

Lnhilon

NVoˆ* i*

Bristol O

I’.fracoinbu. j

rTgUNDY I. 0

Barnstajile Bay VpSlB

Hartland Point pvl/v V.

UartlaJd0 BldeforfK

)HoliworthT

rlborough 9_r_^\

L-Aiderlhot

^7^ I Alton/ ^

in Tham«

Super Marc’

Wells .

nan n el

Trowbridge

(WestburT

Punbrldge Folkestoi^^

Wells The ■

Atye* >

liaoVjˆBˆgeuclH

-jˆUsˆtlng* A Boult

4* (i » gur]

(Shepton

-Mattet

ˆllnghau /‘goul

Taunton

.Tiverton

/Abba*

Lt/me £a// V

Weymouth

Jrevose Head

Newquay

So m 01 ft

“St-Valery-en-Cg

► St. Martin

Sr. Mary

Sr. Aonm

Aldkrnev

ltoueu

Channel Isla.nds

[onfleur Q?{

Guernsey

X*ongitii(ie_ AV’est. fxcuck_ Gjˆauwiclˆ

Carteret

Elbeut*

.Holier

Blu.mullg AUvsI

Rona«

BRITISH ISLES

SCALES

Longitude West from Greenwich

SHETLAND

st.Mug”**-

Papa V***

Longitude East from Greenwich

Statute Bile’s Cl

Kilometres, 103 = 1 Inch.

Rand, McNally k Co’a. New 11*14 Map of Britiib Ulei.

*Gopˆitb..i 03 Rand McNally k Co.

Pa Pa WtKTRA

Butt of Lewie

Swalnboˆˆ S ˆ

Barvˆf \ Tolata ˆ

1 fo Head C* ‘

iVorf/ig 2t. ItoNAU > ?*liA» 1.

KoUnay-v {IˆSarnlay Sound

Pomona 01/-XO8 L. 1

Mainland/ Stuonsay I.

Stromnee»(/\ St rOHsay Firth

ORKNEY ISLANDS

Hov\ \a ˆ Con, bay L

% % %

rˆ. . f ˆ ˆ

411 ‘ ‘

DurtNˆ-

＞n \eJ$

3 l/*f

ˆ-O “ˆ7 Dunoin9bay

.YJ““0 /Sinclair; L

Head

Sinclair’s Bay

Wick

Rudh lie/

ˆO.Y.

710*?ˆ Cann* ˆ

Ba r ka/I > 0i, RuM I. < Q V J

Kockall

Island

Eidc’Lft

HEBRIDES YJ

CD

Ardnamurchan Pointy

Coll

«9’ ° Joaa .id!

fill 5s 8

Wrrt 0/

CoLuNSA Y fj

iverley

”“JLv-VUbaYOBCA

itrington

jwHuinber^^sHl/spurn Point

^Dnxjbur /• ^

e Hutnhe t*

r < Wdf n,^

Dunmore Head ^

?-Dmgle

Ot. Blaskrt * _

1 . ‘ v*t

pin < Jie

VAUlNTtˆ*’

Kcn’n < xtC

nP* < ,s

River

C”n: ˆ*N.

ˆheerneii ˆ.ˆjuxd

‘Ramsgate

BRITISH MUSEUM, a national deposi¬

tory of science, literature and art, in London, which owes its origin to the will of Sir Hans Sloane, an eminent physician and naturalist, who, dying in 1753, bequeathed to the nation his collection of medals and coins, antiquities, seals, cameos, drawings and pictures, and his library, consisting of 50,000 volumes and manuscripts, on the condition of the payment of $100,000 to his heirs. This offer was agreed to by Parlia¬

ment, which authorized a lottery of $500,000 to implement the bargain, as well as to purchase other collections. Montague House, which was bought for the purpose, was appropriated for the museum, which was first opened on 15 Jan.

1759. The original edifice having become in¬

adequate, a new building was resolved on in 1823, the architect being Sir R. Smirke, whose building was not completed till 1847. It forms a hollow square, facing the cardinal points.

The south, or Russell street front, is the prin¬

cipal one, having an imposing columnar facade of the Ionic order. This, as well as the other three, looks into the central square court, which measures about 320 feet by 240. There are

two stories of galleries and rooms round the greater part of the building. Smirke's designs were no sooner completed than it was found that additional accommodation was needed in

various departments, and several new rooms

were provided; but the library accommodation being wholly inadequate for the accommodation of the readers, as well as for the reception of new books, a grant was obtained from Parlia¬

ment for a new library building in 1854, and it was completed and opened in 1857, at a cost of $750,000. It was erected in the interior quad¬

rangle and contains a circular reading-room 140

feet in diameter, with a dome 106 feet high.

The whole arrangements were completed with

the utmost economy in regard to space, and, besides ample accommodation for books, the

reading-room contains accommodation for 300

readers comfortably seated at separate desks, which are provided with all necessary conveni¬

ences. The accommodation having become

again inadequate, it was resolved to separate the objects belonging to the natural history de¬

partment from the rest and to lodge them in a building by themselves. Accordingly a large

natural history museum was erected at South Kensington and the specimens pertaining to

natural history (including geology and min¬

eralogy) were transferred thither, but they still form part of the British Museum. Subsequent additions to the main museum building include the southeast White Wing, built in 1879, and the Annex, opened in 1911. The British Mu¬

seum is under the management of 48 trustees, among the chief being the archbishop of Can¬

terbury, the Lord Chancellor and the speaker of the House of Commons. In all, the staff of the institution numbers over 320 persons. The museum is open daily, free of charge. Admis¬

sion to the reading-room as a regular reader is by ticket, procurable on application to the chief librarian, there being certain simple con¬

ditions attached. An average of over 220,000

persons use the reading-room and over 720,000

persons visit the general collections annually.

The institution contains over 4,000,000 volumes in the department of printed books. A copy of every book, pamphlet, newspaper, piece of

music, etc., published anywhere in British ter¬

ritory must be conveyed free of charge to the British Museum. There are various catalogues and handbooks prepared by the officers of the museum and containing classified descriptions of the contents of the different departments.

Of these there are eight, namely, the depart¬

ment of (1) printed books, maps, charts, plans, etc.; (2) of

manuscripts; (3) of natural his¬

tory; (4) of Oriental antiquities; (5) of Greek and Roman antiquities; (6) of coins and med¬

als; (7) of British and mediaeval antiquities and ethnography; (8) ‘of prints and drawings.

BRITISH NORTH AMERICA, the

Dominion of Canada and the Island of New¬

foundland, with the portion of Labrador belong¬

ing to the latter. The Bermudas are also in¬

cluded.

BRITISH NORTH BORNEO. See

Borneo.

BRITISH SOUTH AFRICA. See Ba¬

sutoland; Bechuanaland Protectorate, *etc.*

BRITISH SOUTH AFRICA COM¬

PANY, a corporation established 29 Oct. 1889, with a royal charter, by Cecil Rhodes and

others, for the purpose of controlling, settling, administering and opening up by railways and telegraphs, etc., certain districts in central South Africa. Mashonaland was first settled, and, in 1893,

Matabeleland was annexed and settled

after the defeat of King Lobengula. In 1895, North Zambesia, in British^Central Africa, was added, as well as a strip of territory in the Bechuanaland protectorate. This territory,

called Rhodesia or British Zambesia, has an area of about 500,000 square miles. In consequence of the filibustering raid of Dr. Jameson, an officer of the company, near the close of 1895, Rhodes resigned his connection with the com¬

pany in 1896, and a joint administrator of the territory was appointed by the British Crown.

See Rhodesia.

BRITISH WEST INDIES. See West

Indies.

BRITISH WEST INDIES, Diplomatic

Relations with. American interests in the

West Indies, which began through trade before the Revolution, were increased later by acqui¬

sitions bordering on the Gulf of Mexico in a period of the steadily increasing interests of Great Britain, which had the advantage of naval control. The first movement of the Revolution may be regarded as beginning with the Sugar Act of 1764, which suddenly threatened to cut off the important New England trade with the foreign West Indies, regarded by New England as necessary to satisfy the large demand for sugar which the British Islands could not en¬

tirely supply.

In the Revolution, the Continental Congress

contemplated the acquisition of the Bermudas, and the destiny of the United States was partly determined by naval strategy in the West In¬

dies, which, during the war, were also the chief source of American foreign trade.

The British West Indies, which suffered

their first commercial decline during the Revo¬

lution, were again injured after the Revolution by British orders practically prohibiting trade in American ships — a policy which was against the best interests of the islands. An unratified provision of the Jay treaty of 1794 granted the right to direct trade in American ships of not 564

over 70 tons, but forbade American ships to carry molasses, sugar, coffee, cocoa and cotton from either the West Indies or American ports to any part of the world except the United States — conditions to which the American

Senate refused to agree.

In 1806, in the attempt to negotiate a treaty to replace the expired clauses of the Jay treaty, the American government made an unsuccess¬

ful effort to induce the British government to reconsider its stricter policy and to restore the West India trade to a footing of 1801. The commerce treaty of 1815, although it opened to America the East India trade, did not men¬

tion the question of the West Indies, but its provisions indirectly resulted in encouraging British ships to carry American products to the West Indies and thereby gave to British ships an advantage in the direct trade between England and the United States, causing Ameri¬

can merchants and skippers to turn to the Ori¬

ent — to China and the East Indies. The dec¬

ade which followed was characterized by ex¬

tensive smuggling in the West Indies and

retaliatory shipping legislation. In 1818, after commissioners failed to secure larger privileges in the West India trade. Congress closed

American ports to all British ships from the West Indies and compelled all vessels leaving American ports to give bond not to unload their cargo in those islands — causing great injury to American industries and commerce. After

the failure of new proposals, Congress retali¬

ated again by act of 1820, excluding the United States from any intercourse whatever with the West Indies — an act which resulted in the opening of a continual and unrestricted trade of the West Indies with Canada and New

Brunswick. In 1822, Parliament by repeal of existing statutes opened certain West India

ports to direct American trade, although sub¬

ject to heavy duties and exclusion of certain important articles of export. The United States promptly opened its ports to goods of the Brit¬

ish West Indies imported in British bottoms and allowed exports to the West Indies to be carried in British vessels.

In 1825, Parliament, although reserving the

coasting trade, by a somewhat obscure act

opened the ports of her colonies to nations without colonies on the same shipping terms as such nations gave to England and her pos¬

sessions, but Congress neglected to pass the necessary legislation to accept the offer within the year stipulated by the act. In 1826, by an order in council, American vessels were defi¬

nitely excluded from the West Indies. There¬

upon President Adams, in 1827, revived the

prohibitive provisions of the acts of 1818 and 1820. As a result of this battle of legislation and decree, neither British nor American ves¬

sels could trade between the United States and the British West Indies (except as smugglers).

In 1829, the Jackson administration asked

for the reopening of the West India trade as a privilege on the terms of the act of 1825, and in 1830 the British government opened the trade, allowing American vessels to import any ar¬

ticles which could be imported on British ves¬

sels from the United States and to export from the West Indies to any country except British possessions any article which a British vessel could export.

The Parliamentary Emancipation Act of 1833

for the gradual extinguishment of colonial

slavery in seven years, the consequent British policy of encouraging emancipation elsewhere

and the activity of the British government and the British navy in attempts to stop the illegiti¬

mate foreign slave trade which usually eluded capture by flying the American flag, greatly affected public sentiment in the United States and American relations with the West Indies.

Among other sources of friction was that aris¬

ing from the interstate slave trade by sea in American vessels from Chesapeake ports to

Charleston or to New Orleans, or from Charles¬

ton to New Orleans, and stopping at the Brit¬

ish West Indies ports of the Bahamas, where under British jurisdiction the slaves were set free. In 1840, after long negotiations, England allowed indemnity in the cases of the Comet (wrecked 1831) and the Encomium (wrecked

1833). She refused payment in the case of the Enterprise (driven by stress of weather 1840).

In the famous case of the Creole (1841), aris¬

ing from a mutiny of the slaves, who carried the vessel into Nassau and were discharged by the British authorities, no agreement could be reached by 10 years of negotiations; but finally, by arbitration of Joshua Bates, an American-born English banker, England paid an indem¬

nity. Bates also decided that an indemnity was due in the case of the Enterprise and in the case of the Hermosa (wrecked 1841). For

nearly two decades before the American Civil War, American foreign policy relating to the West Indies was largely influenced or domi¬

nated by apprehensive fears of American slave¬

holders that the safety of slavery in the South¬

ern States might be endangered by the effects of emancipation in the British West Indies, through its influence upon neighboring islands and upon general British policy in tJhe entire region, especially in Cuba. In the Qvil War, the Bermudas or Nassau were used as stations from which blockade runners carried European goods into Confederate ports and returned with cotton — a very lucrative business. At Nassau the Confederate cruiser Florida , after escaping from England in 1862, was allowed by near¬

sighted officials to arm and equip itself as a man-of-war and later to remain in port beyond the time allowed by international law. As a result of such incidents, which doubtless pro¬

longed the war, the United States felt the need of West India harbors and naval stations, and after the war sought to strengthen its position by the acquisition of the Danish West Indies and San Domingo.

In 1884, when the United States, under a

reciprocity policy inaugurated by President Ar¬

thur in 1882, recognizing the need of less ob¬

structed traffic with Cuba and Porto Rico, took steps to succor languishing Spanish interests in the West Indies by proposing a treaty of commerce to place trade on a more favorable footing (and negotiated a draft treaty which was later withdrawn from the Senate by Presi¬

dent Cleveland), the British government made overtures for a like mutual extension of com¬

mercial intercourse with the British West In¬

dies and South American dependencies, but

without results. On 4 Dec. 1884, Secretary

Frelinghuysen submitted to the British repre¬

sentative at Washington a project of a conven-BRITO CAPELLO

tion for commercial reciprocity between the

United States and the British West Indies, but the British representative could not agree to the interpretation of the most-favored-nation clause.

Under provision of the McKinley tariff bill, John W. Foster, in 1891, entered into reciproc¬

ity arrangements with Jamaica, Trinidad, Brit¬

ish Guiana, Barbados, Leeward Islands and

W indward Islands, nominally through negotia¬

tions with the British Minister but really by separate conferences with delegations from

each of the colonies. Jamaica hesitated, and reached an agreement with considerable dif¬

ficulty.

Since the Spanish-American War, resulting

in an American protectorate over Cuba and

American possession of Porto Rico, the United States has. had a larger control in the entire Caribbean region — a control to which Great Britain contributed by reduction of her West India armaments following the Hay-Paunce-fote treaty of 1901, resulting in American naval supremacy in the Caribbean. Coincident with

these events, the British West Indies in trade relations have been growing more dependent

upon the American market. They were quick

to recognize that the probable entrance of

Cuban and Porto Rican sugar into the United States free of duty would have important sig¬

nificance in relation to their commercial and political future. In Jamaica and at a confer¬

ence in Barbados, in August 1898, there was much discussion in favor of annexation to the United States in case Great Britain should fail to take action for protection of their sugar interests.

Economically the British West Indies have

become an appanage of the United States, de¬

pendent for their prosperity upon favorable

American customs duties. For this reason

Trinidad and other islands hesitated to enter the Canadian preferential agreement of 1913

which is now in force. The recent gravitation toward the United States has resulted in prop¬

ositions for a vigorous Caribbean confederation with a responsible government as a means to counteract this tendency.

James M. Callahan,

Professor of History and Political Science,

West Virginia University.

BRITO CAPELLO, bre'too ka-pel'oo,

Hermenegildo Augusto de, Portuguese sailor,

African explorer and administrator: b. 1839.

His connection with the 1877 and the 1884 ex¬

peditions of Maj. Serpa Pinto and Robert

Ivens to explore Portuguese Angola brought

him into prominence, and their scientific work, of great meteorological, mineralogical, botan¬

ical, zoological and ethnographical value, was honored by both the Madrid and the Paris

Geographical societies. Brito Capello, who had been advanced to the rank of captain in 1880, received the Portuguese Military-Naval Grand

Cross and, with Ivens, the gold medal of 1886

from the Paris Geographical Society. Brito

Capello was Portuguese commissioner in the

matter of the boundaries of Zanzibar and

Mozambique in 1887, and later was governor

of the province of Loanda. Consult H. A. de Brito Capello and R. Ivens, (De Benguella as terras de Jacca^ (2 vols., illustrated, 1881), and (De Angola a Contra-Costa ^ (2 vols., illus¬

trated, 1886).

BRITOM ARTIS, -a nymph of Cretan

mythology, fabled to have been raised by Arte¬

mis into a deity, on the occasion of drowning herself to escape from the pursuit of Minos.

She was presented as patroness of hunters and fishermen. The name was chosen by Spenser

to represent in the (Faerie Quccne' the personi¬

fication of chastity, and thus contained an allu¬

sion to the Virgin Queen, Elizabeth.

BRITTANY, or BRETAGNE, a former

province of France, a peninsula washed by the Atlantic on all sides except the east, where it joined Poitou, Anjou, Maine and Normandy.

It now forms five departments, Finistere, Cotcs-du-Nord, Morbihan, Ille-ct-Vilaine, Loire-Inferieure, containing nearly 3,327,000 inhabit¬

ants on 13,130 square miles. It is supposed to have received its name from those Britons who were expelled from England and took refuge

here at various periods between the 5th and 7th century. Before that time it bore the

name of Armorica. It formed one of the

duchies, of France, and was held by sovereigns nearly independent and often at wˆar with the French monarchs till it was united to the crown by the marriage of Louis XII with Anne of Brittany, the wddow of Charles VIII, in 1499.

It was given by Louis XII to Claude, Countess of Angouleme, who married Francis I, and

was reunited to the crown in 1532. The prov¬

ince wras divided into Upper and Lower Brit¬

tany. Agriculture in this territory is very back¬

ward, and it is estimated that about one-half of the surface lies waste. Corn and wine are produced in small quantities. Flax and hemp, apples and pears are abundant and of good

quality. Cider is the principal drink. Salt is made on the coast, and coal, lead and iron are found in various parts. There are manufac¬

tures of hemp, flax and iron. The fisheries also employ manv of the inhabitants. Brest. Nantes, Lorient, Quimper, Saint Brieuc and Saint Malo are important seaport towns. The people of

Brittany still retain their ancient language, which is closely allied to Welsh, and is exclu¬

sively used by the peasantry in the western part of the province. Many Celtic remains — mega-lithic monuments — are found throughout the country.

BRITTLE STAR, also called SNAKE

STAR, and SAND STAR, a member of the

order of 0 phiuroidca, class Astcroidca, of the phylum E chin oder mat a (q.v.), a class of star¬

fish-like echinoderms. It is characterized by the body forming a flattened disc, with cylin¬

drical arms, the stomach not extending into the arms, and there is no

intestine or anal opening. The ambulacral furrow is covered

by the ventral shields of the tegument, so that the ambulacral feet project from the sides of the arm. It moves faster than the true star¬

fish, the arms being more slender and flexible and more easily broken. An ophiuran wrhich

has accidentally lost an arm can reproduce it by budding. In species of 0 phiothela and

Ophiactis the body divides in two spontane¬

ously, having three arms on one side and two on the other, while the disc looks as if it had been cut in two by a knife, and three new arms had then grown out from the cut side.

Few specimens reach a size in excess of an inch in diameter and the rays seldom exceed 10 inches in length. The ophiurans in most cases undergo a decided metamorphosis like

that of the starfish. The larva, called a

ˆPluteus,® is free-swimming, though in some

species the young, in a modified larval condi¬

tion, reside in a pouch situated above the mouth of the parent, finally escaping and

swimming freely about. Our most common

brittle star is Ophiopholis aculeata, which may be found at low-water

mark, and especially

among the roots of Laminaria thrown upon

the beach. They have little means of defense, and so live under rocks or buried in mud and sand. They are nearly all vegetable feeders though possibly some are carnivorous. It is variable in color, but beautifully spotted with pale and brown, its general hue being a brick-red. Ophiurans are widely distributed, and live at depths between low-water mark and 2,000

fathoms. Fossil ophiurans do not occur in

formations older than the Upper Silurian,

where they are represented by the genera Pro¬

taster, Palceodiscus, Acroura and Encaladia ; generic forms closely like those now living appear in the mushcelkalk beds of Europe

(Middle Trias). There are about 600 known

species, of which few belong to the shore

waters of the United States.

BRITTON, Elizabeth Gertrude, Ameri¬

can bryologist or moss specialist: b. New York, 9 Jan. 1858. She was a daughter of James

Knight and spent her early life in Cuba. A graduate of New York Normal College she

later became teacher in the training depart¬

ment 1875-82, and was assistant botanist 1882-85, in that institution. In 1885 she married Nathaniel Lord Britton (q.v.). From 1885 to 1888 she edited the Bulletin of the Torrey Botanical Club. Her contributions to scien¬

tific journals and her interest in adding to and improving the collections of Columbia Uni¬

versity and the New York Botanical Gardens

have largely increased the general knowledge of »mosses and ferns.

BRITTON, John, English archaeologist:

b. 7 July 1771 ; d. London, 1 Jan. 1857. In 1787 he came to London, and was employed

for six years as cellarman in the Jerusalem Tavern, Clcrkenwell, and afterward served

in the same capacity in the London Tavern.

He next entered the employment of a hop

merchant in Southwark, and then an attorney's office in Gray's Inn. During all this period he had sedulously cultivated his taste for read¬

ing during his leisure hours, and took part in the proceedings of several debating socie¬

ties. In 1799 he accepted an engagement from a Mr. Chapman to write, sing and recite for him at a theatre in Panton street, Haymarket, at a salary of three guineas per week. From this period his literary career may be said to have commenced, developing itself at first in the form of pamphlets, songbooks and similar minor subjects. He soon advanced, however,

to a higher grade, and in 1801 appeared the first two volumes of the (Beauties of Wilt¬

shire, } by J. Britton and E. W. Brayley. These collaborateurs, with others, subsequently com¬

pleted a similar work for all the other counties of England (1801-16, 18 vols. ; 1825, 26 vols.).

In 1805-14 Britton published his Architectural Antiquities of Great Britain) in four volumes, supplemented in 1818-26 by another entitled

(Chronological History and Graphic Illustra¬

tions of Christian Architecture in England.) These were followed by his (Cathedral Antiquities) (in 14 vols., 1814-35) ; and the dictionary of the Architecture and Archaeol¬

ogy of the Middle Ages) (1832-38). In 1848

he attempted to prove that Isaac Barre wrote the letters of ˆJunius.® Consult his Autobi¬

ography) (2 vols., London 1849-50).

BRITTON, Nathaniel Lord, American

scientist: b. New Dorp, Staten Island, N. Y., 15 Jan. 1859. He was educated at Columbia

University and from 1879 instructed there as assistant, adjunct and professor of geology, botany and zoology until his retirement as

professor emeritus in 1896, when he became

director of the New York Botanical Garden.

He wrote (Geology of Staten Island) (1880) ; (Catalogue of the Flora of New Jersey >

(1882); and collaborated with Addison Brown

in An Illustrated Flora of the Northern

United States, Canada* (3 vols., 1896-98; 2d ed. revised and enlarged, 1913). Later works are (North American Trees) (1908) ; (Studies in Cactaceae* (1913).

BRITZKA, a Russian traveling carriage,

copied in England and Austria early in the 19th century, the head of which is always a movable calash, having a place in front for the driver, and a seat behind for servants.

The body is so arranged that the traveler can sleep therein at night.

BRIVES-LA-GAILLARDE, brev-la-ga—

yard (Ancient Briva Curretia), a town in

France, department of Correze, situated amidst vineyards and orchards, on left bank of the Correze, about 18 miles southwest of Tulle, surrounded by a fine avenue of elms.

The houses are substantially built of stone, but the streets are narrow, and the public squares indifferent. It contains a church of Saint Martin dating from the 12th century,

some ancient houses in the Gothic style and a library. Its industries include the manufacture of leather, cotton goods, pottery, wax candles, etc., and it also carries on an active trade in truffles, wool, wine and nuts. There are also dyeworks and quarries of slate and millstone.

The Romano-Gallic name of the place was

Briva Curretia. It is the birthplace of Car¬

dinal Dubois. Pop. 21,486.

BRIXHAM, an English town in Devon¬

shire, situated on the English Channel, six miles south of Torquay. It covers the sides of two hills, and is divided into Upper and Lower Brixham. The parish church is a large ancient structure, in the Perpendicular style.

The trade of Brixham is chiefly in fish, and is of considerable extent, London, Bath and Bris¬

tol receiving supplies from this place. The port possesses also a number of vessels en¬

gaged in the coasting and foreign trade; those in the latter plying chiefly to the Mediterranean.

Shipbuilding and the manufacture of sails,

ropes, paint, etc., are among the other indus¬

tries. The Prince of Orange, afterward Wil¬

liam III, landed, 4 Nov. 1688, where the quay of Brixham now stands. In 1858 a cave was discovered on Windmill Hill, containing the

bones of extinct mammals, some flint imple¬

ments, *etc.* Pop. about 7,954.

BRIZA, a genus or grasses, commonly

called quaking-grass, maiden's-hair, or lady'stresses. There are about 30 species, chiefly found in South America. B. media is a native of the United States, and is found occasionally in pastures in the eastern States.

BROACH, or BAROACH, India, sea¬

port town in Guzerat, Bombay, situated on the Nerbudda, about 30 miles from its mouth. The river here is crossed by a railway bridge, and for about a mile in front of the town is lined with a massive stone wrall. Broach is sur¬

rounded with ruinous walls, and has narrow

streets, with houses mostly of two stories and built of brick. There are no buildings of

interest. It is an ancient place, and one of the oldest seaports of western India, and was formerly famous for its cotton manufactures.

The town was taken by storm by the British in 1772, and with the district, ceded to them by treaty with Scindiah in 1803. Formerly it had a great export of cotton, and it still carries on a trade in cotton, grain and seeds with Bombay and Surat. Pop. 42,300 (including

many Parsees). The district of Broach lies

on the east side of the Gulf of Cambay.

Broach cotton holds the highest place in the Bombay market. Area 1,453 square miles ;

pop. about 350,000.

BROAD ARROW, a government mark

placed on British stores, guns, etc., to dis¬

tinguish them as public or Crown property.

It was the cognizance of Henry,

Viscount Sydney, Earl of Rom¬

ney, master-general of the ord¬

nance, 1693-1702, and was at first

placed only on military stores.

Persons in possession of goods

Broad Arrow marked with the broad arrow for¬

feit the goods and are subject to a penalty, and it is made felony by statute to obliterate or deface it. The mark is also used in the Ordnance Survey maps to denote points from

which measurements have been made.

BROAD CHURCH, a name given orig¬

inally to a party in the Church of England, regarded as being midway between the Low

Church or Evangelical section and the High

Church or Ritualistic; now widely applied to the more tolerant and liberal section of any denomination.

BROADHEADED SNAKE. See Death—

adder.

BROAD MOUNTAIN, an elevation in

the anthracite coal region of Pennsylvania; a plateau of conglomerated rock, about three

miles wide and 2,000 feet above the sea, undu¬

lating just enough to contain three shallow coal-basins intermediate between the Pottsville and Mine Hill on the south, and the Mahoning and Shamokin coal-fields on the

north.

BROAD PIECE, a term applied to some

English gold pieces broader than a guinea, par¬

ticularly Caroluses and Jacobuses.

BROAD RIVER, a stream of North and

South Carolina, rising at the foot of the Blue Ridge, in the western part of the former State, and entering York district in South Carolina.

It then takes a southerly course through a rich and highly productive tract of country covered with fields of maize and cotton, and finally unites with the Saluda to form the Congaree River. The city of Columbia is at their junction. The river is about 225 miles in length, and is navigable for shallow-draft boats for 140 miles above Columbia.

BROAD SEAL WAR, 1838-39, a disputed—

election case in New Jersey and in Congress; turning in New Jersey on the power of a

county official, in collusion with the State execu¬

tive, to nullify the result of a State vote; in Congress on the right of the clerk to base offi¬

cial action on information not before Congress.

New Jersey then elected her six congressmen on general ticket, and in 1838 that of the Demo¬

crats carried the State by an average of about 100; but the Whig county clerk of Middlesex County threw out the vote of South Amboy,

with 252 Democratic majority, for lack of the election clerk's signature, and for other irregu¬

larities, giving the Whigs five of the six seats.

The Democrats claimed that such technicalities had been repeatedly waived, and were counter¬

vailed by like ones in Whig towns ; and, even so, that by law the governor and council, as a canvassing board, must send at once for any missing return and pass on its validity. Those officials were Whigs, however, and they decided that they could not go behind the clerk's certifi¬

cate, and issued credentials to the Whig candi¬

dates under the (<broad seal® of the State. This would have made only the usual party broil, but that the national House stood 119 Demo¬

crats to 118 Whigs without the New Jersey

members, so that the decision carried with it control of the organization of Congress. The Democratic clerk of the House, H. A. Garland, of Virginia, on its meeting 2 Dec. 1839, omitted the New Jersey members in his roll-call, on the ostensible ground that their seats were to be contested and he must leave the decision to Congress ; really because excluding them gave his party the speaker and the committees, and inci¬

dentally secured himself the clerkship however the contest was decided. This was utterly ille¬

gal, as there could be no contest till a congress was organized to bring

a contest before ; but he doubtless felt it as legitimate as the trick by which the Whig members were sent there, and that party could hardly complain of unfair¬

ness. For three days there was helpless rage and anarchy in the House, the clerk refusing to put the question upon any of the motions to bring order out of the chaos. Finally on the fifth the leaders of both parties called in John Quincy Adams (q.v.), the one member who had no party or affiliations of any sort, and who was respected as at once immutably just, unshrink¬

ingly courageous and of the highest parlia¬

mentary knowledge. He called upon the meet¬

ing to organize itself, offered a resolution ordering the clerk to call the names of the New Jersey members with credentials, and on the clerk's refusal announced that he would put the question himself. He was at once elected speaker pro tempore, and for six days more the fight went on to choose a permanent speaker, with both New Jersey delegations voting. On the 11th a motion was carried that neither dele¬

gation had a right to vote till the contest was decided; on the 16th a compromise was made by which R. M. T. Hunter, of Virginia, a Whig who favored the Democratic sub-treasury

scheme, was chosen speaker. On 10 March

1840 the Democratic contestants were seated; on 16 July the majority report of the com¬

mittee on the case, declaring them duly elected, was accepted by a vote in which all but 22

Whigs re.fused to take part, on the ground that the report and testimony were too long to

examine. The political prize at stake had

caused the parties to exchange principles, as they did earlier on the Louisiana Purchase and later on the Electoral Commission ; the Demo¬

crats, though strict constructionists, disre¬

garded State certificates and insisted on going behind the returns ; the Whigs, though uphold¬

ing equity against forms, clung to the sanctity of a State certificate however obtained.

BROAD-TOP MOUNTAIN, a trapezoi¬

dal plateau of semi-bituminous coal measures, in Huntingdon and Bedford counties,, Pa.

The highest point is about 2,500 feet

above the sea. It is surrounded by a red shale valley and an outside ring of Devonian rocks, called Terrace, Harmer and Sidelong moun¬

tains. Through gaps in this ring flows the Raystown branch of the Juniata. The moun¬

tain contains two principal coal basins. It contains in its deepest troughs about 900 feet of coal measures and takes in the Pittsburgh coal bed, with one of the limestones above it.

Coal was mined here for blacksmithing nearly 100 years ago. The coal is a semi-bituminous steam coal, containing from 12 to 18 per cent of volatile matter, and of the same qualities as Cumberland coal.

BROADBENT, Sir William Henry, Eng¬

lish physician: b. Yorkshire, 23 Jan. 1835; d.

London, 10 July 1907. He was educated at the Royal School of Medicine in Manchester and at Paris. He was at first appointed physician to the Western General Dispensary; then physi¬

cian to the London Fever Hospital and the

Saint Mary's Hospital successively, and in 1881

became president of the Medical Society of

London. He was physician-extraordinary to

Queen Victoria 1898-1901, and in the latter year was appointed physician-in-ordinary to

King Edward VII. He was a member of the

Medical Society of London and was censor of the Royal College of Physicians 1888-89 and 1895-96. He wrote (The Pulse } and (The

Heart.) A volume of selections from his writ¬

ings was edited and published by Walter Broadbent in 1908, and his <Life) by his daughter in 1909.

BROADCASTING, a mode of sowing

grain by which the seed is cast or dispersed upon the ground with the hand or a machine devised for sowing in this manner ; opposed to planting in drills or rows; largely limited to the sowing of spring grains and grasses.

BROADHEAD, Garland Carr, American

geologist: b. Albemarle County, Va., 30 Oct.

1827 ; d. Columbia, Mo., 15 Dec. 1912. He

studied at the University of Missouri and

was long the State expert in geology. He

was professor of geology at the University of Missouri 1887-97, and considered an author¬

ity on the Missouri coal measures. He

was a member of the jury on geology at the Philadelphia Centennial

Exposition and in 1881

was a .special agent of the 10th census for rendering a report of the quarrying industry of Missouri and Kansas. His writings include (Geological Survey of Missouri Iron Ores and Coal Fields) ; (Geological Survey of ‘Missouri, ‘

and Ullinois Geological Survey Report* (1873).

He contributed to the Transactions of the

Saint Louis Academy of Science (Vol. II,

1868).

BROADHURST, Henry, English politi¬

cian and labor organizer: b. Oxfordshire, 13

April 1840; d. 11 Oct. 1911. As a boy he worked in a blacksmith’s shop, then as a stone mason till 1872. He has been prominent in the labor movement; in 1873 he wras secretary of the Labor Representative League and in 1874 sec¬

retary of the Parliamentary committee of the Trades Union Congress. He was member of

Parliament for Stoke-upon-Trent 1880-85, for

Bordesley 1885-86, for Nottingham 1886-92.

He was under-secretary for the Home Depart¬

ment in 1886 and for Leicester 1894-1906, and served on several royal commissions for the investigation of the condition of the laboring class. He wrote (Handy Book on Leasehold

Enfranchisement (with Sir R. T. Reid) and

his Reminiscences.*

BROADMOUTH, or BROADBILL, one

of about a dozen species of small, lethargic, songless birds of the family Eurylcemidce , hav¬

ing a notable breadth of beak. Flocks of these birds are distributed through the woods from the Himalayas to the Philippines. The broad-mouths are brilliant in plumage and mainly

fruit-eaters, with the exception of two species of the genus Calyptomcna, which are insectiv¬

orous.

BROADS, The Norfolk, England, district

in Norfolk and Suffolk, but principally in the former, so called from a series of lakes, sur¬

rounded by reedy marshes, formed by the

widening or broadening out of the rivers. The broads par excellence are those of the Bure or North River (which empties into the sea at Yarmouth) and its tributaries, the Ant and the Thurne. The broads have grown greatly

in favor with holiday-makers in recent years, but they have in consequence lost the charm of seclusion that once was theirs.

BROADSIDE, in a naval engagement, the

whole discharge of the artillery on one side of a ship of war, above and below. The fighting power of a ship was formerly estimated by the weight of her broadside. The term is also ap¬

plied to any large page printed on one side of a sheet of paper and, strictly, not divided into columns. In this sense it is sometimes called a broadsheet.

BROADSTAIRS, England, a watering-place in the Isle of Thanet, Kent, two miles northeast of Ramsgate. The name is derived

from the width of the passage leading down to the sea. It was a favorite summer resort of Charles Dickens. Pop. 8,929.

BROADSWORD, a sword with a broad

blade, designed chiefly for cutting, formerly used by some regiments of cavalry and High¬

land infantry in the British service. The clay¬

more or broadsword was formerly the national weapon of the Highlanders.

BROADUS, Andrew, American clergy¬

man: b. Caroline County, Va., 4 Nov. 1770; d. Salem, Va., 1 Dec. 1848. At the age of 18

he united with a Baptist church and began ex¬

hortations and preaching. His education had

been limited, but he had a mind of more than ordinary capacity and an impressive and grace¬

ful elocution, which, added to his youthful ap¬

pearance, made him a favorite as a preacher.

In 1821 he became assistant pastor of a church in Richmond, and in 1832 he was moderator of the Dover Association of Baptist Churches. He declined the pastorate of the leading Baptist churches in Boston, New York, Philadelphia

and ‘various Southern cities and lived and died a country pastor. In 1843 the degree of D.D.

was conferred by Columbian College, Washing¬

ton, D. C., but declined. He wrote extensively for the press and published (History of the Bible > ; a (Catechism > ; (A Form of Church Discipline > ; the (Dover) and (Virginia Selec¬

tions of Hymns, > both of which were long

popular, and ˆLetters and Sermons.) Consult his (Sermons, > with a memoir by J. B. Jeter (New York 1852).

BROADUS, John Albert, American cler¬

gyman : b. Culpeper County, Va., 24 Jan. 1827; d. Louisville, Ky., 16 March 1895. He was

educated at the University of Virginia and was professor of ancient languages there. He then became pastor of the Baptist church in Char¬

lottesville and in 1859 professor of New Tes¬

tament interpretation and homiletics in the

Southern Baptist Theological Seminary at

Greenville, S. C., now in Louisville, Ky. As a Greek scholar and New Testament critic Dr.

Broadus stood at the head of the Baptists

of the South, but his only publication in this department is an elaborate review of the Amer¬

ican Bible Unions’ revised version of the New Testament (in the Religious Herald, 1866 and 1868). In 1870 he published (The Preparation and Delivery of Sermons, * which is still in use as a textbook in several theological semi¬

naries. His o.ther publications consist of ser¬

mons and review articles and a series of papers, (Recollections of Travel, } in the Religious Herald (1872-73), describing a tour in

Europe and the East; (Lectures on the History of

Preaching) (1877) ; (Three Questions as to the Bible) (1884); Commentary on Matthew)

(1886), and (Sermons and Addresses) (1886).

BROADWAY, the chief thoroughfare,

and the principal business street of New York city. Starting from Bowling Green at the

lower extremity of the island, it runs nearly due north to 14th street, whence it takes a westerly diagonal course to 78th street, at which point it again runs due north to 103d street.

Taking the westerly trend again to 108th street, it thence runs north again and, following the course of the old post-road, is continued under the name of Broadway as far as Albany. Its continuous course is interrupted by two public squares — Union square at 14th street and

Madison square at 23d street. Below Madison - square it is devoted mainly to office buildings and wholesale establishments, most of the of¬

fices of great corporations being below

Chambers street. The chief shopping district has recently removed to above 34th street,

and most of the theatres are in the vicinity of 42d street. Its length below 59th street is about five miles and is traversed by an electric railway. Above 59th street are many fine apartment-houses and hotels. Subways

have been excavated under Broadway almost

its entire length from Battery Park to 168th Street. An elevated section runs from 225th Street to 242d Street. The first grant of a lot on Broadway dates from 1643, when Martin

Kregier erected, at what is now' No. 9, a tavern, which was later known as Burns' Coffee House and Atlantic Gardens. Consult Jenkins,

S.,

(The Greatest Street in the World* (New

York 1911).

BROADWOOD, John, English pianoforte

manufacturer: b. Cockburnspath, Scotland,

1732; d. 1812. Going to London, he entered into partnership with a Swiss maker of harpsi¬

chords, named Burkhardt Tschudi, the firm

being known as Tschudi & Broadwood. In

1769 his partner retired, and on his death four years later his son became a partner with

Broadwood, but from 1783 till 1795, when

Broadwood's son entered into partnership with him, he had the sole control of the business.

The firm has long been known as John Broad-wˆood & Sons. By the skill of Broadwrood and those associated with him many improvements

were introduced in the construction of the

pianoforte, and for a long time the history of the firm wras practically the story of the pro¬

gressive development of that instrument.

BROBDINGNAG, an imaginary country

described by Dean Swift in (Gulliver's Trav¬

els.) The inhabitants are represented as being of enormous size and the details of their en¬

vironment in proportion, whence has arisen the adj ective

<(brobdingnagian.))

BROCA, bro-ka, Pierre Paul, French sur¬

geon and anthropologist : b. Sainte Foy-la—

Grande, department of the Gironde, 28 June

1824; d. Paris, 9 July 1880. In 1841 he began the study of medicine at Paris, became hospital surgeon in 1844, anatomical assistant in the faculty of medicine in 1846, preparator in anat¬

omy in 1848, and professor of surgical pathology in 1867. Between 1861 and 1865 he carried out his famous researches on the localization of cerebral functions, discovering the seat of ar¬

ticulate speech in the third convolution of the left frontal lobe of the brain, commonly called the ˆconvolution of Broca. ** He gained great distinction in anthropology, and in 1859 founded the Paris Anthropological Society. During the Franco-German War he engaged in hospital

wrork at La Pitie, but when peace was con¬

cluded he resumed his teaching. In 1872 he founded the Revue d'Anthropologie , and four years later he established the Ecole d'Anthropologie, which formed the nucleus of the later Institut Anthropologique. After 1880 he was

perpetual senator. He took great interest in literature and philosophy and is known widely as a brilliant conversationalist. Besides wrrit-ings on a wide range of subjects, and contribu¬

tions to the Anthropological Society's Revue, he published the famous (Des aneurysmes et de leur traitement* (1856) ; (L'Ethnologie de la France) (1859) ; (Recherches sur l'hybridite animale en general et sur l'hybridite

humaine en particular* (1861); (Traite des

tumeurs) (1865-69); Memoires sur les car—

acteres physiques de l'homme prehistorique*

(1869) ; and (Memoires d'anthropologie) (4

vols., 1871-83). Consult Correspondence de

Paul Broca) (2 vols., Paris 1886) ; biography 570

by Pozzi (Paris 1880). A statue of him by Choppin was unveiled at the Ecole de Medecine in 1887.

BROCADE (Sp. brocado, It. broccato,

cf. Fr. brocher , to stitch, embroider) , a fabric having a pattern of raised figures; often a stuff of silk, enriched with a raised pattern of flowers, foliage and other ornaments. Formerly it signified a stuff woven all of gold or silver threads, or in which silk was mixed with such threads; at present all stuffs are so called if they are worked with raised flowers or other figures, and especially when the figures are in more than one color. Brocade is in silk what damask is in wool. Brocatelle, in which cotton and wool are used instead of silk, is an imita¬

tion of brocade.

BROCATELLE . See Brocade.

BROCCHI, brok'ke, Giovanni Battista,

Italian mineralogist and geologist : b. Bassano, 18 Feb. 1772; d. Khartum, 25 Sept. 1826. In 1808 his valuable researches on iron mines and metalliferous mountains procured him the

office of inspector of mines in the newly estab¬

lished kingdom of Italy. In 1814 he published a work on the structure of the Apennine Range, with an account of the fossils of its strata. He

corrected the erroneous view of Brieslak, who supposed Rome to occupy the site of an ex¬

tinct volcano, to which he ascribed the tufa and other volcanic materials found on the

seven hills. Bnocchi, on the other hand, satis¬

factorily showed that they are derived either from Monte Albano or Monte Cimino. Both

of these are extinct volcanoes, the first 12

miles, the other still farther, to the north of the city. In 1823 Brocchi sailed for Egypt with the view of exploring the mineral re¬

sources of that country. He received a com¬

mission from Mehemet Ali to examine his re¬

cent conquest of Sennaar, but the climate

proved too much for his constitution. His

works include (Trattato mineralogico e chemico sulle miniere di ferro del departimento del Mella) (2 vols., 1907) ; (Memoria mineralogica sulla yalle di Fassa nel Tirolo) (1811); (Conchicologia fossile subapennina con osser-vazioni . geologiche) (2 vols., 1814) ; <Dello stato fisico del suolo di Roma) (1820).

BROCCOLI, a variety of the cauliflower,

hardier and with more color in the flower and leaves. The chief varieties are green, purple and dwarf broccoli. It is inferior in flavor to cauliflower, but serves as a substitute for it when the latter cannot be obtained. See Cauli¬

flower.

BROCHANTITE, bro’shon-tit (from Bro—

chant de V illiers, a French mineralogist), an orthorhombic transparent or translucent min¬

eral, with hardness 3.5-4; specific gravity, about 3.90; lustre vitreous, pearly on one

cleavage face. It is a basic copper sulphate having the formula CuS04.3Cu(OH)2. It

much resembles atacamite, like which it occurs in many copper mines, notably in the Urals, in Cornwall, England and in Chile. In the

United States its most important localities are in Utah and Arizona.

BROCHS, broHs, class of edifices peculiar

to Scotland, particularly in the northern coun¬

ties, including Orkney, Shetland and the West¬

ern Isles, more than 300 in all being known.

A broch is a hollow circular tower of dry-built masonry, rarely more than 70 or less than 40

feet in total diameter, occasionally at least 50

feet high, and enclosing a circular court or area from 25 to 45 feet in diameter. The wall, which may be from 9 to 20 feet thick, is carried up solid for about 10 feet, except where pierced by the narrow passage giving entrance to the interior court, or where chambers are hollowed within its thickness and opening off the court. Above this height there are hori¬

zontal galleries in the wall, each about six feet high and three feet wide, running com¬

pletely round the tower, except where crossed by the stair giving access to them, and having-windows placed above each other, and all look¬

ing into the central area. The only external opening is a doorway about five or six feet high, and rarely more than three feet wide.

The passage varies from 9 to 18 feet in

length, and about four feet from its outer en¬

trance is the door. Many of the brochs are found in naturally strong positions, such as a precipitous eminence, or a promontory pro¬

jecting into a loch, and further defenses are afforded by ditches and embankments, earthen ramparts and dry stone walls. Hence it is

clear that they were intended to serve as places of shelter and defense, for which purpose they are admirably contrived, as they form a series of strongholds that could be reduced only by a regular siege, the inmates being safe against missiles and even against fire, from the height and strength of the walls. Provided with a sufficiency of food, and obtaining water from a well inside the enclosure, the people thus shel¬

tered could hold out for an indefinite time.

The relics found in the brochs, like the struc¬

tures themselves, are Celtic in character, and belong to post-Roman times. The Brochs were probably built as places of refuge from the Scandinavian vikings that for centuries were a scourge to many of the European coasts, but little or nothing of their history is known. The relics include swords, spears, knives, axes and chisels of iron, with rings, bracelets, pins and other articles of bronze or of brass. Numer¬

ous articles made of bone and horn are also found, with stone implements, as querns, mor¬

tars, pestles, bowls and cups, lamps, *etc.* Pot¬

tery of various kinds is also found. Spinning and weaving were evidently practised by the broch-builders. Agriculture, hunting and* fish¬

ing furnished subsistence; and animal food

was furnished by the stag, roe, reindeer, ox, sheep, goat and pig, as well as by the whale, porpoise, cod, haddock and other denizens of the sea.

BROCK, Sir Isaac, English soldier, «the

hero of Upper Canada®: b. Guernsey, 6 Oct.

1769; d. Queenston, Canada, 13 Oct. 1812. He was educated at Southampton and Rotterdam,

and entered the army as ensign in the 8th regiment in 1785. In 1791 he transferred to the 49th infantry, with which regiment he was afterward principally associated. He served in North Holland in 1799, with distinction at the battle of Egmont-op-Zee. In 1802 he went to Canada at the head of the 49th regiment, re¬

turning three years afterward; but in 1806 he was again in North America. In 1810 he was appointed provisional lieutenant-governor and

commander of the forces in upper Canada, and in 1811 he became major-general. On the

outbreak of the War of 1812 he acted with vigor and promptitude in making the disposi¬

tions for the comparatively small forces under his command. In July, Fort Michilimackinac

was captured by the British forces, and in the following month Brock compelled the surrender of the American general Hull at Detroit. For these services he was created K.C.B. On 13

Oct. 1812, he was mortally wounded during an American attack on Queenston Heights. His

remains, first interred at Fort George,

were removed to a monument at Queenston

Heights, which however was blown up by a

fanatic Irishman on Good Friday 1840. A

commanding column, with a statue of Brock,

now crowns the heights, and the environs of the battlefield are a public park. There is also a monument to him in Saint Paul's Cathedral,

London. Consult Lady Edgar, < General Brock) (Toronto 1904) ; and his (Life and Correspondence) edited by his nephew, F. B. Tupper (Lon¬

don 1847).

BROCK, Sir Thomas, English sculptor:

b. 1847. He studied with J. H. Foley and

finished after the latter's death a number of his works. Among his productions is the Long¬

fellow bust in Westminster Abbey. He is a

member of the Royal Academy. He was

created K.C.B. in 1911.

BROCKEDON, brok'den, William, Eng¬

lish artist and inventor: b. Devonshire 1787 ; d. London 1854. He studied at the Royal

Academy, London, obtaining a prize for his

(Resurrection of the Widow's Son.* He was

the discoverer of a method by which plumbago and its dust (previously thrown away as value¬

less) could be freed from impurities and re¬

solidified, so as to make a superior description of lead pencils, of various degrees of hardness, well adapted for artists' use. Mr. Brockedon was a painter, and author of (The Passes of the Alps,* with over 100 folio engravings from

drawings by himself. He also produced (Italy, Classical and Picturesque) (1842ˆ13) ; and

(Egypt and Nubia) (3 vols., 1846-49).

BROCKEN (mons Bructerus Melibocus of

the Romans), a mountain in Germany, popu¬

larly known as Blocksberg, the highest summit of the Harz Mountains (about 3,745 feet), in the Prussian government of Magdeburg. It

was a notable landmark in early history.

The bare, treeless summit is covered with snow from November to June; and on it are a hotel and an observatory. Under certain atmospheric conditions the visitor may see a gigantic figure of himself reflected on the clouds (the <(Spectre of the Brocken®). According to a popular

legend the German witches used to assemble

here on Walpurgis Night (q.v.) for an annual orgy. Two well-kept driving-roads lead up

the mountain. Many tourists visit the Brocken during the summer, and in clear weather an ex¬

tensive view may be obtained. The summit is reached by a railway line constructed in 1898.

BROCKENBOROUGH, William H.,

American jurist: b. about 1813; d. Tallahassee, Fla., June 1850. He received a classical edu¬

cation, studied law, was admitted to the bar and settled in Tallahassee. Although struggling

against pulmonary consumption, which event¬

ually caused his death, he held a distinguished position as a citizen. Under the territorial government he was a senator from the western district and at one time president of the senate.

He became successively United States attorney for the western district of the territory, a judge of the United States District Court, and repre¬

sentative in Congress, successfully contesting his seat with Edward C. Cabell, and serving from 24 Jan. 1846 to 3 March 1847. On several occasions he was a presidential elector.

BROCKENBOROUGH, William V.

American jurist: b. 10 July 1778; d. Richmond, Va., 10 Dec. 1838. He represented Essex County in the legislature and was subsequently a coun¬

cillor. He became judge of the General Court in 1809, and retained that office until 1834, when he was appointed one of the judges of the Court of Appeals, an office that he retained until his death.

BROCKET (Fr. broche, a ((spit** or <(tine**), a book-name given to Brazilian deer of the sub-genus Coassus, because of their spike-like antlers. There are four species, varying in height from 19 to 27 inches, namely: (1) Guazu-viva (Coassus nemorivagns) , or Brazilian deer; (2) Pita (Coassus rufus) ; (3) A similar form, the pudu (Pudua humilis) of the Chilean Andes, the smallest of all deer, having spike horns only about two inches long.

BROCKHAUS, brok'hows, Friedrich

Arnold, German publisher, founder of the

publishing firm of Brockhaus in Leipzig : b.

Dortmund, 4 May 1772; d. Leipzig, 20 Aug. 1823.

He was educated at the gymnasium of his native town, and in 1793 went to Leipzig, where he de¬

voted two years to the acquisition of scientific knowledge and the principal modern languages of Europe. In 1795 he established at Dortmund a mercantile house for the sale of English manufactures, which he removed to Arnheim,

in the Netherlands, in 1801, and to Amsterdam in 1802. Although he managed his business with success, he abandoned it out of distaste for mer¬

cantile pursuits in 1804, and entered into the book trade at Amsterdam. After the annexa¬

tion of Holland to the French empire (1810), Brockhaus returned to Germany, and reopened

his establishment in Altenburg (1811). In 1813

the firm received the title of F. A. Brockhaus.

In 1808 Brockhaus had purchased the copy¬

right of the German (Konversations-Lexikon,*

which had been begun in 1796. In 1809-10 he completed the 1st edition by the publication of two supplementary volumes. In 1812 he be¬

gan to publish the second edition of this work, which was finished under his own editorship.

It was favorably received and had an extensive sale. The business now rapidly extended, and was removed to Leipzig in 1817. It still is carried on by the grandsons of the founder, and there are now chief branches in Berlin and Vienna. Among the literary undertakings of

the house have been several important critical periodicals and some large historical and bib¬

liographical works, notably Ersch and Gruber's ˆAllgemeine Enzyklopadie* (167 vols. since

1818, incomplete). The (Konversations-Lexikon,* distinctively associated with the name of Brockhaus, has now reached a 14th edition.

The 5th edition of the (Kleines Konversations-Lexikon) appeared in 1910 (2 vols). Consult Brockhaus, H. E., (F. A. B., sein Leben und 572

Wirken) (3 vols., Leipzig, 1872-81) ; and the same author's (Die Firma F. A. B. von der Begriindung bis zum hundertjahrigen Jubilaum, 1805-1905) (Leipzig 1905).

BROCKHAUS, Hermann, German Ori¬

entalist, third son of F. A. Brockhaus: b.

Amsterdam, 28 Jan. 1806: d. Leipzig, 5 Jan.

1877. He was educated at Amsterdam and at

Gottingen and Bonn, where he devoted him¬

self to Oriental languages. He lived for a long time in France and England and then settled in Dresden. In 1839 he went as professor to Jena, and in 1841 to Leipzig, where, in 1848, he be¬

came professor of Sanskrit, a position he held until his death. He published many works on Oriental literature, including the first five books of the great collection of fairy tales of Somadeva, <Kathasaritsagara) ((<The Ocean of

the Flow of Story®) (1839—66) ; an edition (1845) of the play (Prabodhachandrodaya)

(<(The Rise of the Moon of Intelligence®) of Krishna Misra ; and a critical edition of

(Lieder des Hafis> (3 vols., 1854-60). In

1841, he proposed the plan of printing Sanskrit words in the Latin alphabet and he did much in other ways to increase knowledge of and interest in Oriental languages. He prepared

the first European glossary of the Avestan

language, which was appended to an edition of Vendidad Sade (Leipzig 1850). In 1856 he

became editor of the great ˆllgemeine En—

zyklopadie5 of Ersch and Gruber. In 1853, he founded the Zeitschrift der deutschen morgcn-landischen Gesellschaft, in which he published numerous articles on the Orient.

BROCKPORT, N. Y., village of Monroe

County, 20 miles west of Rochester, on the Barge Canal, the New York Central and Hud¬

son River Railroad. A State normal school is located here. The village has important agri¬

cultural and fruit-growing interests and con¬

tains manufactories of canned goods, shoes,

pianos, clocks, gloves, tractors and spraying machines. The waterworks are village prop¬

erty. Pop. (1920) 2,930.

BROCKTON, Mass., a city in Plymouth

County, situated on the New York, New Haven & Hartford Railroad, 20 miles south of Bos¬

ton. It is one of the largest boot and shoe manufacturing places in the country, the value of the annual output in this industry reaching a total of $60,000,000, and besides these articles has extensive manufactories of rubber goods, shoe machinery and supplies, tools and bicycles.

The United States Census of Manufactures for 1914 recorded 243 industrial establishments of factory grade, employing 18,278 persons, of

whom 16,246 were wage earners, receiving

annually $10,557,000 in wages. The capital

invested aggregated $28,809,000, and the year's output was valued at $51,259,000; of this, $19,-

595,000 was added by manufacture. It con¬

tains the villages of Campello, Montello, Mar¬

shall's Corner, Brockton Heights, Clifton

Heights and Salisbury Square. It was settled in 1700, was incorporated as a town in 1821

and chartered as a city in 1881. The govern¬

ment is vested in a mayor, elected annually, and a bicameral city council. There are two national, two savings banks, three co-operative, one Morris plan and one Trust company, a pub¬

lic library, with over 70,000 volumes ; public school property valued at over $1,000,000; and a property valuation of $54,339,716. Pop.

(1920) 66,254.

BROCKVILLE, Canada, town in Leeds

County, Ontario, on the left bank of the Saint Lawrence below the Thousand Islands, 125

miles southwest of Montreal, on the Grand

Trunk, Canadian Pacific and Canadian North¬

ern railways. It possesses excellent wharfage accommodation, and has important manufac¬

tories, including automobiles, agricultural im¬

plements, engines and motor boats, and the

making of biscuits and confectionery. The

town has 14 churches, hospitals, library and excellent schools and public parks. Pop. 9,374.

BRODEUR, bro-der', Louis Philippe,

Canadian statesman : b. Beloeil, Quebec, 21 Aug.

1862. He was educated at the College of Saint Hyacinthe and Laval University, and was called to the bar in 1884. He was first returned to the House of Commons in 1891, and became

editor of Le Soir in 1896. He was speaker of the House of Commons, 1896-1900, 1900-04;

Minister of Inland Revenue, 1904—06; Minister of Marine and Fisheries, 1906-11; and has been judge of the Supreme Court of Canada since the latter year. He was member of the

Imperial Conferences of 1907 and 1911; as¬

sisted in negotiating the Franco-Canadian

Treaty of 1907, and was the author of the first naval bill introduced into the Canadian Parliament.

BRODIiEA, bro*-di-e'a, a small genus of

western American corm-rooted plants of the .

family Liliacece, some of which are popular as garden flowers. The species are of low growth, and have several purple, red, white or yellow funnel-shaped flowers on a scape. For list of species and cultural directions consult Bailey, (Standard Cyclopedia of Horticulture) (New

York 1914).

BRODIE, Alexander Oswald, American

soldier and administrator : b. Saint Lawrence County, N. Y., 13 Nov.

1849; d. 10 May 1918; graduated, West Point, 1st lieutenant of cavalry, 1875-77, then resigned to take up cattle

ranching in Kansas, and mining and engi¬

neering later in Arizona. He served in two Indian campaigns in 1883 and 1884; and

during the Spanish-American War as major

in Colonel Roosevelt's (Rough Riders, } fight¬

ing in Cuba and elsewhere, being wounded and promoted lieutenant-colonel. He was acting

governor of Arizona in 1902; in 1905 became assistant chief of the Record and Pension

Office, then military secretary, in 1907 lieu¬

tenant-colonel adjutant-general; colonel in

1912, and retired into private life 1913.

BRODIE, Sir Benjamin Collins, English

surgeon : b. Winterslow, Wiltshire, 9 June

1873; d. Broome Park, Surrey. 21 Oct. 1862.

His father superintended his education till he was 18, after which he went to the Hunterian School of Anatomy. In 1803 he became a

pupil of Sir Everard Home at Saint George's Hospital, and in 1805 was appointed assistant to Mr. Wilson, demonstrator of anatomy. In

1809 he became a lecturer of the school and assistant surgeon of the hospital. In 1810 he was elected Croonian lecturer to the Royal

Society, and the excellence of his papers caused him to be elected a fellow, and in the follow-BRODRICK

mg year he received the Copley medal. His

reputation as a distinguished surgeon was now established, and his professional career became one of uniform success. From 1819 to 1823 he was processor of anatomy at the Royal College of Surgeons. In 1822 he was elected a full surgeon at Saint George's. He continued giv¬

ing clinical lectures there till 1830, when the increasing demands of his profession com¬

pelled him to discontinue them. In 1832 he succeeded Sir Everard Home as sergeant-surgeon to William IV, and was made a

baronet by patent in 1834. Queen Victoria con¬

tinued him in the same appointment. From

1835 to 1846 he was a member of the Court of Examiners of the College of Surgeons, and in 1844 he was president of the court. In 1858

he was elected president of the Royal Society, which honor he held till 1861. For some years before his death his sight failed, and for about two years he was almost totally blind. As a professional practitioner his gains exceeded

those of almost any man of like profession in his time. In 1851 he republished a selection of his earlier essays, entitled Physiological Re¬

searches. } His work on (Pathological and

Surgical Observations on Diseases of the

Joints5 (1818) was esteemed of great value both in Great Britain and on the Continent, and went through many editions. In 1854 he pub¬

lished a work in a colloquial form entitled Psychological Inquiries.5 The dialogue is

not controversial, and the work contains the mature opinions of the author on various

speculative subjects.

BRODRICK, George Charles, English

educator: b. Castle Rising, Norfolk, England, 5 May 1831 ; d. 14 Sept. 1903. He was educated at Eton and Balliol College, Oxford, and Uni¬

versity of London. He was called to the bar in 1859. From 1877-79 he was a member of the London School Board. In 1881 he became

warden of Merton College. Among his works

are Political Studies5 ; Pnglish Land and

English Landlords5; (Memorials of Merton

College5 ; (Short History of Oxford Univer¬

sity5 ; and (Memories and Impressions.5

BRODRICK, William St. John Free—

mantle, 9th viscount Middleton, English states¬

man : b. 14 Dec. 1856. He was educated at Eton and at Balliol College, Oxford. From

1880-85 he was member of Parliament for

West Surrey; 1886-92, financial secretary to the War Office; 1895-98, Under-secretary of

State for War; 1898-1900, Under-secretary of State for Foreign Affairs ; after becoming Sec¬

retary for War. His administration of the War Office during the South African War was

severely criticized. He became Secretary of

State for India in 1903, and supported Kit¬

chener against Lord Curzon, which led the

latter to resign in 1905. From 1907 to 1913

he served as alderman of the London county council. In 1907 he succeeded his father as Viscount Middleton.

BRODSKY, Adolf, Russian violinist: b.

Taganrog, South Russia, 21 Feb. 1851. He first played in public at the age of nine, and later went to Vienna to pursue his musical studies.

In 1879 he became director of the symphony conrrrts in Kieff, and later held a professor¬

ship in the Leipzig Conservatory. As a soloist he appeared in concerts in several of the lead¬

ing cities of Europe. He came to the United States in 1891 and taught for a time in Schar-wenka's Conservatory, New York, but returned to Leipzig. In 1895 he was made director of the Royal College of Music, Manchester, Eng¬

land. In 1881-82 he made successful concert tours of England, Paris, Moscow and Vienna.

BRODY, Poland, town in Galicia, near

the Russian frontier, 58 miles east-northeast of Lemberg, on a swampy plain. It has broad

streets, houses mostly built of stone, an old castle, three churches, Jewish synagogue, *etc.*

About two-thirds of its inhabitants are Jews, who have a hospital for themselves and a col¬

lege for the instruction of artists and me¬

chanics. The commerce, carried on principally by Jews, is important, the town being favor¬

ably situated for the interchange of goods be¬

tween Austria and Russia, and Turkey. Grain, wool, cattle, fur, feathers and agricultural implements are the principal items of trade.

Pop. about 14,000.

BRODZINSKI, brdd-zen'ske, Kazimierz,

Polish soldier and national poet : b. Krolowko 1791 ; d. Dresden, 10 Oct. 1835. In early life he was engaged in active military service, and in 1813 during Napoleon's campaign in Ger¬

many, he was taken prisoner at the battle of Leipzig. In his idyllic narrative poem

(Wieslaw,5 he reinvigorated Polish verse from national sources and becoming known for his '

familiarity with the world's literature received the appointment of professor of aesthetics and literature in the newly established university of Warsaw. He translated many of the

masterpieces of European literature into Polish, notably Scott's novels in 10 volumes. His

own writings were published in eight volumes (Warsaw 1872-74). Consult Arabazhin,

(Kazimierz Brodzinski5 (Kiev 1891).

BROGLIE, bro-le, a family distinguished

in the annals of French wars and diplomacy, which derives its origin from Piedmont.

Among its members are :

1. Francois Marie, Due de, French soldier:

b. Paris, 11 Jan. 1671; d. Ferrieres, 22 May 1745. From 1689 he

fought with distinction in the Netherlands, Germany and Italy. He was

also employed in diplomatic affairs, and con¬

cluded a treaty between France, England and Prussia in 1725. He rose by degrees till in 1734 he became marshal of France. In the

war of the Austrian succession he had the

chief command of the armies in Bavaria and Bohemia.

2. Victor Francois, Due de, French soldier: b. (the eldest son of the preceding), 19 Oct.

1718; d. Munster 1804. He commenced his

career under his father in the battles of

Guastalla and Parma (1734) ; was engaged in all the wars of France, and was created

marshal in 1759. Jomini considered him the

only French general who had shown constant

ability during the Seven Years' War. He was engaged in the battles of Hastenbeck, Ross-bach, Sondershausen and Liitzelberg, and,

being appointed to the chief command, de¬

feated the Prussians and Hessians at Bergen in 1759, for which Francis I of Austria created bin a nrince of the empire. In 1760 he gained another victory at Corbach, but was defeated, 574

together with the Prince of Soubise, at Wil-lingshausen, in the following year. In con¬

sequence of this and the favor of Soubise at court he was exiled. He was recalled in 1764, and in 1789, when the Revolution broke out,

Louis XVI appointed him Minister of War;

at the same time he received the command

of the troops that were to keep Paris in check.

The desertion of the National Guard rendered all his efforts vain, and Broglie left France.

In the campaign of 1792 he commanded a

division of the emigres without success. After its close he withdrew entirely from public life.

3. Victor Claude, Prince de Broglie, French soldier: b. (third son of the preceding), 1757; d. Paris, 27 June 1794. He entered at first into the views of the revolutionary party. He was deputy of the nobility of Colmar to the States-General in 1789. After the dissolution of the Constituent Assembly he was appointed field-marshal in the army of the Rhine, but upon his refusal to acknowledge the decree of 10 August, suspending the royal authority, was deprived of his command, summoned before the revolution¬

ary tribunal, and led to the guillotine.

4. Achille Charles Leonce Victor, Due

de, French statesman: b. Paris (son of the preceding), 1 Dec. 1785; d. Paris, 25 Jan.

1870. In 1816 he married a daughter of

Madame de Stael and was made a member

of the Chamber of Peers. After the Revolu¬

tion of 1830 the Due de Broglie and Guizot were the heads of the party known as

doctrinaires. He was Minister of Public

Instruction for a short time in 1830, and

Minister of Foreign Affairs from October 1832

to April 1834. In 1849 he was a Conservative member of the Legislative Assembly, and after the coup d'etat he continued a bitter enemy of the imperial regime. His later years were de¬

voted to philosophical and literary pursuits.

5. Jacques Victor Albert, Due de: b. Paris (son of the preceding), 13 June 1821; d. 1901.

In 1846 he became secretary to the embassy at Madrid, when he was transferred to that at Rome, but the revolution of 1848 caused him to give up public life. From that time he became known as an able writer in political reviews.

In 1856 he published (L'Histoire de l'Eglise et de l'Empire,* in six volumes, a work which gained him a chair in the Academy. In 1871

he was elected to the National Assembly for the department of Eure, and in the same year became Ambassador at London. He led the

opposition to Thiers during 1872-73, and finally succeeded in defeating him. In the latter year he became Minister of Foreign Affairs and

president of the council, but in 1874 he suffered defeat. In 1885 he again gave up political life and devoted himself to his historical studies.

Among his works are (Le Secret du Roi Louis XV) (1878) ; (Frederic II et Marie-Therese*

(1883) ; ˆMaurice de Saxe et le Marquis

d,Argenson) (1891) ; (La Paix d'Aix-la-Chapelle) (1892) ; (Le Pere Lacordaire)

(1895) ; <Malherbe) (1897), *etc.*

BROGNY, bron-ye, Jean Allarmet, Italian

cardinal: b. Brogny, near Annecy, Savoy. 1342; d. Rome, 16 Feb. 1426. Although a swineherd in his youth, he attained, bv his learning and virtues, a position of great influence and

eminence in the Church. He was successively made bishop of Viviers, of Ostia, archbishop of Arles, and bishop of Geneva, and finally cardinal and chancellor of the Church of

Rome. During the great schism which divided the Church for more than 40 years Brogny

devoted himself to the work of conciliation.

The Council of Constance being called for that purpose by John XXIII and the Emperor

Sigismund, the former was deposed at the

sixth session, after which Brogny presided as senior cardinal until the 41st, when Cardinal Colonna was elected Pope, 14 Nov. 1417,

chiefly through Brogny's .influence, under the name of Martin V, and the holy see was once more established at Rome. As president of the Council of Constance he had to pronounce the sentence of death upon Huss, to whom he had shown great kindness during the trial, having visited him several times in his prison and exhorted him, but in vain, to save his life by recanting his creed. The cardinal was the

founder of the hospital of Annecy, and of the College of Saint Nicolas at Avignon to which he left his library and manuscripts. Consult Besson, (Memoires pour l'histoire ecclesiastique des dioceses de Savoie (Annecy (Nancy)

1759).

BROGUE, brog (Ir. and Gael, brog), a

coarse and light kind of shoe made of raw or half-tanned leather, of one entire piece, and gathered round the foot by a thong, formerly worn in Ireland and the Highlands of Scotland.

The term is also used of the mode of pro¬

nunciation peculiar to the Irish, but whether the word in this sense is the same as in the other is doubtful.

BROILING, the cooking of meat or fish on

a gridiron above a fire, or by laying it directly on the coals, a very wholesome method of

cookery. See Cookery.

BROKE, Sir Philip Bowes Vere, British

admiral: b. Ipswich, 9 Sept. 1776; d. 2 Jan.

1841. He entered the navy in 1792, and, after he had seen much active service, distinguished himself in 1813 as commander of the frigate Shannon , in the memorable action which that vessel, in answer to a regular challenge, fought with the Chesapeake off the American coast.

The Shannon , carrying 38 guns and 330 men, in an engagement of only 5 minutes, boarded and captured the Chesapeake , carrying 49 guns and 440 men. Sir Philip, who was severely

wounded in the action, was immediately made a baronet, and in 1815 Knight Commander of the Bath. He became rear-admiral in 1830.

Consult Brighton, (Memoir of Admiral Sir

P. B. V. Broke) (2 vols., London 1866).

BROKEN ARROW, Okla., city in Tulsa

County, 18 miles southeast of Tulsa and 37

miles northeast of Muskogee, on the Missouri, Kansas and Texas Railroad. It has a public school and a high school affiliated with the State University, a city hall and seven churches.

Its three banks have a capital and surplus affgref?ating $200,000, with deposits amounting to $950,000. The value of the city's taxable property amounts to $1,250,000. The indus¬

tries comprise cotton gins, grain elevators, an ice plant, machine shops and an ice cream

factory. The city has an electric-light plant, waterworks valued at $110,000 and a sewer

system valued at $35,000. In 1917 municipal receipts totaled $15,000 *and the expenditures

$13,850. The bonded debt consists of $22,500

for schools, $70,000 for water supply system and $30,000 for sewers. The city is surrounded by a splendid agricultural region, producing corn, oats, cotton, wheat and potatoes. There are also coal mines and oil and gas wells in the vicinity. Pop. 2,000.

BROKEN BOW, Neb., city and county-seat of Custer County, 80 miles distant from Grand Island, on the Chicago, Burlington and Quincy Railroad. It has farming and stock-raising interests, bottling establishments and a creamery. The municipality owns the water¬

works. Pop. (1920) 2,567.

BROKEN HILL, Australia, a mining

town in the western part of New South Wales, south of Stanley Range, about 925 miles north¬

west of Sydney. The town is built on a ridge 150 feet above the plain. It stands in a district which contains many silver mines ; and asbes¬

tos, lead, gold, copper, etc., are also found here. One of the silver mines, the Proprietary, is the most productive in the world. It is connected with Silverton and Adelaide by rail.

Pop. 30,500.

BROKEN-WIND, a disease in horses.

See Heaves.

BROKER (Lat. abrocator, perhaps from

the Saxon abr ocean, to break up, from which is derived (<abbroachment,)) the breaking up of goods or selling at retail). The early use of this term designated a retailer of goods, gen¬

erally supposed to belong to another person, and hence applied to any one making a

bargain as the agent of another for the sale or purchase of goods. The distinctive char¬

acter of a broker was that he acted in behalf of another and in his name ; at least, when the contract came to be consummated, the

name of the principal was in the ordinary

course disclosed. It was a further incident of a broker's employment that he did not have possession of the goods sold, or receive pos¬

session of the goods purchased, in which

respect he differed from a factor. And these principles still apply. But the office of broker has been vastly extended by the increasing

exigencies of commercial business.

The most important kinds of brokers are here enumerated. Bill and note brokers negotiate

the purchase and sale of bills of exchange and promissory notes. They are paid a com¬

mission by the seller, and it is not their custom to disclose the names of their principals. There is an implied warranty that what they sell is

what they represent it to be, and should a bill or note sold by them turn out to be a forgery, they are held to be responsible ; but it would appear that by showing a payment over to their principals, or other special circumstances at¬

tending the transaction proving that it would be inequitable to hold them responsible, they will be discharged. (Edwards, Bills, 291; 4

Duer, 79). The authorities, however, are not in harmony upon this question. (Consult 3

Allen 258; ‘1 Hill 287; 21 E. C. L. 379). Ex¬

change brokers negotiate bills of exchange

drawn on foreign countries, or on other places in this country. It is sometimes part of the business of exchange brokers to buy and sell uncurrent bank notes and gold and silver coins, as well as drafts and checks drawn or payable in other cities ; although, as they do this at their own risk and for their own profit, it is difficult to see the reason for calling them brokers. Insurance brokers procure insurance, and negotiate between insurers and insured.

Merchandise brokers negotiate the sale of mer¬

chandise without having the possession or con¬

trol of it, as factors have. Pawnbrokers lend money in small sums, on the security of per¬

sonal property, at usurious rates of interest.

They are licensed by the authorities, and ex¬

cepted from the operation of the usury laws.

Real estate brokers are those who negotiate the sale or purchase of real property. They are a numerous class, and, in addition to the above duty, sometimes procure loans on mort¬

gage security, collect rents and attend to the letting and leasing of houses and lands. Ship brokers negotiate the purchase and sale of

ships and the business of freighting vessels.

Like other brokers they receive a commission from the seller only. Stock brokers are those employed to buy and sell stock in

incorporated companies. The stock brokers are associated

together in the larger cities under the name of the Board of Brokers. (See Exchange).

This board is an association, admission to

membership in which is guarded with jealous care. Membership is forfeited for default in carrying out contracts, and rules are prescribed for the conduct of the business, which are en¬

forced on all members. The purchases and

sales are made at sessions of the Board, and are all officially recorded and published by an officer of the Association. Stock brokers charge commission to both buyers and sellers of stocks.

BROMAL HYDRATE is prepared by

adding bromine to iced achohol, distilling and combining with water. Its crystals resemble

those of chloral hydrate in appearance and

chemical properties, and are soluble in water.

The drug has a sedative action tending to

produce sleep, and is employed in nervous con¬

ditions and to diminish the attacks in epilepsy.

It has little effect on pain, and should not be used when the heart is weak or the stomach upset.

BROMAMIDE, a volatile crystalline sub¬

stance without odor or taste and containing bromine. It is insoluble in water and is em¬

ployed as a sedative in acute and chronic

rheumatism and neuralgia.

BROMBERG, brom-barH, Poland, town

in the province of Posen, 69 miles northeast of the city of that name ; situated on the Brahe six miles west of its confluence with the Vis¬

tula. It is an important trading centre in coal, lumber, flour, leather and wool. It manu¬

factures soap, candles, furniture and. snuff and contains breweries and. distilleries, iron foun¬

dries and dyeing establishments. It was added to Prussia in 1772 and returned to Poland

after the World War. It has two Protestant and two Roman Catholic churches, a synagogue, asylum for the blind, a gymnasium and a real-gymnasium. Pop. about 58,000.

BROME, Richard, English dramatist: d

about 1652. He was at first the servant and afterward the friend of Ben Jonson, who en¬

couraged him in his literary work, and on

whose style his plays are modeled. The best and most popular of his dramas, some of them 576

comedies dealing with the everyday life of his time and others of a more romantic character, are (The Court Beggar-* (acted 1632) ; (The Love-sick Court) (published 1659) ; (The Queen and Concubine } (published 1659) ; (The North¬

ern Lass) (printed 1632) ; cThe Sparagus

Garden* (acted 1635) ; (The Antipodes) (acted 1638), and (A Jovial Crew-* (acted 1641).

BROME-GRASS, the common name of

the genus Bromus. About 100 species are

known, occurring in both the Old and the New World. These grasses have great power of

resisting drought, and have proved themselves valuable forage plants on the high, dry plains of the western United States. Some species

are cultivated for hay in the Eastern States, but are not much relished by cattle. One species is known as cheat or chess, and is found in wheat-fields. Several others have become naturalized in the United States, especially on the Pacific Coast, and are often troublesome weeds.

BROMELIA, a genus of about 25 species

of monocotyledonous, stemless herbs of the

natural order Bromeliaceco, natives of tropical America, introduced into other warm climates for the sake of the fibre obtained from their leaves, and cultivated in greenhouses to some extent for ornament. The species have stiff leaves like the pineapple and flowers in panicles.

B. pinguin, the wild pineapple or pinguin, a native of the West Indies, is perhaps best known because of its use as a tropical hedge-plant, for which its numerous sword-shaped, spiny, rigid leaves, three to six feet long, and two inches wide, specially adapt if. The leaves are also ornamental, being bright green at first and turning red with age. The reddish pubescent flowers in compact panicles are followed by edible fruits as large as plums. These fruits are used to make a pleasant cooling drink.

B. sylvestris, which has smaller leaves, fur¬

nishes a fibre said to be superior to the preced¬

ing species. Other species also yield a fibre of greater or less value. The genus was named after the Swedish botanist Bromel.

BROMIC ACID (HBr03), a monobasic

colorless acid, forming salts called bromates.

It was discovered by Balard in 1826. When

bromine is dissolved in caustic potash a mixture of bromide and bromate of potassium is ob¬

tained, which can be separated by crystallization, 3Br2 + 6KH0 = 5KBr + KBr03 + 3H20. Free

bromic acid can be prepared by passing chlorine into bromine water, 2Br -f-10C1 + 6H20 —2HBr03 + 10HC1. The acid is best obtained by decomposing potassium bromate by argentic ni¬

trate, and acting on the resulting argentic bro¬

mate by bromine, 5AgBr03 + 3Br2 -J-3H20 =

5AgBr + 6HBr03. Bromic acid is a strongly

acid liquid, reddening and then bleaching litmus paper. On concentration at 100° it decomposes into bromine and oxygen. It is decomposed by sulphur dioxide (S02), by sulphide of hydro¬

gen (H2S), and by hydrobromic acid (HBr).

Bromates are with difficulty soluble in water, and are decomposed on heating into oxygen and bromides. When combined with sulphur or

charcoal the bromides may be exploded by

percussion.

BROMIDE, brc/mld, a combination of bro¬

mine with a metal or a radical. Bromides are soluble in water, except silver and mercurous bromides; lead bromide is very slightly soluble: They are detected in analysis by the following reactions: Argentic nitrate gives a yellowish precipitate of AgBr, insoluble in dilute nitric acid, and soluble in strong ammonia. Chlorine liberates bromine, and, if the liquid is shaken up with ether, a yellow ethereal solution floats on the liquid. Heated with sulphuric acid and Mn02, bromides yield vapors of Br, which turn starch yellow. Potassium bromide (KBr) is

one of the most important of the bromides, being extensively used in medicine as a sedative.

It is formed by the addition of bromine to a solution of potassium hydroxide; the residue is evaporated and heated with some charcoal.

The bromide is next purified by re-crystalliza¬

tion from water. It is colorless, and has a pungent saline taste. Sodium bromide is also used extensively in medicine and is said to cause less disturbance in the alimentary tract than potassium bromide. Silver bromide is

made by adding silver nitrate to an aqueous solution of another metallic bromide. It is much used in photography because of its sensi¬

tiveness to light. Ammonium bromide, lithium bromide, calcium bromide and zinc bromide are also used in medicine and have special appli¬

cations; their prolonged use, however, is at¬

tended with injurious effects generally termed bromism, and consisting of a rash, mental dull¬

ness and general loss of nervous power.

BROMIDROSIS (bromos, a bad odor —

hidros, sweat), malodorous perspiration usually excessive in quantity and due mostly to bacterial decomposition of the sweat. The parts most

effected are the armpits and the feet, but the latter are not attacked in persons who go bare¬

foot. The victims are mostly anaemic, nervous persons. Very hot water, formaldehyde, sali¬

cylic acid and boric acid are the most used ap¬

plications, the latter being dusted in shoes and stockings. The sweat also sometimes smells of certain odoriferous substances not necessarily offensive, which have been taken ; for example : asafeetida, copaiba, benzoic acid, musk, onion or garlic. It also may

develop a peculiar odor in cholera, smallpox or typhoid fever, and

smell of urine in uraemia. Rarely it gives a pleasant odor of violet or pineapple. The

sweat in some colored races has a distinc¬

tive, unpleasant smell.

BROMINE, a non-metallic element. Syrm

bol Br; atomic weight, 79.4 for H — 1, or 80.0

for 0 = 16. Bromine was discovered in 1826

by Balard, in the salts obtained by the evapora¬

tion of sea water. Bromine is not found in an uncombined form in nature but exists as a constituent in all sea water and in most mineral waters and salt springs. It is liberated from its sodium and magnesium salts by the action of free chlorine, and is separated by ether, which dissolves the bromine. This red-colored solu¬

tion is removed, saturated with potash, evapo¬

rated and heated to redness, and the bromide of potassium is heated with manganese dioxide and sulphuric acid. The bromine is liberated in the form of a deep red vapor, which condenses into a dark, reddish-black liquid, which is mobile, and volatile, and has a specific gravity of 2.97. It boils at 63°, and its vapor density is 5.54 times that of air. It has an irritating smell, and when inhaled is poisonous. On account of this poisonous quality and the great vapor

density it was used largely in the making of the asphyxiating gases employed in the Euro¬

pean War (see Bombs). It dissolves in 30

parts of water, and the solution has weak

bleaching properties. Bromine and hydrogen do not unite in the sunlight, but do when they are passed through a red-hot porcelain tube, form¬

ing hydrobromic acid (HBr), which is also ob¬

tained by the action of phosphorus and water on bromine. It is a colorless, fuming gas, which liquefies at 73°, very soluble in water. The con¬

centrated solution contains 47.8 per cent of HBr; it boils at 126°, and has powerful acid properties ; it neutralizes bases, forming bro¬

mides and water. Hypobromous acid, HBrO,

is only, known in solutions ; it has bleaching properties. Bromine can displace chlorine from its compounds with oxygen, while chlorine can liberate bromine from its compounds with hy¬

drogen. Free bromine turns starch yellow.

In the arts bromine is used in very large quantities in making the sensitive silver salts employed in photography. It is also used to dissolve gold in metallurgical processes, and in the manufacture of dyes and disinfectants. In medicine bromine has been applied externally as a caustic but rarely. Its chief officinal prep¬

arations are bromide of ammonium, useful in whooping-cough, infantile convulsions and ner¬

vous diseases generally; and bromide of potas¬

sium, very extensively used as a depressant of the nervous system, especially in epilepsy,

hysteria, delirium tremens, diseases of the throat and larynx, bronchocele, enlarged spleen,

hypertrophy of liver, fibroid tumors, *etc.* Also, as an antaphrodisiac, for sleeplessness, glandular swellings and skin diseases. The alterative

properties of bromide of potassium are similar to, but less marked than, those of the iodides.

Its preparation is the same as iodide of potas¬

sium, substituting an equivalent quantity of bromine for iodine — 6KHO + Br# = 5KBr -f-KBr03 + 3H20. It has a pungent saline taste, no odor and occurs in colorless cubic crystals, closely resembling the iodide. As a hypnotic its usefulness is much increased by combining it with morphia or chloral hydrate. Bromine is manufactured chiefly from the mother liquors of saltworks. In the United States the largest production comes from the natural brines of the salt wells of Michigan. Other localities of note are Pomeroy, Ohio, and a few points in West Virginia. Previous to the outbreak of

the European War the Michigan and Ohio

product was manufactured into fine chemicals, the average amount produced annually being

about 600,000 pounds, and the average price about 20 cents per pound. By 1915 the output had been placed on the market largely in crude form, and the amount totaled 855,857 pounds, the price rapidly advancing to as high as $6.50

per pound in the early part of 1916. The de¬

mand from abroad decreasing, the output for 1916 fell to 688,260 pounds, for which an aver¬

age price of $1.34 per pound was obtained, ag¬

gregating a value of $922,225. See Mineral

Productions of the United States.

BROMIPIN, a yellow, bland liquid of

simple oily taste, and composed of oil of sesame with 10 per cent of bromine. It is easily borne by the stomach and does not readily produce bromism, therefore in some cases it is sub¬

stituted for the bromides which it resembles in its action on the nervous system.

BROMISM, a condition which results

from the accumulation of bromides in the sys¬

tem, owing to the ingestion of greater quantities than the body can get rid of. The breath is fetid, the skin breaks out in an acne eruption, the throat is insensitive to touch so that it may be tickled with a feather, and there is loss of memory, heaviness of intellect, great sleepiness and depression of spirits. If the drug is still continued there may be paralysis, loss of sight and hearing, inability to speak above a whisper and various symptoms of mental derangement.

The symptoms usually quickly subside on stop¬

ping the drug.

BROMLEY, England, town of Kent, 10

miles south-southeast of London. It has a

market square with a large market-house, and has rapidly increased by the erection, in its vicinity, of large groups of houses occupied by London merchants. The most notable place of worship is the church of Saint Peter and Saint Paul, which retains a Norman font and other remains of an earlier church. It possesses a chalybeate spring that was in high repute

prior to the Reformation, and has a charitable foundation for the widows of clergymen. Pop.

33,646.

BROMOFORM, a clear, heavy, volatile

liquid of ethereal odor and sweetish taste, soluble in alcohol or ether though not in water.

It is analogous to iodoform and chloroform, and is made like the latter from alcohol or acetone.

It is somewhat anaesthetic and has been used like chloroform, but its special use is in ˆwhooping-cough,® in which a few drops are

given in solution or mixture several times a day.

BROMOL, the precipitate formed when

bromine water is added to a solution of carbolic acid. It occurs in crystals, is antiseptic, and may be taken internally for diarrhoea or cholera morbus, or applied to wounds or ulcers in the form of a salve.

BROMPTON, England, a suburban dis¬

trict of London, in Kensington, associated with the names of Burke, Canning and other eminent men. The oratory of Saint Philip Neri, the Victoria and Albert Museum, the Brompton

Consumption Hospital and the West London

cemetery are included in this district.

BROMUS. See Brome-Grass.

BRONCHI, brong'ki, the twin branches

into which the trachea or windpipe divides in the chest, one going to the right lung, the other to the left, and ramifying into innumerable smaller tubes — the bronchial tubes. See

Lungs.

BRONCHITIS (Gk. bronchia , the bron¬

chial tubes + itis, a suffix denoting inflamma¬

tion), inflammation and catarrh of the bron¬

chi. It occurs in various forms in each of which the bronchitis may be

acute or chronic.

It may also as acute or chronic be a primary condition, known as non-specific, or second¬

ary specific. The former results from ex¬

posure to chemical or mechanical irritation, sudden change to lower temperature, inhala¬

tion of dust, particularly dust containing

vegetable organisms and probably bacterial

agents ; the latter is due to the micro-organisms of other specific infectious diseases as measles, diphtheria, *etc.* It may also occur in other severe disease forms from the chemical or

organic irritants deposited in the mouth and pharynx from which they find their way into the bronchi. Lessened resistance power in

other diseases also predisposes to bronchitis.

Acute bronchitis is frequently an exacerbation of the chronic condition, while again chronic bronchitis may develop from an acute attack.

The disease is particularly common in young children and in the aged with both of whom it assumes a serious form and often proves

fatal. It is more common with men than with women since it is frequently due to occupa¬

tional exposure.

The acute attack may be very slight, lasting only a day or two, but the usual duration is one or two weeks. Complete return to health may be long delayed. In a protracted course there may be frequent remissions and exacerbations depending upon the season and other external factors. Pneumonia may develop following an

attack of bronchitis or the chronic form may lead to chronic symptoms in the respiratory organs or the heart. The symptoms of an at¬

tack are cough and mucopurulent expectoration.

The cough may be dry for a day or two but this is followed by an abundant secretion or a scanty and viscid expectoration. Dyspnoea is also present in the severer forms. In the milder forms the inflammation is limited to the larger bronchi. In other cases the symptoms are more marked and there is fever for several days or for one or two weeks. Capillary bronchitis or bronchitis of the finest bronchi is found usually as a primary condition only in children, espe¬

cially in weak and ill-nourished children. In adults it may develop, however, as a secondary bronchitis in connection with other severe dis¬

ease. There may be also a putrid or fetid bronchitis distinguished by the foul putrid char¬

acter of the expectoration due to a decomposi¬

tion of the mucous membrane. A rare form is a croupous bronchitis in which there is a for¬

mation of extensive fibrinous patches in the bronchi which give rise to membranous casts in the expectoration. Aside from the treatment

of the fever in the acute condition and the use of expectorants the treatment consists largely of warmth, light diet, warm diluent drinks, diaphoretic baths and inhalations. Prophylactic treatment for those subject to exacerbations of the chronic condition consists of seasonal change of climate and avoidance of external irritating conditions, with a moderate diet. Consult All¬

butt's (System of Medicine-* ; Osier's Prin¬

ciples and Practice of Medicine5 ; and Striim-pell's (Textbook of Medicine.5

Smith Ely Jelliffe.

BRONCHOCELE, brong'ko-sel, an in¬

dolent tumor on the forepart of the neck,

caused by enlargement of the thyroid gland, and attended by protrusion of the eyeballs, anaemia and palpitation.

BRONCHOTOMY, brong-kot'o-mi, in sur¬

gery, an incision into the windpipe or larnyx, between the rings, to afford a passage for the air into and out of the lungs when any disease prevents respiration in the usual way, or to ex¬

tract foreign bodies which have got into the trachea, or in cases of suffocation, drowning, *etc.* It is known as tracheotomy or laryngot-omy, according as the windpipe or the larynx is operated on.

BRONCO, or BRONCHO, the small

horse of the plains in western United States and in Mexico. In Texas it is called <(Mustang.5) It is descended from the horses of Arabian stock, brought to America by the early

Spaniards, and exhibits still certain Arabian features due to this ancestry. Many of the Spanish horses were captured by the Indians, and some escaped from their owners. Of the former, great numbers deserted their Indian

captors and roamed with their free companions over the plains of the Southwest, where they multiplied rapidly and adapted themselves to the local conditions of climate and vegetation.

Thus they returned to a wild state in this coun¬

try, which has been considered as the original habitat of the horse family, but which presents nowhere, unless on the pampas of South Amer¬

ica, an aboriginal type of horse. These wild horses have more recently been captured and bred in captivity, and have been modified by admixture of blood with horses from the east¬

ern United States. They are famous for their endurance, despite their rather weak hind

quarters. Their heads are proportionately

very large, and not handsome, but the little ani¬

mals are extremely intelligent and serviceable.

BRONDEL, John Baptiste, American

clergyman: b. Bruges, Belgium, 1842; d. Hel¬

ena, Mont., 1903. He studied in the American College of the University of Louvain and was ordained to the Catholic priesthood in 1864. He came to America and from 1867-77 was rector at Steilacoom, Wash., and at Walla Walla,

1877-78. In 1879 he became bishop of Van¬

couver Island, and was appointed, in 1883,

administrator apostolic of Montana, becoming

later bishop of Helena. Bishop Brondel is

especially known for his labors among the

Indians. His influence over them was very

great and it was availed of several times by the national government.

BRONGNIART, bro-nyar, Adolphe The-

ophile, French botanist, son of Alexandre

Brongniart: b. Paris, 14 Jan. 1801; d. there, 19

Feb. 1846. He first studied medicine and re¬

ceived his diploma of doctor of medicine in 1826 ; but afterward turned his attention to the physiology of plants and antediluvian phytol-ogy. In 1833 he succeeded Desfontaines as pro¬

fessor of botany at the Jardin des Plantes; as a member of the Academy of Sciences, in 1834, and in 1839 as professor of botany at Museum of Natural History in Paris. His researches were various, and among his numerous works

are (Histoire des vegetaux fossiles5 (1828-47) ; (Essai d'une classification naturelle des cham¬

pignons5 (1825) ; (Memoire sur la structure et les fonctions des feuilles5 (1871). His Enu¬

meration des genres de plantes cultivees au Musee d'Histoire Naturelle de Paris5 (1843), played an important part in the development of modern systems of classification.

BRONGNIART, Alexandre, a-leks-andr,

naturalist and mineralogist: b. Paris, 5 Feb.

1770; d. there, 7 Oct. 1847. He turned his attention at a very early age to the study of the ceramic art; and after having served for some time in the army on the medical staff in 1797 he became professor of natural history in the Ecole Centrale and was appointed, in 1800, director of the porcelain manufactory at Sevres, where he revived the art of painting on glass.

In 1797 appeared his Classification des rep¬

tiles,‘1 and in 1807 (Traite Elementaire de Mineralogie) ; and about the same time his labors in the department of natural history brought him into .contact with Cuvier, whom he aided materially in classifying the newly dis¬

covered fossils of Montmartre. Along with

Cuvier he engaged in the composition of the (Essai sur la geographic mineralogique des

environs de Parish first published in 1811, and afterward in 1822, much enlarged, under the title of description geologique des environs de Paris. } In 1844 appeared his (Traite des arts ceramiquesP He succeeded Haiiy as professor

of mineralogy in the Museum of Natural His¬

tory in 1822.

BRONI, bro’ne, a town of northern Italy,

with mineral springs, 11 miles southeast of Pavia. Near by is the castle of Broni, where Prince Eugene obtained a victory over the

French in 1703. Pop. 5,147.

BRONN, Heinrich Georg, hhi-riH ga-orH

bron, German naturalist : b. Ziegelhausen

1800; d. 1862. He was educated at the Uni¬

versity of Heidelberg, where he was nominated professor in 1828, and was later appointed lec¬

turer on zoology in succession to Leonhard.

Among his various scientific works may be

named (System der urweltlichen Konchylien)

(1824), which was followed by (System der

urweltlichen Pflanzentiere) (1825). His most

important geological work was dithasa Geog—

nostica) (1836-38) on rock formations. (Allgemeine Zoologie) (1850) was the first attempt to develop zoology in its entirety with reference to extinct organisms. He published, in 1860, a translation of Darwin's (Origin of Species. 5

BRONSON, Solon Cary, educationalist

and theologian: b. West Union, Iowa, 26 July 1855. He was educated at Upper Iowa Univer¬

sity, Garrett Biblical Institute and Cornell Col¬

lege, Iowa, and ordained a Methodist Episcopal minister in 1878. He became successively pas¬

tor at Hopkinton 1878-81, Waterloo 1881-84,

Toledo 1884—87, Clinton 1887-92, Burlington

1892-96, when he became connected with

Garrett Biblical Institute as Cornelia professor of practical theology. In 1913 he became pro¬

fessor in the same institution of practical theol¬

ogy and social relations. He was acting presi¬

dent of Garrett Biblical Institute and secretary of the faculty from 1908-09. Among his pub¬

lished works are (Religious Delusions > and various lectures and sermons.

BRONTE, bron’ta, Anna (Acton Belle).

See Bronte, Charlotte, Emily and Anne.

BRONTE, Charlotte, Emily and Anne,

English novelists. Their father, Patrick Bronte (1777-1861), belonged to a family of Irish Prot¬

estants named Prunty or Brunty. He was born in the village of Emdale, in county Down, Ire¬

land. By schoolmastering he earned money

enough to take him to the University of Cam¬

bridge, where he graduated B.A., at Saint John’s College in 1806. Ordained the same year to a curacy in Essex, he subsequently migrated to Yorkshire, and in 1811 obtained the living of Hartshead-cum-Clifton, to the east of Halifax.

There he met his future wife, Maria Branwell of Penzance, then on a visit to her friends in the north. They were married on 29 Dec.

1812. Both husband and wife, it is interesting to note, had a zest for writing. A little manu¬

script in Mrs. Bronte’s hand is still extant ; and Mr. Bronte published between 1811 and

1818 two volumes of meditative verse and two didactic stories, one of which follows the lines of Richardson’s < Pamela. > In 1815 Hartshead was exchanged for Thornton, another small

parish near Bradford, in a bleak and lonely district. To this new home the Brontes brought with them two children, Maria and Elizabeth.

At Thornton were born Charlotte (21 April

1816), Patrick Branwell (26 June 1817), Emilv Jane (30 July 1818), and Anne (17 Jan. 1820).

A month after the birth of their last child, the Brontes moved to Haworth, near Keighley, a village that then consisted mainly of a street of gray stone houses running irregularly up a hillside by the church and the graves to the parsonage near the summit. As perpetual cur¬

ate of the parish, the elder Bronte there passed his life; and there the children all grew up within sight of the broad and sweeping moors, wild and bleak in winter but grand and glorious in summer. Mrs. Bronte, a frail woman like her daughters, died in September 1821, worn out by the birth and care of six children; and the next year Miss Branwell, an unmarried

sister, came to Haworth to manage the house¬

hold with the aid of the faithful old servant ˆTabby.® After the death of his wife, Mr.

Bronte, always eccentric and austere, grew

morose; and Miss Branwell seems to have been rather prim and reserved. Wherefore the chil¬

dren were left much to themselves. In 1824 the daughters were placed in a school at Cowan Bridge, a hamlet on the road between Leeds and Kendal, where they remained for about a year to their great discomfort. Just after leav¬

ing school Maria and Elizabeth died of con¬

sumption, brought on, Charlotte thought, by

bad food and brutal treatment.

Soon after this, Charlotte, Emily and Bran¬

well — for so they always called their brother — began to write .ˆoriginal compositions® in a curious microscopic hand, which they stitched into booklets and covered with brown paper.

The specimens of Charlotte's stories, such as (The Adventures of Ernest Alembert,) which

have been printed as literary curiosities, show a facile pen and a remarkable command of

vague and ornate phrases. She, and no doubt Emily and Branwell, had been reading Scott

and the Gothic romances. In January 1831

Charlotte was sent to a school kept by Mar¬

garet Wooler at Roehead, between Leeds and

Huddersfield. Though she remained there but

a year, she formed a strong attachment for Miss Wooler and several of the girls, especially for Ellen Nussey, with whom she kept up a lifelong correspondence. In 1835 she returned to Roehead as a teacher, in company with

Emily as a pupil. After three months Emily became homesick and her place was taken by Anne. Charlotte stayed on with Anne till

Christmas, when both returned to Haworth.

Charlotte 'was completely worn out by the work, for which she was ill adapted. During the

next years Emily remained at home, while

Anne and Charlotte went out as governesses.

Charlotte had a hard time of it in her first posi¬

tion, but received better treatment on a second trial in 1841. In the meantime, she rejected two offers of marriage. With a view to setting up a school of their own, Charlotte and Emily went over to Brussels in 1842 to prepare them-580

selves, especially in French and German, at the Pension Heger, a large school under the man¬

agement of M. Paul Heger and his wife. They advanced rapidly in their studies, receiving high praise from their master. Called home

within a year by the death of Miss Branwell, Emily remained with her father, but Charlotte returned for a year as teacher of English.

Homesickness and anxiety for her father,

whose eyesight was failing, brought Charlotte back to the parsonage. Brief as was the so¬

journ abroad, it was of the greatest value to the sisters. Without that experience, neither of them would likely have written novels that are still read.

In 1846, Charlotte, Emily and Anne pub¬

lished jointly a volume of (Poems) under the names of Currer, Ellis and Acton Bell. The little volume was hardly noticed, though it contained Emily's fine stanzas on the 'Old

Stoic.5 At this time each of the sisters was getting ready a novel. After traveling from publisher to publisher, Emily's (Wuthering

Heights5 and Anne's (Agnes Grey5 were ac¬

cepted and published together in December

1847, under the authors' pseudonyms, and ((on terms somewhat impoverishing.55 Fifty pounds

was advanced to Newby, the publisher, on ac¬

count and never returned. Charlotte's 'Pro¬

fessor,5 which became detached from the other two novels in the long journey, was everywhere rejected; but Smith and Elder intimated to her that they were willing to consider ((a novel of a more striking and exciting character.55 'Jane Eyre,5 by Currer Bell, already completed, was at once accepted and published in October 1847, two months before her sisters' novels came

out. In January 1848 it went into a second edition with a dedication to Thackeray. Char¬

lotte Bronte at once took her place among the great novelists of the period.

The next year appeared Anne's second novel, the 'Tenant of Wildfell Hall.5 By this time sorrow and death were settling over the York¬

shire parsonage. Branwell, who had started

out in life with the intention of becoming a portrait painter, fell into evil ways and slowly degenerated through long years under the eyes of his sisters. After several attacks of delirium tremens, the end came in September 1848.

When he felt the approach of death, he rose to his feet and died standing in order to prove that as long as there is life there is strength of will to do as one chooses. Emily drooped and died on 19 December, refusing to see a physician till just before the end. Among the poems she left unpublished were the memorable 'Last Lines,5 and several other stanzas which Matthew Arnold justly placed by the side of Byron's poems for vehemence, passion and

pain. Anne, long in declining health, was taken over to Scarborough where she died of con¬

sumption on 28 May 1849, within sight and

sound of the sea she passionately loved. She lies buried in the Scarborough churchyard. Like Emily, she also left behind "last verses55 in a noble but more subdued key. Charlotte lived on with her father in great loneliness, publish¬

ing 'Shirley5 in 1849 and ' Villette 5 in 1853. She visited London several times, and on two occa¬

sions she met Thackeray, with whom she was greatly puzzled. To Mrs. Elizabeth Gaskell, the novelist, who made her acquaintance among

the lakes of Westmoreland in 1850, she seemed like one irom whom suffering had taken "every spark of merriment55 and "to be shy and silent from the habit of extreme, intense solitude.55

After a courtship of some years, broken off by her father, she married, on 19 June 1854, the Rev. Arthur Bell Nicholls, who had served as curate at Haworth. Her married life, which

promised much happiness, was brief. She

passed a few months on her husband's estates in Ireland and then returned to Haworth to die on 31 March 1855. She was buried in the

church by the side of Emily and Branwell. Two years after her death, the 'Professor,5 nine times rejected, was published with a note by Mr. Nicholls. The fragment of a story called 'Emma, 5 which had been begun in 1854, ap¬

peared in Cornhill Magazine for April 1860, along with Thackeray's beautiful tribute under the title of the 'Last Sketch.5 Settling perma¬

nently in Ireland, Mr. Nicholls died there in 1906.

A glamour rests over these children of an

Irish clergyman who had strayed to the York¬

shire moors. What Charlotte said of Emily

and Anne may be said of herself also : "For strangers they were nothing; for superficial observers less than nothing; but for those who had known them all their lives … they were genuinely good and truly great.55 In them all, except perhaps Charlotte, lurked consump¬

tion; and they all died young. Two were en¬

dowed with unusual talents and two were

geniuses. Much, no doubt, that has been re¬

ported of Branwell is legendary, but he cer¬

tainly possessed the Bronte taste for art and letters. A beautiful reproduction of his por¬

trait of Emily was engraved from a photograph for the Haworth edition of 'Wuthering

Heights5 (1900). At one time he aspired to win a name in literature. A

letter of his to Wordsworth, enclosing a few stanzas of verse and asking for the poet's opinion of them, is as pathetic as remarkable in tone and style. "From the day of my birth,55 he said, "to this the nineteenth year of my life I have lived among secluded hills, where I could neither know what I was or what I could do. I read for the same reason that I ate or drank, because it was a real craving of nature. I wrote on the same principle as I spoke — out of the impulse and feelings of the mind ; nor could I help it, for what came, came out, and there was the end of it.55

That pressure of utterance which opium and

alcohol brought to naught in this case was characteristic of the sisters. They wrote be¬

cause they could not help it. Anne possessed less of the Bronte fire. Fragile and gentle like her mother, she was "the prettiest … with light brown hair, violet eyes and pencilled eye¬

brows.55 Without the outlook that came to

Emily and Charlotte from their stay abroad, she moved in the narrowest circle of experience easily imaginable. Her novels, in consequence, suffered much by comparison. They are, how¬

ever, storehouses of biographical incident re¬

lating to the family, and for themselves they are interesting, notwithstanding their crudeness, as transcripts of Yorkshire ways and manners at a time when the daughters of clergymen

were forced to become governesses.

Emily's genius towered far above the rest.

Of the poems the sisters published together, only hers cling to the memory. Under more

favorable surroundings she should have become a poet ranking with Christina Rossetti and Mrs.

Browning. One may pick flaws enough in

(Wuthering Heights.* It is ill put together and perhaps the author has not fully realized her aim. It is no doubt brutal where it was intended not to be. But it displays the same intense power of utterance as the poems. It is one of the great things in English fiction, not much like any romance before or since its time. Over it hangs the mystery of the moors and their solitary wanderer.

(Wuthering Heights,* however, has never

gained the popularity of Charlotte's novels. To many it is nightmarish and repellant. It is not softened by the humanity of Charlotte who

mingled more with the world. (Jane Eyre) was based upon Charlotte's experiences as school¬

girl and governess. As a picture of the life of the times in the north, it came as a startling revelation. Its characters were drawn on hard and unconventional lines totally unlike the run of novels women were then writing. Against

the author was brought the charge of coarse¬

ness and brutality, though no mind was ever cleaner than hers. The novel was really the wail of a human soul compelled to haunt the Yorkshire moors. (Shirley* was quieter in

tone; but it caused a stir in the north, for the characters were easily recognized portraits,

among which was a superb study of Emily as Shirley Keeldar of quivering lip, dilating nos¬

trils and wild, fascinating eyes, when moved to passion or strange, Titanic visions. (Villette,) which is the 'Professor* worked over, was

founded on Charlotte's life in Brussels.

Though it suffers somewhat from its foreign setting, it is perhaps her masterpiece. Lucy Snowe and Paul Emanuel are her most elabo¬

rate characters, and nowhere else has Charlotte Bronte so subtly analyzed states of mind verg¬

ing into madness. See Jane Eyre; Wuthering

Heights.

Bibliography. — (The Life of Charlotte

Bronte* by Mrs. Elizabeth Gaskell (London

1857, afterward revised and frequently re¬

issued) is among the finest biographies in the English language. It should be supplemented, however, by C. K. Shorter, f Charlotte Bronte and her Circle* (London 1896) and (Charlotte Bronte and her Sisters) (New York 1905) . Inter¬

esting but less valuable biographies of Charlotte Bronte have been written by T. W. Reid (Lon¬

don 1877), and A. Birrell (London 1887).

Consult also (Emily Bronte* by A. Mary F.

Robinson in the (Eminent Women Series)

(Boston 1883) ; Swinburne's (A Note on Char¬

lotte Bronte* (London 1877) ; F. A. Leyland's 'The Bronte Family* (London 1886) ; Wright's (The Brontes in Ireland) (New York 1893) ; C. K. Shorter's (The Brontes* (London 1907) ; May Sinclair's 'The Three Brontes* (London

and New York 1913), and the 'Publications*

of the Bronte Society. The 'Life and Works of the Sisters Bronte* with a preface by Mrs.

YVard, and introduction and notes to Mrs. Gaskell's 'Life* by C. K. Shorter (7 vols., London and New York 1899-1900) is the best complete edition yet published. Charlotte Bronte's Ad¬

ventures of Ernest Alembert* is included in Nicholl and Wise, (Literary Anecdotes of the Nineteenth Century* (Vol. II, London 1896).

In the London Times of 29 July 1913 a number of letters were published ; these had passed be¬

tween Charlotte Bronte and Heger, her teacher in Brussels. The letters shed a new light on the hero of (Villette.)

Wilbur L. Cross,

Professor of English, Yale University.

BRONTE, Charlotte, Mrs. Gaskell's Life

of. The best biography of Charlotte Bronte is that by Mrs. Gaskell (Elizabeth Cleghorn Ste¬

venson). It maintains its high place in English literature by virtue of many qualities. It is not often that a biography is written by one so thoroughly able to understand and sympathize with the subject. If for no other reason, Mrs.

Gaskell's volume would be worthy of careful consideration because of the fact that it is the work of one gifted woman novelist nar¬

rating and interpreting the life of another.

In addition to this happy circumstance, Mrs.

Gaskell brought to her labor an actual gift for biography, with which she combined the

careful investigation and accuracy of a his¬

torian. To supplement her personal knowledge of the subject, she spared no pains to obtain all possible information. The result is that no subsequent biography of Miss Bronte

has superseded that by Mrs. Gaskell. The one error charged against the author was what has been termed her <(singularly reckless treatment of living people.® She found it necessary, in consequence of threatened suits for libel, to cancel a number of passages. We may agree

that now and then she may not have maintained a strictly judicial attitude, and that some of her inferences in regard to other people may not have been correct or wise. “The great thing for us,® as May Sinclair reminds us, ((is that she was right about Charlotte Bronte. She

was right with a rightness which no biographer and no critic of the Brontes has ever so se¬

curely attained. When all the old rubbish has been sifted… we shall come back to Mrs.

Gaskell’s (Lif e J with the certainty that we shall find there the truth about Charlotte

Bronte, all that was most profoundly and essen¬

tially she. Others have opined, inferred, con¬

jectured. Mrs. Gaskell knew.® Even apart from its accuracy, the (Life, *like that of Nelson by Southey, would probably maintain a place in literature by reason of its skilful manner and charming style. Mrs. Gaskell’s pen is as sure in this work as it is in Branford.*- From the excellent portrayal of the conditions surround¬

ing the Yorkshire village of Haworth as a pre¬

requisite for a clear understanding of such a life as that of Charlotte’s, to the chastened and reserved description of Miss Bronte’s death, there is no false note in the narrative. The work is a masterpiece. Consult May Sinclair’s penetrating introduction to the ‘Life* in

‘Everyman’s Library.*

Waldo H. Dunn.

BRONTOTHERIUM, or TITANOTHE—

RIUM, a genus of the extinct mammals first found in the Bad Lands of South Dakota and later in Nebraska and Colorado. The forma¬

tion is Miocene and the genus is but one of an extinct family of herbivorous mammals. It had the following features: The skull was long and depressed, with a large pair of horn cores, placed transversely on the maxillary bones, in front of the orbits; the nasal bones, which were greatly developed and firmly co-ossified, pro-

trude over the narial orifice ; the brain cavity was small and did not extend over the cerebral hemispheres or the cerebellum, and but little over the olfactory lobes; the neck was of

medium length and stout ; axis was large and extended transversely, being massive, with

odontoid process stout and conical ; lumbars were slender and not as large as the dorsals, and there were four sacral vertebrae; a long and slender tail, indicated by the caudals ; limbs somewhat shorter than the elephant's ; radius separated from the ulna; carpal bones short and supporting four toes; tibia separated from the fibula; three toes of almost equal size on the hind foot.

BRONX, The, a borough of New York

city, 42 square miles in extent, comprising the section of the city northeast of the Harlem River, with adjacent islands. The Bronx River flows through it. The northern part is subur¬

ban in character, but the southern part has become closely built up within recent years.

While mainly residential, the borough contains a great number of industrial establishments. In 1913 it was made a separate county, and on 1

Jan. 1914 the new county government went into operation. For

population, government, educa¬

tion, etc., see New York City.

BRONZE, in its strictest sense, is a solid solution of tin in copper. As generally used the term signifies any alloy consisting of propor¬

tions of copper and tin, varying according to the purpose desired, to which lead, zinc, alumi¬

num, and silver also, are sometimes added for the purpose of giving greater brilliancy to the compound, or rendering it more fusible, the zinc being introduced in its combination with copper as brass. In some of the modern so-called bronzes, brass is used instead of tin ; these are then nothing more than forms of

brass, with very large proportions of copper.

The true bronzes in general use vary the pro¬

portions of copper to tin from 5 to 1 to 24 to 1

(by weight). These alloys are not often used in the arts as they are difficult and costly to finish either with tool or machine. Mixtures of these bronzes with lead, zinc, nickel, phos¬

phorus and aluminum are abundantly strong

and much easier to work. Where the propor¬

tion is larger in tin, the color of the bronze is whitish or gray, and as the copper component is increased the color passes through shades of bluish red and reddish yellow to the brick red of pure copper. It is claimed by some founders that a chemical union of copper and tin is effected only in one or two definite proportions, and that mixtures in other proportions are

defective, particularly so for engine work

where they are subjected to fluids at high pres¬

sures — in which cases they develop porosity.

The addition of a small amount of lead, how¬

ever, seems to do away with this difficulty.

The uses of bronze in the arts, as defined by the proportion of the tin component, are as follows : With 5 per cent tin, soft gun-metal castings ; with 7 per cent tin, mathematical in¬

struments ; with &/2 per cent tin, toothed gear wheels; with 8 to 12 per cent tin, soft bronze statues, medals, coins and cannon ; with 12 to IS per cent tin, machine and engine bearings; with 16 per cent tin, soft-toned bells; with 18

to 20 per cent tin, gongs, house bells and cym¬

bals ; with 22 per cent tin, school bells ; with 24

per cent tin, church bells and fire bells ; with 33

per cent tin, the so-called speculum metal for telescope mirrors and surgical instruments.

Bronze was used by the ancient Assyrians and Egyptians. Layard brought many ornaments

and other articles of this metal from Assyria.

It has been found, on examination, that the bronze weapons of the Greeks and Romans

were of the best composition for securing the greatest density in the alloy, and the cutting edges were brought to the highest point of tenacity by hammering. For ornamental articles, zinc and lead are frequently added. These two metals are usually contained in the bronzes of France along with the copper and tin. Japanese bronzes frequently contain silver and gold

(sometimes to the exclusion of tin) and also lead. A greenish color has been imparted to ancient bronzes by oxidization. This has been imitated in modern bronzes by chemical treat¬

ment. The heat-black finish on bronze, brass and copper is obtained by the use of two solu¬

tions : (1) Nitrate of copper, 1 oz. ; water, 1

oz. ; (2) nitrate of silver, 1 oz., water, 1 oz.

The solutions are mixed for application in the proportions : water, 3 oz. ; copper solution, 2

oz. ; silver solution, 1 oz. The surface of the bronze to be treated may first be submitted to a sand blast to roughen it. The bronze is heated on a hot iron plate, or in an oven, to about 250° F., and the mixed solution is ap¬

plied with a cotton swab or soft brush. The coating dries greenish, and should be allowed to stand till it is a uniform black. Then it is permitted to cool and is brushed over with metal brushes. It will then appear a brownish black. To produce a dead black, a solution of 2 oz. liver of sulphur to the gallon of water is swabbed over it. When dry it is brushed with bristle brushes and finished with a wax polish or with lacquer. Bronzing upon brass and copper to produce artistic texture and color effects is accomplished by varied manipulations of the electro-plating processes to deposit an actual bronze coating upon the objects treated.

The <(bronzes)) used in the economic arts are the three-metal or poly-metal alloys, made by adding other metals to the true copper-tin

bronzes, and in several mixtures dispensing

with the tin altogether. The metals chiefly in use in these alloys with bronze are lead, zinc, phosphorus, manganese and aluminum. In

general, lead gives to bronzes a superior ma¬

chining quality, and a dull bronzy polish highly esteemed in statuary. The lead alloy is called <(plastic bronze.® Its ultimate lead content is 30

per cent — with copper, 65 per cent, and tin, 5

per cent. This bronze, though soft, stands up well in heavy locomotive bearings. There is some difficulty in making this alloy, due to the segregation of the metals, but this has been remedied by adding about

1 per cent of nickel.

Zinc added to bronze gives greater ease in cold rolling and forging. In most maganese bronzes zinc takes the place of tin, so that these bronzes are really brasses. Examples of copper-tin-zinc bronzes are the United States <(Standard Bronze No. 2® (copper, 88 per cent; tin. 10 per cent, and zinc, 2 per cent), and <(Admiralty gun-metal® (copper, 86 per cent; tin, 13 per cent, and zinc, 1 per cent). The addition of phos¬

phorus to bronze imparts greatly increased

hardness and wearing qualities, but if the

proportion is not kept low the tensile strength and elastic limit are impaired. In the malleable BRONZE AND BRASS WORK

phosphor-bronzes the top limit for tin is 8 per cent, and for phosphorus 0.8 per cent. The phosphorus alloys generally consist of about 90

per cent of copper, 9 of tin and from 0.5 to 0.75 of phosphorus. By varying the proportion of the constituents, the hardness, tenacity and elasticity of the alloy may be modified at pleas¬

ure. Its special characteristics are resistance to corrosion by salt water, which affects all zinc alloys to some extent, its resistance under abrasion and its high qualities as a constructive material. Great hardness and tenacity with

little elasticity can be conferred on it for the making of ordnance, and hardness and tenacity combined with permanent elasticity can be given to it for the making of parts of machines, *etc.*

In the elastic condition it is peculiarly well adapted for the bearings of machinery, since it produces very little friction. The standard

phosphor-bronze used for bearings in railway cars is composed of 76.8 per cent of copper, 8

per cent of tin, 15 per cent of lead and 0.2 per cent of phosphorus. For

large castings the pro¬

portions are : Copper, 90 to 92 per cent ; tin, 7.4 to 9.7 per cent ; phosphorus, 0.3 to 0.6 per cent. For braiding the covering of submarine electric cables the proportions are : Copper, 92.9 per cent; tin, 6.55 per cent, and phosphorus, 0.32 per cent. The addition of phosphorus has another important effect. When the proportion exceeds 0.5 per cent it gives a warmer color to the bronze, making it resemble gold largely alloyed with copper. This form is therefore largely used for works of art. Arsenic may be substituted for phosphorus in all the phosphor-bronze formulas with practically the same effect.

Manganese bronze, as has been noted, is really a form of brass. If it contains any tin at all, the amount is small. Iron is often added to this bronze to impart a high elastic limit. It has a low melting point and is readily cast into the most intricate forms. For sheets and forgings, manganese bronze carries 60 parts of copper, 39 parts of zinc and 2 parts of steel alloy; for sand casts, 56 parts copper, 43 parts zinc and 2

parts (<steel alloy.® This ((steel alloy® is com¬

posed of tin, 29.03 per cent ; wrought iron, 58.06

per cent, and of 80 per cent ferro-manganese, 12.91 per cent. Manganese bronze is classed as red and yellow : the red is composed

of copper, 80 parts ; tin, 10 parts, with

10 parts of a 20 per cent manganese-copper alloy. It is used for gear wheels; the yellow is composed of 50 parts of copper, 6 parts of 20

per cent manganese-copper and 44 parts zinc, and is used for gun mechanism, automobile

castings, motor-boat shafts and propeller blades, as it is non-corrodible in sea water. It is also used for the vanes or blades in steam turbines where the erosive action of the steam is severe.

A special type of this alloy is called <(Naval Manganese Bronze® : it consists of copper, 57

per cent; zinc, 40 per cent; iron, 1 per cent; manganese, 0.75 per cent; aluminum, 0.75 per cent ; tin, 0.50 per cent. A very fine bell metal is composed of copper, 90 parts; tin, 5 parts; zinc, 5 parts, and manganese, 1 part. <(White Manganese Bronze® is a quite different

alloy: it contains copper, 68 per cent; manganese, 18

per cent; zinc, 13 per cent, and aluminum. 1 per cent. The tensile strength of cold rolled man¬

ganese bronze is 95,000 pounds per square inch ; of castings, 70,000 pounds per square inch.

<(Turbandium Bronze® is the trade name for an alloy containing copper, 48 per cent; zinc, 46

per cent; iron, 1 per cent; manganese, 1.75 per cent; nickel, 2 per cent; tin, 0.5 per cent; alu¬

minum, 0.2 per cent. It is non-corrodible by sea water and is especially valued for ships' pro¬

pellers. Aluminum bronzes carry from 9 to 11

per cent of aluminum and are of a golden

color. They are very viscous in the liquid state even at the highest temperature. They pour

thick and sluggish, owing to a tenacious film of oxide of the aluminum which invariably

covers the surface. For this reason they are poured very slowly and so as to enter the bot¬

tom of the mold. In large castings risers are necessary to overcome the shrinkage of the

alloy. The temperature should not be higher than from 100° to 150° above the setting tem¬

perature of the alloy. Aluminum bronze has

properties very similar to Swedish Bessemer

steel, and withstands ((fatigue® from 9 to 15

times longer than the best manganese bronze.

The addition of titanium tends to remove the troublesome oxidation and reduces segregation.

Thus titanium-aluminum bronze is the hardest of all the bronzes, but of little use in the arts as it cannot be worked. The proportions of the alloy are copper, 76 per cent; titanium, 12 per cent, and aluminum, 12 per cent. It is made by adding the titanium to aluminum bronze. Its tensile strength is 100,000 pounds per square inch. A form of this bronze offered in the market under the trade name of ((Titan Bronze®

has a* tensile strength of 110,000 pounds. It is extremely plastic and is forgeable and is sup¬

plied in hot-rolled bars, hot and cold-rolled sheets, castings and recasting ingots. ((Chro-max Bronze® is a trade name for a chrome—

nickel bronze, white in color and capable of taking a high polish. It has a denser structure and greater compression strength than man¬

ganese bronze, and can be rolled into sheets and drawn into wire. Its tensile strength is 79,000 pounds per square inch. ((Tobin Bronze®

is another commercial bronze, composed of cop¬

per, 59 per cent; zinc, 38 per cent; tin, 2 per cent, and lead, 0.5 per cent. The name <(steel-bronze® is given to bronze condensed and hard¬

ened artificially, as in the making of cannon the bore of which is enlarged and the metal com¬

pacted by forcing in several strong steel cylin¬

ders of gradually increasing sizes in succession.

See Bronzes.

Richard Ferris,

Editoral Staff of The Aynericana.

BRONZE AND BRASS WORK. There

is a strong tendency at present to obliterate, or to regard as merely

nominal, the distinction be¬

tween these two alloys. As a matter of fact, they approximate each other in composition, and to a considerable extent overlap in uses. The following table, published in the Journal of the Society of Constructors of Federal Buildmgs, Brattleboro, March 1916, may be taken as rep¬

resenting present-day views of the varied range of alloys under the general terms <(brass® and «bronze.® Note the different alloys used in “statuary bronze® :

Copper

Tin

Zinc

Lead

Statue of Louis XV (Paris)

82.4

4.0

10.30

3.2

Statue of Henry IV (Paris)

Statue of Napoleon I

89.6

5.7

4.2

0.5

(Paris) .

75.0

3.0

2.0

2.0

Column Vendome .

89.2

10.2

0.5

0. 1

Bacchus 1 Potsdom palace)

89.4

7.5

1.63

1.0

Munich bronze .

77.03

0.91

19.12

0.12

584

BRONZE AND BRASS WORK

Modern uscme

Statuary bronze .

Statuary bronze .

Statuary bronze (D’Arcet

formula) .

Yellow brass (common) …

Yellow brass (for brazing).

Yellow brass (tough for

bearings) .

Tough brass (Thompson’s

formula) .

Brass (common) .

Brass (common hard) .

Brass (rolled) .

Brass (very tenacious) ….

Brass (wheels, valves) ….

Brass (white) .

Brass (wire) .

Brass (yellow, fine) .

Bronze (red) .

Bronze (red) .

Bronze (gun metal large) . .

Bronze (cymbals) .

Bronze (medals) .

Bronze (phosphor) .

Bronze (statuary) .

Church bells . .

Church bells .

Gun metal .

House bells .

Machinery bearings .

Copper

Tin

Zinc

90.0

3.0

2.0

85.0

6.0

5.0

78.5

2.9

17.2

63.1

….

33.1

75.0

1.0

24.0

75.0

15.0

10.0

55.0

0.5

44.5

84.3

10.5

5.2

79.3

14.3

6.4

74.3

3.4

22.3

88.9

8.3

2.8

90.0

10.0

10.0

10.0

80 !o

67.0

….

33.0

66.0

34.0

87.0

….

13.0

86.0

2.9

11 . 1

90.0

10.0

…

80.0

20.0

93.0

7.0

…

92.0

8.0

91.4

1.4

5.5

80.0

10.1

5.6

69.0

31 .0

90.0

9.0

i.o

77.0

23.0

87.5

12.5

Lead

5.0

4.0

1.4

The most important present-day uses of

bronze are those classified under the two gen¬

eral headings of sculptural and architectural bronze work. The long lists of such works

include statues (from the small figures so com¬

monly used as interior ornaments to the colos¬

sal equestrian statues), memorial tablets and windows, doors (often elaborately . orna¬

mented), lecterns, wrought bronze-and-brass

entrance gates or vestibule gates and bronze chancel-rail or altar gates, grilles, hall-screens, lamp-standards, elevator enclosures and ele¬

vator doors, counter-screens, check-desks, cage work and safe-deposit screens in banks, flag¬

pole bases, large clocks that are made a part of the architectural scheme, stair railings, sar¬

cophagi, tripods, urns, sun dials, balcony rail¬

ings and domes — such as that made for the Armour mausoleum. In the United States no

bronze statue was cast prior to the year 1847, and the earliest productions, about the middle of the 19th century, lacked perfection

for the reason that the assistance of professional found¬

ers with European training was not available at that time. A portrait statue by Bale Hughes and Henry Kirke Brown's (<Indian and Panther®

are the earliest examples known. A great im¬

petus was given to sculptural art when the gov¬

ernment of the United States ordered bronze doors for the National Capitol. Randolph

Rogers and Thomas Crawford were chosen to

do this work. The former modeled his doors in Europe, and they were cast in 1861. The Crawford doors were hung in 1868. Louis

Amateis designed the third and last pair of bronze doors for the main entrance to the

Capitol at Washington (cast in 1910). The

three sets of bronze doors in the main entrance of the Boston Public Library are the work of Daniel Chester French. Of the three sets of sculptured bronze doors for the main entrance of the Congressional Library at Washington,

one was modeled by Herbert Adams, one by

Olin L. Warner and the third by Frederick

MacMonnies. Large cast bronze grille entrance doors, designed by Richard M. Hunt for a resi¬

dence at Newport, R. I., were made in New York (1892) at a cost of $50,000. Their meas¬

urements are ; width, 22 feet, and height, 14

feet. The total weight of bronze in the dome of the Armour mausoleum, designed by Renwick, Aspinwall and Owen, is 16 tons. Orna¬

mental bronze work for the interior of build¬

ings is given a coating of transparent lacquer that preserves the polish and finish for a num¬

ber of years. But lacquer cannot be used to protect the surfaces of bronze statuary or other bronze work exposed to the weather ; on the contrary, new bronze statuary placed out-of-doors is oxidized with chemicals, so that the glaring appearance of the new metal is sub¬

dued. •

No presentation of this part of our subject, however brief, can be satisfactory unless at¬

tention is called to the emphasis that is now being laid on craftmanship. The art of the bronze founder, as practised today, possesses, in the words of one of its exponents, a subtle charm for the lover of craftsmanship. <(The finished product of his skill strongly impresses the thoughtful observer, for the statue or sculp¬

tured object in plaster or other material, while the embodiment of the sculptor's genius, lacks something which only the bronze can give — the glow of color and feeling of imperishable¬

ness.® Another leader in this field makes a strong appeal for craftsmanship, expressing the belief that bronze and brass are attaining their highest artistic development, and that the

craftsmen (<only need opportunity, unhampered by the tendency toward commercialization of

their art,® to demonstrate their artistic ability beyond dispute. (Consult The American Archi¬

tect, 27 June 1917, Vol. CXI, pp. 399-404) .

Briefly, authorities on sculptural and architec¬

tural bronze insist to-day that craftsmanship, or painstaking, artistic and technical care given to each separate work, is all important. On the mechanical side, we may mention, as one of the most important modern developments in the

bronze industry, an English invention — the so-called (<extrusion process® of wrought shapes, by which extruded metal (a special

alloy) is produced by forcing a billet of the metal, in a semi-molten state, through a steel die by hy¬

draulic pressure. Another modern development

of the bronze industry is along the line of vol¬

taic deposition of pure copper upon prepared moulds or over a prepared model — the galvano-plastic method. Still another compara¬

tively new process is the Gorham special

(Smith) process of casting, which has been

developed from a silver-casting process, is now used on objects up to 36 or 40 inches in length, and reproduces the plastic mould and form

faithfully without chasing or hand-finishing.

As we have said above, the modern uses of brass overlap those of bronze to a considerable extent ; but it is not less true — and this fact deserves our special attention at present — that quite beyond the zone occupied by both alloys almost indistinguishably there lies a wide indus¬

trial field that is still held by the copper-and-zinc alloy almost to the exclusion of the copper-and-tin alloy. In this connection it is well to note the adaptability of the former, as that is set forth in (The Metallic Alloys, } W. T.

Brannt, ed. (Philadelphia 1908), to the fol¬

lowing effect : Generally speaking, brass

should contain only copper and zinc, but many or most of the varieties found in commercial use as a matter of fact do contain small quan-

titles of iron, tin, arsenic and lead, and these admixtures are due either to contaminations

mixed with the ores from which the copper

and zinc have been extracted or to additions made intentionally in order to change the duc¬

tility, color, fusibility, hardness, etc., of the re¬

sultant alloy. Again, copper and zinc can be combined in many ways, the proportions vary¬

ing within very wide limits and the resulting alloys being adaptable to uses as varied. It is the common observation that with an increase in the content of copper the color becomes more golden and at the same time the malleability and softness of the alloy are increased. With successive additions to the content of zinc the color becomes lighter and lighter, finally shad¬

ing into a grayish-white, while the alloys be¬

come more fusible, brittle and, at the same time, harder. In other words, the properties of the alloys produced in this way are different ; and of course their cost of production varies also, the price of brass decreasing as the con¬

tent of copper becomes less. But this is not the whole story of the adaptability of brass — the characteristic which explains the wide range of its uses at the present time. As a brief summary of the results attained in the course of very extensive researches that have been made in regard to the behavior of alloys of copper and zinc, the following statement has special value and interest : ((An alloy contain¬

ing from 1 to 7 per cent of zinc still shows the color of copper, or at the utmost only a slight yellow tinge. With 7.4 to 13.8 per cent of zinc, the color of the alloy undergoes a considerable change,® becoming what is described as ((a

pleasant red-yellow.® A pure yellow appears

as a characteristic of alloys with 13.8 per cent to 16.6 per cent of zinc, while the color of alloys in which the content of zinc runs up to 30 per cent is also yellow but not pure. ((It is a singular fact that with a content of over 30

per cent of zinc a red color appears again, which is most pronounced with equal parts by weight of the metals, an alloy of 50 parts of copper and 50 of zinc having almost a golden color but exhibiting also a high degree of brittleness. With a still higher content of zinc the gold color rapidly decreases, becoming red¬

dish-white with 53 per cent, yellowish-white with 56 per cent and bluish-white with 64 per cent. With a still higher content of zinc the alloy acquires a lead color.® Obviously, then, the term ((brass® designates an extensive group of alloys. The great variety or diversity of brass objects may occasion less surprise if this circumstance is kept in mind; nevertheless such diversity remains one of the striking illustra¬

tions of modern industrial ingenuity. Thus, as a few of the subdivisions under which the

numberless brass objects are classified, we may mention the following: Andirons, badges, balls, barrels, bearings, bedsteads, bolts and nuts, boxes, brackets, buckles, buttons, candelabra, candlesticks, chains, checks, couplings, craft tools, curtain rings, easels, escutcheons, faucets, files, fountains, hammers, handles, hinges, hods, hooks, kettles, knobs, labels, > lamps, medals, mouldings, nails, oilers, pins, pipe, plugs, poles, pulpits, pumps, railings, rings, rivets, racks, rods, screens, screws, shells (ordnance, rifle, shot-gun, torpedo, etc.), signs, springs, stamps, tablets, tacks, tags, thimbles, tubes, valves, vases, wire and wire-cloth. Utility is the character¬

istic appearing most plainly in this list ; and although, if the list were extended, it would include a large number of architectural and sculptural objects, we should find included in it, on the other hand, a much larger number of purely utilitarian objects — things designed for common use and produced in very great

or commercially adequate numbers in which the art quality is a minor consideration if, indeed, it is present at all.

The conclusion is, therefore, in respect to present-day tendencies, that specialization of utilitarian manufactures characterizes the brass industry, just as in the bronze industry the leaning is toward sculptural and architectural specialization — the architectural products hav¬

ing, as a rule, marked decorative and artistic qualities. Contributory to this specialization of bronze is the circumstance that the copper-and-tin alloy stands the action of the weather bet¬

ter than the copper-and-zinc alloy, and this of course influences the choice of material for monumental sculptures, the external portions

of architectural designs, *etc.* In this field brass is, indeed, sometimes a convenient substitute ; the superiority of bronze, however, for out¬

door use is generally conceded. Even more

important is a peculiarity of bronze that has been described by Mr. William Donald Mitchell in (The Art of the Bronze Founder) (New

York 1916) as follows: <(I wish to call your attention to a wonderful property that bronze possesses and that no other material or sub¬

stance possesses so far as I know. I mean the peculiarity of bronze taking on beautiful colors when subjected to the action of chemicals.

Now, you know the color of gold never changes.

Silver will oxidize black but chemicals . will not cause permanent colors to appear on silver.

If you apply acids or any chemical or even water to iron, there is just one result — a red rust. But the surface of bronze reacts to chem¬

icals applied in a certain manner as an autumn leaf does to frost. Skilled workmen called

bronzers easily obtain colors which are as

beautiful as those seen on the bronze works of art of antiquity. The color on ancient bronzes is called patina,* which means the color or incrustation which age gives to bronze works of art, but the word (patina} is now generally used to describe the color on modern bronze sculptures… . People have said to me that they always thought bronze was the same color as the surface color (all the way through^

This was a very natural mistake, for it is not often that one sees the natural gold color of bronze, and it is easily understood why people should suppose that the dark bronze they saw was the same color all the way through… .

The color on bronze is an oxidization of the surface only. It is a film of color on the sur¬

face of the bronze, but is also a part of the bronze itself — like the color on the surface of a piece of glazed pottery. Now, this oxidiza¬

tion on the surface of the bronze does not con¬

tinue eating ,into the metal until the metal is entirely consumed, as the rust of . iron does, but the surface of the bronze having become colored it goes no deeper; and no matter how many years roll by — yes, or centuries the glowing golden color of the bronze will show if the surface is abraded or scratched. Thus bronze, being practically everlasting, is some¬

times called (the eternal, 5 ®

According to the best opinion to-day among

bronzeworkers, a thin casting (of statues, busts, etc., which are always cast hollow) is to be regarded as an evidence of good foundry work; and modern practice conforms to the view that a successful bronze cast of a sculptured model cannot be made if the alloy exceeds three-eighths of an inch in thickness. The standard thickness (or thinness) is from one-quarter of an inch to three-eighths of an inch. The rea¬

sons for this are, that a thin shell of the alloy cools and sets immediately after filling the mold; that an excessive thickness of metal

neither makes the casting stronger nor adds to its durability, and that, if there were too great thickness, the alloy would not harden or set for a considerable time and in the slow cooling would set up strains and

shrinkages which would disturb the surfaces of the mold to such an extent that there would be a loss of fine detail.

BRONZE AGE, the period represented by

archaeologists as intervening between the Stone Age and the Iron Age, when weapons, utensils and implements were, as a rule, made of bronze.

The demarcations of these periods, however,

are far from being clearly defined and overlap to some extent. The use of stone for weapons, utensils, etc., naturally preceded the use of metals by primitive man, and the order in

which the different metals would come into

service would depend upon several factors. The nearness of the metallic deposits to the surface of the earth, the relative degree of purity in which they are usually found and ease in smelt¬

ing and working would all affect the sequence of their introduction. The study of the traces of the Bronze Age in Europe apparently leads to the conclusion that throughout that conti¬

nent the introduction of copper and its alloys was nearly synchronous, but the transition to the Iron Age took place more or less slowly in different regions, the new metal being intro¬

duced from the south and superseding bronze soonest where the paths of early commerce

were most numerous or most frequently trod¬

den. The implements of the Bronze Age in¬

clude swords, awls, knives, gouges, hammers, daggers and arrow-heads. The age is also

characterized by the fact that cremation was the mode of burial instead of interment. Be¬

sides weapons of various kinds and beautiful workmanship, amulets, coronets, diadems of

solid gold and vases of gold ornamented with gold and bronze were produced. The weapons

are often Oriental in pattern, which is an indi¬

cation of the traces of Eastern culture in the Bronze Age. In Great Britain and Scandinavia the Bronze Age lingered much longer, accord¬

ing to certain archaeologists, than in Italy, France and Spain. In Greece, the use of bronze distin¬

guishes the Mycenaean period, especially in its earlier days. In the New World, especially in Peru, the existence of the Bronze Age is indi¬

cated. The chronology of the three ages

presents marked difficulties, and the periods should be regarded as stages of evolution in civilization still exemplified among races of slow development. The Bronze Age in Europe

mav be approximately placed between 2000 b.c.

and 1800 b.c. Consult Lord Avebury, (Prehistoris Times) (1900) ; Evans, , Sir J., (Ancient Bronze Implements of Great Britain* (1881);

Chartre, (Age du bronze en France. *

BRONZE STEEL, the name originally

given to the metal obtained by the process of General Von Uchatins of the Austrian army,

which process consists of casting bronze in a chill-mold and forging it cold. In the casting process hardness is increased and this has the effect of placing the interior metal in a state of compression and the exterior in a state of tension, while the metal has almost the strength and elasticity of steel. The circumstances of chief difficulty and importance in the manipula¬

tion of bronze affecting the production of can¬

non and large castings are: (1) The chemical constitution of the alloy as influencing the bal¬

ance of hardness and tenacity; (2) its chemical constitution and other conditions influencing the segregation of the cooling mass when cast into two or more alloys of different and often variable constitutions; (3) the effect of rapid and slow cooling and of the temperature at which the metal is fused and poured; (4) the effect due to repeated fusions and to foreign constituents in minute proportions entering the alloy. In bronze, sufficient hardness must be secured to resist longest the abrasions of pro¬

jectiles and deflagration of powder; along with the greatest ultimate tenacity there must be certain rigidity and ductility with ultimate co¬

hesion ; hardness and rigidity increase with the proportions of tin, ductility and tenacity with that of the copper, but not in direct ratio ; specific gravity increases with copper. The

fusibility is greater than copper and less than tin, ultimate cohesion less than that of tough copper but greater than that of tin, ductility greater than tin but less than copper, hardness greater than either. In consequence of the

difference in the fusibility of tin and copper the perfection of the alloy depends much on the nature of the furnace and treatment of the melted metal. By these means alone the tenac¬

ity of bronze has been carried as high as 60,000

pounds.

BRONZE WING, BRONZEWING PI¬

GEON or BRONZE PIGEON, any of sev¬

eral different species of the genus Phaps, found in Australia, Tasmania and New South Wales.

These are birds of beautiful plumage, obtain¬

ing their name from the lustrous bronze color with which the wings are variously marked.

The most familiar species is the (<common

bronzewing® (Phaps chalcoptera) , a plump, de¬

liciously edible bird, weighing about a pound, and distributed throughout Australia. It nests on low branches of trees near swamps. The

((brush bronzewing® (P. elegans) of southern Australia and Tasmania is a groundkeeping

bird and resembles a partridge in its habits.

Another species is the ((harlequin bronzewing®

(P. histrionic a) , found in great flocks in the northwestern part of New South Wales. Some¬

times the ground-pigeons of the genus Geophaps are called (<bronzewings.®

BRONZES. The art of bronze-casting

was known in very early times to the Assy¬

rians, Babylonians. Hindoos, Persians, Chinese and Japanese. Egyptian bronze work dates

back to the 3d dynastv (4900 b.c.) ; the bronze was a natural not artificial alloy. By 1600 b.c.

artificial bronze was in common use on the BRONZES

Nile, and really artistic work appears from the 3d century b.c. While the early bronze work (see Bronze Age) of the nations con¬

sisted largely of weapons, armor and eating utensils, articles of decoration soon were pro¬

duced and bells came into early use. To such early bronze art work belong the Assyrian Bala-wat gates with their bands of bronze figure

subjects, and some Egyptian cast and carved bronze statues.

The Greek sculptor Lysippus (340 b.c.)

signed his name on statues showing great skill in a single piece. Earlier large statues were built up of plates or separate parts. The

Phoenicians also did excellent work in statuary.

In the reign of Vespasian (79-81) the city of Delphi had 3,000 bronze statues. The Greeks made several alloys of bronze; one much fa¬

vored was the liver-colored (hepatizon) variety.

Among the noted large bronze Greek works

of art may be mentioned : the headless statue of a youth (Berlin) ; heroic figure of a chario¬

teer (Athens) ; boy extracting a thorn («spin-ario®) and the boxer (both in Rome) ; statue of a boy (New York Metropolitan Museum) ;

Hdolino® (Florence) ; Hermes resting (Naples) ; Nike (Breccia); praying boy • (Berlin) ; Eros (Morgan Collection), *etc.*

The Greeks and Romans knew the art

value of patina (see Patina) on bronze work.

They termed the natural oxidation cerugo, but they had a more rapid, artificial rust-producing process brought about with soured wine. This latter patina they termed (zruca.

That the ancient Etruscans were capable

of casting bronze in large pieces is demon¬

strated by the present existing ((Capitoline WolP*

(in Rome) and the chimaera (in Florence).

Both bronzes show, by their archaic style, that they belong to the early stages of the Etrus¬

can artisans. But the Etruscans excelled in producing lovely household and decorative

pieces. Their many existing hand-mirrors

(specchi), their toilet caskets (cistcu), etc., arc truly works of art and their incised decorative treatment is greatly admired to this day.

Roman and Greco-Roman Bronzes. —

Many lovely works of art in bronze, repousse and cast, have been excavated in Italy in mod¬

ern times. Pompeii and Herculaneum afforded

us great examples of such work; the statu¬

ette of Narcissus is, perhaps, best known, as well as many bronze heads with eyes formed of ivory. The Naples Museum has over 14,000

examples of decorative bronzes including can¬

delabra, tripods, chairs, couches, tables, etc., Etruscan Cist a.

used by the Romans 18 centuries ago. Among the noted pieces of this period extant we would mention the equestrian statue ((Nero): > (about 65 a.d.) found at Pompeii; that of Marcus Aurelius (175 a.d.), at Rome; four bronze

horses, now in front of Saint Mark's, Venice, probably of the Nero period (54-68 a.d.) ; those of Tribonianus Gallus (251-53), and Camillus (365). Other noble works are four beautiful fluted Corinthian columns of gilt bronze at the chapel of the Holy Sacrament in the Lateran basilica, and the massive bronze doors of the Pantheon.

Mediaeval Bronzes. — To this period belong

two bronze medallions (Vatican), each repre¬

senting the heads of Saint Peter and Saint Paul facing each other. Most important are

the bronze seated statue of Saint Peter in Saint Peter's basilica (Rome) ; and the so-called chair of Dagobert (Paris). After the fall of Rome, Constantinople became the centre ot the bronze workers, and Byzantine style, of course, prevailed in the decoration. Bronze castings of the Middle Ages were largely devoted to 588

church uses : crosses, ciboria, candelabra, bap¬

tismal fonts, reliquary holders, censers, bells, *etc.* Fine art work was done on bronze doors, columns, tombs, as witnessed in the Hildesheim Cathedral door panels by Bishop Bern—

ward (1015), the Byzantine gates at Amalfi

(1066), and at San Salvator, Atrani (1087), and the metal doors in San Sophia Cathedral, Nizhni-Novgorod (Russia) ; the equestrian

statue of Saint George in Prague.

Renaissance Bronzes. — Italy made rapid

strides in the bronze arts early in this period, and we have the recumbent figures of Sixtus IV, by Antonio Pollajuolo, as well as his Inno¬

cent VIII ; Ghiberti's metal gates in the Flor¬

ence baptistery; Benvenuto Cellini's (<Nymph

of Fontainebleau® and his Perseus masterpiece; also his bust of Cosimo de Medici (Florence Museum) ; Donatello's ((Judith and Holof er¬

nes® ; Giovanni da Bologna's <(Neptune® at

Bologna; Verrochio's (<David® (Florence), and his colossal equestrian statue of General Coleoni (finished by Leopardi) at Venice, all belong¬

ing to this period. Other great Renaissance bronze artists were Sansovino, Torrigiano,

Simone and Filarete, Luca della Robbia

(one work only known). Many lovely medal¬

lions, plaques and pieces for household deco¬

ration belong to this great art epoch.

French Bronzes. — Under Louis XIV,

France commenced an ambitious career in

bronze art work. Besides church furniture she produced pieces of merit for household use

such as candelabra, candlesticks, bracket clocks, vases, lovely statuettes finely chiseled, also con¬

soles, sedan-chairs, even carriages of state re¬

ceived beautiful decorative inserts or mounts in delicately worked bronze-gilt devices. From Louis XIV to the Empire art in bronze was represented by such men of genius as Jacques and Philippe Caffieri, Gouthiere, Thomire, Duplessis, Prieur, *etc.* And to this day the French have held a very high place in the bronze art world with their statuary castings, furniture fittings, mirror-frames, chimney ornaments,

clocks, *etc.*

German Bronzes. — Peter Vischer, after

his practical studies in Italy in the 16th century, brought Germany into closer line with the great Italian work in bronze. His efforts in Nurem¬

berg, and, later, those of his sons, brought forth sepulchral

monuments, statues, as well as house¬

hold art materials. In the 16th century we have the second Peter Vischer, Benedict Wur-zelbauer (both of Nuremberg), A. de Vries

of Augsburg and P. Candido of Munich.

Their bronze fountains, for instance, rank high, but baptismal fonts, candlesticks and other

apparatus of the Church were added to monu¬

mental work of this century. There was a fall¬

ing off in the output of large bronze pieces in the following two centuries. Germany's later founders of note were A. Schlueter, R. Donner, *etc.*

England's Bronzes. — Many fine old bronze

statue effigies exist in Great Britain, such as the Earl of Salisbury at Salisbury (1227), the recumbent figures of Henry VI (1272) and

Queen Eleanor (1291) in Westminster Abbey,

by William Torrell. In Canterbury is a fine effigy of the Black Prince (1376) and in West¬

minster Abbey are the effigies, by Nicholas Broker and Godfrey Prest, of Richard II and his Queen (1395). In that same abbey arc the effigies of Henry VII and his Queen by the Florentine, Torrigiani; also the figures of the Countess of Richmond and the Duke of Buck¬

ingham (1628).

A separate group of bronzes is that of the Orient — Persia, India, China and Japan. In

all Buddhist lands the casting of bronze dates back to early historic times. To this category belongs the Siam bronze termed samrit, an an¬

cient alloy that stands severe climatic condi¬

tions in a most remarkable way for many cen¬

turies ; so much so that, while the old temples have fallen into decay, they have left their old great images of Buddha enclosed in great for¬

est trees and in perfect condition still. Large bells also have been made by Orientals since early times. See Bells.

Japanese Bronzes. — No nation excels the

Japanese in the art of bronzeworking. Dur¬

ing the olden times of the Daimios and the Samurai the wonderful bronze inlays, chased

work, etc., in their elaborate armor and swords are present proof of their wonderful excellence in the past; their superlative modern bronze art w'ork in the decorative arts and the extraor¬

dinary low price of the product are the ad¬

miration of the connoisseur and the despair of the Occidental manufacturer. The Japanese

ability to excel in patina, fire-gilt, enamels, lac¬

quers in bronze articles, and the originality of design and motif, have set American, as well as European, craftsmen a pace that is proving beneficial to our modern concepts of art prog¬

ress. An expert of Nippon declares Japanese workers have no less than 70 different bronze alloys in which to display their diversity of production. Thirty of these alloys are still much in use. Favorites are Shakudo (deep

bluish to black patina) ; shibuishi (silver-bronze) ; seido (green copper) ; mokume, imi¬

tating, in metal, the grain of wood; sentoku-do, an artificial copper-gold like the ancient Corinthian alloy, *etc.* The Japanese hira-zog-wan (metal pictures in nature's colors) and ukibori (chasing) are working methods much

favored. The utensils and pieces used in their cult are naturally found chiefly in Japanese old pieces such as koro (incense burner), kogo

(incense box), images of their ((seven gods of good-fortune,® *etc.* The present output is

strictly industrial and consists of decorative goods made to order, w'ith Japanese motifs, chiefly for the European and American markets.

Chinese Bronzes. — In Buddhist and Brah¬

man temples is found elegant art work in

bronze ceremonial services, such as censers, bowls, vases, etc., displaying the most perfect workmanship and decoration. Household orna¬

ments and utensils in this metal are in high de¬

mand with connoisseurs and collectors ; the

patina, enamel and other inlay work are greatly admired, and the-peculiar yet artistic forms place their origin clearly.

Modern Bronzes. — Of European nations

Italy has led the race for producing art-bronze work. She has relied much on low-priced

reproductions of antiques, but her sales have reached the world over on account of the su¬

perior quality of the workmanship. Germany's art-metal output for a number of years was reduced largely to statues, etc., in cast-iron, bronze-coated zinc, etc., till, in the seventies BRONZES

Some Ancient Bronzes in the Metropolitan Museum of Art 1 Greek Statue. End ist century B. C. 3 Greek Repousse' Bronze Mirror 2 Etruscan Bronze Mirror. Incised Ornament 4 Etruscan Bronze Mirror BRONZING — BROOKE

of last century, they cultivated the use of cuivre poll (a species of brass). Later came true bronze art work into vogue, and statuary and decorative pieces prevailed. Noted early found¬

ries are Royal Foundry, Berlin; Burgschmiet

of Nuremberg, Stiglmayer of Munich, Howalt

of Brunswick. Later, vicing with the French product, come the foundries of Gladenbach &

Sons (Berlin), Miller (Munich), Stotz (Stutt¬

gart). These factories excel in statuary. In Austria, with Vienna in the lead, we find quite an industry in household art materials (chan¬

deliers are notable) and decorative pieces.

Belgian bronzes have been largely produced

around 1870, especially in figure work, with such artists as Meunier and van der Stappen to promote them.

The United States have done valuable work

in art-bronzes under such direction as the Tif¬

fany studios and Gorhams.

Bibliography. — Barbedienne, Ferdinand,

‘Bronzes d’Art) (Paris 1893) ; Bisei, Unno, ‘Japanese Art-Metal Working) ; Collection of J. P. Morgan : Bronzes, antique Greek Roman, etc.’ (Paris 1913) ; Daragon, Laurent, (Le

bronze d’art) (Paris 1881) ; Delon, (Le cuivre et le bronze) (Paris 1877) ; Edgerton, Giles, (Bronze Sculpture in America,) in The

Craftsman

(1908) ; Fortnum, C. D. E., (Bronzes ' (South Kensington Museum Art Handbooks, New

York 1877) ; Gangoly, O. C., (South Indian Bronzes) (Calcutta 1915) ; Goldschmidt, Fritz, (Die italienischen Bronzen der Renaissance und des Baroc.k) (Berlin 1914) ; Grey, Edward,

(A Brief History of Japanese Bronzes) (New

York 1888) ; Havard, Henry, 'Les bronzes

d'art et d'ameublement' (Paris 1897) ; Lessing, Julius, 'Bronzen des XVIIIte Jahrhunderts)

(Berlin Kunstgewerbe Museum Vorbilder—

hcfte, Berlin 1898) ; McIntyre, R. G., 'Small Bronzes and Their Makers : the Recent Works of some American Sculptors,' in Arts and Dec¬

oration (New York 1912) ; Molinier, Louis M., (Les bronzes de la Renaissance' ('Bibliotheque Internationale de l'Art,' Paris 1886) ; Murray, A. S., Creek Bronzes' (London 1898) ; Ridder, A. de, 'Bronzes antiques' (Paris 1913) ; Swarzenski, Georg, 'Mittelalterliches Bronze-gerath' (Berlin Kuntsgewerbe Museum Vor—

bilderhefte, Berlin 1902) ; Wilson, H., (Silver-work and Jewelry' (New York 1912).

Clement Webber Coumbe.

BRONZING, a process by which a bronze¬

like surface is imparted to objects of metal, wood, plaster, *etc.* Bronze of a good quality acquires by oxidization a fine green tint, called patina antiqua, or by the Romans, aerugo. Sal-ammoniac and salt of sorrel dissolved in vine¬

gar and applied with a soft rag or brush will produce this result. The process must be re¬

peated several times to have its full effect. The proportions given by

Dr. Ure are three-fourths of an ounce of sal-ammoniac and a

drachm and a half of salt of sorrel to a quart of vinegar. A variety of liquid solutions are prepared for bronzing copper and other metals, in which verdigris, sal-ammoniac, salt of sorrel, cinnabar, alum and common salt are employed.

To bronze wood and other articles, waste gold-leaf, ground in with honey and washed, or

mosaic gold, ground with bone ashes, is ap¬

plied, with size or oil varnish. Gypsum casts are bronzed with black-lead. The bronzing of gun-barrels may be effected by the use of a strong solution of antimony trichloride.

BRONZINO, Agnolo, or Angelo. See

Allori.

BROOCH, an ornament worn on the dress,

to which it is attached by a pin stuck through the fabric. Brooches are of great antiquity and were formerly worn by men as well as women.

They were used by both sexes among the Greeks and Romans, and also in the Middle Ages.

Among the Highlanders of Scotland there are preserved, in several families, ancient brooches of rich workmanship and highly ornamented.

Some of them are inscribed with characters

to which particular virtues were attributed, and seem to have been used as a sort of amulet or talisman.

BROOK FARM, a community organized in

1841 near West Roxbury, Mass. Under the

leadership of George Ripley and his wife, an association was formed with a few stockholders and a farm of 200 acres was purchased. Among the members of this association were Nathaniel Hawthorne, Charles A. Dana, John S. Dwight

and George P. Bradford; other prominent peo¬

ple connected with Brook Farm were Ralph W.

Emerson, Amos B. Alcott, Theodore Parker,

George W. Curtis and Margaret Fuller. The

ideal of the Association was to promote the re¬

organization of society in accordance with the principles of cooperation. The, life of the com¬

munity was very simple ; every one had some share of the work to do, the rate of pay being practically the same for all kinds of work, and all had a share in the educational advantages and the social enjoyments. There were a num¬

ber of industrial employments besides the till¬

ing of the farm, and the surplus product was sold to outsiders. The school was also an im¬

portant feature, furnishing instruction in all grades, including college subjects; pupils out¬

side the community were received on the pay¬

ment of a small fee. In 1843 the Association, coming under the influence of Albert Brisbane, adopted the organization of the phalanx accord¬

ing to the plan of Fourier, and established the three “primary departments® of agriculture, do¬

mestic industry and mechanic arts ; it became also a centre of the Fourierist propaganda and prospered until, on 3 March 1846, the new

building, the Phalanstery, was burned. Enthu¬

siasm waned with financial loss, and the Asso¬

ciation finally dissolved in October 1847. Con¬

sult Codman, (Brook Farm, Historic and Per¬

sonal Memoirs) (Boston 1849) ; Russell, 'Home Life of the Brook Farm AssociatioiP (Boston 1900); Sears, 'My Friends at Brook Farin'

(New York 1912) ; Swift, L., (Brook Farm,

Its Members, Scholars and Visitors' (New

York 1900).

BROOKE, Mrs. Frances (nee Moore),

English novelist: b. 1724; d. 1789. Her hus¬

band, Rev. John Brooke, rector of Colney,

Norfolk, was chaplain to the garrison at Que¬

bec. She spent some years in Canada and pub¬

lished, in 1769, ' Emily Montague,' the first Canadian novel. Among her other works were

'History of Lady Julia Mandeville' (1763),

and two musical entertainments, 'Siege of

Sinope) (1781); 'Marian' (1788).

BROOKE, Francis Key, American Protes¬

tant Episcopal bishop: b. Gambier, Ohio, 2

Nov. 1852; d. 22 Oct. 1918. He was graduated from Kenyon College in 1874, and enter¬

ing the Episcopal ministry was successively

rector in the Ohio towns of College Hill, Ports¬

mouth, Piqua and Sandusky, and in Saint Louis, Mo., and Atchison, Kan. In 1893 he was con¬

secrated bishop of Oklahoma and Indian Ter¬

ritory. In 1907, on the combining of the Ter¬

ritory into the State of Oklahoma, he became bishop of Oklahoma. In 1910 eastern Okla¬

homa was made a separate district with its own bishop, but Dr. Brooke still held the

title of bishop of Oklahoma. He received the degree of S.T.D. from the Kansas Theological School in 1893, D.D. from the University of the South in 1910 and from Kenyon College

in 1911.

BROOKE, Henry, Irish dramatist and nov¬

elist : b. Rantavan, Ireland, about 1703; d. Burrator, Devonshire, 10 Oct. 1783. He was edu¬

cated at Dublin University and began to practise at the bar; but his taste was decided for poetry and general literature, and he came forward as an author by publishing a tragedy called (Gustavus VasaP which was remarkably popular at the time and was translated into French, though it is now almost forgotten. He wrote several other tragedies and also several novels, one of which, the (Fool of Quality, } possesses consid¬

erable merit and was republished with a preface by Rev. Charles Kingsley. The death of his wife and the loss of a favorite child

completely broke his spirit, and he lived for a short time in a state of second childhood.

BROOKE, Sir James, English rajah, cele¬

brated as the Rajah of Sarawak: b. Bengal

1803; d. Burrator, Devonshire, 11 June 1868.

He was brought at an early age to England and, having completed his education there, ob¬

tained a cadetship ill the Indian army. He dis¬

tinguished himself in the Burmese war (1826) and subsequently sailed to China. On this voy¬

age there rose in his mind the idea of ridding the Eastern Archipelago from the scourge of piracy and ameliorating the condition of the inhabitants. Having come into the possession of a large fortune by the death of his father, he bought one of the royal yachts and set sail for the East (October 1838). Having directed his course to the island of Borneo, he found Muda Hassim, uncle of the King of Borneo and

Rajah of Sarawak, a district on the northwest coast of the island, engaged in suppressing a revolt. The Rajah, being hard pressed, agreed to make him his successor in return for his as¬

sistance. The offer was accepted, Brooke took command of the Rajah's army and speedily re¬

duced the rebels to submission. Being now es¬

tablished in the government and recognized as Rajah of Sarawak by the Sultan of Borneo

(1841), he endeavored to induce the Dyak na¬

tives to abandon their irregular and piratical mode of life and to turn themselves to agricul¬

ture and commerce. For this end he published a code of laws, establishing free trade and personal equality, and declaring piracy a crime punishable with death. His efforts were won¬

derfully successful. In conjunction with the British naval commanders, he carried on war against the pirates with great vigor. A sum of money was paid by government for the head of each pirate, and under this system the Malay rovers were soon almost extirpated. On his

return in 1847, Mr. Brooke was received with general favor, his position was recognized by the government, he received the honor of

Knight Commander of the Bath and was made

governor of Labuan, an island near Sarawak, which had been acquired by the British. After his return to Borneo, he continued to labor as before for the extension of British influence.

In 1850 he went as Ambassador to Siam, and not long after gave up his post as governor of Labuan. On the outbreak of the war with China in 1857, his residence was suddenly at¬

tacked by about 4,000 Chinese and he himself only escaped by swimming across the river.

His adherents soon rallied, however, and at the head of a large body of Malays and Dyaks he drove the Chinese from Sarawak with the loss of half their number. In 1863 he finally re¬

turned to England, leaving the government in the hands of his nephew, Charles Brooke.

Whatever may be thought of the policy of Sir James Brooke, there can be no doubt as to the benefits derived from it by the people of Sara¬

wak. He established civilization and opened up a trade where previously they had scarcely any existence. Under his administration Sarawak

increased from a village of 1,000 inhabitants to a town of 16,000, while the trade increased in the same proportion.

BROOKE, John Mercer, American sailor,

scientist and inventor: b. Tampa, Fla. 1826; d.

1906. With early education at Kenyon Col¬

lege, Gambier, Ohio, he graduated from the

United States Naval Academy in 1847, and was stationed at the Naval Observatory, Washing¬

ton, D.. C., 1851-53. As director of the as¬

tronomical department, he was engaged on the Vincennes expedition in the exploration and sur¬

vey of the north Pacific Ocean. He resigned from the United States navy in 1861, and in the Confederate government became chief of

the Bureau of Ordnance and Hydrography. He

invented a gun named after him, and directed ihe refitting of the Merriniac to meet the Monitor in Hampton Roads. For 33 years

from 1866 to 1899 he was professor of physics at Virginia Military Institute. He was the

author of numerous technical magazine articles and the Academy of Berlin conferred upon

him the gold medal of science.

BROOKE, John Rutter, American military

officer: b. Pottsville, Pa., 21 July 1838. He entered the army as captain in a volunteer regi¬

ment on the breaking out of the Civil War in 1861, and resigned in February 1866, with the rank of brevet major-general. He became colo¬

nel in March 1879; brigadier-general, 6 April 1888, and major-general, 22 May 1897. After the declaration of war against Spain, he was placed in command of the 1st Provisional Army Corps, and subsequently distinguished himself in the campaign in Porto Rico, and was made a member of the joint military commission to arrange the cession of the island to the United States. On 13 Dec. 1898, he was appointed mili¬

tary and civil governor of Cuba, a post which he held till April 1900, when he was succeeded, by Gen. Leonard Wood. On 10 May

following, he succeeded Maj.-Gen. Wesley Merritt as com¬

mander of the Military Department of the

East, with headquarters in New York. He

retired under the age rule in 1902.

BROOKE, Stopiord Augustus, English

clergyman and author: b. Letterkenny, Donegal, Ireland, 14 Nov. 1832; d. Ewhurst, Surrey, Eng¬

land, 18 March 1910. Alter a brilliant course at Trinity College, Dublin, he was ordained in the Anglican Church in 1857. From that year till 1859 he officiated as curate of Saint Mat¬

thew's, Marylebone (London) ; and in 1876,

after having held various other clerical appoint¬

ments, he became minister of Bedford Chapel, Bloomsbury, where he officiated till his retire¬

ment from regular ministerial work in 1894.

In 1872 he was appointed one of the chaplains-in-ordinary to the Queen. Having become a

Unitarian in his views he left the Church of England in 1880, but till 1894 still continued to occupy the same pulpit, Bedford Chapel being private property. He gained a high reputation as a preacher and writer on religious subjects, and also as a poet, but more especially as a literary critic and historian of English litera¬

ture. His chief works are 'Life and Letters of the Late Frederick W. Robertson of Brighton) (1865); (Christ in Modern Life5 (1872) ;

‘Theology in the English Poets) (1874) ;

‘Primer of English Literature) (1876) ; ‘Riquet of the Tuft) (1880), a love drama; ‘The Early Life of Jesus) (1888) ; ‘Poems) (1888); ‘His¬

tory of Early English Literature: from Its

Beginning to the Accession of Alfred5 (1892), the only work in English treating adequately its special subject; ‘Tennyson: His Art and Re¬

lations to Modern Life5 (1894) ; ‘The English Poets from Blake to Tennyson5 (1894) ; ‘Jesus and Modern Thought5 (1894) ; ‘The Old Tes¬

tament and Modern Life5 (1896) ; ‘The Gos¬

pel of Joy5 (1898) ; ‘English Literature to the Norman Conquest5 (1898); ‘On Ten Plays

of Shakespeare5 (1905) ; ‘A Treasury of Irish Poetry in the English Tongue5 (1901), edited in collaboration with T. W. Rolleston; ‘Poetry of Robert Browning) (1902) ; ‘Studies in

Poetry5 (1907); ‘Four Poets5 (1908); ‘On¬

ward Cry: Addresses5 (1911); ‘Ten More

Plays of Shakespeare5 (1913).

BROOKFIELD, Mo., city of Linn County,

on the Chicago, Burlington and Quincy Rail¬

road, 104 miles east of Saint Joseph. Extensive coal deposits are mined in the neighborhood; coal, cattle, grain and farm produce are largely exported along with the manufactured products of ironworks, brickyards, shoe factories, flour mills, grain elevators and railroad shops.

Brookfield, settled in 1860, was incorporated in 1865, and has municipal waterworks. Pop.

(1920) 6,304.

BROOKHAVEN, Miss., city and county-seat of Lincoln County, on the Illinois C. Rail¬

road; 56 miles south of Jackson, the State capi¬

tal. It is the seat of Whitworth Female College (Methodist), one of the most popular educa¬

tional institutions in the South, and Saint Francis School (Roman Catholic), and is the trade centre for a large farming, cotton and yellow pine lumbering region. It has a cream¬

ery, machine shops, cotton compress, cotton¬

seed-oil mill, lumber mills, syrup, brick and handle and spoke factories. An electric-light and power plant is owned by the city. Pop.

(1920) 4,706.

BROOKINGS, S. D., city, county-seat of

Brookings County, on the Chicago & N. W.

Railway, 60 miles north of Sioux Falls. It is chiefly a dairying place ; has electric lights, waterworks and several mills ; and is the seat of the South Dakota Agricultural College and of the United States Experiment Station. Its principal industries consist in manufactures of cigars, tow, flour, cement block and automo¬

bile tire treads. Grain and live stock are produced in large quantities in the district. It was settled in 1876. Pop. (1920) 3,924.

BROOKITE, a mineral only known in the

form of orthorhombic crystals. It is an oxide of titanium, having the formula Ti02. It is found in a variety of colors, red, yellow, black and brown. It has a hardness of 5.5 to 6.0, and a specific gravity of 3.9 or 4.0. It occurs in Switzerland, in the Tyrol and in Wales. In the United States it is found (in stout black crystals known as “arkansite55) at Magnet Cove, Ark. ; also at Paris, Me., in Ulster County, N. Y., and in North Carolina. The mineral

was named for the English mineralogist, H. I.

Brooke.

BROOKLIME (Veronica Beccabunga and

V. americana) , two species of speedwell, peren¬

nial plants of the natural order Scrophulariacece, common in ditches and wet places in Europe and America, respectively, and attractive for their axillary racemes of bluish flowers, for which they are grown in damp places for orna¬

mental purposes.

BROOKLINE, Mass., town in Norfolk

County, on the Charles River, and the Boston &

A. Railroad; three miles west of Boston, with which it is connected by electric railroad. It contains the villages of Cottage Farm, Long-wood and Reservoir Station, and has a granite town house, public library (80,000 volumes), two banks and two trust companies, a school of practical arts, high school and intermediate schools, municipal baths and gymnasium, and

fine parks and golf course. There are manu¬

factories of scientific instruments and marine compasses and some others. The United States census of manufactures for 1914 reported 21

industrial establishments of factory grade, em¬

ploying 429 persons, of whom 335 were wage earners, receiving annually $239,000 in wages.

The capital invested aggregated $1,123,000, and the value of the year's output was $659,000; of this, $441,000 was the value added by manu¬

facture. Brookline is chiefly a place of subur¬

ban residence, being one of the most beautiful and wealthy suburban

towns in the country.

It was first settled in 1634, and was known as “the hamlet of Muddy River55 until its incor¬

poration as Brookline in 1705. The government is by limited town meeting under a special form adopted in 1915. In that year the receipts amounted to $3,338,661.25, the expenditures to $3,176,578.09. The value of taxable real estate was estimated at $77,827,300, and of personal property at $46,174,600. Pop. (1910) 27,792; (1920) 37,748. Consult the ‘Annual Publica¬

tions of the Brookline Historical Society5 ; Bol¬

ton, C. K., ‘Brookline: the History of a

Favored Town5 (Brookline 1897) and Spencer,

C. A. W., ‘Brookline, Chronicle Souvenir of the Bicentennial5 (Brookline 1905).

BROOKLYN, Ill., town in Saint Clair

County, one mile north of East Saint Louis, on the Chicago and Alton, the Wabash and the

New York Central railroads. It contains rail¬

road repair shops and has taxable property

valued at $170,000, a city hall, and two schools.

It has 90 blocks of new granitoid walks. Pop.

2,200.

BROOKLYN, N. Y., the second largest of

the five boroughs of New York city, includes the entire area of the county of Kings and was, until 1898, when it was consolidated with New York, the fourth largest city in point of popu¬

lation in the United States. It covers the western extremity of Long Island, in lat. 40°

41′ 50″ N., long. 73° 59′ 50″ W., and has an area of 77.52 square miles, extending from the East River, an arm of the sea which separates it from the borough of Manhattan (the old city of New York), to the Atlantic Ocean and to Newtown Creek and Queens County on the east. Its

extreme length from Newtown Creek to Brigh¬

ton Beach, on the Atlantic shore, is 11 miles, and its average width is over seven miles. So

many natural advantages are rarely to be found within a similar area for the building up of a great industrial and commercial community.

The island of Manhattan is the centre of the business activity of the American metropolis, but its restricted area limits its capacity and forbids its expansion. The tendency has been to expand skyward and to utilize to the utmost the ground area of the island by the erection of lofty buildings, many of them exceeding 20

stories in height, but there is a limit to expan¬

sion in this direction, and there seems no possi¬

bility of adding to the amount of Manhattan water front available for purposes of commerce, while the high price of land caused by the im¬

perious demands of trade compels those en¬

gaged in business in Manhattan to seek their homes elsewhere. Brooklyn profited during

the greater part of its history from this compul¬

sion, and its population increased at a con¬

stantly accelerated ratio as the demands of busi¬

ness made property more valuable in the older portion of the city. After 1860 Brooklyn ad¬

vanced in population more rapidly than any

other American city. The period of its most rapid growth dates from the opening of the first bridge across the East River in 1883, from Park Row, Manhattan, to Sands and Washing¬

ton streets. Since then the Williamsburg

Bridge from Clinton street, Manhattan, to

Havemeyer street, and the Manhattan Bridge

from the Bowery and Canal street, Manhattan, to Nassau street have been built, and with the East River tunnel of the Interborough Rapid Transit System expedite communication with

all parts of the metropolis. Brooklyn's large territorial area keeps the cost of a home within the resources of people of moderate means,

especially as regards the outlying sections, which are thoroughly covered by electric sur¬

face, elevated and subway railroads. The char¬

acter of the soil and the freedom from any rocky hills makes nearly every foot of ground admirably suited to building purposes. The

greater part of the borough is situated at a considerable elevation above tide-water. A

low range of sand-hills, from 50 to 200 feet high, runs north and east through its centre, which slopes gently down on both sides to the East River and the Atlantic Ocean.

The natural configuration of the site sim¬

plifies drainage and other similar municipal problems to a material extent, while the loca¬

tion of the borough, between ocean,' river and bay, mitigates the

extremes of winter cold and summer heat, and makes it a desirable place of residence throughout the year.

Its advantages as a centre of commerce and industry are no less than those which made it famous as a city of homes before its consolidition with the metropolis. Its water-front avail¬

able for shipping comprises two miles on New¬

town Creek, including its basins, and nearly 10 miles on the East River and New York

Bay. The construction of large docks, such as those of the Atlantic and Erie basins — the latter being the chief point of entry of the canal barges that bring great cargoes of grain from the dis¬

tributing centre at Buffalo to the Brooklyn grain-elevators — have largely increased the wharfage facilities of the borough.

Most large cities grow by the absorption of outlying suburbs and adjacent villages, and in this respect the experience of Brooklyn has been striking. The name of Brooklyn, which was

derived from the town of Breucklen in Hol¬

land, the home from which came most of the earliest settlers, was first attached to a small trading-village that grew up on the shores of the East River near what is now the Fulton ferry to Manhattan. There were several other villages in the county which for a long time retained their individuality and developed along their own lines. Across the Wallabout swamp, to the eastward — “Wallabout® being derived

from a settlement of Walloons — a village was laid out in 1827 which was incorporated under the name of Williamsburg and in 1851 became incorporated as a city. Then Williamsburg

swallowed up the older and adjacent villages of Bushwick and Greenpoint, just as Brooklyn

had already swallowed up Bedford and Gowanus. In 1854 Brooklyn and Williamsburg

were consolidated. The town of New Lots,

including the village of East New York, came next, and the work of absorption, as far as Brooklyn was concerned, was completed in

1894, when the towns of Flatbush, New Utrecht, Gravesend and Flatlands were made part of

the city, the corporate limits of which then included all of Kings County. It was a natural process, but usually, when a large city is sur¬

rounded by suburbs that are destined to absorp¬

tion, the lines of development of the suburbs are indicated and set in accordance with their inevitable destiny, and annexation entails no confusion. It was different with Brooklyn.

Williamsburg, Flatbush, Canarsie, Bushwick

and East New York — more than 20 villages and hamlets all told, that are now a part of the borough of Brooklyn — had each its own plan and its own system of nomenclature. The

result has been hopeless and to a large extent irremediable confusion. Duplication of street names may be corrected by the substitution of new names for the old, and much has already been done in that direction, but the confusion resulting from the multiplicity of independent plans on which the various parts of the borough were originally laid out have never been wholly corrected, and Brooklyn will continue to be a puzzle to strangers and even to old residents.

It is as a city of homes — of middle-class homes — that Brooklyn has gained its distinc¬

tive character among American cities. The

Main Portion

BROOKLYN

SCALE

Baod-MoNally’a lliM Map of the Main Portion Copyright hy Rand - McNally & Co

EXPLANATION

Railroads

Elevated R. R. - , ,

Street Car Lines ?ˆL

suSt*-,

fJQff

GOVERNOR;

island

ˆ= =3 crm’ss®

j£|j|gipf

SriaM

“LANTIC

‘oplgaioiu

■ = 3‘l^5jy

I - , I UNION - -

1 - -JiCT ~| .

r-— 1 1 rEZ-t^iOCNT

f? ‘“COlV

»M*CEN.

Outlie* Map of

BROOKLYN

.Port too S’nowi*

i ooJIainJJap

t^r7~

EBSI

~f-oum v.

. ‘

;

■>

i

!•

. ’.*

I .

• • - ….

.

,

*

»!

« * f

‘ ’

• *

l

-

»

*

. *

>

■

-

. •

- . •

;

i

< »

j

..

0

■ ‘ .

y

‘ .

* ‘

.

■ ‘

■i

‘ .

■J

*

-

.

■

.

-

- ‘

>

*

i •

“

!

i

‘ .

.

»

BROOKLYN

593

very wealthy can afford to live in Manhattan, and the very poor have no alternative but to crowd into its hive-like tenements, but it may be said that, as a rule, the palace and the tene¬

ment — using the latter word in its ordinary, not its technical sense — are alike unknown in Brooklyn. No place of like population is freer from those congregations and nurseries of crime and disease known as “slums,® and in no city is a larger proportion of the population

housed under decent and sanitary conditions. It is for this reason, and because the growth of Brook¬

lyn has kept pace in other respects with its growth in numbers, that the population in¬

creased from 279,122 in 1860 to 599,495 in 1880; 1,166,582 in 1900, 1,634,351 in 1910 and 2,022,262

in 1920.

The earliest settlement of the Dutch in

Kings County was made in 1619, but it was not until more than a century later that Brooklyn had any organized existence. It was the scene of Washington's first battle and defeat during the American Revolution. That battle was

fought only about six weeks after the American Congress in Philadelphia had adopted the

Declaration of Independence. Washington's

army, as yet raw and totally unused to warfare, was massed among Brooklyn's hills, while Gen¬

eral Howe, with 30,000 seasoned fighting men, occupied Staten Island. The British crossed to Long Island, landing on the plains of New

Utrecht, and on the morning of 27 Aug. 1776, a general advance was made on the American lines. The attack was made at three points.

One division advanced through the marshes of Gowanus, and, despite a gallant resistance, drove back the Maryland regiment to the main body of American troops. A second point of attack was through what is now known as Battle

Pass, in Prospect Park, where the Americans were forced back on the entrenched position at Fort Green, but the heaviest blow was struck through the advance of a strong flanking party.

It had early that morning passed along the northern base of the ridge of hills in what is now the Twenty-fourth ward, stopping at the Howard House, a tavern in East New York,

and impressing its owner as a guide. It then advanced upon Washington's forces from the

east. A misty night fell, with no general en¬

gagement, and by morning Washington had

withdrawn his troops, under cover of fog, across the East River. The British retained posses¬

sion of Brooklyn until the evacuation of New York at the close of the war. Brooklyn's most memorable association with Revolutionary his¬

tory, however, lies in the fact that the British prison ships — the Jersey and its consorts — -.

were moored in Wallabout Bay, and the bones of 11,000 victims who died in those floating slaughter-pens are buried at Fort Green, where a monument to their patriotic devotion is

erected.

Brooklyn was incorporated as a village in

1801, and at about that time the Federal gov¬

ernment made its first purchase of land at the Wallabout for navy-yard purposes. The Brook¬

lyn navy yard is now the best equipped in the possession of the United States government. It covers an area of over 100 acres, with a capa¬

cious drydock, and a mechanical plant capable of shipbuilding on the most extensive scale.

Some of the finest ships in the United States vot. 4 — 38

navy have been constructed here, and its great repair shops are kept constantly at work. A splendidly equipped naval hospital occupies a fine site in connection with the yard.

Brooklyn village was incorporated as a city in 1834, with George Hall as its first mayor.

In 1854 came consolidation with Williamsburg, and thereafter the growth of the city was steady and rapid. Street railway enterprises opened highways through outlying farm districts, and these speedily became transformed into great thoroughfares, and Brooklyn has now 1,230

miles of streets, of which the principal ones are paved with asphalt.

The surface, elevated and subway railroad

lines, all operated by electricity, have 655 miles of tracks and carry annually about 600,000,000

passengers.

Industries. — It has been generally assumed

that Brooklyn is merely “the sleeping-place of Manhattan.® It is undoubtedly true that many thousands of those who are engaged in busi¬

ness in Manhattan find their homes in Brook¬

lyn — the number has been estimated at between 100,000 and 200,000 — but the fact remains that Brooklyn itself is one of the greatest manu¬

facturing centres of the United States. In

many important branches of industry it leads all its competitors. Its most important industry is foundry and machine-shop products. Brook¬

lyn’s sugar-refining industry is by far the most important in the United States, nine-tenths of the sugar consumed in the country being refined here. Coffee-roasting is another large and im¬

portant industry, as is the manufacture of

chemicals. Some of the leading publishers of the United States have

located their printing and bookbinding establishments in Brooklyn.

It is also the seat of jute manufacture, glass and porcelain factories, cordage works and

other important industries. The United States census of manufactures for 1914 reported 6,096

industrial establishments of factory grade, em¬

ploying 106,740 persons, of whom 140,881 were wage-earners, receiving $81,910,000 annually in wages. The capital invested aggregated $448,-

757,000, and the year's production was valued at $515,303,000; of this, $217,034,000 was the value added by manufacture.

Education. — Brooklyn's public school sys¬

tem, up to the date of consolidation with New York, held a high place in the esteem of public educators. In 1897 it was merged in the public-school system of the greater city, but it still possesses many of the characteristics that for¬

merly distinguished it, and few if any cities in the world have a better equipped galaxy of pub¬

lic schools. It has six high schools, of which one is devoted to manual and technical instruc¬

tion, while another is wholly given over to commercial instruction. Its 180 public schools are crowded almost beyond their capacity every day in the school year. Many of the schools in the poorer neighborhoods are kept open dur¬

ing the summer months as recreation schools for the benefit of children who remain in the borough during the ordinary school vacation

and who are taught many things outside of the ordinary school curriculum. Brooklyn has more than 328,000 pupils registered in her public schools and 7,900 teachers.

Brooklyn has no university but it has many excellent private schools and academies, some 594

of which, such as the Polytechnic Institute, . Adelphi Academy and Saint John's College, hold collegiate rank and grant degrees. The parochial schools also hold high rank, while the Pratt Institute affords thorough technical training to hundreds of pupils.

The Brooklyn Public Library, with which

the excellent Brooklyn Library was incorpo¬

rated, maintains 31 branch libraries throughout the borough, including 20 presented by Mr.

Andrew Carnegie.

One of the most notable of the educational institutions in Brooklyn is the Brooklyn Insti¬

tute of Arts and Sciences. This valuable and practically unendowed institution is, as regards its present buildings, situated upon high ground adjacent to Prospect Park, on what is known as the East Side Park lands, of which 11 9/10

acres have been leased to the trustees for 100

years. It is the development of a school of arts and sciences founded during the middle of the 19th century by Augustus Graham, a philan¬

thropist of English extraction. It expanded

under the direction of the late Prof! Franklin W. Hooper and a public-spirited board of trus¬

tees into what is likely to prove the nucleus of a great national academy. It has a well-furnished museum, which is especially rich in

prehistoric American relics, and departments

of archaeology, architecture, astronomy, botany, chemistry, domestic science, electricity, engi¬

neering, entomology, geography, geology, law, mathematics, microscopy, mineralogy, music,

painting, pedagogy, philology, philosophy, pho¬

tography, physics, political science and psy¬

chology, each of which is presided over by an expert in the science. When completed the

entire structure will cover a large area, with four interior courts to provide light for the central portions of the building. It will con¬

tain on the first floor rooms for collections illustrating the general history of the arts and architecture, on the second floor rooms for the illustration of the practical arts and sciences and on the third floor galleries for the illus¬

tration of the history of painting, engraving, etching and decorative art.

Parks.— Brooklyn's public park system has

been developed on a scale altogether commen¬

surate with the character of the borough, and full advantage has been taken of the cheapness of land to make provision for the needs of the future in the matter of breathing places and pleasure grounds. The oldest and best known, although not the largest of these, is Prospect Park, which includes 516 acres of rolling land, with picturesque lakes and an unrivaled growth of old forest trees. Prospect Park is beautifully laid out, special care having been taken during the 40 years of its existence as a park to pre¬

serve its natural characteristics. Its statuary includes figures of J. S. T. Stranahan, one of the pioneers in the matter of providing public parks; John Howard Payne, Thomas Moore,

Washington Irving, Beethoven and Mozart.

There is also, at the foot of Lookout Hill, a memorial shaft in honor of the Maryland sol¬

diers who fell in the battle of Long Island.

Another notable pleasure ground is Forest

Park at Richmond Hill, which includes 536

acres on the crown of the ridge of hills on the Queens County border. Except for the laying out of walks, paths and golf links, it has been left in its natural state. It affords splendid views of the Atlantic Ocean and Jamaica Bay.

Sunset Park, a reserve of 14 acres on the shores of New York Bay, and the Coney Island Con¬

course, which runs along the Atlantic shore and contains 70 acres, are unique in their location.

In addition, there are nearly 40 small parks and recreation grounds in the borough.

Bibliography. — (Brooklyn, the Borough of

Beauty and Promise — the Home Borough of

New York City) (Municipal Club of Brooklyn

1912) ; Edwards, R., (Historical and Descrip¬

tive Review of the City of Brooklyn) (New

York 1883).

Charles Leonard-Stuart,

Editorial Staff of The Americana.

BROOKLYN INSTITUTE OF ARTS

AND SCIENCES. See Brooklyn.

BROOKLYN POLYTECHNIC INSTI¬

TUTE, an institution founded in 1835, which gives college preparatory training and a college engineering course. The latter course is given during the day and evening and affords a train¬

ing for engineers and chemists. Certificates from the accredited schools are accepted for admission. Degrees are given in chemistry,

chemical, mechanical, civil and electrical engi¬

neering. A graduate department is also main¬

tained. The faculty consists of 14 professors and 27 instructors and assistants.

BROOKS, Alfred Hulse, American geolo¬

gist, Alaskan explorer and author : b. Ann

Arbor, Mich., 18 July 1871. He studied at

Harvard University, in Germany and Paris;

in 1898 became assistant geologist in the United States Geological Survey, engaged in geological work and exploration in Alaska, and was ap¬

pointed geological curator of Alaskan mineral resources 1902. His publications include Rail¬

way Routes in Alaska* (1907); (Mining and

Mineral Wealth of Alaska) (1909) ; (The

Mount McKinley Region, Alaska) (1911) ;

(Gold, Silver, Copper, Lead and Zinc in West¬

ern States and Alaska* (1913).

BROOKS, Charles William Shirley, Eng¬

lish journalist, editor of Punch : b. London, 29

April 1816; d. there, 23 Feb. 1874. He settled in London, wrote dramas, contributed to the leading periodicals and journals, and for five sessions wrote the Parliamentary Summary *

for the Morning Chronicle. By its proprietors he was sent, in 1853, on a mission to report on the condition of labor and the poor in Rus¬

sia, Syria and Egypt, and a result of his obser¬

vations appeared in <The Russians of the South) (1856). He wrote political articles, attracted attention by several dramas and burlesques and in 1854 joined the staff of the London Punch.

In 1870 he succeeded Mark Lemon as Its editor.

His novels, which include (Aspen Court*

(1855); (The Gordian Knot) (1860); (The

Silver Cord) (1861); ˆSooner or Later/ with illustrations by Du Maurier (1866-68); (The

Naggeltons) (1875), show keen observation.

He also wrote (Amusing Poetry) (1857). His son, Reginald Shirley, collected Brooks' (Wit and Humor from Punch* (1875).

BROOKS, Elbridge Streeter, American

author, son of Elbridge Gerry Brooks: b.

Lowell, Mass., 14 April 1846; d. Somerville, Mass., 7 Jan. 1902. He was the author of more than 40 books for young people, intended to BROOKLYN, N. Y

Water Tower and Entrance to Prospect Park Memorial Arch, Plaza Entrance to Prospect Park BROOKS

familiarize them with American history, among which are ‘Historic Boys) ; (Chivalric Days’; ‘The Story of the American Indian’ ; (The

Story of New York’ ; ‘Heroic Happenings)

(1893) ;‘The True Story of George Washington (1895) ; ‘The Century Book of Famous Amer¬

icans’ (1896); ‘Stories of the Old Bay State) (1899); (A Godson of Lafayette’ (1900);

‘Under the Allied Flags > (1901). He edited the Wide Awake Magazine for several years,

and was the literary adviser of the Boston pub¬

lishing house of D. Lathrop Company from

1895 until his death.

BROOKS, James Gordon, American poet :

b. Claverack, N. Y., 3 Sept. 1801 ; d. Albany, 20

Feb. 1841. He studied law, and removed in

1823 to New York, where he became editor of the Minerva, a literary journal, and afterward of the Literary Gazette, the Athenaeum and

the Morning Courier, continuing in all these papers the publication of his verses. In 1828

he married Mary Elizabeth Aikin, who had

written under the signature of Norma, and the next year appeared the ‘Rivals of Este, and Other Poems, by James G. and Mary E.

Brooks.’

BROOKS, John, American soldier, and

governor of Massachusetts: b. Medford 1752;

d. 1 March 1825. While pursuing the study of medicine he displayed a love for military exer¬

cises, and having settled as a medical practi¬

tioner at Reading undertook the drilling of a company of minute men, with whom, on the

news of the expedition to Lexington, he

marched in time to see the retreat of the British.

Promoted soon after to the rank of major in the Continental service, he assisted in throwing up the fortifications on Breed's Hill, and was espe¬

cially serviceable to the army as a tactician. He was made lieutenant-colonel in 1777, and in the battle of Saratoga stormed the entrenchments of the Hessian troops. He was a faithful adherent of the commander-in-chief during the con¬

spiracy at Newburg. Washington requesting

him to keep his officers within quarters, that they might not attend the insurgent meeting, his reply was : "Sir, I have anticipated your wishes, and my orders are given.® Washington took

him by the hand, and said: "Colonel Brooks, this is just what I expected from you.® After the peace he resumed the practice of the medi¬

cal profession in Medford, and was for many years major-general of the militia of his county.

In the War of 1812 he was adjutant-general of Massachusetts, and in 1816 was elected gov¬

ernor of that State, an office to which he was reelected annually till 1823, when he declined being again a candidate.

BROOKS, John Graham, American lec¬

turer on economics : b. Acworth, N. H., 19 July 1846. He was graduated from the Harvard

Divinity School in 1875, and subsequently

studied in the universities of Berlin, Jena and Freiburg. He was for a time in the work of the Unitarian ministry, and was for several years a lecturer in the extension department of the University of Chicago, also in the

economic department at the University of Cali¬

fornia. For two years he served as an expert in the Department of Labor at Washington,

making a report in 1893 upon workingmen's

insurance in Germany. For 16 years he was

president of the National Consumers' League.

He published 'Charity and the Unemployed' ; ' The Pope and the Encyclical on Labor' ; 'The Social Unrest' (1903) 'As Others See Us'

(1908) ; 'An American Citizen' (1910) ; 'Amer¬

ican Syndicalism' (1913).

BROOKS, Noah, American journalist and

author: b. Castine, Me., 30 Oct. 1830; d. Los Angeles, Cal., 16 Aug. 1903. From 1850 he

was connected with newspapers in Massachu¬

setts, California, Washington and New York.

He published many popular books for boys,

among which are 'The Fairport Nine' (1880) ; 'Our Baseball Club' (1884) ; 'How the Repub¬

lic is Governed' ; 'American Statesmen' (1893) ; 'Short Stories in

American Party Politics’

(1896); ‘The Boys of Fairport’; ‘The Medi¬

terranean Trip.’

BROOKS, Peter Chardon, American mer¬

chant : b. Medford, Mass., 6 Jan. 1767; d. Bos¬

ton, 1 Jan. 1849. He began his business career as secretary in a marine insurance office in Bos¬

ton, and presently became its principal. He rapidly acquired a fortune, retiring in 1803, and for the remainder of his life took an active interest in municipal and philanthropic affairs.

He was the president of several benevolent asso¬

ciations, a member of the first city council of Boston and sat in both houses of the State leg¬

islature. He was one of the most prominent op¬

ponents of the lottery schemes then coun¬

tenanced by many respectable persons. One of his daughters married Rev. H. L. Frothingham (q.v.), and several prominent Boston families of to-day claim him as an ancestor. Consult Everett, ‘Life of Peter C. Brooks.’

BROOKS, Phillips, American Protestant

Episcopal bishop: b. Boston, Mass., 13 Dec.

1835; d. there, 23 Jan. 1893. He inherited the best traditions of New England history, being on the paternal side the direct descendant of John Cotton, and his mother’s name, Phillips, standing for high learning and distinction in the Congregational Church. Born at a time

when the orthodox faith was fighting its bitter¬

est battle with Unitarianism, his parents ac¬

cepted the dogmas of the new theology, and had him baptized by a Unitarian clergyman. But

while refusing certain (dogmas of the orthodox Church they were the more thrown back for

spiritual support upon the internal evidences of evangelical Christianity. Transition to the

Episcopal Church was easy ; the mother became an Episcopalian, and the future bishop received all his early training in that communion. But heredity had its influence, and in after life he declared that the Episcopal Church could reap the fruits of the long and bitter controversy which divided the Newr England Church only

as it discerned the spiritual worth of Puritan¬

ism and the value of its contributions to the history of religious thought and character.

Such were the early surroundings of the man, and the subsequent influences of his life tended to foster this liberal spirit. When he entered Harvard, he came into an atmosphere of in¬

tense intellectual activity. James Walker was the president of the college, and Lowell, Holmes, Agassiz and Longfellow were among the pro¬

fessors. He graduated with honor in 1855,

and soon after entered the Episcopal Theologi¬

cal Seminary at Alexandria, Va. The transition from Harvard to this college was an abrupt 596

one. The standards of the North and South

were radically different. The theology of the Church in Virginia, while tolerant to that of other denominations, was uncompromisingly

hostile to what it regarded as heterodox.

When the Civil War was declared he threw

himself passionately into the cause of the Union.

Yet his affection for his Southern classmates, men from whom he so widely differed, broad¬

ened that charity that was one of his finest characteristics, a charity that respected convic¬

tion wherever found. No man, in truth, ever did so much to remove prejudice against a

Church that had never been popular in New

England. To the old Puritan dislike of Episco¬

pacy and distrust of the English Church as that of the oppressors of the colony was added a sense of resentment toward its sacerdotal claims and its assumption Of ecclesiastical supremacy.

But he nevertheless protested against the claim by his own communion to the title of <(The American Church.® He preached occasionally

in other pulpits, he even had among his audi¬

ences clergymen of other denominations and

he was able to reconcile men of different creeds into concord on what is essential in all. The breadth and depth of his teaching attracted so large a following that he increased the strength of the Episcopal Church in America far more than he could have done by carrying on an active propaganda in its behalf. His first

charge was the church of the Advent, in Phila¬

delphia ; in two years he became rector of Holy Trinity Church in the same city. In 1869 he was called to Trinity Church, Boston, of which he was rector until his election as bishop of Massachusetts in 1891.

It is impossible to give an idea of Phillips Brooks without a word about his personality, which was almost contradictory. His command¬

ing figure, his wit, the charm of his conversa¬

tion and a certain boyish gayety and natural¬

ness drew people to him as to a powerful

magnet. He was one of the best-known men

in America ; people pointed him out to strangers in his own city as they pointed out the Com¬

mon and the Bunker Hill monument. When he

went to England, where he preached before the Queen, men and women of all classes greeted him as a friend. They thronged the churches where he preached, not only to hear him but to see him. It was said of him that as soon as he entered a pulpit he was absolutely imper¬

sonal. There was no trace of individual ex¬

perience or theological conflict by which he might be labeled. He was simply a messenger of the truth as he held it, a mouthpiece of the Gospel as he believed it had been delivered to him. Although in his seminary days his ser¬

mons were described as vague and unpractical, he was as great a preacher when under 30 years of age as at any later time. His early sermons, deliverd to his first charge in Philadelphia, dis¬

played the same individuality, the same force and completeness and clearness of construction, the same deep, strong undertone of religious thought, as his great discourses preached in Westminster Abbey six months before his death.

His sentence were sonorous ; his style was char¬

acterized by a noble simplicity, impressive, but without a touch showing that dramatic effect was strained for. He passionately loved nature in all her aspects, and traveled widely in search of the picturesque ; but used his experience with reserve, and his vivid illustrations to explain human life. His treatment of Bible narratives is not a translation into the modern manner, nor is it an adaptation, but a poetical rendering, in which the flavor of the original is not lost though the lesson is made contemporary. He

used figures of speech and drew freely on

history and art for illustrations, but not so much to elucidate his subject as to ornament it. As might be expected of one who, in the world's best sense, was so thoroughly a man, he had great influence with young men and was one of the most popular of Harvard preachers. It was his custom for 30 alternate years to go abroad in the summer, and there, as in America, he was regarded as a great pulpit orator. He took a large view of social questions, and was in sympathy with all great popular movements.

His advancement to the episcopate was warmly welcomed by all parties, except one branch of his own Church with which his principles were at variance, and every denomination delighted in his elevation as if he were the peculiar prop¬

erty of each. His works include (Lectures on Preaching) (1877) ; 'Sermons* (1878-81) ;

'Bohlen Lectures) (1879); 'Baptism and Confirmation) (1880) ; 'Sermons Preached in Eng¬

lish Churches) (1883) ; 'The Oldest Schools in America) (Boston 1885) ; 'Twenty Sermons)

(New York 1886); 'Tolerance> (1887); 'The

Light of the World, and Other Sermons >

(1890); and 'Essays and Addresses) (1894).

His 'Letters of TraveP show him to have been an accurate observer, with a large fund of spontaneous humor. Consult Allen, 'Life and

Letters of Phillips Brooks) ; Howe, 'Phillips Brooks) (1902).

BROOKS, Preston Smith, American poli¬

tician and legislator : b. Edgefield, S. C., 4 Aug.

1819; d. Washington, D. C,, 27 Jan. 1857. He was graduated at South Carolina College in

1839; elected to the legislature of his native State in 1884; raised a company for the Mexican War and led it as captain in the famous Pal¬

metto regiment. He was sent to Congress in 1853, made his first speech in February 1854, on the subject of the Nebraska bill; speaking also in June of the same year on the Pacific Railroad bill. On 22 May 1856, Senator Sumner, of

Massachusetts, having employed in a speech in the Senate various expressions which had

greatly incensed the members of Congress from South Carolina, Brooks entered the Senate

chamber, after the Senate had adjourned, while Sumner was seated at his desk engaged in

writing, and with blows on the head from a gutta-percha cane struck the Senator to the floor, where he left him insensible. On 2 June a committee of the House of Representatives reported in favor of Mr. Brooks' expulsion. In the final action upon the report there were 121

votes in favor of and 95 opposed to it, which, being less than the requisite two-thirds vote, prevented the House from agreeing to the reso¬

lution. Mr. Brooks, however, resigned his

seat, and; 8 July, pleaded guilty before the court at Washington upon an indictment for assault, and was sentenced to a fine of $300. Having addressed his constituents on the subject of the assault, he was reelected to Congress by a unanimous vote, and made, on 7 Jan. 1857, a second speech on the Nebraska bill.

BROOKS, Shirley. See Brooks, Charles

William Shirley.

BROOKS, William Keith, American zoolo¬

gist : b. Cleveland, Ohio, 25 March 1848; d. Bal¬

timore, Md., 12 Nov. 1908. He was professor of zoology in Johns Hopkins University from 1876. He wrote (Handbook of Invertebrate

Zoology' (1882); 'Heredity' (1884); 'The

Development and Protection of the Oyster in Maryland' (1884) ; 'A Monograph of the

Genus Salpa' (1893) ; foundation of Zoology'

(1898).

BROOKS, William Robert, American

astronomer: b. Maidstone, Kent, England, 11

June 1844; d. Geneva, N. Y., 3 May 1921. He was educated in the United States, became an expert mechanical draughtsman, and in 1874

founded the Red House Observatory at Phelps, N. Y., where he discovered 11 comets. After 1888 he was in charge of the Smith Observatory at Geneva, N. Y., where he discovered 12 more comets. In 1887 he was elected a fellow of the Royal Astronomical Society of Great Britain.

He was a popular lecturer on astronomical sub¬

jects and had considerable reputation as an astronomical photographer.

BROOKVILLE, Ind., town and county-seat of Franklin County, 65 miles southeast of Indianapolis, on the Cleveland, Cincinnati, Chi¬

cago and Saint Louis Railroad, and on the

White Water River. Its industrial establish¬

ments comprise furniture factories, flour mills, paper and saw mills. The waterworks are

municipal property. The town has a Carnegie library. Pop. 2,169.

BROOKVILLE, Pa., borough and county-seat of Jefferson County, 100 miles northeast of Pittsburgh, on the Pennsylvania, the Pitts¬

burgh, Shawmut and Northern, and the New

York Central railroads, and on Red Bank Creek.

The Brookville Memorial Home for the widows of sailors and soldiers is located here. The borough has iron foundries, flouring mills, glass¬

works, lumber-dressing works, brick and tile works, furniture and automobile factories. It owns the waterworks. Pop. 3,003.

BROOM, various shrubs of the closely

allied genera Genista, Cytisns and Spartium, of the family Fabacece, natives mostly of the warm and temperate parts of the Old World.

The name is applied only to species which have long, slender twigs and numerous axillary

flowers. Genista monosperma, a Spanish and

North African species, attains a height of 10

feet; has almost leafless, grayish branches; small, simple, linear, silky leaves; fragrant white flowers in short lateral racemes ; and one-seeded pods. It is planted in shrubberies and is grown in greenhouses in preferably

loose, dry soil. G. tinctoria, dyer's greenweed, a native of Europe and western Asia, is an erect shrub about three feet tall with somewhat pubescent branches and many flowered axillary racemes which are terminally panicled. Its

branches, leaves and blossoms are used to dye wool yellow, or when mixed with wood, green, Cytisus sooparius, Scotch or common brown,

a native of middle and southern Europe, at¬

tains a height of 20 feet, but usually much less, has erect slender branches short-petioled

leaves, generally large, solitary, long-stalked, drooping yellow flowers and brownish black

pods. It has been largely introduced into the United States for ornament, and is hardy as far north as Nova Scotia. It succeeds on dry soils, and produces an abundance of bloom in late spring and early summer. The stems and leaves, which are very bitter and nauseous

tasting and smelling, have been used in dyeing and tanning, and the fibre of the former used to make cloth and paper. The wood of large specimens is highly valued for turning and

cabinetmaking. C. albns, white or Portugal

broom, a native of the Mediterranean region, which attains a height of three feet, sometimes even 20 feet, has fascicles of axillary flowers, for which it is frequently planted in shrubberies.

Many other species are valued for ornamental planting, for pasturage, and since their flowers yield abundant nectar, for bee forage. Spartium junceum, Spanish broom, a native of southern Europe, is an upright shrub, 10 feet tall, with slender, green branches, fragrant yellow flowers which appear continuously during summer, and in California, where the plant has been intro¬

duced, almost throughout the year. It grows on dry soils and in rocky places. Its fibre is used to some extent in Spain, Italy and France for rope-and cloth-making and even for mak¬

ing some kinds of lace. See Cytisus; Genista; Spartium.

BROOM-CORN, (Holcus sorghum var.

millet or Guinea-corn), a plant of the grass family with a jointed stem, rising to the height of 8 or 10 feet, extensively cultivated in North America, where the branched panicles are made into carpet-brooms and clothes-brushes. The

seed is used for feeding poultry, cattle, *etc.*

BROOM RAPE (Orobanche ramosa), an

annual parasitic plant of the family Oroban-chacece, a native of Europe but established in America, especially in tobacco and hemp fields, where it often does damage by sucking the

juices of the plants which it eventually kills.

Its slender, brownish or straw-colored stems attain a height of 6 to 15 inches, bear small scales instead of leaves, and light blue sessile flowers, followed by an abundance of minute seeds which rapidly spread the pest. Several closely related species also occur in the United States, parasitic upon clover and various other plants.

BROOM-SEDGE. See Andropogon.

BROOM TOPS, the fresh and dried tops

of Cytisus scoparius (common broom). There

are two official preparations; the decoction (de¬

co ctum scoparii), consisting of a pint of dis¬

tilled water to an ounce of the dried tops, and the juice (succus scoparii), made of three

ounces of the fresh expressed juice to a pint of rectified spirits. They are valuable diuretics, especially in cardiac dropsies. Scoparine and sparteia are the two active principles ; the action of sparteia is analogous to that of conia.

BROOMS. See Brushes and Brooms.

BROSBOLL, Karl. See Etlar, Carit.

BROSE (Gaelic brothas), a dish sometimes

used in Scotland, made by pouring boiling

water, milk or the liquor in which meat has been boiled, on oatmeal, and mixing the in¬

gredients by immediate stirring. Butter may be added, and sweet milk when the brose is made with water. It is kail brose, water brose or beef brose, according to the liquid used. Athole 598

brose, a famous Highland cordial, is a com¬

pound of honey and whisky.

BROTHER JONATHAN, a name of per¬

sonification applied to the people of the United States, as (<John Bull® is to the people of Eng¬

land. The most widely accepted explanation of its origin rests on the tradition that Washing¬

ton, on assuming command of the New England Revolutionary forces, being in great straits for arms and war material, and having a high re¬

gard for the judgment of his friend the gov¬

ernor of Connecticut, Jonathan Trumbull, said in that emergency, <(We must consult Brother Jonathan.® This expression, being repeated on other difficult occasions, came into common use, and at last was extended to the entire people of the country. See National Nicknames.

BROTHERHOOD OF AMERICAN

YEOMEN. A fraternal beneficiary society

with headquarters at Des Moines, Iowa, or¬

ganized under the laws of the State of Iowa in February 1897. The purpose of this organiza¬

tion is to unite in a fraternal association all acceptable white persons between the ages of 18 and 45, at nearest birthday, under a lodge system and ritualistic form of work. It pays to its members or their beneficiaries, death and disability benefits either as a result of disease, accident or old age. The Society has a repre¬

sentative form of government, the governing

body being known as the Supreme Conclave,

which meets quadrennially and which is com¬

posed of representatives duly elected thereto.

The affairs of the Association are managed by a board of directors consisting of five members elected by the Supreme Conclave. On 1 July 1916, the Society had a membership of 225,153; assets totaling $3,541,925.11, and claims paid since organization, $14,611,184.33.

BROTHERHOOD OF ANDREW AND

PHILIP, The, is an international and inter¬

denominational fraternity within the Church

advocating prayer, service, Bible study and the spread of Christ's kingdom seeking to cultivate the working interests of every man in the

Church. The first chapter was organized 4 May 1888. The idea of the Brotherhood is simplicity itself. Its object is to bind men together in Christian fellowship and religious work. Its fun¬

damentals are the two rules of prayer and serv¬

ice. The rule of prayer is to pray daily for the spread of Christ's kingdom among men and for God's blessing upon the labors of the Brother¬

hood. The rule of service is to make personal efforts to bring men and boys within the hearing of the gospel of Jesus Christ, as set forth in

the services of the Church, prayer meetings and men's Bible classes. This being the simple nucleus of its activities, the Brotherhood is not restricted in its development. But in all that it does it holds in view the fact embodied in its constitution, namely, that the sole object of the Brotherhood is the spread of Christ's kingdom among the youth and older men. The word

"men® is used in its broad sense, and means any male over the age of 16. Every chapter is a society of the local church. None should be chartered without the approval of the pastor.

Every member is expected to be loyal to his own denomination. But the Brotherhood is

interdenominational, in that each chapter af¬

filiates with chapters in other denominations, for the purpose of fellowship, extension and growth.

BROTHERHOOD OF SAINT AN¬

DREW, a religious organization of the Prot¬

estant Episcopal Church, founded in 1883, in Saint James' Parish, Chicago. It has more than 1,200 active chapters, exclusive of the junior department, with a membership of about 13,000

men. The junior department has 500 chapters and a membership of about 4,000. The Society has extended to Canada, England, Scotland,

Australia, the West Indies and South America.

In Canada there are 300 chapters with a mem¬

bership of about 3,000. The official organ of the brotherhood is Saint Andrew's Cross, pub¬

lished monthly. There are two rules, one of prayer and one of service. The pledge of

service binds every member to make an earnest effort to bring at least one young man each week within the hearing of the gospel. The headquarters of the Association is at Boston, Mass.

BROTHERHOODS, Religious. See

Orders, Religious.

BROTHERS OF CHARITY, a congrega—

gation founded for the purpose of securing the sanctification of its members by the practice of the three simple vows and the observance of its constitution. Its special object is the ministry of charity in maintaining and ministering to the aged, the sick and the insane, in sheltering the poor, in educating poor children and perform¬

ing any other work of charity to which they may be called. The congregation was founded in Belgium about 1809 by Rev. I. Triest, canon of Saint Bavon, Ghent.

BROTHERS OF THE CHRISTIAN IN¬

STRUCTION, a Roman Catholic Institute

founded at Saint Brieuc, France, by the Abbe Jean Marie de le Mennais, and approved by

the Holy See in 1891. The Order was estab¬

lished in Canada in 1886 and has 12 establish¬

ments in the archdiocese of Montreal ; one in the archdiocese of Ottawa., one in the diocese of Saint Hyacinth, two in the diocese of Three Rivers and one in the diocese of Valleyfield.

The object of the Order is the Christian educa¬

tion and instruction of youth. General motherhouse at Ploermel, France; Provincial House

and Novitiate at Laprairie, near Montreal.

BROTHERS OF THE CHRISTIAN

SCHOOLS, commonly called Christian

Brothers. This is a society of men belonging to the Roman Catholic Church who devote

themselves exclusively to the education of

youth. The Society was founded in 1680 by

Jean Baptiste de la Salle, canon of the metro¬

politan church of Rheims, who in the year

1900, was canonized by Pope Leo XIII.

The Society spread rapidly in France, partly because the Brothers made French the language of the schools instead of Latin, and partly be- •

cause they did away with the individual system of teaching by grouping the pupils together into distinct classes. They abandoned the lecturing style in all their instructions for the Socratic method, introduced object-lessons and added

museums to the equipment of the school.

These bold innovations in education met

with popular favor and official recognition, and did more than anything else to bring about a general system of primary instruction in France.

In consequence of these reforms in the tradi¬

tional methods of teaching, the Christian

Brothers have come to be considered the

founders of primary education in Europe. In due time, the Society spread to Italy, Belgium, Germany, Austria, England and Ireland; and

also to Canada, the United States, South Amer¬

ica, India and South Africa.

The general methods of teaching followed

by the Brothers are explained in the Govern¬

ment of the Christian Schools,) while the

qualities which they should possess as teachers are expounded in the (Twelve Virtues of a Good Master.) Besides these two manuals, the Society has published for the benefit of its members numerous works on education and

pedagogy, together with a series of textbooks on all subjects taught in the schools, including logic, ethics, literature, philosophy, methodology, mathematics, physics, *etc.*

The Christian Brothers established a college for the training of teachers in 1684, which was the first of its kind in Europe. They opened Sunday schools in 1699, also the first of their kind, in which secular as well as religious in¬

struction was given in the afternoon. They

have novitiates in every “province® of the So¬

ciety for the religious formation, and scholasticates for the pedagogical training of their members. They direct schools of all grades

from the primary to the college ; they have agricultural and technical schools as well as normal colleges, orphanages and “protectories.®

In the United States, they have colleges and other institutions taught

by 1,021 Brothers and attended by over 29,900 pupils. Altogether, the Society has more than 1,600 schools, with

15,500 Brothers and 350,000 pupils.

The Society was suppressed in 1792 at the

beginning of the French Revolution, was re¬

stored in 1803 by order of Napoleon I, and incorporated with the University of France in 1808. It was again officially suppressed in France in 1904 during the war against religious congregations waged by Premier Combes, but

continued to live and flourish in other countries.

The Christian Brothers wear a distinctive re¬

ligious habit and take the three vows of re¬

ligion. As they do not take “orders,® they are free to devote themselves entirely to the work of education.

BROTHERS AND CLERKS OF THE

COMMON LIFE, an institute founded by

Gerhard Groot, a deacon of Deventer in 1384

for the purpose of providing a home for men who desired to live an austere Christian life without taking perpetual vows. See Common

Life, Brothers of the.

BROTHERS OF OUR LADY OF

LOURDES. This congregation was founded

by Very Rev. S. M. Glorieux in 1830. Its object is the Christian education of youth, especially the poor, the care of orphan asylums

and the nursing of the sick and old people in hospitals.

Pope Leo XIII approved the congregation and its rule 18 July 1892. The Brothers conduct a house of studies and a boarding and day school at South Park, Wash., and a protectory for homeless boys at Pittsburgh .and New Derry, Pa.

BROTHERS OF THE SACRED

HEART, a Roman Catholic congregation es¬

tablished in Lyons, France, in 1820 bv Pere Andre Coindre, of the Society of Missionaries.

In 1847 five Brothers came from France to this country to take charge of parish schools and asylums. They have establishments in the arch¬

diocese of New Orleans, in the diocese of Alex¬

andria, Brooklyn, Natchez, Mobile, Natchitoches Savannah, Trenton, Indianapolis, Manchester,

Providence, Boston, Oklahoma and over 30

places in Canada. In September 1900 at a

general Chapter of the Congregation held in France, two provinces were formed, one for the United States and the other for Canada. The object of the Brothers is the Christian educa¬

tion of youth in schools, asylums and colleges.

A motherhouse was opened in Metuchen, N. J., June 1901. There are 225 Brothers, 5 colleges, 13 parochial schools, 1 house of studies, 1

novitiate and about 3,000 pupils in the United States.

BROUGH, bro, John, American statesman:

b. Marietta, Ohio, 17 Sept. 1811 ; d. Cleveland, 29

Aug. 1865. In his youth he was a printer's apprentice. He studied at the Ohio University and later entered journalism. As a Democratic

orator he became well known. In 1846 he en¬

tered the legal profession. In 1863 the Repub¬

lican Union party nominated him for governor and he was elected by a joint vote of all electors advocating war. He has been called the “war governor® of his State.

BROUGHAM, bro-am, Henry (Baron

Brougham and Vaux), British statesman and

jurist: b. Edinburgh, 19 Sept. 1778; d. Cannes, 7 May 1868. His father, Henry Brougham,

belonged to an old Westmoreland family, and his mother, Eleonora Syme, was a niece of

Robertson the historian. He was educated at the High School and the University of Edin¬

burgh, entering the latter at the age of 16. At the age of 18 he wrote an essay, ˆObservations on the Phenomena of Light, > which, being sent to the Royal Society, was printed in its (Transactions) for 1796. On leaving college he de¬

voted himself to the study of law at Edinburgh, and was admitted a member of the faculty of advocates in 1800. As a member of the

Speculative Society he was brought into con¬

tact with Jeffrey, Horner and others afterward famous ; and along with the above-mentioned

writers and Sydney Smith bore a chief part in the starting of the Edinburgh Review in 1802, to which he contributed a great number of

articles. In 1803 appeared his (Inquiry into the Colonial Policy of the European Powers, >

a work which showed a wide extent of knowl¬

edge in the author, and drew upon him con¬

siderable attention. In it he expressed his decided hostility to the

slave-trade. Finding too circumscribed a field for his abilities in Edinburgh, he removed to London, and in 1808

was called to the English bar. One of the first occasions on which he distinguished him¬

self in his professional capacity was in 1810, when he spoke before the House of Lords in behalf of some Liverpool merchants who wished the repeal of the orders in council prohibiting trade with the states subject to France. The same year he entered Parliament as member

for the rotten borough of Camelford, joined the Whig party, which was in opposition, and soon after obtained the passing of a measure making the slave-trade felony. He also suc¬

ceeded, before the dissolution of Parliament, in

getting the orders in council repealed. At the general election in 1812 he endeavored to get himself elected as one of the members for

Liverpool, but was defeated by Canning, and remained without a seat till 1815, when he was returned for Winchelsea. He represented this borough up to 1830. On his return to Parlia¬

ment he began his lifelong efforts in the cause of education. In 1819 he and his friends estab¬

lished a model school for the children of the poorer classes in London. In 1825 he published his (Practical Observations upon the Education of the People, > which ran through 20 editions.

The same year he was elected lord rector of Glasgow University; and also introduced a bill into Parliament for the incorporation of the London University, of which he may be consid¬

ered one of the chief founders. He also bore an active part in establishing the Society for the Diffusion of Useful Knowledge in 1827, the first publication of which was his (Discourse on the Objects, Pleasures and Advantages of Science. > Meantime his reputation as a brilliant speaker and able advocate had been gradually increasing, and his fearless and successful de¬

fense of Queen Caroline in 1820-21 placed him on the pinnacle of

popular favor. Two of the speeches spoken by him in this course are

looked upon as classic specimens of English eloquence. But the part he took in the defense of the Queen brought him into disfavor with the King, and delayed his promotion for some years, so that it was not till 1827 that he was made a King's counsel. In Parliament he con¬

tinued to speak against negro slavery, and in favor of what may be considered the most

valuable of the reforms that we owe to him ; namely, the amendment of the common law and of the judicial administration. On this subject he delivered a famous speech of six hours'

duration, on 7 Feb. 1828. At the general elec¬

tion of 1830 he was returned for the large county of York, an honor which he attributed chiefly to a celebrated speech delivered by him shortly before on the slave-trade. In the ministry of Earl Grey he accepted the post of Lord Chan¬

cellor, and 22 Nov. 1830, was raised to the peerage, with the title of Baron Brougham and Vaux. The Reform Bill of 1832 received his warmest support in the House of Lords. In

1834, when the Whig ministry was dismissed, Lord Brougham of course lost the chancellor¬

ship, and this proved the end of his official life.

He had proved a disagreeable colleague, and was heartily distrusted. Henceforth he devoted himself chiefly to legal and social reforms, maintaining his hostile attitude toward slavery, and continuing his labors in the cause of

popular education. He was a zealous opponent of the corn laws. He latterly resided much at Cannes, in the south of France, which he (<discovered® as a wintering resort. Lord Brougham accomplished a large amount of literary work, contributing to newspapers, reviews and en¬

cyclopaedias, besides writing several independent works in his time. His works, collected by himself, were published in 10 volumes (Edin¬

burgh 1855-57). He was president of Univer¬

sity College, London, and chancellor of Edin¬

burgh University.

Lord Brougham must be looked upon as one

of the most remarkable men of his century.

His energy and industry were amazing; and

he had great powers of application; but he wrote on too many subjects to be an authority on any. It was said of him that if had known a little of law, he would have known a little of everything. Mathematics, history, biography,

moral philosophy and physical science were

among the subjects on which he wrote. His

greatest service was undoubtedly in the im¬

provement of the legal system. As an orator and parliamentary debater he was regarded as inferior to Canning alone. A little carriage specially built for him was nicknamed a

<(Brougham,® a name that has since been ap¬

plied to this type of vehicle.

BROUGHAM, John, Irish actor and play¬

wright: b. Dublin, 9 May 1810; d. New York, 7 June 1880. He was at first a student of surgery, but when thrown on his own resources he adopted the stage as a profession. After a short experience as actor, playwright and

manager, he came to America in 1842. Eigh¬

teen years later he returned to England, but in 1865 he again came to the United States, and remained here till his death. He wrote about 100 plays, including (The Game of Love) ; Ro¬

mance and Reality) ; (Love's Livery* ; (The Duke's Motto,* etc., and

contributed largely to periodicals.

BROUGHAM, a close four-wheeled car¬

riage with a single inside seat for two persons, or a four-wheeled close carriage with two seats, accommodating four persons. Each type is

glazed in front and has a raised seat for the driver. Named after Lord Brougham.

BROUGHTON, brow'ton, Hugh, English

Biblical scholar: b. Owlbury, Shropshire, 1549; d. London, 4 Aug. 1612. He was educated at Cambridge, and early became distinguished for his familiarity with the learned tongues. He entered the Church, but his views coming under ecclesiastical disapproval, he went to the Conti¬

nent for a time. For several years he preached to an English congregation in one of the cities of Holland. His disappointment in receiving no part in the King James version led him to criticize the version unsparingly. He wrote

(A Concert of Scripture) ; and an Explication of the Article of Christ's Descent into Hell.) Ben Jonson in two of his plays holds up to ridicule this Puritan preacher. Consult <Ed.

of his Life and Literary Remains) by John

Lightfoot (London 1662).

BROUGHTON, Lord (John Cam Hobhouse), Baron, English statesman and writer: b. near Bristol, 27 June 1786; d. London, 3

June 1869. He was educated at Westminster

School and Trinity College, Cambridge, whence he was graduated B.A. in 1808, and M.A. in 1811. He was an intimate friend of Lord

Byron, and accompanied him in his travels to Spain, Portugal, Greece and Turkey in 1809.

In 1812 appeared his (Journey Through Al¬

bania and Other Provinces of Turkey.* In the years 1813 and ˆ814 he accompanied the allied armies in Germany, and was present at the

battle of Dresden. He also accompanied Byron to Italy in 1816-17, and visited Rome and Venice with him. He suggested an extension of the 4th canto of- (Qhilde Harold, 5 which Byron dedicated to him, and by arrangement with the poet he undertook to write for it a series of notes, for which his observations during their journey furnished materials. These notes were BROUGHTON — BROUSSONET

written at Venice, and ultimately formed a

separate work, (Historical Illustrations of the Fourth Canto of Childe Harold,* published by Murray in 1818. Hobhouse was an advanced

Liberal in politics, and on his return took an active part in the advocacy of reforms. In 1816

he published anonymously the (Hundred Days

in Parish which, from its hostility to the Bour¬

bon cause, gave great offense to the govern¬

ments of France and England, while a French translator and the publisher of it were fined and imprisoned for issuing an anonymous pam¬

phlet, the (Trifling Mistake.* Broughton was committed to Newgate, and kept there for almost three months. In 1820 he was elected to Par¬

liament representing the borough of West¬

minister, and became a supporter of Liberal measures, as the Reform Bill of 1832, the repeal of the Test and Corporation acts, the removal

of Catholic disabilities, *etc.* In February 1832, he entered Lord Melbourne's Ministry as Secre¬

tary of War, and became a privy councillor. In 1833 he was made Chief Secretary for Ireland, but lost his seat in seeking re-election. In 1834, he was made Chief Commissioner for Woods and Forests, and the following year became president of the Board of Control. He lost his seat for Nottingham in 1847, but a seat was found for him at Harwich, which he continued to occupy till he was raised to the peerage in 1851. He had succeeded his father as baronet in 1831.

As he left no male issue the title became ex¬

tinct, the baronetcy passing to his nephew.

He published (Imitations and Translations

from the Classics* (1809) ; (Journey through Albania and Other Provinces of Turkey*

(1812). His diary, which he desired to be left unopened until 1900, is in the British Museum.

Consult Lady Dorchester (ed.), (Recollections of a Long Life) (London 1909).

BROUGHTON, Rhoda, English novelist:

b. North Wales, 29 Nov. 1840; d. London,

Eng., 5 June 1920. Her novels, especially

the earlier ones, show great cleverness,

and are very popular. They include (Cometh Up as a Flower) (1867) ; (Not Wisely but Too WelP (1867) ; (Red as a Rose Is She) (1870) ; (Goodbye, Sweetheart, Goodbye) (1872) ;

(Nancy > (1873); 'Belinda* (1883); 'Doctor

Cupid* (1886); 'Alas!* (1890); 'A Beginner*

(1894) ; (Scylla or Charybdis?) (1895) ; 'The Game and the Candle * (1899) ; (Lavinia)

(1902) ; (The Devil and the Deep Sea) (1910) ; (Between Two Stools) (1912).

BROUSSA, bro'sa. See Brussa.

BROUSSAIS, broo'sas', Francois Joseph

Victor, French physician: b. Saint Malo, 17

Dec. 1772; d. 17 Nov. 1838. Educated at the College of Dinan, he entered the army and soon attained the rank of sergeant; but a severe ill¬

ness caused him to give up a military career and devote himself to medicine. He studied

under his father, and returned to the service with a surgeon's commission, being attached first to the army and then to the navy. In 1799 he studied at Brest and Paris and from 1804-08 was again surgeon in the army; from 1808-14 was chief physician of a division of the French army in Spain, and in 1820 obtained a pro¬

fessorship at Val-de-Grace, a chair which he exchanged in 1831 for that of general pathology in the faculty of medicine at Paris. In 1841, a statue was erected to his memory at Val-de-Grace. His first important work was his

'Recherches sur la Fievre Hectique) (1803),

which was followed by the more celebrated

(Histoire des Phlegmasies ou inflammations

chroniques* (1808), and 'Examen de la doc¬

trine medicale generalement adoptee* (1816).

In these works he propounded what is known as the physiological system of medicine. Ac¬

cording to him irritation or excitation is the fundamental property of

all living animal

tissues, and diseases are produced by an undue increase or diminution of that property. Broussais also taught and wrote on phrenology. Be¬

sides the works already mentioned, Broussais wrote ‘Traite de la physiologie appliquee a la pathologie) (1824) ; ‘Commentaires des

propositions de pathologie consignees dans

l’examen* (1829) ; ‘Le cholera morbus epi—

demique) (1832). Consult Montegre, (Notice

historique sur la vie, les travaux et les opinions de Broussais> (Paris 1839) ; and Reis, (Etude sur Broussais et sur son oeuvre) (Paris 1869).

BROUSSON, Claude, French martyr: b.

Nimes 1647; d. Montpellier, 4 Nov. 1698. He was educated for the law, and practised as an advocate first at Castres and Castelnaudary, and afterward in the Parliament of Toulouse, where the Protestants, to whom he belonged, were

often indebted to him for the zeal and ability with which he defended their cause. In 1683, when the government had resolved on recalling the edict of Nantes, and trying the effect of persecution as a means of suppressing the Ref¬

ormation, it was at Brousson’s house the depu¬

ties from all the churches assembled, and re¬

solved that, even were their churches destroyed, they would still hold their meetings, though it should be under the canopy of heaven. His part in this and other important movements

marked him out as one of the first objects of attack ; and on receiving warning of an intention to arrest him, he sought an asylum at Lausanne, where he published several works, exposing the persecutions to which the Protestants of France were subjected, and awakening the sympathy of their brethren in all other parts of Europe. Nor was he satisfied merely to aid the cause with his pen. At the hazard of his life he returned to France, and continued for four years among

the recesses of the Cevennes, preaching the gos¬

pel. In 1693 he repaired to Holland, where a pension was given him by the States-General ; but the sufferings of his persecuted countrymen were ever uppermost in his mind, and he visited many courts of Europe to plead their cause, and more than once went to France for their instruction and encouragement. He was on

a mission to France when, a price having been set on his head, he was arrested at Oleron, tried at Montpellier, condemned to be broken on the wheel and executed accordingly. He left a large number of works including (L'Etat des reformes de France) (3 vols., 1685) ; (Lcttres pastorales) (1697) ; 'Lettres et opuscules *

(1701). Consult Payne, (The Evangelist of the Desert* (1853).

BROUSSONET, broo -son-a', Pierre Marie

Auguste, French naturalist : b. Montpellier, 28

Feb. 1761 ; d. there, 27 July 1807. In Paris he studied natural history; went to England and pursued ichthyology, and after three years'

residence there returned and was assistant in the College of France. At this period he com-602

municated a number of valuable papers to the Academy of Sciences, of which he became a

member. In 1785 he was appointed secretary

to the Paris Agricultural Society. Merino

sheep and the Angora goat are said to have been first introduced by him into France. The Revolution breaking out, he became connected with the Girondists. On the downfall of that party he was arrested at Montpellier, but hav¬

ing escaped, crossed the Pyrennes under the pretext of botanizing, and arrived in Spain destitute. Later he went to Africa and resumed his botanical studies, making some important collections. Returning to France, after execut¬

ing various missions he was appointed, in 1805, to the chair of botany at Montpellier. In the same year he became a member of the Corps Legislatif. He died from the effects of a fall by which the brain had been seriously injured.

Besides his (Ichthyologise Decas Prima) (1872), his publications include important memoirs of ichthyology and botany.

BROUSSONETIA, a genus of trees. See

Mulberry.

BROUWER, or BRAUWER, Adrian.

See Brauwer, Adrian.

BROWER, Jacob Vradenburg, American

explorer and archaeologist: b. York, Mich., 21

Jan. 1844; d. 1905. He served in the cavalry and the navy during the Civil War, was a mem¬

ber of the Minnesota legislature, 1867-73, and discovered numerous prehistoric mounds at

Mille Lac and other points in Minnesota. He published (The Mississippi River and Its

Source) (1893) ; (Prehistoric Man at the Head Waters of the Mississippi* (1895) ; (The Mis¬

souri River and Its Utmost Source) (1896);

<Quivira) (1898); (Harahey* (1899); (Mille

Lac) (1899).

• BROWN, Aaron Venable, American politi¬

cian : b. Brunswick County, Va., 15 Aug. 1795; d. 1859. He studied law, and commenced prac¬

tice in Nashville, Tenn. He was partner in business with President Polk, until the latter entered upon his congressional career ; served in almost all the sessions of the legislature of Tennessee between 1821 and 1832; was a mem¬

ber of the House of Representatives in Congress from 1839 to 1845; and was in that year elected governor of Tennessee. He was a delegate to the Southern convention held at Nashville in 1850, and submitted a report to that body known as the Tennessee platform. He was also a

member of the convention of the Democratic

party at Baltimore in 1852, to which he reported the platform adopted by them. In 1857 he

became a member of President Buchanan's Cab¬

inet, in which he held the office of Postmaster-General. His speeches were published in Nash¬

ville (1854).

BROWN, Abbie Farwell, American writer

for young people : b. Boston, about 1875. She was educated at the Boston Girls' Latin School and at Radcliffe College ; was one of the editors of the (Young Folks Library) (1902) ; traveled abroad in 1899, 1906 and 1910. She has pub¬

lished (The Book of Saints and Friendly

Beasts) (1900) ; (The Lonesomest DolP (1901) ; (A Pocketful of Posies) (verse, 1902) ; (In the Days of Giants1* (1902) ; (The Flower

Princess* (1903) ; (The Star Jewels* (1904) ; (Brothers and Sisters* (1905); (Friends and Cousins* (1906); (The Story of Saint Chris¬

topher* (1906) ; (The Curious Book of Birds*

(1907) ; (Fresh Posies* (verse, 1908) ; (John of the Woods* (1909) ; (Tales of the Red

Children* (1909); (The Christmas Angel*

(1910); (Their City Christmas* (1912); (The

Lucky Stone* (1913) ; (Song of Sixpence*

(verse, 1914) ; Uvissington Town* (1915) ; is also the author of several plays and librettos, of many song-texts and magazine tales.

BROWN, Addison, American lawyer,

judge and botanist: b. West Newbury, Mass., 21 Feb. 1830. A graduate of Harvard College and Law School in 1854, he was associated

with the New York bar from 1855 to 1881, and until 1901, when he resigned, was judge of the District Court of the United States for the southern district of New York. Dealing with shipping, admiralty, extradition and bankruptcy nearly 2,000 of his decisions are found in The Federal Reporter, Vols. VIII to CXV. As a

botanist, Judge Brown is also well known. He was one of the founders (1891) of the New York Botanical Gardens and is the author of (Illustrated Flora of the Northern United

States and Canada* (3 vols., 1896-98; new

edition, with Nathaniel L. Britton, 1913) ; (The Elgin Botanical Garden and its Relation to

Columbia College and the New Hampshire

Grants* (1908).

BROWN, Albert Gallatin, American states¬

man : b. Chester District, S. C., 31 May 1813; d. near Jacksonville, Miss., 12 June 1880. His parents removed to Mississippi while he was a child. He took a boyish interest in military affairs, and was made a brigadier-general in the State militia when only 19 years of age. He adopted the law as a profession, gaining admis¬

sion to the bar in 1834, and was a member of the State legislature from 1835 until 1839, and member of Congress from Mississippi in 1840-41. He was also a judge of the Circuit Superior Court in 1841-43; governor of Mississippi on successive re-elections from 1843 to 1848; again member of Congress from 1848 to 1854; and

United States senator from 1854 until 1858. He was reelected for six years, beginning 4 March 1859, but resigned in 1861 to join in the rebellion.

His colleague in the Senate at the time was Jefferson Davis, and they both attended the caucus of seceding senators, held in Washing¬

ton, 6 Jan. 1861. He was an uncompromising adherent of the Democratic party in the South.

A volume of his speeches was published in 1859.

BROWN, Alexander, American historian :

b. Glenmore, Nelson County, Va., 5 Sept. 1843; d. 29 Aug. 1906. He studied for a short time at Lynchburg College. He served in the Con¬

federate army during the Civil War and from 1880 devoted himself to literature. His point of view on the history of Virginia was that the commonly accepted historical account, based on works and documents of the court party, is largelv inaccurate and unjust to the original founders. He wrote (New Views of Early

Virginia History* (1886) ; (The Genesis of the United States* (1890) ; (The Cabells and Their Kin* (1895); (The First Republic in America*

(1898) ; (The History of Our Earliest History*

(1898); (English Politics in Early Virginia*

(1901) ; besides numerous articles for historical societies and magazines.

BROWN, Alice, American novelist and

writer of short stories descriptive of phases of New England life: b. Hampton Falls, N. H., 5

Dec. 1857. She was graduated at Robinson

Seminary, Exeter, N. H., 1876; taught school for several years, but has given herself entirely to literary pursuits for some years. Her work is most careful and conscientious in character, displaying equal literary skill and sympathetic insight . into character. She has published 'Fools of Nature' (1895); 'Meadow Grass'

(1895) ; (By Oak and Thorn,' a volume of

English travels (1896) ; 'The Road to Castaly, '

a book of verse (1896) ; 'The Day of His Youth' (1896) ; 'Tiverton Tales' (1899) ;

'King's End' (1901); 'Margaret Warrener'

(1901); 'Life of Mercy Otis Warren'; 'The

Mannerings' ; 'High Noon' ; 'Paradise' ; 'The County Road' (1906) ; 'The Court of Love'

(1906) ; 'Rose MacLeod' (1908) ; 'The Story of Thyrza' (1909) ; 'Country Neighbors,'

stories (1910); 'John Winterbourne's Family'

(1910); 'The One-Footed Fairy' (1911); 'The

Secret of the Clan' (1912) ; 'Vanishing Points'

(1913); 'Robin Hood's Barn' (1913); 'My

Love and I' (1913) ; 'Children of Earth,'

Winthrop Ames' Prize Play (1915). See

Children of Earth.

BROWN, Arthur Judson, American Pres¬

byterian clergyman and author : b. Holliston, Mass., 3 Dec. 1856. A graduate of Wabash Col¬

lege and of Lane Theological Seminary he

was ordained in 1883 and held pastorates in Ripon, Wis., Oak Park, Ill., and Portland, Ore.

Appointed one of the secretaries of the Presby¬

terian Board of Foreign Missions, he made

world tours of inspection in 1901-02 and in 1909. He is the author of 'The New Era in the Philippines' (1903) ; 'New Forces in Old China'

(1904) ; 'The Foreign Missionary' (1907) ;

'The Nearer and Farther East' (1908) ; 'The How and Why of Foreign Missions' (1909) ;

'The Chinese Revolution' (1912) ; 'Unity and Missions — Can a Divided Church Save the

World?' (1915) ; 'Rising Churches in Non—

Christian Lands' (1915).

BROWN, Benjamin Gratz, American

politician: b. Lexington, Ky., 28 May 1826; d.

Saint Louis, 13 Dec. 1885. He was graduated at Yale (1847) and practised law in Missouri and was a member of the State legislature in 1852-58. In 1854 he began the Missouri Dem¬

ocrat. In the Civil War he served in the Union army, recruiting a

regiment, and becoming a brigadier-general of volunteers. In 1863-4)7 he was United States senator from Missouri, and in 1871 was elected governor of his State. He was the candidate for the Vice-Presidency of the United States on the ticket with Horace Greeley in 1872.

BROWN, Charles Brockden, American

novelist: b. Philadelphia, 17 Jan. 1 771 ; d. 22

Feb. 1810. He descended from a family of

Quakers, was remarkable in his childhood for his attachment to books, and at the age of 16, after having received a liberal education at the school of Robert Proud, an historian and

noted teacher, had already formed plans of

extensive literary works. The delicacy of his constitution incapacitated him for the bustle of business and all athletic amusements. During frequent visits to New York he became inti¬

mate with a literary club, which fostered his devotion to letters, drew him away from his Quaker modes of life and thought and in¬

creased his eagerness to be conspicuous as a writer. He kept minute journals, indited essays and dissertations and cultivated, with unremit¬

ting assiduity, the arts of composition. He moved to New York and in 1797 published

‘Alcuyn: A Dialogue on the Rights of Women.’

The first novel which he wrote was entitled ‘Sky Walk,’ subsequently incorporated in

‘Edgar Huntley.’ ‘Wieland,’ his first pub¬

lished novel, appeared in 1798. It soon ac¬

quired the reputation of a powerful and original romance. The next was ‘Ormond, or the Secret Witness’ (1799), which had neither the suc¬

cess nor the merit of the other, but still ex¬

hibits uncommon powers of invention and de¬

scription. At this time Brown had begun no less than five novels, two of which — 'Arthur Mervyn' and 'Edgar Huntley,' — were com¬

pleted and sent forth almost immediately. In the former the ravages of the yellow fever, which the author had witnessed in New York and Philadelphia, are painted with terrific real¬

ism. All these works abound in • both ex¬

cellencies and faults and are strikingly original.

In 1801 he published another novel, — 'Clara Howard,' — less open to exception, but also less deserving of praise. Its form is different from that of the others, being epistolary. The last of his novels was 'Jane Talbot' (1804). It is deficient in interest, and indeed in all respects inferior to its predecessors. In April 1799, Brown published the first number of the

Monthly Magazine and American Review.

This work he continued until the end of the year 1800, writing abundantly for it. Circum¬

stances compelled him to relinquish it ; but in 1805 he commenced another journal, with the title of the Literary Magazine and American Register, and in this undertaking persevered for five years. In 1806 he entered upon a new work, a semi-annual American Register, five

volumes of which he lived to complete and pub¬

lish. It is now and must long be consulted as a valuable body of annals. In 1809 it was dis¬

covered that his lungs were seriously affected, and he then consented to travel for the recovery of his health. The remedy, however, was ap¬

plied too late. In November of that year he betook himself to his chamber, as he thought, for a few days; but his confinement lasted until February and ended only with his life. His writings are * characterized by rich diction, variety of incident and vivid representation, but he deals too much in the extravagant and the horrible. He has been praised highly, but his reputation did not live

long. He should be re¬

membered as the first truly professional man of letters in America. His novels were collected in seven volumes (1827) with a ‘Life’ by Dun¬

lap, re-edited in Philadelphia (1857) ; and again enlarged with a critical comment by McKay.

Consult Prescott, ‘Biographical and Critical

Miscellanies’ (Philadelphia 1867) ; Wendell in ‘A Literary History of America’ (New York

1900) ; Marble, A. R., ‘Heralds of Literature’

(Chicago 1907) ; Erskine, ‘Leading American

Novelists’ (New York 1909).

BROWN, Charles Reynolds, American

Congregational clergyman, lecturer and author : b. Bethany, W. Va., 1 Oct. 1862. A graduate in 604

1883 of the University of Iowa, he studied theology at Boston University, lectured at dif¬

ferent times at Columbia, Yale, Cornell and Leland Stanford universities, and was pastor of the First Congregational Church at Oakland, Cal., from 1896 to 1911, when he became

dean of the Yale Divinity School. He traveled through Egypt and Palestine for professional study in 1897, and was lecturer at Leland Stan¬

ford Jr. University, 1899-1906; Yale, 1905-06; Cornell, 1909; Columbia, 1911. He is the author of Two Parables) (1898) ; (The Main Points) (1899) ; (The Social Message of the Modern Pulpit5 (1906) ; (The Strange Ways of God, a Study of the Book of Job) (1908) ; (The

Cap and GowiP (1910); (The Modern Man's

Religion5 (1911); (The Quest of Life and

Other Addresses) (1913).

BROWN, Charles Rufus, American Bap¬

tist clergyman and Hebrew scholar : b. Kings¬

ton, N. H., 22 Feb. 1849; d. 2 Feb. 1914. A graduate of the United States Naval Academy, he resigned from the service in 1875 to study at Harvard, Newton Theological Institution,

Union Theological Seminary and the univer¬

sities of Berlin and Leipzig. He became asso¬

ciate professor of Biblical interpretation in 1883 and professor of Hebrew and related

languages in 1886 in Newton Theological In¬

stitution. He was resident director of the

American School of Oriental Research in Jeru¬

salem 1910-11. His published works include

(An Aramaic Method 5 (1884, 2d ed., 1893) ; a translation of <Jeremiah) (1906), and (A Com¬

mentary on Jeremiah5 (1907).

BROWN, David, Scotch ecclesiastical

writer: b. Aberdeen, 17 Aug. 1803; d. Aberdeen, 3 July 1897. He was educated at the University of Aberdeen, from which he was graduated in arts and theology. He was assistant to Edward Irving in London (1830-32). He finally went over to the Free Church in 1843 and at once became minister of Saint James, Glasgow,

where 14 years later he became professor of apologetics, Church

history and exegesis of the Gospels at the Free Church College, of which he became principal in 1876. He was director of the National Bible Society of Scotland and one of the founders of the Evangelical Alli¬

ance and moderator of the General Assembly

of the Free Church (1885). Among his pub¬

lished works are (Christ's Second Coming)

(1846); (Crushed Hopes Crowned in Death)

(1861) ; (The Restoration of the. Jews5 (1861) ; < Li f e of John Duncan5 (1872) ; (The Apoc¬

alypse5 (1891). R. Jamieson and A. R. Fausset and he collaborated in making the Commen¬

tary, Critical, Experimental and Practical on the Old and New Testaments5 (6 vols., Glas¬

gow 1864-70), of which he personally wrote

the part devoted to the Gospels, the Acts and the Epistle to the Romans. He also did much other work of a like nature.

BROWN, David, Cherokee preacher: b.

about 1800; d. Creek Path, Miss., 14 Sept. 1829.

He was educated with his sister Catherine at the school of Rev. Cyrus Kingsbury, in what was then the Cherokee territory, in northern Alabama and Mississippi, and engaged with

her in educating and christianizing their native tribe. He was a preacher and interpreter, and also acted as secretary of the Indian govern¬

ment. In November 1819 he assisted John

Arch in the preparation of a Cherokee spelling-book, which was printed. Through his agency a mission was established at Creek Path

town in 1820. David Brown united with the Church at this time, and in the spring of the same year went to Cornwall, Conn., to attend school.

After two years there he spent a year at An¬

dover, fitting himself for the ministry. Return¬

ing to his birthplace, he began his missionary work and made many converts to Christianity among the Cherokees. According to a letter

written by him in 1825, the Christian religion was generally adopted by the tribe and an ad¬

vanced standard of civilization had been at¬

tained by them. He died before the Cherokees were dispossessed by the United States in de¬

fiance of treaty obligations.

BROWN, Elmer Ellsworth, American

educator: b. Kiantone, Chautauqua County,

N. Y., 28 Aug. 1861. He was graduated at the Illinois State Normal University 1881, and at the University of Michigan, A.B., 1889, and made use of the intervening time in earning the means for his university course by teaching public schools in Belvidere, Ill. He was elected association State secretary for Illinois of the Y. M. C. A. and served in that capacity, 1884 —87 ; was principal of the high school, Jackson, Mich., 1890-91 ; acting assistant professor of science and art of teaching at Ann Arbor, 1891—92; associate professor of a similar chair in the University of California, 1892-93; full pro¬

fessor, 1893-1906, and honorary professor from 1 July 1906, when he was appointed United

States Commissioner of Education to succeed

William T. Harris, deceased, and thus became head of the Bureau of Education in the Depart¬

ment of the Interior, Washington, D. C. Be¬

came chancellor of New York University in

1911. He visited Europe (1889) to pursue a post-graduate course in pedagogy at the Univer¬

sity of Halle, Wittenberg, Germany, receiving the degree of Ph.D. in 1890. His honorary

degrees are Columbia, LL.D. (1907) and Wes¬

leyan, LL.D. (1909). He was elected member

of the National Council of Education and

served as president, 1905-07. He was also

made fellow of the American Academy of Arts and Science and vice-president of the section of education in 1907. Among his contributions to pedagogic literature are (The Making of our Middle Schools5 (1903) ; (Origin of American State Universities5 (1905); Government by

Influence and other Addresses5 (1909) ; (An Efficient Organization and Enlarged Scope for the Bureau of Education5 (1910). He has also published in pamphlet form many articles writ¬

ten for magazines.

BROWN, Ernest William, American

mathematician and astronomer : b. Hull, Eng¬

land, 29 Nov. 1866. He took his degrees at Christ College, Cambridge ; was appointed pro¬

fessor of mathematics at Haverford College,

1891, and at Yale University in 1907. He was for some time editor of The Transactions of the American Mathematical Society and of the Bulletin of the American Mathematical Society and besides numerous pamphlets of scientific value has published (Treatise on the Lunar Theory5 (1896) ; (A New Theory of the

Moon’s Motion5 (1897-1905) ; and the Adams

prize essay for 1907 in the University of Cam-BROWN

bridge, (The Inequalities in the Motion of the Moon due to the Direct Action of the Planets) (1908).

BROWN, Ford Madox, English painter,

grandson of Dr. John Brown of Edinburgh,

author of the Brunonian system of medicine : b. Calais, France, 16 April 1821 ; d. London, 6

Oct. 1893. He studied at Bruges, Ghent and Antwerp, and after a three years’ residence in Paris he went to England about 1845. His

Wiclif and Chaucer pictures, in the manner of Peter Cornelius and the German Pre-Rapha¬

elites, were painted shortly afterward. One of these, (Wiclif Reading his Translation of the Bible* (1848), aroused Rossetti’s admiration

and caused his enrolment among Brown’s

pupils. In 1844 and 1845 he contributed (un¬

successfully) cartoons of the (Finding of the Body of Harold,* (Justice) and other subjects to the competitive exhibition for the frescoes of the Houses of Parliament. In 1865 he opened in London an exhibition of many of his pic¬

tures, including (The Last of England) (1852) ; (The Autumn Afternoon*, and (Work* (1865),

the last named having occupied him for several years. Only a month before his death he com¬

pleted the last of the 12 Manchester town-hall frescoes, on which he

had been engaged for a long time. Among his other works are (Lear and Cordelia) (1849) ; (Pretty Baa-Lambs)

(1851) ; (Chaucer at the Court of Edward IIP

(1851), and (Cordelia's Portion. * He is gen¬

erally rated as a Pre-Raphaelite, but though a close intimacy existed between him and the

brotherhood, he never actually joined them.

Consult Hueffer, (Ford Madox Brown: a

Record of His Life and Work> (London 1896) ; Stephens in (The Portfolio) (London 1893).

BROWN, Francis, American scholar : b.

Hanover, N. H., 26 Dec. 1849; d. 15 Oct. 1916; graduated, Dartmouth College 1870, and

Union Theological Seminary, New York, in

1877. He was instructor in Biblical philology in the latter institution 1879-81 ; associate pro¬

fessor 1881-90; professor of Hebrew from

1890 ; and on 12 Mav 1908 was elected president.

He is the author of (Assyriology : Its Use and Abuse in Old Testament Study) (1885) ; (The Teaching of the Twelve Apostles) with Hitch¬

cock (1884) ; (Hebrew and English Lexicon of the Old Testament* with Driver and Briggs

(1891-1906) ; <The Christian Point of View>

with Knox and McGiffert (1902). He con¬

tributed to many leading periodicals and re¬

views.

BROWN, George, Canadian statesman : b.

Alloa, Scotland, 29 Nov. 1818: d. 10 May 1880; educated Royal High School and Southern

Academy, Edinburgh. He emigrated to the

United States with his father in 1838 and as¬

sisted in the management of a newspaper in New York; but in 1843 removed to Toronto,

where he founded The Globe, a newspaper

which soon became a power in upper Canada.

In 1852 he was returned to Parliament and

rapidly rose to the first rank as a debater and advocate of reforms. In 1858 he was called to the office of Premier and formed an administra¬

tion which, however, owing to an adverse vote of the Assembly, lasted only three days. In 1864 he joined the coalition government as

leader of the reform section and took an active part in the Confederation conferences at Char¬

lottetown and Quebec, but resigned his office as minister in December 1865. He was called to the Senate in 1873, and the year after was sent to Washington as Commercial Ambassador and

succeeded in negotiating the Brown-Fish draft treaty, which, however, failed to secure ratifica¬

tion from the American Senate. He was one

of the first to foresee the future development of the Canadian Northwest, and strongly advo¬

cated the incorporation of the Hudson Bay

Company's territories within the Dominion. He was a courageous advocate of better relations with the United States. His personal magne¬

tism was remarkable, but he lacked the spirit of compromise. He died of a gunshot wound

inflicted by a discharged employee. Consult

Mackenzie, ‘Life and Speeches of the Hon.

George Brown) (1882), and Lewis’s (George

Brown> (1910).

BROWN, George, American rear-admiral:

b. Indiana, 19 June 1835; d. 29 June 1913. He entered the navy in 1849 and served with dis¬

tinction in the Federal navy during the Civil War, especially distinguishing himself on the night of 24 Feb. 1863, when, in command of the Indianola at Palmyra Island, he defended him¬

self for an hour and a half against four Con¬

federate gunboats. Finally he was wounded

and taken prisoner and his vessel was de¬

stroyed. He became a commander in 1866 and a rear-admiral in 1893. He commanded the

naval forces in the Philippines in 1889, and the Norfolk Navy Yard in 1890, and again in 1893-97. He retired in the latter year.

BROWN, George Loring, American land¬

scape artist: b. Boston, 2 Feb. 1814; d. 25 June 1889. At first he studied wood engraving

under Alonzo Hartwell and worked as an illus¬

trator. He went abroad at 16 and on his re¬

turn, two years later, was a pupil of Washing¬

ton Allston. In 1840 he went to Paris to study under Isabey. Among

noted pictures by him

are (Doge's Palace and Grand Canal* ; (Bay of Naples) ; (Moonlight Scene) ; (The Crown of New England) ; and The Bay of New York,*

the two latter acquired by Edward VII when visiting the United States as Prince of Wales.

The composition is good, the coloring harmo¬

nious, but they are spoiled by being too

theatrical.

BROWN, George William, American ju¬

rist: b. Baltimore, Md., 1812; d. 1890. After studying law at Rutgers College, New Jersey, he was admitted to the bar and in 1860 was elected mayor of his native city. At the time of the passage of troops through Baltimore, 19

April 1861, he placed himself at the head of the 6th Massachusetts regiment, then on its way to Washington, and did everything in his power to suppress the riot which the appear¬

ance of the soldiers had occasioned. He was chief justice of the Maryland Supreme Court, 1873-88; professor of international and consti¬

tutional law in the University of Maryland, and with two others compiled the first (Digest of the Decisions of the Maryland Court of Ap¬

peals) (1847). He published numerous other

addresses.

BROWN, Helen Dawes, American writer

and lecturer: b. Concord, Mass., 15 May 1857.

She was graduated at Vassar College, 1878, and received the degree of A.M. from the same

college in 1890. She has published (Two Col-606

lege Girls' (1886); (The Petrie Estate'

(1893); (Little Miss Phoebe Gay' (1895): (A Civilian Attache' (1899) ; (Her Sixteenth

Year' (1901) ; (A Book of Little Boys'

(1904); (Mr. Tuckerman's Nieces' (1907);

(Orphans' (1911) ; (How Phoebe Found Her¬

self (1912) ; (Talks to Freshman Girls' (1914).

BROWN, Henry Kirke, American sculp¬

tor: b. Leyden, Mass., 24 Feb. 1814; d. Newburg, N. Y., 10 July 1886. He began to paint portraits while quite a boy, studied painting under Chester Harding, and in 1836-39 spent his summers as a railroad engineer in order to make possible his future studies. He spent

four years in Italy. He made the equestrian statue of Washington in Union square, New

York, the altar piece for the church of the Annunciation in the same city ; portrait busts of William Cullen Bryant, Dr. Willard Parker,

Erastus Corning and other New York men, and the statue of De Witt Clinton in Greenwood cemetery. The last named was the first bronze statue cast in the United States. Mr. Brown brought skilled workmen from Europe and did the first work in bronze casting attempted in this country. Some of his other well-known

works are a statue of Lincoln in Prospect Park, Brooklyn, and equestrian statues of General

Scott and Nathanael Greene for the national government.

BROWN, Jacob, American general : b.

Bucks County, Pa., 9 May 1775; d. Washington, 24 Feb. 1828. He was descended from members of the Society of Friends; supported himself in early life by teaching school ; was also employed for some time as a surveyor of public lands in Ohio; and settling in Jefferson County,

N. Y., in 1799, became one of the pioneers in that part of the country and founded the village of Brownsville. He next joined the militia

service as a militia general in 1812 ; was soon after appointed brigadier-general in the regular army, and in 1814 major-general ; assisted in the defense of Sackett's Harbor in 1813; ex¬

hibited much bravery in the battle of Chippewa, in that of Niagara Falls and at the siege of Fort Erie ; received the thanks of Congress and a gold medal, <(emblematical of his triumphs" ; and finally, at the termination of the war, con¬

tinued in the army as major-general, and in 1821 succeeded to the supreme command.

BROWN, John, Scottish covenanter and

martyr: b. about 1627; d. 1685. He is said to have fought against the government at Bothwell Bridge in 1679, and to have been on inti¬

mate terms with the leaders of the persecuted party. He was shot by Claverhouse and a party of his dragoons, for refusing to acknowledge the King, at Priestfield, or Priesthill, in the upland parish of Buirkirk, Ayrshire, where he cultivated a small piece of ground and acted as a carrier. Consult Woodrow, (History of the Sufferings of the Church of Scotland' (Edin¬

burgh 1721-22) ; Napier, (Life and Times of John Graham' (ib. 1862), containing Claverhouse's report of the killing. A life of Brown was published at Stirling in 1828.

BROWN, John, Scottish Biblical scholar:

b. Carpow, Perthshire, 1722; d. 19 June 1787.

Successively herd-boy, peddler, soldier and

schoolmaster, by his intense application to study he became acquainted with the French, Italian, German, Arabic, Persian, Syriac and Ethiopic languages, as well as the Greek and Hebrew.

He became pastor at Haddington, Scotland, in 1751, and remained in that position till his death, though called to a pastorate in the Dutch Re¬

formed Church in New York in 1784. In gen¬

eral he preached three sermons every Sabbath day. He was appointed professor of theology to the Associate Synod in 1768. His most

important works are dictionary of the Bible'

(1769) and (Self-Interpreting Bible' (1778),

so called from the copious marginal references to other passages of Scripture by which it is distinguished. These have gone through many

editions.

BROWN, John, Scottish physician, author

of the Brunonian system in medicine : b. Buncle, Berwickshire, 1735; d. London, 17 Oct. 1788.

His parents were in a very humble sphere in life, his father being merely a day laborer.

Like the children of other Scottish cottars, however, he had the advantage of being edu¬

cated at the parish school, where he was very soon distinguished for his abilities and the rapid progress he made in his studies. His father having died, his mother married a

weaver, and young Brown was bound an ap¬

prentice to that business, but the distaste he evinced for it was so great as to induce his stepfather to cancel his indentures and remove him to the grammar school of Dunse, where he was looked upon as a prodigy — reading all the Latin authors with the greatest facility, and

soon making considerable progress in Greek.

In 1755 he went to Edinburgh, with the inten¬

tion of studying divinity and entering the

Church, but soon abandoned his theological

studies. Having been employed by a medical

student to translate his thesis into Latin, he suc¬

ceeded so well that the elegance and purity of the language attracted the notice and enco¬

miums of the professors and led to his com¬

mencing the study of medicine. In the year 1765 he married, and opened a boarding-house for the accommodation of medical students ;

but being irregular and intemperate in his

habits was soon reduced to bankruptcy. Hav¬

ing taken the degree of doctor in medicine at Saint Andrew's, he commenced practice in Edin¬

burgh, and produced his celebrated work, en¬

titled the Elements of Medicine.' He then

commenced lecturing on the practice of physic, and made use of this work as his textbook.

He divided all diseases into two classes, those resulting from a deficiency, and those resulting from an excess of excitement; the one class to be treated with stimulants, the other with

debilitating medicines. Becoming involved in

pecuniary embarrassments, he removed to Lon¬

don in 1786. The system of physic which he taught, though no longer accepted as a system, had a distinct influence on subsequent practice.

BROWN, John, American merchant : b.

Providence, R. I., 27 Jan. 1736; d. there, 20

Sept. 1803. A man of energy and enterprise, he developed the industry and extended the trade of his native city in a notable degree, being, it is said, the first merchant in Rhode Island to carry trade to China and the East Indies.

Though having large interests at stake in the existing order of things, he was a leader in the cause of the American Revolution, and headed the party which destroyed the Gas pee in Nar-BROWN

ragunsett Bay, 17 June 1772. He was chosen a delegate to the Continental Congress in 1784, hut did not take his seat in the body. When Rhode Island refused to adopt the national Con¬

stitution, he _ did more than any other man toward securing the final reversal of that oppo¬

sition. From 1799 to 1802 he was a representa¬

tive in Congress. He at all times fostered the interests of the Baptist Church, contributed largely to the endowment of the present Brown University, laid the cornerstone of its original hall and was its treasurer from 1775 to 1796.

BROWN, John, American soldier: b. San—

disfield, Mass., 19 Oct. 1744; d. Stone Arabia, N. Y., 19 Oct. 1780. He was graduated at Yale 1771, studied law in Providence, R. I., and in 1773 settled in Pittsfield, Mass., where he iden¬

tified^ himself actively with the patriot cause.

In 1775 he was a delegate to the Provincial Congress, and was with Ethan Allen at the cap¬

ture of Ticonderoga. In the same year he

assisted in the capture of Fort Chambly,

planned the attack on Montreal which resulted disastrously, and was at the storming of Quebec.

Congress commissioned him a lieutenant-colonel in 1776, and in 1777 he conducted an expedition against Ticonderoga and the posts in its vicin¬

ity, releasing 100 American prisoners and cap¬

turing large quantities of stores and provisions.

Soon after this he retired from the service on account of his detestation of Arnold. At Al¬

bany in the winter of 1776-77 he published a handbill denouncing Arnold, predicting that he would become a traitor, and closing with the remarkably prophetic words, ((Money is this

man's God, and to get enough of it he would sacrifice his country.ˆ Brown was afterward

employed in the Massachusetts service, and in the autumn of 1780, with the Berkshire militia, marched up the Mohawk Valley for the relief of Schuyler and to act as circumstances might require. He was killed in ambush with 45 of his men at Stone Arabia, in Palatine, on his birthday.

BROWN, John, Scottish clergyman : b.

Whitburn, Linlithgowshire, 12 July 1784; d.

Edinburgh, 13 Oct. 1858. He was ordained pas¬

tor of the burgher congregation at Biggar in 1806. In 1821 he removed to the care of the United Secession Church, Edinburgh, and after¬

ward that of the Broughton-place Church. The burgher and anti-burgher seceders having come together in 1820, under the name of the United Associate Synod, he was chosen one of their professors of divinity in 1835. He took the part of the parent society on the division in the British and Foreign Bible Society, concerning the circulation of the Apocrypha and the vol¬

untary side on the question of church establish¬

ments. Having, by residence within the royalty of the city of Edinburgh, become liable to the payment of an annuity tax, which was levied upon him, for the support of the city ministers, he refused to pay, and suffered his goods to be distrained; and in reply to the proceedings of the civil authorities, he preached and published two sermons on the ((Law of Christ Respecting Civil Obedience, Especially in the Pavment of Tribute, ˆ which, with notes and additions, be¬

came finally an octavo volume. In 1847 he and his congregation entered the United Presby¬

terian Church. Other works of his are (The Resurrection of Life) (1852) ; Expository Dis¬

courses on the Epistle of Saint Peter* (1848) ; 'Discourses and Sayings of Christ } (1850).

BROWN, John, American abolitionist

leader: b. Torrington, Conn., 9 May 1800; d. 2

Dec. 1859. His paternal ancestry was of May¬

flower stock, his grandmother of Welsh, his mpther of Dutch. His grandfather was a cap¬

tain in the Revolution. His father, who drew his abhorrence of slavery from Jonathan

Edwards, an anti-slavery champion, shared in the forcible rescue of fugitive slaves in 1798.

1 he son found his warrant against slavery in the Bible, where its defenders found their war¬

rant for it. From the age of five he grew up in Ohio. He was an exceedingly active and

adventurous boy, who loved play-fights, but not real ones, disapproved of war, and in manhood paid annual fines rather than perform militia duty. His detestation of slavery was confirmed by witnessing the abuse of a slave boy; he swore in his own words, (<eternal war against slavery'* ; and throughout his career he never

lost sight of this life-work. His 12 children who grew to maturity (out of 20 he had by two wives) were ingrained with his spirit,

pledged themselves to him in prayer to spend their lives making it operative, and bore great privations to furnish him the means of so do¬

ing. He became a farmer and leather-dresser, surveyor, shepherd and wool dealer; unfixed, unprosperous and esteemed ˆshiftless.® This

was certainly not due to indolence or lack of honor; his immense family and want of money¬

getting faculty were partly responsible, his ab¬

sorption in a fixed idea and lack of interest in money-getting still more. By 1834, then in

Pennsylvania, he had devised an association of abolitionist families to educate colored youth, believing that it would force the South into speedy emancipation. Seeking cooperation in

this plan, he removed to Ohio in 1835, and to Massachusetts in 1846; in 1840 he made sur¬

veys of Oberlin College lands in Virginia and projected a negro colony there. In 1846 Gerrit Smith (q.v.) offered 100,000 acres of northern New York lands in small farms to colored

families who would clear them ; and in 1848, to work among them, Brown bought a farm in North Elba, where his family lived till his death, working with and for him. History

can hardly parallel so large a family's unanim¬

ity of self-sacrifice for a social ideal, in whose behalf they stinted themselves ungrudgingly: a testimony to the father's commanding nobility of soul. From thence, by grace of contribu¬

tions from abolitionists who had come to know and respect him, he traveled often on errands of organizing resistance to slavery. In 1850, after the passage of the Fugitive Slave Law, he visited Springfield, Mass., his former residence, and formed a (<League of Gileadites, w sworn to stand by each other in the rescue of fugitive slaves.

In 1854 Kansas had become, in the eyes of both South and North, the decisive battle

ground of the two systems, and five of Brown's sons living in Ohio set out thither to swell the free-soil ranks; they settled a few miles from Ossawatomie, and Brown joined them in Octo¬

ber 1855, against his intention. The family wrere among the most stalwart defenders of the Territory for the next two years against the fraud and terrorism by which the Border Ruf-608

fians plunged it into anarchy and bloodshed.

John Brown's career there brought him into

national prominence, from the conspicuousness of the stage rather than the magnitude of the actions. Its most dramatic incidents were the retaliatory murder of five pro-slavery men at Pottawatomie, 24 May 1856, the capture of

Captain Pate at Black Jack, 2 June, and the magnificent defense of Ossawatomie against a crushing force of Missourians in August. It has never been narrated, even by Northerners without sympathy for the slavery cause, except with strong partisan bias pro or con, and from its very nature, it probably never can be. The judgment passed on it depends not merely on the view taken of his cause (of which an impar¬

tial estimate is not impossible), but on the ques¬

tions whether that cause would have succeeded in any event, and whether he helped or harmed it. No proof of either is possible, and favor or disfavor toward fanatical enthusiasts is one of the deepest lines of cleavage among human spirits. As the victory for freedom was won, it is the fashion to assume that it never was in doubt; that active warfare was needless; that the influx of free settlers would soon have caused the pro-slavery invaders to desist in despair; that Brown acted as a lawless ruffian who justified the other party, and that he only discredited and hampered his own side. But

it is still quite rational to maintain the older view, of which the premises are certainly cor¬

rect, whatever the deduction may be. The pro¬

slavery party had no such illusions; from the first they openly proclaimed the struggle for Kansas a war for life or death, and carried it on by the machinery of war. They constituted a government by open fraud and maintained it by open violence; sacked towns, burnt houses, assassinated some of their opponents and ille¬

gally imprisoned others; while the United

States courts dispersed their foes by legal anathema, and the United States troops acted as their army. If no resistance had been offered, it is not apparent why these methods should have been less employed or less successful in 1858 than in 1856; the prize would not have been less and the incentive would have grown greater. It is certain that such peaceful sub¬

mission of the free-soilers would have been hailed by the Pierce and Buchanan parties as proof incontestable that the Republican charges of illegality and outrage were mere libels. It is therefore at least arguable that it was Brown, Montgomery, Lane and the other fighters, by their stubborn and ˆlawless® defiance to sheer foreign conquest, plunging Kansas into open

and bloody anarchy, who shamed the govern¬

ment into withdrawing its help to the invaders and convinced the slavery party that force was no longer available. Incidentally, they gave the non-combatants a free community in which to decry their champions.

Whatever may be the judgment now, the

Eastern abolition leaders at that time had no thought of suppressing him, they furnished him some moneys and supplies for whatever plan he privately deemed best, feeling sure at least of some bold, heartening stroke for the cause. For many years he had entertained the project of establishing, in the Maryland or Virginia moun¬

tains, a stronghold for fugitive slaves, where they could withstand attacks and if necessary reach Pennsylvania. He thought the knowl¬

edge of this refuge might stimulate the slaves into a dash for freedom, and the insecurity of slave property might drive the South into emancipation. That he could suppose the United States would allow such a guerrilla fortress and firebrand within its jurisdiction for a day seems scarcely compatible with sanity, but

Brown was insane only as all religious, intense idealists tend to become so. At the last, his plan developed into one for a stroke that should startle the country into action, draw recruits to him and leave no chance for compromise or

delay. Characteristically, he seems not to have doubted that the country would stand by him.

He chose to assault the United States arsenal at Harper's Ferry, thus not only securing arms for his presumed fugitives, but making the

country ring; without reflection that this was open war against the nation, and that even the abolitionists could not uphold him. In 1857 he began drilling a small band of adherents at Tabor and Springfield, Iowa, but his trusted drillmaster, Forbes, gave the alarm, and the scheme was postponed. At length, in June 1859, he and some of his men hired a farm near Har¬

per's Ferry, and two of his women came to keep house there ; he gradually collected the remainder, 22 men besides himself, with some arms ; and late Sunday evening, 16 October, with 18 men, seized the armory and took pos¬

session of the village. He made hostages of some leading citizens, and had a few neighbor¬

ing planters and their slaves brought in. But the remaining citizens armed themselves, as¬

sailed and shot several of Brown's men and surrounded the rest, and on Monday evening

Col. Robert E. Lee came from Washington

with a company of marines and cooped Brown and his six remaining men into the engine-house. Brown fought there till the two sons with him were killed, and himself supposed to be mortally wounded, before he would sur¬

render. Why he had not retreated to the

mountains on capturing the arsenal was never explained, even by himself. He was tried be¬

fore a Virginia court, but defended by Mas¬

sachusetts counsel, sentenced as was inevitable and just, and hanged at Charlestown, W. Va.

His testimony at the trial, and his demeanor and language all through, produced an inefface¬

able impression on the North, revealing a char¬

acter of heroic simplicity, purity and grandeur ; if his action was mad, he himself was not; and even his adversary, Governor Wise, of Virginia, admired his <(clear head, courage, fortitude and simple ingenuousness,® and felt him to be

wholly truthful. The actual importance of the Harper's Ferry raid, in determining or hasten¬

ing secession, has always been exaggerated, by his friends as praise and by his foes as detrac¬

tion : to suppose that secession would not have come after Lincoln's election, had there been no such raid, is to ignore all American history for many years previous. But the revolt of the slave power seemed to justify his prevision and action ; he became the popular incarnation of the spirit of liberty, its great pioneer and mar¬

tyr; and the slogan of the North was: ®John Brown's body lies a-mouldering in the grave, but his soul goes marching on !® His nature had something of the sublime ; and great

natures have their function and service as well BROWN

as great intellects. No community could exist with such men for statesmen ; perhaps none can be great without some such men for prophets.

Bibliography. — Sanborn, F. B., ‘Life and

Letters of John Brown, Liberator of Kansas

and Martyr of Virginia) (Boston 1885) ; Bur¬

gess, ‘The Civil War and the Constitution >

(New York 1901) ; Rhodes, (History of the

United States from the Compromise of 1850)

(Vol. II, New York 1893) ; Villard, (John

Brown, 1800-1859: A Biography Fifty Years

After) (Boston and New York 1910).

BROWN, John, Scottish physician and

essayist, son of John Brown (1784-1858, q.v.) : b. Biggar, 22 Sept. 1810; d. Edinburgh, 11 May 1882. He was graduated at Edinburgh in 1833

and began practice as a physician. His leisure hours were devoted to literature, many of his contributions appearing in the North British Review, Good Words and other periodicals.

His collected writings, published under the title of ‘Horae Subsecriv3e) (leisure hours) (1858—82), embrace papers bearing on medicine, art, poetry and human life generally. Several of his sketches, such as ‘Rab and His Friends, } ‘Our Dogs,* ‘Pet Marjory, *‘Jeems the Doorkeeper,*

on which his fame chiefly rests, have been pub¬

lished separately. Humor, tenderness and

pathos are his chief characteristics. Consult Peddie, ‘Recollections of Dr. John Brown)

(1893) ; M’Laren, E. T., (Dr. John Brown and His Sister Isabella* (4th ed., 1890) ; Forrest, D. W. (editor), ‘Letters of Dr. John Brown, *

•with a biography by E. T. M’Laren (1907).

BROWN, John George, Anglo-American

painter: b. Durham, England, 1831; d. 1913. He was educated in the common schools in Newcastle-on-Tyne and came to the United States in 1853. He studied in the schools of the Na¬

tional Academy of Design, was elected an aca¬

demician in 1863, received honorable mention at the Paris Exposition in 1899 and in 1900 was president of the American Water Color Society.

He is best known for his pictures of bootblacks and street urchins. Among his famous pictures are ‘A Merry Air with a Sad Heart,) (The Stump Speech,* (The Passing Show,* (Be

Mine* and ‘Training the Dogs.*

BROWN, John Hamilton, American in¬

ventor: b. Liberty, Me., 28 July 1837. At the age of 18 he was apprenticed to a gunsmith and in 1857 entered business in Haverhill, Mass.

He served in the Civil War as a sharpshooter and in 1882 was a member of the American

rifle team at Wimbledon. He devised a com¬

bination pleating machine and rotary ruching press. He began in 1883 to perfect the inven¬

tion of a weapon for military use later known as the Brown segmental wire-wound gun, which after numerous government tests was pro¬

nounced a success.

BROWN, John Howard, American editor:

b. Rhinebeck, N. Y., 8 Nov. 1840; d. 22 April 1917. He studied law; was a journalist in

Washington, D. C., and Augusta, Ga., and

later a publisher in New York. In 1896 he removed to Boston to become editor-in-chief

of ‘Lamb’s Biographical Dictionary of the

United States.* He edited in New York Ameri¬

cana, a monthly magazine of history, genealogy and literature (1912, 1913 and 1914) and as¬

sisted in editing ‘History of German-American VOL. 4 — 39

Families in the United States) (Carl Wilhelm Schlegel, editor-in-chief), volume I of which work was issued in 1916. He is the author of ‘American Naval Heroes) (1896) and of nu¬

merous contributions to periodical literature.

BROWN, John Lewis, French artist: b.

Bordeaux, 16 Aug. 1829; d. 1892. He studied under Belloc and Roqueplan and was famous

as an impressionist painter of military and hunt¬

ing scenes, as well as of studies of horses and dogs. Among his numerous works are ‘Steeple Chase) (1861); ‘At the Outposts) (1865);

‘Relay of Omnibus Horses) (1884) ; ‘Hohen—

linden) (1887).

BROWN, John Young, American lawyer :

b. Claysville, Hardin County, Ky., 28 June 1835; d. Henderson, Ky., 11 Jan. 1904. He was grad¬

uated at Centre College, Danville, 1855, studied law and was admitted to the bar. In 1859 he was elected to Congress, but not having

attained the constitutional age, could not take his seat.

He was again elected to Congress in 1868, but his seat was refused him by the House because of political disabilities. Finally he served in Congress (1873-77). He retired to the practice of law and during 1891-95 he was Democratic governor of Kentucky.

BROWN, Joseph Emerson, American

statesman : b. Pickens County, S. C., 15 April 1821 ; d. Atlanta, Ga., 30 Nov. 1894. He was educated at Calhoun Academy and was gradu¬

ated at Yale in 1846. He settled in Canton, Ga., served in the State legislature and was elected governor in 1857, serving three terms.

As war governor he opposed Jefferson Davis

in the matter of the conscription laws and raised 10,000 recruits to oppose Sherman's

march to the sea, but would not allow them to leave the State. After the war he gave hearty support to the reconstruction measures and supported General Grant for the Presi¬

dency. He was chief justice of Georgia in

1868 and United States senator in 1880-91. He made large gifts for religious and educational purposes. Consult Fielder, 'Life and Times of Joseph E. Brown) (Springfield 1883).

BROWN, Kenneth, American journalist

and novelist: b. Chicago, 9 March 1868. After studies in Germany, Switzerland, Paris, at Har¬

vard University and the University of Virginia, he engaged in journalism in Boston, New York, Baltimore and Chicago, and from 1898 to 1900

was editorial writer on the staff of the New York Commerical Advertiser. He is coauthor

with Henry Burnham Boone of 'Eastover

Court House) (1901) and 'The Redfields Suc¬

cession (1903); coauthor with his wife of

'The First Secretary* (1907) and The Duke's Price) (1910), and author of 'Sirocco) (1906) and of Two Boys in a Gyrocar* (1911).

BROWN, Lancelot, English landscape

gardener, sometimes called "Capability Brown" : b. at Harle-Kirk 1715; d. 1773. He commenced life as a kitchen gardener, but by his industry and genius rose rapidly in public estimation till he came to be regarded as a kind of oracle in taste in regard to all rural improvements —agricultural, horticultural and even architec¬

tural. His extensive employment enabled him

to realize a handsome independence, and he

adorned the station to which he had worked his way with more graces and virtues than are eio

often displayed by those who have been born to it. He obtained the dignity of high sheriff of Huntington in 1770. He avoided the stiff for¬

mality of the older landscape gardens blit is charged with having often sinned against good taste by endeavoring to reform natural scenery and force it, under all circumstances, to assume the form of clumps, belts and serpentine canals.

His architectural performances are remarkable for their interiors. A full list of his works is given by Repton, (Landscape Gardening and

Landscape Architecture > (ed. by J. C. Loudon 1840, pp. 30, 266, 327, 520).

BROWN, Moses, American naval officer:

b. Salisbury, Mass., 20 Jan. 1742; d. at sea, 1

Jan. 1804. He was a sailor in early life and commanded the United States privateer Gen¬

eral Arnold. He was the first commander of the sloop of war Merrimac, having the rank of captain, United States Navy. He captured four French vessels during 1799-1801. He was re¬

tired by Thomas Jefferson and re-entered the merchant service.

BROWN, Nicholas, American merchant

and philanthropist : b. Providence, R. I., 4 April 1769; d. there, 27 Oct. 1841. He was graduated at Rhode Island College 1786. Through the

death of his father in 1791, he inherited a handsome fortune, formed a partnership with

his brother-in-law, Thomas P. Ives, and became one of the most successful and best-known

merchants of America. He was a nephew of

John Brown (1736-1803, q.v.). In 1792 he gave $500 to Rhode Island College with which to purchase law books. This was the beginning

of a long series of endowments and benefac¬

tions to that institution, which took his name in 1804, when he endowed a professorship of oratory and belles-lettres. In 1822 he built Hope College, at an expense of $20,000, Man¬

ning Hall in 1834 at a cost of $18,500 and a president's house in 1840, costing $7,000. The total of his various gifts amounted to $160,000.

He was a trustee from 1791 to 1825, a fellow 1825-A1 and a most efficient treasurer from 1796 to 1825. He was also a generous donor to the Providence Athenaeum and Butler Hos¬

pital for the Insane. He served several terms in the State legislature, and in 1840 was a presidential elector. Consult Hunt, (Lives of American Mcrchants) (New York 1856).

BROWN, Oliver Madox, English artist,

son of Ford Madox Brown (q.v.) : b. 1855; d.

1874. From early boyhood he showed remark¬

able capacity both in painting and literature, especially prose fiction and poetry. His two most promising pictures were (The Tempest

— Prospero and the Infant Miranda) (exhib¬

ited in 1871 at the International Exhibition, South Kensington), and (A Scene from Silas

Marner) (1872). (Gabriel Denver* (1873) and

some other unfinished novels, besides sonnets and other poems, show wonderful literary

power in one so young. His (Literary Remains>

were published in 1876. Consult Ingram, H., (0. M. Brown: A Biographical Sketch* (Scrib -

neAs Magazine, Vol. XII, pp. 425-28, 1876).

BROWN, Peter Hume, British histographer: b. Haddingtonshire, Scotland, 17 Dec.

1850. He was graduated from Edinburgh Uni¬

versity and became a teacher and journalist.

He was appointed register of the Privy Coun¬

cil of Scotland (1898), and in 1908 he became histographer royal for Scotland. He has been professor of ancient Scottish history and pa¬

laeography in Edinburgh University since 1901, and he was Ford lecturer 1913-14. Among his more important works are (George Buchanan,

Humanist and Reformed (1890) ; (Early Trav¬

elers in Scotland) (1891); Scotland before

1700> (1893); ˆHistory of Scotland) (1898—

1909) ; (Scotland in the Time of Queen Mary*

(1903-04) ; (The Youth of Goethe* (1913), and (Ford Lectures) (1914).

BROWN, Phoebe Allen Hinsdale, Ameri¬

can hymn writer: b. Canaan, N. Y., 1 May 1783; d. Marshall, Ill., 10 Oct. 1861. In 1805 she married Timothy H. Brown, a painter, who

moved about considerably with his family.

Amid this shiftless life she succeeded in edu¬

cating her children, one of whom, S. R. Brown, became the first American missionary to Japan.

Mrs. Brown was quite a voluminous writer.

She has left several volumes in prose, an Au¬

tobiography* and a volume of poems. She has been called the best writer of hymns in America.

BROWN, Robert, Scottish botanist: b.

Montrose, 21 Dec. 1773; d. London, 10 June 1858. He finished his education in 1795, when he became ensign and assistant surgeon in a Fifeshire fencible regiment, which he accom¬

panied to Ireland, remaining there till 1800. He was then, through the influence of Sir Joseph Banks, appointed naturalist to Captain Flinders'

surveying expedition to Australia or New Hol¬

land. The whole continent of Australia was

circumnavigated, the coast at various points examined, and Brown remained in the colony, visiting various parts of New South Wales and Van Diemen's Land, till 1805. He returned

with nearly 4,000 species of plants, was shortly after appointed librarian to the Linnsean So¬

ciety and was now able to devote himself to the systematic study of his plants. He con¬

tinued to make the result of his investigations known in communications to the Linnaean and Royal societies. One of his earliest papers was on a group of the family of plants named by Jussieu Apocynece, which he succeeded in estab¬

lishing as a separate family under the title already given them by Jussieu of Asclcpiadcce.

In 1810 he published the first volume of the great work he had been preparing on the plants of Australia and Tasmania, entitling it (Pro-dromus Florae Novae Hollandiae et Insulae Van Diemen. * No second volume of it ever ap¬

peared. He was the first English writer on botany who adopted the natural system of

classification which has since entirely superseded that of Linnaeus. In 1814 he published a botan¬

ical appendix to Captain Flinders' account of his voyage, entitled (General Remarks, Geo¬

graphical and Systematical, on the Botany of Terra Australis. * In 1828 he published a brief (Account of Microscopical Observations on the Particles Contained in the Pollen of Plants, and on the General Existence of Active Mole¬

cules in Organic and Inorganic Bodies.) He was the first to call attention to the presence of these active molecules. The movement of

the granules of the fovilla (or semi-fluid mat¬

ter contained in the pollen grains) which he believed to be purely physical, or non-organic, has on the Continent acquired the name of the BROWN

Brownian or Brunonian movement. He also

wrote botanical appendices for the voyages of Boss and Parry, the African exploration of

Denham and Clapperton and others, and de¬

scribed, with Dr. Bennet, the plants collected by Dr. Horsfield in Java. In 1810 he re¬

ceived the charge of the collections and library of Sir Joseph Banks, which were afterward

bequeathed to him for life. He transferred

them in 1827 to the British Museum and was appointed keeper of botany in that institution.

He became a fellow of the Royal Society in 1811, D.C.L. of Oxford in 1832, a foreign asso¬

ciate of the French Academy of Sciences in 1833. He had the Copley medal in 1839 and was appointed president of the Linnaean So¬

ciety in 1849. He also received the decoration of the highest Prussian order of civil merit, presided over by Baron Humboldt, who called him Botanic orum facile prince ps. As a bot¬

anist Brown occupied the very highest rank.

He made the microscope and the study of de¬

velopment the basis of his classification, and by his skill in the application of ascertained facts to the elucidation of obscure and the explanation of doubtful phenomena, greatly ad¬

vanced our scientific knowledge of the vege¬

table kingdom. His works, contained chiefly

in the (Transactions) of learned societies and other inaccessible forms,

are not of a nature to be popular. See Brownian Movement.

BROWN, Robert, Scottish scientist: b.

Campster, Caithness-shire, 1842; d. 1896. He explored the coast of Spitzbergen, Greenland, and the western shore of Baffin Bay in 1861, made charts of the interior of Vancouver, and with Whymper, in 1867, made discoveries as to the inland ice of Greenland, since borne out by those of Peary. He traveled extensively in

the Barbary States, lectured on scientific themes in Glasgow and Edinburgh and was a member

of learned societies in Europe and America.

He published (Manual of Botany) (1874) ;

Peoples of the World) (1882-85) ; (Science for A1P (1877-82) ; (The Story of Africa and Its Explorers) (4 vols., 1892-95; new ed., 1911).

BROWN, Samuel, American physician : b.

Rockbridge County, Va., 30 Jan. 1769; d. 12

Jan. 1830. He was graduated at Dickinson

College in 1789, studied medicine in Scotland and practised in Kentucky, Louisiana and Mis¬

sissippi. He became professor of medicine in Transylvania University in 1819; established a medical school in Lexington, Ky., of which he was president until 1825, and organized the first medical society in Lexington. He introduced

the method of preparing ginseng for medicine, and contributed to medical journals. He

labored for the abolition of slavery.

BROWN, Sir Samuel, English engineer :

b. London 1776; d. Blackheath, Kent, 15 March 1852. After serving with honor in the English navy, he was made a retired captain in 1842.

He is remembered for his system of making

iron chain cables and as the designer and

builder of the earliest iron suspension bridge in England, at Berwick-on-Tweed. The fa¬

mous chain pier at Brighton was designed by him. He was knighted in 1838.

BROWN, Samuel, Scottish chemist and

poet: b. Haddington, 23 Feb. 1817; d. Edin¬

burgh, 20 Sept. 1856. He was graduated from the University of Edinburgh with extraordinary attainments, began his public career by deliver¬

ing, in 1840, in association with his intimate friend, Edward Forbes, a course of lectures on the philosophy of the sciences; and having es¬

tablished among his auditors, as he had before among his teachers, the conviction that he was destined to great achievement, renounced all else that he might have won, to devote himself to the slow experimental realization of a great scientific conception. In 1849 he delivered in Edinburgh a series of lectures on the history of chemistry, tracing its progress from its play-ful_ childhood among the Greeks, through the Oriental and mediaeval alchemists, with most fascinating sketches of Roger Bacon and Para¬

celsus ; passing thence through the epoch of Stahl and Priestley, till the young and unfortu¬

nate Lavoisier changed the whole form of

chemical science, opening a new path to all succeeding philosophers. In 1850 he published the (Tragedy of Galileo.) Many of his lectures

and essays have been collected since his death, under the title of ˆLectures on the Atomic Theory, and Essays Scientific and Literary.) BROWN, Samuel Robbins, American

scholar, educator and missionary : b. East Wind¬

sor, Conn., 16 June 1810; d. Munson, Mass., June 1880. His mother was Phcebe Hinsdale,

one of the first and best known of American hymnologists. Educated at Munson Academy,

Yale College and the Theological Seminary at Columbia, S. C., he supported himself most

of the time by teaching music. He sailed

with his young bride in 1838 to China and at Macao organized and taught in the school of the Morrison Education Society, which was later removed to Hongkong, where Dr. Brown

was wounded by pirates. He established

the first Christian Protestant school in China, brought the first Chinese students to America for education and was the chief instrument in establishing (at Elmira, N. Y.) the first wo¬

men's college in America chartered as such.

He translated the New Testament into Jap¬

anese 13 days after the formation of the Ameri¬

can Board of Commissioners for Foreign Mis¬

sions. He returned to America in 1847, bring¬

ing with him Yung Wing (who afterward

brought 120 Chinese students to America) and Wong, who became a famous physician. Most

of Dr. Brown's Chinese pupils rose to posi¬

tions in the Imperial Customs and other gov¬

ernment services which required a knowledge

of English. Remaining in America until 1859, as pastor and teacher at Owasco Lake, N. Y., he went out to Japan to found the mission of the Reformed Church in America. He trained

a native ministry and many Japanese pupils

who have since become editors, statesmen,

scholars, presidents of colleges or otherwise active in the remaking of the Japanese empire.

He wrote the first (Grammar of Colloquial

Japanese) and other works for the mastery

of the language, and made scholarly transla¬

tions. Consult Griffis, W. E., (A Maker of the New Orient* (1902).

BROWN, Sanger, American physician: b.

Bloomfield, Ontario, 16 Feb. 1852. He was

graduated from the Bellevue Hospital Medical College, New York, 1880, and has since held several important professional posts, becoming 612

professor of neurology in the Post-Graduate

Medical School of Chicago in 1890, and in

1901-06 was associate professor of medicine

and clinical medicine at the College of Physi¬

cians and Surgeons in the same city. He was the earliest to demonstrate that the occipital lobe is the centre of vision in monkeys. In 1908 he joined the United States Army Medical Reserve Corps with rank of first lieutenant.

BROWN, Stimson Joseph, American math¬

ematician and astronomer: b. Penn Yan, N. Y., 17 Sept. 1854. He studied at Cornell Univer¬

sity and at the United States Naval Academy; served on the United States Coast and Geodetic Survey, was appointed professor of mathe¬

matics 1883, and astronomical director of the United States Naval Observatory 1898, and after six years' service in the United States Naval Academy from 1901, was appointed head of the department of mathematics and mechanics in

1907. Among his published service textbooks

are Practical Algebra > (1908, 1910) ; and

Analytical Geometry and Curve Tracing)

(1907; rev. ed., 1912).

BROWN, Thomas, Scotch metaphysician :

b. Kirkmabreck, Kirkcudbright, 9 Jan. 1778; d.

London, 2 April 1820. He was educated at the University of Edinburgh, where he obtained

the professorship of moral philosophy. He

distinguished himself, at a very early age, by an acute review of the medical and physiologi¬

cal theories of Dr. Darwin, in a work entitled Observations on Darwin's ZoonomiaP But he

chiefly deserves notice on account of his meta¬

physical speculations, his chief work being

(Lectures on the Philosophy of the Human

Mind) (1822). His system reduces the intel¬

lectual faculties to three great classes — per¬

ception, simple suggestion and relative sugges¬

tion, employing the term suggestion as nearly synonymous with association. His development

of the theory of cause and effect was first sug¬

gested by Hume.

BROWN, Thomas Edward, English poet :

b. Isle of Man 1830; d. Clifton, England, 29

Oct. 1897. After a brilliant career at Christ Church College, Oxford, he became assistant

master at Clifton College, Bristol, in 1862, re¬

signing in 1892. His work, though strong and remarkably original, failed to attract general attention during his lifetime, but when collected in 1900, contemporaneously with two volumes

of his (Letters,) they drew forth extended

notices from leading critical reviews and jour¬

nals in England and the United States. His poems, written in Anglo-Manx dialect for

the most part, are chiefly narrative, and

include (Betsy Lee) (1873) ; Ao'c's'le Yarns, including Betsy Lee) (1881) ; (The Doctor and Other Poems) (1887) ; (The Manx Witch and

Other Poems) (1889) ; (01d John and Other

Poems) (1893). Consult Collected Poems and

Letters) (London and New York 1900).

BROWN, Sir William, English merchant

and philanthropist: b. Ballymena, Ireland, 1784; d. 1864. In 1800 he removed with his parents to Baltimore, Md., and became the partner of his father in the linen trade there. In 1809

he set up a branch of the business in Liverpool and subsequently founded the famous mercantile house of Brown, Shipley & Company. He sat

in Parliament four years from 1846, advocated free trade and decimal coinage, gave $200,000, in 1857, to establish a free public library in Liverpool, and built the original library build¬

ing and museum there. He was knighted in

1863.

BROWN, William Adams, American Pres¬

byterian theologian and author: b. New York city, 29 Dec. 1865. He studied at Yale Uni¬

versity, Union Theological Seminary, and in

Berlin, Germany; began teaching at the Union Seminary in 1892 ; and the following year was ordained to the Presbyterian ministry. In

1898 he became professor of systematic theology at Union Seminary. A contributor to Hastings'

(Dictionary of the Bible, } Hastings' (Encyclo¬

pedia of Religion and Ethics, } to the American Journal of Theology , and the Harvard Theo¬

logical Revieiv, his. advanced views as expressed in his writings aroused the opposition of a con¬

servative element in the Presbyterian Church, who subjected him to caustic criticism at the General Assembly of 1913. His published

works include (The Essence of Christianity0

(1902; new ed., 1913); 'Christian Theology

in Outline) (1906); 'Christian Llope : a Study in the Doctrine of Immortality* (1912) ; 'Modern Theology and the Preaching of the Gospel *

(1914).

BROWN, William Garrott, American

writer : b. Marion, Ala., 24 April 1868 ; d. 20

Oct. 1913. He was graduated at Harvard in

1891, taking highest honors in history, and be¬

came assistant in the Harvard Library, serving till 1900, when he was appointed lecturer on American history. In 1892 he took an active part in the Presidential campaign, serving on various committees and stumping Massachusetts in behalf of Cleveland. He made a special

study of Southern history, and after 1900 de¬

voted himself to writing and lecturing on this topic, contributing chiefly to the Atlantic

Monthly. His writings in book form are An¬

drew Jackson) (1900) ; (History of Alabama) (1901) ; (The Lower South in American His¬

tory (1902) ; (Stephen A. Douglas) (1902) ; (Golf) (1902) ; ‘History of the United States since the Civil War* (1903) ; A Gentleman of the South* (1903) ; ‘The Foe of Compromise, and Other Essays) (1903) ; ‘Life of Oliver Ellsworth> (1905).

BROWN, William George, American

chemist: b. Newcastle-on-Tyne, England, 5 Nov.

1853. Coming with his parents to Virginia in 1869, he studied at the University of Vir¬

ginia, at Harvard University and at Hei¬

delberg. He held appointments in the East

Tennessee University, the University of Ten¬

nessee, University of Virginia, South Carolina Military Academy; was professor of chemistry at Washington and Lee University from 1886

to 1894; assistant chemist in the United States Department of Agriculture 1894 to 1896; in

the latter year going to the University of Missouri as professor of chemistry; in * 1905

being appointed director of laboratories and in 1910 professor of

industrial chemistry. He

edited University of Missouri Studies (1904-11) and published ‘Chemistry* (1912).

BROWN, William Montgomery, Ameri¬

can Protestant Episcopal bishop: b. Orrville, Ohio, 4 Sept. 1855. He was educated at Seabury Hall, Faribault, Minn., and at Gambier,

Ohio. He entered the Episcopal ministry,

was rector at Gabon, Ohio, 1883-91, became

archdeacon of Ohio in 1891, and in 1898 was consecrated coadjutor bishop of Arkansas; be¬

coming bishop of that diocese in the year fol¬

lowing. Owing to ill health he retired in 1912, and took up his residence at Gabon, Ohio. He published <The Church for Americans ’ (1895) ; (The Crucial Race Question) (1907) ; (The

Level Plan for Church Union) (1910).

BROWN, the color produced when certain

substances — wrood or paper, for example — are scorched or partially burned. Brown is not one of the primary colors in a spectrum. It is com¬

posed of red and yellow, with black, the nega¬

tion of color. It is also the name of a genus of colors, of which the typical species is ordinary brown, tinged with gray or black. The other species are chestnut brown, deep brown, bright brown, rusty,

cinnamon, red brown, rufous,

glandaceous, liver-colored, sooty and lurid.

BROWN COAL. See Coal, Varieties of.

BROWN-SEQUARD, sa kar', Charles Ed¬

ouard, French-American physician and physiol¬

ogist : b. Port Louis, 8 April 1817; d. Sceaux, near Paris, 2 April 1894. His father, a Phila¬

delphian, was a captain in the merchant marine, his mother a Sequard, was French. He took his M.D. degree in Paris in 1840, and thereafter de¬

voted his attention to experimental physiology, achieving wide fame by his contributions to racial knowledge on the spinal cord and the nervous system, on blood and animal heat. As professor at Harvard University 1864 to 1868; in Paris from 1869; in New York as medical practitioner from 1873 to 1878; from 1878 as professor at the College de France, he led a diversified and useful life, somewhat marred in his old age by his advocacy of the derisively styled (Brown-Sequard Elixir,' for prolonging life, a fluid of animal seminal origin, which was to be used as a hypodermic injection. From 1858

to 1863 he edited the Journal de la Physiologie de V Homme et dcs Animaux which he founded; he published (Lectures on the Diagnosis and Treatment of the Principal Forms of Paralysis of the Lower Extremities) (1861) ; and in 1869

founded Archives de la Physiologie Normale

et Pathologique which contain about 500 of his essays and articles describing his researches.

BROWN SPAR, a name given to the

brown varieties of dolomite whose color is due to the presence of iron carbonate.

BROWN THRUSH, or THRASHER.

See Thrasher.

BROWN UNIVERSITY, an educational

institution in Providence, R. I. Its charter was granted by the general assembly of the State in 1764 and the institution was opened in War¬

ren in 1765 as Rhode Island College. Its

founding was due to the wish of the Baptists to have a college under their own control and it has ever since been affiliated with the Baptist Church, although remaining unsectarian. The

college was removed to Providence in 1770 and in 1804 its name was changed to Brown Univer¬

sity in honor of Nicholas Brown (q.v.), whose various gifts to the college were not far from $160,000 in amount. Under its 4th president, Francis Wayland (q.v.), 1827-55, the university was practically reorganized. Under President

Elisha Benjamin Andrews (q.v.), 1889-98, the number of students increased from 268 to 860.

In 1891 the Women's College was founded, and in 1897 this was accepted by the corporation as the Women's College in Brown University.

Since the presidency of the Rev. W. H. P.

Faunce began in 1899, the institution has grown very rapidly; over $3,000,000 has been added to the endowment and several large and im¬

portant buildings have been erected, including the John Carter Brown Library, the Adminis¬

tration Building, the Engineering Building, Cas¬

well Hall, Rockefeller Hall, the John Hay li¬

brary, and the Arnold Biological laboratory.

At the end of 1915 there were 114 professors and instructors, 1,114 students in all depart¬

ments; in 1915 the productive funds were $4,-

566,000, and there were 235,000 volumes in the library.

BROWNE, Charles Farrar (((Artemus

Ward®), American humorist: b. Waterford,

Me., 26 April 1834; d. Southampton, England, 6 March 1867. He learned the printer's trade, and while working on the Carpet Bag, a Bos¬

ton comic weekly, began his career as one of the most widely popular of American writers and lecturers. (Artemus Ward's Sayings, ' written for the Cleveland Plain Dealer, extended his fame as a clever and witty writter. In 1860, he moved to New York and joined the editorial staff of Vanity Fair. His humorous lectures, especially those on Mormonism, proved most

successful in this country and in England. He died of consumption while on a lecture tour in the latter country. Browne's humor had a quality of its own, and was essentially demo¬

cratic and American. His winning personality never failed to put an audience in a receptive mood. His works in book form are (Artemus

Ward: His Book) (1865); (Artemus Ward:

His Travels Among the Mormons) (1865) ;

(Artemus Ward: His Book of Goaks' (1865) ; (On the Rampage' (1865) ; (Artemus Ward

Among the Fenians) (1865) ; (Artemus Ward

in London) (1867); (Artemus Ward's Lecture

at Egyptian Hall' (1869). While in England

he made several contributions to Punch, be¬

ginning with the number for 1 Sept. 1866. Later editions of his works are numerous. Consult M. D. Landon's biographical sketch, prefixed to (Artemus Ward, His Works Complete'

(1875).

BROWNE, Edward Granville, English

Orientalist: b. Uley, England, 7 Feb. 1862. He was educated at Eton and Pembroke College,

Cambridge. He traveled in Persia (1887-88),

becoming lecturer in Persian at Cambridge in the year last named. He has published (A

Travelers' Narrative, Written to Illustrate the Episode of the Bab' (Persian text and English translation with notes, 1891) ; ˆThe New His¬

tory of Mirza and Ali Muhammad the Bab'

(1893); (A Year Amongst Persians' (1893);

(Literary History of Persia' (1906); (Recent Events in Persia' (1909) ; (History of the Persian Revolution, 1905—09 ˆ (1910) ; (The

Press and Poetry of Modern Persia' (1914).

BROWNE, Edward Harold, English prel¬

ate : b. Aylesbury, Buckinghamshire, 6 March 1811; d. Winchester, Hampshire, 19 Dec. 1891.

He was educated at Emmanuel College, Cam¬

bridge, took orders in the Anglican Church in 614

1836, and was consecrated bishop of Ely in 1864.

In 1843, he became professor of theology at the College of Saint David and in 1854, at Cam¬

bridge University. In 1873, he was transferred to Winchester, resigning this bishopric in 1891.

He was a prominent advocate of the old Catholic movement in Germany and one of the Old Tes¬

tament company of revision of the King James version of the Bible. He published ‘An Ex¬

position of the XXXIX Articles > (1850-53);

(Sermons on the Atonement and Other Sub¬

jects1 (1859); ‘The Messiah Foretold and

Expected1 (1862); ‘The Pentateuch and the

Elohistic Psalms in Reply to Bishop Colenso) (1863) ; (The Stripe, the Victory, and the King¬

dom1 (1872) ; ‘Position and Parties of the English Church) (1875) ; ‘Commentary on

Genesis) in the Speaker’s Commentary. 1

BROWNE, Francis Fisher, American

editor and author: b. South Halifax, Vt., 1 Dec.

1843; d. 11 May 1913. During the Civil War he served in the 46th Massachusetts Volunteers.

He edited the Lakeside Monthly, 1869-74, and in 1880 became editor of The Dial, Chicago, which under his direction came to be one of the

two or three American literary journals worthy of being ranked with the best English period¬

icals of similar scope. His publications are ‘Everyday Life of Abraham Lincoln) (1886) ; (Volunteer Grain) (1896) and poems. He edited (Golden Poems by British and American

Authors) (1881) ; ‘Golden Treasury of Poetry and Prose) (1883); ‘Bugle Echoes: a Collec¬

tion of Poems of the Civil War’ (1886).

BROWNE George Forrest, English

bishop: b. York, England, 1833. He was ed¬

ucated at Saint Catharine’s College, Cambridge, and ordained 1858. He was appointed theolog¬

ical tutor and Bell lecturer in ecclesiastical history in the Episcopal Church of Scotland, 1862 ; fellow and lecturer at Saint Catharine’s, 1863-65; rector of Ashley, 1869-75; Disney

professor of archeology, 1887-92; canon of

Saint Paul’s, 1891-97 ; bishop of Stepney, 1895—97 ; and bishop of Bristol, 1897-1914. He is the author of (Ice Caves of France and Switzerland) (1865) ; (The Venerable Bede) (1879) ; ‘University Sermons1 (1878-80) ; (The Ham

Crosses> (1889) ; (Early English Church History) (1893) ; ‘The Church at Home Before

Augustine) (1894) ; (Augustine and His Companions) (1895) ; Conversion of the Hept—

archy) (1896); (Theodore and WilfritlP

(1897); (History of Saint Catharine’s College) (1902) ; (Life and Works of Saint Aldhelm,1

and various publications of the Church History Society (1894-97).

BROWNE, George Waldo, American

author: b. Deerfield, N. H., 8 Oct. 1851. For five years he . edited American Young Folks, and is a well-known writer for young people under the nom-dc-plume of “Victor St. Clair.®

At present he is editor of New England and Granite State Magazine. He has written over 100 serials and several hundred short stories for leading juvenile periodicals. Of his

best-known books are ‘The Woodranger Tales)

(4 vols., 1899-1902) ; (Two American Boys in Hawaii1 (1899) ; (New America and the Far

East) (10 vols., 1902-06) ; ‘Paradise of the Pacific,1 ‘Pearl of the Orient) (1902) ; (His¬

tory of the Saint Lawrence River1 (1904);

(Japan, the Place and the People) (1906);

(Ruel Durkee> (1910); China, the Country

and the People1 (1912); ‘Keepers of the

Wilderness1 ; ‘Amoskeag Manufacturing Com¬

pany, a History1 (1915). He has compiled and edited 15 volumes of local history. His most recent juveniles include ‘For Home and

Honor,1 ‘Post Boy of the Kenewah, 1 ‘From

Switch to Lever,1 Comrades under Castro,1

‘Zip the Acrobat,1 Castaway in the Jungle,1

‘With Rogers’ Rangers1 (1905).

BROWNE, Hablot Knight, English carica¬

turist, better known by his pseudonym of Phiz: b. London, 15 June 1815; d. Hove, Brighton. 8

July 1882. He was educated at a private school, and at an early age began to draw caricatures with great spirit. In 1835 lie succeeded Sey¬

mour as the illustrator of Dickens' 'Pickwick,1

and so happy and successful was his pencil that he was engaged to illustrate 'Nicholas Nick-leby1 ; 'Dombey and Son'1 ; 'Martin Chuzzle-wit1 ; 'David Copperfield,1 and other works of that great novelist. He subsequently con¬

tributed many graphic illustrations to the novels of Lever, Ainsworth, Scott (the Abbotsford

edition of the Waverley Novels), and to an illustrated edition of Byron, besides sending many comic sketches to the illustrated serials of the time. Consult Thompson, 'Life and

Labors of H. K. Browne1 (1884).

BROWNE, Isaac Hawkins, English poet:

b. Burton-on-Trent, Staffordshire, 1706; d.

London, 14 Feb. 1760. He was educated at

Trinity College, Cambridge, and called to the bar, but he did not practise. He wrote 'Design and Beauty1 ; 'The Pipe of Tobacco1 (in which he imitates Pope, Young, Swift and others) ; and a Latin poem, 'De Animi Immortalitate,1

modeled on Lucretius and Virgil. The last-named received high commendation from the

scholars of his time, and has been several times translated into English. Browne had a great reputation as a wit and conversationalist. His works were collected and published by his son (1768).

BROWNE, John Ross, American author

and traveler: b. Ireland 1817; d. Oakland, Cal., 9 Dec. 1875. He came to America when a child, his father settling in Kentucky. At the age of 18, having learned stenography, he went to

Washington and for several years was employed as shorthand reporter in the Senate. His de¬

sire for travel led him to take a whaling cruise, in the course of which he visited the greater part of the world. In 1849 he was a govern¬

ment commissioner in California, and reported the State Constitutional Convention proceed¬

ings. In 1851, and again in 1861, he traveled extensively in Europe and the Holy Land, visit¬

ing Iceland, Russia, Poland and other countries.

Commissioned by the government to study the mineral resources west of the Rocky Mountains, he presented an elaborate report, reviewing the mines, climate, topography, agriculture, com¬

merce, etc., of that region. His books of travel were illustrated with humorous drawings of his own. He was United States Minister to China in 1868-69. His publications include ‘Etchings of a Whaling Cruise1 (1846); ‘Yusef : a

Crusade in the East1 (1853); ‘Adventures in the Apache Country1 (1859); ‘The Land of

Thor1 (1866) ; ‘Adventures of an American

Family in Germany *(1867) ; (Crusoe’s Island, with Sketches of Adventures in California and Washoe* (1864); (Resources of the Pacific

Slope > (1869).

BROWNE, Junius Henri, American jour¬

nalist: b. Seneca Falls, N. Y„ 14 Oct. 1833; d.

New York, 2 April 1902. He was a graduate of Saint Xavier College, Cincinnati. In 1861 he became waT correspondent for the New York

Tribune, was wounded at Fort Donelson, and

taken prisoner while engaged in an abortive ex¬

pedition to run the Vicksburg batteries. After an imprisonment of 20 months in seven different prisons, he eluded his guard at Salisbury, N. C., traveled 400 miles through a hostile country, and reached the Union lines 14 Jan. 1865. His list of Union soldiers who died at Salisbury, published in the Tribune, is the only authentic account of their fate. After the war he served as correspondent of the New York Tribune,

Times and other journals, and contributed many articles to leading periodicals. His best-known works are (Four Years in Secessia* (1865) ; (The Great Metropolis: A Mirror of New

York) (1869) ; (Sights and Sensations in

Europe * (1872). A series of articles on women, which he wrote for the Galaxy , created a

sensation in literary circles. His (Four Years in Secessia* was hastily prepared and lacked much grace and elegance in its literary form, but its descriptions of various incidents of the war and particularly its information concerning the conditions of the Southern prisons and the Northern soldier confined in them, render the book especially valuable.

BROWNE, Robert, earliest separatist from

the Church of England and the reputed founder of Congregationalism : b. Tolethorpe, Rutland¬

shire, about 1550; d. about 1633. He was

graduated at Christ's College, Oxford, in 1572, and was afterward ordained. He preached at

Islington without episcopal license, and also in Cambridgeshire, where he denounced alike

ordination by bishop and presbytery and the parochial system. He carried matters to ex¬

tremities by destroying a license to preach which his brother had secured for him from the bishop of Ely. With Robert Harrison he went to Norwich about 1580 and founded a

<(church® popularly known as the <(Brownists.®

He was twice imprisoned for seditious preach¬

ing at Bary Saint Edmunds, and on both occa¬

sions was released through the influence of Cecil, Lord Burleigh, to whom he was related.

He emigrated to Middleburg with a large sec¬

tion of his congregation in 1581 ; but dissensions there occasioned his going to Scotland in 1583, where he also suffered imprisonment and on

his release returned to England. He was ex¬

communicated by the bishop of Peterborough

in 1586 for ignoring an episcopal citation, then made submission, conformed and gave no

further trouble to the ecclesiastical authorities, and was successively master of Stamford

grammar school and rector of Achurch, North¬

amptonshire. He is reputed to have died in Northampton jail following an assault on a

constable during an outburst of temper.

BROWNE, Sir Thomas, English prosaist,

scholar and physician : b. 19 Oct. 1605, London, parish of Saint

Michael, Cheapside ; d. Norwich, 19 Oct. 1682. His father, who had been a mer¬

cer at Upton, in Cheshire, and came of an ancient and honorable family, died early; and Browne's mother soon married Sir Thomas

Dutton. Browne received his early education

at Winchester College, and in 1623 was sent as a fellow-commoner to Broadgate Hall (now

Pembroke College) Oxford. Here he was

graduated B.A., in June 1626, and M.A. 11 June 1629. Early becoming interested in the natural sciences, he devoted most of his time at Oxford to the study of medicine, and for some time after graduation practised medicine in Oxford¬

shire. Later on, he accompanied his stepfather to Ireland on a tour of inspection of its forts and castles. After this, Browne continued his travels through France and Italy, spending some time at the celebrated schools of physic at Mont¬

pellier and Padua, and doubtless acquiring some of the (<six languages® which, ((besides the jar¬

gon and patois of several provinces,® he later stated that he understood. On his way back to England he traveled through Holland, where in 1633 the University of Leyden conferred upon him the degree of doctor of medicine. After his return, he established himself as a physician at Shipden Hall, near Halifax. He was much (<resorted to for his skill in physic,® and spent his leisure hours in study and contemplation.

At Shipden Hall, 1635-36, Browne composed

the beautiful contemplative soliloquy known as the (Religio Medici.* It was written for his (<private exercise and satisfaction,® and was not intended for publication. It was, however,

widely circulated in manuscript among his lit¬

erary friends, and was surreptitiously published in 1642 by Andrew

Cooke. Browne, in self-defense, published an authorized edition in

1643; and almost simultaneously appeared a

series of Observations® on the work, penned in 24 hours by the eminent Sir Kenelm Digby.

The book at once attracted the cultured class, both at home and abroad. In 1664, John Merry-weather published a Latin version of it ; and Dutch, French and German translations ap¬

peared in 1665, 1668 and 1680, respectively.

Because of the ((daring skepticism® which it combined with ˆimplicit faith in revelation,® it was placed in the Index Expurgatorius of the Catholic Church. Between 1642 and 1881, the treatise ran through 33 English editions.

In 1637 Browne had moved to Norwich,

where he practised medicine and pursued his literary studies till his death. On 10 July 1637, he was incorporated doctor of physic at Ox¬

ford. He married, 1641, Dorothy, 4th daughter of Edward Mileham, of Burlingham Saint

Peter. She bore him 12 children, and survived him three years. Throughout the civil wars

he remained at heart a Royalist, and ever re¬

gretted what he called (<the horrid murther of King Charles I.® But his calm spirit ((quietly rested under the drums and tramplings® of the revolution, and he took no active part in the upheaval of the times.

Browne’s reputation for learning and re¬

search was greatly increased in 1646 by the publication of his elaborate work, (Pseudodoxia Epidemica : or. Enquiries into very many re¬

ceived tenets and commonly presumed truths,

which examined prove but Vulgar and Common

Errors.* This treatise is encyclopedic in scope, and must have grown to its final extent through many years of slow accretion. It was soon

translated into Dutch, German and French; and attracted no little attention among scholars by the vast and recondite learning it displayed.

Browne's advice and assistance soon became

sought by scholars engaged in scientific and antiquarian pursuits. Among the best-known

men of the time who sought his acquaintance was John Evelyn, with whom in 1658 he began a correspondence which lasted through his life.

In October 1671, Evelyn journeyed to Norwich to visit Browne; and wrote, in his diary, an account of Browne's surroundings. The house

and garden were ((a paradise and cabinet of rarities, and that of the best collections, espe¬

cially medals, books, plants and natural things.®

Evelyn noticed particularly Browne's extensive collection of birds' eggs.

In 1658 Browne composed the solemn (Hydriotaphia, Urn-Burial; or, A Discourse of the Sepulchral Urns lately Found in Norfolk.' At the same time he published the most fantastic of his writings, (The Garden of Cyrus; or, The Quincuncial, Lozenge, or Network Plantations

of the Ancients, Artificially, Naturally, Mys¬

tically Considered. 5 In December 1664, he was created socius honorarius of the College of Physicians, and received the diploma of the in¬

stitution on 6 July 1665. On 28 Sept. 1671, he was knighted by Charles II, on the occasion of a royal visit to Norwich. Although Browne's literary activity continued unabated until his death, he published nothing after 1658. He died on his 77th birthday, and was buried in the church of Saint Peter Mancroft, Norwich. In 1840, some workmen who were making a new

grave accidently fractured the lid of Browne's coffin with a pickaxe. The skeleton was thus exposed, and the sexton took possession of the skull. It is now on exhibition in the Norfolk and Norwich Hospital.

Many of Browne's manuscript writings

were published posthumously. In 1684 his

friend Archbishop Tenison brought out a col¬

lection of (Miscellany Tracts' on subjects

ranging from the ancient monuments of Nor¬

wich to the plants mentioned in the Bible and the fishes eaten by our Saviour with his dis¬

ciples after his resurrection from the dead. In 1690 his son, Dr. Edward Browne, published

his beautiful (Letter to a Friend, upon occasion of the death of his intimate friend,' which forms a sort of prelude to the careful dis¬

sertation on (Christian Morals) — intended per¬

haps as a continuation of the <Religio Medici'

— which was first published in 1716 by Arch¬

deacon Jeffrey. A collection of the (Posthu¬

mous Works of the learned Sir Thomas

Browne, Knt., M.D., late of Norwich, > was

published by an unknown editor in 1712. It contains, among other tracts, a striking frag¬

ment of an essay on (<Dreams.”

Browne belongs to the class of mystical

soliloquists who love to discourse to them¬

selves about fantastic subtleties too fine to excite the curiosity of vulgar minds, but who yet are not too self-engrossed to allow the friendly reader to overhear their musings. He loved to <(turn the world round® not only for his own but also for his reader’s <(recreation,®

and to lead the reader with him through a labyrinth of fancy until both Hose themselves in a mystery.® His works are lacking in design, uneven, whimsical and capricious ; but they re¬

veal a personality serene, altruistic, tolerant, mystical, reverent and friendly. Furthermore, he commands a style that for lordly eloquence and orchestral harmony remains unrivaled in

the entire history of English prose.

Browne’s greatest work is the (Religio

Medici.’ In this treatise, which combines the meditations of many leisure hours, he has re¬

vealed all of the emotional affluence of his soul.

It is a mystical acceptance of the creed of the Anglican Church leavened with a touching tol¬

erance of other beliefs. Paradoxically it com¬

bines an imaginative scepticsm with a naive credulity. Browne believed in witches, for ex¬

ample ; and refused to accept the Copernican system of astronomy

because it contradicted the literal statements of the Hebrew Scriptures.

But there is no narrowness in Browne's most characteristic mood. He rises on the wings of exaltation until he soars into the presence of Infinitude and glows with a religious ecstasy known of all nations and of all times.

The (Pseudodoxia) is a less worthy work.

It is a vast chaos of recondite lore, bewildering by the very extent of its voluminous observa¬

tion. It opens with an enquiry into the sources of error not a little resembling Bacon's famous arraignment of <(Idols® ; but Browne had no true sense of natural law as Bacon understood it, and often fallacies pursue him in his pursuit of fallacy.

(The Garden of Cyrus) is a fanciful dis¬

sertation on the quincunx, that geometrical

arrangement of five points familiar in the five of a domino. As Coleridge said, Browne finds (<quincunxes in heaven above, quincunxes in

earth below, quincunxes in the mind of man, quincunxes in tones, in optic nerves, in roots of trees, in leaves, in everything.®

The grandeur of Browne's style is displayed most fully in (Hydriotaphia.' Some Roman

sepulchral urns accidentally unearthed in Nor¬

folk furnished him with the suggestion for this eloquent monody, which, beginning with an

historical discussion of ancient modes of burial, soon develops into a solemn homily on death and the vicissitudes of worldly fame' The style shows an eloquent spontaneity rather than a conscious mastery of art. It would not be a serviceable. model for a modern writer ; it is

hyper-latinised and capricious; but it is incom¬

parable for pompous rhythm and resonant har¬

mony. See Religio Medici; Hydriotaphia.

Bibliography. — The standard edition of

Browne's works is that edited by Simon Wilkin (4 vols., 1835-36) which has been called the best edited book in the language ; it contains a life of Dr. Johnson. The posthumous works

(ed. 1712) contain also a life and Whitefoot's minutes. His (Notes and Letters,' edited by Southwell, were published in 1902. Consult

also S. T. Coleridge, (Literary Remains) ; Ed¬

ward Dowden, (Puritan and Anglican Studies' ; Edmund Gosse, (Sir Thomas Browne'; W. A.

Greenhill, introductions (to separate volumes of Browne) (Golden Treasury Series) ; Walter Pater, (Appreciations' ; Sir' Leslie Stephen, (Hours in a Library* (Vol. I) ; J. A. Symonds, introduction. (Camelot Scries.'

Clayton Hamilton,

Extension Lecturer, Columbia University.

BROWNE, Thomas Alexander (Rolf

Boldrewood), Australian romancer: b. London,

England, 6 Aug. 1826; d. Melboune, 11 March 1915. He is a son of Capt. Sylvester Browne, a founder of Melbourne, Australia. He was edu¬

cated in Sydney College ; was the author of (Ups and Downs' (1879) ; (Robbery Under

Arms* (1888) ; (A Squatter's Dream Story)

(1890) ; (The Miner's Right' (1890) ; (A Co¬

lonial Reformed (1890) ; (A Sydney-Side

Saxon ' (1891) ; (A Canvas Town Romance'

(1898); (The Babes in the Bush' (1900); (In Bad Company' (1901) ; (Ghost Camp' (1902) ; (The Last Chance' (1905) ; (A Tale of the Golden West' (1906).

BROWNE, Ulysses Maximilian (Count

von), Austrian military officer: b. Basel, 23 Oct.

1705, of an Irish Jacobite family: d. 26 June 1757. He entered the Austrian service at the age of 12, and after fighting against the Turks (1737-39), served in Silesia, and later became one of the foremost field-marshals in the army of Maria Theresa. As governor of Silesia

(1739-42), he had to face the first of Frederick the Great's attacks, and in the Seven Years'

War he commanded the Austrians at Lobositz

(1756). He was mortally wounded at the

battle of Prague.

BROWNE, William, English poet: b.

Tavistock, Devonshire, 1591 ; d. Ottery Saint Mary, Devonshire, about 1643. He was edu¬

cated at Oxford, and spent a quiet, tranquil life.

His poetry is graceful and fanciful, and abounds in beautiful pictures of English scenery. Browne has always been much admired by the poets.

His chief work is (Britannia's Pastorals'

(1613-16). (The Shepherd's Pipe' (1614) is a collection of eclogues, and (The Inner Temple Masque' (1614-15) tells the story of Ulysses and Circe. His minor poems are very fine. The best modern editions are by Hazlitt for the Roxburghe Club, and by Gordon Goodwin, (The Muse's Library.'

BROWNE, William George, English trav¬

eler : b. London, 25 July 1768; d. northern Per¬

sia 1813. He was graduated from Oriel Col¬

lege, Oxford, after which he devoted himself to literary pursuits, and finally decided to ex¬

plore central Africa. In several expeditions he traveled through Egypt and some parts of the interior of Africa, and through Asia Minor

and Armenia. In 1793 he visited Sinai, and in May set out for Darfur, where he was detained by the Sultan, but finally released and allowed to return to London. In 1800, he again left England and spent three years in Greece, Asia Minor and Sicily. He had already, in

1813, arrived at Tabriz, on his way to Tartary, when his party was attacked by banditti and himself murdered. He was the author of

(Travels' in Africa, Egypt and Syria (1800).

Robert Walpole published an account of

Browne's journey through Asia Minor to An¬

tioch and Cyprus from his papers in (Memoirs relating to European and Asiatic Turkey'

~'.(4;820).

BROWNE, William Hand, American

author: b. Baltimore, 31 Dec. 1828; d. 13 Dec.

1912. He studied medicine and was graduated M.D. at the University of Maryland, but soon turned his attention to English literature, in certain departments of which he came to be an authority. He edited the Southern Reviezv (1867-68), and the Southern Magazine (1870—75) ; he was librarian at Johns Hopkins Uni¬

versity from 1879 to 1891, when he became

professor of English literature. He translated F. Spielhagen's (Hammer and Anvil' (1870) ; Turgenieff's < Spring Floods' (1874); and

Falke's (Greece and Rome' (1882). In col¬

laboration with R. M. Johnston he wrote his¬

torical Sketch of English Literature' (1872); and a (Life of Alexander H. Stephens' (1878) ; with J. T. Scharf, history of Maryland'

(1878) ; and with S. S. Haldeman he compiled Clarendon Dictionary: Concise HandBook of

the English Language' (1882). He has also

written (George Calvert and Cecilius Calvert, Barons Baltimore' ; (Maryland: the History of a Palatinate' (1884) ; and has edited (Archives of Maryland : Proceedings and Acts of the Gen¬

eral Assembly, 1637-44' (1883) ; and Selections from the Early Scottish Poets.'

BROWNELL, Clarence Ludlow, Amer¬

ican journalist and educator: b. Plartford,

Conn., 6 June 1864. He received his prepara¬

tory education at the Stamford Military Acad¬

emy, made a special course at Harvard 1885—86, and received the

degrees of M.A. and B.Sc.

at the Stevens Institute of Technology. He

went round the world soon after leaving the university, visited Brazil, South Africa, East Indies, the Philippines, China and Japan,

Hawaiian Islands, _ British Columbia and

Mexico. He was instructor in English and

military drill in government and private schools in Japan for five years. Served on the staff of Seattle Post-Intelligencer and the New York

Press. He contributed articles on Japanese

topics to American and English magazines and newspapers. He did special work on Japanese history and Buddhism for the British Museum in 1903; was contributor to San Francisco

Chronicle, Portland Oregonian and Los Angeles Times 1905—06 ; became headmaster of the

Dayton Latin School in 1909; visited Cumber¬

land Gap, Tenn., in 1909 and wrote series of articles on Lincoln Memorial University. He

made a special study of educational conditions in the farming and manufacturing districts of western Ohio 1910-11 ; is now engaged in social service work at the Froebel School, Gary, Ind.

He has published (Tales from Tokio' (1900) ; (Hon-Gwan-ji at Home and Abroad' (1902);

(The Heart of Japan' (1902) ; (Japanese

Wrestling' (1903); Japanese Archery' (1903);

Japanese Swordsmen' (1903); (Europe and

America in Japan' ; (Japan in California'

(1906).

BROWNELL, Franklin, Canadian artist:

b. New Bedford, Mass., 28 July 1857. He

makes specialties of portraits and figure-paint¬

ing. For some years he has been principal of the Ottawa Art School. His canvas, (The Pho¬

tographer,' is in the National Gallery at Ot¬

tawa.

BROWNELL, George Griffin, American

educator: b. Fairfield, N. Y., 2 July 1869. He was graduated at Syracuse University, 1893,

studied at the Sorbonne, Paris, 1893-94, and at Johns Hopkins University, 1894-98, when he was appointed professor of Romance languages at the University of Alabama. He spent four years traveling in Africa, the Mediterranean countries and Mexico. Received the degree of Ph.D. from Johns Hopkins University in 1904.

He is a corresponding member of the Hispanic 618

Society of America. Has edited for college use the Spansh texts (E1 Capitan Yeneno) (1901) ; (E1 Pajaro Verde) (1901) ; (La Vida de Vasco Nunez de Balhoa) (1913). He published (The

Position of the Attributive Adjective in Don Quixote 1 (1910), and contributes regularly to periodical literature.

BROWNELL, Henry Howard, American

poet and historian: b. Providence, R. I., 6 Feb.

1820; d. East Hartford, Conn., 31 Oct. 1872.

He was graduated from Trinity College, Hart¬

ford, in 1841, studied law and was admitted to the bar, but settled as a teacher in Hartford.

His first essay in poetry was a spirited versifi¬

cation of Farragut's (General Orders) to the fleet below New Orleans. Afterward he was

appointed to an honorary place on the Hartford , flagship, and had opportunity to observe actual naval warfare. In (The Bay Fight1 he de¬

scribes, with truth and force, the battle of Mobile Bay. He collected and published his

many occasional verses in (Lyrics of a Day; or, Newspaper Poetry by a Volunteer in the United States Service) (1864). There is an

appreciative essay on Brownwell by O. W.

Holmes, entitled (Our Battle Laureate.1

BROWNELL, Thomas Church, American

Protestant Episcopal bishop: b. Westport,

Mass., 19 Oct. 1779; d. Hartford, Conn., 13 Jan.

1865. He was graduated from Union College,

Schenectady, N. Y., in 1804. The next year he accepted the post of tutor in Latin and" Greek in that institution ; in 1807 was appointed to the chair of belles-lettres and moral philosophy; and in 1809 was chosen the first professor of chemistry and mineralogy. He entered the

Episcopal ministry in 1816, and in connection with his professional duties gave himself to the work of a missionary in Schenectady. In 1818

he became an assistant minister in Trinity

Church, New York. He was consecrated

bishop of Connecticut, 27 Oct. 1819, and re¬

moved at once to his new field of labor. Dur¬

ing his long episcopate of 45 years, Bishop Brownell was actively and efficiently engaged in the duties of his station at Kentucky, Mis¬

sissippi, Louisiana and Alabama. Washington

(now Trinity) College, at Hartford, Conn., took its rise under his auspices in 1824; and he be¬

came its first president, resigning in 1831. In 1852 he became presiding bishop in the Ameri¬

can Episcopal Church. He published (The

Family Prayer Book) (1823) ; (Religion of the Heart and Life) (1839-40) ; (Consolation for the Afflicted 1 ; (The Christian's Walk and Conversation,1 *etc.* A bronze statue of Bishop Brownell has been placed on the campus of

Trinity College.

BROWNELL, William Crary, American

essayist and critic: b. New York, 30 Aug. 1851.

Having graduated from Amherst, he devoted

himself to critical and editorial work in New York city. He became an editor of Scribner's Magazine, and since 1888 he has been a literary adviser of Charles Scribner's Sons. His treat¬

ment of French life was recognized as remark¬

ably subtle and sympathetic, and of French art as very suggestive from a non-professional

standpoint. His studies of the later English prose writers have been highly praised. He was elected to the American Academy of Arts and

Letters. Among his writings are (French

Traits: an Essay on Comparative Criticism1

(1889); (French Art1 (1892); Newport1

(1896); ˆVictorian Prose Masters1 (1901);

(American Prose Masters1 (1909); ˆCriticism'

(1914).

BROWNIAN MOVEMENT (originally

called Brunonian Motion or Movement), an

irregular agitation seen when minute solid

particles, suspended in a liquid, are viewed under a high magnifying power. The phe¬

nomenon is named for the Scottish botanist and agriculturist, Robert Brown (1773-1858), who

observed it in 1827. It had been previously noted by Buffon and Spallanzani, but they did not comprehend its true nature, and thought that the moving particles which they saw

were rudimentary animalcules. Brown had

the advantage of improved achromatic micro¬

scope objectives. The Brownian movement is

not to be confused with the tremor that results from vibration of the microscope stand, which affects all the particles in the visible field in the same manner, so that they execute their oscilla¬

tions simultaneously and in parallel directions.

Nor is it to be confused with such motions as may be produced by convection currents in the liquid in which the particles are suspended.

Movements due to currents of this kind affect neighboring particles in the same way, whereas in the true Brownian movement the particles show wholly independent movement even when

they are almost in contact with one another, —each pursuing its own course without the least relation to its neighbors. The movement is

shown by particles of all kinds, and it has been observed in liquid carbonic acid in a cavity in the interior of a transparent quartz crystal, where it probably has been going on continu¬

ously for millions of years. It cannot be

explained by any peculiarity of chemical compo¬

sition, nor as a phenomenon dependent upon

the gradual solution of the particles. Moreover, experiment shows that it does not depend upon light (as the motion of the radiometer does), because its activity is not modified by increas¬

ing the intensity of the light in the microscope field a thousand fold. It may be conveniently observed by examining, under a powerful mi¬

croscope, water to which a very small amount of Chinese ink has been added.

Brown's discovery attracted no special atten¬

tion at the time it was announced, and little is to be found with regard to it in scientific literature until 1888, when Gouy emphasized

the inadequacy of the summary explanations

of the phenomenon that had been offered pre¬

vious to that time. Quite recently the subject has received exceedingly careful study from

Prof. Jean Perrin of the Sorbonne, who

gives the results of his investigations in his book (Les Atonies,1 and

also in (The Brown¬

ian Movement and Molecular -Reality1 (trans¬

lated by Soddy). According to present views, which have been so completely verified by

experiment that no important future modifica¬

tion is probable, the movement is due to the bombardment of the visible solid particles by the molecules of the liquid in which they are suspended. This bombardment is sensibly the

same in all directions, if our observation ex¬

tends over any considerable time; but on

account of the nature of the molecular motion the balance cannot be perfect at every instant.

. vn extremely small suspended particle is there¬

fore impelled hither and thither, as the force of the bombardment preponderates, momen¬

tarily, now on one side of it and now on an¬

other side; and the Brownian motion is the visible evidence of this action. Large suspended masses are subject to the same irregularity of pressure (or impact), but they do not show any sensible movement because the preponderance

of the bombardment in any one direction is of too brief a duration to accelerate large masses to a measurable extent.

If the Brownian movement is caused as

here described, much may evidently be learned from it with regard to molecular physics;

because microscopic solid particles will behave in many respects like molecules of enormous size ; and their behavior and distribution in the liquid in which they float will conform, very closely, with the laws which govern the inter¬

diffusion of the molecules of liquids.

In his methodical study of the subject, Per¬

rin undertook to make emulsions containing

minute solid particles of spherical shape and uniform size. For this purpose he dissolved resinous substances in alcohol, and subsequently precipitated them as emulsions by pouring their alcoholic solutions into considerable quantities of water. Of the 11 different resins tried, two (namely, mastic and gum gamboge) gave ex¬

cellent results. To secure uniformity of size in the spherules he subjected the emulsions to powerful centrifugal action for a long time, thereby effectively separating the larger par¬

ticles from the smaller ones. The work was tedious, but after several months of labor he obtained, from a kilogram of gum gamboge,

a satisfactory emulsion containing several

decigrams of the gum in the form of sus¬

pended spherules of remarkably uniform size

and sphericity. Consonant determinations of

the density of these spherules were obtained by three methods,— one of which consisted in dis¬

solving bromide of potassium in the emulsion until the centrifugal machine no longer affected the spherules, and then determining the den¬

sity of the solution. To ascertain the diameters of the particles three

methods were also used.

One of these consisted in allowing a single layer of spherules to settle in contact with one another on the surface of a microscope slide, and then counting the number of spherules

included within a known length or covering a known area.

From a study of the way in which the density of distribution of the spherules in his standard emulsions varied with height when a state of equilibrium was attained, Perrin draws import¬

ant conclusions concerning the relation be¬

tween the masses of his resin spherules and the masses of actual molecules ; and as he had already determined the average mass of the

spherules, he is therefore able to calculate the mass of an actual molecule. In this way he finds that 682 thousand million million million hydrogen atoms would have a combined mass

of one gram. See Gases, Molecular Theory

of; and Molecular Theory.

Allan D. Ri steen.

Director of Technical Research , Travelers In¬

surance Company.

BROWNIE, a spirit or goblin, in old

popular superstitions of Scotland, supposed to haunt old houses, especially those attached to farms. He might be called the Robin Good-fellow of Scotland. In the night he helped the family, and particularly the servants, by doing many pieces of drudgery, performing domestic labors while the inmates of the household slept.

If offered food or any other recompense for his services, he decamped and was seen no more.

In Germany, he is called ˆKobold,® and the old Roman <(Lar):> is akin to him.

BROWNING, Elizabeth Barrett, English

poet: b. Coxhoe Hall, Durham, 6 March 1806; d-Florence, Italy, 30 June 1861. Her father, Edward Moulton, or Moulton-Barrett, as soon

after her birth he began to write his name, was a country gentleman who resided at the foot of the Malvern Hills, and in this beautiful retreat Elizabeth's girlhood was passed. She early began to commit her thoughts to writing, and in 1826 appeared her volume entitled (An Essay on Mind and Other Poems, > anonymously published. Viewed as the production of a young woman of 20, this book is indeed a remarkable one; but in after years its author was so dis¬

satisfied with it that she omitted it in the col¬

lected editions of her poems. In 1833 appeared a translation by her of the (Prometheus Bound) of Hiischylus. A collection entitled (The Sera¬

phim and Other Poems) was produced in 1838, the principal piece being a lyric drama shadow¬

ing forth the feelings and emotions which may be supposed to have been excited in an angelic being by the spectacle of the crucifixion. Both in this and in a subsequent work, (The Drama of Exile) (1840), she chose for her theme the fall and redemption of man, subjects on which Milton had already employed his genius, and in the treatment of which, though exhibiting much grandeur and sublimity, Mrs. Browning

can scarcely be said to have approached him.

Always feeble in health, she was now nearly brought to the verge of the grave by the rup¬

ture of a blood vessel, and having been taken to Devonshire to promote her recovery, re¬

ceived there a severe shock from the drowning of a favorite brother. For several years she was confined to a darkened chamber, and saw only a few of her most intimate friends, but nevertheless continued to busy herself with

study and composition. Her health was at

length partially restored and in 1846 she was married to Robert Browning, already well

known in the literary world as a poet and dramatist. After their union they went to

Italy, and continued subsequently to reside for the most part in Florence. In 1850 a collected edition of Mrs. Browning's works appeared in two volumes, including several new poems, and among others (Lady Geraldine's Courtship,)

one of the finest of her productions, and re¬

markable, it is said, as having been composed in the incredibly short space of 12 hours. Her (Sonnets from the Portuguese,* included in this volume, were written after her engagement, and first privately printed. They have no parallel for excellence in their peculiar kind in our literature. (Casa Guidi Windows,) a poem on the struggles of the Italians for liberty in 1848-49, appeared in 1851. The longest and most finished of all her works, (Aurora Leigh,* a romantic narrative and didactic poem in blank verse, was published in 1857. Her last volume, (Poems Before Congress,* appeared in 1860,

and cannot be said to have added greatly to her reputation. Several detached pieces of hers

appeared from time to time in the Cornhill Magazine, up to the period of her death. (Last Poems,* by Mrs. Browning, published by Robert Browning in 1862, and (Greek Christian Poets and the English Poets,*

translations and essays of hers published by Browning in 1863, were followed in 1866 by his publication of Selec¬

tions from the Poems of Elizabeth Barrett

Browning) (2d series, 1880). The (Letters of E. B. Browning,* edited by Frederick G. Ken¬

yon (1897), are a definitive presentation of her character and career in a selection from a very large mass of correspondence collected by Mr.

Browning himself. It is a chronicle, and prac¬

tically a life, by reason of the character of the letters and the addition of connecting links of narrative. The letters give an unusually full and interesting revelation of the course of her life. Mrs. Browning's poetry is characterized by much pathos and depth of feeling, combined with great vividness and powers of description.

It partakes eminently of the modern English school, as represented by Tennyson and others, at times obscure and transcendental, but ani¬

mated throughout by the most noble and ex¬

alted sentiments, and illuminated from time to time by flashes which, in their bearings on the unseen world of mind and spirit, seem almost supernatural. She is described by George Mac¬

donald as <(the princess of poets,® in idea noble, in phrase magnificent. In their married life she and Robert Browning found mutual happiness

and help, the good influences of which are reciprocally manifested in their writings. See Aurora Leigh ; Sonnets from the Portuguese.

Bibliography. — (Letters of Robert Brown¬

ing and Elizabeth Barrett Browning* (edited

by Kenyon, 2 vols.. New York 1899) ; Bayne, 'Two Great English Women* (London 1881);

Ingram, (Elizabeth Barrett Browning* (Boston 1888) ; Lubbock, P., (Elizabeth Barrett Brown¬

ing in Her Letters* (London 1906) ; Whiting, L., (Study of E: B. Browning* (Boston 1899) ; (The Brownings: Their Life and Art* (1911).

D. S. Douglas,

Editorial Staff of The Americana.

BROWNING, Orville Hickman, Amer¬

ican political! : b. Harrison County, Ky., 1810 ; d.

Quincy, Ill., 10 Aug. 1881. While performing the duties of clerk in the office of the county and circuit clerk of Bracken County, he pur¬

sued a course, of classical studies at Augusta College.. Admitted to the bar in 1831, he settled in practice at Quincy, Ill., where he subsequently resided. In 1832 he served through the Black Hawk War, and was a member of the Illinois legislature, 1836-43. In conjunction with Abra¬

ham Lincoln he organized the Republican party in Illinois at the Bloomington convention.

When the Civil War broke out he warmly sup¬

ported the government, and in 1861 was ap¬

pointed to the United States Senate to fill the vacancy caused by the resignation of Stephen A.

Douglas. President Johnson made him Secre¬

tary of the Interior in 1866, and for one year from March 1868 he also acted as Attorney-General. In 1869 he was elected to the State Constitutional Convention, and after that he retired to the practice of his profession.

BROWNING, Oscar, English author: b.

London, 17 Jan. 1837. He was educated at

Eton and at King's College, Cambridge, where he was graduated in 1860. He has served as a master at Eton, as lecturer in history and political science at Cambridge and as principal of the University Training College for Teachers.

Lie is a voluminous writer on subjects of ed¬

ucation, history, biography, etc., and among his works are (Modern England* (1879) ; (Modern France* (1880) ; (History of Educational

Theories* (1881); (History of England*

(1890); (Life of George Eliot* (1890); (The Citizen: His Rights and Responsibilities*

(1893); (Wars of the 19th Century* (1899);

(History of Europe 1814-43* (1901); bet¬

ters from India* (1902); (Napoleon: the First Phase* (1906); (The Fall of Napoleon*

(1907); (Memories of Sixty Years* (1910);

(History of the Modern World) (1912) Gen¬

eral History of Italy* (1915).

BROWNING, Robert, English poet: b.

Camberwell, a suburb of London, 7 May 1812; d. Venice, 12 Dec. 1889. His father, Robert who was a clerk in the Bank of England, and was himself a lover of books, a classical scholar and ready at versifying, had the boy educated in a school at Peckham, after which he attended lectures at University College. His father's family being Dissenters, his mind was trained and his character formed under influences less peculiarly English than those to which youths are

exposed in the great public schools and the two leading universities of that country. At the age of 20 he traveled on the Continent and resided for some time in Italy, where he made diligent study of the mediaeval history of that country, so fruitful in themes for poetry such as his genius was to produce. In 1833 he pub¬

lished anonymously his first book, (Pauline* ; spent some months in Russia, in 1834 ; and in the following year issued (Paracelsus,* a

dramatic poem in five parts. In 1837, at the suggestion of Macready, he wrote the tragedy of ‘Strafford,* which was produced at Covent Garden in May of the same year, with no

marked success. His next poem, ‘Sordello,*

was printed in 1840, and the obscurity of its introspective subtleties injured the poet’s repu¬

tation with the critics. Notwithstanding this, he published (1841-46) the (Bells and Pome¬

granates* series, in which were included the three plays, (Pippa Passes,* ‘King Victor and King Charles* and (Colombe’s Birthday* ; the four tragedies, ‘The Return of the Druses,*

(A Blot in the ’Scutcheon* (produced by Macready at Drury Lane in 1843), ‘Luria* and (A Soul’s Tragedy* ; while among the lyrics were ‘The Pied Piper of Hamelin,* ‘How They

Brought the Good News from Ghent to Aix*

and ‘The Lost Leader.* In 1846 he married

Elizabeth Barrett, and settled with her in

Florence, where they remained for nearly

15 years. During his residence there he pub¬

lished (Christmas Eve and Easter Day* (1850), and ‘ Men and Women* (1855), the latter con¬

taining such characteristic poems as (Andrea del Sarto,* (Fra Lippo,* (Childe Roland,*

‘Evelyn Hope,* (One Word More* and ‘Up

at a Villa.* After the death of his wife in 1861 Browning returned to London, and there entered upon his richest literary period by publishing ‘ Dramatis Personae* (1864). These dramatic monologues, of which there were 17, include (Rabbi Ben Ezra,* ‘Abt Vogler,* ‘Pro-

spice, 5 (Caliban upon Setebos) and (A Death in the Desert.5 Recognition of his literary fame, which came slowly, was made in 1867, when he was elected an honorary fellow of

Balliol, an M.A. of Oxford, and later an LL.D.

of Cambridge. It was not, however, until 1869, that (The Ring and the Book’ was published, and this poem, which accentuates every char¬

acteristic of the poet, still remains his central achievement. The poem, which is epical in

length if not in method, is the story of a murder told 10 times over in wide variety of intention by various persons connected with the tragedy.

His next publication was the short poem of (Herve Riel,5 the proceeds from which were

devoted to the relief of Paris after the siege in 1871. Following this came (Balaustion’s Adventure) (1871), including a translation of

Euripides’ <Alcestis) ; (Prince Hohenstiel—

Schwangau, (Saviour of Society 5 (1871), an imaginary conception of how Louis Napoleon

might justify his policy; (Fifine at the Fair’

(1872), in which the relations of the sexes are discussed; (Red-Cotton NightCap Country5

(1873), a story of love, penitence and suicide, the scene of which is laid in Normandy; Aris¬

tophanes' Apology5 (1875) ; (The Inn Album5

(1875), a story of a woman's wrongs; (Pacchiarotto and Other Poems5 (1876), in which (Pacchiarotto and How He Worked in Distem¬

per5 conveys an implication of Browning's own method in the poetic art; (The Agamemnon of 2Eschylus5 (1877) ; and (La Saisiaz5 (1878), in which immortality is discussed. As a kind of new departure he published a first set of dra¬

matic Idylls5 (1879), and a second series

(1880), of which the more important are Mar¬

tin Relph,5 (Pheidippides5 and (Ivan Ivano—

vitch.5 The volumes which have followed are (Jocoseria5 (1883) ; derishtah's Fancies5

(1884) ; (Parleyings with Certain People of Im¬

portance in Their Day5 (1887), and (Asolando5

(1889). The latter volume was published when the author was on his death-bed, and an account of its favorable reception was almost the last information he received. In national recogni¬

tion of his genius, he was buried in West¬

minster Abbey between Cowley and Chaucer.

In such fashion, and in ungrudged com¬

pleteness, was his poetic greatness acknowl¬

edged at the last. Its too tardy recognition by the popular voice was largely due to the pre¬

vailing belief that poetry is for the mental dalliance of a lazy hour, and also to the per¬

sistency with which Browning had mocked

at this belief in the athletic hardiness of mind which he required in his readers. Moreover he seemed always inclined, to the dismay of the

public, to press forward into service the super¬

ficial detects of his solid interior qualities.

Thus, at times, his wide scholarship strayed off into pedantry; his secure skill in verse dropped ever and again into grotesque Bohemian robust¬

ness of phrase and rhyme; his swift intuitive glance into the problems of life seemed to create in him an artistic impatience of detail which, in the structure of his verse, became a thrifty brusqueness of expression tending

toward cipher; and, above all, his most notable gift of analysis, his power to track the most hidden motive to its last retreat, seemed ever tending to lapse into an introspective subtlety akin to the cobwebberies of the schoolmen.

Yet, aside from these occasional shortcomings, there remain his learning, his humor, his mas¬

tery of artistic expression, his immense range of sympathy, his spiritual insight and the height and strength of his ideals to make him one of the greatest of modern poets. See Sordello ; Pippa Passes; Ring and the Book, The;

Saul; Childe Roland to the Dark Tower

Came; Pied Piper of Hamelin, The; Andrea

del Sarto; Fra Lippo Lippi.

Bibliography. — The poems of Robert

Browning have given rise to a great body of literature, largely interpretative. His (Life5 and Letters,5 edited by Mrs. Sutherland Orr, was published in 1891 ; the (Love Letters, 1845-46, 5

in 1899. Among biographies and appreciations may be recommended those by G. H. Chester¬

ton (1908) ; Edward Dowden (London 1905) ; R. B. Figgis (London 1902) ; C. H. Herford (New York 1905), and R. B. Waugh (London

1900). Other useful works are Berdoe, E.,

(Browning Cyclopedia5 (London 1892) ; (Studies5 (London 1895) ; Brooke, Stopford, (Poetry of Robert Browning5 (London 1902) ; Clarke, (Browning and His Century5 (New York

1912) ; Cunliffe, (Elizabeth Barrett Browning's Influence on Robert Browning's Poetry5 (Cam¬

bridge 1908) ; Gosse, E., (Personalia5 (London 1890) ; Jones, H., (Browning as a Philosophical and Religious Teacher5 (6th ed., 1913) ; Nettle-ship, (Robert Browning: Essays and Thoughts5

(London 1890); Phelps, (Robert Browning:

How to Know Him5 (New York 1915) ; Pigou, A. C., (Robert Browning as a Religious Teach¬

er5 (London 1901) ; Revell, W. F., (Browning's Criticism of Life5 (London 1892) ; Symons,

Arthur, (Introduction to the Study of Robert Browning5 (London 1886), and the publications of the Browning Society.

D. S. Douglas,

Editorial Staff of The Americana.

BROWNING GUN. See Machine Gun.

BROWNISM. See Browne, Robert.

BROWNISTS, a name given during the

latter part of the 16th century to those who were afterward known in England and Holland under the denomination of Independents, called Brownists from Robert Browne (q.v.). See

also Congregation alists.

BROWNLEE, William Craig, American

clergyman : b. Torfoot, Lanarkshire, Scotland, 1784; d. New York, 10 Feb. 1860. His paternal ancestors for many generations were the

(<Lairds of Torfoot.55 He was graduated M.A.

at the University of Glasgow, was licensed to preach and came to America in 1808. For a time he taught Latin and Greek in Rutgers

College, but in 1826 was installed as one of the ministers of the Collegiate Reformed Dutch

Church in New York city. He was a vigorous controversialist, earnestly opposing the Quakers and Roman Catholics. His writings include

< Inquiry into the Principles of the Quakers5

(1824) ; (The Roman Catholic Controversy5

(1834); (Treatise on Popery5 (1847); (Lights and Shadows of Christian Life5 (1847);

< Deity of Christ,5 (History of the Western Apostolic Church,5 and some minor religious

tracts and pamphlets.

BROWNLOW, William Gannaway,

American clergyman, journalist and politician: b. Wythe County, Va., 29 Aug. 1805 ; d. Knox-622

ville, Term., 29 April 1877. Early left an orphan and penniless, he

earned enough as a carpenter to give himself a fair education, and in 1826

became an itinerant Methodist preacher. He

began his career as a political agitator in 1828

by advocating in Tennessee the re-election of President John Quincy Adams, and in Cal¬

houn's own district in South Carolina he pub¬

licly opposed nullification. From 1838 until its suppression by the Confederates in 1861, he published and edited at Knoxville a paper

called The Whig, his fiery editorials causing him to become known as (<the fighting parson.®

He upheld slavery but opposed secession, a

course which subjected him to much persecu¬

tion. He refused to take the Confederate

oath of allegiance, and in consequence was

imprisoned on a charge of treason, but finally released and sent into the Union lines, 3 March 1862. On the reconstruction of Tennessee in 1865 he was elected governor and served two terms. He advocated the removal of the

negroes to a separate territory and opposed giving them. the ballot. In 1869 he was elected to the United States Senate and served until 1875, during which time he was a member of the committees on pensions and revolutionary

claims. He wrote (The Great Iron Wheel

Examined) (1858), a defense of Methodism;

(Sketches of the Rise, Progress and Decline of Secession: With a Narrative of Personal Ad¬

ventures Among the Rebels } (1862) ; and, with Prynne, 'Ought American Slavery to be Per¬

petuated? A Debate at Philadelphia, Septem¬

ber 1858,) in which Brownlow took the affirma¬

tive side (1858).

BROWNSON, Orestes A., American pub¬

licist : b. Stockbridge, Vt., 1803; d. 1876. His writings embrace philosophical, political, socio¬

logical and theological subjects. He was

brought up without any strictly defined creed, but at the age of 19 formally joined the Pres¬

byterian Church. Soon becoming dissatisfied

with Presbyterianism he sought refuge in Universalism, abandoning, as he himself says, Su¬

pernaturalism for Rationalism. After leaving

Presbyterianism, in 1825, he applied for and re¬

ceived a letter of fellowship as a preacher from the General Convention of Universalists. It

was shortly after this that he fell in with the socialistic theories of Robert Owen, who had come to this country to establish his commu¬

nistic colony at New Harmony, Ind. Under

the influence of Owen's ideas, Brownson co¬

operated in founding and establishing the Work¬

ingman's party to advance Socialism in the

sphere of practical politics. Through Owen

Dr. Brownson also came in contact with

Frances Wright, who lectured throughout the

United States in the interest of the Socialist propaganda. But Brownson's enthusiasm in

the political side of the question was short¬

lived and he soon abandoned the political move¬

ment and returned to his pulpit, but as an inde¬

pendent preacher, responsible to no church, sect or denomination. In 1832 he came under the influence of Dr. Channing, to whom he pays a grateful but discriminating tribute in his work (The Convert,* written after his conversion to the Catholic Church. In 1836 he went to Bos¬

ton to preach to the laboring classes, and be¬

coming convinced of “the necessity of a new religious organization of mankind,® established for that purpose “The Society for Christian Union Progress,® whose object was the union and progress of mankind on broad humani¬

tarian lines. The ((new doctrine® inculcated and preached during this period by Dr. Brown¬

son was a mixture, in part drawn from the Eclecticism of Cousin and from the Commu¬

nism of the Saint-Simonians, a philosophico—

religious sect then recently sprung up in

France. Brownson’s attitude was at this time ultra-radical ; he utterly denied the Church and the priesthood in the religious order, and the distinction of classes in the social order, and would have made all government but the instru¬

ment to level men and their institutions to the lowest terms of the socialistic idea. But by 1840 he began to retrace his steps, and after much study and reflection, and after having read for the first time, as he himself tells us in ‘The Convert, } Aristotle on Politics, “came to see that the condition of liberty is order, and that in this world we must seek not equality, but justice.® Up to this point in his career Dr.

Brownson had followed negative lines in his religious and intellectual life from a belief in a supernatural Christianity, as represented by Presbyterianism, to the broadest Socialism

which denied the supernatural life of man alto¬

gether. He now began an advance to a posi¬

tive and supernatural conception of the world.

“I had now settled in my mind,® he says, “that the progress of man and society is effected only by supernatural assistance, and that this assist¬

ance is rendered by Almighty God, in perfect accordance with nature and reason, through

providential means.® With this conception as his premise, after some four years of struggle and study, he arrived at the conclusion that he must logically accept the Catholic Church as the divinely established institution for the su¬

pernatural guidance and direction of mankind.

After receiving instruction from Bishop Fitz¬

patrick, of Boston, Dr. Brownson was bap¬

tized a Catholic in 1844, and died in the Catholic communion. After his entrance into the Catho¬

lic Church he became its ardent and vigorous champion, though sometimes in the advocacy of his views he came into conflict with ecclesi¬

astical authority. He was a vigorous and

trenchant writer, bold and uncompromising in his views, when he believed them logical, and often in controversy unsparing in his method against an adversary. His temperament was

polemical and fearless, his interest keen and his advocacy enthusiastic of whatsoever cause he might be pleading. He was a sincere lover of truth and unflinching in pursuing his con¬

clusions. He was perhaps the greatest publicist whom America has produced. His writings are voluminous, covering a vast variety of subjects, and have been published in 20 volumes (1882-87) by his son, Henry F. Brownson. A ‘Life*

in three volumes by the latter appeared in 1900.

‘Watchwords from Dr. Brownson* was edited

by J. S. O'Neil (1910).

Conde B. Pallen,

Managing Editor, ' Catholic Encyclopedia .*

BROWNSTONE, the reddish-brown sand¬

stone of the Triassic Age, so named originally in the eastern United States, where it occurs in New Jersey and Connecticut. The name is now generally used for any brown sandstone adapted for building purposes, but the most important BROWNSTOWN — BRUCE

stones included under this name are those

which are quarried at Portland and Middletown, Conn., and the Cambrian or Pre-Cam¬

brian sandstones that are worked near Mar¬

quette, Mich. The use of brownstone has

greatly diminished in recent years, granite and limestone having largely superseded it in public favor.

BROWNSTOWN, Battle of. See De¬

troit, Siege and Capture of.

BROWNSVILLE, Tenn., city and county-seat of Haywood County, 55

miles northeast

of Memphis, on the Louisville and Nashville Railroad. Fruit growing, lumbering, stock rais¬

ing and cotton growing are the city's chief interests. It has a large trade in these and contains a cotton compress, cottonseed-oil mill, *etc.* It has also a Carnegie library and is the seat of Brownsville Training School for Bovs.

The city owns the waterworks. Pop. 3,062.

BROWNSVILLE, Tex., city, port of entry

and county-seat of Cameron County, situated

on the Rio Grande River and the Rio Grande Railroad opposite Matamoras, Mexico. It con¬

tains the cathedral of the Immaculate Concep¬

tion, the Convent and Academy of the Incarnate Word, a United States government building

and a national bank, and has a large trade with Mexico. The products of farming and stock

raising constitute a considerable part of the city's trade. There is also a large sugar mill.

Nearby, at Point Isabel, the government has erected a large wireless station. In the sub¬

urbs is Fort Brown, a garrisoned United States post. In May 1846 Brownsville was occupied

and fortified by a small body of United States troops, who maintained their position in the face of a heavy bombardment that lasted for 160 hours, and the town was taken by Mexican raiders under Cortina on 28 Sept. 1859. In November 1863 it was taken from the Confed¬

erates by a Federal army under General Banks.

On the night of 13 Aug. 1906, a shooting affray occurred which was attributed to a negro regi¬

ment at Fort Brown. Failing to detect the par¬

ticular offenders, President Roosevelt dismissed an entire battalion, which action occasioned heated debates in Congress and in the public press. The city has adopted the commission-manager plan of government. Pop. 11,791.

BROWNWOOD, Tex., a city and county-seat of Brown County, situated on the Gulf, C.

& S. F. and the Fort Worth & R. G. railways, 140 miles northwest from Austin. It was set¬

tled in 1866 and incorporated in 1878. It trades in wheat, hay, cotton, cattle, hides and pecan nuts. There are flour mills, cottonseed-oil mills and manufactories of wire-fencing, saddle and harness, ice, *etc.* Here are located the Daniel Baker College, under Presbyterian auspices, and the Howard Payne College, controlled by the Baptists. The city owns its waterworks and

has a Carnegie library. Pop. (1920) 8,223.

BROZIK, broˆjek, Vaczlav, Bohemian art¬

ist : b. near Pilscn 1852; d. 1901. He was a pupil at the Prague Academy, where he studied under Emil Lauffers, and also of Piloty in Munich and Bonnat in Paris.. Most of his sub¬

jects were taken from the history of Bohemia, and as a historical painter he won high rank.

His canvases are usually very large and crowded and are interesting chiefly as illustrations.

Among his works may be mentioned the Em¬

bassy of Ladislas of Bohemia to Charles VII of France* ; (The Execution on the White

Mountain* ; (The Ballad Singer) and (The Im¬

perial Councilors Thrown Out of the Window

at Prague.* His (Columbus at the Court of Ferdinand and Isabella) is in the Metropolitan Museum, New York.

BRUCE, a noble family of Scotland, two

members of which occupied the throne after

one had pretended to it in vain. Distinguished members were :

1. Robert, 7th lord of Annandale : b. 1210; d. 1 April 1295. He was one of the 13 claimants of the crown in 1290, when, by the demise of Margaret, the (<Maiden of Norway,® the pos¬

terity of the last three kings of Scotland had become extinct, and the succession reverted to the posterity of David, Earl of Huntington, and younger brother of King William, the Lion.

The question of succession speedily resolved it¬

self into a simple alternative between two com¬

petitors, John Baliol, the great-grandson of David by his eldest daughter, Margaret, and Robert Bruce,' the grandson of David by his second daughter, Isabel. The contest was, by mutual consent, referred for decision to King Edward I of England, who pronounced, in ac¬

cordance with principles that would not now be disputed, that ((in all indivisible heritages the more remote in degree of the first line of de¬

scent is preferable to the nearer in degree of the second,® and thus gave the kingdom to

Baliol, from whom he required homage and

fealty. Bruce now retired to England, took

service in the English army and fought against Baliol in the war which resulted in the subjuga¬

tion of Scotland to England. He returned to his English estates soon after the resignation of Baliol where he died.

2. Robert, son of the preceding, Earl of Carrick and Annandale : d. 1304. He constantly followed the fortunes of Edward and fought

bravely against Wallace and the patriot party of Scotland. After having assisted in defeat¬

ing Wallace at Falkirk, he is said to have slackened his zeal for England, but did so little for the national cause that he was able to make his peace with Edward, when, a little later, after the capitulation at Irvine, Wallace was driven with his adherents into the northern mountains.

3. Robert, son of the preceding, Earl of Carrick, and afterward King of Scotland: b. 21

March 1274; d. 9 July 1329. He acted at first as Edward's liegeman, but vacillated between the two parties, taking no very active part in the struggle between Wallace and England, but inclining to the national cause when a gleam of success enlivened the hopes of the patriots, and, at the approach of Edward, making his peace with the conqueror. He was one of those con¬

sulted by the King in the settlement of Scotland as an English province, and was permitted to retain the extensive lands of his ancestors un¬

alienated. In 1306, Comyn, the son of Baliol's sister, a nobleman distinguished by his efforts to recover the independence of his country, arrived in Dumfries about the same time with Bruce. By appointment he met Bruce alone in the church of the Minorites, who there stabbed him with his dagger ; whether by premedi¬

tated treachery or in a sudden fit of passion 624

cannot now be ascertained. Bruce now as¬

sumed the title of King, summoned the Scots to his standard, and was

crowned, without any opposition, at Scone. Edward immediately sent Aymar de Valence, Earl of Pembroke, with a great army to chastise the rebels. The force of Bruce was almost immediately destroyed, six of his best knights made prisoners, and he himself, thrown from his horse, was rescued only by the devotion of Seaton. For two months, with

his brothers and the ladies of his household, he wandered to and fro in the Grampian Hills, till, his party being discovered, defeated and forced to separate, he buried himself for con¬

cealment in the island of Rathlin, on the north of Ireland. His three brothers and others

were captured, and the brothers were soon after hanged at Carlisle. In the spring of 1307 Bruce returned from his retreat, surprised his own castle of Carrick, defeated small parties of English in many skirmishes and was enabled

to maintain himself among the hills and forests until Edward called out an army and marched toward the borders, but died on his way, leav¬

ing to his son a charge not to bury his bones till he had borne them in triumph from Ber¬

wick bounds to the utmost highlands. For

three years Edward II paid no attention to his father's advice or the Scottish war, but in the autumn of 1310 he marched into Scotland as far as the Forth without encountering an

enemy, for Bruce wisely declined to give him battle. In the next year he sent his favorite Gaveston to renew the war, who penetrated be- .

yond the Forth but still gained no advantage, Bruce constantly retreating before him, keeping the hills, where he could not be assailed, and harassing the English by constant petty skir¬

mishes in which he mostly worsted them. The following years were passed by Edward in

ignoble contentions with his Parliament, and by Bruce in gradually but surely recovering all that he had lost in Scotland, until, in 1314, the strong hill fortress of Stirling alone held out for the English, and even that the governor, Mowbray, had been forced to consent to

surren¬

der if it should not be relieved before the feast of Saint John the Baptist. This at length

aroused Edward, who, at the head of a large army, encamped in the neighborhood of the

beleaguered fortress, and was there met by

Bruce at the head of 30,000 picked men, on the eve of the festival fixed for its surrender. The battle of Bannockburn, which succeeded, was

the bloodiest defeat which the English ever suf¬

fered at the hands of their Scottish neighbors.

It fixed the crown securely on the head of Bruce and at once enabled him to exchange his prisoners, who were of the highest rank in Eng¬

land, against his wife, his sister and his other relatives, who had long languished in captivity.

After this success the Scottish people assumed the offensive and invaded Ireland, where they at first gained considerable successes, and of which island Edward Bruce was crowned King.

While the dissensions lasted between Edward

II and his barons, Robert Bruce repeatedly

devastated the borders and all the north of Yorkshire, even to the walls of York, into which he on one occasion chased the English King in disgrace, narrowly failing to make him pris¬

oner. Tn 1323 this bloody war, which had raged, with few pauses, for 23 years, was brought to a close by a truce concluded between the two kingdoms for 13 years, to remain in force even in the event of the death of one or both of the contracting parties. Four years after this Ed¬

ward II was compelled to abdicate in favor of his son, Edward III, and Bruce, seeing his occa¬

sion in the distracted state of England, renewed the war, with the avowed intention of forcing Edward to renounce his claim of

sovereignty over the crown of Scotland. In 1328 this re¬

nunciation was made ; Scotland was declared

sovereign and independent; Jane of England,

the sister of Edward, was affianced to David, Prince of Scotland, and Robert Bruce paid £20,-

000 sterling to defray the expenses of the war.

He died the next year, having, after a life of incessant toil and warfare, secured the inde¬

pendence of his country and won the crown, which he left undisputed to his son.

4. Edward: d. 1318. He was a brother of

Robert I of Scotland, who, after distinguishing himself in the Scottish war of independence, crossed in 1315 to Ireland to aid the native septs against the English. After many suc¬

cesses he was crowned King of Ireland at Car-rickfergus, but fell in battle near Dundalk.

5. David, son of the preceding king of

Scotland: b. about 1320; d. 22 Feb. 1371.

Shortly after his accession, at the age of nine years, his kingdom was invaded and his crown wrested from him by Edward Baliol, son of

that John Baliol whom Edward I had com¬

pelled to resign the crown. In support of his claim Edwrard III maintained a fierce strife on the borders, in active though undeclared hostil¬

ities to the Scots. David, with his young queen, Jane of England, escaped to France, where he resided till 1341, when, the nobles Murray, Douglas and Stuart having expelled Baliol from the throne into the northern counties of Eng¬

land, he ventured to return. In 1346, while Edward III, with the flower of his army, wras absent in France, David suddenly invaded Eng¬

land at the head of 33,000 men. He was met at Neville's Cross, Durham, by a force of 11,200

irregular troops under Queen Philippa. The

Scottish troops were totally defeated, leaving 15,000 men dead on the field of battle and their King a prisoner. From this time until 1357

David was detained a prisoner in the Tower of London, when he was liberated after the bat¬

tle of Poitiers, on agreeing to pay 100,000 marks in 20 half-yearly instalments. His queen, Jane of England, died in 1362 and David then mar¬

ried Margaret Logie, whom he divorced in

1369. He tried to exclude his nephew, Robert, from the throne, and died at Edinburgh Castle 22 Feb. 1371. Consult Dunbar, Scottish Kings) (Edinburgh 1906).

BRUCE, Alexander Balmain, Scottish

theologian : b. Abernethy, Perthshire, 1831 ; d.

Glasgow, 7 Aug. 1899. He was ordained to

the ministry of the Free Church of Scotland, held pastorates at Cardross and Broughtv Ferry, and was elected professor of apologetics and New Testament exegesis in the divinitv hall at Glasgow in 1875. He established a high repu¬

tation as an exegetical writer, and exercised a profound influence over the minds of his

students. The publication in 1889 of (The

Kingdom of God; or Christ's Teaching in the Synoptic Gospels) involved him the following year in a charge of heresy before the General BRUCE

Assembly, which ended in acquittal. His

works include ‘The Training of the Twelve)

(1871); (The Humiliation of Christ) (1876);

(The Parabolic Teaching of Christ’ (1882) ; Commentary on the Synoptic Gospels’ (1897) ; the Gifford Lectures, ‘The Providential Order of the World’ (1897) ; (The Moral Order of the World’ (1899) ; and (With Open Face’

(1896).

BRUCE, Blanche Kelso, American colored

politician: b. Prince Edward County, Va.,

1841 ; d. 1898. Born in slavery but educated with the son of his master, and subsequently a student at Oberlin College, he became a planter in Mississippi in 1S69. Entering politics he became a United States senator from Missis¬

sippi in 1875, the first negro member of the National Senate. He was appointed register

of the United States Treasury in 1881, holding office till 1885, and was reappointed to the same office by President McKinley in 1897.

BRUCE, Sir David, English surgeon: b.

Melbourne, Australia, 29 May 1855. He was

graduated at Edinburgh University, entered the Royal Army Medical Corps in 1883, has served in Malta, Egypt and South Africa (including siege of Ladysmith), and holds rank as sur¬

geon-general. He is an authority on tropical diseases, and has been director of the following official investigations: (1) on sleeping sickness, in Uganda, 1903, and 1908-10; (2) on Mediter¬

ranean fever, at Malta, 1904—06; (3) on the connection between wild animals and human

and stock diseases, in Nyassaland, 1911-14. He was knighted in 1908.

BRUCE, Herbert Alexander, Canadian

surgeon : b. Blac.kstock County, Durham, On¬

tario, 28 Sept. 1868. He was graduated M.D. at Toronto University in 1892, and is a licentiate of the Royal College of Physicians of London and a fellow of the Royal College of Surgeons of England. He was appointed associate pro¬

fessor of clinical surgery at Toronto University in 1907, and in 1909 became head of the

service in surgery at Toronto General Hospital.

He was president of the Ontario Medical Asso¬

ciation in 1911-12. He was attached to the Canadian Army Medical Corps in 1915, in

which he holds rank as lieutenant-colonel. His report on the condition of the Canadian army hospitals overseas, prepared at the request of the Minister of Militia, Sir Sam Hughes, in which he strongly animadverted on the con¬

dition of the Canadian hospitals in England, was the occasion of a somewhat heated con¬

troversy. He is the author of numerous

pamphlets on medical subjects.

BRUCE, James, Scottish traveler: b. Kin—

naird House, Stirlingshire, 14 Dec. 1730; d.

there, 27 April 1794. He became a wine mer¬

chant in 1754, but on the death of his wife he took up the study of

languages, and availed himself of the opportunities of his trade to visit Spain, Portugal and the Netherlands. In 1758

he inherited his father's estate, and he conse¬

quently retired from the wine trade in 1761.

Lord Halifax, appreciating Bruce's character, proposed to him a tour of . discovery, in which he promised him his protection and support. He pointed specially to the exploration of the coast of Barbary, in completion of the labors of Shaw, and hinted also at the discovery of the sources VOL. 4 — 40

of the Nile. In the meantime Halifax offered him the consulship of Algiers, which was ac¬

cepted. His gonsulship lasted for two years, and on its expiration in 1765 he visited successively Tunis, Tripoli, Rhodes, Cyprus, Syria and sev¬

eral parts of Asia Minor, where, accompanied by an able Italian draughtsman, he made draw¬

ings of the ruins of Palmyra, Baalbec and other remains of antiquity. Having now formed his plan for visiting Abyssinia, he set out for Cairo in June 1768, after about a year spent in Syria, navigated the Nile to Syene, crossed the desert to the Red Sea, passed some months in Arabia Felix, and reached Gondar, the capital of Abys¬

sinia, in February 1770. On 14 Nov. 1770, he succeeded in reaching the sources of the Abai, then considered the main stream of the Nile.

His 'Travels to Discover the Source of the Nile'

appeared in 1790 in five large quarto volumes.

The authority of the work, in regard to facts of natural history and human manners, was

questioned on its first appearance; but the truth of his descriptions, however, has been amply confirmed by travelers who have visited the same regions. This enterprising traveler lost his life in consequence of an accidental fall down stairs.

BRUCE, Michael, Scottish poet: b. Kin—

nesswood, Kinross-shire, 27 March 1746; d. 5

July 1767. His father, though a weaver and poor, was ambitious to see his boy secure an education. He was himself a man of great

natural talent, and he gave his personal atten¬

tion to the training of his son. The boy, who was early sent to school, developed a singular liking for literature, poetry and history. How¬

ever his days at school were irregular for the poverty of the family made it necessary for him to help in its maintenance. This he did by herding cattle on the hills. This had a strong influence on his poetry which is distin¬

guished for tenderness, pathos and a love of nature. Bruce received an education superior to his position in life and, at the age of 15, he was sent to Edinburgh University which he

attended from 1762 to 1765. The following

year he became a divinity student, but, through lack of means to continue his studies, was forced to become a teacher, an occupation un¬

suitable to his genius and temperament. Broken in health and disheartened he died of consump¬

tion ; and it was not until three years after his death that a collection of his poems was published by John Logan, a clergyman, and

fellow student of Bruce. Logan is accused

of publishing as his own work various of the poems of Bruce, notably, the ‘Ode to the

Cuckoo’ ; and for several years a literary battle was waged against Logan by the friends and admirers of Bruce, who also claimed that the hymns published in Logan’s poems (1781) were the ‘Gospel Sonnets’ of Bruce, which had

disappeared, though they were well known to have existed. Consult Stephen, William, ‘The Poetical Works of Michael Bruce with Life

and Writings’ (1895); MacKenzie, James,

‘Life of Michael Bruce, Poet of Loch Leven’

(1905).

BRUCE, Philip Alexander, American

author: b. Staunton Hill, Va., 7 March 1856.

He was graduated at the University of Vir¬

ginia in 1876 and at the Harvard Law School in 1879. In 1908 he received the degree of (326

LL.D. from Washington and Lee University,

and in the following year from William and Mary College. He was for many years cor¬

responding secretary of the Virginia Historical Society. He is the author of (The Plantation Negro as a Freeman) (1888) ; (Economic His¬

tory of Virginia in the 17th Century) (1895); ‘Short History of the United States) (1903) ; (Rise of the New Souths ; ‘Social Life of Vir¬

ginia in the 17th Century* ; (Life of General Robert E. Lee> ; (Institutional History of Vir¬

ginia in the 17th Century * ; ‘Pocahontas and Other Sonnets) (1912).

BRUCE, William Speirs, Scottish explorer:

b. 1 Aug. 1867. He was educated at Edinburgh University. After serving on various Arctic

and Antarctic expeditions, he led the Scottish National Antarctic Expedition of 1902-04, dis¬

covered 150 miles of the coast-line of Antarc¬

tica, which he named Coat's Land, and bathy-metrically surveyed a part of the south At¬

lantic Ocean and Weddell Sea. He has since explored and surveyed Prince Charles Fore¬

land and other parts of Spitzbergen. He is director of the Scottish Oceanographical Lab¬

oratory.

BRUCE-JOY, Albert, Irish sculptor: b.

Dublin 1842. He studied art at South Ken¬

sington and the Royal Academy School of Art, was a pupil of Foley's and studied in Rome for three years. He has twice visited the United States. He has been entrusted with many im¬

portant commissions, among them being

statues of Gladstone, John Bright, Lord Kel¬

vin and Queen Victoria ; busts of King Edward VII, King George V, Lord Morley, Matthew

Arnold, Chauncey Depew (Lotus Club, Nfcw

York), Hon. Louden Snowden (Philadelphia) ;

his ideal works including (The Young Apollo, >

'Faith,* (The Cricketer,* (The Fencer,* 'The Boy Scout. *

BRUCH, brooH, Max, German composer:

b. Cologne, 6 Jan. 1838; d. Berlin, 3 Oct. 1920.

He studied under Breidenstein and was a spe¬

cial pupil of Hiller, in 1853-57. During this period he completed several of his musical com¬

positions. In 1865 be was director of the musi¬

cal institute of Coblentz, and from 1870 to 1880

lived in Berlin and Bonn. In 1880 he went to Liverpool to become director of the Philhar¬

monic Society; in 1883 he came to the United States and conducted his own oratorio, ‘Arminius,* in Boston; in 1887 he was made a member of the Berlin Academy, and in 1890

obtained the title of royal professor. Bruch ranks among the foremost of the modern com¬

posers. His best works include ‘The Flight of the Holy Family, > ‘ Ulysses, * <Arminius,) ‘Lied von der Glocke> (words by Schiller), ‘Achil¬

les, } ‘Scenes from the Frithjof’s Saga,* ‘Ro¬

man Triumph Song,* ‘SalamisP ‘Ivol Nidrei,*

a Hebrew melody for the ’cello, is a favorite with all ’cellists. His four concertos for vio¬

lin and orchestra rank among the greatest

works of their kind.

BRUCHESI, broo-ka’ze, Paul, Canadian

clergyman : b. Montreal, 29 Oct. 1855. He was educated at Montreal Seminary and Issay,

France; ordained at Rome 1878; later profes¬

sor in Laval University, Quebec, and Montreal ; canon of Montreal Cathedral 1891, and conse¬

crated archbishop of Montreal, 8 Aug. 1897.

He is the author of a number of lectures and other literary works.

BRUCHSAL, brooH’sal, a town of Baden,

on both sides of the Salzbach, 12 miles from Karlsruhe, now an important railway centre.

It is an ancient town, was a common residence of the prince-bishops of Spires from the 12th century, and the residence formerly occupied by them is still standing. This is a building in the rococo style, erected in 1720-70, and in con¬

nection with it is a fine garden with fountains.

In the church of Saint Peter the prince-bishops were buried. Soap, paper, cigars, etc., are made. Pop. about 15,000.

BRUCHUS, a genus of beetles belonging

to the section tetramera and the family Rhyn-cophora or Curculionidce. The antennae are 14-jointed and are filiform, serrate or pectinated, not geniculated as in the more normal Curculi-onidee. It contains small beetles which deposit their larvae in the germs of leguminous plants, and, when hatched, devour their seed. B. pisi is destructive to the garden pea.

BRUCINE, broo’sm (from Brucea), an

alkaloid discovered in 1819 and obtained in the preparation of strychnine, from which it is sep¬

arated by boiling alcohol. It crystallizes in white and transparent prisms, with a rhom-boidal base. It has a very bitter taste but no smell, and is less poisonous than strychnine. It is insoluble in ether and dissolves in a mixture of 850 parts of cold and 500 parts of boiling water. Nitric acid gives it a scarlet, and sul¬

phuric acid a rosy, tint, but both turn gradually to yellow. A solution of copper turns it to vio¬

let. These reactions distinguish brucine both from strychnine and morphine. The salts of

brucine are tolerably numerous and are pre¬

pared by double decomposition or by direct

combination of the brucine with the acid. They are for the most part crystallizable and, like the base, have a bitter taste. They are not used in medicine. Symbol + 4H20.

BRUCIOLI, brooche-d'le, or BRUCCI—

OLI, Antonio, Italian reformer and scholar:

lx Florence, about 1500; d. after 1554. In 1522, having become implicated in a conspiracy against Giuglio di Medici, who then governed "Florence in the name of Leo X, he took refuge in France, where he became acquainted with the doctrines of the reformers and probably embraced them.

On the expulsion of the Medici in 1527 he re¬

turned to Florence, but, by his free declamation against monks and clergy, brought his ortho¬

doxy in question and was imprisoned on several charges, among which that of heresy was in¬

cluded. He would have been executed but for the interference of powerful friends, who ob¬

tained a commutation of his sentence into

banishment. He retired to Venice with two

brothers, who were printers, and availed him¬

self of their press to publish a great number of works, of which the most celebrated is a trans¬

lation of the Bible into Tuscan. The boldness of his annotations caused it to be ranked as a heretical work. Brucioli was living in 1554, but the exact date of his death is not known. The number of his volumes is said to have exceeded that of his years. Among his works are Italian translations of Pliny, Aristotle and Cicero, and annotated editions of Petrarch and Boccaccio.

BRUCITE, a native hydrate of magnesia,

having the formula Mg(OH)2. It has a hard¬

ness of 2.5 and a specific gravity of about 2.4.

Its color is white, often tinted blue or green.

At T. exas, Pa., it crystallizes in hexagonal (rhombohedral), tabular plates whose bases

show pearly lustre while the edges are vitreous to waxy. A fibrous, pearly variety occurs at Hoboken, N. J. Delicate blue and green crys¬

tals were found at Tilly Foster, N. Y. Brucite was named for Dr. A. Bruce, an American

mineralogist, who first described it as a species.

BRUCK, brook, Karl Ludwig, Baron,

Austrian statesman: b. Elberfeld, 8 Oct. 1798; d. Vienna, 23 April 1860. In 1821 he went to Trieste in order to take part in the war for Grecian independence, and, remaining there

several years, founded the Trieste Lloyd (later the Austrian Lloyd), a combination of insur¬

ance societies. In 1848 .he was a member of the German National Assembly; after the Vi¬

enna revolution of October 1848, he became

Minister of Commerce and Public Works. In

this office he introduced a number of reforms in the industrial policy

of the government, es¬

tablished important telegraph lines, built a num¬

ber of highways and railroads and founded the Austro-German Postal Union. In 1849 the

Emperor gave him the rank of baron, but in 1851 he was compelled to resign his ministry.

In 1855 he became Minister of Finance; he

was not able to introduce the reforms he wished and when a period of general financial disaster resulted from the Italian war, Bruck was per¬

sonally blamed. He accordingly obtained his

dismissal from the Emperor and the next day committed suicide. He was officially declared innocent one month after his death.

BRUCKER, brook'er, Johann Jakob, Ger¬

man historian: b. Augsburg, Bavaria, 22 Jan.

1696; d. there, 26 Nov. 1770. He was educated at Jena and in 1744 became pastor at Augs¬

burg. His most important work is a (Critical History of Philosophy* (1741-44), in Latin,

which was the first complete history of the different philosophical schools. It contains bio¬

graphical matter of great value.

BRUCKNER, brook'ner, Anton, Austrian

organist and composer : b. Ansfelden, 4 Sept.

1824; d. 11 Oct. 1896. He was mostly self-edu¬

cated, but after serving as organist in the cathe¬

dral at Linz he studied for a time in Vienna under Simon Sechter, whom he succeeded as

court organist. He later became professor at the Vienna Conservatory and lecturer on music at the university. Bruckner is to some extent an imitator of Wagner; his best-known com¬

positions are his symphonies; he has written also some religious music, including a Te Deum and several masses.

BRUEGEL, or BREUGHEL, BREU—

GELS, etc., bre'Hel, a family originating in Brabant and of which no less than 12 individ¬

uals — during a period of five generations —were artists. Only one of them is of first-rate importance, but he is sufficient to immortalize the name. This is the founder of the family, Pieter: b. Bruegel, near Breda, about 1528; d.

Brussels 1569. He is often spoken of as the Old or Peasant Bruegel, by reason of his sub¬

jects, and is to be distinguished from his son, Pieter II, called Hell Bruegel. While the

later members of the family may be considered as of the Flemish school, Pieter (I) is of the Dutch school. Pieter Bruegel, the elder, began his studies under a pupil of Hieronymus Bosch, who persuaded him to go to Antwerp and work under P. Coeck dAlast, painter to Charles V.

He did so, but his admiration for his robust compatriot, Bosch, kept him from accepting

the Italian tendency of Coeck, and it is to Bosch that we must trace Bruegel's technique and his idea of art. In 1551 he entered the guild of Antwerp as a master painter. Shortly afterward he made a journey to Italy, by way of France, arriving in Rome in 1553. By 1554

he was back in Flanders, again but little in¬

fluenced by the Italians. He lived at Antwerp till 1563, when he married the daughter of Pieter Coeck and took up his residence at

Brus¬

sels, where he remained until his death. It is during his last six years that his genius reached its greatest development. He had already ac¬

complished a powerful and original work in

his earlier religious pictures and he continued with these subjects. But the realistic observa¬

tion of Bruegel was more at liberty when, in his last period, he frankly took the life about him as his subject, for it had been that which interested him chiefly even when depicting sa¬

cred themes. All the vigorous humor and

satire of Bosch appear again in a finer and more profound spirit. The whole outlook of

Brouwer, Ostade and Teniers in the 17th cen¬

tury and Millet in the 19th is foreseen, and they never approached their predecessor. The sane and healthy outlook on mankind is supple¬

mented by a magnificent conception of nature.

One can think of no other painter who has given the sense of vastness in a landscape and at the same time kept the amazing realism of detail that Bruegel gives us. Best of all, he has a sense of design that carries his philo¬

sophic and emotional qualities immediately into the realm of art. He is, in fact, one of the world's great designers, and the admiration he inspires is increased when we reflect that he is the originator of his style instead of inherit¬

ing it from others. As painting, whether in tempera (as the (Blind Men* at Naples) or

in oil (e.g., <Winter) at Tournai) his works are masterpieces. Among other important pic¬

tures to be mentioned are the (Massacre of the Innocents, *at Brussels; (The Brigands,*

at the University of Stockholm; (The Wed¬

ding Dinner* at the Vienna Museum, and

(The Wolf,* in the collection of Mr. John G.

Johnson of Philadelphia. His spirited and

important engravings have been edited by Van Bastelaer. His eldest son, Pieter the Younger, b. Brussels 1564; d. there 1637, studied with Gillis van Conincxloo at Antwerp. Like his

father, he painted rural and genre subjects, but he is generally known as (<H611en-Bruegel,)) because of his fondness for representing the infernal regions and subjects like witches,

devils and robbers. Jan Bruegel, the Elder: b. Brussels 1568; d. there 1625. The younger son of Pieter the Elder is usually called ((Velvet-Bruegel** from the softness and smoothness of his technique. He studied with Goetkind

in Antwerp and spent several years in Italy.

He returned to Antwerp about 1597 and soon acquired wealth and high honors. He was

dean of the painters' guild (1601-02) and, like his intimate friend, Rubens, was official painter to the regents of the Netherlands. His land-628

scapes are important in the development of

landscape painting. They usually contain many small figures and are numerous in all the prin¬

cipal European collections. The most import¬

ant are probably the 54 examples in the gallery of Madrid. His son and pupil, Jan Bruegel, the Younger: b. Brussels 1601; d. 1678. It is difficult to distinguish his work from his

father's. For the Bruegel family consult

Rooses, (Geschiedenis der Antwerpsche bilder—

schule) (Antwerp 1887-90), and Michel, (Les

BrueghеP (Paris 1892).

BRUEIS, broo-e's, or BRUYS D'AIGAIL—

LIERS, Frangois Paul, French admiral: b.

Uzes, 11 Feb. 1753; d. 1 Aug. 1798. He entered the navy at an early age and gradually rose in the service. In 1798 he was employed to con¬

vey Bonaparte and his army, who were to

effect the conquest of Egypt and the East, and having managed to elude the vigilance of Nel¬

son, who had been long watching for him,

reached the Bay of Abukir, and disembarked

the troops in safety. Brueis moored his fleet in a position naturally so strong that he deemed it impregnable; but by the heroic daring of Nelson, he found the precautions which he had taken turned to his disadvantage. In the battle which ensued, he fell fighting boldly, a little before his ship, the Orient, of 100 guns, was destroyed. See Abukir.

BRUES, brooz, Charles Thomas, Ameri¬

can entomologist: b. Wheeling, W. Va., 1879.

He studied at the University of Texas and at Columbia University ; was appointed field agent of the Bureau of Entomology, United States

Department of Agriculture 1904-05; curator of invertebrate zoology in the Milwaukee Public Museum 1905-09, and then became instructor

in economic entomology at Harvard University.

His contributions on embryology and the habits of insects, notably the

Hymenoptera — ants, bees, etc., and Diptera — mosquitoes, flies, fleas, etc., are highly instructive. He was editor of the Bulletin of the Wisconsin Natural History

Society 1907-09; and in 1910 was appointed

editor of Psyche, a journal of entomology.

BRUGES, broozh, (Flemish Brugge), a

city of Belgium, capital of West Flanders, situ¬

ated about 60 miles northwest of Brussels, about eight miles from the sea, surrounded and inter¬

sected by canals which connect it with Ostend and other places. By these canals fairly large vessels can reach Bruges; and a ship canal built since 1900 connects it with th.e sea at Zeebrugge on the North Sea, seven and one-half miles distant. This allows ships of 25 feet draft to reach the wharves of the city. Bruges

has over 50 bridges all opening in the

middle for the passage of vessels. The

Halles (containing cloth and other markets)

is a fine old building, with a famous belfry or tower 350 feet high, in which is a fine carillon of 48 bells. Bruges has also a beautiful town hall dating from the 14th century; a palace of justice, noted for a magnificently adorned fire¬

place; an academy of painting, sculpture and architecture ; a public library, etc., and many valuable specimens of architecture and sculp¬

ture. In the church of Notre Dame, which

has a spire 290 feet high, are the splendid tombs of Charles the Bold and of Mary of Burgundy, his daughter, constructed in 1550, besides many other artistic treasures. The cathedral of Saint Sauveur dates from the 13th and 14th centuries, and is unattractive externally, but has a fine interior, and there are other notable churches.

Philip the Good here founded the order of the Golden Fleece in 1430; and the celebrated jan Van Eyck, or John of Bruges, the supposed

inventor of painting in oil, was born here. From the 7th century Bruges was rapidly acquiring importance. It was fortified by Count Baldwin in 837, walled first in 1053 and again in 1270.

During the government of the rich and power¬

ful counts of Flanders, who resided there from the 9th to the 1 5th centuries, its woolen manu¬

factures grew and flourished to an amazing ex¬

tent. The wealth of the citizens was enormous; a single merchant gave security for the ransom of Jean sans Peur, the last Count of Flanders, to the amount of 400,000 crowns of gold. Un¬

der the Austrian dynasty, at the close of the 15th century, the rebellious vConduct of the in¬

habitants of Bruges called upon it such destruc¬

tive vengeance that henceforth its greatness died away, its trade was transferred to Ant¬

werp, and the religious persecution and ferocity of the Spanish under Philip II and the Duke of Alva completed the process of its ruin. During the wars of the Spanish and Austrian succes¬

sions the city was besieged by the Dutch and the French. In 1794 it was taken by the latter, and from 1814 to 1830 it belonged to the Nether¬

lands. In 1914 it was taken by the Germans and held by them during the war. With Zee¬

brugge it formed an important base for the fitting out of submarines in the undersea cam¬

paign directed against England's commerce.

The remains of ancient buildings, abandoned

monasteries and streets half deserted from

the diminished population of the modern city give Bruges an antiquated and venerable ap¬

pearance. Many of the houses are very old, but in a state of excellent

preservation. Bruges is still, by means of its canals, an entrepot of Belgian commerce. The chief articles manu¬

factured here are lace, linen, damasks, light woolen goods, cottons, mixed stuffs, beer, *etc.*

It exports agricultural produce and manufac¬

tured goods, and imports wine, oil, colonial pro¬

duce, *etc.* Pop. 54,000. Consult Gilliat-Smith, (Bruges) (in (Mediaeval Towns Series, } 1901) ; Duclos, (Bruges; histoire et souvenirs) (1910).

BRUGG, a town in the Swiss canton of

Aargau, on the right bank of the Aar, and near the mouth of the Reuss, 36 miles east-southeast of Basel by rail. Among the industries are silk mills, machine shops, chemical works and a power-house. Near it is the site of Vindo-nissa, the chief Roman station in Helvetia ; and it was also the cradle of the house of Hapsburg, whose ruined castle, founded in 1020, crowns a wooded height two miles distant.

Nearer is the abbey of Konigsfelden (1310;

converted in 1872 into an asylum) in the vaults beneath which are interred many of the mem¬

bers of the Austrian royal family. Zimmer¬

man, the philosopher, was born here in 1728.

Pop. about 3,000,

BRUGMANN, broog-man, Friedrich Karl,

German philologist : b. Wiesbaden, 10 March

1849.. He was educated at Halle and Leipzig; was instructor in the gymnasium at Wiesbaden and at Leipzig; and in 1872-77 was assistant at the Russian Institute of Classical Philology at the latter place. In 1877 he was lecturer at BRUGSCH — BRUHNS

the University of Leipzig, and in 1882 became professor of comparative philology there; in 1884 he took the same position at the University of Freiburg, but returned to Leipzig in 1887

as successor to Curtins. He is one of the chief representatives of the new school of philologists and his researches have done much to revolu¬

tionize the study of philology. This school, known as that of the <(Neo-grammarians,® fol¬

lowed Leskien, especially in urging the inviol¬

ability of laws of sound changes, and in em¬

phasizing the working of analogy as an im¬

portant linguistic factor, as well as in laying stress on the observation of phonetic laws and their operation in modern languages. As joint editor with Curtins of (Thc Studies in Greek and Latin Grammar, 1 he wrote an article for this work on (Nasilis Sonans,1 in which he defended theories so radical that Curtius after¬

ward disclaimed them. His conclusions are

now generally accepted. His most important

work, summarizing his conclusions, is (Outline of the Comparative Grammar of the Indo-Germanic Languages) (translated into English) ; he also wrote (Morphological Researches in

the Indo-Germanic Languages 1 (with Osthoff) ; (A Problem of Homeric Textual Criticism)

(1870) ; Lithuanian Folk Songs and Tales)

(1882) ; (The Present Position of Philology1; (Greek Grammar 1 ; and (Short Comparative

Grammar1 (1902). Brugmann was knighted

by the King of Saxony, and in 1896 he was invited, with other distinguished scholars, to attend the jubilee of Princeton University,

where he received the degree of doctor of

laws.

BRUGSCH, Heinrich Karl, German Egyp¬

tologist : b. Berlin, 18 Feb. 1827 ; d. Charlotten-burg, 9 Sept. 1894. A work entitled (Scriptura yEgyptiorum Demotica,1 published in 1848,

gained him the favor of Alexander von Hum¬

boldt and Frederick William IV, the latter of whom enabled him to complete his studies by visiting the museums of Paris, London, Turin and Leyden. In 1853 he made his first visit to Egypt and assisted Mariette in his researches, being appointed on his return in the following year assistant in the Berlin Egyptian Museum.

He accompanied the Prussian embassy to Per¬

sia in 1860, and four years later became consul at Cairo. Returning in 1868, he was appointed to the chair of Egyptology at Gottingen, but soon resigned in order to take charge of the Cairo school of Egyptology. He was soon

raised to the rank of bey, and some time after¬

ward to that of pasha. In 1876 he came to the United States as Egyptian commissioner to the Centennial Exposition at Philadelphia. In 1883

he traveled in Egypt, Syria, Greece and Italy, with Prince Frederick Charles of Prussia, and in 1885-86 he twice visited Persia, partly on official business. He was again in Egypt in 1891, and in the following year he made a jour¬

ney to the Libyan Desert. Brugsch's chief work is the Hieroglyphisch-demotisches Worterbuch1

(1867-82). His other writings include (Reise-berichte aus Agypten1 (1855) ; {Grammaire

Demotique1 (1855) ; (Monuments de l'Egypte1

(1857); (Geographische Inschriften altagyptis—

cher Denkmaler1 (1857-60) ; (Histoire d'Egypte1

(1859); (Recueil des Monuments Egyptiens1

(1862-85); (Reise der koniglich Preussischer

Gesandtschaft nach Persien) (1862-63) ; (Hi-

eroglyphische Grammatik1 (1872) ; (Geschichte Agyptens unter den Pharaonen1 (1877) ; (Dic-tionaire Geographique de l'ancienne Egyptc1

0877-80) ; (Religion und Mythologie der alten Agypter, nach den Denkmalern1 (1888) ; (Thc-saurus lnscriptionum Lgyptiacarum1 (1883-91) ; Lie Agyptologie1 (1890) ; (Aus dem

Morgenlande, Altes und Neues1 (1893), *etc.*

His Hlistory of Egypt from the Monuments1

has appeared in English. In 1894 his autobi¬

ography appeared under the title (Mein Leben und Wandern. 1

BRUHL, brel, Heinrich (Count von),

Saxon politician: b. Weissenfels, Prussia, 13

Aug. 1700; d. Dresden, 28 Oct. 1763. As a page he gained the favor of Frederick Augustus I of Poland, and on the death of the King in 1 733, the crown of Poland with the other regalia being, through the good fortune of Briihl, en¬

trusted to him, he carried them immediately to the new Elector, Augustus III, and showed the greatest activity in promoting his election. He had cunning and skill sufficient to govern his master and get rid of his rivals and succeeded in keeping everybody at a distance from the King. No servant entered his service without the consent of Briihl, and even when he went to the chapel all approach to him was prevented.

Briihl kept 200 domestics ; his guards were better paid than those of the King himself, and his table more sumptuous. Frederick II says of him, <(Briihl had more garments, watches, laces, boots, shoes and slippers, than any man of the age. Caesar would have counted him

among those curled and perfumed heads which he did not fear® ; but Augustus III was no Caesar. When this idle prince loitered about smoking, and asked, without looking at his

favorite, ((Briihl, have I any money?® Wes, sire,® was the continual answer; and to satisfy the King's demands he exhausted the state,

plunged the country into debts and greatly

reduced the army. At the beginning of the

Seven Year's War it comprised but 17,000 men, and these were compelled to surrender at Pirna from want of the necessary supplies. Briihl fled with the King, the pictures and the china, to Poland; but the archives of the state were left to the victor. He was no less avaricious of titles and money than of power. An exam¬

ination after his death showed that he owed his immense fortune to the prodigality of the King rather than to unlawful means of accumu¬

lation. His own profusion was often beneficial to the arts and sciences.

BRUHNS, brons, Karl Christian, German

astronomer: b. Plon, Holstein, 22 Nov. 1830; d.

Leipzig, 25 Julv 1881. He was the son of a locksmith; going in 1851 as locksmith and me¬

chanic to Borsig, and then to Berlin with Sie¬

mens and Halske, he attracted the attention of Encke by his remarkable powers as a computer, and was appointed in 1852 as assistant, and in 1854 as observer, in the Berlin .Observatory, and in 1859 as instructor in the university. In 1860

he was called to Leipzig as professor of astron¬

omy and director of the new observatory to be constructed there, which, under his skilful direc¬

tion, grew into one of the finest structures of its kind in Europe. He is known as the dis¬

coverer of five comets, an able computer of cometary and planetary orbits, and for his

important work in geodesy in connection with the European triangulation.

BRUISE, or CONTUSION, an injury

caused by a blow or sudden pressure, in which the skin is not wounded and no bone broken or dislocated. Both terms, but more particularly the latter, are employed in surgery to include all such injuries from a black eye to a thor¬

oughly crushed mass of muscle. In the slighter forms of this injury, as in ordinary simple bruises, there is no tearing but only a concus¬

sion of the tissues, the utmost damage done being the rupture of a few small blood vessels, occasioning the discoloration always observed in these cases. In more severe contusions, the subjacent structures- — -muscles, connective tis¬

sue, vessels, *etc.* — are more or less ruptured, and in extreme cases are thoroughly crushed and usually become gangrenous. The quantity

of blood extravasated depends chiefly upon the size and number of the ruptured blood vessels, but partly also on the nature of the textures of the injured part. Thus, a lax tissue, as that of the eyelids, favors the escape of blood into the surrounding parts. Simple and not very

severe bruises require little treatment other than the rest necessary for

the avoidance of pain, but the removal of the swelling and discolora¬

tion may be hastened by the application of vari¬

ous local stimulants, which seem to act by ac¬

celerating the circulation through the bruised part and promoting the absorption of the ef¬

fused fluid. Friar's balsam, compound soap

liniment or poultices made with the roots of black bryony beaten to a pulp are popular rem¬

edies of this class. Tincture of arnica has a great reputation, but experiments have made it very doubtful whether it is any more efficacious than simple spirit of the same strength. A so¬

lution of sulphurous acid, and hazeline and other preparations of the American witch-hazel are of more value. They should be kept con¬

stantly applied to the bruised part on lint or cotton wool. Pugilists, who are probably bet¬

ter acquainted with ordinary bruises than any other class of men, are in the habit of removing the swelling of the eyelids that often naturally occurs during a prize fight to such an extent as to close the eyes, by at once puncturing the eyelids at several points with a lancet ; and their favorite remedy for a black eye or other bruise on the face is a fresh beefsteak applied locally as a poultice. Bruises of a more severe nature, as when there is much breaking or

crushing of the tissues, must, of course, at once be referred to the care of a surgeon.

• •

BRUILL, Ignaz, Austrian pianist and com¬

poser: b. Brossnitz, 7 Nov. 1846; d. 17 Sept.

1907. Pie was educated at Vienna under Ep¬

stein and Dessoff, and played at concerts there and in London. His first composition appeared in 1861 and afterward he became instructor at a school of music in Vienna and has won dis¬

tinction as a composer. His works include

several numbers for the piano, orchestral pieces and operas, among them (The Beggar of

Samarkand,) (The Golden Cross, y (Bianca, >

(Queen Marietta,* (The Heart of Stone* and

(The Hussar. *

BRUMAIRE, brii-mar', the second month

of the year in the French revolutionary calen¬

dar. It commenced on 23 October and ended

on 21 November, thus comprising 30 days. It received its name from the fogs that usually prevail about this time. The 18th of Brumaire, VIII year (9 Nov. 1799), is celebrated for the overthrow of the Directory and the establish¬

ment of the sway of Napoleon. See Calendar.

BRUMIDI, broo-me'de, Constantine, Ital¬

ian painter: b. Rome, 20 June 1805; d. Wash¬

ington, D. C., 29 Feb. 1880. He studied at Rome, becoming a member of the Academy of

Saint Luke at the age of 13. He painted fres¬

coes in the Vatican under Gregory XVI, be¬

sides adorning other palaces in his native city.

The occupation of Rome by the French caused him to emigrate to America, and in 1852 he became a citizen of the United States. After settling in this country, he executed much of the decoration of the national capitol, forming a belt about the base of the interior of the dome, the first frescoes in America. They represent (The Apotheosis of Washington) and various

scenes from American history, in addition to work of an allegorical character. He also dec¬

orated churches in Philadelphia and in the City of Mexico.

BRUMMAGEM JOE. See Chamber-

lain, Joseph.

BRUMMEL, George Bryan (<(Beau Brum¬

mel**), English dandy: b. London 1778; d.

Caen, 29 March 1840. He was educated at

Eton and Oxford, at both of which places he acquired great distinction by his taste in dress, which afterward made him the autocrat in the world of fashion. At the age of 16 he casually made the acquaintance of the Prince of Wales, afterward George IV, who conceived a par¬

ticular fancy for him and made him a cornet in his own regiment, the 10th Hussars. Brummel was now introduced into the most aristocratic society in England, and through the favor of the Prince had rapid promotion in the army, though his carelessness was such that he often did not know his own troop. The death of his father in 1794 put him in possession of a for¬

tune of £30,000, which he expended in a course of sumptuous living, extending over a period of 21 years, during which his dicta on matters of etiquette and dress were received in the beau monde as indisputable. He kept a mag¬

nificent bachelor establishment, gave splendid dinners and basked in all the sunshine that youth, money and princely favor could bestow.

But the fickle temper of the Prince Regent at last tired of Brummel and an estrangement

took place. The beau's creditors now began

to be clamorous and in 1814 he crossed the Channel to Calais, where

he resided for many years, partly supported by the remains of his own fortune and partly by remittances from

friends in England. In 1824, when George IV

passed through Calais on his way to Hanover, Brummel ventured again to address himself to him, but was unceremoniously repulsed. Sub¬

sequently to this he was appointed consul at Caen, but after holding this office for a few years it was abolished as unnecessary, and he was reduced to absolute poverty. His mind,

too, gave way, and he died in the Asylum du Bon Sauveur, in Caen, France. Bulwer's (Pel¬

ham } is said to be founded on Brummel's life.

Consult Jesse, (Life of George Brummel, Esq.*

(new ed., London 1885), and Boutel dc Mon—

vel, (Beau Brummel and His Times.)

BRUMMITT, Dan Briarley, Methodist

clergyman and editor: b. Batley, England, 13

Aug. 1867. He came to the United States in 1882 and was educated in Kansas Agricultural College, Baker University, Drew Theological

Seminary and New York University. He was

ordained as Methodist Episcopal minister in

1893 and held various churches in Kansas from that date until 1897. He was assistant editor of The Epworth Herald 1901-10, on which

date he became manager of the circulation de¬

partment of the Methodist Book Concern and, in 1912, editor-in-chief of The Epworth Herald.

He is author of < Epworth League Methods J

(1906), and (The Efficient EpworthiaiP (1914).

BRUN, broon, or BRUNN, Malte-Conrad

(generally known as Malte-Brun), Danish

geographer and politician: b. Thisted, Jutland, 12 Aug. 1775 d. 14 Dec. 1826. While yet very young he produced some poems which gave great promise of his rising to eminence as a poet, though his father had destined him for the Church. About this time the French Revolution called forth a host of ardent champions of the cause of progress throughout Europe, and the young poet embraced it with enthusiasm. He

abandoned the Church for the bar and subse¬

quently became editor successively of two jour¬

nals, in which his advocacy of Liberal princi¬

ples provoked a state prosecution that compelled him to take refuge in the Swedish island of Hven, once the residence of Tycho Brahe. Not long after, his admiration of Napoleon Bona¬

parte, then rapidly advancing to the head of affairs, prompted him to take up his abode in France; but the elevation of his idol to the post of consul for life opened Brun's eyes to his ambitious designs, and for the time he with¬

drew from the pursuit of politics. He now

directed his attention to the science of geogra¬

phy. In 1803 he published, along with Men—

telle and Herbin, the commencement of Geog¬

raphic, mathematique, physique, et politique de toutes les parties du monde,* a work which was completed in 16 volumes in 1807 and in the composition of which Brun's share amounted

to about a third. Before the completion of this work his reputation as a writer had been firmly established, and in 1806 he received an appointment on the staff of the Journal des Dehats, for which he continued to write arti¬

cles on foreign politics until his death. In 1808

appeared his (Tableau de la Pologne,* and the same year he joined M. Eyries in starting the (Annales des Voyages, de la geographic, et de l'histoire,5 which proved the introduction into France of regular periodical geographical liter¬

ature. In 1810 was published the first volume of his (Precis de la geographic universelle,*

completed in eight volumes in 1829 and reis¬

sued in 12 volumes in 1831. During the Hun¬

dred Days, Brun adhered to the legitimist cause and published an (Apologie de Louis XVIII. V

Toward the end of 1821 he lent powerful as¬

sistance in establishing the Societe de Geogra¬

phic. Besides the works already mentioned,

he was the author of various geographical and political treatises too numerous to particularize.

His son, Victor Adolphe, was also a noted

student and professor of geography.

BRUNANBURGH, broo-nan-bur'6, Scot¬

land, the scene of a battle in which Athelstan and the Anglo-Saxons defeated a force of

Scots, Danes, etc., in 937 ; locality very doubt¬

ful. The battle forms the subject of one of the oldest Anglo-Saxon poems.

BRUNCK, broonk, Richard Frangois

Philippe, French critic: b. Strassburg, 30 Dec.

1729; d. same place, 12 June 1803. He made rapid progress in learning when he studied with the Jesuits in Paris, but neglected study and was engaged for a while as military commis¬

sary in the Seven Years' War. While in win¬

ter quarters at Giessen, as commissary of war during the French campaigns, he resided with a professor who, by his advice and example, revived his love of letters and led him to the study of the classics. When Brunck returned to Strassburg he devoted all his leisure time to Greek, and at the age of 30, and while hold¬

ing public office, attended the lectures of the Greek professor of the university. The zeal which had encouraged him to undertake this

laborious study was increased by the pleasure of overcoming difficulties, and he became fixed in the conviction that all the instances of appar¬

ently careless writing in the Greek poets were only errors of the transcribers. Entertaining this opinion, he altered whatever displeased him, overthrew the order of the verses and permitted himself liberties which criticism must needs reject. This arbitrary process is so vis¬

ible, even in the editions he has published, that much caution is required in using them. Brunck has, nevertheless, been of essential service to Greek literature, and since the revival of letters few scholars have so effectually promoted it.

He published a valuable edition of Virgil. Of his Greek editions mention may be made of

those of the (Analecta, } (Apollonius Rhodius,*

(Aristophanes, } (The Gnomic Poets) and his masterpiece, (Sophocles, > for which the King allowed him a pension of 2,000 francs. At this time the French Revolution interrupted his

studies. He adopted the new ideas with en¬

thusiasm but without deviating from the prin¬

ciples of moderation. He was arrested at

Besangon during the Reign of Terror and did not obtain his liberty until after the death of Robespierre. In 1791 and again in 1801 eco¬

nomical reasons obliged him to sell part of his library. As he was passionately fond of his books, and his former fortune had enabled him to collect an excellent library this was a severe privation. From this time Greek became his

aversion; but he prepared an edition of Ter¬

ence and had Plautus ready for publication

when he died. Many of his papers are in the library at Paris.

BRUNDUSIUM, or BRUNDISIUM.

See Brindisi.

BRUNE, broon, Guillaume Marie Anne,

Marshal of France: b. Brives-la-Gaillarde, 13

March 1763; d. 2 Aug. 1815. While young he went to Paris to study law. At the breaking out of the Revolution he was a printer and had made himself known by some small pieces of his own composition. He now devoted himself ardently to politics, was connected with Danton, and played an active part in the tempests of that period. Till 10 Aug. 1792 he was engaged in publishing a daily newspaper. Afterward he went as civil commissary to Belgium. In 1793

he entered the military service in the revolution¬

ary army in the Gironde. He aided Barras to 632

put down the Jacobins, who had assaulted the camp of Grenelle, 10 Oct. 1795. Afterward he distinguished himself as general of brigade in the Italian army, in the battle of Areola and in the attack on Verona. When the Directory of Switzerland declared war Brune received

the chief command of an army, entered the

country without much opposition in January

1798, and effected a new organization of the government. In 1799 he received the chief

command in Holland, defeated the British, 19

September, near Bergen, and compelled the Duke of York to agree to the treaty of Alkmaar, 18

October, by which the British and Russians

were to evacuate the north of Holland. In

January 1800, he was made a councillor of state, and was placed at the head of the Army of the West, in occupation of La Vendee, and contrib¬

uted greatly to the re-establishment of tranquil¬

lity in the revolted province. He was appointed commander-in-chief of the Italian army 13 Au¬

gust. Toward the end of December he led his troops over the Mincio, conquered the Austrians, passed the Adige 8 Jan. 1801, took possession of Vicenza and Roveredo, and concluded an

armistice, 16 January at Treviso, with the Aus¬

trian general, Bellegarde, by which several forti¬

fied places in Italy were surrendered to the French troops. When peace recalled him to the council of state toward the end of November 1802, he laid before the legislative body for confirmation the treaty of peace with the court of Naples. Next year he went as Ambassador to Constantinople. He prevailed there at first over the British party, and received from the Turkish ministry the highest marks of honor; but when new dissensions arose between the

two powers he left Turkey. During his absence, 19 May 1804, he was appointed marshal of the empire. At the end of 1806 Napoleon appointed him governor-general of the Hanseatic towns, and soon after commander of the troops in

Swedish Pomerania against the King of Sweden.

This monarch invited the marshal to a personal interview, in which he endeavored to convert him to the cause of Louis XVIII. Brune re¬

fused every proposal. After the revolution of 1814 he acknowledged Louis XVIII, and re¬

ceived the cross of Louis, but no appointment.

This was the cause of his declaring himself for Napoleon immediately upon his return. He re¬

ceived the chief command of an important army in the south of France and was made a peer.

When circumstances changed again he delayed

a long time before he gave up Toulon, which was in his possession in 1815, to the troops of Louis XVIII, and sent in his resignation to the King. This circumstance, the severities ex¬

ercised by his command, and a report that he was the murderer of the Princess Lamballe,

excited popular feeling against him. While re¬

tiring, from Toulon to Paris he was recognized at Avignon by a royalist mob, which broke into his hotel and shot him. His body was exposed to the most shameful insults, and then thrown into the river

Rhone. Consult (Notice historique sur la vie politique et militaire du Marechal Brune* (Paris 1821) ; and Conchard, Vermeil de, (L'Assassinat du Marechal Brune) (Paris 1887).

BRUNEI, broo-na'e, BRUNI, or Borneo

Proper, a state lying northeast of Sarawak, in the island of Borneo. It has an area of 4,000

square miles and a population of about 30,000.

The territory forms a triangle, having for a base the coast line from a point three miles north of the mouth of the Baram River to the mouth of the Timbang. This is all that re¬

mains of the old Malay Sultanate of Bruni, which is now under the protection of the

British Crown. The town of Bruni, the an¬

cient capital of the sultans, is built over the water on the river Bruni, not far from its mouth. Pop. about 15,000. A British protec¬

torate over Brunei was proclaimed in 1888, as well as over North Borneo (q.v.) and Sara¬

wak (q.v.). Thus the whole of Borneo — the largest island in the world — is divided between the Dutch and British. On 2 Jan. 1902,

by treaty, the Sultan of Brunei handed the general administration over to a British resi¬

dent, acting under the governor of the Straits Settlements, who is high commissioner for

Brunei. The Sultan Mohammed Jemal-ul-alam

(b. 1889) succeeded his father in 1906. He receives $7,000 per annum from state funds

and his two chief ministers are paid $3,500

each. There is but little manufacturing indus¬

try beyond the processes of reducing the raw products to a portable condition. The chief products exported are cutch (q.v.), coal, rubber and sago ; imports consist mainly of rice,

tobacco, tools and cloth. Most of the trade is with Singapore, and a regular steam launch

service is maintained with Labuan (43 miles).

The revenue falls short of the expenditure, and the state is run at a loss by the British Crown.

For bibliography see Borneo.

BRUNEL, broo-nel', Isambard Kingdom,

English engineer: b. Portsmouth (son of Sir Marc Isambard Brunei, q.v.), 9 April 1806; d.

15 Sept. 1859. He was educated at the Henri IV

College at Caen, France. The bent of his

genius was toward mechanical pursuits, and

at the age of 20 he commenced practical engi¬

neering under his father at the Thames Tunnel, for which he acted as resident engineer. Dur¬

ing the progress of the works he was more than once in imminent danger of his life by the breaking in of the river, and only saved himself by swimming. His attention was mainly directed to steam, navigation and railway engi¬

neering, and of his works in these departments may be mentioned, among others, the Great

Western (1838), Great Britain (1845) and Great Eastern (1858) steamships; the entire works on the Great Western Railway, to which he was appointed engineer in 1833; and the railway viaduct over the Tamar at Saltash. He was

also the engineer of the Hungerford suspen¬

sion bridge. He designed many docks at Eng¬

lish seaports, including those of Monkwear—

mouth, Plymouth, Briton Ferry and Milford

Haven. The genius of the younger Brunei was undoubted, but in carrying through his opera¬

tions he was, like his father, too apt to regard merely the attainment of a grand and brilliant result without taking into consideration the losses and expense which might thereby be

occasioned to those who had invested their

capital in the undertaking. This was more

especially the case with the Great Western Rail¬

way. While on board the Great Eastern — his last work — the day before she quitted the Thames on her first. disastrous cruise, Mr. Bru¬

nei was suddenly seized with paralysis and had BRUNEI - BRUNER

to he carried home. In a weeK afterward he expired. He became a fellow of the Royal

Society in 1830, and D.C.L. of Oxford in 1857.

BRUNEL, Sir Marc Isambard, English

engineer : b. Hacqueville, near Rouen, 25 April 1769; d. 12 Dec. 1849. He was the son of a Normandy farmer, and was educated at the

seminary of Saint Nicaise, Rouen. From early boyhood he displayed a decided turn for scien¬

tific and mechanical pursuits, amusing himself with the construction

of ships, musical instru¬

ments and machines of different sorts. At the age of 15 he went to Rouen, where he took a course of lessons in drawing, perspective and hydrography. In 1786 he entered the French

naval service and made several voyages to the West Indies, in which he distinguished himself both by his inventive mechanical genius and the attention and ability with which he discharged the duties of a seaman. In 1793 he returned to France, and, having paid a visit to Paris, and taken part in the proceedings at one of the political clubs, he narrowly escaped proscription by venturing to oppose the ferocious doctrines then current, and was obliged to make his

escape to America. Shortly after his arrival there he joined a party of Frenchmen in an expedition to explore the regions around Lake Ontario, and in 1794 he was appointed one of the surveyors of the canal now connecting

Lake Champlain and the river Hudson. He

was afterward employed, both as engineer and architect, on various undertakings in the city of New York, including the erection of forts for its defense and the establishment of an arse¬

nal and foundry. He submitted a highly

ornamental design for the national capitol at Washington, w hich was not accepted ; but he was engaged in building the Bowery Theatre, New York, which was destroyed by fire in 1821.

In 1799 he went to England and settled at Plymouth, where he married Miss Sophia King¬

dom, whom he had formerly known at Rouen.

His first wrork in this country was the con¬

struction of a copying-machine; and he soon established his reputation as a mechanician by the invention of a machine for making the

block-pulleys for the rigging of ships, which effected an immense saving in labor and ex¬

pense and is still in full operation in English naval dockyards. In 1820, he also made plans for bridges at Rouen and Saint Petersburg.

Of Brunei's subsequent achievements may be

mentioned more especially the erection of the steam sawmill in Chatham dockyard ; a ma¬

chine for making seamless shoes for the army; machines for making nails and wooden boxes, for ruling paper and twisting cotton into hanks ; and lastly, a machine for producing locomotion by means of carbonic acid gas, which, however, though partially successful, was ultimately

abandoned. But the great work by which his name will be transmitted to posterity was the Thames Tunnel, which, though almost a com¬

plete failure as a commercial speculation, was nevertheless a wondrous monument of engi¬

neering skill and enterprise. It was commenced in March 1825, and opened to the public in 1843, after a multitude of disasters and obstacles had been endured and surmounted. He was

elected a fellow of the Royal Society in 1814, and vice-president from 1832-33. He received the order of the Legion of Honor in 1829, and in 1841 the honor of knighthood was conferred on him. Consult Beamish, Richard, (Memoirs

of Sir Marc Isambard Brunei } (1862).

. BRUNELLESCHI, broo-nel-lesk'e, Filippo

di Ser Lappi, Italian architect : b. Florence 1377; d. same place, 15 April 1446. He first studied painting and sculpture, and brought

the art of perspective to perfection ; but as an architect he gained most distinction having, according to his countrymen, revived the Doric, Ionic and Corinthian orders. He invented vari¬

ous ingenious mechanical contrivances. He

applied himself particularly, however, to archi¬

tecture, and learned the art of drawing to make his architectural plans, statuary to adorn them and mechanics that he might be able to raise the materials. He was also profoundly versed in mathematics and geometry. He is said to have drawn views of the finest monuments in

Florence in perspective — an art which then excited much astonishment. This varied knowl¬

edge prepared him for bold and difficult under¬

takings, and he gained the name of the restorer of architecture. As a statuary he was much indebted to his intimate connection with Dona¬

tello, who was then very young but very able.

Both went to Rome. Here Brunelleschi con¬

ceived the idea of restoring architecture to the principles of the Greeks and Romans in the hope of making the revived classic forms super¬

sede the Gothic then in vogue. When the archi¬

tects assembled, in 1407, at Florence to consult on the building of the dome of the cathedral of Santa Maria, the plan which Brunelleschi proposed received but little attention, and he went back to Rome.

It was necessary, however, to have recourse to him, as the undertaking far surpassed the powers of the other architects. He engaged to erect a dome which, by its own weight and by the strong connection of its parts, should hang suspended. This proposal seemed so wonderful that the author was regarded as insane. As all other plans, however, failed to answer the expectations of the magistrates, Brunelleschi was again recalled and ordered to explain the mode in which he intended to execute his plan.

This he refused to do, but built two small, chapels according to his new system. On this the charge of erecting the dome was committed to him. Aided only by his own genius, he ac¬

complished the work, which remains one of the boldest creations of the human mind. But the ingenious lantern, which formed the upper part of the dome, was not finished when he died in 1444. It was completed, however, according to his first design. Few monuments of architec¬

ture are so noble as this wonderful building.

Only the dome of Saint Peter's in Rome, which was built since, excels it in height, but is in¬

ferior to it in lightness and grandeur of style.

Michelangelo said it was difficult to imitate Brunelleschi and impossible _ to excel him.

Brunelleschi was the author of a great number of other masterpieces of architecture.

BRUNER, Lawrence, American entomolo¬

gist : b. Catasaqua, Pa., 2 March 1856. A grad¬

uate of the University of Nebraska, he received an appointment as assistant on the United States Entomological Commission in 1880, and as field agent for the United States Department of

Agriculture at the University of Nebraska in 1888, where he became instructor in entomology 634

in 1890 and professor in 1895. In 1897-98 he traveled in Argentina as field agent again for the United States Department of Agriculture.

His published writings include (The Destruc¬

tive Locust of Argentinaˆ (2 reports, 1898 and 1900); (Locusts of Paraguay) (1906); (South

American Tetrigidse5 (1912), and in coauthor¬

ship a (New Elementary Agriculture) (9th ed., 1911).

BRUNET, broo-na', Jacques Charles,

French bibliographer: b. Paris, 2 Nov. 1780; d.

same place, 14 Nov. 1867. He began his bibli¬

ographical career by the preparation of several auction catalogues, of which the most interest¬

ing is that of the Count d'Ourches (Paris 1811), and of a supplementary volume to Cailleau's and Duclos' (Dictionnaire bibliographique*

(Paris 1802). In 1810 was published the first edition of his (Manuel du libraire et de l'amateur des livresP in three volumes, which gained such universal applause that in 1814 a second, and, in 1820, a third, edition, of fouˆ volumes each, were demanded. This work showed him

the worthy successor of the meritorious Debure.

A sixth edition of his great work appeared between 1860 and 1865 in six volumes, the last containing a Table Methodique, or classified catalogue, in which the works are arranged in classes according to their subjects.

BRUNETIERE, broon-tyar', Ferdinand,

French orator and literary critic: b. Toulon, France, 19 July 1849; d. Paris, 9 Dec. 1906. He was educated at the Lycee Louis-le-Grand,

Paris. From 1886 to 1905 he was professor of French language and literature at the Ecole Normale, Paris, and in 1905-06 was ordinary-lecturer of the Societe des Conferences, Paris.

He lectured at the Odeon Theatre and the Sorbonne, Paris; at the Johns Hopkins University, Baltimore, Md., and throughout the United

States. He received the cross of the Legion of Honor and was elected member of the French Academy. He published (Etudes critiques > ; (Le roman naturaliste) ; (Histoire et litterature) ; (Questions de critique) ; (L'Evolution des genres dans l'histoire de la litterature) ; (Manuel de litterature frangaiseP He was also editor of the Revue des Deux Mondes and con¬

tributed to the (Catholic Encyclopedia. >

BRUNHILDA, broon-hil’da, the name of

(1) a legendary, (2) a historical person. (1) In the ˆibelungenliedp the young and stal¬

wart Queen of Iceland, wife of Gunther, the Burgundian King. She passionately hated

Kriemhild and her husband, Siegfried, who had once been her own lover; and she caused his murder by the hands of Hagen. Originally she was identical with the Norse Walkyrie Bryn-hildr, who, for a fault, was stripped of her divinity by Odin and sank into a charmed sleep, from which she was awakened by Sigurd (Sieg¬

fried). (2) The daughter of the Visigothic

King Athanagild, who married King Sigbert of Austrasia in 567, and afterward, as regent of her two grandsons, Theodebert II, King of

Austrasia, and Theodoric II, King of Burgundy, divided the government of the whole Frankish world with her rival Fredegunda, who gov¬

erned Neustria for the youthful Clotaire II.

On the death of Fredegunda in 598, she seized on Neustria, and for a while united under her rule the whole Merovingian dominions, but was overthrown in 613 by a combination in their own interests of the Austrasian nobles under the nominal leadership of Clotaire II, and put to death by being dragged at the heels of a wild horse.

BRUNI, broo’ne, BRUNO, or BRUNUS,

Leonardo (ˆAretino,ˆ from his birthplace),

Italian humanist: b. Arezzo 1370; d. Florence, 9 March 1444. He studied law and philosophy at Florence, but under the influence of the Greek scholar Chrysoloras finally took up the study of the classics. In 1405 he obtained a position as papal secretary, an office which he held under four Popes, Innocent VII, Greg¬

ory XII, Alexander V and John XXIII. He

went with the latter to the Council of Constance in 1414, but in 1415 he moved to Florence, w-here he devoted himself to literary work.

Here he wrote his history of Florence in 12 volumes, for which service he obtained the right of citi¬

zenship and was made state secretary there in 1427. He translated the works of Aristotle, Plato, Plutarch, Demosthenes and ZEschines.

He wrote also ˆommentarius Rerum Suo Tem¬

pore GestarunP ; ˆDe Origine Urbis Mantuse) ; (De Romae Origine) ; and (Epistolae FamiliaresP

BRUNI ISLAND, Australasia, an island

off the southern part of the east coast of Tas¬

mania, from which it is separated by D'Entre¬

casteaux Channel. It has a length of 32 miles, a varying breadth of 1 to 11 miles, and an area of 160 square miles. Coal is mined.

BRUNINGS, Christian, Dutch engineer: b.

Neckerau 1763; d. 1805. In 1769 the states of Holland appointed him general inspector of

rivers. This introduced him to a share in sev¬

eral important commissions ; for instance, that for the improvement of the dike system in 1796; that for draining the tracts between Nieuw-skogs and Zevenhoven in 1797, *etc.* His most important works were his improvements in the diking of the lake of Haarlem, the improved diking and deepening of the Oberwasser, which at high tides often inundated vast extents of country, together with the change in the course of the Waal and the canal of Pannerde, by which the beds of the Rhine, the Waal and the Leek were improved.

BRUNLEES, Sir James, Scottish civil

engineer: b. Kelso 1816; d. Wimbledon 1892.

His father was gardener to the Duke of Roxburghe's agent, and as a

youth he w-as employed to make a survey of the estate and thus saved enough money to take him to Edinburgh Uni¬

versity. He was assistant engineer on the Bol¬

ton and Preston line in 1838; assisted in the con¬

struction of the Lancashire Railway; constructed the Sao Paulo Railway, Brazil; in conjunction with Douglas Fox, built the Mersey Railway, with the tunnel under the river between Bir¬

kenhead and Liverpool, at the completion of which (1886) both engineers were knighted;

and carried through (1868-77) the extensive

Avonmouth Docks at Bristol.

• •

BRUNN, capital and important city of

Moravia, and of a circle of the same name, on the railway from_ Vienna to Prague, 70 miles north-by-east of Vienna, and nearly encircled by the rivers Schwarza and Zwittawa. It con¬

sists of an older portion in the centre, sur¬

rounded by fine promenades and pleasure-grounds that have taken the place of the old walls and ramparts, and of extensive newer

quarters and suburbs surrounding this. It con¬

tains a cathedral and other handsome churches ; a landhaus, where the provincial Diet meets ; several splendid palaces, a gymnasium,

poly¬

technic institute, museum, botanic garden, *etc.*

It has extensive manufactures of woolens, which have procured for it the name of the Austrian Leeds, and in some 70 works employs about

12,000 hands. Other industries embrace cotton, linen, jute, machinery, hardware, chemicals,

soap and candles, beer and spirits. It is the centre of the Moravian commerce, a great part of which is carried on by fairs held at Briinn every three months. Near it is the fortress of Spielberg, on a hill about 940 feet high, in which Baron d renck and Silvio Pellico were confined, and which now serves only as a

prison. It is surrounded with finely laid-out grounds. Briinn was formerly a free imperial city, an important fortress and the residence of the margraves of Moravia. It was unsuccess¬

fully besieged by the Taborites in 1428; by Torstenson in 1645; by the Prussians in 1742.

It was occupied by the French in 1805, and Napoleon made it his headquarters after the battle of Austerlitz. It was taken again by a division of the French army in 1809, when it suffered severely. In 1866 it was occupied by the Prussians. Briinn is the seat of a United States consular agent. The city's affairs are administered by a council of 48 and an execu¬

tive board of 11 members. Pop. about 125,000.

BRUNNE, brun, Robert of, the name by

which Robert Manning, a monk of the order

founded by Saint Gilbert of Sempringham, is usually designated. His monastery was in Lin¬

colnshire, near the modern town of Bourn, and he lived in the reigns of Edward II and Edward III. His chief work is his (Handlynge SynneP

a free and amplified translation into English verse of William of Waddington's < Manuel des PechiezP with such judicious omissions and

excellent additions as made his version much more entertaining than the original. The pur¬

pose cf the book was to convey religious in¬

struction to the people in the agreeable form of moral anecdotes. It is of great importance

from the linguistic point of view, as one of our best landmarks in the transition from the early to the later Middle English. He also made a new version in octosyllabic rhyme of Wace's <Bn.it d'AngleterreP and added to it a popular translation of the French rhyming chronicle of Peter Langtoft of Bridlington. Robert deliber¬

ately wrote in English instead of French, in order to reach the common people, to give them the means «for to haf solace and gamen, in felauschip when tha sit samen (together).):> See Handlynge Synne.

BRUNNOW, broo'noff, Philipp (Count

von), Russian diplomatist: b. Dresden, 31 Aug.

1797; d. Darmstadt, 12 April 1875. He entered the Russian service in 1818. He was present in a civil capacity in the campaigns of 1828 and 1829 against the Turks, and in 1839 was sent on a special mission to London, where, in the following spring, he was accredited as per¬

manent ambassador. In this capacity he soon acquired distinction as a diplomatist. After retiring from London on the outbreak of the Crimean War, in 1854, he represented Russia in Frankfort, and, together with Count Orloff, was sent to the Conference of Paris in 1856. He was afterward appointed to the court of Prus¬

sia ; but in 1858 he returned to his old place in London, where he represented Russia at the

conferences in 1864 and 1871. He was raised to the rank of count in 1871, and in 1874 retired to Darmstadt.

BRUNO, broo' no, Giordano, Italian philos¬

opher: b. Nola, Naples, about 1550; d. Rome, 16 Feb. 1600. He

entered the order of Domini¬

cans and became distinguished by the origin¬

ality and poetical boldness of his speculations.

In 1580, probably on account of the persecu¬

tions which he drew upon himself by his re¬

ligious doubts and his satires on the monks, he was forced to take refuge at Geneva. Here, however, he was soon persecuted by the Calvin¬

ists for his paradoxes and his violence. In 1583 he stood forth at Paris as the antagonist of the Aristotelian philosophy, and as teacher of the ars Lulhana. His disputes with the

Aristotelians caused him to leave Paris, and he then went to London, where he published sev¬

eral of his works, and to Oxford, where he taught for a short time. In 1585 he went bv way of Paris and Marburg to Wittenberg, and Irom 1586 to 1588 taught his philosophy there.

He then went to Helmstadt, where, protected by Duke Julius of Wolfenbiittel, he remained till 1589. He was then engaged at Frankfort-on-the-Main with the publication of some works, particularly <De Monade, Numero, et FiguraP

but left this city in 1592, and returned to Italy.

He remained peacefully in Padua until 1598, when the inquisition of Venice arrested him and transferred him to Rome. After an imprison¬

ment of six years, that he might have oppor¬

tunity to retract his doctrines, he was burned for apostasy, heresy* and violation of his mo¬

nastic vows. This death, which he might have averted eight days before by a recantation, he suffered with fortitude. While his violent at¬

tacks on the prevailing doctrines of the Aristo¬

telian philosophy, and on the narrow-minded

Aristotelians themselves, everywhere created

him enemies, his rashness and pride threw him into the hands of his executioners. A monu¬

ment was erected in 1889 on the spot where he was burned at the stake. His philosophical

writings, which have become very rare,

display a classical cultivation of mind, a

deep insight into the spirit of ancient

philosophy, wit and satire, as well as a

profound knowledge of mathematics and natu¬

ral philosophy. In 1585 appeared at Paris

his famous <Spaccio della Bestia Trionfante>

(a moral allegory, with many satirical strokes on his own times) ; also his work < Della Causa, Principio ed Uno) (Venice and London 1584) ; besides <Del Infinito, Universo, e MondiP The former contains the foundation, the latter the application of metaphysics to the natural world.

The doctrine is a pure Pantheism, connected with very peculiar notions of God — Dens est monadum monas, nempe entiiim entitas — a

more complete Pantheistical system than had

been previously exhibited, and which, since his time, Spinoza only — who, like Descartes, bor¬

rowed his ideas — has reduced to a more sys¬

tematic form. The notion that God is the soul of the universe, and the world endowed with organization and life, might have been forgiven by his contemporaries; but his inference that the world is infinite and immeasurable, and his 636

doctrine of the plurality of worlds, at the moment when the new system of Copernicus

was attacked from all quarters, could not but be looked upon as a crime. His writings are mostly in the form of dialogues, without any methodical order. His language is a strange mixture of Italian and Latin. His style is violent and fiery. The originality and loftiness of his ideas take a powerful hold on those who can understand him. His logical writings, in which he boldly and skilfully applies Raymond Lully's art of topical memory, are more obscure and less interesting. His belief in magic and astrology, notwithstanding his enlightened views of the nature of things, is to be attributed to the spirit of his age. He also wrote poems, among others, (Degli Eroici Furori,5 and a

satirical comedy, (I1 Candelajo.5 A collection of his Italian works by Wagner appeared at Leipzig in 1830, and another edition by Lagarde was issued at Gottingen (1888). His Latin

works were issued in Florence and Naples

(1879-81). Consult Rand, (Modern Classical

Philosophers5 (Boston 1908), in which a part of (Della Causa, Principio, ed Uno5 appears in an English translation by J. Royce. A biography by Domenico Berti (Florence 1868) is of special interest and importance on account of the new papers it brings to light regarding the official examination of Bruno before the Inquisition of Venice.

Bibliography. — Bartholomess, (Jordano

Bruno5 (Paris 1846) ; Berti, D., (Documenti intorno a Giordano Bruno di Nola5 (Rome

1880) ; Brunnhofer, (Giordano Bruno's Welt- '

anschauung und Verhangnis5 (Leipzig 1882) ;

Carriere, (Die philosophische YVeltanschau—

ung der Reformationszeit 5 (ib. 1887) ; Elton, Giordano Bruno in England5 (in (Modern

Studies,5 New York 1907) ; Gramzow, Gior¬

dano Bruno, der erste moderne Mensch5 (Char-lottenburg 1912) ; Frith, (Life of “Bruno the Nolan5 (London 1887) ; McIntyre, J. L.,

Giordano Bruno5 (ib. 1903) ; Mariano, (Gior¬

dano Bruno: La vita e 1’uomo5 (Rome 1881); Pater, Walter, Gaston de Latour5 (London

1896) ; Reiner, Giordano Bruno und seine

Weltanschauung5 (Berlin 1907) ; Sigwart, (Die Lebensgeschichte Giordano Brunos5 (Tubingen

1880).

BRUNO, Saint, the name of two saints of

the Roman Catholic Church. (1) The apostle

of Prussia: b. about 970; d. 1009. He entered the order of Saint Benedict and accompanied Saint Adalbert on his mission to Prussia. He was appointed chaplain to the Emperor, Henry II, and was a zealous missionary in Poland, Russia and Hungary. Having been taken by

the pagans of Lithuania, he had his hands and feet cut off, and was afterward beheaded. (2) The founder of the Carthusian order : b.

Cologne about 1030; d. Della Torre, Calabria, 1101. He was educated in the school of the collegiate church of Saint Cunibert, in which he afterward received a canonship, and then studied at Rheims, wffiere he so distinguished himself that Bishop Gervais appointed him to superintend all the schools of the district. He attracted many distinguished scholars, and

among others Odo, afterward Pope Urban II.

Subsequently he was offered the bishopric of Rheims, but the immoralitv of his times in¬

duced him to go into solitude. In 1084 or 1086

he repaired with six friends of a like disposi¬

tion to a narrow, bleak valley, called Chartreuse (now known as La Grande Chartreuse) about

15 miles from Grenoble, where they built an oratory and separate cells, keeping silence six days of the week and only seeing each other on Sundays, and founded one of the severest or¬

ders of monks, named from their location Car¬

thusians. In the meantime Urban II became

Pope, and in 1089 invited his former instructor to his court. Bruno reluctantly obeyed, but refused every spiritual dignity, and in 1094 re¬

ceived permission to found a second Carthusian establishment in the solitude of Della Torre, in Calabria, where he died. Leo X, by whom he was beatified, in 1514, permitted the Carthu¬

sians to celebrate a mass in honor of him; and Gregory XV, who ordered the process of his canonization, in 1623 extended it to the whole Roman Catholic Church.

BRUNO THE GREAT, German ecclesias¬

tic : b. 925 ; d. Rheims, 1 1 Oct. 965. He was the third son of Henry the Fowler, and brother of the Emperor Otho I. He had a great share in the events of his time, and surpassed all the contemporary bishops in knowledge and liberal¬

ity of mind, combined with earnest piety. He was made archbishop ‘of Cologne in 953, and Duke of Lorraine in 954, and had much trouble in bringing into due subjection his unruly sub¬

jects. Commentaries on the five books of

Moses, and the biographies of some saints, are ascribed to him.

BRUNONIAN THEORY, an hypothesis

framed by Dr. John Brown, 1735-88 (q.v.), ac¬

cording to which the living system was regarded as an organized machine endowed with ex¬

citability, kept up by a variety of external or internal stimuli, that excitability constituting life. Diseases were divided into sthenic or asthenic, the former from accumulated and the latter from exhausted excitability. Darwin,

author of the (Zoonomia,5 adopted the theory with enthusiasm, and Rasori introduced it into Italy, where it flourished for a time, and then had to be abandoned, as it ultimately was

everywhere.

BRUNSWICK, Ferdinand, Duke of, Ger¬

man soldier: b. Wolfenbiittel, 11 Jan. 1721; d.

Brunswick, 3 July 1792. He was the fourth

son of Duke Ferdinand Albert, and was ed¬

ucated for the military profession. In 1739 he entered the Prussian service, was engaged in the Silesian wars and became one of the most eminent generals in the Seven Years' War

(q.v.). He commanded the allied army in

Westphalia, where, always opposed to superior forces, he displayed superior talents. He drove the French from Lower Saxony, Hesse and

Westphalia, and was victorious in the two great battles of Crefeld and Minden. After the

peace he resigned his commission on account of a misunderstanding with the King. From

that time he lived at Brunswick, the patron of art and literature.

BRUNSWICK, Friedrich Wilhelm, Duke

of, German soldier: b. 9 Oct. 1771 ; d. Quatre Bras, 16 June 1815. He was the fourth and youngest son of Duke Karl Wilhelm Ferdinand of

Brunswick (q.v.). He was educated for the army, and in 1786 was appointed by the King BRUNSWICK

of Prussia successor of his uncle, Frederick Augustus, Duke of Oels and Bernstadt. He

then went to Lausanne, remained two years in Switzerland, and upon his return was made

captain in a Prussian regiment of foot. Dur¬

ing the war against France in 1792 and the fol¬

lowing year he fought in the Prussian armies and was twice wounded. In 1806 he took part in the war against France with all the fire which the oppression of Germany and his

father's unhappy fate had kindled in him. He finally joined the corps of Blucher, and was made prisoner with him at Lubeck. On the

death of his eldest brother he would have

succeeded to the dukedom, as his other brothers were incapacitated by disease, but Napoleon

prohibited his succession. He raised a free corps in Bohemia to operate against the French, but though he gained a victory over 4,000 West¬

phalians he was unable to make an effectual stand on the Continent. He embarked his

troops for England, landed in 1809 and was received with enthusiasm. His corps im¬

mediately entered the British service, and was afterward employed in Portugal and Spain.

The Parliament granted him a pension of £6,000

until he returned to his hereditary dominions, 22 Dec. 1813. The events of 1815 called him again to arms and he fell at Quatre Bras.

BRUNSWICK, House of, a royal German

house, the true founder of which was Albert Azo II, Marquis of Reggio and Modena, a

descendant, by the female line, of Charlemagne, who had also extensive domains in Lombardy, and in 1047 married Cunigunda, heiress of the counts of Altorf, and thus united the two

houses of Este and Guelph. The previous his¬

tory of the Este family is uncertain. Guelph, the son of Azo, was created Duke of Bavaria, in 1071. He married Judith of Flanders, who was descended from Alfred the Great of Eng¬

land. The most powerful of this line was

Henry the Proud, who succeeded in 1125, and by his marriage with the daughter of Lotharius II acquired Brunswick and Saxony. Bruns¬

wick ultimately fell to a younger branch of the family, and Otho, the great-grandson of Henry by this branch, was the first who bore the title of Duke of Brunswick (1235). John, eldest son of Otho, founded the house of Liineburg. Albert the Great, a younger son of Otho, conquered Wolfenbiittel, and on his death

(1278) his three sons divided his dominions.

Henry founded the house of Grubenhagen, Al¬

bert became Duke of Brunswick and William

Duke of Brunswick-Wolfenbuttel. Henry Ju¬

lius, of this last branch, inherited Grubenhagen (1596). Ernst of Zell, of the second branch, who succeeded (1532), conquered the territories of Wolfenbuttel, and left two sons, by whom the family was divided into' the two branches of Brunswick-Wolfenbuttel (II) or Brunswick-Luneburg, and Brunswick-Hanover, from the

latter of which comes the present royal family of Great Britain. The former was the German family in possession of the duchy of Bruns¬

wick down to 1884, when this line became ex¬

tinct on the death of the last duke, Wilhelm I, who ascended the throne of the duchy in 1831.

Ernst Augustus, of the Brunswick-Hanover

house, was created Elector of Hanover in

1692. He married Sophia, daughter of Eliza¬

beth, the daughter of James I of England.

Their son George succeeded his father as

Elector of Hanover in 1698, and was called to the throne of Great Britain as George I in 1714, under the Act of Settlement of 1701, which in¬

vested the succession in the heirs of the Princess Sophia, being Protestants. The British sover¬

eigns continued to rule Hanover till the acces¬

sion of Victoria, when the Duke of Cumber¬

land succeeded. The present Duke of Cumber¬

land, titular Duke of Brunswick and King of Hanover, would have become ruler of Bruns¬

wick but for the events which transferred

Hanover to Prussia; and Prince Albert of

Prussia was elected regent of Brunswick in¬

stead. On the latter's death in 1906, the Duke of Cumberland proposed the renunciation of the throne for himself and his eldest son, on con¬

dition that Ernst August, his second son, should succeed. The offer was not accepted and the Duke of Mecklenberg became Regent. In 1913

Ernst August married the daughter of Wilhelm II, Emperor of Germany, and Brunswick was

given him on condition of his renouncing all claims to Hanover.

Consult Fitzmaurice,

(Charles William Ferdinand, Duke of Bruns¬

wick (London 1901) and Heinemann, (Geschichte von Braunschweig und Hanover*

(Gotha 1882-92) ; Knoll und Bode, (Das Her-zogthum Braunschweig* (1897).

BRUNSWICK, Ga., city and county-seat

of Glynn County, situated on Saint Simon's

Sound, eight miles from the Atlantic Ocean, on the Plant System and the Southern Railway, 80

miles south-southwest of Savannah. Its settle¬

ment dates back more than 100 years, and its importance as a commercial port has been de¬

veloped since the close of the Civil War. It has an admirable and spacious harbor, provided with a brick lighthouse; is connected with New York, Fernandina and Savannah by regular

steamship lines; and exports large quantities of cotton, phosphates, tar, turpentine and pine lumber. Truck gardening, fishing and oyster

and vegetable canning are important industries, and there are box, handle, cigar and carriage factories, machine shops, foundries, lumber

mills, and bottling, copper and cement-stone works. There is also a large turpentine and rosin refinery having a capacity of 700,000 gal¬

lons of turpentine and 108,000 barrels of rosin a year. The city is the seat of a United States marine hospital and is a popular summer and winter resort, with fine hotels. Brunswick was settled as early as 1735 by James Oglethorpe.

Pop. 10,182.

BRUNSWICK (Ger., Braunschweig).

Germany, a republic and free state in the

northwest part of the German empire, _ compris¬

ing an area of 1,425 square miles. It is divided into eight districts — three larger and five smaller, detached from each other and sur¬

rounded by foreign possessions. The minerals are of some importance, including iron, lead, copper, some gold and silver, salt, asphalt, peat ; while there are also marble, granite, sandstone and other kinds of stone. The forests cover a considerable area, and over 72 per cent ol this is in the hands of the state. About one-half of the land is arable. Of the cultivated area of Brunswick 75 per cent belongs to private per¬

sons, 14 per cent to corporations and 11 per cent ' to the state. The most important culti-638

vated crops arc grain, flax, hops, tobacco, pota¬

toes, the sugar-beet and fruit. A good deal of attention has been given in recent times to the improvement of the breeds of cattle, sheep and horses. The industrial occupations are varied if not individually important, and embrace beet¬

root sugar, tobacco and cigars, paper, glass, flax, jute and woolen goods, hats, wooden wares,

chemicals, porcelain, sewing and other machines, lacquered wares, sal-ammoniac, chicory and

madder industries. The lacquered wares and

porcelain of Brunswick are famous even in

foreign countries. Brunswick, the capital, is the centre of trade. In 1806 the duchy was annexed by Napoleon to the kingdom of West¬

phalia, but its native prince, Frederick William, was restored in 1813.

In the German Confed¬

eration Brunswick held the 13th rank, with

two votes in the Assembly and one along with Nassau in the Diet. It was afterward a mem¬

ber of the North German Union, formed after the dissolution of the old confederation by the victories of Prussia in the short campaign of 1866. As a state of the German empire it now sends two members to the Bundesrath and three deputies to the Reichstag. In its internal government Brunswick is a constitutional mon¬

archy. As amended in 1899, the constitution provides for a Diet of one chamber, composed of 48 members, 15 elected by the towns, 15 by the rural communities, 2 by the Protestant

clergy, 4 by the landed aristocracy, 3 by the manufacturing interests, 4 by the professional classes and 5 by the highest taxed citizens. The estimated revenue and expenditure for 1912-13

were respectively 14,964,413 marks and 14,961,518

marks; the debt, 45,173,991 marks; reserve fund, 37,644,003 marks. Education is in the hands of a special commission. There are about 439

elementary schools, and a considerable number of secondary and trade schools. In 1910 the population was 494,339. The prevailing religion is the Lutheran.

BRUNSWICK, Md., town in Frederick

County, 45 miles northwest of Washington,

D. C., on the Chesapeake and Ohio Canal, the Potomac River and on the Baltimore and Ohio Railroad. It contains a casket factory and rail¬

road shops. The government is vested in a

mayor and council of six, chosen for terms of one year. The waterworks are the property of the municipality. Pop. (1920) 3,905.

BRUNSWICK, Me., a town in Cumberland

County, situated on the right bank of the An¬

droscoggin, 26 miles northeast of Portland, on the Maine Central Railroad. The falls of the Androscoggin afford excellent power for sev¬

eral pulp, paper and cotton mills and other manufactories. Bowdoin College (q.v.) is lo¬

cated here, and connected with it is the Medical School of Maine, established in 1820. Bruns¬

wick, originallv called Pejepscot, was settled in 1628. Pop. (1920) 7,261.

BRUNSWICK BLACK, a quick-drying

varnish, made of turpentine, asphaltum and lin¬

seed oil. It is used as a lacquer for roughly coating finished iron work, and also in the prep¬

aration of microscopic slides.

BRUNSWICK GREEN, a green pigment,

prepared by exposing copper turnings to the action of hydrochloric acid in the open air. It is a pale bluish-green, insoluble, cupric oxy¬

chloride, CuCl2.3CuO.4HoO. It derives its name from Brunswick, Germany, where it was first made by Gravenhorst.

BRUNSWICK-LUNEBURG, Karl Wil¬

helm Ferdinand, Duke of, German soldier:

b. (eldest son of Duke Charles of Bruns¬

wick, and of a sister of Frederick the

Great) 9 Oct. 1735; d. Ottensen, near Altona, 10 Nov. 1806. He was carefully educated, and his military ambition was early kindled by the achievements of Frederick II. He commanded

the Brunswick troops in the allied army in the Seven Years' War, and in the fatal battle at Hastenbeck, 28 July 1757, he recaptured a bat¬

tery that had been taken by the French, calling forth from Frederick a statement that (<he

showed that nature had destined him for a

hero.® He was instrumental in deciding the

victory of Crefeld. He took the most active part in all the enterprises of his uncle Ferdi¬

nand; and Frederick's esteem for him continued to increase. In 1764 he married the Princess Augusta of England. He practised the greatest economy, living mostly retired from public

business, and devoted to the arts and sciences.

In 1773 he entered the Prussian service and be¬

came general of infantry, but had no opportu¬

nity of displaying his military talents. After the death of his father (1780) he entered upon the government with zeal and activity. Anxious

for the improvement of the finances, he dimin¬

ished his household, discharged the debts of the state, encouraged agriculture, extended the

liberty of commerce, undertook or assisted in the erection of considerable buildings, and by causing Italian operas, masquerades, etc., to be exhibited gratis, provided also for the amuse¬

ment of the public. Yet, with the best inten¬

tions, he was often unsuccessful. This was the case with his plans for the improvement of pub¬

lic education. He invited men of learning into the country at great expense, but the projected reformation having met with innumerable ob¬

stacles, they became a burden to the state. In 1787 he commanded a Prussian army for the

support of the Stadtholder of Holland. When the wars of the French Revolution broke out, he received the chief command of the Austrian and Prussian army, and issued at Coblenz, 15

July 1792, a manifesto, drawn up in a very haughty style, which did more injury to the allied forces than a hostile army could have done. The Duke planned to press forward from Lorraine to Paris to cut off its supplies, and thus force it to surrender by famine. Longwy was taken 23 August and Verdun 2 Sept. 1792.

But in Champagne, an unproductive country,

the transport of provisions for the army from the frontiers was rendered difficult by moun¬

tains and forests. Dumouriez was encamped

in the vicinity of Saint Menehould, and skir¬

mishes took place daily; but the skilful disposi¬

tions of Dumouriez culminated in the defeat of the Germans by Kellermann at Valmy, 20 Sept.

1792, and Brunswick-Liineburg was obliged to conclude an armistice and evacuate Champagne.

Custines took Worms and Spires during this

retreat, and captured the fortress of Mainz, 21

October, and soon afterward Frankfort, which latter city, however, was retaken by the Prus¬

sians and Hessians, 2 December. The en¬

deavors of the Germans, therefore, were prin¬

cipally directed to the recapture of those places.

To this end the Duke, in conjunction with the Austrians, opened the campaign on the upper Rhine, in 1793, took the fortress of Konigstein 7 March, reconquered Mainz, 22 July, and pre¬

pared to attack the strong fortress of Landau, then in the power of the French. The French, on the other hand, 14 September, made a general attack on the Duke of Wurmser, from Strassburg to Saarbruck. On that day the Duke had a sanguinary engagement with Moreau in the

vicinity of Pirmasens, a town belonging to the landgraviate of Hesse-Darmstadt. The French

were driven from their camp near the village of Hornbach as far as the Saar. A month later the Duke, having formed a union with Wurm¬

ser, succeeded, 13 October, in his attack on the lines of Weissenburg and his attempt to draw nearer to Landau. In order to gain another strong point of support, he ventured, on the night of 16 November, to make an assault upon the mountain-fortress of Bitche, which is the key of the Vosges, as the roads from Landau, Pirmasens, Weissenburg and Strassburg unite at that place. This attempt miscarried. Between the 28th and the 30th of November, however, he defeated a division of the Army of the Moselle at Lautern, which was pressing through the

mountains under the command of Hoche, with

the intention of relieving Landau. But the daily attacks of Hoche and Pichegru, without re¬

gard to the sacrifice of men, and the successful attempt of the latter to break the Austrian lines near Frceschweiler, 22 December, forced the

Austrians to retreat beyond the Rhine, and oc¬

casioned the retreat of the Duke also. As some difficulties had already arisen between Austria and Prussia, he laid down the chief command of the army in the beginning of the year 1794.

The Duke continued to labor for the welfare of his country until 1806. Although now of such an age that he might have retired without reproach from public life, yet he assumed bur¬

dens beyond his powers. At the beginning of the year 1806, commissioned by the King of Prussia, he made a journey to Saint Petersburg relative to the war that soon broke out with France. He was then placed at the head of the Prussian army. But his physical strength was not equal to his moral energy, as was proved by the battles of Jena and Auerstadt, in the latter of which he was mortally . wounded.

Napoleon included his duchy in the kingdom of Westphalia in 1806, but it was afterward re¬

stored to his son Frederick William. The latter lost his life at the battle of Quatre-Bras in 1815.

His son Charles Frederick came of age in 1823

and succeeded to the dukedom (George IV of England having acted as Prince Regent during his minority) but he was driven from the duchy by a revolt in 1830. His brother William then assumed the government, ruling until 1884.

BRUNTON, Mary (Balfour), Scotch

novelist: b. Burra Island, in the Orkneys, 1778; d. 1818. In her 20th year she married Dr. Alex¬

ander Brunton, minister at Bolton, near Had¬

dington ; afterward at Edinburgh. She wrote discipline* and < Self-Control,* two novels

which met with favor. At her death she left dmmelinc,* a tale, and other pieces, which

were published by Dr. Brunton, with a bio¬

graphical sketch.

BRUSH, Charles Francis, American in¬

ventor: b. Euclid, Ohio, 17 March 1849. He received his early education in the public schools of Cleveland, Ohio, and was graduated from

the high school of that city. At an early age he developed a liking and aptitude for scientific studies and, entering the University of Michi¬

gan, was graduated therefrom in 1869 with

the degree of mining engineer. From the same university he received the honorary degrees of M.S. in 1899 and Sc.D. in 1912. The honorary degree of Ph.D. was conferred upon him in

1880 by the Western Reserve University, and that of LL.D. in 1900 by the same institution, and also, in 1903, by Kenyon College. He was an analytical chemist in Cleveland 1870-73.

From 1873 to 1877 he was engaged in the iron-ore' and pig-iron industry. Throughout this

period, however, he carried on and made great progress with his investigations and experi¬

ments in practical electricity. He perfected, in 1876, the dynamo-electric machine known by his name, and not long after the ˆseries** arc lamp, which might with uniform results be used in circuit in large numbers. Since that time he has patented more than 50 other inventions, chiefly detailed improvements on the two pre¬

ceding. He founded in Cleveland, in 1880, the Brush Electric Company, which controlled his American patents. In 1891 Mr. Brush with¬

drew to a great extent from active business affairs but has since continued to maintain a laboratory at his home, where he carries on his scientific pursuits. In 1881 he was deco¬

rated by the government of France a chevalier of the Legion of Honor, in recognition of his discoveries in electricity. In 1899 the Ameri¬

can Academy of Arts and Sciences awarded

him the Rumford medal for ((the practical de¬

velopment of electric arc lighting.® In 1913

the American Institute of Electrical Engineers awarded him the Edison

medal. He has con¬

tributed many important papers to scientific societies and publications, embodying the re¬

sults of his investigations.

BRUSH, Edward Nathaniel, American

physician : b. Glenwood, Erie Count}-, N. Y., 23 April 1852. He was educated at public and private schools in Buffalo, received degree of M.D. from medical department of the Univer¬

sity of Buffalo, edited the Buffalo Medical Journal (1874-79, and was assistant in the State Lunatic Asylum at Utica (1878-84) and in the Pennsylvania Hospital for the Insane at Phila¬

delphia (1884-91). In the year last named he became physician-in-chief of the Shepard and Enoch Pratt Hospital, Baltimore. He has writ¬

ten much upon the subject of insanity and was associate editor of the American Journal of Insanity (1878-84), and is now managing edi¬

tor. He is now professor of psychiatry at the University of Maryland Medical School, is

president of the American Medico-Psychologi¬

cal Association and the Mental Hygienic So¬

ciety of Maryland.

BRUSH, George De Forest, American

artist: b. Shelbyville, Tenn., 28 Sept. 1855. He studied under Gerome in Paris and first at¬

tracted attention by his pictures of Indian life.

His later work is almost entirely figure com¬

position. He exhibited (The Artist* and Mo¬

ther and Child > at the Paris exhibition of 1900, and received its gold medal. His later works are owned by the principal museums — the Met¬

ropolitan Museum, New York; the Boston Art

Museum ; the Carnegie Art Gallery, Pittsburgh ; the Corcoran Gallery, Washington; the Penn

Academy, Philadelphia ; the Chicago Art Insti¬

tute — and are also found in private collections.

He is academician of the National Academy of Design and member of the Academy of Arts

and Letters.

BRUSH, George Jarvis, American mineral¬

ogist : b. Brooklyn, N. Y., 1 Dec. 1831 ; d. 1912.

He received a public school education and was graduated at Yale, where he studied science, in 1852. He subsequently studied in Germany.

From 1855 he held professorships at Yale

— that of metallurgy down to 1864, and that of mineralogy after that date. He was long a leading official of the Sheffield Scientific School.

His writings on mineralogy are authoritative.

BRUSH, an instrument used for painting,

or for removing dirt by light rubbing, from floors, furniture, *etc.* Brushes are generally made of hair, bristles, whalebone or of various vegetable fibre and are divided into two classes — simple and compound. Simple brushes are

composed of a single tuft and compound

brushes consist of several tufts inserted in a handle. Painters' brushes are examples of the former and ordinary hair brushes of the latter.

BRUSH-GRASS (Andropogon gryllus), a

grass of South Europe, with stiff wiry roots which are used for making

brushes.

BRUSH-TURKEY, a mound-building

game-bird of Australia, Catheturus lathami.

See Megapodes.

BRUSHES AND BROOMS. Brushes are

implements used for two distinct purposes: (1) The sweeping or whisking away of dust and

dirt, and (2) the laying on of liquids in thin layers, as in painting. Brooms, in general, are brushes with longer handles ; the whisk-broom, or whisk, is a little broom with a short handle.

Brushes are made of many kinds of material, to suit the many purposes for which they are used. Some of these are bristles, rice root, bass, Tampico (grass), Jaumave (istle), palma fibre, bristle fibre or coir (cocoanut husk), broom corn, rushes, rattan (split), bamboo

(fibre), oiled kitool (a wood fibre), rubber, wire of brass, steel and German silver; the hair of the camel, cow, horse, goat, squirrel, sable and bear; feathers, and whalebone.

Notwithstanding the great variety of pos¬

sible material, about 92 per cent of all brushes are made from the bristles of the hog. The best quality comes from Russia and China,

where certain breeds of hogs are raised espe¬

cially for their black bristles and, in some sections, not for eating. The Russian bristles are most highly esteemed. They are from 3

to 7 inches in length. The Chinese bristles are from 2y2 to 7 inches long. A considerable part of the supply of bristles on the market comes from France and Germany, and these bristles are white, yellowish or

bleached and vary in length from 2 to nearly 5 inches in length. In the year ending 30 June 1915, the United States imported 4,062,060 pounds of bristles (valued at $3,613,084), of which 2,400,000 pounds came from China. In order to get enough to supply their needs, the larger brush-houses keep em¬

ployees at the great packing-houses to collect the better quality of bristles from the hogs as they are slaughtered.

Except in the largest plants, the brush¬

making industry consists in assembling parts made elsewhere in specializing factories. The handles are made in one place and finished in another. The bored blocks are made in still other factories. Twine, broom nails and staples, plush and metal bands, caps for whisks — each has its specialized trade. One concern special¬

izes in badger hair, and every sort of brush material has its particular importing and trade houses.

Brushes have been classified as simple and

compound — in the first class those composed of a single tuft of brush material ; in the sec¬

ond class those made up of a number of tufts.

The first class comprises the brushes made for the use of artists and painters and the ((hair pencils® used in medicine for the outward ap¬

plication of certain remedies, as, for example, the tincture of iodine. Some painters' brushes made for roof painting are compound, or per¬

haps, more exactly, are formed of a single rank of simple brushes.

For painters' brushes no material has been

found acceptable but the bristles of the hog, which have a fag or split end tending to hold the paint. Several different lengths of bristles are used in each brush, so that as the brush wears down there are always new tips at the end to keep the brush in good working order.

The bristles are gathered in a tuft of the re¬

quired size and set into a socket in the handle with some kind of cement, the kind of cement depending upon the use to be made of the

finished brush ; if in alcohol varnishes, they are set with glue; if in water solutions, thev are set with a cement whose solvent is alcohol or benzine. The problem of the brush makers is to find some cement which will resist the dissolving action of all the common solvents in use — water, oils, alcohol, turpentine, petroleum spirit and the like. A comparatively recent improvement has been the setting of the bris¬

tles with rubber (paste) and then vulcanizing the rubber. This is successful with small

brushes, particularly the flat varnishing brushes, but the great heat required destroys the liveli¬

ness or elasticity of the bristles, and, besides, the process is slow, consuming several days.

It is entirely useless for large brushes.

Fibre brushes are of many sorts and the

materials are drawn from all parts of the world.

The <(rice root® fibre comes from Mexico, and so does the ftMexican grass,® of which other cheap brushes are made. Another material

much used is ((kitool,® a wood fibre boiled in oil, coming from the west coast of Africa.

Tampico fibre comes from the Philippines. The fibre brushes are mostly of the compound type.

The wood blocks in which the tufts of fibre are set come from the wooded sections of

Pennsylvania and Maine. The first operation

is boring the holes in the blocks. The bunches of fibre of the proper size to fill the holes are dipped at one end into pitch, pressed into the holes and given a little twist. The operatives are mostly girls, and each will set about 2,000

tufts a day. There are 41 holes in a scrubbing brush and 125 in a fine floor brush. Another method of setting the fibres (used also in mak¬

ing bristle brushes) is to catch a loop of wire coming down through the hole in the block at the middle of a tuft, and then to draw the wire

up tight into the block, without using pitch.

The brush is clipped into perfect shape almost instantly in a machine having many adjustable knives. Backs are glued on or molded on with composition and generally finished with var¬

nish. Many brushes are made on the Wood¬

bury machine, but the great bulk of the work is still done by hand. The Woodbury machine makes what is called a ((trepanned® brush ; the holes are not bored through the block, but only so deep that they may meet other holes bored from the sides and ends. These holes are after¬

ward plugged and the back is finished on the original block.

In making the common household broom,

the material used is broom corn, a variety of sorghum grown extensively in the Mississippi Valley and particularly in Kansas and Okla¬

homa. The broom corn is graded, the rougher portions, called ˆunderworking,® being tied

(with wire) first around the foot of the handle; the medium quality, called ˆself-working,® next, and then the outer layer of the best quality, called ((hurl.® The broom thus formed is con¬

ical. It is given its usual flattened shape by squeezing it in a vise and, while thus held, sewing it -through and through with twine. A special broom for heavy use has a metal band placed around it while in the

vise, and is sewn with wire through the band, the handle being brought down low enough to be circled with this wire stitching. A recent introduction is the (<knoc.k-down broom,® which is made on a short stick with a socket for the handle, the idea being to renew the broom, when worn out, without the cost of a new handle which prac¬

tically never wears out.

According to the census of 1909, there were in that year in the United States 1,282 estab¬

lishments making brushes and brooms, employ¬

ing 12,153 hands and a capital of $18,982,000

The value of the output was $29,125,596, of which $11,547,326 represented the value added by manufacture. In the year ending 30 June 1915, the United States imported feather dust¬

ers and hair pencils to the value of $1,644,189.

BRUSILOFF, broo-si-lof, or BRUSILOV,

Alexei Alexeievitch, Russian general : b.

Kutais, Russian Caucasus, 1853. The descend¬

ant of an old noble family, he spent his youth in his birthplace, halfway between Poti on the Black Sea and the ice-capped Mount Kaz¬

bek, and was educated in Tiflis. Trained to horsemanship from childhood, he began his

military career as a sub-lieutenant in the cav¬

alry and speedily distinguished himself as one of the champion riders of the country. At the age of 24 he served in the Russo-Turkish

War of 1877-78; rising steadily through the various ranks, he was appointed commander of the 2d Cavalry Division of the Guard in

1906, and played a prominent part in develop¬

ing and perfecting that branch of the army.

For some time he acted as military assistant to the governor-general of Warsaw. In 1911,

he was placed in command of an army corps in Podolia. It was there, on the borders of

eastern Galicia, that he was stationed when the European War broke out in 1914, and

whence he invaded Galicia. He was offered

a high command in the early stages of the War," but declined on the ground that he

wished <(to perfect his great scheme.® The

thrilling story of the invasion of Galicia and the ensuing campaign is told elsewhere in

these volumes.

General Brusiloff was given the command

of the 8th Russian Army on the Carpathian

front in April 1915, just before General von Mackensen opened his terrific drive against

the Dunajec-Biala line and reconquered Galicia.

In the disastrous Russian retreat that followed it was the skill and resourcefulness of Brusi¬

loff alone that enabled the Russians, who were trapped in the passes, to extricate themselves from the grip of von Mackensen's ((phalanx.®

His remarkable rearguard actions made his

defeat appear rather like a victory. Being short of artillery, Brusiloff reversed the usual military practice of covering retreat with guns and

finally sacrificing them to the pursuing enemy.

Instead, he left strong detachments of infantry behind and saved his guns for future service.

At a later stage — on the Styr — he fought a desperate battle lasting nearly two months

against the Austro-German forces under Gen¬

eral von Linsingen. Brusiloff succeeded Gen¬

eral Ivanoff as commander of the southwestern group of armies in April 1916. His first task was to send the war correspondents home

again. To their expostulations he replied, (<Not a word, not a line of my movements shall go hence; if you want to known what we are do¬

ing, read the Vienna dispatches. … I have no intention of having my movements sent to Berlin over the Petrograd switchboard.® Un¬

der his command great victories, won in three days (June 1916), in the offensive against the Teutonic forces which developed in Volhynia, Galicia and Bukowina, were announced.

Strongly fortified positions were carried by bayonet charges ; entire batteries were seized, over 40,000 prisoners taken, besides huge stores of booty.

After the fall of the house of Romanoff

in the revolution of 1917, Brusiloff's main preoccupation was to maintain discipline in the army and to prosecute the war with increased energy. The ensuing political chaos and mili¬

tary insubordination were strongly against him.

He tendered his resignation in May 1917, which Kerensky refused to accept. In June 1917 he was appointed commander-in-chief of the Rus¬

sian armies in succession to General Alexeieff (q.v.). A collection of

phrases and military maxims, culled from his letters, interviews and private conversations, was published 10 June 1916.

BRUSSA, or BROUSSA, Asia Minor, a

Turkish city, and capital of the vilayet of Khodavendikyar, situated in a fertile and finely wooded plain, which is enclosed by the ridges of Olympus, and abounds in hot, sulphurous

and chalybeate springs, which are much fre¬

quented. A railway runs between Brussa and

Mudania, its port on the Sea of Marmora. The inhabitants are Turks, Greeks, Armenians and Jews, engaged in commerce, in the culture of the vine and in the manufacture of carpets, gauze, *etc.* A considerable number of persons are

employed in mulberry culture, the reeling of silk and silk manufacture, Brussa silks being in great demand throughout the Orient, though it sends much raw silk to Lyons to be manufac¬

tured. Caravans passing from Aleppo and

Smyrna to Constantinople promote the com-

merce of the town. Before the earthquake of 1855 Brussa contained close upon 150 mosques, and was adorned with an immense number of

fountains; but from the earthquake and a

terrible conflagration the former splendor of the town suffered greatly. It is a picturesque and interesting place, however, gardens, groves and streams of running water being inter¬

spersed among the buildings. The castle, which is about a mile in circumference, is supposed to represent the Prusa of the ancients. Brussa was long the capital of Bithynia, and one of the most flourishing towns in the Greek empire of Constantinople. In 1326 it was taken by Orkhan, son of Othman, founder of the Otto¬

man dynasties ; and from that epoch it was the residence of the Turkish sovereigns until the seat of empire was transferred to Adrianople. Pop. about 76,000.

BRUSSELS (Flem. Brussel; Fr. Brux¬

elles), capital of the province of Brabant, Belgium, and also of the country, is situated on the small river Senne, about 50 miles south¬

east of the German Ocean; lat. 50° 51' N. ; long. 4° 22' E. Brussels is built partly on the acclivity of a hill, partly on a plain, in a coun¬

try agreeably diversified by sloping heights.

Like many other Continental towns whose

political situation has changed, its old fortifica¬

tions have been transformed into boulevards.

These surround the older portion of the city, extending for nearly five miles ; they are

planted with elms and linden trees in four rows and form a wide and agreeable promenade, commanding an extensive view of the sur¬

rounding country. The numerous gates, most

of which bear the names of the principal high roads or railways which traverse the kingdom, are nearly all modern, but the Porte de Hal, built in 1379, is a remnant of the ancient forti¬

fications, a large military tower of remarkable construction, which in later days was long used as a prison. The city now extends far beyond the boulevards. The Senne enters it by two branches, a great part of one of these being now covered over. The stream is not navigable,

but Brussels possesses water communication by means of canals with Charleroi, Mechlin, Ant¬

werp and the ocean. In many quarters within the boulevards Brussels still presents a con-gery of twisted streets, but improvements since the beginning of the century, and a system of electric street railroads connecting with the suburbs, have done much to modernize and

beautify the city. That part of the upper or new town inside the boulevards, which con¬

tains the royal palace, is the principal excep¬

tion. The suburbs, outside the boulevards, es¬

pecially in the upper town, have greatly in¬

creased. The principal are the Quartier Leo¬

pold and the Quartier Louise, which are

regularly and elegantly built. The principal buildings of the new town are the King's palace, the palace of the chambers, the palace of

justice (a magnificent new building of colossal proportions in the classical style), the palace of the fine arts, the public library and museum, *etc.* The upper town is ornamented with a

fine park of 17 acres, with fountains and

statues, around which most of the principal buildings are situated. The lower town is rich in ancient architecture. The Hotel de Ville (built 1401-55), one of the finest municipal buildings in Belgium, is an imposing Gothic structure with a spire 364 feet high. The

square in front of it is perhaps the most in¬

teresting of all the public places of Brussels.

The cathedral of Saint Gudule is the finest of many fine churches, richly adorned with sculp¬

tures and paintings. It was founded in 1010, and its reconstruction, commenced in 1226, was carried on till the 17th century. The churches of Notre-Dame-de-la-Chapelle and Notre-Dame-des-Victoires are also edifices of great beauty. The monuments of Brussels, and the

specimens of paintings and sculpture with

which its public buildings are adorned, are too numerous to mention.

The manufactures and trade of Brussels are

greatly promoted both by its canal communica¬

tions and by the network of Belgian railways.

Printing, type-founding and all the other de¬

partments of bookmaking give employment to

a large section of the population. Lace was an ancient manufacture, and is still of importance ; the printing cotton and woolen fabrics, mus¬

lins, etc., and many minor manufactures are carried on. Brussels carpets are chiefly made at Tournai, but some are manufactured in the city. There are breweries, distilleries, sugar refineries, foundries of iron and brass, steam engine factories, *etc.* The trade carried on by the canals and railways is that of a capital city and manufacturing town, for the supply of

internal wants and the distribution of its own products. The languages spoken in Brussels

are French and Flemish, or Dutch, ‘the former principally spoken in the new town, the latter chiefly in the old. English is also spoken a good deal, owing to the number of English

residents and visitors.

The scientific, literary, artistic and benev¬

olent institutions of Brussels comprise a free university, founded in 1834, a proprietary in¬

stitution, with four faculties, mathematical and physical sciences, belles-lettres, law and

medicine; a school of geography, founded in 1830, with an extensive museum, embracing

geology, chemistry and natural history; one of the finest observatories in Europe, the Belgian Royal Academy of Sciences, Letters and Fine

Arts and the Royal Academy of Fine Arts; the public library, the picture gallery, with the finest specimens of Flemish art ; the Royal School of Medicine; many institutions for

elementary education; societies of horticulture and other natural sciences ; several hospitals ; an infirmary; a philanthropic society, *etc.*

During the Middle Ages Brussels did not

attain the extent or importance of several other cities of the Low Countries. The Emperor

Otho dated a decree from Brussels in 976. It was walled by Baldric, Count of Louvain, in 1044. It was more completely fortified in 1380, the wall then following nearly the line of the present boulevard. During the 1 5th century it was twice burned and once ravaged by the

plague. It was the scene, in 1568, of the execution of Counts Egmont and Horn. It

was bombarded and burned by the French in

1695, and was the headquarters of Marlborough after the battle of Ramifies. It was taken by the French in 1794, and retained till 1814, when it became the chief town of the department of the Dyle. From 1815 to 1830 it was one of the capitals of the kingdom of the Netherlands, BRUSSELS CONFERENCE

and in 1830 it was the chief centre of the revolt which separated Belgium from Holland. Since

then it has been the capital of the Belgian kingdom, and one of the centres of European civilization, being especially distinguished for the cultivation and patronage of art. Inter¬

national conferences were held at Brussels in 1874, 1876, 1889-90 and in 1902. An inter¬

national exposition of great importance, held in 1910, was visited by

13,000,000 persons, but was marred by a disastrous fire which oc¬

casioned a loss of $10,000,000. Following the invasion during the great European War,

Brussels was occupied by the Germans 20 Aug.

1914. The population of Brussels in 1911 was 177,078; including the suburbs, 728,910. The foreign element is prominent, especially the F rench.

BRUSSELS CONFERENCE, the current

name of two abortive international conferences — one on the usages of war, July-August 1874; the second on bimetallism, in the autumn of 1892. ˆ

1. The harsh treatment of prisoners and non-combatants in the Franco-German War aroused

a humane feeling in protest. At the Congress of Universal Alliance in Paris, June 1872, a Society for the Improvement of the Condition of Prisoners of War was formed, which sent a circular to the chief European powders asking them to appoint delegates to a congress on this subject at Paris. England and France declined, because the request came from no official source, but Russia substituted a project of her own, and Gortchakoff invited the powers to a con¬

ference at Brussels, ostensibly to lay before them a proposal for <(a code to determine the laws and usages of warfare, and to limit the consequences and diminish the calamities conse¬

quent upon war, as far as it may be possible or desirable.® The pronunciamento accompany¬

ing the call set forth that war is a conflict between the armed and organized forces of

the belligerents and operations of war must be directed exclusively against such armed forces and not against the non-combatant subjects of either belligerent state. However, by a fur¬

ther stipulation, the occupying army was to be allowed to levy taxes

for its benefit, to seize not only all public property of the conquered government, but also all private property use¬

ful in carrying on the war or which interfered with the success of the military operations. A declaration that volunteers and militia were non-military inhabitants was also included, and it was claimed that they were liable to “mili¬

tary punishment® if they took arms. Further, it was declared that an army may exact “pro¬

visions, clothing, etc.,® necessary for its main¬

tenance and levy money contributions either

in case of need or as a penalty. The Russian project was characterized in England as an

imposture and only one English delegate was sent — to register the dissent of his government.

The United States sent none, and the South American states were refused any share. To

the dismay of the promoters, the meeting was at once turned into an engine for the exact re¬

verse of their intentions. The dominating force throughout was that of Germany and Russia,

whose views and purposes were identical ; and it soon became clear that the real object of the call was to strengthen their hands as militant states by throwing overboard the entire fabric of international law on the obligations of hu¬

manity and substituting the boldest assertion of the naked rights of irresponsible force. The foremost contention was that enemy goods in neutral ships were exempt from capture. This England construed as an attack upon her naval power. The original topic of prisoners of war, when brought up, was refused discussion by the Russian delegate, Jomini, on the ground that the governments did not wish to hamper them¬

selves. The question of revising the articles of the Geneva Convention (q.v.) on the treatment of the sick and wounded, and the neutrality of clergymen, physicians, etc., attending them, was also thrown out by

him, on the ground that for military reasons it w?as necessary to revise the whole convention and that the states “most apt in the initiative of war® should have the right to “insist on their necessities.® The question of what constitutes “effective occupation® was still more vital. The obvious interest of aggres¬

sive states was to insist, as did Germany, that it “need not manifest itself by visible signs,®

so that a town once occupied should still be considered so even if the troops were removed and any rising of the inhabitants be punishable as treason, and that it wras sufficiently estab¬

lished by “flying columns,® or, as defined by a satiric German, “three Uhlans and a trumpet.®

This denial of all rights of self-defense against invasion was almost unanimously rejected by

the other delegates, however, and the principle substituted that there must be actual occupation by adequate force and lines of communication kept open ; that it “exists only wffien the terri¬

tory is placed actually under authority of the hostile army, extends only to the territory where such authority is established and exists only so long as the belligerent is able to exer¬

cise it.® The right of levee en masse, or armed insurrection of the body of a people, is linked with this ; and naturally the states itching for conquest washed to confine belligerent rights to regularly enrolled armies and oblige the rest of the people to submit when these are defeated.

Of course no such rule adopted by the belliger¬

ents themselves would ever bind a people who wanted to rise, but it would form a plea for much political murder before it was repealed.

Jomini said that war had so changed its nature in modern times that it was necessary to “reg¬

ulate the inspirations of patriotism,® for fear they might be “more disastrous to the country itself than to the oppressor,® and that “those grand explosions of patriotism wffiich took place in the beginning of the century cannot continue to occur in our day, at least not in the same form.® On this head it wras proposed that any inhabitant of a

country under occupation who should give information to the “enemy® (his own people) should be handed over to “justice.®

But this philanthropic repression of self-defense in its own interest and outlawry of the means by which Prussia gained her own independence wras not agreed to. All these assaults on nat¬

ural right were opposed by the British dele¬

gate. An attempt was made to discuss reprisals or retaliation, but it wˆas refused. Restriction of bombardment of the interior of towns with¬

out harming the fortifications was sought but flatly refused by Germany and Russia, on the ground that “experience had shown it (the bom¬

bardment) to be one of the most efficient means e44

of securing the objects of a war,8 which is true of sack, massacre and other things banned by civilization. Finally a proposal was made that, at the option of the belligerent, neutrals should be obliged to receive and care for (at the bel¬

ligerent’s expense) the wounded; in other

words, that a strong power could make its neu¬

tral neighbors depots to keep its armies in condition.

2. The change in relations between gold and silver, which has produced so much financial and political demoralization in the last quarter of the 19th century, was the subject of three international conferences within that time — at Paris, August 1878 and April 1881, and at Brus¬

sels, November 1892. The last named was

called by President Harrison for both business and political reasons.

The accumulation of

silver under the Sherman Act of 1890 was

threatening the country with a fall to the sin¬

gle silver standard and was only averted by the bond sales of 1893 and the repeal of the act; and the free-coinage movement which con¬

vulsed the country in 1896 was making head¬

way, had been approved by the platform on

which Harrison was elected and demanded some recognition. Abroad, the recent adoption of the gold standard by state after state was raising gold to a premium and arousing the fear that it was too scarce to be the sole money of ulti¬

mate payment ; the fall in silver was causing much loss and dislocation of trade, and many believed that its demonetization was the sole cause of this and of the low price of commod¬

ities (which they called the high price of gold), and that its restoration by common agreement would raise its price again and restore equilib¬

rium of commerce. The call was accepted by all the European states and Mexico, with the United States, 20 in number; and all the 50

delegates were present, but those of Germany, Austria and Russia were forbidden to debate or vote. The president was Montefiore Levi, of Belgium; its vice-president, Edwin H. Terrell, United States Minister to Belgium. The

United States delegation drew up the order of business, and offered a resolution that <(it is desirable that some means should be found for increasing the use of silver in the currency systems of the nations, w and, while stating their own belief in general bimetallism, sug¬

gested two plans short of this, to which Mr.

Alfred Rothschild, of the British delegation, added a third. The resolution was favored by most of the delegations, who indeed would not otherwise have been sent there ; but was too gen¬

eral to be of any service, and was laid on the table' and not taken up. A special committee reported on the three schemes before it: (1) That of A. Soetbeer, too involved for interna¬

tional agreement; (2) Rothschild's, as altered in committee, essentially, that all Europe should buy 30,000,000 ounces of silver yearly, the United States to keep on buying 54,000,000; that unlimited free coinage should be estab¬

lished in British India and Mexico; the agree¬

ment should run for five years unless silver rose to an agreed price before that; (3) Moritz Levy's, laid before the conference of 1881, to withdraw from circulation all gold coin and notes under 20 francs. The British delegation refused to support this unless joined with

something like the Rothschild plan of maintain¬

ing the gold price of silver; the Latin Union members would not have this amendment be¬

cause it involved fresh purchases of silver; nor the United States, because of its unfairness; and Rothschild withdrew his plan. There¬

upon the conference began discussing bimetal¬

lism till they adjourned, 15 December, for the holidays, to reconvene the following May if the governments thought it advisable ; but the elec¬

tion of President Cleveland meantime had taken the subjects out of the immediate political field as an adjunct, and the conference did not meet again. See International Law; United

States, Diplomacy of the.

BRUSSELS LACE. See Lace.

BRUSSELS SPROUTS, a garden veg¬

etable (Brassica oleracea var. gemmifera) , de¬

rived from the same species as cabbage and cauliflower (qq.v.), like which it is cultivated as an autumn crop more widely in Europe than in America. It is distinguished by producing in the axils of the leaves,

buds or cabbage¬

like heads, an inch or more in diameter. Some varieties attain a height of four feet aud pro¬

duce sprouts on nearly the whole length of the stem. It takes its name from Brussels,

Belgium.

BRUT, Roman de, a poem in eight-syllable

verse, composed by Robert Wace, but indirectly modeled upon a legendary chronicle of Brit¬

tany, entitled (Brut y Brenhined) (Brutus of Brittany) discovered in Armorica by Walter,

archdeacon of Oxford, and translated into Latin by Geoffrey of Monmouth. Wace presented his poem to Eleonore of Guyenne in 1155, and it was translated into Anglo-Saxon by Layamon.

The poem relates that after the capture of Troy by the Greeks yEneas came to Italy with his son, Ascanius, and espoused Lavinia, daugh¬

ter of King Latinus, who duly presented a son to him. This son, as well as Ascanius, succeeded to the throne, which devolved at last upon Silvius, son of Ascanius, who became the father of Brutus, from whom the (Roman* takes its name. Brutus slew his father with a misdi¬

rected arrow and fled. First he went to Greece, where he delivered the Trojan captives; next he conquered the Armorican Isles, to which he gave the name of Britain. Afterward he made war upon the King of Poitou and founded the city of Tours, which he named in honor of his son. From Poitou he returned to the Armori¬

can Isles, overcoming the giants in possession, and renamed it Britain. He founded the city of London and reigned long and gloriously

there.

The narrative now concerns itself with the

descendants of Brutus. The adventures of

Lear, of Belin, of Brennus who voyaged to

Italy, of Cassivellaunus who so bravely resisted Caesar, of all the bellicose chiefs who opposed the dominion of the Roman emperors, are

minutely related. King Arthur, however, is the real hero of the (Roman dc Brut.* Arthur per¬

forms prodigies of valor, is the ideal knight of his order of the Round Table, and finally de¬

parts for some unknown region, where it is implied he becomes immortal, and never desists from the performance of deeds of valor. In this portion of the narrative figure the en¬

chanter Merlin, the Holy Grail, or chalice in which were caught the last drops of the

Saviour's blood as he was taken from the cross, Lancelot of the Lake, Tristan and his unhal¬

lowed love, Perceval and his quest of the Holy Grail. The (Roman } became unprecedentedly

popular and it was publicly read at the court of the Norman kings. The British Museum

holds the two manuscripts of his work.

BRUTT, Ferdinand, German painter: b.

Hamburg, 13 July 1849. He was educated at

the Weimar Art School and settled in Diisseldorf in 1876; was professor at the art school there in 1893; and in 1900 went to Kronberg.

Together with L. Bokelmann he developed a

new type of genre painting in the stvle of the Belgians, Leys and Gallait, representing court¬

room scenes. The subjects of his earlier

pictures were from the life of the modern

peasants or from the history of the 18th

century, but afterward he painted scenes from the life of the city; he has since turned to the painting of landscapes and historical subjects, like the extensive frescoes in the Romer at Frankfort. His works include (Peasant Dele¬

gation } ; (The Prince on the Promenade) ; (At the Exchange) ; (In the Art Gallery) ; (The Hour of Decision) ; (Christus Victor } ; Christ¬

mas Morning. >

BRUTTII, an ancient people of Italy,

living in the southwestern peninsula, now

Calabria. The Greeks had several flourishing colonies on the coast and had to some extent conquered the inhabitants of the interior; the Lucanians also made themselves masters of

some portions of the interior. But about 350

the people revolted, and assisted by the Luca¬

nians, gained their independence and captured several Greek cities. At this time they were called by the Greeks Bruttii (rebels). They remained independent until they united with

Pyrrhus against Rome and were subdued by the Romans in 272 b.c. In the second Punic war they sided with Hannibal, and after his ex¬

pulsion from Italy were heavily punished by the Romans, robbed of considerable of their territory, entirely deprived of their independ¬

ence and not allowed to bear arms. Their

chief towns were Consentia and Petelia. A

great forest spread through the country, from which great quantities of pitch were obtained.

Augustus joined the country of the Bruttii and Lucania to form the Third Region, which,

under Diocletian became a province under a

governor.

BRUTUS, or BRUTE, in the fabulous

history of Britain, the first king of the island, according to Geoffrey of Monmouth. He is

said to have been the son of Silvius and grand¬

son of Ascanius, the son of /Eneas, and to have been born in Italy. He slew his father, Silvius, fled to Greece, thence to Britain, where he founded New Troy or London. He landed

at Totness, in Devonshire, destroyed the giants who then inhabited Albion, and called the

island from his own name. At his death the island was divided among his three sons :

Locrine had England, Cumber, Wales, and

Albanact, Scotland.

BRUTUS, Decimus Junius Albinus, Ro¬

man soldier: d. 43 b.c. He served under Caesar in the Gallic war, and in the civil war he com¬

manded the fleet destined to besiege Massilia, ancient Marseilles. Caesar afterward appointed him to the government of further Gaul, and, in case of Octavian's death, nominated him as one of his heirs. Nevertheless he joined the con¬

spiracy against Caesar, and volunteered, on the memorable Ides of March, to conduct his friend and benefactor to the place of slaughter. When the tragedy was consummated, Decimus Brutus

retired to Cisalpine Gaul, and there maintained himself for some time, but was ultimately de¬

serted by his troops, betrayed to Antony and put to death by order of that general. Consult Appian, B. C. (Ill, 97); Dio Cassius (XLVI, 53) ; Caesar, B. G. (Ill, 2), B. C. (I. 36, 45).

BRUTUS, Lucius Junius, a Roman patriot,

sometimes called the Elder, to distinguish him from Marcus Junius, the slayer of Caesar, lived about 500 b.c. According to the legend, he was the son of Marcus Junius and the elder daugh¬

ter of Tarquin the Proud, the last king of Rome, and is represented as having saved his life from the cruelty of that prince by feigning idiocy, whence he received the surname of

Brutus (Stupid). Yet the King associated him with his own sons, Aruns and Titus, in a mis¬

sion which he sent to Delphi to inquire into the meaning of a portent, which had caused much alarm at Rome. After receiving the

reply to the question they were charged to propound, the young men enquired of the

oracle which of the three should be king of Rc>me, no one of them being, it is observable, beir to that dignitv. To this the reply was, <(Whichever shall first kiss his mother.® So, on their return to Italy, Titus and Aruns ran to kiss the Queen mother; but Lucius Junius, as he landed from the galley, pretending to slip, fell prostrate and kissed the soil of Rome, in the belief that by ((mother® the oracle had meant mother earth. When Lucretia, the wife of Collatinus, plunged a dagger into her bosom that she might not outlive the insult which she had suffered from Sextus, the son of Tar¬

quin, Brutus is said to have drawn the dag¬

ger from the wound, and to have sworn ven¬

geance against the Tarquins whose banishment he then demanded and procured. Then (about

509 b.c.) he is said to have been chosen one of the two first consuls. According to the legend, a conspiracy to restore the monarchy having been supported by the two sons of Brutus, he, after the crime had been proved, ordered the lictors to execute the law, and did not leave the assembly till after the execution. At length Tarquin marched against Rome. The consuls

advanced to meet him. Brutus led the cavalry; Aruns, son of Tarquin, commanded the body

opposed to him. They pierced each other with their spears at the same moment, and both fell.

The Romans conquered, and Brutus was buried with great splendor. The details of the story of Brutus, which may be regarded as a poetical legend, have been shown by Niebuhr to be irre¬

concilable with history. Consult Bondurant,

(Decimus Junius Brutus Albinus) (Chicago

1907).

BRUTUS, Marcus Junius, Roman republi¬

can : b. 85 b.c. ; d. 42 b.c. He was the son of that Marcus Junius Brutus whom Pompey

caused to be murdered, and of Servilia, the half-sister of Cato. He lost his father when he was only eight years old, but his mother and uncles carefully “directed his education. On the outbreak of the civil war he followed the 646

example of Cato, and joined the Pompeians,

notwithstanding his aversion to their leader.

After the unfortunate battle of, Pharsalia, he surrendered himself to Caesar, who received

him generously, allowed him to withdraw from the war, made him in the following year gov¬

ernor of Cisalpine Gaul and afterward con¬

ferred on him the government of Macedonia.

Notwithstanding these benefits, Brutus allowed himself to be drawn by Cassius and others into the conspiracy against Caesar, who had now

made himself master of the supreme power in the state. Caesar was assassinated in the Senate house. In public speeches Brutus explained the reasons of this deed, but he could not appease the dissatisfaction of the people, and retired with his party to the capitol. Antony succeeded in exciting the popular indignation against the murderers of Caesar, and they were compelled to flee from Rome. Brutus went to Athens,

raised a large force, and also gained over the troops in Macedonia. Thus, master of all

Greece and Macedonia, he stood at the head of a powerful army. He went to Asia and

joined Cassius, whose forces were also strong.

At Philippi they fought the army of Antony and Octavius. Cassius was beaten by Antony, and caused himself to be killed. Brutus re¬

pulsed Octavius, by whom, however, he was

soon afterward totally defeated. Seeing his

cause ruined, he ended his life by falling upon his sword. The glamour thrown over the char¬

acter of Brutus by Shakespeare will not bear scrutiny. He was at one time a relentless

usurer and did not hesitate to apply to Cicero as governor of Cilicia for power to make un¬

lawful exactions. Brutus was a man of little independent judgment, a mere student, liable to be swayed by others, and he was in no sense a martyr to a genuine patriotism. He was the author of philosophical and historical treatises, orations, etc., none of which now survive.

We still have part of his correspondence with Cicero. Cicero dedicated to him his (Orator, >

a description of the ideal orator, and called his history of Roman oratory (Brutus. >

BRUYAS, Jacques, zhak brii-ya, French

Jesuit: b. 1637; d. 1712. In 1666 on coming to Canada he went as a missionary to the Iroquois, and later established one of the earliest mis¬

sions among the Mohawk Indians. He was a

student of their language, and wrote in Latin a valuable work on the (Mohawk Radicals. >

BRUYERE, Jean de la, brii yar. See

La Bruyere.

BRUYN, Barthel, bar'tel broin, German

painter: b. Cologne 1493; d. about 1556. His earlier works show the influence of some of the German masters, but later he imitated

Michelangelo and other Italian painters. His masterpiece is the altarpiece for the church of Saint Victor at Xanten. His numerous works

are mostly in Cologne and Munich ; among

them are (Martyrdom of Saint Ursula) ;

(Adoration of the MagP ; (Corpus ChristP ; (Saint Catherine) ; and a number of portraits, including (A Man and His Wife) (1532 Strassburg) ; (Young Patrician and his Wife* (1534

Berlin Museum) ; (An Old Man in a Black

Cap and His Wife) (Wiesbaden) ; burgo¬

master Braweiler) (1535 Cologne). Other

paintings arc to be found in Vienna, Dresden, Berlin, Cologne, Antwerp. His son, Bartholom/EUS the Younger (died before 1610)

inherited his father's studio, but was inferior to him in painting. He has been called the (<Master with the Pale Faces® by reason of this characteristic in his paintings. He was a mem¬

ber of the Council of Cologne (1566-1606),

and, when his eyesight failed, became bannerman of the city in 1591. Consult Firmenich-Richartz, E., (Bartholomaeus Bruyn und seine Schule) (Leipzig 1891).

BRUX, Czechoslovakia, a town of Bohemia,

on the Biela, 48 miles northwest of Prague. The Schlossberg, 1,300 feet high, crowned by the ruins of an ancient castle, overlooks the town, with its interesting Gothic Dechanteikirche

dating from 1517, and its new Rathaus. Brown coal is extensively mined, the neighboring saline springs of Seidlitz, Piillna and Seidschiitz at¬

tract numerous visitors, and breweries, dis¬

tilleries, manufactures of sugar, enameled ware, cast iron, machinery and potash, constitute the chief industries. In a battle here in 1421 the Salons defeated the Hussites. Pop. 22,500.

BRYAN, Charles Page, American diplo¬

mat: b. Chicago, 2 Oct. 1856; d. 13 March 1918.

After two years at the Universitv of Virginia, he studied law at George Washington (then

Columbian) University, He was elected mem¬

ber of the Colorado house of representatives in 1880 and of the Illinois lower house from 1888 to 1897. As a representative of the

Chicago World Fair he visited Europe twice, and was successively United States Minister to China, Brazil, Switzerland, Portugal and Bel¬

gium from 1897 until he was appointed Am¬

bassador extraordinary and plenipotentiary to Japan 1911-12. The Emperor of Japan con¬

ferred on him the Grand Cordon of the Rising Sun.

BRYAN, Elmer Burritt, American ed¬

ucator and college president: b. Van Wert,

Ohio, 23 April 1865. After studies at Indiana, Harvard and Clark Universities, he held

various pedagogical positions in Indiana, at Butler College and Indiana University, and

became general superintendent of education in the Philippine Islands, and principal of the Insular Normal School. He returned to

Indiana University in 1903 ; in 1905 became president of Franklin College and in 1909 of Colgate University. He is author of (Nascent Stages and their Pedagogical Significance)

(1900); (The Basis of Practical Teaching)

(1905) ; fundamental Facts for the Teacher *

(1912).

BRYAN, William Jennings, American

political leader: b. Salem, Ill., 19 March 1860.

He was graduated at Illinois College, Jackson¬

ville, in 1881, and at the Union College of Law, Chicago, in 1883. He practised law at Jackson¬

ville from 1883 to 1887, when he removed to Lincoln, Neb. He was elected to Congress in 1890, and again. in 1892. From 1894 to 1896 he was editor of the Omaha World-Herald. In

1896 he was nominated for President by the Democratic National Convention at Chicago,

and also by the People's party and Free-Silver Republicans, on a platform demanding the free and unlimited coinage of silver by the United States at a ratio of 16 to 1, regardless of the action of other nations, a financial policy which BRYAN —BRYANT

he had for some time advocated with much

earnestness and eloquence of both tongue and pen. He was defeated at the polls by McKinley.

During the war with Spain, he was colonel of a Nebraska regiment of volunteers, but saw

no field service. In 1900 he was a presidential candidate, of the Democrats, Populists and

Free-Silver Republicans, upon an anti-imperial¬

istic and anti-trust platform, with a reiterated demand for free-silver. He was again defeated by William McKinley. Soon after the election he established The Commoner, a political

weekly. Made tour of the world in 1906 and contributed to newspapers. In 1908 he was

again the Democratic candidate for President, and received 162 electoral votes, against 321 for William H. Taft, March 4, 1913, he was ap¬

pointed Secretary ot State by President Wilson ; occupied that position until his resignation 9

June 1915. While Secretary he was instrumental in promoting closer relations with Latin America and he negotiated 30 treaties with as many governments, representing three-fourths of the population of world. These treaties embody a plan which he had been advocating for many years., whereby the parties agree: (1) That all disputes of every character and kind shall, when they defy diplomatic settlement, be submitted to an international tribunal for investigation and report; (2) the time allowed for the in¬

vestigation shall not exceed one year; (3) the contracting parties agree that during the in¬

vestigation there shall be no declaration of war or commencement of hostilities; (4) the

contracting parties reserve the right to act independently at the conclusion of the in¬

vestigation. It is expected that these in¬

vestigations will reduce war to a remote

possibility. After resignation he devoted

himself largely to the cause of inter¬

national peace. When the United States de¬

clared war, he supported its policy. He wrote (The First Battle: a Story of the Campaign of 1896) (1897), which contains some of his speeches and a biographical sketch by his wife; (Under Other Flags) (1904); (The Old World .

and Its Ways* (1907). Also many articles in magazines and newspapers.

BRYAN, Ohio, village and county-seat of

Williams County, 55 miles southwest of Toledo, on the Lake Shore and Michigan Southern and the Cincinnati Northern railroads. The village owns the electric-lighting plant and the water¬

works, and includes in its industrial establish¬

ments condensed milk factories, wheelbarrow

works, agricultural implements and show-case

works, *etc.* Pop. (1920) 4,252.

BRYAN, Tex., city and county-seat of

Brazos County, 100 miles southwest of Houston, on the International and Great Northern and the Houston and Texas Central railroads. It contains a Carnegie library, the Allen Academy, a convent, a Baptist academy and the Free-Will Baptist Academic and Collegiate Institute. It has a large trade in cotton and live stock and contains cotton compresses, gins, oil mills and fertilizer works. The electric plant and water¬

works are the property of the city. Four miles from Bryan is situated the Texas Agricultural and Mechanical College. The city is governed under the commission-manager plan. Pop.

(1920) 6,307.

BRYANT, Henry Grier, American ex¬

plorer and geographer : b. Allegheny City, Pa., 7

Nov. 1859. He was graduated at Princeton

1883, and from the law department of the Uni¬

versity of Pennsylvania, 1886. He has con¬

tributed literary articles to various magazines and encyclopaedias. In 1891 he organized and conducted an exploring expedition to the Grand Falls of Labrador, was second in command of the Peary Relief Expedition in 1892, was leader of the Peary Auxiliary Expedition of 1894 and in 1897 led an exploring expedition to the Mount Saint Elias

region of Alaska. In 1912

he explored and surveyed the Saint Augustine River in southeast Labrador. He has been a delegate to various international geographical congresses and since 1897 has served many

terms as president ot the Geographical Society of Philadelphia. He is president of the Ameri¬

can Alpine Club; fellow, Royal Geographical

Society of London ; Officier de l'Academie

(France) ; corresponding member of the Geo¬

graphical societies of Stockholm and Geneva; member American Philosophical Society, *etc.*

BRYANT, Jacob, English philologist and

antiquarian: b. Plymouth 1715; d. 1804. He

studied at Eton and King's College, Cambridge, became afterward tutor of the sons of the

famous Duke of Marlborough, the eldest of

whom he also accompanied to the Continent as his secretary. After his return he received, by the influence of his patron, a lucrative post in the ordnance, which gave him leisure for his researches into Biblical, Roman and Grecian

antiquities. His most important work is the (New System of Ancient Mythology) (1774-76), a fantastic and now valueless treatise. He wrote also many other works of interest to antiquarians. He left his library to King's College, and endowed the superannuated col¬

legers of Eton. He was engaged in a famous dispute on the veracity of Homer and the ex¬

istence of Troy, in which he endeavored to show that there never was such a city as Troy, and that the whole expedition of the Greeks was a mere fiction of Homer. The object of one of his earlier treatises, which appeared in 1767, is to show that the island Melita, on which Saint Paul was wrecked, was not Malta, but situated in the Adriatic. He

endeavored to illustrate the Scriptures by explanations drawn from Jo¬

sephus, from Philo the Jew and from Justin Martyr ; but in this, as in all his writings, hi's learning and his ingenuity are misled by his love of controversy and paradox.

BRYANT, John Howard, American poet :

b. Cummington, Mass., 22 July 1807; d. Prince¬

ton, Ill., 14 Jan. 1902. He was a brother of William Cullen Bryant (q.v.). He studied at the Rensselaer Polytechnic Institute, Troy,

N. Y., removed to Illinois in 1831 ; from

1832 until his death lived on his farm at Prince¬

ton, performing the greater part of its work with his own hands. He held numerous local offices, served in the State legislature in 1842

and 1858; was a Free-soil candidate for Con¬

gress in 1854 and a delegate to the convention which organized the Republican party in 1856.

He was an intimate friend of Abraham Lincoln, who appointed him collector of internal revenue for the Fifth Illinois district, 1862-66. The poems which were the product of his leisure hours show him as a lover of nature, which he 648

described minutely and effectively, and a man of refined tastes and kindly feelings. His first printed poem, (My Native Village,' appeared

in the United States Review and Literary

Gazette in 1826, his brother William then being editor of that journal. His collected works may be found in (Poems) (1855), and (Poems Writ¬

ten from Youth to Old Age, 1824-84,' privately printed in Princeton, Ill., in 1885.

BRYANT, Joseph Decatur, American

surgeon and author: b. East Troy, Wis., 12

March 1845 ; d. 7 April 1914. A graduate of Bellevue Hospital Medical College in 1868, he was attached to the faculty in various positions until he became professor of anatomy and

clinical surgery and associate professor of

orthopedic surgery in 1883, later, in 1898, be¬

coming professor in the principles and practice of surgery and consulting surgeon to several New York hospitals. In 1882 he had been

appointed surgeon-general of the State by Pres¬

ident Cleveland, whose personal friend and

physician he was. In 1908 New York Univer¬

sity conferred upon him the degree of LL.D.

Besides numerous medical monographs, he was

the author of (Operative Surgery ' (2 vols., 1905) ; (Bryant and Buck's American Practice of Surgery' (8 vols., 1906-11).

BRYANT, William Cullen, American poet

and journalist: b. Cummington, Mass., 3 Nov.

1794; d. New York, 12 June 1878. His father, Dr. Peter Bryant, a physician, was a man of much literary culture, as well as large experi¬

ence in public affairs. He prepared, when he was but 14, a collection of poems, which were published in Boston in 1809. In that volume appeared (The Embargo,' the only poem deal¬

ing with the politics of the day he ever wrote.

In the following year Bryant entered Williams College as a student of law, but left without taking a degree in 1815, when he was admitted to the bar. In that year be became a contributor to the North American Review, in which

appeared the following year his (Thanatopsis,'

a poem in blank verse, which from the first has commanded profound admiration. Six years

later he published a second collection of poems, which brought him into a wide fame. The prin¬

cipal piece, (The Ages,' is a didactic poem, in which he sketches the past progress of the world, concluding with a glowing picture of America, and its occupation by the new race.

He definitely abandoned law for literature in 1825, and went to New York, where he founded the New York Review, and a year after became the editor of the Evening Post, an old estab¬

lished paper, with which he was connected till his death. In 1832 he issued another collection of poems, which was republished in Great Brit¬

ain with a preface by Washington Irving. In the summer of 1834, accompanied by his family, he went to Europe, and traveled through Eng¬

land, France, Germany and Italy, remaining

in the latter country for a considerable time. In 1845 he again visited Europe, and still again in 1849, when he extended his journey to Egypt and the Holy Land. The incidents of these and subsequent travels, both in Europe and America, were described in letters written to the Evening Post, which were reprinted in separate volumes, entitled (Letters of a Traveler' (1850) ; bet¬

ters from Spain and Other Countries' (1859) ; (Letters from the East' (1869); (Orations and Addresses' (1873). A complete edition of his poems up to 1855 was published in that year, and in 1863 appeared a small volume entitled (Thirty Poems.' His last works of importance are his transations of the (Iliad' (1870) and the (Odyssey' (1872), translations which many

American critics rank above any that had hith¬

erto appeared in the English language. Early in 1878 appeared (The Flood of Years,' his last poem of any great length, in which the poet, in strains that remind the reader of (Thanatopsis,'

reviews the life of man as the ridge of a wave ever hurrying on to oblivion the forms that appear on its surface but for a moment, con eluding, however, with the expression of a con¬

fident hope in the future of mankind, even though the present is most dark and drear. His death was occasioned by a sunstroke, while

making an address at the unveiling of a statue in Central Park. At the time of his death he was engaged in conjunction with Sydney How¬

ard Gay, on a popular history of the United States, the first volume of which appeared in 1876. (See Thanatopsis). Consult Bradley,

W. A., <W. C. Bryant' (New York 1905);

Godwin, Parke, (The Life and Works of Wil¬

liam Cullen Bryant' (New York 1883-84) ;

Bigelow, John, (Life of William Cullen Bryant'

(Boston 1890) ; Stedman, E. C., (Poets of America' (Boston 1885) ; Stoddard, (Poetical Works of Bryant,' with biographical introduc¬

tion (New York 1907) ; Wendell, Barrett, (A Literary History of America' (New York

1900). '

BRYAXIS, Greek sculptor: flourished in

the 4th century b.c. He cast a statue in bronze of Seleucus, King of Syria, and assisted in adorning the mausoleum with bas-reliefs. He

also executed five gigantic statues at Rhodes, a statute of Pasiphge and other works. According to Clemens Alexandrinus, two of his statues were attributed by some to the celebrated

Phidias.

BRYCE, George, Canadian educationist :

b. Mount Pleasant, near Brantford, Ontario, 22

April 1844. He was a graduate of Toronto Uni¬

versity, and was ordained to the ministry of the Presbyterian Church in 1871. He was first pas¬

tor of Knox Church, Winnipeg, organized Man¬

itoba College, and was head of the science department of the University of Manitoba,

1891-1904. His literary works, which deal

mainly with the Canadian Northwest, include

(Manitoba: its Infancy, Progress and Present Condition' (1882); (Short History of the

Canadian People' (1887) ; (Remarkable His¬

tory of the Hudson's Bay Company' (1900) ; (Romantic Settlement of Selkirk's Colonists'

(1909).

BRYCE (Viscount), James, British his¬

torian and diplomat: b. Belfast, 10 May 1838.

His father, James Bryce, LL.D., was a Scotch¬

man, well known as a distinguished teacher and geologist, and a master in a high school of Glasgow from 1846 to 1874. He received his early education at the high school and Univer¬

sity of Glasgow, and afterward at Trinity Col¬

lege, Oxford, where he was graduated B.A.

with a double first-class in 1862, being in the same year elected a fellow of Oriel College.

In 1867 he became a barrister of Lincoln's Inn.

From 1870 till his resignation in 1893, he was regius professor of civil law at Oxford. He WILLIAM CULLEN BRYANT

entered Parliament in 1880 as member for the lower Hamlets division of London, and from

1885 represented South Aberdeen as a Liberal and Home Ruler. He was chancellor of the

duchy* of Lancaster, a member of the cabinet in the Liberal ministry of 1892, and president of the Board of Trade (1894—95). In 1905-06 he was Chief Secretary for Ireland, and from

1907-12 Ambassador to the United States. He received the degree of D.C.L. of Oxford, LL.D.

of Edinburgh and Glasgow; in 1894 was

elected a fellow of the Royal Society, and many foreign honors were conferred on him.

In 1907 he received the Order of Merit and 1 Jan. 1914 was created Viscount Bryce of

Dechmont. His two most important works are

(The Holy Roman Empire 5 (1864, afterward

enlarged and republished) and <The American

Commonwealth > (1888; new ed. revised and

enlarged 1910), a very full exposition of the American constitution,

system of government,

and administration, political machinery, *etc.*

He also wrote (Transcaucasia and Ararat 5

(1877) ; (Impressions of South Africa5 (1897) ; (Studies in History and Jurisprudence 5 (1901) ; (Studies in Contemporary Biography 5 (1903) ; (South America: Observations and Impressions) (1912; Sp. trails., (La America del Sud5

by Guillermo Riviera, 1913) ; (University and Historical Addresses) (1913).

BRYCE, Lloyd, American editor and

novelist: b. Flushing, L. I., N. Y., 20 Sept. 1851 ; d. New York, 2 April 1917. He was educated at Georgetown University and at Oxford. He

was a member of the 50th Congress (1887-89), directing his efforts there to harbor improve¬

ments, copyright matters, *etc.* In 1889, his friend, Allen Thorndyke Rice, died, leaving

him a controlling interest in the North Ameri¬

can Review. He purchased the other interests and conducted the Review until 1896. He was United States Minister to the Netherlands and Luxemburg 1911-13. His works include (Paradise) ; (A Dream of Conquest5 ; (The Romance of An Alter Ego) ; (Friends in Exile) ; (The Literary Duet5 ; (After Christianity, what?5

BRYCE COMMITTEE. A committee ap¬

pointed on 15 Dec. 1914 by Mr. Asquith, then British Premier, (<to consider and advise on the evidence collected on behalf of His

Majesty's government as to outrages alleged to have been committed by German troops dur¬

ing the present war, cases of alleged maltreat¬

ment of civilians in the invaded territories and breaches of the laws and established usages of war; and to prepare a report for His Majesty's government showing the conclusion at which

they arrive on the evidence now available.55

Under the chairmanship of Viscount Bryce,

formerly British Ambassador to the United

States, the following were appointed to serve: Rt. Hon. Sir Frederick Pollock, K.C., Rt. Hon.

Sir Edward Clarke, K.C., Sir Alfred Hopkin—

son, K.C., Mr. H. A. L. Fisher, a noted his¬

torian and vice-chancellor of the University of Sheffield, and Mr. Harold Cox, a former M.P., a well-known journalist and editor of the

Edinburgh Review. Two secretaries, both bar¬

risters, Messrs. E. G. Mears and W. J. H.

Brodrick, were appointed, and Sir Kenelm E.

Digby, K.C., became an additional member of the Committee on 22 Jan. 1915. A great num¬

ber of Belgian refugees had been conveyed to England during the early stages of the war.

For some months before the appointment of

the Committee the Home Office had been col¬

lecting a large body of evidence taken from Belgian witnesses, some soldiers, but most of them civilians from those towns and villages through which the German army passed, and

from British officers and soldiers. Over 1,200

depositions made by these witnesses were sub¬

mitted to and considered by the Committee.

The depositions were in all cases taken down in the United Kingdom

by persons of legal

knowledge and experience ; they had no author¬

ity to administer an oath. The officials were instructed not to (<lead55 the witnesses, or make any suggestions to them ; but they were to cross-examine them, so far as the testimony given provided materials for cross-examination.

Care was taken to impress upon each witness that the giving of evidence was a grave and serious matter, and every deposition submitted to the Committee was signed by the witness in the presence of the examiner. The printed

evidence is all couched in the very words which the witnesses used, and where they spoke in Flemish or French, pains were taken to have competent translators, and to make certain that the translation was exact. The Committee also had before them about 90 diaries taken from German soldiers who had fallen or been taken prisoners. After five months of investigation the Committee published their report in May 1915, with an appendix containing the verbatim evidence and facsimile reproductions of ex¬

tracts from the diaries referred to above. The document makes gruesome reading. While

making due allowance for ((some exaggeration in one witness, possible delusion in another, inaccuracies in a third,55 the Committee arrived at a (<definite conclusion55 to the effect that (<Murder, lust, and pillage prevailed over many parts of Belgium on a scale unparalleled in any war between civilized nations during the last three centuries.55 The report stated (1) <(That there were in many parts of Belgium deliberate and systematically organized massacres of the civil population, accompanied by many isolated murders and other outrages. (2) <(That in the conduct of the war generally innocent civilians, both men and women, were murdered in large numbers, women violated, and children mur¬

dered. (3) ((That looting, house burning, and the wanton destruction of property were ordered

and countenanced by the officers of the German army, that elaborate provision had been made for systematic incendiarism at the very outbreak of the war, and that the burning and destruc¬

tion were frequent where no military necessity could be alleged, being

indeed part of a system of general terrorization. (4) (<That the rules and usages of war were frequently broken, par¬

ticularly by the using of civilians, including women and children, as a shield for advancing forces exposed to fire, to a less degree by kill¬

ing the wounded and prisoners, and in the

frequent abuse of the Red Cross and the

White Flag.55 In conclusion, the Committee ex¬

pressed the ((hope that as soon as the present war is over, the nations of the world in council will consider what means can be provided and sanctions devised to prevent the recurrence of such horrors as our generation is now wit¬

nessing.55

The German point of view was quoted by

the Springfield Republican (May 1915) from

the semi-official Kolnische Zeitung: <(We all made one fundamental principle clear : for the fault of the individual the community to which he belonged must suffer. The village in which our troops had been shot at by the civilian popu¬

lation was burned down. If the culprit was not discovered, a few representatives were

taken out of the general population and shot.

Women and children were not touched, except when they were found with weapons in their hands. This principle may seem hard and cruel — it has been developed from the customs of modern and ancient war history, and, as far as it can be spoken of at all, recognized. It is also

justified by the theory of setting an awful example (‘ Abschreckeffi). The innocent must suffer with the guilty … War is no drawing¬

room game : war is hell-fire. He who sticks his finger into it will burn his hand, his soul, and his life. The poor, confused, misled Bel¬

gian nation has been sacrificed to this fate.®

Shortly after the destruction of Louvain,

when the allegations against German troops

had gained world-wide attention, the German

government commenced an enquiry into the

charges made by the Belgians. The results of the investigation were published at Berlin in a White Book (May 1915) headed “Offenses

against International Law in the Conduct of the War by the Belgians.® The shooting of

civilians, and the destruction of towns and villages, are claimed as military necessities forced upon the German army by the illegal activities of franc-tireurs (q.v.). The charges of looting and drunkenness were not replied to in the report; but the names of the hereto¬

fore unknown officers responsible for the al¬

leged atrocities were revealed. Consult Re¬

port of the Committee on Alleged German Out¬

rages, Appointed by His Britannic Majesty’s

Government and presided over by the Rt. Hon.

Viscount Bryceˆ parts, London 1915) ; Mears, E. G., (The Destruction of Belgium: Ger¬

many’s Confession and Avoidance) (pamphlet,

London 1916). See also Aerschot; Alost; An—

denne; Charleroi; Dinant; Gelrode; Liege;

Louvain; Malines; Namur; Tamines; Ter—

monde.

BRYCE REPORT. See Bryce Com¬

mittee.

BRYDEN, Henry Anderson, English au¬

thor: b. 3 May 1854. He was educated at

Cheltenham College, and later studied for the bar. In early life he won a national reputation as an athlete, especially as runner. His

travels in South Africa have been extensive.

Among his books are ‘Kloof and Karroo > ; ‘Gun and Camera in Southern Africa) ; (Tales of South Africa) ; (Nature and Sport in South Africa*; (An Exiled Scot) (1899); (Animals

of Africa> (1900) ; ‘Big Game Shooting)

(1905); (The Gold Kloof* (1907); ‘Highways

and Byways of Sport and Nature) (1913) ;

‘Tales of Sport and Mystery) (1913).

BRYENNIOS, bre-en’ ne-os, Philotheos,

Greek theologian : b. Constantinople in 1833.

He attended the universities of Munich, Berlin and Leipzig. His German education gave him

the point of view of the western theological world and made him liberal in his religious views; and he has ever shown himself apprecia¬

tive of Catholic religious thought. This he showed by attending the Bonn Old Catholics'

Conference (1875). From the position of pro¬

fessor of Church history at Chalkis, Bryennios was raised to that of metropolitan of Seres and, later on, to that of metropolitan of

Nicomedia. He first attracted the attention of the literary world by the publication of the first complete manuscript of the two 'Epistles of Clement, in 1875. This was followed in 1883 by another manuscript of 'The Teachings of the Twelve Apostles.* These manuscripts he had

discovered in 1873, in the Holy Sepulchre, in Constantinople, both bound together under one cover, with several other manuscripts. Around them a very considerable literature, contro¬

versial and critical, has grown up.

BRYMNER, Douglas, Canadian archivist :

b. Greenock, Scotland, 1823; d. 1902. Trained for a mercantile career, he was engaged in busi¬

ness until 1856, when ill health compelled his retirement. He emigrated to Canada in 1857, and engaged in journalism, becoming editor of the Presbyterian and associate editor of the Montreal Herald. In 1872 he. was appointed

Dominion archivist and for 30 years labored tirelessly in collecting and arranging the histori¬

cal records and documents of Canada. His

series of annual reports on the Canadian

archives constitute a rich treasury of original documents of every phase of Dominion history.

BRYMNER, William, Canadian artist : b.

Greenock, Scotland, 1855. He studied in Paris ; received a gold medal at the Pan-American

Exhibition and a silver medal at the Saint Louis Exhibition. He is president of the Royal Canadian Academy.

BRYN MAWR COLLEGE, an educa¬

tional institution for women, at Bryn Mawr, Pa.; founded in 1880 by Joseph Taylor. Bryn Mawr is distinctive among women's colleges in that its course and method of study are based upon the university model. The system of

"major and minor elections in fixed combina¬

tion® has been adopted ; students are grouped in accordance with the work they have actually accomplished instead of by arbitrary classes; original research is in all cases encouraged; and, in pursuance of the same policy, of placing the scholarship of the college upon a basis of pure merit, candidates for admission as under¬

graduates are not accepted upon certificate, and honorary degrees are not granted. The college offers to graduate degrees of A.B., A.M. and Ph.D. Fifteen resident fellowships, 24 gradu¬

ate scholarships and 4 European fellowships

are offered to graduate students, 10 graduate scholarships are offered to English, German

and French women, and there are also 50 schol¬

arships and a students' loan fund for under¬

graduates. Bryn Mawr has grown rapidly

since its foundation, and in 1920 had 66 profes¬

sors and instructors and a student body of 467.

The library, largely designed for specialized study, contained in the same year over 68,000

bound volumes and 10,000 pamphlets, including the classical libtary of Professor Sauppe of Gottingen. The college buildings include six halls of residence, accommodating from 60 to 70 students each — Taylor Hall containing the lecture-rooms and office of administration, a large library building, with a book capacity of BRYONY — BUBBLE

187,000 volumes, 14 seminar rooms, lecture

rooms, laboratories, a model school, etc., a well-equipped gymnasium, Dalton Hall, a lighting

and heating plant, an infirmary, two apartment hotels for men and women professors and nine houses for professors. The endowment fund

is $1,890,000, the value of the buildings and grounds $1,950,000, and the annual income

about $302,700.

BRYONY (Bryonia) , a genus of 12 climb¬

ing perennial herbs of the family Cucurbitacecc , natives of Europe and Asia. Common bryony

(B. dioica) , which attains a height of from 6 to 12 feet, has long, white, branching, ill-smelling, fleshy roots, one-half inch thick; five-lobed roundish leaves; racemes of staminate flowers and axillary, greenish-white, pistillate flowers in corymbs, followed by red berries as large as peas. Probably because of its repulsive odor the plant has been reputed as poisonous, but is used to some extent medicinally. Common

bryony is frequently planted for ornament in Europe, but like its relatives has not become very popular in the United States for this pur¬

pose. White bryony (B. alba) attains a height of from 6 to 12 feet, has thick, yellowish, tuberculate roots, long-petioled leaves and long¬

stemmed pistillate flowers in racemose corymbs.

Black bryony (Tamus communis) belongs

to the family Dioscoreaccce.

BRYOPHYLLUM, a small genus of suc¬

culent herbs of the family Crassulacecc, natives of warm climates. B. pinnatum, the only species commonly cultivated, is a native of the tropics.

It is two to four feet high with reddish stems, fleshy leaves and compound panicles of pendu¬

lous flowers. Both calyx and corolla are red¬

dish green and cylindrical, the former about an inch long, the latter two inches or more. The plant is specially interesting, since the leaves when laid on damp sand or moss or placed in moist air produce new plants from the notches in their margins. In Bermuda, where they are called ˆfloppers,® in some of the West Indian islands, and parts of the southern United States, the plant is a weed in fencerows, upon stone walls, etc., and sometimes a pest in fields.

BRYOZOA, the name given by Ehrenberg

to a class of molluscoid animals, the peculiari¬

ties of which have been previously observed by J. V. Thompson, who had called them polyzoa.

See Polyzoa.

BRZEZANY, Poland (<birch-town>), a

town of Galicia, on the Zlota-Lipa near the Dneister, 49 miles southeast of Lemberg. It has tanneries, alcohol distilleries, and an active trade in grain and farm produce. Pop. 12,000.

BRZOZOWSKI, Theodor, Tesuit general:

d. 5 Feb. 1820. He succeeded Gabriel Gruber 2 Sept. 1805 as 19th

general of the Jesuit order, and was active in the restoration of the society throughout Europe. His efforts in Prussia

after a slight success in 1812 were nullified by the edict of 20 Dec. 1815 which, fearful of their growing influence, expelled them.

BUA, boo'a, a small island in the Adriatic, belonging to the Dalmatian district of Spalato, Jugoslavia; is connected with the town

of Trau bv a bridge. During the latter period of the Roman empire many political offenders and heretics were confined here. It contains six villages, of which Santa Croce, or Bua, is the principal. The productions of the island com¬

prise dates, wine, olives, and particularly asphaltum, of which there is a remarkable well.

BUACHE, Philippe, fe-lep bii-ash, French

geographer: b. Paris, 7 Feb. 1700; d. 24 Jan.

1773. He spent seven years in arranging a new repository of maps and charts. In 1729 he be¬

came chief geographer to the King, and in the following year a member of the Academy of

Sciences in which he had been the means of instituting a professorship of geography. His notions of geography were in some respects

peculiar. He asserted that there was a vast continent about the South Pole, traversed by lofty mountains and gigantic rivers. The sug¬

gestion, that at Bering Strait a connection be¬

tween Asia and America might be traced, came from him. He published Considerations geographiques et physiques sur les nouvelles de-couvertes au nord de la Grande Mer) (1753) ; (Atlas Physique) (1754).

BUANSU, boo-an-soo', a wild dog

(Cyon primccrus) , found throughout India, es¬

pecially in the forests along the foothills of the Himalayan Mountains. It is smaller than a

wolf, but similar in habits, and reddish in color.

It hunts in companies, and a pack of these dogs is able to overcome any of the wild beasts in the jungle, except the elephant and rhinoceros, but they are very shy of mankind. It is gen¬

erally known in the south as the dhole.

BUBACH. See Insecticide.

BUBALIS, or BUBALE, a North African

antelope (Alcclaphus bubalinus) , thought to be the bubalus of the ancients. It is one of the hartbeests (q.v.), and equals a large stag in size, with an ox-like head and muzzle, and lvrate horn, heavily ringed. It is bay in color, with a black tuft on the end of the tail.

BUBASTIS, or BUBASTUS, a city of

ancient Egypt, now in ruins ; mentioned in the Old Testament as Pi-Beseth, now known as

Tel-Basta; situated in the delta of the Nile, southwest of Tanis; was built in honor of the goddess Pasht, called by the Greeks Bubastis.

This goddess was represented by the figure of a cat, and many mummied cats have been found in the tombs of Bubastis. On the north side of the city began the canal between the Nile and the Red Sea, constructed by Pharaoh Neco.

Bubastis was taken by the Persians 352 b.c. and its walls dismantled. Among the ruins of this city have been found remains of costly and magnificent temples. Here were celebrated

solemn feasts to the goddess Pasht, attended by people from all parts of Egypt, even to the number of 700,000 at one time, as is stated by

Herodotus.

BUBBLE SHELL, the thin, inflated

bubble-like shell of a gastropod mollusk.

(Bulla), the shell usually without a spire. On each side of the head is a large swimming flap (epipodium), and one species flits about in shal¬

low pools on mud flats. Our eastern Atlantic coast species are Bulla occidentalis and Haminea solitaria, the latter found in Vineyard Sound.

They mostly live in rather deep water, at least below low-tide mark.

BUBNA UND LITTITZ, boob'na, lit-titz',

Ferdinand (Count of), Austrian field-marshal: b. Zamersk, Bohemia, 1768; d. Milan, 6 June 1825. He was, early in life, the chamberlain of the Emperor of Austria, afterward entered the military service, and after distinguishing himself on various occasions, at Mannheim, in the de¬

fense of Bohemia (1880), and at Austerlitz, gained at Wagram, in 1809, the rank of field-marshal-lieutcnant. In the war of 1813 he com¬

manded an Austrian division with much honor, was present at the battles of Liitzen, Brautzen, Dresden and Leipzig, and in 1814 received the chief command of the Austrian army which was to pass through Geneva to the south of France.

He advanced upon Lyons, but was unsuccessful, till the corps of

Bianchi and Hessen-Homburg came to his assistance. Bubna remained at

Lyons till the return of the allied forces, and then retired to Vienna. After the landing of Napoleon in 1815, he again led a corps against Lyons, and in Savoy opposed Marshal Suchet, till Paris was conquered, and the marshal re¬

treated beyond Lyons. He then took possession of Lyons without opposition, established a court-martial to punish the disturbers of public

order and proceeded with greater severity than on his former campaign. In September he

marched back to Austria, and received for his services valuable estates in Bohemia from the Emperor. In the insurrection of Piedmont,

1821, the Count de Bubna received the chief command of the Austrian troops destined to

restore the ancient government. After the ac¬

complishment of this commission, he was ap¬

pointed general commandant of Lombardy.

BUBO, a genus of birds belonging to the

family Strlgid.ee, or owls. They have a small ear aperture, two large feathered tufts like horns on the sides of the head and the legs feathered to the toes. B. maximus is the eagle owl, or great owl. It is a native of Europe.

The corresponding American species is B. vir-ginianus.

BUBONIC PLAGUE. An epidemic dis¬

ease which has been very prevalent and terribly destructive in almost every part of the eastern hemisphere since the 3d century b.c. and prob¬

ably before that time. It was referred to as the pestilential buboes in

the waitings of Rufus of Ephesus who lived in the 1st century a.d.

and was said to have been prevalent for ages in Libya, Egypt and Syria. From the dis¬

coloration of the skin by effusions of blood, which is characteristic of the severe and fatal cases, it became known as the ((Black Death.®

It has also been known as the Levantine,

Oriental, Egyptian and Pali plague. While it has been a tremendous scourge to humanity

during all the ages of the Christian era it is by no means certain that all the accounts of it are descriptive of the same disease; that would be expecting too much from ancient pathology.

History. — It first appeared in Europe at

.Constantinople in 543 a.d., having been brought thither from Egypt. Its ravages were terrible and as many as 10,000 were said to have died from it in Constantinople in a single day. In the 14th century it was prevalent for at least 20 years not only in Europe, but in the most of the eastern world, and during that period its victims numbered from twenty-five to forty

millions. In the 1 5th century there were fre¬

quently recurring epidemics in nearly all parts of Europe but especially in Italy, Spain, Ger¬

many, England, France and Belgium. In the

16th century China was almost depopulated by it, and it was rampant in Germany, Holland, Italy, Spain, England and Scotland. In this century also typhus fever, which has been

equally well known as ship fever, spotted fever, etc., appeared in Europe, and was terribly fatal among the poor, the dirty and the underfed, the same classes which were attacked by the plague. It is not improbable that the two dis¬

eases were confused from time to time, thus giving uncertainty to the

records. In the 17th century it was widely diffused and very preva¬

lent in England, Italy, Spain, Germany and

Holland. Naples is said to have lost 300,000

by it during five months in 1656, and Genoa 60,000 in about the same period. In 1665 the great plague of London occurred, with a mor¬

tality of 68,000 out of a population of 460,000.

It prevailed also in other parts of England and wras constantly in evidence until the beginning of the 18th century. In the 18th century it was prevalent in Germanv, Austria, Sweden, Russia and other countries in the north of Europe, and then it moved to Italy and France in the south.

In the 19th century Constantinople was re¬

peatedly scourged by it as it had been so many times before and from that unfortunate city it was carried to India, Persia and other

countries. From this time the disease began to receive real scientific attention, and such attention and study have been continued to the present time. It is unlikely that it will ever again obtain an extensive foothold among the white races. The last great epidemic began at Hongkong in 1894 and has continued un¬

interruptedly in China, India and many other countries. In 1900 it appeared in South

America and soon afterward it was noted on the Pacific coast of the United States. Up to 1908 there had been 121 cases in San Francisco, 77 of which were fatal. It was observed

sporadically in England between 1906 and 1911.

In the Punjab, Bombay and the United Prov¬

inces of India the mortality from this disease between 1906 and 1911 was five and a half millions, while an additional two millions

perished from it in other parts of India. In 1912 there were 47 cases in Porto Rico, of which 23 were fatal.

Clinical History. — After an incubation

period of three to eight days the disease is ushered in with chill, fever, pain in the limbs, head and stomach, intense thirst, congested

eyes, swollen tongue and profound nervous

symptoms. Vomiting is of common occurrence,

and constipation alternates with diarrhoea. The characteristic features are buboes or swellings of the glands in the groins, the armpits and the neck. These swellings frequently sup¬

purate and discharge, and this is sometimes a favorable sign. In the severe cases there are carbuncles and dark discolorations of the skin, which indicate haemorrhage. There may also be haemorrhages from the stomach, bowels, lungs and nose, and cases in which such haemorrhages occur are usually fatal. The disease may be fatal within 24 hours or it may continue for a month. The fatal cases almost invariably ter¬

minate by the fifth day. It is the most de¬

structive of any known form of epidemic dis-BUCARAMANGA — BUCCANEERS

ease, the mortality at different periods and different localities running from SO to almost 100 per cent.

Geography. — It is unknown in the tropics,

it has prevailed most extensively in temperate climates and it is not of infrequent occurrence in cold countries like Russia, Sweden and Nor¬

way. A moist and moderately warm climate

is most favorable to its development, while intense heat or cold will

usually arrest it.

Sanitary Factors. — It abounds in places

where the sanitary conditions are bad, some¬

times in the lowlands, sometimes in the moun¬

tains, wherever the drainage is poor, the air foul, the soil saturated with filth and the houses mean and overcrowded. Those who use proper

hygienic precautions are not likely to get the disease, those who live amid good or relatively good sanitary surroundings have seldom been

its victims.

Method of Conveyance. — This is a germ

disease and is caused by a specific organism known as the Bacillus pcstis. It was discovered at Hongkong during the plague epidemic of

1894, by Kitasato and Yersin, working inde¬

pendently of each other. It was found by them in the pus from the buboes, in the lymphatic glands, in the internal organs and in the blood.

The bacillus enters the body in the majority of cases by inoculation through the skin, which usually implies that there is some abrasion or break in the skin through which the bacilli can effect an entrance. It has long been supposed that the disease was communicated by the

medium of filthy soil, or filthy clothing, or rags, or discharges from the bodies of those who have had the disease. It is doubtless true that it may be conveyed by any or all of these means, if the germ is really there. But a more explicit statement would be that it is conveyed and distributed by the rat-flea Ptilex cheopis.

For some time it was supposed that the bacillus was also carried by bedbugs, but that is now questioned. The principal conclusions of the (Report on the Plague Investigations in India*

which was published in 1907 are the following: (1) Healthy rats contracted plague from in¬

fected rats when the only apparent means of communication between the two was the rat-flea. (2) In 21 experiments out of 38, 55 per cent of healthy rats living in flea-proof cages contracted plague, after fleas collected from rats dead or dying from septicaemic plague

were placed upon them. Hence the rat-flea can transmit plague from rat to rat. (3) Continu¬

ous contact of plague infected rats with healthy ones does not result in the infection of the latter if fleas are excluded. (4) If fleas are present the disease appears and spreads in pro¬

portion to the number of fleas. (5) Guinea pigs placed in plague infected houses become in¬

fested with rat-fleas and often develop plague.

(6) Fleas taken from plague infected rats may infect rats in flea-proof cages. (7) Guinea pigs in plague infected houses, do not get plague when protected from fleas. If in cages surrounded by sticky paper six inches in radius, they remain immune, as the fleas cannot jump over the paper. (8) Chronic plague may pre¬

vail in rats. The rat-flea, therefore, is probably the only medium by which the plague is trans¬

mitted and the present method is to destroy all rats in cities and villages, especially in sea¬

ports, where the plague has appeared. Efforts have been directed not only at the destruction of rats ashore, but they have also been directed to preventing them from getting aboard ships.

Prevention. — Preventive measures consist

in destroying rats, and ground squirrels which also carry the germ-bearing flea, in examining all passengers and baggage from suspected

ports, in destroying or disinfecting with live steam all suspicious clothing, bedding and mer¬

chandise, and in applying an emulsion of kero¬

sene oil to all furniture which is likely to harbor fleas. Human beings who are suspected to have been in contact with rat-fleas should receive intravenous injections of Haffkine's

prophylactic serum, which is the most reliable of any of the several serums which have been devised. This serum gives immunity for a few months and may abort the disease in its stage of incubation. The sputum, fasces and urine of the sick must be disinfected and all abra¬

sions of the skin must be constantly protected with collodion. The point of inoculation must be found if possible and cauterized with pure carbolic acid.

Treatment. — Imperative are good nursing,

the recumbent position and attention to the bladder which may become partially paralyzed.

Fluid food should be given and plenty of water.

Heart stimulants are indicated — alcohol, digi¬

talis, strophanthus, strychnia and adrenalin

chloride. Good results were obtained at Hong¬

kong from internal use of pure phenol. Mor¬

phine and hyocine may be required to relieve pain. Treatment with serums is proving very satisfactory. Yersin's serum, a blood serum

taken from horses that have been inoculated with the plague bacillus, has increased recover¬

ies 15 per cent, and is an unquestioned preven¬

tive. Venal injection has proved most effective.

Consult Blue, Rupert, (The Post-Mortem Diag¬

nosis of Plague) (Washington 1912) ; Creel, R.

H., (Bubonic Plague* (ib. 1914) ; Guiteras, S.

M., (Plague in Havana* (in Journal of the

American Medical Association, Chicago, 2 Jan.

1915) ; Neufeld, F., (Seuchenentstehung und

Seuchenbekampfung* (Berlin 1914).

BUCARAMANGA, Colombia, capital of

the department of Santander, in lat. 6° 50’ N., at: an elevation above sea-level of 3,036 feet.

It has wide streets, electric light, theatre, hos¬

pital and public gardens. The surrounding

country is an agricultural region, producing ex¬

cellent crops of coffee, cocoa, cotton and to¬

bacco. A United States consular agent resides here. Pop. (1916) 20,000.

BUCARELI Y URZUA, boo-ca-ra le e

urt-zoo’a, Antonio Maria, Spanish soldier and administrator: b. Seville, 24 Jan. 1717; d. Mex¬

ico City, 9 April 1779. He was governor of Cuba in 1760-71, and viceroy of New Spain

(Mexico) from 1771 till his death.

BUCCANEER, The, a narrative poem by

Richard Henry Dana. It was first published

in 1827, and the scene of a portion of the work is laid in Block Island. Rhode Island.

BUCCANEERS, a name applied to various

bands of English and French freebooters in

America, whose exploits form a remarkable

part of the history of the 17th century. The French called them “filibusters** ; the Span¬

iards ((demons of the sea,” and among them-654

selves they were known as ((brethren of the coast.® The origin of these associations of buccaneers seems to have been the arrogant

pretensions of the Spaniards to the dominion of the whole of America. The English and

French settlers combining against them for

mutual defense, acquired from their precarious life in the vicinity of the Spanish settlements, adventurous and lawless habits, and became ulti¬

mately, in some of the islands of the Caribbean Sea, little better than pirates. The earliest association of this kind began about 1525, but they afterward assumed greater magnitude.

After the assassination of Henry IV in France in 1610, several Frenchmen sought a residence on the island of Saint Christopher, one of the Antilles. Driven thence in 1630, some of them fled to the western coast of San Domingo,

others to the small island of Tortugas, in the vicinity. Several Englishmen, led by a similar disposition, associated themselves with the lat¬

ter. The fugitives at San Domingo employed

themselves especially in the chase of wild cattle, of which there were large herds on the island.

They sold the hides to the mariners who landed on the coast, and as they cured the flesh by smoking it before the fire, like the American savages, they were called buccaneers, from the Caribee boucan, a place for smoke-drying meat.

These hunters lived in the rudest state of nature, enjoying in common all that they had taken in the chase or acquired by robbery. The Spaniards, who could not conquer them, deter¬

mined to extirpate all the cattle on the island, and thus obliged the buccaneers either to culti¬

vate the land as husbandmen, or to join the other freebooters on the island of Tortugas.

These bold adventurers attacked, in small num¬

bers and with small means, but with an intrepid¬

ity which bade defiance to danger, not only single merchant vessels, but several of them together, and sometimes armed ships. Their

common mode of attack was by boarding. They directed their efforts especially against the Spanish ships which sailed for Europe laden with the treasures of America. By the repeated losses which they suffered, the Spanish were at last so discouraged that they seldom offered a serious resistance. It happened once that a ship of the buccaneers fell in with two Spanish galleons, each of which had 60 cannon, and 1,500 men on board. To escape was impossible, and the pirates could not think of surrender.

Their captain, Laurent, made a short speech to them, sent one of his men to the powder room with orders to set fire to it upon the first sign which he should give him, and then placed his men in order of battle on each side. (<We must sail between the enemy's ships,® cried he to his crew, ((and fire upon them to the right and left.®

This manoeuvre was executed with extraordi¬

nary rapidity. The fire of the pirate killed so many people on board both ships that the

Spaniards were struck with a panic, and let him escape. The Spanish commander was after¬

ward put to death on account of the disgrace which he had brought

upon his nation. Their frequent losses greatly reduced the trade of the Spaniards with America. The buccaneers

now began to land on the coast, and to plunder the cities. Their manner of dividing the booty was remarkable. Every one who had a share

in the expedition swore that he had reserved nothing of the plunder. A false oath was of extremely rare occurrence, and was punished

by banishment to an uninhabited island. The wounded first received their share, which was greater according to the severity of their

wounds. The remainder was divided into equal parts, and distributed bv lot. The leader re¬

ceived more than the others only when he had particularly distinguished himself. Those who had perished in the expedition were not for¬

gotten. Their part was given to their relations or friends, and' in default of them, to the poor and to the Church. Religion was strangely

blended with their vices, and they began their enterprises with a prayer. The wealth acquired was spent in gambling and debauchery, for it was the principle of these adventurers to enjoy the present and not care for the future. The climate and their mode of life gradually dimin¬

ished their number, and the vigorous measures of the British and French governments at last put an end to their outrages, which had, per¬

haps, been purposely tolerated. From this band of pirates arose the French settlements on the western half of San Domingo. The more

famous of the buccaneers were Sir Henry Mor¬

gan, who was allowed a more or less free hand so long as he confined his activities to Spanish ships and towns, and Captain Kidd. In the

18th century these pirates came to be known as (<marooners,® from their practice of maroon¬

ing or placing their victims ashore on desert islands or inaccessible coasts. The most notori¬

ous of these were Avery, Blackbeard and Rob¬

erts. Much fable surrounds the narrative of the buccaneers ; but trustworthy accounts have reached us, notably that of Esquemeling, a

Dutchman who served under Morgan. In the

first quarter of the 18th century Capt. Charles Johnson edited numerous histories of pirates and highwaymen. Consult his (General History of the Pyrates of New Providence) (1724),

and (History of Highwaymen and Pirates>

(.1734-42). Consult also (History of the Buc¬

caneers of America y (London 1816; reprinted 1891); Archenholz, <The History of the Pi¬

rates, Freebooters, or Buccaneers of America) (London 1807) ; Burney, (History of the Buc¬

caneersˆ ; Haring, (The Buccaneers in the West Indies in the Seventeenth Century > (London

1910) ; Johnston, (Famous Privateersmen and

Adventurers of the Sea) (Boston 1911) ; Pyle, editor, (The Buccaneers and Marooners of

America) (London 1891, contains the narrative of Esquemeling) ; Raynal, (History of the Two Indies > ; Stockton, 'Buccaneers and Pirates of Our Coasts } (New York 1898) ; Teramond,

(Pages d'histoire; la guerre sur mer, corsaires, pirates, boucaniers, filibustiers, negriers, etcP

(Vincennes 1912).

BUCCARI, book 'ka-re, or BAKAR, a port

on the. Gulf of Quarnerno, a small bay of the Adriatic, five miles east of Fiume. It stands on the slope of a hill with a castle at the top, and its harbor, though small, is safe. Fishing, shipbuilding and linen manufacturing are car¬

ried on here, the tunny fisheries being of the greatest importance. The Wine of the district is also exported. Pop. 2,092.

BUCCINATOR, from bucina, Lat. ((trumpet,® the trumpeter's muscle, one of the maxil¬

lary group of muscles of the cheek. They are the active agents in mastication. The bviccinator BUCCINIDZE — BUCH

circumscribes the cavity of the mouth and, aided by the tongue, keeps the food under the pressure of the teeth ; it also helps to shorten the pharynx from before backward, and thus as¬

sists in deglutition.

BUCCINIDiE, a family of gastropod mollusks belonging to the order Prosobranchiata, and the section Siphonostoinata. They consti¬

tute part of Cuvier's buccinoida. They have the shell notched in front, or with the canal abruptly reflected so as to produce a varix on the front of the shell. The leading genera are buccinum terebra, ebnrna, nassa, purpura, cassis, doliuni , harpa and Oliva. These shellfish are much valued as the source of the dye commonly called royal purple.

BUCCINUM, the typical genus of the fam¬

ily Buccinidcc. In English they are called

whelks (q.v.).

BUCCLEUCH, buk-klii' (now a dukedom),

the title of one of the oldest families in Scot¬

land, whose estate is in Selkirkshire. The origin of the house of the Scotts of Buccleuch dates back to the large grants of land to Sir Walter Scott of Ivirkurd and Buccleuch, a border chief, by James II; but the family traced descent from Sir Richard le Scott in the reign of Alex¬

ander III (latter half of the 13th century), and first becoming conspicuous in the person of the border chieftain Sir Walter Scott, of Branxholm and Buccleuch, who distinguished

himself at the battle of Pinkie (1547) and fur¬

nished material for his later namesake's poem (The Lay of the Last Minstrel.) The son of Sir Walter, bearing the same name, was raised to the peerage, in 1606, as Lord Scott of Buc¬

cleuch, and his successor was made an earl in 1619. In 1663 the titles and estates devolved upon Anne, daughter of the second Earl, who married the Duke of Monmouth, illegitimate

son of Charles II, the pair, in 1673, being created Duke and Duchess of Buccleuch, *etc.*

Subsequently the dukedom of Queensberry

passed, by marriage, into the family. The sixth Duke of Buccleuch, William Henry Walter

Montagu Douglas-Scott, succeeded to the title in 1884. Consult Eraser, Sir W., (The Scots of Buccleuch > (1878).

BUCENTAUR, a mythological being, half

man and half ox or ass. The splendid galley in which the Doge of Venice annually sailed over the Adriatic on Ascension Day also bore this name. Dropping a ring into the sea, he

espoused it in the name of -the republic, with the words, (<Desponsamus te, mare, in signum veri perpetuique dominii.** The custom originated

in 1176, when the Doge, having refused to de¬

liver up the Pope, who had taken refuge in Venice, to the Emperor, encountered and de¬

feated the imperial fleet which was sent to reduce the Venetians.

BUCEPHALUS, the horse of Alexander

the Great, which he bought for 13 talents

(about $5,000). Philonicus, a Thessalian,

offered to sell him to King Philip; but Philip, who considered the price too great, commanded the unmanageable steed to be led away, when the young Alexander offered to mount him.

He mounted accordingly, and to the astonish¬

ment of all, the horse obeyed him, and willingly submitted to his guidance, though he had never before obeyed a rider. Alexander, from this circumstance, conceived such an affection for him that he never rode upon any other horse ; and Bucephalus also, when caparisoned for

battle, suffered no other rider. He died of a wound, and Alexander caused him to be buried near the Hydaspes, and built over his grave a city, which he called Bucephala.

BUCER, bu'ser, or BUTZER, Martin,

German Protestant theologian : b. Schelestadt, Alsace, 11 Nov. 1491; d. Cambridge, 28 Feb.

1551. Fie entered the Dominican order in 1506, and studied at Heidelberg, but in 1521 left the order, and became a convert to Lutheranism.

He was at first preacher at the court of Fred¬

erick, the Elector of the Palatinate, afterward in Strassburg, and at the same time professor in the university there for 20 years. He took part in the conference of Marburg with the hope of reconciling Luther and Zwinglius. He also attended the conference at Augsburg,

where he opposed the articles of confession, and the conference at

Wittenberg. In 1548

King Edward VI of England, at the suggestion of Archbishop Cranmer, invited him to Cam¬

bridge, where he was professor of theology.

He was buried in the principal church at Cam¬

bridge but in 1557 Queen Marv caused his bones to be burned. The Cardinal Contarini called him the most learned divine among the heretics.

Fie wrote a commentary on the Psalms under the name of Aretius Filinus, and many other works. Consult Baum, (Capito and Butzer)

(1860); Tollin, (Servet und Butzer) (1880);

Mentz and Erichsen, (Zur 400-jahrigen Ge—

burtsfeier Martin Butzer) (1891). His corre¬

spondence with Philip of Hesse was published by Lenz, (Briefwechsel Landgrafs Philipps des Grossmutigen von Hessen) (1880).

BUCH, booH, Leopold von, German geol¬

ogist: b. Stolpe, Prussia, 26 April 1774; d.

Berlin, 4 March 1853. He studied under the celebrated Werner in the mining school of

Freiberg in Saxony, where Alexander von Hum¬

boldt was his fellow-student, and early began to distinguish himself by his geological writ¬

ings. His first works were descriptions of the Mineralogv of LandeckP and (The Geognosy

of Silesia.) Up to 1798 he had adopted the Nep¬

tunian theory of Werner, with some modifica¬

tions ; but now saw cause to abandon it, and to recognize the volcanic

origin of the basalts. He saw Vesuvius for the first time in 1799; but afterward, in 1805, had an opportunity, along with Humboldt and Gay Lussac, of witnessing its actual eruption. In 1802 he examined the extinct volcanoes of Auvergne in the south of France. The results of all these geological travels were given to the world in a work en¬

titled Observations During Travels in Ger¬

many and Italy* (1802-09). Indefatigable as

an observer, Von Buch turned his steps from the south of France in 1806, and proceeding to Scandinavia spent two years in examining its physical constitution, this furnished the ma¬

terials for his well-known work entitled

ˆTravels in Norway and Lapland.* In 1815 he visited the Canary Islands. These volcanic

isles furnished the starting point from which Von Buch commenced a regular course of

study on the production and activity of vol¬

canoes. This is attested by his standard work on the subject entitled Physical Description of the Canary Isles> (1825). On his return from

the Canaries he visited the basaltic group of the Hebrides and the coasts of Scotland and Ire¬

land. His geological excursions, even in coun¬

tries which he had repeatedly visited before, continued without interruption at a very ad¬

vanced age, till within a few months of his death. Alexander von Humboldt, who had

known him intimately for a period of more than 60 years, called him the greatest geologist of our period. He was unmarried and lived aloof

from the world, entirely devoted to scientific pursuits. Besides the works already mentioned he was the author of many important tracts on paleontology, as, (On the Ammonites*

(1832) ; (On the Terebratulae* (1834) ; (On the Ceratites* (1841), and (On the Cystidae*

(1845). Another of his works not to be omitter is his (Geological Map of Germany.)

BUCHAN, David* English voyager and

explorer: b. 1780; d. about 1837. He obtained a lieutenant's commission in the navy in 1806, and in 1810 his admiral, Sir John Duckworth, dis¬

patched him to the river Exploits, for the pur¬

pose of exploring the interior and opening a communication with the natives. He reached

the mouth of the river in January 1811, and with 34 men and three guides penetrated

through the greatest difficulties 130 miles into the country. Buchan afterward became high

sheriff of Newfoundland. On a subsequent ex¬

pedition he was lost with his ship Upton Castle.

In 1818 Buchan was appointed to the com¬

mand of an Arctic expedition. The Admiralty fitted out two expeditions that year — one to discover the Northwest passage, the other to reach the North Pole. The Dorothea and Trent were the vessels selected for the second expedi¬

tion, under Captain Buchan and Lieutenant

(afterward Sir John) Franklin. Latitude 80°

34' N. was the most northerly point gained by this expedition.

BUCHAN, Elspeth (Simpson), Scottish

religious enthusiast, founder of a sect: b. near Banff 1738; d. near Dumfries 1791. She was educated in the Scottish Episcopal Church, but on her marriage to Robert Buchan, in Glas¬

gow, became, like him, a burgher seceder. In 1779, or thereabouts, she broached dogmas of her own, soon deserted her husband and moved to Irvine, where she made a number of con¬

verts, among them Mr. Elugh Whyte, a relief clergyman. In 1784, the people assaulted Mr.

Whyte's house, which the Buchanites had made their tabernacle. They then, 46 persons in all, set up a sort of communty at a farmhouse 13

miles from Dumfries, waiting for the millen¬

nium or the day of judgment, fasting for weeks in the expectation that they would be fed like the young ravens that cry, and adjuring all fleshly vanities. A few left, accusing Mrs.

Buchan of tyranny and dishonesty, but the

majority of her votaries were faithful to her to the last. She called her disciples around her death-bed and communicated to them, as a

secret, that she was the Virgin Mary, who had been wandering through the world since the

Saviour's death, and that she was only going to sleep now, and would soon conduct them to the new Jerusalem. Her disciples, in the expecta¬

tion of her reappearance, refused to bury her until ordered by a justice of the peace. The sect became extinct in 1848. See Buchanites.

BUCHAN, John, Scottish novelist : b.

Perth, Scotland, 26 Aug. 1875. He was educated at Glasgow University and Brasenose College, Oxford, and is now a member of the publishing firm of Thomas Nelson & Sons. His published books include (Sir Quixote* (1895) ; (Musa

Piscatrix) (1896); (Scholar Gipsies) (1896);

(John Burnet of Barns) (1898) ; (A History of Brasenose College) (1898) ; (Grey Weather*

(1899) ; (A Lost Lady of Old Years* (1899) ; (The Half-hearted* (1900); <The Watcher by

the Threshold) (1902); (The African Colony*

(1903); (Some Eighteenth Century Byways*

(1908); (Sir Walter Raleigh* (1911); (The

Marquis of Montrose* (1913) ; and (Nelson's History of the War,* publishing serially.

BUCHAN, William, Scottish physician:

b. Ancrum, Roxburgshire, 1729; d. 1805. He

commenced practice at Edinburgh, and having

for a considerable time directed his attention to a digest of popular medical knowledge, pub¬

lished in 1769 his work entitled (Domestic Medicine; or, the Family Physician,* — an at¬

tempt to render the medical art more generally useful by showing people what is in their own power, both with respect to the prevention and cure of diseases. It is constructed on a plan similar to that adopted by Tissot on his (Avis au Peuple.* It appealed to the wants and

wishes of so large a class of the community, that, considering it to have been the first work of the kind published in Britain, there is no wonder that it should have attained success.

Before the death of the author 19 large editions had been sold. Duplanil of Paris, physician to the Count d'Artois (Charles X), published a translation in five volumes, with notes, which rendered the work so popular on the Continent that in a short time no language in Christendom wanted its translation. It would almost appear that the work met with more undivided applause on the Continent than in Britain. While many English and Scottish physicians conceived that it was as apt to generate as to cure or prevent diseases, by inspiring the

minds of readers with hypochondriacal notions, those of other coun¬

tries entertained no such suspicions. Among

the testimonies of approbation which Dr. Buchan received from abroad was a huge gold medal¬

lion, sent by the Empress Catherine of Russia, with a complimentary letter. The work became more popular in America and the West Indies than in the older hemisphere. Buchan pub¬

lished two other works, (A Treatise on Gon¬

orrhoea* ; (An Advice to Mothers on the Sub¬

ject of their own Health, and on the Means of Promoting the Health, Strength and Beauty of Their Offspring.* He was buried in Westmin¬

ster Abbey.

BUCHANAN, Claudius, Scottish mission¬

ary clergyman : b. Cambuslang, Scotland, 12

March 1 766 ; d. Broxbourne, 9 Feb. 1815. He took orders in the Church of England, and was appointed chaplain to the East India Company in 1795. From this time the remainder of his life was occupied in missionary labors in India and in forwarding the translation of the Bible into the Indian languages. In 1800 he was ap¬

pointed professor of Greek, Latin and English in the College of Fort William. Pie returned to Europe in 1808, afterward visited the Holy Land and was engaged at his death in a trans¬

lation of the New Testament into Syriac. He BUCHANAN

published ‘Christian Researches in Asia, with a Notice of the Translation of the Scriptures into the Oriental Languages) (London 1858),

and several other works.

BUCHANAN, Francis, Scottish medical

officer: b. Branziet, Perthshire, Sterlingshire, 15

Feb. 1762; d. 15 June 1829. He was educated in the medical profession and took his degree at Edinburgh in 1783, and was shortly afterward appointed surgeon on board of a man-of-war, but resigned because of ill health. In 1794 he entered the service ot the East India Company as a surgeon on the Bengal establishment. He traveled extensively in the East Indies, making collections illustrative of the botany, zoology, etc., of the countries which he visited, and pub¬

lished ‘A Journey from Madras Through the

Countries of the Mysore, Canara, and Malabar, Performed Linder the Orders of the Marquis

Wellesley — for the Purpose of Investigating the State of Agriculture, Arts and Commerce, etc., History, Antiquities, etc., in the Dominions of the Rajah of Mysore) (1807). He contrib¬

uted largely to the scientific journals of the day, and in 1819 published a (History of the King¬

dom of Nepal, } and in the same year a ‘Gene¬

alogy of the Hindu Gods,’ which he had drawn up some years before with the assistance of an intelligent Brahmin. He made a statistical sur¬

vey of the presidency of Bengal, the results of which appeared after his death in Calcutta, and in ‘Eastern India) by M. Martin (3 vols., 1838).

He was also superintendent of the Botanical Gardens of Calcutta in 1814. In 1822 appeared his ‘Account of the Fishes of the Ganges,*

with plates.

BUCHANAN, Franklin, American naval

officer: b. Baltimore, 17 Sept. 1800; d. Talbot County, Md., 11 May 1874. At an early age he entered the navy, becoming lieutenant in 1825

and master-commandant in 1841. The organ¬

ization, of the United States Naval Academy at Annapolis was committed to him in 1845 and he was made the first superintendent. During the Mexican War he took part in the siege of Vera Cruz. In Commodore Perry's expedition

to Japan he had command of the flagship Sus¬

quehanna. In 1855 he was raised to the rank of captain, was in command of the Washington navy yard in 1859, and in 1861 resigned from the United States navy, intending to follow his State in secession, but later asked to be restored.

Upon the refusal of his request, he entered the Confederate navy. In command of the Merrimac in Hampton Roads, he sank the Congress and the Cumberland , being severely wounded

during the engagement. In 1863 he commanded the naval defenses at Mobile, Ala., there con¬

structing the ram Tennessee. After promotion to the rank of admiral in the Confederate navy he was for some time senior officer in the Con¬

federate navy and commanded at the battle of Mobile Bay, where he was defeated by Farragut, lost a leg and was made prisoner. At the close of the war he became president of the Agricultural College of Maryland.

BUCHANAN, George, the chief repre¬

sentative of humanism in Scotland: b. near

Killearn, Stirlingshire, February 1506; d. Edin¬

burgh, 28 Sept. 1582. He came of Celtic stock, and his family though poor was of honorable desceYit, tracing connection some five genera -

tions back with the great houses of Albany ana Lennox. His father died while George was a child, and the family of five sons and three daughters was brought up by his mother, born Agnes Heriot of Trabroun in Haddingtonshire.

His early education was gained at the common schools, tradition naming those of Killearn and Dumbarton; and at the age of 14 he was sent by his maternal uncle to the University of Paris, then in the throes of the struggle be¬

tween humanism and Lutherism on the one

hand, and scholasticism and Catholicism on the other. He remained here for two years, his principal academic occupation being the writ¬

ing of Latin verse. At the end of these two years, the death of his uncle and his own serious illness compelled his return to Scot¬

land. In the autumn of 1523 he took part in an abortive expedition against England, led

by the Regent Albany. In the spring of 1525

he went to Saint Andrews, where he graduated in October of the same year, the fee for his bachelor's certificate being remitted on account of poverty. He returned to Paris in 1526, and, after two years as a bursar of the Scots Col¬

lege there, he took his master's degree. Be¬

ginning in 1529, he taught for three years as "regent** in the College of Sainte Barbe, one of the most fully equipped and most liberal in the university, receiving food and lodging from the college and fees from the students. Here he was already known as a writer of stinging epigrams. He resigned his regentship to be¬

come tutor to the young Earl of Cassillis, a post he occupied for five years, living at first in Paris, but returning to Scotland with his pupil in 1536. It was during the latter part of this engagement that he first roused the antagonism of the Franciscan order by his 'Somnium,* a Latin poem paraphrasing the well-known Scots satire 'How Dunbar was desyrit to be ane

Fryer.* At the conclusion of his period with Cassillis, he was appointed tutor to one of the natural sons of James V, and through this

came into close relations with the court. At the instance of the King he produced two more short satires against the Franciscans, and began his ‘Franciscanus,* a brilliant and elaborate piece of invective, finished much later. The wrath aroused by these attacks forced Buchanan to flee from Scotland to save his life; and after a short sojourn in England, where he addressed poems to Henry VIII and Cromwell, he re¬

turned to Paris. There he found Cardinal

Beatoun, who had been the chief agent in

driving him out of Scotland, and for safety he was glad to accept a position in the College de Guyenne at Bordeaux, under Andre de Gouvea, formerly his colleague at Sainte Barbe. He re¬

mained here three years, counting among his pupils the celebrated Montaigne, and among his acquaintances, J. C. Scaliger. While at Bor¬

deaux, Buchanan translated into Latin the

‘Medea) and the ‘Alcestis) of Euripides, and composed his two original dramas, ‘Jephthes) and ‘BaptistesP Leaving Bordeaux in 1542 or 1543, he seems to have returned to Paris, where he may have taught till about 1545 in the Col¬

lege du Cardinal Lemoine ; but the record of these years is obscure, and for the next three we are altogether without evidence as to his residence or occupation. In 1547 we find him in Portugal, again under Andre de Gouvea,

teaching in the College of Arts of the Univer¬

sity of Coimbra. On Gouvea’s death, the col¬

lege fell into the hands of the Jesuits, who pro¬

ceeded to accuse Buchanan of heresy. After

a persecution of a year and a half, he was shut up for some months in a monastery to be in¬

structed in the true faith by the monks. There he made most of his famous Latin translations of the Psalms, and during the same period pro¬

duced his poems to Leonora. On his liberation in 1552, he spent a short time in England, then returned to France, where for a while he held once more the office of regent, this time in the College Boncourt. In 1555 his patron, Charles du Cosse, Comte de Brissac, appointed him

tutor to his son Timoleon, whom he instructed from the age of 12 to that of 17, living some¬

times in France, sometimes in Italy. During these years Buchanan seems to have given

closer attention than formerly to the religious controversies of the day; and when he returned to Scotland about 1561, he took the side of the reformed Church of Scotland. In spite of this decision for Protestantism, we find him soon after his return acting as tutor to Queen Mary and writing court masques and complimentary

poems. He received an annual pension of 250

pounds Scots (pound Scots =1/12 of an Eng¬

lish pound), a sum apparently inadequate to his needs. In 1564 the Queen bestowed on him a pension of 500 pounds Scots from the income of the abbey of Crossraguel, but this he seems to have had difficulty in collecting. His friendly relations with Mary continued till the murder of Darnley in 1567, which turned him into her open enemy. He wrote the virulent (Detectio Marias Reginas ScotorumP the work which was the chief means of spreading throughout Europe a belief in the guilt of the Queen. Meantime Buchanan had become an important figure in

the Scottish Church, and in 1567 he was mod¬

erator of the General Assembly which de¬

manded Mary's abdication in favor of her son.

About this time he produced his two most im¬

portant vernacular writings, the (Admonition.

to the Trew LordisP a pamphlet in support ot the young King James and against the house of Hamilton; and the (Cham3eleonP an attack on Maitland of Lethington.

In 1566 Buchanan was appointed principal

of Saint Leonard's College of Saint Andrew's University, but he resigned his principalship in 1570 to take charge of the education of the young King, James VI, then four years old; and he continued to superintend his instruction for about eight years. During this period he was for a short time director of chancery and later keeper of the privy seal. In spite of these appointments, he does not seem to have held, or to have sought, a leading position in politics. The most important writings of his later years were a dialogue, (De Jure Regni apud ScotosP a defense of Scotland's treatment of Mary, and his (Rerum Scoticarum HistoriaP

published in 1582. In September of that year he died, and was buried in Grayfriars Church¬

yard in Edinburgh.

The comparative obscurity into which Bu¬

chanan's name and writings have sunk to-day is in striking contrast to the splendor of his contemporary reputation. Throughout the lat¬

ter part of the 16th century he was regarded by men of letters in Europe as easily the most distinguished representative of humanism in

Britain, and this reputation continued for more than a century after his death. The contrast is explained by the medium in which he wrote.

Like most of his learned contemporaries, he had no doubt that Latin was to be the universal language of the future, and almost all his writings are in that language. His mastery of Latin remains the admiration of scholars, but for the world in general his works are dead.

By genius and temperament he was a poet,

and his Latin verses represent his best work.

These belong to the conventional types of his age. Of his satires, the most notable are those already mentioned, against the Franciscans. To modern taste they pass the bounds of decency, but in brilliance and point they stand in the first rank of post-classical productions. His epigrams are entitled to th,e same blame and the same praise. He wrote complimentary poems

to most of the persons of distinction with whom he came in contact, and an epithalamium on the marriage of Mary and the Dauphin, con¬

taining a famous passage in praise of the Scots.

More genuinely poetical is his piece on (The First of May.-* His love-poetry need not be taken as having any relation whatever to his experience. Such poems as those to Leonora

and Neaera are merely academic exercises in the fashion of the Renaissance on the model of Catullus and Tibullus. Of his dramatic

efforts, the most artistic is Qephthes,* a play which still holds a place among the best of the attempts to revive the drama of antiquity.

(Baptistes, > under the guise of the story of John the Baptist, is a thinly-veiled parable ex¬

pressing Buchanan's views on kingship. His

most ambitious poem is the (De Sphsera,* an elaborate exposition of the Ptolemaic system of astronomy, and his most popular production is his Latin translation of the Psalms into a variety of classical metres. The last continued to be used as a schoolbook in his native coun¬

try into the 19th century.

Of his prose works, his (De Jure Regni J

sets forth explicitly and with special reference to Scotland the same doctrine of the sover¬

eignty of the people which was shadowed in ‘Baptistes. > Both this work and his history earned the distinction of being later suppressed by the government. The <Historia) covered

the history of Scotland from the earliest times till 1580 and, while far from being a critical work in the modern sense, is much more dis¬

criminating than most of the chronicles that preceded it. Its chief value is for the period of his own life, and here his authority is that of the honest partisan.

The general impression left by his work is that of an acute, vigorous and independent

mind, poetical rather than practical or philo¬

sophical; of a temperament capable of strong emotion ; of a character showing some of the defects common to most men of his age, but on the whole straightforward and robust. And if the use of Latin has caused his writings to cease to be read to-day, it is to be remembered that for the Europe of his own time he was the foremost man of letters in Britain, and in the opinion of such judges as the Scaligers and Montaigne, the first Latin poet in Europe.

Bibliography. — Buchanan’s complete >vorks

were collected by T. Ruddiman (re-edited by BUCHANAN

Peter Burman, 2 vols., Lugduni Batavorum

1725). The vernacular writings have been is¬

sued by the Scottish Text Society, with life and notes by P. Hume Brown (Edinburgh

1892). The (Lives) by Irving and Chalmers

are now superseded by P. Hume Brown's

'George Buchanan) (Edinburgh 1890). Shorter

sketches are those of D. Macmillan (Edinburgh 1906) and of Robert Wallace, (Famous Scots Series5 (Edinburgh 1900). His portraits are

discussed in Drummond's (Portraits of Knox

and Buchanan 5 (1875). Bibliographies are

given by Ruddiman and Irving.

William A. Neilson,

Professor of English , Harvard University.

BUCHANAN, George, Scottish surgeon :

b. Glasgow 1827 ; d. 1905. Became surgeon of the Western Infirmary of Glasgow and later

served as civil surgeon with the British army in the Crimean War. In 1888 he was elected presi¬

dent of the surgical section of the British Medi¬

cal Association, and for some years was profes¬

sor of clinical surgery in the Glasgow Univer¬

sity. Pie was the author of (Camp Life in the Crimea 5 ; (On Lithotrity, with Cases 5 ; Clini¬

cal Surgery5 ; (Radical Cure of Inguinal Hernia in Children5; 'Talipes Varus5; (Faure's Stor¬

age Battery and Electricity in Surgery,5 and (Anaesthesia Jubilee, a Retrospect.5 He was one of the editors of the Glasgow Medical

Journal and also edited the 10th edition of the (Anatomist's Vade Mecum.5

BUCHANAN, Sir George William, Brit¬

ish diplomatist: b. Copenhagen, 25 Nov. 1854.

He was educated at Wellington College, en¬

tered the diplomatic service in 1876 and rose by successive stages till he became secretary of the embassy at Berlin (1901-03) ; Minister plenipotentiary at Sofia (1903-08) ; Minister at The Plague (1908-10). He was appointed

Ambassador at Saint Petersburg in 1910.

BUCHANAN, Isaac, Canadian pioneer

merchant and statesman: b. Glasgow 1810; d.

Hamilton, Ontario, 1883. He came to Canada

in 1830 to found a branch in Montreal of a wholesale business, which he developed with

remarkable success. He was elected member

for York in the first union Parliament, held the office of president of the council in the Tache-Macdonald ministry in 1864 and was a

Dominion arbitrator 1878-83. He was one of

the promoters of the Great Western Railway

(later merged in the Grand Trunk) and the

chief advocate of protection in pre-Confederation days, being sometimes regarded as the

father of the national policy. But coupled with protection, he strongly urged the establishment of commercial union with the United States.

BUCHANAN, James, 1 5th President of

the United States : b. near Mercersburg, Pa., 23 April 1791 ; d. at

Wheatland, near Lan¬

caster, Pa., 1 June 1868. The Buchanans

were a Scotch-Irish family of recent migra¬

tion; James was the second of 11 children.

He received a good education for that

time in the schools of Mercersburg and at

Dickinson College, where he was graduated

at the age of 19. He then studied law in an office in Lancaster, and at the age of 21 was admitted to the bar. He practised his profes¬

sion very little, for almost all of his mature life was spent in the public service of the State or of the United States. His public life began in 1814 with his election to the Pennsyl¬

vania legislature where he served two terms.

In 1821 he began a 10-year period of service in Congress; in 1832-33 he was Minister to Russia; from 1834-44 he was United States

senator from Pennsylvania; under President

Polk he was Secretary of State, 1845 — 49 ; under President Pierce he was Minister to England, 1853-56; and from 1857 to 1861 he was Presi¬

dent, the last Democratic President for 24

years. Before he became President his experi¬

ence had been mainly in legislative service and in diplomacy. During the short periods when not in office his time was yet given largely to public matters and he continued a keen interest in current political problems.

In part his absorption in politics was prob¬

ably due to the. lack of close family ties; he was never married, his fiancee having died

just before the time set for the wedding. There was a large family connection, but none of them except a niece, Harriet Lane, appears

to have come much into his life. He was

quiet, well-mannered ; a conservative gentle¬

man of the old school whose only ambition

was to serve the state. He began his public career as a Federalist, and as a Federalist he was elected to the Pennsylvania legislature and to Congress. He criticised severely the Demo¬

cratic-Republican conduct of the War of 1812, but urged its continuance to a victorious end, and even enrolled himself in the militia, though he was not called into service. Monroe's veto message on the internal improvement bill first called his attention to the political complica¬

tions involved in the nature of the Federal Union. Buchanan then began a study of Ameri¬

can constitutional law with the result that he gradually became a Democrat, a believer in the (<strict construction55 of the United States con¬

stitution and in the ˆreserved rights55 of the States. It is difficult for one of the 20th century to understand the conscientious devotion of

some early American statesmen to the letter of the law without much regard to the changing social conditions back of the law. But it was an age of lawyers; nearly all statesmen and politicians were trained in law, and naturally their views of government were legalistic and theoretical.

Buchanan's 20-year record as congressman

and senator was one of useful but not of bril¬

liant service. In the House his principal service was on the judiciary committee, of which he became chairman in 1829 and which under him was credited with having accomplished needed reforms of the Federal judiciary. In general he supported the policies of President Jackson, both financial and foreign, but an increas¬

ing tendency on his part toward “strict con¬

struction55 is noticeable. He opposed a Fed¬

eral bankruptcy law because of its tendency toward political consolidation and he believed it would injure the character of the farming class if the latter were able to disburden them¬

selves of obligations under the law. He ob¬

jected to protective tariffs because they were at the expense of the agricultural industry.

When the controversies arose over anti-slavery petitions Buchanan voted to receive them, since to do so was plainly prescribed by the United States constitution, but on the other hand he 600

held that Congress had the authority to keep incendiary anti-slavery literature out of the mails and should exercise this right. When

President Tyler broke with the Whig party

and an attack was made upon his use of

the veto power, Buchanan was found defend¬

ing the President’s constitutional right to influ¬

ence legislation by the veto. As senator he held that the State legislature had the right to instruct him to vote on all important questions.

In a Senate which contained Clay, Calhoun and Webster, Buchanan was known as one of the

useful, working members, but he scarcely at¬

tained the first rank.

Buchanan's first connection with foreign

affairs was as Minister to Russia in 1832—33.

At Jackson's request he retired from Congress to undertake negotiation of treaties with Rus¬

sia. He was well received and well liked at the Russian capital, and succeeded in arranging a commercial treaty. Disliking the formal et¬

iquette of the court, he resigned and on his way home traveled in the western countries of Europe and in England. In 1844 he was named by the Pennsylvania Democrats as their candi¬

date for the Presidency and this, added to his other qualifications, caused President Polk to make him Secretary of State. In this position he handled the Oregon Boundary Question

(q.v.) and the foreign affairs connected with the annexation of Texas and the Mexican War (q.v.). Polk and Buchanan developed a vigor¬

ous foreign policy, especially concerning Latin-America, and in so doing came into conflict with England and Spain. Buchanan opposed

the activities of England in Central America and in California and favored the restoration and strengthening of the Central American

Federation in order to resist the encroachments of European powers. Believing that Cuba

could not be held by Spain he offered $100,-

000,000 for the island. As Secretary of State Buchanan acquired a reputation as an able

diplomat and left office firmly convinced that the most important foreign problem for the

United States was the acquisition of Cuba.

President Pierce, having before his inaugura¬

tion sought Buchanan's advice in regard to

foreign affairs, was so impressed with his views that he asked him to accept the English mission, thus practically accepting the latter's Latin-American policy. Buchanan accepted reluct¬

antly because he had an eye to the presidential campaign of 1856 and because the position of the United States in the Central American mat¬

ters had been embarrased by the Clayton-Bulwer treaty which in the previous Whig admin¬

istration had reversed the policy of Buchanan and Polk. In London he was successful in se¬

curing a somewhat favorable interpretation of the treaty and also in a contention over British enlistment of soldiers in the United States.

But Buchanan attained greater notoriety at

this period by his connection with the so-called Ostend Manifesto (q.v.). The Pierce adminis¬

tration was anxious to acquire Cuba, and a new cause of trouble with Spain had arisen — the episode of the Black Warrior — so Secretary Marcy suggested that Buchanan, Soule, Minis¬

ter to Spain, and Mason, Minister to France, should meet for a consultation over the Cuban situation. The result was the Ostend Mani¬

festo, which was not made public, however,

until the papers were called for by Congress.

In this report the three ministers suggested that the United States should offer Spain $120,-

000,000 for the island and seize it if Spain refused, since Cuba as then governed was a dangerous nuisance from the American view¬

point.

Buchanan returned from England in 1856

to become a candidate for the Presidency. For years he had been considered as a presidential possibility, and in 1852 he was really the strong¬

est candidate, though Pierce, <(a dark horse,®

received the Democratic nomination. He was

stronger than ever with his party and in the country at large. He was moderate in his

views on the slavery issue, and his attempts to secure Cuba had gained him some support in the South. Though he supported the legisla¬

tion of 1850 and 1854 relating to the extension of slavery in the territories he had not been connected with any of the bitter controversies over those measures and their results in Kansas.

Pierce now received the support of the major¬

ity of the Southern Democrats, but Buchanan was easily nominated by the pressure of the conservative Democrats, North and South, and at the last received the support of Douglas. He was undoubtedly the best candidate that the party could have selected. In the campaign

that followed he emphasized the fact that the Democracy constituted a national party as

against the new Republican party led by Fre¬

mont which was frankly sectional.- In both

sections Buchanan received the support of many Whigs whose party had been wrecked on the

slavery question. He was elected President by 112 electoral votes from the South and 62

from the North, against 114 from the North for Fremont, and 8 from Maryland for

Fillmore, the candidate of the American party.

The result showed that the Democratic party was still a national one but that the danger of sectionalization was very great. Buchanan be¬

lieved it to be his task to check this trend toward separation.

Buchanan’s program as President was to

settle the slavery question according to the principles of the Compromise of 1850 and the Kansas-Nebraska legislation of 1854, to super¬

vise the conduct of foreign affairs himself, with a vigorous policy against European influ¬

ence in Latin-American affairs, to acquire Cuba if possible, and to prevent any further aliena¬

tion of North and South. But he was destined to fail in the most important of all.

He, as a legalist would do, expected to settle the Kansas troubles bv accepting the Lecompton Constitution (q.v.) and the Dred Scott Deci¬

sion (q.v.). But in this many of his party would not follow him and he finally broke with Douglas on the Kansas issue. His desire to acquire Cuba alienated many Northern Demo¬

crats and the Conservative Whigs who had

supported him in 1856. Fires of the controversy over slavery fed by the stories from Kansas would not be extinguished ; sectionalization

proceeded rapidly; the John Brown raid in

1859 crystallized Southern and much Northern opinion ; the break with Douglas split the

Democratic party and in the elections of 1860

the sectional alignment was definite. Buchanan supported the Breckinridge ticket, believing that the South had been unwisely irritated by such JAMES BUCHANAN

Fifteenth President of the United States

I

measures as the ”personal liberty® laws and by the violent anti-slavery agitation. Though his sympathies were with the South, he denied that the latter could find a remedy in secession irom the Union in case of Lincoln’s election.

W hen it was known that Lincoln had been

elected Buchanan expected that an attempt at secession would be made, but hoped that con¬

servative influences in the South aided by a considerate attitude of the North would pre¬

vent it or confine the movement to a narrow area. His conduct of affairs during the last three months of his administration has been severely criticized. Even at this day it is im¬

possible to arrive at a satisfactory estimate of his policy. When South Carolina began the

secession movement on 20 Dec. 1860, his cabi¬

net was almost evenly divided in sympathy be¬

tween the North and South. He was intensely anxious to prevent civil war. He denied the possibility of peaceable secession but held that under the constitution and laws he had no power to force a State back into the Union. It would seem he confused the coercion of a State

with the forcible administration of Federal law.

He would hold and defend all Federal posts but would inaugurate no policy that might pre¬

cipitate war. He asked Congress for legisla¬

tion to deal with the situation but secured none, though the Republicans who controlled the lower house might have given it had they so desired.

Even so, he appeared to believe that delay would undermine and weaken the secession

movement. Consequently, he favored the Crit¬

tenden Compromise (q.v.), the Virginia Peace Convention (q.v.), and other measures designed to avoid the issue of civil war; though he re¬

fused to give any official recognition to the Confederacy. Changes in his cabinet during

the last weeks brought in new advisers —

Black, Dix, Stanton and Holt — who stiffened Buchanan's policy somewhat, but he was glad to turn over the administration with its responsi¬

bilities to Lincoln before war began. It is worth noting that for several weeks Lincoln made little change in policy. Buchanan retired to Wheatland, where he announced his support of Lincoln's administration and where he spent his last years writing a defense of his own ad¬

ministration. During these years he was vili¬

fied as if he were a traitor, and accused of cowardice and weakness of character; but in passing judgment one must remember that

Buchanan, like Andrew Johnson and other not¬

able Democrats of the strict constructionist school, was so firmly grounded in his political principles that it was hardly possible for him to act otherwise than as he did. Consult

Buchanan, James, (Buchanan's Administration

on the Eve of the Rebellion) (New York 1866) ; Curtis, George Ticknor, 'Life of President

Buchanan5 (2 vols., New York 1883) ; Moore, John Bassett, (The Works of James Buchanan) (12 vols., Philadelphia 1908-11) ; Rhodes, James Ford, (History of the United States, 1850-1871 5

(Vols. I-III, New York 1907).

Walter L. Fleming,

Professor of History, Vanderbilt University.

BUCHANAN, Joseph Rodes, American

physician: b. Frankfort, Ky., 11 Dec. 1814; d.

San Jose, Cal., 26 Dec. 1899. He was graduated as M.D. at Louisville University in 1842, and from 1846 to 1856 was professor of physiology in the Electric. Medical Institute of Cincinnati.

He was dean of the faculty from 1850 to 1855, and edited the medical journal connected with the institute. He was subsequently connected with similar colleges in New York and Boston.

Professor Buchanan discovered what he called the sciences of Psychometry and Sarcognomv,

and claimed to have demonstrated the action of the brain on the body as its controlling physio¬

logical organ. His health failing, he removed to Kansas City, and thence, in 1893 to California.

From 1849 to 1856 he published Buchanan's

Journal of Man and published (Outlines of

Lectures on the Neurological System of An¬

thropology > (Cincinnati 1854) ; (Eclectic Prac¬

tice of Medicine and Surgery5 (Philadelphia

1868) ; (The • New Education5 (New York

1882) ; (Therapeutic Sarcognomy) (Boston

1884) ; 'Manual of Psychometry5 (1885) ;

(Cerebral Physiology5 (1900) ; ‘Periodicity5

(1897); (Primitive Christianity5 (1898).

BUCHANAN, Robert Christie, American

soldier: b. Baltimore, about 1811; d. Washing¬

ton, 29 Nov. 1878. He was graduated at the United States Military Academy in 1830 and

served in the Black Hawk War in the rank of second lieutenant. From 1837-38 he served in the Seminole War, and from 1845-ˆ45 in the military occupation of Texas. During the Mex¬

ican War he was promoted for gallantry. In 1856 he was placed in command of the mili¬

tary district of Oregon and northern California.

Early in the Civil War he was promoted lieu¬

tenant-colonel. He fought in the Peninsular

campaign and on the Rappahannock, winning

at Gaines Mills the rank of brevet colonel, and at Malvern Hill that of brevet brigadier-gen¬

eral. He was in the battles of Antietam and Fredericksburg, and was promoted brevet

major-general. In 1864 he was assistant prov¬

ost-marshal for New York. In 1870 he retired from active service.

BUCHANAN, Robert Williams, English

poet and novelist : b. Caverswall, Staffordshire, 18 Aug. 1841 ; d. London, 10 June 1901. He received his education in Glasgow and while young went to London to engage in literature.

His attack upon Dante Gabriel Rossetti, (The Fleshly School of

Poetry,5 drew a famous let¬

ter from that poet on ‘The Stealthy School of Criticism5 and a scathing pamphlet from Swin¬

burne, ‘Under the Microscope5 (1872). It

should be added that in later life he regretted his course in this matter. His poems include (Undertones5 (1863) ; (Idylls and Legends of Inverburn5 (1865) ; ‘London Poems,5 his best effort (1866); ‘North Coast Poems5 (1867);

(Book of Orm, the Celt5 (1868) ; (Saint Abe and His Seven Wives5 (1871) ; ‘Napoleon Fal¬

len: a Lyrical Drama5 (1871) ; ‘The Drama of Kings5 (1871) ; (Ballads of Love, Life and Humor5 (1882) ; (The City of Dreams5 (1888) ; ‘White Rose and Red5 ; ‘The Wandering Jew5

(1893). His best novels are (The Shadow of the Sword5 (1876) ; (A Child of Nature5

(1879) ; ‘God and the Man5 (1881) ; ‘The

Martyrdom of Madeline5 (1882), and ‘Fox¬

glove Manor5 (1884).

BUCHANAN, William Insco, American

diplomat: b. near Covington, Ohio, 10 Sept.

1852; d. 17 Oct. 1909. Educated in country schools, living on a* farm in early life; removed 662

to Sioux City, Iowa, 1882. In 1894 he was appointed United States Minister to the Argen¬

tine Republic, and in 1903 United States Min¬

ister to the republic of Panama.

BUCHANANIA, a genus of Anacardiacea,

named after Dr. Buchanan Hamilton, a well-known Indian botanist. B. latifolia is a large Indian tree, the kernel of the nut of which is much used in native confectionery. It also

furnishes an oil and a black varnish.

BUCHANITES, buk'an-Its, a sect of en¬

thusiasts who sprung up at Irvine, in the west of Scotland, about 1783. Rev. Hugh White, the minister of a congregation of the Relief Church in that town, having been invited to preach in the neighborhood of Glasgow, Elizabeth Bu¬

chan, the wife of a painter, was captivated with his eloquence, and writing to him, announced that he was the first who had spoken to her heart and requested permission to pay him a visit at Irvine, that the work of her conversion might be perfected. On her arrival she was joyfully received by the members of the con¬

gregation, engaged without intermission in re¬

ligious exercises, went from house to house, conducted family worship, answered questions, resolved doubts, explained the Scriptures, and testified that the end of the world was at hand and that it was the duty of every Christian to abandon the concerns of time and prepare for the reception of Christ. White was complained of to the presbytery, by which he was deposed from his ministry. Thus a distinct party was formed, the meetings of which were commonly held at night, and on these occasions the new prophetess indulged in her reveries, styling her¬

self the Woman of the Twelfth of Revelations, and White her first-born. Such gross outrage on the common sense of the inhabitants occa¬

sioned a popular tumult, to save her from the fury of which the magistrate sent her under escort to some distance; after which, with her clerical friend and about 40 deluded followers, she wandered up

and down the country, singing and avowing that they were travelers for the New Jerusalem and the expectants of the im¬

mediate coming of Christ. They had a com¬

mon fund, and did not consider it necessary to work, as they believed God would not suffer them to want. See Buchan, Elspeth.

BUCHAREST, boo-ka-rest', or BUKA—

REST (Rumanian, Bucuresci, that is, ((city of joy®), formerly the chief city of Wallachia, now the capital of the kingdom of Rumania, on the Dimbovitza, 37 miles from its mouth. It is the most populous city of southeastern Eu¬

rope after Constantinople and Budapest, and is spoken of by the Rumanians as the Paris of the East. Besides being the seat of govern¬

ment, Bucharest is the residence of a Greek archbishop. The houses are mostly of one

story, built of brick, pointed externally, and have metal roofs. The streets are mostly nar¬

row and crooked, the most important being the Boulevard, running from east to west, the Calea Victoriei, the Lipscani and the Karlsstrasse.

There are statues to Joan Heliade-Radulescu, the father of Rumanian literature, George

Lazar and others. Twelve bridges — five of iron and seven of stone — cross the Dimbovitza, a small, muddy stream that formerly caused a good deal of damage by inundations. From

1885 till 1896 extensive fortifications were erected, there being now 18 forts in the circle of defense. The inhabitants nearly all belong to the Greek Church. The churches are very numerous, but few of them are architecturally noteworthy, the chief being the metropolitan cathedral, built in 1656, restored in 1834, and standing on a hill, and the Roman Catholic cathedral, built in 1875-84, one of the chief or¬

naments of the city. Bucharest has a univer¬

sity, and connected with it a public library and a museum of natural history and antiquities.

There are four lyceums, two gymnasia, some

technical and military schools, a conservatory of music, girls' schools and other educational institutions. There are a few fine public build¬

ings, of which the most conspicuous is the royal palace, recently rebuilt; among the others being the new Palace of Justice, the National Theatre, the Athenaeum, the postoffice and several fine hotels. What chiefly distinguishes Bucharest is the magnificence of the public gardens. There is a mixture in the population of eastern habits, with European civilization among the upper

classes. The manufactures comprise iron goods, earthenware, refined petroleum, brandy, arm}'

supplies, textiles, leather, linen, soap, paper, beer, etc., but they are of no great importance.

There is an active trade, Bucharest being an entrepot both for the kingdom of Rumania and for adjacent countries. It imports manufac¬

tured goods and exports grain, wool, honey, wax, tallow and cattle, the produce of the coun¬

try. In 1698, when it became the capital of Wallachia, it was only a village. It was pil¬

laged by the Serbians in 1716; taken by the Russians in 1769 and 1806; occupied by them again in 1828-29 and 1853-54; by the Aus¬

trians in 1774, 1789 and 1854; was partly de¬

stroyed by fire in 1847, and in 1862 became the capital of Rumania, which had just been formed from the union of Moldavia and Wallachia.

In 1866 a revolt in Bucharest dethroned the first ruler of united Rumania. The partition of the captured parts of European Turkey was settled among the Christian states of the Bal¬

kans by the Treaty of Bucharest, 10 Aug. 1913.

Peace congresses were held here 1772-73 and in 1812, and in 1886 peace was concluded here between Serbia and Bulgaria. Pop. 338,109.

See Bucharest, Peace of; Bucharest, Uni¬

versity of.

BUCHAREST, Peace of, a treaty signed

28 May 1812 between Russia and the Porte. In November 1806 the Emperor Alexander took up arms for the protection of Moldavia and Walla¬

chia, and on account of the violation of the free navigation of the Bosporus. He occupied Moldavia, upon which the Porte declared war against Russia, 7 Jan. 1807. An armistice, how¬

ever, was agreed upon at Slobosia, 24 Aug. 1807, and after the expiration of the truce in April 1808, it was tacitly continued, but in April 1809

the war was renewed. The Russians advanced

to Bulgaria, and after two fierce campaigns re¬

mained masters of the Danube. The Porte now offered terms of peace. A congress was opened at Bucharest in December 1811. Napoleon did all in his power to induce the Porte to continue the war; but the interposition of Great Britain and Sweden, as well as the concessions of Rus¬

sia and the distrust of the Porte toward Napo¬

leon, brought to a conclusion the Peace of BUCHAREST — BtJCHNER

Bucharest. The Porte gave up to Russia all Bessarabia and a third of Moldavia, with the fortresses of Choczim, Bender, Ismail and Kilia, so that the Pruth, as far as its confluence with the Danube, became-the boundary between the two powers, and from thence the left bank of the Danube as far as Kilia and even to its en¬

trance into the Black Sea. The Russians gave back the rest of their

conquests. In Asia the boundaries were established as before the war.

The boundary then settled between Russia and Turkey was modified in favor of the Porte at the Peace of Paris, 30 March 1856.

BUCHAREST, University of, a univer¬

sity in the city of Bucharest, under the con¬

trol of the state government of Rumania. It was founded in 1864. In addition to the usual academic, scientific and professional depart¬

ments, with courses followed by about 4,300

students, there is a school of pharmacy. There are museums and laboratories connected with

the university. Tuition is absolutely free in all departments of this university. The library

contains over 26,000 volumes.

BUCHELER, biik'e-ler, Franz, German

philologist: b. Rheinberg, 3 June 1837; d. 1908.

He studied at Bonn and became professor in Freiburg in 1858 and in Greifswald in 1866; in 1870 he was called to Bonn. His specialty has been in the field of ancient Italian dialects.

He has published (Grundriss der lateinischen Deklination) (1866) and other important works, and since 1878 has been an associate editor of the Rheinisches Museum fur Philologie. He

was renowned equally for his great learning, his discriminating critical talent and his skill as a teacher.

BUCHER, booH'er, Anton von, German

polemical writer: b. Munich, 8 Jan. 1746; d. 1817.

He was educated in the Latin schools of the Jesuits, studied at Ingoldstadt and was conse¬

crated priest in 1768. In 1771 he was appointed rector of the German schools of Munich. In his different offices as a public teacher he did a great deal in his day to instruct and enlighten his country. He incurred the enmity of the Jesuits by his satirical attacks upon them and was finally removed from his position by Max¬

imilian Joseph II, who, however, compensated him by bestowing upon him the benefice of

Engelbrechtsmunster. His contributions to the history of the Jesuits in Bavaria ((Beitrage zur Geschichte der Jesuiten in Baierffi) are of great historical value. His collected works appeared in 1819-20.

BUCHEZ, bii-sha, Philippe Joseph Benja¬

min, French philosopher: b. Matange-la-Petite (now in Belgium), 31 March 1796; d. Rodez, France, 12 Aug. 1865. He gave himself up to the study of the natural sciences, and in par¬

ticular to medicine, receiving his doctor's de¬

gree in 1825. He was bitterly hostile to the government of the Restoration and was one of those who, in 1821, founded the French Society of Carbonari. He became chief editor of the Journal des Progres des Sciences et Institutions Medicates, and in 1826 assisted in editing the Producteur, a weekly paper which advocated

the doctrines of Saint-Simonism. In 1831 he founded a journal of moral and political sci¬

ence, called L'Europeen, in which he .expounded those doctrines which owe their origin chiefly to himself and have been collectively denom¬

inated ˆBuchezism.® The fundamental idea of

his system is that of the progress and develop¬

ment of the human race. But progress pre¬

supposes an aim, and this aim must be pointed out beforehand, or revealed. Thus the idea

of progress leads him to the orthodox belief in revelation. This theory is worked out in his (Introduction a la science de l'histoire) (1833) and his (Essai d'un traite complet de philoso¬

phic an point de vue du catholicisme et du progres } (1839). Along with his predilections for the Catholic Church he still retained his strong democratic and republican opinions, and with M. Roux-Lavergne published ˆistoire

parliamentaire de la Revolution frangaise, ou journal des assemblies nationales, depuis 1789

jusqu'en 1815 > (40 vols., 1833-38). After the revolution of 1848 he was elected to the con¬

stituent National Assembly, of which he was soon appointed president. Thenceforth he held aloof from public life, prosecuting his studies and writing several works, among which is the (Histoire de la formation de la nationality frangaise* (1859).

BUCHHOLZ, (booHffialts) FAMILY, a

series of sketches by Julius Stinde, represent¬

ing life among the middle classes of the Ger¬

man capital. The books are entertainingly writ¬

ten and are very popular in Germany, reaching their 85th edition in 1900.

BUCHNER, booH'ner, Eduard, German

chemist: b. Munich 1860. A student at the

universities of Munich and Erlangen, he be¬

came lecturer in chemistry at Munich in 1891 ; professor at Kiel in 1893; at Tubingen in 1896; at the Agricultural College of Berlin in 1898; was awarded the Nobel prize in 1907; became professor at Breslau in 1909, and was created a privy councillor in 1910. His leading contri¬

bution to science is the discovery that the alco¬

holic fermentation of sugars is caused by the purely chemical action of an enzyme and not by the physiological processes operating in the organism of the living yeast. With his brother he is coauthor of (Die Zymasegahrung.*

BUCHNER, Friedrich Karl Christian

Ludwig, German physician and materialist

philosopher: b. Darmstadt, 29 March 1824; d.

Darmstadt, 1 May 1899. He studied at Giessen, Strassburg, Wurzburg and Vienna; became a

lecturer at Tubingen University, and, in 1855, published (Kraft and StofP (14th ed., 1876; English trans., (Force and Matter, > 1870), in which he attempted scientifically to establish a materialistic view of the universe. A violent controversy was raised, and Buchner saw him¬

self compelled to resign his university post and begin medical practice in Darmstadt. He wrote numerous contributions to periodicals on physio¬

logical and pathological subjects, as also in support of his atomistic philosophy; published in the latter department (Natur und GeisD

(1857) ; (Aus Natur und WissenschafP (1862-84) ; as well as works on Darwinism, the idea of God, the intelligence of animals, etc.; and translated Lyell's (Antiquity of Man> (1864).

Consult Tanet, The Materialism of the Present Day> (1867).

BUCHNER, Georg, German poet, brother

of F. K. C. L. Buchner (q.v.) : b. Goddleau, near Darmstadt, 17 Oct. 1813; d. Zurich, Swit-664

zerland, 19 Feb. 1837. In 1834 he entered the political arena with a manifesto entitled ‘The Rural Messenger5 and bearing the motto “Peace to the cabin; war to the palace.® To escape arrest he fled to Strassburg, where he studied the philosophies of Descartes and Spinoza. He wrote a drama in 1834 on ‘The Death of Danton, } the work of a genuine but undisciplined poet. His ‘Complete Works,) with biography, was published in 1879.

BUCHNER, Hans, hants, German scien¬

tist: b. Munich 1850; d. 1902. After studying at the universities of Strassburg, Giessen and Leipzig, he became lecturer on hygiene at Mu¬

nich in 1880 and professor in 1892. He has made many important researches in bacteri¬

ology. In 1877 he demonstrated the resistance offered by the physical organism to microscopic bodies present in states of ulceration, inflam¬

mation and fever; and in 1890 he showed that this resistance directly depended upon the pres¬

ence in the blood serum of certain clearly-defined albuminous substances. He wrote (Die nagelische Theorie der Infektionskrankheiten)

(1883) ; ‘Die neue Geschichtspunkte in der

Immunitatsfrage5 (1892).

BUCHNER, Luise, German poet and novel¬

ist, sister of Georg Buchner: b. 12 June 1821; d. Darmstadt, 28 Nov. 1877. Her first publica¬

tion, (Women and Their Calling) (1855), was followed by many others on the “woman’s rights question® ; it commanded much attention and

reached a fifth edition (1883). She wrote a volume of tales, (From

Life) (1861) ; ‘Poet-Voices of Home and Foreign Lands) ; several original poems; ‘Woman’s Heart5; and some

‘Christmas Stories.)

BUCHON, bii-shon, Jean Alexandre,

French historical writer: b. Menetou-Salon, 21

May 1791 ; d. 30 April 1846. Having gone to Paris, he became collaborateur on several liberal journals and early took part in the opposition to the Restoration. He was in consequence

several times prosecuted by the government

and his writings, such as his ‘Vie de Tasse) (1817) were interdicted. In 1821 he gave a course of lectures in the Athenaeum on the his¬

tory of dramatic art in England, and in the following years he traveled over the greater part of Europe for the purpose of collecting documents to illustrate the history of France during the Middle Ages. After his return he published his ‘Collection des chroniques na¬

tionals frangaises, ecrites en langue vulgaire du XIIIe au XVIe siecle5 (47 vols., 1824-29), which he began with the ‘Chroniques de Frois¬

sart5 (15 vols., 1824-26). He was appointed inspector of the archives and libraries of France in 1828 and, in 1829, inspector-general of the departmental and communal archives, but soon lost his office through a change of ministry.

In addition to the works of this indefatigable writer already mentioned, may be named his

‘Histoire populaire des frangais5 (1832) ; ‘La Grece Continentale et la Moree5 (1843) ; ‘His¬

toire des Conquetes et de l’Etablissement des Frangais dans les Etats de l’ancienne Grece sous les Ville-Hardouin5 (1846) ; besides his editions of Brantome, etc., and his articles in cyclopedias and magazines.

BUCHTEL, book'tel, Henry Augustus,

American clergyman and educator : b. Akron,

Ohio, 30 Sept. 1847. He was educated at Asbury (now De Pauw) University, from which

he was graduated in 1872; entered the Metho¬

dist ministry; served for a year as a mission¬

ary in Bulgaria, and held pastorates in various parts of Indiana, New York, New Jersey and Colorado. Since 1900 he has been chancellor of the University of Denver. He took an in¬

terest in State politics as a reformer and in 1907 was elected governor of the State on the Republican ticket, serving until 1909. He then returned to his duties as chancellor.

BUCHTEL COLLEGE, a coeducational

institution in Akron, Ohio, founded in 1871

under the auspices of the Universalist Church and named for John R. Buchtel, who gave it $500,000. In 1910 its productive funds were $190,000 and income $49,206, and the value of the buildings and grounds about $300,000. It had 20 professors and 297 students, and some 10,000 volumes in its library. In April 1913, the trustees offered the entire plant and endow¬

ment of the college to the city of Akron as the nucleus of a municipal university. The

offer was accepted by the city, and the new University of Akron came into existence on 1

Jan. 1914. The name of Buchtel College is re¬

tained for the College of Liberal Arts.

BUCHU, bu'ku, a South African name for

several species of barosma , especially B. crenata.

crenulata and serratifolia. They belong to the order Rutacece and the section Endiosmece.

They have a powerful and usually offensive

odor, and have been recommended as antispasmodics and diuretics.

BUCK, Carl Darling, American philolo¬

gist : b. Orland, Me., 2 Oct. 1866. He was graduated from Yale in 1886; took the degree of Ph.D. there in 1889; member of the Ameri¬

can School of Classical Studies at Athens in 1887-89; student in German universities 1889-92. In 1892 he became assistant professor, in 1900 professor, of Sanskrit and comparative

philology at the University of Chicago. He

has written 'Vocalismus der Oskischen Sprache5

(1892) ; "Discoveries in the Attic Deme of Ikaria® (in 'Papers of the American School

of Classical Study, Athens,5 Vol. V) ; 'The Oscan-Umbrian Verb System5 (1895) ; 'Latin

Grammar5 (1902) (with W. G. Hale) ; 'Gram¬

mar of Oscan and Umbrian5 (1904) ; 'Intro¬

duction to the Study of the Greek Dialects5

0910) ; 'Survey of the Linguistic Conditions in Chicago5 ; numerous articles in philological journals. In 1912 received honorary degree

of Litt.D. from the University of Athens,

Greece.

BUCK, Dudley, American organist and

composer: b. Hartford, Conn., 10 March 1839; d. 1909. After musical study at home and in Leipzig, whence he returned in 1862, he became organist at Park Church, Hartford, and suc¬

cessively at Saint James' Church, Chicago,

Music Hall, Boston, and Saint Ann's Church, church of the Holy Trinity and Plvmouth

Church, Brooklyn, retiring in 1903. He has

written several books — 'A Dictionary of Musi¬

cal Terms,5 a work on 'The Influence of the Organ in History5 (1882), *etc.* The 'Centen¬

nial Cantata,5 for the opening of the Exposi¬

tion in 1876, by appointment of the United States Centennial Commission, the 'Forty-sixth BUCK — BUCKINGHAM

Psalm,' the (Legend of Don Munio,' the (Golden Legend' and the <Marmion) symphonic

overture are among his larger works with or¬

chestra. He has also composed chamber music, songs and male-voice pieces. Among his later works may likewise be mentioned (The Voyage of Columbus,' (The Light of Asia,' 'The Chris¬

tian Year' and 'Deseret,' a comic opera.

BUCK, Jirah Dewey, American physician :

b. Fredonia, N. Y., 20 Nov. 1838. He was

graduated in 1864 from the Cleveland Homoeo¬

pathic Medical College, became professor in

that institution, first in physiology (1866-71), later theory and practice and finally in psychol¬

ogy. He afterward founded Pulte Medical Col¬

lege at Cincinnati, Ohio, now the medical de¬

partment of the Ohio State University. He

is well known for his scientific and philosophi¬

cal contributions to magazines. Among his

books are (The Nature and Aims of Theos¬

ophy' (1887); (A Study of Man' (1888);

(Mystic Masonry' (1896) ; (The Genius of

Freemasonry' (1908); Constructive Psychology' (1909) ; 'The New Avatar' (1909) ; 'The Lost Word Found' (1909); Christos'; Che

Soul and Sex in Education.'

BUCK, a name sometimes distinctively ap¬

propriated to the adult male of the fallow deer, the female of which is a doe. The term is often also applied to the male of other species of deer, as of the roebuck, although never to tfiat of the red deer, which, when mature, is a stag or a hart.

BUCKBEAN, BOGBEAN, or MARSH—

TREFOIL (Mcnyanthes trifoliata) , a beauti¬

ful 'plant belonging to the Menyanthea, sub¬

division of the natural order of the Gentian -

acece. It is common in spongy, boggy soils, throughout the northern temperate lands, and flowers about the latter end of May and early June. It has a procumbent stem rising to a height of 6 to 12 inches, and covered by the sheaths of the leaves, and a creeping jointed root.

The leaves are trifoliate (like those of clover), with obtuse, ovate leaflets. The flower-stalk terminates in a thyrse of white flowers, rose-colored outwardly. The calyx is five-parted, the corolla funnel-shaped, spreading, and clothed on the inner surface with a coat¬

ing of dense fleshy hairs. The fruit consists of a one-called, two-valved capsule containing numerous seeds. The whole plant, the root

especially, has an intensely bitter taste, and an extract of it ranks as a valuable tonic quite equal in its effects to gentian. It is not so fre¬

quently employed now, however, as it used to be. It is said to be beneficial in intermittent fevers, gout, liver complaints, dropsy, scurvy, *etc.* In the north of Europe it is sometimes used instead of hops to give bitterness to beer; and in Lapland an unpalatable kind of bread is made from the powdered roots.

BUCKBOARD, a four-wheeled vehicle

having the seat mounted on an elastic board instead of springs. Buckboards were intended originally for rough and hilly roads and were rather primitive in construction, but became so popular that the styles at present employed are greatly improved in form and finish.

BUCKETS, in water-wheels, are a series

of cavities into which the water is delivered, on the circumference of the wheel to be set in motion. By the revolution of the wheel

the buckets will be alternately erected so as to receive water and inverted so as to discharge it; the loaded side will descend, and present the empty buckets in succession to the current, and thus keep up a constant revolution of the wheel. Buckets made of wood and of various metals, are also used for many other mechani¬

cal purposes, as in grain-elevators, dredges, *etc.*

BUCKEYE. The name in the central and

southern United States for native species of trees of the horse-chestnut genus, especially the sweet buckeye (JEsculus octandra) , abundant in

Ohio and southward. See Horse-Chestnut.

BUCKEYE STATE, a nickname applied

to the State of Ohio.

BUCKHANNON, W. Va., town and

county-seat of Upshur County, 40 miles south of Clarksburg, on the Baltimore and Ohio

River and on the Buckhannon River. Its indus¬

trial establishments include flouring, lumber and woolen mills, glassworks, veneering factories, a tannery and a brickyard. The West Vir¬

ginia Wesleyan College is located here. Pop.

(1920) 3,785.

BUCKHOUND. See Deerhound.

BUCKINGHAM, George Villiers, 1st

Duke of, British courtier : b. Brooksby, Leices¬

tershire, 28 Aug. 1592; d. Portsmouth, 23 Aug.

1628. He was the unworthy favorite of James I and Charles I. His father was George Vil¬

liers, knight; his mother was descended from the ancient family of Beaumont. His father

died when he was 13, and at 18 he was sent to France, where he resided three years, and

acquired great skill in all bodily exercises.

This, together with his beauty of person and graceful manners, made so great an impression on James I, who gave him the familiar name of Steenje, that in less than two years he was made a knight, a gentleman of the bed-chamber, viscount, Marquis of Buckingham and lord

high admiral, etc., and at last dispenser of all the honors, offices, favors and revenues of the three kingdoms, according to the dictates of his ambition, his cupidity or his caprice. The nation was indignant at seeing merit under¬

valued, the people trampled upon, the nobility humbled, the crown impoverished and degraded, to elevate and enrich a weak and insolent

favorite. Such rapid and undeserved promo¬

tion likewise caused many private jealousies.

In 1623 he engaged in a romantic adventure with Charles, Prince of Wales, in connection with which traitorous views have been attrib¬

uted to him. The Earl of Bristol was negotiat¬

ing a marriage for the Prince with the Infanta of Spain. Buckingham persuaded the Prince

to go to Madrid and carry on his suit in person.

They set out incognito, passed through various adventures and saw on their way the Princess Henrietta Maria of France, whom Charles

afterward married. The result of this journey is well known. The marriage was broken off, war declared with Spain and Bristol was im¬

peached. Buckingham vˆas created a duke dur¬

ing his absence, and vdiatever misconduct may have been associated with the design or execu¬

tion of his mission, his favor with the King and Prince remained unimpaired. James died in

March 1625, and in May of the same year

Buckingham wˆas sent to France as proxy for 666

Charles I, to marry the Princess Henrietta

Maria. In the following year the unpopularity of the war with Spain, and the failure of the expedition to Cadiz, caused his impeachment, from the consequences of which he was saved by his favor with the King. His intrigues soon after brought on war with France, and he was entrusted with an expedition to succor the

Rochellese, but they refused his aid. and he carried his forces to the Isle of Rhe, where, after three months spent in unskilful operations, he suffered a defeat in re-embarking which

cost 2,000 men. Notwithstanding this proof of incapacity, a large force was again entrusted to him to renew the attempt on Rochelle. He

went to Portsmouth to superintend the prepara¬

tion, and was there assassinated by John Felton, a lieutenant who had withdrawn from the army in consequence of being disappointed in pro¬

motion.

BUCKINGHAM, George Villiers, Duke

of, son of the preceding: b. Westminster, 30

Jan. 1628; d. Kirkby Moorside, Yorkshire, 16

April 1687. After studying at Trinity College, Cambridge, he traveled abroad, and on his re¬

turn home, after the commencement of the civil war, he was presented to the King, at Oxford.

He served in the royal army, under Prince

Rupert and Lord Gerard. His estate was seized by the Parliament ; but having obtained the restoration of it, he traveled with his brother into

France and Italy. In 1648 he returned to England, and was with Charles II in Scotland, and at the battle of Worcester. He followed that Prince abroad, and served as a volunteer in the French army in Flanders. He afterward returned to England, and in 1657 married the daughter of Lord Fairfax, by which means

he repaired the ruin of his fortune in the royal cause. He, however, preserved the favor of

Charles II, and at the Restoration was made master of the horse. He also became one of the King's confidential ministers, who were des¬

ignated by the appellation of the "Cabal®

(1667-73). His political conduct was, like his general behavior, characterized by unprincipled levity and imprudence. In 1666 he engaged in a conspiracy to effect a change of the govern¬

ment; notwithstanding which, he recovered the favor of King Charles, which he repeatedly

abused. The profligacy of his private life was notorious. He seduced the Countess of Shrews¬

bury, and killed her husband in a duel ; and he was more than suspected of having been

the instigator of the infamous Colonel Blood to his brutal outrage against the Duke of Or¬

mond, whom he attempted, with the assistance of other ruffians, to carry to Tyburn and hang on the common gallows. In 1677 he was, to¬

gether with the Earls of Shaftesbury and Salis¬

bury and Lord Wharton, committed to the

Tower for a contempt, by order of the House of Lords, but on petitioning the King, they were released. He plotted against the government

with the Dissenters, and made himself an ob¬

ject of contempt to all parties. Pope ((Moral Essays, > epistle 3d) has more strikingly than accurately described his death. His abilities were far superior to those of his father; and among his literary compositions

the comedy, or rather the witty burlesque, of ‘The Rehearsal) may be mentioned as a work which displays no common powers, and which greatly contributed to the correction of a corrupted public taste.

BUCKINGHAM, James Silk, English

traveler and editor: b. Flushing, Cornwall, 25

Aug. 1786; d. London, 30 June 1855. In 1815

he went to Bombay, and in the following

year, after many vicissitudes, to Calcutta, where he established the Calcutta Journal, but the censorship of the press was then in full force in India, and Buckingham, having offended

government, his printing presses were seized, and he himself compelled to quit the presidency of Bengal and return to England, where he

began to deliver lectures in London in favor of free trade to the East and the extinction of the East India Company’s monopoly. He also

established in London, 1824, the Oriental Her¬

ald, and four years later the Athenceum, now one of the foremost English weeklies, and pre¬

pared for the press the manuscript journals of his travels. In 1822 appeared (Travels in Palestine*; in 1825, (Travels in Arabia*; in 1827, (Travels in Mesopotamia * ; and in 1830, ‘Travels in Assyria and Medial From 1832-37

he was member of Parliament for Sheffield.

Subsequently he made a tour of three years in America, resulting in the publication of eight volumes on the United States and one on

British North America. He was a zealous

promoter of the temperance cause, and presi¬

dent of the London Temperance League. The

last of his voluminous writings was .his Auto¬

biography, 5 two volumes of which appeared in 1855, but its completion was prevented by the author's death.

BUCKINGHAM, Joseph Tinker, Ameri¬

can journalist: b. Windham, Conn., 21 Dec.

1779; d. Cambridge, Mass., 11 April 1861. His father exhausted his whole property in support¬

ing the American army during the Revolution, and died leaving a family without means of support. At Worthington, Mass., Joseph was

apprenticed to a farmer, with whom he re¬

mained for several years, during which he

made himself acquainted with the rudiments of an English education. At 16 he entered a

printing-office and became acquainted with the elements of the profession in which he was afterward to gain distinction. In Boston, 1806, he began life for himself by the publication of The Polyanthus, a monthly magazine, which,

after one year, was discontinued and not re¬

sumed until 1812. In 1809 he published for six months the Ordeal, a weekly. In 1817 he began the publication of The New England

Galaxy and Masonic Magazine, wffiich he con¬

tinued until 1828. From 1831 to 1834 he pub¬

lished The New England Magazine. In 1824 he published the first number of the Boston

Courier, which he continued to edit until 1848.

Mr. Buckingham was several times elected to the legislature, serving in both houses. Among his publications deserving mention are Speci¬

mens of Newspaper Literature, with Personal

Memoirs, Anecdotes and Reminiscences1* (1850) ; and 'Personal

Memoirs and Recollections of

Editorial Life* (1852).

BUCKINGHAM, William Alfred, Ameri¬

can politician : b. Lebanon, Conn., 28 May 1804 ; d. Norwich, 3 Feb. 1875. He was educated in the common schools; worked on his father's

farm ; was also a school-teacher, and at Nor-BUCKINGHAM

wich, 1825, began business in drygoods, be¬

coming later a manufacturer and something of a capitalist. In 1849 he was elected mayor of Norwich, to which office he was repeatedly

chosen. For nine years (1858-66) he was gov¬

ernor of Connecticut, and as one of the most efficient of the <(war governors® achieved a national fame. He served as United States

senator from 1869 till his death. He was active in the temperance cause, and a liberal giver to Yale College and to many benevolent objects.

BUCKINGHAM, or BUCKS, England,

south-midland county, bounded north and north¬

west by Northampton; northeast and east by

Bedford and Hertford ; southeast by Middle¬

sex; southwest by Berks and west by Oxford.

Its length, north to south, is about 45 miles ; greatest breadth, east to west, 23 miles ; area, 746 square miles. The vale of Aylesbury,

stretching through the centre of the county, and celebrated for its fertility, furnishes rich pasturage for vast numbers of cattle and sheep.

The total area under all kinds of crops, bare fallow and grass is somewhat more than 400,-

000 acres, of which considerably more than

half is in permanent pasture. The chief cereal crops are wheat, barley and oats. The county forms a great dairying centre. The breeding and fattening of cattle are largely carried on, Herefords and short-horns being favorite

breeds. The heavy arable lands in the northern part of the county are being brought under cultivation by steam plough, and are producing rich crops of beans, wheat, *etc.* The manufac¬

tures of Buckinghamshire are unimportant.

Among them are straw-plaiting and the making of thread lace, wooden articles, such as beechen chairs, turnery, *etc.* There are also' paper-mills, silk-mills and other manufactories. The mineral productions of this county are of no great importance. There is chalk burning and limestone quarrying. The county is watered

by the Ouse, the Thame, the Thames, and other streams, and is intersected by the Great Western and Northwestern railroads. Buckingham is

nominally the county town, but Aylesbury is the assize town. Buckinghamshire used to contain three parliamentary boroughs, namely, Ayles¬

bury, Buckingham and High or Chipping

Wycombe, which now give name to correspond¬

ing parliamentary divisions. The county thus returns three members to the House of Com¬

mons. It gives the title of earl to the family of Hobart Hampden. Pop. 219,551.

BUCKINGHAM, England, municipal and

formerly a parliamentary borough, capital of the county of its own name, 61 miles north¬

west of London, situated on a peninsula formed by the Ouse, which is here crossed by three stone bridges. The town hall is a large and commodious building. The parish church,

erected in 1781, is a spacious structure, with a square tower, surmounted by an elegant spire, and there are also several other places of wor¬

ship, and a free grammar school, founded by Edward VI. Malting and tanning are carried

on to some extent ; and a good deal of business is done in wool and hops. In the vicinity are several limestone quarries, and one of marble.

Pop. 3,280.

BUCKINGHAM PALACE, a royal palace

in London, facing Saint James's Park. It is the town residence of the King.

BUCKLAND, Cyrus, American inventor :

b. Manchester, Conn., 10 Aug. 1799; d. 26 Feb.

1891. After learning the trade of a machinist, he assisted in building the machinery for the first cotton-mills erected at Chicopee Falls, and became, in 1828, patternmaker in the United States armory, Springfield, where he remained for 28 years, becoming master mechanic. He

designed machinery and tools for the manu¬

facture of firearms ; remodeled old weapons and designed new ones ; perfected a lathe for turn¬

ing out gunstocks ; invented machines to bore and turn gun-barrels and for rifling muskets, and many other novelties in the manufacture

of firearms and ordnance. Much of his machinery was adopted by foreign governments. As he

received nothing for his labor at the armory, excepting his salary, Congress voted him

$10,000 when ill-health compelled him to resign.

In all he received from Congress for his inven¬

tions $70,000.

BUCKLAND, Francis Trevelyan, Eng¬

lish naturalist: b. Oxford, \7 Dec. 1826; d.

London, 19 Dec. 1880. He was the son of

William Buckland (q.v.) ; graduated at Christ Church, Oxford, and having studied medicine

in Paris and London, he was for some time house surgeon to Saint George's Hospital, when he joined the 2d Life Guards as assistant sur¬

geon, a post which he held for nine years. His strong passion for natural history soon absorbed all his thoughts, and he became a constant con¬

tributor to Field and other periodicals. Latterly he devoted himself with enthusiasm to piscicul¬

ture, a subject on which he was long the leading authority. His advice on the subject was

sought by several foreign governments, and he was the means of introducing salmon and trout into the Australian and New Zealand waters.

He was appointed inspector of salmon fisheries in 1867, and his reports as commissioner led to the passing of several useful acts of Parlia¬

ment. Besides a great quantity of pleasant gos¬

sipy articles contributed to various periodicals, he published (

Curiosities of Natural History*

(1857-72); the (Logbook of a Fisherman and

Zoologist* (1876) ; a (Natural History of Brit¬

ish Fishes) (1881) ; and other works.

BUCKLAND, William, English geologist:

b. Axminster, Devon, 12 March 1784; d. 15 Aug.

1856. He was educated first at Winchester,

afterward at Corpus Christi College, Oxford, took his degree of B.A. in 1803 and obtained a fellowship in 1808. From early childhood he had been familiar with the ammonites and other fossils in the lias quarries near his native town, and with advancing years the bent of his mind to geological pursuits was developed and con¬

firmed. In 1813 he was appointed reader in mineralogy at Oxford, and in 1818 a readership of geology was instituted for him. In 1825 he was presented by his college to the living of Stoke Charity, near Whitechurch, Hants, and

the same year he became one of the canons in the Christchurch Cathedral, Oxford. He was

one of the eight selected to write the celebrated (Bridgewater Treatises,* and in 1836 his essay was published, under the title of (Geolog}' and Mineralogy Considered with Reference to Nat¬

ural Theology.) In 1845, he was made dean of Westminster, and in 1847 one of the trustees of the British Museum. His papers, contributed to various societies and periodicals, were very 668

numerous. He was a fellow and twice presi¬

dent of the Geological Society of London, and of the Royal Society

from 1818.

BUCKLANDIA, a handsome evergreen

Javanese and East Indian tree (B . populnea) , of the family Hamamelidacece, the only species of its genus. It is said to attain considerable height, often more than 30 feet, without

branches, and occasionally a circumference of more than 20 feet at the height of a man's chest from the ground. Its timber is widely used in the Orient.

BUCKLANDITE, the name of two min¬

erals: (1) Bucklandite of Hermann, a variety of epidote; (2) Bucklandite of Levy, a variety of allanite distinguished by being anhydrous.

It occurs in small black crystals having the form and physical properties of allanite in an iron mine near Arendale, Norway.

BUCKLE, George Earle, English jour¬

nalist: b. Tiverton-on- Avon, near Bath, 10 June 1854. He was educated at Winchester and at New College, Oxford, and was a fellow of All Souls College 1877-85. Lie was editor of the London Times from 1884 to 1912. On the death of W. F. Monypenny, the author of the authori-*

tative (Life of Benjamin Disraeli, } he under¬

took to complete the work, and has since pub¬

lished (1914—16) the third and fourth volumes of the work.

BUCKLE, Henry Thomas, English histor¬

ian : b. Lee, Kent, 24 Nov. 1821; d. Damascus, 29 May 1862. He was the son of a wealthy merchant and received his education partly at

home and partly at Dr. Halloway's school,

Gordon House, Kentish Town. His delicate

health prevented his remaining long at school, but his love of learning and indefatigable indus¬

try as a student supplied any deficiencies in his training, and he was to a great extent self-educated. He read in 19 languages and could converse fluently in seven. He was brought

up on orthodox lines but early developed free-thought and radical principles. At an early age he entered his father's counting-house, but he displayed no aptitude for business ; and when, at the age of 18, his father's death left him an ample fortune, he devoted himself en¬

tirely to study. The only thing he allowed to distract him from his more serious pursuits was his favorite game of chess, in which he attained such excellence as to be recognized as one of the first English masters of the game; but even this he gave up when he found it en¬

croached too much on his time. He had formed a plan, to which he dedicated his life, of writ¬

ing the 'History of Civilization in England) in conformity with certain philosophical prin¬

ciples and with an exhaustive treatment in re¬

gard to details which he deemed indispensable to historical accuracy, which made the work he had undertaken one of almost incalculable magnitude. For 14 years he toiled incessantly at his manuscript, but he only succeeded in finishing two volumes. The first, published in 1858, stated with copious illustrations the plan of the work; the second, issued in 1861, con¬

tained a digression on the histories of Scotland and Spain, intended further to illustrate his design and demonstrate the principles on which it was based. These works gave rise to much controversy, but it has been generally agreed that they exhibit great boldness and originality of design, with profound if not accurate scholar¬

ship, and also with a good deal of what was the object of the historian's strongest aversion in others, dogmatism. Certain it is that his work does not now stand in the high repute it did in the years immediately succeeding pub¬

lication. His death occurred when he was on a journey undertaken for the restoration of his health. (See History of Civilization in Eng¬

land). Consult Huth, A. H., ‘Life* (1880) ; his (Miscellaneous and Posthumous Works *

(edited by Miss Taylor, 1872), and Robertson, I. M., ‘Buckle and His Critics* (1895).

BUCKLE, a metal instrument consisting of

a rim and tongue, forming a clasp, used for fastening straps or bands in dress, harness, *etc.*

In making buckles both brass and iron are used, and the chief kinds are called tongue, roller, brace and gear buckles. The use of buckles, instead of shoe-strings, was introduced into England during the reign of Charles II. They soon became very fashionable, attained an enor¬

mous size (the largest being called Artois

buckles, after the Comte d’Artois, brother of the King of France), and were usually made of silver, set with diamonds and other precious stones. In the latter half of the 18th century the manufacture of buckles was carried on most extensively in Birmingham, there being at one time not less than 4,000 people directly em¬

ployedˆ in that city and its vicinity, who turned out 2,500,000 pairs of buckles annually. When the trade was. at its height, however, fashion changed, and in 1701 buckle-makers petitioned the Prince of .Wales for sympathy, on the

ground that, owing to the introduction of shoe¬

strings, their trade was almost ruined. The Prince promised to assist them as far as he could by wearing buckles himself and enjoin¬

ing his household to do the same, but fashion was too strong even for him and, before the close, of the century, a great staple trade of Birmingham had become extinct, though shoe-buckles are still by no means unknown.

BUCKLER, Fr. Bouclier, so named from

the boss, boncle, on it, a kind of small shield formerly. worn on the left arm, a piece of armor varying in form and material, among the lat¬

ter being wickerwork, wood covered with

leather, a combination of wood and metal, *etc.*

BUCKLEY, James Monroe, American

clergyman and editor : b. Rahway, N. J., 16 Dec.

1836; d. Morristown, N. J., 8 Feb. 1920; edu¬

cated at Pennington Seminary and Wesleyan

University, studied theology at Exeter, N. H., and in 1858 entered the ministry of the Metho¬

dist Episcopal Church. He had charges at sev¬

eral places, including Detroit, New York and Brooklyn, the last of which he retained from 1866 to 1880. He was editor of the New York Christian Advocate from 1880 to 1912. He pub¬

lished (Two Weeks in the Yosemite and Vicin¬

ity } (1873) ; (Christians and the Theatre) (1876) ; (Oats or Wild Oats' *(1885) ; 'Travels in Three Continents* (1895); 'Extemporane¬

ous Oratory* (1899) ; (The Fundamentals and their Contrasts* (1906); 'Theory and Practice of Foreign Missions* (1911); 'Constitutional

and Parliamentary History of the Methodist

Episcopal Church* (1912). Consult 'Life* by

George P. Mains (New York 1917).

BUCKLEY, Samuel Botsford, American

botanist and geologist: b. Torrey, Yates County, N. Y, 9 May 1809; d. Austin, Tex., 18 Feb.

1884. lie was graduated from Wesleyan

University in 1836. During his travels in the Southern States he investigated the botany,

choncology, etc., of those regions, discovering many new species of plants and shells. Among the flora was the new genus Buckleya distichophilla, which was named in his honor.

He determined the height of Mount Buckley,

North Carolina, and of several other summits.

From 1860-61 he was connected with the State survey of Texas and from 1866-67, was State geologist of Texas. He was scientific editor of the Stale Gazette (Austin 1871-72). He wrote many papers of a scientific nature and a work on the trees and shrubs of the United States.

A list of Scientific papers written by him is con¬

tained in the Alumni Record of Wesleyan

University.

BUCKMINSTER, Joseph Stevens, Amer¬

ican clergyman : b. Portsmouth, N. H., 26 May 1784; d. 9 June 1812. His father, Joseph Buck¬

minster, a scholarly and eloquent preacher, sent the son to Harvard, where he was graduated in 1800, afterward becoming a teacher in Phillips Exeter ‘ Academy, Daniel Webster being among his pupils. In 1804 he entered upon the work of the ministry as pastor of the Brattle Street Church, Boston; in 1808 he supervised the pub¬

lication of Griesbach’s (New Testament in

Greek and in 1811 became lecturer of Biblical criticism at Harvard, and at once took his place as a writer and preacher of the finest gifts, to grow in power and public esteem until the day of his premature death. He was a member of the Anthology Club of Boston, and a con¬

tributor to the Monthly Anthology. His pul¬

pit influence aided to develop a more literary style of sermon, while his oratorical ability was equal to his skill in composition. He was a representative of the Liberal Congregationalism, which, soon after his death, became Unitarian in belief. His works, in two volumes, were pub¬

lished in 1839. Consult Lee, (Memoirs of the Buckminsters } (Boston 1851).

BUCKNELL UNIVERSITY, a coeduca—

ional institution in Lewisburg, Pa. (renamed in 1886, from the University of Lewisburg in honor of William Bucknell, its liberal bene¬

factor) organized in 1846, under the auspices of the Baptist Church: Professors and in¬

structors, 48 ; students, 703 ; volumes in the li¬

brary, over 19,000; grounds and buildings

valued at more than $523,000; endowment,

$1,250,000.

BUCKNER, Simon Bolivar, American sol¬

dier and politician : b. Kentucky, 1 April 1823 ; d. 8 Jan. 1914. • He was graduated at West Point in 1844, taught there, as assistant professor, during the next two years, and served in the Mexican War, 1846-48, under Generals Taylor

and Scott. He was brevetted 1st lieutenant, and also captain, for gallantry at the battles of Churubusco and Molino del Rey. From 1848

to 1850 he served at West Point as assistant instructor in infantry tactics. In 1855 he re¬

signed from the army and engaged in various occupations, civil and military, in Illinois and Kentucky. When the Civil War began he

joined the Confederate army as a brigadier-

general. Afterward he rose to distinction,

attaining the rank of lieutenant-general, and taking a prominent part in several important events of the war, notably in the defense and surrender of Fort Donelson, 16 Feb. 1862. Here he was third in rank, but Generals Floyd and Pillow withdrew during the night of 15 Feb¬

ruary, and it remained to Buckner to surrender the garrison and fort to General Grant. He was exchanged the following August and led

a division under Bragg in Tennessee, and was present at Murfreesboro and Chickamauga. He

attained the rank of lieutenant-general and sur¬

rendered with Kirby Smith's army at Baton

Rouge, La., 26 May 1865. He was one of the pall-bearers at General Grant's funeral in 1885, by the personal selection of the great soldier himself,. who had been warmly attached to him for many years. In 1896 he was nominated for Vice-President by the National (Gold) Demo¬

crats on the ticket with J. M. Palmer, having previously (1887-91) served a term as governor of Kentucky.

BUCKNILL, Sir John Charles, English

alienist and writer : b. Market Bosworth,

Leicestershire, 1817; d. 20 July 1897. He

was educated at Rugby and University College, London, graduating in medicine in 1840.

He held the position of Lord Chancellor's

visitor of lunatics from 1862-76, and held

a high position among physicians who de¬

voted themselves to the treatment of insanity.

He was originator and sometime editor of the Journal of Mental Science. An ardent sports¬

man, keenly interested in the volunteer move¬

ment, which he did much to promote, and a student of Shakespeare. He was the author of (Manual of Psychological Medicine) (1858) ; (The Mad Folk of Shakespeare) (1859) ; (The Medical Knowledge of Shakespeare } (1860).

He was knighted in 1894.

BUCKRAM, a coarse fabric, linen or cot¬

ton, sized with glue. It is used in making gar¬

ments to give them, by stiffening, the form intended, and as a cover in bookbinding.

BUCKSHOT, a leaden shot larger than

swanshot. About 160 or 170 of them weigh a pound. They are especially designed to be

used in hunting deer and other large game.

BUCKSHOT WAR, 1838, a disputed-election case in Pennsylvania, of national import¬

ance as bearing on the nature of the ((domestic violence, from which the constitution requires the Federal government to protect the States.

As usual, fraud under legal forms was met by retaliation in defiance of them. The legislature that year had to elect a United States senator; and the return of Democratic candidates in

Philadelphia gave that party a majority on joint ballot, though the

Senate was 22 Whig (Anti-Masonic) to 1 1 Democratic. But the Demo¬

cratic congressional candidate in one of the city districts was defeated; his party charged it to frauds in the Northern Liberties district (now in Philadelphia), and the 10 Democratic election judges threw out its entire vote of some 5,000, giving him the certificate of election. At once the seven Whig judges met and gave the certifi¬

cate not only to their candidate, but to their legislative candidates who were not elected even with the Northern Liberties vote: obviously to fight till their congressman was restored. The 670

secretary of State was chairman of the Whig State committee, received the Whig certificate first (professedly at least), refused to acknowl¬

edge any others and publicly advised his party to claim the election and hold out. Armed

crowds of both parties collected at Harrisburg (<to see fair play® when the legislature met, 4

December ; and for some days the sessions were held with a roaring mob outside. The Whig

returns alone were handed in by the secretary of State; the Whig senate organized, and then adjourned on account of the mob; one member is alleged to have threatened them with (<ball and buckshot,® whence the name. In the Rep¬

resentatives' hall both parties organized and chose speakers, the Wings, T. S. Cunningham, and the Democrats, William Hopkins ; the

former then adjourned, whereupon the latter

held the hall with a guard and the Whigs had to meet outside. The Whig governor, Joseph

Ritner, called on the Senate militia to be ready to rescue the capital from a' ˆlawless mob,® and appealed to the commandant, at Carlisle, and next to President Van Buren, for help against <(domestic violence,® which was refused on the ground that this phrase referred

only to insur¬

rection against lawful authorities, whereas this was only a political struggle to determine who the lawful authorities were, in which the gov¬

ernment could not decently interfere. (The

same excuse was afterward made for leaving

Kansas at the mercy of the Border Ruffians, though the Federal court put the United States soldiery into their hands). About 1,000 militia were brought to Harrisburg; but after a fort¬

night's stay departed, as the city was entirely quiet, and the rival houses holding regular ses¬

sions. The cooler Whigs, however, saw that

the secretary of State could not justify his assumption of power; enough Cunningham

members joined the Hopkins house to give it a majority, and on the 25th the Senate acknowl¬

edged it as the true one, whereupon the other broke up and its members gradually drifted

in — all but Thaddeus Stevens (q.v.), who

would not take his seat during the session. The legislature elected as senator Daniel Sturgeon, then State treasurer, who as such refused to honor Ritner's bill for the employment of the militia.

BUCKSKIN, a soft leather of a yellowish

or grayish color, made originally from deer¬

skin, but now usually from sheepskin. The

softness which is its chief characteristic is im¬

parted by using oil or brains in dressing it.

The name is also given to a kind of twilled woolen cloth without a pile

or (<face.®

BUCKTAILS, the New York State Dem¬

ocrats opposed to De Witt Clinton, 1812-28; originally the members of the Tammany So¬

ciety in New York, from the buck's tail worn in their hats as a badge. Their factional op¬

position to Clinton, under Martin Van Buren and other important local leaders, extended to his advocacy of the Erie Canal, authorized 15

April 1817 ; the Tammany men were fiercest in opposition to it, and the name ((Bucktails® was given to all the anti-Canal Democrats. Clinton was an ungracious and tactless politician, and in 1824 the Bucktails carried the State and ousted him from the office of canal commis¬

sioner; which primitive bit of <(spoils,® in a com¬

munity not then hardened to it, created a re¬

action that gave him two terms more in the governorship. His death in 1828 dissolved his party, and the <(Bucktails,® under Van Buren and other members of the ((Albany Regency®

(q.v.), became the Democratic party in the

State.

BUCKTHORN (Rhamnus cathartica), a

shrub, native of Great Britain, naturalized in the United States, where it is sometimes culti¬

vated for hedgerows. The stem is covered with a dark-brown bark, and divided into numerous branches with strong spines. It grows to a height of seven or eight feet. The leaves are elliptical and serrate. The male and female flowers are on different plants; the calyx is of a greenish yellow and the petals are minute and greenish. The fruit is a

round black berry, containing four seeds. It flowers in May, and the seeds ripen in September. The berries are medicinal. They form a powerful purgative,

but, being harsh in action, are seldom used in modern practice. The juice of the ripe berries, mixed with alum, forms the sap-green of artists.

The bark yields a beautiful yellow dye. Several related species of Rhamnus are common in

North America, and are also known as buck¬

thorn.

BUCKWHEAT (Fagopyrum) , a grain,

native of Asia, and called hie Sarrasin, or Saracen wheat, by the French, after the Sar¬

acens or Moors, who are believed to have in¬

troduced it into Spain. It thrives on poor soils, comes rapidly to maturity and is most frequently planted in tracts that are not rich enough to support other crops. It is extremely sensitive to cold, being destroyed by the least frost, but it may be planted so late and reaped so early as to incur no danger from that source.

Its flowering season continues for a long time, so that it is impossible for all the seeds to be in perfection when it is reaped, and the farmer must decide by careful observation at what

period there is the greatest quantity of ripe seeds. Buckwheat does not exhaust the soil, and by its rapid growth and its shade it stifles weeds, prevents their going to seed and leaves the field clean for the next year. As a grain, buckwheat has been principally cultivated for oxen, swine and poultry; and although some

farmers state that a single bushel of it is equal in quality to two bushels of oats, others assert that it is a very unprofitable food. Mixed with bran, chaff, or grain, it is sometimes given to horses. The flour of buckwheat is occasionally used for bread, but more frequently for cakes fried in a pan. In Germany it serves as an ingredient in pottage, puddings and other food.

In the United States it is very extensively used for griddle-cakes. Beer may be brewed from

it, and by distillation it yields an excellent spirit. It is used in Danzig in the preparation of cordial waters. Buckwheat is much culti¬

vated by the preservers of game as a food for pheasants. If left standing it affords both food and shelter to the birds during winter. With some farmers it is the practice to sow buck¬

wheat for the purpose only of plowing it into the ground as a manure for the land. The best time for plowing it in is when it is in full blossom, allowing the land to rest till it decom¬

poses. While green it serves as food for sheep and oxen, and mixed with other provender it may also be given with advantage to horses.

If sow i. in April two green crops may be pro¬

cured dunng the season. The blossoms may be used in dyeing a brown color. It is frequently cultivated in this country as food for bees, to whose honey it imparts a flavor by no means unpleasant. The principal advantage of buck¬

wheat is that it is capable of being cultivated upon land which will produce scarcely anything else, and that its culture, compared with that of other grain, is attended ‘with little expense.

BUCKWHEAT-TREE, an evergreen

shrub of the genus Cliftonia, family Cyrillacecu ; also called titi. It is a native of the southern United States, where it is found in the neighbor¬

hood of water. It bears fragrant white flowers, followed by dropping

fruits, which suggest the name.

BUCOLIC, a term derived from a Greek

word meaning ˆherdsman.® It is equivalent to the word pastoral, derived from the Latin, and is applied to pastoral poetry of the kind espe¬

cially descriptive of rural life as led by cow¬

herds and mountain shepherds. Of this class of poetry Theocritus and Virgil left the highest examples. See Pastoral Poetry.

BUCRANE, an ornamental design carved

in relief on the altars of Greece and Rome. It represented an ox skull with garlands depend¬

ing. This decoration is sometimes seen as an architectural detail with other animals' heads introduced in place of the original ox-head.

BUCYRUS, Ohio, city and county-seat of

Crawford County, situated on the Sandusky

River and on the Pennsylvania, the Ohio Cen¬

tral and Sandusky division of the Pennsylvania railroads. Stockraising and farming are carried on in the region and the city is actively en¬

gaged in the manufacture of machinery, ven¬

tilating apparatus, plows, vehicles and furni¬

ture. The city has fine school and county

buildings, municipal waterworks, a park, and there are numerous mineral springs in the sur¬

rounding region. Bucyrus was settled in 1818

and incorporated in 1829. Pop. (1920) 10,425.

BUD, a modified shoot in which, owing to

the non-development of the axis, the lateral organs become crowded together. It contains

the rudiments of future organs, as stems,

branches, leaves and organs of fructification.

The usual form of a bud is an elongated ovoid, and according to their position they are de¬

scribed as terminal, that is, formed at the end of a branch, or axillary, that is, produced in the axil of a leaf. Besides the rudimentary organs found in the interior, buds are in cold or tem¬

perate climates often covered externally with a viscous and resinous coating, and furnished

internally with a downy tissue, destined to de¬

fend the enclosed organs from the rigor of win¬

ter. No* envelopes of this kind are observed on the buds of the greater number of tropical plants. Buds on exogenous plants are in their commencement cellular prolongations from the

medullary rays, which force their way through the bark. The cellular portion is surrounded by spiral vessels, and covered with rudimentary leaves. When the vascular part of the bud

develops the central cellular portion remains as pith, enclosed in a medullary sheath, which iso¬

lates it from the parent stem. Thus it remains till the second year. The bud here described, which contains the rudiments of future leaves, branches, etc., is called a leaf-bud. Sometimes more than one bud is found in or near the axil of a single leaf, in which case all but the proper axillary bud are called accessory buds. The buds begin to show themselves as soon as the leaves have taken their full development. They are then very small, as the developed leaves absorb the nutritive juices of the plant, leaving them little nourishment. On the fall of the leaf they enlarge, and take the form they are to retain during winter, in which season they are stationary. On the return of spring they

begin to swell, and burst the scales which form their external covering, and the young shoots which these have served to protect now make their appearance. The external scales of the bud are usually deciduous, that is, they fall off when the young shoot appears ; sometimes, how¬

ever, they are persistent. These scales some¬

times represent leaf-blades, as in lilac; some¬

times stipules, as in the beech; or petioles, as in the horse-chestnut. Flower-buds are pro¬

duced in the axil of leaves called floral leaves or bracts. They are not capable of extension by the development of the central cellular por¬

tion, and instead of the conservative organs of plants, leaves and branches, they produce the reproductive organs, flowers and fruit. Peren¬

nial herbaceous plants spring from a subter¬

ranean bud called the turio, which is developed annually, and from which the new stem is pro¬

duced. The bulb is a sort of bud of this kind.

The arrangement of the leaf in a leaf-bud is called its vernation; of the petals and sepals in a flower-bud, their aestivation.

BUD MOTH. An apple pest. See Apple;

Insects.

BUDiEUS. See Bude, Guillaume.

BUDAPEST, boo’da-pest, Hungary, the

united towns of Buda or Ofen, and Pest or Pesth, the one on the right, the other on the left of the Danube, forming the capital of Hungary, the seat of the Hungarian Parliament and Supreme Courts, about 135

miles southeast from Vienna. Buda, which is the smaller of the two, and lies on the west bank of the .river (here flowing south) consists of the fortified Upper Town on a hill, the Lower Town or

Water Town at the foot of the hill, and sev¬

eral other quarters, including Old Buda farther up the river. Among the chief buildings are the royal castle and several palaces, the arsenal, town hall, government offices, the church of Saint Mathew, dating from the 13th century, during the Turkish occupation a mosque for

150 years, and recently rebuilt; and the finest Jewish synagogue in the empire. Pest, or the portion of Budapest on the left or east bank of the river, consists of the inner town of Old Pest on the Danube, and a semi-circle of districts —Leopoldstadt, Theresienstadt, Elizabethstadt,

etc. — which have grown up around it. The

river is at this point somewhat wider than the Thames at London, and the broad quays of Pest extend along it from two to three miles. It is spanned by fine suspension and other bridges, the latest, the Schurplatz suspension bridge, completed in 1903 having a span of 320 yards and a width of 59 feet. Pest retains, on the whole, fewer signs of antiquity than many less venerable towns. Its fine frontage on the

Danube is modern, and includes the new Houses ©72

of Parliament, opened in 1896, the Academy of Science, with a library of 180,000 volumes, ex¬

change, custom house and other important

buildings. The oldest church dates from 1500; the largest building is a huge pile used as bar¬

racks and arsenal. Other buildings include the old and the new town house, National Museum, national theatre, university buildings, various palaces, the Royal opera house, *etc.*

Budapest contains the most important of the three universities of Hungary, attended by

about 4,500 students, and having over 220 pro¬

fessors, lecturers, *etc.* Another important edu¬

cational institution is the technical high schools, with 60 teachers and 1,100 to 1,200 students, and a library of 60,000 volumes. In commerce and industry Budapest ranks next to Vienna in the empire. It's chief manufactures are ma¬

chinery, gold, silver, copper and iron wares, chemicals, textile goods, leather, tobacco, *etc.*

A large trade is done in grain, wine, wool, cattle, *etc.* At Budapest are the largest electri¬

cal works in all Europe. Engineers employed there have brought to perfection the science of applying electricity to motors. They con¬

structed there the first successful underground trolley lines. The city contains the important parks of the Stadtwaldchen, about 1,000 acres in extent, and Margaret Island. It is divided into 10 municipal districts, three on the Buda side of the river, and seven on the Pest side.

Budapest is strongly Magyar in character and sentiment, and as a factor in the national life may almost be regarded as equivalent to the rest of Hungary. Old Buda was founded by

the Romans about 150 a.d., and was known

as Aquinicum. Pest is of much later origin, first being heard of in the 13th century. The citadel of Buda was captured by the Turks after Mohacs in 1526. From 1541 to 1686 Buda was the seat of a Turkish pasha, the Turks being then driven out. The towns were united as

one municipality in 1873. It was not until 1799 that the population of Pest began to out¬

distance that of Buda but from that date its growth was very rapid and out of all propor¬

tion to the increase of Buda. In 1799 the joint population of the two towns was little more than 50,000; in 1890 it was 506,384; in 1900,

732,322; in 1910, 880,371.

BUDAPEST, The Royal Hungarian Uni¬

versity of, the lineal descendant of the insti¬

tution established at Ofen in 1390 which had a somewhat checkered career. It reached a recog¬

nized status in 1850. It includes the four tra¬

ditional faculties of theology, law, medicine and philosophy. It has a library, established in 1635, containing over 275,000 volumes and over 2,000

manuscripts. It is supported partly by the gov¬

ernment, which furnishes half of the budget.

BUDDE, boo'de, Karl Ferdinand Rein—

hard, German theologian : b. Bensberg, 1850.

He was professor successively at Bonn, Strassburg and Marburg. On account of his original work in connection with the Hebrew languages and dialects arid in Old Testament criticism he was given the degree of D.D. from Saint An¬

drew's University in 1911. Among Budde's

works are (Die Biicher Richter und Samuel, ihr Aufbaw und ihre Quellen, (1890) ; (The Re¬

ligion of Israel to the Exile* (in (American Lectures on the History of Religions,* 1899) ; (Die Bucher Samuel* (1902) ; (Die alte Testa-mente unde die Ausgrabungen* (1903) ; (Das

Prophetische Schriftum* (1905) ; (Geschichte der althebraischen Litteratur) (1906) ; (Auf dem Wege zu Monotheismus* (1910).

BUDDHA (<(The Enlightened One®), the

founder of the Buddhist religion : b. near Kapilavastu, India, 570-560 b.c. ; d. near Kusinara, India, 490-480 b.c. (the exact dates are uncer¬

tain). The name Buddha is a theological title (see Buddhism), and its bearer was usually

known to his contemporaries by his family name Gotama (or, in Sanskrit, Gautama). The facts of his life are enveloped in a mist of pious legend, but it appears certain that he was the son of Suddhodana, a chieftain of the Sakya clan (whence Gotama's epithet Sakyamuni,

<(Sage of the Sakyas®), who inhabited a dis¬

trict at the base of the Himalayas on the border of the present Nepal, almost due north of

Benares. Gotama is said to have received the personal name Siddhattha (Sanskrit Sidd-hartha), <(he who has accomplished his pur¬

pose,® and to have been brought up by his aunt Maha-Pajapati (Sanskrit Prajapati), his mother Maya having died seven days after his birth.

He passed his early years in ease and luxury, but he seems to have been deeply impressed by the misery of the world, as exemplified by oil age, sickness and death. At the age of 29, his spiritual unrest caused him to leave his home, his wife and his new-born son, and to go forth as a wandering ascetic. He attached himself in turn to two religious teachers, Alara and Uddaka, but, finding their systems inadequate, he resolved to practise the severest forms of bodily penance. According to the Buddhist

texts, he continued to do this for six years until he was nigh death. Then, suddenly abandoning his self-torture, he gave himself to profound meditation, and during one night's ecstatic vigil he attained the supreme knowledge and enlight¬

enment that constituted him the Buddha. The tradition names as the scene of this crisis the sacred Badhi tree (((tree of enlightenment®) at Uruvela (now Bodh-Gaya in Bengal, about 60

miles south of Patna).

After spending some weeks in meditation,

Gotama, now ((the Buddha,® resolved, according to the texts, to proclaim his doctrine to the world, and sought out five ascetics who had formerly been his companions and who were

then living in the <(Deer-park® near Benares. B>

his first sermon he converted them, an event which is celebrated as <(The Setting in Motion of the Wheel of the Law.® He soon gathered 60

more disciples, the nucleus of his monastic com¬

munity, and then sent them forth as mission¬

aries, while he himself returned to Uruveld, where he made a thousand converts. Thence

he proceeded to Rajagaha, the capital of the kingdom of Magadha (now the district South

Bihar), gained the adherence of the King,

Bimbisara, as a lay disciple, and received from him a grove as a residence for himself and his followers. Not long afterward Gotama is said to have visited his native town Kapilavastu and to have received his own son Rahula into the monastic order as a novice. After these first events the most trustworthy texts give no con¬

nected account of the 45 years of Gotama's public, ministry, but it appears that he passed them in journeying through the eastern part of the Ganges Valley, teaching and preaching in BUDDHISM

each place, accompanied by a band of disciples.

The rainy seasons he was accustomed to spend in some one of the (<abodes® (viharas) provided for the new community by generous lay ad¬

herents. His mission seems to have encountered little organized

opposition, and the list of his chief disciples shows them to have been largely from the priestly Brahman caste and from the aristocratic and wealthy classes, including

many members of his own family and clan.

The two Brahmans Sariputta and Moggallana

are mentioned as the leaders in the community after Gotama himself, but Ananda, his cousin, who was his personal attendant during the last 25 years of his life, seems to have been his most intimate and beloved companion. An¬

other cousin, Devadatta, tried to create a schism in the community after having failed to supplant Gotama as its head, but had little success. The story also relates that he plotted Gotama's death with the help of the wicked king Ajatasatru (who was afterward converted), but perished

miserably himself.

When Gotama approached the age of 80, his

health began to fail, but he continued his journey-ings until the end. While oh the way to Kusinara, an ancient city on or near the Gandak River, he was seized with his last illness, a dysentery caused perhaps by eating pork, and expired in a grove near the city. His last ex¬

hortation to his disciples was that they should henceforth regard his doctrine and discipline as their master and should strive with earnest¬

ness. After his body had been burned with

great pomp, the tradition says that the ashes were divided into eight parts and distributed as sacred relics, over which . monumental mounds (Stiipas) were erected.

Bibliography. — Dutoit, J., (Das Leben des

Buddha > (1906, a translation of the Pali sources for Buddha's life, representing in the main the earlier tradition) ; Asvaghosha, (Buddhacarita) (tr. by E. B. Cowell in (Sacred Books of the East,* Vol. 49, 1894) ; the anonymous (Maha-vastu,* (ed. E. Senart, 3 vols.,

1882-97) ; the (Lalitavistara) (partial English trans. by Rajen-dralala Mitra, 1881-86, and complete French

trans. by P. E. Foucaux, 2 vols., 1884—92) ; these three works give the elaborated legend of Buddha's early career as it was current in northern India 200 b.c. — 200 a.d. Later ac¬

counts in other languages are (The Fo-sho-hing-tsan-king) (tr. from the Chinese by S. Beal in SBE., Vol. XIX, 1883) ; Rockhill, W. W„

(The Life of the Buddha) (1884, derived from the Tibetan) ; Bigandet, P., (The Life or

Legend of Gautama, > 2 Vols., 4th ed., 1911-12, a translation from the Burmese). For modern works concerning Buddha, see Buddhism,

Charles J. Ogden, Ph.D.

BUDDHISM, one of the great religions of

Asia, receives its name from its founder,

Gotama the Buddha (see Buddha). Accord¬

ing to Buddhist belief, all the doctrines and disciplinary rules of the religion were promul¬

gated by the Buddha himself during his lifetime and were faithfully handed down by oral tradi¬

tion for several centuries before being com¬

mitted to writing; but Western scholars have shown that much of the contents of the sacred books must be subsequent to his time. The

earliest complete records that we possess are the scriptures preserved by the Ceylonese

Buddhists, which are written in the Pali lan¬

guage and known as the Tipitaka (see Pali

Literature and Pitakas). These date in their final form from the 1st century b.c., though their substance is much older. The Buddhists of northern India possessed from early times their own recensions of the canon, only frag¬

ments of which are extant, but these show no fundamental differences from the Pali version.

The later Buddhist works composed in India

after the Christian era display a marked de¬

velopment in both legend and doctrine. The

Pali canon may therefore be taken as the best authority for early Buddhism, although it af¬

fords no certain means of distinguishing be¬

tween the basic doctrines of Gotama himself and the scholastic expansion and classification of them by later minds.

Even in the oldest texts Buddhism appears

as an elaborate system with a long array of technical terms, and its doctrines show an evi¬

dent relationship with earlier Indian specula¬

tion, which from the polytheism of the Rig-veda had advanced to the monistic or dualistic conceptions of the universe tentatively expressed in the Upanishads. From such sources Bud¬

dhism derived its world-weariness, its notion of rebirth in existence after existence, and its theory of karma, ((the act,® namely, that a man’s acts in one life are the cause of his lot in the next. The combination of these views results in the doctrine that all sentient ex¬

istence is suffering continued through an endless succession of lives under the inexorable law of retribution. This is (tThe Noble Truth concern¬

ing Suffering,® the first of the ((Four Noble Truths,® or cardinal doctrines, which Gotama is said to have enunciated in his first sermon, and which may almost surely be regarded as his authentic utterances.

The ((Second Noble Truth,® concerning the

origin of suffering, declares it to be (<thirst,® that is, craving or desire, whether in a lower form for sensual enjoyments or in a higher for con¬

tinued existence. Thirst, however, — and herein Buddhism shows the characteristic intellectual-ism of most Indian thought — is caused ulti¬

mately by ignorance. This doctrine is set forth in the important formula of the <(Chain of Causation,® or <(Wheel of Life,® the details of which are obscure, but in which Ignorance,

Consciousness, Thirst, Birth and Suffering in its various forms are terms of the series.

The ((Third Truth® declares that the cessa¬

tion of suffering is brought about by the aban¬

donment of desire. This brief statement is

elaborated in other texts, which show that the emancipation is obtained through true knowl¬

edge, summed up in the sentence : (<Whatsoever is subject to origination is subject to cessation.® This doctrine of universal im¬

permanence, that all existence is merely a

process of becoming without any substratum of permanent being, is the most distinctive tenet of Buddhism, which rejects the LJpanishads'

conception of an All-Soul. In regard to human personality Buddhism refuses to recognize an indestructible soul-entity and analyzes con¬

sciousness into a mere series of transitory states. Hence the knowledge

both that ail

objects of desire are impermanent and that

there is no personal subject to desire them leads to the destruction of desire itself. It is 674

evident that this doctrine of the illusory nature of individuality is at variance with the inherited notions that the individual himself is reborn and reaps the consequences of his acts in a future life; but Gotama and his early disciples seem to have evaded the dilemma by dismissing all such questions as useless and improper.

Whatever absolute reality there might be apart from the world of phenomena, they considered only the latter, i.e., the realm of suffering, and the means of escaping from it.

The <(Fourth Truth® points out the path that leads to the cessation of suffering, the “Middle Way,® remolded both from the life of sensual pleasure and from that of self-torture. It is the (<Noble Eightfold Path®; namely, Right

View (recognition of the truths about suffer¬

ing), Right Intention (to renounce evil), Right Speech (abstaining from lying, slandering, rev viling, and idle talk), Right Action (abstain¬

ing from taking life, from taking what is not given, and from carnal intercourse), Right Live¬

lihood (not following a forbidden occupation), Right Effort (to avoid and put away evil states of mind, and to seek and cherish good states of mind), Right Mindfulness (self-possession

that does away with longing and despondency), and Right Concentration (the four stages of ecstasy).

The goal of the Path is Nirvana (Pali

nibbana), a term which means literally Extinc¬

tion® or “quiescence® and which denotes a

state of perfect calmness and purity, in which the four great “taints® or “weaknesses,® sensual desire, longing for existence, vain theorizing an(d ignorance, have been destroyed. This

blessed condition during life is, however, only the earnest of the “complete Nirvana® (Pali parinibbana) into which the perfected disciple will pass at death. For such a one, who has abandoned all craving, there is necessarily no rebirth, no continuance in the world of phe¬

nomena ; but concerning what lies beyond this world — whether nothingness or some incon¬

ceivable felicity — Buddhism, at least in its earlier stages, forbids us to inquire. The

Teacher has revealed the way of emancipation from suffering; what he has not revealed, as being unprofitable toward salvation, is to be left uninvestigated on the part of the disciple.

In the early days of the Buddha’s preaching, many persons are said to have attained com¬

plete purification (i.e., Nirvana) soon after their conversion ; but there arose in time a more elaborate classification of believers according to the degree of their religious attainment ; namely, the convert (lit. (<he who has entered the stream®), the “once-returner® (who will be reborn on earth only once), the ((not-returner®

(who will be reborn only in the highest

heavens), and finally the Arhat (Pali arahat, lit. ((worthy one®), the perfected saint, who will be reborn no more. The spiritual discipline is partly a negative one, consisting in overcom¬

ing the soul-heresy and scepticism and attach¬

ment to outward works and ceremonies, in striv¬

ing to suppress the great faults of sensuality, ill-will and mental error, and in destroying the four “taints® already mentioned. The positive discipline is first ethical, — the cultivation of virtue, and especially of the sentiments of friendliness, sympathy with others’ joy and sor¬

row, and equanimity ; then mystical, — the prac¬

tice of ecstatic meditation in its four degrees (this not peculiar to Buddhism, but taken over from an early form of the ((Yoga® system) ; and finally intellectual, — the attainment of supreme wisdom in the comprehension of the

“Four Noble Truths.®

Thus far Buddism would appear to be merely a system of self-discipline, but it shows a more distinctively religious aspect in its doctrine concerning the Buddha himself. The “Noble

Truths,® although they are in accordance with reason, are not discoverable by the unaided intellect of the wisest man, but must be learned from a Supreme Buddha, a “completely en¬

lightened one,® who is an omniscient being, endowed with various supernatural character¬

istics and powers, and superior even to the highest gods. This glorious eminence can be attained only by one who, as a Bodhisattva or “potential Buddha,® during countless existences •on earth and in the heavens, has practised all the virtues with the firm resolution of becoming a Buddha, and who in the fullness of time de¬

scends from the Heaven of Delight, is born as a man, gains the supreme illumination, and

preaches the Truths. At his death he enters into complete Nirvana, and can then neither hear nor answer prayer (which indeed has no place in early Buddhism) ; but his memory is to be cherished by the faithful, and meditation upon it brings abundant profit.

Of the Supreme Buddhas, who appear only

at long intervals, Gotama is the most recent and is consequently ((the Buddha® par excel¬

lence ; but even the earlier texts give the names of his six immediate predecessors and mention also his successor Maitreya (in Pali, Metteyya), who will appear ages hence. In the younger Pali texts the list of the Buddhas of the past is extended to 24 or 27 names. It is impossible as yet to determine how far this doctrine of the Buddha, or omniscient sage, is due to the Indian habit of deifying any great religious teacher, in this case Gotama, and how far it represents merely the centring of pre¬

existing mythological conceptions around his

personality; but both processes have evidently been at work.

Buddhism also recognizes a class of “Individual Buddhas,® that is, men who have at¬

tained Nirvana by their own insight, but who are not omniscient and who do not preach the Truths to others. Furthermore, there is a long array of supernatural beings, such as gods of various ranks, demons, terrestrial spirits and ghosts. Many of these are simply taken over from the popular beliefs of ancient India, and they are of slight importance in the orthodox doctrine, however much we may suspect that

they were feared and worshiped by the mass of Gotama’s adherents. In the cosmology of

Buddhism these and all other sentient beings are distributed among 31 states of existence; namely, four formless or immaterial heavens, 16 heavens of pure form, six sensuous heavens, the worlds of men, demons, ghosts and animals respectively, and the realms of hell. Every such state, however, is limited in duration, by reason of the law of impermanence, and even the highest gods are subject to rebirth and degradation, unless through discipleship they at¬

tain Nirvana.

The external organization of the Buddhist

religion has always consisted chiefly in the institution known as the <(Order® or (<Congre-

. gation® (sang ha), which is placed on an equal¬

ity with the Buddha and the Law or Doctrine as one of the (<Three Jewels,® or supreme ob¬

jects of veneration. The mendicant life as an aid to religious training had been recognized by the Brahmans even before Gotama's time, and it was natural that he and his disciples should gradually develop it into a regular monastic order, especially as the following of the Path to the full extent involved the renunciation of ordinary worldly pursuits. The monk is there¬

fore the typical Buddhist, and, as a rule, only the monk may hope to attain Nirvana during this life.

Any man may enter the Order, regardless

of his race or caste, unless he is disqualified physically, e.g., by a loathsome disease, or legally, e.g., by being a slave. The rules of discipline distinguish two stages in the monastic life, that of novice and that of itinerant mendi¬

cant (Sanskrit bhikshu, Pali bhikkhu). A per¬

son becomes a novice by making a profession of faith, which consists in repeating three times the formula : ((I take refuge in the Buddha, I take refuge in the Law, I take refuge in the Order,® and by assuming the monastic garb.

He is then bound to observe the ((Ten Pre¬

cepts® ; namely, to abstain from taking life, from taking what is not given, from unchastity, from false speaking, from using intoxicating liquors, from eating at forbidden times (i.e., between midday and the

following sunrise),

from worldly amusements, from using per¬

fumes and ornaments, from using a high or

broad bed and from accepting gold or silver.

The full ˆinitiation,® which could be given only to those who were 20 years of age or over, was effected by a formal vote of the chapter of monks. The rules of discipline required a

monk to secure his food by begging, to possess no property but his three robes of reddish-brown or yellow rags, his alms-bowl, girdle, razor, needle and water-strainer, and to

lodge either as a hermit in the forest or with a few companions in an <(abode® (vilidra) near but not in a village or town. Dur¬

ing the greater part of the year the monks usually traveled from place to place, but

they were restricted to a fixed abode during the three months of the rainy season. Four times each month the monks of any given dis¬

trict assembled for the uposatha, a sort of sabbath-day observance, and twice a month on such occasions they listened to the recital of the Patimokkha (Sanskrit Prdtimoksha) , a very old code of monastic discipline. These ob¬

servances, together with a yearly ceremony of begging one another's pardon at the close of the season of retreat, constituted the simple ritual of the Order. Grave breaches of dis¬

cipline were punished by expulsion, minor ones by penance or reprimand ; and anyone who felt himself unequal to the monastic life might

voluntarily return to the lay state.

Beside the Order or Congregation of monks

stood that of the nuns (Sanskrit bhikshums, Pali bhikkhums) , which, according to the tra¬

dition, was instituted by Gotama rather un¬

willingly at the request of his aunt, who desired to renounce the world. The nuns were strictly subordinated to the monks in various ways and seem always to have been inferior to them both in numbers and in importance.

Outside the two branches of the Order and

in no definite connection with them was the mass of lay disciples (updsakas) . No initiatory rite was required of these except the mere formula of ((taking refuge® in the Buddha, the Law and the Order ; and no special command¬

ments were laid upon them except the observ¬

ance of the first five of the l<Ten Precepts®

already mentioned, although it was considered meritorious for a layman to observe the sixth, seventh and eighth also, particularly on upo¬

satha days. In practice the chief religious exercise of the laymen and laywomen consisted in supporting the monks and nuns by gifts of food, banquets, robes, dwelling-places and the like, and in listening to their preaching. The veneration of relics of the Buddhas, and of sacred trees and places, was also a form of worship on the part of the laity.

History of Buddhism. — For the first two

centuries we have no trustworthy accounts of the progress of the religion. The sacred tra¬

dition, indeed, recognizes two ((councils,® that of Rajagaha, held shortly after Gotama's death for the purpose of fixing the canon of disci¬

pline and doctrine, and the council of Vesall, held a century later in order to settle 10 dis¬

puted points of discipline. In each case, how¬

ever, the narratives of the proceedings are so filled with

inconsistencies and impossibilities that they have little weight as history, although there is probably a basis of fact. With the reign of Asoka (273-232 b.c.), the 3d emperor of the Maurya dynasty, we begin to have con¬

temporary evidence for the spread of Bud¬

dhism; for the edicts of that monarch show that he became a convert and also a patron of the monastic order. Not only did he propagate the faith in his own dominions embracing the greater part of India, but he sent missionaries to the Himalayan regions, to the Greek rulers of the eastern Mediterranean, to southern

India and perhaps to Burma. The most last¬

ing result was the conversion of Ceylon, which was effected, according to tradition, by Ma-hinda, the Emperor's brother (or son).

Ceylonese records also relate that a third

council of the Church was held under Asoka for the confutation of heresy, and his own edicts show that he took measures to prevent schism, a danger continually present in the loose or¬

ganization of Buddhism. The Sunga dynasty,

which overthrew the Mauryas in eastern India in the 2d century b.c., was hostile to Buddhism, but the religion made headway in the north¬

western provinces under the Greco-Bactrian

kings and was subsequently favored there by the great Indo-Scythian ruler Kanishka in the 1st century a.d. In his reign there was another general council, according to northern Bud¬

dhist accounts.

About the beginning of the Christian era

there arose in Buddhism a new school of

thought, whose members not only developed

the original law of impermanence into a theory of the unreality of all things but, going beyond the ideal of attaining Nirvana through saint¬

hood, aspired to become Buddhas themselves

by following the career of the Bodhisattvas, or potential Buddhas, and made devotion to

Buddhas and Bodhisattvas conceived as per-

sonal divinities a prominent part of religion.

This system they called Mahayana, (<Great

Vehicle," as opposed to the Hinayana, (<Little (or, Inferior) Vehicle," of the older schools (see Mahayana). Different in spirit as the two

Vehicles were, they continued to exist side by side in India as recognized divisions of Bud¬

dhism, although the kinship of the Mahayana with the Hinduism of the time is unmistakable.

About the 6th century a.d. another school, that of the Tantras, or mystic formulas (see Tantra), sprang up, partly as an offshoot of the Mahayana, and partly as an accommodation of popular and often gross superstitions to the terms of Buddhist mythology. Thus Buddhism

in India gradually abandoned its distinctive character and tended, from the 8th century on¬

ward, to merge itself in the surrounding Hin¬

duism. There seems to have been little perse¬

cution by Brahmanical rulers, but the Moham¬

medan invaders and conquerors of northern

India in the 12th century dealt a fatal blow to Buddhism in its original home by their destruc¬

tion of the monasteries. From that time it rapidly declined, and for the last three centuries it has been practically extinct as a religion in India proper, although traces of its influence are discernible in the rites of certain castes.

Only on the slopes of the Himalayas does it still partially maintain itself, though in a cor¬

rupted form. The Buddhism of the native

state Nepal has a special historical importance, since its uninterrupted literary tradition has preserved many theological works that would

otherwise have perished.

The great expansion of Buddhism north¬

wards and eastwards began about the Christian era, when under the Indo-Scythian kings it

spread from the valley of the Indus over the Hindu Kush and the Pamirs into Turkestan.

Thence it was brought to China in the 1st century a.d., where it became firmly established in the course of the 4th century. China in turn transmitted the faith to Korea (384 a.d.), and Korea to Japan (552 a.d.). In the Far East, however, the Mahayana school early became

predominant, and the history of the various Chinese and Japanese sects consequently is not within the scope of this article. In Tibet, which received Buddhism from India in the 7th and 8th centuries a.d., the Mahayana and Tantra doctrines were combined with the native super¬

stitions and ultimately developed into the

peculiar politico-religious system known as

Lamaism. See Lamaism.

The Buddhists of Ceylon, on the contrary,

have held fast to the more primitive teaching of the Hinayana, or <lLittle Vehicle," through all the vicissitudes of their history, and this is still the principal religion of the island, al¬

though others predominate in the northern

portion. From Ceylon or southern India the

Hinayana was conveyed to Pegu in Lower

Burma not later than the 6th century a.d., and in the 11th century it overcame the Mahayana in Upper Burma, gaining over the entire country a sway that it still maintains. Throughout

Indo-China Mahayana Buddhism appears to

have been early introduced by colonists from India along with the rival religion of Hin¬

duism ; but the Hinayana gradually advanced from the coast inland and has been supreme in Siam and Cambodia since about the 14th cen¬

tury. Buddhism also penetrated into Sumatra

and Java but was supplanted by Mohamme¬

danism in the course of the 14th and 1 5th centuries.

The Buddhism of the followers of Gotama,

the so-called ((Sect of the Elders® (Theravada), consequently is found at the present day only in Ceylon and through the greater part of the Indo-Chinese Peninsula; but even in these

countries the monks have deviated in many

respects from the strictness of the ancient rule, and the mass of the laity, although paying a formal homage to the Buddha, the Law and

the Order, are in fact more addicted in their daily lives to spirit-

worship and other native superstitions.

Statistics. — In the British East Indian pos¬

sessions, for which alone accurate statistics are available, there were, according to the census of 1911, 336,874 Buddhists in India proper, 10,384,579 in Burma and 2,474,170 in Ceylon. In Siam and French Indo-China the number of

Buddhists is probably nearly 25,000,000. The Lamaistic Buddhists of Tibet, Mongolia, the

Russian empire and the Himalayan states of

Nepal and Bhutan may amount to 10,000,000

more; and a large proportion of the 400,000,000

people of China and Japan may be reckoned

as Buddhists in a measure, although the inter¬

penetration of Buddhism with other forms of religion in these countries makes it impossible to give definite figures.

Bibliography. — Copleston, R. S., bud¬

dhism Primitive and Present in Magadha and

in Ceylon' (2d ed., 1908) ; Davids, T. W. Rhys, buddhism, being a sketch of the Life and

Teachings of Gautama, the Buddha) (rev. ed., 1903), buddhism, its History and Literature) (2d ed., 1906), (Early Buddhism ' (1908) ; Hackmann, H., buddhism as a Religion: Its

Historical Development and Its Present Conditions) (Eng. trans., 1910) ; Kern, H., (Manual of Indian Buddhism' (1896) ; Oldenberg, H., buddha: sein Leben, seine Lehre, seine

Gemeinde) (6th ed., 1913) ; Pischel, R., (Leben und Lehre des Buddha' (2d ed., 1910) ; La Vallee-Poussin, L. de, bouddhisme: opinions

sur l'histoire de la dogmatique' (1909). Older, but valuable particularly for Ceylonese Bud¬

dhism, are the works of Hardy, R. S., (Eastern Monachism' (1850), and (A Manual of Bud¬

dhism, in its Modern Development' (2d ed.,

1880). Warren, H. C., buddhism in Trans¬

lations' (1896), gives a selection of the most characteristic passages from the Pali writings.

For further references, consult Edmunds, A. J., (A Buddhist Bibliographv' (in Journal of the Pali Text Society, 1902-03, pp. 1-60), and

Pratt, Ida A., buddhism, a list of references in the New York Public Library' (1916).

Charles J. Ogden, Ph.D.

BUDDING, in gardening, the art of multi¬

plying plants by causing the leaf-bud of one species (or, more commonly, variety) to grow upon the branch of another. The operation

consists in shaving off a leaf-bud, with a por¬

tion of the wood beneath it, which portion is afterward removed by a sudden jerk of the

operator's finger and thumb, aided by the

budding-knife. An incision in the bark of

the stock is then made in the form of a J ; the two side lips are pushed aside, the bud is BUDDLEIA — BUDGET

thrust between the bark and the wood, the

upper end of its bark is cut to a level with the cross arm of the J , and the whole is bound up with netting or worsted, the point of the bud alone being left exposed. In per¬

forming the operation, a knife with a thin flat handle and a blade with a peculiar edge is required. The following conditions are

essential to the success of the operation : First, the bud must be (<ripe,® that is, fully formed —which is known by its plumpness and hardness.

If too young, it will not succeed, because it has not acquired vitality enough to depend upon its own resources, until that new growth has taken place which attaches it to the stock. If too old, ˆsprung,® or beginning to grow, it is also unfit for use, because the new organs belonging to the young growth need an instant and uninter¬

rupted supply of food, which in the beginning the bud cannot obtain from the branch. Sec¬

ondly, the bark of the stock must <(run freely,®

that is, must separate readily from the wood below it. This separation is necessary in order that the bud may be inserted beneath the bark ; and is always attended by the presence of a large quantity of the viscid matter called cam¬

bium, which is in fact a mixture of young tissue in the act of organizing and of organizablc matter. The bud coming in contact with this substance, young and full of vitality, readily forms an adhesion with it, and thus the opera¬

tion is complete. On this account young

branches should always be chosen, since the bark never runs so freely, that is, there is never so great a collection of cambium under it in old branches. Those of the year in which

the operation is performed are the best, pro¬

vided they are advanced toward maturity.

Shoots far advanced in a second year’s

growth are, however, often used, and with

success. With regard to the time of perform¬

ing the operation, autumn is preferred in this country, but it may be practised also in spring.

Buds take better in autumn, because the stock has at that period ceased growing, and is chiefly occupied in storing up the organizable material required for the nutrition of the young organs, of which the bud, by the act of insertion, has become one. It ought to be borne in mind

that the nearer the constitution of the stock approaches that of the bud, the greater is the success that attends this operation. If they are in any considerable degree dissimilar, the oper¬

ation becomes precarious ; if very different, it is impracticable.

In animals, a form of reproduction, as of

the hydra, the sea-anemones, the coral polyps, ascidians, *etc.* The nature of the process due to rapid cell-division developed locally is best seen in the hydra (q.v.), where young hydras arise from protrusions, well called ((buds,® from the side of the parent stock, and later are con¬

stricted off and become free individuals. In the corals, as a result of throwing out lateral buds from the base, arises a colony, or com¬

pound coral like most of the reef-building

forms, such as the brain-coral (Meandrina).

In the hydra and other animals the new indi¬

vidual arising by budding becomes free from the parent.

BUDDLEIA, bud-le'ya, a genus of about

70 species of shrubs or trees of the family Loganiacece, natives of the tropics and warmer temperate regions of the world. A few of the hardiest species, none of which are quite hardy in the northern United

States, are cultivated as ornamental plants, for which purpose they are specially fitted by their attractive, usually de¬

ciduous, but sometimes almost persistent foli¬

age and their clusters or racemes of tubular or bell-shaped flowers produced abundantly during the summer. The flowers, which in some spe¬

cies are fragrant, range in color from yellow to red, white, and purple, and in some cases have more than one color in individual flowers.

They may be propagated from seed or cuttings and are found to thrive in well-drained soil in sunny situations. They are popular in the

southern United States and the West Indies.

BUDE, bii-da, Guillaume, French scholar

more generally known under the Latin form

Budoeus: b. Paris 1467; d. 1540. He was royal librarian and master of requetes. From his 24th year he devoted himself to study with the

greatest zeal, in particular to belles-lettres, to mathematics and to Greek. Among his philo¬

sophical, philological, and juridical works, his treatise (De Asse et Partibus ejus,' and his commentaries on the Greek language, are of

the greatest importance. By his influence the College Royal de France was founded. He

enjoyed, not only as a scholar, but also as a man and citizen, the greatest esteem. His works appeared at Basel (1557). Consult E. de Bude, (Vie de Guillaume Bude' (1884).

BUDE (bud) LIGHT, an exceedingly bril¬

liant light, produced by directing a current of oxygen gas into the interior of the flame of an argand-lamp or gas-burner, by which intense

combustion is established and a dazzling light obtained. This plan of lighting was adopted in the House of Commons in 1840 and continued till 1852, when another system of lighting was introduced. It was invented by Mr. Gurney of Bude, in Cornwall, and hence the name.

BUDGE, Ernest A. Wallis, English Orien¬

talist. He is a graduate of Christ's College, Cambridge. He has conducted important ex¬

cavations at Aswan in Egypt, at Gebel Barkel, on the island of Meroe, and at Nineveh and Der in Mesopotamia. He is the keeper of

the Egyptian and Assyrian antiquities in the British Museum, and, beginning with the pub¬

lication of his (Assyrian Incantations' in 1878, has issued many important works on these sub¬

jects and translations from the ancient inscrip¬

tions.

BUDGERIGAR, the dealer's name for the

Australian grass-parrakeet (q.v.). This small parrot has become a common cage-bird in all parts of the world, and goes by a great variety of names, among which ((zebra,® (<shell,® and (<warbling grass-parakeet® are perhaps the most common.

BUDGET, the annual statement relative to

the finances of a country, made by the proper financial functionary, in which is presented a balance sheet of the actual income and expendi¬

ture of the past year, and an estimate of the income and expenditure for the coming year, together with a statement of the mode of taxa¬

tion proposed to meet such expenditure. The term ((budget" is also applied to the periodical (usually yearly) statement of financial

tions or plans of financing enterprises during a definite period, prepared by a responsible executive and submitted to the proper officials.

See Budgets, American; Budgets, Foreign.

BUDGETS, American. Under this head¬

ing will be described the national budget sys¬

tem adopted by the United States and also

systems in effect in some of the states and cities throughout the country.

NATIONAL BUDGET.

The United States adopted the Dudget sys¬

tem on 10 June 1921, when an act of Congress putting it into effect was signed by President Harding. This Act, except for sections creat¬

ing a General Accounting Office and a Bureau of Accounts in the Postoffice Department, be¬

came a law immediately and was the outcome of a long struggle to enforce a change in the government system of making appropriations.

President Taft, during his administration,

strived earnestly to secure the enactment of a Budget Bill, but Congress, exercising sole au¬

thority over governmental disbursements, stead¬

fastly refused -to surrender any of its privi¬

leges. However, the agitation was kept up

and in May 1920 an act was passed which was vetoed by President Wilson on 4 June 1920

because of his belief that certain provisions therein made it unconstitutional.

The act of 1921 makes the President of the United States the real head of the Budget

System though the actual work of preparing

the budget devolves upon the Bureau of the Budget created by the measure and attached

to the Treasury Department. This bureau is

under the supervision of a director and assist¬

ant director, both of whom are appointed by the President, who also prescribes all rules and regulations for their guidance.

The law provides that the President shall

transmit to Congress on the first day of each regular session a budget in which he shall set forth (a) his estimates of the expenditures and appropriations necessary for the support of the government for the ensuing fiscal year; (b) his estimates of the receipts of the gov¬

ernment during the ensuing fiscal year not only under existing laws but also under any reve¬

nue measures he may propose; (c) an estimate of the expenditures and receipts of the govern¬

ment during the last completed fiscal year; (d) an estimate of the expenditures and receipts of the government during the fiscal year in prog¬

ress ; (e) the amount of annual, permanent, or other appropriations, including balances of appropriations for prior fiscal years, available for expenditure during the fiscal year in prog¬

ress ; (f) balanced statements showing the

condition of • the treasury (1) at the end of the last completed fiscal year, (2) its estimated condition at the end of the fiscal year in prog¬

ress, and (3) its estimated condition at the end of the ensuing fiscal year, if the financial pro¬

posals contained in the budget are adopted.

He must also furnish essential facts regarding the indebtedness, bonded or otherwise, of the government, and recommend ways and means

for increasing or decreasing revenues if in¬

creases are needed or decreases are deemed

advisable. The President is given the right to transmit such supplemental or deficiency

estimates for appropriations as are necessary to take care of deficits arising under laws enacted after transmission of the budget, or otherwise.

All estimates for lump sum appropriations

must be accompanied by detailed statements.

Under the law estimates for the legislative branch of the government and the Supreme

Court of the United States must be trans¬

mitted to the President on or before 15 October of each year and shall be included by him in the budget without revision. The director and assistant director of the Bureau of the Budget receive salaries of $10,000 and $7,500 a year respectively. The director, subject to the ap¬

proval of the President, appoints all the em¬

ployees of the bureau and fixes their compen¬

sation. No appointee of the director, however, shall receive more than

$6,000 a year and not more than four shall be paid a salary in excess of $5,000 a year. All employees receiving

$5,000 a year or less are appointed in accord¬

ance with the Civil Service laws and regula¬

tions.

Under such regulations as may be pre¬

scribed by the President, every department and establishment is required to furnish to the bud¬

get bureau such information as it may from time to time require. The head of each de¬

partment and establishment must designate an official thereof as budget officer therefor, who, in each year, under his direction, shall preoare the departmental estimates. Departmental esti¬

mates so prepared must be revised by the de¬

partmental heads and submitted to the Budget Bureau for its revision on or before 15 Sep¬

tember of each year.

Shortly after signing .the budget bill, Presi¬

dent Harding appointed Brig.-Gen. Charles G.

Dawes, one of the best-known bankers of Chi¬

cago, as the first director of the Bureau of the Budget.

The sections of the Budget Act, creating the General Accounting Office, went into effect 1

July 1921. It abolishes the old offices of Comp¬

troller of the Treasury and Assistant Comp¬

troller of the Treasury and creates in their stead the positions of Comptroller-General and Assistant Comptroller-General of the United

States. The former is the head of the Gen¬

eral Accounting Office upon whom is imposed most of the duties ‘previously performed by the Comptroller of the Treasury, the six auditors of the Treasury Department, and thˆ Division of Bookkeeping and Warrants of the Treasury

Department. Both the Comptroller-General and

Assistant Comptroller-General are appointed

by the President, with the advice and consent of the Senate, hold office for 15 years and re¬

ceive salaries of $10,000 and $7,500 a year, re¬

spectively. The Comptroller-General is ineligi¬

ble for reappointment. Either he or the Assist¬

ant Comptroller-General may be removed at any time by joint resolution of Congress for perma¬

nent incapacity, inefficiency, neglect of duty, malfeasance in office, or for the commission of any felony or for conduct involving moral tur¬

pitude, but for no other cause and in no other manner except by impeachment. The General

Accounting Office is independent of any of the executive departments.

Upon the Bureau of Accounts in the Postoffice Department, created by the act, is imposed the duties previously performed by the auditor of the Postoffice Department. It is under the di¬

rection of a comptroller, appointed by the Presi-BUDGETS

dent, with the advice and consent of the Sen¬

ate, whose salary is fixed at $5,000 a year. The section of the law creating this bureau also went into effect 1 July 1921. For other National Budget Systems see Budgets, Foreign, Na¬

tional.

A. H. McDannald,

Managing Editor , Encyclopedia Americana.

STATE AND LOCAL BUDGETS.

Provisions and Procedure in States. — As

a whole American States and cities have no uniform budget system and in their practice in this particular vary considerably. Every

State in the Union has a provision that the governor (<from time to time® or <(at every session,® or ((at every regular session® shall give the legislature information on the condi¬

tion of the State and make recommendations.

Colorado, Idaho, Illinois and Kansas require that he shall ((recommend measures.® But no governor assumes to have any standing before the State legislature until a bill is passed. Ala¬

bama, Colorado, Idaho, Illinois, Missouri, Mon¬

tana, Nebraska, Texas and West Virginia

require that on the opening of each regular session the governor shall present estimates of the amount of money to be raised by taxation, but no governor would construe this as mean¬

ing that he should prepare and submit a

<(budget.® Maryland adopted a budget system

in 1916, under which the governor submits to the legislature a detailed budget which the latter may reduce or reject, but may not in¬

crease. The South Dakota constitution

requires a two-thirds vote of the legis¬

lature to pass a special appropriation ; the gen¬

eral appropriation bill passes by majority vote.

In 1912 Wisconsin undertook to effect a plan of developing the State budget as a joint meas¬

ure of the legislature and the administration.

In 1913 New York established a State board of estimate so as to interject in its budget pro¬

cedure a means of central control. The board consisted of the governor, lieutenant-governor, president pro tempore of the senate, chairman of the senate finance committee, speaker of the assembly, chairman of the assembly ways and means committee, controller, attorney-general, commissioner of efficiency and economy, four members ex officio of the legislative branch and five members ex officio of the executive and administrative branches. The first year

the estimates came before the board it was unable to reach any conclusion and made no report, except such as was submitted individ¬

ually by two members.

The question has aroused much popular un¬

rest and in recognition of the dissatisfaction several States have appointed commissions or committees to inquire into methods of securing greater efficiency and economy in conducting the State business. Such commissions were

appointed by Massachusetts and New Jersey in 1912 and by New York, Pennsylvania, Minne¬

sota, California, Illinois and Iowa in 1913, most of them recommending methods of ridding the States of irresponsible government. In the

revised constitution of New York that was

rejected in the election of November 1915,

the financial methods were grouped round the budget idea. In California a State board of control has taken over the general supervision of the business and financial affairs of the State, with absolute control of the expenditure of the appropriations made by the legislature, and in 1915 the legislature took further steps to perfect the budgetary machinery. In 1913

the Illinois legislature passed an act providing for the preparation of a budget by the legis¬

lative reference bureau which was submitted to the session of 1915 and revealed the lack of cor¬

relation in the different departments and the lack of uniformity in compensation and in

matters of accountancy. On 6 May 1913 an act was approved by Governor Cox of Ohio (<to

establish a budget system for the State officers, departments, and institutions,® requiring that on or before 15 November, biennially in even numbered years, all State activities requiring appropriations should submit to the governor a statement of their wants for the next bi¬

ennium, which estimates should be submitted

at the beginning of each regular session of the general assembly. Only two States require

that appropriation bills originate in the lower branch of the legislature, while not half of the State constitutions provide that bills for raising revenue shall originate in the lower house. In some States no appropriation bill may contain more than one item. In some States a date is set, after which no appropriation bills may be introduced, while some provide that it may be done on unanimous consent. Wisconsin pro¬

vides that in order to consider a revenue bill three-fifths of the members must be present to constitute a quorum. South Dakota requires

a two-thirds vote to pass an appropriation bill.

Other constitutions prohibit appropriations of money in excess of revenues provided ; others forbid the expenditure of public money for

institutions outside the control of the State or for religious purposes.

In most legislatures the appropriation and

revenue bills are in the hands of separate com¬

mittees, though in a few States the same com¬

mittee has charge of both. Other committees may report bills providing appropriations, but these bills must be referred to the regular ap¬

propriations committee which finally decides

the matter. In most States the various exec¬

utive officers are consulted by the committee before presenting appropriation bills and to a large degree committees defer to the informa¬

tion given them by the State auditor or some specially designated official in his department.

But as many State legislatures do not meet annually it is necessary to frame budgets two or three years in advance, and as revenues are bound to fluctuate there can be no orderly financial procedure.

County Budgets. — In the county budget

the board of supervisors or county commission or tax-levying authority must provide for two classes of expenditures and may provide for a third class. The first class includes items over which the county authorities have no

power, such as taxes levied by the State in the county, court judgments against the county, sal¬

aries established by legislative enactment and similar items. The second class includes items over which the tax-levying authority has dis¬

cretion as to the amount. The third class in¬

cludes expenditures over which the tax-levying authority has complete control both as to their existence and their amount. In New York

there is a law which empowers the State con-680

troller to prescribe a uniform scheme of ap¬

propriations for all the counties of the State but he has no means to enforce its adoption or use. Indiana has an accounting law which prescribes budget estimates by each department head but as in the New York plan many of the essentials of a complete budget are lacking, such as a balance sheet, a working plan, a statement of estimated funds available for

budget purposes in the reduction of taxation, *etc.* The new charter of Los Angeles County, Cal., has . made a great advance in budget¬

ary provisions. In Westchester County, N. Y., the heads of departments submit in advance

requisitions for all the needs during the fiscal year; these requisitions are passed upon by the finance committee and the budget is then pre¬

pared and submitted to the board of supervisors with the estimates of municipal receipts. On¬

tario and Monroe counties, N. Y., have greatly improved their budgets and the latter has estab¬

lished a bureau of municipal research.

City Budgets. — In some cities the council

or board of aldermen prepares the budget while in others this work is done by the board of estimate and apportionment. Under the council plan the estimates of the various departments are submitted to the municipal legislative body, are referred to and discussed by the proper committee, and then, after action by the coun¬

cil, submitted to the mayor for approval or veto. Under the Philadelphia charter the con¬

troller is the only one permitted to submit esti¬

mates to the aldermen and no one is required to assume responsibility for a definite financial plan or proposal for the next fiscal period.

The controller is forbidden to make payments under any appropriation bill unless the total appropriations have been brought within the

estimated revenues. New Orleans provides that appropriations must not exceed 80 per cent of the estimated revenues. Under the charter

adopted in 1912 the mayor of Cleveland pre¬

pares the preliminary budget from the depart¬

mental estimates, though in practice this is prepared for him by the city director of finance.

He may change any item but must not increase the total. The revised estimates are then sub¬

mitted as a basis to the council which has full power to increase, decrease, reapportion or

reject items in the mayor's estimate. The esti¬

mate must go to the council by the middle of November, and the appropriation ordinance

prepared ((at once.® This is printed for general distribution and public hearings must be held, either before the regular appropriations com¬

mittee or before the council sitting as a com¬

mittee of the whole. The committee's report is then printed in the city

record with a sep¬

arate schedule setting forth the items asked for in the mayor's estimate and rejected or changed by the council and the reasons for such rejection or change. The council cannot pass the ordinance until 15 days after its publication or before the first Monday in January. In

Illinois a State statute requires that each mu¬

nicipality shall pass an annual appropriation bill during the first quarter of the fiscal year.

In Chicago the practice has been to pass the budget late in January or early in February, but during the course of the year numerous supplemental appropriations are made. All ap¬

propriations are made by the council with the mayor's approval, he having also a veto power over specific items contained in the appropria¬

tion bills, which veto may be overridden by a two-thirds vote. The controller revises the pre¬

liminary estimates of the departmental needs, and transmits them to the finance committee of the council, comprised of 15 members. After about two months of consideration and public hearings this committee refers the budget to the entire council which usually passes it sub¬

stantially in the form submitted.

In many of the large cities the preparation of the budget rests with the board of estimate and apportionment, which apportions the esti¬

mated expenditures among the various munici¬

pal departments. This plan was adopted in

New York in 1871, not as a measure of more scientific and honest government but in the interests of the Tweed ring. Under its new charter of 1897 the board consists of the mayor, controller, president of the board of aldermen and the five borough presidents. The first three have three votes each, the borough presidents of Manhattan and Brooklyn two each and the other borough presidents one each. The

de¬

partment estimates are sent to this board and duplicates to the board of aldermen. Having made its budget (or more strictly its appropria¬

tion bill) based on these reports, the board of estimate must within five days submit it to the board of aldermen, which within 20 days must have completed its discussions and have taken final action. The aldermen cannot in¬

crease the budget nor insert new items but may reduce it, though reductions are subject to the mayor's veto, which can be overridden only by a three-fourths vote. After the amount of the budget is definitely fixed authority is given to laise this sum by taxation and 3 per cent may be added to provide against loss in the collec¬

tion of the levy. In actual practice the city votes expenditures before it levies its tax so that for six months revenue bonds in anticipa¬

tion of taxes must be issued in order to carry on the government, but recently the city has instituted semi-annual payments of taxes and does not deduct interest if paid promptly but adds interest if unpaid after a certain date.

Every year a considerable amount of the taxes is unpaid (the uncollected balance of deficien¬

cies written off on the real property tax averag¬

ing 6 per cent, so that the net collections are about 94 per cent of the total levy, while of the personal property tax only about 70 per cent is collected) and provision for the deficit occasioned thereby is made in succeeding

budgets. In 1915 the city began the (<pay-as-3'ou-go® plan of financing. Baltimore and De¬

troit also have boards of estimate. The former city forbids its officials to make up deficits by temporary loans but directs that such deficien¬

cies be offset by pro rata reductions in the departmental appropriations. Detroit's board

of estimate is entirely separate from the exec¬

utive departments, since it consists of two members elected by each

ward and five mem¬

bers elected at large. In this city the council considers the budget first and then submits it to the board of estimate which has the dis¬

cretionary power to reduce any item of the appropriation bill or the rate of taxation. See Municipal Accounting.

Nearly 50 cities of the United States have adopted the commission manager form of gov¬

ernment, which, as regards the budgetary pro¬

visions of their charters, may be divided into two groups — Dayton, Ohio, comprising one

and the remaining cities the other. The char¬

ters of the latter merely provide that at a certain time each year the commission shall cause to be prepared or that the manager shall prepare a list of receipts from all sources and detailed estimates setting forth the necessary expenditures for all purposes for the ensuing year. Although most of these budgets are un¬

scientific in form, they seem to work out satis¬

factorily in practice. Since 1 Jan. 1914 Dayton has been operating under a commission manager charter which provides that on or before

1 November of each year the city manager

shall submit to the city commission an estimate of expenditures and revenues for the ensuing year, which estimate is to be based on informa¬

tion furnished by the several departments.

Prior to submission the manager has reduced the total request to within the estimated in¬

come for that year. The commission then

reviews the budget with the manager, receives his explanations for the recommendations made and makes such changes as it sees fit. The manager is the head of the administrative

branch, of the government and alone is respon¬

sible for operation of the various departments.

Since the department heads are responsible to him and removable by him the city manager

controls the expenditures and he is kept in close touch with the work of each department and with the adequacy of funds by frequent cabinet meetings. Thus he is in a position to make curtailments and to recommend increases as the occasion presents itself and the system is removed from the old log-rolling and per¬

sonal consideration in appropriating funds.

City business as in fact all governmental busi¬

ness — - national, State and local — is a matter of dollars and cents and not of bosses and parties ; administering a city is a specialized business requiring specialists just as much as the largest of our great corporations. See Pub¬

lic Finance; City Manager.

Bibliography. — Adams, H. C., ‘Science of

Finance) (New York 1912) ; Agger, E. E., ‘The Budget in the American Commonwealth’ (in

‘Columbia University Studies in Flistory, Eco¬

nomics and Public Law,) Vol. XXV, No. 2,

New York 1907) ; Beard, C. A., < Readings in American Government and Politics ’ (New

York 1909), and (American City Government'

(New York 19121 ; Cleveland, F. A., 'Chapters on Municipal Administration and Accounting'

(New York 1909); Collins, C. W., <The

National Budget System' (New York 1917) ;

Fairlie, J. A., 'Municipal Administration' (New York 1910), and 'Essays on Municipal Admin¬

istration (New York 1910) ; Ford, H. J.,

'Cost of Our National Government' (New

York 1910) ; Goodnow, F. J. 'City Govern¬

ment in the United States' (New York 1904) ; Hatton A. R., 'Digest of City Charters'

(Chicago 1906) ; Lowrie, S. G., 'The Budget'

(Madison, Wis. 1912) ; Powers, L. G., 'Mu¬

nicipal Budgets and Expenditures' (in 'Pro¬

ceedings of National Municipal League,' 1909) ; Plehn, C. C, 'Government Finance in the

United States' (New York 1915) ; Reinsch,

P. S., 'Readings in American Federal Govern¬

ment' (Boston 1909) ; Renick, E. I., and

Thompson, W. H., 'National Expenditures' (in Political Science Quarterly, Vols. VI-VII,

1891) ; 'Report of the President's Commission on Efficiency and Economy' (1912); 'Report

on City Finances and Budgets' (in 'Proceed¬

ing' of the Conference for Good City Govern¬

ment, Philadelphia 1910) ; 'The Government of the State of New York: A Survey of Its Or¬

ganization and Functions' and 'The Constitu¬

tion and Government of the State of New

York' (published by the New York Bureau of Municipal Research, 1915) ; and articles in the Annals of the American Academy of Political and Social Science by E. L. Bogart (Vol.

VIII, Philadelphia 1896), S. N. Patten (Vol.

XLIV, 1912), L. G. Powers (Vol XXXVIII,

1911), H. R. Sands, and F. W. Lindars (Vol.

XLI, 1912) ; and the series of articles and ex¬

tensive bibliography in Vol. LXII (1915).

Irving E. Rines,

Author of ' History of the United Statesd

BUDGETS, Foreign, National. — Most of

the main features of the European budgets are similar. Each department of the government

submits a detailed statement showing the object and amount of expenditures for the preceding year and an itemized estimate of expenditures for the next year. These estimates are co¬

ordinated by the ministry of finance, which assumes an especially effective control in Great Britain. The ministry, assisted by the revenue collecting bureaus, estimates the yield of exist¬

ing sources of revenue and if the estimated expenditures exceed the revenues a way must be found either to reduce the expenditures or to provide means of increasing the revenues. In Austria, Hungary,

Belgium, France, Holland,

Russia and Switzerland the budget goes into effect on 1 January; in Denmark, Germany,

Great Britain, Norway, Prussia and Sweden

on 1 April ; in Italy, Portugal and Spain on 1 July. Great Britain and the countries that follow her practice leave a comparatively short interval between the preparation and enforce¬

ment of the budget, but France allows from 13 to 15 months. The British budget accounts only for actual receipts and expenditures within the fiscal year, and is divided into the per¬

manent “Consolidated Fund” (which includes

about one-sixth of the expenditures and four-fifths of the revenues, but does not require the annual vote), and the “Supply Services” which are adjusted annually. In Belgium and France there must be yearly votes on revenues and expenditures, while Germany has yearly budgets that contain complete estimates, but the Parlia¬

ment has little more than new proposals to adjust. In most continental states the budgets are divided into ordinary budgets, which in¬

clude the items of annual recurrence, and

extraordinary budgets that take in unusual ex¬

penditures to be met by loans or other unusual revenues.

In Great Britain the Crown has the sole

right to initiate expenditures. The House of Commons may reduce but it cannot increase

the estimates, while the Lords have not even the power to amend — they must either accept or reject the whole budget. No items of ex¬

traneous nature may be attached to the budget (see Great Britain, Parliament). Many of

the European constitutions require that finance bills originate only in the lower house, but most continental legislative bodies have less direct influence on the budget than the British.

In the British Parliament the budget is dis¬

cussed in committee of the whole House, deci¬

sions being formally adopted later by the

House. Here committee action is representa¬

tive, responsible and decisive, while the reverse is true of continental committees. In Great Britain a small deficit or unexpected expendi¬

ture is met by a ˆsupplementary estimate® in the budget, while in the case of an emergency, such as war, expenditures are authorized by a <(vote of credit.® In continental states such emergency requirements are met by additional credits or supplementary budgets. Sometimes

the passage of the budget is so delayed that the fiscal year is well under way before depart¬

mental funds are available, in which case it is usual to provide for current expenses by pro¬

visional grants. In Great Britain there are numerous checks on the use of funds. Money can be expended only in the amount and for the object specified, and while it is very unusual to transfer balances between (<votes,® such

transfer is permissible within the same depart¬

ment for army and navy. There is a special auditing department, as also in France, directly responsible to Parliament, that controls the dis¬

bursements and audits all accounts, thus assur¬

ing an accurate execution of the budget.

City Budgets. — In considering German

municipal budgets it should be remembered

that the empire comprises 26 more or less

independent states, each having its own legis¬

lative body, administrative officials, political subdivisions and system of local government.

The financial relations between the local and general governments are very complicated,

since every taxpayer contributes either directly or indirectly to several governmental organiza¬

tions : (1) The empire, (2) the state, (3) the province, (4) the government district, (5) the circle and (6) the commune, of which there are two kinds — rural and urban. The income tax is a source of both state and municipal revenue, while the unearned increment tax, in¬

troduced into Frankfort in 1904, was adopted by the imperial government in 1911. Under

the law this tax should be collected and ad¬

ministered by the various states and the pro¬

ceeds divided between the imperial, state and municipal treasuries, but in practice the tax is collected by the municipal governments which, with the state's sanction, may levy a supple¬

mental unearned increment tax not to exceed 100 per cent of the imperial tax. Hence the policy of one state may not be the policy of all. While the finance administration of both the empire and the state is carried on by a division of the respective ministries of finance, the cities have no special municipal budget com¬

mission or board of estimate, every phase of budget-making being in the hands of the regu¬

larly constituted city officials.

Under Prussian laws a city may plan its

budget for one, two or three years, but as a rule it is done yearly, the financial year begin¬

ning 1 April and ending 31 March. The vari¬

ous departments present their estimates of rev¬

enues and expenditures to the magistrate (the administrative board which controls and di¬

rects the city government, prepares the business for the council, supervises municipal enter¬

prises, has custody of revenues, etc.), which makes the annual estimate not later than 1

January preceding the fiscal year. After public examination and criticism for eight days it is formally presented to the city council whose approval is necessary before it becomes the established budget. When the preliminary esti¬

mate is made, a copy is sent to the authorities superior to the municipality, but their sanction, which the law requires, is necessary only if new taxes are imposed or old ones changed. If the*

superior authorities do not object and the city council approve, the estimates become the bud¬

get for the fiscal year following. Special

budgets may be passed if unforeseen events

demand the raising of more revenues, but these occasions are few. The forms and details of a municipal budget are not prescribed by general law, but the main features are as follows : The municipal budget consists of two general classes of minor or subsidiary budgets: (1) those which either increase or decrease taxa¬

tion, and (2) those which do not, such as sav¬

ings bank budgets, foundation budgets, *etc.*

Each of these general classes is again divided into two heads — ordinary administration and extraordinary administration ; then follow the minor subdivisions or special items of adminis¬

tration from which the original or primary

estimates are made; that is to say, before the general budget is drafted its makers must know the needs of the ultimate administrative di¬

visions though in order of presentation the gen¬

eral budget precedes the separate estimates.

The ordinary part of the budget includes regu¬

lar current income derived from communal

property, taxes and exemptions, dues, fees, etc., and the portion granted to the municipality by the state, province and circle. The extraordi¬

nary part includes receipts from special or exceptional sources, such as legacies, gifts, loans, sales of land, *etc.* There is no state audit of local finance in Germany, but a

((revision® of the local treasury is made by the executive every month on specified days and at least once a year a (<surprise revision® is made when no notice is given. Further control of the budget is provided by requiring the magis¬

trate to keep and publish a register of munici¬

pal property, both real and personal.

The methods pursued in British and French

cities are in marked contrast, since the British municipality is practically autonomous (even

the small measure of control exercised by the central authorities, the Local Government

Board and the National Exchequer, being con¬

ceded grudgingly), while in France a large

measure of local control has been sacrificed to the efficiency of centralized authority. English cities may exercise only those powers expressly granted them by Parliament and accordingly

constantly petition for special acts granting additional powers. The English mayor is a

figurehead, the town council possessing the

chief powers and doing the bulk of the work through its committees. The finance committee is held to strict account for the finances of all committees ; it negotiates all loans, invests sink¬

ing funds, prepares the annual financial state¬

ment and manages the tax collections. Through it must be made all warrants for payment of BUDWEIS — BUEL

authorized appropriations. It acts as a consul¬

tative committee on rate estimates, conferring with other committees as to financial needs for the following year, revising their estimates, and then presenting the completed statement to the council, together with the precept (tax rate) deemed necessary to meet the estimated expend-ditures. Though the finance committee presents the estimate the several committees of the

council are responsible for the expenditures with regard to the purposes entrusted to them and are expected to keep the expenditures

within the amount allowed by the council. The manner of levying the rate varies in different cities. Leeds has a city rate, a consolidated rate and a highway rate levied by town council, besides which there is a poor rate levied by the overseers of the poor, but all are collected in one. Birmingham levies but one, the borough rate, covering the whole expenditure of the corporation which can be charged on the rate, though there is an additional poor rate to meet expenditures entailed by the poor law proper.

In the French city the mayor prepares the

budget for the council's consideration at the May meeting, this being known as the original budget, which may be succeeded toward the

close of the year by a supplemental budget.

The receipts are denominated ordinary (stable and permanent) and extraordinary (irregular

and occasional) ; the expenditures are optional and obligatory, the former resting in the dis¬

cretion of the local authorities — in the mayor, if he can influence the council sufficiently.

Obligatory expenditures must be met out of

established income, and if not adequately pro¬

vided for, the higher authorities make forcible provision by inscription d' office or official entry upon the budget. Cities with annual receipts of less than $750,000 must submit their budgets to the prefect of their department; those with revenues above this sum are subject to the min¬

istry of the interior, representing the president of the republic. Should the mayor and council prove obstinate regarding obligatory expendi¬

tures they may be suspended from office by the central authorities. When approved, the

French budget cannot undergo the slightest

alteration. When additional expenditures are

found necessary they are incorporated in the supplementary budget, drawn up by the mayor and considered by the council at the May

session of the year to which it applies — that is, a year after the budget whose transac¬

tions it completes. In this budget no obligatory expenditures appear as they have been cared for in the regular budget. If the contemplated expenditures do not appear warranted to the higher authorities they

may be rejected or re¬

duced by a decree of the President or by a res¬

olution of the prefect in charge of the depart¬

ment, but these authorities are not permitted to increase expenditures or to introduce new ones.

In England the system of audits is perfunc¬

tory and not taken seriously in the large cities, since there are three auditors, each acting independently and serving without pay. Hence some cities employ salaried professional ac¬

countants. In France, however, there is a

National Court of Accounts which surveys and audits the whole of the accounts of national revenue and expenditure of the departments

(provinces) and of all towns, districts and pub¬

lic institutions having an annual revenue ex¬

ceeding $7,500. Towns below this limit send their accounts to the prefectoral council for audit.

Canadian cities have been revising their

budgetary practices. In 1913 Toronto formed

a Civic Survey Committee which consulted with the New York Bureau of Municipal Research

to ascertain defects and suggest remedies. The report of the committee has been made, but up to 1918 no drastic changes had been made and hence the methods pursued are about the same as before, though the tendency is gradually to fix the responsibility more clearly. At present the estimates are made out by the heads of de¬

partments and submitted to standing commit¬

tees, resubmitted to the board of control and submitted by them, amended, to the council, who pass the final estimates. The word

“budget® is not officially used in connection with the Toronto city government. The coun¬

cil attempts to control expenditure by passing vouchers before payment ; its tendency, owing to lack of details supporting the estimates, is to over-estimate income and under-estimate ex¬

penses for the purpose of keeping down the tax rate, which process results in a deficit.

Bibliography. — Adams, H. C., (Science of

Finance) (Pt. I, New York 1912) ; Bastable, C. F., (Public Finance) (3d ed., London 1913) ; Dawson, William H., (Municipal Life and Gov¬

ernment in Germany) (2d ed., New York 1916) ; Plehn, C. C., Hntroduction to Public Finance) (3d ed., New York 1911) ; National Monetary Commission, (Report on Fiscal Systems of the United States, England, France and Germany)

(1910) ; articles by Karl F. Geiser, D. C. Bald¬

win and H. L. Brittain in (Annals of the Amer¬

ican Academy of Political and Social Scienceˆ

(Vol. LXII, pp. 192-210, Philadelphia 1915), giving extensive bibliography by H. A. Rider.

Irving E. Rines,

Author of (History of the United Statesd

BUDWEIS, bood’vis (Czech Budejovice),

a town of Bohemia, on the navigable Moldau, 133 miles northwest of

Vienna by rail. It has a cathedral with a detached belfry dating from about 1550; manufactures of stoneware, por¬

celain, machines, lead pencils, saltpetre, etc., be¬

sides a brisk trade in grain, wood, coal and salt. In its many educational institutions, in¬

cluding two gymnasia, high, agricultural, trade, industrial and other schools, instruction is given in both German and Bohemian. In the neigh¬

borhood is Schloss Frauenberg (1840-47), the seat of Prince Schwarzenberg. Pop. 39,400.

BUEL, Clarence Clough, American editor

and author : b. Laona, Chautauqua County,

N. Y., 29 July 1850. He was connected with the New York Tribune from 1875 to 1881, when he joined the staff of the Century Magazine, and, in 1883, in conjunction with Robert Un¬

derwood Johnson, began the editing of the cele¬

brated (Century War Articles,* which were

afterward expanded into the notable (Battles and Leaders of the Civil War) (1887). Asso¬

ciate editor of the Century Magazine 1909-13; advisory editor until May 1914.

BUEL, Samuel, American clergyman : b.

Troy, N. Y., 11 June 1815; d. New York. 1 Feb.

1891. He was graduated from Williams Col¬

lege in 1833 and from the General Theological 684

Seminary, New York, in 1837. He was rector successively in Marshall, Mich., Schuylkill

Haven, Pa., Cumberland, Md., Poughkeepsie,

N. Y., and New York until 1866. From 1866 to 1869 he was professor of ecclesiastical history in the Seabury Divinity School, Faribault,

Minn., and professor of divinity there 1869-71, when he was elected to the chair of systematic divinity and dogmatic theology hi the General Theological Seminary, a position which he held until his retirement as professor emeritus in 1888. He wrote (The Apostolical System of the Church Defended, in a Reply to Dr. Whately on the Kingdom of Christ' (1844) ; Eucharis¬

tic Presence, Sacrifice and Adoration' (1874); (A Treatise of Dogmatic Theology' (1890),

and translated F. H. Reusch's Conference at Bonn : Proceedings, August 1875, Between Old Catholics, Orientals, Members of the Anglican and American Churches, from Europe and

America' (1876).

BUELL, Don Carlos, American military

officer: b. Lowell, Ohio, 23 March 1818; d. near Rockport, Ky., 19 Nov. 1898. He was gradu¬

ated at West Point in 1841 and served with distinction in the Mexican War under Generals Taylor and Scott, being severely wounded and promoted twice for gallant and meritorious con¬

duct. When the Civil War broke out he was adjutant-general in the regular army, having been promoted to the rank of lieutenant-colonel in the adjutant-general's department, 11 May 1861. On 17 May 1861, he was appointed briga¬

dier-general of volunteers; from 20 May to 9

August was on duty in California, and from 14 September to 9

November assisted in pre¬

paring the army at Washington. On 15 Nov.

1861, he succeeded Gen. W. T. Sherman in

command of the Department of the Ohio, which was then enlarged so as to include the States of Ohio, Indiana and Michigan. For two

months he was occupied in organizing his de¬

partment and accomplished little in a military way until February 1862. Grant, following

Buell's plans, had captured forts Henry and Donelson, thus causing the Confederates to

abandon Bowling Green and Columbus and to

evacuate Nashville, Tenn., and on 24 February Buell formally received the surrender of the latter city. On 21 March he was made major-general. of volunteers, his department at the same time being merged into the Department

of the Mississippi, then in charge of Gen. H.

W. Halleck. Meanwhile Grant had begun his

operations at Shiloh or Pittsburgh Landing

(q.v.); expecting that Buell would join him at his leisure, but the Confederates had planned to surprise Grant before Buell's arrival and accordingly marched from Corinth on 3 April and attacked early on the morning of 6 April.

Grant's troops were being driven back gradu¬

ally to the landing when, toward evening, part of Buell's army, which had marched through

the swamps from Savannah, appeared on the

field and checked the Confederate onslaught.

The next day, the remainder of his army hav¬

ing arrived, Buell aided Grant to force the exhausted Confederates in

full retreat back to Corinth, thereby saving Grant from a disastrous defeat. On 11 April, General Halleck arrived and took supreme command of the Union

forces, then numbering 100,000 effective troops, and placed Buell in command of the centre

wing of the reorganized army. In this capacity he participated in Halleck's campaign against Corinth (q.v.), which was captured 30 May and where he remained until 10 June, when, as com¬

mander of the Army of the Ohio, he moved

northward to checkmate Bragg's designs on

Kentucky. Early in September Bragg started

for Louisville and, closely pursued by Buell, reached that city first, but owing to* lack of provisions was compelled to relinquish the city to Buell, who arrived 25 September. There

Buell was reinforced by 30,000 raw soldiers, raising his army to nearly 100,000 troops. Ac¬

cordingly on 1 October, taking 58,000 troops, he left Louisville to pursue Bragg, and on the 8th overtook and defeated his army of 16,000

troops at Perryville (q.v.), compelling him to retreat from Kentucky by way of Cumberland

Gap. Some assert that Buell should have

pushed the pursuit with more vigor and that his dilatory tactics permitted Bragg to reach safety. However that may be, on 24 October, «by Halleck's order, Buell was relieved of com¬

mand and on the 30th was superseded by Gen¬

eral Rosecrans, the army then being designated as the Army of the Cumberland. In November a military commission was appointed to inves¬

tigate his conduct of the campaign in Kentucky and Tennessee, the hearings continuing until May 1863. The commission rendered a

report

adverse to Buell and in reply the latter subse¬

quently published his Statement of Major—

General Buell, in Review of the Evidence be¬

fore the Military Commission Appointed by

the War Department in November 1862.'

Though Grant endeavored to entice him into

active service again, Buell refused all further assignments, on 23 May 1864 resigning from

the volunteer service and on 1 June also re¬

signing his commission in the regular army.

From 1865 to 1870 he was president of the Green River (Ky.) Ironworks, afterward en¬

gaging in coal mining, and from 1885 to 1889

served as United States pension agent at Louis¬

ville. Consult (Battles and Leaders of the

Civil War' (New York 1884-88) ; Cist, H. M,,

(The Army of the Cumberland' (New York

1882) ; Fry, J. B., Operations of the Army under Buell' (New York 1884).

BUEN AYRE, bwan I'ra, or BONAIRE,

a small island off the coast of Venezuela, be¬

longing to the Dutch. It is 50 miles in circum¬

ference and inhabited chiefly by Indians, with a small mixture of

Europeans; mountainous;

producing a few cattle, goats, large quantities of poultry and a considerable quantity of salt.

It has springs of fresh water. On the south¬

western side is a good harbor. Pop. 4,926.

BUENA VISTA, bwa'na ves'ta, a village

of Mexico, seven miles south of Saltillo, where, on 22-23 Feb. 1847, about 4,700 United States troops, under Taylor, defeated 20,000 Mexicans under Santa Anna. The American army en¬

gaged at Buena Vista consisted in large part of volunteers, most of whom had no military ex¬

perience, and on account of the unequal daring and composure displayed by them at different times the battle would have been lost again and again but for the heroic conduct of the regular artillery. The Americans had taken a strong position on the 21st and were attacked on the 22d, though the main battle did not begin till the 23d, continuing with only slight intermission

throughout the day. Santa Anna's attacks were successfully repulsed and on the 24th he was compelled to retreat. The American losses were 696 killed and wounded and the Mexican about 2,000. This battle practically closed the cam¬

paign in the north. See Mexican War. Con¬

sult Carleton, (The Battle of Buena Vista)

(1848) ; Howard, (General Taylor) (1892).

BUENA VISTA, Va., city in Rockbridge

County, 40 miles northwest of Lynchburg, on the Chesapeake and Ohio and the Norfolk and Western railroads, and on the North River.

The Southern Seminary for Girls is located

here. The city has iron foundries, fertilizer works, leather works and a pulp factory. The city owns the waterworks. Pop. (1920) 3,911

BUENAVENTURA, bwa-na-v en-tu'ra, a

seaport of Colombia, on the Bay of Choco, on a small island at the mouth of the Dagua, 200

miles southwest of Santa Fe de Bogota. It is the port of Santa Fe Bogota, Popayan and

Cali, and is considered one of the most ad¬

vanced cities in the Republic. Its location on the Pacific Ocean, contiguous to the Panama Canal makes it the most important trade centre and port of entry for all the western region of Colombia. The city is well built but the harbor is lacking in many facilities for docking, load¬

ing and unloading vessels. The government,

however, is taking measures to provide these through the construction of piers and ware¬

houses.

BUENOS AIRES, bwa'nos i'ras, one of

the provinces of Argentina, lying west of the La Plata and Atlantic Ocean, and separated

from Patagonia by the Rio Negro. The chief rivers are the Parana, with its tributary, the Plata River, and the Rio Salado. The province presents nearly throughout level or slightly un¬

dulating plains, known as the Pampas of Buenos Aires. They are

covered with tall, waving

grass, which affords pasture to vast numbers of sheep, cattle and horses. These constitute the chief wealth of the inhabitants, and their prod¬

ucts, along with wheat, are the chief exports.

The climate is generally healthful. For judicial purposes the province is divided into four dis¬

tricts, and for administrative ones into 100.

The capital is La Plata. The executive power resides in a governor and vice-governor, indi¬

rectly elected for three years, and the legis¬

lative power in a Congress, composed of a

Chamber of Deputies of 100 members, biennially elected, and a Senate of 50, elected biennially.

The Congress sits from 1 May to 31 August.

Pop. about 1,500,000.

BUENOS AIRES, Federal capital and

principal port of importation and exportation of the Argentine Republic, and the largest of all the cities of the southern hemisphere. From its population (estimated at 1,700,000 on 1 Jan.

1917) it occupies the second place among the Latin cities of the world, coming directly after Paris. It is situated in lat. 34° 36′ 21″ S., which in the northern hemisphere corresponds to the latitudes of Los Angeles, Cal., and Yokohama, Japan; its longitude is 58° 21’

33” west from Greenwich; it is built, 65 feet at the highest point, above the level of the sea, upon the right bank of the La Plata River, which is here about 30 miles wide, and distant 172 miles from its mouth where it empties into the Atlantic Ocean. It is the metropolis, com¬

mercially, politically and socially, of the ex¬

treme southeastern portion of the continent.

Distant 5,220 miles from London and 4,370

miles from New York, it is the terminal port for 10 transatlantic lines of steamships which unite it with European ports, and it is also the centre from which radiate 6,600 miles of rail¬

roads, which end in Patagonia in the south, and in the west and north connect it with the fron¬

tiers of Chile and Bolivia. It is also the prin¬

cipal port for all the river traffic for a distance of 2,250 miles, extending the whole length of the rivers La Plata, Uruguay, Parana and trib¬

utaries, connecting it with Montevideo, capital of the. eastern republic of Uruguay, and with Asuncion, capital of Paraguay. Its climate is one of the most changeable in the world, though its annual average temperature corresponds to those of Genoa, San Francisco, Tokio and

Sydney.

General Topography. — The city is spread

out upon a plain on the right bank of the Rio de la Plata, 125 miles west of the city of Monte¬

video, which lies on the north bank of the estuary. Buenos Aires extends 11% miles from north to south and 15 miles from east to

west, with a circumference of more than 38

miles.

The plan of the city is quadrangular, similar to a chess-board. In the central part the streets are 32 feet wide and the blocks are 429 feet in length. By municipal regulations the height of the front of the buildings cannot exceed one and one-third times the width of the street. In 1892 the Avenida de Mayo was completed and opened. This

avenue is 100 feet wide and a mile and a half long, and divides from east to west the oldest and most densely populated part of the city. It is well paved with asphalt and has in the centre, facing each block, three safety islands, with double electric light posts, and a row of plane trees extending the entire length. The buildings along this avenue vary in materials and in the number of stories. At the extreme eastern end it opens upon the Plaza de Mayo with an area of more than four acres, beautified with trees and flanked with public buildings; — the (<Casa Rosada® (((Pink House®) or executive palace, the old House of Con¬

gress, the commercial exchange, the cathe¬

dral, the municipal buildings, the ((Bank of the Nation® and other establishments of impor¬

tance. At the extreme western end is the new House of Congress of monumental proportions, which cost $6,000,000.

The district of the Boca (about 100,000 in¬

habitants) in the city of Buenos Aires, upon the left bank of the Riachuelo, and the district of Avellaneda (12,000 inhabitants) in front of Barracas to the south, upon the right bank in the jurisdiction of the province of Buenos

Aires, are united by a drawbridge and other similar devices, and the people living there are for the most part occupied in the traffic of the harbor, there being in all a business capital of $150,000,000 invested in this traffic. Moreover, the railroads to the west and to the south, which assist in this traffic, represent a capital of $201,-

500.000.

Harbors, Wharves, Markets, *etc.* — The

location of the city, owing to the shallowness of the river, demanded the construction of an ex¬

tensive harbor. Its facilities are as follows : —086

inner harbor, comprising the north and south basins and docks and the Boca del Riachuelo ; outer harbor, comprising the outer roads and channels through which shipping enters; the

south channel, 11 miles long, having a depth of 17 to 22 feet; and the north channel, with a depth of from 20 to 23 feet. Both channels are 350 feet wide at entrance and marked by

buoys.

This harbor was built in 11 years (from 1886

to 1897) and cost $35,000,000 gold. It covers a superficial area of 165 acres and consists of two canals (about 21 feet deep), one from the entrance and the other from the outlet (both provided with luminous buoys), which never¬

theless do not satisfy the demands of traffic; two shipyards, four docks and two dry docks ; 24 warehouses with a capacity, roughly esti¬

mated, of 20,000,000 cubic feet, which can hold 24,000,000 tons of merchandise, and which ex¬

tend for 1 y2 miles fronting the wharves, the latter having a length of 6 miles (the same length as the harbor of Antwerp). It has grain elevators whose capacity amounts to 200,000

tons. Within the circumference of the harbor are 3/> miles of railroad. The wharf for

animals on foot has room for 40,000 sheep and more than 1,500 beeves.

The Boca del Riachuelo has a depth of 18

feet and is bordered by wharves for three

miles, and has a movement of 1,200,000 tons of merchandise per annum.

Facing these wharves on the right bank is

the <cCentral Fruit Market, }) the largest ware¬

house in the world; it occupies an area equal to nine square blocks in New York. The cost of its construction was $4,155,000. It is the principal exchange for all business pertaining to the exportation of the fruits of the country, and in it are stored large quantities of the products of cattle industries.

The Southern Railroad has its own dock, on the right bank of the Boca del Riachuelo, 23

feet deep, with 1J4 miles of wharves, for the exportation of agricultural and cattle products from the southern part of the province of

Buenos Aires.

Commerce. — Compared with the principal

harbors of the world, the harbor of Buenos Aires stands in the 11th place, and is second after New York in foreign commerce in all

America. At the time of its greatest activity, the port harbors as many as 1,400 steamships and sailing vessels moving in and out. The general movement of passengers is about 1 50,-

000 outgoing and 250,000 arriving, annually, making an increase from immigration of 100,-

000 persons every year. The harbor of Buenos Aires receives 84 per cent of the importations for the entire country, and sends away 51 per cent of the national exports. About $17,000,000

have recently been spent in enlarging and

widening this harbor to enable it to meet the expected development of

commerce of the city and of the industries of the country.

Parks. — Buenos Aires has 79 parks and

squares, with an area of 2,320 acres, one of the finest park systems in the world ; the Zoo is one of the largest and the best kept on the whole continent ; the Botanical Garden is only second to Rio de Janeiro's; squares, with profusion of flowers and handsome trees, are beautified with monuments to heroes of the struggle for inde¬

pendence.

Schools, Libraries, *etc.* — As in many other cities, the school buildings do not have the needed space for games and outdoor activities such as school gardening, *etc.* Already it Is thought that the school buildings to be erected in the future should be located in the centre of the parks and public gardens, as in Japan. The school buildings in Buenos Aires, with highly ornamented faqades, are quite unfitted for their purpose, not having the proper accommodations in the interior; Italian architects imported the scheme of treating the faqade as a mere screen, disregarding modern hygienic exigencies for

educational buildings. There are now about 250

public schools in which 200,000 scholars are en¬

rolled. There are over 3,000 teachers (mostly women) in the elementary grades. The number of pupils from 6 to 14 years of age is over 200,000, there now being only 15 per cent illiter¬

ate against 20 per cent in 1895. In the second¬

ary institutions of instruction (except the nor¬

mal) about 3,000 pupils are enrolled. The num¬

ber attending the seven normal schools of the city is 3,000, and a business college counts about 700 pupils. The university has 4,600 to 4,700

students. The public libraries possess 50,000

books.

Press. — More than 200 newspapers are pub¬

lished in the city of Buenos Aires, — most of them in Spanish : but some are in Italian, Eng¬

lish, French, Scandinavian, Russian, Hebrew

and Arabic. La Nacion and La Prensa have a daily circulation of over 100,000 copies and have the most extensive telegraph services in the world. La Prensa is a kind of institutional newspaper. Its building, one of the hand¬

somest in the city, is dedicated to social services, and contains a library, free evening schools for commerce and for music, offices for free medi¬

cal assistance, free legal aid, free chemical lab¬

oratory, *etc.*

Sanitation. — The sanitary system (running

water and sewers) is excellent and has cost the city $46,875,180. When in 1875 these works

were proposed, there had been few years that the city had not suffered through terrible epi¬

demics, cholera morbus in 1865 and 1873, and yellow fever in 1871. Since 1885, thanks to the extension of these works of sanitation, to the efforts of the Board of Health in the inspection of foods, and the struggle against tuberculosis and other contagious diseases, the mortality has been reduced from 44 per 1,000 in 1875 to 22.7 in 1894 and to 15.2 in 1908. There has likewise been a considerable reduction in the death rate of infants under one year of age, which in 1889 was 195 for each 1,000 born, and dropped to 141 in 1894, to 102 in 1899

and to 83 in 1904. In the same year the pro¬

portion in Christiania was 100, 111 in Paris, 146

in London, 162 in New York, 166 in Hamburg and 202 in Berlin.

The sewage of the city is handled by the

circulating or dynamic sewage system. Drain¬

age works costing over $35,000,000 discharge into the estuary of La Plata near Quilmes, 15.5

miles southest of Buenos Aires.

Another question which occupies the Argen¬

tine hygienists is to find a type of sanitary dwelling which will correspond to the change of customs and to the increase of population.

BUENOS AIRES, ARGENTINA

1 Plaza de Mayo (May Square), Showing City Hall and Catholic Cathedral 2 Plaza de Mayo (May Square), Showing Government House
BUENOS AIRES

Buenos Aires is the only city in the world with buildings suited to a mild climate which sud¬

denly had to face modern conditions occasioned by a congested population and the rapid distri¬

bution of a heavy traffic, resulting from its being an important seaport. As they are now, the city blocks are not adapted to meet these demands.

They have an area of more than four acres and there is no provision for an empty space in the centre. Therefore, the city lots are too long,

the houses receiving light and air from a court or patio, which in the case of a many-story building does not provide for either. Besides, long houses do not afford privacy or comfort and are heated with difficulty — a serious detri¬

ment in a city where the temperature falls sometimes as low as 28° F., together with great moisture in the air.

Public Utilities. — The principal streets are electrically lighted, are well paved with asphalt blocks of wood and granite, and are kept in good repair, cleaned and sprinkled. The in¬

ternal business of the city is very considerable.

In 1904 there were 315 miles of street car lines, of which 166 miles were electric and 149 miles were horse-car lines ; the latter power is grad¬

ually being exchanged for electric traction.

During the year 1905 there were constructed III14 kilometres of electric roads. The street railroads carry about 180,000,000 passengers, there being a vast increase in the last 10 years.

There are also about 20,000 carts, 5,000 car¬

riages, of which 2,500 are for hire, and 500

automobiles, which are in large demand. The five railroad stations handle about 15,000,000

passengers and 4,000,000 tons of merchandise ; the postoffice 85,000,000 letters and 76,500,000

packages and pamphlets.

Water required for general purposes is

drawn from the estuary five miles above the city. The waterworks consist of two tunnels, subfluvial and subterranean, 18,702 feet ˆ in length, with two pumps capable of raising 6,073, -

320 cubic feet of water to a height of 49.2 feet every 24 hours. The

filtered water is carried to a central reservoir at the highest point in the city. This distributing reservoir is provided with forcing pumps having three distinct flows : there are 12 tanks, elevated in groups one above another at 39.3, 55.7 and 72.1 feet respectively.

It is the most noticeable iron construction in the city; 16,000 tons of iron were used in building it. The exterior is of pressed brick and vitrified tiles. The annual consumption of water is

11,000,000 gallops or a daily average of 33.5

gallons per capita.

The telephone service is very deficient. It has only 7,000 subscribers and connections with the cities of La Plata (38 miles), Rosario (186

miles), and by cable with Montevideo (125

miles) .

Industries. — Buenos Aires is not especially industrial. There are not more than 119,000

workmen in its factories and workshops, where they work hides, wood, metals, clay for bricks, chemical products, constructive materials, manu¬

factures pertaining to lights, furniture, carpets and hangings, cloths, preserved foods, *etc.* ; and this production is stimulated by the protection of the custom-house, in spite of which Buenos Aires is well supplied with articles made in Europe and America. According to the last

industrial census taken in the city of Buenos Aires, there were 10,350 industrial establish¬

ments.

Banking, Finance, *etc.* — Buenos Aires sup¬

ports 21 banks of discount with a joint capital of $100,000,000. As

late as 10 years ago, 10

were foreign and represented all the principal cities except New York, notwithstanding that in 1905 the business transacted with the United States amounted to $44,637,901, having increased 110 per cent in the previous five years; all of this business had to be done through London banks. In a year the Bolsa de Comercio

(Chamber of Commerce) transacted business to the amount of $174,061,251, and the Clearing House passed through $2,875,924,788.35. The

municipal taxes amounted to $7,500,000, 41 per cent of which is devoted to loans tor new undertakings, 29 per cent for direct taxes and 11*4 per cent for indirect taxes. In 1917 the National City Bank of New York was estab¬

lished in this field, with branches at Buenos Aires and Montevideo. Landed property sells

yearly to the average value of $35,000,000, vary¬

ing from $20,000,000 to $40,000,000 a year. The value of buildings constructed annually amounts to $15,000,000. There are annual transfers of real estate amounting to $42,240,000. The aver¬

age of fire losses and insurance paid has not been high. See Argentina — Banking, *Etc.*

Population, Social Conditions, *etc.* — The

census of 1869 gave the population of Buenos Aires as 187,346 inhabitants, and prophesied 600,000 for 1919; in 1895 it had 663,854 and in January 1917 about 1,700,000. The increase has been at the rate of 40 per cent in a decade (inferior alone to Chicago). Buenos Aires has more than 440,000 foreign residents, of whom 230,000 are Italians, 105,000 Spanish, 28,000

French, 6,000 English and 6,000 German. The greater part of the landowners of the prov¬

ince of Buenos Aires and the Pampas prefer to live in the city of Buenos Aires, enjoying the rent of their land or hoping that the improve¬

ments on their neighbors' lands will increase the value of their own. In this respect, that prov¬

ince and this territory are to the city of Buenos Aires what Ireland has been to London. Be¬

cause of this and because the city is the seat of the national government, also because of the many commercial establishments engaged

in foreign trade, Buenos Aires is a centre, where the light and splendor of a great capital never die out. It has two theatres where in an especially interesting season appeared Saint-Saens, Puccini, Sara Bernhardt, Coquelin,

Rejane, Tina di Lorenzo, Jane Hading, No—

velli, Caruso, *etc.* Nevertheless, this wealth, which is the result of the absenteeism above leferred to, retards the progress of the country districts and gives birth to a close, feudal plutocracy. Such a social condition is not best fitted to call forth a truly democratic public spirit. However, the spirit of association com¬

mences to enjoy a broader outlook, there being a constant increase in the number of educational and civic associations whose object is to make all classes participate in social well-being. The charitable institutions are disposed more and more to abandon their cut-and-dried methods, and instead of lessening the effects of poverty, they endeavor to prevent its causes through a collective social crusade, hoping that before long a law against child-labor will be passed and that 688

model reformatories and juvenile courts will be established to better the general conditions of children.

There are over 5,000 persons in the asylums.

The free municipal lodging-house gives lodging and board to 41,578

persons, the Salvation

Army to 40,305, the French Charity Associa¬

tion to 5,046. The criminals a. rested annually for each 1,000 inhabitants from 15 to 70 jˆears of age may be divided very nearly as follows : German, 4.23; Argentine, 8.70; Spanish, 8.26; French, 3.40; English, 4.93; Italians, 6.61; Ura-guayan, 8.65.

In one year there were 929 births for each 10,000 foreign women. That year, for each

10,000 Argentine women were born 1,926

children. Later, these figures decreased to 850

and 1,300 respectively. There are about 75

marriages and 150 deaths for each 10,000 in¬

habitants. For history, see Argentina.

Government. — The communal government

of the city is a kind of government by commis¬

sion, composed of an intendente and a de¬

liberating council appointed by the national executive authority. The amount of annual

expenditures is about $10,000,000.

As is evident, it can hardly be said that Buenos Aires enjoys self-government, strictly speaking. Nevertheless the government pos¬

sesses considerable prestige, resembling in this respect an aristocratic citv. For this reason the public employees seek for the reward of public opinion, and it has been said that there is not a city in the world where so much is accomplished for the same amount of money. On the other hand, as a consequence of paternal government, apathy

is to be found in furthering official action. The Asistencia Publica, or board of health, can truly be called the best in the world. The 18 hospitals are well kept, many in very appropriate buildings. The sale of food in the 35 markets of the city is scrupulously controlled.

In the Americas, October 1916, recent rail¬

way developments in and about Buenos Aires

are described, the writer calling attention to the circumstances that suburban Buenos Aires is served by three railways — The Central

Argentine and the Southern, each of which

operates two lines, and the Western which

operates one. One of these roads has finished the electrification of its route; another has com¬

pleted a subway under the city. Measures of the volume of business at Buenos Aires in 1916

are supplied in a cablegram which gives (<the barometrics of the business situation at the beginning of September,® as follows: Visible gold supply in Caja de Conversion (see Argen¬

tina — Banking and Finance) and legations

$317,000,000; in banks $27,000,000, circulating currency, paper $1,013,000,000. bank clearings, August, $613,000,000 paper; business failures, August, liabilities $9,000,000 and assets $10,-

000,000 ; foreign vessels entered, August, 126

with net tonnage 208,000; exportation of wheat, August, 82,000 tons, of maize 329,000, of linseed 53,000, of oats 127,000 tons, *etc.*

Juan A. Senillosa,

Former Argentine Consul-General to Canada.

BUENOS AIRES, University of (Universidad Nacional de Buenos Aires), the

national university of Argentina and the largest institution of learning in South America. It was founded in 1821 by the consolidation of several small institutions. It was charged with the administration of all official instruction —elementary, secondary and collegiate. Its

students number about 4,650, and its courses cover agriculture, engineering, law and govern¬

ment, mathematics, medicine, natural science, letters, science and philosophy. Its library con¬

tains about 97,000 volumes.

BUFF, a mixed color, something between

pale pink and pale yellow. It was adopted by the English Whig party, in combination with blue, as their distinctive color; and, possibly in consequence of that circumstance, the Whig party having beea opposed throughout to all the measures of government which led to the American Revolution, was chosen as the

national uniform of the Americans at the open¬

ing of the Revolutionary War.

BUFF LEATHER, a leather prepared by

saturating the hides with some aluminous sub¬

stance, and afterward with oil. Leather pre¬

pared in this way is softer and more flexible than any other kind, and on that account it is much used for soldiers' cross-belts, gloves and other military accoutrements. Its color is

naturally light yellow, but it is in some cases bleached before being used. The buff leather used in former times to make the jerkins, worn under coats of mail to deaden the pressure of the metal on the body,

and to prevent any con¬

tusion from a blow, was made from the hide of the urus, or wild bull of central Europe, the common name of which was buffe, whence the name of the leather was derived.

BUFFALMACCO, boo-fal-mak'ko* (as¬

sumed name of Buonamico Christofani) ,

Italian painter who flourished according to

Vasari during the first half of the 14th century.

The same authority attributes to him the

frescoes depicting the Passion in the hall of the Campo Santo in Pisa (uncovered in 1910), and states that he worked in Arezzo, Florence, Bologna and Cortona. He is mentioned by

Boccaccio in the (Decameron J and by Sacchetti in the ˆovelleP Consult Bacci in (Bolletino d'Arte) (Rome 1911).

BUFFALO, N. Y., county-seat of Erie

county, the 2d largest city in the State and 11th in the United States; situated at the eastern end of Lake Erie and on its outlet, the Niagara River. Its centre is 24 miles south of Niagara Falls, and its important suburbs, the Tonawandas, are half way between. It lies due west 297 miles by rail from Albany and 499 from Boston; northwest 425 miles from

New York, and 417 from Philadelphia; about

410 southwest from Montreal, and 540 east of Chicago. It extends about 10 miles along the lake and river front, and half as far east; area, 42 square miles.

Description. — Buffalo, which began at the

mouth of Buffalo Creek, has spread mainly

north and east up to a gradual rise, a plateau some 80 feet above the lake and 620 above sea-level. It is laid out in wide, rectangular streets, beautifully shaded and decorated with shrubbery more completely than any other city in the world. No less than 260 miles of its 600 miles of streets are asphalted, 84 are stone-paved, 37 are brick-paved and 16 are

macadamized. The chief business streets are

K

[NEW YORK STATE

HOSPITAL

•1

fii t;

f IT CEN-li

jL n ii

ˆrmr

-| | HqBˆ|ngtW| p

Elmwood Ave.Sta.

I — Great-Arrow—

LINE

nr

fU-nlversityj?

8

m

-Poolpy St.-j

imjoe

r}1 orwe«

CZZJDU

-Btjwy-

r

1/

■Amherst

Agassiz \

_ |PU } 7

‘ll Pi

wnmfc?

riJwoli - —

ISUffitlEJUtifJ ucma*r — i eˆij«

oflOii mn o d UK] d □ j-T” = fs/ˆ/7’

nn— ™@0DDD0amnˆˆ/ IUL

irai

, Blaine—

LU I’ll _ „

!r-Pbelps. I— - - -

/ pWnkeheM

>£

!!3gl

-Ge*

1

3.

frxˆ /s J Intake Pier Q

□

□□

□o

/d L-Xo rlh-land

“3 — A-ve-

Kensln irton Are;

Sta.

AppKnlip.iim’

— €Hevp4aiTth-

-P enter

-6*s-

lilghlajTˆr-

□

EMT1,

Fort Pqj’tˆr

&

— Bf-V;

si”®

o«‘c

Now Pumping Sta

U

3ase Ral

Ground

i fLatrre4-]

n &

-flCMlti Di

□

□cn =

Iptcf-Park- A-rˆ

L

101

tarnhardt

•pWnri’iin!

E-Kel,:™|!

3C£ =

rB. Berryˆ r

n£

rnMnwii

- Cftj V-

— fnr

- 1| - GW-

±*11* - 1

d

is — IS —

T ■ Op-Box -

11 ■ i

r

r^r

.□i _

j g jLandoir

r6‘w,it

]□[

-^•li idipity-in

~~6tri

ZKESZRV01R

OH

r-i rBestj j

irr Hasten

Haec

• - rjjˆ-«6|th | —

Armory.

I - /LIZ _ IL-J UL-JTUUZJˆJTˆnLJ*}

itiimoimooomm

umDOtmoonnwr’

os

nr’

. . 1 U”T “O

51

c

-OiTMd n. | - 1 p|

IM

r

III

-mr-StT-i

C-«ra»-

&

12

13

T 04’FTW A > N D A

iiH,PaV

_ N’t Buffalo

W \ I *r’/L

_ •■itj \ • - ‘ />

r ”, r**} A” ” county* >9

-K— - - - *IV*.. <*fr.V* <»#;*ijoo*MO. vS*.

^ _ - . .

\Main Su

”VpIlihlllK

LJI0?*-3pls?

MtfiT.k i A -K

North Park A

;hland* \ „ ,1

\h eualngton

L-“ V～ ‘ F“‘J eu »

. -ok®*

15

_ u LJ U L

rifYf’rr

U UUUUii uul

-ip

Buffalo «=n?-

Light House

=c^k

OUTLINE MAP OF

BUFFALO

^Portion Sliown on Main M<ip

in Solid Color. (i

SCALE OF STATUTE MILES. v

y — =a - - l//i

SCALE or KILOMETRES.

§ Poiaˆ

Rand Me. Vail,’#

Copyright Ly f

6

8

9

1 1

12

13

BUFFALO

(Main Portion)

SCALE

n Portion),

Main, running north and northeast from the

harbor to the city limits ; Delaware avenue, parallel with it; Niagara, north and northwest along the river front to Tonawanda; and

Broadway, which with Genesee, Sycamore and

Seneca, widen spoke-like from the heart of the business district around Lafayette and Niagara squares. Each of these is several miles long.

The finest residence streets are Delaware

avenue and North street. Th-e latter crosses the former at right angles a mile north of the centre ; they are set with large separate man¬

sions, having great lawns, gardens and shrub¬

beries, a fashion followed in the new residence streets to the north.

Municipal Service and Improvements. —

The street cleaning and sprinkling services, under municipal control, cost $475,573 in 1915.

The sanitary service, embracing ash and

garbage removal, also done by the city, in the same period cost $310,589. Both these depart¬

ments are notably efficient. The sewage, col¬

lected through 544 miles of mains, is emptied into the Niagara River

and carried swiftly

away. The first public bath house erected in New York State under the law of 1895 was

opened here in 1897. All these things, with the cool and healthful summer climate which at¬

tracts many visitors, enable Buffalo to claim the distinction of being the cleanest and

healthiest city in the United States. The death rate in 1915 was 13.98, inclusive of residents and visitors. Exclusive of non-residents, it was 13.83. The waterworks built in 1888 in 1915

were augmented by the opening of a large

pumping station, erected at a cost of nearly $7,000,000. They are supplied by water from Emerald channel, the purest source in Lake

Erie. The water is conveyed from the intake to the shore station by means of an immense underground tunnel, blasted through solid rock.

The reservoirs have a storage capacity of

200,000,000 gallons a day. The average con¬

sumption is about 150,000,000 gallons a day, or 312 gallons per capita per day. Nearly 600

miles of mains distribute the water, and the cost of the water department in 1915 was

$1,182,212, including interest on $11,620,383 out¬

standing water bonds. Electric lighting is al¬

most universal in business houses and res¬

idences, the cheap power furnished by Niagara Falls being used. The police department num¬

ber 907 men. There are 14 precincts, a sub¬

station and a headquarters building. A harbor patrol is maintained and the cost of operating the department in 1915 was $1,079,245. The fire department is thoroughly modern, its equip¬

ment consisting largely of motor-driven ap¬

paratus of the latest type. There are two

chiefs, 12 battalion chiefs, three fire boats, an up-to-date system of storage and signal boxes, 678 men and the annual cost of operation and maintenance is $1,105,385. An important munic¬

ipal improvement has been the transfer of tele¬

graph, telephone, police and fire alarm wires from overhead poles to conduits. The street railway system was the first in the United States to be equipped for electric power. It covers 250 miles of double tracks, 96 miles of single tracks and 31 miles of extra tracks within the city limits. The lines extend to all suburbs, along the Niagara River to Niagara Falls and across into Canada.

Parks and Cemeteries.ˆ— The park system

includes six large parks of 1,229 acres, con¬

nected by a magnificent system of boulevards*

speedways and approaches, covering 28.45 miles*

and 367 acres of minor plots and squares.

Much the largest is Delaware Park, on the

north side, with an area of 362 acres and a lake of 46*4 acres; here and on adjacent grounds the. Pan-American Exposition of 1901 was held.

It is continued on the south by Forest Lawn Cemetery, comprising 239 acres — by far the greatest of the 26 cemeteries in the city — and contains monuments to former President Mil¬

lard Fillmore and the Indian chief, Red Jacket.

On the west of the park begin the grounds of the Buffalo State Hospital for the Insane, oc¬

cupying 203 acres. Toward the southeast is

Humboldt Park, 56 acres; and overlooking the lake at the point where the river starts is the Front, a bold bluff 60 feet high. This is the site of Fort Porter, garrisoned by United

States soldiers. The parade ground consists of 48 acres, and is a favorite promenade because of the fine view it affords. On the south side of the city are South Park, 155 acres, and Cazenovia Park, 106 acres. Another large park is Riverside. 37 acres, on the north side of the city. There are attractive squares in different parts of the city, including Lafayette, Niagara and Gates. Lafayette contains the Soldiers and Sailors' monument, erected at a cost of $50,000.

A beautiful marble shaft, in honor of the mem¬

ory of former President William McKinley,

who died in Buffalo, stands at Niagara square.

Principal Buildings. — There are numerous

large and fine buildings in the city. Among these are the Marine National Bank building, the Iroquois Gas building, the Electric building, the Ellicott Square, the New York Telephone building and the Manufacturers and Traders'

National Bank building. The city also owns

two large halls, Elmwood Music Hall and the Broadway Auditorium. Other noteworthy struc¬

tures are the Albright Art Gallery, a gift to the city from John J. Albright, and ranking as one of the leading art centres in the country; the home of the Buffalo Historical Society, which was the $200,000 New York State-build¬

ing at the Pan-American Exposition ; the

Federal building, erected at a cost of $2,000,000, the City and County Hall, the Chamber of

Commerce building, the 65th and 74th regi¬

mental armories, the Central Y. M. C. A. build¬

ing, the Buffalo State Normal school and five of the most complete

and expensive high

schools in the United States.

Trade and Commerce. — Buffalo's position

at the eastern terminus of the Great Lakes and the distributing point for the East has made it one of the large cities on the lakes. It ranks as one of the world ports in the volume and variety of products received and transshipped, although the harbor is ice-bound one-third of the year. In 1915 the tonnage of the port was upward of 19,000,000 tons, and the customs

receipts were $1,170,195. Naturally, its fore¬

most handlings are of western products, such as grains, flour and provisions, as well as live stock. Its receipts of grain, though varying with the crop, in 1915 was 258,404,000 bushels, while the flour receipts were 8,429,000 barrels.

Next in importance is the live stock industry.

Buffalo handles more horses and sheep than

any other American port, and is among the

first in cattle and hogs. It receives more than 15,000,000 pounds of fish yearly, largely from the Georgian Bay district, and sends it to in¬

land points east and west. The lumber industry is another of the leading ones in the city, its receipts of this product in 1915 being 85,884,000

feet, and it receives immense quantities of pig iron and ore, the same in 1915 reaching 5,358,000

tons. The total export trade is over $80,000,000

a year. This immense development, in a meas¬

ure, has been made possible by cooperation between the Federal, State and municipal gov¬

ernments in providing facilities for handling the business — breakwaters, piers, basins, canals, *etc.* — and as yet Buffalo has not commenced to utilize to any degree of capacity the numerous facilities available. Originally, as with most lake ports, the harborage was only the shallow mouth of a small river, Buffalo Creek, but which now is navigable nearly three miles in¬

ward. The United States has built a great

series of stone and cement breakwaters, four miles long, at a cost of upwards of $2,000,000, which forms an inner and an outer harbor, one of the best on the Great Lakes. The State has built Erie and Ohio basins, which will be used for terminals of the new and enlarged barge canal. The city has deepened the Buffalo River giving a ship canal more than two miles long and navigable to a depth of 23 feet. The

banks of the river are lined with in¬

dustries, and there still is much land vacant for development. Nearly a score of steamboat lines run from Buffalo to different lake points, including the excursion routes to nearby resorts and more distant places. The Welland Canal, about 20 miles west of Buffalo, connects Lake Erie with the Saint Lawrence River. Improve¬

ments now under way will, when completed,

make it possible for the largest lake steamers to go from the lake to the river. Niagara River to beyond the Tonawanda is navigable

for the largest boats on the Great Lakes, the Federal government having built a ship canal, immense locks and dredged a 23-foot channel.

New York State's barge canal system, built at a cost of $130,000,000 and involving an enlarge¬

ment of the principal canals of the State, makes a continuous waterway from Buffalo through

the heart of the State to the Hudson River.

As to railroads, Buffalo is the terminal of the main line or some spur of every trunk road from Philadelphia to Quebec; from the east

in the United States, the New York Cen¬

tral, Erie, Lehigh Valley, Delaware, Lacka¬

wanna & Western, Pennsylvania, Buffalo,

Rochester & Pittsburgh ; from the west, the Lake Shore & Michigan Southern, Michigan Cen¬

tral, New York, Chicago & Saint Louis, Wa¬

bash; from Canada, Canadian Pacific, Grand

Trunk and Canada Southern. Electric lines

entering the city are the Buffalo and Lake Erie Traction Company from the west, and the

Buffalo, Lockport & Rochester Electric Railway from the east. There are 250 passenger trains a day, 700 miles of railroad tracks within the city limits, and six square miles of territory are owned by railroads. There are ferry lines connecting the United States and Canada at

Fort Erie, and the International Bridge con¬

nects Buffalo and Bridgeburg, Ontario. The in¬

ternal conveniences for carrying on a great trade correspond to the railroad and steamship facilities. Two great passenger terminals were practically completed in 1916, and there are 22

immense grain elevators, with a storage capacity of 28,250,000 bushels. Some of these are among the largest in the world. The chief one, the Frontier, has a capacity of 4,000,000 bushels.

The first elevator in the world was built here in 1843. The largest coal pocket in the world that of the D., L. & W. Railroad, is located here. It is 5,000 feet long, and ships a large part of the 3,864,000 tons of coal annually ex¬

ported. Upwards of 10,000,000 tons are re¬

ceived in the city yearly by rail. The coal docks can handle 29,000 tons each day. The railroad coal stocking trestles are in the eastern part of the city, as are the great stockyards, nearly 100

acres in extent.

Manufactures. — Buffalo has a more diversi¬

fied line of industries than any city in the country, according to the United States census reports. Two advantages are natural gas, for which mains have been extensively laid, and cheap electric power from Niagara Falls. In 1915, 70,000 persons were employed in the

manufacturing establishments of the city. The principal industries are — with figures accord¬

ing to the 1910 census (except food, mason, carpenter, tinsmithing, jobbing, etc.) — whole¬

sale slaughtering and meat packing, $25,416,000 ; foundry and machine shop products, $20,775,000; flour manufactured, 5,358,000 barrels ; the

Lackawanna Steel Company, capitalized at $70,-

000,000, has the largest and most capacious in¬

dependent steel plant in the world, with a private breakwater a mile long and a spacious harbor ; linseed oil, $6,500,000, partly used in the manufacture of $800,000 worth of paints; malt and malt liquors, $6,500,000 ; railroad cars, $5,000,000; soap and candles, $8,652,000; flour and grist mill products, $19,941,000; planing mill products, $3,500,000; factory-made clothing,

$4,712,000; chemicals, $2,000,000, largely in¬

creased after the start of the European War; patent medicines and compounds $2,801,000;

leather and leather goods, $3,938,000; factory-made furniture, $4, 184,000 ; besides more than $1,000,000 each of carriages, automobiles, con¬

fectionery and large quantities of jewelry and tobacco products. There are, in all, more than 200 varieties of industries. In 1910 the value of

Buffalo's products was $218,803,994. The

United States census of manufactures for 1914

recorded for Buffalo 2,225 industrial establish¬

ments of factory grade, employing 67,534 per¬

sons, of whom 54,424 were wage earners, re¬

ceiving annually $34,820,000 in wages. The

capital invested aggregated $243,311,000, and the year's output was valued at $251,103,000: of this, $92,257,000 was added by manufacture.

Finances and Banking. — The assessed val¬

uation of the city has increased in 25 years from $38,000,000 to $346,560,000 in 1915, nearly all in real estate, with a tax-rate of $26.10. The total outstanding bonds amount to $37,870,-

446.82, including $11,620,383 of water bonds.

Upon the aggregate there is an annual interest charge of $964,833.65. The sinking funds

amount to $4,230,276.21, and the city's resources are valued at $59,312,228. The city budget for 1915 was $12,174,902, minus resources of $3,-

131,812, leaving $9,043,090 to be raised by taxa¬

tion. The post office receipts are more than BUFFALO

$2,000,000 annually, and the internal revenue receipts in the same period more than $3,000,000.

There are 10 banks of discount (including four national banks) with a

capital and surplus of $15,169,181 and total deposits of $150,259,000; four trust companies, with $3,506,000 capital and surplus, and four savings banks with more than $118,000,000 deposits and $10,000,000 surplus.

Churches. — Buffalo is the seat of Roman

Catholic, Episcopal and Methodist bishops, and has two large and impressive cathedrals. The newer structure, built out of white marble at a cost of more than $800,000, is a stately

edifice with a set of 42 chimes said to be the best in the country. Besides there are 60 Catho¬

lic churches, 12 convents and 199 Protestant churches, the most numerous being 31 Baptist, 17 Presbyterian, 24 Methodist, 24 Episcopal, 7

Churches of Christ, Disciples, 23 Evangelical Lutheran and 4 Congregational. There are also 9 synagogues and Jewish temples. The most

notable Protestant churches are the First Pres¬

byterian, Trinity Episcopal, Saint Paul's Epis¬

copal and Holy Trinity Lutheran.

Charities. — There are 12 children's refuges in Buffalo and as many homes and refuges for adults ; besides a Children's Aid Society and S. P. C. A., a Charity Organization Society, As¬

sociated Jewish charities, many religious organi¬

zations for relieving distress, a Church Federa¬

tion, a central organization of the Protestant churches ; 27 hospitals, besides the United

States Marine Hospital, the Erie County Home, the Erie County Lodging-House, a District

Nursing Association, Legal Aid Bureau, Asso¬

ciation for the Prevention and Control of

Tuberculosis, city dispensaries and clinics.

Of the children's institutions, the more not¬

able is the free Fitch institute, a creche or day nursery for children of poor working mothers — training school for nursemaids, etc., which is managed by the Charity Organization Society

(organized in 1877, the first in the United States). Of the more important institutions, the following may be mentioned : Social Service buildings, headquarters for charitable and

social service organizations, made possible by gift of the late Mayor J. N. Adam; Monsignor Nelson H. Baker's institutions at Lackawanna (Catholic) the Buffalo Orphan Asylum (non¬

sectarian), Saint John's Home for Orphans

(Lutheran), the Home for the Friendless, Saint Vincent's and Saint Joseph's Roman Catholic

orphanages, Saint Mary's Asylum for Widows

and Foundlings and Saint Mary's Institute for Deaf-Mutes, the Lutheran Church Home and

Ingleside Home.

Other notable buildings are the Homeo¬

pathic Hospital, the Children's Hospital, the Buffalo General Hospital, the Gratwick Cancer Laboratory and Hospital, the only institution in the world exclusively devoted to cancer re¬

search ; the municipal J. N. Adam Memorial Hospital for Incipient Tuberculosis at Perrys-burg, and a great Municipal General Hospital, to cost upward of $5,000,000 when completed, which now is in the process of construction.

Organizations. — There are many, clubs,

organizations and associations in the city, de¬

voted to many and varied causes. In addition to the smaller and more numerous social and athletic organizations, there are the larger and more important Buffalo Club, Park Club, Ellicott Club, Country Club, Saturn Club and Uni¬

versity Club. There are a Chamber of Com¬

merce, a Better Buffalo Association, a Greater Buffalo Ad Club, and a Rotary Club. There

are five branches of the Young Men's Christian Association, including two railroad branches in the city.

Education. — The city in 1917 had 73 pub¬

lic grammar schools, including four vocational and one teachers' training school, housed in about 126 buildings. In 1917 there were 2,187

day school teachers, 600 evening school teachers and 375 vacation school teachers. The registra¬

tion of the day school was 67,093, for the even¬

ing schools 15,700 and for the vacation schools 11,000. As part of the school system there are five modern high schools, four of them com¬

pleted within the pas.t two years. One of these is the most complete technical high school in the United States. There are 45 Catholic parochial schools, with an estimated attendance of 30,635

5 Luthern parochial schools, 1 Jewish and 75

private schools and academies. There also are some 20 free kindergartens in connection with the public school system, orphan asylum schools and a school at the East Ferry Street Municipal Hospital.

Of the higher institutions of learning, the chief are the University of Buffalo and Canisius College, both with complete arts and science courses. The university is 70 years old, with six departments; 4,100 alumni, 209 in¬

structors and professors and 943 enrolled stu¬

dents. It owns a large plot of land upon which it is planned to erect a complete and up-to-date building. Toward this a large sum has been pledged. Canisius College is a Catholic in¬

stitution with a preparatory school, Canisius High School. Other schools are Saint Joseph's Collegiate Institute, the Academy of the

Sacred Heart, Holy Angels' Academy, Miss

Nardin's Academy, D'Youville College, the last two for women and all Catholic, the German Martin Luther Seminary and the Park and

Nichols schools.

The Fine Arts Academy is located in the

Albright Art Gallery, a splendid edifice of pure white marble, built in the style of a Grecian temple ; the Buffalo Historical Society with in¬

teresting relics and a large library is in the old New York State Building; the Buffalo

Society of Natural Sciences, with a valuable museum of natural history, with nearly 60,000

specimens is in the Buffalo Public Library

Building. There are many other art and liter¬

ary organizations, drama clubs, musical clubs and theatres, including the Buffalo Guild of Allied Arts. The city has a branch of the Drama League and there is an Artists' Club.

Libraries. — The two chief ones are the

Buffalo Public and the Grosvenor. The former was installed in a large

and modern structure in 1897, and now has 330,057 volumes and 23,902

pamphlets, a large and complete reference de¬

partment and also newspapers, magazines and

periodicals. The library conducts numerous

branches and loans traveling libraries to schools and other institutions. Grosvenor Library

(Reference) contains 100,000 books and 15,000

pamphlets; the State Law Library of the

eighth judicial district contains 41,000 volumes; Buffalo Historical Society, 33,973 volumes,

including the John C. Lord Library of

10,262 volumes and the Millard Fillmore Li¬

brary of 612 volumes, and 5,000 pamphlets;

Buffalo Catholic Institute Library, 18,000

volumes and 500 pamphlets ; the medical library of the University of Buffalo, 6,000 volumes ; the Central Y. M. C. A. Library, the Lutheran and German Y. M. A. Library, the Polish, Adam Mickiewicz, the North Buffalo Catholic Asso¬

ciation and Saint Michael's Sodality libraries.

Publications. — In 1917 there were published in Buffalo 11 daily papers, including 2 German, 2 Polish and a live stock record ; 5

Sunday papers, including 3 English, 1 German and 1

Polish; 21 weekly papers, 12 monthlies, and a score of smaller ones, having merely sectional distribution. There also are 3 quarterly and 2

fortnightly publications.

Government. — • Since. 1 Jan. 1916, the city of Buffalo has been under the commission form of government, being the largest city in the United States to be thus governed. The ad¬

ministration consists of a council of five, which has both administrative and legislative author¬

ity. The mayor is president of the council, and has under his immediate supervision the de¬

partment of public safety, comprising the police, fire and health departments. One councilman

or commissioner directs the school department, which includes the poor department, with the assistance of a board of education of five ; another has charge of parks and public

buildings ; a third is superintendent of pub¬

lic works and the fourth superintendent of

the department of finance and account.

The charter has a referendum clause but

does not provide for initiative or recall.

Primaries for the nomination of commis¬

sioners are held entirely separate from the ordinary political primaries, the aim being to divorce politics from the municipal government completely. Until 31 Dec. 1915, the city was governed by a common council, consisting of an upper house of nine councilmen, elected at large, and a lower house of 27 aldermen, elected from as many wards. The mayor was the

head of the city government, with various

elected officials in charge of departments, such as the treasurer's office, the assessors' office, the comptroller's office, the public works depart¬

ment and the school department.

Population. — Buffalo has grown steadily,

now ranking among the foremost American

cities. Her name first appeared in the Federal census of 1820, with a population of 2,095, with increases as follows: 1830, 8,668; 1840, 18,213; 1850, 42,261; 1860, 81,129; 1870, 117,714; 1880, 155,134; 1890, 255,664; 1900, 352,387; 1910, 423,715. By 1920 its population had increased to 506,775. In addition there are numerous

suburbs, within a dozen miles of the downtown section of the city, where workers in the city live. These include the Tonawandas, Tonawanda and North Tonawanda, both classed as

cities ; Kenmore, Williamsville, Lancaster, De¬

pew, Hamburg and Orchard Park. The six last named are villages, and practically all of the trade is done in Buffalo. Lackawanna is an¬

other city outside the Buffalo city limits and adjoining it on the south but like the other places mentioned, due to rapid transit facilities, most of the trade is done in Buffalo. Accord¬

ing to the United States census of 1910, Buffalo was the 10th largest city in the country. Ten years before Buffalo was 11th. Buffalo has a foreign population of considerable proportions, but this is being assimilated under intelligent and sympathetic supervision. The following

figures from the 1910 census show the number of native-born and foreign-born residents :

foreign born, total, 118,444; native born of foreign parentage, 183,673; and native born, 121,598. Of the foreign-born population, the principal nationalities represented are Polish, German, Italian, Irish and Polish-German Jews.

History. — The site of Buffalo was origi¬

nally a basswood forest, amid which an Indian tribe, the Kahkwas, between the Neutrals and the Eries, hunted and fished along the creek; it was exterminated by the Iroquois before 1651, and not a single Indian lived there again for more than a century and a quarter. In 1679 La Salle passed the spot in his 60-ton sloop the Griffin, the first sailing vessel ever on Lake Erie, built at Cayuga Creek below. In 1687 the Baron La Hontan recommended it to the French government as the proper site for a fort to command the fur trade down the Niagara, and marked a <(fort suppose" on his map; but no attention was paid to him. In 1764 Colonel Bradstreet built Fort Erie across the river on his Indian campaign. In 1780 the Senecas,

driven from their old haunts by Sullivan's cam¬

paign, settled along the creek inland ; the next winter an English family captive among them heard them call the creek by a name they trans¬

lated ˆBuffalo," — whether rightU or not is dis¬

puted but probably enough the herds had

sought the salt-licks to the east. Their narra¬

tive was published in 1784, and in the treaty of Fort Stanwix that year between the English

and the Iroquois, the name was used as familiar to the latter. The Indian settlement soon be¬

came known as <(the village on the Buffalo,"

currently shortened to <(Buffalo village," and presently to ((Buffalo," without any official sanction. The land had formed part of the

grant of James I to the Plymouth Company in 1625, and that of Charles II to the Duke of York in 1664. The consequent dispute between Massachusetts and New York was compromised

in 1786, and ultimately the Holland Company of aliens became patentees in trust in 1792, and by legislative permission owners in fee in 1798.

Meantime a few settlers had straggled in ;

a trader named Cornelius Winne in 1789; two families in 1794 and 1796; and in 1797, when there were half a dozen houses, the first white child was born, a girl. A number of others took up residence there by 1803. In that year, by the advice of their surveyor, Joseph Ellicott, the founder of Buffalo, who had assisted his brother Andrew in laying out the city of Wash¬

ington, and was convinced that here was the site of another great city, the company had him plot a village, and in 1804 sold the first lots. He called it New Amsterdam, and named the streets after the members of the company, but the set¬

tlers disregarded all his names and his oxbow line for Main street, where his own mansion was to be. In 1810 the town of Buffalo was incorporated, including several now separate

townships. In 1811 the first newspaper, the Buf¬

falo Gazette, was established. In 1813 Buffalo village was incorporated, and received a new charter in 1822. In the War of 1812, after the storming of Fort Niagara by the British in De-BUFFALO, NEW YORK

1 (Left to right) St. Paul's Church; Prudential and Telephone Buildings, and Erie County Savings Bank Building Z Historical Society Building, Delaware Park BUFFALO — BUFFALO BIRD

cember, a force of British and Indians under (jeneral Riall was detailed to destroy Black Rock and Buffalo ; on the 29th captured the latter, and the next day burned all but seven or eight houses, coming back 1 January and burn¬

ing all but three of the rest. The settlers re¬

occupied their homes to some extent on the 6th, but it was not generally rebuilt till 1815; on 10 April 1814 General Scott put it under mili¬

tary rule. In 1818 the first steamer, Walk-inthe-Water , was launched. For many years,

however, supremacy was balanced between it

and Black Rock down the river, now the north¬

ern part of the city, where at that time was the ferry across the Niagara to the Canada side; but in 1825, after a fierce struggle, the former secured the terminal of the Erie Canal, and in five A'cars its 2,412 inhabitants had grown to over 8,000, and its future was assured. Long after, however, able capitalists invested heavily in Dunkirk, 48 miles south, in faith that it and not Buffalo was the coming lake port. In 1832, it became a city, and the next year it annexed Black Rock. Buffalo has given two Presidents to the United States, Millard Fillmore and

Grover Cleveland, the latter its mayor in 1882.

From 1 May to 1 Nov. 1901, the Pan-American Exposition was held here, and on 6 September President McKinley was shot while attending it.

Consult publications of the Buffalo Histori¬

cal Society; Smith, (History of the City of Buffalo and Erie County > (1884); Ketchum,

(History of Buffalo > (1864—65) ; Powell, < His¬

toric Towns of the Middle States) (1899) ; Severance, (Picture Book of Earlier Buffalo >

(1913).

Archer A. Landon,

President of Buffalo Chamber of Commerce.

BUFFALO, Wyo., town and county-seat of

Johnson County, 30 miles southeast of Sheridan.

It has a Carnegie library, courthouse, county high school and the State Soldiers and Sailors'

Home. Agriculture and stock-raising are the

chief industries. The waterworks and sewage

system are the property of the municipality.

FMp. 1,368.

BUFFALO, a name frequently misapplied

to the American bison, but more properly desig¬

nating a type of heavy oxen, of the tropics of the Old World, long domesticated in the Orient.

Buffalo are characterized by their long, angulated horns, broad and flat at the base, so as to form in some cases a shield over the forehead; and by their broad, splay feet, particularly adapted to wading in muddy waters, where

they mainly feed on aquatic grasses and other plants. There are three distinct species.

The largest and fiercest buffalo is the black <(cape,® or South African species (Bos caffer) found throughout the entire south of Africa, northward to Abyssinia. It reaches a length of six feet, and in old bulls the relatively short horns join at their bases, so as to form a helmet-like mass, which makes the head almost invulnerable. The horns curve ((outward, down¬

ward, and backward, and then forward, up¬

ward, and inward.® This buffalo is bluish—

black, and nearly hairless. Its chief enemies are the lion and man, whose combined efforts have greatly decreased its numbers. The

buffalo are warned of the approach of danger by the buffalo-birds (q.v.), which constantly hover near them. Another species (B. pnmilus) is widely scattered throughout the west and central parts of Africa. It is smaller than the more southern species, and is chestnut in color, rhe most widely domesticated of the buffalo is that of India (B . bubaliis), called <(arni®

(feminine (<arna®) by the Hindu. It differs greatly in appearance from the African species, having a cow-shaped head, and long, much

flattened, triangular horns, covered with trans¬

verse wrinkles, which curve regularly outwards and backwards toward the shoulder, and do

not form a buckler over the forehead. The bull is ashy-black in color, frequently with white feet, and is smaller than the African buffalo, never exceeding 16 hands at the withers. It is in the wild state an animal of tremendous

power and ferocity, and is regarded by sports¬

men as one of the most dangerous beasts of the jungle. It has long been employed in the rice-fields of the Orient, as far east as Japan; the ordinary ((water-buffalo® or ((carabao® of the Philippines is a small variety. It was long ago introduced into Egypt for service in the boggy lowlands of the Delta, and is now ex¬

tending up. the Nile to the lake regions of central Africa. A variety exists in the Niger Valley, and another, called ((sanga,® and dis¬

tinguished by its very long horns, is domesti¬

cated in Abyssinia. The Indian buffalo is also employed in marshy farming districts in Tur¬

key, Hungary, Italy and Spain, where it is able to work in ground too wet and soft for the other cattle, and to pasture upon coarse, marsh grasses. Its hide makes good leather, and its milk is excellent, and is greatly used in India for the making of the semi-fluid butter called (<ghee.® See Bison.

BUFFALO-BERRY, (Lepargyrea argentea), an American shrub of the family Elceag-naclce, occasionally cultivated in the Western plains

region for its edible berries, and planted for hedges, windbreaks and ornament to some extent elsewhere. The plant, which is some¬

times a tree, attains a height of about 18 feet, has thorny stems, small, silvery leaves, yellow¬

ish densely fascicled dioecious flowers at the nodes, and globular, one-seeded, yellow or red tart fruits, about the size of currants. The fruits make acceptable jellies and preserves.

The plants are readily propagated by means of seeds, cuttings and occasional suckers. They succeed in any good garden soil.

BUFFALO BILL. See Cody, William F.

BUFFALO-BIRD, any of several birds

which remain about cattle, and feed upon their parasites. Most of them are starlings (q.v.) of plain dark plumage, with the habit of

gathering into noisy flocks. Those of South Africa, almost always seen in company with

buffaloes and rhinoceroses, belong to the

genus Bnphaga, and are commonly termed

((ox-peckers,® ((beef-eaters® or ((rhinoceros—

birds.® They cluster upon the backs of these animals while they rest or slowly feed, and pick from them ticks and similar pests; and they also serve as watchmen for their hosts, arousing them by their cries whenever any¬

thing suspicious happens. The wild and tame buffaloes of the Orient are similarly attended by the starlings of the genus Eulabes. These wait about the villages until the cattle come 694

in from pasture at sunset, when the birds

throng about them, and relieve them of

troublesome insects, to the manifest comfort of the resting cattle. In Africa the larger mammals are frequently served in the same

way by certain small, white herons, also called ˆbuffalo-birds® by the colonists.

BUFFALO BUG. See Carpet Beetle.

BUFFALO-FISH, a large, coarse, fresh¬

water fish of which there are four varieties; three inhabiting the waters of the Mississippi Valley, and one the river Usumacinto in

Mexico. The formation of the head suggests

the name, for from the nose to the top of the shoulders it has . the high, humpy pitch of the bison. In Louisiana they are known as

ˆgourd-heads.® The common big-mouthed

buffalo-fish (Ictiobus cyprinella) reaches a length of three feet and a weight of 50

pounds. In the spring freshets of the Missis¬

sippi Valley, at spawning time, it swims in great shoals on to the Hooded marshes, where the receding waters make it an easy victim to the farmers, who kill great numbers of them for fertilizers. In body they are stout and of a dull, brownish-olive hue, not silvery, with dusky fins. The black, or mongrel, buffalo-fish (/. urns') has a smaller, more oblique mouth, and a much darker color ; the fins

being almost black. The small-mouthed or

white, buffalo-fish (/. bubalus) is the most abundant. It does not run so large as the common buffalo, 35 pounds being its limit.

In color it is pale, almost silvery. Consult Jordan and Evermann, (American Food and

Game Fishes. >

BUFFALO-GNAT, a fly allied to the

blackfly (q.v.), Simulium pccuarum, of the

family Siniuliidce, order Diptcra, a larger and more formidable species than the blackfly of the northern and subarctic regions. It attacks in the lower Ohio and the Mississippi Valley various domestic cattle, horses, sheep, poultry, dogs and cats, and is especially hurtful to mules and horses, killing many. # Hogs ‘show at first the effects of the bite but very little; yet large numbers die soon after the attack, while others die about six weeks after the disappearance of the buffalo-gnats; they

usually perish from large ulcerating sores,

which cause blood-poisoning. Animals bitten

by many buffalo-gnats show all the symptoms of colic, and many people believe that these bites bring on that disease. The animal at¬

tacked first becomes frantic, but within a very short time ceases to show symptoms of pain, submits passively to the affliction, rolls over and dies ; sometimes all within the space of three or four hours. Animals of various

kinds become gradually accustomed to these

bites, and during a long-continued invasion

but few are killed toward the end of it. The larvae are found more particularly attached to submerged logs, wholly or partly submerged

stumps, brush, bushes and other like objects in the larger creeks and bayous of the region to which they are common. They cluster to¬

gether, and fastened by the posterior pro¬

tuberance or by a minute thread, they wander and sway about, but do not venture above

the water. When fully grown the larvae

descend to near the bottom of the stream,

sometimes 8 or 10 feet, to make their cocoons.

The adult fly, on emergence from the pupa, rises quickly to the surface, runs a few inches over the water, and the wings expanding al¬

most instantly it darts away. The time of

appearance of the swarms is regulated by the earliness or lateness of the spring, and con¬

sequently it is much earlier in the southern parts of the Mississippi Valley. As a rule, they can be expected soon after the first continuous warm weather in early spring. In 1885 the

first swarms were observed in Louisiana, 11

March, in Mississippi and Tennessee, 1 May, and in Indiana and Illinois, 12 May. Their presence is at once indicated by the action of the various animals in the field. Horses and mules snort, switch their tails, stamp the

ground and show great restlessness and symp¬

toms of fear. If not harnessed to plow and wagon they will try to escape by running

away. Cattle rush wildly about in search of relief. Consult Osborn, Unsects Affecting

Domestic Animals> (Bulletin 5 n. ser. United States Department of Agriculture, Division of Entomology, 1896).

BUFFALO GRASS, a name applied to two

grasses of western North America, Bulbilis

dactyloides and Bouteloua gracilis, so called because they formed a large part of the food of the buffalo. Both are important forage

grasses. The latter is perhaps more widely

known as blue grama.

BUFFALO HISTORICAL SOCIETY.

Foremost among institutions of its kind west of New England and the older Atlantic sea¬

board cities is the Historical Society ot Buf¬

falo, N. Y. Founded in the spring of 1862, Millard Fillmore was its first president, and it was at his suggestion that 50 citizens of Buffalo agreed to pay $20 each per year for five years, thus founding the first maintenance fund in the institution. In President Fill-morels inaugural address, 2 July 1862, the

principal objects were stated to be to ((discover, procure and preserve whatever may

relate to the history of western New York

in general and the city of Buffalo in par¬

ticular.® For many years the Society occupied various leased quarters, with its small museum and dibrary; its progress was slow, but

throughout its more than 40 years of existence it has always included among its members

the most substantial and representative

families of Buffalo. Grover Cleveland was a member, and Wilson S. Bissell, afterward

Postmaster-General in President Cleveland's

Cabinet, was one of its managers. From 1887

to 1902, the society occupied rooms in the Buffalo Public Library building. The nucleus of a building fund has been formed bv a gift of $5,000 from Hon. James M. Smith, and

various building projects had been under

consideration when, in 1900, legislation inci¬

dent to the construction at Buffalo of a build¬

ing for New York State at the Pan-American Exposition opened the way for securing a

permanent and worthy home for the institution.

Mr. Andrew Langdon, president of the

Society 1894-1910, was the first to suggest an historical building on park lands and was tireless in his well-directed efforts to secure it. Assisted by the Hon. Wilson S. Bissell, he prevailed upon Governor Roosevelt to per-BUFFER — BUFFET

mit the employment of a local architect to design the New York State building at the

Pan-American Exposition and supervise its

construction. George Cary of Buffalo was

engaged for that purpose and designed the

beautiful building of Doric architectural style, that was used at the Pan-American Exposi¬

tion as the New York State building, and now houses the possessions of the Buffalo Histori¬

cal Society. Through the efforts of Senator Henry W. Hill, aided by Hon. Wilson S.

Bissell, Andrew Langdon and others, a bill

was enacted which enabled the State to ex¬

pend $100,000 out of its Exposition appropria¬

tion of $300,000 toward the erection of a

permanent building and also provided for

adding thereto $25,000 from the city of Buf¬

falo and funds from the Historical Society, said building to be placed on park lands and at the close of the Exposition to become the property of the Historical Society, the city being bound to make an annual appropriation toward its maintenance. Under this agree¬

ment a building was erected in Delaware Park at a cost of some $200,000. The only per¬

manent building connected with the Pan-American Exposition, it has the added interest of being the scene of President McKinley's

last public reception, 5 Sept. 1901, prior to that held the next day in the Temple of

Music at which he received the wound from

which he died 14 September.

The Historical Building stands in a beauti¬

ful and easily accessible site in Delaware

Park, the principal park of Buffalo. It is 130

by 80 feet in dimensions, 50 feet high, per¬

haps the most notable example in America of the Doric order of architecture. It is of white marble, the northern faqade faced with three-quarter columns, the south side having a

portico 61 by 17 feet, embellished by 10 Doric columns and approached by marble steps 40

feet in width. The columns are of the same proportions as those of the Parthenon, three feet six inches in diameter at base. Within the chief structural material is black marble.

Standing on sloping ground, the edifice has three available floors, the basement being for the most part but little below the ground level.

In the middle of the main floor is the grand hall, two stories high and lighted, as is the upper floor, by side windows and skylights.

The library, lecture-hall and administrative

offices are on the main floor, the museum and portrait galleries above. A notable feature

of the building is the massive bronze doors, presented by Andrew Langdon, the design of

J. Woodley Gosling, the sculptural work by

R. Hinton Perry, the principal panels bearing female figures typifying ˆHistory® and “Eth¬

nology® ; the bronze transom contains a group showing “Science® and “Art.® In the central hall is a bronze stalie of Lincoln, Charles H.

Niehaus, sculptor, a gift to the Society from the Lincoln Birthday Association of Buffalo, now affiliated with it. Here also have been erected bronze tablets, in memory of two resi¬

dents of Buffalo who became Presidents of

the United States, Millard Fillmore and

Grover Cleveland.

Mr. Langdon's gifts include bronze and

marble busts and tablets, antique Italian can¬

delabra, *etc.* Mr. Langdon was also the donor to the city and to the Buffalo Historical So¬

ciety of the replica in bronze of the "David®

by Michelangelo that adorns that part of

Delaware Park facing the Buffalo Historical

Society building; it is the only replica of this work in America.

The museum includes the Dr. F. H. James

coin and medal collection, valued at $15,000; the Dr. Joseph C. Greene collection of Egyp¬

tian and Oriental articles, casts, *etc.* ; the Cot¬

tier, Scoville and other Indian collections ; the Atkins Alaska collection ; the Civil War and Lincoln collection of Julius E. Francis,

founder of the Lincoln Birthday Association ; the William A. Galpin collection of Washing¬

ton and Lincoln portraits and engravings illus¬

trating great events in American history; and many relics of the pioneer days in western New York and on the Great Lakes. Many

• articles formerly belonging to President Mil¬

lard Fillmore are shown, as are relics of

Lincoln, Grant and other Presidents and

famous men. The Historical Society library

(40,000 volumes) is a free reference library, chiefly devoted to American history. It in¬

cludes the special collection known as the

Dr. John C. Lord library, owned by the city of Buffalo, but cared for by the Historical Society, and the private library of Mrs. Mil¬

lard Fillmore. It is also rich in manuscript material relating to western New York and

the Great Lakes.

The Society is active in historical publish¬

ing, having issued 19 volumes — 15 of them since 1902; some miscellaneous in character, others of national scope and interest. Among them are the works of Hon. Henry W. Hill, president of the Society since 1910, on New York State waterways, canals and allied

topics; the (Millard Fillmore Papers) (2

vols.), being the correspondence, addresses,

etc., of President Fillmore, collected and

edited by Frank H. Severance, secretary of the Society. Several other volumes by this writer present various phases of Niagara regional

history. The Buffalo Historical Society makes its collections and facilities free to the public, maintains courses of lectures and co-operates with the schools and other organizations of Buffalo. Its building is one of the most use¬

ful as well as one of the most interesting and beautiful places in Buffalo.

BUFFER, any elastic apparatus or cushion

attached to the end of a car to receive and absorb shocks caused by other cars running

against it. The term is generally applied to those attachments in which springs are used to give the apparatus elasticity. In the Linked States the buffers used on passenger cars are composed of a head, bar and stem and are

placed at the centre of each end of the car.

The stem passes through the spring and beam, and the shoulder thus formed bears against

the spring by means of a plate which bears and rubs against the opposing plate of the next car of the train. On English railways they are placed in pairs at each end, and are fastened by rods to springs under the frame¬

work to deaden the concussions caused when

the velocity of part of the train is checked.

BUFFET, Louis Joseph, French politician:

b. Mirecourt, Vosges, 26 Oct. 1818; d. 1898.

In 1848 he was elected to the Chamber of

Deputies from the Vosges, and held the posi¬

tion of Minister of Commerce and Agriculture under the presidency of Louis Napoleon. He

then took a prominent part in the “Tiers Parti, which sought to join liberal reforms to loyalty to the government, later becoming its leader.

He became a member of M. Emile Ollivier’s

Cabinet in January 1870, occupying the port¬

folio of Minister of Finance, but after only three months’ service resigned. In 1871 he was again elected to the National Assembly, of

which he was elected president to succeed M.

Jules Grevy, 4 April 1873. In 1875 he formed a new Cabinet, becoming himself vice-president of the council and Minister of the Interior, but owing to his having made himself unpopular

with the members of his own party, he failed of re-election to the Assembly, and resigned his seat in the Cabinet in 1876. He was, how¬

ever, in June of the same year elected a life member of the Senate.

BUFFET, buf-fa’, anciently a little apart¬

ment, separated from the rest of the room, for the disposing of china, glass, *etc.* It is now a piece of furniture in the dining-room, called also a side-board, for the reception of the plate, glass, *etc.* In France many mansions

have a detached room called buffet, decorated with pitchers, vases, fountains, *etc.* The word is very commonly applied to the space set

apart for refreshments in public places.

BUFFINGTON, Adelbert Rinaldo, Amer¬

ican army officer: b. Wheeling, W. Va., 22

Nov. 1837. He was graduated at the West

Point Military Academy 1861 ; was brevetted major in 1865, and was commander successively of the United States ordnance depot at Wheel¬

ing, W. Va., and of the arsenals in New York, Baton Rouge, Watertown, Mass., Watervliet,

Indianapolis, Pittsburgh, Springfield, Mass.,

and Rock Island. In 1899 he was appointed

chief of ordnance and was raised to the rank of brigadier-general; was retired in 1901. He is the inventor of depressing carriages for heavy guns, light steel artillery and shielded machine gun carriages, novel road and recoil brakes, magazine small arms and parts of

small arms ; of which all that were used by the United States government were given to

it without cost. He is a life member of the Graduates' Association of the United States

Military Academy, the Luther Burbank Society and the American Tract Society.

BUFFLEHEAD, a small plump duck of

American inland waters (Chcirionetta albeola), remarkable for its beauty of coloring. It is about 13 inches in length, and the plumage of the drake is black and white, with the crested head, shaped like a puff-ball, rich, silky, changing green. The female is smaller, and

more protectively colored in a dull-brown

plumage, with white markings. Its food con¬

sists of larvae, shells, seeds, etc., and it fre¬

quents gravelly shores and wooded ponds,

breeding in holes of trees and burrows, from the Great Lakes northward to the Arctic Circle.

It lays about 12 large, dark-colored eggs. It is of small value to the sportsman, and requires little skill in shooting, except when on the wing, at which time it is remarkable for the speed with which it flies, and the peculiar whistling sound of its wings, It is sometimes called "butterball,® because of its roundness, and (<spiritduck,)) a name derived from the In¬

dians, owing to its faculty for vanishing and reappearing from the surface of the water

with amazing skill.

BUFFON, bii-fon, George Louis Leclerc

(Comte ue), French naturalist of distinction: b.

Montbard, Burgundy, 7 Sept. 1707 ; d. Paris, 16

April 1788. He received from his father, Ben¬

jamin Leclerc, counsellor to the Parliament of his province, a careful education. Chance con¬

nected him at Dijon with the young Duke of Kingston, whose tutor, a man of_ learning, in¬

spired him with a taste for the sciences, They traveled together through France and Italy, and Buffon afterward visited England. In order

to perfect himself in the language without

neglecting the sciences, he translated Newdoffis fluxions,* and Hales' (Vegetable Statics, }

After some time he published some works of his own, in which he treated of geometry, nat¬

ural philosophy and rural economy, He laid

his researches on these subjects before the Academy of Sciences, of which he became a

member in 1733. The most important were on the construction of mirrors for setting bodies on fire at a great distance, as Archimedes is said to have done, and experiments on the

strength of different kinds of wood, and the means of increasing it, particularly by removing the bark of the trees some time before felling them. Buffon, in his earlier years, was ani¬

mated only by an undefined love of learning and fame, but his appointment as superintend¬

ent of the Royal Garden (now the Jardin des Plantes), in 1739, gave his mind a decided turn toward that science in which he has immor¬

talized himself. Considering natural history

in its whole extent, he found no works in this department but spiritless compilations and dry lists of names. There were excellent observa¬

tions indeed on single objects, but no compre¬

hensive work. Of such a one he now formed the plan, and to aid him in this, by examining the numerous and often minute objects em¬

braced in his plan, he associated himself writh Daubenton, and after an assiduous labor of

10 years, the two friends published the three first volumes of the 'Natural History0; and, between 1749 and 1767, 12 others, which com¬

prehend the theory of the earth, the nature of animals and the history of man and the viviparous quadrupeds. The most brilliant parts of them, the general theories, the descriptions of the characters of animals, and of the great natural phenomena, are by Buffon. Daubenton

limited himself to the description of the forms and the anatomy of the animals. The nine

following volumes, wffiich appeared from 1770

to 1783, contain the history of birds, from wffiieh Daubenton withdrewˆ his assistance.

Buffon published alone the five volumes on

minerals, from 1783 to 1788. Of the seven

supplemental volumes, of wffiieh the last did not appear until 1789, after his death, the fifth formed an independent whole, the most celebrated of all his works. It contains his 'Epochs of Nature,* in which the author, in a style truly sublime, and with the triumphant power of genius, gives a second theory of the earth, yery different from that which he had traced in the first volumes, though he assumes

at the commencement the air of merely defend-BUFFOON — BUFORD

ing and developing the former. This great

labor, with which Buffon was occupied during 50 years, is, however, but a part of the vast plan which he had sketched, and which has

been continued by Lacepede in his history of the different species of cetaceous animals, rep¬

tiles and fishes, but has remained unexecuted as far as regards the invertebrate animals and the plants. There is but one opinion of Buffon as an author. For the elevation of his views, for powerful and profound ideas, for the

majesty of his images, for noble and dignified expression, for the lofty harmony of his style in treating of important subjects, he is per¬

haps unrivaled. His pictures of the sublime scenes of nature are strikingly true, and are stamped with originality. The fame of his

work was soon universal. It excited a general taste for natural history, and gained for his • science the favor and protection of nobles and princes. Louis XV raised the author to the dignity of a count, and D'Argivilliers, in the reign of Louis XVI, caused his statue to be erected, during his life, at the entry of the Royal Cabinet of Natural Curiosities, with the inscription ((Majestati naturae par ingenium.®

The opinions entertained of Buffon as a natural philosopher and an observer have been more

divided. Voltaire, D'Alembert, Condorcet,

have severely criticized his hypotheses and his vague manner of philosophizing from general

views. But although the views of Buffon on the theory of the earth can no longer be de¬

fended in detail, he will always have the merit '

of having made it generally felt, that the pres¬

ent state of the earth is the result of a series of changes which it is possible to trace, and of having pointed out the phenomena which indi¬

cate the course of these changes. His theory of generation has been refuted by Haller and Spal¬

lanzani, and his hypothesis of a certain in¬

explicable mechanism to account for animal

instinct is not supported by facts; but his eloquent description of the physical and moral development of man, as well as his ideas on the influence which the delicacy and development of each organ exert on the character of different species of animals, are still of the highest interest. His views of the degeneracy of ani¬

mals, and of the limits prescribed to each species by climates, mountains and seas, are real discoveries which receive daily confirma¬

tion, and furnish to travelers a basis for their observations, which was entirely wanting be¬

fore. The most perfect part of his work is the (History of Quadrupeds > ; the weakest, the (History of Minerals.* Buffon was of a noble figure and of great dignity of manners.

His conversation was remarkable for a sim¬

plicity which strikingly contrasted with the style of his writings. The best edition of his (Natural History* is that published from 1749—89, in 36 volumes.

BUFFOON (Italian buff one), a comic

‘rigfnger ‘ih’ the opera buffa, or the Italian inter¬

mezzo. The Italians, however, distinguish the buffo cantate, which requires good singing,

from the buffo comico, in which there is more acting. Buffoonery is the name given to the jokes which the buffoon introduces. The word is

no doubt borrowed from the Low Latin,

in which the name buffo (cheeked) was given to those who appeared on the theatre, with their cheeks puffed up to receive blows on them, and to excite the laughter of the spec¬

tators. Afterward the name came to signify

a mimic, a jester in general.

BUFO, a genus of batrachians, the type of

the family Bufonidce. The body is inflated, the skin warty, the hind feet of moderate length, the jaws without teeth, the nose rounded. At least 20 species are known.

BUFON1TE, literally, toad -stone ; a name

given to the fossil teeth and palatal bones of fishes belonging to the family of Pycnodonts .(thick teeth), whose remains occur abundantly in the Oolitic and Chalk formations. The term bufonite, like those of serpents' eyes, batra-chites and crapaudines, by which they are also known, refers to the vulgar notion "that those organisms were originally formed in the heads of serpents, frogs and toads.

BUFORD, John, American soldier : b. Ken¬

tucky, 1825; d. Washington, D. C., 16 Dec. 1863.

He was graduated at West Point in 1848; was appointed to the 1st Dragoons, and served in the Sioux expedition, 1855, in the Kansas dis¬

turbances of 1856-57, and in the Utah expedi¬

tion, 1857-58. On 12 Nov. 1861 he was ap¬

pointed major in the inspector-general's corps, attached to General Pope's staff, 26 June 1862, made a brigadier on 27 J uly, and commanded a cavalry brigade under Hooker in the northern Virginia campaign. He was chief of cavalry

in the Maryland campaign, and succeeded Gen¬

eral Stoneman on McClellan's staff. He took part in the engagement at South Mountain,

Antietam, Fredericksburg and Beverly Ford;

and at Gettysburg began the attack before Rey¬

nold's arrival on 1 July, and rendered import¬

ant services at Wolf's Hill and Round Top.

After the engagement at Culpeper he pursued the enemy across the Rapidan, and cut his way to rejoin the army north of the Rappahan¬

nock. His coolness, fine judgment and splen¬

did courage were notable, and in a few months he acquired an influence over men as remark¬

able as it was useful. His military sagacity was far-reaching and accurate, and made him one of the most trusted and respected officers in the service, and his death, caused by disease contracted during months of active service and constant exposure, was widely lamented in the army. A major-general's commission reached

him the day he died, and a monument to his memory was placed on the Gettysburg battle¬

field in 1895.

BUFORD, Napoleon Bonaparte, Ameri¬

can soldier: b. Woodford County, Ky., 13 Jan.

1807 ; d. 28 March 1883. He was graduated at West Point, 1827, did garrison duty in Virginia and Maine as second lieutenant in the 3d

Artillery, and was assistant professor of nat¬

ural and experimental philosophy at the

Military Academy, 1834-35, when he resigned

his commission, became an engineer in the

service in the State of Kentucky, 1835-42,

and a merchant and iron founder at Rock

Island, Ill., 1843-61, being president of the Rock Island & P. Railway, 1857-61. He entered the Civil War as colonel of the 27th Illinois Volun¬

teers, took part in the battle of Belmont, 7 Nov.

1861, the attack on Island No. 10 in the Missis¬

sippi River, March-April 1862, captured Union 698

City, Ky., 31 March 1862, took part in the expe¬

dition to Fort Pillow, the siege and battle of Corinth, and the siege of Vicksburg, February 1863. On 24 Aug. 1865, he was mustered out of service with the rank of brevet-major-general of volunteers, conferred for gallant and meri¬

torious services during the Rebellion. He was special commissioner of Indian affairs during 1868, and for inspecting the Union Pacific Rail¬

road, 1867-69. During the negotiations after the battle of Belmont the Confederate Gen.

Leonidas Polk wrote of Buford, whom he had known at West Point: <(He is as good a fellow as ever lived and most devotedly my friend —a true Christian, a true soldier and a gentle¬

man every inch of him.®

BUG, an insect of the order Hemiptera.

Bugs are characterized by the beak-like suck¬

ing mouth-parts, composed of the mandibles

and maxillae, which are ensheathed by the large expanded labium; by the free, large prothorax, the usually angular short body, and the irregu¬

larly veined wings, the veins being but few in number, while the fore wings are often half coriaceous and thick. The metamorphosis is

incomplete. There are many wingless parasitic forms, and many aquatic species.

The triangular head is nearly always sunken into the prothorax, and is small in proportion to the rest of the body; the eyes are small, nearly globular, and very prominent, and the three ocelli are set far back, while the short, bristle-like, or filiform antennae, with from 5 to 13 or more joints, are inserted below and far in advance of the eves, so that the front is broad and flat. The parts of the mouth form a four-jointed, solid, hard beak. The mandibles and maxillae are long and style-like, the iatter with¬

out palpi ; they are ensheathed at their base by the canaliculate labium, which has obsolete

palpi. The labium is well developed, being

generally acutely triangular. The thorax is like that of beetles, the prothorax being broad above, and the wings, when folded, concealing the rest of the body. The legs are situated close to¬

gether, with coxae and trochanters very similar to those of the Coleoptera. The body is usually very flat above, or, in the more or less cylindri¬

cal species, somewhat broad and flat. The body is less concentrated headwards than in the

Coleoptera, though much more so than in the Orthoptera, and in this respect, as well as in other essential characters, the group is inter¬

mediate between these two orders. Both pairs of wings are very equal in size and alike in shape, except in the higher families, where they are very unequal, the hinder pair being very small.

The legs are slender, and often very long, owing to the great length of the femora and tibiae, while the tarsi, like those of the lowest Coleoptera , are two-or three-jointed. The ab¬

domen has six to nine segments apparent,

though the typical number is 11. The stigmata are very distinct, being often raised on a tubercle. On the basal ring of the abdomen are two cavities in which are sometimes seated

vocal organs, as in the male cicada, and in the metathorax of some species are glands for se¬

creting a foul odorous fluid. In the Cicadidcu and Phytocoris the ovipositor is perfect and much as in the saw-flies and wasps.

The active nymphs of the Hemiptera , like

those of the locusts, resemble closely the imago, differing mainly in possessing the rudiments of wings, which are acquired after the second

molting. After two changes of skin (four in all) they assume the pupa state, which differs mainly from that of the larva in having larger wing-pads. While the development of the

imago ordinarily occupies the summer months, in the Aphides it takes but a comparatively few days, but in the 17-year cicada as many years as its name indicates. An exception to this mode of development is seen in the nymph of the male coccus, which, somewhat as in the higher orders, spins a silken cocoon, and changes into an inactive pupa. Apterous individuals, especially females, sometimes occur, especially in the aquatic Hydrometra, V elia and Limno-bates, and in many other genera the hind pair of wings are often absent. There are about 50,000 species living and fossil. Some species are of great size, especially the Hydrocores, a division containing the aquatic genera, V elia, Ncpa, Belostoma and N otonecta, and which

first appeared in the Jurassic formation. But the oldest known fossil insect (Protocimex

silurica) was apparently a bug; traces of one wing having been found

in the Upper Ordovi¬

cian beds of Sweden. Consult Packard, (Guide to Study of Insects) (1889) ; (Entomology for Beginners) (1899); Comstock, (A Manual for

the Study of Insects) (1895) ; Sharp, Unsects (1899).

BUG, two rivers in European Russia. One

rises near the confines of Volhynia, in the northwest of government Podolsk, and pro¬

ceeds first east and then southeast to Oliviopol, where it enters government Kherson, which it traverses almost centrally from north to south, and falls into the estuary of the Dnieper, near Kherson. Its chief affluents are the Ingul, Balta, Tchertal and Solonicha. It has a course of 500 miles, but its navigation is greatly ob¬

structed by rocks and sandbanks. The second river rises in Galicia and joins the Vistula at the fortress of Novogeorgieosk, about 20 miles north-northwest of Warsaw. It is navigable

for nearly 300 miles.

BUGASON, boo-ga-son', Philippines, a

town on the island of Panay. Pop. estimated about 15,000.

BUGBANE, a genus of herbs (Cimici -

fuga), of the family Ranunculaccce, tall peren¬

nial plants, of which some 10 species are natives of the northern temperate regions, and are

often planted, in spite of their disagreeable odor, for ornamental purposes in hardy borders in exposed places or in partial shade. The species have large decompound leaves, and

racemes of white flowers, which appear during summer and early autumn. In some species

the fruits are attractive in appearance. One species, black cohosh, or black snakeroot (C.

racemosa) is used in domestic and rural medi¬

cine as an infusion for various ailments.

BUGEAUD DE LA PICONNERIE, bii—

zho-de-la-pe-kdn-e-re, Thomas Robert (Due

uIsly), marshal of France: b. Limoges, 15

Oct. 1784; d. Paris. 10 June 1849. He. be¬

longed to an Irish family which had settled in France with James II on his abdication. He

entered the army in 1804 as a grenadier, was corporal at Austerlitz, made the campaigns of Prussia and Poland, and was wounded at Pultusk in 1806. He afterward went into Spain as lieutenant adjutant-major, gained new promo¬

tion and remained with the army of Aragon

till 1814. During these long wars he repeat¬

edly distinguished himself, and received hon¬

orable mention from Suchet, his commander-in chief. On the restoration of the Bourbons he gave his adhesion to them ; but on the land¬

ing of Bonaparte, followed the general example by deserting to his old master. After the revo¬

lution of 1830 he was appointed marechal de camp, and in 1831 obtained a seat in the

Chamber of Deputies, where he often displayed great good sense, though in a style of oratory so blunt and rustic as occasionally to excite the risibility of his opponents. He was after¬

ward sent to Algeria, where he gained many advantages over the Arabs, and showed him¬

self possessed of the kind of talents necessary to cope successfully with them and their cele¬

brated leader, Abd-el-Kader. On the revolu¬

tion of 1848, it is said that, if permitted, he would have effectually put down the insurgents and secured the throne to Louis Philippe. He yielded in his adhesion to the republic, but re¬

mained unemployed. He was better received

by President Louis Napoleon, who appointed

him commander-in-chief of the army of the

Alps.

BUGENHAGEN, boo-gen-ha'gen, Johann,

called Pomeranus, or Doctor Pommer, German

reformer : b. Stettin 1485 ; d. Wittenberg, 20

April 1558. He fled from his Catholic superiors to Wittenberg in 1521, where he was made, in 1522, professor of theology. Luther derived

assistance from his profound exegetical learn¬

ing in preparing his translation of the Bible.

In 1525 he gave occasion for the controversies about the sacrament, by a work against Zwinglius on the communion. He acquired more

reputation by his Unterpretatio in Librum

PsalmortmL (1523). He effected the union

of the Protestant free cities with the Saxons, and introduced into

Brunswick, Hamburg, Liibeck, Pomerania, Denmark and many other

places the Lutheran service and Church dis¬

cipline. For the Lower Saxons he translated the Bible into Low German (1533). He was

a faithful friend to Luther, and delivered his eulogy. Together with Melanchthon, he com¬

posed the (Interim of Leipzig. } He wrote also a (History of Pomerania.)

BUGGE, bug'ge, Elseus Sophus, Norwe¬

gian philogist : b. Laurvig 1833 ; d. Christiania, 8 July 1907. After obtaining an education at the Universities of Christiania, Copenhagen,

and Berlin he was made professor of compara¬

tive philology and Old Norse, at Christiania.

He was an eminent authority on northern lan¬

guages and among his works are an edition of the songs of the Edda, (Norroen FornkvoedP

(1867); (Gamle norske Folkeviser) (1858);

(Norroene Skrifter of sagnhistorik Indhold)

(]864_73); and a notable edition of the Vol-sunga and Hervarar sagas. An English trans¬

lation was published under the title (The Home of the Eddie Poems) (London 1899). He was

a most brilliant scholar and made very fine studies in the Romance, Celtic, Oscan, Umbrian and Etruscan languages.

BUGGE, Thomas, Danish astronomer : b.

Copenhagen, 12 Oct. 1740; d. 15 June 1815.

After Tycho Brahe, he was the greatest astron¬

omer of Denmark. First officiating as pro¬

fessor, he afterward spent most of his time in traveling abroad, and was sent to Paris in 1798 to confer with the commission of the French Institute on the subject of the intro¬

duction of uniform weights and measures, on which occasion he was made a member of that learned body. He has left many valuable

works on mathematics and astronomy.

BUGGY, a name given to several species of

carriages or gigs : In the United States a light one-horse four-wheeled vehicle with or without a hood or top ; in India, a gig with a large hood to screen those who travel in it from the sun's rays; in England, a light one-horse two¬

wheeled vehicle without a hood.

BUGIARDINI, boo-jar-de'ne, Giuliano,

Italian painter (also known under the Latin¬

ized form of his name, as Tulianus Floren—

tinus) : b. Florence, 29 Jan. 1475; d. 16 Feb.

1554. He studied under Ghirlandajo and Al—

bertinelli, and collaborated with Michelangelo.

Among his best works are (The Martyrdom of Saint Catherine } ; (Betrothal of Saint Catherine) ; (J°Im the Baptist* ; (Virgin with Saints) ; (Virgin with John the Baptist.*

BUGIS, boo'jez, a people of the Indian

archipelago, chiefly inhabiting Macassar and

Boni, in the island of Celebes. They profess the religion of Islam, have a literature and alphabet of their own and have more liberal governmental institutions than any of the other peoples of the Celebes. They are muscular,

middle-sized and of a light-brown color, some being even fair. Their dress consists of a piece of red or blue striped cotton, which they wrap about their loins, and pass between their legs. They bind their jet-black hair very taste¬

fully, in a red or blue cotton handkerchief.

They pluck out the hair of their beards, and ornament their arms and legs with brass wire above the wrists and ankles, and to these the children attach bells. They are, to a notable degree, proud, passionate, revengeful and

crafty ; yet they are regarded as the most civil¬

ized of the natives of Celebes, and are the chief trading people in the Malay archipelago.

Their fondness for commerce has led to their settling in many places out of Celebes, and a (<Bugis quarter** is to be found in most of the large towns of the different islands. They

build ships of 50 or 60 tons burden, and their voyages extend from Sumatra to New Guinea.

From Macassar the voyage begins with the

cast monsoon, the prahus trading as they pro¬

ceed west until they reach Rhio, and even

Malacca and Acheen, when they are prepared

to return with the change of the season. They take with them native cotton cloths, gold-dust, nutmegs, silver dollars, birds'-nests, camphor, benzoin or frankincense and tortoise shell; and return with European broadcloths and cottons, opium, unwroght iron and tobacco, which

they partly seil at the intermediate ports as they sail homeward. This is their most im¬

portant voyage, but they make many subordi¬

nate ones for collecting birds'-nests, feathers, tortoise shell, trepang and other articles of commerce. Consult ten Brink, P. B. van S., (Zuid Celebes) (1884).

BUGLE, a wind instrument of far carry¬

ing and penetrating tone used for signalling.

It is generally made of copper or brass and in its commonest form is devoid of all valves and keys. It can thus produce only certain notes, and those most commonly employed in the calls are contained in the major triad. In shape the bugle is a long, gradually tapering tube, bent three or four times to ensure portability, has no regular bell, but ends in a tapering cone.

It is usually made tuned in B-flat, C, E-flat.

More complicated instruments are made with

keys and valves but are of no use in the sym¬

phony orchestra, and the ordinary one described above is the one generally employed in the army. The infantry bugle has a narrower tube, is not bent so many times and has a more clearly marked bell. The history of the bugle dates from the very earliest times, having its archetype in the old ram or bull's horn. The corresponding wind instrument in Hebrew

times was the shofar. In Rome it was also used for military purposes. We even find in the British Museum a bugle which dates back to the Bronze Age in Denmark. In the Middle Ages the word was applied to the ox or its horns, whether used for drinking or music. As a military instrument in England it was intro¬

duced in the 1 7th century.

BUGLE, a shining elongated glass bead,

usually black, used in decorating women's ap¬

parel and also in trafficking with savage tribes.

BUGLE CALLS. The soldier's day usually

begins with a march played by the drummers to awaken him in the morning. About five

minutes thereafter the first call is sounded, to warn of reveille five minutes later still. Soon there follows the assembly for morning roll-call, and after this the mess-call, familiarly known as the ((come-and-get-it.® After morn¬

ing mess, first call is again sounded, to warn the men to prepare for drill, schools or some other formation, the nature of which is indi¬

cated by the next call. Each formation is

immediately preceded by the assembly. The

adjutant's call is the signal for the formation of battalions from companies or regiments from battalions. The morning's work is terminated by the recall. In the afternoon a similar se¬

quence of calls is gone through. At about

half-past five in summer there is a formation for retreat. Retreat is played with the troops at ((parade rest.® At (<to the color,® which fol¬

lows immediately, the troops present arms.

After evening mess and any school calls that may follow, the next call is the tattoo , to warn that all men should return to quarters and that work is over for the day. At call to quar¬

ters, half an hour thereafter, all men must be in their quarters, and in 15 minutes taps fol¬

lows, at which all lights must be extinguished and all noise must cease. Taps is also played over the grave of a dead soldier. Besides these calls there are several warning calls, such as the alarm, the fire

call, to arms!, to horse!, fix bayonets! , to the charge!, charge! Other calls indicate the equipment or uniform, such as

boots and saddles, overcoats, *etc.* Still other calls are employed in various ceremonies.

BUGLE-WEED, a genus of hardy herbs

\Ajuga), of the family Menthacece, mostly na¬

tives of the cooler parts of Europe and Asia, but cultivated for ornaments in many temper¬

ate countries. The plants have many whorls, usualy of blue, purple, pink or white flowers, and are useful for planting in the rear of bor¬

ders. They are readily propagated by seeds or division. Some of the species have escaped

and may be found growing wild on moist land and in the borders of woods.

BUGLOSS, a popular name for various

species of the genera Anchusa, Lycopsis and Echuim, of the natural order Boraginacece.

Several species of Anchusa, which is also

known as alkanet, are cultivated for ornament.

They are hardy, have blue or purple blossoms in panicled racemes, which are used as cut flowers. The plants are easily raised from seed and thrive well in sunny places. The species of Lycopsis, to which some botanists restrict the name bugloss, are not cultivated in Amer¬

ica, but in some parts of Europe certain ones, especially L. arvensis, are considered weeds.

Several species of Echium, popularly known as viper's bugloss, are cultivated under glass in Europe and America, especially in California,

where three species are grown out of doors.

They are coarse herbs or shrubs which bear beautiful spikes of very numerous white, blue, red or violet flowers with prominent stamens.

They are particularly useful where the soil is too poor for many other garden plants, because they produce more numerous and more highly-colored blossoms upon such soils than upon

rich soil. Indeed, upon rich soil they may fail to blossom altogether.

BUGONG MOTH, a species of owlet—

moth Agrotis spina of the family Noctuidce. It occurs in millions in certain localities in Vic¬

toria, Australia. It hibernates as a moth, and in this stage was formerly an important article of food with the native tribes.

BUGONIA MYTH, also ((Bugonia lore,®

((Bugonia craze® and ((Bugonia superstition.®

For more than 2,000 years a superstition has prevailed among the masses that besides the usual production of honey-bees in hives, they originated by spontaneous generations from

the carcasses of dead animals, and chiefly from those of oxen. Thus, says Osten Sacken, arose in Greece the term Bugonia (from Bo/zg ox; and Tovrj progeny) as well as the Latin names Bugenes melissae or Taurigenae apes, (<oxen-born bees.® Greeks, Carthaginians and Romans spoke of the Bugonia as an everyday occur¬

rence. The poet Archelaus calls them the <(factitious progeny of a decaying ox.® This super¬

stition has also prevailed in northern Africa and some parts of Asia; it continued to exist through the Middle Ages and survived till the 16th and 17th centuries, being mentioned by Rcdi, Aldrovaldi (1602), while Melanchthon

regarded it as a divine provision. The orig¬

inal cause of this delusion, which has been finally exploded by Osten-Sacken, lies in the fact that a fly which mimics the honey-bee in shape and its hairy clothing (Eristalis tenax, of the order Diptera), and which breeds in the carcasses of animals, has always been mistaken for the honey-bee. It is a true fly, with only one pair of wings and no sting, and is a little stouter and larger than a honey-bee. Its larva is the (<rat-tailed maggot,® that lives in open cess-pools, sewers, etc., and decaying carcasses BUHACH — BUILDING

on which the corrupt liquid forms during the secondary stage of putrescence. The Bugonia

myth is, as showm by Osten-Sacken, the founda¬

tion of Samson's riddle; the supposed honey¬

bee issuing from the lion's carcass was evi¬

dently the Eristalis fly. This insect is now distributed over a greater part of the world and is abundant in the United States. It was first detected at Cambridge, Mass., in 1875 by Osten-Sacken himself. Consult Osten-Sacken

on the Oxen-born Bees of the Ancient (Bugo¬

nia) and their relation to Eristalis tenax.

BUHACH, a preparation for destroying in¬

sects made by grinding the flower-heads of cer¬

tain species of chrysanthemums.

BUHL, bool, Frants, a Danish philologist

and Arabian and Oriental scholar : b. Copen¬

hagen 1850. He was educated at the Metro¬

politan School, later studied theology and made special studies in Oriental languages. At the age of 30 he was appointed lecturer and, 10

years later, professor of Old Testament theol¬

ogy at the University of Leipzig. In 1898 he was called to the University of Copenhagen to fill the chair of Semitic and Eastern philology.

He wras university rector in 1911-12. Among Buhl's published works are (Den gammeltesta-mentlige Skriftoverlevering) (1885) ; (Jerusa¬

lem paa Christi og Apostlenes Tid) (1886) ; (Fortolkning til Jesaja* (1889-94) ; (Palaestina >

(1890) ; (Det israelitiske Folks Historie)

(1893) ; (Psalmerne eversatte og fortolkede*

(1900); (Muhammeds Lif) (1903).

BUHLWORK, a description of inlaid

wrork, consisting at first of inserting a brass scroll or pattern in a ground of dark-colored tortoise-shell or wood ; but at a later period the use of wood of a different color, instead of metal, was introduced by Reisner, and to his process the modern practice of buhlwork is

chiefly confined. It consists in cutting out a pattern from two veneers of different colored woods, which are glued together with a piece of paper laid between them ; the pieces are then separated by running a thin knife through the paper, the patterns are carefully taken out, and the figure removed from the one veneer is

inserted into the cavity of the other, the dust of the wood being rubbed in to fill the inter¬

stices. A little glue is then rubbed in, and the work laid aside to dry, after which it is ready to be glued to the box or piece of furniture which it is wished to ornament. The cutting of the pattern is effected by the use of a very fine saw, of the kind known as a key-saw, which can readily be made to run around the sinuosi¬

ties of the patterns. The suitable designs for this work are continuous figures like a running vine or the honeysuckle, the saw completing these without the necessity of discontinuing the work to commence anew. Two pieces of buhl¬

work are thus produced; but three are fre¬

quently obtained by gluing together three pieces of wood and cutting out in the same manner.

It is not, however, found expedient to combine a greater number of pieces. The French term for buhlwork and all sorts of inlaid work is marqueterie. The name buhl is derived from

a French cabinetmaker, Andre Charles Boulle or Boule, formerly miscalled Buhl, b. 1642; d.

1732. He raised cabinetmaking to an art in¬

dustry, and Reisner, above mentioned, was a German contemporary of Boulle's.

BUHLER, bii'ler, Johann Georg, German

Orientalist: b. Berstel, Hanover, 19 July 1837; d. April 1896. He pursued his studies in Gottin¬

gen, Paris and London, and in 1863 accepted the chair of Oriental languages in Elphinstone College, Bombay. Among his other labors

while in India, he undertook tours into various provinces in search of ancient manuscripts, por¬

tions of his collections going to enrich the libraries of European universities. Returning from India in 1880, he became professor of Sanskrit and Indology in the University of

Vienna. The breadth and accuracy of his

knowledge in various departments of Oriental learning made him an ultimate authority. He collaborated in 1868 in the establishment of the Bombay Sanskrit Series, in 1867-84 in the pro¬

duction of a 'Digest of Hindu Law,* and in 1887 in the founding of the (Wiener Zeitschrift fur die Kunde des Morgenlandes.* His work

upon the (Grundriss der Indo-Arischen Philologie und Alterthumskunde* was interrupted by his death from drowning in Lake Constance.

BUHRSTONE (ber), or BURRSTONE,

a variety of quartz containing many small, empty cells, which give it a peculiar roughness of sur¬

face. They are used principally as millstones.

The best kinds are creamy-white, with a granu¬

lar and somewhat cellular texture, and are ob¬

tained in the Tertiary formation of the Paris basin and chiefly at La-Ferte-sous-Jouarre.

They are cut into wedge-shaped parallelopipeds, called panes, which are bound together with iron hoops to form large millstones. Numer¬

ous substitutes for the French buhrstone have been found in the United States, the most im¬

portant being furnished by the buhrstone rock of the bituminous coal measures of northwest¬

ern Pennsylvania and eastern Ohio but they

cannot compete in the great markets with the French rock. Buhrstone is also the local name of an Eocene (q.v.) formation in Alabama.

BUILDING, in the United States. The

remarkable physical development of the United States in the last 20 years, with its attendant increase of wealth, is most strongly evidenced in the number of buildings of every character constructed during that period throughout the country. As an incentive to artistic improve¬

ment, and an example of cooperated effort and grouping of buildings, the World's Fair at Chi¬

cago, re-echoed in varying forms at the expo¬

sitions of Atlanta, Nashville, Buffalo, Saint Louis and San Francisco, undoubtedly have

exerted a strong influence. Many new schemes of magnitude have been projected along lines which will require years for their completion, but the start has been made intelligently and with a view to the final result. It is only nec¬

essary to cite the Municipal Building in New York city, the University of California and of Washington University, at Saint Louis, to sug¬

gest the power of this influence. The business and residential sections of the larger cities —and, it might almost be added, the outlying sub¬

urban districts — have undergone in many in¬

stances a complete transformation. The im¬

provement and expansion of the steel, cement, brick and terra-cotta industries (qq.v.) have done more to facilitate this transformation within the cities proper than any other causes. Fortunately the allied mechanical and decorative arts have kept pace with them, and in spite of the popular 702

feeling that our cities are for the most part unsightly, they are more cosmopolitan, conveni¬

ent and interesting as to their buildings than ever before.

For the large majority of new buildings the systems of construction hitherto in vogue have been used without great change, and probably will continue to be so used. We must there¬

fore look for signs of structural development, rather, to the

constructions commonly desig¬

nated slow-burning, steel-skeleton and fire¬

proof.

In point of materials and possibilities of

decorative effect, the architect's palette has been extended to an incredible degree. Facilities of transportation make it possible to use granites, marbles, all kinds of stone, brick and woods, ornamental bronze and iron, the most approved systems of plumbing, heating, lighting and ele¬

vators, without approaching the domain of ex¬

travagance and even without overstepping the limits of true economy. There has been a

steady tendency toward more stable, permanent and beautiful construction, — the outgrowth of public sentiment, which in its turn has been stimulated by the results attained. It would have been quite impossible 20 years ago, even had individual fortunes at that time been large enough to create the demand, to build the pala¬

tial residences, churches, hotels and office build¬

ings which we now look upon as commonplace, for in many trades skilled artisans were not to be had and the difficulties of securing proper materials were too great.

Steel structural building of the commercial

type has advanced to such an extent, and in¬

volves such colossal operations, that vast cor¬

porations have been formed for this especial purpose. These corporations are affiliated with financial institutions seeking investments, with owners of real estate desiring to make improve¬

ments and with large manufacturing concerns

furnishing materials of construction, so that the necessary conditions for undertakings of importance are kept constantly related. The

Fuller Construction Company, The Norcross

Brothers Company, The Wells Brothers Com¬

pany and others of a similar nature, carry on a business chiefly made up of steel structural buildings aggregating many millions of dollars per annum, and widely scattered throughout the United States. These companies employ armies of men, covering every building trade and in¬

volving details of office management, methods of erection and finishing, transportation and storage of materials, and the harmonizing of the various and often conflicting elements enter¬

ing into such undertakings, which are almost incredible and can be appreciated only after the most minute investigation. It may be said in general that these constitute the great move¬

ments in building which distinguish the opening years of the 20th century.

Slow-burning Construction. — In buildings

requiring special provisions against the spread of fire, and where the artistic effect is not of prime importance, a frequent mode of construc¬

tion is that known as ˆslow-burning® or ftmill®

construction. This has been brought about in a great measure through the efforts of the mutual fire-insurance companies in New Eng¬

land. The system consists usually in building outside walls (generally of brick) of concen¬

trated piers or buttresses, connected by a thin curtain wall ; the girders, beams and interior columns are made of large timbers and the

floors of plank of a suitable thickness. It is essential to avoid concealed hollow spaces, such as furring, where dirt would accumulate. The

underlying theory of slow-burning construction is that whereas small timbers, such as the three-inch joists and studs and the one-inch flooring of ordinary construction, readily burn through and are destroyed, large timbers, under the influence of severe heat, char but do not burn through readily, as the charred surface forms a non-conductor and protects the interior. If, however, for any reason they should burn to destruction, all connections are so made that the timbers can fall out of their places without disintegrating the masonry or columns on which they rest.

Beams are spaced every 8 or 10 feet be¬

tween centres, and should not be painted for several years after completion of the building, in order to avoid dry-rot. The ends of timbers in masonry bear on iron plates with anchors, or rest in cast-iron boxes, with air spaces in the sides, which permit a circulation of air, and reduce the risk of dry-rot. Floor planks are not less than three inches in thickness, and for spans of 12 feet usually four inches. The larger spans are less desirable than the smaller. These planks should not be over nine inches wide.

They should be planed on both sides, and

grooved on the edges, the grooves being filled with hardwood splines.

Top floors are made of 1ˆ-inch boards of

southern pine, maple or other hard wood. It is desirable to lay top floors over a three-quar¬

ter-inch bed of mortar, or two thicknesses of heavy sheathing paper.

For rooms where there is unusual risk of

fire, such as hot-air drying, it is well to protect the ceilings with plastering on metal lath, filling in solid so as to avoid any cavities. Wooden posts should be covered with asbestos paper and tin.

Roofs are best when flat, and are constructed in the same way as the

floors. They should be covered with tin, gravel or duck. Where the roof is pitched, it should be covered with shin¬

gles or slate, laid over a three-quarter-inch bed of mortar.

Superposed columns are connected by iron

caps, bases and pintles, arranged to give a proper bearing for the girders.

Partitions, if used, should be two-inch,

tongued-and-grooved plank set on end, and

plastered both sides, on metal lath.

Doors and shutters are built of two or more thicknesses of inch boards, covered on all sides with asbestos paper and tin, lock jointed.

The underwriters' associations have formu¬

lated in detail the best practice in mill construc¬

tion, and are willing to advise on all question¬

able points.

Steel-skeleton Construction. — The closing

years of the 19th century witnessed a develop¬

ment in the structural use of steel for buildings which is wholly without precedent. While col¬

umns and floor beams of iron or steel had been in use for many years as interior supporting members, it was not until conditions demanded buildings of extraordinary heights that the

as well as the interior structure. Exterior walls constructed entirely of masonry must be made too thick for economy of space and materials if the building which they enclose is more than six or seven stories high.

The first step was made by introducing iron columns in the masonry of the outside walls, with the sole purpose of supporting the adja¬

cent floors, the masonry of the walls carrying itself on its own independent foundations. This system was found also to lack economy after the possible height of buildings had been increased a few stories. The culmination of the system was reached when the exterior frame was de¬

signed to carry not only the floors and their various loads, but also the exterior walls. Each story now has its enclosing wall independent of the story above and below it, so that, as is fre¬

quently the case, the outer facing or curtain wall of the high building is started at several levels at the same time at intervals of 5 or 10 stories.

The limit of height construction of such

buildings is not yet known. Every year or two a taller one is constructed in New York city.

They have an advertising value.

Vibration and deflection under the pressure

of the wind must be provided against by stiffen¬

ing braces or ties in the floors or partitions, more particularly where the height of the

structure is relatively great.

Where streets are narrow, the crowding to¬

gether of a number of such buildings darkens the streets and often produces disagreeable and even dangerous currents of air. The trend of legislation in large cities is toward restriction of height, Boston having already fixed a limit of 125 feet from the sidewalk level to the top of the cornice line.

There are three elements which enter into

the construction of the steel-skeleton building, — foundations, columns and floors. Of these three elements the column is the most import¬

ant; for while foundations may settle, derang¬

ing the floor levels and causing the building to lean out of plumb; and while floors may bend or break without serious danger to any parts of the structure other than themselves, — col¬

umns, if they fail, may entail the collapse of the entire structure. For this reason, in the best work, columns are made of the softer, less brittle grades of steel, while floor beams are permitted of ˆmedium® steel, a harder and consequently more brittle grade.

Many sections of columns have been de¬

vised, each having its own particular advan¬

tages, but columns in which all the surfaces, except those between riveted plates, are ac¬

cessible, are generally to be preferred. These columns usually consist of a single web or plate, with one or more flange plates connected to the web by riveted angles. Other sections have

been devised, made of Z bars or of channels connected by lattice plates, and a very ingenious column is that known as the Gray column, made up of angles in pairs connected by ties. The choice of any one form depends upon the sta¬

bility of its section, the ease of procuring the parts of which it is composed and the facility of connections. It is sometimes necessary to use the box column, but it is not to be recom¬

mended by reason of the inaccessibility of the interior surfaces. Water and steam pipes are sometimes run inside the fireproofing of col¬

umns next to the steel, but this is to be avoided if possible.

Columns are usually made in two-or three—

story lengths. The bearing parts are carefully ground normal to their axis, and the connec¬

tions are made by riveted cover plates. The extraordinary weights which these columns are called upon to carry demand on ordinary soils a very extended footing. If this were attempted by the old method of brick or stone piers, the foundations would have to be carried to such depths that the system would not be economical.

The customary method is that known as the, grillage-beam system, in which the column

starts from an iron or steel shoe which bears upon steel beams extending on opposite sides of the shoe, and bearing in turn upon one or more layers of beams bolted together and com¬

pletely imbedded in concrete; under all is a layer of concrete whose area depends upon the compressive resistance of the soil. In rare cases the foundation is of solid rock, and the area may then be reduced to a minimum.

;A peculiar type of grillage foundations is re¬

quired for columns on or near party lines, beyond which the foundations may not

extend. A cantilever construction is then

used, whereby the wall column foundation is united by beams to the nearest interior column foundation, so that the two act together and in a measure counterbalance each other. Where

foundations occupy an interior corner of a

property, and must be maintained inside two intersecting party lines, it is often necessary to combine four grillages in the same fashion.

Where the soil is of a very compressible nature, as is frequently the case in many parts of Chi¬

cago, the entire area of the building may have to be covered by a distributing foundation of concrete and beams, forming a pan upon which the building floats. This has been followed in some cases by settlements due to the leakage of . the underlying soil, a result which might easily develop from the construction of other buildings in the immediate neighborhood. Where possible, it is preferable to penetrate through soft soils to a firm bed. In the lower part of Manhattan Island bed-rock has been reached by pneumatic caissons. These caissons are made of steel

plates riveted together. The excavation is made under or in the caisson under air pressure suffi¬

cient to hold back any water-bearing material which may underlie the foundations of adjoin¬

ing buildings. After the caisson has been sunk to its proper depth it is filled with concrete or sucli other masonry as has been designed to form the foundation. Hydraulic caissons have also been used for the same purpose. Where excavations adjoin high buildings on sandy soil, and are car¬

ried to a greater depth than the grillages, as in the case of the work on the subway in lower Broadway, New York, an artificial freezing proc¬

ess is sometimes resorted to. A network of tiny pipes is inserted into the sand foundation, wind¬

ing in and out among each other, so as to reach every part of the foundation soil. A cold salt solution is sent through the pipes, causing the sand foundation to freeze solid. This is a very expensive process and not to be employed unless other means fail. See Foundation.

The floors used in steel-skeleton construc¬

tion may be of any of the ordinary fireproof types, but in designing the floors it is necessary 704

to connect the columns by steel beams or gird¬

ers, which act best for the stability of the build¬

ing if arranged in continuous straight lines. The voids between the girders are spanned by beams, whose spacing is dependent upon the style of floor to be used, varying from 5 to 12 feet, the spaces between being filled by brick arches or porous terra-cotta tiles, or by concrete slabs.

The amount of material in the beams must be exactly sufficient for the work — no more or less. This is essential, not only for economy, but also to reduce the dead loads on the joints, columns and foundations. There are many

varieties of each of these systems, nearly all requiring the use of steel ties, plates or rods.

For spans over 12 feet the monolithic concrete floor reinforced by steel bars or metal lath has been used, but there is a great tendency to de¬

flection. The long-span systems are still in their infancy.

The girders of the exterior walls, commonly known as spandrel girders, are used at or near the level of each floor, and should be connected to the columns by knee or angle braces. •

While the exterior walls of the building are carried in part on the spandrel girders, it is customary to rivet additional angles or chan¬

nels on the outer face of the columns for the support of the outer four or more inches of the wall.

All projecting parts of the exterior, such as belt courses, cornices and balconies, must be supported by special framing. The ornamental finish of cornices having any great projection is often secured to the frame by iron hangers.

All parts of steel framework, except those

buried in concrete, such as grillage beams, should be painted with the greatest care, as their preservation depends almost entirely on the

quality of .paint used and the way in which it is applied. All surfaces should be first thoroughly cleaned of scale and rust. It has been found that concrete adheres to a clean steel surface,'

and is a sufficient protection. All remaining parts should be given a coat of oil at the shops ; they should then be painted with a coat of red lead or graphite paint upon arrival at the build¬

ing, followed by a second coat after they are assembled. Sometimes a third coat is given, but it is scarcely necessary if the two previous coats have been properly applied. See Con¬

crete Construction.

Fireproofing. — While the steel-skeleton

building is economical from the constructive standpoint, its usefulness and safety are greatly impaired if it is left unprotected against the ravages of fire. Many systems of fireproofing have been devise I, all of which, however, con¬

sist in enclosing the parts with a non-combus¬

tible substance, — usually a clay product, or con¬

crete or plaster, — applied in blocks or molded forms, set in mortar. For the outside of exte¬

rior columns and girders it is considered suffi¬

cient to lay the outer facing of the wall, if of brick or terra-cotta, directly against the metal.

Granite, by reason of its friability under the combined action of heat and water, should be kept sufficiently far away from the structural parts to allow of the insertion of a layer of concrete. For all other parts of the skeleton the usual protections consist of two inches of porous terra-cotta block, plaster block or cin¬

der concrete. Columns and beams are some¬

times enveloped with a sheet of wire cloth or expanded metal, and plastered.

None of these systems may be considered

absolutely perfect, since they have all shown serious signs of deterioration under the contin¬

ued action of a fierce fire, but it is a conceded fact that concrete, as a fire-resisting material, is unequaled.

In connection with fireproofing it is essential that interior partitions be built of non-combus¬

tible materials' Those most frequently employed are of the same nature as the fireproofing just described. Porous terra-cotta blocks and plas¬

ter blocks, three or four inches in thickness, dependent upon the height of the story in

which they occur, have certain advantages by reason of the rapidity with which they can be set up, and the ease with which they can be removed where alterations are desired. Par¬

titions are often made of small f or angle irons, over which is spread expanded metal or wire cloth in one or two thicknesses, to which the plastering is directly applied. Double thick¬

ness partitions of this sort are more sound¬

proof than those first mentioned.

In many so-called fireproof buildings wood

finishes are desired, which with the contents are a menace ; but experience has shown that fire can usually be confined to the room in which it originates, and can be checked in a few min¬

utes. Methods of fireproofing wood have been devised, and consist of injecting a fireproofing solution into the pores, either under pressure or by capillarity. Its use is not frequent, however, being largely limited to warships.

The most fireproof structure yet built is

probably the Printing Crafts Building, adjoin¬

ing the Pennsylvania Terminal, on Eighth ave¬

nue, New York city. No wood or other read¬

ily burnable material is used in the construction.

The elevators are all in the centre and isolated by fireproof partitions and steel doors from the rooms. The floors and ceilings are of

heavily reinforced concrete, set into steel

framework. All window sashes are steel, and all glass is wired. Each tenant's quarters are separated from every other like so many ovens, so that a fire may burn out the contents of one without the least chance of communicating to another. The floors are scuppered, like those of a steamship, so that water thrown on to extinguish a blaze is led by the scuppers to the outside of the building, instead of running down the hallways and stairs. There is ample water in the standpipes to drown out any

blaze that might occur, and the system ensures any _ fire being confined to the place of its origin. This building is also remarkable for its heavy bracing. Printing presses produce great vibration, and to overcome this heavy L braces are placed at all cross joints.

Non-Fireproof Buildings.— The great ma¬

jority of buildings cannot be rated as fireproof.

Construction formerly rated as fireproof is

now rated as semi-fireproof. The demand for cheap structures forces the erection of a vast number of buildings of mixed brick and wood as well as all-wood or frame buildings. In New York and most large cities these non-fireproof buildings are restricted to’ 75 feet in height, though in a few large western cities 100 feet is permitted. Each city has its own building regulations, and these are apt to be BUILDING

more stringent in cities like Baltimore, San Francisco and Salem, Mass., that have suffered from severe conflagrations. In practically all United States cities wood structures of limited height are permitted outside of what are known as the (<fire limits.®

Along with the advance in the construction

of mercantile and public buildings in cities there has progressed a country-wide development of residence structures. These may be considered profitably under two heads : Country Homes

and Suburban Homes. The former classifica¬

tion includes the larger and more expensive buildings erected chiefly as summer residences for men of wealth. In this class the ruling tendency has been toward the revival of the old colonial exteriors with, in many cases, repro¬

ductions of the oldtime interiors, but harmon¬

ized with the ultra-modern conveniences of the present day. Individualized examples of Eliza¬

bethan and Georgian types, with motives

adapted from other foreign models have been erected ; but, far outweighing this sporadic con¬

struction, has been the gradual development of a distinctly American type of country house.

This may be briefly described as low and

spreading, with long, peaceful horizontal lines and a low-pitched, hipped roof showing a heavy overhang. In the more successful expressions of this type much importance is given to the roof as a visible feature, treated broadly and simply. The high-pitched and lofty gables,

towers, turrets and spire-like chimneys of the past have disappeared from the design, and the same fate has befallen the practice of breaking up a noble roof area with a row of petty soli¬

tary dormers. Along the Pacific Coast the

architecture of the old Spanish missions has had its influence, but in general the motive has been adapted rather than adopted. This type of house combines with tall trees to produce highly artistic landscape effects which appeal strongly to that subconscious sentiment ex¬

pressed by the word <(homelike.® Even in the older houses of square and stocky outline the low, spreading effect has been measurably se¬

cured by the addition of one-story wings, per¬

golas or similar constructions.

In the smaller detached suburban homes the

same idea prevails in what has been called the ((bungalow® : — as it has been developed, an¬

other distinctive American creation. The essen¬

tial beauty of low masses and spreading lines of the American bungalow offers a basic motive on which American architects have skilfully

worked styles as widely variant as Swiss, Span¬

ish, Italian, Old Colonial, and even Egyptian.

Stucco, titles, shingles, logs, natural wood, painted sidings, upright and horizontal, in num¬

berless combinations with stone, brick and con¬

crete have yielded structures of striking beauty and attractiveness, and the residence quarters of many of the smaller cities show street after street of these picturesque and truly American bungalows and semi-bungalows.

Since so many materials have become avail¬

able for building, there has been an immense increase in minor building supplies and conveni¬

ences. For instance, for cheap construction

a plaster board is made of thin alternate layers of paper and plaster of paris, as a substitute for lath. It is simply tacked on the joists in large squares, and serves as a base to hold a

thin coat of plaster. In isolated structures of the bungalow type it is a decided conveni¬

ence.

Portable buildings are coming into use, these being made in sections at the factory, and shipped by rail or wagon almost anywhere.

Being cheap, they are in much demand for

summer camps. Some are made of corrugated

steel and are quite substantial. Many are

adapted for use as garages and outbuildings in the country.

Exterior Finishes. — The artistic effect of a building depends upon its color as well as upon its form either in general lines or detail.

For durability and permanency of color, com¬

bined with economy, no exterior facing can sur¬

pass natural red brick. We now have reds

toning into the browns and purples, and com¬

bined often with dark headers, from which

it is possible to lay up a simple surface full of artistic interest. Outside the plain red, there is a wide variety of brick within certain limits; whites, buffs, browns or grays are easily obtain¬

able both in the plain colors and mottled, and made by either the wet or the dry process.

Color, width and style of mortar joints, if used knowingly, can be made to intensify or soften the natural color of the brick. American enam¬

eled brick holds its own with the English, and E invaluable for light-shafts and damp places.

Nearly all makes, however, craze or chip in time.

Architectural terra-cotta, as an' exterior fin¬

ish, easily claims first rank in point of develop¬

ment. Many steel structures are covered en¬

tirely with it, excepting perhaps parts near the ground, subject to abrasion. It can be made in almost any color by means of ˆslip's®

or ((glazes,® and it lends itself readily to decora¬

tion. The use of terra-cotta is of advantage to the architect, in that he can see the models for every part of the work as they are in proc¬

ess, and vary them to his satisfaction before they are finally cast. Economy in the use of terra-cotta comes chiefly from minimizing the

number of molds; but this must be guarded

against, for, if pushed to excess, monotony is likely to result.

Ornamental bronze, copper and iron work,

through improved processes of manipulation,

have added greatly to the possible richness of exterior effect.

Outside enclosures of sheet metal, such as

iron or aluminum, are rarely aesthetic. Cor¬

rugated sheet iron has been used extensively for freight sheds, wharf enclosures and similar ordinary constructions, where no effort for

good looks has been made. The enclosure of steel-skeleton buildings with metal is not to be counted upon where such buildings are ten¬

anted, as it is too great a conductor of heat.

Rough-cast and plaster work are most ad¬

mirable and sympathetic as exterior wall fin¬

ishes, where the extremes of temperature from winter to summer are not too great. Even

adobe structures are possible in the South and West, but their use is most limited. Rough¬

cast or pebble-dash is applied to both masonry walls and lath ; it is more durable on masonry, as the expansion and shrinkage of lath tend to disintegrate the mortar. Rough-cast is com¬

bined frequently with timber work in imitation of the old English half-timber constructions, 706

BUILDING AND LOAN ASSOCIATIONS

and is specially adapted to domestic buildings of the freer country sort.

Concrete walls, where of the right texture

and color, such as that made from coquina in Florida, give a pleasing effect.

Roof coverings comprise tin, copper, slag,

tiles, slate and shingles, each having its own appropriateness. Copper is the only permanent one of those mentioned, and slag is the next best. Tiles and slate require constant repairs, and shingles rarely last more than 20 years.

Shingles lend themselves admirably to staining, and are deservedly popular. Thatch is attempted where picturesqueness is demanded.

A roof interesting from the constructive

standpoint is that commonly used on the steel-skeleton building. It is known as actinolite, and consists of a number of thicknesses of heavy felts bedded upon a smooth Portland-cement

surface, and covered with a roofing cement on which are laid vitrified tiles with the joints thoroughly filled, practically forming a pave¬

ment.

Interior Finishes. — For ordinary buildings

the interior finish of floors, walls and ceilings must necessarily be simple, consisting of cement or wood for the floors and plaster for the walls and ceilings, except that in the case of mill con¬

struction walls are usually made of hard red brick, pointed inside the same as outside, and ceilings consist of the dressed undersurface of the

floor planking white-washed, painted or

varnished.

Cemented floors are the most permanent, par¬

ticularly where they are subjected to moisture, although the hard pine and maple flooring com¬

monly used is less tiresome to walk on and is sufficiently durable.

The so-called patent plasters have come

largely into use by reason of their hardness and quick-setting quality. They are mixed by machine in fixed proportions, and are therefore more dependable in quality than the ordinary lime mortar. If applied to lath, the patent plas¬

ters require that the lath, if of wood, shall be wet before application, or, if of metal, that the metal be of heavy threads, as the finer wire cloth is sometimes eaten away by the ingredients of the plaster. _

Tiles, whether of marble, ceramic or glass, form excellent interior finishes, except that small tiles for floors are likely to loosen, and frequent joints in tiling become unsightly

through discoloration. The glass tile known as ˆopalite® produces a finish similar to enameled brick, and has been shown in some cases to be more lasting. Interlocking rubber tiles are de¬

sirable in cases where there is risk of slipping, such as for elevator floors. They are also good deadeners of sound.

Beautiful effects of mosaic, both of marble and of glass, are easily obtainable — a great variety of color and design is largely in their favor. All of these applied finishes require a solid base, preferably of masonry or concrete.

The variety of woods for interior finish is almost without limit, and has been greatly in¬

creased by staining and by methods of finish.

In no department of interior ornamentation

has greater progress been made than in plaster work — a system which can be pushed to almost any point of elaboration, and which lends itself perfectly to painted decoration. In fact, there are few materials that cannot be simulated in plaster if the decoration is clever.

The field of interior decoration was never

wider, and the knowledge of the application of leathers, stamped, modeled and woven fab¬

rics, and the thousand and one other forms of wall applications, never better understood.

In marble for interior use America is not

particularly fortunate. Granite and limestone produce satisfactory results, but most of the American marbles are cold and lacking in rich¬

ness of texture. Among the best marbles are the Knoxville Gray, and a few of the whites.

For the more beautiful effects recourse must be had to the imported marbles, such as Sienna, Numidian, Pavonnezza, Alps Green and others.

See Building Laws ; Building Materials ;

City Planning; Iron Skeleton Construc¬

tion ; Strength of Materials.

Richard Ferris,

Editorial Staff of The Americana.

BUILDING AND LOAN ASSOCIA¬

TIONS, co-operative organizations, originally

designed to aid their members in procuring

homes, at the lowest cost, and on the easiest terms. Later developments gave them some

of the functions of a bank for savings. The associations are a development, dating from

1831, when the Oxford Provident Building

Association was organized in Frankford, a

suburb of Philadelphia. The original associa¬

tions proving successful, plans were gradually improved, until by 1850 they became an estab¬

lished part of American institutions. They

flourished especially in the Northwest, the resi¬

dential portions of Saint Paul and Minneapolis being almost entirely built up under this sys¬

tem. They have been operated under various

titles, besides the above, as mutual loan asso¬

ciations, home assistance associations, coopera¬

tive savings and loan associations and co¬

operative banks, the latter title being popular in New England. These organizations have

had exceptional development in England where single societies have

founded and built up entire communities, familiar as ((garden cities. w

The basic plan of these associations is the issuing of stock, which is paid for in monthly instalments, and the loaning of the money thus raised to shareholders, borrowers paying twice as much per month as lenders. It has been common to give the shares a maturing value of $200 each on which the dues are $1 per month over the entire period during which they are accumulating their par value. These shares are issued in series, at stated intervals, and each series runs its separate course in maturing.

Borrowers are required to hold at least that number of shares whose par value equals the principal of their loan. In addition to their monthly dues borrowers pay a monthly instal¬

ment of interest on the loan, usually at the rate of 5 per cent per annum. When money is in brisk demand it is customary with most as¬

sociations to offer the loan to the highest bidder.

The amount of the premium thus bid is added to the principal of the loan, and the borrower is required to cover it with an equal value of shares on which he also pays dues as well as interest each month. The premium is thus

matured at the same time as the loan. An

alternate system provides that the competitive BUILDING AND LOAN ASSOCIATIONS

premium shall be a small additional payment each month with the dues.

Under such an arrangement an association

received an average of $1.40 per month per share., and in the course

of a little more than 11 years this was theoretically sufficient to bring the shares to par value. In practice, the shares would sometimes run out in 10 years, if pre¬

miums on loans ran high, and sometimes 12 or more years were, required for shares to reach the $200 value, if the association had passed through hard times. When the shares reached the $200, or other maturing value, the lenders received the full par value of their shares, on which they had paid in from $120 to $144 in cash, according to circumstances, and the loans of the borrowers were canceled as paid and their mortgages satisfied. The advantage of

issuing shares in series at intervals is that it enables outsiders to come in and take shares any time a new series is opened, or to purchase the most recent series, by paying the dues for the number of months such series has run.

The legislatures of the various States have made laws rendering easy the forming of these associations,, because they have proven to be a good means of enabling wage workers to build and own their own homes. The parties inter¬

ested manage their own affairs, and as the money is loaned out as fast as it comes in, there is seldom any loss by peculation. To il¬

lustrate how these associations assist a man of small means to build and pay for a home, let us follow the system from his point of view.

Suppose he has a lot of land, for which he has paid $400. He can subscribe for five shares of an association, of the par value of $200 each, paying therefor $5 per month. Every month,

or every few months, there will be money to be loaned, and he attends the meetings, and when he thinks the premiums are low, he bids in a loan of $1,000. If the premium he bids is $100, he takes out another share and pays thereafter $6 a month in dues and $4.58 monthly in interest (assuming the rate to be 5 per cent). An

appraisement committee of the association in¬

spects the lot and' the plans of the proposed house, and, if the entire loan is not above 75

per cent of the prospective value of the com¬

pleted property, the loan is approved, and the borrower executes a mortgage to the associa¬

tion. The money thus loaned for the building of a house does not pass into the hands of the borrower, but is paid directly by the associa¬

tion to the builder as his work progresses. The association will not have to pay over any of the loan until the house is half completed, and then only half of the loan (and perhaps 10 per cent less, if the contract is so drawn), and the remainder when the house is finished, after some months. In the meantime the borrower

is paying interest upon the whole loan, and also upon the premium which he did not receive at all. It is by these small side profits that the shares of these associations are more quickly matured, and in this early maturing the borrow¬

ing member shares equally with the lending

member, the home being paid for that much

sooner. In the case cited, the loan of $1,100

would be canceled with the maturing of the shares, and as the value of the six shares would be $1,200, the borrower would receive $100 in cash in addition.

Many of the associations issue two kinds

of shares: the regular instalment shares and the full-paid or saving shares. The latter are not accounted as membership shares. Their

owners have no vote in the conduct of the association, and interest is paid at a fixed rate, generally working out at an average of 20 per cent less than the profits of the regular share¬

holder.

Since 1912 several of the States have passed (<Rural Credits® laws, authorizing Building and Loan associations in such States to make long¬

time (up to 20 years) loans to farmers on mort¬

gage notes based on farm property. These

((rural credit® shares are figured to pay 5 per cent clear to the lending members, and are charged to the farmer at about 6Y per cent interest.

The plan appeals to the wage worker, be¬

cause of the easy. payments. It appeals to small lenders, because it affords them a sort of sav¬

ings bank and encourages systematic savings.

Small tradesmen and merchants are almost as apt to become interested in such associations as are those. who work for a weeklv wage, and the economical methods by which a large

amount of money is borrowed and loaned

safely have attracted many to the associations as being a safe depository, and likely to pay 6

or even 7 per cent dividends.

Originally, these associations were usually

confined to a town or locality, no loans being made beyond the territory where most of the members lived and knew the value of the prop¬

erty. But within recent years both State and national associations have been organized,

which do business anywhere within the limits of their larger territory. It is a significant fact, however, that many of these larger associations have come to grief, and at their best their profits have been much smaller than those of the local associations, their expenses being very much larger proportionally for the sums handled.

The management of an association is usually lodged in a board of directors elected annually from the shareholders, and whose members

serve without pay. They pass upon the loans, and having investments of their own to pro¬

tect, closely guard the association treasury.

The secretary is customarily the only salaried officer, and is often paid for doing the detail work by a system of small fees. Sometimes

the fines levied on delinquents are his sole compensation.

Each association makes minor laws of its

own, and many vary the plan as above given in numerous details ; but the general principles here outlined are the same with all.

In 1916 there were in the United States, as reported at the annual meeting of the League of Building and Loan Associations, 6,806 of the local associations, most of them being in Penn¬

sylvania, where they number 1,820; New Jer¬

sey following in order with 742, and Ohio with 657. The total membership reported was 3,334,-

899, an increase in the year of 230,964. Among the States Ohio was credited with having the largest list of members, numbering 649,126.

The aggregate assets of all the associations was $1,484,295,875, an increase in the year of $126,-

497,975, and an average of $445.05 per member.

In the ten years (since 1906) the membership 708

had nearly doubled and the assets more than doubled. The aggregate expense of manage¬

ment for all the associations for the year was $8,640,152, a little less than nine-tenths of 1 per cent of the year's receipts. See Co-operative Banking; Land Credits.

Bibliography. — (History of Cooperation

in the United States, > a symposium issued by Johns Hopkins University; Bulletin No. 52,

Bureau of Labor; Rosenthal, (Building, Loan

and Saving Associations } (1911), and annual reports of the United States League of Building and Loan Associations.

Richard Ferris,

Editorial Staff of The Americana.

BUILDING LAWS, laws passed either by

State or municipal authorities regulating the construction of buildings by landowners or

lessees on their lands. Usually they prescribe the height of buildings, their distance from the street, the composition, dimensions, strength, etc., of the materials used, the manner of light¬

ing, ventilating and drainage, the amount of open space around them, and the measures to be adopted to make structures sanitary and as far as possible free from the perils of fire.

Colonial Regulations. — Early in American

history laws were passed with the object of preventing disastrous conflagrations and with a view to making the towns and villages more substantial and architecturally more beautiful.

In 1662 the Virginia legislature passed an act for the building of a town at James City, which act provided : <(That the towne to be built shall consist of 32 houses, each house to be built with brick, 40 foot long, 20 foot wide, within the walls, to be 18 foote high above the ground, the walls to be two brick thick to the water table, and a brick and a halfe thick above the water table to the roofe, the roofe to be 15

foote pitch and to be covered with slate or tile® ; furthermore that (<noe wooden houses shall hereafter be built within the limits of the towne, nor those now standing be hereafter

repaired, but brick ones to be erected in theire steads® (Hening, W. W., (Statutes at Large of Virginia, J (Vol. II, pp. 172-76, New York 1823). On 23 Jan. 1648 an ordinance was

passed at New Amsterdam providing that

<(henceforth no wooden or merely plastered

chimneys shall be put into any house between the Fort and the Fresh Water,® because

<(some careless people neglect to have their chimneys properly swept and they do not take care of their fires.® On 15 Dec. 1657 the New Netherland council directed that <(all roofs covered with reeds, all wooden chimneys, all hay ricks shall be taken down and removed

within the next four months® and that (<fire buckets, ladders and hooks be kept at the

corners of the city streets and in public

houses.® (Fernow, Berthold (ed.), (The

Records of New Amsterdam,* Vol. I, pp. 5,

34-35, New York 1897). In 1761 an act was passed <(for the more effectual prevention of fires and for the regulating of buildings in the City of New York,® providing that (<every

building that shall be erected after January 1, 1766 in the city south of (Fresh Water*

shall be made of stone or brick and roofed with tile or slate.® ((Colonial Laws of

New York,* Vol. I, p. 269; Vol. IV, p. 571, New York 1896). As many years elapsed be¬

fore the inauguration of buildings several

stories in height, the early building legislation was concerned with one-or two-story houses.

Fire Prevention Measures. — The numer¬

ous appalling disasters that culminated in the Chicago fire of 1871 led to the establishment in many cities of what is known as <(fire limits,®

within which none was allowed to erect enclos¬

ing walls and roofs of inflammable material.

With the expansion of the area of the city the fire limits were extended but the Baltimore fire of 1909 showed that this extension had not been pushed either sufficiently far or rapidly.

Many suggestions have been made to overcome the danger, such as dividing the larger cities into three fire-zones, the innermost zone con¬

taining fireproof buildings only; the next

zone only such buildings as have non-inflam¬

mable walls ; and the third area buildings

which may be constructed with inflammable

exterior walls but with non-inflammable roofs and other protective features. Where rows of wooden houses prevail, as in suburban com¬

munities, a <(fire wall street® has been suggested, though as yet not incorporated in any law. By this is meant the erection of non-inflammable buildings on certain streets, which would

traverse dangerous areas at right angles, thus cutting a district into isolated sections.

About 1886, owing to the great loss of life in theatre fires at Brooklyn and Vienna, special types of construction and protection were

adopted for buildings devoted to large assem¬

blages of people. The New England mutual in¬

surance companies have advocated a better type of factory construction and have imposed pro¬

hibitive insurance rates on buildings that do not meet proper standards, while the National Board of Fire Underwriters has used every

effort to secure the adoption of better fire resisting devices, such as automatic sprinklers.

The opposition of private interests had to be overcome in securing protective legislation,

since manufacturers endeavored to have their materials specified in the building laws to the exclusion of all others. Thus in 1888-90 the makers of structural steel products met stren¬

uous opposition from the iron founders who

believed that their control of structural iron work would be taken from them. See Fire

Protection; Fireproofing and Fireproof Con¬

struction.

State Codes. — As a rule the regulation of

building construction has been left to the local communities, but the growth of small towns

and cities into large metropolitan districts has brought about in some States the realization that local ordinances must be based on State¬

wide laws. In 1911 Ohio adopted a State

building code, and codes were subsequently

prepared for Pennsylvania and Illinois. Many movements have been instituted to secure

special State legislation to improve poorer

class dwellings, such as prevail in some dis¬

tricts of New York, Saint Louis and other

large cities, under the belief that local or¬

dinances could not be enforced against small property owners so as to obtain the necessary and desirable reforms. Accordingly tenement

house laws (State laws instead of local or¬

dinances) have been adopted, which in many

cases have necessitated the razing of certain types of old houses because they could not be BUILDING LEASE

changed in any way that would ensure the

required air space and other sanitary pro¬

visions. The constitutionality of these so-called confiscatory measures or legislative interfer¬

ences with property rights has been upheld as within the police powders of the State. Sec T ENEM ENT-HOUSE.

The High Factory Building. — In recent

years legislation has been concerned with the growing problem of the factory located in

large cities. One reason for the establishment of factories in such places is that the manu¬

facture^ of “seasonal55 goods demands the

proximity of a large supply of surplus labor and this advantage is given by a congested city area. The average height of such factories is 10 stories and in many of them conditions pre¬

vail worse than those of the so-called sweat¬

shops or tenement-house factories. The prob¬

lem has been studied by a State factory in¬

vestigation committee and a local ((commission on congestion of population55 and it seems

likely that the control of such buildings can be made absolute only by enlarging the powers

of the State or municipal departments having under their charge all measures for health, fire prevention and safe construction. See Fac¬

tories and Factory Inspection.

Recent Enactments. — Much effective work

has been done by the National Board of Fire Underwriters and the National Fire Protection Association, working in conjunction with State and local authorities, and the American In¬

stitute of Architects, in securing good building codes and improved methods of construction

not entirely by process of law but also by educating the various communities to the

economic value of the high standards set. This has been done chiefly by reducing insurance rates and demonstrating the possibilities of lowrer cost of maintenance and repairs.

In 1915 New York city adopted a new code

that had been under preparation for several years by Rudolph P. Miller, formerly super¬

intendent of the Manhattan building depart¬

ment, assisted by a committee of fire under¬

writers, architects, builders, structural en¬

gineers and representatives of the real estate interests. There were a number of important new sections as -well as changes, the idea being to establish a foundation for future building construction and inspection and to provide a code that would ensure the highest type of construction, sanitation and fire protection.

A change in the fireproof limits was made; provisions were adopted for reinforced con¬

crete and terra-cotta construction, for greater use of hollow tile, for increased exit facilities, for projections beyond the building lines, for providing flues and chimneys in a building

where the abutting building is built higher, for inspecting and certifying elevator installation, *etc.* ; new7, specifications for ventilation and lighting -were adopted ; provision was made

for an assessment of penalties and for com¬

pelling immediate compliance with depart¬

mental orders. In Philadelphia new regulations were enacted in 1915 relating to the construc¬

tion of reinforced concrete buildings requiring that, when plans of such a building were sub¬

mitted to the building department, stress com¬

putations and detailed descriptions should ac¬

company them, including the nature and sizes of all reinforcements, the quality, proportions and method of the concrete, and the dead and live loads that each and every floor was sup¬

posed to carry. In 1916, after three years' in¬

vestigation at home and abroad, the New York City Board of Estimate and Apportionment,

under authorization by the State legislature, di¬

vided the city into four classifications: (1) residence; (2) business; (3) unrestricted; (4) undetermined. In the first, all kinds of busi¬

ness and industrial buildings and occupations are excluded. In the second, residences are per¬

mitted, but industrial buildings are prohibited, and only certain limited areas are permitted for industrial occupations. The unrestricted dis¬

tricts are open to industrial uses, and it is ex¬

pected that they will congregate there. The classification "undetermined55 is given to areas in w'hich the particular lines of development are not yet evident, owing to the incomplete state of the city's transportation facilities. By the same act a schedule of heights for build¬

ings was established upon which the basis of the vfidth of the streets on which they are built. In 1917 the legislatures of seven States — Pennsylvania, New^ Jersey, California, Minne¬

sota, Michigan, Rhole Island and Indiana —

passed laws affecting buildings throughout those States, the so-called "zoning55 system as applied to New York exhibiting a marked influence.

In 1915 the Pourth Edition of the Building Code5 was published by the National Board of Fire Underwriters of New York. This gives

a vast amount of information regarding build¬

ing problems, methods and requirements of

construction and materials, and the most note¬

worthy features that have been incorporated in local codes. It also gives the most advanced requirements in fire protection, considers the question of materials and working stresses and gives the latest developments for iron, steel, timber, etc., based on official and other tests.

The Federal, government has taken interest in the standardization of building methods to the extent of issuing an order through the

Treasury Department that uniformity and business

economy must be established in the construc¬

tion of post offices and other government build¬

ings. Consult Ash, M., (Building Code of

New York City) (New York 1899) ; Blake,

Clinton H., (The Law of Architecture and

Buildings) (New York 1916) ; Fitzpatrick, F.

W., Pudding Code, a Compilation of Building Regulations5. (Chicago 1913) ; Hoxie, G. L., ‘City Taxation and Skyscraper ControP (in

Journal of Political Economy, Vol. XXIII, pp.

166-76, Chicago, February 1915) ; Ray, David H., Architecture, Engineering and the Build¬

ing Law-* (New York 1911) ; Williams, F. B., (City-planning Restrictions on Private Prop¬

erty5 (in The American City, Vol. XIII, pp.

24-30, New York, July 1915} ; National Board of Fire Underwriters, (Building Code Recom¬

mendation (4th ed., New York 1915) ; Factory Mutual Companies, Publications5 ; National

Fire Protective Association, Publications5 ;

Brooklyn Daily Eagle, Pudding and Health

Laws and Regulations Affecting the City of

New York5 (1912) ; and the various yearbooks.

Richard Ferris,

Editorial Staff of The Americana.

BUILDING LEASE, a lease of land for

a long term of years, usually 99 years, at a 710

BUILDING MATERIALS

rent called a ground-rent, the lessee covenant¬

ing to erect certain edifices thereon, and to maintain the same during the term. At the

expiration of the lease the houses built become the absolute property of the landlord, unless otherwise provided in the contract. See Lease.

BUILDING MATERIALS. The mate¬

rials used for structural engineering and archi¬

tectural purposes may be conveniently divided into two general classes — (<materials of con¬

struction,® such as the woods, stone, metals, cements, etc., and ((materials of consumption,®

such as coal, water, oil, etc., which are con¬

sumed or transformed while being used.

In this article, the materials of construction will be briefly considered according to their physical and chemical properties, and their

adaptability for various purposes, leaving the consideration of the materials of consumption to the sphere of chemistry and physics where they properly belong.

Apart from their chemical composition, the

principal properties of building materials im¬

portant to the engineer are the “density® or specific gravity of the substance ; its “resistance® or capacity to withstand strains and

stresses ; the “hardness® or power to oppose penetration ; its ((toughness® or capacity to elongate under tension without rupturing; its <(brittleness,® which is the opposite of tough¬

ness; and its behavior under conditions of

varying temperature, or when worked in the

many ways required by structural operations.

Timber or Wood. — The following general

facts relative to the physical properties of wood have been determined by experiment: (1)

Bleeding has not much effect on the strength of wood, but increases its flexibility slightly, and it is probable that bled timber will stand exposure to the weather fully as well as the unbled. (2) In general, moisture absorbed in the form of sap, or in the form of water after seasoning, reduces the strength of wood. Well-seasoned wood or that which contains not more than 12 per cent of moisture is from 75 to 100

per cent stronger than green timber. (3) In artificially-dried timber any remaining moisture exists in a uniform percentage throughout the mass, a condition which requires months, and sometimes years, to attain in heavy air-dried timber. (4) The strength per square inch of section of large timbers is in every way equal to that of small timbers, provided they are equally sound and contain the same percentage of moisture. (5) In general, the strength of woods of uniform structure increases with their specific gravity, that is, the heavier wood is generally the stronger. Oak, however, appears to be an exception to this rule. (6) Seasoned wood will increase in weight to the extent of 5 to 15 per cent if exposed to the weather.

This excess of weight can be easily reduced by keeping the timber in a warm dry place for a week or 10 days.

In Table 1 below is given the physical prop¬

erties of some of the woods suitable for

structural, interior finishing, decorative and other similar purposes. The ((elastic limit®

given in the table is a relative quantity, as there is no definite “elastic limit® in woods similar to that in metals. In Table 2, the strengths of green woods of various kinds un¬

der different stresses. When well dried their strength is increased from 50 to 75 per cent. It is considered that only when wood is green can a test be accurately made, as it is quite impos¬

sible to gauge the exact degree of moisture re¬

maining in seasoned wood.

In selecting and preparing timber or wood

Table 1 — Physical Properties of Timber or Wood (As determined by tests of seasoned timber, containing 12 per cent or less of moisture) The stresses are given in pounds per square inch Name of

Wood

Ultimate Resistance to

—

Elastic limit

Modulus of

—

Ordinary Working

Stress

Weight per cubic foot

(pounds)

Tension

Compression

(length)

Compression

(cross)

Shearing (length)

Shearing (cross)

Elasticity

Ultimate bending

Elastic bending

Tension

Compression

Transverse

Ash (American) .

17,000

7,200

1,900

1,100

6,820

7,900

1,640,000

10 , 800

7,900

2,000

1,000

1,200

39

Rirrh

15,000

8,000

5,600

1 , 645 , 000

11,700

2,000

1,000

1 , 200

33

Cedar (American red)

10,600

6,000

600

400

1,300

5,600

900,000

7 ‘ 000

5,600

1,300

‘ 700

900

24

Chestnut . .

11,500

5,300

1,500

1 , 130,000

8,000

1,400

600

900

41

Fir

13,000

1,300

1 , 500 , 000

Gum .

7,000

1,400

800

5,800

7,800

1,700,000

9,600

7,600

1,200

900

900

37

Hpmlonk . .

8,700

5,700

400

2,700

7,000

750

25

Hickory (American

aver.) .

19,500

9,500

2,500

1,000

6,200

11,200

2,400,000

17,000

12,000

2,000

1,200

1,800

50

T.ignnm-vit.sR

1 1 , 800

9,800

1 1 , 000

1,500

1,200

1,500

83

Maple .

11,000

7,000

1,800

500

6,000

10,000

49

Orpgrvn pine

13,000

5,700

800

500

6,400

1 , 600 , 000

7,800

6,400

1 ,400

700

1 ,000

32

Oak (black)

10,000

7 , 300

1,900

1,100

8,100

1,740, 000

10,800

8,100

1 , 400

900

1,200

45

Oak (white) .

13,600

8,500

2,200

1,000

4,400

9,600

2,090,000

13,000

9,600

1 , 700

1,000

1,500

50

Pine (Southern yel-

low) .

13,000

8,000

1,200

835

5,600

10,000

2,070,000

12,600

9,500

1,600

1,000

1 ,500

38

Pine (Cuban) .

13,000

8,700

1,200

770

5,000

11,000

2,300,000

13,600

10,600

Pine (“loblolly)

1 3 , 000

7,400

1,150

800

9,200

2,050, 000

11,300

9,400

1 ,600

900

1 ,200

33

Pine (white) .

10,000

5,400

700

400

2,500

6,400

1,390,000

7,900

6,400

1,200

700

900

24

Poplar

7,000

5,000

6,500

900

600

750

Sprnre (North pm)

1 1 , 000

6,000

800

400

3,250

1,400, 000

8,000

1 ,200

700

900

26

Spruce (Southern) …

1,200

7,300

1,200

800

8,400

1,640,000

10,000

8,400

1 i200

700

900

30

Walnut (black) .

10,500

7,500

2,500

4,700

5,700

1,306,000

8,000

1,000

1.000

900

38

BUILDING MATERIALS

711

Table 2. — Strength of Green Woods

Compiled from United States Forest Service Circular 213 (Washington 1913) Figures show pounds per square inch

Name of Wood

Fibre

stress at

elastic

limit

Modulus

of rupture

Modulus of

elasticity

Crushing

parallel

to grain

Crushing

perpen¬

dicular

to grain

Crushing

elasticity

parallel

to grain

Shearing

strength ;

parallel

to grain

Tension

perpen¬

dicular

to grain;

minimum

Ash (white) .

5,180

9,920

1,416,000

4,220

889

3,510

1,300

645

Birch (yellow) .

4,190

8,390

1,597,000

3,400

439

2,570

1 , 150

446

Cedar (Arkansas) .

3,950

6 , 040

754,000

3,030

518

2 710

613

Cypress . » .

4,430

7,110

1,378,000

3,960

548

3 \ 560

836

242

Fir (Douglas) .

3,570

6,350

1,247,000

2,920

427

2,390

853

304

Gum (red) .

3,460

6,450

1 . 138,000

2,690

Hemlock .

3,410

5 ,770

917,000

2,750

420

2,110

790

2 7 i

Hickory (average) .

5,470

10,280

1,399, 000

4,370

1 ,080

3,730

1 094

Maple (red) .

4 , 450

8,310

1,445, 000

3,560

606

1 130

610

Oak (red) .

3,890

8,100

1 i 248 , 000

3,440

844

2,540

1,215

660

Oak (white) .

4,320

8,090

1,137,000

3,520

829

2 , 400

1,096

622

Pine (longleaf) .

5,090

8,630

1 ,662,000

4,280

491

3 420

1 060

240

Pine (white) .

3,410

5,310

1,073,000

2,720

314

2 ! 370

649

225

Redwood .

4,530

6,560

1,024,000

3,820

530

3,420

Spruce (red) .

3,440

5 , 820

1,143,000

2,920

322

754

Tamarack .

4,200

7,170

1,236,000

3 , 480

480

3,010

883

236

for structural purposes, a careful considera¬

tion of the following facts in addition to those already stated is quite important: (1) That timber grown in moist soils is lighter, and decays more quickly than that grown in dry, sandy soil, and that, usually, the best timber is that grown in a dark soil intermixed with

gravel, with the exception of those various kinds, such as poplar, cypress, willow and all others that naturally grow best in a wet soil.

(2) That the wood of trees grown upon the plains or in the centre of forests is less dense than that of those grown upon the edge of a forest or upon the side of a hill. (3) That in temperate latitudes, as in the United States, standing timber should be selected in the latter part of July or the first part of August, when the sound and healthy trees are indicated by fresh green leaves, in contrast to the unsound and unhealthy trees, the leaves of which begin to turn yellow at that season of the year. De¬

caying branches, a scarcity of leaves and the tendency of the bark to become rough and

to separate from the wood, are positive indi¬

cations that the physical properties of the wood are impaired.

The trees selected should be those that have most nearly attained their full maturity, a period which varies greatly with the different species. As a rule, the age and the rate of growth of a tree may be ascertained from

the number and the width of the rings of

annual increase which are exhibited in a cross-section of the wood. (4) That timber should be felled or cut either in midsummer or in mid¬

winter. In midsummer, the most suitable time is in the month of July. A tree should be cut as near to the ground as possible, as the lower part of the trunk furnishes the best timber. (5) That as soon as a tree is felled it should be (<dressed® by having its bark stripped off, then raised from the ground and the sap-wood re¬

moved, and finally squared or reduced to the required dimensions. (6) That in the inspec¬

tion of timber the quality of the wood may be ascertained by observing that its color, as ex¬

hibited by a cross-section, is practicallv uniform in the heart. It may be a little deeper in color at the centrg than pear the white-colored sap-wood next to the bark, but the gradation

should be uniform and free from sudden

transitions of color, or white spots, which are infallible signs of decay; that it is free from Avind-shakes® or circular cracks which sep¬

arate the concentric layers of wood from each other, and constitute a very serious defect; that it is free from (<splits,® ((checks>) and ((cracks,® wrhich extend very deeply toward the centre; and that it is free from large or de¬

cayed knots, which tend to materially affect its strength.

Furthermore, the condition known as

(<brash-wood® is generally consequent to the decay of the tree on account of age, and is characterized by a reddish color of the wood which becomes porous, and breaks off short

without splintering; while (<belted® timber is that which has been killed, or which has died from some unavoidable cause, before being

felled, and is of a highly objectionable char¬

acter. Other serious defects are indicated by the presence of many knots, which, although the timber may be sound, stamps it as being of stunted growth, and is commonly known

as (<knotty timber,® and a spirally winding grain characteristic of Awisted wood® which

is unfit for long pieces. Dry-rot is indicated by yellow stains ; elm and beech are very

quickly affected by it if left with the bark on after felling.

The proper seasoning and preserving of

timber is of the utmost importance in con¬

nection with its use as a material of construc¬

tion. Freshly cut timber contains from 35 to 50 per cent of moisture, which may be reduced to 17 or 25 per cent, by exposure to the air in

seasoning one year, and to less than 12 per cent, by artificial drying in a comparatively short time.

There are various processes of seasoning.

Natural seasoning requires a period ranging

from two to eight years, according to the size and physical properties of the wood. Timber of large dimensions is not only improved in strength, but is rendered less liable to warp and crack in becoming seasoned, by being pre¬

viously immersed in water for several weeks.

When the seasoning is accomplished naturally 712

by exposure to the air, the timber should be piled under a shed and kept dry, with a free circulation of air about it, but without exposure to strong currents. The bottom pieces should be placed upon skids raised about two feet from the ground, and a space of at least an inch should be allowed between the horizontal layers. Slats or piling strips should be placed between the layers at each end of the pile, and also at short intervals between the ends so as to prevent the timber from “winding.® It

is important that these strips should be placed directly one over the other and that they

should not be less than one inch in thickness.

Care should be taken to pile the heavy tim¬

bers upon the ground floor of the shelter, and the light stuff upon the upper portion, with a clearance of at least two and one-half feet between the piles. The timber should be re¬

piled from time to time, and all pieces showing any indications of decay should be removed, so as to prevent their affecting that which is sound and healthy. The gradual method of

seasoning is undoubtedly the most suitable for preserving the strength and durability of the timber; but, as already stated in the preceding paragraphs, it has been very definitely ascer¬

tained by tests that the results of artificial methods, properly applied, do not indicate that those qualities are materially affected by such processes, while other important advantages,

such as the reduction in the time required for seasoning, and the uniformity of the percentage of moisture contained in the seasoned product, are unquestionably obtained. The hastening of seasoning by steaming the timber has been

successfully accomplished, and the saturation of timber with a solution of corrosive sub¬

limate, to secure it against dry-rot, and to protect it from the attacks of worms, has

proved very satisfactory. Kiln-drying, how¬

ever, is applicable only for boards and other pieces of small dimensions, and has a tendency to crack the wood and impair the strength in various ways, unless it is accomplished very slowly. Timber ought not to be seasoned by either charring or smoking, and should not be painted unless it has been thoroughly seasoned, as such methods and applications effectually prevent the drying of the w-ood in the interior of the piece, so that fermentation sets in and decay soon takes place.

The principal processes of impregnation are

the following : “Kyanizing,® introduced by

Kyan in 1832, consists in saturating the wood with a solution containing one pound of chloride of mercury to four gallons of water under a pressure of IS pounds per square inch; <(Burnettizing,® introduced by Burnett in 1838, by which the wood is first submitted to live steam at a pressure of 20 pounds for several hours; then exhausted by vacuum pumps for a few

hours ; then impregnated in vacuo with a solu¬

tion of one pound of zinc chloride to 10 gal¬

lons of water, at 160° F., and finally treated to air pressure at 150 pounds per square inch; “Creosoting,® introduced by Bethel, by which the wood is impregnated with the oil of creosote mixed wflth bituminous matter under an end¬

wise pressure of 150 to 400 pounds per square inch. The Kyanizing and the Boucheri processes are applied to standing timber, that is, while the tree is still grqwing, the head is cut off and the top of the stem is hollowed into

the form of a bowl and filled with the impreg¬

nating solution which, being replenished from time to time, soaks down into the tree, killing it as it goes down, but thoroughly saturating the wood and imparting to it a remarkable

degree of durability. Timber may be crcosoted by simply steeping it in the oil of creosote, but the “creosoting® and “burnettizing® of tim¬

ber of large dimensions is accomplished with the aid of special apparatus that gives the requisite pressures. Creosoting is the most

satisfactory method of preserving timber used as piles for wharves against the attacks of the “Teredo® or ship-worm, but it is not an infal¬

lible remedy.

The presence of vegetable albumen in tim¬

ber appears to be the primary cause for its deterioration. The most necessary element in the healthy growing tree, it is the most per¬

nicious of all in that which is dead. The sap-wood contains a large proportion of it and other fermentable elements, the putrefactions of which cause dry-rot or sap-rot, and pro¬

duce various forms of injurious fungi, there¬

fore, in order to correct these evils, the most effective method to preserve timber is to expel or exhaust its fluids, solidify its albumen and introduce an antiseptic liquid. This appears to be accomplished in the most satisfactory manner by the process introduced by Robbins in 1865, by which the liquids are dissipated and the albumen solidified

by heating the wood in a chamber raised to a temperature of 212°

F., and then subjecting it to the vapor of coal-tar, resin or bituminous oils, wrhich, being at a temperature of not less than 325° F., will readily take the place of the vapor expelled by the lower temperature.

Stone. — To be suitable for building pur¬

poses, it is essential that a stone should pos¬

sess the qualities of durability, permanency of color, strength and toughness, and should be susceptible of being inexpensively quarried,

and easily worked. The greater number of

such stones belongs to some one of the fol¬

lowing classes of rocks: (1) The crystalline; (2) the calcareous; and (3) the fragmental

rocks, including the sandstones and slates.

Of the crystalline rocks, the best known

and the most suitable are the granites and the syenites, which possess an average crushing

strength of from 15,000 to 26,200 pounds per square inch ; most of them above 20,000 pounds.

These stones, varying greatly in their physical composition and color, are found in large quan¬

tities in all parts of the world. They are very proof against the action of frost, and are com¬

monly quite permanent in color, varying from a sparkling whitish gray to dark gray, and from a delicate pink to a dark red. Until recently, on account of great hardness, granite was only employed for massive masonry in which roughly dressed stones could be appropriately used, or where the magnitude of the structures per¬

mitted the great expe* se involved in dressing and polishing; but the

development of improved forms of stone-cutting and dressing machinery during the last few years permits of its being turned and carved into columns, pilasters and other, forms, and polished perfectly, at a com¬

paratively small expense, so that it is being used more and piore extensively, and is be-etla onyx

GRECIAN GREEN MARBLE

COPYRIGHT, 1913, BY F. E. WRIGHT

coming one of the most popular of all building stones.

Although quarried in practically every East¬

ern State embracing the Appalachian Moun¬

tain system, from Maine to North Carolina,

and in the States of California, Montana, Wy¬

oming, Colorado, Minnesota, Wisconsin and

Missouri, the greatest supply of granite in the United States is furnished by Maine and Mas¬

sachusetts. The Maine granites, principally

derived from the Hurricane Island quarries,

are mostly of the light gray variety, although a limited amount of the pink and red varieties are also quarried and are found to be commer¬

cially available. The Massachusetts granites

are of a rich dark blue-gray color, and are extensively quarried in the vicinity of Quincy, while other fine granites of similar qualities are quarried at Concord, N. H., and Westerly, R. I.

While the United States is one of the largest producers of granite, it is also one of its largest importers. Red granites from the quar¬

ries at Peterhead, Scotland, and the gray

granites from Aberdeen are quite largely

brought into this country for monumental

work. They take a very high polish, and are of great durability, especially the coarse red variety. This is also the case with the red and gray Canadian granites, which are exten¬

sively quarried in Quebec, New Brunswick,

Nova Scotia, Ontario, and near Victoria, in British Columbia. In the United States, be¬

sides granite and syenite, the other crystalline rocks available to some extent for building purposes are porphyry, gneiss and trap. Por¬

phyry, although a verv handsome building

stone, with large crystalline structure, and colors ranging through shades of white, gray, pink, red and black, is used only to a limited extent in rough construction on account of its great hardness, and the consequent difficulty of cutting and polishing it within a reasonable limit of expense. Gneiss is more extensively used ; it resembles granite in composition, but, unlike granite, it has a well-defined cleavage, which allows it to be split into thick slabs.

Trap is a sombre-hued rock, which is very

difficult to work, and is seldom used as a material of construction,

except in the form of paving blocks, or as crushed stone for

making concrete or road material.

Of the calcareous rocks, the most suitable

for structural purposes are the limestones and the marbles. These consist of carbonate of

lime, and differ in quality rather than in com¬

position, the marble having a crystalline struc¬

ture capable of taking a high polish. The oolitic limestones, possessing great strength, their re¬

sistance to compression ranging from 4,500

pounds up to 20,600 pounds per square inch (the strongest being those from Arkansas and Vermont), are in great favor because of their fine and even texture. The most widely known in the United States are those quarried in Indiana and Kentucky, from strata of Mississippian (Sub-Carboniferous Age), and com¬

monly known as <(Bedford Stone® ; they are

handsome in color and are very easily worked.

The colors of limestones range through broken shades of pink, red, yellow, green and blue, imparted to the structure by various impurities.

Dolomitic limestone, commonly known as do¬

lomite, contains magnesia in addition to the carbonate of lime ; is somewhat coarse in qual¬

ity, and is quarried in nearly every State of the Union, to supply an apparently permanent local demand. The most favorably known of

the foreign varieties is that obtained from the quarries of the Isle of Portland, England, and the French stones quarried near Caen. Nor¬

mandy. The latter is a soft, fine-grained stone of a light color very suitable for carved work, but entirely unfitted for exposed structures

in cold climates, on account of its highly absorb¬

ent quality.

The marbles are generally harder than the

limestones, having a crushing strength of from 10,300 to 16,000 pounds per square inch. They are the most showy and ornamental of all

building stones, and have been very popu¬

lar since the earliest times. A great many beautiful varieties are quarried in various parts of the United States, but about 60 per cent of the total amount is quarried in the State of Vermont, the principal centres of the industry being Dorset, West Rutland, Middlebury, Wal¬

lingford, Brandon and Pittsford. These

marbles are of all varieties of texture, and range in color from pure white to dark green, and dark blue, the white stones often being veined and mottled with the darker colors.

Very beautiful marbles are also quarried in Tennessee. They are particularly noticeable on account of their variegated colors, which in¬

clude many shades of chocolate and red, and lemon yellow, olive and green, which form an endless variety of color combinations of strik¬

ing effect. The distribution of these Appa¬

lachian marbles extends from Vermont to

Georgia, and they are extensively quarried in all of the States bordering that mountain sys¬

tem. On the other hand, although very fine marble deposits exist in many of the States in the Rocky Mountain region, they have not been worked to any great extent, up to the present time, on account of lack of transporta¬

tion, and the limited local demand.

The most notable of the foreign marbles

are those of Italy, the French Pyrenees and Belgium, although Germany, Austria, Spain,

Portugal and Ireland also furnish many

varieties of fine texture and color. Among the most beautiful of these European productions are the <(Brocatelle® marbles, having a light yellow body marked with veins and blotches

of dull red, and the Languedoc, having a bril¬

liant scarlet body color blotched with white, both of which are obtained from the Pyrenees; the (<Black and Gold,® a black limestone veined with yellow; the pure white stone of Carrara, and the ((Giallo Antico,® a yellow marble, all three of which are obtained from Italy; and the Saint Anne marble having a deep blue-black body color marked with white veins,

and the pure black marble known as ((Belgian Black,® which is obtained from Belgium.

Of the fragmental rocks, a great variety of sandstones are used for facing, lintels and gen¬

eral structural purposes, while slate is used for roofing, and for floor tiles, flagging and mantels. Sandstones are composed of rounded

and angular grains of sand, bound together

by such cementing materials as silica, oxide of iron and carbonate of lime, into the form of solid rocks. The presence of silica gives a white colored stone of durable quality, but very difficult to work. Cementation by oxide of iron 714

gives a reddish or brownish stone of medium durability, fairly easy to work. Carbonate of lime cement gives a gray-colored stone much softer than the other two varieties, and much easier to work, but

much less durable. Sand¬

stones vary in texture from those having a very fine grain to those composed of pebbles.

The latter are divided into two classes — the ˆconglomerates” composed of rounded pebbles,

and ˆbreccias” composed of angular pebbles.

Some sandstones have a clayey cement which

makes them unfit for building purposes, while others, although they contain hardly any cement, and owe their tenacity to the pressure under which they were consolidated, make good build¬

ing stone. As a general rule, sandstones are softer when first quarried than after a period of seasoning by exposure to the air. They vary in color from light gray, buff, drab and blue, through shades of brown, pink and red. Their resistance to compression ranges from 7,000

pounds per square inch for the Oregon stone to 16,000 pounds for the Connecticut sand¬

stone ; while the ˆMedina” stone and the bluestone of New York have a crushing strength of 14,000 pounds per square inch. Other well-known and extensively quarried varieties are the <(Berea” stone of Ohio, and the ˆPortland”

stone of Massachusetts and Connecticut. The

Lake Superior <(Red Sandstone” of Keweena—

wan Age, and the <(Brownstone” of the Con¬

necticut Valley and New Jersey, of Triassic Age, were formerly very popular but are now in much less demand.

Slate consists of an indurated clay which

may be easily split into sheets of various sizes and considerable thinness. The principal quar¬

ries in this country are located in Maine, Ver¬

mont, Pennsylvania and New York, while

those of Ardennes in France, and of Wales in England, are the greatest producers in

Europe. Slate is used most extensively as a roofing material.

The methods employed in quarrying build¬

ingstone vary with the character of the stone, but the ultimate object of all of them is to obtain large and well-shaped blocks free from incipient fractures. Therefore, explosives are used as little as possible for that purpose, and the work of dressing is very largely done by hand. A great deal of machinery, however, is employed for the purposes of sawing, planing and polishing, and for splitting slate.

The durability of a building stone is one

of the most important factors in its value as a material of construction. Durability is the ability of a stone to withstand the deteriora¬

tion induced by its exposure, to the action of changing weather and temperature conditions,

to the chemical agencies in the moisture of the atmosphere and to the disintegrating ac¬

tion of growing organisms. The normal

strengths of the softest building stones are much greater than is necessary for structural purposes, but under the action of the natural elements and agencies just stated they disin¬

tegrate more or less rapidly according to their structure and the materials of which they are composed. Granites suffer disintegration chiefly from changes of temperature and are affected but little by the expansion and contraction due to the absorption of water and its subse¬

quent freezing in cold climates, and are almost entirely unaffected by the chemicals ordinarily held in the atmosphere or carried by rain.

Limestones suffer even less by expansion and contraction, but

deteriorate much more quickly under the action of the chemicals in the air and rain; while the sandstones, on account of their porous structure, suffer chiefly from the effects of expansion and contraction and disin¬

tegrate so rapidly from the effects of frost that they are unsuitable for building purposes in countries with cold climates.

As the durability of <(life in years" of a given variety of building stone, therefore,

varies greatly under different climatic con¬

ditions, it is obvious that the engineer and architect cannot be too careful in selecting the stones best suited to the climatic and other conditions of the localities in which his struc¬

ture is to be built. In order to make the selection intelligently, it is necessary for them to know the special qualities of the various stones, according to their structural constitu¬

ents, and the natural causes by which those constituents were formed into rocks. The

porosity, or the capacity to absorb moisture, of the various classes of stone available for building purposes, varies from to 1 per

cent in the granites, 7 to 8 per cent in the limestones and to 8 per cent in the sand¬

stones, and their hardness or resistance de¬

pends on the firmness with which the particles of which they consist are bound together. In the igneous or metamorphic rocks, the bond

is the result of crystallization, and in the sedi¬

mentary rocks it is due to cementation by

depositions of silica, etc., between the individ¬

ual grains as already described. The resist¬

ance of a stone to frost action may be con¬

veniently and accurately tested by soaking it in water and then freezing it; the process be¬

ing repeated a number of times and the

amount of disintegration noted.

Artificial Stones. — These are represented

by a great variety of artificial compositions of which the basis is hydraulic cement. The best-known varieties are the ((Beton-Coignet,"

a French production composed of Portland

cement, silicious hydraulic cement and clean sharp sand. These constituents when mixed

together with a small amount of cold water make a plastic compound which is hardened

in molds to the consistency of a stone, very suitable for various building purposes ; the <(Ransome stone," which consists of a mixture of sand and silicate of soda, molded into

blocks and slabs, is hardened under pressure in a hot solution of chloride of calcium;

"Portland stone," consisting of a mixture of Portland cement and sand, or sand and gravel, rammed while wet and plastic into molds to harden; "McMurtrie stone," consisting of the Portland stone mixture to which a certain

amount of alum and potash soap is added so as to deposit compounds of aluminum in the pores of the stone and thus reduce its poros¬

ity. The Portland stone, under various, trade names, is extensively used in the United States; the Ransome stone in England, and the

French products mostly in the country in

which they originated. All of them possess

considerable merit for building purposes.

Sand lime brick is increasing rapidly in

favor. In its early use in the United States if BUILDING STONE — BULAK

was often so imperfectly made that readily it absorbed moisture and rapidly deteriorated

through weathering. But it was learned that the secret of good sand lime brick lay in form¬

ing the brick under tremendous pressure, about 100 tons to a brick being often employed. This produces very solid as well as handsome brick, accurate in form and with good moisture

resistance.

Ordinary brick is now artificially colored to many pleasing hues which greatly aid the archi¬

tect in securing harmonious effects. In large buildings the using of different tints of bricks in groups adds vastly to the appearance.

Pressed brick, once favored for fronts, owing to its smooth, handsome surface, is largely in disuse, owing to its tendency to crack.

Terra cotta, which is really nothing but

brick of superior quality, tinted and molded to attractive designs, is in greatly increased use, especially for covering steel work, and for ornamental decoration of buildings, inside and out. It is commonly made in blocks, 24 to 30

inches long, and 6 to 12 deep, the height varying with the ornamental design on the face. The interior is usually hollowed, with partitions about \x/\ inches thick.

The use of steel is no longer confined to the skeleton frame of buildings. There are more than 30 factories in the United States making steel doors and shutters, and probably even more making metal lath and steel sashes. Steel and concrete construction is generally replacing wood, brick and stone, in the large cities, and in all important buildings.

The use of various kinds of brick and tile, and of iron, steel and other metals for build¬

ing purposes, is too familiar to require a de¬

tailed account in this connection, especially as they are exhaustively treated under their spe¬

cial titles. It is important to note, however, that during the last decade the tensile strengths of structural iron and steel have been more than doubled by improved processes of manu¬

facture, and they have almost entirely sup¬

planted wood and stone in those portions of large structures which are subjected to the greatest strains, and also where economy of space is of vital importance.

For further detailed information relative to the production and strength of various kinds of building materials, and the specific purposes for which thev are most suitable, see Architecture; Brick; Cement; Concrete; Concrete Con¬

struction ; Iron ; Lumber Industry in the

United States; Masonry; Steel; Timber—

lands; Wood; and special articles on Granite; Limestone; Marble; Sandstone; Masonry;

Strength of Materials.

Bibliography. — Hall, (Treatise on the

Building and Ornamental Stones of Great

Britain) (London 1872) ; Johnson, (The Ma¬

terials of Construction (New York 1912) ;

Mills, A. P., (Materials of Construction5 (New York 1915) ; Ries, H., <Building Stones and Clay Products5 (New York 1912) ; Watson,

(British and Foreign Building Stones5 (Cam¬

bridge, England, 1911) ; Canada Department of Mines, (Report on Building and Ornamental

Stones of Canada5 (Vol. I, 1912).

Richard Ferris,

Editorial Staff of The Americana.

BUILDING STONE. See Building

Materials.

BUISSON, bwe-son, Ferdinand Edouard,

French educational administrator: b. Paris, 20

Dec. 1841. After completing his studies at

Paris he went to Neuchatel, Switzerland, where he taught from 1866 to 1870. His appointment by Jules Simon in 1871 as inspector of

elemen¬

tary schools caused much agitation on account of his advocacy of the secularization of the schools. The opposition of the Church party led to his resignation. In 1873 he was sent to the exposition in Vienna, to represent French educational interests; in 1876 he went to Phila¬

delphia on a similar mission, and in 1878 was in charge of the educational section of the Paris Exposition. In 1879 he was made director of elementary instruction and became prominent

through the reforms introduced during his ad¬

ministration. After resigning from his post in 1896 he accepted the professorship of pedagogy in the Faculte des Lett res. Plis strong stand on the Dreyfus question attracted much atten¬

tion. He is the author of an authoritative dictionary of Pedagogy5 (1882-84), and has

also written (Liberal Christianity5 ; (Orthodoxy and the Gospel in the Reformed Church5 ; (The Teaching of Sacred History in Primary

Schools5 ; duties of American Scholars5 ;

(Pedagogical Lectures and Talks,5 and a life of Sebastian Castellion.

BUKOWINA, boo-ko-ve'na («beech land55),

Rumania, a province in the extreme north of the kingdom, surrounded by Galicia, Russia,

and Moldavia. Area, 4,035 square miles. It

is traversed bv offsets of the Carpathians, culminating at 6,077 feet ; gives rise to many rivers flowing toward the Black Sea,, and

abounds in wood and considerable mineral

riches. Pop. 800,098.

BUL-TSO («borax lake55), Tibet, a lake

situated 100 miles northwest of Lhasa. It has an area of 24 square miles.

BULACAN, boo-la-kan', Philippines, a

town in Luzon, about 22 miles northwest of Manila, with which it is connected by railway.

The town is composed mainly of. native huts, although there are factories in which silk mat¬

ting is made. Sugar-boiling is also an. industry of importance. The place has strategic advan¬

tages so that it became a theatre of military operations after the Spanish-American War. It was fully pacified in 1900 and made a military post by the United States authorities. Pop.

about 14,000.

BULAK, boo-lak', or BOULAK, a town

on the Nile; the port of Cairo and a north¬

western suburb of that city, with which it is connected by an electric tramway. Its site was once an island, but that part of the river which separated it from Cairo has been filled up. It lies right opposite the island of Gezireh-Bulak.

It was founded in 703; burned by the French in 1799, and rebuilt by Mehemet Ali. In 1835 an arsenal and arms factory were established

there and are still in operation. There are also several mosques, an iron-foundry, a paper-mill, a school for languages, a female peniten¬

tiary and a custom house. The town is sur¬

rounded by the country residences of numerous Egyptian pashas and other grandees. From

1864 to 1889 the Museum of Egyptology was in Bulak; it is now removed to Gizeh (q.v.) Of great interest and importance is the famous

printing establishment — the greatest in the Orient — founded by Mehemet Ali in 1822.

Here an enormous quantity of Arabic, Turkish, and Persian writing of literary character has been published, as well as Arabic newspapers.

Pop. about 78,000.

BULAMA, boo-la'ma, an island on the west

coast of Africa, one of the Bissagos. It is 18

miles long and nine broad and is situated about two miles from the mouth of the Rio Grande.

It is very fertile, but not easy of access.

It is now occupied by the Portuguese. See

Bissagos.

BULAN, boo-lan, Philippines, a town of

the province of Albay, situated in the south¬

eastern part of the island of Luzon. Pop. about 11,000.

BULAU, boo'low, or TIKUS, ti'koos, an

animal of the mole family (Talpidcz) and genus Gymnura (G . rafflesii), a native of Sumatra and Malacca, bearing a considerable resem¬

blance to the opossum. The body is about 13

inches long and the tail about nine. It is noc¬

turnal and feeds on insects. The muzzle is much prolonged and the fur is long and white mixed with stronger bristly black hairs. The tail is naked. It is savage and morose and will live but a short time in

captivity. It is pos¬

sessed of glands which secrete a kind of musk, but in spite of this, it is relished as food by the natives.

BULAWAYO, boo-la-wa'yo, Rhodesia, the

principal town and chief commercial centre of Matabeleland, South Africa, 490 miles north¬

east of Mafeking, 1,360 miles from Cape Town, with which it is connected by railroad. It has several hotels, good business blocks and resi¬

dences, banks and telephone service and is

rapidly growing in size and importance. A few years ago it was the chief town of the Matabele tribe, though only a collection of rude huts, in an enclosure of wattles, whose inhabitants were savages of the lowest type. The royal kraal is now replaced by the government house, which communicates by an avenue a mile and a half long with the town proper. Pop. (white) about 5,000.

BULB (Greek BoAroc) , meaning bulbous

root, the name given to a leaf bud belonging to certain perennial herbaceous plants, and par¬

ticularly to the monocotyledons. It is usually underground, and is supported by a kind of solid and horizontal plate lying between it and the true root. To this flattened portion the fleshy scales of which the bulb is externally formed are fixed by their base. The interior contains the rudiments of the flower-stalks and leaves. The outermost scales are thin and dry like paper, but they become more fleshy and succulent in the interior. Sometimes the scales are of one piece, a single scale embracing the whole circumference of the bulb, as in the onion and the hyacinth. They are then named

(<coated® or ((tunicated5) bulbs. At other times the scales are smaller and free at the sides, and cover one another only in the manner of tiles on a roof, as in the white lily. Lastly, the coats are sometimes so close as to be confounded together, so that the bulb

seems as if formed of a solid and homogeneous substance. Such

bulbs are called <(solid,® and they are exem¬

plified in the common saffron. Bulbs again are either ((simple,)> as in the tulip or squill, or they are ˆmultiple,® or formed of several small bulbs collected under the same envelope, as in garlic.

Bulbs are reproduced every year, but differently in different species, the newr bulbs sometimes being formed in the centre, sometimes at the side, sometimes above, sometimes below the old bulbs. The bulb is usually found in short sea¬

son plants, and is especially adapted for quick growth.

BULBUL, bul'bul, a small brilliantly

plumaged thrush-like bird of the family Pyon-onotidcc, species of which are found in Persia, India and other portions of Asia and in South Africa. The South African bulbul (Pyonono -

tus tricolor) is remarkable for becoming intoxi¬

cated by syringa berries and similar fruits, when it is easily captured and caged. The com¬

mon Indian bulbul (P. Hcemorrhous) is a fa¬

miliar and favorite bird of European residents, and often builds its nest in their gardens and on the verandas. The pugnacity of the males is utilized by the natives for their amusement, the birds being caught and trained to fight for small prizes. The name ˆbulbul® was applied to the little Persian nightingale and first in¬

troduced into English poetry by Lord Byron, after which its praises were much sung by the poets of the day.

BULFINCH, Charles, American architect:

b. Boston, 8 Aug. 1763; d. there, 15 April 1844.

He was graduated from Harvard in 1781, for several years traveled in Europe, studying ar¬

chitecture, which he adopted as a profession upon his return in 1786. His first wTork was the present memorial column on Beacon Hill, Bos¬

ton. In 1793 he built the first theatre in Boston.

In the course of his career he designed more than 40 churches and public buildings in New England. Among them were the State house,

Suffolk . County courthouse, Massachusetts

General Hospital ; he remodeled Faneuil Hall in Boston ; the State prison and MacLean Asy¬

lum, at Charlestown; the county jail and Uni¬

versity Hall in Cambridge, and the State house in Augusta, Me. From 1817 until its comple¬

tion in 1830 he was the architect of the national capitol at Washington. Consult Bulfinch, Ellen, (Life and Letters of Charles Bulfinch, Architect) (Boston 1896).

BULFINCH, Stephen Greenleaf, Ameri¬

can poet and hymn writer : b. Boston, Mass., 18

June 1809; d. Cambridge, Mass., 12 Oct. 1870.

He was a son of Charles Bulfinch (q.v.), a noted American architect, who drew the plans for numerous public buildings. Graduated

from Columbian College, Washington (1826),

and the University School, Cambridge, Mass., he was ordained a Unitarian minister, and after preaching in Georgia for seven years, Pitts¬

burgh, Pa., two years, Washington, D. C., six years and Nashua, N. H., seven years, he re¬

moved to Boston in 1852. Among his published works are numerous

religious (Poems) (1832) ; Contemplations of the Saviour> (1834); (The

Holy Land and its Inhabitants5 (1834) ; Cays of the GospeP (1835) ; Communion Thoughts)

(1852) ; Che Harp and the Cross5 (1857) ; ‘Honor, or the Slave-Dealer’s Daughter5

(1864) ; (Manual of the Evidence of Christian¬

ity5 (1866) ; ‘Studies in the Evidence of

Christianity5 (1869).

.

.

‘

.

.

,

,

-

!

‘

.

*

.

l

|

l

I

i

i

l

i

l

I

I

I

|

I

i

i

i

i

$

THE

ENCYCLOPEDIA

AMERICANA

JT

‘

.

*

.

1

|

1

I

i

i

l

i

1

I

I

I

|

I

i

i

i

i

$

THE

ENCYCLOPEDIA

AMERICANA

JT

£g$*w

UjilVmSAL

JQoWLEDGEj

In Thirty Volumes

>)

*

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK CHICAGO

2S5

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

4

0 V

*

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 1 8 1922

©r.!.A654 317

PARTIAL LIST OF CONTRIBUTORS TO VOLUME V

AYRES, HARRY MORGAN, Ph.D.

Assistant Professor of English, Columbia University

CANTERBURY TALES, THE

BAART, P. A., S.T.L., LL.D.

Author of " Church and State in the United States of America," " The Roman Court," " Legal Formulary," " Tenure of Church Property in the United States," *Etc.*

CANON LAW

BIGGAR, H. P..

Author of " The Early Trading Companies of New France "

CANADA — THE ERA OF EARLY DIS¬ COVERY

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

CALEB WILLIAMS CARLYLE, THOMAS

BRYCE, GEORGE, D.D., LL.D.

Member of Conservation Commission of Canada;

Royal Commission on Technical Education (1910-13), and of Royal Society Committee on Research (1916)

CANADA — TECHNICAL EDUCATION CANADA — HUDSON'S BAY COMPANY

BUCHANAN, MILTON A., Ph.D.

Professor of Italian and Spanish, University of Toronto

CALDER6N DE LA BARCA, PEDRO

BURPEE, LAWRENCE J., F.R.G.S., F.R.S.C.

Secretary, Canadian Section of International Joint Commission, Ottawa

CANADA — LITERATURE

CAIRNS, WILLIAM B., Ph.D.

Assistant Professor of American Literature, Uni¬ versity of Wisconsin

BUNKER HILL ORATIONS

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

CANADA — DIPLOMATIC RELATIONS OF UNITED STATES WITH

CARIBBEAN — AMERICAN INTERESTS AND DIPLOMATIC RELATIONS IN

CANFIELD, ARTHUR G., A.M.

Professor of Romance Languages, University of Michigan

CANDIDE

CARVER, THOMAS N., Ph.D., LL.D.

Professor of Political Economy, Harvard Uni¬ versity

CAPITAL

COATS, R. H.

Dominion Statistician and Controller of Census

CANADA — POPULATION CANADA — MANUFACTURES CANADA — WATER POWERS CANADA — THE LABOR MOVEMENT

* Deceased

COCHRANE, CHARLES H. *

Author of “ Modern Industrial Progress ”

CABLE, SUBMARINE CANNING AND PRESERVING IN¬ DUSTRY

CAR BUILDING INDUSTRY CARRIAGE

COLBY, CHARLES W., Ph.D.

Formerly Professor of History, McGill University

CANADA — UNDER FRENCH RULE

(1632-1755)

CANADA — UNDER BRITISH RULE TO CONFEDERATION (1760-1864) CANADA — JESUIT ESTATES ACT

COLEMAN, ARTHUR P., Ph.D.

Professor of Geology, University of Toronto

CANADA — MINERALS ,

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

CAMPOAMOR Y CAMPOOSORIO, RAMON DE CARDUCCI, GIOSUE

COUMBE, CLEMENT W.

Technical Art Expert

CAMEOS

COWIE, JOHN J.

Department of Marine and Fisheries, Ottawa

CANADA — FISHERIES

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell Uni¬ versity

BUTLER, JOSEPH CAMBRIDGE PLATONISTS CARTESIANISM

CROSS, WILBER L., Ph.D.

Professor of English, Yale University

BULWER-LYTTON, EDWARD GEORGE EARLE

DAKE, CHARLES LAWRENCE, A.M.

Assistant Professor of Geology and Mineralogy, School of Mines and Metallurgy, University of Missouri

CAMBRIAN

CARBONIFEROUS

DE LEON, EDWIN W., LL.B. *

Late President of The Casualty Company of America

BURGLARY INSURANCE

DERRY, JOSEPH T.,

Author of “ History of Georgia ”

CALHOUN, JOHN CALDWELL

DICKINSON, THOMAS H., Ph.B., Ph.D.

Associate Professor of English, University of Wis¬ consin

‘ CANDIDA

DOUGHTY, ARTHUR G., Litt.D.

Dominion Archivist; Author of “ The Battle of the Plains ”

CANADA — BRITAIN’S FIGHT WITH FRANCE FOR NORTH AMERICA

DUNCAN, DAVID M.

Author of “The Story of the Canadian People Collegiate Institute, Winnipeg

CANADA — THE CANADIAN WEST

EVANS, W. SANFORD

Chairman of Georgian Bay Canal Commission, Ottawa

CANADA — SETTLEMENT OF THE CANADIAN WEST

FERRIS, RICHARD, C.E., D.Sc.

Editorial Staff of The Americana

CARBIDE CARBOHYDRATE CARBOLIC ACID CARBOLINEUM CARBON

CARBON COMPOUNDS CARBON DISULPHIDE CARBON DIOXIDE

FOURNET, A., S.S.,*and NEVEU, J.R., S.S., D.D.

Laval University, Montreal

CANADA — CATHOLIC CHURCH IN

GERIN, LEON, LL.B.

Member de la Societe Internationale de Science Sociale

CANADA — THE FRENCH CANADIAN

GODFREY, ERNEST H., F.S.S.

Editor, Census and Statistics Office, Ottawa

CANADA — AGRICULTURE CANADA — THE GRAIN TRADE

HAGUE, DYSON, D.D.

Vicar of the Church of the Epiphany, Toronto; Professor of Liturgies, Wycliffe College, Toronto

CANADA — RELIGIOUS CONDITIONS

HAMILTON, C. F., Lieut.-Col.

Department of Militia and Defense, Ottawa

CANADA — MILITARY SYSTEM

HAMLIN, ALFRED D. F., A.M., L.H.D.

Professor of the History of Architecture, Columbia University

BYZANTINE ARCHITECTURE

HARRY, JOSEPH E., Ph.D.

Author of " The Greek Tragic Poets," *etc.*

BYZANTINE EMPIRE BYZANTINE LITERATURE

HEDRICK, EARLE RAYMOND, Ph.D.

Professor of Mathematics, University of Missouri

CALCULUS OF VARIATIONS

INGERSOLL, ERNEST

Naturalist and Author

BUTTERFLY

CARIBOU

CASSOWARY

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

CARMEN (OPERA)

KELLOGG, VERNON L., A.B., M.S.

Professor of Entomology, Leland Stanford Junior University

BURBANK, LUTHER

JEMMETT, F. G.

Colonial Bank, London; formerly Secretary of The Canadian Bank of Commerce

CANADA — BANKING SYSTEM CANADA — CURRENCY, COINAGE AND LEGAL TENDER

«

KENNEY, JAMES F.

Public Archives of Canada, Ottawa

CANADA — CATHOLIC EDUCATION

KERR, WILLIAM A. R., Ph.D.

Dean of the University of Alberta

CALGARY, CANADA

KLEIN, HENRI F.

Librarian “ London Times,” 1898-1905; Editorial Staff “ London Standard,” 1905-15; and Staff of The Americana

BULGARIA

BULGARIAN LANGUAGE AND LITER¬ ATURE

LAMONT, HAMMOND

Editor of “ New York Nation;” Editor of “ Burke’s Speech on Conciliation with America ”

BURKE, EDMUND

LANGTON, H. H.

Editorial Staff of “ Review of Historical Publica¬ tions Relating to Canada ”

CANADA — GEOGRAPHY

LANGWORTHY, CHARLES F., D.Sc., Ph.D.

United States Department of Agriculture

CALORIMETER

LEACOCK, STEPHEN, Ph.D., Litt.D.

Professor of Economics and Political Science, McGill University

CANADA — CLERGY RESERVES CANADA — LOCAL GOVERNMENT CANADA — IMPERIAL FEDERATION CANADA — PUBLIC EDUCATION CANADA — THE ASHBURTON TREATY CANADA — WASHINGTON TREATY CANADA — GRANGER MOVEMENT

LENNOX, PATRICK JOSEPH, B.A., Litt.D.

Professor of English Language and Literature, The Catholic University of America

CARLETON, WILLIAM

LUCKIESH, M.

Nela Research Laboratory, Cleveland

CAMOUFLAGE

LUMMIS, CHARLES FLETCHER, Litt.D.

Founder Emeritus of the Southwest Museum, Founder and President of Landmarks Club

CALIFORNIA

* Deceased.

LEONARD-STUART, CHARLES, B.A.

Editorial Staff of The Americana

BURMA

LIGHTHALL, WILLIAM DOUW, M.A.

Author of “ The False Chevalier Founder of Chateau de Ramzay Historical Museum, *etc.*

CANADA — THE ACADIAN REFUGEES

LOISEAUX, LOUIS A., B.S.

Associate Professor of Romance Languages and Literatures, Barnard College, Columbia Uni¬ versity *

CARMEN

MacMECHAN, ARCHIBALD, Ph.D.

Professor of English Language and Literature, Dalhousie College, Halifax

CANADA — THE MARITIME PROV¬ INCES TO CONFEDERATION

MAGIE, WILLIAM FRANCIS, Ph.D.

Professor of Physics, Princeton University

CAPILLARITY

McCREA, NELSON G., Ph.D.

Professor of Latin Language and Literature, Co¬ lumbia University

CAESAR, GAIUS JULIUS CAPTIVI

McIntyre, w. a.

Normal School, Winnipeg

CANADA — PRIMARY EDUCATION

MOLDENKE, RICHARD, E.M., Ph.D.

Specialist on Metallurgy of Cast Iron and Expert in Malleable Castings

CAST IRON, MALLEABLE

MUNRO, WILLIAM BENNETT, Ph.D., LL.D.

Professor of Municipal Government, Harvard University

CANADA — THE QUEBEC ACT CANADA — SEIGNIORIAL TENURE

NEILSON, WILLIAM A., Ph.D.

Professor of English, Harvard University

BURNS, ROBERT

PANARONI, ALFRED G., B.S.

Instructor in Romance Languages, College of the City of New York

CANTICLE OF THE SUN, THE

PARKHURST, CHARLES H., D.D., LL.D.

Pastor of Madison Square Presbyterian Church, New York

CALVIN, JOHN

RINES, IRVING E.

Author of “ History of United States ”

CABINET AND CABINET GOVERN¬ MENT

ROSS, ALEXANDER H. D., M.A., M.F.

Consulting Forest Engineer, Toronto

CANADA — FOREST AND LUMBER IN¬ DUSTRY

SCHMIDT, NATHANIEL, A.M.

Professor of Semitic Languages and Literatures, Cornell University

CANTICLES

SCOTT, W. D.

Superintendent of Immigration, Ottawa

CANADA — IMMIGRATION

SEATH, JOHN

Superintendent of Education, Ontario

CANADA — SECONDARY EDUCATION

SHORTT, ADAM, LL.D.

Chairman of Board of Historical Publications, Public Archives of Canada

CANADA— WAR ECONOMICS CANADA — COMMERCE, TARIFFS and TRANSPORTATION CANADA — PUBLIC FINANCE

SMITH, GOLD WIN, LL.D.*

Formerly Regius Professor of Modern History of the University of Oxford, and Emeritus Professor of Cornell University

CANADA — CONFEDERATION CANADA — THE CONSTITUTION

SMITH, WILLIAM BENJAMIN, Ph.D.

Formerly Professor of Mathematics, The Tulane University of Louisiana

CALCULUS, THE INFINITESIMAL

STUDEBAKER, JOHN M.

Manufacturer

CARRIAGE AND WAGON INDUSTRY

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Uni¬ versity

BYRON, GEORGE GORDON

UNDERHILL, JOHN GARRETT, Ph.D.

Representative of the Sociedad de Autores Espanoles in the United States and Canada

CARTAS OF FEIJOO

WHITFORD, NOBLE E., A.B.

Author of “ History of New York Canals ”

CANALS

WILCOX, MARRION, A.M., LL.B.

Coeditor of “ Encyclopedia of Latin America ”

CARIB

CARIBBEAN SEA

WOOD, FRANCIS CARTER, M.D.

Director of Cancer Research, Columbia University

CANCER

WRONG, GEORGE M., M.A.

Professor of History, University of Toronto

CANADA — OUTLINE HISTORY AND POLITICAL DEVELOPMENT
CANADA — CANADA AND THE EURO¬ PEAN WAR

CANADA — SINCE CONFEDERATION CARTIER, SIR GEQRGE ETIENNE

* Deceased.

KEY TO PRONUNCIATION.

a

far, father

n

•

Span, h, as in canon (can’ySn), pihon (pen’yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

A

a

all, fall

o or 6

not, on

ch

choose, church

6

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. e, as in de ; eu, as in neuf; and ocu, as in

oi

oil, soil ; also Ger. eu, as in beutel

boeuf, coeur; Ger. o (or oe), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

ii

between u and e, as in Fr. sur,

Ger. Muller

i or 1

him, it

1

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

y

(consonantal) yes, young

j

gem, genius

•

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon-

‘(prime),

“(secondary) accents, to indicate

point, Jean, temps

syllabic stress

BULGARIA, bul-gar’e-a, or bool-ga’re-a, an independent kingdom of the Balkan Peninsula (q.v.), southeastern Europe. Bulgaria is bounded on the north by the Danube and Rumania ; on the east by the Black Sea; on the south by Greek Macedonia and Thrace ; and on the west by Serbia. Before the Bal¬ kan Wars (q.v.) in 1912-13 the estimated area of the country was 24,380 square miles, and of South Bulgaria (formerly Eastern Rumelia) 13,700 square miles, total 38,080 square miles. According to the census of 1900 the total population was 3,7 44,283 ; in 1906, 4,028,260; in 1910, 4,337,516. By the Treaty of London (30 May 1913) Bulgaria had gained a large amount of territory from Turkey, but being discontented with her share, she turned against her former allies (29 June 1913) and was severely defeated in the second Balkan War and in consequence lost much of

what she had won. Rumania intervened and acquired about 2,900 square miles of territory. Bulgaria finally secured only about 10,000 square miles from Turkey, while she lost nearly 3,000 square miles of her own territory to Rumania, with a population of about 273,000. Balkan statistics, however, should be accepted with considerable reserve, as it is rare to find any two authorities in agreement. The most re¬ cent figures obtainable give the kingdom of Bulgaria an area of 43,320 square miles, and a total population of 4,467,000, made up of Bul¬ garians, Turks, Rumanians, Greeks, Serbs, Gypsies, Jews, Russians, Germans and other nationalities. Before 1913 Bulgaria was divided into 12 districts, Saint Zagora, Bourgas, Vidin, Philippopolis, Varna, Rustchuk, Tirnovo, Chou-men, Pleven, Sofia, Kustendil and Vratza. The capital is Sofia (q.v.), with a population of 103,000; other chief towns are Philippopolis, Varna, Rustchuk, Slivno, Shumla and Plevna.

Soil, Climate, Industry. — The surface of Old Bulgaria is a gradually sloping plain, broken by occasional mountains, which give rise to rapid tributaries of the Danube. The Balkan Mountains or Stara Planina are describ¬ ed under Balkan Peninsula and Balkan Moun¬ tains. There is little mining, although the mountains are rich in minerals, iron, gold, silver, manganese and copper. The soil is ex¬ cellent and the slopes of the mountains are richly wooded. The climate is healthy, and the country enjoys the reputation of possessing more centenarians than any other in Europe. People stated to be 105 to 125 years of age are

not uncommon, though it is not improbable that such remarkable longevity may be due rather to unreliable records and memories than to any virtues of climate. Over 70 per cent of the people are engaged in agriculture and most of them own freehold plots on which they pay a small land tax, while they enjoy free rights over communal grazing and timber lands. A considerable quantity of grain, chiefly wheat, is exported; fruit and vegetables are raised in abundance ; roses are largely cultivated for the production of the attar, which is exported to the value of $1,500,000 per annum. Wine is plentiful and cheep ; silkworms are bred in some regions and tobacco forms an important crop. Stone quarries and government coal mines are in operation ; domestic industries are chiefly carpets, hosiery, woolen and cotton goods and ribbons. The highways are still in a backward condition ; most of the traffic is car¬ ried on by the rivers, and export trade by the Black Sea ports of Vara and Bourgas; pas¬ senger and merchant steamers run between Varna and Constantinople (150 miles). Rust¬

chuk, Vidin and Sistova are the chief Danube ports. There is a railroad system of nearly 1,500 miles in the kingdom; Sofia is connected with the general European system, and several new lines are projected or are in course of con¬ struction, one to run from the Danube to the 2Lge an Sea. The National Bank of Bulgaria (capital, $4,000,000) has over 60 branches; there is also a State Agricultural Bank, and a French, a German and an Austrian bank. On 1 April 1916 Bulgaria abolished the Julian calendar (old style), which is 13 days behind ours, and adopted the Gregorian calendar. Sta¬ tistics of 1914 showed the Bulgarian revenue as $51,399,000; in 1915, $55,135,975; expenditure, 1914, $51,352,520; in 1915, $55,073,240; national debt, 1915, $231,496,540. Imports, 1914, $44,586,- 860; exports, 1914, $28,813,372.

Government. — Bulgaria is a constitutional monarchy. Legislative authority is vested in the Sobranje, a national assembly consisting of only one chamber, to which members are elected at the rate of one representative to every 20,000 of the population. The members are paid for their services; elections are held every four years unless the Sobranje is dis¬ solved by the King before the expiration of its term. With certain exceptions, every, man over 30 is eligible. For decisions concerning highly important matters of state the Sobranje is doubled by special election and resolved into a <(Grand Sobranje.® The cabinet is composed of

eight ministers appointed by the King; they hold the usual portfolios — premier, finance, war, *etc.*

Religion. — The national religion of Bul¬ garia is the same as that of the orthodox Greek Church, but it is independent of that bod}-. Over 75 per cent of the population belong to that faith ; the remainder are Mohammedans, Jews, Roman Catholics, Protestants and Grego¬ rian Armenians, whose ancestors seceded from the Greek Church in the 5th century. The University of Sofia is open to women as well as men ; the state subsidizes education, which is obligatory and free to those who cannot pay for it. There are also Greek, Turkish, Ameri¬ can, Jewish,

French, Armenian and German schools, and education is further promoted by free libraries, museums and technical schools.

Military Service. — Before the Great War of 1914-18 Bulgaria possessed a -large and ef¬ ficient army. It gave a good account of itself jn the Serbian War of 1885, and a still better one in the Balkan Wars. Recruiting was by conscription ; Moslems were exempt on pay¬ ment of a tax of $100 each. Every other Bul¬ garian subject was liable to 26 years' service, and the army was consequently composed of many different races. Besides the pure-bred Bulgars, there were Turks, who could not pay the tax, Pomakes (settlers and nomads), Jews USpanioles® and Poles), Serbs, Greeks, Ru¬ manians, Armenians, Gypsies, Circassians, and naturalized Russians, Germans and Levantines. The army actually dates from January 1878. From 1389, when the Turks defeated the Slav allies, till 1878, the Bulgarians, as Christian subjects of Turkey, had been exempt from mili¬ tary service. The soldiers were well-treated, though hard-worked, and very particular .atten¬ tion was paid to their spiritual welfare. Should a regiment contain but one Jew and one Mohammedan, a rabbi and a dervish are pro¬ vided. The barracks are comfortably built and equipped with appliances calculated to promote the health of the troops. Large mirrors and framed pictures adorn the walls; drunkenness is practically unknown, and little smoking is indulged in. The Bulgarian officer takes his profession seriously, working and studying hard with dogged pertinacity and living within his in¬ come. Under the terms imposed by the Treaty of Neuilly of 27 Nov. 1919, Bulgaria's military forces must not exceed 20,000 men. Mobiliza¬ tion measures are prohibited, and, in order to preclude the formation of a reserve, service in the ranks is for a minimum period of 12 years. In addition there is permitted a frontier guard of 3,000 men. The total of gendarmes, police, and forest guards must not exceed 10,000.

History. — The Bulgarians were originally a Tartar nation, which in the 4th century set¬ tled on the Volga. The ruins of their former capital may still be seen in the neighborhood of Kazan. Their kingdom, which occupied a part of the Asiatic Sarmatia of the Greeks, was called Great Bulgaria, and is now comprehended in the Russian government of Orenburg. They afterward removed to the countries between the Bog and the Danube and called their territories Second Bulgaria. The first Bulgarian kingdom south of the Danube was founded in the latter half of the 7th century, but the Bulgarians who established it were comparatively few in num¬

ber, and after their adoption of Christianity in the 9th century they became completely mixed up with the Slavonic inhabitants, though the whole became known as Bulgarians. The great¬ est ruler of this kingdom was Symeon (888-927), who subjugated the greater part of the peninsula and raised the Archbishop of Bul¬ garia to a position independent of the Patri¬ arch of Constantinople. Under the son of Symeon this empire fell to pieces. The western half broke off and formed a separate kingdom, with Ochrida in Macedonia for its capital ; and the eastern portion was subdued by the Byzan¬ tine Emperor, John Zimisces, who reincorpo¬ rated it with the empire. The western Bulgarian kingdom existed only till about 1018, when it also was subdued by Basil II, ((the slayer of the Bulgarians. M Toward the end of the 12th cen¬ tury, however, the Bulgarians revolted and man¬ aged to establish a third kingdom between the Balkan range and the Danube, which, some¬ times weak and sometimes powerful, continued to exist till the advent of the Turks. The last ruler of this kingdom was conquered by Bajazet I about 1390, and for nearly 500 years the Turks ruled supreme. In 1876, on account of the atrocities of the Turkish soldiers, an insur¬ rection broke out. Russia took the part of Bul¬ garia against Turkey, and the war of 1877-78 followed. (See Batak). By the first article of the Treaty of Berlin, 13 July 1878, the princi¬ pality of Bulgaria was constituted, made tribu¬ tary to Turkey and placed under the suzerainty of the Sultan. In 1879, Alexander of Battenberg, a German prince, was chosen sovereign of part of Bulgaria, the rest being made a sepa¬ rate province, called Eastern Rumelia, to pre¬ vent Bulgaria from becoming a strong state. In 1885 there was a revolution in Eastern Ru¬ melia, which annexed itself to Bulgaria.

The annexation of Eastern Rumelia led to a quarrel with Russia; Tsar Alexander III withdrew all Russian officers who had been training the Bulgarian army and were still serv¬ ing in it. King Milan of Serbia considered the moment ripe to realize the territorial aspira¬ tions of his country and declared war on Bul¬ garia, 14 Nov. 1885. (See Serbo-Bulgarian War). After a short, sharp campaign the Serbians were defeated but saved from extinc¬ tion by the intervention of Austria. Russian and Bulgarian conspirators abducted Prince Alexander and set up a government under Russian tutelage. A counter-revolution, headed by Stambuloff (q.v.), succeeded in restoring the Prince within a few days. Unfortunately Alexander made a false move when he tele¬ graphed to the Tsar and offered to resign his crown into Russian hands. This step turned Bulgarian opinion against him ; he was com¬ pelled to abdicate and leave the country on 9 Sept. 1886. For 11 months Bulgaria remained without a ruler, its affairs being managed

by a regency under the leadership of Stambuloff. This statesman, an innkeeper's son, was a rude, violent man, of uncouth manners but sincere patriotism. He had been largely responsible for throwing off the Turkish yoke, and now fought strenuously to resist the aggression of Russia. The Russian candidate for the throne was rejected and Prince Valdemar of Denmark, to whom it was offered, refused the honor. Stambuloff sent a commission round the Euro-BULGARIA

O

u

pean capitals to find a prince for the vacant post. Their choice eventually fell upon Prince Ferdinand of Saxe-Coburg-Gotha, son of Prince Augustus of Saxe-Coburg-Gotha and Princess Clementine, daughter of King Louis Philippe of France. At the time of his election (7 July 1887), Prince Ferdinand was 26 and an officer in the Austrian Hussars. The task that lay before him was difficult and the enterprise most precarious. Though he never achieved the pop¬ ularity of his predecessor, the new Prince brought his undoubted ability and ambition to the regeneration of Bulgaria. Aided by Stambuloff, who, like Bismarck, was the master of his sovereign, Ferdinand produced order from chaos with an iron hand. None of the Powers would recognize him, and it took nine years before he succeeded in wearing down the an¬ tagonism of those within and without his do¬ main. He cultivated the friendship of Turkey and Rumania and combated the Russian influ¬ ence permeating Bulgaria. It would perhaps be more correct to ascribe the strong anti-Russian policy to Stambuloff rather than to the Prince; the former was the fortiter in re to the suaviter in modo of the latter. With but one passion — love of his country — Stambuloff labored ruthlessly and mercilessly for a master whom he despised, whom he would neither flatter nor betray. Stambuloff cared nothing for the man ; only for the nationality he rep¬ resented. YVith fiery, self-sacrificing energy Stambuloff developed the resources of his coun¬ try — railways, financial reform, education — creating an efficient army and fostering every type of commerce and industry. During the seven years that Prince Ferdinand and his Minister ((worked together® their personal re¬ lations grew from bad to worse, developing into fierce hatred. By describing his conduct in an official communication as ˆinfamous,® Prince Ferdinand goaded Stambuloff into res¬ ignation in 1894. Stambuloff's request that he be

permitted to visit a foreign health resort was refused. He made a public declaration that he would be murdered, and on 15 July 1895 his prognostication was fulfilled ; he was murdered and mutilated by four men in the streets of Sofia in the presence of the police. One of his hands, which was cut off in the struggle, is said to be still preserved in his home, to be buried on the day when his murder is avenged.

From the moment of Stambuloff's resigna¬ tion Prince Ferdinand took the reins into his own hands. For the next 10 years a succession of premiers wrestled with the chaotic finances of the country and the thorny question of Macedonia. Efforts were made to establish friendly relations with Russia and Austria. Prince Ferdinand's eldest son, Boris (b. 30 Jan. 1894) had been baptized a Roman Catholic, the religion of his parents ; at the age of two he was rebaptized and received into the Ortho¬ dox Greek Church, the Tsar standing as his sponsor. Russia then recognized Prince Ferdi¬ nand, and the other Powers followed suit. The Minister for Public Works in Stambuloff's last cabinet (1892-94) was a Bulgarian jour¬ nalist, M. Petkoff, who had previously been mayor of Sofia. He was walking with Stam¬ buloff at the time the latter was murdered. In 1903 General Petroff became Premier, and Petkoff joined the cabinet as Minister of the

Interior. On the resignation of General Pet¬ roff (5 Nov. 1906), M. Petkoff was called to the helm of Bulgarian affairs. He belonged to the party known as the Stambuloff section of the Liberals, distinguished by its irrecon¬ cilable hostility to Russian influence in the Balkanˆ. Less than five months (11 March 1907) later, Petkoff was shot dead on the street by a dismissed employee of the Agri¬ cultural Bank. The accession of Count von Aehrenthal (q.v.) as Austrian Foreign Minister in October 1906 was destined profoundly to influence Balkan affairs, and especially those of Bulgaria. For many years Bulgaria had been begging the Powers to relieve her of the burden of the ((Capitulations,® a relic of Turk¬ ish rule. According to. these rules, a foreign subject could not be arrested except in the presence of a kavass, dragoman or some other consular official, or tried without similar super¬ vision. Practically all the other Powers had signified their readiness to abolish the Capitu¬ lations if consent thereto could be obtained from every one of them. Austria-Hungary, however, had hitherto always objected to any change. Within a month of taking office, Count von Aehrenthal rendered this service to Bul¬ garia, which cost Austria nothing and yet laid the principality under a great obligation. By this simple stroke the dual monarchy assured to itself

the warm sympathy of Bulgaria to an extent long absent from their relations. For 10 years it had been the policy of Count Golu-chowsky (Aehrenthal's predecessor) to play off the Slav against the non-Slav Balkan States, e.g., Greece and Rumania against Bul¬ garia and Serbia, inclining toward the former and treating the latter in a magisterial manner that aroused bitter resentment. Austria's <(graceful concession® paved the way for two important events profitable to both parties. Having gained the goodwill of Bulgaria, Aus¬ tria was able, in 1908, to annex Bosnia-Herze- govina, despite the fierce opposition of Serbia. To Prince Ferdinand, the removal of the Capit¬ ulations was the first step toward the realiza¬ tion of his larger policy — complete independ¬ ence from Turkish suzerainty, and a royal crown. In September 1908, Prince Ferdinand was received with royal honors at Budapest ; 12 days later (5 October) Bulgarian independ¬ ence was proclaimed and the Prince took the title of Tsar of Bulgaria; two days later Em¬ peror Francis Joseph issued a proclamation that Austro-Hungarian sovereignty was ex¬ tended to Bosnia and Herzegovina. The mo¬ ment was well chosen; the Young Turk revolu¬ tion had just achieved its object; the Committee of Union and Progress ruled in Constantinople, and there seemed every prospect of Turkey becoming a united and enlightened nation, strong to reassert her claims on Bosnia-Herze- govina and suzerainty over Bulgaria. Shadowy indeed those claims were, for public opinion in western Europe had long ceased to consider them valid. The fact that Tirnovo (Trnovo) was chosen as the scene of the proclamation of the re-establishment of the Bulgarian king¬ dom added to the dramatic interest of the situation, for no portion of the Bulgarian soil is so intimately associated with the most stir¬ ring events of the national history. The church of the Forty Martyrs, wherein the Prince read the proclamation, was built in 1230

by John Asen, <(Tsar and Autocrat of the Bulgarians,® whose inscription on one of the pillars reads : <(I smote the Greek army … and all lands have I conquered, from Adrian-ople to Durazzo, the Greek,, the Albanian, and the Servian land… . ® Here the Bulgarian

Tsars were crowned and buried, an < 4 many inscriptions of those times still adorn the walls. Turkey claimed $24,000,000 as compensation ; Bulgaria offered $7, 600, 000. An agreement was arrived at through the intermediary of Russia, who advanced most of the money; in April 1909, the Powers recognized Bulgaria as an independent, sovereign state.

The next important event in the history of Bulgaria was the formation of the Balkan League (q.v.) and the Balkan Wars in 1912 and 1913. However much Bulgaria was to blame for the second war, the Treaty of Bucharest (10 Aug. 1913), imposed upon her by Serbia, Montenegro, Rumania and Greece, was a colos» sal blunder on the part of those who dictated it. It left Bulgaria sullen and dissatisfied, and robbed her of the fruits of her early victories. She failed to receive any part of that district of Macedonia inhabited chiefly by Bulgars. Serbia and Greece had obtained most of the spoils, and Rumania had rectified her frontier at Bulgaria's expense. This legitimate griev¬ ance was destined to affect the course of the great European War (q.v.) that broke out a year later. The sympathies of Rumania were with the Allies, but she could not enter the war without an understanding with Bulgaria. On behalf of Greece, M. Venizelos had prom¬ ised the support of his country to Great Britain and France if the necessity should arise. In a communication to King Constantine (11 Jan. 1915) he pointed out that, if Greece allowed Serbia <(to be crushed to-day… . we should have to submit to the disturbance of the Balkan equilibrium in favor of Bulgaria, who, thus strengthened, would either now or some time hence be in a position to attack us, when we should be entirely without either a friend or an ally.® He proposed to make ((adequate con¬ cessions® to Bulgaria ; but he confessed, <(on account of Bulgaria's greed, it is not at all certain, whatever concessions we make, that we shall be able to satisfy her … .® There was every indication that Bulgaria might have been won for the Allies had her price been paid, as her most distinguished generals favored a Russian alliance ; but nothing was done to conciliate her. The Bulgarian Premier, M. Radoslavoff, declared in July and again in August that Bulgaria was prepared to enter the war as soon as she received the necessary guarantees. But the Russian disaster in the Carpathians and the failure of the Dardanelles campaign persuaded King Ferdinand that by joining Germany and Austria he would be on the winning side. A secret treaty was signed about 17 July 1915 between Bulgaria, Germany, Austria and Turkey. Bulgaria was promised her price, in the shape of Serbian Macedonia, with Salonica and Epirus thrown in. During September began the Austro-German advance that was to deal the final blow to Serbia. On the 21st M.

Venizelos asked the Allies for 150,000 men; they were promised on the 24th, and Greece began mobilizing. Bulgaria was also mobilizing; a deputation of ex-ministers waited on the King and warned him against

joining the Central Powers. Serbia proposed on the 27th to attack Bulgaria, as the presence of German and Austrian officers in Sofia looked suspicious, but Great Britain opposed the plan, apparently still harboring belief in the Bul¬ garian declaration of ((armed neutrality.® Had the Serbians not counted till the last moment on Greece fulfilling her treaty obligations, it is probable that they would have disregarded the British advice. On the 3d of October the Russian government addressed a note to Bul¬ garia declaring that there was no longer any doubt (<as to the object of the present military preparations,® and the Russian Minister was instructed to leave Sofia if the Bulgarian gov¬ ernment did not <(openly break with the enemies of the Slav cause and of Russia within 24 hours by sending away the officers belonging to the armies of states who are at war with the Powers of the Entente.® An unsatisfactory reply led to a rupture of diplomatic relations, and Bulgaria formally entered the conflict on 5 Oct. 1915. On the 19th an imperial mani¬ festo issued in Petrograd stated that (<the Bul¬ garian troops have attacked our loyal ally Serbia, already bleeding in a struggle against a stronger enemy.® See War, European.

Bibliography. — Abadjieff, C., (Die Han-delspolitik Bulgariens) (Munich 1910) ; Andrassy, J., (La Bulgarie et la guerre generale* (Budapest 1916) ; Anon., (Ferdinand of Bul¬ garia: the amazing career of* (London 1916) ; Anon., Nationalism and War in the Near East) (Oxford 1915) ; Baker, Valentine (Pasha), (War in Bulgaria) (London 1879) ; (<Balkani-cus® (pseud.), (The Aspirations of Bulgaria,* translated from the Serbian (London 1915) ; Barkley, H. C., (Between the Danube and the Black Sea: or, Five Years in Bulgaria) (Lon¬ don 1876), and (Bulgaria before the War* (London 1877) ; Beaman, H., (M. Stambuloff* (London 1895) ; Blanqui, J. A., 'Voyage en Bulgarie pendant l'annee 1841) (Paris 1843) ; Bousquet, G., 'Histoire du peuple bulgare* (Paris 1909); Brailsford, H. N., 'Macedonia: its races and their future) (London 1906) ; Buelens, F., 'La Bulgarie contemporaine* (Brussels 1905) ; Bulgaria of To-Day: official edition of the Bulgarian Ministry of Commerce and Agriculture (London 1907) ; Calary de La-maziere, R., (Les capitulations en Bulgarie* (Paris 1905) ; Caleb, A., 'La Bulgarie et le traite de Berlin) (Geneva 1909) ; Cambon, V., (Autour des Balkans) (Paris 1890) ;

Chaunier, A., ‘La Bulgarie: etude d’histoire diplomatique) (Paris 1909) ; Cholet, Count A. P. de, ‘Etude sur la guerre bulgaro-serbe* (Paris 1891) ; Curtis, W. E., ‘The Lost Provinces of Turkey) (Chicago 1903) ; Dicey, E., (The Peasant State: Bulgaria in 1894) (London 1894) ; Drander, A. G., ‘Evenements politiques en Bulgarie) (Paris 1896), and ‘Cinq ans de regne : le prince Alexandre de Battenberg en Bulgarie) (Paris 1884) ; Dupuy-Peyou, L. L., (La Bulgarie aux Bulgares) (Paris 1896) ; Eliot, Sir C., ‘Turkey in Europe* (London 1908) ; Falkenegg, Baron von, (Bulgarien, Vergangenheit und Gegen-wart* (Berlin 1900) ; Floericke, K., ‘Geschichte der Bulgaren) (Stuttgart 1913) ; Forbes, Toyn¬ bee, Mitrany and Hogarth, ‘The Balkans : a History of Bulgaria, etc.* (Oxford 1915) ; Fox, F., ‘Bulgaria* (London 1915) ; Gladstone, W. E., (Lessons in Massacre: or, the Conduct of the Turkish government in and about Bulgaria

since May, 1876) (London 1877) ; Gubernatis, Comte de, (Le Bulgarie et les Bulgares) (Flor¬ ence 1899) ; Guechoff, J. E., (The Politics of the Balkan League ‘ (London 1915) ; Guerin Son-geon, R. P., (Histoire de la Bulgarie) (Paris 1913) ; Herbert, W. V., (By-Paths in the Balkans) (London 1906) ; and (The Chronicles of a Virgin Fortress, being some unrecorded chapters of Turkish and Bulgarian history) (London 1896) ; Hilferding, A. F., (Geschichte der Serben und Bulgaren) (Bautzen 1864) ; Huhn, Maj. A. von, (The Struggle of the Balkans for National Independence under Prince Alexander (London 1886) ; Huyshe, W., (The Liberation of Bulgaria: war notes in 1877 J (London 1894) ; Jire&ffi, C. J., <Geschichte der Bulgaren) (Prague 1876), and (Das Fuerstenthum Bulgarien) (Prague 1891) ; Kanitz, F. P., (Donau-Bulgarien und der Bal-kan) (Leipzig 1882) ; Kazezes, N., (Greeks and Bulgarians in the 19th and 20th Centuries) (London 1907) ; Koch, A., (Prince Alexander of Battenberg: reminiscences of his reign in Bulgaria) (London 1887) ; Lamouche, L., <La Bulgarie dans le passe et le present’ (Paris 1892) ; Landemont, Comte A., (L’elan d’un peuple : la Bulgarie jusqu’au traite de Londres 1861— 1913 > (Paris 1914) ; Leger, L., (La Bul¬ garie’ (Paris 1885) ; Launay, L. de, (La Bul¬ garie d’hier et de demaiiP (Paris 1912) ; Mac¬ donald, J., (Czar Ferdinand

and his People' (New York 1913) ; Macfie, R. A., (With Gypsies in Bulgaria' (Liverpool 1916) ; MacGahan, J. A., (The Turkish Atrocities in Bulgaria' (Lon¬ don 1876) ; Mach, R. von, (The Bulgarian Ex¬ archate' (London 1907) ; Mahoney, P. C., (Bulgaria and the Powers' (Dublin 1915) ; Miklositch, F., (Vergleichende Grammatik der bulgarischen Sprache' (Vienna 1879) ; Miller, W., (Travels and Politics in the Near East' (London 1898), and (The Balkans' (New York 1896) ; Moeller, R., (Der Serbisch-Bul- garische Krieg 1885' (Hanover 1891); Moltke, (The Russians in Bulgaria and Rumelia in 1828 and 1829' (London 1854) ; Monroe, W. S., 'Bulgaria and her People' (Boston 1914) ; Moore, F., (The Balkan Trail' (New York 1906) ; Morfill, W. R., (Grammar of the Bul¬ garian Language' (London 1897) ; Murray, W. S., (The Making of the Balkan States' (Lon¬ don 1912) ; Muzet, A., (Aux pays balkaniques' (Paris 1912); Pears, Sir E., (Forty Years in Constantinople' (London 1916) ; Price, W. H. C., (Light on the Balkan Darkness' (London 1915) ; Pypin and Spasovitch, (History of the Slavonic Literature' (Paris 1881) ; (Report of the International Commission to inquire into the causes and conduct of the Balkan War' (Washington 1914) ; Ruland, W., (Auszug der bulgarischen Geschichte' (Berlin 1912) ; St. Clair, S. G., and Brophy, C. A., (A Residence in Bulgaria' (London 1869) ; Samuelson, J., Bul¬ garia Past and Present' (London 1888) ; Scelle, G., (La situation diplomatique de la Bulgarie avant la proclamation de son independence' (Revue gen. de droit international, Paris 1908) ; Schurman, (The Balkan Wars' (Princeton 1915) ; Stambler, B., (Les Roumains et les Bulgares : le traite de Bucarest' (Paris 1914) ; Stoyanoff, Z., 'Autobiography of a Bulgarian Insurgent' (London 1913) ; Strausz, A., 'Die Bulgaren' (Leipzig 1898) ; Toula, F., 'Reisen und geologische Untersuchungen in Bulgarien'

(Vienna 1890) ; Vymazal, F., (Die Bulgarische Sprache schnell und leicht zu erlernen' (Vienna 1888) ; Ward, Capt. M. C., 'Handbook of the Armies of the Balkan States' (War Office, London 1900) ; Wiesner, A. K., 'Aus Serbien und Bulgarien' (Leipzig) ; Woods, H. C., (The Danger Zone of Europe' (London 1911) ; also, 'Washed by Four Seas' (London 1908). See also bibliography under Balkan Peninsula and Balkan Wars.

Henri F. Klein.

Editorial Staff of The Americana.

BULGARIAN LANGUAGE AND LIT¬ ERATURE. Bulgaria and the

adjacent dis¬ tricts of Macedonia are considered to have been the cradle of the old Slavic languages. The ancient Bulgarian language was the richest of them all, and was the scriptural language of the Greek-Slavic Church and the great medium of ecclesiastical literature in the ancient Slavic lands. The Russian language is said to have been molded by missionaries of the Greek Church sent from Bulgaria about the 11th cen¬ tury, while the future empire was still in a state of semi-barbarism. The Russian tongue has preserved many inflections which the Bul¬ garian has lost. After the overthrow of the Bulgarian kingdom at the close of the 14th century, the grammatical structure and purity of the language became impaired by mixture with the Wallachian, Albanian, Rumanian, Turco-Tatar and Greek vernaculars; and the modern Bulgarian language has only the nom¬ inative and vocative of the seven Slavic cases, all the rest being supplied by prepositions. It has an article, which is put after the word it qualifies, like that of the Albanians and Wallachians. Among ancient Bulgarian ecclesias¬ tical literature must be mentioned the transla¬ tions of the Bible by Cyril and Methodius, and the writings of John of Bulgary in the 10th century. Grammars of the Bulgarian language have been published by Neofyt in 1835 and by Christiaki in the following year. Venelin, a young Russian scholar, sent to Bulgaria by the Russian archaeographical commission, published in 1837 a grammar and two volumes of a his¬ tory of the Bulgarians, but died while he was engaged in preparing a third volume. A new grammar was given to the public by Bogojev in 1845 and finally, in 1849, by the Rev. E. Riggs, an American missionary stationed at Smyrna, who also sent a Bulgarian translation of Gallaudet's (Child's Book on the Soul' to New York. Dictionaries of the Bulgarian lan¬ guage have been compiled by Neofyt Rilski, who also published a work on education, and Stojanowicz. A Bulgarian version of the New Testament was printed at Smyrna in 1840 for the British and Foreign Bible Society. The Bulgarian national songs are numerous, and are similar to those of the Serbians. Czelakowsky's collection of Slavic songs contains a number of Bulgarian songs. Bobojev has published several historical poems. Among more recent writers the poet Christo Boteff (d. 1876), who exercised a powerful influence on the national spirit, is regarded as one of the greatest poets Bulgaria has produced ; while the poet-novelist Ivan Vazoff is the most popular author to-day. He is also a dramatist and was at one time a soldier and a revolutionary. His best works were written during the years of his exile in

Russia and Rumania. Many are translated into English and other languages. Ivan Vlaikoff depicts peasant life and writes psychological romances ; Michailovski is a brilliant political journalist, a mystical poet and a satirist of French education; Aleko Constantinov was a lawyer, literary critic and translator of French and Russian masterpieces, and a humorist of a high order. Perhaps the greatest literary artist of all was Pencho Slaveikov, philosopher, poet and revolutionist, who died in 1912 by the hand of an assassin. Competent critics have designated him ((the Bulgarian Shakes¬ peare® on account of his beautiful language and deep insight into the mysteries of the soul. His mantle fell on the shoulders of Petko Todoroff, dramatist, poet and philosopher. Velitchkov translated from Shakespeare, Moliere and Dante; he fought against the Turks in his younger days and later held a govern¬ ment position. Tserkovsky is to Bulgaria what Burns was to Scotland, the bard of the peas¬ antry. Among the younger poets there are P. Yavoroff, K. Christoff, C. Boteff and A. Strashimiroff, all intensely national in the spirit of their works. Bulgaria can also boast of a number of writers in other spheres. In his¬ tory, law, philosophy and economics, V. Zla-tarsky, M. Daneff, the well-known statesman, S. Radeff and Stepan Bobtcheff. D. Ivanoff is the Tolstoy of the Bulgarian short story and has all the grim realism of the Russian mas¬ ter. In the scientific field are Ivan Georgoff, D. Michaltchieff, P. Neukoff, G. Bontcheff and Stepan Petkoff. Literary criticism has its rep¬ resentatives in B. Penneff, Balabanoff, Krstieff and Ivan Shishmanoff. There are several lit¬ erary societies and important reviews dealing with all aspects of human culture.

Bibliography. — See also under Bulgaria. — Constantinoff, A., <Bai Ganio) (Paris 1911); Dozon, L., (Chansons bulgares) (Paris 1875) ; Leskien, A., (Handbuch der altbulgarischen Sprache) (Weimar 1886) ; Miklositch, F., (Vergleichende Grammatik der Bulgarischen Sprache5 (Vienna 1879) ; Miladinoff Brothers, (Folk-Songs and Proverbs) (Agram 1861) ; Miletitch, L., (Staroblgarska Grammatika) (Sofia 1896) ; Monroe, W. S., (Bulgaria and Her People) (Boston 1914 — an excellent, comprehensive work) ; Morfill, W. R., Tram-mar of the

Bulgarian Language) (London 1897) ; Pypin and Spasovitch, (History of the Slavonic Literature) (Paris 1881) ; Slaveikoff, P., (The Shade of the Balkans5 (London 1904) ; Strausz, A., (Bulgarische Volksdichtungen5 (Vienna 1895) ; Teodoroff, (Blgarska Litera-tura5 (Philippopolis 1912); Vazoff and Velitch¬ kov, (Bulgarian Chrestomathie5 (Philippo¬ polis 1884) ; Vazoff, I., (Under the Yoke5 (London 1912) ; Vymazal, F., (Bulgarisch5 (Hartleben's Bibliothek der Sprachenkunde, Vienna 1888) ; Winslow, Clara, (Our Little Bul¬ garian Cousin5 (Boston 1913) ; (World's Best Literature5 (Vol. XXIV, New York 1897).

Henri F. Klein,

Editorial Staff of The Americana.

BULGARIN, bool'gar-in, Faddei Vene¬ diktovich, Russian author: b. Minsk 1789; d. 13 Sept. 1859. He served in the Russian army, but, finding himself neglected, in 1810 joined Napoleon. In 1819 he returned to Saint Petersburg where his writings attracted no¬

tice by their intense satire and servility. In 1825 he started the Severnaja Pclield (North¬ ern Bee), a daily paper, which for long was alone permitted to discuss political questions. A zealous supporter of reaction and of abso¬ lutism, he enjoyed, through relations with the secret police, an unlimited power. He was a witty and versatile writer, and published travels, histories, novels and statistical works, even signing his own name to the work of N. A. Ivanoff, professor at Dorpat.

BULGARIS, bool-ga'res, Demetrius, Greek statesman: b. Hydra 1803; d. Athens, 11 Jan. 1878. While a young man he held office in his native city and took a prominent part in the Grecian war for independence. In 1831, after the downfall of Capo d'Istria, he had charge of the administration of the Department of Ma¬ rine, but on the accession of King Otho he retired from office. After the revolution of 1843 he was a member of the Senate, and from 1848 to 1849 was Minister of Finance in the cabinet of Canaris. During the Crimean War he was at the head of the cabinet and as Min¬ ister of the Interior put an end to internal dis¬ order and conciliated the Powers. In 1857 he resigned and entered the Senate as a leader of the opposition. At the outbreak of the revolu¬ tion of 1862 he was made regent and chose Canaris and Rufos as his colleagues, but was deposed by the former. In 1865, 1872 and 1874— 75 he was again at the head of the cabinet.

BULGARUS, Italian jurist: b. Bologna in the 11th century; d. 1166. He lived to a great age and was one of the trusted advisers of Emperor Frederick I. He was one of the famous group of writers known as the <(Four Doctors55 of Bologna, and his most noted work is a legal commentary, (De Regulis Juris.5 It was edited at Bonn (1856) by F. G. C. Bechhaus.

BULGURLU, Mount, on the Asiatic side of the Bosporus, rises over Skutari to a height of 850 feet. From the summit a mag¬ nificent view may be obtained of Constanti¬ nople, the Bosporus, the Sea of Marmora, the valleys of Thrace and the valleys and moun¬ tains of central Asia Minor. Most of the ascent can be made in an hour by carriage. An im¬ perial kiosk near the summit was built in 1660 by Muhammed IV.

BULIMIA, a disease characterized by insatiable hunger. Persons suffering from this disorder are never satisfied. When the stomach is surfeited they throw off the food they have taken, half-digested, and with violent pain. It frequently occurs in the insane, in cases of pare¬ sis, and usually appears as a concomitant of other diseases, as certain intermittent fevers and diseases of the stomach and bowels, par¬ ticularly such as are produced by the tapeworm.

BULIMUS, a genus of land-snails of the family Helicidce , the species of which are mainly restricted to South America, especially Peru, Ecuador and Bolivia. Some of the species are very large, as are also their eggs, those of B. oblongus being about the size of a sparrow's. There is an egg of another species in the British Museum which measures exactly one and three-fourths inches in length.

BULKELEY, Morgan Gardner, Ameri¬ can politician : b. East Haddam, Conn., 26 Dec. 1838. At the age of 15 he entered a mercantile

house in Brooklyn, N. Y., and in a few years became a partner in it. When the Civil War broke out he went to the front as a private in the 13th New York regiment and served dur¬ ing the McClellan-Peninsula

campaign under General Mansfield at Suffolk, Va. In 1872 he came to Hartford, organized and became pres¬ ident of the United States Bank in that city, and later (1879) was elected president of the Hftna Life Insurance Company, a position he has long held. For 30 years he has been a prominent figure in local and State politics. He was four times elected mayor of Hartford (1880-88), and in 1889 was elected governor. At the State election in November 1890, the first gubernatorial election under the new secret ballot law, the Democratic ticket received a considerable plurality over the Republican, but a majority being necessary to elect, there was some doubt whether there had been a choice by the people for governor or treasurer. Ac¬ cordingly the matter went before the general assembly, which met in January 1891, and in which the Republicans had a majority of four on joint ballot, the senate being Democratic. A long contest ensued between the two houses, the senate claiming the election of the recent Democratic candidates and refusing to recog¬ nize in any manner Governor Bulkeley and the other hold-over Republican officials. The mat¬ ter was finally settled on 5 Jan. 1892, when the State Supreme Court, in the quo warranto suit brought against Governor Bulkeley by the Dem¬ ocratic candidate for governor, found <(Morgan G. Bulkeley to be governor, both de facto and de jure? and his right to hold over till both houses of the general assembly should unite in declaring the election of his successor was affirmed. As the two houses could not agree, the governor remained in office for another full term. In November 1892 the Democratic ticket swept the State. He was United States Senator from 1905 to 1911. Governor Bulkeley has since, as chairman of the Connecticut highway and bridge commission, interested himself ear¬ nestly in trying to procure a fine stone bridge across the Connecticut at Hartford.

BULKELEY, Peter, American colonist and clergyman: b. Bedfordshire, England, 31 Jan. 1583; d. Concord, Mass., 9 March 1659. He was educated at Cambridge, and for 21 years was rector of a Bedfordshire parish. Being removed from this by Archbishop Laud, for nonconformity, he left England and be¬ came the first minister at Concord, in the col¬ ony of Massachusetts, of which famous town he was the chief founder. He was the author of some Latin poems, which are contained in Cotton Mather's (History of New England5 ; also of some English verse and of a theological treatise, the Gospel Covenant Opened,5 pub¬ lished in London in 1646. He was as remark¬ able for his benevolence and kind dealings as for the strictness of his virtues. Consult Tyler, (History of American Literature) (New York 1878)'; Mather's <Magnalia) (London 1702), and an article, (Life and Times of Rev. Peter Bulkeley5 (in the New England Historical and

Genealogical Register, Vol. XXXI, Boston

1877).

BULKHEAD, the name given to a variety of forms of partition. In its nautical sense a

bulkhead is a wall or partition extending across the ship for the purpose of dividing the hold into compartments, for separating classes of merchandise, for strengthening the vessel, or more especially for confining water which may leak in to the compartment in which the breach occurs. In large vessels longitudinal bulkheads are employed, as well as those running athwart-ships, and communications between the com¬ partments are maintained by means of doors which can be instantly closed in case of acci¬ dent and for the purpose of maintaining forced draught. One of the most important bulk¬ heads in a ship is the one farthest forward, which is built with great strength, being de¬ signed to withstand the shock of ramming and confining the damage to a small portion of the vessel. It is hence known as the collision bulk¬ head. Another form of bulkhead is a strong framework used in the construction of tunnels, to prevent the irruption of water, quicksand, etc., into the workings. The term is also ap¬ plied to the facing (generally of timber) that supports the sea-wall of a harbor, and some¬ what illogically to the sloping flap doors often used to cover the entrance of a dwelling-house cellar. See Shipbuilding.

BULKLEY, Lucius Duncan, American physician and author: b. New York, 12 Jan. 1845. He studied at Yale University and at the College of Physicians and Surgeons, and took courses in dermatology in Europe. He became attending and later consulting physician and dermatologist in various New York city hospitals. Among his works are (Acne and Its Treatment5 (1885) ; (Syphilis in the Innocent5 (1889) ; (Manual of Diseases of the Skin5 (1898) ; (Eczema and Its Treatment5 (1901) ; Compendium of the Diseases of the Skin5 (1912) ; (Diet and Hygiene and Diseases of the Skin5 (1913) ; Cancer, Its Cause and Treat¬ ment5 (1915).

BULL, Charles Stedman, American phy¬ sician: b. New York 1846; d. there, 17 April 1911. He was graduated from Columbia Col¬ lege in 1864, and at the College of Physicians and Surgeons in 1868. He was house physi¬ cian and surgeon at Bellevue Hospital, New York, and

later studied in Vienna, Heidelberg, Berlin, Utrecht, Paris and London, and was a pupil of Von Arlt, Graefe and Donders. He was surgeon to the New York Eye and Ear Infirmary, consulting ophthalmic surgeon to Saint Luke's and Presbyterian hospitals, and Saint Mary's Hospital for Children. He was professor of ophthalmology in Cornell Univer¬ sity and ranked among the greatest oculists of his time. He became president of the American Ophthalmological Society in 1903-07. He wrote (Eye Defects Which May Cause Apparent Mental Dulness and Deficiency in Children5 (1901) ; (Tuberculosis of the Eye5 (1900) ; both in the transactions5 of the New York Academy of Medicine; (Vascular Tumors of the Orbit5 (1900), and other articles on his specialty in the transactions5 of the American Ophthalmological Society, the Medical News and Medical Record.

BULL, George Joseph, Canadian ophthal¬ mic surgeon : b. Hamilton, Ontario, 16 Feb. 1848; d. 1911. He graduated at McGill Univer¬ sity in 1869, studied in Paris, and began the

practice of medicine in Montreal, devoting himself especially to diseases of the eye. He made his residence in Paris in 1886, and won celebrity as an expert in ophthalmic subjects. He wrote (Ophthalmia and Optometry,* and many similar works.

BULL, John, English musician: b. Somer¬ setshire, about 1563 ; d. Antwerp, 12 March 1628. He was appointed organist in the Queen's Chapel in 1591 ; first music lecturer at Gresham College in 1596; and organist to James I in 1607. A Catholic, he fled beyond the seas in 1613, qnd at Brussels entered the archduke's service. In 1617 he became organist at Ant¬ werp Cathedral. Little of his music has been printed. The claim advanced for his author¬ ship of (God Save the King,* is unfounded.

BULL, John, the popular personification for the English nation. Its origin is obscure. Its first literary use appears to have been in Arbuthnot's famous (History of John Bull,* written in ridicule of the Duke of Marlborough. The name is also used for an Englishman.

BULL, Ole Bornemann, Norwegian vio¬ linist: b. Bergen, 5 Feb. 1810; d. near there, 17 Aug. 1880. He went to Cassel in 1829, where for a short time he studied under Spohr, re¬ turning later to Bergen. He went to Paris in 1831, where at first he met with little suc¬ cess, being robbed of his few belongings, in¬ cluding his violin. His attempt at suicide at this time secured him a patroness, *Mme.* Ville-minot, who provided him with a Guarneri in¬ strument. He secured great triumphs both throughout Europe and in America by his remarkable playing, which won for him a dis¬ tinct and unique position in the musical world as a virtuoso of extraordinary talent and a master of the violin. He overcame serious dis¬ couragements in preparing for his career, throughout which public interest and admira¬ tion were no less awakened by his manliness and grace of bearing than by his skill as a musician. At his debut (Paris 1833) he was honored by the presence of Paganini, and that master was witness to the young aspirant's triumph. Bull afterward studied and turned to good account the method of Paginini. In busi¬ ness life he met with various successes and reverses. He lost all his money in a scheme to found a colony of his countrymen in Penn¬ sylvania, and had to take to his violin to repair his broken fortunes. He afterward married in this country, settled at Cambridge, Mass., and retained a summer residence in Norwav. He built a national theatre in Bergen and soon became involved in quarrels with the authori¬ ties. Consult (01e Bull: A Memoir) by Sara C. Bull (Boston 1883), and the Norwegian biography by O. Vik (Bergen 1890).

BULL (Lat. bulla , a knob, boss), a seal, usually of lead, appended to state documents to prove their authenticity. Such seals were used by the Roman Emperors, and by various monarchs during the Middle Ages. They finally went out of use in the northern countries but were retained in southern Europe where wax seals did not keep well. In form, the bull resembled a coin, being round with an inscrip¬ tion on each face. The best known seal of this type is the papal bull (q.v.).

BULL, a ludicrous speech in which the ideas combined are totally incongruous or con¬ tradictory. A good example is Artemus Ward's saying of Jefferson Davis that ((It would have been money in Jefferson Davis's pocket if he had never been born.**

BULL, Golden. See Golden Bull.

BULL, Papal, an authoritative letter is¬ sued by the Roman pontiff acting in his official capacity as head of the Church. A Papal Brief is

also an official letter of the pontiff of a less formal and weighty character, and differs in sundry particulars from the Bull, especially in its seal. The seal of the Bull, from which comes the name of the instrument, is a bulla or globular mass of lead on which is impressed the name of the reigning Pope, also those of Saints Peter and Paul, abbrevi¬ ated, S. Pe, S. Pa. The material of the Bull is parchment, but of the Brief, white paper; and the seal of the Brief is of red wax, stamped with the Fisherman's Ring, which gives the impress of Saint Peter in a boat, fishing. There are other peculiarities in matter and manner distinguishing the Bull from the Brief, but it suffices to note the foregoing. Of Papal Bulls that have played a signal part in history, eccle¬ siastical or civil, especially worthy of mention are the Bull Clericis laicos (1296) of Boniface VIII by which the French clergy were forbid¬ den to pay taxes to King Philip the Fair unless these were approved by the Pope ; the Bull Exsurge D online of Leo X against Martin Lu¬ ther (1520) ; the Bull In Coena Domini against heretics and fautors of heresy, dating from the 15th century, but re-enforced by Pius V in 1571 and ordered to be publicly read in all parish churches yearly on Holy Thursday; the Bull Unigenitus (1713) against quietism and Jansenism; the Bull Dominus ac Redemptor, of Clement XIV, abolishing the Jesuit order (1773), and the Bull Pastor ceternus (1870), which defined papal infallibility. The most complete collection of papal bulls is that by Cosquelines, Barberi and Gaude (28 folio vols., 1739-44 et seq.). There are several general or special collections. Consult Giry, (Manuel de diplomatique) (Paris 1894).

BULL AND COW, the names given by English speaking races from time immemorial to the male and female respectively of bovine cattle. The words are probably imitative, the root-idea of ˆbull** being a suggestion of its bellowing; while ˆcow® — which in early English, as still in Scotch and some pro¬ vincial dialects, is pronounced coo — is imi¬ tative of the lowing call to the calf. Since these animals have become domesti¬ cated, and most of the males have been castrated, the term has come to mean more particularly an unmutilated ox. On the other hand, the large size and robust qualities of the bull have led to a transference of the term to the males of various other animals having no zoological resemblance, or very little, to the cattle. Thus we speak of <(bull and cow® ele¬ phants, moose, wapiti, seals, whales and even alligators ; while various animals, as the bull-snake, take the name as expressive of some bull¬ like quality, as a habit of snorting, or because of horn-like appendages (for example, bullhead catfish).

BULL-BAITING, the sport of setting dogs on a bull, which was tied to a stake and torn to death for the amusement of the spec¬ tators. In this case the dogs, which were set upon the bull singly, were trained to seize the bull by the muzzle, technically, ((to pin® the bull ; but they were very frequently tossed on the horns of the animal. Sometimes also the bull was allowed to run loose in the arena, and then several dogs were set upon him at once. Bull¬ baiting was a favorite sport in England till about the time of George IV.

BULL-DOG, a dog of moderate size, de¬ rived previous to the 13th century, from a cross between the old British mastiff and the large pug of extreme southeast Asia. Both its an¬ cestors still exist as separate breeds. An aver¬ age mature specimen will weigh 40 to 50 pounds. They are squat and muscular in build, with short legs, rather higher behind than in the front, especially if the front legs are very much bowed. Their chests and heads are abnormally broad for their size. The lower jaw overlaps the upper and is of extraordinary strength. The teeth are large, especially the two canines, and very strongly fixed in the jawbone, giving the dog a holding power beyond that of any other breed. The coat is close and short. The most variable feature is the color, which ranges from all black to all white among dogs bred for show purposes, but a brindle is more natural. For many centuries this dog was used for “baiting,® or biting at, the bull, as a popular recreation ; and up to more recent times men of brutal disposition used it for public dog-fights. It was through these exhibi¬ tions that the bull-dog got his bad name for temper, but now he is mainly kept as a watch¬ dog. In that capacity he is invaluable, and so gentle is his disposition that he is the safest canine companion for children. About the year 1900 a small variety of the bull-dog was evolved in the neighborhood of Brussels, but as it was first shown in Paris it has always been known as the “French® bull-dog. It is in the main a miniature of the English bull-dog. The most notable difference, other than that of size, being that the ears are shaped like those of a bat, and are carried erect, or “pricked,® giving the animal a very alert, sharp look.

BULL-FIGHT, a contest between men and bulls, conducted as a public spectacle. Once popular in Greece and Rome, this form of en¬ tertainment was introduced by the Moors into Spain and universally

adopted in the cities of the kingdom, where, as well as in Mexico and some other parts of the world, it is still much in favor. The bull-fight is held in an arena of greater or less magnificence, called in Spanish the plaza de toros. The bulls are turned out, one by one, with many forms of pomp and solemn ceremonial, into the open space, where they are assailed, first by horsemen, called pica-dores, who attack them with the lance; then, when one or more horses have been wounded and one or more men have met with injury or perilous mishap — in which case a crowd of active footmen, called chulos , provided with crimson banners, take off the attention of the bull — the banderilleros, armed with sharp-barbed darts with fireworks and flags attached to them, worry the bull until he is covered with shafts, bleeding and scorched and his glossy

hide becomes black and crisp from the explo¬ sion of the fireworks. Then comes the last act of the tragedy, when the skilful matador enters the arena slowly and alone, clothed in plain black and armed with a long, straight sword and a stick, called a mnleta, with a piece of red silk fastened to it. With his sword he seldom fails to give the coup de grace to the tortured bull, sheathing the blade, with one sure thrust, up to the hilt in his body just at the juncture of the neck and spine. Mules drag out the slaughtered carcass, amid the sound of trumpets and acclamations of the spectators ; the dead or dying horses are re¬ moved, the arena is strewed with fresh saw¬ dust, another bull is introduced, and so goes on the combat, until perhaps a dozen bulls and a larger number of horses have been slaughtered to delight the spectators. About 1,300 bulls and 6,000 horses are sacrificed annually in Spain to this sport. The Spanish settlers of Mexico and South America introduced bull-fighting to the New World. Consult Sancho, (Machaquito y el renacimiento del toreo* (Madrid 1906).

BULL-FROG, a widely distributed, edible North American frog (Rana catesbyana) found in sluggish waters throughout the eastern half of the United States and Canada, and so called because of its loud, bass voice. It is from five to eight inches long, and of various shades of green, with the legs spotted. It lays its eggs in strings and the tadpole does not reach maturity until two years old. The same name is given by English-speaking people in various parts of the world to other large bellowing frogs, as the “bull-frog® of Siam and Malaya (Callula pulchra) . See Frog.

BULL MOOSE, a name applied to Theo¬ dore Roosevelt in 1912 and arising from his remark, “I feel as fit as a bull moose.® Through

constant use of this animal's figure by the car¬ toonists in connection with Roosevelt's political campaign as the presidential nominee of the Progressive party, he became known as the "Bull Moose candidate® and the party as the "Bull Moose party.® See Progressive Party.

BULL RUN, First Battle of. The first great battle of the Civil War occurred Sunday, 21 July 1861, in the vicinity of Manassas, Va. The Union forces were commanded by Briga¬ dier-General Irvin McDowell, the Confederates by General Joseph E. Johnston, who had ar¬ rived from Winchester at noon of the 20th with nine regiments of his army and assumed command. The battlefield was west of Bull Run and near the crossing of that stream by the turnpike running nearly west from Alex¬ andria to Warrenton. This road, a mile and a half west of the Stone Bridge by which it crossed Bull Run, unexpectedly to the Confed¬ erates, became the axis of the battle. Bull Run is a narrow, winding stream with rugged and mainly precipitous banks, but with numerous fords, flowing southeastwardly, being about 25 miles west of Alexandria and from three to five miles west of Manassas.

McDowell marched from his camps in front of Arlington and Alexandria on the afternoon of the 16th of July, with five divisions, com¬ manded respectively by Brigadier-General Dan¬ iel Tyler, four brigades ; Colonel David Hunter, two brigades; Colonel S. P. Heintzelman, four

brigades ; Brigadier-General Theodore Runyon, two brigades, and Colonel Dixon S. Miles, three brigades. The Fourth Division was left as a reserve in the region of Fairfax, guarding the lines of communication. The advance divi¬ sion, Tyler's, reached Centreville the morning of the 18th and sent a brigade to Blackburn's Ford in reconnoissance. After a sharp skirmish in which both sides lost about 60 men, it with¬ drew toward Centreville, to which point Mc¬ Dowell, hearing of the operations at Black¬ burn's Ford, concentrated four divisions.

Ford, Longstreet's at Blackburn's Ford, Bon¬ ham's between Mitchell's and Ball's fords, Cocke's at Lewis' Ford, and Evans' demi-brigade at the Stone Bridge forming the Con¬ federate left. Of Johnston's Army of the Shenandoah, Jackson's brigade supported Bon¬ ham, and Bee and Bartow supported Cocke.

From each of these fords fair roads led to Centreville. General Beauregard had planned an attack upon Centreville which involved an advance of his whole force upon that point. This was officially approved by General John-

'Hinn

*ousa

l/ssion Stills Ford

BULL BU/V

7VLV z ' g G/

Theatre of First Bull Run Battle.

The Confederate ((Army of the Potomac® had been concentrated at Manassas under Gen¬ eral Beauregard. In expectation of a Union advance it occupied the south bank of Bull Run for eight miles from Union Mills Ford, at the crossing of the railroad to Alexandria, to the Stone Bridge, at the Warrenton turnpike, three brigades being thrown forward of that posi¬ tion, one of them to Fairfax Court House. These brigades fell back before the Union ad¬ vance, skirmishing slightly. Ewell's brigade, the right of the line, was at Union Mills, with Holmes in support, Jones' brigade at McLean's

ston before daylight of the 21st, but at sunrise it was rendered impossible by McDowell's ini¬ tiative. The plan was then changed to an attack on the Union left from Blackburn's Ford. This also was abandoned from the same cause.

McDowell, who had first intended to attack the enemy's right, after the affair at Blackburn's Ford, finding the ford at Sudley Spring two miles beyond the Confederate left, decided to attack from that direction. While Tyler feinted before the Stone Bridge, Hunter and Heintzelman, by a long detour, crossed at Sudley Spring and moved south toward the Warrenton turn-

pike in the enemy's rear. Evans, at the bridge, discovering the movement, withdrew 11 com¬ panies and formed them on a ridge half a mile north of the road as the head of Hunter's col¬ umn entered the open fields which extended a mile north of the Warrenton road. Evans made stubborn resistance and was soon supported by Bee's brigade and Imboden's battery. While the position was hotly contested, the Confeder¬ ates were pressed back down the hill, across the valley of Young's branch, a tributary of Bull Run, to the plateau south of it upon which were the Robinson and Henry houses. Two of Ty¬ ler's brigades crossed above the Stone Bridge and joined Hunter and Heintzelman in their advance. The fighting continued desperate until noon, and for new troops was, for both sides, most remarkable, but the Confederate line, though stubbornly contesting the ground, began to disintegrate, and the road to Manassas was crowded with retiring soldiers.

General Johnston describes the Confederate situation at two o'clock as ˆcritical® ; General Beauregard terms it a ((pressing exigency® and speaks of the retirement of <(our shattered bat¬ talions,® and of the fighting line as having <(lost its cohesion.® Dr. Jones, Jackson's distin¬ guished biographer, records that t(the retreat became every moment more disordered,® that Bee's quick eye <(now told him that all was lost® and that (<he could not reform his line.®

At that hour a Union victory seemed assured. Johnston and Beauregard reached the position together. The troops on the line of Bull Run that had been held there by the demonstrations of two Union brigades designed to mask Mc¬ Dowell's turning movement were ordered in haste to the new line which was at right angles to the first. Jackson soon arrived with five regiments and two batteries. Hampton's Legion joined him and the Union advance was checked. Other arrivals strengthened the line. Kirby Smith's brigade of Johnston's army appeared about three o'clock, having just arrived on the field from Manassas, and pushed its three reg¬ iments toward the right of the Union line. Early's brigade of Beauregard's force, from the extreme right of his line, hastened beyond Smith's brigade, now commanded by Colonel Elzey, and, supported by Stuart's cavalry, ap¬ peared directly on the Union right flank. Two regiments from Bonham and two from Cocke also arrived upon the Union right. These also were of Beauregard's army. This turned the check which that portion of the Union line had received, first into retreat and then into a dis¬ organized withdrawal, except that the rear guards maintained fair order till the columns were well off the field, the right retracing its long detour by Sudlcy Spring. At Cub Run, halfway to Centreville, the batteries of a pur¬ suing column broke up the wagons and batteries on the bridge, compelling the abandonment of 13 guns. From this point the movement to the rear was still further disorganized, to which condition the vehicles of many visitors, congressmen, cor¬ respondents and officials largely contributed. The attempt to rally the troops at Centreville failed, though General Johnston reported that the ((apparent firmness® of the Union reserves at that point checked the pursuit. The army, in great part disorganized, streamed on to Washington.

After the severe stress under which the Con¬ federate leaders found themselves from 11 o'clock until about 3, the sudden change on the Union side, first from assaulting to cessation of fighting; next, to a general retreat, and later to widespread panic, was as much a surprise to the enemy as to the Union commanders. It was not until the second day after the battle that the Confederates ascertained the full ex¬ tent of the Union stampede. Upon this point President Davis wrote General Beauregard: ((You will not fail to remember that, so far from knowing that the enemy was routed, a large part of our forces was moved by you in the night of the 21st to repel a supposed attack upon our right, and the next day's operations did not fully reveal what has since been re¬ ported of the enemy's panic.®

McDowell's strength at Centreville appears to have been about 28,000 men and 49 guns. His report says he crossed Bull Run with 18,000 men. A very careful estimate made from official records in 1884, by Gen. James B. Fry, McDowell's adjutant-general at the battle, gives the number actually engaged as 17,676.

General Beauregard reported his strength on the field when the battle opened as 27,833 and 49 guns; and after Johnston's delayed troops and Holmes' brigade had arrived in the after¬ noon as 31,972 and 57 guns. A very careful estimate by Gen. Thomas Jordan, his adjutant-general, fixed the number actually engaged at 18,053, thus showing the two sides to have been about equal on the firing line.

The Union loss as reported was: killed, 460; wounded, 1,124; missing 1,312; total, 2,896. Union guns captured or abandoned, 29.

The Confederate loss reported was : killed, 387; wounded, 1,582; missing, 13; total, 1,982.

It was called the ((Battle of Manassas® by the Confederates. Consult Johnson and Buel, (Battles and Leaders of the Civil War* (4 vols., New York 1887) ; Nicolay and Hay, (Abraham Lincoln) (10 vols., New York 1890); Ropes, (Story of the Civil War* (2 vols., New York 1898) ; and (Official Records) (Vol. II, Wash¬ ington 1880).

H. V. Boynton.

BULL RUN, Second Battle of, 30 Aug. 1862. When McClellan on the peninsula had reached the vicinity of Richmond, Lee, to pre¬ vent McDowell's corps at Fredericksburg from reinforcing McClellan, ordered Jackson in the Shenandoah to make a demonstration that should detain all available troops for the defense of Washington. Jackson advanced, and in a brilliant campaign drove Banks out of the valley and forced him across the Potomac. By a masterly retreat, he regained the upper valley in spite of McDowell and Fremont, and soon after appeared on McClellan's flank at Mechan-icsville and participated in the seven days' battles.

On 27 June the Union authorities united the three corps of McDowell, Fremont and Banks into the Army of Virginia under the command of Maj.-Gen. John Pope. He had concentrated his forces between Sperryville and Warrenton, and began to operate with his cavalry against Lee's railroad lines about Gordonsville. His mission also was to prevent Lee from concen¬ trating upon McClellan, when he should with¬ draw from the peninsula. Lee promptly sent

Jackson's Division, followed by Ewell's and A. P. Hill's, to Gordonsville. On 7 August these moved from Gordonsville toward Pope's posi¬ tion at Culpepper, and 9 August encountered .Banks at Cedar or Slaughter Mountain. Banks attacked, instead of holding his position as Pope's plan contemplated, and while at first brilliantly successful, he was at last defeated. Jnckson, however, retreated on the 11th across the Rapidan.

On the 13th Lee ordered Longstreet, with his own and Hood's divisions, to Gordonsville. R. H. Anderson's division was ordered to fol¬ low. Upon their arrival Pope was largely out¬ numbered. Lee planned a move for the 18th

and Manassas with its immense supplies on the night of 26 August. Pope moved to attack him at Manassas. On the night of the 27th and early on the 28th, Jackson's three divisions withdrew by different roads, and soon after noon of the 28th assembled on the battlefield of the first Bull Run.

On the night-of the 25th Pope's headquar¬ ters were at Warrenton Junction. Reynolds' Division had joined him on the 23d. On the 25th the advance of Heintzelman's corps ar¬ rived from the Army of the Potomac, Hooker's and Kearny's divisions, and Fitz-John Porter, with the divisions of Sykes and Morell of his corps. These two corps with Reynolds' Divi-

Theatre of Second Bull Run Battle.

against Pope's left, but this officer learned of the plan through the capture of Stuart's adju¬ tant-general, recrossed the Rappahannock,

and took position behind it on the 20th. Lee next arranged to cross at Sulphur Springs, turn Pope's right, and move upon his communica¬ tions. This failed. Pope, at the same time, had planned to cross the river and attack Lee's right and rear, but a sudden flood prevented the movement. Lee then se'nt Jackson's corps far beyond Pope's right by way of Salem and Thoroughfare Gap to cut Pope's railroad line at Manassas. Jackson succeeded, passing around Pope's right, capturing Bristoe Station

sion were the only reinforcements that Pope received from the Army of the Potomac until after the battle of Manassas.

On the night of the 27th Pope, supposing Jackson at Manassas, ordered general concen¬ tration in that direction. Porter's failure to move promptly under this order constituted one of the charges under which he was subsequently court-martialed and cashiered. Ricketts' Divi¬ sion, the rear of McDowell's corps, upon the information from the cavalry that Longstreet's forces were entering Thoroughfare Gap, moved to the gap and held Longstreet back during the day, and into the evening of the 28th. In the

afternoon of the 28th, Pope, supposing Jackson east of Bull Run, ordered his army to Centreville, Heintzelman and Reno by the fords of Bull Run, McDowell, Sigel and Reynolds by the Warrenton turnpike. The advance along the turnpike was begun without the knowledge that Jackson was just north of it on the first Bull Run field. The Union approach led Jackson to attack, thus revealing his position, which Pope had been vainly seeking. This was the battle of Gainesville, being a very bitter fight between Taliaferro's Division and two brigades of Ewell, and King of McDowell's advance.

After the close of the fight, in the absence of McDowell, his two divisions retreated, Rickett's to Bristoe Station, and King's to Manassas. At daylight of the 29th the Union forces were again put in.

motion to pursue Jackson. His line was mainly along an unfinished railroad, the left near Sudley Spring, and his right on high ground north of Warrenton road over¬ looking Groveton. The Union forces attacked throughout the day, with brief intermissions. The contest was desperate, and Jackson's line, though hard pressed at various points, main¬ tained its organization. Porter's failure to here attack the Confederate right was another of the charges under which he was tried. Sub¬ sequently, however, he was exonerated by the findings of an army board, and restored to his rank by act of Congress. McDowell arrived late, with King's Division. As it moved into action it encountered the head of Longstreet's column, which had achieved its junction with Jackson. In less than an hour, in a bloody contest, Hood's Division of Longstreet's force had ended the battle of Groveton. Such were the preliminaries of the Second Bull Run.

The battle of Manassas, the Second Bull Run, was fought 30 August, the day following the action at Groveton. The movement covered the ground of McDowell's and Johnston's battle of the year before. Jackson's line occu¬ pied the position from Sudley Spring to the heights overlooking Groveton. Lee, whose forces were now all up, formed Longstreet's line across the Warrenton turnpike on high ground about a mile west of Groveton. On this ridge he established a number of batteries un¬ der Stephen D. Lee and Walton. The line then turned east south of the turnpike, and ex¬ tended toward the Sudley Spring road. The Confederate position south of the Warrenton road seemed not to be suspected by Pope. The fact that after the action of the afternoon, be¬ fore Jackson's troops had retired to their morning position, Lee had withdrawn Long¬ street's advance to form on better ground, misled Pope and caused him to insist that the enemy was retreating. At noon, after reconnoissances north of the road, he therefore ordered vigorous pursuit. Porter was to push west on the Warrenton pike followed by King's Division on his right and Reynolds' on his left. Ricketts' Division, followed by Heintzelman's corps, was to pursue on the Haymarket road. Sigel's and Reno's corps were the reserves.

About four o'clock Porter advanced with his own corps and King's Division pushed in on Jackson's line with great vigor, and assault fol¬ lowed assault, each made with great pertinacity. Lee seemed willing to let them continue in order to exhaust his opponents. At length Jackson

sent for help and Longstreet was ordered to his assistance. This officer had, however, posted his batteries so as to enfilade Jackson's front,

and instead of sending troops, opened with a terrific flanking fire of artillery. The Union lines were repulsed with great loss. Nearly all of Pope's forces had been put in north of the turnpike and had been seriously repulsed. All Union support was now directed to defend the position against Longstreet's forces south of the Warrenton pike. The whole of Long¬ street's line went forward toward the road with a rush. There were five divisions — Wilcox on the left, then Evans (Hood), Anderson, Kemper and Jones. As soon as Jackson, north of the road, saw the advance of Longstreet, he ordered his own line forward. The corps of Heintzelman and Reno resisted this attack, but were gradually forced back. The supreme struggle of the Union forces was to hold two elevated positions near the Henry and Chinn houses. The latter, known as Bald Hill, was carried by the Confederates after persistent and sanguinary fighting. The Henry house hill was held against repeated assaults. The Union army was in retreat across Bull Run, and the possession of the hill was necessary to main¬ tain an orderly retreat.

The Union troops remained in possession until eight o'clock, when the last of Pope's army moved unmolested toward the Stone Bridge, crossing Bull Run about midnight. The bridge was then destroyed and the Union army concentrated at Centreville. It was a Union defeat, but not a rout. While there was much straggling, the main army had re¬ treated in good order, and Lee did not pursue. In the management of the battle Lee had dis¬ played his eminent generalship in a striking manner. Pope's chief error had been in per¬ sisting, before his attack was delivered, that the enemy was in retreat.

Pope was reinforced at Centreville by the strong corps of Sumner and Franklin from the Army of the Potomac. Here also he found sup¬ plies. His army had fought for two days al¬ most entirely without food or forage. Lee began pursuit the afternoon of the day after the battle, Jackson leading from Sudley Ford and marching by a circuitous route toward Fairfax Court House, seven miles in rear of Centreville. Passing Chantilly, he turned toward the War¬ renton turnpike and formed in front of Ox Hill, his right extending toward the pike. He was far in advance of Longstreet, and wholly without support. He was attacked by the two divisions of Reno under Stevens, and later by Kearny. Stevens and Kearny were killed, and Jackson was repulsed.

Longstreet came up at night, and at noon the next day (2 September), Pope's army was ordered by the authorities at Washington to withdraw within the defenses of the city. Pope's losses throughout the campaign from 16 August to 2 September were : Army of Vir¬ ginia, killed and wounded 5,318, missing 2,787 ; Army of the Potomac,

killed and wounded 3,613, missing 1,115; 9th Army corps, killed and wounded 1,204, missing 319; Kanawha division, killed and wounded 64, missing 42 ; total killed and wounded 10,199; captured or missing 4,263. The Confederate losses were not fully reported, but the best estimates

placed them at about 8,500. There are no offi¬ cial returns which enable a presentation of the exact strength of either army during the cam¬ paign up to 30 August, but the best estimate places the Union forces at about 65,000 to 70,- 000, and the Confederate at 54,000.

References: (Official Record of the War of the Rebellion,5 Vol. II; Gordon, George H.,

(History of the Campaign of the Army of Vir¬ ginia5 ; Nicolay, John G., (Outbreak of the Re¬ bellion ; Ropes, John C., (The Army Under Pope) (New York 1881) ; (Battles and Leaders of the Civil War5 (4 vols., ib. 1887) ; Long, A. L., (Memoirs of Robert E. Lee5; Cooke, J. E., (Stonewall Jackson5 ; Lee, Fitzhugh,

(Life of Gen. Robert E. Lee5 ; Johnston, Joseph E., (J°hnston's Narrative5 ; Allen, _ William, <The Army of Northern Virginia in 1862 5 ; Henderson, G. F. R., (Stonewall Jackson and the American Civil War5 ; Roman, Alfred, (The Military Operations of General Beaure¬ gard in the War between the States5 ; the Count of Paris, (History of the Civil War in America.5

H. V. Boynton.

BULL-SNAKE, See Pine Snake.

BULL-TERRIER. See Terrier.

BULL-TROUT. (1) A salmon-like trout of North America. See Salmon-trout. (2) The Dolly Varden trout (q.v.).

BULLA, a genus of mollusks called, from the thinness of their shells,

bubble-shells. The shell is oval, ventricose, convoluted externally, or only partially invested by the animal. The animal has a large cephalic disc bi-lobed be¬ hind ; the lateral lobe is much developed. It occurs in temperate and tropical seas from 25 to 30 fathoms. Over 50 recent species are known and 70 fossil, the latter from the Oolite onward.

BULLACE, a small tree or shrub of the genus Prunus, prunes. It is a kind of plum, related to the sloe. In England its fruit is used for making jam. The tree is seldom found in America.

BULLAE, miniature blisters, or blebs. They are larger than vesicles, with a large portion of cuticle detached from the skin and a watery transparent fluid between. The skin beneath is red and inflamed.

BULLANT, bu-lan, Jean, French archi¬ tect: b. probably in Ecouen about 1515; d. Paris, 10 Oct. 1578. He studied at Rome and after his return to France became supervisor of the royal buildings. He was connected with the erection of the Tuileries and built the pavil¬ ion named for him. He was also the architect of the Hotel de Soissons for Catherine de Med¬ ici. In 1570 he succeeded Primaticcio at Fon¬ tainebleau.

BULLBAT, a name in the Southern States for the nighthawk (q.v.), a bird which flies in the dusk like a bat, and makes a booming sound.

BULLE, bul-le, Konstantin, German histo¬ rian : b. Minden, 30 March 1844. He studied philosophy and history at Jena and Bonn, taught in the high school at Bonn and became director of the gymnasium there in 1879. In 1887-90 he was a member of the Reichstag. After some philosophical studies he devoted himself to historical work and wrote (History

of Recent Times 1815—71 5 ; (History of the Years 1871-775 and (History of the Second Empire and the Italian Kingdom.5 The first two were combined and published as (History of Recent Times5 in 1886.

BULLEN, Frank Thomas, English author and lecturer: b. Paddington, London, 5 April 1857; d. Madeira, 26 Feb. 1915. He received but scanty schooling, and after a few years' experience as errand boy, etc., went to sea as ordinary seaman in 1869, becoming chief mate after several years. He left the sea in 1883 and was junior clerk in the English meteorological office, 1883-99. His contributions to nautical literature have attracted widespread attention, the earliest of these, (The Cruise of the Cacha¬ lot5 (1898) being the most noted. His other

books include Udylls of the Sea5 ; (The Log of a Sea Waif5 (1899) ; (The Men of the Mer¬ chant Service5 ; (With Christ at Sea5 ; (A Sack of Shakings5 (1901) ; (The Apostles of the Southeast5; (Deep Sea Plunderings5 (1901); (A Whaleman's Wife5 (1902) ; (Sea Wrack5 ; (Sea Puritans5, (Our Heritage, the Sea5 (1906) ; (The Call of the Deep5 (1907). A volume of (Recollections5 was published posthumously.

BULLER, Sir Redvers Henry, English

general : b. Devonshire 1839 ; d. London, 2 J une 1908. He joined the 60th Rifles as ensign in 1858 ; in 1862 was promoted lieutenant, and eight years later captain. He was major in 1874, lieutenant-colonel in 1878, colonel in 1879 and major-general in 1884. He served with his regiment in the Chinese campaign of 1860, and in the Red River expedition in 1870. During the Ashantee war he acted as quartermaster-general and head of the intelligence department, and gained special mention for his behavior in several engagements. He also served with dis¬ tinction during the Kaffir War of 1878, and the Victoria Cross was conferred on him in 1879 for his gallant conduct in saving the lives of two officers and a trooper of the Frontier Light Horse, during the retreat at Inhlobane in the Zulu campaign. He was chief of the staff to Sir Evelyn Wood in the war against the Boers in 1881 and in Egypt in the following year, gaining special distinction for his services at Kassassin, Tel-el-Kebir and elsewhere. In the Sudan campaign of 1884-85 he was chief of the staff to Lord Wolseley, and was in command at the battle of Abu-klea after Sir Herbert Stew¬ art had been wounded. From 1887 till 1890 he held the post of quartermaster-general of the army, and from 1890 till 1897 he acted as adjutant-general to the forces. In 1886-87 he was undersecretary to the lord-lieutenant of Ireland, and in 1891 was promoted to the rank of lieutenant-general. He was created K.C.M.G. in 1882, K.C.B. in 1885 and G.C.B. in 1894. In 1899 he went to Natal as commander in the war with the Boer republics, and succeeded in relieving Ladysmith after it had been besieged 118 days. His various reverses prior to this event caused him to be superseded by General Roberts, and on his return to England he was placed on the retired list in consequence of an unwise speech. The publication of official docu¬ ments, still later, practically destroyed his repu¬ tation as a commander, it being shown by these that he had advised General White, the defender of Ladysmith, to give up the defense and sur¬ render to the Boers.

BULLERS OF BUCHAN, a large oval cavity in the rocks on the east coast of Aber¬ deenshire, about six miles to the south of Peter¬ head, forming a sort of pot or caldron about 150 feet deep, open to the sky above and communi¬ cating with the sea below by a natural arch or horizontal passage, into which the waves often rush with a tremendous noise.

BULLET. A projectile discharged from a musket, fowling-piece, pistol or similar weapon. When the smooth-bore arms alone were used, the bullets were made by casting. Molten lead was poured into molds and the molds were dipped in cold water, to hasten the solidification of the lead. The molds were cooled after using a few times, and the lead was heated only just to the degree for maintaining fluidity. Bullets are now, however, made more expeditiously, and more truly spherical in form, by compress¬ ing machines. The lead is first fashioned into a rod about a yard long by five-or six-eighths of an inch thick; this rod is passed between rollers to condense it ; then between other rollers to press it into a row of nearly globular pieces ; then a spherical die gives the proper form to each of these pieces; and, lastly, a treadle-worked punch separates them into bullets. With one of these machines and two dies, nine boys can make 40,000 bullets in a day.

Kinds and Sizes. — Spherical bullets for the old muskets, carbines and pistols varied from 14 to 20 to the pound, and from .60 to .68 of an inch in diameter. There is a particular ratio, depending on the specific gravity of lead, by which the number to the pound will give the diameter, or vice-versa. Such bullets are, how¬ ever, becoming every year less and less used, being superseded by other forms better suited for rifles. Robins' bullet was egg-shaped, with the centre of gravity at the larger end; Beau-foy's was ovoid, with a hemispherical cavity at one end; Manton's was a spherical ball put into a wooden cup, with projections on the exterior; Greener's was oval, with a plug of mixed metal driven into a hole barely large enough for it; Norton's, Delvigne's, Minie's, and others of various elongated shapes, mostly with some kind of plug, which, driven into the lead by the force of the explosion, causes it to fill up the grooves in the rifling of the barrel.

Since the advent of powder and ball, there have been thousands of varieties of all sizes and imaginable shapes, round and .long, with

points of every conceivable curve that can be geometrically figured, some with a flat base, others with depressions of all depths and shapes, some to be patched with paper, or covered with steel, copper or nickel, others with grooves, the width, depth and number of them varying ac¬ cording to the theories of many scientific men. The manufacturers of the various arms have by a long series of experimenting decided upon a standard size of bullet to be used in their differ¬ ent calibres, and the manufacturers of ammuni¬ tion make the bullets to that standard and they will not vary .001 of an inch as they come from the factory. There are, however, some who dif¬ fer in their opinions as to what diameter of a bullet should be for their rifles; they will push a bullet through the barrel, and if the impres¬ sions of the rifling on it are not deep enough to suit their ideas, they decide that a bullet of the standard size is not large enough and may

condemn the mold. Others there are who de¬ sire to have their bullets smaller than the standard size and point to their fine records to prove that they are correct. Of course, a bullet should fit so as absolutely to prevent the escape of the gas by the side of the bullet; all pres¬ sure generated by the ignition of the powder should be kept at the base of the bullet to expel it. If gas escape through the barrel past the bullet, so much force is lost, and if the escapement is greater on one side than on the other, it will deflect the bullet and make the flight irregular, and accuracy under such con¬ ditions is out of the question. A bullet when seated in the barrel by hand should fit to the bottom of the rifling so as to shut off all gas before the powder is ignited. As to how a bullet of the standard size will fit a barrel de¬ pends wholly upon the bore and the depth of the rifling. Variations in both of these points are found, as well as in everything else; there are no two rifle barrels alike any more than there are two human beings ; each has its own individuality and must be humored in accord¬ ance with its peculiarities. The bore of a rifle is the size of the smooth hole in the barrel be¬ fore it is rifled, which is commonly called the calibre; this, however, is not the size of the bullet. The diameter of the bullet is deter¬ mined by the depth of the rifling and should be large enough to shut off the gas. The depth of the grooves in the ordinary rifle barrel is from .001 to .004 of an inch according to the ideas of the various manufacturers. It must be remembered that it is the barrel, not the shells, that the bullet should fit properly to get good results. A reloading tool should have a bullet sizer as well as a bullet mold combined with the loading chamber in a convenient and handy form. The molds thus can be made so as to cast the bullets a trifle above the

standard size, allowing the use of any mixture of metal that the shooter desires ; and, after the lubrica¬ tion is in the grooves, they can be forced through the sizing die, this will press the lubri¬ cation solidly into the grooves, wipe off all surplus grease and at the same time make the bullet perfectly round.

Bullets to be patched with paper are smooth, without grooves. They are from three-to six-thousandths of an inch smaller than the stand¬ ard size. The diameter is increased to the size desired by having a thin paper patch rolled around them, covering about two-thirds of the bullets from the base up. This paper is of fine, strong texture, similar to bank-note paper. It is specially prepared for this purpose, and is made in different thicknesses, which are known to the manufacturers of ammunition as extra-thin, thin, medium and thick. The extra-thin is about one and one-half thousandths of an inch thick and there is an increase of about one-half thousandth in each succeeding size; thus shooters wishing to increase or decrease the diameter of their bullets can do so by select¬ ing the proper thickness of paper. There is a difference of opinion relative to the superiority of patched bullets over grooved, yet for hunt¬ ing or military purposes the grooved ball is generally preferred, as such ammunition can be carried and exposed to wet weather without injury, while a part of the patch being exposed is liable to get wet and injured so as to impair

its accuracy. Still, for fine target-shooting, the patched bullet properly handled is, without doubt, preferable.

Expansive Bullets. — Expansive bullets, more appropriately called deformative bullets, alter their shape upon impact with the tissues of the body. All unsheathed lead bullets are of this class, and sheathed bullets are often made deformative by various devices. Among these are the split-nosed, hollow-nosed and soft-nosed bullets. They are often erroneously called ((dum-dum,® from the fact that the origi¬ nal deformative bullets were made at Dum-Dum, the fact that principally hard-nosed bul¬ lets are made at that place being overlooked.

Explosive Bullets. — Explosive bullets con¬ tain a charge of explosive which is detonated on impact, and, exploding, cause great wounds, instantly fatal. They are used only in big-game hunting. Stories of their use in warfare are misstatements, due to ignorance of what con¬ stitutes such a bullet. The modern Spitz-Ge- schoss bullet of the Germans produces less dangerous wounds than the Mauser of 1888. It has a remarkably flat trajectory, its height being only 11.75 inches at a range of 400 yards, as compared with 28 inches for the Lee-Metford of the English.

Bullets are now made with extraordinary speed, by machinery of beautiful construction. The machine draws in a coil of leaden rod, un¬ winds it, cuts it to the required length, stamps out the bullets with steel dies, drops them into boxes and conveys them away. Each machine, with four dies, makes 7,000 bullets per hour; and four such machines, in an easy day's work, turn out 300,000 bullets. So nearly are the machines automatic that one man can attend them all. Modern rifle bullets have a pressed leaden or steel core, and a thin covering of steel, copper or nickel. A combination of copper and nickel, known as cupro-nickel, is very gen¬ erally employed, as it is without the poisonous qualities of copper used alone. See Ammuni¬ tion; Cartridges; Projectiles; Small Arms.

BULLET-TREE, or BULLY-TREE

(Mimusops balata), a forest tree of Guiana and neighboring regions, family sapotacece, yielding an excellent gum known as balata, hav¬ ing properties giving it in some respects an intermediate position between gutta-percha and india-rubber, and making it for certain industrial purposes more useful than either. The timber of the tree also is valuable.

BULLFINCH, a European finch (Pyrr - hula Europaa)', of plump form, and a favorite cage-bird. It is a soft gray above, with shin¬ ing black cap, wings and tail, and, in the male, has a rich rose breast (gray in the female). Its native call is a clear piping; and birds in captivity are trained to whistle simple tunes and bring a high price in the bird market.

BULLHEADS, or <(horned-pouts,® are small, dark-colored catfish, abundant every¬ where east of the plains, and, by introduction, in California and Oregon. They are mud-lov¬ ing fishes, remaining on the bottom and feeling for food with the barbels, one on each side of the mouth and two under the chin. The ®com-mon bullhead® (Ameiurus nebulosus) varies in length, at full age, from 18 to 24 inches

and occasionallv weighs five pounds. It is brown¬ ish-black in color, with a fine, scaleless, rubber¬

like skin, a big head and a long upper jaw. It is a gluttonous biter, gorging the bait, so that the hook must often be cut out of its interior. A smaller species, the black bullhead (A. melas), may be distinguished by the smaller anal fin and its nearly white rays. The southern <(flat-headed cat® (A. platycephalus) has an eel-like form and a greenish brown hue, and is almost entirely herbivorous. Several of the large ((catfish® (q.v.) of the western lakes belong to this genus.

BULLIER ADVERTISING AGENCY,

the most noted concern for the handling of ad¬ vertising in France. In 1856 it entered into a working agreement with the Havas agency for the mutual selling of news and advertising to¬ gether. This agreement strengthened both companies and made of them the strongest in¬ stitution of the kind in Europe. See Press Associations.

BULLINGER, Heinrich, Swiss reformer: b. Bremgarten, 18 Aug. 1504; d. Zurich, 17 Sept. 1575. He studied first at Emmerich, in the duchy of Cleves, and afterward at Cologne. His intention was to become a Carthusian monk, but after perusing the writings of Melanchthon and other reformers he changed his views, formed a close connection with Zwinglius, became one of the most strenuous sup¬ porters of his views, and ultimately succeeded him in his charge of Zurich. He was one of the authors of the first Helvetic Confession, drew up in concert with Calvin the formulary of 1549, by which the differences between the churches of Zurich and Geneva on the subject of the Lord's Supper were happily terminated, and kept up a close correspondence with the principal English reformers. The Zurich Let¬ ters lately published by the Parker Society con¬ tain part of this correspondence, and, among others, letters addressed to him by Lady Jane Grey.. The most important of his many writ¬ ings is a (History of the Reformation. > See lives by Hess (1828-29) ; Pestalozzi (1858) ; also Heinrich, (Bullinger und seine Gattin) (1875); Zimmermann, (Die Ziiricher Kirche und ihre Antistes) (1877).

BULLION, uncoined gold or silver in bars, plate or other masses, which has been re¬ duced to the standard fineness of the coinage of a country, but is sometimes used to designate the metals;, generally, whether coined or un¬ coined. United States standard bullion con¬ tains 900 parts of pure gold or pure silver, and 100 parts of copper

alloy. The coining value of an ounce of pure gold is $20.67183, and the coining value of an ounce of standard gold is $18.60465. The coining value in standard silver dollars of an ounce of pure silver is $1.2929, and the coining value of an ounce of standard silver is $1.1636. The word bullion was of fre¬ quent use in the proceedings respecting the Bank of England from 1797, when the order in council was issued that the bank should discon¬ tinue the redemption of its notes by the pay¬ ment of specie to 1823, when specie payments were resumed ; for, by a previous law, the bank was authorized to pay its notes in un¬ coined silver or gold, according to its weight and fineness. The investigations of the bul¬ lion committee, and the various speculations on the subject of bullion, related to the supply of

gold and silver, whether coined or not, as the basis of the circulating medium. The discovery of the mines in America did not at first add materially to the stock of bullion in Europe. The total addition for the first 54 years was about $85,000,000 ; not quite so great an amount of value (in gold at least) as Russia has ob¬ tained from the Ural mines in less than half the time. The average annual supply from all the American sources during the 54 years from 1546 to the end of the 16th century was rather more than $10,000,000. During the 17th cen¬ tury the annual average was about $16,250,000 ; in the next half century it was $27,500,000; and in the years 1750 to 1803 it was $38,000,000. In the decade 1901-10, imports of gold, chiefly bul¬ lion, into the United States ranged from a minimum of $43,339,905 in 1910 to a maximum of $148,337,321 in 1908. The extremes of ex¬ ports were $38,573ˆ,891 in 1906 and $118,563,215 in 1910.

BULLIONS, Peter, American philologist: b. Moss Side, Scotland, December 1791 ; d. Troy, N. Y., 13 Feb. 1864. Educated at Edinburgh University, where he studied theology, he came to America in 1817. He was pastor of the Pres¬ byterian church at Argyle, N. Y., for six years, and from 1824 to 1848 taught languages in the Albany Academy and was, from 1832 to his death, pastor of the United Presbyterian con¬ gregation at Troy, N. Y. His published works

include (Life of Alexander Bullions,' (1840) ; Principles of English Grammar' (1834) ; Principles of Greek Grammar' ; Analytical and Practical English Grammar' (1853) ; Principles of Latin Grammar' (1853); (Latin and English Dictionary' (1862).

BULLOCK, Charles Jesse, American economist : b. Boston, 21 May 1869. He was graduated at Boston University in 1889, taught in secondary schools for four years and then pursued graduate studies in political economy and political science, receiving the degree of Ph.D. in 1895 from the University of Wis¬ consin. After holding an instructorship in political economy at Cornell University from 1895 to 1899, he was appointed assistant pro¬ fessor, and later professor, of political economy at Williams College, where he taught from 1899 to 1903. In 1903 he became assistant pro¬ fessor, and in 1908 professor, of political economy at Harvard University. He served as a member of the commission appointed to codify and revise the taxation laws of Massa¬ chusetts in 1907, and of the commission ap¬ pointed in 1913 to draft a forest tax law, which was enacted in 1914. In 1916 he was elected vice-president of the National Tax Association. His best writing is in the field of financial his¬ tory and theory, especially the finances of the United States between 1775 and 1789 (Univer¬ sity of Wisconsin Bulletin, 1895). He is the author of (The Finances of the United States 1775-1789' (1895) ; (Introduction to the Study of Economics' (1897); (Essays on the Mone¬ tary History of the United States' (1900); (The Finances and Financial Policy of Massa¬ chusetts' (1907) ; and has edited Currencies of the British Plantations in North America' (1897) ; Selected Readings in Public Finance' (1906); 'Selected Readings in Economics'

(1907).

BULLOCK, Rufus Brown, American statesman : b. Bethlehem, Albany County, N. Y., 28 March 1834; d. Atlanta, Ga., 27 April 1907. He was graduated at Albion Academv in 1850, and, after various pursuits, was sent during 1859-60 to organize the business of the Adams Express Company in the South Atlantic States. His headquarters were at Augusta, Ga., where he formed the Southern Express Company and became one of its active managers. During the Civil War he continued this occupation under the direction of the Confederate government

establishing railroad and telegraph lines on interior routes. Later he was placed in charge of contributions for the officers and men of the Army of Northern Virginia, and at Appomat¬ tox he gave his parole as acting assistant quar¬ termaster-general. After the cessation of hos¬ tilities he resumed the general management of express affairs and was elected one of the trustees and secretary of the Southern Express Company. He was also associated in the organ¬ ization of the First National Bank of Georgia and was elected president of the Macon and Augusta Railroad. In 1867 he was chosen a delegate to the convention called to frame a constitution under the reconstruction laws then recently passed. His course at that convention met with the approval of its progressive mem¬ bers and he was their unanimous choice as candidate for governor. After a bitter canvass in the spring of 1868 the new constitution was ratified and Bullock was declared elected. But the reactionists obtained a majority in the leg¬ islature and expelled the colored men who had been elected and seated. Against this action the governor protested, and after its accomplish¬ ment brought the matter to the attention of Congress, by which he was empowered to re¬ assemble the old legislature, including the ex¬ pelled colored members. This struggle for the rights of negroes to hold office rendered him very unpopular in his State, and he was over¬ whelmed with abuse. At the next regular elec¬ tion the opposition seated a large majority of the general assembly, and just prior to its con¬ vening in November 1870 Governor Bullock resigned his office. Charges of corruption were made against him, and, after a hearing in the State courts at Atlanta, he was acquitted and thoroughly vindicated. He continued his resi¬ dence in Georgia and became president of one of the largest cotton mills in Atlanta. For sev¬ eral years he was prominent in public service ; as a trustee of Atlanta University, president of the Atlanta Chamber of Commerce, vice-presi¬ dent of the Cotton States Exposition and gov¬ ernment director of the Union Pacific Railroad.

BULLOCK, Shan F., Irish novelist: b. Crom, Fermanagh, Ireland, 17 May 1865. He has written a number of popular works. Among them are (The Awkward Squads' (1893) ; (By Thrasna River' (1895) ; (Ring o' Rushes' (1896) ; (The Charmer' (1897) ; 'The Barrys' (1899) ; and (Irish Pastorals' (1901) ; 'The Squireen' (1903) ; (Dan the Dollar' (1905) ; (A Laughing Matter' (1908) ; 'Thomas Andrews, Shipbuilder.' His work is remarkably individual and his studies of life in the north of Ireland are faithful reflections of Irish life and character.

BULLOCK, William A., American in¬ ventor : b. Greenville, Greene County, N. Y.,

1813; d. Philadelphia, 14 April 1867. He learned the trade of machinist, and having started a periodical. The Banner of the Union, he invented a printing-press in connection with that enterprise. He removed to New York and devoted himself to the construction and gradual development of a ((planetary press,)} finally producing the Web perfecting press that delivers 30,000 papers per hour, printed, cut and folded. While handling one of his presses he met with an injury that proved fatal.

BULLS AND BEARS, a popular phrase used in connection with the stock market. The term ˆbulls® is applied to the operators at¬ tempting to force up prices, and the term <(bearsJ) to those seeking to lower them.

BULL'S HORN CORALINE (so named because the shape of the cells is like a bull's horn), a zoophyte of the family Cellariadoe. It is the Eucratia loricata. It is branched sub¬ alternate, and has the cells conical, with a raised orifice, beneath which is a spinous process.

BULNES, bool-nas, Manuel, Chilean soldier and statesman : b. Concepcion, 25 Dec. 1799; d. Santiago*, 18 Oct. 1866. He served in most of the battles of the Chilean revolution. In 1838 he commanded the Chilean army of 5,000 men against Santa Cruz, in Peru, and was finally instrumental in driving Santa Cruz from the country and breaking up the Peru-Bolivian confederation. In 1841 he was elected Presi¬ dent of Chile and served for four years. He was afterward senator and councillor of state.

BULOW, bii'lo, Bernhard, Prince von, German statesman : b. Klein-Flottbeck, Hol¬ stein, 3 May 1849. He came of a distinguished family, and was, on the mother's side, of Danish ancestry. He was educated at Lausanne, Leip¬ zig and Berlin, studied law and served in the Franco-German War, where he rose to the grade of lieutenant After being secretary of legation at Rome, Saint Petersburg and Vienna, he became charge d'affaires at Athens during the Russo-Turkish War, and later was secretary of the Berlin Congress. In 1888 he was appointed

Minister to Rumania, and in 1893 Ambassador to Italy. He was called home to become Minister of Foreign Affairs. His skilful treatment of the Samoan difficulty won him popular favor in his own country. Dur¬ ing the Chinese complications in 1900 he fully supported the Emperor's foreign policy. When Prince Hohenlohe resigned, 16 Oct. 1900, Von Billow was called to succeed him as Chancellor of the empire. His diplomacy was shaped on the whole in accordance with ideas of his Imperial master. In 1905 he set in motion a campaign against the ambitions of France in Morocco which led to the fall of the French Foreign Minister Delcasse and the meeting of the Algeciras conference in 1906. He was raised to the princely rank in 1905. He was especially skilful in controlling a majority in the Reichstag among the different factions until the failure of his budget proposals which led to his resignation in 1909, when he was suc¬ ceeded by Von Bethmann-Hollweg. He op¬ posed many of the latter's policies and criticized as inimical to the empire his utterances in the Reichstag on the German conditions of peace during the War' of 1914-18.

BULOW, Dietrich Adam Heinrich von,

German military writer: b. Falkenberg, in Altmark, about 1757 ; d. Riga, Russia, 1807. He studied in the military academy at Berlin, and afterward entered the Prussian service. But he soon retired, and occupied himself with the study of Polybius, Tacitus and J. J. Rousseau, and then served for a short period in the Nether¬ lands. He afterward undertook to establish a theatre, but immediately abandoned his proj¬ ect, and visited the United States, whence he returned poor in purse but rich in experience, and became an author. His first work was on the (Art of War,* in which he displayed un¬ common talents. He wrote a book on (Money, > translated the (Travels of Mungo Park,* and published, in 1801, his (History of the Cam¬ paign of 1800. > He lived a time in London, was there imprisoned for debt, and afterward removed to Paris, whence he was banished in 1804. In 1804 he wrote (Lehrsatze des neuern Krieges) ((Theory of Modern Warfare*) and several other military works, among which is his <Tactics of the Moderns as They Should Be.* In the former he points out the distinc¬ tion between strategy and tactics, and makes the triangle the basis of all military operations. This principle of his was opposed by Jomini and other French writers. His history of the war of 1805 occasioned his imprisonment in Prussia, at the request of the Russian and Austrian courts. He died in the prison of Riga. He was a follower of Swedenborg. Consult Cammerer, development of Strate¬ gical Science) (London 1905).

BULOW, Friedrich Wilhelm (Count von Dennewitz), Prussian general: b. Falken¬ berg, 16 Feb. 1755; d. Konigsberg, 25 Feb. 1816. In his 14th year he entered the Prussian army. In the war of 1806 he was a lieutenant-colonel at the siege of Thorn, and distinguished himself in various battles. In 1808 he was made major-general and general of brigade. When the war against France broke out in 1813 he fought the first successful battle at Mockern, 5 April; 2 May took Halle, and protected Berlin from the danger which threatened it, by his victory at Luckau 4 June. He saved Berlin a second time by the memorable victory over Oudinot at Grosbeeren, 23 August, and relieved the same city a third time by the great victory over Ney at Dennewitz. For this service the King made him one of the few grand knights of the Iron Cross, and after the end of the cam¬ paign bestowed on him the title Count Billow of Dennewitz, and made the same hereditary in his family. At the storming of Leipzig, 19 Oc¬ tober, he took an important part. At the open¬ ing of the campaign of 1815 he received the chief command of the fourth division of the army, with which he contributed so essentially to the victory of Waterloo, that the King gave him the command of the 15th regiment of the line, which was to bear in future the name of the Regiment of Biilow von Dennewitz. Con¬ sult Biilow, (Generalfeldmarschall Graf Billow v. Dennewitz) (Vienna 1910).

BULOW, Hans Guido von, German pianist and composer: b. Dresden, 8 Jan. 1830; d. Cairo, Egypt, 12 Feb. 1894. He studied the piano under Liszt, and made his first public appearance in 1852. In 1855 he became leading professor in the Conservatory at Berlin ; in

1858 was appointed court pianist; and in 1867 became musical director to the King of Bavaria, followed by a series of concerts in Germany, Italy, Russia, England and the United States, which he first toured in 1875-76. In 1878 he became musical director at Court Theatre; from 1880-85 was Hofmusikintendant to the Duke of Meiningen. From 1886 till his death he was conductor of the Philharmonic Society, Hamburg. His compositions include overture

and music to (Julius Caesar,) (The Minstrel's Curse) and (Nirvana) ; songs, choruses and pianoforte pieces. He was considered one of the first of pianists and orchestral conductors remarkable for the range of his repertoire and for his retentive memory, playing and conduct¬ ing without book. He was the greatest living authority on Beethoven, and edited an edition of his works. His (Letters^ edited by his widow, appeared 1895-97; and (Lives) by Rau-mann (Berlin 1906) and La Mara (Leipzig

1911).

BULOW, Karl Eduard von, German author : b. Berg vor Eilenburg, Saxony, 17 Nov. 1803 ; d. Ottishausen, 16 Sept. 1853. He studied at the University of Leipzig, and be¬ came the friend and imitator of Ludwig Tieck. His literary fame rests mainly on his (Book of Tales,) after ancient Italian, Spanish, French, English, Latin and German originals (4 vols., 1834—36), which was followed by a supple¬ mentary volume (1841). Of his own original compositions, the springtide Wandering Among the Hartz Mountains) is one of the best. He wrote also the very interesting story of (The Youth of a Poor Man of Toggenburg,* founded on the autobiography of Ulrich Braker, a Swiss weaver. He published the original later.

BULOW, Margarete von, German novel¬ ist: b. Berlin 1860; d. near there, 2 Jan. 1885. Her early years were spent partly in Thuringia and partly in Smyrna, where her father was Prussian consul. Her published works in¬ clude (Stories) (1885) ; (Jonas Briccius)

(1886) ; (Herr im Hause) (1886) ; (Chronicle of the Riffelshausen Folks> (1887) ; (New Stories) (1890). She delineated character with great precision, and displayed true insight into the human heart. She lost her life in an at¬ tempt to rescue a boy from drowning in the Rummelsburger Lake.

BULOZ, bu-lo, Francois, French publicist: b. Vulbens, Savoy, 20 Sept. 1803; d. Paris, 12 Jan. 1877. In 1831 he became editor of the Revue des Deux Mondes, the celebrated French fortnightly literary magazine, which, under his direction, increased its subscription list from 350 to 18,000. It published the works of de Vigny, de Musset, George Sand, and rendered remarkable service to the encouragement of contemporary literature. From 1835-45 he also edited the Revue de Paris. For 10 years (1838-48) he was director of the Comedie Frangaise.

BULRAMPUR, bool-rum-poor', a town of India, in the Fyzabad division of Oudh, the residence of the Maharaja of Bulrampur. It has a trade in rice, etc., besides manufactures of cotton and other articles.

BULRUSH, a popular name for tall, reed¬ like plants which grow in marshy places, and which for the most part belong to the genus

Sclrpus. The common bulrush is frequent in clear waters and about the borders of rivers throughout Europe, as well as in North Amer¬ ica and New South Wales. The roots are thick and stout, creeping under water in the deep mud; the stems are of a dark-green color, and four or five feet or more in height, and are naked, smooth, round, tough, pliant and spongy within. Their base is covered with several sheathing scales, partly ending in leafy points. They are useful for packing and thatching, and especially for plaiting into the bottom of chairs.

BULTHAUPT, boolt'houpt, Heinrich Al¬ fred, German poet and dramatist: b. Bremen 26 Oct. 1849; d. 1905. On quitting the univer¬ sity he was for a while a private tutor; then traveled in the East, Greece and in Italy. He was a lawyer in his native town for some years, and in 1879 became custodian of the city library. Of his dramatic compositions the list is very long,, comprising tragedies, (SauP (1870); (A Corsican Tragedy > (1871); plays dealing with the questions of the time, (The Workmen) (1876) ; comedies, comic operas, including (Die Kopisten) (1875); (Lebende Bilder) (1875); <Ahasver) (1904). He wrote the text for oratorios by Bruch and Vierling, adaptations of Shakespearean dramas ((Cymbeline) 1885; (Timon von Athen) 1894) ; he also wrote (Durch Frost und Gluten > (1892, new ed.,

1904), and several works of criticism, especially (Shakespeare und der NaturalismusP His special distinction, however, is as author of (Dramaturgy of the Theatre* ; (Dramaturgic der Klassiker) (1S82 et seq.), a work of exceed¬ ing value which has been reprinted frequently under the title (Dramaturgic des Schauspiels) ; also (Dramaturgy of the Opera* (2 vols., 1887). Consult Kraeger, H., (Litterarische Vortrage aus dem Nachlass ausgewahlt und durchge-schen) (Oldenburg 1912).

BULWER, John, English physician and author. He flourished in the 1 7th century and appears to be entitled to the honor of having first pointed out a method of instructing the deaf and dumb. His works include (Philosophus, or the Deafe and Dumbe Man's Friend) (1648) ;

(Chironomia, or the Art of Manual Rhetoric* ; <Chirologia, or the Natural Lan¬ guage of the Hand) and (Anthropometamor-phosis.*

BULWER, William Henry Lytton Earle

(Baron Dalling and Bulwer), English author and diplomat, brother of Sir Edward Bulwer-Lytton (q.v.) : b. London, 13 Feb. 1801; d. Naples, 23 May 1872. He was educated at Sun-burg, Harrow and Cambridge. He became agent for the London Greek Committee in 1824, and made a journey to the Morea, which he later described in (A Journey to Greece.* He entered the army, but resigned to enter the diplomatic service, and after 1827 was succes¬ sively in Berlin, Brussels and The Hague. In 1830 he was elected to Parliament as an ad¬ vanced Liberal and in 1837 was made secretary of the embassy at Constantinople, where he concluded an important commercial treaty with Turkey. He was Minister to Madrid in 1843, and concluded the peace between Spain and Morocco in 1844. Disliked by Narvaez, the soldier-dictator, Bulwer was ordered to leave Spain. Parliament approved of his conduct and

he was awarded the highest decoration of the Order of the Bath; in 1849 had a diplomatic mission to Washington, and was one of the negotiators of the Bulwer-Clayton Treaty (q.v.). In 1852 he was envoy extraordinary to Tuscany and in 1856 was sent to Bucharest to investigate the conditions of the Danubian principalities, and was Ambassador to Turkey in 1858-65. He was created Baron Dalling and Bulwer in 1871. His works include (An Autumn in Greece) (1826) ; (France, Social, Literary and Political } (1834—36); (Life of

ByrorP (1835); (Historical Characters) (1868-70) ; (Life of Palmerston) (1870-74).

BULWER-CLAYTON TREATY, a

treaty negotiated at Washington, D. C., in April 1850, by John M. Clayton, Secretary of State under President Tyler, and Sir Henry Bulwer, British Minister to the United States. It provided that neither the United States nor Great Britain should attempt to control a pro¬ posed canal across Nicaragua. The treaty provided further for the neutrality of the canal and it guaranteed encouragement to all lines of interoceanic communication. The terms of the treaty were afterward much disputed. In 1882 the United States government intimated to Great Britain that the canal having become impracticable because of reasons for which Great Britain alone was responsible, the United States considered the treaty as no longer bind¬ ing, but Great Britain continued to hold it as in force. On 3 March 1899, Congress passed a bill providing for the construction of a canal on the Nicaragua route, which also authorized the President to open negotiations with Great Britain for the abrogation of the Bulwer-Clay¬ ton Treaty, and under the last clause a conven¬ tion between the two countries, abrogating por¬ tions of the treaty deiemed to be against the interests of the United States, was signed in Washington, 5 Feb. 1900. For a complete ac¬ count see Clayton-Bulwer Treaty.

BULWER-LYTTON, Edward George Earle (1st Lord Lytton), English politician and novelist: b. London, 25 May 1803; d. Tor¬ quay, Devonshire, 18 Tan. 1873. The Bulwers, long settled at Heydon Hall, Norfolk, claimed descent from the Normans and Vikings, per¬ haps as a ready explanation of their bold and turbulent spirit. The novelist's father, William Earle Bulwer, was colonel of the 106th regiment or Norfolk rangers. His mother, Elizabeth Barbara, was the only daughter of Richard Warburton Lytton of Knebworth in Hertford¬ shire, the family seat since the time of Henry VII. From her and her father, who was a learned scholar, Bulwer claimed to have derived his love for letters. As a boy he lived much among his grandfather's books and read through three circulating libraries. He wrote volumes of Byronic verse, some of which was published at the age of 17. Prepared for the university at various private schools, he entered Trinity College, Cambridge, at Eas¬ ter in 1822; but soon migrated to Trinity Hall, where it was not necessary to attend lectures. At Cambridge he was a conspicuous member of the Union; he won the Chancellor's medal in 1825, and sketched two novels. At this time he also read enormously in history and began the practice of keeping those huge common¬

place books which afterward became useful in preparing his historical novels. Before receiving his bachelor's degree in 1826, he published more Byronic verse, fell desperately in love, made a tour of Scotland and the Eng¬ lish lakes, and passed a season in Paris, where he was received into the most brilliant salons. Returning to London ((a finished dandy,® he married on 29 Aug, 1827, Rosina Doyle Wheeler, a beautiful Irish girl of some accom¬ plishments. The marriage led to an estrange¬ ment from his mother and the young man was consequently thrown upon his own resources. He settled with his wife at Woodcot House in Berkshire, where he attempted to live in style from what he could earn with his pen. The marriage proving uncomfortable, a legal sepa¬ ration was obtained in 1836 after years of a life apart. On the death of his mother in 1843 he inherited Knebworth and assumed the sur¬ name of Lytton.

To pass by Bulwer's numerous contribu¬ tions to annuals and periodicals, he published in 1827, (Falklandp a sentimental novel in imi¬ tation of Rousseau's (Nouvelle HeloiseP After a quick passage through the sentimental stage, he came out with (Pelham) in 1828, a brilliant novel founded upon what he had seen of high life in London and Paris. It was likewise Bul¬ wer's first excursion into politics and crime. Late in the same year followed (The Dis¬ owned, y a curious novel which the author called ˆmetaphysical® inasmuch as the charac¬ ters are intended to stand for (<certain disposi¬ tions influential upon conduct.® After (Dever-eux* (1829), an experiment in historical ro¬ mance, Bulwer took up the criminal novel, publishing (Paul Clifford* (1830) and (Eugene Aram* (1832), which are among his most char¬ acteristic books. By this time a popular nov¬ elist, he displayed during the coming years extraordinary versatility. With (The Pilgrims of the Rhine) (1834) he began a series of fan¬ tastic tales which he called ideal and poetic, announcing that they should be judged (<by the rules rather of poetry than prose.® The chap¬ ter entitled (<The Life of Dreams® elaborates a clever system of dreaming, evidently made use of in our day by Du Maurier in (Peter Ibbet-son) and by Kipling in (The Brushwood Boy.* Occult philosophy was cleverly employed in (Zanoni* (1842) and speculation about the future age of electricity in (The Coming Race) (1871). A series of ghost stories culminated in (The Haunted and the Haunters) (1861) hardly surpassed in its kind. Historical ro¬ mance, resumed in (The Last Days of PompeiP (1834), was continued in (Rienzi) (1835), (The Last of the Barons> (1843), (Harold* (1848), and the incomplete <Pausanias) (posthumous, 1876). The best of these novels stand for an attempt to get near to the facts of history. In the midst of this work was planned a com¬ prehensive history of (Athens, its Rise and Fall,*

of which two volumes appeared in 1837. Another idealization of the criminal in (Lu-cretia) (1847) provoked considerable criticism, to which he replied with (A Word to the Pub-lic) (1846). To test his popularity Bulwer now published anonymously in Blackwood's Maga¬ zine three experiments in 18th century humor. The series comprises (The Caxtons* (1849), (My Novel* (1853), and (What Will He Do

With It) (1858). Though a little too obviously in the manner of Sterne, the novels are among Bulwer's best work. They were, curiously enough, as well received by the public as if they had borne the author's name. Somewhat like them is (Kenelm Chillingly) (1873), interesting besides for its infusion of autobiography.

Throughout his career, Bulwer never ceased to cultivate his muse. From the Byronic influ¬ ence that marked his poems down to 1830, he worked into satire, addressing himself (<to the humors rather than to the passions of men.® The (Siamese Twins) (1831), a poem of four books in the metre of (Hudibras,5 appeared in a volume of miscellaneous poems, of which the longest is one on Milton. (The New Timon; A Poetical Romance of London5 (1846), a satire on men then prominent in politics and literature, is memorable for the reference to Tennyson as (<Schoolmiss Alfred,® and for Tennyson's caustic stanzas in a reply contrib¬ uted to Punch, 28 Feb. 1846. Among Bulwer's other collections of verse as (Poems and Bal¬ lads,'* translated from Schiller (1844) ; an epic in two volumes on Ring Arthur 5 (1848-49) ; (The Lost Tales of Miletus) (1866) ; and a translation of the (Odes and Epodes of Horace5 (1869). If Bulwer did not gain much fame as a poet, he exactly hit popular taste in three plays — (The Lady of Lyons5 (1838), Riche¬ lieu5 (1838) and (Money 5 (1840) — which still keep the stage.

Bulwer's role in letters has obscured for later times the part he played in politics. From 1831 to 1841 he sat in Parliament as a Liberal member of Saint Ives, Huntingdonshire and then for Lincoln. After making his maiden speech in support of the Reform Bill, he de¬ voted his energies largely in favor of copyright on original works, cheap

postage on newspa¬ pers and the laws affecting dramatic literature and the stage. His early speeches on these sub¬ jects are still worth reading. In 1834, he issued a spirited pamphlet on the (Present Crisis,5 which went through 20 editions and influenced greatly the election that brought Lord Melbourne back to power. The new Premier offered him a lordship in the Admiralty but the post was declined. In 1841, Bulwer lost his seat owing to his willingness to accept a slight tax on corn. Ten years later he ad¬ vocated protection to this extent in (Letters to John Bull, Esq.5; and in 1852 he returned to Parliament as a Conservative member for Hert¬ fordshire. His numerous speeches of this period relate to the excise duties, the Crimean War, China and the East India Company. On the formation of the Derby Ministry in 1848, he became Secretary to the Colonies. While hold¬ ing this office he organized the new colony of British Columbia. He spoke in support of Disraeli's reform bill of 1859, but against the measures introduced by Lord Russell and Glad¬ stone in 1860 and 1866. As a reward for his services, he was elevated to the peerage in 1866, as Baron Lytton of Knebworth. Before this he received the degree LL.D. from both of the great English universities. In 1854 he was in¬ stalled honorary president of the Associated Societies of Edinburgh University, and he was twice elected lord rector of the University of Glasgow. To the last he kept up his literary work. (The Parisians5 was running in Black¬ wood's Magazine when the end came at Tor¬

quay on 18 Jan. 1873. He was buried in West¬ minster Abbey.

As a novelist Bulwer was subject to fierce assaults from the critics throughout his career. Thackeray, for example, in a review of (Ernest Maltravers5 ridiculed and scorned his bad art, affected style, ((his eternal whine . about the good and the beautiful55 and ((the dulness of his moral sense.55 Still there is the other side. In various prefaces to his novels and especially in two papers contributed to the Monthly Chronicle for 1838, Bulwer carefully elaborated his views on the art of fiction, draw¬ ing clear distinctions between the novel and the drama as he understood and practised them. He never aimed at the dramatic novel wherein each incident and conversation must contribute to the working out of a logical plot. ((It is often desirable,55 he said with reference to the novel, <(to go back instead of forward, — to wind, to vary, to shift the interest from person to person55 that the reader may not become fatigued. In that aim he succeeded. However much his novels may fail in technical details, they have never failed to find an audience.

Bibliography. — Unfortunately there is no adequate life of Bulwer or critical edition of his novels, indicating the many important changes he made in the text from time to time. Uncrit¬ ical editions of the novels are numerous. To his (Speeches5 (2 vols., Edinburgh 1874), his son, the Earl of Lytton, prefixed a memoir dealing with his political career. The period of his life from 1803 to 1832 is covered by a most interesting autobiography, half fact and half fiction, and several supplementary chapters by his son, published together under the title Rife, Letters and Literary Remains5 (2 vols., London 1883). After the death of Lady Lyt¬ ton, her executrix, Louisa Devey, published in vindication of her memory (Letters of the Late Edward Bulwer, Lord Lytton to his Wife5 (New York 1889). Consult also Cooper, Rife of Edward Bulwer, First Lord Lytton5 (London 1873) ; Escott, (Edward Lytton5 (London 1910) ; Ten Brink, (Edward Lytton5 (Leyden 1882) ; and Second Earl of Lytton, Rife of Edward Bulwer, First Lord Lytton5 (2 vols., New York and London 1913).

Wilbur L. Cross,

Professor of English, Yale University.

BULWER-LYTTON, Edward Robert.

See Lytton, Edward Robert Bulwer.

BUM-BOAT (perhaps originally Room-boat,55 from the boom rigged out from the side of a man-of-war at anchor, to which boats may make fast), employed by hucksters to visit ships lying at anchor, with supplies of pro¬ visions, trinkets, clothing, etc., for sale to the sailors.

BUMBLEBEE, a wild bee of some species of the genus Bomhus, of which upward of 50 species inhabit North America. Few occur in the southern hemisphere or tropical regions, and none in Africa south of the Sahara or in Australia, while they are the only bees inhabit¬ ing Arctic and Alpine regions. The bumble, or humble, bee is recognized by its large, thick, hairy body and long bass hum. The colonies of bumblebees are not numerous compared with those of wasps, or the stingless or the honey bee. A populous colony in England and

America may number from 300 to 400 individ¬ uals. The proportion of sexes and castes of Bombus muscorum in England were found by Smith to be, in a colony of 120, 25 females, 36 males and 59 workers. The roundish oval cells differ in size and have no exact arrange¬ ment. Besides the cells containing the young, the old discarded ones are made to serve as honey tubs or pollen tubs, and there are also the cells of the guest or Psithyrus bees. In good weather and when flowers are plentiful the bees collect and store honey in abundance, and when the empty pupa-cells are full they form special cells made entirely of wax and these are filled with honey, and left open for the benefit of the community (Sharp). Hofer states that special tubs for the storing of pollen are sometimes constructed. Putnam says that the larvae make their own cells of silk, which are finally strengthened with wax by the old bees. Bumblebees have been seen working in warm moonlight nights. About two centuries ago Godart stated that a trumpeter bee is kept in some nests to rouse the colony to work by three or four o'clock in the morning, and this has been recently confirmed by Hofer, who ob¬ served the fact in his laboratory. If the trum¬ peter was removed its place was filled the next morning.

There is a, great deal of variation in our bumblebees, and, besides the local and climatic varieties, polymorphism is apparently marked, as Packard has (in Bombus fervidus) detected two sets of males and females, the large and the small ; but whether there are two sizes of workers has not yet been ascertained. The queen bees lay their eggs in masses of bee-bread attached to the top or sides of the old cells, in little enclosures formed by thin par¬ titions set up by the bee after the eggs have been deposited. Thus placed, says Packard, in a mass of food, the young larvae, on hatching, begin, by eating the food, gradually to construct their cells in the manner described by Putnam, who gives the following account of the economy of the bumblebee colony: The queen awakens in early spring from her winter's sleep beneath the leaves or moss, or in deserted nests, and selects a nesting-place, generally in an aban¬ doned nest of a field-mouse, or beneath a stump or sod, and immediately collects a small amount of pollen mixed with honey, and in this deposits from 7 to 14 eggs, grad¬ ually adding to the pollen mass until the first brood is hatched. She does not wait, how¬ ever, for one brood to be hatched before laying the eggs of another; but as soon as food enough has been collected, she lays the eggs for the second. As soon as the larvae are capable of motion, and commence feeding, they eat the pollen by which they are surrounded, and, grad¬ ually separating, push their way in various directions. Eating as they move, and increasing in size quite rapidly, they soon

make large cavities in the pollen mass. When they have attained their full size, they spin a silken wall about them, which is strengthened by the old bees covering it with a thin layer of wax, which soon becomes hard and tough, thus form¬ ing a cell. The larvae now gradually attain the pupa stage, and remain inactive until their full development. They then cut their way out, and are ready to assume their duties as workers (small females), males or queens.

The cells vary in size and are known as queen, worker and drone cells. Of the first brood only workers are permitted to survive. These now supply the colony with honey and pollen and the queen remains in the nest, laying eggs from which emerge new workers until the colony is strong. About midsummer males or drones are permitted to develop and in July a number of eggs are laid in the queen cells. The young queens are fertilized by the drones in the fall, the latter dying after the effort. On the ap¬ proach of cold weather all the workers die, leaving the nest in possession of the queens, who sleep through the winter to awaken in spring, when the process begins anew. See Bee; Beekeeping.

BUMBLEFOOT, a corn or abscess on the feet of domestic fowls, thought to arise from roosting on narrow perches or walking on sharp pebbles. The disease is sometimes in-, curable, but in other cases yields to the daily application of lunar caustic.

BUMMALOTI, a fish (Harpodon ne-hcreus), related to the salmon, but marine, which is caught in large quantities on the western coast of India, dried, salted and ex¬ ported all over the East. A trade-name is <(Bombay duck.® It is a very long fish, with a long mouth containing slender teeth, an indi¬ cation of its voracity.

BUMPING POSTS, constructions at the ends of railroad tracks in shifting yards, in¬ tended to prevent cars from running off the track. They are usually strong wooden frames with buffers placed at such a height as to re¬ ceive the blow of the platform or coupler of the car. Banks of earth or cinders are some¬ times utilized for this purpose and portable metal posts known as shipblocks are frequently employed as bumping posts.

BUMPPO, Natty. See Leatherstocking Tales.

BUMPUS, Hermon Carey, American edu¬ cator : b. Buckfield, Me., 5 May 1862. He was graduated from Brown University in 1884, was professor of biology at Olivet College, Michi¬ gan, 1886-89 ; professor

of zoology in Clark University, Worcester, Mass., 1 890—9 1 ; and professor of comparative anatomy in Brown University from 1892. In 1898 he was ap¬ pointed director of the biological laboratory of the United States Fish Commission at Wood's Hole, Mass., and was assistant to the president and curator of the department of invertebrates in the American Museum of Natural History in New York in 1901-02, when he became di¬ rector of the Museum. He was chosen business manager of the University of Wisconsin in 1911; chosen president of Tufts College in 1914. He is the author of (A Laboratory Course in Invertebrate Zoology > (1893) ; also numerous monographs and articles on biology and educational subjects.

BUNCE, Francis Marvin, American naval officer: b. Hartford, Conn., 25 Dec. 1836; d. there 19 Oct. 1901. He entered the naval serv¬ ice in 1851 and was graduated from the Naval Academy in 1857. In 1862 as executive officer of the Penobscot he took part in the engage¬ ment with the rebel batteries at Yorktown, Va. Assigned to temporary duty with the army, he

had charge of the disembarkation of the heavy artillery and mortars for use in the investment of Yorktown by General McClellan, April 1862. He commanded a successful expedition up Lit¬ tle River, between North and South Carolina, destroying several schooners and large quan¬ tities of cotton, turpentine and resin, together with extensive salt works. With the monitor Patapsco in 1863 he took part in all the actions in which she was engaged during the siege of Charleston, and was wounded by the pre¬ mature explosion of a cartridge. Later he was chief of scouts on the staff of Admiral Dahl-gren. On 5 Sept. 1865 he was placed in com¬ mand of the monitor Monadnock and took that vessel from Philadelphia to San Francisco, the first extended sea voyage ever made by a moni¬ tor. On 1 March 1895 he was selected to com¬ mand the North Atlantic squadron, with the rank of active rear-admiral. On 1 May 1897 he went to the Brooklyn navy yard and there superintended the conversion of many fast ships and yachts for war service. It is said that the government's

policy of furnishing the navy with abundant ammunition for target practice and giving prizes for the best shots, a policy whirh produced such admirable results in the Spanish-American War, was due to the efforts of Admiral Bunce. He was commissioned rear-admiral 6 Feb. 1898, and retired from active service 25 Dec. 1898.

BUNCE, Oliver Bell, American author: b. New York, 8 Feb. 1828; d. there, 15 May 1890. After spending several years as clerk in a sta¬ tionery store, and bookseller and publisher on his own account, he became manager of the publishing house of James G. Gregory, which he conducted very successfully for many years. It was at his instigation that the fine edition of Cooper's works, with steel and wood engrav¬ ings by F. O. C. Darley, was planned and pub¬ lished. For a short time he was a reader for Harper & Bros., but in 1869 he formed a con¬ nection with D. Appleton & Company, that ended only with his death. He edited Appleton's Journal, and largely planned and carried through for the firm some of their most famous illustrated publications, such as (Picturesque America,* (Picturesque Europe,* < Picturesque Palestine.* In addition to office business his literary aptitudes and ambitions kept him at work in spite of chronic invalidism. He wrote, among other works, (Romance of the Revolu¬ tion* (1852); (A Bachelor's Story) (1859); (Life Before Him) (1860) ; (Bachelor Bluff, His Opinions, etc.) (1881); (Don't: A Manual of Mistakes and Improprieties) (1883), of which over 100,000 copies have been sold; (My House: An Ideal) (1884), a graphic study of a country home; and (The Adventures of Timias Terry-stone: a Novel > (1885). As a very young man he wrote three plays which were accepted and produced on the stage with success: (Fate, or the Prophecy,* a tragedy; (Love in '76, > a com¬ edy; (Marco Bozzaris,* an heroic tragedy. The second of these was played by Laura Keene, the other two by James W. Wallack.

BUNCO, a familiar term applied to the practices of a certain class of swindlers. The trickster trades upon the credulity of the ap¬ parently well-to-do stranger in the city, under pretense of some connection with the latter's friends or native place, or by similar expedi¬

ents. After confidence is secured, counterfeit money is imposed upon him, he is induced to cash "bogus® checks, etc., or even becomes the victim of more direct robbery.

BUNCOMBE, or BUNKUM, swollen po¬ litical oratory not directed to the point in hand or the audience present, but to the achievement of a

charlatanic reputation outside. “Twisting the tail of the British lion,® and other like feats of windy chauvinism, are specimens of bun¬ combe; the object of the speaker being, not primarily to impress the hearers, but to make the general populace admire his swaggering patriotism. The reputed origin of the story is an anecdote of a member of the North Carolina legislature, from Buncombe County in that State, who told the thin remnants of a house he had nearly emptied by his dull and pointless remarks, that they might go, too, as he was only “speaking for Buncombe.® Consult Wheeler, (History of North Carolina.*

BUNDELCUND, bun-del-kund’, or BAN-DALKHAND, bun-del-kand’, India, a tract, consisting partly of certain British districts con¬ nected with the Northwest Provinces, and partly of a number of small native states sub¬ ordinate to the central Indian agency. Politi¬ cally, there are nine states, 13 estates and the pargana of Alampur belonging to the Indore state, making an area of 9,851 square miles. Diamonds are found, especially near Panna. Its surface is considerably diversified, and there are several ranges of hills, some of which reach the height of 2,000 feet. It has soil of every variety, which yields almost every grain and plant of India. The Jumna and the Ken are the only two navigable rivers. The lesser waters are carried by different streams to the Jumna and so on to the Ganges. A branch of the Great Indian Peninsular Railway traverses the north of the country. A garrison of all arms is stationed at Nowgong. Pop. about 1,400,000. The people represent various races, the Bem-delas still remaining chieftains. The prevailing religion is Hinduism. In 1817 the British gov¬ ernment, by the Treaty of Poona, acquired all territorial rights over Bundelcund. There was a mutiny in 1857.

BUNDESRATH, until 1919 the German Federal council which represented the individual states of the empire, as the Reichstag repre¬ sented the German nation. It consisted (1916) of 61 members, who were appointed by the gov¬ ernments of the individual states for each ses¬ sion, while the members of the Reichstag were elected by universal suffrage and ballot for the term of five years, and its functions were mainly those of a confirming body, although it had the privilege of rejecting measures passed by the Reichstag.

BUNDESSTAAT, a German term denot¬ ing a political form created by the^ union of several independent states into a single sov¬ ereign state with a Federal government. Ex¬ amples are the United States, Switzerland and the South African Lrnion.

BUNDI, boon-de’, or BOONDI, India, a native state of Hindustan, in

the southeast of Rajputana, under British protection; area 2,220 square miles. A double line of hills running from southwest to northeast, penetrated by few

passes and rising to the height of 1,793 feet, divides the state into two almost equal portions, that of the south being the more fertile. Much of the state is under wood. The chief river is the Mej, which penetrates the central range and joins the Chambal near the northeast extremity of the state. It was much more extensive be¬ fore Kotah and its territory were separated from it. The inhabitants are of the Hara tribe, which has given birth to many famous men, and, among others, to Ram Singh Hara, one of Anrungzebe's most renowned generals. The ruler is practically absolute in his own territory. Pop. 218,731. Bundi, the capital, is pictur¬ esquely situated on a steep slope in a gorge in the centre of the hills above mentioned, 190 miles southwest of Agra, and its antiquity, numerous temples and magnificent fountains give it a very interesting appearance. It is crowned by a fort and surrounded by fortified walls. For picturesque effect its main street is almost unequaled. At its upper extremity stands the palace, built of stone, with turreted win¬ dows and battlements, supported partly by the perpendicular rock, and partly by solid piers of masonry 400 feet high. At its lower extremity is the great temple dedicated to Krishna. Pop.

31,000.

BUNGALOW, an East Indian term for a kind of country house with a thatched or tiled roof. Bungalows are generally of one story, though sometimes of two, and have verandas running round them to afford shelter from the sun. Public bungalows for travelers (daks) are maintained by government on the main highways. In the United States the term means any small cottage of one story usually, or else with a second story in the roof, with dormer windows. It usually has large porches. Con¬ sult Saylor, 'Bungalows: their Design, Con¬ struction and Furnishing) (New York 1913).

BUNGAY, England, a market town in Suffolk, on the right bank of the Waveney, 30 miles northeast of Ipswich. It is well built; the streets, spacious and well paved, diverge from a moderate-sized area in the centre of the town forming a market-place, in which is a handsome cross. It has two fine churches. The principal trade is in corn, flour, lime and malt, in which a considerable amount of business is done. There is also an extensive printing office. Adjoining the town is a very spacious common. Pop. 3,359.

BUNGE, boon'ge, Alexander, Russian botanist: b. Kiev, 24 Sept. 1803; d. 1890. He was educated at Dorpat, and after taking the degree of M.D. in 1825 he traveled in Siberia and the eastern part of the Altai Mountains, and then joined the mission of the Academy of Saint Petersburg to Pekin, where he remained eight months and procured an extensive her¬ barium. In 1883, by invitation of the Academy of Saint Petersburg, he made a second A -iatic journey, and in 1836 settled as professc-r of botany at Dorpat. His principal publications are catalogues of the plants which he collected in China and near the Altai Mountains.

BUNGE, Friedrich Georg von, Russian legal historian (brother of the preceding) : b. Kiev, 13 March 1802; d. 1897. He was educated at Dorpat, and for many years

was professor of law there. His writings, prin¬ cipally upon the history of law and rights in the countries around the Baltic Sea, are numerous and valuable.

BUNGENER, boon-ge-na, Louis-Felix,

French writer and critic: b. Marseilles, 29 Sept. 1814; d. Geneva, June 1874. He was graduated from the theological school in Geneva and afterward continued in the same institution as professor until 1848, when he began to devote his time to literature. His works, most of which were published at Geneva, are quite numerous. Among the most notable of them are (Deux soirees a l'hotel de RambouilleD (1839) ; 'Essai sur la poesie moderne) (1840) ; 'Histoire du Concile de Trente) (1846) ; 'Vol¬ taire et son temps) (1850) ; 'Julien, ou la fin d'un siecle) (1853, 4 vols.) ; 'Rome et la Bible) (1859) ; 'Rome et le coeur humain) (1861) ; '•Saint Paul, sa vie, son oeuvre et ses epitres' (1867) ; 'LincohP (1867). At his death he left a great deal of work still unpublished.

BUNGERT, boon'gart, August, German composer: b. Miilheim, Prussia, 14 March 1846. He studied under Kufferath at Miilheim, at Cologne and Paris. He held a position as musical director at Kreuznach, then went to Berlin, where he continued his studies under Kiel, and later moved to Genoa. By many Ger¬ man musicians he has been regarded as one of the greatest composers of the Wagnerian school. His songs are among the modern masterpieces of that kind of music. His com¬ positions include an opera cycle, 'The Homeric Worlds consisting of two main parts, 'The Iliad, > and 'The Odyssey) ; 'Tasso) ; 'The Students of Salamanca,* a comic opera; 'On the Wartburg,* a symphonic poem ; 'Hohes Lied der Liebe* ; a mystery, 'Warum? Woher? Wohim?); 'Heroische Symphonie) ; inciden¬ tal music to Goethe's 'Faust) ; 'MeerliederP and 'Lieder einer Konigin) ; and a number of songs. The songs are considered his most successful productions.

BUNHILL-FIELDS, formerly BON-HILL FIELD, a burial-ground in London, near Finsbury Square. The poet Southey named it the "Campo Santo of the Dissenters.® Opened in 1665, it became a public "open space® by act of Parliament in 1867. Among those who lie buried there are John Bunyan (1688) ; Dr. Thomas Goodwin, who attended Cromwell on his deathbed (1679); George Fox, the Quaker (1690); Dr. Isaac Watts (1748) ; Gen¬ eral Fleetwood, son-in-law of Cromwell (1692) ; Daniel Defoe, author of 'Robinson Crusoe* (1731) ; Dr. John Owen, who preached the first sermon before Parliament after the execution of Charles I ; William Blake, the painter and poet; Susannah Wesley, mother of John Wes¬ ley, and Horne Tooke. In 1870 a monument to Defoe was inaugurated, subscribed for by boys and girls.

BUNIAS, a small genus of plants of the natural order Cruciferc p, mostly natives of southeastern Europe and adjacent Asia. Some of the species, especially B. orientalis, called hill-mustard, have been cultivated for forage and have become weeds where they have escaped from cultivation. Since they are not very leafy and are not relished by stock, they have not

become popular. In Russia it is used as a vegetable.

BUNION, a small, hard, painful tumor formed in any part of the foot, but especially in the metatarsal joints. It consists in a swelling of the bones themselves, which fact distin¬ guishes bunions from corns. It appears to be caused by the pressure of a boot or shoe which is too tight, especially when the feet are a lit¬ tle deformed. The best means to relieve the pain is to remove the causes of the tumor as soon as possible, to give rest to the foot and to apply lotions and emollient poultices.

BUNKER HILL, Mass., an eminence, 110 feet high, in the Charlestown district of Boston, connected by a ridge with another elevation, 75 feet high, named Breed's Hill. These heights are memorable as being the scene of a battle, 17 June 1775, commonly known as the battle of Bunker Hill. The city of Boston was occupied by the British under General Gage, who had re¬ solved to begin offensive operations against the rebels. This design becoming known in the American camp, it was determined to seize and fortify the heights of Charlestown on the night of 16 June. The execution of this perilous mis¬ sion was confided to Colonels Prescott and Pep¬ pered at the head of a brigade of 1,000 men ; and at dawn of day a strong redoubt was already completed on Breed's Hill. About 1,500 Americans advanced successively to the relief of Prescott, and General Warren entered the redoubt as a volunteer, refusing the command which was tendered to him. At about 2 :30 o'clock, two columns of the British advanced to a simultaneous assault ; they were received with a terrific fire, and were twice repulsed in dis¬ order. When the Americans had exhausted all their ammunition, Prescott gave the order for retreat. They received a destructive volley as they left the redoubt, and Warren fell, shot through the head with a bullet. The retreat was harassed by a raking fire from the British ships and batteries, but there was no pursuit beyond Charlestown Neck. The British loss was 226 officers and men killed and 828 wounded ; that of the Americans 145 killed or missing and 304 wounded. Although defeated, the moral result of this action was great. The Americans had seen su¬ perior numbers of the disciplined soldiers of England retreat before their fire, and had given the proof they they were able to defend their liberties. On Breed's Hill, and near the spot where Warren fell, stands the Bunker Hill Monument, the cornerstone of which was laid by the Marquis de Lafayette, 17 June 1825. This monument was inaugurated 17 June 1843. It consists of a plain granite shaft, 220 feet high, 31 feet square at the base and 15 at the top. The monument affords a magnifi¬ cent panoramic view of the surrounding coun¬ try. Consult Ellis, G. E., < History of the Battle of Bunker's (Breed's) HilP (1875) ;

Adams, C. F., Jr., in American Historical Review (Vol. I) ; Frothingham, P., (Siege of Boston* (Bos¬ ton 1902).

BUNKER HILL ORATIONS. The first of the socalled (Bunker Hill Orations) of Daniel Webster was pronounced 17 June 1825, the 50th anniversary of the Battle of Bunker Hill, when the cornerstone of the Bunker Hill Monument was laid. The second was delivered

18 years later at the exercises to commemorate the completion of the monument. The earlier address is, justly, the better known, and ranks as one of the most notable examples of Ameri¬ can oratory, if indeed it is not the greatest occasional oration delivered in America during the first half of the last century. Though Webster substituted a weighty dignity of utter¬ ance and sheer personal force for the more exuberant figures, the classical allusions and quotations which were in vogue in the public speaking of his day, he belonged after all to the old school, which regarded oratory as some¬ thing apart from the simple expression of natural thought and feeling. A comparison of the (First Bunker Hill Oration* with Lincoln's ˆGettysburg Address * will make this plain; and it may help in explaining why, notwithstanding the clearer recognition of Webster's honesty and ability, his orations are less read and ad¬ mired now than they were in his day. The most valuable part of the (First Bunker Hill Oration) is the discussion of the American gov¬ ernment and the ideals for which the fathers fought — a feeling exposition which seems to have renewed pertinency in each new national crisis ; but the most popular passage is perhaps the moving address to the veteran survivors of the battle, who were seated on the platform. The second oration is filled with felicitations and compliments, and contains no very notable passage, though the tribute to Washington has often been quoted.

William B. Cairns.

BUNODONT, a term applied to animals in which the crowns of the molar teeth are composed of a number of low rounded cones or cusps. The pig is one of the best examples among living animals; the teeth of monkeys and other omnivorous or frugivorous animals, including man, are also of this type. It is prob¬ able that the molars of many if not all modern mammals have been evolved from bunodont teeth, for the ancestors of many races of the modern hoofed animals, carnivora, and some other groups, show a series of stages in the evo¬ lution of the teeth leading from the omnivorous bunodont type into the specialized grinding or cutting teeth (selenodont) of the modern ani¬

mals. See Teeth,

BUNSEN, Christian Karl Josias (Cheva¬ lier), German statesman and philosopher: b. Korbach, Waldeck, 25 Aug. 1791 ; d. Bonn, 28 Nov. 1860. He studied philology under Heyne at Gottingen, and subsequently went to Holland and Denmark, to acquire a critical knowledge of the Danish and Dutch languages. In 1815 he made the acquaintance at Berlin of the cele¬ brated Niebuhr, and in 1816 proceeded to Paris, where he studied Persian and Arabic under Sylvestre de Sacy. The same year he visited Rome, where he married, and renewed his inti¬ macy with Niebuhr, then Prussian Ambassador to the Papal court. Niebuhr procured him the appointment of secretary to the Prussian legation, and in 1823 Bunsen assumed Niebuhr's duties, being later, and in 1827, formally ac¬ credited as resident Prussian Minister. In this capacity he continued till 1838, and conducted several important negotiations with the Papal See, the result of one of which was the brief of Leo XII relative to mixed marriages. His next mission was to Berne, as Ambassador to

the Swiss Federation. During his residence at Rome Bunsen had industriously pursued his philosophical and historical studies, including more especially that of the Platonic philosophy, and investigations into the religious and eccle¬ siastical history of mankind. The liturgies of the Church received his especial attention, and a service of his own framing, introduced by him into the chapel of the Prussian embassy at Rome, was printed by order of the King of Prussia, who wrote a preface to it. This work was oublished without the author's name at Hamburg in 1846, under the title of (Allgemeines Evang. Gesang-und GebetbuclP (ˆGen¬ eral Hymn and Prayer Book of the Evangelical Lutheran Church)), and may be regarded as a new edition of the (Versuch eines allgemeinen Evang. Gesang-und Gebetbuchs,, published at Hamburg in 1833.

In 1841 Bunsen was summoned to Berlin from Switzerland to proceed to England in charge of a mission for the establishment, in conjunction with that country, of a bishopric at Jerusalem. Shortly afterward he

was nomi¬ nated Prussian Ambassador to England. In 1844 he was consulted on the subject of grant¬ ing a constitution to Prussia, and is said to have drawn up and submitted to government the form of one which bore a very close resemblance to that of Great Britain. In the Schleswig-Hol¬ stein affair he strenuously opposed the claims of Prussia and the German Confederation in opposition to those of Denmark. From the opposite views taken by him to those of his government in relation to the Russian War he was recalled from London in 1854, and, aban¬ doning politics, retired to Heidelberg to devote himself exclusively to literary pursuits. The results of these have established his reputation as one of the most profound and original critics in the department of Biblical and ecclesiastical history. Among these are *Die Verfassung der Kirche der ZukunfD ((The Constitution of the Church of the Future*) (1845) ; (ZEgyptens Stelle in der Weltgeschichte* ((Egypt's Place in the World's History*) (1845) ; (Hippolytus und Seine Zeit* ((Hippolytus and His Time*) (1851), and lastly, his greatest work, (Bibelwerk fur die Gemeinde* ((Bible Commentary for the Community*), the first part of which was published in 1858, and was intended to be completed in 1862. It had occupied his atten¬ tion for nearly 30 years, and, as he informs us, was regarded as the grand centre-point to which all his literary and intellectual energies were to be devoted. Death interposed to pre¬ vent him completing his undertaking. Ill health caused him to spend the winters of 1858-59 and 1859-60 at Cannes, in the south of France, re¬ turning thence in the spring of 1860 to Bonn (whither he had recently transferred his abode from Heidelberg), where he died. Three vol¬ umes of his <Bibelwerk) had been published at his death (the first, second and fifth), and this great work was completed in his spirit and by the aid of his manuscripts under the editorship of Holtzmann and Kamphausen, in nine vol¬ umes (1858-70).

BUNSEN, Robert Wilhelm Eberard,

German chemist: b. Gottingen, 31 March 1811; d. 16 Aug. 1899. He studied at Gottingen Uni¬ versity and at Paris, Berlin and Vienna ; was appointed professor at the Polytechnic Institute of Cassel 1836; extraordinary professor at the

University of Marlburg 1838, and ordinary pro¬ fessor there 1841 ; professor at Breslau 1851 ; and finally professor of experimental chemistry at Heidelberg 1852. Among his many dis¬ coveries and inventions are the production of magnesium in quantities, magnesium light, spectrum analysis, and the electric pile and the burner which

bears his name (see below). Among his works are (Chemische Analyse durch Spektralbeobachteungen) (with Kircholl, 1861 ; new ed., 1895) ; (Gasometrische Metho-den* (1857; English by Roscoe) ; and (Anleitung zur Analyse der Aschen und Mineral-wasser) (1874). He retired from active teach¬ ing in 1889.

BUNSEN BATTERY, a modification of the Grove battery, plates or bars of gas coke being used instead of platinum. The electro¬ motive force is slightly less than that of the Grove battery.

BUNSEN BURNER, a form of gas-burner especially adapted for heating, consisting of a tube in which, by means of holes in the side, the gas becomes mixed with air before consumption, so that it gives a non-illuminating, smokeless flame. Burners of this nature are part of the indispensable outfit of a chemical laboratory.

BUNT, sometimes called SMUT BALL, PEPPER BRAND and BRAND BLAD¬ DERS, the most formidable disease, perhaps, to which wheat is subject, but one which may in most instances be greatly modified, and which seldom in the present day does material injury except where there is careless cultivation. Like many other of the diseases to which the cereal plants are subject, it arises from the attack of a parasitic fungus (Uredo caries). It is gener¬ ated in the ovary of wheat and a few other Graminece, and very rarely on the stem. It is formed at an early stage of growth, before the ear is free from the sheath; and indeed the plants which are affected by the parasite may be readily recognized by their unusual luxuri¬ ance, being generally several inches higher than plants not affected, larger in bulk, and often producing a greater number of stems from the same root. The bunted grains are shorter and blunter than the sound, of a dark-green when young, but when old of a pale brown, or some¬ times nearly black. The contents of the ovary are reduced to a uniform black powder or paste, which has an offensive smell like that of de¬ cayed fish. Various substances have been used by cultivators to prevent the growth of bunt, such as salt, quicklime, arsenic, corrosive subli¬ mate, *etc.* Careful washing and a selection of good seed will alone prevent much mischief, but it is advisable to take some more stringent measures with a view to destroy the vitality of the bunt, spores. For this purpose Dombasle's method is the most successful. It consists in thoroughly wetting the grain with a solution of sulphate of soda (Glauber's salts), then drying the wheat with quicklime, which combines with the. water to make sulphate of lime (gypsum), which acts as a manure, while the caustic soda destroys the vegetative powers of the bunt spores.

BUNTER SANDSTONE, one of the

three divisions of the Triassic. It is the low¬ est, that is, the oldest of the series. It corre¬ sponds to the gres bigarre (variegated free-

BUNTINGS, CANARIES, ETC

1 Lapland Longspur Bunting 4 Meadow Bunting

o Chaffinch ˆ Cardinal

3 Wild Canary 6 Rose-breasted Grosbeak (Male;

7 Reed Bunting (Male and Female)

stone or grit) of the French. In the Hartz it is more than 1,000 feet thick; in Cheshire and Lancashire, England, about 600. It consists chiefly of red sandstones, and fossils are very rare. The rocks are highly porous and afford an important source of water supply. The footprints formerly known as those of chirothe-rium, now known to be labyrinthodont, are found in the bunter ; the plants are chiefly ferns, cycads and conifers.

BUNTING, Jabez, English clergyman: b. Monyash, Derbyshire, 1778; d. London, 16 June 1858. His parents were members of the Wesleyan Church and removed to Manchester when he was a child. While at school he at¬ tracted the attention of Dr. Percival, who employed him as his amanuensis, and at his death made him one of his executors. He early joined the Church; became a traveling preacher in 1799; joined the Conference after the death of Mr. Wesley, and was appointed to the Old¬ ham circuit. After traveling four years he was sent to London, where he gained great popu¬ larity as a pulpit and platform orator. After remaining two years in London he was removed to

Manchester, where he distinguished himself as an advocate of ecclesiastical order and dis¬ cipline in a controversy with some disaffected Methodists. In this controversy he gave such evidence of a knowledge of the polity of Wes¬ leyan Methodism as secured for him the favor of the entire body to which he belonged. He was four times president of the Methodist Con¬ ference; 17 years missionary secretary, and three years as editor. In 1835 he was chosen president of the theological school, and Was looked upon as the acknowledged leader of the Methodists, superintending the interests of the body at home and abroad, while, at the same time, his influence was felt in other evangelical denominations, and also in the political world, statesmen frequently resorting to him for ad¬ vice. Yet he derived only the ordinary emolu¬ ments of a Methodist minister — a yearly salary of £150, with house-rent and taxes. Dur¬ ing all the distractions connected with the seces¬ sions that have taken place in the Wesleyan body, Dr. Bunting remained a firm, unwavering adherent and advocate of the doctrines and dis¬ cipline of the Church as they came from the hands of John Wesley, and to his influence and indefatigable zeal are largely to be ascribed the permanency and prosperity of the Wesleyan connection.

BUNTING, Sir Percy (William), Eng¬ lish journalist: b. Manchester 1836; d. 22 July 1911. He was educated at Owens College, Manchester, and Pembroke College, Cambridge, and was called to the bar. He was editor of the Contemporary Review from 1882 until his death and was concurrently editor of the Methodist Times from 1902. He was knighted in 1908.

BUNTING, William Maclardie, Wesleyan minister: b. Manchester, 23 Nov. 1805; d. High-gate Rise, 13 Nov. 1866. He began to preach at the age of 18. For many years he was very active in the “Evangelical Alliance and also in the British Society for the Propagation of the Gospel among the Jews. After his death his selected sermons and other writings were published, under the editorship of G. Stringer Rowe (1870).

BUNTING, one of a group of cone-billed birds, forming the genus Emberizidce, repre¬ sented in Europe by several large, brown-streaked, or yellowish finches, of which the corn-bunting, reed-bunting and cirl-bunting are well known in Great Britain. It is marked by its cone-shaped bill and a hard knob on the inner surface of the upper mandible. The corn¬ bunting, which is considerably larger than a house sparrow, is brown in color with darker streaks on the upper

parts or whitish brown with dark brown spots and lines on the under parts, and has a slightly forked tail. The reed¬ bunting has a black head and throat and the nape and sides of the neck are white. The head of the cirl-bunting is olive-green, with bright yellow patches on the cheek and over the eyes. The term is used in the United States for two or three similar birds, such as the dick-cissel and snow-bunting (qq.v.). All the buntings are good singers, and the term is applied by dealers in cage birds not only to the true Euro¬ pean buntings, but to many other seed-eaters, such as the ortolan and our indigo-bird.

BUNTING, a thin woolen stuff, of which flags are usually made ; hence, flags, collectively.

BUNYA-BUNYA, the native Australian name of Araucaria bidwillii, a fine Queensland tree with cones larger than a man's head, con¬ taining seeds that are eagerly eaten by the natives.

BUNYAN, John, English preacher and author : b. Elstow, near Bedford, Bedfordshire, England, 1628; d. Swan Hill, London, 31 Aug. 1688. The Bunyans were an old family in Bed¬ fordshire but Bunyan's immediate ancestors for several generations had been obscure, and Bun¬ yan's own father, Thomas Bunyan, was a tinker. Of his mother, Margaret Bentley, little is known. In spite of their lowliness, however, these parents trained Bunyan with some care and sent him to the Bedford schools. Then he took up the trade of tinker, at which, until he became an established preacher, he worked in¬ dustriously. In the latter part of 1645 and the early months of the following year he fought in the Civil War, but on which side is uncertain. Fronde maintains that he was in the Royalist army, whereas Macaulay and Brown, to whom the weight of authority must be given, state that the evidence goes to show that Bunyan was with the Parliamentarians. In 1646, he returned to his trade in Elstow, and at about the age of 20 married a wife, whose goodness of character is the accepted proof that Bunyan was better than he represented himself.

Of far more importance in giving character to Bunyan's career was his spiritual life. Be¬ sides being brought up religiously and at a time of peculiarly strong belief in the literal truth of hell and heaven, of damnation and atone¬ ment, of devils and evil spirits, Bunyan's boy¬ hood and early manhood were not only a con¬ tinual struggle between the inclinations of an active, pleasure-loving youth and the terror lest he be doomed to eternal perdition, but also a spiritual anguish heightened by one of the most imaginative of minds of which there is record. ((He was,® says William James ((The Varieties of Religious Experience'), <(a typical case of the psychopathic

temperament, sensi¬ tive of conscience to a diseased degree, beset by doubts, fears and insistent ideas, and. a victim

of verbal automatisms, both motor and sen¬ sory. These were usually texts of Scripture which, sometimes damnatory and sometimes favorable, would come in a half-hallucinatory form as if they were voices, and fasten on his mind and buffet it between them like a shuttle¬ cock.® Though in most ways a wholly respect¬ able character, he speaks of himself, in his au¬ tobiography, (Grace Abounding, > as a most blasphemous youth, in return for which he was warned and tormented by visions to which he gave little heed. When the visions left him he tells us that he became worse, nor were some narrow escapes from death sufficient to make him repent. His marriage had a good effect on him ; he went to church regularly and was rev¬ erent, though, he says, in a formal way. He still liked his sports and was in the habit of playing cat on the village green Sunday after¬ noons. The effect of a peculiarly vivid vision of a warning voice from heaven while he was in the act of striking the cat was to make him despair of ever being redeemed from his wicked courses. Yet he began to mend his ways, first giving up his profanity, then his love of bell¬ ringing, and lastly his dancing, though it took him (<nearly a full year before he could quite leave that.® He became esteemed as a godly man, but he feared that he had no depth of re¬ pentance. Overhearing some poor old women talking of the new birth and of the ways of resisting the devil, he became convinced that he ((wanted the true tokens of a truly godly man.® Though he meditated much on their sayings, though he gave up all his evil companions and once or twice had visions of the way to sal¬ vation, two questions obtruded themselves, <(Whether he was elected?® and <(How if the day of grace should now be past and gone?® After much questioning, distress of mind and manifold temptations that Satan put in his way, he gained some comfort from the Scrip¬ tures. The preaching and talk of Gifford, the Bedford minister, made him feel worse and worse; he seemed to himself to be utterly base and corrupt. Temporary comfort came in the Song of Solomon, but about <(a month after, a very great

storm came down upon me, which handled me twenty times worst than all I had met with before.® Satan was continually with him ; he feared that he had blasphemed against the Holy Ghost. This temptation lasted about a year, but partly from texts in the Bible, and partly from the ministrations of Gifford and Luther's (Comment on the Galatians, } he re¬ ceived some comfort. Even so, he was sub¬ ject to another temptation, which endured a year, ((to sell and part with the most blessed Christ.® He feared that he had committed the unpardonable sin, and he was so torn between despair and hope that, after another conflict of three-quarters of a year, he fell into sickness. Even then he was tempted, but his mind and body grew whole together, and from this time on, about 1655, he seems to have felt himself redeemed.

In 1653 Bunyan joined the Bedford church, and two years later, <(after I had been about five or six years awakened,® he began preaching at the suggestion of (<some of the most able of the saints.® He was at first appalled by the gravity of his mission, but finding that he gave comfort to many he grew more confident. The secret of his success lay in the fact that <(I

preached what I felt, what I smartingly did feel; even that under which my poor soul did groan and tremble to astonishment.® So great was the sincerity and success of his mission that he raised for himself much opposition among the Anglican divines, and was much slandered. Almost simultaneously, he began his very pro¬ lific career as author with a book of controversy directed against the Quakers, 'Some Gospel Truths Opened) (1656).

On 12 Nov. 1660, shortly after the return of Charles II, Bunyan was arrested for preaching. Refusing to flee or to agree not to preach, he was lodged in the Bedford county jail. Failing to get his case heard, he remained here for 12 years, except for a few weeks of liberty in 1666. During his unjust imprisonment, Bun¬ yan had some access to the outside world, fre¬ quently visiting his church and once going as far as London. In the sense that he had much leisure to write, his confinement was of advan¬ tage to him. He composed and had published many books of which the most famous was (Grace Abounding to the Chief of Sinners) (1666). On his release, in 1672, from jail, in accordance with the Declaration of Indulgence of Charles II, he became minister of the Bed¬ ford church. In 1675-76, Bunyan was again imprisoned, this time for six months in the small jail on Bedford bridge. The fact is im¬ portant because it is probable that

there he wrote, among other books, at least two-thirds of the first part of Pilgrim's Progress.) This part was first published in 1678, and a second edition with some additions, as the character of Mr. Worldly Wiseman, appeared the same year. The third came out early in 1679 and since then editions have been numberless. The second part appeared in January 1685. In the interval between the two were published the other books for which Bunyan is best known next to Pil¬ grim's Progress) and (Grace Abounding) — (The Life and Death of Mr. Badman) (1680) and (The Holy War* (1682). Aside from the imprisonment of 1685 and some persecution Bunyan's last years were quiet. His influence from his preaching and his writing was very widely diffused, and he was, in these respects, second to scarcely any man in England. He met his death in doing a characteristic act of charity : having successfully reconciled a father and son at Reading, he was, while continuing his journey to London, overtaken by a rain storm and died from the effects of the expo¬ sure, in his 60th year.

Bunyan ranks among the most popular of English authors: his Pilgrim's Progress) is said to be read more widely than any other book in the language, except the Bible. It has been translated into over 70 foreign tongues. The reasons for its extraordinary vogue lie in the simplicity of the style, the fervor of the imagination, the universality of its spiritual ap¬ peal ; no book is more widely intelligible or freer from sectarian dogmas. In all his books he appears as an unsurpassed master of a simple, direct, vernacular style. See Holy War, The; Pilgrims's Progress.

Bibliography. — Editions of Bunyan's four more important works are numerous, and there are several of his collected works. Altogether he wrote about 60 books. Among the many lives that of the Rev. John Brown, (John Bun-

BUNZLAU

BUOY

van, His Life, Times and Work' (1885), is the most complete and authoritative. Fronde's life in the (English Men of Letters' (1880) ; and that by Canon Venables in the (Great Writers Series' are also good; to the latter a full bib¬ liography is added. Consult also Dowden, (Puritan and Anglican Studies' (1901) and James (op. cit., 1902).

BUNZLAU, boontz'low, the name of sev¬ eral central European towns, chief of which are :

1. Bunzlau, a town in the province of Silesia, near the Bober, 25 miles west of Lieg-nitz. Formerly surrounded by fortifications, handsome promenades now cover their sites. In the market-place is an iron obelisk to the Russian general, Kutusov, who died here in 1819. Earthenware, glass, iron, etc., are manu¬ factured. Pop. 16,000.

2. Jung Bunzlau, a town of Bohemia, 31 miles northeast of Prague, the capital of the circle of Bunzlau. It stands on the left bank of the Iser, is well built, and has an old castle, an old and a new town house and other inter¬ esting buildings. Its inhabitants are chiefly engaged in manufacturing cottons, woolens, starch, sugar, spirits, beer, *etc.* Pop. 11,500.

3. Alt Bunzlau, a small town of Bohemia, situated on the Elbe.

BUOL-SCHAUENSTEIN, bwal-show'en-stin, Karl Ferdinand (Count), Austrian statesman: b. 17 May 1797 ; d. Vienna, 28 Oct. 1865. He was Minister in succession at Carls-ruhe, Stuttgart, Turin and Saint Petersburg. He was second Austrian plenipotentiary at the Dresden Conference (1850), after which he was Minister at London until the death of Schwarzenberg recalled him to Vienna to hold the portfolio of foreign affairs. He presided at the Vienna Conference in 1855, and repre¬ sented Austria at the Congress of Paris.

BUONAPARTE. See Bonaparte.

BUONAROTTI, bwo-nar-rot'te, Filippo; b. Pisa, 11 Nov. 1761; d. Paris, 15 Sept. 1837. He received an excellent education under the auspices of the Grand Duke Leopold, but for¬ feiting the friendship of that prince on account of his sympathies with the French revolution¬ ists, he resorted to Corsica, where he com¬ menced a journal of so inflammatory a character that he became involved in difficulties with the government. After having spent some time in Sardinia, where he was invited to draw up a liberal constitution for the people, he went to Paris to urge the desire of the people of the Corsican island of Saint

Pierre for annexation to France. French citizenship was conferred upon him ; he was employed, in important mis¬ sions in Corsica and Oneglia and became an ardent partisan of the Terrorists. Having been detained for some time in prison after the fall of Robespierre, he founded the Pantheon Asso¬ ciation and when this was dissolved by the government he joined the conspiracy of Babeuf and was sentenced to transportation, but was finally permitted to retire to Geneva, and after¬ ward went to Brussels, where, in 1828, he pub¬ lished his (Conspiration de Babeuf.' Return¬ ing to Paris after the revolution of 1830, he spent the rest of his life in poverty and obscurity.

BUONARROTI, Michelangelo. See

Michelangelo.

BUONONCINI, bwo-non-che'ne, Giovan¬ ni Battista, Italian composer: b. Modena 1672. In 1697 he went to Vienna and soon after to Berlin, where his opera (Polifemo' had great success. After living a while at Rome, he went, in 1720, to London, and became there one of the most powerful rivals of Handel. Every¬ thing in England at that time was made to bear upon party politics, and Buononcini became the favorite of the Whigs, while Handel was sup¬ ported by the Tories. But upon a trial of skill, in an opera of their joint composition, the talent and taste of Buononcini proved an unequal match for the genius of his rival.

BUONTALENTI, bwon-ta-len'te, Ber¬ nardo (Delle Girandole), Italian painter, sculptor and architect: b. Florence 1536; d. 6 June 1608. When 11 years of age an inundation of the Arno broke into the quarter of Florence where his family resided, and carried off every member of it except himself. Cosmo de Medici, on learning the disaster, received him into his palace, and improved the taste which he had displayed for drawing by placing him in the schools of Salviati, Bronzino and Vasari. He displayed great versatility of mind, and excelled not only in the kindred arts of painting, sculp¬ ture and architecture, but distinguished him¬ self as a mathematician, a military engineer and an inventor of machines.

BUOY, boo'i, boi or bwoi, any floating body employed to point out the particulai situation of anything under water, as of a ship's anchor, a shoal, *etc.* They are of various shapes and constructions. The can buoy is of a conical form and is used for pointing out shoals, sand¬ banks, *etc.* In the United States it is prescribed by law that channel buoys be painted red on the starboard hand coming in from sea, and black on

the port or left-hand side. They are also numbered in order from seaward, with even numbers on the starboard and odd numbers on the port hand. Mid-channel obstructions are marked with danger buoys, having black and red transverse stripes. Mid-channel buoys marking the fair way have longitudinal white and black stripes. Buoys marking sunken wrecks are painted green. White buoys desig¬ nate anchorage limits or dumping limits. A yellow buoy designates a quarantine station. The cask buoy is in the form of a cask; the larger are employed for mooring, and are called mooring buoys. Spar buoys are wooden poles weighted at the thick end, by which they are moored. They are used in inland waters and in situations where, by reason of ice, iron buoys would be damaged in winter. Whistling buoys are provided with apparatus, operated by the waves, which compresses air and discharges it through a whistle. A bell buoy is a large fixed buoy to which is attached a bell which is sounded by the heaving of the sea, serving as a signal in foggy weather. The life or safety buoy is intended to keep a person afloat till he can be taken from the water. Its most usual form is a ring of cork covered with painted canvas and having beckets at its circumference. Life buoys are sometimes equipped with a port¬ fire or signal light which is kindled by pulling a lanyard at the moment of heaving overboard. Gas buoys are charged with compressed gas and provided with a suitable burner. The gas be¬ ing lighted, and burning continuously, such

buoys serve as a guide at night. Some buoys are fitted for generating and burning acetylene gas, and are often made to carry a charge to last six months or more. Electric buoys are illuminated by connection with power on shore by means of a cable.

BUPALUS, Greek sculptor :fl. at Chios about 500 b.c. He and his brother Athenis are best known for their satirical conflict with the poet Hipponax. Augustus adorned many of the Roman temples with works of the two brothers, who used the pure white marble of Paros. Pausanias represents Bupalus as being an elegant architect as well as a sculptor.

BUPHAGA, bu-fa'ga, a genus of birds of the starling family (Sturnidce) , whose species are found in various parts of Africa, where they are of great use from their habit of feeding on the parasites infesting cattle. They are popularly known as beef-eaters or ox-peckers, and are distinguished from the true starlings by a stouter beak, bare nostrils, more curved claws and some other characters. The South African ox-pecker (B . africana) in¬ habits Natal, while farther north the genus is represented by a red-billed species (B . erythro-rhyncha). A third species is found still farther north and also in the Transvaal.

BUPHAGUS, in ancient mythology, a son of Japetus and Thornax, who was killed by Diana for an attempt upon her chastity. A river of Arcadia was named after him. Bu-phagus was also one of the surnames of Her¬ cules, which was given to him on account of his gluttony.

BUPHONIA, bu-fo'nya (Gr. (3ov(j>6via ox-killer), an ancient Athenian festival in honor of Zeus, celebrated every year on the 14th of Scirophorion, on the Acropolis. Barley and wheat were placed on the altar, and the ox destined for the sacrifice was permitted to go and eat the grain, when a priest armed with an axe sprang forward and slew the ox, and then secreted himself. The other priests, as if not knowing the author of the deed, made inquiry, and, failing to ascertain anything, for lack of a better victim arraigned the axe, found it guilty and condemned it. The Buphonia were also called Diipolia.

BUPRASIUM, a town of ancient Greece, in Elis, often mentioned by Homer as one of the chief cities of the Epians. It had ceased to exist in the time of Strabo, but the name was still attached to a district situated on the left bank of the Larissus, and on the road leading from Dyme to Elis. The region is now identi¬ fied with the plain of Bakouma.

BUPRESTIDZE, bu-pres'ti-de, a family of coleopterous insects (beetles), many of which are remarkable for the splendor of their appear¬ ance. This family is included in the pentamerous section of Coleoptera, which was formed by Latreille,. and so named because the members of it have five joints in the tarsi. The char¬ acteristics of the Biiprestidce are : body ovate, elongated, somewhat broad and obtuse in front, but pointed behind ; eyes oval, with the antennse finely serrate inserted between them; jaws powerful. The larvae are mostly wood-borers although some of the smaller species mine in leaves or galls. They walk slowly, but fly with

great rapidity, especially in warm weather. They are very fond of sunning themselves on bushes or the branches of trees. When one attempts to seize them, sometimes even when one approaches them, they allow themselves to fall suddenly to the earth, or fly rapidly away. There are several hundred species belonging to this family, over 200 species occurring in North America, and the tropical species are those which are chiefly distinguished by the brilliancy of their colors. The prevailing color appears to be green, but species are often found of a blue, red, golden or other color. The most injurious is the Chrysobothris fermorata, an apple borer. The largest are the B. Chalcophora, which bore into pines. The B. gigas of Linnaeus, which is about two inches in length, and one of the largest of the family, has bright golden elytra, or wing-cases, which are often used as orna¬ ments by the inhabitants of South America, of which continent it is a native.

BUR-MARIGOLD, a large genus of annual and perennial herbs (Bidens) of the family Asteraccce, mostly natives of North America, but widely distributed in other countries, chiefly as weeds, but some as garden plants. The best-known ornamental species is B. grandiflora, a native of Mexico. Several species are common in eastern North America, where they are variously known as devil's bootjack, stick-tight, beggar-tick, Spanish-needle, *etc.* They are especially troublesome in wool and on clothing, to which the seeds stick like burs. Some species are valuable as honey plants.

BURA, in ancient mythology, a daughter, of Jupiter, or, according to some authorities, the offspring of Ion and Helice, from whom Bura, or Buris, once a flourishing city of ancient Greece, on the Bay of Corinth, received its name.

BURA, in ancient Greece, one of the 12 original Achsean cities, which stood formerly close to the sea, on the Bay of Corinth, but, having been destroyed, with the neighboring town of Helice, by a terrible earthquake, the surviving inhabitants rebuilt it afterward about 40 stadia from the coast, and near the small river Buraicus. Bura was situated on a hill, and contained temples of Ceres, Venus, Bacchus and Lucina, the statues of which were sculptured by Euclidas of Athens. On the banks of the river Buraicus was a cave consecrated to Hercules, and an oracle usually consulted by the throwing of dice. The ruins of Bura are close to the road from Megastelia to Vostitza, and the cave of Hercules Buraicus is visited by tourists.

BURBANK, Luther, American naturalist, author and plant originator : b. Lancaster, Worcester County, Mass., 7 March 1849 ; of English-

Scotch ancestry ; educated in the com¬ mon schools and local academy ; worked as a boy for the Ames Plow Company, agricultural implement manufacturers, Worcester, Mass., where he exhibited marked inventive abilities, but soon began market-gardening and seed¬ raising in a small way, developing the well-known Burbank potato in 1873 ; removed to Santa Rosa, Cal., 1 Oct. 1875, where he has since resided and carried on his work. His many and important ((new creations® of fruits, flowers, vegetables, timber trees, grains and

grasses have made him the best known plant-originator in the world. The characteristics which are the special factors in the success of his work are, the large extent of his experi¬ ments, his keenness of perception of slight variations in plant qualities and the rapidity with which he develops new qualities, this rapidity being due to a combination of multiple hybridizing, selection and grafting of seedling plants on mature stocks, so that immediate re¬ sults as to flowers and fruits are obtained from seedling stems. But the final and most import¬ ant factor in Burbank's success is the inherent personal genius of the man, whose innate sympathy with nature, aided by the practical education in plant biology derived from 50 years of constant study and experiment, enable him to perceive correlations and outcomes of plant growth which seem to have been visible to no other man. As the history of Burbank's life is the history of his work, the remainder of his biographical sketch may advantageously be devoted to a brief consideration of the character and method of creation of some of his principal new plant varieties. Burbank has originated and introduced a remarkable series of plums and prunes. No less than 60 varieties are in¬ cluded in his list of offerings, and some of them, notably the Gold, Wickson, Apple, Oc¬ tober, Chaleo, America, Climax, Formosa, Bart¬ lett, Santa Rosa and Beauty plums and the Splendor, Sugar, Giant and Standard prunes are among the best known and most successful kinds now grown. He has also perfected a stoneless prune, the Abundance, and has created an absolutely new species, the plumcot, by a combination of the common plum and the

apri¬ cot. The Sugar and Standard prunes promise to supplant the French prune in California. The Bartlett plum, cross of the bitter Chinese simoni and the Delaware, a Burbank hybrid, has the exact fragrance and flavor of the Bart¬ lett pear. The Climax is a cross of the simoni and the Japanese triflora. The Chinese simoni produces almost no pollen, but few grains of it ever having been obtained, but these few grains have enabled Burbank to revolutionize the whole plum shipping industry. Most of Burbank's plums and prunes are the result of multiple crossings, in which the Japanese vari¬ eties have played an important part. Hundreds of thousands of seedlings have been grown and carefully worked over in his 40 years' experi¬ ments with plums and single trees have been made to carry as many as 600 varying seedling grafts.

Burbank has originated and introduced the Van Deman, Santa Rosa, Alpha, Pineapple, <(No. 80,® Dazzle and other quinces; the Leader, Opulent and National peaches, cross-bred from the Muir, Wager and White nectarine; the Winterstein and Goldridge apples; and has made interesting, although not profitable, crosses of the peach and almond, and plum and almond.

Next in extent, probably, to his work with plums is his long and successful experimenta¬ tion with berries. This work has extended through 35 years of constant attention, has in¬ volved the use of over 50 different species of Rubus, and has resulted in the origination and introduction of 10 new commercial varieties, mostly obtained through various hybridizations

of dewberries, blackberries and raspberries. Among these may especially be mentioned the Phenomenal, a hybrid of the Western dewberry (R. ur sinus) and the Red raspberry (R. ideaus) , fixed in the first generation, which ripens its main crop far ahead of most raspberries and blackberries, and the berry is of enormous pro¬ portions and exquisite quality; the Iceberg, a cross-bred white blackberry derived from a hybridization of the Crystal White (pistillate parent) with the Lawton (staminate parent) and with beautiful snow-white berries so nearly transparent that the small seeds may be seen in them ; the Balloon berry, selected from a complicated cross of many species; the Hima¬ laya, the most rapid growing and by far the most productive blackberry in existence, of unequalled quality and of great value in Cali¬ fornia and other mild climates ; also a wonder¬ ful series of absolutely thornless blackberries of great productiveness and superior quality. The thornless berry has not yet

been generally introduced, but will no doubt supplant the thorny varieties nearly everywhere. An inter¬ esting feature of Mr. Burbank's brief account, in his <(New Creations® catalogue of 1894, of the berry experimentation, is a reproduction of a photograph showing ((a sample pile of brush 12 feet wide, 14 feet high and 20 feet long, containing 65,000 two-and three-year-old seedling berry bushes (40,000 Blackberry X Raspberry hybrids and 25,000 Shaffer X Gregg hybrids) all dug up with their crop of ripening berries.® The photograph is introduced to give the reader some idea of the work neces¬ sary to produce a satisfactory new race of berries. <(Of the 40,000 Blackberry-Raspberry hybrids of this kind (Paradox) is the only one now in existence. From the other 25,000 hybrids two dozen bushes were reserved for further trial.®

Leaving Burbank's other fruit and berry creations unmentioned, we may refer to his curious cross-bred walnut results, the most astonishing of which is a hybrid between Juglans calif ornica (staminate parent) and J. regia (pistillate parent), which grows with an amazing vigor and rapidity, the trees in¬ creasing in size at least twice as fast as the combined growth of both parents, and the clean-cut, glossy, bright-green leaves, from two to three feet long, having a sweet odor like that of apples. This hybrid produces no nuts, but curiously enough the result of a nearly similar hybridization (i.e., pollen from nigra on pistils of californica) produces in abundance large nuts of a quality superior to that pos¬ sessed by either parent. These new species of walnut are now known as <(Paradox® and <(RoyaP respectively.

Of new vegetables Burbank has introduced, besides the Burbank and several other new potatoes, new tomatoes, sweet and field corn, squashes, asparagus, *etc.* Perhaps the most in¬ teresting of his experiments in this field is the successful production of a whole series of giant spineless and spiculess cactus, both for forage and fruit (the spicules are the minute spines, much more dangerous and harder to get rid of than the conspicuous long, thorn-like spines), edible for stock, and indeed for man. This work is chiefly one of pure selection, for the cross-bred forms often seem to tend

strongly to revert to the ancestral spiny con¬ dition.

Among the many new flower varieties origi¬ nated by Burbank may be mentioned the Peach-blow, Burbank, Coquito and Santa Rosa roses, the Splendor, Fragrance (a fragrant form) and Dwarf Snowflake callas, the enormous Shasta and Alaska daisies, the Ostrich plume, Waverly, Snowdrift and Double clematises, the Hybrid Wax myrtle, the extraordinary Nicotunia, a hybrid between a large, flowering Nicotiana and a petunia, numerous hybrid Nicotianas, a hundred or more new gladioli, an ampelopsis. numerous amaryllids, various dahlias, the. Fire poppy (a brilliant flame-colored variety), striped and carnelian poppies, a blue Shirley (obtained by selection from the Crimson field poppy of Europe), the Silver lining poppy (obtained by selection from an individual of Papaver umbrosium showing a streak of silver inside) with silver interior and crimson ex¬ terior, and a crimson California poppy (Escholt - zia) obtained by selection from the familiar golden form. Perhaps his most extensive ex¬ perimenting with flowers has been done in the hybridizing of lilies, a field in which many botanists and plant breeders have found great difficulties. Using over half a hundred vari¬ eties as a basis of his work, Burbank has produced a great variety of new forms. ((Can my thoughts be imagined,® he says, in his (New Creations> of 1893, (<after so many years of patient care and labor (he had been working over 16 years) as, walking among them (his new lilies) on a dewy morning, I look upon these new forms of beauty, on which other eyes have never gazed? Here a plant six feet high with yellow flowers, beside it one only six inches high with dark red flowers, and further on one of pale straw, or snowy white, or with curious dots and shadings ; some de¬ liciously fragrant, others faintly so ; some with upright, others with nodding flowers, some with dark green, woolly leaves in whorls, or with polished, light green, lance-like, scattered leaves.®

So far no special reference has been made to the more strictly scientific aspects of Bur¬ bank's work. Burbank has been primarily in¬ tent on the production of new and improved fruits, flowers, vegetables, trees, grains and grasses for the immediate benefit of mankind. But where biological experimentation is being carried on so extensively it is obvious that there must be a large accumulation of data of much scientific value in its relation to the great problems of heredity, variation and species-forming. Burbank's experimental gar¬ dens may be looked on from the point of view of the biologist and evolutionist as a great laboratory in which, at present, masses of valuable data are, for lack of time and means, being let go

unrecorded. Of Burbank's own particular scientific beliefs touching the <(grand problems® of heredity we have space to record but two ; first, he is a thorough believer in the inheritance of acquired characters, a condition disbelieved in by the Weismann school of evolutionists ; second, he believes in the con¬ stant mutability of species, and the strong individuality of each plant organism, holding that the apparent fixity of characteristics is a phenomenon wholly dependent, for its degree

of reality, on the length of time this character¬ istic has been ontogenetically repeated in the phylogeny of the race. See Plant-breeding,

For other accounts of Burbank and his work, consult articles in the illustrated maga¬ zines; (New Creations in Plant Life,* by W. S. Harwood. Burbank has written 12 large vol¬ umes, (Luther Burbank, His Methods and Dis¬ coveries and Their Practical Application* ; (The Training of the Human Plant) ; and his series of catalogues, 1893-1901, called (New Creations) ; and has several other volumes under preparation covering an enormous amount of experimental data on plant life in all its aspects.

Vernon L. Kellogg,

Professor of Entomology, Leland Stanford Junior University.

BURBOT, a fresh-water fish (Lota lota) of the cod family, inhabiting northern Europe and America. It is numerous in the inland waters of the Northern States and Canada, where it displays the nocturnal voracity of its race. It ordinarily weighs about five pounds, but has little market value. It is more often called cusk, ling or loche among us, than bur¬ bot, which is the British designation.

BURBRIDGE, Stephen Gano, American soldier: b. Scott County, Ky., 19 Aug. 1831; d. 1894. He organized the famous 26th Kentucky Regiment, which he led for the Union at Shiloh, where he was promoted to the rank of briga¬ dier-general of volunteers. He was engaged in the Vicksburg expedition under General Grant ; led the charge at Arkansas Post and at Port Gibson, being the first to enter each of these places; was retired with the brevet of major-general in 1865.

BURCH, Charles Sumner, American Prot¬ estant Episcopal bishop : b. Pinckney, Mich., 30 June 1855; d. New York, 20 Dec. 1920. Gradu¬

ated at University of Michigan in 1875 ; en¬ gaged in publishing business in Chicago, he was editor of the Grand Rapids Evening Press from 1897 to 1905. He had taken deacon's orders in 1895 and was ordained to the priesthood in 1905. He was rector of Saint Andrew's, Staten Island, N. Y., until 1911, when he was conse¬ crated suffragan bishop of New York.

. BURCHARD, Samuel Dickinson, American clergyman : b. Steuben, N. Y., 6 Sept. 1812 ; d. Saratoga, N. Y., 25 Sept. 1891. He was grad¬ uated at Centre College in 1836 and became a prominent lecturer in Kentucky on the anti¬ slavery and temperance questions. He was for many years a Presbyterian pastor in New York. In 1885 he became pastor emeritus. During the presidential campaign of 1884 a company of clergymen, about 600 in number, called on James G. Blaine, the Republican candidate, at the Fifth Avenue Hotel, New York. Dr. Burchard made an address, in which he affirmed that the antecedents of the Democracy were (<rum, Romanism and rebellion,® and this de¬ nunciatory speech on the very eve of the elec¬ tion created intense excitement throughout the United States and alienated from Blaine many Democratic votes upon which he had reckoned. It is generally conceded that Burchard was thus largely instrumental in electing Grover Cleveland.

BURCHIELLO, boor-che-el'lo, Domenico, Italian poet : fl. 15th century at Florence, where he was probably born. He died at Rome, about 1449. He was the son of a barber named Gio¬ vanni, and was called originally only Domenico. He assumed the name of Burchiello afterward for reasons that cannot be assigned. His fame began about 1425. He was first registered as a barber in 1432. Some writers have reproached him for shameful vices, and represented him as a low buffon who did everything for money. Others have defended him. His shop was so famous that learned and unlearned, high and low, assembled there every day, and Cosmo the Great caused a picture of it to be painted on one of the arches of his gallery. It appears here divided into two portions ; in one Bur¬ chiello is acting the part of a

barber; in the other that of a musician and poet. The por¬ trait of Burchiello himself is painted over his shop. It is extremely difficult to decide upon the absolute value of his satires, as the local and personal allusions in them are obscure. They were composed of his contemporaries, with a studied obscurity and extravagance of expression. His style is, nevertheless, pure and elegant. His burlesque sonnets are enig¬ mas, of which we have no intelligible explana¬ tion, notwithstanding what Doni has done. The narrative and descriptive parts are very easily understood ; but the wit they contain is, for the most part, so coarse, that the satire fails of producing its effect. They are, on the whole, lively, but licentious. The best editions of his sonnets are those of Florence (1568) and of London (1757).

BURCKHARD, Max Eugen, Austrian writer on jurisprudence, poet, novelist and dramatist: b. Korneuburg 1854; d. 1912. He studied at the University of Vienna, rendered efficient service for several years as a member of the ministry of education, and received in 1890 his appointment as director of the Hof-theatre (court theatre) in Vienna, an office so well suited to his talents that it called forth a series of appropriate works. Thus, in 1896 he published (Das Recht des Schauspielers) ; next followed the comedy (Rat SchrimpP (Berlin 1905) ; Gottfried Wunderlich > (1906) ; (Das TheateP (Frankfurt am Main 1907) ; (Im Paradiese) (Wien 1907) ; (Die verfixten Frau-enzimmeP (1909); (Jene Asra> (Salzburg 1910) ; a novel of distinction entitled (Trin-caria) in 1910; and in 1912 his (Cillis — Sina — Gabrielle : Briefe von und an Carl RahlP It should be noted that, before his appointment as director of the court theatre, he had published his Gesetze und Verordnungen in Kultussa-chen) (1887) and the poem entitled (Das Lied voin TannhauseP (1888).

BURCKHARDT, boork'hart, Jakob, Swiss author, eminent as a student and critic of Italian art and as an historian : b. Basel 1818 d. 1897. At the university of his native town, and later at the University of Berlin, he studied history and theology. His first appointment was as professor of the history of art and civilization at the University of Basel, and this connection he maintained to the end of his life, with the exception of a few years spent at Zurich as an instructor in the Polytechnic Institute of that city. His most important works are (Die Zeit Constantins des Grossed (Leipzig 1880) ; (Der

Auflage, unter Mitwir-kung des Verfassers und anderer Fachgenossen bearbeitet von Dr. Wilhelm Bode) (parts 1 and 2, Leipzig 1879) with its English versions, <The Cicerone, or Art Guide to Painting in Italy> (ed. by A. von Zahn and trans. by Mrs. A. H. Clough, London 1873), and a translation of that portion which relates to painting, published in New York in 1910; (Die Kultur der Renais¬ sance in Italien* (1st ed., 1860,8th ed., 1902, and English translation, (The Civilization of the Renaissance in Italy, > London 1890) ; Geschichte der Renaissance in Italien) (3 ed., 1890-91) ; Griechische Kulturgeschichte) (3 vols., 1898-1900). Material additions to and en¬ hancement of the value of (Der Cicerone) must be credited to Dr. Bode and the other editors.

BURCKHARDT, Johann Karl, Ger¬ man astronomer: b. Leipzig, 30 April 1773; d. 22 June 1825. He acquired a fondness for astronomy from the study of the works of Lalande, and made himself master, at the same time, of nearly all the European languages. He wrote a Latin treatise Gn the Combinatory Analytic Method) (Leipzig 1794). He then studied practical astronomy with Baron von Zach at the latter's observatory on the Seeberg, near Gotha, and assisted his patron, from 1 795— 97, in observing the right ascension of the stars. Von Zach recommended him to Lalande, at Paris, who received him at his house 15 Dec. 1797. Here he distinguished himself by the cal¬ culation of the orbits of comets ; participated in all the labors of Lalande and those of his nephew, Lefrangois Lalande; took an active part in the observatory of the ficole Militaire; and translated the first two volumes of La¬ place's (Mecanique Celeste* into German (Ber¬ lin 1800-02). Being appointed adjunct astrono¬ mer by the board of longitude, he received let¬ ters of naturalization as a French citizen 20 Dec. 1799. His important treatise on the comet of 1770, which had not been visible for nearly 30 years, although, according to the calculations of its orbit, it should have returned every five or six, was rewarded with a gold medal by the Institute in 1800. This treatise, which proposed some improvements in Dr. Obler's mode of cal¬ culation, is contained in the (Memoires de-l'Institut) for 1806. During this year he was made a member of the department of physical and mathematical sciences in the Academy; in 1818 was made a member of the board of lon¬ gitude; and, after Lalande's death, astronomer in the observatory of the ficole Militaire. In 1814 and 1816 he published in French, at Paris, (Tables to Assist in Astronomical Calculations.) He also wrote some treatises in Von Zach's Geographical EphemeridesP

BURCKHARDT, John Lewis, English African explorer: b. Lausanne, Switzerland, 24 Nov. 1784; d. Cairo, 17 Oct. 1817. He was educated at Neuchatel, Leipzig and Gottingen. In 1806 he went to London with

introductions to Sir Joseph Banks, who accepted his proffered services on behalf of the African Association, founded to explore the interior of Africa. Af¬ ter studying at Cambridge, and inuring himself to hardship and exposure, he sailed for Malta in 1809; and from Malta he went to Aleppo as an Oriental, and studied there for two years Arabic and Mohammedan law. In 1810 he

made a tour of Palmyra, Damascus and Baal¬ bek; in 1812 he journeyed through Palestine and Arabia to Egypt; in 1813 he traversed the Nile above Assouan; in 1814 he visited Mecca, successfully personating a Moslem pilgrim ; 1815 saw him at the Prophet's tomb at Medina, and he journeyed to Suez and also made the ascent of Mount Sinai in 1816. He died with the main purpose of his life unfulfilled, the exploration of the sources of the Niger, and was buried in his assumed character of a devout Moslem pilgrim. His collection of 350 volumes of manuscript he bequeathed to Cambridge University. His works were all published post¬ humously: travels in Nubia (1819), in Syria (1822), in Arabia (1829); Notes on the Be¬ douins and Wahabys (1830) ; (Arabic Proverbs> (1830).

BURDEKIN, a river of the northeast of Queensland, with a course of about 350 miles. With its affluents it waters a large extent of country, but it is useless for navigation.

BURDEN, Henry, American inventor : b. Dumblane, Scotland, 20 April 1791; d. Troy, N. Y., 19 Jan. 1871. He was brought up on a farm, and at an early age showed his inven¬ tive genius by making a variety of labor-saving machinery, including a threshing-machine. He came to the United States in 1819 and engaged in the manufacture of agricultural implements. He invented an improved plow ; the first culti¬ vator made in this country; machines for mak¬ ing horseshoes and hook-headed spikes used on railroads; a self-acting machine for

rolling iron into bars, and a new machine for making horse¬ shoes, which received a rod of iron and turned out completed shoes at the rate of 60 a minute.

BURDEN OF PROOF, in legal procedure, the obligation to establish by evidence certain disputed facts. As a general rule this burden lies on the party asserting the affirmative of the issue to be tried or question in dispute, or on the party who would fail if no evidence were adduced on either side. Burden of proof is to be distinguished from prima facie evidence or a prima facie case. Generally, when the latter is shown, the duty imposed upon the party having the burden will be satisfied; but it is not neces¬ sarily so. In criminal cases, on the twofold ground that a prosecutor must prove every fact necessary to substantiate his charge against* a prisoner, and that the law will presume inno¬ cence in the absence of convincing evidence to the contrary, the burden of proof, unless shifted by legislative interference, will, in criminal pro¬ ceedings, be on the prosecuting party, though in order to convict he must necessarily have recourse to negative evidence. The burden of proof throughout is on the government. This subject is treated by all writers on Evidence, as Taylor, Roscoe and Powell in England; Dick¬ son in Scotland and Greenleaf in the United States. Consult also Bentham's (Rationale of Judicial Evidenced

BURDER, George, Congregational min¬ ister: b. London, 5 June 1752; d. 5 June 1832. He started life as an engraver and artist and drifted partially into journalism. He began preaching in 1776 and was ordained pastor two years later, but was not publicly recognized until 1784. In the meantime he had been doing the work of a traveling preacher throughout

England and Wales. He initiated Sunday schools at Coventry (1785) and he was chief founder of the ˆAssociation of Ministers for the Spread of the Gospel at Home and Abroad® (1793), now called the ˆWarwickshire County Association,® which has done much to encour¬ age foreign missions. He helped to form the (<Religious Tract Society.® In 1803 he became secretary of the London Missionary Society, a post he held until 1827. He also edited the Evangelical Magazine for several years, and in 1804 he was instrumental in the foundation of the British and Foreign Bible Society. Among his works are (The Welsh Indians, a Collection of Papers Respecting a People whose Ancestors Emigrated from Wales to America in the year 1170 with Prince Madoc* (1797) ; (Missionary Anecdotes* ; (The Pilgrim's

Progress, an Epic Poem,* and several volumes of poems. Consult Bennett's 'History of Dissenters* (1839).

BURDETT, Sir Francis, English politi¬ cian: b. 25 Jan. 1770; d. 23 Jan. 1844. He was educated at Westminster and after two years at Oxford made a continental tour. In 1796 he obtained a seat in Parliament through the pa¬ tronage of the Duke of Newcastle; but he soon abandoned the Tory party and made himself conspicuous by his advocacy of liberal measures. In 1802 he stood for Middlesex but though at first elected he finally lost his seat in 1806 after much costly litigation. He was more success¬ ful in 1807 at Westminster where his election at the head of the poll was hailed as a great popular triumph. In 1810 he published a letter in Cobbett's Political Register , denying the right of the House of Commons to imprison for libel, as they had recently done in the case of John Gale Jones. This letter, having been brought under the notice of the House, was de¬ clared a gross breach of its privileges, and a warrant was issued by the speaker for the com¬ mittal of Sir Francis to the Tower. He denied the legality of the warrant and declared his determination to surrender only to force. The public mind was strongly agitated, but proro¬ gation of Parliament relieved him from his im¬ prisonment in the Tower, and he became per¬ haps the most popular man in the kingdom. In attaining this popularity he was greatly aided by the graces of his appearance and the talents which he undoubtedly possessed. Ultimately, however, his fervor cooled, and he owed his last seat in Parliament to the Conservatives of Wiltshire.

BURDETT, Sir Henry, K.C.B. (1897), K.C.V.O. (1908), English author, publicist and statistician : b. 1845. Was superintendent of the Queen's Hospital, Birmingham, and the Sea¬ man's Hospital, Greenwich, and secretary of the share and loan department of the London Stock Exchange. He was founder and editor of The Hospital. His works are numerous and cover a wide range. Among them are (The Sinking Fund of the National Debt* ; 'The Patriotic Fund* ; (How to Become a Nurse* ; (Dwellings of the Middle Classes*; 'Helps in Sickness*; (Health* ; 'The Future of Hospitals* ; 'Official Intelligence of British, American and Foreign Securities* (17 vols.) ; (The National Debts of the World* ; (Local Taxation in England and Wales*; Seventeen years of Securities*; Co¬ lonial Loans and Development* ; (The Admi¬ ralty and the Country* ; 'Hospitals and Asy-BURDETT-COUTTS — BURDON-SANDERSON

lums of the World5 (4 vols.) ; ˆHospitals and Charities) ; (Hospitals and the Stare' ; Archi¬ tects, Hospitals and Asylums) ; (A Practical Scheme for Old Age Pensions) ; (The Nursing Profession) ; (Housing of the Poor5 ; (Official Nursing Directory5 ; (London Water Com¬ pany5 ; (Light Railways5 ; and (Municipal,

County and Indian Finance.5

BURDETT-COUTTS, Right Hon. An¬ gela Georgina (Baroness), English philan¬ thropist: b. 21 April 1814; d. London, 30 Dec. 1906. In 1837 she inherited much of the prop¬ erty of her grandfather, Thomas Coutts, the banker, on the death of his widow, the Duchess of Saint Albans (formerly the actress, Miss Mellon). Besides spending large sums of money in building and endowing churches and schools, she endowed the three colonial bishop¬ rics of Cape Town, Adelaide and British Co¬ lumbia. She founded an establishment in South Australia for the improvement of the aborig¬ ines, and established a 'fishery school at the Irish village of Baltimore (1887). To the city of London she presented, besides several hand¬ some fountains, the Columbia Market, Bethnal Green (1870), for the supply of fish in a poor district. She also built Columbia Square, con¬ sisting of model dwellings at low rents, for about 300 families. The home established by her at Shepherd's Bush has rendered great as¬ sistance to many unfortunate women, and the People's Palace owes much to her generosity. In 1871 she was created a peeress in her own right as Baroness Burdett-Coutts. In 1877 she organized the Turkish Compassionate Fund, to relieve the sufferings of the peasants in Turkey, and in recognition of her services the Sultan conferred upon her the Order of the Medjidie, In 1881 she was married to William Ashmead-Bartlett, who in 1882 obtained the royal license to assume her name.

BURDETT-COUTTS, William Lehman Ashmead-Bartlett, English philanthropist : b. in the United States in 1851, the son of the late Ellis Bartlett of Plymouth, New England. He was graduated at Keble College, Oxford, in 1876, and married in 1881 Angela, Baroness Burdett-Coutts, whose name he assumed. As commissioner for the Baroness' Turkish Com¬ passionate Fund he proceeded to the theatre of the Russo-Turkish War in 1877; and sub¬ sequently largely developed her schemes for relieving Irish distress and aiding Irish fisher¬ men. The food supply for the poor of London is a subject that has deeply interested him, and he has been instrumental in carrying through some useful acts of Parliament, notably the Hempstead Heath Act of 1885. He has repre¬ sented Westminster in the House of

Commons since 1885.

BURDETTE, Robert Jones, American humorist, lecturer, writer, preacher: b. Greens¬ boro, Pa., 30 July 1844; d. Pasadena, Cal., 19 Nov. 1914. Removed in boyhood to Peoria, Ill. He was educated in public schools ; D.D., Kalamazoo University, Michigan, 1908; LL.D., Occidental College, California, 1913. Served as private in the 47th Illinois Volunteers, 1862-65. In 1869 he became night editor of the Peoria Transcript, and afterward was associated with other Peoria papers. He be¬ came associate editor of the Burlington, Iowa,

Hawkeyc in 1872, where he made a reputation as a humorist. Later he was on staff of the Brooklyn Eagle, and was editorial contributor to the Los Angeles Times, and to many periodi¬ cals. Began to lecture in 1876. He became a licensed minister of the Baptist Church in 1887, was ordained in 1903, and became pastor of the Temple Baptist Church, Los Angeles; pastor emeritus, July 1909; and was city commissioner of Pasadena, Cal. He published (Hawkeye-tems5 (1877) ; Eise and Fall of the Moustache5 (1879); (Life of William Penn5 (1882); (Innach Garden5 (1897); Eons of Asaph5; (Chimes from a Jester's Bells'; (Temple and Templars5 ; Emiles Yoked with Sighs5 (poems, 1900) ; (Silver Trumpets5 (poems) ; <01d Time and Young Tom5 (1912) ; (Drums of the Forty-Seventh5 (1914).

BURDICK, Francis _ Marion, American jurist: b. De Ruyter, N. Y., 1 Aug. 1845; d. there, , 3 June 1920. Graduated at Hamilton Col¬ lege jn 1869, and at its law school in 1872, he practised law in Utica, N. Y., from 1872 to 1883, and was later professor of law at Hamilton College and at Cornell. From 1891 he was professor of law at Columbia University, and in 1907 was appointed commissioner on uniform State laws for New York. Besides numerous articles in law journals his published works include (The Law of Sales5 (3d ed., 1913) ; (The Law of Torts5 (1905; 2d ed., 1908); (Law of Partnership5 (2d ed., 1906) ; Essen¬ tials of Business Law5 (1908).

BURDOCK, a small genus (Arctium) of coarse perennial or biennial herbs of the family Asteracece, natives of temperate Asia and Eu¬ rope, but widely distributed as weeds through¬ out the world. Common burdock (A. lappa), which often attains a height of four feet, is sometimes planted in Japan, where it has been improved by cultivation, for its enlarged pars¬ nip-like roots, which are eaten as a boiled vegetable. Formerly the roots were used in medicine, but they seem to be generally classed with many other domestic remedies of

doubtful value. The plant is best known as a weed in waste land, but usually on good soil. Its globu¬ lar burs become attached to the wool of sheep and to clothing. Their presence injures the price of wool.

BURDON-SANDERSON, Sir John

Scott, English physician: b. Jesmond, Newcastle-on-Tyne, 21 Dec. 1828; d. 23 Nov. 1905. He was graduated at Edinburgh University in 1851 and afterward studied at Paris, settling in London as a practising physician in 1853. In 1856, while medical officer for Paddington, he first gave proofs of the eminence to which he was to attain. In 1870 he gave up his hos¬ pital appointments and a valuable private prac¬ tice to devote himself exclusively to scientific research. He held the appointments of pro¬ fessor of practical physiology and histology at University College, London, 1871-77 ; was Jodrell professor of physiology, 1874-82 ; Wayneflete professor of physiology at Oxford, 1882-95 ; and regius professor of medicine at the same university, 1895-1903. He is regarded as the virtual founder of the medical school at Ox¬ ford. His methods of research into the diseases of animals occasioned the violent opposition of the anti-vivisectionists. He accomplished much in the way of elucidating the true character

of cholera and tuberculosis. He was created a baronet in 1899, and died without issue. He contributed many papers to scientific publica¬ tions, and a (Memoir,) which contains some of his addresses, edited in part by his widow, was published in 1911.

BURDWAN, or BARDWAN, India, town and capital of a division of the same name in the lower provinces of Bengal, on the left bank of the Damoda, 68 miles northwest of Calcutta, with which it is connected by railway. There is a titular rajah of Burdwan, who resides here in a spacious palace, with gardens, *etc.* ; and there are also a large collection of temples and a shrine of Pirba-haram. Pop. 34,477. The division has an area of 13,956 square miles, and a population of about 8,250,000, and is divided into the districts of Burdwan, Bankura, Birbhum, Hugli, Midnapur and Howrah. The chief crops are sugar,

indigo, tobacco, cotton and the usual cereals. Mulberry-trees are culti¬ vated and coal is raised.

BUREAU, the chamber or official apart¬ ments of an officer of government, and the body of subordinate officials who labor under the direction of a chief. The term ((bureau system,® or ˆbureaucracy,® is applied to those systems of government in which the business of administration is carried on in departments, each under the control of a chief ; and is opposed to those in which the officers of govern¬ ment have a co-ordinate authority. Sometimes a mixture of the two systems is found. Thus the business of the executive branch of govern¬ ment may be carried on by bureaus, while the administration of justice is in the hands of co¬ ordinate judges. In the United States, bureau is the universal word for a chest of drawers.

BUREAU OF ANIMAL INDUSTRY, The. See Agriculture, Department of.

BUREAU OF BIOLOGICAL SURVEY, The. See Agriculture, Department of.

BUREAU OF CHEMISTRY, The. See

Agriculture, Department of.

BUREAU OF CROP ESTIMATES, The. See Agriculture, Department of.

BUREAU OF ENTOMOLOGY, The.

See Agriculture, Department of.

BUREAU OF PLANT INDUSTRY, The. See Agricultural, Department of.

BUREAU OF SOILS, The. See Agri¬ culture, Department of.

BUREAUCRACY, bu-ro’cra-ce, a form of political organization through which the gov¬ ernment . is carried on by means of bureaus, each of which manages a particular branch of state business. This form of organization is admirably adapted to securing responsibility, since each bureau is hierarchically organized with a chief at its head on whom rests the final responsibility, whereas in the collegial or board system a number of persons of coequal author¬ ity divide the responsibility. While the officials of bureaucracies are usually trained and ex¬ perienced administrators, little affected by pub¬ lic opinion, their tendency is to develop a caste spirit, to overemphasize

administrative routine and to become victims of ((red tape® and ex¬ cessive formalism. They fail to stimulate inter¬ est in public affairs or to cultivate patriotism

among the masses, thus becoming (<pedantoc-racies.® Consult Garner, J. W., (Introduction to Political Science) (New York 1910) ; Good-now, F. < Comparative Administrative Law> (New York 1903).

BURETTE, a graduated glass tube occa¬ sionally used for dividing a given portion of any liquid into small quantities of a definite amount.

BURG, boorg, Adriaan van der, Dutch

painter: b. Dordrecht 1693; d. 1733. He studied under Arnold Houbraken, distinguished himself by his portraits, and acquired a reputa¬ tion which would have procured him an in¬ dependence. But intemperate habits rendered his talents of no avail, and hurried him to a premature grave. His freedom of touch and fine coloring are his distinguished excellences. His best-known pieces are two large pictures at Dordrecht, one of which gives on a single canvas portraits of the managers of the orphan hospital, and the other portraits of the officers of the Mint.

BURG, Johann Tobias, Austrian astron¬ omer: b. Vienna 1766; d. 1834. He attracted the notice of Van Swieten, who was then at the head of the commission appointed to re¬ form the scholastic establishments of Austria, and through his patronage obtained the means of prosecuting the study of mathematics, and more especially of astronomy, for which he showed a decided inclination. In 1791 he be¬ came professor of physics at Klagenfurt, and in 1792 was appointed colleague of Trisnecker at the Observatory of Vienna. In 1798, the French Institute having proposed a prize for the determination, by at least 500 observations, of the mean place of the apogee and ascending node of the moon. Burg sent in a memoir in which the determination was made by a most accurate and ingenious method, not from 500 but 3,232 observations. The tables contained in it were afterward published by the Institute, and constitute the chief foundation of his fame. In 1813 he became almost entirely deaf and retired from public life to Wiesenau, Carinthia.

BURG, Prussia, a town in the republic of Saxony, 12 miles northeast of Magdeburg, on the Ihle, where it joins a canal uniting the Havel with the Elbe. It has four churches, a hospital, a gymnasium and a well-

endowed in¬ stitution for the bringing up of orphan children, and is the seat of civil and judicial administra¬ tion for the circle. Its manufactures are ex¬ tensive, especially of woolens, for which it was a centre as early as the 12th century. Cloths for army purposes are largely made. There are also spinning mills, dye works, ma¬ chine works, tanneries, oil works, brick kilns, foundries and a large trade in farm produce. The prosperity of Burg dates from the end of the 1 7th century, when a large number of French, Palatinate and Walloon refugees took shelter there. Pop. 24,074.

BURGAGE TENURE, in England, a ten¬ ure in socage, whereby burgesses, citizens or townsmen hold their lands or tenements of the King or other lord for a certain yearly rent. In Scotland that tenure by which the property in royal burghs is held under the Crown, pro¬ prietors being liable to the (nominal) service

of watching and warding, or, as it is commonly termed, <(service of burgh, used and wont.w

BURGAS, boor-gas', or BOURGAS, Bul¬ garia, a seaport in the district of eastern Rumelia, situated on the Black Sea. The bay on which it stands is of sufficient depth for large vessels, and the exports are grain, iron, butter, wine and also wooden goods for Constanti¬ nople. It is the terminal of the Sofia-Burgas Railway, and contains several mosques and Christian churches. The principal source of the prosperity of the town is the manufacture of pottery, pipe-bowls, cups, etc., for which a superior clay is found in the neighborhood. Pop. about 12,000.

BURGDORF, boorg'dorf, Switzerland, a town in the canton of Bern, situated on the Emmen. It is the market for the linen goods and cheeses of the Emmenthal, and manufac¬ tures linen, wool, tobacco and chocolate. The castle which stands here was formerly a place of great strength. Pestalozzi resided from 1798 to 1804 in the chateau of Burgdorf, and con¬ verted it into an educational institution. In the vicinity are the baths of Sommerhaus. Pop.

9,381.

BURGEO ISLANDS, Newfoundland, a group of islands on the southern coast, much visited by summer tourists and artists from the Eastern States and Canada, lat 47° 33’ N. and long. 57° 44’ W. The population is chiefly engaged in fishing. Burgeo, the principal town, has a population of less than 1,000. In 1765 Captain Cook made an observation of the sun’s eclipse here.

BURGER, Gottfried August, German poet : b. 1 Jan. 1748, at Wolmerswende, near Halber-stadt : d. Gottingen, 8 June 1794. He showed an early predilection for solitary and gloomy places and the making of verses, for which he had no other model than hymnbooks. He learned Latin with difficulty. In 1764 he studied theol¬ ogy at the University of Halle, and in 1768 he went to Gottingen, in order to exchange theol¬ ogy for law, but soon formed connections here equally disadvantageous to his studies and his morals, so that his grandfather, who had hith¬ erto maintained him, withdrew his support. The friendship of several distinguished young men at the university was now of great service to him. He studied the ancient classics and the best works in French, Italian, Spanish and Eng¬ lish, particularly Shakespeare, and the old English and Scottish ballads. Percy’s (Reliques) was his constant companion. His poems soon attracted attention. In 1772 he obtained the office of baillie in Alten-Gleichen, but throughout his life he was involved in pecu¬ niary difficulties. In 1774 he married the daugh¬ ter of a neighboring baillie, named Leonhart, but his marriage was unfortunate. He con¬ ceived a violent passion for the sister of his wife and married her in 1784, soon after his first wife’s death. She also, his celebrated ˆMolly,® died the first year of their marriage. At the same time he was obliged, by intrigues, to resign his place. He was made professor extraordinary in Gottingen, but received no salary, and this favorite poet of the nation was obliged to gain his living by poorly rewarded translations for booksellers. A third marriage in 1790, with a young lady of Swabia, who had

publicly offered him her hand in a poem, com¬ pleted his misfortunes; he procured a divorce from her two years afterward. The govern¬ ment of Hanover afforded him some assistance shortly before his death. His songs, odes, elegies, ballads, narrative poems and epigrams hold a very high place in German literature, Schlegel especially

commending his work, though Schil¬ ler criticised him very severely. The first col¬ lection of his poems appeared in Gottingen in 1778. His complete works were first published by Reinhard at Gottingen in four volumes in 1796-98, and this edition has been repeatedly published since. Other editions of his works and letters have also been published, and his life has been written by Doring; Prohle, (G. A. Burger: Sein Leben und Seine DichtungeiP (Leipzig 1865), and others.

BURGER, Ludwig, German historical painter and illustrator : b. Cracow, 19 Sept. 1825 ; d. Berlin, 22 Oct. 1884. He studied at the Berlin Art Academy, at the same time working at book-illustrating; he was also a pupil of Couture in Paris. Among his best drawings are the illustrations for the works of La Fon¬ taine and a collection of 20 plates known as (Die KanoneP After 1869 he devoted himself to decorative painting, his most important work in this line being the walls and ceilings in the Berlin City Hall (1870) and the colossal figures symbolizing the warlike virtues at the School of Cadets at Lichterfelde (1878).

BURGERS, Thomas Francis, Transvaal statesman: b. Cape Colony 1834; d. 1881. He was educated for the ministry at Utrecht and was pastor of the Dutch Reformed Church of Hanover, Cape Colony. Some of the rational¬ istic views he expressed led to his trial for heresy, but he was acquitted. He was elected President of the Transvaal republic in 1872 and held the office until 1877, when the republic was annexed by Great Britain.

BURGES, Tristam, American statesman and orator: b. Rochester, Mass., 26 Feb. 1770; d. Providence, R. I., 13 Oct. 1853. When 15 years old he attended a school in the vicinity for six weeks, and again the next year for six weeks more. This was all the instruction he received from others until he reached the age of 21. In September 1793, he entered Rhode Island College, now Brown University, gradu¬ ated three years later with the first honors of his class and was admitted to the bar in 1799. He became a leader of the Federal party, and in 1811 was elected to a seat in the State legisla¬ ture. In 1815 he was made chief justice of Rhode Island, and afterward became professor of oratory and belles-lettres in Brown Univer¬ sity. In 1825 he was elected to Congress, and almost immediately achieved a national reputa¬ tion by his speech on the judiciary. He con¬ tinued in Congress until 1835. Many of his most brilliant efforts were in defense of the American tariff system, and his logic and sar¬ casm won for him an unrivaled reputation as a debater. Consult Bowen, (Memoirs of Tristam Burges. y

BURGESS, Alexander, American Prot¬ estant Episcopal bishop: b. Providence, R. I., 31 Oct. 1819; d. Saint Albans, Vt., 8 Oct. 1901. He was a younger brother of George Burgess, first bishop of Maine. He was graduated from

Brown University in 1838, and from the Gen¬ eral Theological Seminary in 1841. He was successively rector at East Haddam, Conn., 1842-43; Saint Mark's, Augusta, Me., 1843-54; Saint Luke's, Portland, Me., 1854-67 ; Saint John's, Brooklyn, N. Y., 1867-69; and Christ Church, Springfield, Mass., 1869-78. In 1878 he was consecrated first bishop of the diocese of Quincy, Ill. He wrote a popular religious textbook, (Questions for Bible-Classes and Sunday-school (1855), and a (Memoir of the Life of George Burgess, First Bishop of Maine*

(1869).

BURGESS, Charles Frederick, American electrochemical engineer : b. Oshkosh, Wis., 5 June 1873; d. 31 Dec. 1919. Graduated at the University of Wisconsin, became instructor and assistant professor of electrical engineering there 1895 to 1900, and organized the depart¬ ment of applied electrochemistry and chemical engineering. He developed several electrolytic processes and was appointed, in 1904, investi¬ gator of electrolytic iron alloys for the Carne¬ gie Institute and president of the Northern Chemical Engineering Laboratories. He was au¬ thor of the Strength of the Alloys of Nickel and Copper with Electrolytic Iron) (1910).

BURGESS, Daniel, English ecclesiastical writer : b. Staines, England, 1645 ; d. London, 26 Jan. 1713. He studied at Oxford but was not graduated because he would not conform to the established church. In 1667 he went to Ireland with Roger Boyle, Earl of Orrery, where he became head of a school established by the latter at Charleville. In 1685 he went to Lon¬ don where he soon attracted attention on ac¬ count of his humor, vivacity and oratorical power. His publications

include directions for Daily Holy Living) (London 1690) ; the Golden Snuffers) (1697); (Proof of God's Be¬ ing and of the Scriptures' Divine Origin*

(1697).

BURGESS, Edward, American naval architect: lx West Sandwich, Mass., 30 June 1848; d. Boston, 12 July 1891. He was educated at Harvard, whence he was graduated in 1871, and became secretary of the Boston Society of Natural History, being editor of the publica¬ tions of that society. He was instructor of entomology at Harvard from 1879 to 1883. He then became a designer of sailing-yachts. In 1884 he designed the Puritan, the winner of the America's cup in 1885 ; and a year later the Mayflower, the winner in 1886. He was also the designer of the Volunteer, which won the cup in 1887.

BURGESS, [Frank] Gelett, American humorist and satirical writer, novelist and illustrator: b. Boston, 30 Jan. 1866. He was graduated from the Massachusetts Institute of Technology in 1887; was a draughtsman with the Southern Pacific Railroad 1887-90, and in¬ structor in topographical drawing in the Uni¬ versity of California. He was a designer 1893-94, and in 1895-97 he came prominently before the reading public as a publisher and writer of eccentric and humorous literature, such as his journal called The Lark, and poem, (The Pur¬ ple Cow) (1897). In 1898 he removed to Lon¬ don, but returned to America in 1900; in 1914-lb he was in Paris as correspondent of Collier's Weekly, He edited (Petit Journal des Refu¬

sees* (1897), and has written the Lark Almanac) (1898); (Vivette) (1898); (The Non¬ sense Almanac *(1898); the Lively City o' Ligg* (1898) ; (Goops and How to be Them> (1900) ; (A Joyous Journey Round the Year) (1901) ; (Romance of the Commonplace)

(1902); (A Gage of Youth> (1901); <Burgess Nonsense Book) (1901) ; (More Goops) (1903) ; (The Reign of Queen Isyl* (with Will Irwin,

1903) ; the Picaroons* (with Will Irwin,

1904) ; (A Little Sister of Destiny* (1905) ; (Are You a Bromide?* (1906) ; the White Cat* (1907) ; the Heart Line) (1907) ; the Maxims of Methuselah) (1907) ; (Blue Goops and Red) (1909); (Lady Mechante* (1909); (Find the Woman* (1911); the Master of

Mysteries* (1912) ; the Goop Directory* (1912) ; (Love in a Hurry* (1912) ; the Mas¬ ter of Mysteries* (1912); (Burgess Un¬ abridged* (1914) ; the Romance of the Com¬ monplace* (new version, 1915).

BURGESS, George, American Protestant Episcopal bishop : b. Providence, R. I., 31 Oct. 1809; d. Haiti, 23 April 1866. After graduating at Brown University, and holding a tutorship in that college, he traveled in Europe, and studied for two years in the universities of Gottingen, Bonn and Berlin. He was rector of Christ Church in Hartford from 1834 to 1847, when he was consecrated first bishop of the diocese of Maine and became, at the same time, rector of Christ Church in Gardiner. Both offices he filled with great ability. He published two academic poems, a metrical ver¬ sion of a portion of the Psalms, (Pages from the Ecclesiastical History of New England* (1847); (The Last Enemy Conquering and Conquered* (1850), and various sermons.

BURGESS, George Kimball, American physicist and author: b. Newton, Mass., 4 June 1874. He studied at the Massachusetts Institute of Technology and at the University of Paris, later, in the former institution, and at the uni¬ versities of Michigan and California, becoming instructor in physics. He was appointed asso¬ ciate physicist in the National Bureau of Stand¬ ards in 1903, and editor of the Journal of the W ashing ton Academy of Sciences in 1911. He translated Le Chatelier's (High Temperature Measurements* (1901), and Duhem's ther¬ modynamics and Chemistry* (1901). His orig¬ inal work includes (Recherches sur la constante de gravitation* (1901) , Experimental Physics, Freshman Course* (1902) ; the Measurement of High Temperatures,* collaboration with H. Le Chatelier (1911; 3d ed. rev., 1912); <A Micropyrometer* (1913).

BURGESS, James, Scottish archaeologist: b. Kirkmahoe, Dumfriesshire, 14 Aug. 1832. He went to India in 1855, and there entered upon educational work in Calcutta and Bombay. From 1886-89 he was director-general of the archaeological surveys of India. From 1872 to 1884 he. published the (Indian Antiquary.* His works include the Temples of Shatrunjaya* (1869) ; the Rock Temples of Elephanta* (1871);. (Scenery and Architecture in Gujarat and Rajputana*. (1873); and other books; also many writings in the (Epigraphia Indica,* and *Archaeological Reports* (1874-87).

BURGESS, John William, American edu¬ cator: b. Cornersville, Tenn., 26 Aug. 1844. He

Avas educated at Cumberland University, Leb¬ anon, Tenn., and at Amherst College, Mass., Avhere he was graduated in 1867 ; studied law, and began to practise in 1869. During this year he was appointed professor of English lit¬ erature and political economy at Knox College, Galesburg, Ill. Two years later he studied in Gottingen, Leipzig and Berlin. On his return in 1874, he became professor of history and political science at Amherst, in 1876 professor of history, political science and international law in Columbia College, and in 1880 professor of constitutional and international history and law. In 1890 he became dean of the faculty of political science; also dean of the faculties of philosophy, pure science and fine arts, holding all of these offices until 1912, when he retired from the active service of the university. In 1906 he became Roosevelt professor of Ameri¬ can history and institutions at Berlin University. He received the degrees of A.B., M.A. and LL.D. from Amherst College, the degree of LL.D. from Columbia, that of Ph.D. from Princeton, and from the University of Leipzig, Germany, and the degree of Ju.D. from the Uni¬ versity of Berlin. In 1907 he received the order of the Prussian Crown from the Emperor of Germany, and the Albrecht's Order from the King of Saxony. He has published (Political Science and Comparative Constitutional Law) (1890); (The Middle Period of United States History' (1897) ; (The Civil War and the Con¬ stitution J (1901); Reconstruction and the Con¬ stitution (1902) ; (The European War of 1914) (1915) ; (The Reconciliation of Government and Liberty' (1915); (The Administration of Rutherford B. Hayes) (1915) ; (America's Re¬ lations to the Great War' (1917), and contri¬ butions to reviews on historical, political and legal topics.

BURGESS, Neil, American comedian : b. Boston 1846; d. 19 Feb. 1910. Not long after entering the theatrical profession, he undertook in a stage emergency to fill the place of an actress, and his success in the humorous female role assumed led to his entering that line per¬ manently. He acted in (Josiah Allen's Wife) and in (Widow Bedott.' The latter was very popular, as was also <Vim,) produced in 1883. <The Country Fair,' a play which he brought out in 1889, ran for more than two years. Mr. Burgess finally undertook vaudeville acting. Consult Clapp and Edgett, (Players of the Present ' (Dunlap Society

Publications, New York 1899).

BURGESS, a Avord used in somewhat vary¬ ing senses, but generally meaning a freeholder, or a person invested with all the privileges of a citizen in a borough or corporate town. Those entered on the burgess roll of English bor¬ oughs are householders who have resided and paid rates for 12 months prior to July in any year. In the United States the uses of the word have undergone some specific changes, and in States having boroughs as political di- \isions, as Connecticut, New Jersey and Penn¬ sylvania, it carries an implication of magisterial authority. See Borough ; Burgh.

BURGH, berg, a corporate town or bor¬ ough, more especially the Scottish term corre¬ sponding to the English borough, applied to several different kinds of corporations and to

towns and cities in Scotland. There are three classes of burghs: (1) A burgh of barony is a certain tract of land created in a barony by the feudal superior and placed under the au¬ thority of magistrates. The right of electing these magistrates is vested by the charter of erection sometimes in the baron or superior of the barony and sometimes in the inhabitants themselves. (2) A royal burgh is a corporate body created by a charter from the Crown, the corporation consisting of the magistrates and burgesses of the territory erected into the burgh. The magistrates are generally a provost and baillies, dean of the guild, treasurer and common council. (3) A burgh of regality is a kind of burgh of barony which had legal jurisdiction (i.e., exclusive) over its own terri¬ tory. The right of free trade in return for bearing certain public burdens was sometimes given to a burgh of barony, in which case it was known as a free burgh. In the United States, the termination ((borough" was for gen¬ erations added to the names of places, as in England. But under a decision of the United States Board on Geographic Names, the form (<boro)) was adopted, as in "Brattleboro.®

BURGHER, the name applied to a former subdivision of the Scottish Secession Church. The Secession, which originated through the withdrawal of Ebenezer Erskine and some other ministers from the Scottish establishment in 1732, split in two in 1747, part having felt free to take, while others refused, what they deemed an ensnaring burgess oath. They re¬ united in 1820 under the name of the Asso¬ ciate Synod, and, joining with the ˆRelief" in 1847, formed the United Presbyterian Church. The name <(burgher" is also applied to any

citizen of a borough or town.

BURGIN, George B., English novelist and journalist: b. Croydon, Surrey, 15 Jan. 1856. He became private secretary to Baker Pasha and accompanied him to Asia Minor as secre¬ tary of the Reform Commission in Armenia. In 1885 he returned to England and was for a time sub-editor of The Idler. Among his works are (The Dance at the Four Corners' ; (Tuxter's Little Maid' ; (The Judge of the Four Corners' ; (Tomalyn's Quest' ; fortune's Footballs' ; (The Cattle Man' ; (The Hermits of Gray's Inn' ; (The Bread of Tears' ; (The Tiger's Claw' ; (A Son of Mammon' ; (A Wil¬ ful Woman' ; (The Shutters of Silence' ; (The Belles of Vaudroy' ; (Galahad's Garden' ; (This Son of Adam' ; (A Lady of Spain' ; (The Duke's Twins' ; (The Game of Hearts.'

BURGKMAIR, boork'mar, Hans, German painter and engraver: b. Augsburg 1473; d. about 1531. He is supposed to have been a pupil of Albert Differ, but studied principally under Schongauer in Colmar, Alsace. Several of his frescoes and paintings in oil upon wood are still preserved in his native town ; but though possessed of considerable merit, they have contributed far less to his fame than his woodcuts, in which he at least equaled Differ, and has scarcely been surpassed by Holbein. In 1501 he executed three pictures of Roman basilicas, with scenes from the lives of patron saints, *etc.* He was one of the first exponents of the Renaissance in Germany. _ Among his most famous works are the (Triumph of the

Emperor Maximilian I,) embracing 135 cuts, with a text written by that Emperor; and a series, (The Wise King,) including 237 cuts, in which the deeds of the same ruler are repre¬ sented. Consult Woltmann in Dohme's (Kunst und Kunstler) (Vol. I) ; Dornhofer, (fiber Burgkmair und Differ } (1903).

BURGLARY, at common law, the break¬ ing and entering the house of another in the nighttime, with intent to commit a felony therein, whether the felony be actually commit¬ ted or not. Burglary at common law, and in its first degree in the statutes of the various

States, must, in general, be committed in a mansion-house actually occupied as a dwelling, but if it be left by the owner animo revertendi, though no person resides in it in his absence, it is still his mansion. But at common law burglary may be committed in a church. In New York (Penal Code § 496), and in some other States in which the New York statute has been adopted, burglary at common law, or in the first degree, must be committed in the night, but in New York and in some other States burglary in the second and third degrees may he committed in the daytime, and it is burglary in the third degree in New York feloniously to enter a building, whether inhab¬ ited or not, either in the daytime or night. Be¬ fore the offense is complete there must be both a breaking and an entry or an exit. An actual breaking takes place when the burglar breaks or removes any part of the house, or the fasten¬ ings provided for it, with violence. Construct¬ ive breakings occur when the burglar gains an entry by fraud, conspiracy or threats. The least entry, with the whole or any part of the body, hand or foot, or with any instrument or weapon, introduced for the purpose of commit¬ ting a felony, will be sufficient to constitute the offense. Burglary is a felony in all of the States, and in North Carolina it may be pun¬ ished with death or imprisonment. In New York it is punishable as follows: Burglary in the first degree, imprisonment for not less than 10 years; second degree, not exceeding 10 years; third degree, not exceeding five years.

BURGLARY INSURANCE. A contract of indemnity, (1) against direct loss by bur¬ glary, or by burglary, theft or larceny of any of the assured's property, occasioned by its felonious abstraction from the interior of the house, building or apartment occupied by the assured as a residence bv any domestic servant or other employee of the assured, or by any other person or persons, excepting a person whose property is insured ; also against direct loss by damage to property insured, and to the premises, caused by burglars or thieves ; known as residence burglary insurance; (2) against direct loss by burglary of merchandise owmed by the assured, or held in trust or on com¬ mission, or sold but not delivered, occasioned by its felonious abstraction from the premises, occupied by the assured for business purposes, by any person or persons, after entry into the premises by the use of force and violence, of which there are visible marks upon the prem¬ ises ; also for direct loss by damage to the merchandise, furniture, fixtures or premises caused thereby ; knowm as mercantile burglary insurance; (3) against direct loss by burglary

of money, post office and revenue stamps, bul¬ lion, negotiable

securities, drafts, promissory notes and merchandise, in consequence of the felonious abstraction of the same from a safe or safes after entry therein by the use of tools or explosives ; also for direct loss by damage to the safe or safes, to the merchandise or to the furniture, fixtures or premises caused there¬ from; known as mercantile safe insurance; (4) against direct loss by robbery of money, bullion, post office and revenue stamps, checks, negotiable securities, coupons, bills of exchange, drafts and notes, express, bank and post office money orders, watches, jewelry and other mer¬ chandise from the care or custody of any employee of the assured, while acting as mes¬ senger or paymaster, and while conveying the same to or from the place or places direct by the assured; also for direct loss by robbery of any of said property, feloniously, violently and forcibly abstracted from within the premises of the assured; also for direct loss by robbery, by force or violence of money intended for payrolls, from the person, care or custody of any employee of the assured, while acting as messenger or paymaster, or while conveying the same to and from the places directed by the assured; also for direct loss by robbery, of any property above described, from the safe or safes located on the premises of the assured, by any person or persons, after entry therein, by the use of tools or explosives ; also for direct loss by damage to said property, or said safe or safes, or the furniture, fixtures or premises caused by such entry ; known as com¬ bination messenger, paymaster, interior holdup and safe burglary insurance.

Burglary insurance was first written in this country in 1892, over 25 years ago, and from a very modest beginning, in which this form of underwriting was confined entirely to bur¬ glarizing private residences, the business has broadened and developed until the assured is protected now, not only in his home, against burglars, as well as theft and larceny by his own servants or employees, but also in his place of business, and even against loss by the robbery or holdup of his messenger or pay¬ master while going to or from the bank, or the store or office, or wrhile en route to some distant place, with payrolls for employees working in a factory, mill or mine. The busi¬ ness grew quite slowly during the first five years, but in the next five years, from 1897 to 1901, premiums written amounted to $1,759,- 540, and losses paid to $622,765. During the next 10 years, the increase wTas much greater, wdth premiums of $20,000,000 and losses of $6,859,000. The figures for the five years end¬ ing 31 Dec. 1916, show premiums written, $21,- 938,671, and losses paid, $8,103,180, while for the year 1916 alone, the results were the most satisfactory in the entire history of the business, with 44 companies transacting some or all of the different forms above mentioned, and

with premiums written of $5,427,977, and losses paid of $1,932,022.

Edwin W. DeLeon.

BURGLEN, Switzerland, village in the canton of Uri, about a mile from Altorf, is the traditional birthplace of William Tell. The supposed site of the patriot's house is now

occupied by a chapel, erected in 1522, upon the walls of which are represented certain well-known scenes from his history. Pop. 1,852.

BURGOMASTER, the title of the chief magistrate of a city or a large town in Germany and the Netherlands, practically equivalent to mayor. He is elected by the people, but in most German towns he must have the confirma¬ tion of the government.

BURGOMASTER, a sailor's name for cer¬ tain large domineering gulls of the genus Lams.

BURGON, John William, English Biblical scholar and critic : b. Smyrna, 21 Aug. 1813 ; d. Chichester, 4 Aug. 1888. He was the son of a Turkish merchant, was sent to study at London University, and later was graduated at Oxford in arts and finally in theology (1848). He became vicar of Saint Mary's, Oxford (1863), Gresham professor of divinity (1867) and dean of Chichester (1876). He was the bitterest and at the same time ablest and most learned of the critics and opponents of the revised New Testament including the revised Greek text. His publications, which are very numerous, include, in addition to controversial tracts and periodical literature, (The Life and Times of Sir Thomas GreshanV (2 vols., Lon¬ don 1839) ; (A Plain Commentary on the Four Holy Gospels } (8 vols., 1855) ; (Ninety Short Sermons for Family Reading) (2 series, 2 vols. each, 1855—67) ; (Portrait of a Christian Gentleman) (1859); (The Revision Revised) (Lon¬ don 1883) ; (The Lives of Twelve Good Men) (2 vols., 1888) ; (The Traditional Text of the Holy Gospels Vindicated and Established and Causes of the Corruption of the Traditional Text> (1896).

BURGOS, boor'gos, Francisco Javier de,

Spanish statesman and poet : b. Motril, Gra¬ nada, 1778; d. 1845. In his dramatic composi¬ tions he sought to restore the classical Spanish comedy. Among them are (The Three Equals) ; (The Masked BalP ; and (The Optimist and the Pessimist. } Pie wrote a celebrated (Ode to Reason. >

BURGOS, Spain, city, the capital of the province of Burgos, and formerly of Old Cas¬ tile, and once the residence of its kings. It stands on the declivity of a hill, on the right bank of the Arlanzon. The streets are narrow and dark, the finest in every respect being that called the Huerto del Rey. Places of promenade are numerous; the one most frequented, and justly forming the boast of the town, being the Espolon. The most remarkable structure is the cathedral, one of the finest buildings of the kind in Europe. It was begun in 1221, but was not finished for several centuries. It is built of white marble in the form of a Latin cross, and is about 300 feet long by 200 broad, and its size is such that service can be performed in eight chapels at once without confusion. Its interior, as well as its exterior, is of great magnificence, is adorned with fine carvings and paintings, and contains numerous monuments, in particular the tombs of Don Fernando and the Cid, both natives of Burgos, and celebrated throughout Spain for their heroic achievements in the wars with the Moors. There are several other fine churches, but the rest of the public buildings are not deserving of notice. The wool of Old Castile passes principally through Burgos, and

it has some woolen manufactures and hat mak¬ ing. Burgos is the see of an archbishop, and at one time contained a university. It was founded, about the close of the 9th century as theˆ capital city of the courts of Castile and Leon and soon became a flourishing city, reach¬ ing the height of its prosperity in the 15th cen¬ tury, when it shared with Toledo the prestige of being occupied as a royal residence. It declined rapidly after the removal of the court to Madrid in 1560. To-day, despite its decay, the city is dominated by the grand old cathedral and the personality of the national hero, the Cid Campeador. Pop. about 31,400. The province of Burgos is bounded on the north by Santan¬ der, east by Alava, Logrono and Soria, south by Segovia and west by Palencia and Vallado¬ lid. The area is 5,650 square miles. Pop. about

340,000.

BURGOYNE, ber-goin', John, English general and dramatist: b. 24 Feb. 1723; d. Lon¬ don, 4 Aug.1 1792. He was the son of Capt. John Burgoyne, and grandson of Sir John Burgoyne of Bedfordshire, although reputed to be a natural son of Lord Bingley. Educated at Westminster, he entered the army at an early age, and while a subaltern eloped with Lady Charlotte Stanley, daughter of the Earl of Derby. Soon after his marriage he sold his commission to pay his debts. He then lived abroad for seven years, but entered the army again in 1758 as captain of the Foot Guards. In 1759, as lieutenant-colonel of the Coldstream Guards, he served at Belle Isle. After an elec¬ tion to Parliament in 1761, he served with dis¬ tinction in Portugal, and was sent to America in 1775. He joined General Gage at Boston, with large reinforcements, and witnessed the battle of Bunker Hill, of which he has left an animated description. After proceeding to Can¬ ada as governor, he returned to England, but in 1777 was despatched to take command of that expedition from Canada against the United States, the failure of which so largely con¬ tributed to the establishment of American free¬ dom. Indeed, few battles have led in their ulti¬ mate influence to results so great as did the surrender of Burgoyne with 5,791 fighting men, well provided with artillery, at Saratoga, to the army of General Gates. On his return home, he was received by the King with marked dis¬ favor. His wife died in 1776. He had several natural children by Susan Caulfield, an opera singer, one of whom was Field Marshal Sir J. F. Burgoyne. Burgoyne did not possess the genius of a great general, and was in many respects utterly inadequate to the tasks imposed upon him, yet no one can read his work written in his own defense, (State of the Expedition from Canada > (London 1780), without ac¬ knowledging his courage, and detecting quali¬ ties which in a less exalted station might have been of much service to his country. Disgusted with his treatment by the government, he re¬ tired to private life, and devoted his leisure to the production of dramas, some of which, as (The Maid of the Oaks,* cThe Lord of the Manor, *etc., were highly popular in their day. His best play, (The Heiress,* has been success¬ ful not only in its original tongue, but also in several foreign versions. He was made com¬ mander-in-chief in Ireland in 1782, and in 1787 was one of the managers of the impeachment of

Warren Hastings, whose trial lasted through several years after Burgoyne's death. He was buried at Westminster Abbey. (See Saratoga, Battles of). Consult De Fonblanque, (Episodes from the Life and Correspondence of Burgoyne) (London 1876) ; O'Callaghan (editor), (Orderly Book of Lieutenant General John Burgoyne) (Albany 1860) ; and Stone, (Campaign of Lieutenant General Burgoyne> (Al¬ bany 1877).

BURGOYNE, Sir John Fox, English offi¬ cer of engineers: b. 24 July 1782; d. 7 Oct. 1871. He was the son of Gen. John Burgoyne; was educated at Eton and at the Royal Military Academy at Woolwich ; entered the Royal En¬ gineers in 1798; served at Malta in 1800, in Sicily with General Stewart in 1806, in Egypt in 1807 and in the Peninsula with Sir John Moore and Wellington from 1809 to 1814. He shared in the celebrated retreat on Corunna and was present at all the sieges, generally as first or second in command of the engineers, and at most of the battles of the Peninsular War, in which he was twice wounded. During the War of 1812 he assisted as lieutenant-colonel and chief engineer in the attack on New Or¬ leans. In 1826 he accompanied the army of General Clinton to Portugal in the same capac¬ ity. He was appointed chairman of the board of public works in Ireland in 1830 and in 1845 became inspector-general of fortifications in England. He was made a lieutenant-general in 1851, and on the outbreak of the Crimean War was sent to Turkey to provide for the defense of Constantinople. After returning to England he was again sent out to Sebastopol, where he was chief of the engineering department till recalled in 1855. He received the order of the Medjidie from the Sultan of Turkey, was made a general in 1855, the following year was cre¬ ated a baronet, in 1868 a field-marshal and for some years, up to his death, held the appoint¬ ment of constable of the Tower of London. In 1859 a work was published in London under the title of (Military Opinions of Gen. Sir J. F.

Burgoyne, > in which many of his official writ¬ ings were collected.

BURGRASS. See Sandbur.

BURGRAVE (cf. Ger. Burg, town, + Graf, count, governor), a count who in the Middle Ages had command of a castle or burg. Burgraves were appointed to their office by the Emperor or by the bishops, and belonged to the nobility by virtue of their office, which be¬ came hereditary. Their powers differed in dif¬ ferent places, but as a rule they were entrusted with keeping the public peace, the oversight of trade and the market, and the command of the troops and the police in their districts. As the free cities grew in power they were separated from the jurisdiction of the burgrave. The office lost its significance in the course of the 13th century, but the title was retained by some princely families to modern times, as, for in¬ stance, by the Kings of Prussia, under the title of Burgrave of Nuremberg.

BURGUNDY, Louis (Duke of), Dauphin of France: b. Versailles, 6 Aug. 1682; d. 18 Feb. 1712. He was grandson of Louis XIV and father of Louis XV. A boy of ungovern¬ able passions and temper, great haughtiness of bearing and sensuality of life, he is said to have

been much corrected in character and conduct by the influence of his preceptor, the saintly Fenelon. At the age of about 15 he married Princess Adelaide of Savoy; was made general¬ issimo of the army in 1701, but he failed to show any ability and the result of the unfortu¬ nate campaign of 1708 was laid at his door, after which he returned, discredited, to Paris. On the death of his father he became heir-apparent to the throne. He was called the Grand Dauphin. Throwing himself into the party of St. Simon and his old teacher, Fen¬ elon, he boldly advocated liberal measures that would have removed many of the worst evils of the old regime. But before his party had more than barely outlined their scheme, he was stricken with smallpox. With him perished the hopes of the party. His wife died two days previous to his death. His second son became Louis XV of France. Consult St. Simon, <Memoirs) (Paris 1829-30), and Farmer, Ver¬ sailles and the Court under Louis XV } (New York 1896).

BURGUNDY, a region of western Europe, so called from the Burgundians, a Teutonic people originally from the country between the Oder and the Vistula. In consequence of the wars against the Alamanni, in which they were defeated, they migrated to the region of the upper Rhine and in the beginning of the 5th century they passed

over into Gaul, and, as allies of the Romans, after a long struggle obtained possession of the southeastern part of this country. Here they founded a kingdom, which had as its seat of government sometimes Lyons and sometimes Geneva ; but having be¬ come engaged in a war with the Franks, they were at last wholly subdued in 534. More than one kingdom of Burgundy, so called, sub¬ sequently arose, as well as the important county of Burgundy (Upper Burgundy, Franche-Comte) ; but the most important state of this name was the duchy of Burgundy (Lower Bur¬ gundy), consisting principally of the French province Bourgogne (Burgundy, properly so called). The long line of ancient dukes of Burgundy became extinct in 1361 with the death of Duke Philip, and Burgundy was immediately united by King John of France with the French crown. The dignity of Duke of Burgundy was restored in 1363 by his grant of the dukedom to his youngest and favorite son, Philip the Bold (q.v.). In 1368 he married Margaret, the widow of the last Duke Philip of the old line, only daughter and heiress of Louis III, Count of Flanders, and thereby greatly augmented his possessions, which now included Flanders, Mechlin, Antwerp and Franche-Comte. In 1402 he was made regent of France, an appointment which gained him the hatred of the King's brother Louis, Duke of Orleans, and led to the struggle between the Orleanist and the Bur¬ gundian factions. In 1404 Philip died and was succeeded by his son, John the Fearless, who was stabbed by the companions of the Dauphin in 1419. His son and successor, Philip the Good (q.v.), gained great accessions of territory, in¬ cluding Hainault, Holland, Zealand, Namur and, in 1431, Brabant and Limburg, which reverted to him from a younger branch of his family. In 1441 he also obtained the duchy of Luxem¬ burg. On his marriage with his third wife, Isabella, daughter of King John of Portugal,

he founded the order of the Golden Fleece (1429). His son, Charles the Bold (q.v.), who succeeded him in 1467, became the inveterate enemy of Louis XI of France, and one of the most powerful princes in Europe. He acquired Guelders in 1475, but perished in the fatal bat¬ tle of Nancy in 1477, leaving behind him a daughter, Maria, the sole heiress

of his states. She married Maximilian of Austria, who thus obtained the Netherlands and Upper Burgundy. The King of France received the dukedom of Burgundy, which he assumed as a male fief. Henceforth the territories that had belonged .to Charles shared the fortunes either of France or of the empire. In the empire what was called the circle of Burgundy for a time em¬ braced Franche-Comte and the Netherlands. In the Peace of Madrid, in 1526, Francis I was obliged to agree to the cession of the duchy of Burgundy to Charles V of Germany, but the cession was never carried out, and in the Peace of Cambray, in 1529, Charles renounced his claim to it. Franche-Comte was conquered by Louis XIV and retained by him at the Peace of Nimeguen in 1678. After this time the name Burgundy is best known as designating one of the provinces or governments of France. The name is now applied to one of the four depart¬ ments of Yonne, one of the most productive regions in France. Consult Plancher, U., (Histoire generale et particuliere de Bourgogne > (Dijon 1739-81) ; John, O., (Geschichte der Burgundionen) (Halle 1874) ; Barante, B. de, (Histoire des dues de Bourgogne de la maison de Valois > (Paris 1833-36).

BURGUNDY (called also Burgundy Proper or Lower Burgundy), formerly a prov¬ ince in the east of France, lying on the west of Franche-Comte and on the south of Cham¬ pagne. It now forms the four departments of Yonne, Cote-d'Or, Saone-et-Loire and Ain. It is one of the most productive regions in France. The principal product is wine. See Burgundy Wines.

BURGUNDY PITCH, the resinous exuda¬ tion of the stem of the spruce fir (Abies excelsa or Finns abies), melted and strained. It is ob¬ tained from Switzerland, but is seldom genuine. It is hard and brittle, opaque, of a dull reddish-brown color, empyreumatic odor and aromatic taste. It gives off no water when heated, is not bitter and is free from vesicles. It consists chiefly of resin and a little volatile oil, whence its odor. The resin resembles that of turpen¬ tine. The resin is melted in hot water to re¬ move some of the oil and is then strained through a coarse material. Pitch plaster acts externally as a slight stimulant to the skin. Burgundy pitch enters also into the composi¬ tion of the iron plaster. It takes its name from Burgundy in France, where it was first pre¬ pared. A pitch resembling it can be prepared from common resin and palm oil, which, un¬ like Burgundy, is non-soluble in glacial acetic acid.

BURGUNDY WINES, famous French wines, deriving their name from the ancient province of Burgundy. They have a reputa¬ tion superior to their present popularity. They are nevertheless wines of delicious flavor and bouquet. It has been supposed that they would not well

hear a sea-voyage, but it is now set¬

tled that when transported to America and back, their quality is greatly improved. Burgundy has a medium content of alcohol, acids and solids, is very low in tannin and rather lacking in color. The vineyards, consisting of Pinots, Gamai Noir and Meunier grapes, are located halfway up the hillsides (800-1,000 feet high) in the Cote d'Or, between Dijon and Chalons. Three classes of red Burgundy and two of white are recognized. The most renowned red wines of Burgundy are Romane-Conti, Clos-Vougeot, Chambertin and Richebourg. Chambertin was the favorite wine of Louis XVI and Napoleon. Chablis, a white wine, has many admirers but is inferior to the best growths of the Garontie and the Rhone.

BURHANPUR, boor-han-poor', a town of the Nimar district, Central Provinces, British India, formerly the capital of Khandesh, is sit¬ uated on the Tapti River about 300 miles north¬ east of Bombay, 210 miles east of Surat. It is situated on high ground and is well planned and built, with a rampart of brick and a pal¬ ace of brick, known as the Red Fort, built by Akbar, who adorned the town with marble halls. It has a mosque and other buildings worthy of note, and was once famous for its manufac¬ tures of gold and silver brocade, muslin and silks, which still exist to some extent, though the town has long been declining. Pop. 22,777.

BURHEL. See Bahral.

BURI, the grandfather of Odin, in Nor¬ wegian mythology. According to the legends, 12 streams flowed from the spring Hvergelmir (the roaring cauldron) in Niflheim (the region of shadows), and later in their course were frozen, thus surrounding the region of elemen¬ tal fire (Muspelheim) with blocks of ice. In the conflict of the ice with the fire, the rime, or frosty snow, was melted and the drops formed the giant Ymir and the cow Audhumla (darkness) ; from the cow's udder came four streams of milk with which the giant was fed. Audhumla was nourished by licking the salt ice-blocks, and as she licked them a man's hair appeared on the first day, a man's head on the second day and the whole man on the third day; this was Buri. He was of giant size and strength ; he had a son Bor through whom he was the grandfather of Odin, Vili and Ve. Consult Anderson, (Norse Mythology) (Chi¬ cago 1901).

BURIAL, the ordinary method of disposing of the dead, a practice

which varies among different people. Among savage races, and even among some civilized peoples of the East, exposure to wild animals or birds of prey is not uncommon. The careful embalming of the dead by the ancient Egyptians may be regarded as a special form of burial. But by far the most common forms of disposing of the dead have been burning and interring. Among the Greeks and Romans both forms were practised, though among the latter burning became com¬ mon only in the later times of the republic. In this form of burial the corpse, after being borne in procession through the streets, was placed upon a pyre built of wood, and profusely sprinkled with oils and perfumes. Fire was set to the wood, and after the process of cre¬ mation was complete, the bones and ashes were carefully gathered together by the relatives and

placed in an urn. With the introduction of the Christian religion, consecrated places were appropriated for the purpose of general burial, and the Roman custom of providing the sepul¬ chre with a stone and inscription was continued by the Christians. The practice of cremation now declined and finally disappeared, but has recently to some extent been revived. See Burying-Places ; Cremation; Funeral Rites; Mound Builders; Mummy.

BURIAN VON RAJECZ, Baron Stefan,

Austro-Hungarian diplomat and statesman : b. near Pressburg, Hungary, 15 Jan. 1851, a Hun¬ garian of Slovak extraction. Educated in his native town and Vienna, he served in various consular capacities at Alexandria, Bucharest, Belgrade, Sofia and Stuttgart. As Austro-Hun¬ garian Consul-General at Moscow, he acquired a thorough knowledge of the Russian language and country; later, as Ambassador to Greece, he became intimately acquainted with the com¬ plexities of Balkan politics. He was also for a time Finance Minister of the Dual Monarchy, and in 1903 succeeded von Kallay as chief ad¬ ministrator of Bosnia-Herzegovina, in which office he came into close touch with the vexed southern Slav question. On the resignation of Count Berchtold, the Austro-Hungarian Foreign

Minister, in January 1915, Baron von Burian, known as a man of conciliatory tem¬ perament and firm character, in addition to his wide experience, was called to succeed him. His appointment at that juncture was regarded as evidence of a desire to make some political changes at a moment when affairs had become extremely critical. The policy of Count Berch¬ told (q.v.) had precipitated the great war; and Berchtold was now involved in a diplomatic duel with Baron Sonnino (q.v.), the Italian Foreign Minister, over the interpretation of Article VII of the Triple Alliance (q.v.), on the strength of which Italy demanded certain territorial concessions. It was believed that Baron Burian wTould be more disposed than Count Berchtold to make the sacrifices neces¬ sary to assure a continuance of Italian neutral¬ ity. Almost from the beginning, however, he declared the cession of territory to be impos¬ sible, though he afterward agreed, on the ad¬ vice of Germany, to cede almost the whole of the Italian-speaking territory of Austria. The only important Italian demand he rejected was the cession of certain islands along the Dal¬ matian coast. The negotiations, at which Prince Buelow assisted in Rome, broke down owing to the inflexible demand of Baron Sonnino that the transfer be effected immediately and not, as was proposed, after the end of the war. Italy declared war on Austria-Hungary, 23 May 1915. The undiplomatic activity of the Austrian Ambassador to the United States, Dr. Dumba (q.v.), was revealed by the British seizure of a private letter addressed by him to Baron Burian, and resulted in the Ambassa¬ dor's dismissal. In the Ancona and Arabic (q.v.) controversies with the American governmen, Baron Burian experienced further diplo¬ matic reverses. Reports of his resignation were current on several occasions, the first appearing a few days after his acceptance of office.

BURIATS, boo're-ats, a Mongolian people, numbering some 300,000 who were conquered

by the Russians in 1664 and have since de¬ veloped the peaceful arts. They resemble the Chinese in appearance and dress, the men still retaining the queue. They inhabit the southern part of Irkutsk and the trans-Baikal territory. Their principal occupation is the breeding and rearing of cattle and horses, the latter being especially famous for their endurance and for the masters' attachment to them. They are good agriculturists, being adept at manuring and irrigation, and are also clever fishers and trappers. They are active in the mechanical arts. Their religion is partly Buddhistic, with a Khambo Lama at their head who resides at. the Goose Lake ; partly Shamanistic with head-cpiarters at the river Angar ; and some thou¬ sands near Lake Baikal

have been converted to Christianity. They have three dialects of their own, and some literature. Many are educated. Consult Melinkoff, Dr. N., (Internationales

Archiv fur Ethnographie) (1899) ; Gmelin, <Siberia) ; Howorth, Sir H. H., (History of the Mongols) (1876-88).

BURIDAN, bu -re-dan, Jean, French scho¬ lastic philosopher: b. Bethune, Artois, about 1300; d. after 1358. He studied at Paris, where he attached himself as a disciple of Occam to the party of the Nominalists, and at a later time became himself a teacher. In the end he was forced by his opponents to flee from Paris, when he betook himself to Vienna, where he is said to have been influential in bringing about the establishment of the university. Here also he wrote some logical and ethical treatises, in which he appears as a zealous adherent of the Aristotelian philosophy. Buridan was a sup¬ porter of the doctrine of Determinism (q.v.), and he is now chiefly known through having his name attached to an illustration that he is said to have used in support of his views, and known as <(Buridan's AssA He is said to have supposed the case of a hungry ass placed at an equal distance from two equally attractive bundles of hay, and to have asserted that in the supposed case the ass must inevitably perish from hunger, there being nothing to determine him to prefer the one bundle to the other. This illustration, however, is not found in any of his works, and from its nature it would appear more likely to have been used by the assailants of the doctrine of Determinism. He wrote Compendium Logicae) (1489); (In Aristotelis Metaphysica) (1518); (Quaestiones in Decern Libros Ethicorum Aristotelis) (1489). Consult Prantl, (Geschichte der LogflC (Vol. IV, Leip¬ zig 1855—70) ; Townsend, (Great Schoolmen of the Middle Ages) (New York 1905), and Rickaby, (Scholasticism > (London 1908).

BURIN, or BRAVER, the principal in¬ strument used in copper engraving, is made of tempered steel, and is of prismatic foim, the graving end being ground off obliquely to a sharp point. The distinctive style of a master is frequently described by such expressions as a soft burin, a graphic burin, a brilliant burin, *etc.* It is fixed in a handle, the end of which is rounded to fit the hand. Pushed forward by the hand it cuts a shallow or deep furrow, according to the pressure exerted. When in etching, bitten lines or lines with the dry point are imperfect or weak, the burin is used to repair or strengthen them.

BURITI, bu-ri-te', PALM, a lofty, fan-leaved palm (Mauritia vinifera), common in swamps in northern Brazil. It bears abundant crops of scaly nuts about two inches long, from the reddish oily pulp of which a confec¬ tion is made by boiling with sugar. The nuts also yield an oil which is emulsified to make a popular drink. After the tree is felled nu¬ merous cuplike holes are made in the prostrate trunk. These become filled with a reddish fluid, which is used as a beverage. Its taste resembles some sweet wines.

BURKE, Edmund, political philosopher and orator: b. Dublin, 12 Jan. (probably) 1729; d. Beaconsfield, England, 9 July 1797. He was the son of a solicitor in good practice. His mother was a Roman Catholic, but he and his two brothers adopted the religion of their Protestant father. Always, however, he was tolerant of Catholicism. At the age of 14 he entered Trinity College, Dublin, where he took his bachelor's degree in 1748. In this period, as his letters show, he had fits of enthu¬ siasm over various studies — a furor mathe-maticus, succeeded by a furor logicus, a furor historicus and a furor poeticus. The 17 years between 1748 and 1765, when his career was finally determined by his election to Parlia¬ ment, he spent in different employments. Going to London with the intention of taking up law, he succumbed to the attractions of literature and philosophy. He traveled in England and on the Continent, frequented debating clubs and theatres and did more or less hack work for publishers. He printed nothing, however, with which his name is connected till the two books of 1756: (A Vindication of Natural Society* and (A Philosophical Inquire into the Origin of Our Ideas on the Sublime and Beautiful.* In the first he attempted to refute Bolingbroke's arguments against revealed religion by showing that they might be urged with equal force against the organization of society. In the second he took up a subject much discussed at the time ; and though his speculations have been superseded, he has the credit of stimulat¬ ing Lessing to the production of (Laokoon.* Burke also wrote or helped to write an Ac¬ count of the European Settlements in America* (1757), and an Abridgment of the History of England* (1758). In 1759 he began to edit the Annual Register, with which he was con¬ nected for 30 years. In 1761 he went to Ireland, attached in some indefinite way to

William Gerard Hamilton — ((Single-speech** Hamilton — who was secretary to the lord-lieutenant. After two years in Dublin he returned to Eng¬ land; there he joined the famous Literary Club, with which are associated the names of John¬ son, Goldsmith, Sir Joshua Reynolds and Gar¬ rick.

In recognition of his abilities and of the knowledge of politics which he had shown in the Annual Register, he was offered the post of private secretary to Lord Rockingham when the latter became Prime Minister in 1765. In the same year he was elected member of Parliament from Wendover. Within a week or two he made a strong impression with two speeches for the repeal of the Stamp Act. Upon the fall of the Rockingham ministry, Burke, who might have had a place with the new administration, remained with his friends. Turning to their

account his literary powers, he began his series of great political tracts. In 1769 he put forth Observations on the Present State of the Nation,* a replv to a pamphlet by George Grenville. In this controversy Burke showed himself a master of the details of revenue and finance. At this time he took part in some transactions which afforded his enemies a handle against him. Though he had been living almost from hand to mouth till he entered Parliament, he bought in 1768 an estate worth upwards of $100,000. The underlying facts have never been determined with complete satisfac¬ tion. This much, however, is clear: Burke lived on terms of intimacy with his brother Richard and a distant kinsman, William Burke. Richard and William, together with Lord Verney, a political patron of Edmund, speculated in stock of the East India Company, and later Richard was engaged in questionable dealings in West Indian lands. That these ventures were shared by Burke has been charged but never proved. On the other hand it can be shown that most of the money for the purchase of his estate he borrowed from Lord Rockingham. After get¬ ting the place, he had to borrow right and left to maintain it. Probably his faults were neither dishonesty in speculation nor venality in Parlia¬ ment, but undue ambition to live as he thought became his position, carelessness and improvi¬ dence, and adherence to 18th century standards of propriety, which in such matters were lower than ours.

Whatever his shortcomings in managing his private affairs, his services to the public were very great. He was on the side of the people in the long contest over John Wilkes. Since his sentiments on this subject were in general those of the (Letters* of Junius, he was

suspected of being Junius. This accusation he denied; and his (Thoughts on the Cause of the Present Dis¬ contents* (1770) showed so many differences on minor points that — were no other evidence available — it must be concluded that Burke was not Junius. In the (Thoughts* Burke argued that the King and a small knot of advisers were building up power for themselves ; that powers of government are held in trust for the people; and that popular impatience must therefore be indulged. But, true to his conservative in¬ stincts, he would not accept the radical reforms commonly proposed — 'Universal suffrage and the disfranchisement of ((rotten boroughs.** He would have changes more gradual. During the years immediately following 1770 Burke devoted his energies to keeping the Rockingham Whigs united against the efforts of the King to win them over. Without Burke, says John Morley, ((the Rockingham connection would undoubtedly have fallen to ruin, and with it the most up¬ right, consistent and disinterested body of men then in public life.**

From his political activity Burke withdrew for a time in 1773 for a trip to France. There he observed two things which he strongly dreaded : atheism and an eager questioning of the ˆallowed opinions which contribute so much to the public tranquillity.** This atheism and speculation, he perceived — and he was one of the few who were so clear-sighted — were working toward revolution. His fear of these tendencies he expressed in Parliament not long after his return.

By this time Burke had won a substantial reputation throughout the United Kingdom. Indeed, as early as 1766 at least one Irish munic¬ ipality had voted him the freedom of the city; and in succeeding years English mercantile organizations passed resolutions commending his labors in behalf of commerce. Finally in 1774, when troubles with America were thicken¬ ing, Bristol, the trading centre of the west of England, a city which had everything to lose and nothing to gain from a war with the colo¬ nies, elected him to Parliament. At the con¬ clusion of the poll his colleagues had promised obedience to the instructions of his constituents. Burke, however, declared his

independence : “Your representative owes you, not his industry only but his judgment; and he betrays you in¬ stead of serving you if he sacrifices it to your opinion.® To this declaration he adhered when in 1778 a bill was proposed relaxing restrictions upon Irish commerce. The English merchants, including those of Bristol, protested; but Burke replied, ((England and Ireland may flourish to¬ gether. The world is large enough for us both. Let it be our care not to make ourselves too little for it.® (Two letters to Gentlemen in BristoP). For this liberality Burke was never forgiven, and in the election of 1780 he was forced to seek a new constituency.

‘It was during his six years as member for Bristol that, in the contest over America, he rose to his full height as a statesman. He was almost alone among the speech-makers of that time in always going below the superficial con¬ siderations of the moment to the fundamental fact that in the long run restraint and violence defeat themselves. In addition to many minor speeches scattered through the Parliamentary Historyˆ he made three great contributions to the subject — (Speech on American Taxation,* 19 April 1774; (Speech on Conciliation,* 22 March 1775, and (Letter to the Sheriffs of Bristol,* 3 April 1777. In the first he argued that the tea duty was of no use to England for revenue ; that it served only to irritate the Americans, and that by winning the loyalty of the colonists England would get more than she could ever take by force. In the second speech Burke maintained that England must conciliate, and that the only way was by yielding. In the <Letter) he reviewed the struggle and in the light of events justified his own position. Of the three pieces that on Conciliation* is the best. Not even when dealing with India does Burke excel in grasp of details, in lucid pres¬ entation of a large mass of facts, and in rip¬ ened political wisdom. Then, too, he saw what so many failed to observe, that the real cause of the contest lay deeper than the casual orders of a governor or the retaliation of a mob, and that America, in resisting the encroachments of royal prerogative, was fighting a battle for the liberties of Englishmen at home.

Though Burke could not win over Parlia¬ ment to his views on America, he had better success with his (Speech on the Plan for Eco¬ nomical Reform* (1780). People were stag¬ gering under the debt from the American war and agitating for a general reform of Parlia¬ ment. Burke opposed such radical changes ; he proposed to abolish some offices, consolidate others and reduce salaries. One of the offices which he reformed, that of paymaster of the forces, he himself occupied in 1782. At that

time the North ministry yielded to the Whigs, who were temporarily united under Lord Rock¬ ingham, Charles James Fox a-nd Lord Shel¬ burne. Burke, owing in part to infirmities of his temper and the suspicions against him, got only this third-rate position, instead of a place in the cabinet. The Whigs were scarcely in their seats when Lord Rockingham died and Lord Shelburne became head of the adminis¬ tration. At once Fox and Burke refused to work with him, and by joining their old enemy, Lord North, in what is known as the Coalition, they broke up the Whig party. Burke is accused of deserting his principles for purely personal motives. His conduct is hard to de¬ fend, for he attacked Shelburne writh asperity, and under the Coalition resumed for a few months the office of paymaster.

Against this dubious course we may set his strenuous advocacy of reform in India. That country was victim of the corrupt and cruel system of the East India Company. Burke was familiar with the subject, for he had been a member of select committees on Indian affairs and had drawn two important reports. He is also supposed to have framed the East India bill commonly known as Fox's. At any rate he defended it, 1 Dec. 1783, in one of his best speeches. The bill, however, was defeated and the Coalition, which supported it, driven from office. Early in 1785 Burke renewed the attack in his (Speech on the Nabob of Arcot's Debts> — a preliminary to the proceedings against Warren Hastings. In 1786 Burke drew the ar¬ ticles against Hastings. The trial dragged on till 1795, and though the verdict at last was for acquitttal, Burke had none the less suc¬ ceeded in reforming the government of India; for he had trumpeted the wrongs of that "emptied and emboweled® land till public sen¬ timent would no longer tolerate them.

Before the trial of Hastings had closed, the French Revolution had broken out. Burke looked upon it, not as the emancipation of op¬ pressed masses, but as an effort of atheists and political theorists to uproot the settled order. Since his views were hostile to those of the more radical Whigs, he began to draw away from the men with whom he had been allied against the encroachments of the Crown in England and America. In 1790 he widened the breach still further by aggressive proclamation of his opinions in Reflections on the Revolu¬ tion in France.* The book had for that day an enormous sale and divided Great Britain into two parties — one composed of Burke and an uncongenial company of Tories; the other of Liberals, many of whom had been Burke's life¬ long associates. Burke himself violently quar¬ reled with his old friend Fox. The seeming contradiction between his early position and his later is accounted for in part by the fact that he grew more conservative with age, in part by his desire to

preserve the balance between monarch and subject. In England the Crown had been the aggressor; in France, he thought, the peo¬ ple. Moreover, he had always insisted that liberty is “inseparable from order® ; and in France he saw nothing but disorder. As the Revolution progressed, Burke became more and more wrought up, so that in each of his suc¬ ceeding . utterances — (Letter to a Member of the National Assembly) (1791), (Appeal from

the New to the Old Whigs *(1791), (Thoughts on French Affairs* (1791), (Remarks on the Policy of the Allies* (1793), Observations on the Conduct of the Minority* (1793) and bet¬ ters on a Regicide Peace* (1796) — the reason¬ ing grew feebler, the scolding shriller.

During the same period, when Burke was dealing with a subject on which he was more thoroughly informed, Ireland, he showed his old qualities of statesmanship. He had always been a champion of his down-trodden native land. When Ireland caught the contagion of the French Revolution, and when the war be¬ tween England and France made Ireland still more restless, Burke urged for Ireland the same policy of conciliation that he had urged for America. In letter and pamphlet he unceas¬ ingly advocated relieving the Catholics of their political disabilities.

In 1794 he retired from Parliament. He was to have received a peerage with the title Lord Beaconsfield ; but since the death of his son left him without direct male heir, he ac¬ cepted instead a pension. This was the occa¬ sion of a fresh attack upon him by his enemies. He replied effectively in the (Letter to a Noble Lord* (1796).

His zeal in behalf of the wretched and the oppressed was not a mere vague sentiment ; it was a motive in his daily conduct. When the poet Crabbe was obscure and penniless, Burke took him into the family, found a printer for his verses and finally obtained for him a living in the Church. At the time of the Revolution, Burke also kept open house for French refu¬ gees and established a school for their chil¬ dren. Burke’s principles of statesmanship, when briefly set down, seem very

bald and simple. The basis of his system is explained in a sen¬ tence from one of his letters: (<The principles of politics are those of morality enlarged.** The first of the moral laws upon which he rested great weight was justice; the second, generosity. Knowing that perfect justice could never be obtained, that human institutions are at best compromises, he was not a theorist; he did not fall into the fallacy that the machinery of government may be constructed as if men were uniform, passive units. These phases of his bent for the practical are in the last analy¬ sis a trust in experience. A man who clings so tenaciously to experience is likely to be an uncompromising conservative ; and Burke was, for his generation and all generations since, the (<great pleader for conservatism.** As an orator he frequently produced no immediate effect. His gestures were clumsy, and when he spoke in public his voice was somewhat harsh, he dropped into a strong Irish brogue and, at times, a hurried articulation. But, above all, he overestimated the capacity of his hearers. Not content with a concise presentation of leading points, he insisted on applying profound philo¬ sophic principles. Yet some of his speeches, notably at the trial of Warren Hastings, pro¬ duced a profound effect. This effect was largely due to the vigor of his style as a writer. He was virile, vivid in description and unsurpassed in lucid and logical arrangement of material.

In the winter of 1756-57 he married Jane Nugent, daughter of a physician. Her capacity for management lifted many burdens from his shoulders. His only child, a son, Richard, died in 1794.

Among his important writings or speeches not already mentioned are (Address to the King* (1777); (Letter to Sir Hercules Lang-rishe* (1792) ; (Thoughts and Details on

Scarcity* (1795). See Reflections on the French Revolution; On Conciliation with the Colonies; On The Sublime and Beauti¬ ful.

Bibliography.— There are in the market three or four editions of Burke's writings and speeches, substantially complete. The best short life is in the dictionary of National Biogra¬ phy.* John Morley's (Life of Burke* (in the (English Men of Letters,* 1879) is excellent; also his (Burke, a Historical Study* (1867). Of the earlier lives, James Prior's (2d ed., 1826) is the best. Of course Burke bulks large in the standard histories and memoirs of Eng¬ land in the 18th century.

Hammond Lamont,

Editor Neiv York Nation; Editor (Burke's Speech on Conciliation with America . *

BURKE, Jane, better known as Calamity Jane, American army scout and mail carrier: b. Princeton, Mo., 1852; d. Deadwood, S. D., 1 Aug. 1903. She was reared on the plains and early became an Indian scout and was an aide to General Custer and General Miles in numer¬ ous campaigns. For-several years she was the government mail carrier between Deadwood, S. D., and Custer, Mont.

BURKE, John, Irish genealogist : b. near Parsonstown, Ireland, 1786; d. Aix-la-Chapelle, 27 March 1848. His life was devoted to gene¬ alogical research. In 1826 he began to publish a (Genealogical and Heraldic Dictionary of the Peerage and Baronetage of the British Empire* and subsequent works by him were (A Gene¬ alogical and Heraldic History of the Com¬ moners of Great Britain and Ireland* (1833— 38), which in subsequent editions appeared as (A Dictionary of the Landed Gentry.*

BURKE, John, State governor and national treasurer : b. Keokuk County, Iowa, 25 Feb. 1859. He studied at the University of Iowa, receiving the LL.B. degree in 1886, when he removed to North Dakota and was county judge during several years of Rolette County. After being elected member of the North Da¬ kota House of Representatives (1891-93) and State Senator (1893-95), in 1906, 1908 and 1910, on three occasions, he was elected Democratic Governor of North Dakota. President Wilson in 1913 appointed him Treasurer of the United States.

BURKE, Sir John Bernard, English herald and genealogist, son of John Burke (q.v.) : b. London 1815; d. Dublin, 13 Dec. 1892. He was educated at Caen in Normandy, was trained as a lawyer and called to the bar in 1839. Be¬ sides editing the successive issues of the Peer¬ age* founded by his father (49th ed., 1887), he published other works on the (Landed Gen¬ try* (1846); (Extinct Peerages* (1846); An¬ ecdotes of the Aristocracy* (1849) ; (Family Romance* (1853); (The Vicissitudes of Great Families* (1859) ; (The Rise of Great Families* (1873); (The Book of Precedence* (1881); and (Reminiscences* (1882).

BURKE, Maurice Francis, American cler¬ gyman : b. Ireland, 5 May 1845. He came to the United States in childhood and was educated in

Chicago and Notre Dame, Ind., and in the American College, Rome, where he was or¬ dained to the Roman Catholic priesthood in 1875. Returning to the United States, he took charge of a parish in Joliet, Ill. (1878-87). In 1887 he was consecrated bishop of Cheyenne, Wyo., and in 1893 was transferred to the see of Saint Joseph, Mo. Bishop Burke is known as a fine linguist.

BURKE, Robert O'Hara, Australian ex¬ plorer: b. County Galway, Ireland, 1820; d. Australia, 28 June 1861. After serving in the Austrian army he went to Australia, and after seven years' service as inspector of police was appointed commander of an expedition to cross the continent of Australia from south to north. He and his associate, Wills, reached the tidal waters of the Flinders River, but both perished of starvation on the return journey. They were among the very first white men to cross the Australian continent from south to north.

BURKE, Thomas, American statesman : b. Ireland, about 1747; d. Hillsborough, N. C., 2 Dec. 1783. He left Ireland about 1764 and lived for some years in Accomac County, Va., en¬ gaged in the study and practice of medicine. He next studied law, began practice in Nor¬ folk and in 1774 removed to Hillsborough, N. C. Of a bold and impetuous temper, a ready writer and speaker, he became one of the leading spirits in the Revolutionary strug¬ gle. While he was in Virginia, his writings in opposition to the Stamp Act had brought him into notice, and he had a large share in the formation of the constitution of North Caro¬ lina. He was a member of the provincial con¬ gress at Halifax in 1776 and a volunteer at the battle of Brandywine. He was a member of Congress from December 1776 to 1781, when he was chosen first governor of North Caro¬ lina under the new constitution. In September of that year he was surprised and seized by the Tories and retained at James Island, S. C., as a prisoner on parole. Obnoxious to the Tories from his previous course, he was in daily apprehension of assassination, to escape which, after endeavoring unsuccessfully to ob¬ tain an exchange or a parole to some other State, he effected his escape in the night of 16 Jan. 1782, after an imprisonment of four months. In a letter to General Leslie, Burke gave his reasons for

withdrawing and said that he still considered himself subject to the dis¬ posal of the British authorities. He was reg¬ ularly exchanged soon afterward and resumed his duties as governor, but was defeated the following year, when a candidate for re-elec¬ tion, it being urged that he had violated his parole.

BURKE, Thomas Martin Aloysius, Amer-can clergyman: b. Ireland, 10 Jan. 1840; d. 20 Jan. 1915. He came in childhood to Utica, N. Y., and was educated at the College of Saint Michael, Toronto, and at Saint Mary's Semi¬ nary, Baltimore, and was ordained to the Ro¬ man Catholic priesthood in 1864. He was ap¬ pointed to labor in Albany and became succes¬ sively vicar-general and administrator. In 1894 he was consecrated bishop of Albany.

BURKE, Thomas Nicholas, Irish clergy¬ man and orator: b. Galway 1830; d. 1883. He was educated in Italy, where he entered the

Order of Saint Dominic. Going to England, he preached in that country and later in Ire¬ land, gaining a high reputation as an orator and becoming familiarly known as ((Father Tom.® In 1872 he made a visit to the United States and lectured in reply to Froude, his addresses appearing in print under the title of (English Misrule in Ireland.)

BURKE AND HARE, two miscreants, of whom William Burke, a native of Ireland, was detected, tried and executed at Edinburgh, in 1829, for the murder of numerous individuals, his accomplice, Hare, escaping the hangman by turning king's evidence. At this time the <(res-urrectionists® were busy at their nefarious trade, but the vigilance with which the burying-grounds throughout the country were watched rendered a supply of subjects for anatomical schools almost impracticable, and the demand for dead bodies consequently became great. This led Burke and Hare to murder, by suffo¬ cation, many poor waifs who were decoyed into Hare's lodging-house, and whose bodies they sold to Dr. Robert Knox, proprietor of an an¬ atomical theatre in Edinburgh. The case of Burke and Hare brought home to the public mind more clearly than ever before how neces¬ sary it is that schools of anatomy should re¬ ceive a regular supply of subjects for dissection, and in 1832 an act was passed for supplying the anatomical schools throughout the kingdom from the unclaimed dead in the hospitals.

BURKEL, biir'kel, Heinrich, German painter: b. Pirmasens, 30 March 1813; d. Mu¬ nich, 10 June 1869. He was educated at Munich and in

Italy; he is chiefly a genre painter; his scenes from the Bavarian and Tyrolean Alps were among the first of their kind, and his village and tavern scenes rank among the best in modern art. Among his paintings are ‘Scenes in an Inn* and (Winter Scenes in the Tyrol.*

BURKITT, Francis Crawford, English Biblical scholar : b. London, 3 Sept. 1864. He was graduated at Trinity College, Cambridge, was lecturer in palaeography at Cambridge Uni¬ versity 1904—05, and since 1905 has been Norrisian professor of divinity at the same insti¬ tution. He has published (Early Christianity Outside the Roman Empire) (1899) ; frag¬ ments of Aquila) (1897); <The Rules of Ty-conius) (1894) ; (Two Lectures on the Gospels) (1900); (Early Eastern Christianity *(1904); ‘The Gospel History and Its Transmission* (1906) ; (Earliest Sources for the Life of Jesus* (1910) ; (The Failure of Liberal Chris¬ tianity } (1910) ; (Jewish and Christian Apocalypses> (1914).

BURLEIGH, ber’la, Bennet, war corre¬ spondent : b. Glasgow, Scotland, 1841 ; d. 17 June 1914. He fought in the American Civil War, during which he was twice condemned to be shot. As war correspondent he served in the Egyptian campaign of 1882, in the Sudan, Madagascar, Ashanti, South Africa, the Russo-Japanese War, Tripolitan War and the Bul¬ garian War of 1912-13. He was the author of (Two Campaigns> and (The Empire of the East> (1905).

BURLEIGH, Edwin Chick, United States Senator: b. Linneus, Me., 27 Nov. 1843; d. 16 June 1916. Educated Houlton Academy; State

land agent and assistant clerk in the Maine House of Representatives 1876-78, clerk in the office of the State treasurer in 1880 and treas¬ urer in 1884. He was elected Governor of Maine 1889-92; member of Congress 1897-1911; and United States senator 1913-16.

BURLEIGH, George Shepard, American writer, brother of William H. Burleigh : b Plainfield, Conn., 25 March 1821 ; d. Provi¬ dence, R. I., 21 July 1903. He has published (The Maniac and Other Poems) ; (Signal Fires on the Trail of the Pathfinder J ; a metrical romance in

six cantos., several dramas and a very considerable volume of fugitive poetry which appeared in newspapers and magazines for half a century. His work is characterized by simplicity, naturalness and forcefulness; but it is very uneven in quality, though generally euphonic. Burleigh early developed a facility in verse which gained for him distinction in his native State where he was known as the farmer poet. He received only such education as the district school afforded in the winter months, and he continued to work on the farm until middle life. All his spare time was given to literary pursuits from his boyhood days.

BURLEIGH, William Cecil (Lord), Eng¬ lish statesman : b. Bourn, Lincolnshire, 13 Sept. 1520; d. London, 4 Aug. 1598. He was Sec¬ tary of State under Edward VI and Elizabeth, and Prime Minister of England for 40 years. In 1588 Parliament was assembled, and, by his advice, a plan of religious reform was laid before it. In this he had a considerable share; and he also took the leading part in the estab¬ lishment of the Thirty-nine Articles of faith which form the basis of the reformed religion of the state. To him is also due the regula¬ tions of the coinage, which had been altered since Henry VIII's time. He was created Baron Burleigh, in 1571, and in 1588 concluded an advantageous treaty with the Netherlands. His policy was both cautious and comprehensive and he was unaffected by personal prejudices in his management of public affairs. Consult Nares, (Memoirs of Lord Burghley) (1 828— 31); Charlton, (Life) (1847) ; Hume, (Great Lord Burleigh y (1898).

BURLESON, Albert Sidney, United States Postmaster-General: b. San Marcos, Tex., 7 June 1863. A graduate in 1884 of the Univer¬ sity of Texas, he became a lawyer, and was assistant city attorney of Austin, and attorney of the 26th judicial district of Texas during several years. From 1899 he was several times elected member of Congress, and in 1913 was appointed Postmaster-General by President Wilson.

BURLESQUE, the comic effect arising from a ludicrous mixture of things high and low. High thoughts, for instance, are clothed in low expressions, or noble subjects described in a familiar manner, or vice-versa.

BURLEY, Bennett G., Confederate* naval officer. On 19 Sept. 1864, assisted by Acting-Master John Y. Beall and others, he captured the steamer Philo Parsons, plying between De¬ troit and Sandusky, when about two miles from Kelly's Island, off the Ohio Coast. Subse¬ quently another American steamer, the Island Queen, was captured by Burley and his party, and after her passengers, including 25 United

States soldiers, had been made prisoners and transferred to the Philo Parsons, the Island Queen was taken out into the lake and sunk. The Philo Parsons was afterward taken to Sandwich, on the Canadian shore, and left there. Burley was arrested, and the evidence produced at the extradition trial at Toronto in his case rendered it manifest that he was acting under the orders of the Southern Confederacy in the capture of the steamers, and that the im¬ mediate object was the capture of the United States war-vessel Michigan, guarding Johnson's Island; and the ultimate object the taking of Johnson's Island and the liberation of the 3,000 Confederate soldiers there imprisoned. That all this was not attempted by Burley and his comrades was probably owing to the fact of his discovery of the hazardous and seemingly im¬ possible character of the undertaking after he had captured the two steamers. After some diplomatic correspondence between the British government and that of the United States, Bur¬ ley was surrendered to the authorities of the latter, under the provisions of the extradition treaty, the plea of <(belligerent rights** in his behalf by Jefferson Davis not being regarded by the court as sufficient to free him from the crime of robbery charged against him in the indictment.

BURLINGAME, Anson, American di¬ plomatist: b. New Berlin, N. Y., 14 Nov. 1822; d. Saint Petersburg, Russia, 23 Feb. 1870. After he was graduated from Harvard Law School in 1847 he practised law in Boston, and enter¬ ing politics was active as a Free Soil advocate in 1848, and in 1854 was sent to Congress as a representative of the American party. His vigorous denunciation of the assault upon Sen¬ ator Sumner by Preston Brooks brought him a challenge from the latter, which was accepted, but Brooks declined to travel to the rendezvous in Canada. In 1861 he was sent as Minister to Austria but was not received by the Austrian government on account of his advocacy of Hun¬ garian independence. He was Minister to China 1861-67, and in the last-named year was ap¬ pointed Ambassador from China to the United States and various European governments. On 4 July 1868 he concluded the noted Burlin¬ game Treaty* which gave reciprocal privileges to China and the United States and was the first acceptance by China of the principles of international law. After concluding treaties be¬ tween China and Denmark, Sweden, Holland and Prussia, he died while arranging a treaty between China and Russia. Consult Williams, (Anson Burlingame, and the First Chinese Mis¬ sion to Foreign Powers) (New York 1912).

BURLINGAME, Edward Livermore, an

American editor, son of Anson Burlingame (q.v.) : b. Boston, 30 May 1848. He studied at Harvard and Heidelberg and later acted as private secretary to his father, who was United States Minister to China. Since 1879 he has been associated with the publishing house of Charles Scribner's Sons, and from 1886 to 1914 was editor of Scribner's Magazine. He has received the degrees Hon. A.M., Harvard, 1901 ; Litt.D., Columbia, 1914.

BURLINGAME, Cal., city in San Matec-County, situated on a peninsula, 20 miles south of San Francisco, on the Southern Pacific and the United of San Francisco railroads. It is

well built, has two grammar schools, a citv hall and a public library, four churches, banks, a weekly newspaper. Its enterprises are of the kind that supply the wants of the immediate territory in which they are situated. The city is a favorite residential suburb of San Fran¬ cisco. It is progressive in the matter of im¬ provements, with miles .of permanently paved streets and walks, well-lighted, and with a mu¬ nicipal water plant. Pop. (1920) 4,107.

BURLINGTON, England. See Bridling¬ ton.

BURLINGTON, Iowa, city and county-seat of Des Moines County, 206 miles west-southwest of Chicago on the west bank of the Mississippi River at the intersection of the Chicago, Burlington and Quincy, the Chicago, Rock Island, and Pacific, the Muscatine North and South and the Toledo, Peoria, and Western railroads. Burlington, sometimes called the (<Orchard City,® occupies a natural amphi¬ theatre, formed by the limestone bluffs that slope back from the river, and on which many of the residences are built. The river here is broad and deep and is spanned by a railroad bridge. The city is connected by steamboat lines with important points on the Mississippi, and its river commerce is of considerable im¬ portance. The industries include the manu¬ facture of agricultural tools, pearl buttons, wheels, desks,

furniture, screens, boilers, mat¬ tresses, soap, flour, candy, burial caskets, Cor¬ liss engines, sleigh bells, novelties and the quarrying of limestone found in the vicinity. The extensive machine and repair shops of the Chicago, Burlington and Quincy Railroad are located here. The city contains among its im¬ portant buildings an opera house, courthouse, public library, hospitals, schools of various kinds and the Burlington College of Commerce. Crapo Park, of 100 acres, is in the southern part of the city and is noted for its beauty. The city is governed by a mayor, elected for two years, and a city council, which has the power of appointment to all city offices (the commission form of government). It was named for Burlington, Vt., by its first settlers. A fur trading post was established there in 1829 ; its earliest buildings were erected in 1833, and it was the State capital, 1837-40. It was incorporated in 1837 and received its city char¬ ter in 1838. Pop. (1920) 24,057.

BURLINGTON, Kan., city and county-seat of Coffey County, 60 miles south of Topeka, on the Atchison, Topeka and Santa Fe, and Missouri, Kansas and Texas railroads, on the Neosho River. It has extensive agricultural and stock-raising interests ; is in a district rich in natural gas, and contains grain elevators, flouring mills, cigar factories and manufactories of electric appliances, tiles and carriages, and a Carnegie library. Pop. (1920) 2,236.

BURLINGTON, N. J., city and port of entry in Burlington County, on the Delaware River and the Pennsylvania Railroad, 18 miles northeast of Philadelphia. It is a manufactur¬ ing trade centre for surrounding towns, and contains Saint Mary's Church, endowed by Queen Anne ; Saint Mary's Hall, the oldest Church school for girls in the country; the State Masonic Home; Burlington Cpllege, and many fine old residences ; and has manufac¬ tories of shoes, stoves, iron pipe, canned goods,

silk, hollowware, braid, typewriter ribbons and carbon paper, carriages and structural iron. There is a national bank and a trust company, with combined resources amounting to $2,356,- 959. The value of taxable property is $3,866,- 201 ; of school property and equipment $137,- 200; and of public buildings and equipment $344,888. Burlington is governed, under a char¬ ter of 1851 (revised in 1868), by a common council of 12 members. In 1915 the government receipts amounted to $116,393, expenditures to $94,559. The city was settled in 1677, by Friends, under the name of New Beverly. The name was subsequently changed to Bridlington, in honor of the Yorkshire town of that name on the North Sea, commonly

called Burlington, and the spelling was presently made to accord with the pronunciation. The city was for many years the seat of government of West Jersey; and was the residence of the last colonial gov¬ ernor, William Franklin. It wras bombarded by the British in 1776 and again in 1778. Pop. 9,049. Consult Stackhouse, A. M., (Retrospect of Colonial Times in Burlington County^ (Moorestown, N. J., 1906) ; Woodward, E. M.,

(History of Burlington and Mercer Counties, N. JP (Philadelphia 1883).

BURLINGTON, N. C., city in Alamance County, 20 miles east of Greensboro, on the Southern Railroad. It contains casket factories, hosiery and overalls establishments, manufac¬ tures steel bridges and has extensive cotton interests. Settled in 1850 Burlington was in¬ corporated in 1866. The government is vested in a mayor and council, the former being chosen for a term of two years. The city owns the waterworks. Pop. (1920) 5,952.

BURLINGTON, Vt., city, port of entry and county-seat of Chittenden County, on Lake Champlain and the Central Vermont and Rut¬ land railroads, 40 miles northwest of Mont¬ pelier. It has a very large lake commerce and manufactories of lumber, cotton and woolen goods, furniture, boxes, refrigerators, brushes, paper, toys, medicines and iron. In the neigh¬ borhood are large quarries of marble and lime¬ stone. The environment is agricultural. The city is the seat of the State University of Ver¬ mont and of the State Agricultural and Medi¬ cal colleges ; Bishop Hopkins Hall ; the Roman Catholic Cathedral ; the Fletcher, Billings and Burlington Law Libraries, a county courthouse, United States government building and a Young Men's Christian Association hall. Burlington is noted for its benevolent and educational in¬ stitutions, which include the Mary Fletcher Hos¬ pital, Home for Aged Women, Home for Friend¬ less Women, Home for Destitute Children, Adams Mission House, Louisa Howard Mis¬ sion, Providence Orphan Asylum, Cancer Relief Association, Lake View Retreat, several sani¬ tariums, the Vermont Episcopal Institute, Saint Joseph's and Saint Mary's academies (Roman Catholic) and high and graded schools. The city was settled in 1763, was a garrisoned post during the War of 1812 and was incorporated in 1865. It is governed by a mayor, elected for two years, a council and a board of aldermen. The waterworks and electric-lighting plants are the property of the city. Its material develop¬ ment has been largely due to its great lumber¬ ing industries. The famous Col. Ethan Allen is buried beneath a handsome monument in

Greenmount Cemetery. Pop. (1920) 22,779. Consult Allen, (About Burlington, Vermont ' (Burlington, V,t., 1905) ; Possons, (Burlington, Vt, as a Manufacturing, Business and Com¬ mercial Centre) (Glens Falls, N. Y., 1890) ; (Vermont Historical Gazetteer) (Vol. 1, 4 vols., Burlington 1867-82), and New England Maga¬ zine (Vol. XI, 2d series).

BURLINGTON, Wis., city in Racine County, 35 miles southwest of Milwaukee, on the Chicago, Milwaukee and Saint Paul and the Minneapolis, Saint Paul and Sault Sainte Marie railroads. It is a prosperous dairying centre and has brickyards, tileyards, brassworks, condensed milk factory and manufactories of baskets, horse blankets and veneer. The water¬ works are the property of the municipality. Consult Wood, (Burlington: Its Early Growth, History and Progress' (Burlington 1908). Pop.

(1920) 3,626.

BURLINGTON LIMESTONE, a lime¬ stone of sub-Carboniferous (Mississippian) Age, named for its occurrence near Burlington, Iowa. It is also found in other parts of the Mississippi Valley. This limestone is of light color and fine-crystalline, resembling litho¬ graphic stone. It has important industrial value.

BURMA, India, the largest province of British India, on the east side of the Bay of Bengal, at one time formed the greater portion of a native kingdom or empire, which is said to have extended from lat. 9° to 26° N., and from long. 92° to 104° E. Its greatest length was about 1,000 miles and its breadth 600, its area being then about 270,000 English square miles. In 1826 the provinces or divisions of Arracan and Tenasserim were occupied by the British, and in 1852 Pegu and the province of Martaban shared the same fate. This portion was then known as British Burma and con¬ tinued to be so till in 1886 the rest of the king¬ dom was annexed by Great Britain, when the two

portions came to be designated Upper and Lower Burma, respectively. They now form together one province under a lieutenant-gov¬ ernor and legislative council. Total area, about 231,000 square miles; population, over 12,000,- 000, mainly Buddhists.

Lower Burma is to a large extent mountain¬ ous in character, the only extensive level being in Pegu, where the valleys of the Irrawadi and Sittaung form an alluvial tract of about 10,000 square miles. The rainfall varies from less than 60 inches in some places to 190 or more in others. About half the soil is believed to be cultivatable, but a comparatively small portion is as yet under cultivation, though agriculture is extending year by year. Since the occupa¬ tion of the country by the British it has rapidly increased in prosperity, and the revenue is generally greater than the expenditure. The imports and exports together exceed $84,500,000, the bulk of the trade being with Great Britain. The capital and principal port is Rangoon. Other towns are Moulmein, Akyab and Bassein. Upper Burma is on the whole similar in char¬ acter to Lower Burma, but less productive, and has generally a smaller rainfall. It is rich in minerals, including gold, silver, precious stones, marble, iron, lead, tin, antimony, arsenic, sul¬ phur and petroleum. Only a few of these are worked. The chief precious stones are the ruby and the sapphire; amber and jade are also

found. All precious stones used to be sent to the royal treasury and strangers were prohibited from approaching the places where they were found. These districts are still the subject of special regulation under the British rule. The whole country is intersected by numerous streams, which, following the direction of the chief mountain chains, flow generally south to the Indian Ocean. The chief of these are the Irrawadi, the Salween and the Chindwin, which joins the Irrawadi, the combined stream being of great volume. The Irrawadi is of great value as a highway of communication and traffic, being navigable beyond Bhamo, near the Chinese frontier. In their upper courses the rivers flow through narrow valleys ; in their lower courses they traverse lowlying districts, and in the rainy season often overflow their banks. Among the wild animals of the country are the elephant, rhinoceros, tiger, leopard, deer of various kinds and the wild hog. The rivers abound with fish. Of domestic animals we may mention the ox, buffalo, horse, elephant and cat. In the southern districts, owing to the numerous rivers, the soil is most productive. Here grow rice, sugar cane, tobacco, cotton, indigo and all the tropical fruits. Tea is cultivated in many of the more elevated parts. The forests pro¬ duce timber of many sorts, including teak. A great part of the trade of the

country is carried on by means of the Irrawadi River. From Bhamo goods are conveyed to China. Rice is the great crop (occupying about 80 per cent of the cultivated area), and this grain forms the chief export, others being teak, cotton and silk stuffs, petroleum, saltpetre, paper and lacquer ware. About 12,446 miles of roads are main¬ tained, and the number of railway miles open is now about 1,000. From Rangoon two lines proceed north, one along the left bank of the Irrawadi to Prome and Meaday, the other through the Sittaung Valley to Mandalay, and from that on the other side of the Irrawadi to Bhamo and Mogaung.

The Burmese have many skilful weavers, smiths, sculptors, workers in gold and silver, joiners, *etc.* Among industrial establishments are rice-mills, sawmills, a few works for iron goods, shipbuilding yards, cutch works, *etc.* Other industries include boat-building, weaving, pottery, lacquerwork and brasswork. The weaving of cotton and silk goods is carried on by the women everywhere. The pottery of the country is strong and durable, if not especially artistic; and the gold and silver work finds numerous purchasers outside the country. Wood-carving is extensively practised for the adornment of houses, boats, *etc.* The native vessels plying on the Irrawadi and other rivers are often of 100 to 150 tons burden, while thou¬ sands of small craft are engaged in trade or fishing. Large numbers of good cigars are made by women, and are partly used in the country, partly exported. The buildings among the Bur¬ mese are very slight, as the government used to require them to be chiefly of wood or bam¬ boo, and prohibited the use of stone or brick except for pagodas, and other important struc¬ tures.

People. — The Burmese are divided into sev¬ eral tribes, and belong to the common Indo-Chinese stock. Among the tribes other than the Burmese proper are the Karens, Kakhyens,

Shans, *etc.* The Burmese proper are of a brown color, with lank, black hair, and vigorous, well-proportioned frames. No Burmese can have more than one wife ; but he may have as many mistresses as he will.

The latter live in the same house with the wife, and are her serv¬ ants. The Burmese women enjoy a good deal of freedom; are not shut up as in some parts of the East, and can even engage in a lawsuit in their own name. The chief amusement of the Burmese is their theatre, where declamation, dancing and music are given by turns. The new year (which begins in April) is celebrated with what is known as the ((water feast, M when young men and women throw water on each other and the passers-by. The Burmese usually write on palm leaves with an iron style or on black tablets with a pencil ; the rich have libraries, with books, the leaves of some of which are thin pieces of ivory, with gilt edges. Their materia medica is chiefly confined to herbs, spices and mercury ; with vaccination they have long been acquainted. The language is monosyllabic, like Chinese, and written with an alphabet (derived from India), the characters of which are more or less circular. Among the common people the principal part of the male dress consists of a double piece of cloth about five yards long, loosely wrapped about the body. Over this a frock is worn, with sleeves open in front, and reaching below the knees. The lower classes of women wear only a single garment, resembling a sheet, wrapped round the body and fastened under the arms. Men of rank wear a long robe of flowered velvet or satin, with open sleeves and collar, a mantle or scarf being thrown over this. On the head is worn a high velvet or silk cap, plain or embroidered, according to rank. The men wear earrings, often of large size. Women of the higher classes generally wear a shift which reaches only to the pit of the stomach, where it is drawn tight and fastened by strings. This is covered by a loose jacket, with tight sleeves. A piece of silk or cloth encircles the waist and descends to the feet. When a woman wishes to be par¬ ticularly fine she stains her nails and palms a red color, and tinges her teeth and the edges of her eyelids with black. Both sexes wear the hair long; the men tying it in a knot on the crown of the head, the women on the back. Sandals are often worn, but neither boots, shoes nor stockings ; every man, woman and child, however, carries an umbrella. The chewing of betel and smoking of tobacco are universal. The Kakhyens or Singfo are a courageous people inhabiting the upper basin of the Irrawadi above Bhamo. They practise a sort of nature worship, and are active as traders, though at present rather lawless. Their villages are ruled by hereditary chiefs. Chinese from Yunnan have settled in considerable numbers as traders and agriculturists in the Kakhyen country; and in Lower Burma they are now a highly important element in the population as traders and otherwise. In the hilly districts, of Tenasserim and Pegu we find the Karens, a somewhat secluded people, less intelligent and more ignorant than the Burmese, and not so purely Mongolian in physical character. The Talaings or

Mons of the Irrawadi delta re¬ semble the Burmese, but speak a distinct lan¬ guage. The Shans are a numerous people

closely allied to the Siamese, and inhabiting eastern and northeastern Burma, together with portions of the neighboring countries.

The native government was an absolute mon¬ archy, the King having unlimited power over life and property. The seat of government, after oscillating between Ava and Amarapura, was latterly fixed in Mandalay, a new town founded in 1857, and situated in a dusty plain a little over two miles from the left bank of the Irrawadi, and about 28 miles northwest from Amarapura. The King was assisted in govern¬ ing by a council of state known as the Hloot-daw, to which belonged at once the functions of a legislature, a cabinet and a supreme court of justice. It was composed of officials of 14 grades, the president being the King himself, some other member of the royal family or the Prime Minister. The King had power to punish at his pleasure anyone, including even the great officers of state. The public revenue was de¬ rived from taxes levied in a very irregular and capricious manner, and as the officials received no fixed salary corruption and oppression were extremely prevalent. The criminal laws were barbarously severe. Capital punishment was commonly inflicted by decapitation, but cruci¬ fixion and disemboweling were also practised. Torture might be applied to principals or wit¬ nesses ; and trial by ordeal was not unknown. The standing army was small. Levies were made, in case of war, by way of conscription; and a specified number of houses was required to furnish a soldier or pay a fine. The religion of the country is that of Buddha, which is said to exist here in great purity. The tutelary di¬ vinities worshipped in various Buddhist countries are unknown, and the vows of pov¬ erty and chastity taken by the monks are said to be less frequently broken here than else¬ where. The Burmese possess a complete sys¬ tem of education so far as male children are concerned. All boys are required to reside in a religious house for three years and there they act as servants to the priests who instruct them in reading, writing and arithmetic, as well as the doctrines of their religion. Upward of 90 per cent of the population dwell in rural areas, and no tendency toward gravitation to the towns is observed. Notwithstanding the fact that the social position of women is so assured in Burma and that there is no suspicion of the existence of female infanticide, women number only 962 in 1,000 against 1,006 and 1,022 in Ben¬ gal and Madras. But the explanation probably lies in the preponderance of the male element among the numerous immigrants into the prov¬ ince. Marriage in Burma is a

purely secular ceremony, and elementary education is far more widely dispersed than in India, one individual in five being able to read and write.

History. — The Burmese empire is of little note in ancient or general history. Buddhism and civilization are said to have been intro¬ duced from India. The last native dynasty was founded by a Burmese called Alompra, a man of obscure birth, who defeated the Peguans, and in 1753 obtained possession of Ava. Having made himself master of Burma, he invaded Siam ; but during this invasion he died sud¬ denly in 1760. Alompra ruled well and wisely, and Namdogee, his eldest son and successor, who died in 1764, inheriting his father's spirit,

BURMA

*2

O

o

£

u

1 >

03

a

< 3

03

O

o

£

&

to

a

O

a >

a

s

Vh

< D

> >

as

u.

to

c

3

to

ctf

CO

<D

x:

o

-4-»

to

.5

•3

as

<L>

~

<L>

cs

O

13

O

O

M

a;

H

M

5*’

55

03

Q

O

>

u

1)

03

a

D

03

O

O

£

U

0 >

03

fl

D

> »

.O

X3

ho

＞%

a.

Q

as

•C

T3

T5

3

PQ

M-.

o

*5

aJ

＞＞

X*

＜D

cj

C

*2

*3

j> >

*3

jd

3

u

as

Ui

6

TS

O

M

03

ft

O

(D

03

> >

introduced various reforms and useful measures. Shembaun (Tshen-bo-yen), the Emperor's brother, became regent as guardian for his nephew Momien ; but he usurped the throne himself and conquered Siam. In 1771, how¬ ever, Siam recovered its independence, while the principal part of the Burmese forces were engaged in a war with China. In this war they were victorious, and compelled the Chinese whom they took prisoners to intermarry with Burmese females, and to remain in their terri¬ tory. In 1776 Shembuan left his empire, much enlarged, to his son, Chenguza. This prince lived in the unrestrained indulgence of every appetite till in 1782 he was dethroned and put to death. In consequence of the revolution, Mentaragyi, the fourth son of Alompra, ascended the throne. He ordered his nephew, Momien, who was a state prisoner, to be drowned, and in 1783 subdued the kingdom of Arracan. He then engaged in a war with Siam, which continued till 1793, when peace was made on certain conditions. About this period, it happened that some robbers fled from the Bur¬ mese empire, and took refuge in the territory of the East India Company. The Burmese de¬ manded that they should be delivered up, and on their demands not being immediately complied with, marched with a strong force into the offending country. At the same time they

car¬ ried on a friendly negotiation with the govern¬ ment in Calcutta, which resulted in the surren¬ der of the criminals, and the conclusion of a treaty of amity and commerce between the two governments, negotiated by Captain Symes. The last victory of the Burmese was in 1822 over the province of Assam. The party driven from Assam, together with the Burmese rebels, fled to the British territories, whence they intended to invade Burma. The British government dis¬ armed the insurgents, but refused to deliver them up or to drive them from the island of Shapuri, which they had occupied. At length the Burmese sovereign demanded of the govern¬ ment at Calcutta the cession of northern Bengal as being a part of Ava, and in January 1824 his forces marched into Cachar, which was under British protection. Lord Amherst, as governor-general of the British East Indies, now declared war against Burma, and Gen. Archibald Camp¬ bell prosecuted it so successfully that after the victory at Prome (1-3 Dec. 1825), he obliged the monarch to conclude a peace at Palanagh in 1825. As the treaty was not ratified on the part of the Burmese Emperor by the time specified (18 Jan. 1826), Campbell renewed the war and stormed the fortress of Munnum. On 24 February the peace was ratified, and the war concluded with the cession of Arracan, Mergui, Tavoy, *etc.* In 1852 a second war broke out at the conclusion of which Rangoon and the whole of Pegu fell into the hands of the British. About 1860 the new city Mandalay supplanted Amarapura as the capital. In 1867 British steamers were permitted by treaty to navigate Burmese rivers, and not long after traffic was carried on up the Irrawadi as far as Bhamo. In 1885 the outrageous proceedings of King Theebaw provoked another war, and a British force proceeded from Rangoon up the Irrawadi River, took Mandalay and sent King Theebaw a pris¬ oner to Rangoon. On 1 Jan. 1886, Theebaw's dominions were annexed to the British empire by proclamation of the viceroy of India (the

Earl of Dufferin). After the annexation there was a considerable amount of scattered fighting with dacoits and others, but this has ceased since 1890 and the country is now opened up to commerce, and is rapidly advancing in pros¬ perity. In 1897 Burma was constituted a province, and placed under a lieutenant-gov¬ ernor instead of a chief commissioner.

Bibliography. — Clifford, H. C., (Further India } (New York 1904) ; Coxon, S. W., (And That Reminds Me' (London 1915) ; Dautre-mer, J., (Une colonie modele-la Birmanic' (Paris 1912) ; Kelly, R. T., (Burma, Painted and Described' (London 1912) ; White, T., 'A Civil Servant in

Burma' (London 1913).

Charles Leonard-Stuart, Editorial Staff of The Americana.

BURMEISTER, boor'mis-ter, Hermann, German scientific writer: b. Stralsund, 15 Jan. 1807 ; d. Buenos Aires, Argentina, 2 May 1892. In 1842, he became professor of zoology at Halle. He distinguished himself as a geologist and zoologist in his native country, and settled permanently in Argentina, where he continued his investigations. He traveled in South America, and was for a time director of the Museum of Natural History at Buenos Aires. Among his works are (Handbuch der Entomol-ogie' (5 vols., Berlin 1831-55) ; (Geschichte der Schoffung' (Leipzig 1843) ; (Systematischc Ubersicht der Tiere Braziliens) (3 vols., 1854-56) ; and many contributions to scientific peri¬ odicals.

BURMEISTER, Richard, German-Ameri- can musical composer : b. Hamburg, Germany, 7 Dec. 1860. He received an academical educa¬ tion in Hamburg; studied with Franz Liszt, and in Rome, Budapest and Weimar; made concert tours in Europe in 1883-85 and in the winter of 1893; was at the head of the piano department of Peabody Institute, Baltimore, Md., 1885-97 ; and settled in New York in the latter year. He made concert tours all over the United States and was director of the Scharwenka Conserv¬ atory, New York, in 1897-99. In 1903 he be¬ came head of the piano department of the Royal Conservatory of Dresden. Since 1907 he has been living in Berlin. He has composed (The Sisters' (a dramatic tone poem), numerous songs, and piano, violin and orchestra pieces ; and arranged Liszt's (Concerto Pathetique, ' originally for two pianos, for the piano and orchestra.

BURN, Sir George, Canadian banker : b. Thurso, Scotland, 10 April 1847. He was ed¬ ucated in Scotland and was trained in the Royal Bank of Scotland. He joined the staff of the Royal Canadian Bank in 1866 ; in 1880 was ap¬ pointed general manager of the Bank of Ottawa. He was elected president of the Canadian Bankers' Association in 1915 ; has been promi¬ nently identified with philanthropic and patriotic work, and was knighted in 1917.

BURNABY, Frederick Gustavus, English soldier and traveler: b. Bedford, England, 3 March 1842; d. 17 Jan. 1885. He was educated at Bedford and Harrow, and entered the Roval Horse Guards in his 18th vear as cornet. In 1861 he became lieutenant, in 1866 captain, major in 1879, lieutenant-colonel in 1880, and finally, in 1881, was appointed colonel, a ra"k which he held till his death. He was military

correspondent for the London Times with Don Carlos in Spain, and joined Gordon in the Sudan. In 1875 he made his famous ride to Khiva — a journey that presented great diffi¬ culties. During the ride, which he undertook partly because he had learned that the Rus¬ sian government kept Europeans out of cen¬ tral Asia, he suffered severely from the intense cold prevailing at the time when he crossed the steppes. In 1876 he rode through Asiatic Tur¬ key and Persia. Of both these journeys he pub¬ lished narratives, namely, 'Ride to Khiva) (1876, 11th ed., 1877, new ed., 1884), and (On Horseback Through Asia Minor) (1877). In 1880 he was the unsuccessful candidate for the Birmingham seat in Parliament. While serving as lieutenant-colonel of the Royal Horse Guards in the Egyptian campaign, he was killed at the battle of Abu-Klea. Consult Mann, 'Life of Burnaby) (London 1882) and Wright, 'The Life of Colonel Fred Burnaby) (London 1908).

BURNAND, Sir Francis Cowley, English author: b. 29 Nov. 1837; d. 21 April 1917. He was educated at Eton and Trinity College, Cam¬ bridge, and at first studied with a view to enter¬ ing the Church of England, but when in 1858 he became a Roman Catholic he devoted himself to legal studies, and was called to the bar in

1862. By that year he had already achieved some success as a writer, and in consequence he seldom practised. After about a year's connec¬ tion with Fun he joined the staff of Punch in

1863, and was editor from 1880 to 1906. His book, 'Happy Thoughts, > republished from Punch went through several editions, and was followed by 'More Happy Thoughts) (1871) ;

(Happy Thought HalP (1872) ; 'Quito at Home) (1890). Other successful productions of his are the extravaganzas, 'New Light on Darkest Africa, > and 'Ride to Khiva) (making fun out of Stanley and Colonel Burnaby respec¬ tively), the parody on Ouida's novel, 'Strath¬ more,-* which he published under the title of 'StrapmoreP and (The Modern Sandford and AlertonP Numerous plays have come

from his pen, mostly of the nature of burlesques and light comedies, such as the plays (Black-eyed Susan* (a burlesque of Douglas Jerrold's drama), and (The Colonel.* He issued a his¬ tory of the Amateur Dramatic Club which he had founded at Cambridge University. He col¬ laborated with Sir A. Sullivan in the light operas (The Chief tainP produced in 1894, and 'Contrabandista.* He was knighted in 1902, and published an interesting volume of (Records and Reminiscences.*

BURNE-JONES, Sir Edward, English painter : b. Birmingham, 28 Aug. 1833 ; d. Lon¬ don, 17 June 1898. In 1852 he went to Exeter College, Oxford, where he was a fellow student of William Morris, and afterward became ac¬ quainted with A. C. Swinburne (who dedicated his 'Poems and Ballads) to him). His first intention was to enter the Church of England, and it was not till he had reached his 22d year • that he seriously devoted himself to art studies; but, going to London in 1855, he came under the influence of D. G. Rossetti and the Pre-Raphaelite movement, and soon attained con¬ siderable success in various departments of artistic work. In 1859 he set out on a journey through Italy in order to see the productions of the early Italian painters and sculptors, and on

his return to England he gave in his stained-glass designs and his pictures splendid promise of his subsequent triumphs. In 1865 he began a series of illustrations to Morris' 'Earthly Para-diseP and he also executed some 70 designs for the 'Story of Cupid and Psyche,* besides pictures dealing with the same subject. He was elected a member of the Old Society of Painters in Water Colors in 1864, but withdrew from it in 1870, and from this year till 1877 scarcely ever exhibited in London. 'In the Grosvenor Gallery exhibition of the latter year, however, his works formed the chief attraction. He re¬ ceived the Cross of the Legion of Honor in 1880, was elected in 1885 Associate of the Royal Academy, a position which he resigned in 1893 (having only exhibited one picture at the Acad¬ emy, 'The Depths of the Sea*), and he was created a baronet in 1894. His most important pictures are 'Day, Night* ; (Spring, Summer, Autumn, Winter) (1867-68) ; (The Wine of Circe *(1869); ' Chant d' Amour > (1873) ; 'Be-guiling of Merlin* (1877), an illustration of Tennyson's (Merlin and Vivien) ; (Six Days of Creation) (1877) ; (The Golden Stairs* (1880) ; 'The Wheel of Fortune) (1883) ; 'Wood Nymph *; (King Cophetua) (1884); 'Laus Ven-eris) ; 'The Depths of the Sea* (1886); and (The Briar Rose) series (1890). He holds a specially high place as a designer for stained-glass windows, and in many other departments of decorative

art. His leading characteristics as a painter are his fertile imagination and fine poetic feeling, qualities which no painter of the century has possessed in anything like the same degree. The Old-World dreaminess of his work is finely aided by his wonderful power as a colorist. In common with his friends, Morris and Rossetti, he exercised a most potent im-fluence on Victorian art. Consult Bell, Ed¬ ward Burne-Jones) (1902).

BURNELL, Arthur Coke, English Orien¬ talist: b. Gloucestershire 1840; d. 1882. He was educated at Bedford and King's colleges, entered the Indian Civil Service, and became immersed in South Indian palaeography. His 'Handbook of South Indian Palaeography *was regarded by Max Muller as indispensable to every student of Indian literature.* A 'Classified' Index to the Sanskrit MSS.* in the palace at Tajore appeared in 1880. (The Law of Partition and Succession* showed how well he had grasped the fundamentals of Indian law. He left unpublished (A Translation of the Ordinances of Manu* (1885) ; and (jointly with Colonel Yule) 'Hobson-Jobson ; being a Glos¬ sary of Anglo-Indian Colloquial Words and Phrases* (1886). He was a remarkable lin¬ guist, having a knowledge of Sanskrit, Tibetan, Pali. Kawi, Javanese, Koptic and Arabic, and in his later years he became deeply absorbed in the Italian writers of the Renaissance. An ardent booklover himself, he overflowed with helpfulness, and generosity to other students. His collection of over 350 Sanskrit MSS. was gifted in 1870 to the India Library, and by the time of his death he had again collected an equal number, which were purchased from his heirs on behalf of the same institution.

BURNES, Sir Alexander, Scottish soldier and traveler: b. Montrose 1805; d. Cabul, 2 Nov. 1841. Having obtained a cadetship, he joined the Bombay native infantry in 1821.

Here his proficiency in Hindustani and Persian procured him two regimental appointments as interpreter, and contributed greatly to his future promotion. In 1830 he was appointed to pro¬ ceed to Lahore, ostensibly for the purpose of delivering a present of horses from the

King of England to Runjeet Singh, but really for the purpose of acquainting himself with the lower Indus, with the view of opening it up to com¬ mercial enterprise. On returning from this mission, which he successfully accomplished, he proposed a mission into central Asia, and having obtained the sanction of the government, set out in January 1832, descended the Sutlej to Lahore, and proceeded thereafter to Peshawur, Cabul and Bokhara. He afterward traveled with a caravan across the desert of Merv, visited the Shah of Persia in his capital of Teheran, traveled southward to the Persian Gulf and reached Bombay after a year's abscence. He published an account of this journey in 1834, under the title of (Travels into Bokhara. > He was afterward sent to England as the bearer of his own despatches, received the special thanks of the court of directors and was presented with the gold medal of the Royal and the silver medal of the French Geographical Society. He returned to India in 1835, and in the following year was sent on a commercial mission to Cabul. While there he discovered that Russia was intriguing to detach the Emir, Dost Mohammed, from the British alliance, and on finding the Emir disposed to be friendly to Great Britain, he urged Lord Auckland to come to terms with him. His advice was, however, rejected, and a force was dispatched in 1839 to reinstate Shah Sujah on the throne. Burnes accompanied the force as second political officer, and received the honor of knighthood. On the breaking out of an insurrection in Cabul, he was murdered with his brother and several other Europeans.

BURNET, Gilbert, British prelate and his¬ torian : b. Edinburgh, 18 Sept. 1643 ; d. London, 15 March 1715. Having graduated at Marischal College, Aberdeen, he zealously devoted him¬ self to the study of law and divinity. In 1661 he qualified as a probationer in the Church, and traveled into Holland in 1664. On his return he was made fellow of the Royal Society in London, and ordained to the living of Saltoun, Haddingtonshire, in 1665. In 1669 he was made a professor of divinity at Glasgow, where he published his (Modest and Free Conference between a Conformist and a Nonconformist, > and wrote his (Memoirs of the Dukes of Hamilton* (1676); and was offered a Scottish bishopric, which he refused. His Vindication of the Authority, Constitution, and Laws of the Church and State of Scotland, > in which he maintains the cause of episcopacy, was much approved of at court, and several bishoprics were successively offered him and refused. In 1673 he was made chaplain in ordinary to the King, and was in high credit both with Charles and the Duke of York. Removing to London he received the appointment of chaplain to the Rolls Chapel in 1675, and shortly afterward the lectureship at Saint Clement's. The nation be¬ ing alarmed on account of the progress of Catholicism,

Burnet undertook a (History of the Reformation in England. } He gave a first volume to the public in 1679, when the affair

of the popish plot was in agitation. It procured for the author the unprecedented honor of thanks from both houses of Parliament. The second appeared in 1681 ; the third, which was supplementary, in 1714. The high character of Burnet as a divine caused him to be sent for by the witty and profligate Earl of Rochester, when, exhausted by a course of libertinism, he was sinking into the grave. The result of his conferences vvith the dying nobleman he gave to the world in his celebrated (Account of the Life and ;Death of the Earl of Rochester.* About this time he wrote a letter to the King censuring his public misgovernment and private vices. His connection with the opposition party was now very intimate, and he attended Lord William Russell to the scaffold, when executed for his share in the Rye House plot. He pub¬ lished during this period several works in favor of liberty and Protestantism, and wrote the lives of Bishop Bedell and Sir Matthew Hale (1682) ; and in 1683 made his translation of More's <Utopia.) On the accession of James he made a tour in France and Italy, and in 1687 he published an account of his travels in a series of letters to Robert Boyle. When at Utrecht he was invited to The Hague by the Prince and Princess of Orange, and had a great share in the councils relative to Britain. James caused a prosecution for high treason to be commenced against him in Scotland, and demanded his person from the States, who refused to deliver him up. In the revolution he took an active part, accompanying the Prince of Orange to England as chaplain, and was rewarded for his services by the bishopric of Salisbury. On taking his seat in the House of Lords, he dis¬ played his usual moderation in regard to the non-juring clergy and dissenters. As a prelate, Bishop Burnet distinguished himself by fervor, assiduity, tolerance and charity. In 1699 he published his Exposition of the Thirty-nine Articles.) The scheme for the augmentation of poor livings out of the first-fruits and tenths due to the Crown, known as Queen Anne's Bounty, originated with Burnet. He left behind him in manuscript his well-known (History of His Own Times) (1723-34), upon which the best judgment to-day is that nothing could be more admirable than his general candor, his accuracy as to facts, the fullness of his information and the justice of his judgments, both of those whom he vehemently opposed and of those whom he greatly admired. The value of the work, says a recent authority, <(as a candid narrative and an invaluable work of reference, has continually risen as investigations into original materials have proceeded.®

BURNET, Jacob, American jurist: b. New¬ ark, N. J., 22 Feb. 1770; d. Cincinnati, Ohio, 10 May 1853. He was graduated at Princeton 1791, was admitted to the bar in 1796, removed to Cincinnati, then a village with about 500 in¬ habitants, and was a member of the territorial government from 1799 till the establishment of a State government in 1803. In 1821 he was appointed judge of the Supreme Court of Ohio, and was elected United States senator in 1828, and was prominent in the legislation to remove the national debt of the Middle West for public lands ; and for the completion of the Miami Canal. Burnet was elected a member of the French Academy of Sciences upon the recom-

emendation of Lafayette, and published in 1847 a volume of (Notes on the Northwestern Ter¬ ritory.ˆ He was prominent in civic enterprises in Cincinnati for over half a century, assisting to establish the Lancastrian Academy; helping to found the Cincinnati College, whose first president he was; besides being president of the Ohio Medical College and the Cincinnati Colonization Society and the Cincinnati branch of the United States Bank.

BURNET, John, Scottish engraver, painter and art-critic : b. Musselburgh, near Edinburgh, 20 March 1874; d. 1868. He learned etching and engraving, and, with Sir William Allan and Sir David Wilkie, was a student in drawing and painting at the Trustees' Academy, Edinburgh. In 1806 he went to London, where he engraved Wilkie's (Jew's Harps5 ; (Blind Fiddler) ; (Rent Day5 ; (Rabbit on the Wall5 ; (Chelsea Pension¬ ers Reading the Gazette of the Battle of Water¬ loo) (his largest and most elaborate work) ; (Letter of Introduction5 ; (Death of Tippoo Sahib5 ; and (Village School.5 He also engraved plates from several recent painters, from the Rembrandts in the National Gallery and from several of his own paintings. Among his writ¬ ten works, for which he still maintains a repu¬ tation, are (Practical Treatise on Painting5 (1827) ; (Rembrandt and His Works5 (1849) ; (Life and Works of J. W. M. Turner,5 with Cunningham (1852). He was a sound and careful painter, but possessed little originality. He was made a fellow of the Royal Society,

and in 1860, receiving a civil pension, he retired. Consult Pye, (Patronage of British Art5 (in Art Journal 1850, 1868).

BURNET, John, Scottish classical scholar : b. Edinburgh, 9 Dec. 1863. He was educated at the Royal High School and University, Edin¬ burgh, and Balliol College, Oxford, and has been professor of Greek in Saint Andrew's University since 1892. His works include (Early Greek Philosophy5 (1892) ; (Greek

Rudiments5 (1897) ; (Platonis Opera5 (5 vols., 1899-1907); <Plato's Phaedo5 (1911); <Greek Philosophy, Part I5 (1914).

BURNET, Thomas, English divine and philosopher: b. Croft, Yorkshire, about 1635; d. London, 27 Sept. 1715. He was educated under Dr. Ralph Cudworth at Cambridge, and afterward traveled as tutor to several young noblemen. In 1681 he made himself known by his (Telluris Theoria 'Sacra,5 which he subse¬ quently translated into English. In 1685 he became master of the Charterhouse and after the revolution of 1688 was appointed chaplain in ordinary and clerk of the closet to King William. In 1692 he published (Archaeologies Philosophicse, sive Doctrina Antiqua de Rerum Originibus,5 but the freedom of opinion dis¬ played in this work led to the removal of the author from the clerkship of the royal closet. Two posthumous works of this author appeared in 1727 — the treatise (De Fide et Officiis Christianorum5 ; (De Statu Mortuorum et Resurgentium.5 All the works of Burnet ex¬ hibit him as an ingenious speculator, rather than as a patient and sober inquirer concerning the moral and natural phenomena of which he treats. His great work, the (Theory of the Earth,5 is one of the many systems of cos¬ mogony in which Christian philosophers have attempted to reconcile the Mosaic account of

the creation, paradise and the deluge, with the traditions of the ancient and the principles of modern science. His speculations are recom¬ mended by sublimity of description and elo¬ quence of style. In his (Archaeologiae Philo¬ sophies5 he has combatted the literal interpre¬ tation of the history of the fall of man ; and to expose its improbability he has introduced an imaginary dialogue between Eve and the serpent, which, as coming from the pen of a divine, is singular enough. It is only to be found in the first edition of the wo'rk.

BURNET, William, American colonial gov¬ ernor : b. The Hague, Holland, 1688 ; d. Boston, 7 Sept. 1729. He was a son of Gilbert Burnet (q.v.) and was appointed governor of New York and New

Jersey in 1720. Two years later he founded at Oswego the earliest English trading post on the Great Lakes as the first step in his able Indian policy in New York which accomplished very much for the interests of the mother country and the colonies. In 1728 he was transferred to the governorship of Massa¬ chusetts and New Hampshire and was speedily involved in disputes with the assembly of the former colony over the question of salary. He was fond of astronomical studies and published observations in the Transactions of the Royal Society.

BURNET, the popular name of two genera of plants of the family Rosacea'. (1) Garden Burnet (Sanguisorba) , a perennial plant which grows to the height of about two feet ; leaves smooth, alternate, imparipinnate, com¬ posed of serrate leaflets; flowers arranged in rounded heads of a purplish color, with the female flowers above and the male flowers below. It is a native of Europe but has become naturalized in sunny places among rocks and in open fields, from New York to Maryland. It is cultivated in kitchen gardens for its aromatic leaves, which are used to season salads. (2) Canadian Burnet (S . canadensis) is also a perennial plant ; calyx of four divisions ; stamens four. Its stem is straight, from three to six feet in height ; leaflets ovate, smooth. This plant grows chiefly in bogs and wet places from Labrador to Georgia, and west to Michi¬ gan.

BURNET MOTH, the name for the genus of hawkmoths, called Anthrocera, or, bv some, Zygcena. Anthrocera filipendulce is the six-spot burnet moth. The six spots, which are on the superior wings, are red, while the rest of the wings are green. Its caterpillar, which feeds on the plantain, trefoil, dandelion, etc., is yel¬ low, spotted with black. A. loti is the five-spot burnet moth. It is less common. The cater¬ pillar feeds on honeysuckle, bird's foot, trefoil, *etc.*

BURNETT, Frances Eliza Hodgson,

Anglo-American novelist : b. Manchester, Eng¬ land, 24 Nov. 1849. In 1856 went to Tennessee with her widowed mother, and lived there until her marriage in 1873 to Dr. S. M. Burnett. She has since lived in Washington and Europe. Between the ages of 16 and 20 Mrs. Burnett wrote numerous stories for magazine publica¬ tion-including (Vagabondia5 ; (Theo5 ; (The Fortunes of Philippa Fairfax,5 *etc.* This girlish work was collected later by Charles Scribner's Sons in an edition known as (Mrs. Burnett's Earlier Stories.5 Her first serious

literary success was (That Lass o' LowrieV (1877), a novel founded on colliery life in Lancashire. This appeared serially in Scrib¬ ner's Magazine and in book form in 1877. This was followed by (Haworths) (1879) ; (Louisiana) (1880) ; (A Fair Barbarian) (1881) ; (Through One Administration (1883); <A Lady of Quality) (1896); (His Grace of Os-monde) ; (The De Willoughby Claim } (1899) ; (Emily Fox-Seton) ; (The One I Knew the Best of A1P; (The Shuttle) ; (T. Tembarom) (1913), *etc.* Her books for children are (Little Lord Fauntleroy) (1886) ; (A Little Princess) (1905); Two Little Pilgrims' Progress) ; (The Secret Garden) ; (The Lost Prince/ *etc.* Her dramatic work comprises plays founded upon c Little Lord Fauntleroy) ; (A Little Princess) ; <Esmeralda) (1881); (Phyllis 5 ; (A Lady of Quality) ; (The Dawn of a To-morrow/ *etc.*

BURNETT, James (Lord Monboddo), Scottish judge: b. at the family seat of Mon¬ boddo, in Kincardineshire, 1714; d. Edinburgh, 26 May 1799. After studying at Aberdeen and Edinburgh he went to the University of Gronin¬ gen, whence he returned in 1737, and commenced practice as an advocate at the Scottish bar. In 1767 he was raised to the bench on the decease of his relative, Lord Milton. He distinguished himself by his writings as a metaphysician, having published a work on the (Origin and Progress of Language) (1773-92), and (Ancient Metaphysics) (6 vols., 1779-99). Lord Mon¬ boddo was an enthusiastic admirer of ancient literature, and especially of the works of Plato and other Grecian philosophers. His works contain many interesting observations, but also exhibit some strange and paradoxical opinions. Thus he seriously advocates the existence of satyrs and mermaids, and has advanced some pre-Darwinian speculations on the affinity be¬ tween the human race and the monkey tribe, which exposed him to a good deal of ridicule on the first publication of his theories. Both his official and his private character were of high standing, and he was, notwithstanding some eccentricities, a man of learning and ability.

BURNETT, Peter Hardeman, first State governor of California and author: b. Nash¬ ville, Tenn., 1807; d. San Francisco 1895. After residence in Missouri and Oregon, where he practised as a lawyer and

assisted in the organi¬ zation of territorial government, serving two terms in the legislature, he went to California in 1848 with one of the first band of gold diggers, and became prominent in organizing State government without waiting for Con¬ gressional sanction. He was elected governor on the adoption of the constitution, but resigned in 1851. In 1857-58 he was judge of. the Supreme Court and from 1863 to 1880 president of the Pacific Bank of San Francisco. His published works, marked by lucid exposition and clear logical thinking, include (The Path which led a Protestant lawyer to the Catholic Church) (1860) ; (The American Theory of Govern¬ ment considered with reference to the Present Crisis) (1861); (Recollections of an old

Pioneer } (1878) ; (Reasons why we should be¬ lieve in God, Love God, and Obey God) (1884).

BURNETT PRIZES, The. Two prizes in theology founded by John Burnett, of Dens,

Aberdeen, Scotland, for the two best treatises on ((The evidence that there is a Being all-power¬ ful, wise and good, by whom everything exists; and particularly to obviate difficulties regarding the wisdom and goodness of the Deity; and this independent of written revelation, and of the revelation of the Lord Jesus; and from the whole to point out the inferences most neces¬ sary and useful to mankind.® Burnett, who was born in 1729 and died in 1784, was a merchant of Aberdeen, and was known for his bene¬ factions to the poor. On his death he be¬ queathed his fortune to found the prizes above referred to, and to establish funds for the re¬ lief of the poor and of pauper lunatics. He ordered the prize fund to be accumulated for 40 years at a time, and the prizes (not less than $6,000 and $2,000) to be awarded as above. In 1883 the fund was applied to found a lectureship on natural theology in the University of Aber¬ deen. Awards of the prizes were, first prize to William Laurence Brown in 1815; second prize to John Bird Sumner in 1848; first prize to Robert A. Thomson in 1855 ; second prize to John Tulloch in 1860.

BURNEY, Charles, English composer and writer on music: b. Shrewsbury, 12 April 1726; d. Chelsea, London, 12 April 1814. He studied music under the organist of Chester Cathedral there, and at Shrewsbury, under the direction of his half-brother, an organist, and afterward in London between 1744 and 1747, under Dr. Arne. In 1751 he obtained the place of organist at Saint Margaret's Church, Lynn Regis, in Norfolk. Here he commenced his (General History of Music/

In 1760 he re¬ turned to London, where his compositions and the musical skill of his eldest daughter, then eight years of age, excited admiration. In 1769 he took the degree of doctor of music at Ox¬ ford. In 1770 he visited France and Italy, and two years afterward the Netherlands and Ger¬ many, for the sake of his great work. He pub¬ lished accounts of both tours. After his second return he became a fellow of the Royal Society. In 1776 appeared the first volume of his Gen¬ eral History of Music from the Earliest Ages to the Present Period* (4to), the second in 1782, and the third and fourth in 1789. He was the author of several other valuable works, among which are the (Memoir of Handel/ and a (Life of Metastasio/ He died in the office of organist at Chelsea Plospital, and in receipt of a pension of $1,500. He wrote most of the musical articles in Rees' Cyclopaedia. His 2d daughter, Frances or Fanny (Madame D'Arblay, q.v), well known as an authoress, published a memoir of her father.

BURNEY, Charles, English classical scholar and critic, son of Charles Burney (q.v.): b. Lynn, Norfolk, 4 Dec. 1757; d. 28 Dec. 1817. He received his education at the Charterhouse School, at Caius College, Cam¬ bridge, and King's College, Aberdeen, where he took the degree of M.A. He carried on a pri¬ vate school, distinguished himself as a writer in the Monthly Review and the London Magazine, to which he contributed many ar¬ ticles on classical literature ; subsequently en¬ tered into holy orders, and obtained some pre¬ ferment in the Church. His valuable collection of books, many of them enriched with manu-

script notes, was purchased by Parliament for the British Museum.

BURNEY, Frances. See D'Arblay, Ma¬ dame; Evelina.

BURNHAM, Sherburne Wesley, Ameri¬ can astronomer; b. Thetford, Vt., 12 Dec. 1838; d. Chicago, Ill., 11 March 1921. In early life a stenographer, he became a clerk in the United States Circuit Court, northern district of Illi¬ nois. He took up astronomy as an amateur, and, in 1876, became connected with the Chicago Observatory, and later with the Lick Observa¬ tory, receiving also an appointment as

professor of practical astronomy at the Yerkes Ob¬ servatory of the University of Chicago. He made notable discoveries of double stars, having catalogued 1,274 new ones. In 1874 he was made a fellow of the Royal Astro¬ nomical Society of England, receiving its gold medal in 1894 for his discovery and measurement of double stars. In 1900 the Yerkes Observatory issued a catalogue of the stars he discovered. In 1904 he was awarded the Lalande prize of the Paris Academy of Sciences. He published (General Catalogue of Double Stars within 121° of the North Pole) (1906) and (Measures of Proper Motion Stars) (1913).

BURNHAM BEECHES, England, remains of an ancient forest in Buckinghamshire. It is situated some 25 miles northwest of London, and is famous for its enormous beech trees. Since 1883, the Burnham Beeches tract of 374 acres has been open to the public as a park by the Corporation of London.

BURNING-BUSH, or WAAHOO, a tall

shrub (Euonymus atropurpureus) of the natural order Celastraceaz with oval-oblong leaves and purple flowers occurring in fours. It is com¬ mon throughout the Middle West from New York to Wisconsin and Nebraska, and south¬ ward. It is sometimes cultivated for the orna¬ mental effect of its long drooping peduncles of crimson fruit.

BURNING BUSH, The, the place from out of which Yahwe spoke to Moses on Sinai, when he gave him the tables of the law (Exod. iii, 2-4). The story as there told would ap¬ pear to have resulted from a fusion of two widely current beliefs — that fire indicated the Divine Presence and that certain trees were the permanent abode of deities. In Deut. xxxiii, 11, another form of the story is hinted at ac¬ cording to which the bush was Yahwe's per¬ manent dwelling. The fiery appearance in Exodus is clearly regarded as temporary. Rob¬ ertson Smith cites some parallels from non-biblical sources, and argues that <(the original seat of a conception like the burning bush, which must have its physical basis in electrical phenomena, must probably be sought in the clear dry air of the desert or of lofty moun¬ tains. w Consult Baudissin, 'Studien zur semit-ische Religions-geschichte.*

BURNISHER, a blunt, smooth tool, used for smoothing and polishing a rough surface by pressure, and not by removing any part of the body. Other processes of polishing detach the little asperities. Agates, tempered steel and dogs' teeth are used for burnishing. It is one of the most expeditious methods of polishing, and one which gives the highest lustre. The burnishers used by engravers are formed to

burnish with one end and to erase blemishes with the other.

BURNJIRD, Persia, town of the province of Irak-Ajemi, in the Tahji River Valley, about 190 miles north by west of Ispahan. It has manufactories of cottons, felt hats, caps, etc., and a trade in skins, most of which are ex¬ ported to Russia. Roads connect the town with Ispahan and Hamadan. It boasts a castle and numerous mosques. Pop. 25,000.

BURNLEY, England, a parliamentary and county borough in Lancashire, about 29 miles north of Manchester by rail, situated on the small river Brun, near its confluence with the Calder. The town presents a modern ap¬ pearance, and is, generally speaking, well built, mostly of stone. The townhall is a large, handsome building, erected in 1887 ; there is also a commodious exchange, and a convenient market hall. Among the churches the chief place is due to Saint Peter's, an ancient build¬ ing restored in 1867. A splendidly equipped technical school was opened in 1909. The public utilities are nearly all publicly owned. The manufactures and commerce of Burnley have rapidly increased in recent years. The staple manufacture is cotton goods, and there are large cotton-mills, worsted-mills and several extensive foundries and machine-shops, with collieries, quarries and other works in the vicinity. Burnley is situated on the Leeds and Liverpool Canal, has a good water supply and has five railway stations. It seems to have been a Roman station, and various Roman remains have been dug up in and around it. Burnley returns one member to Parliament. Pop.

106,765.

BURNOOSE, a large kind of mantle in use among the Bedouin Arabs and the Berbers of northern Africa, commonly made of white or undyed wool, but sometimes also of red, blue, green or some other color, and having a hood which may be drawn over the head in case of rain. In Spain also a similar garment is worn which bears the similar name of albornoz, and the name has also been applied to different kinds of upper garments worn by women of other European countries.

BURNOUF, bur-noof, Emile Louis,

French Orientalist, cousin of Eugene Burnouf (q.v.) : b. Valognes,

Manche, France, 25 Aug. 1821 ; d. 1907. After a normal school training, he became professor of ancient literature in the faculty of Nancy, and in 1867 director of the French School in Athens. Among his works are ‘Essay on the Veda) (1863); Sanskrit-French Dictionary) (1863-65), the first of its kind in France; ‘History of Greek Literature > (2 vols., 1868) ; ‘Science of Religions) ; ‘The Athenian Legend* ; Essays on Antiquity* (Paris 1879) ; ‘Method of Studying Sanskrit (1859, 3d ed., Paris 1885) ; ‘The Mythology of the Japanese,* according to the ‘Koku-si-Ryakel,* the first translation of the work into a European tongue (1875) ; ‘The City and the Acropolis of Athens) (Paris 1877) ; and ‘Contemporary Catholicism * (1879). He also edited the letters of his cousin, Eugene Burnouf.

BURNOUF, Eugene, French Orientalist: b. Paris, 12 Aug. 1801 ; d. there, 28 May 1852. He commenced his studies at the College of Louis-le-Grand, became a pupil in the £cok.

des Chartes in 1822, passed as a lawyer in 1824 and soon after devoted himself to the study of Oriental languages. In 1826 he attracted the attention of men of learning throughout Europe by publishing, in conjunction with his friend, Lassen, an (Essay on the Pali,’ or the sacred language of the Buddhists in Ceylon and the Eastern Peninsula, and in 1827 by furnish¬ ing an explanatory text to the series of litho¬ graphic plates prepared by Geringer and Cha-brelle to illustrate the religion, manners, cus¬ toms, etc., of the Hindu nations inhabiting the French possessions in India. This work was not completed till 1835. In 1832 he was ad¬ mitted into the Academy of Inscriptions, and in the same year was appointed to the professor¬ ship of Sanskrit in the College de France, an office which he held till his death. His fame is chiefly due to his having, so to speak, restored to life an entire language, the Zend or old Persian language in which the Zoroastrian writings were composed. Anquetil-Duperron had ob¬ tained the text of the extant works of this sacred language of the Persians. It is the glory of Burnouf to have interpreted those works with the aid of the Sanskrit. To this part of his labors belongs his (

Extrait d'un commentaire et d'une traduction nouvelle du Vendidad-Sade' (1830) ; Observations sur la grammaire de M. Bopp) (1833); (Commentaire sur le Yaqna' (1833-35). Burnouf also distinguished himself by his labors on Buddhism. On this subject he published the text accompanied by a translation of the (Bhagavata Purana' (1840-47) ; Hntroduction a l'histoire du Bouddhisme Indien) (1st vol., 1844), *etc.* A fortnight be¬ fore his death the Academy of Inscriptions elected him secretary for life. Consult Lenormant, (Eugene Burnouf' (Paris 1852) ; Bar-thelemy-St. -Hilaire, (Notice sur les travaux cie M. Burnout-' (in the 2d ed. of the Untroduction a l'histoire du Bouddhisme) (1876) ; (Choix de Lettres d'Eugene Burnouf ' (1891).

BURNOUF, Jean Louis, French classical scholar: b. Urville, Manche, 1775; d. Paris, 1844. He was appointed assistant professor at the College Charlemagne in 1807 and professor of Latin there in 1816. In 1840 he became uni¬ versity librarian. He exercised a profound influence on classical learning in France. He published a translation of <Tacitus) (6 vols., 1827-33, 1881) and a (Methode pour etudier la langue grecque) (1814, 1893).

BURNS, Anthony, American fugitive slave : b. Virginia, about 1830 ; d. Saint Catherine's, Ontario, 27 July 1862. Escaping from slavery he worked in Boston during the winter of 1853-j64; but on 24 May 1854 — the day after the repeal of the Missouri Compromise and the passing of the Kansas-Nebraska Bill had in¬ flamed the North against the slave power — was arrested on warrant of Charles F. Suttle through his agent Brent. The next day he was taken before United States Commissioner Ed¬ ward G. Loring for examination; but Wendell Phillips and Theodore Parker secured an ad¬ journment for two days. Burns, meanwhile, was confined in the courthouse under a strong guard, and on the evening of the 26th a great mass meeting in protest was held at Faneuil Hall. T. W. Higginson and others had planned to stampede the meeting into storming the courthouse and rescuing Burns, and at the ap¬

pointed time battered in a door and attempted the rescue themselves, relying upon assistance in their undertaking. The size of the meet¬ ing, however, prevented the signals from work¬ ing well and the leaders from emerging, and after a scuffle in which a deputy was fatally stabbed and several assailants wounded, the latter retired. The next day Loring, an ardent upholder of the Fugitive Slave Law, delivered Burns to his claimant on evidence entirely il¬ legal and worthless even under that law. Es¬ corted by a strong military guard,

Burns was taken to a government cutter, through streets draped in mourning and crowds ready to stone the soldiers. A riot at the wharf was only pre¬ vented by the action of Rev. Daniel Foster upon his saying ((Let us pray!® The crowd uncov¬ ered and stood quiet while Burns was taken on board. Indictments were drawn against his would-be rescuers, but quashed for want of evi¬ dence. Burns afterward gained his liberty, studied theology at Oberlin College and was eventually settled over a Baptist colored church in Saint Catherine's, Ontario, where he died. Consult Stevens, (Anthony Burns: a History' (1856) ; Adams, (Richard Henry Dana: a Biography' (1891); Higginson, <Cheerful Yes¬ terdays' (1898).

BURNS, John, English labor organizer and statesman : b. London, October 1858. He was of humble birth and became a factory employee at the age of 10. He was an omnivorous reader and imbibed his socialistic views from a French fellow laborer. By working a year as engineer on the Niger River, he earned enough for a six months' tour of Europe. He constantly ad¬ dressed audiences of workingmen, and was a persistent labor agitator. He was one of the leaders in the West End riot in London, Feb¬ ruary 1886, and was imprisoned the same year for maintaining the right of public meeting in Trafalgar square. He, in conjunction with Ben Tillett, organized the successful dock strike in London in 1889. He has been thrice elected to the London county council and has sat in the House of Commons as Labor mem¬ ber for Battersea since 1892. From 1905-14 he was president of the Local Government Board, and in the latter year he became presi¬ dent of the Board of Trade. On the out¬ break of the Great European War in August 1914, on account of the war policy of the As¬ quith cabinet, he resigned his place in the gov¬ ernment.

BURNS, Robert, Scottish poet : b. near Ayr, Scotland, 25 Jan. 1759; d. Dumfries, 21 July 1796. His father, William Burnes or Burness, a native of Kincardineshire, had been a gar¬ dener, but at the time of the poet's birth was a nurseryman on a small piece of land on the banks of the Doon in Ayrshire. He was a man of strong intelligence and deep piety, but un¬ successful in his struggle with poverty. His mother was Agnes Brown, a woman of ability, and, though of meagre book education, well versed in folk-song and legend. Robert, the eldest of seven children, went to school for three years, 1765-68, under John Murdoch in the neighboring village of Alloway. Later he was in attendance for a few months each at Dal-rvmple parish school in 1772, at Ayr Academy in 1773 and at Kirkoswald about 1776; but the

more important part of his education he re¬ ceived from his father and his own reading. In 1766 William Burness had borrowed money to rent the farm of Mount Oliphant; and the future poet by the time he was 16 was do¬ ing a man's work, overstraining his immature physique in performing his share in the vain effort of the family to keep its head above water. The scene of the struggle was moved in 1777 to Lochlea, about 10 miles distant, where in 1784 his father died. During the Lochlea period, Burns, ambitious to improve his position, went to the neighboring town of Irvine to learn flax-dressing. Nothing came of this move; but while resident there he formed that acquaintance with a dissipated sailor to which he himself ascribed the beginning of his licentious adventures. On his father's death, Robert and his brother Gilbert rented the farm of Mossgiel, but this experiment was no more successful than those previously made. While here he contracted an intimacy with Jean Armour, which brought upon him the censure of the Kirk-session. Finally the poet, dis¬ heartened by successive bad harvests and irri¬ tated by the attempts of his father-in-law to cancel his irregular marriage with Jean and to hand him over to the law, determined to emi¬ grate. For 10 years he had been composing verses, some of which had brought him con¬ siderable local fame, and these he collected and published in order to raise money for the voy¬ age ; but the unexpected success of this volume (Kilmarnock 1786) roused his literary ambition, gave him fresh courage and led him to change his plans. Instead of sailing for the West Indies, he went to Edinburgh in November 1786, and during that winter was the literary lion of the season. Here he met such celebrities as Dugald Stewart, the philosopher ; Blair, the rhetorician; Henry Mackenzie, the author of (The Man of Feeling-* ; Lord Glencairn ; the Duchess of Gordon, and Creech, the publisher. The last named undertook an enlarged edition of his poems (Edinburgh 1787) ; and while waiting for the profitˆ of this volume, Burns made several tours through the country, traces of which are to be found in a number of occa¬ sional poems. Creech finally paid him enough to enable him to give substantial help to his brother in Mossgiel, and to rent and stock the farm in Ellisland in Dumfriesshire. Hither in 1788 he brought Jean Armour, to whom he was now regularly married, his success and fame having reconciled her parents to the match ; and for

three years he tried farming. But failure still dogged him, and in 1791 he moved to Dumfries, where he lived on a posi¬ tion in the excise service which he had obtained while still at Ellisland through the influence of some of the powerful acquaintances he had made in Edinburgh. He had, however, lost heart ; and after a few years of drudgery, varied with the drinking bouts to which he was con¬ stantly tempted both by habit and by the invita¬ tion of foolish admirers, he died at Dumfries in his 38th year.

Biographies of Burns have frequently been crowded with attempts to disentangle or to ex¬ plain away the facts of his numerous amours. There is much controversy over the identity of the semi-mythical Mary Campbell, the ((Highland Mary® of the songs; much curiosity over the precise degree of Platonism in his feeling

for Mrs. McLehose, the ((Clarinda® of his let¬ ters, and the inspirer of a number of lyrics; much difference of opinion as to whether and how long he was in love with his wife. Into these details we do not enter. It is clear enough that Burns was a man of exceptionally power¬ ful passions, that the extreme and depressing hardships of his youth, and, indeed, of the greater part of his life, along with his natural tendencies to conviviality, drove him to excesses of self-indulgence; and that while he strove often and painfully after better things, his striving was many times without avail. <(The sport,® he calls himself, <(the miserable victim of rebellious pride, hypochondriac imagination, agonizing sensibility and bedlam passions.® These phrases are true enough, though they do not imply the further explanation of his pitiful career that is found in the habits of his class and time, and the untoward nature of his en¬ vironment.

Something of his education has already been indicated. His schooling left him with a good grammatical knowledge of English and a read¬ ing knowledge of French. His father's care and his own eagerness gave him no slight knowledge of literature ; and among other authors we know that he read, of older liter¬ ature, the Bible, Shakespeare, Spenser, Johnson, Bunyan, Drvden, Locke, Moliere, Wycherley; of his own century, Addison, Steele and Pope; Ramsay, Fergusson, Thomson and Beattie ; Fielding, Smollett, Sterne and Mackenzie ; Shenstone, Gray, and Goldsmith ; Hume, Rob¬ ertson and Adam Smith, and a number of philosophical and theological works. This list is by no means complete, but it is sufficient to correct the impression that Burns's was an (<untutored Muse.®

The literary influences apparent in the work of Burns are of two main classes : English and Scottish. So far as he fell under the former of these he was an inferior poet of the school of Pope, an ardent admirer and imitator of such a minor master as Shenstone. In this field his critical judgment was never more than com¬ monplace, and his imitations never first-rate. Almost all of his greatest work was done in his native dialect; and here he is the heir, as well as the last great representative, of an ancient national tradition. Previous to the 17th century there existed a Scottish literature of consider¬ able variety and distinction, produced in part under the patronage of the court. But the Ref¬ ormation and the union of the crowns of Eng¬ land and Scotland resulted in the disuse of the vernacular for dignified and courtly writing, and it rapidly lost social prestige, until as a literary medium it survived only in the songs of the peasantry and in an occasional piece of satire. The 18th century, however, saw a revival of interest in purely Scottish letters, and the publication of such compilations as Watson's (Choice Collection of Comic and Serious Scots Poems) (1706-09-11), and Allan Ramsay's (Evergreen > (1724) and (Tea-Table Miscellany* (1724—27) was the result of an impulse that showed itself also in renewed attempts to com¬ pose in dialect. Among the most important leaders in this movement were William Hamil¬ ton of Gilbertfield (who modernized the 1 5th century poem on Wallace), Allan Ramsay and Robert Fergusson; and each of these had a share in inspiring Burns to work in that field

in which he achieved his greatest triumphs. Their influence was both general and particular. They showed him by their own success what could be done in the native idiom ; and they gave him models of which he was not slow to avail himself. Many of Burns's best known poems are all but imitations of productions, usually inferior, by Ramsay and Fergusson, and to them and their poetical ancestors he wras indebted not only for suggestions as to theme and method of

treatment, but also for his most characteristic verse-forms. This readiness on the part of Burns to accept from his prede¬ cessors all that they had to give, and to seek to maintain loyally a national tradition rather than to strive after mere novelty, has much to do with his success in carrying that tradition to its highest pitch, and in becoming, in a sense almost unique, the poet of his people.

The first kind of poetry which Burns thor¬ oughly mastered was satire; and the most im¬ portant of his successful efforts in this form, (The Twa Herds, or the Holy TulzieF (Holy Willie's Prayer, J The (Address to the Unco Guid, > (The Holy Fairˆ and the (Address to the DeilP were all written within less than a year (1785-86). Whatever Burns's feelings may have been about what he suffered in his own person from the discipline of the Kirk, it is clear that the impulse that gave these poems their fire and their influence was something much larger than mere personal grudge. Against the narrow dogma and tyrannical con¬ duct of the socalled ((Auld Licht® party in the Scottish Church, there had sprung up the (<New Lichts,® demanding some relaxation of Calvinistic bonds and preaching charity and tolerance. Though not a member of this or any ecclesias¬ tical faction, Burns sympathized strongly with their protest; and the shafts of his satire were directed against both the doctrines of the ortho¬ dox party and their local leaders. For some time after the Reformation the Scottish people seem to have submitted willingly to the rig¬ orous domination of the Presbyterian ministers; but, after the struggle against Rome and the persecutions of the Covenanting times had alike become matters of history, there began to ap¬ pear a more critical attitude toward their spiritual leaders. The revolt against authority that spread throughout Europe in the latter part of the 18th century manifested itself in Scot¬ land in a growing disposition to demand greater individual liberty in matters of conduct and belief. It was this disposition that Burns voiced in his satires, the local conditions determining the precise direction, of his attack. The sub¬ stantial justice of his cause, the sharpness, of his wit, the vigor of his invective, and the im¬ aginative fervor of his verse, all combined to bring the matter home to his countrymen ; and he is here to be reckoned a great liberating force.

Several of the satires were published in the Kilmarnock volume, and along with them a va¬ riety of other kinds of poetry. In the words of his preface, (<he sings the sentiments and man¬ ners he felt and sawT in himself and his rustic-compeers around him.® Some of these are de¬ scriptive of sides of humble Scottish life with which he himself was in the closest contact. (The Twa Dogs) gives a democratic peasant's views of the lives of lairds and farmers; and the sketch of the

factor in this poem has been

taken as a reminiscence of what his father had to endure from the arrogance of such an agent. (The Cotter's Saturday Night> describes with affectionate reverence the order of his father's house; <Puir MailieR (The Auld Mare Mag¬ gie, > (To a Mouse,) and others, reveal the kind¬ liness of the poet's heart in his relation to animals; ˆallowe'eiP gives a vivid picture of rustic mirth and manners, and preserves a mass of folklore. Of the additional poems that appeared in the Edinburgh editions the most notable was (Tam o' ShanterP Burns's best sus¬ tained piece of narrative, a poem that indicates that, had he worked his vein farther, he might have ranked with Chaucer as a teller of tales in verse.

A large quantity of Burns's poetry remained in manuscript at the time of his death. Of this, much the most remarkable is (The Jolly Beg¬ gars, } in the opinion of many his most brilliant production. This cantata carries to its highest point the far-descended literature of the rogue and the beggar, and its superb spirit and aban¬ don show how heartily the poet could sympa¬ thize with the very dregs of society. It is to be noted that, alone among pieces that reach his highest level, it is chiefly in English. Burns wrote besides a large number of epistles, epi¬ grams, epitaphs and other personal and occa¬ sional verse, the quality and interest of which vary much, but throughout which one con¬ stantly finds phrases and stanzas of superb quality. He came to write verse with great' ease; but the result of the training he gave him¬ self in artistic discrimination was to check mere fluency, and to lead him to discard much that was of inferior value in his improvisations. Thus the proportion of his work possessed of real poetic distinction is very high.

But the national importance of Burns, though increased by his influence upon the liberalizing movements of his time, and by his vital de¬ scriptions and characterizations of the peasant life of the Scotland of his time, is based chiefly on his songs. The period of Presbyterian des¬ potism already referred to had forced the lyric muse of Scotland into low company and as a result Burns found Scottish song still pure and fine in melody, but hopelesly degraded in point of both poetry and decency. From youth he had been interested in collecting the sordid frag¬ ments he heard sung in cottage and tavern, or found printed in broadsides and chapbooks ; and the resuscitation of this all-but-lost national heritage came to be regarded by him in the light of a vocation. Two points are especially to be noted about his song-

making: first, that almost all sprang from real emotional experiences; second, that almost all were composed to a pre¬ viously existing melody. He had begun the composing of love-songs while still almost a boy, and he continued it to the end. During his visit to Edinburgh in 1786-87, he formed a con¬ nection with the editor of Johnson's Musical Museum, and for this publication he undertook to supply material. Few of the traditional songs were such as could appear in a reputable volume, and Burns's task was to make them over into presentable form. Sometimes he re¬ tained a stanza or two, sometimes only a line or refrain, sometimes merely the name of the melody : the rest was his own. His method was to familiarize himself with the traditional air, to catch a suggestion from some stanza or

phrase of the old song, to fix upon an idea or situation for the new poem; then, humming or whistling the melody about the fields or the farmyard, as imagination and emotion warmed within him, he worked out the new verses, com¬ ing into the house to write them down when the inspiration began to flag. Careful consideration of this process, for the reality of which we have his own authority as well as the evidence of the raw material and the finished product, will explain much of the precise quality and func¬ tion of Burns as a song-writer. In George Thomson's collection of (Scottish Airs) he had a share similar to that in Johnson's undertak¬ ing, his work for these two publications con¬ stituting the greater part of his poetical activity during the last eight or nine years of his life. It was characteristic that, in spite of his finan¬ cial stringency during these years, he refused to accept any recompense, preferring to regard this as a patriotic service. And a patriotic service it was of no small magnitude. By birth and temperament he was singularly fitted for just such a task, and his fitness is proved not only by the impossibility of separating, by a mere examination of the finished songs, the new from the old, but by. the unique extent to which his productions were accepted by his country¬ men, and have passed into the life and feeling of his race. See Tam o" Shanter; Cotter's Saturday Night; Jolly Beggars, the.

Bibliography. — Early collections by Currie, Allan Cunningham, Hogg and Motherwell have been incorporated in modern editions. Consult Chambers, R. and Wallace, W. (4 vols., London and New York 1896) ; W. Scott Douglass (6 vols., Edinburgh 1877-79 and 3 vols., Edin¬ burgh 1893) ; Smith, Alexander, ˆGlobe® edition (1 vol.) ; ˆCambridge11 edition (Boston 1897); Lang, A., and Craigie, W. A., (1 vol., New York 1896) ; McKie, (Bibliography of Burns 1 (Kilmarnock 1881); Henley, W. E. and Hen¬ derson, T. F., (The Centenary of Burns) (4 vols., Edinburgh, 1896) ; Henderson, T. F., (Robert Burns1 (New York 1904) ; Dougall, (The Burns Country 1 (New York 1911) ; Wal¬ lace (editor), Correspondence between Burns and Mrs. Dunlop) (London 1898) ; Carlyle, (Burns 5 in his (Essays > (London 1847) ; Ste¬ venson, (Robert Burns> (in (Familiar Sketches of Men and Books1 (London 1882).

William A. Neilson, Professor of English, Harvard University.

BURNS, William Chalmers, Scottish Prot¬ estant missionary: b. Dun, Forfarshire, 1815; d. 1868. He received his education at Aber¬ deen University and entered on the practice of law, which he soon abandoned to enter the mis¬ sionary field in 1839. For about seven years he led great revivals throughout the British Isles, but set out for China in 1846. He was very successful, having adopted the native cos¬ tume and manner of life and becoming a fluent speaker in the native tongue. Consult Burns, (Memoir of William Chalmers Burns 1 (1870).

BURNS, William Wallace, American soldier : b. Coshocton, Ohio, 3 Sept. 1825 ; d. Beaufort, S. C., 19 April 1892. He was gradu¬ ated from West Point in 1847. He served in the war with Mexico and also in the Union army during the Civil War, becoming major-general of volunteers. In 1865 he was brevetted

brigadier-general and was for many years af¬ terward in the Commissary Department at Washington, until 1889, when he retired, with the regular rank of colonel.

BURNSIDE, Ambrose Everett, American soldier: b. Liberty, Ind., 23 May 1824; d. Bris¬ tol, R. I., 13 Sept. 1881. He served an appren¬ ticeship to a tailor, but received a nomination to West Point, where he was graduated in 1847. After serving some years in garrison duty, he left the army as first lieutenant in 1852, and from 1853 to 1858 was engaged in the man¬ ufacture of firearms at Bristol, R. I., during this

period, in 1856, inventing the Burnside breech-loading rifle. On the outbreak of the Civil War (q.v.) in 1861, he returned to the army as colonel of volunteers, serving from May to August of that year as colonel of the Rhode Island Volunteers, and as such taking part in the first battle of Bull Run (q.v.). On 6 August he was promoted brigadier-general of volunteers and from October 1861 to January 1862 supervised the organization of the ((Coast Division® of the Army of the Potomac. From January to July 1862 he commanded the De¬ partment of North Carolina; in February cap¬ tured Roanoke Island, occupied Newbern, N. C., and took Fort Macon, Beaufort. He was raised to the rank of major-general of volunteers on 18 March 1862 and placed in command of the troops that subsequently constituted the 9th Army Corps. In July 1862 and again after the second battle of Bull Run (q.v.) he was offered the command of the Army of Virginia which, after the battle of Bull Run, had been merged into the Army of the Potomac, but each time declined the offer and served with the 9th Army Corps under McClellan. In this capacity he participated in the Maryland campaign (q.v.) against Lee, rendering important services in the battles of South Mountain and Antietam (qq.v.), in the latter action on 17 September command¬ ing the left wing. On 10 November of that year he superseded General McClellan in com¬ mand of the Army of the Potomac. On 13 December he crossed the Rappahannock and attacked General Lee near Fredericksburg, but was repulsed with a loss of over 10,000 men, and was soon after transferred to the Depart¬ ment of Ohio. In November 1863 he success¬ fully held Knoxville against a superior force, and in 1864 he led a corps, under General Grant, through the battles of the Wilderness and Cold Harbor. Resigning in April 1865, he was elected governor of Rhode Island (1866-68), and United States senator in. 1875 and 1881. Con¬ sult Poore, (Life and Public Services of Am¬ brose E. Burnside 1 (Providence 1882) ; Wood¬ bury, (Major General Burnside and the Ninth Army Corps1 (Providence 1867).

BURNSIDE, Helen Marion, English art¬ ist and poet : b. Bromley Hall 1844. She pub¬ lished a book of poems in 1864, which made her widely known. From 1880 to 1889 she was designer to the Royal School of Art Needle¬ work. She has published (The Lost Letter,1 ‘Tales for Children,1 <The Girl without a Penny1 and many occasional contributions in prose and verse to leading magazines.

BURNSIDE, Ky, town in Somerset County on the South Fork River, and on the C. B. & C. R. and Cincinnati & Southern rail-

roads. The chief industries are lumber manu¬ factures and roller mills. Taxable property amounts to $800,000. Pop. 1,500.

BURNT OFFERING, one of the sacrifices enjoined on the Hebrew Church and nation. It is called, in their language, olah, from the root alah, to ascend, because, being wholly con¬ sumed, all but the refuse ashes, was regarded as ascending in the smoke to God. In the New Testament it is called holokautoma, meaning a whole burnt offering, an offering wholly burnt. In the Vulgate it is called holocaustum, which has the same meaning. Stated burnt offerings were presented daily, every Sabbath, at the new moon, at the three great festivals, on the day of atonement and at the feast of trumpets. Private ones might be presented at any time.

BURNT SIENNA, an ochreous earth known as sienna earth (terra di Sienna) sub¬ mitted to the action of fire, by which it is con¬ verted into a fine orange-brown pigment used in both oil and water-color painting.

BURNT STONES, a kind of carnelian often met with in ruins. The red color dis¬ played by holding it up to the light is believed to be the result of fire and artificial methods toward the same end have been tried with more or less success.

BURNT UMBER, a pigment of reddish-brown color obtained by burning umber, a soft earthy mixture of the peroxides of iron and manganese, deriving its name from Umbria in Italy.

BURNT WOOD WORK. See Pyrog—

RAPHY.

BURNTISLAND, burnt-i’land, Scotland, a royal burgh and seaport of Fife, on the north shore of the estuary of the Forth, 7f4 miles north by west of Edinburgh and five miles by steam ferry north of Granton. It is a favorite summer residence and bathing-place as well as a busy port. Its parish church dates from 1594, and close by is Rossend Castle, where Chastel-ard’s indiscreet love affair with Mary Queen of Scots

was followed by his execution. The har¬ bor is capacious, of great depth and of easy access, and the docks are extensive and well equipped. Vegetable oil and oilcake are made, and there are railway repairing works and a distillery. It unites with Kinghorn, Dysart and Kirkcaldy in sending a member to Parliament. Pop. 4,708.

BURPEE, Lawrence Johnston, Canadian author: b. Halifax, Nova Scotia, 5 March 1873. He entered the Canadian public service in 1890; in 1905 he was appointed librarian of the Car¬ negie Public Library, Ottawa. In 1912 he was appointed secretary of the Canadian section of the International Joint Commission. In addi¬ tion to editorial work for the publications of the Canadian Archives and the Royal Society of Canada, contributions to various encyclo¬ pedias and ˆCanada and Its Provinces,' he has published, among others, the following works :

(Bibliography of Canadian Fiction) (1904) ; (The Search for the Western Sea' (1907), a notable contribution to the history of explora¬ tion; (By Canadian Streams) ; (Songs of French Canada' (1909) ; dictionary of Cana¬ dian History) (with A. G. Doughty) ; <La Verendrye and the Western Sea) (1911) ; c Canadian Humour' (1912) ; * Among the

Canadian Alps' (1914); (Sandford Fleming, Empire Builder' (1915).

BURR, Aaron, American clergyman : b. Fairfield, Conn., 4 Jan. 1716; d. Princeton, N. J., 24 Sept. 1757. He was graduated at Yale and was settled as pastor of the Presbyterian Church of Newark, N. J. In 1748 he became president of the College of New Jersey, now Princeton University, succeeding the first presi¬ dent, Dickinson, who held office only a few months. He married a daughter of Jonathan Edwards, and was the father of Aaron Burr (q.v.), third Vice-President of the United States. He published a Latin grammar, known as the (Newark Grammar,' and (The Supreme Divinity of Our Lord Jesus Christ.'

BURR, Aaron, American statesman : b. Newark, N. J. (son of the preceding), 6 Feb. 1756; d. Port Richmond, Staten Island, 14 Sept. 1836. Before he was three years old his parents died, leaving him a considerable estate. He entered the sophomore class of Princeton College in 1769, and was graduated in 1772. At the outbreak of the Revolution Burr enlisted as a private and joined the force before Boston. He volunteered for the expedition against Can¬ ada and took part in the attack upon Quebec. For this service he was raised to the rank of major. As aide-de-camp to General Putnam, Burr was engaged

in the defense of New York, and shortly after (1777) was promoted lieuten¬ ant-colonel with the command of his regiment, the colonel being a civilian. He was at Valley Forge, and distinguished himself at the battle of Monmouth, where he commanded a brigade in Lord Stirling's division. During the winter of 1778 he was stationed in Westchester County, N. Y., but early in the following spring he resigned his commission, partly on account of ill health, and partly through disappointment at not being more rapidly promoted. Burr be¬ longed to the Lee and Gates factions ; he always affected to despise the military talents of Gen¬ eral Washington; and it is not improbable that these circumstances interfered with his profes¬ sional career. In 1782 he was admitted to the bar in Albany, and in July of the same year he married Mrs. Provost, the widow of a British officer who had died in the West Indies. In 1783 he began to practise in New York, and soon obtained a lucrative business. In politics his success was rapid and brilliant. In 1784 he was elected to the State legislature ; he was appointed attorney-general of New York in 1789 and United States senator in 1791. While in the Senate several influential members of Congress recommended him for the mission to France, but Washington, with marked emphasis, refused to appoint him. He left the Senate in 1797, and the following year was returned to the State legislature. Some aspersions upon his conduct while in that body, which were thrown out by John B. Church, led to a duel between Burr and that gentleman, in which, however, neither party was injured. Burr was very efficient in the presidential can¬ vass of 1800. To his efforts may be attributed the success of the Republicans in New York, upon the action of which State the result in the Union depended. On account of the prom¬ inence he thus obtained the friends of Jefferson brought him forward for the Vice-Presidency. An equal number of votes having been thrown

for Jefferson and Burr in the Electoral College, the election of a President devolved upon the House of Representatives. Most of the Federal members, taking advantage of the singular turn in affairs, supported Burr. The contest lasted several days. Upon the 36th ballot

Jefferson was chosen President, and, in accordance with the provisions of the constitution at that time, Burr became Vice-President. His conduct in permitting himself to be used by his political opponents in order to defeat the candidate of his party, whom he himself had supported, dis¬ solved his connection with the Republicans and destroyed his political influence. The Federal¬ ists nominated him for governor of New York in 1804. Some of the leading men of that party refused to support him, and he was defeated. The contest was bitter and led to a duel between Burr and Alexander Hamilton (q.v.), 11 July 1804, in which the latter was killed. Burr was compelled to give up his residence in New York. After his retirement from the Vice-Presidency in April 1805, he made a journey to the South¬ west. His conduct gave rise to the suspicion that he was organizing an expedition to invade Mexico, with the purpose of establishing an empire there which should embrace some of the southwestern States of the Union. He was arrested in Mississippi and taken to Richmond, Va., for trial upon an indictment for treason. After a protracted investigation before Chief Justice Marshall the prosecution was abandoned and Burr was acquitted in September 1807. In 1808 he went to Europe, expecting to get means to carry out his Mexican design. He was dis¬ appointed ; and after being abroad four years, part of the time in extreme poverty, he returned to America in 1812. He resumed his profession in New York, but never regained his former position at the bar. In 1833 he married *Mme.* Jumel, a wealthy widow, but they soon sep¬ arated. Mr. Burr had but one child, the ac¬ complished Theodosia Allston. (See Burr, Theodosia). In person he was below the me¬ dium height, but his manners and presence were very attractive. He was an adroit, persevering but not a great lawyer. He cannot be said to have been an orator, yet he was an effective and ready speaker. It has been usual to regard Burr as a brilliant, and even a great, man, who was led astray by moral obliquity. In regard to the looseness of his principles, there can be no doubt ; but there is a growing tendency to relieve his name of much of the odium that for¬ merly attached to it. He survived nearly all his contemporaries. His body was laid beside his father's at Princeton. Consult Adams, his¬ tory of the United States) (9 vols., New York 1889-91); Davis, <Memoirs of Aaron Burr) (2 vols., New York 1836) ; Orth, S. R., (Five American Politicians: A. Burr) (Cleveland 1906) ; Parton, (Life of Aaron Burr) (New York 1858) ; Schouler, (History of the United States of America under the Constitution) (6 vols., last ed., New York 1899) ; Tompkins, (Burr Bibliography5 (Brooklyn 1892) ; Todd, <The True Aaron Burr5 (ib. 1902) ; McCaleb, <The Aaron Burr Conspiracy) (ib. 1903).

BURR, Edward, American soldier: b. Boonville, Mo., 19 May 1859. He studied at Washington University 1874-78, and at the United States Military Academy 1878-82, and on graduation at the latter was assigned to

the corps of engineers with the rank of second lieutenant. He was promoted first lieutenant in 1883 and captain in 1894; and as lieutenant-colonel of volunteers commanded the battalion of engineers in the campaign against Santiago de Cuba in June-July 1898. He was appointed colonel 2 March 1912. He is a member of the American Society of Civil Engineers.

BURR, Enoch Fitch, American mathemati¬ cian and clergyman : b. Green's Farms, Fairfield County, Conn., 21 Oct. 1818; d. 1907. He was graduated at Yale in 1839, and became pas¬ tor of the Congregational Church in Lyme, Conn., in 1850. From 1868 till his death he was a lecturer at Amherst College. Among his works are (A Treatise on the Application of the Calculus to the Theory of Neptune f (1848) ; (A Song of the Sea5 (1873) ; (Aleph, the Chal-dean) (1891); cPater Mundi5 (1869); (Ad Fidem5 (1871); (Ecce Terra) (1884); Celes¬ tial Empires-* (1885) ; (Universal Beliefs5 (1887) ; (Supreme Things in their Practical Relations5 (1889) ; besides several historical stories.

BURR, George Lincoln, American his¬ torian : b. Oramel, N. Y., 30 Jan. 1857. He was educated at Cornell University, where he wras graduated in 1881, and studied also at Leipzig, the Sorbonne and at Zurich. He became pro¬ fessor of ancient and mediaeval history at Cor¬ nell in 1888 and in 1898 was appointed librarian of the White Historical Library. In 1896-97 he served as historical expert of the Venezue¬ lan Boundary Commission. He has made an especial study of the history of superstition. He has published (The Literature of Witch¬ craft5 (1890) and (The Fate of Dietrich Flade5 (1891). He edited the Century Historical Series5 and is a member of the editorial staff of the American Historical Review.

BURR, Theodosia (Mrs. Joseph Allston), daughter of Aaron Burr, b. New York 1783; d. 1812. She was carefully educated and be¬ came very accomplished, showing particular linguistic talent. After the death of Mrs. Burr she presided over her father's household until her marriage in 1801 to Governor Allston of South Carolina. Her correspondence with her father after her removal to the South is of great interest and shows continued devotion to his interests. Her beauty, brilliant personality and relationship to the famous statesman

drew public attention to her, especially during her father's trial, and had the effect of enlisting the public sympathy on his behalf. In 1812 she sailed from Charleston in the Patriot for New York, but the vessel was never heard from and was believed to have been lost in the storm or sunk by pirates.

BURR, William Hubert, American edu¬ cator: b. Watertown, Conn., 14 July 1851. He was graduated at Rensselaer Polytechnic In¬ stitute 1872; was employed by the Wrought Iron Bridge Company of New York, and later on the water supply and sewerage systems of Newark, N. J. He was assistant professor and later professor of rational and technical me¬ chanics at Rensselaer Polytechnic Institute 1876-84; became assistant engineer of the Phoe¬ nix Bridge Company 1884, and subsequently its general manager; was professor of engineering in the Lawrence Scientific School of Harvard

University 1892-93 ; consulting engineer to the New York city department of public works 1893-95, of parks and of docks 1895-97, and later of bridges. Since 1893 he has been pro¬ fessor of civil engineering at Columbia, and in 1904 became a member of the Isthmian Canal Commission. He is author of (The Stresses in Bridge and Roof Trusses) (1879) ; (Arched Ribs and Suspension Bridges) (1913); Elas¬ ticity of the Materials of Engineering) (1883) ; (The Theory of Masonry Arches,' 'Ancient and Modern Engineering and the Isthmian Canal' (1902), *etc.*

BURRAGE, Henry Sweetser, American clergyman: b. Fitchburg, Mass., 7 Jan. 1837. He was graduated from Brown University, 1861, and entering the 36th Massachusetts as a pri¬ vate, rose to the rank of captain and brevet-major of volunteers. After the war he resumed his studies, graduated at Newton Theological Institution, 1867, was at the University of Halle, Germany, 1868-69, and became a Baptist clergy¬ man in 1869. He was pastor at Waterville, Me., 1869-73; editor of Zion's Advocate, 1873-1905 ; recording secretary of the American Bap¬ tist Union, 1876-1904; recorder Maine Com-mandery, Loyal Legion, 1889-1912; chaplain National Soldiers' Home, 1905-12; trustee Col¬ by College, 1881-1905; Newton Theological In¬ stitution, 1889-1906; fellow of Brown Univer¬ sity since 1901. He has edited 'Brown Univer¬ sity in the Civil WaP (1868) ; 'Henry W. Longfellow's 75th Birthday' (1882) ; 'History of the 36th Regiment of Massachusetts Volun¬ teers' (1884) ; and has written 'The Act of

Baptism in the History of the Christian Church' (1879) ; (History of the Anabaptists in Switzerland' (1882) ; 'Rosier's Relation of Waymouth's Voyage to the Coast of Maine in 1605' (1887) ; 'Baptist Hymn Writers and their Hymns' (1888) ; (History of the Baptists in New England, (1894) ; 'History of the Baptists in Maine' (1904) ; Gettysburg and Lincoln' (1906); Early English and French Voyages' (1906) ; (Maine at Louisburg in 1745' (1910) ; 'The Beginnings of Colonial Maine' (1914.

BURRARD INLET, an inlet at the south¬ west corner of British Columbia, a little north of the mouth of the Fraser River. It is nine miles long, is one of the finest harbors on the Pacific coast, and has Vancouver, the terminus of the Canadian Pacific Railway, on its south¬ ern shore.

BURRELL, David James, American cler¬ gyman and author: b. Mount Pleasant, Pa., 1 Aug. 1844. He was graduated at Yale in 1867 and at Union Theological Seminary in 1870. He spent four years in mission work at Chicago and thereafter was successively pastor at Dubuque, Iowa, 1876-87, Westminster Church, Minneapolis, 1887-91, and the Marble Collegiate Church, New York. He has pub¬ lished (Religions of the World' (1891) ; Gos¬ pel of Gladness' (1892) ; (The Early Church' (1897) ; 'The Religion of the Future' (1894) ; (The Wonderful Teacher' (1902) ; 'Teachings of Jesus' (1904) ; 'The Lure of the City' (1908); 'The Cloister Book' (1909); 'In David's Town' (1910); 'At the Gate Beauti¬ ful' (1911); 'The Home Sanctuary' (1911); (The Gateway of Life' (1912); 'The Old-Time Religion' (1913) 'The Sermon' (1913); 'The Church in the Upper Room' (1913) ; vou 5 — 5

'We Would See Jesus' (1914); and 'The Apostles' Creed' (1915) ; 'Why I Believe the Bible' (1917).

BURRELL, Martin, Canadian legislator : b. England 1858. He was educated at Saint John's College, Hurstpierpoint, Sussex, and came to Ontario in 1886, where for 14 years he engaged in fruit growing near Niagara. He removed to British Columbia in 1900, and continued at fruit growing and began to take an interest in local politics. He became widely known as an authority on horticulture, and in 1907 the government of British Columbia ap¬ pointed him fruit commissioner and sent him as lecturer to England. In 1908 he was elected as a Conservative to the House of Commons and reelected in

1911. In the latter year he was appointed Minister of Agriculture in the Borden administration.

BURRIANA, Spain, town in the province of Castellon, eight miles south of the town of Castellon, on the river Seco, and about one mile from the Mediterranean. It is situated in a fertile region. Agriculture and fishing are the principal industries and it has a trade in oil, wine and fruit. Pop. 14,243.

BURRILL, Thomas Jonathan, American naturalist: b. Pittsfield, Mass., 25 April 1839; d. 14 April 1916. Graduated, Illinois State Nor¬ mal University in 1865, and in 1867 was botan¬ ist of Powell's first Rocky Mountain Expedi¬ tion. From 1868 he was a member of the faculty of the University of Illinois and held the following offices in the university : pro¬ fessor of botany and horticulture since 1868; dean of the College of Science, 1877-84 ; vice-president since 1879 ; acting president, 1889-90, 1891-94 and 1904; dean of the Grad¬ uate School since 1894. The degree of LL.D. was conferred upon him in 1893 by the North¬ western University. He' was a member of sev¬ eral American and foreign scientific societies, and is well known from his writings under more than 100 titles, mostly upon the parasitic diseases of plants, bacteriology, microscopy, fruit growing, forestry, landscape gardening and modern education.

BURRILLVILLE, R. I., town of Provi¬ dence County, 24 miles northwest of Provi¬ dence, on the New York, New Haven and Hart¬ ford Railroad. It manufactures woolen goods. Nearby is Wallum Lake, a popular summer resort. Burrillville is governed by a town council, chosen every year. Pop. (1920) 8,606.

BURRITT, Elihu ("The Learned Black¬ smith"), American reformer: b. New Britain, Conn., 8 Dec. 1811 ; d. 7 March 1879. The son of a shoemaker, he was educated in the com¬ mon schools of his native village, and at the age of 16 was apprenticed to a blacksmith. An early conceived project of reading the Scrip¬ tures in their original language led him to philological studies in the intervals of labor, and by diligence and a remarkable facility he was soon able to understand works in several languages. He removed to Worcester to take advantage of the library of the Antiquarian Society there, and while still plying his trade became acquainted with the principal ancient and modern languages. In 1846 he went to England, where he formed the "League of Universal Brotherhood," whose object was "to

employ all legitimate means for the abolition of war throughout the world.11 He was con¬ stantly engaged in writing and lecturing, and took a prominent part in all the European peace congresses. He returned to America in 1853. He was consular agent at Birmingham, 1865-68. The promotion of temperance, cheap ocean postage and the abolition of American slavery were leading objects of his continued exertions. His principal publications are ‘Sparks from the Anvil1 (1848) ; (Thoughts and Things at Home and Abroad) (1854) ; (Chips from Many Blocks,1 *etc.*

BURROUGH, BOROUGH, BURROWE, or BORROWS, Stephen, or Stefan, English navigator : b. Devonshire, 23 Sept. 1525 ; d. 1584. In 1553 he took a very active part in the expedition dispatched from the Thames under Sir Hugh Willoughby to look for a northwest passage to Cathay and India. There were three ships in the expedition, one of which was under the command of Burrough, who got separated from the other craft during a storm. He continued the voyage alone, reaching Nova Zembla and the island of Wai-gatz. In 1556 he made a second voyage into the same regions and in 1560 he took charge of another expedition to Russia. In 1563 he was appointed chief pilot and one of the four masters of queen’s ships in the Medway, a position which he held for many years. Bur¬ rough, who reached 70° 30’ N. on one of his Russian expeditions, was looked upon, in his day, as a noted explorer. He seems to have been a very active and intelligent sailor.

BURROUGHS, George, American clergy¬ man : d. Salem, Mass., 19 Aug. 1692. He was graduated at Harvard College in 1670, was a preacher at Falmouth, now Portland, Me., in 1676, and at Salem in 1680. In consequence of some dispute with his people he returned to Portland in 1683, but, when that town was destroyed by the Indians in 1690, came back to Salem. Though a person of unblemished character, he became one of the victims of accusation by the confessing witches. It was testified that two of his wives had appeared to the witnesses, saying that he was the cause of their death, and threatening, if he denied it, to appear in court. He was also accused of performing feats of extraordinary strength by diabolical assistance, such as carrying a barrel of molasses, holding out a gun by a finger

placed in the muzzle, and of having Tortured, afflicted, pined, consumed, wasted and tor¬ mented11 one Mary Wolcott. Although he asserted his innocence so as to draw tears from the spectators, and recited the Lord's Prayer, which it was supposed no witch could repeat without mistake, he was condemned and executed.

BURROUGHS, John, American essayist and literary naturalist: b. Roxbury, N. Y.„ 3 April 1837 ; d. 29 March 1921. In his youth he taught school for about 10 years ; he began early to write for the magazines ; in 1863 he became clerk in the Treasury Department at Washington, D. C., where he worked for 10 years, carrying on his literary activities simul¬ taneously. Later he became a national bank examiner. In 1873 he built "Riverby,11 his home at West Park, on the Hudson, where he lived the rest of his life, devoting himself to fruit cul¬

ture, nature study and literature. In 1862 Mr. Burroughs wrote the poem, 'Waiting,1 by which he is perhaps more widely known than by any of his books. His first book, 'Walt Whit¬ man, Poet and Person,1 was written in 1867, he being the first person of note in the United States to give public recognition of Whitman. His later book on the 'Good Gray Poet,1 'Whitman, a Study,1 was published in 1896, and was the result of many years of comrade¬ ship with the poet. Mr. Burroughs gath¬ ered most of the harvest for his nature books near at home, either at "Riverby,11 in his bark-covered study, or in the region of "Slabsides,11 his retreat back from the Hudson, near West Park, or in later years at "Woodchuck Lodge,® on the farm in the Catskills where he was born. He, however, wan¬ dered away from these haunts occasionally, as his books testify — to many parts of the United States, to Bermuda, the West Indies, the Canadas, twice to Europe, on the Alaskan expedition of 1899 with E. H. Harriman, in the Yellowstone in 1903 with President Roose¬ velt, through the Southwest and Yosemite with John Muir, in 1909, and also to Hawaii. The personal element is very marked in his writ¬ ings, and the charm of his easy familiar style, with his remarkable observation and interpre¬ tation of nature, has done much to popularize the study of nature in our day, while his work on literary criticism, his character studies and his philosophical essays are eagerly welcomed by lovers of good literature. His books, with the dates of their publication, are (Walt Whit¬ man, Poet and Person) (1867) ; 'Wake Robin> (1871); (Winter Sunshine1 (1875); (Birds and Poets1 (1877) ; 'Locusts and Wild Honey1 (1879) ; 'Pepacton1 (1881) ; 'Fresh Fields1 (1884); 'Signs and Seasons1 (1886); 'Indoor Studies1 (1889); 'Riverby1 (1894); 'Whit¬ man,, a Study1

(1896) ; ‘The Light of Day1 (1900); ‘Literary Values1 (1902); ‘Life of Audubon1 (1902); ‘Far and Near1 (1904); ‘Ways of Nature1 (1905) ; ‘Bird and Bough1 Poems (1906) ; ‘Camping and Tramping with Roosevelt1 (1907) ; ‘Leaf and Tendril1 (1908) ; ‘Time and Change1 (1912) ; ‘The Summit of the Years1 (1913) ; ‘The Breath of Life1 (1915) ; ‘Under the Apple Trees1 (1916). Mr. Burroughs has also edited a vol¬ ume of nature poems, ‘Songs of Nature1 (1901) ; and several books have been compiled from his works — ‘Birds and Bees1; ‘Afoot and Afloat1 ; ‘Sharp Eyes1 ; ‘Little Nature Studies1 ; ‘Squirrels and Other Fur Bearers1 ; ‘A Year in the Fields1 ; ‘In the Catskills1 ; and ‘Bird Stories from Burroughs.1

BURROWING BEE, any of the species that burrow in the ground and form their nests there. Among the principal kinds are the Adrena and Halictus. See Bee.

BURROWING OWL, a small owl (Speo - tyto cunicularia) common on the open plains of both North and South America, where it makes its nest in burrows. It is mottled gray in color, has very long legs, scantily feathered and stands erect upon them in a manner different from that of owls generally. It is gregarious, and is especially prevalent on the North Ameri¬ can plains in the “towns11 of the prairie dogs; and in South America it lives with the vizca-chas and cavies, and is thought to warn them by

its excited notes whenever an enemy ap¬ proaches. Among the many unowl-like traits of this curious little exile from the woods is its cry, which has no resemblance to the ordinary hoot of an owl, but more nearly resembles the chattering of a cuckoo. This owl makes its home wherever it can in some abandoned bur¬ row of a ground-squirrel or other animal, but, failing this, it digs a little cave-like hole of its own, which it furnishes with a bed of soft ma¬ terials, whereon are laid about eight globular white eggs. The food of these owls consists almost entirely of insects and mice. Consult Coues, E., (Birds of the Northwest (Wash¬ ington 1874) ; Sclater and Hudson, (Argentine Ornithology * (London 1888).

BURROWS, William, American naval offi¬ cer: b. near Philadelphia, Pa., 6 Oct. 1785; d. at sea, 5 Sept. 1813. He served in the war with Tripoli and commanded the sloop Enterprise in its successful action with the British brig Boxer off the coast of Maine. Both Burrows and the British commander were killed in the fight, and they were buried side by side at Portland. Con¬ gress struck a medal in honor of the victory and its hero.

BURSA, in anatomy, a sac containing a clear fluid between surfaces which move one upon the other. There are two varieties — mucous, or simple cavities between the skin and bony protuberances, as at the knee, and synovial, or sacs between the muscles or ten¬ dons and bony protuberances.

BURSAR, or BURSARY, an endowment in one of the Scotch universities, corresponding to an exhibition in an English university, and intended for the support of a student during his ordinary course and before he has taken a degree in the faculty in which he holds the bursary. Each of the four universities of Scot¬ land has a greater or smaller number of bur¬ saries. As yet the University of Aberdeen is better provided than any of the others with this class of endowments. Bursaries are in the gift sometimes of the Senatus Academicus of the university to which they belong, sometimes of the town council of the city in which the university is situated and sometimes of private individuals. With regard to the manner in which they are bestowed, some are obtained after competitive examination and others are given by the patrons for special reasons. As the former method of bestowing them is found to be the more beneficial in its results, it is gradually becoming the prevailing one, as at Aberdeen it has always been. Bursaries which are in the gift of the Senatus Academicus are all bestowed in this way. In a monastery, the bursar was the one who held and disbursed the income. In the sense of subtreasurer, the term is still used in English universities and in Har¬ vard University and elsewhere. In England it is also applied to candidates for the elementary school-teaching profession receiving mainte¬ nance from the state.

BURSCHENSCHAFT, boor-shen-shaft (Ger.), an association formed in 1815 among students in German universities for the libera¬ tion and union of Germany.

BURSERACEiE (named after the bot¬ anist, Joachim Burser), a family of dicotyledon¬ ous plants, of which there are about 13 genera

and 300 species. The family belongs to the tropics and yields varieties of balsams and resins.

BURSITIS, inflammation of a bursa, most commonly caused by injury. The well-known housemaid's knee is a good example of bursitis. See Joints, Diseases of.

BURSLEM, England, market town and municipal borough in Staffordshire, within the parliamentary borough of Hanley, in «The Pot¬ teries. w It is the oldest of the six towns form¬ ing the potteries and is known as the ((Mother of. the Potteries.** It is well built, chiefly of brick; has electric tramways, a fine townhall, covered market, public baths, hospital and the Wedgwood Institute, comprising a free library, a museum and a school of art, erected in honor of Josiah Wedgwood, who was born at Burs-lem in 1730. The building is an excellent ex¬ emplification of the structural application of ceramics. It has extensive manufactures of china and earthenware, and carries on coal mining. Pop. 41,556.

BURT, Mary Elizabeth, American edu¬ cator: b. Lake Geneva, Wis. ; d. 17 Oct. 1918. She studied at Oberlin College, then took up teaching. For three years she was a member of the Chicago board of education. Later she un¬ dertook editorial work and lecturing. She edited (Little Nature Studies for Little Peo¬ ple* ; (Seed Thoughts from Robert Browning, *etc.; contributed frequently to periodical litera¬ ture and is the author of (Browning's Women* (1889); (Literary Landmarks* (1889); (The World's Literature* (1890); 'German Iliad (Siegfried)* (1892); (Stories from Plato and Other Classic Writers* (1893), and collabo¬ rated in writing (The Literary Primer* (1901) ; 'The Boy General* (1901); 'Poems Every Child Should Know* (1904) ; (Prose Every Child Should Know* (1907) ; (Adventures of Pinocchio* (1908).

BURT, Thomas, English labor leader: b. Northumberland, 12 Nov. 1837. He began work in the coal mines at 10 years of age. He early became immersed in the labor movement ; was secretary for the Northumberland miners from 1865-1913; has represented Morpeth as a Lib¬ eral since 1874; was parliamentary secretary of the Board of Trade from 1892-95, and in 1906 was made a privy councillor.

BURT, William, American Methodist Epis¬ copal clergyman : b. Cornwall, England, 23 Oct. 1852. He was graduated at Wesleyan Univer¬ sity in 1879 and at Drew Theological Seminary in 1881. He spent five years in churches at Brooklyn, N. Y., and in 1886 was appointed presiding elder of the district of Milan in the Italian conference. He was in Rome from 1890 to 1904, and there founded

schools and a publishing house. In 1904 he was made a bishop. His work has been looked upon with disfavor by the Papal Curia because of the proselyting methods adopted. He has published ‘Europe and Methodism* (1909).

BURTON, Edwin Hubert, English clergy¬ man and writer : b. London, 12 Aug. 1870. He was educated at Ware, Ushaw and Oscott; studied law 1888-93; solicitor, . High Court of Justice, 1893. He was ordained a Catholic priest in 1898; was curate at Saint Mary and Michael’s, London, 1898, when he was appointed

to the staff of Saint Edmund’s College, Ware, becoming vice-president in 1902, professor of Church history in 1907 and Weld lecturer in ascetic theology in 1909, He is a fellow of the Royal ‘Numismatic Society, the Royal Histor¬ ical Society and of the East Herts Archaeologi¬ cal Society. He contributed about 300 articles to (The Catholic Encyclopedia,* to the Dublin Review, and is editor of The Edmnndian. He has published (Catalogue of Books in the Li¬ braries at Saint Edmund’s College, Old Hall, printed in England, and of Books written by Englishmen printed Abroad to the Year 1640) (1902) ; (Life and Times of Bishop Challoner* (2 vols., London 1909) ; (Meditations on the Passion by Richard Rolle, Hermit of Hampole, done into Modern English* (London 1906) ; co-author of (Biographies of English Catholics in the Eighteenth Century) ; (Lives of the Eng¬ lish Martyrs> (Vol. I, London 1913).

BURTON, Ernest De Witt, American Biblical scholar : b. Granville, Ohio, 4 Feb. 1856. He was graduated at Denison University in 1876 and at Rochester Theological Seminary in 1882, and went to Europe for further study in Leipzig and Berlin. From 1882-83 he taught in the Rochester Theological Seminary and from 1883-92 in the Newton Theological In¬ stitution, first as associate professor and later a professor of New Testament interpretation, In 1892 he was appointed head professor of New Testament interpretation in the Univer¬ sity of Chicago. Among his works are (Syntax of the Moods and Tenses in New Testament Greek) ; (Harmony of the Gospels for Histori¬ cal

Study, *and (Handbook of the Life of Christ* (in collaboration with W. A. Stevens) ; (Records and Letters of the Apostolic Age* ; (Handbook of the Life of PauP ; Constructive Studies in the Life of Christ) in collaboration with Shailer Mathews (1901) ; Principles and Ideals of the Sunday-School *(1903) ; 4 Bibli¬ cal Ideas of Atonement* (1909) ; (Studies in Mark) (1904), and Tome Principles of Lit¬ erary Criticism and their Application to the Synoptic Problem * (1904). In 1892 he became associate editor of the Biblical World and in 1897 of the American Journal of Theology.

BURTON, John Hill, Scottish historian: b. Aberdeen, 22 Aug. 1809; d. 10 Aug. 1881. He was educated at the grammar school and Marischal College in that city. He studied law and was admitted to the bar in 1831. He never succeeded in gaining much practice and soon turned his attention to literature, contributing to the Westminster, the Edinburgh and North British Reviews; acted for a short period as editor of the Scotsman, and committed that journal to a free-trade policy. With Sir John Bowring he edited Bentham's works, as well as an illustrative (Benthamiana,* with the aim of making more widely known the opinions of the great apostle of utilitarianism and radical¬ ism. His first original work of importance was the (Life and Correspondence of David Hume5 (1846), followed next year by the <Lives) of Lord Lovat and Duncan Forbes of Culloden. In 1849 he published his Political and Social Economy) ; in 1852 he compiled (Narratives from Criminal Trials in Scotland.) He com¬ menced in 1853 the publication of his chief work, the (History of Scotland,* with two vol¬ umes covering the period from the revolution

of 1688 to the extinction of the last Jacobite rebellion in 1746. This was afterward com¬ pleted by seven volumes commencing with Ag¬ ricola's invasion and ending with the revolution of 1688. A second edition of the complete his¬ tory was published in eight volumes in 1873. A series of literary and historical sketches con¬ tributed to Blackwood's Magazine formed the basis of two of his best-known books, (The Scot Abroad) and (The Book Hunter.) His last important historical work was the (History of the Reign of Queen Anne* (1880). In 1854 Mr. Burton was appointed secretary to the Scottish Prison Board, and he continued his connection with this department as a commis¬ sioner of prisons until his death. The success of his (History of Scotland) brought him the appointment of historiographer royal for Scot¬ land. Consult article in Blackwood's Magazine for September 1881, and the memoir by his widow prefixed to (The Book Hunter. *

BURTON, Lewis William, American cler¬ gyman: b. Cleveland, Ohio, 9 Nov. 1852. He was first honor graduate in 1873 of Kenyon College, with A.B., later A.M. and D.D. from University of the South. He was graduated from the Philadelphia Divinity School 1877 ; ordained deacon 1877 and priest in 1878, in the Protestant Episcopal Church; was successively in charge of parishes in Cleveland, Richmond, Va., and Louisville. He was consecrated bishop of the diocese of Lexington (eastern half of Kentucky) 1896. He has published sermons, Episcopal charges and addresses and was au¬ thor of (Annals of Henrico Parish) in J. S. Moore's <Virginiana) (1904). He traveled abroad in 1880 and was a member of the Lam¬ beth conferences of the bishops of the Anglican Communion in 1897 and 1908. He is a member of the Phi Beta Kappa Society and of the Society of Colonial Wars; a trustee of Kenyon College and of the University of the South. He is Episcopal head of Margaret College, Ver¬ sailles, Ky., and of Saint John's Collegiate In¬ stitute and Industrial School, Corbin, Ky.

BURTON, Marion Le Roy, American educator: b. Brooklyn, Iowa, 30 Aug. 1874. He was graduated, A.B., from Carleton Col¬ lege, 1900; Ph.D. from Yale, 1907. He was as¬ sistant professor at Yale, 1907-08; pastor Church of the Pilgrims, Brooklyn, 1908-09; traveled in Europe 1909—10 ; president Smith College, 1910-17 ; president University of Min¬ nesota, 1917-20; president University of Michi¬ gan since 1920. He is a trustee of the Carnegie Foundation for Advancement of Teaching, New York. His published works include (The Problem of Evil* (1909); (The Secret of Achievement* (1913); <Our Intellectual Atti¬ tude in an Age of Criticism* (1913) ; (Life Which is Life Indeed> (1914); 'First Things. >

BURTON, Richard, American poet and journalist: b. Hartford, Conn., 14 March 1861. He was graduated from Trinity College, Hart¬ ford, and took a degree at Johns Hopkins Uni¬ versity in 1887. He was managing editor of the Churchman 1889-90, literary editor of the Hartford Courant 1890-97 and professor of English literature in the University of Minne¬ sota 1893-1902 ; now in charge of the English department of the University of Minnesota. He has published 'Dumb in June* (1895) ; Me¬ morial Day* (1897); 'Literary Likings* (1898);

Eyries of Brotherhood* (1899); (Song of the Unsuccessful (1900); (Life of Whittier* (1900) ; (Forces in Fiction* (1902) ; (Message and Melody* (1903) ; Eiterary Leaders of America *(1904); (Three of a Kind* (1908); 'Masters of the English NoveP (1909) ; (A Midsummer Memory * (1910); (The New

American Drama) (1913); (Bernard Shaw> (1916); Charles Dickens* (1918).

BURTON, Sir Richard Francis, English traveler, linguist and author : b. Barham House, Hertfordshire, 19 March 1821 ; d. Trieste, Aus¬ tria, 20 Oct. 1890. He was educated at Oxford with the intention of entering the Church, but in deference to his own urgent request his father obtained a commission for him in the East India Company's service. He joined the army in 1842, served for some years in Sind under Sir C. Napier, explored the Neilgherry Hills, published an important work on Sind and acquired a complete knowledge of the Persian, Afghan, Hindustanee and Arabic languages. Returning to England in 1851, he soon after¬ ward set out to explore Arabia, disguised as an Afghan pilgrim, and published on his return a (Personal Narrative of a Pilgrimage to El-Me- dinah and Mecca> (1855) as the result of this daring adventure. His next expedition was into the Somali country in East Africa, from whence he proceeded to the Crimea, where he was chief of the staff of General Beatson, and organized the irregular cavalry. After peace was pro¬ claimed, Burton set out in 1856 along with Captain Speke to explore the lake region of central Africa. The expedition was absent three years, and during that time the great Lake Tanganyika was discovered by Burton. Subsequently he made a journey in the West¬ ern States of North America and published an account of the Mormon settlement at Utah in his City of the Saints.) In 1861 he mar¬ ried, and he received the same year an appoint¬ ment as consul at Fernando Po. While ful¬ filling his duties there he explored the Bight of Biafra, visited the Kamerun Mountains and conducted a dangerous mission to the King of Dahomey. Afterward he was transferred to the consulate of Santos in Brazil, and here he explored his own province, visited the Argen¬ tine Republic, crossed the continent to Chile and Peru, returned home after exploring the Pacific coast and published his Explorations of the Highlands of the Brazil. * He was now (1871) made consul of Damascus but was soon recalled, and in the following year, after a journey to Iceland, an account of which he wrote, he was appointed consul at Trieste. While occupying this position he led two expe¬ ditions into Midian (1876-78), and in company with Commander

Cameron he conducted an expedition into the gold-producing country be¬ hind the .Gold Coast. He remained English consul at Trieste until his death. In his latter years his services to geographical science were acknowledged by the gold medals of the French and English Geographical societies, while in 1886 his services to his country were tardily recognized by the honor of K.C.M.G. Besides the books of travel already mentioned, he was the author of many others, such as (Sind, or the Unhappy Valley) (1851); (Goa and the Blue Mountains) (1851) ; (Falconry in the Val¬ ley of the Indus) (1852) ; Eirst Footsteps in

East Africa) (1856) ; (The Lake Regions of Equatorial Africa* (1860); (Abeokuta, or an Exploration of the Kamerun Mountains *(1863); cNarrative of a Mission to the King of Dahomey* (1864) ; (The Nile Basin* (1864) ; (Vikram and the Vampire* (1869) ; Canzibar* (1872) ; (Gorilla Land* (1875) ; Cltima Thule, or a Summer in Iceland) (1875) ; Etruscan Bologna) (1876) ; (Sind Revisited) (1877), and (The Gold Mines of Midian> (1878). In 1885— 88 he published a remarkable literal translation of the cArabian Nights) entitled (Ten Thou¬ sand Nights and a Night,* on which his repu¬ tation is firmly established. His manuscript translation, with notes, from the Arabic of (The Scented Garden,* of great value to schol¬ ars, was burned by his widow, who deemed it an immoral work. Consult Eives* by Hitch-man (1887), Lady Burton (1893), Stisted (1897), Wright (2 vols., 1906).

BURTON, Robert, English clergyman and author: b. Lindley, Leicestershire, 1577 ; d. 1640. He was educated at Oxford, took orders and became rector of Seagrave in Leicestershire. His learning, which was varied and extensive, is copiously displayed in the (Anatomy of Mel¬ ancholy, by Democritus Junior, *first published in 1621 and repeatedly reprinted. He was a man of integrity and benevolence but subject to strange fits of hypochondriac melancholy which rendered his conduct flighty and incon¬ sistent. He is reputed to have undertaken the composition of his ˆAnatomy of Melancholy) with a view to the dissipation of his morbid feelings. Among those who have been most deeply indebted to Burton is Sterne, as may be seen in his (Tristram Shandy.* See Anatomy of Melancholy.

BURTON, Theodore Elijah, American statesman: b. Jefferson, Ohio, 20 Dec. 1851. He received his education at Ohio College and at Oberlin ; entered the practice of law, which he later abandoned for the political field. In 1889— 91 he was in Congress and again in 1895-1909. He was reelected in 1909-11 but resigned to become senator. While in the

House he ren¬ dered important services as chairman of the Committee on Harbors and Rivers. He served as delegate to the Republican conventions of 1904 and 1908, nominating William H. Taft to the Presidency at the latter. In 1913 he became chairman of the senatorial Committee on Can¬ adian Relations and has also been president of the American Peace Society. His published works are Einancial Crises and Periods of Commercial and Industrial Depression (1902) ; Corporations and the State* (1911) ; Eife of John Sherman (1906).

BURTON, a special form of tackle, known either as top burton or sail burton. The for¬ mer are used aboard ship to support the yards when these are rigged for hoisting heavy loads ; the latter are used to hoist sails up to the yard where they are to be bent. They consist of a guide-block, fastened to the under purchase-block and traveling on the hauling line. They help keep the tackle straight and prevent the sail from yawing as it is hoisted aloft. See Tackle.

BURTON-UPON-TRENT, England, a municipal and county borough in Staffordshire, 11 miles southwest of Derby, on the north bank

of the Trent, in a low, level situation. It is substantially built. Malting and iron-founding are carried on to a considerable extent, but it is chiefly celebrated for its excellent ale, of which vast quantities are made for both home consumption and exportation. For nearly three centuries Burton ale has been known and cele¬ brated, but the latter-day development of the trade dates from the opening of the Midland Railway in 1839. There are about 30 breweries at work, giving employment in the various de¬ partments of the trade to about 5,000 men. The largest brewing establishments are those of Messrs. Bass & Co. and Messrs. Allsopp, the former of which covers considerably more than 500 acres of ground, brews 1,400,000 barrels of ale and stout annually and employs 3,000 men. Contrary to common usage, the brewers employ hard water obtained from wells instead of soft water. There are in all about 50 places of worship in the town, which also possesses a grammar school, girls' high school, alms¬ houses, a dispensary and infirmary, a public library and reading-rooms, school

of science and art, handsome public baths, *etc.* A bridge of 34 arches, built in pre-Norman times, was replaced in 1864. Pop. 48,266.

PURTSCHEID, bert'shid, Germany, southern suburb of Aix-la-Chapelle, and until 1897 an independent municipality of the Rhine province. It is noted for its thermal springs and has manufactures of iron, steel, needles and woolen goods. The woolen industry is the largest of all.

BURTSELL, Richard Lalor, American clergyman: b. New York, 14 April 1840; d. Kingston, N. Y., 4 Feb. 1912. He studied in Rome and was ordained to the priesthood in 1862. After returning to the United States and having charge of parishes in New York he was appointed "defender of the marriage tie,® being the first to fill this office, which in 1884 was instituted in the Catholic Church in the United States. Having become connected with the movement headed by Rev.. Dr. McGlynn, he was retired from his parish to one of less prominence in 1890. In 1904 he was elevated to the dignity of domestic prelate by Pope Pius X, and in 1905 was made rector of Saint Mary's Church, Kingston, N. Y.

BURU, one of the Dutch East India islands, in the Indian Archipelago, west of and belongs to the residency of Amboyna. It is oval in shape, 92 miles long and 70 broad, and an area of 3,400 square miles. It has several bays, of which Cajeli is the largest, and contains a safe harbor sheltered from the monsoons. Viewed from this bay the island has a very fine appearance. In the foreground the minarets and native houses are seen through the open¬ ings of the rich tropical vegetation; while lofty mountains, wooded to their summits, shut in the view. The island is watered by 125 streams, large and small. On the northwest side there are vast swamps swarming with crocodiles. The island contains some high mountains — Mount Tumahu having an altitude of 8,530 feet. Bum produces a variety of valuable woods, balsams, resins and odoriferous flowers. The chief arti¬ cle of export is cajeput oil, of which about $50,000 worth is exported yearly; most being sent to Java. The tree from which it is ob¬ tained (Melaleuca cajeputi) grows also upon

the islands of Amboyna, Ceram, Celebes and Sumatra; but the best oil is procured in Buru. The population (about 15,000) consists of Chinese in the interior, and Malays on the coast.

BURWASH, Nathaniel, Canadian educa¬ tor : b. Argenteuil, near Saint Andrews, Quebec, 25 July 1839, of a loyalist family, who left Ver¬

mont during the American Revolution. He was educated at Victoria College, Cobourg, and Yale University, and entered the Methodist ministry in 1860. He was professor in Victoria College, 1867-73 ; dean of faculty of theology in 1873, and has been president and chancellor of Victoria University, Toronto, from 1887. He was secretary of education for the Metho¬ dist Church in Canada, 1874—86, and devoted much time toward bringing about university federation in the province of Ontario. He has published (Wesley's Doctrinal Standards) (1881) ; (Handbook on the Epistle to the Ro-mans) (1887) ; Unductive Studies in Theology) (1896); (Manual of Christian Theology >

(1900) ; 'Edgerton Ryerson) (1902).

BURY, Sir George, Canadian railway offi¬ cial : b. Montreal, 6 March 1866. He was edu¬ cated at Montreal College, entered the Canadian Pacific Railway service in 1883 as clerk in the purchasing department, rose to be general superintendent of the Central Division, Winni¬ peg, and in 1911 was appointed vice-president of the company and manager of their western lines. He was knighted in 1917.

BURY, John B., Irish scholar: b. 16 Oct. 1861. He was graduated from Trinity College, Dublin, in 1893 became professor of modern history in Dublin University, professor of Greek there in 1898, and Regius professor of modern history at Cambridge University since 1902. He has written 'History of Greece to Death of Alexander the Great > (1902) ; and has edited Pindar's Usthmian Odes5 ; and (Ne-mean Odes) ; Freeman's 'History of Federal Government in Greece and Italy ' ; and Gibbon's 'Decline and FalP ; 'Life of Saint Patrick) (1905) ; 'The Ancient Greek Historians5 (Har¬ vard Lectures 1908) ; 'Constitution of the Later Roman Empire) (1909) ; 'History of the Eastern Roman Empire) (1912) ; 'History of Freedom of Thought* (1913) ; and Freeman's 'Historical Geography of Europe) (1913).

BURY, Richard de. See Aungerville,

Richard; Philobiblon.

BURY, England, a municipal and parlia¬ mentary borough, in Lancashire, 10 miles north-northwest of Manchester. It is well situated on rising ground between the Irwell and the Roche, and, being much improved in recent times, now presents the appearance of a clean and well-built town. It has a handsome town hall and athenaeum, a technical school and art gallery, Trevelyan Club, and Philips Hall, *etc.* Among the churches, Saint Mary's (the parish church) and Saint

Thomas' are perhaps the finest, being highly ornate Gothic buildings with tower and spire. Bury was at one time the seat of a woolen industry introduced by the Flemings in the 14th century. The staple manu¬ facture is that of cotton, and it was here that John Kay invented the fly-shuttle. There are also large woolen factories, bleaching and print¬ ing works, dyeworks, foundries, *etc.* The

borough owns and operates the water supply, gas and electric undertakings. Sir Robert Peel was born at Chamber Hall in the vicinity in 1788; and a bronze statue of him adorns the town. Bury returns one member to Parlia¬ ment. Pop. 59,040.

BURY SAINT EDMUNDS, England, parliamentary and municipal borough in West Suffolk, situated on the Lark, 26 miles north¬ west of Ipswich. It contains two fine churches, those of Saint James and Saint Mary. Among other buildings a shire-hall, a guild-hall, a corn exchange, athenaeum with library, *etc.* Agricul¬ tural implements are manufactured, and there is a large trade in agricultural produce. Of many benevolent institutions the principal is a free grammar school founded by Edward VI. Bury Saint Edmunds sends one member to Parliament. It is an ancient place, and de¬ rived its name from Saint Edmund, a king of the East Angles, who was buried here. The barons in John's reign met here and swore to obtain the ratification of Magna Charta. Bury Saint Edmunds contains the remains of an abbey, once the most wealthy and magnificent in Great Britain, of which all that remains is the noble Norman tower or Church Gate, one of the best specimens of early Norman archi¬ tecture in England, and the western gate, deco¬ rated in style. Pop. 16,785.

BURYING-BEETLES, coleopterous in¬ sects of the family Silphidce. The carrion or sexton beetles are useful in burying decaying bodies of birds, mice, etc., in which they lay their eggs. The larvae are crustaceous, flat¬ tened, with the sides of the body often serrated, black and of a fetid odor. They undergo their transformations in an oval earthen cocoon. In N ecrophorus the antennae have 10 apparent joints, and the rounded club is four-jointed. The genus Silpha, of

which S. lapponica is a common species, differs in the third joint of the antenna being no longer than the second but shorter than the first. In N ecrophilns the third joint is as long as the first. N. surinamensis has a yellow thorax with a central irregular black spot. Catops and its allies live in fungi, carrion and ants' nests, and are small, black, oval insects. There are between 800 and 900 species of the family, many of which are small and live in caves (see Cave-Dwelling Ani¬ mals) or in nests of ants.

BURYING-PLACES, localities of sepul¬ ture of the dead. The custom of burying the dead in public places prevailed among the most ancient nations, including the Romans, who afterward, in the flourishing periods of the republic, burned their dead and kept the ashes in tombs, collected in urns. The ancient Ger¬ mans buried their dead in groves consecrated by their priests. With the introduction of the Christian religion consecrated places were ap¬ propriated for the purpose of general burial ; and it was regarded as ignominious not to be buried in consecrated earth. The deprivation of the rites of burial was therefore part of the punishment of excommunication. The Romans provided their gravestones, upon which were inscribed the name of the deceased, and the wish, Sit illi terra levis (ffMay the earth rest lightly upon him®). This custom was preserved by the Christians. The Egyptians, Greeks and Romans erected over the graves

of men of rank, or persons otherwise remark¬ able, pyramids, mausoleums or temples. After the introduction of Christianity little churches, called chapels, were erected over the dead. Early Christian martyrs were often buried in caverns, which by degrees were enlarged to spacious subterranean vaults. Subsequently others considered themselves happy if their bones were allowed to repose near the ashes of a martyr. As early as the 4th century the Christians built churches over the sepulchres of the holy martyrs; and in the belief that a place was sanctified by their ashes they anxiously sought out, on the erection of new churches in cities, or the transformation of heathen temples into Christian churches, the remains (relics) of the martyrs, and buried them under the altar of the new church to communicate to it a character of greater sanc¬ tity. The Emperor Constantine, who died in 337, is supposed to have been the first person who ordered his tomb to be erected in a church. This was done in the Church of the Apostles at Constantinople, of which he was the founder, and therefore probably considered himself as peculiarly entitled to this privilege. He was soon imitated by the bishops, and later all those who had enriched the Church were distinguished by this honor. The

Emperors Theodosius and Jus¬ tinian, indeed, forbade the erection of sepul¬ chres in churches, but in vain. Leo the Philoso¬ pher again permitted them to everybody. At present interment in churches is almost every¬ where suppressed, or at least permitted only under certain restrictions. Even in Naples and Rome the general practice of erecting sepul¬ chres in churches was forbidden in 1809, and the foundation of burial places without the city was provided for. The custom introduced by the communities of Moravian Brothers, who form their burial places into gardens, is now becoming general ; and cemeteries, instead of exhibiting merely dull ranges of tombstones, are adorned with flower plots and ornamental shrubbery. The celebrated burying-place of Pere la Chaise, near Paris, is one of the most beautiful and interesting spots in the world. See also Burial; Cremation; Catacombs.

BUSACO, boo-sa'ko, a hamlet in the prov¬ ince of Beira, on the north side of the river Mondego. It is memorable for the battle, 27 Sept. 1810, between Wellington and Massena. Wellington, with about 40,000 men on a retreat before Massena, with a force of 65,000, availed himself of the favorable position of the sierra or ridge here for checking the pursuit.

BUSBECQ, or BUSBEQUIUS, Ogier Ghislain de, Flemish diplomatist and author : b. Comines 1522; d. 1592. After having studied in the most celebrated universities of Flanders, France and Italy, he entered the service of Ferdinand, King of the Romans, who in 1555 sent him as Ambassador to Constantinople. In 1562 he returned home, after spending several years as tutor and guardian to the sons of Max¬ imilian II, was sent to accompany the Arch¬ duchess Elizabeth (who was to be married to Charles IX) on her journey to France. Busbecq lived there as steward to Elizabeth, and when she left France, after the death of her husband, he remained as Ambassador of Ru¬ dolph II. Two important works of his sur¬ vive, (Legation is Turcicas Epistola? QuatuorP

in which the policy, the power and the weak¬ ness of the Porte are so

profoundly and clearly explained that even at present information may be drawn from them; and (Epistolae ad Ru-dolphum IIP a very important work for the history of those times. His style is pure, ele¬ gant and simple. During his stay in Turkey he collected Greek inscriptions and manu¬ scripts. Consult Forster and Daniell, (The Life and Letters of Ogier Ghiselin de Busbecq) (London 1881), which contains his most im¬ portant writings: De Thou, (Histoire de mon temps) (Paris 1604) ; St.-Genois, (Les voyageurs belges) (Brussels 1847) ; Dupuis, (Etude sur l'ambassade d'Augier de Busbecques en Turquie) (in (Memoires de la Societe des Sciences de Lille*).

BUSBY, Richard, English schoolmaster: b. Lutton or Sutton, Lincolnshire, 22 Sept. 1606; d. 6 April 1695. He was educated at West¬ minster School and at Oxford, where he en¬ tered Christ Church in 1624 and was graduated B.A. four years later, and received his M.A. in 1631. He became a tutor of his college and at the age of 33 was appointed prebendary and rector of Cudworth, in Somersetshire. In 1638 he was provisionally appointed headmaster of Westminster School and two years later was confirmed in this appointment, which he held continuously till his death. He was strict in discipline and a. successful teacher, and among his pupils were many of the greatest men of his time — Dryden, Locke, Atterbury, South, Henry, Hooper and others. His published works were mainly school books, now long out of date. He was buried in Westminster Abbey.

BUSBY, a military headdress worn by hus¬ sars, artillerymen and engineers, consisting of a fur hat, with a bag of the same color as the facings of the regiment hanging from the top over the right side. The style and material of the busby vary in the different branches of the military service. The bag appears to be a relic of a Hungarian headdress, from which a long padded bag hung over and was attached to the right shoulder as a defense against sword cuts. It is worn only in times of peace.

BUSCH, Moritz, German publicist: b. Dresden, 13 Feb. 1821 ; d. 1899. He was edu¬ cated at Leipzig and in 1847 began his literary work by translating a number of the novels of Dickens and Thackeray. As a member of the Radical party he was disappointed by the failure of the revolutionary movement of 1848 and came to the United States in 1851, but re¬ turned to Germany in 1852. He also traveled in the Orient in behalf of the Austrian Lloyds. In 1856 he became editor of the Grenzbotcn, and in this paper defended the policy of Bis¬ marck. In April 1870 he was appointed to a position in the Foreign Office and accompanied Bismarck to France at the time of the Franco-Prussian War as reporter for the press. In 1873 he gave up his official position

to become the editor of the Hcinnoverschen Kuriers, but continued to be a confidant of Bismarck and strongly advocated the Chancellor's policy in his articles for the press. After his visit to the United States he wrote (Wanderungen zwischen Hudson und Mississippi* (1853), and <Die Mormonen* (1857). Other works of his are (American Humorists* (translations of selec¬ tions from Mark Twain, Bret Harte, etc.) ;

(The History of the International* ; (The Humor of the German People* ; (Count Bis¬ marck and His People During the War with France* ; (Our Chancellor* (a life of Bis¬ marck), and (Bismarck; Some Secret Pages of His History* (translated into English 1898).

BUSCHING, Anton Friedrich, German geographer : b. Stadthagen, Schaumburg-Lippe, 27 Sept. 1724; d. Berlin, 28 May 1793. tie studied theology in Halle from 1744 and was for a time minister of a Protestant church in Saint Petersburg. When acting as a traveling tutor he became convinced of the defects of existing geographical treatises and resolved to write a new one, which he began on his return to Germany in 1752 by publishing a short de¬ scription of Schleswig and Holstein as a speci¬ men. In 1754 he was made professor of philos¬ ophy in Gottingen. In 1766 he was made direc¬ tor of the united gymnasiums of Berlin and the suburb Kolln. Before his great (Erdbe-schreibung,* which he began to publish in 1754 in separate volumes, and which, though not en¬ tirely completed by the author, passed through eight editions during his life, neither the Ger¬ mans nor any other nation had a thoroughly scientific geographical work. Another of his important writings is the (Magazin fur Histori-ographie und Geographic* (25 vols., 1767-83).

BUSENBAUM, Hermann, German Jesuit: b. Notteln 1600; d. Munster, 31 Jan. 1668. He taught moral philosophy at Cologne and was rector of the Jesuit College at Munster. He is best known through his casuistical work, (Medulla Theologiae Moralis, Facili ac Per-spicua Methodo Resolvens Casus Conscientiae,* in which he treats of the principles of the Jesuit morals in a detailed and systematic manner. This book passed through 45 editions between 1645 and 1670, and has been reprinted in mod¬ ern times. After Damiens' attempt to assassi¬ nate Louis XV of France, the charge was made that it had taught the Jesuits' approval of mur¬ der and regicide, it was therefore publicly con¬ demned by the order and burned by the Par¬ liament of Toulouse.

BUSH, Katharine Jeanette, American zoologist: b. Scranton, Pa., 30 Dec. 1855. She received her education in public and private schools at New Haven, Conn., studied zoology under the direction of Verrill at Yale Univer¬ sity and in 1879 was appointed assistant of the Yale Zoological Museum. She became a mem¬ ber of the United States Fish Commission, also of the American Society of Naturalists and the American Society of Zoologists. She was joint editor of (Webster's Dictionary* (1890 ed.), and is the author of (The Tubiculous Annelids of the Tribes Sabellides and Serpulides* (in Harriman Alaska Expedition Series, Vol. XII, 1905) ; (Deep Water Mollusca* (1885) ; (New Species of Turbonilla* (1899), and contribu¬ tions to the principal scientific journals.

BUSH, Hans, English lawyer: b. 1815; d. 1882. He received his education at King's Col¬ lege, London, and at the University of Cam¬ bridge. He was called to the bar in 1841. He attracted public notice through his advocacy of the establishment of rifle clubs as a means of defense of the nation. While still at the university, he published <The Rifle and How to Use It* and instituted a rifle club among

the undergraduates. In 1853 he reorganized the Victoria Rifles, then England's only volun¬ teer body, and lectured and wrote in further¬ ance of his great hobby. To him belongs the honor of first suggesting life-saving stations and of organizing a model station. His prin¬ cipal work is (The Navies of the World: Their Present State and Future Capabilities) (1859).

BUSH-BROWN, Henry Kirke, American sculptor: b. Ogdensburg, N. Y., 21 April 1857. He studied art in Paris and Italy and has a studio in New York. His most important works are equestrian statues of Generals Meade and Reynolds and the Lincoln Memorial at Gettys¬ burg; the statue of Justinian, Appellate Court, New York; (Indian Buffalo Hunt,* Chicago World's Fair ; statues for Hall of Records, New York. He was elected a member of the National Sculptural Society and was prominent in the movement for municipal art.

BUSH CREEPERS, the English name of the Uncotillince, a subfamily of the .Sylviidce. These birds have sharp, conical bills and long, pointed wings. They are usually diminutive in size, active in habits, have a twittering note and build their nests in thickets, solitary bushes or trees. They are found in the warmer parts of both hemispheres, some of them, however, being migratory.

BUSH-DOG, a small wild dog (Icticyon vcnaticus), resembling a fox in appearance, found in Guiana and Brazil. It is distinguished by its one molar tooth in the upper jaw, has close hair and a short, stubby tail. Compare Fox-dog.

BUSH-HOG. See River-hog.

BUSH-QUAIL, the Anglo-Indian name for the button-quail (q.v.).

BUSHBUCK, any of several African ante¬ lopes, frequenting thickets and bushy regions. The name applies especially to the diminutive antelopes of the genus Ccphalolophus, which the Dutch of South Africa called ˆduykers® (q.v.). These include the smallest members of their race, some of them standing only 13 inches high at the shoulders. They haunt the rocky hill¬ sides, leaping with extraordinary agility from stone to stone and diving into the thickets at the first alarm. They feed upon berries, leaves, buds and similar food, rather than upon grass, and their flesh has a delicate flavor. The name “bushbuck® is also given, especially in South Africa, to the larger antelopes of the genus Tragclaphus , more distinctively known as (<harnessed® antelopes, because their hides, often richly colored, are conspicuously marked with whitish stripes, suggesting a harness thrown over the back. The largest of these handsome antelopes is the West African bongo (T. eiiry-ccros), of the forests of the Gaboon region, which stands nearly four feet high and has horns 30 inches long. On the opposite side of the continent the nyala (T. angasi) frequents the fever-stricken swamps of the East African coast. Another well-known species of the swamps of southern and eastern Africa is Speke’s antelope (T. spekei), native names for which are ((nakong® and (<sititunga.® It differs from its fellows in having a uniform grayish-brown silky coat, without any “harness,® but the young are faintly striped and spotted. This species is one of the best known of African an¬

telopes wherever rivers or swamps occur, and still survives in considerable numbers. That species most often called “bushbuck® is

the guib (T . scriptus), still to be found in the jungles along the African rivers from Abys¬ sinia to the Cape. It is remarkable for its in¬ ferior size, which is about that of a goat, and for the variability of its markings, which has led to much confusion in describing it. The variety most common in Cape Colony is uni¬ formly dark brown, with no stripes whatever, and only a few spots on the haunches. This genus of antelopes is closely allied to that of the koodoos (q.v.), and resembles them in that the females are hornless and usually differ in color from the males. Consult Lyddeker, Tame Animals of Africa) (London 1908).

BUSHEL, a dry measure containing eight gallons or four pecks. The standard bushel in the United States (originally known as the Winchester bushel) contains 2150.42 cubic inches, and holds 77.627 pounds of pure water at a temperature of 39.8° F., and 30 inches at¬ mospheric pressure. The English standard, the imperial bushel, has a capacity of 2218.20 cubic inches and holds 80 pounds of pure water at 62° F. See Weights and Measures.

BUSHIDO, boo-she'do (<(the way of the warrior®), the ethical code of the Samurai, the Japanese order of knighthood. It is in some ways like the code of the knights of the Middle Ages, demanding courage, honor and loyalty to country and rulers; it also enjoins the duty of suicide by hari-kari (q.v.) to avoid loss of honor. Although the formal code was given up when feudalism was abolished in Japan, its ideals still have great influence on the people, and many of the most prominent of the nation were educated according to its principles. It has given women a remarkable position in Japan and even yet instills in the young loftier ideals. See Samurai.

BUSHING, a piece of metal placed in ma¬ chinery to reduce the wear of the major parts of the machine. It is also used to decrease the size of perforations and generally to re¬ duce friction, eliminate rapid wear of moving parts and to prevent clogging. Bushings gen¬ erally are inserted in the machine frame at those points where axles or other moving parts are to be inserted and are made of a harder material than the machine frame.

BUSHMAN, or BOSJESMANS, a dwarf African race inhabiting the Kalahari Desert and some of the more northerly portions of Cape Colony. Their average height seems to be rather less than five feet, but the Bushmen of the Cape are more stunted than those living farther north. The skin is of a dirty yellowish color, and they have repulsive countenances, with a somewhat prominent forehead, thick lips, large ears and small, deep-set, restless eyes. They are essentially a nomadic

people, neither tilling the soil nor rearing domestic animals, but subsisting on the flesh of various wild animals, and on wild bulbs, roots, fruits, *etc.* They live in rocky caves or in rude nest¬ like structures in a bush. Consult Bleek, Rey¬ nard the Fox in South Africa) (London 1864) ; Stow, (Native Races of South Africa* (New York 1905) ; Bleek and Lloyd, specimens of Bushman Folklore* (London 1911).

BUSHMASTER, a large pit-viper (Lac - he sis mutus) of the rattlesnake family, numer¬ ous in northeastern South America, and called by the natives <(surucucu.” It is the largest and most venomous snake known, sometimes reaching a length of nine feet. Its ground color is pale yellow, darker on the back, and marked with a chain of jagged brown spots, and lighter on the belly. It has no rattle, but its tail terminates in a horny spur, which, when the tail is vibrated, strikes against the ground, producing a rattling noise, which can be heard several feet. It is similar to the rattlesnake in its habits, dwells wholly upon the ground, and its poisonous apparatus is greatly developed, making it a very deadly serpent, and one much feared. Consult Hopley, <Snakes) (London 1882) ; Bates, (A Naturalist on the River Ama¬ zon’ (New York 1884) ; Moles and Urich, (Serpents of Trinidad’ in Proceedings Zoolog¬ ical Society of London (London 1894) ; Dit-mars, (Reptiles of the World’ (New York

1910).

BUSHNELL, Horace, American theolo¬ gian : b. Litchfield, Conn., 14 April 1802 ; d. Hartford, 17 Feb. 1876. He was graduated at Yale in 1827, engaged in journalistic and edu¬ cational work, then studied law and theology at Yale, where for a time he was tutor, and in 1833 he began his brilliant pastorate of the North Congregational Church in Hartford, from which he retired owing to failing health in 1853. His writings on theological subjects were as remarkable for the interest and dis¬ cussion which they aroused among religious scholars and

thinkers as for their originality and independence of thought and vigor of utterance. Both as writer and preacher he was a commanding figure, and his influence was far-reaching. His works include Principles of National Greatness; Christian Nurture' (1847) ; (God in Christ' (1849) ; (Christian Theology' (1851) ; (Sermons for the New Life' (1858) ; (Nature and the Supernatural' (1858) ; Char¬ acter of Jesus' (1861); (The Vicarious Sacri¬ fice' (1865) ; (Women's Suffrage, the Reform Against Nature' (1869) ; (Forgiveness and

Law' (1874). He also contributed to several periodicals, and propounded many original views, even to the extent of being accused of heresy. However, he maintained his standing and commanded an ever increasing influence until his death. Consult Cheney, Mary B., (Life and Letters of Horace Bushnell' (New York 1880) ; Munger, T. T., (Horace Bushnell,

Preacher and Theologian' (Boston 1899). The public services of Dr. Bushnell as a citizen were such as to make him long remembered for his civic pride and devotion to the interests of the city where his lifework was performed. Bushnell Park, Hartford, named in his honor, is a monument to his initiative and persistent efforts, whereby mainly the city came into pos¬ session of one of its chief adornments.

BUSHNELL, Ill., city in McDonough County, 60 miles west of Peoria, on the Chi¬ cago, Burlington and Quincy and the Toledo, Peoria and Western railroads. The city has manufactories of wood and steel tanks, pumps, wagons, buggies, brick and garden tools. Poultry farming is an important source of em¬ ployment and great quantities are shipped annually and there is a good trade in farm

implements. The waterworks are the property of the municipality. Pop. (1920) 2,716.

BUSHRANGERS, a name originally ap¬ plied to desperadoes in Australia who took to the' bush and supported themselves by levying contributions on property and persons. Not long after the establishment of penal settle¬ ments in Van Diemen's Land and Southern Australia by the British government the bush¬ rangers began to make conditions disagreeable for the settlers in these colonies and their operations finally became so bold that martial law was proclaimed in Van Diemen's Land in 1815; and 15 years later a very stringent act was passed in New South Wales to do away with the nuisance. During the early days fol¬ lowing the discovery of gold in

Australia, these desperadoes obtained immense sums by robbing the diggers, stage coaches and metal convoys on their way from the mines to the cities and towns. In one haul a notorious gang headed by Capt. Frank Gardiner gathered in £7, 490 in bank notes and more than 5,000 ounces of gold. Gardiner afterward came to the United States in 1874. (<Jacky Jacky" in Tasmania headed several hundred escaped prisoners, es¬ tablishing something very like a reign of terror in parts of the island. They finally made an attack on the governor's quarters on Norfolk Island. Hundreds of these malefactors were captured, tried and executed or imprisoned ; while many more were killed by the govern¬ ment police, troops and armed citizens; but the country was not able to rid itself of them until roads were opened up and railways and tele¬ phones came, bringing with them rapid and sure communication. Consult Boxall, (History of the Australian Bushrangers' (London 1908).

BUSHTIT, a very small titmouse of the genus Psaltriparus, two species of which inhabit the western United States. One, the least bushtit (P . minimus) , is found in summer from the Rocky Mountains to the Pacific coast, and is noted for its nest, which is formed of moss, down, lint of plants and similar materials, and is shaped like an old-fashioned purse, 8 or 10 inches in length, suspended from the branch of a bush, and entered by a small hole near the top. The lining is of feathers and downy materials, and the eggs are 8 to 10 in number, and pure white. A southern variety of this is the lead-colored bushtit. A Mexican species (P. melanotis) is distinguished by black patches on each side of the head. The resemblance in the nesting habits of these birds to those of the European titmouse will be noted. See Tit¬ mouse.

BUSHWHACKER, a term applied during the Civil War to men living in the States where military operations were carried on, who pro¬ fessed to be neutrals and to be solely occupied in their _ ordinary vocations, but who seized opportunities to harass or attack individual soldiers or small bodies off their guard.

BUSINESS COLLEGES. See Education, Commercial.

BUSINESS LIFE INSURANCE. See

Commercial Life Insurance.

BUSINESS MANAGER, Municipal. See

City Manager.

BUSINESS SCHOOLS. See Education, Commercial.

BUSIRIS, boo-si’-ns, in Egyptian my¬ thology, a being of whom the most contradic¬ tory accounts are given by ancient writers, some speaking of him as a king, others affirm¬ ing that the name meant simply the tomb of Osiris.

BUSKIN (Latin cothurnus), a kind of high-soled shoe or half-boot, worn upon the stage by the ancient actors of tragedy, in order to give them a more heroic appearance. The Greek word kothornos denoted a sort of closed boot, fitting either foot, worn by women ; the tragic boot being the embates or embas. The word is figuratively employed by the Latin authors for tragedy itself, or for a lofty and elevated style. Consult Smith, K. K., (The Use of the High-Soled Shoe or Buskin in Greek Tragedy of the Fifth and Fourth Cen¬ turies b.cU in Harvard Studies in Classical Philology (Vol. XVI, 1905).

BUSONI, Ferruccio Benvenuto, Italian

composer : b. Empoli, Florence, 1 April 1866. His parents, both of whom were skilled musi¬ cians, superintended his early musical training. He went to Leipzig in 1886 and in 1888 was appointed teacher at the Conservatory of Helsingfors. He was professor at the New England Conservatory, Boston, in 1891-93 and in 1894 settled in Berlin, where he has con¬ tinued to reside. He made several very suc¬ cessful concert tours of Europe and also in the United States in 1910-11. He is an excellent performer on the piano. He was made chevalier of the Legion of Honor by France in 1913, the third of his race thus honored. His composi¬ tions include a concertstiick for piano and orchestra, concerto for violin; (Pojohlas’ Daughter,* a symphonic poem; two suites for orchestra; (Lustspiel Ouverture) ; two string quartets, and the opera, (Die BrautwahP

(1912).

BUSSA, boos’sa, or BUSSANG, British Northern Nigeria, central Africa,

capital of Borgu, a wall-encircled town on the Niger at the rapids marking the head of river navigation from the sea. Here, attacked by the natives, Mungo Park, the explorer, was drowned in 1806. Pop. 12,000.

BUSSEY, Benjamin, American merchant: b. Canton, Mass., 1 March 1757; d. Roxbury, 13 Jan. 1842. He was a soldier in the Revolu¬ tionary War, became a silversmith in Dedham, afterward a merchant in Boston, where he ac¬ quired a large property, from which he be¬ queathed about $350,000 to Harvard College, one-half for founding the Bussey Institute, a school of agriculture and horticulture, and one-half for the support of the law and divin¬ ity schools of the college.

BUSSI, bu's!, D'AMBOISE, Louis de Clermont D'Amboise (Sieur de) : b. 1549; d. 19 Aug. 1579. He acquired an infamous notori¬ ety by the prominent part he took in the mas¬ sacre of Saint Bartholomew. He afterward attached himself to the Duke of Anjou, and obtaining the command of the castle of Anjou, made himself universally odious by his pride and oppression. He had the meanness to pander to the low passions of the Duke, and undertook to seduce the wife of the Count of Montsoreau. The intrigue cost him his life. Montsoreau,

having come to the knowledge of it, obliged his wife to write Bussi, giving him a rendezvous at the castle of Constancieres. Bussi arrived with a single confidant, and was immediately met by Montsoreau, who killed him.

BUSSON, bu -son, Charles, French painter: b. Montoire, Loir-et-Cher, 15 July 1822; d. 1909. He studied under Remond and Franqois and devoted himself to landscape painting. His style was not marked by the characteristics of the ((open air school,® but recalled the canvases of earlier masters in his chosen branch of art. Among his paintings are (Les Ruines du cha¬ teau de Lavardin* and (La chasse au marais.*

BUSSU PALM, a plant (Manic aria suc-cifera), common in the swamps of northern Brazil. Though it rarely exceeds 15 feet in height, it has huge leaves, said to be the largest undivided leaves produced by any palm, even reaching 30 feet in length by 4 or 5 feet in width. After splitting the midrib from end to end the leaves are laid obliquely upon rafters to form thatch for houses. This position makes the spaces between the veins act as gutters to carry off water. The spathes are used by the Indians for caps and bags and for cloth-making. The large, hard, three-seeded, olive-green fruits do not seem to be used

commercially.

BUSSY-RABUTIN, bu-se-ra-bu-tan, or ROGER DE RABUTIN, Comte de Bussy : b. Epiry, Nivernois, 1618; d. Autun 1693. He entered the army at the age of 13, and made several campaigns. Turenne, in a letter to the King, describes him as the best officer in his army, as far as songs were concerned. His scandalous chronicle, entitled (Histoire Amoureuse des Gaules,* cost him the loss of his official appointment and a year's imprison¬ ment in the Bastile. He was a correspondent of Madame de Sevigne, and is often mentioned in her letters. He had the vanity to suppose that he excelled her in her peculiar art, and his letters were afterward published in seven volumes.

BUST (French buste, Italian busto, of un¬ certain origin), in sculpture, the representation of that portion of the human figure which com¬ prises the head and the upper part of the body. The bust did not become common among the Greeks until the time of Alexander, nor among the Romans till the time of the empire. Among the Greeks, the portrait busts of the learned formed an important branch of art. The artists in these works exhibited a singular power of expressing character, and in this way we possess what are probably faithful likenesses of Socrates, Plato and other distinguished per¬ sons. The first Roman bust that can be de¬ pended upon as giving a correct likeness is that of Scipio Africanus the elder. The number of busts of the time of the Roman empire is very considerable, but those of the Roman poets and men of letters have not been preserved in so large numbers as those of the Greeks. A col¬ lection of drawings of antique busts was made by Fulvius Ursinus, and published with the title, (Virum Ulustrium Imagines) (Rome 1569; Antwerp 1606) ; subsequently a similar collec¬ tion was published in the Uconographie Grecque) of Visconti (Paris 1811), which was followed by his Uconographie Romaine) in

1817.

BUSTAMANTE, boo-sta-man'ta, Anas-tasio, Mexican statesman and

revolutionist : b. Tiquilpan, Michoacan, 27 July 1780; d. San Miguel Allende, 6 Feb. 1853. In 1808 he joined the Spanish army, and for a time fought against the party of the revolutionists, but in 1821 he acted with Iturbide. He was made Vice-Presi¬ dent and commander of the army, in the ad¬ ministration of Guerrero, 1829. He afterward revolted and led the Centralist party, and in 1830 became acting President of Mexico. In 1832 Santa Anna opposed him at the head of an army, and he was conquered and banished 1833. When the Centralist party returned to power he was recalled, and in 1837 was elected President of Mexico. In 1842 he was obliged to retire from the Presidency, and was succeeded by Santa Anna. He served in the Mexican army in the war with the United States, retiring from military service in 1848.

BUSTAMANTE, Carlos Maria, Mexican historian: b. Oaxaca, 4 Nov. 1774; d. 21 Sept. 1848. He studied law and in 1801 began its practice. In 1805 he became editor of the Diario de Mejico. He held a command under Morelos in 1812, and was captured at Vera Cruz. He was released, and became-a member of Con¬ gress and held other public offices. He founded a weekly newspaper, La Azrispa de Chilpancingo , whose articles twice led to his imprisonment. His works treat of various periods of Mexican history, and are of special value, as he was an eye-witness of much that he describes. He published a history of the Mexican revolution (1823-32), and histories of the times of Iturbide and of Santa Anna.

BUSTARD QUAIL, the name given by Anglo-Indians to the button-quail (q.v.).

BUSTARDS, a family of game birds (Otididce) of the Old World, which, however, are not gallinaceous, but are related in structure on the one hand to the cranes, and on the other to the plovers. They are inland birds, haunting dry, grassy and sandy plains, and in the more settled districts resorting to stubble-fields and pasture-land. They have strong legs and feet, as well as good wing-power, and spend more of their time on the ground than in flight. Most of them are birds of handsome plumage, the upper parts being mottled with brown and red¬ dish tints, set off with white and black. Orna¬ mental plumages are characteristic of the group, and often form crests, or ruffs, about the head, neck and breast. Bustards are known in the Mediterranean regions, and throughout south¬ ern Asia to China and Japan. They also abound all over Africa, and one species (Eupodotis australis) inhabits Australia, where it is called (<native turkey.® Those of North Africa and western Asia are known as <(houbaras,® and form the favorite game-birds of that semi-desert region. Certain small

species of India, favorites with sportsmen, are called ((floricans.® The typical, and best-known bustard, however, is Otis tarda, now extinct in Great Britain, but numerous throughout the Mediterranean coun¬ tries. It has somewhat the size and form of an American turkey, and is the largest and one of the most valuable of European game-birds. A remarkable feature of this species is the fact that a great pouch, opening under the tongue, is developed in the throat of the male of some examples during the breeding season. This

phenomenon is restricted - to adult birds, and the pouch disappears at other times of the year. Its utility is unknown. A much smaller but otherwise similar species, the little bustard (Otis tetrax), is another favorite with Euro¬ pean sportsmen. The term is sometimes errone¬ ously applied to other large birds, such as the Magellanic goose of Argentina. Consult Aflalo, (Sport in Europe) (London 1901) ; See-bohm, (Birds of Asia* (London 1901) ; Bryden,

(Nature and Sport in South Africa * (London

1897).

BUSTO-ARSIZIO, ar-sits'io, Italy, city in the northern division, 21 miles northwest of Milan. It contains a church, designed by Bra-mante, and containing frescoes by Gaudenzio Ferrari. It has manufactures of cotton goods and a trade in wine. Pop. 25,992.

BUSYBODY, The, a pen name under which Benjamin Franklin wrote a series of papers, modeled on (The Spectator* of Addi¬ son; also a comedy by Mrs. Centlivre, 1709.

BUTADES. See Dibutades.

BUTANE and ISOBUTANE, two gas¬ eous compounds of carbon and hydrogen with the same molecular formula, CJdio, yet differing in their chemical properties. They are similar to marsh gas. Crude petroleum contains dis¬ solved butane.

BUTCHER. See Abattoir.

BUTCHER, Samuel Henry, Irish classical scholar : b. Dublin, 16 April 1850 ; d. 29 Dec. 1910. He was educated at Marlborough Col¬ lege, and Trinity College, Cambridge, and was a lecturer at University

College, Oxford, 1876— 82. From 1882-1903 he was professor of Greek in the University of Edinburgh, and in 1906 he was elected one of the members for Cambridge University. In 1904 he visited the United States to deliver a series of lectures at Harvard Uni¬ versity and other places. He has published a (Prose Translation of the Odyssey* (with A. Lang q.v.) (1879); (Demosthenes* (1881);

(Some Aspects of the Greek Genius) (1891) ;

(Aristotle's Theory of Poetry and the Fine Arts, with a Critical Text and Translation of the Poetics* (1895) ; (Demosthenes' Orationes) (1903, 1907) ; (Harvard Lectures on Greek Subjects* (1904).

BUTCHER-BIRD, a shrike of the family

Laniidce, representatives of which range throughout the northern hemisphere. They are birds of moderate size, and gray and white in color, with black markings upon the head, wings and tail, which are properly included among the insect-eating birds, but have de¬ veloped certain falcon-like traits. They are of powerful build, with hooked beaks, and strong claws, and in winter, when insect prey is not easily obtained, they are accustomed to strike down small birds, and to seize mice, shrews, *etc.* These they carry off in their claws to some thorn-tree, or to a fence with spikes, and impale them one by one upon the thorns, or other sharp points, in order to fix them firmly while they feed upon their flesh. It often happens, however, that their love of the chase exceeds their appetite, so that they will catch and store away several victims, whose frozen bodies re¬ main hanging upon the thorns, like meat in a butcher's shop ; the Germans have a popular belief that nine victims are thus stored at a

BUSTARDS

1 Little Bustard 2 Great Bustard

time, and call the birds ˆnine-killers.® These shrikes make rude nests in trees and lay four or five brownish spotted eggs. They feed their young upon insects, and these form the larger part of their own fare, especialy grasshoppers. A typical species, common over northernmost North America, is the great northern shrike (Lanins borealis), which is rarely seen in the United States, except in winter. Another species, the loggerhead (L. ludovicianus), dwells in the Southern States and is somewhat smaller in size. Consult Ingersoll, (Wild Life of Orchard and Field) (1902) ; Newton, Alfred, dictionary of Birds) (New York 1896) ; Evans, A. H., (Birds > in Cambridge Natural History) (Vol. IX, ibid., 1900). See Shrike.

BUTE, but, John Patrick Crichton-Stuart,

(3d Marquis of) : b. Mountstuart, 12 Sept. 1847 ; d. 9 Oct. 1900. He was educated at Har¬ row and Oxford. He was mayor of Cardiff in 1891-92, and did much to advance the com¬ mercial prosperity of that city. From 1892 to 1898 he was lord rector of Saint Andrew's University, which benefited greatly by his munificence. He donated Bute Hall to Glasgow University. He was deeply interested in Scot¬ tish history, and was the author of (Early Days of Sir William Wallace) ; (The Burning of the Barns of Ayr* ; and (Altus of Saint ColumbaP His secession from the Scottish Presbyterian to the Roman Catholic Church in 1868 caused a sensation in Scotland. He figures as the hero in Disraeli's novel, dothairP He was the author of an adequate and scholarly translation of the Roman (BreviaryP

BUTE, John Stuart (3d Earl of), British statesman: b. Edinburgh, 25 May 1713; d. 10 March 1792. His grandfather was created a peer in 1703, and the family was connected with the royal Stuart line. In 1737 he entered Parlia¬ ment as one of the Scottish representative peers, but was not reelected in 1741. He then retired to his estates, and lived there wholly secluded till the landing of the Pretender in Scotland in 1745 induced him to go to London and offer his services

to the government. He soon gained influence with the Prince of Wales, and succeeded in making himself indispensable to him. At his death, in 1751, he was appointed by the widowed Princess chamberlain to her son, and was intrusted by her with his educa¬ tion. Bute never lost sight of his pupil, and possessed so much more influence with the Princess of Wales than her son's particular tutors, the Earl of Harcourt and the bishop of Norwich, that they resigned their offices. George II died 25 Oct. 1760, and two days after Bute was appointed member of the privy council. In March 1761 the Parliament was dis¬ solved and Bute was made Secretary of State. Pitt, who saw his influence in the new council annihilated, resigned the same year. This event made an unfavorable impression on the nation ; but Bute, possessing the unbounded confidence of his King, stood at the head of the state. After a severe contest in Parliament, he con¬ cluded a peace with France. The terms for England were perhaps not disproportionate to the successes obtained during the war ; but Bute was obliged to bear the most bitter reproaches. He, however, succeeded in winning the popular favor, and everything seemed to promise the

power of the minister a long continuapce. The influence of Bute seemed unbounded, when it was made known, contrary to expectation, that he had resigned his office as Prime Minister, and intended to retire into private life. In 1766 Bute declared in the House of Lords that he had wholly withdrawn from public business and no longer saw the King; still it was not doubted that his great influence continued. It was only on the death of the Princess of Wales, 1772, that he seems first to have given up all participation in the affairs of government. He spent his last years on his estate. A costly botanical garden, a library of 30,000 volumes, excellent astronomical, philosophical and mathe-mathical instruments, afforded him occupation. His favorite study was botany, with which he was intimately acquainted. For the Queen of England he wrote the (Botanical Register,) which contained all the different kinds of plants in Great Britain (9 vols. 4to). This work is remarkable, both for its splendor, in which it excels all former botanical works, and for its rarity. Only 12 copies were printed, at an ex¬ pense of more than $50,000. Consult A. von Ruville, (William Pitt and Graf Bute) (Berlin 1895) ; Lovat-Fraser, (John Stuart, Earl of Bute} (New York 1912).

BUTE, Scotland, an island in the estuary of the Clyde, with an area of 30,000 acres, be¬ longing principally to the Marquis of Bute. It is about 16 miles long, and the average breadth is 3ˆ2 miles. Agriculture is in an advanced state, and there are about 20,000 acres under

cultivation. The herring fishery is also a source of considerable profit. The only town is Rothe¬ say, whose ancient castle is one of the many interesting antiquities of the island. Mount Stuart, the seat of the Marquis of Bute, is four miles south of Rothesay. The climate of Bute is milder than that of almost any part of Scotland. The county of Bute comprises the islands of Bute, Arran, Great Cumbrse, Holy Isle, Little Cumbrae, Inchmarnock and Pladda, with a total area of 139,658 acres, but only a small part is under cultivation. Arran is about double the size of Bute, but the other islands belonging to the county are small. The county returns one member to Parliament. Pop. of Bute, 11,835.

BUTEA, a small genus of trees or woody vines of the family Fabacece, natives of China and India, noted for their racemes of large, rich, usually scarlet, papilionaceous flowers, for which they are cultivated in warm countries and to a small extent in warm greenhouses. The best-known species (B . frondosa) is called the dhak or pulas tree in India, and is grown out of doors in California. It is a leafy tree, at¬ tains a height of 50 feet and bears very slowly orange-crimson flowers, which are used in the Orient under the name keesoo or teesoo for dyeing yellow or orange. Its fibrous roots and bark are used for caulking boats, making rope, *etc.* Its red, resinous gum, with which the twigs are frequently covered, is said to be very rich in tannin, and is found in the markets of India. The seeds are used as a vermifuge.

BUTESHIRE, Scotland, county in the West Midlands division. It includes Bute, Arran, Pladda, Marnoch, Cumbraes, Iona and several smaller islands; has a total area of 220

square miles and a population of 18,186. Agri¬ culture and fishing are the only industries of any extent. Rothesay, Bute, is the county-seat.

BUTIN, bu-tan, Ulysse Louis Auguste,

French painter: b. Saint Quentin 1838; d. Paris, 9 Dec. 1883. He was a pupil of Picot and Pils. His subjects are mostly from the life of the French fishermen, and his work shows remark¬ able truthfulness to

nature. Among his best paintings are (The Departure) ; <Fishing) ; and (Burial of a Sailor at VillervilleP

BUTLER, Alban, English writer on re¬ ligious topics: b. 1711; d. Saint Omer 1773. He received his education at that famous centre of English Catholicism, the English College of Douai, was ordained to the priesthood and was successively professor of philosophy and the¬ ology at Douai. Later he traveled throughout Europe and was appointed chaplain to the Duke of Norfolk. He became afterward president of the College of Saint Omer. He spent 30 years in compiling his great lifework, (The Lives of the Saints.) It appeared in four volumes (1756-59) and after his death in 12 volumes with annotations omitted from the former edition.

BUTLER, Amos William, Am'erican ornithologist, sociologist and philanthropist : b. Brookville, Ind., 1 Oct. 1860. He was educated at Hanover College and at Indiana University ; was one of the founders of the Indiana Acad¬ emy of Science, and became its president in 1895 ; became general secretary American Asso¬ ciation for the Advancement of Science 1891 ; vice-president of the section of Anthropology, 1900; president of the National Conference of Charities and Corrections, 1906-07 ; president of the American Prison Association, 1909-10; chairman of the American Committee on In¬ ternational Prison Congress, 1909-10; vice-president of the International Prison Congress, 1910; secretary of the Indiana Board of State Charities since 1897. He has published (Birds of Indiana) (1891) and many other papers on ornithology, anthropology and charities and correction, which have appeared in the publica¬ tions of scientific societies.

BUTLER, Andrew Pickens, American poli¬ tician : b. Edgefield District, S. C., 7 Nov. 1796; d. near Edgefield Courthouse,, 5 May 1857. He was admitted to the bar in 1819, and in 1824 was elected to the legislature as the representa¬ tive of his native district. In 1831, a period marked by the apprehended collision of South Carolina with the Federal government, on the nullification issue, he was elected colonel of a regiment of cavalry. In 1833, still a member of the legislature, he was made a judge of the Courts of General Sessions and Common Pleas. Subsequently, when a change was made in the judiciary system, he was transferred to the supreme bench of the State, where he continued until 1846, when he was elected a senator in Congress. Soon after taking his seat in this body, he was appointed chairman of the Judi¬ ciary Committee. One of his earliest speeches was against making Colonel Benton lieutenant-general of the army. The Kansas question, the action of the naval retiring board, the

abolition question and all others affecting the peculiar interests of South Carolina, and the general welfare of the South, engaged him in frequent

debate, in which he always took a conspicuous part. His last speech was in reply to Mr. Sumner, and in defense of South Carolina.

BUTLER, Benjamin Franklin, American lawyer and soldier: b. Deerfield, N. H., 5 Nov. 1818; d. Washington, D. C, 11 Jan. 1893. He was graduated at Waterville College (now Colby University) ; studied law, was admitted to the bar in 1841, and beginning practice at Lowell, Mass., became distinguished as a crim¬ inal lawyer and politician. He was a member of the State legislature in 1853, of the State senate in 1859-60, and a delegate to the Demo¬ cratic National Convention of 1860, which met at Charleston and adjourned to Baltimore. He supported the nomination of John C. Brecken-ridge, which rendered him so unpopular in the North that he was defeated for governor of Massachusetts in that year. Butler had risen to the rank of brigadier-general of militia ; and at the outbreak of the Civil War, he marched with the 8th Massachusetts Regiment, and, after a check at Big Bethel, was appointed to the command of Baltimore and of eastern Virginia, with his headquarters at Fort Mon¬ roe. In February 1862 he commanded the mil¬ itary forces sent from Boston to Ship Island, near the mouth of the Mississippi ; and, after New Orleans had surrendered to the naval forces under Farragut, he held military posses¬ sion of the city. His administration was vigor¬ ous and while mostly just was severely criti¬ cized. Especial notoriety attached to his order directing that women who should publicly insult United States officers be regarded as women of the street. The order was bitterly resented in the South and caused Jefferson Davis to order that Butler be considered a felon and if cap¬ tured, that he be hanged. Relieved of his com¬ mand, he acted under General Grant in his operations against Petersburg and Richmond in 1864. Returning to Massachusetts at the end of the war, he took an active part in politics as an extreme radical, advocated the impeachment of President Johnson, and in 1866-75 was a member of Congress. In 1877 and 1879 he was defeated as candidate for governor of Massachusetts, but in 1882 was elected by a large majority. In 1884 he ran for the Pres¬ idency as the candidate of the Greenback and Anti-Monopolist parties, but was defeated, car¬ rying no State. He published (The Auto¬ biography and Personal Reminiscences of Maj.- Gen. Benjamin F. Butler) (1892). Consult Parton, (Butler in New Orleans) (New York 1863) ; Bland, (Life of Benjamin F. Butler) (1879) ; (Private and

Official Correspondence of General Benjamin F. Butler: During the Period of the Civil War* (5 vols., 1918). Con¬ sult also Rhodes, James F., (History of the United States, from the Compromise of 1850) (Vol. V, New York 1902).

BUTLER, Charles, English Roman Cath¬ olic historian: b. London. 15 Aug. 1750; d. there, 2 June 1832. He was nephew of the Rev. Alban Butler (q.v.). He was called to the bar in 1791, and was the first Roman Catholic who was admitted, after the passing of the relief bill of that year. He wrote (Horae BiblicaeP giving a history of the original text, early versions and printed editions of the Old and New Testaments, and also of the (Koran, }

(Zend-Avesta 5 and the Adda. 5 This first ap¬ peared in 1797, and was followed by (Horse Juridicae Subsecivae, 5 a connected series of notes respecting the geography, chronology and literary history of the principal codes and orig¬ inal documents of the Grecian, Roman, feudal and canon law. He continued and completed Hargrave's (Coke Upon Littleton) ; supervised the 6th edition of Fearne's <Essay on Con¬ tingent Remainders> ; wrote a history of the geographical and political revolutions' of Ger¬ many, and a (Historical and Literary Account of the Formularies, Confessions of Faith, or Symbolic Books of Roman Catholic, Greek and Principal Protestant Churches.5 During the last 25 years of his career he principally de¬ voted his pen to the vindication of the Roman Catholic Church. He published numerous biog¬ raphies of eminent Roman Catholic divines and authors; continued his uncle's (Lives of the Saints,5 and produced (Historical Memoirs of the English, Irish and Scottish Cath¬ olics. J When Southey's ultra-Protestant (Book of the Church5 appeared, it was replied to in Butler's (Book of the Roman Catholic Church,5 which gave rise to six answers on the Prot¬ estant side, two of which were responded to by Butler. His (Reminiscences 5 appeared 1822-27. As a constitutional lawyer his repu¬ tation was very high.

BUTLER, Ellis Parker, American humor¬ ist : b. Muscatine. Iowa, 5 Dec. 1869. His first great success (Pigs is Pigs5 (1906), was fol¬ lowed

by others equally successful. These in¬ clude (The Incubator Baby5 (1906) ; (Perkins of Portland5 (1906) ; (Great American Pie Company5 (1907); (Confessions of a Daddy5 (1907); (Kilo 5 (1907); <That Pup5 (1908); (Cheerful Smugglers (1908) ; (Mike Flannery5 (1909); (Thin Santa Claus5 (1909); <Water Goats5 (1910) ; (Adventures of a Suburbanite5 (1911) ; (The Jack-Knife Man5 (1913) ; Nom¬ ine Dean, A Tale of the Mississippi5 (1917). He is secretary and treasurer of the Authors' League of America.

BUTLER, Howard Crosby, American educator: b. Croton Falls, N. Y., 7 March 1872. He was educated at Princeton University, at the Columbia School of Architecture and at the American schools of Classical Studies in Rome and in Athens. In 1899, 1904 and 1909 he led three archaeological expeditions in Syria. In 1905 he was appointed professor of the history of architecture at Princeton. His publications are Scotland's Ruined Abbeys5 (1900) ; (The Story of Athens5 (1902) ; Archi¬ tecture,5 Part II of Publications of American Expedition to Syria5 (1903); Ancient Ar¬ chitecture in Syria, 5 in Division II of Publica¬ tions of Princeton Expedition to Syria5 ; also papers in archaeological journals.

BUTLER, James (Duke of Ormonde), English statesman: b. London, 19 Oct. 1610; d. Kingston Hall, Dorsetshire, 21 July 1688. When Strafford became lord-lieutenant of Ireland, Butler was made commander of the army, but as it consisted of only 3,000 men, and he was overruled by the lords justices, he could do little more than keep the enemy in check, and was obliged to agree to a cessation of hostilities ; after which, having been created a marquis, he was appointed lord-lieutenant. On the ruin of the royal cause he retired to France. After

the execution of Charles he returned to Ireland with a view to raising the people ; but on the landing of Cromwell returned to France. While abroad he exerted himself to further the res¬ toration of Charles; and when that event was brought about by Monk, returned with the King. Before the coronation he was created duke, and assisted at that ceremony as lord high-steward of England. In 1662 he was again appointed lord-Jieutenant of Ireland, which country he restored to comparative tran¬ quillity, and was an active benefactor of it by encouraging various improvements, particularly the growth of flax and manufacture of linen. On the exile of Lord Clarendon, his attach¬ ment to that nobleman involved Butler in much of the odium attached to him, and although, on his recall from Ireland, nothing, on the most rigorous inquiry, could be proved against him, he was removed

through the machinations of Buckingham. For seven years he was deprived of court favor, but at length was again ap¬ pointed lord-lieutenant of Ireland, which place he held until, shortly before the death of Charles, he was recalled in order to make way for Rochester. He died at his seat in Dorset¬ shire, leaving behind him the character of a man who united the courtier and the man of honor and integrity better than any nobleman of the time.

BUTLER, James Glentworth, American Presbyterian clergyman : b. Brooklyn, N. Y., 3 Aug. 1821 ; d. Boonton, N. J., 28 Dec. 1916. He was the son of one of the five founders of the First Presbyterian Church in Brooklyn. He was educated at Yale, the Union Theological Seminary and Yale Divinity School, and was ordained in the Presbyterian ministry in 1852. He served in Williamsburg and then at the Walnut Street Presbyterian Church in Phila¬ delphia from 1852 to 1868. Next he became secretary, treasurer and editor of the American and foreign Christian Union, remaining in that field 11 years. He spent the following 20 years compiling a series of 11 volumes entitled (The Bible Work,5 which constitute what some au¬ thorities regard as the most comprehensive and valuable commentary on the Bible that has ever been written. It had a wide circulation in many languages. Other works issued by Dr. Butler are (Topical Analysis of the Bible5 (1896) ; ‘Vital Truths Respecting God and Man5 (1904) ; and (Present Day Conservatism and Liberalism5 (1911).

BUTLER, John, American royalist leader in the American Revolution : b. Connecticut ; d. Niagara 1794. He became a leading resident of Tryon County, N. Y. ; commanded the In¬ dians in the Niagara campaign (1759) and in the Montreal expedition (1760). At the out¬ break of the Revolution he sided with the Tories and became deputy superintendent of Indian affairs. In 1776 he organized a band of marauders, chiefly Indians, and fought the battle of Oriskany (1777) ; in July 1778, he com¬ manded at the brutal Wyoming massacre. In 1780 he took part in Sir John Johnson’s raid on the Mohawk settlements. At the end of the war he fled to Canada, and was appointed In¬ dian agent.

BUTLER, Joseph, English philosopher and theologian : b. Wantage, Berkshire, England, 1692; d. 1752. Although reared a Presbyterian,

he became a member of the Episcopal Church, and entered Oriel College, Oxford, in 1714. After receiving his degree he took orders and was appointed preacher at the Rolls Chapel, where he preached the famous <(Sermons on Human Nature® which have given him a lead¬ ing place among moral philosophers. These (of which the first three are of fundamental importance) were published in 1726. Ten years later (1736) appeared his famous (Anal¬ ogy of Religion, Natural and Revealed, to the Constitution and Course of Nature.) He gained the friendship of Queen Caroline who at her death left a request that he should re¬ ceive promotion in the Church. In 1738 he was appointed bishop of Bristol, and in 1750 was promoted to the bishopric of Durham.

Butler's (<Sermons on Human Nature® have given him a foremost place among ethical writers, and have had an important place in the instruction at the English universities. His ethical teachings are directed at what might be called the "naturalistic® view which was formu¬ lated with great clearness by Hobbes in the previous century and which still seemed suffi¬ ciently dangerous in the 18th century to require repeated refutation. The doctrines of Hobbes as against which the more "orthodox® writers directed their attacks were: (1) That moral distinctions are not "natural,® founded in the nature of things, but conventional, resting upon the authority of a state founded by social contract; and (2) that human nature is essen¬ tially egoistic. These positions had been con¬ troverted by Cudworth, Samuel Clarke and others who sought to show that moral relations belong to the very nature of things. Butler chose a more concrete method of inquiry. There are two ways, he says, in which moral questions can be treated. "One begins from inquiring into the abstract nature of things, the other from a matter of fact, namely, what the particular nature of man is, its several parts, their economy or constitution; from whence it pro¬ ceeds to determine what course of life it is which is correspondent to this whole nature.® It was this psychological method which Butler adopted. Human nature, he maintains, is to be regarded as a whole or system, which is made up of parts, but which cannot rightly be under¬ stood until we consider "the relations and respects which these parts have to each other.® In addition to particular affections and in¬ stincts, Butler finds that there is in man a natural instinct which makes for his own pres¬ ervation and happiness, and also a natural principle of benevolence whose object is the good of others. These are the two general principles which he

names self-love and be¬ nevolence. Against Hobbes, he argues that the latter is just as fundamental and natural as the former. The constitution of our nature proves therefore that we are made for society. But, on the other hand, Butler will not deny the legiti¬ macy of self-love, or identify, as had been done, the content of morality with benevolence. The self-love which is approved, however, is not a particular affection, but a general principle of regard for one's own happiness and interests. It is "cool® or "rational® self-love which is justified. This principle may, however, become perverted into selfishness or egoism by being allowed to operate without due reference to the elements of human nature. It then loses its

authority and ceases to be a general principle. Men constantly sacrifice their most evident interest to fancy, inquisitiveness, love, hatred or any vagrant inclination, and thus violate their nature no less in regard to their individual than to their social end. Self-love has accord¬ ingly a regulative control over the particular passions and inclinations : it possesses higher authority, and this authority is something quite distinct from the question as to. which in any given case happens to be stronger. There are some passages in which it might seem that Butler intends to identify morality with what he calls "rational self-love,® and to subordinate benevolence as a particular affection to it. Yet it is evident from the whole context of his ethical system that he rather intends to show that self-love and benevolence are co-ordinate, but not contradictory principles, both superior to what he calls the "particular affections,® and both in turn harmonized and systematized in human nature by the supreme principle of con¬ science. "There is a natural principle of be¬ nevolence in man, which is in some degree to society what self-love is to the individual.® By insisting as he does upon the presence in human nature of these two principles, and their necessary harmony, Butler avoids the extremes of making one or other of these principles supreme in conduct, as well as the necessity of denying or explaining away the other. He transcends the fundamental conflict between "interested® and "disinterested® conduct, in which his predecessors and many of those who came after him found themselves involved; and he goes far in suggesting the conception of the complementary character and essential unity of these principles in the idea of a "social self.® But Butler's ethical system receives its com¬ pletion in the idea of conscience as the supreme authoritative principle to which both self-love and benevolence are subordinate. He defines conscience as that "principle of reflection in men by which they distinguish between, approve and disapprove their own actions.® Moreover, "conscience not only offers

itself to show us the way we should walk in, but it also carries its own authority with it, that it is our natural guide.® The conclusion is that from the very make or constitution of man he is in the strictest sense a law unto himself. “Had con¬ science strength, as it has right ; had it power, as it has manifest authority, it would absolutely govern the world.® Two objections have been brought against Butler’s view of conscience by modern writers. In the first place, it is urged that it involves a falling back upon mere intui¬ tion, upon a principle that can give no account of itself or of its mode of operation. There are doubtless some passages in his writings which, taken by themselves, might seem to jus¬ tify this interpretation. But it is necessary to remember that for Butler conscience is reason or reflection, that is, that it is the action of the whole moral constitution of man, and that in following its requirements we are acting in the light off the whole. The second criticism is that for him conscience seems to pronounce in¬ fallible judgments, taking no account of cir¬ cumstances, and not providing for the growth or development of ethical judgment. It is doubtless true that Butler was concerned to defend the “absolute® authority of conscience as a principle of human nature. Yet it is not

for him any mechanically acting faculty: the due proportion between self-love and benevo¬ lence is different in different cases, and “can be judged only from our condition and nature in this world.® Conscience itself develops with use and practice, becoming more and more ade¬ quate to deal with the changing conditions of life, and giving rise to virtuous habits and fixed modes of character. Morality for him is no set of fixed axiomatic truths, infallibly per¬ ceived once for all ; but it is what the moral reason perceives in particular situations to be correspondent to man’s nature and constitution when this is seen in its true perspective.

Butler’s <Analogy) is the most famous and most carefully reasoned defense of revealed religion which appeared in England during the 18th century. It was directed against deism (q.v.) and sought to meet the attacks which tfiis school of writers brought against the tra¬

ditional view of theology. Butler undertakes to show that the course of nature suggests not only the conclusions, which the deists admitted, of the existence of God and the duty of wor¬ shipping Hin ; but also, when looked at more closely, natural occurrences and laws seem to furnish evidence for the doctrines of revealed religion which the deists discarded and denied as immoral. Butler's candor in pointing out what might be called imperfections and injus¬ tice in nature, which the deists were inclined to neglect, has led to the remark that his treat¬ ment tends to raise doubts rather than to settle them, and that his conclusions might be read by a sceptical mind in a different way. However this may be, one can say that Butler's (Analogy> together with Hume's (Dialogues on Natural Religion5 served to undermine, long before the appearance of Kant's systematic criticism, the rationalistic conclusions of "natural religion.® It should be noted that Butler did not profess to furnish a demonstration for the doctrines of revealed religion, but only to show their probability by pointing out their analogy with the course of nature. For man, as he says, in all such matters, "probability is the very guide of life.®

Bibliography. — There are many editions of Butler's works ; the most recent being that of Gladstone in two volumes, 2d ed., 1898. Mr. Gladstone also published a volume entitled Subsidiary Studies on Butler.5 Consult also Collins, W. L., <Butler) (Blackwood's (Philos Classics5) ; Stephen, Leslie, (English Thought in the 18th Century5 (Vol. I) ; Sidgwick, H., (History of Ethics5 ; Lˆfevre, A., articles in the Philosophical Review, Vols. VIII and IX.

James E. Creighton,

Professor of Philosophy , Cornell University.

BUTLER, Josephine Grey, English philan¬ thropist : b. Milfield, Gloucestershire, about 1828; d. 30 Dec. 1906. Married George Butler, afterward Canon Winchester, 1852. She was prominent in efforts for the higher education of women, and for moral reform, and published (Life of John Grey of Dilston5 ; (Life of Cath¬ erine of Siena5 ; (Recollections of George But¬ ler5 ; (The Lady of Shunem5 ; (Personal Remi¬ niscences of a Great Crusade5 ; (Prophets and Prophetesses5 ; ˆNature Races and the War5 ; (Silent Victories5 ; (The Hour Before the Dawn5 ; Government by Police5 ; (The Con-vol. 5 — 6

stitution Violated5 ; (Women's Work and Women's Culture5; (Life of Oberlin5 ; (A Voice in the Wilderness.5

BUTLER, Marion, American legislator: b. Sampson County, N. C., 20 May 1863. In 1889 he was admitted to the bar and practised suc¬ cessively in Raleigh and Washington. He was elected to the senate of North Carolina in the late eighties, and took a prominent part in rail¬ way regulation legislation. He abandoned the Democratic party in 1892, became one .of the organizers of the Populist party and from 1896 to 1904 served as chairman of its executive com¬ mittee. In 1896 he was elected United States senator, serving until 1902. He successfully piloted through the Senate a bill providing for rural free delivery in the postal service. He also advocated the establishment of postal sav¬ ings banks. Being defeated for the Senate in 1902, he thereafter allied himself with the Re¬ publicans.

BUTLER, Matthew Calbraith, American army officer : b. near Greenville, S. C., 8 March 1836; d. 1900. He studied law at Stonelands, near Edgefield Courthouse, and was admitted to the bar in December 1857. He was elected to the legislature of South Carolina in 1860; entered the Confederate service as captain of cavalry in the Hampton Legion in June 1861, and became a major-general through the regu¬ lar grades; lost his right leg at the battle of Brandy Station on 9 June 1863. He was elected to the legislature of South Carolina in 1866; was United States senator in 1877-95 ; com¬ missioned a major-general of volunteers for the war with Spain, 28 May 1898; and was ap¬ pointed one of the American commissioners to arrange and supervise the evacuation of Cuba.

BUTLER, Nicholas Murray, American educator : b. Elizabeth, N. J., 2 April 1862. In 1882 he was graduated at Columbia University with the highest honors. In 1882-84 he served as fellow in philosophy and studied in Berlin and Paris for one year. In 1885 he became assistant professor of philosophy and in due time held the chair of philosophy, psychology and ethics. In 1890 on the reorganization of the university he became dean of the faculty of philosophy. He founded the New York Col¬ lege for Training Teachers, in 1887, which later became Teachers' College, and is now known as Hunter College, under Columbia University. In 1901 Dr. Butler succeeded Seth Low as president of Columbia. His administra¬ tion has been most successful in extending the influence of the university in the educational field and in its relation to the life of the coun¬ try at large. Dr. Butler has taken a deep in¬ terest in politics and in 1912 was the Republi¬ can party's candidate for Vice-President of the United States on the ticket with William H. Taft. He has done much for the cause of education, founding the Educational Review in 1891 and editing it for the intervening interval as well as (The Great Educator Series,5 (The Teachers' Professional Library5 and < Columbia University

Contributions to Education and Philosophy.5 Dr. Butler has been decorated by several foreign rulers and is the recipient of honorary degrees from a very great number of prominent universities at home and abroad. He has published (The Meaning of Education5 (1898, rev. enlarged ed., 1900) ; (True and

False Democracy* (1907); <Philosophy) (1908, 3d ed., 1911) ; (The American as He IsJ (1908) ; (The International Mind) (1912) ; (Why Should We Change our Form of Government > (1912) ; (Progress in Politics) (1913) ; Mono¬ graphs on Education in the United States, *ex¬ hibit at the Paris Exposition (1900) ; (A World in Ferment* (1917).

BUTLER, Samuel, English satirical poet : b. Strensham, Worcestershire, 12 Feb. 1612; d. London, 25 Sept. 1680. He passed some time in his youth at Cambridge, but never matriculated at the university. He was after¬ ward clerk or steward to several country gentle¬ men, and later lived in London. He resided some time with Sir Samuel Luke, a commander under Cromwell. In this situation Butler ac¬ quired materials for his Mudibras* (q.v.) by study of those around him, and particularly of Sir Samuel himself, a caricature of whom con¬ stituted the celebrated knight Hudibras. The first edition of (Hudibras> was published in 1663 and was brought under the notice of the court by the well-known Earl of Dorset. It immediately became highly popular with the prevailing party in Church and state, and served as a general source of quotation ; the King himself perpetually answering his courtiers out of 'HudibrasP Celebrated as it rendered its author, it did nothing toward extricating him from indigence. He was buried in Saint Paul's Church, Covent Garden, at the expense of his friend, Mr. Longueville, of the Temple, and a monument was, 40 years after, erected to his memory, in Westminster Abbey, by Alderman Barber, the printer. (Hudibras, } both in its style and matter, is one of the most original and witty works that were ever written. As a work intended to ridicule the Puritans its at¬ traction was great but temporary, but as appli¬ cable to classes of character found in all ages, its satire will always be relished. Butler's (Remains in Verse and

Prose* appeared in 1759.

BUTLER, Samuel, English author and composer : b. Langar, 4 Dec. 1835 ; d. London, 18 June 1902. He was educated at Shrewsbury School and Cambridge University. After grad¬ uation in preparation for the ministry he did parish work among the poor of London. In 1859 he sailed for New Zealand and became a successful sheep farmer. He returned to Eng¬ land in 1864 and studied art. With Henry Festing Jones, he composed many gavottes, fig¬ ures, etc., and the cantata of < Narcissus.* He was also an artist of merit, and for several years exhibited at the Royal Academy. He is best known as a brilliant, original writer in more than one field, and as a master of irony had few equals among his contemporaries, in this particular more nearly approaching Swift than anyone else. His published books include (A First Year in Canterbury Settlement* (1863) ; (Erewhon, or Over the Range* ; (Fair Haven,* an ironical defense of Christianity (1873) ; (Life and Habit) (1877) ; (Evolution, Old and New) (1879) ; (Unconscious Memory) (1880); (Alps and Sanctuaries of Piedmont and the Canton Ticino) (1881) ; (Luck or Cunning as the Means of Organic Modifica¬ tion (1886); (Ex Veto) (1888); (Life of Dr. Samuel Butler, Bishop of Lichfield) (1896) ; (The Authoress of the Odyssey> (1897) ; (The Iliad of Homer, Rendered

into English Prose) (1900); 'Erewhon Re¬ visited* (1901); and (The Way of All Flesh* (New York 1903), published post¬ humously, his best and most popular work. Consult Harris, John F.. (Samuel Butler: the Man and His Work* (New York 1916).

BUTLER, William, English polemical writer : d. about 1410. He was the 30th pro¬ vincial of the Minorites in England. At Ox¬ ford in 1401 he wrote a tract against the trans¬ lation of the Bible into the vulgar tongue. He also wrote a tract, (De Indulgentiis,* four books of commentaries on the Sentences of Peter Lombard) and several tracts against the Wycliffites. He removed to Reading from Ox¬ ford. Consult Brewer, Monumenta Francis-cana) (London 1858).

BUTLER, William Archer, Irish clergy¬ man and philosopher : b. Annerville about 1814 ; d. 5 July 1848. He was baptized and educated as a Roman Catholic, but became a convert to the Established Church before entering Trinity College, Dublin. He was graduated in 1834 and spent the next two years in residence as a scholar. In 1837 he was appointed to the new chair of moral philosophy at Trinity, was or¬ dained a minister of the Established Church and was presented to the

prebend of Clonde-horka, Donegal. In 1842 he was promoted to the rectory of Raymogby. He was an able preacher and an indefatigable pastor. In 1845 the Roman Catholic controversy occupied But¬ ler and he contributed to the Irish Ecclesiastical Gazette a series of (Letters on Mr. Newman's Theory of Development.* During the famine years of 1846-47 Butler's efforts were untiring as relief officer of his parish. His lectures were issued after his death as (Lectures on the History of Ancient Philosophy) (2 vols., Cambridge 1856). Other works are (Sermons, Doctrinal and PracticaP (3d ed., Cambridge 1855) ; (Eternal Life of Christ in HeaveiP (1845). Consult the memoir by the Rev. Thomas Woodward (Dublin 1849) and Dublin University Review (July 1849).

BUTLER, Sir William Francis, British general : b. Tipperary County, Ireland, 31 Oct. 1838; d. London, 7 June 1910. He was educated at Dublin, and joined the army in 1858. In 1863 he became lieutenant, and in 1874 was pro¬ moted to the rank of major. He served on the Red River expedition of 1870-71, and about the same time was sent on a special mission to the Saskatchewan territories. He accompanied the Ashantee expedition in 1874, and in 1879 acted as staff officer in Natal. He also served in Egypt in 1882, and held important commands under Lord Wolselev in the Sudan campaign of 1884—85. From 1890 till 1893 he was in com¬ mand at Alexandria, and in 1892 was raised to the rank of major-general. He had com¬ mand of the 2d Infantry Brigade at Aldershot, 1893, and of the southeastern district at Dover, 1896-98. In 1898 he became commander of the forces in South Africa, and for a time, during the absence of Lord Milner, was acting high commissioner. He was strongly opposed to Milner's policy with regard to the rights of the <(outlanders** in the Transvaal, and refused to transmit their petition to the home govern¬ ment, — an action which, among other causes of friction, led to his recall. He had command of the western district, 1899-1905, and concurrently

that of the Aldershot district, 1900-01. He pub¬ lished (The Great Lone Land: A Narrative of Travel and Adventure in the Northwest of

America) (1872); (The Wild North Land) (1873), the story of a winter journey across northern North America; (Akim-Foo) (1875), a story of the Ashantee War; (Far Out) (1880) ; (Red Cloud, the Solitary Sioux) (1882) ; (The Campaign of the Cataracts) (1887). He was created K.C.B. in 1886 and in 1900 was appointed lieutenant-general. His wife (nee Elizabeth Thompson) is famous as a painter of battle scenes. His autobiography, edited by his daughter, was published in 1911.

BUTLER, William Morris, American physician : b. Maine 1850. He was educated at Hamilton College, the New York College of Physicians and Surgeons and at the Lcole de Medicine, Paris ; has been professionally con¬ nected with several homoeopathic hospitals, and has been professor of nervous diseases at the Metropolitan Postgraduate School of Medicine, New York; is professor of mental diseases at Flower Hospital, New York, consulting alienist at the Middletown State Insane Hospital. He has published (Home Care for the Insane) and (Mental Diseases and Their Homoeopathic Treatments

BUTLER, William Orlando, American general : b. Jessamine County. Ky., 1791 ; d. Carrollton,, Ky., 6 Aug. 1880. He was about devoting himself to the legal profession when the War of 1812 broke out. Enlisting as a private soldier in Captain Hart's company of Kentucky volunteers he gained distinction in the battles at Frenchtown and the river Raisin. Subsequently he took a conspicuous part in the battles of Pensacola and New Orleans, was brevetted major, 23 Dec. 1814, acted as aide-de- camp to General Jackson from 17 June 1816 to 31 May 1817, when he tendered his resignation, resuming for the next 25 years the profession of the law. From 1839 to 1843 he served as a representative in Congress from that district, in the interests of the Democratic party. Nom¬ inated as a candidate for governor of Ken¬ tucky in 1844, he was defeated by the influence of Clay. Created major-general, 29 June 1846, he led with great spirit the daring charge at Monterey, and although wounded on that occa¬ sion, still remained for several months with the army. On 18 Feb. 1848 he succeeded General Scott in command .of the army in Mexico. The most important operation during his tenure of this office was the defeat of Padre Jarauta and his guerrilla forces by General Lane. His military administration in Mexico was brought to a close on 29 May 1848, when he announced the ratification of the treaty of peace. After his return to the United States he was nom¬ inated in 1848 by the Democratic party as candi¬ date for the vice-presidency. He was the au¬ thor of (The Boatman's Horn and Other Poems. } Consult Blair, (The Life and Public Service of William O. Butler) (Baltimore

1848).

BUTLER, Zebulon, American military offi¬ cer: b. Lyme. Conn., in 1731 ; d. Wilkesbarre, 28 July 1795. He served in the French and Indian War, and in the Revolutionary War also. He commanded the garrison at Wyoming Valley at the time of the massacre of 3 July

1778, and in 1779 served in Sullivan's expedition against the Indians.

BUTLER, Mo., city and county-seat of Bates County, 75 miles southeast of Kansas City, on the Missouri Pacific Railroad. Agri¬ culture and coal-mining are the principal in¬ dustries. The city owns and operates the sewerage system and the electric-lighting plant. Pop. 2,894.

BUTLER, Pa., borough and county-seat of Butler County, situated on the Conequessing Creek, and on the Pennsylvania and other railroads, 30 miles north of Pittsburgh. It is the centre of a region having coal, iron, oil and natural gas. The chief industry is glass manufacture, and there are also flouring and planing mills, oil-well supply manufactories, also of silk, buttons, carriages, paint, beds of metal. Its noteworthy buildings are a hospital, courthouse and public library. Butler was first settled in 1778 and was incorporated in 1803. The government is vested in a burgess and council, the former being chosen for a three-year term. Pop. (1920) 23,778.

BUTLER UNIVERSITY, a coeducational (nonsectarian) institution in Irvington, a sub¬ urb of Indianapolis, Ind. ; organized in 1855 as Northwestern Christian University. Its de¬ partments include an undergraduate college, a normal course, departments of art and educa¬ tion, a summer school and extension courses. It has about 540 students, 19 instructors, a library of 13,000 volumes, an endowment of $395,000, an income of $45,000 and property valued at $212,000.

BUTLEROV, Alexander Mikhailovich,

Russian chemist: b. Tchistopol, Kazan, 1828; d. Saint Petersburg 1886. He received his uni¬ versity training at Kazan, and was successively professor of chemistry and rector there after 1858. After 10 years at Kazan he removed to Saint Petersburg as professor of chemistry at the university there. He did very important work in organic chemistry, discovered the ter¬ tiary alcohols and wrote a masterly treatise on organic chemistry. He believed in spiritualism and is the author of a French work entitled (Etudes psychiques.* He also contributed to the

literature of apiculture.

BUTO, an Egyptian goddess whom the Greeks identified with Leto or Latona. She was represented under the guise of a serpent, and the city of Buto, which took its name from her, is supposed to have occupied a site on an island in the modern Lake Burlos in the delta of the Nile.

BUTON, boo'ton, BOETON, or BU-TUNG, an East Indian island, southeast of Celebes, belonging to Holland. Its area is about 1,700 square miles. It is fertile and densely wooded, and is governed by a native chief, subject to the Dutch government. The chief products are tropical fruits, rice and maize. The population, mainly Malays, is about 100,000. The chief town is Buton at the south¬ western end of the island.

BUTSCHLI, biit'shle, Otto, German zoologist: b. Frankfort-on-the-Main 1848.

Since 1878 he has been professor of zoology in the University of Heidelberg. He was one of the first to establish knowledge of nucleus and cell division, and his writings upon protoplasm

and bacteria have been widely read and dis¬ cussed. He has published <Protozoen) ; (Untersuchungen fiber mikroskopische Schaume und das Protoplasma) (1892); (Untersuchungen iiber die Mikrostructur kiinstlicher und natfir-licher KieselsauregallerteiF (1900); (Mechanismus und Vitalismus) (1901); (Vorlesungen iiber vergleichende Anatomie) (1910).

BUTT, Archibald Willingham, American army officer: b. Augusta, Ga., 26 Sept. 1866; d. 15 April 1912. He received his education at the University of the South, became a news¬ paper correspondent for some years and in 1900 was made captain of volunteers. After¬ ward he received a commission in the regular army, served as quartermaster in the Philip¬ pines, Washington and Plavana. In 1911 he was made a major. He was personal aide to Presi¬ dent Roosevelt in 1908, and to

President Taft from 1909 till his death on the Titanic, return¬ ing from Europe. Washington is graced with a fountain in memory of him.

BUTT, Isaac, Irish politician; the first to make political use of the phrase “Home Rule® ; was the son of a Protestant rector : b. County Donegal, 16 Sept. 1813 ; d. 5 May 1879. Edu¬ cated at Raphoe and at Trinity College, Dublin, he gained a brilliant reputation for his accom¬ plished scholarship. In 1852 he was elected to Parliament as a Liberal Conservative for Youghal, for which constituency he sat until 1865. He defended Smith O’Brien and others in the state trials of 1848, and with equal fear¬ lessness and self-devotion all the Fenian pris¬ oners between the years 1865 and 1869. In 1871 he was elected for the city of Limerick to lead the Home Rule party. He published (History of Italy) (1860) and (The Problem of Irish Education* (1875).

BUTTE, but, Mont., city and county-seat of Silverbow County, on the Great Northern, the Northern Pacific, the Chicago, Milwaukee and Saint Paul and other railroads. It is on the high plateau between the Rocky Mountains and the Bitter Root Mountains, 5,800 feet above the sea-level. The city is well-built, the more imposing buildings being the city hall, court¬ house and jail, opera-house, the Federal building and a fine public high school, completed at a cost of $125,000. The Montana State School of Mines is located here. It has several fine thea¬ tres and a good public library. The Columbia Gardens also deserve mention. The public school system is excellent, and there is a public library of more than 35,000 volumes. Butte is the largest mining town in the world, employ¬ ing thousands of persons in this industry alone. Copper is the chief production, although there are valuable deposits of gold and silver, lead and zinc. The Great Anaconda Copper mine is here, and many other valuable mining prop¬ erties are within a radius of a few miles of the city. The copper production alone is about 25 per cent that of the United States and 13 per cent that of the world, and the total annual mineral output is estimated at more than $60,- 000,000. Probably no city of equal size in the country is so exclusively given over to a single industry. It has also manufactories of candy, cigars, mattresses and other minor industrial interests. In 1914 there were 108 establishments with $2,393,000 capital, employing 904 persons. The salaries and wages amounted to $890,000.

The products were valued at $2,907,000 and were made from materials costing $1,317,000.

Butte is the trade and jobbing centre for southern and western Montana ; has an ex¬ tensive trolley system; gas and electric lights; national and other banks ; gnd several daily and weekly newspapers. Butte is governed by a mayor, elected biennially, and a city council. It spends annually about $200,000 for schools, and about $50,000 each for the fire, police and street¬ cleaning departments. Butte was settled as a gold-placer camp in 1863, laid out as a town in 1866, and grew rapidly after the successful opening up of quartz mining in 1875. It was incorporated by the territorial legislature in 1879, and reincorporated in 1888. In 1881 it was made the county-seat of Silverbow County. Pop. in 1870 about 300; (1880) 3,363; (1890)

10,723; (1900) 30,470; (1910) 39,165; (1920)

41,611. Consult Davenport, (Butte and Mon¬ tana beneath the X-ray) (Butte 1909) ; Free¬ man, (A Brief History of Butte) (Chicago

1900).

BUTTE, a hill which rises abruptly from the surrounding ground. Such hills are com¬ mon in the region of the American Rockies, and the term is sometimes applied to high mountains which are more or less isolated from other peaks. See Mesa.

BUTTER, a product of milk, particularly cow's milk, consisting chiefly of its fatty con¬ stituent. It is obtained by churning or other¬ wise violently agitating milk or its cream, and working the product to remove water and other constituents. Butter fat is not a simple fat, but is a mixture of several fats, which are indi¬ vidual compounds of glycerine and several dis¬ tinct fatty acids. The principal fats in butter are olein, which constitutes 35 per cent ; palmitin, 26 per cent ; and myristin, 20 per cent. Laurin, butyrin and caproin are present in much smaller proportions, and there are also very small percentages of caprin, stearin, capry-lin and other constituents. It has a specific gravity of 0.91 and a melting point of about 92° F.

Butter has been in use from early historic days. It is first mentioned in the Bible in Gen. xviii, 8. It was used as food and medicine, as an ointment and for burning in lamps. The Greeks probably learned of it from the Scy¬ thians or Thracians, and the Romans from the Germans. It was made from the milk of sheep and goats, and later of cows, the method of making being to jar the milk roughly by placing it in skin bags or pouches hung over the backs of trotting horses. Formerly

butter was pre¬ pared by direct churning of the whole milk; this was both laborious and wasteful of butter-fat. To reduce labor and loss the system of setting the milk and skimming off the cream was evolved; since 1877 this method has given way in considerable measure to the use of cen¬ trifugal force for the separation of the cream and milk.

The making of good butter begins with the cow. She must be healthy and be well fed. The essential next in importance is absolute cleanliness in the care of the milk. The dairy utensils should be of tin, and never used for any but dairy purposes. They should not be continued in use after the tin plating begins to wear off. They should be washed with a brush,

never with a cloth, and with hot water and sal soda or borax, and not with soap. The final rinsing should be with boiling water, after which they should be drained and allowed to dry without wiping. The process of making butter is divided into the operations of cream¬ ing, churning, working and finishing. The fat exists in the form of small globules in the milk, in suspension. In the setting system the milk is placed in shallow pans about four inches high, or in deep ones of about 18 inches, and advantage is taken of the fact that the fat globules, being lighter than water and other constituents of the milk, rise to the surface by the action of gravity. Large fat globules will rise more rapidly than small ones, and the size of the globules varies with different breeds of cattle. In the milk of Jersey cattle they are 1/8000 of an inch in diameter ; in Holstein cat¬ tle 1/12000 of an inch in diameter. In the shal¬ low-pan system the milk is set as soon as pos¬ sible after it is drawn, and the cream is skimmed off in 24 to 36 hours. This system is wasteful in that the skim-milk often contains 0.5 to 1.5 per cent of fat. The deep-setting system is less wasteful, the fat in the skim-milk being often reduced to 0.2 per cent. The new-drawn, warm milk is placed in cans surrounded by or submerged in water of about 40° F., and the rapid reduction in temperature causes the glob¬ ules to rise quickly. It is best to skim the cream at 30 to 40 lactometer : that is, 10 gallons of milk should yield 1 to 1J5 gallons of cream. The

cream is removed by dipping it off, or the skim-milk is drawn off from the bottom of the can. The fat left in the skim-milk consists of the smallest fat globules.

The introduction of the separator and use of centrifugal force has resulted in a more per¬ fect and rapid separation. This force exceeds that of gravity a thousand-fold. The system of separation is continuous, a constant, uniform flow of milk being conducted into a bowl or drum revolving at from 5,000 to 9,000 or more revolutions per minute. The inlet tube is in the centre of the bowd and reaches almost to the bottom ; here the constituents in the milk sepa¬ rate, the heavier serum gravitating to the cir¬ cumference of the bowl, the fat — the lightest portion — remaining in the centre. These are forced upward by the incoming milk, and the separated milk escapes through a side tube, while the cream passes through a small outlet in the centre. This last outlet can be closed or opened in some machines, thus regulating the percentage of fat in the cream. The ma¬ chines are of various sizes, from those worked by hand power and doing 200 to 500 pounds of milk per hour, to power machines of 2,000 pounds and over per hour capacity. Some makes have appliances within the bowl to in¬ crease the efficiency. A good separator, well run, will not leave more than from 0.05 to 0.1 per cent of fat in the separated milk. The temperature should be kept between 85° and 95° F. for the best results and the speed should not lag.

The cream may be churned at once if sweet cream butter is desired, or “ripened” or soured. The aim of ripening is to develop certain flavors in the butter, and a certain degree of acidity which aids in churning and influences the texture. Since the discovery that the changes which commonly take place in milk are

due to the action of microorganisms, it has become a part of the butter maker’s task to make use only of such organisms as will aid in his work, and eliminate those which tend to impair the product. It has been found that the flavor of butter depends in very large degree upon the kind of bacteria wrhich accomplishes the souring of the cream preliminary to churn¬ ing. The scientific butter maker, therefore, prepares a “culture” of the beneficial bacteria, keeping it free from all others. In the usual pro¬ cedure of butter-making on the farm, a “starter,” used to start the acid fermentation in the newly-skimmed cream, is saved from the preceding batch of sour cream, or from the buttermilk of the preceding churning. This naturally con¬ tains a mixture of many bacterial ferments, and too often a large proportion

of those which are injurious to butter quality. It is advisable to make the “starter out of sweet skim-milk, two or three gallons for each 10 gallons of the cream to be soured. Place it in a covered vessel in a temperature between 75° to 85°. It will require from 18 to 24 hours to become thick. It should be distinctly but pleasantly acid. The top inch should be rejected, as it contains the undesirable bacteria. It is not always easy to obtain the starter from the milk of a mixed herd. In this case it is best to make the starter from the milk of one cow chosen after experi¬ ments as to which milk makes the finest-flavored butter. Or, as is the habit in many dairies, a pure culture may be purchased (by mail) from the nearest agricultural experi¬ ment station and a “mother culture” established from that. One of the essentials in making good butter is the proper care of the cream after churning: if it is to be churned the next day it should be mixed at once with the starter and placed in a temperature of 65° to 70°. If it is to be churned the second day, it should be cooled to 55° to 60° ; and if not till the fourth day, it should be cooled to 40° F. Warm cream, fresh from the separator, should never be added at once to the cooled cream : it should first be cooled to the proper keeping temperature. The starter should be mixed in at such a time that the cream will reach the desired degree of acidity by the time it is desired to churn. The degree of acidity may be determined by various tests. The most effective acidity is from 0.6 to 0.7 per cent. When possible it is advisable to pasteurize the milk or cream. This is accom¬ plished by heating the milk or cream to 145° F. for 30 minutes, then rapidly raising it for a moment to 185°, and then as rapidly cooling it to 75° or 80°. This destroys about 98 per cent of all the bacteria. It does not, however, de¬ stroy the spores, and when making pure cul¬ tures of lactic acid bacteria, it is the rule to repeat the pasteurization daily for four days. Into the pasteurized cream is stirred the starter, 18 to 24 hours before the churning is planned, the cream meanwhile being held at a tempera¬ ture of 52° to 54° in summer, and 58° to 62° in winter. The cream should be strained into the churn, and the churn should be not more than one-third full. A box or barrel churn is the best, and the churning should not be too fast, the idea being to keep the liquid measurably in one body which is thrown forcibly from one end of the churn to the other. In the dasher churns much of the cream is overchurned, pro¬ ducing a greasy butter. When the granules of

butter are fairly uniform in size and have the general appearance of cracked corn, the churn¬ ing is done. It takes about 30 minutes. The buttermilk should be strained away, and the butter washed with about the same quantity of water as there was cream in the beginning. Too much water will yield a tasteless butter. The butter is then to be worked by pressure, never by a rubbing motion, which destroys the grain. A wedge-shaped or square butter-worker is preferable. The butter is usually salted im¬ mediately after washing, and before working, the amount of salt used being about one and one-half ounces to the pound of butter. When the washing is done in the churn, the salt is sometimes added in the form of brine composed of one pound of salt to two pounds of water for each 10 pounds of butter. The churn is then set in operation for two or three minutes, and the butter is allowed to stand 15 minutes in the brine before working.

The most common defects of farm-made butter are: (1) Rancidity, due to the cream being too old, or too sour, or having been kept too warm before churning; (2) foul flavor, from having been allowed to absorb bad odors; and (3) ˆmottles,® from buttermilk being worked into the butter instead of having been worked out. Scrupulous cleanliness and atten¬ tion to details from the feeding of the cows to the placing of the product on the market are imperative. See Butter Worker; Churn; Dairy Industry.

The composition of butter varies. It ranges from 78.88 per cent to 88.41 per cent of milk fat; 7.22 per cent to 15.62 per cent of water; 1.03 per cent to 3.32 per cent of casein, and 1.34 per cent to 4.16 per cent of salt. The best butter has a content of 85 to 86 per cent of milk fat and from 13 to 14 per cent of water. The quality of butter is judged by its flavor, texture, color, amount of salt and general ap¬ pearance. Flavor counts about 45 per cent of the points, and varies with the market. Some markets require a mild, delicate butter; for the supply of such the cream is often pasteurized: others require a high flavor, almost verging on rancidity. Whatever is desired, that flavor should be pronounced, with an absence of ran¬ cidity or other flavors. Texture carries 25 per cent of the points and depends upon the granu¬ lar condition of the fats. The more distinctly the granules show up when the butter is broken the better the texture. The right color depends upon the market requirements ; usually a bright golden yellow, as naturally yielded when cows are on grass, is considered ideal. It should be uniform. To ensure this, it is sometimes neces¬ sary to use

some butter-color : formerly the main one used was arnotto ; now the coal-tar colors, aniline yellow and butter yellow are used. The vegetable coloring matter is usually dissolved in some oil, and this often gives a peculiar flavor to the butter, so that the coal-tar colors are preferred. Some South Ameri¬ can countries require the butter to be a deep orange or red color. A small quantity of salt is often added to improve the palatability ; it has little influence on the keeping qualities. The amount varies with trade requirements. Un¬ salted or slightly salted butter is largely used in Europe and the United Kingdom. The finish and packing of the butter should be attractive and neat. The Styles are numerous, but at¬

tempts are being made to standardize them. The American butter-tub is generally used here. It holds from 50 to 70 pounds. In Canada and Australia a box holding 56 pounds is used for the export trade. The Danes ship their butter in firkins containing 112 pounds. For local trade the standard rectangle pound print is 4 $/sX2y2X23/s inches. These are wrapped in parchment paper and packed in specially made boxes.

Oleomargarine is the most common adul¬ terant, and its detection, especially when pres¬ ent in only small amounts, is difficult. Cotton¬ seed and other oils have been used. Glycogen has been added to increase the water-holding capacity of the butter, and in butters for South America glucose has been added as a preserva¬ tive. The various preservatives, as borax, boracic acid, etc., sold under their own and other names, are now prohibited as adulterants.

Renovated or process butter is generally low-grade butter which has been melted and put through a chemical process to remove the disagreeable odors and taste; sometimes it is then mixed with soured separated or whole milk or cream and churned until granulated. If the primary article is not too inferior, the resulting product can be sold as good creamery butter; generally its keeping qualities are im¬ paired. In some States and in the United King¬ dom all butter so treated must be distinctly branded ˆRenovated.®

During the year 1850 the amount of butter made on farms in the United States was 313,345,306 pounds. As reported by the United States census of manufactures for 1914 the pro¬ duction of butter in that year amounted to 786,013,489 pounds, valued at $223,179,254, as compared with 627,145,865 pounds, valued at $180,174,790, in 1909, representing an increase of 25.3 per cent in quantity and 23.9

per cent in value.

The farm production of butter (including that made for home consumption) is probably greater than the factory output, and a relatively small quantity of cheese is also manufactured on farms. Statistics in regard to the farm output of these commodities, however, are collected only once in 10 years. At the census of 1909, 994,-650,610 pounds of butter were reported as made on farms. These amounts represented de¬ creases in the decade of 7.2 per cent and 42.6 per cent, respectively, as compared with 1899. The value of that made on farms ranged in 1915 from 21 cents to 32 cents per pound, de¬ pending on location more than upon quality. Creamery-made butter brought from 24 cents for ordinary to 38 cents for extra fancy. The lower prices were generally those of the sum¬ mer months and the highest ones of midwinter. The cost of transporting the milk to factories is about 1.5 cents per pound of butter. Den¬ mark is at present the leading butter-exporting country of the world, with a record of almost 165,000,000 pounds, valued at $37,000,000, the average price being the highest on the market. The butter exports of the United States in 1915 amounted to 9,850,704 pounds.

The coefficient of digestibility of butter-fat is 98 per cent or over. It is well assimilated, and, like other fats, is a source of heat and energy. Its value as a food and methods of usage are well known. Butter containing 82.4 per cent butter-fat has a fuel value per pound

of 3,475 calories, and in a number of dietary studies butter furnished 1.9 per cent of the total food, and 19.7 per cent of the total fat of the daily food. Further information is given in Professor Atwater's reports on dietary studies. Fresh and salt butter are equally valuable. Clarified butter is used in cooking. It is or¬ dinary butter freed from water by heating.

Bibliography. — McKay, G. L., and Larsen, C., Principles and Practice of Butter-Making) (New York 1906) ; Meyer, M. H., (Treatise on Commercial Starters in Butter and Cheese Making) (Little Falls, N. Y.,

1910) ; Michels, J., (Market Dairying and Milk Products)

(Wauwatosa, Wis., 1913) and (Creamery But-ter-Making) (Farmingdale, N. Y. 1914) ; Mon¬ rad, I. H., (The A. B C of Butter-Making) (New York 1905) ; Wing, H. H, <Milk and Its Products* (Ithaca, N. Y., 1913) ; United States Animal Industry Bureau, (Circular Zoo) (Washington, D. C., 1912) ; Illinois Agricultural Experiment Station, (Bulletins 131, 137, 138, 1 39) (Urbana 1909).

BUTTER, Artificial. See Oleomargarine.

BUTTER-BUR (Petasites petasites)a a composite plant, with large rhubarb-like leaves and purplish flowers, growing by the side of streams, allied to coltsfoot. The flowers ap¬ pear before the leaves. It is a native of Eu¬ rope, but has become naturalized in a few localities in the eastern United States.

BUTTER-COLOR, a preparation em¬ ployed to color butter and its imitations. An-natto was formerly largely used for this pur¬ pose, but is now superseded by coal-tar colors and other coloring substances such as tumeric, saffron, marigold leaves, carrot juice and chrome yellow. Owing to the small quantities used in coloring butter they are quite harmless.

BUTTER AND EGGS, a troublesome weed. See Toad-Flax.

BUTTER-FISHES. The two best known butter-fishes in American waters are denizens of the Atlantic. One (Poronotus triacanthus) is the butter-fish or dollar-fish of the coast of Massachusetts and New York, the harvest-fish of New Jersey, the dollar-fish of Maine, the sheepshead of Cape Cod, the pumpkinseed of Connecticut and the starfish of Norfolk. It swims mostly in company with large jellyfish, whose streamers, while often protecting it from other depredators, are frequently the cause of its death from their stings. The body is ovate and flat, the dorsal and anal fins are each very pointed, and the tail is long and widely forked.

The harvest-fish (Peprilus paru) is another ˆbutter-fish** found from Cape Cod southward to Brazil, but it is most abundant about the mouth of Chesapeake Bay, where it is locally called ((whiting.** It has the habit of swimming beneath the Portuguese man-of-war. It is a delicious little pan-fish, about six inches long. On the Pacific coast there are three species, one of which (P . simillima) is the Californian ((pompano,** abundant during summer about Santa Cruz, where it is highlv prized for its rich and delicate quality, and reaches 10 inches in

length. Consult Jordan and Evermann, (American Food and Game Fishes) (1902).

BUTTER-MAKING. See Butter.

BUTTER-TREE, various tropical or sub¬ tropical trees of different genera and even

families. Their seeds yield fixed oils which resemble butter, and are similarly used or are employed for lighting. The leading group is perhaps the genus Butyrospermum of the family S apotacece. Of this genus the best-known species are B. longifolium, the Indian oil-tree, whose wood resembles teak, and is in use in the East; B. butyraceum, the Indian butter-tree, whose light wood is of no commercial import¬ ance; and B. latifolium , the East Indian Ma-howa, Mahwa or Madhuca. Besides the oil obtained from each of these trees, B. butyra¬ ceum yields an edible fruit, and the corollas of B. latifolium are either eaten raw or are used for making a liquor or for distilling their es¬ sential oil. Butyrospermum parkii is the butter-tree of central Africa. It yields the galatn or shea butter, obtained by boiling the seeds, which is locally an important article of commerce. The oil is obtained by boiling the kernels of the sun or kiln-dried seeds in water. It pos¬ sesses long keeping qualities. Various species of the genus Caryocar (q.v.), natives of South America, are known as butter-trees.

BUTTER-WORKER, a machine designed to unite the small particles of butter, remove the buttermilk and water and incorporate the salt, giving the product a uniform appearance. Hand and power machines are made, the large power workers being also used for blending butters to make them uniform. The makes are variable and numerous ; some being combined with a churn, the butter not being removed until it is finished. The former method of working by the hands injured the texture of the product and was too slow. With the pres¬ ent machinery the butter is untouched by hand, can be held at a temperature of 45° to 55° F. during working and is handled expeditiously. They are a necessity in all creameries and dairies where butter is made in large quantities. See also Butter ; Creameries ; Dairying.

BUTTERCUP, the popular name of two or three species of the Ranunculus (q.v.).

BUTTERFIELD, Daniel, American sol¬ dier: b. Utica, N. Y., 18 Oct.

1831; d. Cold Spring, N. C., 17 July 1901. In 1849 he was graduated at Union College, and for some years engaged in the transportation and express business. At the outbreak of the Civil War he was colonel of the 12th New York Militia. He served in the Peninsular campaign and under Pope and McClellan in 1862. At Fredericks¬ burg he commanded the 5th Corps, and at Chancellorsville and Gettysburg was chief of staff. He served as chief of staff to Hooker at Lookout Mountain, and Ringgold and Pea Vine Creek, and commanded a division at Buzzard's Roost, Resaca, Dallas, New Hope Church, Kenesaw, Lost Mountain and other battles. He was brevetted major-general in the regular army. He resigned in 1869, and became chief of the United States sub-treasury in New York. He organized and commanded the Washington centennial parade in New York city in 1889, in which over 100,000 persons took part. He was author of (Camp and Outpost Duty) (1862). He is buried in the West Point military cemetery, an elaborate and costly marble tomb marking the spot. Consult Butter¬ field, (Mrs.) J., (Biographical MemoriaP (New York 1904).

BUTTERFIELD, Kenyon Leech, Ameri¬ can educator: b. Lapeer, Mich., 11 June 1868. He was educated at the University of Michigan and at the Michigan Agricultural College, and became assistant secretary at the last-named institution. In 1892 he began to edit the Michi¬ gan Grange Visitor and in 1896 became head of a department of the Michigan Farmer. From 1895 to 1899 he also served as superintendent of the Michigan Farmers' Institute and field agent of the Michigan Agricultural College. In 1902-03 he was instructor in rural sociology at the University of Michigan, and in the latter year was named president of the Rhode Island College of Agriculture and Mechanical Arts. In 1906 he was made president of the Agricul¬ tural College of Massachusetts. He published (Chapters in Rural Progress > (1908) ; (The Country Church and the Rural _ Problem) (1911) and contributions on professional topics in agricultural periodicals.

BUTTERFIELD, William, English archi¬ tect : b. 7 Sept. 1814; d.

London, 25 Feb. 1900. He first attained distinction by the introduction of color into ecclesiastical buildings with the aid of bricks and mosaic. Among the notable structures designed by him are Saint Augus¬ tine's College at Canterbury; Keble College, Oxford; All Saints' Church, Margaret street, London ; and the cathedral at Melbourne.

BUTTERFLY, one of the day-flying Lepidoptera of the suborder Rhopalocera (compare Moth). This group is distinguished from the moths by the slender, knobbed antennae, which are never hairy or pectinated. The body is small, but there is a greater equality in the size of the three regions (head, thorax and abdomen) than in the moths, the abdomen being much shorter and smaller, as a general rule, than in the lower families of Lepidoptera. The ocelli are usually wanting; the spiral tongue is long, and the broad wings are carried erect when in repose, and are not held together dur¬ ing flight by a bristle (frenum) and socket as in most of the moths.

The caterpillars (larvae) vary greatly in shape and in their style of ornamentation, but they uniformly have, besides the thoracic legs, five pairs of abdominal legs. The pupa is called a ˆchrysalis® or (<aurelian,® from the bright golden hues that adorn it in many species, but disappear as the wet tissues beneath the pupa-skin harden, just before the fly appears. A few species, such as those of the genus Vanessa, hibernate, while several species, such as V. antiopa, are social as young larvae. But¬ terflies also occasionally swarm while in the perfect state, such as species of Colias, Cynthia and Danais, multitudes of which are sometimes seen passing overhead in long columns. One of the North American species, and others else¬ where, are migratory, flying southward in autumn.

Butterflies are found in all parts of the world except the coldest, wherever plants exist suitable for food for the caterpillars, but they are most numerous both in species and in indi¬ viduals within the tropics, and especially in South America. About 13,000 species have been described, and it is believed that twice or three times this number are in existence. About 1,000 species inhabit North America. Butter¬ flies are especially liable to local variation, and

to seasonal and dimorphic changes, so that entomologists have recorded many subspecies and temperature-forms.

Certain Nymphalidce have glands at the end of the body secreting a repulsive fluid (see Mimicry) ; in others there are remarkable dif¬

ferences between the sexes ; in certain butter¬ flies (Androconia) some of the scales are battledore-shaped, and secrete a special odor. The species of Ageronia, a South American genus, make a clicking noise when flying. While caterpillars are plant-eaters, those of several Lyccenidce are known to be carnivorous, feeding on plant-lice and scale-insects.

The eggs of butterflies have a membranous shell, and exhibit much variety in form and character of surface. ˆSometimes,® says Hol¬ land, <(they are ribbed. Between these ribs there is frequently found a fine network of raised lines, variously arranged. Sometimes the surface is covered with minute depressions, sometimes with a series of minute elevations variously disposed.® The color is most often greenish white, but many are brightly colored, or have lines and dots of color. Another peculiarity is the minute opening (micropyle) in every egg, by which the spermatozoon may enter. The eggs are laid by the female on a plant that will afford suitable food for the caterpillar when it hatches. They may be de¬ posited singly or in small or large masses ; and those that will not hatch until after the follow¬ ing winter are protected in some way, as by a varnish, or otherwise, against the weather. Some butterflies are ˆsingle-brooded,® others lay eggs twice or more in a season, the early layings hatching quickly and the last lot sur¬ viving the winter to establish the species in the succeeding spring. Few adult butterflies survive the advent of the cold season in the North, the species continuing through the sur¬ vival of eggs, larvae or pupae, the last some¬ times by burial in the ground.

The caterpillars of butterflies are typically cylindrical and worm-like in form ; but some are short and slug-shaped, or irregular in out¬ line. The head is distinct, often large and formed of hard (chitinous) material; and often it bears horn-like projections or protrusile appendages. The thin skin is in many cases brightly ornamented with colors similar to those worn later by the adult fly (imago) ; but green and gray prevail — tints inconspicu¬ ous among the leaves and grasses on which most of the species feed. Most caterpillars live solitary lives ; but in some species they are gregarious, and even weave large silken dwell¬ ing-places in which they live as a colony.

Caterpillars are able to grow by sloughing the skin, which from time to time cracks, en¬ abling the creature to crawl out of it, and to begin another period of growth with a new and elastic skin that has formed beneath the old one. Four or five of these molts take place as a rule. When the larva is to hibernate, it usually does so after the first or second molt, and resumes feeding and growth when it wakes up in the spring.

One great distinction between moths and butterflies lies in the form and structure of the pupa — that quiescent stage of development in which the caterpillar is transformed to the imago. The term chrysalids is usually applied to the pupae of butterflies, because no such a

BUTTERFLIES AND MOTHS

■ m. .

‘ tS

H i

BUTTERFLIES

1 Amblypodia Amantes

2 Ornithophera Pompeus

5 Papilio Hector

3 Morpho Cypris

4 Ornithophera Priamus

BUTTERFLIES AND MOTHS

1 Mulberry Silkworm, Caterpillar and Adult

2 South American Silk Moth

3 Chinese Silk Moth

4 Ailanthus Moth

cocoon as is common among moths enwraps them. They are naked and hang free from the underside of some support, as a twig or stone, or are suspended against a surface, as the bark of a tree-trunk, attached to a button® of silk, and held in place by a girdling thread of silk. Chrysalids are usually protectively colored.

The families of butterflies are few, and all of them, except one small tropical group (Libythcidce) are represented in every conti¬ nent. Following is a list of the five families recognized by American entomologists, begin¬ ning with the most primitive and ending with the most specialized: (1) Hesperiidce, (2) Papi-lionidcc, (3) Lycccnidce, (4) LemoniidcE, (5) Nymphalidce. In the last three families, which comprise the majority of butterflies, the first pair of legs is more or less modified, differing from the two hinder pairs, especially in the male nymphalids, in the more or less aborted tarsi, or toe-joints.

The Hesperiidce, or <(skippers,® have a world¬ wide range except New Zealand, and are largely represented in the United States. This family contains small, prevailingly brown but¬ terflies, with relatively large bodies and broad heads, the feelers hooked at the tip. The forewing is triangular and pointed in shape,, and the prevailing color is brown. The hesperiids are remarkable for their short, jerky flights. The pupa is enclosed in a light, silky cocoon.

The P apilionidce are a very populous family of large and handsome butterflies, familiarly called ˆswallow-tails® from the prolongation of the hind wing in many of them. Yellow is a prevailing color, usually ornamented with black, red-brown or some other dark tint. The wing-neuration differs characteristically from that in other families. All six feet are present in both sexes. The caterpillar is cylindrical, elongate and never hairy, but often tuberculate, and is provided with a retractile tentacle behind the head, which in some species emits a highly disagreeable odor of protective value. The pupa has two

anterior projections called ((nosehorns,® and hangs to its food-plant by its anal extremity, sustained by a loose girdle. This family is distributed throughout the world.

The Lyccenidce are a very large family of small or moderately sized butterflies with slender bodies, the feelers placed close together, and the front feet aborted in the males. The caterpillars are short and hairy, resembling woodlice in shape. The pupa has a well-marked ((waist,® is clothed with hairs or bristles, is attached to a pad of silk by the cremaster and is girdled with a silken thread. This family occurs in all parts of the world, and its members are known, on account of their prevailing hues, as blues,® <(coppers® and ((hair-streaks.® In alighting they always fold their wings upright.

The LemoniidcE are a small family related to lycaenids, which contains brilliant butterflies mostly confined to tropical America, a few bright-brown species, the (<metal-marks® of the subfamily Erycinince, occurring in the south¬ western United States.

The NymphalidcE embrace a group called ((four-footed® or brush-footed® butterflies, be¬ cause the foremost pair of feet in both sexes are dwarfed, hairy and held folded up against the body. This is the largest and most promi¬

nent of butterfly families, is very ancient and is much subdivided in classification. The caterpillars vary much in form, and some are hairy, or armed with spines or tubercles. The pupa hangs by its ((tail,® but is not sustained by a silken girdle-thread. The nymphalids are represented in all countries, but most numer¬ ously and strikingly in tropical America.

Bibliography.— Chapman, T. A., bupae of Moths5 (in (Transactions) of the Entomological Society, London 1893) ; Doubleday and West-wood, (Genera of Diurnal Lepidoptera5 (ib. 1862) ; Edwards, (Butterflies of North Amer¬ ica5 (Philadelphia 1868-88) ; French, G. H., (Butterfles of the Eastern United States5 (Philadelphia 1895) ; Holland, W. J., <The Butterfly Book) (New York 1898) ; Kellogg, (American Insects) (New York 1908) ; Kirby, W. F., (Butterflies and Moths of Europe5 (London 1907) ; Longstaff, butterfly Hunting in Many Lands1* (New York 1912) ; Miller, butterfly and Moth Book) (ib. 1912) ; Pack¬ ard, A. S., (TextBook of Entomology5 (ib. 1898) ; Scudder, S. H., (Butterflies of New England1* (3 vols., Cambridge 1889) ; id., but¬ terflies, Their Structure, Changes and Life Histories5

(ib. 1881) ; Strecker, butterflies and Moths of North America: Diurnes5 (Reading, Pa., 1878) ; Walker, british Museum Cata¬ logue of Lepidoptera1* (London 1854-56) ; Wood, butterflies5 (New York 1910) ; also the works of Boisduval, Haebner, Eimer, Moore, Niceville and Standinger.

Ernest Ingersoll.

BUTTERFLY-FISH, or CORAL-FISH.

These beautiful fish representing the large family Chcetodontidce and its allies of the scaly-finned group (Squamipinnes) of marine fishes, obtain their English names from their oval form, brilliancy and their quickness of move¬ ment, and the fact that their principal habitat is in and around the tropical coral-reefs. They are so compressed as to resemble the ((pumpkinseed® sunfishes of the ponds, and are aided in keeping their balance by a very high, arched dorsal fin and an anal fin extended beyond the tail. Their colors are always gay, usually rich orange-yellow, as a ground tint, set off by broad, black bars and fin ornaments in great variety, besides blue and red touches. The type-genus Chcetodon is represented by several species in the West Indies, and southward, some of which occasionally drift northward in the path of the Gulf Stream. More numerous in American waters is the black-angel® (Po - macanthus arcnatus) , common around Porto Rico and at Key West, where it is. caught in traps, or sometimes speared. The ((blue-angel® (Holacanthus ciliaris) represents a genus con¬ taining several West Indian species, of which the most important is the bock beauty® (H . tri¬ color), often exceeding a foot long, and good food, as well as most beautiful. The name <(angel-fish® is also given in Bermuda to several similar fishes of the genus Angelichthys, called in Spanish Usabellitas.® All these fishes are carnivorous, and Jordan remarks that their ex¬ cessive quickness of sense and motion enable them to maintain themselves in the struggle for existence in the close competition of the coral reefs, notwithstanding that they are made so conspicuous to their enemies by their bright colors. Consult Jordan and Evermann, (Food and Game Fishes of America5 (1902).

BUTTERFLY PLANT, an orchid (Onci - dium papilio) brought from Trinidad. It is so called because its large yellow and red blossoms, poised on slender flower-stalks and vibrating with every breath of wind, resemble butterflies hovering on the wing. It is also applied to the Indian butterfly plant, Phalcunopsis amabilis, which is another orchid.

BUTTERFLY-WEED (Pleurisy-root), a handsome American perennial herb (Asclepias tuberosa) of the family Asclepiadaceoe, com¬ mon in dry ground almost throughout the United States and southern Canada. The large, irregular, yellowish-brown, tuberous roots have a nauseous, bitter taste when fresh, merely bitter when dried, and are reputed useful in lung and throat troubles, rheumatism, etc., but seem to be less popularly used than for¬ merly. It is usually administered as a decoc¬ tion, fluid extract or at times as a powder. The hairy stems, which rise to a height of two or three feet, bear alternate oblong-lanceolate leaves, and several umbels of short-peduncled, bright orange-yellow flowers followed by erect pubescent pods. Unlike other members of the genus, this plant has not a milky sap.

BUTTERINE, a substance prepared in imitation of butter, from animal or vegetable fats. The fat is first freed from all impurities, and by heat converted into olein. The olein is then transferred to a churn containing a small quantity of milk and churned into butterine. Sometimes it is colored in imitation of butter. Freshly prepared, it is sweet and palatable, and when spread on bread or cold toast is but slightly inferior to a fair quality of butter. The process has attained such perfection in the mat¬ ter of manufacture in the United States that it takes an expert to distinguish it from genuine butter, and laws have been passed compelling tradesmen to label each package containing it so that no one may be deceived. See Oleomar¬ garine.

BUTTERMILK, the fluid left behind after churning milk for butter. It possesses a specific gravity somewhat higher than ordinary milk, owing to the removal of most of the fat, and varying between 1.032 and 1.035 per cent at 59° F. It may be fresh or sour, according to the method of churning. It should not contain more than 0.5 to 0.6 per cent of butter-fat. Its com¬ position is variable, an average of 85 analyses being: Water, 90.1 per cent; casein, 3.0; fat, 1.1; protein, 4.0; milk sugar and lactic acid, 4.0; ash, 0.7 per cent. Its dry matter is practically all digestible,- and it is a healthy and nutritious beverage, much relished by many people. Its fhel value per pound is 165 calories. It has about the same value as skim-milk for pig-feed¬ ing, and is used in conjunction with corn meal or some other grain, excellent pork being pro¬ duced. It is also used for calf-feeding, al¬

though failures are reported in the undertaking. In fattening poultry it is highly esteemed. See Butter.

BUTTERNUT (White Walnut), a large spreading tree (Juglans cinerea) of the family Juglandacece, native of America, where it ranges from New Brunswick to Georgia and westward to the Dakotas and Arkansas. It sometimes attains a height of 100 feet but usu¬ ally varies from 50 to 80. It has smooth, gray

bark, large compound pubescent leaves, small flowers, followed by oblong, pointed, ribbed green nuts covered with viscid hairs. The ripe nuts when dried have very hard shells and are highly prized for dessert in regions where the trees grow ; and the green nuts are used for making pickles. The bark of the stems has been used in dyeing and that of the root in medicine. The wood is used to some extent for cabinet work and in¬ terior finish of houses, but is less popular than black walnut. An inferior sugar can be made from the sap. The tree is not quite so attractive as the walnut and is less densely cov¬ ered with foliage, but is less attacked by insects.

BUTTERWORT, a genus of about 30 species of small succulent plants (Pinguicula) of the family Lentibularicicece , widely distribu¬ ted throughout the world in bogs and other wet ground. The species have rosettes or tufts of leaves, from among which single-flowered scapes rise to a height of a foot or less. The short, thick, stick-haired leaves attract small in¬ sects which are covered by the in-rolling leaf-margins and digested. The leaves of certain species, especially of the common butterwort (P. vulgaris) are used like rennet to coagulate milk, and thus form a favorite food in Lapland and the Alps. The milk (reindeer milk in Lapland) is poured upon the leaves, strained, al¬ lowed to stand 48 hours, or until creamy and somewhat acid, when it is ready for use as food or for impregnating other milk for the same purpose. This property is said by some authori¬ ties to account for the English name, but others attribute the name to the buttery feeling of the leaves. Several species are cultivated for their dainty flowers, and as curiosities on ac¬ count of their carnivorous habits, but they are rather difficult to manage unless conditions are naturally right. They are less popular in America as greenhouse plants than in Europe. Several species are natives of the United States.

BUTTERWORTH, Hezekiah, American story writer and poet : b. Warren, R. I., 22 Dec. 1839 ; d. there, 5 Sept. 1905. He was editor of the Youth’s Companion , 1871-74. He published many popular

juvenile stories and travels, in¬ cluding (Zig-Zag Journeys* (1876-90) ; (Songs of History: Poems and Ballads upon Important Episodes in American History) (1887) ; (The Wampum Belt, or the Fairest Page of History* (1896); (A Knight of Liberty*; (The Patriot Schoolmaster* ; (Poems for Christmas, Easter, and New Year* ; (The Boyhood of Lincoln) ; (Boys of Greenway Court* ; (In Old New England) ; (Traveler Tales of China) ; (Over the Andes* ; (Great Composers) ; (South America) ; and many others.

BUTTMANN, Philipp Karl, German scholar: b. Frankfort-on-Main 1764; d. Berlin, 21 June 1829. He was educated at the Univer¬ sity of Gottingen and in 1789 was made assistant at the Berlin Royal Library, later becoming secretary and librarian. From 1796 to 1808 he also held a chair in the Joachimsthal Gymnasium at Berlin and on the establishment of the Uni¬ versity of Berlin he was appointed a professor there. He published (Griechische Grammatik) (1792; 22d ed., 1869); Griechische Schulgram-matik) (14th ed., 1862); (Texilogus) (1818; 2d ed., 1860) ; a glossary of difficult Homeric

words; (Ausfiihrliche griechische Sprachlehre) (1827) ; <Mythologus) (1828) ; a continuation of Spalding's edition of Quintilian, and editions of various Greek classics.

BUTTON, Sir Thomas, English navigator in the early part of the 17th century, the suc¬ cessor of Hudson in exploring the northeastern coast of North America. He sailed in 1612 with two vessels, the Resolution and the Dis¬ covery, passed through Hudson Strait, and was the first to reach land on the western coast of the bay. The point which he touched was in lat. 62°, and was named by him Carey's Swan's Nest. Being obliged to winter in this region, he selected a position near the mouth of a river, first named by him Nelson's, after the master of his ship. Every precaution was taken against cold and icebergs, yet the severity of the climate occasioned much suffering to his crew, and was fatal to a few of them. During the next summer he explored and named several places on the coast of Hudson Bay, and advanc¬ ing to lat. 65°, became convinced of the pos¬ sibility of the Northwest

Passage.

BUTTON, a small circular disc or knob of mother of pearl, horn, metal or other material, with a shank or perforations through its centre for attachment to an object, and made to fit into a hole formed in another one for its re¬ ception, the two fastening the objects together. Its chief use is to unite portions of a dress to¬ gether. The ancient method of fastening dresses was by means of pins, brooches, buckles and tie-strings. Buttons of brass are found on dresses of the 16th century. Gilt buttons were first made in 1768 and those of papier-mache in 1778. Buttons of vegetable ivory are now all but universally used for tweed coats and vests. The palm fruit which yields it is called corozo nut. It is not unlike true ivory but softer, and is easily turned and dyed. These buttons are often mottled with some stain to suit the common patterns of tweed stuffs. Recently a substitute vegetable ivory has been found in the seeds of a common palm of north¬ ern Africa (Hyphence thebacia). These seeds are known to the trade as gingerbread doum, doom or dum nuts. They are much cheaper than the tagua, corozo or South American ivory nuts, and are available in much larger quantities. The difficulty at present is the adaptation of existing machinery to the manufacture of but¬ tons from this African nut, but it is believed that within a short time manufacturers will see the advisability of installing machinery espe¬ cially designed to make buttons, trinkets and toys in the most efficient manner from this new and less expensive material. Mother of pearl but¬ tons are formed of the beautiful substance of which the large flat shell of the pearl oyster consists, and this has long been a favorite material for buttons. Small cylinders are first cut out of the shells with a tubular saw. These are then split into discs, which are shaped by a steel tool, drilled with holes, and finally polished with rotten stone and soft soap, or by a more recent method with ground charcoal and turpen¬ tine. Shirt studs as well as flat and globular buttons with metal shanks are also made of this substance.

Among other animal substances used for but¬ tons are ivory, bone, horn, and hoof. From this last socalled horn buttons were some years

ago made in enormous numbers by pressing them in heated dies in which the design was cut. There are many kinds of composition buttons. Glass buttons are made in great variety. For pinched buttons small rods of colored glass are heated at the ends, and pressed into shape by means of a pair of rather long hand pliers, on the ends of which are a die and its counterpart, likewise kept hot. Other kinds are

cut out of colored sheet glass, which is coated on the back with tin amalgam like a mirror. With other varieties, some beau¬ tiful glass buttons are made in Bohemia, either partly or wholly of aventurine glass; and of this gold-spangled material artistically in-wrought with other colors, studs and solitaires still more remarkable for their beauty and minute patterns are made at Venice. Porce¬ lain buttons were a few years ago nearly all of French manufacture, but are now made principally at Prague. The plastic clay is pressed into molds of plaster of Paris in the same way as small objects are usually produced in earthenware. Some are plain and others are painted or printed with patterns. More or less expensive buttons are made of ornamental stone, such as agate, jasper and marble. Oc¬ casionally they are formed of amber, jade or of still more costly materials, as pearls and gems. In recent years, improved methods and machines have been introduced for the shap¬ ing as well as for the polishing and finishing of bone, corozo and wood buttons. In England, Birmingham is the seat of the button trade, which, however, is much more largely de¬ veloped in France. Brass buttons were made in Philadelphia in 1750, and hardwood but¬ tons were made there soon after. The button factory in Waterbury, Conn., now the seat of the metal button manufacture, was established about 1800. Horn buttons were made in the United States as early as 1812, and the produc¬ tion of buttons covered by machinery was be¬ gun at Easthampton, Mass., by Samuel Willis-ton in 1827. The making of composition but¬ tons was begun at Newark, N. J., in 1862, and there have been about 1,500 patents for but¬ tons issued by the patent office of the United States. In 1850 there were in the United States 59 establishments for the manufacture of but¬ tons, with an output whose value was placed at $964,359. According to the returns of the United States census of manufactures for 1914 the but¬ ton industry comprised 517 establishments, pro¬ ducing in that year 60,602,359 gross of buttons valued at $16,233,198.

The most important branch of the button industry was the manufacture of pearl buttons, either from mother of pearl or ocean pearl or from the shells of the Unios or fresh-water pearl.

In 1914 there were manufactured 26,181,405 gross of pearl buttons, with a value of $7,369,- 208, representing 43.2 per cent of the total quan¬ tity and 45.4 per cent of the total value. Of this amount, 21,664,436 gross, valued at $4,879,- 844, were made from fresh-water pearl and 4,516,969 gross, valued at $2,489,364, from mother of pearl or ocean pearl.

Next in importance was the manufacture of buttons from vegetable

ivory, the output of this kind amounting to 5,128,005 gross, valued at $2,885,503, or 8.5 and 17.8 per cent of the total in quantity and value, respectively.

Q2

BUTTON-BUSH — BUTTZ

The others of the more important classes in point of value were covered buttons, $1,600,178; celluloid, $724,354; shoe, $610,796; bone, $329,- 934 ; horn, $299,487 ; and ivory, $283,484. In addition various other kinds and parts, having a total value of $2,130,254, were manufactured.

Of the 517 factories reporting in 1914, there were 224 located in New York, 81 in Iowa, 60 in New Jersey, 31 in Illinois, 21 in Pennsyl¬ vania, 18 in Connecticut, 14 in Massachusetts, 12 in Indiana, 9 each in California, Missouri and Ohio, 5 in Arkansas, 4 in Kentucky, 3 each in Minnesota and Washington, 2 each in Michi¬ gan, Rhode Island, Tennessee, West Virginia and Wisconsin, and 1 each in Colorado, Kan¬ sas, New Hampshire and Oregon.

Statistics compiled in July 1916 by the Bureau of Foreign and Domestic Commerce showed that American export trade in but¬ tons indicated an increase of 79 per cent and prospects of further advancement. This was owing to the fact that the normal European production of buttons, the largest in the world, was curtailed by the war. Under usual con¬ ditions the United States manufactures enough to meet about nine-tenths of its own require¬ ments and more than half the supply of Can¬ ada, which has some factories of its own, and ranks next to the European nations in produc¬ tion. The American export trade in buttons amounting to $654,372 in 1914, more than half ‘of which was with Canada, expanded to $1,- 171,232 in 1915, with England, Canada, Aus¬ tralia and Cuba the largest purchasers. The bibliography of the button industry is varied and interesting: Consult (The Button Industry in Europe) — Consular Reports Vol. 58, pp. 481-91 (Washington, D. C., 1898) ; (The Emilio Collection of Military Buttons, American, British, French and Spanish, with some other countries) (Essex Institute, Salem, Mass., 1911) ; Rathbone, R. L. B., (Buttons,* Art Journal, Vol. 71, pp. 7-14 (London 1909) ; Smith,

H. W., (The Pearl-Button Industry of the Mississippi River,) Scientific American, Vol. 81, pp. 86-87 (New York 1899) ; Petrie, W. F., (Buttons from Egypt, *Antiquary, Vol. 32, pp. 134—37 (London 1896) ; Skeel, R., Jr., Cov¬ ered and Celluloid Button Factories in New York City,* New York Commission Report (Albany 1915); (Art in Buttons> — German-American Button Company (Rochester 1906-16).

BUTTON-BUSH, HONEY-BALL, or GLOBE-FLOWER, a North American shrub (Cephalanthus occidentalˆ) of the madder family, which grows in wet places, and bears extremely fragrant flowers whose small florets are folded or packed into balls, while C(the long styles and capitate stigmas remind us of pins stuck in a cushion.®

BUTTON-QUAIL, a small quail-like bird of the genus Turnix, family Turnicidce , order Hemipodii, of which there are some 20 species in various parts of the Old World, some of which are termed bustard-quail, bush-quail, ortygan and hemipode. They frequent wooded places and afford good sport for the gunner. The females, as well as the males, are brightly colored. They are one of the smallest game birds known, inhabit woody places and feed generally on berries and insects.

BUTTONWOOD, a name often given to the North American plane (Platanus occiden¬ talis). See Plane.

BUTTRESS, in architecture, a structure of masonry used to resist the thrust of an arch or vault. It takes the form of a great proportion¬ ate thickening of the walls at the point where the thrust affects the wall, the thickness some¬ times increasing until the mass of masonry is set across the general direction of the wall. Thus in the developed Gothic style it nearly re¬ places the wall, because all the space between buttress and buttress is occupied by a great win¬ dow. In the case of an archway in a single wall it often happens that the two sides or outer edges of the wall are carried up in such a way that they are spread wider toward the base and approach one another at the top, by means of certain offsets or steps, and these extensions of the wall are called buttresses, although they are mere widenings of the wall. In like manner some English Gothic church towers have curious diagonal spurs projecting on the four corners, in the form of short pieces of wall built on a prolongation of a diagonal of the square plan, and these are considered as buttresses, although they have very rarely any thrust to

resist, be¬ cause the tower is not often occupied by vaulted chambers, and because the meeting of the two walls would provide sufficient masonry for the practical purpose. It is a vice in that style that these considerations are lost sight of.

Historically, the real buttress begins to show itself in Romanesque work along the walls of the aisles, and is at first a slight projecting pilaster-like thickening of the wall, or a rounded projection like an engaged shaft of a column. These are called by special names, as buttress-pier, pilaster-strip, *etc.* They were very inade¬ quate for their purpose (see Romanesque Architecture) and their presence shows the uneasiness of the early builders in try¬ ing to dispense with the precautions taken by their masters, the Romans of the empire, and their hesitation in building what alone would do the work. As the vaulting within became concentrated on certain points, when groined vaults superseded barrel-vaults for the aisles, the need of the buttress became more evident, and in some Romanesque churches they have been built up afterward, the walls being stayed up with great cost and trouble after they had begun to spread under the thrust of the vault. It was not until the ribbed vault came in and the Gothic style came into being that the buttress took its permanent shape of a piece of wall, thin in comparison to projection; that is to say, having by far its greatest dimen¬ sion in the direction of the thrust of the vault and therefore at right angles with the wall of the church. Except in modern Gothic exterior buttressing is seldom employed nowadays. It is, however, employed in railway stations and factories, where strong vibration of the floors necessitates the reinforcement of the walls at regular intervals. See Flying Buttress.

BUTTZ, Henry Anson, American educa¬ tor : b. Middle Smithfield, Pa., 18 April 1835. He was graduated at Princeton in 1858, and entered the Methodist ministry the same year. He was president of Drew Theological Semi-

nary, 1880-1912, president emeritus since 1912, and has written much on polemics, exegetics and hermeneutics.

BUTYRIC ACID, an acid obtained from butter; it also occurs in perspiration, in cod liver oil and other fats, and in meat juice. When obtained, as it may be from butter and from sugar, it is in the form of a clear, oily, volatile fluid. It combines with bases, and forms crys¬ talline salts, which possess no taste. Butyric acid is a colorless liquid, having a smell like that of rancid butter; its taste is acrid and bit¬ ing, with a sweetish after-flavor. Formula, normal butyric acid CH3.CH2.CH2.COOH.

BUTYROSPERMUM, a genus of tropi¬ cal trees found in the East Indies and Africa, of the family Sapotacece. One species (B . parkii) is supposed to be the shea-tree of Park, the fruit of which yields a kind of butter that is highly valued and forms an important article of commerce in the interior of Africa. There are several other species, of which B. longifolium, or Indian oil-tree, and B. butyraceum, or Indian butter-tree, are well-known examples, yielding a large quantity of oleaginous or butyraceous matter. The wood is as hard and in¬ corruptible as teak. See also Butter-tree.

BUXAR, buks'ar, or BAXAR, a town of British India, in the district of Shahabad, presi¬ dency of Bengal, situated on the south bank of the Ganges, about 60 miles below Benares. It is celebrated for a victory which confirmed the British in the possession of Bengal and Bahar, 23 Oct. 1764.

BUXTEHUDE, buks-te-hoo'de, Dietrich, German organist : b. Helsingor 1637 ; d. 9 May 1707. His father was organist at Helsingor for 32 years, and no doubt imparted the art to his son. In 1668 Buxtehude was appointed to the important post of organist at the Marien-kirche (Mary's Church) in Lubeck. In 1673 he introduced special church concerts after the evening services on the five Sundays before Christmas. He wrote the music for these con¬ certs, producing new compositions with much rapidity. The great Bach tramped a long dis¬ tance in 1705 to hear Buxtehude play and to learn from him.

BUXTON, Sidney Charles, 1st Viscount of Newtimber (cr. 1914), G.C.M.G., LL.D., 1916; high commissioner and governor-general of South Africa since 1914: b. October 1853. He was educated at Clifton College and Trinity College, Cambridge; was member of the Lon¬ don school board from 1876 to 1882; of the Conciliation Committee of the Dock Strike, 1889; of the Royal Commission on Education, 1886-89; of the Income Tax Committee, 1904; UnderSecretary for the colonies, 1892-95 ; M.P. for Peterborough, 1883; and from 1905—10 he was Postmaster-General. While in this latter office he succeeded in introducing penny postage to the United States and reduced maga¬

zine postage to Canada. The Insurance Act and the Copyright Act, both passed in 1911, were largely his work, as were the Bankruptcy Act and Extension of Trade Boards Act, 1913, and the Pilotage Act of 1912. He was M.P. for Popular, 1886-1914. His published works in¬ clude (Handbook to Political Questions) (11th ed.) ; f Political ManuaP (5th ed.) ; (Finance and Politics5 (1783-1885) ; Hlandbook to Death

Duties) ; (Mr. Gladstone as Chancellor of the Exchequer5 ; (The Fiscal Question5 ; (Fishing and Shooting5 ; (Recreations. 5

BUXTON, Sir Thomas Fowell, English philanthropist : b. Earl's Colne, Essex, 1 April 1786; d. 19 Feb. 1845. He was educated at Trinity College, Dublin, and in 1808 joined the firm of celebrated brewers, Truman, Hanbury & Company, and took an active share in carry¬ ing on the business. In 1816, on the occasion of the Spitalfields distress, he made his first public effort in a speech at the Mansion House, and afterward succeeded in organizing an ex¬ tensive system of relief. He next proceeded, in concert with his sister-in-law, the celebrated Mrs. Elizabeth Fry (q.v.), to examine into the state of prisons; and as the result of his inquiries produced in 1818 a work entitled (An Inquiry Whether Crime and Misery are Pro¬ duced or Prevented by Our Present System of Prison Discipline,5 which attracted great at¬ tention, and led to the formation of the Prison Discipline Society. In 1818 he was elected member of Parliament for Weymouth, and con¬ tinued to sit for it in successive Parliaments till 1837. He distinguished himself by his en¬ lightened zeal in the cause of humanity, and was long the right-hand man of Wilberforce, who, on retiring from public life, selected Buxton as the person best qualified to carry out those of his benevolent schemes which remained un¬ completed. In 1823 he moved and, with a slight modification, carried a resolution to the effect that slavery, being repugnant to the Christian religion and the British constitution, ought to be abolished. Subsequently in 1831 he made such an impression on the House and country by an admirable speech that the government were glad to take the matter into their own hands and give full effect to emancipation. After his retirement from Parliament the slave trade occupied much of his thoughts, and he published in 1839 a work entitled (The Slave-trade and Its Remedy.5 In 1840 he was created a baronet. Consult (Memoirs of Sir T. F. Buxton, Bart.5 (1872).

BUXTON, England, a town in Derbyshire, 36 miles northwest of Derby, and 25 south-southeast of Manchester. The highest town in

England and the centre of the Peak District. Buxton has long been famous for its calcareous springs, the waters being taken for indigestion, gout, rheumatism and nervous and cutaneous diseases. The locality was known to the Romans, who had baths here. The season ex¬ tends from May to October. The town is 1,025 feet above sea-level and is situated in a deep valley. Much of the splendor of Buxton is due to the Dukes of Devonshire, one of whom, in 1780, at the cost of $600,000, erected an immense three-storied pile of buildings, called the Cres¬ cent. Near Buxton is the Diamond Hill, famous for its crystals; and Poole's Hole, a gas-lit stalactite cavern 770 yards long. Mary, Queen of Scots made several visits to the baths at Buxton while a prisoner in the custody of the Earl of Shrewsbury. Pop. (1911) 10,024.

BUXTORF, Johann (The Elder), Ger¬ man Orientalist: b. Kamen, Westphalia, 25 Dec. 1564; d. Basel, 13 Sept. 1629. He spent his student years at Marburg, Plerborn, Heidelberg, Basel, Zurich and Geneva. Being very learned in Hebrew and Chaldaic, in the acquirement of

which he obtained the assistance of many learned Jews, he was engaged by the magis¬ trates of Basel to become professor of those languages, which he taught with great success. His chief works are (Lexicon Chaldaicum, Talmudicum et Rabbinicum) (1639) ; (The¬ saurus Linguae Hebraicae) ; (Biblica Hebraica Rabbinica) ; (Synagoga Judaica hoc est Schola JudaeorunP (1604) ; Hnstitutio Epistolaris He¬ braica > ; (Concordantiae Bibliorum Hebraicorum.* Consult Kautsch, (Johann Buxtorf der Altere) (Tubingen 1880).

BUXTORF, Johann (The Younger), German Hebraist: b. Basel, 13 Aug. 1599; d. there, 16 Aug. 1664; son of the preceding. He entered the University of Basel at 12, became master of arts at 16, and proceeded to Heidel¬ berg and afterward to Geneva. In 1629 he suc¬ ceeded his father in the chair of Hebrew at Basel, and occupied it for 34 years, until his death. The same chair was filled by his son and his nephew successively during 68 years longer, making a combined occupancy of

this professional chair by the Buxtorf family for an unbroken period of 140 years. He spent a great part of his life in controversy with other scholars regarding disputed biblical and theo¬ logical questions, and especially regarding the antiquity of the vowel system in Hebrew. He completed and published two of his father's principal works, the (Lexicon Chaldaicum, Talmudicum, et Rabbinicum) (Basel 1639) and (Concordantiae Bibliorum Hebraicorum) (Basel 1632), the most important publication of his own being the < Lexicon Chaldaicum et Syria-cum) (Basel 1622).

BUXUS, the genus name of a number of shrubs or small trees. See Box.

BUYS-BALLOT, bu-is-ba-lo, Christo-phorus Henricus Didericus, Dutch meteor¬ ologist: b. Kloetinge, Zeeland, 10 Oct. 1817; d. Utrecht, 2 Feb. 1890. He studied at the Uni¬ versity of Utrecht, where he became professor of mathematics in 1847, and professor of ex¬ perimental physics in 1870. In 1854 he re¬ ceived the appointment of director of the Royal Meteorological Institute at Utrecht. He was one of the initiators of the new sys¬ tem, under which, by daily synoptical weather reports, and simultaneous observations by land and sea, materials are collected for forecasting changes. His own observations have resulted in the determination of a general law of storms, known as the Buys-Ballot law. The inventor of a system of weather signals, he was largely instrumental in bringing about an international uniformity in meteorological observations. His works include (Changements periodiques de la temperature* (1847) ; (Eenige reglen voor te wachten van weerverandering in Neder¬ land 1860) ; in English, Suggestions on a Uni¬ form System of Meteorological Observations) (1872-73) ; and 40 volumes of the Annual of the Meteorological Institute.

BUYUKDEREH, bi-yjook'de-ra, a little town on the western side of the Bosporus 10 miles north-northeast of Constantinople, situ¬ ated in the midst of a large, deep-bosomed val¬ ley. It is the summer residence of the Euro¬ pean embassies at Constantinople, and its gar¬ dens and palaces, not less than its natural beauty and coolness, make it a favorite promenade

ground. The tradition that Godfrey of Bouil¬ lon encamped here with his army is not alluded to in the original records of the Crusades.

BUZFUZ, Sargeant, a character introduced by Dickens in the (Pickwick Papers.* He is the barrister who becomes counsel for the

plaintiff in Mrs. Bardell's breach of promise suit against Mr. Pickwick, and is remarkable for the ingenuity he displays in drawing in¬ criminating inferences from ordinary and in¬ consequential occurrences.

BUZZARD, a term given in America to two distinct groups of birds — buzzard-hawks of the genus Buteo and its allies, also familiar to Europeans, and the turkey-buzzard — a vul¬ ture. The buzzard-hawks are closely related to the eagles, from which they are distinguished by the smaller size in the majority of cases, the smaller and rounder head and a slow and heavy manner of flight. They feed chiefly upon the smaller mammals and reptiles, seldom catch¬ ing or disturbing poultry, although popularly accused of it and styled "hen-hawks.® Import¬ ant North American species of the genus Buteo are the red-tailed, red-shouldered, Swainson's, and broad-winged hawks, all of which are else¬ where described under their names. The most important of the genus Archibuteo is the rough¬ legged hawk (q.v.), and the handsomest one, the squirrel hawk of California. In the south¬ ern United States the name usually refers to the common black vulture (Cathartes aura). See Turkey-Buzzard.

BUZZARD'S BAY, on the southeast coast of Massachusetts, is about 30 miles long, and has a mean breadth of seven miles. It is sheltered from the ocean and separated from Vineyard Sound by the Elizabeth Islands. Its chief harbors are those of New Bedford, Ware-ham, Mattapoisett, Nasketucket and Sippican.

BUZZING, the sounds produced by many insects, other than by mechanical means, that is, by friction. How the buzzing of bees, flies, etc., is produced has been a disputed question. Two distinct sounds may be distinguished — one, a deep noise, is due to the vibration of the wings, and is produced whenever a certain rapidity is attained; the other is an acute sound, and is said to be produced by the vibrations of the walls of the thorax, to which muscles are attached; this sound is specially evident in Diptera and Hymenoptera, because the integu¬ ment is of the right consistence for vibration. In both of these, observers agree that the spi¬ racles are not concerned in the matter. Laudois tells us that the wing-tone of the honey bee is A'; its voice, however, is an octave higher, and often goes to B" and C". The sounds produced by the wings are constant in each species, ex¬ cept where, as in Bombus, there are individuals of different sizes ; in these the larger ones gen¬ erally give a higher note. Thus, the compara¬ tively small male of B. terrestris hums on A ', while the large female hums an entire octave higher. Consult Sharp, <Insects) (New York 1899) ; Packard, (Textbook of Entomology> (New York 1898).

BYBLOS, bib'los, an ancient maritime city of Phoenicia, more properly Gyblos, now called Jebail, a little north of Beyrout. It is often mentioned in inscriptions under the form G B L and it also appears in cuneiform documents as

early as the 15th century b.c. either as Gubli or Gubal. It was the chief seat of the worship of Adonis of Thammuz, and of Astarte as Baalat-Gublu. In Ezek. xxvii, 9 the town is called Gebal. To Strabo and the Greek authors it was-always Byblos. Philo Byblius was born there. There are extensive remains dating from the Roman period and from the times of the Crusades.

BYERLY, William Elwood, American mathematician: b. Philadelphia, 13 Dec. 1849. He was graduated at Harvard College in 1871 ; was assistant professor of mathematics at Cor¬ nell University from 1873-76 and at Harvard from 1876-81, when he became professor. He became professor emeritus in 1913. He is a fellow of the American Academy of Arts and Sciences. Among his works are (Elements of Differential Calculus> (1879) ; (Elements of Integral Calculus) (1881) ; ˆProblems in Differ¬ ential Calculus* (1895), and a (Treatise on Fourier's Series and Spherical, Cylindrical and Ellipsoidal Harmonics) (1893).

BYERS, Samuel Hawkins Marshall,

American writer: b. Pulaski, Pa., 23 July 1838. Educated at public schools in Iowa. He served four years in Union army; was captured at battle of Chattanooga. While in prison at Columbia, S. C., he wrote (Sherman's March to the Sea,* a song that gave its name to the great campaign, and of which 1,000,000 copies were sold. In 1865 he escaped from prison, rejoined the army and served on General Sher¬ man's staff in the Carolinas ; was sent down to Cape Fear River and

brought the first news north of Sherman's success. After the war he was appointed consul to Switzerland 1869-84; promoted consul-general to Rome in 1884. Later, he was consul-general to Switzerland under President Harrison. Altogether he was some 20 years in the foreign service. He wrote Switzerland and the Swiss> during this time, and published a volume of poems, (The Happy Isles.* On leaving the service he published (Iowa in War Times> ; (The March to the Sea, or the story of the Great Campaign,* in verse; (The Honeymoon,* a volume of verse; (With Fire and Sword, *a prose account of his adven¬ tures in the Civil War; (A Layman's Life of Jesus) ; (Twenty Years in Europe, or the Life of a Consul-General* (1896), which contained 50 personal letters to the author from General Sherman; (Complete Poems* (1914); (The Bells of Capistrano * (1915), a love poem of the old mission days in California; also (Glorietta, or The City of Fair Dreams) (1916), a poeti¬ cal romance of Monterey, Cal., in the Spanish days.

BYERS, William Newton, pioneer, jour¬ nalist, publicist and capitalist : b. Madison County, Ohio, 22 Feb. 1831 ; d. 1901. As a civil engineer he served in the capacity of United States deputy surveyor in Iowa, Oregon, Wash¬ ington, Nebraska and Colorado. He was a member of the first Nebraska State legislature and of the first Colorado constitutional con¬ vention. In 1864-66 and from 1879-83 he was postmaster of Denver. In 1859 he founded the Rocky Mountain Nezvs, of which he was editor and publisher for 20 years. A man of modest and retiring disposition, he was one of the most constructive personalities in the history of Colorado.

BYESVILLE, Ohio, a village of Guernsey County on the Pennsylvania Railroad, 95 miles east of Columbus. It is the commercial centre of a large bituminous coal mining region, and has manufactures of bricks, tiles, glass and gas engines. Pop. 3,156.

BYINGTON, Cyrus, missionary among the Indians: b. at Stockbridge, Mass., 11 March 1793; d. Belpre, Ohio, 31 Dec. 1868. His early educational advantages were limited, but in his youth he was taken into the home of Joseph Woodbridge in his native town, under whose tuition he studied Latin and Greek and with whom he afterward read law. He was ad¬ mitted to the bar in 1814 and began to prac¬ tice, but soon after entered the theological seminary at Andover, Mass., at which he grad¬ uated in 1819. Having been ordained to the ministry, he entered the service of the Amer¬ ican Board of Commissioners for Foreign Mis¬ sions (Congregational) and was assigned labor among

the Choctaw Indians in Mississippi. Journeying overland from Massachusetts to Pittsburgh, he descended the Ohio and Missis¬ sippi rivers in a fiatboat to the point nearest his destination. After working among the Choctaw people in Mississippi for a dozen years, he accompanied them on their westward migration to the Indian Territory, opening up and building a new mission station near Eagle-town, in the southeastern part of the Choctaw Nation, which he named in honor of his native town — Stockbridge. His health failing, in 1851, he went to New York,' but later returned and resumed his work among the Choctaw people, whiclPhe continued until the outbreak of the Civil War put an end to all mission¬ ary enterprises in that section. Early in his missionary career he began to make an ex¬ haustive study of the Choctaw language, a grammar of which was completed in 1834. He also compiled a Choctaw-English dictionary, upon the seventh revision of which he was en¬ gaged at the time of his death, nearly half a century after the beginning of his missionary labors. This work, entitled ((A Dictionary of the Choctaw Language,** was issued as Bulle¬ tin 46, of the Bureau of American Ethnology, in 1915.

BYLAW, a particular or private law, as the local or subordinate law of a city, town, private corporation or other organization. The power to make bylaws is usually conferred by express terms of the charter creating the cor¬ poration ; though, when not expressly granted, it is given by implication, and it is incidental to the very existence of a corporation. The constitution of the United States and acts of Congress made in conformity to it, the con¬ stitution of the State in which a corporation is located, and all acts of the legislature constitu¬ tionally made, together with the common law as there accepted, are of superior force to any bylaw ; and any bylaw, when contrary to either of them, is void, whether the charter authorizes the making of such bylaw or not; because no legislature can grant power larger than it possesses. A valid bylaw of a munici¬ pality is a true law, for it has the authority of the State behind it. Bylaws of corporations and societies are rather working agreements between the members than laws in the true sense. Consult Boisot, (By-Laws of Private

Corporation (2d ed., Saint Paul 1902), and Pollock and Maitland, (History of English Law } (2d ed., Boston 1899).

BYLES, Mather, American clergyman: b. Boston, 26 March 1706; d. there, 5 July 1788. He was graduated at Harvard in 1725; was ordained to the ministry in 1733 and was placed over the church in Hollis street, in Boston, in the year 1733, and obtained a distinguished posi¬ tion among the contemporary clergy. He was learned after the manner of those times, and was more addicted to literary recreations, and had a keener relish of the later humanities than was then common among the members of his profession. As a proof of his recognized excel¬ lence in polite letters, we may accept the fact that he was the correspondent of some of the chief poets and authors of England. He was himself a votary of the muses in a small way, and a volume of his miscellaneous poems was published in 1744. He gave an early expression, too, to the loyalty which distinguished his char¬ acter through life, in a poem on the death of George I and the succession of his son, in 1727, when he was but 21 years of age. He also tempered the bereavement which Governor Belcher had suffered in the loss of his wife in 1734, by such consolation as an elegiac epistle could convey. It is not likely^, however, that his name would have been preserved to this time had his reputation depended on the merits of his poetical effusions. The cheerful flow of his spirits and frank gaiety of his conversation seem to have been something out of the com¬ mon way, and to have left an enduring mark on the memories of that generation. His piety was tinctured with no asceticism, and the lively sallies of his sprightly imagination, always kept within the limits of decorum, were restrained by no fear of injuring his personal or clerical dignity. He was an ardent Royalist and in 1777 was sentenced to banishment, but was allowed to remain under guard in his own house. This severity was soon relaxed for a while, and afterward renewed. One of the stories told of him is, that wishing to have an errand done at a distance, he asked the sentry to undertake it. The man objected on the ground that he could not leave the door un¬ guarded; on which the doctor volunteered to be his substitute, and, accordingly, was seen by some one in authority, in powdered wig and cocked hat, with a musket on his shoulder, walking up and down before his house, keeping guard over himself. His release from custody soon followed, on which occasion, alluding to these changes of treatment, he said that he had been ((guarded, regarded and disregarded.® His son, Mather, b. 1736; d. 1814, was also a clergyman and became the rector of the Tories, who, expelled from Boston, founded Saint John, New Brunswick.

BYLLYNGE, billing, Edward, English provincial governor: d. 1687. He became joint purchaser with John Fenwick of a large tract of land in what is now the State of New Jersey. Upon the occasion of a dispute between the two proprietors, nine-tenths remained, by Penn's decision, with Byllvnge and was long known as C(the Byllynge Tenths.® He was governor of the province of West Jersey in 1677. Consult Taimer, (The Province of New Jersey, 1664— 1738) (New York 1908) ; Myers, (Narratives of

Early Pennsylvania, West New Jersey and Del¬ aware, 1630—1 707 } (New York 1912).

BYNG, George Viscount Torrington,

English admiral: b. Wrotham, Kent, 27 Jan. 1663; d. 17 Jan. 1733. He entered the navy at the age of 15. In 1688 he recommended-him¬ self to William of Orange, and for his gallant conduct at the sea-fight of Malaga was knighted by Queen Anne. In 1706 he was elected to Parliament from Plymouth. Two years later he commanded a squadron sent out to oppose the Pretender's invasion. He followed the French fleet and forced it to take refuge at Dunkirk. In 1718 he commanded the English fleet sent to Sicily for the protection of the neutrality of Italy, and on 31 July utterly de¬ stroyed the Spanish fleet off Messina. Later he became naval treasurer and attained the rank of rear-admiral. In 1715 he was created Knight of the Bath and was First Lord of the Ad¬ miralty after the accession of George II in 1727. He was created Viscount Torrington in

1721.

BYNG, John, English admiral: b. 1704; d. 14 March 1757. He was the son of Viscount Torrington, and by his own merits, as well as the influence of his name, was raised to the rank of admiral. His attempts to relieve Fort Saint Philip, in Minorca, when blockaded by a French fleet under La Galissoniere, proved abortive, and his hesitation in engaging the enemy, when a bold attack might have perhaps gained him the victory, excited the clamor of the nation against him. The ministry, who wished to avert the public odium from their unsuccessful measures, beheld with seeming satisfaction the unpopularity of Byng, and when he was condemned by a court-martial they suffered him, though recommended to mercy, to be sacrificed to

the general indignation, and he was shot at Portsmouth. The historical con¬ troversy as to his guilt is still undecided.

BYNG, Sir Julian Hedworth George,

K.C.B., K.C.M.G., M.V.O., English soldier, the 7th son of the 2d Earl of Stafford: b. 11 Sept. 1862. He passed through the Staff College and became lieutenant in the 10th Royal Hussars in 1883. He saw his first service in the Sudan campaign 1884, was present at El Teb and Tamai, and received the Khedive's Star for gallant conduct. He rose to captain in 1890, major in 1898, served through the South Afri¬ can War 1899-1902, during which he com¬ manded the South African Light Horse and several flying columns in various parts of Cape Colony and Orange Free State. He was ((mentioned in despatches® five times, received the Queen's and King's medals with six clasps and was brevetted colonel in 1902. For the next two years he commanded his old regiment ; was in charge of the Cavalry School at Netheravon

1904-05; commanded the 2d Cavalry Brigade

1905-07; the 1st Cavalry Brigade in 1909; pro¬ moted major-general in that year and placed in command of the East Anglian Division, 1910-12. In the latter year he was appointed com¬ mander-in-chief of the Egyptian army under the administration of Lord Kitchener, who undoubtedly influenced the appointment. At the outbreak of the European War he was recalled from Egypt and given the command of the 3d Cavalry Division, which was attached to the 7th Division of the 4th Army Corps. The

Byng family history now repeated itself. Gen¬ eral Byng's grandfather, General Sir John Byng, 1st Earl of Strafford, had served as a youth in the disastrous campaigns in Flanders under Colonel Wellesley (afterward Duke of Wellington) in 1793-95. Over 120 years later Sir Julian Byng stood on the same battlefields, but at the side of his grandfather's enemies, the French. The troops under his command cov¬ ered the Belgian retreat, checked the German onslaught at the

first battle of Ypres, and (<were repeatedly called upon to restore the situation at critical points, and to fill gaps in the line caused by the tremendous losses which oc¬ curred® (Sir John French, 4th dispatch, 20 Nov. 1914). General Byng commanded the 9th Army Corps in the Gallipoli campaign of 1915, and at the end of May 1916 he succeeded Lieut.-Gen. Sir Edwin Alderson in the command of the Canadian corps on the western front. Under his lead the Canadian troops performed prod¬ igies of valor in the great Somme battles (q.v.), and again in the dashing capture of the German stronghold, Vimy Ridge. In June 1917 General Byng was placed in command of the 3d Army in succession to General Allenby, and on 20 Nov. 1917 his army opened what has been described as the most dramatic episode on the western front since the battle of the Marne, namely, the great drive on Cambrai (q.v.). Be¬ fore the enemy realized what had happened, the socalled impregnable ((Hindenburg Line® had been shattered and thousands of prisoners cap¬ tured. The distinguishing feature of this bril¬ liant exploit was the utter absence of the cus¬ tomary ((artillery preparation.® Accompanied by the formidable ((tanks,® .the British infantry advanced at dawn and stormed the enemy's trenches with remarkably few losses. See War, European, Western Front.

BYNKERSHOEK, bin'kers-hook, Cor¬ nelius van, Dutch jurist: b. Middleburg, Zea¬ land, 29 May 1673; d. 16 April 1743. He studied at the University of Franeker, and after prac¬ tising as a barrister at The Hague, became pro¬ fessor of law at Leyden, and president of the supreme council of Holland. He was one of the most learned among modern civilians. His books are in Latin, and his treatise (De Foro Legatorum Competente) was translated by Barbeyrac into French under the title of (Du Juge Competent des Ambassadeurs> (1728). His most important writings are the (Observationes Juris Romani) ; (De Dominio Maris) ; (Quaestiones Juris PublicP ; and a digest en¬ titled (Corpus Juris Hollandici et ZelandiciP A complete edition of his works was published at Geneva in 1761, and at Leyden in 1766.

BYR, bur, Robert, pseudonym of Karl Robert Emmerich Bayer (q.v.).

BYRD, berd, William, American lawyer and author: b. Westover, Va., 1674; d. there, 26 Aug. 1744. He received a liberal education in England, possessed one of the largest libraries in the colonies, and, having a large property, lived in a splendid style, unrivaled in Virginia. He was a member and a last president of the King's Council. To French Protestants fleeing to Virginia from persecution in France, he ex¬ tended the most generous assistance. The towns of Richmond and Petersburg were laid out by him, and he was one of the commission¬ ers for establishing the boundary line between VOL. 5 —

Virginia and North Carolina. He was a mem¬ ber of the Royal Society, and as a patron of literature and art deserves remembrance. His own writings include the (Westover Manu¬ scripts, > embracing (The History of the Divid¬ ing Line) ; (A Journey to the Land of Eden) ; and (A Progress to the Mines. } In The Vir¬ ginian Magazine of History and Biography (1902) appeared his letters, revealing much of interest concerning his personality and career. Consult Trent, (English Culture in Virginia* (1889) ; (A History of American Literature) (New York 1903).

BYRD, William, composer. See Bird, William.

BYRGIUS, ber'jl-us, Justus (properly Jobet Burgi), Swiss mathematician: b. Lich-tensteig, Canton of Saint Gall, Switzerland, 28 Feb. 1552; d. Cassel, Germany, 31 Jan. 1632. He was invited to Cassel by the Landgrave of Hesse to superintend the observatory which he had there erected, and constructed a number of astronomical instruments, some curious clocks and other machines, including the proportional compasses. A discovery involving that of the logarithms, and another exhibiting an applica¬ tion of the pendulum to clocks, have been attributed to him. He is eulogized by Kepler for his talents, but censured for his indolence and undue reserve, which kept back his dis¬ coveries from the public. Consult Gieswald, (Justus Byrg als Mathematiker* (Dantzig

1856).

BYRNE, Thomas Sebastian, American clergyman: b. Hamilton, Ohio, 29 July 1841. He was graduated from Saint Mary's College of the West in 1865. In youth he was an expert machinist, but deciding to enter the priesthood of the Roman Catholic Church, he went, after preparatory training, to the American College in Rome. In 1869 he was ordained in Cincin¬ nati. He devoted himself to literature and teaching in Mount Saint Mary's Seminary ; for a time had charge of the Cincinnati Cathedral and again became connected with the seminary, acting as rector until 1894. He wrote (Man from a Catholic Point of View) (1903), which was read at the Parliament of Religions in Chicago. He has published many other re¬ ligious works and pamphlets. In collaboration with the Rev. Dr. Pabisch, he translated

Dr. Alzog's (Church History0 (3 vols., 1874-78).

BYRNES, Thomas, American detective and chief of police: b. New York city 1842; d. there 7 May 1910. In young life a gasfitter, he served in the Civil War with the Ellsworth Zouaves, in 1863 joined the police force of New York city, was promoted captain in 1870, in¬ spector in 1880, superintendent in 1892 and chief of police in 1895. He early became famous for his detective work, and despite great cor¬ ruption in the police department, maintained an unbesmirched reputation. The nature of his work is well brought out in two books, one by himself, Professional Criminals of America> (New York 1886), and in collaboration with Campbell, H. S. T., and Knox, T. W., (Dark¬ ness and Daylight, or Lights and Shadows of New York Life* (Hartford 1899).

BYRON, George Gordon, 6th lord. Eng¬ lish poet: b. London, 22 Jan. 1788; d. Misso-

longhi, Greece, 19 April 1824. He was the son of (<Mad Jack Byron,® a good-looking, profligate soldier, who first married the divorced Marchioness of Carmarthen, and had by her a daughter Augusta, later Mrs. Leigh. Captain Byron became a widower in 1784 and, a little more than a year later, married a Scotch heiress, Catherine Gordon of Gight. Their only child, the poet, was born at No. 16 Holies street, Cavendish Square, and was lame from birth, owing to a defect in one of his ankles. The influences surrounding the child were de¬ plorable. John Byron, to escape his creditors, had to flee to France, where he died in 1791. Mrs. Byron, with a much reduced income, resided in Aberdeen and proved to be a most indiscreet mother, now fondly petting her child, now reviling him. She was actually guilty of reproaching him for his lameness. The boy himself was capable of great affection for his nurse and for a cousin, Mary Duff, and his schoolmates seem to have regarded him as warm-hearted. His education was not neglected during his early years, but tutors and schools could not make up for his lack of training at home. He learned, however, to love nature amid the Scotch hills.

In 1794 the grandson of the then Lord Byron died, and the six-year-old boy became heir to the peerage, which he inherited in 1798. Then his mother obtained a pension and left Scotland, Byron being made a ward in chan¬ cery and Lord Carlisle being appointed his guardian, though his mother's lawyer, John Hanson, really looked after his welfare. A quack tortured his foot, and schoolmasters tried to make him studious, his main mental nutriment consisting, apparently, of the Bible and poetry. He wrote love verses to a young cousin, endured his mother's caprices and was doubtless glad to be entered at Harrow in 1801, where, however, he was at first discon¬ tented and not liked. He could not make a scholar of himself, though, as Mr. Coleridge has shown, his classical attainments have been much underrated ; but he was a good declaimer and through his pluck in fighting and in athletics, despite his deformity, he became a leader in the school. He was romantically devoted to his friends, and once offered to take half the thrashing a bully was giving to the boy who later was known as Sir Robert Peel. Impul¬ siveness characterized both his insubordinate attitude toward the school authorities and his love affair with his cousin and senior, Mary Anne Chaworth, who soon married and left him disconsolate. His affection for her seems never to have been entirely effaced. Altogether, his childhood and youth were well adapted to produce a wayward man.

In October 1805 he went into residence as a nobleman at Trinity College, Cambridge. He took full advantage of his privileges, ran into debt, though he had an allowance of £500 a year, gambled, consorted with pugilists, won fame as a swimmer, traveled about in style, and, last, but not least, after stormy quarrels with his mother, successfully asserted his claim to be his own master. He formed some warm friendships with promising students, notably with John Cam Hobhouse, afterward Lord Broughton (q.v.) ; he dabbled in literature and wrote Verses, and he received his M.A. (<by special privilege as a peer,® in July 1808.

Nearly two years previously he had printed 'Fugitive Pieces,) a volume of poetry, but had destroyed all save two or three copies because a clergyman friend had objected to one poem as too free. A small edition of what was prac¬ tically the same book, 'Poems on Various Oc¬ casions, } appeared early in 1807. A few months later this was reissued with consider¬ able alterations as 'Hours of Idleness,* which was again altered in a second edition of March 1808, two months after the now famous slash¬ ing review from the pen of Brougham had appeared in the Edinburgh Review.

Byron's youthful volume certainly gave little indication of the genius he was soon to display, but it called for no severe chastisement. Hence, the editor of the Edinburgh, Jeffrey, got only what he deserved when Byron pil¬ loried him in 'English Bards and Scotch Re¬ viewers, * which appeared anonymously about the middle of March 1809, and was at once successful. It is still decidedly readable in parts and ranks with the best satires of its kind. It went through five editions in two years, the last being suppressed by its author, because he had become the friend of many of his victims.

Meanwhile Byron had settled — if such a word may be used of his riotous occupation of his domain — at Newstead Abbey, and had repaired it on borrowed money. In March 1809 he took his seat in the House of Lords. Then he prepared himself for a tour of the Con¬ tinent, which was begun with Hobhouse and three servants in July. That Byron was to any marked extent as dissipated and misanthropical as his own Harold does not seem likely.

The travelers sailed to Lisbon and saw something of Portugal, Spain, Malta, Albania and Greece. At Athens Byron finished the first canto of 'Childe Harold) and celebrated the charms of his landlady's daughter, Theresa Macri, the "Maid of Athens.® Then the friends visited Asia Minor and reached Constantinople shortly after Byron's famous swim from Sestos to Abydos (3 May 1810). About two months later Hobhouse returned to England and Byron to Athens, where, after a tour of the Morea, he spent the winter of 1810-11 apparently studying and writing and making excursions. He reached England, by way of Malta, about 20 July 1811.

Throughout his travels he had been in severe financial straits, which his mother had shared. Immediately on his return she was taken ill, and before he could reach her she died. He mourned for her in a passionate way, and the practically simultaneous deaths of three friends also afflicted him and gave him an excuse for writing melancholy verses. He had brought to England the first and second cantos of 'Childe Harold) and his paraphrase of the 'Ars Poetical the 'Hints from Horace.* The latter, which he is said to have preferred, was immediately accepted by a publisher, but for some reason it did not appear during Byron's life. 'Childe Harold, > after some de¬ lay, was the means of uniting its author with his famous publisher, John Murray. It ap¬ peared in March 1812, after Byron had made a successful speech in the House of Lords. As all the world knows he awoke one morning and found himself famous as a poet; it is no wonder that he put a parliamentary career, in

which he might have done great good, forever behind him.

It has been for some years fashionable to sneer at the earlier cantos of (Childe Harold) ; but they are at least effective poetry, and their novel theme and romantic tone fitted them for the early readers who went wild over them. Melancholy and cynicism in a youth were more likely to attract than to shock men and women who were subjects of the Regent and contem¬ poraries of Napoleon. Byron, who had pre¬ viously made a fast friend of his would-be adversary, Thomas Moore (q.v.), became the social lion of the day. He was young and reckless, and unfortunately gave occasion for scandal through his relations with the notori¬ ous Lady Caroline Lamb and the equally frail Lady Oxford. People could also gossip about his handsome face and his drinking, and his strange diet for the reduction of his dis¬ figuring obesity. His pecuniary difficulties, too, and his folly in presenting the money from his copyrights to his connection, Dallas, doubtless caused tongues to wag. He enjoyed his vogue, but not to such an extent as to grow idle. After the failure of the anonymous (Waltz,* he gave the world (The Giaour *in May 1813, (The Bride of Abydos,* in Decem¬ ber of the same year, and (The Corsair* two months later. All were dashed off, all were very popular, all deepened the atmosphere of mystery about him. Scott's supremacy as a romantic poet passed to the newcomer, and although the lines on the Princess Charlotte caused some hard feeling and he threatened to quit poetry, Byron continued for two years to have his fling both as a poet and as a gay man of the world. (Lara* appeared in August 1814; (Hebrew Melodies) in January 1815; (The Siege of Corinth* and <Parisina) in January and February 1816. The sums paid by Murray for these poems — Byron, harassed by debt, at last began to be businesslike — show plainly how well the poet continued to hold his pub¬ lic. Except for such lyrics as (She walks in beauty like the nighty the work of this period has in the main failed to hold later generations. This is due no doubt to an unwholesome de¬ sire on the part of a puritanical race <(to take it out** upon Byron's far from impeccable char¬ acter and career, as well as to a natural change of taste toward greater polish and refinement, and to the effect

of such a story as that its author wrote the first sketch of (The Bride of Abydos) in four nights after coming home from balls. That latter-day criticism has been alto¬ gether wrong in correcting the excessive praise given by Byron's contemporaries to this facile group of poems cannot be maintained; but it is well to remember that copious power is a good sign of genius, that Byron managed to put into (The Giaour) not a little narrative vigor and into the whole group of Oriental tales much of the color and the spirit of the East, and that English literature would have been deprived of many beautiful lyric and descriptive pas¬ sages if he had allowed society completely to turn him from writing verse.

Meanwhile Byron had seen much of Moore and Rogers and had met, after many years, his half-sister, Mrs. Leigh, the a Augusta® of some of his best poems, and the being of all others to whom his heart went out most fondly. In after years his memory and hers were to be

clouded by a dark suspicion which, whether true or false, would probably never have soiled the ears of the world but for the jealousy of another woman — his wife. Whether the scan¬ dal which Mrs. Stowe (q.v.) spread and which Byron's own grandson, Lord Lovelace, unac¬ countably revived will ever be substantiated or laid completely to rest is a matter upon which the data for a decision are not forthcoming. In the interim generous minds and hearts will prefer to believe in the purity of the (Epistle to Augusta.)

The story of Byron's courtship and mar¬ riage, while less mysterious than that of Mil-ton, is not a clear one. In 1812 he seems to have been rejected by an heiress in expectation, Miss Anna Isabella Milbanke, four years his junior and a connection of his flame, Lady Lamb. The young woman appears to have been fond of mathematics and theology, to have written poems, to have been somewhat priggish and prudish and very self-centred. Some cor¬ respondence was kept up between the pair and, as a marriage seemed likely to steady his habits and better his fortunes, Byron proposed again by letter in September 1814. This time he was accepted. Miss Milbanke was apparently proud of her catch and Byron of his. They were married on 2 Jan. 1815 and they seem to have got on well at first, though each later made reports to the contrary. The young wife soon inherited money and promised him a child ; the poet behaved himself well on the surface, took an interest in the management of Drury Lane, saw something of Sir Walter Scott (al¬ ways his defender) and helped Coleridge to publish (Christabel.* But the pair were evi¬ dently incompatible, and after the

birth of their only child, Augusta Ada, on 10 Dec. 1815, a separation was arranged for, Lady Byron be¬ lieving that her husband was insane — a notion obviously stupid, but possibly charitable from her own point of view. The doctor, the lawyer and the father-in-law she let loose upon Byron may have irritated him into conduct that did not allay her suspicions. It is all a tangle; perhaps the easiest way out is to censure Byron and resolutely refrain from admiring his wife.

The separation was followed by an astonish¬ ing public clamor against Byron, whose friends seem to have thought his life in danger. Sir Leslie Stephen has contended that the public indignation was not unnatural. Perhaps it was not, in the sense that it represented some of the worst elements of human nature. For a society that tolerated the Regent and his boon associ¬ ates to fawn upon a man and then to condemn him unheard on the score of practically unspeci¬ fied charges was simply to put an indelible blot upon Englishmen of the upper and middle classes — a blot the blackness of which may be somewhat gauged from the depth of the vin¬ dictiveness with which Byron's fame has been since attacked by many of his countrymen. It by no means follows, however, that Byron was at all justified in writing and publishing his numerous poems and passages relating to the separation — though literature would do ill with¬ out (Fare Thee Well,* and would like to have had a chance to see his destroyed novel on the (Marriage of Belphegor* — or that he can be excused for much of his conduct during the exile that began at the end of April 1816 and lasted for the rest of his spectacular life. One

can, however, pardon his constant desire to shock the British public ; and, taking account of his temperament, one can understand his varying moods of conciliatory tenderness and defiant scorn toward his implacable wife.

Byron first visited Belgium, traveling luxu¬ riously. Then he went, by the Rhine, to Geneva, where he met the Shelleys and Claire Clair-mont, who had made up her mind in London to be his mistress. She bore him in January 1817 a daughter, Allegra, with whom he charged

himself and whose death in 1822 grieved him deeply. The intercourse with the Shelleys at Geneva was probably more beneficial to Byron than to Shelley. (The Prisoner of Chillon,* the most popular of his poems of the type, the third canto of (Childe Harold* which, thanks to Shelley, showed the influence of Words¬ worth, the stanzas (To Augusta* and other poems are memorials of the period and proofs that his experiences had ripened Byron's poetic powers. After the Shelleys returned to Eng¬ land, Byron, with Hobhouse, crossed into Italy.

He was in Milan in October 1816 and then went for the winter to Venice, where he prac¬ tically remained for three years. His excesses in the Palazzo Macenigo are unfortunately but too well known ; yet, although his health and his character suffered from them, to say nothing of his reputation, he did not a little reading, and his poetical genius continued active. The fourth cantos of (Childe Harold) and (Man¬ fred, } which date, in part at least, from 1817 and reveal the effects of a visit to Rome, show his genius almost at its zenith, and <Beppo,) suggested by Frere's (Whistlecraft Cantos) preluded the greatest of his works — perhaps the greatest of modern English poems — the incomparable medley, (Don Juan/ the first canto of which was written in September 1818. The first two cantos, between which he wrote (Mazeppa,* were published, without indication of either author or publisher, in July 1819.

Meanwhile Byron had met the Countess Teresa Guiccioli, the young, beautiful and ac¬ complished daughter of Count Gamba of Ra¬ venna. They became passionately attached to each other, and, aided by the customs of the country, were constantly together at Ravenna and other places, Venetian society finally giv¬ ing them up when she resided under his roof. After some extraordinary business negotiations with the lady's elderly husband, it looked as if the temporarily weary lover might regain his freedom; but finally the affection of the Countess prevailed, and Byron, yielding to an influence higher and better than any he had known of late, established himself near her at Ravenna at the end of 1819. Here for a time, at her request, he gave up (Don Juan,* and, after some translating from the Italian poets, began to write dramas.

His first play was (Marino Faliero,* in writing which Byron departed from English models and made a diligent study of authori¬ ties. It was finished in the summer of 1820 and played unsuccessfully at Drury Lane the next spring. The year 1821 saw the writing of the more effective (SardanapalusP (The Two Foscarip the powerful, though not stylis¬ tically adequate (Cain: a MysteryP (Heaven and Earthp another (Mysterv,* and the. in¬ ception of (Werner,* his best acting

play, t&ken largely from Harriet Lee's (q.v.) story (Kruitz-

ncr. * That Byron had little dramatic genius is generally admitted ; the literary power which he could not avoid putting into any composition is not, in the case of these experiments, suffi¬ ciently recognized.

While writing his dramas, Byron had more trouble with Count Guiccioli, who was finally separated from his wife, and he was led by the Gambas to take a deep interest in the Car¬ bonari conspiracies. He had already in his poetry given evidence of liberal political senti¬ ments ; now he subscribed for the patriotic cause, headed a section of the conspirators, and, but for his birth and fame, would have got into trouble with the Austrian authorities. The Gambas and the Countess were exiled from Ravenna, and Byron, after some lingering, joined them at Pisa in November 1821. Here he saw much of Shelley, Medwin, Trelawny and other Englishmen, and here some time in 1822 he wrote an ineffective drama, (The De¬ formed TransformedP The same year he made with Shelley and Leigh Hunt (q.v.) the unfortunate arrangements which induced the latter to come to Italy and begin the publica¬ tion of the quarterly journal, The Liberal. The details of this affair are too complicated to be entered upon without ample space. Shelley was imprudent, Byron rather brutal, Hunt exas¬ perating. Shelley's death complicated matters still further, and The Liberal expired after four numbers. Its most memorable item was Byron's masterly satire upon Southey, (A Vision of JudgmentP written in 1821. This Murray had been chary of publishing after the trouble he had had with the orthodox on account of cCain* — an episode which had a good deal to do with Byron's willingness to establish a journal the chief expense of which he knew would fall on himself.

Meanwhile (Don Juan* had been taken up once more, in a deeper vein, and the Gambas had been ordered to leave Tuscany. Byron, whose health and spirits were impaired, fol¬ lowed them to Genoa in the autumn of 1822. Here he wrote his satire (The Age of Bronze,* upon the political reaction of the time, as well as his poor narrative poem (The Island* and the later cantos of (Don Juan.* He was grow¬ ing restless and feared that he was losing his powers ; but, fortunately, for his fame at least, a new outlet for his energies was at hand. A Whig and Liberal committee was formed in London to aid the Greek revolutionists and at Trelawny's suggestion Byron was made a mem¬ ber. He proposed to go in person to the Le¬ vant, and by midsummer of 1823 he completed his elaborate preparations for the expedition. Sailing from Genoa, with rising spirits, he reached Cephalonia early in

August. Here he remained four months writing excellent letters of advice and sensibly waiting for a clear op¬ portunity for action, not, in all likelihood, for an offer of the Greek crown. At the end of December 1823 he accepted the invitation of Prince Alexander Mavrocordatos to co-operate in the organization of western Greece and sailed for Missolonghi, where he was cordially welcomed. He appears to have shown great tact in harmonizing opposing factions and con¬ siderable practical genius as an organizer. He had no chance to lead into action the wild troops over whom he was placed as com¬ mander-in-chief, but he did hold out success-BYRON

fully against a mutiny, awing by his courage the Suliotes that broke into his tent while he was ill. He recovered somewhat, but exposure to fatigue and the constant rains told heavily upon him, and he took no care of himself. At last he was prostrated with ague and received only the crudest medical attention. After much delirium he passed into a long slumber, which ended in his death at six o'clock in the evening of 19 April 1824. The news was a shock to the world. His body was sent to England and was buried, not in Westminster Abbey, but at Hucknall Torkard, near Newstead Abbey. The Greeks would have liked, more appropriately, to bury him at Athens, and, fortunately, they did secure his heart for interment at Missolonghi. There is no incongruity, however, in thinking of him as reposing, after his stormy life, in company with his passionate mother and his long line of wild ancestors.

Byron's position in English literature is a much disputed matter. Foreigners, influenced by the spell cast by his genius upon the ro¬ mantic writers of their own countries as well as by his devotion to freedom and by the fact that his work in translation does not offend by its slipshod features, almost unanimously — whether they be Frenchmen, or Germans, or Italians, or Spaniards, or Russians, — place him only below Shakespeare. The English-speak¬ ing world knows the work of Chaucer, Spenser and Milton too well to admit such a high esti¬ mate of his genius; but it seems to have gone farther astray in depreciation than foreigners have in appreciation of his extraordinary gifts and achievements. With a few honorable ex¬ ceptions like Matthew Arnold, English critics have magnified Byron's plain moral and artistic delinquencies and have minimized his

powerful intelligence, his great range of work — he is one of the best of letter writers and the most brilliant of satirists, as well as the arch-roman¬ tic and revolutionary poet, and a notable de¬ scriptive and lyric one — his copius creative power, and his great <(sincerity and strength." They have judged him as somewhat finicky connoisseurs of verse rather than as impartial appraisers of literature. They have under¬ estimated the hold he has kept upon youth and the attraction which his later work, especially <Don Juan,' so frequently exercises upon in¬ telligent men of mature years. Whether he will ever receive his due from the more cultured of his countrymen is problematical ; but there have been indications of late that a less banal atti¬ tude is being taken toward both him and his works. He may not be the greatest English poet of modern times, but he is certainly the most ef¬ fective of all the enemies of cant. See Byron's Letters; Childe Harold's Pilgrimage; Don Juan; Manfred; Vision of Judgment.

Bibliography. — The bibliography of Byron is naturally immense. His memoirs, given to Moore, were burned, after many family com¬ plications, in 1824. Moore's (Life, Letters and Journals of Lord ByrorP (1830) is the stand¬ ard biography. It was included in Murray's edition of the collected (Life and Works' (1832-35; 17 vols., 1837). The number of separate editions of the poems and of trans¬ lations is enormous, all previous editions being superseded by Murray's edition of the works in 13 volumes (6 of prose, edited bv R. E. Prothero, 1898-1901 ; 7 of verse, edited by

E. H. Coleridge, 1898-1904). The best one-volume edition of the poems is that by Cole¬ ridge (1905) ; the [American 1 Cambridge edi¬ tion by P. E. More (1905) is also good. The large list of memoirs and books of biographical value may be represented here by Karl Elze's (Lord Byron) (1870), Emilio Castelar's (Vida de Lord Byron' (1873), J. C. Jeaffreson's (The Real Lord Byron) (1883), John Nichol's (Byron) in the < English Men of Letters) (1880) and Roden Noel's volume in the <Great Writers' series (1887). Reminiscences by Lady Blessington, Medwin, the Countess Guiccioli, E. J. Trelawny, Hobhouse, Leigh Hunt and many others should also be consulted. Of critical essays, favorable and unfavorable, those by Matthew Arnold, Charles Kingsley, Mazzini, Macaulay, John Morley, J. A. Symonds and Swinburne may be mentioned. Among more recent studies are (Byron: The Last Phase, ' by Richard Edgcumbe (1909) and a work in two volumes by Ethel Colburn Mayne (1912-13). The mass of continental criticism is very large and is steadily increasing.

William P. Trent,

Professor of English Literature, Columbia University.

BYRON, Harriett, a character in Richard¬ son's novel, <Sir Charles Grandison.' She was attached to the hero and was the writer of the greater part of the letters comprising the novel.

BYRON, Henry James, English drama¬ tist and actor: b. Manchester, January 1834; d. London, 11 April 1884. He studied at first for the medical profession, and afterward for the bar, but his passion for the stage caused him to abandon them. He was the first editor of Fun, and also started another paper en¬ titled the Comic Times, which soon ceased to appear. He wrote an immense number of pieces, including a great 'many farces, bur¬ lesques and extravaganzas, besides comedies or domestic dramas, such as (Fra Diavolo) (1858); (Cyril's Success, ' probably his best work; (Dearer than Life) ; (Blow for Blow) ; (The Lady of Lyons) ; (Uncle Dick's Darling' ; (The Prompter's Box' ; (Partners for Life' ; and (Our Boys' (1878), which had a run of four years and three months, the longest on record.

BYRON, John, English naval officer: b. Newstead, 8 Nov. 1723; d. 10 April 1786. At the age of 17 he sailed with Lord Anson on a voyage round the world, but iyas wrecked on the coast of the Pacific, north of the Straits of Magellan. Byron, with some of his unfor¬ tunate companions, was conducted by the In¬ dians to Chile and remained there till 1744, when he embarked on board a ship of Saint Malo, and in 1745 returned to Europe. At a subsequent period he published a narrative of his adventures, which is extremely interesting. In 1758 he commanded three ships of the line and distinguished himself in the war against France. George III, who wished to explore the part of the Atlantic Ocean between the Cape of Good Hope and the southern part of Amer¬ ica, gave Byron command of a frigate, with which he set sail in June 1764. After having circumnavigated the globe he returned at the end of two years to England, where he arrived in May 1766. Although Byron's voyage was not fruitful in discoveries, it still deserves an

honorable place in the history of voyages round the world, since he was the first of those re¬ nowned circumnavigators of the globe, includ¬ ing Wallis, Carteret and Cook, whose enter¬ prises were not merely mercantile, but were directed to scientific objects. In 1769 Commo¬ dore Byron was appointed to the government of Newfoundland, which he held till 1772. He was raised to the rank of vice-admiral in 1778, was worsted by d'Estaing in an indecisive ac¬ tion off Granada in 1779 and died in 1786. Such was his general ill fortune at sea that he was called by the sailors ((Foul-Weather Jack.®

BYRON BAY, a bay on the northeastern coast of Labrador, situated about' lat. 55° N., and long. 58° W., and north of Hamilton Inlet. The width of the bay is about 50 miles.

BYRON ISLAND, Micronesia, a small island of the Gilbert group, in the Pacific Ocean, about 12 miles in length, abounding in cocoanuts. It was discovered by Commodore Byron in 1765, and belongs to Great Britain.

BYRON'S LETTERS. The letters of Lord Byron are numerous. In Moore's (Life of Byron > 560 appear. It is reasonable to sup¬ pose that his biographer did not select the least interesting, and we are thus able to form a tolerably accurate judgment of Byron's merits as a letter-writer. The chief qualities revealed in these letters are naturalness, good sense and straightforward sincerity. He writes much about himself, as every good letter-writer must, but with no more egoism than is usually dis¬ played in a frank communication between friends. The character thus revealed is at total variance with the character invented for him by his critics and his enemies, and partially sustained by the nature of his poems. He ap¬ pears as the very reverse of a sentimentalist. There are few passages of tenderness; even when he speaks of the death of his daughter, Allegra, for whom he had a deep affection, he does little more than record his loss in the simplest language. In speaking of the death of Shelley the same restraint is practised; beyond a brief picture of the romantic scene on the shore at Pisa, where the body was burned, there is nothing that reveals the poet. He is at his best when describing his own dailv life, his literary aims and ideals and his opinions of his contemporaries. In describing his fellow-writers he sometimes has a flash o.f true illu¬ mination, but fiis habitual attitude is hostile and satiric. For Walter Scott he has a genu¬ ine appreciation; but the rest move him only to contempt — r (<Southey twaddling, Wordsworth drivelling, Coleridge muddling, Bowles quib¬ bling, squabbling and snivelling — Barry Corn¬ wall

will do better by and by, if he don't get spoiled by green tea and the praises of Pentonville and Paradise Row.®

It is the pervading quality of robustness which is the chief characteristic of the bet¬ ters.) There is nothing of the delicate word-felicity of Edward Fitzgerald, nor of his fine literary discrimination. There are none of those passages of wild imagination and pro¬ phetic passion which give to Carlyle's letters a place in literature equal to that attained by his most deliberate essays and histories. Never¬ theless he can strike out memorable phrases, as when he speaks of the unpublished letters

of Burns as revealing a strangely antithetical mind — "dirt and deity — a compound of in¬ spired clay.®

Nor are his thoughts upon life and religion without value, though to the modern mind, familiar with the problems of philosophic doubt, his reflections may appear to have little depth or originality. They are, however, the sincere utterances of a mind in revolt against the slug¬ gishness of conventional opinion, and intent upon a freedom which few were bold enough to seek. Upon the whole, it may be said that the real Byron is more faithfully depicted in his letters than in his poetry. We cannot read them without being aware of a mind possessing great natural force, characterized by a trenchant sanity, a hard, clear vision of material facts and a justness of apprehension which belong more frequently to the great critic than the popular poet.

W. J. Dawson.

BYSSUS, bis'sus, a kind of fine flax, and the linen made from it, used in India and Egypt at a very early date. In the latter coun¬ try it was used in embalming, and mummies are still found wrapped in it. As an article of dress it was worn only by the rich. Dives, in Christ's parable (Luke xvi, 19), was clothed in byssus, and it is mentioned among the riches of fallen Babylon (Rev. xviii, 12). Byssus was formerly erroneously considered as a fine kind of cotton. The fine stuff manufactured from the byssus is called more particularly ((sindon.® Foster derives the word byssus from the Coptic. Byssus was also used by the ancients, and is still used to signify the hairlike or threadlike substance (also called the beard), with which different kinds of sea-mussels fasten themselves to rocks. Pinna marina, particularly, is distin¬ guished by the length and silky fineness of its beard, from which very durable cloths, gloves and stockings are still manufactured

(mainly as curiosities) in Sicily and Calabria.

BYSTROM, Johan Niklas, Swedish sculp¬ tor: b. Filipstad, Wermland, Sweden, 18 Dec. 1783; d. Rome, 11 March 1848. He studied art under Sergell in Stockholm, and in 1810 went to Rome. In 1815 he returned, and winning the favor of the Crown Prince by his statue of the latter, received several important commis¬ sions. Several years before his death he again took up his residence in Rome. Among" his more important works are 'Drunken Bac¬ chante*; (Nymph Going into the Bath*; de¬ clining Juno) ; <Hygieia) ; 'Dancing GirP ; a polychrome marble statue of ' Victory > in the palace at Charlottenburg ; a statue of Lin¬ naeus and colossal statues of Charles X, XI, XII, XIII, XIV, and Gustavus Adolphus.

BYWATER, Ingram, English scholar: b. London, 27 June 1840; d. 17 Oct. 1914. He was educated at University College and King's Col¬ lege schools, London, and Queen's College, Oxford. He was Regius professor of Greek at Oxford University 1893-1908. Among his works are 'Fragments of Heraclitus) (1877) ; 'Works of Priscianus Lydus) (1886) ; 'Textual Criticism of the Nicomachean Ethics) (1892) ;

' Aristotle on the Art of Poetry, with Transla¬ tion and Commentary* (1909).

BYZANTINE ARCHITECTURE desig¬ nates the style and type of architecture which were developed in the Byzantine empire after

BYZANTINE ARCHITECTURE

T-'r '*1*' / 1$

if * V 1/ MF/iAw

. ˆri ' * i i } \ I iHf*P4i!

* l Yal i ' V ' •

('(f wwf i fftf \ |

PALATINE CHAPEL AT PALERMO

the fall of Rome, and which spread thence westward into Italy and northward into what is now Russia, where it still persists in atten¬ uated and almost grotesque form. The pic¬ torial and decorative art associated with this architecture was widely diffused through Europe (see Painting), and materially affected West¬ ern art. With the final division of the Roman empire between Honorius and Arcadius (395 a.d.), Constantinople became not only the cap¬ ital of the Eastern or Greek empire, but the most important city of Christendom; the chief centre for centuries of Christian art and learn¬ ing, especially of Greek culture as distinguished from the Latin, and of the Eastern Church as distinguished from that of Rome. Under the great Emperor Justinian (527-65 a.d.) there ensued an extraordinary activity in the building of churches, not only in the capital but in Syria, Dalmatia and Macedonia and in Ravenna, the seat of the Byzantine Exarchate of Italy. This architecture was chiefly the work of Asiatic Greeks, who introduced into the construction of churches certain traditional Asiatic forms and methods, especially in types of vaulting in brick or stone. They abandoned the distinctive Latin type of church — the basilica, with its three aisles and wooden roof — and substituted for it new types both of plan and construction, of which the dominant feature was invariably a central dome, raised above the surrounding structure and pierced by a ring of windows at its base. They revived certain features of Roman secular vaulted buildings and blended with these an Oriental taste for applied decora¬ tion in color, creating out of this combination a wholly new style and new effects. The style thus evolved matured with extraordinary rapid¬ ity and then began a long and gradual decline. If we take the baptistery of the Orthodox and the tomb of Galla Placidia, both at Ravenna, and dating from about 450 a.d., as the earliest examples of the style, less than a century elapsed between its birth and its culmination in the unsurpassed church of Hagia Sophia at Constantinople (532-38 a.d.). This master¬ piece was never equaled in scale or magnifi¬ cence thereafter. Five centuries later, how¬ ever, in the church of Saint Mark at Venice (1047-71; the fagade later) the style flowered in a new masterpiece of great beauty, at the hands of Greek and Italian artists. No other extant example approaches these two in mag¬ nificence and artistic merit. During the reign of Justinian several other splendid churches were built at

Constantinople and Jerusalem, but even these were far inferior to Hagia Sophia. Except in the one instance of Saint Mark's, all the later churches were relatively small in dimension and timid in construction.

Characteristics. — The dominant feature of the style is the central dome on pendentives. The pendentive is a device by which a circular dome can be erected upon four or more isolated supports, instead of upon a continuous circular wall. It consists of a triangular portion of a sphere comprised between two adjacent arches and a horizontal circle touching their summits. Four such surfaces carried by four arches bounding a square meet at the top in a circle to form the base of the dome, or of a circular drum upon which the dome is to rest. By means of eight piers, with their arches and pendentives, the dome may be built over an

octagonal space. In either case the openings between the piers allow the floor-plan to be extended in any direction, so that the dome may be used in connection with almost any type of ground-plan; whereas in previous styles it had been almost wholly confined to circular struc¬ tures, as in the Pantheon at Rome. The Byzan¬ tine plans were therefore very varied, and were vaulted throughout in brick. The construction of these domed and vaulted buildings, which were nearly all ecclesiastical, was based gen¬ erally on the Roman principle of massive inter¬ nal piers and intermediate columnar supports; but the Byzantine columns carried arches in¬ stead of entablatures like the Roman. External buttressing above the roofs of side-aisles or other low portions was another Roman feature derived from bath-halls and the Basilica of Maxentius. Roman also were the system of wall decoration by incrustation with slabs of richly veined marble, the use of marble in dec¬ orative patterns for floor-pavements, and the employment of monolithic column-shafts of polished granite, porphyry and marble, at once structural and decorative. On the other hand, the Byzantine conception of interior adornment as a covering of all surfaces, both of walls and vaults, with a veneer of perfectly flat decora¬ tion in color, broken up into minute units, was distinctly Oriental. All carving in high relief was replaced by delicate all-over patterning in very flat low relief, and above the marble wain¬ scoting the walls and vaults were covered with mosaic of minute glass tessera (see Mosaic) in brilliant colors usually on a gold ground. These mosaics were partly pictorial, represent¬ ing Christ, saints, apostles and other religious or Biblical subjects, and partly conventional patterns. The Roman types of capital were replaced generally by new types of simpler mass covered with flat-relief carving of foliage and basketwork, and impost-blocks were

often introduced between the caps and the heavy arches which they carried.

History and Monuments. — The germs of the style are seen in certain early Christian buildings in Syria and in Diocletian's palace at Spalato, which was probably built by Syrian or Byzantine workmen ; more clearly in two 5th century buildings at Ravenna — the baptistery of the Orthodox, having a dome over an octagonal substructure and the tomb of Galla Placidia, a cruciform edifice with a square "lantern® rising above the arms at their intersection, crowned by a dome on rudimentary pendentives. Doubt¬ less, however, the original prototype of one class of Byzantine churches having a central square or octagon surrounded by an aisle is to be found in two Roman buildings erected by Constantine — the baptistery of the Lateran and the tomb of Constantia (Santa Costanza). The roof of the high central part of the former was of wood; of the latter, a masonry dome. The evolution of the central space with a dome on eight supports may be traced through early examples in Syria to Saint Sergius at Con¬ stantinople (520 a.d.) where alternate sides of the octagon were occupied by open columnar niches or apsidioles projecting into the sur¬ rounding aisle, thence to San Vitale at Ravenna (525 or 527), where there are six such apsidi¬ oles ; the easternmost bay being in both these churches extended to form a chancel and apse ;

and finally to its culmination in the new type of plan seen in Hagia Sophia (The Divine Wisdom, often called ((Saint Sophia® ; now a mosque). This extraordinary edifice, the work of two architects from Asia Minor, Anthemius and Isodorus, was built under the orders of Jus¬ tinian in six years (532-38) to replace an earlier church destroyed by fire during a race¬ course riot. It occupies a broad rectangle, measuring nearly 300 by 240 feet, and consists of a central nave 243 by 115 feet covered by a dome 107 feet in diameter and 180 feet high, and two half-domes of 100 feet span opening into the two transverse arches of the four that carry the dome. This hall is flanked by two vast aisles, 60 feet wide, each divided into three parts by two

massive buttresses which rise above the roofs of the two-storied aisles. This triple division of the aisles by transverse buttress-masses which rise above the aisle roofs is plainly derived from the traditional form and construction of the Roman thermae, probably through the intermediary Basilica of Maxentius of the early 4th century. A narthex across the west front preceded by an atrium or fore-court, and the projection of the apse at the east end, make up the total length of 300 feet. Open columnar apsidioles expand the semi-circular ends of the nave, and recall the six similar apsidioles between the piers of San Vitale at Ravenna. The interior is resplendent with pol¬ ished columns of costly marble, verd-antique and porphyry, with marble wainscot and superb mosaics, though all human figures have been concealed by gilding and paint on account of Moslem prejudices. The furniture of the church, which was of unrivaled cost and splen¬ dor, disappeared centuries ago. In this stupen¬ dous work we seem to see the plan of Saint Sergius cut in two and between the two halves an immense square interposed, covered by a gigantic dome on pendentives rising far above the rest of the building. On the other hand, the cruciform type first shown in the tomb of Galla Placidia culminated, also in Justinian's time, in the church of the Apostles at Constan¬ tinople. This had five domes, one on each arm of the cross and a central dome dominating the whole. This splendid church was demolished in 1463 bv the conquering Sultan Mehemet II, but it had already served as the model for the builders of Saint Mark's at Venice.

With the exception of this last named church, none of the other Byzantine churches of Constantinople was of large size. The only other church of Justinian's time that has sur¬ vived to our day is that of the Holy Peace, Hagia Eirene (miscalled <(Saint Irene®), now used as a museum of arms. It is, however, a poor example, destitute of all embellishments, and is really a late (8th century?) and hasty reconstruction of the original edifice. With its two domes it may have served as the model for the Cathedral of Cahors, France. The later ex¬ amples of the style in Constantinople were relatively small in scale, sometimes complex in plan, with small domes on high drums (Saint Theodore, Pantokrator, Mone tes Choras, etc.). About 40 of these small churches are extant, mostly transformed into mosques; and only one of them retains any considerable part of its original decorations. This one is the Mone tes Choras, now known as Kahrie Jami, dating probably from the 11th or 12th century, with a

narthex adorned with mosaics and frescoes which, uncovered about 1880, the Turks have allowed to remain exposed. There are a num¬

ber of late Byzantine churches in Athens — all of singularly small size — and at Salonica sev¬ eral of various dates (Saint George, Saint Elias, Saint Bardias. Saint Sophia) ; besides interesting monastic groups in Macedonia, at Meteora and on Mount Athos. In Russian Armenia (Ani, Etchmiadzin, etc.) the style took on a distinct provincial character, with stone pyramids instead of domes as the outer form of the cupola on a high drum, and often with highly interesting carved interlace orna¬ ment. The singular and barbarously fantastic forms of shurches at Moscow, Kiev and other Russian cities (e.g., the Saint Basil in the Krem¬ lin in Moscow) are remotely derived from the tail-drum domed Uanterns® of the late Byzan¬ tine type. Near the middle of the 11th cen¬ tury the destruction by fire of the church of Saint Mark at Venice turned the attention of the Venetians toward Constantinople as the source from which to obtain architects and dec¬ orators capable of rebuilding worthily the ven¬ erated shrine of the evangelist. Architecture was at that time in Italy only beginning to revive from its low estate, and the native artists and the native art appeared inadequate for the task in hand, except as they were guided and assisted by Byzantine architects. The new church, measuring about 220 by 180 feet, was erected on the cruciform plan of the Holy Apostles' Church at Constantinople, with five domes, of which the central was slightly larger than those on the four arms. The very active Venetian commerce with the East brought in an extraordinary wealth of artistic material — antique columns, veined marbles, carvings from ruined or dismantled churches — and with these and the embellishments of mosaic by Greek artists and their Italian pupils, as well as by later additions of sculpture and furnish¬ ings, the interior was made resplendent beyond any other church in Italy or western Europe. Lacking the overwhelming majesty and unity of Hagia Sophia, it has nevertheless an extraor¬ dinary beauty of its own. The main construc¬ tion was completed in 1071 ; the domed narthex dates from the 12th century, with the extraor¬ dinary and marvelously picturesque facade; the wooden exterior domes and Gothic pin¬ nacles were added in the 1 5th century: some of the mosaics are modern. Unlike the Byzantine churches of the East, which almost wholly lack external embellishment, Saint Mark's is revetted externally with paneling of fine marble. Strange to say, it was never copied or imitated, except in the Romanesque church of Saint Front at Perigueux (France), which however is totally lacking in the embellishments of marble and mosaic that make up so much of the splendor of the Venetian model. Quite as sur¬ prising is the fact that Hagia Sophia, the noblest of all Byzantine monuments, remained absolutely unique and unimitated until the Turkish conquest. It was the Turkish mosque-builders who seized upon its superb possibilities

and developed from them a new and splendid type of architecture for their own requirements (see Mohammedan Art).

An interesting lateral branch of Byzantine architecture is sˆen in the monasteries erected by Coptic Christians in Egypt, in the 6th-9th

centuries, recently explored by the Metropolitan Museum of Art of New York. The domes and surface-carvings of these buildings strongly in¬ fluenced the development of the Arabic art of Cairo. The great mosque at Jerusalem, known as that of Omar (more properly the Dome of the Rock, Kubbet-es-Sakrah) is probably a re¬ construction of the church built on Mount Moriah by Justinian. The decline in the size and splendor of the Byzantine churches built after the 6th century was due to the slow decay of the empire itself in both political and military prestige and power. Those erected in Greece and the Danubian provinces were often of almost microscopic size. The ((01d Cathe¬ dral" at Athens measures 37 by 32 feet ; the dome of another church in the same city is but seven feet in diameter. Many of the later churches have three apses, one at the end of each aisle; and in all the examples after the 7th century the dome is carried on a high drum pierced with windows, forming a "lantern," whereas in the earlier churches the windows penetrate the base of the dome itself. Another innovation was the introduction, into the wall of the main structure, of arched windows coupled in pairs under a discharging arch, often with a mullion or midwall shaft between the two. This feature, together with the central lantern or high cupola over the crossing, was adopted by the Romanesque church-builders of Italy and France in the 11th and 12th centuries, and both became important features in the Western Romanesque style. The partial copying in France of Saint Mark's, and perhaps of Hagia Eirene, at Perigueux and Cahors has been re¬ ferred to. Besides these there are in Aquitania and in the valleys of the Loire and Charente a large number of domed churches of the 12th century due to Byzantine influence, partly by way of Venetian commerce, partly (according to Enlart) by way of Cyprus where the Crusad¬ ers established important Latin Christian com¬

munities.

Of the Byzantine secular architecture there are hardly any remains. Doubtless the palaces of the emperors were of great splendor, but the only extant ruin of any importance is that of the palace of the Porphyrogenitus near the Blachernae at Constantinople, of which the walls of the great hall are still standing, but with no vestige of its interior decoration. The vaulted cisterns of the city are still intact, and at Ravenna the front wall of the socalled pal¬ ace of Theodoric. There are a number of Byzantine fortifications in ruins in various cities of the empire, and Byzantine military architecture was of great importance; but these examples are so ruinous or have been so often and so completely rebuilt in later ages that further notice in this article is unnecessary.

Bibliography. — The best general handbook of Byzantine architecture in English is by Sir T. G. Jackson, 'Byzantine and Romanesque Architecture' (Cambridge 1913). There are excellent accounts of the style in F. M. Simp¬ son's 'A History of Architectural Development) (Vol. I, London 1911) ; in R. Sturgis' (Dictionary of Architecture) (New York 1901), and in Vol. II of his 'History of Architecture' (ib. 1905). Lethaby and Swainson's 'Sancta Sophia' (London 1894) is an authoritative work. Tcxier and Pullan's (Byzantine Archi¬

tecture' is chiefly concerned with the churches of Salonica. The majority of the most import¬ ant works on the subject are in French, among which may be mentioned: Bayet, 'L'Art byzantin' (Paris) ; Choisy, A., 'L'Art de batir chez les Byzantins> (Paris 1883) ; Diehl, Ch., 'Manuel d'art byzantin' (Paris 1910); Hiibsch, 'Monuments de l'architecture chre-tienne' (Paris 1866) ; Pulgher, 'Les eglises byzantines de Constantinople' (Vienna 1878), and de Verneille, 'L'Architecture byzantine en France' (Paris). In German: Essenwein, 'Ausgange der klassischen Baukunst' (in the Handbuch dcr Architektur, Darmstadt 1886), and the monumental work of Salzenberg, (Die altchristlichen Baudenkmale von Constanti-nopel ' (Berlin 1854). In Italian the great work of Ongania, 'La basilica di San Marco' is au¬ thoritative.

Alfred Dwight Foster Hamlin, Professor of the History of Architecture ,

Co¬ lumbia University.

BYZANTINE ART. The style which pre¬ vailed in the Byzantine or Eastern Roman em¬ pire as long as it existed (330-1453) and which has prevailed since in Greece, in the Balkan Peninsula and in Rumania, southern Russia and Armenia, with other parts of Asia Minor. Byzantine art is divided into four periods: (1) From the Foundation of Constantinople (330 a.d.) to the beginning of the Iconoclastic Pe¬ riod. — This represents the experimental period and the golden age of Byzantine achievement. Figure sculpture had not yet become dominated by Eastern ideals, and was largely realistic in treatment, but by the 6th century mosaics were splendidly conventionalized and attained great, beauty. The Byzantine style of archi¬ tecture became distinctive about the year 450 a.d. The great development of trade between the East and the West led to its rapid develop¬ ment. The great buildings of this period were Holy Wisdom (Hagia Sophia) in Constanti¬ nople, the early basilicas in Rome and the early churches at Ravenna, *etc.* The artistic centres of the Near East were at first Alexandria and Antioch, and later Byzantium itself. (2) The second period is that known as the Iconoclas¬ tic Period. — The Emperor Leo III (717-40 a.d.) was an adventurer from the mountainous regions of Isauria. Gibbon narrates that he was “ignorant of sacred and profane letters; but his education, his reason, perhaps his inter¬ course with the Jews and Arabs had inspired the martial peasant with a hatred of all im¬ ages.” One reason for this hatred can be found in the fact that many of the people were beginning to endow the images with mysterious power, believing they could work miracles and were in some occult way the medium of the saints. In spite of the opposition of the peo¬ ple, whose sympathies were monastic, and who were led by the priests themselves, Leo joined the iconoclastic party, which thought the grow¬ ing power of the monks a danger to the state. He began to wage war against all sacred im¬ agery, causing numberless works of art to be destroyed, and prohibited the further production of religious art of a monumental kind. This pro¬ scription did not have for art the disastrous con¬ sequences that one might have expected. Re¬ ligious art, persecuted, continued to increase despite the strife. Hundreds of artists and

craftsmen also, prohibited from following their callings, turned from religious to Hellenistic motives, and devoted themselves to ivory and goldsmith's work, miniature painting and con¬ ventional decorative design, Eastern in inspira¬ tion. By about the middle of the 9th cen¬ tury, mosaic and painted figures began to be used once more in decoration, and a general artistic revival set in, furthered by the growing prosperity of the empire under the Macedonian dynasty. (3) The third period dates from the beginning of the Macedonian Dynasty (867 a. d.) to the sack of Constantinople (1204 a.d.). This was the second great stage of Byzantine art. It was twofold in character, being im¬ perial and secular, and inspired by classic tra¬ dition, while at the same time the monastic art of the times continued and preserved its strict and severe traditions. Masterpieces of each type were frequent, both historic and ecclesias¬ tical. The greatest extant monument of this style and period was San Marco, Venice (11th century. (4) The fourth period is that from the Restoration until the Turkish Conquest (1453 a.d). — Although many fine works of art were produced during this period, it was, on the whole, an age of artistic decline and slow de¬ cadence. As the empire was impoverished fewer works were executed in precious metal and ivory.

Byzantine art had no period of struggle and slow development, and passed through no archaic stage. It represented the union of the mature styles of the nearer East and West, and showed small desire to draw fresh truth from nature, being content instead to blend the stored fruits of its knowledge for the produc¬ tion of its masterpieces. Its chief element was not so much the art of Rome, but of Sassanid Persia and the Hellenized East. It was from the East that it acquired its dislike of realistic representation, its love of domed and vaulted buildings and its delight in Oriental decorative pattern and sumptuous richness of color. It was above all a great decorative art — formal, splendid, ceremonial and reflecting the set ritual of the court and the Church. We find the key to it, not in nature and the spontaneous joy and beauty of life, but in some such scene as Gibbon has described, when telling of the visit of Luitprand, bishop of Cremona, to the Emperor Constantine VII in the year 948 a.d. : <(When he (Luitprand) approached the throne the birds of the golden tree began to warble their notes, which were accompanied by the roaring of two lions of gold. With his com¬ panions, Luitprand was compelled to bow and to fall prostrate, and thrice to touch the ground with his forehead. He arose, but in the short time the throne had been hoisted from the floor to the ceiling, the imperial figure appeared in new and more gorgeous apparel, and the in¬ terview was concluded in haughty and

majestic silence.® Here we have all the set pageantry and conventionality of Byzantine decoration, which was magnificent for its purpose, but which, in the end, was destined to lose its power and force owing to its lack of fresh stimulus and inspiration, and its divorce from life.

Byzantine art was sternly controlled by the Eastern Church which turned in perhaps not unnatural reaction from the pagan love of form, as shown in the sculptures of Greece and

Rome, and employed art instead in a decorative manner only, as an expounder of dogma, and an expression of East Christian ideas. In this way it forms an interesting contrast to Gothic art, the product of the Western Church some centuries later, which mirrored faithfully every joy and sorrow of the human heart. Our knowledge of the earliest decorations other than mosaic is very slight. It is gathered from painted manuscripts, book bindings often of metal and ornamented with precious stones, a few enamels, and some glassware, and a very few paintings on wood, forming parts of the iconostasis or choir screen of this or that church of the Greek form of Christianity. The mosaics are the most important decorations of the earlier art, so far as we have any knowledge of it, and these are more familiar to Europe as found in the churches of Ravenna than in any building farther East. The fact that Moslem rule requires the covering up as with white¬ wash of these representations when a church is taken over for a mosque makes it probable that at some future time many fine early mo¬ saics will be uncovered.

The characteristic of Byzantine art is rich decorative effects almost to the exclusion of accurate drawing or modeling of the human figure or faithful representation of nature in any form. Early or late, the attitudes of per¬ sonages represented are formal and conven¬ tional, but the robes are splendid, the back¬ grounds are rich and the effect is that of a splendid colored pattern with but slight repre¬ sentative or expressional meaning. Sculpture has never risen to excellence; it is almost lim¬ ited to decorative carvings, of book covers and sacred objects, reliefs in ivory and casting of small figures in bronze. The earlier statues of emperors and the like are chiefly remarkable for the lingering Roman traditions.

Mosaics and Painting. — In the second Council of Nicea (787 a.d.) the following statement, from its Acts, shows the attitude of the Church at the time toward painting: <(It is not the invention of the painter

which creates pictures but an inviolable law, a tradi¬ tion of the Church. It is not the painters but the Holy Fathers who have to invent and dic¬ tate. To them manifestly belongs the compo¬ sition, to the painter only the execution.® This paragraph is interesting in connection with both Byzantine mosaics and painting. It shows us once more how tradition took the place of nature, and led to both the greatness and the weakness of Byzantine art.

The weakness of Byzantine drawing and painting became apparent after the Restoration. Byzantine art had never been dramatic, and had never been filled with the warmth of human joys and sorrows, an . when the artistic creeds became outworn and lifeless, the artists had lost their imaginative power, and were con¬ tent to copy drawings which were often in themselves copies, and to accept such guidance as has been preserved to us in the (Guide to Painting,* a collection of artistic precepts col¬ lected by the monk Dionysius, in the 16th or early 17th century, from the works of an earlier and famous Byzantine painter, Manuel Panse-linos of Thessalonica, who may have lived as early as the 13th century. In this guide, exact directions are laid down for the execution of all well-known scenes from Bible history.

Byzantine painting was generally executed in tempera upon plaster or a wooden panel, the outlines of the design being often drawn in with gold. Some of the frescoes are still exist¬ ing, and the paintings, which were exported by the merchants, have been spread far and wide. Numberless minatures were also produced in the monasteries, and these and the panel pic¬ tures exerted an immense influence on the art of other countries, particularly upon Italian art which was brought into such close touch with that of Byzantium. Even at the present day the Byzantine tradition is the chief force in the painting of many parts of Greece, Rus¬ sia and Asia Minor.

Mosaics were the most splendid expression of Byzantine decorative art. The art, which was an ancient one, had probably been derived from the East, and was raised to a position of importance in Egypt in Ptolemaic times. From there it spread both to the East again and to

the West, where in Rome it grew to be very popu¬ lar. The Byzantines preferred, however, glass tessera ? of various colors to the small cubes of colored marbles commonly employed by the Romans.

Gold and silver tesserae were made by lay¬ ing gold and silver leaf upon the back of the glass and then covering the leaf by a second thin film of glass to protect it. The mosaics were placed in position by means of cement, and the glowing richness of the solemn figures against their golden backgrounds formed a sumptuous and splendid decoration to dome or wall.

In the 5th and 6th centuries Ravenna, then the artistic centre of Italy, was the most famous centre of the mosaic industry, and was renowned for the magnificent mosaic decora¬ tions of its churches. In the early days Venice was under artistic allegiance to Constantinople, and among later mosaics those in the churches of San Marco and the cathedral of Torcello, dat¬ ing from the 11th century, may be mentioned. Fine mosaics were also produced in the Sicilian churches in the 12th century, although in Sicily the Byzantine craftsmen were probably helped by their western pupils.

Sculpture. — One of the immediate effects of Christianity was a distaste on the part of Christians for monumental figure sculpture, which to their minds was associated with the rites of pagan worship. This dislike was also shared by the all-conquering Arabs, who read in the preachings of Mohammed a prohibition of anything appertaining to idol-worship, a fact which no doubt had its influence on the Byzantines who were in constant touch with the Mohammedans. At this time, also, the gen¬ eral trend of opinion as to artistic decoration in the Near East was in favor of elaborate pat¬ tern as opposed to a naturalistic treatment of forms, and Byzantine art, being partly Eastern in spirit, shared to a certain extent the common preference. As the nude was not studied in classic times such few figures as were carved soon lost their close relation to life. Figure sculpture became a dependent of architecture and was chiefly concerned with the depicting of members of the Imperial family, high offi¬ cials or famous characters from sacred story. Delicate gradations of relief were avoided, and carvings were largely confined to two planes so that a strong effect of light and

shade, without halftones, should be obtained, and the effect of strong pattern produced. Some of the most beautiful Byzantine sculp¬ tures are on the capitals of columns and on the pulpits, or ambones, in the

churches. Here we find the most delicate patterns of natural forms, plants, birds and animals, and also entwined scroll-work and geometrical designs. Among the most famous of the carvings are those in ivory, the diptyches, ikons, caskets, book covers and tablets, many of which were originally colored and gilded. The goldsmith's work, tapestry, weaving and the art of enameling also attained great beauty, and served to keep the Eastern tradition alive in Europe.

Bibliography.— Browne, < Early Christian and Byzantine Architecture) (New York 1912); Errard and Gayet, <L'Art bvzantin> (Paris 1901) ; Dalton, (Byzantine Art and Archaeology* (Oxford 1911); Garrucci, (Storia dell' arte cristiana* (Prato 1879-99) ; Ivondakoff, (Histoire de l'art byzantin dans les miniatures* (Paris 1891) ; Labarte, (Histoire des arts in¬ dustries . (Paris 1873). Consult also Brockhaus, (Die Kunst in den Athos-Klostern* (Leipzig 1891); Choisy, (L'Art de batir chez les Byzantins) (Paris 1883) ; Texier and Pul-lan, (Byzantine Architecture) (London 1884) ; (Monuments de l'art byzantin * (Paris 1900 et seq.) ; also Essenwein, (Byzantinische Baukunst) (Darmstadt 1886) ; and Kraus, (Geschichte der christlichen Kunst) (Vol. I, Freiburg 1896).

John B. McDonnell, Editorial Staff of The Americana.

BYZANTINE EMPIRE, The. Old

Byzantium, founded about 688 b.c., lay in ruins after its destruction in 196 a.d. until Emperor Constantine the Great rebuilt the city and made it the capital of the Roman empire instead of Rome (hence called also Roma Nova). By¬ zantium was chosen on account of the excel¬ lence of the site. On 26 Nov. 328 the corner¬ stone was laid for the extension of the city walls, and on 11 May 330 the solemn dedication of the new city was made. Two large tracts in the centre were adorned with colonnades and statues, while in the hippodrome was placed the famous serpent-column from Delphi. The whole empire was robbed of its finest treasures of art to embellish the new residence. The Emperor's palace was a magnificent congeries of buildings. The colonization of inhabitants was promoted by granting the privileges of Old Rome to the citizens of New Rome: the coun¬ cillors were called senators, and the same ad¬ vantages in the way of bounties and amuse¬ ments were afforded the people of Byzantium as had been enjoyed by the Romans. The city soon grew in territory to 14 districts. But the people lacked unity, for the population consisted of colonists from many different races. Never¬ theless, Byzantium was destined to become a seat and centre of learning. The schools of law were soon in a flourishing state. The bishop of Byzantium acquired the

rank of a patriarch and laid claims to supremacy over the Oriental Church. Many councils, or conven¬ tions, were held in the city, the most renowned of which are the following: in 381 against the Macedonians, in 553 for the settlement of the controversy over the three capitals, in 680 against the Monotholetes, 692 for the ratifica-108

tion of the older ecclesiastical observances, 754 against the adoration of images, 869 against the patriarch Photius, and in 879 in his favor. After the partition of the empire in 395 Con¬ stantinople became the residence of the Em¬ peror of the Eastern empire. Under the in¬ fluence of an immoral, intriguing court, fond of luxury and display, the people degenerated. Living in idleness on the bounties of bread, and caring for nothing except to gratify their passion for the hippodrome, the people split into two factions, who named themselves, after the color of the charioteers, the ˆBlues® and the ˆGreens,® and utterly devoid of higher aims fought each other with passionate hate. Under Justinian I this factional strife increased until finally what is known as the Nika insur¬ rection broke out. This sedition raged from 13 Jan. to 20 Jan. 532, and ended with the massacre of at least 30,000 human beings in the hippo¬ drome by Belisarius. Justinian rebuilt the city with great magnificence after its semi-destruc¬ tion by fire and embellished it with numerous richly adorned churches, the finest of which was the cathedral, Saint Sophia. The strong fortifications protected the city against the violence of enemies. The Avars, strengthened by Bulgarians and Slavs in 626, penetrated sev¬ eral times into the suburbs. In 616 and 626 the Persians under Chosroes appeared before the city walls. The two sieges of the Arabs are particularly celebrated: from April to Septem¬ ber 673, when the city was saved by the Greek fire of the Syrian Kallinikos, and 717-18, when Leo the Isaurian defended it. In 1203 the soldiers of the 4th Crusade marched before the walls of the city to restore to the throne Isaac Angelus, who had been dethroned by Alexius. For a long time the inhabitants defended them¬ selves under the leadership of Theodorus Lascaris; but when Alexius on 18 July cowardly took to flight, Isaac was released from prison and restored to the throne, whereupon the leaders of the Crusade marched into and occu¬ pied Galata. Meanwhile the bitterness of the Byzantines against the Franks led to an insur¬ rection (February 1204), in which Isaac

and his son Alexius were killed. The new emperor, Alexius V. Ducas ˆMurzuphlos,® was immedi¬ ately defeated by the Crusaders, who took Con stantinople by storm on 12 April after a stubborn fight. In the sacking of the city, which followed the battle, the most magnificent treasures of art were destroyed, while most of the rest were carried off to adorn Venice and the cathedral of Saint Mark; and an enormous booty was taken. On 9 May the Crusaders elected Count Baldwin of Flanders emperor. But the Latin empire also soon sank into a mere semblance of a realm in consequence of internal strife and of the wars with the Bulgarians and Cumani (who under Asen II in 1236 besieged the city) and on account of the rise in power of the Greek empire of Nicsea. Nevertheless, the Italian commercial cities ac¬ quired in Constantinople a great influence, es¬ pecially the Genoese and the Venetians, who settled permanently in Galata. But these too grew weak though factional strife and jealousy. After the restoration of the Greek imperial throne through the Pakeologi in 1261 the Genoese and Venetians came to open hostilities. On 22 July a Venetian fleet of 75 vessels ap¬ peared before the city, burnt the residences of

the Genoese in Galata, and even fired on the town. During the last days of December the Genoese of Galata in retaliation massacred all the Venetians.

About the middle of the 14th century the Othmans began to interfere in the contests for the throne of the Byzantine empire and to threaten Constantinople. After the battle of Nicopolis in 1396 Bajesid besieged the city with great vigor. In 1399 the French Marshal Boucicaut came to its aid, but had to give up in 1401 on account of the approach of Timur. A fresh appearance of the Othmans under Murad II occurred in 1422. He succeeded in taking the outer works. Nevertheless, the great attack of 24 August was repulsed, the siege-works destroyed by a sally, and in 1452 Mohammed II began the construc¬ tion of a coast-tower which closed the Bosporus, and in the spring of 1453 the siege ended. Enormous machines and heavy cannon were brought up. The army numbered 200,000 soldiers and the fleet 250 ships. To oppose these the defender, Constantine XI Dragades, had only 11,000 Greeks and 3,000 Italian re¬ inforcements, which the Genoese, Giovanni Giustiniani, commanded. In addition to this great disparity in numbers was a further dis¬ proportion consisting in the unity of the assail¬ ants and the division among the defenders. In Constantinople embittered religious strife raged between the Orthodox and the Unionists (Henotikoi). But in spite of the inequality in strength the

besieged, supported by the natural strength of the position and fortifications of the city, repelled the most violent attacks for 40 days. When the emperor, Constantine, re¬ fused a voluntary surrender, even with the per¬ mission of a free withdrawal of his forces, the city was stormed on all sides, 29 May, and captured. Giustiniani fled, and Constantine met a hero's death in the midst of the battle. In the heat of the conflict the conquerors de¬ stroyed everybody that fell in their path. Those that survived were sold into slavery. The city was completely sacked and numerous treasures of art destroyed. At mid-day Mo¬ hammed marched triumphantly into the subju¬ gated city and offered up prayers of thanks¬ giving in Saint Sophia, which became now the principal mosque. Then he ordered all the dig¬ nitaries of the empire to be driven into one place and cut down. The city was rebuilt, the fortifications restored, and Constantinople be¬ came the capital of the Ottoman empire.

Given in more chronological detail; after the death of Theodosous in 395 the Roman empire was divided between his two sons. Arcadius received the eastern and Honorius the western half. The former (395-408) was a weak ruler: he was under the domina¬ tion of his successive ministers Rufinus, Eutropius and Gainas, the last being succeeded in power by the Empress Eudoxia. In 408 the seven-year-old son of Arcadius (Theodosius II) ascended the throne. He ruled from 408 to 450. The government was ably carried on by his sister Pulcheria during his whole reign, notwithstanding the fact that the Huns under Attila exacted contributions of money and gifts. Pulcheria married Marcianus, who ruled from 450 to 457. This strong emperor refused to comply with Attila's demands. Leo the Thra¬ cian became the next emperor (457-74), and

was succeeded by Zeno (474-91), after whose death Anastasias I (491-518), who married Zeno's widow, ascended the throne. The next emperor, Justin, was an Illyrian peasant, who had become an experienced soldier. He reigned from 518 to 527. By the conquests and able administration of the next emperor, Justinian the Great, the

empire reached the acme of its prosperity and power. This great ruler en¬ deavored to bring all under one state, one church and one law. He had the Roman law compiled and published under the form of a monumental code. After his death the empire began to decline. His successor, Justin II (565-78), desired to emulate the great Justinian and win even greater glory. But the Persian War exhausted his resources, while the Avars and Slavs made incursions on the northern borders and the Lombards overran Italy. In¬ efficient rulers succeeded: Tiberius Constantinus (578-82), Maurice (582-602) and Phocas (602-10). Heraclius ascended the throne in 610 and ruled till 641. By 628 he had restored the empire to its old supremacy. But the provinces had been crushed by the long wars, and when the Arabs began their conquests the emperors were too weak to oppose them successfully. Constans II (641-68) was an able ruler, as was his son Constantine (668-685), who fought bravely against the Mussulmans. But the reign of Justinian II (685-95 and 705-11) was dis¬ astrous. Leo the Isaurian (717-41) preserved the state. He defended Constantinople against the Saracens and reorganized the empire. Con¬ stantine Copronymus (741-75) was a great ruler and succeeded in enlarging the bounds of the empire. He planted colonies along the frontiers-and encouraged commerce. The next ruler was Leo IV (775-80), who was suc¬ ceeded by his son, Constantine (780-97), a boy of nine. His mother, Irene, was his guardian until he became of age, after which they ruled conjointly; but in 797 Irene had her son's eyes put out and deposed him, so that she ruled in his stead till 802. The next emperor, Nicephorus I (802-11) paid tribute to the Caliph Harun-al-Rashid, and later was killed by the Bulgarians. Leo the Armenian (813-20) de¬ feated the latter and began a prosperous reign, but was murdered by conspirators. Under Michael (820-29) the Saracens conquered Crete. His son, Theophilus (829-42), was con¬ stantly fighting against the Caliphs. He was celebrated for his justice, and he won great renown for the magnificent edifices he erected. Constantinople was now the centre of European trade. Theophilus' son, Michael, was only four years of age when he ascended the throne. He later became a drunkard and was put to death at the instigation of Basil, who succeeded him (867-86). Basil was the first of the Mace¬ donian line of emperors. From this time on the government was good, and the empire continued to be prosperous for three centuries. Basil himself was a man of great ability. His son, Leo the Wise (886-912) and his grandson, Constantine Porphyrogenitus (912-59), were authors of considerable ability. Romanus II (959-63), son of Constantine, reconquered Crete under the able generalship of Nicephorus Phocas, who married the sister of Romanus, and became emperor in 963, ruling in the name of his two stepsons until 969. The

first of these was Basil II (963-1025) and the second Con¬

stantine VIII (963-1028). Basil defeated the Bulgarians and extended the boundaries of the empire further than any emperor since Jus¬ tinian. On the death of Constantine VIII the husbands and creatures of his daughter Zoe ruled for 26 years. The next two years (1054-56) her sister, Theodora, who was virtuous and able, held the reins of government. In¬ significant rulers were seated on the throne for the next 24 years. The Seljukian Turks had been rapidly conquering all the Asiatic posses¬ sions of the empire ; and the next emperor, Alexius Comnenus (1081-1118) had to face also new dangers from the attacks of the Normans and the Crusaders. But the finances of the empire had been weakened by the growth of the Italian cities and the foundation of the kingdom of Jerusalem. Alexius was succeeded by John the Good (1118-43), who fought courageously against the Turks, Hungarians, Serbians and Armenians. Manuel Comnenus (1143-80) undertook many wars, but ex¬ hausted the resources of the empire; and the weak rulers, of the next 24 years brought it almost to ruin. Cyprus was soon lost, Bul¬ garia became independent and the Seljukian Turks menaced Constantinople. The Venetians were hostile and allied themselves with the Crusaders, who coveted the riches of the city. In 1204 Constantinople was captured, and the Latin empire established; but it lasted only until 1261, when Michael Palaeologus of Nicaea drove out the Latins and re-established a By¬ zantine empire, though smaller than it was in 1204. The Palaeologi were unable to strengthen the empire or increase its bounds. Michael VIII (1261-82) endeavored to win allies by offering to bring the Greek Church under the authority of the Pope. His son, Andronicus II (1282-1328), was a weak ruler, and civil war was rife at the close of his reign. Disaster fol¬ lowed disaster. The finances were in a hope¬ less condition, and from now on the emperors were incompetent. The command of the sea was lost, and the Ottoman Turks had already gained a foothold on the ruins of the Seljukian realm in Asia Minor. They conquered the provinces of the Byzantine empire one by one. Under John V (1341-91) the Turks gained their first foothold in Europe. They took Gallipoli in 1354. Manuel II (1391-1425) and John VIII (1425-28) were weak rulers and practically vassals of the Sultan. Constantine XI (1448-53) contended bravely against the Turks, but was unable to check the invaders and retain his capital — the only part of the empire left — and, finally, in 1453 Constantinople was captured by the Turks. This event marked the end of the Byzantine empire.

Of the 107 rulers from 395 to 1453, 20 were assassinated, 18 had

their eyes put out, or were otherwise mutilated, 12 died in a monastery or prison, 12 abdicated, 3 died of starvation, 8 in battle, or as a result of accident. Vice and corruption reigned supreme in some periods ; the people were servile and superstitious, the government despotic ; yet the traditions and civilization of Old Rome were maintained. Frederic Harrison says : ((First the Byzantine Empire preserved more of the tradition, civil and military organization, wealth, art and litera¬ ture of the older Rome than existed elsewhere; and, secondly, in many essentials of civilization it was more modern than the nascent nations of

the West.® The Corpus of Justinian continued to be the law of the Byzantine empire until the 9th century, when a new code was drawn up. Examples of Byzantine architecture can be found in every Mohammedan and Christian land. In the manufacture of mosaics, silks and embroidered satins, the Byzantine empire sur¬ passed all others.

Bibliography. — Bury, (The Later Roman Empire) (London and New York 1912) ; Diehl, (Etudes byzantines) (1905) ; id., Hustinien et la civilization byzantine) (Paris 1901); Dieterich, (Hofleben in Byzanz> (Leipzig 1912) ; Fridav, (History of Greece from b.c. 146 to a.d. 1864> (7 vols., Oxford 1877) ; Gay, J., (L'Italie meri-dionale et l'empire byzantine) (Paris 1904) ; Gibbon, (Decline and Fall of the Roman Em¬ pire) ; Harrison, (Byzantine History in the Early Middle Ages* (London 1900) ; Heyd, (Histoire du commerce du Levant au Moyen Age* (Dessau 1885) ; Holmes, W. G., (Age of Justinian and Theodora) (New York 1905) ; Oman, (Byzantine Empire) (London 1892) ; Pears, (Fall of Constantinople) (New York 1885) ; Rambaud, (L'Empire grec au Xe siecle* (Paris 1870) ; id., (fitudes sur l'histoire byzantine* (Paris 1912) ; (Corpus Scriptorum Historise Byzantinse* (Bonn edition).

Joseph E. Harry,

Author of cThe Greek Tragic Poets, ˆ *etc.*

BYZANTINE LITERATURE. Byzan¬ tine literature comprises the writings of the Greeks from Constantine the Great (324 a.d.) to the fall of the Byzantine empire (14531. The period, however, down to the time of Justinian (527) is generally regarded as be¬ longing to the ancient Greek literature. The Byzantine literature does not so completely lack individuality as is commonly assumed, although it continues substantially the ancient Greek tradition and borrows antique forms. Being of a learned nature, it deals in large measure with the science of antiquity. Through excerpts, compilations, textbooks, scholia and lexica, the Byzantines preserved the knowledge of the ancient world. Even down to the 10th century men were keenly interested in antiquity, as, for example, Arethas and Photius in the 9th cen¬ tury and Emperor Constantinus VII Porphyrogenitus (945-59), who was himself a political and historical writer, and established commis¬ sions of scholars, who had compiled encyclo¬ paedias for the various sciences. To the same century belongs the great (encyclopaedic lexicon of Suidas. In the following centuries there came about a revival of classical studies, which were zealously prosecuted, thanks to the enthusiasm and activity of such men as Psellus (11th century), Tzetzes, Eustathius, Gregory of Corinth (12th century) and Planudes (14th century). With these scholars many Greeks associated themselves in uninterrupted succes¬ sion : Theodorus of Gaza, Lascaris, Musurus, who introduced the epoch of ˆhumanism® in the West. Christianity presented entirely new problems to Byzantine scholarship. Hence theological literature occupies by no means a small space in Byzantine literature. This is mainly a continuation of the tradition of the Church Fathers, but it also unites with ancient philosophy, and reaches its summit in the Aristotelian and theologian, John of Damascus (8th century), and in Psellus. After the 11th century theological literature

was revised by the controversy with the “Latinists.® Fully developed also was the science of writing history, which dealt with universal his¬ tory either in imitation of the manner of pres¬ entation or of the language of the ancient models. Special attention too was given to Church and to contemporaneous history. The former is represented by the wChroniclers,® that is, the composers of world-chronicles, such as John Malalas (6th century), George Syncel-lus, Theophanes Nicephorus and George Monachus (8th century), John Scylizes (11th century), John Zonaras (12 century), Michael Glycas (12th century). In the foreground, however, stand the historians, who treat con¬ temporaneous history, or merely a section of the history of the world. If we count, also, the historians of the 5th century (Eunapius, Zosimus,

Priscus), who lived in a period really prior to the beginning of Byzantine literature, then we should reckon as the first of the early Byzantine time (to the death of Heraclius, 640), Procopius, Agathias, Petrus Patricius, Menan¬ der Protector, and Theophylactus. After the two following centuries, which mark a period of literary barrenness, we find in the 9th cen¬ tury a revival of literature, which manifests it¬ self particularly in the manifold and varied his¬ torical activities of the patriarch Photius, and was further promoted by Constantine VII of the Macedonian house, and continued by his¬ torians such as Joseph Genesius and Leo Dia-conus. With the many-sided Michael Psellos - statesman, philosopher, philologian and his¬ torian — begins in the 11th century another rise of Byzantine literature (Michael Attaliates among others), which reaches the summit in the 12th century in the historical Works of Nicephorus Bryiennius, of Anna Comnena, John Cinnamus and Nicetas Acominatus. This period is also separated from the old develop¬ ment by the form of the language, for, while down to the 10th century concessions were made more and more to the spoken language, with the revival of classical studies in Byzan¬ tium the authors endeavored also to approach the antique form in the written speech ; and so the gulf widened more and more between the language employed in books and that spoken by the people. Consequently, in the 12th century a reaction set in also against this current in the socalled <(vulgar Greek® literature, which selected the popular language as its vehicle of expression (see Greek Literature). This branch of Byzantine literature confined itself, to be sure, to didactic and elegiac poems, epic and romantic verse and popular books. In the official literature also later, the archaizing form of speech held undisputed sway, for example, in the historians, especially in the polyhistors, George Acropolites and Pachymeres (13th cen¬ tury), Nicephorus Gregoras and Emperor John VI Cantacuzenus (14th century), Laonicus Chal-condyles and George Phranzes (15th century), who portray the downfall of the Byzantine and the establishment of the Turkish empire in Europe. The Greek authorship of the follow¬ ing centuries (down to the Greek revolution) must be looked upon as a branch of Byzantine literature, so far as it does not deal with the products of the popular language.

The poetry of the Byzantines has nothing of real importance to show except in the ecclesi¬ astical field. Its chief representative is the

composer of hymns, Romanus, who is supposed to have lived in the 6th century. After John of Damascus (author of Sacra Parallela) and Cosmas of Jerusalem (7th century) nothing important and individual was produced. In secular poetry the didactic and eulogistic play an important part, as, for example, in George Pisides (7th century). The sententious and epigrammatic poetry is represented by the poetess Casia (9th century), by John Geometres (10th century), Christopher of Mitylene and John Mauropus (11th century). The single drama of the whole period, Christus Patiens (11th or 12th century) scarcely de¬ serves this designation, for it is merely a multi¬ tude of reminiscences from ancient Greek tragedy. Theodorus Prodromus (also called Ptochoprodromus, <(Beggar Prodromus*) showed a most remarkable activity and pro¬ ductivity, if the works that have come down to us under his name are the productions of one individual instead of several bearing the same name. He is the author of a long romance in verse, as well as satirical poems, eulogies and epigrams. In some of his works he makes use of the Bulgarian language and belongs consequently also to the earliest period of Bulgarian literature. The first collection of Byzantine historians, (Historiae Byzantinae scriptores, J appeared in Paris (1648-1711, 39 vols., reprinted in Venice 1722ff. in 28 vols.). A new (Corpus scriptorum historiae Byzantinae, > was published in Bonn (1828-97, 5 vols.) under the auspices of the Berlin Academy of Sciences, but is very unscholarly.

On the whole Byzantine literature is almost without originality, but is valuable for the his¬ torical material which it contains. Besides the authors already named we might mention Theo¬ dorus Prodromus, who wrote a long romance, in which the heroine is Rhodanthe and the hero Dosikles, Nicephorus Callistus of the 14th cen¬ tury, a writer on ecclesiastical history, John Doxopater of the 11th century, who wrote on rhetoric, and Michael Bellus, the younger, of the same century, who wrote historical and other works. See Greek Literature, and con¬ sult works there referred to.

Joseph E. Harry,

Author of cThe Greek Tragic Poets? *etc.*

BYZANTIUM, bi-zan'shi-um, the name of the city of Constantinople before its name was changed by Constantine the Great. It was founded by a colony of Greeks from Megara, who, under a leader named Byzas,

settled on what seemed a favorable spot at the entrance to the Thracian Bosporus, in 658 b.c. The city, which was built by the first colonists, was named after their leader. Other colonists fol¬ lowed from different quarters, especially from Miletus, and Byzantium was already a flourish¬ ing town when it was taken and sacked by the Persians, in the reign of Darius, the son of Hystaspes. After the retreat of the Persians (479 b.c.) Byzantium soon recovered itself. During the Peloponnesian War it acknowledged for some time the supremacy of the Athenians, but afterward fell away. Alcibiades recovered it for Athens (409), but it was taken by Lysander in 405. At a later period the Byzantines received support from Athens in their resistance against Philip of Macedon. The barbarian Thracians, who occupied the neighboring terri-lory, and the Celts (Galatians), in their migra¬ tions to the East, often appeared to threaten the safety of the town; but in spite of this, chiefly owing to its favorable position for com¬ merce, it continued to prosper, and survived the decay of most of the other Greek cities; and even under the Romans it was left free to manage its own affairs, and was allowed to demand dues from all ships passing through the Bosporus, only part of these being claimed by the Romans. At the end of the 2d century of the Christian era Byzantium, unfortunately lor itself, sided with Pescennius Niger against Septimius Severus. By the latter it was be¬ sieged for three years, and when at last it was forced to surrender Severus ordered its walls to be razed to the ground, deprived the city of its privileges and placed it under the jurisdic¬ tion of the Perinthians. For a time the pros¬ perity of the city was annihilated, until a new and more brilliant era began for it under Con¬ stantine the Great, after the defeat of Licinius in 330 A.p. Constantine made it the capital of the Roman empire, and changed its name to Constantinople (see Constantine; Constanti¬ nople). Its early form of government wras that of an aristocracy, which passed into an oligarchy. In the year 390 b.c. it received from Thrasybulus a democratical constitution, closely resembling that of the Athenians. Byzantium was the great entrepot for the grain trade be¬ tween the countries bordering on the Black Sea and those bordering on the 2Egean.

BYZANTIUM, Bank of. In the remotest historical times Byzantium was not only a city of commercial importance, it was the feeder to Ilion, Tyre and Carthage, and the port through which flowed not merely the envied products of the Orient, but also its science, its art and its delusions. It was the galleys of Byzantium that first bore the spices of India to the 2Egean, its rich carpets and metallic wares to Tyre, its Hyperborean missionaries (peripheres) to Delos, its sacred hymn (the maneros) to Egypt, and its fame to Venice and Carthage. (Herodotus,

Mel., 32, 36). The Byzantines en¬ grossed the entire trade and prolific fisheries (palamenes) of the Pontic sea; levied tolls upon all vessels passing the Bosporus; and in their proud superiority, jeered at the Chalcedonians, who, after following them from Phrygia and arriving at the Bosporus too late to seize upon its commanding shore, had camped upon the arid point now known as Scutari. It is true that the Greeks claimed to have founded By¬ zantium ; they also swore to their lineal descent from the ((Eternal Gods*; but Grote has long since pricked these bubbles. Byzantium was in the possession of Cyrus, who died 520 b.c. ; and the Ionian Greeks only captured it from the Persians in 478.

Byzantium was probably the most ancient city of the Levant, older than Colchis or Troy, and richer than Tyre or Sidon. To the former she afforded safe passage to adventurous Jason and vengeful Menelaus ; to others, the com¬ merce of the Mediterranean. Under whatever name — Byzantium, Nova Roma, Constanti¬ nople, Stamboul — she remained for 25 centuries the mistress of two seas ; the arbiter and in¬ terpreter of two continents ; the most inviting and most necessary location for the establish¬ ment and maintenance of an international bank.

whose installation took place about 390 b.c., when she became an independent state and shook off the restraints imposed upon her industries and growth by the successive tyrannies of Babylon, Assyria, Persia and Greece.

At this period, shortly after the disastrous Peloponnesian War, Greece was much ex¬ hausted; its industries were prostrated, sup¬ plies annihilated, and the mines of Laurium, Thasus, Scapte-Hyle, Siphnos, Pangaeus, etc., all shut down. Both gold and silver coins were hoarded. In 407 b.c. the Athenians were obliged to melt down the statue of Minerva Victoria and convert it into those base gold coins which Aristophanes satirizes in “The Frogs.® In time, even the base minae were hoarded and gave way to the iron coins and parchment notes alluded to by Aristotle : the “shinplasters® and “wild cats® of a

disturbed and suffering state. Prohibitions against ex¬ porting the precious metals had been followed by the usual evasions and these by the inevitable issuance of a fiduciary currency; something by which to trade ; something by which to count.

When this makeshift currency was es¬ tablished in Athens the hoarded coins (chiefly silver drachmas) were furtively purchased by brokers, technically at risk of their lives, and sold to merchants with Oriental connections, who even in normal times profited so largely by this trade that now the shipment of silver to the Orient is said to have yielded, clear of all expenses, profits nearly cent per cent : a circumstance due to the superior value of silver as compared with gold, over and against the same relation in the Occident.

According to Boeckh, 772 : “The money¬ changing business, which, if the iron coins were at that time in existence, must have been of special importance, was farmed in Byzantine to a single bank; and all persons were prohibited from buying or selling money elsewhere, under penalty of forfeiting the sums thus bought or sold.® As the Hellespont at that period (5th and 4th centuries b.c.) was the principal, al¬ most the only channel through which flowed the trade to the Orient; the Bank of Byantium must have reaped very considerable advantages from this monopoly, even when, before the independence of the state, such monopoly may have been acquired through Athens : advan¬ tages that were doubtless enhanced when By¬ zantium recovered its entire liberty. But the “money-changing business® was not its only source of profit. The bank collected the Straits dues and farmed the customs; it financed the fisheries, by discounting the obligations of merchant adventurers who were obliged to provide ships, tackle and nets and yet run the risk of storms or a bad catch. The bank also accommodated the foreign merchants who came to buy or sell commodities in the adjacent fairs; of which a great number were held within a short distance of Byzantium, both in Greece, the Isles and “Syria,® a name, that according to Herodotus, went at that period for nearly all of Asia Minor west of the Halys.

Among the banking laws enacted while By¬ zantium was under the control of Athens were the following:

1. No banker shall demand (or receive) more interest money than that agreed upon at first. See “Banks, Ancient and Medieval® for a similar provision in ancient India.

2. Nobody who had put in surety for any¬ thing may sue for it, he or his heirs. (“Put in® is here probably meant for “pledged®).

3. Pledges and securities shall not stand but for one year.

4. Counterfeiters and debasers and diminish-ers of the current coin shall forfeit their lives.

5. No Athenian or sojourner shall lend money to be exported, unless for corn or some such commodity allowable by law. He who sends away money (out of the country), for other uses, shall be brought before the master of the custom house and prosecuted criminally, after the manner of those transporting corn un¬ lawfully. He shall have no writ or warrant against his correspondent, nor shall the archons permit him to have a civil trial.

6. Corporations may make their own by¬ laws, provided that they are not inconsistent with the public laws (Potter, (Antiq. Graeca, } II, 198-200).

The numismatic collections of Europe are so full of Byzantine coins of almost every period that they have given rise to numerous works and still more numerous contentions. Briefly, it may be stated that before the plunder of Persia and India by Alexander the Great, gold was valued in the coinages of the Greek states at 10 times that of the same weight of silver. After his soldiers were so laden with gold spoil that they rejected silver vessels and all other plunder less valuable than gold, and demanded to be led back to Greece because they could carry no more, their leader, in his capac¬ ity of King and Basileus, raised by decree the value of gold in his coinages to 12 times that of silver; and so it remained until Byzantium fell to the arms of Rome, and practically throughout the entire Roman domination down to the capture of Constantinople by the Latin forces in 1204, when the various kingdoms and principalities which arose upon the ruin of the empire struck their own coins and fixed their own valuation upon them.

The socalled “leather moneys® of Byzantium and of the various nations which throughout the Dark and Middle Ages issued fiduciary moneys were obligations written on parchment and attested by the proper authorities ; of which moneys but a single specimen is known to exist at the present time, preserved in one of the great national cabinets of Europe. For the history of other ancient banks see Barcelona, Bank of; Fuggers, Bank of the; Genoa, Bank of; Medici, Banks of the; Tyre, Bank of; Venice, Bank of.

BZOVIUS, Abraham (Pol. Bzowski) , Polish scholar and divine: b. Proszowice, near Miechow, 1567; d. Rome, 31 Jan. 1637. At the request of Pope Paul V, he spent several years of the ‘latter part of his life in the Vatican, as librarian of the Virginio dei Ursini, and actively engaged in literary pursuits. He was a member of the order of the Dominicans, one of the most voluminous writers of his age, gained for him¬ self a high reputation as professor of philoso¬ phy and theology at Milan and Bologna, and crowned the labors of his life by continuing the celebrated ecclesiastical annals of Caesar Baro-nius, who had left them off at the year 1198, and completed only 12 volumes. Bzovius car¬ ried them to the year 1532, in nine volumes.

c

Cthe third character of the English alphabet and of all the alphabets de¬ rived from the Latin. In its present form it is a modification of the primitive Greek gamma. That primitive form was < , an angle with vertex pointing to the left; it is the reverse of the ancient Phoenician >• , which points *to the right, and of the Old Hebrew gimel, ˆ>. The Latin C (used also by the Greeks to some extent) is the ancient Greek < retained by the Greeks of Italy and rounded, just as the later Greek gamma sym¬ bol, L, is the angular symbol erected by the Eastern Greeks. The Russian alphabet retains the Greek symbol but its place is fourth, because in that alphabet the sign for the denti¬ labial V holds the third place. The Greek gamma (< , L,) seems to have always repre¬ sented the same sonant guttural as the English g in “go.® In the Latin alphabet of-the Romans, as represented ‘ in their earliest in¬ scriptions, the C stood for the same sonant gut¬ tural as in the Greek, g hard; for example, lecio, later written legio • macistratus, later magistratus ; yet at the same time the C repre¬ sented also the surd guttural K, as it still does in English except before the vowels e and i and the diphthongs ce and ce in words from the Latin. Thus the early Latin alphabet was with¬ out the symbol K. There is in this use of the character C in ancient Roman epigraphy ground for the inference that the early Romans con¬ founded the two gutturals k and g hard, as in some localities or in some classes of people the termination ing becomes ink, and “something® becomes “somethink.® But at a later period the distinction between g hard and k was recog¬ nized, and then for the designation of the mute guttural the kappa (K) of the Greek alphabet came into use in Latin writing. But the k was afterwrard rejected, and its only use in Latin was in writing the word

Kalendce (abbreviated to kal. or k .) and as an abbreviation of Car¬ thago (Carthage) and of the personal name Cceso. No doubt the persistence of k in kalendce was due to the adherence of the Pontifices to the antique forms of the official calendars ; and the K standing for the fore¬ name Caeso was retained as a means of abbre¬ viating that name and distinguishing it from the abbreviation of the name Cains: C. Julius Caesar is Gaius, but K. Fabius Augustus is Caeso. But the k having been discarded from the Latin alphabet, its function was assigned to the symbol C, while for representation of the sonant guttural a modified form of C was adopted, namely, the G with the value of g in “go.® The soft g, eoual to j, was probably un¬ known to the Romans before the general de¬ basement of the Latin language. After the vol. 5 — 8

symbol k had been discarded and been super¬ seded by C, the symbol C, with the power of gamma, was retained as an initial abbreviation of Gaius, name for a man, and of Gaia (with C reversed O), the name of a woman. C was also retained in the formula Cn. as an abbrevia¬ tion of Gnaeus. This use of the initial C as representing g hard (sonant guttural) recalls the primitive equivalence for the Romans of the two gutturals k and g hard ; but the modern Latinists, unacquainted with such use of C, have usually pronounced Gaius “Kaius® and Cnaeus “Knaeus,® instead of “Gaeus® and “Gnaeus.® In the Anglo-Saxon, its alphabet having been derived from the Latin, the C had everywhere the value of K, and the same is to be said of the Gaelic; that fact gives presump¬ tive proof that at the first contact of the Gaelic and Germanic races with men of Latin speech the C in all situations was equivalent to k in Latin ; and the German word Kaiser is proof that when the Germans first heard of Julius and the Caesars who succeeded him the head of the Roman state was “Kaisar? not ˆCcesar? The change in the pronunciation of C from k to s, as in French and English, to ch as in Italian, to ts as in German, appears to have come about after the fall of the Roman empire.

In Anglo-Saxon the original Germanic K sound of C undergoes palatalization, ending in the English ch; cf. Germanic kerl, A. S. ceorl, English churl. In some cases a word is trans¬ ferred into English from Scandinavian or a non-palatalizing dialect, giving us a k-sound and a ch-sound side by side ; cf . churl and carle, cheap and coper, church and kirk. In words of true Indo-European descent, English C corre¬ sponds to original g, as Eng. tug, Lat. duco. To a primitive C, h corresponds in English, as Gr. kvuv , Lat. canis, Eng. hound. There is no q in Anglo-Saxon and Old English, so ewao is written for the

modern quoth. Similarly, cyning is written for king.

As an abbreviation, C stands for a musical note, for Centigrade, for 100, for the name Gaius. c. stands for cent, for centime, for circa (about). Cn. stands for the name Gnaeus. B.C. stands for before Christ.

C. G. S., or CENTIMETER-GRAM- SECOND. See Metric System, The.

QA IRA, sa e-ra, a popular song of the great French Revolution. The origin and date of this song are both uncertain, and there are various versions of the words claiming to be original. The words are generally supposed to have been written by Ladre, a street singer, and the melody was originally a popular carillon by Becourt, and a favorite air of Marie Antoinette. In all probability it dates from May or June

1790. French writers say that Benjamin Franklin, in speaking of the American Revolu¬ tion, frequently used the expression <(£a ira" ((<it will succeed"). The French republicans caught up the phrase, and ˆconsecrated" it to their own revolution in a popular hymn. The refrain of one version runs thus: —

" Ah ! ga ira, ga ira, ga ira,

En depit d' 1' aristocrat' et d' la pluie,

Ah ! ga ira, *etc.*

Nous nous mouillerons, mais ga finira,"

referring to the rain which fell during the tak¬ ing of the Bastile. In 1797 the song was banned by the Directory.

CAABA. See Kaaba.

CAAING-WHALE, one of several species of porpoise-like cetaceans of the Killer family (Orcidce), characterized by its globose head; properly Globiocephalus melas, of the north Atlantic Ocean. It is from

16 to 24 feet long, 10 feet in diameter at its thickest part and weighs between 5,000 and 6,000 pounds. Its pectoral fins are about 5 feet long and 18 inches broad, and its dorsal fin is very low. With the exception of a white streak, which begins in the form of a heart under the throat and gradu¬ ally narrows to the vent, the whole of the body is of a glossy black color, and hence the fish is frequently known as the blackfish (q.v.) or black dolphin. The teeth are arranged at con¬ siderable distances in the upper and under jaw in such a manner that those of the upper jaw fit into the spaces left in the lower jaw, and conversely. Their number is very variable. They are conical in shape, strong, rather long, and end in a point which is a little curved backward and inward. The caaing-whale is very abundant and very widely distributed. It is found in the whole of the Arctic Ocean, and also in the German, Atlantic and Pacific oceans, and even in the Mediterranean Sea. It is re¬ markable for its gregarious habits, being often found in schools numbering several hundreds, which are led by an old and experienced male whom, it is said, they never abandon. On this account its pursuers always endeavor to force the leader on shore, and when this is accom¬ plished all the rest follow him and are likewise stranded — hence the Scotch name <(caaing," equivalent to ((driving." In the stomachs of these animals are usually found the remains of codfish and various species of cuttle-fish, as well as of herrings, ling and other fishes. The caaing-whale is pursued chiefly on account of its oil. See Whale.

CAAMA, ka'ma. See Hartbeest.

CAB, a carriage with two or four wheels, usually drawn by one horse, and plying for hire; a hackney-carriage. One well-known two¬ wheeled variety is the hansom named after the inventor. Public cabriolets — hooded chaises carrying one person besides the driver — were introduced in London in 1823, and the name was soon after shortened to cab. See Coach ; Hackney-Carriage.

CABAL, an English ministry under Charles II (1667-73), composed of Clifford, Ashley, Buckingham, Arlington and Lauder¬ dale, the initials of whose names form this word, whence nerhaps its use as a designation. But the use of this word to signify a body of intriguers was not originally derived from this

circumstance, as sometimes supposed, for the word cabale, derived from cabala, was used in that sense in French before this time.

CABALA, or CABBALA. See Jews and Judaism — The Cabala.

CABALLERO, Fernan, fer-nan' ka-va- iya'ro, pseudonym of Cecilia Bohl von Faber, Spanish novelist, daughter of a German who settled in Spain and married a Spanish lady: b. Morges, near Lausanne, Switzerland, 25 Dec. 1796; d. Seville, 7 April 1877. Brought up in Germany, she went to Cadiz with her father in 1813. She was a polyglot writer, publishing works in Spanish, German and French. Her first novel, (La Gaviota,* appeared in 1849, and was followed by (Elia,) ˆlemenciaP <La Familia de AlvaredaP etc., as well as by many shorter stories. In 1859 she published a collection of folk-tales under the title, (Cuentas y poesias populares andalucesP Some of her works have appeared in English translations, including (La Gaviota) (translated as (The Sea-Gull, > 1867) ; (Elia: or Spain Fifty Years Ago' (1868); (Air-Built Castles) ; and (The Bird of Truth* (1881). The chief charm of her writings lies in her descriptions of life and nature in Anda¬ lusia. She was three times left a widow; her last husband was a lawyer named Antonio Arron de Ayala. Of late it has been discovered that she was a very excellent letter writer, and critics who have examined her correspondence with Antoine de Latour name her the Madame de Sevigne of Spanish literature. She forms the subject of one of the% (Six Life Studies) (1880) of M. B. Edwards. Her (Obras Completas) were published in 18 volumes (Madrid 1855-67), and have since been reprinted in the (Coleccion de escritores castellanosP Consult de Latour, A., (Etudes litteraires sur l'Espagne contemporaine* (Paris 1864) ; and (Espagne, traditions, mceurs et litterature* (Paris 1869) ; De Gabriel y Ruiz de Apodaca, F., Ultimas producciones de Fernan Caballero,* with a biography (Seville 1878) ; Jose Maria Ausen-sio, (Fernan Caballero y la novela contem-poranea* (Madrid 1893) ; Morel-Fatio, A., (Fernan Caballero d'apres sa correspondence avec Antoine de Latour) (in the Bulletin Hispanique, Vol. Ill, Bordeaux 1901), reproduced in his (Etudes sur L'Espagne, 3e serie* (Paris 1904) ; Pitollet, (Les premiers essais de Fer¬ nan Caballero* (Paris 1908) ; Coloma, (Recuer-dos de Fernan Caballero* (Bilbao 1910). See La Familia de Alvareda.

CABANEL, ka-ba-nel, Alexandre, French artist: b. Montpellier, 28 Sept. 1823; d. Paris, 23 Jan. 1889. He studied with Picot, and after 1860 gave himself mainly to portrait painting. He was for many years a professor of the Academie des Beaux Arts and was especially popular with American patrons. Among his many portraits of Americans is that of Miss Catherine Wolfe, now in the Metropolitan Mu¬ seum, New York, which contains also his (Queen Vashti and King Ahasuerus,* and (Birth of VenusP Consult Stranahan, (A History of French Painting) (1899).

CABANIS, ka-ba-nes, Jean Louis, Ger¬ man ornithologist: b. Berlin 1816; d. 1906. He made an ornithological tour through North and South Carolina, 1839-41, and in 1849 be¬ came custodian of the ornithological depart-

nient of the Berlin Zoological Museum. His investigations were largely instrumental in es¬ tablishing a natural classification, and were published in Wiegmann's (Archiv fur Naturge-schichte) (1847), and in the (Museum Heinea-num) (1850-63). Cabanis founded the Jour¬ nal fur Ornithologie in 1853, and continued to edit it for 40 years. He was a most prolific writer, his contributions to ornithology reach¬ ing a total of 400 and embracing the birds of all countries.

CABANIS, Pierre Jean George, French physician and philosopher: b. Cosnac, de¬ partment of Charente-Inferieure, 5 June 1757 ; d. Rueil, near Paris, 5 May 1808. In his 16th year he went to Warsaw as secretary of a Polish lord, where the proceedings of the stormy Diet of 1773 filled him with melan¬ choly and contempt of mankind. He began at Paris a complete translation of the (Iliad) ; became acquainted with Madame Helvetius, and through her with Holbach, Franklin and Jefferson, and became the friend of Condillac, Turgot and Thomas. In his (Serment d'un MedeciiP he formally took leave of the belles-lettres. He was a leader in the reformation and reorganization of French medical schools and taught in several. He professed the principles of the Revolution, and was inti¬ mately connected with Mirabeau, and made use of his ideas, and obtained from him the work on public education which Cabanis pub¬ lished himself in 1791, after the death of Mirabeau. He lived in still closer intimacy with Condorcet. At the time of his death he was a member of the Senate. His (Rapports du physique et du morale de l'hommej edited by Peisse (Paris 1844), is his most important work. It displays considerable power of analysis, and advocates the most extreme materialistic doctrines. Consult Dubois, (Ex-amen des doctrines de Cabanis) (2 vols., Paris 1842) ; Labrousse, F., (Quelques notes sur Cabanis) (Paris 1903).

CABARET, ka-bar-&', derived from the French, signifying inn or restaurant, a term generally applied in the United States since 1910 to the dinners, suppers or meals, the dan-sants or tea dances served in hotels and popu¬ lar restaurants to the accompaniment of singing, instrumental music and dancing. It is an elab¬ oration of the imported cafe chantant of Paris which provided vaudeville entertainment during meals.

CAB AT, ka-ba, Nicolas Louis, French artist : b. Paris, 1812 ; d. 1893. He studied with Flers and became prominent among painters of the landscape realistic school. Among his works are (Pond at Ville d'Avray) (1834); (A Spring in the Wood) (1864), and (A Morning in the Park of Magnet > (1877).

CABBAGE, a biennial plant, too well known to need description, and constituting one of the most valuable classes of vegetables. The Brassica oleracea, the original species from which the numerous varieties of cultivated cab¬ bages are derived, although in a wild state very remote in appearance from the full, round head which our plants present, is scarcely more so than the kale, cauliflower, broccoli, etc., all of which belong to the same family. There are two general classes of cabbage, smooth-leaved and wrinkle-leaved. The smooth-leaved are

cither red or green and the head conical, oblong, round or flat. The principal varieties are known to have existed at least as far back as the 16th century, but minor varieties are being con¬ stantly produced by selection and intercrossing. The parent stock is of highly vegetable char¬ acter, as its habitat and habit alike show ; and placed in more favorable conditions, its growth becomes luxuriant. More normally it is carried back into the stem, and this may accordingly become swollen and turnip-like, in which case we have the kohl-rabi, of which an extreme subterranean and almost turnip-like variety has also arisen; or it may be, as in the Jersey cab¬ bage, largely applied to the purpose of the growth of the stem, which may reach a height of 8 to 10 feet, and furnish not only walk¬ ing-sticks, but even spars for small thatched roofs, *etc.* The vegetative overplus may, how¬ ever, also be applied to the formation of buds, which accordingly develop with peculiar ex¬ uberance, giving us Brussels sprouts. The most evolved and final variety is the cauliflower, in which the vegetative surplus becomes poured into the flowering head, of which the flower is more or less checked ; the inflorescence becom¬ ing a dense corymb instead of an open panicle, and the majority of the flowers aborting, so as to become incapable of producing seed. Let a specially vegetative

cabbage repeat the exces¬ sive development of its leaf parenchyma, and we have the wrinkled and blistered savoy. Again a specially vegetative cauliflower gives us an easily grown and hardy winter variety, broccoli, from which, and not from the ordinary cauli¬ flower, a sprouting variety arises in turn.

The common cabbage is by far the most val¬ uable to both man and beast. It is also the most productive ; for it is believed that an acre of ground will yield a greater weight of green vegetable matter (and thus be more prof¬ itable to the farmer) in the shape of cabbage than in that of any other vegetable whatever. It is very abundantly produced by clay soils which are unfit for turnips, and the farmers who cultivate such soils will find it a vegetable worthy of much attention. The cabbage fur¬ nishes green fodder for cows and sheep, which is at least as good as turnips or carrots, fat¬ tening the animals equally fast, and rendering their milk, butter, etc., to the full as sweet, and is far preferable, as it keeps later in the spring, and thus supplies green food when no other can be procured. It is eaten by men in three forms, all of which have their admirers, but which vary much in respect to their whole¬ someness and digestibility. These forms are sliced raw, plain-boiled and salted cabbage or sauerkraut (q.v.), the favorite dish of the Ger¬ man nation. Raw cabbage, sliced fine and eaten with vinegar, either cold, or hot enough merely to wilt the vegetable, is one of the lightest and most wholesome articles of vege¬ table food, and in this shape will supply a green summer vegetable through the whole of the winter. Its use cannot be too highly recom¬ mended. Boiled cabbage takes longer to di¬ gest and is more trying to a weak stomach.

Cultivation. — The cabbage being biennial, the main crop must be sown the autumn pre¬ vious to that in which it is to be reaped. Field cabbages and the drum-head varieties that are used in gardens, being late in character, may be sown in July, or from the third week of that

month to the second week in August. But the smaller and earlier sorts used in gardens should not be sown before the first week of August, nor later than the second week of that month. If the plants are reared

earlier, they are apt to run to seed the following spring; and if, on the other hand, they are reared later, they will not acquire strength enough to withstand the cold of winter before it comes upon them. For suc¬ cessive crops to be used in the shape of young summer cabbages, one or two sowings may be made from the beginning of March to the beginning of April. Autumn-sown plants may be planted out in rows permanently, as soon as they are strong enough. Additional plantations from the same sowing may be made in spring, to be followed by others, made at intervals, up till July, from spring-sown plants. Thus a close succession of usable cabbages may be ob¬ tained the year round. In the northern parts of the United States cabbages for the early summer market are sown about September, kept under glass or frames during winter and planted out in spring. For later markets the seed is sown in beds as early as possible in spring (about March), and transplanted later. Cabbages are sometimes preserved for winter by inverting them and burying them in the ground. Cabbage coleworts may be obtained from any good early variety of cabbage. They are simply cabbages which are not permitted to form hearts, but are used while the leaves are yet green and the hearts more or less open. Three sowings should be made for the rearing of these: the first about the middle of June, the second about the same time in July, and the third about the last week of the latter month, or the first week of August. These sowings will provide crops of green cabbages from October till March or April, if the winter is not destructive, after which they begin to run to seed.

CABBAGE-BARK. See Andira. CABBAGE-BUG. See Cabbage-insects.

CABBAGE-BUTTERFLY, a name given to several species of butterfly, which deposit their eggs on cabbage-lea»ves, hence called Brassicaria ; for example, Pieris brassica.

CABBAGE-FLY, a species of insect (Anthomyia brassica) of the same family (Muscidc e) as the house-fly, larvae of which prey upon the roots of cabbages, and to the same genus as the turnip-fly and the potato-fly. The Anthomyia deposit their eggs in the earth, and the different species receive different names according to the particular roots upon which the larvae feed, in which they produce disease.

CABBAGE-INSECTS, certain insects in¬ jurious to the cabbage, some of which also prey on the radish. The harlequin cabbage-bug (Murgantia histrionica) destroys in the South¬ ern States, by its punctures, cabbages, turnips, radishes, mustard, *etc.* It is a black and or¬ ange-colored bug. The newly-hatched insect is pale green marked with black, but with succes¬ sive molts takes on certain orange

markings. The eggs hatch on the third or fourth day after laying, and the young bugs go through all their molts and are ready for reproduction in about two weeks. There are many generations in the course of the summer; and on the advent

of winter the adult insects crawl under rubbish to hibernate. The earliest specimens in the spring congregate upon mustard and early rad¬ ishes, flying later to cabbages. The very young, as well as the old, combine to destroy the plant, which wilts as if poisoned. The insect is very difficult to kill, so that destruction of the over¬ wintering individual is the important point to be striven for. Diluted kerosene emulsion must be applied, not too strong to ruin cabbages. The caterpillar of the cabbage-moth (Pieris rapa) and its congeners prey on cabbage and turnip leaves. Cabbages are more or less in¬ jured by the web-moth (Plutella xylostella) , the zebra caterpillar (Marnestra picta), the cab¬ bage root fly (Phorbia brassicce), the cabbage-weevil {Otiorhynchus picipes), the cabbage aphis (Aphis brassicce), *etc.* All these can best be destroyed by the use of pyrethrum, or dilute kerosene emulsion or salt. The larvae or eggs or infected leaves should be destroyed.

CABBAGE-MOTH. See Cabbage-In¬ sects.

CABBAGE-PALM, a name given to va¬ rious species of the palm-tree, from the circum¬ stance that the terminal bud, which is of great size, is edible and resembles cabbage, as the Oreodoxa oleracea, a native of the West .Indies, the simple unbranched stem of which grows to a height of 150 or even 200 feet. It is crowned by a head of large pinnate leaves. The flowers are placed on a branching spadix and protected by a double spathe. The unopened bud of young leaves is much prized as a vegetable, but the removal of it completely destroys the tree, as it is unable to produce lateral buds. Ptycho-sperma elegans is the cabbage-palm of New South Wales. The name is also given to species of Euterpe, and to Sabal palmetto, a Florida palm.

CABBAGE-ROSE, a species of rose (Rosa centifolia) of many varieties, supposed to have been cultivated from ancient times, and eminently fitted, frorh its fragrance, for the manufacture of rose-water and attar. It has a large, rounded and compact flower. It is called also Provence (or more correctly Provins) rose, from a town in the French department of Seine-et-Marne, where it is much cultivated.

CABBAGE-TREE, a name given to the cabbage-palm, and also to a tree

of the genus Andira (q.v.).

CABEIRI, ka-bi'ri, or CABIRI, heroes or divinities, venerated by the ancients in Samothrace, Lemnos, and in different parts of the coasts of Greece, Phoenicia and Asia Minor, as the authors of religion and the founders of the human race. The multiplicity of names ap¬ plied to the same character, the interchange of the names of the divinities themselves with those of their priests, the oracular law which enjoined the preservation of ancient barbaric names, and thus led to a double nomenclature, sacred and profane, together with the profound secrecy of the rites, have involved the subject in great obscurity. Some have thought that the Eastern mythology and the Druidism of western Europe contain traces of the Cabeiri. Some say there were six, three male and three female, children of Vulcan and Cabira, daugh¬ ter of Proteus. Others make two sons o f Jupi¬ ter or Bacchus. In Samothrace four were vene-CABELL — CABEZA DE VACA

rated. Recent excavations near Thebes have brought to light much information on the cult of the Cabeiri, one of whom has been identified with Demeter. The mysteries celebrated there, in the obscurity of night, were the most famous. Consult Lobeck, (Aglaophamus> (Konigsberg 1829) ; Schomann, (Griechische Altertiimer) (Vol. II, Berlin 1894) ; Preller, (Griechische Mythologie) (Vol. I, Berlin 1894) ; Welcker, (Griechische Gotterlehre) (Vols. I and III, Gottingen 1857-62) ; Lenormant, in Daremberg and Saglio, (Dictionnaire des antiquites) (Vol. I, Paris 1892) ; Rubensohn, O., cDie Mysterien-heiligtiimer in Eleusis und Samothrake) (1892) ; Robinson, (Greek Inscriptions from Sardis* (in American Journal of Archceology, 2d series, 17, 1913; 365, for etymology).

CABELL, William, American statesman : b. Licking Hole, Va., 13 March 1730; d. Union Hill, Va., 23 March 1798. He was a member of the House of Burgesses of Virginia upon the outbreak of the Revolution; took an active part in the affairs of the new nation, and be¬ fore the adoption of the Federal constitution was presiding magistrate for the United States in Virginia.

CABELLO. See Porto Cabello.

CABER, the undressed stem of a tree, 20 or more feet long, used for

trial of strength in Scottish athletic games. It is held upright against the chest, by the smaller end, and tossed so as to strike the ground with the heavier end and turn over. The contestant making the farthest toss with the straightest fall is winner.

CABES, ka'bes, or GABES, Africa, a town and port of the French protectorate of Tunis. It stands at the foot of the Jebel Ham-arra, on the right bank of the Wad-er-rif, near the head of the Gulf of Cabes, and may be said to consist of several villages. It contains an Arabic school, a French garrison and is the seat of the governor of the province. It has some export trade in dates, henna, *etc.* The Gulf of Cabes (Syrtis Minor) has at its en¬ trance the islands of Kerkenna and Jerba. Its chief seaport is Sfax. Pop. of Cabes, 20,000.

CABESTAING, ka'bes-tan', Guillaume de,

Provencal poet and knight : d. about 1213. Ac¬ cording to Boccaccio in the ninth tale of the four.th day of the (Decameron, J Cabestaing was the victim in the legend of the ((eaten heart,® which originated in Oriental literature, and is also told of Chatelain de Coucy, a French troubadour, and of Reinmann von Brennenberg, a German minnesinger. In 1212 Cabestaing fought in the famous Christian victory over the Moors at Las Navas. He loved and was beloved of Marguerite, wife of Raymond of Chateau-Roussillon. In jealousy the husband murdered the poet-knight, tore out his heart, had it cooked and served in a meal to his wife. When he told her, she replied ((Since I have eaten such noble food, I shall never eat any other,® and leaping from a balcony, killed her¬ self. A selection of Cabestaing' s verse is found in Raynouard's collection.

CABET, ka'-ba', Etienne, French com¬ munist: b. Dijon, 2 Jan. 1788; d. Saint Louis Mo., 9 Nov. 1856. He was brought up for the bar, and was appointed attorney-general of Cor¬ sica, from which office, however, he was soon dismissed. He was sent to the Chamber of

Deputies in July 1831, and there made himself so obnoxious to the government by his violent speeches, and at the same time by his inflamma¬ tory pamphlets and a journal entitled La Popu¬ late, that he was indicted for treason, and rather than subject himself to the imprisonment to which he was sentenced, withdrew for five years to England. While there he published the ˆVoyages et aventures de lord Carisdall en Icarie,* in which he elaborated his scheme of communism, which from 1842 to 1848 passed through five editions.

He began again to pub¬ lish La Populate in 1841, and circulated it widely among the working classes. He also issued an Icarian almanac, several pamphlets and a work on Christianity, which would restore social equality as taught by the early Christians and opposes modern ecclesiasticism. He also wrote a history of the French Revolution from 1789 to 1830 which appeared in five volumes. On 2 Feb. 1848, a band of Icarians left France for the Red River in Texas, where Cabet had secured a tract of 400,000 acres of land, the free use of which was open to the settlers, under condition that before their departure they should deposit all their funds in the hands of Cabet, who assumed the financial and general control of the expedition. But the expedition turned out badly, and lawsuits were instituted against Cabet; and on 30 Sept. 1849, after he had left France for Texas, he was found guilty by default of swindling his disciples, and sen¬ tenced to two years' imprisonment. Meanwhile, with his colony of Icarians much reduced in number, he took up his abode at Nauvoo, on the Mississippi, in May 1850, and soon after re¬ turned to Paris. There, after a protracted trial, his innocence was fully established, 26 July 1851, by the Court of Appeal, and the judgment against him canceled. He returned to Nauvoo, where he continued to preside over his colony but many disappointments and cares embittered his life and accelerated his death. In justice to Cabet it should be said that the highest moral tone prevailed in Nauvoo, and whatever may be the politico-economical objections to his sys¬ tem, the colony presented, as far as the conduct of the settlers was concerned, a model of purity and industry. Consult Shaw, (Icaria: A Study in Communistic History) (New York 1884) ; Lux, (Etienne Cabet und der ikarische Com-munismus) (Stuttgart 1897) ; Prudhommeaux, Ucarie et son fondateur, E. Cabet* (Paris 1907).

CABEZA DE VACA, ka-ba'tha da va'ka, Alvar Nunez, Spanish explorer: b. Jerez de la Frontera 1490; d. about 1564. He was sec¬ ond in command in the illfated expedition of Panfilo de Narvaez to Florida in 1528. After the loss of their commander, Cabeza de Vaca, with a few survivors, landed west of the mouth of the Mississippi, and after eight years of wandering and captivity among the Indians reached a Spanish colony on the Pacific. He returned to Spain, and in 1540 was appointed governor of La Plata. He explored Paraguay, but became unpopular with the colonists, and after a defeat by the Indians was arrested on the charge of one of his subordinates, returned to Spain (1544), found guilty and banished to Africa. Eight years later he was pardoned and made judge of the Supreme Court at Seville. He has left an account of his travels and ex¬ plorations in Celadon de los naufragios y

comentarios) in the (Coleccion de libros y docu-mentos referentes a la historia de America* (Vols. VI and VII, Madrid 1906). An English translation by Buckingham Smith of the North American story is found in J. F. Jameson, (Original Narratives of Early American History) (Vol. II, New York 1907), and in Fanny Baudelier, (Journey of Alvar Nunez Cabeza de Vaca* (id. 1905). The South American ac¬ count was translated by L. L. Dominguez for the Hakluyt Society Publications (Vol. LXXXI, London 1891). Consult Fernandez de Oviedo, G., (Historia general y natural de las Indias* (Madrid 1853) ; Bancroft, H. H., (History of North American States and Texas) (San Francisco 1884) ; Texas State Historical Asso¬ ciation Quarterly (Vols. I, II, III, IV, X, Aus¬ tin 1897-1907) ; Lowery, W., (Spanish Settle¬ ments within the Present Limits of the United States 1513-61 * (New York 1901).

CABEZON (Sp. <(big head0), a name ap¬ plied to three or four distinct fishes. 1. Lari-mus breviceps, occurring in seas from the West Indies to Brazil, and belonging to the family of croakers, or Scicenidce. It reaches a length of 10 inches. 2. Scorpcenichthys marmo-ratus, a member of the Cottidce, or sculpins. It is found from Puget Sound to San Diego, reaches a length of 30 inches, and is a common food-fish, but its flesh is coarse and tough. 3. The smooth cabezon (Leptocottus armatus), also a sculpin of the Pacific coast. 4. Porich-thys notatus, a member of the Batrachoididce, found from Puget Sound to Lower California, which reaches a length of 15 inches and is sometimes called ˆsinging-fish.ˆ

CABILLONUM. See Chalon-sur-Saone.

CABINDA, ka-ben’da, or KABINDA,

Portuguese West Africa (also called Angola), a seaport town north of the Kongo River in lat. 5° 30’ S. It is the most important place in that portion of Angola separated from French Kongo by the boundaries assigned by treaty of 12 May 1886, and from the Belgian Kongo by those prescribed 25 May 1891. Its trade is chiefly in such products of

the region as sugar, coffee, cocoanuts and vegetable oils. Number of inhabitants about 10,000.

CABINET AND CABINET GOVERN¬ MENT. The word cabinet was originally ap¬ plied to the small chambers, closets or private apartments in which sovereigns, ministers and other high officials consulted their trusted ad¬ visers. In modern times, where used in connec¬ tion with governmental affairs, the word is a collective name applied to the leading officers of state in a number of constitutional govern¬ ments who act as a body of advisers to the head of the state and in some countries as the chief executive council and controller of legis¬ lation as well. While usually confined to the ministers or department heads of a constitu¬ tional government, there is no reason why the term should not be applied also to the chosen advisers of an absolute monarch.

Status and Functions of Foreign Cab¬ inets. — Cabinets are widely divergent in their powers and functions. That of England, which is the earliest cabinet, is the direct antithesis of the President's Cabinet in the United States, which is the next oldest, though the two cabi¬ nets are similar in this respect, that they are

composed entirely (save on rare occasions) of members of the dominant political party, se¬ lected by the actual head of the state. The constitutional governments of Europe, the self-governing British colonies and Japan have completely or imperfectly accepted and ap¬ plied the British type, while Switzerland and the Latin-American republics have patterned theirs after that of the United States. France, which has completely accepted the theory of Cabinet government, is the most important re¬ public which has an actual Cabinet government in its modern highly developed form. Cabinets based on the British type may be loosely de¬ scribed as executive committees of the legisla¬ tive bodies, in which their members have seats, before which they expound and defend the leg¬ islative measures they prepare, and to which they are directly responsible — in fact, they are ((the government.-0 The Cabinet must not be confused with the ministry. All members of the Cabinet are of the ministry — of the mem¬ bers of the Commons and Lords who hold of¬ fice under the government and who retire from office when the government goes out of power, but all members of the ministry are not of the Cabinet. Members of the ministry must sup¬ port the policies adopted by the Cabinet — vote with the government as regularly as Cabinet ministers — but they have no voice in determin¬ ing these policies. See Great

Britain — Crown and Cabinet; Italy — Political Ad¬ ministration and Crown and Parliament.

The British Cabinet, a shortened name for “cabinet council0 — that is, a council held in the King’s cabinet, or private room — gained its name under Charles I, between 1630-40, when it was ostensibly a committee of the privy council to expedite business, but in reality a few of the King’s favorites. The sovereign presided at its deliberations, and it was not until George I ascended the throne (1714) — this King being unable to speak the English lan¬ guage — that it became the practice for the mon¬ arch no longer to preside over its meetings. But the kings did not give up their control over the povver of appointing the great officers of state without a long and bitter struggle; and it was not till George Ill’s insanity loosened his hand that effective control by ministers can be said to have won the final victory. Even then, and during the early 19th century, its unity had by no means become so rigid as now ; during the latter period many instances occurred of Cabinet, members opposing the measures of the majority, and even of the Premier, and still retaining their portfolios. But by the ’thirties it had pretty much settled into its pres¬ ent constitution and rules. An important change was made in 1782, just after the Amer¬ ican Revolution, when its honorary members were dropped, and the membership confined to “efficient0 members, — officers of state so im¬ portant that they cannot be excluded from it, or personalities so powerful that moribund of¬ fices are kept constructively alive to make place for them. There is no absolute limit to the number of members, but custom dictates not less than 11, and the necessity of coming to some agreement and transacting business pro¬ hibits its being much in excess of 20. The As¬ quith Coalition Cabinet of 1915 contained 22 members. As the Premier’s duties are of a general character, it is unusual under modern

conditions that he assume control over a de¬ partment, and he generally takes the office of First Lord of the Treasury, which is practically a sinecure. There are also the four other chief secretaries of

state — for war, for home af¬ fairs, for the colonies and for India; the Chan¬ cellor of the Exchequer, the First Lord of the Admiralty, the Lord Privy Seal, the Lord Presi¬ dent of the Privy Council, the Lord Chancellor, and the Chief Secretary for Ireland. The last-named may or may not be included, and the heads of other departments may find places if desired. The Prime Minister is the head of the Cabinet ; he selects his ministers, enforces har¬ mony and concert of action among them, and by retiring, whether voluntarily or not, renders imperative their resignation. He presides at all Cabinet meetings (the deliberations of which are secret) but has no legal control over that body or its individual members. Besides being Premier, he may hold one or more govern¬ mental offices. The ministers are usually men of affairs, successful politicians and able de¬ baters. If they cannot defend the government's policy on the floor of the legislative body, the ministry may be turned out, and practical in¬ capacity may render all defense of no avail. The defection of a Cabinet minister not only involves his retirement from the Cabinet but also from the office held by him. All ministers have the right to appear in the legislative cham¬ ber and to discuss measures under considera¬ tion ; they introduce most of the important leg¬ islative proposals and also quite effectually con¬ trol the proposals of orivate members by making them questions of confidence in the government or ministry. While ministers are present on the floors of the legislative chambers the en¬ tire policy and administration of the Cabinet may be subjected to the most searching review by means of parliamentary questions and inter¬ pellations put to the ministers in open session. (See Great Britain — Parliament; France — Government). In some of the countries which have followed the United States form of gov¬ ernment the Cabinet members are granted a seat in the legislature for purposes of govern¬ ment, if not of voting. In the Cabinet system the head of the state in whose name all acts of government are performed is legally irre¬ sponsible, the responsibility for such acts being assumed by the ministers who countersign or otherwise attest their approval of such acts. The Cabinet's responsibility for all govern¬ mental acts is enforced by the legislative body by means of votes of censure or of lack of con¬ fidence or by defeating the legislative meas¬ ures or program advocated by the ministry. In the event of an adverse vote on their proposals the Cabinet must either resign or dissolve the existing legislature and appeal to the electorate at a new election. The responsibility is collec¬ tive and the ministry stands or falls as a body or unit. But in England the fate of the Cabi¬ net can only be affected by the censure of the House of Commons; the censure of the Lords can have no adverse effect.

Hence in governments patterned after the British system the Cabinet is the dominant power in the state and renders wholly impos¬ sible the separation of powers, which forms the basic principle of constitutional government.

The American Cabinet, or ˆPresident's Cab¬ inet, w has, of course, grown with the growth of

the departments. There were but four Cabinet officers at the outset, the Secretaries of State, of War and of the Treasury, with the Attorney-General. Of these, following the English tra¬ dition, in which from necessity foreign affairs had held the highest place, the secretaryship of state was regarded as the most important and honorable, and its incumbent was consid¬ ered to be in the line of succession for the Presidency, as for several administrations proved to be the case. John Quincy Adams was the last of these, and he appointed his chief rival, Henry Clay, Secretary of State with the presidential succession in view. The same notion has lingered to our own day and caused the Secretary of State to be termed the ˆPremier® of an administration; in itself an absurd and meaningless term, but with color given to it by the preference for this post among some of the ablest party leaders ambi¬ tious of the Presidency. The next officer added was the Secretary of the Navy, whose office was created in 1798. In 1829 the Postmaster-General was raised to the Cabinet, though the office had existed 35 years ; in 1849 the Secre¬ taryship of the Interior was created and made of Cabinet rank; in 1889 was added the Sec¬ retary of Agriculture, in 1903 the Secretary of Commerce and Labor. The last-named office was divided in 1913 into the Department of Com¬ merce and the Department of Labor, and the executive heads of each accorded Cabinet rank. In accordance with Congressional action in 1886 the Cabinet officers rank in order of suc¬ cession to the Presidency as follows : Secretary of State, Secretary of War, Secretary of the Treasury, Attorney-General, Postmaster-Gen¬ eral, Secretary of the Navy, Secretary of the Interior, Secretary of Agriculture, Secretary of Commerce and Secretary of Labor. It will be noted that after the original four the others are named in the order of the creation of their de¬ partments, not of their elevation to Cabinet rank.

The President's Cabinet cannot, properly speaking, be called a cabinet, in the sense of a unified body, and only once has it been recog¬ nized by statute — in the General Appropria¬ tion Act of 26 Feb. 1907, where it is called by name in the clause fixing the salaries of its members. It does not act as a unit and has no responsibility as a unit.

The word is merely a popular name for the group of officers in charge of the great branches of administra¬ tion, whom the President consults individually or collectively at will or not at all. A more ap¬ propriate term for the President and his ad¬ visers would be ˆadministration,® since this of itself indicates that the group is restricted to the field of law operating and not concerned with law making, thus distinguishing the group from the British Cabinet which combines both functions and thus may properly be called the ((govemment.® The President is the head and centre of the administration, possessing all power of direction, short of suspending the laws, and usually co-operates with the depart¬ ment heads to enforce the principles of the party in power. There are no gradations of authority, the departments being equal in their subordination, and no means of inter-connection, save as they grow out of the Cabinet council. The department heads have nothing to do with legislation, and by law are prohibited from

being members of the legislative body (Art. I, Sec. VI, H 2 of the Constitution). Hence the privilege of debate and even of personal com¬ munication with Congress as a body has been withheld from department heads.

The Cabinet members are responsible only to the President in the sense that they are called to office by him and are subject to his dismissal at any time, whereas the President is responsible to the country by popular elec¬ tion. The President very seldom endeavors to direct ordinary department operations, but practical necessity has clothed the secretaries wTith a measure of authority and discretion. Hence, as department heads, the Cabinet offi¬ cers are morally responsible to Congress and indirectly to the country for the conduct of the affairs of their separate departments. They are liable to censure and impeachment, and conviction on impeachment means removal from office, which also results actually though not technically from a vote of censure. Ap¬ pointments of Cabinet officers are subject to the approval of the Senate, which is rarely withheld, and the only

limitation on the powrer of removal is consideration of party welfare; the Tenure-of-Office Act of 1867 (q.v.) was an exception but this act was repealed. In forming his Cabinet, the President usually en¬ deavors to strengthen his administration po¬ litically by observing a code of geographical and other rules, distributing his appointments to cultivate doubtful sections or to reward party strongholds. In early times the Cabinet changed with the party, but with the develop¬ ment of the powers of appointment and removal the Cabinet comes into office with the Presi¬ dent and retires with him. While in foreign countries ability to debate, personal prestige and political sagacity are usually essential to cabinet appointments, the reverse is true of the President's Cabinet. The President may fill the various portfolios with totally unknown men, in reliance on their unproved abilities, without serious risk, and some of these ap¬ pointments have been eminently successful. The Secretary of State is usually selected with the greatest care, since he is regarded as the head of the Cabinet in influence and follows the Vice-President in the presidential succes¬ sion, but he has neither the powers nor the in¬ fluence of the European Premier, these residing in the President and the Speaker of the House of Representatives.

Cabinet meetings are frequent, occurring twice a week (Tuesday and Friday) when the President is at the seat of government. The procedure resembles a conference of a board of directors, the nature of the discussions de¬ pending upon the President. Sometimes they degenerate into mere discussions of routine affairs connected with the various departments: There is no question as to what officers shall sit in the Cabinet nor can outsiders mix in its councils ; at times, however, outside persons with information to impart have met with it, but this is regarded more as a special consulta¬ tion than as a Cabinet meeting. The Presi¬ dent's position as head of his party necessitates advisers outside his official household ; and oftentimes he has certain intimates not con¬ nected with the government on whom he de¬ pends for impartial and unbiased opinions on matters of special importance to the country.

Since Jackson's time these advisers have not attained such influence as to receive the title (<Kitchen Cabinet.® Cabinet opinions carry weight according to the personality of the President and secretaries and surrounding conditions. As previously stated the President is not obliged to consult the Cabinet but is expected to do so. As a rule, however, he consults it regarding matters of grave public importance and very seldom takes action re¬ garding departmental affairs without

first con¬ sulting the several department heads.

The term cabinet is sometimes applied in the United States to the heads of State departments advisory to the governor, but this is even less justifiable than its application to the Presi¬ dent's advisers, since the State officers are elected by the people on the same ticket with the governor and the latter has no power of appointment or dismissal. Its use in connec¬ tion with the municipal officers accessory to a mayor has some justification, as many of these officers are appointed by him.

The history of the national executive de¬ partments and of the President's Cabinet will be found under the title United States — Be¬ ginning of Executive Departments of the and The Cabinet of the; also the depart¬ ments by name. In this connection see also Congress; Congressional Government; Ex¬ ecutive and Congress; The United States — The President's Office; The Vice-Presi¬ dency, and The Speaker of the House of Representatives.

Bibliography. — Anson, W. R., (The Law and Custom of the Constitution (4th ed., Ox¬ ford 1909), and (The Growth and Develop¬ ment of the British Constitution' (Lovdon 1912) ; Bagehot, W., (The English Constitu¬ tion (2d ed., London and Boston 1873) ; Blau-velt, M. T., (Development of Cabinet Govern¬ ment in England) (New York 1902) ; Bodley, J. E. C., (France, ' Vol. II, Bk. 3 (London 1898) ; Bryce, James, (The American Common¬ wealth (rev. ed., New York 1914) ; Finley, J. H., and Sanderson, J. F., (The American Executive and Executive Methods' (Newr York 1908) ; Garner, J. W., (Introduction to Political Science, pp. 180-189 (New York 1910) ; Hinsdale, M. L., (History of the President's Cabinet' (Ann Arbor, Mich., 1911); Learned, H. B., (The President's Cabinet' (New Haven 1912) ; Low, S. J. M., (The Governance of England' (London 1904) ; Lowell, A. L., < Es¬ says on Government1* (Boston 1889), (The Government of England' (rev. ed., New York 1912), and Governments of France, Italy and Germany' (Cambridge, Mass., 1914) ; Todd, Alpheus, (On Parliamentary Government in England' (London 1867) ; Traill, H. D., (Cen¬ tral Government' (2d ed., London 1908) ; Wil¬ son, Woodrow, (The President of the United States' (New York 1916).

Irving E. Rines.

CABINETMAKING, the industry of mak¬ ing artistic. furniture, fine inlaid woodwork, such as cabinets, sideboards, picture and photo¬ graphic frames, tables, ornamented bedsteads and other articles for household and interior building decoration, cabinet organs, cabinet pianofortes, cabinet of arms, books, etc, A cabinet, specifically, is a

piece of furniture with shelves or drawers, or both, or simply cup-

hoards enclosed within doors ; and these usually range from those of plain and chaste style to those of a highly ornamented character, decˆ orated with carving, inlaying, marquetry, lacquer, painting, porcelain insets and medallions, enamel or metal appliques. Cabinetmaking also com¬ prises fine and ornamental joineiy, interior wood finish, paneling and lattice work, etc., with their adjuncts of varnishing and polishing. The art of cabinetmaking is said to have orig¬ inated in the 15th and 16th centuries in Italy and soon spread to France, Germany, the Netherlands and Spain, the craftsmen of these nationalities in the 16th and 17th centuries, and English cabinetmakers in the 18th century, rivaling each other in the design and production of sumptuous, monumental and costly articles of lurniture. Antwerp notably from the 16th century became famous for its output. Historic names among cabinetmakers are those of Boulle, Pierre and Andre Charles, and Jean Mace, Frenchmen, and Chippendale, English. See Buhlwork; Joinery; Wood-Carving.

GABIRI. See Cabeiri.

CABLE, George Washington, American novelist and miscellaneous writer: b. New Or¬ leans, La., 12 Oct. 1844. His father died when he was 14 years of age, and he had to leave school, and seek employment as a clerk in order to assist in the support of his mother and sis¬ ters. In 1863 he joined the Confederate army as soldier in a cavalry regiment, and served till the conclusion of the Civil War, when he returned to New Orleans and again took to commercial life. But in 1879, being by this time a practised writer, and having had considerable success with his literary ventures, he decided to devote himself entirely to authorship. In 1884 he took up his residence in Massachusetts, where he has originated a system of <(home culture clubs, }) since developed into the People's Institute. Mr. Cable is a member of the National Institute of Arts and Let¬ ters and the American Academy of Arts and Sciences. His first important book, 'Old Creole Days* (1879), appeared originally in Scribner s Magazine ;

and since its publication he has written (The Grandissimes) (1880) ; ‘Madame Delphine) (1881) ; ‘The Creoles of Louisiana *(1884), a history; (Dr. Sevier*

(1884) ; (The Silent South *(1885), a plea for the negro; ‘Bonaventure* (1888); ‘The Negro Question* (1888) ; (Strange True Stories of Louisiana) (1889); ‘John March* (1894); ‘Strong Hearts) ; ‘The Cavalier) (1901) ; ‘By-low HilP (1902); ‘Kincaid’s Battery > (1908); (Posson Jon-e* and Pere Raphael 5 (1909) ;

(Gideon’s Band) (1914) ; (The Amateur Gar-deiP (1914). The chief interest of Mr. Cable’s novels lies in their excellent descriptions of Creole life, a subject which he may be said to have introduced into literature. His pictures of negro life are equally effective, and he handles dialect in a masterly manner. See Grandissimes, The; Old Creole Days.

CABLE, a large, strong rope or iron chain used as a mooring tie. The term is most frequently used in its nautical sense to desig¬ nate the means by which a ship is connected with her anchor. The large ropes used for towing, or for making a vessel fast to a buoy or pier, are commonly known as hawsers, In

more recent times the term cable has been ex¬ panded to include also the large suspensory topes (usually of twisted or parallel wires) from which suspension bridges are hung; the endless ropes used to operate the kind of street cars commonly called cable cars or grip cars; the suspended wire ropes known as cableways, for the transport of goods, building materials, etc.; the groups of telephone wires placed in underground conduits or strung overhead in leaden casings ; the wires for high voltage elec¬ tric transmission ; the undersea telegraph con¬ ductors, and, in fact, any very strong flexible tension connection. Rope cables are made of hemp, manila or other fibre, or of wire, twisted into a line of great compactness and strength. The circumference of hemp rope varies from 3 to 26 inches. A certain number of yarns are* laid up left-handed to form a strand; three strands laid up right-handed make a hawser ; and three hawsers laid up left-handed make a cable. The strength of a hemp cable of 18-inches circumference is about 60 tons, and for other dimensions the strength is taken to vary according to the cube of the diameter. Wire-rope has within recent years largely taken fhe place of hemp for towlines and hawsers of? board ship. These usually consist of six strands, laid or spun around a hempen core,, each strand consisting of six wires laid the’ contrary

way around a smaller hempen core. The wires are galvanized or coated with a preservative composition. Wire ropes are usually housed on board ship by winding them round a special reel or drum. Hemp cables, moreover, have for long been almost wholly superseded by chain cables ; the introduction of steam on board ship having brought in its train the powerful steam windlass wherewith to manipulate the heaviest chains and anchors required.

Chain cables are made in links, the length of each being generally about six diameters of the iron of which it is made, and the breadth about three and one-half diameters. They are generally of eight lengths of 15 fathoms each connected by swivels to prevent twisting. There are two distinct kinds of chain cables — the stud-like chain, which has a tie or stud welded from side to side of the long link, and the short-link or unstudded chain. The cables for use in the mercantile service are made in 15-fathom lengths, but in government contracts chain cables are required to be made in 1214-fathom lengths, with one swivel in the middle of every alternate length, and one joining-shackle in each length. Besides the ordinary links and joining-shackles, there are end-links, splicing-tails, mooring-swivels and bending-swivels. The sizes of chain cables are denoted by the thickness of rod iron employed in forging the links. The following table gives certain ascertained data concerning the cables in ordinary use :

Diameter of iron j

Weight of stay-pin

Weight per fathom

Breaking

strain

1 in.

I oz.

13i lbs.

6 tons

1 “

3i “

54 “

24 “

U “

12 “

121 “

60 “

2 “

28 “

215 “

99 “

2i “

40 “

272 “

126 “

122

CABLE

Compared with the strength of hempen cable, a chain cable of one inch diameter of rod is equivalent to a hemp cable 10ˆ4 inches in

circumference; \% inches, to 13f4 inches; 1*4 inches, to 16 inches; E)4 inches, to 18 inches; and 2 inches, to 24 inches. In navigation a cable's length is a nautical measure of distance equaling 120 fathoms, or 720 feet, by which the distances of ships in a fleet are frequently esti¬ mated. This term is often misunderstood. In all marine charts a cable is deemed 607.56 feet, or one-tenth of a sea mile. In rope-making the cable varies from 101 to 115 fathoms; cablet, 120 fathoms; hawser-laid, 130 fathoms, as de¬ termined by the British Admiralty. According to Ure a cable's length is 100 to 140 fathoms in the merchant service. The wire rope used for •submarine telegraphy is also called a cable. See Cables, Submarine.

CABLE, Submarine specially con¬ structed ropes of wire, hemp and gutta-percha, or other waterproofing and protecting materials, laid on ocean or river beds for the purpose of providing means of electrical communication across large bodies of water.

Until the discovery of gutta-percha such communication was impossible, as water is so good a conductor of electricity that the sub¬ mersion of current-carrying wires was de¬ pendent upon complete insulation. In this gum, however, such a perfect insulator was found that submarine communication all over the world became merely a question of time, ex¬ perience and necessity. In 1843 Prof. S. F. B. Morse suggested electrical communication be¬ tween the United States and Great Britain, but it was not until more than 20 years had passed that practical telegraphy across the Atlantic Ocean was established.

Early Cables. — The first under-water cables were short ones laid across rivers ; later the English Channel was electrically ˆbridged** in this manner. In 1852 Dover and Ostend were connected by a cable 75 miles long and containing six wires. In 1854 Sweden and Den¬ mark, Italy and Corsica, and Corsica and Sar¬ dinia were linked. In the same year the New York, Newfoundland & London Telegraph Company was incorporated, mainly through the efforts of Cyrus W. Field and Peter Cooper, of New York, for the purpose of lay¬ ing a cable between Newfoundland and Ireland, a distance of about 2,000 miles. It received a charter from the Newfoundland legislature, with an exclusive right for 50 years to establish a telegraph between the American continent and Europe via Newfoundland. In 1856 Cape Ray and Cape Breton were united, as well as Prince Edward's Island and New Brunswick. The same year Mr. Field organized the Atlantic Telegraph Company. It was supported by both the United States and British governments* but the results of its efforts were discouraging for several years. In August 1857 an attempt was made to lay a cable

by the American frigate Niagara and the British ship-of-war Agamem¬ non , but about 300 miles from the Irish coast the cable parted, owing to a strain caused by a sudden dip of the sea-bottom. In 1858 the same two ships, each with half the cable on board, steamed to a point in the Atlantic mid¬ way between Valentia, Ireland, and Heart's Content, Trinity Bay, Newfoundland, spliced

the cable, and, steering in opposite directions, safely landed the ends at their destinations on

5 August. The cable was 2,500 miles in length, weighed about one ton per mile and cost $1,256,- 250. It was composed of seven copper wires encased in gutta-percha, which in turn was surrounded by a covering of hemp saturated with oil, pitch and beeswax ; the whole being protected by an outer sheath composed of 18 strands of seven iron wires each. Despite the success in laying, however, the cable was prac¬ tically useless. The current was so weak that a message of 90 words from Queen Victoria to President Buchanan took 67 minutes to trans¬ mit, and after a few more messages the cable ceased to transmit signals. Two more cables were laid in this year to connect Great Britain with the Continent, — one to Holland and the other to Hanover ; and 1859 saw, among other cable connections, the joining of England with Denmark and France, and of Malta with Sicily. In 1860 a cable was laid between France and Algiers, and in 1861 Malta was connected with Alexandria and Batavia with Singapore. Fail¬ ures were met with in attempts to lay cables through the Red Sea and from Falmouth to Gibraltar, and these, with the ill-success of the Atlantic cable, caused great disappointment to the promoters of the latter enterprise. Capital seemed to have made up its mind that a success¬ ful cable across the Atlantic was impossible. In 1865, however, another cable of 2,300 miles and weighing 4,000 tons, was shipped on the Great Eastern, and was successfully paid out for 1,065 miles from Valentia, when it broke, and was abandoned after vain attempts to grapple the lost end. The following year the Great Eastern sailed with a lighter but stronger cable of 2,370 miles and laid it successfully. She then grappled the lost cable of the year before, recovering it from a depth of two miles, spliced it and completed the task by landing the end at Heart's Content.

Advance in Cable-Laying. — With two cables now linking America and Great Britain, confidence was restored, and the manufacture and successful laying of submarine cables went on at a rapid rate. In 1869 a line was laid from Brest, France, to Saint Pierre, New¬ foundland (a

distance of 3,100 miles), by a French company. In 1873 a cable joined the cities of Lisbon and Pernambuco, and in 1874 and 1875 two more cables were laid between Valentia and Heart's Content. The latter weighed less than 900 pounds per mile. Another line from Penzance, Cornwall, to Saint Pierre, 2,920 miles, was laid in 1879, and one from England to Panama in 1882.

Meanwhile an incident had occurred which greatly influenced the expansion of submarine cable systems. In 1870 the British government purchased the entire land telegraph system of the British Isles, and the capital thus liberated, about $50,000,000, was largely reinvested in submarine cable ventures. In 1872 a number of small competing companies with lines through the Mediterranean were consolidated into the Eastern Telegraph Company, and in the follow¬ ing year the Eastern Extension, Australasian

6 China Telegraph Company was formed by the amalgamation of companies owning cables farther east. Since then the Eastern, Eastern Extension and Associated Cable companies

have become practically one immense organiza¬ tion.

In 1884 John W. Mackay and James Gor¬ don Bennett organized a cable system across the Atlantic from Valentia to Torbay, N. S., in the interests of the Commercial Cable Company and the New York Herald. Consolidation of competing companies followed as a matter of course, and now there are practically, besides the French lines, but two competing cable com¬ panies in the north Atlantic field — the Anglo-American and the Commercial Cable companies. There are now 15 cables between North Amer¬ ica and Europe, some of which run into New York harbor. The cables of 1858, 1865 and 1866 are ˆdead,® and three others have but a brief tenure of life. Nine are ˆalive® and active.

About 1902 France undertook to lay cables to connect her colonies, and now has over 12,000 miles in operation. A little later the

Commercial Cable Company laid its fourth line to connect New York and London, by way of Rockport, Mass., Canso, N. S., and Waterville, Ireland. The European War put a check on cable-laying for several years.

Pacific Cables. — In the Pacific Ocean the Commercial Company has constructed a cable 6,912 miles long anil costing $12,000,000, laid from San Francisco, via Honolulu, the Mid¬ way Islands and Guam to Manila, in the Philip¬ pines, with an ultimate extension to Shanghai or Hongkong. The first section, from San Francisco to Honolulu, 2,413 miles, was opened 1 Jan. 1903. This section is the most hazardous on the route, depressions of 5,160 and 5,269 fathoms having been encountered, and the pro¬ file displaying mountains of immense elevation and valleys of corresponding depth. A level plain, with an average depth of 2,700 fathoms, extends throughout the second section, from Honolulu to the Midway Islands, the bottom being of soft mud and extremely favorable for cable-laying. Thence toward Guam an average of 3,200 fathoms is found, and favorable con¬ ditions are maintained throughout. The last section is similar in its profile to the first, though the depth averages less, being from 1,400 to 2,700 fathoms. The sea-bed is ex¬ tremely irregular in outline, with many reefs and depressions.

The cable is built around a core formed of copper wire insulated by gutta-percha, around which layers of jute yarn are wound. This, in turn, is sheathed in small cables, each formed of several strands of steel wire. An outer covering of jute yarn, the whole saturated with a bituminous compound, binds together the con¬ ducting and protecting wires in one solid mass. The landing of the shore end of the cable at San Francisco was effected thus: A section of six and one-half miles was cut from the main cable on board the cable-steamer Silvertown and loaded on a tender, which steamed toward the shore. On approaching the line of breakers, which were heavy, the shore end was floated on balloon buoys placed every 10 fathoms, and a team of 12 horses dragged it ashore, where it was spliced to the permanent shore connection, and the tender returned to the Silvertown, on board which the shore section was respliced to the main cable. The cable-ship then started for Honolulu fin the evening of 14 Dec. 1902.

The Silvertown was. specially built for cable¬

laying purposes. On this trip she carried 2,413 nautical miles of cable, weighing 4,807 tons. She arrived off Honolulu on 25 December and

landed the shore end by buoying the cable ; but she employed no tender or horses. Two spider-sheaves were sent ashore and fixed by sand anchors about 60 yards apart. A hauling-line was paid out from the ship, reeved through the sheaves and brought on board again. One end of this line being attached to the cable and the other to the picking-up gear, the engines were started and the cable was dragged toward the shore.

Another Pacific cable has been constructed jointly by the governments of Great Britain. Canada and Australia across the Pacific from Vancouver to Fanning Island, Fiji Islands, Norfolk Island, and thence to New Zealand and Australia. It is practically 8,000 miles long, and the 3,600-mile stretch from Vancouver to Fanning Island makes the longest single sec¬ tion in the world. This cable brought the Aus¬ tralasian colonies 10,000 miles nearer to Canada than they were before, and there is now com¬ pleted a British telegraph girdle of the world which touches foreign territory only at Madeira and Saint Vincent, in the Cape Verde Islands, both belonging to Britain's old ally, Portugal.

Mention has already been made of the con¬ solidation of competing lines in the Mediter¬ ranean and the East into the Eastern Telegraph Company. To this huge organization belongs a marvelous network of submarine cables — practically all the cables from Land's End, in England, through the Mediterranean to Suez, on through the Red Sea to Aden, across the In¬ dian Ocean to Bombay, thence linking into the system Madras, Singapore, Hongkong, Ma¬ nila, Australia and New Zealand. In addition, practically all the cables which now surround Africa, and many of those which cross the ocean and follow the coastline of South Amer¬ ica, are in its control. To such an organization the laying of 15,000 miles of cable from Eng¬ land to Australia, via the Cape of Good Hope, at a cost of over $15,000,000, was comparatively easy. Yet this great line may be traced from Land's End in England to Adelaide in South Australia, a distance which a modern Atlantic liner would take six weeks to steam over. The length of cable is more than half way round the globe, and about eight times longer than the first Atlantic cable.

The life of a deep-sea cable, aside from in¬ juries by ship's anchors, rocks, sharks, sawfish and swordfish, has been variously estimated at from 30 to 40 years. Sharks occasionally bite cables and leave some of their teeth embedded, and sawfish and swordfish attack them, espe¬ cially in tropical waters, but on the level plains of ooze two miles or more below the surface cables seem to be almost imperishable. In shal¬ low water they are most exposed to damage. Deep-sea cables

generally weigh from one to one and a half tons per mile, but the portions lying in shallow water are so heavily armored as to weigh from 10 to 30 tons per mile. The breaking strain is about seven tons. Yet in one year the ocean cables of the Commercial Company were severed by ships' anchors five times. In the Firth of Forth in Scotland no less than 13 ship's anchors were once found entangled in a length of four miles of cable. The deep-sea cable costs about $400 per mile,

is made in lengths of 15 to 25 miles and stored in coils in a cable-laying steamship. The cost of coast cables may run up to $5,000 a mile, as they have usually paper insulation, covered with a lead sheath, and heavily armed with wire. Coast cables are made in mile lengths and stored on large reels.

Cable Tariffs and Codes. — In the early days the Atlantic Telegraph Company started with a minimum tariff of $100 for 20 words, and $5 for each additional word. Later this was reduced to $25 for 10 words. It was not till 1872 that a rate of $1 a word was intro¬ duced. This word rate system proved so popu¬ lar that it was soon adopted universally, and since 1888 the cable rate across the Atlantic has been down to 12ˆ2 cents a word. Rates now range from the 12ˆ4-cent tariff across the Atlan¬ tic to $1.33 per word from New York to Japan. The average for the whole world is roughly 50 cents a word. The cost of cabling, how¬ ever, is greatly influenced by ˆcoding,® a system by which business men use secret words for commercial messages, and which has developed to an extraordinary degree of perfection. One code word will frequently stand for 10 or 15 words, and there are instances where one word has been used to represent over 100 words. Practically all commercial cablegrams are coded, and nearly all departments of commer¬ cial and industrial life nowadays have their special codes.

Speed of Transmission. — The cost of deep-sea cables makes it vitally important to get as much work out of them as possible. In the first place the transmission time of mes¬ sages has been greatly reduced. Formerly from many parts of the world it took 5 or 10 hours to deliver

a cablegram where it now takes from 30 to 60 minutes, and across the Atlantic the companies, for stock-exchange purposes at any rate, send a cablegram and get a reply in two or three minutes. In the second place, where traffic is heavy, speed of transmission of the signals has been greatly increased. Across the Atlantic and on three or four of the busy lines of the Eastern Company the art of cable teleg¬ raphy has been highly developed.

On the first Atlantic cables the speed was about seven words a minute in one direction only. The speed of recent Atlantic cables is as high as from 40 to 45 words a minute in both directions — that is, from 80 to 90 words a min¬ ute. Thus, compared with the early days, the speed and therefore the value of the best cables has been multiplied more than 10 times over by means of some of the most ingenious and deli¬ cate machinery in modern industry. On the first Atlantic cable it was found that, using land telegraph methods of signaling, the speed was only one or two words a minute. The first great forward step was to send exceedingly fee¬ ble currents ana to use extremely sensitive receiving instruments. Lord Kelvin's mirror galvanometer supplied the instrument needed. By this means the speed of the early Atlantic cables was raised to seven or eight words a minute. Subsequently, when heavier cables were laid, the speed was increased to as much as 20 words a minute.

The Siphon Recorder. — In 1870 Lord Kel¬ vin perfected his siphon recorder for working long cables, and it at once supplanted the mirror instrument, as it worked just as well with fee¬

ble currents, gave a written record of signals received and enabled one man to do the work of two. An exceedingly light coil of fine wire (in shape and size like the long, narrow O which would be obtained by winding several hundred turns of fine silk thread around the palm of the open hand) is delicately suspended between the two poles of a powerful magnet. As the electric signals from the cable flow through the coil of wire, it swings round under the influence of the magnet, back or forward according as the current is positive or negative. The motions of the coil are transmitted by silken fibres to a little glass siphon about as thick as a needle and three or four inches long, suspended so as to swing with perfect freedom. One end of the siphon dips into a pot of ink, and the other end hangs close above a moving strip of paper. The signals are so feeble that if the end of the glass siphon rested on the paper it would not move at all, but by causing the siphon to vibrate continuously against the paper the free motion of

the siphon is not inter¬ fered with, and the ink is spluttered upon the paper so that the siphon traces a line of very fine dots and thus records the signals transmit¬ ted through the cable. This instrument, though crude at first, has gradually been perfected. It is now the most important part of modern cable apparatus.

The Duplex System. — The next improve¬ ment, undoubtedly the greatest ever made for increasing speed, was the invention of a success¬ ful system of ˆduplexing® cables by Dr. Alex¬ ander Muirhead and Herbert Taylor in 1875. This invention rendered it possible simultane¬ ously to send messages both ways through a long ocean cable. In 1878 the Direct United States cable across the Atlantic was successfully duplexed, and a speed of 16 words a minute ob¬ tained each way at the same time. Duplexing cables has now become such a fine art, chiefly through the labors of Dr. Muirhead, that the capacity of cables, and therefore their commer¬ cial value, has been practically doubled. Since 1875 about 100,000 miles of ocean cables have been duplexed almost entirely on the Muirhead system.

The increasing traffic across the Atlantic and the pressure of competition led next to an in¬ crease in the size of the copper (<core® which conducts the electric signals. The resistance of a wire delays the electric current and therefore the speed. By doubling the size of the copper core the resistance is halved and the speed greatly increased. The copper wires used for telegraphy on land weigh about 200 pounds per mile. In 1894 two cables were laid across the Atlantic, one for the Commercial Cable Com¬ pany and the other for the Anglo-American Company. The copper core of the former weighed 500 pounds per mile, while the latter weighed no less than 650 pounds per mile, or as much as three ordinary land wires. The result was that the speed obtained with these two cables was as high as 40 to 50 words a minute, or, working duplex, from 80 to 90 words a min¬ ute. On previous Atlantic cables 25 to 28 words a minute was the maximum each way. Owing to the reduction of rates the benefit of this ten¬ fold increase of speed since the early days has gone almost entirely to the general public.

Automatic Transmission. — The, increase in speed brought up another difficulty. No

t

human operator can send so fast. The key used for signaling through the cables by hand is practically the same as the ordinary Morse key used for land telegraphy, except that two keys are used side by side, one to send positive signals and the other negative signals, the let¬ ters of the alphabet being indicated by various arrangements of the two kinds of signals. First-class cable operators can send as many as 30 words a minute for a few minutes, but a sustained speed of 20 words a minute, when working by the hour, is regarded as very good. To take full advantage of the speed of a mod¬ ern Atlantic cable, therefore, it is necessary to have some automatic method of transmitting. The advantages of automatic transmission are higher speed, . greater uniformity of signals, more legibility and fewer mistakes.

The method adopted is simple and beautiful, — a modification of the Wheatstone system. The message is first punched as a series of holes in a paper tape. This perforated tape is then run through an automatic transmitter, and by means of a system of small levers the re¬ quired signals are transmitted at any desired speed. The operator has a wooden stick in each hand with which he strikes one or other of the three keys of the small perforator directly in front of him. One key punches a right-hand hole, another key a left-hand hole and the mid¬ dle key makes a space. In this way the cable¬ gram before him is transmitted at the rate of about 20 words a minute into a perforated tape. From the perforator the tape runs into an au¬ tomatic transmitter, or <(auto.® There is a row of small central holes in the tape, and on each side is a row of larger holes. The latter rep¬ resent the message. A small star wheel in the ((auto® engages with the central line of holes and feeds the tape along at a uniform rate. A couple of small steel rods about the size of a knitting-needle, one for each of the two rows of message holes, continually vibrate against the paper. When either of them enters a per¬ foration in the paper, a lever connected with it moves and makes an electric contact, sending a short, sharp signal into the cable.

Cable Relays. — Recently several still more wonderful inventions have been perfected. On land relays are used. For instance, messages from

New York to Chicago are automatically repeated at Buffalo or Meadville and by auto¬ matic repeating every 600 or 800 miles it is an everyday occurrence to telegraph direct be¬ tween New York and San Francisco. A relay capable of performing similar work for cables has been a dream of cable engineers and in¬ ventors for years, and in default of such an instrument ((human relays® have been em¬ ployed; that is, at the end of one section of a cable an operator takes the paper record of a cablegram as it comes from the siphon recorder and retransmits it.

But the cable relay is now an accomplished fact. The only hope of constructing such an instrument was to utilize the siphon recorder. One difficulty has been that the movements of the siphon, as shown by the paper records, have till recently been most irregular. There has been what photographers would describe as Jlack of definition® about the signals, rendering it hopeless to attempt to relay them automatic¬ ally by machinery. The first thing to do was, therefore, to straighten and sharpen up the sig¬

nals a bit, and a very able group of cable engi¬ neers, including H. A. C. Saunders, electrician-in-chief of the Eastern and associate cable companies, his assistant, Walter Judd, with Dr. Muirhead, inventor of the cable duplex, and Messrs. Brown and Dearlove, succeeded in sharpening them. They secured very regular signals, usually described as <(square signals.® This result was obtained by means too techni¬ cal to be described here, but the chief device used is known as an (<inductive shunt.® Having squared the signals, it was now possible, though by no means easy, to construct a cable relay. Two have been perfected. One is known as the Brown & Dearlove relay, the principal inventor of it being S. G. Brown. The other has been invented by Dr. Muirhead. In both a fine wire terminating in a platinum contact-point takes the place of the ink in the siphon of a re¬ corder. The contact-point instead of resting on the paper tape rests on a rapidly moving metal¬ lic surface divided into two parts. In the Brown & Dearlove relay this contact-surface consists of a constantly revolving metallic drum or wheel. The siphon, with its wire and con¬ tact-point, (<skates,® as the inventor describes it, with the utmost freedom on the periphery of this wheel. The drum looks like a phonograph cylinder. As the siphon skates upon the right or left half of this drum it makes a positive or a negative electric contact and automatically transmits a corresponding signal with renewed energy into the next section of cable. In the Muirhead relay the moving metallic surface consists of a small plate vibrating rapidly. The result is the same. Able

in this way to make definite electrical contacts through a long ocean cable, an operator can easily work, by means of these contacts, local apparatus moved by more powerful currents. In this way both Mr. Brown and Dr. Muirhead have devised perfora¬ tors which reproduce at the receiving station perforated tape identical with that used for transmitting the message at the sending station. This tape is available for transmission through an <(auto,® this plan having the advantage that the signals are retransmitted in as perfect form as the original signals ; and, theoretically at any rate, the process may be repeated indefinitely, so that it would be possible to send a cable mes¬ sage automatically through a dozen stations from England to Australia. This will no doubt be done in time, but it is a very slow process getting such complicated and delicate inventions into commercial use. It is a question of time and growth. The Brown & Dearlove relay has been adopted by the Eastern Company, and has been in commercial use. Dr. Muirhead's relay has also proved very successful in several long¬ distance tests.

Cable Statistics. — In all there are now about 291,000 nautical miles of submarine cables, enough to go about 13 times around the globe. They have cost about $250,000,000, but their market value is considerably higher, as deep-sea cables are solid and profitable investments. All told there are about 50 cable steamers in the world, including those owned by the cable-con¬ struction companies and governments, with gross tonnage of perhaps 85,000 tons.

The Eastern Telegraph Company owns 107 ocean cables of a total length of 46,790 nautical miles. Its cables extend from England to Spain, all through the Mediterranean and Black

seas, to most important points in Africa and on to Australia. The Eastern Extension, Australian & China Telegraph Company owns 37 cables of 26,421 miles. The next largest is the Western Telegraph Company, with 30 cables of a total length of 23,836 miles, extend¬ ing from Portugal across the Atlantic to the principal ports on the east coast of South America. The Western Union Telegraph Com¬ pany's

system is almost as extensive, comprising 27 cables of 23,508 miles. It controls three transatlantic cables and the Gulf of Mexico system. The Commercial Cable Company's sys¬ tem from Ireland via Nova Scotia to New York employs 15 ocean cables with a mileage of 16,595. The Central & South African Telegraph Company has 25 cables of 11,896 miles. La Compagnie Frangaise des Cables Tele-graphiques has 24 cables of 11,657 miles, con¬ necting Brest, France, with Cape Cod, Mass., and also Saint Pierre and San Domingo. The Eastern & South African Telegraph Company has 17 cables of 10,490 miles. The Commercial Pacific Cable Company has 8 cables of 10,010 miles, connecting San Francisco with Guam, Manila and Shanghai. La Compagnie Allemande des Cables Transatlantiques has 5 cables of 9,556 miles, connecting Coney Island, N. Y., with Borkum Island, the Azores and Spain. La Grande Compagnie des Telegraphes du Nord has 29 cables of 9,331 miles, connecting northern Europe and Asiatic ports. Die Deutsch-Sudamerikanische T elegraphen-Gesell- schaft has 5 cables of 7,354 miles. The West Indian & Panama Telegraph Company has 22 lines of 4,355 miles. Die Deutsch-Nieder- landische Telegraphen-Gesellschaft has 3 cables of 3,415 miles. There are 17 other private companies operating 66 submarine cables of a total length of a little over 20,000 miles ; the total of privately-owned lines being 418, of 235,680 nautical miles.

The nations of the world own and operate over 2,000 short submarine cable lines, of a total nautical mileage of 55,207 miles. The longest of these is the line from British America through the Pacific to Australia. The greatest number is in Norway, 770, but they average less than two miles in length. The United States owns 15 to and about Alaska, and 26 in the Philippines. Japan has 181, of 5,000 miles; Spain has 25, of 3,158 miles; France 79, of 12,348 miles ; there are 224, of 2,909 miles, in the British Isles ; Germany controls 98, of 2,956 miles, and the Netherlands 27, of 5,130 miles. Many of the terminals in the countries engaged in the European War were cut and put out of service until peace was restored and they could be patched up.

Charles H. Cochrane, Author of (Modern Industrial Progress?

CABOOL. See Kabul.

CABOOSE, ca-boos', the cook-room or kitchen of a ship. In smaller vessels, the name is given not to a room but to an enclosed fire¬ place, hearth or stove, for cooking on the main deck. The cook-room is also known as the (<galley.® The name caboose is also given to a railroad car on freight or construction trains used for carrying brakemen or workmen, tools, *etc.*

CABOT, George, American statesman : b. Salem, Mass., 3 Dec. 1751 ; d. Boston, 18 April

1823. He was educated at Harvard College, spending two years there, and afterward going to sea. He reached the rank of captain while still under 21 years of age. In 1776 he was elected member of the provincial congress of Massachusetts and also of the State Constitu¬ tional Convention, and in 1791 he became United States senator for Massachusetts, and proved a steadfast friend of the Washington administra¬ tion. He yielded essential aid to Hamilton in perfecting his financial system. President Adams appointed him first Secretary of the Navy, after the creation of that office in 1798, but Cabot served only one month. In 1814 he was chosen a delegate to the memorable Hart¬ ford Convention, and was elected president of that assembly. In 1793 he introduced the Fugi¬ tive Slave Act in the Senate. Consult Lodge, H. C., (Life and Letters of George Cabot) (Boston 1877).

CABOT, James Elliott, American biog¬ rapher: b. Boston, Mass., 18 June 1821; d. 16 Jan. 1903. He was the friend and literary executor of Emerson and in 1887 published (A Memoir of Ralph Waldo Emerson, > a work undertaken at the request of the Emerson family.

CABOT, John, or GIOVANNI CABOTO

(in the Venetian dialect, Zuan Caboto), an Italian navigator in English employ; the dis¬ coverer of the continent of North America. On 5 March 1496 he was given by Henry VII of England . letters patent authorizing him to take possession of any countries he might dis¬ cover. Under this charter, in May 1497, he embarked in a single vessel, the Matthew of Bristol, accompanied by his son Sebastian, and sailed west, as he said, 700 leagues, when, on 24 June 1497, he came upon land which he reported to have been a part of a continent, and which he assumed to be in the dominions of the Grand Cham. A letter of that year represents him as having sailed along the coast for 300 leagues ; he landed, but saw no person, though he believed the country was not unin¬ habited. He planted on the soil the banners of England and of Venice. The exact spot of his landing is not known, but from the La Cosa map and the map of Sebastian Cabot it appears to have been a point on the coast of Cape Breton, more than a year after Columbus dis¬ covered the main land of the continent at Venezuela. On his return voyage he discerned two islands to the starboard, but for want of provisions did not stop to examine them. He reached Bristol in August. His discovery at¬ tracted the favor of the English

King, who on 3 Feb. 1498 granted him letters patent to im¬ press six English ships at no higher charges than were paid for ships taken for the King's service, to enlist companies of volunteers, «and theym convey and lede to the londe and iles of late founde by the seid John.® He sailed early in May with two ships, and after a stormy voy¬ age sighted early in June the east coast of Greenland, which he named "Labrador's Land.® He then turned south, skirting the coasts of Nova Scotia and New England, and is believed to have reached the parallel of 38° near Chesa¬ peake Bay, after which the return voyage was made. He then passes out of history. Neither the time nor the place of his death, nor his age, is known. Neither is it known what country

gave him birth. He was a Venetian only by denization. Consult Beazley, (John and Sebas¬ tian Cabot) (New York 1898) ; Biggar, H. P., (The Precursors of Jacques Cartier } (Ottawa 1911) ; Harrisse, H., (John Cabot, The Discov¬ erer of North America, and Sebastian, His Son : a Chapter of the Maritime History of England under the Tudors (1496—1557) } (Lon¬ don 1895).

CABOT, Sebastian, English navigator: b. ˆBristol, about 1474; other authorities say 1477 ; d. London 1S57. He was the son of John Cabot (q.v.). Sebastian was early instructed in the mathematical knowledge required by a seaman, and at the age of 17 had made several voyages. In 1496 John Cabot obtained from Henry VII letters patent empowering him and his three sons, Lewis, Sebastian and Sanctius, to discover unknown lands, and conquer and settle them. In consequence of this permission John and Sebastian sailed to the northwest on 2 May with the Matthew of Bristol, manned by a crew of 18 men. In June 1497 the coast 'of Cape Breton, or, as some think, of Labrador, was reached. The accounts of this voyage are attended with much obscurity ; but a second patent was granted to John Cabot in 1498, and it seems that in a subsequent voyage, the father and son sailed as far south as Chesapeake Bay and were actually the first who saw the main¬ land of America. Little, however, is known of the proceedings

of Sebastian Cabot for the ensuing 20 years ; but it seems that, in the reign of Henry VIII, by the patronage of Sir Thomas Peart, vice-admiral of England, he procured another ship to make discoveries, and attempted a southern passage .to the East Indies, in which he failed. This disappointment is supposed to have induced him to quit Eng¬ land in 1513 and visit Spain, on the invitation of Ferdinand. The death of the King lost him his patron, and in a few years he returned to England and was employed by Henry VIII to find out the northwest passage. After this expedition he again entered the Spanish service, and in 1526 began a voyage which resulted in his reaching the river La Plata, where he dis¬ covered San Salvador, and erected a fort there. He returned to England after the death of Henry VIII and settled in Bristol. He was introduced by the protector Somerset to Edward VI, who settled a pension on him. From this time he was consulted on all ques¬ tions relating to trade and navigation ; and in 1552, being governor of the company of mer¬ chant adventurers, he drew up instructions and procured a license for an expedition to discover a passage to the East Indies by the north. He was also governor of the Russian Company, and was very active in its affairs. He was the first who noticed the variations of the compass; and he published a large map of the world, as also a work under the title of (Navigazione nelle parti Septentrionali, per Sebastiano Ca-bota) (1583). See Nicholls, (Remarkable Life of Sebastian Cabot) (London 1869) ; Winship, (Caboc Bibliography } (1900), and Henry Harrisse's unflattering portrayal in (John Cabot and Elis Son Sebastian > (London 1895).

CABRA, ka'bra, Spain, town in the province and 29 miles south-southeast of Cor¬ dova, in a valley almost environed by moun¬ tains. It has wide streets; a large, irregular,

but imposing looking square ; two large and handsome parish churches; a richly endowed college, *etc.* Captured from the Moors by Ferdinand II in 1240, and recaptured in 1331, in the succeeding century it passed finally into the possession of Spain. It has manufactures of coarse cloth and bricks. Pop. 12,181.

CABRAL, or CABRERA, Pedro Alvarez,

pa'dro al'va-reth ka-bral', Portuguese nav¬ igator: b. about 1460; d. about 1526. In 1500 he received command of a fleet bound for the East Indies, and sailed from Lisbon, but having taken a course too far to the west he was carried by the South American current to the coast of Brazil, of which he took possession about 24 April 1500, in the

name of Portugal. Continuing his voyage he lost several ships and men in a storm, but with the remainder he visited Mozambique, and at last reached India, where he made important commercial treaties with native princes, founded a trading-post at Calicut and then returned to Europe. Despite his discoveries he was for some reason not retained in the service and sank into obscurity. Consult Fiske, (Discovery of America, } Vol. II (Boston 1892) ; Capistrano de Abreu, (Descobrimento do Brasil > (Rio de Janiero (1883) ; Varnhagen, (Historia general do BraziP (2d ed., 2 vols.).

CABRERA, Ramon, Carlist general: b. Tortosa, Catalonia, 31 Aug. 1806; d. Went¬ worth, England, 24 May 1877. He was brought up for the clerical profession, for which, how¬ ever, he was unfitted by his love of pleasure and dissipation. When civil war broke out be¬ tween the partisans of Don Carlos and those of the Queen Isabel II, the priests became the most zealous champions of Don Carlos, and their enthusiasm acted so powerfully upon the impetuous spirit of young Cabrera, that he joined in 1833 a small band of guerrillas. He fought with singular ferocity, which rose to fury, when, 16 Feb. 1836, upon the order of the Queen and of Mina, General Nogueras put to death Cabrera's aged mother and. his three help¬ less sisters. Cabrera took vengeance upon all the Christinists who fell into his hands. His enemies treated him like a wild animal, and hunted him, after he had laid waste Aragon, Valencia and Andalusia, from one place to another. * After a temporary defeat at Torre Blanca he eventually took Morelia. Hence in 1838 Don Carlos created him Count de Morelia, and at the same time lieutenant-general, and in this capacity Cabrera continued to fight for the cause of the Pretender, and for what he con¬ sidered the cause of the priesthood and the Church, until 1840, when he was compelled to flee to Paris. By order of Louis Philippe he was arrested and consigned to the fortress of Ham, but wras soon set free. In 1848 the French revolution filled Cabrera with the most sanguine expectations ; which, however, were doomed to disappointment, as on his arrival in Catalonia he was but indifferently received, and on 27 Jan. 1849, he was severely wounded at Pasteral, although he succeeded in making good his escape to France. In August of the same year he took up his abode in London, where he married a rich English woman. When Alphonso XII was proclaimed King of Spam in 1875 Cabrera advised the Carlists to submit to him. Consult Valras, 'Don Carlos VII et

Ramon Cabrera,* translated from the Spanish (Paris 1875) ; Dias and Cardenas, (Galena de Espanoles celebres contemporaneos,* Vol. I (Madrid 1841); Valle Inclan, (La guerra car-lista> (Madrid 1908).

CABRERA, a small Spanish island, one of the Balearic Isles, about 10 miles from Majorca. It is about three miles in length and breadth and the coast is irregular. The chief industry of the island is fishing and the permanent popu¬ lation is very small. During the war in the Peninsula Spain used it as a place for receiving convicts.

CABRERA BOBADILLA CERDA Y MENDOZA, ka-bra'ra bo-ba-del'ya thar'da e men-do'tha, Luis Geronymo Fernandez de,

Spanish colonial governor : b. Madrid, about 1590; d. near there 1647. He was viceroy of Peru 1629-39, during which period the useful properties of cinchona bark were discovered and the third ascent of the Amazon made. The cruelty of the Spaniards caused a revolt among the Urn Indians near Lake Titicaca, which Cabrera had great difficulty in suppressing.

CABRILLA, or HIND, one of the sea-basses (Epinephelns maculosus) found in the Atlantic from Charleston to Brazil. It attains a length of 18 inches and is highly esteemed as food. Another sea-bass (Paralabrax macu-latofasciatus) living along the coast of lower California and highly regarded as a food-fish ; is called the spotted cabrilla. See Sea-bass.

CABRILLO NATIONAL MOVE¬ MENT, created 14 Oct. 1913, at Point Loma, Cal., of a small tract of land containing 21,910 square feet which lies within the military reser¬ vation at Fort Rosecrans. It is of historic interest because of the discovery of the ter¬ ritory now partly embraced in the State of California, by Juan Rodriguez Cabrillo, who at this point first sighted land on 28 Sept. 1542.

CABUL, CABOOL or KABUL. See

Kabul.

CACAHUATE, CACAHUETE, ka-kawa'ta (nahuatl, <(CacahuaV)), the indigenous peanut of Mexico and Central America. It is practically the

same as the mani (q.v.) of Cuba and parts of South America, and it is very much like the same member of the family grown in the United States. The cacahuate has been a common food of the indigenous races of the torrid zone of America since pre¬ historic days. At the time of the conquest of Mexico (1521) the Spaniards found it among the many kinds of fruit and vegetables dis¬ played on the great market of Tenochtitlan (Mexico City). The cacahuate was one of the offerings made to the goddess of growth, fer¬ tility and birth, and on certain festive occasions it was the only offering made. A distant echo of this very ancient religious custom is still heard in Mexico during the novenas or nine days of semi-religious celebration which pre¬ cede Christmas day, when it is used to stuff earthen jars which are placed on the inside of cardboard, paper or tissue-paper figures or decorations. These latter are suspended from the ceiling of the house or in a yard to be knocked down by blind-folded children or young people in a game very mu.ch like blind-man's buff. For hundreds of years the Mexi¬ cans have extracted from the cacahuate a light

oil which, when burnt, gives a beautiful, strong, white light. Cacahuate nuts are sold every¬ where in Mexico and Central America, in little stores, on the markets and on the street corners of the towns and villages, and every one buys them as candies are bought in other countries.

CACAO. See Cocoa.

CACCIANIGA, kat-cha-ne'ga, Antonio, Italian writer: b. Treviso 1823; d. 1903. He founded a satirical magazine called Lo Spirito Folletto at Milan in 1848; being exiled after the revolution of 1848 was for six years a journal¬ ist in Paris. He was subsequently mayor of his native town and a parliamentary deputy. He is the author of some notable works of fic¬ tion, including (I1 proscritta) (1853) ; (Boz-zetti morali ed economicˆ (1869) ; (La Vita Campestre> ; (Villa Ortensia) (1876).

CACCINI, ka-che'ne, Giulio, Italian com¬ poser: b. Rome about 1546; d. Florence 1618. He was styled the father of a new music, hav¬ ing been the first to write an opera for per¬ formance in a public theatre. His works in¬ clude (Daphneˆ and (Apollo's Battle with the Serpent. *

cAceres, ka-tha'ras, Andres Avelino,

Peruvian military officer and statesman : b. Ayacucho, in southern

Peru, 10 Nov. 1836; d. 20 Nov. 1911. While still young he was actively engaged in political strife, serving as an officer under Castilla and Prado, and when the latter was overthrown was imprisoned for a year. He distinguished himself at the taking of Arequipa. In 1857 he became military attache to the legation of the Peruvian government at Paris, and was stationed at that post until 1860. In the Chilean War (1879-83) he served in nearly all of the battles, being rapidly promoted from colonel to the rank of general, and, after the taking of Lima, was made 2d Vice-President in the provisional government of Calderon (June 1883). The imprisonment of Calderon the President, and the absence of the 1st Vice-President made him acting President of Peru. In his refusal to acknowledge Iglesias, whom the Chileans had placed at the head of the gov¬ ernment at Lima, as President, Caceres was supported by the interior provinces, and he at once planned to depose him. In his first at¬ tempt to take Lima, in August 1884, he was re¬ pulsed in a bloody street fight, but after raising a larger force he appeared before the city, 1 Dec. 1885, and peaceably persuaded Iglesias to submit the office of President to a general election. This resulted in the election of Ca¬ ceres, and on 3 June 1886 he was inaugurated President of Peru. The country prospered greatly under his administration, gradually re¬ covering from the ill effects of the war; a pri¬ vate company absorbed the state railroads and guano beds and took over a portion of the na¬ tional debt. In 1890 he was defeated for the Presidency by Bermudez, but was soon after¬ ward, in 1891, appointed by him Peruvian Min¬ ister to France and Spain. In 1894, upon the death of President Bermudez, the party of Ca¬ ceres seized the reins of government, Caceres was proclaimed dictator and the Congress forced to elect him President. The ex-dictator, Pierola, however, disputed his right to the office and besieged the city, on 18 March 1895, after a bloody conflict, taking it. A treaty of peace was signed between the two parties, in which

Caceres was obliged to resign the Presidency. He soon afterward fled and Pierola was elected President 10 July 1895. Upon the retirement of Romana from the Presidency, Caceres re¬ turned to his native land and again entered the political areua. He was sent as Envoy Ex¬ traordinary to Italy in 1905, and was assassi¬ nated 20 Nov. 1911.

CACERES, Spain, a town in Estremadura, capital of the province of the same name, 24 miles west by north of Truxillo. It consists of an old and a new town, the former crowning the top of a hill, and surrounded by a strong wall flanked with towers, and the latter built round it on the lower slopes. The houses are tolerably well built, but the streets are mostly narrow and steep. Among the objects worthy of notice are four churches, several old feudal mansions and the bull-ring. It is famous for its bacon, has manufactures of linen, woolens, hats, leather, soap, etc., and controls a large trade in the produce of the district. Pop. about 16,000. The province of Caceres is the second largest of Spain, in the north of Estremadura, owned chiefly by large proprietors, and mostly devoted to cattle-raising; the north half is a good wine country. The area is over 8,000 square miles, and the population about 415,000.

CACERES NUEVA. See Nueva Caceres.

CACHAR, ka-‘char’, a district of Assam, India, bounded east by Manipur and the Naga Hills, south by the Lushai Hills, west by Sylhet and the Jaintia Hills, and north by Nowgong district. It comprises a series of fertile valleys diversified by low hills and almost surrounded by mountain ranges. The Barak River flows through the district, its course here being about 130 miles. Lignite and petroleum have been found. Salt is manufactured in small quantities. The forests are of great extent, and constitute the chief natural wealth of the district. Rice and tea are extensively cultivated. Area, 2,472 square miles; pop. 467,300. The chief town is Silchar.

CACHE, kash, the name of (1) a river in Arkansas, flowing northwest about 150 miles into the White River, near Clarendon, Monroe County; (2) a peak of the Rocky Mountains in Idaho, height 10,451 feet; (3) a fertile valley in the Wasatch Mountains in Utah and Idaho. It is 60 miles long and from 10 to 20 miles wide, and has an altitude of 5,000 feet. It is watered by the Bear River, and has several vil¬ lages, of which Logan is the largest.

CACHE, a hole in the ground for hiding and preserving provisions which it is incon¬ venient to carry; used by settlers or travelers in unsettled parts of North America and by Arctic explorers. In the case

of the latter the caches are well marked so that they may be dis¬ cerned from a distance. In pioneer days in the West the traders or explorers dug holes to a depth of several feet and in these placed the articles which they intended for their use on the return journey. The hole was next covered in and the surface replaced so as to leave no trace of any excavation. It was later found by means of some landmark, as a jutting rock, tree, bend in the stream, *etc.*

CACHEO, ka-sha'oo, or CACHEU, Por¬ tuguese Guinea, .West Africa, a fortified town founded in 1588, and situated 10 miles inland on VOL. 5 — 9

the Cacheu River. Ivory and gold dust are the principal articles of commerce. Pop. 15,000.

CACHET, Lettres de, letr de ka-sha', a term formerly applied especially to letters pro¬ ceeding from and signed by the kings of France, and countersigned by a Secretary of State. They were at first made use of occasionally as a means of delaying the course of justice, and appear to have been rarely employed before the 17th century as arbitrary warrant for the deten¬ tion of private citizens, and for depriving them of their personal liberty. During the reign of Louis XIV their use became frightfully com¬ mon, and by means of them persons were im¬ prisoned for long periods, or for life, on the most frivolous pretexts. Sometimes, however, such arrests were favors on the part of the King, as they withdrew the accused from the severer punishment to which they would have been liable upon trial before the courts. Lettres de cachet were abolished at the Revolution.

CACHEXY, ka-kek'si, or CACHEXIA,

ka-kek-si-a (Gr., ((evil habit of body^), a mor¬ bid state of the bodily system, in which there is great weakness, with or without the local mani¬ festation of some constitutional disease. It is not a disease of itself, but the result of diseases such as gout, cancer, lead-poisoning, tuber¬ culosis, syphilis, intermittent fever, excessive use of alcohol, etc., each disease producing its particular modification of cachexia. Thus scrofulous cachexia means the condition of body due to scrofula, shown by slender form, narrow or deformed chest, pallor, diseased glands, large prominent joints, *etc.*

CACHOEIRA, ka-shwa'e-ra, Brazil, town in the state and 62 miles northwest of Bahia. It stands on the Paraguassu, which divides it into

two unequal parts and has often injured it by inundations, and is the entrepot for the traffic of a large extent of surrounding country. Tobacco and cigars are manufactured, the best brand in Brazil being named from the suburb of Saint Felix. The chief exports are coffee, sugar, fruit, cotton and tobacco. Pop. 15,000.

CACHOLONG, kash'o-long, a mineral of the opal division of the quartz family. It is often called pearl-opal. It is usually milk-white, sometimes bluish or yellowish white, or red¬ dish, opaque or slightly translucent at the edges. Its composition is of silica, like quartz, and its symbol is SiCfi. Some authorities add to the symbol n H;0, to express a varying amount of water usually found in its composi¬ tion. Other authorities regard the water con¬ tent as not characteristic. It often envelops common chalcedony, the two minerals being united by insensible shades. It also associates with flint and semi-opal.

CACHOU, ka-shoo', an aromatic sweet¬ meat in the form of a silvered pill, used for giving an agreeable odor to the breath.

CACHUCHA, ka-choo'cha, an Andalusian dance, resembling the bolero, performed to a graceful air in 3-4 time and with a strongly marked accent. It is usually danced with castanets, and was introduced on the stage by Fanny Elssler in the ballet of (Le diable boiteuxP

CACIQUE, ka-sek', or CAZIQUE, a title borne by, or a designation given to, the chiefs

of Indian tribes in Central and South America, Cuba, Haiti, *etc.* The term was formed by the Spaniards from a native Haitian word. Among the Pueblo Indians of New Mexico, there are two tribal divisions — summer and winter. Dif¬ ferent caciques preside over each. Their office has religious powers, chiefly ; on them also de¬ volves the appointment of the annual govern¬ ment officials. The caciques are appointed for life.

CAQIQUE, one of several South Ameri¬ can icterine birds, forming the genus Cassicus, and closely related to the Baltimore oriole. They are sometimes uniform black, some¬ times black relieved by chestnut, yellow, green or scarlet; the bill is frequently white in¬ stead of the usual black or brown. The cagi-ques are noted for their intricately woven, pouch-like nests, composed of thin bark and grasses, several of which, sometimes a yard in length, hang from the outer twigs of a single branch of some large tree, usually overhanging the water, as an extra precaution of safety against monkeys and snakes.

CACODYLE, or CACODYL, kak'o-dil, -dil (Gr., <(having a bad smell®), in chemistry, a monad radical having the formula As(CHs)2, and known as dimethyl arsine oxide. It is of special interest to the chemist because it was the first radical known in which a metal or a metalloid (in this case, arsenic) is combined with an organic base. The compound As2(CH3)4, which was discovered by Bunsen in 1837, and which can exist in the free state, is often called cacodyle, but it is more correctly known as dicacodyle since its molecule consists of two cacodyle radicals. Dicacodyle is obtained in the pure state by heating cacodyle chloride with zinc in an atmosphere of carbon dioxide, but a mixture of cacodyle oxide and dicacodyle (known formerly as Cadet's fuming liquid) may be obtained by distilling potassium acetate with an equal weight of arsenic trioxide. As thus prepared it is liable to spontaneous com¬ bustion. Mercuric oxide (HgO) converts both of the constituents of Cadet's liquid into cacodylic acid, (CHaCAsO (OH) ; and this, in turn, is converted into cacodyle chloride, As- (CHsGCl, by the action of corrosive sublimate and fuming hydrochloric acid. Cacodyle oxide (known also as alkarsin) may be obtained in the pure state by distilling the chloride with an aqueous solution of caustic potash in an atmos¬ phere of carbon dioxide. Dicacodyle is a color¬ less oily liquid, heavier than water, boiling at 338° F., very poisonous, and characterized by an intensely disagreeable smell suggestive of garlic. Dicacodyle is known to the chemist as tetra-methyl di-arsenid.

CACOMISTLE, kak'6-mis-el, a small

Mexican animal (Bassariscus astutus) , closely related to the raccoon found in Mexico and neighboring parts of the United States. It is slender, about 16 inches long, with a sharp, fox-like face, large bright eyes surrounded with light patches, and erect ears. The long, soft fur is light brown above, darker along the back; the under parts are white, and the bushy tail has six broad white rings running around it. In habits it resembles the raccoon. It feeds on smaller mammals, birds and insects. It is frequently tamed by miners and is known to them as the American civet cat.

CACOMITE, ka-kc>-me'-ta, a plant in Mexico and Central America from which an edible flour is made. It is called in the Nahua tongue oceloxochitl (tiger flower) on account of the appearance of its very handsome and showy blossoms.

CACONGO, ka-kong'go1, or KAKONGO,

a former district of Guinea, Africa, extending along the south Atlantic Ocean, in lat. 5° S., just north of the mouth of the Kongo. The Cacongo River enters the sea in lat. 5° 12' S. This territory was claimed by the Portuguese, and Cabinda, the northern part of it, they still retain ; the south and east of the Kongo have been absorbed in the Kongo Free State.

CACTACEiE. See Cactus.

CACTUS, the common name for all mem¬ bers of the family Cactacece, ˆ group of dicoty¬ ledons, found in luxuriance in the arid sections of North and South America. Like the water¬ melon, they have the faculty of absorbing a vast bulk of water, making the stems most suc¬ culent.

Giant Cactus or Shuaro Cactus near Phoenix, Arizona.

The economic uses of the cacti are many, especially among primitive peoples. One or two species of the genus Anhalonium yield alkaloids which are used in medicine and which were known and used to produce intoxication by the Indians before the advent of the whites, and are still so used to a limited extent. The peculiar reticulations of the vascular or wood systems of many species render them very use¬ ful in the manufacture of art goods, otherwise known as curios in many sections. The vari¬ ous species are of most importance as articles of food for man and beast. In the semi-tropi¬ cal and tropical regions of America a large group of the plants belonging to the genus Cerens and its allies furnish edjble fruits known to the Spanish-American as pitahayas. These

— — /T - r-

CACTUSES

1. Leaf-cactus (Phyllocactus anguliger). 2. Stapelia (simulating a cactus). 3. A Cereus (Cereus dasycanthus). 4. Globe-cactus (Echinocactus horizonthalonius). 5. Wart-cactus (Mammilaria pectinata). 6. Hairy Opuntia (Opuntia filipendula) a, the blossom, enlarged. 7. Melon-cactus (Melocactus communis). 8. Giant Cactus (Cereus giganteus) a, blossom, enlarged, b fruit, enlarged. 9. Mexican Opuntia (Opuntia coccinellifera) — a, the fruit (prickly pear), enlarged.

CACTUS

Flower of the Hedgehog Cactus

grow for the most part on tall, branching and columnar plants, similar to the familiar giant cactus (Cerens giganteus) of the Arizona desert. These fruits vary in size from three-fourths of an inch to two inches in diameter, depending upon the species. Along the Texas frontier forms grow which are known as Mexi¬ can strawberries to the English-speaking peo¬ ples.

By far the greater part of the fruit produced by this family of plants comes from the flat-jointed prickly pears belonging to the genus Opuntia, the fruits of which are known in Spanish America as tunas. Some of these are extensively cultivated throughout the highland region of Mexico as well as in the Mediter¬ ranean region of Europe, Asia and Africa. Prickly pears, although natives of the American continent and its continental islands, are now cultivated or have become naturalized through¬ out the tropical and subtropical regions

of the world. The fruits are eaten raw, dried, and in the form of preserves. Their juices are also expressed and fermented into a drink called colonche. It is less common now than formerly to find a distilled drink made from the tuna because of the deleterious effects of tuna alcohol.

On account of their ability to absorb and re¬ tain large quantities of water, the cacti, espe¬ cially the prickly pears, often become important to the stockmen in portions of our southwestern States. They remain green and succulent after other forage has dried up or become exhausted. The rancher then resorts to this rough feed to save his stock. He may singe the thorns off with a brush or, if his herds are large, he may singe them with a modified plumber's torch, or he may even chop the plants into small pieces and feed them in this way.

It is a common practice in southwestern Texas to feed prickly pear and cottonseed meal to stock during the winter. In the vicinity of San Antonio dairymen for a number of years have fed prickly pear to their dairy cows along with a liberal supply of grain and hay. Prickly pears furnish the succulence so essential in milk production and so difficult to obtain in a semi-arid region.

When driven to extremity travelers in the desert have been known to resort to these plants for water supply. The pulpy tissues, prefer¬ ably of such forms as the barrel cactus (Echinocatus) , are macerated to set the juices free. A rather unpalatable and somewhat pur¬ gative drink is thus obtained which relieves thirst in a measure. The candied flesh of the barrel cactus forms a palatable sweetmeat.

The flowers and stems of the night-blooming cereus (Cereus grandiflorus) have been used in medicine, in the form of a fluid extract, as a cardiac stimulant. Its action resembles that of digitalis, but is less uniform.

CACTUS WREN, a small wren (Campy - lorhynchus brunneicapillus) inhabiting the arid and desolate regions of the Mexican border. It is grayish brown above, darker on the head, nearly pure white beneath, with a spotted breast, and a white line over the eye. It makes a large flask-shaped nest of grasses and twigs, lined with feathers, and laid in the crotch of a cactus. This nest is entered by a covered way or neck several inches in length. It is a very sprightly bird with a clear, ringing song.

CACUS, in Roman legend, a huge giant, in some accounts a son of Vulcan, who lived in a cave on Mount Aventine. Having stolen and dragged into his cave some of the cattle which Hercules had carried away from Geryon in Spain, he was killed by that hero, who dis¬ covered his place of hiding by the lowing of the oxen within, in response to the lowing of the remainder of the flock as they v/ere passing the entrance of the cave. The Ara Maxima was built by Evander to commemorate this vic¬ tory. Consult Livy (Bk. I, 7) and Virgil, <yEneid> (VIII, 184-279.).

CADA MOSTO, ka'da mosto, or CA DA MOSTO, Luigi da, Italian navigator : b. Venice, about 1432; d. about 1480. In 1455 he departed from Lagos, sailed into the river Sene¬ gal, which had been discovered five years be¬ fore, and after trading in slaves and gold he steered for Cape Verde, where he joined two other discovery ships, and visited, in company with them, the mouths of the Gambia, the riches of which had been greatly extolled. In 1456 Cada Mosto, in company with two other ships, made a second voyage to the Gambia. On the way thither they discovered the Cape Verde Islands. The description of his first voyage, (I1 Libro de la prima navigazione per l'oceano alle terre de' Negri della Bassa Etiopia, di Luigi Cada Mosto) (Vicenza 1507, and Milan 1519), the oldest of the voyages of the moderns, is a masterpiece. The arrangement is admir¬ able, the narrative interesting, the descriptions clear and accurate.

CADAMBA, ka-dam'ba, or KUDUMBA,

the wood of several species of Nauclea, an Indian genus of Cinchonacece. It is a wood of deep yellow hue, used locally in the manufacture of furniture. N. (Uncaria) gambir is the source of the dyestuff known commercially as gambir or gambier.

CADASTRAL SURVEY (F. cadastre, from It. catastro, from low Lat. capitastrum, <(a register for a poll-tax® ; Lat. caput, (<the head®), a territorial survey in which objects are represented in their true relative positions and magnitudes. A cadastral survey differs from a topographical one, in not magnifying the principal objects. It requires consequently to be made on a larger scale than the topo¬ graphical survey, so as to admit of a proportion¬ ally accurate representation of towns, houses, roads, rivers, *etc.* The scale on which the cadas¬ tral map of the United Kingdom is prepared, Wfro of the linear measure of the surface sur¬ veyed, is an example of the scale of a cadastral survey. This scale corresponds with 25.34 inches to the mile. See Surveying.

CADDIS-FLY, the common name of any of the order Trichoptera, a group of aquatic insects, related to and by many supposed to be the ancestors of the moths and butterflies (Lepidoptera) . They resemble the lower moths, but the wings are not scaled, except in a very rudimentary way. They differ from moths in having no true (<tongue® or well-developed maxilla adapted for sucking the nectar of flow¬ ers, but as in moths the mandibles are either absent or obsolete. About 150 species are thus far known to live in North America. The larvae are called <(caddis-worms,® “case-worms,® or (<cad-bait.® They are more or less cylindrical, with well-developed thoracic feet, and a pair of

feet on the end of the abdomen, varying in length. The head is small, and like that of a tortricid larva, which the caddis-worm greatly resembles, not only in form, but in its habit of rolling up submerged leaves. They also con¬ struct cases of bits of sticks, sawdust or grains of sand, which they drag over the bottom of quiet pools, retreating within when disturbed. They live On vegetable matter and on water-fleas (Entomostraca) and small aquatic larvae. When about to pupate they close up the mouth of the case with a grating, or, as in the case of Helicopsyclie,, which is coiled like a snail-shell, by a dense silken lid with a single slit, and in some instances spin a slight, thin, silken cocoon, within which the pupa state is passed. The pupa is much like that of the smaller moths, except that the mandibles are present, and wings and limbs are free from the body. After leaving its case it makes its way over the surface of the water to the shore, some¬ times going a long distance. The female de¬ posits her eggs in a double gelatinous, greenish moss, which is attached to the surface of some aquatic plant. Consult McLachlan, Mono¬ graph of the Trichoptera of the European Fauna* ; Banks, (A List, Synopsis, Catalogue, and Bibliography of the Neuropteroid Insects of Temperate North America* ; transactions of the American Entomological Society,* Vol. XIX; also a paper by Newham and Betten in bulletin of the New York State Museum,* 47.

CADDOAN (ka’do-an) INDIANS, a

family of North American Indians, comprising the Arikari tribe in North Dakota; the four Pawnee villages, Grand, Tapage, Republican and Skidi, in the Indian Territory; and the Caddo, Kichai, Wichita and other tribes, formerly in Louisiana, Texas and Arkansas. The present number of these Indians is about 2,130, of which 416 are in North Dakota, the rest in the Indian Territory.

CADE, John (the Jack Cade of Shakes¬ peare), Irish rebel: d. 11 July 1450. Early obliged to flee from Ireland, he took refuge in France. In 1450 he passed over to England at the moment of great popular dissatisfaction with the ministers of Henry VI. He at once pre¬ tended to be a relative of the Duke of York, assumed the name of Mortimer, raised the standard of rebellion in Kent, 8 May, and very soon found himself at the head of 20,000 men. He advanced to Blackheath, and interchanged notes with King Henry, to whom he made known the griefs of his companions. He de¬ feated the royal troops which were sent against him, and entering London, 1 July, immediately caused the execution of two of the offensive ministers. At first he kept his army under rigorous discipline, but after a few days' resi¬ dence in the capital their propensity to plunder could no longer he restrained, and they pillaged some of the finest houses. This aroused the citizens against them, and on the night of 5 July Cade met with his first defeat. A promise of pardon now dispersed most of his followers, and finding his force no longer sufficient for re¬ sistance he took to flight, was overtaken, offered resistance and, mortally wounded, was taken prisoner and died on his way to London. Con¬ sult Kreihn, (The English Rising of 1450> (Strassburg 1892) ; Clayton, (The True Story of Tack Cade> (London 1909).

CADELL, Francis, Scottish explorer in Australia : b. Cockenzie, Scotland, 1822 ; d. 1879. At the age of 14 he entered the service of the East India Company as midshipman and in 1844 was appointed commander. Becoming as¬ sured of the navigability of the Murray River in Australia he made an extended exploration of that stream in 1850. Subsequently forming a navigation company he reached by steamboat a point 300 miles from the river's mouth, and in 1858 explored the Murrumbridgee River, and in 1858. the Darling River as far as Mount Mur¬ chison. While in command of a vessel sailing from Amboyna he was murdered by his crew.

CADENCE, the concluding notes of a musical composition or of any well-defined sec¬ tion of it. See Harmony.

CADENCY, in heraldry, a system of marks intended to show the descent of a younger branch of a family from the main stock. Mod¬ ern heraldry recognizes nine marks of cadency; the first son bears the label ; the second, the crescent; next in order come the mullet, the martlet, the annulet, the fleur-de-lys, the rose, the cross-moline and the octofoil.

CADENZA, in music, a flourish of in¬ definite form introduced on a bass note immedi¬ ately preceding a close. Formerly the per¬ former improvised his own cadenzas but after Schumann's tune all composers write out the cadenzas and do not trust to the improvisa¬ tions of every performer.

CADER IDRIS, a mountain in Merioneth¬ shire, Wales, the beginning of a chain running northeasterly. The ridge is nearly 10 miles long, and with its breadth of from one to three miles makes an elevation of great massiveness. Its greatest height is 2,925 feet. It is about five miles southwest of Dolgelly, and there is a fine view of the Irish Sea from the summit.

CADET, ka-det', a word having several significations. It is of French origin, and was written capdet in the 1 5th century, from capi-tetto, little chief, inferior head of a family. Fr. pron. ka-da'.

1. A younger son of a family; that is, one junior to the eldest or heir by primogeniture; the youngest son ; a younger branch — or mem¬ ber of a younger branch — of a family. Thus the brothers Coquelin, the famous French actors, were described as Coquelin aine and Coquelin cadet. The feminine forms are ainee and cadette.

2. In the former French military service — before the Revolution — a gentleman who en¬ tered the army without a commission and with¬ out pay to learn the military profession, as was regularly done by the younger sons of the nobility to find a career for themselves. This last was all the more necessary as the droit d'ainesse, which had prevailed in France since the 12th century, gave the whole inheritable estate to the eldest son, to the detriment of the younger ones. Since the decree of 15 March 1790, hereditary possessions are equally divided among all the children or their descendants, irrespective of sex and primogeniture.

3. A junior clerk in the old East India Company's service.

4. A student in a military or naval college or on a_ training ship. The body of students in the United States Military Academy at West

Point, N. Y., is known as the United States Corps of Cadets. They constitute part of the army, but are not officers. Graduates are com¬ missioned as 2d lieutenants. The students in the United States Naval Academy at Annapolis; those of the Royal Military Academy at Wool¬ wich, or the Royal Military College at Sand¬ hurst, are termed cadets, or, in the French mili¬ tary sense, a young man designed to become an officer not by rising from the ranks, but by a course of special instruction to qualify him for the position. A midshipman is a naval cadet afloat. In Germany the cadet system is highly developed. The training ships are called Ka-dettenschiffe. Cadet schools and corps exist in all the other European armies and navies. The Japanese Cadet School in Tokio has a teaching staff of 239 and over 1,500 students. In China each provincial capital contains a primary military school, where pupils from 15 to 18 years of age undergo a three years' course, proceed to one of the Four Middle Schools for two years, followed by six months' practical training in the army and finish up with two years in the Military High School at Paotingfu.

CADETS DE LA CROIX, crwa, the early name by which the Camisards (q.v.) styled themselves, from a white cross they wore under their hats.

CADET'S FUMING LIQUID. See

Cacodyle.

CADILLAC, ka-de-yak, Antoine de la Mothe, French military commander: b. Gas¬ cony, France, about 1660; d. France 1720. He came of good family, and having entered the army was for some time captain in Acadia. In 1694 Frontenac placed him in command of Michilimackinac, where he remained until 1697. Cadillac then brought to the attention of Louis XIV a well-considered scheme for a permanent settlement and trading post in the Northwest. On receiving the monarch's approval he founded Detroit in 1701, establishing 50 soldiers and 50 settlers at that point. From 1712 to 1717 he was governor of Louisiana, returning to France in the year last named. The

town of Cadillac, Mich., was named in his honor. Consult Burton, (Cadillac's Village, a History of the Settlement, 1701— 10> (1896); Parkman, (A Half Century of ConflicD (Boston 1892).

CADILLAC, Mich., city and county-seat of Wexford County, on Little Clam Lake, and on the Grand Rapids and Indiana and the Ann Arbor railroads, 98 miles north of Grand Rapids. It was founded in 1871, incorporated in 1874, and since 1914 has been under the com¬ mission manager plan of government. The principal buildings comprise city hall, county courthouse, public library and hospital. Be¬ sides the lumber interests of a valuable hard¬ wood timber region, it has veneer, table, chair and shoe last factories, chemical works and machine shops. Pop. (1920) 9,750.

CADIZ, Ohio, village and county-seat of Harrison County, about 25 miles northwest of Wheeling, W. Va., and 120 miles east-northeast of Columbus, on the Pittsburgh, Cincinnati and Saint Louis Railroad. Cadiz is important as a banking centre and has a large trade in coal, gas, poultry, oil and wool. It was the home of Edwin M. Stanton (q.v.) Pop. (1920) 2,084.

CADIZ, ka'deth or ka-diz (anciently Gades), a seaport and one of the handsomest cities in Spain, 95 miles south-southwest of Seville by rail, is situated at the extremity of a long tongue of land projecting from the Isla de Leon, off the southwestern coast of Andalusia. The narrowness of the land communication prevents its capture by a military force while the garrison is master of the sea. It is walled, with trenches and bastions on the land side ; the houses are high, and the streets narrow. The chief buildings are the great hospital, the custom-house, the old and new cathedrals (with pictures by Murillo), two theatres, the bull-ring, capable of accommodating 12,000 specta¬ tors, and the lighthouse of Saint Sebastian. From the harbor the town presents a magnifi¬ cent appearance. The Bay of Cadiz is a very fine one. It is a large basin enclosed by the mainland on one side, and the projecting tongue of land on the other. It is from 10 to 12 leagues in circumference, with good anchorage and protected by the neighboring hills. It has four forts, two of which form the defense of the grand arsenal, La Caracca, in which are 3 basins and 12 docks. The city touched its greatest prosperity after the discovery of America, when it became the European em¬ porium for the New World. The loss of the Spanish colonies in America dealt it a heavy blow ; but within recent years it has made rapid strides despite the imperfect drainage and a bad water supply which are responsible for the high death rate of 44

per 1,000. Cadiz has long been the principal Spanish naval station. It was the centre of the Spanish-American trade, and the commerce of the port was very extensive before the separation of the colonies. The preparation of salt from pits belonging to the government was formerly an important branch of industry, but is now of comparatively little consequence. The manufactures of Cadiz are of comparatively little importance, but in regard to the extent and value of its commerce it ranks as one of the first ports in Spain. Its imports consist of all kinds of foreign and colonial produce, coal, cotton and woolen man¬ ufactures *etc.* ; its exports of wines, fruits, oils and other products of Spain. The town of Santa Maria, opposite Cadiz, is the principal depot of the wines of Xeres. Cadiz was founded by the Phoenicians about 1100 b.c., and subsequently belonged in succession to the Car¬ thaginians and the Romans. Long in possession of the Moors, it was captured from them in 1202 by Alfonso X of Castile. In 1587 Sir Francis Drake destroyed the Spanish fleet in the bay; and it was taken bv the Earl of Essex in 1596 and from its bay Villeneuve sailed pre¬ vious to the battle of Trafalgar in 1805. In 1809 it became the seat of the central junta, and afterward of the Cortes. It sustained a long blockade from the French (1810-12), which was not raised till after the battle of Salamanca. In 1823 the French entered it after a short siege. The Spanish revolution of 1868 orig¬ inated in Cadiz. Pop. 67,174.

CADMAN, Samuel Parks, American Con¬ gregational clergyman and author: b. Welling¬ ton, Shropshire, England, 18 Dec. 1864. A graduate of London University (Richmond College), after he came to the United States, he received the degree of D.D. from Wesleyan

and Syracuse universities, 1898; S.T.D., Colum¬ bia University, 1913; D.H.L., University of Vermont, 1913. He was pastor of the Metro¬ politan Temple, New York, from 1895 to 1900, when he accepted a call to the Central Congre¬ gational Church, Brooklyn. Previously a trustee, he became acting president of Adelphi College in 1913-14. Well known as a public speaker and lecturer, he is author of (Charles

Darwin and Other English Thinkers } (1911) and (Three Great Oxford Movements) (1915).

CADMEA, the name given to the acropolis of Thebes, Boeotia, because it was said to have been founded by Cadmus. Only fragments of its walls remain.

CADMIA, a name used by early writers (1) for the mineral calamine (q.v.) ; and (2) for the sublimate of zinc oxide that often col¬ lects on the walls of furnaces used in the re¬ duction of metallic ores, when those ores hap¬ pen to contain zinc.

CADMIUM, a metallic element resembling zinc in its chemical properties, and discovered by Stromeyer in 1817, in a specimen of zinc carbonate. Cadmium often occurs in ores of zinc to a small extent, blende sometimes con¬ taining as much as 3 per cent of cadmium sul¬ phide. The commercial supply of the element is obtained as a by-product in the smelting of zinc, chiefly in Belgium and Silesia. Cadmium sulphide also occurs native as the mineral greenockite (q.v.), otherwise known as (<cadmium blende.® In the distillation of zinc ores the cadmium, being more volatile, passes over first; and advantage is taken of this fact for the isolation of the metal in the arts. In Silesia, where the zinc ores often contain considerable quantities of cadmium, the first portion of the distillate is likely to contain as much as from 3 to 10 per cent of cadmium. This is mixed with coal or charcoal and redistilled at a low, red heat. Cadmium, mixed with a little zinc, passes over; and by one more distillation the metal is obtained in a fairly pure form. To eliminate the last traces of zinc, the crude metal is dissolved in hydrochloric acid, then diluted and precipitated as a sulphide by a current of sulphuretted hydrogen. The sulphide is then dissolved in concentrated hydrochloric acid, and the subsequent addition of carbonate of soda precipitates the carbonate of cadmium, which is reduced to the oxide upon ignition. The pure oxide thus obtained may then be reduced to the metallic form by distillation with charcoal.

Metallic cadmium is lustrous and resembles tin in appearance, though it has a bluish tinge. It is stronger than tin, but, like that metal, it emits a peculiar crackling sound, or ((cry,® when bent. At ordinary temperatures it is quite ductile and malleable, and may be drawn into thin wire, rolled into thin sheets, or hammered into foil. At about 175° F. it becomes brittle, however, so that it can be pulverized in a mortar. Cadmium has the chemical symbol Cd. Its specific gravity is about 8.65. It melts at 600° F., and boils at about 1,500° F., yielding a yellow vapor. Its atomic weight is 112.4 if 0 = 16, or 111.6 if H = l. Its

specific heat is about 0.055, and its linear coefficient of ex¬ pansion is about 0.0000185 per Fahrenheit de¬ gree. Metallic cadmium is used to a limited

extent in the preparation of alloys, its general effect being to reduce the melting-point of the alloy to which it is added. The total produc¬ tion of the metal per annum is probably about two tons.

In its chemical relations, cadmium, like zinc, is a dyad. Metallic cadmium undergoes a slow, superficial oxidation upon exposure to the air ; and when sufficiently heated in the presence of air it oxidizes rapidly and may even take fire. The resulting oxide, CdO, is brown in color and readily dissolves in acids, with the produc¬ tion of the corresponding cadmium salts. One of the best known of these salts is the iodide, Cdl2 which is used in photography and in medicine, and may be obtained by the action of hydriodic acid, HI, upon cadmium carbonate, or metallic cadmium. The bright yellow sul¬ phide, CdS, is formed when the stream of sul¬ phuretted hydrogen gas is passed through a slightly acid solution of a cadmium salt ; and this fact is used in the detection and isolation of cadmium in qualitative analysis. The sul¬ phide is used as a pigment, under the name of (<cadmium yellow® ; it is brilliant in color, and does not change upon exposure to air or light.

CADMUS, in Greek mythology the son of Agenor and grandson of Poseidon. With his brothers he was sent by his father to seek for his sister, Europa, who had been carried away by Zeus, and he was not to return without her. After several adventures, the oracle at Delphi commanded him to desist from further search, to entrust himself to the guidance of a heifer, and where she should stop to build a city. He accordingly wrent to Boeotia, where he wished to sacrifice the cow to Athena. But his com¬ panions, attempting to bring water from the fountain of Ares for the purpose of the sacri¬ fice, were slain by the dragon that guarded it. Cadmus killed the dragon, and, at the com¬ mand of Athena, sowed its teeth in the earth ; armed men immediately sprang up, whom he called Sparti (the sowed), but who perished in a contest with each other, excepting five. With the remainder he built the city of Cadmea or Thebes (see Thebes). He became by his marriage with Harmonia the father of Antinoe, Ino, Semele, Agave and Polydorus. After rul¬ ing for a time the city which he had built, and the state which he had founded, he proceeded, at the command of Bacchus, with Harmonia to the Enchelae, conquered their enemies, the Illy¬ rians, became their King, and begat another

son, Ulyrius. Tradition states that Cadmus came to Boeotia from Phoenicia, 1550 b.c., con¬ quered the inhabitants who opposed him, and, in conjunction with them, founded the above-mentioned city. To promote the improvement of his subjects he taught them the Phoenician alphabet, the employment of music at the festi¬ vals of the gods, besides the use of copper, *etc.* Another Cadmus, of Miletus, a son of Pandion, was regarded among the Greeks as the first who wrote in prose. He lived about 600 b.c.

CADOL, Victor Edouard, vek-tdr ed-oo- ard ka-dol, French dramatist and novelist: b. Paris, 11 Feb. 1831; d. 1898. He was long prominent as a journalist, being on the staff of Le Temps, and was one of the founders of L' Esprit Frangais. Among his very numerous works, many of which were written in col¬ laboration, are (La Germaine, > a three act

COUNT GENERAL LUIGI CADORNA

Comniander-in-Chief of the Italian armies (1915-17)

comedy (1864); (Les ambitions de M. Fau-velle> (1867), which ran for over 200 con¬ secutive nights; (Les inutiles) (1868); (La Belle Affaire* (1869); (La fausse monnaie) H869) ; (Paris pendant le siege* (1871); (Le spectre de Patrick^ (1872) ; (Mariage de princesse) (1888) ; (Therese Gervais) (1893); (L'archiduchesse* (1897). A corrected edition of his dramas appeared in 1897 entitled ^Theatre inedit. > Among Cadol's romances are f Contes gais) (1867) ; (Le monde galant* (1873) ; (Madame Elise) (1874) ; (Rose) (1875) ; (La grande vie* (1879) ; (Son Ex¬ cellence Satinette) (1882); (La belle virginie) (1883); <Tout SeuP (1884); <Lucette)

(1886).

CADORE, ka-do'ra, or PIAVE DI CADORE, a town of Italy, in the province and 22 miles north-northeast of the town of Belluno, on the Piave, derives its chief interest from being the birthplace of Titian.

CADORNA, ka-dor'na, Luigi, Count, Italian general, son of General Count Raffaele Cadorna : b. Pallanza 1850. After receiving his early education at a cadet school he passed the Staff College and was attached to his father's staff in 1870 when the latter — a bril¬ liant soldier — led the Italian army into Papal territory in 1870 and blew in the Porta Pia. He attained the rank of captain in 1875, and was ultimately appointed chief of staff of the Verona Army Corps. After commanding the 10th Bersaglieri he was promoted major-gen¬ eral in 1898 and lieutenant-general in 1905. For a time he commanded a division at Ancona and was subsequently appointed corps commander at Genoa, with the rank of commander-desig¬ nate of an army in the field. In 1914 he suc¬ ceeded General Pollio as chief of the general staff. His reputation as a professional soldier had long been established throughout Europe, for he had written works on military science and possessed a unique knowledge of that dif¬ ficult terrain in which, if ever, Italy would be called upon to fight her old enemy and quon¬ dam ally Austria. When Italy entered the war in May 1915 Count Cadorna was given the supreme command in the field. His battle front of about 480 miles was the most difficult one in Europe, presenting enormous geograph¬ ical obstacles, the angle of the Trentino, the great wall of the Dolomites and the Carnic and Julian Alps. The Italian successes of 1916, including the capture of Gorizia, were neutral¬ ized by the great Austro-German drive against Italy that began on 23 Oct. 1917. By the even¬ ing of the 28th the whole Italian line was in retreat and General Cadorna fell back upon the Tagliamento. Gorizia fell to the enemy and Udine was lost. The mountain defenses in the Carnic Alps began to crumble and the disaster soon extended to Cadore. Abandoning the Tagliamento lines on 5 November Cadorna fell back upon the Piave after an unsuccessful at¬ tempt to hold the Livenza. The Italian losses were estimated by the enemy at 250,000 men and 2,300 guns, and the Allies suffered a defeat in the field unparalleled in the war. French and British troops were rushed to the scene, but the Italians recovered themselves by their own efforts and made a firm stand on the Piave. On 9 Nov. 1917, a Supreme Political Council of

the Allies for the whole of the western front was created, and General Cadorna was ap¬ pointed a member of the permanent central military committee. On 10 Feb. 1918 Cadorna was succeeded as a member of

the Supreme War Council by Gen. Gaetano Giardino. He was succeeded in his command by General Diaz. See War, European — Austro-Italian Cam¬ paign.

CADORNA, Raffaele, Italian general: b. Milan 1815; d. Turin, 6 Feb. 1897. He served in the Crimean War, and in 1860 was made war minister in Tuscany's provisional government, and military commandant of Sicily in 1866. He suppressed the Bourbon insurrection in Palermo in the latter year, and in 1870 captured Rome and was its military governor for a time. In 1871 he entered the Italian Senate. He was the author of (Osservazioni sull' amministrazione centrale della guerra) (1854) ; (Bibliografia delle campagne per l'independenza italiana* (1882), and (La liberazione di Roma nel 1870 >

(1889).

CADOUDAL, Georges, ka-doo-dal', French Chouan chief: b. Brittany, 1 Jan. 1769; d. Paris, 25 June 1804. In the protracted and sanguinary contests between the Royalists and Republicans during the French Revolution, the Chouans and Vendeans were the most resolute supporters of the Royal cause; and the energy and ability of Cadoudal soon raised him to an influential place among the adherents of the house of Bourbon. At this time attempts were made by Napoleon to gain over Cadoudal to the cause of the republic, • and a lieutenant-generalship in the army was offered as the price of his submission ; but he firmly declined all these overtures. He afterward engaged, in concert with General Pichegru and others, in a conspiracy having for its object the overthrow of the consular government and the restoration of the monarchy; which being discovered, Cadoudal was arrested and executed. Consult Georges de Cadoudal, (George Cadoudal et la Chouannerie) (Paris 1887).

CADUCEUS, ka-du'se-us, the staff con¬ sidered as a symbol and attribute of the Greek god Hermes and the Roman god Mercury. It is generally represented as having two serpents twined around it in opposite directions, th ir heads confronting one another. It is probable that the staves carried by heralds and public criers gave rise to this fable, the fluttering rib¬ bons or fillets tied to the end of the staff, or the green wreaths or boughs which were tied around it, giving the suggestion of the presence of living serpents. Several different fables were invented by late Greek writers to account for the serpents in a miraculous way. The fable tells that Apollo gave his staff to Mercury

in consideration of his resigning to him the honor of inventing the lyre. As Mercury entered Ar¬ cadia with this wand in his hand he saw two serpents fighting together ; he threw the staff between them, and they immediately wound themselves around it in friendly union.. The caduceus is Mercury's peculiar mark of distinc¬ tion. With this he conducted the shades to* the lower world, and from it received the. name of Caducifer; yet we find it on ancient coins in the hands of Bacchus, Hercules, Ceres, Venus and Anubis. Among the moderns it serves princi-136

pally as an emblem of commerce over which Mercury was the presiding divinity.

CADWALADER, kad-wol'a-der, George, American lawyer and soldier: b. Philadelphia 1804; d. there, 3 Feb. 1879. He practised law till 1846; was made brigadier-general of volun¬ teers; and was brevetted major-general after Chapultepec. He resumed his law practice till 1861 ; became major-general of State volun¬ teers; was placed in command at Baltimore; accompanied Patterson's expedition to Win¬ chester (1861) ; and, as one of a military board, directed the United States army operations. He was author of (Services in the Mexican Campaign of 1847) (1848).

CADWALADER, John, American soldier: b. Philadelphia, 10 Jan. 1742; d. Shrewsbury, Pa., 10 Feb. 1786. At the outbreak of the Revolution he was placed in command of a battalion and soon became brigadier-general. He fought at Trenton, Brandywine, German¬ town and Monmouth. In 1777 he organized the militia of eastern Maryland. In 1778 he challenged and wounded Gen. Thomas Conway for plotting against Washington. He published (A Reply to Gen. Joseph Reed's Remarks* (1783). Subsequently, he became a member of the Maryland legislative assembly.

CADY, J. Cleveland, American archi¬ tect: b. Providence, R. I.; d. 17 April 1919. He became an architect in 1870 and among his noteworthy buildings are the American Mu¬ seum of Natural History, the Metropolitan Opera House, the Brooklyn Art Association, various collegiate structures at Yale, Williams, Trinity and Wesleyan, and numerous churches, hospitals, mansions, commercial buildings, etc.,

throughout the country. Trinity College con¬ ferred on him the degree of M.A. in 1880 and LL.D. in 1905.

CiECILIAN, se-sil'i-an, a member of a family of batrachians, the Cceciliidce, regarded as forming an order, called Apoda, or Gymno-phiona. They are long, worm-like animals, lacking all traces of limbs, and having only a rudiment of a tail. There may be as many as 250 vertebrae. The hinder end is blunt and hardly to be distinguished from the head. The body is covered writh a soft, moist skin, and the jaws are armed with rather feeble teeth. These animals are found in the tropical parts of America, Africa and Asia, where they burrow like earth-worms, which they resemble. They are often found in the nests of ants, which they devour. They also feed on worms. The breed¬ ing habits of these creatures are not well under¬ stood. The eggs are laid either in the water or near it. One species found in Ceylon lays a mass of eggs which are connected by a cord, thus resembling a string of beads. They are deposited in a burrow near the water, and are incubated by the mother until the escape of the young. About 30 species of these animals are known.

CiECILIUS, se-cil'i-us, Statius, Roman

comic poet and dramatist. He was born in Gaul of the race of the Isurbians ; d. 166 b.c. His contemporaries ranked him with Plautus and Terence. He wrote over 40 comedies of which fragments remain. He was brought to Rome as a prisoner of war, but was freed. He was a friend of Ennius. Volcacius Sedigitus ranks

him first among the comic poets of Rome. A. few fragments have been preserved, mainly by Cicero and Aulus Gellius. Consult Ribbeck, (Comicorum Romanorum Fragmenta) (Leip¬ zig 1898).

CiECULUS, sek'u-lus, in mythology, a son of Vulcan, and a great robber, who lived in Italy, and built Praeneste; but being unable to find inhabitants he employed the aid of Vulcan, his father, who populated the city for him.

C2ECUM, se'kum (Lat. caecus, blind), or caput coli (head of the colon), a blind pouch into which the small intestine empties. In the human body it is so small as to be practicall> useless ; but the vermiform appendix begins in it as does also the colon. • However, the caecum is quite large in many of the mammalia, and serves the purpose of the retention of the food for a longer period than would be

possible without it. It is therefore inclined to be larger in herbivorous animals ; but it is lacking in some animals, like the bear, which would seem to require it; and omnivorous or granivorous birds have two caeca generally large, while fishes have no true caecum and in reptiles the caecum is small. The caecum aids the digestion in the mammalia by the secretion of a fluid re¬ sembling gastric juice.

CAECUM, Diseases of. Acute disease of the caecum is usually present in the form of appendicitis (q.v.). Tuberculosis of the caecum and cancer of the caecum are described under the terms cancer and intestinal tuberculosis. The chronic diseases of the caecum may be arranged under the headings, chronic catarrhal inflammation, atony of the caecum with dilata¬ tion, spasm of the caecum, displacements, and the neuroses of the caecum. In some respects the caecum may be thought of as a secondary stomach. Like the stomach, it is a dilated organ at the end of a portion of the intestinal canal, hence its disorders run in a sense parallel to those of the stomach. It is a food pouch which contains a quantity of food ready to be ab¬ sorbed.

Atony of the caecum is a not infrequent cause of serious disturbance and is due either to a general body loss of tone, as from wasting disease, from neurotic disturbances, from dis¬ placements or from mechanical obstructions. Certain clinicians regard the neurotic disposi¬ tion or constitution as the most frequent, others regard the mechanical factors to be the most important. Atony may be present alone or be associated with dilatation, which latter is the more frequent.

The symptoms are complex and at times ob¬ scure. They are frequent in young adults, usually between 25 and 45. Obstinate constipa¬ tion is a prevailing state. This is interspersed or broken into, as it were, by paroxysmal at¬ tacks of griping pain. These may last a few hours. At times there are simply periods of severe discomfort, with feeling of fullness in the right iliac fossa. Loss of appetite with at times nausea and vomiting are present. Ex¬ amination of the abdomen reveals a fullness and resistance; there is frequent ileo-csecal gurgling of gases and percussion of the area reveals a greater or less area of tympanites. Diarrhoea is not infrequent during the attacks. X-ray pictures are important in the diagnosis as it is frequently misinterpreted as a chronic ap-

pendicitis — which latter condition often accom¬ panies the chronic caecal atony and dilatation. The treatment is by rest, the knees drawn up, hot applications and belladonna. If the pain is severe, high soapsuds enemata are of value. Operation is rarely called for; the chief gen¬ eral treatment should consist in raising the general muscular tone of the individual. Setting up exercises with special attention devoted to the morale of the abdominal muscles is the best treatment. A vigorous attitude will give rise to a <(strong-minded intestine55 and do much to relieve the flabbiness and loss of muscular tone of these individuals. They are for the most part people who are chronically sorry for them¬ selves and are usually internally indolent al¬ though at times externally fairly active.

Typhlospasm is the name given to an op¬ posing type in which increased tone of the caecum gives rise to a chronic spastic state of the organ. This is found in young adults usually of the more forceful and busy type. Here pain and discomfort are felt and there is a tendency toward increased frequency of bowel move¬ ment, two to three small dryish movements a day. The movement usually does not seem to relieve the patient. There is a sense of some¬ thing left behind. Mucus and blood are some¬ times passed, and the entire colon seems in a tense, full, uneasy state. This type of individual is usually forceful, overaggressive, choleric and impatient. They are frequently haters and often not well socially adjusted, often intensely avaricious and envious. The treatment is largely psychical. Belladonna, chloral and bromides are of value in tiding over the acute periods of distress. A prevailing trend in neurological medicine is to regard these condi¬ tions as largely of mental origin in which the mechanical factors, Lane's kinks, etc., are con¬ tributing causes.

CiEDMON, kad'mon, the first Anglo-Saxon poet : d. 680. According to Bede's (Ecclesiastical History5 Caedmon was a swine¬ herd to the monks of Whitby, and never gave evidence of any poetical talent until one night a vision appeared to him, and commanded him to sing. When he awoke, he found the words of a poem in praise of the Creator of the world impressed upon his memory. This manifesta¬ tion of talent obtained for him admission into the monastery at Whitby, where he continued to compose devotional poems. An edition of his paraphrase of parts of the Scriptures was printed at Amsterdam

in 1655, edited by Junius. Thorpe published an edition of it (London 1832) for the Society of Antiquaries. It has been assumed by some that Milton took some ideas of (Paradise Lost) from the poems of Caedmon. It is certain that they were very popular among the English and the Saxon part of the Scottish nation, and furnish plentiful ma¬ terials to the makers of mysteries and miracle plays. In the Bodleian Library at Oxford is a manuscript the contents oi which are ascribed to Caedmon, but the best authorities do not con¬ sider it to be his. Consult Ten Brink, ˆEarly English Literature) ; Morley, (English Writers,5 Vol. II (1888) ; and the bibliography in the <(Cambridge History of English Literature.55

CiELIUS, se'li-us, Aurelianus, Latin physi¬ cian, generally supposed to have been a native of Numidia, and to have flourished in the 4th

or 5th century of the Christian era. He was a member of the sect of the Methodici, and the author of (Medicinales Responsiones,5 a com¬ pendium of the whole science of medicine in the form of a catechism (Libri Quinque Tar-darum Chronicarum Passionum) and (Libri Tres Celerum sive Acutarum Passionum.

CiELIUS MONS, one of the seven hills on which Rome was built. It is said to have re¬ ceived its name from Caelius Vibenna, an Etrus¬ can, to whom it was assigned. The palace of Tullus Hostilius was on this mount. It is at present covered with ruins.

CAEN, kan, France, town in the depart¬ ment of Calvados, and the ancient capital of Normandy, 125 miles northwest of Paris, and about nine miles from the mouth of the Orne, which is here navigable and crossed by several bridges. There is a dock connected with the sea by both river and canal. Caen is the centre of an important domestic trade, the market of a rich agricultural district, and carries on exten¬ sive manufactures. The streets are broad, regu¬ lar and clean, the houses well built of white freestone and it possesses various ancient and remarkable edifices. The public promenades and recreation grounds are beautiful, and there are various extensive squares and ((places.55 The church of La Trinite, a fine edifice in the Norman-Romanesque style, restored in modern times, was formerly the church of the Abbaye-aux-dames, founded in 1066 by Matilda, wife of William the Conqueror. The church of Saint Stephen was founded at the same time by Wil¬ liam the Conqueror as the church of the Abbaye-aux-hommes, and though considerably modified since is a noble and impressive edifice. It has two fine western towers 295 feet

high. The Abbaye-aux-hommes, built by the Con¬ queror, who was buried in it, is now used as a college, having been rebuilt in the 18th century. One of the finest churches in Caen is that of Saint Pierre, whose tower (255 feet), termi¬ nated by a spire, is exceedingly elegant. Among other public buildings are the Hotel de Ville, the prefecture and the palace of justice. Caen pos¬ sesses a university faculty or college, a public library with some 100,000 volumes, a gallery of paintings with valuable works of old masters, a natural history museum, an antiquarian mu¬ seum, *etc.* The hospital of the Abbaye-aux- dames is one of the best regulated in France. The hospital of the Bon-Sauveur is another ad¬ mirable institution. The city was formerly for¬ tified, and there are remains of a castle begun by William the Conqueror and finished by Henry I, but since much altered and now used as bar¬ racks. Caen first rose into importance in the time of William the Conqueror. In 1346 it was taken by Edward III, at which time it was said to be larger than any city in England except London. Henry VI of England founded a uni¬ versity here in 1431, Caen having been in the possession of the English from 1417 to 1450. It suffered much in the religious wars between the Protestants and the Roman Catholics of France. Admiral de Coligny captured it for the Protestants in 1562. Caen carries on ship¬ building, and its manufactures embrace linen, woolen and cotton goods, lace, ropes, metal goods, leather, cutlery and various other articles and has foundries, breweries, dyeworks and sawmills. It is also famed for gloves made

from the skins of the Angora rabbits. It car¬ ries on a considerable trade in timber, iron ore, coal, grain and other articles, including agricul¬ tural produce exported to England, to which also is still exported the Caen building stone famous for many centuries. A canal connects the port with the sea. Maherbe, Laplace, Eeie de Beaumont and Auber were born in this city or in its vicinity, and are commemorated by statues. Pop. 46,934.

CAEN-STONE, a cream-colored oolitic limestone from Caen in

Normandy, identical with the Bath oolite of England. It is easily carved and has long been highly esteemed as a building stone. Westminster Abbey, Canter¬ bury Cathedral and other English churches are built of it. It is quarried underground in blocks nine feet long, two feet thick. Its amor¬ phous nature prevents its use on external struc¬ tures in severe climates. Its principal use is for interior work.

CiENOTHERUM. See Ruminants. CiENOZOIC. See Cenozoic.

CAERNARVON, kar-nar'von. See Car¬ narvon.

CffiRULARIUS, Michael, Greek eccle¬ siastic, the Patriarch of Constantinople, 1043-49. By dispensing with the Latin ritual in many churchesivof Bulgaria and protesting against the use of unleavened bread by the Latins in the Eucharist, he completed the division between the Latin and the Greek communions. He was formally excommunicated by Pope Leo IX. Some decretals and letters issued by him are still preserved. Consult Pichler, (Geschichte der kirchlichen Trennung zwischen dem Orient und Occident (Munich 1864).

CiESALPINIACEiE, ses-al-pin-i-a'se-e, a family of plants containing numerous genera. The botanical characteristics of the family are : Calyx of five divisions, joined together at dif¬ ferent points, or often distinct to the base, with prefloration imbricate or valvular ; petals equal or fewer in number; stamens often not sym¬ metrical to the other parts of the flower, or very irregular, sometimes very numerous, sometimes partly abortive, rarely regular, very often free, or lightly joined together at the base only; ovary raised on a free support, or joined in part to the calyx and becoming legumes, which sometimes contain only one or two ovules, and of which the pericarp may have a fleshy consistence; seeds without perisperm; embryo often straight; stems often arborescent or fruticose, sometimes creeping; leaves simple, or more frequently compound, in the latter case frequently bipinnate. The typical genus is C&salpinia. The family contains many plants of great economic importance.

CiESALPINUS, Andreas, or ANDREA CESALPINO, Italian physiologist: b. Arezzo, Italy, 1519; d. 23 Feb. 1603. He is first men¬ tioned in public life as a professor of botany in the University of Pisa. He was subsequently made chief physician to Clement VII, and lived during the remainder of his life at Rome. He published works on botany, mineralogy, medi¬ cine and the highest questions of philosophy. In his first publication, entitled (Speculum Artis Medicae Hippocraticum,* his knowledge of the

system of the circulation of the blood is stated in the clearest manner. The following passage is taken from the second chapter of its first book : ((For in animals we see that the nutri¬ ment is carried through the veins to the heart as to a laboratory, and its last perfection being there attained, it is driven by the spirit which is begotten in the heart through the arteries and distributed to the whole body.® The system ac¬ cepted since the time of Harvey could hardly be more definitely or accurately stated. His philosophical speculations are contained mainly in his (Qusestiones Peripateticse. } The philoso¬ phy of Caesalpinus was scholastic Aristotelian-ism, with a leaning toward some of the methods and doctrines of the later transcendental or ab¬ solute systems. He reduces the world to the simplicity of two only substances, God and mat¬ ter, and he makes all finite intelligences, all human, angelic and demoniac souls, to belong to the latter element. Two things are remark¬ able about his system: (1) The boldness of speculation, unparalleled in his age, with which he seeks a purely scientific view of the uni¬ verse; and (2) its entirely materialistic char¬ acter. But more important than either his anticipation of Harvey's discovery, or his specu¬ lative opinions, were his botanical labors. He was styled by Linnaeus the first orthodox or systematic botanist, and his work (De Plantis,* was a handbook to Linnaeus in all his classifi¬ cations. Botany in the time of Caesalpinus was the popular witchcraft: as a science, it consisted in a mass of erudition about the imaginary but marvelous virtues of plants. Caesalpinus sought successfully to transfer it from the realm of magic to that of science. He proposed the basis of classification upon which the whole system of Linnaeus rests, namely, the distinction of plants in their parts of fructification. He lived quietly to an old age at Rome, submitting all his speculations to the supremacy of the Church, and presenting in his life an example of every virtue.

CiESAR, the name of a patrician family of the Julian gens, tracing its origin to Julius, the son of ˆEneas. The first member of the family who occurs in history with the surname of Caesar was Sextus Julius Caesar, praetor, 208 b.c. Caesar was the family name of the first five Roman emperors. With Nero the imperial family became extinct (68 a.d.), and Caesar be¬ came merely a title of dignity. The Emperor, who bore the title of Augustus, appointed his successor, with the title of Caesar. On medals and monuments we find the title Caesar preced¬ ing the name of the emperor, as ((Imp. Caesar Nerva Trajanus Augustus,® and following that of the designated successor, as <(Marc. Aurel. Antonin. Caesar.® In the lower Greek empire, a new dignity of Sebastocrator was conferred, and that of Caesar became the third rank in the state.

From Caesar are derived the German <(kaiser® and the Russian ((tsar.®

CiESAR, Gaius Julius, the greatest repre¬ sentative of the genius of Rome, a man of con¬ summate ability alike as a general, a construc¬ tive statesman and a writer. He was born, ac¬ cording to all the ancient authorities, 12 July 100 b.c., but Mommsen, in his (History of Rome,) considers that the year should be given as 102. Of purest patrician ancestry, and with a family tradition intimately associated with the

rule of the senatorial oligarchy, he was yet, from early youth, a champion of the popular party. His aunt Julia had married Marius, and when, upon the latter's death in 86, Cinna became the leader of the Populares, Caesar entered into intimate relations with him and in 83 married his daughter Cornelia. But the following year Sulla returned from the East and overwhelmed the foes of the Senate. A reign of terror for the Marian party followed. With character¬ istic boldness, Caesar refused to divorce his wife at the order of the dictator, and lost, in consequence, his property, his position as priest of Jupiter and almost his life. The famous story that Sulla pardoned him with the remark that <(he would one day be the ruin of the aristocracy, for in him there was many a Marius, w though vouched for by both Suetonius and Plutarch, seems strikingly inconsistent with Sulla's usual remorseless logic. Partly to avoid further trouble, and partly to gain that military experience which was at Rome deemed a pre¬ requisite to an official career, he now went to Asia, and, as a staff officer, served with distin¬ guished bravery at the siege of Mytilene, and afterward against the pirates in Cilicia, but re¬ turned home upon receiving news of Sulla's death in 78. As pleading in the courts was the natural avenue to popular favor, we presently find him acting as prosecutor in two cases in¬ volving extortion in provincial administration. But the culprits, Dolabella and Antonius, be¬ longed to the senatorial order, and his elo¬ quence, though it won applause, failed to move juries composed of senators. He determined to perfect

himself in oratory by studying under the most famous teacher of the age, Apollonius Molo of Rhodes. On the way thither he fell into the hands of pirates near Miletus, and was held for a ransom of 50 talents (over $55,000). During a stay of almost 40 days he won the admiration of his captors by his coolness and wit, and laughingly promised to crucify them all as soon as he should obtain his freedom, a threat which he promptly carried out to the letter. He studied under Molo only a short time, however, for the renewal of hostilities by Mithridates against the Roman province of Asia brought him into the field with some hastily levied troops, and, after brief but effec¬ tive service, he returned to Rome in the winter 0f 74—73. He had been elected pontifex in his absence, and now took part, with the utmost energy, in the attempts that were being made to overthrow the Sullan constitution.. This was accomplished in the year 70, though in a totally unexpected manner, by the legislation of Pom-ney and Crassus, both of whom had, previous to that time, been supporters of senatorial pre¬ rogative. Meanwhile Caesar, by his unfailing courtesy and good will, and a lavish generosity that soon plunged him deep into debt, had been winning all hearts. In 69 he was elected quaestor, and was assigned to the province of Further Spain. But before his departure1 he lost his aunt Julia and his wife, Cornelia. At the former's funeral he caused busts of Marius to be carried in the procession, to the great de¬ light of the populace, and in the two memorial addresses which he delivered in the forum he eulogized the aims and leaders of the people's party. In Spain he must have noted with ap¬ preciation the work of the great Marian gen¬ eral, Sertorius, the first man who tried to

romanize the provincials. Upon his return, in 67, he entered into friendly relations with Pompey, and supported the Gabinian and Manilian laws, by which the latter was to re¬ ceive the supreme command against the pirates and Mithridates, with powers unprecedented in the history of the republic. In 65 he was sedile, and met the demands of his office with unheard of magnificence in buildings and games. In particular, he stirred the people to frantic en¬ thusiasm by secretly erecting in the capitol new trophies of Marius, to replace those which Sulla had destroyed. In 63 he was chosen pontifex maximus, an office of great prestige and prominence in a state in which religion and politics had always been closely associated. That he had knowledge of the Catilinarian con¬ spiracy of this year is by no means unlikely. But he took no part in it, and the aristocracy was unable to persuade Cicero to include him in the list of the conspirators. In 62 he was praetor, and in the following year went as

governor to Further Spain, where for the first time he commanded an army and became con¬ scious of his military genius. Toward the end of 61 Pompey returned to Rome, a victor over the entire East, but was coldly received by the distrustful Senate, which refused to ratify his acts in' Asia and to make the assignments of lands promised to his veterans. Caesar, return¬ ing from Spain, seized his opportunity, and about the time of his election to the consulship, reconciled Pompey and Crassus, whose enor¬ mous wealth made him indispensable, and formed with them the socalled First Trium¬ virate. The alliance was strengthened by the marriage of Pompey with Caesar's daughter Julia. During his consulship in 59 Caesar car¬ ried, among other measures, a popular agrarian bill, the ratification of Pompey's acts, and a stringent law against extortion in the provinces, while he won to his support the whole eques¬ trian order, to which the collectors of the pub¬ lic revenues belonged, by modifying the terms of their last contract with the state. His popu¬ larity enabled him to secure the assignment to himself for five years (subsequently increased to 10) of the provinces of Cisalpine Gaul, Illyricum and Transalpine Gaul, together with four legions. The following eight years (58-51) witnessed those brilliant campaigns which ended in the complete subjugation of Gaul, and its acceptance of the laws, language and civiliza¬ tion of Rome. The first three years of war brought all Gaul to his feet, but the love of liberty was still too strong in this brave people, and dangerous revolts broke out year after year. In 55 he crossed the Rhine on the famous bridge, and later made his first expedition to Britain, which he invaded again the following year. Finally, in the winter of 53-52, V ercingetorix, Gaul's greatest hero, and a born leader of men, organized a general uprising of all the tribes. The flame of insurrection swept over the whole country. The campaign cul¬ minated in the siege of Alesia (Alise in Bur¬ gundy), an almost impregnable fortress into which the Gallic chieftain had thrown himself with 80,000 men. Caesar invested the place with less than 60,000, and was presently himself in¬ vested by an enormous army of relief, estimated at over 240,000 men. But he completely routed this vast host, and Vercingetorix, worn out by hunger, surrendered. By the end of the fol-140

lowing year Caesar was at last able to address himself to the peaceful organization of the new territory.

At Rome, however, a crisis was imminent. The ties between Caesar and Pompey were being rapidly dissolved. The death, in 54, of Julia, Pompey's wife and Caesar's daughter, was fol¬ lowed in 53 by the defeat and death of Crassus in the Parthian War. Pompey became more and more jealous of his rival's military glory, and the Senate, resolved to crush Caesar at any cost, and itself unable even to keep order in the streets of Rome, made friendly overtures to Pompey, and in 52 made him sole consul, with practically the powers of a dictator. Caesar's term of office would expire on 1 March 49. It was essential to his safety that he should retain his provinces and his army until after he should be elected consul for 48. But the aristocracy was plainly determined that there should be an interval during which he would be a mere pri¬ vate citizen, defenseless against the attacks of his enemies. It is certain that Caesar acted with great moderation, even sending to Italy two of his legions which the Senate declared were needed for the war in the East, but which, as he had foreseen, were instead placed in camp at Capua. At length, in January 49, the de¬ cisive step was taken. The Senate ordered Caesar to lay down his command on pain of being proclaimed a public enemy. The tribunes of the people, Antony and Quintus Cassius, who had in vain interposed their veto, fled to him for protection in their inviolable office ; Caesar with a single legion crossed the Rubicon, the frontier stream of Italy, and war was begun.

In the ensuing five years, all that remained for him of life, the amazing energy and re¬ sourcefulness of this extraordinary man are most impressively displayed. In three months, without striking a blow, he was master of Italy, and Pompey, with a small force, barely escaped from Brundisium across the Adriatic. Caesar had no ships on which to follow him, and be¬ sides, the veteran Pompeian forces in Spain must be crushed before they could join their commander. Accordingly after first securing Sicily and Sardinia, through his lieutenants, he crossed the Pyrenees into Spain, and, in a brief campaign of 40 days, perhaps the most brilliant in all his career, extricated himself from ap¬ parently certain destruction, and forced the sur¬ render of the entire opposing army. All Spain now declared for him. On his way back he received the submission of Massilia (Mar¬ seilles), which had been besieged by Decimus Brutus and Trebonius. Eleven days were spent in Rome in administrative work, and early in January 48 he crossed the Adriatic and pro¬ ceeded to surround Pompey, near Dyrrachium, now Durazzo. But his force was quite in¬ sufficient, and, to deprive his foe of the ad¬ vantage of the sea, he retreated into Thessaly, whither Pompey followed him, and the decisive battle was fought on the plain of Pharsalus, 9 Aug. 48.

Pompey had 47,000 infantry and 7,000 cavalry; Caesar only 22,000 infantry and 1,000 cavalry. But the latter's army was com¬ posed of veterans, and numbers did not avail. Pompey fled to Egypt where he was brutally murdered. Caesar, who had followed him with all speed, was nearly trapped in Alexandria by the forces of the young King Ptolemy, but ultimately, upon the arrival of reinforcements,

defeated them, and set Cleopatra upon the throne. He then passed through Syria and Asia Minor, putting affairs on a permanent basis, and incidentally defeating Pharnaces, a son of the great Mithridates. The victory was announced in the famous despatch, ((V eni, vidi, vicv > > (((I came, I saw, I conquered®). Upon his return he announced his intention of pardoning all who had fought against him. In December he left Rome for Africa, where the campaign against the Pompeians, commanded by Scipio and Cato, ended in a sweeping victory at Thapsus, 6 April 46. Cato, unable to defend Utica, committed suicide. Caesar returned to Rome in June, and, after celebrating his vic¬ tories over the Gauls, Egyptians, Pharnaces and Juba, King of Numidia, who had fought against him at Thapsus, by four magnificent triumphs, flung himself into the work of legis¬ lation. Among his reforms was the placing of the calendar, for the first time, upon a scientific basis. But these labors were interrupted by a dangerous revolt in Spain, headed by Pompey's sons, and the campaign against them, ending in the hard-fought battle of Munda, 17 March, and the final settlement of affairs in Spain, necessitated his absence from Rome from the end of 46 to September 45. The Senate wel¬ comed him upon his return with the most servile flattery. He was already tribune for life; he was now made, for life, dictator and prasfectus morum, a new term for the censor¬ ship ; his head was stamped on the coinage, the month of Quintilis was renamed Julius and he was given divine honors. With absolute power thus lodged in his hands, he set about the per¬ manent reconstruction of the government and the social fabric. He made the Senate a much larger and more representative body, increased the number of magistrates, reduced by one-half the recipients of the donation of grain, passed several laws in the interest of the debtor class and of Italian agriculture, prohibited farming by slave labor exclusively, inaugurated a far-reaching plan to colonize in the provinces the unemployed population of Rome and Italy, and laid a legal foundation for the principle of lim¬ ited local self-government of all Roman com¬ munities, wherever they might be. He had in mind, but did not live to carry out, the codifica¬ tion of the laws, the building of public libraries, the draining of the Pontine marshes, the mak¬ ing of a canal

through the Isthmus of Corinth, and the taking of a general census which should form a just basis for the imposition of taxes throughout the empire.

But he had risen too high to escape hatred. The plot to assassinate him probably originated in the personal spite of Gaius Cassius, but many of the conspirators, in particular Marcus Brutus, were foolish enough to believe that by the death of the dictator the republic could be restored. On 15 March 44 b.c., at a meeting of the Senate held in the hall attached to Pompey's theatre, he fell at the feet of his great rival's statue, pierced by 23 wounds.

In studying Caesar's life, one is especially struck by three points : his sane perception of the concrete fact, his indomitable energy and his many-sidedness. More clearly than any other man of that time, he saw that the sena¬ torial oligarchy had been proved wholly incom¬ petent to govern a great empire, and that the problem could be solved only by the concentra-

lion of all power in the hands of a single man. Augustus cautiously veiled the change to mon¬ archy; Julius bluntly called things by their real names and paid the penalty with his life. He was an able orator, but of his speeches, warmly praised by Cicero and Quintilian, none has come down to us. A treatise on grammar and one on astronomy have also perished. But his enduring fame as a writer rests upon the seven books of (Commentaries on the Gallic War) (the eighth book is by Aulus Hirtius) and the three books of Commentaries on the Civil War. ' The former, essentially a political docu¬ ment, published in 51 b.c., is unsurpassed in its succinct simplicity and strength. See Com¬ mentaries on the Gallic War.

Bibliography. — The principal ancient au¬ thorities are the biographies of Plutarch and Suetonius, Cicero's (Letters,' Sallust's (Catiline, ' Lucan's (Pharsalia, ' Caesar's own (Commentaries,) and the Roman histories of Velleius Paterculus, Appian and Dion Cassius. Mommsen's account in his (History of Rome) is brilliant but over-

enthusiastic. The follow¬ ing books may be recommended : Fowler, (Julius Caesar and the Foundation of the Roman Imperial System' (New York. 1899) ; Dodge, Caesar' (Boston 1892) ; Drumann, Ceschichte Roms' (Vol. Ill, ed. by Grobe 1906) ; Froude, Caesar' (New York 1884) ; Napoleon III, (Histoire de Jules Cesar' (Eng. trans., New York 1865) ; continued by Stoffel, (Histoire de Jules Cesar; la guerre civile' (Paris 1887) ; Holmes, Caesar's Con¬ quest of Gaul' (London 1899) ; Holmes, An¬ cient Britain and the Invasions of Julius Caesar' (Oxford 1907) ; Ferrero, Creatness and Decline of Rome' (Vol. II Eng. trans., New York 1907) ; Tyrell's edition of the Cor¬ respondence of Cicero' (Introduction to Vol. V) ; Scott, (Portraitures of Julius Caesar' (London 1903) ; Roper, Che Likenesses ˆof Julius Caesar' (in Scribner's Magazine, 1887) ; Veith, Ceschichte der Feldziige C. Julius Caesars' (1906) ; Holmes-Schott-Rosenberg, Casars Feldziige in Gallien und Brittanien,' a condensation of the two works by Holmes, mentioned above. Nelson G. McCrea.

Professor of Latin Literature, Columbia Uni¬ versity.

CiESAREA, ses-a-rea, the ancient name of many cities: (I)Oesarea Philippi, or Paneas (deriving its second name from the local deity, Pan, to whom the neighboring grotto, the source of the river Jordan, was dedicated), named after Philip, tetrarch of Galilee, son of Herod the Great, who founded it in 3-2 b.c., near the source of the Jordan on the southern slope of Mount Hermon. It is mentioned twice in the Gospels. On its site is the small modern village of Banias. It fell into the hands of the Crusaders in 1130 but was recaptured by the Moslems (1165). (2) Oesarea Palestine

or Stratonis, on the shores of the Mediter¬ ranean, about 55 miles northwest from Jeru¬ salem. It was built with great magnificence by Herod the Great, named in honor of Augustus Caesar, and became the metropolis of Palestine, and the seat of the Roman proconsul, as well as a busy seaport owing to the fact that Herod, who encouraged commerce, built there one of the finest ports on the coast, and pro¬ tected it by a breakwater, the ruins of which still

exist there. It was the place where Herod Agrippa was smitten by the angel (Acts xii, 20-23), where Cornelius the centurion resided (x), and Saint Paul was imprisoned twro years (xxiii-xxv). It was a place of some import¬ ance during the Crusades, but is now a scene of ruin and of utter desolation. Eusebius was bishop of Caesarea. (3) The ancient capital of Cappadocia in Asia Minor, originally called Mazaca,

and now Kaisarieh. It is situated in the southeast of the vilayet of Angora, at the foot of the Erjish Dagh, about 160 miles to the southeast of the town of Angora. It was once supposed to contain 400,000 inhabitants. It has now about 70,000 inhabitants, and its position makes it a place of considerable trade. The manufacture of carpets, though of quite recent introduction, is of some importance. Foreign goods are received by way of the railway from Angora to Constantinople. The name Caesarea dates from the time of Tiberius, and under Valerian the city was captured by Sapor, when a large number of its inhabitants were slain.

CESAREAN SECTION, a surgical operation in obstetrics which consists in deliver¬ ing a child by means of an incision through the abdominal walls and the uterus. The opera¬ tion has been recorded since ancient times but was performed at first upon a dead or dying woman and was required by Roman and later by Venetian law. The first recorded instance of operation upon a living woman was in 1500 when a butcher of Switzerland operated upon his wife. After this it was frequently resorted to but with a very high mortality for the mother until the latter half of the 19th century brought the knowledge of antiseptic and aseptic surgery and suturing for control of haemor¬ rhage. The mortality has now been decreased from almost 100 per cent to about 5 per cent, and its employment increases in favor. It is indicated when the child is alive and the mother dead, either in labor or in the later months of pregnancy, in extreme degrees of pelvic con¬ traction, if the existence of malformation or tumor of the uterus, cervix or vagina render normal birth impossible, and in case of mater¬ ial complications such as eclampsia and con¬ cealed accidental haemorrhage. The etymology of the name is probably from the Latin verb ccedere, to cut, though it has been attributed to Julius Caesar who is reported to have been born in this manner.

CZESARION, the son of Julius Caesar and Cleopatra, put to death by order of Augustus.

CZESARIUS, Saint of Arles, French prel¬ ate of the 6th century, consecrated bishop of * Arles in 502. Before the general adoption of monastic orders of the Rule of Saint Benedict his Regulce duce formed a standard of dis¬ cipline much esteemed by the founders of orders. Consult Arnold, (Caesarius von Arelate und die gallische Kirche seiner Zeit' (Leipzig

1894).

CZESARIUS OF NAZIANZUS, Chris¬ tian scholar of the 4th century. From Alex¬ andria, where his education was received, he went to Constantinople and rose to distinction as a mathematician and physicist. In the Latin editions of Saint Gregory are four dialogues ascribed to him, as also in the (Bibliotheca

PatrumP and he is also credited with a work styled (Contra GentesP

CiESARS, The Era of, also known as the Spanish Era, a period of time reckoned from 1 Jan. 38 b.c., being the year following the con¬ quest of Spain by Augustus. It was much used in Africa, Spain and the south of France; but by a synod held in 1180 its use was abolished in all the churches dependent on Barcelona. Pedro IV of Aragon abolished the use of it in his dominions in 1350. John of Castile did the same in 1383. It was used in Portugal till 1415, if not till 1422. The months and days of this era are identical with the Julian calendar, and to turn the time into that of our era, sub¬ tract 38 from the year; but if before the Chris¬ tian era, subtract 39.

CiESAR'S COMMENTARIES. This

great work contains the narrative of Caesar's military operations in Gaul, Germany and Britain. It was given to the world in the year 51 b.c. Every victory won by Caesar had only served to increase the alarm and hostility of his enemies at Rome, and doubt and suspicion were beginning to spread among the plebeians, on whom he chiefly relied for help in carrying out his designs. When public opinion was evidently taking the side of the Gauls and Germans the time had come for Caesar to act on public opin¬ ion. Plence the (Commentaries, J a hasty com¬ pilation made from notes jotted down in his tent or during a journey. As to its truthfulness we cannot decide absolutely, the Gauls not hav¬ ing written their commentaries. But if Caesar sinned in this respect, it was probably by omis¬ sion, not by commission. Things the Romans might not like he does not mention : the sole aim of the book is to gain their suffrages. There is no allusion to the enormous fortune Caesar acquired by plunder. On the other hand, he speaks of

his cruelties — for instance, the killing in cold blood of 20,000 or 100,000 prison¬ ers — with a calmness that to us is horrible, but which the Romans would deem natural and proper. The (editio princeps) or first edition was printed at Rome (1449).

CAESIUM, se'zi-um, a metallic element dis¬ covered in 1860 by Bunsen and Kirchhoff, in the form of the chloride, in a mineral spring at Durkheim, Bavaria. It has the historic dis¬ tinction of being the first element discovered by the agency of the spectroscope. The metal is widely disseminated, but is seldom found in any considerable quantity. It never occurs in the metallic state, but usually as the chloride or oxide, and commonly associated with the rare element rubidium. Caesium is found in the ashes of many seaweeds, in tea and tobacco and in several mineral springs. It is also a common constituent of the drainage water of mines. Its most important source is the mineral pollucite (q.v.), or pollux, which is found on the island of Elba and in the vicinity of Hebron, Me., and which contains as much as 36 per cent of caesium oxide, with no rubidium. Caesium forms stable salts, and strongly re¬ sembles potassium in its chemical properties. It may be separated from this metal by taking advantage of the fact that caesium platinochlor-ide is much less soluble in water than the cor¬ responding potassium compound. Metallic caesium cannot be obtained by reducing the oxide wPh carbon, but is best prepared by the

electrolysis of a fused mixture of four parts of 'the cyanide of caesium and one part of the cyanide of barium, using aluminum electrodes. It may also be obtained by heating caesium chloride with metallic calcium. It is a silvery white metal, quite soft and ductile, and oxidiz¬ ing rapidly upon exposure to the air. It also decomposes water with the production of suffi¬ cient heat to ignite' the liberated hydrogen. Caesium has a specific gravity of 1.88, and melts at about 80° F. Its chemical symbol is Cs, and its atomic weight is 133 (0 = 16). Its oxalate and nitrate are used to a limited extent in medicine. The spectrum of caesium is char¬ acterized by two blue lines, from which circum¬ stance the element takes its name (ccesius , bluish-gray). Caesium stands first in rank among the electro-positive elements.

CiESTUS. See Cestus.

CAESURA, se-zu'ra, in verse, the resting of the voice on a syllable ; in Latin verse, the caesura divides the line or verse into two parts and renders the syllable on which it falls long.

CAF, kaf, or KAF, a fabled mountain of the Mohammedans which encircles the whole earth. It is the home of giants and fairies, and rests upon the sacred stone Sakhral, one grain of which gives miraculous powers to its possessor. This stone is of an emerald color, and its reflected light is the cause of the tints of the sky. The name ˆKaP is sometimes ap¬ plied to the Caucasus range.

CAFE, ka-fa, a coffee-house, enlarged by American usage to include restaurants of all descriptions.

CAFFARELLI, kaf-fa-rel'le, Francois Marie Auguste, French general, brother of the famous bishop of the same name : b. Falga, Haute-Garonne, 7 Oct. 1766; d. 23 Jan. 1849. At the beginning of the Revolution he was em¬ ployed in the Sardinian army, but joined the army of the republic as a simple dragoon. He was in command of the French army that op¬ posed the Spanish invasion of the Pyrenees in 1793. For his good work in this campaign he was made adjutant-general and later on chief of the consular guard. In 1804 he was charged with the mission to Rome to induce the Pope to come to Paris to perform the ceremony of Napoleon's coronation, and on his return was made governor of the Tuileries. He was wounded at Austerlitz, where he distinguished himself for his bravery and ability as a leader; accompanied Prince Eugene in Italy, where he became Minister of War and Marine; took part in the war in Spain, and defended Metz against the Russians. In 1814 he was chosen by Na¬ poleon to conduct the Empress and son from Paris to Vienna. He retired from public life after the battle of Waterloo.

CAFFEINE, kaf'fe-m, an alkaloid oc¬ curring in the coffee bean, and having the formula CsHioN402. It is considered identical with the alkaloid theine, which occurs in tea, and also with guaranine (the alkaloid of guarana) ; and it is present in small amounts in cocoa. It is found also in mate or Paraguay tea, and also in Kola nuts. Coffee contains by weight about 1.5 per cent of caffeine; and tea, from 3 to 4 per cent. It may be prepared bv adding basic acetate of lead to a strong decoc¬ tion of coffee or tea until the tannin that is

present has all been precipitated, removing ex¬ cess of lead by a stream of sulphuretted hydro¬ gen, and then evaporating the filtrate until the caffeine crystallizes out. For commercial pur¬ poses it is commonly prepared from tea dust. This is heated for an hour with four times its weight of boiling water, and then mixed with its weight in lime, and dried. The caffeine is dissolved out with boiling chloroform. When prepared from a water solution caffeine con¬ sists of a mass of silky needles which contain more or less water; when by a chloroform solution it is anhydrous. It is but slightly soluble in water, alcohol or ether. It has a bitter taste, and although it acts as a weak base, its salts are decomposed by water. See also Coffee.

CAFFI, kaf'fe, Ippolito, Italian artist : b. Bulluno 1814; d. near Lissa, 20 July 1866. He studied in Venice and excelled in matters in perspective and effects of light. He also lived in Rome and traveled extensively in Africa and the East. Among his chief works are Hsthmus of Suez) ; and (Carnival Scene on the Piazetta, Venice) (1855). He was killed on the Italian battleship Re d'ltalia in a naval battle off Lissa, being present on that occasion with the design of painting a picture of the en¬ gagement. He also painted the (Panorama of RomeP Many of his works are in the Museo-Civico, Venice. Consult his biography by Codem-Gerstenbrand (Venice 1868).

CAFFIN, Charles Henry, American art critic: b. Sittingbourne, England, 4 June 1854; d. 15 Jan. 1918. Educated at Oxford he en¬ gaged in school and theatrical work, and came to the United States in 1892 and worked in the decoration department of the Chicago Exposi¬ tion. He went to New York in 1897 and be¬ came art critic for Harper's Weekly, New York Evening Post and New York Sun (1901— 04). His published works which are popular in style include (Photography as a Fine Art) (1901) ; (American Masters of Painting >

(1902); (American Masters of Sculpture)

(1903) ; (How to Study Pictures) (1905) ; (Story of American Painting) (1907) ; (Story of Spanish Painting) (1910) ; (Story of French Painting) (1911) ; (Art for Life's Sake* (1913) ; (How to Study Architecture) (1915).

CAGAYAN, ka-ga-yan', an island of the Philippine group; the largest of six small islets, known as the Cagayan-Sulu group. It is five miles wide and eight miles long. Pop. about 3,500. There are mountains attaining a height of 1,100 feet. The chief products are tobacco and sugar. There are pearl and shell fisheries. Cagayan was sold by Spain to the United States, with Cibitu, in 1900, upon payment of $100,000,

having been inadvertently excluded from the terms of the treaty of peace.

CAGE-BIRDS, birds kept in cages for the benefit or enjoyment afforded by their powers of song, beauty of plumage, ability to talk or companionship. They have been so kept by human beings ever since prehistoric times. The first essential for the maintenance of birds in captivity is a cage as large as possible, and as nearly like the birds, original habitat as cir¬ cumstances permit. Cleanliness is a prime ne¬ cessity, and the bird should be given a constant fresh supply of water for bathing and drinking purposes, and as much fresh air and light as

possible, always, however, avoiding draughts and the sun's direct rays. The food and neces¬ sary attention bestowed on the bird vary ac¬ cording to the species.

Birds are captured by means of birdlime or a falling net, but many are taken from their nests when young, and so tamed, or are bred solely for market purposes. An important trade throughout Europe is the rearing of cage-birds, especially German canaries. The best-known songster, and probably the most popular cage-bird, is the common canary (q.v.), originally a native of the Canary Islands. It is typical of captive birds generally, in the marked change produced by captivity and selective breeding, in coloring and size, from its original wild state. Other widely known and popular cage-birds are the nightingale, goldfinch, cardinal, mocking-bird, bullfinch, the Indian bulbul, sev¬ eral European thrushes, and others, all of which are fine singers. Among the birds kept be¬ cause of their beauty are the parrakeets, love¬ birds, cockatoos, macaws, the whydah-bird, the painted finches and others. Those imitating human speech are not so plentiful, consisting chiefly of the parrot, of which there are several species, and the starlings, especially the English species, and the Indian mina-bird (qq.v.). Ow¬ ing to the change of climate, and especially the cold, nine-tenths of the African parrots trans¬ ported to Europe or North America die before learning to speak. It is advisable, therefore, to purchase such birds in the spring, thus giving them a chance to become gradually acclimated.

In the case of all cage-birds most particular attention should be paid to their food, and over¬ feeding must be especially guarded against. Frequently ailments can be greatly benefited by a fresh supply of food given in smaller quan¬ tities. Insectivorous birds are most trouble¬ some to care for in regard to food, as their diet is less easily obtained.

In case of inability to procure the accustomed food, finely chopped meat should be substituted, and a reasonable quantity of. spiders is always beneficial. The universal and most acceptable food to nearly all birds, however, is canary-seed, with which hemp, rape or oats may frequently be mixed to advantage. Seed-eating birds should be given such fresh vegetable matter as soft green leaves, chickweed or lettuce, at regular inter¬ vals. Sugar in small quantities is also bene¬ ficial, but acid fruits of all kinds should be avoided. A prime necessity in the rearing of cage-birds is something on which the bird may sharpen its bill. This is most easily supplied in the form of sandpaper, or, better, cuttle-fish bone, which is essential to the health of breed¬ ing birds. A bird's nails are apt to grow so long as to become troublesome to it, but in clipping them care should be taken to use a sharp pair of scissors, avoiding a possible in¬ jury to the foot by twisting. In case of illness due to overfeeding, a drop of castor oil may prove beneficial, especially if it is accompanied by a change of surroundings, quiet and a sim¬ pler diet for a time.

Bibliography. — Bechstein, (Cage and

Chamber Birds) (London 1864), a most com¬ plete work; and Greene, (Notes on Cage Birds* (London 1899) ; Dixon, <Dovecote and Aviary* (London 1851); Holden, (Book on Birds) (Boston 1875) ; Greene, (Diseases of Cage Birds* (London 1897) ; Blackston, Swaysland

and Wiener, (Book of Canaries and Cage Birds } (London) ; Greene, (Parrots in Cap¬ tivity } (London 1884) ; Butler, (Foreign Finches in Captivity* (London 1899) ; and (How to Sex Cage Birds) (London 1907) ; Oldeys, (Cage-bird Traffic of the United States *(Washington 1907) ; Norman, (Aviaries, Bird-rooms and Cages) (London 1908) ; Birchley, (British Birds for Cages, Aviaries, and Exhibitions) (London 1909) ; Telling, (Practical Guide to Successful Cage-bird Culture* (Lon¬ don 1909). The Avicultural Magazine and Bird Notes are two monthly magazines pub¬ lished in London and devoted to the interest of cage and aviary birds.

CAGLI, ka'lye, Italy, city and bishop's see of the province of Pesaro e Urbino at the con¬ fluence of the Cantiano and Busso, 18 miles by rail south of Urbino. It has a fine cathedral; the church of San Domenico is noted for its frescoes by Giovanni Sanzio, father of Raphael; and there are interesting archaeologi¬ cal remains dating from early Roman days. Pop. 13,000.

CAGLIARI, kal-ya're, Paolo. See Ver¬ onese, Paolo.

CAGLIARI, Sardinia, the capital of the island, situated on a hill slope near the south coast. It consists of four parts: (1) the Cas¬ tle or old town; (2) the Marina; (3) Estem-pache; (4) the Villa Nuova or new town. It is fortified, and is the residence of the viceroy and of an archbishop, and the seat of a univer¬ sity founded in 1596, and revived and re¬ modeled in 1765. Cagliari has some manufac¬ tures, and is the chief emporium of the Sardin¬ ian trade. There are dockyards and a spacious and safe harbor. The <(Castle)) contains some important buildings, including palaces of the nobility. The cathedral, partly faced with mar¬ ble, was completed in 1312, but afterward modernized. The city was founded by the Phoenicians, and there are some interesting re¬ mains of Roman times, including an amphi¬ theatre and ancient dwelling-houses. Cagliari was the residence of the kings of Sardinia from 1798 to 1814. It is connected by railway with the most important Sardinian towns. Pop. of commune 59,606.

CAGLIOSTRO, kal-yos'trd, Alessandro

(Count of) (real name Giuseppe Balsamo), Italian charlatan: b. Palermo, 8 June 1743; d. Saint Leon, Italy, 26 Aug. 1795. He entered the order of the Brothers of Mercy, where he found an opportunity to cultivate his talents for medical science, by which he afterward dis¬ tinguished himself. But as he showed at the same time a great love of dissipation, he was compelled to separate from the order. He re¬ turned to Palermo, where, among other tricks, he deceived some credulous persons by his pre¬ tended skill in magic and the finding of hidden treasures. He also showed himself adroit in counterfeiting handwriting, and attempted to get possession of a contested estate by means of a forged document, but was discovered and was obliged to flee. He now determined to go to Rome, and in his journey through Calabria became acquainted with Lorenza Feliciani, daughter of a belt-maker, who appeared to him intended by fortune to assist his designs. He formed an intimacy with her, and they began their travels, in which he assumed the character

of a man of rank, first appearing under the name of the Marquis Pellegrini, and finally under that of the Count Cagliostro. He trav¬ eled through many countries of Europe, stopped in the capital cities, and by his chemical mix¬ tures, his trices, and by the amours of his companion, gained considerable sums. He knew how to cheat with great ingenuity, and was al¬ ways fortunate enough to preserve himself by an early flight, if men's eyes began to be opened, or waking justice threatened him with impris¬ onment. The discovery of the philosopher's stone, the preparation of a precious elixir vitae, etc., were the pretenses by means of wffiich he extracted considerable sums from credulous people. Many had recourse to his assistance, not indeed to be initiated into the mysteries of magic, but to purchase at a high rate different kinds of medicine, one of which was the water of beauty. This profitable business employed him many years ; but his trade in medicine began to grow less lucrative, and he determined to seek his fortune as the founder of a new and secret sect. In pursuance of this plan he passed himself off during his second residence in Lon¬ don for a Free Mason, and played the part of a magician and worker of miracles, in which character he drew upon himself the eyes of all the enthusiasts in Europe. The Countess Cag¬ liostro, on her part, did not remain idle. She was the first and most perfect scholar of her husband, and ably played the part of a priestess to this new order. His plan for reviving an old Egyptian order, the founders of which he declared to be Enoch and Elias, contained a mass of absurdities, but his pretensions to super¬ natural power, the mystery writh which his doc¬ trines were enveloped, his pretended ability to work miracles, his healing the sick without pay, with the greatest appearance of generosity, and the belief that, as the Great Ivophta (this name he had taken as the restorer of Egyptian ma¬ sonry), he could reveal the secrets of futurity, gained him many friends and supporters. Cag¬ liostro again traveled through Europe, and at¬ tracted great attention in Mittau, Strassburg, Lyons and Paris. While in this last city (1785) he had the misfortune to be implicated in the scandalous affair of the Diamond Neck¬ lace, and was banished the country as a confi¬ dant of Cardinal Rohan. He now returned to London, and sent many epistles to his follow¬ ers, wherein he bitterly complained of the in¬ jury he had received in France, and painted the French court in the blackest colors. From London, where he could not long remain, he went to Basel and other cities in that quarter. But at length, listening to the repeated en¬ treaties of his wife and other friends, he re¬ turned (1789) to Rome. Here he busied him¬ self about Freemasonry; but being discovered and committed to the Castle of Saint Angelo, he

was condemned by a decree of the Roman Inquisition to imprisonment for life as a Free¬ mason, an arch heretic and a very dangerous foe to religion. He died after five years' im¬ prisonment. His wife retired to a convent. Con¬ sult the Cagliostro bibliography by W. E. A. Axon in (Notes and Queries) (4th series, Vol. X, London 1872) ; Carlyle, Thomas, (The Life of Count Cagliostro) (London 1787) ; (The Life of Joseph Balsamo, Commonly Called Count Cagliostro* (London 1791) ; Trow¬ bridge, (Cagliostro; the Splendor and Misery

of a Master of Magic) (New York 1910). There is much spurious material in existence concerning Cagliostro, such as the socalled 'Memoires authentiques) (Paris 1786).

CAGNACCI, kan-ya'che. See Canlassi.

CAGNOLA, kan-ya'la, Luigi, Marchese, an Italian architect: b. Milan, 9 June 1762; d. Inveriga, 14 Aug. 1833. He was a member of the State Council, and was much engaged in political affairs. His most celebrated works are the Arco della Pace, (<Arch of Peace,® commenced in 1807 and finished in 1837; the Porta di Marengo, . subsequently called Porta di Ticino (both built by order of Napoleon), at Milan; the Campanile, at Urgnano, com¬ pleted in 1829, and the mausoleum for the Metternich family.

CAGNOLI, kan-yo'le, Antonio, Italian as¬ tronomer: b. Zante, Ionian Islands, 1743; d. Verona, Italy, 1816. He was attached in his youth to the Venetian embassy at Paris, where, after the year 1776, he showed more love for astronomy than for diplomacy. Having settled in Verona in 1786 he constructed an observa¬ tory in his own house, by his observations in which he enriched the science of astronomy with many discoveries. After the destruction of his observatory by the French (1798), who, however, compensated him for his loss, his instruments were transferred to the observatory of Brera in Milan, and he was appointed professor of astronomy in the military school at Modena. His best works are (Notizie astronomiche adat. all' uso comune) (1802); (Trigonometria piana e sferica> (2d ed,, Bologna

1804).

CAGOTS, ka -go’, a race or caste of men, living in the south of France in the region of the Pyrenees, regarded as pariahs or social outcasts. In former ages they were shut out from society as lepers, cursed as heretics and abhorred as cannibals; their feet were bored with an iron, and they were forced to wear a piece of red cloth in the shape of a duck’s foot on their clothes by way of distinction. The only trade they were allowed to follow was that of sawyers or carpenters. They had to enter the church by a special door, and had a special corner set apart for them with a holy-water vessel for themselves. Opinions are divided with regard to the origin of the Cagots, of whom there are now comparatively few. They have been considered by some to be remains of the Saracens conquered by Charles Martel. The most plausible conjec¬ ture is that which derives them from the Visigoths who established themselves in the south of France and in Spain in the 5th century. The origin of the name has been the subject of equal controversy. Among nu¬ merous derivations, is that from canis and gothns, (<dogs of Goths.® Others derive the name from a word simply meaning leper, and believe that the Cagots were originally lepers, who as such were expelled from the society of and intercourse with their fellowmen. Several diseases and deformities, doubtless due to inbreeding, are common among them, such as cretinism (q.v.) , goitre, *etc.* Until the French Revolution the Cagots were not considered citizens. Some remains of them, or of corresponding outcasts, are to be found vol. 5 — to

under various names in different parts of France. Their language is a jargon of neigh¬ borhood dialects with some original forms. Similar remains are also found among the mountains of North Spain. Consult Michel, (Histoire des races maudites de la France et de 1’EspagneP

CAGSAUA, kag’sa-wa’, or DARAGA,

Philippines, town of Luzon, Albay province, two miles north of Albay, an important hemp growing and trading centre. Pop. 18,700.

CAGUAS, ka’gwas, Porto Rico, munic¬ ipality and commune; on the military road, 22 miles southeast of San Juan. It is a thriving tobacco growing and cigar manufacturing centre, and also has marble and limestone quarrying industries. Pop. 10,500.

CAHAN, ka’han, Abraham, Russo-Ameri- can journalist and novelist :

b. Vilna, Russia, 7 July 1860. He came to the United States in 1882 and has edited several Yiddish periodicals in New York. He was prominent as a labor leader and in time drifted to the Socialists. He became editor of the Jewish daily Vor-u'drts in 1901. After 1884 he was a constant contributor to American journals, his articles generally dealing with phases of Ghetto life. He has written (Yekl, a Tale of the New York Ghetto) ; (Raphael Narizokhp in Yiddish; (The Chasm-* ; (The Imported Bridegroom and Other Stories) ; /The White Terror and the Red* (1904) ; (Ein Historie von die Vereinigte Staaten) (1912); (Yiddish Folk Songs) (1912).

CAHENSLYISM, a popular name given to a movement in the United States in 1891, among Roman Catholics speaking other lan¬ guages than English, to have bishops or priests of their respective nationalities appointed over them. It took its name from Herr Cahensly, a layman, secretary of Saint Raphael's Society for the protection of German Catholic immi¬ grants to America, on the supposition that he was the chief inspirer of the movement. On a visit to the United States in 1893 Herr Cahensly denied his connection with the scheme. It was vigorously opposed by most of the English-speaking prelates of the Catholic Church in the United States. It received no official sanction by the Vatican authorities, and, after considerable agitation in the Cath¬ olic and secular press, died out. As a matter of fact, owing to the large immigration of Roman Catholics speaking foreign tongues, priests of their respective nationalities are often appointed to administer to their spiritual needs. This is especially notable in the in¬ stance of the Italians. To meet this necessity in the archdiocese of New York, the study of Italian is now made compulsory in its diocesan seminary for all candidates for the priesthood.

CAHILL, Thaddeus, American inventor: b. Iowa 1867. After studies at Oberlin Col¬ lege 1884-85, and a law course at George Washington (then Columbian) University, he was admitted to the bar in 1894, but never practised, devoting himself to mechanical in¬ vention. His most notable achievements are the electric typewriter and the telharmonium, the latter a device to produce music electri¬ cally by means of dynamos transmitting vi¬ brations from a central station to receiving

telephones. George Washington University conferred on him the degree of D.C.L. in 1900.

CAHORS, ka-or', France (ancient Cadur-cum), capital of the department of Lot, and on the river of that name, 60 miles north of Toulouse. It is nearly surrounded by the river, and communicates with the opposite shore by three bridges, one of which, dating from the 14th century, is the finest fortified bridge of mediaeval times existing in the country. Before the conquest of Gaul by Caesar it was the capital of the Cadurci, and under the Romans, who gave it the name of Divona, it was adorned with a temple, theatre, baths, an immense aqueduct and forum. Sev¬ eral Roman roads can still be traced in its vicinity. Among the principal edifices are the cathedral, an irregular structure, supposed to date from the 12th century; an episcopal palace, now converted into the prefecture ; three old churches; barracks; a theatre; and a lyceum or college. In the Middle Ages it was a great centre of finance operated by Lombard bankers. Cahors had formerly a university, which was united with that of Toulouse in 1751. It was founded in 1322 by Pope John XXII, a native of the town. The celebrated jurist Cujas was a professor, and Fenelon a student, in it. The manufactures are insignificant ; but a considerable trade is carried on in the red wine of the district, in brandy and nut oil. Coal is worked in the vicinity. Clement Marot, the poet, and Leon Gambetta, the statesman, were born here. Cahors was given up to the English by the Treaty of Bretigny in 1360. It revolted, and returned to French allegiance in 1428. Pop.

13,650.

CAIAPPIAS, ka'ya-fas, the high-priest of the Jews at the time when the crucifixion took place. Previously, when the resurrection of Lazarus had spread dismay among the Jewish functionaries, it was Caiaphas who suggested the expediency of putting the Saviour to death, and when Jesus was arrested in Gethsemane he was carried first to Annas and then to Caia¬ phas, from whom he was transferred to the hands of the civil authority. Caiaphas was deposed, 35 a.d., and Jonathan, son

of Annas, appointed in his stead. Consult Schiirer, (Geschichte des jiidischen Volkes) (Vol. II, 4th ed., 1907) ; Schmidt, (The Prophet of Naza-retlP (pp. 286 f, 2d ed, 1907).

CAIBARIEN, ki-ba-re-an', Cuba, a town of the province of Santa Clara, situated on the northern seacoast ; it has sponge fisheries and some trade. Pop. about 10,000.

CAICOS, kfikos, CAYOS or THE KEYS

(from the Spanish cayo, a rock, shoal or islet), one of the island groups comprehended under the general name of the Bahamas, belonging to Great Britain, consisting of six islands be¬ sides some uninhabited rocks; between lat. 21° and 22° N. and long. 71° and 73° W. The largest, called the Great Key, is about 30 miles long. They are wooded and tolerably fertile, and at one time produced cotton, but at pres¬ ent the inhabitants are few in number and mostly engaged in fishing and the preparation of salt. In 1873 the Turks Islands and the Caicos were united into a commissionership under the jurisdiction of the governor of Jamaica. Pop. 5,615.

CAILLAUX, ka'yo', Joseph, French statesman: b. Mans 1863. After the study of law he entered politics and became in¬ spector of finances in 1888. Elected deputy for Sarthe in 1898, 1902 and 1906, his rise was rapid. He was thrice Minister of Finance between 1899 and 1911, when he became Pre¬ mier and Minister of the Interior. For the fourth time, 8 Dec. 1913, Caillaux was ap¬ pointed Minister of Finance. His general ad¬ ministration, previously attacked and criticized, now became the object of a special campaign to discredit him, directed by Gaston Calmette, editor of the Figaro. Following the publica¬ tion of a letter 13 March 1914 said to have been abstracted from M. Caillaux's office, and which showed duplicity on his part in con¬ nection with the defeat of the income tax bill, *Mme.* Caillaux shot and killed Calmette in his office 16 March 1914. This deed was followed by Caillaux's resignation. In December 1917 Caillaux and others were charged with treason¬ able correspondence with Germany in the course of the war. On 22 Dec 1917 the Chambre voted to deny Caillaux parliamentary immunity, he was arrested and held for trial. He was sum¬ moned as a witness in the trials of Paul Bolo Pasha (q.v.) and of the editor of the Bonnet Rouge and the other persons indicted for treasonable commerce with the enemies of France as a result of the Bolo expose. For later developments see France — History.

CAILLETET, ka-ye-ta, Louis Paul,

French chemist: b. Chatillon-sur-Seine 1832; d. 1913. He studied at the School of Mines in Chatillon and subsequently gave especial at¬ tention to original research. He succeeded in liquefying oxygen and nitrogen in 1877, fore¬ stalling by a few days a similar discovery by a Swiss, chemist, and wras at once elected corre¬ sponding secretary of the Academie des Sciences, becoming a full member in 1884. He was made an officer of the Legion of Honor in 1889.

CAILLIAUD, ka'yo', Frederic, French traveler: b. Nantes, France, 9 June 1787; d. there, 1 May 1869. In examining the mineral resources of Egypt he rediscovered the ancient emerald mines of Jebel Zobara, near the Red Sea; and his report of a journey to Siwah led to its annexation by Egypt in 1820. In 1821-22 he accompanied Ibrahim Pasha's ex¬ pedition to the White Nile, and his (Voyage a Meroe) (1826-27) contained the first reliable information of that district. On a mummy bought from him by the French government

a. Greek translation was added to the usual hieroglyphic inscription, which aided Cham-pollion in his researches in the Egyptian language. He also published (Voyage a l'oasis de lhebes) (1821). In 1827 he settled as conservator of the Natural History Museum at Nantes. He published also (Voyage a l'oasis de SyouahP (1823); (Recherches sur les arts et metiers, les usages de la vie civile et domestique des anciens) (1837).

CAILLIE, ka-ya, Rene, French traveler:

b. Mauxe, Poitou, France, 19 Sept. 1709; d. Paris, 8 May .1838. He became an African traveler early in his career, obtaining his liv-ing by trading with the Moors, who taught him Arabic. On his travels hfe dressed in Arabic style and passed as an Egyptian. Hav¬ ing gone to Senegal he learned that the Geo-

graphical Society of Paris had offered a premium of 10,000 francs to the first traveler who should reach Timbuctoo. On 13 June 1827 he reached for the first time the shores of the Niger, which he crossed. He then traveled about 200 miles eastwardly over territories ndver visited before, arriving at Time 3 Au¬ gust. Here he was detained by illness until 9 Jan. 1828, when he struck on a new road previously unknown to geographers, and reached Jenne on 11 March. Here he embarked for Timbuctoo, where he arrived about 11 April, after one month's sail on the Niger. After a short stay of a fortnight, and after a tedious and painful return passage through the desert, he reached Fez, 12 August, and from there returned to France. On his arrival at Toulon he was received with the utmost en¬ thusiasm. He was the first European who ever returned from Timbuctoo, and who had achieved success, while expeditions supported by government had resulted in failure. A special prize of 10,000 francs was awarded to him by the Geographical Society, with the annual prize of 1,000 francs for the most im¬ portant discovery. The order of the Legion of Honor was conferred upon him by the King, and he became, at the same time, the recipient of a salary in connection with an office, to which he was appointed in the Sene¬ gal service. Furthermore, a pension from the fund set apart for eminent literary and scientific men was decreed to him by the Minister of the Interior, and his (Journal d'un voyage a Temboctou et a Jenne, dans l'Afrique centrale,5 with geographical data added by Jomard, was published at the expense of government, and appeared at the beginning of 1830 in three volumes.

CAIMAN. See Cayman.

CAIN, the eldest son of Adam and Eve; the first murderer, who slew his brother Abel. God drove him from His presence, but relieved his fears by appointing for him a sign, <(lest anyone finding him should smite him.® For the biblical account of Cain and his descend¬ ants see Gen. iv-vii. Modern biblical scholars assume that Genesis iv is a composite of stories relating to several Cains. The posterity of Cain became extinct at the flood. Cain founded the first city, which he named after his son Enoch, and his descendants were the first in¬ ventors and promoters of the useful and agree¬ able arts. Josephus relates that he became the leader of a band of robbers, committed all sorts of licentiousness, corrupted the simplicity of primitive manners by his luxury, established the right of property by setting up landmarks and was the inventor of weights and measures. A Gnostic sect of the 2d century were called <(Cainites.55 See Religious Sects. Consult Stade, (Das Kainzeichen> (in Zeitschrift fur alttestamentliche

Wissenschaft, Vol. XIV, pp. 250ff, 1884) ; Driver, (Book of Genesis 5 (1904) ; Gordon, Early Traditions of Genesis5 (1907); Cheyne, (Cain) (in Encyclopedia Biblical; Schmidt, (Messages of the Poets> (pp. 290ff, 1911); Gunkel, <Genesis) (3d ed.,

1913).

CAIN, ka-an, Auguste Nicolas, French sculptor: b. Paris, 4 Nov. 1822; d. there, 7 Aug. 1894. He was in early life a carpenter, but subsequently studied under Guionnet and

Rude, and devoted his attention chiefly to groups of animals. He received the bronze medal in the great exhibition of 1851, another medal in 1864 and a third at the Universal Exposition in 1867. His largest work was the monument of Duke Charles of Brunswick for Geneva — an equestrian statue representing two lions and a griffin in red marble. Among noted works by him are Eagle Defending its Quarry5 (1852) ; (Combat Between Two Tigers>

(1878) ; (Rhinoceros Attacked by Tigers.5

CAIN, Richard Harvey, American clergy¬ man : b. Greenbrier County, Va., 12 April 1825 ; d. Washington, D. C., 18 Jan. 1887. He entered the ministry at an early age ; was elected to the South Carolina Constitutional Convention in 1867, and to the State senate in 1868; and was a member of Congress 1876-80. He was made bishop in the African Methodist Episcopal Church and placed in charge of the churches in Louisiana and Texas, and later was trans¬ ferred to the first Episcopal district of that Church. While in Texas he organized Paul Quinn College in Waco.

CAIN, William, American civil engineer: b. Hillsboro, N. C., 14 May 1847. He was graduated from the North Carolina Military Institute and has been professor of mathe¬ matics and civil engineering in the University of North Carolina since 1889. He has pub¬ lished (Theory of Voussoir, Solid and Braced Arches) (1874) ; (Maximum Stresses in Framed Bridges) (1878); (Solid and Braced Elastic Arches) (1879); (Symbolic Algebra) (1884); Eractical Designing of Retaining Walls) (1888) ; (A Brief Course in the Calculus) (1905) ; and contributions to scientific journals.

CAINE, (Thomas Henry), Hall, English novelist and dramatist : b.

Runcorn, Cheshire, 14 May 1853. He received his education in the Isle of Man and at Liverpool, and qualified as an architect, but abandoned architecture in or¬ der to become a journalist. He lived in London with Dante Gabriel Rossetti from 1881 till the latter's death in 1882, and in that year appeared his (Recollections of Rossetti.) He had pre¬ viously published (Richard III and Macbeth' (1877), a critical work, and (Sonnets of Three Centuries5 (1882). In 1883 appeared his ˆCob¬ webs of Criticism5 ; and in 1887 he contributed to the Great Writers series a Eife of Cole¬ ridge.5 His first novel was (The Shadow of a Crime5 (1885), followed by (A Son of Hagar5 ; but (The Deemster5 (1887) first brought him fame. His subsequent novels include (The Bondman5 (1890); (The Scapegoat5 (1891); (The Prophet5 (1892) ; (The Manxman' (1894) ; (The Christian5 (1897) ; (The Eternal City5 (1901) ; (The Prodigal Son5 (1904) ; (The White Prophet5 (1909); (The Woman Thou Gavest Me5 (1913). His most successful novels deal with Manx life, in the description of which he reveals intimate knowledge of his subject and considerable literary power. His principal novels have been successfully drama¬ tized. In (My Story5 (1908) he records the earlier years of his literary life.

CAINOZOIC. See Cenozoic. .

CAIQUE, ka-ek', a light boat or skiff much used in the Levant, and particularly in the Bosporus.

CAIRD, kard, Edward, Scottish philoso¬ pher : b. Greenock, 22 March 1835 ; d. Oxford, 1 Nov. 1908. He was educated at the univer¬ sities of Glasgow and Oxford; was a fellow and tutor of Merton College, and was professor of moral philosophy at Glasgow from 1866 till 1893; and in 1893 succeeded Benjamin Jowett as master of Balliol College, Oxford, a position he held with much distinction until his retire¬ ment in 1906. He is author of 'Account of the Philosophy of Kant' (1878); 'Social Philoso¬ phy and Religion of Comte' (1885) ; 'Hegel' (in (Blackwood's Series of Philosophical Classics,' 1883) ; 'Critical Philosophy of Kant' (1889) ; (Essays on Literature and Philosophy' (1892) ; and 'The Evolution of Religion) (1893) ; (Evolution of Theology in the Greek Philosophers' (1904) ; (Lay Sermons and Addresses) (1907); ' Essays on Literature ' (1909). He is a brother of John Caird (q.v.).

CAIRD, John, Scottish theologian : b. Greenock, 15 Dec. 1820; d. London, 30 July 1898. He was educated at the Grammar School of Greenock, and at Glasgow University, where he took a high place both in arts and divinity. Having entered the ministry of the Church of Scotland, in 1845 he became minister of New-ton-upon-Ayr, and two years later was trans¬ ferred to Lady Yester's parish, Edinburgh. Be¬ tween that date and 1862, when he became pro¬ fessor of divinity in Glasgow University, he was minister of Errol, Perthshire (1849-57) and of Park Church, Glasgow (1857-62). In 1873 he was elected principal of his university, a position which he held till his resignation in 1898. He died before his resignation had taken effect. He was generally recognized in Scot¬ land as the most powerful preacher of his time. He published sermons (his sermon 'Religion in Common Life,' preached before the Queen, had an immense circulation, and was described by Dean Stanley as the greatest single sermon of the century) ; Untroduction to the Philoso¬ phy of Religion' (1880) ; and (Spinoza) (1888) in (Blackwood's Philosophical Classics.) In 1899 appeared 'The Fundamental Ideas of Christianity,' under the editorship of hi-s brother, Edward Caird (q.v.), accompanied by memoir of the author.

CAIRN, karn (Gaelic cam), a name given to heaps of stones, common

in Great Britain, particularly in Scotland and Wales, generally of a conical form. Some are evidently sepulchral, containing urns, stone chests, bones, *etc.* Others were erected to commemorate some remarkable event, and others appear to have been intended for religious rites.

CAIRNES, karnz, John Elliot, British political economist : b. Castle Bellingham, County Louth, 26 Dec. 1823; d. London, 8 July 1875. After an education at Kingstown and Chester he was for a time employed in his father's brewery at Drogheda, but ultimately went to Trinity College, Dublin. He was grad¬ uated in 1854, and two years afterward was ap¬ pointed Whately professor of political economy at Dublin. His first series of lectures was pub¬ lished in 1857, under the title 'The Character and Logical' Method of Political Economy.' In 1859 he was elected professor of political econ¬ omy and jurisprudence in Queen's College, Gal¬ way, and seven years later was appointed to the

corresponding chair in University College, Lon¬ don; but in 1872 the state of his health com¬ pelled him to give up active teaching. He had been called to the Irish bar in 1857, but he hardly ever practised. During the later years of his life he suffered much from the effects of an accident to his knee, which befell him while hunting in 1860, and for some time before his death was completely crippled. In 1862 he is¬ sued a work in defense of the Northern States of America, entitled 'The Slave Power,) which created a profound impression. The most im¬ portant of his other works are 'Essays on Political Economy, Theoretical and Applied' (1873) ; and 'Some Leading Principles of Po¬ litical Economy Newly Expounded ' (1874). He takes rank as one of the leading economists of the 19th century.

CAIRNGORM, karn-gorm' (that is, "blue cairn"), a mountain of Scotland belonging to the Grampian Hills, on the border of Banffshire and Inverness-shire, three miles north of Ben Macdhui in Aberdeenshire. Its summit is 4,084 feet above the level of the sea, and its sides are clothed with pine forests. The group of moun¬ tains to which it belongs is known as the Cairngorm Mountains. It is particularly cele¬ brated for the regular, brownish yellow crystals of quartz found on it and known as cairngorms. These are also found in many other places, and are much used for seals, brooches, *etc.* Speci¬ mens weighing a good many pounds are some¬ times found.

CAIRNS, karnz, Hugh McCalmont Cairns

(1st Earl), Irish lawyer and parliamentary de¬ bater: b. County Down, Ireland, 1819; d. Bournemouth, England, 2 April 1885. He was called to the bar at the Middle Temple in 1844, was returned to Parliament for Belfast in 1852 and quickly made his mark in the House by his fluency and readiness in debate. He became Queen's counsel in 1856, in 1858 solicitor-gen¬ eral, and in 1866 attorney-general under Lord Derby. Later in the same year he was a judge of appeal, and in 1867 was created Baron Cairns. Under Disraeli's premiership he be¬ came Lord Chancellor in 1868, and again in 1874, and was created Earl Cairns in 1878. For some years he led the Conservatives in the House of Lords with dexterity and vigor, and is ranked among the finest parliamentary ora¬ tors of his time.

CAIRNS, John, Scottish theologian : b. Berwickshire, 23 Aug. 1818; d. Edinburgh, 14 March 1892. He was ordained at Berwick in 1845, where he remained till 1876, becoming also in 1867 professor of theology in the Uni¬ ted Presbyterian Church, and principal in 1879. He was an eminent preacher of a healthy evan¬ gelical type, and among his works were 'Life of John Brown, D.D.' (1860) ; 'False Christs and the True) (1864); and 'Unbelief in the 18th Century' (1881). Consult Cairns, 'Prin¬ cipal Cairns' (1903); A. MacEwen, 'Life and Letters of John Cairns' (London 1895), and his brother's memoir in the 'Famous Scots' series (1903).

CAIRO, kl'rd (Arabic El Kahira, "The Victorious," or Masr cl Kahira), Egypt, capital of the country and largest town of Africa, situ¬ ated on the right bank of the Nile, about nine miles above the point where it divides to form

TOMBS OF THE MAMELUKES, CAIRO

the two main branches of its delta. The town is built between the river-bank and the northwest¬ ern end of the hills known as Jebel Mokattam, on whose most advanced spur the citadel stands in a

commanding position well above the rest of the city. Within the last 50 years the town has lost much of its Oriental character, but the Arab quarters still present a maze of very narrow streets lined by curious buildings in an endless variety of style. The houses are mostly built of yellow limestone, with flat roofs ; and many of them have small gardens behind. In the more modern parts of the city the streets are broader, and many of them are lined by trees and well lighted. The European quarter, known as Ismailiyeh, forms the western part of modern Cairo, and its centre is the octagonal Ezbekiyeh Garden (20ˆ4 acres), with plants from many regions and with an artificial pond. Here, too, are many cafes, concert-halls and other similar buildings. Among the more not¬ able buildings of the European quarter are the consulates, the opera-house, open in winter, the Italian summer theatre, English and German churches, the ministerial offices and the bar¬ racks. The chief business street of Cairo, known as Muski, runs east-southeastward from the neighborhood of the Ezbekiyeh, and the Boulevard Mehemet Ali extends from about the same place southeastward to the citadel. Cairo has more than 500 mosques, but many of them are wholly or partly in ruins. The finest of all is t.he Sultan Hasan Mosque, a truly noble building with a lofty minaret. Others worthy of mention are : that built in the 9th century by Ahmed ibn Tulun in imitation of the one at Mecca ; the Hakim Mosque, dating from the beginning of the 11th century; the Hosen Mosque of the Son of Ali, Mohammed's son-in-law ; the Sitti-Zeynab Mosque, named after a grandchild of the Prophet, and the Ala¬ baster Mosque of the citadel, with the tomb of Mehemet Ali, the finest of the modern mosques. Cairo is one of the great educational centres of the Mohammedan world, the chief of the schools being that associated with the mosque of El Azhar, attended by 8,000 students, and having behind it the history of nearly a thou¬ sand years. The tombs in the burying-grounds outside the city, many of them in the form of mosques, are remarkably interesting, es¬ pecially those known as the tombs of the ca¬ liphs. The most important gate of the city is the Bab-en-Nasr, through which large num¬ bers of pilgrims pass every year on their way to Mecca. The mosques contain valuable li¬ braries, but the chief library of the city is the vice-regal one, founded in 1870, and now con¬ taining about 60,000 volumes, largely in manu¬ script. The trade of Cairo is large and the bazaars and markets are numerous, there being special bazaars for gold-and silversmiths, tap¬ estry merchants, saddlers, armorers, shoemak¬ ers, *etc.* It has also a large cotton industry. Beside the numerous Mohammedan places of worship Cairo contains English, French, Ger¬ man, Coptic and other churches and Jewish svnagogues, and there are European schools and hospitals. The Egyptian Institute, founded at Alexandria in 1859, is now located

in Cairo.

The suburb of Bulak, in the northwest of the town, opposite the island of Bulak, forms the port of Cairo, and its narrow streets present a busy scene of Oriental life. The island of Bulak

and the left bank of the Nile are reached by a great iron bridge, and there is also a railway and general traffic bridge below the island. To the southwest of the modern town and also on the Nile bank stands the suburb of Old Cairo or Masr el-Atika. On the left bank of the river, almost directly opposite Old Cairo, is the suburb of Gizeh. It has government buildings, a zoological garden, etc., but its chief attraction is the great Egyptological Museum formerly in Bulak, but removed here in 1889. From Gizeh a road and a tramway lead southwest-ward to the famous group of pyramids called the pyramids of Gizeh. On the island of Roda, between Gizeh and Old Cairo, the celebrated Nilometer still stands. Cairo enjoys a very mild climate, and is in consequence visited in winter by many Europeans suffering from chest and lung ailments. Many of these stay at Hel-wan, a small place about 14 miles south-south¬ east of the town. Cairo is in railway commu¬ nication with Alexandria, Damietta, Suez, etc., and with Upper Egypt, and the Fresh-water Canal connects it with Ismailia and Suez. In 1896 electric tramways were introduced in the most important streets. Cairo is the residence of the Khedive, the seat of a Coptic and a Greek Orthodox patriarch, and it contains all the highest public offices of the country. El-Fostat, (<The Tent,® now Old Cairo, was founded by Amru, lieutenant of Caliph Omar, in 640 a.d. In 969, when the Fatimite dynasty gained possession of the country, the new city to the north was founded. Saladin surrounded it with walls of stone and built the citadel. He also constructed a wooden aqueduct from the Nile to the citadel, a work afterward replaced by the still existing aqueduct of stone. Cairo was taken by the French in 1798, and passed into the hands of the Turks in 1801. The city was occupied by the British in 1882, after the battle of Tel-el-Kebir and has since remained in their hands. Pop. (1911) 654,476, including Fellahin, Copts, Turks, Arabs and other Ori¬ entals, besides about 53,000 foreigners from the chief European countries, especially Italy, Greece, France, Austria, England and Ger¬ many. Nowhere in the world do the contrast¬ ing civilizations of East and West blend more picturesquely than in Cairo.

CAIRO, Ill., city, port of entry and county-seat of Alexander County, situated at the junc¬ tion of the Mississippi and Ohio rivers, in the southernmost part of the State, with Ken¬ tucky on the east and

Missouri on the west, 150 miles southeast of Saint Louis, on the Illi¬ nois Central, Cleveland, Cincinnati, Chicago and Saint Louis and other railroads. The city was first settled in 1838 by William Bird and was incorporated as a city in 1857. It was ex¬ pected to become a great commercial centre. Cairo has a commission government, adminis¬ tered by a mayor and four commissioners. It has a large transit trade in agriculture and lumber, and affords a good market for the nroduce and trade of the Mississippi Valley. The industries include sewing-machine factory, box factories, handle factory, flour mills, wagon works, foundries, *etc.* The United States census of manufactures for 1914 re¬ ported 61 industrial establishments of factory grade, employing 1,769 persons, of whom 1.522 were wage earners, receiving annually $853,-

000 in wages. The capital invested aggregated $3,474,000, and the year's production was valued at $4,584,000; of this, $1,538,000 was the value added by manufacture. The city has four banks with a combined capital of $4,806,690. A United States custom house is located in Cairo and it has a free public library, court¬ house, United States Marine Hospital, Saint Mary's Infirmary and Bondurant Hospital. The Federal government during the Civil War used the town as a depot for military supplies. For many years, until levees were built, the city suffered from frequent floods which greatly im¬ peded its progress, the most disastrous of which occurred in 1858. In 1913 $250,000 was appro¬ priated by the State for the repair of levees within the city limits ; it is the ((Eden,:> of Dickens' (Martin Chuzzlewit.* The city is growing in wealth and population, has many fine churches and an excellent system of edu¬ cation with six white schools, five colored schools and two parochial schools. The value of its taxable property is $11,000,000. Pop.

(1920) 15,203.

CAISSON, a water-tight chest or casing, used in the construction of

bridges, quays, etc., large enough to contain an entire pier, which is built in it, the caisson being sunk to the bed of the river. (See Foundation). The pneu¬ matic caisson has an air-chamber in which men may work at the bottom of the water, air pres¬ sure being maintained within the caisson suffi¬ cient to keep the water out, and the air-space being entered by what is called an air-lock. This form of caisson is used where the water is too deep or the bottom too rocky to permit of the construction of a coffer-dam. The name is also applied to an air-tight structure which is sunk below a vessel by the admission of water, and raises the vessel when the water is pumped out, although the commoner name for this form is ˆpontoon.ˆ It is also used to des¬ ignate the hollow boat-shaped gate used to close the entrance to a dry dock. (See Har¬ bors). In military language, the term is applied to the ammunition carriage attached to a battery of artillery. In architecture caisson signifies a panel left in a vaulted ceiling or more rarely in a flat ceiling or a wall. They are sometimes square, but the most common arrangement is a pattern of sunken octagons with much smaller sunken squares set diagonally between. The caisson may be decorated with mouldings and ornaments of stucco painted and gilded.

CAISSON DISEASE, or COMPRESSED AIR DISEASE, a disorder occurring among workers in compressed air, who are submitted to a pressure of two or three atmospheres, as in bridge-caissons. The symptoms of the dis¬ ease do not appear while the workman is under compression but come on after decompression when some minutes or even hours have elapsed. The symptoms were at first thought to be due to mechanical pressure which by producing changes in the distribution of the blood caused congestion or blood stases when pressure was removed. This, however, is contrary to the adaptability of body fluids to pressure and does not agree with experimental evidence. The gas emboli theory is now generally accepted. According to this theory blood in compressed air absorbs an increased amount of oxygen and nitrogen which under compression is distributed

to the fluids of the various parts of the body. If now rapid decompression takes place bub¬ bles of gas form in the blood more rapidly than the gas can be cast off by the lungs and numerous capillary emboli result. These then cause pain in local regions, either by direct or mechanical force, or by cutting off the local blood supply. There may be more or less gen¬ eral pain involving two or three or all of the extremities and sometimes severe abdominal pain with prostration, which in some cases re¬ sult in unconsciousness, collapse

and death. These symptoms are due to the presence of cord or brain lesions, the result of the gas em¬ boli in the blood supply to the central nervous system. Vertigo with deafness and occasional labyrinthine haemorrhage are sometimes pres¬ ent and probably point to embolism in the laby¬ rinth. Dyspnoea and sense of constriction in the chest are also sometimes present but are not fatal. The most successful treatment is that of recompression with gradual decompres¬ sion carried on in a medical air-lock. This is now required by law in some countries. Pro¬ phylactic measures are carried out by careful examination of the workman and elimination of those unfitted for work in compressed air. Predisposing factors are youth or too ad¬ vanced age, alcoholism, organic disease and fat¬ ness. New men should be given a short shift and w'orkmen should be carefully supervised. Fatigue is also a factor. Certain countries and states already have lawrs regulating shifts and providing for gradual decompression, gauged according to the pressure undergone, which are the chief preventive measures.

Smith Ely Jelliffe.

CAITES, or CAETES, ka-e-taz', an ex¬ tinct tribe of Brazilian Indians which, up to the close of the 16th century, inhabited a large portion of the eastern coast region north of the Sao Francisco. Of the Tupi race, they were more warlike than other branches of that fam-ily, and, while they exhibited traits that indi¬ cated at least a crude sort of civilization, such as life in fixed villages and the practice of ag¬ riculture, they were the most cannibalistic of all the Brazilian tribes. In 1554 they murdered the bishop of Bahia and his companions, who were shipwrecked on that coast, and their rav¬ ages upon the settlements of the colonists aroused an enmity that finally resulted in their' complete extinction.

CAITHNESS, kath'nes, a maritime county in the extreme northeast of the mainland of Scotland; area, 686 square miles. The surface is generally level or undulating, and there are few hills of any height, except on the Suther¬ land border. Much of the surface is deep moss or peaty moor, but there is a fair proportion of fertile land in the eastern part. About one-quarter of the whole surface is under crops and rotation grasses, or in permanent pasture. Of corn crops oats is by far the most import¬ ant. Sheep farming is largely engaged in, and a considerable area is under deer forest. Only a very small portion of the country is wooded. Th~ coast, north and east, is prevailingly bold and rocky; in the southeast low' and sandy. The chief headlands are Dunnet Head on the north coast, Duncansby Head at the northeast corner, Noss Head and the Ord on the east coast. The largest bays are

Dunnet Bay on the north and Sinclair's Bay on the east, but Thurso Bay and Wick Bay are also noteworthy. There are many lakes, some of them very attractive. The largest is Loch VY atten, near the centre of the county. There are no navigable rivers. Caithness is poor in metallic minerals, but excellent flagstones have been quarried for many years and form one of the chief exports of the county. Many of the inhabitants are engaged in fishing, and Wick is one of the chief centres of the Scottish her¬ ring-fishery. The manufactures are subsidiary to its other industries. Wick, the county town, is a royal burgh, and Thurso is the only other town. The antiquities of Caithness are numer¬ ous, and include old castles, socalled Piets' houses, monoliths, *etc.* The country returns one member to Parliament. Pop. 32,010.

CAIUS, ka'yus. See Gaius.

CAIUS, kez, John, English physician, the founder of Cains College, Cambridge Univer¬ sity: b. Norwich, 6 Oct. 1510; d. Cambridge, 29 July 1573. His name was Kaye or Key, which he Latinized into Caius. He took his degrees at Gonville Hall, Cambridge, and was chosen fellow of his college. While at Cambridge he distinguished himself by various translations from the classics. He spent some time in trav¬ eling on the Continent, studied medicine at Padua, under Montanus and Vesalius, and took his doctor's degree at Bologna (1541). In 1542 he lectured at Padua on the Greek text of Aristotle, and in the following year made a tour through Italy, visiting the principal libra¬ ries, in order to compare the manuscripts of Galen and Celsus. He returned to his native country in 1544, and practised, first at Cam¬ bridge, then at Shrewsbury, and afterward at Norwich. He was appointed by Henry VIII lecturer on anatomy to the Company of Sur¬ geons, London. In 1547 he became fellow of the College of Physicians, and was appointed court physician to the young King Edward VI, which appointment he retained under the queens Mary and Elizabeth. In the reign of the latter, an exciting -controversy arose between the surgeons and physicians of London, as to the right of the former to administer internal remedies for sciatica. Caius argued the nega¬ tive

so ably on behalf of the physicians that the decision was against the right of the. sur¬ geons to continue the practice of administer¬ ing medicines. He was elected president of the College of Physicians for seven years in succes¬ sion. There is extant a book of the college annals from 1555 to 1572 written by him in Latin, the earliest account we have < of. the transactions of that college. He was dismissed from the royal service in 1568 on suspicion of favoring the Catholic party. He obtained per¬ mission to endow and raise Gonville Hall into a college, which still bears his name (Gonville and Caius College), and accepted the mastership thereof. His last days were passed in the se¬ clusion of his college. His works are numer¬ ous, on various subjects; many of them have been reprinted in modern times. Consult his <Works,) edited by J. S. Roberts, with memoir by J. Venn (New York 1912).

CAIUS CESTIUS, ka'yus ses'ti-us, Pyra¬ mid of, a sepulchral monument, a pyramid of the time of Augustus, standing at Rome. Built of brick and stone and encrusted with white

marble, it is more than 114 feet in height, while each side of the base measures 90 feet. This contains a small burial chamber, which is painted with arabesque.

CAIUS COLLEGE. See Gonville and Caius College.

CAIVANO, ki -va'no, Italy, a city lying north of Naples, at a distance of about five miles, and connected with the latter by tram¬ way. It was a fortified town in the Middle Ages, and at present is interesting as the cen¬ tre of a fertile agricultural district that pro¬ duces fruits, wine, olives, grain, hemp, *etc.* There are also a few manufactories. Pop. about 13,000.

CAIX, ka-eks, Napoleone, Italian philolo¬ gist : b. Bozzolo, near Mantua, 1845 ; d. 1882. His education was obtained at Cremona and Pisa, and in 1869 he was called to the chair of ancient languages in the Lyceum of Parma, becoming professor of Romance languages and comparative philology in the Institute of Higher Studies in Florence in 1873. He was a prolific writer, and among his many works are (Saggio sulla storia della lingua e dei dialetti d' Italia) (1872) ; (Sulla lingua del contrasto5 (1876) ; (Le origini della lingua poetica italiana) (1880).

CAJAMARCA, ka-ha-mar-ca', or CAXA-MARCA, Peru, the name of a

department and city in the valley of the upper Maranon, or Amazon. The department lies in a very moun¬ tainous region. Pop. 213,391. The city stands on the eastern declivity of the Andes in a rich silver mining district, 75 miles from Trujillo. It lies about 350 miles to the northwest of Lima, has broad and well-paved streets and several plazas or squares. The climate is equable, the temperature being very moderate because of the elevation. It contains several handsome churches afid flourishing manufactories of steel articles, straw hats, cotton goods, woolens and cutlery. The inhabitants are considered the best workmen in silver and iron in Peru. An extensive trade between the inland provinces and Lambeyeque and Truxillo is carried on through this town. Woolen fabrics form the chief exports, and European manufactures, sugar, brandy, wine, iron, steel and other arti¬ cles are imported in return. In the vicinity are the baths of the Incas, and a volcanic lake, into which, according to tradition, were cast the throne and regalia of the Peruvian monarchs, the last of whom, Atahualpa, perished here in 1533 by the hands of Pizarro. Pop. about 9,000.

CAJEPUT, kaj ‘e-put, or CAJUPUT OIL,

the volatile oil obtained by distillation from the leaves of the cajeput-tree (Melaleuca cajupti or minor), belonging to the order Myrtacece. This tree has lanceolate, aromatic leaves and spikes of odorless flowers, and is common in many islands of the Malay Archipelago, India and the hot sections of Australia. Booro, one of the Moluccas, yields the bulk of the oil exported, although much comes from Celebes. It is mostly sent to Singapore, when it is_ re-ex¬ ported to other countries. The oil is of a pale-green color, very limpid, lighter than water, of a strong smell, resembling both tur¬ pentine and camphor, and of a strong pungent taste. It is often adulterated with other essen-

tial oils. The color of the oil depends on the presence of a little copper, which must be re¬ moved by redistillation before the oil is fit for use in medicine, in which it has many applica¬ tions, being used as a carminative, an antispas-modic, a rubefacient and a sudorific. The active principle of cajeput oil is the camphor <(cineol” (CioHisO). Kayuputi, the native name of the tree, means <(white wood,” and

refers to the color of the bark.

CAJETAN, kaj ‘e-tan, or CAJETANUS, Tommaso de Vio, Italian cardinal: b. Gaeta, 25 July 1470; d. Rome, 9 Aug. 1534. He en¬ tered the order of Dominican friars, graduated as a doctor and was elected general of his order in 1508. When Pope Julius II was sum¬ moned to appear before the council of cardinals assembled at Pisa and afterward at Milan, in the interest of King Louis XII of France, Cajetan undertook his defense, asserting that to the Pope alone belonged the power of con¬ vening a council. He was appointed cardinal in 1517 by Leo X, and sent as a legate in Ger¬ many to bring the Emperor Maximilian and the King of Denmark into the league formed against the Turks. His efforts to make Luther recant his doctrines proved in vain. In 1519 he was present, as Roman legate, at the assembly of the electors of the empire, and sided with the partisans of Don Carlos of Spain, who was elected emperor under the name of Charles V. Then he returned to Rome, but was soon or¬ dered by Adrian VI to Hungary, which was invaded by the Turks. In 1524 he was recalled to Rome by Clement VII. On the capture of Rome in 1527, being taken prisoner by the im¬ perial troops, under the command of the Con¬ stable of Bourbon, he had to pay 5,000 crowns as a ransom for his liberty. He made a trans¬ lation of the Old Testament, with a commen¬ tary, and wrote a treatise on the authority of the Pope, which was answered by the faculty of the University of Paris. He also wrote com¬ mentaries on parts of Aristotle’s writings and on the (Sumara) of Aquinas. The latter is reprinted in the definitive edition of the great Aquinas issued under the patronage of Leo XIII (Rome 1882). A collection of his work to which his life is prefixed appeared at Lyons in 1639 (5 vols.). Consult Schilbach, (De Vita ac Scriptis de Vio Cajetani’ (1881).

CAJIGAL, ka-he-gal, DE LA VEGA, Francisco Antonio, Spanish colonial governor: b. Santander, 5 Feb. 1695; d. there, 30 April 1777. He held the post of governor of Santiago, Cuba, 1738-47, and in 1742, during the course of the war between Spain and England, repelled an attack by Admiral Vernon. He was governor-general of Cuba 1747-60, and while in office established an arsenal and navy yard at Ha¬ vana. During a part of 1760 and the year fol¬ lowing he was viceroy of Mexico. Withdraw¬ ing to Spain after this, he became councillor of the War Department (1761), and on the outbreak of hostilities with England in 1762 went to the front and fought in Portugal under the orders of the Count of Aranda. After the war, he returned to the Council of War, whose dean he became in 1768.

CAJORI, ca-jo’re, Florian, Swiss-Ameri- can mathematician : b. Saint Aignan, Switzer¬ land, 28 Feb. 1859. He came to the United States in

1875 and studied at the University of

Wisconsin and at Johns Hopkins and Tulane universities. In 1885-88 he was professor of mathematics at Tulane and removed to Colo¬ rado College in the latter year, where he be¬ came professor of physics and mathematics and' later dean of the School of Engineering. He has published (The Teaching and History of Mathematics in the United States' (1890) ; (A History of Mathematics' (1894) ; (A History of Elementary Mathematics' (1896) ; (A His¬ tory of Physics' (1899) ; (Introduction to the Modern Theory of Equations' (1904; 1912); (A History of the Logarithmic Slide Rule'

(1909).

CAKCHIQUEL, kak-che-kal', a tribe of Mayan stock occupying northern and central Guatemala. They are probably an offshoot of the Quiches, as they resemble that tribe closely in customs and language. They were conquered by Alvarado in 1524, and at that time had a well-developed civilization, as is shown by their architectural ruins and their system of hieroglyphic writings. They had an intense religious veneration for maize, and it is even probable that they were the first to cultivate it. Consult Brinton, (Annals of the Cakchiquels' (Philadelphia 1885) ; Stoll, (Zur Ethnographic der Republik Guatemala' (Zurich 1884) ; Thomas and S wanton, (Indian Languages of Mexico and Central America' (Washington

1911).

CAKE-URCHIN, SAND-CAKE or SAND-DOLLAR, a flat, round sea-urchin two or three inches in diameter (Echinarach - nius parma) which lives buried in the sand in the shallow portions of the north Atlantic, from low-water mark to 40 fathoms. It is occasionally thrown ashore on beaches. The body is protected by limestone plates, and the ((ambulacra," or delicate suckers, are arranged in a rosette on the upper side of the animal, the mouth being on the under side. See also Sea-Urchin.

CALABA OIL, an excellent illuminating oil obtained from calaba-nuts, the seeds of Calo-phyllum calaba, a tree of the order of Guttifera? that flourishes in Brazil and the West Indies, and yields useful timber. The

yield of oil is from 50 to 55 per cent of the weight of the nuts after they are divested of their shells — equiva¬ lent to about 30 per cent of their gross weight. The oil consists of the glycerides of palmitic, stearic and oleic acids, and contains about 15 per cent of a greenish resin which is poison¬ ous, and renders the oil inedible. It is, how¬ ever, used medicinally. Calaba oil solidifies at 38° F., and melts again at 46°. Its saponifi¬ cation value is 196.

CALABAR, ka-la-bar', or kal-a-bar', Africa, the former name of a district on the west coast, extending eastward from the Niger delta, and now included in the Niger Territories. The name is now applied to two towns and two rivers in that region. Old Calabar is a port in southern Nigeria, situated on the east bank of the estuary of the Cross River at the point where it receives the waters of the Old Calabar River. It contains, among other buildings, a Presbyterian Mission Institute for natives, a large prison, good hospitals and marine work¬ shops. Its climate, like that of all coast settle¬ ments in this part of the continent, is very

unhealthful. The rainfall is very great, torna¬ does are frequent and the temperature is very high. The value of its exports, consisting chiefly of palm-oil, palm kernels, and rubber, exceeds $1,000,000, and its imports are valued at rather more. New Calabar is situated farther east on one of the mouths of the Niger known by the same name. Its trade is less than that of Old Calabar, but is nevertheless of considerable value. Since 1904 the official style of Old Cala¬ bar has been Calabar.

CALABAR BEAN, or ORDEAL BEAN,

the brown or reddish-brown kidney-shaped seed of Physostigma venenosum, a climbing, woody, West African vine of the pea family {Leguminosce), reaching a height of 50 feet. The flowers are purple, resembling the sweet pea, and each pod contains two or three seeds, which are about one inch long with a blackish groove along the convex edge ; and in the interior an air-cavity which enables the

heavy seeds to float on water. This bean is very poisonous, and has been much used in paste or in infusion in the trial by ordeal conducted by the native medicine men of West Africa. If the person accused of witchcraft or crime vomited the mixture, he was declared innocent ; if he did not vomit, death ensued. At one time 70 chil¬ dren in Liverpool ate some of the beans ; one who ate four seeds did not vomit and died; all the rest vomited and recovered. In poison¬ ing with this bean vomiting should be encour¬ aged, the stomach washed out and atropine administered if the dose has been small; if the dose was large atropine hastens death. Two alkaloids are prepared from the Calabar bean, calabarine and physostigmine. The latter has the largest known power of contraction upon the pupil of the eye, and is used in subcutane¬ ous injection by oculists for this purpose. It is also used in the treatment of photophobia and glaucoma. In medicine, physostigmine is used in connection with tetanus antitoxin in the treatment of lockjaw, and also in chronic constipation and certain diseases of the bladder.

CALABASH GOURD, BOTTLE GOURD, WHITE PUMPKIN, Lagenaria vulgaris , the only cultivated or common wild species of its genus, which belongs to the family Cucurbitacece , distinguished from the species of the closely related genus Cucurbita by having white instead of yellow flowers, distinct instead of united anthers, and seeds with distended edges. It is a climbing annual vine, 30 to 40 feet long, with a musky odor and sticky texture. It is a native of tropical Asia and Africa, and is grown in warm countries for its very vari¬ able smooth, hard-shelled fruit, which, while young and soft, is used by some races as food ; but much more generally the ripe fruits are used for making utensils such as dippers, cups and pitchers. Some of the largest fruits are used in India and other Eastern countries in raft-construction and for buoys. These fruits range in size from a few inches to five feet or even more, and from their resemblance to various objects are called Hercules' club, dipper, bottle, snake, sugar trough, *etc.* The plant is often cultivated in the southern United States, but is less frequently seen in the North, where the season is usually too short for the fruits to fully 'mature. A sunny exposure in warm,

quick soil, and cultivation similar to that given squashes and melons, will suit the plan well.

CALABASH NUTMEG, a tree (Mono - dora myristica) of the family Annonacece , in¬ troduced into Jamaica probably from West Africa. The fruit resembles small calabashes, hence the name. It is called also

American nut¬ meg or Jamaica nutmeg.

CALABASH-TREE, a tree (Crescentia cujete) of the West Indies and tropical North America, of the family Bignoniacecu, about the height and dimensions of an apple-tree, with crooked, horizontal branches, wedge-shaped leaves, pale-white flowers on the trunk and branches, and a roundish fruit, from two inches to a foot in diameter. The greenish-yellow skin of the fruit encloses a thin, hard and almost woody shell, which is used for the same pur¬ poses as water-cans, goblets, cups, *etc.* So hard and close-grained are these shells that when they contain fluid they may even be put several times on the fire as kettles, without any injury. When intended for ornamental vessels, they are some¬ times highly polished, and have figures engraven upon them, which are variously tinged with indigo and other colors. The calabash contains a pale-yellow, juicy pulp of an unpleasant taste, which is esteemed a valuable remedy in several disorders, both external and internal.

CALABAZAR, ka-la-ba-thar', Cuba, city of the province of Santa Clara, situated 20 miles north of the city of Santa Clara. It has a fine municipal building. The Calabazar River is crossed at this point by a fine railroad bridge, the best of its kind in the country. Pop. 1,496; municipal district, 16,979.

CALABOZO, ka-la-bo-thc/, Venezuela, town in the state of Miranda (Guzman Blanco), 120 miles south-southwest of Caracas, on the left bank of the river Guarico, in the midst of the llanos. It was founded in 1730, is tolerably well built and has rather a pleasing appearance. Its church, though not very handsome, is com¬ modious. The principal wealth of the inhabit¬ ants consists of cattle. There is a considerable trade in live stock, hides, cheese, timber, *etc.* The neighboring ponds abound in electrical eels. Pop. 6,000.

CALABRIA, Italy, division of the kingdom, comprising the southwest peninsula or toe of Italy, from about 40° N. lat. to the Strait of Messina; area estimated at 5,819 square miles. It was formerly divided into three provinces — Calabria Citeriore, the most northerly; Calabria Ulteriore I, the most southerly; and Calabria Ulteriore II, between the two former; but these have been renamed respectively Cosenza, Reggio di Calabria and Catanzaro. The central region is occupied by the great Apennine ridge, wild and bleak, to which, however, whole colonies with their cattle migrate in the summer. The flats near the coast are marshy and unhealthy, and inhabited by herds of buffaloes; but the valleys at the foot of the mountains are well watered and produce most luxuriant vegetation. The vine, the orange and lemon

trees, the fig, the olive and all the fruits of southern climes, grow there to perfection. The climate was reckoned salubrious in ancient times ; but in some places the accumulation of stagnant water produces disease in the hot season. Corn, rice, saffron, anise, licorice, madder, flax, hemp,

olives, almonds, cotton and sugarcane are raised in abundance. Sheep, horned cattle and horses are numerous. Near Reggio a kind of mussel is found, called Pinna marina , from whose silky byssus or beard a beautiful fabric is manufac¬ tured, remarkable for its extreme lightness and warmth. Coral is also obtained. The quarries and pits afford alabaster, marble, gypsum, alum, chalk, rock-salt, lapis lazuli and the fine copper renowned in ancient times.

Calabria corresponds with the ancient Bruttium and part of Lucania, while the ancient Calabria corresponds to the heel of Italy. It early received numerous Greek colonies, and formed part of Magna Graecia. In 268 b.c. it was conquered by the Romans. The Saracens had occupied the greater part of it when it was conquered by the Normans in the 11th century. Since then it has constantly followed the fate of the kingdom of the Two Sicilies, with which it was united to the kingdom of Italy in 1860. It was visited by continuous earthquakes from 1783-87 and suffered severely in the disastrous earthquakes of 8 Sept. 1905 and 28 Dec. 1908. The greater part of the inhabitants are poor. Formerly the country w'as much infested by brigands and brigandage is not yet entirely extinct. The language of the people is a corruption of the Italian. There are somewhere about 40,000 Albanians settled in Calabria, who continue to preserve their lan¬ guage and racial identity. Pop. 1,402,151.

CALADIUM, a genus of plants of the Arum family, consisting of a dozen species, natives of tropical South America. The plant commonly in cultivation which is known as Caladium or elephant ear is a species of the related genus Colocasia. Two species of Caladium, C. schomburgkii and C. bicolor, are popular with gardeners as foliage plants. They have large heart-shaped or angled leaves, beautifully

mottled and variegated in many shades of green, red and yellow.

CALAFAT, Rumania, town of Doliju, de¬ partment on the Danube, opposite Vidin, Bul¬ garia, with which it communicates by a steam ferry. Calafat, named after the calfats or ship repairers, employed by the 14th century Genoese colonists who settled here, is a great grain¬ trading centre served by the Wallachian Rail¬ way system. Here in 1854 the Turks won a surprise victory over the Russians. Pop. 7,500.

CALAH, ka'la, an ancient city mentioned in Genesis x, 12 as one of those built by Asur. It is the citv called Kalchu in the Assyrian in¬ scriptions, which say that it was founded by Shalmaneser I about 1250 b.c. It was rebuilt by Asurnazirpal III about 880 b.c., who erected a wall on the northern side and a large palace. His successors also built palaces in the city. It is now known as Nimrud, where a number of important ruins and inscriptions have been found, among them the socalled <(black obe¬ lisk® which tells of the tribute paid by Jehu, King of Israel, to Shalmaneser II.

CALAHORRA, ka-la-or'ra, Spain, a town of Old Castile, near the south side of the Ebro, in the province of Logrono, and 32 miles south¬ east of the city of Logrono by rail. It is a bishop's see, and contains a cathedral, three parish churches and three convents. In 78 b.c.

this town, then called Calagurris, siding with Sertorius, was besieged by Afranius, one of Pompey's generals, and the inhabitants reduced to such extremity that they fed on their wives and children; whence the Romans were wont to call any grievous famine fames Calagurritana. Quintilian was born here about 35 a.d.. Pop.

9,871.

CALAIS, ka-la', France, a seaport town and fortified place of the first class, in the depart¬ ment of Pas-de-Calais, 20 miles northeast from Boulogne on the Strait of Dover, and about 21 miles east-southeast of the port of Dover. It is situated at the junction of several canals, and by railway is directly connected with Paris, from which it is distant 185 miles. The town con¬ sists of two portions, almost entirely separated by basins or water areas connected with the harbor accommodation. These are Calais proper or the old towrn farther to the north, and Saint Pierre or the new town lying to the south, now a great manufacturing centre, 'and incor¬ porated with the other

portion only in 1885. The whole is enclosed by a new line of circumvallation, and is also defended by a citadel and seven detached forts and batteries. On the land side the country is flat and marshy, and can be laid under water to strengthen the de¬ fenses. The streets are broad and well paved, the houses substantially built of brick, and the hotels in general excellent. The chief square is the Place d'Armes, where the old Hotel de Ville, built in 1740 (restored in 1867), is situated. The new town hall is on Place Centrale. The principal church, Notre Dame, contains a fine altar-piece in Genoa marble. Other noteworthy objects are the Hotel de Guise, originally founded by Edward III of England ; the column erected to commemorate the landing of Louis XVIII in 1814; barracks; and the Hotel Dessin. Calais is the seat of a commercial court and chamber of commerce, and has a college, a commercial school, school of design, school of hydrography, *etc.*

The harbor is accessible at all states of the tide, and is entered between two long piers. The works include extensive graving dock and wet dock accommodation. Calais is one of the principal ports for the debarkation of travelers from England, there being day and night com¬ munication with Dover by steamboat. There is a submarine cable to England from this port. The manufactures of the town are important. The silk and cotton tulle or bobbinet trade em¬ ploys thousands of hands. Various other in¬ dustries are also carried on, such as flax¬ spinning, lace-making, hosiery, engineering, netmaking, brewing, *etc.* Vessels are built here, and fitted out for the cod, mackerel and herring fisheries. It is the entrepot for an important district, and a considerable trade is carried on in grain, wool, wine, sugar, timber, coal, etc., and not less than 55,000,000 of eggs are annually exported to England. Calais is a town of con¬ siderable antiquity. In 1347 it was taken bv Edward III of England, after a siege of 11 months. The famous incident of the six bur¬ gesses having their lives saved at the inter¬ cession of Queen Philippa belongs to this siege. In 1558 it was retaken by the Duke of Guise, being then the last relic of the French dominions of the Plantagenets, which at one time com¬ prehended the half of France. Pop. 72,322.

CALAIS, kal'is, Me., city, port of entry, and county-seat of Washington County, situated on Saint Croix River, opposite Saint Stephen, N. B., and on the Saint Croix & P. and the Canadian P. railroads, 120 miles east of Bangor. It is the extreme northeast seaport of the United States and is connected by steamship lines with Boston, Portland and Saint John, N. B. It has a large lumber trade and numerous foundries, machine shops, shipyards, granite quarries and other extensive mechanical indus¬ tries, including shoe factories, plaster works, *etc.* ; a national bank, several newspapers, high and grammar schools, electric lights, a public library and an assessed property valuation of $2,500,000. The government is vested in a mayor and council elected annually. Pop. 6,084.

CALAMANCO, a woolen stuff made in the Netherlands, the warp of which is sometimes, mixed with silk or goats' hair. It has a fine gloss, and is checkered in the warp, so that the checks are seen on one side only. It was fash¬ ionable in Addison's time.

CALAMANDER WOOD, a hard wood of Ceylon, obtained from a species of ebony-tree. See Ebony.

CALAMARY. The old European name of the 10-armed cuttle-fish. See Squid.

CALAMATTA, Luigi, Italian engraver: b. Civita Vecchia, Italy, 12 July 1802; d. Milan, 8 March 1869. He was educated in Rome under Marchetti and Ricciani, but was much in Paris, where he was a follower of Ingres. In 1837 he became professor at the Ecole des Beaux-Arts in Brussels and among his pupils were Gustave Biot, Leopold Flameng and Charles Blanc. He founded a school of engravers in Brussels under government direction, and in his latest years was professor of drawing in the Academy of Milan. He is well known by his engraving of the head of Napoleon, from the death mask, and portraits of Ingres, Paganini, Guizot, George Sand, ((Francesca da Rimini®; (<La Gioconda® after Leonardo da Vinci, and the (<Madonna di Foligno®. after Raphael. Consult Alvin, (Notice sur Luigi Calamatta) (Brussels

1882).

CALAMBA, ka-lam'ba, Philippines, a town of the province of Laguna, situated in the south¬ ern part of the island of Luzon, about 30 miles

southeast of Manila. It is connected with sev¬ eral important towns by highways, and has a telegraph station. Pop. about 13,000.

CALAMBAC, aloes-wood, the product of a tree, Aquilaria agallocha, growing in China and some of the Indian islands. It is of a very light, spongy texture, and contains a soft, fragrant resin, which is chewed by the natives.

CALAME, ka-lam, Alexandre, Swiss land¬ scape artist: b. Vevey, Switzerland, 28 May 1810; d. Mentone, France, 17 March-1864. His life was passed mainly in Geneva, where a monument was erected to him in 1880. He was ranked among the best landscape painters of his day and he excelled the most, if not all, of his contemporaries in portraying Alpine scenery. Among works by him are (Bernese Oberland) (Leipzig Gallery) ; (Wetterhorn> (Basel Muse¬ um) ; (Lake of Lucerne* (Berlin Museum) ; (Shreckhorn) ; (Lake of the Four Cantons. *

CALAMIANES, ka-la-me-a'nes; a cluster of islands in the Philippine Archipelago, of

which Busuanga, Calamian and Linacap»n are the most important ; Busuanga is 36 miles long and 17 miles broad. They lie between lat. 11° 25' and 12° 20' N. and about long. 120° E. The islands are mountainous and well timbered. They produce rice, cacao and great quantities of wax and honey. The principal occupations are cattle raising and fishing. The climate is un¬ healthful. There are about 98 islands in the group, with a total land area of 675 square miles. Pop. 17,000.

CALAMINE, a native basic metasilicate of zinc, having the formula (Zn0H)2Si03. In England the name is applied to the carbonate ore and the name given to the silicate is smithsonite. The mineral, now known as smithsonite, was formerly included here, but James Smithson, in 1803, showed that the two species are distinct. The two are usually found together. Calamine occurs in hemimorphic, rhombohedral crystals, usually white, with a vitreous lustre, a hardness of from 4.5 to 5 and a specific gravity of between 3.4 and 3.5. It also occurs in mas¬ sive forms, sometimes mammillary in shape, and often cellular. In the United States calamine is found in fine crystalline form in New Jersey, Pennsylvania and Virginia ; and both crystalline and mammillary in Missouri, Utah and Mon¬ tana. In localities where it occurs in quantity it constitutes a valuable ore of Hnc.

CALAMINT, any plant of the genus Calamintha, belonging to the family Mcnthace<z. The plants are herbs or shrubs with usually entire leaves, and dense whorls of purple-white or yellow flowers, with a two-lipped corolla and didynamous stamens not projecting from the corolla. Five species are British. They all con¬ tain a volatile oil, and a pectoral medicine is obtained from them. In the United States sev¬ eral species are also found.

CALAMIS, Greek sculptor, statuary and embosser of Athens, a contemporary of Phidias, who flourished between 467 and 429 b.c. Pliny bestows the highest praises upon his horses. Among his most celebrated works were a statue in metal of Apollo Alexicacos, in Athens, in 429 b.c., and which has erroneously been supposed to be the Apollo Belvedere; a colossal statue of Apollo in bronze, 30 cubits in height, which was taken to Rome by Lucullus; and a Jupiter Ammon consecrated by Pindar at Thebes. Con¬ sult Gardner, E. A., (A Handbook of Greek Sculpture) (pp. 232-36, London 1911).

CALAMITE, a genus of fossil plants very characteristic of the coal measures. They occur in the Devonian rocks, and in other formations up to the Jurassic, in which one species is found. Their classification is not finally deter¬ mined, but they are generally regarded as closely related to the Eqnisetacece or horsetails. The stalks are striated lengthwise, and interrupted with rings marking a regular articulation.

CALAMITY JANE. See Burke, Jane.

CALAMUS, a remarkable genus of palms, the species of which are mostly Indian, and are very different from most other palms, having slender, many-jointed, reed-like stems, often stretching to a length of several hundred feet. Some have the stems erect, others climb and trail among trees on which they support them¬ selves, hanging on by the hooked prickles that terminate their leaves. Some have leaves at

intervals along the stem, others only at the ex¬ tremity. The stems are hard, smooth and sili¬ ceous on the surface, and from their toughness and pliancy they are much used in the regions where they grow for matting, strong ropes, plaited work, *etc.* Bridges over streams are frequently made of ropes formed by twisting up their stems, and the native vessels of the Eastern seas often carry cables of the same kind.

CALAMUS, a popular name for the sweet flag (Acorns calamus), of the family Aracecc. This plant is found in wet land from Nova Scotia to Florida, and westward to Kansas and Minnesota. The pungent, bitterish, acrid root stocks have been used in medicine, especially among the colored people of the southern United States. It is sometimes cultivated as an ornamental plant in wet places, and is attractive for its erect, sword-shaped leaves, which in one variety are striped with yellow.

CALAMY, Edmund, Puritan clergyman : b. London, England, February 1600; d. there, 29 Oct. 1666. He studied at Pembroke Hall, Cam¬ bridge (1616-19), where he attached himself to the Calvinistic party, and in 1639 was chosen minister of Saint Mary's, Aldermanbury, Lon¬ don. He entered warmly into the controversies of the time, and became noted as a leading man on the side of the Presbyterians. He had a principal share in the composition of 'Smectym-nuusP a work intended as a reply to Bishop Hall's 'Divine Right of Episcopacy0 (London 1640), and one of the most able and popular polemics of the day. Like the mass of the Presbyterian clergy, he was monarchical and not republican in his political opinions. He dis¬ approved, therefore, of the execution of Charles, and of Cromwell's protectorate, and did not hesitate to avow his attachment to the Royalist cause. He was one of the deputies appointed to meet Charles II in Holland and congratulate him on his restoration. He took part in the Savoy Conference (1661); but was ejected from his living by the Uniformity Act (1662); for venturing to preach in his church (December 1662) he was cast into prison, but released by Charles II.

CALAMY, Edmund, English clergyman, grandson of the preceding: b. London, 5 April 1671; d. there, 3 June 1732. He was educated among the Dissenters and in Holland, and later became pastor of a congregation in Westminster and published an abridgment of Baxter's his¬ tory of His Life and Times, } with a continua¬ tion; 'Inspiration of the Scriptures) ; 'Life of Increase Mather > ; 'Historical Account of My Own Life) (London 1830) ; and also carried on through the press controversies with Bishop Hoadly and others. He is well known for his

‘Nonconformists’ Memorial > (1778) which is the best historical source concerning the 2,000 ministers ejected from the Church of England by the Act of Conformity. Consult Palmer, ‘Abridgment of Nonconformists’ MemoriaP (London 1802-03).

CALANCHA, ka-lan’cha, Antonio de la,

Peruvian chronicler: b. Chuquisaca 1584; d. Lima, 1 March 1654. He belonged to the Augustinian order, and was rector of the Col¬ lege of San Ildefonso in Lima. Afterward he traveled extensively through Peru. He wrote ‘Cronica moralizada del Orden de S. Agustin

en Peru,’ first printed at Barcelona in 1638 in folio, which is an important source for early Peruvian history. It was continued in a second volume, never completed, however, by Fray Diego de Cordova (Lima 1653). The first volume was translated into French as ‘Histoire de l’eglise du Perou aux antipodes y (Toul¬ ouse 1653), and Brulius’ ‘Historia Peruana) (Antwerp 1651) is called a translation. The original work appeared at Barcelona 1639, under the title ‘Cronica moralizada del orden de San-Augustin en el PeruP The Spanish bibliographer Antonio credits Calancha with another work, ‘Cronica de los santuarios de Nuestra Senora de Copacabana y del Prado) (Lima 1653).

CALANUS, Indian philosopher, much es¬ teemed by Alexander the Great. At the age of 73, 323 b.c., being seized with illness at Persepolis, he caused a funeral pile to be erected, which he ascended with a composed counte¬ nance, and expired in the flames, saying, that having lost his health and seen Alexander, life had no more charms for him.

CALAS, ka-las, or ka-la, Jean, French

judicial martyr: b. Languedoc 1698; d. Tou¬ louse, 9 March 1762. Brought up in the Protes¬ tant religion, he had established himself as a merchant in Toulouse. He had four sons and two daughters whom he educated himself, and was held in general esteem, when he was sud¬ denly accused of the crime of murdering one of his sons. In 1761 his eldest son, Marc Antonine, a young man of irregular habits and a gloomy disposition, was found strangled in his father’s house. It was reported that the unfortunate youth had been put to death by his father because he wished to become a Catholic. Jean Calas and his whole family were arrested, and a prosecution instituted against him,

in support of which numerous witnesses came forward. The Parliament of Toulouse con¬ demned him, by eight voices against five, to be tortured and then broken on the wheel ; and on 9 March 1762, the sentence was executed. He suffered the torture with firmness, and pro¬ tested his innocence to the last. The youngest son was banished forever, but the mother and servant were acquitted. The family of the unhappy man retired to Geneva. Voltaire, then at Ferney, became acquainted with them, and for three years exerted himself to defend the memory of Calas, and to direct attention to the defects of the criminal law which affected profoundly the legal attitude toward the French Protestants. The widow and children of Calas also solicited a revision of the trial. Fifty judges once more examined the circum¬ stances, and declared Calas altogether innocent, 9 March 1765. The King by his liberality sought to recompense the family for their un¬ deserved losses, and people of the first rank emulated each other in endeavoring to relieve them. Consult Coquerel, ‘Jean Calas et sa Famille* (Paris 1858) ; ‘Causes Celebres) (Vol. IV, 1875) ; Allier, Raoul, ‘Voltaire et Calas> (Paris 1898) ; Masmonteil, ‘La legislation criminelle dans l’ceuvre de Voltaire) (Paris 1901) ; Fallentyre, ‘Life of Voltaire) (2 vols., London 1903; New York 1905).

CALASIAO, ka-la-se-a’o, Philippines, a town of the province of Pangasinan, situated in the western part of the island of Luzon, a

few miles from the coast of the Gulf of Lingayen, on the main highway to Manila. Pop. (1903) 16,539.

CALATAFIMI, ka-la-ta-fe’me, Sicily, town in the western part of the island, in the district of Trapani, 57 miles southwest of Palermo. It is situated in a mountainous district, near the river Gaggera, is badly built, and has a ruinous castle on the summit of a neighboring hill, now used as a prison. The environs are well cultivated and extremely fertile. A ruined Saracenic castle stands above the town. In 1860 a battle took place here between Gari¬ baldi’s forces and Landi’s Neapolitan troops, in which the latter were defeated. Pop. of

commune 10,486.

CALATAGIRONE, kal-a’ta-je-ro’na, or CALTAGIRONE (ancient Calata Hieronis), Sicily, town in the province of, and 36 miles southwest of, Catania direct. It stands on two hills, 2,000 feet above sea-level, and consists generally of spacious, clean and well-built streets. There is a fine promenade and market¬ place, beside which stands the old castle. It is the see of a bishop, and has several churches and a college. Its inhabitants are highly skilled in the arts. It has a considerable commerce, and is celebrated for the manufacture of terra¬ cotta ware. It was fortified by the Saracens, and wrested from them by the Genoese. Roger Guiscard gave it important privileges. There are interesting Greek, Roman and Moorish remains. Pop. 43,169.

CALATA YUD, ka-la-ta-yood\ Spain, the second city of Aragon, 48 miles southwest of Saragossa. It stands on the Jalon, near its confluence with the Jiloca, at the foot of two rocky heights crowned with the ruins of Moorish forts. The upper or Moorish town is a very wretched place ; but the modern town below is well built and contains many remark¬ able edifices, among which the most conspicu¬ ous are the church of Santa Maria, once a mosque, and surmounted by an octagonal tower; and that of San Sepulcro, a Doric structure containing many curious relics. Red wines are produced in the neighborhood, and about 10 miles from the town there are sul¬ phur baths. The poet Martial was born at Bilbilis, a former town on the site of the present Bambola, two miles east of Calatayud. Pop. 11,594.

CALATRAVA, ka-la-tra’va, Order of, a Spanish order of chivalry, originated during the Moorish wars. Calatrava la Vieja, taken from the Moors in the 12th century by the king of Castile, was committed to the Templars, who guarded it till 1158. At this time, a power¬ ful army advancing to besiege it, they despaired of being able to defend it, and restored it to the king, who offered it in absolute property to whosoever would defend it. Two. monks of the .abbey of Citeaux (Cistercians), in France, presented themselves and were accepted. They preached a crusade, and offered a pardon of sins, and being supplied with money and arms, were able to repel the invaders. Thereupon, having received the investiture of the town and other donations, they instituted the same year (1158) an order into which all the nobility of Castile and Navarre were emulous to enter. In 1164 the chevaliers of this order, by sanc¬ tion of Pope Alexander III, separated them¬

selves from the monks, and the order became purely military. They still followed the rule of the Cistercians, until Paul III dispensed them from the vow of chastity. The almost uniform success of the Knights of Calatrava against the Moors gave rise to rashness, and in 1197 they were defeated and nearly exter¬ minated, the survivors transferring the seat to the castle of Salvatierra. In 1523 the grand-mastership was transferred to the Crown by a papal bull, the knights being permitted to marry once by way of compensation for their loss of independence. Since 1808 the body has been continued as an order of merit.

CALATRAVA LA VIEJA, ve-a'ha, a ruined city of Spain, situated on the Guadiana, about 12-miles northeast of Ciudad Real. It was captured by Alfonso VIII of Castile, who gave it to the Templars. They in turn, re¬ stored it to Sancho III (1157). Its defense against the Moors, undertaken by Raymond, abbot of Fitero, and Diego Velasquez in 1158, after it had been abandoned by the Templars, is famous on account of its having originated the Order of Calatrava (q.v.) in 1158.

CALAVERAS GROVE, the most north¬ ern of the California groves of big trees, con¬ taining about 100 of these trees. The tallest one standing is known as the <(Keystone State,® and is 325 feet in height and 45 feet in girth; the (<Mother of the Forest® is another tree of notable size, being 315 feet high and 61 feet in circumference. The grove is a State reservation.

CALAVERAS SKULL, a widely disputed fossil skull, now preserved in the Peabody Museum, Cambridge, Mass., reported by Prof. J. D. Whitney to have been found in 1886 in the undisturbed auriferous gravels of Cala¬ veras County, Cal. Whitney assigned the skull to late Tertiary (Pliocene) times. The skull corresponds in type with those of modern In¬ dian inhabitants of the district. Consult Hrdlicka, (Bureau of American Ethnology, Bulletin 33 > (Washington, D. C., 1907).

CALAVERITE, a native gold telluride, AuTe2, with the average composition: tellu¬ rium, 57.4 per cent; gold, 39.5 per cent; silver, 3.1 per cent. It was originally described by Genth as a very rare massive gold (and sil¬ ver) telluride from Boulder County, Colo. It is the commonest of the gold ores of Cripple Creek and occurs there in beautiful triclinic crystals. It is found also in great abundance at Kalgoorlie, West Australia. Calaverite oc¬ curs with petzite at the Stanislaus mine, in Calaveras County, Cal., and with sylvanite at the Red Cloud mine in Boulder County, Colo. It is often confused with <(sylvanite® by the miners, but while it is practically of the same qualitative composition as sylvanite, it carries a proportion of gold 25 to 40 per cent greater, and only about one-third as much silver. It has

a brilliant metallic lustre, pale bronze-yel¬ low color, a hardness of 2.5 and a specific gravity of about 9.

CALBAYOG, kal-ba'yog, Philippines, town of Samar province at the mouth of the Cal-bayog River on the west coast, 30 miles north¬ west of Cathalogan. Hemp, the chief product, copra and fine timber are shipped to Manila. Pop. 16,000.

CALC-TUFA, a variety of calcite essentially travertine. It is formed in streams or springs by deposits of calcium carbonate in a cellular form. It often contains fossil twigs, moss, leaves, seeds, *etc.*

CALCAIRE GROSSIER, kal -car gro-se-a, a coarse limestone of the Middle Eocene Ter¬ tiary series of the Paris and London basins. Its limestone strata furnish building material for the city of Paris. The fossils of the Cal-caire Grossier are remarkable for number, and for the variety of forms, some 500 species in all being represented, including water shells as well as marine shells and rising up to the re¬ mains of the mammalia.

CALCAR, or KALKAR, Jan Stephanus van, yan ste-fan'us van kal'kar, Dutch painter : b. Calcar in Westphalia 1510; d. Naples, 1546. He studied so thoroughly the style of Titian, that their pictures cannot always be distin¬ guished. Later he imitated the style of Ra¬ phael with equal success. The 1 Mater Dolorosa, > in the Boisseree collection in Stuttgart, a perfect work of art, is by him. Another small picture of his, the (Infant Christ with the Shepherds, > was a favorite with Rubens. In this piece the light is represented as proceeding from the child. He designed almost all the portraits in Vasari's Lives, and the figures for the ana¬ tomical work of Vesalius.

CALCAREOUS, a term applied to sub¬ stances partaking of the nature of lime or con¬ taining quantities of lime. Thus, we speak of calcareous waters, calcareous rocks, calcareous soils. Calcareous spar is calcite (q.v.).

CALCAREOUS TUFA. See Calc-tufa.

CALCASIEU, kal'ka-shu, a river of Louis¬ iana, rising in the western part of the State. It flows through the parish of the same name, and after a southerly course of about 200 miles enters the Gulf of Mexico through Lake Cal¬ casieu. It drains a large area in southwest Louisiana, and is navigable by small boats for about 130 miles.

CALCEOLARIA (Latin, calceolus, a little shoe, alluding to the form of the corolla), a genus of plants of the family Scrophulariacece, mostly natives of South America, especially of Chile and Peru. They are characterized by having a corolla with a very short tube, with two lips, concave or shaped like a hood, the upper one very small, the under one greatly inflated. They are common as greenhouse or outdoor plants. There are about 200 species, of which about 20 are in cultivation, and their varieties are very numerous. The flowers of the indigenous species are white, yellow and purple. They are greatly excelled in beauty by the cultivated varieties, which acquire numerous tints in these colors, and have besides on the lower part of the corolla, the part which bears the strictest resemblance to a shoe, large spots, or innumerable small points of a different color, which have a very graceful effect. They grow best in a rich, open, sandy garden mold, and are propagated by seeds or cuttings, the herba¬ ceous kinds mostly by the former method.

CALCHAQUI, kal-cha'ke, a South Amer¬ ican tribe formerly living in the northwestern part of Argentina. They were conquered by the Incas of the 15th century, and the ruins of their buildings and tombs indicate quite an ad¬

vanced stage of civilization. They extended over considerable area of territory now belonging to Argentina. They lived in villages, as the sur¬ viving stone inclosures, mounds, cemeteries and art products show. They were visited by the Jesuit missionaries, but strongly opposed the inroads of the Spaniards. The tribe is now extinct and all record of their language is lost. Consult Chamberlain, A. F., in the American Anthropologist (N. S. Vol. XIV, pp. 503-07,

1912).

CALCHAS, kal'kas, a legendary priest and prophet of the Greeks at the time of the Trojan War, who foretold that Troy would not be sub¬

dued by them till the 10th year of the siege. At his advice, Iphigenia was sacrificed at Aulis to appease Artemis. He himself accompanied the Greek army to Troy. During the siege, the Greeks were attacked by a plague, and Calchas declared that it was the effect of Apollo's anger, because they had deprived his priest of his daughter Chryseis, whom Aga¬ memnon had selected as his mistress. He counseled the Greeks to appease Apollo bjr re¬ storing the damsel ; and it was by his advice that they afterward built the wooden horse. There are various legends relating to his death. The most common is that he died of grief caused by his failure in a contest of prophecy with Mopsus at Colophon. At Apulia, where he had a temple and an oracle, his grave is shown.

CALCIFEROUS, a geologic term applied to the sandy limestones found in Pennsylvania, extending across New Jersey and New York to Canada, and known as the Beekmantown beds. The formation is probably the equiva¬ lent of the magnesium limestones of Iowa and Missouri and belongs to the Canadian epoch of the Lower Ordovician. See Ordovician.

CALCIMINE, a mixture of zinc-white, glue, water and pigments, used to finish the plaster walls of buildings. In cheaper forms, lithopone or Paris white is substituted for zinc-white. A superior dampproof form uses casein instead of glue. See Whitewash.

CALCINATION, a term now used as practically equivalent to roasting. It is derived from the Latin word calx , meaning quicklime, and received its present signification by exten¬ sion from its original meaning of obtaining lime from limestone by the application of great heat. The process contemplates a very high degree of heat, but lower than the fusing point of the substance treated. By calcination many substances may be reduced to a friable con¬ dition, and freed from constituents capable of passing off in the form of gas or vapor. Thus various salts may be deprived of water of crystallization, and rendered amorphous in this way; the hydrated carbonate of magnesium is reduced to the pure oxide, known as calcined magnesia ; limestone is converted into quick¬ lime, *etc.* Calcination is usually the first process in the extraction of metals from their ores. The oxides of metals produced by this process were formerly known as calxes, but this term is now disused. It depends on cir¬ cumstances which oxide is obtained, if the metal, like lead, can form more than one. The weight of the total calx is equal of course to that of the metal and the oxygen with which

Photograph by .1. Horace McFarland Co.

CALCEOLARIA (FISHERMAN'S BASKET)

CALCITE

1 Calcite Crystals, Bigrigg Mine, England

2 Calcite " Bird's Nest," Reichelsdorf, Hesse, Germany

it has combined, but the calx itself is specifically lighter than the metal. Platinum, gold, silver and some other metals are not affected in this way, and on this account they are called the noble metals. See Combustion.

CALCITE, -sit, also known as calc-spar, a native carbonate of calcium, crystallizing in the rhombohedral system, and exhibiting over 300 distinct crystals of general forms or (<hab-its.® The mineral also occurs massive, fibrous, granular, lamellar, compact, earthy, stalactitic, nodular. In other forms it exhibits minute percentages of magnesium, iron, manganese, zinc and lead, replacing equivalents of cal¬ cium. Its typical crystals exhibit a very per¬ fect cleavage, commonly splitting up, from a blow, into many small rhombohedrons. Pure crystals have the composition carbon dioxide 44 per cent, lime 56 per cent. They show a vitreous or earthy lustre and have a specific gravity of about 2.72, and a hardness of about 3, though the latter varies somewhat with the face of the crystal. Calcite may be transparent, translucent or opaque, and in color may vary from white, or colorless, to black, also brown, violet, blue, green, yellow and red.

It ex¬ hibits the phenomenon of double refraction powerfully, and transparent crystals of it (called ((Iceland spar® because first obtained from Iceland) are used in the manufacture of polarizing prisms. (See Light). Limestone, marble and chalk are commonly classed as massive or cryptocrystalline varieties of calcite. Oolite (q.v.) is a granular limestone composed of innumerable minute rounded concretions. Pisolite is a similar variety in which the spheres are as large as peas. The stalactites and stalagmites of many caves (q.v.) are cal¬ cite. Mexican onyx, travertine and calc-tufa (q.v.) are a few of the many other varieties of calcite. Varieties containing other metallic carbonates are known as baricalcite, strontiano-calcite, ferrocalcite, *etc.* Calcite effervesces briskly even in cold acid. It occurs abundantly all over the world ; especially choice specimens of crystals come from Germany, England, Guanajuato, Mexico; Rossie, N. Y. ; Joplin, Mo., and Lake Superior. Examples of the stalactite forms are found in caves at Scho¬ harie, N. Y., and at Wier's Cave in Virginia. The various rock forms of calcite are burned to make lime, and also in mixture with silica and alumina in the manufacture of Portland cement. See Calcium ; Cement.

CALCITE GROUP, in mineralogy, an im¬ portant series of rhombohedral carbonates of the bivalent metals — calcium, magnesium, iron, manganese, zinc and cobalt. The series includes calcite, CaC03 ; dolomite, (Ca, Mg) CO3; ankerite, CaC03 (Mg, Fe, Mn) C03; mag¬ nesite, MgC03; mesitite, 2MgC03.FeC03 ; sider-itc, FeCOs; rhodochrosite, MnCOs; smithsonite, ZnC03; and sphaerocobaltite, C0CO3.

CALCIUM, a metallic element first obtained in the free state by Sir Humphry Davy in 1808. Its compounds are exceedingly abundant and are widely distributed. Calcium carbonate, CaCOs, is familiar in its various forms of mar¬ ble, chalk, limestone and calcite. The sulphate, CaS04, is also very common, and is perhaps best known in the form of gypsum, which contains two molecules of water, and therefore has the

formula CaSCh + 2H20. Calcium phosphate also occurs in nature in considerable quantities, both in the form of fossilized bones and as a constituent of apatite (q.v.) and its various modifications.

Metallic calcium may be obtained by the electrolysis of the fused chloride (which melts at a red heat), or by decomposing the iodide with metallic sodium. It is a white metal with a light yellow hue, has a hardness about equal to that of gold and is very malleable and duc¬

tile. Its density is 1.548 and its melting point about 1455° F. Its chemical symbol is Ca, its specific gravity is about 1.58 and its atomic weight is 40.0 (O = 16). Perfectly dry air does not affect it at ordinary temperatures, but in moist air it becomes rapidly coated with the hydrate Ca(OH)2. When strongly heated in air it burns with a yellow flame, taking up oxygen to form the oxide CaO. It decomposes water rapidly, passing into the form of the hydrate, with evolution of hydrogen. It melts at a red heat, has a specific heat of about 0.169 and has an electrical resistance only about one-twelfth of that of mercury.

In its chemical relations calcium is a dyad. It combines with almost every known acid, and yields a vast number of compounds, many of which are of great industrial value. Of these the best known are the carbonate, oxide, hy¬ drate, chloride, sulphate, phosphate, fluoride, carbide and bisulphide, and the indefinite mix¬ ture of the chloride and hypochlorite known as bleaching-powder (q.v.).

The carbonate occurs native in large quan¬ tities, as already noted. It is also commonly present in ground water as obtained from wells and springs. It is almost insoluble in pure water, but dissolves to a considerable extent when the water contains free carbon dioxide in solution. It is this compound that gives to water what is known as ˆtemporary hardness.® Upon boiling, the free carbon dioxide held in solution is expelled, and the lime carbonate is therefore precipitated also, so that the water loses that part of its hardness which is due to the presence of the carbonate. This effect is well illustrated, in regions where the soil is rich in limestone, by the crust of lime carbonate that is deposited upon the interior of household kettles that are used for heating water. Cal¬ cium carbonate also gives rise, in steam boilers, to troublesome deposits that keep the water out of contact with the metal plates, which, in such cases, become overheated and seriously impaired in consequence. To prevent this action chem¬ ists often recommend the addition to the water in the boiler of a certain amount of ammonium chloride (sal ammoniac). This compound com¬ bines with the lime carbonate to form calcium chloride, which is exceedingly soluble, and ammonium carbonate, which is volatile, and therefore passes away with the steam. Beautiful as this process is in theory, it cannot be recom¬ mended for adoption in practice, because if the sal ammoniac is present in anjr excess it induces rapid corrosion of the boiler plates.

When calcium carbonate (more familiarly known as carbonate of lime) is strongly heated in a current of air, it loses its carbon dioxide and becomes converted into a substance known to the chemist as calcium oxide CaO, and in the arts as quicklime, burnt lime or simply

lime. Pure calcium oxide (or lime) is a white, amor-

phous substance, infusible, glowing with a dazzling white light when strongly heated, possessing caustic properties and acting as a powerful chemical base. When treated with about one-third of its own weight of water, lime passes into the form of the hydrate or hydrox¬ ide, $Ca(OH)_2$, with the evolution of much heat. The process of converting it into the hydrate by the addition of water is called slaking, and the resulting hydrate is known in the arts as slaked lime. Mortar is composed of a mixture of slaked lime and sand, the silica (or sand) slowly com¬ bining with the lime to form a silicate after the mortar has been applied. Slaked lime, or cal¬ cium hydrate, is somewhat soluble in water, its solution being known as lime water.

Calcium chloride is formed when calcium carbonate is dissolved in hydrochloric acid. It is exceedingly soluble, but upon evaporation of its solution it separates in white, needle-like crystals having the formula $CaCl_2 + 6H_2O$. When these are heated to about 400° F. they lose two-thirds of their water of crystallization and become converted into $CaCl_2 + 2H_2O$, in which form the chloride is commonly used. Thus prepared, calcium chloride is a white, porous solid, which absorbs moisture with great avidity, and hence is exceedingly valuable to the chemist and physicist for drying air and other gaseous bodies. It forms crystalline com¬ pounds with ethyl and methyl alcohols, which are again resolved, by the addition of water, into calcium chloride and the free alcohol. On account of this property it has been used for the preparation of these alcohols in the pure state. See also Calcium Chloride.

Calcium hyperchlorite is a bleaching agent which is more stable than ordinary bleaching powder (chloride of lime), yielding a clear solution in water and containing from 80 to 90 per cent of available chlorine. (See Bleach¬ ing). It is made by passing chlorine gas into milk of lime at a temperature not exceeding 90° F., and then concentrating the solution to crystallization. Besides its bleaching properties it is used in very large quantities for the purifi¬ cation of water in reservoirs for

drinking purposes.

Calcium sulphate occurs native in the an¬ hydrous form, as the mineral anhydrite ; and, combined with two molecules of water, it also occurs abundantly as gypsum. It is soluble in 400 parts of water, and, like the carbonate, it occurs quite generally in the waters of wells and springs. Like the carbonate, too, it makes the water in which it occurs hard ; but the hardness due to the presence of the sulphate cannot be removed by boiling, and it is therefore said to be ˆpermanent.® Calcium sulphate produces deposits in steam boilers that are far more troublesome and injurious than those due to the carbonate, since the sulphate is deposited in a hard, compact, stony form, and can be re¬ moved only with difficulty.

When gypsum is moderately heated it loses its water of crystallization and becomes con¬ verted into a substance that is commercially known as plaster of Paris, from the fact that the gypsum from which it is prepared (and which is also called plaster of Paris, though rarely) occurs abundantly in the Tertiary formations of the Paris basin. Plaster of Paris, when moistened by the addition of the proper quantity of water, takes up two molecules of

water again, and rapidly sets into a hard, solid mass which expands somewhat at the instant of solidification. It is much used in making casts and molds. These are harder and better when the plaster is wetted with a solution of alum than they are when pure water is used for this purpose. If equal weights of the an¬ hydrous sulphates of calcium and of potassium are wetted with about four parts of water, the mixture sets like plaster of Paris, with the formation of a double sulphate of calcium and potassium, having the formula CaSCfi.KoSCfi. FLO. The casts so obtained exhibit polished surfaces, superior to those obtained with pure plaster.

Calcium fluoride, CaF2, occurs native as fluor¬ spar, or fluorite, and is used to some extent as a flux in metallurgical operations, to which circumstance it owes its name (Latin fluor, a flux). It is also used in’ the manufacture of vases and other ornamental articles and as a source of hydrofluoric acid, which is set free when the fluoride is treated with warm sul¬ phuric acid.

Calcium carbide, CaC2, has long been known, and was prepared by Wohler in 1862 by melting an alloy of zinc and calcium in the presence of carbon. Its commercial importance, however, dates from

the discovery made by Mr. T. L. Willson in 1892, that it can be formed by the direct combination of lime and carbon at the temperature of the electric furnace. Large quantities of it are now made by this process at Niagara Falls, at Spray, N. C., and elsewhere. Calcium carbide in its commercial form is a dark-gray substance, often almost black. It is hard, infusible and incombustible, with a specific gravity of about 2.24. Its value in the arts depends upon the fact that when it is thrown into water a double decomposition occurs, by which acetylene gas is formed, in accordance with the equation CaCa + 2FLO = C2F[2 + Ca(OH)2. See Acetylene; Carbide.

Calcium phosphide, Ca3P2, has the property of decomposing instantly when thrown into water with the evolution of phosphuretted hy¬ drogen which takes fire spontaneously. It is used in several forms of marine signal lights and also in naval target practice at night.

Calcium sulphite, CaSCL, is formed and pre¬ cipitated as a white powder when a solution of a calcium salt is added to a solution of an alka¬ line sulphite. The sulphite so formed requires 800 parts of pure water to effect its solution. It is far more soluble in sulphurous acid, however, and it is believed that the sulphurous acid acts upon it to produce a new but comparatively unstable compound, CaS03.S02, to which hypo¬ thetical substance the name calcium bisulphite, or bisulphite of lime, has been given. Upon exposure to air the bisulphite solution gradually deposits crystals of the monosulphite, having the composition CaS03.2H20. On the commer¬ cial scale the bisulphite solution is prepared by passing sulphur dioxide gas (S02) through (<milk of lime^ (that is, water containing slaked lime in suspension). The monosulphite of lime is first formed, and by the continued action of the sulphur dioxide this passes into solution in the form of the bisulphite. The usefulness of bisulphite of lime in the arts depends upon the power of dissolving the gums and resins by which the fibres of wood are cemented together. Thus, in the sulphite process of manufacturing

wood pulp, chips of wood are submerged in a solution of the

bisulphite and heated for some hours in closed digesters, by the action of steam. By this means the chips are disin¬ tegrated, the gummy connective materials being entirely dissolved away, and the wood being thereby reduced to a mass of separate fibres, which after simple washing and bleaching are ready for use in the manufacture of paper. See Electrochemical Industries.

CALCIUM CARBIDE. A compound crystalline substance composed of calcium and carbon. Its symbol is CaC2. When pure it is colorless and transparent, but as found in commerce it is of a lustrous reddish-brown or blackish color, being discolored by iron. It is a substance of great economic importance, owing to the fact that it decomposes with water at ordinary temperatures, with the formation of acetylene gas. See Calcium; Carbide; Elec¬ trochemical Industries.

CALCIUM CHLORIDE. The commercial supply of this important chemical salt is ob¬ tained from natural brines found in several lo¬ calities in Michigan, Ohio and West Virginia. The output in 1916 was 26,062 tons (20,535 tons in 1915), valued at $216,729. In addition to this direct and recorded production there were thousands of tons produced as a by-prod¬ uct in the manufacture of soda. The uses of calcium chloride are constantly increasing in number. One of the most important is that the addition of 3 per cent to Portland cement per¬ mits cement work to be carried on during freez¬ ing weather. In the water-jackets of water-cooled automobile engines a 20-per cent solution of calcium chloride will remain liquid down to a temperature of 9 degrees below zero. In re¬ frigerating apparatus it is much superior to common salt (sodium chloride), remaining liquid at a much lower temperature. Because of its affinity for moisture it is used to sprinkle roads, tennis courts and playgrounds, to pre¬ vent dust. It is used also to preserve railroad ties and fence posts, and other timber used under similar conditions, and also in the man¬ ufacture of important dyestuffs. See also Calcium.

CALCIUM LIGHT, a brilliant light pro¬ duced by directing the flame of an oxy-hydro- gen blowpipe against a block of compressed quicklime. It had long been known that lime emits a light of • extraordinary . brilliance and whiteness when strongly heated in this manner, but the first practical application of the prin¬ ciple was made by Capt. Thomas Drummond in 1825, in connection with the trigonometrical survey of Ireland. The calcium light is con¬ stantly employed in the production of theatrical effects and for the projection with a stereopti- con of photographic pictures upon a screen. It is also called Drummond light, lime-light and oxy-hydrogen light.

CALCULATING MACHINES. These machines are classified according to their use, as arithmetical or geometrical ; the former dealing with computations of numbers, the lat¬ ter with calculations of lengths, areas or con¬ tents. In the first class the operations per¬ formed by the machine may be simply addi¬ tion, in which case it is called an adding ma¬ chine. Some of these simple machines also

perform subtraction. The multiplying ma¬ chines are far more complicated and perform also division, and they can be manipulated so as to work problems in the rule of three, and extract square roots.

In the simple adding machine the number is always progressively added, a unit at a time. Several different devices . have been employed by inventors to accomplish this result. The simplest is a train of wheels bearing the nine digits and zero on the face of the wheel near its outer edge. On the first wheel (at the left) units are counted up to 10. At the tenth count the next wheel to the left is moved one cog by a stud which operates each time the “units® wheel makes a complete revolution. The “hundreds® wheel, next again to the left, is in like manner turned one cog when the “tens® wheel completes one revolution; and so on. The result is read through a “window® show¬ ing the uppermost figure on each wheel. On this principle the automobile speedometer and the trolley-car fare indicator are operated. Other devices include a rocking sector of a circle, operated by a key. On the curve of the sector are nine teeth engaging a counting wheel with nine teeth. When the key marked 9 is depressed, the entire sector moves in gear with the counting wheel giving it a complete turn. When the key 4 is depressed only four of the teeth engage the wheel which is thus turned only four-ninths of a complete revolu¬ tion. A second sector placed to the left of the first and operated in the same way would count tens, and a third sector still farther to the left would count hundreds ; and so on up to as many places as desired. Several variations of this system have been utilized. The key may not move the sector when it is pressed, it may simply set a stop or check, and the movement may be produced by a lever, or by electric mechanism. This is the device used in the cash register, and in the Burroughs Adding Machine.

Another application of the same fundamen¬ tal idea is the stepped cylinder, in which ridges running lengthwise of the cylinder take the place of cogs on a wheel or sector. These ridges are of different

lengths, appearing as steps, each succeeding ridge being longer by one unit than the ridge preceding. By sliding a toothed counting-wheel across the cylinder, a distance regulated by the position of the de¬ sired number on a scale, and turning the cylin¬ der by a crank, the respective number of ridges at that plane will operate the counting-wheel. This device is utilized in the Arithmometer and other machines of the Thomas type. A vari¬ ation of this idea consists of a series of racks in place of the ridges on the cylinder — as in the Mercedes machine.

Another basic device is a cylinder having cogs which may be withdrawn into the body of the cylinder by adjusting a cam-shaped ring. The teeth or cogs which remain projecting be¬ yond the surface of the cylinder are those which operate the counting wheel. The action may be similar to that of the sector, the teeth operating in one plane, or it may follow the plan of the stepped cylinder, and the teeth be “stepped® and operate on a sliding carriage. This device is used on the Brunsviga machine, and the many modifications of it.. Adding ma¬ chine attachments have been devised for type-

writers, whereby figures set in a column by the typewriter are added by the attachment and the total may be printed in at the foot of the column.

The Abacus, described elsewhere in this en¬ cyclopaedia, in one of its varied forms is widely employed in India, China and Japan for mak¬ ing a variety of mathematical calculations, generally for commercial accounting.

In the geometrical class of calculating ma¬ chines the simplest type is a measuring wheel which is graduated on its circumference, and is run over the lines to be measured, a record¬ ing mechanism at the axis showing the total distance traversed. The slide rule is a device of some little antiquity, having been invented in the logarithmic type in 1620 by GunterT Many other mathematicians followed with vari¬ ations and adaptations. The slide rules are classified as (1) those working

with movable indexes, and (2) those with adjacent sliding scales. To the first class belong the circular scales of Oughtred, Scott, Nicholson and Weiss; and the spiral scales of Milburne, Adams, Nicholson and Lilly. To the second class be¬ long the straight rules of Partridge, Everard, Roget and Mannheim ; the circular rules of Biler, Sonne and Charpentier ; and the cylin¬ drical rule of Thacher. The standard British slide rule is of the Mannheim type, and carries four scales, two on the stock and two on the slide. The slide is set for the problem in hand, and the result is read by a <(runner,® or the rule may be turned over and read from scales on the back. The Integraph is a me¬ chanical apparatus for solving graphically dif¬ ferential equations. Planimeters are machines which measure lines and the areas of plane surfaces. There are several types, but only one, the polar planimeter, is in use at the pres¬ ent day. There are two separate fixed points on this machine, one of which is the pole. From these points reach out arms to a carriage on which is a tracing wheel and calculating mechanism mounted on a sleeve, which slides along graduations on one of the arms. A modification of this machine has a long straight rail against which a guide is held while the machine is being operated. The Integrator is another form of planimeter by which many intricate problems may be solved mechanically. The name <(Harmonic Analyser® is given to another machine of similar construction. The (<Tide Predicters® of Roberts and Lord Kelvin are among the remarkable mechanisms de¬ vised to solve mathematical problems. With these machines set with a duplication of the component forces operating upon the tide at any port, the mechanism delivers in about two hours a tracing showing graphically the move¬ ments of the tide at that port for a year in advance.

The Hollerith electric tabulating mechanism used by the United States Census Bureau is prominent among the remarkable calculating machines that have been developed in America. Three separate machines constitute the outfit. The first one punches holes in cards, in any one or more of 240 places ; the second tabulates the cards, while the third sorts them. Machine No. 1 has a keyboard of 240 keys, this being the number of answers called for in the census blanks of the bureau. The operator takes a return blank, representing the report of some

individual, and, as he reads it, strikes the appro¬ priate keys, which results in the punching of a card, that becomes a mechanical counterpart of the original return. As the average number of questions answered on each return is but 15, the work is not so tedious as might

be inferred from the statement as to 240 questions.

When the cards of a State have been punched, they are brought to the tabulating ma¬ chine, which is the real calculator. This ma¬ chine reads the holes of the cards that are fed into it, and makes an electrical record of each hole, according to its position, adding up the totals for each hole, and showing them on dials. When the cards are all fed through, the total of each of the 240 replies is enumerated. The third machine is a sorting box, which serves to secure answers to cross-questions. For in¬ stance, if it is desired to know how many white persons are among the total number convicted of crime, the sorting, box will locate all cards having the holes corresponding to these two statements, and give the total. In this way a great variety of statistics are made available which it would be too expensive to gather or compute in any other way. For other informa¬ tion on this subject, see Cash Register; Com¬ puting Scale. Consult Cajori, F., (A History of the Logarithmic Slide Rule) (London 1909) ; Horsburgh, F. M., (Modern Instruments and Methods of Calculation (London 1914) ; Pick-worth, C. N., (The Slide Rule: A Practical ManuaP (London 1910).

CALCULUS. As used in medicine the term calculus (Lat. calculus , a pebble or small stone) is applied to certain concretions oc¬ curring in the cavities or tissues of the body, usually as the result of the deposition of solids from some natural secretion. Calculi may be of many different sorts, and vary greatly in consistency, some being merely crumbly masses that can be crushed between the fingers, while others are extremely hard. Calculi occurring in the lachrymal or tear passages are called dacryoliths, while salivary calculi are formed in the salivary glands or their ducts, and amyg-doliths in the tonsils. Socalled rhinoliths are concretions which sometimes develop in the nasal cavities, usually as the result of the pres¬ ence of some foreign body. The tartar on the teeth is sometimes spoken of as dental calculus. Pneumoliths occur in the lung and broncholiths in the bronchi ; pancreatic calculi are found in the pancreas. The breast and prostate gland also occasionally harbor calcareous concretions, which in the former case are called lacteal cal¬ culi. The deposits of chalk about the joints in gouty persons are sometimes referred to as arthritic calculi. Intestinal calculi or entero¬ liths may give rise to serious disturbances, and if they happen to occur in the vermiform ap¬ pendix often simulate date or other fruit stones in appearance. Before appendicitis was well understood their true nature often passed un¬ recognized and when they were discovered in cases of the disease the malady was mistakenly attributed to the swallowing of such foreign bodies. The two most important types of cal¬ culi, however, are the biliary calculi or gall¬ stones, and urinary calculi.

Gall-stones are very common and fortunately usually do not give rise to symptoms. It is estimated that in Europe 10 per cent of the

entire no'milatin* have gall-stones, while in the United States their frequency is held to be about 7 per cent. As their formation is probably en¬ couraged by sedentary life and conditions favor¬ ing stagnation of the bile, such as tight lacing, lack of exercise and constipation, they are three times commoner in women than in men. They rarely give symptoms in younger persons, and about half of the patients are over 40 years of age. Pregnancy is said to be of importance in favoring their formation. Biliary calculi may be extremely small or may attain con¬ siderable size, stones as large as an English walnut not being at all uncommon. They also vary greatly in number and the smaller ones may be present in hundreds. They are com¬ posed principally of cholesterin (q.v.), with varying but much smaller amounts of bile pig¬ ment, lime and magnesium salts, fatty acids and bile acids. It is now generally assumed that an inflammatory or catarrhal condition of the mucous membrance of the gall-bladder (q.v.), usually induced by microorganisms, furnishes the starting point of gall-stone forma¬ tion. As already stated gall-stones may remain in the gall-bladder for years without causing symptoms, or their presence may be accom¬ panied by inflammatory changes in the organ, or they may enter the gall-ducts and give rise to disturbances of various sorts, of which pain, local tenderness, persistent or remittent jaundice, clay-colored stools and chills and fever are conspicuous features. While a ra¬ tional and hygienic mode of life will do much to prevent the formation of gall-stones, if they are present and give rise to symptoms that are at all severe surgical intervention is usually necessary to effect a cure.

Urinary calculi may be found either in the kidney, ureter or bladder, and are accordingly called renal, ureteral or vesical calculi. Kidney stones of small size often pass into the ureter and during their journey downward to the blad¬ der give rise to seizures of renal colic which in the agony and general prostration they cause are very similar to those

of biliary colic. The pain is felt lower down in the abdomen and also in the back; frequently also radiating along the inner surface of the thigh. Aside from the attacks of colic renal stones may cause pain in the back, chills, fever and bloody or turbid urine containing pus. “Coral calculi® are large stones which gradually fill the pelvis of the kidney, and in the conformation re¬ produce with great fidelity the irregularities and recesses of this cavity. Very small concretions pass into the bladder without difficulty and are evacuated in the urine as “gravel.® Stone in the bladder is rare in women and in the male sex is seen oftenest in infancy and after the fiftieth year. The symptoms include pain in¬ creased by jolting or bodily motion, frequent urination, pain at the end of urination — and sometimes sudden stoppage of the stream owing to the fact that the stone rolls into the neck of the bladder shutting off the flow — and usually bloody and turbid urine. Stone is especially common in old persons on account of the cystitis (q.v.) often present. Urinary cal¬ culi may be composed of various materials, of which uric acid and urates, calcium oxalate (“mulberry calculus®), calcium phosphate and ammonio-magnesium phosphate are the com¬ monest, singly or in combination. Rarer forms

are made up of calcium carbonate, cystin or xanthin. The cut section usually shows a laminated structure and a nucleus or starting point, which may be a blood clot, a shred of tissue, a bit of mucus, a small renal calculus, a mass of urates or a foreign body. Any condi¬ tions encouraging excessive deposition of the urinary constituents predispose to urinary cal¬ culi. Among such causes are lack of exercise, digestive disorders, defective oxidation, excesses in eating or drinking, catarrhal conditions of the urinary tract, *etc.* The tendency to stone formation is particularly pronounced in those having what is called the gouty or lithemic diathesis. The diagnosis of renal calculi is facilitated by the use of the X-ray, while for the detection of bladder stones a special form .of steel sound termed a “stone searcher® is introduced into the bladder. The cystoscope is also of great service in this field. Individuals predisposed to stone should keep the urine abundant by the free use of water — preferably distilled — and milk, should take much open-air exercise and avoid the consumption of large amounts of meat, fats, sugar or alcohol. Green vegetables, salads, bread, poultry, fish, eggs and fruit should form the main articles of diet. Despite the claims of nostrum venders, when a stone is once formed there is little chance of its being dissolved by any plan of internal medi¬ cation. If the condition causes decided symp¬ toms surgical removal of the offending body is indicated. See Lithotomy ; Lithotrity.

CALCULUS, The Infinitesimal. The In¬ finitesimal, or Differential and Integral, Cal¬ culus is not so much a branch of mathematics as a method or instrument of mathematical in¬ vestigation, of indefinite applicability. The masters now seldom try to treat it in less than a thousand large pages ; here we may hope no more than to expose its basic principles, to illustrate its characteristic processes and to ex¬ hibit some of its more immediate applications, with their results. Even so little will require the utmost condensation and self-explaining abbreviations.

We might define the Calculus as the Theory and Application of Limits, so central and dominant is this latter concept. We must, then, clear the ground for its full presentment.

Successive addition of the unit 1, continued without end, gives rise to the Assemblage of positive integers, in which all additions, multi¬ plications and involutions are possible. This assemblage is ordered: i.e., of two different elements, a and b, either a < fb or a > &; and if a < fb and b < fc, then a < fc. To make all subtractions (inverses of addition) possible, we annex the symmetric assemblage of negative integers, any negative integer as a (or — a), being defined by the equation a + a, = = 0, this 0 itself being defined by a — a = 0. To make all divisions (inverses of multiplication) possible, we annex the assemblage of Fractions, quotients of integers by integers. This total assemblage of integers and their quotients, both + and — , we may call the domain or assemblage of rational real numbers, wherein all direct opera¬ tions (of addition and multiplication) and also the inverses (subtraction and division) are pos¬ sible.

For a precise definition of the processes ol

annexation here involved, see Algebra, Defi¬ nitions and Fundamental Concepts.

The operation of involution is direct, a special case of multiplication, but is not com¬ mutative like addition and multiplication : thus a T b = = b + a, ab = ba, but in general ab ˆ & a • Hence the direct operation ab, yielding c, has two inverses : Given b and c, to find a, and given a and c, to find b. The former gives rise to roots or surds, the latter to logarithms. But neither of these can in general be found in the universe of rationals ; to make such in¬ versions always possible, we must still further enlarge the domain of number by annexing Irrationals. These demand exact definition.

Divide the assemblage of rationals into two classes, A and B, any member a of the first Ding <C any member b of the second. Three possibilities present themselves :

1. A may contain and be closed by a number a > any other a but <C any b.

2. B may contain and be closed by a number 3 <C any other b but any a.

3. Neither A may contain a largest a, nor B a smallest b. Thus we may form (1) A of 2 and all rationals <ˆ2; or (2) B of 2 and all rationals 2, — in either case 2 is a border (frontiere) number; or (3) A of all negatives and all positive rationals whose squares are <C 2 and B of all positive rationals whose squares are ■> 2. Here there is no border number among rationals. But a border does exist, de¬ fined as >• any a but <” any b. We jname it

second root of 2 and denote it byV2 or 2 2-All such common borders are called Irrationals. The assemblage of irrationals is determined by all such possible partitions of rationals (A,B). The assemblage of all rationals and all such irrationals is the assemblage of Reals. It remains and is possible to extend the opera¬ tions of arithmetic to all reals. In particular, the assemblage of rationals is dense ; i.e., be¬ tween every two there is an infinity of others ; in the same sense the assemblage of reals also has density. Again, always on dividing all reals into A and B, in such a manner that each mem¬ ber oi A C each member of B, there will be a border y, the greatest in A or the least in B, all less numbers being in A, all greater in B. Hence, and in this sense, the assemblage of reals is named continuous.

In this continuum, admitting no further in¬ troductions, suppose a magnitude to assume successively an infinity of values : Vi, Vi, … vn, … Vn+k, … ; it is then called a variable, V, and its values in order form a sequence, S. It often happens that V will approach some con¬

stant L, so that by enlarging n we may make and keep the modulus or absolute worth (i.e., regardless of sign) of the difference V — L < fany preassigned positive magnitude, e, for all follow¬ ing values of V; in symbols, | Vn + k — L \ < L e for every positive k. Then L is called the Limit of V : L = Lim. V. Plainly, V cannot have two limits as thus defined. It is easily seen that V will have a limit when and only when| Fn + fc — EJ < e„. If V changes always in the same sense, by increase or decrease, it has a limit when and only when \V\ < always than some fixed number n. When V increases (positively or negatively) beyond any assign¬ able n, it is often said to have 00 as limit.

A perfect geometric illustration is found in

the sequences *and C of inscribed and circum¬ scribed regular polygons of the circle. Here every C is > every I ; also Cn — In <e; also C n+A; — Cn <T £,In+& — In D e,C n A F,A In ˆ £ (A being the circle-area) ; hence A is the com¬ mon limit both of Cn and of „,* for n increas¬ ing without limit (nzz °°).

Algebraically, if Ci, C3, Co .. . C2n+ 1.- be the sequence (0) of odd convergents and C2, Ci, … Cin … the sequence (E) of even con¬ vergents in an interminate continued fraction

1

1

“ m+ r+i +ˆ+r +L • • ■ • then every Cl”+‘

>0,also C2n +x— G (n +k) +1 <C£ , O— G(w +*)<«; and O-h — (V 13—3) <e, (\/l3 — 3) — C2n<e.

The odd convergents from above and the even convergents from below close down endlessly

upon their common limit, V 13 — 3, — as quad¬ rants of an hyperbola and its conjugate close down upon their common

asymptote.

The difference \V — L\ is a variable small at will and is called Infinitesimal (o) ; its limit is 0. The quotient of two ff's will generally be a variable; if it has a finite limit L, the ff's are named of the same order; if the limit of the quotient is 0 (or <*>), then the numerator (or denominator) is of higher order. If any o be chosen as standard, it is called principal infinitesimal ; any other whose *>th root is of the same order as the principal cr is itself said to be of* >th order.

Easy theorems are now proved as to the limits of the sum, difference, product, quotient or variables. In general: If R(u, v, w, ...) be a rational function of simultaneous variables, u, v, w, ..., and if u, v, w ... have limits, /, m, n ..., — then R(u, v, w, ...,) has a limit R(l, m, n ...) — always provided that this latter does not involve a division by 0, which has no sense.

If tivo V's differ at most by cl a , and one has a limit, the other has the same limit. Herewith there becomes possible a Calculus of the Litnits of Variables instead of the Variables them¬ selves. These limits are often far the more important, as we shall soon see.

A variable V (or sequence Vi, V2 ...) is bounded above when we may assign a value M that it cannot exceed ; then there is a certain smallest number its upper limit, which it can¬ not exceed. Similarly, it is bounded below when we may assign an m below which it cannot sink ; then there is a certain greatest number, its lower limit, under which it cannot descend. If V may assume either of these limits as one of its values, then that limit is attainable and is a Maximum or a Minimum ; otherwise it is 'unattainable. If V be a proper fraction, its limits, 0 and 1, are not attainable. When V may assume every value between its attainable limits, a and b, it is said to vary continuously in the interval [a, b]. But if a, or b, or both be unattainable, we shall say that it is continuous in [a+0, b] or [a, b — 0], or [o+O, b— 0].

When to values of one magnitude correspond values of another, the magnitudes are called Functions of each other (Leibnitz). The one to which arbitrary values may be supposed given is called the argument or independent variable ; the other, whose corresponding values

may be reckoned or observed (or which at least exist), is called the function. Such are a number and its logarithm or sine ; the radius of a sphere and its surface or volume; the elasticity of a medium and the velocity of an undulation through it ; *etc.* … The general functional connection of x and y is expressed by F (x, y) = 0. If this F be an entire poly¬ nomial in x and also in y, the F is algebraic, otherwise transcendental. If F be solved as to y, thus y~f(x), then y is an explicit function of x ; otherwise, an implicit function. If f(x) be the quotient of two entire polynomials in x, then f(x) is a rational function of x; otherwise, irrational. If to any one value of x there corresponds only one value of y, then y is a one-valued or unique function of x; if x be also a unique function of y, then there exists between x and y a one-to-one correspondence.

If y = f(x) and * = (t>(y) express the same correspondence between x and y, then / and <t> denote inverse functions. A function may re¬ duce to a constant ; as xn — 1, for every finite x when n — 0.

As x ranges in [a, b], f(x) will also range. Similarly f(x) may have an upper limit M and a lower limit ra; then f(x) is bounded in [a,b], [m, M] is its interval and M — m its oscillation. If either m or M be absent (or°o)} this oscil¬ lation is oo . If we cut [a, b] into n subinter¬ vals (ak , bk) (k — l ,…»), then plainly the upper limit of f(x) will be M in at least one [ak, bk] and > M in none; the oscillation will not be > M — m in any [ak, bk.

If as x approaches c, no matter how, f(x) approaches f(c) as its limit, then f(x) is con¬ tinuous at c (i.e. for x—c). Or, if f(x) be bounded in [c — a, c + a] and if the limit of its oscillation be 0 for a vanishing, then f(x) is continuous at c. That is, we must be able to make and keep the oscillation of f(x) small at will by making and keeping the fluctuation in x small at will.

It may be that limit f(c + °) = f(c) only for then f(x) is named continuous right of c\ or that Lim. f(c + °) = f(c) only for —a, then f(x) is named continuous left of c. Only when fix) is continuous both right and left of c [f(c) being the same], is f(x) continuous at c.

If f(x) be continuous at all points (values of x) right of a and left of b, it is named con¬ tinuous in [a, b].

The infinitesimal [c — a, c ~r a] is called the (immediate) vicinity (or

neighborhood) of c.

A change in the value of a v is conveniently denoted by dv, read difference-?/ or Delta-?/; hence dx and dy will denote corresponding (simultaneous) differences or changes in x

and y. .

If now y = f(x) be continuous in [a, b], we may cut this latter up into finite subintervals, d x, each so small that the oscillation of y in each shall be <£. Hence Heine calls y uni¬ formly (equably, gleichmassig) continuous in [a, b]. This corresponds to uniform cou¬ rt-00

* vergence, as of a power-series, y= 2 Cnxn as

71 =0

opposed to non-uniform or infinitely slow con¬ vergence (Seidel, 1850). Finer discriminations must here be omitted.

Continuity is the supreme functional property with which the Calculus is concerned. Sine

and cosine are everywhere continuous, but tan x is discontinuous for x —(2n ± l)^/2, where

tan x drops from + 00 to — °° . Similarly—

OC CJL

at x — a, an extremely important discontinuity.

is discontinuous at

x = 0, leaping from — 1 to 1; the discontinuity is 2. It is generally

assumed that Continuity holds throughout the Processes of Nature.

Again, y — sin —is not defined for x = 0, but oc

whatever value be assigned it there, it remains discontinuous, since sin — vibrates infinitely

OC

fast between + 1 and — 1 for x~ 0. — Again,

f(c ± c r) may approach a limit for evanishing, yet not approach f(c). Thus, let f(x) = x2

x

4-i *j*ˆ2 *t* … , a decreasing geometrical series,

ratio (1 + x2) 1, hence Lim. f(x) = \Jrx2.

Then as Xz = .0, f(x) — \, Lim. /(0 ± e) = l; but for .r = 0, f(x)— f(0) — 0. — There are many immediate consequences of continuity, which we have no space to discuss here, such as : A function continuous in [a, b] attains its upper and lower limits (its maximum and minimum) ; it also assumes at least once every value be¬ tween f(a) and f(b), — a property, however, not peculiar to continuous functions (Darboux).

The notion of function is at once extended to several variables, u—f(x, y, …), one-or many¬ valued, algebraic or transcendental, etc., as be¬ fore. Here each variable, as x, has its range or in¬ terval [a, a] ; so y its [b , b'], *etc.* All possible sets of values (x, y …) form an assemblage or the Domain (D) of variation. Any set (or point) for which any variable has an extreme or border value, as a or a', b or b\ is a border point; the assemblage of all such is the border or contour of D. A simple geometric depiction of D in rectangular co-ordinates for only

two variables, x and y, would be a rectangle with sides x = a, x = a\ y^b, y = bf ; of three variables, x, y, z, it would be a cuboid bounded by the planes x—a, x = a', y = b, y = b', z = c, z = c,'e tc. The point (x, y) or (x, y, z) may be anywhere in or on the rectangle or cuboid. Such a D may be thought cut up into elements, infinitesi¬ mal rectangles or cuboids. Suppose any point {(h, bi,...) within an element. If now

f(x, y, ...) approaches f(ax, bi, ...) as limit, as point (x, y, ...) approaches point (ax, b i, ...), no matter how, then f(x, y, ,..) is called con¬ tinuous at (oi, bi, ...). This amounts to saying that the oscillation of / shrinks toward zero as the element contracts, no matter how, about the point; that is, infinitesimal function-changes correspond to any and all infinitesimal argument-changes in the immediate vicinity of the point.

Any f(x, y, ...) is called continuous within D when continuous at every point in D, border included; but on this border, as x, y, ... approach ax bx, ... the point must not get without D. An / is continuous in the (imme¬ diate) vicinity of a point, when continuous within an infinitesimal D including that point.

In general, theorems holding for functions of one variable may be extended, with proper mod¬ ifications, to functions of several variables.

Derivatives. — In the study of functional dependence, the main subject of scientific inquiry, it is of first importance to know how corresponding changes in the magnitudes are related. To discover this, we form the quo—

Ay

tient of corresponding differences, called

Difference-Quotient (DQ). In general, it is very complex, but breaks up into two parts, one independent of Ax, the other vanishing with

Ax. The first is the important part and is named Derivative (D) or Differential Coeffi¬ cient {DC). More formally, if y—f(x) be a unique continuous function of x in [a, b], and x

u • j • r Ay — f{x ± Ax) — f{x)

be any point therein, and if — = — — -

approaches a limit as Ax approaches 0 no matter how, then that limit is called Derivative (D) of f(x), as to x, at the point x. If f{x) has a D at every point of [a, b], the assemblage of them forms a new function, the Derivative of f(x) for [a, b], which we may write f (x) with Lagrange, or Df{x) with Cauchy. Hence

= /'(*) + *■

Geometric Interpretation. — The Differential Calculus originated in the Problem of Tangents. Let P be any point of a curve referred to rectangular axes X, Y, and let P be between Q and Q'. Draw secants PQ, PQ', sloped # and to X, and <P to each other ; draw ordinates through P, Q, Q' ; through P and Q' draw parallels to X, meeting ordinates through Q and P at D and D'. Then

PD = Jx, D'Q' = A'x, DQ = Ay, PD' = A'y.

Also iˆtanˆˆtan tan ($' — &) —

tan <j>. If now by approaching Q and Q1 to P we can make and keep </>, and therefore tan <p, small at will, then the secants settle down into a common position called tangent to the curve at P (sloped t to X) and the

common limit of

Ay , A'y . *r and* r is Ax Ax

tan

t:

or

f(x) — tan t. But if P were an angular point, then PQ and PQ ‘ would not tend together,

Ay

‘ would tend to one limit, the progressive

Ax

differential coefficient, and

A’y

A’x

to another

limit, the regressive differential coefficient ; only when these two coalesce is there a Deriva¬

tive proper

at the Origin, Lim

. Thus in y = x (e* — 1ˆ f (ex-{-l)t

* (<M /om!

the progressive DC— 1, the regressive DC— — 1, the two limiting positions of the secants are perpendicular.

How thickly may such salients be strewn along a curve? To have a D, i.e., to be dif¬ ferentiable, plainly the function must be continuous ; it was long thought that this

necessary condition was sufficient, that the continuous function possessed in general a D, save at certain special points. It was Riemann who first suggested (at least as early as 1861) the astonishing possibility that such an

fix) as 2°° sln (w2*), though everywhere con-n—i n2

tinuous, was nowhere differentiable; but as he left no proof, it was generally thought he meant that it was possible to find such salients in every infinitesimal [x, x~\~ Ax], which was easy to show; but Weierstrass thought he meant strictly that the D did not exist for any value of x. In any case Weierstrass himself produced (18 July 1872) an exampie of such

n— oo

a function, y= 2 bn cos(anJC7r) , — where a is an

n — 0

odd integer, b a positive number 1, and ab “> 1 + |tt, — which, though everywhere con¬ tinuous, has nowhere a D, since the progressive and regressive Difference-Quotients are every¬ where opposite in sign and increase oppositely toward oo as they pass over into Differential Coefficients ((Math. Werke von K. Weierstrass, II, > p. 71-74). Geometrically, in the graph of the differentiable function, the polygon formed by n consecutive chords tends toward the curve for n = =. oo , PQ and PQ’ tend to coalesce as Q and Q’ both approach P, the triangle PQQ’ becomes flatter and flatter (we may suppose the arc QPQ’ steadily enlarged under a microscope to its original length as Q and Q’ close down on P), the curve we may say is

elementally straight at P. But with Weierstrass's function the polygon remains always re-entrant, a zig¬ zag, and consecutive chords, PQ and PQ', tend to separate at a straight angle. Such discontinuities may yet present themselves to the future student of nature.

If y = = x2 Ay — 2xAx + Ax2 > ~ ˆ x

whence Dxy =

dy _

dx

—yx = 2x.

Here y is the area

of a square whose side is x, and 2x is the border of the square perpendicular to which the square expands, the D is the front of variation. Similarly, if y =? rx*, Dry — 2'ˆx, the circum¬ ference, the front of variation perpendicular to which x varies. If y — x3, Dxy — 3x2 = the front of variation perpendicular to which x varies. If y = iˆx3, Dxy = 4xx2 = the sphere-surface, the front of variation perpendicular to x. For y — x *, Dxy = 4x3 = again the whole front of variation, though here our powers of envisagement fail us. Thus we are conducted to the Derivation of Assemblages, for which the reader must be referred to this latter subject.

Kinematic Illustration. — Let s = length of path of a moving point P, described in time t ; As and A t = corresponding changes in ˆ and A s

-

t; then j] = v = average speed during At; *

Lim. -jj — Dts — instantaneous speed at t —

speed at the instant t (i.e., end of t and begin¬ ning of At). There is no motion at the instant of time, nor at the point of path, but only

during the time and space immediately about the point and instant. Instantaneous speed is a technical term for limit of average speed in the immediate vicinity of the point and instant. This instantaneous speed generally varies with t, and its D as to t is named accelera—

dv

Hon and is written^. The product of this

acceleration by the mass of the moving P yields the all-important motion of force. The D of this acceleration might be called second acceleration, but the notion has not yet proved useful in Mechanics (q.v.).

The notation for D may be this or that. Newton used the dot, thus s, to denote deriva¬ tive as to t, as still do the British; Lagrange, the accent, F'(x), still common; Cauchy, the operator D, with or without subscribed argu¬ ment x; others subscripts, as yx, yh, etc.; most common, most expressive, but possibly mis—

dy

leading is the Leibnitzian not a fraction

(thus far at least), not the quotient of dy divided by dx, but the limit of the fraction dy

for A x vanishing, no matter how. Somed

times we write ^ for Dx , thus: yx — Dxy —

lv = ^y etc dx ^ dx '

Lagrange ((Theorie des FonctionsC I) at¬ tains the notion of Derived Functions (or D's) by substituting x + s for ;r in F (x) — a0 + (hx + a2x2 + … anx v , whence F (x + £) = F (x)

F"(x) F(n)(x)

+ F\X) -f + f2 + . • . + —

where each F turns out to be formed from the preceding in the same way ; they are the Derived Functions of F. A nearlying Gen—

M =00

eralization considers f(x) ~ 2 an(x — a)n,

n =0

supposed absolutely convergent for all values of \x—a\ < +R, i.e., for * within [a—R, a + R]. Then in the same [ ] all the °o series

■ fl»(* — a) n-m(ni — 1, 2, 3, …)

m = °° \n n - m | n — ■ m

will also converge absolutely. Denote them in turn by f(x), f\x), … Choose s so that

m = oo f (to) (x) m

\x — a| + | R; then the series 2 • ——

will also converge absolutely in the same [ ] and will equal /(* + £)• These Sums f(x), f'(x), … are called 1st and 2d, … Derived Functions of f(x), which may be called its own Oth Derived Function. If instead of the inconvenient Lagrangian accents we put Cauchy's D's with proper exponents, we per¬ ceive that these latter, denoting order of dif¬ ferentiation, obey the same laws as ordinary exponents :

]Jm -f n= £)to. J)n — J)n, Dm, *etc.*

It is usual, though not quite satisfactory, to denote the value of any derived function at any point (x~a) by writing a for x, thus : f(n) (a). At this stage the D-notation is not so convenient. These special values

are seen to be f(n)(a) = \n.an. On finding hence the

a's and substituting in the definition of f(x) we get f(x) = f(a) + 2 , ' (x — a)n =

n = 1 \R_

w = °°/0)(a). .

2 — iT~ — a)n.

w = 0 [_

Such is the ordinary Taylor's Series, or Maclaurin's (more justly Stirling's) in case a = 0.

Lagrange supposed (amazingly, Picard) any arbitrary f(x) expansible in positive integral powers of (x — a), except for special values of a. However, presupposed only uniqueness and continuity in a definite interval, there may be no value of a in the interval for which such expansion is possible. Thus, /(.r) = (— x)v for

x <Z 0 and =xp for aryˆO cannot be developed

in positive integral powers of x for x positive and p not integral. Hence this Lagrangian notion of derived function, while in general agreeing with the notion of D as limit of dif¬ ference-quotient, is not yet so universal.

The notion of Differential, though unneces¬ sary at this stage, is commonly introduced

Ay _ Af (x) thus: Fromˆ = ˆ-

=/'(x) + <7, Ay~df(x) =

f(x) Ax~\~ a Jx. This first part of Af(x), namely, f(x) Ax, proportional to Jx and of the same order of infinitesimality, may be defined as the Differential of f(x) and may be denoted by

df(x), which is thus a finite variable for Jx'X.O.

For f(x) — x, we have dx = Ax, which is there¬ by df (x)

fore differential of x. Hence — "dx~ — /' (x),

i.e., the D of f(x) as to ;r= =the quotient of the

dy

differentials of f(x) and x (Leibnitz). Here ˆ7

is strictly a fraction whose terms are by no means ((ghosts of departed quantiesˆ (Berke¬ ley). Geometrically, dy is the Ay prolonged up to the tangent at P , — change of the ordinate of the tangent when abscissa changes dy

by dx; Lim. ffˆ~ 1. This notion of differen¬ tial, though useful in geometr)ˆ, mechanics and elsewhere, rather embarrasses the theoretical development of the subject. Hence the terms Differentiation (= Derivation), to differentiate, and hence the names Differential Calculus, Differential Coefficient.

On these bases the structure of the Differ¬ ential Calculus may now be safely erected. Primary formulae, easily established, are as follows (D meaning always Derivative as to x, u, v, etc., being simultaneous functions of x) :

P(m + v — w) = Du + Dv — Dw; D(uv>)=Du y + u'Dvrruv (—77 +

u

u'-V—U'v'

(u±c)f — u ; (cu)' — c ■ u.

Very important is Mediate Derivation, when y is function of a function of x, as y=<t> (u) , u=f(x) , hence y=</>] f(x) 1 =F(x). If then andf

have definite D's , <y(u) and f(x) , we have

=4ˆ *t% hence y%* =*yu'ux*= <t>' («)*/' (x). Ax Au Ax

But yx may exist even when the supposition fails, and this rule with it.

In particular, if y=f(x) and inversely x—<j>\y) and if either variable has a D =4= 0

For if f{x) = Lim. 0,

J v Ax'

7 r

so has the other A x

then

1

Ay

, Ay , T. Ax 1 =1 / - — ; hence Lim. — =77—, ■ Ax Ay f ix)

or f (y)

i.e., in general, the D's of x as to

y and of y as to x are reciprocals of each other: yx'Xy— 1._

If yf —f{x) be +, then x and y increase (or decrease) together, fix) is called increasing at x. But if yr be — , then x and y change oppo¬ sitely, / ix) is decreasing at x.

Hence if *'(c) =j=0, fix) must be* (c) on one side of the point c, and <. /(c) on the other. Hence Rolle's Theorem: If fix) vanishes at a and h and has a D at every point within [a, b], then this D, fix) vanishes at some point within [a, b].

Now, / ix) = (b — a) { <f> (x)—<Pia)\ — (x—a) \ <p{b) — 0(a) } is such an fix), made to order, 0 being differentiable within [a, 6]. Hence fix)~(b — a) f(x) —]<P ib) — 0 (a) J must = 0 for some x in [a, b]. Hence 0(6)— -0(a) = (6 — a)f(x). Commonly we write a for x

and x 4* h for b ; then x—xfOh, where 0 is in [0, 1], so that 0 (x--h) — 0 ix)—hf ixfdh), the extremely im¬ portant formula for finite increments. Hence we see at once that if the D is everywhere 0 within an interval, the function is constant in that interval ; and hence that two functions whose D's are equal in an interval can them¬ selves differ only by a constant in that interval — a Theorem at the base of the Integral Calculus.

Passing now to D's, we first attempt y — ex. Hence

- 2

y-f- jy = ex--Ax = ex-eˆx = gx i 1 4-Ax 4- ˆ x 4-... [.

|_2 *

Hence Ay

A x

This [ ] is term by term, except the first, less than eAx, whose limit is 1 ; hence Lim. [ ]

Ay

-•c — 2

/ eˆx — A l Ax Ax

e* (-7*-) = < *['+ — +73 + •••]•

is 1 : hence Lim.

Ax

ex, or Dex = ex. The ex¬

ponential ex is unchanged by Derivation as to its exponent. Hence De« = e« ux. Hence, if

y = log x, ev — x , evyx = 1 , yx =e v =— ; or

oc

Hence, if

1 Ux

D log x~ — ■ • Hence D log u = — b x u

y — xm, log y — m log x ; Dy — Dxm = mxm — i.

For y — sin x,

2 Jy = sin (x + 2Ax) — sin x

= 2 cos ix-j-Ax) sin Ax;

— cos (x -}- Ax) S— ˆ ; hence Ax Ax

yx = D sin x = cos x = sin y| : hence

D sin u = cos u ux. Hence D cos x = — sin x

= cos ˆ x-- — ˆ • Hence derivation of sine and

cosine as to the angle merely adds -yto the angle.

Also, D tan x = l -j-tan x = sec x 2. If y = sin lx,

1

sin y = x, yX’ cos y = 1, yx =

hence

D sin lu =

Ux

Vl— X2 ’ Similarly for cos-

1

If

V 1—u2

y = tan~ lx, similarly D tan- ˆ lx = . Specially,

1

x

, _ D tan-1 —

Vˆ2 — x 2’ a

a

a 2 + xr

n • i X

D sin-1 — • a

Similarly we treat the hyperbolic sine and cosine and tangent ihsx, hex, htx), and their inverses hs-lx , hc-lx, ht-lx, with the important

results: Dhsx—hcx, Dhcx = hsx, Dhtx = 1 — htx 2,

1 1

Dhs~~l x -

V*2 + i

Dht~lx =

Dhc

1

lx

V jc2 — 1 ’

1

X

2’

X

with easy generalization for u and — > — formulas

especially important in Integration. By Deri¬ vation the anti-transcendentals are thus reduced to algebraic forms, while the exponentials and goniometrics return into themselves ; hence the inverse of Derivation, whatever it may be, applied to algebraic forms, may give rise to transcendentals. So much for ordinary alge¬ braic and simply periodic functions.

The Infinite Series cannot always be differ¬ entiated by differentiating term by term, but only under certain conditions of equable

n = - oo

convergence. If each term fn(x) of fix) = L'Zfn(x)

n = 0

be unique and continuous and if 2 converge, for every x in [a, a + dj, and if Lfix) = = fia), —

x — a + 0

for such a series the Theorem holds : If each term has a finite progressive DC, /«' (a) , and if

nv. J rt/ V'"*' * ■"V J Jt V"'t' /

•» con-

the series of DCs,^^^ + ^ fn ^

n— 0

Ax

verges equably for every J^* > 0and <^d, then n = oo

2 fnia) also converges and

n= = 0

= 1 2

n= 0

M=°° fnia + Ax) — fnia)

Ax

» for Ax ~ +0.

In general, this narrower Theorem will an¬ swer: If, for every x in [a, a+d], each fnix) is unique, continuous, and has a D (and for x=a at least a progressive DC), and if both

n= = oo n= = oo

2 fnix) and 2 f'n ix) converge,, the latter

n — 0 n — 0

equably, then Lfix)=fia), and fix) has a

n = co

progressive DC at a, which is 2 /n'(a) ; i.e.,

n = 0

we form the D of the infinite series by summing (to °°) the D's of the terms (for details see Real Variable, Theory of Functions of the.

For D of fiz) as to z, where z=xfiy, see Complex Variable, Theory of Functions of*

* The simultaneous variation 0, x and y is vividly depicted by the graph of f(x, y) = 0. But we may image it otherwise, thus: Let P and Q

depict the variables x and y, one moving on X , the other on Y, and let the elastic rod PQ connect them. As P moves uniformly along X, Q will slide up and down along Y, obeying f = 0. The assemblage of x-values is

A D of a first D ic called a second D, written

d2

variously /”(y), Dx\ and so on for the

3d, 4th, … nth D’s. We see at once,

Dnxm = —L =-xm-n J)n S*n = *S*n lx ,

m—n cos cos \ 2/

Du¬

ct

(x + b)m

= (_ i), °im +

| m — l(x 4 -b)m + n

A rational fraction must first be decomposed into such fractions. The exponential e* repeats itself steadily, D^eax — a^ea*; hence <t>(D)e<*‘X — <p(a)eaxt 0 being algebraic and ra¬ tional. The log x is at once reduced to a

fraction by D log x — ~ . For a product uv

x

we have Leibnitz’s Theorem:

fl(fl — 1)

Dn(uv) = UnV 4-UUn-iVi 4 - *Un*) j ,

precisely as in the Bionomial Theorem, the subscripts denoting the D’s. For a quotient u

y~ — » we write u=vy, Ui—viy-rvyi, u-j=v*y

--2viji 4-vy-i , … , un=vny 4-nvn — 1 yi 4- • • • 4 -Vyn. From these (n4~l) simultaneous equations we form the eliminant of the n unknowns, y, yi, y% …yn i; this eliminant is linear in yn and

yields

yn —

(— 1)«| n vn + l

u

V

0 0 0…

Mi

Vi

d00…

Ui

Vi

vi v 0 …

2

2

Un

… Vi V

\n

Applications. — 1. Let P be any ordinary point of a curve, .*S*’ the foot of the ordinary y,

strewn evenly along V, the assemblage of y-values is not strewn evenly along F, but is stretched, compressed, folded, crumpled in countless ways. The study of yx becomes the

study of the intimate texture of this F-axis bearing the assem¬ blage of y-values.

If now z = x + iy, w — u + iv be complex variables, and w =/(z), then w is indeed compounded of x and y, not however in just any combination, as x2f-y2, x--2iy, but only in the one combination, x + iy. The domain of z is the XF-plane, of w the t/F-plane, as which two we may take the floor and a wall or the ceiling. Not having a 4th dimension at command, we cannot envisage w = f(z) as a surface, as we did y—f(x) as a curve. We must again think of two points P and Q,

in XY and UV, con¬ nected by an elastic rod, PQ; as P moves about in XY , Q moves about in UV, obeying w = f(z). We may think of the texture of XY as uniform, then the texture of UV will not be uniform, but stretched, compressed, folded and crumpled in countless ways. The study of wg now

becomes the study of this intimate texture of UV. As

Ay

in y = =/(*) the derivative yx is the part of the — that

Ax

is entirely independent of Ax< so w z musˆ be independent of Jz. as yx is the same whether Jx = =. + 0 or = — 0,

so in general wg is the same no matter how Jz — 0, along

whatever path of value. Geometrically this signifies that if p, p' be two intersecting paths of z, and q, q' the correspond¬ ing intersecting paths of w, then p and p', q and q' , intersect under the same angle. Hence the angles of the curvilinear triangle (q, q', q") = the angles of the corresponding cur¬ vilinear triangle; (p, p' , p") ; hence the two corresponding infinitesimal rectilinear triangles of the chords (or tangents) will be similar, the ratio of similitude being wg, which of

course varies from point to point: the one plane is a map of the other and the textures are similar in the smallest parts. Such is the geometric interpretation of the Derivative of Functions of a Complex Variable (q v.). It would seem that such interpretations might be indefinitely extended.

T and N the feet (on X) of tangent and normal at P. Since yx = tan rt SN = y'yx, ST — y.xv, and we easily express PN, PT, *etc.* Also, if 0 = angle of intersection of y=/(x) and Y—F(x),

then tan <f> =

yx — Yx

14 -yx Yx'

If the curves touch, the

numerator = 0; if they are perpendicular, the denominator = 0.

2. Envelopes. — Let F(x, y; p) = 0 (1)

be a system of curves distinguished by varying values of the parameter p. For any special value of p, Fix. y ; p)~0 will be one curve and F(x, y; p + Ap) = 0 (2)

a neighboring curve. Where do they meet? What relation connects x and y of the inter¬ section, I, of any such pair? We must com¬ bine (1) and (2) and eliminate p. If in the result we pass to the limit for Ap AO, we shall find the locus of the intersection of consecutives (or the Envelope) of the system. For (2) we may put (l)-(2), or still better

F (x, y; P 4~ Ap) — F (x, y; p) _

Ap ~ W

It will be equivalent to invert the procedure, to pass to the limit and then eliminate p. So we get

Fp(x, y ; P) = o, (4)

between which and (1) we now eliminate p. This eliminant connects x and y for every intersection of two consecutives of the system, every instantaneous pivot about which the curve starts to turn into a neighboring position. But this is not all. It connects the x and y of all other points where meet two curves (branches) corresponding to the same p, as may thus be seen. Assign any pair of values to x and y, i. e., take any point in the plane, and ask what members of F = 0 pass through it, i.e., what are the corresponding values of p? There are n

such, if F be of nth degree in p. When will two of these p-roots be equal? Only when the *>-discriminant of F— 0 van¬ ishes ; i.e., when the eliminant of p between F= 0 and Fp= 0 vanishes, as we know from Algebra. Hence this eliminant connects x and y for all points where meet two curves corresponding to the same or equal p's. This will include all cusps and nodes as well as instantaneous pivots; hence the* >-eliminant=0 will be the equation of all cusp-loci and node¬ loci as well as of envelope proper.

Illustration. — Find the envelope of a straight line AB on which the intercept between X and Y is a constant c. The equation of AB is

— 4 - j- — —1=0 = F(x, y\ a).

a V c2-a* ' J

Another A'B ' of the system is

^ + y^f-1=0 (<»'=»+'«)•

and another A" B" is

— 4-a"

{a" —a — Ac).

The Intersections *' and I" of these two with AB are definite. As A ' and A " close down upon and coalesce in A, V and I", always definite, close down upon and coalesce in their common limit* , the instantaneous pivot about which AB starts to turn. Differentiating and eliminating

a we find the 4-cusped Hypocycloid, x%ff-y%— c%, as the envelope, or path of the instan¬ taneous pivot I.

Hence Pliicker's double conception of a curve as path of a point gliding along a straight line that turns about the point, and envelope of a straight line that turns about a point that glides on the straight line. The relation connecting the corresponding mag¬ nitudes, arc-length s (of the path) and angle « (through which the straight line turns), is the intrinsic equation of the da

curve. The is named average curvature

of ds; its limit — is named instantaneous

ds

curvature (*) at P. Plainly da — dr; hence

dr

ds

dr

d tan r

dx

ds

d tan r ' dx ' ds (l+y/2)L

(N.B. The Differential Triangle PDQ formed by dx, dy, ds, yields at once

2, ■ dx 1 dy y* \

xt + y* > ds V l + yxrds

1

sf

ˆ /

t + yx 2 ,

In the circle k is the constant hence the

curvature of the circle is the reciprocal of the radius. For any point of any curve the recip¬ rocal of this curvature is called the radius of curvature, p; hence this p at any point is the radius of a circle of equal curvature, hence called circle of curvature.

To illustrate. — Draw PT and PN, tangent and normal to the curve; about Kf and K” on PN, with radii p’ S> p and p” “Cp, through P draw two circles, one less, the other greater than the circle of curvature. Let p’ and p” approach and coalesce in p; then K’ and K” approach and coalesce in K, the centre of curvature, and the O about K is the oscilla¬ tory circle.

Otherwise, through P, and Q’ and Q” on opposite sides of P, draw a circle. Let mid¬ normals to PQ’, PC) ” meet PN at S’ S”, and each other at .S””; as O’ and Q” approach and coalesce in P, S’, S”, S’” all approach and coalesce in their common limit, S (or K). Hence the osculatory circle = circle through three consecutive points of a curve, and centre of curvature ˆintersection of two consecutive normals.

The co-ordinates (u and v) of K are given

by w = x— (1 + y‘2), v = y L(1 + y‘2). Elimi—

y y

nating x and y between these equations and the equation of the curve, we get the equa¬ tion connecting u and v for every K, i.e., the equation of the Evoiute, or locus of the centres of curvature of the original curve (the Involute). Since Vu. yx -\~ 1 = 0, the tangents at cor¬ responding P and K are perpendicular, the nor¬ mal to the involute is tangent to the evoiute. Also, it is easy to prove that the arc-length in Evoiute can differ only by a constant from the radius of curvature (p) in Involute. Hence a point of a cord held tight while being un¬ wound from the evoiute must trace an involute-, hence the former name. To any involute there is only one evoiute, but to any evoiute there are infinitely many (socalled parallel) invo¬ lutes, — an excellent illustration of a one¬

valued determination with many-valued inverse, and also of the definiteness of dif¬ ferentiation as compared with the indefinite¬ ness of its inverse, Integration (see below). Some curves reproduce themselves in their evolutes, notably Cycloid and Logarithmic Spiral, which latter inspired the engraving and epitaph on the tomb of Jacob Bernoulli (1654-1705) : Eadem mutata resurgo. The general theory of the Contact of curves, Asymptotes, etc., beautifully exemplifies this Calculus, but cannot be treated here (see Curves, Higher Plane).

Indeterminates. — If for x = a both terms of a

fraction vanish, then y loses definite—

0(a) 0

ness, taking the unmeaning form, y' •

X™ — am

The fundamental example is y— - — — '

OC CL

for x~a. However, we may still seek Lim.

0(x)

for x — a = 1 = 0, though it would be arbitrary

to assume this limit as the value of

0(g)

0(a)

(Dar-

boux). If x — a be removable from both terms, we may cancel it for -a, and then

Xp - (] %

seek the limit for x—a. Thus — — — =

X CL

x2Jrax--a 2 for xˆa-, this last=:3a2 for x=a ;

Lim. x3 — a3 x3 — a3

hence x~a - - = 3a2, but not — - =3 a2

X CL X CL

for xˆa, unless arbitrarily. Now <*j*>*(x)* Lim. <t>' (a)

x~La f°r 0(a) = 0 = 0(a) (L'Hospital).

Hence the ordinary rule: Take the limit of the quotient of the D' s of the terms at the critical value. Or, expand the terms in the neighborhood of a, simplify, cancel the vanish¬ ing common factor, and evaluate for x~a. Similarly, with proper modification, we treat

ˆ ; and °° — <*> , reduced to "q-. Indeterminate

exponentials like 1°°, 000 etc., are first reduced

0

to — by passing to Logarithms.

Maxima and Minima are points where a curve ceases to ascend and begins to descend; accordingly at such points the D must change sign ; hence must pass through 0, if continuous. This passage is from + to — for a maximum, from — to + for a minimum. Hence the ordinary rule: To maximize or minimize /(.r), put f' (x)— 0; the .r-roots will yield maximal or minimal values of f(x) according as they make f" (x) negative or positive. For f" Cr) =0 treat 3d and 4th D's precisely as the 1st and 2d D's. The same rules result from expanding f(x), as by Taylor's Theorem. Special cases (as of D discontinuous) call for special treatment, often preferably geometrical or mechanical.

The geometric depiction of a function of two independent variables, z=f (x,y) or F(x, y, z) =0, is of course a surface (S) : at any point (x, y) in the plane erect the corresponding value

of z\ the ends of these z's form S'. We may pass on S' from P to P' in® of ways; e.g., parallel to ZX ; then x and z would change, but not y. Hence there would be simultaneous Ax

Jz, but Ay= 0.

Then Lrj is written

and

dz

(Jacobi), and is read partial D of z as to x.

Similarly, for a path of P parallel to YZ, there are simultaneous Ay and Az, but Ax— 0;

j 0 er

L Tv = partial D of z as to y.

For u—fix, y , z) institution fails, but we think each P in [x, y, z] as weighted with the proper u instead of erecting this u perpendicular to [x, y, z], As P moves, the weight u changes. For motion parallel to X both Ay and Az are 0 Au _ du

Ax dx ’

presumes that z and u actually admit of the derivations in question.

Differentials, Partial and Total. — By Defini—

du …

tion, dxu — ff~x’ Ax = partial Differential of n as

du du

and L—_ — — » *etc.* Of course, the foregoing

to x , *etc.* du — ■ A x -f …

du

dx’ dx + • — Ax + … Ax

(v — y)

total Differential of u. Au = ˆx

+ . . —total Difference — u.

Geometrically, on z = f(x,y), the path of xdx

change is parallel to ZX, hence ˆ — tan rf as

dz

before. Similarly = tan u. The plane

through the tangents to these paths (at P) is in general the plane tangent at P(x, y, z) to S.

dz

Clearly its equation is w — z — (u — “i

dz_

dy(u,v,w being the current co-ordinates for the plane). This equation assumes the sym¬ metric form (u—x) Fx + (y—y) Fy + {w—z) Fz — 0,

since —= — ˆr, *etc.* Hence the equations dx Fz

u — x v — y w — z

of the normal are —5 — •

rx ry fz

As to existence, the tangent plane is condi¬ tioned like the tangent line. Through P (x, y, z) and two neighbor points, Q and K (as 1 + Ax, y, z + Axz, and x,y + Ay, z + Ayz), pass a secant plane II. Let R and Q descend any wise upon P. If the tiltings of II approach o, if II settles down toward the same fixed position, no matter how Ax and Ay approach 0, *i.e.* independently Ay

of — and yx, then the limiting position of II

is the tangent plane at P. But at the vertex P of a cone {x2 -p y2 = tn2z2) , II rolls forever around the cone as Q and R circle around P.

dz x dz y

Here, at (0, 0, 0), ˆ = ˆ and = ˆ

all meaning, as do tangent plane and normal.

In general there is no such notion as Total Derivative of z = f(x, y), x and y independent; but if both be functions of an arbitrary t. we have the Total D of z as to this t :

dz df df dx df dy dt dt dx ‘ dt dy’ dP

lose

an extension of mediate derivation. Of course, the possibility and definiteness of the opera¬ tions are implied. Hence again

iz = df=¥x-dx + ¥y-iy’

or the Total Differcntial=the sum of the Partial Differentials. For t=x, ffx=fx + fy • yx, or

dz —fx.dx + fy.dy, a fundamental theorem hold¬ ing when at (x, y) the DQ

fix + Ax, y + Ay) — fjx, y + Ay)

Ax

is an equably continuous function of y and Ax.

Higher D’s are pure when the same Inde¬ pendent Variable is retained, mixed when it is

t . _ d2z H d3z « , 02 2

changed. So ˆ ˆ3 are pure, but

is mixed. In mixed D’s the question arises: Is the order of Derivation indifferent f The

answer is, Yes,

d2z

d2z

, but only under

dx dy dy dx

conditions. For a power-series the case is clear, but the general investigation is subtle, and the result is involved and tedious. The theorem holds: When, for x in \a — h, a + h\ and y in [b — k, b + k], fix, y) is uniquely de¬ fined, and the i(n — l)(n + 2) DC's

Smf (r = 0, L … ms

dˆm-rd-yrl I ˆ M ˆ 11 1

exist and are finite, and all the mixed ones are continuous as to both x and y, then every¬ where in the same rectangle (2 h, 2k) all the other mixed DC's below the nth order exist, and the order of derivation is indifferent. Also, if, besides, everywhere in the rectangle

dnf(x, y)

the (n — 1) mixed DC's of nth order,

dnf(x,y) dnf(x, y) . . „ ..

9*0$?' ' ■ ■ Yx exlst and at

[a, b] are continuous as to both x and y, then all other mixed DC's exist at [a, b], the order of derivation being indifferent. Space is want¬ ing for the proofs.

The Taylorian Series or Law of the Mean may now be extended, under proper conditions, to develop f(x, y) near (x, y), thus:

f(x + h,y + k) = f(x,y) + j h |£ + k & |

1 lh,ˆ+2hkJl + kˆf)

dx2

dx dy

dy 2

1 P = n hn-PkPdnfjx -f Oh, y + vy)

| \n dxn-pyp

Symbolically,

f(x+h, y+k)=2e jt A -j-k v

dx fyf(x,yh

The last term is the remainder Rn, which must converge upon 0, for n = = to be neglected. A sufficient condition therefore is that the partial D's of / remain finite near (r, y) for 71—' 30 . This is not a necessary condition, how¬ ever, to find which is not easy nor attempted here.

Geometrically, take the tangent plane at P as XY, the normal as Z. Develop z — f{x, y)

near P(0, 0, 0) so that Ax — h — x, Ay — k = y, A z = z. We have

z = f (x, y)-

a2

| + 4f/(0’0) +

a2

)* 2

\T\x‘w + 2xy dfdy + ylwif(°’ 0) + 1 5C’- yS ! ‘

df d f

Since x, y, z are all infinitesimal and — = 0 = — ’ fix fi y

at (0, 0, 0), z is infinitesimal of 2d order. Call the 2d D’s in order A, B, C and put x — r cos y = r sin where a is the angle with ZX of a normal plane, making a normal section, through

Z. Hence^ = A cos $ -j-2£cos#sin# + Csin &

+] r } , hence Lim. A cos # + 2 B cos # sin#

-f C sin #2, which is easily seen to be the

curvature, , of this normal section. For P

a perpendicular normal section, #’ = # -f-tt/2,

1 - 2 - 2

k’= —r —A sin # — 2 B sin # cos # + C cos # ;

P

hence — p — ˆA + B, a constant for all pairs P P

of perpendicular normal sections (Euler), im¬ portant in Physics and formerly taken as measure of the curvature at P(0, 0, 0).

Consider the surface 2 z = Ax2~h 2Bxy + Cy2. It is a Paraboloid (Pd) ; it fits on S only at P (0,0,0), elsewhere departs from 5”. The sec¬ tions of S and Pd are not the same for z — c, but close down on each other for c i=0. The Pd-section is an ellipse, an hyperbola, or a parabola, according as B 2 — AC <C 0, >0, or = 0. Suppose it enlarged under the microscope to a constant size as c = = 0; then the Nsection steadily closes down on it as limit.

Hence Pd and S’ agree elementally at P(0, 0, 0) ; also they agree in curvature (of their own normal sections), hence Pd is called the osculating paraboloid of S’ at (0, 0, 0). All these parallel sections, for changing c, are similar, hence Ax2Jr 2 Bxy + Cy2= 1 is taken as type and called Indicatrix (Dupin). This indicatrix is an ellipse for B2 — AC<ˆ 0, the S’ is cup-shaped or synclastic ; it is an hyperbola for B 2 — ACˆ> 0, the S’ is saddle-shaped (anti-clastic), like a mountain-pass. The indicatrix has two Axes, tangents to sections of greatest and ‘-.east curvature both of Pd and S’ at P (any point of S’) which are mutually perpendicular and named principal sections. Now let P start to move on S’ facing along either axis or prin¬ cipal section (say that of least curvature). This axis starts to turn about P. Let P continue to move on S’ facing always along the turning axis. The tangent to its path will give the direction of this axis at every point of its path, which path is called a Line of Curvature (PC). Plainly through every point of S’ there pass in general two and only two PC’s (Monge), each the envelope on S’ of a system of principal tangents to S’. These PC’s cut up S’ into elementary curvilinear rectangles and yield an excellent system of co-ordinates (u, v). If the indicatrix be a circle, then all its axes are principal, through the point P there pass an » of PC’s,

every normal section is principal, the point P is an umbilic or cyclic point. If the indicatrix be a parabola, then S’ is edged or ridged

(cylindric) at P.

The notion of surface-curvature is generated and defined quite like that of line-curvature. Draw the normal A to S' at every point of the border B of AS', forming a ruled surface, R. Draw parallel to each N a radius of a unit-sphere, forming a cone C cutting out AS', on the sphere-surface, which subtends a (socalled) solid angle Aa at the centre. This we also define as the solid angle of the A's, and further define the average curvature of AS as the ratio

Aa

JS'

(Think of a cord passed round the gorge

of R and then tightened, compressing R into C without changing the solid angle). If the unit solid angle or stereradian (Halsted) be subtended by r2, the whole solid angle about centre — 4?r; then the metric numbers of Aa and AS' are equal, hence the curvature of

,c AS' AS'

AS = — 7T. and Lim. — rr AS AS

sy

a.

instantaneous

curvature at P (in AS)—K.

If R, R' be the principal radii of curvature

1

at any P on S', then K — - ; moreover, this

RR'

K is not affected by bending S' in any way with¬ out stretching or tearing — a beautiful Gaussian theorem of profound philosophic import. In this sense, an S' that may be flattened out into a plane (a Developable) has 0-curvature; for such, RR' must become a ; hence either P = * or R' = o o. But PP' = (1 + p2 + q2)/ (rt — s 2), where P = zx, q = zy, r = zxx, s = z*y, l = Zyy (Euler). Hence rt — sr = Q is the equa¬ tion of Developables. For Applicables and fur¬ ther illustrations, see Surfaces, Theory of.

The difficulty in dealing with Implicit Func¬ tions (defined by unsolved equations) lies in the Existence-theorems, which can only be stated. I. Let F (x, y) = H) at (xo, yo), and have 1st partial D's finite and continuous about (xo, yo), and Fy = 0 at (x0 , yo) : then there is a y = 9y(x) that becomes y0 for x = x0, and satis¬ fies identically F (x, y) = 0 in the vicinity, and is unique, and _ has a D , y* = </>'(x) = — Fx/Fy. II. Quite similarly for F(x, y, z) = 0, z = <p(x, y), the last statement being: has two partial D's.

Fx

ZX - 77 * % -

Xz

Fy

— — ; and so on for n variables. Fx

Most generally (III) let Pi, … , Fn be n func¬ tions of m variables x, y, … , and n variables u, v, … , all the P's vanishing at (x0, yo, , Uo, Vo, …), all admitting partial D's in that vicinity, and J(Fi, … , Fn ; u, v, …) = J = 0(p. 176), at (x0, yo, … , Uo, Vo, …) : then there is a system of functions of m independents x, y, … that become Uo, v0, … at (x0, y0, …), that satisfy identically all the P's in that vicinity, and that have partial D's.

Hence we have as the ordinary rule for find¬ ing yx from F(x, y)— 0: Differentiate P as to x regarding y as a function of x, as in mediate derivation, and solve the result as to yx.

To find now maximum or minimum y in F(x, y) = 0, we have yx = 0, Pi = 0; also,

therefore, Fxx + Fv.yxx = 0. If Fy 4 = 0, there is

maximum for FXx and Fy like-signed, minimum for F xx and Fy unlike-signed, and no determi¬ nation for Fxx = 0.*

Often we seek (socalled) relative maximum and minimum of z = f(x, y) when F(x, y) = 0. The former equation is a surface S, the latter an intersecting surface determining a path over S, — we seek the peak and valley points in this path. Differentiating we find as the prime con¬ dition, fx. Fy — fy. Fx = 0 — (, F ; x, y), from which and F = 0 we find the x and y that maxi¬ mize or minimize /.

More generally we seek maximum or mini¬ mum of a function of (m + n) variables, f(x, y,…u, v,…), under n conditions Fi(x, y,…u, v, …) = 0, … Fn(x , y, … u, v, …) = 0. Theo¬ retically we might eliminate n variables u, v, … leaving the other m independent ; it is better to let them remain considered as functions of the m independents, x, y, … Hence, on putting each partial D — 0, we get m equations which, with the n F i = 0, … Fn— 0, form {mfrn) equa¬ tions for finding (m + n)

unknowns x, y, … u, v, w, . ‘ . . To discriminate between maximum and minimum by the sign of dff will now be tedious, but often geometrically or mechani¬ cally unnecessary.

Swifter and simpler is Lagrange’s (Method of Multipliers. > We form a new function, 0 (x, y, … u, v, …)— f(x, y, … u, v, …) — 2?F(x, y, … u, v, …). Only so long as each F~ 0 will <t> =f identically for all values (under consideration) of the variables. We now de¬ termine these A’s so as to make vanish simul¬ taneously all the partial D’s of 0 as to x, y, …u, v,… The n conditions are rolled off from the u, v, … upon the n A’s. We may proceed similarly in dealing with Envelopes, where (w + 1) parameters are connected by n condi¬ tions.

Transformation of Variables is often neces¬ sary, like transformation of Co-ordinates. The formulae, simple at first, soon become highly complicated and we are led into the Theory of Substitutions, Invariants, Rcciprocants and the like, which cannot be treated here.

Integration. — As the Differential Calculus is the doctrine of Limits of Quotients of Simul¬ taneous Infinitesimal Differences, so the Integral Calculus is the doctrine of Limits of the Sums of Infinitesimal Products that increase in number while decreasing in size, both indefinitely. The type is the quadrature of an area (A) bounded by X, a curve y = / (jr), and two end-ordinates, x~ a and x — b. Cut it into n strips, AA, standing each on a Ax; their sum is A; plainly Y A x^y> A A~y>y A x, Y being the greatest, y the least, ordinate stand¬ ing on its own particular base Ax. Since 2Ax=b — a, if y = /(.*■) be continuous, finite, one-valued throughout [a, b], each V — y is an c, hence 2(F — y)Ax<fe^Ax, or <(& — a) e; hence Lim. 2(F — y)Ax = 0. Hence A is the

fb

common limit of every ZyAx, written I ydx,

named Definite Integral (DI) of f(x) (the Inte¬ grand) as to x, between the extremes (end-

* From foregoing sections it is seen that, to max-resp. minimize z a function of independent x and y, we must have, as first condition, zx = 0~Zy\ and similarly for any

number of independents. The secondary conditions are too complicate for discussion here.

values) a and b. The total sign of Integration is J~. .. dx or fj being an extended S, meaning Limit of Sum.

Plainly, exchanging extremes (a and b) merely reverses the integral by reversing

/a rb rb rc ra

b~Ja-AlsoJ = 1 + I >/(*) being

supposedly integrable throughout, from a to b,

and ‘b

to

Also

6*j*c

J’ c<pxdx = c j* (p(x)dx. Also

f{x±c)d{x±c) , — a mere change

Cbf(x)dx= fb±C. J a J o±c

/

of origin. Also j* ±<p(x)]dx= [<j>(x)dx±

f

<t>(x)dx. We easily prove the almost obvious

Theorem of the Mean : If f(x) = <t>(x) ■ <t>(x), each factor integrable, and <!>(x) always of

same sign, in [a, b], then ‘b

f:

(t>(x) <j>(x) dx =

<Kx)

/:

<p(x)dx, x = a --0{b — a). Hence lb =

f(b), I a— — /(«), where the D is again the front of variation of the Integral I or Area A. Hence we readily reckon many integrals as :

J a n 1 n - f-1

an+l j

n + 1

, wapos.int.;

a

r f .)b rb (

I cos xdx— 1 sin x 1 , I sinxdx= 1 —

J I J aj a {

/:

V r2—x-dx = = q ˆ V F — x 2 + r2 sin— i—

This is seen at once from the figure (circle-quadrant), as also

j' y/ r2+x2dx = x Vr2 + + r2hs-1 5

seen from y2 — x*=r*. We perceive that the /(x) is always the D of the socalled Indefinite Integral, the expression to be evaluated at b and a. This is easily proved variously to be always the case. Thus, if f(x)=3(l>' (x) for x in [a, b], then \I -ˆ(b) j b =/(&)- f{b) = 0, for every value of b in the range of Integra-bility. Hence I — <f> (b)=C. For b=a, C is found to be = — 0(a) ; hence,

1 =

J'ˆ(t>'(x)dx —

<t>{b) — 0(a).

Hence, to calculate the integral of any integrand from a to b, find the function of which the integrand is the D, and take the difference of its values at b and a. The D of the integral is the integrand, so far as form goes, but the value depends on the extremes. Since b may be any x in the range of integra-bility, it is common to write it x, using x in double sense, not necessarily confusing. So long as a is unassigned, C is undetermined; hence it is common to omit a and write

/

f{x)dx = 0(x) -p C, where under we may

/■

put 2 or any other symbol for x. The integral depends for its form solely on f; for its value, on a and b also.

Hence integration and derivation or differen¬ tiation are inverse operations and J-D \ D— C . The direct D yields a definite result,

the inverse J' yields a result definite only as

to form, up to an additive constant, C. (Cf. Evolute and Involute, above). Derivation simplifies, reducing even transcendents to algebraics ; Integration complicates, lifting algebraics and even rationals up into tran¬ scendents ˆas V a2 ■ — xl and . Derivation is

deductive and can create no new forms. Integration is inductive and creates an oo of new forms, all defined as integrals.

Operating directly on y=f(x) by a series of differentiations as to x, say <f>(D), we get some function of x, as X, or <p(D)y=X. If we know X and </>, we may seek that v=f (x) that will yield X on being subjected to the train of operations 0(D) ; i.e., we seek to invert at once the totality of operations 0(D),

so that y'— — — =0-1 (D)X. This inversion 9(D)

is solving the Differential Equation <p(D)y=X, and is perhaps the most profound of mathe¬ matical operations, of immense and even uncon¬ querable difficulty, overcome as yet only in

d2y dy

special cases. Thus x 2 — 3.v + 4 y = 2x 2,

where (f>(D)=x2D2 — 3.rD+ 4, yields, as result of the inverse

<p~l(D) or

y=x2(A~\~B log .r+log x1),

where A and B are arbitrary constants. Other forms of 0(D), quite as simple, yield far higher transcendents.

Inverting a table of elementary D' s we get a table of elementary Integrals. The art is to reduce other forms, if possible, to these elementary forms; when impossible, we must introduce transcendents defined by integrals.

Change of Variable is the most fruitful method of Reduction. By mediate deriva¬ tion, Dx0(w) = 0'(«) * ux\ also Du<t>(u) = <p'(u) ;

/,

hence I <j>' (u)du=<p(u)= I 4>'(u) • ux ' dx. In this

2d

/■

all is supposed expressed through x.

Hence, to pass from an old to a new variable of integration, multiply by the D of the old as to the new, or divide by the D of the new

as to the old; i.e., under the

j sign,

du — Ux ' dx, dx = — .

Ux

Of course, the extremes must be properly adjusted.

Integration by parts is also a powerful reduc¬

tive process. From (uv) xˆUxV uvx we have uv— ˆ Uxvdxff-J'uvxdx, ovJ'uvxdx = uv -I uxvdx.

This latter J' may be simpler, or may return into the first, or other advantages may accrue. Thus I cos x . cos x • dˆ = sin x • cos .r -f-I sin .v • dx

3/c

-/*

= sin x • cos x x — J < cos x~dx; whence

2ˆJ*cos~x2 -dx = x + sin x - cos x. Similarly for

any integral power of sine or cosine except (sin x)-1, (cos x) -1, which are reduced by

x

passing to the half-angle, ˆ

What is the range of such reductions? What functions can we thus integrate in terms of known functions ? Few enough. Of Alge¬ braics,

0(*)

I. Rational functions, tion into part-fractions.

(

/

II. Rational functions of x and (

by decomposi-ax -j-b\ a/ft

dx + b\ a'/P'

cx + dj

, , , , ... Put ~yn = um' m being

cx--d/ cx--d

L.M.C. of /3, Herewith the ˆbecomes

rational in u.

III. Rational functions of x and

V ax2Jr2bx--c .

If we think of y2 = = zax2--2bxJrc as a conic, and y — fl—u(x — «) as a secant through a point («,/?) of the conic, then we may express both x and y rationally through u, which reduces this case to I; (a, /3) may be taken variously. Generally we bring y2 to the form of sum or difference of two squares by putting x = 2Jrh.

IV. Rational functions of x and y, these being co-ordinates of a unicUrsal F (x, y)~0. We shall then have jr = ,0 (u), y = = 0(?f), where 0 and 0 are rational, whereby these Abelian Integrals reduce to I.

The binomial xm(aA-bxn)p can be reduced to II, and hence integrated, not generally, but in these important cases, by putting u = xn.

m + 1 r

1. p integral ; if

n

(r and j integers),

5 _

put $\sqrt{u} = z$.

nr -j-1 . r

2. - integral; if p= - (r and s integers),

71 S

put Va-Cbu m-- 1

3. - +/> integral; if /> =- — (r and ˆ inn s

tegers), put a--bu=nzs.

If f(x) be rational in X, ˆax+b, Vcx+6,put axJrb=vi, which reduces it to 3.

Of Transcendentals. — 1. Rational func—

X

lions of sin x and cos x. Put u~tan -j, a very important substitution.

CALCULUS, THE INFINITESIMAL

175

2. Rational functions of eax. Put u—ea*.

3. Rational Integral functions of x, e<**, A>x, … sin mx, sin nx, . . cos mx, cos nx, … Express the sines and cosines through imagi¬ nary exponentials. In the result express the imaginaries through sines and cosines. Here are included rational functions of the hyper¬ sine and -cosine.

4. Rational Integral functions of x and log x, or x and sin—1;r. Put x=eu, or ;r=sin u.

If f(x)=R(x,‘V T), T of 3d or 4th degree in x, we cannot rationalize but must introduce Higher Transcendents. Let

00 dx r°° dx

u =

r 00 _dx r J x VT =J 1

V 4 (x — ei) (x — ei) (x — et)

Here x and u are functions of each other and it seems natural to take u as function, x as

argument ; but in I—

f

dx

Vl

-sin— x, x—

sin *is a much simpler (periodic) function of I than* is of x; hence we may suspect that x above is a simpler (periodic?) function of u than u of x. Hence Abel thought the theory might be simplified by inverting the dependence before him assumed — one of the greatest div¬ ination in mathematical history. We write

. . dx

oc = $ > (u) (Weierstrass) , u-

f

p(«) V T

P (*).

i

Hence uˆ— — , ~ — »

r V T[f(u)]

and so on. Now just

as sine and cosine have one period 2 tt, so

has two periods, 2 wand 2«', it is an Elliptic or Doubly periodic function. The Theory of such Functions, one of the most august creations of the last century, is conspicuous in Analysis. Of Hyper-elliptic Integrals there is no space to speak.

The integral of an Infinite Series may be found by integrating term by term only when the series converges uniformly within an inter¬ val comprising the extremes of the integration.

It is seen that the integrable forms are absolutely many, relatively few, the integra¬ tion generally giving rise to a new function.

Thus far we have raised no question as to I ntegr ability , the Integrand being supposed unique, continuous, finite and therefore in¬ tegrable, in [a , b]. But when, if ever, may we let one or more of these conditions fall? As to continuity, Riemann has discussed pro¬ foundly, In what cases is a function integrable, and in what not f and still further precision has been attained by Du Bois Reymond and Weierstrass.* It is of particular interest to know whether Zydx will vary finitely with varying modes of divisions of [a, b]. Riemann calls the subintervals <h, 4, … 4; the greatest fluctuation of function-value in each 4. he calls Djc; then must 2414 be infinitesimal. Thence it follows that when, as each 4 sinks in¬ definitely toward 0, the sum of

subintervals, in which D is itself is infinitesimal, then

the Sum 2 has a definite limit, the same how¬ ever [a, b] be subdivided. Hence the integral

00 Db

I = L Zf(xk) dk — I / (x) dx exists when f(x) 4—0 k—=o J a

* For yet greater refinement and generalization, see

Lebesgue, ‘Annali di Matematica’, (259f, 1902).

is finite and unique in [a, b], and when for every infinitesimal positive e there is also a posi¬ tive d such that |2— . 1\ < e when each 4< d.

Plainly such is the case (1) for f(x) continu¬ ous throughout [a, b] ; but also (2) when f(x) is finitely discontinuous at a finite number of points in \a, b], and when f(x) has an « of maxima and minima, or is quite undeter¬ mined (though finite) at a finite number of

points in la, b], as sin ˆ_1)(;c_2)

at 1 and 2 ;

(3) even when f(x) is discontinuous or finitely indeterminate at an 00 of points and has an 00 of maxima and minima in the vicinity of an co of points, provided only all these points of finite function-fluctuation form not a linear but only a discrete mass of points (Punktmenge) — the function is then said to be only point wise (punktirt) discontinuousˆ Hankel). — A dis¬ crete mass or manifold of points is an °o of points in a finite interval [a — h, a+h], so distributed at subintervals that the sum of these subintervals may be made small at will by enlarging at will the number of subintervals. Otherwise, the mass is linear. Functions linearly discontinuous are not integrable. For Cantor’s more comprehensive theory of Derived Masses ((Math. Ann.,* XVII, 358/), see As¬ semblages.

Du Bois Reymond has shown ((Jour. f. d. r. u. d. a. Math.,* 79, 21/) that the product of two such integrable functions is itself inte¬ grable.

Thus far the integrand has been finite. But

the DI

— it/2, although the inte-

grand = °o at 1. In general, if f(x) be <*> or dis¬ continuous, or oscillatory at x~c in [a, b], then

/b

f(x)dx loses meaning; but if the sum

/:

/ (x) dx +

/:

f(x)dx nears a definite limit

no matter how a and ft approach 0 indefinitely,

/b

f(x)dx.

Such is the case only when

/:

/c — a' c — a

f(x)dx and

:+/3’

■+/*

f(x)dx converge each toward 0, as a, a’t

P, fi’, all close down on 0, a’ at p’ < 3-i.e., the immediate neighborhood of c must con¬ tribute infinitesimally to the integral. Simi¬ larly for any number of points not forming a linear mass.

So, too, we may let either extreme, as b, increase toward <*> if only the total contribu¬ tion of the infinitely remote region be infini¬

tesimal

f(x) dx<y for b however large,

b’ being first taken sufficiently large.

Double Integrals.

x,y)dxdy. — Think of

a finite region R in XY , at each point of which is erected a perpendicular z, all forming a cylindric volume (V) bounded by XY, the surface

z = f(x, y), and the cylindric surface standing on the border (B) of R. To find V we may cut up R into elements (JR), as by parallels to X and Y, and V into elementary cylinders (JF) on these elementary bases. Plainly

■f

V = L2f(X, y) JR = f(x,y)dR. Here we assign

no extremes to R, the integration stretches over all of R, so that B corresponds to the extremes of simple integration. It is and must be indifferent in what order the elements JR are taken ; hence we may sum up first along a strip parallel to X, and then sum all such strips along Y. This double summing is ex¬ pressed by a Double Integral (II) thus:

fa ffi

L 2 [2/ (x, y)Jx]Jy = j J f (x, y) dx dy.

Here for any value of x the values of y are determined by the equation of B. Hence b and 6 are functions of x ; but a and « depend on the extreme parallels to Y tangent to B, hence are absolute constants.

It is geometrically clear that II is perfectly definite, but we must ask in default of Geometry, when does 2 approach the same limit inde¬ pendently of the function-value chosen for each JR and the way in which each JR = 0, as their number rb: oo ? Answer: When 2 DbJRk = = 0 as each JRk = 0, Dk being the greatest fluctuation in function-value in JRk. When is this the case? Answer: (1) When f(x, y) is con¬ tinuous throughout R: (2) when / at single points or on single lines (at oo1 points) be¬ comes finitely discontinuous or indeterminate or oscillatory; (3) when f becomes thus finitely discontinuous or indeterminate or oscillatory along an » of lines (at

<»2 points), if only the sum of the elements (JR' s), where D'ye, is itself <" e (infinitesimal) ; i.e., when the linear masses do not form an areal (or planar) mass, i.e., when their initial elements form not a linear but only a discrete mass.

May f(x, y) attain « and II retain sense? Answer: If / attains a definite ° ° but only at definite points, or along a curve and of order <■ 1, then the II remains definite and finite ; also the order of integration remains indifferent. Here the contribution, to the II, = 0 as the element of area (in XY) shrinks toward 0 along the curve ; i.e., the volume V shoots up to a* only along an infinitely sharp edge.

So, too, the region R may stretch out any way toward » if *shrinks faster than R spreads ; e.g., R may spread over all the plane, if in all remote regions* becomes 0 of higher than 2d order. Minuter discussion must be foregone.

Extremely important is the change of vari¬ ables in II. In simple integration du=uxdx

under the

whereby we pass from x to u

as variable of integration. In passing from

//'

x, y to u, v, under the ,du dv=M dx dy, but

du 0v du dv

what is M? It ts =

UX VX

Uy Vy

d(u, V.)

=J (u, v; x, y). This remarkable

d(x, y)

expression, introduced by Jacobi and named by him the Functional Determinant, is called the Jacobian (Salmon). As already exemplified, it plays the role of derivative of the system

(u, v) as to (x, y). In fact

d(u, v) d(x, y)

= 1

d(x, y) ‘ d(u, v)

. ˆ du dx , A1 d(u, v) d(u, v) d(w, z)

lust as — . — =1. Also - = rr - r • 7T7 - xdx du d(x, y) d(w, z) d(x, y)

as yx =yu-ux. Again, if ˆ=0, then u~c\ so,

if — l —0, then F (u, v)=c, and so on. d(x, y)

From DI we readily pass to the triple I,

V

/ (x, y, z) dx dy dz, and hence to mul¬

tiple /’ s in general. The higher Jacobian maintains its role : du dv dw = J dx dy dz,] =

d(u, v, w) d(x, y, z)

Ux Uy Uz VX Vy VZ WX VUy Wz

; and so on in general.

Thus, to pass from rectangular to polar co-ordinates, x = p cos y = p sin J (x, y\ p,&)

= i p; under

//•

dx dy—pdpdd — this latter is in

fact the elementary curvilinear rectangle. — To pass from rectangular to spherical co-ordinates, x = p cos & sin <p, y—p sin d sin <j>, z = p cos <p, whence J (x, y, z; p, <j>) = p2 sin <p, and p2 sin <p dp dJ d(j> is in fact the rectangular

curvilinear volumetric element under

///

Analogy readily extends these forms to w-fold spaces. Thus the Jacobian appears geomet¬ rically as a real derivative, the limit of the ratio of two simultaneous changes.

The single | f(x)dx—F(b) — F(a), where

f — Ff expresses the sum-value of f, integrated along the length b — a , through the end-values of

some Fat b and a; can the double

//

f(x, y) dx dy

integrated over the region R also be expressed through the end-values of some F(x,y) along the contour of R ? This query is much harder to answer, but is answered similarly: If f(x,y)

is integrable in Rt then in general

/7(*,

y)dx

is for every included value of y a contin¬ uous function of .r, F (x, y), and for every included value of x an integrable function of y.

Then the DI

ff

f(x,y)dxdy = ˆ F(x,, y)

sin vds, where s is the contour of R and v = slope of the normal (drawn inwards at any point of j) to the +F-axis. This latter is a

curvilinear J , geometrically depicted as a wall built up (resp . down) along the contour ˆ of R . —

Similarly a

///•

£ f extended throughout

a volume (or three-wayed spread) may be expressed through the end-values of a certain F integrated over the entire surface (5) of the volume, whereby a space-integral is turned into a surface-integral and conversely:

/// dy di

//(

dn dn dn\

</>— ; + <? — + X fa)dS’

dy

where Jn along the normal to S corresponds to Jx on X, *etc.* These conversions (of Green and Riemann) are equally important to pure and to applied mathematics.

The most immediate geometric problem of integration is Quadrature, already discussed. Rectification is finding in a straight-length = an arc-length. This latter must be defined as the common limit of the length of inscribed and circumscribed polygons of which each side = 0.

and form therefrom the three Jacobians, by deleting the columns in order, commonly written A, B, C. Hence, by easy substitution

for FXi Fy, Fz, S 2 + B2 -j-C2 du dv*.

To every point (x, y, z) of .S' there is co-ordi¬ nated a point (u,v) of a plane.

For Revolutes, S — 2,xˆ yds.

Differentiate de Curva in Curvam. — We

have found theD of anˆJ~ as t0 either extreme,

but the integrand may contain a parameter, thus

j /(•*■; p)dx. Theˆ, being then a function of

f, is also a function of p and may be differen¬ tiated as to p, giving rise to Parametric Deriva¬

tion.

Thus, 1 =

Since st= V (**)2+ (yt)\ s = V (xt)2 + (yt)2dt. fp= = j epx j-

/:

evxdx

1 \b

XepxC P) a

hence

If now x= <l>(t), y= =0(O, be continuous

functions of t, with finite limits of value, then this integration is possible, and the curve is rectifiable. Such is not the case in Weierstrass's curve; there the oscillations (maxima and minima) are infinitely many in every neighborhood however small, nor is the variation finite in any such neighborhood — the arc is infinite between any two points.

Volume is given by triple Integration,

… If now we differentiate P la

the integrand first, and then integrate, we obtain the same result. Hence the order Integr. xDer. p is equivalent to Der.p Integr. x This holds generally, if for a definite interval

[p, p--Jp], and for [a, b\, is in general

op

Iff

dxdy dz, extremes defined by the bounding

(with possible exception of only discrete masses of points) a continuous function of

fdf(x, p)

J

a rb

both x and p\ then — j f(x, p)dx =

dx.

dPj a

If p appears in either a or b or both, then

surface. Often the area of a section perpen¬ dicular (or possibly oblique) to an axis, as X,

is a function of x, xS~f(x) ; then V — JxSdx.

In the important case of Revolutes (of an area bounded by X, the curve, and two y-ordinates),

‘bdf{x, p)

dx.

tS = xy\ V

xj y2dx.

Quadrature of a curved surface is sometimes called Complanation.

Here again the area must be defined as the common limit of the surface area of polyhedra inscribed and circumscribed, no matter how. The surface element dS or (JS) about P may be viewed as projected into the element dx dy in XY and as having a limiting ratio 1 with the corresponding element JII in the plane tangent at P. The slope of this plane to XY = y= slope of normal to Z\

tt t • JS j ■ JS

Hence Lim. — — — =Lim.

JII T . JII = Lim.

JxJy . JII JxJy . . JxJy

sec y= j Fx2 + Fy2 + Fz2\ h/Fz\ hence S =

J'J' \ S b/Fzdx dy, the region of integration

in XY being the projection thereon of S, under obvious conditions. Often the surface is given parametrically, i.e., x, y and z as func¬ tions of the independents, u and v. Then we

write off the rectangular array ˆ ˆ

d ch

0p\ J(x> P)dx

dd da fb

Tp ~f(a-p)Tp+Ja a p

Cb

If the I be an integrable function of p,

F(p), in [«, fi], integrating as to p we get

f(x, p)dxˆ dp = j” 1 F(p)dp, and the

order of integration is indifferent while / is a continuous function of both x and p.

Cb

Thus the j may be treated as function of

any parameter in /, when the extremes are constant, as 0, 1, ± 00 , and this gives rise to an important set of concepts and to the Theory of Definite Integrals. Thus, for

7 r

, and is a function

/Xxa — 1

07 + idx = si

sin a 77

of a. Among such the Eulerians are conspic¬ uous, especially that of 2d species (Legendre),

/oo

0

Xa.-\e-xdx, denoted by T(a), or better by

the Gaussian 1 1 (a — 1), through which count-

* Also S = f f V EG— Fl du dv, E = V + yu2 + zu2 > G = = xv2 +

y,2 + z„2. P = xu *D + yM-yv + zu-zv (Lagrange).

VOL. 5 — 12

less others are expressible. This T-or II-func¬ tion has remarkable properties :

1. T(a + l) = aT(a), or II(a) = aII(a — 1), —

the factorial property, | n — n\n — 1. But the

factorial loses its meaning if n is not a posi¬ tive integer, while T and II retain theirs : thus,

2. T(a) T(1 — a) = ‘• n • 1 ‘ Euler’s beautiful

bill ‘

discovery. Hereby arguments complemental to 1 are set in mutual relation, as sin (tv — a) =

sin a, tan

ir

a -tan ly

a

1, so that from T(S)

wre may reckon T(I). Hence wˆe need reckon T(a) only for a in [0, i], as sin a only for a in [0, 7t/2].

F(a) and particularly log r(a) may now be differentiated with highly interesting results,

V log f(a) 1 ˆ v .

as - dST~ = (ˆjV Thls 2 IS unl—

formerly convergent for af> 0; hence we may

integrate term-wise from 1 to a and get

d log T(a) , 1 , „ ,

- %- - • = (a — 1; 2 j— — — — : — r -fC, where

da y M= =0(l +n) (a+n)

C is the Eulerian or Mascheronian Constant

ray

A i)

= T (1) — .5772156649 … calculated by

Euler to 15 and by Legendre to 19 decimals. Hence, by a 2d Integration,

m

tn—x>

log r(a)= 2 log.

7W=1

m-- 1\ a~

m)

a--m — 1

m = oo W

r(a) = II —

m = 1

fm + r

m

a--m — 1

m(m + l)a — t

a(l --a)

> + T

(w + l)a

,1 + At)

a(l -]-a) (1 +

a

1

a

(m = oo) .

m — 1.

y

Such is Gauss's Definition of l"(a) for every finite a for which no factor in the denominator vanishes. Herewith wre are brought to the expression of functions not through infinite series but through infinite products , as already exemplified in Wallis's formula :

tv 224466

T"TTTTTT " * '

This subject, of infinite range, cannot be pursued here — (<hills peep o'er hills, and Alps on Alps arise.® The fundamental theorems were rigorously proved first by Weierstrass r. u. d. a. Math.. LI). It may be

(Jour. f. d. r. u. d. a. Math., LI)

/oo

0

It may

xa — l

(1 +x)a + ^

dx.

is denoted by B(a,b) (Binet) and is connected with the 2d by B (a, b)T (afi~b) = T (a) -Tb, and being expressible thus simply through T has not so much independent significance.

The central notion of the Integral Calculus , the Ltmit of a Sum, is more obvious than that of the Differential Calculus, the Limit of a Quotient. The foundations of the one are also seen to be much broader than those of the

other, so that the former is not merely the in¬ verse of the latter. The twain seize upon the two great aspects of History, the Dynamical and the Statical, Process and Result. While the Integral Calculus borrows its speed and direct¬ ness from the Differential Calculus, its own reaction upon this latter is instant and power¬ ful. Thus, from integration by parts we have

/ r

(y)dy = y(p'(y)-

1

= — yy y*t > '(y) +

/

if

<t>”(y)ydy; — I <!>”(y)ydy

/

< P”’(y)y2dy\ ; and so on.

Evaluating between the extremes 0 and h we

get Bernouilli’s Series (with Remainder) ;

h1 /z3

+yy 9’”(h) — …

1 Ch

± 7— I yruj > (n + i)(y)dy. To avoid the alterna-

\JL J o

tion in sign w7e take / 9 (a — u)du and proceed

as before: then on putting a = x0 + h,

h 2

9{x0Jrh)—9{xo)--h9'{xo) + jy - 9"(*o)-- • • •

+ | un < j)n^{x--h — u)du , 0 < h < R.

Such is the swiftest, directest, nearest-lying deduction of the fundamental Taylor's Series, by wrhich the value of 9 at (xo T h) is built up out of the value of 9 and its D's at xo • The Rn is here yielded as a definite integral, from which form the other forms, as Lagrange's, Cauchy's, Schlomilch's, come at once on apply¬ ing the Maximum-Minimum Theorem. This development holds under the two necessary and sufficient conditions (Pringsheim) :

1. That^(x) possess everywhere in[^o,aco-|-R] definite finite differential coefficients of every finite order ;

2. That Lim. 9^nHxo + h). kn converge uni- | n

formly on 0 (for n— oo , for all pairs (h, k) for which 0 < /z < /z + k < R.

The Infinitesimal Analysis or Method of Limits is very highly developed and is applica¬ ble to almost every subject of exact thought, often asserting itself in the most surprising fashion, as in the Theories of Numbers and of Knots, to which it might seem wholly alien, suddenly unlocking and laying wide open secret passages utterly

unsuspected. In particular the Integral Calculus shows itself amazingly and unendingly fertile in the generation of new notions. As other and still other fields are exposed to investigative thought, the Calculus will receive more and more applications, and there seems to be no limit to the subtlety and refinement of its processes, to the keenness and penetration that may be given to this two-edged swrord of the spirit, the strongest, sharp¬ est and most flexible ever fashioned or wielded by the mind of man.

Historical Sketch. — Passing by anticipa¬ tions, especially of Integration, that reach back at least to Archimedes (287-212 b.c.), we come to Barrowr's (Lectiones opticse et geometric3e)

(1669-70), on which Newton collaborated, how much no one knows. Barrow used the Differential Triangle even in 1664 (indefinite parvum, … ob indefinitam curvae parvitu-dinem), calling Ay a and Jx e (as Fermat used A and E, 1638). Newton was busied with Series at Cambridge, 1665-66 (eo tempore pestis ingruens coegit me hinc fugere — in his famous letter, filling 30 pages in the Opnscula, to Oldenburg, secretary of the Royal Society, 24 Oct. 1676). His MS. (De_ analysi per aequationes numero terminorum infinitas) (partially published first in Wallis's Works, Vol. II, 1693) was shown to Barrow, Collins, Lord Brouncker in 1669, wherein he used o for a magnitude ultimately vanishing, as had James Gregory already in his (Geometriae pars universalis* (1667, Venice). He treated Recti¬ fication, Cubature and Mass-Centre determi¬ nations as reducible to Quadrature and to be solved by introducing the notion of Momen¬ tum)= = instantaneous change, thus going beyond Barrow. Newton's (Methodus Fluxi-onum et Serierum infinitarum) was ready for the press before 1672, but not printed till 1736. In it he proposes, (1) to find the velocity at any instant from the space trav¬ ersed up to each instant, (2) to find the latter (space) from the former (velocity) — the two problems of Derivation and Integration con¬ ceived kinematically. The equicrescent mag¬ nitude x, as a space, is called fluens (CavaHeri fluens, 1639, Napier fluxus, 1614, Clavius finer e,

1574) ; the velocity he writes x and calls fluxio — our Derivative (as to the time t). Momentum varies as fluxion, is written xo, and corresponds to our Differential x (in-crementa indefinite parva). Thisˆ treatise seems to have been revised after 1673, hence does not clearly attest Newton's knowledge in 1671. Leibnitz wrote, 26 Oct. 1675 (follow¬ ing Cavalieri), Omnia w, etc.; but 29 Oct. 1675,

Utile erit scribi I pro omn. ut I l pro omn. I

id est summa ipsorum l; again, the same day, nempe ut | augebit, ita d minuet dimensiones.

f

autem significat summam, d diff erentiam.

There and then was born the "Algorithm of the Differential® and Integral "Calculus.® Under date of 11 Nov. 1673, Leibnitz wrote y2 t ydy= but the 3 was originally 5. His

/

"Characteristic Triangle,® equivalent to Dif¬ ferential Triangle, he took not from Barrow but from Pascal. All attempts to show any real dependence of Leibnitz on Newton have failed. The germs of the new Method were abroad in the air.

Bibliography. — Leibnitz and his school, especially the Bernouillis, poured forth memoirs abundantly. Leibnitz' first, (Nova Methodus pro maximis et minimis, itemque tangentibus, etc.,* appeared in the Leipzig Acta Eruditorum 1684. Newton gave his method of prime and ultimate ratios in geometric form in his Philo¬ sophise Naturalis Principia Mathematical 1687. Johann Bernouilli's Pectiones Mathematicse) was the first textbook of the Integral Calculus,

composed at Paris 1691-92, published 1742; Taylor, (Methodus incrementorum directa et inversa) (1715); D'Alembert, (Memoire sur

le calcul integral* (1739) ; Maclaurin, (A Treatise on Fluxions) (1742) ; Euler, Untroductio in Analysin InfinitorunP (1748) — resuming and expanding all knowledge on the subject, “one of the most contentful, beautiful, and fruitful works that ever left the press,® — Unstitutiones Calculi Integralis) (1768-70) ; Cramer, (Introduction a l’analyse des lignes courbes algebriques* (1750) ; Lacroix, (Traite du calcul dif. et du cal. int.* (1797) ; Lagrange, (Theorie des fonctions analytiques* (1797) ; Cauchy, (Cours d’analyse) (1821), Pegons sur le calcul differentiel* (1829) ; Duhamel, ‘Cours d’analyse) (1840), third edition, by Bertrand (1874-75) ; De Morgan, (Diff. and Int. Calculus) (1842) ; Todhunter, (Diff. and Int. Calculus) (1852) ; Price, Unfinitesimal Calculus) (1854) ; Gerhardt, Pie Entdeckung der hoheren Anal¬ ysis* (1855) ; Bertrand, (Traite du Cal. Diff. et du Cal. Int.* (1864-70) ; Hermite, Pours d’ Ana¬ lyse J (1873) ; Williamson, (Dif. and Int. Cal¬ culus *(1872-74) ; Meyer, (Theorie der bestimm-ten IntegraP — nach Lejeune-Dirichlet (1875) ; Lipschitz, Pehrbuch der Analysis) (1877-80) ; Houel, Pours de Calcul Infinitesimal* (1878— 79) ; Dini, (Analisi Infinitesimale* (1877-78), (Fondamenti per la teorica delle funzioni di variabili realP (1878) ; Harnack, Pie Elemente der Dif.-und Int. Rechung) (1881) ; Stolz, (A11-gemeine Arithmetic (1885-86), Prundziige der Differential-und Integralrechnung* (1893-96-99) ; Tannery, (Introduction a la theorie des fonctions d’une variable* (1886) ; Laurent, (Traite d’ Analyse* (1885-92) ; Picard, <Traite d’Analyse) (1891-1903) ; Genocchi-Peano, Pal-colo differenziale e principii di calcolo integraP (1884, German translation 1898-99) ; Cantor, Peschichte der Mathematik* (1880-1900-01); Jordan, Pours d’Analyse) (1893-94-96) ; Serret, Pours de Calcul dif. et int.* (1868, Harnack’s German translation, 2d ed., by Bohlmann and Zermelo, 1899-1904-05) ; de la Vallee Poussin, Pours d’ Analyse infinitesimale* (1903) ; Gour-sat, Pours d’ Analyse mathematique* (1902-04); Humbert, Pours d’ Analyse *(1903-04) ; Borel, Pegons sur les fonctions de variables reelles* (1905); Kiepert-Stegemann, Prundriss der Differential-u. Integralrechnung) (1905).

Elementary textbooks on the calculus are legion, and of very various merits, though those in favor at American universities do not vary much from type. Those of Byerly and of Os¬ good are perhaps as good as any. Among the older books, those of Williamson, though in many respects obsolete, give a training in the purely formal treatment of the subject that is not to be surpassed. The more advanced books generally go by the name of Pours d’ Analyse* or (Introductions to AnalysP ; they partake equally of the nature of textbooks and of inde¬ pendent investigations. They are only acces¬ sible to those who already have a thorough grounding in the elements of the Calculus.

William Benjamin Smith, Professor of Mathematics, The Tulane Uni¬ versity of Louisiana.

CALCULUS OF VARIATIONS, The.

The Calculus of Variations is a natural out¬ growth of the Infinitesimal Calculus (q.v.) — in particular of the Integral Calculus (q.v.) and of

Differential Equations (q.v.). In the Integral Calculus, properly speaking, only integrals of the

f to.)d* are considered, where

f(x, «i, «2, …) is a function of the variable of integration x and of several parameters «i «2, … which are independent of x. In solving differential equations of the type dy/dx = f (x, y) we are in one sense dealing with a new type of

integral,

f(x, y)dx.

Such integrals, in which

y is to be replaced by a certain function of x, are called line integrals.

The integral's considered in the Calculus of Variations are essentially of this kind, but we shall see that the more interesting problems are

those in which still another element is intro¬ duced. The integral

(1) I = f 1 fix, y, y')dx,

where y'=dy/ dx, can be evaluated whenever y is known as a function of x. For if y— <P(x) be the known value of y in terms of x, and if <t>(x) and <p' (x):=\d<l>(x)/dx be substituted for y and y' respectively under the integral sign, the inte¬ grand becomes a function of x alone, and the integral itself has a definite numerical value, at least under certain very general restrictions which need not be stated here. Thus to every function of x which can be substituted for y there corresponds a definite number — the value of x and y. We shall denote the value of / relation y=<P(x) defines a curve C in the plane ofa* and y. We shall denote the value of I which corresponds to the function 9{x) by the . symbol / c.

The central problem of the Calculus of Variations is the determination of a curve K[y=i> (x)], for which the value of I, Ik , is less than [greater than] the value of I for any other curve C [yˆVfx)], which satisfies the conditions of the particular example.

In most of the simpler examples it is speci¬ fied or implied by the conditions of the problem that the curves C considered shall all pass through each of two given fixed points P0(xo, yo) and Pi (xi , 3'i), whose abscissae are respectively ,r0 and Xi, the limits of integration of the inte¬ gral /. Hence only those functions of x, 9(x) are to be considered for which <t> (x0)=yo and)=W

In order to clarify the general problem, let us consider the example

1 + y'2 dx.

This is a familiar integral; it is the formula for the length of any curve y=9(x) between any two of its points. .With respect to this integral the statement of the simplest prob¬ lem of the Calculus of Variations is as fol¬ lows: Given two fixed points Po (x0, y0) and Pi (xi, yi) in the xy plane; to determine that curve joining Po and Pi for which the

value of the integral L (i.e., the length of the arc PoPi) is at a minimum. Accepting the Euclidean postulate that the shortest distance between two points is measured along the straight line joining them, it is evident a priori

that the solution of this example is the straight line PoPi, or

y = y'o + (x — Xo) (yi — yo)/ (xi — x0) .

It is at least plausible that any conditions which we may discover must, in this particular ex¬ ample, be satisfied by this function.

It is easy to see how this simple problem may be generalized. For w'e might inquire what is the shortest path between a fixed point and a fixed curve, or between two fixed curves. Again, obstacles may be placed in the plane, and the shortest path then sought. This latter idea leads to an important application of the general theory: the determination of the shortest path between any two fixed points of a given surface, the surface being thought of as an obstacle placed in the plane. The most general problem of the kind mentioned above may be thought of as the determination of a certain shortest path.

An entirely distinct generalization of the preceding problem is that in which the integrand involves derivatives of higher order than the

first, *i.e.* , of the type:^ f{x , y, yr, y", ... y(n)dx.

Another is that in which the integral involves several dependent variables :

I

f(x, y, z,..., y', z. ,.)dx.

Finally, the in¬

tegral considered may involve two (or more) independent variables and require two inte¬

grations :

p, q) dx dy, where p and q

denote bz/bx and bz/by, respectively, and where the function to be determined is a function of x and y which is to be substituted for z. Further generalizations are evident and would tend only to confuse if stated here. We shall return briefly to these generalized problems, but we shall state theorems principally for the simple integral I in one dependent and one independent variable. Many of these theorems can be generalized without essential difficulty to the other cases which have been mentioned.

Returning to the integral (1), let us consider the history of the problem very briefly. Al¬ though a previous problem had been considered by Newton in 1687 ((Phil. nat. prin. Math.,* II, Sec. 7, Prop. 34), the first problem which gave rise to any general theory and encouraged investigation was the socalled problem of the brachistochrone — or curve of quickest descent — which we shall discuss as a particular exam¬ ple. This problem was stated by Johann Bernouilli in 1698, solved by him in the follow¬ ing year, by his brother Jacob in 1701 in an important memoir dealing with more general problems, and by Euler in 1744 in an important treatise (Methodus inveniendi lineas curvas… * . It has remained of interest down to the present day, probably the last paper concerning it being that by Bolza, (Bull. Amer. Math. Soc., 1904, No. V in which a final solution is given. In the paper mentioned Euler first gave the first necessary condition (known as (<Euler's condition,® or less properly as ((Lagrange's condition®) in its general form, and developed the theory in several directions, solving inci¬ dentally many problems from the formal stand¬ point. Following Euler, Lagrange introduced

many simplifications and generalizations in a scries of important papers (cf. his < Works, > and his books (Theorie des fonctions) and (Cal-cul des fonctions>). In particular the Method of Multipliers for the treatment of problems of relative extrema, which we shall discuss briefly, is due to Lagrange. The other prominent names in the early history are Legendre, for whom the second condition is named ; Gauss, who first studied double integrals with variable limits; Jacobi, who discovered the condition which bears his name ; and Du Bois Reymond, who initiated the very modern critical develop¬ ment of the theory. We shall restrict ourselves to a reference to Todhunter, (A History of … the Calculus of Variations.) (Cambridge 1861) ; and Pascal, (Calcolo delle variazionP (Milan 1897ˆ German trans. by Schepp, 1899) ; and Kneser, (Variationsrechnung) and (Ency. der Math. Wiss., II A 8, 1900) ; and Bolza, (Lectures on the Calculus of Variations } (Chicago 1905). In these books exact and complete references to the literature of the sub¬ ject and notes concerning its history up to the dates of publication may be found. It should be noted that only the latter of these books con¬ tains references to the important developments published since 1900.

Precise Statement of the Problem. — It is

evident upon examination that the naive con¬ ception of the problem does not permit of exact mathematical treatment. For definiteness, let us suppose that the function f(x,y,y') in (1) is an analytical function of its three arguments inside of a certain three-dimensional region R, which may be finite or infinite, but which ex¬ pressly does not include any points at infinity. Let us also restrict ourselves to curves of the type y=,<P(x), where <P(x), together with its first derivative <p'(x), is a continuous, single¬ valued function of x in the interval x0 <x<. Xi ,

and where <t>(x0) and ˆ(ˆi) are equal, respec¬ tively, to the ordinates y<> and yx of the fixed points Po and Pi. We shall call these ((curves of the class B9* If there is a single one of these curves yˆt(x), or K, for which 1 K is less than

[greater than] Lc for any other curve C [y=<0(.t')] of the class B, that curve K is said to render the given integral I an absolute mini¬ mum [maximum]. It is evident that this will rarely occur, as is also the case in extrema of functions of a single variable. If we now set

(2) <f>(x) = f(x) + v(x) , i.e., v(x) = <p{x) -</>(*), and if there exists a positive number 3 such that Ik is less than [greater than] Ic whenever the condition

(3) b(*)<K W{x)\<C ,

then K is said to render the integral / a weak minimum [maximum] among the curves of the class B. If instead of (3) we merely require the condition

(4) | n(x) | < xo< x<Lxi,

the curve K is said to render a strong minimum [maximum]. If in addition to (3) [or (4)] we also require that

?(**)= 0,

(5) Xo +(*■ — 2) • &<iXi<Lxo-- (i — 1) * J^Lxi,

i=2, 3, ... («+■ 1),

where n •<$ ~xf=x0, the curve K is said to render / a limited weak [strong] minimum [maximum] .

Geometrically these conditions mean that the curves compared to K must lie, in the case of a strong extremum (i.e., maximum or minimum), close to the curve K; in the case of the weak extremum, they must lie close to K and vary only a little from K in direction; in the case of a limited extremum, they must cut K at least once in every vertical strip of width 3.

It is easy to show that if K is to render / an extremum (of any sort), f(x) must in general satisfy the equation

(6)

or

a2/

a/2

y”+

ˆ=o

dx \dy’J dy

J2-y+_32-_&=, o

dydy’ dx dy’ dy

which is known as Euler’s (or less properly as Lagrange’s) equation. For we have

(7) / f\x, Wx)+y(x), i>’(x) + v’(x) \dx,

which must be a minimum [maximum] for v(x)—0. Replacing rj(x) byr-A(x), where A(%) is an arbitrary function and e is a variable para¬ meter, Ic will evidently be a function of the parameter e alone :

(8) IC = F (e) = I ‘fix), rp + e. 1, i />’ + e -P)dx.

It is readily demonstrated that the ordinary rule applies and that we can have an extremum only if

(9) dIe/de=F’G)=

fl

1 1>-- e-h , ip’ -f-e • A’) \

+fv’(x, ip + ip’ + eV) • V j-dx= 0,

when e = 0, or F

‘(o) = P1

J X0

ify • * + fy’%’)dx = 0 ,

where fy—df/dy, *etc.* Integrating the second term by parts, we get

(10) F’(0) = 0

%Xi

Hx)fy’(Xt Ip, Ip’) d

Xi

3Co

+ J x Kx)ˆfy(x, rp, Tp’) - J-Xfv’ix, rp, V»0 ˆdx,

or since h(x) evidently vanishes for x = x0 and for x = Xi,

) fXl’

J x0

(11) I _h{x)\fy{x, 1 p, V”) -p[xfv’(x > V’, V ydx = 0.

But ˆ(.r) was itself any permissible function of x, and it is not hard to prove that the integral of such a product, of which one factor is arbitrary, can vanish only if the other factor vanishes. This gives precisely the equation (6). Certain further considerations are necessary to show that this proof, which implicitly assumes the existence of the second derivative of ˆ(x), does not involve any restrictions. (Cf. Bolza, lec¬ tures,) Chap. I).

Assuming the further details without proof, it becomes evident that any curve K, y—‘i’ix), which is to render I a minimum (of any sort) must satisfy the differential equation (6). Since f and its derivatives arc known functions, (6) is an ordinary differential equation of the second order, linear in d2y/dx2(=y”) . The coefficient of y” is d2f/dy‘2(—f y’y) . If this coefficient f y’y does not vanish, one and only one solution of (6) passes through a givea

point in a given direction. The general solution of (6) contains two arbitrary constants:

(12) F=f(*,a,P)-

Any one of these solutions, i.e., any solution whatever of (6) is called an extremal. Hence the required curve K, if it exists, must be an extremal, and it is necessary to search for it only among the extremals. But K was to connect P0 and Pi. Usually, however, there is only one of the extremals (12) which passes through two given points, for the equations,

(13) yo—f(Xo, at (3) , yi=/(xi, a, (3), usually determine « and P, and hence also determine a single extremal joining P0 and Pi. If this is actually the case, either that extremal is the required solution K, or else there is no solution of the problem.

A large number of special cases lead to dif¬ ferential equations which

can be solved directly.

For example, if I— j V 1 +y‘2dx, we shall have

J x 0

f{x, y, y’)=v l+y‘2 , whence fx=fy=fxy’=fyy’ —fxy— 0,fy’= y’*(l Ary) 1 ,* yVrrU/U + y+4and the equation (6) takes the form y”=o. The only solutions of this differential equation are the straight lines y=ax+b. It follows that if there is any curve of the class B in the plane along which the distance between two given fixed points is at a minimum, that curve is the straight line joining the two points. This result is independent of the Euclidean postulate, and depends only upon the definition of length by means of the preceding integral.

The problem of the brachistocrone, men¬ tioned above, is to find the curve along which a particle with initial velocity Vo will descend most quickly from a given initial point Po to another given point Pi. It is easy to show that the time of descent is given by the formula

■r

J

V 1 +y‘2

V Vo 2 2g(x Xu)

dx ,

hence Euler’s equation (6) is

= a y

=0

dx\dy) dx\ˆf i-|-y‘2Vz’o — 2g(x — Xo)

which gives at once y‘2 — c2(l+y‘2) (v0P2g (x0 — x)) . This equation may be readily solved in parameter form, and we find :

x — A = — y-C

A + B

where

B—

2

A + B

2

Vo

■ -j-Xo,

2g

c2-

-Vo2

: - Xo’

(1— COS w),

(w — sin (A) ,

2 g

These extremals are cycloids on horizontal bases, the radius of the generating circle being (AA~B)/2, and one cusp being at the point (A,. C). Further investigation is necessary to decide just when a given pair of points can be connected by such a cycloid (cf. Bolza, (Lec¬ tures, •* p. 236). If such a cycloid can be drawn, we can infer that it is the solution if there is any solution. If no such cycloid can be drawn, we can infer that there is no solution in the region R.

The problem of finding the geodetic lines

on a given surface is that of minimizing the integral,

(£ + 2Fy' A~Gy'2) %dx,

where 2=^(.t'j) is the surface and where E = = 1 +32x, F = zxzy , G= 1 A-z2y. Euler's equa¬ tion therefore coincides with the usual equation for the geodetic lines :

d_ I Gy' A-F \ Ey A-2 Fy y' A-Gy y'2

dx \ \! EP2Fy' A-Gy' V 2 V E +2Fy ' +Gy2

and the geodetic lines are the extremals of this problem, i.e., no line not a geodetic can be a shortest line on a surface.

Though the proof of the necessity of Euler's condition was satisfactory, even in a cruder form, to the originators of the subject, a desire to formulate sufficient conditions arose. Thus Legendre showed that a second necessary con¬ dition for a minimum [maximum] is that the condition

fy'y'{x, fix), ty\x))>0[< 0] for Xo^- X— Xi

be satisfied along the supposed solution y—^(x) between the end points. We shall prove this, and we shall see that the same condition is

actually a sufficient condition for a weak lim¬ ited minimum if the sign = be removed.

Jacobi then showed, by means of the second variation of the given integral, that a third necessary condition for a minimum [maximum] is that the quantity

J(x, Xo) = Vi{x)Vi{Xo) — lh{x)rji(Xo)

should not vanish for any value of x in the interval x0 < f x xif where J (x, x0) is a solu¬ tion of the equation

fv'u,7 > " +

df

r f

y y

dx

V +

which vanishes for x = x0. The proof, which is omitted, can be found in Bolza, 'Lectures^ Chap. 2. A beautiful geometrical interpretation of this condition exists : if we consider the one parameter family of exterminals through (w0,yo), and call their envelope E, the extremal which joins Xo to any point beyond its point of tangency with E cannot possibly render the in¬ tegral a minimum [maximum] between those two points, i.e., the envelope of the extremals through (Xo, Vo) bounds all the points which can possibly be reached by a minimizing ex¬ tremal from x.

It was long believed that Jacobi's condition, together with the

previous two, was a sufficient condition. That such is not the case was first pointed out by Weierstrass, who also showed that Jacobi's condition, while not sufficient for a minimum in general, is sufficient for a weak minimum (if the point (xi, yO lies inside the envelope of the extremals through (.r0, y0). Cf. Bolza, ˆecturesB Chap. 3.

That the preceding conditions are not suffi¬ cient is most readily seen by giving an actual example in which the extremals, though all the above conditions are satisfied, do not minimize the integral. Such is the example (see Bolza, (Lectures, 5 p. 73),

f(-r,y,y') = y'2 (y2 + l)2.

Here the extremals are straight lines, but it is easy to join two points for which all the preceding conditions are satisfied by a simple broken line for which the value of the integral

is less than that along the straight line extremal. Of course, the comparison line used varies con¬ siderably from the straight line extremal in direction, though not in position.

Weierstrass, in 1879, gave a fourth necessary condition. He defines a new function,

E(x,y, y',p) = f{x, y, y')—f(x, y,p)

— (y'—P) fp (x, y, p).

Then W eierstrass's (fourth) necessary condi¬ tion for a minimum [maximum] is

E(x, y, y' , p) 0 [<L 0] Xu 5c x < Xi,

where x,y,p are the values of x, y, dy/dx along the extremal between the end points, and where y' is any finite number whatever. (Cf. Bolza, (Lectures,* Chap. 3). Since we have

Limit

y=p

E(x,y,y', p) (y'—P)2

_L f f / — ^ J v y

J y—p,

it follows that it is also necessary that fy'y— 0,

which is precisely the second (Legendre's) nec¬ essary condition mentioned above. It is easy to show that if (a) the end points can be joined by an extremal K, (h) a one parameter family of extremals [y=^(jr, a)] can be found, one of which is K itself, and one and only one of which passes through each point of the plane near K, so that y=p{x, y) can be found, i.e., a function which gives the slope of the extremal of the family at any point (x , y) near K, then the integral

J = f 1 \f(x, y, p) + (/— p) fP(x,y,p)]dx J xo

is independent of the path of integration inside the field just constructed near K, and we have

E(x, y, y' p)dx

along c” ,

where C is any curve of the class B in the field about K, since Ik = Jk = Jc . It follows that the condition

E(x, y, yf, p)ˆ0, Xo5L x < Lxi, for all x and y near K and for the function p(x, y) just mentioned and for any finite value of yr whatever, is a sufficient condition for a strong minimum, if the sign of equality holds only for p = y’. Cf. Osgood, (Annals of Mathe¬ maticsˆ II, 3; Bolza, (Lectures,* Chap. 3.

It is possible to show (cf. Hedrick, (Bull. A. M. S.,* IX, 1) that for a limited minimum the conditions remain the same except that Jacobi’s condition may be omitted. The condi¬ tions in the various cases may be summarized in the following scheme :

Limited variations

Unlimited variations

Weak

Strong

Weak

Strong

Necessary

Euler’s,

Legendre’s

necessary.

Euler’s,

Legendre’s

necessary,

Weierstrass’s

necessary.

Euler’s,

Legendre’s

necessary,

Jacobi’s

necessary.

Euler’s,

Legendre’s

necessary,

Jacobi’s

necessary,

Weierstrass’s

necessary.

Sufficient

Euler’s,

Legendre’s

sufficient.

Euler’s,

Legendre’s

sufficient,

Weierstrass’s

sufficient.

Euler’s

Legendre’s

sufficient,

Jacobi's

necessary.

Euler's,

Legendre's

sufficient,

Jacobi's

necessary,

Weierstrass's

sufficient.

It is seen on glancing at the table that from the simple conditions (Euler's and Legendre's) for limited weak variation we proceed to any other case by adding Weierstrass's conditions in the case of a strong minimum, and Jacobi's in case of an unlimited mimimum, only. A fifth necessary condition for a strong extremum, in¬ dependent of all the others, has been discovered by Bolza.

In special problems the irksomeness of these conditions can sometimes be circumvented. For

instance, given a problem in which

Pf

W2

i > 0 for

all values of x, y, y', then the necessary and sufficient condition for a limited strong minimum is the possibility of finding a solution of

Eulers equation joining the two given end points. Such is the case in the geodetic problem and also in the integral which leads to Hamilton's principle ; and in each of these cases, fortunately, a limited strong minimum is all that is desired. Similar

d2f

simplification occurs in every case when > 0

for all values of x, y, y\ For then Legendre's and Weierstrass's conditions are always satis¬ fied, and may be abstracted from the above table. For this reason Hilbert has called a

problem in which

a2/

dy'2

>0 for all x, y, y' con¬

tained in a singly connected region R, in which the given end points lie, a ((regular ** problem of the Calculus of Variations.

Considering the example

xi

xo

V 1 -f y'Hx , we

see that fy'y^ > 0 for all finite values of x, y, and y' whatever. Since

E(x, y, y't p) =- y- - Y^—fv'v (x,yJ), y'< f < p

it follows that such an example surely satisfies Weierstrass's sufficient condition, provided that a field exist in the manner specified above. But in this case, since the extremals are all straight lines in the plane, it is obvious that all other conditions are satisfied. Hence the straight line joining any two points actually minimizes the given integral, i.e., the straight line is the ^shortest® line between any two of its points if the preceding integral be the definition of length.

In the problem of the brachistochrone, men¬ tioned above, it is shown that the extremals found (cycloids) actually render the integral of the problem a minimum provided no cusp lies between the end points. (Cf. Bolza, lec¬ tures,) Chap. 4, pp. 126, 136, 146).

Returning to the integral which defines length, it is evident that some other integral might as well have been selected as the defini¬ tion of length, if we are not to assume an intui¬ tive knowledge of it. The variety of choice, is limited only by the selection of those properties which we desire to have hold. This leads very naturally to The Inverse Problem of the Cal¬ culus of Variations: Given a set of curves which form a two-parameter family. What is the con¬ dition that they be the extremals of a prob¬ lem of the Calculus of Variations? What are the conditions that they actually render the integral thus discovered a minimum? Let

y = P\x, a, b) be the given family. Then (cf. Bolza, (Lectures, > p. 31) the integrand of any integral for which these are extremals must satisfy the equation

_ V=G(X y V)

0y dy'dx dy'dy y uˆx>y>y) ' dy'dy' '

where y" = G(x, y, y') is the differential equa¬ tion of the given family. This equation for f(x, y, y) always has an infinite number of solutions, of which only those are actually solu¬ tions of the given inverse problem which satisfy the relation f y'y' >0, and these are solutions in any region free from envelopes of one-para¬ meter families of the given extremals. Some interesting conclusions for particular forms are to be found in a paper by Stromquist, trans¬ actions of American Mathematical Society)

(1905).

Another interesting class of problems are the socalled isoperimetric problems. These are problems in which a further restriction is placed upon the solution by requiring that it shall give a second (given) integral a given value. Such is, for example, the problem of finding the curve of maximum area with a given perimeter. The problem is treated by means of the socalled method of multipliers, which is too long for presentation here. Consult Bolza, (Lectures,} Chap. 6.

This article is too short to give any account of the details of the work for double integrals. Suffice it to say that the known methods follow closely those given above for simple integrals. In the other possible problems mentioned above the same holds true. An interesting appli¬ cation of these other problems occurs in the well-known Problem of Dirichlet, which is fun¬ damental in mathematical work. Another is the important problem of Minimum Surfaces. Another is the well-known theory of mechanics based upon Hamilton's Principle or one of the analogous mechanical principles. The modern methods have made these theories more rigorous.

Bibliography. — The following is a list of the more important works and articles published in America concerning the Calculus of Varia¬ tions: Bliss, <Thesis) (Chicago 1901); and various papers, (Annals of Mathematics) and transactions of the American Mathematical Society > ; Bolza, various papers, (Bulletin Amer¬ ican Mathematical Society } ; transactions American Mathematical Society, > *etc.* (1901— 06) ; brochures published in the Chicago Decen¬ nial publications, including the Lectures on the Calculus of Variations mentioned above (Chicago 1904) ; Carll, (Calculus of Variations* (New York 1885) ; Hancock, various papers in (Annals of Mathematics* and (Calculus of Variations) (Cincinnati 1894) ; Hedrick, articles in (Bulletin American

Mathematical Society > (1901-05); Osgood, (Annals of Mathematics) (II, 3) and transactions American Mathemati¬ cal Society) (II) ; Whittemore, (Annals of Mathematics) (II, 3).

The foreign literature is well collected for reference in the footnotes to Bolza's lectures and in the following books and articles : Kneser, (Variationsrechnung* (Braunschweig 1900) ; (Encv. d. Math. Wiss., > (II, A 8) (Leip¬ zig 1904) ; Moigno-Lindeloff, (Calcul des Variations) (Paris 1861) ; Pascal, (Calcolo delle Variazioni* (Milano 1897, German trans.,

Leipzig 1899) ; Todhunter, (History of the Calculus of Variations) (Cambridge 1861); Zermelo u. Hahn, (Ency. d. Math. Wiss.,* (II A 8a) (Leipzig 1904).

The literature is altogether extremely ex¬ tensive, covering, as it does, a period of over 200 years. It is evident that the more important papers for present use are those of recent date.

An important phase of the subject which has necessarily been overlooked is the general proof by Hilbert (1900) that at least an improper minimum always exists. Consult Bolza, (Lec¬ tures,) (chap. 7).

Earle Raymond Hedrick, Professor of Mathematics , University of Mis¬ souri.

CALCUTTA (((the ghaut or landing-place of Kali® from a famous shrine of this god¬ dess), India, the capital of the presidency and province of Bengal, and until 1911 the capital of British India, is situated on the left bank of the Hooghly (Hughli), a branch of the Ganges, about 80 miles from the Bay of Bengal. The Hooghly is navigable up to the city for vessels of 4,000 tons or drawing 26 feet ; the naviga¬ tion, however, on account of sand-banks which are continually changing their size and position, is dangerous. The river opposite the city varies in breadth from rather more than a quarter to three-quarters of a mile. The city may be said to occupy an area extending along the river for about five miles from north to south, and stretching eastward to a distance of nearly two miles in the south, narrowing in the north to about half a mile. The eastern boundary is nominally formed by what is known as the Circular road, the Lower Circular road form¬ ing part of the southern boundary. Another eastern boundary on the north is the Circular Canal, which runs for

some distance parallel to the Circular road. The southwestern portion of the area thus spoken of is formed by the Maidan, a great park stretching along the river bank for about one and three-quarter miles, with a breadth in the south of one and a half miles. This grassy and tree-studded area is one of the ornaments of Calcutta; it is inter¬ sected by fine drives, and is partly occupied by public gardens, a cricket ground, race-course, etc., and partly by Fort William, which rises from the river bank. The fort was built in 1757-73, having been begun by Clive after the battle of Plassey, and is said to have cost about $10,000,000. Along the river bank there is a promenade and drive known as the Strand road, which has for the most part been re¬ claimed from the river by successive embank¬ ments. Along the east side of the Maidan runs Chauringhi road, which is lined with magnifi¬ cent residences, and forms the front of the European fashionable residential quarter. Along the north side of the Maidan runs a road or street known as the Esplanade, on the north side of which are the old Government House and other public buildings. The Euro¬ pean commercial quarter lies north of the Es¬ planade, between it and another street called Canning street, having the river on the west. The centre of this area is occupied by Dalhousie square (enclosing a large tank or res¬ ervoir), and here there are a number of public buildings including the post-office, telegraph

CALCUTTA, INDIA

Copyright by Underwood & Underwood, N. Y.

THE JAIN TEMPLE, CALCUTTA

office, custom house, Bengal secretariat, *etc.* The European retail

trading quarter occupies a small area to the east of the above area. Everywhere outside of the European quarters Calcutta is interspersed with bastis, or native hamlets of mud huts, which form great out¬ lying suburbs. <(The growth of the European quarters, and the municipal clearings de¬ manded by improved sanitation, are pushing these mud hamlets outward in all directions, but especially toward the east… . They

have given rise to the reproach that Calcutta, while a city of palaces in front, is one of pig-styes in the rear.® First among the public buildings is old Government House, the vice¬ regal residence, situated, as already mentioned, on the Esplanade. It was built in 1799-1804, and with its grounds occupies six acres. Four wings extend toward the four points of the compass from a central mass which is crowned with a dome and approach from the north by a splendid flight of steps. The High Court, the townhall, the Bank of Bengal, the currency office, post-office, etc., are among the other pub¬ lic buildings in this locality, while further to the north stands the mint, near the banks of the Hooghly. The chief of the Anglican churches in Calcutta is the cathedral of Saint Paul's, at the southeastern corner of the Mai-dan, a building in the ((Indo-Gothic® style, with a tower and spire 201 feet high, consecrated in 1847. Saint John's Church, or the old ca¬ thedral, is another important church, in the graveyard surrounding which is the tomb of Job Charnock, founder of Calcutta. The chief Presbyterian church is Saint Andrew's, or the Scotch Kirk, a handsome Grecian building with a spire. The Roman Catholics have a cathe¬ dral and several other churches ; and there are also places of worship for Greeks, Parsees and Hebrews. Hindu temples are numerous but uninteresting; among the Mohammedan mosques the only one of note is that which was built and endowed by Prince Ghulam Moham¬ med, son of Tippoo Sultan. The religious, edu¬ cational and benevolent institutions are numer¬ ous. Various missionary and other religious bodies, British, European and American, are well represented. There are four government colleges — the Presidency College, the Sanskrit College, the Mohammedan College and the Bethune Girls' School. There are five colleges mainly supported by missionary efforts ; besides several others, some of them under native man¬ agement. Other educational institutions in¬ clude Calcutta Medical College, a government school of art, Campbell Vernacular Medical School and a school of engineering at Howrah, on the western side of the river. Besides these there is the Calcutta University, an examining and degree-conferring institution. Among the hospitals are the Medical College Hospital, the General Hospital, the Mayo Hospital (for na¬ tives), and the Eden Hospital for women and children. The Martiniere

(so named from its founder, General Martin, a Frenchman in the East India Company's service) is an important institution for the board and education of in¬ digent Christian children. Elementary and other schools are increasing in numbers. The Asiatic Society was founded by Sir W. Jones in 1784 for the study of the languages, litera¬ ture and antiquities of Asia. The Botanic Gar¬ den occupies a large area on the right bank of

the river. Calcutta possesses a number of public monuments, most of them in or about the Maidan. Several governors-gencral are thus commemorated, as also Sir David Ochter-lony and Sir James Outram, ((the Bayard of the East,® of whom there is an admirable equestrian statue by Foley. The city is lighted partly by gas, partly by electricity. There is an extensive system of tramways. The sanitation of Cal¬ cutta, though vastly improved in recent years, is still defective, more especially in the sub¬ urban districts, where the bastis or native huts are so numerous. The Calcutta Improvement Commission was formed in 1912 to aid in town planning and in the improvement of public health. One difficulty in the way is the site of the city itself, which is practically a dead level. An act which came into force in 1889 brought a large additional area-under the municipal au¬ thorities, and since then much has been done in the way of drainage, opening up of arterial streets, alignment of roads, *etc.* The water supply has also been greatly increased, and fil¬ tered water from the Hooghly (there is a pump¬ ing station at Palta, 16 miles above Calcutta) is now available at the daily rate of 36 gallons per head in the city, and over 15 in the suburbs, be¬ sides a supply of unfiltered water for washing and other purposes. The mortality through¬ out the entire municipality in 1912 was 28.1 per 1,000, a great improvement on former times, and the birthrate 21.06 per 1,000. The death-rate is far higher among the natives than among the Europeans, and in the native quar¬ ters cholera is said to be seldom absent. The healthiest months are July and August, which form part of the season of rains; the unhealthiest are November, December and January. The mean temperature is about 79°, the average rainfall a little over 66 inches. The port of Calcutta extends for about 10 miles along the river, and is under the management of a body of commissioners. Opposite the city it is crossed by a great pontoon bridge, which gives communication with Howrah for vehicles and foot passengers, and can be ' opened at one point to let vessels pass up or down. It cost $1,100,000. Besides the accommodation for shipping furnished by the river, there are also several docks. The trade is very large, Cal¬ cutta being the commercial centre of India. There is a very extensive inland trade by

the Ganges and its connections, as also by rail¬ ways (the chief of which start from Howrah), while almost the whole foreign trade of this part of India is monopolized by Calcutta. In 1913-14 the gross tonnage of the shipping in¬ ward and outward was over 6,926,817 tons ; the total of exports and imports at the wet docks was about 4,800,000 tons. The total overseas trade in merchandise during the fiscal year ended 31 March 1916, amounted to $452,786,- 505. The year's imports were valued at $167,- 666,650 and the exports at $285,119,855. The chief exports are opium, jute and jute goods, tea, grain and pulse, oilseeds, raw cotton, indigo, hides and skins, silk and silk goods, seeds, coal and coke, raw hemp, mica, *etc.* The most important imports are cotton goods, sugar, metals, machinery, oils, railway plant and roll¬ ing stock, cutlery, salt and spices. The jute manufacture is extensively carried on, also that of cottons.

The first factory in Bengal of the East India

Company, which was incorporated by royal charter in the year 1600, was established at Hooghly, 28 miles farther up the river, in 1644. Job Charnock, the company's agent, was driven out of this settlement in 1686, and the English then occupied part of the present site of Calcutta, which in 1689-90 became the head¬ quarters of the commercial establishments of the company in Bengal. In 1700 the company acquired from Prince Azim, son of the Em¬ peror Aurungzebe, the three villages of Suta-nati, Kalikata (Calcutta) and Govindpore, for an annual rent of 1,195 rupees, and these formed the nucleus of the present city. The original Fort William, named after William III, was built in 1696, on a site considerably to the north of the present fort. Calcutta was taken and plundered by Suraj-ud-Dowlah in 1756, and retaken by Lord Clive in 1757. To the capture by Suraj-ud-Dowlah belongs the episode of the <(Black Hole® (q.v.) of Cal¬ cutta. When the British recovered possession, much of the town was in ruins and had to be rebuilt, so that it may be said to date only from 1757. Clive built the new Fort William on the site of Govindpore, between 1757 and 1773. In 1773 Calcutta became the seat of Brit¬ ish

government for the whole of India, and so continued until 1911, when announcement was made, for political and climatic reasons, of a change of capital to the city of Delhi, the an¬ cient seat of the Mogul empire. Pop. (1911)

896,067.

CALDARA, Polidoro. See Caravaggio.

CALDER, Alexander Stirling, American sculptor: b. Philadelphia, 11 Tan. 1870. The son of Alexander Milne Calder, also a sculptor, whose work is represented by the Gen¬ eral Meade statue in Fairmount Park, and by the sculptural decorations in the city hall, Philadelphia, after early instruction at the Pennsylvania Academy, went to Paris and studied under Chapu and Falguiere. On his return he was appointed instructor in the School of Industrial Art, Philadelphia. Among his notable productions are <The Dozing Her¬ cules^ (Primeval Discontent, > (The Man Cubp (The Miner,) (Narcissus) and the six heroic figures of leading Presbyterian theologians above the entrance to the Witherspoon Building. Philadelphia.

CALDER, James Alexander, Canadian statesman: b. Ingersoll, Ontario, 17 Sept. 1868. He was educated at Ingersoll Public School, High School, Winnipeg, and was graduated from the University of Manitoba in 1888. He entered the teaching profession, was principal of Moose Jaw High School 1891-94, inspector of schools for the Northwest territories 1894—1900 and deputy commissioner of education for the terri¬ tories 1901-05. He was called to the bar of the territories in 1906. He wTas elected to the local legislature of Saskatchewan for South Regina in 1905, but was defeated in 1908, and afterward represented Saltcoats. As Provincial Treasurer and Minister of Education in the Scott ministry he showed a thorough mastery of the details of legislation and was aided bv his singularly lucid expository style. In 1910 he became Minister of Railways. During the ill¬ ness of Premier Scott he was acting head of the government, and on his retirement he de¬ clined the succession in favor of William Mar¬

tin. In October 1917 he joined as one of the Western Liberal representatives the Dominion Union ministry formed by Sir Robert Borden, in which he assumed the new portfolio of Immigration and Colonization.

CALDERA, Chile, a seaport in the province of Atacama, 25 miles by rail from the city of Copiapo, and connected also by rail with other points of the central valley and west coast. Among Chilean ports, Caldera ranks as 1 5th in the value of imports and as 19th in the value of exports. For the mineral productions of this region, the climate and agricultural prod¬ ucts (with the aid of irrigation) see Chile. Pop. about 3,000.

CALDERON, Francisco Garcia, Peruvian statesman: b. Arequipa 1834; d. Lima, Peru, 21 Sept. 1905. At the age of 21 he was a pro¬ fessor of jurisprudence, a member of the Peruvian Congress 1867 and Minister of the Treasury 1868. After the occupation of Lima by the Chilean army, during the war between Chile, Peru and Bolivia, 1879-81, he was made president of a provisional government formed under the protection of the Chilean authorities, February 1881. His government was recog¬ nized bv the United States, the Central Ameri¬ can republics and Switzerland. He pledged himself to conduct his government upon prin¬ ciples not opposed to the fundamental con¬ ditions demanded by Chile for the final arrange¬ ment of peace, but failing to do this, he was arrested, 6 Nov. 1881, by order of Gen. Patrick Lynch, rear-admiral and general-in-chief of the Chileans, and sent as a prisoner to Val¬ paraiso. Upon his return to Lima in 1886 he was elected president of the Senate and was made rector of the University of San Marcos. He worked earnestly for its rehabilitation after the war and by 1886 its restoration was in great part effected, new buildings constructed and normal university life resumed. He aided in securing the Grace contract through which Peruvian finances were placed on a sound basis and the commercial stability of the country as¬ sured a great degree of permanency. His prin¬ cipal work is a dictionary of Peruvian Juris¬ prudenceˆ a standard work. Consult Mark¬ ham, C. R., (History of PeriP (Chicago 1892) ; Garcia's (Le Perou contemporain > (Paris 1907) ; Martin, P., (Peru of the Twentieth Century > (London 1911).

CALDERON, Philip Hermogenes, Eng¬ lish painter, of Spanish parentage : b. Poitiers. 3 May 1833 ; d. London, 30 April 1898. He wras the son of Juan Calderon, at one time professor of Spanish literature in King's College, London. Coming to England about 1845, he became shortly afterward the pupil of a civil engi¬ neer ; but his artistic ability was so pronounced that his father allowed him to devote himself to the study of art at the British Museum and the National Gallery. In 1853 he went to studv under Picot at the Ecole des Beaux Arts in Paris. He first exhibited at the Academy in 1853, his picture being named (By the Waters of Babylon.) Among the many pictures he subsequently produced are (Broken Vows) (1857); (Far

Away* (1858); (The Gaoler's Daughter0 (1858); (Never More) (1860); liberating Prisoners on the Young Heir's Birthday* (1861); (After the Battle* (1862), one of his most successful works; (The English

Embassy in Paris on the Day of the Massacre of Saint Bartholomew) (1863) ; (Her Most High, Noble and Puissant Grace5 (1865), the last two being among his finest works; 'Whither?5 (1867 — his diploma picture); (Sighing His Soul Out in His Lady's Face) (1869) ; (Spring Driving Away Winter5 (1870) ; (On Her Way to the Throne) (1871), a sequel to his masterpiece of 1865; 'Victory5 (1873) ; (Half-hours with the Best Authors) ; (La Gloire de Dijon5 (1878) ; denunciation of Saint Elizabeth of Hungary5 (1891, National Gallery, London), probably his greatest work; 'Home They Brought Her Warrior Dead5; (Aphrodite 5 ; (The Answer5 (1897); and (Ruth5 (1897). Elected A.R.A. in 1864, he be¬ came, three years later, a full academician. He gained in 1867 the first French gold medal awarded to an English artist, and in the same year was made keeper of the Royal Academy, in which position he remained until his death. In 'Broken Vows5 he betrayed a tendency to the pre-Raphaelite style, but he did not retain this style very long. His work betrays his French technical training, yvhile his subjects reflect English popular sentiment.

CALDERON, Serafin Estebanez, Spanish writer: b. Malaga, Spain, 1799; d. Madrid, 7 Feb. 1867. He was professor of poetry and rhetoric at Granada, 1822-30, but resigned and went to Madrid. There he collected a library of old Spanish literature, especially of ballads, whether manuscript or in print; the collection is in the National Library at Madrid. He wrote a volume of poems, 'Poesias del Solitario5 (1833); a novel, (Christians and Moriscos5 (1838), and a very valuable study of 'The Literature of the Moriscos.5 He also wrote 'The Conquest and Loss of Portugal5 and a charming volume of (Andalusian Scenes5

(1847).

CALDERON DE LA BARCA, Pedro,

Spanish poet and playwright : b. Madrid, 17 Jan. 1600; d. there, 25 May 1681. His long life, which embraced the reigns of three kings, one of whom, Philip IV, was a generous patron, and exerted a profound influence upon the dramatist's art by demanding of him spectacular plays for his theatre in the royal palace, co¬ incided with the golden age of the Spanish drama, and his death marked its close.

Of Calderon's life little is known except that it was uneventful and blameless, in which re¬ spect he contrasts favorably with his famous contemporary and rival, Lope de Vega. His father, who was of noble origin, served as secre¬ tary to the Treasury Board under Philip II and Philip III. When nine years of age, Cal¬ deron was sent to the Jesuit College at Madrid, from which, at the age of 14, he entered the University of Salamanca, not without first giv¬ ing evidence of precocity and an interest in the drama by writing a play, known now only by title, 'The Chariot of Heaven5 (i.e., Eli¬ jah's). The influence of Jesuit teaching is seen in his plays, where the dramatist reveals an unusual fondness for dialectics. Some of his most successful dramas defend the attitude of Jesuits toward the doctrine of freewill. These influences were continued at the Univer¬ sity of Salamanca, whose professors stoutly championed the Jesuit cause against the pro¬ fessors of the LJniversity of Coimbra. At Sala¬

manca Calderon studied mathematics, philoso¬ phy, geography, history, civil and canon law, and graduated in 1619. While at the university he continued to write plays, and, according to his panegyrist and earliest biographer, Vera Tassis, with such marked success that his name became known throughout Spain. Nevertheless, he planned to enter the legal profession in his native city, but, as he himself records, the de¬ sire to win a prize in a poetical tournament organized in 1620 to honor the patron saint of Madrid, Saint Isidor, made a poet of him. He failed, however, to win a prize, but in a second contest two years later he was awarded a third prize for a euphuistic poem of little promise. More significant, as indicating the esteem in which he was already held by contemporary writers, is the fact that he contributed one of three commendatory poems to the official ac¬ count of the second contest prepared by Lope de Vega. In 1625 Calderon entered the army for service in Lombardy and Flanders. Upon his return to Spain he became attached to the court of Philip IV as a kind of official play¬ wright and master of the revels. For these services he was honored with knighthood in 1636, and later

was granted a pension. In order to qualify for a chaplaincy endowed by his maternal grandmother in his parish church, San Salvador, he became a priest in 1651. It is usually stated in biographies of Calderon that he now ceased to write for the secular stage and produced only (<autos sacramentales55 for the feast of Corpus Christi. Documents pub¬ lished by Perez Pastor (1905) show, however, that he wrote plays at rare intervals for the royal theatre in the palace of the Buen Retiro. Calderon was by nature a serious and pious man, and his literary production from 1651 on consists almost entirely of ((autos sacra¬ mentales,55 most of which were adaptations of his earlier secular plays. In 1653 Philip IV appointed Calderon to a chaplaincy in Los Reyes Nuevos at Toledo, but the absence of the poet from the court proved unsatisfactory to the King, and so in 1663 he made him one of his honorary chaplains at Madrid. On his death, in 1681, all Spain mourned for him. Foreign scholars vied with Spaniards in paying tribute to his memory.

During his long life he had been honored by royalty, and the principal cities of Spain commissioned him annually to write their (<autos sacramentales.55 Many of his plays had been translated into French and Italian. In Spam his dramatic works remained popular until about the middle of the 18th century, when pseudo-classical critics singled him out as the special butt of their attacks on the national drama. In 1763 the performance of ((autos sacramentales55 was forbidden by law. Cal¬ deron's plays were censured for the importance given in them to intrigue, with the consequent neglect of character study. His brilliant, but at times pompous and euphuistic style — especially in plays composed for the royal theatre — also met with disapproval. About the year 1800 romantic critics of Germany, especially Fried¬ rich Schlegel, started a furore for Calderon which made him during two decades the most popular dramatist of modern times. This ex¬ travagant enthusiasm for the Spaniard is well exemplified in Shelley, who read his plays "with inexpressible wonder and delight,55 and

was inspired (<to throw over their perfect and glowing forms the

grey veil of my own words,** with what success is seen in his famous, al¬ though often inaccurate, rendering of parts of (The Wonder-Working Magician.* At present, partly because of a natural reaction, and partly because critics like Grillparzer and Menendez y Pelayo have set up the counterclaim of his more spontaneous and less conventional con¬ temporary, Lope de Vega, Calderon is held in less esteem than formerly.

Calderon's plays can be grouped under five headings, as follows: (1) Religious or sacred plays, to which class belong three of his most successful works, (The Wonder-Working Magician* (q.v.), (The Devotion to the Cross) and (The Firm Prince. *These plays have as their themes conversion from paganism, the repentance of a sinner, who thereby receives pardon, and the fortitude of a Christian hero. (2) Philosophical plays, the best-known being <Life is a Dream* (q.v.). (3) Tragedies, or

socalled honor plays, a representative work of this peculiarly Spanish type of play being (The Mayor of Zalamea* (q.v.). (4) ((Cloak and

sword® comedies, plays of intrigue which re¬ flect the customs of the dramatist's age. It was of these plays that Goethe was thinking when he remarked that Calderon's characters are as alike as bullets or leaden soldiers cast in the same mould. In this type of play Cal¬ deron was surpassed by Lope de Vega, Tirso de Molina and Alarcon. (5) (< Autos sacramentales,** in which Calderon was acknowledged a master without a peer. The modern reader is interested only in the few lyrical passages which occur at rare intervals in arid wastes of philosophical or theological discussions and abstractions.

Bibliography. — (Biblioteca de autores espanoles* (Vols. VII, IX, XII, XIV, LVIII) ; (Select Plays) (ed. N. MacColl, London 1888) ; <Six Dramas of Calderon) (freely trans. by E. Fitzgerald, London 1903) ; Schmidt, F. M. V., (Die Schauspiele Calderons* (Elberfeld 1857) ; M. Menendez y Pelayo, (Calderon y su teatro* (Madrid 1881) ; Breymann, H., (Calderon-Studien* (a pretentious but incomplete and in¬ accurate bibliography, Munich 1905).

Milton A. Buchanan,

Professor of Italian and Spanish, University of T oronto.

CALDER6N Y BELTRAN, Fernando,

Mexican dramatist and poet: b. Guadalajara, 20 July 1809; d. Ojocaliente, 18 Jan. 1845. Throughout Spanish America his plays, such as (The Journey, *(Anne Boleyn* and (The Re¬ turn of the

Crusader,* have been extremely pop¬ ular. As a lyrical poet his work is characterized by dramatic fire, and he is popular, not only in Mexico, but throughout the whole of Spanish America.

CALDERWOOD, David, Scottish clergy¬ man and ecclesiastical historian : b. Dalkeith 1575; d. Jedbury, 29 Oct. 1650. In 1604 he was settled as a minister of Crailing, in Roxburgh¬ shire, where he distinguished himself by his opposition to episcopal authority. In 1617 he was banished from the realm for his contumacy and went to Holland, where, in 1623, he pub¬ lished his famous work entitled (Altare Da-mascenum*. He returned to Scotland, and be¬ came minister of the church of Pencaitland,

near Edinburgh, and in 1643 was appointed one of the committee which compiled the directory for public worship in Scotland. He then en¬ gaged in writing the history of the Church of Scotland, in continuation of that of Knox, a work which was printed for the Woodrow So¬ ciety, with a life by the Rev. Thomas Thomson, from his manuscript in 1842-49, in eight volumes.

CALDERWOOD, Henry, Scottish philoso¬ pher : b. Peebles, 10 May 1830 ; d. Edinburgh, 19 Nov. 1897. He received his early education at the Edinburgh Institution and High School. He afterward attended the university of that city, and while a student published his Philoso¬ phy of the Infinite* (1854), an attempt to con¬ trovert the views of Sir William Hamilton. He became minister of Greyfriars United Presby¬ terian Church, Glasgow, in 1856, and in 1868 was elected professor of moral philosophy in Edinburgh University, a chair which he occu¬ pied for the rest of his life. His chief works are his (Handbook of Moral Philosophy* (1872) ; (Relations of Mind and Brain) (1879) ; < Evolution and Man's Place in Nature1* (1893) ; (The Relations of Science and Religion1* (1881); and a (Life of David Hume* (1898). He devoted much of his time to work for edu¬ cational and temperance reform. Consult the biography (London 1900) by his son, W. C. Calderwood, and D. Woodside, which contains a chapter on Calderwood's philosophy by A. S. Pringle-Pattison.

CALDICOTT, Alfred James, English

musician and composer : b. Worcester, England, 1842 ; d. 24 Oct. 1897. After studying at Leip¬ zig under Richter and Moscheles he was organ¬ ist of Saint Stephen's Church in his native town for a time, becoming professor in the Royal College of Music in 1882. Among his

works, besides many songs, glees, etc., are the cantatas (The Widow of Nain* (1881) and (A Rhine Legend* (1883); and ‘ the operettas (A Moss Rose Pent* (1883) and (01d Knockles* (1884).

CALDWELL, Alexander, American

banker : b. Drake’s Ferry, Huntington County, Pa., 1 March 1830; d. May 1917. He at¬ tended school until 16 years of age. In 1847 he enlisted as a soldier in the Mexican War, entering the company of his father, who was killed at one of the gates of the city of Mexico. In 1848 he returned to Columbia, Pa., where he entered a bank, and later took up business. In 1861 he removed to Kansas, where he engaged in the transportation of military supplies to the various posts on the plains, and became largely interested in railroad and bridge building. He was elected to the United States Senate as a Republican, took his seat 4 March 1871 and served until 24 March 1873, when he resigned. He was president of the Kansas Manufacturing Company and president of the First National Bank of Leavenworth after 1897.

CALDWELL, Charles Henry Bromedge,

American naval officer: b. Hingham, Mass., 11 June 1828; d. Boston, 30 Nov. 1877. He did a notable service in an expedition against a tribe of cannibals inhabiting one of the Fiji Islands, . defeating them in a pitched battle and destroying their town. In the Civil War he commanded the Itasca, taking part in the bom-

bardment of forts Jackson and Saint Philip and the Chalmette batteries, and in the capture of New Orleans. He was promoted commodore in 1874.

CALDWELL, Howard Walter, American historian : b. Bryan, Ohio, 26 Aug. 1858. He was graduated from the University of Nebraska in 1880 and is professor of American history and jurisprudence there. He has written his¬ tory of the United States, 1815-1861 5 (1896) ; c Studies in History) (1897) ; (A Survey of American History5 (1898) ; (Some

Great Amer¬ ican Legislators5 (1899); (Life of Henry Clay 5 (1899); (Expansion of the United States)

(1900) ; (Education in Nebraska) (1902) ; (Civil Government of Nebraska) (1902) ; (Source History of the United States) (1909) ; (Outlines with References for American His¬ tory 1783-1877 > (1910).

CALDWELL, James, American clergy¬ man: b. Charlotte County, Va., April 1734; d. 24 Nov. 1781. After graduating at the College of New Jersey, now Princeton University, he became Presbyterian pastor at Elizabethtown. During the growing antagonism between the colonies and Great Britain, he warmly took the side of the former, and when hostilities began, became chaplain to the New Jersey brigade, and took an active share in its campaigns, fighting ((with the sword in one hand and the Bible in the other.® Irritated at the unexpected and obstinate resistance made by the Jersey troops and yeomanry, the English began to burn the houses and pillage the property of the villagers at Connecticut Farms. In one of the houses was the family of Mr. Caldwell, whose wife had retired to a back room with her two youngest children — one an infant in her arms — where she was engaged in prayer, when a musket was discharged through the window. Two balls struck her in the breast, and she fell dead upon the floor. On 23 June General Knyp-hausen made a second incursion with about 5,000 troops. On this occasion he passed over the same route to Springfield, where a battle was fought. Among the most active in the fight was the chaplain Caldwell. The British were compelled to retrace their steps, which they did with all possible rapidity. He was shot and killed by an American sentinel in the course of a dispute over a package the latter desired to examine. The soldier was tried and exe¬ cuted for murder later. In 1846 a monument was raised to Caldwell's memory in Elizabeth.

CALDWELL, Joseph, American educator : b. Lammington, N. J., 21 April 1773; d. Chapel Hill, N. C., 24 Jan. 1835. He was graduated at Princeton in 1791, delivering the Latin salu¬ tatory, and then taught school in Lammington and Elizabethtown, where he began the study of divinity. He became tutor at Princeton in April 1795, and in 1796 was appointed pro¬ fessor of mathematics in the University of North Carolina. He found the institution, then only five years old, in a feeble state, nearly destitute of buildings, library and apparatus, and to him is ascribed the merit of having saved it from ruin. He was made its presi¬ dent in 1804 and held the office till his death, with the exception of the years from 1812 to 1817. Princeton gave him the degree of D.D. in 1816. In 1824 he visited Europe to purchase

apparatus and select books for the library of

the university. A monument to his memory has been erected in the grove surrounding the university buildings. He published (A Com¬ pendious System of Elementary Geometry,5 with a subjoined treatise on plane trigonometry (1822), and (Letters of Carleton5 (1825).

CALDWELL, William, Scottish-American educator: b. Edinburgh, Scotland, 10 Nov. 1863. He was graduated from the university of his native city and was assistant professor of logic and metaphysics in that institution 1887-88. In 1891 he was called to the Sage School of Philosophy, Cornell University, New York; in 1892 to the University of Chicago, and from 1894 to 1903 he was profes¬ sor of moral and social philosophy in the Northwestern University at Evanston, Ill. In the latter year he was appointed Macdonald professor of moral philosophy in McGill Uni¬ versity, Montreal. He has published Schopen¬ hauer's System in Its Philosophical Significance) (1896) ; (Pragmatism and Idealism5 (1913) ; and contributions to the leading psy¬ chological and philosophical reviews.

CALDWELL, Idaho, city, county-seat of Canyon County on the Oregon Short Line Rail¬ road, 26 miles direct west of Boise. It is in the Payett-Boise Reclamation project, a rich farming region, yielding wheat, flour, cereals, fruits, potatoes and live stock. It has munici¬ pally owned waterworks, a Carnegie library, courthouse, city hall, and the College of Idaho is situated here. Here 30 Dec. 1906, ex-Gov- ernor Steunenberg was assassinated by Harry Orchard. Pop. (1920) 5,106.

CALDWELL, Kan., city in Sumner County, on the Chicago, Rock Island and Pacific, the Atchison, Topeka and Santa Fe and Kansas and Southwestern railroads. The principal in¬ dustries are the manufacture of ice and flour. There are two banks whose combined resources amount to $1,750,000. The public buildings in¬ clude two primary and one grade and high schools, a city hall, Carnegie library, opera house. The government is by a commission, and the municipality owns its light and water plants, which have been brought up to date re¬ cently at a cost of $95,000. Pop. (1920) 2,191.

CALDWELL, N. J., city in Essex County, on the second ridge of the Orange Mountains, 10 miles west of Newark, the county-seat, and on the Erie Railroad. It is mainly a residential city, has two banks with combined resources of $2,000,000, and taxable property of an aggregate value of $3,500,000. There are three public schools and a

Carnegie library and town hall. Pop. (1920) 3,993.

CALDWELL, Ohio, village, county-seat of Noble County, on the Ohio River and Western and the Cleveland and Marietta railroads, 35 miles north of Marietta. Coal mines and oil wells are worked and the village owns water¬ works and electric-lighting plant. Pop. 1,706.

CALDWELL, Tex., town and county-seat of Burle'son County, on the Gulf, Colorado and Santa Fe Railroad, 87 miles east-northeast of Austin. It is the trading centre of a stock raising and cotton growing region and has cot¬ ton-gin, oil and grist mills, ice-factory and brick yards. Pop. (1920) 1,689.

CALEB, son of Jephunneh, a descendant of the tribe of Judah, or according to some au

thorities a foreigner of Kenezite origin incor¬ porated with that tribe, according to Ussher born 1530 b.c., was sent with Joshua and 10 others to examine the land of Canaan. When Joshua had conquered the country, Caleb re¬ minded the Jews of the promise which had been made by God, that they should enjoy this country. He obtained the city of Hebron for his share of the spoil, besieged and captured it, and drove out three giants, or Anakim. He then marched against Kirjath-sepher, and of¬ fered his daughter Achsah to the first who should enter it. Othniel, his nephew, was the successful aspirant for the fair Jewess. Con¬ sult Moore, (Judges } (1895) ; Myer, ed., (Die Entstehung des Judentums) (1896); id., (Die Israeliten und ihre Nachbarstamme) (1906).

CALEB WILLIAMS. 'Caleb Williams' the best-known novel and most widely read book of William Godwin, published in 1794, embodies many of the ideas of the author's celebrated (Inquiry Concern¬ ing Political Justice. > The hero, from whom the book takes its name, a lad of hum¬ ble origin but uncommon intelligence, becomes involved in the after effects of a feud between two wealthy and influential country gentle¬ men, Tyrrel, a brutal, boorish squire, and the more

courteous and refined Falkland. Becom¬ ing possessed, through an inordinate curiosity, of the secret that his master, Falkland, had murdered Tyrrel and allowed the blame to lie on innocent men, Williams is unrelentingly per¬ secuted by his master. Lodged in jail at Falk¬ land's instigation on charge of felony, the hero, after one unsuccessful attempt, finally escapes, and in the course ot his adventures meets with many classes of society — highwaymen, arti¬ sans, "blood-hunters® and magistrates — but never escapes the consequences of Falkland's malevolence. The thesis of the book is the in¬ equality of man before the law. Having in¬ nocently incurred the enmity of the influential, Williams cannot henceforth obtain either legal or social redress. The results of injustice are also illustrated among other members of the humbler classes, and a secondary thesis of the book is that many thieves and highwaymen are driven to their mode of life simply through in¬ justice of laws and customs. Falkland's de¬ sire to preserve his reputation at all hazards and Tyrrel's exclamation that the lives of 20 such as his ward 'are not worth one hour of his convenience, are typical of the anti-social feeling that Godwin attacks.

Throughout, the book is written in a vigor¬ ous and vivid style, which, in spite of its con¬ scious stateliness, retains vitality and has made it one of the minor classics of English litera¬ ture. A short account of the relation of 'Caleb Williams) to the theories of the time is to be found in H. N. Brailsford's (Shelley, Godwin and Their Circled

William T. Brewster.

CALEDONIA, the name by which the por¬ tion of Scotland north of the rivers Forth and Clyde first became known to the Romans. The year 80 of the Christian era is the period when Scotland first becomes known to history. The invasion of Caesar did not immediately lead to the permanent occupation of southern Britain. It was only in the year 43 that the annexation of this portion of the island to the Roman em¬

pire began. It was completed superficially about 78, and two years were occupied in recon¬ ciling the natives to the Roman yoke. Agricola then moved northward, invading Scotland by the eastern route, and occupying the country up to the line of the Friths of Clyde and Forth. Agricola ran defensive works across this line, and hearing, in the third year of his occupation, rumors of an organized invasion in preparation by the Caledonians, a name applied to the dwellers north of the boundary, he resolved to anticipate them, and again advanced

north¬ ward. The Roman army marched in three di¬ visions. The weakest, consisting of the ninth legion, was attacked by the barbarians, who fought their way to the Roman camp. Agricola came to the rescue, and the Romans were vic¬ torious. The Roman army now advanced to Mons Grampius, where they found the enemy, 30,000 strong, under a chief named Galgacus. Agricola had to stretch his line as far as he deemed prudent to prevent being outflanked. The auxiliaries and Romanized Britons were in the centre and front, the legions in the rear. The Caledonians are described as riding furi¬ ously about in chariots between the two camps. Each chief (Roman and Caledonian) made a set speech to his followers; that of Galgacus was peculiarly eloquent. The Caledonians were armed with small shields, arrows and large pointless swords. Their chariots routed the Roman cavalry, but afterward became embar¬ rassed in the broken ground ; and when the Roman auxiliaries charged the masses of the enemy with the gladius, they gave way before a method of fighting to which they were un¬ accustomed. The site of the battle remains undetermined. The name Caledonia is first used by Pliny, who, as well as Tacitus, is sup¬ posed to have derived it from Agricola. The name is applied by Ptolemy to one of the numerous populations of North Britain. The use of the name by Tacitus gave it immediate popularity with the Romans and to the same source its subsequent popularity in Britain is to be traced. Caledonia as a name for Scotland has been much used by poets. Consult Smith,

‘ Dictionary of Greek and Roman Geography*; Burton, (History of Scotland) ; Rhys, ‘Celtic Britain.)

CALEDONIA SPRINGS, Canada, town of Prescott County, Ontario, on the Canadian Pacific Railroad, 65 miles west of Montreal, a health resort frequented for its alkaline springs.

CALEDONIAN CANAL, in Scotland, counties of Inverness and Argyle, connects the North with the Irish Sea, extending from Mur¬ ray Frith through Lochs Ness, Oich and Lochy, in the great glen of Caledonia, to Loch Eli. The total length is 60ˆ miles, of which the lochs compose 37jL It was built to shorten the distance between Kinnaird’s Head and the Sound of Mull, which had offered a very diffi¬ cult passage. By the canal route the distance was reduced from 500 to 250 miles. It allows passage of ships of 500 to 600 tons. The canal was begun in 1803, and opened for navigation about the close of 1823.

CALEF, Robert, American merchant of Boston: b. about 1648; d. Roxburv, Mass., 13 April 1719. His fourth son, also named Robert, died in 1722 or 1723, aged about 41. One or the

other of these men was the author of a re¬ markable book on the witchcraft delusion in New England. The best authorities, notably James Savage and Wm. F. Poole, ascribe it to the younger, who was about 23 when it ap¬ peared. The book was entitled (More Wonders of the Invisible World) (London 1700), the title being suggested by Cotton Mather's bon¬ ders of the Invisible World. J The substance of it had been circulated in manuscript several years previous to its publication and its mali¬ cious attacks on Cotton and Increase Mather caused a bitter and lifelong quarrel between the former and the author. The book abounds in malicious innuendoes, directly charges the Mathers with inciting and being in full sym¬ pathy with the Salem tragedies, and accuses the Boston ministers, in their advice of 15 June 1692, of endorsing the Salem methods. When the book was printed and came back to Boston it was denounced and hated because it was an untruthful and atrocious libel on the public sentiment of Boston, and on the conduct of its ministers. It is said that Increase Mather publicly burned it in the Harvard College yard. The animus of the book has been greatly mis¬ understood, and the popular idea that Calef was a stalwart agent in putting an end to Salem witchcraft is both a myth and a delusion. Its historical value and the author's character have been greatly overrated. His personal history is a blank which the most assiduous investiga¬ tion has never been able to fill, or even to sup¬ ply with the most common details. It is not known where or when he was born, when he died or where he was buried, although he lived in Boston and his will is on file in the Suffolk records. His book has now become very rare and copies bring high prices in the book auc¬ tions. It was reprinted at Salem in 1796, 1823 and 1861, and at Boston in 1828 and 1865.

CALENDAR, a system of dividing time into years, months, weeks and days for use in civil life, or a register of these or similar divisions. Among the old Romans, for want of such a register, it was the custom of the pontifex maximus, on the first day of the month, which began with the new moon, to proclaim (calare) the month, with the festivals occurring in it. Hence, calendce (the first of the month) and

calendar. The periodical oc¬ currence of certain natural phenomena gave rise to the first division of time. The apparent daily revolution of the sun about the earth occasioned the division into days. The time at which a day begins and ends has been differently fixed, the reckoning being from sunrise to sunrise, from sunset to sunset, from noon to noon, or from midnight to midnight. The changes of the moon, which were observed to recur every 29 or 30 days, suggested the division into months, but the month now used, though nearly equal to a lunation, is really an arbitrary unit ; and, as a still longer measure of time was found necessary for many purposes, it was supplied by the apparent yearly revolution of the sun round the earth, producing the changing sea¬ sons. The time of this revolution is now known to be 365 days, 5 hours, 48 minutes and 46 seconds, but as it has at various times been reckoned differently, this has given rise to cor¬ responding changes in the calendar. This unit of time is called a solar year. The division

into weeks, which has been almost universally adopted, is not founded on any natural phe¬ nomenon, and, as it originated in the East, has been attributed to the divine command to Moses in regard to the observation of the seventh day as a day of rest. By other author¬ ities it has been ascribed to the number of the principal planets, a theory supported by the names given to the days. It was not used by the Greeks, nor by the Romans, till the time of Theodosius. The great influence of the sun's course upon the seasons naturally attracted the attention of men at all periods to this phe¬ nomenon ; accordingly all nations in any de¬ gree civilized have adopted the year as the longest unit of time. The year of the ancient Egyptians was based on the changes of the seasons alone, without reference to the lunar month, and contained 365 days, which were divided into 12 months of 30 days each, with five supplementary days at the end of each year. The Jewish year consisted of lunar months, of which they reckoned 12 in the year, intercalating a 13th when necessary to main¬ tain the correspondence of the particular months with the regular recurrence of the seasons. The Greeks in the earliest period also reckoned by lunar and intercalary months. They divided the month into three decades, a system also adopted long afterward at the time of the French Revolution. It possesses the ad¬ vantage of making the smaller division an exact measure of the larger, and under it the num¬ ber of a day in the 10-day period readily sug¬ gests its number in the month. The Greeks in the time of Solon had a year of 12 months alternately of 29 and 30 days, the total num¬ ber of days being 354, and the year being very nearly equal to a lunar one. Soon afterward a month of 30

days began to be intercalated every other year in order to reconcile their year with that founded on the sun's movement, but as the error was still very large the intercalary month was afterward omitted once in four times. The Jewish and also the Greek year thus both va¬ ried in duration according as the intercalary month was introduced or omitted. This, with the uncertainty as to the exact duration of the year, was a constant source of confusion.

Various plans for the reformation of the calendar were proposed from time to time; but all proved insufficient till Meton and Eucte-mon finally succeeded in bringing it to a much greater degree of accuracy by fixing on the period of 19 years, in which time the new moons return upon the same days of the year as before (as 19 solar years are very nearly equal to 235 lunations). (See Cycle). This mode of computation, first adopted by the Greeks about 432 b.c., was so much approved of that it was engraven with golden letters on a tablet at Athens. Hence the number showing what year of the moon's cycle any given year is is called the golden number. This period of 19 years was found, however, to be about six hours too long. This defect Calippus, about 102 years later, endeavored to remedy, but still failed to make the beginning of the seasons re¬ turn on the same fixed day of the year.

The Romans first divided the year into 10 months, but they early adopted the Greek method of lunar and intercalary months, mak¬ ing the lunar year consist of 354, and after-

ward of 355 days, leaving 10 or 11 days and a fraction to be supplied by the intercalary di¬ vision. This arrangement, which was placed under the charge of the pontiffs, continued until the time of Caesar. The first day of the month was called the calends. In March, May, July and October, the 1 5th, in other months the 13th, was called the ides. The ninth day before the ides (reckoning inclusive) was called the nones. The other days of the months they reckoned forward to the next calends, nones, or ides, whether in the same or the succeeding month, always including both days in the reckoning. Thus the 3d of

March, according to the Roman reckoning, would be the fifth day before the nones, which in that month fell on the 7th. The 8th of January, in which month the nones happen on the 5th, and the ides on the 13th was called the 6th before the ides of January. Finally to express any of the days after the ides, they reckoned in a similar manner from the calends of the following month. From the inaccuracy of the Roman method of reckoning it appears that in Cicero's time the calendar brought the vernal equinox almost two months later than it ought to be. To check this irregu¬ larity Julius Caesar invited the Greek astrono¬ mer Sosigenes to Rome, who, with the assist¬ ance of Marcus Fabius, invented that mode of reckoning which, after him who introduced it into use, has been called the Julian calendar. The chief improvement consisted in restoring the equinox to its proper place in March. For this purpose two months were inserted between November and December, so that the year 707 (46 b.c.), called from this circumstance the year of confusion, contained 14 months. In the number of days the Greek computation was adopted, which made it 365*4-The number and names of the months were kept unaltered with the exception of Quintilis, which was henceforth called, in honor of the author of the improvement, Julius. To dispose of the quarter of a day it was determined to intercalate a day ever}'- fourth year between the 23d and 24th of February. This was called an intercalary day, and the year in which it took place was called an intercalary year, or, as we term it, a leap year.

This calendar continued in use among the Romans until the fall of the empire, and throughout Christendom till 1582. The festivals of the Christian Church were determined by it. With regard to Easter, however, it was neces¬ sary to have reference to the course of the moon. The Jews celebrated Easter (that is, the Passover) on the 14th of the month Nisan (or March) ; the Christians in the same month, but always on a Sunday. Now, as the Easter of the Christians sometimes coincided with the Passover of the Jews, and it was thought un¬ christian to celebrate so important a festival at the same time as the Jews did, it was re¬ solved at the Council of Nice, 325 a.d., that from that time Easter should be solemnized on the Sunday following the first full moon after the vernal equinox, which was then supposed to take place on 21 March. As the course of the moon was thus made the foundation for determining the time of Easter, the lunar Cycle of Meton was taken for this purpose; accord¬ ing to which the year contains 365*4 days, and the new moons, after a period of 19 years, return on the same day as before. The inac¬

curacy of this combination of the Julian year and the lunar cycle must have soon discovered itself on a comparison with the true time of the commencement of the equinoxes, since the re¬ ceived length of 365*4 days exceeds the true by about 11 minutes; so that for every such Julian year the equinox receded 11 minutes, or a day in about 130 years. In consequence of this, in the 16th century, the vernal equinox had changed its place in the calendar from the 21st to the 10th ; that is, it really took place on the 10th instead of the 21st, on which it was placed in the calendar. Luigi Lilio Ghiraldi, fre¬ quently called Aloysius Lilius, a physician of Verona, projected a plˆn for amending the calendar, which, after his death, was presented by his brother to Pope Gregory XIII. To carry it into execution, the Pope assembled a number of prelates and learned men. In 1577 the proposed change was adopted by all the Catholic princes; and in 1582 Gregory issued a brief abolishing the Julian calendar in all Catholic countries, and introducing in its stead the one now in use, under the name of the Gregorian or reformed calendar, or the new style, as the other was now called the old style. The amendment ordered was this : 10 days were to be dropped after 4 Oct. 1582, and the 15th was reckoned immediately after the 4th. Every 100th year, which by the old style was a leap year, was now to be a common year, the 4th century divisible by four excepted; that is, 1600 was to remain a leap year, but 1700, 1800, 1900 of the common length, and 2000 a leap year again. In this calendar the length of the solar year is taken to be 365 days, 5 hours, 49 minutes and 12 seconds, the difference between which and the true length is immaterial. In Spain, Portugal and the greater part of Italy the amendment was introduced according to the Pope's instructions. In France the 10 days were dropped in December, the 10th being called the 20th. In Catholic Switzerland, Ger¬ many and the Netherlands the change was in¬ troduced in the following year, in Poland in 1586, in Hungary 1587. Protestant Germany, Holland and Denmark accepted it in 1700, and Switzerland in 1701. In the German empire a difference still remained for a considerable time as to the period for observing Easter. In*' England the Gregorian calendar was adopted in 1752, in accordance with an act of Parlia¬ ment passed the previous year, the dav after 2d September becoming the 14th. Sweden fol¬ lowed in 1753. Greece still adheres to the Jul¬ ian calendar, which, by the interjection of two more days, 1800 and 1900 being regarded as leap years, now differs from the Gregorian calendar by 13 days. Thus 14 Tan. 1917 of the new style was 1 Jan. 1917 in Greece. Russia adopted the Gregorian calendar 14 Feb. 1918.

The change adopted in the English calendar in 1752 embraced another point. There had been previous to this time various periods

fixed for the commencement of the year in various countries of Europe. In France, from the time of Charles IX, the year was reckoned to begin from 1 January; this was also the popular reckoning in England, but the legal and ecclesiastical year began on 25 March. The 1st of January was now adopted as the beginning of the legal year, and it was customary for some time to give two dates for the period intervening between 1 January and 25 March,

that of the old and that of the new year, as January 1752-53.

In France, during the Revolutionary epoch, a new calendar was introduced by a decree of the National Convention, 24 Nov. 1793. The new reckoning was to begin with 22 Sept. 1792, the day on which the first decree of the new republic had been promulgated. The year was made to consist of 12 months of 30 days each, and, to complete the full number, five fete days (in leap year six) were added at the end of the year. Instead of weeks, each month was divided into three parts, called decades, con¬ sisting of 10 days each ; the other divisions being also accommodated to the decimal system. This calendar was abolished at the command of Napoleon, by a decree of the Senate, 9 Sept. 1805, and the common or Gregorian calendar was re-established on 1 January of the follow¬ ing year. The Mohammedans employ a lunar year of 354 days and 12 lunar months, which have alternately 29 and 30 days. Thirty years form a cycle and 11 times in every cycle an extra day is added at the end of the year. The months and the seasons do not correspond and the first of the year may fall at any time dur¬ ing the solar year. The months are named Muharram, Saphar, Rabia I, Rabia II, Jomadi I, Jomadi II, Rajab, Shaaban, Ramadan, Sha-wall, Dulkaada and Dulkeggia. The Moham¬ medan era is computed from the first day of the year of the Hejira, or flight of Mohammed to Medina. It corresponds with 15 July 622 of the Christian era. The Mohammedan year which began on 28 Oct. 1916 was the 1 5th year of the 45th cycle, or the year 1335 of the Mo¬ hammedan era. See also Chronology; Cycle; Epoch ; Hejira.

Bibliography. — Boll, (Griechisches Kalen-dar5 (Heidelberg 1910) ;

Bowditch, Numera¬ tion, Calendar Systems and Astronomical Knowledge of the Mayas5 (Cambridge, Mass.,

1910) ; Burnaby, (Elements of the Jewish and Mohammedan Calendar5 (London 1901) ; Langdon, (Tablets from the Archives of Drehem, with a Complete Account of the Origin of the Sumerian Calendar5 (Paris

1911) ; Mahler, (Etudes sur le calendrier egyptien5 (ib. 1907) ; Plunket, (Ancient Calen¬ dars and Constellations5 (London 1903) ; Schram, (Kalendariographische und chronol-ogische Tafeln5 (Leipzig 1908).

CALGARY, Canada. The city of Calgary is situated in the province of Alberta, at the junction of the Bow and Elbow rivers, 840 miles west of Winnipeg, and 2,262 miles west of Montreal. The site is picturesque, as the city lies in a species of natural bowl. From Calgary, the Rocky Mountains 80 miles away are clearly visible. Before the advent of the Canadian Pacific Railway 30 years ago, Cal¬ gary was an important trading post and head¬ quarters for the ranching country of southern Alberta. With the establishment of through transcontinental communication, Calgary as¬ sumed a place on the map and rapidly began to develop commercially.

Situated as it is at the entrance of two great passes through the mountains and surrounded by both a fine agricultural and ranching coun¬ try, Calgary has naturally become an import¬ ant railway centre. Lines belonging to the Canadian Pacific run north to Edmonton and south via Lethridge through the Crow's Nest vol. 5 — 13

Pass. The city is also served by the lines of the Grand Trunk Pacific and the Canadian Northern.

The city has an altitude of 3,410 feet above sea-level, and enjovs a bracing and healthful climate. The average temperature is 35.2 and the rainfall 19 inches. While low temperatures are of regular occurrence in the winter, the climate is agreeably modified by the warm Chinook winds which frequently bring a cold spell to a sudden and welcome close.

Buildings. — Calgary is a very substantially built city, and is fortunate in having nearby extensive quarries of excellent sandstone. Cal¬ gary stone, as it is called, has been used with excellent effect in the Provincial Parliament Buildings at Edmonton. Handsome public and

office buildings and business blocks line the downtown streets. Knox Presbyterian Church, built of Calgary stone, is one of the finest speci¬ mens of ecclesiastical architecture in western Canada.

Government. — Calgary was founded in 1883 and incorporated in 1894. Its municipal government consists of an elective mayor and council and an elective board of commissioners. Calgary employs a slightly modified form of the single tax. The city owns its own electric street railway, with 60 miles of trackage in operation. It operates its own gravity water system and sewerage system, and owns its own asphalt paving plant. Natural gas sells for 35 cents per 1,000 cubic feet, and at 15 cents for power. Water power has also been brought in and of this 31,100 horse power is already available.

Religion and Education. — Calgary is the

seat of Anglican and Roman Catholic bishop¬ rics, and all the leading religious denomina¬ tions are well established. Educational facili¬ ties are amply and generously provided. There are 32 public and high schools, four Roman Catholic separate schools and a Normal School. The provincial government opened in 1916 an Institute of Technology and Manual Arts.

Industrial Progress. — Western Canada is substantially an agricultural country, but Cal¬ gary has had a considerable industrial develop¬ ment, and is the chief distributing centre be¬ tween Winnipeg and the Pacific. Though coal is not mined in the immediate vicinity, it is worked on an extensive scale at Lethbridge and Bankhead, both of them points within 100 miles. Natural gas has been piped into the city from Bow Island, 100 miles distant. Oil was dis¬ covered in 1914 a short distance south of Cal¬ gary, and the indications are promising. The foothills of the Rockies to the west form an admirable grazing country and large herds of stock are raised. These contribute the raw material for the successful stockyards and ex¬ tensive packing plants which are amongst Cal¬ gary's most important industries. Excellent clays for brickmaking exist. Calgary ˆ is the site of one of the Dominion government's great interior storage elevators and has become an important centre in the grain trade. Large milling establishments flourish. Manufactures include biscuits, boxes and breakfast foods. A large business is carried on in building mate¬ rials, harness and leather goods, iron and metals, aerated waters, beer, *etc.* The Canadian Paci¬ fic has erected at Calgary car shops costing over $3,500,000, with an annual wage bill of

$3,400,000. Pop. (1911) 43,704; special

Dominion census of 1916, 55,000.

William A. R. Kerr, Dean of the University of Alberta.

CALHOUN, kal-hoon', John Caldwell,

American statesman : b. Abbeville District, S. C., 18 March 1782; d. Washington, D. C., 31 March 1850. He was graduated with distinc¬ tion at Yale College in 1804, and was admitted to the South Carolina bar in 1807. After serv¬ ing for two sessions in the legislature of his native State, he was elected to Congress in 1811. From that time until his death, a period of nearly 40 years, he was seldom absent from Washington, being nearly the whole time in the public service, either in Congress or in the Cabinet. When he first entered Congress the disputes with England were fast approaching actual hostilities, and he immediately took part with that portion of the dominant party whose object was to drive the still reluctant admin¬ istration into a declaration of war. They suc¬ ceeded, and, as a member of the Committee on Foreign Relations, he reported a bill for de¬ claring war, which was passed in June 1812. When Monroe formed his administration in 1817, Calhoun became Secretary of War, a post which he filled with great ability for seven years, reducing the affairs of the department from a state of great confusion to simplicity and order. In 1824 he was chosen Vice-Presi¬ dent of the United States under John Q. Adams, and again in 1828 under General Jackson. In 1828, a protective tariff was enacted which bore very heavily on the agriculturists of the South and hence was known throughout that section as ((The Tariff of Abominations.® Mr. Calhoun prepared a paper declaring that the <(United States is not a union of the people, but a league or compact between sovereign states, any of which has the right to judge when the compact is broken and to pronounce any law to be null and void which violates its con¬ ditions.® This paper was issued by the leg¬ islature of South Carolina and was known as (The South Carolina Exposition.5 This view of the United States constitution as a compact between the States had been many years before strongly expressed in the Virginia and Kentucky resolutions,

the former being drawn up by James Madison, often styled the (<Father of the Constitution,® and the latter by Thomas Jefferson. The Kentucky resolutions had suggested nullification as a remedy. Alex¬ ander Hamilton in The Federalist frequently spoke of the United States as a ˆConfederate Republic® and a <(Confederacy® and called the constitution a ((compact.® Washington fre¬ quently referred to the constitution as a (<compact,® and spoke of the Union as a ((Confederated Republic.® At the time of the Louisi¬ ana Purchase Hon. Timothy Pickering of Massachusetts advocated the right and advisa¬ bility of secession and Hon. Josiah Quincy of the same State in 1811 expressed similar views. Hence John C. Calhoun propounded no new or strange doctrine, but one which had found advocates before, and in the North as well as in the South.

In 1828, the friendly relations between Mr, Calhoun and President Jackson were broken off, when the latter ascertained that Calhoun had sought to have him called to account for

his acts in the Seminole War. This breach was still further enlarged when Calhoun re¬ fused to co-operate with President Jackson in the effort to reinstate Mrs. Eaton in Washing¬ ton society.

•When Mr. Calhoun found that the repeal of the tariff of 1828 could not be secured through President Jackson, he resigned the Vice-Presi¬ dency and entered the Senate from South Caro¬ lina. On 26 July 1831 he published a paper favoring free trade and declaring that the <(great conservative principle of Union is nullification.® The tariff question was settled by a compromise in 1832.

Mr. Calhoun feared that the slavery quarrel would some day disrupt the Union and there¬ fore endeavored to check all discussion of this issue. He opposed Jackson's removal of the funds from the National Bank and also assailed the ((spoils system.® He supported Van Buren's <(sub-treasury system,® favored his re-election and secured for him the electoral vote of South Carolina. He defended Tyler for vetoing the recharter of the United States Bank and as Secretary of State under that President was largely instrumental in bringing about the an¬ nexation of Texas. He regretted the division of the Union into sections, but, recognizing a fact which already existed, he advocated a dual executive, one from the North, the other from the South, each having the power to veto an act approved by the other; thus preventing the passage of any law offensive to either section. His motive in this was the preservation of the Union, which he dearly loved.

He died 31 March 1850, having spent the last few months of his life in writing his dis¬ quisition on Government and his discussion on the Constitution and Government of the United States) which has been pronounced the most remarkable discussion of the rights of minorities ever written. Mr. Calhoun was of attractive personality and of irreproachable character, to which Daniel Webster testified in his grand eulogy on the great South Carolinian.

His (Collected Works) appeared 1853-54, and his correspondence, edited by Jameson, in 1900. Consult Lives by Jenkins (1851) ; Von Holst (1882) ; Benton, (Thirty Years' View) (1854) ; Dodd, Statesmen of the Old South) (New York 1911) ; Hunt, (J. C. Calhoun) (Philadelphia 1908) ; Peck. H. T., <The Jack¬ sonian Epoch5 (1906) ; Peck. H. T., c American Party Leaders5 (New York 1914) ; and Cal¬ houn's correspondence, edited by J. F. Jameson

(1900).

J. T. Derry, Author , History of Georgia.

CALHOUN, Simon Howard, American

Congregational missionary, linguist and trans¬ lator : b. Boston 1804 : d. 1876. A graduate of Williams College in 1829, from 1836 to 1874 he labored as a missionary in the Levant and Syria. An expert in Turkish and Arabic he collabo¬ rated with William Goodell on the first Turkish translation of the Bible.

CALHOUN, William James, American

diplomat : b. Pittsburgh, Pa., 5 Oct. 1848. He practised as a lawyer at Danville, Ill., from 1875 to 1898, when he removed to Chicago to become senior member of the law firm of Calhoun, Ly-ford & Sheean. In 1897 President McKinley had appointed him special commissioner to

Cuba and in 1898, member of the Interstate Commerce Commission. President Roosevelt appointed him special commissioner to Vene¬ zuela in 1905 and he served as Minister to China from 1909 to 1913. The subsequent Chinese policy of President Wilson was severely criticised by him.

CALI, ka-le', Colombia, South America, a city near the confluence of the Cali and Cauca rivers in the department of Cauca, and north of Popayan, the capital of that department. It is one of the ancient cities of the republic (founded in 1536) and to-day is important on account of its location in an agricultural district and on the Pacific Railway, from Buenaventura to Cali and thence through the Cauca Valley, a total distance of 108.1 miles. Cali is also con¬ nected by a short steam tramway with the Cauca River. Pop. 27,747.

CALICE, Count Heinrich, diplomatist,

ambassador and linguist of international fame : b. August 1831 ; d. Goerz, 28 Aug. 1912. His first activities began in the year 1857 when he was appointed consul for the Dual Monarchy at Constantinople. Later he served in Liverpool, China and Japan. In 1876, while the Serbian War was in progress, he was sent with full powers, by Count Andrassy, as the Austro-Hun¬ garian representative, to the eventful conference that ended in initiation of hostilities between Russia and Turkey. At the conference Count Ignatieff, the Russian Plenipotentiary, strongly urged armed entry into Serbia, but was resisted by Lord Salisbury, supported by Count Calice. In 1880 Baron Calice was appointed Austrian Ambassador to the Porte, — which position he held for 26 years. Notwithstanding the fact that he presented four ultimatums to Turkey, he was at all times a trusted friend of the ex-Sultan. Baron Calice was the oldest active diplomatist in Europe, and became the dean of the diplomatic corps in Constantinople.

CALICO-PRINTING, the art of produc¬ ing on calico or cotton cloth variegated patterns by the process of printing; the object, as a rule, being to have the colors composing the designs as fast as possible to washing and other in¬ fluences. It is similar to the art of dyeing, but differs from it in so far that the coloring mat¬ ters are fixed on certain parts of the fabric only, to form a pattern. Linen, wool and silk fabrics are printed in a similar manner, but less extensively. The origin of the art of printing is probably coeval with that of dyeing (q.v.). India is generally regarded as the birthplace of calico-printing, and the word

calico is derived from the name of the Indian town Calicut, where it was at one time extensively manufac¬ tured and printed. Calico-printing, as an Egyptian art, was first described by Pliny in the 1st century. Indian printed chintz calicoes were introduced into Europe by the Dutch East India Company, and the first attempts at imitating them in Europe are said to have been made in Holland, but at what exact date is uncertain. The art, however, soon spread to Germany and England, where it is said to have been intro¬ duced about 1676, two of the earliest works be¬ ing situated at Richmond on the Thames, and at Bromley Hall, Essex. In 1738 calico print¬ works were established in Scotland in the neighborhood of Glasgow, and in 1764 at Bamber Bridge, near Preston, in Lancashire. At the present time the chief seats of the calico-printing trade in Great Britain are still in the neighborhood of Glasgow and Manchester. The chief European seat of calico-printing is Mulhausen, in Germany, and it is practised in various towns in France, Austria, Russia, Swit¬ zerland, Holland and the United States.

Calico-printing is of a highly complex char¬ acter, and enlists not only the cooperation of the arts of designing, engraving, bleaching and dyeing, but also an important element of suc¬ cess, the science of chemistry.

The first operation to which the gray calico is submitted, as it comes from the loom, is that of singeing. This consists in burning off the loose downy fibres from the surface by passing the pieces rapidly, in an open and stretched con¬ dition, over red-hot plates. or a row of smoke¬ less Bunsen gas flames. The object of singe¬ ing is to obtain a smooth printing surface on the calico, thus ensuring the production of clear, sharp impressions during the printing process. The next operation is that of bleaching, which consists in boiling the fabric with weak alkaline solutions, followed by a treatment with cold dilute solutions of bleaching-powder and acid, interspersed with frequent washings with water. By these means the natural impurities of the cotton are removed, and the calico ultimately presents a snow-white appearance. A number of pieces are now stitched together, wrapped on a wooden roller, and passed through a socalled shearing machine, in which, by means of a spiral cutter similar to that in a lawn-mower, any projecting knots, loose fibres or down are finally removed. In this condition the calico is ready for the printer.

The printing of the patterns upon the cloth may be carried out in various ways, the earliest method being by means of wooden blocks, on which the figures of the patterns stood out in relief. Where several colors were employed in one pattern, a block for each color was

neces¬ sary. In a set of blocks for one pattern, each block, although at first having the same design drawn upon it, was cut in such a manner that it ultimately transferred only a single color, which appeared in different parts of the pat¬ tern. When all the blocks had been applied, the various colors printed completed the origi¬ nal design. To ensure accurate juxtaposition of the colors, each block was furnished with brass points at the corners, in order to guide the workman. The printer first furnished the face of the block with the requisite color by pressing it several times on a piece of woolen cloth suitably stretched and supported on a socalled color-sieve, and which had been previ¬ ously brushed over with color by a boy attend¬ ant. The printer then applied the block to the surface of the calico, which was stretched on a long table covered with felt, striking the back of the block with his hand or with a small mal¬ let. The operation of block printing was slow and tedious and though many improvements have been introduced, and it can even be effected by mechanical power, as in the socalled Perrotine machine, it is now only em¬ ployed to a very limited extent for certain special kinds of work. Another mode of print¬ ing, introduced about 1760, is by means of en¬ graved copper-plates, but its employment is also similarly restricted.

The modern method of printing, which dates from 1785, is effected by means of engraved copper cylinders, and this method has now practically superseded all others.

The method of engraving employed varies according to the kind of pattern to be put on the roller. In the case of very large patterns the figures are engraved by hand on the cylin¬ ders themselves with the use of the ordinary tools of the copper-plate engraver. For smaller designs, however, which are often repeated, it is usual in the first instance to engrave the pat¬ tern by hand on a very small cylinder of soft steel in intaglio, just as it will ultimately ap¬ pear on the copper. This steel cylinder, which is called a die, is then tempered to a high degree of hardness, and by means of machinery is pressed against another cylinder of soft steel, on which the pattern is thus made to

appear in relief. This last cylinder, called the mill, is then hardened, and, being pressed against the copper cylinder, the figures are indented and the roller is ready for use. In the first instance the original pattern of the designer has always to be reduced or enlarged, so as to repeat an exact number of times over the roller to be engraved. In order to reduce the amount of skilled labor one repeat only of the pattern is engraved on the die; the mill, which is of larger diameter, has two, three or four repeats ; while the num¬ ber of repeats on the circumference of the cop¬ per cylinder is still greater. A third method of engraving, which has now largely superseded the foregoing, is that of etching, in conjunction with the pantograph system of transferring the design to the copper roller. The roller, being coated uniformly with a bituminous varnish, has the pattern traced on the varnish in the pentagraph machine by a set of diamond points, and it is then submitted for a very brief period to the action of nitric acid. In the parts where the pattern has been traced the varnish is re¬ moved, there the copper is speedily attacked by the acid, and the pattern is thus etched upon it. After removing the varnish the roller is ready for printing.

The cylinder printing machine consists of a large central iron drum, around which are ar¬ ranged one or more engraved copper rollers, according to the number of colors to be printed simultaneously. Each roller is provided with the means of making several adjustments, in order to determine the exact position of the color which it prints. The central drum is wrapped with cloth, and it is further provided with an endless blanket and back-cloth, so as to present a yielding surface to the printing rollers. The cloth to be printed passes from a roll behind the machine, round the central drum in a tightly stretched condition, while the sev¬ eral printing rollers press forcibly against it. Each roller, as it revolves, is fed with color from a small trough below, the superfluous color being scraped off the plain surface of the roller by means of a sharp-edged steel blade, or (<doc-tor,® thus leaving the color only in the en¬ graved portions. As the rollers thus charged with color press against the cloth, the latter absorbs or withdraws the color from the en¬ graving, and the pattern is thus transferred to the calico. By this machine as much work can be performed in three minutes as could be done by block-printing in six hours. After the cloth has received the impression from the rollers

it passes over a series of steam-heated flat irons, chests or cylinders, and is thus dried.

In close connection with the printing-machine department is the socalled color-house or color-shop, where the solutions of coloring matters are suitably thickened and made ready for the printer. The color-house is provided with numerous steam-heated cop¬ per pans, so arranged on supports that they can be readily turned over for emptying or clean¬ ing. The color mixtures are stirred with wooden blades by hand, or by mechanical agita¬ tors, and carefully strained through cloth be¬ fore use. The thickening of the color solutions with starch, flour, gum, dextrine, albumen, etc., is necessary to prevent the spreading of the color by capillary attraction beyond the printed parts, and thus ensure sharp and neat impres¬ sions. Near the color-house is a chemical laboratory, and a drug room containing the store of coloring matters, dyewood, extracts, thickenings, chemicals, *etc.*

The various classes or styles of calico-prints are usually arranged either according to the chief dyestuffs employed or their mode of ap¬ plication. Each of these primary styles may be further separated into subdivisions, of which the most important are the discharge and resist styles, which refer to the manner in which the pattern is produced. The following include the chief styles of calico-prints at present in vogue:

Madder Style. — This is so named because the chief dyestuff formerly employed in it was madder. This dyestuff belongs to the class of socalled mordant-colors. Such dyestuffs are worthless if employed alone by the calico-printer and only furnish useful colors if applied in conjunction with certain metallic salts or mordants, of which the chief ones here em¬ ployed are the acetates of aluminum and iron. At first the pattern is printed on the white calico with these or similar mordants alone, and only after they have been suitably fixed is the madder or other similar coloring matter ap¬ plied in the dye-bath, where for the first time the desired colored pattern appears. The aluminum mordant yields red and pink, iron yields purple or black, a mixture of iron and aluminum yields chocolate, *etc.* The fixing of the mordant after printing and drying is effected by passing* the printed calico through the socalled ageing-machine, a large chamber suitably heated and charged with moisture, where the acetic acid of the printed mordants is driven off, leaving the aluminum salt in an in¬ soluble form on the calico. A more complete fixing of the mordant is subsequently effected by passing the fabric through solutions con¬ taining silicate or arseniate of soda, and a final washing completes its preparation for dyeing. The dyeing operation consists in boiling the fabric in a solution or decoction of the requisite dyestuff. After dyeing, the stained unprinted portions are cleaned and purified, while the printed colors are rendered more brilliant by washing, soaping,

coloring, *etc.* Variety ofi effect is produced by printing the same fabric two or three times (print, cover, pad) with various designs before proceeding to the age¬ ing, *etc.* If in the first instance a portion of the pattern is printed with lime-juice (citric acid), it resists or prevents the fixing of the mordants applied over it in the second and third printings, and the part remains undyed and ap-CALICO-PRINTING

pears as a socalled resist white. In a simi¬ lar manner stannous chloride, mixed with aluminum acetate before printing, resists the fixing of iron mordants printed over the alumi¬ num mordant, and a resist red pattern under a purple cover is obtained, presuming madder to be the dyestuff employed. Alizarin now re¬ places the madder formerly used, and similar variegated effects are obtained if other mordant dyestuffs are employed, for example, cochineal, quercitron bark, *etc.* Formerly a preparation of madder, termed garancine, was largely em¬ ployed, and gave rise to the garancine style, in which the colors were fuller and darker, the prevailing hues being browns, chocolates, drabs, *etc.* Since the range of colors yielded in the madder style is limited, additional colors, as green, blue or yellow, may be printed in by block after dyeing, etc., and are fixed by steam¬ ing. If the whole fabric is evenly impregnated with mordant by means of a ˆpadding-machine® and dried, and then a pattern is printed over the mordant with lime-juice, the mordant is re¬ moved or discharged in the printed parts, and remains white in the subsequent dyeing. Such a print would be termed a padded style with dis¬ charge white.

Steam Style. — Many coloring matters, dif¬ fering from each other widely in character, are fixed by the operation of steaming instead of by dyeing, so that this style is somewhat varied in character. Ordinary steam-colors consist of a thickened mixture of dyewood extract and mordant, with the addition of assistant metallic salts and acids. The mixture is printed upon the white calico, which, after drying, is exposed from a half to one hour in closed chambers to the action of steam. This steaming operation effects the combination of the coloring matter and mordant, and the color is thus developed and at the same time fixed upon the calico. Black is produced with logwood extract and chromium acetate, scarlet is produced with coch¬ ineal extract and stannous chloride. The prints are washed and dried after steaming, the colors being usually bright, but not very fast. Steam-

colors, fast to light and soap, are obtained in a similar manner by printing mixtures of alizarin and allied coloring matters with mordants, and then steaming. These are used in the socalled madder extract or steam alizarin style, in which red, pink, purple, etc., appear. In the pigment style use is made of pigments, or insoluble colored mineral powders as ultramarine-blue, chrome yellow, Guignet's green, *etc.* These are mixed with a solution of egg or blood albumen, printed and steamed. The albumen coagulates on steaming, and thus adheres firmly to the cloth, at the same time enclosing the pigments within the coagulum. Such colors are fast to light and soap, and may therefore be printed simultaneously with the steam alizarin colors for the production of variegated fast prints. Another class of colors are the socalled basic colors, as magenta, aniline blue, *etc.* Their so¬ lutions may also be thickened with albumen, printed and steamed, to give fast steam-colors. It is more usual, however, to print a mixture of the thickened color solution and tannic acid, and to pass the steamed print through a boiling solution of tartar emetic. By this means an in¬ soluble color-lake (tannate of antimony and color-base) is fixed on the calico, which is fast to soaping but not to light. Basic colors ap¬

plied in this manner are now usually printed along with the steam alizarin colors, instead of pigments, thickened with albumen, and variegated fast prints are thus obtained. Loose pigment colors are basic colors thickened with starch or gum tragacanth only, and then steamed. Such prints do not even stand wash¬ ing with cold water.

Turkey-red Style. — In this style use is made of the fact that turkey red is at once bleached by the action of chlorine. Plain dyed turkey-red calico is printed with tartaric acid, dried and passed through a solution of bleaching-powder. In the printed parts chlorine gas is evolved, the red is destroyed and a white dis¬ charge pattern is produced. A blue pattern re¬ sults if Prussian blue is added to the printing mixture ; yellow is obtained if a lead salt is added, and the fabric is afterward passed through bichromate of potash solution, where¬ by yellow chromate of lead is produced; green results from a mixture of the blue and yellow; black is printed direct. These and other dis¬ charge colors may also be obtained by other methods.

Indigo Style. — Of the numerous indigo styles in use it is only possible to refer to one or two of the most important. Indigo blue pat¬ terns on a white ground are obtained by print¬ ing a thickened mixture of finely-ground indigo and caustic soda on white calico, previously im¬ pregnated with glucose. A subsequent steaming reduces the indigo to

indigo white, and causes it to penetrate the fibre, while a final washing oxidizes, regenerates and fixes the color. A resist white pattern on a blue ground is ob¬ tained by first printing upon white calico a re¬ sist paste composed of gum or flour, China clay, sulphate of copper, *etc.* When the printed calico is dyed in the indigo vat the paste resists the entrance of the color, partly in a mechanical and partly in a chemical manner, hence the blue is only fixed in those parts which are unpro¬ tected by the paste, after the removal of which by washing, the white pattern appears. Vari¬ ous resist colors, as yellow, green, etc., are ob¬ tained by the addition of different chemicals to the paste and altering the after-processes. A discharge white pattern on a blue ground is ob¬ tained by printing on plain indigo-blue dyed calico a solution of bichromate of potash thick¬ ened with gum, and then passing the _ fabric through a solution containing sulphuric and oxalic acids. During this passage there is liberated, in the printed parts only, chromic acid, which at once oxidizes and destroys the blue, producing the desired white pattern. Colored discharge patterns are produced simi¬ larly by employing albumen thickening instead of gum thickening, and adding to the printing mixture such pigments as are not affected by acids, for example, vermilion, chrome yellow, Guignet's green, *etc.*

This method is now being superseded by the Freiberger process, a simpler and more pro¬ ductive way of discharging, the reagents used being either chromic acid, sodium chlorate or, in some cases, bromate and, still more recently, nitrates. This latter method passes the cotton fabric imprinted with nitrate discharging color through hot and concentrated sulphuric acid and, by accurate control of the strength, tem¬ perature and time exposed, not only preserves the fabric in undiminished strength but obtains

the most accurate and permanent discharge effects.

Bronze Style. — Manganese brown ♦ or bronze is decolorized by reducing agents ; hence white discharge patterns on a bronze ground are obtained by printing plain manganese-brown- dyed calico with a

mixture of stannous chloride and oxalic acid, and then steaming. Colored discharge patterns are obtained if coloring mat¬ ters are added to the printing mixture which are not affected by reducinr-agents, or which even require stannous chloride as a mordant to de¬ velop the color as Prussian blue, chrome yel¬ low, Persian-berry yellow, Brazil-wood pink, safranine, acridine orange, *etc.*

Aniline Black Style. — Aniline black being a product of the oxidation of aniline, patterns in this color on a white ground are obtained by printing a thickened solution of aniline hydro¬ chloride containing the oxidizing agent, sodium chlorate, and a salt of copper or vanadium. When the printed fabric is slightly Steamed or exposed to a moist, warm atmosphere, the im¬ pression, which is at first devoid of color, grad¬ ually becomes dark green, and this by a final treatment with an alkaline solution, soap, etc., changes at once to a rich black. The color is extremely fast to light, alkalis, acids, etc., and it is largely employed by the printer, both alone and in conjunction with dyed or steam colors. The development of the black during the age¬ ing or oxidizing process occurs only in the pres¬ ence of a mineral acid, hence resist whites are obtained by first printing the design on the white calico with thickened solutions of sub¬ stances of an alkaline or reducing character or salts of organic acids, as acetate of soda, and then printing or padding over all with the ani¬ line black mixture, ageing, steaming, *etc.* Where the design is printed the alkalinity entirely pre¬ vents the development of the black. Pigment colors thickened with albumen, also certain benzidine colors, containing an admixture of chalk, acetate of soda, etc., are largely em¬ ployed in this manner. These resist colors may also be printed immediately after the ap¬ plication of the aniline black mixture, before the development of the color by ageing.

Azo Color Style. — The socalled insoluble azo colors result from the interaction of an azo compound and a phenol. Two methods of printing based upon this principle are employed. One method is to print the design with a thick¬ ened solution of /3-naphthol on the white calico, and then pass the fabric through a very cold solution of the azo compound (developing-bath), when the design at once appears in a color corresponding to the azo compound em¬ ployed. Another method is to print the design with a thickened solution of the azo compound upon calico which has been previously impreg¬ nated with a solution of sodium-naphthol and dried ; in this case the color of the design is de¬ veloped in the moment of impression. The necessary azo compounds are obtained by the action of nitrous acid, on salts of amido sub¬ stances for example, paranitraniline, naphthy-lamine nitrotoluidine, dianisidine, etc., each of which yields a distinct color,

bright red, claret red, orange, blue, *etc.* The naphthol-prepared cloth and also the azo compounds are somewhat unstable, so that this style is not successfully printed without considerable care. The in¬ soluble azo colors, also the direct or benzidine

colors, are capable of furnishing discharge pat¬ terns, since, in common with the azo colors gen¬ erally, they are readily decomposed and destroyed by reducing-agents. It suffices to print calico dyed with these colors, as benzopur-purine, chrysophenine, benzoazurine, Mikado brown, etc., with a mixture containing stannous acetate, zinc powder, or other similar reducing-agent, and then steam the printed fabric, to ob¬ tain white discharge patterns. If there be added to the printing mixture such mordants and coloring matters as are not affected by reduc¬ ing-agents, for example, safranine, auramine, etc., a variety of colored discharges are ob¬ tained, exactly as in the bronze style. Many of the benzidine colors may also be printed direct on white calico to furnish color designs, but such prints are not particularly fast to washing.

A newer method of printing on cloth by a lithographic process has recently been invented. The principle involved is printing lithographically upon the fabric with lithographic, or oil, colors and dispensing with the practice of fixing the colors after printing, which is essential when aniline or allied colors are used. The actual process is continuous, as in ordinary calico printing, but instead of ordinary copper rollers being used for impress¬ ing the pattern the effects are obtained by the use of continuous metal plates, or tubes, upon which the designs are transferred directly in the manner employed in ordinary lithographic printing on paper. It is said to cheapen pro¬ duction greatly, for as soon as an order is com¬ pleted of one design, the rollers may be cleaned and fresh patterns immediately transferred.

Bibliography. — Blackwood, William, Cali¬ co Engraving) (London 1913) ; Stiitz, Ernest, in the (Journal of the Franklin Institute) (Janu¬ ary 1914).

CALIFORNIA, principal Pacific Coast State of United States (No. 31 in order of ad¬ mission), bounded north by Oregon, south by Mexico (Lower California), east by Nevada and Arizona, west by Pacific Ocean. Extreme length about 800 miles, coast line 1,097 miles, greatest width about 270 miles. Area (No. 2 in United States), 158,360 square miles (2,380 water). Pop. (1910) (No. 21 in United States) 2,377,549, an increase of 892,496 (60.1 per cent) since the census of

1900. Pop. (1920) 3,426,861, an increase of 1,049,312 (44.1 per cent) in 10 years.

Topography and Climate. — Its peculiar

shape, determined less by political than by nat¬ ural delimitations, gives California a character unique among the States, climatically and eco¬ nomically. It has a range of climate all its own, and its boundaries include all the climates in North America. It is longest of the States; and, in proportion to its length, narrowest. It corresponds with an area which upon the At¬ lantic seaboard should run as far inland as does South Carolina, and as long coastwise as from Charleston to Boston. This in itself gives large range of climate by latitudes ; but its to¬ pography and its colimitations greatly increase this range. Its peculiar projection or <(leaning out0 upon the Pacific; its enormous coast line (somewhat less than one-fifth total coastline of the United States) ; and particularly its <(exposure® to the west and south upon this great

CALIFORNIA.

Estimated population, 3,119,412

Pop.

246.131 309

9,086

27,301

9.171 7,732

31,674

2,417

7,492

‘.5,657

7.172 33,857 13,591

6,974

37,715

16,230

5,526

4,802

504.131 8,368

25,114

3,956

23,929

15,148

6,191

2,042

24,146

19,800

34.955

27,732

808

5,021

916

402 2,628 1,124

696

1,121

2.376

1,477

16,874

481

2,360

57,653

403 1,190 2,372

507

544

881

1,565 797 751 3,750 1,444 1,114 823 4.199 621 3,980 1.582 922 703 666 972 3,540 1,477 1,652 1,114 970 827 214

Alameda . F 4

Alpine . . E

Amador . E

Butte . D

Calaveras . E

Colusa . D

Contra Costa . . F

Del Norte . B

Eldorado . E

COUNTIES Pop.

14,436 18,237 5,259 34,696 67,806 8,041 56,706 61,665 416,912

Orange . J

Placer . E

Plumas . C

Riverside . J

Sacramento . E

San Bˆiito . G

San Bernardino … H 9

San Diego . J 9

San Francisco …. C 7

Fresno .

.G 6

50,731 San Joaquin .

. .F 4

Glenn .

D 3

19,383 San Luis Obispo .

. H 5

Humboldt .

C 2

26,585 San Mateo .

Imperial .

J 10

27,738 Santa Barbara .. .

. .1 5

Inyo .

.G 8

83,539 Santa Clara .

. .F 4

Kern .

.H 7

26,140 Santa Cruz .

. .F 3

Kings .

. H 6

18,920 Shasta .

. .C 3

Lake .

D 3

4,098 Sierra .

D 5

Lassen .

.C 5

18,801 Siskiyou .

. B 3

Los Angeles ….

. .1 7

27,559 Solano .

. .E 4

Madera .

.F 6

48,394 Sonoma .

. .E 3

Marin .

.E 3

22,522 Stanislaus .

. ,F 5

Mariposa .

F 6

6,328 Sutter .

. .D 4

Mendocino .

. D 2

11,401 Tehama .

. .C 3

Merced .

.F 5

3,301 Trinity .

. C 2

Modoc .

B 5

35,440 Tulare .

. .G 7

Mono .

9,979 Tuolumne .

,.E6

Monterey .

.G 4

18,347 Ventura .

.16

Napa .

E 3

13,926 Yolo .

Nevada .

D 5

10,042 Yuba .

. D 4

Incorporated Cities and Towns

Alameda .

.F 3

679 Hermosa Beach,

Los

Albany, Alameda.

. .F 4

Angeles .

Alhambra .

2,308 Hollister .

. .G 4

Alturas .

.B 5

1729 Holt ville .

.K 10

Alviso .

. D 9

f. 1 60 Hornitos, Mariposa F 6

Anaheim .

. J 8

815 H untington B each ,

Antioch .

Orange .

. J 8

Arcadia, Los Angeles

1,299 Huntington Park. .J 7

I 7

1,257 Imperial .

.K 10

Areata .

.C 1

1,536 Inglewood .

. . J 7

Auburn .

.E 4

2,035 Jackson .

. .E 6

Azusa .

. .1 8

634 Kingsburg .

. G 3

Bakersfield .

..I 8

70 Lakeport .

. D 3

Belvedere .

.F 3

594 Larkspur, Marin

. .E 6

Benicia .

.E 3

1,000 Lemoore .

. .G 4

Berkeley .

.C 8

1,402 Lincoln .

. .E 7

Biggs .

D 4

1,814 Lindsay .

. .G 4

Bishop .

.F 7

2,030 Livermore .

. .F 4

Black Diamond . .

,.F 4

2,697 Lodi .

. .E 5

Blue Lake .

.02

1,482 Lompoc … .

.15

Boulder Creek…

. .F 3

44,865 Long Beach .

. .J 7

Brawley, Imperial

954 Lordsburg .

…18

J 10

503,812 Los Angeles… .

17

Burlingame .

F 3

745 Los Banos .

. G 5

Calexico, Imperial. J 10

2,232 Los Gatos .

. .F 3

Calistoga .

.E 3

983 Loyalton, Sierra

. ,D 5

Chico .

.D 4

2,404 Madera .

Chino .

. .1 3

2,115 Martinez .

. .F 3

Claremont .

. .1 8

5,430 Marysville .

Cloverdale .

.E 2

1,041 Mayfield .

Coalinga .

.H 5

3,102 Merced .

. .F 5

Colfax .

.D 5

2,551 Mill Valley .

Colton .

. .J 8

4,034 Modesto .

■ -F 4

Colusa . D

Compton . J

Concord . F

Coram, Shasta… .C

Corning . D

Corona . J

Coronado . . , . K

Covina . 18

Crescent City . B 1

Dinuba . G 6

Dixon . E 4

.B 3

3,576 274 4,923 607 1,161 5,791 1,733 2,689 892 445 1 035 198,604

Monrovia . I 8

Montague . -B 3

Monterey . G 4

Morgan Hill . F 4

Mountain View… . F 4

Napa . E

National City . K

Nevada City . . D

Newman . F

Newport Beach … J

Oakdale . F

Oakland . F

1,719

Dunsmulr .

. B 3

3,119 Ocean Park .

. . J

1,661

East San Jose,

673 Oceanside .

J

Santa Clara…

. .F 4

4,274 Ontario .

. .1

1,610

El Centro .

. K 10

2,920 Orange .

488

Elsinore .

. .J 8

836 Orland .

D

2,613

Emeryville,

3,859 Oroville .

. .D

Alameda .

. ,C 9

2,555 Oxnard .

F

1,334

Escondido .

. ..J 8

2,384 Pacific Grove … .

. G

518

Etna .

. .B 2

4,486 Palo Alto .

. P

14,684

Eureka .

. .C 1

46,450 Pasadena .

T

834

Fairfield .

1,441 Paso Robles… .

. .H

905

Ferndale .

..Cl

5,880 Petaluma .

. .E

2,408

Fort Bragg .

. .D 2

1,719 Piedmont .

F

316

Fort Jones .

. .B 3

798 Pinole .

P

883

Fortuna, Humboldt

1,914 Placerville .

. . E

C 2

1,254 Pleasanton .

. ,F

675

Fowler, Fresno..

. . G 6

497 Point Arena ….

. .E

34,958

Fresno .

13,150 Pomona .

.1

1,725

Fullerton .

. . J 7

2,696 Porterville .

. .G

2,437

Gilroy .

. .G 4

576 Potter Valley, Men-

2,746

Glendale .

. I 7

docino .

4,520

Grass Valley ….

. ,D 5

3,530 Red Bluff .

987

Gridley .

. .D 4

3,572 Redding .

,()

4,829

Hanford .

. G 6

14,000 Redlands .

. . 1

2,746

Hayward .

.C 10

2,935 Redondo Beach.

…J

2,011

Healdsburg .

. ,E 3

2,442 Redwood City .. .

. ,F

992

Hemet .

. .J 9

6,802 Richmond .

. . F

279

Hercules, Contra

884 Rio Vista .

E

Costa .

. . F 4

19,763 Riverside .

.1

1,026 Rocklin, Placer.

. .E

INCORPORATED CITIES. ETC. — Continued

Pop.

2,608

Roseville .

. E‘4

556

Ross .

F 4

66,895

Sacramento .

1,603

St. Helena .

.E 3

3,736

Salinas .

G 4

1,531

San Anselmo ….

..F 3

16,945

San Bernardino . .

.18

53,330

San Diego .

. K 8

463,516 San Francisco. .

. F 3

898

San Jacinto .

. .J 8

38,902

San Jose .

.F 4

326

San Juan .

. G 4

3,471

San Leandro ….

. .F 3

5,157

San Luis Obispo.

H 5

4,384

San Mateo .

. F 3

5,934

San Rafael .

.F 3

10,627

Santa Ana .

. .J 8

14,846

Santa Barbara …

..16

4,348

Santa Clara .

. .F 4

14,594

Santa Cruz .

G 3

2,260

Santa Maria .

..15

7,847

Santa Monica ….

. ,J 7

2,216

Santa Paula .

…16

7,817

Santa Rosa .

.E 3

2,383

Sausallto .

F 3

2,143

Sawtelle .

T 7

1,233

Sebastopol .

. E 3

1,750

Selma .

1,303

Sierra Madre ….

..17

636

Sisson .

B 3

Pop.

957 Sonoma . E 3

2,029 Sonora . F5

4,649 South Pasadena … I 7 1,989 South San Francisco

F 3

35,358 Stockton . F 4

641 Suisun City . E 4

688 Susan ville . C 5

385 Tehachapi . H 7

221 Tehama . C 3

2,758 Tulare . G 6

1,573 Turlock . ,…F5

2,136 Ukiah . D 2

2,384 Upland . 18

1,177 Vacaville . E 3

13,461 Vallejo . A 9

2,945 Ventura . 16

772 Vernon, Los Angeles

I 7

4,550 Visalia . G6

4,446 Watsonville . G4

1,922 Watts . J 7

481 Wheatland . E4

4,550 Whittier . J8

1,153 Wlllits . D 2

1,139 Willow . D 3

910 Winters . E 3

3,187 Woodland . E4

1,134 Yreka . B 3

1.160 Yuba City . D 4

Diamond

PhuWlHe

«t(id o

Oj

i.J,’) *‘0 .<,’”^4

Yolo\J Jl

‘%ou31,nˆMu,len IW\ ? O IMemtt* vAˆ‘48ˆ

lElr

tV’cTˆˆX. iˆT rehiont OXi ˆ

Simmer

Xake

1 Litton \

Myn

˚0Tope Tafim -Calistoga V—ˆ

v A. Maple jluau’ii

. St. Helena

®Kr(

MfLake -

v. i

Hstmas m

||l7p].per

H’: /ivlamatfc

rw\w EsA1ˆ

a. \vVM’ . A\ dc. nc tena ; ,- _ a 1

vXzin.audel^"^Jfj NXX : • \Rutherfor4 ^v\^ LoAoakville^/,^.a^ X Yount vi lT^W- \ sVistaW*. • v0ak.Kn9;n^ SonomM u Buena Q^^b/lfy 01?„ .*U Vise a otI k8helItiUg3^*>. Thorn pren

ViWi

»VmA Jb«r.bSJ^£li'<>-S.

JSCOW • ty. \J.

KenilworflipfnG Traestoiie^^ V 8eba3topol\ /Bodega Koad* \ A Valley Ford J> - r/^[arh^ dummlt

T)ixon

WcLaugnlw

riotet

^/KBatavia y ^^Eluiira JyjSpT?4/* Cannon L

* "'waiLvanden

B/Fairfiel<l

^SJuiBun City

oBenverton,

, OlX$.A N O 'Good Rio \ i*Ui

—^EV^^oBVrds Ldg.y

Union House

i»S&A"aSi4Bl

ATS .”■•’”•Xs. o :v

Franlclin ˆ ˆVˆftlchland. ˆPCourtlnNuV’

Scero j »• Jack#*

\Jiy PHttfe Sflajta ‘ • yMontagiLe/C-‘fe -/A lOrelJr q\(‘■ ‘% Linda
>■<•>< 00,/

iForcat Lake l,Acampo

TomailaPet?,arai iflamletY J*.

y ATarshalX”ˆ*ˆ AˆyMillorton Xˆ\Point Reyes

Foirpo]

.Rani/h

tJBidwell

•Alkali

‘yfUarXake Lake Cornell Davis Cr% ©Straw Lak

1 PoAe8° ˆVoodbtVdˆj Bouldin Yv ! V Id. CtXstlej

ilˆrM-Iebijon

?losden

L Valle i

‘^T^Vjgeel an 1 a t ioii\i

^yVe\ Oro Fiho - K, I .EtnaMillnO

firiednsJS^011^8 ^ar \s^yer8^ 7*7 ^%Lforks Salmon ^C0

. ‘ ^ °Jilack Beajillti ^ /r ‘

”Z^iSs

_\AbrtT?ns A i?rancl«”fe,A\ ,.Ca7^

JHattcs’-^arv‘llec?

1 tu

M w\aK Lake a‘n5,, Klagle.m. QA(lin k Likely

1 Gar ci a

XvAo’Aˆcuv iˆon > coras

$&&•%, r .v°5

\V.i0va’Cr.INyr,on A

te-vC O N V L R.ˆ ABerTreley bAlam&’ <

llEmoryxil’eˆ” X: j

“/(> ». Qs NVX < n\ ‘if

J r-1 r°*

U © ˆ‘■ˆ• < r\ˆreoa’ \dlrig CT.atlirop ACometa\ j

gy ‘\M0rxan9jt’ \ ˆ \

J ˆ VHuollA

ˆ Aoi«.

5o\viV oOe8ti > & y?

c»’»\

AVest’eyVA N V

jMMS

giffl

jteˆvSrtXy. if vˆ,bJ ohBreuiwo’od

Bolinhz

mEw

CiiUiJj ldK

W“‘fk!F$

j ‘• ThStrˆb

Lˆˆˆˆˆ^pXlt’s < £ro‘Cav7ii } I t/ > ‘Vr ea! >

* Sage Hen Madeline

Jilebtr.

SgKSims

5MSlatonla\ˆAXˆLˆ*～ˆ IˆDelta ˆ(-tl««a > Carljoj 5jS„i.b.of , iw« •

Termo

* Karlo A

SusanvXlUe

mm

■rings/

ip StjfiiM

ˆedbluffˆAˆsoˆ

/M;1ˆ JeiiamaAjoSpˆ flieadot

Maltcmytfl J VAntta /$} | Wile’- Orland

(ˆGreenwood I D’ J

5,\Puri8Bainaˆ

Harris 0

Xc«ftl ˆMf.Cojslo

I u%imag a ‘c,o7X’i!

H())| InglenooW ‘•)\> °0 Cleone \ \ 0.

-JNewman

3hit Chat \utnae Jo. Jurdys

La Honda

II /?l5alKa<tsˆ1ir!*“lir rpE

OrovUj/M.fsrBo.wm’&fill!

6»ˆws» v.»d«!

1

BonIder*p» ˆ .» v

Xsˆu° >,

. J V .

>New xˆp* . AlmadenX vY right a Morgan •Laurel flju C

Mafqfffi

=Xinora

? o

(f6ˆrace

■>uparQ l

i ˆlpel’laj

0 bWendliug Vj o El Rohleo

Carson

SLake

Virginia C J,

undocinql

IMmI?

£v oitXvJ ‘ Xos _Ba(.os

dJusa * oa Cyl

Ct-lusa !1»

flUttg

s cdk5i«ii«‘rroy »»» A,b\l/r5r3?v‘iUe’Nk58

MbWbJiolA. a x .

ˆ Statute Miles, 2S— * L

igAlandO’ VPr* • ˆ

iMinaen ˆl

lralley

Vqjdxfords

’ ilker

Thorne:

It. ‘Helˆ

Jioeia

\napa

X Hiiwtlion

ov°’ 7T~£.,-＞’., nv.-Y

San AD’lrSu / V

Eˆy?© v* ＜TMuri*yfr _ ..™//.l.,

X v-v

. ? V TU/fLUMˆE

» [yklmir4 5 JO L A N O. v/FaiiTield ‘

‘Suisun City j

IVIONTE CRISTO

Fountains

lariat_.

‘iiaiella

P.artJif-r’enfral-CiiHl’oruia.

‘Tonopah

r^-^Tuoiuml

Sonora! X

WiQspi’M

^jjl’PARKl—

ISPS

j o A

.athrop)

ni anrf?

CHetchy

MARIPOSaX-3

Merced Fulls »* I Grant ^ Springs’

jntou’

rTvˆwliu-r/iiit l!aXtˆu ˆ WoterloSˆHa

XˆMjjutpeliVi

y/L’T’cuTioi] ”Coroegie 1 ALAMEOaI

Goldfield X Black .

•ilHIainmil

oOakhj

t’Zebm

ˆAthloneUvX’

IxaligYv. V

‘ebaugnhX

pNIendotai

I n d epe u d < ˆit ˆ ©

7 LssLA.

GoSzalfs ,\i’Xfs 5v So ledaaf-Xˆ s

Lone Pine // XSwTinflea Keeler \mf Owens Lake, \01ancha

i ^^^Manse ˆMˆPeak

\XLfWtV

.[sKurthˆXcoy

ˆP-oplarlZX!?”‘11®

Ail BTerrn ItuTTT:

icor _

ˆVYhileHv

isperanza;

j

ISaˆMiguˆ [

w°p«|

}Evkt %\ fs

QsSteelee X

“‘ &67entm

Brow

Troha.

Sperry’

Woody

C.I ’■’ hr i,

JWeldnnk-.-? W0-0 Heviilahˆ.

leld ˆ X

‘Sfefl

Rade/uiacher

ˆWBERRV

‘JVLOUNCAINS

‘erdeoMfˆral

Alulhollsnd

ˆMjfuadathpˆY”

\X tak \w

\S A N Irvingtonˆ

, B E R tsLXA

Jcntlan(

Broadvell]

i/EbTr-U.RA I.

Oro Grande i

Cotto mood ˆ ˆ

ecˆvAVe %k\

S’ CtAˆ Co voP ledlarog

Eli

OvHalrold ,

A nagie l e s:

yS’-KyS £* Palmdale f

fivotoitari-/*

PSnntu Mooicoˆy Sv SluusoniT”T l[%wci < .dˆKrfencd

Sctps

WF‘°”°

RW’ter,

‘*wr*-yTj). Thoourd J

?*«*

ˆi»er»jde—

Beaumont” iBar Box 8pringa Alee9ftndrˆ(

Kilbeck

t}W7/y’ArlChaI)l > A ‘

cCv’ˆ°*10%Vb

\ ILorona ‘XT

ˆ)oTeme8cdl V

#, 1 V ERl

Pemˆ

[Randolph v

X Arica VidaL’v*

Blytlie

ˆ4 LunkersliTin

ˆy_Los?A»igel<

SaoJacintop ‘d ,v JJemeM \ V

Winlcbester’

.lslnore Jo. I

ˆ■‘tnVildomar |

tfiVMurrietta

Temecu|a Aguanka

°ArlingMon j

j® AniiSˆ‘Xris

Pu«U_ AlbcrhillˆQ V GEl8inj»re>

[Rlsinoiie R [“3c.

XMurnetta

ˆlythe.

YˆfSaˆJiian ‘IbLui’Rg. _

#XXs| PalllfrookStaˆˆahˆ lauiOuufrlXv J>« Lux / -X . ,;sˆ

Brook *

Xv. pDe Lur MOce®^’

*Santa Ysabel lacondldo v/

^ <£an paagual ^

tNellie

10 -n

Yfe tinoreiand-

tlmperial

omtiecr

. oimpenai AeL»˚MBra > ley

Cemi. Kearny

c*”

ˆXˆiiuliura* V Ban V sidro °|

kaS0˚BValley Center \ MU cl land q Vineyard ˆ

vSs.oonaiao4-1/,”1™ˆ

SutherlanC ltamona /

‘QcVausul

scopdidoy.

ˆLa’C;

Holt y ill*

:i Centro

Silsbec

Calexico

Gaxclo’

Poway

niao 0 Stowe ILakesideXˆj 8ant - eˆ-

CALIFORNIA

KlC«on n,tˆO

ˆra

SCALE

Statate Miles, 6f» — 1 Ineh.

Statute Miles. 34 — = 1 Inch.

Band McNally’s New 11 x 14 Map of California Copyright by Rand McNally k Co*

CALIFORNIA

equalizer ; its contact on the east with the “Great American Desert® ; its huge mountain systems ; and its orographic protection against the north, are all vital factors in determining its atmos¬ pheric temperament. While the Atlantic sea¬ board is made humid by the warm Gulf Stream, and is open to the north (its mountains being scattered, low and well inland), California is screened from the Arctic air-currents by a vast Alpine range, almost unbroken in its whole length and with its lowest passes 50 per cent higher than the highest peak east of Colorado. The State has 120 peaks exceeding 8,000 feet, 41 exceeding 10,000 feet and 11 exceeding 13,000 feet. From its northern boundary down to Point Conception, California is washed by the cold Kuro Siwo, or Japan current, swinging back from the Arctic; and the exposure is largely westerly. From this point southward the exposure is more southerly, the Japan cur¬ rent is deflected far off-shore, and the coast is sheltered by a long line of islands. Tempered on one side by an equable ocean, on the other by 1,000 miles of arid lands, the climate of Cal¬ ifornia is still further differentiated by its mountain systems. Roughly speaking, it is all ‘hinder wall.® Two huge cordilleras, inosculat¬ ing at the north and south, form an almost com¬ plete circumvallation of the great agricultural region ; while to the south, though the ranges are much broken down, there is something like a repetition of this pattern, on a much smaller scale ; the whole forming something like an inverted figure 8. In their major loop, these ranges enclose one great central valley, practi¬ cally level, of 18,000 square miles, — or about the aggregate area of Massachusetts, New Jer¬ sey and Delaware, — -screening it from the Arc¬ tic, and filtering the winds from sea and desert. This great rampart is broken down only at the Golden Gate, through which, in a mile-wide pas¬ sage, the drainage of this enormous watershed reaches the sea. In their imperfect minor loop, there is a broken congeries of valleys aggregat¬ ing an almost equal area, sheltered from the desert, but as a rule open southerly toward the here warmer sea. To the east of the main wall lies a large but almost uninhabited area, strictly desert, and part of the great interior wastes. The inclination of the State to the west, and its consequent southern exposure, is indicated by the fact that despite its narrowness the ex¬ tremes are three-fourths as far apart in longi¬ tude as in latitude. The southeast corner or San Bernardino County is nearly 500 miles more easterly than False Cape; while from Ore¬ gon to the Mexican line the north and south

distance is about 655 miles.

The Coast Range, altitude 2,000 to 8,000 feet, rather closely follows the coast line from Ore¬ gon to Point Conception ; south of which topo¬ graphic hinge it so breaks down as to be relatively unimportant. The Sierra Nevada proximately following the east line of the State, at an average distance of 50 to 100 miles there¬ from, is “the largest and most interesting chain of mountains in the United States® (J. _D. Whitney). Really part of the gigantic spine which extends from Lower California to Alaska, this range in California is 600 miles long and 75 to 100 miles wide — its base cover¬ ing four times the area of Massachusetts. The snow-line averages about 30 miles wide. Its surpassing peak (Mount Whitney, highest in

the United States) is 14,522 feet (Langley). Its passes average 11,000 feet, the lowest being 9,000 feet, and the most used (Kearsarge) 12,000 feet. The western slope is gradual, aver¬ aging about 100 feet to the mile; its eastern slope 10 times as rapid, being by far the steepest general gradient in North America. At many points the fall is 10,000 feet in 10 miles; and from the highest peak in the United States one looks down nearly 15,000 feet into Death Valley, some 200 feet below sea-level. This vast gran¬ itic range is the most remarkable register of glacial action on the continent. Decapitated by “perhaps a vertical mile® (Muir) it is still the most Alpine cordillera in North America. It holds 1,500 glacial lakes — the lake line being at about 8,000 feet. Of small residual glaciers, Muir has counted 65 between 36° 30” and 39°. Its Yosemites (including the famous one socalled, the Hetch-Hetchy, and minor ones) are noted among geologists as well as travelers ■ — well-like valleys gouged deep in the granite by glaciers, and of scenery nowhere surpassed. The highest water-fall in the world (the’ Pioneer, 3,270 feet) is in this region. Upon the huge moraines left by that continental incubus of ice grow the noblest coniferous forests in the world — -greatest in variety of species, in density of merchantable lumber and in size, age and beauty of trees. These forests cover 44,700 square miles (a larger area than the entire States of New Hampshire, Vermont, Massachusetts, Con¬ necticut, Rhode Island, Delaware and Mary¬ land together). California is fifth in area of forests and second in stand of lumber (200,- 000,000,000 feet, exceeded only by Oregon with 225,000,000,000 feet). Eighteen national forests reserves in the State cover 19,508,000 acres. The cut of 1916 was nearly three times that of 1890. It comprised: redwood, 490,828,000 feet; Western (white) pine, 494,973,000 feet; Douglas fir, 141,200,000 feet; sugar pine, 165,- 461,000 feet; white fir,

85,918,000 feet; spruce, 10,000,000 feet; cedar, 16,587,000 feet; hemlock, 500,000; other trees, 25,000,000 (1,430,467,000) ; shingles, ties, etc., 130,000,000 feet; a total of 1,560,467,000 feet. To this should be added 30,000 cords of tan-oak bark, valued at $600,000. Total value of product, 1916 (exclusive of fuel) $47,000,000. Fuel wood amounts to about $9,000,000. The Big Tree (Sequoia Gigantea) is the largest arrd oldest of growing things on earth; averaging 275 feet high and 20 feet diameter. The largest reach over 325 feet high and 38 feet diameter, with an age of 5,000 years. Muir “never saw a Big Tree that had died a natural death.® The other Sequoia (Semper - virens), or California redwood, covers an area of about 2,000 square miles. It is second only to the Big Tree in size, reaching 18 feet diam¬ eter; and like it is found nowhere else. It belongs to the Coast Range, as the Big Tree to the Sierra. It is almost exclusively used in California for sheathing. The immunity of a city like San Francisco -from great fires, though windy, hill-built, and of “frame,® is largely due to the low inflammability of this redwood lum¬ ber. The sugar pine, the noblest pine yet dis¬ covered, reaches 245 feet high and 18 feet diameter; the yellow pine 220 feet high and 8 feet diameter; the Douglas spruce, king of spruces, 200 feet high, 6 feet diameter; the Libocedrus, or incense cedar, 150 feet high and 7 feet diameter; the white silver fir 200

feet high, 6 feet diameter; the (<magnificent® silver fir 250 feet high and 5 feet diameter. The nut pine, or pinon, is a small and shabby tree, but of great economic importance in feed¬ ing the Indians and horses ; in a good year its crop of excellent nuts is enormous — estimated (Muir) equivalent to 50,000 acres of wheat in food value. These are often fed to horses instead of barley. There are many varieties of oaks (which reach great size) ; also maples, yews, birches, alders, sycamores, cottonwoods, aspens, madronos, *etc.* A California palm (W ashing tonia) is native in mountain canons along the southerly desert, and is now largely used for street ornamentation. Specimens planted by the Franciscans have reached a height of 80 feet. The flora of the State in¬ cludes about 2,500 species, and is of

great in¬ terest. In the great central valley in February or March one can travel 400 miles, treading flowers at every step ; and as much is true in other parts of the State.

No other State contains a moiety of the vast number of exotic trees now in California. Fruit, ornamental and shade trees from every country in the world have been acclimated here. Nearly 11,000,000 tropical fruit trees are bearing in 1918. Millions of ˆpepper-trees® (Mollc) from Peru are used on streets, etc.; and of Australian eucalyptus (introd. 1858), there are now over 15,000,000, including about 100 varie¬ ties, for fuel and ornament. Setting 3,000,000 acres to orchard and other trees within a gen¬ eration has partially balanced the deforestation, though not where needed to offset the denuda¬ tion of the watershed by lumbering and forest fires.

The most striking meteorological feature of California is perhaps the ordering of its seasons, of which it has practically but two, the wet and dry. The winter, or (<rainy season,® is approx¬ imately from late October to late April, with 15 to 25 rainy days, an annual precipitation rang¬ ing from 23.53 inches for San Francisco (and far greater in the extreme north) to 14.56 inches for Los Angeles, and 10 for San Diego. For six months after 1 May, rain is practically unknown, except showers in the high mountain regions. In 1917-18 there were 361 days with only y2 inch of rain in Los Angeles, the largest city west of Saint Louis. In the high Sierra the winter precipitation takes the form of snow, with an annual fall of 30 to 50 feet, thus sup¬ plying the natural reservoirs which feed the streams, upon irrigation from which agriculture largely depends. But in Oregon, which bounds California on the north, we have the familiar eastern seasons ; and again in Arizona and Nevada, abutting upon the east, winter snow and summer rains characterize the meteorology. Thus, climatically, California differs altogether from all its neighbors and has well been called an <(Island on Land.® Within its own limits, also, it has extraordinary range of climates, as it were in strata, following the topographic con¬ tours. Thus in the vicinity of Los Angeles it is possible at times to take a sleigh-ride within 12 miles of the city on one side (and looking down upon blossoming orange groves not five miles distant), and by an hour's ride to bathe in the Pacific, which has here a winter temperature of 60°. Within a short journey from almost any given point one may find almost any variety of

climate, from below sea-level to nearly 15,000 feet above it; from the

extreme but arid and non-prostrating heat of the desert to eternal snow; from palms and perennial roses to the primaeval coniferous forests, or to the desola¬ tion of alkaline Saharas. Although all Califor¬ nia shares the seasonal peculiarity of <(California climate,® the northern and southern parts of the State — roughly dividing at Point Concep¬ tion and the Tehacheni Range — are very un¬ like meteorologically. The upper portion is rel¬ atively humid, with more than twice the south's average rainfall, with far larger streams and vastly richer forestation. At Crescent City, on the far coast, precipitation often reaches 80 inches per year. The trend of the coast is here northerly, and the region shares something of the extraordinary humidity of Oregon. The smallest precipitation is in the desert southeast corner, averaging only three inches annually at Yuma. The seven counties habitually termed ((Southern California® — though the geographic southern half of the State would include 13 counties — have an average rainfall of but about 15 inches. This precipitation is insufficient to ensure crops, except cereals (which are not irrigated but depend on the rains). This broad difference between the two sections in rainfall has been chief factor in an extraordinary differ¬ ence of development within the last 30 years. Compelled by aridity to resort to irrigation, compelled by the magnitude of the task to as¬ sociative effort, the southern communities have suddenly developed a generic type of agriculture and of life quite unlike anything else in the Union. The paragraph on population shows something of the disproportionate settling-up of the southern end of the State — an entire re¬ versal of the balance which obtained for nearly 60 years, during which the population was over¬ whelmingly about ftthe Bay® and San Francisco was practically California, socially, politically and financially.

About San Francisco there is a steady and brisk wind movement, flowing in through the narrow gap of the Golden Gate. In southern California, while there is daily ebb and flow of air-currents (in the morning from off the sea, and at night down from the mountains), a real wind is very rare. Hurricanes and cyclones are absolutely unknown in the State. Despite the great heat of the deserts, and high mercury sometimes recorded in the valleys, the dryness of the atmosphere renders it harmless, and sun¬ stroke is unknown. Seasonal diseases, typhoids, malarias and pernicious fevers, summer diseases of children, gastric or hepatic diseases, are rare. Mean summer temperature San Francisco 60° ; winter mean 51°; greatest daily range temper¬ ature Los Angeles 29°, as against 69° for Bos¬ ton. The modern migration to California has been largely attracted by this unique and hos¬ pitable climate, free from the dangerous heats of

summer and the bitter winter cold of the regions east of the Rocky Mountains. In the inhabited portions of this State, extreme cold is unknown ; while, owing to rapid radiation, the summer nights are always so cool as to call for blankets.

The fauna of California is peculiarly inter¬ esting, and includes considerably over 100 spe¬ cies of mammals, though the larger game varieties have in a half century been nearly

State Capitol at Sacramento, Cal

“Ten Miles” Range including Mount San Bernardino, altitude 11,800 feet; full-bearing orange groves to the left

100-foot Australian Eucalyptus to the right

exterminated. At the American occupation, elk were seen in droves of thousands. Great num¬ bers were killed from the deck of steamers plying to Sacramento. Occupation of the State by Indians immemorially, and by Spaniards for nearly a century, had not appreciably dimin¬ ished the wild animals ; but the same wanton spirit which in a score of years exterminated tens of millions of the American bison on the great plains has in California made the great mammals nearly extinct. The grizzly bear (the State emblem) once in great abundance in all parts of the State is now scarce; the black,

cinnamon and brown bear are more common, though rare. Sea lions of a ton weight are still found along the coast, and their populous rookeries a few hundred feet from the <(ClifF House® in San Francisco are an object of in¬ terest to travelers. The California lion, moun¬ tain lion or puma, is still not infrequent, and wildcats abound in the mountains. The coyote is common and of utility in decimating the hordes of rabbits, though an ill-judged bounty on coyote scalps hds of late years much reduced the numbers of this small wolf. The beaver, once in vast numbers here, is now confined to the remotest streams ; and the valuable sea otter is almost extinct. Black-tailed and mule deer are still reasonably frequent; but the antelopes, which once roamed the northern and southern valleys in great bands, have hardly a repre¬ sentative left. The same is true of the moun¬ tain sheep (Ovis Ammon), once common in all the higher ranges. Spermophiles, or ground squirrels, and five species of gopher, are in¬ numerable and a great pest to the farmer as well as carriers of bubonic and other diseases. The Federal and State .governments are making scientific campaigns to exterminate them. Mil¬ lions have been poisoned. The true gray squir¬ rel is common in the north. Jack rabbits and ˆcotton-tails® are abundant in all parts of the State, despite community ˆdrives® in which sometimes tens of thousands are killed in a day. The birds of California number above 350 species. The largest winged creature in North America is the California condor. Quail of two species are in vast abundance throughout the State.

Earthquakes. — While the Pacific Coast of North, Central and South America in general is peculiarly liable in recent geological times to seismic disturbances, California has never experienced an earthquake of the second magni¬ tude, nor probably even of the fourth. The only first-degree earthquake in the _ United States was that of New Madrid, Mo., in 1811. The largest city in the world, if built upon its epicentre would have been irremediably wiped off the map. California has never had an earth¬ quake approaching in severity that of Charles¬ ton, S. C, in 1886. The most serious «trem-blores® of California were in 1812 when the fall of the Mission tower of San Juan Capistrano killed 30 persons in the church, but did no special damage elsewhere in the village ; and 1872 when some old adobe houses in Owens Valley collapsed and killed 19 Mexicans. The (<Earthquake® of San Francisco, April 1906, was a very minor shock (geologically) — not above the 6th or 7th magnitude. It broke rusty water-mains in the 30 feet of sand with which lower San Francisco is ((filled®. It threw down a few

decrepit frame buildings, on the same sand <(fill,® but not a single respectable structure in the city. Fire caught in one of the wrecked tenements; and half San Francisco was con¬ sumed because there was no water to check the fire. In Charleston, practically every building was wrecked by the earthquake.

The unremitting tension upon the crust of the entire earth has found its (<safety-valves® in California. The earthquake ((faults® are not only known and visible, but mapped. There is no excuse for building towns or reservoirs across one of these “faults.® For this reason, the foremost geologists agree (vid. Branner) that California is safer from earthquakes than are many States where these safety-valves have not yet been developed, and earthquakes are as yet strangers.

River Systems. — As in most arid States, the drainage of California is simple. For some 300 miles on its southeastern edge the State is bounded by the Colorado River, which rises in the Rocky Mountains in Colorado and flows 1,360 miles to the Gulf of California. It has no tributaries whatever from California, all east-bound streams from the Sierra Nevada being lost in the desert. On the western coast, though a few rivers reach the sea (like the Klamath, Mad, Eel and Salinas) they are relatively urn important and incidental. The real drainage system of the State has outlet through San Francisco Bay and the Golden Gate, by two chief inland rivers which join about 60 miles northeast of San Francisco. Both rise in the Sierra Nevada, the Sacramento (370 miles long) to the north, the San Joaquin (350 miles long) to the south. Their main course averages along nearly the median line, north and south, through nearly two-thirds the length of the State. They have no tributaries worthy of the name from the great westerly mountain wall, the Coast Range ; their waters being fed almost exclusively from the vast Alpine chain which is in effect, though not politically, the eastern boundary of Cali¬ fornia down to latitude 35° 30”. Their import¬ ant feeders from the Sierra are the Feather, Yuba, Cosumnes, American, Mokelumne, Kern, Kings, *etc.* All these are fine mountain tor¬ rents, beloved of sportsmen, and flowing through magnificent scenery, but not of rank as water¬ ways. The most important is the Feather, which has a large drainage area. Several streams in southern California, like the Los Angeles, San Gabriel and Santa Ana, reach the sea, but all are practically exhausted by irrigation uses, except during winter flood-water. The many streams from the abrupt eastern slopes of the Sierra Nevada all disappear in alkaline ((sinks,® — like Pyramid Lake, the Mojave River, Mono Lake and Death V alley, — and never even in flood reach the ocean by their great natural conduit, the Colorado River.

The total mean annual run-off (in acre-feet) of 32 chief California rivers is 59,078,200. The Colorado River is enormously largest, with 16,900,000 acre-feet; the Sacramento next with 9,770,000; the Feather 5,880,000; American 3,- 820,000; Yuba 3,050,000. The San Joaquin, Kings, McCloud, Merced, Stanislaus and Link rivers all exceed 1,000,000 acre-feet; and the Tuolumne 2,000,000. Seven others exceed

500,000.

The Sacramento and Colorado are navigable to light-draft steamers to the State capital and

to Needles, respectively. The lakes of Cali¬ fornia are not important as to navigation. Tulare Lake, receiving the drainage of the Kern, Kaweah and Kings rivers, is 700 square miles in area, but only 40 feet deep. In very high water its overflow reaches the San Joaquin; but ordinarily its income of waters is cared for by evaporation. Lake Tahoe in the extreme north, at an elevation of 6,200 feet, is 20 miles long and 1,500 feet deep, and famous for the purity of its waters, the beauty of its scenery and its trout. It is the largest of the glacial lakes, of which there are a great number in the Sierra, mostly at altitudes exceeding the highest moun¬ tain summits east of Colorado. The lower-lying lakes of the State are mostly without outlet, and of various degrees of brackishness, culmi¬ nating in the ((sink)) of the Amargosa River nearly 200 feet below sea-level on the eastern side of the range, where evaporation has left vast alkaline deposits, now of great commercial value.

Geology. — The main axis of the Sierra Nevada is of granite throughout. To the north there are some metamorphic peaks, and many summits are capped with volcanic materials. Mount Shasta in the far north is an extinct vol¬ cano (14,470 feet). So also is Lassen's Peak (10,577 feet), of late years sometimes emitting smoke. This

granite core is flanked by a very heavy mass of slaty, metamorphic rocks, — mostly argillaceous, chloritic and talcose slates, — constituting the great auriferous belt of the Sierra. The Coast Range is made up almost entirely of cretaceous and tertiary marines, chiefly sandstones and bituminous shales. It is in this belt that the recent vast development of petroleum has been made.

Besides the vast reaches of alluvial soils in the lower valleys, which were first selected for agriculture, an enormous area of disinte¬ grated granite gravels along the foothills and first acclivities has been found the most produc¬ tive soil in the State, particularly with reference to valuable crops. These great gravel beds, which seem to the farmer from the black <(bottoms® of Ohio the most unpromising of soils, are in reality rich in all the elements of plant food. The vast majority of the valuable or¬ chards, particularly of southern California, are planted upon this granitic detritus ; and with¬ out exception the finest oranges and other citrus fruits come from this soil. The relative aridity of California, long supposed to be a curse, is now known to be a twofold blessing. Exhaustive analyses, comparative with every portion of the Union, show these gravels to average much richer in chemical constituents than soils leached out by excessive rainfall. Furthermore, the fact that precipitation is not invariably sufficient to ensure crops has com¬ pelled irrigation, which does ensure them; so that farmers in the arid lands have much greater crop-certainty than those of regions with most abundant rainfall.

Agriculture. — In no item of its history has California been more unlike other States than in development and sequences of agriculture. The first (and for 60 years commercially chief) industry was cattle — derived from herds in¬ troduced from Mexico by Viceroy Galvez, 1769, and chief wealth of the Mission establishments and Spanish colonists. It was a generation after the American occupation before agricul¬

ture was seriously undertaken ; and for another term of years it was chiefly a gigantic seasonal ˆgamble with the weatherˆ in dry-farming of cereals. The characteristic features of agri¬ culture up to about 1870 were enormous hold¬ ings, — reckoned by at least tens of thousands of acres, — with the single crop (almost ex¬ clusively wheat and barley) and purchase of every other article of necessity or luxury. On areas of hundreds of square miles apiece there were an individual or corporate owner, a single crop, a few hundred hirelings at the height of the season and their temporary quarters. A few of

these enormous ranchos still survive ; and Miller and Lux still farm about 1,000,000 acres, with 20,000 acres in a single field. But within a generation the typical character of agriculture in California has radically changed. The greatest record drought (1864) which not only destroyed grain but hundreds of thou¬ sands of cattle (60,000 head being sold that year in Santa Barbara at 37jˆc. per head), exclusion of the Chinese, who had been the chief reliance for labor on the great ranchos, the fall in wheat, and other factors, led to the breaking up of these gigantic domains. A slight idea of the change may be had from the census fact that in 1850 the average size of all California farms was 4,456.6 acres; and in 1910, 318 acres. Along with this great dry-farm gambling — for such it was — sheep became a leading industry in the State, par¬ ticularly in southern California. But the enor¬ mous increase in value of land has reduced sheep to a valuation of $17,000,000. The city of Pasadena (Pop. 40,000) was a sheep pasture in 1870. <

Within about 30 years — that is, since 1885, — the general character *of California farming has changed to small holdings, occupied not by tenants but by American owners, with fam¬ ilies, with diversified crops, and obliged to purchase only the luxuries of life ; with inten¬ sive methods and certainty (by irrigation) of crops. California has now more than one-fourth of all the irrigators in the United States. The average size of irrigated farms is in southern California 21 Y\ acres; in rest of State about 82 acres. The typical California farqi under the modern regime is perhaps 10 acres ; irrigated either by its own pumping plant or from a community ditch, and yielding an annual income of not less than $200 per acre and some¬ times $900.

Perhaps the greatest single factor in bring¬ ing about this structural change was the orange. In 1862 there were 25,000 orange trees in the State, all seedlings, and deriving from Mexico, where the fruit was introduced by the Span¬ iards nearly three and a half centuries earlier. In 1873 two seedless orange trees from Brazil were sent from the Department of Agriculture in Washington to Riverside, Cal. From these two parent trees has sprung the modern orange industry of California — and practically of the United States ; as Florida, the only other orange State in the Union, yields only one box of oranges to California's two. Mil¬ lions of trees grafted from their "budsˆ are now bearing in this State, and the hereditary fruit, seedless and delicious, leads the American market. This crop, highly remunerative, and practically continuous (shipments being made every month in the year) has been for these

reasons, and aesthetic ones, a large attraction to high-class immigration, and an important factor in shaping agricultural methods. For develop¬ ment of the industry, see statistics below.

In deciduous fruits, total production, ship¬ ments fresh, canned and dried, California has within a generation come to lead the Union ; as it leads in all tropical fruits.

Beet Sugar. — California was the first success¬ ful grower of sugar beets, and has by far the lar¬ gest factories. In 1909 it was second to Colorado in the value of its beet-sugar output ($11,981,- 000), or 25 per cent of the total. The beet sugar industry of the United States originated at Alvarado, Alvarado County, Cal. In 1916 the output of its 11 beet-sugar factories was 472,770,100 pounds of sugar; value, $30,800,000. In 1917 the number of beet-sugar factories and acreage planted to beets had increased in one year over 26 per cent. California beets aver¬ age 7 per cent higher in sugar than those of other States. The effect of the great war and government control on agriculture in California (as elsewhere) is not yet to be prophesied; particularly as to beet sugar, wheat, beans and live-stock. In 1917 the production of sugar beets was 2,636,800,000 pounds. Within a dec¬ ade California has become the greatest pro¬ ducer of beans (navy and frijol, but princi¬ pally lima). In 1916 the yield of beans was 5,047,082 bushels, valued at $19,144,000. In 1917 there were 8,035,000 bushels at double the value per bushel. This industry is practically confined to Ventura, Los Angeles, Orange and San Diego counties. Within less than a decade, also, cotton has come to count in the agricultural resources of California. Im¬ perial County, organized 1907 (a recently re¬ claimed desert, often compared with the valley of the Nile), now produces annually 65,000 bales of cotton (40 per cent Durango or long-staple) worth $9,380,000, besides a great variety of other vegetable products. It lies along the Colorado River, just north of the Mexican line. Ten years ago a desert, it has now a population of 50,000, with several small cities and tens of thousands of acres under

cultivation by a huge irrigating system from the river.

With modern refrigerator freight cars, a vast quantity not only of citrus and deciduous fruits, but even of fresh vegetables, is now shipped from California, 2,000 to 3,000 miles to the Eastern States, including some 800 carloads of celery annually from one small town. Straw¬ berries are in the Los Angeles market every month of the year, but are shipped (as are blackberries, raspberries, loganberries, etc.) to Arizona and New Mexico only in summer; as are also the famous canteloupes and water¬ melons. California is foremost producer of the most extraordinary of forage plants, the Arabian-Spanish-Mexican alfalfa. This produces, under irrigation, about one ton per acre for each of four to eight cuttings per annum. In 1917 it sold at $26 per ton. In 1910 there were 487,134 acres planted to alfalfa; in 1916, 862,- 534 acres.

Grain Acres Yield, bushels

Corn . 75,000 2,400,000

Wheat . 375,000 7,425,000

Barley . 1,350,000 39,150,000

Oats . 196,000 6,860,000

Rye . 8,000 104,000

Rice . 80,000 5,600,000

CALIFORNIA FIELD CROPS, 1916

Crop Acres Yield Value

Hay and for¬ age . 2,533,347 4,327 , 130 tons $55,125,000

Gram . 1,812,000 47 ,572 ,000 bush. 47,507,000

Potatoes - 200,000 10,575 ,000 bush. 4,230,000

Onions . 2,350,000 bush. . 2 , 400 , 000

Dry beans… 558,000 6, 100,000 bush. 20,000,000

Celery . 3,500 2,600 cars • 1,000, 000

Beet sugar.. 144,200 472 , 770 , 100 lbs. 30,800,000

Rice . 80,000 5 , 600 , 000 lbs. 9,800,000

Cotton . 117,000 65,000 bales 2,574,000

Wool . 1 1 , 600 , 000 lbs. 2,552,000

Hops . 19,991 21 ,552,500 lbs. 4,869,000

Sweet pota¬ toes . 6,000 960,000 bush. 768,000

Up to 1808 the hop industry of the United States was all in Maine, Vermont and Massa¬ chusetts. Soon New York, with better soil, had a monopoly; then Wisconsin and Michigan be¬ came important hop-growers. In 1916 five counties of California produced more hops than all the rest of the United States. In 1916 the live-stock in the State consisted of 468,000 horses, valued at $45,396,000; 70,000 -mules, valued at $8,120,000; 591,000 milch cows, valued at $39,597,000; 1,636,000 other cattle, valued at $62,332,000 ; 2,524,000 sheep, valued at $16,911,000; 994,000 hogs, valued at $10,039,000; and poultry valued at $19,000,000, making a total value of $201,395,000.

In the same year the total value of the State's dairy products amounted to $40,310,105, con¬ sisting of 70,030,174 pounds of butter, worth $19,181,264; 7,745,124 pounds of cheese, worth $1,203,592; and other produce valued at $19,-

925,249.

The sensational achievements of Luther Bur¬ bank in hybridizing fruits — for instance, the creation of a large plum without any pit what¬ ever — 'are already world-famous. Almost as remarkable results have been reached in floricul¬ ture. Seeds and bulbs are raised on a great scale; carnations, calla lilies and other flowers being grown outdoors by the 10-acre field. A large proportion of the flower seed of the United States is grown in California, and it supplies most of the mustard of the nation. The total area of California farms is now over

46,000 square miles, considerably exceeding the entire area of States of Massachusetts, New Hampshire, Vermont, Connecticut, Rhode Is¬ land and Maryland. The State was eleventh in the Union in per capita value of farm prod¬ ucts ($88) and fifth in value of products of farm ($1,816 as compared with Ohio, $929) in 1900. California had in 1910, 87,670 farms ; total value of farm property, $1,448,560,000; total value of farm products 1899, $131,690,606. Total acreage in farms, 27,883,000 acres, of which 11,380,000 acres are improved. The area farmed decreased 3 per cent, 1900 to 1910. In 1850 there were 872 farms; in 1860, 18,716; in 1870, 23,724. The development of farming is briefly indicated as follows to 1910 — the latest Federal figures available. The great increase since 1910 cannot be officially stated.

Year

Farms

Acres

Value farm property

Value

products

1910…

1900…

1890…

1880…

87,670

72,542

52,894

35,934

27,883,000 28,828,951 21 ,427,293 16,593,742

$1,448,560,000 796,527,955 772,065,570 305 , 999 , 443

5131 ,690,606 87,033,200 59,721 ,425

The largest number of farms was in Los Angeles County (6,577) ; three other counties

had over 3,000 farms each; Santa Clara, 3,995; Sonoma, 3,676; and Fresno, 3,290. Of all farms, 84,692 were farmed by whites ; the rest by Indians, Chinese, negroes, Japanese.

Dairy cows had increased nearly one hun¬ dred-fold since 1850, in 1910 being 464,000. Horses (1910), 462,000; mules, 68,000; sheep, 2,325,000; swine, 749,000; of other cattle there were 1,155,000. Total value of domestic animals 1910, $119,487,452 — including poultry and bees, $4,566,629; animals sold and slaughtered, $15,754,985 ; poultry and eggs, $6,356,746; wool, $1,707,088. Sheep and wool decreased steadily, from 1879, with the great increase in value of lands for farming.

From 1850 to 1900 the population increased sixteen-fold; number of farms over eighty¬ fold. California was one of the few States in 1900 that in 30 years added more to its agri¬ cultural than to its other population.

Irrigation and Horticulture. — Develop¬ ment of the new and characteristic agricultural era in California is outlined by these statistics from the last available census (1910). .

No.

Acres

Value

irrigators

irrigated

irrigated

crop

Wnited States… .

102,819

7,263,273

$84,433,438

California .

25,611

1,445,872

32,975,361

Of the 72,542 farms in the State, 25,675 or 35.4 per cent were irrigated, an increase of 44 per cent in 10 years; the number of irrigators increased in the same term 87 per cent, showing the great subdivision of the lands — nearly twice as many people living on the same area. Total cost of construction of all irrigating sys¬ tems, $19,181,610; so the irrigated crop of 1899 alone paid nearly $14,000,000 in excess of total cost of works. Los Angeles County led by far in number of irrigators (4,066) ; only Fresno (2,459) having one-half as many. In number of acres Fresno County was far in the lead, with 283,737 acres; Kern next with 112,533 and Merced, 111,330. Of the total 1,445,872 acres irrigated in 1910 (last available figures), 1,- 293,608 were irrigated from streams. There were 2,361 artesian wells and 10,924 pumped. By 1914, the pumping-plants for

irrigation had increased to 24,589. More than half the flowing artesian wells in the United States were in California; and a large number of farms were served by electric power pumped from under¬ ground wells.

Of deciduous orchard trees there were in the State, in 1916: Apples, 61,752 acres; apri¬ cots, 96,716 acres; cherries, 13,484 acres; figs, 10,872 acres; peaches, 107,971 acres; pears, 40,- 324 acres ; plums, 22,805 acres ; others, 19,000 acres ; a total of 372,924 acres planted to de¬ ciduous orchard trees. In 1916 the shipments of fresh deciduous fruit from 50 counties of northern California were 17,890 carloads; from the seven counties of southern California 450 carloads, having a total value of $29,500,000.

In 1916 the citrus fruits (orange, lemon and grape-fruit, nearly all from southern Cali¬ fornia), were 192,607 acres; shipments reached a total of 45,083 carloads, valued at $41,348,000.

Dates were recently introduced from the

government experimental stations in Arizona. In 1916 ‘the Coachella Valley produced $65,000 of dates. The acreage has vastly increased since. There are over 7,000 bee-keepers in the State, owning more than 600,000 colonies. The production of honey in 1916 was 11,100,000 pounds, valued at $642,000.

California was first (1769), and is still prac¬ tically the only State to produce the olive and its oil. Thirty-eight counties now grow the olive, though only in half a dozen is it import¬ ant. There are about a million bearing trees in the State, and half as many not yet bearing. The California ˆripe® olive has become of great commercial importance ; while the ˆdehydrated® seems destined to become even more popular.

The annual production of oil (1916) is 1,000,000 gallons; packed olives, 18,000,000 gallons.

Of dried fruits the output is larger than in any other State.

Dried Fruit

1913

1916

tons

tons

Apples .

. 1,900

4,500

Apricots .

. 10,500

10,900

Figs .

. 5,000

6,700

Peaches .

. 23,000

28,000

Prunes .

. 48,000

68,500

Raisins .

. 65,000

115,500

Sundry .

. 2,000

3,000

Total .

. 155,400

237,100

Almonds and walnuts are not ˆcommercially® produced elsewhere in the United States. Both crops have more than quadrupled in a decade. In 1916 the yield was, for California, 3,400 tons of almonds and 12,800 tons of walnuts.

California produces 95 per cent of the United States almond crop ; and

over four times the nation's importation of this nut. The aguacate, avocado or alligator pear (from Guatemala) is of recent introduction, but there are already over 35,000 trees in southern California; and the ordinary income is $200 per tree — the fruits selling as rarities at 50 cents to $1.25 each. Tn the last census year the number of plum and prune trees was greater than the total number of all deciduous orchard trees 10 years before. The number of apricot trees had more than doubled in the decade.

Total number of semi-tropical fruit trees had increased from 1,809,161 to 8,996,459 in the decade. Of the latter number 62.8 per cent were orange trees; 17 per cent olives; 16.6 per cent lemons; 2.1 per cent figs. Other trees included were guavas, kalci, limes, pineapples, pomelos, *etc.* The counties of San Bernardino, Los Angeles, Riverside and Orange contained more than four-fifths of the orange trees. The number for the State increased nearly five times in 10 years. Orange and lemon ship¬ ments increased about eight-fold in the decade. San Diego and Los Angeles counties contained more than half the lemon trees of the State, the number being more than 18 times as great as 10 years before. There were 5,648,714 orange; 1,493,113 lemon; 1,530,164 olive trees in the State.

Strawberries, blackberries, raspberries, Isgan-berries and other small fruits are valued at about $2,000,000. Fifty-two of the 57 counties raise grapes. California is the principal wine-producer of the Union, yielding more than one-half the total product.

SOUTHERN CALIFORNIA PALMS

CALIFORNIA ROSE GARDEN

CALIFORNIA

1 Mt. Shasta, from Sisson's

2 Mt. Tamalpais, near San Francisco

CALIFORNIA

1 Th.e Arroyo ,Seco (“ Dry Wash ”)» a Epical ravine between Los Angeles and Pasadena and its concrete bridge

1,460 feet long, 160 feet high

2 Oil wells in the Pacific Ocean at Summerland

CALIFORNIA

1 The Bay of Avalon, Santa Catalina Island

2 The Junipero Serra Cross on Mount Rubidoux; Riverside “the city of orange groves” 500 feet below; Snow¬

capped Mount San Bernardino (11,800 feet) in the distance

CALIFORNIA

205

Viticulture. — California has over 90,000,000 grapevines (more than all the rest of the Union), occupying 356,009 acres; representing an investment of $150,000,000. The State shipped in 1916 10,741 carloads, valued at $13,- 000,000. It is the only raisin State. In 1916 it shipped (from 22 counties, though Fresno is centre) 128,500 tons of raisins. The seeded-raisin industry began in Fresno County, and has grown from 3,500 tons in 1897 to 45,000 tons in

1916.

Grape Products,

1916 Quantity Value

Dry wines . 23, 000 , 000 gals. \

Sweet wines . 19,262,475 “ \ $14 , 500 , 000 . 00

Brandy . 3,027,892 “ J

Grape juice . 50,000 “ 50,000.00

Champagne . 1 , 000 , 000 bottles 2 , 000 , 000 . 00

Table grapes . 11,741 carloads 11,000,000.00

Raisins . 128,500 tons 16,000,000.00

The best <(dry® wines are grown almost ex¬ clusively in the northern half of the State; the best sweet wines exclusively in the southern. The recent (1917) vote in Los Angeles pro¬ hibits the use of beverages above 14 per cent alcohol after 1 April 1918. This is the largest city in the West thus to restrict. It permits the 14 per cent clarets of the North, but in¬ hibits the 21 per cent ports, sherrys and other fortified sweet wines of the South. California is committed to a policy of fflocal option,® as regards the liquor problem, but the great ma¬ jority of the smaller cities are (nominally) (<bone dry.® On 1 April 1918, the 200 saloons in Los Angeles (600,000 population), closed their doors, being ((voted out® by a large citv ma¬ jority. It was then the largest city in the Union without liquor license. The effect of the ((prohibitory® movement on the whole grape in¬ dustry and the 100,000 persons directly depend¬ ent upon it can be inferred. The ordinance was voted in November, and became effective only four months later. This was virtual confisca¬ tion of several million dollars in stock, leases, licenses, fixtures, *etc.* At the same time there were still 1,750 places in San Francisco where (<hard drinks® could be secured.

Mining. — As early as 1690, Loyola Casallo mentions seeing placer gold in California ; large nuggets were described (by Antonio Alcedo, 1786) in the 18th century. Not later than 1841, gold was found on San Francisquito Creek, Ventura County, about 45 miles from Los Angeles, and was <(washed® there by Mexicans on a modest scale. On 19 Jan. 1848, James W. Marshall, an American from New Jersey, em¬ ployed

by the Swiss pioneer, John Sutter, in building a sawmill near Coloma, on the north fork of the American, picked up yellow metallic flakes in the mill-race ; the news spread in spite of efforts to suppress it, and in a few months the gold rush was on. Up to 1848 the whole United States had produced less than $12,000,000 in gold since the discovery of America ; in five years following, California alone yielded over $258,000,000. The annual gold product of the State, from the discovery to 1859 inclusive, was in million dollars, 5, 10, 45, 75, 85, 65, 65*4, 65, 57, 50 and 50. The total gold output from 1848 to 1 Jan. 1918, was $1,673,594,500. It now averages 21ˆ4 million per year. This first bonanza in United States history had a profound economic, sociologic and political

effect. v' Sound money® was as yet unknown in this country ; silver and gold together in the whole Union up to 1848 had not reached $25,000,000 in total output ; and the instability of the currency prior to the California gold discovery is familiar to students. The Cali¬ fornia gold-find not only precipitated such a shifting of population as had not before been dreamed of on this continent; it not only brought about the admission to the Union of a State distant 2,000 miles from any other State, — California was the first State in the geographic western half of the United States, and sixth west of the Mississippi River, — it furnished the finances for the great civil cleav¬ age nominally most concerned with slavery, and gave the free States a majority in the United States Senate. It is probably not fanciful to hold that this ˆirrepressible conflict® could not so soon have opened had the nation been so short of bullion and of credit as it was prior to the gold discovery of 1848. Furthermore, in 1859, almost exclusively with California cap¬ ital, labor, enterprise and machinery, the great silver bonanzas of Nevada (just across the Sierra) began the remarkable record of 21 years, in which they produced over $306,000,000 in bullion.

The first mining in California by Americans was crude, as it had been in Mexican days — <(washing out® the auriferous gravels in the (<gold pan.® The first step in advance was the ((rocker,® employing two men, and foreshadow¬ ing a certain associative effort. Next came the (<Long Tom,® which made also for stability, since it could not be carried. Then came the sluice-box, a small wooden flume with wooden riffles on the bottom, behind which the gold sank and was saved, while the lighter sand and gravel were swept on by the swift current. In 1852, E. E. Matteson, a Connecticut Yankee, invented hydraulic mining, the greatest advance ever made in the placers. Water under

high pressure, served through a nozzle called the <(monitor,® thrown 200 or 300 feet with such nozzle force that a crowbar could not be thrust into the jet, ate away whole hillsides almost as hot water disintegrates sugar, the detritus pass¬ ing through long riffled sluice-boxes. While this invention was the most essential yet made in mining, it was long disastrous to ultimate development of the State, agriculturally. In 1880 it was proved by engineers' measurements that on the Yuba River alone more than 100,000,000 cubic yards of gravel had been washed by hydraulics into the bed of the stream, raising it 70 feet, and burying 15,000 acres of farm lands under the debris. After a long and bitter fight, the ((anti-Slickens® campaign ended in 1884 in favor of the agricultural interests, and hydraulic mining in California has never since been on a large scale.

((Quartz mining® — that is, deep mining on the original veins from whose waste the placers derive — began in 1851, but did not take chief rank for many years. Now it is the principal form of gold mining in this State ; and as it requires large capital, experience and time, gold mining no longer attracts the multitude, though the State annually produces three times as much gold as set all the East in a fever three-fourths of a century ago. California is the only ante¬ bellum State in the Union which has never had

ttsoft money® or a depreciation of currency. The largest mint in the world is located in San Francisco.

In the 'sixties, extensive experiments were made by Thomas Scott of the Pennsylvania Railroad to develop petroleum in California, even shipping around the Horn barrels for the expected product. For various reasons, chiefly administrative, the experiment failed.

Petroleum.— In 1875, J. D. Whitney (of Yale), perhaps the greatest geologist of the United States, and for years State geologist of California, stated that while there (<were surface indications of petroleum, it was ge¬ ologically impossible that California should become a great producing petroleum State, and there could not be

flowing oil wells like those of Pennsylvania.® The enormous surface indications in many parts of the Coast Range tempted further exploration ; and within a year after Professor Whitney's prophecy, oil was struck in Los Angeles County at Puente ; and soon thereafter in Los Angeles City and also in Ventura County. By 1893, there were about 100 wells in California producing in the year 400,000 barrels. By 1900, the annual prod¬ uct had increased to 4,324,484 barrels, with 1,590 producing wells, and 470 drilling. In February 1918, the total number of producing wells was 8,158. A majority of the California oil wells are flowing when first tapped. The famous (tLake View® spouted about 90,000 barrels a day for a long time, and continued to flow for more than a year. Other wells have spouted from 30,000 down to 10,000 barrels a day. The life of a flowing well varies from six months to three years. For these great gushers, whole valleys are dammed up as reservoirs are dammed for water; and the petroleum product makes lakes of large size. The oil fields touch 17 counties in a line over 600 miles long. The vast majority of the product is in eight counties in the south in the following order (1916) :

County	Barrels	Value
Kern .	54,120,509	$34,691,246
Fresno . .	14,594,246	7,530,631
Orange .	13,198,591	8,750,666
Santa Barbara .	4,502,206	3,574,752
Los Angeles .	2,875,468	1,871,930
Other counties .	971,537	1,002,109
Total .	90,262,557	$57,421 ,334

Oil wells are from 700 to 4,000 feet deep. In the Summerland district, in Ventura County, most of the production is from wells put down in the bed of the ocean from piers. Thousands of miles of pipe-lines deliver at tidewater the product from Kern River and other districts. In 1916 (except for Oklahoma which has recently outstripped it) California produced nearly 50 per cent of the total petroleum of the United States and over 10 times as much as Pennsylvania.

California locomotives nearly all burn crude petroleum, as do the steamers. Steam and electric roadbeds are «oiled® for thousands of miles. An overwhelming majority of the manu¬ facturers of the State use it for fuel. It is equivalent to coal at about $3 per ton. There can be no fuel famines in California. The mu d road has disappeared from the progressive sections. Farmers drive (mostly bv auto and truck) to market over unsurpassed boulevards made by mixing the universal disintegrated

granites with crude oil and steam-rolling the surface. The production of natural gas in¬ creased from $34,578 in 1900 to $2,871,751 in 1916 — a gain of 82 times in 16 years. Twelve counties produce this commodity but the output is overwhelmingly from Kern (over 60 per cent of total), Santa Barbara, Orange, Fresno, Los Angeles and Ventura counties, in that order. One pipe line (the ˆMidway®) transmits 23,-000,000 cubic feet per 24 hours, and is 107 miles long. In 1916 there were 31 plants in the State making gasoline, having an aggregate capacity of 61,400 gallons per day. The petroleum of California in its varying forms has not only been one of the greatest industrial and economic factors of the State, but has contributed to Paleozoology the most extraordinary find in history — ‘not even surpassed by the remarkable deposits of actual fossils at Agate Springs, Neb. — the ((La Brea Rancho,® partly within the city limits of Los Angeles, discovered in 1906, a unique preservative of Pleistocene remains. In a space of about 1,400 feet long, northwest by southeast, and 150 feet wide, thousands of skeletons have been discovered, of which many were before unknown to science. In the same area, crude oil is still bubbling up; and jack-rabbits, owls and smaller animals are caught in it at night, taking it for water, and being (<bogged down.® In the Pleistocene period, southern California was a tropical jungle roamed by the largest land mammals. The drying up of the region, the extinction of tropical forests and of lakes and watercourses, brought about the rapid extinction of these ancient species. On the ((La Brea® is a little pond of about an acre of asphaltum springs, still bubbling. In Pleistocene days, the Imperial elephant came down here to water, and was caught in this oleaginous quicksand. Sabre-tooth tigers sprang upon their backs and devoured them alive — and other tigers dis¬ puted the prey; and all slowly sank down to be preserved hundreds of thousands of years for science, to-day. The skeletons of 50 species of mammals and 50 of birds have been exhumed here, and new material is constantly coming up. The great bird of 14 feet wing spread — the teratornis — is the largest of the winged creation found here. The sabre-tooth tiger was known to science before, but none with tusks

reaching below the lower lip. In this incom¬ parable cemetery have been taken out, already, 630 sabre-tooth tigers with an average length of 10 inches for those great canine teeth, seven incnes below the gums. The first complete skeleton of the Imperial elephant was taken out here; and 16 other specimens have been found. Over 700 of the <(big wolves® — very much larger than the modern timber wolf ; 7 masto¬ dons ; 39 giant ground sloths; 39 bison; 39 horses and 39 camels, and new varieties of the little sloth, the antelope and a cat as large as the jaguar (whereas the puma was before the largest, except the lions and tigers). Other museums have fragments of the giant ground sloth ; but the onlv complete specimen is from here. Of the little sloth, here are the only 11 skulls known. This is the only place known in the world where bones have been preserved in asphalt They are not fossils, and their dur¬ ability is a matter of surmise, though they are in perfect preservation and not friable as if they had been buried in soil. The Museum of

History, Science and Art, in Los Angeles, has a vast quantity of material unmounted, and 15 examples mounted of the most important of these unique prehistoric creatures. The owner of ((La Breaˆ has donated 32 acres of this waste land, and Los Angeles County will build a park and subsidiary museum on the spot around this death-pit, which attracted these forgotten animals, of the Pleistocene period. The petro¬ leum (<trapw will be maintained as it has been for so long; except that it will show the modern excavations and some bones in situ.

Mining Output in 1916 and 1917. — Cali¬ fornia, while first in present annual output of gold, is overwhelmingly first in total produc¬ tion ; having produced more than all the rest of the United States put together. It is second in output of copper, eighth in silver, first in borax and soda, second in petroleum, fifth in salt, first in asphaltum, tungsten, quicksilver (with two-fifths of the total production of the world) ; and with a range of mineral produc¬ tions entirely without parallel in North America.

The principal products with their respective values were (1917) :

Gold .

Copper .

Petroleum .

Quicksilver .

Potash (by kelp) Potash, mineral.

Silver .

Other .

$22,500,000 17,000,000 57,421,334 2,500,000 2,700,000 2,200,000 1,400, 000 39,478,773

In 1917, total value of mineral products for California was $142,100,107, excluding kelp and many other products amounting to about

$6,000,000.

Interesting other items in mineral produc¬ tion (1917) were

Borax and soda . .

Cement .

Brick . .

Lead .

Natural gas . .

Tungsten concentrates

Zinc . .

Building stone . .

Chromite .

Mineral water . .

Pyrite . .

Pottery clay .

Lime .

Magnesite . .

Manganese ore . .

$3,000,000 6,100,000 1,600,000 1,000,000 2,871,751 4,000,000 2,000,000 5,100,000 200,000 470,000 295,000 135,000 285,000 800 , 000 200 , 000

total yield, as compared with 38 per cent for 1915. More than seven-eighths of the placer total was recovered by the 53 dredges through¬ out the State. The largest dredging operations were carried on in Yuba County, where 13 dredges, some of them the largest ever built, were at work during the year. Some platinum also was obtained bv the dredges. The largest output of copper was in Shasta County, which produced 50 per cent more than in 1915. The lead output was nearly threefold that of 1915, and nearly all came from Inyo County. Shasta and Inyo counties produced nine-tenths of the zinc output, and San Bernardino County the remaining tenth. The total tonnage of ore mined and treated in California in 1916 was 3,187,642 short tons. From this was recovered an average value of $9.77 per ton — a figure surpassing the former record ton-value of $7.87, made in 1915, by 24 per cent.

Minor mineral products (1917) by thousand dollars : Antimony 5, asbestos 5, barytes 10, bituminous rock 60, coal 25, dolomite 15, feld¬ spar 7, fuller's earth 4, gypsum 45, infusorial earth 60, iron 3, limestone 155, marble 40, platinum 25, potash 25, silica 35, soapstone 15, soda 85.

Manufactures. — For its first 80 years en¬ tirely pastoral, for its next 20 years chiefly mining, for the next 60 years overwhelmingly devoted to agriculture, horticulture and viti¬ culture, California has in the last decade (to 1917) become the ninth manufacturing State in the Union. This is due not alone to the vast range of productivity but still more to the un¬ precedented development of petroleum-fuel and hydro-electric power. Between a population of 92,597 in 1850 and 2,938,659 in 1916, California's population increased 31-fold. Its economic progress has been perhaps as surprising. The United States census of 1914 shows nearly 5,000 manufacturing industries, of which 71 produce more than $500,000 a year each (including four that exceed $50,000,000 and 11 between $10,- 000,000 and $50,000,000). Value increased, in five years, more than value increase of United States as a whole.

Number of establishments. .

Persons engaged .

Capital .

Salaries and wages .

Value of products .

1899 1914

4,997 10.057

* 176,547

$175,467,806 $736,105,455

47,385,354 140,842,691

257,385,521 712,800,764

The total metal output of the 589 active mines of California for 1916 amounted to a value of $39,749,263, a figure $7,485,419 greater than for 1915, and a new record in the mining history of the State. But this increase is to be attributed to the greatly enlarged output of copper, zinc and lead; for the gold output showed a falling off of $1,031,555. In detail, the year's record shows: gold, 1,035,744.6 ounces, valued at $21,410,741 ; silver, 2,564.354 fine ounces, valued at $1,687,345; copper, 55,897,118 pounds, valued at $1 3,750,691 ; zinc, 15,256,485 pounds, valued at $2,044,369; lead, 12,407,493 pounds, valued at $856,117.

The reduction in the gold output was nearjv all in the deep-mine production, and is laid partly to the two months' strike of miners in the Mother Lode district, and partly to the higher wages paid at the copper mines, which drew away a considerable body of miners. The placers are credited with 40 per cent of the

* Figures not available.

Percentage of increase 1899-1914, establish¬ ments 101.3; average number of wage-earners, 80.6; value of products, 176.9; value added by manufacture, 186.1.

Aside from manufacturing products covered in other tables for petroleum, fisheries, fruit and vegetable canning, lumber, etc., some im¬ portant manufactured products may be assem¬ bled as follows :

Esiablish-

Census 1914 — Industry ments

Slaughterhouse and meatpacking. . 108

Printing and publishing . 1,543

Foundry and machine-shop products 1 ,097

Flour and mill products . 132

Bakery products … . . 1,117

Butter, cheese and condensed milk. . 201

Value of output

$50,011,820 34,744,879 31,732,384 24,078,735 21,855,181 20.466,428

See also, elsewhere, statistics of oil refining, packing fish, fruit and vegetables, etc., under their headings.

Detailed statistics of minor manufactures may be found in the census of manufactures of the Department of Commerce, United States of America.

Even in the four years since the issue of the last (1914) bulletin, enormous changes have taken place in nearly every item.

The canning of fruits and vegetables has reached its highest development in California; and in output this State easily leads the Union. More than one-half of all the canned peaches ; more than two-thirds of all the canned pears; nearly one-half of all the canned cherries ; nearly four-fifths of all the canned plums; more than one-half of all the canned beans; more than one-half of all the dried fruits, produced by the whole United States, are from California. The increase in all items of manufacturing had been by far largest in Los Angeles, where, for instance, the percentage of increase in a decade (to 1905) had been in number of establishments, 88.7 ; number of wage-earners, 107.7 ; value of products, 115.3. Another new, but highly im¬ portant industrial advance, is the long-distance transmission of electric power from mountain streams. In this California has for years led the world. When a 33,000-volt, 82-mile line from San Bernardino Mountains to Los Angeles was installed (1900), it far exceeded any other line in the world in length and volt¬ age. Then 40,000 volts were brought 140 miles from Yuba River to Oakland — with cable crossing Carquinez Straits by suspension span of 4,400 feet, 300 feet in air. The longest power transmission in the world was that from Colgate to San Francisco, 211ˆ4 miles. Plants have been built to transmit 28,000 horse power from Kern River, 116 miles, to Los Angeles; and 120,000 horse power from San Joaquin River, 180 miles, to San Francisco; and 218 miles to Los Angeles. One electric company expended $250,000 per month for a year, in electric development in and around Los Angeles. Two companies in the northern part of the State are developing 169,000 horse power for long-distance transmission. Not only are nearly all streets and houses lighted, and street-cars propelled by this new, far-fetched ((fuel,® but thousands of the smaller manufacturing estab¬ lishments are run by hydro-electric motors.

The first hydro-electric plant in the world was operated at Frankfort-on-Main, in 1894; the second (first commercial) at Folsom, Cal., in 1895 to light Sacramento (State capital). California was not only a pioneer, but still leads in hydro-electric development. In 1917 there were about 85 plants in California with aggre¬ gate maximum capacity of 9,000,000 horse power ; which will be greatly increased by plants now building. There are lines carrying as high as 150,000 volts, operating at (<heads® of over 2,000 feet, or a pressure of approximately 875 pounds per square inch.

For the last 20 years shipbuilding has made a great advance, and California became the third State in the Union in this industry. The Oregon, Olympia, Ohio and other United States war vessels were built in San Francisco. Long Beach, Los Angeles County, has also become

important in the building of war ships. The first successful concrete vessel was launched in 1918, and large vessels of different types are on the way.

Commerce and Navigation, *etc.* — The po¬

sition of California (commanding, from the best seaports in 5,000 miles of the Pacific Coast, the shortest routes to the Orient), is reinforced by its enormous coastline. The littoral of the United States is divided practically into thirds — Atlantic, Gulf and Pacific. California has two-thirds of the total United States frontage upon the Pacific Ocean, and nearly one-fifth of the total coastline of the United States. All this, added to its relation as outlet for an enor¬ mous inland territory, including not only Cali¬ fornia but New Mexico and Arizona, gives great importance to its commerce. San Francisco (1905) though the 11th city of the Union in population was third in commerce. Its exports for 1916 were $127,598,531 and imports $117,- 128,253 (including exports to China $4,857,956 and to Japan $24,818,324). Operations in the Philippines and development of the Oriental trade are bringing about for California the realization of Seward's prophecy (about 1865) that ((the Pacific is to be the chief theatre of the world's activities.® The Bay of San Francisco, with a shore-line of 300 miles, open to the ocean only by the mile-wide Golden Gate, and receiving through the two great central rivers the drainage of the vast interior valley, is reckoned among the world's best harbors. San Diego at the extreme south has a well-sheltered natural harbor, entrance to which has been improved by the government. Los Angeles har¬ bor (formerly San Pedro) is the most import¬ ant artificial harbor and ranks close second to San Francisco. Other roadstead wharves serve rapidly growing commerce. California had, in 1917,. 19 lines of ocean steamers — plying to China, the Philippines, Sandwich Islands, Alaska, Mexico, Panama, Chile, and 13 coastwise. Of six lines of river steamers, five concern San Francisco and its river system. The Sacramento River is navigable to the city of that name.

Kelp.— In 1916 an important industry, unique to California (and practically confined to southern California) was initiated by the Los Angeles Chamber of Commerce, largely through the instrumentality of the director of the Southwest Museum. This was the syste¬ matic harvesting of the vast beds of kelp (macrocystis pyrifera, with also the pelago-phycus parva and butkeana) , which skirt the littoral from about Point Concepcion to San Diego. These kelp beds cover 50,000

acres. ((Kelp pirates® had for several years ravished the beds to a small degree by a crude method, and extracted the potash still more crudely; destroying the plants which they tore out by the roots, and causing great havoc among the young fish, of which the most important have their spawning-beds and nurseries in this same kelp field. State legislation has now been secured to regulate the harvesting of the crop by scientific methods, so that it will be enduring. Kelp is ((thc alfalfa of the sea.® The more it is cut (scientificallv) the better it thrives. There are (1918) eight corporations with plants, with an investment of $6,000,000, ((heading® kelp with a fleet of special boats of 12 to 600 wet-tons capacity, and with reciprocating knives which cut the kelp not over five feet below the surface, without any injury whatever to this curious marine plant, or disturbance to the myriad fish-spawn sheltered thereby ; and carry the harvest to be treated in great modern plants.

The product of potash (selling in 1918, at $450 a ton, multiplied about 700-fold), amounts to $2,700,000. The wet-tons harvested in 1917 were 400,000; yielding 6,000 tons of potash at 1(4 per cent of potash to the wet-ton. The large content of ammonia and iodine by¬ products is very important, and is already being saved — though too recently for accurate statis¬ tics. The harvest, under this scientific treat¬ ment, lasts all the year, three crops annually; the average, per acre, being 7*4 wet-tons. No method is yet known of increasing the acreage of the kelp beds; but under the present system the crop will be perennial. About 75 per cent of the possible gathering is now harvested. On account of its vital relation to the important fisheries of California, the administration of this industry has wisely been placed under the control of the State game and fish commission. Whether to be rated among the “agricultural,® “manufacturing® or “marine® products, this “Sea Alfalfa,® in view of the constant value of potash, ammonia and iodine, the inexhaust¬ ible field, and its proximity to factories by rail make this extraordinary industry of southern California worthy the attention of economists.

The first commercial production of potash in California was in 1914 from 10 tons of kelp. The first potash derived from “mineral® sources was produced as a by-product from “cement treater® dust, at Riverside, in 1915. The yield of potash from purely mineral sources for 1917 was approximately 120,000 tons, valued at $2,200,000. This is principally from the “cement treater® dust in Riverside County and the evaporation of the natural brines in Searles Lake, San Bernardino County. Eight cor¬ porations are now engaged in the manufacture of mineral potash ; and in spite of the youth of this industry, it is already important. The development of the mineral industry is barely begun, and its potentialities can hardly be esti¬ mated. The kelp potash can be practically measured as above. But the mineral potash cannot be. But it is the consensus of producers that there is an enormous possibility for the mineral potash industry in the great deposits now being developed in California.

Fisheries. — In 1865 there were 650 vessels, manned by 15,000 men, engaged in whale fish¬ eries in the Pacific. The centre of the industry was San Francisco. Half a century later, San Francisco was still the foremost whaling port of the New World, but the industry had shrunk to $132,000. Long Beach, southern California, is important in this fishery; whale meat has be¬ come a valued market food. The State is the richest in marine and fresh-water fish; and ranks second or third, at present, in the canned pack. This was-until recently almost altogether salmon. But within a few years the socalled “Tuna® (really the albacore), and the sardine have become rivals of the salmon pack. The centre of this industry is in southern Cali¬ fornia, at Los Angeles Harbor (formerly San Pedro). Another important fishing and can¬ ning point is San Diego. The total pack for southern California, 1916, was :

Fish	Cases	Value
Tuna .	560,000	$3,360,000
Sardines .	500 , 000	2 , 000 , 000
M iscellaneous .	100, 000	300 , 000
Total .	1,160,000	$5,660,000

The value of the salmon pack (entirely con¬ fined to northern California) was, for 1916, approximately $8,375,000. The sardine pack, for northern California, for 1916, had increased from 50,000

cases to 250,000 cases. Japanese and Chinese and other alien fishermen dry large quantities of fish which are not recorded in State or Federal statistics. Throughout, the fishermen are about 90 per cent aliens. Statis¬ tics are not readily available, under a loose system of State supervision. Probably now that the government has taken control of the food supply it will soon be easy to get some ac¬ curate idea of this product, which is enor¬ mously larger than the recorded statistics. Among the most important marine fishes are the chicken-halibut, sole, tom cod, rock cod, rock bass, mackerel, Spanish mackerel, barracuda, pompano, sand-dab, red snapper, flounder and other valued varieties, besides many fish of lesser estimation. These marine fish are in the market the entire year, at reasonable prices. The San Francisco market lists 133 varieties on sale by seasons. Of the fresh water fish, the striped bass of the Sacramento River is an esteemed delicacy. Salmon, sturgeon, steel-head trout, rockfish and smelt, running from sea to stream, are abundant and famous. Within the last 30 years all varieties of trout (besides the native) have been successfully colonized in California, which now exceeds any other State in the variety, size and abundance of trout. Black bass, shad, codfish, crab, etc., have also made handsome growths here. For game fish and sport, California is admitted to lead the world not only in trout and black bass, but in the marine fish, like the “leaping tuna® of Catalina Island, which has built about itself an international annual tournament with cups and gold medals and strict laws. The record tuna of 251 pounds and the black sea bass of 380 pounds were taken with light rod and reel and 21-strand line. The coast is very rich in shell fish. It is against the law to have in one’s possession a crab less than six inches in diameter. But though large, they are delicious. Shrimps are abundant. Crawfish, like the eastern lobster in flavor but without mandibles, are abundant. The native oyster is small but flavorsome ; and eastern oysters propagate well here and are excellent in flavor. Mussels, clams, razor-shells, cockles and other edible mollusks are in great abundance. The mollusk most prized by the epicure, though still little known, is the abalone. Its beautiful shell is familiar to collectors all over the world, when polished — a beautiful nacre univalve, measur¬ ing from six inches longer diameter, upward (six inches being the minimum allowed by law). It requires much labor to pry it from the rocks, and still more to beat it into edibility ; but when properly macerated it is deemed the highest delicacy in the market. All game fish, as well as all game quadrupeds and birds, are pro¬ tected by strict State laws, rigidly enforced. The State has 12 fish hatcheries, turning out an¬ nually, of fry: trout, 17,000,000; quinnat Sal¬ omon. ‘20,000,000 ; shad, 1,000,000.

The Mount Shasta hatchery produces more salmon and trout fry than any hatchery in the world. Besides these State hatcheries, there are four hatcheries and egg-collection stations under Federal control.

The value of marine fish, fresh, in 1917 was $11,795,000; packed, $15,235,000; a total value of

$27,030,000.

Railroads and Street Railways. — In 1870 the State had 525 miles of railways, 7,529 in 1910 and 12,145 in 1916. This mileage pertains chiefly to the great transcontinental lines of the Central and Southern Pacific and the Atchison, Topeka and Santa Fe, with much more than half the total. There are three other railroads of over 500 miles each, five more of over 100 miles and 39 shorter lines. Several other trans¬ continental lines have terminals in Los Angeles over leased trackage ; and the ((Salt Lakeˆ (San Pedro, Los Angeles, and Salt Lake) running over its own rails 586 miles, except about 60 miles, leased. In 1870 there was no urban rail transit whatever. In 1873 Hallidie in San Francisco invented the first successful urban rapid transit in the world; and the re¬ sultant cable system is still probably without parallel, as is also the urban and interurban electric system centred in Los Angeles. In 1916 there were 3,032 miles of electric railways in the State, more than half in four counties of southern California. These interurban electrics run 50 to 70 miles an hour, on 110-pound rails. The principal lines are Pacific-Electric (Los Angeles), with trackage of 1,059 miles; Los Angeles Railway, 392; United Railroads, San Francisco, 286; San Francisco-Oakland termi¬ nals, 263; Northern Electric Railway, 165; 30 other roads, 865.

State Finances. — State bonded indebted¬ ness, $39,073,500; bonds voted but not sold, $23,875,000. Except for the Panama-Pacific Ex¬ position, the State has levied no ad valorem taxes on real or personal property since 1910. Its principal revenue is from taxes levied against gross receipts or value of franchises of corporations. For the fiscal year 1917-18 these amount to $16,344,275.

Total assessed valuation of State (1917): realty, $1,860,963,460; personal, $1,861,642,947; total, $3,722,606,407.

Banks. — The great immigration of ((well-to-do® people has proportionately increased the banking business. In 1917 there were 264 national banks as against 147 in 1909 and 421 State banks as against 239 in 1909. The clear¬ ings in 1916 aggregated $5,531,109,926 and $7,- 295,714,819 in 1917. On 30 June 1916 the total bank deposits were $997,635, 191 .66, of which $468,716,944.43 was in commercial and $528,- 918,247.23 in savings banks.

Education. — California probably still leads the Union in proportionate enrolment of college students, having 1 to every 419 of total popula¬ tion, and surpasses New England in pro rata of pupils in secondary schools. The following table shows the present status and the recent progress in education in California :

Number of normal schools .

Number of high schools .

Number of elementary and kin¬ dergarten .

Teachers in public schools .

Pupils in public schools .

Value of school property .

Annual expenditure for schools. .

Number of colleges . ; •

Number of students enrolled in colleges .

1910

5

185

2,119

10,769

349,145

$38,661,701

6,000,000

1917

8

435

5,009 19,074 569,284 $92,800,821 34,133,122 13

15, 136

California has two great free universities. The State University at Berkeley ranks high among American universities in number of undergraduates, and in total number of students is exceeded only by the University of Chicago, New York University and Harvard. It is about 14th in size among the universities of the world. Resources, $7,260,000; supported by State tax of two cents on every $100 valua¬ tion. Mrs. Phoebe A. Hearst, widow of United States Senator Hearst, has contributed great sums to the university, and has secured in a competition open to all the world (won by M. Benard of Paris), a complete architectural plan whose buildings will cost at least $10,000,000. Leland Stanford Jr. University was founded in 1891 by Governor and United States Senator Leland Stanford and wife. The widow later turned over to the university the complete en¬ dowment they designed, amounting to nearly $30,000,000. A harmonious architectural plan, of symmetry ana beauty unrivaled at present by any university in the world, has already been carried far enough to accommodate the 1,200 students (of whom one-third are women) and

has cost several millions. University affairs in California are in the hands of noted educators from the East; standards are high, and friendly rivalry has done much to promote educational affairs throughout the State; while the two uni¬ versities have together over six times the en¬ rolment that the one had a generation ago. The accrediting system has been developed to high efficiency. Coeducation in both univer¬ sities is not an experiment, but acknowledged success. There is a large number of colleges, private schools, seminaries, academies and other educational institutions, besides those under State supervision; also medical law, art, music, dentistry, business and other schools. Educa¬ tionally, California ranks very high in the Union. A large number of distinguished teachers have been attracted by climatic and other considerations. It pays its teachers in public schools an average salary of $943.

Public Libraries. — There are in the State (1918) 826 public and semi-public libraries, in¬ cluding institutional and professional (school, college, law, medical, etc.), besides 111 asso¬ ciation and 33 subscription libraries. The ((free county libraryˆ has become an important feature for outlying rural communities, giving them most of the advantages of a great urban library. Forty-one counties maintain these. The branches of the free public libraries num¬ ber 2,836. Total number of volumes (1916) in 127 leading free public libraries, 3,319,667. There are 175 library buildings; 18 built by their communities, 144 by Andrew Carnegie (in which case the community furnishes the site and a permanent annual maintenance of 10 per cent of the endowment) and 13 by other donors. The largest public libraries are in Los Angeles, San Francisco, Stockton and Oakland. Library schools are maintained by the State Library at Sacramento and the Riverside Public Library. There are training classes at Los Angeles and other points.

In proportion to population, California has twice as many periodicals as New England. At the last Federal census there were in San Fran¬ cisco alone 242 in 13 languages. In 1914 (United States Department Commerce) there were in the State 975 publications in 16 lan-

guages, including English, which had of course the vast preponderance in number and circula¬ tion. There were 15 foreign-language dailies — including five each in Chinese and Japanese, two each in French, Italian and German and repre¬ sentatives in Portuguese, Spanish, Greek, Swed¬ ish, Danish, Croatian, Armenian, Serbian, Hungarian and Russian.

California periodicals, 1914 (United States census) :

Publications

English

Circ.

Foreign—

language

Circ.

Dailies .

162

1,340,807

16

81,655

Weeklies .

498

623,242

31

59 , 300

Monthlies .

159

1,073,867

7

48 , 500

All others .

91

807,271

11

51,636

910

3,845,187

65

241,091

Largely populated by educated people from all over the world, and of recent migration, California has extraordinary activity in all educational, philanthropic, religious, fraternal, literary and similar organizations. The Y. M. C. A. has 68 associations with 30,641 members, $4,000,000 value in buildings, $852,000 annual expenditure. Los Angeles has the largest asso¬ ciation in the State, and probably in America, with (1917) 8,095 members, $902,841 value in buildings and $433,772 annual expenditures. The Association raised

in 1917 $2,360,000 for war and other purposes.

The Y. W. C. A. has 12 city, 14 student and 1 county associations, with total membership 34,820; valuation of buildings $927,208; annual expenditures $390,393. A special quest for funds in 1917 raised $450,000. Particular stress is laid on work among younger and immigrant girls. The California Federation of Women's Clubs numbers 485 clubs and 38,893 members (1917). The war greatly stimulated humanita¬ rian work already existing, and caused the formation of scores of new organizations. The Red Cross raised in its June and December 1917 campaigns in Los Angeles County alone over $1,022,000.

California includes as residents many famous musicians. Los Angeles is one of the few cities in the United States which maintain a symphony orchestra. Communal singing has not advanced as far here as in a few other cities, though it is in progress; but there are few cities where good music can be heard so abundantly and so cheaply. The Bohemian Club of San Francisco and the Gamut Club of Los Angeles are internationally famous; and there are many musical, theatrical and other clubs throughout the State, besides women's clubs, which have been of serious import in the development of musical and art culture.

Other organizations peculiar to the State are the Native Sons of the Golden West and the Native Daughters of the Golden West, patriotic associations composed of persons born in California — perhaps the only State in the Union where such a thing obtains. Each num¬ bers tens of thousand of members and scores of local chapters, called ˆParlors.® The Land¬ marks 'Club was the first corporation in the United States to save historic monuments, and has done a great work in preserving the old missions of California. There are half a dozen

museums of scientific importance in the State — in Berkeley, San Francisco and Stanford, with the Southwest Museum in Los Angeles and the County Museum, with its wonderful array of Pleistocene semi-fossils.

Churches. — Though founded and civilized by the Catholic Franciscan Friars in 1769 (the first Protestant sermon being preached here 80 years later), California is richer per population in Protestant churches than most of the Puri¬ tan States; having (1916) 2,370 Protestant churches, valued at $21,400,565; membership 328,631 (an increase of 60 per cent in 10 years) and under 25 denominations. These churches

contributed to missionary purposes in 1916 $1,650,926. Los Angeles city had 281 Protestant churches with 58,685 members or 10 per cent of the population. San Francisco had 100 such churches with 15,713 members, or 3l/2 per cent of the population. Los Angeles County leads the State with 104,418 members or 31 per cent of total Protestant membership of the 58 coun¬ ties. Alameda comes next with 21,750 members. Twelve denominations maintain 17 Protestant religious schools and colleges, of which more than half are in southern California. It is widely recognized that lack of co-ordination causes great wastefulness in this church work.

The Christian Science churches have multi plied in number and membership very greatly in the last decade ; but no statistics are available They are not included in the list of Protestant or other churches.

The Catholics have 539 churches, of which 298 have resident priests, 155 mission stations, 15 orphan asylums and 8 homes for the aged.

Church membership is as follows :

Churches Members

Methodist . 92 , 065

Presbyterian . 50,704

Baptist . 41,503

Congregational . 32,640

Christian . 32,522

Episcopalian . 28,584

All other 19 Protestant denominations . 50,613

Total Protestant . 328,631

Catholic . 523,233

Charities and Penal Institutions. — Cali¬ fornia has two State prisons, three industrial re¬ form schools, five asylums for insane, one for deaf, dumb and blind, and a great number of public and private hospitals, asylums, orphan¬ ages, *etc.* There are 64 orphan homes, of which 38 receive State aid. There is also a Federal prison on Alcatraz Island in San Francisco Bay.

Military and Naval Establishments. —

There are garrisons and fortifications at the harbors of San Francisco, Los Angeles and San Diego — respectively ((The Presidio,® Fort MacArthur and Fort Rosecrans. There is also a navy yard at Mare Island, and an arsenal at Benicia. The largest training caipp in Cali¬ fornia in the Great European War was Fort Kearney, located near San Diego. Under con¬ tract with the government there is being built in 1918 a large number of wooden and steel and concrete ships, of 3,000 tons and upward, for commerce during and after the war. This shipbuilding is almost exclusively in Los An¬ geles Harbor, Long Beach and San Francisco.

State Government. — State officers elected for four years, except assemblymen for two; no bar to re-election; governor's salary, $6,000;

two-thirds vote in each house passes bill over governor's veto. If he does not act on any bill within 10 days, it becomes law, unless adjourn¬ ment of legislature prevents return of bill, in which case it becomes operative if within 10 days after such adjournment the governor ap¬ proves it. Legislature limited to 40 members in senate, 80 in house; meets biennially, in Janu¬ ary of odd-numbered years. Sessions not limited, but pay allowed members for only 60 days — $8 per day, with traveling expenses and mileage 10 cents per mile. No bill can be in¬ troduced after 50th day of session. State consti¬ tution is notable for numerous restrictions on legislative action ; provision for three-fourths' majority verdict of juries in civil cases; and prohibition of Chinese suffrage and of employ¬ ment of Chinese on State works, or by corpora¬ tions. The initiative, referendum and

recall are also in full use. California was sixth State to adopt <(Woman's Suffrage.® There are 40 State commissions, expending annually nearly $5,000,000. California is represented in the National Congress by two senators, nine con¬ gressmen (prior to apportionment of 1901, seven congressmen). Electoral vote, nine.

Population. — The settlement of California, steadily progressive for 65 years, has been marked by two of the most remarkable shift-ings of population anywhere recorded. Every¬ thing considered, the ((Gold Rush® of 1848-49 has no parallel. In first 12 months after the discovery of a small flake of gold at Sutter's Mill, 42,000 Americans from the far Eastern States made their way across the unbroken plains with wagons. This great migration con¬ tinued uninterruptedly for years. Its demands brought about the first large development of steam navigation ; and the finest clipper ships that had ever been built were constructed for the California trade. In 1845 the white popu¬ lation of California was about 5,000; 4,000 of whom were Spanish Californians, 360 Ameri¬ cans,® 300 English, Scotch and Irish, and the remainder ˆscattering.® By 1850 this number had increased to 92,597 ; by 1860 to 379,994. That is, in 12 years over 370,000 persons reached California by an overland journey of 2,000 miles; or by a voyage of 19,000 miles around the Horn in sailing ships ; or by the 5,000 mile voy¬ age by way of Panama, with its difficult pas¬ sage of the isthmus. For the first decade this precipitate migration was overwhelmingly of men ; and this preponderance of males, with dearth of families and of women, colored in almost every social, political and economic as¬ pect the early fortunes of the State. The scar¬ city of home life, and profligate abundance of money, brought about an era of luxury in pri¬ vate and public expenditures on such a scale as was then hardly dreamed of in the Eastern States. San Francisco had less than 150,000 peo¬ ple when it began to build the largest hotel in the world — covering two and a half acres and costing $7,000,000. Everything was in this pro¬ portion. Enormous subscriptions were sent to relieve great catastrophes of fire, pestilence or war, in all parts of the world. Huge gifts were made to education and other public utilities, or a scale never yet surpassed and at that time else where unheard of. For a generation San Frar cisco was a proverb the world over of prince! living and princely giving. This large popul: tion of young men, vigorous, adventuroi'

mostly unattached, far from home and the con¬ ventions, and under excitation of sudden wealth, shaped and established such an epoch, social and financial, as no other American State has ever comparably

known.

It was only after the first decline in the <(diggings® — after the pursuit of gold became less a fortuitous scramble for surface nuggets, and mining had come to demand skill, patience, and business methods — that attention began to be paid to the soil. Though for 80 years the Franciscan missionaries had already proved, in little oases about their missions, the won¬ derful fertility of California, the aridity of cli¬ mate and the ((look® of the land, so unlike in color and texture to soils recognized as fertile at home, led the adventurers to believe for years that California was worthless except for mining and stock-raising. It was only when the real fecundity of the soil began to be under¬ stood that character of population underwent essential change. Immigration in the first decade was almost purely of male fortune-hunters, with no thought of permanent resi¬ dence. They came to get rich and go home. But when the slow comprehension dawned that in agricultural possibilities the State was incon¬ ceivably richer than in mineral resources, and that here was not only the most hospitable of climates, but the most generous land for home-building, an entirely different type of migra¬ tion began — the migration of families. This stream, small at first, has continued steadily since about 1870. In 1886 the completion of a competing railroad into southern California — to which its first transcontinental line had brought but slow increase of population or development — precipitated another migration numerically greater than the gold rush, almost as rapid, far longer continued and of entirely different category. It was characteristically of well-to-do and educated families, without the heroic qualities of the pioneers, but of much higher average in the civic and financial scale. They came not to tame a wilderness, but to enjoy such a land as travelers seek along the Mediterranean. They came by Pullman cars instead of <(prairie schooner® ; instead of felling forests they planted groves of tropical fruits; instead of building frontier cabins, they erected a class of homes such as probably cannot be found among an equal population. It is only by reference to the peculiar character of this migration that the development and progress of California in all social, educational and material lines during the last 25 years seems at all credible.

In 1880 the population was 864,694; in 1890, 1,208,130; in 1900, 1,485,053; in 1910, 2,377,549, an increase of 60.1 per cent since the census of 1900; in 1916 it was 2,938,654. The recent great increase in population, however, has been dis¬ proportionately in the seven southern counties of the State. Much more than half of the State gain for 20 years has been in eight counties, in¬ cluding in the northern half of the State only the city and county of San Francisco. Since 1880,

Los Angeles had by 1910 outstripped in population 99 other American cities then numer¬ ically larger. In 1900 it was the 36th city in the Union in population, and only 13 cities in the Union had gained as many people in the decade. There are 58 counties, with 116 incorporated lities and towns ; 50 places exceeding 5,000 popu-

lation ; 25 exceeding 10,000; and 12 exceeding 25,000. Of total population of 1,485,053 (1900), whites were 1,402,727 ; colored, 11,045; Chinese, 45,753; Japanese, 10,151; Indians, 15,377. The total males were 820,531 ; females, 664,522. Population has doubled in 1918 ; but these pro¬ portions are practically maintained. While in most of the far Eastern States the excess of females to males is increasing, in California the growth is steadily toward a balance. Of the total population, 1,117,813 were native born and 367,240 foreign.

The 15,377 Indians in California, compris¬ ing at least 14 different linguistic stocks, live principally on three reservations in the north, on 1 at Yuma, and 32 ˆmission" reservations, all on the edge of the desert in the south. They are mostly self-supporting, peaceful and fairly industrious farmers, with government day schools everywhere among them ; besides which, 2,934 Indian children are in public schools. Their chief art is basket-making, in which some tribes lead the world for beauty and value of product. The record price for a basket is $2,000; but prices average from $5 to $50. The government is now encouraging this industry by teaching it in Indian schools.

Chief Cities.— For more than 60 years San Francisco was the largest city west of Saint Louis (about 2,000 miles by rail), and by far the largest on the entire Pacific Coast of North, Central and South America. Within a decade it has been outstripped by Los Angeles, which has now (1918) some 60,000 more population. San Francisco is still the foremost city of the whole Far West in business, commerce, bank clearings and shipping. From a population of 2,000 in February, 5,000 in July and 20,000 in December of-1849 (the first results of the gold rush), it had by the census of 1850 about 25,000; and has increased steadily since as shown by the appended table. The

extraordinary growth of Los Angeles has come from New England and its pioneer migrations as northern New York, the ((Western Reserve" of Ohio, northern In¬ diana, Illinois, Iowa, *etc.* At the annual picnic of the Iowa Societies (one for each county) held annually in Los Angeles County, there are more Iowa people present than the total population of any city in Iowa. The New Eng¬ land ((State Societies" are also very large. In 1880 Los Angeles was the 135th city of the Union in population; in 1910 it was 12th in population, fifth in number of buildings erected, and eighth in value of new buildings; and first in expenditure per capita for new buildings. In 1918 it was about the eighth city in the Union in population. The first Federal census of California was in 1850. The following figures will show sufficiently the proportionate growth of the State and its leading cities:

	1850	1870	1890	1916
State .	92,597	560,247	1,208,130	2,938,659
San Francisco . .	25 , 000	149,473		

298,997

463,516

Los Angeles ….

1,610

5,728

50 , 395.

503,812

Oakland .

48,682

185,604

San Diego .

16,159

90 , 330

Sacramento ….

26,386

75,000

Berkeley .

5,101

60 , 000

Fresno .

10,818

45 , 000

Pasadena .

4,882

46,450

Stockton .

4,124

42 , 000

Long Beach ….

564

32,252

Riverside .

4,683

19,763

San Jose .

18,060

34 , 000

Alameda .

11,165

30 , 000

San Bernardino.

-

4,012

18,000

The first large aviation field-meet in the United States was held in Los Angeles County about 1911. Until recently surpassed by a field in

Texas, the North Island Field, San Diego was the largest in the country. Up to date, 1918, it has had the fewest fatalities, the climatic conditions making this location particularly adaptable for the training of beginners in avia¬ tion. Los Angeles is the world's chief centre of the ((Moving Picture" industry; the expendi¬ ture within the city by the film industries amounting to about $20,000,000 a year, and the actors including nearly all the famous stage favorites. The fact that weather conditions are favorable nearly all the year is no more im¬ portant than the fact that almost every land¬ scape from that of Palestine or the Sahara to that of the Alps, from perpetual summer and roses to snowbanks and glaciers and deserts and almost every other geographic range can be duplicated within easy reach of the various studios, of which there are a large number. Egypt and Babylon and Switzerland, France, England and New England, South America — the pictures of these are almost entirely <(located" in southern California. As with Florida, Switzerland and parts of New England, the tourist must be reckoned by the economist among the assets of the State. This is over¬ whelmingly the case in the southern counties, where the tourist influx amounts in value to from $75,000,000 to $100,000,000 per year. In 1915, over 250,000 tourists visited southern Cali¬ fornia. Unlike the case of other summer or winter resorts the number of tourists who re¬ main permanently or return soon to become residents causes the increase in population which has no parallel in United States history. The climate, the scenery, the romance of the missions and other history, the educational and other advantages, the class of population al¬ ready here, the growth of automobiling and the unrivalled facilities for this in southern Cali¬ fornia have conspired with other causes to make it the most visited State in the Union. Its permanent immigration is small from foreign countries except by individuals. Its great growth comes from the better classes of the Eastern States. From Point Concepcion on to San Diego (nearly half the total coastline of the State) the littoral is dotted with dozens of cities, towns and resorts largely depending upon their in¬ terests of bathing, boating, fishing, yachting, *etc.* The most important of these, from north to south, are Santa Barbara, Ventura, Santa Monica, Venice, Ocean Park, Redondo, Long Beach, La Jolla and Coronado at San Diego. The important seaside towns have their en¬ closed swimming tanks ; but many people take surf baths every month in the year. For climatic reasons above stated, the seaside above Point Concepcion is not as popular nor as popu¬ lous for marine diversions, the water and the weather being alike too cool. Perhaps the most famous of these seaside resorts is the island of Catalina, about 20 miles off coast from the harbor of Los Angeles, with its placid bay and its remarkable ((Marine Gardens" which are viewed through glass-

bottom boats ; and its fishing which is internationally famous. Cali¬ fornia is the paradise of the automobilist, and has more auto-vehicles per capita than any other part of the world. Within 10 years (end¬ ing with 1917) over $40,000,000 have been spent

by State and counties on ((good roads® — of native asphalt and gravel, largely founded on concrete, and generally smooth as a table. One can ride almost from end to end of the State on these luxurious roads — and over 1,000 miles in Los Angeles County alone. There are many extraordinary scenic drives — some over a mile above the sea. This has naturally led to the decimation of deer, duck, rabbits, quail and trout, as well as the multiplication of cars. There were in 1917 over 400,000 auto-vehicles in the State — about two-thirds in the southern half. Southern California has also the largest per capita number of telephones in the world. The automatic telephone was perfected here. The number of telephones in California, 1 Jan. 1918, was 669,470, being one telephone to every 4.38 persons; for San Francisco, 130,175, being one to every 3.56 persons; for Los Angeles, 132,662, being one telephone to every 3.79 per¬ sons. Comparison is often more graphic and more instructive than mere figures. California has a total area practically equal to that of Maine, New Hampshire, Vermont, Massachu¬ setts, Connecticut, Rhode Island, New York and Pennsylvania combined; or England, Ire¬ land, Scotland, Wales, Barbados, Mauritius, Straits Settlements, Cyprus and Hongkong together; or our Philippines, Hawaii, Porto Rico, Samoa and Guam, with Massachusetts and Connecticut thrown in. California has in its 18 ((National Forests® more acres of great trees than the total area of the States of New Hampshire, Massachusetts, Connecticut, Rhode Island and Delaware — and nearly another Delaware thrown in ; and the national reserves are less than half the forestation of the State. California has enough primal desert to blanket most of New England. But in that same desert is more mineral production per annum (except coal and oil) than is recorded for all States east of the Alleghanies in all their history.

California's hay, grain and alfalfa fields are nearly as large in area as the States of Con¬ necticut and Delaware. California's fruit farms cover more than twice the area of Rhode Is¬ land; and California's acreage to vegetables another Rhode Island. Nor do these figures for vegetables include half another Rhode Is¬ land in cultivated home-lots. California's acreage in beans, sugar, beets and potatoes is 15 per cent larger than Rhode Island.

History. — The name California, for which so many preposterous derivations have been urged, is taken from a Spanish romance, called (Sergas de Esplandian) ((Exploits of Esplan-diaiP) by Ordonez de Montalvo (translator of (Amadis de GauP), printed about 1510, and often mentioned in old sources. (<California® was a mythical island ((on the right hand of the Indies, very near the Terrestrial Paradise,® peopled with Amazons and Griffins. 'The name was first applied to the peninsula (discovered by Jimenez 1533) and is first recorded thus in Preciado's diary of Ulloa's coastwise voyage in 1539. In time it came to be used indefinitely for the whole Pacific Coast from the peninsula practically to Nootka; and later <(the Californias,® differentiated into Baja (or Lower) California and Alta (Upper) California, the former including about what is now the Mexi¬ can Peninsular Territory. The first European to touch the present Stat« was Alarcon, who

went up the Colorado River some hundreds of miles in 1540. The first seaboard exploration was by Cabrillo 1542; and the next important coast explorations were by Sir Francis Drake 1579, and Vizcaino 1602. The first colonization of Upper California was in 1759 by the Fran¬ ciscan missionaries under Junipero Serra, with a small escort of Spanish troops. These pioneer missionaries had by 1800 founded 18 missions, whose total population, mostly Indian neo¬ phytes, was 13,000. Three other missions were established by 1823. The mission period lasted about 65 years ; converted over 80,000 Indians ; erected in the wilderness at least $1,000,000 worth of buildings, and had developed stock-raising and wheat on a scale which astonished Humboldt. In 1834 the Mexican government ˆdisestablished® the missions and confiscated their property. The Indians were scattered, and perished in great numbers. The buildings were plundered and left to decay. At present the Landmarks Club (incorporated) is pre¬ serving the mission edifices. The State passed from Spanish rule to that of the Mexican repub¬ lic, 1821 ; was seized, practically without resist¬ ance, by the United States in 1845, and ceded bv Mexico at close of Mexican War ; Admitted to the Union, 9 Sept. 1850. _The American dis¬ covery of gold caused an unprecedented trans¬

continental migration (see Population) . Aside from the great impetus given steam and clipper ships, the migration had other unique features — like the Merchants' Express, which employed 5,000 men, 2,000 wagons and 20,000 yoke of oxen in freighting across the continent; and the Pony Express, which carried mail (letters only) at $5 per half ounce, 1,950 miles horse¬ back from Independence, Mo., to San Fran¬ cisco, in 10 days; and the Butterfield stages, 8 times a month between Saint Louis and San Francisco, via Texas and New Mexico; quickest time, 21 days from New York to San Francisco. Extraordinary records were made in this over¬ land traffic. Robert H. Haslam (((Pony Bob®) made one continuous ride of 380 miles; and William F. Cody (((Buffalo Bill®) one of 384, without stopping except for meals and to change horses — both as riders of the Pony Express. .The quickest time made by this route (1,950 miles), was 7 days, 17 hours. The growth of this overland traffic led California capital¬ ists, heavily subsidized by government, to build a transcontinental railroad. Ground was broken at Sacramento for the Central Pacific Railroad 8 Jan. 1863. The road was completed by driv¬ ing of a spike of pure California gold by Gov¬ ernor Stanford in the presence of distinguished company at Promontory, Utah, 10 May 1869. In 1877 the Southern Pacific Railroad from Texas tidewater to San Francisco was completed. In 1885 the Atchison, Topeka and Santa Fe Railroad reached Los Angeles from Saint Louis; and in about 1910 was extended to San Francisco. The latter and the Southern Pacific Railroad are among the longest railroad systems in the world, the former with a mileage of 8,648 and the latter with a mileageof 7,065. The modern development of California dates from competi¬ tion of these two lines during the decade be¬ ginning 1886.

The swift creation of an American common¬ wealth by the sudden horde of adventurous pioneers upon whom that duty at once devolved

is perhaps the most remarkable monument to the genius of the American people for self-government. Ninety thousand wanderers, home¬ less, wifeless and chaotic in the wilderness, fevered by

enormous and sudden gains, without cities or laws or communication with the out¬ side world, within a year installed soberly and firmly all essential machineries of an American State. The desperadoes who flocked in from all parts of the world — including a large contin¬ gent of Australian convicts — were firmly sup¬ pressed, though not at once. Between 1849 and 1856 there were in San Francisco alone 1,000 homicides and seven executions. In 1856 the second vigilance committee, composed of the best citizens, after full and formal trial, publicly hanged half a dozen of the worst des¬ peradoes, and banished scores of others on pain of death. Since that time life and property fiave been quite as safe in California as in the East¬ ern States. Chinese exclusion, though finally a national measure, was brought about by Cali¬ fornia, which then contained a majority of all Chinese in this country. In 1879 California voted exclusion by 154,638 to 883. The num¬ ber of Chinese in the State has decreased from 75,132 in 1880 and 72,472 in 1890 to 45,753 in 1900. The bitterness aroused by the exclusion struggle has passed, and Chinese are well treated.

California entered the Union as a free State, thus giving balance of power to the North. In State elections since the war it has been pecul¬ iarly independent, having gone Democratic in 1867, 1875, 1882, 1886 (Democratic governor and Republican lieutenant-governor, who became governor by his superior's death) and 1894; Republican in 1871, 1879, 1890, 1898 and 1902.

In politics, California is counted ((Safe Re¬ publican.® For its first half century it came near alternating between the two great parties ; but from 1902 to 1918 has elected only Republi¬ can governors (including a "Progressive®). In national politics it has given its electoral vote in the same 16 years for only one Democratic President — 'Wilson, second term. This was largely by the women's vote, and on the slogan ((He kept us out of war.® The presidential vote of California was decisive. California was the sixth State to adopt (1911) equal suffrage, and the first State of considerable size — being more than double the total population of the five earlier equal suffrage States. In 1916, out of a population of 3,000,000, the total registra¬ tion was 1,314,446; the total vote nearly 80 per cent of this, ranging from 39 per cent to 46 per cent women. No woman has been elected to a Federal or State office; about 30 have been appointed. In counties and cities, over 50 women have been elected to office — from 18 superintendents of schools, to one county clerk and the only councilwoman in the county (Los Angeles). There are several policewomen, probation officers, etc.; and many serving on civic commissions. The question of their eligibility on juries is not yet

(1918) de¬ termined, and depends on the ruling of the judge. Women have procured the introduction and enactment of over a dozen humanitarian laws of varying importance and value, chiefly concerned with women and children, prohibition and “the social evil.®

Next to the gold excitement (see Mining and Population) the most sensational era in

California history was the great bonanza silver period from 1859 to 1880. The mines were in Nevada, but were owned in San Francisco, and an era of stock-gambling theretofore unheard of in history, and probably not yet surpassed, sprang from their sensational yield. Stocks on the San Francisco board rose $1,000,000 a day for many months, and sales in one year were $120,000,000. Everybody gambled in stock, from bankers to scrubwomen. In 1875, with less than 200,000 population, San Francisco had 100 millionaires. The “Consolidated Virginia® mines paid $1,000,000 per month dividends for nearly two years. One lode was valued at nearly $400,000,000 ; $250,000,000 was spent in “developing® a small group of hills. The deca¬ dence of these great bonanzas, following the subsidence of gold mining to sober methods, at last turned more general attention to agricul¬ ture, the real wealth of the State. (See Agri¬ culture). In 1880 California was first in the Union only in gold, sheep and quicksilver; all other industries being far down the list. It is now first in gold ; ninth in sheep ; first in diversity of crops; first in wines, total fruits, canned fruits, dried fruits, barley; first in num¬ ber of irrigated farms ; first in average wages in manufacturing establishments; first in borax, asphalt, quicksilver, platinum ; second in cop¬ per; third in wheat; first in beet sugar; first in hops ; first in oranges, lemons, olives and all semi-tropic fruits, honey, prunes, walnuts, al¬ monds, beans, grapes, pears, peaches, cherries, apricots, etc.; first in electric power trans¬ mission ;. third in shipbuilding; second in pe¬ troleum; fifth in total value products per farm; eleventh in value of farm products per capita; twelfth in total value of manufactured products.

The highest California gold product in any one year was $85,000,000. The total agricul¬ tural products for 1916 were $194,566,000 ; and total value of manufactured products (1916)

$712,800,764.

A South Sea bubble as wild as the Com¬ stock silver stock-craze was the great “Land Boom® of southern California, 1886-87, a period of land-gambling never quite equaled in any other part of America. An area as large as New England was involved, with varying in¬ tensity; but the chief focus of excitement was in Los Angeles, San Bernardino and San Diego counties. Scores of thousands of city lots were staked out far from towns; hundreds of miles of cement sidewalks and curbs were laid; scores of big hotels and other buildings erected as baits, and great quantities of lands (pur¬ chased at from $10 to $30 per acre) were sold in town lots at $1,000 to $10,000 per acre. In Los Angeles County alone, with a population then not over 50,000, real estate transfers recorded in 1887 were over $100,000,000. Ex¬ cursion auction sales of new “towns® some¬ times realized $250,000 in a day; and $100 was often paid for place in the line waiting for a sale to open. The collapse of this gigantic bubble, early in 1888, was as extraordinary in its freedom from disaster as it had been in its inflation. Not a bank failed, nor a business house of respectable standing; and while desert town lots reverted to acreage and acreage values, all really desirable real estate, rural and urban, has constantly advanced in value every year — thanks to the uninterrupted continuance of large and wealthy immigration, Building of

homes and setting out of orchards continue on an extraordinary scale. (<Local option0 is in force; and nearly all towns of southern Cali¬ fornia are “prohibition.”

MILITARY AND PROVISIONAL GOVERNORS.

Corn. John D. Sloat . 1846

Col. Robert F. Stockton . 1846-47

Col. John C. Fremont . 1847

Gen. Stephen W. Kearny . 1847

Col. R. B. Mason . 1847-49

Gen. Persifcr F. Smith . 1849

Gen. Bennet Riley . 1849

STATE GOVERNORS.

Peter H. Burnett . Democrat .

John H. McDougall . “ _

John Bigler . “ ……

John N. Johnson . Know-Nothing

John B. Weller . Democrat… .

Milton S. Latham . “ ….

John G. Downey . “ ….

Leland Stanford . Republican …

Frederick F. Low . “ …

Henry H. Haight . Democrat… .

Newton Booth . Republican…

Romualdo Pacheco . “

Willipm Irwin . Democrat… .

George G. Perkins . Republican …

George Stoneman . Democrat ….

Washington Bartlett . “ ….

Robert W. Waterman …. Republican …

Henry H. Markham . “ …

James H. Budd . Democrat… .

Henry T. Gage . Republican …

George C. Pardee . “ …

James N. Gillett . “ …

Hiram W. Johnson . Progressive …

1849-51

1851-52

1852-56 1856-58 1858-60 1860 1860-61 1861-63 1863-67 1867-71 1871-75 1875 1875-79 1879-83 1883-87 1887-1887-91 1891-95 1895-99 1899-1903 1903-07 1907-10

1910-

Bibliography. — General History: Hittell, T. H., (History of California 5 (4 vols., 1897, exhaustively indexed and by one author) ; Ban¬ croft, H. H., ‘History of California5 (7 vols., 1890, by anonymous staff, and inadequately in¬ dexed) ; Hittell, J. S., ‘History of San Fran¬ cisco 5 (1876, concise and reliable, to its date).

Mission Period: Duhaut-Cilly, A., ‘Voyage autour du monde, 1826-29) (2 vols., 1835) ;

Forbes, Alex., (History Upper and Lower California) (1839) ; Jackson, Helen Hunt ((<H. H55.), <Glimpses of Three Coasts) (1886), reprinted in (Glimpses of California and the Missions) (1902) ; Englehardt, F. Zephyrin, ‘Missions and Missionaries of California) (4 vols. and index vol.) ; Clinch, California and its Missions) (2 vols.) ; Carter, C. F., California Missions) (a careful digest of all important facts about the Missions, in a small book) ; Chase, T. Smeaton, and Saunders, Chas. F., Che Cali¬ fornia Padres and their Missions) (1915). The vast bulk of sources on this period is in Span¬ ish, and inaccessible to English students.

Contemporary writers on Pioneer period American occupation: Colton, Rev. Walter, (Three Years in California) (1850) ; Thornton, J. Q., Cregon and California in 18485 (2 vols., 1849) ; Bryant, Edwin, (What I Saw in California) (1849) ; Revere, Lieut. J. W., 'Tour of Duty in California) (1849) ; Soule, F., (Annals of San Francisco5 (1855); Taylor, Bayard, California and Mexico5 (1850), and 'Home and Abroad) (1862, 2d series) ; Majors, A. M. (manager "Merchants' Express"), (Seventy Years on the Frontier5 (1893) ; Newmark, Har¬ ris, (Sixty Years in Southern California >

(1916).

Mining: Shinn, C. H., ' Mining Camps5

(1885), and (Story of the Mine5 (1896); also both Hittells, sup.

Physiography, Mountains and Forests: Muir John, Che Mountains of California5 (1894), and Cur National Parks5 (1901).

Climate, Modern Development and General: Warner, Chas. Dudley, (Our Italy5 (1892) ; Nordhoff, Chas., California for Health, Pleas= ure and Residence5 (1882), and 'Northern California5 (1874) ; Van Dyke, T. S., 'South¬ ern California5 (1886), and 'Millionaires of a Day5 (1892) (Land-Boom) ; Bindley and Wid-ney, 'California of the South5 (1896) ; "H. H." as above; Smythe, Wffl, E.* Conquest of Arid America5 (1900) ; Ltimfhis, Chas; F;, Ch@ Right Hand of tne Continent* (hi press).

Statistical: Census United States; Cali¬ fornia State Reports ; Bulletins United States Census, California State Bureaus, California Development Bureau; McCarthy's 'Statistician and Economist5 (San Francisco) ; vid. Reports, United States Department Agriculture, *etc.*

Charles Fletcher Lummis, Founder Emeritus, The Southwest Museum, Founder and President, Landmarks Club.

CALIFORNIA, Gulf of, or SEA OF CORTEZ, an arm of the Pacific Ocean, sep¬ arating Lower California from the Mexican mainland. It is 700 miles in length, varies in width from 40 to 100 miles, and has a depth ranging from 600 feet near the head to over 6,000 feet near the mouth, containing many islands in the upper part. There is but little navigation carried on there. On the western coast are pearl fisheries.

The gulf was dis¬ covered by Cortez, and for some time was called after him. The river Colorado empties into the northern extremity.

CALIFORNIA, Lower or Old, a territory of the republic of Mexico, forming a peninsula in the Pacific Ocean, united on the north to the continent, from which it is separated on the east, throughout its entire length, by the Gulf of California. It extends from about lat. 22° 40’ to 32° 40’ N. It is about 750 miles in length, and in different places 30, 60, 90 and 150 miles wide. The coast forms many capes, bays and havens, and is fringed by numerous islands. A chain of mountains extends through¬ out, of which the greatest height is from 4,500 to 4,900 feet above the sea, the latter being the height attained by its culminating point, Cerro de la Giganta. The chain is almost destitute of vegetation, having only here and there a few stunted trees or shrubs. It has a single vol¬ cano, and possesses distinct traces of volcanic origin. The foot of the range is covered with cactuses of remarkable size. Some of the hollows, where the soil is formed of decom¬ posed lava, are tolerably fertile. On the plains the soil is often of the richest quality, and when the advantage of irrigation can be ob¬ tained, raises the most abundant crops ; but this advantage often fails, owing to the great deficiency of water. Rain seldom falls in sum¬ mer, in most of the region ranging from under 10 to 25 inches, and the streams are very in¬ significant. The climate varies much accord¬ ing to locality. On the coast of the Pacific the temperature ranges in summer from 58° to 71°. At a distance from the coast, where the sea breeze is not enjoyed, the summer heat is excessive. The principal food products are maize, manioc wheat, grapes, oranges, lemons, pineapples and other choice fruits; cattle rais¬ ing, fishing, gold mining and pearl fishing are also successfully carried on. La Paz, in the

south, is the capital ; Ensenada, in the north, is a rising port. Lower California was explored by order of Cortez in 1532-33, and was Visited try Drake as early as 1579, In 1697 the lesuits(formed establishments hi the territory, built villages and missions, and in

some meas¬ ure civilized the natives. On their expulsion in 1767, the missions were carried on by the Dominicans. Pop. about 52,244, of whom probably about half are Indians.

CALIFORNIA, Pa., borough in Washing¬ ton County oil the Monongahela River, 50 miles south of Pittsburgh, on the P., V. and C. Railroad. The largest Coal mine in the world is located here (Vesta No. 4). There are also manufactures of glass bottles and foundry and machine shops. The resources of the two banks amount to $1,735,045. The Southwestern State Normal Schools and the borough public and high school are situated here. The latter and the borough building are fine structures. The government is in the hands of a council of seven members. Pop. about 2,500.

CALIFORNIA, University of, a univer¬ sity which is a part of the State educational system in California, but supported as well by the income from endowments and by national aid.

In 1869 the College of California, which had been incorporated in 1855 and which had car¬ ried on collegiate instruction since 1860, closed its work of instruction and transferred its prop¬ erty, on terms which were mutually agreed upon, to the University of California.

The university was instituted by a law which received the approval of the governor, 23 March 1868. Instruction was begun in Oakland in the autumn of 1869. The commencement exercises of 1873 were held at Berkeley, 16 July, when the university was formally transferred to its per¬ manent home. Instruction began at Berkeley in the autumn of 1873. The new constitution of 1879 made the existing organization of the uni¬ versity perpetual.

The professional schools were contemplated in the original plan, but not organized till later. The governing body, the board of regents, con¬ sists of the governor and lieutenant-governor of the State, the speaker of the assembly, the State superintendent of public instruction, the presi¬ dents of the State Agricultural Society and the Mechanics' Institute of San Francisco, and the president of the university (all regents ex offi¬ cio), and 16 others appointed by the governor for a 16-vear term with the advice and consent of the senate. The uni.ersity comprises the following colleges and departments: (1) In Berkeley: the colleges of letters and science, commerce, agriculture (courses at Berkeley; farms and laboratories, etc., at Davis, River¬ side, Whittier, Chico, Santa Monica, Tulare County, Meloland and Kearney Park, Fresno County), mechanics, mining, civil engineering, chemistry ; the schools of architecture, educa¬ tion, jurisprudence,

medicine (first year and part of second year), the university extension division, the California Museum of Vertebrate Zoology; (2) at Mount Hamilton: the Lick Astronomical Department (Lick Observatory) ; (3) at Santiago, Chile: the D. O. Mills Observatory; (4) in San Francisco: the Cali¬ fornia School of Fine Arts, the Hastings Col¬ lege of Law, the medical school (part of second

year, and the third, fourth and fifth years, in¬ cluding the University Hospital, the George Wililams Hooper Foundation for Medical Re¬ search, the college of dentistry, the California college of pharmacy, the museum of anthropol¬ ogy, archaeology and art; (5) in Los Angeles ; Los Angeles Medical Department (graduate in¬ struction only) ; (6) the Scripps Institution for Biological Research at La Jolla; (7) the Herz-stein Research Laboratory of Biology at Pacific Grove, and (8) the Summer School of Sur¬ veying at Swanton.

In 1896 Mrs. Phoebe Apperson Hearst in¬ formed the regents that she proposed to erect a building, but wished first a ‘ worthy general plan for the Berkeley campus, and that she would bear the expense of an international competition to obtain such a plan. In 1898 an international jury assembled at Antwerp and voted upon more than 100 plans submitted, awarding prizes to 11 competitors, who were invited to visit the university and to pre¬ pare revised plans for a second competition. In September 1899, the jury met again in San Francisco and gave the first prize ($10,000) to M. Emile Benard of Paris. After a long stay in Berkeley and many conferences with the uni¬ versity authorities, M. Benard undertook a re¬ vision of his drawings to fit the plans to the actual necessities of the site and the prospective needs of the university. In December 1909, he submitted a design which the regents adopted as the permanent plan. To Mr. John Galen Howard was entrusted the development of the plan, as supervising architect. In realiza¬ tion of the Hearst plan, several buildings have been completed including the Hearst Memorial Mining Building, given by Mrs. Hearst for the college of mining of the university and as a memorial to the late Senator George Hearst; California Hall, for which an appro¬ priation of $250,000 was made by the California legislature, and the president’s house. Another notable building is the beautiful Greek theatre, an open-air auditorium, seating 8,000, pat¬ terned after the classic theatres of Greece and the Greek colonies, and given to the university by Mr. William Randolph Hearst. Among other new buildings is the library, for which generous provision was made by Mr. Charles F. Doe of San Francisco, who bequeathed $700,000 for this purpose.

Since this time gifts and appropriations have made possible the erection of a series of new buildings. As a memorial to her husband, the late Judge John H. Boalt, Mrs. Elizabeth J. Boalt in 1908 made a gift of about $100,000. to the university for the erection of a Hall of Law. Members of the bench and bar of Cali¬ fornia subscribed an additional $50,000 and on the 28th of April, 1911, the Boalt Hall of Law, constructed of white granite and completely equipped with library, offices and class rooms, was formally dedicated. Upon the death of Mrs. Jane K. Sather on 12 Dec. 1911, President Wheeler, as her trustee, sold to the regents of the university property valued at $400,000 which Mrs. Sather had left as a gift to the university. Of this sum $200,000 was devoted to the erection of the Sather Tower, a white granite campanile 302 feet in height, designed after several similar towers in Italy, but not a direct replica of any one. In 1917 the Sather Bells, made in Europe

at a cost of $10,000, were hung in the Sather Tower and the Sather Esplanade* was con¬ structed at its base at a cost of $40,000. Benja¬ min Ide Wheeler Hall, the new classroom building, was made ready for occupancy in January 1917. It was built at a cost of $720,000, of white granite, and represents the Georgian tradition in architecture. It contains an audi¬ torium seating 1,020 people, 62 classrooms, 48 studies for members of the faculty (each study accommodating two), a large and comfortable faculty room, and accommodations for 4,889 students at one time. Hilgard Hall, the new agriculture building, was dedicated in the sum¬ mer of 1917. If was built of reinforced con¬ crete at a cost of $362,000, to house instruction in agronomy, citriculture, forestry, genetics, pomology, soil technology and viticulture. The exterior of this building is notable for the highly original treatment of decoration in sgraffiti — the use of colored cements for adorn¬ ment of concrete surfaces. Work was started in 1917 on Gilman Hall, which is being built at a cost of $220,000, to house the research labora¬ tories in chemistry. It will be used by the faculty and by graduate students. Reinforced concrete is the building material used. These three buildings were designed by John Galen

Howard, professor of architecture and super¬ vising architect in the university. Under his direction also has been completed the university library, at a cost of about half a million dol¬ lars, making the total cost of the building $1,- 400,000. Special features of the new portion are a second reading room seating 240 readers and used for periodicals (of which the uni¬ versity receives 8,000 titles), 20 seminar rooms, 22 faculty studies and space for book-stacks to hold 1,250,000 volumes, although at present this space is only utilized for some 600,000 volumes. In San Francisco the univer¬ sity has built the university hospital at a cost of $700,000, with accommodations for 225 patients. It is mainly intended as a laboratory for the university's medical school and the Hooper Foundation for Medical Research.

The university has 542 officers of instruc¬ tion, 5,850 students, a library of 360,000 volumes, an art gallery, museums and laboratories, also the agricultural experiment grounds and sta¬ tions, which are invaluable adjuncts of the farming, orchard and vineyard interests of the State. In San Francisco there are 150 officers of instruction, besides demonstrators and other assistants, and 775 students. Tuition in the col¬ leges at Berkeley, during regular sessions, is free to residents of California; non-residents pay a fee of $10 each half year. In the pro¬ fessional colleges, in San Francisco, except that of law, tuition fees are charged. The instruc¬ tion in all the colleges is open to all qualified persons, without distinction of sex. The con¬ stitution of the State provides for the perpetua¬ tion of the university with all its departments.

In 1917 there were 5,850 students in all the departments, of whom about 60 per cent, due to the entrance of the United States into the war, were women; it is also to be noted that a com¬ paratively large proportion of students is in the general or academic courses, as distinguished from the technical and professional courses.

CALIGULA, Gaius Caesar Augustus Germanicus, Roman Emperor, a son of Germanicus

and Agrippina: b. 31 Aug. 12 a.d., in the camp at Antium, and brought up among the legions ; d. 24 Jan. 41 a.d. He received from soldiers the surname of Caligula, on account of his wearing the ealigee, the boots commonly used by the soldiers. He understood so well how to insinuate himself into the good graces of Tibe¬ rius that he not only escaped the cruel fate of his parents, and brothers, and sisters, but was even loaded with honors. Whether, as some writers inform us, he

removed Tiberius out of the way by slow poison is uncertain. When the latter was about to die he appointed, ac¬ cording to Suetonius, Caligula and the son of Drusus, Tiberius Nero, heirs of the empire. But Caligula, universally beloved for the sake of his father, Germanicus, was able without difficulty to obtain sole possession of the throne. Rome received him joyfully, and the distant provinces echoed his welcome. His first actions were just and noble. He interred, in the most honorable manner, the remains of his mother and of his brother Nero, set free all state prisoners, recalled the banished and forbade all prosecutions for treason. He con¬ ferred on the magistrates free and independent power. Although the will of Tiberius had been declared by the Senate to be null and void, he fulfilled every article of it, with the exception only of that above mentioned. When he was chosen consul he took his uncle, Claudius, as his colleague. Thus he distinguished the first eight months of his reign by many magnani¬ mous actions, when he fell sick. After his recovery, by a most unexpected alteration, which has given good grounds to suspect his sanity, he suddenly showed himself the most cruel and unnatural of tyrants. The most ex¬ quisite tortures served him for enjoyment. During his meals he caused criminals, and even innocent persons, to be stretched on the rack and beheaded ; the most respectable persons were daily executed. In the madness of his arrogance he even considered himself a god, and caused the honors to be paid to him which were paid to Apollo, to Mars, and even to Jupiter. He also showed himself in public with the attributes of Venus and of other goddesses. He built a temple to his own divin¬ ity. At one time he wished that the whole Roman people had but one head, that he might be able to cut it off at one blow. He fre¬ quently repeated the words of an old poet, Odcrint dum metnant — ((let them hate so long as they fearA He squandered the public money with almost incredible prodigality. One of his greatest follies was the building of a bridge between Balae and Puteoli (Puzzuoli), in order that he might be able to boast of marching over the sea on dry land. He had it covered with earth, and houses built on it, and then rode over it in triumph. He gave a banquet in the middle. of the bridge, and to celebrate this great achievement ordered numbers of the spectators whom he had invited to be thrown into the sea. On his return, he entered Rome in triumph, because, as he said, he had con¬ quered nature herself. After this, he made preparations for an expedition against the Ger¬ mans, passed with more than 200,000 men over the Rhine, but returned after he had traveled a few miles, and that without having seen an enemy. Such was his terror, that, when he came to the river, and found the bridge ob-CALIPH

structed by the crowd upon it, he caused him¬ self to be passed over the heads of the soldiers. He then went to Gaul, which he plundered with unexampled rapacity. Not content with the considerable booty thus obtained, he sold all the property of both his sisters, Agrippina and Livilla, whom he banished. He also sold the furniture of the old court, the clothes of Marcus Antonius, of Augustus, Agrippina, *etc.* Before he left Gaul, he declared his in¬ tention of going to Britain. He collected his army on the coast, embarked in a magnificent galley, but returned when he had hardly left the land, drew up his forces, ordered the signal for battle to be sounded, and commanded the soldiers to fill their pockets and helmets with shells, while he cried out, ((This booty, ravished from the sea, is fit for my palace and the capitol !® When he returned to Rome, he was desirous of a triumph on account of his achievements, but contented himself with an ovation. Discontented with the Senate, he resolved to destroy the greater part of the members, and the most distinguished men of Rome. This is proved by two books which were found after his death, wherein the names of the proscribed were noted down, and of which one was entitled Gladius (Sword), and the other Pugillus (Dagger). He became rec¬ onciled to the Senate again when he found it worthy of him. Caligula's morals were, from his youth upward, corrupt. After he had mar¬ ried and repudiated several wives, Caesonia re¬ tained a permanent hold on his affections. A number of conspirators, at the head of whom were Chaerea and Cornelius Sabinus, both tribunes of the praetorian cohorts, murdered him in the 29th year of his age, and the fourth of his tyrannical reign, which thus lasted from 37 to 41 a.d. Consult Baring-Gould, (The Tragedy of the Caesars) (London 1892).

CALIPH (Fr. calif e, Ar. khalifa, calif, suc¬ cessor), is the name assumed by the succes¬ sors of Mohammed in the government of the faithful and in the high-priesthood. Caliphate is therefore the name given by historians to the empire of these princes which the Arabs founded in Asia, and impelled by religious en¬ thusiasm, enlarged, within a few centuries, to a dominion superior in extent to the Roman em¬ pire. The title is still borne by the Sultan of Turkey. Mohammed, in the character of the prophet of God, made himself the spiritual and temporal ruler of his people. In the following account the dates both of the Hegira and the Christian year are often given. The difference in the mode of computing the Mohammedan year has caused

considerable divergencies among authorities in regard to the exact dates of the particular events of Mohammedan his¬ tory.

After the death of the Prophet the election of a successor occasioned considerable excite¬ ment, Mohammed having left no son and nom¬ inated no successor. Abdallah Ebn Abu Koa-fas, called Abubekr, that is, father of the virgin (because his daughter Ayesha was the only one of the wives of Mohammed whom he had married as a virgin), obtained the victory over Ali, the cousin and son-in-law of Mo¬ hammed, and became the first caliph. 632 a.d. (year of the Hegira 11). Victorious over enemies at home, by the aid of his general,

Khaled, <(the Sword of God,® he proceeded, as the Koran directs, to spread the doctrines of Mohammed by arms among the neighboring nations. With the watchword, conversion or tribute, a numerous army, consisting entirely of volunteers inspired with zeal for the holy war, penetrated into Syria and Mesopotamia, but before much could be done, Abubekr died after he had filled the place of the Prophet two years and four months.

Omar, another father-in-law of the Prophet, now became second caliph, and under him the war was continued. The Moslems having once acquired a strong footing in Syria by the treacherous surrender of Bosra, they under¬ took, under Khaled, the siege of Damascus, and having repulsed two large armies, sent by the Emperor Heraclius to the relief of the city, they obtained possession of it by a capitulation (635 a.d.) , the terms of which were perfidiously broken, Khaled pursuing and slaughtering the retreating Christians. By him and other gen¬ erals, though not without a brave resistance on the part of the Greeks, the subjugation of Syria was completed (638 a.d., of the Hegira 17). Jerusalem having been compelled to sur¬ render (636 a.d., Heg. 15), Omar proceeded thither in person to fix the terms of capitula¬ tion, which subsequently served as a model in settling the relations of the Moslems to the subject Christians. These terms were carefully observed by the conscientious caliph. The new Persian empire of the Sassanidse was also over¬ thrown, and Mesopotamia and other extensive regions overrun. Equally successful was the Mohammedan general, Amru, in Egypt, which was subjected to the caliphate in two years (641). Omar was the first who bore the ap¬ pellation of Emir al Moumenin ((<Prince of the Faithful®) — a title inherited by all suc¬ ceeding caliphs. Many of these conquests were over Christian populations who readily changed their creed and adapted themselves to the new rule.

After the murder of Omar by a revengeful slave (644 a.d., Heg. 23), a council, appointed by him on his deathbed, chose Osman, or Oth-man, son-in-law of the Prophet, passing over Ali. Under him the empire of the Arabs con¬ tinued to expand. From Egypt the tide of con¬ quest advanced westward along the northern coast of Africa, as far as Ceuta. Cyrus too (647 a.d.), and Rhodes (654 a.d.) were con¬ quered; but the former was lost again two years after. An agitation against Othman now arose, partly owing to the fact that he favored and aggrandized his own family connections in every way, and entrusted the provinces, not to the most capable, but to his favorites. To many also the claims of Ali to the caliphate were deemed superior to those of Othman. The dissatisfaction thus excited occasioned a gen¬ eral insurrection in the year 656 (Heg. 34), which terminated in Othman's death.

Ali, the son-in-law of the Prophet by Fatima, became the fourth caliph, by the choice of the people of Medina, and is regarded as the first legitimate possessor of the dignity by a numer¬ ous sect of Mohammedans, which gives him and his son, Hassan, almost equal honor with the Prophet. This belief prevails among the Persians, and others who belong to the Shiite sect as opposed to the Sunnites or Orthodox. Instead of being able to continue the conquests

of his predecessors, Ali always had to contend with domestic enemies. Among these was Ayesha, the widow of the Prophet, called the mother of the faithful ; also Tellah, Zobeir, and especially the powerful Moawiyah, governor of Syria, who all laid claim to the government. These were able to create suspicion, and spread the report that Ali had instigated the murder of Othman. In vain did he endeavor to repress the machinations of his enemies by entrusting the government of the provinces to his friends. Nowhere were the new governors received. The discontented collected an army and made themselves masters of Bassora. Ali defeated it, and Tellah and Zobeir fell; but he could not prevent Moawiyah and his friend Amru from extending their party and maintaining them¬ selves in Syria, Egypt, and even in a part of

Arabia. Three men of the sect of the Kharejites proposed to restore concord among the faithful, by slaying each one of the three heads of the parties, Ali, Moawiyah and Amru ; but Ali only fell (661 a.d., Heg. 40). He was a man of a cultivated mind, and was the author of a collection of sentences or moral maxims, *etc.* His son, the mild, peaceful Hassan, had no desire to defend the caliphate against the in¬ defatigable Moawiyah; a treaty was concluded between the two, by which Hassan solemnly abdicated the government (661). Some years later he perished by poison, said to have been administered by one of his wives at the insti¬ gation of Moawiyah.

Moawiyah I transferred the seat of the caliphate from the city of the Prophet, Medina, where it had hitherto always been, to Damas¬ cus, in the province of which he had formerly been governor (673 a.d., Heg. 54). With him began the series of the caliphs called Ommiades (or Ommayads), which name this family bore from Moawiyah's progenitor, Ommiyah. Not long after his accession he was obliged to quell an insurrection of the Kharejites by a cam¬ paign, and a rebellion at Bassora by severe punishments. He then seriously meditated the entire subversion of the Byzantine empire (q.v.). Rhodes was attacked, and the famous colossus was broken in pieces. His son Jezid marched through Asia Minor, meeting but little resist¬ ance; then crossed the Hellespont and laid siege to Constantinople, but was obliged to raise it (669 a.d., Heg. 49). Other generals were more successful against the Turks in Khorasan, and the regions extending to the borders of India.

The next caliph, Jezid (or Yazid), was not altogether a worthy successor of his father, the politic Moawiyah (680 a.d., Heg. 60). At first he was not acknowledged by the two holy cities, Mecca and Medina, which, as long as the caliphs had resided in the latter city, had enjoyed a principal voice in their election, but which had not been consulted when Moawiyah, according to the custom of the caliphs, ap¬ pointed his successor in his lifetime. The dis¬ contented espoused the cause, either of Houssain, the famous son of Ali, or of Abdallah, Zobeir's son, both of whom had laid claim to the caliphate. A rebellion of the inhabitants of Irak, in favor of Houssain, led by Moslim, Houssain's cousin, was suppressed by the pru¬ dence and decision of Obeidallah, governor of Cufa; and Houssain, who had accepted the in¬ vitation of the conspirators, was killed (680

a.d., Heg. 61), to the great grief and rage of all those who took part with Ali's family — a feeling still cherished by the Shiites. Abdallah

Ebn Zobeir was recognized as caliph in Medina, where Jezid was detested for his voluptuousness and scepticism. On this account Medina was invested, stormed and sacked; and Mecca, in which Abdallah took shelter, was besieged, but during the siege Jezid died.

After Jezid's death (683 a.d., Heg. 64) his son, Moawiyah II, a weak but pious youth, be¬ came caliph, but after a reign of 40 days he died when he was meditating abdication. By this time Abdallah Ebn Zobeir had caused him¬ self to be proclaimed as Prince of the True Be¬ lievers, and he had a powerful following. For a period anarchy prevailed. Irak, Hejaz, Ye¬ men and Egypt acknowledged Abdallah Ebn Zobeir as caliph. In Syria, Dehac, regent to Abdallah, was at first chosen caliph ; but the people of Damascus appointed Merwan I, of the race of the Ommiades, caliph, who made himself master of all Syria and Egypt. Khora¬ san separated from the caliphate, and submitted to a prince of its own choosing — the noble Salem. In the following year (684 a.d., Heg. 65) Soliman Ebn Sarad excited a great rebel¬ lion of the discontented in Syria and Arabia, and pronounced both caliphs deposed, but was defeated by the experienced soldier Obeidallah. Merwan (who died in 685) had been compelled to promise on oath to leave the caliphate to Khaled, the son of Jezid, yet he nominated his son Abdalmelek as his successor. Under him (685 a.d., Heg. 65) Mokthar, a new rebel against both caliphs, was subdued by one of them, Abdallah (686 a.d., Heg. 67) ; but this only made Abdallah more formidable to Abdal¬ melek, who, in order to be able to direct all his forces against him, concluded a peace with the Greek emperor, Justinian II, in which, reversing the order of the Koran, he conceded to the Christians a yearly tribute of 50,000 pieces of gold. He then marched against Ab¬ dallah, defeated him twice, and took Mecca by assault. In this last conflict Abdallah fell. Thus Abdalmelek united under his dominion all the Mussulmans ; but the resistance of governors and wars with the Greeks kept him con¬ stantly occupied. He was the first caliph that caused money to be coined. He died 705 a.d. (Heg. 86). . Under Walid I, his son, the Arabs conquered in the east Charasm and Turkes¬ tan (707 a.d., Heg. 88) ; in the north Gala¬ tia (710 a.d.) ; and in the west Spain (711 a.d.) . (See Spain). He died in 716 (Heg. 97). His brother and successor, Soliman, be¬ sieged Constantinople, but his fleet was de¬ stroyed by Greek fire, and his army suffered severely from famine. He died while on his way to take part in the siege in 717 (Heg. 99).

Omar II, his successor by Soliman's last will, was equally unsuccessful in the conduct of the war. . Having incurred the displeasure of the Ommiades by his indulgence toward the sect of Ali, he was poisoned by them (721 a.d., Heg. 102). . Jezid II, his successor also for the dis¬

position of Soliman, died of grief for the loss of a female favorite, of whose death he was the author (723 a.d., Heg. 104). His successor was Hisham, who reigned till 743. He had to suppress several revolts, the chief being that of Zaid (739-40). About this time the Abbassides, descendants of Abbas, son of Abdalmo-

taleb, uncle of the Prophet, began to be for¬ midable. Under Hisham an end was put to the progress of the Saracens in the west by the energy of Charles Martel, who annihilated their armies at Tours in 732, and at Narbonne in 736. Walid II was murdered after a reign of one year (744 a.d., Heg. 124).

After the still briefer reigns of Jezid III and of his brother Ibrahim, Merwan II fol¬ lowed, with the surname (respectable among the Arabs) of the Ass (A1 Hemar). Ibrahim, the Abbasside leader, being imprisoned and put to death by this prince, his brother, Abul Abbas, took up the cause of the Abbassides and as¬ sumed the title of caliph. In the resulting war Medwan was twice defeated, and fell (750 a.d., Heg. 133). With him terminates the series of caliphs of the race of Ommiyah. The furious Abdallah, uncle of Ibrahim and Abul Abbas, treacherously destroyed almost all the Ommiades by a horrible massacre at a meeting to which they had been inveigled. One of the family, Abderrahman, grandson of Hisham, having taken refuge in Spain, escaped the massacre and founded the independent caliphate of Cordova. See Spain.

Abul Abbas, first of the Abbasside caliphs, died young in 754 a.d. (Heg. 136). His brother, Abu Giafar, called A1 Mansur ((<the Victorious®), was obliged to contend with a rival in his uncle, Abdallah, whom he, however, overcame. He acquired his surname by his vic¬ tories in Armenia, Cilicia and Cappadocia. Spain was lost by him, however, as well as Africa. In the year 764 he founded the city of Bagdad on the Tigris, and transferred thither the seat of the caliphate (768 a.d., Heg. 149). He died on a pilgrimage to Mecca, leaving im¬ mense treasures (775 a.d., Heg. 158). Moham¬ med Mahdi, his son and successor, a man of a noble character, had to contend with the

tur¬ bulent inhabitants of Khorasan under the pre¬ tended prophet, Hakem, and died 785 a.d. ; and Musa or Hadi, his grandson, met with the same opposition from the Ali party under Houssain. Hadi's mother was a strong-minded, ambitious woman, who washed to rule her son, and with him the state, and this led him to try to poison her. She, however, caused him to be smothered before he could effect his purpose.

Hadi was followed, not by his son, but by his brother Harun (786 a.d.), who was denom¬ inated A1 Rashid (<(T,he Upright®) on account of his justice, and is famous for promoting the arts and sciences. He concluded a truce (an actual peace could never be made with Chris¬ tians) writh the Greek empress, Irene (788 a.d.), who consented to pay him tribute. Yahya, a member of the house of Ali, disputed with him the possession of the throne, but subsequently submitted. Harun, however, tarnished his repu¬ tation by the murder of Yahya, and still more by the murder of his sister, and her favorite, the Barmecide Giafar, and by the expulsion and persecution of the whole family of the Barme¬ cides, whose services to the state and himself had been of very great value. Harun divided the empire among his three sons. A1 Amin, as sole caliph, was to reign over Irak, Arabia, Syria, Egypt and the rest of Africa: under him A"l Mamun was to govern Persia, Turkestan, Khorasan, and the whole East; and Motassem was to rule Asia Minor, Armenia and all the countries on the Black Sea. The younger broth¬

ers were to succeed Amin in the caliphate. Thus, in Khorasan, through which Harun was passing, in order to quell a rebellion that had broken out in Samarcand, he was arrested by death, of which he had been forewarned by extraordinary dreams (809 a.d., Heg. 190).

A1 Amin the faithful (his proper name was Mohammed) was undeserving of this name. Untrue to his obligations as a ruler, and ad¬ dicted to all kinds of sensuality, he left the dis¬ charge of his duties to his vizier, Fadhel. The vizier, from hatred of Mamun, persuaded the caliph to appoint his son his successor, and de¬ prive Motassem of his portion of territory. A war arose between the brothers. Mamun's gen¬ eral, Thaher, defeated the armies of the caliph, took Bagdad, and caused Amin to be put to death (813 a.d., Heg. 194).

Mamun was recognized as caliph. Nobler in his inclinations than Amin, he cherished the arts and sciences but, like his brother, he left the government and armies to his ministers. His measures to secure

the caliphate to the Alides in order to please Riza, his favorite, ex¬ cited the powerful Abbassides to an insurrec¬ tion. They declared Mamun to have forfeited the throne, and proclaimed Ibrahim caliph, but submitted again, after the death of Riza, when the caliph had changed his sentiments. The vast empire of the Arabs, embracing number¬ less provinces in two quarters of the globe, could hardly be held under his sceptre. There is but one step, and that an easy one, under a weak sovereign, from a vice-royalty to a king¬ dom. The wisdom of the former Abbassides could only retard this evil ; the faults of the latter precipitated it. Even under Harun A1 Rashid the Agladides had founded an . inde¬ pendent empire in Tunis (800 a.d., Heg. 181), as had likewise the Edrisides in Fez. Thaher, having been appointed governor of Khorasan, made himself independent. From him the Thaherides derived their origin. Mamun sent Thomas, a Greek exile, with an army against the Greek emperor, Michael II the Stammerer. Thomas depopulated Asia Minor, and laid siege to Constantinople ; but a storm destroyed his fleet (823 a.d., Heg. 207). A second attack on the imperial city was repelled by the aid of the Bulgarians. Thomas was taken prisoner and executed. Toward the many religious sects into which the Mussulmans were then divided Mamun acted with toleration. He died 833 a.d. (Heg. 218). During his government (about 830 a.d., Heg. 215), the African Arabs con¬ quered Sicily and Sardinia, where they main¬ tained themselves about 200 years, till the latter island was torn from them by the Pisans in 1016-17, and the former island by the Normans between 1061 and 1090.

Motassem, at first named Billah (by the grace of God), Harun's third son, built a new city, Samara, 56 miles from Bagdad, and trans¬ ferred thither his residence. In his wars against the Greeks and rebellious Persians he first used Turkish soldiers. From grief at the death of his private physician, Motassem be¬ came insane, and died 842 a.d. (Heg. 227).

Vathek Billah, his son, member of the Mo-tazelite sect, exerted himself to promote the advancement of science; but he was an ener¬ vated voluptuary, and died of nervous weakness (846 a.d., Heg. 232). A contest for the succes¬ sion, between his brother Motawackel and his

son Mothadi, was decided by the already power¬ ful and arrogant Turkish bodyguard in favor of the former, the more unworthy competitor. Under Motawackel it became more and more customary to carry on all wars by means of Turkish mercenaries. Thus the Arabs were rendered unwarlike and effeminate, as must necessarily be the case in a hot climate with those who do not live in constant activity. Motawackel manifested a blind hatred of the Alides, not sparing even the memory of the de¬ ceased. He moreover evinced a malignant spirit, and a proneness to sensuality and cruelty. His own son, Montasser, trained to early indul¬ gence in both these vices, and often barbarously treated by him, conspired against him with the Turkish bodyguards and effected his murder (861 a.d., Heg. 247).

The Turks, who now arrogated the right of electing the caliphs, called the murderer to the throne of the faithful, and compelled his broth¬ ers, who were innocent of the atrocious act, and whose revenge they feared, to renounce the suc¬ cession which had been designed for them by Motawackel. Montasser died soon after of a fever, caused by the goadings of remorse (862 a.d., Heg. 248). The Turks then elected Mostain Billah, a grandson of the Caliph Motassem. Two of the Alides became competitors with him for the caliphate. One of them, at Cufa, was defeated and put to death; but the other founded an independent empire in Tabristan, which subsisted half a century. The discord of the Turkish soldiers completed the dismember¬ ment of the empire. One party raised to the throne Motaz, second son of Motawackel, and compelled Mostain to abdicate. Motaz Billah soon found means to get rid of him as well as of his own brother Muwiad. He then meditated the removal of the Turkish soldiers; but before he found courage to execute his projects they rebelled on account of their pay being in ar-rear, and forced him to resign the government. He soon after died (869 a.d., Heg. 255). They conferred the caliphate on Mohadi Billah, son of the Caliph Vathek, but deposed this excellent prince 11 months after, because he attempted to improve their military discipline.

Under Motawackel's third son, the sensual Motamed Billah, whom they next called to the caliphate, Muaffek his brother succeeded, by his prudence and courage, in overcoming the dan¬ gerous preponderance of these Turks. Mo¬ tamed transferred the seat of the caliphate from Samara back to Bagdad in the year 8 73 (Heg. 259), where it afterward continued. In the same year, owing to a revolution in the inde¬ pendent government of Khorasan, the dynasty of the

Thaherides gave place to that of the Sof-farides, who eventually extended their dominion over Tabristan and Segestan. The governor of Egypt and Syria, Achmet Ben Tulun, also made himself independent (877 a.d., Heg. 263), from whom are descended the Tulunides. The brave Muaffek annihilated, indeed, the empire of the Zinghians, in Cufa and Bassora, 10 years after its formation (881 a.d., Heg. 268) ; but he was unable to save the caliphate from the ruin to which it was continually hastening.

Motamed died soon after him (892 a.d., Heg. 279), and was succeeded by Muaffek's son, Mothadad Billah. He contended unsuccessfully with a new sect that had arisen in Irak — the Carmathians (899 a.d., Heg. 286) — against

whom his son, Moktaphi Billah (902 a.d., Heg. 289), was more fortunate. He was still more successful in a war against the Tulunides, as he again reduced Egypt and Syria in 905 (Heg. 292). Under his brother, Moktadar Billah, who succeeded him at the age of 13 years (909 a.d., Heg. 296), rebellions and bloody quarrels about the sovereignty disturbed the government of the empire. He was several times deposed and reinstated, and finally murdered (931 a.d., Heg. 319). During his reign Abu Mohammed Obeidallah rose in Africa, who, pretending to be descended from Fatima, daughter of the Prophet (therefore from Ali), overthrew the dynasty of the Agladides in Tunis, and founded that of the Fatimites (910 a.d., Heg. 298). Not satisfied with reigning independent of the caliph, this party, as descendants of the Prophet, asserted themselves to be the only lawful caliphs.

Shortly afterward the dynasty of the Bouides, in Persia, rose to authority and power (925 a.d., Heg. 315). Khorasan was still inde¬ pendent. The only change was that the Samanides had taken the place of the Soffar-ides. In a part of Arabia the heretic Car¬ mathians ruled ; in Mesopotamia, the Hama-damites. In Egypt, which had just been recovered, Akschid, from a governor, was called to be a sovereign. From him descended the Akschidites. Kaher Billah, Mothadad's third son, merited his fate, on account of his malice and cruelty. The Turkish soldiers hav¬ ing recovered their power drove him from the throne into exile (934 a.d., Heg. 322), in which he perished five years afterward. Rhadi Billah, his brother, bore the dignity of an emir al omra ((<captain of the captains®), with which the exercise of absolute power, in the name of the caliph, was united ; and thus the caliph was more and more thrown into the background. The first who

was invested with this dignity was Raik; but it was soon torn from him by the Turk Jakan, by force of arms, in the year 939 (Heg. 327). Jakan extended the power of the office to such a degree as to leave the caliph nothing, but the name of his temporal sway, and even assumed the right of determining the succession to the throne. Raik was indemnified by receiving Cufa, Bassora and Irak Arabi as an independent government.

The next caliph, Motaki Billah, Moktader's son, made an effort to regain his independence by the murder of Jakun; but he was soon com¬ pelled by the Turkish soldiers to appoint Tozun, another of their countrymen, emir, who made this office hereditary. He formally de¬ vised it to a certain Schirzad, but it soon came into the possession of the Persian royal house of the Bouides, whose aid the succeeding caliph, Mostaki Billah, solicited against the tyranny of Schirzad. The first Bouide emir, Moezeddulat, left it as an inheritance to his posterity. Not the caliph but the emir now reigned in Bagdad, though over only a small territory. In every remote province there were independent princes.

To continue the catalogue of the names of those who were henceforward caliphs would be superfluous, for these Mussulman popes had not by any means the power of the Christian. It would be too tedious to trace the branches into which the history of the caliphate is now divided; but we must briefly show the great

changes which the different states and their dynasties have undergone, and which gave rise to the dominion of the Ottoman Porte.

During the minority of the Akschidite Ali, the Fatimite Morz Ledinillah, at that time caliph in Tunis, subjugated Egypt in 969 (Heg. 358), and founded Cairo, which he made the seat of his caliphate. There were, conse-cjuently, at this time three caliphs, — at Bagdad, Cairo and Cordova, — each of which declared the others heretics. But the Fatimites as well as the Abbassides fell under the power of their

viziers, and, like them, the Ommiades in Cor¬ dova were deprived of all power by the di¬ vision of Spain into many small sovereignties, till they were entirely subverted by the Mora-bethun.

Ilkan, King of Turkestan, having conquered Khorasan, and overthrown the Samanides, was expelled again by Mahmud, Prince of Gazna, who founded there the dominion of the Gazne-vides, in 998 (Heg. 388), who were soon, how¬ ever, overthrown in turn by the Seljuk Turks under Togrul Beg, in 1030 (Heg. 421). This leader conquered also Charasm, Georgia and the Persian Irak. Called to the assistance of the Caliph Kajem Bemeillah, at Bagdad, against the tyranny of the Bouide emirs, he proceeded to Bagdad, and became emir himself in 1055 (Heg. 448), by which means the dominion of the Turks was firmly established over all the Mussulmans. To his nephew, Alp Arslan (who defeated and took prisoner the Greek Emperor Romanus Diogenes), he left this dignity, with so great power that these Turkish emirs al omra were frequently called the Sultans of Bagdad. Turkish princes, who aspired to be sovereigns in the other provinces, were at first satisfied with the title of atabek (father, teacher), such as the atabeks of Irak and Syria, of Azerbijan, Farsistan (Persia) and Laristan. It was the atabeks of Syria and Irak with whom the Crusaders had principally to con¬ tend. The first was called Omadeddin Zenghi ; by the Franks, Sanguin. They were afterward termed sultans. The Caliph of Bagdad was recognized by all as the spiritual sovereign of* all Mussulmans : his temporal authoritv did not extend beyond the walls of Bagdad. Noureddin, Zenghi's son, being requested by the Fati¬ mite caliph Adhed to protect Bagdad against his vizier, sent to Cairo, in succession, Shirkuh and Salaheddin or Saladin; but the latter over¬ threw the Fatimites (as schismatic anti-popes), and usurped the authority of Sultan of Egypt in 1170 (Heg. 556) with which he united Syria, after Noureddin's death. This is the great Salaheddin (Saladin), the formidable enemy of the Christians, the conqueror of Jerusalem. The dynasty which commenced with him was called, from his father, Ayoub, the Ayoubite. They reigned over Egypt till expelled by the Mamelukes in 1250. The Seljuk sultans of Irak were overthrown in 1194 (Heg. 590) by the Charasmians ; and as those of Khorasan were extinct, there remained of the Seljuk dominions nothing but the empire of Iconium or Roum, in Asia Minor, from which the present Turkish empire derives its origin. See Ottoman Empire.

The Charasmian Sultans extended their con¬ quests far into Asia, until their territories were invaded by the Tartars under Genghis Khan, in 1220 (Heg. 617). They were finally totally

destroyed by his son Octai. Bagdad, also, the remains of the possessions of the caliphs, be¬ came the easy prey of a Mongol horde under Plolagu, in 1258 (Heg. 636), by the treachery of the vizier Al Kami, and a slave, Amram, under the 56th caliph Motazem. The nephew of the cruelly murdered Motazem fled to Egypt, where he continued to be called caliph under the protection of the Mamelukes, and be¬ queathed the Mohammedan popedom to his posterity. When the Turks conquered Egypt, in 1517, the last of these nominal caliphs was carried to Constantinople and died, after re¬ turning to Egypt in 1538. The Turkish Sultans subsequently assumed the title of caliph, and have retained it to the present day, with the claim of spiritual supremacy over all Mussul¬ mans, though this claim is little regarded out¬ side his own dominions, and strongly disputed by the Persians. Consult Muir, Sir William,

(Annals of the Early Caliphate) (London 1883) ; id., (The Caliphate : Its Rise, Decline and FalP (ib. 1891) ; Syed Ameer Ali, (A Short History of the Saracens) (New York 1899) ; Lane-Poole, S., (The Mohammedan Dynasties) (London 1894) ; Weil, (Geschichte der Chalifen) (5 vols., Mannheim and Stutt¬ gart 1846-62).

CALIPPUS, a Greek astronomer, who was the first to discover the inaccuracy of the golden number or period invented by Meton, and attempted to remedy it by the invention of a new cycle of 76 years, being only six hours less than the quadruple of Meton's period. It commenced 331 b.c., and being adopted par¬ ticularly by astronomers in giving the date of their observations, is frequently mentioned by Ptolemy. Though more perfect than Meton's period-, it was shown to be inaccurate by Hip¬ pocrates, who substituted for it a cycle of 345 years.

CALISAYA BARK, the yellowish bark of Cinchona Calisaya (q.v.).

ˆ CALISTHENICS, or CALLISTHEN¬ ICS, the art of promoting gracefulness, strength and health by means of the lighter forms of gymnastic exercise. See Gymnastics.

CALIVER, an early form of hand-gun, musket or arquebuse, lighter and shorter than the original musket, fired without a rest and much more rapidly. It seems to have gone out of fashion about 1630. Its name is derived from the fact that the bore was of uniform calibre, so that a common supply of bullets might be used by an entire company.

CALIXTINES, ka-liks'tmz, or UTRA-QUISTS, a sect of the Hussites in Bohemia (q.v.), who differed from the Roman Catholics principally in

giving the cup in the Lord's Supper to laymen, from which circumstance they got their name, derived from the Latin calix, <(a cup.®

CALIXTUS, the name of several popes. 1. The first of this name, a Roman bishop, was the 1 7th pope (217 to 224, or from 218 to 223), when he suffered martyrdom according to some accounts. 2. Guido, son of Count William of Burgundy, archbishop of Vienne, and papal legate in France, was elected in 1119, in the monastery of Clugny, successor of the expelled Pope, Gelasius II, who had been driven from Italy by the Emperor Henry V, and had died

in this monastery. In the same year he held councils at Toulouse and at Rheims, the latter of which was intended to settle the protracted dispute respecting the right of investiture. As the Emperor Henry V would not confirm an agreement which he had already made on this subject, Calixtus repeated anew the excom¬ munication which he had already pronounced against him when legate in 1112. He excom¬ municated also the anti-pope, Gregory VIII, and renewed former decrees respecting simony, lay investiture and the marriage of priests. Successful in his contest with the Emperor on the subject of investiture, by means of his alliance with the rebels in Germany, in par¬ ticular with the Saxons, he made his entrance into Italy in 1120, and with great pomp into Rome itself ; took Gregory VIII prisoner in 1121, and banished him to a monastery. He availed himself of the troubles of the Emperor to force him, in 1122, to agree to the Concordat of Worms. After an energetic pontificate he died in 1124. 3. Calixtus III, chosen in 1168

in Rome as anti-pope to Paschal III, and con¬ firmed by the Emperor Frederick I in 1178, was obliged to submit to Pope Alexander III. As he was not counted among the legal popes, a subsequent Pope was called Calixtus III. This was a Spanish nobleman, Alfonso Borgia, counsellor of Alfonso, King of Aragon and the Sicilies. He was made Pope in 1455. He was at this time far advanced in life, but equalled in policy and energy the most enterprising rulers of the Church. He

appointed an eccle¬ siastical commission to reconsider the case against Jeanne d'Arc, and its decision was that she died a martyr to her faith, her king and her country. In order to appease the dis¬ pleasure of the princes and nations occasioned by the proceedings of the councils of Constance and Basel, he instigated them to a crusade against the Turks. His intention was counter¬ acted in Germany by the discontent of the states of the empire with the Concordat of Vienna, and in France by the appeals of the universities of Paris and Toulouse against the tithe for the Turkish war. King Alfonso, moreover, was indignant at the refusal of the Pope to acknowledge his natural son Ferdinand as king of Naples.

CALIXTUS (properly Callisen), Georg, ga'org, German clergyman, the most able and enlightened theologian of the Lutheran Church in the 17th century: b. Medelbye, Schleswig, 14 Dec. 1586; d. 19 March 1656. In 1609 he vis¬ ited the universities of the south of Germany; in 1612 those of Holland, Britain and France, where his intercourse with the different re¬ ligious parties and the greatest scholars of his time developed that independence and liberality of opinion for which he was distinguished. In 1614 he was made professor of theology at Helmstedt, and he held this post till his death. His treatises on the authority of the Holy Scriptures, transubstantiation, celibacy, su¬ premacy of the Pope, and the Lord's Supper belong, even according to the judgment of learned Roman Catholics, to the most profound and acute writings against Roman Catholicism. But his genius and the depth of his exigetic and historical knowledge exposed him to the perse¬ cutions of the zealots of his time. His asser¬ tion that the points of difference between Cal¬

vinists and Lutherans were of less importance than the doctrines in which they were agreed, and that the doctrine of the Trinity was less distinctly expressed in the Old Testament than in the New, and his recommendation of good works, drew upon him the reproach of heresy. He made Christian morality a distinct branch of science, and, by reviving the study of the Christian fathers and of the history of the Church, prepared the way for Spener, Thomas-ius and Semler. Consult Henke, E. L. W., (Calixt und seine Zeit) (Halle 1853-56) ; Dowding, W. C., (German Theology during the Thirty Years' War* ; (The Life and Cor¬ respondence of G. Calixtus) (London 1863).

CALKING, kok'ing, the process of driving tarred oakum into the seams between the planks of ships, in order to render the joints water-tight. A wisp of the oakum is drawn out and rolled together between the

hands, and, being laid over the seam, is driven by a wedge-shaped instrument called a calking iron. The work is afterward gone over with a more powerful instrument of the same kind, which is held by one man and struck with a beetle held by another. When all the oakum is forced in that is practicable, the seams are payed over with melted pitch, and where they are to be covered with copper, a thread of spun yarn is laid in to make them flush with the planks.

CALKINS, Franklin Welles, American author: b. Iowa County, Wis., 5 June 1857. He was an early explorer of parts of Black Hills of South Dakota and made acquaintance with many Indian tribes. His studies of bird and animal life have given him rank as a natr uralist. He was educated for the law and had practice in counsel ; also had experience as ranch¬ man and railway contractor. He began writing for The Youth's Companion at 22 years of age and has been one of the chief contributors to that magazine for 35 years; is author of a num¬ ber of syndicate serials which have been run¬ ning in various magazine sections of news¬ papers for 30 years, and contributes to many periodicals; author of (Tales Of The West) (3 vols., 1893) ; (The Cougar-Tamer* (1899) ; (My Host The Enemy* (1901) ; (Two Wilder¬ ness Voyagers) (1902) ; (The Wooing of Tokala* (1907).

CALKINS, Gary Nathan, American sci¬ entist: b. Valparaiso, Ind., 18 Jan. 1869. He was graduated at the Massachusetts Institute of Technology in 1890. He received the degree of Ph.D. at Columbia in 1898. In 1900 he became instructor in zoology at Columbia University; adjunct professor of zoology 1902; professor of protozoology 1909. He was biologist of the New York State Cancer Laboratory 1904—08; president of the American Association for Can¬ cer Research 1913-14; and is vice-president of the Society of Experimental Biology and Medi¬ cine. He has published (The Protozoa) (1901) ;

(Protozoology* (1909) ; <Biology) (1914) ; also numerous scientific papers.

CALKINS, Mary Whiton, American psy¬ chologist, educator and author: b. Hartford, Conn., 30 March 1863. She studied at Smith College and at Clark and Plarvard universities and from 1891 was instructor and afterward professor of philosophy and psychology at Wellesley College. Her published works in¬ clude introduction to Psychology (1901;

1905); lDer doppelte Standpunkt in her Psy¬ chology (1905) ; (The Persistent Problems of Philosophy > (1907; 3d ed., 1912); <A First Book in Psychology5 (1909; 2d ed., 1911).

CALKINS, Raymond, American Congre¬ gational clergyman : b. Buffalo, N. Y., 10 Aug. 1869. A graduate of Harvard University in 1890, after teaching experience in Belmont, Cal., and in Grinnell, then Iowa, College, he became instructor in German at Harvard and a student of the Harvard Divinity School 1893— 95. He was ordained in 1896 and after pas¬ torates in Pittsfield, Mass., and Portland, Maine, from 1912 was pastor of the First Church in Cambridge, Mass. Prominent in the national councils of the Congregational Church, he was one of the editors of the (Hymns of the Church) (1912), and author of Substitutes for the Saloon5 (1901).

CALL, an American family, several of whose members took a prominent part in the public life of the nation, Daniel, lawyer : b. about 1765; d. Richmond, Va., 20 May 1840. He was a brother-in-law of Chief-Justice John Marshall, and published ˆReports of the Vir¬ ginia Court of Appeals5 (6 vols., 1790-1818; 2d ed., edited by Joseph Tate 1824-33). — His brother, Richard Keith, soldier: b. 1757 ; d. 1792, was a citizen of Virginia, and was a major in the Revolutionary army. He was one of the seven who cut their way through the British cavalry at Charleston, S. C, 6 May 1780, and escaped. He commanded a rifle corps in the action with Colonel Simcoe at Spencer's Ordinary, Va., 25 June 1781, and at Jamestown, on 6 July, served under General Lafayette. He was elected surveyor-general of Georgia in January 1784. — Their nephew, Richard Keith, soldier: b. near Petersburg, Va., 1791 ; d. Tallahassee, Fla., 14 Sept. 1862. He was appointed first lieutenant in the 44th infantry, 15 July 1814; brevet captain, 7 Nov. 1814; volunteer aide to General Jackson in April 1818; captain July 1818; and re¬ signed in 1822. He was a member of the legis¬ lative council of Florida in April 1822 ; brigadier-general of West Florida militia in January 1823; delegate to Congress from 1823 to 1825; and receiver of the West Florida land-office in March 1825. He was governor of Florida from 1835 to 1840, and led the army against the Seminoles from 6 Dec. 1835 to 6 Dec. 1836, commanding

in the second and third ‘battles of Wahoo Swamp, 18 and 21 Nov. 1836. It is said that at the battle of Omithlacoochie Governor Call personally saved General Clinch and his command from being cut to pieces. A controversy with Joel R. Poinsett, Secretary of War in Van Buren’s Cabinet, relative to the misdirection of the war, cost Call his office. He consequently turned Whig, and worked earnestly for Harrison’s election, canvassing the Northern States in his behalf. President Harrison reappointed him governor of Florida in 1841, and he held the office till 1844, but was an unsuccessful candidate for the governorship in 1845, when the Territory became a State. Although he had sacrificed fortune, health and popularity to protect the citizens of Florida during the Seminole War, they could not for¬ give him for turning Whig, and he never again held political office in Florida. Governor Call took great interest in the development of his vol. 5 — 15

State. He projected and built the third rail¬ road in the United States, from Tallahassee to Saint Marks, and also located the town of Port Leon, which was afterward destroyed by a cyclone. He always considered himself a Jackson democrat, as opposed to later democracy. Feeling that he had fought at Jackson’s side for every inch of ground from Tennessee to the peninsula, he regarded him¬ self as one of the builders of the nation, and during the Civil War was one of the few men in the South that looked on secession as trea¬ son. On 12 Feb. 1861, he wrote a long letter to John S. Littell of Pennsylvania, deploring seces¬ sion, but defending slavery. See also Call, Wilkinson, nephew of the preceding.

CALL, Wilkinson, American lawyer and politician: b. Russellville, Ky., 1834; d. 1910. Early in life he removed to Florida where he was admitted to the bar. He entered the Con¬ federate army in the Civil War and attained the rank of adjutant-general. In 1865 he was elected to the United States Senate, but was not permitted to take his seat. He was again elected in 1879 and served thereafter for 18 years.

CALLA, a genus of plants of the Arum family, containing a single species, growing in bogs in Europe, Asia and eastern North America. The plant commonly cultivated under the name of calla is Zantedeschia cethiopica.

CALLAHAN, James Morton, American publicist: b. Bedford, Ind., 4 Nov. 1864. He was graduated at the University of Indiana in 1894 and completed the work for the doctorate at Johns Hopkins in 1897. He

was engaged in historical research (at Washington, D. C.) and lecturer on American diplomatic history at Johns Hopkins University 1898-1902, and since 1902 professor of history and political science, West Virginia University. He has written Neutrality of the American Lakes) (1898); (Cuba and International Relations) (1899) ; (American Relations in the Pacific and the Far East5 (1901) ; diplomatic History of the Southern Confederacy > (1901) ; (The Ameri¬ can Expansion Policy) (1908) ; (Seward's

Mexican Policy5 (1909); (History of West Virginia5 (1914) ; and various monographs and cyclopaedia articles. Editor of (West Virginia University Studies in American History5 ; His¬ torian of Semi-Centennial Commission of West Virginia, 1913.

CALLAO, kal -ya'o, Peru, seaport city, capital of Callao province, on Callao Bay, seven miles by rail, steam and electric, west of Lima. The spacious harbor affords safe anchorage, making Callao the principal port of the coun¬ try; defended by three forts and sheltered southward by San Lorenzo Island, nine miles in circumference, and rising 600 feet above sea level. An earthquake and tidal wave de¬ stroyed the early city in 1746 and the modern city is three-quarters of a mile from the orig¬ inal site. The city itself is uninteresting, and the climate unhealthful. Business centres around the harbor, which is modern in every respect, with concrete piers, floating dock, gas and electric lighting, steam cranes, *etc.* Over 1,100 vessels of 2,672.000 tonnage enter and clear the port annually. Callao has lumber,

iron and sugar manufacturing industries ; ex¬ ports sugar, minerals, cotton, hides, bone, cocoa, wool, etc., to the value of over $7,350,000 an¬ nually, and imports coal, beer and manufactured articles valued annually at about $13,434,250. Callao dates from early Spanish times. In 1624 it was besieged unsuccessfully by the British pirate, Clark,

who died there. Incor¬ porated as a town in 1671 ; it was submerged with all its inhabitants during the earthquake of 1746, and when the sea is calm, the ruins are still distinguishable under water. The har¬ bor saw the naval victory of the independent Chileans in 1820 over the Spaniards who sur¬ rendered Callao, their last foothold in Peru, the following year. Callao suffered volcanic disasters in 1825 and in 1868. In 1866 it was bombarded by a Spanish fleet and in 1880 by the Chileans who took possession the follow¬ ing year. It was restored to Peru by the treaty of 1883. Pop. 32,000.

CALLAWAY, Morgan, American educa¬ tor: b. Cuthbert, Ga., 3 Nov. 1862. He was educated at Emory College, Ga., and at Johns Hopkins University, and has been professor of English in the University of Texas from 1890. He has published (The Absolute Participle in Anglo-Saxon) (1889) ; (The Appositive Par¬ ticiple in Anglo-Saxon) (1901) ; (The Infini¬ tive in Anglo-Saxon1 (1913) ; and contribu¬ tions to reviews.

CALLAWAY, Samuel Rodger, American railroad president: b. Toronto, Canada, 24 Dec. 1850; d. New York, 1 June 1904. At the age of 14 he entered the employ of the Grand T. Rail¬ way and later was in the service of the Cana¬ dian Express Company, and Great W. Railway. His rapid progress thereafter may be summar¬ ized as follows : in 1875 he became superintend¬ ent of the Detroit and M. Railroad ; in 1880, manager of the Chicago and G. T. ; in 1884, vice-president of the Union P. and allied lines of nearly 6,000 miles; president of the Toledo, Saint L. and K. C. Railroad, 1887-95 ; president of the Lake Shore and M. S., 1897-98; presi¬ dent of the New York C. and H. R. Railroad, 1898-1901. He was regarded as one of the ablest railway managers in the United States. From 1901 he was president of the American Locomotive Company.

CALLCOTT, kol'kot, Sir Augustus Wall,

English painter: b. Kensington, 20 Feb. 1779; d. there, 25 Nov. 1844. He studied portrait¬ painting under Hoppner, but soon discovered that his genius lay in another department of art, and was so successful in his delineation of landscape, that in 1807 he was elected an asso¬ ciate of the Royal Academy. In 1837 he was knighted, and in 1843 was appointed keeper of the royal collections of pictures. He suffered much from ill health for many years before his death. Callcott excelled in the delineation of coast scenes, and, like Turner, has been called the ((Modern Claude.® Examples of his paint¬ ings are (The Mouth of theTyne) (1820) ; En¬ trance to the Pool of London1 (1816); and (Milton Dictating to his Daughters1 (Leeds).

> CALLCOTT, John Wall, English com¬ poser, brother of Augustus Wall (q.v.) : b. Kensington, 20 Nov. 1766; d. near Bristol, 15 May 1821. He at first intended to become a surgeon, but abandoned the intention, and de¬

voted himself to music. In 1785 he competed for the prizes of the Catch Club, and gained three out of four gold medals. In the follow¬ ing decade the same club awarded him 20 med¬ als. In 1790, when Haydn arrived in England, he studied under him, and the same year ob¬ tained from Oxford the degree of musical doc¬ tor. In 1805 he published his (Musical Gram¬ mar1 ; and in 1806 was preparing to deliver lectures on music at the Royal Institution when his mind gave way. He never completely re¬ covered, although his insanity left him on one occasion for three years. He ranks among the most eminent of English composers, and was especially celebrated for his glee compositions. His best works were published in two volumes by his son-in-law, Mr. Horsley, in 1824.

CALLEJA DEL REY, kal-ya'ha del ra, Felix Maria, Spanish general : b. Medina del Campo 1750; d. Cadiz 1820. He distinguished himself in Mexico by quelling the insurrection instigated in 1810 by Hidalgo, who was on the point of seizing the city of Mexico, when Calleja was charged by the viceroy, Venegas, to oppose his progress. After encounters, in which both parties strove to surpass each other in a display of cruelty and brutality, Calleja succeeded in defeating Hidalgo's army, and on 2 Jan. 1812, he took possession of the principal fortress Zitaquaro, and massacred the inhabit¬ ants. Hidalgo, who fell near Guadalajara, was succeeded by the priest, Morelos, who defended Cuautla Amilpas against the attack of Calleja with great bravery until 2 May 1812, when famine forced him to surrender. Calleja again signalized his victory by acts of barbarism, and was rewarded for his zeal, 4 March 1813, by the appointment of viceroy, in which capacity he continued to alienate the feelings of the Mexi¬ cans by his relentless rigor. The priest, More¬ los, fell into his hands and was shot, 22 Dec. 1815. Subsequently he promulgated an am¬ nesty, but as he was unable to restore peace to the distracted country, he was recalled. On his return to Spain he was created Conde de Calde¬ ron, and in January 1820, while preparing to sail from Cadiz against the revolutionists of Paraguay, his troops having mutinied, he was captured and remained prisoner in the fortress of the Isla de Leon until the insurrection was quelled by Ferdinand VII, when he died, soon after having recovered his liberty.

CALLENDER, Hugh Longbourne, Eng¬ lish physicist: b. Hatherop 1863. A student of Trinity College, Cambridge, since 1902 he is professor of physics at the Imperial College of Science, London, having previously held a similar position at McGill University, Montreal 1893-98, and at University College, London, 1898-1902. He is author of <Law of Con¬ densation of Steam 1 (1898) ; and (The Im¬ perial College of Science) (London 1904).

CALLENDER, James Thomas, American publicist : b. Scotland ; d. 1813. He came to Philadelphia as a refugee from England in 1790 having been exiled for his pamphlet (The Political. Progress of Great Britain.1 He pub¬ lished, in . America, The Political Register, The American Register, and was editor of the Richmond Recorder. He wrote (Sketches of the History of America) ; (The Prospect Be¬ fore Us.1

CALLENDER, John, American historian and Baptist minister: b. Boston, Mass., 1706; d. Newport, R. I., 26 Jan. 1748. He collected many valuable papers relating to the Baptists in America; and published (A Centennial Dis¬ course on the Civil and Religious Affairs of the Colony of Rhode Island> (1739), which was the only history of that State for more than a century. The State Historical Society reprinted it, with notes by Rev. Romeo Elton (1838), and a memoir of the author.

CALLET, ka-la, Antoine Francois, French historical painter: b. Paris 1741; d. Paris 1823. He obtained the grand prize in 1764 for a painting entitled (Biton and Cleobis dragging the chariot of their mother to the temple of Here.' This picture was purchased by the Academy. Among his noted paintings are c Winter Saturnalia, ' (The Festival of Bac¬ chus, } 'Summer,' (Spring' (all four in the Louvre), (Battle of Marengo,' (The First Consul entering Lyons,' (The XVIII Brumaire,' (Auto-photo,' (The Marriage of Na¬ poleon and Marie-Louise,' (Birth of the King of Rome,' (Capitulation of Ulm,' Battle of Austerlitz.' Callet was one of the best dec¬ orative painters of his day, and became a member of the Academy in 1780. He painted three

portraits of Louis XVI, one each of Louis XVIII and the Comte d'Artois and Comte de Vergennes, then Minister of Foreign Affairs, and several other portraits now in the Louvre.

CALLET, Jean Francois, French mathe¬ matician and educationalist: b. Versailles, 25 Oct. 1744; d. Paris, 14 Nov. 1798. He com¬ pleted his studies at Paris in 1768, and in 1779 gained the prize which the Academy of Arts at Geneva had offered for escapements in watches. In 1788 he was appointed professor of hydrog¬ raphy at Vannes and shortly after obtained the same appointment at Dunkirk. He was afterward professor in the school of geographi¬ cal engineers, Paris. He is best known by his (Tables of Logarithms.' He was also one of the first to propose a regular <(telegraphic" code for commercial purposes, using the word ((telegraphic" in the French sense.

CALLEY, Walter, American Baptist clergyman : b. Dover, Del., 19 Aug. 1858. A graduate of Crozier Theological Seminary at Upland, Pa., he was ordained to the ministry in 1880 and after holding pastorates at Bethle¬ hem, Pa., 1880-82; Lehigh Avenue Church, Philadelphia, Pa., 1882-91 ; Emmanuel Church, Cambridge, Mass., 1891-93; Tabernacle Church, Boston, 1893-1902; Upland, 1905-09, in the lat¬ ter year he became pastor of the First Church, Jamaica Plain, Boston. He specialized in so¬ ciology and penology, was one of the founders of Prospect Union, an affiliation of Harvard Union for the education of workingmen, was general secretary of the Baptist Young People's Union of America, and managing editor of the official magazine Service 1902-05.

CALLICRATES, Greek architect of the 5th century b.c. He was a contemporary of Ictinus and with him erected the Parthenon at Athens.

CALLICRATIDAS, a Spartan, succeeded Lysander in the command of the Lacedaemonian fleet against the Athenians, in 406 b.c. He de¬

feated Conon at Mitylene, captured the fleet of Diomedon, and was afterward himself defeated by the Athenians at Arginusae, where he was drowned.

CALLII-CRES, ka-lyar', BONNEVUE, Louis Hector, Chevalier de, French colonial administrator: b. France 1639; d. Quebec, 26 May 1703. He was governor of Montreal in 1684, and impressed on the French government, during a special visit to France, the necessity of capturing

New York so as to maintain French supremacy in Canada. He had previously led a division of the French and Indian forces which in 1687 unsuccessfully attacked the Five Nations in New York State. In 1699 he became governor-general of Canada, succeeding Frontenac. and was the founder of Detroit, Mich.

CALLIGONUM, a genus of shrubs be¬ longing to the Polygonacece. They are leafless plants, with small flowers, branches jointed, dichotomous, and the fruit a large, four-cor¬ nered nut. The root of C. Pallasia, a leafless shrub found in the sandy steppes of Siberia, furnishes from its roots, when pounded and boiled, a gummy, nutritious substance like tragacanth, on which the Calmucks feed in times of scarcity, at the same time chewing the acid branches and fruit to allay their thirst.

CALLIMACHUS,, Greek architect and statuary : d. Athens 396 b.c. He originated the Corinthian capital and designed the mystic golden lamp which shed perpetual light on the Erechtheum. Consult Gardner, W., (Handbook of Greek Sculpture' (London 1911).

CALLIMACHUS, Greek poet and gram¬ marian : b. Cyrene, about 310 b.c. ; d. about 240. He opened in Alexandria a school of grammar, that is, of the belles-lettres and liberal sciences, and could boast of several scholars of dis¬ tinguished attainments, such as Eratosthenes, Apollonius Rhodius, Aristophanes of Byzan¬ tium and others. Ptolemy Philadelphus pre¬ sented ,him with a place in the museum, and gave him a salary, as he did other men of learn¬ ing. After the death of Philadelphus, he stood in equal favor with Ptolemy Euergetes. Under these circumstances he wrote most of his works, the number of which was, according to Suidas, over 800. With the exception of some frag¬ ments, we have of these only 64 epigrams and six hymns. His works in prose include the (Tablets' in 120 books (a critical bibliography) ;

(Memorabilia' ; (Causes' (4 books) ; in poetry, the best known is his (Hecale,' which Ovid used in his (Philemon and Baucis.' In 1893, research in Egypt uncovered some 50 verses of this poem, which are published in Gomerz, (Neue Bruchstiicke aus der Hekale des Kallimachos' (Vienna 1893). His poem on the hair of Berenice has been preserved in the Latin adaptation of Catullus ((De coma Bere¬ nices'). (Callimachus' poems bear the stamp of their age, which sought to supply the want of natural genius by a great ostentation of learn¬ ing. Instead of noble simple grandeur, they ex¬ hibit an overcharged style, a false pathos and a straining after the singular, the antiquated, the learned. His elegies are mentioned by the ancients with great praise and served Propertius as models. The best editions of

the hymns and epigrams are those of Meineke (Berlin 1861) ; Schneider 1870-73; Wilomowitz (Berlin 1897). Consult also Kenyon, (Recent Greek Literary

Discoveries > (in the Classical Review, Vol. VII, pp. 429-30, 1893).

CALLINGER, an ancient hill fort and town in India. See Kalinjar.

CALLINUS OF EPHESUS, the earliest Greek elegiac poet, flourished probably about 700 b.c. Only one elegy and a few fragments are extant ; these have been edited by several scholars, among them Bergk, in the (Poetae Lyrici GraecP (Leipzig 1878). Consult also Wright, (A Short History of Greek Literature) (New York 1907).

CALLIOPE, kal-li‘6-pe. (1) In Greek mythology, one of the Muses (q.v.) She pre¬ sided over eloquence and epic poetry. She is said to have been the mother of Orpheus by Apollo. She was represented with an epic poem in one hand and a trumpet in the other, and generally crowned with laurel. (2) An asteroid (No. 22). It was discovered by Hind on 16 Nov. 1852. (3) A musical instrument, consist¬

ing of a series of steam whistles, pitched to produce the notes of the scale, and grouped to¬ gether and operated by a keyboard.

CALLIOPE HUMMING-BIRD. See

Humming-Bird.

CALLISTHENES, Greek historian: b. Olynthus, about 365 b.c. ; d. 328. He was a nephew and pupil of Aristotle, and was ap¬ pointed to attend Alexander the Great in his expedition against Persia. His republican sen¬ timents rendered him unfit for a courtier, but his unpardonable crime was his opposition to the assumption of divine honors by the con¬ queror. On a charge of treason he was put to death, by what method historians are not agreed. Of several historical works written by him only fragments remain. A work on Alex¬ ander

was once thought to be his, but it has since been proved to be of later date. Consult Christ-Schmid, (Geschichte der griechischen Litteratur) (Vol. II, Munich 1911).

CALLISTO, in Greek mythology, a nymph of Artemis, daughter of Lycaon, King of Arca¬ dia. According to the most prevalent story of this maiden, Zeus loved her, and her son Areas was hid in the woods, and preserved, while she was changed by the jealousy of Hera into a bear. Zeus placed her, with her son, among the stars, as the constellation of the Great Bear. Areas became the ancestor of the Arcadians.

CALLISTRATUS, Athenian orator: b. about 400 b.c. ; d. 361. In 377 b.c. he played an active part in the movement for the formation of a new Athenian League. His eloquence is said to have fired the imagination of the youth¬ ful Demosthenes. For his Spartan sympathies he was condemned to death by the Athenians, and on his return from exile in Macedonia was actually executed.

CALLOT, Jacques, French etcher: b. Nancy 1592; d. there 1635. He overcame many obstacles to his study of art, twice running away from his parents. He went to Italy, learned drawing in Rome, soon gave himself up entirely to his love for engraving, and became famous for his etchings. He studied with Parigi at Florence and served at the court at Tuscany. In the space of 20 years he designed and executed about 1,600 pieces, most of them, except sacred subjects, representations of bat¬

tles, sieges, dances, festive processions, *etc.* The (Miseres et malheurs de la guerre, y in 18 pieces, may be mentioned as a remarkable series. He executed works of this kind for Cosmo II of Florence, Louis XIII of France and the Duke of Lorraine. His (Fair) and his (Beggars > are called his best pieces. He was the first who used in his etchings the hard var¬ nish — the vernice grosso dei lignaiuoli of the Italians ; and was the first to make etching an independent art. He was distinguished for his piety, magnanimity and regularity of life. Con¬ sult Meaume, (Recherches sur la vie et les ouvrages de J. CalloD (Paris 1860), and Green, J. H., (A Catalogue and Description of the Works of the Celebrated J. CalloD (London

1804).

CALLUNA. See Heath.

CALLUS, an abnormal hard growth, either carneous or osseous. The new growth of bony substance between the extremities of fractured bones, by which they are united, is an instance of the latter. External friction or pressure pro¬ duces the former, as in the hands of laborers and the feet of persons who wear ill-fitting shoes. A temporary or provisional callus is a flange of callus formed on the ends of broken bones which move freely upon one another and separate widely; and acts as a splint would. When the amount of callus is excessive, per¬ manent injury may result to neighboring struc¬ tures since nerves and tendons may be included or a joint rendered useless. Surgical operation is sometimes necessary under these conditions. See Corn.

CALMET, kal-ma', Augustin, French exegetical and historical author : b. Mesnil-la- Horgne, near Toul, France, 26 Feb. 1672; d. Paris, 25 Oct. 1757. He entered the order of Saint Benedict in 1688, and became the head of several abbeys in succession. In 1698 he be¬ came teacher of philosophy and theology in the abbey of Moyen-Moutier ; in 1704, subprior of a convent of learned monks at Munster in Al¬ sace; and in 1706 he went to Paris to under¬ take the publication of his commentary on the Bible. He afterward became prior at Lay (1715), abbot of Saint Leopold in Nancy (1718), abbot of Senones in Lorraine (1728). He was an industrious compiler of voluminous works. Among them are Commentary on the Old and New Testaments) (23 vols., Paris 1707-16) ; historical and Critical Dictionary of the Bible* (4 vols., Paris 1722-28) ; and (Ecclesiastical and Civil History of Lorraine* (4 vols., Nancy 1728; 2d ed., 6 vols., 1745-47). For his life consult Fange (Senones 1762) ; Digot, A. (Nancy 1861) ; for his correspond¬ ence, Guillaume, P. E. (Nancy 1875).

CALMETTE, Gaston, French journalist: b. Montpellier 1858; d. Paris, 16 March 1914. As editor of the Figaro from 1903, and noted for his fearlessness in attacking his political opponents, regardless of consequences, he was shot and killed by *Mme.* Caillaux, wife of Jo¬ seph Caillaux, Minister of Finance and former Premier, whose private correspondence, ob¬ tained surreptitiously, Calmette had threatened to publish. Calmette was a chevalier of the Legion of Honor, and had been decorated with the grand cross of the order of Charles III by the King of Spain.

CALMON, kal-mon, Marc Antoine,

French political economist: b. Tamnies, Dor¬ dogne, 3 March 1815; d. Paris, 13 Oct. 1890. In 1871, he became undersecretary of State in the Department of the Interior, and in De¬ cember 1872 prefect of the Department of the Seine. He entered the National Assembly as life member in 1875, but will be longest remem¬ bered for his writings on political economy, which include (Les impots avant 1789> (1865) ; (William Pitt, etude financiere et parliamentaire) (1865) ; (Histoire parliamentaire des finances de la Restauration) (1868-70); i Etude des finances de l'Angleterre depuis la reforme de Robert Peel, jusque en 1869) (1870) ; <Histoire parlementaire des finances de la mon¬ archic de Juillet) (4 vols., 1899). He edited Thiers' c Discours parlementaires) (15 vols., Paris 1879-83).

CALMON DU PIN E ALMEIDA, Miguel, Brazilian statesman : b. Santa Amara, Bahia, 22 Dec. 1796; d. Rio de Janeiro, 5 Oct. 1865. He entered the Constituent Assembly in 1822, was senator in 1840, Prime Minister in 1840 and again in 1843 and resided in Europe as special envoy 1844-47. He was created vis¬ count in 1849 and Marquis of Abrantes in 1854.

CALMS, Region of, or Zone of, tracts in the eastern Atlantic and eastern Pacific oceans, on the confines of the tradewinds, where calms of long duration prevail. This region is not the same all the year through, but follows the course of the sun, and lies farther north or farther south according to the hemisphere in which the sun happens to be. About the win¬ ter solstice its average northern limit is in lat. 5° N., and in the months about the summer solstice its average northern limit is about 12° N. lat. The southern limit lies nearly always to the north of the equator, varying between lat. 1° and 3° N. ; buc it is sometimes, though rarely, so far south as lat. 1° or 2° S. During the months following the winter solstice its av¬ erage breadth is four degrees, while in the months following the summer solstice it is about six degrees. The calms prevail espe¬ cially on the northern margin of this region, but even there, there is 2n occasional light breeze, but not sufficient to fill the sails. The climate of this region is extremely unpleasant, for the atmosphere is moist and foggy, and the sky generally overcast and gloomy, and the heat is intense and unvarying.

Almost every day there occurs a violent storm of thunder and light¬ ning, accompanied by sudden blasts of wind, and by rain which falls in regular streams for hours together. On this account the region is dangerous to navigators. To increase these dangers there is between lat. 4° and 10° N., and long. 1*8° and 23° W., a tract of considerable extent, which seamen call the ((rainy sea,® and which, with only rare intervals of calm, is visited by almost constant storms of thunder and lightning, and violent falls of rain, from which it is very difficult for a sailing vessel to make its escape.

CALMUCKS. See Kalmucks.

CALOCHORTUS, a genus of plants of the lily family, containing about 50 species, natives of western North America. They are known as Mariposa lilies, star tulips and globe tulips. The plants have narrow leaves and

showy, tulip-like white or pale or bright yellow flowers, often spotted with darker colors. Many of the species are frequent in cultivation.

CALOMARDE, ka-16-mar'da, or CALO-MARDA, Francisco Tadeo (Count of Al¬ meida), Spanish statesman: b. Villel, Aragon, 1775; d. Toulouse, France, 1842. He studied law, entered political life and sustained the national cause in resistance to Napoleon. In 1814 on the return of Ferdinand VII, Calomarde was made chief secretary of the Depart¬ ment of Indian Affairs. Here he was convicted of bribery and banished to Toledo and after¬ ward to Pamplona. In 1815 he held a similar post in the Ministry of Justice, and was made life secretary of the American Order of Isa¬ bella the Catholic. In 1823 he received the appointment of secretary to the regency, and subsequently an important office in the royal household, and he was appointed Minister of Justice. He organized the corps of royalist volunteers, recalled the Jesuits, reopened the convents and closed the universities. Ferdi¬ nand VII decorated him with the order of Charles II, and on the birth of Isabella he became Knight of the Golden Fleece and, by order of the King of Naples, Duke of Santa Isabel. He established the Pragmatic Sanction of Charles IV, admitting women to the succes¬ sion. In 1832, when Ferdinand's death was supposed to have taken place, Calomarde was the first to bend his knee before Don Carlos. The King recovered physically, but lingered in a semi-idiotic condition; of this Calomarde took advantage, by extorting from him his signature to the act of 31 Dec. 1832, reintro¬ ducing the Salic law, by which Ferdinand abdicated in favor of Don Carlos instead of the

Infanta Isabella. When Ferdinand revealed this fraudulent proceeding Calomarde was ban¬ ished to Aragon, and later avoided imprison¬ ment by escaping to France in disguise. Here he passed the rest of his days in obscurity.

CALOMEL, the sub-chloride, or ftmild® chloride of mercury, HgCl (or Hg2Cl2), known to chemists as <(mercurous chloride,® to distin¬ guish it from corrosive sublimate, HgCl2, which is known as ((mercuric chloride.® It is prepared by adding an alkaline chloride to a solution of a mercurious salt, usually the nitrate. The precipitate is thoroughly washed to remove the last remaining trace of the unchanged alkaline chloride. In the use of calomel as a medicine particular attention should be given to its lia¬ bility to generate corrosive sublimate by de¬ composition. This effect may be produced by bitter almonds or cherry-laurel water, or any other substance containing hydrocyanic acid, being administered simultaneously with it. Nitro-muriatic acid produces the same effects, as also, to some degree, the chlorides of potas¬ sium, sodium and ammonium. If there is any possible chance of its adulteration with cor¬ rosive sublimate, it may be tested by shaking a sample with a little alcohol and dipping a knife blade in the solution. The presence of even so minute a proportion of corrosive sub¬ limate as 1/500 of 1 per cent will be shown by a blackening of the steel blade. It is rendered ineffectual by the alkalies and alkaline earths. Calomel is regarded as the most valuable of the mercurial preparations, though some medical innovators reject it. It is employed as a purga-

live, operating chiefly upon the liver by stimu¬ lating its secretory functions. Being slow in its action, and liable to salivate if too long retained, it is usually administered with some saline cathartic. It is also given as a remedy for worms and as an alterative in derangement of the liver. Calomel occurs native in Spain, Bohemia, Serbia, Mexico and elsewhere, in the form of tetragonal crystals white in color (or nearly so) with a hardness of from 1 to 2 and a specific gravity of 6.48. In this form it is known to miners as horn-quicksilver.

CALONNE, ka-lon, Charles Alexandre

de, French statesman: b. Douai, 20 Jan. 1734; d. Paris, 30 Oct. 1802.

He succeeded Necker in 1783 as Comptroller-General of the Finances. In this office he continued till 1787. During this period he maintained the public credit by a punctuality till then unknown in the payments of the royal treasury, though he found it drained to the lowest ebb. He labored with unwearied assiduity to restore the equipoise between the annual income and expenditure, and to provide a supply for the emergencies of the state, without increasing the burdens of the people. For this purpose he advised the King to revive the ancient usage of convening the national assemblies of the “notables,0 to whom he proposed the bold project of suppressing the pecuniary privileges and exemptions of the nobility, clergy and magistracy. This measure alarmed those powerful bodies, and Calonne found it necessary to retire to England, where he wrote two defenses of himself — his Peti¬ tion to the King) and (Reply to Necker.* On the breaking out of the Revolution he supported the Royalist party with much zeal, both by his pen and his journeys to various countries of Europe on their account. Consult Susane, (La tactique financiere de Calonne,* with bibliog¬ raphy (Paris 1902).

CALOPHYLLUM, a genus of trees be¬ longing to the family Guttiferacece, and natives of warm climates. They have large shining leaves, with numerous transverse parallel veins. Some of the species yield excellent timber. C. inophyllum affords a medical resin, the taca-mahac of the East Indies. The seeds yield domba oil, which is used for burning, for mak¬ ing ointment, *etc.* C. calaba is a West Indian species whose oil is used for illuminating purposes.

CALORESCENCE, the phenomenon of the transmutation of heat rays into light rays ; a peculiar transmutation of the invisible calorific rays, observable beyond the red rays of the spectrum of solar and electric light, into visible luminous rays, by passing them through a solu¬ tion of iodine in bisulphide of carbon, which intercepts the luminous rays and transmits the calorific. The latter, when brought to a focus, produce a heat strong enough to ignite com¬ bustible substances, and to heat up metals to incandescence, the less refrangible calorific rays being converted into rays of higher re-frangibility, whereby they become luminous. Tyndall first described it in the book men¬ tioned below. See also Fluorescence. Consult Tyndall, T., (Heat a Mode of Motion) (New York 1905).

CALORIC (Latin color, “heap*), a name formerly given to a hypothetical, imponderable

substance of gaseous form, whose existence was postulated in order to explain the" observed phenomena of heat. It is known that no such substance exists, and the word is now practi¬ cally obsolete, except as an adjective in such expressions as "caloric effect,0 "caloric engine,0 etc., where it stands for the words "thermal0 or "heat,0 though sometimes in a special sense. For a statement of the principles of the old caloric theory, consult Metcalfe's Caloric* (2 vols., Philadelphia 1859). See also Heat; Thermodynamics.

CALORIE, or CALORY, the unit of heat in the c. g. s. system ; being the amount of heat necessary to raise the temperature of a kilogram of water one degree Centigrade, or from 4° to 5° C. In ultra-scientific researches the calorie is determined by taking 1/100 part of all the heat required to raise 1 gram of water from 1° to 100° C. It is used as a standard of heat by physicists as the term "foot-pound0 is employed as the unit of energy. It is also known as the "greater calorie,0 to distinguish it from the "small calorie,0 in which the unit of mass is the gram instead of the kilogram. Its mechanical equivalent is 4.187 joules, that being the amount of energy which disappears when one calorie of heat is developed. See Calorimetry.

CALORIMETER, The Respiration. A

respiration calorimeter is an instrument of precision by means of which gaseous exchange and heat production can be measured. It com¬ prises a chamber in which the interchange of gases and the production of heat occurs, the walls of which are air-tight and heat-proof, with accessory devices by which any gases added to or removed from the air of the cham¬ ber are measured, while the heat imparted to the air of the chamber is also removed and its quantity determined. The apparatus was origi¬ nally designed for use in the study of funda¬ mental problems of physiology with the living organism, particularly with respect to nutri¬ tion, but it has been found valuable for a great variety of other uses.

Investigations of nutrition commonly com¬ prise what-are known as ˆcomplete metabolism experiments. The subject, for example a man, is given a prescribed diet during an experi¬ mental period which mav continue several days. All his food and drink and all solid and liquid excreta are weighed and samples analyzed. From a comparison of the quantities of ele¬ ments and compounds in the materials taken into and given off by the body it is possible to tell whether the store of material has in¬ creased or decreased under the experimental conditions. In order that the balance may be complete, however, it is necessary to include with the data obtained by analysis of the solids

and liquids, the quantities of oxygen consumed, and those of water vapor and carbon dioxide given off by the lungs and skin. To this end the subject remains during some part or all of an experimental period in a device called a respiration apparatus by means of which these quantities mav be measured. From all of the data thus obtained it is possible to estimate with considerable accuracy the actual transformation of matter within the body.

The transformations of energy are likewise learned from comparison of the intake and

output of energy by the body, the quantities of energy being measured as heat, because other kinds of energy can be converted into heat and whatever the nature of the energy utilized in the body it . is ultimately converted into heat, and eliminated from the body as such. The actual income of energy to the body is the difference between the potential energy of the combustible material in the food and drink and that of the unoxidized residues of food and body material in the solid and liquid excreta, which are determined by burning samples of each in oxygen in a bomb calorimeter. The actual output of energy by the body is the heat resulting from the expenditure of energy in the maintenance of bodily functions and the performance of muscular work. To measure the amount of energy given off from the body

and alter it leaves is determined, and from these data the quantities of gases imparted to the air by the subject are ascertained. By another method somewhat similar the air leav¬ ing the chamber is passed through purifying devices which remove all the carbon dioxide and water vapor from it, the amount of each being found from the gain in weight of its absorber. The quantities of gaseous exhalation can be determined with considerable accuracy in such manner, and with small animals as subjects the consumption of oxygen can also be ascertained; but with larger animals, such as man, the determination of the quantity of oxygen consumed is somewhat more difficult. This

can be accomplished more readily by the closed circuit method in which air is withdrawn from the chamber, passed through the purify-

Ktii

Respiration Calorimeter, in Laboratories of the United States Department of Agriculture, Washington, D. C.

as heat, the respiration apparatus in which the subject spends the experimental period is ar¬ ranged also as a calorimeter. The term ((respiration calorimeter0 is intended to signify that the device measures simultaneously the respiratory exchange and the heat output of the body. In recent years a large amount of work has b6en done with the respiration calori¬ meter in experiments in which measurements of the gaseous exchange and energy produc¬ tion were the chief end, few or none of the other factors of income and outgo being con¬ sidered.

Several methods of measuring the respira¬ tory exchange are employed. One of the simplest is that in which a constant current of air is passed into and out of the respiration chamber by means of pipes through the walls, which are otherwise air-tight. The volume of air passed through the chamber is measured, and the composition of the air before it enters

ing devices and returned again to the chamber, and oxygen is supplied to it to replace that used by the subject. The gain in weight of the air purifiers shows how much carbon dioxide and water vapor were brought out of the chamber, and the loss in weight of the oxygen container shows how much of this gas was admitted to it; from these data, with al¬ lowance for any change in the composition of the air of the chamber, the actual respiratory exchange by the subject is determined.

Various methods are also employed to de¬ termine the amount of heat produced by the subject in the respiration calorimeter. One method in common use at the present time is to take up the heat as fast as it escapes from the body by a current of cold water flowing through a

coil of pipe in the chamber. From the weight of water flowing through the coil and the difference between the temperature of the water entering and that of the water leaving

the coil, the quantity of heat carried out is com¬ puted. This constitutes the major part of the heat given off from the body of the subject. A small part, however, leaves the chamber as latent heat of water vapor in the air, the amount thus carried out being computed by factor from the quantity of water caught in the water absorber. With due allowance for change of temperature of any object in the chamber, the sum of these two quantities rep¬ resents the quantity of heat produced by the subject. The temperature of the walls of the chamber is controlled so that no heat will be transmitted through them from within or without..

The illustration gives a general view of a respiration calorimeter of this type as employed in the laboratories of the United States De¬ partment of Agriculture in investigations with men and women. The respiration chamber of this apparatus is 6ˆ4 feet long, 4 feet wide and 6*4 feet high. Though it is rather small, a person can remain within it very com¬ fortably during a period of even several days' duration. The subject enters the chamber through the large opening in the side in which a pane of glass is sealed during an experiment, thus serving as a window, though there is a small electric lamp inside to provide further light if needed. There is also a small electrc fan to keep-the air stirred, and a telephone by which the sub¬ ject may communicate with those on the out¬ side. On the walls are hooks for clothing and shelves for books, food receptacles and the like. A tubular opening in one wall, called the (<food aperture,® has a tightly closing door on each end by means of which receptacles for food and excreta and other objects may be passed into or out of the chamber. The furniture, which varies with the character of the experiment, comprises a chair, a table and a cot, which may all be folded into small bulk, and devices with which definite amounts of muscular work may be performed.

That this apparatus is sufficiently accurate for the purpose for which it

is used is demon¬ strated by the fact that it measures at least 99 per cent of the quantities of oxygen used and of water vapor, carbon dioxide and heat produced when known amounts of alcohol are burned in test experiments within the chamber.

The first respiration calorimeter employed in America was devised, and constructed in the laboratory of Wesleyan University by the late W. O. Atwater, then director of the Office of Experiment Stations of the Department of Agriculture, and professor of chemistry, and Dr. E. B. Rosa, of the United States Bureau of Standards, then professor of physics at Wesleyan University, who began work on it in 1892. The original device combined an open circuit respiration apparatus similar in prin¬ ciple to that of Pettenkofer of Munich, but was altered in detail in accordance with modifi¬ cations in method of investigation; and a calorimeter that was quite original, the principal features of which were suggested by Professor Rosa. The completion of this apparatus and conducting experiments with it were made part of the investigations on the nutrition of man which were begun by the United States De¬ partment of Agriculture in 1894, and were put

in charge of Professor Atwater. During the 12 years in which it was in use at Wesleyan University the respiration calorimeter was considerably modified, particularly with respect to the experiments of respiratory exchange, being changed from an open to a closed circuit type to afford better means of determining the oxygen consumption. In 1907 it was trans¬ ferred to Washington and completely recon¬ structed in the laboratory of the Department of Agriculture, where it continues in use at the present time. In the same laboratory a smaller respiration calorimeter of similar nature but with modifications that make it to a con¬ siderable extent automatic in operation, has been constructed and employed for use in the study of metabolic activity of small magnitude, as, for example, the ripening of fruits, the wintering of bees and other problems.

Respiration calorimeters are important aids in research and are in use in many laboratories. They have been found of great value for clin¬ ical purposes and for the study of pathological and other medical problems as well as. general problems of health and hygiene. Their appli¬ cation to botanical research opens up a large field which is very promising from a theoret¬ ical as well as from a practical standpoint.

Charles F. Langworthy, United States Department of Agriculture.

CALORIMETRY (<(heat measurement®), the art of measuring the quantity of heat that a body absorbs or emits when it passes from one temperature to another, or when it undergoes some definite change of state. In order to exe¬ cute such measurements it is first necessary to adopt some convenient and accurate unit, in terms of which the quantities of heat that are to be measured can be expressed. Several such units have been proposed, but none has yet met with universal favor among physicists. One of the simplest that has been suggested (at least so far as the principles involved are concerned) is the quantity of heat that is required to melt a kilogram or a pound of ice. Evidently it will require precisely 10 times as much heat to melt 10 pounds of ice as to melt one pound and hence, if the quantity of heat required to melt one pound of ice is taken as the unit of heat, the measurement of any given quantity of heat becomes reduced to the simple operation of observing how many pounds of ice the proposed quantity of heat can melt. The earliest form of heat-measuring device (or (<calorimeter®) based upon this idea is that invented by Dr. Joseph Black about the year 1760. It consists simply of a block of clear ice, in which a cavity is made, the cavity being closed by a slab of ice laid upon the main block. To make the use of this device plain, let us suppose that it is de¬ sired to determine the quantity of heat that is given out by a certain fragment of platinum in cooling from 100° F. to the freezing-point. The chamber in the block of ice is first carefully wiped dry, and the platinum, heated accurately to 100°., is quickly introduced, and the covering lid of ice is laid in place. The platinum gives up its heat to the ice about it, with the result that a certain weight of the ice is melted, and a corresponding weight of water collects within the chamber. When it is certain that the nlatinum has attained the temperature of the ice, the slab covering the excavation in the main

block is lifted off, and the water that has col¬ lected about the platinum is removed and weighed. The quantity of heat given out by the platinum is then known at once, if the accepted unit of heat is the quantity required to melt one pound of ice. Lavoisier and La¬ place

improved Black's calorimeter in certain respects, while retaining its main features. Their instrument consists essentially of three distinct concentric chambers. The object upon which the experiment is to be performed is placed in the inner chamber, and the ice whose melting is to serve as a measure of the heat given out is placed, in the form of broken lumps, in the intermediate chamber, surrounding the object to be investigated. In the outer chamber, which encloses the other two as completely as possible, broken ice is also introduced, to prevent the conduction of heat into the apparatus from the outside. The quantity of ice melted is deter¬ mined by observing the amount of water that is formed in the middle chamber, this being drawn off by a conveniently situated tube and tap. This apparatus has been described as an improvement upon that of Black; but the only way in which it can be said to be an improve¬ ment is in the respect that it does not call for large blocks of pure clear ice. In other particu¬ lars it is somewhat inferior to the simpler ap¬ paratus of Black. The quantity of water that is produced, for example, cannot be determined with the same degree of 'accuracy in Lavoisier and Laplace's instrument. The ice calorimeter of Bunsen was a far greater advance. This in¬ genious apparatus consists of an inner chamber, for the reception of the object to be studied, and an outer enveloping one, which is entirely filled with a mixture of ice and water, and from which a graduated capillary tube is led away. The whole instrument is surrounded by broken ice, as in Lavoisier and Laplace's form, in order to protect the interior parts from the effect of external thermal influences. When the apparatus is in perfect working order, the mix¬ ture of ice and water in the intermediate cham¬ ber should be neither melted nor freezing, but should be in exact equilibrium in this respect. Upon the introduction of the object to be stud¬ ied into the central chamber, the ice in the inter¬ mediate chamber begins to melt, just as in the types of calorimeter already considered ; but the essential peculiarity of Bunsen's instrument con¬ sists in deducing the quantity of ice that is melted by observing the change of volume of the contents of the intermediate chamber, as shown by the motion of the water in the gradu¬ ated capillary tube that leads away from that chamber; advantage being taken, for this pur¬ pose, of the known fact that ice diminishes in volume upon melting, so that when the exact diminution in the volume of the contents of the intermediate chamber is known, we can calcu¬ late with a considerable degree of precision the quantity of ice that has been melted. Bunsen's calorimeter is an admirable instrument, capable of giving results of great accuracy when intelli¬ gently handled.

Another unit of heat that suggests itself quite naturally is the quantity

of heat given out by a pound of steam when it condenses into a pound of water at the same temperature. A calorimeter based upon this idea was also used by Bunsen, but the steam calorimeter was brought to its present excellent form largely

through the labors of Dr. J. Joly. In his type of the instrument the object to be studied is suspended from one arm of a delicate balance. After being accurately counterpoised, the object is bathed in an atmosphere of steam, with the result that it absorbs a certain amount of heat as its temperature rises to that of the steam. But the heat thus absorbed by the body under examination can be obtained only from the steam itself ; and, since saturated steam cannot part with heat in this way without condensing, it follows that there is deposited upon the body a weight of condensed moisture that corresponds precisely to the quantity of heat that has been absorbed. The amount of this moisture is de¬ termined by careful weighing; and it is evident that the quantity of heat absorbed by the ex¬ perimental body in passing from its original temperature to the temperature of the steam is then immediately known, if we take, as the unit of heat, the quantity of heat that is given out by a pound of steam in condensing into a pound of water at the same temperature. In practice, numerous corrections are of course necessary, as with all other instruments of pre¬ cision. It may be added that although the ice and the steam calorimeters are primarily in¬ tended to determine the heat emitted or ab¬ sorbed by a body in passing from any given tem¬ perature to some one particular temperature that is always the same (that is, the freezing-point in the one case and the boiling-point in the other), yet it is always possible to deter¬ mine the quantity of heat emitted or absorbed by the body between any two temperatures, by performing two experiments in succession, the body having these respective temperatures as its initial temperatures in the respective experi¬ ments. It is plain that the quantity of heat emitted or absorbed between the proposed in¬ itial and terminal temperatures can then be obtained by simply subtracting one of these results from the other.

Another and more familiar unit of heat is the quantity of heat required to warm a given weight of water one degree on a given ther¬ mometric scale. (See Caloric). Thus in gen¬ eral engineering practice in the United States and in England, it is customary to define a heat unit as the quantity of heat that is required in order to raise the temperature of a pound of water one degree on the Fahrenheit scale. This definition is good enough for rough purposes, because it conveniently happens that there is no great difference between the

quantity of heat required to warm a pound of water from 32° to 33° and the quantity required (for example) to warm it from 99° to 100°. This, however, we can only regard as a fortunate accident ; and for accurate scientific purposes we must recog¬ nize that the equality is only approximate, and we must adopt some particular temperature range as a part of our definition. Thus it is common to define the British heat unit, when great accuracy is desired, as the quantity of heat required to raise the temperature of a pound of water from 59° to 60° ; although some authorities, apparently without sufficient reason, make the temperature range from 32° to 33°, and others have chosen other positions on the temperature scale for the defining degree. It is unfortunate that no general agreement has yet been reached on this point. In accurate sci¬ entific work the unit of heat is usually taken as

the quantity of heat required to warm a kilo¬ gram of water from 15” C. to 16° C., or (which is practically the same thing) from 14.5° to 15.5° C. It would appear that several very good reasons could be assigned for selecting 40° C. as the standard temperature to be used in de¬ fining the heat unit. For example, the specific heat of water has its minimum value not far from that point; or, in other words, any small uncertainty in the actual realization of the tem¬ perature contained in the definition would have little or no effect if that temperature were 40° C. Again 40° C. is the temperature at or near which the differences between the various thermometer scales that are in practical use reach their maximum ; and this means that at or near this temperature a slight error in the standardi¬ zation of the thermometer that is used would have the least effect upon the verification of the heat unit. Moreover, 40° C. (104° F.) is a temperature that is likely to be always greater than the general temperature of the laboratory in which work is being carried out; and it is well known to be easier to realize a tempera¬ ture that is higher than that of the surrounding air, than it is to realize one that is lower. From every point of view, therefore, 40° C. (or there¬ abouts) would appear to be the best temperature to assume in establishing the definition of the heat unit ; a unit of heat being then defined as the quantity of heat required to raise the tem¬ perature of a kilogram of water from (say) 39° C. to 40° C. Yet, cogent as these reasons would appear, no authority has yet suggested this particular temperature as the standard.

In measuring the quantity of heat emitted by a body by observing the change of tempera¬ ture produced in a given mass of water when the

water absorbs the heat so emitted, a great variety of forms of apparatus may be used. In some cases the heated body may be plunged into the water directly, the water being kept well stirred, and its temperature taken at the be¬ ginning and end of the experiment. In other cases, and especially when the body under ex¬ amination cannot be allowed to come in con¬ tact with the water, it is necessary to adopt some more elaborate method, such as enclosing the experimental body in a water-tight envelope of some kind, and afterward making due allow¬ ance for the heat capacity of the envelope. In cases, for example, in which the heat generated by the combustion of fuel is to be measured, the fuel must be enclosed in an air-tight cruci¬ ble, to which oxygen is admitted by one tube, and from which the products of combustion are drawn off by another. The crucible is sur¬ rounded by a mass of water that is disposed in such a way as to intercept and absorb as much of the heat that is produced as possible. A direct observation of the temperature of the water in the calorimeter is made before and after the combustion, and the change of tem¬ perature so obtained gives a first approximation to the amount of heat that has been liberated.

This result has to be corrected, however, for the thermal capacity of each part of the calori¬ meter that has been warmed during the experi¬ ment, and for that of the gases admitted and drawn off, and also for any loss of heat that may have occurred through radiation. The pre¬ cise details of the corrections will vary, how¬ ever, with the design of the calorimeter, and with the mode of conducting the experiments,

• CALOTTISTS

For a discussion of the relations of the dif¬ ferent units of heat that have been mentioned above, and for an account of the experiments that have been made for determining the dif¬ ferences in the heat capacities of water at different temperatures, see Heat. Calorimeters (q.v.) constructed on a large scale are used to measure the amount of heat given off by an animal or human being, the amount of food and air supplied being recorded. Considerable success has been attained in ascertaining the fuel value of various foods by W. O. Atwater and by the Nutrition Laboratory of the Car¬ negie Institution of Washington. A very good account of the subject of calorimetry in gen¬ eral will be found in Preston's (Theory of Heat) (London 1894), which also contains val¬ uable references to original papers. The vari¬ ous forms of calorimeter that are used in prac¬ tical engineering are explained

and illustrated in Carpenter's (TextBook of Experimental Engineering) and in almost all general textbooks on physics. Consult Philosophical Transactions of the Royal Society of London) (1894), and Wiedemann's (Annalen der Physik und der Chemie> (Vol. XXXVII, p. 494, 1889). See Fuel.

CALOTROPIS, a genus of asclepiads forming shrubs or small trees natives of the tropics of Asia and Africa. There are three species, and their flowers have a some¬ what bell-shaped corolla, expanding into five divisions. C. gigantca, the largest of the genus, forms a branching shrub or small tree about 15 feet high, with a short trunk four or five inches in diameter. Its flowers are of a pretty rose-purple color. Cloth and paper have been made from the silky down of the seeds. The bark of the roots of some species furnishes the sub¬ stance called mudar, which is used in India as a diaphoretic. The juice has been found very efficacious in the cure of elephantiasis, in syphi¬ lis and anasarca. From the bark of the plant is made a substance called mudarine. The bark of the young branches also yields a valuable fibre. The leaves warmed and moistened with oil are applied as a dry fomentation in pains of the stomach; they are a valuable rubefacient. The root, reduced to powder, is given in India to horses. An intoxicating liquor, called bar, is made from the mudar by the hillmen about Mahabuleshwar, in the western Ghauts.

CALOTTISTS (French Calottiste, kal'o' test'), or the Regiment de la Calotte, a society which sprang up at Paris in the last years of the reign of Louis XIV, and took its name from the word calotte , a flat cap formerly worn by the priests, which was the symbol of the society. All were admitted whose odd be¬ havior or character, foolish opinions, etc., had exposed them to public criticism. Every one who made himself particularly ridiculous re¬ ceived letters patent authorizing him to wear the calotte. They had a singular coat of arms, on which was the sceptre of Momus, with bells, apes, rattles, *etc.* On their principal standard were the words, Favet Momus, luna influit. On the death of Torsac, the colonel of the Ca¬ lottists, the eloge (a spirited satire on the aca¬ demical style) which the Calottists pronounced on this occasion, was suppressed. Aimon, colo¬ nel of the guards, hastened to Marshal Villars with their complaints, and concluded with the

words, (<My lord, since the death of Alexander and Caesar, the Calottists have not had any protector besides you,** and the order was re¬ tracted. They became, however, too bold, at¬ tacked the ministers and even the King him¬ self ; and the regiment was in consequence dis¬ solved. After the restoration the epithet, Regime de la Calotte, was applied to the cleri¬ cal influence in politics. The (Memoires pour servir a l'histoire de la Calotte* (Basel 1725) is an amusing little book. Consult (Journal historique et anecdotiquc du regne de Louis XV de l'avocat Barbier* (ed. 1857).

CALOTYPE, a photographic process in¬ vented by Talbot, and patented in 1841. Paper saturated with nitrate of silver is dried and then immersed in a solution of potassium iodide for a few minutes, and again dried and kept in the dark. When wanted for use it is brushed over with a solution of the gallo-nitrate of silver, and immediately exposed in the camera. The image thus formed may be left to develop itself, and then thoroughly washed and fixed with hyposulphite of soda ; or a cus¬ tomary developer may be used. The process is no longer in use commercially, but is occasion¬ ally revived by amateurs.

CALOVIUS (Latinized form of original German name, Kalau), Abraham, German Lutheran theologian : b. Mohrungen, Prussia, 16 April 1612; d. 25 Feb. 1686. He became rector of the gymnasium in Danzig (1643) and professor of theology in Wittenberg (1650). He was the chief representative of controver¬ sial Lutheran orthodoxy in the 17th century, and waged war incessantly on Arminian, So-cinian, Reformed and Roman Catholic doc¬ trines, and with the greatest bitterness against Calixtus. He was six times married, the last time in his 72d year. His chief writings are (Systema Locorum Theologicorum* (12 vols., 1665-77) ; (Biblia Illustrata* (4 vols.), defend¬ ing the orthodox views of inspiration against Grotius.

CALOYERS (mMs, «beautiful,» «good** ; and yepw (<an old man**), Greek monks be¬ longing with a few exceptions to the order of Saint Basil, who lead a very austere life, eating no meat and observing the fasts of the Greek Church rigidly. They do not even eat bread unless

they have earned it. During their seven weeks of Lent they pass the greatest part of the nights in meditation and grief for their own sins and those of others. The caloyers of the Greek Church occupy a position of much greater importance than the members of the religious fraternities of the Church of Rome, inasmuch as all the higher Church dignitaries — bishops, archbishops and patriarch — are chosen from their number. They are, indeed, the only individuals in the Greek Church who are instructed in theology, and even among them the amount of theological learning is very limited. They are commonly educated at the monasteries on Mount Athos, and on the isle of Patmos, but besides these there are many monasteries dispersed over the archipelago and the Morea, and a few elsewhere belonging to this class of monks. Their most celebrated monastery in Asia is at Mount Sinai. They do not all agree as to their mode of life. Some of them are cenobites ; that is, they live in common. Others are anchorites, living alone, or with only one or

two companions ; and others again are recluses, who live in grottoes or caverns in the greatest retirement, and are supported by alms supplied to them by the monasteries. There are also convents of female caloyers. The Turks some¬ times call their dervishes by this name.

CALPE, kal'pe, the ancient name of the rock of Gibraltar (q.v.), at the southern ex¬ tremity of Spain, the northern of the two hills called by the ancients the <(Pillars of Hercules** (qv.). Across the straits of Gibraltar, on the African coast, was Abyla, the southern pillar.

CALPEE. See. Kalpi.

CALPRENlfDE, kal'pre'ned', Gautier de Costes de la, French romance writer: b. Tol-gou, Gascony, 1610; d. Paris 1663. He was an officer of the guards and royal chamberlain, and one of the authors who in the 1 7th century brought into fashion a new kind of voluminous and long-spun romances of chivalry. He wrote 'Cassandra* ; (Cleopatra *; and 'Faramond,*

besides 10 tragedies, among which are (La mort de Mithridate* (1635) ; (Jeanne d'Angleterre* (1636) ; (Le Comte d'Essex* (1638). His romances were highly celebrated, and are the best of their kind. Consult Fourgeaud-Lagreze, (Le Perigord litteraire; La Calprenede* (Rib-erac 1877) ; Morillot, (Le roman en France' (Paris).

CALPURNIA, the fourth wife of Julius Caesar, married to him 59 b.c. She was a daughter of L. Calpurnius Piso Caesonius, who was consul 58 b.c. Shakespeare introduces her into his tragedy, (Julius Caesar.* The name is also that of the daughter of L. Calpurnius Bestia, wife of P. Antistius, who took her own life when she learned that her husband was slain by order of the younger Marius, 82 b.c.

CALPURNIUS, Titus, surnamed Siculus, Latin poet : b. about 30 a.d. ; d. about 80. Seven eclogues composed by him are extant, but noth¬ ing whatever is known with certainty about his life, and even his name is doubtful. The poems attributed to him are evidently modeled on Virgil's more famous eclogues. They are exag¬ gerated and artificial. They have been edited by Schenkl (Leipzig 1885), and Keene (London 1887), and translated by Scott (London 1890). Consult Butler, (Port-Augustan Poetry* (pp. 150-59, Oxford 1909). See Nemesianus.

CALTANISSETTA, kal-ta-ne-set'ta, Sicily, capital of the province of the same name, on the right bank of the Salso, 62 miles southeast of Palermo. It is fortified, and has a citadel and cathedral, with paintings of the later Sicil¬ ian school, public gardens, a seminary, a gym¬ nasium, a school of technology, broad streets and well-built houses. In the vicinity, at Terra Pilata, are springs of petroleum and of hydro¬ gen gas, a mud-volcano and important sulphur mines, producing annually about 5,500 tons. In the neighborhood there still stands a Norman monastery built by Roger II in 1153. Caltanis-setta owes its origin to the Saracens, by whom it was called Kalat al Nisa ("the lady's castle**). The province of the same name has an area of 1,445 square miles. Pop. 40,297.

CALTHA, the genus of ranunculaceous plants to which the marsh-marigold (C . paliis-tris) belongs. See Cowslip.

CALTROP, a kind of thistle growing in southern Europe. Tt is armed with prickles,

which, if trodden on by men or animals, are capable of wounding. Hence in the military art the name of caltrop is given to an instrument with four iron points disposed in a triangular form, three of them being turned to the ground and the other pointing upward. They are used to impede the progress of cavalry.

CALUMBA or COLOMBO, the root of Jateorrhiza columba , an herbaceous plant, be¬ longing to the family Menispermcicece, which grows in Ceylon in the neighborhood of Colombo, whence it is said to derive its name. It is imported in the form of round slices or cut pieces, the interior of which is of a green¬ ish-yellow color, while its thick and furrowed skin is greenish-brown ; its odor is slightly aromatic, but somewhat nauseous; its taste extremely bitter. Calumba is often adminis¬ tered as a tonic, and is considered an excellent stomachic. It is regarded as of great value in chronic diarrhoea and dysentery; but it is necessary that all symptoms of inflammation should have disappeared before it can be used. It is usually given as a decoction, less com¬ monly in the form of pills or powders. The root of an American gentian, Frasera caro-linensis, is sometimes substituted for the true calumba, and is hence frequently called the false calumba. It is not very bitter, and is almost without smell ; it has no very marked effects.

CALUMET, Mich., township in Houghton County, at the terminus of the Mineral Range Railroad, 42 miles north of L'Anse and 68 miles northwest of Marquette. It is the seat of the famous Calumet and Hecla copper mine, the richest in the world, producing nearly 50,000 tons a year. It is the trade and supply centre of the Superior mining district, and has a national bank, several weekly newspapers, man¬ ufactories and an assessed property valuation of over $26,000,000. A $10,000,000 water-power project on the Sturgeon River, 15 miles to the south now completed, affords cheap freight rates to a large number of industrial plants, elevators, and coal docks. Commerce in a recent year amounted to 6,549,576 short tons, consisting of coal, grain, iron ore and merchandise, valued approximately at $162,000,344. Pop. (1920) 22,379.

CALUMET, the pipe of peace, a tobacco-pipe used by the North American Indians. On ceremonial occasions, as when Indian chiefs and warriors meet in peace, or at the close of a war with those of another nation, in their talks and treaties with the whites, or even when a

single person of distinction comes among them, the calumet is handed round with ceremonies peculiar to each tribe, and each member of the company draws a few whiffs. To accept the calumet is to agree to the terms proposed; to refuse it is to reject them. Some symbols of amity are found among all nations ; the white flag or flag of truce of the moderns and the olive branch of the ancients are similar in character to the Indian calumet. There is also, it appears, a calumet used in the ceremonial declaration of war and differently made from that of peace. Tobacco is smoked in the calu¬ met, and the leaves of various other kinds of plants. The bowl of this pipe is made of dif¬ ferent kinds of soft stone, especially of a kind of red soapstone, and the stem of a reed, or of some light kind of wood which is easily per¬ forated. This stein is adorned in various ways ;

sometimes it is marked with the figures of animals and hieroglyphical delineations, and almost universally has beautiful feathers at¬ tached to it, disposed according to the taste of the individual or of the tribe to which he belongs.

CALUMPIT, Philippines, a town of the province of Bulacan, situated in the south¬ western part of the island of Luzon on the Pampanga River. It is about 27 miles north¬ west of Manila, with which it is connected by rail. Pop. about 15,000.

CALVADOS, kal'va'dos', France, a north¬ ern maritime department, bounded on the north by the English Channel, and east and west and south by the departments of Eure, Manche and Orne. The soil is generally fertile, supplying wheat, barley, oats and rich pasturage for cattle, sheep and horses, which, with swine, constitute the principal wealth of Calvados. Fishing is also a thriving industry. Calvados is named for its cider. The climate is healthful, though changeable. Iron, marble, slate and coal are found. The area is 2,198 square miles. It is so called from Calvados, corruption of (Sal¬ vador the name of a vessel of the Spanish Armada, which was wrecked on the coast here. Capital, Caen. Pop. 396,310.

CALVAERT, kal'vart, Dionys (called in Italy Dionisio Fiammingo), Flemish painter: b. Antwerp 1555; d. Bologna, Italy, 17 March 1619. He went very young to Italy as a land¬ scape painter, where, in order to learn how to draw figures, he entered the school of Fontana and Sabbatini, in Bologna, with the latter of whom he visited Rome. After

having passed some time in copying the paintings of Raphael, he opened a school at Bologna, from which proceeded 137 masters, and among these Al-bano, Guido and Domenichino. The Bolognese regarded him as one of the restorers of their school, particularly in respect to coloring. Cal-vaert understood perspective, anatomy and architecture ; but the attitudes of his figures are sometimes mean and exaggerated. His best paintings are to be seen at Bologna and others are to be found in England, Dresden and Vienna.

CALVARY, the English name for the emi¬ nence, which was the scene of the crucifixion of Jesus Christ. It lay beyond but near Jerusalem, and by some it is identified with the old House of Stoning, or place of public execution, ac¬ cording to the law of Moses, on the top of the remarkable knoll outside the Damascus gate, on the north side of Jerusalem. It was from this cliff that the criminal used to be flung before being stoned (according to the Talmud), and on it his body was afterward crucified ; for the spot commands a view all over the city, and from the slopes round it the whole population might easily witness the execution. In Roman Catholic countries the name is applied to the representation of the passion and crucifixion, by three crosses, with life-size figures of Christ and the thieves and a number of surrounding figures, representing the mob present at the crucifixion. The Calvary at Aix-la-Chapelle is represented by a church on a hill, around which are 12 stones, with sculpture marking the events which occurred on the journey of Jesus to Mount Calvary. The road leading to Calvary is called <(Via Dolorosa.®

calv£, kal’va, Emma, French opera singer: b. Madrid, Spain, 1864. Her real name is Emma de Roquer. She was born of a French mother and Spanish father, and was educated in a convent school in the south of France. She studied under Rosine Laborde and made her debut at Brussels in Gounod’s c Faust, > 1882. She has made successful tours of the United States in leading roles, her first appear¬ ance in New York being on 29 Nov. 1893; and has been popular in opera comique and grand opera in Europe. Some of her best roles are 4 Chevalier

Jean) (1885) ; and Massenet's (Navarrise> (1895). After 1909 she devoted herself to concert tours.

CALVERLEY, Charles Stuart, English poet and humorist, son of the Rev. Henry Blayds : b. Martley, Worcestershire, 22 Dec. 1831 ; d. London, 17 Feb. 1884. In 1852 his father dropped the name of Blayds and re¬ sumed that of Calverley, formerly borne by his family. He wTas educated at Christ's College, Cambridge, and during his college career showed great skill in Latin and Greek composi¬ tion, in 1856 was second in the classical tripos and was appointed fellow in 1858. As a writer of humorous English verse he also made him¬ self famous. He afterward studied for the bar, and was called in 1865, but his promising legal career was cut short by a serious accident which befell him on the ice in the winter of 1866-67. The effects of this misfortune clouded the whole of the remainder of his life. As a parodist and writer of light verses Calverley is perhaps unequaled, but his published volumes are not numerous. The earliest of them ap¬ peared in 1862 under the title of (Verses and Translations) ; and the others are translations into English and Latin) (1866) ; (Theocritus Translated into English Verse) (1869) ; (Fly Leaves) (1872) ; and the Idylls of Theocritus and the Eclogues of Virgil Translated into English Verse; with an Introduction by R. Y. TyrelP (London 1908). A (Memoir and Lit¬ erary Remains> were published by Sendall (London 1885).

CALVERT, George. See Baltimore Family.

CALVERT, George Henry, American writer: b. Baltimore, Md., 2 Jan. 1803; d. New¬ port, R. I., 24 May 1889. He was a great-grandson of Lord Baltimore. After graduating at Harvard in 1823 he studied in Gottingen ; then returning to Baltimore, became editor of the American and a contributor to various periodicals. In 1843 he removed to Newport, R. I., of which city he was elected mayor in 1853. His published books include (Illustra¬ tions of Phrenology) (1832) ; (Poems) (1847) ; (Joan of Arc* (1860); (Goethe, his Life and Works* (1872) ; (Brief Essays and Brevities* (1874), and (Wordsworth: a Biographic ./Esthetic Study* (1875); 'Three Score and Other Poems) (1883). He translated the cor¬ respondence of Schiller and Goethe (1845) and Schiller's 'Don Carlos* (1836).

CALVERT, Leonard. See Baltimore Family.

CALVI, kal've, Lazzaro and Pantaleone,

Genoese painters, sons of Agostino Calvi : the former b. 1502; d. 1606; the latter d. 1595. They painted in concert many pictures in

Genoa, Monaco and Naples. In particular, the fagade of the Palazzo Doria (now Spinola), a spirited composition crowded with figures, is highly extolled. Lazzaro was the more in¬ ventive genius of the two, his brother generally working out the details of their joint produc¬ tions.

CALVIN (modified from the French form Cauvin or Caulvin), John, Swiss reformer of the 16th century; b. Noyon, Picardy, 10 July 1509; d. Geneva, Switzerland, 27 May 1564. Though born in humble condition, his father, as procureur-fiscal of the district of Noyon and secretary of the diocese, was able by per¬ sonal influence to further the interests of his family. . Calvin's mother, Jeanne Lefranc, was distinguished alike by personal beauty and piety. Even as a lad Calvin was deficient in physical vigor, but gave early tokens of more than ordinary intellectual powers, a circumstance that attracted to him the regards of a noble family at Noyon who received him under their care and gave to him the same opportunities of schooling as were enjoyed by their own children (1523). It was his father's original intention to fit him for the priesthood and in pursuance of that object he was sent to the College de la Marche at Paris ; then to the College Montaigu where he was trained in logic by a learned Spaniard who afterward directed the education of Ignatius Loyola while a student at the same school. He easily stood in the front rank of his fellow-students but was little disposed to affiliate with them, and from a certain unsocial severity of bearing acquired among them the nickname of the (<Accusative Case.® At the age of 12 he received part of the chapel revenue of Noyon in return for some services there. In 1527 his father secured for him the curacy of Saint Martin de Martinville, from which he resigned in 1529, in favor of his younger brother, and in the same year ex¬ changed the curacy for that of Pont l'Eveque, his father's birthplace.

Then his father changed his plans with reference to John and determined to have him prepared for the profession of law, putting him for that purpose under instruction at Or¬ leans (1528), where he studied with Pierre d'Etoile and Bourges (1530), where he applied himself to his studies with the same assiduity evinced at Paris, and attained immediate dis¬ tinction, though at the expense of impaired health. Without confining himself strictly to the curriculum of the school he devoted himself at the same time to the study of Greek under the German professor, Melchior Wolmar, whose Protestant views strengthened the bias toward the new faith already existing in his pupil's mind, for his attention had previously been drawn to the

careful study of the Scriptures by his kinsman Olivetan, the first Protestant translator of the Bible into French. When Calvin was 22 his father died, whereupon the young man gave up his law studies and returned to Paris, where he met Lefevre and Farel, studied theology, issuing soon after his first publication, an annotated edition of. Seneca's 'De dementia. * Up to this point it is safe to presume that his interests and ambitions were purely those of a humanist, and whatever thought he may have had in regard to the need of reform in the matters of Church doctrine

and discipline, he doubtless felt with Erasmus and Reuchlin that all the reforms that might be required would come about as the result of completer knowledge.

It was not long after this that he experienced what he calls his <(sudden conversion.® He writes : (<After my heart had long been pre¬ pared by the most earnest self-examination, on a sudden the full knowledge of the truth, like a bright light, disclosed to me the abyss of errors in which I was weltering, the sin and shame with which I was defiled.® His experi¬ ence is near of kin to that of Luther, and we are set thinking also of the <(great light® that shone upon Saul as he was nearing Damascus. Yet with all the profound disclosure thus made to him, he still felt no special call to the work of preaching the reformed doctrine and sought only for the undisturbed retirement that would permit him farther prosecution of his serious studies.

His friend Nicholas Cop had been elected to the rectorship of the University of Paris and at his request Calvin prepared for him an inaugural address which was substantially a defense of the reformed doctrine (1533). To the Sorbonnists this was intolerable, and Calvin was obliged to escape. He returned for a while to his native place, resigned the prefer¬ ment he held in the Roman Catholic Church and for nearly three years led a wandering life. We find him at Saintonge; at Nerac, the residence of the Queen of Navarre; at Angouleme, with his friend Louis Tillet; then in Paris again. To escape persecution in France, he fled to Basel, where in 1536, at the age of 26, he published

his ˆInstitutes.® This remark¬ able work was intended to be a vindication of the Protestant doctrine, and its dedication to the reigning king, Frances I, sought to create royal sympathy for the cause and for its persecuted adherents. It has been claimed that no other work, written at so early an age, has produced such a marked influence upon the opinions and practices both of contemporaries and posterity. Although the book as then composed was but the germ of what it was subsequently developed into, yet the line initially laid down in it Calvin never swerved from. By his Catholic opponents his work was styled the (<Koran of the heretics.®

After completing this work he went for a short time to Italy to visit Renee, the Duchess of Ferrara. Finally he made a visit to his native town ; and after selling the paternal estate, which had devolved on him at the death of his eldest brother, set out with his brother and sister for Strassburg. The direct road being dangerous, they went through Geneva. The situation, political and religious, which he there confronted, however, vetoed his plans and really determined his entire subsequent career. That situation briefly outlined is as follows : The Duke of Savoy, unable to secure the submission of Geneva, had by the aid of Pope Leo X forced upon the city the reluctant acceptance of John, the Bastard of Savoy, as bishop, it being stipulated that the civil admin¬ istration of the city should be vested in the Duke. The Genevese revolted under the lead of Berthelier and Bonnivard, but were defeated, Berthelier was executed and Bonnivard became the ((Prisoner of Chillon® (1530-36). Defeat did not, however, extinguish the spirit of re¬

volt. Of the two parties into which the Gene¬ vese were divided, the Confederates (((Eidgenossen,® a word from which perhaps comes the word Huguenot) looked for relief to the Swiss, and the Mamelukes favored supporting the Duke. The Confederates prevailed, the Duke was worsted and all power both military and civil passed into the hands of the people. This was in 1533.

To this civil overturning succeeded an ecclesiastical revolution. Protestant tendencies had established themselves in Bern, and from there had extended themselves to Geneva. The struggle in the latter place was a severe one, but Protestantism gained ground till under the leadership of Farel and with the assistance of Bern an ecclesiastical reconstruction was effected, the bishop driven out, Protestantism established and Geneva left independent. This meant not only a new form of doctrine ˆnd mode of worship, but a reformed system of

morals, and thereby a strain put upon the large profligate element of the population that soon worked a reaction strenuously encouraged by the Savoyards and the Catholic priests. The entire city was in this way wrought into a con¬ dition of tumultuous faction, and ic was just in the midst of this warring of civil, moral and ecclesiastical elements that Calvin arrived at Geneva as already stated, and took lodgings for the night with the distinct intention of going on to Basel the next day. Farel, who was in charge of the Protestant movement, learned of Calvin's presence in the city, through Louis du Tillet, got into communication with him and in an interview graphically described by Calvin in the preface to his Commentary on the Psalms) (a work especially rich in auto¬ biographical references), entreated him to re¬ main and help work out the problem of Prot¬ estantism in Geneva, denouncing upon him the curse of God if he refused. Calvin was awe¬ stricken by what seemed to him the prophetic deliverance of Farel and yielded to his Elijah-like expostulation, so that the dictum is well justified that (<Farel gave Geneva to the Ref¬ ormation and Calvin to Geneva.®

He prefaced his work in Geneva by intro¬ ducing and setting in operation a system of stringent regulations relative to doctrine, dis¬ cipline and daily conduct. Amusements like dancing and card-playing were punishable of¬ fenses, not because in his judgment inherently wrong, but because so abused that the only safe course was to prohibit them altogether. The stringency of this policy excited a revolt led by the Libertines, so styled, and participated in even by many of the same ((Eidgenossen® that had helped wrest Geneva from the grasp of the Duke. The opposition culminated in an act of Council expelling Calvin and Farel from the city (1538), the latter going to Neuchatel, and Calvin to Strassburg, where, with a sense of relief, he thought to find himself free to gratify his tastes and resume his studies. Here again, however, as at Geneva, he was stirred by an intimidating call and applied himself to the work of ministering to the French refugees there gathered. It was during his stay in Strass¬ burg that he married a lady of admirable char¬ acter, Idelette de Bure, widow of Jean Strodem of Liege, with whom he lived in relations of tender attachment till her death nine years later, their only child, a son, dying in early infancy.

In Geneva, in the meantime, matters had been going from bad to worse, till by the united voice of government and people Calvin was called. Crime and vice had become ram¬ pant. Catholics were planning for the restora¬ tion of the old faith. Cardinal Sordelet had addressed to the people a flattering and cajoling letter calculated to win them back to the Catholic Church. To that letter Calvin while still in Strassburg had published a reply both sagacious and masterly. Bern was suspected of having ambitious political designs on the city. The local government was too weak to maintain itself amid such a storm of conflicting elements and so after three years the people turned again helplessly to the man they had exiled. He fought against the overtures ten¬ dered him but was overborne by their earnest¬ ness and unanimity and came back to Geneva to make there his lifelong home (1541).

Calvin entered at once upon his office of ad¬ ministrative head of the city, considered in both its ecclesiastical and civic character. Though combining the two in his own person he was no Erastian, and Church and State stood to him as theoretically distinct, and yet contribut¬ ing, each, to the. interests of the other, the Church infusing its spirit into the State and the State in turn furnishing authoritative sup¬ port to the Church. Civil authority, previously widely distributed, he made more oligarchic and vested it primarily in what was known as the ((Little Council of Twenty-five.® The code de¬ vised for the city bears everywhere the marks of Calvin's authorship. For this his legal train¬ ing especially qualified him. Larger and smaller matters alike came under his purview. Like the English Alfred the Genevese legislator braced his system of enactments by a liberal infusion of the Mosaic letter and spirit. Ecclesiastical discipline was delegated to the Consistory, com¬ posed at first of 18 members, 6 clerical and 12 lay, with Calvin as its president. The city was divided into districts or parishes and a system of vigilance so thoroughly organized that every family was at least once a year visited by re¬ sponsible parties for purposes of censure, coun¬ sel or relief.

Although introducing his administration with a measure of moderation, its animus soon evinced itself in a way that made evident to the lawless and vicious classes what it was they had to contend with, and a wide-reaching op¬ position began immediately to organize itself. This opposition included the Libertines and the "Patriots,® which latter class bitterly opposed the close aristocratic

lines with which the previous popular government had been re¬ placed and regarded with jealousy the foreign¬ ers that in great numbers were coming to make their home at Geneva. The enmity toward him and his administration was still further fomented by the irrational and merciless severity shown in the punishment of small of¬ fenses, such as the beheading of a child for striking its mother, the committal of heretics to the flames, the eliciting of testimony by torture. His rule was one of terror and he was both feared and hated. Mobs attempted to in¬ timidate him. Dogs in the street were named after him. To antagonize Calvin was a crime, as Castellio found to his cost, and to speak dis¬ respectfully. of predestination, as did Bolsec,

a felony. But cases like these two are quite eclipsed by the instance of Servctus.

Servctus was a Spaniard, a scholar of in¬ dependent thought, who convinced himself of the groundlessness of papal claims, but without cordially accepting the theology of Protestant¬ ism. In 1531 he published a book entitled (The Errors of the Trinity. } Irritated by Calvin's treatment of him and his speculations he re¬ torted upon him and the Reformed doctrine flatly and acrimoniously. Though out of sym¬ pathy with the Roman Catholic Church Servetus continued for 20 years in outward con¬ formity with its doctrine and discipline and then wrote another volume under the title (The Res¬ toration of Christianity. } This was issued by him during his residence at Vienne and resulted in his arrest at the instance of the archbishop. A copy of the work came under Calvin's eye, who declared that if Servetus were to come to Geneva he should not get away alive if his au¬ thority was sufficient to prevent it. Having es¬ caped from Vienne Servetus did come to Geneva, where his presence soon reached the knowledge of Calvin, who ordered his arrest. Thirty-eight heretical propositions were alleged against him, among others the rejection of the Trinity and speculation leaning toward pan¬ theism: and, although he conducted his defense with vigor and with a degree of acuteness, he was condemned and, to the disgrace of the Protestant cause, was burned a little way out from Geneva on 27 Oct. 1553. It is claimed in behalf of Calvin that he tried to mitigate the severity of the penalty. However that may be, he was set on pursuing Servetus to the death, and it is on record that he wrote as follows to Farel two months before the execu¬ tion, — <(I hope the sentence will be capital but desire the atrocity of the punishment to be miti¬ gated.® It has to be remembered however that all of this was in keeping with the barbarism of the age and that so gracious-spirited a man as

Melancthon gave to it his assent. After the execution of Servetus and the expulsion of the Libertines two years later, Calvin's power in Geneva was firmly established. He used his influence vigorously for the defense of Protest¬ antism throughout Europe. By the mediation of Theodore de Beza he made his influence felt in France in the great struggle going on there between the hierarchical party with the Guises at its head and the Protestants led by Conde and Coligny. In 1561, his energies be¬ gan to fail, and after much bodily suffering, he died.

During the entire course of his conflict with heresy and the Libertines, Calvin was actively engaged in preaching and lecturing. He had crowds of hearers from all parts of Europe. Protestant refugees were in attendance upon his lectures and discourses and went back carrying with them the impression made upon them by his doctrines and personality. Thus was he able to stamp himself ineffaceably upon the re¬ ligious thought of his own and aftertimes, and to cause Geneva to sustain to the Latin nations in particular a relation similar to that subsisting between Wittenberg and the Germanic. The weight and permanence of the influence he ex¬ erted was due partly to his own idiosyncrasies. Both his mode of thinking and his policy of action were measurably determined by his nat¬ ural temperament and his physical debility. He

was composed principally of will and brain, with too little of the tenderer sensibilities to sweeten the action of the one or to rectify the aberrations of the other. Naturally enough then he made the doctrine of God's sovereignty the keystone of his system, and could conceive of heresy as being none other than the unpardon¬ able sin. The same combination of volitional and intellectual genius made him also a born or¬ ganizer, enabling him to compact and mature the reform tendencies of the times into a corporate whole where before everything had been in¬ cipient and sporadic.

Calvinism is Augustinianism in its developed and Protestant form, the two theologians coin¬ ciding in their views of predestination, sin and grace, though differing in the matter of justifi¬ cation and other less

important matters. The keynote of Calvinism is not predestination, as is sometimes claimed, but divine sovereignty, out of which, understood as Augustine and Calvin understood it, predestination issues as a neces¬ sary corollary. Predestination so derived car¬ ries with it perforce the notion that those who are elected to be saved are so elected by the ar¬ bitrary action of the divine will; — <(He hath mercy on whom he will have mercy, and whom he will he hardeneth.® The motive therefore leading to God's exercise of grace in specific cases has its inexplicable grounds in the mind of God, and is nowise referable to any condi¬ tion existent in the sinner. <(Infralapsariartiism,® <(Permissive Decree,® etc., are merely philosophi¬ cal attempts to relieve divine arbitrariness from the charge of immorality.

Among Calvin's most important works are (Christinae Religionis Institutio) (1536) ; (De Necessitate Reformandae Ecclesiae) (1544) ; (Commentaires sur la concordance ou harmonic des Evangelistes) (1561) ; (In Novum Testa-mentum CommentariP ; (In Libros Psalmorum CommentariP ; (In Librum Geneseos Commen-tariiP The first edition of Calvin's whole works is that of Amsterdam (1671, 9 vols. fob), but this has been superseded by the definitive and critical edition begun by J. W. Baum, E. Cunitz and E. Reuss, and finished by Lobstein and Erichson (59 vols., Brunswick and Berlin 1863-1900). By the Calvin Translation Society, his works have been collected, translated into Eng¬ lish and issued in 51 volumes (1843-55). Consult for biography Beza, T. de (Geneva 1564, new ed., 1869), the original life, written a few months after Calvin's death; Bolsec, J. (Lyons 1577 ; new ed., 1875), written from the Roman Catholic standpoint; Henry, P. (3 vols., Ham¬ burg 1835-44), English translation abridged and altered by Stebbing (London 1851); Dyer, T. H. (London 1850) ; Bungener, F. (Paris 1863, English trans., Edinburgh 1863) ; Staehelin,

E. (Elberfeld 1863) ; Pierson, A. (Amsterdam 1883-91) ; Walker, W. (New York 1906) ; all of which are written from a Protestant point of view. A very impartial and valuable book from a Roman Catholic is that by Kampschulte,

F. W., (Johann Calvin, seine Kirche und sein Staat. in GenP (Leipzig 1869-99). An ex¬ haustive work is that by Doumergue, E. (Lau¬ sanne 1899-1908), containing many original drawings, facsimiles, etc., and is the work of a lifetime. For detailed history of the life of Calvin, consult d'Aubigne, Merle, (History of the Reformation in Europe in the Time of Calvin > ; Fisher, G. P., (The Reformation* ; Schaff,

Philip, in (History of the Christian Church *(Vol. VII, pp. 257-844, New York 1892) ; article on (< Calvin® in the (Schaff-Herzog Encyclopedia of Religious Knowledge.* A very complete bibliography is given in Schaff's (Creeds of Christendom.) See Institution of the Christian Religion.

Charles H. Parkhurst.

CALVINISM. The system of religious thought taught by John Calvin, which main¬ tains that God is the sovereign ruler of the World and every good thought comes directly from him. The conception of the sovereignty of God did not originate with Calvin; it is as old as the Hebrew writings; but he emphasized it in such a way that it impressed itself upon the religious thought of his day and has continued to be the conception of God held by all Christian denominations and by many of whom it is made such a cardinal belief that the possibility of doubting it is not even brought into question. The dominant features of Calvinism impressed themselves upon his followers so thoroughly that they became a moving power in the lives of vast masses of people. Calvin followed the belief in predesti¬ nation to its logical conclusion and he pro¬ claimed that some were born to life and some to damnation; he taught that regeneration could be obtained only through the spirit of Gpd acting upon the human heart; that God will keep to the path of righteousness only those to whom he has given regenerating grace, and that he who is elected will continue in the way of righteousness. Calvinism em¬ phasizes the unchangeable nature of God, his never-dying love and his justice; for the mani¬ festation of these, his great and glorious at¬ tributes, he created the world and all that is thereon. He foreordains everything that comes to pass; and the world moves forward accord¬ ing to his plans. Calvinism lays stress upon election, redemption, bondage of will, grace and the pereseverance of the saints. According to Calvinism the fall of man was predestined, and all descendants of Adam have ineherited his sin and the accompanying punishment.

All Calvin's religious beliefs are logically stated and developed in his (Institutio Chris-tianae Religionis* ; but, with all his care, he left certain questions unanswered; and these have divided his followers into two camps or schools, the (<Supralapsarian® and the «Inf ralapsarian,® who differ principally on the order of the divine decrees. The former looks to the final result, as the first thing contemplated in these decrees; while the latter tries to soften the pronounced theory of predestination by hav¬ ing God permit man to fall. This softened form of predestination is the one generally ac¬ cepted by Calvinists. (See Calvin, John). Con¬ sult Bright, < Select Anti-Pelagian Treatises of St. Augustine> (London 1880) ; Calvin,

(The In¬ stitutes of the Christian Religion* (Philadel¬ phia) ; . Hodge, A. A., Commentary on the Westminster Confession of Faith* (Philadel¬ phia 1869) ; Kuyper, A., Calvinism, The Stone Lectures> (New York 1898).

CALVINISTIC METHODISTS, a sec¬ tion of the Methodists in Great Britain, dis¬ tinguished by their Calvinistic sentiments from the ordinary Wesleyans, who are Arminian. Wesley and Whitefield, the colleagues in the

great evangelistic movement in the 18th cen¬ tury, differed with regard to the doctrines of grace, Wesley being Arminian, and Whitefield Calvinistic. Whitefield may be regarded as the founder of Calvinistic Methodism. Other names, and especially that of Howell Harries, of Trevecca, should be mentioned in connection with it. In its distinctive form it dates from 1725, but did not completely sever its connec¬ tion with the Church of England till 1810. In government it is now Presbyterian. Its great seat is Wales and it is claimed as the only de¬ nomination in Wales of purely Welsh origin. The Calvinistic Methodists exist in three di¬ visions: the Whitefield Connection, 1741; Countess of Huntingdon's Connection (Hunt-ingdonians) 1748; Welsh Methodists, 1750.

CALVO, kill 'vo, Carlos, Argentine jurist and author : b. Buenos Aires, 26 Feb. 1824 ; d. Paris 1906. On 25 June 1860 he was accredited to the courts of Paris and London as minister plenipoteniary, and resigned after having ful¬ filled his special mission. In 1885 he became Argentine Minister at Berlin. In 1869 he was elected a corresponding member of the Paris Academy of Moral and Political Sciences, and later received the decoration of an officer of the Legion of Honor. He wrote numerous works, the most important of which are (Complete Collection of Treaties, Conventions, and Other Diplomatic Acts of All the Latin-American States) (15 vols., 1862-69); (Historical Annals of the Revolution in Latin America) (5 vols., 1864, and late dates) ; (International Law in Theory and Practice) (2 vols., 1870-72; 5th ed., in 6 vols., Paris 1896), a work considered by jurists as one of

the most remarkable on its subject; (Study on Emigration and Coloniza¬ tion (1875) ; (Dictionary of Public and Pri¬ vate International Law* (2 vols., 1885) ; Man¬ ual of Public and Private International Law) (3d ed., 1892). The (<Calvo Doctrine,® ad¬ vanced by him, provided that the collection of pecuniary claims made by citizens of any country against the government of another country should never be made by force. Prac¬ tical application of that doctrine to crises that arose subsequently was urged by the Argen¬ tine Minister for Foreign Affairs, Dr. Luis Maria Drago (q.v.), whose name has therefore been associated with South and Central Amer¬ ican protests against the employment of for¬ eign naval or military forces to coerce debtor nations on those continents.

CALVUS, Gaius Licinius Macer, Roman orator and poet, a son of the annalist and ora¬ tor of the same name : b. 82 b.c. ; d. about 47. He left 21 orations, but few fragments survive. One of these, against Vatinius, whose counsel Cicero was, produced so powerful an effect that the accused interrupted the orator and ex¬ claimed, ((Judges, am I to be condemned because my accuser is eloquent?® His poems were ranked with those of Catullus. He is often praised by Cicero (Brutus, 280-85; Ep. ad. Fam., 15, 21). The fragments of Calvus's writ¬ ings have been collected by Plessis (Paris

1896).

CALX, properly lime or calk (hence ((calcareous earth®) ; but the term is more gener¬ ally applied to the residuum of a metal or mineral which has been subjected to violent heat, burning or calcination, solution by acids vol. 5 — 16

or detonation by nitre, and which is or may be reduced to a fine powder.

CALYCANTHUS, a genus of plants of the family Calycanthacecz. Four species of American fragrant shrubs, often grown for ornament. C. floridus and C. fertilis are found in the Alleghany Mountains from Pennsylvania southward ; C. occidentalis, in California. They are popularly known as sweet-scented shrub and Carolina or American allspice. The leaves are green and rather large, and the flowers usually some shade of chocolate or purple ; both are sweet-scented. In the northern United States the species are scarcely hardy, though some

thrive in the vicinity of New York city upon well-drained, rather rich soil in somewhat sheltered situations.

CALYDON, an ancient city of 2Etolia, celebrated in the stories of King CEneus, the Calydonian boar and Dejanira and Hercules. The Romans, according to their measurement, placed it at seven and one-half miles from the Ionian Sea on the river Evenus. The heroes, Meleager, Tydeus lived there. In the reign of Augustus 31 b.c. the inhabitants were moved to the city of Nicopolis which was founded to commemorate the victory of Actium. Recent explorations point to the site of the city at Kastro of Kurtaga on the Evenus.

CALYDON, Forest of, a large forest mentioned in the Arthurian legends; it is sup¬ posed to have been in the northern part of England, or it may have been the wooded por¬ tion of the midland counties, which include also the ((Sherwood® of Robin Hood.

CALYDONIAN BOAR, in Greek mythol¬ ogy, a boar sent to lay waste the fields of CEneus, King of Calydon, the ancient capital of 2Etolia, when he omitted a sacrifice to Artemis. The goddess sent the boar when CEneus was absent on the Argonautic expedi¬ tion. No one dared to face the monster, until Meleager, the son of CEneus, with a band of heroes, pursued and slew him. The Curetes laid claim to the head and hide, but were driven off by Meleager. Later accounts make Mel¬ eager summon to the hunt heroes from all parts of Greece, among them the maiden Ata-lanta, who gave the monster the first wound. This hunt is often found in Greek art. The best known is in the pediment of the Temple of Athena Alea at Tegea by the great sculptor, Scopas, some fragments of which are now in Athens. Consult Gardner, E. A., (A Handbook of Greek Sculpture) (pp. 378-81, London 1911).

CALYMENE, kal -!‘me-ne, a genus belong¬ ing to the fossil order of the trilobites, charac¬ teristic of the lower and middle Ordovician formations of the Lower Silurian strata of Europe. In this genus the head is almost semi¬ circular and deeply divided by longitudinal furrows. The eyes are situated on the lateral lobes. The rings of the thorax and abdomen are difficult to distinguish from each other. The thoracic segments are from 10 to 14 in number. The abdominal rings are distinct and never at¬ tached to each other. The genus includes about 20 species, of which the Calymene Blwnenbachii may be taken as the type. The members of this genus have the power of rolling themselves up like a ball.

CALYPSO, in Greek mythology, a daugh¬ ter of Atlas (some say of Nereus and Doris, or of Oceanus and Thetis). She inhabited the woody island Ogygia situated deep in the ocean, and lived remote from all intercourse with gods and men. She rescued the shipwrecked Odysseus and kept him with her seven years ; but though she promised him immortality, she was unable to stifle his desire to return to Ithaca. At the command of Zeus, brought by Hermes, she allowed him to depart on a raft of his own making. Grief for his departure brought about her death.

CALYPTRA, the hood of the theca or capsule of mosses. The same name is given to any hoodlike body connected with the organs of fructification in flowering plants.

CALYPTRZEA, a genus of gasteropod mollusks belonging to the family of the Calyptrcei-dce, resembling limpets in certain characteris¬ tics, but differing from them in structure. This genus consists of small marine shellfish, conical in form, but sometimes very flat ; they are fragile, and are distinguished by a conical shell or testaceous process attached to the bottom of the cavity of the shell. The branchiae of this mollusk are composed of long and thin hairlike filaments. It is sometimes found as a fossil.

CALYPTREIDZE, a family of limpets, including those called slipper limpets or cup-and-saucer limpets. See Limpet.

CALYX, in botany, the exterior covering of a flower ; that is, the outermost floral en¬ velope consisting of a circle or whorl of leaves external to the corolla, which it encloses and supports. The parts or leaves which belong to it are called sepals ; they may be united by their margins, or distinct, and are usually of a green color and of less delicate texture than the corolla. In many flowers, however (especially monocotyledons), there is little or no difference in character between calyx and corolla. In some groups of plants the calyx is wanting.

CAM, kan, Augustus Nicolas, French sculptor : b. Paris 1822. He was a pupil of Rude; his first works represent small animals, but he later chose the large beasts and birds of prey for his subjects. Among his

best-known works are (Linnets Defending Their Nest Against Rats) ; (Tiger in Conflict with a Crocodile) ; and (Eagle and Vulture Wrangling over the Carcass of a Bear.*

CAM, kan, or CAO, kan, Diogo, Por¬ tuguese explorer of the 15th century, who fol¬ lowed up the course of Prince Henry of Portu¬ gal, sailed along the west coast of Africa, and in 1484 discovered the mouth of the Kongo, near whose bank an inscribed stone erected by him as a memorial was found in 1887. He then continued on to Cape Cross, where he also left a pillar dated 1485. This monument is now at Kiel, and three others which he erected are in the museum of the Lisbon Geographical So¬ ciety. On Cam's return from his first voyage, his sovereign, Joan II, ennobled him (April 1484). He established Christianity in one of the Kongo states.

CAM, kam, an English river formed by the junction of two streams, one of which (the Granta) rises in Essex and flows northwest, while the other (the Rhee) rises in the north of Hertfordshire, and flows northeast. The united

stream flows sluggishly northward through Cambridgeshire, and falls into the Ouse some four miles south of Ely after a course of about 40 miles. The university town of Cambridge is situated on its banks a few miles below the con¬ fluence of the head-streams. It is navigable to Cambridge ' and is famous in connection with the boating races of the students of Cambridge University.

CAM, in machinery, a simple contrivance for converting a uniform rotary motion into a varied rectilinear motion, usually a projecting part of a wheel or other revolving piece so placed as to give an alternating or varying mo¬ tion to another piece that comes in contact with it and is free to move only in a certain direc¬ tion.

CAM AND ISIS, a familiar couplet by which the sister universities of Cambridge and Oxford are often mentioned. The allusion is to the rivers on which they are situated.

"May you, my Cam and Isis, preach it long;

The right divine of kings to govern wrong . ' '

Pope, "The Dunciad."

" The drooping Muses, (Sir Industry,)

Brought to another Castahe,

Where Isis many a famous nursling breeds Or where old Cam soft passes o'er the lea,

In pensive mood."

Thomson, "Castle of Indolence."

CAMAGUEY, Cuba, (formerly Puerto Principe), (1) town, capital of the province of Puerto Principe, 170 miles northwest of the city of Santiago de Cuba. It was originally founded in 1515 at Nuevitas, the site of an old Indian village, on the northern coast, but was moved to its present site in 1516. For a time after 1800 it was the seat of government for the Spanish West Indies, and until the end of Spanish rule was an important military post. It is the largest inland city of the island, and is connected with its port, Nuevitas, by railroad. It is the centre of a cattle-raising district, and exports cattle, hides, *etc.* ; sugar also is culti¬ vated somewhat in the vicinity and exported. The town is very mediaeval in appearance, the streets are narrow and the houses old ; during the American occupation artesian wells were bored to obtain a pure water supply, the streets were repaired, a good drainage system intro¬ duced and buildings for schools remodeled.

(2) Province, east of the centre of the island, bounded on the east by Oriente and on the west by Santa Clara; area, 11,000 square miles. The north of the province is mountain¬ ous, the most of the surface being high table¬ land affording excellent pasturage. The chief industry is cattle raising, which, though it de¬ teriorated during the war, is being rapidly re¬ vived, and the number of cattle largely in¬ creased; the finest horses on the island are also raised here. The province is also well wooded, and lumbering is an important industry; the minerals include iron, copper and asphalt, all of which are mined to some extent, asphalt being of the most commercial importance. General agriculture is carried on mostly in the vicinity of the town of Puerto Principe, and its port, Nuevitas; sugar is the most important agri¬ cultural product. The province was a centre of the insurrectionary movement, and Cubitas in the northern part was the seat of the insur¬ gent government in 1896-98. Camaguey is the second province of Cuba in size but is least densely populated.

CAMAIEU, ka'ma'ye, or CAMAYEU, a

painting wherein there is only one color, and where the lights and shades are of gold, wrought on a golden or azure ground. When the ground is yellow the French call it cirage; when gray, grisaille. This kind of work is chiefly used to represent bas-reliefs. The Greeks called pieces of this sort govoxpˆg-ara. The word is also applied to a painting in two or three different colors, which, however, do not represent the natural colors of the objects de¬ picted.

CAMAJUANI, ka-ma-hwa'ne, Cuba, an in¬ land city in the province of Santa Clara, about 20 miles from the north coast of the island. It has rail connection with the capital and other northern cities. Pop. about 5,000.

CAMALDOLITES, CAMALDULIANS, or CAMALDUNIANS, a religious order es¬ tablished in 1012 by Saint Romuald, a Bene¬ dictine of Ravenna and a member of the family of the dukes of Ravenna, in the valley of Camaldoli, near Arezzo, in the Apennines, and confirmed afterward by Pope Alexander II. They were originally hermits living in separate cells, but as their wealth increased the greater part of them associated in convents. They ex¬ isted in Italy, France, Germany and Poland. In the 18th century there were five independent fraternities of them, which are here mentioned in the order of their foundation: (1) at Camaldoli; (2) at Murano in the Venetian ter¬ ritory; (3) on Monte Corona, near Perugia; (4) at Turin; (5) the French fraternity, the first establishment of which was that of Notre Dame de la Consolation. They all had in com¬ mon white garments, and the austere rules of the Benedictines. The hermits wore beards, and had still more severe rules than the monks in regard to fasting, silence and penances. Their life was devoted to contemplation rather than to active work. A small branch of the order, consisting of nuns, was founded in 1086, which has now five convents • in Italy. There is in the vicinity of Naples a mountain which takes its name from a convent of the Camaldoli situated on its top, from which the traveler en¬ joys a prospect of remarkable grandeur and beauty. The order has greatly declined, but still has several monasteries in Italy, one in Poland and one in Brazil. Its greatest mem¬ bers have been Gratian, the canonical jurist of the 12th century, and Pope Gregory XVI (1831—

46).

CAMALIG, ka-ma-leg', Philippines, a town in the southeast part of the island of Luzon, situated within six miles west-northwest of the city of Albay in a plain near the source of the Juaya River. Hemp-growing is the leading industry. Pop. 14,868.

CAMARA Y LIBERMOORE, ka'ma-ra e liv'er-mora, Manuel de la, Spanish naval officer : b. in Malaga in 1836. He was educated at the naval academy in San Fernando, and served in the Mexican campaign as staff officer of the French general, Frangois Jurien de la Graviere, and later acted as sailing master and lieutenant of the Villa de Madrid and the Vencedora. He was active in the campaign against Peru and Chile, and in the struggle with Cuba (1868-78) ; and commanded a squadron in the Philippines as captain. Later

he became chief of the naval commission to the United States and London, and rear-admiral. He commanded the squadron dispatched to the Philippines during the progress of the Spanish-American War. On 16 and 17 June the Cadiz reserve squadron under Admiral Camara left port and sailed eastward through the Mediter¬ ranean. His fleet included troopships convoyed by the Pelayo and the best of the men-of-war, except those with Cervera in the West Indies. The United States consul at Port Said pro¬ tested against permitting the Spanish fleet to refill its bunkers with coal there; nevertheless Camara received orders to proceed through the Suez Canal. At this juncture an official bulletin of the Navy Department at Washington an¬ nounced that Commodore Watson would Hake under his command an armored squadron with cruisers and proceed at once to the Spanish coast.® That was on 27 June. As though to emphasize the threat came Cervera's defeat on 3 July. On 6 July Camara's squadron was re¬ called to protect the Spanish coast ; and so Wat¬ son's fleet, which had scarcely begun to exist, had yet completely fulfilled its destiny. Later he was chief of the training ships for cadets and captain-general of the department of Fer-rol. He became vice-admiral in 1903 and re¬ tired in the same year.

CAMARASAURUS, kam-a-ra-sor'us, a genus of amphibious dinosaurs (see Dino-sauria), resembling the brontosaurus but of more massive proportions, with heavier fore limbs and shorter tail. An incomplete skeleton found in the Jurassic strata near Canon City, Colo., was the first of these gigantic ani¬ mals discovered in America. It was deposited in the American Museum of Natural History, New York. The

length of this animal was esti¬ mated by Professor Cope at 75 feet; its name was suggested by the hollow-chambered verte¬ brae of the back and neck. The atlantosaurus, of which the femur is over six feet long and two feet across at the head, was probably the same animal.

CAMARGUE, La, ka-marg', France, an island in the department of Bouches-du-Rhone, southeast France, formed at the mouth of the river by its two principal branches. It has an area of about 300 square miles. It is protected from the inundations of the river by dykes, and is mostly an unhealthy tract of pools and marshes, only a small portion of it being culti¬ vated. Horses and cattle are raised on the island.

CAMARILLA, ka-ma-re'lya, a word first used in Spain, but now in other countries also, to express the influence of certain persons in obstructing the operation of the official organs of government. When Ferdinand VII, in 1814, returned to Spain, he was surrounded by flat¬ terers, who prevailed upon him to violate his promise of giving the people a constitution. They were called camarilla either from the room where they remained in waiting, or in allusion to the Council of Castille (Camara dc Castilla'). Until the revolution of 1820 the camarilla consisted mostly of men without talent and passionately opposed to everything new ; but when the King recovered his power in 1823 they became more influential and have since repeatedly interfered with the ministers.

CAM ARINA, ka-ma-re'na, Sicily, an an¬ cient town on the southern coast of the island, founded by a colony from Syracuse in 599 b.c. Its first overthrow, which occurred 553 b.c., was the result of a revolt from the parent city. On its reduction it was razed to the ground, but was afterward rebuilt. It was in an ex¬ posed position in the Carthaginian and Roman wars, and was several times taken, retaken and destroyed. Its ruins to-day are about five miles in circumference.

CAMARINES, North and South, Phil¬ ippines, two provinces in the southeastern part of the island of Luzon. Area, 3,279 square miles. The name is also applied more vaguely to the whole of the southeastern

peninsula of the island. The formation of the peninsula is volcanic; the Caravallos range of mountains extends its whole length, from north to south, and seven of its peaks are active volcanoes. One of them, which is continually emitting smoke and flame, is well known to mariners coming from the east, and forms a kind of natural lighthouse. The most important prod¬ uct is rice. The soil of the two provinces possesses the same remarkable fertility which accompanies all the volcanic formations throughout the archipelago. Tobacco, sugar, coffee, cocoa and indigo are largely produced for exportation; but the chief occupation of the inhabitants of the Camarines is the culture of the pineapple, and the manufacture of pina cloth (q.v.). The women of the Camarines are esteemed the most artistic embroiderers in Luzon of the delicate pina and also display singular skill in the working of gold and silver filigree. All the artificers in precious metals are women; and some articles of jewelry, especially their neck chains, are very beautiful. The agriculture of the Camarines indicates in some respects a degree of progress beyond that of the other provinces of the island. The ox, and occasionally the horse, are used in plowing, instead of the slow, unwieldy buffalo, so gen¬ erally preferred by the native East Indian farmer. The Camarinians have also discarded the primitive plow, formed from a single piece of crooked timber, with a point hardened by fire ; and have substituted in its place a more modern style of implement. The provinces have well-constructed roads ; the rivers abound in fish and are crossed by substantial stone bridges. The Naga River, which drains the lakes Bato, Baao, Buhi and Iryga, and empties into the Bay of San Miguel, is navigable about 40 miles for vessels drawing not more than 13 feet of water. The industrial development of these provinces has been accompanied by a notable increase in population ; and this is composed, with but small exception, of the brown race of the Philippines, which has yielded so readily to the influences of Christian civilization. The Camarines have not had their progress retarded like other provinces of Luzon, by the troublesome presence of the wild negrito race.

CAMASS, a genus (Camassia) of plants of the lily family, including six species, natives of western North America. They have narrow leaves and many-flowered racemes of blue, purple or white flowers. Some of the species are in cultivation. The bulbs of the common

camass (C. ijuamash) of the northern Pacific Coast were a favorite food of the Indians.

CAMASS-RAT, a rodent quadruped of the northwestern United States,

similar to the gopher (q.v.). Its chief food is the camass (Camasia esculcnta) .

CAMBACERES, kan-ba-sa-ras, Jean Jac¬ ques Regis de, Duke of Parma, French states¬ man : b. Montpellier, 18 Oct. 1753; d. Paris, 8 March 1824. His zeal and talents soon ob¬ tained him distinction, and the office of a counsellor at the cour des comptes at Mont¬ pellier. At the beginning of the Revolution he received several public offices, became in Sep¬ tember 1792 a member of the Convention, and labored in the committees, particularly in the committee of legislation. On 12 Dec. 1792 he was commissioned to inquire of Louis XVI whom he desired for his counsel, and it was on his motion that the counsel was allowed to communicate freely with the King. In January 1793 he declared Louis guilty, but disputed the right of the Convention to judge him, and voted for his provisional arrest, and in case of a hos¬ tile invasion, death. On 24 January he was chosen secretary of the Convention. As a mem¬ ber of the Committee of Public Safety he re¬ ported, in the session of 26 March, the treason of Dumouriez. In August and October 1793 he presented his first plan for a civil code, in which his democratical notions were displayed. Subsequently, as a member of the Council of the Five Hundred, he presented the Projet de Code Civil, 1796, which became the foundation of the Code Napoleon. On 20 May 1797 he left his seat in the council. A year afterward he appeared among the electors of Paris; and after the revolution of the 30th Prairial, VII (19 June 1799), was made Minister of Justice. On the 18th Brumaire he was chosen second consul, and in that office made the administra¬ tion of justice the chief object of his attention. After Napoleon had ascended the throne, Cambaceres was appointed arch-chancellor of the empire, and after obtaining many high dis¬ tinctions, became in 1808 Duke of Parma. Dur¬ ing the campaign against the allied powers in 1813, Cambaceres was made president of the council of regency. At the approach of the allies in 1814 he followed the government to Blois, and from that place sent his consent to the abdication of the Emperor. When Na¬ poleon returned in 1815 Cambaceres was again made arch-chancellor and Minister of Justice, and subsequently president of the Chamber of Peers. After the second fall of Napoleon he was banished, as a regicide, but in 1818 was permitted to return.

CAMBALUC, kam-ba-look’, the name by which the city we now call Peking became known to Europe during the Middle Ages. It was the form given by Marco Polo (q.v.) to the Tartar word, Khambalu.

CAMBAY, kam-ba’, British India, a seaport of Hindustan, Bombay presidency, the chief town of a native state of the same name, at the

head of the Gulf of Cambay, 76 miles north-northwest of Surat. It was once a place of im¬ portance, but owing to the silting-up of the gulf, and the bore or rushing tides, has greatly declined. The tides run in at from 6 to 7 knots an hour, rising as high as 33 feet, and are very

dangerous to shipping. Among the buildings are several mosques and Hindu temples, and many religious structures of the Jains. The natives are expert jewelers and goldsmiths, and agate, carnelian and onyx ornaments are ex¬ ported. The trade is chiefly in cotton, ivory and grain ; the latter product being shipped to Bombay. Pop. 31,870. The state has an area of 350 square miles, and a population of 75,225.

CAMBERT, kan-bar, Robert, French musi¬ cian : b. Paris, about 1628; d. London 1677. He lounded the Royal Academy of Music, now the Paris Grand Opera. He was the first French opera composer, his works including 'La Pas¬ torale) (1659), the first French musical comedy; (Ariane et Bacchus) (1661); (Pomone) (1671); and ' Adonis. > For 22 years he was associated with the Abbe Perrin in the conduct of French opera, and going to England subsequently be¬ came ((Master of the Music® to Charles II.

CAMBERWELL, England, a metropolitan and parliamentary borough of London, on the south of the Thames, in Surrey, between Lam¬ beth and Deptford. Area, 4,480 acres. The borough has inaugurated a great working-class housing scheme. Its three divisions, North Camberwell, Peckham and Dulwich, each re¬ turn one member to Parliament. Pop. (1911) 261,328. Consult Allport, Collections Illus¬ trative of Camberwell and Neighborhood* (1841) ; Blanch, (Ye Parish of Camberwell: Its History and Antiquities) (1875).

CAMBERWELL BEAUTY, the common English name of the Vanessa or Euvanessa antiopa, a large and beautiful butterfly found in Great Britain, but much more common on the continent of Europe and in North America, where it is called Mourning Cloak. It measures three inches or more between the ex¬ tremities of its extended wings, which are of a dark-brown color, with a broad light-yellow border, and a row

of blue spots near the edge.

CAMBIASO, kam-be-a'so, Luca (called Luchetto da Genova), Italian painter and sculptor: b. Moneglia, near Genoa 1527; d. Madrid 1585. His best works are the Martyr¬ dom of Saint George) ; 'Saint Benedict and 'Saint John the Baptist,* at Roccrettini and the 'Rape of the Sabines,* in the Palazzo Imperiale, at Terralba, near Genoa. Late in life, at the invitation of Philip II, he visited Madrid, and executed an immense composition, representing the 'Assemblage of the Blessed, * on the ceiling of the Escorial. For his ability as a sculptor, with examples of his skill in that art, see the fifth volume of Thieme-Becker, p.

430.

CAMBIER, kanffie'a', Emeri Henri Celes-tin, Belgian Catholic missionary : b. Flobecq, Belgium, 2 Tan. 1865. He was educated at the College of Enghien and at the seminaries of Bonne Esperance and Schent-lez-Bruxelles. In 1888 he was ordained to the priesthood and as a member of the congregation of the Immacu¬ late Heart of Mary was sent to the Kongo mission field, where he founded the missions of New Antwerp 1890, Tuluaburg 1891, Merode-Salvator 1894, Saint Trudo 1895, Hemptinne-Saint Benedict 1897 and Saint Tames-Tielen 1898. In 1894 he became the first prefect apos¬ tolic of Upper Kassai, Belgian Kongo, in 1901 organized Kassai into a mission district and

made several journeys to Belgium in the interests of his mission and studied tropical diseases in order the better to combat sickness in his prefecture. He brought to Africa a complete equipment for a hospital for the treat¬ ment of the sleeping sickness. He served as member of the Commission for the Protection of the Natives of the Kongo and was made officer of the Royal Order of the Lion. He wrote the first grammar of the Bangala tongue

(1890) .

CAMBIER, Ernest, Belgian explorer: b. Ath 1844; d. 1909. He entered the army, serv¬ ing as adjutant on the general's staff, and in 1877 went as geographer on the first expedi¬ tion of the International African Association, under the leadership of Crespel. The latter died in

Zanzibar in 1878, and Cambier became leader. Accompanied by Wauters and Dutrieux, he started for the interior from Baga-moyo, and after a difficult journey reached Unyamwezi ; after the death of Wauters and Dutrieux's return to Europe, he went on to Karema on Lake Tanganyika. Here, in Sep¬ tember 1879, he established the first post and scientific station of the Association, and re¬ mained there till 1882. He published 'Rapports sur les. marches de la premiere Expedition de 1' Association internationale.*

CAMBIUM, in botany, the layer of delicate thin-walled cells separating the wood from the bast in a great many stems and in a cross sec¬ tion appearing as a ring. The growth of the stem takes place by the deposition, on the out¬ side of the wood, of new wood-layers formed from the cambium, and, on the inside of the bast, of new layers of bast formed from the • outer cells of the cambium layer. To this cir¬ cumstance — that it produces different kinds of cells — it owes its name (connected with the Latin cambire, to exchange). In conifers and dicotyledonous woody perennials the primary bundles are arranged in a circle, and their cam¬ bium layers are thus made to form a more or less continuous ring of cambium in the stem. By the deposition of new layers of wood and bast regularly taking place, especially in spring, at: the inner and outer surfaces of this cambium¬ ring, the stem is caused to increase in thick¬ ness.

CAMBLES, a gluttonous king of Lydia, who is said to have eaten his own wife, and afterward killed himself for the act.

CAMBODIA, or CAMBOJA, Indo-China, nominally a state under a French protectorate, but practically a French dependency, situated on the lower course of the Mekong, 220 miles from northeast to southwest, and 150 miles broad, comprising an area of 45,000 square miles. The coast, 156 miles long, indented about the middle by the Bay of Kompong-Som, offers but one port, Kampot. Among the numerous islands along the coast are Kong, Rong and Hon-Nan-Trung, most of them in¬ habited. The principal river, the Mekong (in Cambodian, Tonle-Tom, "Great River®), flows through Cambodia from north to south as far as Chen-Tel-Pho, and thence southwest till, at the town of Pnom-Penh, it divides into two arms, the Han-Giang, or Bassac, and the Tien-Giang, or Anterior River, both flowing south. Above Pnom-Penh is a north-northwest outlet

for the surcharge of the Tonle-Tom, the Tonle-Sap (((Sweet Water River®), expanding into the Great Lake, 100 miles by 25 miles in area, with a maximum depth of 65 feet. The greater part of the country is low, well watered and heavily timbered. The climate presents a dry and wet season (June to November) and is fairly healthv. The soil is amazingly fertile, producing large quantities of rice, besides silk, pepper, maize, sugarcane, cotton, betel, tobacco, indigo, coffee, *etc.* Timber is abundant. Gold and precious stones are found, besides iron, tin, limestone and salt. The breeding of cattle is a flourishing native industry. Among wild animals are the elephant, wild buffalo, deer and tiger. The Cambodians were formerly a highly cultured and civilized race. Various architec¬ tural remains, witnessing to former greatness, are found throughout the country. The present population is very mixed, being composed of Annamites, Malays and Chinese, with a season¬ ing of aboriginal racial elements. The religion is Buddhism. Polygamy is practised, the num¬ ber of wives being restricted to three. In early times Cambodia was a powerful state to which even the kings of Siam paid tribute, but it gradually fell into decay, until about the close of the 18th century the Siamese annexed part of Cambodia to their own land, and reduced the rest of the country to a state of dependency. France, on 11 Aug. 1863, concluded a treaty with the king of Cambodia, Nerodom, placing Cambodia under a French protectorate. This treaty was superseded by that of 17 June 1884, under which the king of Cambodia accepted all the reforms, administrative, judiciary, finan¬ cial and commercial, which the government •of France might institute. The present King Sisowath succeeded to the throne in 1907. The chief imports are salt, sugar, wine and various manufactured goods, such as textiles and arms ; the exports include salt-fish, spices, cotton, tobacco and rice. The external trade is mostly passed through Saigon in Cochin-China. The capital is Pnom-Penh (pop. 54,621). Pop. 1,634,252, of which about 1,100 are Europeans, exclusive of military.

CAMBODIA, or MEKONG, a large river of southeastern Asia, which rises in Tibet, passes through Yunnan, a province of China, Laos, Anam, Cambodia and French Cochin-China, and falls into the Chinese Sea bv several mouths, after a course of about 2,600 miles. Its navigation is much interrupted by sand¬ banks, rapids, etc., at various points of its mid¬ dle and upper course. The Tonle-Sap (a lake

covering an area of 100 square miles in the dry season and 770 square miles in the rainy season), on the frontiers of Cambodia and Siam, is connected with the Mekong.

CAMBON, kan bon, Jules Martin, French diplomatist: b. Paris, 5 April 1845. He studied for the law and fought in the Franco-Prussian War, reaching the grade of captain. Entering the civil service, he became prefect of Con¬ stantine in 1878, prefect of the Department du Nord in 1882, prefect of the Rhone in 1887, governor-general of Algeria in 1891 and Am¬ bassador to the United States 1897-1902. In that capacity he represented Spain in drawing up the Spanish-American protocol in 1898. From 1902-07 he was Ambassador at Madrid, and from 1907-13 was Ambassador at Berlin,

where he made strenuous and successful efforts to find a peaceful solution of the Agadir crisis of 1913. He is a brother of Pierre Paul Cam-bon (q.v.).

CAMBON, Pierre Joseph, French states¬ man: b. Montpellier, 17 June 1754; d. near Brussels, 15 Feb. 1820. Engaged in commercial pursuits, he became interested in the Revo¬ lution, and on hearing of the flight of Louis XVI he caused the republican government to be proclaimed in his native town. He was sent to the legislative assembly, and while supporting the cause of democracy, gave particular atten¬ tion to financial matters. Most of the great measures which enabled the government to get through the revolutionary period were sug¬ gested or controlled by him ; and to him the honor is due of having laid the foundation of the modern financial system of France. He promoted the confiscation of the estates of the emigres in 1792, and made, after 10 August, a report in which he argued that Louis XVI, having held a secret correspondence with the enemies of France, was guilty of high treason. He presided over the last sittings of the legis¬ lative assembly, and afterward took his seat as a member of the Convention. Here he opposed with equal energy the partisans of monarchy and of terrorism. When Louis XVI was ar¬ raigned before the Convention, he voted for his immediate death, and against the appeal to the people. He opposed the creation of the revolu¬ tionary tribunal, and insisted upon trial by jury. At the opening of the Convention, he had been appointed member of the Committee on Fi¬ nances; 7 April 1793 he entered the Committee of Public Safety. On 2 June, when the Giron¬ dists were threatened by the infuriated mob calling for their proscription, he boldly took his place among them, hoping to be able to save them from violence and arrest. The next year he made another

report on the administration of finances, which is considered a masterpiece of financial ability, and gives a full sketch of the plan which was afterward adopted for the regular registration of public debt. In the conflict which brought on the revolution of the 9th Thermidor, Cambon took part against Robespierre and his adherents ; but though he had been instrumental in their defeat, he was charged with having been their accomplice, and a warrant was issued against him. He suc¬ ceeded in eluding arrest, and, when amnesty was proclaimed by the Convention, he retired to an estate in the vicinity of Montpellier. In 1815 he was elected a member of the Chamber of Deputies. On the second return of the Bourbons, he was exiled as a regicide.

CAMBON, Pierre Paul, French diploma¬ tist: b. Paris, 20 Jan. 1843. He was graduated at the Ecole Polytechnique in 1863, and, after serving as secretary to Jules Ferry, became secretary of prefecture for the Alpes-Mari- times, prefect successively of the departments of the Aube, Doubs and Nord and French resident-general in Tunis. He was appointed Ambassador to Spain in 1886, was transferred to Constantinople in 1890 and to London in 1898. To him is due in large measure the seal¬ ing of the Anglo-French entente.

CAMBORNE, England, market town of Cornwall, 11 miles northwest of Falmouth, sit¬ uated on the slope of a gently rising hill. There

is a granite church in the Perpendicular style, restored in 1862. It also contains a market-hall, a mining school, a workingman’s institute, and a museum of mineralogy. Near it are exten¬ sive lead, tin and copper mines, and mining machinery is manufactured. Pop. 15,829.

CAMBRAI, kan-bra, or CAMBRAY,

France (Flemish, Kambryk), fortified city on the Scheldt, in the department Nord, 37 miles south-southeast of Lille by rail. From this place the linen cloth known by the name of cambric got its name. Cambrai is the seat of an archbishop. The Revolution stripped it of all

its principal ornaments. The beautiful cathedral and the tomb of its archbishop, the celebrated Fenelon, were razed to the ground. There is a new monument to the memory of Fenelon in the present cathedral, a modern building of indifferent architecture. There is a large and handsome modern Hotel de Ville and an ancient belfry tower. Cambrai is the seat of a diocesan seminary, communal college and has a valuable public library. Cambric and other linen goods, cotton, lace thread, leather goods, sugar, soap, beer, etc., are manufactured ; and there is a trade in grain, oilseed, hemp, *etc.* Cambrai is the Camaracum of the Romans. In 1508 the league against Venice was concluded at Cam¬ brai between the Emperor Maximilian, Louis XII, the Pope and Ferdinand of Aragon; in 1529 the peace with Charles V. Louis XIV took Cambria from the Spaniards in 1677, and ii was finally confirmed to France by the Treaty of Nijmegen in 1678. Pop. 21,791.

CAMBRIA, the Latin name of Wales (the Roman Britannia Secunda), derived from Cymri, the name of the branch of the Celts to which the Welsh belong, by which they have always called themselves.

CAMBRIAN from ˆCambria,® an ancient name for Wales) is a term applied to the earliest time period of the Paleozoic Era, and to the system of rocks laid down during that period. It was first applied by Murchison and Sedgwick to rocks of England and Wales, about 1835. In Cambrian time animal life on the earth was already highly differentiated. All the great groups of the animal kingdom except the vertebrates were present then and definitely characterized. The principal types, so far as the fossil evidence goes, were Brachiopods and Trilobites, but many others existed, such as mollusks, marine worms, siliceous sponges, graptolites and jellyfish, and by the end of the period starfish and crinoids. It is probable that plants, such as seaweeds, existed, but the evi¬ dence is very obscure. The climate during the Cambrian period was probably warm, even up to the Arctic Circle, but not torrid. This even¬ ness of temperature may have been due to a much larger part of the earth's surface being covered by water than in later time, or to a dif¬ ference in the composition of the atmosphere, more carbon dioxide being present. At the beginning of Cambrian time the North Ameri¬ can continent was probably larger than now. On the east a sound stretched from Labrador to Alabama, separating an island known as Old Appalachia, which extended east beyond the present coast. Central United States was largely land. On the west, a second sound ex¬

tended from the Arctic south into Nevada and California, separating

another land mass on the west, which also probably reached beyond the western coast.

During Cambrian time the continental land mass slowly sank, and by the end of the Cam¬ brian a great interior sea covered the whole Mississippi Valley and large areas both east and west. Changes in land and sea were also going on in other continents, large parts of which were under water during later Cambrian time. The period was without notable folding, but was marked by great volcanic activity in Wales and Scotland. In China, Norway and possibly at other points, rocks of very early Cambrian, or else of very late Algonkian Age, bear evidence of glacial origin.

The Cambrian system is fairly well defined at its base, since the rocks are deposited upon the upturned, eroded edges of Algonkian and older strata, indicating a great time break. The top of the Cambrian grades into the Ordovician, so that geologists are not agreed as to the line of demarcation. In North America the rocks of the Cambrian system are divided into three series, as follows: (1) The Lower Cambrian, or Georgian, (2) the Middle Cambrian or Acadian, and (3) the Upper Cambrian, or Potsdam (Saratogan). The Lower Cambrian rocks are largely restricted to the long narrow sounds already described. As the continent gradually sank, the areas of Cambrian deposition became larger, and Middle and Upper Cambrian sedi¬ ments were laid down over much of central Linked States from the Appalachians to the Sierra Nevada, south as far as northern Ark¬ ansas. They have since been eroded from parts of this area, and in still other parts lie hidden below more recent deposits. Cambrian rocks outcrop in large areas in the Appalachian Mountains, the Adirondacks, central Wisconsin, the Ozarks and in many isolated patches in the Rocky Mountains, as well as at numerous other points. The rocks indicate generally a period of tranquil change, the ocean slowly ad¬ vancing over the sinking continent and islands, just as one may see it to-day along great stretches of coast. The rocks are chiefly shal¬ low water formations, including conglomerates, sandstones and shales, though limestones are by no means unknown. In a few places as at South Mountain, Pa., there are rocks represent¬ ing lava and volcanic ash interstratified with detrital sediments. In the Appalachian region, the Cambrian sediments vary from 3,000 to 12,000 feet in thickness. Over central United States they are much thinner, but in British Columbia they are reported to reach the enormous thickness of 40,000 feet.

In Europe the Cambrian rocks are generally developed more fully than in North America; thus the conglomerates, sandstones, shales, slates and quartzites of the Welsh Cambrian are fully 20,000 feet thick and

contain much volcanic material. They are rocks indicating shallow-water conditions, and show three divi¬ sions. They extend from Wales, along Sweden, Norway and Lapland into Russia, having in Sweden a thickness of 2,000 feet. To the east the Cambrian formations thin out, and in central Russia die out altogether, the Ordovician rest¬ ing directly on the Archsean. There are con¬ siderable areas of Cambrian in Germany, Bohemia, France, Portugal and Spain ; also in

northeast China, in the Salt Range in India, in Australia and in Argentina.

Bibliography. — Report of the British As¬ sociation, Sedgwick 1835 ; Chamberlin and Salis¬ bury, (Geology) (Vol. II, New York 1907) ; Cleland, H. F., (Geology Physical and HistoricaP (New York 1916) ; Dana's (Manual of Geology) (New York 1895) ; Freeh, (Die geo-graphische Verbreitung tind Entwickelung des Cambrium5 in Compte Rendu du Congres Geologique Internationale, 1897 (Saint Peters¬ burg 1897) ; Geikie's ˆextBook of Geology) (London 1903) ; Bulletin 81 of the United States Geological Survey (Washington 1891).

Charles Laurence Dake, Assistant Professor of Geology and Mineralogy,

University of Missouri School of Mines.

CAMBRIC, a fine, thin kind of linen cloth manufactured originally, it is said, at Cambrai (q.v.) in French Flanders, whence the name. Cambric is manufactured in the north of Ire¬ land, in England, Switzerland and France, and is now chiefly used for handkerchiefs. The name is also applied to a cotton fabric which is in reality a kind of muslin.

CAMBRIDGE, Ada, the pseudonym of Mrs. George Frederick Cross, Australian nov¬ elist : b. Saint Germains, Norfolk, England, 21 Nov. 1844. She was married in 1870 to Rev. G. F. Cross and went with him to Australia, since residing in bush country districts. She is the author of (My Guardian) (1877) ; (In Two Years' Time) (1879) ; (A Mere Chance) (1882); (A Marked Man5 (1891); (The Three Miss Kings) (1891) ; (Not All in Vain) (1892) ; (A Little Minx5 (1893) ; (A Marriage Ceremony) (1894) ; (Fidelis> (1895) ; (A Humble Enterprise) (1896) ; (At Midnight5 (1897); (Materfamilias5 (1898); (Path and Goal5 (1900) ; (The Devastator (1901) ; (Thirty Years in Australia) (1903) ; (Sisters5 (1904) ; (A Platonic Friendship5 (1905) ; (A Happy Marriage5 (1906); (The Eternal Fem¬ inine5 (1907); (The Retrospect5 (1912); (The Hand in the Dark5 (1913).

CAMBRIDGE, Adolphus Frederick (1st

Duke of) : b. London, 24 Feb. 1774; d. 8 July 1850. He was the youngest son of George III, and the uncle of Queen Victoria. He entered the British army as ensign when 16 years of age, and completed his education at the German University of Gottingen. He leaned at first to the side of the opposition on the question of the French war, but afterward sided with the government. He served in the Hanoverian and British armies in several campaigns on the Continent. In 1816 he was sent to Hanover as viceroy, and administered the affairs of the kingdom with wisdom and discretion. In 1837, on the separation of Hanover from the British Crown, he returned to England again. From that period until his death he was best known to the public as the president of charitable societies.

CAMBRIDGE, George William Fred¬ erick Charles (2d Duke of), English general, son of the preceding: b. Hanover, 26 March 1819; d. 17 March 1904. His rise in the army was phenomenally rapid, and was due to his close relationship to the Crown. When a lad of 19 he became a colonel, and at 26 was a

major-general. In 1850 he succeeded his father as Duke of Cambridge, in 1854 was advanced to lieutenant-general, and in 1856 to that of general. He commanded the two brigades of Footguards and Highlanders which formed the first division of the army sent to the Crimea. He led these troops into action at the battle of Alma, and at Inkerman had a horse shot under him. He was constitutionally not well adapted for high command in the field, lacking the im¬ perturbability of the born soldier. After his experiences at Inkerman

his physician directed him to withdraw for a time from camp life. He retired first to Pera, and soon after to Eng¬ land. On the resignation of Viscount Hardinge in 1856, he was appointed commander-in-chief of the British army. As commander-in-chief he opposed most of the reforms introduced into the army, including short service and the aboli¬ tion of purchase; but he loyally carried out changes which he did not approve. He retired in 1895. Consult Sheppard, ˆPrivate Life of H.R.H, the Duke of Cambridge5 (London 1906) ; Verner, (Military Life of the Duke of Cambridge5 (2 vols., London 1905).

CAMBRIDGE, England, an inland county bounded on the north by the county of Lincoln; on the west by Northampton, Huntingdon and Bedford; on the south by Hertfordshire and Essex; and on the east by Suffolk and Norfolk. A great part of the northern half of the county belongs to the fen district and is very flat; farther south it is undulating, and in the south¬ east some heights occur. The principal rivers are the Cam or Granta, and the Ouse, with the Nene in the north. An important portion of the county, including the Isle of Ely, belongs to the great artificially drained tract known as the Bedford Level (q.v.). About nine-tenths of the total acreage of the county is now pro¬ ductive, and a greater proportion of land is under corn crops than in any other county in the kingdom. Potatoes, turnips and mangold are the chief green crops. The southern portion of the county abounds in dairy farms, celebrated for the production of excellent butter and cheese. The part of the county extending from Gogmagog Hills to Newmarket is chiefly ap¬ propriated to sheep-walks. The chief mineral productions are the phosphatic nodules known as coprolites, lime and clay for brick and tiles ; and peat is cut for fuel. For parliamentary pur¬ poses the county is divided into four divisions — Wisbech, Chesterton and Newmarket, and the parliamentary borough of Cambridge, each re¬ turning one member to Parliament. Adminis¬ tratively the ancient county embraces the two counties of Cambridge and the Isle of Ely. There are two municipal boroughs, Cambridge and Wisbech. The educational institutions in¬ clude a day training college for schoolmasters, and the new Homerton undenominational train¬ ing college for women at Cambridge, and a theological college founded in 1876 at Ely ; there are also more than 225 elementary schools in the county. Area, 553,241 acres. Pop. 198,074. See also Cambridge, University of.

CAMBRIDGE, England, capital of the county of Cambridge, is situated on the Cam, about 56 miles north by east by rail from Lon¬ don. It is a municipal and parliamentary bor¬ ough, the seat of a celebrated university (see

Cambridge, University of), and has a large agricultural market.

Geology. — The geological formation of Cambridge and the surrounding district con¬ sists chiefly of clay. The following strata are to be found — Chalk, Marl, Cambridge Green¬ sand, Gault, Kimeridge Clay, Oxford Clay, Ampthill Clay, Cherryhinton Chalk and some recent alluvium which borders the rivers and tributaries, consisting of peat, sandy loam, *etc.* The town is made up of three main thorough¬ fares, two running north and south and the other east and west.

Public Buildings, Libraries, *etc.* — The city possesses a Guildhall, including municipal build¬ ings, law courts and public free library. There is also a spacious corn exchange, attended weekly by buyers from all parts of the United Kingdom, and a cattle market. Addenbrooke's Hospital is a noted institution, connected as it is with the Cambridge University Medical School. Cambridge was one of the first towns to establish a public free library, which now com¬ prises a central library and three branches with a collection of upwards of 50,000 volumes.

Churches. — Cambridge is fortunate in the number of its ancient churches, two of which are worthy of mention. The church of Saint Benedict's is the oldest, being of pre-Conquest date. It possesses a tower in the Saxon style of architecture. That of the Holy Sepulchre or <(Round Church® is one of four round churches in England, and was probably in exist¬ ence about the year 1130. The largest parish church is that of Saint Mary the Great (the University church), built in the perpendicular style. Other churches of interest are the Abbey (early English, 13th century), Saint Edward (rebuilt in the 14th century with the exception of the tower which is a work of the 12th cen¬ tury), Saint Michael (13th century), Trinity (about 1274), Saint Mary the Less (1340), Saint Botolph (14th century) and Saint Peter, which has examples of 12th century architec¬ ture. The history of nonconformity in Cam¬ bridge dates from the year 1457, and it is now well represented by its churches. The Roman Catholics have a fine church built in the early decorated style. It was commenced in

1887, through a donation from Yolande Marie Louise Lyne-Stephens. Of theologians Cambridge was the birthplace of Jeremy Taylor; it was at Cam¬ bridge the Rev. Charles Simeon founded the evangelical school of the Church of England, and at the same period Robert Hall, the great Baptist preacher, attracted large congregations. Johnny Stittle, the hedger, occupied a unique position at the end of the 18th and beginning of the 19th century, drawing a large congrega¬ tion from both town and University. Thomas Hobson was famous as a carrier. He is said to have been the first to let out horses for hire, and the originator of the proverb (<Hobson's Choice.®

Education. — Cambridge has 20 public ele¬ mentary schools, including higher grade schools, among which we may note the Perse gram¬ mar schools, founded by Dr. Stephen Perse in 1615. The Wesleyans are represented in education by the Leys school, the Roman Cath¬ olics by Saint Edmund's House, the Presby¬ terians by Westminster College, and more re¬ cently the Congregationalists have removed from Cheshunt, Herts, to Cambridge, prelimi¬

nary to the erection of a new college. Homerton College has about 150 female students in training for educational duties.

Railroads. — The railway companies which have connections at Cambridge are the Great Eastern, the Great Northern, the Midland and the London North Western.

Recreation Grounds. — Cambridge is for¬ tunate in its number of common lands and recreation grounds, numbering in all and having a total area of 300 acres. Of the recreation grounds Parker's Piece is a noted cricket and football ground, where all the University matches were played, until they purchased their own grounds.

Government. — The corporation of Cam¬ bridge, under the ((Municipal Reform Act,® consists of a mayor, 10 aldermen and 30 coun¬ cillors. The University also returns its quota of two aldermen and six councillors. The town returns one member to Parliament.

History. — There is every proof that in its early days Cambridge was an important trading centre. Its situation on the Cam made it easily accessible from the surrounding district for miles around, and provender, fuel and mer¬ chandise were conveyed by water to all parts of East Anglia. It was the seat of Stourbridge Fair, one of the largest fairs in Europe. That the Romans occupied the town is evident

from the fact that numerous Roman remains have been found at various periods. Miles of ancient earthworks, said to be of British origin, sur¬ round Cambridge, and in the town itself there is a large mound called (<Castle Hill,® probably of Saxon origin and raised as a defense against the incursions of the Danes. In the years 870 and 1010 the town was destroyed by the Danes. William the Conqueror built a castle here in 1068. The year 1110 is alleged to be the date of the origin of the university, at which time, we read that learned monks visited Cambridge to teach philosophy and other sciences. Richard II held a Parliament at Cambridge in 1388. The town was frequently visited by the plague (((Black Death®), and in 1630 the mortality was terrible. At the time of the Civil War Oliver Cromwell (formerly a student of Sidney Sus¬ sex College) represented Cambridge in Parlia¬ ment, and the town supplied a large number of men for the Parliamentary army. William Downing did considerable damage both to the colleges and to the parish churches in 1643. Queen Victoria and her consort visited Cam¬ bridge in 1845 and again in 1847, and as chan¬ cellor of the university, the influence for good, exercised by the Prince Consort, was pre¬ dominant. The King and Queen visited Cam¬ bridge on 1 March 1904 to open the new uni¬ versity museums. The second meeting of the British association was held at Cambridge in 1833, and subsequent meetings were held in 1845, 1862 and 1904. Apart from the Univer¬ sity, Cambridge would lose much of its import¬ ance. The colleges with their various styles of architecture, surrounded by gardens and wcol-lege walks,® are a constant source of delight. The river Cam winds its course through the college grounds for a distance of about three-quarters of a mile. Nine bridges connect the colleges and grounds where nature and art com¬ bine. Below the town, the river is the scene of the well-known college boat races which oc¬ casion the visit of thousands of people.

Area and Population. — The town covers an area of 3,278 acres. Much house property has been destroyed to make room for the con¬ tinuous additions to colleges and university buildings, with the result that residents have migrated to adjacent districts. Pop. 40,027.

Bibliography. — Atkinson and Clark, his¬ tory of Cambridge'* (1897) ; Carter, (History of Cambridgeshire1 (1819) ; Clark, historical and Descriptive Notes on Cambridge1 ; Cony-beare, history of Cambridgeshire) (1897); Cooper, (Annals of Cambridge, 693-1853 1 (5 vols.) ; (Memorials of Cambridge> (3 vols., 1866) ; Stubbs, (Cambridge and its Story 1

(1903).

CAMBRIDGE, Ill., the county-seat of Henry County, a village on the Rock Island and Peoria Railroad, about 28 miles southeast of Rock Island. Surrounded by a productive agri¬ cultural district, it has a thriving domestic and export trade in farm produce, grain and cattle, *etc.* Pop. (1920) 1,335.

CAMBRIDGE, Mass., city and one of the county-seats of Middlesex County, situated on the Charles River and the Fitchburg division of the Boston and Maine Railroad, also con¬ necting with the Boston and Albany Railroad ; opposite and joined to Boston by nine bridges. It was founded in 1630-31, under the name of ˆNewe-Towne,11 or ˆNewtown,11 and did not receive its present name until several years later. In 1636 the General Court appropriated $2,000 to locate a school in Old Cambridge, which later became Harvard College, now Harvard University. In 1631 Cambridge was 35 miles long and onlv one mile wide, includ¬ ing the townships now incorporated as Billerica, Bedford, Lexington, Arlington, Brighton and Newton, all these having been gradually separated from it. The city was formerly divided into villages called Old Cambridge, Cambridgeport, East Cambridge and North Cambridge, names which are still used to desig¬ nate certain districts. It has grown into a populous centre, manufacturing glass, furniture, organs, steam-engines, etc., the total value of which amounts annually to over $45,000,000. Nearly 1,200 retail establishments supply the wants of Cambridge, paying $2,250,000 a year in wages, and having sales of over $15,000,000. The first printing office in the United States was located in Cambridge, and the (Bay Psalm-Book, 1 published by Stephen Day and printed in 1640, was the first book from this press. Cambridge has now extensive printing estab¬ lishments, including the Riverside Press, the Athemeum Press and the University Press. For historical and literary associations, Cam¬ bridge is one of the most famous cities in the United States. The venerable Washington elm, under which Washington took command of the American army, 3 July 1775, stands at the corner of Mason and Garden streets. ((Craigie House,*1 built by

Col. John Vassall in 1759, _ was Washington's headquarters in 1775-76, and afterward became the home of the poet Henry W. Longfellow until his death. On Elm ave¬ nue is ˆElmwood,11 the birthplace and home of James Russell Lowell, who lived here 1819-91. A part of the place, bought by public subscrip¬ tion, is preserved as a public park. This city was also the home of Oliver Wendell Holmes, William Henry Channing, Margaret Fuller

Ossoli, Col. Thomas Wentworth Higginson, Louis Agassiz, John Fiske and Charles Eliot Norton. The fine city hall and land for a park was the gift of a former citizen, Frederick H. Rindge, who also presented the city with a pub¬ lic library, an institution now called the Rindge Manual Training School, and other benefac¬ tions which amounted to more than $1,000,000. The beautiful Mount Auburn cemetery is partly in Cambridge and partly in Watertown. Among important buildings are those of Harvard Uni¬ versity; Radcliffe College; Cambridge Hospi¬ tal; Manual Training School; the Latin and High Schools; Public Library; and Middlesex County Courthouse. Much has been accom¬ plished toward developing a system of parks which includes nearly the entire river front, and extends around the manufacturing district. In two recent years the total building operations in new factories, fine apartment-houses and private residences amounted to $5,000,000. The total value of taxable property is $130,000,000. The city buildings, land and equipment are valued at $4,000,000; its parks at $4,300,000, and it owns its waterworks which cost $6,500,000. The administration consists of a mayor and city council. Pop. 109,694. Consult Bacon, (Cambridge and Vicinity1 (Newark 1892) ; Paige, (History of Cambridge1 (Boston 1877) ; Eliot, (History of Cambridge1 (Cambridge 1913). See Harvard University.

CAMBRIDGE, Md., a city and county-seat of Dorchester County, 58 miles southeast of Baltimore on the Choptank River near Chesa¬ peake Bay and on the Seaford and Cambridge Railroad. Cambridge was settled in 1684 and was incorporated as a city in 1900. It is gov¬ erned by a mayor, elected eyery two years by the city council, which includes the mayor and four aldermen. Cambridge has important manufactures of underwear and lumber and as the centre of a fertile agricultural district has an active trade in farm produce and live stock. Fruit, vegetable and oyster canning industries are carried on to a considerable extent. Pop.

(1920) 7,467.

CAMBRIDGE, N. Y., village of Wash¬ ington County, on the Delaware and Hudson Railroad, 28 miles northeast of Albany. The Cambridge Valley Agricultural and Stockbreed¬ ers' Association is located here and seed, steel plow, chaplet and knitting industries are carried on. The village was incorporated in 1866. Pop.

(1920) 1,559.

CAMBRIDGE, Ohio, city and county-seat of Guernsey County, on the Baltimore and Ohio and Pennsylvania railroads, 55 miles north of Marietta. It is situated on a hill 800 feet above sea-level, in a coal and iron region which has also deposits of pottery clay. The industries are chiefly mining and manufactures connected with these resources. The United States cen¬ sus of manufactures for 1914 reported 39 in¬ dustrial establishments of factory grade, em¬ ploying 1,656 persons, of whom 1,435 were wage earners, receiving, annually, $1,1 12,000 in wages. The capital invested aggregated $2,969,000, and the year's output was valued at $3,924,000: of this, $416,000 was the value added by manu¬ facture. Natural gas is used for heating. The city owns and operates its waterworks. The city has five banks, courthouse, children's home and Carnegie Library. It was settled in 1804,

was incorporated as a city in 1887 and received a new charter of administration in 1893. A mayor, elected every two years, and a council govern the city. Pop. 13,000.

CAMBRIDGE, University of. Situated at

Cambridge, England. Its origin is very obscure, and of its early history, before the 12th century, there are only very scanty records. It is clear that a university existed long before the foundation of the oldest

college, and that it was powerful enough to claim and to obtain from the town very important privileges, such as im¬ munity from taxation, the right to test weights and measures and to prescribe what amuse¬ ments should be allowed or forbidden. From the bitter feeling aroused by the possession of these and other privileges frequent serious out¬ breaks of hostilities arose between the town and the university, resulting in the wanton destruction of valuable records, which has left little or no material for a connected history. It is probable that the university owed its origin to the schools in connection with the priory of Saint Frideswyde and the conventual church at Ely. The earliest recognition of Cambridge as a university is contained in a writ of the second year of Henry III, 1217, ordering all clerks who had been excommuni¬ cated for their adherence to Louis, son of the king of France, to depart the realm. The number of students was increased in the same reign by a migration of students from Paris in 1229, and further by a like migration from Ox¬ ford in 1240. In the early part of the 13th cen¬ tury students lived where they pleased, but in time they inaugurated a system of hostels or lodging-houses, in which a number had to live under the supervision of a superior; and out of this system of hostels sprang the collegiate sys¬ tem. The oldest of the colleges, Peterhouse, was founded in 1284 by Hugh de Balsham, bishop of Ely; it was followed by Clare Col¬ lege, founded in 1326 by Lady Elizabeth, grand¬ daughter of Edward I ; Pembroke Hall, in 1347, by Marie de St. Paul ; Gonville Hall, after¬ ward Gonville and Caius College, in 1348 by Edmund Gonville; Trinity Hall, in 1350, by William Bateman, bishop of Norwich; Corpus Christi College, in 1352, by the joint efforts of two Cambridge communities, the Guild of Cor¬ pus Christi and the Guild of the Blessed Virgin ; King's College, in 1441, by King Henry VI ; Queen's College, in 1448, by Margaret of Anjou, though it was not till 1475 that it re¬ ceived its code of statutes from Elizabeth Woodville, the consort of Edward IV ; Saint Catherine's Hall, in 1452, by Robert Wodelarke, provost of King's College; Jesus College, in 1496, by John Alcock, bishop of Ely; Christ's College, in 1505, by the Lady Margaret, Count¬ ess of Richmond, mother of Henry VII ; Saint John's College, in 1511, also by Lady Margaret; Magdalene College,' in 1542, by Sir Thomas Audley; Trinity College, formed by the union of the earlier foundations of Michaelhouse, 1324, and of King's Hall, 1337, and founded in 1546 by Henry VIII; Emmanuel College, in 1584, by Sir Walter Mildmay, a college dear to all Americans as that in which John Harvard, founder of Harvard College, was educated; Sidney Sussex College, in 1596, by the Lady Frances Sidney, Countess of Sussex; Downing College, in 1800, by Sir George Downing;

Selwyn College Public Hostel, founded in 1882 in memory of George Augustus Selwyn, late bishop of Lichfield, formerly bishop of New Zealand. Each of these colleges is a separate corporation governed by its own statutes and practically independent of the university, though the connection between the two is nec¬ essarily very close, as every member of the university is a member of some one of the col¬ leges, as a non-collegiate student. The head of a college is styled the master, except in the case of King's College, where he is styled the pro¬ vost, and of Queen's College, which is ruled by the president. Other college officers are the tutor, who stands in loco parentis to the undergraduates, and the dean, who is re¬ sponsible for the services in the college chapel, and for college discipline.

A code of statutes was given to the univer¬ sity by Queen Elizabeth, and this code remained in force till 1858, when a new code was framed by a royal commission ; this latter code was again revised in 1882, when they took their present form. In 1874 all religious tests were finally abolished except for degrees in divinity; and in 1894 the university surrendered the last of its privileges over the town, which it had re¬ tained since the 13th century, and then only put an end to the bitter feeling which had existed for centuries between the town and the univer¬ sity, and which had led to frequent outbreaks of hostilities between the two bodies.

The university was incorporated in the reign of Elizabeth, by the name of ftThe Chancellor, Masters and Scholars of the University of Cambridge.® The executive authority of the university rests in theory with the chancellor, who is elected for life ; but as he is non¬ resident, it is practically in the hands of the vice-chancellor, who is elected annually from among the heads of colleges. The ultimate decision of all questions touching academic policy rests with the senate, a body composed of all those members of the university who have proceeded to the M.A. or some higher degree, and whose names are on the register of members of the senate. All legislative pro¬ posals so far as they are consistent with the statutes, which can only be altered by act of Parliament, are framed by the vice-chancellor in conjunction with the council of the senate, a body elected by the resident members of the senate and consisting of the chancellor, the vice-chancellor, four heads of colleges, four professors and eight other members of the senate. These proposals, having received the sanction of the council, are offered to the senate in the form of graces or resolutions, and must pass the senate before they can take effect. Of the other officers of the university the most important are the two proctors, whose duty it is to

attend to the discipline of all persons in statu pupillari and to read the graces in the senate house ; the registrar, who keeps the archives of the university; the public orator, who is the voice of the university on all im¬ portant occasions, who writes letters in the name of the university and who presents all honorary degrees in a Latin speech ; the li¬ brarian, who has charge of the university li¬ brary. A general board of studies supervises the system of teaching as a whole, and each department of study is controlled by a professor and a syndicate or board. The teaching of the

undergraduates is undertaken partly by the university and partly by the colleges. It takes mainly the form of lectures, delivered either by the university professors or readers, and open to all members of the university; or by college lectures to members of particular colleges or groups of colleges.

The academical year is divided into three terms: the Michaelmas term, lasting from 1 October to 19 December; the Lent Term from 8 January to within a few days of Easter; the Easter term from three weeks after Easter to 24 June. The under¬ graduates reside either in rooms belonging to the several colleges or in rooms in the town licensed for the purpose. They dine to¬ gether in the college hall, but all other meals are taken in their own rooms. Academical dress, a gown and square college cap, must be worn in the college hall and chapel. Before proceeding to any examination for a degree they must have resided for the greater part of each of nine terms ; and must have passed the previous examination, commonly called the <(Little Go,® a somewhat elementary examina¬ tion in classics, mathematics and divinity. Ex¬ emption from this examination can be obtained by passing various non-university examinations. The student can then, if he wishes to proceed to an (<Honors)) degree, devote the rest of his time to his special subject, and having kept his terms, is qualified to become a candidate for honor in a tripos, as honor examinations are called. If he wishes merely to obtain a pass degree he must first pass the general examina¬ tion of somewhat similar nature to the pre¬

vious, but more advanced, and can then proceed to one of the special examinations, as they are called. These examinations are in the same subjects as the tripos examinations, but the questions set are of a much less advanced nature. A student who passes a tripos is called an honor man; one who passes in a special ex¬ amination is called a pass man (commonly (<Pollman,® from oi ttoXXol). The names of successful candidates are arranged in three classes, called in the case of the mathematical tripos, wranglers, senior optimes and junior optimes; in the case of thˆe examinations merely first, second and third class. To the rule that every student before proceeding to a degree must have (<kept® residence at least nine terms, there are some important exceptions. Grad¬ uates of other universities, British and foreign, who can produce evidence of special qualifica¬ tions, can qualify for the B.A. degree by pass¬ ing a tripos examination, or by submitting for approval a dissertation on some subject con¬ nected with the special branch of study. Students, from various educational institutions for adults both at home and in the colonies, which are said to be ˆaffiliated® to the Uni¬ versity, are allowed practically the same privi¬ leges. Further, diplomas in public health, psychological medicine, anthropology, tropical medicine, agriculture, geography, mining en¬ gineering and forestry are granted, after ex¬ amination, to persons who are not members of the university. Having obtained the B.A. de¬ gree the student can then, after the lapse of three years, proceed to the M.A. degree, and thereby, for the first time, he obtains a voice in the government of the university. He can exercise a vote in the senate, and can (<non¬

placet® or oppose the graces offered to the senate by the council. Of the degrees above that of B.A., the M.A. is the only one that is conferred without further examination or ex¬ ercise. The degree of doctor in the various faculties can only be obtained by examination or by a dissertation. Degrees other than these already mentioned which are conferred by the university are the degrees of doctor in divinity, law, medicine, music, letters and science ; master in law and surgery, bachelor of divinity, law, music, medicine and surgery. The university has power to confer honorary degrees, without residence or examination, on distinguished per¬ sons, noblemen, bishops, deans and heads of colleges. Before 1850 the only avenue to an honor's degree was by way of the mathematical tripos, or by the mathematical and classical tripos combined. The last half century has witnessed a remarkable development. New triposes have been established in moral sciences, theology, natural sciences, lawr, history, eco¬ nomics, mediaeval and modern languages, oriental languages and mechanical

sciences ; while new professorships have been founded in archaeology, fine arts, Latin, Anglo-Saxon, ex¬ perimental physics, mechanism and applied science, surgery, agriculture, biological chem¬ istry, biology, divinity, ecclesiastical history, English literature, genetics, German, mental philosophy and logic, Sanscrit and Chinese. This last was founded by Sir Thomas Wade, who was the first professor and who be¬ queathed to the university the first Chinese library outside China. Provision is also made for the teaching of Hindustani, Tamil, Bur¬ mese, Persian, Russian, *etc.*

Of the university buildings the most import¬ ant is the University Library, containing over 800,000 volumes, over 10,000 manuscripts, in¬ cluding the famous Codex Bezse, and 100,000 maps. The Acton Library of 59,000 volumes was presented by Viscount Morley in 1902. This library is entitled by the Copyright Act to a copy of every book published in the United Kingdom, and a large sum is expended every year in the purchase of foreign books and periodicals. The Fitzwilliam Museum contains a valuable collection of paintings, ancient mar¬ bles and coins. The Observatory stands about a mile from Cambridge, and is splendidly equipped with instruments large and small. The Museums and Laboratories of Science cover a large space of ground in the centre of the university and include laboratories, lecture-rooms, and workshops for all departments of science and medicine. These museums have been erected at great cost during the last few years, and were formally opened by King Edward in 1905. The Engineering Laboratory, probably one of the best equipped of its kind in existence, provides adequate instruction for the profession of engineer. The Cavendish Laboratory of Experimental Physics was the gift of the seventh Duke of Devonshire, late chancellor of the university. The Sedgwick Museum of Geology was built as a memorial to the late Adam Sedgwick, professor of geology. Other museums are those of classical archae¬ ology, botany, mineralogy, *etc.* The botanic garden occupies over 20 acres, and contains an extensive range of plant houses, a large ar¬ boretum, *etc.*

Two colleges, Girton and Newnham, have

been established just outside Cambridge for the education of women. The students at these colleges are admitted to university and college lectures and to the various examinations for honors. The names of those who pass are placed in the published lists, and certificates are granted to them. Many of them have obtained the highest honors, but the university confers no degrees upon them.

Iwo movements of the last half century have served to bring the university ((into closer connection with education generally throughout the country.® By the local examinations, estab¬ lished in 1858, the standard of instruction in socalled middle schools has been raised to and maintained at a high degree of excellence; and the movement has spread beyond all ex¬ pectations. The other movement, known as the University Extension Movement, which orig¬ inated in a course of lectures delivered in one or two of the large towns in the north of England in 1867, has had an equally remark¬ able success. The scheme is (<an attempt to solve the problem of how much of what the universities do for their non-students can be done by university lectures for persons unable to go to a university.® The method of teaching “has four characteristic features — the lecture, the class, the weekly paper work, and the examination.® The members of the university whose names were on the board in 1915 num¬ bered 14,417, of whom 10,968 were members of the senate or other graduates, and 3,449 undergraduates. A tabulated statement issued at the end of 1915 showed that 10,250 were serving in war duties. In that year the en¬ rolments of undergraduates numbered 1,097, having shrunk to one-third of the usual num¬ ber owing to war conditions. The ordinary income of the university for 1916 was £37,184, that of the colleges £237,405. The war has also affected adversely the finances of the university, which is faced with a probable deficit at the end of 1916 of £13,500.

Bibliography. — Cooper, (Annals of Cam¬ bridge } ; Mullinger, (History of the University of Cambridge) ; Statutes and Ordinances of the University } ; Student’s Handbook to the University and Colleges of Cambridge) ; Cam¬ bridge University Calendar* ; (Quarterly Re¬ view } (April 1906).

CAMBRIDGE MANUSCRIPT, the CO¬ DEX CANTABRIGIENSIS or BEZ2E, the

most famous of the uncial MSS. in the Univer¬ sity Library, Cambridge, England, consisting of a copy of the four Gospels and the

Acts of the Apostles. It was presented in 1581 to the University of Cambridge by Theodore Beza (q.v.). The Codex Bezae and the Codex Laudianus at Oxford differ widely in text from all texts of other codices. Scrivener, the edi¬ tor, and other critics look upon these diver¬ gences as interpolations of which the Codex Bezae is said to contain no less than 600. Scrivener, nevertheless, believes that the Codex Bezae is derived from an original of not later than the 3d century. Bornemann on the other hand contends that the Codex Bezae contains the original text and that other versions are muti¬ lated. Scrivener's criticism is interesting: <(While the general course of the history and the spirit of the work remain the same as in our commonly received text, we perpetually en¬

counter long passages in Codex Bezae which resemble that text only as a loose and explana¬ tory paraphrase recalls the original form from which it sprung. Save that there is no differ¬ ence in the language in this instance, it is hardly an exaggeration .of the facts to assert that Codex D (that is Codex Bezae) repro¬ duces the textus receptus of the Acts much in the same way that one of the best Chaldee Targums does the Hebrew of the Old Testament, so wide are the variations in the diction, so constant and inveterate the practice of expand¬ ing the narrative by means of interpolations.® See Bible.

CAMBRIDGE PLATFORM, a system of church order and polity agreed on by a synod of New England churches, held at Cambridge, Mass., in 1648. It was a resolution rather than a decree, the platform itself denying the synod's authority to pronounce the latter. Its chief positions were: The one true and immutable form of church government has been prescribed in God's word. Christ is the supreme head of his Church, which, since his advent, consists of distinct, equal and self-governing bodies under him, not too large to meet conveniently in one place nor too small to carry on church work effectively. They are therefore monarchies as to him, democracies in themselves and aristoc¬ racies as to each other ; but obligated to mutual communion of care, counsel, monition, worship, succor and transfer of members. Synods are useful, but not permanent, nor with authority for censure or discipline; but when their decisions accord with God's word they should be submitted to. Christ has deputed ex¬ traordinary but temporary power to his apostles, ordinary and permanent power to the churches. Officers are advantageous, but not indispen¬ sable, and each church may appoint and remove its own, but should consult its neighbor churches when feasible. These officers consist of bishops, pastors or elders (synonymous in function), and

deacons who can act officially only in temporal matters. Ordination is the solemn installation of a church head into his place, following his election.

CAMBRIDGE PLATONISTS, the name given to a school of theological and philosophi¬ cal thinkers of the English Church who were connected with Cambridge University, and who exercised an important influence during the latter half of the 17th century. The most im¬ portant members of this school were Benjamin Whichcote, John Smith, Ralph Cudworth, Henry More, Nathaniel Culverwel, John Worth¬ ington and George Rust. Joseph Glanvil and John Norris were both Oxford men and much younger than the Cambridge thinkers, though representing the same general intellectual tend¬ ency. Sir Thomas Browne, author of (Religio Medici* and (Christian Morals,* is also a repre¬ sentative of the Platonic type of thought, but his work as an author belongs to a somewhat earlier period.

In theology, the influence of these men was in favor of toleration and liberality of view. They maintain that dogmatic uniformity is un¬ attainable, and that the welfare of both church and state demands toleration and latitude of re¬ ligious opinion. Hence they were frequently termed latitudinarians (q.v.). This position was the result of a faith in reason and a con-

viction that free inquiry and discussion could not be prejudicial to theological truth, and that rigid uniformity of doctrine is neither possible nor desirable. At the same time they distin¬ guish between dogma and. true religion. The former is external and necessarily changes from time to time. Religion is the spiritual life springing up in the soul, the union with the divine, which manifests itself through the moral life. The spiritual life is no mere subjective fancy, but is the true reality, more real and abiding than the world of sense and matter.

In philosophy, the Cambridge Platonists were idealists, emphasizing the reality of the ideal essences of things and the highest truth and reality that these possess, both in the intel¬ lectual and moral sphere,

as opposed to what is material and sensuous. Cudworth, who was the most learned and, in many respects, the most important representative of the school, names his two chief works (The True Intel¬ lectual System of the Universe,* and (The Eternal and Immutable Principles of Morality.* From these titles the general standpoint of the whole movement appears. Cudworth was ac¬ quainted with the writings of Descartes and corresponded with him on philosophical sub¬ jects, but the real inspiration of the school came from Plato and Neo-Platonists like Plotinus, Proclus, Hierocles, all of whom are abundantly quoted in uncritical fashion. Negatively, too, their thought and activity were influenced greatly by Hobbes (q.v.), who stands for materialism and for relativity and a naturalistic system of ethics. Indeed the work of Cudworth and Henry More, the two most prominent writers of the school, may be said to be explicit attempts to refute Hobbes. Cudworth's work is the more ponderous and learned, abounding in quotations drawn from many sources. In More we find a more mystical tendency, with perhaps deeper speculative insight.

Bibliography.— Tulloch, J., (Rational Theol¬ ogy and Christian Philosophy in England in the Seventeenth Century) (Vol. II, 2d ed., 1874) ; Hallam, H., (Introduction to the Literature of Europe ; Sidgwick, H., <An Outline History of Ethics 5 ; Erdmann, (History of Philosophy.* In addition, many of the writings of representa¬ tives of the school are accessible in English form.

James E. Creighton,

Professor of Philosophy , Cornell University.

CAMBRIDGESHIRE, England, an inland

eastern county of England; greatest length, about 48 miles ; breadth, 33 miles ; area, 858 square miles. Arable land, meadow and pas¬ ture constitute about three-fourths of the county, the rest being fens. The surface is marshy, flat and thinly wooded, except in the southern portion, which is somewhat elevated and on the chalk formation. The northern section forms part of the Bedford Level. The principal watercourses are the Lark River, the Nene, which borders the county on the north, and the Ouse, which crosses the middle of the county from west to east, with its tributary, the Cam. All of these are navigable for some distance. For parliamentary purposes the county is divided into three divisions (northern or Wisbech, western or Chesterton, and eastern or Newmarket) and embraces also the par¬ liamentary borough of Cambridge, each of

which returns one member. Cambridge Uni¬ versity also returns two members. In the higher sections beans and wheat are produced ; the black, spongy soil of the fens, when drained and burned, in dry years, produces large crops of wheat, oats, barley, potatoes, cole-seed, hemp, hay and flax; fine butter and cream-cheese are produced on the meadows of the Cam; and the Isle of Ely, a part of the fen-tract and within the Bedford Level, is noted for its garden vegetables. Cattle and sheep arc reared on the thin chalky soils, and horses, cattle, sheep and pigeons on the fens. The manufactures are mostly confined to articles used in the agricultural industry; apart from that, brewing and malting are the chief in¬ dustries, and there are paper and parchment mills, and coarse earthenware and needles are manufactured. Cambridgeshire was anciently the seat of a powerful tribe, the Iceni. There are interesting Roman remains, and the county is specially rich in ecclesiastical buildings re¬ plete with architectural, historic interest. Pop.

198,074.

, CAMBRONNE, kan-bron, Pierre Jacques Etienne, Count of, French general: b. Saint Sebastian, near Nantes, 26 Dec. 1770; d. 5 March 1842. He served on the national guard in the Vendee in 1792; distinguished himself by the capture of a Russian battery at Zurich in 1799; and took part in the campaigns in 1806-13. He went to Elba with Napoleon, and returned with him in 1815. Napoleon made him general and gave him the rank of count. At the battle of Waterloo he commanded a division of the Old Guard, and is credited with having made the famous reply to the demand for surrender, La garde meiirt et ne se rend pas (((The guard dies, but never surrenders**). It is now certain, however, that he did not say this, but gave him¬ self up as a prisoner to General Halkett, and was taken to England. At the time of the restoration of the Bourbons he was on the list of proscriptions, but was exonerated by two court-martials, and in 1820 appointed comman¬ dant of Lille by Louis XVIII.

CAMBUSCAN, a prince of Cambaluc (Pe¬ king), whose name is a corruption of Genghis Khan, while the description applies apparently to his grandson, Kublai Khan. This was Mil¬ ton's form of the Cambynskan of Chaucer's fragment of a metrical romance, (The Squieres Tale.* Spenser continues and finishes the tale in his (Faerie Queene* (IV, ii and iii) ; and John Lane, a friend of Milton's father,

also wrote a continuation. Some of the romantic elements in it are widespread in Oriental story, occurring in the < Arabian Nights, *the (Pan-chatantra* and elsewhere.

CAMBYSES, kam-bl'sez, I, Persian king. His historical character is involved in great doubt, but he is commonly identified as the son and successor of Teispes, and father of Cyrus the Great (q.v.).

CAMBYSES II, king of the Medes and

Persians: d. 522 b.c. He was the son of Cyrus the Great, and grandson of Cambyses I, and became, after the death of his father, king of the Medes and Persians, 529 b.c. In the fifth year of his reign he invaded Egypt, killed King Psammetichus III at Pelusium, plundered Memphis, and conquered the whole kingdom

within six months. He now wished to send a fleet against Carthage, to conquer Ethiopia, and to obtain possession of the temple of Jupiter Ammon. The first of these expeditions, how¬ ever, did not take place, because the fleet, which was manned with Phoenicians, refused obedience to him in a war against their kindred. The army which was sent against the Ammonites perished in the desert ; and the troops, at whose head he himself had set out against the Ethiopians, were compelled by hunger to re¬ treat. From this time he gave himself up to the greatest cruelties. On his entrance into Memphis, seeing the Egyptians engaged in the celebration of a feast in honor of their god Apis, whom they had found, he believed that they were rejoicing at his misfortunes. He caused the holy bull to be brought before him, slew him with his own sword and caused the priest to be scourged with rods. To drown his remorse he indulged in wine. No relation was held sacred by him when intoxicated. He caused his brother Smerdis, a dream concern¬ ing whom had disturbed him, to be murdered. His sister and wife Atossa, who lamented the death of Smerdis, he killed with a blow of his foot. These and other acts, almost indicating insanity, had irritated his subjects. A magian availed himself of his discontent, and obtained possession of the throne under the name of

Smerdis, whose death had been concealed. Cambyses had resolved to go to Susa, in order to punish him, when, according to the account of Herodotus, as he was mounting his horse, he received a wound in the hip from his sword, in consequence of which he soon died, at Ecbatana, Syria, leaving no children. Somewhat different accounts are given by Ctesias and others. See Cyrus; Darius; Media; Persia. Consult Lincke, (Kambyses in der Sage, Litteratur und Kunst des Mittelalters) (in Eber's festschrift^ Leipzig 1897).

CAMDEN, Charles Pratt (1st Earl of), English statesman: b. 1713; d. London, 18 April 1794. After studying at Eton and King's Col¬ lege, Cambridge, he entered as a student at Lincoln's Inn, and in due time was called to the bar. In 1754 he was chosen member of Par¬ liament for the borough of Downton. After ac¬ quiring great reputation as an advocate, he was, in 1757, appointed attorney-general, having the same year been elected recorder of the city of Bath. While he held the office of chief justice of the common pleas Wilkes was arrested on a general warrant as the author of the forth Briton. > He was committed to the Tower as a state prisoner; and being brought, in obedience to a writ of habeas corpus, before the Court of Common Pleas, Chief Justice Pratt discharged him from his confinement on 6 May 1763. The behavior of the judge on this occasion, and in the consequent judicial proceedings between the printers of the forth Briton^ and the messen¬ gers of the House of Commons, and other agents of the ministry, was so acceptable to the metropolis that the city of London presented him with the freedom of the corporation, in a gold box, and requested to have his picture. In July 1765 he was raised to the peerage, by the title of Baron Camden ; and about a year after made lord chancellor. In this capacity he pre¬ sided at the decision of a suit against the mes¬ sengers who arrested Mr. Wilkes, when he

made a speech, in which he stated that (<it was the unanimous opinion of the court, that gen¬ eral warrants, except in cases of high treason, were illegal, oppressive and unwarrantable.® On his opposing the taxation of the American colonies, he was deprived of the seals in 1770. He came into office again as president of the council, under the administration of the Marquis of Rockingham, in March 1782; on whose death, he resigned the following year. He soon after, however, resumed his place under Mr. Pitt, and in 1786 was made Earl Camden and Vis¬ count Bayham. His popularity was very great in the American colonies, as is shown by the many counties, towns and villages named in his honor.

CAMDEN, William, English antiquary and historian : b. London, 2 May 1551 ; d. Chiselhurst, Kent, 9 Nov. 1623. He was educated at Christ's Hospital and Saint Paul's and Oxford. In 1575 he was appointed second master of West¬ minster School, and at this time began to make collections for his greatest work the Britannia,* written in Latin and giving an account of the British Isles from the earliest ages. It was published first in 1586, and gained a high repu¬ tation at once. It was revised and enlarged by the constant work and study of Camden, and by 1607 had passed through six editions. In the same year it was translated into English by Philemon Holland; by Edmund Gibson in 1722 (2 vols.) ; by Gough and Nicols (2d ed., 1806). Hume, in his (History of England pranks Cam¬ den's works among the best historical produc¬ tions composed by any Engishman.

In 1593, Camden became head master of Westminster, for which school he drew up a Greek grammar (1597). The same year he obtained the office of Clarencieux King-at-Arms. In 1622 he founded a professorship of history at Oxford which he endowed with the valuable manor of Bexley in Kent. He was buried in Westminster Abbey. His house at Chiselhurst was the residence of Napoleon III (1871-73). His other works consist of (Annales Rerum Anglicarum et Hibernicarum regnante Elizabetha, ad annum salutis) (1559, latest ed., 1717). (A Collection of Ancient English Historians) (Frankfort 1603, 6th ed., 1607) ; (An Account of the Monuments and Inscriptions in West¬ minster Abbey > (1600) ; (Narrative of the Con¬ spiracy called the Gunpowder Plot) (1607) written in Latin at the King's command.

CAMDEN, Ala, town and county-seat of Wilcox County, on the Louisville and Nash¬ ville Railroad, 60 miles southwest of Mont¬ gomery. The centre of the fertile (<Black Belt of Alabama,® it has cotton, cottonseed oil, stock raising and lumber interests. Pop. (1920) 700.

CAMDEN, Ark, city and county-seat of Ouachita County, 115 miles southwest of Little Rock, on the Rock Island, the Southern, the Saint Louis and Iron Mountain and other rail¬ roads and on the Ouachita River. The city has a library and courthouse, machine shop, cotton¬ seed-oil mills, lumber mills, sashes and door factories, spokes, wagon works and a cotton compress. There is a large river trade in cot¬ ton, lumber, poultry and live stock. Pop. 3,238.

CAMDEN, Me, town and summer resort 37 miles southeast of Augusta, served bv the Eastern Steamship Company's vessels. Besides

its summer trade it has important wool and felt manufacturing interests. Pop. (1920) 3,403.

CAMDEN, N. J., city, port of entry and county-seat of Camden County, on the Dela¬ ware River, opposite Philadelphia, with which it is connected by several ferries. The city is situated on a level plain and the streets cross one another at right angles. It is noted for its immense market gardens and important manu¬ factures and is the site of several large ship¬ building concerns. Area, five square miles. According to the latest Federal census Camden had 817 manufacturing establishments, employ¬ ing $30,000,000 capital and 20,000 persons ; pay¬ ing $10,000,000 wages. The most important in¬ dustries are foundry and machine-shop-products, shipbuilding, worsted goods, oil cloth, boots and shoes, masonry, textile fabrics, talking machines, soups, pens, iron mills, *etc.* The United States census of manufactures for 1914 recorded 343 industrial establishments of factory grade, em¬ ploying 25,727 persons, of whom 22,490 are wage earners, receiving annually $12,967,000 in wages. The capital invested aggregated $101,- 433,000, and the year's production was valued at $71,405,000: of this, $35,436,000 was the value added by manufacture. There are nine banks with a combined capital of $3,000,000. The assessed value in 1915 exceeded $80,000,000, and the tax rate was $2 per $100. In 1917 there were in the city more than 200 miles of paved streets, 60 miles of sewers, 115 miles of water mains; and gas and electric street lighting and waterworks plants, the latter owned by the city. The notable buildings are the city hall, county buildings, hospitals and churches. At the close of the school year 1915 there were 38 public school buildings, 20,000 pupils, 510 teachers, a public and private high school. The citv was settled in 1681 by William Cooper and was in¬ corporated as a city under an act passed 14 Feb. 1828. Pop. (1920) 116,309.

CAMDEN, S. C., town and winter resort, county-seat of Kershaw County, at the head of navigation on the Wateree River, and on the Atlantic Coast Line, the Southern and the Sea¬ board Air Line systems,

32 miles northeast of Columbia. In a fertile, productive region, it has manufactures of cotton cloths, yarns and oil, bricks and lumber articles, and trades in naval stores, cotton and rice. Quakers from Ireland settled here in 1750 and received a town charter in 1791. Here 16 Aug. 1780, Baron De Kalb was rportally wounded during the victory of the British under Lord Cornwallis over the Americans under General Gates ; and here 25 April 1781 the British under General Rawdon drove back the Americans under Gen¬ eral Greene at the battle of Hobkirk's Hill. During the Civil War, General Sherman's troops 25 Feb. 1865 sacked and almost totally destroyed the town. Pop. (1920) 3,930.

CAMDEN, Battle of, a battle fought near Camden, S. C., 16 Aug. 1780, between the Amer¬ ican troops under Gates and the British under Lord Rawdon. Shortlv after the British cap¬ tured Charleston in May, all South Carolina was in their hands except for the guerrilla warfare of Marion, Sumter and others. Wash¬ ington had already sent De Kalb (q.v.) with 1,400 Maryland and Delaware regulars, among the best troops in the army, to save it, but the new disaster called for fresh efforts and a first-

rate new commander of the Southern Depart¬ ment to succeed Lincoln. Washington wished to send Greene; but a popular clamor for Gates, mistakenly credited with the victory over Burgoyne, led Congress to give him the post. He took command at Hillsborough, N. C., where De Kalb was vainly waiting for General Caswell and the North Carolina militia to come up from South Carolina. Gates, therefore, deter¬ mined to march south and join Caswell, and thus reinforced, seize Camden and the Wateree, near which was their camp — the strategic cen¬ tre of the State, and the converging point of the chief northern roads. It was held by Lord Rawdon with a comparatively small force. A fortnight's starving march of 150 miles, in the course of which he picked up a company of Virginia regulars and the North Carolina men. brought him in front of Rawdon, strongly posted across the road 15 miles northeast of Camden. He might either attack with superior forces or hold Rawdon with a part while he sent the rest around his flank to seize Camden in the rear; but he did neither, and, after wait¬ ing two days without apparent object, moved west to Clermont, or Rugely's Mill, a strong position, 13 miles north of Camden. Here he was joined by 700 Virginia militia, but sent off 400 of his splendid Maryland regulars to help Sumter cut the British communications far to the southeast, and Cornwallis joined Rawdon, giving the British 2,000 trained men. Gates had no intelligence

department, and sup¬ posed he still had only Rawdon's small force before him; and about 10 p.m. of 15 August started down the road to surprise Rawdon, Cornwallis at the same hour starting north to surprise him. The vanguards met about 3 a.m. a few miles above Camden, and the Americans were routed; but some British prisoners in¬ formed Gates that Cornwallis was in front with 3,000 men. Gates had 3,052, most of his nomi¬ nal force being on paper or helpless with dys¬ entery; and over half of them were militia who had never been under fire and did not even understand using a bayonet. De Kalb, the brave but judicious officer, wished to fall back on Rugely's Mill ; but the other officers thought it too late to retreat, and Gates deployed his men, with as bad judgment as the decision to fight at all. The road ran through a level field flanked by swamps, so that everything depended on the firmness of the front rank; but he massed all the regulars on one wing and all the militia on the other. De Kalb held the right opposite Rawdon, with the Delaware regiment and the 2d Maryland brigade in front, the 1st Maryland in reserve; the left wing had the Virginia militia in front and the North Caro¬ lina troops in the rear, opposed to Col. James Webster, with Tarleton's cavalrv in reserve. Gates' tactics were as ill-judged as his arrange¬ ment; he ordered the first charge made by the Virginia men, who did not even know how to march in order. They became tangled and while trying to reform, Webster's onrush broke them in wild nanic; they threw down thffir loaded guns with bayonets set, without firing a shot, and ran to the rear. One regiment of North Carolina men fired several volleys, but all the rest fled like their neighbors, and the one exception soon shared their flight. Mean¬ time, the 2d Maryland twice drove back Raw¬ don, then broke his ranks with a bayonet charge,

and held the field. But Webster and Tarleton, following the routed mob, had flanked the 1st Maryland and after an obstinate fight crowded it off the field; and, taking the 2d Maryland in the rear, compelled it, too, to retire, after a fierce resistance. De Kalb fought to the last, and was captured, mortally wounded, with 11 wounds. The stubborn fight of the regu¬ lars is shown by the fact that the Delaware

troops were nearly annihilated, and the Mary¬ land regiments lost nearly half their number. There were about 1,000 killed and wounded, and as many prisoners taken, with seven can¬ non and 2,000 muskets. The British lost 324. For the time the American cause in the South was at an end. Gates escaped to Hillsborough, but was shortly supplanted by Greene, who wrought a wonderful transformation in a few months.

CAMDEN SOCIETY. An English asso¬ ciation established in 1838 at London, for the purpose of publishing historical and anti¬ quarian information, named in honor of Wil¬ liam Camden. Its publication began in 1847, the first series including 10 volumes. The sec¬ ond series up to 1900 included 63 volumes. In 1901 a new series was begun. Up to 1913, 23 volumes have been published.

CAMDEN TOWN, England, a district of London in the Metropolitan borough of Saint Pancras and county of Middlesex. It takes its name from the Earl of Camden who ac¬ quired property here by marriage. The houses, which are in general of recent erection, are regular and substantial buildings. The dis¬ trict lies northeast of Regent's Park and north of the Euston station of the London and North Western Railroad.

CAMEL, a large ruminant of the genus Camelus, family Camelidcz (q.v.), two species of which have been domesticated since prehis¬ toric times, and used as riding-animals and beasts of burden in the desert regions of the Old World. Although much search has been made, no wild species of camel can be found except one small two-humped variety, discov¬ ered by Prejevalski, which inhabits central Asia, northward to Siberia, but it is not certain whether it represents an original wild species, or is a degenerate race long ago escaped from domestication.

The Arabian camel (Camelus dromedarius) has one hump on the shoulders ; the Bactrian camel (C . bac trianus) two. These are com-•posed of muscle, flesh and fat, which in times of famine is reabsorbed to a large extent. After it has been exhausted, a rest of three or four months, with abundance of food, is neces¬ sary to restore it. The former is the more common species, and is used from Mongolia and northwest India throughout south-central Asia, Asia Minor, Arabia and northern and eastern Africa, and to a small extent in Spain and else¬ where. At the time of the rush of gold-seekers to California about 1850, efforts were made to naturalize camels in the arid regions of the southwestern United States, as a means of car¬ rying supplies to the army posts there, but they proved unsuccessful, mainly by reason of their intractable and vicious disposition.

The original home of the single-humped camel is uncertain, but as it is better adapted

to a sandy region than is the Bactrian species, it is thought to have been ‘ in the Sahara or Arabian desert. Its peculiar adaptability to life in sandy regions is noticeable in many ways. The callous cushions (pads) on its feet are re¬ peated upon the chest and the joints of the legs, on which it rests when rising, kneeling or lying down, and protect these parts from abrasion by the sharp sand. Its wedge-shaped cutting-teeth are well fitted for cropping the short, shrubby plants of the desert. Its long eye¬ lashes protect it from the glaring sun and from the drifting sand ; and the ability to close the oblique nostrils at will prevents the entrance of dust. The most remarkable provision for life in arid regions, however, is found in the struc¬ ture of the stomach, the interior of which has no villi on its surface. Both the compartments of the paunch contain a number of pouches or cells in their walls, each of which may be closed and separated from the remainder of the paunch. These are filled and closed when the camel drinks, and by these means it can store more water than is requisite for its immedi¬ ate use, and so save up a store which may gradually be drawn upon during long journeys over waterless districts. The camel’s senses of sight and smell are very acute, and it is ca¬ pable of discerning water at a great distance. By reason of these qualities it has been a most important factor in the colonizing of the coun¬ tries that lie south and east of the Mediterra¬ nean, Black and Caspian seas, and such oases or fertile areas as are separated by desert waters ; in fact students of civilization believe that these regions could hardly have become the abode of a settled civilization had it not been for this useful animal.

The Bactrian camel is of smaller size and heavier build, and, by its harder and more cloven feet, and longer and finer hair, is better adapted to a rocky and cooler region. Its hab¬ itat is central Asia. Like the southern species it has wonderful endurance, withstanding the terrific summer heat of Persia and the Tibetan plains, and the Arctic cold of the passes of Hindu-Kush and Mongolia. They have been successfully employed as army transports by the English in northwestern India ; and for many years, through all weathers, trains of these camels, sometimes of many thousands, were al¬ most the only means by which tea and other merchandise was transported between China and Russia. ,

The many breeds of camel exhibit great di¬ versity. Some are those bred only for the sad¬ dle, others as baggage-carriers or draft animals, for they are also trained to haul carriages in harness. Properly, a ˆdromedary® is any camel of either species of a saddle-breed, distin¬ guished for its speed and ease of gait. As a beast of burden the camel has great powers of endurance. The Arabian species carries twice the load of a mule, while it is not unusual for the Bactrian species to carry half a ton weight upon its back; by reason of which it is some¬ times poetically termed the (<ship of the des¬ ert.® Caravans frequently contain as many as 1,000 camels, which move along at a steady and uniform pace of about two and a half miles an hour. When bred especially for the purpose they have been known to carry a traveler 100 miles a day. They move with a fiacing motion, lifting the feet on the same side successively.

Their money value is about the sˆme as that of horses of similar grade and purpose.

The camel serves the nomadic inhabitants of Arabia and the Sahara and the East in many ways besides as a riding animal or beast of burden. It gives them hair that may be woven into the coarse fabric for tent-covers and ropes, or the finer shawls and rugs that are often of great market value. Its milk and flesh are food and its hide and bones are utilized, while its dried dung serves as fuel when no wood is obtainable; and from its tracks, in reading which the Bedouins are amazingly skilful, the nomad derives informa¬ tion of interest and importance as to the move¬ ments of neighbors or the strategy of enemies. This animal forms an important element in the economy of the civilized people of those regions, in warfare as well as in agriculture and commerce. A camel-corps has long been a regular part of the organization of the British army in Egypt and in northeastern India, serv¬ ing as effective cavalry.

CAMEL, a water-tight box or caisson, used to raise a sunken vessel or to float a vessel over a shoal or bar. Its invention is ascribed to the Dutch and its first use is said to have been about 1688. It is sunk by

the admission of water and is attached to the vessel, after which the water is pumped out, and the camel, rising by its buoyancy, lifts the load. Modern camels are built of steel and fitted with ma¬ chinery for working the chains which support the wreck or attach it to the camel.

CAMEL-BIRD, a book-name of the ostrich (q.v.).

CAMEL-CRICKET. See Mantis.

CAMELFORD, England, village on the Camel, 28 miles northwest of Plymouth. The streets are spacious and well paved, but the houses are in general very indifferent. Five miles to the northwest of Camelford are the ruins of King Arthur's castle of Tintagel, and about two miles to the north are the celebrated slate quarries of Delabole. The inhabitants are chiefly engaged in agriculture.

CAMELIDˆE, a family of ruminant mam¬ mals, including the Old World camels (genus Camelus) and New World guanacos and vi¬ cugnas (genus Llama), as the existing remainder of a divergent group formerly closely connected both in structure and in geographical distribu¬ tion. It forms a distinct section of the Ruminan-tia named Tylopoda, in reference to the character of the feet, in which only the third and fourth toes are developed, and these are embedded in a cutaneous pad, forming a broad elastic sole to the foot. The two metapodial or ˆcannon® bones of each of the long limbs are separated for a considerable distance at the lower end, where the articular surfaces, instead of being pulley-like, with deep ridges and grooves, as in other recent split-hoofed animals (Artiodac - tyla), are rounded and smooth. The toes ter¬ minate in small nails, and the weight of the animal rests upon the padded sole of the foot instead of on hoofs, in adaptation to the soft, sandy soil of deserts, in which this race of animals seems to have lived ever since its origin. The dentition of the prolonged jaws has certain peculiarities. The full number of

incisors is present in youth, but in the upper jaw these disappear, except the outermost, which persist through life, while those in the lower jaw are procumbent. Canines are pres¬ ent in both jaws. The molars are of the selenodont type. The neck is very long and flexuous ; the shoulders are high ; and the hinder part of the body is much contracted and drooping in appearance. The tail is well developed and the skin is clothed with long, shaggy hair. The nostrils are high and may be closed against the admission of dust ; and the lips are pro¬ longed and flexible. There are no horns or antlers in either sex. The

interior anatomy is peculiar, principally in the character of the digestive organs, described in the article Camel. See Camelidˆe, Fossil.

CAMELIDiE, Fossil. The evolution of the camel (q.v.) through the Tertiary and Quaternary periods is nearly as completely known as that of the horse, and is hardly less instructive. The camels now inhabit central Asia and northern Africa, the llamas, South America. No fossil camels or llamas are found in these countries in deposits much older than the Quaternary. But in the Tertiary strata of North America have been found a series of animals which appear to be the direct an¬ cestors of this family, and connect them with the primitive hoofed animals of the earliest Eocene. The earliest member of this series, ancestral probably to the camels among other ruminants, is Trigonolestes of the Lower Eocene, smaller than a cotton-tail rabbit, with the complete series of incisor, premolar and molar teeth, the molars of the primitive bunodont type (see Bunodont) and probably five complete toes, the side toes very slender, and the metapodials all separate. In the Upper Eocene stage, Protylopus, as large as a jack-rabbit, the molars have become selenodont (q.v.), as in modern camels, but with shorter crowns, and the side toes in the hind leg are represented only by splints. In the Oligocene stage, (Poebrotherium) , as large as a gazelle, the molars have longer crowns, the splints are re¬ duced to small nodules of bone and the meta¬ podials, though still separate, are closely ap-pressed. In the Miocene stage {Pro camelus, etc.) the metapodials are sometimes separate, sometimes united ; the incisors and premolars are generally reduced in size and the anterior upper incisors are often lost ; and the form of the teeth and skull comes closer to the modern type. The Pliocene camels {Pliauchenia, etc.) are still closer to the modern type, all with . united metapodials and reduced incisors and premolars, and at this epoch they spread to South America and the Old World, the gradual rising of the continents having made land con¬ nections between them about this time. During the Pleistocene epoch the camels all became extinct in their original home, although they still survive in the alien continents to which they had wandered.

The most remarkable peculiarity of the camels is the adaptation of the stomach, which enables the animal to go a long time without water (see Camel) ; palaeontology gives no direct evidence of the evolution of this charac¬ ter. But the cushioned foot, equally an adapta¬ tion to desert life, is not indicated (by the form of the toe bones) in any ancestral camel pre-

CAMELIDjE

1 Guanaco

2 Dromedary

3 Two-Humped Camel

CAMELIDˆ:

1 Alpaca

2 Vicuna

vious to the Miocene, from which time it be¬ came gradually more marked. We may sup¬ pose, therefore, that the earlier ancestors of the camel were antelope-or deer-like in their habitat, and were gradually adapted to desert life.

Besides the main line of descent there were, especially in the Miocene, side branches now extinct, one of which (Alticamelus) was sin¬ gularly giraffe-like in proportions, although not related to the giraffes, which were evolved in the Old World at the same epoch.

It is a general law in the evolution of any race of animals that at each succeeding stage in its development the progressive characters appear at an earlier period in the lifetime of the individual. The young individuals of one stage resemble the adults of the preceding stage, while the old individuals take on some of the characters of that next succeeding. This is well illustrated in the camels, especially of the Miocene epoch ; in young individuals the metapodials .are always separate, as they are in all adult camels of the Oligocene, and they are usually not completely consolidated until a com¬ paratively advanced age. In modern camels and llamas they are consolidated before birth. The anterior incisors and premolars usually drop out in old individuals of Miocene camels ; in the later stages they are minute stumps or scales which disappear early in life.

CAMELLIA, ka-mel’ya, a genus of plants belonging to the family Ternstrcemiacece, beautiful flowering shrubs, natives of Asia. The name Camellia was given to this genus by Linnaeus in honor of Kamel or Camellus, a Moravian Jesuit. Camellia japonica, as it grows in the

woods and gardens of Japan and China, is a lofty tree of beautiful proportions, and clothed with a deep green, shining foliage, with large, elegant flowers, either single or double, and of a red or pure white color. There are numerous varieties of this species in China, the greater part of which have found their way to Europe and America, while other new varieties have been produced bv breeding. The double-white, double-striped and double-waratah, the last so called from the central petals resembling those of the waratah plant of Australia, are considered the finest varieties, and both grow and flower well. The peony-flowered and fringed are also much admired. The oil-bearing camellia (C . sasanqua) is cul¬ tivated for its seeds, from which an oil is expressed that is very generally used by the Chinese in their cookery. It thrives best in a red sandy soil, and attains a height of six to eight feet, producing a profusion of white blossoms and seeds. Besides these species C. reticulata is cultivated.

The single red camellia is propagated by cuttings, layers and seeds. It forms suitable stocks, on which the others are either inarched or budded and engrafted. The cuttings to be selected are the ripened shoots of the preceding summer ; these are taken off in August, being cut smoothly at a joint or bud; two or three of the lower leaves are taken off, and the cut¬ tings then planted firmlv in the soil with a dibble. Inarching or engrafting is performed early in spring, when the plants begin to grow. A few seeds are sometimes obtained from the single red and semi-double camellias, and from

the single waratah. These require two years to come up, but make the best stocks of any.

CAMELOPARD. See Giraffe.

CAMELOPARDALIS, one of the north¬ ern circumpolar constellations added by Hevelius in 1690. It is a large, irregularly shaped constellation, something like the animal, and is more than 40° in length, with its head close to the North Pole. It borders upon Ursa Minor, Draco, Ursa Major, Lynx, Auriga, Perseus, Cassiopeia and Cepheus. It contains no stars brighter than the fourth magnitude, and was put in to fill up a part of the sky otherwise uncovered by constellations. Being introduced later than Bayer’s time, it has no letters except a, ft, and y, which Baily introduced into the ((B. A. C.® in 1845. While these have not been universally accepted by astronomers, they will probably be adopted in a general revision of the northern constellations.

CAMELOT, in the Arthurian legends, the city where King Arthur's palace with the Round Table was located. Tennyson, in (The Coming of Arthur,) describes the city and the royal court, and mentions it in others of the (Idylls of the King) and in (The Lady of ShalottP It is also referred to by Shakespeare in (King LearP The site of Camelot has been much in dispute ; Shakespeare supposed it to be in Somersetshire; Tennyson and Capell lo¬ cated it at or near Winchester; and Caxton placed it in Wales. The monks of Glastonbury were chiefly responsible for the Somerset theory, which they maintained for the purpose of attracting thither pilgrims and so enriching their monastery.

CAMEL'S HUMP, one of the peaks of the Green Mountains, in Vermont, 17 miles west of Montpelier. Its height is about 4,100 feet.

CAMEL'S-THORN, a genus of plants be¬ longing to the family Fabacece. They are herba¬ ceous or half-shrubby plants, with simple leaves, minute stipules, axillary peduncles terminating in spines, and red flowers arranged in racemes. Only three species of this genus are known, Alhagi cameloram, A. grcecorum and A. mauro-rum. They grow in the deserts of Egypt and the East, and their common name is derived from the fact that they afford a food much relished by camels. The species yield a gummy, saccharine exudation like manna.

CAMEN. See Kamen.

CAMEOS. Certain carved reliefs on stones, shells or other substances in which the engraver takes advantage of the medium having two or more superimposed layers or stratifications of different colors or tones to obtain the most striking effect. The derivation of the word is contested. The late Rev. Charles King, one of the most prominent collectors and authorities, says the term comes from the Arab word cam-ant, a flower, and it was used since the Crusades. He says the term camahutum (from the Syriac chemeia, a charm) first appears in the 13th century. In early times the cameo has also been termed cadmeus and cameus. In most cameo examples the relief or subject is com¬ posed from the upper layer and the lower layer is utilized as background. The substance used covers a wide range, among others : Agate, onyx, sardonyx, opal, amethyst, emerald,

aquamarine, carbuncle, jacinth, chrysolite, lapis, garnet, turquoise, jasper, beryl, hematite, malachite, amber, mother-of-pearl, coral, and the shells, strombus gigas, cassis rufa, cassis tuberosa, *etc.* The ˆnicolos® are artificially treated stones (heat or acid action). Glass plates were also used in ancient Greek art as a medium ; one example by Dioscorides' son, in Vienna, is a portrait of Augustus. The ˆPortland0 vase (q. v.), in the British Museum, is another. The paste was usually of blue ground with a white upper layer for the engraved subject. Antique cameos had their work done with a bow-drill. It is rare to find cameos engraved on the rear as well as the face side; some exist, however, and the Paris Bibliotheque Nationale possesses one with Agrippa on one side and Julia on the other. The connoisseur usually classifies an¬ tique cameos as mythological, symbolic and heroic; frequently they are also divided into periods.

The uses to which cameos have been put are quite numerous. The ancients ornamented vases, hair ornaments, bracelets, brooches, even furniture with them. The knight fastened them upon his armor, small ones were worn as am¬ ulets. In the Middle Ages they were lavished upon reliquaries, chalices, crosses, in the church. A peculiar condition that prevailed in the early Christian times was the adaptation of stones having pagan engravings to Biblical sub¬ jects. Thus they took Jupiter for Saint John the Evangelist because of the accompanying eagle attribute. Another peculiar fact is that cameos in olden times were rarely set in rings, although there are a few such Roman and others of the Renaissance period. The subjects treated in cameos are mostly faces terminating at the base of the neck, entire figures and groups. Of the former there are some contain¬ ing two profiles superimposed, the upper one receding so as to expose the one beneath. Such heads are termed conjoined, and the pieces are known as baijoires. The ruler and his consort are often so treated. The cameos of the noted Greek Dioscorides are marvels of art and execu¬ tion as also those signed Glycon, of whom the Cabinet de France, Paris, possesses an Amphitrite. This cabinet also has a signed Evodus example and other cameos such as the Minerva and Neptune (known to the Middle Ages as Adam and Eve), the Apotheosis of Germanicus, Triumph of Licinius (4th century), Apotheosis of Augustus (imported from the Orient in the 13th century), the Grande Camee (or cameo of Sainte Chapelle), a cameo of five layers, measur¬ ing 30 centimeters by 26, on which are engraved the Apotheosis of Augustus, the Family of the Caesars and Group of Captives and Warriors. On the Byzantine cameos we find

Agnostic sym¬ bols and such early Christian monograms as IC-XC (Jesus Christ), KC (Saviour), *etc.* The wonderful Tazza Farnese, now in Naples, is a Renaissance wrork from the Lorenzo de Medici collection. The Renaissance, besides its other art giants, brought forth great cameo ar¬ tists. Domenico of Milan, called Domenico dei Camei (of the Cameos) was engraver to the Medicis; Giovanni delle Corniole (also of the 15th century) received his title Carnelian from his work in this gem stone; Matteo dal Nasaro, of Verona, followed Franqois Premier (earlv 16th century) to France where he did very fine portraits in cameo. The French engraver

Julien de Fontenay, known in art as Coldore, did such splendid work that Queen Elizabeth employed him at her English court, where he produced her portraits in turquoise and onyx (one is in the Victoria and Albert Museum, London, another in the Cabinet de France, Paris). Henri IV was extremely infatuated with cameos and wore 12 of them as buttons (they represented the 12 Caesars), also a cameo in his sword, all of which are in the Cabinet de France. Among the noted family of Pichlers, gem engravers who did fine cameo work, are Giovanni, of Florence, and Luigi, second son of Antonio ; the latter was Austrian court en¬ graver under Francis I. In the 17th century the cameo was so much in vogue that the cele¬ brated Flemish artist Rubens designed a num¬ ber of copies of antiques. In the 18th century Jacques Guay, of Marseilles, did beautiful work; Jean Laurent Natter, of Nuremberg, was great in imitating antiques, and even the Marquise de Pompadour engraved and signed the Genius of Music cameo. Artist .Bouche designed cameos and Louis Chapat, and the most noted cameo artist of all, Joseph Pichler, have left us very fine specimens of this glyptic art. The Simons (father and son), as well as Berini and Jeuffroy, belong to the well-known cameo artists of the 19th century. Bernardo Pistrucci did fine work in London. A Scots¬ man named James Tassie reproduced (late 18th century), to propagate art knowledge, beautiful copies in glass of antique cameos which are collected by connoisseurs of this day on their art merits; they are fetching $10 or more these days though sold originally at $2.50; their colors are very brilliant, but these pieces closely re¬ semble antiques. Besides the collections in Paris already mentioned, there are extensive cabinets at Dresden, Vienna, the Saint Peters¬ burg Hermitage Museum, Florence, Rome, Naples and London.

Bibliography.— Babelon, E. C. F., Cata¬ logue des Camees a la Bibliotheque Nationale) (Paris 1897) ; Same, (La Gravure en pierres fines* (Paris 1894) ; Bucher, B., (Die drei Meister der Gemmenglyptik*

(Vienna 1874) ; Chabouillet, J. M. A., Catalogue general et raisonne des camees et pierres gravees de la Bibliotheque Nationale) (Paris 1858) ; Daven¬ port, C. J., Cameos) (London 1900) ; Raspe, R. E., (A descriptive Catalogue of a General Collection of ancient and modern Engraved Gems) (including Tassie Gems, London 1791).

Clement W. Coumbe.

CAMERA, Photographic, a camera oh-scura so constructed that sensitized plates or films may be placed at the back and receive the image. There are many styles of camera in use, those of the tripod variety being used for por¬ traits and landscapes where a time exposure is required and the hand camera for instantaneous exposures, used by tourists on account of its convenient shape and size. See Camera Obscura; Photography.

CAMERA LUCIDA (Lat. «light cham¬ ber0), an optical instrument employed to facili¬ tate the sketching of objects from nature. It acts by total reflection, and may have vari¬ ous forms, of which that proposed by Wol¬ laston, and illustrated in the accompanying figures, is one of the commonest. The es¬ sential part is a totally reflecting prism with

tour angles, one of which is 90°, the opposite one 135° and the other two each 67° 30'. One of the two faces which contain the right angle is turned toward the object to be sketched. Rays falling in a straight line on its face, as x r, are

totally reflected from the face c d to the next face d a, whence they are

again totally reflected to the fourth face, from which they emerge in a straight line. The eye

(pp) placed so as to re¬ ceive the emergent rays will see an image of the object in a direc¬ tion of right angles to that in which the object

lies. In practice the eye is held over the corner a of the prism in such a position that one-half of the

pupil receives these reflected rays, while the

other half receives light in a parallel direction outside the prism. The observer thus sees the reflected image projected on a real background, which consists of a sheet of paper for sketch¬ ing. He is thus enabled to pass a pencil over the outlines-of the image — pencil, image and paper being simultaneously visible. It is very desirable that the image should lie in the plane of the paper, not only because the pencil-point and the image will theit be seen with the same focusing of the eye, but also because parallax is thus obviated, so that when the observer shifts his eyes the pencil-point is not displaced on the image. The introduction of an ordinary (<stop>) as used in photography remedies this defect, although greatly reducing the volume of light passing. As the paper, for convenience of drawing, must be at a distance of about a foot, a concave lens, with a focal length of some¬ thing less than a foot, is placed close in front of the prism in drawing distant objects. By rais¬ ing or lowering the prism in its stand (Fig. 2), the image of the object to be sketched may be made to coincide with the plane of the paper. The prism is mounted in such a way that it can be rotated about either a horizontal or a vertical axis ; and its top is usually covered with a movable plate of blackened metal, having a semi-circular notch at one edge for the ob¬ server to look through.

Another form of the camera lucida, that of Amici, an Italian optician, is sometimes pre¬ ferred to that of Wollaston, inasmuch as it al-

Fig. 2

lows the observer to change the position of his eye considerably without ceasing to see the image of the object he is tracing. The prism in this case is triangular in shape, and one of the angles is a right angle. In using it, the right

angle is turned upward, so that one of the per¬ pendicular faces is turned toward the object in an oblique direction, while the edge of the other perpendicular face meets a transparent glass plate at right angles. The rays from the object Jailing upon the face of the prism

which is turned toward it are, after being more or less refracted, thrown upon the base of the prism, from which they are totally reflected in the direction of the other perpendicular face. In emerging from the prism of this face they are again refracted and thrown upon the trans¬ parent glass plate. By this, again, the rays are partially reflected, being thrown upward in the direction of the eye of the observer, who, looking through the plate, sees an image of the object on a sheet of paper beneath, the outlines of which can be traced by a pencil as before. Perhaps the most important use of the camera lucida is its adaptation and attachment to the microscope ; but here also direct photography has almost wholly superseded handwork.

CAMERA OBSCURA (Lat. ((dark cham¬ ber®), an optical instrument employed for ex¬ hibiting the images of external objects in their forms and colors, so that they may be traced

and a picture formed. From certain scattered observations in the writings of Friar Roger Bacon, in the 13th century, it would appear that he was acquainted with the principle upon which the camera obscura is constructed, but the first complete description of this instrument is found in the (Magia Naturalis) of Giambat¬ tista della Porta, published in 1569, and Porta is commonly credited with its invention.

In its simplest form the camera obscura con¬ sists of a darkened chamber, into which no light is permitted to enter excepting by a small hole in the window-shutter. A picture of the objects opposite the hole will then be seen on the wall, or a white screen placed so as to receive the light coming through the opening. The images thus obtained become sharper as the size of the hole is diminished ; but this diminution involves loss of light, so that it is impossible by this method to obtain an image at once bright and sharp. This difficulty can be. overcome by placing a lens in the opening in the shutter. If the objects in the external landscape are all at distances many times greater than the focal length of the lens, their images will all be formed at sensibly the same distance from the lens and may be received upon a screen placed

at this distance. The images are inverted, and are of the same size whether the lens is in position or not, so long as the screen remains fixed; but they are far sharper and more dis¬ tinct when the lens is used. As an attraction at seaside resorts and other places of amuse¬ ment, the camera obscura consists of a small building or of a tent surrounded by opaque cur¬ tains and having at its top a revolving lantern, containing a lens with its axis horizontal, and a mirror placed behind it at a slope of 45°, to reflect the transmitted light downward of a sheet of white paper lying on the top of a central table. Images of external objects are thus depicted on the paper, and their outlines can be traced with a pencil if desired. It is still better to combine lens and mirror in one by the arrangement represented in section in the figure. Rays from external objects are first refracted at a convex surface, then totally re¬ flected at the back of the lens (or prism), which is plane, and finally emerge through the bottom, which is concave, but has a larger radius of curvature than the first surface. The two re¬ fractions produce the effect of a converging meniscus. The camera obscura, which was for¬ merly chiefly employed for purposes of amuse¬ ment, has now become well known from its adaptation to photography. See Photography.

CAMERARIUS, ka-ma-ra-ri-oos, Joachim, German classicist and educator : b. Bamberg, 12 April 1500; d. Leipzig, 17 April 1574. His proper name was Liebhard but he changed it to Camerarius, because his ancestors had been chamberlains (Lat. camerarii) at the court of the bishops of Bamberg. At the age of 13 he entered the University of Leipzig. In 1518 he began to teach Greek at Erfurt; in 1521 he taught at Wittenberg, where he became the friend of Melanchthon ; and in 1541 he under¬ took a professorship at Leipzig, which he re¬ tained until his death. He contributed not only to the progress of knowledge by his own works and by editions of classical authors, but also by a . better organization of the universities of Leipzig and Tubingen and of the gymnasium at Nuremberg. He took an important share in the political and religious affairs of his time, and in 1555 was deputy of the University of Leipzig to the Diet of Augsburg. His critical judgment was superior to that of Melanchthon, whose equal he was in classical studies, and he must be ranked as the greatest German classicist of his century. Together with many theological and biographical books, his works include editions of (Homeric Poems) (with the socalled scholia of Didymus, Basel 1541) ; (preek Elegiac Poets) (Basel 1550) ; (Theocritus) (Frankfort 1545) ; (Sophocles) (Basel 1556) ;

<Herodotus) (Basel 1540 and 1557) ; <Theophrastus) (Basel 1541) ; coeditor on (Galen) (Basel 1538) ; <Quintilian) ; <Cicero) (1540) ; and several others. Consult Bursian, (Geschichte der klassischen Philologie in Deutschland 5 (pp. 185-90, Munich 1883), and Sandys, (A History of Classical Scholarship) (Vol. II, Cambridge 1908).

CAMERARIUS, Rudolph Jakob, German botanist : b. Wiirtembcrg, 12 Feb. 1665 ; d. Tubingen, 11 Sept. 1721. To him is ascribed the discovery of the sexual relation in plants. He was in charge of the botanic gardens at Tubingen and was also a medical professor.

CAMERINO, ka-ma-re'no (ancient Ca-merinum), Italy, a town in the province of Macerata, 41 miles southwest of Ancona, be¬ tween the Chienti and the Potenzi. It is the seat of an archbishopric dating from 1787, and contains some good public buildings, among which are the archiepiscopal palace, the ducal palace, the new palace and the cathedral built in 1832, occupying the site of a temple of Jupiter. There is a university, founded in 1727, and a bronze statue of Sixtus V, erected in 1587. Silk is grown and manufactured here. Pop. 11,689.

CAMERLENGO (It. camerlingo, <(a chamberlainˆ), one of the highest officers of the Vatican court, who controls the finances and secular interests of the Pope. A cardinal camerlengo, during a vacancy in the Holy Soe, takes charge of all the temporalities, and pre¬ sides over the apostolic chamber or palace. The other cardinals assist in spiritual offices. There is also a camerlengo of the sacred col¬ lege of cardinals, and a camerlengo of the Roman clergy.

CAMERLYNCK, ka'mer-link, Achilla, Belgian sociologist and Biblical scholar : b. Reninghelst, Belgium, 9 May 1869. He was educated at Roulers, Bruges and at the Uni¬ versity of Louvain. He was ordained to the priesthood in 1894, £fnd from 1899 to 1910 was professor of Scripture and sociology at the Seminary of Bruges. In 1910 he became dean of Ostend and rector of Saints Peter and Paul, Ostend. He is a member of the Belgian Superior Council of Labor and the Belgian Society of Sociology. He is the author of (Saint Irenee et le canon du Nouveau Testa¬ mentˆ (1896) ; <De quarti Evangelii auctore dis-sertaticP (2 vols., 1898-99) ; (Quelques con¬ siderations sur la base philosophique du so-cialisme scientifique contemporakP (1900); (De l'opportunite d'une enquete ethnographique et sociologique sur les peuples incultes) (1905) ; Compendium Introductionˆ generalis in Sacram ScripturanP (2 vols., 1911-13) ; (Evan-geliorum secundum Matthseum, Marcum et Lucam synopsis > (with Dr! Coppieters,

1908). He edited Van Steenkiste's (Commentarius in Epistolas Catholicas> (5th ed., 1909) and (Commentarius in Actus ApostolorunP (6th ed., 1910), and was a contributor to (Collationes BrugensesR (The Catholic Encyclopedia) and <Annales) de la Societe Beige do Sociologie, *etc.*

CAMERON, Agnes Deans, Canadian edu¬ cator, traveler and lecturer : b. Victoria, B. C., 1863; d. there 1912. She taught for 18 years and became widely known for her interest in exploration and national development, giving lectures in Canada, Great Britain and the United States, based on personal observation of the natural resources of Canada, during travels all over the little known country extend¬ ing to the Arctic Ocean. She was elected vice-president of the Canadian Women's Press Club in 1909. She was associate editor of the Educa¬ tional Journal of Western Canada, and author of (The New North) (1909) and (The Outer Trail > H910).

CAMERON, Arnold Guyot, American educator: b. Princeton, N. J., 4 March 1864. He was graduated at Princeton University in

1886, and during the next two years studied abroad. In 1888-91 he was professor of French and German languages and their literatures in Miami University; in 1891-97 assistant pro¬ fessor of French in the Sheffield Scientific School of Yale University; and in 1897 accepted the chair of French at the John C. Green School of Science of Princeton University. He is editor of the textbooks ˆaudetp ˆferimeeP (Lotip (Coppee and Maupassant y and (The Goncourts, y and has lectured on literary topics.

CAMERON, Sir Charles, Scotch journalist and politician: b. Dublin 1841. He was edu¬ cated at Madras College, Saint Andrew's, 1 rinity College, Dublin, and at medical schools in Paris, Berlin and Vienna. He edited the North British Daily Mail from 1864 to 1874, and from the latter year till 1900 was one of the members of Parliament for Glasgow. The adoption of six-penny telegrams was the result of a resolution which he introduced in the House, and he was likewise

instrumental in the conferring of municipal franchise upon women in Scotland. He was knighted in 1893.

CAMERON, Sir Charles (Alexander),

Irish physician: b. Dublin, 16 July 1830; d. there, 27 Feb. 1921. Elected public analyst for the city of Dublin in 1862. In 1867 he was elected profe'ssor of hygiene and chemistry in the Royal College of Surgeons in Ireland. He was knighted in 1886 in recognition of his serv¬ ices to public health. He has written (Chem¬ istry of Agriculture) (1857) ; (Lectures on

Public Health* (1868) ; (History of the Royal College of Surgeons, Ireland, etc.* (1886); 'Elementary Chemistry and Geology) (1896).

CAMERON, Charles Duncan, English soldier: d. 1870. He served in the Kaffir War (1846-47) and in the Crimean War at the de¬ fense of Kars. In 1860 he became British consul in Abyssinia. He undertook two years later to deliver a letter from Queen Victoria to King Theodore, and was imprisoned by the King for 14 months on the charge of interfer¬ ing with the internal politics of that country. He was released only to be shortly imprisoned again, together with Rassan, agent of the Brit¬ ish government, and others, their final release being effected by the advance of English troops upon Theodore's stronghold at Magdala in April 1868. An account of these matters by Cameron was published in the Parliamentary Printed Papers) (1868-69).

CAMERON, Sir Douglas Colin, Canadian knight and statesman : b. Hawkesbury, On¬ tario, 11 June 1854. He became a prosperous lumber capitalist with business interests in Mani¬ toba, British Columbia and Ontario. He was prominent as a Liberal member in the Ontario legislature 1902-05, in 1911 received the appoint¬ ment of lieutenant-governor of Manitoba and was knighted in 1914.

CAMERON, Edgar Spier, American mural artist : b. Ottawa, Ill., 26 May 1862. After early study and training in New York and Paris, he, with Walter McEwing and Robert Reid, were selected to execute the mural paint¬ ings for the Chicago World Fair. The decora¬ tions in the library of the Supreme Court, Springfield, Ill., are representative of his mural work, while distinctive easel work includes <The Youth of Christ,* his most important

work, 'Glass Blowers) and 'Dreamland,* ex¬ hibited at Berlin in 1910. From 1891-1900 he was art critic and correspondent of the Chicago

Tribune, and at the Paris Exposition, 1900, was a member of the international jury. Marie Cameron, his wife, is well known for success¬ ful portraiture and genre work.

CAMERON, Frank Kenneth, American chemist: b. Baltimore, Md., 2 Feb. 1869. A student at Johns Hopkins University, after instructing at Cornell and at the Catho'lic Uni¬ versity of America, he was associated with the United States Department of Agriculture and became head of the laboratory of soil chemistry. His technical writings include numerous de¬ partmental bulletins and (An Introduction to the Study of the Soil Solution) (1910) ; and 'The Soil Solution, the Nutrient Medium for Plant Growth) (1911)s

CAMERON, George Frederick, Canadian poet: b. New Glasgow, Nova Scotia, 1854; d. 1885. He was educated at Queen's Univer¬ sity, Kingston, Ontario ; resided for a time in the United States ; returned to Canada, and edited the Kingston News. As a lyrical poet he received high praise from leading critics, his songs on Spanish oppression in Cuba being especially full of fire.

CAMERON, James Donald, American capitalist and politician : b. Middletown, Pa., 14 May 1833; d. 30 Aug. 1918; oldest son of Simon Cameron (q.v.), and graduated from Princeton College in 1852. He devoted himself to business pursuits and in 1861 was made vice-president and two years later president of the Northern Central Railroad. He remained in this office till 1874. In 1876 President Grant appointed him Secretary of War, and in 1877 he succeeded his father as United States sen¬ ator from Pennsylvania. He was reelected in 1885 and 1890. He retired in 1897. He was prominent in the campaign of 1876, first as opposing the nomination of Blaine, and then in working for Hayes' election. But Hayes re¬ fused to continue him in the Cabinet. In 1880 he was chairman of the Republican Na¬ tional Committee. Consult McClure, 'Old Time Notes of Pennsylvania) (Philadelphia 1905).

CAMERON, John, Scottish scholar: b. Glasgow 1579; d. there, 13 May 1625. He was educated at the University of Glasgow, and at the age of 20 held an appointment there as reader in Greek. In 1600 he went to the Con¬ tinent, where his ability and erudition secured for him several appointments at Bergerac, Sedan, Saumur and other seats of learning. Returning to Great Britain in 1620, he was two years later appointed principal of the Uni¬ versity of Glasgow ; but in less than a year returned to Saumur, and thence to Montauban, where he received a divinity professorship. Here, as at Glasgow, his doctrine of passive obedience made him many enemies, by one of whom he was

stabbed in the street, and he died from the effects of the wound. Sir Thomas Urquhart styles him a <(walking library, }) and Milton, <(an ingenious writer in high esteem. ** He was considered one of the best scholars of his day; in Biblical criticism he was inclined to be perverse ; where there was a difficulty he usually chose the opposite view to that held by other divines, especially Beza. His theolog-264

ical opinions were of a somewhat lax charac¬ ter, his eight works, in Latin and French (10 vols., 1616-42) being said to be the foundation of Moses Amyraut's doctrine of universal grace (1634). His followers are sometimes called Cameronites. His collected works were published with a memoir by L. Cappel (Geneva

1642).

CAMERON, Sir Matthew Crooks, Cana¬ dian statesman and jurist: b. Dundas, Ontario, 1822; d. 1891. He was called to the bar of Upper Canada in 1849, and was first returned to Parliament in 1861. He subsequently sat in the provincial legislature of Ontario ; was provincial secretary 1867-71 ; commissioner of Crown lands 1871 ; and leader of the opposition 1872-76. He was appointed to the bench in 1878, and in 1884 became chief justice of the Court of Common Pleas of Ontario. He was knighted in 1887.

CAMERON, Richard, Scottish Cov¬ enanter : b. Falkland, Fifeshire, 1648 ; d. Ayrsmoss, 22 July 1680. He was at first a school¬ master, and "for a time was tutor in the family of Sir Walter Scott of Flarden. Being con¬ verted by the field-preachers, he became an enthusiastic votary of the Covenant. On 20 June 1680, in company with about 20 other persons, well armed, he entered the vil¬ lage of Sanquhar, and proclaimed at the cross that he and those who adhered to him re¬ nounced their allegiance to the King on account of his having abused his government, and also declared a war against him and all who ad¬ hered to him, at the same time avowing their resolution to resist the succession of his brother, the Duke of York. The privy council imme¬ diately put a reward of 5,000 merks upon Cam¬ eron's head, and 3,000 upon those of Cargill and Douglas, his associates, and parties were sent out to waylay them. The little band kept together in arms

for a month in the mountain¬ ous country between Nithsdale and Ayrshire. But on 22 July, when they were lying in Ayrsmoss, near Auchinleck in Ayrshire, Bruce of Earlshall approached them with a party of horse and foot much superior in numbers. A brief skirmish took place, in which the in¬ surgents were allowed even by their enemies to have behaved with great bravery; but nothing could avail against superior numbers. Cameron being among the slain, his head and hands were cut off and carried to Edinburgh, along with the prisoners. Consult Herkless, (Richard Cameron) (in (Famous Scots Series, y New York 1896). See Cameronians; Cameronian Regiment.

CAMERON, Simon, American statesman : b. Donegal, Lancaster County, Pa., 8 March 1799; d. there, 26 June 1889. He learned print¬ ing and in 1820 he was editor of a paper in Doylestown, Pa., and in 1822 held a similar post in Harrisburg. He then interested himself in banking and the building of railroads, and for a time served as adjutant-general of Penn¬ sylvania. In 1838 he was commissioner to settle accounts with the Winnebago Indians and was accused of swindling them. From 1845 to 1849 he was United States senator from Pennsvl-vania, elected by the Democratic party. He became a member of the Republican party on its formation, and in 1856 was again elected United States senator. He was unsuccessfully

supported for the offices of both President and Vice-President in the National Convention of 1860, and in 1861 was appointed Secretary of War by President Lincoln. He advocated the arming of fugitive slaves and other extreme measures. In January 1862 he resigned from the Cabinet, and was appointed Minister to Russia. He succeeded in gaining the support of the Russian government for the Union. In November of the same year he resigned, and lived in retirement till 1866, when he was again elected to the United States Senate. In 1872 he became chairman of the Committee on For¬ eign Affairs. In 1877 he retired from the Senate in favor of his son, James Donald Cameron. His influence over the Republican party was strong, and his power in the politics of his State practically absolute. The control was transferred later to M. S. Quay and Boies Penrose. Cameron was the first powerful State ˆboss® in American politics. His ideals may be gathered from his definition of an honest politician as <(one who will stay bought when he is bought?* He was a vigorous op¬ ponent of civil service reform during the ad¬ ministration of President Hayes. Consult McClure, (01d Time Notes of Pennsylvania) (2 vols., Philadelphia 1905).

traveler in Africa: b. Weymouth, 1 July 1844; d. Leighton Buzzard, 26 March 1894. He en¬ tered the British navy in 1857, and in 1872 was chosen by the Royal Geographical Society of London to conduct an expedition for the relief of Dr. -Livingstone. He was only in time to meet the remains of Livingstone at Unyan-yembe, but pushed onward to Ujiji on Lake Tanganyika, and partly circumnavigated this great sheet of water, establishing the fact that its outlet was the Lukuga. Not being able to follow the Lualaba River downward, he con¬ tinued his journey westward to Benguela, and was thus the first to cross tropical Africa from east to west. Returning to England in 1876, he was raised to the rank of a commander. In 1878 he made a journey through Asia Minor and Persia in order to satisfy himself as to the feasibility of a railroad connecting India with the Mediterranean, and in 1882 with Sir Rich¬ ard Burton explored the country behind the Gold Coast. He published accounts of his journeys in his (Across Africa) (1877) ; (Our Future Highway to India) (1880) ; and cTo the Gold Coast for Gold) (with Sir R. F. Bur¬ ton, 1883). He died from an accident in the hunting field.

CAMERON, Mo., city of Clinton County on the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy railroads, 50 miles northeast of Kansas City. The dairying industry is important, gloves are manufactured, municipal waterworks and electric lighting-plants are operated and Missouri Wesleyan Col¬ lege is situated here. Pop. (1920) 3.248.

CAMERON, Texas, city, county-seat of Milan County, on the Gulf, Colorado & Santa Fe and the San Antonio & Aransas Pass rail¬ roads, 53 miles south of Waco. Stock raising and cotton growing are the chief industries and coal and timber are exploited from* neighboring denosits. Cameron was founded in 1875. Pop.

(1920) 4,298.

. CAMERON HIGHLANDERS, the old

79th Regiment in the British army, raised in 1793 by Allan Cameron of Erroch. It wears the Highland dress and forms the first battalion of the King's Own Cameron Highlanders. Its depot is at Inverness and its record office is maintained at Perth. A second battalion is now linked with the regiment, the first being known as the 79th Foot.

CAMERONIAN REGIMENT, a British regiment raised in 1689 among the Cameronians of the west of Scotland to support William III, and long famous as the 26th Regiment. It forms now the first battalion of the Camero¬ nians, Scottish rifles (Regimental District No. 26; Depot and Record Office Hamilton, N. B.), the second battalion being the old 90th Regi¬ ment. It takes its name from William Cam¬ eron, and its origin goes back to the time when the Covenanters went armed to public meetings.

CAMERONIANS, a sect of Scotch Pres¬ byterian dissenters, named after Richard Cam¬ eron. James I had enforced on his Scottish subjects a liturgy which the people abhorred, and this led, in 1638, to the formation of the covenant, <(in behalf of the true religion and the freedom of the kingdom.)} The organization of the Scottish presbytery was still further com¬ pleted in the adoption of the Presbyterian form of Church government, a Calvinistic confession of faith, and the two catechisms, which documents are the standards of the Scottish kirk to this day. Throughout the rev¬ olution of 1688 the Cameronians maintained inflexible hostility to the royal usurpation of religious freedom. They supported the Prince of Orange on his assuming the Crown of Eng¬ land, but were displeased and disappointed by the form in which the Presbyterian Church was restored. In 1709 they exerted all their in¬ fluence against the union of Scotland and Eng¬ land. The presbytery of this denomination was not organized until 1 Aug. 1743, when an act of toleration was procured in their favor. They still have a distinctive existence in Great Bri¬ tain and America, under the name of Reformed Presbyterians.

CAMEROONS, ka-me-roon', or KAME-RUN, a German colonial possession in West Africa having originally an area of 191,130 square miles, which was increased in 1911 to 295,000 square miles by France agreeing to cede Kongo territory as compensation for loss of German influence in Morocco. It is bounded by Lake Chad on the north, French Kongo on the east and south, Spanish Guinea on the south¬ west and the Bight of Biafra and Nigeria on the west. From the sea to Lake Chad it meas¬ ures over 700 miles, and its greatest breadth from east to west is 600. The territory re¬ ceives its name from the

Cameroon River, which enters the Bight of Biafra by an estuary nearly 20 miles wide. The swa,mps along the banks of the river render this district unhealthy for Europeans. Northwest of the river lies the volcanic group called the Cameroon Mountains, which rise to a height of 13,760 feet. The lower slopes of these mountains are more healthy and are covered with ebony, redwood and palm-trees. More important than the Cameroon River is the much longer Mbam, entering the Bight of Biafra a little south of the former, and navigable for 40 miles inland to Idia.

Among cultivated plants are the banana, oil-palm, cocoanut, groundnut, manioc, yam, sweet-potato aˆid colocasia; of more recent introduc¬ tion are cacao, coffee, tobacco, *etc.* Among the minerals are gold and iron. There is a consid¬ erable trade in cotton, ivory and oil. The inhabitants are almost entirely of the Bantu stock, widely diffused throughout the more southerly portion of the continent, and many of them have almost regular European fea¬ tures. The coast of the Cameroon territory was annexed by Germany in 1884, and the in¬ terior was afterward acquired, the whole hav¬ ing been a German colony under a governor. The seat of government was at Buea, situated 3,000 feet above sea-level near the coast. At Duala there was a commodious floating dock; 150 miles of railroad had been constructed and there was wireless communication with Berlin through Togoland. The colony had never raised sufficient revenue to meet its expendi¬ ture, the last figures of which were £882,500, with receipts £361,500, imports £1,712,000 and exports £1,165,000.

In August 1914 operations were begun by the British against the Cameroons, which cul¬ minated in January 1916 when 14,000 native troops and 900 officers withdrew over the south¬ western frontier into Spanish Guinea and there gave up their arms. A month later the northern garrison capitulated.

CAMILING, ka'me-ling, Philippines, town of Luzon, Tarlac province, on the Camiling River, 80 miles northwest of Manila. Fine tim¬ ber, rice, corn and sugar are the chief products. The place has an unfortunate reputation as a hiding place for thieves and outlaws. Pop.

26,000.

CAMILLA, in Roman fable, a virgin, said to have been a daughter of

Metabus, a Volscian king, and to have aided Turnus against flEneas (Virgil, <3Eneid,) vii). She was slain by Arruns, an Etruscan ally of flEneas (Virgil, (2Eneid,) xi, 648-833).

CAMILLE, ka-mel', the heroine of Du¬ mas' novel, and the play adapted from it. (See La Dame aux Camelias) ; also the heroine of Corneille's (Les Horaces, } founded on the old Roman legend of the Curiatii.

CAMILLUS, Marcus Furius, Roman patri¬ cian : d. 365 b.c. He is famous as the deliverer of the city of Rome from the Gauls. He first came into notice as consular tribune in 403 b.c. His military successes were numerous, but the accounts of them have become mixed with con¬ siderable mythological fiction. In 396 b.c. he was made dictator during the Veientine War and captured the town of Veii after it had defied the Roman power for more than 10 years. In 394 b.c. Camillus besieged the Falerii, and by an act of generosity induced them to surrender. Three years later the envy and jealousy of enemies caused him to exile himself for a time, and he was living in retirement when the Gauls, under Brennus, invaded and captured Rome, with the exception of the capitol. Camillus was now appointed dictator a second time, and was successful in repelling the invaders, rebuilt Rome and gained new victories over the Volsci and others. In 386 he was elected dictator for the third time and refused the office. In 381 he carried the Roman arms

to victory against Praeneste and other Latin towns. For the fourth time he became dictator in 368, but abdicated in the same year. A new invasion of the Gauls called him, at the age of 80, once more to that position, and he defeated and dispersed the barbarians near the site of Alba Longa, and concluded a peace between patricians and plebeians and aided in passing the Licinian Laws. He erected a temple to Concordia near the Capitol, retired from public life and died of the plague about 365 b.c. uni¬ versally respected and lamented. See Rome, History, and consult Plutarch, ˆamillusP

CAMINATZIN, ka-me-na-tsen', or CACU-MAZIN, Mexican king: d. 30 June 1520. He was nephew of King Montezuma and reigned over Tezcuco at the time of the Spanish con¬ quest. Caminatzin, with more courage and enterprise than his uncle, proposed to his sub¬ jects a declaration of war against the foreign¬ ers. The proposal was received with enthu¬ siasm, and Caminatzin called upon the Span¬ iards to leave the country immediately or to expect to be treated as enemies. Montezuma invited his nephew to Mexico to become recon¬ ciled with the Spaniards. The answer of Cam¬ inatzin was that he could enter Mexico only to destroy the tyrants of his country. Montezuma then despatched secret agents to Tezcuco to get possession of the young prince by fair or foul means. His first officers and nearest friends were corrupt, and he was delivered by them to Cortes and imprisoned. He perished during the evacuation of Mexico by the Spaniards.

CAMISARDS, kam'i-zardz, Protestants in France (in the Cevennes), who, in the begin¬ ning of the 18th century, in consequence of the persecution to which they were exposed after the revocation of the Edict of Nantes in 1685, rose against the royal deputies. The name is usually thought to be derived from <(camise,® a provincial form of the French word <(chemise,® signifying a shirt or smock, and it is said to have been applied to them because their ordi¬ nary outer garment was a smock or blouse. The first occasion on which they broke out into open revolt against the royal deputies was on the night of 24 July 1702, when 50 of them attacked the house of the Abbe du Chayla, one who had signalized himself by his cruelty during the persecutions. They set free the prisoners whom they found confined in the dungeons, and put the abbe himself to death. This was the signal for a general rising of the mountaineers. The government sent troops to punish the authors of these acts. A certain Jean Cavalier, a peas¬ ant, whom a fortune-teller had pointed out as the deliverer of Israel, placed himself at the head of the Camisards. His unlimited authority with his adherents, his talents and courage, enabled him to oppose the measures of experi¬ enced generals with so much success that nego¬ tiation was substituted for force. The Marshal Villars in 1704 made a treaty with Cavalier, by virtue of which Cavalier himself was received into the royal service as a colonel. This treaty, however, did not satisfy his associates, because it did not concede to them liberty of conscience, and on that account Cavalier was reproached as a traitor who had sacrificed the cause of his coreligionists to his own interest. At the court, too, he was received with coldness, so that in a short time he was glad to go into vol¬

untary exile. He went to England, where Queen Anne gave him a favorable reception. Voltaire, who became acquainted with him in London, speaks of him in high terms. At the time of his death Cavalier was general and governor of Jersey. The name camisards blancs (white camisards), or cadets de la croix (cadets of the cross), was given to a band of Roman Catholics formed to put down the Calvinistic Camisards, who were called camisards noirs, or black Camisards. See also France — History.

CAMLET, or CAMBLET (in French, camelot), a name applied in England to a fabric made of long wool, hand-spun, sometimes mixed with cotton or linen yarn. Various derivations of the word are given. Some consider it to be of the same root with camel, because it was originally made of camel's hair; others derive it from the Arabic chamal, signifying fine, because according to them it was originally made of the fine hair of the Angora goat.

CAMMAERTS, cam-marts ', Emile, Bel¬ gian poet and journalist. He gained a world¬ wide celebrity by his fierce poetical denuncia¬ tions of the German invasion of Belgium in 1914. But though his muse at times rises to impassioned heights, it is rather as the poet of domestic joys and sorrows that he shines; it is through the tender details of his descriptions that he makes his best verses. With a number of exiled literary and artistic compatriots, Cam-maerts issued in 1916 a work ((in recognition of the help given by the British empire and the United States during the great War.® It bore the title of ((A Book of Belgium's gratitude.® Consult (New Belgian Poems: Les trois rois et autres poemes) (New York 1916) ; (Chants patriotiques et autres poemesˆ in French and English.

CAMMERHOFF, John Christophe Fred¬ eric, Moravian bishop in America: b. near Magdeburg, Germany, 28 July 1721 ; d. Bethle¬ hem, Pa., 28 April 1751. He was educated at Jena, and at the age of 25 was consecrated a bishop in London and came to America as Bishop Spangenburg's assistant. He preached in Pennsylvania and New York, but his great¬ est successes were made among the Indians. The Iroquois adopted him into the Turtle tribe of the Oneida nation, and gave him the name of Gallichwio, or <(A Good Message.® In 1750 he undertook amid great hardships a tour to Onondaga. It occupied three months, embraced a distance of 1,600 miles and was filled with hair-breadth escapes. He was too weak to en¬ dure such enterprises, and died the following year. The Iroquois mourned him as a brother and said of him ((He was an honest, upright man, in whose heart no guile was found.® Thirty years later Zeisberger heard his name mentioned among them with deep respect and veneration. The memory of his

devotion and irrepressible missionary zeal has ever been held in honor by the people of his faith.

CAMOES, ka-mon'esh, or CAMOENS, Luiz Vaz de, Portuguese poet: b. Lisbon probably 1524, or 1525; d. there 1579. His father, Simon Vaz de Camoes, was a ship-captain, who perished by shipwreck on the coast of Goa about 1552. Camoes studied at Coim¬ bra, of which his uncle, Dom Bento de Camoes became chancellor in 1539, the year of Luis'

entrance to the university. At that time writers were esteemed in proportion as they imitated the ancients. Camdes was inspired by the his¬ tory of his country, and by the manners of his age. His lyric poems, like the works of Dante, Petrarch, Ariosto and Tasso, belong to the literature formed under the influence of Chris¬ tianity. After the completion of his studies he returned to Lisbon, where he fell deeply in love with a lady of the palace, Catharina d'Atayada. Violent passions are often joined with great talents — Camdes had both. He was exiled to Santarem on account of disputes in which his love for Catharina involved him. From despair he became a soldier, and served in the fleet which the Portuguese sent against Morocco. He composed poetry in the midst of battles, and as danger kindled his genius, so genius animated his courage. An arrow de¬ prived him of his right eye before Ceuta. He hoped that his wounds would receive a recom¬ pense, though his talents were not appreciated ; but envy opposed his claims. Full of indigna¬ tion at seeing himself neglected, he embarked in 1553 for India. His powerful imagination was excited by the heroic deeds of his countrymen in this quarter, and although he had much reason to complain of them, he could not resist the desire of celebrating their glory in an epic. But this vivacity of mind, essential to the poet, is not easily united with the moderation which a dependent condition demands. Camoes was displeased with the abuses of the government in India, and wrote a satire, which caused his banishment to Macao. Soon after he was re¬ moved to the Moluccas, but after three years of captivity a new viceroy recalled the decree of

banishment against him, and appointed him administrator of the effects of deceased per¬ sons at Macao. His chief poem, the ˆusiad,* was composed partly during the period of his captivity, and partly while he held the office of administrator. Camoes was at last recalled from his banishment. At the mouth of the river Mekon, in Cochin-China, he was ship¬ wrecked, and saved himself by swimming — holding in one hand above the water the manu¬ script of his poem, the only treasure which he rescued from the waves. In Goa he en¬ countered new persecutions ; was confined in prison for alleged embezzlement of funds en¬ trusted to him during his tenure of office at Macao, and not allowed, until his friends be¬ came responsible for him, to embark and return to Lisbon in 1569. King Sebastian, yet hardly past the age of childhood, took an interest in Camoes. He accepted the dedication of his epic (which appeared in two editions, varying both in the text and the orthography, in 1572), and being on the point of embarking on his expedition against the Moors in Africa, felt more sensibly than others the genius of the poet, who, like him, loved dangers if they led to glory. But Sebastian was killed in a battle before Alcaqar in 1578, and with him the royal family became extinct, and Portugal lost her independence. Every source of assistance, as well as every hope of Camoes, was destroyed by this event. So great was his poetry that at night a slave, whom he had brought with him from India, begged in the streets in order to support the life of his master. In this misery he yet wrote lyric poems, some of which

contain the most moving complaints. This hero of Portuguese literature, the ornament of his country and Europe, died in a hospital, neg¬ lected. In 1596 a splendid monument was erected to his memory. Vasco da Gama's ex¬ pedition to India is the subject of his great poem. The parts of it which are best known are the episode of Ines de Castro, and the ap¬ pearance of Adamastor who, by means of his power over the storms, aims to stop Gama's voyage when he is about to double the Cape. In conformity to the taste of the time, Camoes united in this poem a narrative of the Portu¬ guese history with the splendor of poetic de¬ scription, and Christianity with mythological fables. Fie pleased himself with tracing the descent of the Portuguese from the Romans, of whom Mars and Venus are considered the progenitors and protectors. Since fable ascribes to Bacchus the first conquest of India, it was natural to represent him as jealous of the undertaking of the Portuguese. If the imitation of the works of classical antiquity has been of any disadvantage to the 'Husiadp the injury consists, perhaps, in a diminution of the originality which one expects in a work in which India and Africa are

described by an eye-witness. The general interest of the poem consists principally in the patriotic feeling which pervades it. The national glory of the Portu¬ guese appears here in every” form which inven¬ tion can lend to it, and therefore the country¬ men of Camoes must naturally admire this poem more than foreigners. Some critics pro¬ nounce the <Lusiad) a more powerful and pure historical painting than Tasso’s Jerusalem Delivered. } A valuable edition of the <Lusiad) (Os Lusiadas, etc.) was published by Joze Maria de Souza-Botelho (Paris 1817). It has been translated into English by Fanshaw, Mickle and Duff; by J. J. Aubertin (with Portuguese text), and by Sir R. F. Burton (with (Life of Camoes, Commentary, > etc.; 6 vols., London 1881). The works of Camoes, besides the ˆusiad,* consist of sonnets, songs, odes, elegies, eclogues, redondillas, epigrams, satires, letters and three dramas, (Amphitryon,) after Plautus, (King Seleucus) and the (Love of PhilodemusP The most complete edition of Camoes’ works is that of the Visconde de Juromenha (6 vols., Lisbon 1860-69) ; also the small handy edition of Theophile Braga (3 vols., Oporto 1874) and the edition by Carl von Reinhardstoettner (Strassburg 1874). Con¬ sult also Viscount Strangford, (Poems from the Portuguese of Luis de Camoens, with Re¬ marks on his Life and Writings, Notes, etcP (6th ed., London 1810) ; and Branco, Camillo Castello, (Manual bibliographico portuguez) (Oporto 1878) ; Da Silva, I. F., (Diccionario bibliographico portuguez) (Vol.* V, Lisbon 1860), and also Vols. XIV and XV (Vols. VII and VIII of the continuation of Brito Aranha ; Lisbon 1886-88). These volumes are devoted exclusively to Camoes and his works, and are profusely illustrated. Consult Adamson, Mem¬ oirs of the Life and Writings of Luis De Cam5es) (London 1820) ; Braga, (Historia de Camoes> (3 vols., Oporto 1873-75) ; Castello-Branco, (Luis de Camoes) (Oporto 1880) ; Storck, (Luis de Camoens Leben) (Paderborn 1890), the best biography of Camoes so far published. See Lusiad, The.

CAMOMILE

CAMOUFLAGE

CAMOMILE. See Chamomile.

CAMONICA, ka-mo-ne'ka, or VALLE CAMONICA, a valley in North Italy, in the province of Brescia, formed by two branches of the Rhaetian Alps, watered by the Oglio, and stretching about 50 miles from north-northeast to south-southwest as far as Lake Is.o. It is a principal thoroughfare between Italy and the Tyrol. It has quarries for iron, copper, lead, marble and slate. Its soil is fertile, agriculture being one of the leading occupations ; maize, grapevines and mulberry trees are extensively cultivated.

CAMORRA, an association in Naples, the members of which (Camorristi) carried on ex¬ tortion as a regular business and were found at markets, fairs and all public gatherings in the exercise of their employment. The band became known in 1820, when it was not political but social, originating in the Neapolitan prisons, then filled with victims of Bourbon misrule. It was carried into the city in 1830 and became a political body of great influence in 1848. A determined effort was made to exterminate it in 1877, but in spite of the lessening of their power it has still remained vigorous. In 1900, a government inquiry was made in the course of a libel suit, the result of which was the formation of the Honest Government League and the consequent defeat of the Camorra in the municipal elections of 1901.

They were divided into several classes, — those who dressed as gentlemen and mingled with people of rank; those who practised their work on tradesmen and the like ; and the politi¬ cal and murdering camorristi. There were various ranks and grades which might be at¬ tained in the Society, and certain ceremonies of a very severe character were celebrated. The Association extended its ramifications over en¬ tire Naples. It had central stations in all of the large provincial towns and 12 in the city of Naples. Consult Monnier, (La Camorra-* (Florence 1863) ; Alongi, (La Camorra1* (1890) ; Heckethorn, (Secret Societies of All Ages1* (London 1897).

CAMOUFLAGE, ca' moo-flazh. This art is in reality an adaptation of the science of color to meet man's requirements according to the plan of nature's protective coloring but the idea may be greatly extended in scope as will be briefly suggested in the following paragraphs. It is well known that many species of birds, fishes and animals assume colorings and patterns which quite effectively conceal them in their natural environments. Some of these change their colorings and patterns from season to season and the chameleon and cer¬ tain fishes have the ability to alter their color very quickly to an approximation of that of their immediate surroundings. Some fishes are also able very

quickly to imitate approximately the pattern of the background upon which they are placed. The effectiveness of this scheme of protective coloring has indicated to man the possibility of providing protective concealment for men, batteries, etc., in warfare and in other activities and the science of color has revealed other possibilities. In utilizing this art in war¬ fare the aim is to provide a covering which closely imitates that of the' surroundings. In order to provide effective concealment it is

necessary to consider the character of the lighting and herein the greatest obstacles arc usually encountered because of its changeable¬ ness. The scheme will be introduced by means of a few examples. It is easy to mask a battery in the summer time amid green foliage by using a screen of green branches, grass, *etc.* The duck-hunter utilizes a suit of grass or a blind of vegetation in the same manner. In other seasons suitable changes in the screens may be made. If soldiers are to be concealed in a snow-covered winter landscape which is devoid of vegetation this may be accomplished by means of white clothing and even white masks 'or paint on their faces. On an overcast day the concealment may be accomplished quite effectively but on clear sunlit days the shadows cast upon the surface of the snow and the shadows on the various contours of the form usually render complete deception impossible especially if the soldiers are moving. If the winter landscape is not wholly barren of trees or shrubs and the soldier is on stationary out¬ post duty, a dark gray cloak is effective. In the case of vessels it has been found that a mottled pattern of grays has been quite effec¬ tive toward rendering them less conspicuous or practically invisible. If the vessels lie low in the water it is obvious that the deception is generally more successful. However, the ap¬ pearance of the surface of the water varies with the lighting and with the character of the sky and of the waves. It is obvious that the surface of the water assumes many appearances with a given lighting and sky condition, in¬ cluding the calm smooth surface, the choppy sea and the long swells or rolling sea. To a distant observer these differ least in appearance on a uniformly overcast day. On a sunlit day there are usually bright high-lights on the waves which are reflected images of the sun. Furthermore the surface color of the water is largely due to reflected images of the sky and clouds. The color of a smooth surface of the water at some distance from a given observer appears to him quite similar to that of the lower portion of the sky in the direction in which he is gazing. This is readily seen if a diagram is made and the optical law of reflec¬ tion — the angle of incidence is equal to the angle of reflection — is applied. When small waves are running,

beautiful color-effects are seen if the color of the zenith or upper por¬ tions of the sky differs materially from that of the lower sky near the horizon, as is usually the case after sunset. Such a surface of water appears to be a series of stripes alternating in color. From the simple diagram previously suggested it will be seen that the lagging side of a wave is reflecting toward the observer an image of a patch of sky near the horizon and the advancing side is reflecting an image of a patch somewhat nearer the zenith. If these patches are different in color, the beautiful effects already mentioned are accounted for. These different appearances of the water have been discussed in order to show that the best protective coloring for vessels differs according to lighting, sky condition, and surface char¬ acter of the water. In other words, if prac¬ ticable, several removable coatings, differing in pattern, could be provided. In general the most suitable color is bluish gray but there is always the difficulty with glint or high-lights, even if

smoke can be suppressed or avoided. It is a comparatively simple problem to provide a coat¬ ing for rendering a lowlying ship incon¬ spicuous or even invisible under specific con¬ ditions of lighting, sky and surface of the water ; however, in practice a compromise must be made in order that one coating will serve well under all conditions. In marine camouflage the outline of the vessel is important for it is usually seen against the sky by the sub¬ marine or distant enemy. The science of color can be used effectively in revealing guns, soldiers, etc., belonging to the enemy if they

(.Red Light) (Green Light) (Blue Light)

Fig. 1 — Illustrating the effect of colored lights upon the appearance of six colored fabrics

have not been provided with coverings closely resembling their environments. The plan is quite the reverse of camouflage in that it aims to augment the contrast in hue or in brightness. In general, all

objects are ˆcoloredˆ; that is, relatively few objects are without hue. The latter are the whites, blacks and intermediate grays. We see an object only when there is a contrast between it and its background or im¬ mediate surroundings. This contrast may be in hue or in brightness but usually it is a mixture of both. Camouflage aims to eliminate these contrasts. It is a fact of color-science that a colored object — for example, a pigment * — will not appear, in general, the same under two different illuminants. Both the hue and value or reflection factor of a colored object change with the illuminants. For example, in Fig. 1 are shown the relative values or bright¬ ness-contrasts of six colored fabrics under red, green and blue lights, respectively, as indicated. For example, the lower middle one, which was a blue fabric, is very dark under red light and is very bright under blue light. This experi¬ ment is significant in indicating the possibilities of using various colored screens before the eyepieces of field glasses and telescopes. A study of a landscape by means of such filters may reveal objects owing to the augmented contrast which would not be otherwise suffi¬ ciently conspicuous. Experiments made by the author before the beginning of the European War indicated such possibilities. For example, a khaki cloth amid green foliage may be made to appear darker or brighter than the sur¬ rounding green foliage by viewing it through blue-green and yellow-orange filters _ respec¬ tively. Actual measurements of the ratio of the brightness of the khaki cloth to that'of a green leaf were respectively 0.7 through a blue-green filter, and 1.5 through a yellow-orange filter. These ratios are on the basis that, under day¬ light illumination, the two objects appeared of the same brightness when viewed without colored filters. The applications of colored screens to field glasses appears to be well worth while for many purposes outside of warfare. In order to meet all the conditions to be found, a series of filters, say blue, green, yellow,

orange and red, could be provided in pairs for field glasses and arranged in a convenient man¬ ner for quickly changing from one set to another. These screens should be as pure in color as practicable. Another promising filter is a yellow or canary screen whose object would be to eliminate the bluish haze which is usually present in distant landscapes. A large per¬ centage of light is sacrificed with such screens but fortunately the intensity of daylight is usually far greater than is necessary. It is doubtful that artificial light will play an ap¬ preciable part in the art of camouflage in war¬ fare; however, it has possibilities in other fields in certain developments in color-effects ap¬ plicable to the stage, *etc.* Applying the prin¬ ciple already discussed briefly in connection with Fig. 1 it is possible to relate various colors

with certain patterns in such a manner that certain parts of the scene will disappear completely under a given illuminant. For ex¬ ample, a gray on a red background is readily distinguished under ordinary light because of the difference in brightness and in hue. Under a red light there will be no difference in hue if the red background has been properly selected in relation to the illuminant. There remains, then, only the possibility of a con¬ trast in brightness which depends upon the relative amounts of light reflected by the gray and red objects. If the gray is properly selected it will appear of the same brightness as the red background under the red light and therefore will be indistinguishable or invisible. By the use of the same principles applied to a number of pigments (those having the quality of high transparency being more satisfactory), striking disappearing effects can be obtained by varying the color of the illuminant. The effect which is possible by applying these principles is illustrated in Fig. 2 although rather feebly,

Fig. 2 — Illustrating changing of scenery by the use of colored lights or Camouflage applied to canvass

owing to the absence of color. The paints which were made of high transparency and purity were so chosen that under ordinary illumination the scene appeared as in the illus¬ tration at the left. Under an orange-red light the mountain and entire background disap¬ peared with the result that the scene appeared as in the right-hand illustration.

This example indicates what could be ac¬ complished outdoors if both the landscape and lighting could be controlled. Many effects have been produced on canvas, such as changing a summer landscape to a winter scene, causing figures to disappear, *etc.* The scheme has

possibilities on the stage, in displays and in advertising. Ordinary pigments are not as satisfactory as water colors or paints made by coloring a white base with aniline dyes. In applying the art of camouflage it is seen that the science of light and color contains the under¬ lying principles. With a thorough acquaintance with these much can be accomplished. Even some of the efforts of the enemy to conceal soldiers, batteries, etc., could be rendered in¬ effective by utilizing colored screens on tele¬ scopes and field glasses unless the colors were very carefully chosen by the enemy. For ex¬ ample, for perfect concealment the object must possess the same color as its surroundings, not only as viewed by the eye but as analyzed by the spectroscope. This point is too intricate to discuss in detail but in color-work it is always well to remember that in respect to color the eye is synthetical and not analytical. In other words, the eye records only the integral effect of the spectral colors of which ordinary colors consist. For example, two yellows may appear the same to the eye under a given illuminant though they may be quite unlike in spectral composition. If the latter is true, the two yellows will not in general appear alike under any other illuminant. Camouflage has been practised in all wars, but in the European War it has been highly developed. Consult Luckiesh, M., (Color and Its Applications. >

M. Luckiesh.

CAMP, kan, Maxime du. See Du Camp,

Maxime.

CAMP, Walter, American manufacturer and writer: b. New Britain, Conn., 7 April 1859. He was educated at the Hopkins Gram¬ mar School and at Yale University, from which he was graduated in 1880 with the degree of A.B. For over 30 years he has been asso¬ ciated with the New Haven Clock Company, of which concern he is now president. He was active in the management of athletics at Yale, giving especial attention to football. On this sport he became a leading American authority, and was in demand on various committees which undertook the revision of football rules and brought about the present system of play. He became a member of the Yale University Council. He is a prolific writer on sports, of articles relating to the effect of sport and play¬ grounds on the development of character; is sports editor of various periodicals; also a liberal contributor on sporting topics to The Century, Harpers', Collier's, Saint Nicholas, and numerous other American and English maga¬ zines. He is editor of The Boys' Magazine ; editor-in-chief of (The Young People's Li¬ brary^ He is author of (The Substitute) (1908); (Jack Hall of Yale> (1909);

<01d Ryerson) (1911); (Danny Fists) (1913); (Captain Danny* ; (Danny the Freshman* ;

(Bridge Don’ts) ; (Auction Bridge Don’ts* ; (Auction Bridge up to Date1* ; (Book of Col¬ lege Sports) ; (American Football* ; (Football Facts and Figures) (1886); (Football *; Wale, Her Campus, ClassRoom and Athletics* ; (Drives and Puts,* with Lillian Brooks (1899).

CAMP, in military use, the place and aggregate body of tents or huts for soldiers in the field. In modern times a difference is often made between camp, bivouac and cantonment, the first signifying the quarters of an

army sheltered in tents ; the bivouac the situation of one which dispenses with them, and remains either entirely in the open air, or, when time allows it, in huts built of branches, *etc.* ; the cantonment when the troops occupy buildings in towns or villages. Camps, in a general sense, are of very ancient origin, since almost all nations in their infancy lived as nomads, dwelling in tents, as is the case with many tribes in Asia and Africa at the present day, for example, the Arabs. Among the Greeks, the Lacedaemonians seem to have been the first who devoted atten¬ tion to the art of forming military camps. The form which they adopted was the circular, that being the form which was best calculated to enable the general, who had his tent in the centre, to have a view of the whole camp, and to dispatch assistance in the shortest possible time to any part of the camp that might be attacked. The Romans probably first carried the art of encampment to a high degree of per¬ fection, on account of .their many wars in dis¬ tant and thinly settled regions, where their large armies found no cities to quarter in. Caesar and several other Roman authors give us much information on their way of construct¬ ing a camp, and in Polybius we have a detailed description of the consular camp as it was made in his time. This form of camp, with some modifications, continued to be the usual one during the whole period of the Roman domina¬ tion, and down to the time of the invention of gunpowder. The site was chosen by the general himself, or by one of the military tribunes ; a spot from which a view of the whole camp could be obtained. This spot was marked by a white pole as the point from which the rest of the camp was measured out, and the place where the general’s tent (prcetorium) was to be erected. The form of the camp was a square, and it was divided into two parts by a street from 50 to 100 feet wide, called the principia or via principalis, which ran across it. One of these divisions occupied about one-third of the

whole space, the other, the remaining two-thirds ; and it was in the former of these that the prcetorium was situated, with an open area around it extending 100 feet on all sides. On the right of the prcetorium was the forum or market-place, and on-the left the qucestorium, where were the camp-stores under the superin¬ tendence of the qucestor. Beyond these again on each side there were select bodies of horse and foot taken from the extraordinaries, and behind this whole line of the encampment, and separated from it by a street 100 feet broad, was the place reserved for the main body of the extraordinaries, and for foreigners and oc¬ casional auxiliary troops. Immediately in front of the line of the encampment first described the tents of the military tribunes and of the prcefecti, or officers of the allies, were erected, the former before the forum and qucestorium, the latter before the select bodies of horse and foot. These tents lined the principia on the side of the prcetorium. On the other side of the principia the. main body of the army was quartered, the allies being stationed on the right and left, the two Roman legions which be¬ longed to every consular army in the middle. The whole was surrounded with a ditch (fossa) and a rampart (vallum) at the distance of 200 feet from the tents. On every side of the camp

ngitude W estˆJ f rom. G re

mnipet/osis

Sn*katc

lake St-Joseph

‘PPeiit

tnyf,

0 Long Lake

U ran don*

Eatevan

Morris TURTLE I

pftrdcc

ˆWilliam psuK Royals

% *‘A’* -

Leeds1 DaVila I

r ooeeheai

lur-l/mO’”’

Crbokaton

Oleadiy’c

Sudbury’

fauicoiown

Ashcro/t

< Rblr} ’renlloe

LAKE’*?,

IhUROE

I ft*1’4 J

Ortonvj

Marinette

1 Horn e

Shoshone Q ˆ

Bflle Fourcbe

Red field

, W bite wood

os c

i i u *

| Shakop

Idbkosl

l’e “cos tie”

*1 1 •• 1 •

[anitoW1

WinonaN

ˆAustin

Chamber!*

Albert Lea

ˆdeemont

lakolaˆ/l

Ainsworth Ella worth

fiiver’

Norfolk

Culuinln

/ˆOinuljl

Lincoln/*

’uieabul

■ muur,

Wallace’

ruv’ltfcYfftJ

rcouˆBU:

>T ˆHastings C!AS d I iua Superiorˆ Falrbury ˆ

>v.vi

Lrkabˆ(

LhJ ican

Norton

n 8t. Josebli , Atchison “ ““Has ci.

uU:,v

LLa/rencel

jiˆVernon

m® Asblaoj

Cheyenne \V<

intmllaJ

SedaUa1

itESTOSKˆ

W ainion

Jˆuoliaja-

Emporia, ’ Fort Se/tt

o Roll!

ˆlamog,

dnto„i(0

■an sits’

Trinidad

Bisnmrol

iCotb\ˆ

NortonViU

lonero ft ,

Anthony

-Liberal

Winfield

rccnBborof ˆ

1]

-”44ft\sbv > *3y

iMooett,

Willow’

.Springs

Lspanola

s n /

OkNTA F/t

Sautn“MonW«

if San Bernard] JjColton fi!N ■< Wlers/,». 7

HXSHVTbtt

Dal hart

Fajcttevillo

Canadian

Columbia

jhuttunoogu.

Oklahoma On

R>\Wng

Amarillo

‘Chiokasha

Tort Smitn

Duncan

Childress’

Atoka

Rt ve > i

Gurdom

Roswell,

LobWk

/MoGehee’

Camden

l&pfaked P|ai

l«urietta\

\ Bowie

Oreenv

MonroeT”

;SuvlV”

sCogsbact

[water

Meridiai

lericUB

Vicksbtt*’

f\arri»yˆ>i

JeBup,

ftjruu®*

Cross

Bainbridge

,so«v

Corps

ON

}‘oF

•ngfello,

lislon

Chlhuahi

Ifjflloutbs of the

V Mississippi River

Fledras Negras

Veterebur,

Tampa Ba

•tchoˆA

THOV***V ’ ISLAˆt*3

UNITED STATES

Brownsville”

Monti Jey

,X»R°S

XoRTUCAS

SCALE

Statute Miles, 240 = 1 Inch

ibw^dsI

L. dt la Madn

Rand McNally ’s New llxll Mop of United States. Copyright by RancUMcNally A Co.

Victoria

fa»»

shown thus

United States Arm, _

Boundaries of the Departments of U. S. Army

110“

436A

• «•;

i

v.

*

#

•v ‘

i : . - » ■ •

* •*.

• » *• 1

. >- ‘ - ■ . - -

i. *

r

.

9

*

■v. i

• / . ■ «■

-

CAMP ALLEGHANY

271

there was a gate. That behind the prcetorium was called porta prcetoria, the one on the opposite side porta decumana. The other two were at the ends of the principia, and were called respectively porta principalis dcxtra and porta principalis sinistra. The camp was im¬ proved in strength and convenience according to the time that it was occupied, and in some cases, from the want of fortresses, it was made the basis of their military operations.

After the invention of gunpowder, en¬ trenched camps, such as that just described, proved of very little service, as they afforded no protection against projectiles shot from long ranges, and it became necessary to keep the mass of the army not actually engaged at such a distance in the rear of the fighting line as to be beyond the reach of the most powerful guns of the enemy. In the European War ranges as high as 18 miles were attained, and in a few instances 20 miles was recorded for a few shots from each new gun. The camp, in the old sense, therefore, has lost its former signifi¬ cance, and has become little more than a depot of temporary lodgment of reserves, the fighting line and its immediate supports being protected underground

in dugouts and bombproof con¬ structions.

With the advent of the fighting aeroplane a new danger has to be met. These machines may rise behind the enemy lines to a height where they are no longer visible, and travel many miles to the rear of an opponent's fighting line and drop high explosives upon a camp which is safe from gunfire. In these conditions the camp must be so disguised by the art of camouflage (q.v.) as to be indistinguishable from the adjacent country when viewed from above by the aviator. The camp defenses then become reduced to two: (1) Against spies; and (2) against aircraft. For the latter, quick-fir¬ ing guns which may be pointed upward at a high angle, are mounted on automobile trucks, and stationed at outlying points surrounding the camp. It has recently become common to form camps in time of peace for the sake of disciplining the soldiers to a camp life, and exercising them in the evolutions and manoeu¬ vres of actual warfare. These are called camps of instruction, of which examples are seen in the United States, where the organizations of the National Guard in the different States are accustomed to annual encampments for these purposes ; also in the camp for British troops at Aldershot, and temporary camps throughout Great Britain for the training of the militia and volunteers, and in the like customs and estab¬ lishments of other countries. Such camps are generally of a permanent type, with substantial buildings and arranged to provide many more of the comforts of life than is usual with camps in the field.

In the United States army the duty of select¬ ing the site and laying out the camp devolves upon the engineer corps. This section' of the work of the engineers is termed technically ˆcastrametation.ˆ The practice followed re¬ quires that the site shall be on slightly sloping ground easily drained, and with a sunny expo¬ sure. The surface should be well covered with short grass, and the subsoil should be sandy or gravelly. For a summer camp a high and breezy spot is selected : for a winter camp a site with a southern exposure, and a windbreak of

woods toward the north. The water supply should be pure, abundant and reasonably ac¬ cessible. Good roads should approach the camp site from several directions. Fuel, forT age, pasture and supplies should be available near by. The streets of the camp are ditched on both sides, and each tent is surrounded with a shallow trench. The streets are swept daily, and no refuse is permitted to lie between the tents. As a protection against epidemics, the camp is moved to a new

site every two or three weeks. The United States soldier car¬ ries as a part of his pack a half of a ˆpup® tent, which buttoned to the half carried by another soldier forms a shelter for the two men. When set up it covers a ground area of six feet in length and four feet in width, and is three feet high at the peak. A regiment of 2,200 men requires an area of close to 30 acres, equivalent to a plot of ground about 1,100 feet square. For the permanent camp of instruc¬ tion there is required also a considerable area for drills, parades and manoeuvres. This need not be directly adjacent, but should be conveniently near. See Army Organiza¬ tion. Consult Moss, J. A., c Manual of Military Training) (Menasha, Wis., 1915) ; and 'Training Officers' Manual* (Menasha, Wis., 1911).

CAMP ALLEGHANY, W. Va., a Con¬ federate camp where an engagement took place 13 Dec. 1861. After the affair at Camp Bar¬ tow, 3 Oct. 1861, the Union troops had re¬ mained at Cheat Mountain Summit. Gen. R. H. Milroy, who was in command 12 Dec. 1861, determined to attack Camp Alleghany, the sum¬ mit of Alleghany Mountain, to which the Con¬ federates had fallen back from Camp Bartow, and which was held by Col. Edward Johnson, with 1,400 men and eight guns, partially en¬ trenched. With 1,800 men Milroy marched to Camp Bartow, 12 December, and made his dis¬ positions. One column of 900 men, under Col. James A. Jones, was to ascend the mountain, until near its summit, when, leaving the road, it was to move to the left and attack Johnson's right and rear, while another column of 900 men, under Col. G. C. Moody, was to move down the Greenbank road and by a circuitous route, concealed by heavy forests, assail John¬ son's left. The attacks were to be simultaneous at 4 a.m. of the 13th. Jones started at mid¬ night, gained his assigned position on time, and waited for Moody, but his presence being dis¬ covered, he was quickly engaged and for a time met with success, driving the Confederates be¬ fore him, but Johnson rallying his troops on that flank and fighting desperately, Jones was repulsed after a two-hours' contest, leaving his dead and many wounded on the field. While Jones was being driven from Johnson's right Moody was slowly approaching his left. He had been delayed by the difficulties of his route, and it was after 8 o'clock when he became en¬ gaged, and was met bv such a severe fire of artillery and musketry that he could make no progress, but continued a desultory skirmish until afternoon, when he fell back, and the whole force, reuniting at Camp Bartow, marched back to Cheat Summit. The action was the most severely contested one of the West Virginia campaign of 1861. The Union loss was 20 killed, 107 wounded and 10 missing; the Confederate loss 20 killed, 98 wounded and

28 missing. Consult (Official Records) (Vol. V).

CAMP BARTOW, or GREENBRIER RIVER, W. Va., a place where an engagement in the Civil War was fought, 3 Oct. 1861. On 2 October the Confederates held Camp Bartow, where the road from Beverly to Staunton crosses the Greenbrier River, with about 2,500 men and eight guns, under command of Gen. H. R. Jackson. Gen. J. J. Reynolds, com¬ manding the Union troops at Cheat Mountain Summit, 12 miles west, concluded to feel Jack¬ son's position and, if possible, force it. He marched at midnight of the second with about 5,000 men and 13 guns, drove in a picket post west of the Greenbrier on the morning of the third, and coming to within 600 or 700 yards of Jackson's entrenched position beyond the stream, opened on it with his artillery, the Con¬ federates promptly replying. Several guns were disabled on either side, and Reynolds then, under cover of a demonstration on Jackson's left, moved with six regiments to turn his right. The regiment to make the demonstration on the left crossed the stream, but was quickly driven back, and when the six regiments were about to cross the stream on Jackson's right they were met by such a severe fire of artillery and musketry that Reynolds deemed further effort inadvisable and withdrew with a loss of 43 killed and wounded. The Confederate loss was 39 killed and wounded. Consult (Official Rec¬ ords5 (Vol. V).

CAMP DISEASES, disorders common to camp life and more or less incidental to the con¬ ditions of active military service, which are often such as to increase the virulence of ordinary diseases. They are generally of epidemic and infectious type, due in large measure to overcrowding and uncleanliness. The formerly dreaded scourge known as camp fever, or typhus, is now easily controlled by keeping, the men free from the body lice which carry the disease from one man to another. Improper food, exposure to wet and to ex¬ tremes of

temperature, hard muscular labor, un¬ hygienic surroundings and immoral or intem¬ perate habits, contribute to the general condi¬ tions in which disease flourishes. Some of the troublesome infectious diseases of military life are: Asiatic cholera, bubonic plague, cerebro¬ spinal meningitis, diarrhoea, dysentery, influenza, malaria, measles, mumps, typhoid fever and tuberculosis. Typhoid fever has been enor¬ mously decreased through inoculation with anti-typhoid serum. Alcoholism and venereal diseases depend on personal habits ; bronchitis, frost-bite, pneumonia, rheumatism, snow-blind¬ ness and sunstroke come from exposure. Scurvy was formerly common, but it is now not often met with, owing to scientific feeding. From forced marches or severe exertion the modern soldier often suffers from heart-trouble, which often permanently incapacitates him for further service. However, the medical corps of modern armies are so efficient that the propor¬ tion of cases of sickness and of deaths resulting therefrom is less than in most well-organized communities at home, owing doubtless to the fact that in the army the orders of the medical staff are compulsory.

CAMP FIRE CLUB OF AMERICA, a

social organization with headquarters in New

York city, incorporated in 1904, devoted, in the interests of higher sport, to the protection of wild animals, birds and fish, and the preserva¬ tion of forests. Formulated by the well-known naturalist, Dr. William T. Hornaday, its code of ethics forbids ((the killing of all female hoofed animals, the sale of wild game for food, declares a good photograph of a large wild ani¬ mal in its haunts entitled to greater credit than the dead trophy of the animal, and counsels the greatest conservatism in the killing of all kinds of game, and strict observance of all legislation calculated to protect and increase the supply of game.® Membership now numbering nearly 500 and including well-known American sportsmen, writers on outdoor life, painters and sculptors of animal and bird life, is limited to <(those who have camped in the wilderness a total of 30 days or more, and who have successfully hunted and killed at least two specimens of big game.® The club has energetically initiated and sup¬ ported legislative action in the interests of its purposes, notably the Hornaday clause in the 1913 tariff law ˆprohibiting the importation in the United States of wild birds' plumage for millinery purposes.®

CAMP FIRE GIRLS, an organization de¬ signed to assist in the

development and dis¬ semination of the home spirit, differing in this respect most strikingly from the organization called <(Girl Scouts® which duplicates Baden Powell's original ((Boy Scouts® of England, and so is primarily military and patriotic. The dis¬ tinction becomes clearer if we recall the founder's words : ((Here is an organization [Camp Fire Girls] that is back of the home. It is helping girls and mothers to discover that there are more interesting and happy things to do and relationships to enjoy in connection with everyday life than are to be found in the com¬ mercially supplied amusements.® Its president is Dr. Luther Halsey Gulick; the organization dates from 1911; the membership in 1916 was given as 73,000.

CAMP HOSPITALS. See Hospitals.

Military.

CAMP-MEETINGS, gatherings for re¬ ligious purposes, held usually in thinly popu¬ lated districts, and continued for several days at a time, with the view of securing prolonged and uninterrupted spiritual exercises. Assem¬ blies of a like kind have been more or less usual at various periods in the history of the Christian Church ; but it was in connection with Method¬ ism in the United States that such meetings became especially prominent. The introduction of the protracted camp-meetings into England in 1799 by Lorenzo Dow led to the separation of the Primitive Methodists from the Wesleyans. See Chautauqua.

CAMP SCHOOLS, summer camps for girls and boys affording opportunities for physi¬ cal training and educational advantages. In some of the camps, regular instruction is given in school subjects, mainly to assist students who have failed of promotion in school or who wish to prepare for entrance examinations. In other camps, there is no formal study of school subjects, but instruction is provided in nature study, camp craft, manual training, photography, music, besides the usual activities in land and water sports. In addition to this, the camps

give valuable training in health habits, discipline and self-reliance. Some of these institutions are conducted by private individuals, and others by philanthropic associations. The beginning dates back to about 1885. Consult Findlay, J. J • > (Fielden Demonstration School Record* (Manchester, Eng. 1907); Robinson, E. M., ‘Summer Camps* (in Association Boys, Vol. I. PP-65-109) ; Sandys, E. W., ‘Camps and Camping* (in Outing, Vol. 30, p. 373) ; Seton, E. T., (The Birch-Bark Roll of the Wood¬ craft Indians* ; Shield, G. O., ‘Camping and Camp Outfits* (Chicago and New York) ; Talbot, W. T., ‘Summer Camping for Boys* (American Physical Education Review, Vol. IV, pp. 30-33).*

CAMPA. See Anti.

CAMPAGNA, kam-pan’ya, Girolamo (called de Vergna), Italian sculptor : b. Verona 1552; d. about 1623. He was a pupil and assist¬ ant of Cataneo, many of whose works he com¬ pleted. His earliest known work is a statue of the Doge Leonardo Lovedan in SS. Giovanni e Paolo, Venice. Among his own works are the bronze group for the high altar of San Giorgio ; a Madonna and child in San Salvatore; the Saint Anthony in San Giacomo de Rialto, con¬ sidered his masterpiece, and the altar in the Santi Giovanni e Paolo (all at Venice). Padua, Verona and Urbino also possess beautiful speci¬ mens of his art. His technical ability was of a high order and his treatment of decorative effects was highly successful. However, he was fettered by the mannerisms of his age.

CAMPAGNA DI ROMA, Italy, a terri¬ tory which comprehends the greater part of Old Latium, from 30 to 40 miles wide and 100 long. By it is usually understood the desert plain which begins near Ronciglione or Viterbo, and including the Pontine Marshes, extends to Ter-racina. In the middle of this region lies Rome, on its seven hills, and on the Tiber. A sandy plain stretches along the Mediterranean. The ground is never more than 200 feet above sea-level and is entirely volcanic. The lakes of the Campagna are evidently craters of extinct volcanoes. Thus the Lake Regillus above Frascati lies at the bottom of an inverted cone of hard, black lava, rising in wild and naked masses from 40 to 60 feet high. The craters containing the lakes of Albano and Nemi have a very regular conical form. The Lake of Albano is also remarkable for its aqueduct, or emissarium, one of the most ancient and ex¬ cellent works of the Romans, which discharges the waters of the lake through the mountains. It answers its original purpose even at the present day. There are, also, many sulphur springs here, particularly between Rome and Tivoli, where the water issues almost boiling from the earth, and forms the Lake of Solfa-tara, which contains floating islands, consisting of a calcareous deposit, that

collects round substances thrown into the water. The vapors which rise from the ground all over the Cam¬ pagna, and especially in the neighborhood of this lake, render the whole district unhealthy. The soil of the Campagna is in general dry, but very fertile in the lower parts. In the middle of the summer, when fevers render a residence in the Campagna very dangerous, all the inhabit¬ ants who can do so take refuge in the neigh¬ boring towns or in Rome itself ; or they may

retire with their cattle to the mountains. Be¬ sides huts, innumerable ruins of temples, cir¬ cuses and monuments are scattered over the Campagna, particularly near the Via Appia ; and long rows of aqueducts, some in ruins, some in a state of preservation, are overgrown with ivy and other plants. In the winter flocks of sheep pasture in these solitudes; during the summer they are driven up the Apennines. Herds of half-wild cattle remain during the whole year in the Campagna. The herdsmen are mounted, and armed with long lances, with which they manage the cattle very skilfully. Scarcely a ninth part of the Campagna is culti¬ vated, the rest is used for pasturage. In the times of the ancient Romans, this dreary soli¬ tude exhibited a smiling picture of abundance and fertility. Yet even in those times the cli¬ mate was far from being a healthy one. Strabo, Livy, Cicero, Horace and others agree in de¬ scribing the districts in the neighborhood of Rome, Ardea and other towns which stood in what is now the Campagna di Roma, as ex¬ tremely unwholesome, especially at certain sea¬ sons of the year; and it was only through the greatest exertions on the part of the ancient cultivators, and the numerous aids to cultivation that stood at their command, that this tract, now so desolate, was then made so productive. Several of the popes, particularly Pius VI, have attempted to lessen the insalubrity of the air by the draining of the Pontine Marshes which form the southern portion of the tract. In recent years the Italian government has taken up the problem, and has accomplished much in the way of reclamation by planting eucalyptus trees, and by drainage and other works, thereby increasing the healthfulness of this historic region.

CAMPAGNOLA, Domenico, Italian painter and engraver: flourished about 1520. He was probably born at Padua, where he was a rival of Titian in painting the frescoes in the Scuola del Carmine and in the Scuola del Santo. He is considered one of the best painters of the Venetian school, and his work as an engraver is less important. Of 14 engravings which are known to belong to him, 10 are dated 1517, and one, ‘The Descent of the Holy Ghost,* bears the date 1518.

riette, French authoress (Genest) : b. Paris, 6 Oct. 1752; d. Mantes, 16 March 1822. She be¬ came reader to the daughters of Louis XV ; gained the favor of the wife of the Dauphin, afterward Queen Marie Antionette, who gave her in marriage to the son of her private secre¬ tary, M. Campan, and appointed her the first lady of the bedchamber. Madame Campan gave her patroness many proofs of fidelity and attachment and wished to follow her into the temple after 10 Aug. 1792, which, how¬ ever, Petion did not allow. After the fall of Robespierre, Madame Campan established a boarding school for the education of young ladies at Saint Germain, which soon acquired a wide reputation. On this account Napoleon appointed her the principal of an institution founded by him for the daughters of the officers of the Legion of Honor, at Ecouen, which she organized and superintended for seven years. After the restoration Louis XVIII abolished the institution, and Madame Campan lost her

situation. Her only son died in 1821, in con¬ sequence of ill treatment inflicted because he was a relation of Marshal Ney. She published (Memoires sur la vie privee de Marie Antoinette> (1823); journal anecdotique) (1824); (Correspondance inedite avec la reine Hortense) (1835) ; <De 1'educationP Consult Flamermont, Jules, (Les memoires de Madame de Campan) (Paris IS&d).

CAMPANA, kam-pa'na, Pedro (in the Netherlands known as Peter de Kempeneer), Flemish painter of Spanish descent : b. Brussels 1503; d. there 1580. In 1530 he went to Italy for study of the Italian masters; he visited Venice under the patronage of Cardinal Grimiani, for whom he painted several pictures. At Bologna he painted some of the decorations of the triumphal arch for the reception of Charles V ; he later lived in Seville, Cordova and other cities of Andalusia, and in 1562 re¬ turned to Brussels where he became chief engineer of the Duke of Alva, and in 1563 be¬ came art director and maker of cartoons for the Brussels tapestry works. In style he com¬ bined to some extent the characteristics of the school of Raphael and the

Flemish painters. His best-known work is in the cathedral at Seville, the (Descent from the Cross. } His (Purification > and (Resurrection) are also in the Seville Cathedral; other paintings of his are in the same city and he also painted the altar-piece of the church of Santa Anna in Triana, a suburb of Seville. The National Gallery, London, contains his (Christ Preaching in the Temple. >

CAMPANARI, Giuseppe, Italian operatic baritone: b. Venice 1859. Both as orchestral ’cellist and concert singer, a member of the Boston Symphony Orchestra 1884-93, he be¬ came known to cultured musical circles, and attained national reputation by his appearance as Tonio in the first American production of ˆPagliacciP He was a member of the Met¬ ropolitan Opera Company 1895-98, later con¬ fining himself to concert work with occasional appearances in opera. His musical career be¬ gan as a ’cellist at La Scala Opera House, Milan, where he also studied singing.

CAMPANELLA, kam-pan-el’la, Tommaso, Italian philosopher : b. Stilo, Calabria, 5 Sept. 1568; d. Paris 1639. He displayed great quickness of parts when quite young, and at the age of 15 entered into the order of the Dominicans. He studied theology and other branches of knowledge with assiduity, but was principally attracted by philosophy. The opin¬ ions of Aristotle, then generally taught in the schools, appeared to him unsatisfactory; and in 1591 he published at Naples a work entitled (Philosophia Sensibus Demonstrata, > intended to show the futility of the prevailing doctrines. He claimed that God alone is pure Being, and that being implies as its essence the power whereby it acts, the knowledge that reveals it to itself, and the love which inclines it to will its good. He held a political theory based on self-love and individual liberty. This book procured him some admirers, and more enemies. He then went to Rome, and afterward to Florence, where he was well received by the Grand Duke Ferdinand. In 1598 he returned to Naples, and revisited shortly after Calabria, where, in the following year, he was arrested

on a charge of conspiracy against the Spanish government, to which Naples was then subject. A scheme was imputed to him of having en¬ gaged the Turks to assist him in making him¬ self master of Calabria. On this improbable and apparently unfounded accusation he was imprisoned, and after being repeatedly tortured, condemned to perpetual confinement. In this situation he wrote many learned works, after¬ ward published. At length, in 1626, Pope Urban VIII procured his removal to Rome, and in 1629 gave him his liberty, and bestowed

on him a pension. Dreading some further per¬ secution from the Spaniards, he withdrew in 1634 to France, where he was honorably re¬ ceived by Louis XIII and Richelieu, and much esteemed by the learned men of that country. He died at the monastery of his order. Campanella was a firm believer in astrology and magic. Among his numerous works may be mentioned (Atheismus Triumphatus) (1631) ; (Monarchia Messiae) (1633) ; ˆrodromus Philosophiae Instaurandae) (1617) ; (De Sensu Rerum et Magia* (1620) ; (De Monarchia Hispanica Discursus) (1640) ; (Realis philosophiae epilogisticae partes quattuor, hoc est de rerum natura, hominum moribus, politica, cui Avitas solis adiuncta est, et CEconomica) (1622). A (Life of Campanellaˆ by Baldacchini, was published at Naples (1840-43).

CAMPANERO. See Bell-bird.

CAMPANI-ALIMENIS, kam-pa'ne a-le- ma'ms, Matteo, Italian mechanician: fl. 17th century. In optics, his greatest achievement was the manufacture of the object-glasses through which Cassini discovered two satellites of Saturn. He wrote (Horologium solo naturae motu) (1678), a work on the construction of clocks.

CAMPANIA, Italy, an ancient province of the Roman republic and empire, and a depart¬ ment of the modern kingdom of Italy, lying along the Tyrrhenian Sea and bounded on the land side by Latium, Samnium and Lucania, which, partly on account of its natural curi¬ osities, including Vesuvius, the Phlegrsean fields, the Lake of Avernus, and partly for its re¬ markable fertility, was a favorite resort of the distinguished Romans, who built there mag¬ nificent country houses. Cumae, Puteoli, Naples, Herculaneum, Pompeii, Baiae, Stabiae, Salernum, Nola, Teanum, Venafrum and Capua, the principal cities of Campania, are names rich in classical associations. The Appian and Latin ways led into the interior of this charming prov¬ ince. The early inhabitants were of the Oscan race, who were displaced by the Greeks ; the latter founding the cities of Cumae and Neapolis. The Etruscans later obtained possession of it, but the Oscan element was still considerable and so remained until the country was entirely Romanized about 90 b.c. Cicero had a villa at Pompeii and under Augustus, Campania and Latium formed the first district of Italy. The vineyards of Mons Massicus and Ager Falernus were famous at an early period, as also the olives of Venafrum. Even now Campania is the most beautiful and fruitful part of Italy, and no traveler can wish for a more delightful country than the fields of Campania, filled in the month of April with barley four feet high, and adorned with lofty poplars, which are connected by luxuriant vines, forming a

canopy over the fields. <(There,)) says Goethe, uit is worth while to till the ground.® The modern department of Campania includes the provinces of Avellina, Benevento, Caserta, Napoli and Salerno, covering an area of 6,227 square miles. Pop. (1 Jan. 1915) 3,426,754.

CAMPANILE, kiim-pane'la, a detached tower containing bells. Campaniles are most common in Italy. Several of them have devi¬ ated considerably from the perpendicular, in consequence of their great height and narrow¬ ness of base. The earliest examples date from the 5th century and are circular in form, the most notable examples being those of the basilicas of Saint Apollinare Nuovo and Saint Appollinare in Classe at Ravenna. After the 8th century the square design prevailed. Brick was always used in Rome, while marble or stone entered into their composition in northern Italy. The campanile of Pisa, called Torre Pendente (or Leaning Tower), is one of the most remark¬ able. Its architects were Bonano of Pisa, and Willhelm of Innsbruck, and it was begun in 1174. The tower consists of eight stories, each of which is surrounded by columns, and it inclines nearly 13 feet from the perpendicular. Another celebrated campanile is that which was begun at Florence in 1334, after the designs of Giotto, and finished by Taddeo Gaddi. Its height ap¬ proaches 300 feet, and it is adorned with 54 bas-reliefs, and 16 statues, representing biblical, pagan and allegorical subjects. Giotto intended to surmount this tower with a spire nearly 100 feet high, but his intention was never carried out. The Torre degli Asinelli and the Torre Garisenda at Bologna are also remarkable specimens of the campanile. The campanile of Saint Mark's Church, Venice, is probably the best known to Americans. Begun as far back as 888 by Pietro Tribuno, it did not assume the form which tourists are familiar with until 1590. For centuries its majestic height domi¬ nated the city. Its pinnacle was about 325 feet from the ground.

In 1417 a marble top was put on the old tower. One hundred years later it was crowned with the figure of an angel nearly 16 feet high. Simple in design, the campanile stood out in sharp contrast with the famous belfry of Flor¬ ence.

The Loggetta at the foot of the campanile was built by the famous Jacopo Sansovino, and was the rendezvous for the nobles of the town. Sansovino adorned it with reliefs and with bronze statues of Minerva, Apollo, Mercury and Peace. The bronze doors of the vestibule have long been regarded as masterpieces that de¬ serve to rank by the side of the work of the great Italian sculptors. Like many another Italian structure, the Loggetta lost much of its old-time significance. From a meeting-place for the nobles it degenerated into a waiting-room for commanders of the guards during the ses¬ sions of the great council. Latterly it was used for auctions and lottery drawings.

The tower was peculiar in that it had no staircase. It was ascended by a winding, in¬ clined plane, having 38 bends and ending in a few steps. The tower was always open ; but visitors were not allowed to enter alone. For that reason a single traveler was compelled to engage a bystander to accompany him.

From time immemorial a watchman was

stationed in the lantern. In the days of the grand maritime Venetian republic it was from the tower that the watchman caught the first glimpse of home-coming war vessels. In mod¬ ern times the watchman no longer scanned the horizon for vessels, but kept a lookout upon the city for fires.

The campanile served other purposes as well. It was also used for the purpose which its name signifies. According to some authorities, four bells were hung in the olden days in the tower, to be sounded for different purposes. La marangola was sounded at dawn to call the laboring classes ; la sestamezzana opened the official bureaus; la trotterar called the councils to duty; and the bell del malefizio tolled out the requiem for those who were put to death. A fifth bell was later brought from Candia and tolled only on Ascension Day. In 1518 there hung halfway up the tower a wooden cage, in which prisoners were kept until they were starved to death. Scientifically, the tower was of interest by reason of the fact that from it Galileo made many observations. On the morn¬ ing of 14 July 1902, the campanile collapsed and fell with a great crash into the square. The church of

Saint Mark and the palace of the Doges were not damaged, but the campanile in falling carried away the Sansovino Loggetta and the library of the Royal Palace. Steps were taken at once to rebuild and the corner¬ stone of the new edifice was laid on 24 April 1903. A strengthened pile foundation was put in place and the campanile reerected in the form it had presented since being remodeled in 1517. A study of the data provided by the ex¬ amination of the remains of the fallen tower showed that the bricks had been used for various purposes at a previous stage, in arches, fortifications, tops of walls, *etc.* The most important fact was that they were not Venetian, but Roman bricks. Moreover, when they were manufactured, they were not manipulated like modern bricks, but formed from slices of clay, as they were found without the natural layers being disturbed. This process resulted in each individual brick being able to support a weight quite four times as great as the modern brick. The bricks examined are of the 1st century. One bore the impression of a horseshoe, prov¬ ing the debated point that horseshoes were then in use. In the Renaissance period a few cam-panili of note were erected; the finest is that of San Giorgio Maggiore by Palladio and Sca-mozzi in Venetia. It is of brick with a marble superstructure and has a spire. Modern ex¬ amples of this kind of construction are the campanile of the Capitol at Rome, the Victoria Tower by Barry at the Houses of Parliament, Westminster, the great tower of the Basilique du Sacre Coeur, Montmartre, Paris, and the memorial tower in the Brown University campus at Providence, R. I.

CAMPANINI, kam-pa-ne'ne, Italo, Italian singer: b. Parma, 29 June 1846; d. Vigatto, 23 Nov. 1896. His father was a blacksmith. At 14 the boy enlisted in Garibaldi's army and served in two campaigns, after which he worked at his father's trade until the age of 18. Mean¬ while, having shown that he possessed an ex¬ cellent voice, he had taken singing lessons, and after spending a year at the Conservatory in Parma, he appeared in that city as the notary

in (La Sonnambula,* but suffered failure and ridicule. He still

continued to sing in public, and in 1869 began to study under Lamperti, a celebrated teacher of Milan. In that city, at La Scala, he sang in (Faust, } and immediately was acclaimed a great tenor. He appeared in Lon¬ don in 1872, and in the following year made his first visit to the United States, appearing with Nilsson at the Academy of Music, New York, in (Lucrezia Borgia. } Afterward, in this coun¬ try and Europe, he sang with great success, and was regarded as the foremost tenor of his time. The partial failure of his voice, mainly through an affection of the throat, caused some interrup¬ tion of his career but scarcely diminished his popularity until near the close of his life.

CAMPANULA, BELL FLOWER, or BELLWORT, a genus of annual, biennial and perennial herbs of the family Campanu'acecF. The species, of which there are about 300, are almost all natives of the cooler parts of the northern temperate zone, and among them are some of the most widely grown garden plants, which are popular on account of their bell-shaped blue, violet or white flowers, and the ease with which they are cultivated. C. rapunculns, native of Europe, Asia and northern Africa, is known as rampion ; the leaves and the radish-like roots are used for salads. C. medium , a European species, is the common Canterbury bells. C. rotundifolia, which occurs in Europe, Asia and North Amer¬ ica, is the harebell or blue bells of Scotland, so frequently mentioned in literature. Several species are natives of North America.

CAMPANULACEiE, a family of herba¬ ceous and shrubby plants, generally abounding in a bitter, white juice. Their leaves are alter¬ nate and entire or toothed, rarely opposite. Their flowers usually form spikes, thyrsi or heads. They have a monosepalous calyx, with four, five or eight persistent divisions, and a regular, monopetalous, usually bell-shaped co¬ rolla, having its limb divided into as many lobes as there are divisions of the calyx. The stamens are five, the anthers free, or brought together in the form of a tube. The ovary is inferior or semi-inferior, with two or more cells, each containing numerous seeds. The style is simple, terminated by a lobed stigma, sometimes surrounded by hairs. The fruit is a capsule crowned by the limb of the calyx, with two or more cells opening either by means of holes which are formed near the upper part, or by incomplete valves. The seeds are very small and very numerous. These plants are chiefly natives of the temperate and colder climates of the northern hemisphere.

CAMPANULARIANS, or SERTULA-RIANS, hydroids of the order Calyptoblastea, formerly called Campanularise. They are al¬ ways colonial and possess hydrothecae, and in most cases give rise to a

medusa, with auditory organs on the flaps. The ectoderm is protected by a horny or chitinous sheath (perisarc) en¬ veloping the zooids. The hydroids retract, when disturbed, into small cups (hydrothecae), arranged in opposite rows on the stalk as in Sertularia, or singly at the ends of the stalks, as in Campanularia, while the sheaths (gonothecae) protecting the medusa-buds are distin¬ guished by their much larger size and cup¬ shaped form. The Sertularians abound on sea¬

weeds, and may be recognized from their resem¬ blance to mosses. The medusae of these and many other hydroids can be collected by a tow-ing-net, and emptied into a jar, where they can be detected by the naked eye after a little prac¬ tice. It is possible that the extinct palaeozoic group, Graptolites, belong near the Campanu-larians, as they have a similar perisarc com¬ posed of cells (hydrothecae). Consult Agas¬ siz, A., (North American Acalephae) (Illus¬ trated Catalogue of the Museum of Compara¬ tive Zoology at Harvard College, No. 2, Cam¬ bridge 1865) ; Agassiz, E. C. and A., (Seaside Studies in Natural History* (Boston 1871) ; Nutting, (American Hydroids* ((Special Bul¬ letin of the U. S. National Museum) : Wash¬ ington 1900), contains a full bibliography.

CAMPARDON, kan-par-don, Emile, French writer : b. Paris 1834. He was educated at the Ecole des Chartes, and then had charge of the archives there. In this position he had opportunity to examine the documents relating to the 18th century and the period of the French Revolution. He has written among other his¬ torical works (History of the Revolutionary Tribunal of Paris) (1861) ; (Marie Antoinette at the Conciergerie) (1862) ; (Madame Pompa¬ dour and the Court of Louis XV) (1867); Unpublished Documents of J. B. Poquelin Moliere* ; (Voltaire, Unpublished Documents* ; (The Royal Academy of Music in the 18th Century) ; and (Memoirs of Frederic III, King of Prussia) (with E. Boutaric).

CAMPBELL, Alexander, known as the founder of the Disciples of Christ or (<Camp-bellites** : b. Ballymeda, Antrim County, Ire¬ land, 12 Sept. 1788 ; d. Bethany, Va., 4 March 1866. His mother's ancestors were French Huguenots. His father, Thomas Campbell, a clergyman and teacher in the Church of the Covenanters and Seceders, in April 1807 sailed from Londonderry to Philadelphia and located at Washington, Pa. (one year after the estab¬ lishment of Washington College). Young Alexander embarked with the remainder of the family in October 1808, but was delayed by shipwreck on the coast of Scotland which gave him an opportunity to attend Glasgow Univer¬

sity for a year. In August 1809 he again em¬ barked with the family and after arriving at New York went directly via Philadelphia and over the mountains to Washington, Pa., where, under the direction of his father, he prepared for the ministry.

In March 1811, at West Liberty, Va., he married Miss Margaret Brown of Buffalo Creek, Brooke County, Va., and thereafter re¬ sided at the home of his father-in-law, from whom he later (1814) received a deed for the home property. Immediately following his marriage he took steps to become naturalized. In the same year he was licensed to preach, and began near home a series of preaching tours. In 1812, after following his father in a movement to reunite different religious denomi¬ nations, he took the lead in organizing the Disciples of Christ (q.v.), based on the doc¬ trine that the Bible should be the only creed. Through his preaching tours, which in later years were gradually extended throughout the South and Middle West and eastward to Mas¬ sachusetts Bay, he became widely known. He also won a wide reputation through his pub-CAMPBELL

lie debates with prominent Presbyterian min¬ isters in 1820-23, and later through more fa¬ mous debates with Robert Owen in 1829 and Archbishop Purcell in 1837. In 1818-19 he es¬ tablished Buffalo Seminary and sent for his father to assist in the work of instruction ; and in 1823 he established the Christian Baptist, which in 1829 became the Millennial Har¬ binger and continued under his editorship until 1865. In 1827, finding it inconvenient to mail his letters and publications at West Liberty, he succeeded in establishing at his residence at Buffalo a post-office under the name of Bethany, which also became the name of the town later laid out by him (1847). He thus obtained the franking privilege which enabled him greatly to extend his correspondence. In 1829-30 he represented Brooke County in the Virginia Con¬ stitutional Convention. In the debates he took an active part in urging a system of free popu¬ lar education and a more equitable representa¬ tion of the western counties in the legislature. In 1840 beginning with an endowment from his own means, he founded Bethany College, which was opened in 1841, and he remained president of the institution until his death. In 1847 he visited England, France, Scotland and Ireland. In 1850 by invitation, in connection with one of his eastern trips, he made an address in the

House of Representatives at Washington.

Campbell was a prolific writer and continued to write and preach until 1865. He published many religious volumes, including hymnbooks and a translation of the New Testament. In 1861 he published the (Memoirs of Thomas Campbell, > his father and associate, who died at Bethany on 4 Jan. 1854.

CAMPBELL, Alexander, American poli¬ tician: b. Concord, Pa., 4 Oct. 1814; d. La Salle, Ill., 9 Aug. 1898. He received a common-school education and entered the iron business, re¬ moving to Illinois and attaining prominence in local politics. He was mayor of La Salle, Ill., in 1852, a member of the Illinois legislature in 1858 and a member of Congress in 1875. He was widely known as the ((father of the Green¬ back party.®

CAMPBELL, Sir Alexander, Canadian statesman: b. Yorkshire, England, 9 March 1822; d. Toronto, 24 May 1892. He began the practice of law in 1843 as a partner of Sir John A. Macdonald. In 1858 he entered the legis¬ lative council, and in 1863 was elected speaker. In 1864-67 he was commissioner of Crown lands. He was a delegate to the Confederation conferences in 1864, received a nomination to the Dominion Senate (1867), where he was the government leader, and was Postmaster-Gen¬ eral in the first Federal Cabinet. In 1873 he became Minister of the Interior. With the other Cabinet officers, he resigned in the same year on account of the Pacific Railroad scandal. On the return of Macdonald to power, he was successively Receiver-General of Militia and Defense and Postmaster-General. From 1881—85 he was Minister of Justice, and from 1887-92 lieutenant-governor of Ontario. He represented Canada at the Colonial Conference held in London in 1887. He was created K.C. M.G. in 1879.

CAMPBELL, Archibald. See Argyle,

Campbells of.

CAMPBELL, Bartley, American drama¬ tist: b. Allegheny City, Pa., 12 Aug. 1843; d. Middletown, N. Y., 30 July 1888. He engaged in journalism early in his career and estab¬ lished the Evening Mail in Pittsburgh (1868) and the Southern Magazine in New Orleans (1869). His first drama that met with success in New York was (My Partner,* appearing in 1879. < Fairfax, or Life in the Sunny South, *

and (The Galley Slaved were on the metropoli¬ tan boards during the

same season. Included in his plays are (Matrimony * ; (The White Slave* ; (Siberia* ; and (Paquita.* Several of his plays were brought out in England. He was manager of the Fourteenth Street Theatre, New York, for some time. He became insane in 1886 and died in an asylum.

CAMPBELL, Beatrice Stella Tanner (Mrs Patrick Campbell), English actress: b. Lon¬ don 1867 ; married in 1884 to Patrick Campbell, who was killed in 1900 in the Boer War. Her first appearance on the professional stage was made in 1888 at the Alexandra Theatre in Liv¬ erpool. She has been particularly successful in such plays as (The Second Mrs. Tanqueray,*

(John-a-Dreams) and (The Notorious Mrs. Ebbsmith.* She has also appeared in such Shakespearean roles as Juliet, Ophelia and Lady Macbeth in conjunction with Sir Johnston Forbes-Robertson ; and has played Melisande to the Pelleas of Sarah Bernhardt. She has frequently visited the United States, playing in most of the leading cities. She married in 1914 George Cornwallis-West.

CAMPBELL, Sir Colin, English soldier and administrator: b. 1776; d. 1847. He was first a midshipman ; then entered the army, fought with Wellesley in India, 1801-04, and was present at the battle of Assaye. He served also in Denmark and the Peninsula, and was on Wellington's staff at the battle of Waterloo. He was lieutenant-governor of Nova Scotia, 1834-40, and of Ceylon, 1839-47.

CAMPBELL, Sir Colin (Lord Clyde), British general: b. Glasgow, 20 Oct. 1792; d. 14 Aug. 1863. His father was a carpenter, named Macliver. He was educated at the ex¬ pense of his mother's brother, Col. John Campbell, and owing to an error of the Duke of York's when the youth was introduced to him as a candidate for a commission, assumed the name of Campbell. Entering the army in 1808, and serving in the Peninsular War (181 0— 13), he was severely wounded at the siege of San Sebastian and the passage of the Bidassoa. He served in Nova Scotia in 1814, and then passed nearly -30 years in garrison duty at Gibraltar, Barbadoes, Demerara and various places in England, in 1837 becoming lieutenant-colonel of the 98th Foot. He served in India previous to the Crimean War, on the outbreak of which, in 1854, he was. appointed to the command of the Highland brigade. The victory of the Alma was mainly his ; and his, too, the splendid repulse of the Russians by the ((thin red line® in the battle of Balaklava. When, on 11 July 1857, the news reached England of the Sepoy mutiny, Lord Palmerston offered him the command of the forces in India. He effected the relief of Lucknow on 19 March 1858,

and succeeded in quelling the mutiny. He was created Baron Clyde in July of the same year.

CAMPBELL, Colin, Scottish clergyman and Egyptologist : b. Campbelltown, Argylshire, 1848. He was educated at the universities of Edinburgh and Heidelberg, entered the ministry of the Established Kirk of Scotland, and has been minister of the parish of Dundee from 1882. He preached nearly every year from 1883 to 1900 before Queen Victoria at Balmoral Castle and Crathie Parish Church, and has published 'The First Three Gospels in Greek) ; (Critical Studies in Saint Luke's Gospel* (1891); (Two Theban Queens) (1909); 'Two Theban Princes) (1910) ; 'The Miraculous Birth of King Amon-hotep III and Other Egyptian Studies) (1912).

CAMPBELL, Douglas Houghton, Ameri¬ can educator : b. Detroit, Mich., 16 Dec. 1859. He was graduated at the University of Michi¬ gan in 1882 (Ph.D. in 1886), and then studied in Europe for four years. Returning he was professor of botany in the University of In¬ diana till 1891, when he was called to the similar chair in Stanford University. He is author of (Elements of Structural and Sys¬ tematic Botany* (1890) ; Structure and De¬ velopment of Mosses and Ferns > (1895) ; lec¬ tures on the Evolution of Plants) (1899) ; 'A University Textbook of Botany* (1902) ; (Plant Life and Evolution* (1911).

CAMPBELL, Edward de Mille, Ameri¬ can industrial chemist : b. Detroit, Mich., 9 Sept. 1863. He studied at the University of Michigan, and after serving as chemist to the Ohio Iron Company in 1886, to the Sharon Iron Company, Pennsylvania, in 1887, to the Dayton Coal and Iron Company, Tennessee, in 1888, from assistant professor in 1890 he ad¬ vanced to the position of director of the chemical laboratory at his alma mater, the Uni¬ versity of Michigan, in 1905.

CAMPBELL, George, Scottish clergyman : b. Aberdeen, 25 Dec. 1719; d. 6 April 1796. He was educated at Marischal College, and after¬ ward articled to a writer of the signet at Edin¬ burgh. In 1741 he relinquished the law and studied divinity at Aberdeen. He was

ordained in 1748, became pastor of a church in Aber¬ deen 1757, where he was a fellow member of Thomas Reid in a philosophical society, and in 1759 was appointed principal of Marischal College. In 1763 he published his celebrated dissertation on Miracles,* in answer to Hume's essay. In 1771 he was chosen professor of divinity, and in 1776 gave to the world his (Philosophy of Rhetoric,* which established his reputation as a grammarian and critic. His 'New Translation of the Gospels* appeared in 1778. Consult the biography by Keith prefixed to Campbell's 'Lectures on Ecclesiastical His¬ tory* (London 1800).

CAMPBELL, Sir George, English ad¬ ministrator and author: b. 1824; d. London, 18 Feb. 1892. He was educated at Haileybury for the East Indian service and held several important posts under the Indian government. He represented the Kirkcaldy burghs in the House of Commons in the Liberal interest from 1875 until his death. The success that had attended him as an administrator in India did not follow him as a politician. He published (India as It May Be) ; (The Ethnology of India) (1865) ; 'Handy Book of the Eastern Question* (1876) ; (Black and White in the

United States*; 'The British Empire* (1887); (Memoirs of My Indian Career * (1893).

CAMPBELL, Harry, English physician : b. Margaretting, Essex, England. He studied medicine at Saint Bartholomew's Hospital Col¬ lege and was appointed to the staff of North¬ west London Hospital, 1886, and that of Wel-beck Street Hospital, 1896. He has published (The Physiology of Eyesight* (1885); (The Causation of Disease* (1889) ; 'Flushing and Morbid Blushing* (1890) ; differences in the Nervous Organization of Man and Woman* (1891) ; 'Headache and Other Morbid Cephalic Sensations* (1894) ; 'Respiratory Exercises in the Treatment of Disease* (1898) ; 'On Treat¬ ment* (1907).

CAMPBELL, Helen Stuart, American author: b. Lockport, N. Y., 4 July 1839. She was educated at Mrs. Cook's Seminary, Bloom¬ field, N. J., 1850-58, and very early began con¬ tributing to periodicals. From 1881 to 1884 she edited Our Continent (Philadelphia). Her especial interest has been in social and domestic questions, such as the condition of the poor, household management, etc., and her writings for the most part consist of essays and stories illustrating these topics. Chief among them arc 'The Ainslee Series* (1864-67) ; (Six Sinners* (1878); 'Unto the Third and Fourth Genera¬ tion* (1880) ; (Under

Green Apple Boughs* (1881) ; (The Easiest Way in Housekeeping and Cooking* (1881) ; 'The Problem of the Poor* (1882); 'Mrs. Herndon's Income: a Novel* (1885) ; 'Prisoners of Poverty* (1887) ; Pris¬ oners of Poverty Abroad* (1889) ; 'Roger Berkeley's Probation* (1891); (Anne Bradstreet and Her Time* (1892) ; 'Women Wage-Earners *(1893); (In Foreign Kitchens* (1894); 'Some Passages in the Practice of Dr. Martha Scarborough* (1893); 'Ballantyne: a Novel*

(1901).

CAMPBELL, Henry Donald, American scientist: b. Lexington, Va., 29 July 1862. He was graduated at Washington and Lee Uni¬ versity in 1882; later studied at Berlin and Heidelberg, and in 1887 became professor of geology and biology at Washington and Lee University. He was made dean in 1906 and was acting president of the university January to July 1912.

CAMPBELL, James Edwin, American politician: b. Middletown, Ohio, 7 July 1843. After an academic education he was admitted to the bar. During the Civil War he served for a time in the navy and was with the Mis¬ sissippi and Red River flotillas. He was a Democratic member of Congress, 1883-89; gov¬ ernor of Ohio, 1890-92. He was defeated for re-election by William McKinley, afterward President of the United States. In 1895 he was again a candidate, but was defeated by A. S. Bushnell.

CAMPBELL, James Mann, Scottish-American clergyman: b. Scotland, 5 May 1840. He received his education at the universities of Edinburgh and Glasgow, and in 1874 came to the United States. He has lectured much on religious themes and has published 'Unto the Uttermost* (1889) ; 'The Indwelling Christ* (1895) ; 'After Pentecost, What?* (1897) ; 'The Teachings of the Books* (1899) ; 'Clerical Types* (1900); 'Bible Questions*

(1900) ; <Paul the Mystic> (1907) ; <The Heart of the Gospel* (1907) ; (Grow Old Along With Me* (1911); (The Presence* (1911); (Thc Place of Prayer in the Christian Religion*

(1914).

CAMPBELL, James Valentine, Ameri¬ can jurist: b. Buffalo, N. Y., 25 Feb. 1823; d. Detroit, Mich., 26 March 1890. His family moved to Detroit in 1826. He was graduated at Saint Paul s College, L. I., in 1841 ; was admitted to the Michigan bar, 1844; practised with success until 1857. He was then elected a judge of the Supreme Court of Michigan, reelected at every succeeding election, and was chosen chief justice for nine terms in succes¬ sion. brom 1859 he lectured for 20 years in the law department of the University of Michi¬ gan. Much of his leisure was devoted to literary and historical studies, especially the history of Michigan and the Northwest Terri¬ tory. Until 1854 he was a Whig, but thereafter acted chiefly with the Republicans. He wrote (Outlines of the Political History of Michigan)

(1876).

CAMPBELL, John, American editor: b. Scotland 1653; d. March 1728. He was one of a family or kin of Boston booksellers and public officials whose relationships are not de¬ terminable. John, as postmaster, was the news centre of the New England provinces; and in 1703 was writing ((news letters** of European news to Governor Winthrop of Connecticut, and perhaps to other governors, made up of information received from arriving travelers, etc., with inferences as to New England policy. In 1704 he concluded to make these public and for sale; and on 24 April issued the first news¬ paper in America, the Boston News Letter (q.v.), which he edited till 1722. In 1719 he was deprived of the postmastership. He was justice of the peace for Suffolk County for some years.

CAMPBELL, John. See Argyle, Camp¬ bells of.

CAMPBELL, John, British historian: b. Edinburgh, 8 March 1708; d. 28 Dec. 1775. His writings before 1742 were published anony¬ mously. From 1755 to the close of his life he was agent of the British government for the province of Georgia. Among his works are (A Concise History of Spanish America* (1741) ; (Lives of the English Admirals*

(1744); (A Survey of the Present State of Europe* (1750) ; and (Trade of Great Britain to America* (1772). He also wrote many of the biographies in the (Biographia Britannica,* and Samuel Johnson makes many allusions to his erudition and popularity.

CAMPBELL, John (Baron), Lord High Chancellor of England : b. Springfield, near Cupar, county of Fife, Scotland, 15 Sept. 1779; d. 22 June 1861. He was educated at the gram¬ mar school of Cupar, and at 12 entered the University of Saint Andrews (1791) for the purpose of studying for the Church. After remaining, however, for some years at college, he resolved to abandon the clerical profession, and determined to try his fortune in London. In 1798 he quitted his native country for the metropolis, where he became reporter and theatrical critic on the Morning Chronicle. In November 1800 he entered as a student of Lincoln's Inn, and in 1806 was called-to the

bar. He traveled the Oxford circuit, and ob¬ tained considerable practice. In 1830 he was elected member of Parliament for Stafford, and in 1832 was appointed solicitor-general In 1834, on the retirement of Sir William Horne, he became Attorney-General, and the same year was elected one of the members of Parliament for the city of Edinburgh, serving till 1841, when he was created chancellor of Ireland, and raised to the peerage as Baron Campbell of Saint Andrews. He had scarcely, however, assumed his official duties in Ireland, when he quitted office with the Melbourne min¬ istry ; and having now more leisure worked on his (Lives of the Chancellors,* the first series of which was published early in 1846. On the accession of Lord John Russell to power in that year Lord Campbell accepted the chancel¬ lorship of the duchy of Lancaster, but still continued his literary labors, completing, in seven volumes, his (Lives of the Chancellors,* and adding two other supplemental volumes, entitled (Lives of the Chief Justices of Eng¬ land.* In 1850, on the retirement of Lord Denman, he was appointed chief justice ; in 1859, on Lord Palmerston's resumption of the Premiership, Lord Campbell reached the high¬ est legal dignity in the British empire, becoming Lord High Chancellor. Consult (Life of Lord Campbell,* by his daughter, the Hon. Mrs. Hardcastle.

CAMPBELL, John Archibald, American lawyer: b. Washington, Ga., 24 June 1811; d. Baltimore, 12 March 1889. He was graduated from the Georgia University in 1826 and was admitted to the bar in 1829 before coming of age, by virtue of a special act of the legisla¬ ture. Removing to Alabama he soon became prominent in his profession,

and in 1853 was appointed associate justice of the Supreme Court of the United States, resigning in 1861. He was subsequently appointed Confederate Secretary of War, and was one of the com¬ missioners named by President Davis to me£t President Lincoln and Secretary Seward at the conference in Fortress Monroe in February 1865. He was imprisoned for some months after the close of the Civil War and on his release resumed his legal practice.

CAMPBELL, John Douglas Sutherland.

See Argyle, Campbells of.

CAMPBELL, John Lyle, American chem¬ ist : b. Rockbridge County, Va., 7 Dec. 1818; d. Lexington, Va., 2 Feb. 1886. He was graduated at Washington College (now Washington and Lee University) in 1843. On leaving college he became assistant in the academy at Staunton, Va., and afterward had charge of a similar in¬ stitution in Richmond, Ky. In 1851 he was called to the chair of chemistry and geology at Washington College, an office which he con¬ tinued to occupy until his death. He was a rec¬ ognized authority on the geology of Virginia, and wrote reports on that subject as well as frequent contributions to the scientific journals. Among his larger works are (Geology and Mineral Resources of the James River Valley* (1882), and (Campbell's Agriculture: a Manual of Scientific Agriculture for the School and Farm* (Philadelphia 1859).

CAMPBELL, Lewis, British classical scholar: b. Edinburgh, 3 Sept. 1830; d. Lago Maggiore, 25-Oct. 1908. He received his early

education at Edinburgh Academy, and after¬ ward attended the University of Glasgow and Trinity and Balliol colleges, Oxford. Ordained in 1857, he became vicar of Milford, Hants, in the following year, a post which he held till his appointment, in 1863, as professor of Greek in Saint Andrew's University, a position he held until 1892. The 1894-95 series of Gifford Lec¬ tures at Saint Andrews was delivered by him. As a writer he is known mainly by his editions and

translations of ancient Greek authors, the chief of which are Plato's <Theaetetus) (1861) ; Plato's (Sophistes and Politicus) (1867) ; (Sophocles — The Plays and Fragments' (1879) ; (Sophocles in English Verse' (1873— 83) ; (Aeschylus in English Verse' (1890) ; and Plato's (Republic' (with Benjamin Jowett 1894) ; (Tragic Drama in 2Eschylus, Sophocles and Shakespeare' (1904) ; (Paralipomena Sophoclea' (1907). (The Christian Ideal,' published in 1877, is a volume of sermons; and his other works include a (Guide to Greek Tragedy' (1891) ; <Life of James Clerk Max¬ well' (with W. Garnett 1882) ; (Life of Benja¬ min Jowett' (with E. Abbott 1897) ; 'Religion in Greek Literature' (1898), the substance of his Gifford Lectures.

CAMPBELL, Mrs. Patrick. See Camp¬

bell, Beatrice.

CAMPBELL, Reginald John, English

Congregational clergyman : b. London, 1867. After receiving a collegiate training at Univer¬ sity College, Nottingham, and Christ Church College, Oxford, he entered the Congregational ministry in 1895. He first held the pastorate of the Union Church, Brighton, where he quickly acquired celebrity as a preacher. He succeeded Dr. Parker at the City Temple, London, in 1903, continuing there until his resignation in 1915. For a time his attitude to the fundamental doc¬ trines of Christianity occasioned alarm among orthodox Congregationalists, his (New Theol¬ ogy ' (1907), which set ethics above dogma, be¬ ing especially the centre of attack. By 1915 he had swung in the other direction, for in October of that-year he announced his intention of seek¬ ing orders in the Anglican Church, and was or¬ dained to the diaconate at Birmingham, 24 Feb. 1916. He has published (The Making of an Apostle'; (The Restored Innocence' (1898); (A Faith for To-day' (1900) ; Christianity and the Social Order' (1908) ; (Thursday Morn¬ ings at the City Temple' (1908).

CAMPBELL, Robert, British fur trader

and explorer: b. Glenlyon, Scotland, 1808; d. 1894. He entered the service of the Hudson's Bay Company in 1832; and in 1838 began a series of explorations in the Northwest, in the course of which he discovered Frances Lake, the Pelly and Lewes rivers and the upper Yukon, which he traversed under the impres¬ sion that it was the Colville, but the identity of which he subsequently established.

CAMPBELL, Thomas, British poet : b. Glasgow, 27 July 1777; d.

Boulogne, France, 15 June 1844. He was educated at the University of Glasgow, where he distinguished himself by the excellence of his poetical translations from the Greek. After leaving the university he re¬ sided for a short time in Edinburgh; and sprang suddenly into fame by publishing, in 1799, 'The Pleasures of Hope.' It produced an

extraordinary sensation, and soon became a familiar book throughout the kingdom. This was due not more to the graces of its style than to the noble purity of its thoughts. After the publication of 'The Pleasures of Hope' he went to Germany, wThere he met Klopstock at Hamburg, and visited the scene of the battle celebrated in 'Hohenlinden,' one of the most famous of his poems. The appearance of the English fleet caused him to leave Altona, wThere he had resided for some time. During this tour several of his best lyrics were written or suggested, among them (The Exile of Erin,' 'Ye Mariners of England' and (The Battle of the Baltic.' In 1803 a new edition of (The Pleasures of Hope,' with other poems, ap¬ peared, and in that year he married. Settling in London, he devoted himself to literary work, and in 1805 obtained a pension of £200, through the influence of Fox, of whose politics he was an admirer. After this he appears for a time to have given his attention less to poetry than prose, but in 1809 he again made his appearance as a poet, and published (Gertrude of Wyo¬ ming,' which some eminent critics have con¬ sidered superior to 'The Pleasures of Hope.' In 1814 he visited Paris, and in the following year he received a legacy of over £4,000. In 1819, by his Specimens of the British Poets,' accompanied with critical essays, he proved him¬ self the possessor of great critical acumen and an admirable prose style. In 1820 he became editor of the New Monthly Magazine, a posi¬ tion which he held till 1830. As an editor he was a signal failure. . In 1824 he published (Theodoric,' which, though not devoid of fine passages, scarcely sustained his reputation. For manyyears he took an active interest in the emancipation of Greece and Poland, and in the foundation of the London University, of which he considered himself the originator. He was lord rector of the University of Glasgow from 1826 to 1829. In 1828 his wife died, and thence¬ forth his vigor, both bodily and mental, began to decline; and though he afterward published 'Letters from the South' (1837), describing a visit which he had paid to Algiers, a (Life of Mrs. Siddons' (1834-42), and a 'Life of Petrarch,' and either wrote or edited the 'Life and Times of Frederick the Great,' he failed to equal his more youthful efforts. In 1831-32 he was editor of the Metropolitan Magazine, and in 1832 he founded the Polish Association. Among his works not mentioned above are (The Advent,' a hymn; (Love and Madness'; 'Lord Ullin's Daughter' ; 'The

Wounded Hus¬ sar' ; (Gilderoy' ; 'The Soldier's Dream' ; ' Judith' ; 'The Name Unknown' ; (The Turk¬ ish Lady-* ; 'Lochiel's Warning' ; The Rain¬ bow' ; 'The Last Man' ; 'Navarino' ; (Pilgrim of Glencoe'; 'Moonlight,' *etc.* See Beattie, CLI f eˆ and Letters of Thomas Campbell' ; and Redding, 'Literary Reminiscences of Camp¬ bell.'

CAMPBELL, Thomas W., American clergyman : b. Three Rivers, Quebec, Canada, 24 Sept. 1851 ; d. 26 March 1918. Graduated at Victoria University in 1879, he became a Metho¬ dist minister. Joining the Reformed Episcopal Church, he. was elected a bishop in 1891, and presiding bishop in 1894. In 1895 he moved to Brooklyn, N. Y., to become pastor of the Re¬ formed Episcopal church of the Reconciliation,

and resigned to enter the Presbyterian Church in 1898. In October 1899 he became pastor of the Noble Street Church, Brooklyn, N. Y. ; re¬ signed October 1905; organized Stony Brook Association and Assembly ; secretary and man¬ ager till May 1915.

CAMPBELL, William, American soldier: b. Augusta County, Va., 1745; d. Rocky Mills, Va., 22 Aug. 1781. He was of Scottish de¬ scent. Commissioned a captain in the first reg¬ ular troops raised in Virginia in 1775, and later becoming a colonel of militia, he distinguished himself greatly in the battles of King's Moun¬ tain and Guilford CourtHouse. His military career was short but brilliant, and on all occa¬ sions marked by conspicuous bravery. Lafay¬ ette gave him the command of a brigade of riflemen and light infantry. Washington, Gates and Greene, the Virginia legislature and the Continental Congress expressed their high sense of his merits and services. He was taken fatally ill a few weeks before the siege of Yorktown. He married a sister of Patrick Henry. Consult Warfield, E. D., (in the Maga¬ zine of Western History, January, 1887).

CAMPBELL, William (Lord), English royal governor of South Carolina: b. (?) ; d. 5 Sept. 1778. He was the youngest son of John, 4th Duke of Argyle. He received a captaincy in the British navy, 20 Aug. 1762; was

a mem¬ ber of Parliament in 1764, and governor of Nova Scotia, 1766-73. In 1774 he was appointed governor of South Carolina, entered upon his duties in June 1775, was courteously received by the people, for whom he professed great friend¬ ship. The hollowness of his promises was soon proved, however, and finding his residence in Charleston unsafe, he fled on board a British man-of-war, where he was soon joined by his wife, who was a Miss Sarah Izard, sister of the patriot, Ralph Izard, who belonged to the wealthiest family in the province. In 1776 Campbell served as a volunteer on board Sir Peter Parker's flagship, Bristol, in the attack on Fort Sullivan, 28 June, and was severely wounded early in the action, while in command of the lower deck. He ultimately died from the effects of the wounds received at this time. Consult McCrady, <The History of South Car¬ olina in the Revolution (Vol. I, 1901).

CAMPBELL, William B., American soldier and statesman : b. Sumner County, Tenn., 1 Feb. 1807 ; d. near Lebanon, Tenn., 31 Aug. 1867. He was educated in Abingdon, Va., and studied law at Winchester, Va., in the then noted law school of the Hon. St. George Tucker. He began the practice of his profes¬ sion in 1829 at Carthage, Tenn., was elected attorney-general of his district in 1830, a mem¬ ber of the legislature in 1835. He resigned and raised a company of dragoons to serve in the war with the Indians in Florida in 1836. In this year also he formed a volunteer company, of which he was made captain, and fought in the Creek and Seminole War as part of the. 2d Tennessee Volunteers under Col. William Trousdales. In 1837 Captain Campbell was elected to the United States Congress ˆand served four terms successively. In 1844-45. he served as major-general of his military division. He was colonel of the 1st Tennessee Regiment in the Mexican War. He was present at Mata-moras (Palo Alto), Monterey, where he was

conspicuous for his gallantry. He was at Vera Cruz on 22 March 1847 and at Cerro Gordo, 18 April 1847. In all he displayed unflinching courage and great capacity as commander. On his return to Tennessee Colonel Campbell was elected unanimously circuit judge in his native place. He held the post for several years, fill¬ ing it with dignity and wisdom. In 1851 he was elected governor of Tennessee, serving one term and declining re-election. He wds a member of Congress in 1865-66. In his public life he escaped to a marked degree the cen¬ sures and criticism incident to public station, as a result of his integrity and untiring devotion to duty.

CAMPBELL, William Wallace, Ameri¬ can astronomer : b. Hancock County, Ohio, 1 1 April 1862. After graduation from the Uni¬ versity of Michigan he was professor of mathe¬ matics at the University of Colorado in 1886-88, and instructor in astronomy and assistant in Detroit Observatory, University of Michigan, in 1888-91, making a specialty of comet observa¬ tions and orbit computation. He became as¬ tronomer in 1891, and director in 1901 of the Lick Observatory, and also had charge of eclipse expeditions to India, Spain and Flint Island. He received several medals in recogni¬ tion of his work, including the Janssen prize of the Paris Academy of Sciences in 1910 and the Bruce gold medal in 1915. Besides many papers on the motion of solar eclipses, stars, comet orbits and on the spectra of nebulae, comets and stars, he has published (The Elements of Practical Astronomy) (1900); (The Return of Halley's Comet) (1909) and (Stellar Motions)

(1912).

CAMPBELL, William Wilfred, Canadian, poet: b. Berlin, Ontario, Canada, 1 June 1861. He was educated at Toronto University and the Episcopal Theological School, Cambridge,, Mass., and was for some years in the Episcopal ministry in Canada, retiring from it in 1891 in order to devote himself entirely to literary pur¬ suits. He has published (Lake Lyrics) (1889) ; 'The Dread Voyage) (1893); (Mordred, a Tragedy,) and (Hildebrand) (1895), the latter two being dramas in blank verse; (Beyond the Hills of Dream > (1899) ; (Sagas of Vaster Britain* (1906); and the novels, (Ian of the Orcades* (1906); <A Beautiful RebeP (1909),, and (The Canadian Lake Region) (1910).

CAMPBELL-BANNERMAN, Sir Henry, English statesman: b. 7 Sept. 1836; d. Lon¬ don, 22 April 1908. He was the son of Sir lames Campbell, but added the surname Bannerman, under the will of a maternal uncle. In 1868 he was elected member of Parliament for Stirling borough. From 1871-74, and from 1880-82, he was financial secretary, of the War Office; 1882-84, Secretary of Admiralty; 1884-85, Chief Secretary for Ireland; 1886 and 1892-95, Secretary of War. In February 1899 he be¬ came leader of the Liberal party; on 4 Dec. 1905 succeeded Sir Arthur Balfour as Premier. He distinguished himself by his patience and common sense. He gathered about him a min¬ istry of very able people, including for the first time a representative of the labor department in Mr. Tohn Burns. He resigned the Premier¬ ship in April 1908. Consult McCarthy, (Sir Henry Campbell-Bannerman * (New York 1903) ; Channing, <Sir Henry

man) in the Fortnightly Review (Vol. LXXXIX, London 1908).

CAMPBELL ISLAND, a lonely island in the Pacific Ocean in lat. 52° 32' S., long. 169° 9' E., 36 miles in circumference. Though very mountainous, it has several good harbors. It is a dependency of New Zealand and 180 miles southeast of the Auckland Islands. It is vol¬ canic, with a rich and rare flora.

CAMPBELLFORD, Canada, town in Northumberland County, Ontario, beautifully situated on the Grand Trunk Railway, 32 miles west of Belleville and on the Trent Valley Canal. It manufactures woolens, has pulp, paper and flour mills, bridge works and shoe factory. Pop. (1911) 3,051.

CAMPBELLITES, followers of Rev. John McLeod Campbell, who was deposed from the Church of Scotland in 1831 for teaching the universality of the atonement. He established a church at Glasgow in 1833. The name is also applied to members of the Church founded in the United States by Alexander Campbell. See Disciples of Christ.

CAMPBELL'S STATION, Tenn, the scene of an engagement between Federal and Confederate forces, 4 Nov. 1863. Gen. Braxton Bragg, who was besieging Chattanooga, de¬ tached Longstreet's corps of 10,000 men and 35 guns, with Wheeler's cavalry force of 5,000 men, to capture Burnside or drive him out of East Tennessee. Longstreet reached the south bank of the Tennessee, near Loudon, on the 13th, and that night and next day laid bridges at Huff's Ferry, two miles below Loudon, and began crossing his infantry. Burnside, who was holding the north bank of the river from Kingston to Lenoirs, concluded to leave one brigade at Kingston and retire the rest of his command to Knoxville, about 30 miles, where he had prepared to make a stand behind de¬ fensive works. He skirmished sharply with Longstreet's advance on the 14th and gradually falling back on the 1 5th, at night concentrated Hartranft's and Ferrero's divisions of the 9th corps and White's of the 23d, at Lenoirs. He had about 5,000 men. Longstreet followed, at¬ tacked during the night and was repulsed. Be¬ fore daybreak of the 16th Hartranft, with his division and some cavalry, was put on the march to secure Campbell's Station, the inter¬

section of roads coming from the south. After destroying many wagons and contents, taking the teams to assist his artillery over the bad roads, axle-deep in mud, Burnside followed with the other two divisions, artillery and trains, closely pursued by Longstreet, with Hood's division, commanded by Gen. Micah Jenkins, with whose advance his rearguard had several sharp encounters. McLaws' division of Long¬ street's corps took a more direct road to the left, the two roads intersecting about a mile southward of Campbell's Station, 15 miles south of Knoxville. Hartranft reached the coveted point in advance of McLaws and, turning west on the Kingston road, deployed his division in such manner as to confront McLaws, and at the same time cover the Lenoir road, along which the trains were moving in advance of the in¬ fantry. He had scarcely made his dispositions when McLaws appeared and attacked, but Hart¬ ranft held on until Burnside, with the trains and the remainder of the troops, had passed

and the troops taken position, when he fell back and formed on the left of White's division, in position half a mile beyond the junction of the two roads, Ferrero's division on White's right, and the artillery on commanding ground sweep¬ ing the road and the open country in front. The jaded train continued on the road to Knox¬ ville. McLaws advanced and drew up in the plain, but the forbidding aspect of Burnside's artillery, which opened viciously on him, for¬ bade direct attack with infantry, whereupon he opened with artillery, and Longstreet ordered attacks upon both flanks of Burnsides line, which were made and .nicely parried or re¬ pulsed; but, largely superior in numbers, Long¬ street was able to move around both flanks, especially on Burnside's left, which obliged him to fall back to a ridge nearly a mile in the rear. This he did in a handsome manner, though under a heavy and constant fire, and closely pressed on all sides. It was four o'clock when Hood's division made an attack on Burn¬ side's left, which was repulsed. McLaws at¬ tacked his right and was thrown back, and Longstreet then prepared for a general advance of his entire line, but before his preparations were completed it was becoming dark and his train secure and well on the way to Knoxville. Burnside, after dark, resumed his march. His advance reached Knoxville about daybreak next morning, 17 November, Longstreet wearily fol¬ lowing during the day,' and the siege of Knox¬ ville began. In this action at Campbell's Station and the skirmishes preceding it at Huff's Ferry, Lenoirs, and on the march, the Union loss was 303 killed and wounded, and 135 missing. The Confederate loss is not definitely known. Hood's division, the most seriously engaged, lost 174 killed and wounded; the loss of Mc¬ Laws was much less. Consult (Official

Records) (Vol. XXXV) ; the Century Company's battles and Leaders of the Civil War1 (Vol. Ill) ; Woodward's (Burnside and the 9th Army Corps.1

CAMPBELLTON, Canada, seaport in Restigouche County, New Brunswick, on the Intercolonial Railway. It is the northernmost town in the province and a great centre for hunters of game. Light and water are munici¬ pally owned. Its industries include foundry and machine shops, lumber, shingle and plan¬ ing mills, woodworking factories, *etc.* Pop.

3,817.

CAMPBELTOWN, Scotland, seaport and popular summer resort, famed for its scenic and historic attractions, in Argyllshire, on a fine bay indenting the southeast point of the Kintyre peninsula, 82 miles by water south¬ west of Glasgow. Whisky distilling is the chief industry, producing annually over 2,000,000 gallons, half of which is exported. Coal is mined, woolens manufactured, shipbuilding with _ allied industries carried on and the fisheries are important. The walls remain of the ancient church founded by Saint Columba, and the sculptured granite cross of archaeologi¬ cal fame, from Iona, stands in the principal street. An ancient stronghold of the Macdon¬ ald of the Isles, here in 1647 at Dunaverly Cas¬ tle 300 of the Macdonalds were slain after their surrender. Pop. 9,500.

CAMPE, kam'pe, Joachim Heinrich, Ger¬ man teacher and juvenile author; b. Deensen,

Brunswick, Germany, 29 June 1746; d. 22 Oct. 1818. He studied at Halle for the Church, acted for some time as a teacher in various positions. He ardently supported the educa¬ tion reforms of Basedow whom he succeeded during the year 1777 as the head of the Philan-thropenum in Dessau. In 1786 he was chosen by the government of

Brunswick to superin¬ tend and reform the schools of that duchy, but his radical views brought him into conflict with the Church and government and he was un¬ able to put them through. He became likewise the head of a schoolbook publishing house at Brunswick, and his own works, which were is¬ sued from it, contributed greatly to extend its reputation. These consist principally of educa¬ tional works and books for youth, the most suc¬ cessful being (Robinson Crusoe der JiingereP an adaptation of Defoe's cRobinson Crusoe. } This attained an immense popularity, being translated into almost all the languages of Eu¬ rope. He also wrote a (History of the Dis¬ covery of America. > Consult Leyser, (Joachim Heinrich Campe) (2 vols., 2d ed., 1896).

CAMPECHE, or CAMPEACHY, Mex¬ ico, seaport town in the state and on the bay of the same name, on the west coast of the penin¬ sula of Yucatan, about 100 miles southwest of Merida, with which it is connected by railroad. Under the Spanish regime Campeche was one of the three open ports of this coast, and its general appearance still gives evidence of its former wealth and importance. Founded in 1540 on the site of a native village, of which there are interesting remains, the city has wit¬ nessed many important events down to the revolution of 1842. It contains a citadel, a university with a museum, a hospital and a handsome theatre. Campeche is an important mart for logwood or Campeachy wood, of which great quantities are exported. Other important exports are wax, cigars and hene-quen or sisal-hemp, sugar, salt, mahogany and hides. Owing to the shallowness of the road¬ stead large vessels have to anchor five or six miles off. There is a lighthouse on the coast at this port. Pop. 17,109. The state of Cam¬ peachy has an area of 18,091 square miles. Pop. 87,000. The Bay of Campeachy, part of the Gulf of Mexico, lies on the southwest of the peninsula of Yucatan, and on the north of the province of Tabasco.

CAMPEGGIO, kam-pej'o, or CAMPEGGI,

Lorenzo, Italian ecclesiastic: b. Bologna 1472; d. Rome, 25 July 1539. He succeeded his father as professor of law in the University of Padua in 1511, and gained a high reputation. W hen holding this office he married, and be¬ came the father of several children, but having lost his wife, took orders. Pope Julius II made him bishop of Feltri, and Leo X, after giving him a cardinal's hat, employed him on several important missions, the execution of which gave him some prominence in connection with the Reformation. One of his missions was to Germany, for the purpose of regaining Luther; and another to England, to attempt to levy a tithe for defraying the expense of a war against the Turks. He failed signally in both, but in¬ gratiated himself

with Henry VIII, and was made bishop of Salisbury and archbishop of Bologna (1524). Under Clement VII he was seut as legate to the Diet of Nuremberg, where

he vainly endeavored to unite the princes in opposition to Luther; and to the Diet of Augs¬ burg. He again visited England, with exten¬ sive powers to decide in the question of di¬ vorce between Henry VIII and Queen Cath¬ erine; but his temporizing measures lost him the confidence of all parties, as well as his bishopric of Salisbury. Notwithstanding his repeated failures, he remained high in favor at the papal court. At his death he was archbishop of Sabina. His tomb is in the church of Saint Maria of Trastevere.

CAMPEN. See Kampen.

CAMPEN, Jacob de. See Kampen, Jacob

DE.

CAMPEN, Jan van. See Kampen, Jan

VAN.

CAMPER, kam'per, Pieter, Dutch anat¬ omist: b. Leyden, 11 May 1722; d. The Hague, 7 April 1789. He distinguished himself in an¬ atomy, surgery, obstetrics and medical juris¬ prudence, and also as a writer on aesthetics. From 1750 to 1755 he was professor of medi¬ cine at Franeker, and from the latter year to 1763 at Amsterdam. Henceforth till his resig¬ nation in 1773 he held a professorship at Gro¬ ningen. His (Dissertation on the Natural Va¬ rieties,) etc., is the first work in which was thrown much light on the varieties of the human species, which the author distinguishes by the shape of the skull. His (Treatise on the Nat¬ ural Difference of Features in Persons of Vari¬ ous Countries and AgesR and one on (Beauty as Exhibited in Ancient Paintings and Engrav¬ ings,) followed by a method of delineating va¬ rious sorts of heads with accuracy, is intended to prove that the rules laid down by the most celebrated limners and painters are very de¬ fective. His general doctrine is, that the dif¬ ference in form and cast of countenance pro¬ ceeds from the facial angle. His collected writings were published under the title (Giuvres qui ont pour objet l'histoire naturelle, la physiologie et l'anatomie comparee) (3 vols., Paris 1803).

CAMPERDOWN (Dutch, Catnperduin) , Holland, a stretch of sandy

hills or downs in the province of North Holland, between the North Sea and the small village of Camp, off which the British, under Admiral Duncan, gained a hard-won victory over the Dutch, under De Winter, 11 Oct. 1797. For this victory Ad¬ miral Duncan was raised to the peerage as Viscount Duncan of Camperdown. His son became Earl of Camperdown, and this title still belongs to a descendant.

CAMPERO, Narciso, nar-the'so kam-pa'ro, Bolivian statesman and soldier: b. Tojo (now in Argentina) 1815; d. Bolivia 1896. He studied and traveled in Europe, and on his re¬ turn entered the Bolivian army, and rose to the rank of brigadier-general. He was Minis¬ ter of War in 1872. After the overthrow of Hilarion Daza in 1880 he was chosen President of Bolivia. He commanded the combined forces of Peru and Bolivia in Tacna campaign, but was defeated at Tacna, 26 May 1880. In¬ ternally, his administration was quiet.

CAMPHAUSEN, kamp'how-zen, Wilhelm, a German military painter : b. Diisseldorf, 8 Feb. 1818; d. there, 16 June 1885. He studied under Alfred Rethel and Carl Sohn. His

paintings include { Cromwellian Troopers } (Na¬ tional Gallery, Berlin), (Duppel after the As¬ sault (same) ; (Charles I at Naseby) (Kunst-halle, Hamburg) ; (Tilly at Breitenfeld) (Co¬ logne Museum) ; (Napoleon III after Sedan, > and portraits of Emperor William, Bismarck and Wolke. He was at first of the romantic school, and although his best works are his¬ torical, they are depicted with fine attention to detail and realism.

CAMPHENE, or CAMPHINE, (1) a

general name for those terpenes which are solid at ordinary temperatures (see Terpene) ; (2) a purified form of turpentine, obtained by dis¬ tilling that substance over quicklime in order to remove the resins that the crude product contains, and widely used as an illuminating oil before petroleum was available.

CAMPHOL, a substance now better known as borneol (q.v.).

CAMPHOR, a white, translucent, crystal¬ line substance occurring in the wood and bark of the camphor laurel (C amphora officinarium, Cinnamomum camphora, or Laurus camphora) , a tree indigenous to Japan and central China, and cultivated in many warm countries. The camphor ˆgum® is obtained by distilling the leaves, bark and chips of wood with steam, and afterward driving out the water and vola¬ tile oils from the distillate with a low degree of heat, and then subliming the gum at 350° F. Purified camphor consists of a clinging mass of tough, colorless, hexagonal crystals which break apart readily, but cannot be reduced to powder except with the addition of a little al¬ cohol — which evaporates spontaneously during the grinding. It has the chemical formula GoHisO, melts at 350° F., boils at 500° F., and sublimes to an appreciable extent at practically all temperatures. It has a strong, pleasant, characteristic odor, and a peculiar, cooling, aromatic taste. Its specific gravity is about 0.992, and it dissolves to a slight extent in water, and freely in alcohol or ether. Small shavings of it exhibit lively motions when thrown upon a water-surface that is abso¬ lutely free from oily matter. (See Surface Tension). It is familiar about the household, on account of its use for protecting furs and woolens from the attacks of moths and other insects, and in domestic medicine. It is also employed in the manufacture of celluloid and various explosives.

((Synthetic camphorˆ is the name given to a camphor artificially prepared from turpentine oil. It is identical with natural camphor ex¬ cept that it is optically inactive. The process by which it is made consists of first converting the turpentine into pinene hydrochloride (which is known commercially as ((artificial camphorˆ), and then changing this to camphene by the elimination of the hydrogen chloride. Oxidation of the camphene by any one of several patented processes yields the synthetic camphor.

The name ˆcamphor® has been given to many similar substances of widely different derivation: as peppermint camphor (menthol); cedar camphor (from the oil of juniper) ; cubeb camphor (from the oil of cubebs) ; thymol (from the oil of thyme), *etc.* At one of the government experiment stations in the South a good yield of natural camphor has been se¬

cured from young seedlings, mown down like grass at the close of the first season's growth, and distilled in the green state. See Borneol.

CAMPHORIC ACID, an organic sub¬ stance crystallizing in colorless, needle-like, monoclinic crystals, and obtained by oxidizing camphor by boiling it with concentrated nitric acid, or with an alkaline permanganate. It has the formula CioHieCh, and a specific gravity of 1.19, and melts at about 370° F. It is almost insoluble in cold water, but is soluble in hot water, alcohol and ether. Camphoric acid has a limited use in medicine in the treatment of chronic disorders of the respiratory system.

CAMPHUYSEN, kamp'hoi-zen, Dirck Rafelsz, Dutch theologian and poet : b. Gorkum 1586; d. Dokkum, 9 July 1627. He lost his parents at an early age, and was left to the care of an elder brother, who, thinking that he observed in Rafelsz an inclination for painting, placed him as a pupil in the studio of the artist, Dirck Govertsz. He soon aban¬ doned art to devote himself to theology, which was the reigning passion of the age. He em¬ braced the doctrines of Arminius, and shared in the persecutions under which Arminianism then suffered; was expelled from the curacy of Vleuten; became a fugitive from village to village, a prey to suffering and privation and found now in writing short poems his only relief and consolation. These are generally upon religious subjects, and are characterized by a remarkable depth of feeling. Recent art criticism has shown that the paintings for¬ merly attributed to him were, in point of fact, by the other Camphuysens, his nephews, R. G. and J. G. Camphuysen, or his son, Govert.

CAMPI, kam'pe, a group of Italian artists who founded what is known in painting as the school of Cremona. Of the four of this name, Giulio, Antonio, Vincenzo and Bernardino, the first and the last are the best known. Giulio (b. probably about 1500 or 1502, d. in 1572), the eldest and the teacher of the others, was influenced by Giulio Romano after 1540, as his paintings of that period plainly show, and acquired from the study of Titian and Por-denone a skill in coloring which gave the school its high place. Bernardino (b. about 1522, d. about 1590 or 1595) was the greatest of the school. He took Romano, Titian and Correg¬ gio in succession as his masters. It is important to note that, while the first three — Giulio, An¬ tonio and Vincenzo — were brothers, the com¬ mon assumption that the _ fourth, Bernardino, belonged to the same family, is not supported by any positively known facts.

CAMPINAS, kam -pe'nas, Brazil, town on the Piradcaba River, state of Sao Paulo, 114 miles by rail from the port of Santos, and 65 miles northwest of Sao Paulo. It is an import¬ ant coffee exporting centre, also producing sugar, corn and fruits. The situation of the town is

unhealthful. Pop. 34,000.

CAMPION, Edmund, English theologian: b. London, 25 Jan. 1540; d. 1 Dec. 1581. He was educated at Christ's Hospital and Saint John's College, Oxford, and distinguished him¬ self greatly, becoming B.A. in 1561 and M.A. in 1564. Though at first a Roman Catholic he adopted nominally the Reformed faith and took deacon's orders in the Church of England.

\ hen Queen Elizabeth visited Oxford in 1566 he was selected to make the oration before her, as formerly while at school he had been chosen to deliver an oration before Queen Mary on her accession. He went from college to Ire¬ land, and while there wrote the history of that country, a superficial work of no real value, and connected himself with the Roman Catholic Church. His enthusiasm leading him to seek to make proselytes to his new faith, he was seized and imprisoned; but after a short time effected his escape to the Low Countries, and soon after joined the English college of Jesuits at Douay, passed his novitiate as a member of that So¬ ciety, and became distinguished for his piety and learning. At Rome in 1573 he was admit¬ ted a member of the order of Jesuits, after which he resided for a time at Vienna, where he composed a tragedy, which was received with much applause and acted before the Em¬ peror; and at Prague, where he taught rhetoric and philosophy for six years. Sent by Gregory XIII on a mission to England in 1581, he chal¬ lenged the universities and clergy to dispute with him. His efforts were followed by so large a number of conversions as to disquiet the ministry of Elizabeth ; and he was arrested and thrown into the Tower upon a charge of having excited the people to rebellion, and of holding treasonable correspondence with foreign powers. Being tried, he was found guilty, condemned to death for high treason and executed at Tyburn. The insults of the populace attended him to the Tower, where torture was fruitlessly applied to extort from him a confession of treason or a recognition of the supremacy of the English Church, and after his death a fragment of his body was sent to each of the principal towns

for exposure. Be¬ sides his history of Ireland, he wrote (Decern Rationes) ((Ten ReasonsQ, and compiled a (Universal Chronology,* and collections of his letters and several essays were published after his death. He was beatified by Leo XIII in 1886. His biography has been written by Rich¬ ard Simpson (London 1867), and a complete list of his works is to be found in De Backer's (Bibliotheque de la compagnie de Jesus. >

CAMPION, Thomas, English poet: b. London, 12 Feb. 1567 ; d. London, 1 March 1619. His father died when Campion was nine years of age, and his mother soon after. His stepfather, Augustine Steward, sent him to Cambridge. He had intended studying law at Gray's Inn, but did not practise and was not admitted to the bar. Information concerning the rest of his life is vague. In 1606 he ap¬ pears as a physician in London, where he re¬ mained until his death. He wrote a volume of (Poems) (1595), being Latin elegies and epi¬ grams. He wrote a masque for the occasion of the marriage of Lord Hayes, and three masques for the court of James I. He published (1610-12) four (Books of Airs/ containing songs written by himself to airs of his own composition : the first book contains (Divine and Moral Songs* ; the second, (Light Conceits of Lovers> ; the third and fourth are not distinguished by any separate sub-title. In his songs the verse and the music are most happily wedded. While he was very popular in his own day, he soon sank into oblivion. His works are full of freshness and charm.

Consult the edition by A. H. Bullen, which ex¬ cludes (A New Way* ; (Songs and Masques) (ed. by Bullen, 1903, with an introduction by Janet Dodge) ; (Poems* (ed. by Vivian, 1907) ;

1 Complete Works* (ed. by Vivian, Clarendon Press, 1908).

CAMPLI, kam'ple, Italy, a town in Naples, in the province of Teramo, and five miles north of the town of Teramo. It has a cathedral, three churches, an abbey, several convents, a hospital and a mont-de-piete. Pop. 7,236.

CAMPO BASSO, kam-po-bas'sd, Niccolo (Conte da), Italian soldier: fl. in the latter half of the 15th century. He had first sup¬ ported the house of Anjou in the kingdom of Naples, but afterward transferred his services to their opponent, Charles the Bold, Duke of Burgundy. At the siege of Nancy, in 1477, on the approach of a superior force under Fer-rand, Duke of Lorraine, to relieve the place, Campo Basso deserted

to the enemy immedi¬ ately before battle. “The Burgundians were in consequence defeated, and the Duke himself slain. The treacherous Italian was supposed to be the murderer.

CAMPOFORMIO, Italy, town 66 miles northeast of Venice, famous for the treaty of peace between Austria and France which was signed in its neighborhood, 17 Oct. 1797. Its chief provisions were that Austria should cede the Belgian provinces and Lombardy to France, receiving in compensation the Venetian states.

CAMPO MAJOR, Portugal, city of Alemtejo province, 11 miles northeast of Elvas. Situated at an altitude of nearly 1,000 feet, a meteorological station is maintained here. Wine and woolen goods are manufactured. The town is celebrated in literature and history by Scott’s ballad, (The Bold Dragoon,* depicting an inci¬ dent of the siege in 1811 during the Peninsular War. Pop. 6,000.

CAMPO SANTO (((holy field®), the name given to a burying-ground in Italy, best known as the appellation of the more remarkable, such as are surrounded with arcades and richly adorned. The most famous Campo Santo is that of Pisa, which dates from the 12th century, and has on its walls frescoes of the 14th cen¬ tury of great interest in the history of art. Among more modern Italian cemeteries, that of Genoa is distinguished for its magnificence.

CAMPO SANTO OF THE DISSENT¬ ERS. See Bunhill-Fields.

CAMPOAMOR Y CAMPOOSORIO,

kam-po-a-mor’ e cam-po-o-so’re-o, Ramon de, Spanish poet: b. Navia, 24 Sept. 1817; d. 11 Feb. 1901. He studied medicine with great enthusiasm and thus got his first love of science which never left him and which continued to influence powerfully all his literary work and, to a certain degree, his political and social writings. But though his love of science re¬ mained with him he soon tired of medicine and turned to literature. Realizing that his education was superficial and that he lacked a thorough knowledge of the literature and art of his own and foreign lands, he shut himself up in the public library and went through a self-imposed course of reading intended to help fit him for a literary life. His literary work, which at the beginning was as much journal-

istic as anything else, early brought him into prominence in political circles and he received one political office after another. When Chris¬ tina fled from Spain in 1840, Campoamor de¬ fended her and ever afterward he continued to show admiration for and devotion to her. Naturally, holding these views, he was a Con¬ servative, views which were somewhat modified in his later days. But to his political views we owe a great deal of his prose work which was looked upon as one of the most powerful influences at work in Spain in the middle of the last century. This political work brought to Campoamor, among other offices, those of gov¬ ernor of Alicante and Valencia and State Coun¬ sellor under Alfonso XII (1874). The political views held by him at this period of his life are pretty fully and forcibly expressed in (Polemicas con la Democracia^ and other works of a like nature, which present vividly the burning political and social questions of the day. Even his philosophical works, mostly of an eclectic tendency and subjective idealism, are influenced by his political ideas and the struggle in which he was engaged.

Already when scarcely out of his 'teens, Campoamor began to be recognized as a poet of force and futurity, and the Liceo Artistico, of which he was a very active member, pub¬ lished a volume of his poems in 1840 and fol¬ lowed up with his (Fabulas) two years later. In the same year a Madrid house published (Los ayes del alma* ; all of which brought him immediate popularity and gave him an entree into journalism and literary life. He became an editor on El Espanol, a most valued contributor to El Heraldo, one of the strongest and most feared political writers of the day, and one of the most prolific contributors in Spain to magazines, reviews and newspapers. His work was widely copied by the provincial press, so that his name was soon found among the best known* in literary circles and by the general public wherever the Spanish language was spoken. With this publicity his popularity as a writer grew with great rapidity. In 1862 he was elected a member of the Spanish Academy. Gradually he grew tired of political controversy and, in his latter days, he devoted his time and energy to work of a strictly literary nature, in which poetry began to take the foremost place.

Juan Valera, the great Spanish critic, has said of Campoamor that love and joy are the characteristics of the first half of his life. This is not

altogether true, for the sadness, bitter¬ ness, mild cynicism and scepticism of his later writings show through frequently in his earlier work. Yet he is ever the artist and his touch is sure and true. A word painter, he is vivid, passionate, yet ever true to nature. As a poet and thinker, as a molder of new forms of expres¬ sion and shades of thought, he is in the fore rank of the Spanish poets of the past century. The very faults attributed to him by his severest critics are but the reflection of the age in which he lived and labored ; for he is at once realistic, sceptical and spiritual, all in a mild way that conveys the impression that faith and doubt are constantly striving in his soul for the mastery; while all the time we are conscious that he is toying with a constantly intruding paganism. For he is a veritable

creature of moods, passing from the highest pinnacle of joy to the lowest depths of despair. As a poet, Campoamor possesses a style charac¬ terized by much variety and lending itself to exactness of reasoning and of form of expres¬ sion, to facility of character painting and naturalness of dialogue. This combined with his power of story construction, his dramatic presentation and his energy and directness of style, rather than his facility of political thought, created for him a place in the field of political controversy.

Campoamor ranks higher as a poet than as a prose writer or philosopher. Among his best known poetical works are <Dolores) (1840); (Los ayes del alma) (1842) ; (Fabulas) (1842) ; (Ternezas y flores) (1843) ; (Colon) (1851) ; (E1 Drama NacionaP ; (Cuentos amorosos) ; (Pequenos poemas) ; (Nuevos pequenos poemas* (1887) ; (Dolores y cantares) (1882) ; (Poesias y fabulas* ; and ˆumoradas.* His dramas, which were never successful on the stage, in¬ clude (E1 honor) ; (Guerra a la guerra) ; (E1 palacio de la verdad) ; (Dies iras* ; (Glorias humanas) ; (Cuerdos y locos. * His most im¬ portant prose works are (Historia critica de las Cortes reformadoras) ; (Filosofia de las leyes> ; (Las polemicas con la Democracia) ; (E1 Per-sonalismo) ; (Lo Absoluto) ; (E1 ideismo) ;

<Canovas) ; (La Political

John Hubert Cornyn, National University of Mexico.

CAMPOBASS'O, Italy, city, capital of Campobasso (formerly Molise) province, on Monteverde in the Apennines, 2,200 feet above sea-level, 170 miles by rail east-southeast of Rome. It is a busy agricultural market centre with long-established manufactures of steel and iron

ware, notably cutlery. It has a healthful climate, good educational institutions, a cathe¬ dral, and the romantic ruins of a feudal 1 5th century castle overlook the city. Pop. 17,000.

CAMPOBELLO, New Brunswick, an island, eight miles long, in Passamaquoddy Bay, Charlotte County, situated outside of the Maine boundary, in lat. 44° 57’ N. and long. 66° 55’ W. It is noted as a summer resort. Though cop¬ per and lead ores exist, the inhabitants are chiefly engaged in the herring, mackerel and cod fisheries. From 1767 Admiral Owen’s fam¬ ily retained it as private possession. It was acquired in 1880 by a group of capitalists from Boston and New York. Pop. 1,230.

CAMPODEA, a wingless insect of the or¬ der Thysanura. Owing to its very primitive features it has been regarded by Brauer and by Packard as being the form nearest related to the probable ancestor of all insects. It is a little white insect living under stones. The body is long and narrow, each thoracic segment equal in size, the antennas long and narrow, while the body ends in two very large, slender, many-jointed appendages. It is very agile in its movements and might be mistaken for a young centipede (Lithobius). Though allied to the bristle-tail (Eepisma) it is still more primi¬ tive. The mouth-parts have undergone some degeneration, being partly withdrawn within the head. It has a pair of short vestigial legs on the first abdominal segment. This and other features suggest its origin from some form

with several pairs of abdominal appendages, similar to Scolopendrella. It is a cosmopolitan, and this, as well as its structure, suggests that it is an ancient form which has persisted to the present time.

CAMPOS, kam’pos, Arsenio Martinez de,

Spanish military officer : b. Segovia, Spain, 14 Dec. 1831 ; d. 3 Sept. 1900. He was graduated at the Military Staff School in Madrid and appointed a lieutenant in the army in 1858; served on the staff of General O'Donnell and became chief of battalion in the Morocco cam¬ paign of 1859 ; was on duty in Cuba with the rank of colonel in 1869-72. Returning to Spain, he became a leader in the restoration of the monarchy (1875). With General Jovellar, he called Alphonso XII to the throne; was made commander-in-chief of the Catalonia district, and crushed Don Carlos at Pena de Plata in 1876. For these services he was promoted cap¬ tain-general. In 1877 he was appointed com¬ mander-in-chief in Cuba, and brought the revolution to a close chiefly by means of con¬ cessions which, as Minister of War and Premier in 1879, he endeavored unavailingly to carry out. He was Minister of War in 1881 and 1883, commander of the Army of the North of Spain in 1884-85, president of the Spanish Sen¬ ate in 1885 and captain-general of New Castile in 1888. In April 1895 he was appointed gov¬ ernor-general and commander-in-chief in Cuba, but in January 1896 was recalled to Spain. He found the insurrection more formidable than he had anticipated, and his failure to pursue a vigorous war policy caused much dissatisfac¬ tion in Spain. On his arrival in Madrid he repeated his belief that the trouble in Cuba could only be ended by granting reforms. In 1899 he was, for the third time, president of the Senate. For accounts of his important connection with Cuban affairs, see Spain — History.

CAMPOS, Brazil, city of Rio de Janeiro state, on the Parahyba River, 30 miles from the sea at the head of navigation for small steamers, and 145 miles northeast of Rio de Janeiro city. The trading centre, since its establishment in 1730, of a fertile alluvial sugar¬ cane growing region, also producing coffee, rice, cotton and tropical fruits, its chief indus¬ trial establishments are sugar refineries. Cam¬ pos is the starting point for several small in¬ dependent railroad lines and communicates indirectly with Rio de Janeiro by way of Macahe. The city, electrically lighted, has many fine buildings. Pop. of city 22,500; of municipal boundaries 78,000.

CAMPRA, Andre, French composer: b. Aix, Provence, 4 Dec. 1660; d. Versailles, 29 July 1774. He served as master of the King's chapel, and composed for the Royal Academy of Music. He ranks among the most distin¬ guished composers of operas, his themes being classical love stories, notably <Hesione) (1700) ; Uphigenie en Tauride-' (1711) ; (Triomphe de l'Amour) ; (Les Amours de Mars et de Venus. >

CAMPULUNG, or KIMPULUNG, Ru¬ mania, city and summer resort, capital of Museel department, in the Carpathian Moun¬ tains, at the

head of a glen of the Tirgului River. It is the terminus of a branch railway

Irom Ploesci, exporting the products of its paper mills, operated by river water power. Besides ancient Roman remains there are also an interesting 13th century monastery and a cathedral. Pop. 13,000.

CAMPUS MARTIUS (known also as Campus, merely) was a large place in the sub¬ urbs of ancient Rome, consisting of the level ground between the Quirinal, Capkoline and Pincian hills and the river Tiber. From the earliest times it seems to have been sacred to the god Mars, from which circumstance it re¬ ceived its name. It was originally set apart for military exercises and contests, as also for the meetings of the comitia by tribes and by centuries. In the later period of the republic, and during the empire, it was a suburban pleasure ground for the Romans, and was laid out with gardens, shady walks, baths, *etc.* After the time of Julius Caesar it became crowded with public buildings and monuments. Consult Platner, (The Topography and Monuments of Ancient Rome) (pp. 339-92, New York 1911). The district is now called Campo Marzo, in which the greater part of modern Rome lies.

CAMPUS SCELERATUS, a name given to a spot within the walls of Rome, and close by the Porta Collina, where those of the ves¬ tal virgins who had transgressed their vows were entombed alive (Liv. viii, 15), from which circumstance it took its name.

CAMUCCINI, ka-moo-che'ne, Vincenzo, Italian historical painter: b. Rome, 21 Feb. 1771 ; d. there, 2 Oct. 1844. He followed the academic-classical style, and is generally re¬ garded as the most notable successor of Mengs in Rome. Among his best-known works are ˆeath of Caesar* and (Death of Virginia* (originals in Capodimonte at Naples) ; altar-piece representing the incredulity of Thomas (in Saint Peter's, Rome) ; portrait of Thorwald-sen, painted in 1808; portrait of Pius VII, painted 1814; portraits of the King and Queen of Naples, painted in 1818; (Christ Blessing the Children,* painted for Duke Blacas d'Aulps, 1826; portrait of Pius VIII, now in Cesena, 1829; (Virgil Reading Aloud from His Own Poems, *painted for Prince Alexander of Rus¬ sia, 1839; and (Camillus Freeing the Capitol,* painted for the King of Sardinia, 1840.

CAMUS, ka'mii', Armand Gaston, French revolutionist: b. Paris, 2 April 1740; d. 2 Nov. 1804. A zealous and ascetic Jansenist and a

master of ecclesiastical law, he was elected advocate-general of the French clergy, and in 1789 member of the States-General by the peo¬ ple of Paris. He now appeared as the resolute foe of the ancient regime, gained possession of and published the socalled (Red Book,* with its details of expenditures so disadvantageous to the court and its ministers. While attempt¬ ing to capture Dumouriez he was himself cap¬ tured and, after two years in Austria, was exchanged for the daughter of Louis XVI. He was absent in Belgium during the King's trial, but sent his vote for death. He was made member and afterward president of the Council of Five Hundred, but resigned in May 1797 and devoted his time to literature. He was con¬ servator of the national archives, and as. such preserved the old documents of the abolished

corporations and institutions, and wrote several legal works.

CAMWOOD, BARWOOD, or RING-WOOD, a red dyewood (Baphia nitida) ob¬ tained in Brazil and also in Africa of the fam¬ ily Leguminosce. It once was common in the neighborhood of Sierra Leone, and was also found in Tonquin and other parts of Asia. This wood is of a very fine color, and is prin¬ cipally used in turnery for making knife-handles and similar articles. The dye, mordanted with alum and tartar, obtained from it, is brilliant, but not permanent.

CANA OF GALILEE, town in Palestine, at no great distance from Capernaum (or Capharnaum), remarkable chiefly as having been the scene of our Lord's first miracle. It was there that He turned water into wine (John ii, 1). It was also the city of Nathanael and the place where Jesus, having been appealed to by the nobleman from Capernaum on behalf of his dying son, with a word effected the cure. A long-established tradition has identified it with a village bearing the name of Kefr' Kenna, which lies about four miles northeast of Nazareth; but in recent years two other sites have been mentioned by Bible students as possible claimants, namely, Kanet-el-Jehil, about six miles farther north, and Ain Kana, which lies somewhat nearer to Nazareth. It is to be said that Kefr' Kenna is at present a village of

about 600 rough and uncivilized inhabitants, but with two churches, one Franciscan, one Greek. At Kanet-el-Jehil there are only ruins. The argument in favor of Ain Kana is purely etymological and is not supported by tradition.

CANAAN, ka'nan, the ancestor of the Canaanites (q.v.). He was the son of Ham and the father of Sidon and Heth (Gen. x, 6ff.) and the brother of Cush, Mizraim and Put. In Rabbinical literature he is the first of the seven sinners who made idols for the heathens (Chronicles of Jerahmeel, p. 167). He was predestined for this and similar sins, as he was born on the Ark, contrary to God's wish that the sexes be separated therein. The curse of Noah (Gen. ix, 18-22) descended on him be¬ cause of the sin of his father, Ham (Gen. ix, 20-27), which story many biblical scholars be¬ lieve to have been told at first of Canaan. Probably this conclusion was reached because it was contrary to Jewish sentiment for an inno¬ cent man to be punished for the sin of another. The story of the curse was written, according to some, to account for and justify the servile condition of the Canaanites and the Israelitish supremacy.

CANAAN and CANAANITES, geograph¬ ical and ethnological terms applied to the coun¬ try and the inhabitants of southern Syria in general. The country extended from the foot of Mount Hermon to the lower end of the Dead Sea, including territory both east and west of the Jordan; that is, Judea, Phoenicia and Philistia proper. Ethnologically the name was ap¬ plied to all of the heathen peoples (Jebusites, Hittites, Amorites, etc.) whom the Israelites found west of the Jordan. The country is in some instances connected with Phoenicia, and in consequence it appears (e.g., Hos. xii, 8: Is. xxiii, 8) in the general sense of merchant. The geographical inference is that the land was

originally a small strip of coast, gradually ex¬ tended by conquest. The etymology has been derived from the dialectic word meaning "low,® because of the fact that in Egyptian the word appears with the article prefixed "the canaan® ; but this derivation has been con¬ tested, and the suggestion has been made that the land took its name from the people, not vice-versa.

The earliest mention of "Canaan® is found in the Amarna tablets where the name is used interchangeably with "Amurru® for the land subject to the Amorite Aziru (162, 41) (see Amorite), but mostly as a general nomencla¬ ture of Syria. In the Egyptian inscriptions, Canaan

(Ka-n’n) is mentioned at the time of Seti I, and within the territory of Phoenicia in the days of Rameses III ; and the “land of Ca¬ naan® apparently as Philistia in two papyri from the 19th dynasty. Coins from the t’me of Antiochus IV and his successors bear th* leg¬ end of “Laodicea, a metropolis in Canaan.®

What the original language of the Canaan¬ ites was we do not know, but in later times it was understood to mean Hebrew or the closely allied Phoenician dialect.

On the basis of the Egyptian and Assyrian inscriptions the history of Canaan may be di¬ vided into three periods: (a) the pre-Israelitish, from about 3800 b.c. down to the definite con¬ stitution of Israelitish supremacy; (b) the Israelitish supremacy from about 1100 b.c. — 740 b.c. ; (c) decline of this supremacy ending in the absorption of Canaan by Assyria and Babylonia 587 b.c. After the return of the He¬ brews from the socalled Babylonian exile, the history of the north and south becomes in¬ volved in the various attempts to found a world power by Persia, Macedonia and Rome. The characteristic note in the history is the im¬ possibility of political union among the vari¬ ous peoples, probably due to the split-up na¬ ture of the coast lands which they inhabited. Consult the (Tel-Al-Amarna Letters) (ed. by Winckler with trans. 1896) ; Sellin’s report of excavations at Tel Ta’annek; Vincent, (Ca¬ naan* (1907) ; Benziger, (Hebraische Arche-ologie> (1907) ; Bohl, (Kanaanaer und HebraerP and any of the biblical dictionaries.

CANA-BOTA, a large shark (Hexanchus or Notidanus) which frequents the waters of the Bay of Biscay and the Mediterranean. Specimens have been found in the waters near the West Indies.

CANACE, kan’a-se, (1) in Greek mythol¬ ogy, a daughter of PEolus and Enarete, who was punished by death because of her unlaw¬ ful passion for her brother; she is mentioned in Gower’s (Confessio AmantisP and in Chau¬ cer’s < Man of Law’s TaleP (2) In Chaucer’s (Squire’s Tale> the daughter of King Cam-buscan, who being the possessor of a magic ring, can understand the love plaint of a fe¬ male hawk.

CANACHUS, Greek sculptor of the 6th century, b.c. He was a native of Sicyon in Achaea. His most celebrated works were two statues of Apollo, one in bronze executed for the temple of Miletus, the other of cedarwood for the city of Thebes. Representations of the statue of Miletus have come down to us on the coins of the period.

CANADA, Dominion of. In the following series of articles will be found a comprehensive treatment of Canada — its history, government, economic development, religious and social ac¬ tivities, *etc.*

1. Geography

2. Outline History and Po¬

litical Development

3. The Era of Early Dis¬

covery

4. Under the French Rule

5. Great Britain’s Fight

with France for North America

6. Under British Rule to

Confederation

7. The Maritime Provinces

to Confederation

8. Confederation

9. Since Confederation

10. The Canadian West

11. The Settlement of the

Canadian West

12. The Constitution

13. Local Government

14. Imperial Federation

15. Canada and the Euro¬

pean War

15a. Canadian War Eco¬ nomics

16. Diplomatic Relations of

the United States with Canada

17. Primary Education

18. Secondary Education

19. Higher Education

20. Public Education

21. Technical Education in

Canada

22. Catholic Education

23. Literature

24. Canadian Universities

25. Religious Conditions

26. Roman Catholic Church

in Canada

27. The French Canadian

28. Population; Racial Dis¬

tribution and Immi¬ gration

29. Immigration

30. Military System

31. The Acadian Refugees

32. The Quebec Act

33. The Ashburton Treaty

34. Clergy Reserves

35. Seigniorial Tenure

36. Hudson’s Bay Company

37. Washington Treaty

38. Jesuit Estates Act

39. Agriculture

40. Forest and Lumber In¬

dustry

41. The Grain Trade

42. Minerals

43. Fisheries

44. Manufactures

45. Water Powers

46. Commerce, Tariffs and

Transportation

47. Banking System

48. Public Finance

49. Currency, Coinage and

Legal Tender

50. The Granger Movement

51. The Labor Movement

1. GEOGRAPHY. I. General. — Area and Boundaries. — With the exception of Alaska, Greenland, Newfoundland, and the two small islands of Saint Pierre and Miquelon, all the northern half of the North American continent is comprised in the Dominion of Canada. Alaska, the great peninsular projection at the northwest corner of the continent, with a nar¬ row strip of coast depending from it south¬ ward, belongs to the United States; Greenland, a huge island at the northeast corner, is Dan¬ ish; Newfoundland, another island blocking the mouth of the Saint Lawrence estuary on the east coast, is British, and Saint Pierre and Miquelon, lying off Newfoundland, are French. To the north of the continent there is a cluster of large islands, divided from the mainland and from one another by comparatively narrow channels. All of these form part of Canada and are included in its area, but as yet they have been only partially explored, and their exact dimensions are not known. The official estimate, as nearly accurate as it can be made at present, gives the total area of Canada, in¬ cluding the great fresh-water lakes wholly within its boundaries, as 3,729,665 square miles. The boundaries separating Canada from its only continental neighbor, the United States, are to a great extent meridians of longitude or parallels of latitude. Between Canada and Alaska, beginning from the north, the boundary follows long. 141° W. from the Arctic Ocean to Mount Saint Elias, within(20 miles of the Pacific, from which point it is an irregular line running about parallel with the coast round the heads of all bays and inlets of the sea at a distance of 20 to 30 miles inland. It reaches tidewater again at the head of Portland Chan¬ nel, down which it passes, terminating in the Pacific Ocean. All the islands of the coast

south of lat. 54° 40’ belong to Canada as far as the southern extremity of Vancouver Island, except that a cluster of small islands between the southern end of Vancouver Island and the mainland, but south of lat. 49°, are included in the territory, of the State of Washington. The international boundary begins again in Juan de Fuca Strait. It takes a devious course from Vancouver Island to lat. 49° on the coast of the continent, and then follows the 49th parallel as far east as Lake of the Woods. A water boundary here begins, up Rainy River and its headwater series of lakes, cutting across the height of land to another

chain of small lakes and following Pigeon River to its mouth in Lake Superior. From this point the bound¬ ary is the chain of Great Lakes and the Saint Lawrence River to its intersection with lat. 45°. The line now follows a more or less arbitrary course along the 45th parallel for some distance, then rising irregularly to the north almost to lat. 47° 30', then down -the upper course of the Saint John River as far as Grand Falls, then due south to the Saint Croix River, which it .follows to the Bay of Fundy. The areas in square miles of the individual provinces and territories since the reallotment of territory in 1912 are as follows :

Provinces	Land	Water	Total
Prince Edward Island ...	2,184		2,184
Nova Scotia .	21,068	360	21,428
New Brunswick .			

27,911

74

27,985

Quebec .

690,865

15,969

706,834

Ontario .

365,880

41,382

407,202

Manitoba .

231,926

19,906

251,832

Saskatchewan .

243,382

8,318

251,700

Alberta .

252,925

2,360

255 , 285

British Columbia .

353,416

2,439

355,855

Y ukon District .

206,427

649

207,076

Northwest Territories....

1,207,926

34,298

1,242,224

Total .

3,603,910

125,755

3,729,665

Main Physical Features. — The four princi¬ pal surface divisions are: (1) The Appalachian region, forming the extreme southeastern cor¬ ner; (2) the Laurentian plateau or peneplain, with its fringes and outliers of lowlands, com¬ prising the remainder of the eastern half of Canada; (3) the central plain; and (4) the mountain region to the west. Each of these divisions represents, on the whole, a different geological formation and has its own peculiar physical features. I. The Appalachian region of Canada is the northern extremity of the system of parallel ranges of mountains pushed up, as it were, from the southeast against the great archaean, or Laurentian, area. The ranges all run from southwest to northeast, the Nova Scotian peninsular being without a correspond¬ ing extension in the United States. The hills are composed of older rocks, rising out of the carboniferous strata which once overlay the whole district, but of later formation than the Laurentian plateau to the north. They are much weathered and the river valleys have been comparatively well eroded. II. The Lauren¬ tian plateau or peneplain which covers about half the entire area of Canada is, geologically speaking, the nucleus of the continent. It pre¬ sents a shield-shaped surface of arefuean rocks, broken into on the north by Hudson Bay, and extending south to the Saint Lawrence River

As is implied by calling it a peneplain, it is a much-weathered surface, nowhere rising to any great height, but maintaining a fair elevation above the sea-level, except along the west shore of Hudson Bay. It is a country of hard, crys¬ talline rocks, (everywhere scored by glacier ac¬ tion, and sparsely covered with soil in which pine, spruce and other northern trees grow more or less densely, giving place in the higher latitudes to mosses and lichens. As a result of the melting of the glaciers which covered this region in the last geological period, the whole surface is a network of small lakes and streams. The latter have been unable to wear down the hard rocks to any appreciable extent, and consequently present all diversities of level with many falls and rapids in their course. The western limit of the plateau is marked by a series of great lakes, from Great Bear Lake in the north to Lake Huron near the southern extremity. J Adjoining the Laurentian plateau on thV Forth and south there is, as it were, a fringe of later geological formations. Most of the large islands north of Hudson Bay as of the mainland west of it appear to consist chiefly of older sedimentary rocks in undis¬ turbed arrangement, but the partial glaciation of these islands has hitherto prevented any de¬ tailed geological or other survey. South of the Laurentian plateau again occurs a lowland area, consisting of the valley of the Saint Lawrence River and the peninsula enclosed by the three lower members of the chain of great lakes. It is small in extent, but of great importance in the history of Canada, because the first Euro¬ pean settlements were established mainly within its limits and it still contains the greater part of the population. III. The central plain is of vast extent, reaching from the Arctic Ocean to the Gulf of Mexico, so that only its northern portion lies in Canada. It is the elevated bed of a carboniferous sea, and from a breadth of 800 miles at the international boundary it is gradually narrowed toward the north by the westerly trend of the Laurentian plateau and broken into by subsidiary ranges of the Rocky Mountains. Still farther north, where it ter¬ minates at the Arctic Ocean, it again expands to a width of about 300 miles. There are three steppes of different elevations in this great plain, rising from east to west, and the general slope is from the southwest downward to the east and north. IV. The fourth great region, the mountain belt, is also of vast extent, being traceable in greater or lesser width from the Tierra del Fuego, at the extremity of South America, to the farthest western point of Alaska. In Canada this mountain, or Cordilleran, region attains a breadth of

about 400 miles, the greatest average elevation being in the southern portion. The Rocky Mountains, the most easterly range, are paralleled by a succession of smaller ranges, the most westerly of which is represented by the mountains of Vancouver Island and the Queen Charlotte Islands. The geological age of this division is more ancient than that of the central plain, and the changes in the crust have been violent and recent, resulting in the unheaval of the Rocky Mountains, the youngest of the ranges of the Cordilleran System.

Altitudes and Slopes. — The greatest alti¬ tudes in Canada are in the Saint Elias range of mountains, a small group near the Alaska fron¬

tier, not far from the Pacific Ocean. Mount Logan is the highest of these and is estimated at 19,539 feet. The next greatest elevations are in the southern portion of the Rocky Mountains and the parallel ranges immediately to the west, where several peaks exceed 12,000 feet, although only one, Mount Robson, possibly reaches 13,500. The height of the ranges west of the Rocky Mountains becomes less and less as they approach the Pacific Ocean, and in Vancouver Island the highest peak is under 7,500 feet. The next greatest altitudes are in the extreme east of the Laurentian plateau, in northern Labrador, where a range of hills occurs, bor¬ dering on the Atlantic Ocean, which attains a height of 6,000 feet. Elsewhere in Labrador the Laurentian plateau seldom exceeds 1,800 feet, and on the west side of Hudson Bay the Laurentian area is lower and gradually merges in the central plain. The Appalachian region contains ranges of low hills nowhere exceeding 4,000 feet, which is only reached in the extrem¬ ity of the Gaspe peninsula. The central plain rises in three steppes from the valley of the Red River, about 800 feet above sea-level, to the foothills of the Rocky Mountains, where it has an extreme elevation of 4,200 feet and an average elevation of about 3,000 feet. The Saint Lawrence lowlands are nowhere much higher than 1,000 feet, or about 500 feet above Lakes Huron and Erie, and sink gradually with the Saint Lawrence River to its mouth.

Water Ways. — The distribution of land and water in Canada has rendered the interior continental area peculiarly accessible. The Gulf of Saint Lawrence is a large arm of the sea affording ready means of entrance from the east, and leads to the broad estuary of the Saint Lawrence River. Exploration naturally fol¬ lowed this highway. No mountain barriers oc¬ cur to obstruct or divert approach by the rivers Saint Lawrence and Ottawa to the chain of great lakes that extend to the very centre of the continent. The length of continuous water¬ way

from the Atlantic Ocean at the Straits of Belle-Isle to the head of Lake Superior is 2,388 miles. Similarly Hudson Bay, a huge land¬ locked sea, communicating with the Atlantic by Hudson Strait, reaches even farther west than Lake Superior to the south of it. It was by way of Hudson Strait and Hudson Bay that the English explorers arrived at the great interior plains, just as the French voyageurs penetrated to the same region by the Saint Lawrence and the Great Lakes. The first systematic attempt at settlement of what is now the province of Manitoba, where the prairies begin, was by way of Hud¬ son Bay, when Lord Selkirk established his colony of Highlanders at the junction of the Assiniboine and Red rivers in the first years of the 19th century. Two great waterways are found in the central area leading up from Hud¬ son Bay and from the Arctic Ocean to the very base of the Rocky Mountains. These are the Nelson-Saskatchewan and the Mackenzie-Atha- basaca river systems, both of which were well-traveled highways for voyageurs and fur-trad¬ ers long before settlements along the Saint Lawrence Valley had reached the Ontario pen¬ insula. In the Appalachian region there is one river of considerable length, the Saint John, which flows across the ranges into the Bay of Fundy. The mountain region possesses

its great rivers in the Columbia, the Fraser and the Yukon, all of which originate at the western base of the Rocky Mountains and empty into the Pacific. But the rivers of this region are obstructed by numerous and fierce rapids and have not afforded the same facilities for naviga¬ tion as the rivers of the central and eastern areas. In recent years, however, the Yukon has become a great highway leading to the gold¬ fields of Alaska and the Yukon Territory.

Climate and Vegetable Productions. — The climate of Canada has the usual character¬ istics of a continental climate in its extremes of heat and cold, but the presence of vast bodies of water, Hudson Bay and the Great Lakes, in the very heart of the continent, has introduced mod¬ ifications of temperature which differentiate Canada from other great continental areas. Thus, the Laurentian lowlands enjoy a tem¬

perate and fairly equable climate, and are wholly free from periods of drought. The central prairies, moreover, though subject to extremes of temperature, obtain sufficient moisture for growing wheat, except in the ex¬ treme southwest portion. Here an area of about 20,000 square miles forms part of the semi-arid region which has so great an exten¬ sion south of the international boundary. The grassy plains are liable to frosts in the early and late summer, perhaps in consequence of the general slope down toward the Arctic Ocean, with no intervening chain of mountains. It has been found, however, that where the ground has been broken up for agriculture over consider¬ able areas these unseasonable frosts do not oc¬ cur, and at the same time there is a marked tendency to an increase in the average precipita¬ tion. The western portion of the central plain enjoys milder winters than the eastern, owing to the phenomenon known as Chinook winds, which cross the mountain ranges from the west and descend upon the plain as warm, dry winds, evaporating moisture and raising the temperature. This contrast is even more marked in the north than in the south of the area. In the mountain region great variations are presented both in temperature and humidity. The islands and the coast of the mainland up to the crest of the first range of mountains upon it have a very mild and very moist climate. The western slopes of the ranges farther inland also receive abundant rainfall and are clothed with dense forests. But the interior plateau receives very little moisture, and its altitude and dryness combine to give it extremes of temperature in summer and winter. The northern part of the Laurentian plateau on either side of Hudson Bay is, for climatic reasons, almost uninhabit¬ able. The forests that clothe the southern por¬ tion of the same plateau give place to grasses, sedges and mosses, and ice remains in the rivers and lakes throughout the brief summer. This tundra region, some of which has not yet been explored, covers an area of perhaps 200,000 square miles west of Hudson Bay, where it goes under the name of (<the Barren Grounds, }) and half as much east of Hudson Bay, in the Labra¬ dor peninsula. The climate of the Appalachian region is influenced by its proximity to the At¬ lantic Ocean, and presents no peculiarities. There are three well-defined belts of vegetation in eastern and central Canada. The southern part of the central plain is a region of treeless, grassy prairies, once the home of countless

buffalo. In the extreme north, on either side of Hudson Bay are the Arctic tundras, the Barren Grounds, where only mosses and other lower forms of vegetable life can exist, afford¬ ing food to enormous herds of caribou and a smaller number of musk-oxen. Between these

two treeless regions is the great forest belt which covers the whole of eastern Canada and extends across the central plain to the moun¬ tains, verging continually north in consequence of the decreasing severity of the winters, until in the valley of the Mackenzie River it reaches beyond the Arctic circle. In the northerly lat¬ itudes the forest is composed chiefly of pine, spruces, tamarack and aspen poplar, but in its southern extension, and especially in the Saint Lawrence lowlands and the Appalachian region, deciduous trees, such as the maple, beech and ash, are mingled with the conifers and even replace them in the river valleys. Before the advent of the white men, a dense growth of forest covered the Appalachian region and the Laurentian lowlands, which have since been cleared to a great extent and submitted to agri¬ cultural processes. This development is still going on, settlement is pushed farther and farther north, and forest is giving place to farms wherever the soil is suitable. The prairie region is being rapidly converted to agricultural uses, even the semi-arid corner being capable of cultivation by the aid of irrigation. The moun¬ tain region, throughout almost its entire extent, is heavily wooded near the coast and on the western slopes of the inland range. The enor¬ mous height and girth to which trees of some species, such as the Douglas fir and western cedar, may attain are well known. The river valleys and alluvial flats of the southern portion are suitable for agriculture, but the interior plateau does not receive enough moisture and is given over to ranching.

II. The Provinces. — [For the sake of con¬ venience and completeness, the physical features and topography of the provinces comprising the Dominion are here briefly treated. The articles in this work on the individual provinces should be consulted for further information.]

Nova Scotia. — The province of Nova Sco¬ tia, the most southerly member of the Appala¬ chian region in Canada, consists of a peninsula about 250 miles long and 100 at its greatest breadth, and its continuation, the island of Cape Breton, which is separated from Nova Scotia proper by a narrow strait, the Gut of Canso. More or less parallel to the length of the pen¬ insula run ranges of low hills, which near the Atlantic become mere ridges of rock. The country on this, the southern side of the prov¬ ince, is wild and rocky, covered with forests and dotted with small lakes. Agriculture is confined to the alluvial land along the river valleys, and the villages and towns for the most part are situated on the coast at the heads of the numerous bays which here indent it. The north shore of the peninsula is of a totally dif¬ ferent aspect. The extended ridge of trap which forms the southern shore of the Bay of Fundy is broken into in a few places only, and long narrow bays are thus formed, into which the tide rushes with

great force. The chief agri¬ cultural district of the province is behind this protecting wall of trap, and the hills beyond are covered with fertile soil and clothed to their tops with dense hardwood forests. The marshes

formed by the enormous tides of Minas Basin and Chignecto Bay, the two heads of the Bay of Fundy, have been reclaimed and diked, and form a rich pasture country. The orchards of the sheltered valleys on this side of the penin¬ sula are celebrated. The chief region of min¬ ing and industrial development is the northeast portion, facing Northumberland Strait and the Gulf of Saint Lawrence. Here coal and iron are extensively worked; gypsum also occurs in large quantities and is exported principally from the district around Minas Basin. Gold, on the other hand, is found in the wild rocky region along the southern or Atlantic coast, and is mined on this side from one end of the peninsula to the other. The fisheries of Nova Scotia have always been an important industry, carried on from every harbor of the province. Cape Breton Island, of illegular shape, about 100 miles long by 80 broad, forms part of the province of Nova Scotia. An arm of the sea, entering from the northeast, almost divides the island in two; actual division is accomplished by a canal across the narrow neck of land. A great part of the island to the north is a high forest-covered table-land, and the centre about the Bras d'Or channel is the most picturesque district in the province. At the east side occur the coal and iron ore deposits which are making Sydney, its chief town, one of the industrial centres of Canada.

New Brunswick. — The second in import¬ ance of the maritime provinces is New Bruns¬ wick, occupying the centre of the Appalachian region of Canada. It forms an irregular square of about 200 miles in extreme length and breadth, bounded on the north by the Bay of Chaleur and the province of Quebec, on the east by the Gulf of Saint Lawrence and North¬ umberland Strait, on the south by Nova Scotia (at the isthmus) and the Bay of Fundy, and on the west by the State of Maine and the province of Quebec. Two lines of hills traverse

the province; one follows the coastline of the Bay of Fundy, the other, starting from the same southwestern angle, runs diagonally across the province to the northeast. Between the two lies a triangular lowlying plain, sloping down to the east coast, and beyond the diagonal range of hills the northwest region of the province is a rolling country, fertile and well suited for agriculture, but at present covered with forests. New Brunswick is a country of fine rivers, which have cut broad valleys through the soft rocks of the interior and afford access from the seacoast to the innermost recesses of the prov¬ ince. The Saint John River flows south from the extreme northwest angle, entering the Bay of Fundy not much more than 50 miles from the international boundary. The Saint Croix, forming the boundary, also falls into the Bay of Fundy. The Restigouche, flowing into the Bay of Chaleur, the Miramichi into Miramichi Bay in the Gulf of Saint Lawrence, and the Richibucto, into Northumberland Strait, are the other large rivers. A dense forest, chiefly spruce, still covers most of the province, and lumbering is the principal industry. The fish¬ eries are second in importance. Agriculture follows the river valleys mainly, but the marsh lands at the head of the Bay of Fundy have been converted into rich pastures, and new land in the interior is continually being brought under cultivation. In time, no doubt, the whole

of the level area in the centre of the province will be devoted to agriculture, when the forest wealth has been exhausted in that region. The mineral resources of New Brunswick have not yet been developed to any extent.

Prince Edward Island. — Prince Edward Island, the smallest province of the Dominion, is an island in the Gulf of Saint Lawrence, 145 miles long, with an extreme breadth of about 30 miles, separated from New Brunswick and Nova Scotia by Northumberland Strait, which varies from 9 to 30 miles in width. The curv¬ ing coast on the north side of the island is broken by a deep bay with a narrow entrance, and terminates in long, narrow' points. The south coast is very irregular, presenting a suc¬ cession of bays and inlets. The island has a uniform, gently undulating surface, everywhere fertile, and for the most part cleared of woods and brought under cultivation.

Quebec. — The oldest province, Quebec, for¬ merly a French colony, is still largely inhabited by French-speaking people, although in the extreme south a group of counties, commonly known as the Eastern Townships, were settled almost exclusively by English-speaking colo¬

nists. The province of Quebec is the largest in Canada. It now embraces the whole of the Labrador Peninsula except the strip of eastern coast which belongs to Newfoundland. Its western boundary is Hudson Bay, James Bay and a north and south line from near the southern extremity of James Bay to the head of Lake Timiskaming, an expansion of the upper Ottawa River. The southern boundary is irregular, consisting of the Ottawa River nearly to its mouth, then the 45th parallel of latitude, and the rest of the international boundary eastward as far as New Brunswick, and finally the Restigouche River and the Bay of Chaleur separating it from that province. The island of Anticosti and the Magdalen group in the Gulf of Saint Lawrence belong to Quebec. The whole of the valley of the Saint Lawrence River, from a short distance above Montreal, lies within its boundaries and constitutes, with the Eastern townships, the chief agricultural district. The valleys of the principal affluents of the Saint Lawrence are also cultivated, and two new agricultural dis¬ tricts, that watered by the upper Ottawa and the country about Lake Saint John, out of which flows the Saguenay River, are receiving a great influx of settlers. Except for the northern portion of the Labrador peninsula and the area in the extreme northwest of the province, which drains into James Bay, all the rivers empty into the Saint Lawrence River or Gulf. From the north come the Ottawa, the Saint Maurice and the Saguenay, and many others of less note farther east, while from the south the only ones of importance are the Richelieu, flowing from Lake Champlain, and the Saint Charles, emptying nearly opposite the city of Quebec. The general slope of the country is thus apparent. The southern edge of the Laurentian plateau, which runs not far from the Ottawa and Saint Lawrence rivers, comes quite down to the coast of the Gulf. South of the Saint Lawrence River the fertile lowlands are bounded by the ranges of the Appalachian system, which approach ever nearer to the river until, in the Gaspe peninsula, they also reach the water's edge. Next to agri-CANADA — GEOGRAPHY (1)

culture the chief industry of the province is lumbering. The immense extent of the forests on the Laurentian plateau provides a source of supply that is virtually inexhaustible, and the recent development of the manufacture of pulpwood has given new value to the smaller and softer trees such as the spruce. The mineral wealth of Quebec is at . present undeveloped. Recent geological investigations have proved the

existence of copper, platinum and antimony in the southern part of the province. Asbestos of the best quality is found in the southeastern part and virtually constitutes the world's sole supply of the mineral. Mica is also mined.

Ontario. — The province adjoining Quebec on the west, Ontario, is the most populous and wealthy of Canada. It extends from the prov¬ ince of Quebec to Lake of the Woods. It is bounded by the province of Quebec from its southeastern extremity on the Saint Lawrence River to James Bay in the north. Its north¬ ern boundary is the waters of James Bay and Hudson Bay. On the west a wholly artificial boundary line separates it from the province of Manitoba, consisting of the boundary of the old province of Manitoba running due north from the Lake of the Woods, and then a line running northeast from the northeasterly corner of the old Manitoba to Hudson Bay where the 89th meridian of* west longitude inter¬ sects the shore of the Bay. The southern boundary is the international boundary formed by the chain of Great Lakes and the Saint Lawrence River. The whole of the province is thus to the north of the great waterway, but as both the Great Lakes and the Saint Lawrence River in its upper course lie at the very south¬ ern limit of the area which they drain, Ontario contains all the tributary rivers of the Saint Lawrence system as far down as the Ottawa River. These, however, are not as numerous as might be expected, for the height of land between the Hudson Bay and Lake Superior slopes runs very near to the lake. Almost all the northern part of the province, therefore, drains into James Bay and Hudson Bay by manv rivers of fair size, of which the chief are the Severn, Albany and Moose rivers and their tributaries. The Nipigon, issuing from Lake Nipigon, flows south, exceptionally, into Lake Superior. In the extreme west a corner of the province belongs to the Lake Winnipeg drain¬ age area. There are no ranges of mountains in Ontario. The Laurentian plateau includes the northern half of the province, while the rest is part of the Saint Lawrence lowlands. The lowlands, and especially their western ex¬ tremity, the peninsula between Lakes Huron, Erie and Ontario, are the chief agricultural dis¬ trict. The peninsula is favored with an ex¬ cellent climate and soil, and its southern por¬ tion is the principal fruit-growing district in Canada, the chief products being peaches, grapes, strawberries and apples. Hops, tobacco and flax are also cultivated successfully in this part of Ontario. The northern part of the province beyond Lakes Huron and Superior has recently begun to be opened up, and its agricultural possibilities are being developed with great rapidity. Lumbering has always been an important industry, but the available timber limits producing pine have begun to show signs of exhaustion. The

increasing de¬ mand for wood-pulp has however given new

value to the great northern belt of forest, which is mainly spruce. Ottawa is the chief centre of the manufacture of lumber; its situation on the OttaAva, the great log-carrier of two prov¬ inces, and the magnificent water-power of the Chaudiere Falls, utilized for operating the saw¬ mills, give it advantages over all competitors. The mineral resources of Ontario have begun to be turned to account. In the western part of the Ontario peninsula petroleum wells have long been worked but the production is now diminished. The comparatively rare metal, corundum, occurs in southern Ontario. The province ranks third among the silver-produc¬ ing countries of the world, owing to the recent discoveries in the Cobalt district. Copper is mined in increasing quantities in the Sudbury district, which is also rich in nickel. In produc¬ tion of nickel Ontario now ranks easily first among countries. Iron is found in many dif¬ ferent localities but the ore is principally mined in the Algoma district, northeast of Lake Superior. The water-power of the rapids in the Saint Mary River connecting lakes Superior and Huron has been utilized, and great iron and steel manufactures have been established at the town of Sault *Ste.* Marie.

Manitoba. — The next province westward is Manitoba. It extends from the inter¬ national boundary on the south to Hudson Bay and the 60th parallel of latitude on the north. It is bounded on the east by Ontario and on the west by a line running north and south, coinciding with long. 102° in its northern portion as far as lat. 56°, but from there south trending slightly eastward until it intersects the international boundary in long. 101° 20'. The southern part of the province is one of the chief wheat-growing districts of Canada. It consists of a perfectly level plain, the alluvial bed of a former lake, through which winds the Red River. This first prairie steppe is bounded on the east by the Laurentian plateau which covers all the eastern part of Manitoba beyond Lake Winnipeg. Westward, an escarpment, nowhere rising higher than 500 feet above the level of the first steppe, runs in a northwesterly direction and marks the beginning of the second prairie steppe, which presents a more undulat¬ ing surface. The area covered by water is considerable. Lake Winnipeg, a very large lake, is within the boundaries of Manitoba, as are also Lake Manitoba and Lake Winnipegosis, with others of smaller size. The chief river of the southern part of the province is the Red River which enters Manitoba from the south and empties into Lake Winnipeg. At Winnipeg the Red River is joined from the west by the Assiniboine, which with its affluents waters all the southwestern part of the province. The

northern portion of the province, added in 1912, contains the lower course of the Churchill River and the whole of the Nelson River which flows out of Lake Winnipeg. These are the two largest rivers of the province. The Saskatchewan also, which flows into Lake Winnipeg, and thus may be considered as the upper course of the Nelson River, passes through Manitoba in the latter part of its lower course. The predominating interest of the province is agriculture.. The large terri¬ tory recently added to the area is forested to a considerable extent and may prove to con¬ tain valuable minerals. But at present both

lumbering and mineral industries in the prov¬ ince are in their infancy.

Saskatchewan. — The province of Saskatche¬ wan, established by Act of Parliament in 1905, is bounded on the south by the international boundary and on the north by the 60th parallel of latitude, and extends from the Manitoba boundary westward as far as the 110th meridian. It is thus a huge rectangle about equally divided between prairie and wooded country, the limit of each lying northwest and southeast across the province. Most of the northeastern half is comprised within the Laurentian area, where the forest is scantier and the trees more stunted than in the belt of wood¬ land contiguous to the prairie section. In the northern portion there are several very large lakes, such as Lake Athabasca, Rein Deer Lake, Wollaston Lake, and the chain of lakes which constitute the head waters and upper course of the Churchill River. The Saskatchewan River flows through the middle region of the prov¬ ince, and the Qu'Appelle River waters the prairie section farther south. The general slope being from west to east, all the rivers flow across the province to the east or northeast, except in the extreme northwest where the slope is north toward Lake Athabasca and the Mackenzie River basin. The prairie section comprises all of the second prairie steppe not included in Manitoba and a portion of the third and highest. The escarpment of the latter runs northwest, appearing from the lower level like a range of low hills. When the crest is reached the third socalled steppe is found to be

a much more irregular surface than the rolling plain below. Certain portions of it form small isolated plateaus, standing as high as 2,000 feet above the surrounding country. Saskatchewan is emphatically an agricultural province. The production of wheat is even now more than twice that of Manitoba, and although settlement has been extraordinarily rapid in the southern or prairie part there are still large areas in the central and more wooded portion which are just as well adapted for cultivation of grain or stock raising. Lignite coal is almost the only mineral known and it is mined in the southern part of the province to some extent.

Alberta. — Adjoining Saskatchewan on the west is a second province, Alberta, established by Act of Parliament in 1905. Like Saskatche¬ wan it extends from the international boundary to the 60th parallel of latitude. Its western limit is the summit line of the Rocky Mountains from the international boundary to the point where that line crosses the 120th meridian of longitude, very nearly in lat. 54°, and from this point the 120th meridian to lat. 60°. Alberta, like Saskatchewan, is divided almost equally between prairie in the south and woodland in the north. Its prairie land is altogether within the limits of the third prairie steppe described above ; much of it constitutes a semi-arid dis¬ trict, not suitable for agriculture except by the aid of irrigation, but making excellent pasture-land. The extreme northeastern corner of the province touches upon the rocky Laurentian area, but the rest of the northern half of the province is well-wooded country, broken by prairie openings, with abundant streams and small lakes, suitable alike for grazing or crops. The Peace and Athabasca are the main rivers in this half of the province, while the North

and South Saskatchewan rivers with numerous small affluents rising amid the mountains and foothills cut their channels deeply into the rolling prairie of the southern portion. The climate of Northern Alberta is much milder than the latitude would indicate, and wheat can be grown successfully in the valley of the Peace River near the northern boundary of the province. Besides agricultural possibilities, there are mineral resources of great value as yet only partially developed. Coal is found throughout a large area, and in various for¬ mation, from anthracite to lignite. Bitumen (in the <(tar sands® of northern Alberta), oil and natural gas are also important assets.

British Columbia. — British Columbia oc¬ cupies the whole of the mountain region from the international boundary to lat. 60°. It also cuts off a portion of the central plain, where the eastern boundary of

the province leaves the Rocky Mountains and runs north along long. 120°. Vancouver Island and the other islands off the mainland are included in the bounds of the province. West of the broad chain of the Rocky Mountains, which form the eastern boundary, three older ranges run approximately north and south and are thus confined to the southern part of the province, being extin¬ guished northward by the more recent upheaval of the Rockies, whose axis inclines to north¬ west. These smaller and lower ranges are, in order from east to west the Purcell, the Sel¬ kirk and the Columbia systems. Near and parallel to the Pacific coast another broad mountain system, the Coast Range, extends northward into Yukon Territory and Alaska, where it reaches its greatest elevation. Be¬ tween the Coast and Columbia ranges there is the interior plateau, about 100 miles in breadth and from 2,000 to 3,000 feet in elevation. To the north it is cut off by transverse ranges of mountains. Vancouver Island and the Queen Charlotte islands are the unsubmerged remains of a subsidiary mountain range west of the Coast Range. The rivers and lakes of British Columbia occur in deep valleys between the ranges. The Columbia River and its chief affluent, the Kootenay, take a remarkable course through the valleys between all the eastern ranges, running north and south in great loops. The lake-like expansions of both rivers form the chief navigable inland waters of British Columbia. The Fraser River which rises in the Rocky Mountains flows at first north, but soon turns westward round the head of the Cariboo Mountains, and finally runs almost due south cutting a deep channel in the interior plateau. It breaks through the Coast Range and reaches the sea not far from the international boundary. Its chief affluent is the Thompson. Both are very turbulent streams and form an additional obstacle rather than an assistance to inland communication. The northern half of the province is still very imperfectly explored. In a central elevated plateau many rivers take their rise, some flowing south to join the Fraser, others, such as the Liard, east into the Mackenzie basin, others again like the Skeena and Stikine westward into the Pacific Ocean. What British Columbia lacks in a system of navigable inland waterways is more than made up by its deeply indented coast line, where many magnificent harbors for sea-going ves¬ sels of any draught are available, from Port

Simpson and Prince Rupert at the north to Burrard Inlet at the south

extremity. The coast of Vancouver Island is also well sup¬ plied with harbors. British Columbia, al¬ though so mountainous, is not without its agri¬ cultural industries. The interior plateau forms a good ranching country, and in the sheltered valleys, where irrigation can be introduced, fruit farms are very successful. Lumbering is one of the great industries of the province, and the mineral wealth is very great. Gold has been found in many localities from the international boundary to Atlin district on the borders of Yukon Territory. Placer mining alone has been carried on in most of these places, but in the Kootenay district in the extreme south, where communication by railway and water is easy, scientific treatment of ores has been practised for some years. The metals, besides gold, produced by this method are silver, lead and copper. The exceedingly heavy growth of timber has added to the difficulty of making roads and even of prospecting. The most im¬ portant mining industry, however, is coal¬ mining. Vast deposits have been explored and are being worked in various parts of the prov¬ ince, but chiefly on Vancouver Island at Nanaimo and Comox and in the Rocky Moun¬ tains at Crow's Nest Pass. Another great in¬ dustry of British Columbia is the salmon-fishery, which is carried on chiefly at the mouth and in the. lower reaches of the Fraser River. Canneries are also established at the mouths of the Naas, Skeena and other rivers.

Yukon. — The Territory of Yukon, under the government of a governor and an executive council, in part elective, lies north of British Columbia and is bounded on the west by Alaska. It has also a northern coastline on the Arctic Ocean, but a comparatively short one, its eastern boundary being an irregular line sloping from southeast to northwest, for the most part following the easternmost range of the Rockies. It does not lie entirely outside of the Mackenzie river basin, for the mountain boundary is low and the upper waters of many streams tributary to the Liard River, which flows into the Mackenzie River, take their rise in the southeast part of the Territory and flow south. In the north portion also the Peel River, flowing parallel to the Mackenzie, is contained within the boundaries of the Territory for most of its course, but bursts through the mountain barrier near its mouth and empties into the Mackenzie where the delta of the latter begins. The great part of Territory, however, is watered by the Yukon and its tribu¬ taries, the Teslin, Lewes, Pelly, Stewart and Klondike rivers, all flowing from southeast or east, and in the northern portion the Porcupine, which begins by flowing northeast as if to join the Mackenzie, but turns sharply and flows due west until it crosses the boundary into Alaska. The mountain system of the Territory is the series of parallel ranges of the Rockies, de¬ creasing in elevation as

they run further north and turning eastward into the Alaskan penin¬ sula.

The Northwest Territories. — The re¬ mainder of Canada, north of the provinces and east of the Yukon Territory, including the islands in the Arctic Ocean, is broadly de¬ scribed as the Northwest Territories, the for¬ mer provisional districts of Mackenzie, Kee-

watin and Franklin having been discontinued. This vast country is under the direct control of the Dominion government. It is very sparsely populated by Indians and Eskimos, together with a few white trappers and traders in the employ of the Hudson's Bay Company, and missionaries. The valley of the Mackenzie River in the west is fertile and covered with trees almost to the very mouth of the river in the Arctic Ocean. The climate in that region is not so severe as the high latitudes would seem to imply; the summers, though short, are hot and the summer days long, and vegetables and some cereals have been raised by Hudson's Bay Company's agents at most of their posts in the district. Coal moreover occurs and also pitch, petroleum and natural gas. The fur trade, wffiich is still a considerable industry, is carried on over the whole area covered by the sub-Arctic forest, and much of this vast north¬ ern territory will remain the home of many species of fur-bearing animals as long as that forest remains to shelter them. But the north¬ ern portions of the country on each side of Hudson Bay must remain a hunting country only. The Arctic archipelago has at present only a sentimental value, although the whale fishery is important and there are undeveloped salmon and other fisheries along the coasts of potential wealth. The series of daring British explorers who, in their search for a northwest passage, discovered the various islands and claimed them for British territory, are com¬ memorated in the names given to the islands themselves and to the principal bays, straits and headlands. For ordinary purposes and for men of the white race they are utterly unin¬ habitable.

Bibliography. — Amundsen, R., (The North¬ west Passage* (London 1908) ; Bradley, A. G., (Canada in the Twentieth Century* (London 1908) ; Burpee, L. J., (The Search for the Western Sea) (London 1908) ; Dawson, S. E., (The Saint Lawrence Basin) (London 1905) ; Gosling, W. G., (Labrador) (London 1910) ; Greswell, W. P., (Geography of the Dominion of Canada and Newfoundland* (London 1891) ; Mair, C., (Through the Mackenzie Basin* (Toronto 1908) ; Metin, A., (La Colombie britannique* (Paris 1908) ; Morice, A. G., (His¬ tory of the Northern Interior of British Columbia) (Toronto 1906) ; Seton, E. T.,

(The Arctic Prairies) (London 1912) ; Tyrell, J. W., (Across the Sub-Arctics of Canada* (new ed., Toronto 1908) ; (Annual Reports of the Geo¬ logical Survey of Canada) (Ottawa 1915) ; (Atlas of Canada* (rev. ed., published under the direction of the Department of the Interior, Ottawa 1915) ; (Canada Year Book, 1915) (Ottawa 1915) ; (Fifth Census of Canada for 191 P (Report on Area and Population by A. Blue* (Ottawa 1912); (Reports.of the Ontario Bureau of Mines) (Toronto 1915) ; Sanford's Compendium North America* (Vol. I, (Canada) by H. M. Ami, 2d ed., London 1915).

H. H. Langton,

Editorial Staff, Rcviciv of Historical Publica¬ tions Relating to Canada.

2. OUTLINE HISTORY AND PO¬ LITICAL DEVELOPMENT (1534 to 1918). When the Dominion of Canada came into existence in 1867 the word 'Canadaˆ re-* ceived a wholly new signification. Its origin is

doubtful but it was applied loosely in the early time to the regions occupied by France on the Saint Lawrence, called by the French themselves New France. When in 1763 France surrendered her North American territory to England the term ((Canada® was commonly used for the new British dominions. In 1774 these dominions, including part of the Canadian Northwest and what is now the northern tier of western Ameri¬ can States, were officially called the <(Province of Quebec.® Canada does not appear techni¬ cally until 1791, when the name was used in a constitution given to Upper and Lower Canada, practically the Quebec and Ontario of the present time. Later these provinces were known as Canada East and Canada West. Not until 1867 did Nova Scotia and New Brunswick be¬ come a part of Canada. In considering the his¬ tory of Canada as we now understand the word, it is important to remember that it includes a separate record of detached provinces, Nova Scotia, New Brunswick, Lower Canada, Upper Canada, etc., until 1867.

In the succeeding articles the epochs in Canadian development are treated in detail. It is sufficient here to outline the chief phases of Canada's history. The first of these, the age of discovery in the 16th and early 17th centuries, has received much attention, but there is still

great obscurity as to the range of French effort on the Saint Lawrence. Jacques Cartier (q.v.) and Champlain (q.v.) are the most honored names in this pioneer work. Though few de¬ tails are known, an extensive fur trade and fishing industry existed in the Saint Lawrence region long before the end of the 16th century. Early in the 17th century French trading com¬ panies were fighting for the monopoly of this trade.

The second epoch is that of French coloniza¬ tion and exploration until the final struggle with Britain for the country. When the first pioneer efforts were over France undertook the serious work of colonization, with Quebec as her centre of influence. Her aim was to transplant French social life to North America. Huge grants of land were given to seigniors who were to play the parts of lords in Canada, with vassals look¬ ing to them for light and leading and paying rent for the land which they occupied. The system was uncongenial to the new world, but it survived during the whole period of French supremacy and is a picturesque and interesting if not a successful feature of French coloniza¬ tion. See article Seigniorial Tenure.

The first permanent settlement apart from trading posts occupied only in the summer was at Port Royal, now Annapolis, in Nova Scotia. Here the French planned really to till the soil and develop the country. From the first the colony had a terrible struggle for life. In 1613 the English from Virginia destroyed it and, after it was restored to France in 1632, the adjacent American colonies were always planning to drive out the French. After a chequered his¬ tory they at last succeeded in 1710, during the reign of Anne, in taking final possession of the fort, and it became Annapolis. The quiet vil¬ lage of the present day was thus the object of strife between two nations for well nigh 100 years.

Samuel de Champlain was one of the pioneers at Port Royal, but in 1608 he turned to the Saint Lawrence and made the beginnings

of Quebec, long the centre of political and commercial life in Canada. By instinct Cham¬ plain was an explorer. Like others of that and a later time he hoped that the Saint Lawrence would in some way lead to a water route to China. To Lake Huron and Lake Ontario Champlain penetrated, but the obstacles were enormous. The Iroquois Indians were hostile to the French from the first, and it is hardly strange that with their menace added to the natural difficulties Champlain could do but little of lift the veil from the North American interior.

Nor was he left free from European rivals. The English followed the French to the Saint Lawrence. Quebec they attacked and captured in 1629, and over it the English flag floated for three years. When in 1632 France recovered the place the fortunes of Canada were com¬ mitted to a great commercial company. This company of <(One Hundred Associates® was to be lord of the land and to have in its hands the work both of trade and of settlement. In France it had the powerful support of Cardinal Riche¬ lieu, but when at Quebec in 1635 Champlain died, New France lost its ablest leader, and the company the most effective exponent of its interests. In the end it failed. Both in India and in America in the 17th century the French commercial companies had no success while their English and Dutch rivals succeeded.

After 1635 Canada was the scene of varied activity. It was an age of religious zeal in Europe, and the Jesuit and other missionaries planned to convert and control the savage na¬ tive tribes of the country. In what is now northern New York, in Ontario, and in Quebec the missionaries did heroic work. Since the French missionaries were the friends of the Huron tribe, the relentless Iroquois, bent on destroying the Hurons, pursued too, the French. By 1649 the Huron settlements and the French missions were alike destroyed, and the French were driven back for a time to their base at Quebec. They had founded Montreal in 1642, but it was long only a fortified outpost to check the Iroquois.

But missions represent only one, if the dom¬ inant, phase of French interest. The great in¬ terior exercised all the fascination of the un¬ known upon the chivalrous minds of the French explorers. Radisson, La Salle, Marquette, Joliet are only the best known of the leaders who penetrated to the interior before 1700. On Lake Huron, Lake Michigan, Lake Superior, on the Mississippi, even in the far west of Canada and the United States the sur¬ vival of French names to this day bears witness to the activity of these explorers. It was a French Canadian, La Verendrye, who first advanced so far across the prairie as to justify a belief, still held by many, that he came in sight of the Rocky Mountains. But this was not until 1743, and it now appears likely that he did not advance beyond the Black Hills in South Dakota.
.

Between missions and discovery the slow and laborious work of colonization was in danger of being forgotten, but there grew up gradually on both sides ojt the Saint Lawrence and near the mouths of its tributaries, colonies of French farmers. The river was their highway. For protection from the Indians they lived as close together

as possible and so they divided the land

into long narrow strips with the houses stretch¬ ing in a line on the river front. To the present day it is the most conspicuous feature of the French Canadian farms. Colonization was slow work. Adventurous Frenchmen preferred the wild life of the forest, and it was so difficult to attract settlers that in 1700 there were hardly more than 6,000 Europeans in the whole of New France. They enjoyed no semblance of political liberty. Between an aggressive church and a governor with the ideals of Louis XIV, the subjection of the French habitant is in striking contrast with the liberty^ of New England. To¬ ward the end of the 17th century New France was committed to a very able Governor, Frontenac (q.v.). He had a definite program. He would curb the Church, which aimed to exclude settlement from the interior so that the mission¬ aries might be alone with and thus continue to control the Indian tribes ; he would hold back the English, build a chain of forts from the Saint Lawrence by the Great Lakes and the Ohio to the mouth of the Mississippi to shut them out from the West, and finally drive them into the sea. It was a great plan, but it required resources beyond anything that France could command. In Europe she was fighting William III of England and his allies, and needed all the strength she could muster. So Frontenac died in 1698 with his plans unrealized, but he had done a definite work. The mission stage was ended in New France. Entrenched on the Saint Lawrence and soon on the Mississippi, France was ready to engage in the supreme struggle to make the interior French and to build up a great transatlantic empire for the glory of the French nation.

The next epoch in Canada's history covers the prolonged struggle resulting in the British conquest. Probably impossible of realization in any case, the plan of a French empire in America was ended by Louis XIV's misfortunes in Europe. With a great alliance against him, he was obliged to make the Peace of Utrecht (q.v.) in 1713. In this he surrendered his claims to Hudson Bay, to Newfoundland and to Nova Scotia. This was the beginning of the end. Though in Cape Breton, France built a great fortress, Louisbourg, so as to command the Saint Lawrence, and though she still held the country tributary to Quebec, the odds against her were too great. Walpole managed to keep Great

Britain at peace until 1744, but when war then broke out France and England engaged in a final struggle for North America. The Treaty of Aix-La-Chapelle (q.v.), in 1748, did not really bring peace. Both sides were preparing steadily for renewed conflict. On the Ohio, on the Atlantic Coast, on the Great Lakes, on the Saint Lawrence, a deadly conflict went on after 1755, and when on a September day in 1759 Wolfe (q.v.) defeated Montcalm (q.v.) before Quebec, the issue was at last decided. By the Treaty of Paris . (q.v.) in 1763, France sur¬ rendered her dominion of New France to Great Britain.

The 4th epoch in Canadian history covers British rule from 1763 to the Confederation of the Provinces in 1867. After the conquest in 1763, Canada was for a time governed by the British without creating a special constitution for the country, and not until 1774 did the Quebec Act (q.v.) provide for a permanent system. The Quebec Act played a great part in

both American and Canadian history. It set up a despotic system of government, and it aimed to bring the whole western country under this despotic regime at Quebec. While introducing British criminal law in the country, it re-estab¬ lished the French civil law. The seigniors re¬ tained their feudal rights, the Church was given legal power to collect the tithe.

In the English colonies the Quebec Act caused discontent. They did not desire despot¬ ism as a neighbor, they did not wish to be checked in the West, they disliked the legal establishment of Roman Catholicism, and when the colonies revolted the Quebec Act was one of their grievances. They resolved to attempt the overthrow of British rule in Canada and allied, as they hoped, with the conquered French rising against their new masters they planned to make the revolt continental in character. But in 1775 and 1776 the American army failed to take Quebec; and some of the French showed fight on behalf of Great Britain. Soon the plan to drive the British from Canada was abandoned and the country remained firm in its British allegiance.

Probably with this failure the die was cast finally; it is certainly true that the intervening seven score years have never seen any real prospect of the union of Canada with the United States. When the Loyalists, driven from the United States, found homes in Canada they treasured bitter memories of the revolutionary struggle and rendered the prospect of union even more remote. But once settled in Canada these refugees from the United States demanded the self-government

which they had enjoyed at home, and at last in 1791 the British Parliament established Lower Canada and Upper Canada each with a legislature of its own and with some, though not a complete, measure of self-government. In 1812 the United States and Great Britain drifted into war, and the second failure at that time to overthrow British rule in Canada confirmed the results of the defeat be¬ fore Quebec in 1776.

In 1837 there was armed rebellion in the two Canadas. In Upper Canada the inhabitants claimed the complete control of their own affairs that the Colonial Office in London persistently refused, and to vindicate this demand a few took up arms. In Lower Canada there was a war of races. The French majority demanded that they should dominate in the councils of the country. The English minority, allied usually with the governor, resisted this claim, and at length some of the French also appealed to arms. Each revolt failed completely, but the risings threw into a clear light the causes of dis¬ content in Canada and in time a remedy was furnished.

Lord Durham, an English radical Whig, sent out to rule Canada with despotic authority and to restore order, in a very able report, published in 1839, urged that the English province and the French province should be united under one legislature. This was done. In 1841 Canada received a new constitution, and, joined together for the first time, the people of the two prov¬ inces could demand respect and consideration With more than a million people Canada could no longer be treated as the child of the Colonial Office. After a few doubtful years under the new constitution, the Earl of Elgin, the gov¬ ernor-general sent out from England, defi-

nitely, amidst some riotous events in 1849, recognized the supreme authority of the Cana¬ dian Parliament in regard to Canadian affairs. Since that time political warfare in Canada has been between Canadian parties and not between Canada and the Colonial Office.

But the union of the two provinces contained nothing of finality. Lord Durham had hoped that the English would dominate the French. Instead the French asserted themselves and, since each province

equaled the other in the number of its representatives, the work of gov¬ ernment under the party system proved ex¬ tremely difficult. A better political temper was growing up throughout British North America. Once free to control their own affairs the prov¬ inces saw the advantages of union. Their in¬ sight was quickened when in 1866 an advan¬ tageous Reciprocity Treaty with the United States came to an end, and in self-preservation it became necessary to increase the commercial and political strength of the provinces. With surprising rapidity negotiations were success¬ fully concluded between 1864 and 1866, and in 1867 the Dominion of Canada came into exist¬ ence.

The events connected with Confederation furnish a distinct epoch in Canadian history. In the next and concluding epoch the various prov¬ inces have been welded together until a real national life has appeared. The development of Federal government in Canada presents some interesting contrasts with the Federal system in the United States. Sir John Macdonald (q.v.) aimed to make the Federal power strong, the Provincial power relatively weak, and, since his was the master mind that directed Confedera¬ tion, the Canadian constitution reflected his views. The powers of the provinces are strictly defined, the undefined residue remaining with the Federal government. Carrying out his views Macdonald frequently tried to curb the prov¬ inces, and answering him there was a cry for provincial rights. In spite of Macdonald's desires, development in Canada has been rather in the direction of strengthening the authority of the provinces, but it is still true that a prov¬ ince in Canada falls far short of a State of the Union in political authority. The Federal gov¬ ernment can disallow Provincial legislation; it can dismiss a Provincial lieutenant-governor and has done so more than once. But as a result of the experience of half a century, a fairly stable balance between the two jurisdictions has now been reached. During this time a real unity has grown up in Canada, and it makes Canadians, as it long since made Americans, one in sentiment from ocean to ocean. The French-speaking province of Quebec is perhaps a partial exception. But on most great questions of national interest Quebec, too, is at one with the rest of Canada.

Bibliography. — The beginner in Canadian history cannot do better than read A. G. Brad¬ ley's little volume called <Canada> (Home Uni¬ versity Library) and also his larger volume, (Canada in the Twentieth Century,5 which describes present-day conditions. He might substitute the more scientific volumes on Canada in Sir Charles Lucas's historical Geog¬ raphy of the British Colonies> ; (Canada under French Rule,* by Sir Charles Lucas; (Canada under British Rule,5 by Professor Egerton ; and (Canada, Geographical,5 by J. D, Rogers

(Clarendon Press). Professor W. L. Grant's school book, the (History of Canada,5 is the best small textbook (Toronto). Miss Agnes C. Laut's volume (Canada, the Empire of the North5 (Toronto), has imagination and vi¬ vacity.

The most exhaustive general work on Canada is (Canada and Its Provinces) (Toronto), a huge co-operative account of history and resources (22 vols.). Kingsford's (History of Canada5 in 10 volumes (Toronto) is full but lacks method. (The Chronicles of Canada,5 (Glas¬ gow) are 32 small, readable volumes, sold onl}* by subscription ; Stephen Leacock has in the series three volumes, (The Dawn of Canadian History,5 an account of early discovery; (The Mariner of Saint Malo,5 a life of the first French discoverer in Canada, Jacques Cartier; and (Adventures in the Far Norths an account of the attempts to find the Northwest Passage, which includes the tragic story of Sir John Franklin. Other well-known writers, such as Miss Agnes C. Laut, Colonel William Wood, Sir Joseph Pope and Professor C. W. Colby, have volumes in the series, which covers the whole history of Canada. Another series, (The Makers of Canada5 (Toronto) includes biog¬ raphies of the chief leaders in Canadian history.

For special periods, Biggar's (Early Trading Companies of New France> (University of Toronto) is a learned account of early dis¬ covery. The history of the French regime has been told with great literary charm and ripe scholarship by Francis Parkman (Boston). His volumes can be read with pure enjoyment. (The Pioneers of France in the Early World5 is an account of Cartier, Champlain and other early leaders. (The Jesuits in North America5 de¬ scribes heroic and tragic missionary labors. (The Old Regime in Canada5 describes the planting in Canada of the French type of society which still endures in the province of Quebec. (La Salle and the Discovery of the Great West5 and (Frontenac and New France under Louis XIV5 describe French efforts and policy in North America at the end of the 17th century, while (A Half Century of Con¬ flict5 (2 vols.), (Montcalm and Wolfe5 (2 vols.l and (The Conspiracy of Pontiac5 (2 vols.) give the story of the final long struggle between France and Britain which in the end brought Canada under the British flag. George M. Wrong's (Fall of Canada5 (Clarendon Press) may be said to supplement Parkman by its full account of the last year of French rule. Wood's (Fight for Canada5 covers the Seven Years' War in Canada.

Of English speaking Canada the story has as yet been less thoroughly told and one or two of the following works are out of print. Bourinot,

(Canada under British Rule5 (Cambridge University Press) is a brief outline. Bradley's (Making of Canada5 (Constable) and Lucas's (History of Canada, 1763-1812, 5 and his (The Canadian War of 18125 (Clarendon Press), both cover this history down to 1815 including the War of 1812-15 with the United States. The later period has not yet been covered in a single adequate work and the story must be studied in the lives of the chief actors. The most interesting books are in (The Chronicles of Canada5 such as Wallace's (The Family Compact5, Grant's (Tribune of Nova Scotia5 (HoWe), and Sir Joseph Pope's (Day of Sir

John Macdonald.' In the (Makers of Canada) there are some excellent lives: Lindsay's <William Lyon Mackenzie' tells the story of the leader of the rebellion of 1837 ; Shortt's (Lord Sydenham,' an account of the governor of Canada who brought about the Union of 1841 ; Parkin's (Sir John Macdonald,' a good account of that statesman; and Skellton's (Day of Sir Wilfrid Laurier.' Dent's (Story of the Upper Canadian Rebellion' and his (Last Forty Years, Canada since the Union of 1841' are interesting but now out of print Boyd's (Sir George Etienne Cartier' (New York)is a very full recent account of the French Canadian leader in the federation movement. Sir Joseph Pope's (Life and Times of Sir John Macdonald' (London, Arnold) and Sir John Willison's (Sir Wilfred Laurier and the Liberal Party' (To¬ ronto, Morang) each in two volumes, are very full and excellent. Siegfried's (The Race Question in Canada' (London) is a penetrat¬ ing study of French ideals.

The vital phase of the later history of Can¬ ada is the expansion of the West. Miss Agnes C. Laut's (Conquest of the Great NorthWest' (2 vols., Toronto) is a stirring account of the Hudson's Bay Company, and her (Vikings of the Pacific' (New York) is the story of discovery from the Pacific side. Sir William Butler's (The Great Lone Land' and (The Wild North Land' (London) are vivid accounts of life on the prairie before the settlers came in. Bur¬ pee's (Search for the Western Sea' (Toronto) is a record of the discovery of the West. Mil-ton and

Cheadle's (The NorthWest Passage by Land' (London) is an equally vivid account of crossing the Rocky Mountains in the sixties and should be supplemented by G. M. Grant's (From Ocean to Ocean,' written 10 years later (Toronto 1873). Hayden's (The Riders of the Plains' (London) describes the work of the mounted police in the West, work that has kept the frontier life of Canada almost free from crime. Laut, (The Canadian Commonwealth' (Indianapolis) is a racy discussion of present day problems. The Constitution of Canada will be found in Egerton, federations and Unions in the British Empire' (Clarendon Press).

On Canada's relations with the Empire (The British Empire' (Pollard, editor) and The Round Table , a quarterly, should be consulted by serious students. The University of Toronto Library publishes an annual (Review of His¬ torical Publications relating to Canada,' in which all books on Canada are reviewed from year to year (21 vols. up to 1918). Larned's (Literature of American History' (American Library Association) has a good Bibliography of Canada.

George M. Wrong,

Professor of History, University of Toronto.

3. THE ERA OF EARLY DISCOVERY.

The early history of Canada from 1497 to 1632 may for the sake of convenience be divided into four periods: (1) The period of the early ex¬ plorations along the Atlantic seaboard, 1497— 1533; (2) the discovery and occupation by the French of the gulf and river Saint Lawrence, 1534—43; (3) the rise of the fur-trade, 1 544— 1612; and (4) the first permanent colonization,

1613-32.

The Explorations along the Atlantic Sea-

Board, 1497-1533. — The first European to set foot on British North America after the de¬ parture of the Northmen in the 11th century was John Cabot (q.v.) of Bristol. Though born in Genoa, Cabot had removed in 1461 to Venice and by his naturalization in 1476 as a citizen of that republic had been able to trade to the Venetian factories throughout the Le¬ vant. When on a voyage to Alexandria

for spices he made up his mind to push on to Mecca, then the great mart for the transfer of eastern and western goods. He wished to learn the situation of the region where the spices grew. On questioning on this subject those in charge of the spice-caravans at Mecca, they told him that they received them from other caravans coming from further eastward to whom they had in turn been handed over by others coming from still more remote regions. It seemed clear to Cabot that the spices must grow on the very eastern confines of Asia. In that case would it not be more practical to bring them direct to Europe by sea across the western ocean? With this idea in mind Cabot removed with his family from Venice to London. In England he learned that in the summer of 1480 an attempt had been made by two ships from Bristol to find the island of Brazil to the west of Ireland. Under Cabot's direction fresh efforts were made to find both this island and that of the Seven Cities which should but form stepping-stones on the new route to Asia by the west. All was to no pur¬ pose. No islands or land of any sort could be discovered. Suddenly, however, in the sum¬ mer of 1493 news reached England that an¬ other Genoese, Christopher Columbus, had sailed out into the western ocean with three Spanish ships and had succeeded in reaching the Indies. Cabot and his friends were roused to fresh efforts. During Henry VII's visit to Bristol in the wunter of 1495-96 Cabot pro¬ ceeded to set before him the advantages to accrue to England could intercourse be opened between that country and Asia. London would become in a short time a greater em¬ porium for spices than was then Alexandria itself. As a result of this interview letters patent were issued on 5 March 1496, giving Cabot and his sons permission to sail to Asia under the English flag. Armed with these powers Cabot fitted out at Bristol a small vessel called the Mathew. Her crew consisted of but 18 men. Owing to various delays they were not able to set sail until Tuesday, 2 May 1497. Rounding Ireland, they first of all headed north and then west. After many weeks of varied winds, land was at length sighted at 5 o'clock on Saturday morning, 24 June. On the 53d day after leaving Bristol they had reached the most easterly point of Cape Breton Island. The royal banner was unfurled and as the ship's boat rounded her keel on the beach, perhaps of Mira Bay, John Cabot stepped ashore and in solemn form took possession of the land in the name of King Henry VII. No inhabitants were seen, but the sailors found snares set for game and a needle for making nets. It was, therefore, judged that the country was inhabited. As the climate was agreeable and the soil fertile, they were of opinion that they had reached that portion of the coast of Asia where grew the spices Cabot had seen at

Mecca. The modern Cape Breton was named <(Cape Discovery® and Scatari Island which lies opposite, ((Saint John's Island,® as the day was the feast of Saint John the Baptist. Sailing north along Cape Breton Island they gave to Cape Ray the name of ((Cape Saint George,® and called Saint Pierre, Miquelon and Langley islands the ((Trinity group.® Since their pro¬ visions were none too plentiful should the re¬ turn voyage prove a long one, they spent no time in further exploration and early in July set sail for home from Cape Race which they named <(England's Cape.® Favored by the westerly winds of the North Atlantic, they made good progress and on Sunday, 6 August, the Mathew dropped anchor once more in Bristol harbor. Cabot hurried to Court and on the following Thursday, 10 August, was given a reward of £10 for his successful dis¬ covery. According to Cabot's report he had found some 700 leagues to the west of Ireland the country of the Great Khan. Although silk and brazil-wood grew at the spot where he landed, it was his intention on the next voyage to proceed on down that coast till he reached Cipango, for in his opinion this was the region whence came the spices and precious stones he had seen at Mecca. Henry VII was de¬ lighted and granted Cabot a yearly pension of £20. On 3 Feb. 1498 new letters patent were issued authorizing Cabot to prepare a fresh fleet of six vessels. In order to secure skilled sea¬ men and probably also to hear news of what Columbus had done, Cabot about this time made a trip to Lisbon and Seville. In Lisbon he came across a certain Joao Fernandes., called (<Labrador® because he owned land on the is¬ land of Terceira. When Cabot informed this man of his discovery, Fernandes in turn told him how he himself had also visited a region to the west of Iceland and north of the point in Asia reached by Cabot. The latter's curios¬ ity was roused. Here was perhaps a shorter way of returning to Asia than by crossing again the dreaded western ocean. On Cabot's return to Bristol with Fernandes, a brief con¬ sultation with the merchants of that town who had long traded to Iceland convinced everyone that this was the best route to take. By the beginning of May the two vessels manned by 300 men were in readiness. Since it was known that Cabot was taking the route via Iceland, ((in his company sayled also out of Bristowe three or foure small ships fraught with sleight and grosse merchandizes, as course cloth, caps, laces, points

and other trifles.® Early in' June they reached the east coast of Greenland a lit¬ tle north of Cape Farewell. As Fernandes had already told them of this region they named it the <(Labrador's Land.® On coasting north along this desolate shore, they found the ice to grow steadily thicker and heavier and the cold to become more and more intense. It was also noticed that the coast trended continually eastward. Finally on 11 June in lat. 67° 30', the crews mutinied and refused tto proceed further in that direction. Cabot was thereupon obliged to turn his ships about and to head back to the south. On reaching Cape Fare¬ well, they sailed west and explored the south¬ ern and also the western coast of Greenland. On meeting with ice again on the west coast they once more headed west until they arrived off the coast of the present Labrador, near

the modern Table Hill in 57° 40'. Since they had not penetrated to the bottom of Davis Strait they naturally supposed it was merely a gulf and that this coast was one with the Labrador's Land in the north. Following on down this coast, which in their opinion was that of Asia, they at length reached Cape Race and the region explored in the previous summer. Proceeding on toward the south they coasted the shores of Nova Scotia and New England until they reached the bay of New York. They were now much struck by the distance westward they had come. The east coast of Greenland lies in 43° while the longi¬ tude of Sandy Hook is 74°, which is only three quarters of a degree less than that of Cuba. Cabot could well say, therefore, that he had now ((sayled in this tracte so farre towarde the weste, that he had the Ilande of Cuba on his left hande in maner in the same degree of longitude.® They continued to coast the shores of New Jersey, Delaware and Maryland as far as the 38° parallel of latitude, at which point the low state of their provisions and the absence of any traces of eastern civilization induced them to come about and head back to Bristol, where they arrived late in the autumn of 1498. The results of this voyage proved such a disappointment that no fresh expedi¬ tion was dispatched until 1501. Meanwhile Joao Fernandes returned to Portugal. On the island of Terceira, where he had his home, a Portuguese nobleman named Gasper Corte-Real (q.v.) possessed considerable estates. This nobleman, who was much interested in the discoveries that were then taking place, seems to have put himself in communication with Fernandes. The result was that early in the spring of 1500 Corte-Real applied for and re¬ ceived letters patent empowering him to un¬ dertake an expedition to the northwest. Set¬ ting sail from Lisbon early in that summer he reached the east coast of Greenland on 8 June. They proceeded to follow it northward until 29

June, when the ice-floes and icebergs in Denmark Strait forced them to head back toward the south. Rounding Cape Farewell they explored the southern and western coasts of Greenland, whence as the season was well advanced they once more returned to Lisbon. In the hope of discovering a region of a less wild and desolate nature. Gasper Corte-Real fitted out a fresh expedition in the spring of 1501. They left Lisbon on 15 May and were nearing Cape Farewell when they came upon a large pack of field-ice, which forced them to alter their course to the northwest. At the end of several weeks they came in sight of the coast of our present Labrador in 58°. Following this mainland toward the south they came upon a band of Nasquapee Indians, who still inhabit Labrador. Thinking they would make good slaves they seized 50 of these natives and stowed them under the hatches. Continuing on down that coast they reached Conception Bay in Newfoundland early in September. It was then decided that the two vessels with the Indians on board should sail from here direct to Portugal while Gasper Corte-Real himself should proceed on down that coast in order to discover its connection with the islands discov¬ ered near the equator by Columbus. The two caravels reached Lisbon in safety in the second week in October. Though the account of the

discovery of this mainland and the appearance of its inhabitants excited considerable interest, more importance was attached to Gasper Corte-Real's exploration of the region to the south. The autumn passed, however, without anything being seen of him or his vessel. In that sum¬ mer an English expedition had been dispatched to the same coast by Joao Fernandes, now a naturalized Englishman, and several other Eng¬ lish merchants, but on their return in the au¬ tumn with three Indians they reported that they had seen nothing of Gasper Corte-Real. In January 1502 his rights were transferred to his brother Miguel, who left Lisbon on 10 May with three vessels to search for his lost brother. They reached Newfoundland toward the end of June and on the 24th of that month named the modern Saint John's, ((the river Saint John,® in commemoration of the feast of Saint John the Baptist. To facilitate the search each ship was ordered to visit a certain portion

of the coast and to return to Saint John's by 20 August. Two of the vessels re¬ turned at the date fixed but the vessel of Mi¬ guel himself was never heard of more. An English expedition also visited the same coast in that year and on 20 September King Henry VII granted a pension of £10 each to two nat¬ uralized Portuguese <(in consideration of the true service which they have doon unto us to our singler pleasure as Capitaignes into the newe founde lande.® No trace had been seen by them, however, of either of the missing Corte-Reals. In the hope of finding some trace of them, King Manoel dispatched two vessels to that coast in the summer of 1503, but neither these vessels nor those which were sent out in that year by the merchants of Bristol saw any trace of them. They were thereupon given up for lost. The rich codfishing on this coast had now become so well known that in 1504 the French and Bretons began to resort thither. Two years later a tax was laid on the cod from these parts taken to Portugal. The French rapidly increased in numbers and in 1512 when the first Spanish expedition to this coast was fitted out the latter got their pilots in Brittany. By 1519 the French fleet numbered 100 sail and included vessels from Dieppe all the way down to Bayonne. In 1520 Alvares Fagundes of Vianna in Portugal explored the region be¬ tween Saint Pierre and Miquelon and the coast of Nova Scotia. On his return he received a grant of these regions from the King of Portu¬ gal. It is possible that a colony was sent thither in 1525. In this same year the Em¬ peror Charles V dispatched Estevan Gomez (q.v.), who had sailed with Magellan, to dis¬ cover in the north a strait similar to the strait of Magellan in the south. Gomez explored the Bay of Fundy and then followed the coast southwards as far as the West Indies. On his return to La Corunna with a ship-load of In¬ dians he was understood to say he had spices. The excitement was great for it was believed he had reached the Moluccas. Ultimately the mistake, which was due to the similarity of the words for slaves and spices in Spanish, was explained and afforded the Emperor and his court much amusement. In 1527 two English vessels, the Samson and the Mary-of ˆGilford, the latter being a three-masted barque of 250 tons' burden, were sent out to find a northwest passage. On meeting with icebergs at the

mouth of Davis Strait they headed south. On 1 July in 52° a storm separated them and the Samson was never heard of more. The Mary-of -Gil ford on reaching Saint John's on 3 Au¬ gust found ((eleven saile of Normans and one Brittaine and two Portugall Barkes and all a fishing.® Finding no news here of the Samson, she continued her course to the south (<oftentimes putting her men on land to search the state of those unknowen regions.® On one of these occasions the

Italian pilot, who may pos¬ sibly have been Giovanni Verrazano, who had explored this coast for Francis I in 1524, was killed by the Indians. In the middle of No¬ vember the Mary-of-Gilford reached the West Indies. Being refused permission to enter San Domingo, she set sail again for England. In the course of her voyage she had met more than 50 French, Portuguese and Spanish fish¬ ing-vessels, which shows the proportions to which the codfishing on the Banks had then attained. Each year in fact the numbers in¬ creased.

The Discovery and Occupation by the French of the Gulf and River of Saint Lawrence, 1534-43. — Though during the course of the first three decades of the 16th century various English, Portuguese, French and Spanish expeditions had explored the sea¬ board of eastern North America none of them had penetrated into the interior. The first to do this were the French in 1534. The French fishermen who resorted every summer to that portion of this main coast which was rich in cod had noticed that a bay, called by them the ((Bay of Castles® from the formation of the land thereabout, extended so far inland that not one had ever been able to reach the head of it. It was just possible, therefore, that this might be the entrance to a strait similar to that found by Magellan in the south. On this being reported to the authorities at home an expedition was dispatched from Saint Malo in the spring of 1534 under the pilot Jacques Cartier with orders to explore this opening. Cartier reached Bonne Esperance Harbor inside the Strait of Belle Isle (then called the aBay of Castles®) on Wednesday, 10 June. Having dis¬ covered on examining the coast beyond this point with the long-boats, that it was com¬ pletely barren and rocky, sail was made on Monday, 15 June, from Bonne Esperance Har¬ bor in order to explore the land seen to the south. Following this south shore of the Strait of Belle Isle they were led steadily down the west coast of what we now call the island of Newfoundland. Off Saint George's Bay to the north of Cape Ray they had stormy weather for a week, which forced them to beat up and down. On resuming their course southward they fell in with the Bird Rocks, which lie 55 miles north-northwest of Cape Breton Island. The island to the south of these they named <(Brion Island® after the Admiral of France. From the currents observed here Cartier sur¬ mised that the opening beside Cape Breton Island was a strait and that one could sail from Brion Island directly into the Atlantic. "Should this prove to be the case,® added Cartier, ((it would mean a great saving both in time and distance should anything of importance be dis¬ covered on this voyage.® As is well known, this opening, Cabot Strait, is now used quite as much as the Strait of Belle Isle. Leaving

Brion Island on Saturday, 27 June, they crossed over to the Magdalen Islands, of which they coasted the northwestern corner until the following Monday, 29 June, when on the wind veering to the south thev had to set sail toward the west. They were under the impression that these islands formed the main shore on the south side of the gulf, and when on Tuesday morning, 30 June, they reached Cascumpeque Bay in Prince Edward Island, they believed that this latter formed part of the same main shore with the Magdalens. The western end of Northumberland Strait, which separates Prince Edward Island from the mainland, was mistaken for a bay and called <(Saint Leonore's Bay® in memory of a Breton bishop whose fes¬ tival is celebrated on 1 July. Coasting north¬ ward along the New Brunswick shore they be¬ lieved on reaching Chaleur Bay that they had at last found a passage into the South Sea. On Thursday, 9 July, they discovered that it was merely a deep bay; <(whereat,® says Cartier, (<we were much put out.® On account of the heat experienced there they christened it (<the Bay of Heat.® Pursuing their course north¬ ward they entered Gaspe Bay, where they were detained for ten days by bad weather. On Friday, 24 July, the day before they set sail, they set up a cross 30 feet high as a landmark and also seized the two sons of an Indian chief who had come down to the sea with his tribe to fish. Rounding the peninsula of Gaspe, they were heading straight for the mouth of the Saint Lawrence, when one of the mirages so common in those parts led them to believe that this passage between Gaspe and Anticosti was merely a landlocked bay. They consequently crossed over and followed the south shore of Anticosti as far as the eastern extremity of that island. Continuing on along the north shore of Anticosti they at length caught sight of the Quebec coast opposite and saw that they were entering a passage which they called <(Saint Peter's Strait.® At this point a con¬ sultation was held at which it was decided that since there was a great probability of this pas¬ sage being the one they were in search of, it would be advisable as the season was late to postpone their exploration of it until the fol¬ lowing year. They consequently headed east along the north shore of the gulf and were finally brought back to the Strait of Belle Isle or the ((Bay of Castles,® whence they had set out. The fishermen's statement had been fully confirmed. This narrow opening had turned out to be a

great gulf with probably a second entrance into the Atlantic near Brion Island. There was also a prospect that the opening they had just discovered in the north¬ west corner of this gulf would yet lead them into the South Sea. Setting sail from Belle Isle on Saturday, 15 August, they reached Saint Malo in safety on Saturday, 5 September. As they were in great hopes that the opening in the northwest corner of this large inland gulf would eventually lead them to the South Sea, a fresh expedition consisting of three vessels was sent out under Cartier in the spring of 1535 in order to explore it. Passing through the Strait of Belle Isle and along the north shore of the gulf they anchored on Monday, 9 August, in a small bay on the Quebec shore, opposite Anticosti. As the following day was the feast of Saint Lawrence, this bay was

christened (< Saint Lawrence's Bay.® The name afterward spread by mistake to the whole gulf and was finally extended to the river. The two savages who had passed the winter with Cartier in France, now informed him that the land on the south side of this Saint Peter's Strait was an island and that further west he would come to the mouth of a very large river. Where that river rose they did not know. With this information to help him Cartier proceeded through the passage north of Anticosti and passing on up the gulf entered the river Saint Lawrence or as the savages called it the ((River of Hochelaga.® On arriving at the mouth of the Saguenay his Indian guides informed him that this river took its name from a kingdom lying toward the northwest which was <(rich and wealthy in precious stones.® Pleased with this information Cartier pushed on up the ((River of Hochelaga® until he reached a large island which he named the <(Island of Orleans® after Francis I's third son, Charles, Duke of Orleans. On the banks of a small stream which here enters the Saint Lawrence stood the home of the two Indians who had passed the winter in France. For this and other reasons Cartier laid up his two largest vessels in this stream and with his third vessel and two long-boats pushed on westward to visit another Indian village called Hochelaga. The shallow water at the head of Lake Saint Peter, which he named the <(Lake of Angouleme® after Charles, Duke of Orleans, checked the further progress of the sailing vessel which had to be left behind here. Pushing on in their long-boats they reached the Huron-Iroquois village of Hoche¬ laga on the island of Montreal at the foot of the Lachine rapids on Saturday, 2 October. On the following morning a visit was paid to this village and an ascent was also made of a moun¬ tain near at hand which Cartier named ((Mount Royal.® From this point they had a magnificent view of the surrounding country.

They spe¬ cially noticed the rapids, which checked further progress westward and heard from the savages that there were more such Malls of water® be¬ yond. Just above the rapids another river en¬ tered the main stream. According to the sav¬ ages this was the best route to the kingdom of Saguenay, whose inhabitants were clothed like the French and had great stores of gold and other precious metals.

Cartier made his way back to his vessels on the Saint Charles and in the course of the winter, during which part of his crew was carried off by scurvy, sought to obtain as much information as possible about this northern Mexico called by the savages the (<kingdom of Saguenay.® That King Francis might have as much information as possible on this subject Cartier, on the day he had a large cross erected to mark the French possession of this region, ordered his men to seize the chief of this vil¬ lage and eleven others whom he placed on board his vessels as prisoners. Leaving the Saint Charles with only two of his vessels on Saturday, 6 May, he passed down the south shore of the Saint Lawrence and through the passage to the south of Anticosti Island, which on his first voyage he had mistaken for a bay. From Chaleur Bay he steered for Brion Island and discovered after leaving it that the coast to the south was not the main shore but a group of islands. Heading still to the east he reached

Cape Breton Island and found his conjecture as to the existence of a strait here to be cor¬ rect. After touching at the islands of Saint Pierre and Miquelon he left one of his long¬ boats in a small harbor 10 miles north of Cape Race and then on Monday, 9 Tune, set sail for home. They reached Saint Malo in safety on Sunday, 16 July.

Owing to the wars in which France was then engaged, nothing further was done until the winter of 1540-41, when an expedition was organized to proceed to the conquest of this rich kingdom of Saguenay. While Cartier was to act as pilot, the command of the land forces was given to a Picard nobleman named Roberval, who had distinguished himself in the recent wars. Through a delay about the artillery, the latter was not able to be ready in time, so Cartier set sail

from Saint Malo alone with five vessels on Monday, 23 May. They had a bad passage out and having waited some time in Newfoundland for Roberval did not reach the island of Orleans until the end of August. Cartier took up his quarters this time at the river of Cap-Rouge, nine miles above Quebec. A week later he sent back two of his vessels to France ((with -letters unto the King and to ad¬ vertise him what had been done and found : and how Monsieur de Roberyal was not yet come, and that hee feared that by occasion of contrary winds and tempests he was driven backe againe into France.® Five days later Cartier set off in two long-boats to re-examine the rapids of Hochelaga and find out what arrangements should be made for passing them in the spring with the troops. He was in¬ formed by the Indians living alongside the rapids that after passing this one there were several others of the same sort before the Saguenay could be reached. With this infor¬ mation to help him Cartier returned to Cap-Rouge, where he spent the winter. Neither in that autumn nor in the spring of 1542 was any¬ thing heard of Roberval. The latter did not set sail from France until the middle of April 1542 and was unable to reach Newfoundland until the first week in June. When at anchor there in the harbor of Saint John's he was much surprised one morning to see Cartier arrive. According to Cartier's account ((hee could not with his small company withstand the Savages, which went about dayly to annoy him.® On being commanded, however, by Roberval to return ((he and his company, mooved as it seemeth with ambition, because they would have all the glory of the discoverie of those partes themselves, stole privly away the next night and departed home for Brittany.® Roberval was thus obliged toward the end of June to make his way up the Saint Lawrence alone. He took up his quarters in the build¬ ings at Cap-Rouge which Cartier had vacated. On 14 September he sent back to France two ships ((to carie newes unto the king and to come backe againe the yeere next ensuing fur¬ nished with victuals and other things.® Dur¬ ing the course of the winter 50 of his people were carried off by scurvy, so that when he set off early in June 1543 to conquer the king¬ dom of Saguenay he had only 8 boats and 40 men. The remainder who only numbered 30 were left in charge of the fort. How far up the Saint Lawrence Roberval penetrated we do not know ; for no further account of his move¬

ments has come down to us. It seems probable, however, that after penetrating a short dis¬ tance up the Ottawa and finding no trace of gold he returned to Cap-Rouge where he found Cartier, who had been sent out to bring him home. In the course of the autumn the rest of the men returned. On the failure of this expedition becoming

generally known a new proverb was coined. When any object in ap¬ pearance of value was found to be worthless, it was called a ((Canadian diamond.®

The Rise of the Fur Trade, 1544-1612. — During the 10 years in which the French had been busy exploring the gulf and river Saint Lawrence and seeking to reach the mysterious kingdom of Saguenay, the number of vessels of various nationalities engaged in the fishing trade along the Atlantic seaboard had been steadily increasing. On his arrival at Saint John's, Newfoundland, on 8 June 1542, Rober¬ val had found ((seventeene shippes of fishers,® which were six more than Rut had met there in August 1527. Out of this annual fishing trade, which was carried on along the coast from Belle Isle as far south as Cape Cod, gradually grew the fur trade. The fishermen, when riding at anchor in a bay or inlet, found that the savages of the neighborhood were always ready to part with their furs for a mere trifle. Since these furs sold in Europe for a high price, the practice grew up among the fishermen of bringing out each year a supply of trinkets on purpose to barter for furs. The returns were so good that in process of time some vessels made a specialty of the fur trade. Thus in 1569 we hear of a French vessel from Havre that (<had a trade with the people of divers sortes of fine furres.® In 1581 some Saint Malo merchants sent a small barque of 30 tons into the upper Saint Lawrence, and so successful did the voyage prove that in the following year they dispatched a ship of 80 tons. In 1583, in which year the merchants of Saint Malo sent three vessels to the Saint Lawrence, Stephen Bellinger of Rouen ((brought home a kynde of muske called castor ; divers beastes skynnes, as bevers, otters, martenes, lucernes, seales, buffs, dere skynnes, all dressed and painted on the innerside with divers excellent colours.® In the following year the merchants of Saint Malo brought back with them two savages in order that they should learn French and afterward facilitate more ex¬ tended trading relations. The result was that in 1585 they sent 10 ships into the Saint Law¬ rence. In January 1588 two of Cartier's de¬ scendants obtained a monopoly of this fur trade, but so great was the outcry raised by the other excluded merchants that in May the monopoly was revoked. The trade continued to remain open like the fishing trade until 1599. In addition to cod, some of the vessels fished for furs, and toward the close of the century there was a great development of the walrus¬ fishing. In the spring of 1591 the Bonaventure of Saint Malo made her way to the Magdalen Islands in the Gulf of Saint Lawrence, where she ((slewe and killed to the number of fifteene hundred morses or Sea-oxen,® as the walruses were then called. With the 40 tons of train-oil into which these were boiled down she reached the mouth of the English Channel

in safety, but was there captured by an English vessel from Bristol. Relying on the information thus ob-304

tained, a vessel was sent thither from Falmouth in 1593, and though she (<tooke certaine Sea-oxen, it was ((nothing such numbers as they might have had, if they had come in due sea¬ son,ˆ for they arrived late in the summer. In the spring of 1594 the Grace of Bristol set sail to Anticosti, ((being informed that the Whales which are deadly wounded in the grand Bay (the Gulf of Saint Lawrence), and yet escape the fisher for a time, are wont usually to shoot themselves on shore there.® Finding no whales she made her way back to the bay of Placentia in Newfoundland, where she met <(fishermen of Saint John de Luz and of Sibiburo [Ciboure] and of Biskay to the number of threescore and odde sayles.® After fishing there for some time she made her way to Ferryland on the east coast, where lay ((two and twentie sayles of Englishmen.® In that port she <(made up her fishing voyage® and set sail for home. In the summer of 1597 the Hopezvell of London, of 120 tons, was driven away from the Magdalens by two ships of Saint Malo and two others of Ciboure, which united their forces against her. Meeting with a similar hostile welcome from five French ships in a harbor of Cape Breton Island, she repaired to the port of Sainte Marie in Newfoundland, where she found a vessel from La Rochelle and another from Belle-Isle- en-Terre at the mouth of the Loire. Since this latter hailed from a Catholic part of France it was decided to capture her. <(We first,® says the account, <(sent our boat aboord the Rocheller to certifie him that we were his friends and to request him not to hinder our fight with the enemy. This message being sent, we made all the haste we could unto the ship of Belle Isle, which first began with us with three great shot, one whereof hit our maintop-saile, but both the other missed us. And we also sent one unto them ; then being approached nere unto them ten or twelve of us went in a shallop to enter them. And when we boorded them in our boat, they betooke themselves to their close fights, playing chiefly upon us with shot and pikes out at two ports, between which we entered very dangerously, escaping meere dangers both by shot and pike. Some of our men were wounded, but no great harme was done.® With this prize the Hopewell returned to England. In the following year an unsuc¬ cessful attempt was made to establish a colony on Sable Island. . The Marquis de la Roche had obtained his

first letters patent author¬ izing him to occupy land in the region of Newfoundland in 1577, and in 1578 he had set sail thither with two vessels. The <(pinnace,® however, had been obliged to return through ((fowell weather,® and, though the larger vessel, after being (<well beaten by four English ships which this French ship had thought to have robbed,® had ((taken her course for Newfound¬ land,® we do not know what was done there. It is probable, however, that La Roche merely selected a spot for settlement, since it was not until 1584 that the colonists were embarked. Unfortunately ((his greatest ship of 300 tons was caste awaye over against Brouage® on the west coast of France, and so the expedition came to naught. From 1589 to 1596 La Roche was kept a prisoner by the Due de Mercoeur, but on his release he made a fresh attempt to establish a colony. In the summer of 1598 he landed on Sable Island 60 <(sturdy male and

female beggars,® taken from the prisons of Normandy. On returning thither from the mainland he was blown all the way back to France; No fresh attempt was made to con¬ tinue his colony, and when the remnant was succored by a fishing vessel in 1603, only 11 persons were still alive. On this failure of La Roche's colony, no sign was left that France claimed the region of the Saint Lawrence as her own. To remedy this state of affairs a monopoly of the fur trade for 10 years was granted in the spring of 1599 to a fur trader of Honfleur, who yearly sent out four vessels to the Saint Lawrence. The condition was that he should people the country each year with 50 colonists. In fulfilment of this agreement, on the conclusion of his annual barter with the Montagnais at Tadoussac in the summer of 1599, he left behind 16 men huddled together for warmth in a small log hut at the mouth of the Saguenay. On the return of the vessels in the following summer, no fresh colonists were landed and only five of the former batch were found alive. These had onfy saved them¬ selves from perishing by taking refuge among the neighboring Indians. In the meantime the remaining traders, who were well aware that the few colonists taken out were only to throw dust in the eyes ,of the government, loudly com¬ plained against their exclusion from the fur trade. To quiet matters, a commission was appointed in the winter of 1602-03, which recommended the admission of certain Rouen and Saint Malo traders on condition they should bear their share of the cost of coloniza¬ tion. Before, however, more colonists were sent out it was deemed advisable to explore the country in detail in order that the best site available might be chosen for the settlement. This survey was carried out in the summer of

1603 by Samuel de Champlain, an officer of the navy, and Dupont-Grave, one of the fur traders. The result was that in the spring of

1604 a fresh monopoly for 10 years was given to a company formed by the Sieur de Monts on condition that 60 colonists a year should be taken out. The first settlement was formed in the summer of 1604 on the island of Sainte Croix, in the Bay of Fundy. <(The Fort hee [De Monts] seated at the end of the Hand, opposite to the place where he had lodged his Canon, which was wisely considered to the end to command the river up and down. And out of the same Fort was the Switzers lodging, great and large, and other small lodgings, representing as it were a suburb. Some had housed themselves on the firme lande neere the brook. But within the Fort was Monsieur de Monts his lodging made with very faire and artificiall Carpentrie worke, with the Banner of France upon the same. At another part was the storehouse wherein consisted the safety and life of everie one, likewise made with faire Carpentry worke and covered with reedes. Right over against the said storehouse were the lodgings and houses of these Gentlemen, Monsieur D'Orville, Monsieur Champlain, Mon¬ sieur Champdore and other men of reckoning. Opposite to Monsieur de Monts, his said lodging, there was a galerie covered for to exercise themselves either in play or for the workmen in time of raine. And between the said Forte and the Platforme, where lay the Canon, all was full of gardens whereunto everie

one exercised himselfe willingly.® The winter of 1604-05 proved so severe on the exposed island of Sainte Croix, the soil of which turned out to be extremely sandy, that in the following summer the settlement was transported across the Bay of Fundy to the harbor of Port Royal (now Annapolis Basin), where the buildings were put together in the form of a large square. The winter of 1605-06 again proved a hard one, however, and, owing to the late arrival of the company's vessel, not only were all the furs taken by interlopers, but the colonists themselves finally embarked in two small boats in order to find a fishing vessel willing to take them back to France. They

fortunately met their own vessel, in which they returned to Port Royal. In the spring of 1607, however, the company's monopoly, which had legally seven years more to run, was suddenly repealed through the intrigues of the Hatters' Cor¬ poration of Paris. Nothing remained but to send out a vessel to bring home the colonists at Port Royal, which was done.

On Champlain's recommendation De Monts now turned his attention to the Saint Lawrence. In order that he might retrieve a part, at least, of his losses, King Henry IV allowed him a monopoly of the fur trade there for one year. In the summer of 1608, accordingly, Champlain repaired to that part of the river called Quebec, or ((the Narrows,® where he constructed a trad¬ ing-post. It was hoped that this would not only give them an advantage over the other compet¬ itors in the years of open trade, but would also hold the warlike nation of the Iroquois in check and allow the Algonquins, who came down every summer with furs from the upper Ottawa, to go backward and forward on the Saint Law¬ rence in all security. When Henry IV heard of the construction of De Monts' post at Quebec he renewed his monopoly for another year. Taking advantage of this, Champlain, in the summer of 1609, accompanied the Montagnais and the Algonquins on the warpath against the Iroquois. In order to see the palefaces of which they had heard so much, and also to have their share of the victory over the Iroquois, the Hurons, who dwelt beyond the Algonquins on the shores of Georgian Bay, came down to Quebec, for the first' time, in the summer of 1609. This combined expedition surprised a combined force of 200 Iroquois on Lake Cham¬ plain. At the sight of the French and the report of their firearms the enemy broke and fled. The Hurons were delighted, and promised to come down henceforward every summer to the annual barter. In this same year (1609) the Sieur de Poutrincourt (see Biencourt de Poutrincourt, Jean) established himself with his family in the buildings formerly occupied by De Monts' colony at Port Royal. He con¬ tinued to reside here until his home was burned by the English in 1613. Although during the winter of 1609-10 De Monts sought to have his monopoly renewed, or at any rate the trade reserved to him, in the region explored by Champlain in his expedition against the Iro¬ quois, all was to no purpose. In the summer of 1610 the fur trade was thrown open to the merchant marine of France to the same extent as the cod, whale and walrus fishing. The result was that so many traders resorted to the Saint Lawrence in that summer that there was a plethora of goods and many ships found vol. 5 — 20

it impossible to get rid of even a portion of their cargoes. There was a similar inroad in the summer of 1611. The results of this com¬ petition were soon apparent among the savages. Not only did they ask more for their furs, but they also began to have a poor opinion of the palefaces, whom they saw even strip blood¬ stained furs off the corpses of dead Indians. De Monts also felt it to be unjust that he should be put to the expense of keeping up the post at Quebec when no advantages were accorded him in return. During the summer of 1612 Champlain was kept in France by a fall from a horse, and he improved the opportunity by seeking to bring about a better order of things in the Saint Lawrence. Through his efforts the system of open trade was brought to an end in the autumn of 1612.

The First Permanent Colonization, 1613— 32. — In order that the licentiousness of a few merchants should not spoil the trade in the upper Saint Lawrence and ruin the prospects of exploring, with the help of these Indians, the regions farther to the west, Champlain induced the King's uncle, the Comte de Soissons, to apply in the autumn of 1612 for a monopoly oi the fur trade above Quebec. This was granted on condition that, during the 12 years it lasted, six families a year should be taken out by the company. Although Soissons died a few weeks later, the monopoly was transferred, at Champlain's request, to Soisson's nephew, the young Prince de Conde. As no time was left to form the company before the trading season opened, Conde merely issued licenses to seven merchants to barter above Quebec. They were each to place four men at Champlain's disposal in case he had need of them. On account, how¬ ever, of the licentiousness of some of the traders in the previous summer when Champlain was absent, neither the Algonquins nor the Hurons put in an appearance in 1613 at the rapids. At this Champlain set off up the Ottawa with a few attendants, and by his exertions induced over 80 canoes to come down to the barter. In the same summer of 1613 an English vessel from Virginia destroyed De Poutrincourt's home at Port Royal, and also captured a French vessel sent out by the Jesuits to form a colony at Mount Desert, on the New England coast. In the summer of 1614 Champlain completed the formation of the new company for trade in the Saint Lawrence. On the failure of the La Rochelle merchants to appear, the whole of the shares were divided among the traders of Rouen and Saint Malo. On reaching the annual barter at the Lachine Rapid in the spring of

1615, Champlain found that his absence in the previous summer had made the Indians doubt his friendship. In order to regain their con¬ fidence, and also explore the regions farther to the west, he set out with the Hurons on their return. He was thus able during the winter of

1615-16 to learn much of the geography of the present western Ontario as well as the region about Lake Ontario, to the southern shore of which he accompanied a war expedition against the Iroquois. So grateful were the Hurons for the help thus accorded them that they accom¬ panied Champlain in great numbers on his re¬ turn to the Saint Lawrence in the spring of

1616. For this reason, also, the barters of 1617 and 1618 were extremely well attended. Not¬ withstanding this increase of trade, the company

unfortunately did nothing toward establishing a local source of supply, and paid almost no attention to colonization. Only one family was brought out, and it was treated in an extremely unjust manner. Not only were none of its members allowed to engage in the fur trade, but while paying very high prices for all the stores bought from the company they were obliged to sell their own produce at the very low prices current in France. When Cham¬ plain, as the representative of the viceroy, sought to secure the fulfilment of these condi¬ tions as to colonists, defense and local sources of supply, he simply made himself disliked. In the spring of 1619 they even refused him a passage to Quebec. At the King's express command he returned there in 1620, only to find the factory so tumble-down that the rain came in on every side. When this was notified to the admiral of France, who had succeeded Conde as viceroy, he at once revoked the monopoly of the company and gave the trade to two Huguenot merchants, William and Emery de Caen. The old company, however, appealed to the King. Pending his decision both parties sent out vessels in the summer of 1621 and each left servants of its own to winter at the factory. In the course of the winter of 1621 — 22 the two companies amalgamated with a fresh monopoly which was to run until the year 1635. Unfortunately this united company neglected colonization and local sources of sup¬ ply as much as its predecessor. The result was that in the spring of 1623 when the vessels arrived late they found that for some months all the inmates of the factory had been living on roots

and berries. The same state of affairs reoccurred a few years later. Champlain, who was still governor, did his best to keep this united company up to its engagements, but whenever he returned to France everything was allowed to go to ruin. Although on his departure in the autumn of 1624 he left the new factory almost completed, he found on his re¬ turn two years later that not a single nail had been driven in since he went away. <(It could have been finished,® said Champlain, ((in a fortnight, had they been willing to work, but that is just what they will not do.® As little attention was paid to cultivating a local source of supply, and when, in the summer of 1627, the principal supplv-ship failed to appear, the outlook for the winter was far from bright. To make matters worse, war broke out between England and France in the spring of 1628 and several English ships were sent into the Saint Lawrence. Although Champlain bravely re¬ fused to surrender the factory, the fleet sent out to Quebec by a new company which Riche¬ lieu had formed was captured below Tadoussac. At the same time a Scottish colony was founded at De Poutrincourt's old quarters at Port Royal. In the winter of 1628-29 these Scottish and English merchants formed themselves into one company and sent out two fleets in the spring of 1629. While one brought fresh stores to Port Royal, the other entered the Saint Lawrence and summoned the factory at Quebec to surrender. As no help of any sort had come since 1627 and all the inmates had been living for some time on roots and berries, Champlain was obliged to comply. On 22 July 1629 the English flag was run up on the flagstaff. The new company formed by Richelieu, called the

Company of New France, also sent out a fleet, however, which not only succored the small French post at Cape Sable, below Port Royal, but also succeeded in dislodging Lord Ochiltree, who had formed a settlement on Cape Breton Island. He and his people were taken prisoners, and out of the material of their buildings a new French fort was constructed in one of the neighboring harbors. Here a garrison of 40 men was left. In the autumn of 1629 the French applied for the restitution of Quebec, since it had been surrendered after the con¬ clusion of peace on 29 April. King Charles I acquiesced, but the negotiations dragged on until the spring of 1632. In the meanwhile both companies sent out provisions to their posts; the Company of New France to Cape Sable and Cape Breton Island, and the English and Scottish company to Port Royal and Que¬ bec. Finally, on the conclusion of the Treaty of Saint-Germain-en-Laye on 20 March 1632, the post at Port Royal was made over to the Company of New France, while the old United Company was allowed to enjoy the trade at

Quebec for one year in order to recuperate itself for its heavy losses. In the summer of 1633 its servants retired and the whole of New France passed into the hands of the Company of New France, which held it until the year

1664.

H. P. Biggar,

Author of (The Early Trading Companies of New France ?

4. UNDER FRENCH RULE (1632-1755).

When the Treaty of Saint Germain-en-laye (1632) restored to France (see France — His¬ tory), her possessions in North America, Acadia and Canada were still savage wastes. Prior to this date Port Royal and Quebec had hardly advanced beyond the status of con¬ venient landing points, while Tadoussac and Three Rivers were mere rendezvous for barter. In theory the profits of the fur trade were enormous, but disaster or disappointment seemed to follow each venture with dismal regularity. At the same time the attempt to establish permanent colonies had been attended by only a moderate degree of success. Louis Hebert and a few other settlers had maintained themselves at Quebec for 21 years before the surrender of that place to the English, but their privations were constant and severe. Those who supported themselves by agricul¬ ture were less than a score and the total popu¬ lation barely passed 100. As for the missionary efforts, which constituted a third form of French activity in Canada, neither Jesuits nor Recollets had gained more than a handful of converts and a certain amount of friction be¬ tween the two orders already existed. One hopeful sign was indeed visible, for in 1627 the Company of New France took form with Richelieu (q.v.) and other prominent people at its head, but this organization (better known as the Company of the Hundred Associates) was just beginning to show signs of vitality when Quebec fell (1629) into the hands of Kirke (see Kirke, Sir David). The general state of the situation can be described in a single phrase. Though individuals had dis¬ played great enterprise and splendid heroism, the French as a nation had not impressed them¬ selves deeply upon the western hemisphere.

Between the Treaty of Saint Germain-en- Laye and Wolfe's decisive victory over Mont¬ calm (1759) (see Colonial Wars in America) lies a period of 127 years which is marked by all the features of genuine colonization. It cannot be said that in wealth and population New France kept pace with the English colonies from Massachusetts to Georgia: but while the economic basis of the French was less solid their geographical range was wider and their institutions were equally distinctive. For a century and a quarter France continued to be an active competitor for the control of this continent and maintained a strong foothold upon it. Moreover the Canadian French, the habitants, developed feelings of local pride and patriotism which, though they did not beget political restlessness, are not less noticeable to the historian than are the pride and patriotism of the English in America. From 1632 to 1759 New France was a colony peopled by vigorous and resourceful inhabitants. Unfortunately it possessed a defective system of administration, but its annals are adorned by noble deeds and its life represents a characteristic form of civilization.

Of the two regions which France regained in 1632, Canada was destined to be the more important and to be held upon the firmer tenure. Acadia with its long frontier of sea¬ board lay open to easy attack from the side of New England and after 1621, when James I gave Sir William Alexander the charter of Nova Scotia (see Nova Scotia — History) its population contained a Scottish element. At the moment when Port Royal fell to the Eng¬ lish for the second time (1628) the ablest and most loyal Frenchman in Acadia was Charles de la Tour, but on the formal restoration of the colony four years later Isaac de Razilly, a rela¬ tive of Richelieu, was appointed royal lieuten¬ ant. During his lifetime the French in Acadia proved able to hold their own against New Eng¬ land and even to destroy posts which the English had established on the coast of Maine. De Razilly's death, however, precipitated an acute quarrel between de la Tour and the able, unscrupulous Charnisay, who had come to the colony with de Razilly in 1632. The prosecu¬ tion of the feud between these rivals led, among other things, to a famous siege of Fort Saint John by Charnisay and a spirited but fruitless defense of the stronghold by *Mme.* de la Tour in her husband's absence. The long and bitter broil ended peacefully enough in the marriage of de la Tour and *Mme.* Charnisay after the death of Charnisay and *Mme.* de la Tour, but

meanwhile the prosperity of Acadia had been seriously hampered by a domestic feud which unsettled the whole administrative system and raised the issue of Catholic versus Huguenot. In 1654 Acadia was seized by the English for the third time and held till 1667, when France regained it by the Treaty of Breda (see Breda, Treaty of). During the greater part of the next 20 years peace between the two nations prevailed along the Atlantic coast, broken by occasional bickerings at points near a frontier which was always in dispute ; but with the renewal of hostilities in the reign of William III Acadia suffered severely and had not re¬ paired her losses when the war of the Spanish Succession (see Succession Wars) broke out. This time the contest for supremacy reached a

final settlement in one part at least of the New World. Nicholson's occupation of Port Royal (which he rechristened Annapolis, 1709) to¬ gether with Marlborough's victories in Europe combined to secure Acadia to England by the Peace of Utrecht (1713) (see Utrecht, Peace of). But even then the triumph of the English was not complete, for the island of Cape Breton still remained in the hands of France and the guns of Louisburg, guarding the entry to the Gulf of Saint Lawrence, declared more plainly than words that the Atlantic seaboard would not be surrendered to England without a fur¬ ther struggle. In marked contrast to their precarious hold upon Acadia, the French built up along the shores of the Saint Lawrence a colony which, whatever its shortcomings, did not change hands with every generation. Can¬ ada was far from invulnerable, as the capture of Quebec by Kirke had already proved and as its siege by Phips (see Phips, Sir William) was to prove once more in 1690; but long stretches of wilderness separated it from the English settlements, while the navigation of the river presented grave dangers to a hostile fleet. The fate of Sir Hoveden Walker, whose powerful fleet was shattered among the shoals of the Egg Islands (1710), shows that sea power could not be brought to bear against Canada so readily as against Acadia, and the fierce raids of Frontenac illustrate with equal force the ability of the French to defend them¬ selves by land. French rule in Canada lasted long enough and was sufficiently secure to fur¬ nish a great object lesson in colonial method.

Apart from military history and the pathos which belongs to the loss of an empire, the life of New France is more interesting in the 1 7th than in the 18th century. The two genera¬ tions that elapse between the return of Cham¬ plain (q.v.) and the death of Frontenac (q.v.) (1633-98) are marked by a series of striking exploits and the

establishment of fixed institu¬ tions. Energy and enthusiasm abound ; the explorer and the missionary are lavishing their lives on causes which mean infinitely more to them than any form of personal ambition ; the colonist is becoming a native, a habitant, whose concerns are increasingly associated with Amer¬ ica; problems of Church and state are arising to vex the souls of governors and quicken the zeal of prelates. On every side there are signs of that fresh vigor which derives its impulse from the novelty and charm of the wilderness. In dealing with the progress of Canada during the middle and latter part of the 17th century it is necessary to distinguish between the re¬ gions which were claimed by right of discovery and those which were effectively occupied by settlement. Before Frontenac's death lands had been cleared and rendered fit for cultivation at a good many points between Tadoussac, where the Saguenay enters the Saint Lawrence, and Mon¬ treal. Above Lake Saint Louis there were forts at important strategic points like Kingston (then Fort Frontenac) and Detroit, but for agricul¬ tural purposes the colonial zone stopped at the Lake of Two Mountains, an expansion of the Ottawa. Beyond the island of Montreal lay the pays d'en haut, a vast territory which was repeatedly traversed by the pioneers, whether adventurers, traders or missionaries, but which remained almost destitute of settlers. From the Saint Lawrence the French were led inev-

itably to the Great Lakes and thence by an easy passage to the Mississippi. Thus their explora¬ tions belong no less to the history of Illinois, Michigan and Wisconsin than to that of Canada. In the Laurentian Valley the river was another Nile with a further element added, since besides being the great local thoroughfare it was a highway that opened the route to the mother country. If, unlike the Nile, its waters could not be made to produce a rice crop, they abounded in the fish which were so necessary to the food of a Catholic community. The form of land allotment sprang from the one cardinal condition of life on the banks of a central stream. Each peasant had his strip of water frontage, however narrow, and was able at a moment's notice to embark in his own bateau or canoe. The only towns of Canada were Quebec, Three Rivers and Montreal, all situated on the Saint Lawrence, and no permanent settlements were made in any part of the country unless within easy reach of it or its tributaries.

The north shore, owing to its rugged character, was less suited to farming than the south, and in the valley of the Richelieu, the outlet of Lake Champlain, many of the best seigneuries sprang up. The settlement of the Richelieu Valley was also intended to provide a bulwark against the Iroquois.

Closely connected with the distinction which has just been made between the Laurentian Val¬ ley and the back or upper country (pays d' en haul) is the contrast between peasant and woodsman. According to the system of land tenure that prevailed in Canada under the Old Regime rural society was divided between the seigneurs or landlords and the censitaires or tenants. In Canada, as in France, gentility and the possession of an estate went together, but there is this important difference between the feudalism of the mother country and the colony, that whereas in France the peasants bore ap¬ preciable burdens during the 17th century, in Canada no censitaire could be seriously crippled by the taxes or services to which he was bound. Feudalism, an institution of the 9th century, could not be transplanted without change to the New World in the age of Louis XIV. The French of Normandy and Brittany made ad¬ mirable colonists, when once they had been induced to embark; but some prospect of im¬ proved conditions must be held out before emi¬ grants would come forward. Moreover in a country of virgin forest it was impossible that peasants should be taxed as their kindred were in a land of ancient cultivation. In view of these considerations the habitants received their farms on very reasonable terms How moderate were the demands of the seigneur may be seen from a single instance. A deed of 19 June 1694 concedes a lot of land three arpents in front by 40 in depth (about a hundred acres) <(in consideration of 20 sous and one good live capon for each arpent of front and one sou of cens, payable at the principal manor-house of the seigneury on Saint Marlin's day in each year so long as the grantee shall occupy the land.® The habitant had in a certain sense the character of a woodsman, for a large part of his time was devoted to hewing down the forest, but he was not a woodsman in the fullest sense of the word. Besides the station¬ ary peasant who cultivated his sturnp fields in the valley of the Saint Lawrence, the population

of New France embraced many restless and adventurous spirits who roved the woods, traded in beaver skins whenever they could elude the monopoly, intermarried with the Indians and evaded the restraints of civilization without punishment from civil or ecclesiastical law. The coureur de bois (ˆwood-runner®), to give this type of colonist his

generic name, was one of the most remarkable adventurers that this continent has ever seen. Though his vices were an object of scandal to the missionaries and his lawless habits an inconvenience to the government, he possessed the virtues of fear¬ lessness and initiative to an exceptional degree. The comrades of Magellan and Drake were no more daring or resourceful than the coureurs de bois who pressed on from the valley of the Saint Lawrence into the wilds of the pays d'en haul and found amid the dangers of forest or prairie the fullest excitements of a nomadic life. Their names, for the most part, have perished ; but legends like that of the Cliasse-gallerie bear witness to the hold they preserve upon the memory of French Canada.

In passing from these general statements regarding country and inhabitants, it is hard to say whether a place of greater prominence should be given to the government or to the Church. One should be careful not to represent the French Canadians of the 17th century as slaves — a tendency too current among English writers at the present day. The feudalism of New France was feudalism in its most miti¬ gated form and the habitant winning a home for himself by courageous toil seems anything but a serf by instinct. Nevertheless French Canada was overshadowed by two institutions which visibly embodied authority as authority was not visibly embodied in New England or New York. Whether or not paternalism was the bane of Canada is an open question to be answered by the historical student in accordance with his own scheme of philosophy. The broad fact is that the Crown and the Clergy divided between them an extremely large part of the world in which the habitant lived. From 1632 to 1663 the affairs of Canada were controlled, under the Crown, by the Company of the Hun¬ dred Associates. Had this corporation been better managed, or rather had it been actuated by a larger spirit, it might have gained for itself a distinguished reputation and eventually handed over to the King a flourishing possession ; but looking only to the greatest immediate return it wasted a fine opportunity and does not merit comparison with either the East India Company (see East India Companies) or the Hudson's Bay Company (q.v.). After 1663 executive power in Canada was deputed by the King to the governor and the intendatit, with whom were associated the bishop and a board of coun¬ cillors varying in number from 5 to 12. The governor, who was always a noble, held the highest office in the colony though he did not possess so much real power as the intendant. He commanded the forces, was the chan¬ nel of diplomatic intercourse with the English and the Indians, occupied the central place in colonial society and was authorized to follow his own judgment regarding matters of emer¬ gency. With finance, however, he had little or nothing to do,

and from the whole field of civil administration he was excluded bv the presence at his side of the intendant. This official be-CANADA - UNDER FRENCH RULE (4)

longed ordinarily to the middle class and had been trained to law or business. The Crown seems to have acted on the maxim <(Divide and Rule.® Both governor and intendant were re¬ quired to send home detailed reports which always included a large amount of criticism and gossip. The intendant passed judgment on the acts of the governor and the governor was not slow to express his opinion concerning the administration of the intendant. Neither re¬ ceived untrammeled authority, for an autocratic King like Louis XIV insisted upon reserving the use of his prerogative. The government of New France was less rigid and cumbrous than that of the Spanish possessions under Philip II, but the principle of absolutism carried out at such a distance from the court could not fail to impair the efficiency of administration.

The position of the Church in New France cannot be properly described unless a reference is made to the dominating influence which con¬ trolled Europe during the age of colonization. Seventeen years before Cartier's first voyage to the Saint Lawrence (1534) Luther had de¬ nounced the sale of indulgences at Wittenberg. In the interval between Cartier's first voyage and his last (1541) the "Institutes® of Calvin (see Calvin, John) was becoming the founda¬ tion of a Church and the Company of Jesus (see Jesuits) was arising to stem the tide of heresy. Despite the wars of religion and the national exhaustion which they produced, re¬ ligion was still the reigning issue in France when Champlain sailed westward to continue the work of Cartier. This may be seen chiefly in two ways: from the missionary zeal of the religious orders and from the anxiety of French Catholics that New France be kept untainted by Huguenot misbelief. With De Monts and Poutrincourt, Calvinism made its appearance at Port Royal and a little later it maintained itself for a while at Quebec under the protection of William and Emery de Caen, who did not carry out their promise to exclude heretics from the colony. But during the sway of Richelieu, the Huguenot cause perishes even more completely in Canada than in France, and a way is left clear for the unchecked ascendency of Rome. No one can read the religious literature of New France without recognizing the sincerity of motive which brought Jesuits, Recollets,

Sulpicians, Ursulines to Quebec and Montreal. The savage races of America had excited the imagination of all Europe, and in France the desire was particularly strong to rescue these heathen from the doom of the unbaptized. The greatest nobles in the realm subscribed funds for the mission and acted as sponsors at the baptism of Micmac or Algonquin converts. First in importance among the religious orders of New France come the Jesuits, whose mis¬ sionary tradition had been established more than half a century earlier by Saint Francis Xavier. Entering Acadia and Canada with a record of brilliant success to give them con¬ fidence, they prosecuted their labors among all the nations from the Iroquois to the Illinois and from the Ottawas to the Natchez. Their most heroic deeds of self-sacrifice are bound up with their mission to the Hurons (ending in 1649, when the power of the Hurons was destroyed bv the Iroquois) and with their mis¬ sion to the Iroquois covering the third quarter of the 1 7th century. It was always the aim

of the Jesuits to turn the Indians from the nomadic life to the arts of civilization. In this attempt they were but partially successful. Al¬ though certain tribes of the Algonquin family yielded themselves willingly to the guidance of the missionaries, the total number of converts was far smaller in New France than in Para¬ guay. During the first generation after the restoration of Canada to France the Jesuits published in Paris an annual account of the labors undertaken by members of their order among the American Indians. These (Rela¬ tions } (see Jesuit Relations and Allied Docu¬ ments, The) are the best single source of information about the habits of the aborigines and also rank high in the list of our authorities for the history of Canada. Next to the Jesuits in order of prominence stand the Sulpicians, whose efforts centred chiefly in Montreal and the neighboring district. The founding of Ville-Marie de Montreal exemplifies in its purest form the mood of devotion that prompted Frenchmen to leave the civilization of Europe for a life of privation among the barbarous heathen of Canada. Here the colonizing im¬ pulse proceeded solely from a desire to spread the faith. With Olier and Dauversiere, who founded the Society of Notre-Dame de Mon¬ treal, there was no thought of gaining wealth through the fur trade. The charter of the So¬ ciety expressly states that its members detach themselves from all regard to temporal interest and take for their one purpose the conversion of the natives. From 1642 to the close of the century Montreal was an outpost of civiliza¬ tion and Christianity, exposed to frightful dangers, as the exploit of Dollard (1660) and the Lachine Massacre (1689) testify, but de¬ fended by men who cared more for religion than for life. In the

relations of the Church with the habitants friction seldom arose. There is reason to believe that the Jesuits incurred some unpopularity because they did not favor the appointments of cures in the outlying dis¬ tricts, but for the most part the attitude of the peasants toward the clergy was one of complete deference. Until 1665, when the Carignan Regi¬ ment came to Canada, the social order presented many features of a theocracy. Religion was supported by the state and derived a stronger support still from the energy of the religious. The prevalent mood was pietistic and public opinion sanctioned the ecclesiastical punish¬ ments which were called forth even by minor offenses against morals. Apart from Church festivals the routine of daily life at Quebec or Montreal made little provision for relaxation or entertainment. Taverns were under the ban, dancing parties were unknown and the general demeanor of sobriety would have met favor in the eyes of a New England Puritan. The coming of the Carignan Regiment broke in on this religious Arcadia and proved an entering wedge for frivolity, but in the early days the temper of New France was deeply religious, if not ascetic. One other aspect of ecclesiastical affairs deserves emphatic notice. While the clergy had to do with a docile population and were animated by pure enthusiasm in their work among the Indians, the religious life of the colony was not free from friction. The Recol¬ lets, and after them the Sulpicians, felt that their interests were threatened by the enmity of the Jesuits. The Jesuits in turn prevented

the Abbe de Queylus, an able Sulpician, from being made bishop of Quebec, casting their in¬ fluence in favor of Laval (see Laval-Mont¬ morency, Francis Xavier de), who became the first titular bishop in New France. Laval, once appointed, quarreled with successive governors on different grounds — with Argenson (1661) on the question of precedence, and with Avau-gour (1662) on the question of selling brandy to the Indians. The difficulty over precedence brought in the whole issue of Church and state ; the quarrel over the brandy question was less lofty but more practical. The position of the Church was that brandy should not be sold to the savages under any

circumstances. The general, though not the invariable, position of the government was that if the French did not sell brandy to the Indians the latter would buy rum from the Dutch and English. The Church as a whole and the habitants as a whole lived on excellent terms; but there was much fric¬ tion between the religious orders, the coureurs de bois were a thorn in the side of the clergy, and a governor of secular tastes, like Frontenac, might keep up a running feud with the hierarchy for years.

The mention of Frontenac's name recalls a striking personality, for of all the governors who were sent out to New France during the long reign of Louis XIV he must be called the ablest and most forcible. That his policy toward the Church was judicious or free from prejudice cannot be maintained, nor can it be forgotten that his memory is defaced by the stain of fearful massacres. But he was bold, resolute and thoroughly devoted to the interests of Canada. Throughout both periods of his rule (1672-82; 1689-98) he was master of the situation as none of his predecessors had been, and during the seven years of his absence from the colony the failures of La Barre and Denonville served to set off his virtues in the strongest light. The main political problems with which he had to deal were the enmity of the Iroquois, the aggressive policy of the Eng¬ lish as suggested by Governor Dongan, and the extension of French influence from the Great Lakes into the valley of the Mississippi. Speak¬ ing broadly the Iroquois were the chief menace of Canada in the last part of the 17th century as the English were its chief menace in the first part of the 18th. The most celebrated of the Jesuit martyrs, Jogues and Brebeuf, met death at their hands; the most brilliant deed of courage which the annals of New France con¬ tain was Dollard's fight against them at the Long Saut ; it was in their face that Madeleine de Vercheres shut the door of her father's fort. Whether left to themselves or set on by the English they had every disposition to molest the French. The spirit of conciliation they mis¬ took for weakness and, as Frontenac saw, the only way to impress them was by a show of strength. In 1696 he ravaged their country more thoroughly than De Tracy had done 30 years earlier, burned their palisades, destroyed their corn and convinced them that he had a power which they must respect. The next year their envoys came to Quebec speaking the lan¬ guage of humility. Frontenac's attack upon the English dates from the beginning of his second term of office. Returning to the colony in 1689 he found that French prestige had vanished almost wholly during his absence. To impress

the Indians and terrorize the English he equipped those raiding parties which carried the torch and the tomahawk to Schenectady, Salmon Falls and Casco Bay. As a tour de force of endurance, this winter campaign of the French was a remarkable feat, but the atrocities which accompanied it cannot fail to awaken the deepest abhorrence. Parkman finds extenuation for Frontenac in the standards of his age. (<He was no whit more ruthless than his times and his surroundings, and some of his contemporaries find fault with him for not allowing more In¬ dian captives to be tortured. Many surpassed him in cruelty, none equalled him in capacity and vigor.® Everything considered, this must be called a mitigated sentence, and apart from all considerations of humanity it may be doubted whether Frontenac's policy of .carnage was a sound one. Its momentary success in impress¬ ing the Indians was not an equivalent for the spirit of vengeance which it awakened among the English. From 1690 forward New France and New England have their rancorous en¬ mities which continue to exist quite irrespective of peace or war between the mother countries. Phips may be turned back from Quebec but the memory of massacre endures until French power in Canada has been destroyed. A much brighter feature of Frontenac's regime is the progress made by French exploration in the Far West. While the famous journey of Mar¬ quette (q.v.) and Joliet (q.v.) down the upper waters of the Mississippi (1673) may be more fitly connected with the names of Courcelle (q.v.), Frontenac's predecessor, and of Talon (q.v.), the good intendant, the picturesque ex¬ ploits of La Salle (q.v.) and Tonty (q.v.) fall within the period of Frontenac. It was by favor of Frontenac that the fort at Cataracoui (now Kingston) was placed in La Salle's hands, thus enabling him to establish a fixed base at the east end of Lake Ontario for his operations on the Great Lakes and beyond. As far as the Huron country the French had been on familiar ground ever since the days of Champlain, but their chief triumphs in opening up the Hinterland were won under Frontenac.

The 18th century opened for New France with bright prospects which were destined never to be realized. The war that closed at the Peace of Ryswick (1697) had just demon¬ strated the defensive strength of Canada, and though D'Iberville's (see Iberville, Sieur d') conquests in Hudson's Bay were restored to England, France did not lose Acadia. Fron¬ tenac's chastisement of the Iroquois had brought relief from an ancient scourge and Callieres' diplomacy concluded the peace which had been made possible by a decided blow. The War of the Spanish Succession closed less favorably. The success of Vaudreuil's raids was a poor equivalent for Marlborough's vic¬ tories or even for Nicholson's capture of Port Royal. France lost Acadia and was thrown

back for her hope of an Atlantic dominion upon the single fortress of Louisburg (q.v.). The Peace of Utrecht (1713) may be called the beginning of the end.

The history of Louisburg is a tale of great effort, enormous expense and complete disap¬ pointment. France lavished upon this harbor in Cape Breton as much money as it would have cost to erect a fortress of the first class in

Europe. Until 1745 its strength remained un¬ tested, but the French themselves thought it im¬ pregnable and the English looked upon it with dread. The political effect of Louisburg was twofold. Its near neighborhood to Acadia prevented the French of that province from becoming loyal to British rule, and in New Eng¬ land it was regarded as a permanent menace to peace. When the War of the Austrian Suc¬ cession offered an excuse, Massachusetts was ready for the attack. Governor Shirley (see Shirley, William) devised the plan, which was daringly executed by a colonial fleet under William Pepperell (q.v.) in cooperation with four British men-of-war. The capture of Louisburg by a militia force was the greatest humiliation which France had suffered in Amer¬ ica and its restoration by the Peace of Aix-la- Chapelle (1748) (see Aix-la-Chapelle, Trea¬ ties of Peace Concluded at), came to New England as the sorest affront which it had ever received at the hands of the home government.

At the Peace of Utrecht New France con¬ tained a population of rather more than 25,000. In 1763 when Canada was ceded to England the number of inhabitants had advanced to about 60,000. It is obvious that this rate of increase was trivial in comparison with the prog¬ ress of the English colonies during the same period, and when we remember the unusual fecundity of the French Canadians, some special reason needs to be assigned for the slow de¬ velopment of the colony. The cause of this striking phenomenon will be found in the fact that immigration was not spontaneous, as in the case of the English colonies, but controlled by government. Partly owing to the institutions which prevailed in France during the 17th and 18th centuries, and partly owing to gross mis¬ management of colonial affairs by the court of Versailles, New France was handicapped in the long race with its southern rivals. This fact must be brought out because it is often errone¬ ously stated that the Frenchman has never made a good colonist. The biography of Can¬ ada from Champlain to Montcalm gives the direct negative to such an idea. Maladminis¬ tration, the lack of local self-government and excess of loyalty to inherited institutions ac¬ count for the defeat of the French in

America rather than the want of promptness, courage, industry and resource. It must be remembered, moreover, that the English colonies took root in a soil which was fitted to stimulate rapid growth. The long calm which followed the Peace of Utrecht (171 3—42) was often broken by signs of acute restlessness. As early as 1725 the Marquis de Beauharnois, who had be¬ come governor in succession to Vaudreuil, was busy with schemes for keeping the English within the limits they already occupied. This meant that their expansion northward should be checked in the vicinity of Lake George and their expansion westward by the range of the Alleghanies. Far from losing their love of ex¬ ploration, the French pushed farther . and farther westward with each decade. Michilimackinac was to Verendrye what Cataracoui had been to La Salle, and just at the moment when Maria Theresa was preparing to recover Silesia from Frederick the Great, one of Verendrye's sons caught the first glimpse of the Rocky Mountains. In America the hostilities which accompanied the War of Austrian Succession

centred at Louisburg and accordingly this con¬ flict affected Canada less than the two preced¬ ing wars had done. But every man of colonial origin, English and French alike, saw that the Peace of Aix-la-Chapelle was merely an armis¬ tice. Unsettled boundaries suggested endless friction, especially in Acadia and the Ohio Val¬ ley. The line which was run by Celoron de Bienville at the instance of France aimed at excluding the English from the Ohio and, ac¬ cording to patriotic opinion in such colonies as New York, Pennsylvania and Virginia, amounted to a casus belli. Before the development of the western trade the English and French had been separated by a wide zone of wilderness. The expansion of both races brought them face to face at the junction of the Alleghany and the Monongahela. Should the stronghold built in this angle be called Fort Duquesne or Pitts¬ burgh? Here was an issue on which hinged the future of a continent. It was the misfortune of the French both at home and in Canada that their administrative system suffered from the worst evils of a corrupt absolutism. At Ver¬ sailles the folly and extravagance of Louis XV, at Quebec the unblemishing thefts of the Intendant Bigot, were but a poor preparation for war. And so the small but valiant race of the Canadian French bore the burden of vices not their own when they entered upon the last act of an irrepressible conflict. See also the articles in this section — Great Britain's Fight with France for North America; The Clergy Re¬ serves; Seignorial Tenure.

Charles W. Colby,

Formerly Professor of History , McGill Uni¬ versity.

5. GREAT BRITAIN'S FIGHT WITH FRANCE FOR NORTH AMERICA —

1753-63. For several years previous to the formal declaration of war between England and France, in 1756 (see Canada' — Under French Rule), the stirring events in the Ohio Valley and in distant Arcadia foreshadowed a great crisis, during which territorial disputes, aggres¬ sions and political intrigues would be lost sight of for the moment, and the question paramount would be the supremacy of France or of Eng¬ land in North America. The policy of France, as dictated from Versailles, had not been broad enough to successfully promote colonization, in the sense of expansion, or even to maintain permanent occupancy, although this was much desired. And the honest designs of her colonial administrator, La Galissonniere, to increase the dominion of his royal master, at an opportune moment, met with no responsive aid. The mother country was wedded to schemes of ag¬ grandizement at home, and was inclined to leave her colony to work out its own future. Besides, the French then, as now, were rather a stay-at-home people. New France was con¬ sequently weak in population, and not in a position to retain her empire in the North, and, moreover, her influence was being undermined by official corruption. Great Britain, on the other hand, had the real advantage of superior numbers in the New World, although she had no definite colonial policy, and was already smarting from the effects of an earlier admin¬ istration, due rather to ignorance than to knavery. The disputes touching possessions in Acadia were of long standing. By the 12th

article of the Treaty of Utrecht (see Utrecht, Peace of), Nova Scotia, within its ancient boundaries, had been ceded to the Crown of England. A controversy soon arose over the interpretation of a certain clause. Great Brit¬ ain claimed that her possessions under the Treaty of Utrecht were of the same extent as those acquired by France under the Treaty of Breda; but France protested that the territory she then received was quite distinct from the ancient boundaries, which

confined Nova Sco¬ tia to a portion of the southern peninsula. At the conclusion of the Treaty of Aix-la-Chapelle (see Aix-la-Chapelle, Treaties of Peace Concluded at), when Louisburg (q.v.) was restored to the French, the boundary ques¬ tions were referred to commissioners, each Court agreeing that, until a decision was reached, no fort or settlement should be at¬ tempted upon the debated ground. But the shrewd La Galissonniere, disregarding the stip¬ ulation, if he was ever officially acquainted with it, commenced the construction of forts, and favored settlement upon the lands claimed by England. The importance of Nova Scotia in the future development of Canada was apparent to each nation, both from a strategic and com¬ mercial point of view, but neither power could furnish from its colonial resources an army of sufficient strength to support its ambition. The policy of Great Britain toward Nova Scotia was most short-sighted. Instead of encourag¬ ing the emigration of a desirable class, intended to grow up with the Acadians and form a united and loyal people, she allowed the French, for nearly 40 years, to regard the country in the light of an exclusive settlement. It is true that they were good subjects; but they were French at heart, and it remained to be proved whether, under extraordinary pressure, their sympathies would incline to France or not. The possibility of such a contingency was for years practically ignored, but wffien it was seri¬ ously considered the methods adopted were ill-advised. The lands of the French were divided and subdivided, until new grants were neces¬ sary; but Great Britain decreed that new lands could be acquired only by Protestants. The question of religion, therefore, became a condi¬ tion of tenure. Shirley (see Shirley, Wil¬ liam), the energetic governor of Massachu¬ setts, wTho was largely responsible for the gov¬ ernment of Nova Scotia, was firmly convinced that until French influence was exterminated British interests could not flourish; and so be endeavored to effect the conversion of the in¬ habitants, suggesting that rewards be given to those who renounced their faith. The King favored an assurance that the people should enjoy the exercise of their religion, but Shirley, in a proclamation, omitted the passage as dangerous. The home government then con¬ sented to a scheme for promoting the loyalty of the province by the importation of foreign Protestants, to mingle with the Acadians — a fusion possible under the British flag, but doubt¬ ful at such a critical moment, when the military organization was insufficient to protect the frontier, or to inspire confidence in the stability of British institutions. Government agents in Geneva, and elsewhere, were active in adver¬ tising in the papers for settlers, and bargaining with poor artisans. But the scheme fell through ; though at last 3,000 good settlers were

landed at Chiboucto Bay in 1749, from which at length sprang the important naval post of Hali¬ fax (q.v.). In the meantime, however, a great struggle was impending, which led to the depor¬ tation of 8,000 Acadians (see article The Acadian Refugees), whose subsequent misery and suffering contribute the darkest page to the history of Nova Scotia. A new oath of alle¬ giance was demanded by Governor Cornwallis, which from time to time was deferred. While, on the other hand, the fiery zealot, Le Loutre (see Le Loutre, Louis Joseph), backed by the Indians, exercised every effort to retain in¬ fluence over the people. Le Loutre detested the English, and was generally successful in per¬ suading the unhappy people that an oath of allegiance to a Protestant monarch was very much like being disloyal to their faith, the penalties for which did not cease with their natural existence. But, although the dark deeds which were being enacted in 1753, concerning Nova Scotia, had a distinct bearing upon the approaching conflict, they were of secondary importance to the great mass of the British colonists, when compared with the prize which both France and England coveted — the pos¬ session of the Ohio Valley. The details of the contest in this section cannot be . given here. (See Braddock, Edward; Colonial Wars in America; Fort Necessity; Pittsburgh, His¬ tory; Washington, George). The effect of Braddock's defeat was felt in the expeditions of Shirley against Oswego (q.v.), and in that of Johnson against Crown Point (see Crown Point, Fortress of). A body of provincials had been raised, and placed under the com¬ mand of Johnson for the reduction of Crown Point. But Dieskau intercepted, and almost captured, a detachment of this expedition. Re¬ inforcements arrived at a critical moment, and the tables were turned by the capture of Dies¬ kau. This circumstance was made a great deal of, but, nevertheless, Crown Point was unmo¬ lested, and still in the hands of the French. War and bloodshed had desolated the homes of the colonists and destroyed their commerce, and over all of them hung the dread of the tomahawk and the scalping knife of the In¬ dian. Panic-stricken, they could devise no means of defense, and surrender seemed prefer¬ able to fight. In Acadia, while the two nations were still at peace, the determination of the British had driven into exile the unhappy Acadians. But their own position there was by no means to be envied. British prestige was indeed at a low ebb in America, when the struggle between the colonists was superseded by a contest between the two powers, which commenced officially when King George II signed the declaration of war against France in May 1756.

The situation in New France was indeed acute. Agriculture had been

neglected, grain was scarce, horses were slaughtered for food, famine was imminent. But it should be borne in mind that this deplorable state of affairs was not the inevitable outcome of the struggles through which the country had passed, but a condition actually created for profit, toiled for and plotted for by Bigot, in order that he might appear as the real savior of the dis¬ tressed colony. The advice of the intendant to his somewhat weak-kneed, and certainly dis¬ honest, henchman, Vergor, to ((cut and slip,

and make hay while the sun shone, in order that he might have the means to build a chateau in France, was but an indication of the course he intended to follow himself, though on a grander and more colossal scale. New France was to be pillaged. The people must be sub¬ dued, and bodily suffering would prove effect¬ ive where less persuasive methods might fail. New life was given to the colony for a moment when the Marquis de Montcalm (q.v.) arrived in Canada in the spring of 1756, with 1,200 troops and ample supplies. No better general could have been chosen than Montcalm. In fact, men of his mold were just what New France need:d most at this time. He was an excellent soldier and had already won renown. He was loyal to his sovereign, at a time when loyalty was not profitable ; he was brave and courteous, and he dearly loved France. Vaudreuil, the governor, was a Canadian, and at¬ tached to the land of his birth, but he despised every form of interference from France. Hence there was constant friction. Bigot, the representative of the King, loved his master and the colony only in proportion to the measure in which they contributed to his needs ; and his needs were of abnormal proportions. The conduct of Montcalm throughout the war, until the supreme hour when he yielded up his life in defense of the colony, forms a striking and pleasing contrast to the actions of his two coll agues. He was also fortunate in the chief officers under him.

England was far less happy than France in the choice of the commander-in-chief of her forces. Lord Loudon, who was placed at the head of the 900 regulars sent out to the colonies, was no match for the

brilliant Montcalm. Ar¬ riving in Albany two months after he was ex¬ pected by his chief officers, Abercromby and Webb, Loudon was confronted with a condition of affairs similar to that with which Montcalm had to contend — jealousy between colonials and regulars. The War Office had decreed that a colonial officer could not rank above a senior captain of regulars, and consequently well-sea¬ soned officers, experienced in the methods of the enemy, were liable to orders from a man who had never been under fire, and had no knowledge whatever of colonial affairs. The British general seemed unable to decide upon any plan of action, and much valuable time was wasted. In the meanwhile, disaster had over¬ taken the British at Oswego. By clever tactics Montcalm had surprised the fort, and had 30 guns directed against it before the commander was aware of the danger which threatened him. There was little effective resistance, and capit¬ ulation necessarily followed; 1,600 men were made prisoners, and in a few days the fort was razed. The year was passing away without any important move on the part of the British. Loudon desired a change of scene, and induced the home government to agree to an expedition against Louisburg. Large reinforcements were sent out, and in the month of June 1757 he had nearly 12,000 men arrayed against that strong¬ hold. Still unable to decide upon a plan of attack, he wasted a month in exercising the troops, or, as Lord Charles Howe said, (<In keeping the courage of His Majesty's soldiers at bay, and in expending the nation's wealth in making sham fights and planting cabbages, when they ought to have been fighting the enemies of

the King in realityT On 4 August a movement was set on foot, but intelligence was conveyed to the commander that the French expected reinforcements and were eager for the fray. 1 hereupon, the noble lord abandoned the enter¬ prise and returned to New York, having cov¬ ered himself with ridicule, and greatly amused the French.

In the spring of 1757, the region of Lake Champlain was the scene of unusual activity. The Indians from the distant shores of Lake Su¬ perior, and from the forests beyond Lake Erie, were rallying around the French standard; and by midsummer a restless band, eager for the fray and only restrained with difficulty, gathered at Fort Carillon as part of the expedition against the British strongholds of Fort Edward and Fort William Henry. Montcalm's army con¬ sisted of about 6,000 of the best troops, with the addition of the Indians. The British force was divided between the two forts. Webb was at Fort Edward in command of 3,500 men, and Munro had 2,000 men in Fort William Henry and 500 entrenched upon a rising ground in the rear of the fort.

Montcalm's first move, on approaching, was to occupy the route communi¬ cating with the forts, which, at the same time, cut off the British troops upon the rising ground. This was accomplished by de Levis with 3,000 men. Montcalm strengthened his position and soon had 40 guns bearing upon the fort. From the first it was clear that the British position was untenable. Munro was twice offered terms of capitulation, but he stubbornly refused. At length he was forced to surrender, and the garrison marched out of the fort. Then followed a frightful scene, which has unjustly tarnished the memory of Montcalm. The Indians, disappointed of the plunder to which they looked forward at the sack of the fort, fell upon the prisoners with fury, and horribly massacred nearly 100 before any means could be taken to prevent them. Montcalm and Levis did their best to arrest the fury of the savage hordes and saved many lives ; but the mischief was done, and dire ven¬ geance was threatened. Notwithstanding the dismal failure of Loudon, Pitt was still de¬ termined to reduce Louisburg, which was to be made the chief objective in the campaign of 1758. Loudon had been recalled, and the com¬ mand was entrusted to Amherst, who had al¬ ready done good service in Germany. The chief officers under him were Lawrence and Wolfe. The force consisted of about 12,000 men. On the 2d of June part of the fleet anchored in Gabarus Bay, a few miles from Louisburg, Boscawen being the admiral in com¬ mand. The expedition was a joint one, both naval and military. Wolfe was the most con¬ spicuous figure of all present. His brigade made the real attack from the boats, while Whitmore's and Lawrence's supported him by feints in other places. The landward siege was well pressed home, and Louisburg, the gate¬ way of New' France, soon fell, and being shortly after razed to the ground, literally became a thing of the past.

Success had attended British arms in other quarters. Bradstreet at the head of 3,000 men had captured Fort Frontenac, which the un¬ wisdom of Vaudreuil had left inadequately sup¬ ported, although it was a most important post commanding Lake Ontario and serving as a

base for the Ohio forts. De Noyan, the gover¬ nor, had demanded reinforcements, but, in the place of troops, Vaudreuil had dispatched a one-armed man to his assistance, and, as resistance was futile, capitulation followed. Fort Duquesne had also become a British post, and now bore the name of Fort Pitt. Forbes, in the face of great difficulties, had endured the perils and suffering of a winter's march; and, when at last his bravery and determination had triumphed over every obstacle, and the fort was in sight, he found that it had been evacuated. While Loudon was ((planting cabbages,® a harmless occupation, Abercromby was making a worse mess of affairs at Ticonderoga (q.v.). The French had been expecting an attack at this vital point, which commanded the route by way of Lake Champlain, and threatened Montreal. A large body of men had been ordered there in the spring by Montcalm ; but the withdrawal of so many troops under Lou¬ don had convinced Vaudreuil that it would be an opportune moment to create a diversion on the Mohawk. Montcalm was opposed to this enterprise; consequently Vaudreuil insisted, and 1,600 men were detached for the purpose. By the middle of June Montcalm had only 3,000 men at Ticonderoga, the battalions of La Sarre, Languedoc, Bearn, Berri, Guienne and Royal Roussillon, with two good engineers. The place was by no means strongly fortified, but works were hastily thrown up in advantageous positions. In the meantime the formidable army under Abercromby, consisting of regulars and provincials, in all 15,000 men, was en¬ camped about half a mile from the fort. But the real head of the army, Lord Howe, the best soldier in America, as Wolfe had said, had been killed in a preliminary skirmish, and the com¬ mander was powerless to act. Something had to be done, however, and Abercromby moved his whole force against Carillon. Montcalm's army had been increased b)ˆ 500 men under de Levis; and after a seven hours' blundering as¬ sault, Abercromby was completely outgener-alled, and lost no less than 2,000 men. This victory covered Montcalm with glory, and he is frequently referred to as (<the hero of Caril¬ lon.® But although he had won glory for French arms, the victory was a blow to the jealous Vaudreuil, and signalized the farther accentuation of discord which produced serious results in future operations.

In 1759 Pitt was at last in a position to put his greater scheme into practice. The tide of war was almost on the turn, and he seized op¬ portunity beforehand. The Seven Years' War (q.v.) was being waged in many parts of the world ; in fact, in a purely military sense, there were several different wars going on at the same time. But there was one great connective force which made them one, and that was the British navy. France and England were now in the very middle of their

great imperial war, which began after the fall of the Stuarts in 1688, and was continued as one single age-long and. world-wide struggle for the oversea do¬ minion of the world, down to Trafalgar and Waterloo. The Seven Years' War was the most distinctively imperial phase of the whole of this vast conflict ; the heart of it lay in the fight for American dominion ; and the central episode of this fight itself is to be found in the expedition against Quebec, which culminated in the re¬

nowned battle of the Plains of Abraham. The four real conquerors of New France are Pitt, Anson, Saunders and Wolfe. The names of Pitt and Wolfe have always been on every tongue ; but the equally important ones of Anson and of Saunders have been unduly for¬ gotten. Pitt, of course, was the originator; and in himself, the most important of the four. But as the whole fortunes of the war were really determined by the British command of the sea, it is absolutely necessary to understand the naval side of the campaign, not only for its own sake, but also to fully appreciate the work of the army. In the ever-memorable year of 1759, it was entirely due to the navy that Eng¬ land remained safe at home, and it was more than half due to the navy that she emerged as a conqueror abroad. France had prepared a gigantic scheme of invasion. One fleet was to sail for Ireland, where the troops were to be met on landing by a general rising in their favor. The Jacobites were to be stirred into insurrection by another French fleet destined for Scotland; whilst their third fleet, larger than both the others united, was to convoy in¬ numerable troop-boats across the Channel, as they made a dash for the south of England. To guard against this national danger the navy then developed the first regular system of blockade ever known. Boscawen blockaded Toulon, Hawke blockaded Brest, Rodney cruised off Havre and Admiral Smith kept the reserve fleet always ready in the Downs. Meanwhile, however, Pitt was preparing a counterstroke; not at France herself — where she would be stronger than England in a cam¬ paign fought out on her own home base — but at her oversea possessions in Canada, from which she was separated by those 3,000 miles of hostile waters, which the British command of the sea had practically made a British pos¬ session. Thus Montcalm had to await attack in utter isolation, on the far side of an immense stretch of territorial waters, across which Wolfe advanced in perfect safety to meet him. And it must be remembered that Saunders' squadron was not only a strong one, for it comprised a full quarter of the whole navy, but that it was playing an integral part in a universal scheme of strategy — for all seas are strategically one — whilst Wolfe's little army was only a landing-party on a large scale. There were twice as

many seamen as landsmen engaged in the taking of Quebec. Saunders had over 18,000 sailors, more than two-thirds of whom belonged to the navy, while Wolfe had less than 9,000 soldiers. The total British force, therefore, amounted to 27,000 men. Saunders and Wolfe received their secret in¬ structions from the King in February, and im¬ mediately after sailed for Nova Scotia. The final rendezvous was Louisburg, where over 8,000 men were assembled in May. On 1 June the fleet began its dangerous voyage, with no less than 200 vessels of all sorts and sizes. It was navigated in perfect safety to the Island of Orleans, where it arrived on 27 June, and was not injured by a tremendous gale a day or two later, nor by the costly display of fireworks, in the shape of fire ships, destined to work its destruction. The picket boats met the attack well up stream, and, <(taking hell in tow,® as a bluejacket forcibly expressed it, put all the enemy's vessels ashore, where they burnt them-CANADA — BRITAIN'S FIGHT FOR NORTH AMERICA (5)

selves out. Wolfe established three camps. The principal one was at Montmorency, just beyond the falls. The second was on the Island of Orleans, completely out of range, and thus very convenient for a hospital and stores. The third was at Point Levis, which Vaudreuil fool¬ ishly refused to occupy, in spite of Montcalm's sensible advice, and which was consequently left open for Wolfe to build his batteries on. These batteries literally pounded the town to pieces ; as a manuscript note on a plan of the siege in the French War Office truly remarks, (ice nc jut pas un siege, maisun bombardement ,® Among other projectiles of all kinds, 36,000 solid cannon balls were fired from this coign of vantage. Montcalm's position was still im¬ mensely strong, in spite of the loss of the Levis Heights. The upper town of Quebec is built upon the extremity of a long promontory which is bounded on the south by steep cliffs, 200 or 300 feet sheer up above the Saint Lawrence, and on the north by lower, but still easily defensible, cliffs overlooking the valley of the Saint Charles. The town was held by 2,000 men under de Ramesay. It had a double tier of bat¬ teries, one on the top of the cliffs, the other along the water front below them. The only open ground in the vicinity was round the mouth of the Saint Charles. But this was well entrenched, and the trenches were carried on continuously for seven miles along the Beauport shore to the Montmorency, opposite Wolfe's camp.

Wolfe's first attempt to break through was made some distance up the Montmorency, where he tried to force his way across the fords and so attack the entrenchments in the rear. But he was repulsed with loss, in a bush-fight in which his regulars were at a great disad¬ vantage. His second attempt was a more serious one. On 31 July he tried to carry the Montmorency Heights by storm, a mile on the Quebec side of the falls. But as his troops had to be collected from several quarters, in full view of the French, Montcalm easily antici¬ pated him at the right spot, before he could deliver the assault. Besides the faulty British plan could not be carried out even according to Wolfe's intentions, because the grenadiers, 1,000 strong, suddenly broke into a wild charge before being properly formed up, and lost nearly half their numbers in a fruitless effort to scale the heights. Then a terrific thunderstorm burst on the scene of carnage, making the heights more slippery than ever, and so he had no choice but to call off his men at once. After this repulse Wolfe fell seriously ill, and toward the end of August he gave his brigadiers, Monckton, Townshend and Murray, a memo¬ randum of three other plans for assaulting the trenches and asked them ((to consult together for the public utility.® Their council of war resulted in a complete rejection of all his sug¬ gestions ; because, as they well remarked, the storming of such works from open ground would certainly be both difficult and dangerous. Moreover, even if the works themselves were carried, there would still remain the fortified line of the Saint Charles, as well as the heights of the promotory beyond, to keep him out of Quebec, until the lateness of the season would compel him to raise the siege. Their own plan was to take all the available men up the Saint Lawrence, and land at any suitable point be¬

tween Cap Rouge, which was nine miles, and Pointe aux Trembles, which was 22 miles, above Quebec. Wolfe informed Pitt, in a dispatch written on 2 September, that he had acquiesced in this plan, and intended to put it into oper¬ ation at once.

The Montmorency camp was cleverly evacu¬ ated, without the loss of a man, by a general naval and military demonstration against the entrenchments, which made the French feel sure that another attempt to storm the posi¬ tion there was about to take place. From 7 to 10 September the rain suspended all operations ; and on 10 September Wolfe made his final reconnaissance. He was already well posted on the lie of the land in every direction, and the idea of attacking above Quebec was thor¬ oughly familiar to his mind long before it was mentioned by his brigadiers. On 19 May he had said to his uncle, that

he <(reckoned on a smart action at the passage of the Saint Charles unless we can steal a detachment up the river and land it there, four, five miles, or more above Quebec.® This plan was better than the brigadiers', as it contemplated seizing the ground much closer to Quebec than the nearest objective point they proposed trying. At the final reconnaissance he chose the Foulon, where a path led up to the Plains of Abraham, within two miles of the walls. If he could get up there without any serious check, he saw that he could forestall Montcalm by forming a line less than three-quarters of a mile from the city, where the promontory was narrow enough to be commanded by his small army, and where the mixed regulars and irregulars of New France would be forced to meet his homo¬ geneous British red-coats on a flat and open ground. The French were on the alert every¬ where along the north shore, from the falls up to Pointe aux Trembles, a distance of 29 miles — except just at the Foulon itself. They could not tell what Wolfe was about, nor where the bulk of his men were, behind the impenetrable screen of the ubiquitous British fleet. They were naturally very apprehensive of another desperate attack on their trenches; they were well prepared against an assault upon the town, which was so strongly fortified by nature ; while the constant movement of the fleet, and occa¬ sional landings from it, in the vicinity of Pointe aux Trembles, 22 miles up, made them think that any new plan would probably take the form of an advance in force by land from somewhere thereabouts. One man, indeed, besides Wolfe, was thinking of the Foulon, and that man was Montcalm. On 5 September he had sent the regiment of Guienne to the Heights of Abra¬ ham, but Vaudreuil withdrew it on 7 Septem¬ ber, and left no defense there, except the puny Samos battery near Sillery Point, and 100 mili¬ tiamen at the top of the Foulon, under the treacherous Vergor. Even on 12 September, the very eve of the battle, Montcalm had again ordered the same regiment back, this time to the Foulon itself. However, Vaudreuil had again countermanded the order, saying, "We'll see about it to-morrow.® But Wolfe himself was up there on that morrow! [For some ac¬ count of the battle of the Plains of Abraham, see Colonial Wars in America; Montcalm; Quebec; Wolfe.]

The winter at Quebec, after its capture, was a terribly trying one for the little British gar-

rison ; and so many men died of scurvy that, in the following April, when de Levis marched out of Montreal with 7,260 men, expecting several thousand more to join him on the way, Murray could only muster 3,886 effectives. There was a second battle of the Plains, in which Levis defeated Murray, who in less than two hours lost over one-third of his men. A second in¬ vestment followed, and Levis was in the act of advancing to storm the walls, when the van¬ guard of the British fleet suddenly entered the harbor. The French had now no choice of action. They hurriedly abandoned their camp, and retreated, in all haste, on Montreal, both by land and water. Then, step by step, the final British advance converged on the doomed col¬ ony. Murray came up steadily from Quebec, in close touch with Lord Colville's squadron, which the French had absolutely no means of resisting. Haviland advanced from the south by way of Lake Champlain ; while Amherst, with the main army, came down the Saint Lawrence from the Lakes. When the united British army, 17,000 strong, actually landed on the Island of Montreal, the few remaining Canadians de¬ serted Levis in a body, and he found himself left with only some 2,000 of the faithful French regulars. The capitulation of New France oc¬ curred two days later, on 8 Sept. 1760. The French troops were deported. The Canadians had already dispersed. The American militia went back to their homes. The fleet sailed away to their stations. The British regulars took up their winter quarters. And the New Regime began. The Seven Years' War was one of the most pregnant events in history; and its results have continued to exert a vast determin¬ ing influence on the fortunes of every world power, down to the present day. In Europe it foretold the ultimate decline of France and Austria, and the ultimate rise of Prussia to the leadership of Germany. But its significance for the English-speaking people lies mainly in the fact that it was the most truly imperial war they ever waged ; and its most dramatic episode — the battle of the Plains of Abraham — will serve to mark forever three vital stages in three great epochs of modern times — the passing of Greater France, the coming of age of Greater Britain and the birth of the United States.

Arthur G. Doughty,

Dominion Archivist; Author of cThe Battle of the Plains, > *etc.*

6. UNDER BRITISH RULE TO CON¬ FEDERATION (1760-1864). At the mo¬ ment when Vaudreuil (see Vaudreuil-Cavag- nal, Pierre)

capitulated to Amherst (Septem¬ ber 1760) (see Montreal — History) there were no English in Canada save the troops and a few civilians who had come with them. But, outwardly at least, this act of surrender placed the French Canadians and the English colonists in America on the same basis as subjects of the British Crown. One sovereignty was thus es¬ tablished over a vast area where dwelt two races whose origin, sentiments, faith and insti¬ tutions marked them off from each other in the sharpest contrast. A century later the face of the situation was profoundly changed. The American Revolution had created a second sovereignty in this region at a time when the population of Canada was almost wholly French, and yet by 1860 the Canadian English

had come to outnumber the Canadian French. The maintenance of the bond with Great Britain, the rise of the United States and the influx of English settlers are the broad con¬ ditions which have affected the progress of Canada since the cession.

Three years elapsed between Vaudreuil's surrender and the Treaty of Paris, which con¬ firmed Great Britain in the possession of her American conquests. During this interval the country remained under military rule, and though General Murray's relations with the subject population were marked by sympathy and tact, it was impossible that a sense of permanence should be inspired by such a docu¬ ment as the Act of Capitulation. The text of the treaty, in its turn, left many essential points unsettled, espefcially in the domain of law, and not until 1774, when the Quebec Act was passed, did French Canada receive from the British Crown and Parliament a charter upon which it could rely. The first 14 years of British rule were, however, a time of great importance in that the experience gained during this period suggested legislation which continues in force at the present day. The mass of the French population, seigneurs and habitants alike, ac¬ cepted the change of masters in a spirit of resig¬ nation. Their courageous support of Montcalm and Levis is proved by a large variety of evi¬ dence. They seem to have shown as much dar¬ ing as the French regulars, together with a superior knowledge of the country and a better grasp of the tactics which were suited to Amer¬ ican warfare. That the deportation of the Acadians had stimulated their resistance to the British is more than probable, but in any case loyalty and patriotism would have led them to make a brave defense. Once beaten, they ac¬ cepted the situation frankly and were not en¬ couraged to rebel by that restlessness of the Indian tribes which took form in the conspiracy of Pontiac (1763-64) (see Pontiac). The

contrast between their docility and the growing disaffection of New England and Virginia did not fail to leave an impression on the official mind both in Quebec and London. The result was that when difficulties arose between them and their English fellow-subjects the govern¬ ment was not disposed to espouse the cause of the latter. Apart from the retention of their property, the guarantee of their religious institu¬ tions was the question which came nearest to the hearts of the French Canadians. By Article 27 of Vaudreuil's Capitulation it was agreed that <(the free exercise of the Catholic, Apostolic and Roman religion shall subsist entire, in such manner that all classes and peoples of the town and rural districts, places, and distant posts may continue to assemble in churches, and to fre¬ quent the sacraments as heretofore, without be¬ ing molested in any manner, directly or in¬ directly.® This clause of the capitulation was confirmed at the Treaty of Paris (see Paris, Treaties of) with the condition <(as far as the laws of Great Britain permit,® but any restriction which might seem to be placed upon religious toleration by the foregoing phrase was nominal rather than real. The communities of nuns were not disturbed even at first, and after a few years of deprivation large estates were restored to the Sulpicians. The Jesuits also would prob¬ ably have received a confirmation of title but for the special circumstances attending their

suppression in France shortly before the Treaty of Paris and their general suppression in 1773. As it was, the scrupulous care with which gov¬ ernors like Murray and Carleton (see Carleton, Sir Guy) carried out the policy of tolera¬ tion reassured the hierarchy and made it a firm supporter of British rule.

Had there been no other factors in the politi¬ cal life of the country than the government and the French Canadians, the first years of the new order would have been peaceful enough. It is true that the commission of Governor Mur¬ ray (1763) was marked by ill-advised expres¬ sions. For example, the members of such an assembly as might hereafter be convened by the governor and council <(shall,

before their sitting, take the oaths mentioned in the act entitled (An Act for the further security of his Majesty's person and government, and the succession of the Crown in the heirs of the late Princess Sophia, being Protestants,))) *etc.* In other words, every French Canadian who aspired to sit in the assembly of the colony must sub¬ scribe a declaration against transubstantiation, the adoration of the Virgin and the sacrifice of the mass. Such language (borrowed from the laws of England) would have seemed offensive had political life become active in the colony, but as no assembly was convened till 1791 it remained shorn of practical significance. Real difficulty sprang less from the disaffection of the <(new subjects® than from the presence in Canada of certain <(old subjects,® that is to say, of the English who had come to-Quebec and Montreal at the close of the war. Here was a fresh element in the population, small but active and bitterly opposed to the recognition of French institutions. Prior to the outbreak of the Revolution an influential pro¬ portion of the English living in Canada were natives of the American colonies who had moved to the northern part of the British dominions with the design of enriching themselves through the fur-trade. Their antagonism to the French was prompted partly by race and religion but also by dislike of French law and contempt for the conservatism of French character. Their plea was that since the fate of war had given Canada to the English the country should be made in the fullest sense a British possession. These <(old subjects,® but just arrived in the colony, would have uprooted French law, dis¬ couraged the use of the French language, de¬ stroyed or fettered the hierarchy, and inciden¬ tally have made themselves a dominant class. At no time before the passage of the Quebec Act could they have formed more than a fiftieth part of the population, but, owing to the strength with which they raised the cry of the ruling race, they enjoyed a position of great promi¬ nence. Unfortunately for the success of their program, they incurred the dislike of the local authorities by an extreme radicalism of utterance and demeanor. Carleton, in particu¬ lar, discountenanced them and held them to be infected with the mutinous views which were becoming so increasingly prevalent in the Eng¬ lish colonies.

Sir Guy Carleton, afterward Lord Dor¬ chester, is the most striking figure in Cana¬ dian history from the Conquest to the days of responsible government. The close friend and confidant of Wolfe, he began his career as. a soldier. Circumstances made him an adminis¬

trator and he ended by reaching the full stature of a statesman. Those who approve the policy embodied in the Quebec Act will, of course,

rank him higher than he will be ranked by those who deny the wisdom of that far-reaching measure, but regarding the quality of his mind, the firmness of his temper and the justice of his intentions, opinion is undivided. After serv¬ ing with distinction in the campaigns of 1759 and 1760 he returned to Canada as administra¬ tor of the government in 1766. In 1769 he be¬ came governor-in-chief ; and from this date until his final surrender of office in 1796 he re¬ mained among all Englishmen the leading au¬ thority on Canadian affairs. The Quebec Act was the fruit of information and advice which he supplied ; it was he who repelled Mont¬ gomery's invasion, and the Constitutional Act of 1791 which gave the colony its first training in self-government was largely his work. Dur¬ ing a formative period of 30 years his policy of generosity toward the defeated race was the policy of the British government. Murray, whose language reflects personal resentment, says of the ((old subjects® : C(I report them to be in general the most immoral collection of men I ever kfiew.® Carleton, though less severe in his strictures, formed a highly unfavorable opinion of them and expressed his preference for the French Canadians with perfect freedom. According to his, forecast, which in this respect has not been altogether justified, the valley of the Saint Lawrence was unlikely to be inhabited by any large number of Englishmen. Most of the English who were then resident in Montreal and Quebec had come in the train of the troops and would probably return with them. The traders had not been successful and would soon disappear. To quote his own words, it remained that <(barring a catastrophe too shocking to think of, this country must to the end of time be peopled by the Canadian race.® The Cana¬ dians, he continues, ((are not a migration of Britons, who brought with them the laws of England, but a populous and long-established colony.® Thus believing that the French could never be supplanted he concluded that their customs, ecclesiastical and legal, should be re¬ tained. A detailed statement regarding the Quebec Act will be found elsewhere (see the article The Quebec Act). Here it need only be said that its territorial provisions were ex¬ tremely distasteful to the English colonies and that its concessions to the French Canadians have supplied a solid ground work for their loyalty to the British Crown. Whether Sir Etienne Tache was correct when he said, <(The last gun that will be fired for British supremacy in America will be fired by a French Canadian,® must be termed matter of conjecture; but the sentiment which prompted him to speak so fervently was gratitude for the Quebec Act. This measure provided an unobjectionable oath of allegiance, sanctioned the Roman Catholic religion in so far as it did not conflict with the King's supremacy, and ordained that ((in all matters of controversy relating to property and civil rights, resort shall

be had to the laws of Canada as the rule for the decision of the same.® Hence English criminal law and French civil law were established side by side in the regions covered by the act. When Upper Canada was constituted in 1791 it received the common law of England unmodified and un-318

limited, blit French civil law still survives in the province of Quebec.

At the same moment when Great Britain was endeavoring to meet the wishes of her French subjects, the question of Canada was becoming an additional source of friction between the mother country and her older colonies in Amer¬ ica. Not only did the English colonies dis¬ approve a policy which heaped such favors upon the French, but some of them re¬ sented the King's disposition of the re¬ cently acquired territory to the west of the Alleghanies. In the royal proclama¬ tion of 1763 nothing was said concerning the government of this valuable region, an omission which disappointed Virginia and other colonies ambitious of expansion. Worse still, the Quebec Act handed over the western coun¬ try to Canada, shutting out the older colonies and rendering an immense area subject to the operation of French civil law. At any time such action would have provoked remonstrance ; in 1774 it quickened the resentment which had been gathering force ever since the passage of the Stamp Act. How prominent Canada was in the eyes of the Continental Congress may be inferred from the decision, speedily formed, to gain control of it by force. The sequel was a severe blow to the Revolutionary cause. Mont¬ gomery (see Montgomery, Richard), advanc¬ ing by Lake Champlain and the Richelieu, occu¬ pied Montreal and nearly succeeded in captur¬ ing Carleton, who was the head and front of the defense. Simultaneously Benedict Arnold (q.v.) made his way through the woods of Maine to the valley of the Chaudiere and de¬ spite dreadful privations appeared before the walls of Quebec. On the arrival of Mont¬ gomery from Montreal a siege was commenced, but the sufferings of the troops proved so in¬ tolerable that it was decided to carry the town by assault. On 31 Dec. 1775, the two generals made a desperate attempt to force a passage through the streets of the Lower Town. Dur¬ ing the fight which ensued Montgomery was killed and after a sharp encounter Carleton drove out the invaders with heavy loss. The war in Canada dragged on during the greater part of 1776 but before the

close of that year the Americans had been repulsed at all points and the issue, so far as it affected Quebec, was decided. On the British side the hero of this campaign is undoubtedly Carleton, who main¬ tained his position against heavy odds ; but con¬ sidered historically the attitude of the French Canadians is no less interesting. The clergy and the seigneurs used their influence actively on behalf of the British ; the habitants remained neutral. It seems clear, however, that without the aid which he received from Canadian volun¬ teers, Carleton would have been beaten, and it is also manifest that the French peasantry did not respond with any heartiness to the appeals of the Continental Congress.

While Montgomery's invasion is an exciting and critical episode, the Revolution affected Canada still more profoundly by causing the emigration of the United Empire Loyalists (see American Loyalists). Into the nature of their differences with the American patriots it is not necessary to go, beyond stating that each party represented a definite point of view and was separated from its opponents by the wide gulf of contrasted ideals. The Loyal¬

ists represent the conservative element in the 13 colonies and undoubtedly embraced within their ranks a large proportion of dis¬ tinguished, educated men. Including those who left their homes while the war was in progress and those who came northward after its close, we may place the total number of Loyalist emi¬ grants in British North America at nearly 40,000. More than half of these newcomers settled in the neighborhood of the Bay of Fundy, particu¬ larly in the region which now forms the prov¬ ince of New Brunswick, but at least 10,000 of them made their way to Canada. It is at this period that important settlements are first estab¬ lished upon the northern shore of Lake On¬ tario, where a population exclusively English possessed itself of lands which the French had explored but never colonized. The population of Canada was further modified between 1783 and 1800 by the opening up of the Eastern Townships, a district situated on the northern border of New Hampshire and Vermont, with a short frontier on the northeastern corner of New York. Flere the original settlements were made in part by Loyalists but more largely by emigrants from New England who moved north in quest of cheap land. At the close of the Revolution, then, the race question in Canada begins to assume a very different aspect from that which it had worn before the passage of the Quebec Act. Then the English population con¬ stituted a mere handful. Now, through the steady influx of immigrants from the United States fresh portions of the country are de¬ veloped and a

nucleus is formed round which later accessions of English-speaking colonists will range themselves. As the bulk of the new population professed the deepest affection for Great Britain, a separatist movement was not to be thought of, but it was equally certain that disagreement would arise within Canada over the issue of legal and ecclesiastical institu¬ tions. As early as 1785 the Loyalists resident on and near Lake Ontario sent a petition to England praying that they might enjoy <(the blessings of British laws and British govern¬ ment and of exemption from French tenure of property.® Carleton, now Lord Dorchester, was eminently suited to effect an arrangement be¬ tween the Loyalists and the French Canadians, toward both of whom he was drawn by feelings of strong sympathy. After establishing in 1788 special regulations for the administration of districts inhabited by Loyalists, he assisted in the preparation of the Constitutional Act (1791), a measure which was designed to do away with the grievances of the Loyalists without creating a sense of grievance among the French. Under the Constitutional Act, which in the British Par¬ liament received support from Pitt and Burke, a division was made between Upper and Lower Canada. For each of these provinces the act created a legislative council and an assembly, but no independent power with respect to tariff legislation was granted. Clergymen of what¬ ever denomination were declared ineligible to sit either in the council or the assembly, but freedom of wrorship was guaranteed to the Catholics in perpetuity and the Protestant clergy received as an endowment one-seventh of all waste lands belonging to the Crown. Some idea of the relative importance of the two provinces at this date may be gathered from the fact that in Lower Canada the legislative council was to

consist of not less than 15 members, while in Upper Canada the minimum number was placed at seven. A still greater disproportion existed between the number of members in the assem¬ bly — ‘the minimum of 50 in Lower Canada as opposed to a minimum of 16 in the other prov¬ ince. Although grave troubles afterward arose under the operation of the Constitutional Act, the measure seems to have

encountered little opposition in Canada save from the English minority in Quebec, whose leaders looked for¬ ward with discontent to the prospect of political inferiority. No tests excluded Roman Catholics from the council or the assembly, and after the elections of 1792 the latter body in Lower Canada contained 34 French as against 16 English members.

Within six months from the day when the first Canadian legislature met. Great Brit¬ ain joined Austria and Prussia in their war against revolutionary France. While British North America was not drawn into the vortex of England's contest with the Convention, the Directory and the Napoleonic empire, it felt the influence of that long struggle in more ways than one. Besides Canada's part in the War of 1812, which was a by-product of the larger strife, one must mention the attempt of French republicans to make trouble for England in Lower Canada, and a certain neglect of Cana¬ dian issues by the home government which may be ascribed to the pressure of more critical questions in Europe. At about the same time when Genet was endeavoring to raise the United States against Great Britain, agents of the National Convention sought to provoke a disturbance among the habitants of Quebec. The execution of McLane and the imprison¬ ment of Frechette for life are the chief inci¬ dents in this abortive undertaking. Of much more consequence was the failure of the colo¬ nial office to watch the working of the Consti¬ tutional Act in Lower Canada. The council, whose members were appointed by the gover¬ nor, speedily became a stronghold of English interests. The assembly, whose members were chosen by popular vote, assumed no less speed¬ ily a French complexion. As the council con¬ sidered itself to represent the dominant power and was quite free from the control of the assembly, it tended to assume a tone which was extremely offensive to the French majority in the other house. The Constitutional Act gave representation but did not recognize the principle of ministerial responsibility to the popular branch of the legislature. In an age of mounting democracy, this type of govern¬ ment was open to fierce attack, especially when the question was complicated by racial preju¬ dice. Between 1791 and 1812 the most mala¬ droit governor of Lower Canada was Sir James Craig, who for three years (1808-10) carried on open strife with the assembly and finally had recourse to a coup d'etat. In his assault upon the Canadien, a Nationalist newspaper, he unwarrantably arrested Bedard as the pub¬ lisher of treasonable articles, dismissed Panet, the speaker of the assembly, from the militia, and eventually imprisoned six of the leading members of the assembly. Craig's action was due to a sincere belief that the French Cana¬ dians were disloyal because they criticized the council, but the

effect of his measures was most unfortunate, since the Colonial Office

could not fail to be identified with them in the public mind. The political life of Upper Canada during the same period wTas unmarked by any notable dissensions. Through no fault of her own, and simply by virtue of being a British possession, Canada was drawn into the War of 1812 (see United States t-The War of 1812). Among the causes of the war, the only one which concerned her directly was the ill-founded contention that English officials were trying to stir up an Indian attack upon the American colonists in the West. From the outbreak of hostilities till the conclusion of peace Canadians of both provinces con¬ ducted the defense of their country in a truly patriotic spirit. The Loyalists were stimulated by the memory of their expatriation and fought enthusiastically for the British cause under Brock and Sheaffe. The French Canadians guided by Bishop Plessis (see Plessis, Joseph Octave) of Quebec, himself the descendant of a New England captive, displayed an attachment to England which had not been so clearly appar¬ ent at the time of Montgomery's invasion. De Salaberry's victory at Chateauguay showed that the French peasants had not lost their ancestral courage or their knowledge of the methods to be pursued in guerilla warfare. At Queens¬ town Heights (see Queenstown) and Lundy's Lane (see Lundy's Lane, Battle of) the Loy¬ alists acquitted themselves well in the open field. The War of 1812 contributed much to the formation of a patriotic sentiment which was independent of provincial bounds.

The political unrest wrhich affected most civilized countries in the generation following the battle of Waterloo appeared in Canada under an acute form and was not quieted until after the rebellion of 1837. The Upper Prov¬ ince, free from the problem of a mixed nation¬ ality, had hitherto been undisturbed by violent disputes, but as time went on the Constitutional Act was found unsatisfactory — or rather, the act gave no redress of the grievances which grew up under the existing system of adminis¬ tration. In Lower Canada the claims of the assembly found an eloquent champion in Louis Joseph Papineau (q.v.), the most prominent French Canadian of his generation. It should be clearly pointed out that the grounds of dis¬ cord were different in the two provinces, but the development of agitation went on simulta¬ neously and the two movements, each proceed¬ ing from its own set of conditions, reacted strongly on each other. English radicals and French radicals were brought into close sym¬ pathy as agitators by their common opposition to the established order. In both cases there were minorities whose privileges depended upon the

maintenance of the constitution and the bit¬ terness of the struggle for responsible govern¬ ment was intensified by the presence of these vested interests. In Upper Canada the contest between officialism and reform did not centre round the first principles of politics so much as it did round the exercise of power by cer¬ tain individuals. The main strife was one of old settlers against new, with several minor issues coming in to complicate the situation and render it disagreeable. A few families of Loyalist stock constituted a local oligarchy from which were drawn the chief officials of the colony. As the members of this ruling class belonged almost wholly to the Anglican

Church, and used their influence freely to bene¬ fit the Anglican clergy, they provoked the op¬ position of the dissenters who formed a majority of the more recent immigrants. The political solidarity of Anglicanism and the “Family Compact® led both to be denounced by the champions of responsible government — Robert Gourlay, William Lyon Mackenzie, Dr. Rolph and Egerton Ryerson. The clergy re¬ serves were represented as a symbol of gov¬ ernment by privilege and Roman Catholics united with Protestant dissenters to demand the application of their proceeds toward the sup¬ port of schools. It will be seen that these sources of discontent were hardly of a funda¬ mental character, but the population of Upper Canada was not one to bear political grievances lightly. In Lower Canada the situation was more intricate and more serious. When the ex¬ citement caused by the War of 1812 had died away, the relations between council and assem¬ bly resumed their former rancor, while the as¬ sembly and the executive became involved in a protracted dispute over the power of the purse. By the financial provisions of the constitution certain revenues were at the disposition of the Crown and the assembly had control of certain other revenues which originally were much smaller. Through the development of the colony, the assembly’s share of the revenue kept growing larger in proportion to that of the Crown, and at he same time the Radicals discovered that they could place the govern¬ ment in a very awkward position by refusing their assent to appropriations. The advantage which the assembly possessed through

its power to keep up a perpetual dispute over fiscal matters was used with much tactical cleverness, though perhaps with less genuine patriotism than might have been desired. The fight against privilege (and there can be no doubt that the council had excessive privileges) was accom¬ panied by a revival of racial feeling among the French Canadians. With Papineau for their leader the Nationalist majority in the assembly used language which showed that their brightest ideal was not summed up in subjection to British sway. Gradually the English element was eliminated from the ranks of the re¬ formers, and though a few politicians of Eng¬ lish and Irish name supported Papineau during the disturbances of 1837 his sole hope of suc¬ cess lay in the support of the French. Under such a system of government as was provided by the Constitutional Act, the role of the gov¬ ernor assumed a degree of importance which it does not possess at present in any self-govern¬ ing colony of the British Empire. Had abler men than Sir Francis Bond Head and Lord Gosford represented the Crown in Upper and Lower Canada during the acrimonious debates of 1836, there might have been no breach of the peace. As it was risings took place in both provinces, the Radicals of Upper Canada being encouraged by some initial successes which the party of Papineau had gained in the autumn of 1837. The rebellion cannot be dignified by the name of a war since the engagements were ac¬ companied by slight fatalities and the issue was never in doubt. The French Canadian peasants who took the field were defeated at Saint Charles and Saint Eustache, and in Upper Canada the appeal to force collapsed after a farcical skirmish at Montgomery's

Tavern, near Toronto. In 1838 fresh disturb¬ ances occurred at a few places in Lower Canada, only to be repressed with a promptness which showed the futility of further resistance. Apart from the domestic bitterness occasioned by these outbreaks, they were the cause of a diplomatic crisis, in that the activity of Mac¬ kenzie's American sympathizers led to strained relations between Great Britain and the United States. The burning of the Caroline (q.v.) and the fight at Pelee Island (q.v.) were interna¬ tional episodes of the first importance.

The best fruit of the rebellion was Lord Durham's report and the transformation of British colonial methods which followed it. In 1838 the Earl of Durham (see Durham, J. G. L., Earl of) was sent to Canada as gov¬ ernor-general and given a commission to in¬ vestigate the state of the country. The bluebook in which he described the causes of the rebellion and suggested remedies for obvious evils is held, by

common consent, to rank first among the documents of the Colonial Office. Whether the text was written by Durham or Charles Buller, or by both in conjunction with Gibbon Wakefield, the report as it stands is. a classic in political literature. The two essential recommendations which it makes are that re¬ sponsible government be freely conceded and that the provinces of Upper and Lower Canada be reunited with a view of allaying the racial discord which had raged so fiercely in Quebec under the Constitutional Act. The Union Act of 1840 was the immediate sequel of Lord Durham's proposals and a first step toward the political consolidation of British North America. The salient feature of this constitu¬ tion may be defined as the transfer of political power to an assembly which was chosen on a very democratic basis, though not by universal suffrage. The legislative council, with members appointed by the Crown, was retained, but real authority centred in the popular branch of the legislature. To the assembly each province con¬ tributed 42 members and it was provided that a general election should be held every four years, subject to the chance of a dissolution by the governor-general during the interval. The Union Act had imperfections and incon¬ veniences which finally furnished a strong argument in favor of confederation, but under it (1840-67) Canada gained a political training which was invaluable and escaped from the worst of the anomalies that had provoked the rebellion. At first the act seemed to favor the English, inasmuch as French ceased to be an official language ; but in 1848 it was restored to its former position of parity. With the estab¬ lishment of democratic principles the party system reached a maturity which before had been unknown in Canada. Lafontaine (see Lafontaine, Sir Louis H.), Baldwin (see Baldwin, Robert), McNab (see McNab, Sir Alan N.), Macdonald (see Macdonald, Sir John A.), Brown (see Brown, George), Cartier (see Cartier, Sir George E.), and many other accomplished politicians found free scope for their talents in the ranks of Reformers or Conservatives. Much of the legislation which marks this period (for example, the abolition of seigniorial tenure in 1854) was designed to adjust the life of Canada to modern conditions, even at the cost of parting with a picturesque institution or discarding an ancient view of the

relations which should subsist between church and state. The Refo

rmers, however, had no exclusive possession of the liberal spirit, for it was a Conservative administration which abolished the clergy reserves. Education in both provinces began to receive an amount of attention which had not been paid to it hitherto. Judged also by economic results the progress of Canada under the Union Act was extremely satisfactory.

As the confederation movement is consid¬ ered separately (see the article on The Con¬ federation), it will be unnecessary to discuss here the causes which suggested to Canadians a larger political conception than is represented by the Union Act. But in conclusion some reference should be made to the progress of Canada as affected by its relations with Eng¬ land on the one hand and with the United States on the other. From 1840 onwards the country enjoyed self-government in all matters of a local or domestic character, but it re¬ mained a colony and never considered itself to be a co-ordinate part of the British empire. In the second quarter of the 19th century the fixed belief of English ministers was that colonies are a kind of fruit which drops off the parent tree when it has become ripe. The rebellion of 1837 coming when liberal principles w'ere triumphant in the mother country prompted the adoption of a generous colonial policy which has never been abandoned, but its effect upon the rise of imperial sentiment was only indirect. Yet notwithstanding the absence of a full partnership between Canada and Eng¬ land, the loyalty of the colony was signally il¬ lustrated during the first century of British rule. Despite friction between races, the pressure of foreign invasion and the existence of political privilege in both provinces, the attachment of an overwhelming majority of the population to British institutions and the British connection remained firm even through¬ out the decade that preceded the rebellion. The division which the American Revolution created between the United States and British North America could not fail to affect the fortunes of Canada in the most vital manner. Apart from the importance of the Loyalist immigra¬ tion, the rise of a new and powerful state on the southern frontier brought into being con¬ ditions which thenceforth could never be ig¬ nored. As early as 1775 a small but active minority would have preferred membership in the band of revolted colonies, and ever since there have been individual advocates of an¬ nexation. But this propaganda has never spread widely or gone beyond the theoret¬ ical stage. In addition to the War of 1812 and the irritation caused by the filibuster¬ ing raids of 1838, the question of boundaries was for long periods together unpleasantly prominent. The Webster-Ashburton Treaty of 1842, though it was received with great dis¬ satisfaction in New Brunswick and Quebec, did good rather than harm by settling an

irritating dispute. The Reciprocity Treaty of 1854, which was largely due to the efforts of Lord Elgin, brought the two countries into more direct con¬ tact than ever before, promoted friendlv inter¬ course and was a source of prosperity to Canada during the 13 years of its existence (1854-67). Its repeal by the United States was in large measure due to a resentment which vol. 5 — 21

had arisen from Great Britain's attitude during the American Civil War. The fact remains that in its birth year the Dominion of Canada was excluded, by action not its own, from reciprocity in natural products with the United States. See the articles Under French Rule; The Clergy Reserves; Seigniorial Tenure.

Charles W. Colby,

Formerly Professor of History, McGill Uni¬ versity.

7. THE MARITIME PROVINCES TO CONFEDERATION. The early history of the three eastern seaboard provinces of Canada is an important incident in the long dramatic struggle between France and England for world-empire. Their place on the map linked their destinies with those of New France on the one hand, and of New England on the other. The tale of their settlement and or¬ ganization into communities is part of a greater story, the overflow of European peoples into the New World. They have been profoundly affected by great events outside their borders, European wars and political changes on this continent ; and if they have not as yet reacted on the history of the world, as a nation they are young; their history is yet to make.

Nova Scotia. — In 1604, Sieur de Monts, a Huguenot gentleman adventurer and trusted soldier of Henry IV, made a voyage to the great Atlantic peninsula, which is now called Nova Scotia (q.v.). He was to found a colony in return for his broad patent to trade in furs. After exploring the rugged eastern and south¬ ern coastline, he discovered the beautiful Annapolis Basin, and wintered, suffering ter¬ ribly, on the island of Saint Croix. The next year, after searching as far south as Cape Cod for a suitable place, he turned back to the Annapolis Basin, and planted his colony on its shores, naming the cluster of huts Port Royal. The colony did not flourish, and, in 1613, it was destroyed by a force under Argali from the newly-founded colony of Virginia.

The French name for the country was Aca-die, a musical native word, often mistaken for Arcady. It means ˆabounding in,® as in Shu-benacadie, and covered an ill-defined tract of wilderness, comprising what is now Nova Sco¬ tia, New Brunswick (q.v.) and part of Maine. In 1621, this territory was granted by James I to Sir William Alexander (q.v.), a Scottish gentleman, to be colonized on a plan distinctly mediaeval. Alexander was to parcel out his province in <(baronies,® six miles long by three deep, to gentlemen, who were to (<plant® them with settlers. Each baronet was to have almost regal powers within his own domain, even striking his own coinage, and ((repledging® criminals from the King's courts of law to his own. The colony was to be a new Scotland, even by a legal fiction, part of the county of Edinburgh. One small settlement was actually made on the Annapolis Basin in 1629, but it came to nothing, and the whole province was handed back to France in 1632, by the treaty of Saint Germain-en-Laye. Still, to this day, the baronets of Nova Scotia form a distinct order in the British aristocracy, and the provin¬ cial flag bears the azure saltire of Sir William Alexander and the ruddy lion of Scotland ramping in gold.

For 22 years, the French had undisputed

possession, and succeeded in planting a colony on the feudal pattern, as far removed as pos¬ sible in principle from republican New Eng¬ land. The government was military and paternal ; the land was held by seigniors and tilled by a docile tenantry. The habitants were chiefly unlettered peasants from the country about Rochelle. In Acadie, they found(broad marsh lands beside tidal waters, resembling the country they had left. Here they settled, built long dykes of logs and earth on the river banks, and peacefully cultivated the rich fields the salt tides fertilized. Population grew slowly. In 1671, there were 378 persons in the colony; in 1683, 600, chiefly about Port Royal. An interesting census of Acadie was made in 1686 by de Meulles, intendant of New France, who visited the scattered settlements and numbered the families, acres of cleared ground, boys, girls, fusils, horned cattle, swine and sheep in each. The population had grown to 915, in¬ cluding 30 soldiers at Port Royal. Although thickest about the seat of government, the Acadians had spread along the coasts and so far as

Beaubassin at the head of the Bay of Fundy. They were a race of husbandmen, growing wheat, pease and rye and raising cattle, sheep, swine and poultry; they also built small boats for the shore fisheries. An observer relates that when the manure-heaps beside their barns grew unmanageable, they moved the barns. Few women came with the first settlers, who married with the Indians, and always lived on friendly terms with them. Priests of the Sulpicians and Missions-Etrangeres were their trusted guides both before and after the English conquest. See article Acadian Ref¬ ugees.

Throughout this period, the chief interest lies in the shifting fortunes of one family. Claude de St. Etienne, Sieur de la Tour, a ruined Huguenot gentleman of Champagne came out early in the 17th century, with his son, Charles Amador, a boy of 14, to better himself in the new colony. After Argali's raid, the two lived for years like Indians among the Indians. Their stronghold was Fort Saint Louis at Cape Sable, on the inlet now known as Port Latour. In 1627, Charles petitioned Louis XIII to be made commander of the coasts of Acadie, and his father took the petition to the French Court. On his return voyage the next year, he was captured by Kirk's fleet and taken prisoner to England. Here he became a friend of Sir William Alexander, married a maid of honor to Queen Henrietta Maria and was made a baronet of Nova Scotia, as well as his son, with large grants of land to support their titles. With two men-of-war, he came back to Cape Sable, where Charles held the one solitary post for France in Acadie. By persuasion, and at last by force, he strove to win his son over. Failing in both, he begged permission to live in Acadie, rather than return to England in shame, or to France and lose his head. This Charles granted, and Claude with his bride, his effects, two valets and two femmes de chambre disembarked. In 1635 Denys the historian found them living there in comfort.

Louis XIII rewarded Charles' loyalty by making him his lieutenant-general in Acadie. In 1632, Isaac de Razilly took possession of the province in the name of France; his chief officers were La Tour the younger and D'Aul-

nay Charnizay. On the death of de Razilly in 1636, the territory was divided between the two; La Tour established himself in baronial state at the mouth of the Saint John, with his Huguenot bride, while D'Aulnay made Port Royal, across the bay, his headquarters. D'Aulnay intrigued against his rival at the court of France and procured his recall to answer charges of fraud upon de Biencourt, his former

commander. La Tour refused to go to France, and tried to enlist the Puritans of Boston on his side. Failing them, he obtained help from Rochelle; the (<proud city of the waters^ sent him supplies, munitions of war and 140 soldiers in the Clement. When the Clement arrived in the spring of 1643, she found Fort Saint John closely beset tjty' D'Aulnay and 500 men. Being closely pressed, La Tour and his devoted wife slipped through the blockade by night, reached Boston safely, returned with reinforcements and drove D'Aul¬ nay back to Port Royal. But D'Aulnay's hate was not easily tired. He went to France to raise another force against his enemy. At the same time, Madame La Tour went to Rochelle, to gather aid for her husband. D'Aulnay heard of her presence there and tried to have her arrested, but she escaped to England. On her return voyage, she almost fell into his hands a second time, but at last she reached Saint John again in safety. In April 1645 D'Aulnay be¬ sieged her here, while La Tour was in Boston. After a gallant defense, the fort was taken by treachery. D'Aulnay, to his everlasting shame, broke the terms of surrender, hanged the garri¬ son and forced Madame La Tour to witness the death-struggles of her faithful soldiers, with a rope about her neck. Three weeks later, the heroine died of a broken heart. La Tour became a wanderer on the face of the earth, exploring and border-fighting in New France, while his rival ruled his province unchecked and built it up with a strong hand until he was drowned in the Annapolis River in 1650. La Tour hastened to France, confuted the old charges against him and obtained his former possessions in Acadie. Returning he married the widow of D'Aulnay and seemed about to enjoy a period of prosperity, when the prov¬ ince was once more taken by a Cromwellian fleet, in 1654. Undismayed by the sudden change of fortune, La Tour sailed for England and secured a joint grant of the territory with two English colonels, Crowne and Temple, to whom he soon sold out his interests. At the Restoration he was made a baronet of Nova Scotia, and closed his chequered and adventur¬ ous career in 1672.

In 1667 Acadie was again restored to France by the Treaty of Breda. The story of the French administration is not a pleasant one. It is a tale of incompetence, corruption, petti¬ ness and is told at length in the pages of Parkman. The priests accuse the officials, the officials accuse the priests. The luckless colony was raided time and again by pirates, and by expeditions from New England to avenge the Haverhill and Deerfield massacres. Canada could only be reached by long and dangerous traverse of the wilderness, but Acadie was only a few days' sail from Boston.

French rule came to an end during Marl¬ borough's wars. In

September 1710 a force from Boston, chiefly of provincial troops, under

Col. Francis Nicholson, took Port Royal after a brief but gallant defense by Subercase. Port Royal at once became Annapolis Royal, in honor of the reigning sovereign, but it was not until 1713, by the Treaty of Utrecht (q.v.), and sorely against the will of Louis XIV, that Acadie became finally a part of the British Empire.

From 1710 to 1749 a small British garrison at Annapolis Royal held the province tena¬ ciously for England. The fort, though well placed, and a Vauban plan, was ruinous; the earthen walls were always crumbling into breaches ; the gun-carriages would not bear the guns ; the barracks were roofless ; for years the men were without bedding, stockings, great¬ coats or medicines. Supply-ships from England came once a year and brought provisions for nine months instead of 12. The hostile population would not take New England money for their corn and cattle ; the home authorities would not honor the governor's drafts; the Boston merchants refused credit. During Walpole's long peace England seemed to forget the lonely garrison, while the French priests were agents of the French government, under¬ mining English authority. From 1720 on, Louisburg, the new French city on the island of Cape Breton, was yearly growing in power, millions of livres were spent on its defenses, for France was bound to win back her lost province. All the time, convinced of its im¬ portance to the empire, one discouraged Eng¬ lish governor, after another held doggedly to his post.

The government was military, not civil, for the Acadians being Roman Catholics were, by the laws of England, incapable of voting; but at least one official regretted that they could not be given representation. They were gov¬ erned by their deputies, the aancientest)) and most reputable men of each parish, chosen every year on or about 11 October. These were responsible for the good behavior of their districts and for the execution of orders trans¬ mitted by the governor-in-council. Philipps, colonel of the 20th regiment, was governor for almost this entire period. He visited the prov¬ ince twice, but resided mainly in London, while lieutenant-governors, chiefly

regimental officers, Armstrong, Cosby, Mascarene, administered the colony. The governor was supreme; but to assist him, he had a small council, whose functions were advisory and executive. These officials did their best to advance British in¬ terests, giving the litigious Acadians justice in their endless disputes, and making wise sug¬ gestions for the improvement of the colony, which must have been doomed to gather dust in the Duke of Newcastle's closet of unopened dispatches.

On the outbreak of the War of the Spanish Succession (see Succession Wars) the men of Massachusetts rose and by splendid audacity struck down the stronghold of French power, Louisburg; but that ffiorious adventure be¬ longs to the annals of New England rather than of Nova Scotia. In the summer of 1744, gallant old Mascarene sustained two hot sieges in his ramshackle fort of Annapolis Royal ; the first force was led by young Belleisle and other Acadians ; the second, by Du Vivier, a descend¬ ant of Charles de la Tour. In 1746, Ramezay encamped against him, awaiting D'Anville's ar¬

mada, but did not fight. The same winter, he surprised Noble's force at Grand Pre, and killed, wounded or took prisoner nearly 200 men.

When the war ended by the Treaty of Aix-la-Chapelle in 1748, Cape Breton was restored to France, and Louisburg, the Dunkirk of America, resumed its old attitude of menace to the very life of the English colonies. Then at last sluggish England moved to save the key to her possessions oversea. Nova Scotia was to have an effective garrison to counter-check Louisburg. In June 1749 a fleet of 13 trans¬ ports, bearing some 3,000 colonists, and escorted by the sloop-of-war. Sphinx, reached the great threefold harbor of Chebucto, long known for its excellence to French and English mariners. The leader of the expedition was Col. Edward Cornwallis, twin brother of the gay archbishop of Canterbury, and uncle of the Lord Cornwal¬ lis, who surrendered at Yorktown. He had seen service at Fontenoy and Preston Pans, and although his military reputation was afterward clouded by his share in the Rochefort and Mi¬ norca fiascos, he did his work as a city-builder well. The new military post, Halifax (q.v.), was quickly laid out, the land cleared, the population organized into a militia and a rough line of stockade and block-house run around the streets of tents and log-huts. In spite of the character of the settlers, trade-fallen soldiers and sailors, and the plague that carried them off in hundreds; in spite of Indian massacres, opposition from local smugglers, extortions of Boston merchants, discouragements from the

home government, Cornwallis made Halifax a place on the map of the world. The founding of Halifax brought about the second capture of Louisburg, leaving the way free for Quebec (q.v.) and the downfall of the French power in America. Emigrants from Old and New Eng¬ land flocked to the new city. In 1750 and again in 1752, some hundreds of settlers came from the Palatinate. After a brief stay in Halifax, they were transferred to the island-studded bay of the La Heve, the old headquarters of de Razilly, where they have grown into a race of hardy fishermen, whose town, Lunenburg, is the Gloucester of Canada.

In 1752, Cornwallis returned to England crippled by rheumatism, but his successors, Hopson and Lawrence, built strongly on the foundation he had laid. Their great problem was the growth of French power in the fortress of Louisburg and in the Acadian population. Under English rule, the habitants were far hap¬ pier than under their old masters. The nominal government at Annapolis Royal had been powerless for good or evil. Its authority did not extend beyond a cannon-shot from the walls of Fort Anne. It was precisely under English rule that the Acadians increased and multiplied and, beginning to press upon the means of sub¬ sistence, spread outward, round the Bav of Fundy, to the marsh-lands on the further shore. Their lawsuits were nearly always over dis¬ puted lands, or boundaries. In 1755, they numbered about 10,000 persons. England and France were then mustering all their forces for the coming struggle known to history as the Seven Years' War. No one could foretell that it would be final or which country would win. England seemed to be at the lowest ebb of fortune and spirit. Brown's lugubrious Esti-

mate predicted her immediate downfall. France seemed strong in the New World; she had hemmed the disunited English colonies in with a chain of posts from the mouth of the Mississippi to Louisburg. She had never ceased to regret the loss of Acadie or to plan for its recovery. The province was the pivot of the whole situation in the east. In these circumstances, the presence of the alien French population in it constituted a grave danger. The claim has been set up that they were neutrals ; they had this idea themselves ; but this strange notion was simply due to the im¬ potence of the British government. They were no more neutrals than the people of Alsace and Lorraine were after their transfer to Germany in 1871. They were British subjects by con¬ quest, by treaty, by the formal taking of an oath of allegiance and by the common law of nations, but they refused to consider themselves as such. They might be French subjects again by another war, or the

return of the Pretender. Whether they left the province or remained in it was not a matter of indifference. If they stayed, tjiey afforded a shield to hostile opera¬ tions ; if they were free to go, they would strengthen and feed the garrison of Louis¬ burg. In this dilemma, the old proposal of Shirley's was renewed, their deportation. In the autumn of 1755, after Braddock's defeat gave the signal for war, this was done. The idea originated in New England and was car¬ ried out by New England men, acting under the orders of Governor Lawrence. At Grand Pre, Pisiquid, Chignecto and Annapolis Royal, the men were called together and made prison¬ ers, and placed on board the transports ; their families followed them. The embarkation con¬ sumed long weeks. Finally the ships sailed and distributed the unhappy people among the At¬ lantic colonies. In all, some 7,000 persons were in this way removed from the province. Opin¬ ions differ as to the measure. The French theory is the natural brutality of the English ; one writer finds his reason for it in the greed of Lawrence to seize on the belongings of the poor peasantry. The general English view is that it was a war measure, cruel as all war is, but imperative for self-preservation; and this theory has the support of Parkman.

With the deportation of the Acadians came peace with the Indians. In 1761, Argimoosh, <(the great witch,® and his braves buried the hatchet in Halifax and washed the war paint from their bodies. Now for the first time set¬ tlers were safe outside the pickets of the city; and the country began to fill up. Emigrants from Connecticut occupied the waste lands of the Acadians. Highlanders from Caithness and the Western Isles settled about Pictou harbor. Presbyterians from the north of Ireland found homes in Colchester. Before and after the Revolutionary War, thousands of devoted Loyalists came to the province, some to remain, some to pass on. Shelburne, a city of these exiles, numbering 10,000 at one time, passed away like a gipsy, encampment. The long wars of peace began with countless inroads upon the wilderness. In a century the Acadians had scarcely cleared 300 acres. Now farms and set¬ tlements were eating into the forest, and ham¬ lets were springing up beside the empty harbors. Before the end of the century, the great indus¬ tries of shipbuilding and the fishery were in

their vigorous infancy. The American Revolu¬ tion left few marks on the history of the province : efforts were made to bring the colony into revolt with the rest ; one daring man planned the capture of Halifax, and some sym¬ pathizers with the rebels were tried for treason. There was even something like a tea riot in Halifax; but the conservative

forces held the province firm. Halifax prospered, as it always did in war-times, through supplying the army and navy, and the sale of the many prizes brought to port. With the return of peace, the tide of prosperity promptly ebbed. In three great wars since its founding, Halifax was a nest of privateers, which brought large returns to their owners.

Colonial government was at first military. All power was vested in one man, the governor, or his lieutenant-governor, who was usually a soldier. To advise him, he had a council, and his instructions contemplated a legislative as¬ sembly. As the Acadians were incapable of representative institutions, they were governed through their deputies. Members of the old council were sworn into the new one by Corn¬ wallis, when Halifax became the seat of gov¬ ernment. His large instructions empowered him to summon assemblies and make laws ; but the first assembly was not elected until 1758. From this time, the chief power passed from the governor to the council, a small coterie of Halifax officials and merchants, appointed for life, who sat in secret session and were not responsible to the people. The powers of the assembly were curiously limited, and friction between the two bodies was constant. Gov¬ ernor succeeded governor, almost always an army officer with high Tory views of preroga¬ tive and military conceptions of his office. He was gently guided through his unfamiliar civic part by permanent officials in the council like Richard Bulkeley, who came out as aide to Cornwallis and died provincial secretary in 1800. The tone of society as well as govern¬ ment was conservative, not to say reactionary. This state of things lasted until well into the fourth decade of the 19th century. With its large military and naval population, and the mer¬ chants who lived by supplying them, Halifax was in many respects an English garrison town in America. In the first session of the House of Assembly, the Church of England was estab¬ lished by law ; the first college was modeled on Oxford, and its statutes required subscription to the Thirty-nine Articles both at matriculation and on taking a degree.

The agitation for reform began outside, for the country was pitted against the city. Jotham Blanchard, editor of the Colonial Patriot, was perhaps the first critic of the existing order. The Rev. T. McCulloch, the Scottish <(Seceder® missionary, who founded Pictou Academy and became the first president of Dalhousie College (q.v.), was another early reformer. But the man who brought reform to pass was Joseph Howe (q.v.), Nova Scotia's darling son, per¬ haps the most interesting personality in Cana¬ dian history. He was born at Halifax in 1804 of Loyalist stock. His father was King's printer, and, after some scanty schooling, he was apprenticed to his father's trade. In

1835 he was editor and owner of the Nova Scotian newspaper. On New Year's day it contained a letter signed <(The People,® accusing the Hali-

fax magistrates, in plain terms, of pocketing public money. Their indignation was extreme and they began a libel suit against the daring editor. If truth is libel, Howe had no case ; and no lawyer would undertake it. Howe conducted his own defense, and by a brilliant address to the jury secured a triumphant acquittal. From that hour he was the idol of the people, whose cause he had espoused. On the other hand, several hot upholders of the existing order chal¬ lenged him ; he fought one duel, and, having proved his courage, wisely declined further argument by pistol. Howe was a good example of the popular tribune, emotional, eloquent, social, with the faults of such a nature, but pos¬ sessing tact withal and the statesman's insight into great problems far beyond the ken of pro¬ vincial politicians. On such questions as the union of the remaining British American colo¬ nies, communication between them, the feder¬ ation of the empire, Howe was far in advance of his time, and his ideas were formative. Henceforth, his career was in politics, rather than in journalism. Elected member for Hali¬ fax in 1836, he at once attacked existing abuses in a series of resolutions, which served chiefly as a program of reform. Soon afterward he began an important correspondence with Lord John Russell, the colonial secretary, on the diffi¬ culties of local government. As a result, the latter instructed Sir Colin Campbell, the gover¬ nor, to introduce certain of the changes sug¬ gested by Howe. This Sir Colin refused to do, and Howe began an agitation which led to his recall. He was succeeded by Lord Falkland, whose remedy for the trouble was coalition in the council. Four of the old council were dis¬ missed, and four Liberals, Howe among them, took their place. But the two interests were ir¬ reconcilable : Howe and his friends soon re¬ signed, and began to lay before the people the evils of the irresponsible system. In the elec¬ tion of 1847 Howe and his party swept the country. The new assembly passed a vote of want of confidence in the council, which there¬ upon resigned in disgust. A cabinet was formed of the triumphant Liberals and the principle of responsible government was established.

The situation of the colonies remaining to Britain on this continent in the first half of the 19th century was not cheering. Upper Canada was largely virgin forest, with struggling towms and widening clearings : Lower Canada was alien in speech and religion ; both passed through the throes of rebellion. The great West was supposed to be uninhabitable. The provinces by the sea were poor, thinly settled, each with its own government and its own tariff wall against the rest. The 20th century dawns on a united and prosperous country stretching from the Atlantic to the Pacific. For years Howe pointed out the value of union, for the object lesson of the Great Republic was hard to mistake. But here, as in the case of the 13 colonies, before and after they achieved their independence, each province had its own pride, interests and jealousies. Besides these, the geographical barriers to union seemed insur¬ mountable; but the locomotive engine changed the face of affairs and provided the solution, of the problem. The universal fever for building railways reached the provinces. The first rail¬ way in Nova Scotia united Windsor. Halifax and Truro; the first in New Brunswick, Saint

John and Shediac. A bolder idea was to join the provinces, inland and seaboard, by an inter¬ colonial railway. If united for commerce, why should not the colonies be united for govern¬ ment?

It cannot be said that anywhere in the Mari¬ time Provinces was there a popular movement in favor of union. It was the thought of a few-strong, far-seeing men, with powers of persua¬ sion, like Macdonald in the West and Howe in the East. Nova Scotia has the honor of leader¬ ship in bringing about the Charlottetown confer¬ ence. When the question came up in 1867, Howe was in opposition, and Tupper carried the reso¬ lution through the House. By a curious irony of fate, Howe was now led to combat the very measures he had fought for so long. He took advantage of his opponent's failure to submit such an important measure to the verdict of a popular election and he roused the people into fury against confederation. They were bought and sold, he told them, <(for 80 cents a head, the price of a sheepskin.® In the next election, the great issue was repeal of the union, Howe car¬ ried the country, and Tupper was the only conservative returned. Howe tried every legal means to detach his province from the union, but the British government refused to recon¬ sider the measure it had just sanctioned, and Howe would not appeal to Washington, or have recourse to arms. He sought ((better terms® for his province from the Dominion government, and entered the Macdonald ministry to assist in working out the problems of the new experi¬ ment in government.

Though not a consistent, Howe was a great man ; with all his faults, he loved Nova Scotia well, and Nova Scotia will long cherish his memory.

New Brunswick. — The waterway of the Saint John as a greater Indian road, attracted the attention of the French fur traders early in the 1 7th century. La Tour fixed his headquar¬ ters at its mouth. It is still the main artery of the province. There were also French settle¬ ments on the rivers and harbors, such as the Miramichi, the Restigouche, Baie Verte. Petite Rochelle was partly fortified ; the town at Beau-bien's Point had 200 houses and a chapel. These settlements were not permanent. There was a small colony from Massachusetts at Mauger-ville on the Saint John in 1760; but the history of New Brunswick as a political unity begins with the close of the American Revolutionary War.

In some respects, the struggle of the 13 colonies for independence was a civil war : for all the colonists were not of the same mind. Some of the best regiments on the King's side were raised in America. For instance, Fanning, the second governor of Prince Edward Island, at one time judge of the Supreme Court of North Carolina, raised and commanded <(The King's American Regiment.® When the British cause was lost, such forces were disbanded, and the citizen soldiers, impoverished by eight years of war, could not or would not live under the new government. Many of the official class, the Episcopal clergy and their humble followers were also on the losing side. For the defeated, there was no mercy ; the fierce republicans would not let them live in the country. After the surrender at Yorktown (q.v.) thousands of these unfortunates flocked to New York and other seaports. No provision was made for

them in the terms of peace ; but public sympathy was aroused on their behalf, the British Parlia¬ ment took generous measures for their relief, Sir Guy Carleton stood their friend. Ships were provided to carry them away, large grants of land were made to them in the loyal colonies, with tools, supplies and provisions for one, two, or three years. Some went to England, but the great majority found homes in the northern wildernesses. There some 30,000 exiles, many of the

educated and cultured classes, found refuge. In American history these are the Tories, traitors to their country; in Canadian history, they are the United Empire Loyalists, the makers of the new Dominion. More than any other class of emigrants, they formed present Canadian sentiment and institutions.

The great emigration took place in 1783. On 18 May a fleet of 19 transports, with some 3,000 Loyalists on board, reached the mouth of the Saint John. Here a great stream of 450 miles pours through a narrow breach in the rocks into a small harbor, where the flood-tide rises 26 feet, and ebb leaves the great ships aground. All round are desolate hills masking the fertile region beyond. This unpromising site the Loyalists chose for their city. They were men of the 8th, 98th, 194th regiments, the New Jersey Volunteers, and the Queen's Rangers. The grantees' list show good substantial English names. The Mall fleet® brought 1,200 more, and Parrtown, so called in honor of Governor Parr, of Nova Scotia, began its career with a popula¬ tion of 5,000. Politically, it was situated in Sunbury County, Nova Scotia. Soon the Loyal¬ ists showed active discontent at Governor Parr's delay in making out their grants, and in giving them representation in the House of Assembly and, in spite of his opposition, they succeeded in persuading the British government to erect their county into a separate province with a royal governor, council and House of Assembly of their own. This was done in 1784, and the province of New Brunswick was created by royal charter, with Col. Thomas Carleton, brother of the famous Sir Guy Carleton (q.v.) for governor. His commission and instructions were practically the same as those given to Cornwallis in 1749. This council of 12 members exercised both executive and legislative func¬ tions. The first House of Assembly, of 26 mem¬ bers, was elected, not without riot, in 1785, and met for the first time in the following January. In this year, Parrtown was incorporated as Saint John (q.v.) ; it was the first city in British America to receive a charter. It is modeled on the charter of New York, and gives the mayor the office of garbling spices and the right to appoint the bearer of the great beam. No emi¬ grant or other person could sell goods without first obtaining the freedom of the city. From the founding of the province until 1832, no changes were made in the constitution. As in Nova Scotia, the prevailing ideas were high Tory; and popular rights received little atten¬ tion.

New Brunswick's chief wealth is her great forests ; and her two chief industries, lumbering and shipbuilding, soon sprang up : but agricul¬ ture languished. Population followed the waterways, the natural timber roads from the interior. Down to the time of the Crimean War, the timber trade was fostered by British legislation. The province

grew, but not stead¬

ily; periods of prosperity were followed by periods of depression. Many emigrants brought out by the timber-ships simply passed through to the United States. The Reciprocity Treaty of 1852 was a boon to the Maritime Provinces: its abrogation injured trade.

During the War of 1812, the provinces were harried by privateers ; but they were not in¬ vaded, like Upper Canada, because New Eng¬ land was opposed to the war. In the provincial seaports privateering also throve. Dalhousie College was founded with customs money taken at Castine by an expedition from Halifax. After 1815, settlers from the United States be¬ gan to occupy disputed territory between New Brunswick and Maine. The boundary between the two, left vague by the treaty of 1783 almost led to war. The northwest line was to run due north from the source of the Saint Croix River to the height of land between the Saint Law¬ rence and the Atlantic. Instead of one chain of high lands, there are two chains: between them lay the disputed territory, comprising some 12,000 square miles. Under the Jay treaty of 1794, a commission was appointed to determine the line. The Americans wished to extend the due-north line to the Metis River in Quebec : the British wished to make Mars Hill the limit, and they could not agree. Another attempt at settlement was made by the Treaty of Ghent. The King of the Netherlands was appointed arbitrator, but his award was not accepted. In 1839, the difficulty became acute. Some lumber-thieves cut timber on the debatable land ; the governor of Maine sent a sheriff and posse to drive them out, and New Brunswick lumbermen resisted the officers of the law. The squabble roused intense feeling on both sides. The gov¬ ernor of Maine called for 10,000 troops to guard the State's rights. The governor of New Bruns¬ wick, Sir John Harvey, sent two line regiments with artillery and volunteers to the scene of action. Nova Scotia voted all her militia and £100,000 to aid the sister colony; the Canadas also proffered help. Gen. Winfield Scott took command of the American forces. He and Sir John Harvey had fought against each other in the War of 1812. They agreed to a joint occu¬ pation of the disputed territory; and the war-cloud blew by. In 1842, Mr. Baring for Eng¬ land, and Webster for the United States, negotiated a treaty that at last delimited the frontier. On the disputed territory, Maine got 7,000 and New Brunswick 5,000 square miles. Mr. Baring was made Lord Ashburton for his success, and the treaty is known by his title.

One peculiarity of the colonial status was the appointment of colonial

officials by the home government. New Brunswick's case is typical. The governor, the attorney-general, the pro¬ vincial secretary, the judiciary, the customs and Crown land officials were all appointed from England and paid out of the revenues arising from the customs and Crown lands. In 1825, the Legislature was given control of the cus¬ toms, when it soon discovered that nearly all the revenue went out in salaries. Not until 1848 did the province both receive the revenues and fix the salaries of this department. In 1837, the province took over the revenue arising from the Crown lands on condition of paying the governor, the judiciary and the other govern¬ ment officials. The last department to come under provincial control was the post office.

As in other colonies, the irresponsible coun¬ cil became an abuse, and many were the con¬ tests between it and the assembly. In 1832, a second council was established with executive, but not legislative functions. This was done by the home government in its desire for uniform¬ ity in the colonial governments ; but the parlia¬ mentary principle of majority rule with an executive council or cabinet to carry out the will of the majority were slow in being understood. It was six years later before the executive in¬ cluded a member of the elected assembly. Slowly the province worked out the problem of self-government. In 1839, when Sir John Harvey read to his legislature, Lord John Russell's despatch on tenure of office, and un¬ like the governor or Nova Scotia was in accord with its proposals, the assembly, after full de¬ bate, actually refused the boon of responsible government. In 1848, however, the modern system was in essential particulars recognized by formal resolution. Charles Fisher, and L. A. Wilmot, afterward judge and lieutenant-governor, were the leading reformers, and two of the royal governors, Sir Howard Douglas and Sir John Harvey, were in complete sym¬ pathy with the popular movement.

New Brunswick was represented at the Charlottetown conference, where the prelimin¬ aries of confederation were discussed. At the Quebec conference, the leading men of the op¬ position as well as of the party in power were delegates. The 72 resolutions then agreed upon were to be submitted to the various legislatures for their

approval. Before the New Brunswick assembly could vote on them, it was dissolved; and in the new House, a large majority were pledged to oppose them. This led Nova Scotia to withhold the resolutions, as no vital union could be effected with the upper provinces that left out New Brunswick. However, when the House opened in 1866, the majority committed themselves to the policy of union in the speech from the throne. The House dissolved on the issue, and, sentiment having changed, in the new election, the unionists were returned by a large majority. New Brunswick is one of the four original members of confederation. See article Confederation; also New Brunswick.

Prince Edward Island. — The large cres¬ cent-shaped island in the southern part of the Gulf of Saint Lawrence is supposed to have been discovered by Cabot, and afterward by Cartier, who named it Isle Saint Jean. After the conquest, it was still called Saint John's Island until 1780, when the local legislature named it New Ireland, an act disallowed by the British government. In 1794, it was renamed Prince Edward's Island in compliment to the Duke of Kent, the father of Queen Victoria. After the Treaty of Utrecht, Acadians from the main land settled at the southern central harbor and named it Port La Joie, the present Char¬ lottetown. It was governed from Louisbourg. Tn 1752 the population was 1,354. Three years later, after the fall of Beausejour and the expulsion of the Acadians, many took refuge there. At the fall of Louisbourg in 1758, the population was at least 4,000 souls, in four thriving parishes. The fertile "Garden of the Gulf,® as the islanders love to call their little sea-girt province, was even then worthy, of the name. Casgrain calls it a second Acadie : for hence also the Acadians were expelled. When

Captain Holland made his survey in 1764, he found only 30 Acadian families ((on the footing of prisoners,® and a tiny British garrison in a miserable fort.

In 1763, the year of its cession to England, Lord Egmont proposed a plan of settlement worthy of Sir William Alexander in its feudal character. One feature was a chain of baronial castles from one end of the island to the other; but the plan was never carried out. In 1767, the entire island was divided into 67 lots or townships, of some 20,000 acres each, and granted, by lot, in one day to a number of influ¬ ential Englishmen, on the old condition of set¬ tling so many emigrants* within a certain time ; they were to pay a perpetual quit-rent, or land-tax. Here began the curse of the absentee landlord, which laid the island under a blight for more than a century. At first, it was

an¬ nexed to the government of Nova Scotia, but in 1768 it was, on the petition of a majority of the proprietors, erected into a separate province. In 1770, the first royal governor, Colonel Pat¬ terson, arrived with his official staff, whose salaries were to be paid from the quit-rents. The formative ideas here were also high Tory. Roman Catholics were not permitted to settle; no schoolmaster from England might teach without a license from the Bishop of London. Population grew slowly; for few of the proprietors fulfilled the conditions on which they got the land. In 1773, the first House of Assembly was elected. Its first act was to con¬ firm all the past proceedings of the governor and the council.

On the outbreak of the Revolutionary War, two American vessels, sent to cruise in the Gulf for British ordnance store ships, raided Char¬ lottetown and carried away some prominent officials. For this Washington cashiered the delinquent officers and released the prisoners with, expressions of regret. Another raiding expedition from M?.chias came to nothing, and the island remained free from molestation till the close of the war. In 1781, proceedings were begun in the Supreme Court against the town¬ ships in arrears with quit-rents, and various holdings were escheated and sold, it was thought, without due notice to the landholders. The unimproved waste land was an obstacle to colonization ; the owners neither planted settlers nor paid the quit-rents, on which the revenue depended. The landlords argued for the de¬ fense, that some of them were officers on active service, that the war had prevented settlement, and that the lands were sold to persons on the ground at absurdly low prices. In rebuttal, Patterson urged that in the midst of a dis¬ astrous war, both money and purchasers were scarce; the island might have been captured or ceded back to France. He admitted that he bought up escheated lands, but held he was within his rights as a citizen in doing so ; he had also, at his own risk, saved out of the sales, various lots for the absentee owners. In re¬ sponse to various petitions from the proprietors, the home government granted them relief, and sent a draft bill to Governor Patterson, making the sales voidable. This he was to submit to the assembly, but he suppressed it for two years. A new assembly was elected in 1784. It resolved to complain to the King against the governor for disposing of the lands so hastily, when he dissolved it.

The war was now over ; the exiled Loyalists were pouring into Nova Scotia, and Patterson hoped to divert the desirable stream of emigra¬ tion into his own province. Many Loyalists came; by special favors he secured them to his interest, settled some of them on the lands sold in 1781, and in 1785, secured an assembly cer¬ tain to support him. It passed an act approving his conduct in escheating the unimproved estates, but the home government disallowed the act and recalled the disobedient official. In 1786, the governor submitted at last the English Draft Act, already mentioned, to the assembly, which passed it with haste, as also another act of the governor's -framing restoring the escheated lands to the rightful owners, but saddling them with heavy expenses ; this the home government disallowed and dismissed the members of the council concerned in it.

The new governor, Edmund Fanning (q.v.) arrived in November, but Patterson refused to vacate his office, and the winter was spent in the quarrels of these two Kings of Brentford: but in the spring, Fanning was firmly estab¬ lished. The escheated lands remained in the quiet possession of their purchasers, some of whom came to terms with the original grantees. Fanning was a native of New York, a graduate of Yale, and a D.C.L. of Oxford. Through the Revolutionary War, he commanded the King's American Regiment and was twice wounded. In his administration, the land question smouldered. The chivalrous Earl of Selkirk, who also planted settlements in Upper Canada and the Northwest, brought out, in 1803, 800 of the Clan Ronald Macdonalds and settled them about Point Prim.

Fanning was succeeded by Dcs Barres, a Swiss officer in the British service, famous for his surveys, his amours and his great age ; he jumped over a settle when he was more than a hundred years old. His administration was uneventful, but not so that of his successor. Charles Douglas Smith, brother of the famous Sir Sidney, who foiled Napoleon at Acre, was a fine example of the old-fashioned high Tory royal governor. His first address to the as¬ sembly, when it met in November 1813, was insolent and dictatorial. In the following Jan¬ uary he prorogued it and did not convene it again until 1817. Between this and 1820 the legislature was three times assembled and dis¬ solved, after short sessions, by this exponent of personal rule. His proceedings in regard to the quit-rents were also oppressive. In 1818, in opposition to the express commands of the home government, Smith enforced the payment of quit-rents in arrears. His action, however, the British government disallowed, and ordered part of the exactions to be refunded. Then, for three years, no attempt was made to collect the odious tax ; in some instances payment was refused by the receiver-general. In 1823 an¬ other effort was made by the

governor to enforce payment. The Gaelic-speaking High¬ landers of King's County were required to pay dues that seemed obsolete, or give promissory notes at 10 days. In the depth of winter, they must haul their farm produce to Charlottetown and sell at a sacrifice to meet these demands. Without a legislature, the people petitioned High Sheriff MacGregor to call public meetings for the discussion of grievances. The gather¬ ing at Charlottetown drew up an address to

the King, rehearsing a long list of charges against the governor, and requesting his recall. Smith retorted by opening a libel suit in the Court of Chancery, over which he himself pre¬ sided, against the committee on the King's ad¬ dress in Queen's County. His object was to prevent the petitions reaching England, but the custodian of them escaped to Nova Scotia. For merely publishing an account of the proceedings the editor of the local paper was brought into the Court of Chancery for libel. When he re¬ vealed the names of the writers they were admonished by the chancellor-governor in the vein of Judge Jeffreys. This energetic ruler, who shook his fist at the speaker of the assem¬ bly and gave him three minutes by the watch to adjourn the House, was recalled in 1824, when he had brought his long-suffering prov¬ ince to the verge of rebellion.

Governor succeeded governor; the island grew in population and prosperity ; fisheries and husbandry throve ; but the land question was an open sore. It had now become complicated by the fact that the original proprietors had died and bequeathed or had transferred their rights in the island. In 1859 Sir Samuel Cunard (q.v.), the Halifax merchant who founded the famous line of steamers bearing his name, pro¬ posed that the whole question be referred to a commission of three members, one to be ap¬ pointed by the Crown, one by the island Assem¬ bly and one by the proprietors. To this all agreed. Howe was the nominee of the Assem¬ bly. The commission sat in the Colonial Build¬ ing in Charlottetown, examined many witnesses, though not on oath, and heard counsel on be¬ half of both parties. They afterward visited the shire towns and acquired a vast amount of information on the difficulties. Their report is dated 18 July 1861. It condemns the original method of granting the island, commends the land purchase act, by which the Selkirk and Worrell estates had been acquired for the people, and considers some such system to be the solution of the vexatious problem. It recommends the British government to guar¬ antee a loan of £100,000, which would enable the local government to enter the open market for the purchase of estates. But the home gov¬ ernment refused the loan, and the landlords refused to be bound

by the findings of the commission. The old difficulty remained until the island came into the Confederation in 1873, when the Dominion government placed $800,000 to the credit of the province for the purchase of estates and the local legislature made the sale of estates, on evaluation of commissioners, com¬ pulsory.

Charlottetown was the scene of the historic conference of delegates from the maritime prov¬ inces to discuss union, when the representatives of the Canadas came knocking at the door, but the islanders were not in favor of any change in their status. There was prejudice, the concep¬ tion of a new nation was hard to grasp and the main issue was befogged by parish politics. Although islanders took part in the Quebec and London conferences also, the island remained outside Confederation until 1873, when the crippling of the provincial means by extensive railroad building led the people to a reconsid¬ eration of the matter. The Dominion govern¬ ment gave generous terms, and the little prov¬ ince, while losing nothing of autonomy, entered

into a larger national life. See articles in this series on Confederation ; Since Confedera¬ tion ; Constitution; Agriculture; Fisheries; Manufactures; The Forests and Lumber In¬ dustry; Minerals; Geography; Prince Ed¬ ward Island.

Archibald MacMechan, Professor of English Literature, Dalhousie Col¬ lege, Halifax.

8. CONFEDERATION. In 1837 there took place two rebellions : one in Upper and British, the other in Lower and French, Can¬ ada, simultaneous, but almost unconnected, and scarcely united in sympathy, since the Brit¬ ish Protestants of the upper province were by no means fraternally linked with the French of the lower. In Upper Canada the rebellion was a rising of a democratic party, including many of the most recent colonists and some from the United States, against the personal rule of the imperial governor and the domination of a po¬ litical circle nicknamed the Family Compact, and consisting

largely of U. E. Loyalists, which monopolized public offices and emoluments. Its leader was Lyon Mackenzie, a man honest and right in his main aim, if responsible govern¬ ment is right, but wanting in wisdom and capacity as a leader. The object of the extreme wing was an independent republic or annexa¬ tion to the United States. That of the less extreme wing was responsible government on the British model. The political crisis and the outbreak of civil war were brought on by the indiscretion of an inexperienced governor, Sir Francis Bond Head, who (1836-38) threw him¬ self into the arms of the Family Compact and the Tory party. In Lower Canada the rebellion was a rising of the French, the conquered race, who formed the great majority, against the monopoly of office and power by the British and conquering race, exercised largely through a council appointed by the imperial governor. Its object was the assertion of French equality and right. It had been preceded by a series of angry controversies between the French patriots and the governor with his British councillors and the Colonial Office at their back. Both rebellions were quelled (1838) with ease and without much bloodshed ; that in Upper Canada by the loyal militia, that in Lower Canada by the Queen's troops. There were few executions, but some of the leading insurgents were driven into exile. The consti¬ tution of Lower Canada was suspended, but that of Upper Canada was not.

The Liberal party in the mother country was now in the ascendant, having carried Par¬ liamentary reform. It looked with sympathy on the struggle of the Canadians for free institu¬ tions. Lord Durham (q.v.), son-in-law of the Whig Prime Minister, Earl Grey, and though an aristocrat a strong Liberal, was sent out (1838) to study the situation. In a report of remarkable ability, which has been regarded al¬ most as the gospel of colonial liberty, he de¬ cided in favor of extending to Canada respon¬ sible government on the British model, requiring the governor, instead oi ruling per¬ sonally, to be guided, like the British sovereign, by the advice of responsible ministers, who were to be designated by the choice of the people. The report at the same time recom¬ mended the reunion of the two provinces, a

measure the sure result of which its author imagined to be the complete ascendency of the more powerful race, the destined heir, in his opinion, of the whole North American con¬ tinent.

Durham, having exceeded the limits of his power, and incurred censure by condemning some ex-rebels to banishment of his own au¬ thority, his mission was cut short (1838) but his main

recommendations were carried into effect (1839). The provinces wˆere reunited, the measure being carried in the lower prov¬ ince, the constitution of which had been sus¬ pended by the fiat of the Crown; in the upper province, after some dehate, by a vote of Par¬ liament. Responsible government was intro¬ duced. The governor, was instructed thence¬ forth to be guided, like the British sovereign, by the advice of his ministers, who were to be responsible to the people.

In a dispatch from Lord John Russell (q.v.) (5 Feb. 1841) the governor-general was in¬ structed to call to his councils (<those persons who, by their position and character, have obtained the general confidence and esteem of the inhabitants of the province,® and (<only to oppose the wishes of the Assembly when the honor of the Crown or the interest of the empire is deeply concerned.® There soon followed a general amnesty, wih return of exiles, and Lyon Mackenzie sat in Parliament under the new regime.

About the same time, and by the action of the same general forces, including the ascend¬ ency of the Liberal party in Great Britain, responsible government on the same model was introduced in the maritime provinces. In Nova Scotia the change was brought about largely by the eloquence of the patriot leader Joseph Howe (q.v.) (1838).

The transition was smoothed by the wisdom of the new governor, Poulett Thompson, Lord Sydenham (1839-42), a man of business, trained in commercial life, who adapted himself steadily and with general success to the introduction and working of the new system. Sir Charles Bagot, who followed (1842-43), though a Con¬ servative, took the same line. But the idea of colonial self-government had hardlv taken root in the policy of the Colonial Office or in the minds of British statesmen. Sir Charles Metcalfe (1843-45), the next governor, had been trained in the imperial government of Hindustan, and brought with him the impres¬ sion that in every dependency the governor was still personally supreme and responsible for the choice of his ministers and for their policy. Acting upon this principle, he attempted to form a ministry (1843) of his own without regard to party designation. A political storm, with furious pamphleteering and ministerial interregnum, were the results. The upshot was failure on the governor's part to form an effective ministry, and his consequent defeat. The Colonial Secretary, Lord Stanley, how¬ ever, emphatically endorsed the governor's con¬ duct, and was authorized with his own appro¬ bation to convey the personal approbation of the Queen.

The new system was finally installed and brought into order by Lord

Elgin (q.v.) (1847-55), one of the best and wisest servants of the empire, who entered fully into the spirit of responsible government, contenting him-

self with the exercise of an informal influence, rendered important by his character and ability. He could even flatter himself that he did more in this way than he could have done with the formal powers of the governor. He came in, however, for the last of the storm. The Liberal party, now in power, passed an act called the Rebellion Losses Act (1849), indemnifying those who had suffered losses by the destruc¬ tion of their property in the suppression of the rebellion. This the Tories regarded as the indemnification of the rebels. Their cry was taken up by the Tory party in Great Britain. Elgin gave his assent to the act, reluctantly it seems, in compliance with the rule which re¬ quired him to be guided by the vote of Par¬ liament and the advice of his responsible min¬ isters. The Tories, now playing the part of insurgents in their turn, rose, burned the Par¬ liament House at Montreal (1849), with its irreplaceable archives, and stoned the governor-general, who had a narrow escape from their fury. Elgin, however, remained firm and was supported by the home government. After this his reign, or rather his term, was peaceful and generally popular, though more popular with the Liberals than with the Tories. The triumph of the free trade policy in Great Britain, depriving Canada of her colonial privi¬ leges, while she remained fettered by the Navi¬ gation Laws and was excluded from the market of the United States, bred commercial depres¬ sion and discontent. The consequence was a manifesto signed by leading commercial men and pointing to union with the American re¬ public as a remedy in the last resort. To put an end to this movement by removing its cause, Lord Elgin went to Washington and negotiated a reciprocity treaty with the United States (1854). This, following the repeal of the Navi¬ gation Acts and the release of the Canadian trade from the fetters which they imposed, restored prosperity, allayed discontent and put an end to the desire of annexation.

After the Rebellion Losses Bill, the most hotly debated of the political questions was that of the secularization of the clergy reserves (1854) (see Canada — Clergy Reserves), tracts of land, which, before the revolution of 1837, when the Church of England was estab¬ lished in Canada, had been set apart for the maintenance of the clergy of the state church. After a long struggle secularization was car¬ ried, and the state church, with its privileges, ceased to exist. King's College, Toronto, which, so far as the teaching staff was concerned, had, like Oxford and Cambridge, been Anglican, was turned into the University of Toronto (see Toronto, University of), and thrown entirely open to all denominations. Under Bishop Strachan, the powerful Anglican leader of the day, high Anglicans seceded from the Univer¬ sity of Toronto and founded the University of Trinity College (1852). Other churches, dur¬ ing the continuance of the exclusion, had ob¬ tained charters for universities of their own, and dissipation of resources not more than sufficient, if collected, to maintain one great university, was the result.

The abolition of the seigniories (1854) in French Canada (see article Seigniorial Ten¬ ure), relics of the old Bourbon regime, with the oppressive privileges of the seignior, was another change obviously demanded by the new

order of things. It was accomplished peace¬ fully, without violation of the rights of prop¬ erty, and with entire success. Another nec¬ essary change was the abolition of the aristo¬ cratic custom of primogeniture in succession to land, for which was* substituted the demo¬ cratic principle of equal partition, ((gavel-kind,® as the movers called it. The Tory party, sym¬ pathizing with aristocracy, faintly resisted the change. The progress of democracy was fur¬ ther ma'i&ed by a change in the constitution of the Legislative Council which formed the Upper House of Parliament. Instead of being nom¬ inated by the Crown, as it had hitherto been, it was in 1856 made elective.

The party system of government was now in full play, but the principles and relations of parties were far from being definite or stable. There was a Tory party representing the U. E. Loyalists, and the traditions of the Family Compact under the leadership of Sir Allen MacNab, who opposed the secularization of the clergy reserves and the abolition of primogeni¬ ture. There were on the other side moderate Liberals under Baldwin and more advanced Liberals under Hincks. But the lines of politi¬ cal party were crossed and perplexed by the na¬ tionality of French Quebec. The French Cath¬ olics, instead

of succumbing politically to Brit¬ ish predominance as Durham had imagined that they would, closed their ranks, showed their force, played on the balance between the Brit¬ ish parties and put a Frenchman, in the per¬ son of La Fontaine, at the head of the gov¬ ernment. For a time it became an understand¬ ing that a government, to hold its ground, must have a double majorit}ˆ; that is, a majority both in the British and the French province. The act of reunion had given to the provinces gen¬ eral representation in Parliament, though the population of the French province was much larger than that of the British. Presently the balance of population turned in favor of the British province. The Liberal leaders of the British province, the most pronounced of them at least, then demanded a rectification in its favor. With the political strife about repre¬ sentation by population, ((Rep. by Pop.,® as it was called, mingled the religious antagonism of the British Protestants of the upper prov¬ ince to the Roman Catholics of the lower. The great advocate of representation by population, and at the same time the extreme exponent of the feelings of the Protestants against the Catholics, was George Brown (q.v.), a Scotch Presbyterian, and founder of the Toronto Globe , the most powerful organ of the British Canadian press in those days. On the other side appeared Mr., afterward Sir, John Mac¬ donald (q.v.), one remarkably gifted with the arts of party management, and with an address in dealing with men which in his chief antagon¬ ist, George Brown, was. wanting. Macdonald supplanted in the leadership of his party the old-time Tory, Sir Allan MacNab (q.v.), Lib¬ eralized it, and set it free from all incum¬ brances in the way of reactionary principle by. which, up to this time, it had been weighted in the struggle for place: It was a stroke of strategy something like that performed in Eng¬ land by Sir Robert Peel (q.v.) when, accepting the consequences of the Reform Bill, he changed his party from Tory to Conservative. Between Macdonald and Brown there was, and to the

end continued there to be, enmity, personal as well as political. But Brown was no match for Macdonald in playing the party game. Once for a moment, by a casual defeat of the gov¬ ernment of which his

rival was a member, he set his foot on the steps of power (1858) ; but he immediately fell again, Sir Edmund Head, then governor-general (1855-61), having, by an unwonted exercise of the prerogative, which Brown furiously resented, refused him the dis¬ solution and appeal to the country which he demanded (1858). Questions and principles of all kinds were crossed by personal ambitions and connections, as well as by the national sensibilities of Quebec, which naturally carried her to the side of the Conservatives rather than to that of the advocates of representation by population, the hot Protestants and the Orange¬ men.

The end, after a rapid succession of changes of ministry, producing a total instability of gov¬ ernment, was a ministry with a majority so narrow that it was said that the life of the gov¬ ernment depended on the success of a page in finding a member at the moment of critical division. The upshot was a deadlock. The re¬ lation between the two races, owing to the per¬ sistent attacks of George Brown's party on the French Catholics, had at the same time become critical and dangerous. From this position an escape was sought by merging the antagonism of British and French Canada in a confedera¬ tion of all the British colonies in North Amer¬ ica. The credit of proposing confederation has been assigned to different politicians, to George Brown, to Si" John Macdonald, to Sir Alexan¬ der Galt. Of the party leaders, it was George Brown who first came forward holding out his hand to his rival, Sir John Macdonald, to propose coalition for the relief of the situation. But Mr. Brown's original proposal was not a confederation of all the provinces, but a substi¬ tution of a federal for the legislative union between the British and the French province. What Sir John Macdonald, as a strong Con¬ servative and monarchist, preferred was not a federal but a legislative union of all the North American colonies under the British Crown. What all alike wanted was a relief from the situation, and for this purpose a coalition gov¬ ernment comprehending the two rivals and enemies, Sir John Macdonald and George Brown, with followers of both, was formed (1864). The fact is that the real author of confederation, so far as British and French Canada was concerned, was deadlock.

The three maritime provinces, Nova Scotia, New Brunswick and Prince Edward Island, were inclined to a separate union among them¬ selves, especially with a view to a reduction of the expenses of government. A conference of delegates from those three maritime provinces was held at Charlottetown (1864). To that conference delegates were sent by the coalition government of Canada to propose a wider union. The result was a conference at Quebec (1865), at which 12 delegates were present from Canada, 7 from New

Brunswick, 5 from Nova Scotia, 7 from Prince Edward Island, 2 from Newfoundland. That conference sat for 18 days and passed 72 resolutions on which the act of union was afterward based and which each delegation undertook to submit to its own government.

By the Parliament of the two Canadas the scheme was at once accepted and by a large majority, though there was a long debate in which a speaker of the opposition glanced at the geographical unfitness of the long and broken line of provinces for political union. New Brunswick, not being adroitly approached, at first rejected the scheme, but presently ac¬ quiesced. In Nova Scotia the resistance was very strong, but it still remains a mystery by what arguments a legislature elected expressly to oppose confederation was brought round to its support. Brought round, however, the legis¬ lature of Nova Scotia was. Howe, after a vain appeal to the British Parliament to set Nova Scotia free, himself took office in the confed¬ eration government. Prince Edward Island held out, but came in at last. British Columbia threatened repudiation of the union, till the construction of the Canadian Pacific Railway, which was the condition of her entrance, was assured. Newfoundland still remains unfed¬ erated. But a great addition was soon after¬ ward made to the Dominion by the purchase of the Hudson's Bay country now comprising the province of Manitoba and the Northwest Ter¬ ritories. The accession of Newfoundland alone is wanted to complete the scheme of con¬ federation. The scheme having been framed by the colonial legislature, was laid for revision before the British government, and by it em¬ bodied in the British North American Act. (30 and 31 Viet. Cap. 3; 1867).

When confederation was passed, party lines were drawn again. Brown seceded from the confederation government and the political en¬ mity between him and Sir John Macdonald be¬ came as bitter as before.

The Federal constitution was never submit¬ ted, like the Constitution of the United States, to the people. It was alleged that in a general election which followed, and in which the con¬ federation government was sustained, the peo¬ ple virtually expressed their approbation. But it is obvious to remark that in this election other issues were submitted and other influ¬ ences, that of party especially, played their part. So that it cannot be truly said that the consti-ution of Canada has even been distinctly rati¬ fied by the Canadian people.

See articles on this series: Under British Rule to Confederation; The

Maritime Prov¬ inces ; Confederation ; Since Confederation ; Imperial Federation; Constitution. See also the history of the different provinces in this work.

Goldwin Smith,

Formerly Regius Professor of Modern History of the University of Oxford, and Emeritus Professor of Cornell University.

9. SINCE CONFEDERATION. On 1

July 1867 there were great rejoicings in Canada for it was the birthday of the new Dominion. But at that time the work of founding a Cana¬ dian nation was only begun ; much remained to do. As it stood on 1 July 1867 the Dominion included only four provinces: Nova Scotia, New Brunswick, Quebec and Ontario, (qq.v.) and of these Nova Scotia was profoundly dis¬ contented and, since her people had never voted upon the question, desired to withdraw from the confederation. Nor did Canada possess the entire East. The two important islands, New-

foundland (q.v.) and Prince Edward Island (q.v.) still held aloof; not until 1873 was Prince Edward Island persuaded to join the Dominion, while Newfoundland still stands apart. The vast Northwest, to-day the chief pride and promise of Canada, was not then included within her territory, nor was its entry brought about without discontent and bloodshed. It had long been a hunting preserve for the Hudson Bay Company, but in 1870 by paying to the company £300,000 to extinguish its rights Can¬ ada removed every obstacle to her absorption of those regions. In 1871 British Columbia (q.v.) consented to enter the Union, but was long restless and threatened to withdraw unless a transcontinental railway was promptly built. With all these jarring elements assuredly Canada, when confederated, had no real union, and the subsequent work of her statesmen has been chiefly to consolidate her scattered fragments.

The leader who played the chief part in this work of consolidation was Sir John Macdon¬ ald (q.v.). In many ways, in wit, in intellec¬ tual agility, sometimes in cynical carelessness as to the means he used to secure his ends, he was strikingly like Lord Beaconsfield; but whenever the vital political interests of Canada were con¬ cerned, invariably, according to his light, he showed a whole-hearted patriotism. He was filled with passionate devotion to the British Crown and treasured for Canada the ideal that she should be a kingdom modeled on that of Great Britain, taking her place on equal terms as an auxiliary of the United Kingdom. He did not favor federal government, and would have preferred to give Canada one all-powerful legislature like that of Great Britain. But in these respects conditions were too strong for Macdonald. His cherished (<Kingdom of Can¬ ada® became the ((Dominion of Canada® in def¬ erence to the supposed prejudices of the Amer¬ ican republic against a monarchical neighbor, and he was obliged to assent to a federal system because the French in Canada insisted upon a measure of autonomy only to be secured in this way. It was the pending ((Alabama® question that made Britain so anxious at this time to defer to the opinion of the United States. This and questions more directly affecting Canada were settled by the Treaty of Washington,

1871.

Macdonald was Prime Minister of Canada for the long period, 1867 to 1891, with the ex¬ ception of an interval of about five years, last¬ ing from November 1873 to October 1878. In¬ evitably he did the work of proving the federal system which he had helped to create. There was trouble from the first. When as a result of the bargain with the Hudson Bay Company Canada assumed jurisdiction in what is now Manitoba, some of the settlers already estab¬ lished there objected to being handed over like cattle to a new government. Surveyors sent in by Canada were turned back; officers going into the country to assert Canadian authority met with a like experience; and at last the half-breed inhabitants under their leader, Louis Riel (q.v.), set up a provisional government at Fort Garry, now Winnipeg (q.v.), and defied the Government of Canada. They tried and sum¬ marily executed Thomas Scott, a citizen who opposed their proceedings and they threw other leaders into prison. See Riel Rebellion.

In 1870 it was not easy for Canada to assert her authority in the

remote settlements on the Red River. She might not use for mili¬ tary purposes the territory of the United States, which offered the most convenient route, and she was therefore obliged to send troops through the vast wilderness lying north of Lake Superior. The late Lord Wolseley, then hold¬ ing a military command in Canada, was chosen to lead a small army to Fort Garry and did the work with brilliant success. After a toilsome journey through hundreds of miles of wild and barren country Wolseley at length reached Fort Garry only to find that Riel and his provisional government had fled at the approach of the Canadian force. Rebellion crushed, the work of pacification was conducted partly with the aid of Mr. Donald A. Smith, later Lord Strathcona, an official of the Hudson Bay Company. Mani¬ toba soon became a full-fledged province in the Canadian federation and has since played an important part. In view of the present status of Winnipeg, the third city in Canada, with perhaps 150,000 inhabitants, it is interesting to remember that it had not even the telegraph in 1870 and that the railway did not reach the town until 1878.

The trouble in Manitoba settled, Canada had next to pacify her remote Pacific Province, separated from her by an immense and almost unpeopled wilderness. In 1871 British Columbia entered the confederation on the condition that a railway across the continent should be begun within two years and completed within 10. At the time the province contained but a few thou¬ sand people of European origin, and there were complaints in eastern Canada that the vast ex¬ penditure involved in the bargain would burden too heavily the country's resources. But, on pain of her withdrawal from the union, Britsh Columbia insisted angrily that the bargain should be carried out, and her attitude brought to the front the building of the transconti¬ nental line which was to prove of supreme mo¬ ment to Canada.

That Canada's small population should spend a hundred million dollars on this undertaking was a stupendous proposal ; on the basis of the proportionate cost of each head of population a project for the United States to spend $2,000,- 000,000 would be its equivalent. But to build the railway was the condition of national exist¬ ence in Canada, and in the end the thing was done. Not, however, before the project had long disturbed Canadian political life and threatened to overwhelm its promoters with ruin. When the Canadian Pacific Railway (q.v.) was projected, Canada was face to face with the question that has perplexed all the progressive states of modern times. Should the railway be a government or a private enter¬ prise? Though a similar line, the InterColonial Railway, connecting the eastern

provinces, was a state enterprise, the cabinet of Sir John Mac¬ donald shrank from saddling the country with so vast a burden as a railway to the Pacific, and it was resolved to hand over the task to a pri¬ vate corporation.

In 1872 there was a general election in Can¬ ada, and in the session of Parliament which fol¬ lowed the Canadian Pacific Railway Company with Sir Hugh Allan as president, secured a charter to build the road. With this went also assurances of assistance from Canada amount-

itig to many millions. But when, as a result of the exposure by the opposition, the fact came out that Sir Hugh Allan had contributed more than $350,000 to Sir John Macdonald's campaign fund for the recent election, this ((Pacific Scan¬ dal" brought the downfall of the Government, which had accepted the obvious bribe. Amidst great excitement Sir John Macdonald resigned and the Liberals with Mr. Alexander Macken¬ zie (q.v.) as prime minister took office in No¬ vember 1873.

For five years the Liberals remained in power. Throwing less energy into the construc¬ tion of the Pacific Railway than had been promised, they met naturally with discontent in British Columbia. The menace of withdrawal from the confederation was renewed and at length the matter was referred for arbitration to Lord Carnarvon, the Colonial Secretary, in London. He decided that the original terms were too onerous and proposed new ones under which a transcontinental railway should be opened by the end of the year 1890. When the Liberal Government thought even this al¬ most impossible of accomplishment, (<Carnarvon Terms of Separation® became the war cry in British Columbia. Financial depression over¬ took Canada in 1876-78 and this heightened the difficulty of the question. But in 1876 the Gov¬ ernor-General of Canada, the Earl of Dufferin, visited British Columbia to soothe her discon¬ tent, and he helped to tide over the period of danger. It is interesting to speculate whether an attempt to withdraw from the Canadian union would have been resisted, if necessary, by force of arms. Probably the Canadian and

Imperial governments would have agreed in using coercion.

The financial depression that helped to delay contentment for British Columbia produced ef¬ fects in Canada even more far-reaching, for it led to the cleavage of political parties on the question of Protection (q.v.) or Free Trade (q.v.). In 1878 Canada had a tariff of I7p2 per cent, which was hardly sufficient for her growing revenue requirements. During a gen¬ eration she had tried to secure free exchange of natural products with the United States and in 1854 her governor, Lord Elgin, had succeeded in making a Reciprocity Treaty on this basis. But the treaty was not long in force and when abrogated at the close of the Civil War a heavy tariff upon Canadian products was soon imposed by the United States. Over and over again Canada tried to secure the reversal of this policy but always in vain. Meanwhile the low Cana¬ dian tariff permitted American manufacturers to supply the Canadian market at prices with which the necessarily smaller producers in Can¬ ada could hardly compete, and in time the cry for increased Protection was often heard. Had Mr. MacKenzie's Government taken it up in 1878 probably Sir John Macdonald would have rallied his forces under the banner of Free Trade. But when the Liberal leader refused tenaciously to adopt Protection, Sir John Mac¬ donald proclaimed it as a <(National Policy® for building up Canada, and the Canadian elec¬ torate, forgetting the discredit which attached to him in connection with the Pacific scandal, returned him to power by an overwhelming majority. Since that time Protection has re¬ tained its hold upon Canada, for though the Liberals favored free trade they disturbed the

system but slightly on their advent to power in 1896.

An era of great expansion followed the adoption of a protective tariff in 1879. A great many factories were established, and the build¬ ing o! the Canadian Pacific Railway was pushed on with unparalleled energy; in 1885, five years before the time named in the contract, the last spike was driven in the line connecting Western and Eastern Canada and British Columbia's grounds for discontent were finally removed. Once completed the road's value not only to Canada but to Great Britain was soon apparent. Not only did it unite the Canadian provinces; it furnished a ready all-British land route to the East. The Canadian Pacific Railway Com¬ pany in time established lines of steamers cross¬ ing both the Pacific and the Atlantic, and the highway, looked upon as a doubtful possibility in 1878, has now become one of the chief ar¬ teries of world commerce.

The completion of the Canadian Pacific Railway was almost coincident with a second rebellion of half-breeds in the Canadian West. On the banks of the Saskatchewan, not far from a village called Prince Albert, there was a colony of these people. They had long lived remote from the larger world, and when their country was invaded by the pioneers of modern movement, they began to doubt whether they should be left in permanent possession of the lands they had long occupied. Upon these lands they were technically “squatters® for they had no patents and no surveys had been made. When at length Canadian surveyors came to lay out. their fields on a uniform plan, disre¬ garding the divisions which they had estab¬ lished, the half breeds protested and demanded that they should be granted patents for their lands as they stood. At Ottawa their protests were filed but remained unheeded. The official mind was aghast at the prospect of land grants not based upon the usual survey; the half breeds could get nothing done and they grew ever more restless at the supposed menace to their rights. Disinterested observers sent to Ottawa warnings of a probable rising but official supineness was invincible, and the result of neg¬ lect and delay was that in March 1885 the de¬ spairing half breeds attacked a body of police, killed 12 out of 40 engaged, and defied the au¬ thority of Canada. Since it was not unlikely that they would be joined by the Indian tribes the outbreak was serious.

The half breed leader was the same Louis Riel (q.v.) who had caused trouble in 1870. On its hands the Government now had a diffi¬ cult task. As in 1870 it might not send troops through the United States, and the railway on the north shore of Lake Superior connecting Eastern and Western Canada was not yet com¬ pleted. In bitter March weather, with the ther¬ mometer often below zero, the regiments of militia summoned from Eastern Canada, all un¬ prepared by previous hardship to endure the cold, traversed the desolate shores of that frozen region. Sometimes in open flat cars, for more than a hundred miles on foot, they pro¬ ceeded over the snow. An experienced officer of the expedition declares that the task was more severe than Napoleon’s passage of the Alps, for Napoleon had a beaten road and an abundant commissariat, while both were want¬ ing in the Canadian wilderness. The regi-334

meats soon poured into the West in over¬ whelming force and though the few half breeds made a brave stand against great odds, they were quickly crushed. Their Indian allies the Canadian troops wearily followed to their al¬ most trackless haunts, and so the rebellion was put down. A few of the rebels were hanged; a good many of the Indians were imprisoned; Riel, the leader was taken, and then his fate became a question of national concern in Canada.

With Riel the French Canadians had ties of faith and of blood. French Canadians had been pioneers in the Northwest and at times they had dreamed of holding that vast region for their language and faith. If fate was against them, if it was the Anglo-Saxon who was occupying the country and in influence was destined to dominate, none the less was chiv¬ alrous support due to the few people who stood in the West for the ideals of France and of the Roman Catholic Church. In 1870 Riel had appealed not in vain to the French in Quebec for help in his time of trouble and it was prob¬ ably the strength of their sympathy which then saved him from the scaffold. Since in 1885 the men who took up arms had more real griev¬ ances the Church espoused their cause. In the Province of Quebec Liberals and Conservatives forgot their quarrels in the name of justice and French Canadian nationality against rigorous treatment of the rebel leader, Louis Riel. On the other hand the English demanded that the law should take its course. Riel had led a re¬ volt in which law-abiding citizens were shot down. If he was a murderer the penalty of murder was his due. The demand was too urgent to be disregarded. Riel was tried; in the eye of the law the penalty of his crime was death, and in November 1885 he was hanged at Regina, the capital of the Northwest terri¬ tories. See Riel Rebellion ; see also article Jesuits Estates Act for another religious and racial question in Canada in 1888-89.

The government's course in regard to Riel was a defeat for the French Canadian bishops who had long played an active part in political life. They claimed that even in secular affairs the authority of the bishops was final and that when they spoke the laity were bound to obey. If the Church chose to indicate her desires in regard to the merits of candidates seeking elec¬ tion, it was the duty of the voter to heed the voice of his spiritual directors. Some of the bishops claimed the right to use spiritual cen¬ sures to influence electors. Newspapers which opposed the wishes of the hierarchy must not be read by the faithful, and when L'Electeur, a daily newspaper in Quebec, opposed the bishops' Mandements in 1896 it was denounced from the altar, and under penalty of grievous sin and the refusal of the sacraments all the bishops for¬ bade formally anyone to read it, to subscribe or contribute to it, to sell it or in any manner whatever to encourage it.

The denunciation commanded obedience and made the continued existence of the paper under its existing name impossible. It promptly became Le Soldi, and seemed to suffer little real injury, but the inci¬ dent showed the authority claimed and exer¬ cised by the bishops.

With this attitude on their part occasions of strife were not likely to be wanting. In 1890 the Manitoba government passed an act estab¬

lishing a nonsectarian system of education. Owing to the peculiar conditions of older Can¬ ada the Protestant minority in the province of Quebec had secured the constitutional right to devote the taxes paid by them for education in support of their own schools. In Ontario the Roman Catholic minority possessed a similar privilege. For some time Manitoba had fol¬ lowed the example of Ontario, but, impressed by the obvious advantages of a uniform system, the legislature passed the Act of 1890 which de¬ prived Roman Catholics of former privileges. At once a vehement agitation broke out. The Federal government possesses, within certain limits, the right of disallowing statutes enacted in the provinces and urgent demand was made upon the government of Sir John Macdonald to disallow the Manitoba School Bill. This, on the ground that Manitoba was acting within its constitutional rights, the government refused to do. Appeal was then made to the courts to determine the authority of the respective gov¬ ernments in the matter and the case was finally carried to the Privy Council in London, which decided that the Federal government possessed the right of intervention in regard to the Mani¬ toba schools.

Extraordinary pressure was then brought to bear upon the Federal government. The hier¬ archy of the province of Quebec took up the question with much heat, while the Protestant province of Ontario was also aroused in sup¬ port of the opposite side. In 1891, when Sir John Macdonald died, his successors were left with the legacy of the Manitoba school ques¬ tion. The agitation dragged on for five or six years. Retreat from their position the Mani¬ toba government would not, and finally, in 1896, the Federal government endeavored to put through Parliament a remedial bill for re¬ storing to the Roman Catholics of Manitoba the privileges which had been taken away.

It was this question that brought the down¬ fall of the Conservative party so long dominant in Canada, a process accelerated by evidence ad¬ duced in 1891 of a share by responsible leaders in the province of Quebec in the misuse of public funds. In 1896 Sir Charles Tupper

(q.v.) became Prime Minister and in a general election appealed to the country to do justice to the minority in Manitoba. On this question many of his Conservative allies broke away from him and he fought a stern but losing contest. The Liberals too were in a difficult position. When Sir John Macdonald's old rival, Mr. Alexander MacKenzie, retired from the leadership of the party in 1880 he was succeeded by Mr. Edward Blake, who, in turn, proved unable to overthrow the Conservative chieftain. In 1887 Mr. Blake retired and was succeeded by Mr., afterward Sir Wilfrid, Laurier. In personal charm and tact the new leader was not unlike his formid¬ able rival, and he had, besides, remarkable gifts as an orator. French Canadian by birth and also a Roman Catholic, it was not easy for him to lead the Liberal party, which was committed unreservedly against interfering in Manitoba. In Mr. Laurier's own province of Quebec the hierarchy were still unanimous in demanding intervention to re-establish the Roman Catholic schools. < The election of 1896, fought chiefly on this issue, . resulted in a conspicuous Liberal triumph and it was in Quebec that Mr. Laurier found his most striking support. Either the

issue in regard to Manitoba had been obscured or the (< habitant ® wished to assert his right to pass judgment for himself in political matters independent of the views of the hierarchy. At any rate Mr. Laurier became Prime Minister of Canada. The Manitoba government made some minor concessions and the matter passed out of view, but an important warning against inter¬ fering with the authority of the province had been given to the Federal government.

The Liberal party had long championed the cause of freer trade and declared itself the enemy of Protection; it was therefore commit¬ ted to some modification of the existing pro¬ tective system. But, once in power, it found that, since important industries had grown up under the tariff, this could not be changed in any radical manner without ruin to those con¬ cerned. While doing something to reduce Pro¬ tection the government took a further remark¬ able step. The year 1897 saw the completion of 60 years under Queen Victoria's

sovereignty, and there was a general desire to draw more closely together the different sections of the empire, and thus to assert British unity. In pursuit of this idea Mr. Laurier's government announced that a preference of 25 per cent (later increased to 33ˆ3 per cent) would hence¬ forth be allowed to countries whose tariff gave a favorable opening to Canadian products. Since Britain alone gave such treatment the preference was confined to her, though other countries might share in it on the terms laid down. Both in England and in Canada the preferential tariff aroused great enthusiasm and no doubt it aided in bringing to a head Mr. Chamberlain's scheme, announced a few years later, for a preferential tariff in the mother country for colonial products.

In 1898 the Liberal government had a re¬ newed opportunity to proclaim its devotion to British connection. When war broke out in South Africa and soon proved more serious than had been thought possible, Canada promptly volunteered to send military contin¬ gents in reinforcement of the British troops. The contingents saw some service and a good many Canadian soldiers lost their lives. Nat¬ urally the French Canadian showed less en¬ thusiasm for what was in large degree a racial war than did the British element. Only a few French Canadians served in the contingents, and some voices protested against Canada's par¬ ticipating in British wars. But the overwhelm¬ ing opinion of the country supported the rally to Britain's aid; when the government appealed to the country in 1900 it gained an easy victory, partly upon this issue.

A little earlier the discovery of gold in re¬ markable quantities in the Yukon territory, arousing as it did world-wide interest, naturally attracted attention to a part of Canada hitherto thought of little value. The possession by the United States of the adjacent coast of Alaska (q.v.) through which lay the best route to the new gold country seriously impaired the value to Canada of the territory. The boundary be¬ tween Alaska and Canada had long been the subject of dispute, the Canadians contending that since, under the terms of the determining treaty, the line should run from headland to headland, the land at the head of the inlets which furnished the most ready access to the Yukon were in reality British territory. Can¬

ada's cause was prejudiced by the fact that (though not without occasional protest) she had acquiesced in the American contention that the boundary line followed the sinuosities of the shore. A disputed boundary is always dan¬ gerous. Besides this question there

were other matters requiring settlement between the Uni¬ ted States and Canada, and at last, in 1898, a Joint High Commission, including prominent representatives of both the American and British side, was appointed and sat for some weeks at Quebec and then at Washington. In addition to the Alaska boundary the commis¬ sion was, if possible, to agree upon a settle¬ ment of the differences in regard to the seal fishery in Behring Sea and the Atlantic fish¬ eries ; and besides minor matters was to con¬ sider the general trade relations between the two countries. Points of variance proving too great, the commission effected nothing; but in the end the two governments agreed that six jurists of repute, three to represent each side, should be appointed with authority finally to settle the Alaska boundary. In the end a ma¬ jority of the commissioners gave, in 1903, a decision favorable to the claims of the United States. Lord Alverstone, the British commis¬ sioner who supported the American conten¬ tions, was severely censured in Canada for an attitude that seemed more diplomatic than ju¬ dicial, but in spite of a passing irritation there was general satisfaction that a troublesome issue had at last been settled. See Alaskan Boundary Commission.

It has been said that the politics of Can¬ ada are railways. In a country so vast, means of transportation are of vital moment. Thus it happened that, after the Canadian Pacific Rail¬ way was completed, plans were soon on foot for other transcontinental lines. Since the Ca¬ nadian Pacific Railway ran near the southern frontier, new lines, it was thought, should open up regions farther north. In 1903 Sir Wilfred Laurier announced that the govern¬ ment of Canada had plans for a new trans¬ continental railway. The government was to complete the railway from Moncton, New Bruswick, to Winnipeg, while from that point to the Pacific Coast, at what is now Prince Ru¬ pert, the Grand Trunk Pacific Railway Com¬ pany was to build the line and it was to oper¬ ate this section and also that from Winnipeg to the Atlantic to be leased to the company by the Canadian government. A little earlier a private firm, Messrs. Mackenzie and Mann, had matured plans for a similar line to cross the Rocky Mountains farther south. The firm had only the capital of remarkable energy. It was by means of government bonuses and guaran¬ tees of its bonds that the necessary money was to be obtained. In the end it secured guaran¬ tees of this kind amounting to about $250,- 000,000. Efforts to unite the two plans arid to build a single new line were, unhappily, not successful. At the present time (1918) both lines have been nearly completed. Their cost has been very great and it came at a time when taxation grew heavier as the great war ap¬ proached. Three transcontinental lines in a country with a population of less

than 8,000,000 were a heavy burden. In 1917 the Canadian government took over the Canadian Northern which could not meet the interest on its bonds and there is, at the moment of writing some

prospect that, to promote economy and effi¬ ciency, the government will, for the duration of the war and, it may be, as a permanence, control also the Canadian Pacific and the Grand Trunk Pacific with its parent company, the Grand Trunk. The government of Canada will then direct three vast railway systems, each of them stretching from the Atlantic to the Pacific.

The growth of the Canadian West was ob¬ vious in 1905 when, from a part of the former Northwest territories, were created two new self-governing provinces, Saskatchewan and Alberta, which together fill the gap between Manitoba on the east and British Columbia on the west. In the background of Canadian poli¬ tics lurks always religious and racial strife, since two-fifths of the population are Roman Catholics and form a minority so powerful as to keep alive the suspicions of the Protestant majority. In creating the two new provinces, Sir Wilfrid Laurier proposed to allow the majority in a school district to determine the religion, if any, to be taught in the school, the minority to have separate schools with the same privilege and each school to be kept up by taxes on its supporters. Any government grant was to be equitably divided. Since 1875 the Roman Catholics had had the right to sepa¬ rate schools in the territory affected. The policy of the Prime Minister secured the strong support of the Catholic clergy of Quebec but it was as firmly opposed by a larger number of Protestants. A crisis in the government followed and, in the end, the bill was so modi¬ fied as to place the proposed schools under effective state control. All through the West the demand for sectarian and racial privileges regarding education was pressed. Ruthenians, Poles, Germans and others, besides French in Manitoba, demanded the right to have schools conducted in their own language and declared that this was a sacred heritage, not to be denied to their children without gross injustice. For a time in Manitoba some half dozen languages were used in the schools with official sanction. The need was urged of requiring English in all the schools, if a common Canadian national¬ ity was to be fostered. In 1915 the former Conservative government of Manitoba was de¬ feated and in 1916 the

new Liberal government passed a measure requiring the use of Eng¬ lish as the teaching language in all the schools and, for the first time, making elementary education compulsory.

The strife in Manitoba angered the French element in Canada. They urged anew the rights guaranteed to their language. Without doubt the original constitution of Manitoba, created in 1870, had set up a bilingual system, with French and English on an equality. The truth is that, in a majority at first, the French in the province had by 1916 become relatively unimportant. It was undoubtedly a grievance that rights formerly enjoyed by them should be swept away. The strife spread eastward. Under what is known as Regulation 17, the province of Ontario took steps to ensure that, except in a strictly limited number of admit¬ tedly bilingual schools (French and English), English alone should be used. In Quebec where the majority is French no one challenged the right of the English element to schools using their own language. Though, in fact, in On¬ tario no constitutional provision supported bi¬

lingualism, the French urged that, on any basis of justice, the French minority should have the rights in respect to their language which the English minority enjoyed in Quebec. The Eng¬ lish element in Ontario, it was declared pas¬ sionately, was persecuting those who used French. Their French press carried on a vio¬ lent agitation, answered in kind by the Orange¬ men of Ontario, who feared that with the French tongue would go the dominance of the French-speaking priest. The claim that consti¬ tutional guarantees protected the right to use French in the Roman Catholic separate schools of Ontario was negatived on appeal to the Im¬ perial Privy Council, the tribunal to determine finally such constitutional disputes. Trifling as such questions seem, they yet served to make the French, dominant in the province of Que¬ bec, resentful and suspicious, and this no doubt affected their attitude when the European War broke out in 1914.

In 1911 the government of the United States entered into negotiations with the government of Canada for a wide measure of reciprocity in trade. At first the proposal was welcomed by members of both political parties in Canada, but it soon became clear that financial interests in Canada feared the dominance of New York, that Canadian industries were alarmed lest a protective tariff should disappear, and that the Canadian railways, running for thousands of miles east and west, feared a loss through the diverting of the carrying trade southward to the lines of the United States. In the back¬ ground was

the fear of those attached to the political tie of Canada with Great Britain that Canadian trade would discriminate against Great Britain in favor of the United States with the result either of bringing Canada into the American Union, or, at any rate, of sever¬ ing the tie with Great Britain and the setting up of a republic of Canada. The political cam¬ paign revealed the profound attachment of the Canadian people to Great Britain. An election in September 1911 resulted in the defeat of Sir Wilfrid Laurier, who had made the re¬ ciprocity pact with Mr. Taft. A Conservative government under Mr. (now Sir) Robert L. Borden came into power and the proposals for reciprocity were dropped.

In 1914 came the Great War and the whole life of Canada was soon to be focussed on this event, discussed elsewhere (see Canada and the War). In 1917 Canada celebrated the 50th anniversary of the Federal union created in 1867. It had been a period of varied fortune, of reverses as well as of successes. The popu¬ lation had doubled and the 8,000,000 people of Canada in 1917 represented about the same number that the United States had had a hun¬ dred years earlier. Not until toward the end of the first decade of the 20th century had the development of Canada been very rapid. By 1911 a remarkable immigration movement was at its height. More than half a million settlers from the United States had by that time found new homes in Canada. Settlers from Great Britain and from continental Europe were also flocking in and the prairie country, hitherto almost tenantless, was filling up rapidly with varied types of human beings. Probably, con¬ sidering the small population of Canada, they came too rapidly, for half a million new¬ comers in a single year could not be readily

assimilated when the new arrivals represented about 1 in 10 of the existing population. For the transport involved railways were built in the West too rapidly to be profitable. Even before 1914, depression in all parts of the Western world had tended to check the tide of immigration, and, for the time, the war, begun in that year, suspended it completely. Probably, on the whole, this suspension was in the best

interests of Canada, since it ended a speculative fever in regard to lands and brought optimists face to face with stern reality. Already there is much talk in Canada of reconstruction after the war. In a world shattered by war's dis¬ asters it will be a problem for the wisest states¬ manship to use the undeveloped resources of Canada to create homes for the landless and penniless who will turn from devastated Europe to the founding of a new life in the West. (See Canada — Population, Immigration and Dis¬ tribution). In Canada, as in every belligerent country, the great war is producing far-reach¬ ing effects. Since the war began one by one the Canadian provinces from the Atlantic to the Pacific have imposed such restrictions and prohibitions on the traffic in intoxicating liquors as practically to annihilate it. At the time of writing, from Ontario westward every drinking place is closed. By May 1919 Quebec, including the great city of Montreal, will have done the same thing, and in the Maritime provinces, farther east, by local option, a similar result is nearly achieved. It is likely that by 1920 liquor will not be sold by retail anywhere in Canada except for medical purposes.

When the war broke out, in 1914, Canada had a party government, the result of the vic¬ tory of reciprocity in 1911. In 1916 the term of five years for which a Parliament is elected expired, but, by agreement between the two great parties, the period was extended by a year. As the war went on, the need was felt of united support of the government so as to avoid the dissipation of energy by party strife. In the summer of 1917, Sir Robert Borden made pro¬ posals to Sir Wilfrid Laurier to unite in form¬ ing a Cabinet in which the two parties should be represented equally, but this offer the Lib¬ eral leader declined. He would not accept the policy, insisted upon by Sir Robert Borden, of compulsory military service in order to keep up the Canadian divisions in France. The French Canadians, who are more than a quarter of the people of Canada, had shown themselves hos¬ tile to conscription, and on this issue Sir Wil¬ frid Laurier stood with the members of his own race.

English-speaking Liberals refused, on this point, to follow the lead of Sir Wilfrid Laurier, and the autumn of 1917 saw the formation in Canada of a Unionist government, led still by the former Conservative Prime Minister, Sir Robert Borden, but composed in about equal proportions of Conservatives and Liberals. Since, without practically unanimous consent, the term of Parliament could no longer be ex¬ tended, an election followed in December 1917, with conscription as the vital issue. Sir Wilfrid Laurier led the forces opposed to conscription. In his own province of Quebec he achieved a personal triumph, carrying 62 out of 65 seats. From the other provinces,

however, he secured little more than a score of supporters, and the Unionist government was sustained by an over-vol. 5 — 22

whelming majority. The policy of compulsory military service was pressed with energy and Canada has proclaimed to the world her resolve to make every sacrifice to stay in the war to the end.

The disappearance of party government is already producing far-reaching effects on the political life of Canada. The evils of the spoils system had long corrupted politics and this system the Union government has swept com¬ pletely away. Appointments to the whole civil service are now controlled by a non-partisan Civil Service Commission. Purchases for the government service are made by a committee of experts without regard to party claims. In abolishing the old system, Canada has lagged far behind both Great Britain and the United States, but her reform now promises to be thorough. In respect to other changes Canada is likely to be conservative. Socialism has, as yet, produced little effect on a country where nearly every farmer owns the land he tills and the artisan and the laborer earn high wages. It is still problematical what effect the war will have on the relations of Canada with Great Britain. It has already demonstrated three things: Canada's resolve to settle for herself the part, if any, she shall take in British wars; the solidarity of Canadian opinion with that of the other British peoples on the issues of the present war ; and the affection and mutual con¬ fidence which exists between the peoples scat¬ tered in all parts of the world who have a common British allegiance. Whether out of the welter of the war will come a closer political union of the peoples of the British empire for their common defense it is impossible now to say. The question will receive increased atten¬ tion after the war. It is certain that a unity of aims already exists which will hold together these people whatever political form their union may assume.

George M. Wrong,

Professor of History, University of Toronto.

10. THE CANADIAN WEST. It is

doubtful if a British sovereign ever made a more munificent grant to a company of his subjects than did Charles II, in the year 1670, to <(The Governor and Company of Adventurers of England trading into Hudson Bay** The sweeping terms of the royal charter defined an

area stretching from Hudson Bay to the Rocky Mountains, to which was given the name of Rupert's Land, in honor of the King's cousin, Prince Rupert, the company's first governor. In spite of the hostility of the French Canadian government and the competition of rival traders, the Hudson's Bay Company succeeded in hold¬ ing this territory down to the date of its cession to Canada two centuries later. Although a cen¬ tury had elapsed since Sir Francis Drake had

sighted the snowy peaks of the Pacific Coast, and half a century since the illfated Henry Hudson had discovered the bay which became at once his grave and the monument of his achievement, yet the history of the Canadian West may be said to date from the founding of the Hudson's Bay Company. See Canada — The Hudson's Bay Company.

The presence of the English company upon the shores of Hudson Bay was from the outset a serious menace to French Canadian influence in the Northwest. The newcomers were draw-

ing off the trade of the northern tribes. Eng¬ lish and French were face to face in a struggle for commercial supremacy in the West, and their rivalry was bound sooner or later to break into a clash of arms. The Hudson's Bay Com¬ pany had strengthened its position by the estab¬ lishment of four trading-posts: one upon the west shore near the Nelson, and the other three, Forts Albany, Hayes and Rupert, on the south arm of the bay. In the spring of 1686 the progress of trade was rudely interrupted. Chevalier De Troyes and a company of 80 ad¬ venturous Frenchmen, ascending the Ottawa, worked their way slowly by stream and lake over the height of land to the neighborhood of James Bay. So sudden was their coming, and so spirited their attack, that the three lower forts fell almost without resistance.

In 1697 Pierre le Moyne D'Iberville, who had been De Troyes' right-hand man, entered Hud¬ son Strait, under orders from Quebec, to attack Fort Nelson, the most important trading-post on the bay. The Pelican, which carried the com¬ mander, became separated from the rest of the fleet and fell in with three English ships belong¬ ing to the Hudson's Bay Company. In the en¬ counter which followed the Pelican sank one of the company's ships and disabled a second, while the third made off under full sail. Rejoined by his missing ships, D'Iberville soon forced Fort Nelson to surrender. In 1713 the Treaty of Utrecht put an end to hostilities and left the English traders in undisturbed possession of their posts.

Meanwhile French Canadian traders were extending their trade beyond Lake Superior. With these there was ever present the desire to find La Mcr de VOuest, which they thought could not be far distant. The ambition to dis¬ cover this (<Western Sea® possessed the mind of Pierre Gaultier de Varennes de la Verendrye, the commander of a little post on Lake Nepigon. It was late in August 1731 that Verendrye and his party passed over Le Grand Portage leading over the height of land to the waters flowing toward Lake Winnipeg. The mouth of the Maurepas (Winnipeg) River had been reached when troubles began to crowd upon the unfortunate explorer. The merchants who were to forward supplies failed to do so ; his nephew died ; and, as a climax to his misfortunes, 21 of his company, includ¬ ing his eldest son, were butchered by a band of murderous Sioux. It was not until six years later that Verendrye again turned his face westward. The course of his travels was marked by a series of trading-posts built at successive

stages. Among these were Fort La Reine, near the site of the present town of Portage la Prairie, and Fort Rouge, whose name still clings to a suburb of the city of Winnipeg.

During the last century of the French regime the Hudson's Bay Company had held its own throughout the dangers of war and the competition of trade. Its forts had fallen into the hands of De Troyes or D'Iberville, but had been restored by the Treaty of Utrecht (q.v.). Though the dangers of war were past, the rivalry of the Canadian traders had still to be met. Despite the long overland journey, the latter penetrated to the neighborhood of Hudson Bay, attracting the Indians with showy trinkets, and too often with brandy. The ma¬

jority of the natives, however, were not easily drawn away from the old company's forts. Every spring the rivers and lakes were dotted with fur-laden canoes making their way to Lake Winnipeg, the meeting place of the hun¬ dreds of natives who journeyed annually to Hudson Bay. As many as 500 canoes in a year made the long and toilsome journey to York Factory. Here they exchanged their dearly-earned furs for coats, blankets, kettles and tobacco, or for necessities of the hunt, such as guns, powder, powder-horns, shot, hatchets and knives.

The conquest of Canada by Great Britain brought about an immediate and complete change in the fur trade. With the passing of the French regime, monopoly and licenses dis¬ appeared. The officers of the French company withdrew from the country rather than live under the British flag. The coureurs de bois, suddenly cast adrift, lacked the capital necessary to continue the fur trade. New employers, how¬ ever, were soon at hand. The old route from the East, up the Ottawa and across Lake Superior to Grand Portage, had scarcely for¬ gotten the passing of the French traders when it was traversed afresh by British merchants from Montreal. Alexander Henry, Thomas Curry, James Finlay and the Frobisher broth¬ ers were the hardy forerunners of a new race of traders, whose enterprise and daring soon carried them into the Saskatchewan and Atha¬ basca districts. In order to compete the more successfully with their long-established rivals, the newcomers, who at first traded individually, decided upon union, a decision which led to the founding in 1783 of the Northwest Company. Under the stimulus of competition the opera¬ tions of both companies quickly extended north¬ ward to Lake Athabasca and westward to the foothills of the Rockies.

The necessity of enlarging the field of trade gave a remarkable impulse to exploration. In penetrating the unknown lands, north and west, the pioneer traders rendered invaluable service to their country. The honor of leading the way into the northland belongs to Samuel Hearne, a servant of the Hudson's Bay Company. Set¬ ting out from Prince of Wales Fort, Hearne succeeded, after two failures, in reaching the Coppermine River. He was the first white man to arrive at the Arctic shores from the interior. The men of the Northwest Company were not slow to follow the example of their rivals. No name holds a prouder place in the annals of American travel than that of Alex¬ ander Mackenzie. Fort Chipewyan, situated upon the shores of Lake Athabasca, the trade centre of the north, was the starting point of his two great journeys. The <(Western Sea,® the elusive goal of Verendrye's travels, was the object of Mackenzie's quest. His first jour¬ ney, made in 1789, terminated at the Arctic Ocean. Choosing a more westerly stream for his second attempt, Mackenzie ascended the Peace River to its source in the Rockies, crossed the height of land, and, after descending the Fraser River a short distance, struck out across country for the sea. The successful issue of the journey was proclaimed by the following words inscribed upon the face of a rock over¬ looking the waters of the Pacific : ((Alexander Mackenzie from Canada by land, the twenty-second of July, one thousand seven hundred

and ninety-three.® Two other Nor'westers, Simon Fraser and David Thompson, also made their way to the Pacific Ocean, the former in 180S by the river which bears his name, the latter in 1811 by the Columbia.

While British explorers were forcing a way across the continent, British seamen were mak¬ ing good their country's claim to the Pacific Coast. In 1778 Captain Cook touched at Nootka, on Vancouver Island. At this centre of trade Capt. John Meares 10 years later established a settlement, which unfortunately was soon de¬ stroyed by the Spaniards. In 1792 Capt. George Vancouver, being sent out to

inquire into the action of the Spaniards, forced the latter to withdraw from the scene of their outrage. As the result of arbitration Great Britain received the entire coast line.

Down to the close of the 18th century the ruling interest of the West centred in the fur trade. Lord Selkirk it was who first conceived the idea of planting a settlement, at the heart of the continent. From the Hudson's Bay Com¬ pany he secured a grant of 110,000 square miles in the valley of the Red River, a district hence¬ forth called Assiniboia. Settlers were hurried out from Scotland, and in 1812 a small com¬ pany, 70 in number, made its way inland from York Factory.

The newcomers were looked upon as in¬ truders by the Nor'westers, who suspected that Lord Selkirk, being a shareholder in the Hud¬ son's Bay Company, had planted his colony to interfere with the trade of the Canadian com¬ pany. The early years brought trying experi¬ ences to the settlers. So great was the scarcity of food that the governor, Miles Macdonell, is¬ sued a proclamation to the effect that ((no pro¬ visions, flesh, fish, grain or vegetables were to be taken out of the lands of the settlement for a year.® This action brought the hostility of the Nor'westers to the point of violence. Some of the colonists were bribed to desert, the re¬ mainder were driven out by a band of Metis, or half-breeds. Almost immediately, however, the refugees returned, reinforced by another com¬ pany of immigrants. With the new arrivals came Robert Semple as governor.

Meanwhile Lord Selkirk had arrived in Can¬ ada. Hearing at Montreal of the misfortunes of his colonists, he had engaged the services of 100 discharged soldiers and set out for the West. While he was yet on the way, stirring events were happening in the Red River Valley. The Nor'westers, angered by the destruction of their fort on the Red, bestirred themselves to destroy the settlement. A strong band of half-breeds was gathered at Portage la Prairie under the leadership of Cuthbert Grant. On 19 June 1816 Governor Semple was informed that a body of horsemen was approaching over the prairie. Taking a small force, he marched out to inquire the purpose of the intruders. This move precipitated a skirmish at a spot now marked by the Seven Oaks monument. When the firing ceased Semple and 21 of his followers lay dead or mortally wounded. By this disaster the settlers were forced to again leave their homes.

The news of Seven Oaks was a signal for great rejoicing at Fort William, the headquar¬ ters of the Northwest Company. The joy of the Nor'westers, however, was rudely dispelled by the sudden arrival of

Lord Selkirk. The latter,

acting in the capacity of magistrate, arrested several of the leading partners, and sent them down to York, Upper Canada. In the following spring he pushed on to the Red River, where he promptly restored the ejected colonists to their farms, settled his soldiers about Fort Douglas and made a treaty with the Indians.

When the news of the tragic death of Semple and his men reached England, the im¬ perial government at once interfered. Both parties to the quarrel were ordered to give up all posts and property seized. The death of Lord Selkirk in the year 1820, though to be regretted, was beneficial to the West, removing as it did the last obstacle in the way of a union of the fur companies.

After the union, which took place in 1821, the management of the company's affairs rested with an official known as the governor of Ru¬ pert's Land, assisted by a council of chief fac¬ tors and traders. A strong man was needed for the governorship, and such an one was found in the person of a young Scotchman named George Simpson, who ably guided the fortunes of the company during the next 40 years. To the enterprise of the Hudson's Bay Company, in no small measure, Great Britain owes her control of the Pacific Coast. From the north Russia, from the south the United States, were pressing vital claims which threatened to shut out Great Britain entirely from the sea. Under Simpson's aggressive administration the country between the Rockies and the Pacific was occu¬ pied. A fleet of six armed vessels protected the company's coast trade, of which Fort Van¬ couver was the centre.

Meanwhile the Selkirk settlement, clustering about the historic walls of Fort Garry, was winning its way to prosperity. The hardships of pioneer life in the East were here repeated. Spade and hoe, sickle and cradle, flail and quern, all told of the day of small things. A series of disasters, in the form of grasshoppers and floods, failed to shake the courage of the sturdy settlers. The growth of the colony made necessary a change of government. The peo¬ ple complained that the members of the council of Assiniboia were paid servants of the com¬ pany, and did not, therefore, represent the pop¬ ular will. Discontent was a sign of progress, a sign that the settlement was growing beyond the control of a fur company.

The steadily growing importance of the Pa¬ cific country made it

imperative to determine the boundary line between America and Brit¬ ish territory in the West. The 49th parallel was the accepted line as far as the Rockies, and it was agreed that for the time being the country beyond the mountains should be <(free and open® to both nations. In 1846 the Ore¬ gon treaty continued the boundary line along the 49th parallel to the channel separating Van¬ couver Island from the mainland. The line was to follow this channel southwesterly to the Pacific Ocean. For several years the own¬ ership of the island of San Juan was in dis¬ pute. The question was finally referred for settlement to the German Emperor, who gave his award in favor of the United States.

To maintain order among the lawless min¬ ers whom the discovery of gold had drawn to the Pacific Coast, a separate government was established on the mainland. New West-

minster, on the Fraser River, became the capi¬ tal. This arrangement, however, proved un¬ satisfactory; and at times there was talk of annexing Vancouver Island to the United States. Fortunately a strong British sentiment prevailed, which led to the reunion, in 1866, of the island and the mainland, to form the province of British Columbia. Victoria was chosen as capital.

The British North America Act made pro¬ vision for the admission to confederation at any time of British Columbia, Rupert's Land and the Northwest territories. The first Do¬ minion Parliament petitioned the British gov¬ ernment to hand over to Canada Rupert's Land and the Northwest. It was claimed that the rule of a fur company did not tend to the general development of the country, and, more¬ over, that the extension of the Dominion west¬ ward would be a safeguard against any aggres¬ sion on the part of the United States. The Hudson's Bay Company finally surrendered to Canada its control of Rupert's Land and its monopoly of trade. The company, in return, received the sum of £300,000, one-twentieth of all land thereafter surveyed for settlement, and also retained its posts and trading privileges.

At the time of confederation (q.v.), the only occupants of the land beyond Lake Superior were roving bands of Indians, a few scattered traders and 12,000 settlers in the valley of the Red River. Ten thousand of these 12,000 were half-breeds, Scotch and French. Into this com¬ munity, without warning, flocked Canadian sur¬ veyors to lay out roads and townships. The country had been handed over to Canada and the interests of the natives were to be sacrificed. Such was the thought of the half-breed ele¬ ment. The storm centre was the French half-breed party, the Metis, led by Louis Riel (see Riel Rebellion). There was no one in the colony to restrain the latter's madness. Fort Garry was seized and a ˆprovisional govern-menU established. There was every prospect, however, of a bloodless settlement of the situa¬ tion, when suddenly Riel, in a moment of reck¬ lessness, ordered the execution of a young On¬ tario immigrant named Thomas Scott. The news of this brutal murder raised a storm of indignation in the East. In a remarkably short time a volunteer force under the command of Col. Garnet Wolseley reached Fort Garry, only to find that the instigators of the rebellion had fled across the American border.

Out of the strife of rebellion arose a new province. Even while Wolseley's force was on its way up from the East, the Manitoba Act passed the Canadian Parliament. Manitoba was admitted into confederation as a full-fledged province. The claims of the half-breeds were fully met by a generous land grant. Many of Wolseley's men remained in the new province to share in its making. The little settlement about Fort Garry was soon transformed into the populous city of Winnipeg. Manitoba drew her first governor from the far East, in the person of a distinguished Nova Scotian, Adams G. Archibald.

A year later the westward expansion of con¬ federation was continued. British Columbia be¬ came part of the Dominion, subject to a very important condition, namely, that a transcon¬ tinental railroad should be begun within two

years and completed within 10 years from the date of union. In 1872, therefore, Sir John A. Macdonald introduced the question in Par¬ liament. The great enterprise was well under way when the ministry, charged with corrup¬ tion, was forced to resign. Alexander Macken¬ zie, who succeeded Sir John, proposed to con¬ struct the road gradually, as the finances of the country allowed. This delay put a severe strain upon British Columbia's loyalty to the Dominion. The Macdonald government, re¬ turning to power in 1878, immediately

took up again the railway question. Construction was begun from both ends; and with such vigor was the work pressed forward that the last spike was driven by Lord Strathcona in No¬ vember 1885. The completion of a transcon¬ tinental railway cemented the bond binding the East and the West.

No sooner was order restored after the Riel rebellion than settlers began to flock into Man¬ itoba. Many farmers from eastern Canada moved west, while from Europe came an ever increasing number of colonists, of British, Scan¬ dinavian and German stock. The newcomers spread beyond the limits of Manitoba, many finding their way into the valley of the Sas¬ katchewan, a few even to the foothills of the Rockies. This Northwestern Territory was governed by the lieutenant-governor of Mani¬ toba and a council of 11 members. In 1876 a change took place. The eastern section of the country, called Keewatin, was placed under the personal control of the lieutenant-governor of Manitoba, while the western was given a resident governor and a council of five mem¬ bers. A few years later four districts were or¬ ganized, Alberta, Assiniboia, Athabasca and Saskatchewan. Regina, being situated upon the main line of the Canadian Pacific Railway then under construction, was chosen as the seat of government.

The advent of the railway gave promise of peaceful and rapid progress, when suddenly a second rebellion broke out. At the close of the Red River rebellion many of the Metis with¬ drew westward and settled upon the banks of the Saskatchewan, among their near relatives, the Cree Indians. Here they were disturbed by the encroachment of a hated civilization. Their unrest was increased by a fear of losing their lands through the failure of the Dominion government to issue title deeds. The sudden return from exile of Louis Riel was all that was needed to provoke rebellion. Near Duck Lake, within the angle formed by the North and South Saskatchewan, the first clash took place, between a band of Metis and a force of mounted police and volunteers.

The position of the white settlers of the Saskatchewan Valley was serious. The real danger lay, not in a revolt of the Metis, but in the possibility of a general rising of the Indians, of whom there were over 30,000 in the Northwest. Prince Albert, Battleford and Fort Pitt lay exposed to attack. The most se¬ rious risings of the Indians took place near Battleford and Fort Pitt, among the followers of Poundmaker and Big Bear. The heart of the rebellion was the village of Batoche, the centre of the Metis settlements. The news of the fight at Duck Lake was the signal for an outbreak among Big Bear's warriors, who mas¬

sacred the male inhabitants of Frog Lake and

CANADA

Mt. Assiniboine, the Matterhorn of the Canadian Rockies 2 Mt. Robson, the Monarch of the Canadian Rockies

CANADA

1 Mount Sir Donald, and the Illecillewat Glacier, Selkirk Mountains

2 Lachine Rapids, St Lawrence River

then drove out the garrison of Fort Pitt. When the report of the rebellion reached Ottawa, the Dominion government took prompt action. The call for volunteers met with an eager response on all sides. In spite of the great distance, within less than two months 4,400 men were placed in the field, all save the Winnipeg con¬ tingent being from eastern Canada.

General Middleton, commander-in-chief of the Canadian militia, who arrived at Qu'Appelle in advance of the main force, made the Canadian Pacific Railway the base line of his operations, and prepared to crush the rebellion in all its centres at once. Three places were in immediate danger: Prince Albert, Battleford and Fort Pitt; three relief expeditions were provided for in the plan of campaign. General Middleton was to advance from Qu' Appelle to Batoche, Riel's

headquarters, Colonel Otter from Swift Current to Battleford, and General Strange from Calgary to Edmonton. The three movements were successfully carried through, the divided forces converging upon Battleford. The bulk of the fighting fell to Middleton's column, which met with deter¬ mined opposition at Fish Creek and Batoche. With Riel, Poundmaker and Big Bear finally in custody, the rebellion was at an end. Riel and eight Indians suffered >the death penalty.

The rebellion was not without its good re¬ sults. In recognition of their growing import¬ ance, the Northwest territories were granted representation in the Dominion Senate and House of Commons. The need of a stronger government in the Northwest became obvious. The old council was abolished and its place taken by an elective assembly, which first met in 1888, at Regina. But this was not of course a final settlement and in 1905 the vast district between Manitoba and British Columbia was divided into two self-governing provinces — Saskatchewan and Alberta.

The discovery in 1897 of rich deposits of gold in the Yukon (q.v.) was the signal for an influx of fortune-hunters. As a result the long standing dispute over the Alaskan bound¬ ary gathered new importance. In taking over Alaska from Russia in 1867, the United States secured all the rights of that nation as laid down in the treaty of 1825 between Russia and Great Britain. The interpretation of the terms of the treaty was left to a commission, com¬ posed of three representatives from the United States, two from Canada and Lord Alverstone, the chief justice of England. The commission met in London in September 1903. The de¬ cision was, upon the whole, favorable to the American claims. See Alaskan Boundary Commission.

The growth of the West during the last 30 years has been very marked, the inevitable result of the expansion of the Canadian rail¬ way system and the resultant influx of settlers. Three railway systems now cross Canada from coast to coast: the Canadian Pacific (q.v), the Canadian Northern (q.v.) and the Grand Trunk Pacific (q.v.), the eastern section of which is called the National Transcontinental (q.v). These transcontinental railroads, with their branch lines, have opened up immense tracts of territorv to the settler; and in addition a line is under construction from The Pas, on the Saskatchewan River, to

Port Nelson, on Hudson Bay, a distance ot 410 miles.

David M. Duncan,

Author of (7 he Story of the Canadian People P Collegiate Institute , Winnipeg.

11. THE SETTLEMENT OF THE CA¬ NADIAN WEST. — Without a just apprecia¬ tion of the attractions and possibilities of the “Canadian West,” as the larger half of the Dominion situated west of Lake Superior has commonly been called, neither the Canada of to-day nor that of the future will ever be understood. One of the first acts of states¬ manship after the consummation of confed¬ eration (see Canada — Confederation) was the purchase by the Canadian government from the Hudson’s Bay Company (see Canada — Hudson’s Bay Company) of the immense ter¬ ritory forming the basin of Hudson Bay and known as Rupert’s Land, over which that com¬ pany held proprietary rights. British Colum¬ bia, in 1871, entered the Dominion thus brought up to her borders. Some 14 years later followed the completion of the Canadian Pa¬ cific Railway (q.v.), an enterprise of splendid self-confidence in so young a country. A rail¬ way was needed to fulfil the conditions upon which British Columbia had joined the Con¬ federation, and without it the vast territory between that province and Ontario could not be developed nor preserved to Canada. The purchase of Rupert’s Land created the condi¬ tions which brought about and justified the building of the first transcontinental railway, and the prolonged discussions over the policy of the government of the day in respect to the public assistance given to that road began the process of popular education in eastern Canada in the extent and resources of the West. A seemingly limitless sphere for internal develop¬ ment gradually was revealed, and the necessity on two occasions for the employment of armed force against half-breed rebellions, with some sacrifice of blood, sealed the sense of posses¬ sion. Pioneers proved the fertility of the soil and the richness of the mines, and with the assurance of a rapidly increasing population the whole national life received an access of vigor and hopefulness. External policy, as well as internal, was influenced. A country that could produce and export staple foodstuffs in quan¬ tities capable of indefinite multiplication, and had vast stores of timber, coal and metals could support great home industries and also become a prominent factor in international trade. It could work at home and bargain abroad. It could make choices. The idea of a trade union of the British empire, for ex¬ ample, presented itself in practical form largely because of the potentialities of the Canadian West. Population only was needed to show results, and the movement of population into this part of Canada is therefore a subject of interest and importance.

The country lying west and northwest of Lake Superior in Canada is of

vast extent and great variety. It includes the extreme western end of the province of Ontario, the provinces of Manitoba, Saskatchewan, Alberta and British Columbia, while beginning again at the east and lying to the north of these districts are the Northwest territories and Yukon. Prior to 1905 the only provinces were Manitoba and

British Columbia. The remainder constituted the “territories.” Now (<the territories” signify the vast northern region stretching from Labrador to Yukon. The land area in these districts in acres is :

District Area in acres

Ontario (western end), approximate . 20,000,000

Manitoba . 41,169,098

Saskatchewan . 155,092, 480

Alberta . 160,755,200

British Columbia . 227,302,400

Northwest territories (Labrador to Yukon)… 1 , 197 , 475 , 200 Yukon . 132,113,280

For present purposes the northern terri¬ tories, with the exception of Yukon, may be disregarded, since they have not yet attracted population to any marked degree. The western end of the province of Ontario is rich in timber and minerals, and possesses stretches of good agricultural land. The prairie region begins at the eastern boundary of Manitoba and extends to the Rocky Mountains, embracing the prov¬ inces of Manitoba, Saskatchewan and Alberta: wooded prairie and open prairie, rolling and flat, broken by hills and some rocky ridges and drained by great rivers that flow eastward and northward into great lakes with outlets into Hudson Bay. No richer agricultural lands and no better grazing ranges exist than are here found. Of the 350,000,000 acres in this com¬ bined district it would be idle to

estimate the proportion of good grain land. It is very large, as attested by the successful farms now scat¬ tered throughout the whole region. In 1903 only 5,073,424 acres had yet been put under crop. By the year 1917 the area under crop had grown to 24,938,700 acres. British Columbia is a land of magnificent mountains rich in minerals, and of valleys of the very highest agricultural pos¬ sibilities, nearly the whole clothed with splendid forests. See the articles in this series: Agri¬ culture; Minerals; The Forests and Lum¬ ber Industry.

In 1901 the Canadian West, not including the portion of Ontario, was shown by the census to have a population of 645,517. In 1911 the Canadian West, not including the portion in Ontario, was shown by the census to have a population of 1,742,182. Out of this number 498,347, or 28.6 per cent, had been born in the West, 354,748, or 20.4 per cent, had been born in the eastern provinces of Canada, 341,960 or 19.6 per cent had been born in the British Isles, 509,509 or 29.2 per cent had been born in for¬ eign countries, while 37,618, or 2.2 per cent had failed to give their birthplace or been born at sea. By origin 966,238 were of British stock, 152,137 of German stock, 114,877 of Austro-Hungarian stock, 95,106 of Scandina¬ vian, 83,635 of French, 43,676 of Russian and 32,167 of Chinese and Japanese, and in addi¬ tion to these 78,717 were Indians and 108,905 of unspecified origin. To understand the pecu¬ liar nature and the rate of the movement of population into the Canadian West indicated by these figures, many general considerations must be borne in mind. Conditions as they have existed in the United States are among the most important of these considerations. Until the closing years of the last century the United States was an irresistible magnet. It drew from the movable population of all coun¬ tries. From Canada itself it attracted a larger proportion of the native population than from

any other country. Its relative advantages over Canada, in the eyes of those who sought to better their condition, consisted in its advanced stage of development. Not only were there more varied employment and larger opportuni¬ ties in industrial and commercial life, but its fertile lands were opened up by railways from 10 to 40 years before those in the Cana¬ dian West and the mineral wealth of its western mountains was discovered and adver¬ tised to the world years before the riches of Canada in this respect were even suspected. The prairie regions of the Canadian West had to wait for transportation facilities, and then they had to wait until their profitableness was established. Since people are not predisposed to believe in the security of agriculture in northern latitudes, this meant, practically, that they had

to wait until the prairies in the United States were tested right up to the border. Before that time even official crop returns could not be widely effective as inducements to immigration. Moreover streams of migra¬ tion are not easy to divert. Where many have gone others tend to follow.

To what extent the United States drew upon Canadians up to 1900 is shown in the census re¬ turns of that year which record the residence in that country of 1,181,255 persons born in British North America, that is, in Canada and Newfoundland. How little the United States had given in return appears from the compara¬ tively small number of 127,899 natives of the United States resident in Canada when the Canadian census was taken in 1901. But the flow of population from Canada to the United States has been checked and the tide has turned, and from census returns of 1 June 1911 it is shown that there were 303,680 natives of the United States resident in Canada, of whom 168,278 were males and 135,402 females ; and during the years 1912 to 1917, inclusive, the immigration returns show the arrival in Canada of natives of the United States to a total num¬ ber of 538,815. Canada has made steady and substantial progress and her industries now provide opportunities for all her own people who desire industrial employment. But what is of more direct importance to the present subject, the cheap, good lands in the United States are now very largely occupied ; pros¬ perity and a good birthrate among the farming population have created a host of land seekers of native birth, and the price of land has rapidly risen. In the Canadian West, on the other hand, millions of acres of the most fertile land are obtainable at moderate cost ; this land has been proved, and railway facilities and railway rates put the crops within profit¬ able reach of the markets.

The history of the settlement of the Cana¬ dian West may conveniently be divided into three periods : the first embracing the time be¬ fore railway facilities existed or, say, up to 1885 ; the second from 1885 to 1901 ; and the third beginning in 1901. So far as the prairie division is concerned fur traders visited it and dwelt in it from early times, but no attempt was made at colonization previous to that of Lord Selkirk in the decade succeeding 1812. That his venture, beset with misfortunes though it was, left a permanent result was shown by the fact that in 1873 as many as 530 of the orig¬ inal Selkirk settlers or their white children were

iound to claim the grants of land offered by the Canadian Parliament. Other independent col¬ onists had made their way into the country and there were, of course, the employees of the Hudson's Bay Company, but in 1869, when the purchase by Canada was made, the total white population numbered only a few hundreds. Some members of the military expedition of 1870 remained as settlers and other accessions were received at about the same time. In 1871 the Dominion government appointed the first immigration agents in the West, one in Mani¬ toba and another in the Territories, and author¬ ized the establishment of an ˆimmigration shedˆ at Winnipeg, a hamlet then possessing 241 in¬ habitants. The work of promoting immigration to Canada had been undertaken by the Federal government in 1868, the provincial governments co-operating, and the appointment of agents in the West brought that section into direct touch with the general system having agents in Great Britain and Europe. It is interesting to note that in his annual report to the department for 1872 the agent at Winnipeg estimates the ar¬ rivals during the year at 1,400, of whom 954 came from Ontario, 78 from Quebec and 115 from the United States. During 1872 and 1873 the Dominion government entered into nego¬ tiations with a colony of German Mennonites living in southern Russia who desired to emi¬ grate. Delegates visited Canada and in 1874 1,349 of these people settled in southern Mani¬ toba. This is important, not only because it led to further immigration from the same source but also because the attention of the Dominion government was thus directed to the question of special colonization in the West. In 1874 Scandinavian and Icelandic delegates were shown through the country and a small begin¬ ning was made in Icelandic settlement through the moving up from Ontario of 285 Icelanders. The years 1874 and 1875 may be noted also be¬ cause the Dominion government then first ap¬ pointed Canadian immigration agents in the United States, chiefly for the purpose of effect¬ ing the repatriation of Canadians. Results were at once, obtained and agents reported some 400 repatriated Canadians as immigrants into the West in 1876 and some 800 in 1877. In 1879 a delegation of tenant farmers of Great Britain visited the country and their reports resulted in an increase in immigration from the British Isles. The projected transcontinental railway had met with difficulties and delays, but in 1875 work was begun at Thunder Bay, the head of Lake Superior, on the section to Winnipeg, and in 1S78 a line from the

United States border at Pembina was completed to Saint Boniface, oppo¬ site Winnipeg across the Red River. Although the line from Lake Superior was not completed uptil 1883, the line from Pembina increased the facilities for reaching Winnipeg (q.v.), and the railway building combined with other not un¬ natural causes led to a ˆboom® in real estate, accompanied by a rush of speculators and pros¬ pective settlers. In 1881 the immigration agents estimated the arrivals in Manitoba at about 25,000, in 1882 at almost 70,000, and in 1883 at 50,000. Eastern Canada and the United States contributed the great proportion of these visitors, as most of them proved to be. The boom <(burst® in 1883. By the census re¬ turns for 1881 some estimate of what was per¬

manent in the immigration of the previous years can be reached. Manitoba was given a total population of 65,954, of whom 18,020 were born in Manitoba itself, and 6,422 in the Territories. Of these two classes 6,767 were Indians, but the half-breeds were not separately enumerated. From outside the largest number was furnished by the province of Ontario, namely, 19,125, Que¬ bec supplying 4,085 and Nova Scotia 820. Na¬ tives of England and Wales numbered 3,457, of Scotland 1,836, and of Ireland 2,868. Russia supplied 5,651, chiefly Mennonites; Germany, 220; Norway, Sweden and Denmark, 121; and France, 81. The United States had contrib¬ uted 1,752. In the same year the white popula¬ tion of the Territories was 6,974, of whom 517 were born in Ontario, 101 in Quebec, 98 in Eng¬ land and Wales, 136 in Scotland, 62 in Ireland, 27 in France and 116 in the United States. As the Canadian Pacific Railway was pushed through real settlement followed at a faster rate than ever before and in 1886 when the first train was run from Montreal to the Pacific Coast the net gain in population from the principal sources, over the figures just given for 1881, was: From Ontario 14,996, from Quebec 1,891, from Nova Scotia 497, from New Bruns¬ wick 363, from England and Wales 6,865, from Scotland 4,146, from Ireland 753, from Iceland 1,500, from the United States 570; while each of the other countries showed small gains. The •chief sources of increases in the Territories were Ontario 8,300, Quebec 1,200, England and Wales 3,750, Scotland 2,000, and the United States 890.

It will not be necessary to follow in detail the records of the succeeding years up to 1901, which form the second period. The Canadian Pacific Railway Companv, which had received large grants of land, became an additional agency in the organizing of immigration move¬ ments as also to a limited extent did the col¬ onization

societies which had purchased tracts of land in 1882, 1883 and 1884. A movement which began in 1889 and 1890 and ultimately attained considerable proportions was that from Austria-Hungary. The year 1890 was marked by a considerable immigration from Great Brit¬ ain. Migration from the eastern provinces of Canada remained moderate until 1898. In 1899 over 7,000 Donkhobors were brought in and established in colonies. According to the cen¬ sus of 1901 Manitoba had a population of 238,- 934, not counting Indians and half-breeds. Those born in Canada numbered 164,582. Of the Canadians 67,566 were born in Ontario, 8,492 in Quebec, 1,536 in Nova Scotia, 820 in New Brunswick, 419 in Prince Edward Island and 167 in British Columbia. In England there were born 20,036, in Scotland 8,099, in Ireland 4,537, and in Wales 356; in Aus¬ tria-Hungary 11,570, in Russia 8,854, in Ice¬ land 5,403, in Germany 2,285, in Norway, Swe¬ den and Denmark 2,090, in France 1,470, and in the United States 6,922. The Territories had a population of 185,335, exclusive of Indians and half-breeds. Of the 65,231 born in Canada, Ontario was the birthplace of 28,229, Quebec of 4,075, Nova Scotia of 1,169, New Brunswick of 669 and Prince Edward Island of 488. Those born in England numbered 10,752, in Scotland 4,226, in Ireland 2,158, and in Wales 186; in Austria-Hungary 13,407, Russia 14,585, Norway,

Sweden and Denmark 2,462, Germany 2,170, France 1,023, Iceland 424 and the United States

13,877.

Before touching the movement of the later years into the prairie region a few words may be said of the progress of settlement in British Columbia. In 1901 the population of that province was 149,708, again excluding In¬ dians and half-breeds. The composition of the population of British Columbia differs from that of the districts we have just been considering in several interesting respects. In the first place, it contained in 1901 relatively a larger number born in the

United States, namely, 17,164. Then there were 14,576 Chinese and 4,515 Japanese. Ontario contributed 23,642, but Nova Scotia came next among the provinces with 4,603. These features are easily explain¬ able. The chief attractions of British Columbia have been its mines, its forests and its fisheries. The first named have in many different years caused rushes from the United States and they have been an added attraction to the people of the province of Nova Scotia. The man from Ontario is a good pioneer under any conditions. And the same causes that drew Chinese to Cali¬ fornia have operated in the case of British Co¬ lumbia. The first gold rush to British Columbia occurred in 1858, nine years after the mem¬ orable rush to California. It is said that between 20,000 and 30,000 prospectors from California invaded the province in that year. Systematic exploration, however, was not attempted and the mining population came and went in waves, the years 1858, 1861, 1864, 1865, 1869 and 1872 marking the influxes. Up to 1893 nearly all the gold produced was placer gold and the values ran from $705,000 in 1858 to $3,913,563 in 1863, continuing at an average of over $3,000,000 until 1868, when with variations a decline set in. The working of lode mines since 1893 has given an element of permanence to the mining population and the annual product of gold has for the past 10 years been between five and six million dol¬ lars in value. The copper, silver, zinc and lead mined exceed gold in their total value, copper in 1917 reaching the value of $17,784,494. Coal, of which British Columbia has enormous de¬ posits, shows a steady increase and the annual product now exceeds 2,000,000 tons. In 1917 2,084,093 tons of a value of $7,294,325 were mined. The magnificent timber resources of the province have given employment to an in¬ creasing number of men and the yield of the fisheries has grown from $104,697 in 1876 to $14,637,346 in 1917. In 1871, when British Columbia became a province in the Dominion, the population was 36,247, of whom 25,661 were Indians. In 1881 it had increased to 49,548, in 1891 to 98,173, in 1901 to 178,657, in 1911 to

392,480.

The Yukon territory might perhaps be classed with British Columbia. In 1896 the gold discoveries were made there which caused the famous rush in 1897. The census of 1901 gave the Yukon a population of 24,357, exclusive of Indians and half-breeds. Natives of the United States numbered 6,707, of Ontario 1,940, of Quebec 1,349, of Norway and Sweden 1,265, of England 1,153 and of Germany 746; not specified 6,573. Pop. (1911) was only 8,512.

The part of Ontario included in the Cana¬ dian West has interests of its own in mines and fertile land, but its progress in settlement has

been largely bound up with that, of the prairie region to the west. The mines in the Lake of the Woods district caused the establishment of the town of Rat Portage, now Kenora, the continued prosperity of which, however, came to depend to a great extent on the lumber in¬ dustry for the supply of the demand in Mani¬ toba and the territories. Port Arthur and Fort William on Thunder Bay, Lake Superior, are at the head of lake navigation on the Canadian route, and the summer traffic in goods for the West and in grain and flour from the West is there transshipped, the towns possessing im¬ mense storage and shipping grain elevators. These towns are growing rapidly, particularly since 1901, and their growth will keep pace with the development of the West. The completion of the Canadian Northern Railway between Port Arthur and the wheat fields, running through the southern part of the province, has not only assisted Port Arthur but has opened up the valley of the Rainy River and new centres for the lumber industry. In 1911 Rat Portage, now Kenora, had a population of 6,158 people, Fort William 16,499 and Port Arthur 11,220. Since that date the population, especially of the two last mentioned towns, has greatly increased and new towns have sprung up along the line of the Canadian Northern. .

The third period in the settlement of Mani¬ toba and the Territories began in 1901. Condi¬ tions to which reference has previously been made had developed and the time was ripe. In the United States a greater movement of land-seekers was taking place than at any previous time, with the exception perhaps of the early eighties, and good available lands for pioneers were fast becoming occupied. This movement was not directly from the more thickly settled Eastern and Middle States to new lands, but from these States to the Northwestern and Southwestern States. The newcomers were willing to buy lands under cultivation at prices which were comparatively high to the men who had broken them. It was the men who had entered the Northwestern States as pioneers 10, 15 or 20 years before who were offered tempting prices, and in thousands decided to become pioneers again. This movement of population was directed by the railway com¬ panies and by private land companies, the managers of which had their connections in all parts and thoroughly understood the business of land settlement. The new feature in the history of immigration into the Canadian West in 1901 was the advent of these United States land companies. As soon as prospects seemed to indicate a good crop in

that year, their agents appeared in considerable numbers and pur¬ chased large tracts. This continued in 1902. To show the magnitude of the operations it may be mentioned that one of these companies purchased in one block about 1,100,000 acres. The lands thus secured could be offered to land-seekers in the United States at from $4 to $10 per acre. In certain localities, or in the case of improved farms, the price was higher. The man who could sell his farm in the Da¬ kotas, Minnesota or Iowa, for example, at from $30 to $75, or even $100 per acre was offered land in Canada, which returns showed was capable of producing more bushels to the acre, for a price which would not only pay the ex¬ penses of the transfer but leave him with a

bank account. In most cases the large blocks of land purchased were sold in smaller lots to middlemen and the number of agents thereby largely increased and distributed. Enterprising Canadian land companies also existed and greatly increased in numbers. By 1903 the first phase of this new development, that is, the purchase of large blocks of land by speculating settlement companies, had almost come to an end. The policy of the government is opposed to selling except to the actual settler and the Canadian Pacific Railway Company, the Hud¬ son's Bay Company and the Canadian North¬ west Land Company, the other largest owners of land, were likewise unfavorable to the too extensive operations of speculative middlemen. It was to the interest of the railway company, particularly, to secure the actual settler as soon as possible and it was believed that prices could most effectually be kept at an attractive level by retaining the retail selling of the lands in the hands of the company. Large sales were, however, made by these Canadian companies in blocks as well as in farms, and it is of interest to note how great an increase in land values accrued as shown by the report of the land sales department of the Canadian Pacific Rail¬ way Company for the years 1901 and 1910. During the first year, a total of 831,732 acres was sold for $2,646,237, the average return being $3.18 per acre. In 1910, the sales of agri¬ cultural land aggregated 975,030 acres, for $14,468,564.33, being an average of $14.84 per acre. Included in this area were 145,421 acres

of irrigated land, which brought $26.59 per acre, so that the average price of the balance was $12.78 per acre. The Canadian Northern Railway Company has also an extensive land grant, from which there were sold in 1910 246,966 acres at an average price of $10.36 per acre, compared with 116,662 acres for $1,091,- 722.37, an average of $9.36 per acre, in 1909.

Among the factors at work during this period, the immigration department of the gov¬ ernment must be given a chief place. The

States. To this fund the Dominion govern¬ ment, the government of the province of Mani¬ toba and the city of Winnipeg gave contribu¬ tions. The effect of the increased immigration from the United States was not alone in addi¬ tions to population from that source, but the fact that United States farmers were seeking Canadian lands was an excellent advertisement in Europe. The most telling advertisements of all, however, were the splendid crops of 1901 and 1902. The government returns of wheat, oats and barley for Manitoba and the Terri¬ tories, now the provinces of Alberta and Sas¬ katchewan, for the years 1900, 1901, 1902, 1910, 1915, 1916 and 1917 are as follows:

Year

WHEAT

Acres

Bushels

Yield per acre

1900 .

2,495,474

23,456,985

9.48

1901 .

2,516,532

62,820,282

24.90

1902 .

2,605, 698

67,034,117

25.16

1910 .

7,867,432

110, 166,704

12.73

1915 .

13,867,715

360, 187,000

25.97

1916 .

14,362,809

242,314,000

16.87

1917 .

13,619,410

211,953,100

15.56

1900 .

OATS

833,410

16,654,322

19.98

1901 .

919,390

38,909,654

42.32

1902 .

1,035,427

45,139,455

43.59

1910 .

3,880, 606

106,163,510

27.35

1915 .

6,480,681

279,692,000

43.77

1916 .

7,359,487

313,916,000

42.52

1917 .

8,559,500

254,877,200

29.78

1900 .

BARLEY

152,569

3,141,357

20.58

1901 .

215,711

7,331,255

33.98

1902 .

366,204

10,549,536

34.71

1910 .

667,171

12,057,806

18.07

1915 .

1,171,082

36,003,000

30.74

1916 .

1,391,296

33,419,000

24.02

1917 .

1 , 850 , 000

40,384,100

21.83

- The area under wheat, oats and barley in what are now the provinces of Manitoba, Sas¬ katchewan and Alberta was in 1900, 3,481,453 acres, and in 1917, 24,028,910 acres. The total production was, respectively, 43,252,664 bushels and 507,214,400 bushels.

For the year 1917, the field crops of the Do¬ minion were as follows:

Crops

Fall wheat .

Spring wheat .

Oats .

Barley .

Rye . .

Peas .

Beans .

Buckwheat .

Mixed grains .

Flax .

Corn for husking .

Potatoes . . , .

Turnips, etc .

Hay and clover Fodder corn… Sugar beets … Alfalfa .

Totals… .

Bushels

Total yield

Area (acres)

per acre

(bushels)

Total value

725,300

21.50

15,533,450

$32,336,900

14,030,550

15.50

218,209,400

420,701,700

13,313,400

30.25

403 , 009 , 800

277,065,300

2,392,200

23.00

55,057,750

59,654,400

211,880

18.25

3,857,200

6,267,200

198,881

15.25

3,026,340

10,724,100

92,457

13.75

1,274,000

9,493,400

395,977

18.00

7,149,400

10,443,400

497,236

32.50

16,157,080

18,801,750

919,500

6.50

5,934,900

15,737,000

234,339

33.00

7,762,700

14,307,200

656,958

121.50

79,892,000

80,804,400

218,233

290.75

63,451, 000

29,253,000

Tons

Tons

8,225,034

1.66

13,684,700

141,376,700

366,518

7.34

2,690,370

13,834,900

14,000

8.40

117,600

793,800

109,825

2.39

262,400

3,041,300

42,602,288

$1,144,636,450

number of agents in Europe and the United States had been increased and more money than ever before was spent in advertising Canada. In January 1904 the United States and Canadian land companies interested in western Canada and leading business men in Winnipeg

and else¬ where organized what is called the Western Canada Immigration Association and raised a fund of $50,000 for a two years' campaign of education through the press of the United

The area in field crops in the Dominion in¬ creased from 19,763,740 acres in 1900 to 30,556,- 168 acres in 1910, and to 42,602,288 acres in 1917; and the total values of field crops from $194,953,420 in 1900 to $384,513,795 in 1910, and $1,144,636,450 in 1917. According to official es¬ timates for 1916 the average value of farm lands in Canada was $40.95 per acre ; the aver¬ age wage of farm help (including board) was $43.23 per month for males and $22.46 for fe-

males, and per annum it was, respectively, $396.88 and $227.86. The total value of farm animals in 1916 was $903,685,700 as against $749,640,000 in the year previous.

Immigration. — The total immigration into Canada during the seven fiscal years, 1911-17 inclusive, was 1,620,312, of which 614,520 came from the British Isles; 659,705 from the United States and 346,087 from other countries. Of these 890,068 were destined to the eastern provinces and 730,244 to the west.

The growth of railways in Canada is indi¬

cated by the following table :

Year Mileage Year

1850 . 66 1900

1860 . 2,065 1910

1870 . 2,617 1915

1880 . 7,194 1916

1890 . 13,151

Mileage

17,657

24,731

35,582

37,434

Of the 24,731 miles of railway in Canada in 1910, 9,473 or 38.3 per cent was in western provinces and in the year 1916 of the total 37,434 miles, 17,185 or 45.9 per cent was in the west.

W. Sanford Evans,

Chairman Georgian Bay Canal Commission, Ottawa.

12. THE CONSTITUTION. In the Ca¬ nadian draft of the bill, Canada was styled a ˆKingdom.® For that title ˆDominion® was substituted at the instance of Lord Derby, who thought that the title <(Kingdom® might be offensive to the Americans. Sir John Mac¬ donald, as a strong monarchist, deplored the change, feeling that had the title <(Kingdom® been adopted the Australian colonies would have been applying to be placed in the same rank as the kingdom of Canada. As it is, the Australian colonies have adopted the title ˆCommonwealth,® suggestive rather of progress in democratic sentiment.

The term Confederation has been applied to two forms of polity materially different from each other. One is confederation proper; the other is nationality with a Federal structure. The instance of confederation proper in ancient history is the Achaean League; in modern his¬ tory, instances are the original Swiss Bund, the United

Netherlands, and the Union of the American colonies during the Revolutionary War. Instances of a nation with a Federal structure are the United States of America under their present constitution and the present Swiss Bund. A confederation proper is formed for a special object, usually that of common defense. The several states entering into it do not resign their sovereign power. Nor does the Federal council exercise, like a national government, authority over the indi¬ vidual citizen, but only over the States. Its legislative power is confined to the fulfilment of the special object of the federation. Nor has it any power of taxation, but only a power of requisition. In the case of a federation proper, the Federal government is an organ of the states governments collectively. In the case of a nation with a Federal structure, the states are severally organs of the Federal gov¬ ernment. The Canadian confederation belongs, as its name Dominion of Canada imports, to the class of nations with a Federal structure. So does the newly formed Commonwealth of Australia.

The Canadian constitution is embodied in the act of the British Parliament called the British North America Act, which can be amended only by the power by which it was passed. In com¬ mon with the other colonies, self-governed as they are styled, Canada remains in the allegiance of the British Crown, retains the constitutional forms and nomenclature of the monarchy, and is, to a certain, though of late years diminish¬ ing, extent, under the actual control of the Imperial government. The legislation of the Imperial Parliament is, with certain exceptions, binding upon Canada. To the King's govern¬ ment under the control of the Imperial Parlia¬ ment belong the treaty-making power — with the exception of commercial treaties — and the power of peace and war. By the Imperial gov¬ ernment the governor-general, the legal head of the Dominion is appointed. The supreme juris¬ diction is still the British Privy Council, and in it is vested the interpretation of the Cana¬ dian constitution. The fountain of honor is Imperial. The territory of the Dominion is part of the domain of the empire, at the disposal of the Imperial government, which has exercised its power in boundary cases. The tendency, however, since con¬ federation, has been constantly toward prac¬ tical independence. The veto power has been very sparingly exercised, and only in special cases, as in that of copyright where the colonial act conflicted with the Imperial law. Appeal from the colonial courts to the Privy Council has been restricted. Military occupation has ceased. The military administration has passed, not without friction, into the hands of the Canadian Minister of Militia, and the Chief of the General Staff, as the principal military officer is called, is

his subordinate. In com¬ mercial relations Canada is antonomous. The dispensation of titles and decorations, to which great influence is attached, still remains Imperial, though even in this the wishes of the Canadian government probably make themselves felt.

The Dominion of Canada and the other self-governing dependencies of the British Crown faithfully reproduce the forms of monarchy. The governor-general of Canada, as the repre¬ sentative of the British sovereign, has the pre¬ rogative of calling and dissolving Parliament, of appointing the members of the Privy Council, of nominating the Senate. Parliament is opened by him with a <(speech from the throne.® But, like the monarch whom he represents, he reigns but does not govern. Very rare have been the instances since the confederation, and those not cases of general policy, in which he has exer¬ cised his personal power. Only of the pageantry of his office and of his assumption of state has there since confederation been an increase, favored by those who desire to foster the monarchical sentiment. The lieutenant-govern¬ ors of provinces, nominally appointed by him, are really appointed by his ministers, and almost invariably from the ranks of their own party. When one of them was dismissed it was ap¬ parently against the wish of the governor-gen¬ eral and manifestly on party grounds ; yet on reference to the home government the gov¬ ernor-general was directed to conform to the opinion of his constitutional advisers.

The legislative power is divided between the

central legislature and those of the provinces, the subjects of legislation assigned to each be¬ ing set forth in the Act. The exclusive leg¬ islative authority of the Parliament of Canada extends to (1) the public debt and property;

(2) the regulation of trade and commerce;

(3) the raising of money by any mode or sys¬ tem of taxation; (4) the borrowing of money on the public credit; (5) postal service; (6) the

census and statistics; (7) militia, military and naval service and defense ; (8) the fixing of and providing for the salaries and allowances of civil and other officers of the government of Canada; (9) beacons, buoys, lighthouses, and Sable Island; (10) navigation and shipping; (11) quarantine and the establishment and maintenance of marine hospitals; (12) the coast and inlet fisheries; (13) ferries between a province and any British or foreign country, or between two provinces; (14) currency and coin¬ age; (15) banking, incorporation of banks and the issue of paper money; (16) savings banks; (17) weights and measures; (18) bills of ex¬ change and promissory notes; (19) interest; (20) legal tender; (21) bankruptcy and insol¬ vency; (22) patents of invention and discovery; (23) copyright; (24) Indians and lands re¬ served for the Indians; (25) naturalization and aliens; (26) marriage and divorce; (27) the criminal law, except the constitution of courts of criminal jurisdiction, but including the procedure in criminal matters; (28) the establishment, maintenance and management of penitentiaries.

To the provincial legislatures are assigned

(I) the amendment from time to time, not¬

withstanding anything in the act, of the con¬ stitution of the province, except as re¬ gards the office of the lieutenant-governor; (2) direct taxation within the province in order to the raising of a revenue for provincial pur¬ poses ; (3) the borrowing of money on the

sole credit of the province; (4) the establish¬ ment and tenure of provincial offices, and the appointment and payment of provincial officers; (5) the management and sale of the public lands belonging to the province, and of the tim¬ ber and wood thereon; (6) the establishment, maintenance and management of public and reformatory prisons in and for the province; (7) the establishment, maintenance and man¬ agement of hospitals, asylums, charities and eleemosynary institutions in and for the prov¬ inces, other than marine hospitals; (8) munic¬ ipal institutions in the province; (9) shop, saloon, tavern, auctioneer and other licenses, in order to the raising of a revenue for provincial, local or municipal purposes; (10) local works and undertakings other than such as are of the following classes: (a) Lines of steam or other ships, railways, canals, telegraphs and other works and undertakings connecting the prov¬ ince with any other or others of the provinces, or extending beyond the limits of the province; (b) lines of steamships between the province and any British or foreign country; (c) such works as, although wholly situate within the province, are before or after their execution declared by the

Parliament of Canada to be for the general advantage of Canada or for the advantage of two or more of the provinces;

(II) the incorporation of companies with provincial objects; (12) the solemnization of

marriage in the province; (13) property and civil rights in the province; (14) the adminis¬ tration of justice in the province, including the constitution, maintenance, organization of pro¬ vincial courts, both of civil and of criminal jurisdiction, and including procedure in civil matters in those courts; (15) the imposition of punishment by fine, penalty or imprison¬ ment for enforcing any law of the province made in relation to any matter coming within any of the classes of subjects enumerated in this section; (16) generally all matters of a merely local or private nature in the province.

Powers not specifically given to the prov¬ inces are reserved to the Dominion, whereas under the American constitution powers not specifically given to the Federal government are reserved to the States or to the people.

The judges are appointed by the Federal government and, as in Great Britain, for life or during good behavior, in contrast with the prac¬ tice of tne United States, where judges are elected for a term of years. They can be re¬ moved only by the governor-general on an ad¬ dress from both houses of Parliament.

The Canadian Parliament consists, like the British, of two houses. The House of Com¬ mons, in which supreme legislative power practically resides, is elected almost by man¬ hood suffrage; but by the Military Voters Act of 1917 the wives, widows, mothers, sisters or daughters of men who had served in the mili¬ tary or naval forces of Canada or Great Britain during the Great War were given the right of voting in the election of that year. The North America Act apportions representation to the several provinces on the principles of popula¬ tion and provides for decennial readjustment to meet changes in the balance of population. Mem¬ bers of both houses are paid; in Great Britain only members of the House of Commons. The senators are appointed nominally by the Crown, really by the head of the party in power, and almost invariably on party grounds. Senator-ships are for life, not hereditary like seats in the House of Lords, so that the political analogy is imperfect. On the other hand, party which ap¬ points the Canadian Senate, controls it. It might otherwise block

legislation and there would be no remedial force, while the British House of Lords, it is well understood, must give way to the will of the nation when persistently de¬ clared. As it is, when the outgoing party hap¬ pens to retain a majority in the Senate, there is danger of a block. The House of Commons is elected for a term of five years, subject, how¬ ever, to the prerogative of dissolution. An amendment to the British North America Act was, owing to war conditions, passed in 1916 specially extending for one year the term of the Parliament then expiring.

The provincial legislatures are miniatures of those of the Dominion. The forms like those of the Dominion Parliament are monarchical, the lieutenant-governor formally nominating the ministers, as does the governor-general those of the Dominion. The practical working is popu¬ lar, elective and partisan. The party divisions run through the provinces severally as well as through the Dominion at large. ‘Quebec and Nova Scotia, like the Dominion Parliament, have each two chambers ; the rest have only one. The Federal government has a veto on provincial legislation.

The treatment of the Northwest territories, as provinces, presents a certain analogy to that of the Territories of the United States, execu¬ tive and legislative powers being given to a lieutenant-governor with an elective council subject to instructions by order under Federal council or by the Canadian Secretary of State.

The Parliament is by law bilingual ; the French language as well as the English being recognized, though practically English prevails. The civil law, in which the Coutume de Paris and the Code Napoleon are blended with the common and statutory law of Great Britain, remains the law of Quebec.

In its generally democratic character the Canadian constitution approaches to that of the American republic, but in their structure they materially differ. The American constitution, in accordance with the principle laid down by Montesquieu (q.v.), separates the executive

from the legislative. The members of the President's council, miscalled a cabinet, have not seats in the legislature, nor is their contin¬ uance in office dependent on its support. They are the nominees of the President alone. Under the Canadian constitution, as under the British, the members of the Cabinet have seats in the Parliament, on the confidence of which their tenure of office depends, and in which they in¬ itiate and control legislation. The head of the American republic is elected for a term certain. The terms of members and the times of election are fixed by law, whereas the Canadian Parlia¬ ment is called in the name of the Crown by the Prime Minister, the head of the party in power, who wields in the interest of his party the pre¬ rogative of summoning and of dissolution. The members of the Canadian Senate are chosen by the head of the party in power, whereas the American Senate, formerly elected by the leg¬ islatures of the several States, are now (sinˆ,e 1913) elected by popular vote. Thus the Cana¬ dian constitution lends itself more aptly to the working of the party system of government, which, with all its accessories, political and moral, has prevailed, though the general influ¬ ence of party cannot be stronger than it is in the United States.

In Great Britain the Cabinet, in which the real power of government resides, is a growth of political party unrecognized by law, while the Privy Council, recognized by law, has be¬ come honorary. In Canada the Privy Council is the Cabinet, at the same time conferring the honorary rank, but the relation to the Crown, the relation to Parliament and the working of the system in both cases are the same.

The British North America Act does not, like the American constitution, prohibit the es¬ tablishment of a particular religion by the state. It leaves untouched to the Roman Catholic priesthood of Quebec the power of • levying tithes on the people of their own com¬ munion. In the section respecting education it perpetuates the privilege of denominational schools. Since confederation the government of Ontario has practically aided a denomi¬ national university. But since the secularization of the clergy reserves and the opening of the University of Toronto, non-interference of the state with religion may be said to have been established as a general principle and may be regarded as practicallv part of the constitution. See the articles in this series: Confederation;

Local Government; Imperial Federation; Under French Rule; Under British Rule.

Goldwin Smith.

13. LOCAL GOVERNMENT. Under the British North America Act of 1867, which is virtually the constitution of the Dominion ot Canada, the organization of local government is placed within the jurisdiction of the several provinces. There is consequently considerable variety in the structure of rural and urban gov¬ ernment in the different parts of the Dominion. Certain general features are, however, to be observed. The fundamental principle of organ¬ ization is that of local autonomy by the means of representative elected bodies. The provinces are divided into counties, subdivided into town¬ ships, in which again school sections are formed. The county and the township are not every¬ where found side by side. Indeed, the provinces of Canada present the same contrast between the predominance of the township and the county as is found in the United States. In Nova Scotia and New Brunswick the county is the unit of local government; in Ontario and Quebec both township and county are found ; throughout the West the township system pre¬ vails, the county being only a judicial area. In addition to these rural areas of government, there are found incorporated villages, towns and cities. In Ontario and Manitoba incorpora¬ tion takes place by virtue of a general statute ; elsewhere it is done by special legislation. The details of local government may best be under¬ stood by first passing in review the organization and powers of rural governing bodies in the different provinces, and treating separately the question of town and city government and municipal franchises. Ontario, the most pop¬ ulous of the provinces, contains 38 county cor¬ porations and 423 townships. Both of these divisions vary greatly in size and population. The largest county (Grey) contains 1,092,027 acres, the smallest (Brant) only 213,905 acres. Thirty-two townships contain less than 20,000 acres, 11 of them more than 80,000 acres each. There are in addition the districts of Muskoka, Parry Sound, Nipissing, Manitoulin, Algoma, Thunder Bay, Kenova, Sudbury, Temiskaming and Rainy River, not yet organized as counties, but in the settled portions of which over 200 townships have been incorporated. The affairs of the townships are managed by a reeve and from one to four deputy reeves, according to population, elected yearly. For the county there is a county council, composed of the reeves and deputy reeves of the towns, not being separated towns, and of the villages and townships in the county. The franchise for all local elections is extremely wide. It includes every person of 21 years and upward, rated for real property to an extent varying from $100 in the townships to $400 in the cities ; those assessed for an income of $400, and farmers' sons of full age living at home. The township council is chiefly con¬ cerned with the maintenance, of roads and

bridges, the levy and collection of school taxes and the collection of the county tax. Assessors appointed annually by the township council make a valuation of real and personal property. The other principal officers of the township are the treasurer and the township clerk. The latter, though legally holding office at the pleasure of the council, enjoys a practically permanent ten¬ ure. He prepares the collector's rolls, statute

labor lists, voters' lists, etc., registers births, deaths and marriages and performs many other duties assigned to him by separate statutes. The county council meets at the "county town,8 under the presidency of a warden whom it elects annu¬ ally. It acts largely through committees, both standing and special. It appoints a treasurer, a county clerk, an engineer, a public school in¬ spector and two auditors. The county council provides accommodation for the courts of justice, maintains county buildings, roads and bridges, houses of refuge, *etc.* The county rate is collected with the local taxation, but the county council has power to "equalize® the valuations of the local assessors if it thinks necessary. For organization of school districts, and control of schools in Ontario and elsewhere, see article on Public Education in Canada. Local government in the province of Quebec is organized under a municipal code enacted by the legislature (24 Dec. 1870), and revised in 1888. The larger towns and the cities are in¬ corporated under special charters granted by the legislature. Of the counties some are divided into parishes, others into townships. For each county there is a council composed of all the mayors of the included municipalities. At its head is a warden (prefet) whom it annu¬ ally elects. The county council meets in regular session four times a year; its* duties consist chiefly in the construction and maintenance of roads, bridges, etc., the locating of the Circuit Court, provision against forest fires, *etc.* The subordinate local councils (parish, township, united township, village and town) consist of seven councillors elected annually throughout the province, each council having a mayor as its head. The powers of these minor councils extend to highways, bridges, ferries, regula¬ tion of public health, *etc.* For all local pur¬ poses direct taxes are levied on

all real estate, except the property of the government and that of religious and educational institutions. (For organization, etc., of schools, consult article on Public Education). The Seigniorial tenure of land, which once carried with it certain powers of local administration, is also treated in a sep¬ arate article. The local government of New Brunswick is regulated by a consolidated statute of 1898. Each county has an elected council, meeting twice a year. The larger cities have a representative in the county council as well as their own local council. The officers of the parishes are appointed by the county council. In Nova Scotia there are elective county coun¬ cils, choosing its own wardens. Their by-laws are subject to the approval of the legislature. The counties of Prince Edward Island are electoral and judicial areas, but owing to the small size of the province the legislature itself acts as the organ of local government; villages and towns are, however, incorporated with elective councils. In Manitoba, Alberta, Sas¬ katchewan and British Columbia local govern¬ ment centres in the township, administered by a council of four to six members, with a reeve at its head. The unorganized territories (Yukon, Mackenzie, Keewatin and Ungava) are controlled by the Dominion government, and have no representative institutions. The govern¬ ment in Canadian cities is regulated by statutes of the provincial legislatures. This fact permits of frequent change, and a continuous develop¬ ment of organization to meet the circumstances

of the hour. In Toronto, for example, and in many other cities, it is the practice to suggest to the Parliament from year to year such altera¬ tions of the city charter as seem advisable. In the majority of the Canadian provinces, towns and cities are incorporated by special legislation; in Ontario and Manitoba, by virtue of general statutes on proclamation by the lieutenant-gov¬ ernor. Even in these provinces, however, special acts of incorporation are usually passed in order to provide borrowing powers. The typi¬ cal form of Canadian urban government con¬ sists of a single chamber of aldermen (varying in number from 9 to 26) with a mayor. Both the mayor and council are generally elected for one year. In Montreal and Quebec the mayor is elected for two years, and in the latter city is chosen from among the aldermen. In Montreal, Quebec, Winnipeg, Brandon and Vancouver the aldermen are elected for two years. A board of control (the mayor with four aldermen), whose function it is to prepare the annual esti¬ mates, has been adopted for the cities of Ontario having a population of more than 45,000. In Montreal the affairs of the city are administered by the mayor and four controllers, specially elected for four years, the council of aldermen acting in a legislative and

supervising capacity. Municipal offices are, in most cases, filled by appointments made by the mayor or the council. In the cities of Ontario and British Columbia, in Winnipeg, Charlottetown and Saint John, police appointments are made by commissioners independent of the civic government. The liquor licenses are almost everywhere under the control of the provincial authorities. The municipal suffrage in Canada is more restricted than the rural or parliamentary. Throughout Ontario, in Montreal, Quebec, Calgary and the four largest cities of British Columbia a special qualification of real property or income is de¬ manded. The chief sources of civic revenue are found in taxes on real property, betterment taxes, and, in some cases, license taxes and per¬ centage receipts from city franchises. Munici¬ pal indebtedness, incurred mainly for streets, sewers, waterworks and education, has much increased of late years, and in Montreal, Toronto, the cities of Quebec and the western provinces it grew rapidly from 1910 to 1917 concurrently with an amazing growth in assess¬ ment values. The net debt of Montreal at the beginning of 1917 was $97,790,779, of Toronto about $44,000,000. Except for waterworks there is but little municipal management of pub¬ lic works. Winnipeg, New Westminster, Three Rivers and a number of minor towns in On¬ tario own and operate electric plants; Calgary and Brandon operate their own street railways. Street railway franchises are granted for periods varying from 15 to 30 years; in Toronto, Montreal, “Hamilton, Ottawa and Halifax the city receives a percentage of gross receipts.

Bibliography. — Meredith and Wilkinson, (Canadian Municipal Manual* (Ontario 1917) ; University of Toronto Studies, Vol. II, Nos. 1-2; Report of Ontario Assessment Commission (1901-02) ; Bourinot, (Local Government in Canada* ; Johns Hopkins University Studies in History; Municipal Undertakings; Canada Year-Book (annual; official).

Stephen Leacock,

Professor of Economics and Political Science, M cGill U niversity.

14. IMPERIAL FEDERATION. Im¬ perial federation is the name given to the vari¬ ous projects for revising the relations between Great Britain and her colonies, so as to give to the latter a share in the government of the empire. The growth of the colonies, and the increasing burden of national defense, naturally suggest that the colonies should contribute to the Imperial revenue ; on the other hand, such a contribution, unless accompanied by a voice in the councils of the mother country, would con¬ stitute that ˆtaxation without representation® so abhorrent to Anglo-Saxon ideas. Such was the situation during the great controversy of the 18th century between Great Britain and her North American dependencies, and such is again the situation at the present day. Even in the 18th century various proposals were made for solving the colonial difficulty by admitting American representatives to the British Parlia¬ ment. Governor Pownall (see Pownall, Thomas), Edmund Burke (q.v.), and Adam Smith (q.v.) made suggestions of this sort. But the difficulty of communication rendered any such federation impracticable. During the middle period of the 19th century it was cur¬ rently believed that the manifest destiny of the colonies was independence. With the passing of that idea has arisen the demand for a closer bond of union. The Imperial federation move¬ ment originated in the early 70s, an informal conference for discussing the subject being held in 1871. In 1884 the Imperial Federation League was founded, its first chairman being the Right Hon. W. E. Forster (q.v.). Lord Rosebery (q.v.), the Right Hon. Ed. Stanhope (sometime Secretary of State for the colonies), and Sir Frederick Young (q.v.) (whose work, (Imperial Federation, > had appeared in 1876) were interested in the movement from its incep¬ tion. A significant event was seen in the Lon¬ don colonies conferences of 1887, to which rep¬ resentatives of both the self-governing and the Crown colonies were summoned, and at which the subjects of Imperial defense and trade were discussed. In 1892 a committee of the Imperial Federation League presented a practical scheme of federation. It recommended the institution of a council of the empire, to which delegates should be summoned from the self-governing colonies, the Crown colonies and India. The function of the council was to consist in the regulation of Imperial defense. It was recog¬ nized, however, even at this stage of the move¬ ment, that there was no sufficient unanimity among the members of the league in reference to the details of the plan to be adopted to enable them to work effectively toward a common end. The league, whose work was declared to be only preliminary and preparatory, was dissolved in 1893 and its place was taken by a number of organizations having each a more definite pur¬ pose. Of these the United Empire Trade League became the advocate of the commercial

union of the empire by means of protective duties. The Imperial Federation (Defense) Committee urges combined action for defensive purposes, the establishment of a navy supported by joint contributions being its immediate ob¬ ject. Most important, perhaps, is the British Empire League, established in 1894 and ex¬ tended to the Dominion of Canada. The pro¬ gram of the league aims at the permanent unity of the empire, the promotion of trade

and inter-communication, the holding of peri¬ odic conferences and cooperation in national defense. In Canada, indeed, the movement had already made considerable progress. The Im¬ perial Federation League in Canada had been formed at Montreal in 1885, with branches sub¬ sequently established at various places in the Dominion. Under the auspices of the organiz¬ ing committee of the league a distinguished Canadian, George Parkin, delivered addresses throughout Canada, and in 1889 was sent, on behalf of the parent league, on a tour of the Australasian colonies. In 1894, at the instiga¬ tion of the Canadian government, a conference was held at Ottawa to discuss intercolonial trade and communication. The Imperial gov¬ ernment, Canada, Cape Colony and the Austral¬ asian colonies were represented. Resolutions were adopted in favor of reciprocal preferen¬ tial duties among the colonies. A still more important conference was held in London in 1897 on the occasion of the jubilee celebration of that year. At this meeting the premiers of Canada, Newfoundland, New South Wales, Victoria, Queensland, South Australia, West Australia, Tasmania, New Zealand, Cape Col¬ ony and Natal discussed with the Right Hon. Joseph Chamberlain (q.v.), Secretary of State for the colonies, both the commercial and polit¬ ical relations qf the mother country with the colonies. In reference to the former, a resolu¬ tion was unanimously adopted favoring the denunciation at the earliest convenient time of any treaties which now hamper the commer¬ cial relations between Great Britain and her colonies.® The premiers also undertook to con¬ fer with their colleagues to see whether a pref¬ erence could advantageously be given by the colonies to the products of the United King¬ dom. In reference to political relations, the majority of the premiers endorsed the follow¬ ing resolutions: (1) ((That the present political relations between the United Kingdom and the self-governing colonies are generally satisfac¬ tory under the existing condition of things.® (2) ((That it is desirable, whenever and wher¬ ever practicable, to group together under a fed¬ eral union those colonies which are geograph¬ ically united.® (3) (<That it would be desirable to hold periodical conferences of representatives of the colonies and Great Britain for the

discus¬ sion of matters of common interest.® From the first of these resolutions Seddon of New Zea¬ land and Sir E. N. Braddon of Tasmania dis¬ sented, on the ground that the time had already come for a reconstruction of political relations. The Canadian government in the next year (1898) extended to Great Britain and to such British colonies as should reciprocate a tariff preference of 25 per cent, increased in 1900 to 33 1/3 per cent. In the summer of 1902, on the occasion of the coronation of King Edward VII, a further colonial conference was held be¬ tween Secretary Chamberlain and the premiers of the self-governing colonies. The meetings of the conference, of which there were 10 in all, were also attended by several ministers of Aus¬ tralia and Canada then present in London, and by the members of the British Cabinet whose departments were concerned in the discussion. Chamberlain submitted a paper showing the disproportionate share of the burden of Imperial defense at present borne by the United King¬ dom. ((If you are prepared at any time,® he

said, “to take any -share, any proportionate share, in the burdens of the empire, we are prepared to meet you with any proposal for giving to you a corresponding voice in the policy of the empire,* No definite conclusion was reached for the alteration of present polit¬ ical relations beyond the following resolution : “That it would be to the advantage of the empire if conferences were held, as far as prac¬ tical, at intervals not exceeding four years, at which questions of common interest affecting the relations of the mother country and His Majesty’s dominions over the seas could be discussed and considered as between the Secre¬ tary of State for the colonies and the prime ministers of the self-governing colonies. The Secretary of State for the colonies is requested to arrange for such conferences after communi¬ cation with the prime ministers of the respective colonies. In case of any emergency arising upon which a special conference may have been deemed necessary, the next ordinary conference to be held not sooner than three years there¬ after.* On behalf of the Commonwealth of Australia £200,000 a year was offered toward the cost of the

Australian Naval Squadron and naval reserve, from New Zealand £40,000 for the same purposes, from Cape Colony £50,000, and from Natal £35,000 for the Imperial navy generally, and from Newfoundland £3,000 for maintaining a branch of the Royal naval re¬ serve. The grants were subject to ratification by the colonial legislatures. Resolutions of a general character in favor of preferential trade were also adopted by the congress. The Australian contribution met with sharp criticism from the Melbourne Age as involving taxation without representation. In February 1903 the British Empire League in Canada passed a reso¬ lution against the abstention of Canada from naval contributions, and declared that ((it would be proper for her … to contribute a fair and reasonable share toward the annual cost of the navy of the United Kingdom.*

During the period that elapsed between the conference of 1902 and the outbreak of the European War the movement of opinion in re¬ gard to Imperial organization was very notice¬ able. It was especially stimulated by (a) the continued discussions of the question of tariff reform in England, which involved the possi¬ bility of preferential and reciprocal duties in favor of the colonies, (b) the increasing im¬ minence of war with Germany which would necessitate a common effort of Imperial de¬ fense and (c) the periodic assemblage of the conferences which naturally called forth public discussion throughout the empire. Four dis¬ tinct currents of opinion became more and more clearly defined in the ebb and flow of debate. One of these favored the retention, indefinitely, of the status quo. Another opinion of a kindred nature, which gained ground very rapidly with the progress of the century, favored the reorganization of the empire, not in the form of a centralized Federal state, but as a group of separate units in permanent alliance, no single body holding the sovereign power. This scheme is best set forth in Mr. Richard Jebb's (Britannic Alliance) (1913). It may be said to represent the views during the period in question of Sir Wilfrid Laurier (consult Imp. Conference Report 1911, esp. pp. 122, 123) and of the South African party led by General

Botha in South Africa, and of the Labor and Socialist parties throughout the empire. A third current of opinion revived the idea of Imperial federation in the sense of a central government with supreme power over defense and taxation. This view was supported by such influential leaders as the late Lord Grey (d. 1917), Lord Milner, Sir J. Ward, Premier of New Zealand, the late Sir Starr Jameson (the Dr. Jameson of the "raid*) and others. It led to the formation throughout the empire of a powerful chain of affiliated associations known as the

Round Table Group, organized originally for impartial study but leaning heavily toward centralization. The leading spirit of this move¬ ment was Mr. Lionel Curtis, who had been one of those instrumental in forming the Union of South Africa (1910) and who spent some years in visiting all self-governing parts of the empire to organize the Round Table Groups. On the basis of the work of the groups Mr. Curtis published in 1916 a volume called (The Problem of the Commonwealth, y a brilliant presentation of the case for centralization. A fourth and last current of opinion, necessarily somewhat veiled, is that favoring the breaking up of the empire into independent states. This is pre¬ sumably the goal of Mr. Henri Bourassa and the party of French Canadian Nationalists who follow his lead. (Consult Bourassa, (Que Devons-Nous a l'Angleterre) (1915) ; (National Problems) (1916), etc.). Independence is gen¬ erally held to be the aim, proximate or distant, of the Nationalist party of South Africa headed by (General) Judge Hertzog. A proper appre¬ ciation of these divergent views enables one to understand the full significance of the great Imperial conferences of 1907 and 1911 and the subsidiary conferences of 1909 (consult Re¬ ports of Conferences, also Jebb, R., (The Imperial Conference> 1911). The conferences of 1907 and 1911 showed a strongly marked divergence between the partisans of nationalism and those of federalism. The adoption of the name Imperial Conference in place of Colonial (1907) marks the opening of a new era. The proposal of a central body to be called the Imperial secretariat, advocated by the New Zealand and Australian delegates and those from the Cape and Natal, in 1907 was opposed by the (then) Liberal British government and by the Canadian delegates and those from the Transvaal. But it must be remembered that under the existing Cabinet system the delegates to the conference represent at a given time only one colonial party. In the place of a secretariat there was created a division of the colonial office known as the Dominions department, and the name "dominion* replaced colony in the official designation of the self-governing de¬ pendencies. In 1909 a special naval conference was summoned. A grave situation had been al¬ ready officially declared to exist, by Sir Edward Grey as Foreign Secretary speaking in the House of Commons, and "emergency* offers of assistance had been made by New Zealand and Australia. In the conference of 1909 the prin¬ ciple of centralized control of maritime defense was abandoned in favor of a scheme of "fleet units* presented, perhaps reluctantly, by the Admiralty (consult Report of Conference, Cd. 4948). The conference of 1911 witnessed a pitched battle on the subject of Imperial re-352

organization, Sir J. Ward bringing forward a complete Federal scheme which was over¬ whelmed by the powerful opposition of Mr. Asquith (then British Prime Minister), Sir Wilfrid Laurier and their followers. The much-quoted statements of Mr. Asquith to the effect that Imperial responsibility cannot be shared, and of Sir Wilfrid Laurier (<Canada need not necessarily take part in a British War® should be read in their context (consult Report of Conference). The conference left the Imperial situation still in the same dilemma (no taxation without representation and no representation without taxation) in which it had been since the Imperial Federation Movement began. Meantime certain definite steps were being at¬ tempted toward more adequate Imperial de¬ fense on the lines suggested in the conference of 1909. The Canadian government (Liberal) passed in 1909 a Naval Act for the creation of a separate Canadian navy. The incoming Con¬ servative government (1911) repealed the Act, but found their own naval program (that of presenting dreadnoughts to the British govern¬ ment for an indefinite period) defeated in the Senate, that body being still Liberal. During the same period a separate (<Royal Australian Navy® was brought into being, the principal ships completed during 1913 and the naval es¬ tablishments at Sydney and elsewhere in Aus¬ tralia taken over by the Commonwealth (1 July

1913).

The advent of the war has obviously altered the whole situation. The war efforts of the dominions have been made entirely on a volun¬ tary basis, the nominal legal sovereignty of the British Parliament not being brought into play. The consultations and conference, and especially the general Imperial conference of 1917, were devoted to the immediate aim of the prosecu¬ tion of the struggle, the question of reorganiza¬ tion remaining in abeyance. But it is gen¬ erally agreed that at the close of the war the time will have come for a reopening of the whole question of future Imperial relations. See the articles in this series : Since Con¬ federation; Canada and the European War; Canadian War Economics; and consult in addition to the works noted in article above, Cunningham, (Scheme for Imperial Federation (1895) ; Goldman, C. S., (ed.) (The Empire and the Century: a Series of Essays > (1905); Hurd, P., and Hurd, A. S., (The New Empire Partnership) (1916) ; Keith, A. B., Hmperial Unity and

the Dominions > (1916); Parker,

Hmperial Federation > (1892) ; Silbourne, P.

A. B., (The Governance of Empire) (1910) ; Smillie, E. A., (Historical Origins of Imperial Federation (1910); Worsfold, W. B., (The Empire on the Anvil) (1916).

Stephen Leacock,

Professor of Economics and Political Science, M cGill U niversity.

15. CANADA AND THE EUROPEAN WAR. Though the world at large was sur¬ prised by the outbreak of the great war, there was, in fact, for this little justification. Alarms enough had been given. In 1909 there was in England an acute crisis in regard to expendi¬ ture to meet Germany's naval preparations. The crisis extended to Canada, which was with¬ out either an army or a navy. Appeals were made in the Canadian Parliament that the

country should put itself in a position to do something effective in case of a conflict. These demands embarrassed the government of Sir Wilfrid Laurier. His strength was in the French-speaking province of Quebec, where the people, detached for a century and a half from France, the mother-land of their race, and not stirred by the sense of unity with British ideals felt in English-speaking Canada, were disposed to make preparations only to meet the dangers of a direct attack on Canada. The most violent spokesman of this school of thought was M. Henri Bourassa, grandson of a former stormy leader in Canadian politics, Louis Joseph Papineau. When Sir Wilfrid Laurier sub¬ mitted to Parliament plans for the creation of a Canadian navy, M. Bourassa attacked him as a jingo-imperialist. Like many others, Sir Wilfrid Laurier hoped that the dread of the horrors of war would lead to effective restraint by the more sober-minded people in Germany and elsewhere to prevent an actual outbreak. He proceeded reluctantly to spend money upon a navy and in 1911, when he fell from power, had gone no farther in concrete results than to create a naval college at Halifax and to pur¬ chase from the British government and to man two small warships.

During the election of 1911, M. Bourassa had assailed with great bitterness the policy of creating a Canadian navy as likely to drag Canada into imperialistic wars in which she had no vital interest. In the election, the Conserva¬ tive party, though, in fact, imperialistic in

spirit, had worked in a loose alliance with the anti-imperial Nationalists of Quebec. Con¬ servatives had attacked Sir Wilfrid Laurier's naval policy but, unlike the Nationalist's, on the ground that it aimed at too little rather than too much. When in power, with an adequate majority, the new Prime Minister, Sir Robert Borden, had to formulate his naval policy* To meet Nationalist demands, he rejected the naval policy of his rival, not on the ground that it was not needed but that it was inadequate. As . a first step, and to show the earnestness and sincerity of Canada to give aid in the great crisis which he declared was near, he passed through the Canadian House of Commons in 1913 a measure providing for the immediate building, at a cost of about $35,000,000, of three dreadnoughts to be placed at the disposal of the British government until such time as Canada should have a navy of her own. This would, he said, give time to mature an adequate naval policy while she would meanwhile be giving effective assistance in naval defense. After prolonged discussion the Senate of Canada, which still contained a Liberal majority, re¬ jected the new naval bill. Before this impasse between the House of Commons and the Senate had ended, war broke out on 4 Aug. 1914, while Canada was still without any naval equip¬ ment that would count in the great struggle.

It may be that this helplessness in regard to effort on the sea made the Canadian people the more zealous to equip a great army when once they realized the issues raised by the war. At any rate the outbreak of war was met in Canada by astonishing resolution and en¬ thusiasm, to take part in what the Canadian people believed to be a vital struggle for liberty. It is a mistake to sav that the motive was chiefly to help Great Britain. Hein to Great

Britain Canada was most ready to give, but Canada did not enter the war as a child coming to the help of a parent. It was in the spirit of partners in a great crusade that the Canadians wished to join English, Scotch, Irish, Aus¬ tralians and others in fighting side by side with the French and other allies. No doubt it was due to Canada's political tie

with Great Britain that her people saw so quickly the issue in¬ volved. They had no suspicion of aggressive designs on the part of Great Britain and thus met with quick sympathy her resolve, after the invasion of Belgium, to declare war. On the nature, however, of the issue itself and not through any compulsion to follow Great Britain, Canada fought. It was certain that, in time, the people of the United States would view the war exactly as the Canadians viewed it.

The outbreak of war saw stirring days in Canada. The Minister of Militia and Defense, General Hughes, later Sir Sam Hughes, had great energy and force, though he was at¬ tacked by critics for rashness in words and for ill-considered, impulsive and arbitrary actions. In the end these attacks led to his retirement. In his support it must be said that he brought a fiery enthusiasm and energy to his task of making preparations for war. Under his direc¬ tion a military camp was formed at Val Cartier, near Quebec. When the war broke out few realized the long, desperate struggle that lay ahead and the Canadian government planned to send to Europe only a single division of 20,000 men, fully equipped for war. So eager, how¬ ever, were the volunteers for service that by 7 Sept. 1914, a month after the outbreak of war, Canada had under arms 43,000 men. On 3 Oct. 1914, there steamed out of Gaspe Basin on the lower Saint Lawrence, escorted by a for¬ midable array of warships, the greatest force which, as yet, had ever crossed the Atlantic. On board were 33,000 Canadian soldiers, most of whom, two months earlier, had been civilians with little thought of ever taking part in war. At the moment when this fleet sailed, the Canadian government announced the recruiting of a second division and, by April 1915, the movement to Europe of this force began. At the end of 1915 Canada had more than 200,000 men under arms. By this time it was clear that there could be no reserve in regard to Canada's participation in the war and that she was com¬ mitted to the full extent of her men and re¬ sources. By the end of 1917 she had sent 400,000 men overseas and was raising an addi¬ tional 100,000. By the end of the war Canada provided 628,964 men, of whom 465,984 enlisted voluntarily, the remainder being obtained com¬ pulsorily under the Military Service Act. In France, Canada maintained an army corps of four divisions and a cavalry brigade. In addi¬ tion 12,000 men served in garrisons at home, in Bermuda and St. Lucia, wrhile detachments were dispatched also to Archangel, Russia, and to Siberia. The total casualties of the forces of the Dominion amounted to 213,268, of whom 55,205 were killed or died of wounds or disease.

It was one thing to send men across the sea, another to train them so that they should be able to take a worthy place in the battle line in front of the disciplined battalions of a military nation like Germany.

For a long time the professional soldier had been contemptuous

of civilian levies and the saying was often re¬ peated that, for actual fighting, one trained soldier was worth more than a dozen of raw militiamen, with inexperienced officers, igno¬ rant of war as a science. Remembering this, we can realize the anxiety, the fears and hopes, with which the unprofessional army was watched in Canada, when at last it reached the scene of war. The first Canadian division was sent to the front about Ypres, in Belgium, ground fought over the most bitterly, perhaps, of any part of the long front. On another front in the battle of Neuve Chapelle, 10 March 1915, Canadian artillery took part but not Canadian infantry.

The first great trial of Canadian arms was to come six weeks later. In April 1915, the resolve of the Germans was to force their way through to Calais and thus menace com¬ munications between England and France with greater effect than could be secured from Ostend, already for months in German posses¬ sion. The Canadians were at a critical point on the line, in front of the villages of Saint Julien and Langemarck, near Ypres, in the de¬ fense against the advance of the German army to Calais. At about five o'clock in the afternoon of 22 April 1915, the Germans discharged poisonous gases, slowly carried by a favorable wind to the allied lines, and followed with an attack in great force. In the front line on the Canadian left were French regiments of Turcos and Zouaves. The deadly gas not unnaturally caused a panic among these troops and they fled to the rear in great disorder with the wild eyes and anguished, distorted faces of men who had breathed invisible death and were in ter¬ rible agony. With this support gone the Cana¬ dian left was (<in the air.® Had the Canadian line broken, it is altogether likely that the German divisions, numbering 150,000 men, could have pressed through to Calais with all the dire consequences to the allied cause which this would have involved. The Canadian line gave a little. The left was bent back so that the two fronts were almost at right angles. For two terrible days and nights, fighting in shell holes and behind any defenses which the ground provided, the small force held on until adequate relief came. The Canadians lost 6,000 men, about one-third of all the Canadians then on the front, but they had baffled the enemy designs. (<It is not too much to say,® wrote Sir John French, the commander-in-chief, ((that the bearing and conduct of these splendid troops averted a disaster.® At Festubert (9 May) and Givenchy (15 June) the

Canadians had further hard fighting. The three battles formed a terrible ordeal for troops hitherto untried.

The battle of Saint Julien, the name now generally used, and those which immediately followed are momentous in the history of modern war. They showed that newly-levied forces of good mettle can, after six or eight months of training, hold their own against the fiercest onslaught of professional armies. Not only so, but the training in initiative learned in civilian life made such men specially re¬ sourceful fighters. It was the Canadians who first kept enemy nerves on edge by trench raids and they proved good bombers, woods¬ men, roadmakers and generally handy men as need arose. As we have seen there had been

nervousness in Canada as to the bearing of troops on the battle-line who, officers and men alike, had been untrained civilians less than a year earlier. Saint Julien and the experience which followed relieved anxiety on this score and since that day Canadians, civilians and military alike, have had calm confidence in the capacity of the Canadian divisions at the front. During the first years of the war the chief com¬ mand of the Canadian forces was held by an officer of the regular British army, at first General Alderson and later, from 9 May 1916, Gen. Sir Julian Byng. But after 19 June 1917, the military forces of the Dominion on the French front were under the supreme command of Gen. Sir Arthur Currie, who, previous to the outbreak of the war, was a business man in the Canadian West. His success is one chief proof furnished by Canada of the rapidity with which, in conditions of war, the civilian soldier may become effective.

After the first trying test at Saint Julien, the Canadian army settled down to do its share in holding a part of the long line in France and Flanders. The three chief scenes of war in which the Canadian divisions took part were at Ypres; on the Somme, in the great offensive of the summer of 1916; and before Lens, chiefly in the fighting of 1917. In what is now knowm as the battle of Saint Eloi, on the Ypres line, beginning on 3 April 1916 and lasting many days, the

Germans made a terrific con¬ centration of artillery fire on the Canadians. There were three Canadian divisions in the line of battle. The hoped-for British advance did not succeed, in spite of local successes. The battle of Sanctuary Wood, in the same area, a terrible struggle, was fought in June 1916, and the Canadians held the ground after incur¬ ring fearful losses. The outstanding result of the long fighting was that the British continued to hold the Ypres salient upon which the Germans had concentrated their fiercest at¬ tacks. In September of that year the Canadian divisions were on the Somme where in many weeks of hard fighting their most conspicuous victory was at Courcelette. The Somme offen¬ sive was not the striking success which had been hoped for, but it was successful enough to cause a considerable German retirement in that region early in 1917.

While the Ypres salient will probably always be regarded as the chief battlefield for the Canadian troops during the war, the city of Lens is an objective for which they went through very hard fighting, after being with¬ drawn from the Somme. In the early spring of 1917 the British planned a great offensive and, by the' fortune of war, the Canadian troops were in the hottest part of the attack. On 6 April 1917, the allied forces were cheered by the entrance of the United States into the war. Three days later, as if to celebrate it, they made the great attack at Vimy. Nearly 20,000 prisoners, 200 guns and some 300 machine guns fell to the British. The Canadians took part in the attack on the portion of the line called Vimy Ridge and captured 3,000 prisoners. It was then that Vimy became a great name in the military annals of Canada. The city of Toronto undertook when the region was liberated to restore the village of Vimy as a memorial of Canada's part in a striking military success.

By midsummer of 1917 the British had

fought their way to points close to Lens and then prepared for a new offensive in that region. This took place in the last days of October and early in November. The most striking feat of the Canadians in this offensive was the capture on 6 Nov. 1917 of the strongly defended village of Passchendalle. This fur¬ nished the dramatic close to the Canadian fight¬ ing of 1917. In 1918 the Canadians also fur¬ nished material assistance in the final decisive campaign.

Before the close of the year 1917 the Cana¬ dian casualties amounted to about 6,000 offi¬ cers and 124,000 men. A good many of the wounded returned to the fighting line, but the list of final losses in the

Canadian army makes a grim record. By the end of 1918 the dead, including those killed in action, dead of wounds or disease, and missing and counted dead, amounted to some 2,400 officers and 52,800 men, a total of 55,200 men — numbers slight com¬ pared with the losses of the nations in Europe, but yet appalling. To such great losses indeed must be added those of wholly or partially dis¬ abled men of whom the number must be nearly as many.

In spite of such losses, the war had a stimu¬ lating effect upon Canadian character and pro¬ duction. For the first time in the history of the world a great army from America fought in Europe to redress that balance of the Old World which, a century ago, England redressed in the new, by coming to the support of the Monroe Doctrine. It marked an epoch in the history of mankind that Canadian divisions, to be followed in 1918 by divisions from the United States, should thus fight in Europe in a cause in which neither of them had any thought of direct gain beyond their own secu¬ rity. (<Nothing in the history of the world has ever been known quite like it,® said a dis¬ tinguished French general. ((My countrymen are fighting within 50 miles of Paris … But … the Canadians at Ypres fought with supreme and absolute devotion for what to many of them must have seemed simple ab¬ stractions ; and that nation which will support for an abstraction the horrors of this war of all wars will ever hold the highest place in the records of human valor.® Precisely the same spirit brought the United States into the war. Facility of communication has made the whole modern world a unit. The idealism of the western peoples is practical, for, to each of them, danger and security alike involves a world¬ wide range of forces.

Not less on the material than on the moral side was Canadian life stimulated. Canada supplied vast quantities of munitions for the allied armies fighting in Europe and the skill and enterprise of her industrial leaders made marked advances. In spite of the drain of war upon her male population, agricultural produc¬ tion was increased and-Canada remains one of the chief exporters in the world of food sup¬ plies. The enhanced value of her commodities was so great as almost to counterbalance the cost to her of the war. For the first time in history the Canadian government secured huge loans from the masses of the Canadian people. For the first time also Canada had a heavy trade balance in her favor, due chiefly to the export of munitions. It is an unexpected result of war that this former debtor state, borrowing large

sums, has now become a creditor state financing great enterprises at home and abroad. See also Since Federation (article 9).

1 he full story of Canada's part in the war has not yet been told. (For full details see War, European). The (Canada Year-Book* published annually by the Minister of Trade and Commerce at Ottawa contains much sta¬ tistical information. (Canada in Flanders) by Sir M. H. Aitken, now Lord Beaverbrook (New York), is a semi-official account of Canada's part in the war. Hurd, P., (Canada: Past, Present and Future* (London 1918) ; 'Imperial Year Book for Canada) (Ottawa, annually).

George M. Wrong,

Professor of History, University of Toronto.

15a. CANADIAN WAR ECONOMICS.

In common with most commercial countries, Canada had enjoyed a period of remarkable expansion and prosperity, for at least 10 years previous to 1913. During this period her inter¬ nal economic expansion and external trade in¬ creased in an exceptional ratio. This was chiefly due to the fact that Canada presented the largest remaining area of unoccupied lands and other virgin natural resources, under climatic and social conditions attractive to European and American settlers. With an in¬ flux of over 2,000,000 immigrants, accompanied by over $1*000,000,000 of foreign capital, it was inevitable that values, even on the soundest basis, should very rapidly increase, and equally inevitable, under conditions of free individual investment, that speculative values should rise still higher. The growth of western towns and cities in particular, and some of the newer railroad developments, outran the adjoining agricultural developments on which, however, they must ultimately depend. When, therefore, the optimistic spirit of investment which per¬ vaded the older countries had received a check in 1912-13, and the pendulum began to swing toward greater caution in investments, many Canadian enterprises were caught in an incom¬ plete or relatively unproductive condition. The sudden arrest of a number of these undertak¬ ings not only checked general speculation, but brought about a rather severe reaction in the older industries dependent on the regions of special

expansions. These in turn checked en¬ terprise in many other lines of trade. In brief, a period of stagnation and readjustment had set in during 1913-14.

Such was the condition of Canada when the European War burst upon the world. Naturally the Canadian situation was not improved by the initial paralysis produced by the declaration of war, and the dislocation of international trade. Within a few months, however, the demand for men and equipment relieved the growing stag¬ nation of the labor market and stimulated those industries and trading houses which were able to furnish the various lines of army equipment, or could most rapidly adapt themselves to the new and urgent demands occasioned by the war. The rapid enlistment of many thousands of men involved the employment of many others in furnishing sustenance, equipment and trans¬ portation. The Canadian forces when equipped were rapidly sent overseas. The government, for the first time in its history, undertook to bear the whole expense of equipping, trans¬

porting and maintaining at the front its entire force. This involved very important conse¬ quences for Canadian trade and exchange, and, incidently, for the statistics of import and ex¬ port.

The expansion of Canada for the decade from 1903-13 having been accomplished very largely through foreign capital, practically the whole of this capital came to the country in the shape of goods, thus enormously increasing the imports. Since, however, only a limited number of immigrants were at first employed in meeting their own primary wants, the feeding, housing and general maintenance of a rapidly increasing population made great demands upon the agricultural and other products of the country which would otherwise have been sent abroad increasing the export returns. Thus the epoch of internal prosperity and expansion of 1903-13 was marked by rapidly increasing imports, without any corresponding increase in exports. For the fiscal year 1912-13, the excess of imports over exports amounted to $298,750,- 000, on a total trade of $1,095,000,000. The sud¬ den arrest of imports through the falling off of foreign investment and the corresponding re¬ lease for export of much Canadian produce formerly required in the country rapidly re¬ adjusted the balance of trade. Within two years, including the first eight months of the war, the adverse balance of imports had been reduced from $298,000,000 to $36,000,000. There¬ after the effect of the war became very evident. Supplies for the maintenance of the men

abroad, and the war equipment sent to them, so far as produced in Canada now appeared as exports. On the other hand, such foreign supplies as they were furnished with in Europe did not appear as imports to Canada. Taking the latest returns available, we find that for the 12 months, ending November 1917, the Canadian exports exceeded the imports by over $563,000,- 000 in a total trade of $2,586,000,000. In point of percentage this slightly more than reverses the exceptional excess of imports over exports before the war. Nothing more directly illus¬ trates the remarkable revolution in Canadian external trade in passing from a condition of domestic expansion, through immigration and foreign investment, to the participation in a world war requiring the export of all available resources for the supply of the Canadian army and the needs of the Allies.

The great Arolume of Canadian recent aggre¬ gate trade was due chiefly to three factors, in addition to the central one already indicated. The first and most obvious is the great increase in prices, the usual accompaniment of war con¬ ditions. Second is the fact that the munition and other industries connected with the war have required the import of large quantities of machinery, raw materials and partly manufac¬ tured goods, which enter into the production of the finished articles as finally exported. The other factor is the greatly increased im¬ port, during the war years, of articles of use and luxury for home consumption, due to the exceptional prosperity and spending power of that large section of the community which has benefited financially by the operations of the war.

This last factor is a rather interesting and important one, not by any. means confined to Canada; but, in conjunction with the other

forces, accounting for a very considerable ele¬ ment in the general increase in prices and the higher cost of living generally. As has been already pointed out, the first effect of the war was to aggravate the depression which the recent reaction from exceptional prosperity had produced, but the double demand for men, on the one hand to enlist

for military service and on the other to furnish the supplies and services incidental to their participation in the war, led, before many months, to the absorption of all the efficient man-power of the country. The demand, however, being far from satisfied, not only did wages rise in all activities directly or indirectly connected with the war, but, to an increasing degree, other elements in the popu¬ lation, such as women and youths of both sexes, and elderly persons, found employment at hitherto unknown rates of remuneration. Thus, not only was the fa'mily income increased through its head, but often doubled and even trebled through the remunerative employment of several of its other members. Further, while over 600,000 men were taken overseas for mili¬ tary service, their families or those dependent on them were provided for by separation allow¬ ances, assigned pay and special contributions from the Patriotic Fund, while many of their relatives and dependents were among those who received extra employment, and, as was just and proper, in proportion to their qualifications, were given the preference in such employment. It goes without saying that those who were for¬ tunate enough to control or have investments in munition industries, or other enterprises favorably affected by the war, received as a rule profits and incomes much beyond what were customary, even in the days of expansion before the war. Some of these capitalists and merchants, it is true, had to contribute various percentages of their gains through the war profits and income taxes, but the very volume of the taxes is an index of the exceptional revenue remaining with those who pay them.

It cannot be forgotten, however, that one considerable element in the community suffered more or less heavily from the war without any appreciable redress. This was made up of those living on fixed incomes or annuities, and cer¬ tain professional or other salaries, which, for various reasons, were not increased; also those furnishing services, or conducting various lines of business which were not benefited by the war, but perhaps the reverse. Such persons, according to their previous social status, were forced to meet the steady increase in the cost of living, and the many other calls upon their means without any offset. Their only resource was to continually curtail, as best they might, their former standard of living, while the ma¬ jority of their neighbors were at the worst holding their own, but in most cases enlarging their expenditure.

With the government and its colossal expend¬ iture, on the one hand, and hundreds of thou¬ sands of war-prosperous citizens on the other, competing for the products of agriculture and industry, it was inevitable that prices must soar, the volume of money and bank returns expand, and imports for domestic consumption increase not

merely in value but also in quantity. Pre¬ suming that people indulge in luxuries only after the necessaries of life are secured in suf¬

ficient measure, and that even in the necessaries they may pass from lower to higher grades of quality, the Canadian trade returns during the war indicate that not only does the prosper¬ ous element in the country completely offset those who are forced to curtail their former scale of living, but rolls up a large balance on the other side. It is true that only certain im¬ ports can be cited in proof of this situation, inasmuch as, in many lines the quantity and value taken for domestic consumption cannot be separated from the quantity and value taken for manufacturing purposes, or for reshipment to the troops overseas. Thus, only for the war years have passenger automobiles been sepa¬ rated, in the trade returns, from all forms of automobiles and motor trucks ; hence only for that time can one' safely determine to what extent the increased import represents com¬ mercial or war needs as distinguished from per¬ sonal use and enjoyment. So in the tobacco imports, it is impossible to accurately distin¬ guish between the increased consumption in the country by a considerably diminished male population and the amount which was sent over¬ seas to soldiers at the front. We must also recognize that much of what went to the soldiers at the front was not sent directly from Canada, but furnished from Britain and France or purchased at the canteens, from funds con¬ tributed for that purpose. In the case of many other articles, however, whether of ordinary supply or of pure luxury, what the trade re¬ turns show, alike in actual volume of goods and in the money values of these, is that the actual as well as the relative purchasing power of the people was very greatly increased during the war. A few typical articles may be men¬ tioned, the increased import of which will serve to indicate this interesting economic effect of the war. Boots and shoes, gloves, hats, various fancy articles, furs, glass ware, phonographs, piano parts and musical instruments generally, cheap pictures, precious stones, carpets, shirts, stockings, especially silk stockings, underwear, cottons, lace, embroidery, knitted goods, silks of all kinds for personal wear, tweeds, passenger automobiles, *etc.* The last is a typical case. Leaving values out of account we find that for the eight months ending November 1915, the total number of automobiles, including freight and passenger automobiles and motor trucks, was 4,887. For the next two years, taking the same eight month periods, the numbers of pas¬ senger automobiles alone were for 1916, 8,491 and for 1917, 12,156.

Notwithstanding, however, the increased ex¬ penditure of the

Canadian people as a whole, a sufficient surplus of funds was available from their incomes to enable them to raise, without any serious difficulty, increasingly large domestic loans for the use of the government in the prosecution of the war. The following were the special domestic war loans effected by the government: in November 1915, $100,000,000 September 1916, $100,000,000, March 1917, $150,- 000,000, November 1917, $400,000,000. Large additional amounts were supplied to the gov¬ ernment in the purchase of war certificates and in special loans. Most of the increased capital for war industries was supplied from within the country, while the banks aided in financing British and allied purchases in Canada. There were also the loans for municipal and provincial

purposes which have been largely taken up within the country.

As regards the direction of Canadian trade, it was the good fortune of the country not to experience any appreciable dislocation of its normal trade connections after the outbreak of the war. Before the war nearly 90 per cent of Canada's export trade was with the two coun¬ tries, Great Britain and the United States, and during the war that percentage was practi¬ cally maintained. Before the war 85 per cent of Canadian imports came from the same coun¬ tries, and the only effect of the war was to raise the percentage to a little over 90 per cent. At the same time, the details of the trade with these countries was naturally consider¬ ably altered. There was a very consider¬ able diversion of the exports of Canada to Britain, and a corresponding transfer in the source of Canadian imports from Britain to the United States. When the war was over, there¬ fore, there developed very little change in the direction of nine-tenths of . our world trade, be¬ yond a readjustment of details as between Canada and her two chief trading allies. The loss of trade with the enemy countries was of no material importance to Canada as a whole, though) it naturally affected somewhat seriously a few trading houses.

As to the changes in the nature of the prod¬ ucts called for owing to the war, it is to be ob¬ served that a veritable revolution was wrought

in one department of Canadian export, that of manufactures. Fifty-four million dollars represented the value of the export of the Canadian manufactures in 1913, increasing to $69,000,000 for 1914, $191,000,000 for 1915 and $440,000,000 for 1916; while for eight months to November 1917, the amount was $489,000,000. This of course represented munitions of war of all kinds and involved a correspondingly great increase in imports of materials and equip¬ ment which enter into their production. The usual allowance must of course be made for in¬ creased prices. Incidently the prosperity of the munition industries and their subsidiary de¬ pendents indicated the difficulty of inducing labor and capital to turn, during the war at least, from these tempting fields of sure profits and high wages to the more uncertain realm of agriculture. At the same time the next largest export was in agricultural products, which, though less in aggregate value than manufac¬ tures, indicated a larger actual return from the point of view of the trade balance, apart from individual profits. The increase in agricultural exports was due more to the proportion .of certain products sent abroad, and. the high values attached, than to an actual increase in the agricultural production of the country, which naturally varies with the harvests. The great harvest of 1915 has not been since ap¬ proached. The exported agricultural products, apart from annual products, increased from $127,000,000 in 1914 to $364,000,000 in 1916, and for the eight month period to November 1917, amounted to $384,000,000. Next came, animal products; increasing from $68,000,000 in 1914, to $117,000,000 in 1916, and $124,000,000 for the eight months of the past year. The export of the products of the mine, the. fisheries and the forest have not materially increased for the past couple of years.

Altogether a close survey of the economic

conditions in Canada, from the outbreak of the war, compels the general conclusion that, in spite of the reaction faced at the close of the war, and the subsequent effect of the great na¬ tional debt which Canada in common with the other belligerent nations piled up, and what¬ ever readjustment may be necessary to meet the changed economic conditions and relation¬ ships of the outside world, the chief effect of the war has been to increase the prosperity of the Canadian people as a whole, to increase their command of ready money, and, in conse¬ quence, to raise, for large numbers at least, their physical standard of living. Consult im¬ perial Yearbook for Canada > (Annually).

Adam Shortt,

Chairman Board of Historical Publications, Public Archives of Canada.

16. DIPLOMATIC RELATIONS OF THE UNITED STATES WITH CANADA.

The long Anglo-American peace, beginning in 1783, broken only once by a short period of war, and reinaugurated in 1814 by the Treaty of Ghent, is the more remarkable and significant because it has been maintained across the long¬ est international boundary in the world with¬ out costly fortifications or armaments, in a period of national youth and aggressive west¬ ward movement, and in the face of repeated friction and irritation arising from a long series of international problems — many of which were serious in their nature and difficult of solution or adjustment, sometimes even threatening actual collision. In the war of the Revolution and in the negotiations of peace at its close the United States hoped to obtain Canada, but in the end was able to get only the region north of the Ohio which had been an¬ nexed to Canada by the Quebec Act (q.v.) of 1774 and was regarded as necessary for the future growth and safety of the Union. Great Britain rather reluctantly agreed to the water boundary through the lakes. The Canadians objected to this line of boundary and especially to the amputation of the territory north of the Ohio which under American control might be subject to conditions injurious to the Cana¬ dian fur trade and export trade to the Indians. They also desired to exclude the United States from the Saint Lawrence and all tributaries by making the boundary at the height of land, or at least to limit the size of American vessels upon the lakes.

The early British trade policy in relation to the United States was largely determined by a desire to stimulate Canada to furnish the British West Indies with American products carried via the Saint Lawrence, thus reversing geographic conditions with a view of attaching Canada to Great Britain.

Canada's remaining hope to continue the control of the interior Indian trade received its first shock by the American organization of the Northwest Territory under the ordinance of 1787 and the consequent plans of future roads and river improvements.

Serious questions and complications con¬ fronted the new American government which was inaugurated under the new Federal con¬ stitution in 1789. The boundary was unmaiked. Influenced by Canadian traders who urged that the boundary should have been

established south of the lakes, the British government still held

the lake posts on American territory which it had agreed in 1783 to abandon without delay. British officers also seriously interrupted the fur trade of American citizens, by duties levied on American vessels and by the exclusion of American citizens from the navigation of the American side of the boundary waters, although at one time in 1790 Lord Dorchester suggested that the British government favored an alliance with the United States.

Washington, believing the retention of the posts prevented the possibility of securing a perfect tranquility of the Indians of the North¬ west and fearing that the retention would re¬ sult in retaliatory legislation against commercial relations with Great Britain, sent Jay to negotiate a treaty. This treaty provided for evacuation of the posts by 1796, freedom of intercourse and trade across the border and a commission to determine the boundary. In the United States this treaty was strongly opposed by certain citizens who advocated prevention of trade with Canada and were disappointed in failing to get egress of American vessels from the lakes to the Atlantic via the Saint Lawrence, and the prohibition of the importa¬ tion of arms and warlike stores by way of the lakes.

The international boundary, although de¬ fined by the treaty of 1783, was not easily marked by the surveyors whose governments were not able to agree upon a starting point at the extreme eastern end of the line, and who encountered other difficulties all the way to the Lake of the Woods. Not until 1798, after 15 years of controversy, was the identity of the Saint Croix River determined, the agreement being reached through a joint commission as arranged by a provision of Jay's treaty, and this was the limit of progress made on the de¬ termination of the boundary before the War of 1812.

New sources of irritation on the lake fron¬ tier continued to arise. Canadians regarded the Louisiana Purchase as a step toward ac¬ quisition north of the lakes and, although they still attracted a large part of the Indian trade of the Northwest they induced the British government in 1807, in the negotiations of a treaty to replace the temporary provisions of the Jay treaty, to request an amendment

which would admit their traders and the Hudson Bay Company to participation in the Indian trade of the Louisiana Purchase. By 1808, re¬ lations became much strained. Canadian traders asked redress for injuries resulting from exclusion from Louisiana, from American assessment of portage duties and from Ameri¬ can interference with Canadian boats which had approached too near to particular Ameri¬ can lake ports or shores.

Finally, the Indian troubles of 1811 aroused the American frontiersmen of the Northwest to demand the prevention of further relations between the Indians and the Canadian traders; and the lake frontier became the theatre of the principal military operations of the War of 1812, begun largely with the purpose of the conquest of Canada as a means of terminating British-American trade with the Northwest Indians and giving Americans control of trade on the lakes. See Boundaries of the United States.

One of the most important struggles in the

peace negotiations which resulted in the Treaty of Ghent was to secure the continuation of American rights upon the lakes, where the British sought exclusive control, and upon the adjacent southern shores where the British by an ultimatum sought to establish an Indian bar¬ rier against future American aggression upon Canada. The boundarv remained as before the war. The part of Maine occupied by the British during the war was returned. See Ghent, Treaty of.

Meantime, there was an increase of Ameri¬ can trade across the northern boundary east of Lake Ontario which was not stopped by the Embargo Act of 1808 nor by the later war embargo by which the Madison government sought to prevent trade with the enemy. The Treaty of Ghent, without mention of the osten¬ sible causes of the war, provided for arbitration of various matters in dispute. It contained a provision for the definite establishment of the exact boundary line bv joint commission. In 1817, as a supplement to the peace, to prevent the danger of future collision and sources of misunderstanding from rival navies on the lakes, an agreement was negotiated providing for mutual disarmament on those waters, ex¬ cept four vessels on each side restricted as to size and duties. Although peace existed in fact, there were many unsettled questions, some of which naturally became more important and more serious by the changes of time — influenced not only by development at the East but by the extension of virile peoples westward to the Pacific. The

meaning and import of certain words, used in the treaty of 1783, relating to boundaries were still unsettled and continued a source of dispute between the nations for nearly 30 years. There were also new sources of irritation resulting from the war, and from economic and political policies. Canada could not forget that the closed war was an expres¬ sion of an American policy of territorial absorp¬ tion which had long been apprehended by Cana¬ dian authorities.

Among the most important subjects of dis¬ agreement or possible sources of friction were the ownership of some comparatively worth¬ less islands in Passamaquoddy Bay, the north¬ ern boundarv of Maine, the boundary through the lakes, claims for slaves carried by British war vessels during the war, other general claims, the use of the fisheries, questions relating to commerce with the British West India Islands, the restitution of territory taken during the war and the Northwest boundary. To these were later added the border troubles along the Maine boundary, the border troubles along the Niagara frontier at the time of the Caroline affair, the case of McLeod, trade relations with Canada, the use of Canadian canals, the operations of Confederates from Canada during the Ameri¬ can Civil War, the connection of Canada with the Alabama claims dispute, the San Juan boundary, new phases of the fisheries dispute relating to the Atlantic Coast, the Bering Sea seal fisheries, the Alaska boundary, the ob¬ struction or diversion of boundary waterways and the persistent question of reciprocity in trade relations.

Commercial relations were unsatisfactory. Although Great Britain by government regula¬ tions until 1822 allowed the privilege of trade enjoyed by northern New York and Vermont

with Montreal and Quebec under the pro¬ visions of the Jay treaty which were extin¬ guished by the war, she would make no new permanent agreement on the subject. She also refused to recognize the principle of the Ameri¬ can claims to a natural right to navigate the Saint Lawrence to the sea. Fortunately the importance of the latter question was later diminished by the completion of canals which

connected Lake Champlain and Lake Erie re¬ gions with the Hudson River, and thereby with the sea.

Commercial relations, as defined by the treaty of 1815, remained unsatisfactory until 1831 when the United States, after persistent efforts, obtained the privilege of trade with the British West Indies. Fishing rights were de¬ fined by a treaty of 1818 which also postponed a dangerous dispute by providing for joint oc¬ cupation of distant Oregon until later pro¬ visions could be made for the adjustment of the boundar)' there. So, until new conditions pro¬ duced the need of new adjustments, the people of each country fished together in the unset¬ tled parts along Nova Scotia and hunted fur animals together in the unsettled territory bor¬ dering the Pacific Ocean north of the Columbia. At the same time the American claim to Oregon was reinforced by a provision of the Spanish (Florida) treaty of 1819, ratified in 1821, erect¬ ing the first international boundary line which touched the Pacific Ocean. The Passamaquoddy question was settled in 1817 by actual agreement of two commissioners, one selected by the King of England and the other by the President of the United States. The line of the northern boundary of the Louisiana Purchase was settled at the 49th parallel westward from the Lake of the Woods to the Rocky Moun¬ tains, in 1818. The boundary through Lakes Ontario, Erie and Huron was satisfactorily set¬ tled by two commissioners who met at Utica in 1822.

The claim for slaves carried away, referred after 1818 to the Emperor of Russia who made a compromise award, was later (1822) referred to four commissioners to determine the amount, and was finally terminated by the payment of a lump sum determined by the two governments.

The Northwest boundary question, the run¬ ning of a line from the head of the Saint Croix along the highlands and the 45th parallel to its intersection with the Saint Lawrence, proved most difficult. In accord with the Treaty of Ghent it was submitted to a commission which toiled five years, 1816-21, only to reach a hope¬ less disagreement, the point selected for the (<northwest angle of Nova Scotia® by differing opinions being 105 miles apart. By a subse¬ quent convention of 1827 the question was re¬ ferred to the King of the Netherlands, who in 1831 made a compromise decision which neither country would accept. By 1838, it reached an alarming stage in the Maine-New Brunswick controversy, coincident with the excitement of the Upper Canadian rebellion of 1837—38 and incidents resulting therefrom, including the dangers of lawless violations of American neu¬ trality along the Niagara frontier illustrated by the case of the

Caroline which for its un¬ neutral service was seized on the American side of the Niagara by a small British expedi¬ tion. Later, in 1840 it was further complicated by a new source of friction resulting from the

arrest of Alexander McLeod, a Canadian deputy sheriff who was arrested on the Ameri¬ can side of the river and tried for arson and a murder which had occurred in connection with the seizure of the Caroline. The acquittal of McLeod, in 1841, terminated a serious source of international embarrassment and smoothed the way for the friendly conferences between Webster and Ashburton who both exerted the wisdom of diplomacy to maintain peaceful re¬ lations. Finally, in 1842, after three years of great activity in search for the Northeast boundary, accompanied by a display of vast ingenuity in treaty interpretation, topographical theories and cartographic controversy, the question was settled bv the Webster-Ashburton treaty which each country regarded as a capitu¬ lation. British-Americans who were debarred by the treaty from the most direct and practical line of railway communication between Halifax and Quebec long continued to feel that their interests had been sacrificed to an exaggerated fear of breach with the United States. The State of Maine which mourned the loss of juris¬ diction, and Massachusetts which mourned the loss of lands in the disputed area, each received a solace of $150,000 from the United States government.

In 1846 the Oregon boundary question, which was an increasing source of dangerous tension between the two countries, was settled by the American acceptance of the British offer of the 49th parallel west of the Rockies, but reserving to the British-Americans all of Vancouver Island — a geographical exception which contained the germ of another boundary dispute which was settled in 1872. General claims of citizens of each country were sub¬ mitted to arbitration by a convention of 1853, which provided two commissioners and an um¬ pire or arbitrator chosen by the two. The commissioners in 1854-55 settled all claims suc¬ cessfully, and entirely satisfactorily to every¬ body except some who lost. It gave important decisions regarding fishery rights and rendered awards in the McLeod and Creole cases.

Meantime, for nearly a decade the conditions of international amity had steadily improved except in certain sections of the United States influenced by immigrants from Ireland who preached the antipathy aroused by O’Connell’s agitation and subsequent Irish misfortunes.

From 1815 for nearly four decades, during which fishery and

boundary questions were also prominent subjects of discussion, Canada per¬ sistently solicited commercial reciprocity with the United States. Finally, after the repeal of the English corn laws in 1846 and the repeal of the navigation laws in 1849, she expressed a growing sentiment in favor of closer relations, commercial and political ; and many, both in England and America, seemed to consider that by her own consent she would ultimately be an¬ nexed to the United States. In 1850, certain Englishmen, interested in checking and divert¬ ing the trend of events, urged that the con¬ struction of Whitney's proposed railroad through the western part of the United States to the Pacific would result in the inevitable loss of Canada. In 1854, a reciprocity treaty was negotiated with the expectation that it would result in the gradual, quiet and peaceful settle¬ ment of the Canadian question by growth of close relations which possibly would develop

into annexation ; but conditions were soon changed with the rise of a protective tariff movement in Canada, under leaders who after 1859 affirmed the right of Canada to regulate her own tariffs without interference from Eng¬ land. In 1866, the reciprocity treaty was termi¬ nated by notice of the United States, partly under the influence of a feeling of resentment originating in certain Confederate operations from Canada during the American Civil War.

In the meantime, new conditions on the Pacific and west of Lake Superior threatened to complicate Anglo-American relations and finally induced the British government and Upper Canada to take steps to secure confedera¬ tion and consolidation of the British-American provinces in order to counteract the danger of American annexation of the West. The later American acquisition of Alaska, which was re¬ garded as a counter movement against British-American consolidation, contributed much to stimulate a determined Anglo-Canadian policy to complete the scheme of confederation by including British Columbia and the northwest territory of the Hudson Bay Company, and by opening a trans-Canadian railway to the Pacific. The latter was conceived as a Canadian counter¬ movement to frustrate American influence in British Columbia. In 1869-70, Irish Fenians threatened to complicate international relations by plans to invade Canada. In spite of the proclamation of the President, they persisted until their collections of money were exhausted and their

intoxicated sentiment was sobered by a dawning consciousness of the seriousness of their project. At the same time Senator Sumner, influenced by Cobden's views of 1849 in regard to closer relations between the United States and Canada and especially stimulated by the question of the Alabama claims and by the danger of Fenian disturbances which were ex¬ cited by the proximity of the British flag, pro¬ posed to remove all causes of international dis¬ pute with Great Britain by the withdrawal of the British flag from all British America, but his views were not sustained by Secretary Fish and the Grant administration. The Treaty of Washington, negotiated after the United States dropped her flag-withdrawal proposal, was a great landmark in the adjustment of interna¬ tional questions. It submitted to arbitration three disputed questions : Alabama claims, the San Juan boundary and the Northeastern fish¬ eries. It also contained several clauses which directly affected subsequent relations between Canada and the United States. It established agreements in regard to bonded transit, certain features of the coasting trade, the navigation of certain rivers and canals (including the Wel¬ land and Saint Clair flats canals) as roads of commerce, and the use of the Saint John River by American lumbermen. It recognized the Saint Lawrence as forever free, and gave to Canada the right to navigate Alaskan waters. It failed, however, to renew the principle of the reciprocity treaty, which was requested by the British-Canadians and declined by the Amer¬ icans. Although there was a marked improve¬ ment of international feeling, various contro¬ versies continued to arise at different times. Canadians complained because they did not get the free use of certain State canals which they supposed they had secured by the treaty of 1871. When Canadian authorities protested,

the United States government replied that it had no control over State canals and could not compel States to act in the matter. Because in 1885 the United States refused to pass through the Sault Saint Marie Canal a Canadian vessel loaded with troops on their way to sup¬ press the Riel rebellion, and because in 1892 President Harrison in order to retaliate for dis¬ criminating tolls on freights passed through this canal bound for Canadian ports, the Ca¬ nadians were led to build a canal of their own on the other side of the river. Tariffs often ruffled the temper of the people on the border. Canada by various pilgrimages to Washington made persistent efforts to secure a renewal of the reciprocity treaty; but to these friendly advances the American government declined to respond with equal ardor, probably influenced largely in this policy of reserve by the fact that Canada possessed no treaty-making powers except through the British government. After

1873 the demand for protective duties became general among large classes of Canadian people. In the fall election of 1878 the protectionists were successful in Canada ; and at the next session of the Dominion Parliament, a tariff was enacted. Since that time, both countries have found occasion to complain of new tariff bills. The American Congress placed duties on coal, lobsters, eggs, *etc.* ; Canadian legislation excluded American cattle, and laid a retaliatory tax on lobster cans. Americans responded to Canadian retaliation by threatening to stop the transmission of goods in bond, and by new tariff provisions. New tariffs thereafter continued to be a source of more or less irritation. In¬ cidentally, it may be stated that complications of threatening relations have often been largely the result of the necessity of indirect negotia¬ tions through the mother country, thus taking the feeling of responsibility from Canada who complains that her interests have been sacri¬ ficed by British diplomacy. A former Canadian official, summarizing the history of treaties af¬ fecting Canada, once said: (<Like animals doomed to vivisection for the good of science, Canada has been unsparingly operated upon for the good of the Empire.® In 1887, the right of Canada to negotiate her own commercial treaties with foreign powers was conceded by Great Britain by a provision that negotiation of such treaties should be conducted by the British Minister and the Canadian envoy act¬ ing together and with equal powers. In 1890, the Canadian Dominion government, by its protest to the British Colonial office, prevented the execution of the Blaine-Bond reciprocity treaty between the United States and New¬ foundland, and proceeded first through the British Minister at Washington and later through Secretaries Foster and Blaine, to re¬ new previous efforts to secure commercial reciprocity.

Some more recent questions may here be sketched very briefly. The Bering Sea con¬ troversy, arising in 1886, finally found a way for settlement by arbitration in 1893. There still remained several questions for interna¬ tional negotiations, including protection of fur seals, the fisheries, the Alaskan boundary, re¬ ciprocity, transit questions, alien labor laws, mining rights and naval armaments on the lakes. An attempt to settle these questions was made in 1898-99 through a joint high commis-

sion, of which Lord Herschell was chairman, consisting of six members from each country. Although it practically reached an agreement on several subjects it made little progress on others (including reciprocity) and finally split and suffered shipwreck on the Alaskan bound¬ ary on which the Canadian commissioners de¬ manded a settlement before they would enter into any agreement on other questions. Some one, perhaps with facetious intent, has explained the failure of this commission in contrast with the success of that of 1871 by stating that the latter contained only one Canadian and four English statesmen, while the former contained only one English and four Canadian statesmen. But the action of the Dominion members con¬ cerning Alaska does not seem strange to one familiar with the history of American-Canadian relations in regard to boundaries — a source of almost constant discussion, punctuated by bitter contentions, for over a century. For¬ tunately, in the case of the Alaskan boundary a temporary adjustment was secured by a modus vivendi effected in 1899; and after long negotia¬ tions, the question was in 1903 submitted to the arbitration of a joint commission of six ((impartial jurists of repute® (three Americans, one Englishman and two Canadians) who settled it by a decision which perhaps may be regarded as a reasonable compromise.

For several years, the North Atlantic Coast fisheries threatened to disturb friendly com¬ mercial relations. The fishery agreement of the Treaty of Washington was terminated in 1885 by the required notice given by the United States in 1883, thus restoring the conditions existing under the treaty of 1818, and soon resulting in Canadian enforcement of irritating restrictions on the fishing grounds. In 1888, a modus vivendi was reached by an international commission (of three Englishmen and three Americans). This vivendi was continued both by Canada and by Newfoundland until the question was settled by The Hague tribunal in 1910, although Premier Bond of Newfoundland proposed to abrogate it after the failure of the Hay-Bond treaty in 1905. The chief remaining obstacles to friendly relations between Canada and the United States have recently been re¬ moved. Additional security for the future was made by the negotiation and ratification of an arbitration treaty in 1908, 11 years after the Senate had refused to approve a similar treaty. This treaty provides, with some restrictions, that differences of legal character, or relating to treaty differences which cannot be settled by diplomacy, shall be referred to the permanent court of arbitration established at

The Hague in 1899. The settlement of the various points at issue had a fortunate culmina¬ tion in the recent settlement of the fishery dis¬ pute by The Hague award. In conformity with the provisions of the treaty of arbitration, a special agreement of 1909 was arranged with the concurrence of the governments of Canada and Newfoundland, submitting to The Hague court of arbitration any question relating to the fisheries of the North Atlantic coast arising under the Treaty of 1818. The board appointed to consider the case contained six members, of which one was the chief justice of Canada and another a justice of the United States Circuit Court of Appeals, acting with an Austrian, a Hollander and an Argentine. The result

seemed to satisfy both Canada and the United States, each of whom appeared to have won a victory.

Sources of future dispute have been lessened by a W aterways 1 reaty of 1909 which provides for the establishment of an international joint commission of the United States and Canada (a miniature Hague tribunal) consisting of six members (three appointed by each government) to exercise jurisdiction in cases involving the use, obstruction or diversion of boundary waters, and with authority to inquire and re¬ port on other matters of difference along the frontier or to decide upon such questions as may be referred to it.

The question of trade relations between Canada and the United States remains unsettled. The efforts of the United States to remove cer¬ tain difficulties, arising from the passage of the Payne-Aldrich tariff bill of 1909 by the Ameri¬ can Congress, resulted in the appointment of a commission and the negotiation of an agree¬ ment (January 1911) to secure restricted reci¬ procity by concurrent legislation at Washington and Ottawa. This agreement, which aimed at fuller and freer trade relations, and which after a sharp political struggle passed both houses of Congress, became the chief issue of a keenly fought campaign in Canada and was lost (September 1911) by the overwhelming de¬ feat of the Liberal Laurier government which had held power for 15 years. The feeling of mutual respect and cordiality between the two countries has been strengthened by their con¬ viction of common interest and by their prac¬ tical cooperation to preserve the world peace against the attacks of Germany and her allies. See Alabama Claims ; Alaska Bound¬ ary Commission; Bering Sea Controversy; Boundaries of the United States.

Bibliography. — Anderson, David, (Canada, or A View of the

Importance of the British-American Colonies) (1814) ; Atchison, Na¬ thaniel, (Points to be Discussed in Treaty with the United States) (Pamphleteer 1815) ; id., ˆAmerican Encroachments) (Pamphleteer 1816) ; Callahan, J. M., (The Alaska Purchase and Americo-Canadian Relations) (1908) ; id., (The Neutrality of the American Lakes) (1898) ; Dunning, W. A., (The British Empire and the United States5 (1914) ; Foster, John W., diplomatic Memoirs5 (Vol. II, 1909) ; Hodgins, Thomas, (British and American Diplomacy Affecting Canada5 (1900) ; Roberts, C.G.D., (History of Canada5 (1897) ; Smith, E., (England and America after Independence5

(1900).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

17. PRIMARY EDUCATION. Previous to 1867 there existed in Canada four prov¬ inces, practically independent of each other. These were Ontario, Quebec, Nova Scotia and Prince Edward Island. These provinces es¬ pecially Ontario and Quebec, differed very greatly. Speaking generally the people in Quebec were of French origin and spoke the French language. They were nearly all Roman Catholics. In Ontario most of the people were of British descent. The English language was the ordinary medium of communication. The great majority were Protestants — - Anglicans,

Presbyterians and Methodists being most numerous. When in 1867 confederation was effected, education was entrusted to each of the provinces, the Federal government merely re¬ taining the right to introduce remedial legisla¬ tion when rights or privileges of minorities were interfered with. Naturally, the systems worked out in each of the provinces differed in essential details — the governing bodies, the form of administration, the programs of studies and

methods of instruction, varying to suit local conceptions.

Since 1867, five other provinces have joined confederation — New Brunswick, British Co¬ lumbia, Manitoba, Saskatchewan and Alberta. These have in turn developed systems suited to their needs.

Education Free. — Generally speaking, pri¬ mary education is free to all pupils of school age, that is, from 5 or 6 years to 18 or 21. In one of the provinces a fee may be charged, but this is merely nominal. In kindergarten schools and secondary schools, the payment of fees as supplementary to state, municipal, and district aid is sometimes permitted.

Central Governing Bodies. — In every case the system is administered by a central author¬ ity. In Prince Edward Island the board of education consists of the executive council, the principal of Prince of Wales College and Normal School, and the chief superintendent of education, the last-named officer being ap¬ pointed by the lieutenant-governor in council. In New Brunswick the board of education con¬ sists of the lieutenant-governor, the executive council, the chancellor of the provincial univer¬ sity and the chief superintendent of education, who is appointed by the lieutenant-governor in council. In Nova Scotia the council of public instruction consists of members of the executive council, of whom five shall form a quorum, and the chief officer is a superintendent of education appointed by the lieutenant-governor in council. He is assisted by an advisory board of seven members, appointed by governor-in-council or elected by the teachers. In Quebec the council of public instruction consists of (1) the Roman Catholic bishops of the province, (2) an equal number of Roman Catholic laymen, (3) an equal number of Protestants. The last two classes are appointed by the lieutenant-governor in council. This council of public instruction is divided into two committees known as the Roman Catholic and the Protestant committee, each being concerned with the administration of schools of its own kind. The two committees may have associated with them persons chosen or elected because of expert knowledge. The practical administration of schools is carried on through a superintendent of education, who is appointed by the lieutenant-governor in council, and through two secretaries, one for each sec¬ tion of the council of public instruction. In Ontario the department of education consists of the executive council or a committee thereof, and the head of this department is known as the minister of education. The practical adminis¬ tration is conducted by a superintendent of education who is assisted by chosen specialists and specially qualified school inspectors. In Manitoba the executive council forms the de¬ partment of education. One of the members of

the executive council is known as the minister of education. Under his direction a superintend¬

ent of education and a body of specially chosen workers assist in the work of administration. An advisory board consisting of members chosen by the government, the inspectors and the teachers of the province, has authority in such practical matters as the framing of a program of studies, the certification of teachers, the authorization of textbooks.

In Saskatchewan and Alberta the form of government and administration is quite similar to that of Ontario. In British Columbia the council of public instruction is composed of the executive council, and the work under its direc¬ tion is carried on by a superintendent of educa¬ tion. Recently steps have been taken looking toward closer cooperation among the four western provinces in all matters pertaining to elementary and secondary education and educa¬ tion of defectives.

Local Self-Control. — Though the govern¬ ing bodies just mentioned regulate education as regards the organization, government, examina¬ tion and inspection of schools, the certification and training of teachers, the authorization of textbooks and other matters of like importance, yet much power is given in most of the prov¬ inces to local school boards. Each district selects its own teacher, but must not take any one who has not a certificate to teach in the province. Within limits each district erects the building it considers most suitable under the circumstances and equips it as it may desire. There is wise supervision in matters of this kind to prevent undue expenditure and to guard against overcrowding of pupils, unsanitary con¬ ditions and lack of apparatus. In British Co¬ lumbia the council of public instruction is su¬ preme in all matters, virtually doing away with district control, except in the selection of teacher. In certain districts in Manitoba and Alberta the settlers are non-English and in some cases are not well enough acquainted with Canadian ways to organize and administer their own schools. A public trustee is appointed by the government to act in such cases, with the result that the schools and teachers' resi¬ dences in these districts are fast becoming quite as good as any in the country.

The Religious Difficulty. — The constitu¬ tion of the governing bodies in education indi¬ cates that there has been difficulty in establish¬ ing and administering school systems because of the conflicting religious

beliefs of the people. A closer examination emphasizes this fact. In Quebec there are two systems of schools — one for Roman Catholics, one for Protestants. In Ontario there is a system of separate schools. In Manitoba, which until 1890 had Protestant schools and Roman Catholic schools, there is now but one system. There are in the province many schools conducted by religious com¬ munities. Some of these have regularly quali¬ fied teachers and are ranked as ordinary state schools, receiving a share of the legislative grant. In Winnipeg, and at other points, the Roman Catholic ratepayers support, at their own expense, an independent system of schools. In Alberta and Saskatchewan there is provision made for separate schools, but all schools fol¬ low the same program of studies, are under the same inspection and teachers must qualify in the same way. In Nova Scotia. British Co¬ lumbia and Prince Edward Island the schools are strictly nonsectarian. The complaints

arising from changes made in the school acts, especially in Manitoba, have led to prolonged controversies and interesting court decisions.

Religious Exercises and Religious Teach¬ ing. — Closely connected with the separate school question is that of religious teaching and religious exercises. In British Columbia, schools must be conducted on strictly secular and nonsectarian principles. No religious dogma or creed shall be taught. The Lord's Prayer may be used in opening or closing school. No clergyman of any denomination shall be eligible for the position of superintend¬ ent, teacher or trustee. In Manitoba, schools may close with the reading of the Bible with¬ out comment and the recitation of the Lord's Prayer, and it is possible for clergymen or their appointee half an hour before closing to give religious teaching to those of their own denomination. In Ontario every public school shall be opened with the Lord's Prayer and closed with the reading of Scriptures and the Lord's Prayer, or the prayer authorized by the department of education. Teachers who have conscientious scruples in this matter may be re¬ lieved. Attendance during religious exercises is not compulsory. Religious teaching may be given by the

clergy or their representatives after the regular hours of school. In Quebec, in the Roman Catholic schools, there is daily prayer and systematic daily instruction in the catechism. In Protestant schools the first half hour is devoted to prayer, Scripture reading, in¬ struction in morals and Scripture history. No denominational teaching may be given. A con¬ science clause is operative. In New Brunswick the teacher may open and close the school by the reading of Scripture and by offering the Lord's Prayer. In Prince Edward Island the school is opened with Scripture reading, but no comment or explanation is permitted. In Nova Scotia the law is practically the same as for the last two provinces, local option being permitted. In Saskatchewan and Alberta the school may be opened by recitation of the Lord's Prayer. Religious instruction may be given during the last half hour of the day, but attendance is not compulsory for pupils.

The Language Problem. — There has been not a little difficulty with regard to the language employed as medium of instruction in the schools. In Quebec, both English and French are officially recognized. In Ontario the school act provides that English shall be the language of instruction, except where this is impossible

because of the pupil's unfamiliarity with the language. An attempt in 1912 and 1913 to make regulations covering this point led to a heated discussion. The famous ((Ottawa caseˆ was fought out in the courts. In Saskatchewan, Al¬ berta and Nova Scotia those of French origin have special privileges, and in the first two prov¬ inces any language may be taught at the expense of the ratepayers concerned. But the medium of instruction in regular school hours is English. In Manitoba the Laurier-Greenway compromise made it possible, in any school where 10 or more pupils speaking any language were en¬ rolled, for the parents to demand teaching in that language. This gave rise to what were known as bilingual schools with bilingual teachers. In some districts teaching in as many as four different languages could have been asked for, and in several schools teaching in three languages was demanded. In 1916 the school act was amended so as to do away with bilingualism as a system. English must now be the medium of instruction in all state-aided schools. This would not prevent French, Ger¬ man and other languages from appearing on the program of studies for elementary schools as they now are found on the high school curriculum.

The Support of Schools. — The schools of the Dominion are maintained by a fund drawn from three sources — a state fund, a

municipal or county fund and a fund yielded from dis¬ trict assessment. The government aid is dis¬ tributed in different ways. In Prince Edward Island and New Brunswick the grant depends upon the sex and the grade of certificate of the teacher. In Nova Scotia it depends upon grade of certificate and the number of days school is open. In Quebec the sum depends upon the population of the district, and in Ontario it is divided among the counties, townships, cities, and towns in a similar manner, special grants recognizing the grade of teachers' certificates and length of experience, and grants to rural schools recognizing school accommodation, equipment, teachers' certificates and experience and the municipal aid rendered the school. In Manitoba a definite sum depending upon the total grant available is given to each school open the full year, and a proportionate sum to schools open for less time. In Saskatchewan and Alberta the grant depends upon the size of the district, the number of days school has been kept open, the grade of certificate held by the teacher, and the percentage of attendance. In

Statistics Regarding School Attendance

School

Teachers

Pupils

Average

attendance

Male

Female

Total

Boys

Girls

Total

Number

Per¬

centage

Prince Edward Island .

474

162

426

588

9,514

8,555

18,009

11,170

61.8

New Brunswick .

1,922

201

1,831

2,032

32,244

32,066

64,310

40,882

63.6

Nova Scotia .

2,724

272

2,620

2,892

52,056

53,095

106,351

66,599

62.6

Quebec* .

5,827

213

7,182

7,395

129,052

105,208

234,260

170,438

75.3

Ontario .

Manitoba .

6,548

2,688

1,028

474

9,918

2,390

11,546

2,864

5,140

252,302

241,636

493,838’

93,954

118,927

319,337

59,778

*54,684

64.6

63.6

Saskatchewan .

2,966

1,732

3,408

62,061

56,206

*55.1

Alberta .

2,027

1,375

2,003

3,978

46,709

43,141

89,910

54,582

60.7

British Columbia .

682

394

1,339

1,733

30,476

28,474

58,950

46,555

78.9

*1913

British Columbia the government meets prac¬ tically all the expense of education except in the case of cities. Here a per capita grant is given, the smaller towns getting a higher rate than the larger cities. In Manitoba, Saskatche¬ wan and Alberta no less than one-eighteenth of the whole land is set aside for school purposes.

The Salaries of Teachers. — In the older provinces, when free schools were introduced and districts began to be formed, it was natural that every settler should wish to be near the schoolhouse. This led to small school districts. When the burden of supporting the small dis¬ trict fell upon the small district there was a tendency to reduce the salary of the teacher to the lowest amount possible. The result has been most unhappy. In spite of excellent provision for the instruction and training of teachers it is now sometimes impossible to get as many who are fully qualified for their work as there are schools ; and the male members of the profession are becoming fewer every year. This is particularly true in those communities where there is great industrial activity and con¬ sequent openings for men. Relief can come about in only two ways: (1) There must be an increase of legislative aid; (2) there must be increased local support. The former is prob¬ ably an impossibility in some of the provinces because of the limited resources ; the latter will come only as a matter of education. No people are in a better condition financially than the Canadian farmers. The burdens of taxation are comparatively light. Yet the salaries paid to teachers are very meagre. In Prince Edward Island the average salaries in 1910 ran from $146 to $289 for women, and $201 to $487 for men. In Nova Scotia the salaries vary from $562 for male teachers of the grade and $358 for female teachers of the same grade, to $222 for males of (<D}) grade and $198 for females of the same grade. In Ontario the salaries average $711 for males and $483 for

females. In Manitoba the average for all is $628 — an increase of $134 since 1902. In the new Province of Saskatchewan the rate in 1910 was $1,052 for males and $730 for females hold¬ ing first-class certificates. In Alberta the sim¬ ilar average was $1,092 and $749 respectively.

Wherever salaries are small two things are noticeable: (1) The percentage of female teachers is large; (2) the percentage of trained teachers is small. In Saskatchewan very few of the teachers are untrained; in Manitoba con¬ ditions are almost equally satisfactory. In Nova Scotia about 43 per cent of the teachers have taken normal training. In New Bruns¬ wick where salaries are small less than 20 per cent of the teachers are men; in Nova Scotia about 18 per cent; in Ontario 24 per cent; in Manitoba 30 per cent; in Saskatchewan about 43 per cent. In the older provinces teachers' pension schemes are in operation and other provinces are considering the matter. The city of Winnipeg has worked out a very satisfactory schedule.

Training of Teachers.— The training of teachers is something to which all the provinces have given much attention, though the system followed is not uniform throughout. In On¬ tario and the four western provinces, the course was designed to be purely professional based on academic preparation in the high schools or

university. It has not been found possible to adhere to this intention as there are always some branches in which academic instruction has to be given, such as history, geography, the school arts and the newer subjects on the ele¬ mentary school program. In the eastern provinces the tendency is to combine academic and professional instruction as in American Normal schools. (See Teachers, Professional Training of; Schools, County Training). In some of the provinces a short course of train¬ ing followed by actual school room experience of a year or two, precedes the longer and more philosophic training. The fact that all certifi¬ cates are granted by provincial rather than local authorities does much to elevate the standard of the profession.

Teachers' Institutes. — The work of the normal schools is supplemented by teachers' institutes which are of two kinds, (1) Those arranged for and carried on under the direction of the department of education; (2) those which are purely voluntary on the part of the teachers. These institutes do much toward de¬ veloping a professional spirit, toward bringing teachers into touch with educational progress in other lands, and toward bringing school and home into closer

relationship. The most im¬ portant gatherings are the provincial conven¬ tions held each Easter. An attempt to hold a Dominion educational association has not met with marked success. Either the territory is too great or provincialism is too marked. Yet such an association could have great value. Such an association and a national bureau of education are two things that have yet to be worked out in Canada.

School Inspection. — In all provinces in¬ spectors appointed or approved by the depart¬ ments of education report on the conditions of the schools, not only to the central authorities but to the local school boards. In the cities superintendents are employed, and in some of the provinces their reports are accepted by the department of education. The inspectors or superintendents have to be professionally quali¬ fied in order to serve. In Canada the machinery of politics is not permitted to control school ap¬ pointments.

School Libraries. — It is recognized through¬ out Canada that school libraries are a neces¬ sity in education. In most of the provinces grants are made to supplement the grants of trustees. The newer provinces have made the most complete provision by making it com¬ pulsory for trustees to spend annually a portion of the regular grant in the purchase of books for library purposes.

Coeducation. — A distinctive feature of Canadian elementary schools is the coeducation of the sexes. There are exceptions to this rule in Quebec and in a few leading cities of the other provinces. In all rural communities co¬ education must continue to be the practice, and it is doubtful whether there will be any depar¬ ture from customary procedure in cities and towns. The results morally and intellectually under present conditions seem as satisfactory as in lands where separation of the sexes is con¬ sidered a necessity.

Consolidation of Schools. — In most of the provinces the School Act makes provision for consolidation of schools, but in Manitoba alone has the legislation been followed by consider-

able action. There are about 50 consolidated schools in operation, one operating in a school district of 120 square miles. The children pre¬ fer driving seven or eight miles to walking three miles. The idea is gradually gaining ground that it is easier and better to conwy the children to the schools, than to bring the schools merely within walking distance of the homes. Consolidation can not include all the schools of a province. The little district school will al¬ ways exist, but the influence of a neighboring consolidated school with its higher organization and better equipment will always urge to greater efficiency.

Compulsory Education. — In all the prov¬ inces with one exception education is compul¬ sory. The acts are now enforced more rigidly than ever before. The openings in commercial and industrial life tempt young people to leave school early ; some parents, particularly immi¬ grants, are careless ; and in many cases the distances from home to school are very great. Nevertheless the ((percentage of attendance® is increasing from year to year, there are very few native born who cannot read and write and the incoming settlers are becoming more arid more anxious to give their children the advantage of a school education.

Courses of Study. — The course of study pursued in the various provinces does not differ very greatly from that followed in other civil¬ ized lands, though emphasis may not be placed on the same subjects. Though direct moral instruction is not systematically given in all the provinces, it is doubtful if anything could be more salutary than the influence of the schools. The high moral standing of the aver¬ age Canadian citizen must be attributed in a measure to the faithful labor and supervision of the public school teacher. In addition to the study of the five central subjects, — language, literature, mathematics, geography and history, — emphasis has of late been given to manual training (q.v.), and nature study (q.v.). The former branch received prominent notice owing to the liberality of one of Canada's most worthy citizens — Sir William MacDonald. The work in nature study is carried on successfully in several of the provinces and with excellent results. In the cities and towns particularly music and drawing are taught. The play im¬ pulse is recognized in the games of the school. In these the teacher frequently takes a promi¬ nent part. Many of them at summer schools and on school playgrounds have become ac¬ quainted with the method of organized play, and are capable of exercising skilled leadership. In most of the provinces provision is made for medical inspection of schools, not only in the cities but in rural districts. Physical training usually according to the syllabus of the Strathcona Trust is given in all the provinces. Cadet

companies are numerous especially in Ontario. Instruction in hygiene is compulsory. The temperance wave in the Dominion is said to be owing in part to the teaching given in the schools in the use of alcoholic beverages. A great interest is being taken in rural schools in school-gardening and elementary agriculture, and this interest is on the increase. Vocational education is not attempted below the high school, unless the domestic science, sewing and manual training, given in the senior grades of the elementary school, be counted as such.

It is generally recognized in elementary schools that the method of study, and the mental atti¬ tude developed in pupils, are of as much im¬ portance as the facts learned. The power for self-direction developed in Canadian youth, is amply proven by the behavior of manhood. The method of classification even in the large city schools, does not appear to have crushed out the individuality of the pupils. It may have removed idiosyncrasies, but it has still left power for independent action. The ideal of school government in Canada, though not fully realized in many cases, is that of a kindly authority which induces power of self-control. In this, the temper of the Canadian people is expressed. However, in the home as well as in the school, well-meant liberty often develops into license. Intelligence, right habits of thought, and good morals are often noted where manners and good taste are in a marked degree-lacking. Yet on the whole the type of life rep¬ resented in Canadian elementary schools is of a very high order.

Canada may be considered the land of the common school. With the one unfortunate ex¬ ception already noted, there is nothing in the public school system which recognizes class, race or creed. The school is the most potent agency for unifying the diverse elements of the population. See articles in this series Second¬ ary Education; Higher Education; Cath¬ olic Education ; Public Education. See also the section Education in the articles on the different provinces.

W. A. McIntyre, Normal School, Winnipeg.

18. SECONDARY EDUCATION. The

public high schools of the English-speaking provinces have been modeled more or less upon those of Ontario, which was the first (1844) to organize a system of public instruction. As a result, there is a very general similarity amongst them. Quebec, however, which is

largely French and Roman Catholic, with an English-speaking Protestant minority, has organized its high, as wrell as its elementary schools, in ac¬ cordance with its exceptional conditions.

Secondary education in Canada is provided for in three main classes of schools which are well distributed geographically and are known sometimes by different names in the different provinces :

(1) Public high schools, in which secondary education alone is provided for. A few take up also the first year or the first and the second year work of the universities. Besides the day high schools, night and summer schools are provided generally.

(2) Public high school grades in connection with the elementary schools, known sometimes as construction, superior or intermediate schools. A few of such grades are as good as the smaller high schools, and often gradually develop into separate institutions.

(3) A small number of private secondary schools. These have usually elementary grades attached and occasionally do the work of the earlier years of the universities. Their fewness is due chiefly to the efficiency of the public sys¬ tems, which were organized early in the history of most of the provinces. As, however, the wealth increases, more of such schools are es¬ tablished, but they are now, and will likely con-

tinue to be, comparatively unimportant factors in the education of the Dominion.

The public high schools differ markedly from those of the United States in being organized into one system in each province and in being controlled and supported by the province as well as by the locality. The causes which thus tend to uniformity in the individual systems have in most been reinforced by uniform exami¬ nations of the different grades, conducted by the central authority. The state-control is ex¬ ercised by a minister of education, who is a member of

the provincial Cabinet, or by a su¬ perintendent of education, responsible to the Cabinet, or by both. Sometimes such control¬ ling officers have associated with them an ad¬ visory council, variously constituted, with more or less important powers. The functions of the state are legislative and general. Subject to this oversight, which is exercised both di¬ rectly and through government inspectors and which prescribes textbooks, courses of study and school regulations, local boards of trus¬ tees or commissioners have complete control, appointing the teachers and managing the finances. The boards are thus able to deal with local conditions, while the state connection has secured a measure of uniformity and general efficiency of courses and standards. The state contributes often very liberally to the support of the public high schools, the expense of es¬ tablishment and the rest of the expense of maintenance being provided for by local taxes imposed by the municipality or district in which the school is situated, and, with few exceptions, by the county. Sometimes small fees are charged, but the general tendency is towards free schools.

The private schools are generally proprie¬ tary and of denominational origin ; and, as a result, nearly all of them are under denomina¬ tional control. Although affected in their courses and organization by the denominating public systems, they have no connection with the state, except in the case of a few which are affiliated with state universities, or of some Quebec schools which are subsidized under cer¬ tain conditions. Except also in Quebec, the public high schools are open to and attended by all denominations. The private schools, on the other hand, are usually sectarian, but the religious training given in most of the Protest¬ ant schools is such that they are patronized by the adherents of other churches than those with which they are connected.

All the secondary schools have more or less extended curricula, corresponding to those of the United States high schools ; but, as there, the entrance and the leaving standards vary ac¬ cording to the system of organization, the effi¬ ciency of the elementary schools, the require¬ ments of the universities, and the wealth and population of the different provinces. The On¬ tario secondary schools are the best developed and the most efficient, being, as regards stand¬ ard, on a par with the best in the United States. Besides providing a general education, the Ca¬ nadian secondary schools prepare for univer¬ sity matriculation, for commercial pursuits, for teachers' academic certificates and some of them for industrial and technical occupations. In one important and far-reaching respect they differ from the high schools of the United States : their teachers must all hold certificates

of academic and professional competency, au¬ thorized by the respective State Departments of Education, and varying somewhat in stand¬ ard and character according to the conditions of the system. Such teachers are usually obliged to attend professional schools. On¬ tario, however, is exceptional in providing for the professional training of its first class pub¬ lic school and high school teachers in two fac¬ ulties of education: (1) in the University of Toronto (provincial), (2) and the other in Queen's University, Kingston. Both of these faculties receive provincial aid on condition that they provide courses approved by the De¬ partment of Education. In the other provinces the normal schools provide the general profes¬ sional training for all grades.

Following are additional details in regard to each of the provinces :

Ontario. — The special secondary schools in Ontario are of two classes, high schools and collegiate institutes. The teachers are of two classes : those with ordinary certificates and those with specialists' certificates, each of the latter having taken an advanced course in his department. The principal of a high school or collegiate institute must be a graduate in arts of a university in the British dominions. The staff of a collegiate institute must consist of specialists with honor university degrees in classics, mathematics, moderns and history (in¬ cluding English), and science, and specialists in art and physical culture ; and, where the optional subjects, agriculture, household science and the commercial subjects are taken up, with special¬ ists in these departments also. The staffs of the high schools may consist of teachers with ordinary certificates, but many of them are specialists. Some of the collegiate institutes have as many as 35 teachers and only a few of the high schools have not more than two. Both classes of schools must have good accommoda¬ tions with a minimum equipment of $750 for a high school with two or three teachers; $1,125 for one with four or more teachers ; and $1,675 for a collegiate institute. A collegiate insti¬ tute must have, and a high school may have, a gymnasium, for which the former may receive a maximum grant of $96 a year and the latter of $48. _

A high school may be established by a county or a city municipal council with the approval of the minister of education, and such estab¬ lishment entitles it to a maximum grant of from about $600 to $1,300, according to the grade of the schools, as well as proper maintenance by the county or the municipality in which it is situ¬ ated. After providing for a minimum grant for each school, the rest of

the legislative grant is distributed on the bases of the value of the equipment, the amount of the teachers' salaries, and the character of the accommodations, a system of apportionment which has been adopted generally and which has greatly stimu¬ lated local expenditures and has done much to secure the efficiency of the schools.

Some of the boards of high school trustees are separate from those of the public schools and others, called boards of education, have charge of both classes of schools as in the United States. In constitution, however, they are peculiar in containing a representative of the (Roman Catholic) separate elementary schools, if there should be any such school in a munici-

pality (the large city of Toronto has two such representatives).

Besides the separately established high schools, there are in connection with the ele¬ mentary schools, in localities which cannot maintain a high school, continuation schools which also do high school work of a character sometimes as good and as comprehensive as is done in many of the high schools. Continua¬ tion schools may be established with the ap¬ proval of the Minister of Education by a public or a separate school board or by a union of such boards under conditions which ensure their proper maintenance. Of these schools, there are three grades : Grade A with three teachers, grade B with two, and grade C with one; of these, the grade B schools are the most numerous. The teachers of grade A schools must have the same qualifications as the teachers of high schools; those of grades B and C must hold at least first class public school certificates, many, however, being uni¬ versity graduates. The legislative grants to these schools are proportionately even more generous than those to the high schools, and as, being situated in the rural districts, they commend themselves strongly to the county councils, the support from this source is often proportionately larger than in the case of the high schools.

Pupils pass from the fourth grade of the elementary schools, called public or (Roman Catholic) separate schools (ages 12 to 14 or 15), into the secondary schools on uniform ex¬ amination papers set by the department of edu¬ cation, the answers to which are read and valued by local boards. Permission, however, is granted to boards to set their own papers or to accept under certain conditions the promotion examinations of the elementary school staffs. The standard of entrance into the secondary schools in Ontario is at least as high as that of the best high schools of the United States.

A number of years ago, the department of education held uniform leaving examinations at the end of the courses of each main division of the secondary schools. As a consequence, however, of the evils associated with so much uniformity, these examinations have been dis¬ continued and the department itself holds only those that are necessary for teachers' certifi¬ cates. It continues, however, to conduct through a matriculation board, representing the universities of the province, the uniform ma¬ triculation examination prescribed by these universities.

The following statistics set forth the general condition of the high and continuation schools : Total number of high schools (1918), 162, of which 47 are collegiate institutes and 76 are free. Number of teachers, 1,051, of whom 763 are university graduates, and 507 hold honor degrees or the equivalent. Highest salary, $3,500; average for principals, $1,884; for as¬ sistants, $1,412. Number of pupils, 28,833 (1917). Total amount expended during the year 1916, $2,488,254, of which $1,509,227 was for the sal¬ aries of teachers. Cost for each pupil (on aver¬ age attendance), $109.22. Total number of con¬ tinuation schools (1918), 137, with 241 teachers, of whom 77 are university graduates. Highest salary, $2,000; average for principals, $1,117 ; for assistants, $778; total number of pupils, 5,082 (1917). Total amount expended for continua¬

tion schools in 1916, $306,148, of which sum $224,464 was expended for teachers' salaries. Cost per pupil (on average attendance), $82.09.

The public secondary school system is so efficient and so popular with all classes that there are only a few private schools. Of these the chief is Upper Canada College (which, however, is only semi-private), an old historic residential and day school at one time under government control, but now under a board of governors partly nominated and partly elected by the ((01d Boys,ˆ the state connection being

maintained through the Minister of Education, who is an ex-officio member. This college has still a small endowment, but is supported chiefly by fees. It does general and university matriculation work for boys, and is attended by pupils from all parts of the Dominion and even from the United States. Besides colleges for young women, some of which take up the same courses as the high schools, there are a few other colleges for boys, doing general work and that for university matriculation. Of these, the most important arc Saint Andrew's College, Toronto; Bishop Ridley College, Saint Cathar¬ ines; Trinity College, Port Hope, and the De La Salle Institute, near Toronto. A few also have mixed classes, the chief being Albert Col¬ lege, Belleville, at one time a university, but now affiliated with the University of Toronto (q.v.), which provides courses of various kinds and grades, as far as the end of the university work of the first year. With very few excep¬ tions, all the private schools are connected with religious denominations.

The courses of study are the same for the different grades of public secondary schools : the general courses, the courses for admission to the professional schools for teachers, and the courses for matriculation into the universities. The evolution of the content of the general courses during the last 10 years has proceeded on modern lines ; vocational and prevocational courses have been duly provided in connection with the high and continuation schools and in separate establishments.

There are 86 manual training centres and 84 household science centres attended by 14,130 boys and 13,552 girls from the fourth grade (seventh and eighth years) of the public schools and the first two years of the high schools. These centres are well equipped and liberal grants are made by the Department of Educa¬ tion on the usual bases : salaries, equipment, ac¬ commodations, with minimum fixed grants. In 1915 the total amount of the legislative grant was $30,200. In 1913 agriculture was intro¬ duced into the secondary schools as an optional course covering two or four years. At present 21 schools carry on the work, most of them, however, attempting only the two years' course. These schools also are generously aided by both the Dominion and the Ontario Govern¬ ment.

The Industrial Act of 1911 provides for a system of industrial and technical schools with courses as follows : Day schools : General in¬ dustrial schools for subjects basal in the trades; special industrial schools for particular trades; technical high schools and high school courses ; part time co-operative industrial courses for apprentices ; schools for instruction in the fine arts. Evening schools for day

workmen and workwomen.

The clay and evening schools are liberally supported by legislative grants apportioned on the usual bases ; the maximum grant on sal¬ aries for day schools being $5,000 and for night schools $3,000; on equipment for day schools, $2,000, and for night schools, $1,000. The max¬ imum grant for co-operative classes is $875. The total attendance at the industrial and tech¬ nical schools in 1917 was 16,668. In some urban centres large sums are expended on capital account; for example, at Hamilton a site for a new technical school has been bought at a cost of $75,000; Toronto recently opened a new technical school costing at least $2,000,000, and London has a new building for a technical school costing $250,000.

The day technical departments of the high schools adapt the ordinary courses to the vo¬ cational needs of the communities. At Haileybury, a mining centre, for example, the high school has a mining department in which, since its opening in 1910, 104 boys have been enrolled. And some of the technical schools have already courses nearly as comprehensive as those of the best schools in the United States.

The agricultural, commercial, and industrial and technical schools and classes are managed by advisory committees consisting of represen¬ tatives of the high school and collegiate insti¬ tute boards and an equal number of persons engaged in industrial pursuits approved by said boards. The advisory committees may also co¬ opt persons engaged in such pursuits who are not members of the school board. The pro¬ posals of such committees, however, are subject to the approval of the school boards concerned.

Quebec. — Secondary education in Quebec is organized on somewhat different lines from those followed in the other provinces. The Ro¬ man Catholic Committee of the Council of Public Instruction names the three chief kinds of public schools, respectively the ((primary ele¬ mentary,® ((primary intermediate® or model, and the (<primary

superior® or academy. There are four years of work in the elementary schools, two in the model schools and two in the acad¬ emies. The model schools and academies fre¬ quently teach also some of the lower grades. The majority of the Catholic model schools and academies are French, the others being English. Secondary education proper is that of the classical colleges.

There are three kinds of Protestant schools, namely, elementary, model, and academy, some of the last mentioned being designated (<high schools.® Beginning in the year 1915-16 the Protestant Committee adopted a new classifica¬ tion of the grades as well as a new course of study. There are 11 grades, numbered from 1 to 11. The elementary schools teach the first seven grades, the model schools the first nine and the academies the whole 11 grades. Successful examination at the end of grade 10 admits to the Macdonald School for Teachers, for the elementary diploma course, and at the end of grade 11 to the model diploma course in the same institution. Grade 11 also affords matriculation to McGill and Bishop's univer¬ sities. The principals of the chief Protestant academies are men. The Protestant model schools are practically ˆintermediate® schools. The academies are secondary schools proper, although including all the earlier grades.

Summarized statistics, 1915-16: Catholic

model schools, 680; Catholic academies, 308; Catholic classical colleges, 21. Pupils in Cath¬ olic model schools, 108,475, of which 239 were Protestants. Pupils in Catholic academies, 83,227, of whom 339 were Protestants. Total of lay teachers in Catholic model schools and academies, 1,315. Total of religious teachers, 5,388. Protestant model schools, 58; Protestant academies, 41. Pupils in Protestant model schools, 5,416, of whom 334 were Roman Gath-olic. Pupils in Protestant academies, 12,038, of whom 356 were Roman Catholics. Total of teachers in Protestant model schools and acad¬ emies, 602 ; of these 66 are without diploma, but in nearly every case the teacher is merely an instructor in physical drill, *etc.*

The courses of study in all schools are prepared by the Catholic or the Protestant com¬ mittee, as the case may be, but the general school law of the province makes drawing and agriculture compulsory in all schools. Both of these subjects are extensively taught, and there is a director of drawing for the Catholic schools. An extensive program in household science has been carried out for several years now in some

of the Catholic normal schools (Ecoles Normales Menageres), and the subject receives much attention in the convent schools. Manual training is practically confined to the Montreal schools. The Protestant school board of that city maintains also a large commercial and technical high school, at which the yearly attendance averages about 1,600. The technical schools proper of the province, the large ones at Montreal and Quebec particularly, come un¬ der the supervision of the provincial secretary, not under that of the Department of Public Instruction. The attendance at these two insti¬ tutions is not yet as satisfactory as the splen¬ did equipment and the qualifications of the staffs call for: the school at Montreal cost $636,187; that at Quebec $405,359. The Poly¬ technic School of Montreal, which has been in existence many years and which gives courses in engineering, architecture and the industrial arts, had an attendance of 140 in 1916-17. The teaching of agriculture in the Protestant and Catholic superior schools has received consider¬ able impetus of late from the aid given by the county demonstrators (graduates of Mac¬ donald College, Sainte Anne de la Pocatiere and Oka) in the form of lectures. In 1910 the Ecole des Hautes Etudes Commerciales (School of Commercial Higher Studies) was opened in Montreal. It is now affiliated with Laval University (q.v.). All the classical col¬ leges are affiliated with Laval University and give the university courses in arts and science; and their students take university examinations, and receive the university degrees.

Manitoba. — The terms, intermediate schools, high school, collegiate department, col¬ legiate institute and .technical high school are used in Manitoba to denote secondary schools. Intermediate schools are secondary departments of graded schools, the principal devoting his whole time to secondary school work. High schools have two, collegiate departments three and collegiate institutes four or more teachers engaged exclusively in secondary school work. There were (1917) 72 intermediate schools, 23 high schools, 4 collegiate departments, 7 col¬ legiate institutes and 2 technical high schools. The whole number of teachers in high and

collegiate schools was 173, which with the 72 teachers in the intermediate schools gives a total of 245. In the intermediate schools there were, in 1916-17, 6,294 students of high school grade, of whom 4,096 were enrolled in high and collegiate schools and 2,198 in intermediate schools and the upper grades of rural ele¬ mentary schools.

The secondary school program covers three years and includes several courses. The inter¬ mediate schools invariably give the course for teachers' certificates and occasionally that for university matriculation. In the high schools the student can pursue the teachers' course, the university matriculation course or a ((combined)) course, which admits to the university and to the normal school. In some of the larger collegiate schools a commercial course of two years is given in addition to the preceding. In certain rural centres a course is given in agriculture.

Special grants are paid by the Department of Education as follows : Intermediate schools, $200; high schools, $300 fixed grant, $8 per annum per capita grant and $50 for apparatus and library ; collegiate departments, $450 along with per capita, library and laboratory grants; collegiate institutes, special grants to the amount of $1,600 in all in addition to capitation grant of $5 per pupil.

Principals of intermediate and high schools must hold first class certificates; principals of collegiate schools must in addition be university graduates ; professional certificates are required in all cases.

The Winnipeg technical high schools, which cost over half a million each, were opened in 1912. So far as their day school work is concerned these are really manual training high schools, but as evening schools they are continuation schools for adult pupils along in¬ dustrial and technical lines. Household science, art and physical culture are taught in both the day and the evening classes. In the day school there is a special course for girls, known as the practical arts course, which contains a maxi¬ mum of work in household science and house¬ hold arts and which leads to the normal schools. The percentages in the different courses in 1917 were as follows: Teachers' course, 20 per cent ; university course, 19 per cent ; com¬ bined course, 37 per cent ; commercial course, 10 per cent ; boys' technical, 4 per cent, and girls' practical arts, 8 per cent. The special work in household science and manual training is provided for students in the Collegiate In¬ stitute at Brandon and at Stonewall. The manual work of the technical schools of Winni¬ peg is recognized in the requirements for matriculation to the engineering course of the

university, and it is probable that some allow¬ ance will be made for it in the other matricula¬ tion courses also.

Prince Edward Island. — There are no high schools proper in Prince Edward Island, but provision for the work has been made in about 29 schools with high school departments, in 32 graded schools and in some of the best con¬ ducted primary schools. In these grades about 500 pupils are prepared for entrance into Prince of Wales College and Normal School in Char¬ lottetown (the capital) in a course which cor¬ responds to that of the first two years of a high school. Properly speaking the college is the only secondary public school. All the other

schools aim to matriculate pupils into it. All the schools are supported by legislative aid and district assessment, of which the former con¬ stitutes about three-fourths of the expenditure. No special grant is made for high school pur¬ poses. Whatever is paid extra comes by volun¬ tary vote of. the ratepayers of the district. Manual training, household science, physical culture and agriculture are taught in the Prince of Wales College and the Normal School. The teachers so trained, in turn instruct all the pupils in the public schools in physical culture and agriculture or nature study. Physical cul¬ ture is greatlv stimulated by prizes from the Strathcona Trust Fund and agriculture is as¬ sisted by the Department of Agriculture. With the exception of the Charlottetown and Sum-merside schools no instruction is given in manual training and household science.

New Brunswick. — Secondary education in New Brunswick is provided for in grammar and superior schools. The number of the former is 14, with 41 teachers and an enrolment of 1,281. Teachers holding license of the gram¬ mar school class receive from the government from $350 to $400 a year, according to the length of service of the teacher, and under conditions provided by the Board of Education, but not more than four teachers in any one grammar school can receive this legislative grant. These schools are free to all pupils in the county in grades 8-12. University matriculation exam¬ inations are based on the requirements of the high school course, as completed in grade 11. Superior schools may be established in every county — one for every 6,000 inhabitants, and a majority fraction thereof. The principal of a superior school must hold a first class su¬ perior license, and receives from the govern¬ ment a grant of $250 to $300 a year, according to the time of service of the teacher, provided the trustees pay the teacher a salary from the district at least equal to

the government grant. Superior schools in grade 7 and upward are free to all pupils living within the parishes in which the schools are situated. Most of the superior schools provide courses in high school work of the same character as the grammar schools. Little progress has been made in secondary vocational education. There are five consolidated schools in the high school depart¬ ments of which agriculture, manual training and household science are taken up. In most of the cities and towns these subjects are taught in grade 9 ; that is, the first year of the high school, and at the normal school. As yet, however, there is no provision for purely voca¬ tional training.

Nova Scotia. — In the public schools of Nova Scotia there are 12 grades, 9, 10, 11 and 12 being high school. Very many of the rural elementary schools have superior grades which do the first and the second year and even the third year work of the high schools. In the towns and larger villages the high school de¬ partments are separate. The law allows one high school, called the county academy, in each county, to share in the $10,000 which the legis¬ lature grants for secondary education, in addi¬ tion to the other grants to which they are en¬ titled in common with the high school grades generally; provided the county academy is free to each pupil of the county who passes, the uniform departmental entrance examinations.

Should, however, the shire town fall below the standard in equipment and accommodations, another may be made the county academy by the council of public instruction. Be¬ sides the uniform entrance examinations the education department holds uniform examina¬ tions in the courses of all the high school grades, and the universities and colleges of the provinces accept for matriculation the certifi¬ cate of having passed grade 11 when it indi¬ cates a high pass in the subjects they prescribe, or of grade 12 with a 50 per cent pass on the essential matriculation subjects. The grade 12 pass is expected to displace eventually the old grade 11 pass. There are 18 county academies with 59 teachers, of whim 39 are university graduates, class academic being the necessary professional qualification for the high school

teachers drawing academic grants. In 1917 the total enrolment in all high schools was 9,088. Of the total attendance 1,853 belonged to the county academies. There were 2,949 pupils in the technical schools. Nova Scotia has a num¬ ber of private schools which report an attend¬ ance of 450 as doing high school work.

Academic teachers must henceforth be grad¬ uates of recognised universities, who must after graduation have passed the provincial univer¬ sity graduates' testing examination in six sub¬ jects, one of which (the major) must be of the standard of university honors distinction. After 30 or 35 years' service they can retire with an annuity not exceeding $600 per annum.

So far, except in some progressive centres, very little special attention has been paid in the secondary schools to vocational education. Art is an optional subject in the high school course and in the Halifax County Academy there is a three years' commercial course. In the Nova Scotia Technical College there are two sets of courses, the long course being of university grade and the short course partly of secondary grade. There were also in 1917 local technical schools in seven cities and towns and coal mining and engineering schools. For the school year ending July 1917 the following was the attendance at the different classes of schools: Rural Science School, 148; Agricul¬ tural College (regular), 63; Agricultural Col¬ lege (short course), 290; Nova Scotia Technical College, 67; evening technical schools, 1,643; coal mining schools, 536; Normal College, 263; total, 2,949.

Alberta. — The administrative unit of the educational system of Alberta is the school dis¬ trict. Any district, when conditions warrant, may, in addition to providing for the elemen¬ tary or public school grades (1-8), provide for any or all of the high school grades (9-12), with the usual secondary school courses, all being under one school board. The govern¬ ment provides an increased grant for the sec¬ ondary grades. Grade 11 gives university ma¬ triculation standing and admits to a normal school for training as second class teacher, while grade 12 gives first year university stand¬ ing and admits to normal school for training as first class teacher.

Provincial normal schools containing large practice schools are located at Calgary and Camrose. The other educational institutions which take up secondary school work are the Alberta (Theological) College, the Robertson (Theological) College, the Jesuit College, all

of Edmonton; Mount Royal College; Western Canada College; Saint Hilda's College, all of Calgary; Alberta Ladies' College at Edmonton; and Knight's Academy at Raymond.

As in most of the other provinces, the voca¬ tional side of education is emphasized in Alberta. The board of every district has power to make provision for instruction in both the primary and secondary grades in manual training, domestic science, physical training, music and art, and courses are given during each summer vacation for teachers of these subjects. An optional commercial high school course of two years has also been established. As to agriculture : The subject is taken up in the last two years of the elementary school course and is supple¬ mented in the higher grades after a course in elementary science; and summer schools are provided for both teachers and inspectors. Moreover, in order to provide for very many young men and women who in their earlier years were deprived of school facilities, three schools of Agriculture, managed by the Department of Agriculture, have already been located on three of the demonstration farms of the Department of Agriculture. The courses include scientific and practical agricul¬ ture and household science and art, along with the more essential subjects of the ordinary pub¬ lic and high school grades. Pupils who take the two years' course offered, and who possess the necessary academic standing, may continue their course for a degree in agriculture in the University of Alberta.

In some of the larger centres technical schools have been established whose courses cover a wide range of industrial trades. Night schools have also been established, especially in the mining centres. In order also to corre¬ late efforts in these various directions and to afford opportunities for more advanced train¬ ing, an institute of technology has been estab¬ lished at Calgary.

Saskatchewan. — Since the passing of the Secondary Education Act in Saskatchewan in 1908, 21 high schools have been established, 7 of which have since been raised to the rank of collegiate institutes. In these, 138 teachers were employed in 1916 and the total number of pupils was 3,849. A residential college for bovs and girls has been established by the Methodists in Regina and one for boys by the Presby¬ terians in Moose Jaw.

The total outlay from general revenue in aid of education increased from less than $200,000 in 1904 to approximately $1,000,000 in 1916.

Being a comparatively young province, Sas¬ katchewan has been

devoting most of its energy to its public schools. It has, however, made a beginning in elementary industrial training. A board of any district has authority to provide for manual training, household science and industrial training in both day and night schools. The only secondary schools, however, giving courses in these subjects are the col¬ legiate institutes at Regina, Moose Jaw, Prince Albert, Saskatoon, Yorkton, Weyburn and Swift Current. As Saskatcheman is almost purely an agricultural province, special stress is being laid upon agriculture in both the public and the high schools. So far not much has been done in the latter, but the indications are that a majority of them will provide for the subject in the near future. For commerce and the trades little pro-

vision has so far been made in the secondary schools. Three collegiate institutes, however, have been giving exceptionally good courses for a number of years. There is very close co¬ operation between the Department of Education and the University of Saskatchewan ; especially valuable work has been done through the medium of summer courses for teachers and others held at the university during the months of July, and August.

British Columbia. — Secondary education in British Columbia is provided for in superior and high schools. A superior school may be established where there are at least 10 quali¬ fied pupils available. The subjects taught are those of the junior and senior fourth classes of the public schools and the first two years of the high schools. The teacher must hold at least a first-class B. C. certificate. A high school may be established in any municipal school district where there are at least 20 quali¬ fied pupils available. The teacher must hold a B. C. academic certificate, and the subjects of the course of study are those usually taken up in the high schools of the other provinces. Government assistance to superior and high schools is the same as for other schools, the grant being so much per teacher according to the class of the district, from $360 per teacher in cities of the first class to $480 per teacher in rural municipal districts, with an additional maximum grant of $100. A grant on the same scale is also paid on account of teachers of manual training, domestic science, art and other special subjects, provided such teachers hold B. C. certificates of qualification. Special grants are also made for agricultural education,

the greater part, however, being met by a pro¬ portion of the special Federal grant. As in the other provinces, the secondary schools are controlled by the Provincial Department of Education and by boards of school trustees, and are visited by provincial inspectors.

The King Edward School, Vancouver, which was established in August 1916, is the only school in the province undertaking a comprehensive technical course. It is in¬ tended that at the end of the third year of the course the pupil shall be able to matriculate into the engineering course of the University of British Columbia. Of manual training centres there are 49, with 40 instructors, attended by 992 pupils from the high schools, and of do¬ mestic science centres 39, with 29 instructors, attended by 1,406 pupils from the high schools. A commercial course of a thoroughly practical character, covering three years, has been es¬ tablished in the larger high schools. In order to provide for the study of agriculture, the De¬ partment of Education proposes to establish classes for both boys and girls in certain high and superior schools. Arrangements have al¬ ready been made to carry on these classes at three high schools and two superior schools. Extensive courses, suitable to the different lo¬ calities, have also been provided for young men.

John Seath,

Superintendent of Education, Ontario.

19. HIGHER EDUCATION. The his¬ tory of higher education in Canada is by no means a homogeneous development in all the provinces. Each province, possessing its own

machinery of local government and peculiarities of social and economic condition, has, as might be expected, evolved its own system of higher education. It is, therefore, the more remarkable that the beginnings of university education were almost identical in all the older provinces. This was due to the enlightened policy of the British government, which through the executive heads of the colonies began very early to make pro¬ vision for future educational needs. In Upper Canada (now Ontario) and New Brunswick this provision took the form of an endowment out off Crown lands for the purposes of higher education. In Nova Scotia, already a self-gov¬ erning colony, the legislature was encouraged to devote a special grant of money to establish a university and to make an annual appropria¬ tion in support of it thereafter, while the Im¬ perial Parliament endorsed this

action by vot¬ ing much more substantial sums both for estab¬ lishment and for annual maintenance. In Lower Canada (now Quebec) a proposal was made to create an undenominational state uni¬ versity, but the uncompromising hostility of the Roman Catholic Church to the idea prevented it from being carried out. Thus in each of the four colonies or provinces which at the end of the 18th century made up the settled portion of British North America the policy was inaug¬ urated of establishing state universities, either with large land endowments or with the pledge of support by the provincial legislature. The next stage was also alike in all the provinces of older Canada except Lower Canada. In these a narrower view prevailed, and the state college in each, when established, discriminated in favor of the Church of England against other religious denominations. It was an attempt to implant in the colonies the English institution of an established Church, but the conditions in Canada were very different from those in Eng¬ land; the Church of England was numerically hardly stronger than the Presbyterian, Meth¬ odist or Baptist bodies separately, and cer¬ tainly no exclusive right to control the state universities should have been given. The other denominations accordingly, seeing the doors of the state institution closed to their members, or open perhaps but with reservations in favor of a rival Church, established their own institu¬ tions of higher education. Thus, instead of a single well-supported university in each prov¬ ince there were several universities of a small calibre, none of them, not excepting the state university, coming up to the standard that had been anticipated when the policy of a single state-supported institution for each province was framed. In course of time the disad¬ vantages of division became more apparent. The denominational character of the state uni¬ versities was altered and negotiations for al¬ liance were seriously begun. Up to the present time these negotiations have had no result in Nova Scotia or New Brunswick. But in Ontario a third stage has been reached, and the movement to combine resources has met with partial success. In western Canada the history of higher education is different. Profit¬ ing, perhaps, by the experience of the older provinces, the state universities in Manitoba and other western provinces have been estab¬ lished under conditions that prevent them from being controlled in the interests of any de¬ nomination.

Nova Scotia. — Taking each province in turn, for a more detailed account, we begin with Nova Scotia, the earliest settled of the English-speaking provinces of Canada. The first attempt at establishing a university was made by act of the legislature in 1789 incor¬ porating King's College at Windsor, where a seminary had been founded a year before by legislative aid. A grant of £500 for a site was also made and an annual appropriation of £400 for maintenance. In the following year the British Parliament gave £4,000 in further aid of the infant institution. It does not ap¬ pear that actual university powers were ob¬ tained until 1802, when a royal charter was granted. At the same time an annual sub¬ sidy of £1,000, which was not discontinued until 1835, began to be made by the British Parlia¬ ment. The charter gave control of King's College to the authorities of the Church of England in the province, and at the beginning of its career the governing body unwisely re¬ stricted to members of that Church the right of entering the college as students, thus com¬ pletely establishing the sectarian character of the state institution. A majority of the in¬ habitants of the province were now debarred from sharing in the benefits to which they had looked forward, and agitation began for a freer system. In response to this demand Dalhousie College was founded at Halifax in 1821 out of funds at the disposal of the governor for provincial purposes. Attempts at fusion of the two state-endowed colleges were subse¬ quently made from time to time but without success. It was as a result of the refusal in 1835 of the governors of King's College to surrender their charter and amalgamate with Dalhousie College that the Imperial grant of £1,000 was withdrawn. Dalhousie College, though founded in 1821 and soon afterward provided with a building, was not opened for academical instruction until 1838, when suffi¬ cient funds had accumulated to enable a be¬ ginning to be made. In 1841 university powers were conferred by act of legislature and con¬ trol was vested in a board appointed by the lieutenant-governor. But a similar mistake had been made as in the case of King's College, and Presbyterian influences had been allowed to preside at the organization in 1838. The Baptist body, therefore, seeing one of the state institutions avowedly under Anglican con¬ trol, the other practically Presbyterian, pro¬ ceeded to establish a college of its own at Wolfville. It was named Queen's College, and was formally opened in 1839. The act of in¬ corporation conferring university powers was not passed, however, until 1840, and another act in 1841 changed its name to Acadia College, which it still retains, with the alteration of ˆuniversity® for ˆcollege.® The Roman Catholic Church, which had

always stood apart from any system of higher education under state con¬ trol, established somewhat later Saint Francis Xavier's College at Antigonish, in the year 1855. Under varying conditions higher education in the province continued to be carried on for a number of years by the institutions named, two of them being the recipients of government bounty. Dalhousie College, indeed, for want of funds was closed from 1845 to 1863, and on reorganization at the latter date was given a strictly non-denominational character. But the

hope of uniting all the existing colleges in a single state university has not been given up. In 1876 an act of the legislature established the University of Halifax, which should examine and confer degrees upon candidates sent up by the colleges. The latter, however, gave it no support, and continued to exercise their uni¬ versity-functions. In 1881 the legislature with¬ drew its financial support and at the same time discontinued the annual grant which had hitherto been made to King's College. Univer¬ sity federation in Nova Scotia had proved a failure, and no scheme to that effect has since been proposed. A second Roman Catholic col¬ lege, College Sainte Anne, was established in Digby County in 1890; and the Seminary of the Sacred Heart, at Halifax, in 1895.

New Brunswick. — As early as 1786 an en¬ dowment of 2,000 acres near Fredericton, the capital, was set aside for the foundation of a provincial Academy of Arts and Sciences, which became incorporated in 1800 as the College of New Brunswick. In 1805 an act was passed authorizing an annual grant of £100 in addition, which was subsequently increased from time to time up to $8,844, at which sum it has stood since 1829. In 1828 the provincial charter was surrendered and a royal charter obtained in¬ corporating the institution under the favorite name of King's College, with university powers. In the following year a suitable building was erected and academical work begun. The royal charter contained, however, the same provision for Church of England control which had al¬ ready begun to work so disastrously in Nova Scotia, and almost from the moment of its in¬ ception the sectarian character of the new col¬ lege was strongly opposed by other religious denominations. In 1842 the Wesleyan Meth¬ odists succeeded in establishing an institution of their own, Mount Allison Academy, at Sackville. At first only a secondary school, it re¬ ceived in 1858 university powers, which came into operation four years later. Meanwhile agitation against the existing constitution of the provincial college began to bear fruit. In 1845 religious tests were abolished, and in 1859 re¬ organization on a

non-denominational basis was effected and the name changed to Univer¬ sity of New Brunswick. A third university for the province was added in 1864, when the Roman Catholic College of Saint Joseph was founded at Memramcook.

Quebec — Before the cession of Canada to Great Britain in 1763 the control of all educa¬ tion in the French colony had been in the hands of the Roman Catholic religious orders. Laval, first bishop of Quebec, had established the Grand Seminaire at Quebec in 1663, which is perpetuated as Laval University of the present day. The Grand Seminaire, however, was not a university, but a theological training college for the priesthood. The first suggestion of a university in the province was made in 1789, when a committee of the executive, in report¬ ing on the condition of education in the province of Lower Canada (now Quebec), recommended the establishment of a non-denominational uni¬ versity at Quebec. The opposition of the Ro¬ man Catholic bishop prevented the suggestion from being carried out, and though the hope was long cherished that the project would be renewed under more favorable conditions, no subsequent proposal to that effect was ever

formally made. It was left to private enter¬ prise to establish the first university in Lower Canada. In 1813 the Hon. James McGill of Montreal died, leaving by will a piece of land as a site for a university or college and the sum of £10,000 for maintenance. A royal charter was obtained in 1820, but the college, bearing its founder's name, was not opened until 1829, and on the day of its inauguration the Montreal Medical Institute was united to it as its medical faculty. For more than 20 years the college had a precarious existence, its expansion being, to a certain extent, ham¬ pered by the constitution of its governing board, but a new charter was obtained in 1852 entirely freeing it from official control. The history of McGill University (q.v.) since that time is a record of steady improvement. It is not identified with any religious body, but there are four affiliated theological colleges — Con¬ gregational, Diocesan, Presbyterian and

Wes¬ leyan. It owes its present position as one of the leading universities, not only of Canada but of the continent of America, to the generosity of the merchant princes of Montreal, and to the wise and able guidance of Sir J. W. Daw¬ son, principal from 1855 to 1893, and of his successor, Sir William Peterson.

The second university to be established in the province in the interests of the English-speaking inhabitants was in the Church of England institution at Lennoxville, called Bishop's College. It was incorporated in 1843, but a royal charter conferring university powers was not obtained until 1853. In the previous year, 1852, a royal charter had also issued to the corporation of the Grand Seminaire of Quebec empowering it to confer degrees and exercise other university functions,* under the name of Universite Laval. The uni¬ versity thus established remains the sole Roman Catholic university of the province, with facul¬ ties of divinity, law, medicine and arts, having affiliated colleges and seminaries in various towns, and an integral branch of itself at Mon¬ treal under the name of <(Succursale de l'Universite Laval.* Saint Mary's College at Mon¬ treal, under control of the Jesuit order, incorporated in 1852, has since 1889 been en¬ titled by papal brief to confer degrees of Laval University. There are numerous Roman Cath¬ olic colleges affiliated to Laval University, some of them of considerable antiquity. The oldest are Saint Raphael's College at Montreal, estab¬ lished by the Sulpicians in 1773; those at Nicolet, founded in 1804; Sainte Hyacinthe, in 1812; Sainte Therese in 1824; Sainte Anne de la Pocatiere, in 1827 ; and L'Assumption, in 1832. The higher education given at these colleges is chiefly theological. James Loudon.

Ontario. — The history of higher education in Ontario shows a somewhat different develop¬ ment from that in the older provinces. In 1798 the legislature set aside an endowment of 500,000 acres of Crown lands for the purposes of higher education, but nothing further was done at that time to carry the project into effect. In 1827, however, a royal charter was granted for the establishment of a university under the name of King's College. By the terms of the charter, the institution was to be under the control of the Church of England. It was natural that the other religious bodies

should enter a vigorous protest against these terms, and when this proved unavailing, should take steps to establish independent colleges. Consequently in 1830 the Methodist Church of Canada resolved to found an institution of higher learning in Upper Canada. That this

resolve was not due to narrow sectarian preju¬ dices is vouched for by the fact that religious tests were not to be required for admission, and, further, that a distinct stipulation was made with the early subscribers that (<this shall be purely a literary institution* and that ((no system of divinity shall be taught therein.* In 1836 the college was established in Cobourg under the name of Upper Canada Academy. It was incorporated by letters patent on 12 Oct. 1836 — the first royal charter granted to any Nonconformist institution of learning in the British dominions. In 1841 the first Par¬ liament of Canada extended the charter and changed the name to Victoria College, with power to grant degrees in the various faculties. Work in the faculty of arts was begun in the same year. This was therefore the first uni¬ versity in actual operation in the province. The Presbyterian Church, which some years pre¬ viously had petitioned the provincial govern¬ ment <(to endow without delay, an institution or professorships for the education and training of young men for the ministry in connection with the Synod* had received but little en¬ couragement, and so steps were taken to found a college somewhat after the model of the Scottish national universities. A royal charter was granted on 16 Oct. 1841 for the establish¬ ment of Queen's College at Kingston, and the first classes were opened there in March of the following year.

In the meanwhile affairs at King's College had been almost at a standstill. Owing to the pressure of public opinion a modification of the charter had been made by the legislature in 1837, but the chief grievances had not been removed. Teaching was not actually begun until 1843, that is, not until after the two other colleges had been established. The agitation increased in volume and bitterness until in 1849 it effected a complete change in the con¬ stitution of the university. The special privi¬ leges accorded to members of the Church of England were abolished. From this time on the University of Toronto, as it was now called, was nonsectarian. The immediate effect of this reorganization seemed at first disastrous. Within three years a charter had been granted to a new university in Toronto entirely under Anglican control. Trinity College began work early in 1852, and the university constituency was still further divided. In 1866 three more denominational colleges were opened in On¬ tario, namely, Ottawa College (Roman Cath¬ olic), which in this year was granted the power of conferring university degrees, and in 1889 became the University of Ottawa ; Regiopolis College (Roman Catholic), at Kingston; and Albert College (Methodist Episcopal), at Belle¬ ville. In 1878 Huron College (Anglican) at Lon¬ don became Western University, and in 1887 Toronto Baptist College and Woodstock Col¬ lege were united under the corporate name of McMaster University

with full university powers. Not all of these have survived, how¬ ever. Regiopolis College closed its doors in 1869; and in 1884, in consequence of the union

of the various branches of Methodism in Can¬ ada, Albert College was incorporated in so far as its undergraduate work was concerned with Victoria College, and the name of the latter was changed to Victoria University.

The evils of the multiplication of small col¬ leges brought about their own cure. The enor¬ mous expansion of modern science imperatively demanded larqe expenditures for both buildings and equipment, and none of the existing in¬ stitutions was able adequately to meet the demand. It was natural therefore that an effort should be made to devise a plan by which the ruinous duplication of expensive apparatus and plant could be avoided. Accordingly in 1884 the Minister of Education called a meeting of the heˆds of the various colleges and uni¬ versities of the province for the purpose of discussing ways and means to accomplish this end. The result of these deliberations was that an act was passed by the legislature in 1887 reorganizing the university in order to permit of the federation of the various institutions in¬ volved. Queen's University, which at one time had seemed ready to accept the federation idea, finally decided to retain its independence at Kingston. The only Arts colleges, therefore, to carry out the scheme were Toronto and Victoria. The latter agreed to hold in abey¬ ance its degree conferring power in all depart¬ ments except Divinity, and in 1891 moved from Cobourg to Toronto. In 1903 Trinity College entered into federation and in 1907 Saint Michael's College (Roman Catholic) also began work as an Arts college of the University of Toronto.

The first 14 years of the 20th century were years of extraordinary expansion for Canadian universities. Queen's University had now a clear field in eastern Ontario and under the late Principal Grant became one of the great uni¬ versities of the Dominion. The University of Toronto under the late President Loudon, and since 1907

under President R. A. (now Sir Robert) Falconer grew to be one of the largest universities in the British Empire. At the out¬ break of the war, which swept it almost clean of men students, as it did most British univer¬ sities, the enrolment stood at 4,428.

Western Provinces. — Higher education in Manitoba is of recent date. By act of legisla¬ ture in 1877 the University of Manitoba was established, with the sole power of conferring degrees in arts, law and medicine in the prov¬ ince; degrees in divinity may only be conferred by colleges affiliated with the university. In its early years the university was an examining and degree-conferring body only, all teaching being left to the affiliated colleges. Later, how¬ ever, a grant of land was made by the provin¬ cial government for the erection of a building for purposes of instruction in the departments of science and for a university library.

There are seven colleges affiliated with the University of Manitoba: Saint Boniface Col¬ lege is a Roman Catholic institution and was established as a small school so early as 1818; Saint John's College (Church of England) was founded in 1866; Manitoba College (Presby¬ terian) in 1871 ; Wesley College (Methodist) in 1888; Manitoba Medical College was affili¬ ated in 1882; the College of Pharmacy in 1902; and the Agricultural College in 1907. All are in Winnipeg except Saint Boniface College, which

remains at the town of Saint Boniface, where it was first established. The growth of the insti¬ tution necessitated new buildings and a site was chosen at Tuxedo Park and buildings erected.

In 1903 an ordinance was passed to establish a university for the Northwest territories, which has developed into the University of Saskatche¬ wan. The cornerstone of the first building was laid by Sir Wilfrid Laurier at Saskatoon in 1910 and the building opened for students in 1912. Emmanuel College, founded in 1879 at Prince Albert by Bishop McLean for the train¬ ing of native helpers, and transferred in 1909 to Saskatoon, was the first of the affiliated col¬ leges. A place of special prominence is given to agriculture at this university. A university for Alberta was founded at Edmonton and the first session opened in 1908. Since then per¬ manent buildings have been erected, and various theological colleges and professional societies affiliated to the university. From 1899 to the opening at Vancouver in September 1915 of the University of British Columbia, the interests of higher education in that province were served by the McGill University

College of Brit¬ ish Columbia, an institution which had two branches, one at Vancouver and the other at Victoria, and both affiliated to the McGill Uni¬ versity at Montreal.

A. E. Lang,

Victoria College, University of Toronto.

20. PUBLIC EDUCATION. Under the provisions of the British North America Act, control of public education in Canada is vested in the provincial governments. The position of dissentient denominational schools is, it is true, specially safeguarded under the Act (30-31 .Viet., c. 3, par. 93), and on their behalf the Dominion Parliament may interpose remedial legislation, but, with this exception, the whole organization, conduct and maintenance of edu¬ cation lies with the provinces. At the time of confederation the provinces then existing had already in operation a system of free elemen¬ tary schools, which has since been expanded into the present efficient organization. In general there are two fundamental systems of educa¬ tion throughout Canada, one that of the Prot¬ estant communities, free from the control of religious bodies, and the other that of the Roman Catholic French and Irish communities in which education is united with the religious teaching of the Roman Catholic Church. In Ontario, Roman Catholics have the right to form what are known as “Separate Schools® for elementary education, the local rates for the support of these schools being separately levied and applied. In Quebec, Saskatchewan and Alberta similar provisions apply. In the remaining provinces there are no separate schools for Roman Catholics with state sup¬ port. The figures of the census of 1911 show the high standard obtained in public education in Canada. In a population of 6,319,160 per¬ sons over five years old, only 11.02 per cent are illiterate; in the province of Ontario of the persons over five years old, the illiterates num¬ ber 8 per cent. The percentage of illiteracy is highest amongst the foreign-born and lowest amongst the British-born population. The latest reports available in 1917 show 1,250,000 pupils in 24,871 primary and secondary schools of Canada with about 36,000 teachers. Except in

the province of Quebec all but a small fraction of these schools are government institutions. Throughout the Dominion the cost of educa¬ tion is defrayed from the public revenues, pro¬ vincial and local, and public elementary educa¬ tion is free, except for certain small fees which are payable in parts of the province of Que¬ bec. With the exception of Quebec all the provinces have laws of compulsory education, but under conditions that differ between one province and another. The schools are co-edu- cational and are controlled (within the scope of provincial statutes and regulations) by lo¬ cally elected trustees. Secondary schools or departments and colleges or universities for higher education, exist under government con¬ trol in all the provinces, and the three classes of teaching institutions are more or less co¬ ordinated to allow of natural transition from the lower to the higher. Recent movements in the direction of nature study, manual instruc¬ tion, school gardens, agriculture, domestic science and technical education are all energeti¬ cally in progress.

For the organization of education it is nec¬ essary to consider the provinces separately. Ontario, the most populous of the provinces and the most advanced in matters of education, hav¬ ing largely influenced the educational systems of the other Protestant parts of Canada, de¬ serves the most detailed treatment. The sys¬ tem of public education in Ontario includes kindergartens, public (primary) schools, con¬ tinuation schools, high schools and collegiate institutes, and a provincial university, the whole forming an organic unit. There are, in addi¬ tion, night schools, art schools, model schools, normal schools, teachers' institutes, libraries and technical and industrial schools. Kinder¬ garten schools, admitting children between the ages of four and seven, may be organized at the option of boards of school trustees in cities, towns and incorporated villages. There are at present 216 such schools in the cities and towns of Ontario, with an enrolment of 25,554 pupils. The exercises consist of singing, marching, sewing, object lessons, *etc.* Above these are the public schools of the province, whose or¬ ganization (first placed on a comprehensive basis in 1844 by Egerton Ryerson, superintend¬ ent of education), owes much to the education system of the State of New York. Every township is divided by its council into school sections, and for each section, each incorpo¬ rated village, town and city there is a board of trustees. The latter are elected by the rate¬ payers, both male and female. Within the pro¬ visions of the statutes of the province, and the regulations of the education department, the trustees appoint the teachers, determine the salaries and provide and maintain buildings and equipment. The provincial government makes an annual grant of money to each

school according to' the average number of pupils in attendance. For the rural schools the county council adds an equal grant, the township coun¬ cil contributes $100 ($150 for a school with two teachers), and the remaining funds needed are raised from the ratepayers. In cities, towns and villages the legislative grant is sup¬ plemented by funds raised by the municipal council. All the public schools are free, and under an Act of 1891, trustees are empowered to supply textbooks either free or at reduced

prices. In the uniform course of study pre¬ scribed by the education department, chief stress is laid on reading, writing, arithmetic, grammar, geography and drawing. In the upper forms British and Canadian history and commercial subjects are taught; agriculture is taught in rural schools. Periodic talks are given on temperance and hygiene. Only text¬ books authorized by the education department are allowed. Attendance is obligatory for all children between the ages of 8 and 14 years, not attending separate schools and not under efficient instruction at home. The public schools are strictly nonsectarian, but the schools are opened and closed with the reading of the Lord's prayer and portions of the Scriptures are read daily. The clergy of any denomina¬ tion may arrange with the trustees to give re¬ ligious instruction in the school after the reg¬ ular hours. Any group of five or more heads of families may, upon giving notice to the mu¬ nicipal clerk, cease to pay school rates, and be¬ come supporters of a separate school. This privilege may be used by any religious sect or by persons of color; in actual fact, of the 542 separate schools existing in Ontario all but five are Roman Catholic institutions. The course of instruction given in. the separate schools is almost indentical with that of the public schools, with the addition of special re¬ ligious teaching. Separate schools share in the legislative grant. In 1916 there were 6,600 pub¬ lic schools (including 537 Roman Catholic sep¬ arate schools) with 11,850 teachers (including 1,389 in Roman Catholic separate schools) and 505,074 pupils, 67,481 of whom attend the Roman Catholic separate schools. The average salaries in public schools are as follows: Prov¬ ince — male $902, female $613; urban — male $1,310, female $696; rural — male $621, female $549. For secondary education Ontario has an admirable system of high schools and collegiate institutes ; these are almost identical in char¬ acter, the collegiate having a larger and more highly qualified staff, special facilities in re¬ gard to apparatus, etc., and receiving a larger government grant. Any high school may be¬ come a collegiate institute on fulfilling the re¬ quirements. High schools and collegiate in¬ stitutes are created by municipal and county councils and

managed by elective boards of trustees. The original cost, and the cost of permanent improvements are defrayed by the local authorities. For current expenditure, the provincial government contributes a yearly grant varying according to situation, attendance, etc., but with a fixed minimum. The grants average from $500 to $800. The county con¬ tributes an equal amount. The remaining ex¬ pense is met by the municipality. About one-third of the schools are free, in the others the annual fee varies from $2.50 to $26. A uni¬ form examination is prescribed for admission. A graded series of four forms leads to the uni¬ form Heaving® examinations (junior and senior) conducted by the department, on the results of which certificates are granted. The matriculation examination for the provincial university is almost identical with the junior leaving examination. In 1916 there were in Ontario, 160 high schools and collegiate insti¬ tutes, with 1,023 teachers and 38,426 pupils. Coeducation obtains in all of them, approxi¬ mately 20,000 of the registered pupils being

girls. The total expenditure was $3,444,940. One hundred and thirty-two continuation schools intended to provide an education suited to the needs of the youth of the agricultural communities have been established. The num¬ ber of pupils in 1916 was 6,800 with 237 teach¬ ers. The total expenditure was $294,125. The total school expenditure for all classes of schools was $17,049,244, the provincial govern¬ ment grant amounting to $1,104,775. Special attention is paid in Ontario to the uniform qualification and training of teachers. The lowest grade of public school teachers (third class) must pass the high school primary ex¬ amination (Forms I and II) and attend a county model school. Teachers of the second class must pass the junior leaving and attend the provincial normal school. Teachers of the first class must pass the senior leaving exami¬ nation, and attend the school of pedagogy in Toronto. To hold a position in a high school a teacher must hold a first class public school certificate, or have passed at least equivalent university examinations. For special positions in collegiates, higher university standing' is de¬ manded, varying according to "the subject. Un¬ less by special permission of

the department, only the certificates of the universities in On¬ tario are accepted. At the head of the system is the Minister of Education, a member of the Provincial Cabinet.

The problem of public education in the Province of Quebec, owing to the division of the population between the French and English races, and the Roman Catholic and Protestant religions is one of peculiar difficulty. The dif¬ ference of creeds has led to the establishment of a dual system of elementary, secondary and superior schools. The Roman Catholics of the province, numbering (census of 1911) 1,724,683, had 6,119 schools of all kinds; the Protestant population of 378,549 had 897. At the head of the educational system is a superintendent of public instruction with a council composed of all the Roman Catholic bishops whose dioceses or parts of whose dioceses are in the Provinces of Quebec, now numbering 15, an equal number of Roman Catholic laymen appointed by the Crown and an equal number of Protestants similarly appointed. Within the council are a Protestant committee and a Roman Catholic committee which control the schools of their respective denominations. Each has its ele¬ mentary, model, normal and high schools and academies. School attendance is not compul¬ sory. In each parish or township there is a board of school commissioners elected by the owners of real estate. These erect and main¬ tain schools, appoint teachers and levy the school tax, which falls on real property only. But in any such district a dissentient minority professing a religious faith different from that of the majority, may organize themselves sepa¬ rately, elect a board of trustees and conduct a school of their own. In the cities and towns there are separate Protectant and Roman Cath¬ olic boards of school commissioners. Real estate is taxed for school purposes according to the religious faith of its owners. The finan¬ cial resources of the school municipalities com¬ prise (1) the sums raised by local rates, and (2) grants made by the Legislature. The former consists of the school assessment, which is levied on all ratable property of a school

municipality and the monthly fee, which is col¬ lected for every child who attends or who should attend the public schools. The grant of the Legislature is divided proportionately to the number of the children enrolled. In 1916 there were 5,998 elementary schools, with 7,982 teach¬ ers and 251,492 pupils. The average salary for elementary teachers is male $938 and female $236. There were 1,042 academics, high schools and model schools, with 196,595 pupils. The public schools mentioned above are practically Roman Catholic schools with 897 separate schools attended by 54,745 pupils, of whom nearly all

are Protestants. The total school expenditure for the province in 1916 was $11,- 564,043.64, the government grant amounting to

$1,882,837.73.

In each of the three maritime provinces (New Brunswick, Nova Scotia and Prince Ed¬ ward Island) there is a system of public ele¬ mentary schools, normal schools, high schools and academies (grammar schools in New Brunswick), whose organization closely re¬ sembles that of the Ontario schools. In each province the executive council, acting through its superintendent of education is at the head of the system. The elementary schools are free, coeducational, non-denominational, with com¬ pulsory attendance, placed under trustees elected in each school district, and supported partly by provincial, county and municipal grants, partly by local assessments. In these provinces the annual (<school meeting® of rate¬ payers which elects the trustees, also votes the amount of money to be locally assessed. In Prince Edward Island in 1916 there were 476 public schools with 595 teachers and 18,362 pupils. The average salary for primary school teachers is male $276-$543 and female $220— $371. There were 28 first class schools (doing high school work) with 1,563 pupils. The total school expenditure for the year was $244,572.29, the provincial expenditure amounting to $173,- 962.56. In Prince Edward Island the Prince of Wales College at Charlottetown is a secondary school with governmental support, having a normal school department for the training of teachers. In New Brunswick in 1916 there were 2,020 public schools with 2,141 teachers and 66,044 pupils. The average salary for pub¬ lic school teachers is: Male $290-$873, female $261-$482. There were 39 grammar and su¬ perior schools (high school grades) with 2,365 pupils. The total school expenditure for the year was $1,221,224.71, the government grant amounting to $280,827.35. In certain towns and in some French Canadian settlements there are separate schools for Roman Catholics, attendance at which satisfies the requirements of the provincial law, but the schools are neither supported nor controlled by the state. New Brunswick has a provincial university, whose president is adjoined to .the executive council in its capacity of board of education. In Nova Scotia in 1916 there were 2,837 public schools with 3,019 teachers and 99,463 pupils. The average salary for public school teachers is: Male $262-$872 and female $238-$482.

There were 64 high schools (including 18 academies) with 9,726 pupils. The total school expenditure for the year was $1,620,154, the

provincial government grant amounting to

$414,738.

In Manitoba the executive council, or cab-

inet, is at the head of public education. There is a minister of education who is advised and assisted by a deputy minister and a superin¬ tendent. An advisory board, partly appointed, partly elected by the teachers, aids the govern¬ ment in organizing the school curriculum, es¬ tablishing teachers' qualifications, *etc.* The pro¬ vincial system includes public (primary) schools, a higher grade of which are called intermediate schools, and secondary education is provided for in high schools and collegiate institutes. Schools are free and are supported by provincial grants, municipal grants and a local school tax levied by the trustees. School districts are erected by local municipalities and trustees are elected therein. The whole system closely resembles that of Ontario. (For the pro¬ vincial university see article Canadian Uni¬ versities). The question of separate schools for Roman Catholics was long a subject of acute controversy. Established in 1871, they were abolished in 1890. The agitation in favor of their restoration reached an alarming crisis in 1895. A compromise was made in 1896 whereby religious instruction may be given during the last half hour of the school day, and which permits the Roman Catholic school children of a district, if numbering 25 or more, to have a teacher of their own denomination. Manitoba has two provincial normal schools for the train¬ ing of teachers, one in Winnipeg and the other in Brandon. In 1916 there were 1900 public schools with 2,991 teachers and 97,100 pupils. The average salary for a public school teacher is $768. There were 102 high schools and col¬ legiate institutes with 6,696 pupils. The total school expenditure for the year was $6,658,229, the provincial government grant amounting to

$901,117.40.

British Columbia has a system of free, non-denominational public schools, controlled by the provincial government through a superintendent of education. The schools are supported partly from the provincial treasury and partly by the sums raised by the district assessment. In British Columbia in 1916 there were 808 public schools, with 1,984 teachers and 64,570 pupils. The average salary for public school teachers is $800. There were 40 high schools, con¬ trolled by local boards of trustees, with 4,770 pupils. The total school expenditure was $3,- 216,350, the provincial government grant amounting to $1,591,322. British Columbia has two normal schools and a provincial univer¬ sity.

The provinces of Alberta and Saskatchewan have systems of public schools administered by a Department of Education presided over by a minister of education, who is assisted in the case of Saskatchewan by a superintendent of education, and in Alberta by a deputy minister as permanent administrative head. The organ¬ ization is similar to that of Ontario. In the provinces of Alberta and Saskatchewan the minority ratepayers in any district, whether Roman Catholic or Protestant, may establish separate schools and become liable only to as¬ sessment at such rates as they impose upon themselves in respect thereof. In practice this privilege is but little used. In 1917 there were in Saskatchewan only 19 separate schools out of a total of 4,022 elementary schools, and in Alberta only nine separate schools. There are normal schools at Regina, Saskatoon, Edmon¬

ton and Calgary, and universities at Regina, Saskatchewan and Strathcona, Alberta.

Stephen Leacock,

Professor of Economics and Political Science , M cGill U niversity.

21. TECHNICAL EDUCATION IN CANADA. The term technical education is used with a variety of meanings. The general idea seems to be. the use of schools and indus¬ trial appliances in preparing young men and women for skilled occupations. ((Even in Ger¬ many, » we are told, «the old apprenticeship is dead.® However even the narrower statement seems to be becoming still more limited, for the legal and clerical professions, which seem still to require education and apprenticeship, and even the medical profession, which demands a time course and fixed laboratory work, are not now regarded in the public mind as coming under the heading of technical education.

Tech¬ nical education, in its present more limited use, seems to be regarded as a joint course of pro¬ portionate time in the class room and another period of time in the practice of handicraft — sometimes spoken of as a <(trade® or ˆindustry.® Whether this definition be generally accepted or not, we shall follow it in this article.

In Canada the most notable event in con¬ nection with this specific education is found in the appointment in 1910 of the ((Royal Commis¬ sion on Industrial Training and Technical Edu¬ cation.® As one of the commissioners on this body the writer may state that it was consti¬ tuted as a court with seven members from different parts of Canada with a skilled secre¬ tary. This body, under the direction of the Dominion government, spent two years or more in (1) taking sworn evidence in Canada from 1,400 witnesses of every class (including in the evenings representatives of the ((labor organiza¬ tions®) as to their industrial needs. (2) Visit¬ ing manufactories, schools and universities in Canada. (3) Going, under government direc¬ tion, to other countries, including the United States, and in Europe, the British Isles, France, Germany, Switzerland, Holland, Belgium and Denmark. (4) Embodying their report in four large octavo volumes aggregating in all nearly 2,000 pages. In their report the Royal Com¬ mission gave an elaborate sketch of what they had seen in all these lands and made a recom¬ mendation that $3,000,000 a year for 10 years, making a total of $30,000,000, should be appro¬ priated for securing <(industrial training and technical education® for as many as sought it among the Canadian people.

In the Canadian Confederation the matter of education is reserved to the nine provinces of the Dominion, viz., Nova Scotia, New Bruns¬ wick, Prince Edward Island, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. To meet this case, the proposal of the Royal Commission is that while the Do¬ minion will give the money to be supplied and administered by a ((Dominion Government Com¬ mission® appointed by itself, yet it is to be given through the medium of boards and committees under the authority of the several provinces. The suggestion has been cordially received by the various provincial governments, and but for the European War, in which Canada as a part of the British empire is involved, would have been almost certainly carried out.

The Objects of the Royal Commission. —

These are: (1) The education of trained teachers and demonstrators to carry out the purposes of the commission. (2) The estab¬ lishment of classes, courses and schools for industrial training and technical education. (3) Provision to be made for laboratory ap¬ paratus and teaching equipment. (4) Scholar¬ ships to be given to deserving pupils. (5) Pro¬ vision for traveling experts to visit institutions. (6) Help for institutions, such as universities and colleges. (7) Promotion of diffusion of scientific and industrial research.

Canada's Present Equipment.

I. Under University Control. — Com¬ mencing with the Atlantic coast, the Halifax Technical College is affiliated with several of the universities of Nova Scotia and New Bruns¬ wick. It has a competent staff of professors and assistants. Engineering students who take two years in the universities in a suitable course enter in their third year and finish in their fourth in the technical college. This arrange¬ ment has proved very successful. An excellent engineering department is found in McGill Uni¬ versity, Montreal. This department receives efficient support from the Canadian Pacific Rail¬ way. Queen's University, Kingston, Ontario, especially in its mining school, has excellent courses in practical science. Toronto Univer¬ sity — the provincial university — has a strong faculty of applied science. The several depart¬ ments of the faculty distributed in various buildings are: Civil engineering, mining en¬ gineering, mechanical engineering, architecture, analytical and applied chemistry, chemical en¬ gineering and electrical engineering.

II. Government and Municipal Technical Schools. — The several provinces of the Do¬ minion have their different methods of dealing with technical education, and the newer prov¬ inces are much alive to the necessity of such schools. Nova Scotia, though not a large prov¬ ince, has been forward in providing various kinds of science schools. Much attention has been paid to continuation and night schools. The coal mining schools have been efficiently used in this province. Other mining schools also are maintained. Technical schools are maintained in Truro, Amherst, Yarmouth, New Glascow and Sidney. The province of Quebec has two notable technical schools maintained by the provincial government, besides a number of smaller local schools of

this type. (1) Mon¬ treal. — This technical school, opened in 1911, is declared to rival any technical school of its class in America or Europe. It was erected and is maintained by the Quebec provincial government. The city of Montreal also assists it. Day and night classes of every variety are maintained. (2) Quebec City. — A replica of the Montreal school, erected and supported by the government of the province, is three-fifths of the size of the Montreal school. (3) The Shawinigan Technical Institute, on the Saint Maurice River, is a remarkably complete school, maintained in part by the Quebec government in a thriving manufacturing town. In the province of Ontario, in 1915, a magnificent technical school was erected in Toronto, at a cost of $1,400,000 exclusive of site and equip¬ ment, to take the place of one limited in size and efficiency. The new school (with seven

acres of floor space) can accommodate 2,500 day pupils and a vast number of night pupils, giving instruction in a great variety of subjects. It represents the aspiration of Toronto to be a great manufacturing centre. (4) Hamilton City, also aiming at being a leading trade city, in 1909 erected a building, costing $100,000, exclusively for technical education. Here, ad¬ jacent to a regular collegiate school efficient teaching is given in woodworking, machinery, forging, electrical work, household science, drafting, printing and in fine arts. Brantford, called the ˆSheffield® of Canada, has lately fin¬ ished a commodious technical school. Woodstock, Kitchener (late Berlin), Peterborough and Saint Thomas are industrial centres with excellent educational facilities. In most of these schools woodworking, building construc¬ tion, mathematics, mechanical drawing, applied sciences, dressmaking, millinery, commercial work and practical English are largely taught. Many other Ontario towns have technical evening schools. In the mineral region of On¬ tario on Lake Huron are two towns — Sault Sainte Marie and Sudbury, in which apprentices and workmen receive training in their craft.

In Winnipeg, Manitoba, now the third citv in size of the Dominion, two great technical high schools — called respectively the Kelvin and the Saint John's — erected by the city itself at a cost of $450,000 each without site, are in full operation, and of the night schools of the city numbering 5,000 in attendance half are in these technical schools. Calgary, a considerable city of Alberta, has shown great enterprise in this direction and has large and very successful schools in many technical subjects.

On the Pacific Coast the city of Vancouver, British Columbia, has gained a high reputation, especially for its technical night schools.

III. Railway Employee Schools. — In Stratford (Grand Trunk shops), in Saint Thomas (New York Central shops), in Mon¬ treal (Canadian Pacific shops). A successful training is given to young lads who enter the shops about the age of 13 to 15. The hours in the morning are taken from the company's time, and the teaching is done in the shop precincts. Shop mechanics, workshop practice, mechanical drawing — also mechanics, elec¬ tricity, car construction, and, if desired, teleg¬ raphy and shorthand are taught.

IV. Agriculture and Horticulture. — The cry of the agriculturist preceded that of the manufacturer and the first ambitious design of Canadians was. to improve agriculture. Hence the provincial demand in almost every case is for technology on the farm. After several weak attempts in Nova Scotia at agricultural teaching the college at Truro was begun there in 1905. It has been a popular institution and draws its pupils from the three maritime prov¬ inces of Nova Scotia, New Brunswick and Prince Edward Island. The summer school of science, which has existed in Nova Scotia for some 30 years, has been merged into the Agri¬ cultural College at Truro, which for the last 10 years (1908-18) has been well maintained in this town. From 200 to 500 teachers of public schools attend the six weeks' course in training supplied by the Agricultural College at Truro. The province meets the expense of traveling and maintenance for the session and is doing a large work for the maritime prov-CANADA— CATHOLIC EDUCATION (22)

inces of Canada. Two excellent agricultural colleges a.e found in the province of Quebec, viz., the Macdonald College at Saint Anne and the Oka College in the Ottawa River District. The former of these is 20 miles from Montreal and its farms and beautiful buildings are the gift of Sir William Macdonald, a wealthy manufacturer of Montreal. It is divided into three parts : a school of agriculture, a school for teachers and a school for household science. Registration, tuition, board and laboratory fees are charged. Various courses are given in hor¬ ticulture, farming, etc., making the institution a boon to the province and attracting consider¬ able numbers from other provinces. Chiefly

for the benefit of the element of French-speak¬ ing people in Quebec, who are largely farmers, the Oka College was, after some 14 years of more or less successful existence, reorganized in 1909. It is affiliated with the French Uni¬ versity (Laval) in Quebec. It is well housed and has a farm of 1,800 acres, 700 under culti¬ vation. Its laboratories are well equipped and it has a good technical laboratory. Both the French and English languages are taught in the college. Forestry is taught and Quebec has the most complete fire protection of its forests of any province of the Dominion. The college an¬ nouncement says : ((Agricultural tastes and agri¬ cultural education produce a virile nation!® The examinations are conducted by the authori¬ ties of Laval University. In Ontario, the Provincial Agricultural College of the province is situated near the city of Guelph. It is one of the most notable agricultural colleges on the American continent. It has a staff of 46 in¬ structors, and lately a branch for women was opened. In 1909 there were 1,296 students in attendance. It gives courses for rural teachers. The college course that leads to a degree at Toronto University is four years. There are over 5,000 members of the Farmer's Union who are conducting agricultural experiments and re¬ porting each year to the college authorities. This college has been the alma mater or edu¬ cator of professors in agriculture in the other provinces of the Dominion, and also in many of the agricultural colleges in the United States. The Agricultural College of the province of Manitoba, with its 8 or 10 buildings, is the most magnificent of the agricultural colleges of the Dominion, costing some $4,000,000. It is affiliated with the University of Manitoba, Winnipeg, and has a complete staff. It has educated bands of students and conducts exten¬ sive courses, lectures, etc., throughout the province. It aims at reaching large numbers of the people by holding summer schools, uniting several professions and devoting itself heartily to prairie life. The Saskatchewan Agricultural College is a part of the University of Saskatche¬ wan, which is located at the city of Saskatoon. Its extensive work has been very widespread. The faculty proposes to develop along lines of investigation, teaching and extension work. Its extension work has taken the following forms: Encouraging agricultural societies and competi¬ tion in stock and farming, farmers' institutes, excursions to experimental farms and seed-grain farms, institutes, farmers' and women's clubs. The government gives a liberal appro¬ priation for this work. Alberta and British Columbia are newly established universities and both have agricultural farms maintained by the

Dominion. No doubt they will develop largely along the line of those

of the provinces of Manitoba and Saskatchewan. The Conserva¬ tion Commission of Canada, with its head¬ quarters at Ottawa, has done in its seven years of service in agricultural problems, health, town-planning and forest protection, protection of game and fish, notable work in technical research.

V. Special Features. — In different prov¬ inces are found special features: (a) Mining schools with 673 pupils in attendance are found in 29 places in Nova Scotia; (b) in connection with Saskatchewan agricultural department of the University at Saskatoon extension work takes place for experimental farms, farmers' institutes, agricultural societies, farmers' and women's clubs, *etc.* This is a peripatetic ex¬ periment. In 1916 the Dominion government urged on by learned societies established an Honorary Advisory Council of Scientific and Industrial Research in Canada* This council was closely attached to leading departments of the Dominion government at Ottawa. Several scientists of world-wide reputation, such as Dr. Macallum, Dr. F. D. Adams, Dr. J. C. Mc¬ Lennan and Dr. A. S. Mackenzie were placed on it. Leaders in trade, agriculture, labor and research were chosen to deal with natural re¬ sources, waste products, forestry, farming and pressing industrial problems. This movement has been viewed in Canada with universal approbation.

George Bryce,

Member of Conservation Commission of Can¬ ada; Royal Commission on Technical Educa¬ tion (1910-13), and of Royal Society Com¬ mittee on Research (1916).

22. CATHOLIC EDUCATION. The French Regime (1608-1760). — During this period education in Canada was almost en¬ tirely under the control of the Catholic Church. The first permanent school was the <(Little School® founded by the Jesuits at Quebec in 1635. The first institution of higher learning was the Jesuits' College, also at Quebec, opened in 1636 or 1637. It maintained a classical course similar to those of the famous Jesuit colleges of France, and, after 1707, when the public School of Hydrography was attached to it, became a scientific centre of some im¬ portance. In 1663 Bishop Laval founded the Seminar}ˆ of Quebec ; in 1668 the Little Semi¬ nary, a preparatory school for boys aspiring to the priesthood ; and about the same date the model farm and industrial school of Saint Joachim at Cap Tourmente. From 1666 schools for boys were maintained in Montreal by the Sulpician Fathers, and in several smaller towns and villages schools were established by the Recollets. From 1718 to_ 1730 the Hospitaller Brothers of Montreal, assisted by a royal grant, maintained

a kind of normal school, and sup¬ ported eight .teachers in Montreal and neigh¬ boring parishes. Convent schools for girls were conducted by the Ursulines at Quebec (1639) and Three Rivers (1697), and by the Congregation of Notre Dame, founded at Mon¬ treal in 1659 by Marguerite Bourgeoys and rep¬ resented by branches in many of the larger vil¬ lages. Moreover, by the middle of the 18th century parochial schools existed in the ma¬ jority of the country parishes, After 1727

teachers were by ordinance placed under the supervision of the parish priests, and were re¬ quired to obtain licenses both from the King's Intendant and from the Bishop or Archdeacon of Quebec. Some country schools had Latin classes. In general, education was more wide¬ spread than might be assumed. A majority, or at least a very large minority, of the habitants could read and write. All this was accom¬ plished by the free efforts of Church and peo¬ ple; no assistance was obtained from govern¬ ment, except a few slight subsidies and some grants of land to religious teaching orders. In Acadia (now Nova Scotia and New Bruns¬ wick) education was more backward than in Canada. We hear of a seminary and a girls' school at Port Royal (now Annapolis) before 1640, and, after the temporary English con¬ quest of 1654, of schools for boys and girls. These disappeared on the final conquest in 1710. In Cape Breton the fortress-town of Louisbourg had its own schools, including a convent of the Sisters of Notre Dame, but town and schools alike disappeared after the capitulation to the English in 1758.

Canada 1760-1867. — The British conquest was followed by a decline in education. The Church in Canada was thrown on its own re¬ sources by the break with France, and hampered by the prejudices of alien rulers. The British government tolerated the religious orders of women, but directed the gradual extinction of those of men and the confiscation of their prop¬ erty, property which Canadians believed to have been granted, in large part, as an endowment for education. The Jesuits' College was abandoned in 1768. Both Jesuits and Recollets

disappeared at the beginning of the 19th century, but Sulpician exiles from Revolutionary France were admitted to Canada, and henceforth that order revived. The government had ordered meas¬ ures to be taken — especially the establishment of Protestant schools — to win the Canadians to Protestantism, but in fact little attempt at proselytism was made. Nevertheless the sus¬ picions of the inhabitants were aroused, and there was made permanent under British rule that close union of religion and national cul¬ ture which is so marked a characteristic of the French Canadian people. In 1791 the colony was divided into the provinces of Lower Can¬ ada, mainly French and Catholic, and Upper Canada, where the inhabitants were chiefly newly-arrived English-speaking Protestants. Parliamentary institutions were conceded, and through these the Catholic people of Lower Canada gradually obtained control of their schools. An attempt in 1818 to give a monopoly of education to the Royal Institution for the Advancement of Learning, a body mainly Eng¬ lish and Anglican, was defeated by the hostil¬ ity of the people themselves. In 1824 the in¬ dependent religious schools, Catholic and Prot¬ estant, were recognized by the Legislature, and in 1829 they received state aid. After 1829 the revenues from the Jesuit estates were devoted to educational purposes, and in 1839 the Sulpician estates were confirmed to that order. In Upper Canada Catholics were not numerous. Only a few schools were established, several by the Rev. Alexander Macdonell (consecrated Bishop of Kingston in 1826), who brought teachers from Scotland and obtained a small subsidy from the British government. In 1840

the two Canadian provinces were reunited. Contrary to expectations, this strengthened the position of the French, and, because of their support, of the Catholics of Upper Canada. The period which followed was one of con¬ flict between the ideal of educational uniform¬ ity — the imposition on all classes of a uni¬ form system, more or less secular in character

— and that of freedom — the preservation to each locality, and especially to each religious denomination, of a large liberty in shaping the teaching of its children. The Act of 1841 or¬ ganizing primary schools allowed the religious minority in any locality to establish a separate school and receive its due proportion of state aid. Thence sprang the Separate Schools of Upper Canada and the Protestant Schools of Lower Canada. The independent denomina¬ tional school system was fully established in the lower province by 1846, but in Upper Can¬ ada a bitter struggle preceded the complete recognition of

Separate Schools, which was ac¬ complished by the Scott Act of 1863. The lat¬ ter part of this epoch was marked by the found¬ ing in Canada, or the introduction from abroad, of a large number of religious teaching orders, and also by the opening of many of those class¬ ical and commercial colleges which play so large a role in education in Quebec. In 1852 the Seminary of Quebec founded Laval Uni¬ versity, and in 1866 in Upper Canada Regiopolis College (founded at Kingston, 1846) and Ottawa College (founded as the College of Bytown, 1849) received charters as universities.

The Maritime Provinces, 1760-1867. — After the British conquest only a few Catholics

— Indians, refugee Acadians and Irish settlers

— remained in these regions. From 1766 to 1786 all teaching by “popish recusantsˆ was sternly prohibited by law, and even after that date Catholic schools were few and irregular. The repatriation of the Acadians, and Irish and especially Scottish immigration, gradually improved the Catholic position. In 1802 Father Edmund Burke, afterwards bishop, built a col¬ lege at Halifax but could not find teachers. In 1820 he had two flourishing schools in that city, and the beginning of a seminary. As time passed other institutions of higher learning were opened, religious teachers brought in, and Catholic primary schools established, receiving in some places state aid.

The West 1760-1870.— In 1818 Father — afterward Bishop — Provencher established a mission on the Red River and opened schools at Saint Boniface and Pembina. He and his successor, Bishop Tache, labored earnestly in the cause of education. At Saint Boniface Latin classes were begun about 1823, a’ girls’ school was established in 1829, and an indus¬ trial school in 1838. By 1845 five Catholic schools were in permanent operation in the West, besides several of irregular character. Father Lacombe opened a school at Edmon¬ ton in 1862, and about the same time the foun¬ dations of Catholic education were being laid in British Columbia, where colleges were opened at Victoria, 1863, and at New West¬ minster, 1866. The College of Saint Boniface had been established in 1857. In 1845 the Grey Nuns came to Saint Boniface, and in 1859 the Sisters of Saint Anne to Victoria. These measures were for the benefit of whites and Metis. Indian mission schools were established

from 1833 on; a great impetus to this mission¬ ary work was given after 1845 when it was largely taken over by the Oblate Fathers..

Confederation (1867).— By the British North America Act of 1867 the provinces of Canada (Upper and Lower Canada becoming Ontario and Quebec), Nova Scotia and New Brunswick were united in federal union to form the Dominion of Canada. Other prov-ices have since been added. Education was assigned to provincial control, but the prov¬ inces were prohibited from interfering with de¬ nominational rights as existent at the union, and the Dominion Parliament was empowered to redress any other infringements on the educa¬ tional rights of religious minorities.

Ontario. — Elementary education is free and compulsory, and is provided by public and separate schools, both under state control. Since confederation the essential elements of the Catholic Separate School system have not been changed. Five or more Catholic heads of families in any locality may maintain a sep¬ arate school and be exempted from public school rates. Trustees elected by the school supporters administer school business. Their revenues consist of (a) provincial grants, based on attendance, efficiency, etc., and dis¬ tributed impartially among public and separate schools; (b) county and other municipal grants distributed on similar bases; (c) rates levied by the trustees on the property of sepa¬ rate school supporters; (d) voluntary con¬ tributions, chiefly from church funds. Teach¬ ers must have the same qualifications in sepa¬ rate as in public schools. By a decision of the Privy Council in 1906 religious teachers were made subject to this rule, from which they had hitherto been exempt. The older religious teachers were, by legislation of 1907, given, on certain conditions, permanent qualification. Re¬ ligious instruction is under the supervision of the parish priests. Secular instruction is identi¬ cal with that in the public schools, and the same standards of efficiency are imposed by the pro¬ vincial Department of Education. Textbooks are the same, except in English literature, in which extracts from Catholic authors are more largely used, and to some extent in history. Since 1882 the Department has maintained a distinct board of separate school inspectors.

Secondary education is supported by the province partly through

advanced classes in public and separate schools, but mainly through high schools. No separate high schools are rec¬ ognized. Catholic secondary education is of¬ fered by private institutions, conducted gen¬ erally by religious orders. There are 32 of these Catholic high schools, academies and col¬ leges. Almost all such schools prepare candi¬ dates for the examinations set by the Depart¬ ment of Education, and many are inspected by provincial high school inspectors. The Uni¬ versity of Ottawa, conducted by the Oblate Fathers, which was canonically erected by Pope Leo XIII in 1889, is the only active Cath¬ olic university. There are English and French courses in arts, and a course in theology. Regiopolis College, closed in 1869 and reopened 1896, offers only secondary instruction. Saint Michael's College, one of the federated arts colleges of the provincial University of To¬ ronto, is the most important centre of higher education for English-speaking Catholics. It

has the full benefit of the lectures and equip¬ ment of the university. University boards, on which Saint Michael's is represented, conduct the examinations — except that the college sets its own papers in philosophy — and confer the degrees. There are 9 professors and 140 stu¬ dents. Women students reside in Loretto Abbey College and Saint Joseph's College. Other colleges doing university work are As¬ sumption College, Sandwich (founded 1855) and Saint Jerome's, Kitchener (1865). In northern Ontario colleges have been opened at North Cobalt (1912) and Sudbury (1913). The principal theological seminaries are Saint Au¬ gustine's, Toronto (1913), Saint Peter's, Lon¬ don (1912) and that attached to the University of Ottawa. In 1915 Ontario had 537 Catholic separate schools, with 1,389 teachers, 67,481 pupils and an average daily attendance of 45,733. The total receipts for the maintenance of these schools in the same year were $1,347,502, of which $42,131 was derived from provincial grants and $879,903 from municipal grants and assessments. The total expenditure in the same year amounted to $1,183,847, of which $503,- 946 was for teachers' salaries and $366,625 for sites and buildings. The expenditure per pupil enrolled amounted to $17.54.

Quebec. — 'The primary school system is denominational and separate : it is based on religion, and Catholics and Protestants have each a complete and independent organization, receiving equal proportional assistance from government. State control is exercised through the Council of Public Instruction as reorgan¬ ized in 1876. It is divided into two committees, Catholic and Protestant. Everything relating specially to Catholic schools is within the ex¬ clusive

jurisdiction of the Catholic committee. The committees meet together to consider mat¬ ters of common interest. The Catholic com¬ mittee consists of the superintendent of public instruction, the bishops of Quebec, an equal number of laymen appointed by the lieutenant-governor, and, since 1906, four associate mem¬ bers chosen from the primary school teachers. Primary schools include elementary schools, giving a four years' course ; intermediate or model, two years ; and superior, or academies, two years. They are ((under control® or ((independent and subsidized® according as they are administered by elected school boards or by other bodies. The province is divided into school municipalities, each electing its school commissioners. The revenues consist of (a) rates levied on property of Catholics; (b) fees; (c) provincial grants; (d) private funds of independent schools. Lay teachers must hold diplomas granted by the central board of ex¬ aminers. The moral and religious supervision of Catholic schools is exercised by the parish priests. Secular studies are prescribed by the Catholic committee. Under it are a Catholic inspector general and divisional inspectors. Al¬ though education is neither free nor compul¬ sory, the school attendance is good. In 1912-13, with a Catholic population of 411,701, of the ages 5 to 16 years, there was an enrolment in primary schools of 362,934 (including 4.520 over 16 years) and an average attendance of 287,403.

Secondary education is not under state con¬ trol, but the province maintains a number of special schools. Among such Catholic institu¬ tions are normal schools — nine for women

have been opened since 1905, — agricultural schools at Oka and Ste Anne de la Pocatiere, a school for higher commercial studies at Mon¬ treal, schools for deaf-mutes and the blind, domestic science schools, night schools and schools of arts and manufactures. Catholic secondary education is offered by classical and commercial colleges conducted by ecclesiastics, 19 of which receive an annual subsidy of $1,000 each, and by convent academies for young ladies. The only university is Laval, which was canonically erected in 1876. It has

faculties of theology, law, medicine and arts and affiliated professional and technical schools. A complete branch of the university was established in Montreal in 1879. Each branch receives a grant of $25,000, and the affiliated Polytechnic School $30,000. The Seminary of Quebec and the Grand Seminary of Saint Sulpice at Montreal constitute the theological faculty, and there are affiliated seminaries. The Sulpician Fathers, besides a college, a philosophical and a theologi¬ cal seminary in Montreal, have since 1888 main¬ tained the Canadian College in Rome for ad¬ vanced ecclesiastical studies. In 1915 there were 5,231 elementary schools, controlled 5,151, independent 80; with an enrolment of 211,672, and an average attendance of 166,125. There were 5,576 lay and 949 religious teachers. The model schools numbered 673 ; controlled 552, independent 121, with an enrolment of 105,831, an average attendance of 89,013 ; and 3,206 teachers, lay 922, religious 2,284. The academies were 283 in number, of which 128 were con¬ trolled and 155 independent. The student en¬ rolment was 75,482, with an average attendance of 65,846; and 286 lay and 2,793 religious teach¬ ers. There are 13 normal schools, 2 for men and 11 for women; with 1,134 pupils and 173 teachers. There are three schools for the deaf, dumb and blind, with 515 pupils and 115 teachers. Schools of arts and trades number 11 ; with 2,515 pupils and 45 teachers. There are 48 night schools, with 3,640 pupils and 107 teachers. Universities and classical colleges comprise *Laval University, Quebec, 87 teach¬ ers, 474 pupils ;* Laval University, Montreal, 234 teachers and 1,786 pupils; 21 colleges with 737 teachers and 7,788 pupils.

Nova Scotia. — Elementary schools are sup¬ ported and controlled by the state, and no separate schools are recognized by law. Never¬ theless in practice many of the public schools, especially in the cities and in Acadian districts, are really Catholic. The law permits the school boards to direct religious exercises to be held for a brief period within school hours, or, if objection is made, after school hours. By a good understanding among all classes, over 30 urban schools, accommodating about 10,000 pupils, are recognized practically as being Cath¬ olic, and are so conducted. Many of them are in charge of religious teachers. There are two academies for boys and 12 for young ladies. That attached to Saint Francis Xavier Univer¬ sity is the county academy of Antigonish, and receives, state support. Saint Francis Xavier University, Antigonish, though a small institu¬ tion, maintains high educational standards. It has faculties of arts, law and applied science. Saint Anne's College, Church Point, is the chief

* Figures for 1914. The totals for 1915 are: teachers 326, pupils 2, 295-

centre of higher education for the French popu¬ lation. A theological seminary is maintained at Halifax. The four Catholic institutions of uni¬ versity rank in Nova Scotia have 54 professors and 500 students and the principal secondary schools, including Antigonish Academy, Mount Saint Vincent College and Sacred Heart Col¬ lege, Halifax; Our Lady of Lourdes School, Pictou, and Saint John Baptist Academy, New Glasgow, have 68 teachers and 1,105 students.

New Brunswick. — In 1871 the legislature, which had hitherto granted some assistance to Catholic education, established a nonsectarian system of public schools. The Catholic authori¬ ties unsuccessfully sought redress from the Do¬ minion under the terms of the British North America Act. In 1875 a compromise was effected: urban school boards were permitted to lease Catholic school buildings, open public schools therein, and employ qualified religious teachers and others having the confidence of the Catholic clergy. Much the same work¬ ing arrangement prevails in the towns and cities of New Brunswick as in Nova Scotia. There are 14 convent academies for young ladies, sev¬ eral preparatory boys' schools, and three classi¬ cal colleges — Saint Joseph's, Memramcook (1864), which has the status of a university and forms an educational centre for the Acadian people; Sacred Heart College, Caraquet (1899), and Saint Thomas, Chatham (1910).

Prince Edward Island. — This province en¬ tered confederation in 1871, having then a public nonsectarian school system. There are no separate schools, but Catholics maintain a few private schools, including seven convent academies of the Congregation of Notre Dame and the classical college of Saint Dunstan's at Charlottetown.

Manitoba.— This province was created by an act of 1870 which, in terms resembling those of the British North America Act, guaranteed the permanence of all rights to denominational schools as then existent, and provided for an appeal to the Dominion against infringements of any other educational rights of the future religious minority. In 1871 a school system modeled on that of Quebec was established, with a board of education divided into Catholic and Protestant committees, 12 Catholic and 12 Protestant school sections, and an equal division of provincial subsidies. Later these grants were divided in proportion to school population. By 1890 Protestant school

sections had in¬ creased to 629, Catholic to 90. In that year the legislature created a political department of education, and absorbed all schools into one nonsectarian system, to be supported by taxes which should be levied equally on all property-holders but applied only to schools conducted in accordance with the new regulations of the department. These prohibited all religious ex¬ ercises except certain scriptural readings and prayers, approved by Protestants but not accept¬ able to Catholics. The judicial committee of the Imperial Privy Council decided in 1892 that the new laws were valid, as not infringing any right in existence in 1870. The Catholics then sought the other means of redress provided, an appeal to the Governor General. In 1895 the Privy Council declared their appeal to be, legally and materially, well founded, since there had been an infringement of rights acquired after 1870. In 1896 the Dominion government

introduced into Parliament a bill to remedy the disabilities of Manitoba Catholics. Parliament's term expired before the bill was passed, and in the subsequent elections Wilfrid Laurier and the Liberal party, who had opposed the bill, were returned to power. Laurier, as Prime Minister of Canada, arranged a compromise under which the Manitoba schools are still ad¬ ministered. The trustees of a school may authorize some slight Catholic religious teach¬ ing, and one Catholic teacher must be employed in an urban school containing 40, or a rural school containing 25 Catholic pupils. The Pope, on the report of his special delegate, Mgr. Merry del Val, declared of the new settlement: ((We have no doubt that these measures have been inspired by a love of fair dealing and good intention. But we cannot conceal the truth. The law made to remedy the evil is defective, imperfect, insufficient.® Catholics have never accepted the settlement as satisfac¬ tory, but have been compelled to acquiesce in it. The French bilingual school districts, 137 in number in 1916, enjoy considerable liberty and maintain schools practically Catholic. In Winnipeg, Brandon, and a few other centres, private parochial schools are kept open under great difficulties. There are Ruthenian paro¬ chial schools in Winnipeg and Sifton. Seven¬ teen convent schools

offer secondary education for girls. In 1909 a Lesser Seminary for boys aspiring to the priesthood was established at Saint Boniface. Higher education is offered by Saint Boniface College, which since 1877 has been a federated college of the University of Manitoba, holding a position somewhat analo¬ gous to that of Saint Michael's in the Univer¬ sity of Toronto.

British Columbia. — British Columbia en¬ tered confederation in 1870. Neither then nor since have separate schools been recognized. Catholics accepted without serious opposition the Public School Act of 1872, which organized a nonsectarian system, but protested strenu¬ ously, though unsuccessfully, against the School Tax Bill of 1876, which levied a special head tax for the support of these schools. Catholics maintain a number of private schools: 11 paro¬ chial schools, six academies for young ladies, and two colleges.

Saskatchewan and Alberta. — That portion of the Canadian West lying between Manitoba and the Rocky Mountains was in 1875 granted a certain local autonomy by the Northwest Ter¬ ritories Act, and in 1905 was formed into the provinces of Saskatchewan and Alberta. The Territories Act guaranteed to the majority in each district the right to establish such schools as they thought fit, with the concurrent right of the minoriy to establish separate schools. In 1884 the local legislature organized a school system resembling that of Quebec, with a Cath¬ olic and a Protestant section of the board of education, each supervising its own schools. Gradually this system was changed into one approximating to that of Nova Scotia, with the addition of a minority right to separate schools as in Ontario. Under the ordinance of 1901, which was the school law when the new provinces were created, education was administered by a political department of state, with a purely advisory educational council, two members of which must be Catholics. Re¬ ligious instruction as directed by the trustees

might be given during the last half-hour of the school day in public or separate schools. The religious minority in any section might establish a separate school. Thus the public school in a section predominantly Catholic may be as much a Catholic school as the separate school in one predominantly Protestant. These rights to religious instruction and to separate schools were made permanent by the Dominion acts creating the provinces of Saskatchewan and Alberta. In each province all government schools, Catholic and Protestant, public and separate, are under control of the provincial department of education, are

subject to the same regulations and the same inspection, use the same courses of study and the same text¬ books and receive grants on the same condi¬ tions from the provincial treasury. In Saskat¬ chewan the Catholic ratepayers of a section must support the Catholic school, if there is such. Complete statistics regarding these schools are not available. In 1915 there were in Saskatchewan 14 Catholic separate schools. There is a considerable number of private educational establishments, chiefly convent boarding schools. In Alberta there is a college, Saint Francis Xavier's, at Edmonton West, and a <(Little Seminary® at St. Albert.

James F. Kenney,

Public Archives of Canada, Ottawa.

23. LITERATURE. In any discussion of Canadian literature the first point one must set¬ tle is. What is Canadian literature? What are its essential characteristics? Is it the work of men and women living in Canada, whether born there or not ; or must we confine it to the writings of native Canadians; is its essential characteristic to be that its matter relates in some way to Canada, whether the author be native or otherwise ; or is it to be restricted to work that is in its distinctive manner Canadian? And, in any of these cases, is it to be under¬ stood as including the quite respectable body of French-Canadian literature? In one of the older countries, the first definition would of course be rejected at once as inadmissible; but the conditions are somewhat different in a young country such as Canada, where one must come down to comparatively recent times to find anything like a large proportion of its writers native born. Yet even in Canada it would be undesirable to accept the first defini¬ tion without reservations. The second would obviously give but a very limited and inade¬ quate view of the literary product of the coun¬ try. The third both includes too much and excludes too much. The fourth definition has much to recommend it, but would be exceed¬ ingly difficult to apply, and if strictly adhered to would necessarily exclude many important books written by Canadians. Probably the safer plan to adopt here, as in so many other cases, is a compromise, to include the best of what is distinctively Canadian in tone, whether by native Canadian or by adopted Canadian, without excluding that which, otherwise meri¬ torious, is not peculiarly Canadian either in manner or matter. Finally, one can not justly or logically confine a survey of Canadian litera¬ ture to that which has been written in English. Quebec is as much a part of the Dominion as Ontario, and the literature of the French-speak¬ ing province cannot be ignored unless one is

prepared to set aside a large and important part of the intellectual product of the country.

Canadian literature, both English and French, has the weaknesses, as well as some of the elements of strength, of a young country. Much of it is crude, particularly that produced in the early pioneer days of the colony. At the same time one finds evidence of a broader out¬ look, a tone and treatment less trammelled by artificial conventions, than is always noticeable in the literatures of older countries. As the country has developed, the crudity has largely disappeared, and at the same time much of the best of what has been produced in Canada since confederation, that is, within the last 50 years, retains the freshness, the atmosphere of youth, the virility, that helped to redeem the literary product of pioneer days from hopeless mediocrity. With a few exceptions, this sketch of Canadian literature will be confined to the confederation period. No attempt will be made to include all the writers, or even all the meri¬ torious writers, of the last half century; the object the writer has in view is rather to con¬ sider briefly the work of a few, whose achieve¬ ment may be taken as fairly representative of the qualit}ˆ and development of Canadian lit¬ erature.

Of Canadian writers whose work was pro¬ duced in the years before confederation, one stands preeminently first — Thomas Chandler Haliburton (q.v.). Indeed, it would be equally true to say that Haliburton stands head and shoulders above any other writer that Canada has produced up to the present time. He ap¬ proached more nearly to the rank of true genius than any other Canadian. He was born in Windsor, Nova Scotia, in 1796; was educated at King's College, in his native town ; practiced law in the ancient town of Annapolis ; for some years sat on the Supreme Court bench of his province ; removed to England in 1856, and be¬ came a member of the British House of Com¬ mons. He died at his beautiful home on the banks of the Thames in 1865.

Haliburton's life was in every sense a full one. In law, politics and

literature, his bril¬ liant intellect and forceful personality put him among the leading men of his generation. He was an ardent Imperialist, and at the time when the Little Englander had things all his own way in the British Parliament, he preached the doctrine of a Greater Britain, and blazed the way for a closer union between the mother country and her overseas dominions. As a Nova Scotian, he was a firm believer in the human and material resources of his native province, and used all the power of his virile pen to stim¬ ulate the ambition of his fellow-countrymen and drive them out of the narrow groove of provincial self-sufficiency into which they had fallen. The influence of Haliburton's writings extended far beyond the boundaries either of his own province or his own generation.

Haliburton was the author of three works of an historical nature, (Historical and Statistical Account of Nova Scotia) (1829), (The Bubbles of Canada * (1837) and (Rule and Misrule of the English in America1* (1851). His lasting reputation, however, rests upon his works of fiction, or rather of humor. He has been called the Mather of American humor.® It is hardly too much to say that he was the greatest humor¬ ist America has yet produced. He did not

depend upon exaggeration to produce the effects he sought. His writings are marked by both wit and wisdom. His humor is always genial. His satire is kindly, constructive rather than destructive. He can be caustic enough when laying bare hypocrisy, but never loses sight of the generous purpose that actuated all his works. There is very little plot in any of his books, but his character drawing is inimi¬ table. Sam Slick has been rightly described as <(among the best imaginative creations of modern times.® But Haliburton will probably be remembered chiefly bv reason of the aphorisms and epigrams that abound in his works. Many of them have become part of our everyday speech. He indeed anticipated more than one famous saying of later writers. The remark of the country girl in (The Clockmaker,* <(I guess I wasn't brought up at all, I growed up,® appeared a dozen years before it was repeated in (Uncle Tom's Cabin* ; and Sydney Smith's famous aphorism really belongs to Sam Slick, whom we find saying, (< Ain't this a hot day? I do wish I could jist slip off my flesh and sit in my bones for a space, to cool myself.® It would be idle to attempt to bring together here, even if it were desirable, the many wise and witty sayings that Haliburton puts into the mouth of Sam Slick and his other characters. Two or three examples will serve the purpose : ((The sk'n is nearer than the shirt® ; <(power has a nateral tendency to cor¬ pulency® ; Svhat people hope for, they think at last

they have a right to® ; <(a nod is as good as a wink to a blind horse® ; ((a man who is a slave to his own rules is his own nigger® ; <(a woman has two smiles that an angel might envy; the smile that accepts a lover before words are uttered, and the smile that lights on the first-born babv and assures him of a mother's love.® Haliburton's first book of humor was (The Clockmaker; or, The Sayings and Doings of Sam Slick of Slickville,* which first appeared in book form in Halifax, in 1837. It was followed bv (The Attache* (1843-44) ; (The Old Judge* (1847) ; <Wise Saws and Modern Instances* (1853); (Nature and Human Nature* (1855). There were several others, but these contain his best work. (The Clockmaker* was translated into German, and (The Old Judge* into both French and German.

Putting aside several more or less feeble essays in Canadian history, we find in Christie's (History of Lower Canada* (1848-55) the first noteworthy attempt, after Haliburton, to tell the story of a portion of British North Amer¬ ica. Robert Christie (1788-1856) was, like Haliburton, a native of Windsor. He also practised law, and took an active part in the political life of his country. But there the resemblance ceased. As a writer he is almost unbelievably dull. Yet his history is valuable, for Christie was a careful and impartial his¬ torian, and made full use of the documentary material that he had collected, and much of which has since been lost.

Tohn Charles Dent (1841-88), in his (Last Forty Years* (1881), deals with the history of the. country from the Union of 1841, where Christie leaves off, down to the year 1881. Dent was as conscientious and painstaking as his predecessor, and had the added qualification of a clear and attractive literary style. He also wrote (The Story of the Upper Canadian

Rebellion* (1885), an admirable work, though somewhat controversial in tone. Dent was no admirer of the fiery leader of the rebellion, William Lyon Mackenzie, and lost no oppor¬ tunity of expressing his feelings.

The most ambitious work of history yet produced in Canada is (The History of Canada* of William Kingsford (1819-98). Kingsford was 65 years of age when he began the prepara¬ tion of his great work, and he toiled at it continuously for over 13 years, living to see its completion, in 10 bulky volumes. His history is heavy in style, and not always to be relied upon on minor points, but generally speaking it is authoritative, and indispensable to the student of Canadian history.

A number of short popular histories of Canada have been written within the last 20 or 25 years, a few of which only are of sufficient importance to mention here. George Bryce's (Short History of the Canadian People,* first published in 1887, and recently brought down to date, is a useful and readable work, in the manner of Green's history, though hardly com¬ parable in style. Charles Roberts, better known as a Canadian poet and novelist, is also the author of a very readable (History of Canada. *A third work of the same class is Sir John Bourinot's (Story of Canada,* in the (Story of the Nations* series.

Among more recent works dealing with in¬ dividual phases of the history of Canada, much the most notable is (The Siege of Quebec, *by Arthur G. Doughty, the Dominion archivist, and George W. Parmelee. The work, in six large volumes, is a monument of research, and must always remain the unquestioned authority in its particular field. It covers, with most minute care and scholarly accuracy, every detail of the historic siege of 1759, so far as the land operations are concerned. A companion work is William Wood's (Logs of the Conquest of Canada,* dealing in the same scholarly way with the naval side of the siege. Colonel Wood has told the story of the siege, with equal charm and accuracy, in his (The Fight for Canada.*

Dr. Doughty has shown in his three shorter works, (Quebec under Two Flags,* (The Cradle of New France) and (The Fortress of Quebec) that an archivist, without sacrificing any of his scholarly principles, may, when he possesses the ability, put life and color into the dry bones of history.

The War of 1812 has been thd subject of a number of histories written by Canadians and from a Canadian point of view. In fact, the most serious criticism that must be brought against most of them — a criticism that applies equally to many of the attempts by American writers to deal with the same conflict — is that they are hopelessly partisan and one-sided. To this class belong the histories of William F. Coffin, Gilbert Auchinleck and James Hannay. A much better piece of work is the (War of 1812) of Major John Richardson (1796-1852). It inevitably has the defects of a book written by one who had taken part

in the campaign, but Richardson, like most honest soldiers, was not a bitter partisan, and he had the advantage of being a trained writer as well as a soldier. In 1902 A. C. Casselman brought out a new edition of Richardson's History, enriched with copious notes, an excellent biography and a full bibliographv. Another very readable and vol. 5 — 25

useful book of Richardson's is his (Eight Years in Canada,* which covers the period of Lord Durham's mission to Canada, and the adminis¬ trations of Sydenham and Metcalfe.

Two words that admirably illustrate the modern scholarly method of writing history, are Sir C. P. Lucas' (Canadian War of 1812,) and (A History of Canada, 1763—1812. J Lucas has made excellent use of the splendid collec¬ tions of documentary material in the Domin¬ ion Archives, brought together by the late Douglas Brymner and his worthy successor, Arthur G. Doughty, and on the whole, for the two periods of which he treats, his works will probably remain, for some time at least, the best available. With Wood's (Fight for Can¬ ada* they form an entirely satisfactory treat¬ ment of the history of Canada from the Con¬ quest down to the close of the War of 1812.

Charlevoix and Lescarbot, Champlain, La-hontan and Hennepin, although their books relate to the earliest history of Canada, can scarcely be regarded as Canadian 'writers. The first noteworthy history by a French-Canadian was the (Histoire du Canada sous la domina¬ tion Frangaise* (1843), followed the next year by (Histoire du Canada sous la domination Anglaise,* both by Michel Bibaud (1782-1857). Between 1845 and 1848 appeared a much more important work, one that still ranks as the best general history of the country in French, the (Histoire du Canada* of Frangois Xavier Garneau (1809-66). Garneau's influence was marked upon the intellectual life of French Canada. In 1852 he brought out a new edition of his work, carrying the narrative down to the year 1840, the first edition having stopped at 1792. The history is now being reprinted, with an introduction and very full notes by the his¬ torian's grandson, Hector Garneau, and a pref¬ ace by Gabriel Hanotaux. It has also appeared in an English translation, by Andrew Bell.

Other notable historical works in French, are the (Cours d'Histoire du Canada* of the Abbe J. B. A. Ferland (1805-65) ; (Dix ans d'Histoire du Canada, 1840-50,* by Antoine Gerin-Lajoie (1824-82) ; (Canada sous l'Union,* by Louis Philippe Turcotte (1842-78) ; (L'Histoire de

Cinquante Ans* of T. P. Bedard (1844-1900) ; and the (Histoire des Canadiens Frangais,* by Benjamin Suite. The Abbe H. R. Casgrain (1831-1904) was the author of sev¬ eral historical works, dealing with special phases of Canadian history, and marked by charms of style that make them delightful reading.

With a few exceptions, biography in Can¬ ada has been confined to the lives of men closely identified with the political history of the country. An important series of biograph¬ ies, published in 1906, is (The Makers of Can¬ ada, } in 20 volumes, each by a well-known Ca¬ nadian writer. While inevitably unequal in style and treatment, they are all readable and trustworthy. Adam Shortt's (Lord Syden¬ ham, *D. C. Scott's (John Graves Simcoe,* Jean N. Mcllwraith's (Sir Frederick Haldi-mand,* W. D. LeSueur's (Frontenac,* George R. Parkin's <Sir John Macdonald * and John Lewis' (George BrownP are particularly worth mentioning. Of earlier works of biography, two of the most valuable are Sir Joseph Pope's (Memoirs of Sir John Alexander MacdonaldP and Sir J. S. Willison's (Sir Wilfrid Laurier

and the Liberal Party.) Another admirable piece of biography is Charles Lindsey's (Life and Times of William Lyon Mackenzie. y Sev¬ eral attempts have been made to write the life of the brilliant Nova Scotian statesman, Joseph Howe, blit none are altogether satisfactory. The best, at any rate from a literary point of view, is the sketch by the late Principal Grant, pub¬ lished in 1904. One of the best of more re¬ cent Canadian biographies is George M. Wrong's (Life of Lord Elgin. }

Biography in French Canada has generally been in the form of brief sketches, or collec¬ tions such as Abbe Casgrain's (Biographies CanadiennesP Bibaud's (Le Pantheon Canadien) and David's (Biographies et portraits.) Notable exceptions are the lives of Papineau and Cartier, by the learned Librarian of Par¬ liament, Dr. A. D. DeCelles ; and Thomas Chapais' (Jean Talon) and (Montcalm. } Gravier's (Vie de Samuel Champlain } is an ad¬ mirable piece of work, but can hardly be classed in Canadian literature.

Some of the most important books of travel are associated with the early history of Can¬ ada, or of what is now Canada. Excluding the entertaining narratives of those who were merely visitors, there remain such remarkable works as Alexander Mackenzie's (Voyages from Montreal through the Continent of North America) (1801); Bouchette's (British Dominions in North America) (1832) ; Franchere's (Voyage to the Northwest Coast of America) (1854); Harmon's (Voyages and Travels in the Interior of North America) (1820) ; Paul Kane's (Wanderings of an Artist among the Indians of North America) (1859) ; Grant's (Ocean to Ocean) (1873) ; Mrs. Moo-die's (Roughing it in the Bush) (1852) ; and among more recent works, J. W. Tyrrell's (Across the Sub-Arctics of Canada* ; Cole¬ man's (The Canadian Rockies *; S. E. Daw¬ son's (The Saint Lawrence Basin and Its Bor¬ derLands } ; and L. J. Burpee's (Search for the Western Sea.*

French-Canadian books of travel are rep¬ resented by such readable works as the Abbe Casgrain's (Un pelerinage au pays d'Evangeb ine) (1887) ; Sir Adolphe Routhier's (En Canot* (1881) and (De Quebec a Victoria> (1893) ; Faucher de St. Maurice's (De Quebec a Mexico* (1866) ; and Arthur Buies' ˆecits de Voyages *(1890) and (Au Portique des Laurentides* (1891).

English-Canadian verse seems to have had its beginning in Nova Scotia, where in 1825 Oliver Goldsmith, a distant relative of his more famous namesake, published (The Rising Village. *The poem, in manner an imitation of (The Deserted Village,* records not un¬ successfully or without a certain effectiveness the rude pioneer life of the author's native province. With Charles Sangster (1822-93) came something more of skill in the art of po¬ etry. His (Saint Lawrence and Saguenay) (1856) and (LIesperus) (1860), contain patri¬ otic and other verse of some merit, simple, un¬ pretentious, not very rich in ideas, but eminently sincere. A poet of an entirly different type, and of much greater power, was Charles Heavysege (1816-76). Heavysege published several volumes of verse, including a number of remarkable sonnets, but the work by which he is remembered is his dramatic poem <Saul,)

first published in 1857. This is an elaborate piece of work, divided into three parts, each of five acts, and altogether about 10,000 lines. Heavysege was not an educated man, in the ordinary acceptance of the term, but his mind was saturated with the Bible and Shakespeare, and there are passages in <Saul) not unworthy of either the sacred book or the great Eliza¬ bethan. Saul's vision, on the eve of his death,

forms one of the most dramatic passages in English literature. Longfellow described Heavy¬ sege as the greatest dramatist since Shakes¬ peare, and Coventry Patmore, perhaps a more discriminating critic, praised (SauP scarcely less unreservedly. Isabella Valancy Crawford (1851-87) published one slim volume of verse during her lifetime which, though it won her no recognition, contains verse of quite exceptional quality, sincere, musical, instinct with the poetry of common things. George Frederick Cameron (1854-85) was the author of a number of poems, which were collected and published after his death. He was a passionate opponent of tyranny and oppression, and one finds in many of his verses the lyrical expression of his sympathy with lost causes.

The year 1880 has been said to mark the Canadian Renaissance, because in that year ap¬ peared the first volume of poetry of one of a group of singers destined to put Canadian lit¬ erature on a higher plane than it had hitherto reached. In this group are included Charles Roberts and his cousin Bliss Carman, Archi¬ bald Lampman, William Wilfred Campbell, and on or two others. Roberts' versatile genius has found expression in history, fiction and essays, but he is preeminently a poet. His verse, always scholarly and polished, gained steadily in power with the years. At first limited to classical themes, and more or less imitative, Roberts' more mature work gives expression to the atmosphere and color of Canadian woods and hillsides, the salt sea air of the Tantramar perhaps, and the prob¬ lems of man's physical and moral contact with nature. The development of his genius may be readily traced from his earliest work in (Orion) (1880), through (In Divers Tones) (1886) and (Songs of the Common Day* (1893), until it reached its highest point in (The Book of the Native* (1897). Equally striking in their lyrical interpretation of Cana¬ dian scenes are the poems of Carman, con¬ tained in such of his books as (Low Tide on Grand Pre*' (1893), (Behind the Arras >

(1895), (Ballads of Lost Haven *(1897) and (Pipes of Pan) (1905). Carman's verse, like that of Roberts, reveals the influence of Shel¬ ley and Keats, and perhaps Tennyson; but each of these Canadian singers has a voice that is essentially his own. Each sat at the feet of the masters as humble student, but with the growth of knowledge and experience put his own distinctive personality into the interpreta¬ tion of themes old and new. Campbell's earlier work, in (Lake Lyrics) (1889) reveals many of the qualities that mark the verse of Rob¬ erts and Carman. What they had done to inter¬ pret the spirit of the Fundy shore, he achieved for the great inland seas. In his later books, (The Dread Voyage) (1893) and (Beyond the Hills of Dream* (1899), he strikes a more def¬ initely human note, and touches with an assured hand many of the great problems of life.

His

two _ dramas, <Mordred) and (Hildebrand) (1895) are powerful in conception, though somewhat unequal in treatment. Of all this group of modern Canadian poets, Lampman (1861-99) probably stood first as an inter¬ preter of Canadian scenery. He was a poet first and always. Most of his short life was spent in and about Ottawa, and he knew in¬ timately every beautiful nook and corner of the countryside. His gentle personality breathes through every line of the almost flaw¬ less lyrics he left behind. As William Dean Howells said of him : (<His pure spirit was electrical in every line; he made no picture of the Nature he loved in which he did not sup¬ ply the spectator with the human interest of his own genial presence, and light up the scene with the lamp of his keen and beautiful intelli¬ gence.® Only two slim volumes of verse were published during his lifetime, (Among the Millet > (1888) and (Lyrics of Earth > (1896) ; but after his death his friend and fellow-poet, Duncan Campbell Scott, gathered together with loving care all of his work that seemed worthy of preservation and published it with an ad¬ mirably judicious memoir.

Two other Canadian poets must be men¬ tioned here. Each stands in a class by himself. Robert Service has put into his three books of verse, (Songs of a Sourdough, > (Ballads of a ChechakoP and (Rhymes of a Rolling Stoned much of the strange fascination of the Yukon, its magnificent mountain scenery, the cruel beauty of its winter nights, the brutality as well as the primitive virtues of the mining camps. William Henry Drummond (1854-1909) dis¬ covered to the world the simple, picturesque figure of the Canadian habitant, the peasant of French Canada. In (The Habitant,* (Johnny Courteau) and (The Voyageur,* he interpreted with kindly sympathy, tender pathos and inimi¬ table humor the life and character of the shrewd and simple-minded farmer of Quebec.

As one finds in the poetry of English-Cana- dian writers evidence of the influence of Shel¬ ley, Keats and Tennyson, so the work of French-Canadian poets reveals their indebtedness to Victor Hugo, Lamartine

and Musset. Octave Cremazie (1827-79) is justly regarded as the father of French-Canadian poetry. He has only one volume of verse to his credit, and that was published by his friends after his death, but the sincerity and lyrical quality of his poems, no less than the spirit of patriotism with which they are instinct, have made them an inspiration to his fellow-countrymen. Louis Frechette (1839-1908), more versatile and pol¬ ished than Cremazie, left behind him a larger body of credible verse than any of his contem¬ poraries. His first volume of poetry, (Mes Loisirs,* appeared in 1863, and this was followed by (Voix d'un Exile* (1869), <Pele-Mele* (1877), (Fleurs boreales* and (Oiseaux de Neige* (1879) ; (La Legende d'un Peuple) (1887, and (Feuilles volantes) (1891). Before his death he prepared a collected edition of all his verse that he wished to be preserved. He was essentially a lyrical poet, but, like Cremazie, avoided the passion of human love, making in this sense the sharp line of cleavage between the romantic school of France and the poets of French Canada, who in other respects looked to them for inspiration. Frechette was beyond question the greatest poet that French Canada

has yet produced. A contemporary of his, Pamphile Le May, with less fine craftsmanship and versatility than Frechette, but a more vivid imagination, has won for himself a secure place in the hearts of Canadians. He sings the songs of the people, he is a poet of the soil. In 1865 he published his (Essais poetiques.* This was followed by a fine translation of (Evangeline) (1870); *Les Vengeances) (1875); (Fables Canadiennes* (1881); (Petits Poemes* (1883), and (Gouttelettes) (1904), the last a remark¬ able collection of sonnets. Another member of the same group was William Chapman — a true French-Canadian despite his English name. Chapman (1850-1917) put much very creditable verse into his four books, (Les Quebecquoises* (1876); (Feuilles d'Lrable* (1890); (Aspirations) (1904), and (Les Rayons du Nord) (1910). In 1895 a new school of French-Cana¬ dian literature had its birth in Montreal, of which Emile Nelligan and Albert Lozeau are the most notable exponents. These modern Canadian poets have attempted to transplant the spirit of Verlaine and Beaudelaire in the not altogether congenial atmosphere of Que¬ bec. Yet they have produced some work of much more than passing interest.

It is impracticable here to do more than indicate very briefly the work in fiction thus far achieved by Canadians. James de Mille (1836-80) found leisure amid the preoccupa¬ tions of his life as a college professor to write a number of romances and tales, the best of which were (Helena's Household* and (The Dodge Club.* William Kirby

(1817-1906) was the first Canadian novelist to make use of the rich mine of romantic material offered by the early history of his country. His one romance, (The Golden Dog,* still remains in many re¬ spects the best thing of its kind produced in Canada. Sir Gilbert Parker stands easily first among Canadian novelists. Since the publica¬ tion of (Pierre and His People) in 1892, he has written a succession of novels, romances and short stories, all good of their kind, and most of them dealing with some phase of Canadian life or history. Charles W. Gordon (Ralph Connor) has given us in (Black Rock,* (The Sky Pilot,* and his later novels, admirable pictures of life in the backwoods, lumber camps and mining camps of Canada. Norman Duncan in (Dr. Luke of the Labrador,* and his fine series of boys' stories, has written of the sea and those who make their home upon its waters. Charles Roberts, already considered as a poet, is also favorably known as the author of a large number of very readable romances and short stories. Lucy Maud Montgomery (Mrs. McDonald) has made the little province of Prince Edward Island famous by her altogether delightful stories, (Anne of Green Gables) and its successors. It may be convenient to include here the works of Stephen Leacock, who is per¬ haps rather a humorist than a novelist, and perhaps rather a wit than a humorist. His (Literary Lapses,* (Nonsense Novels* and (Sunshine Sketches of a Little TownJ are bril¬ liantly clever essays in a field that has hitherto been untried in Canada.

In French-Canadian fiction Philippe Aubert de Gaspe stands preeminent. He wrote only one romance, (Les Anciens Canadiens,* but that is almost a national epic, and altogether a remark¬ able piece of work. He began to write it in his

74th year. <(De Gaspe,** says Camille Roy, (<is at once the most eloquent, the most simple, the most charming narrator of Canada's past — the true epic singer of a marvellous phase of its history.® (Les Anciens Canadiens) was trans¬ lated into English by Charles Roberts. P. J. O. Chauveau wrote in 1853 one of the first Cana¬ dian novels, (Charles Guerin,* a not very re¬ markable novel of manners. Antoine

Gerin-Lajoie's (Jean Rivard* is of the same type, but more successful as a true picture of the life of a French-Canadian habitant. G. B. de Boucherville was the author of a very readable novel, (Une de perdue et Deux de trouvees.* Other novels with a purpose are J. P. Tardivel's (Pour la Patrie* ; Ernest Choquette's (Claude Paysan,* and Hector Bernier's (Au large de l'Ecueil.* Among the best examples of the historical novel in French Canada are Joseph Marmette's (Charles et Eva,* (Frangois de Bienville,* (L'Intendant Bigot,* and (Le Chev¬ alier de Mornac* ; Napoleon Bourassa's (Jacques et Marie* ; Mile. Angers' (L'Oublie* ; and Sir A. B. Routhier's (Le Centurion.*

What Camille Roy has written of French-Canadian literature may very fairly be said of the entire body of Canadian literature. It has no doubt at times been unduly imitative, yet wit must be acknowledged that, taken as a whole, the literature is indeed Canadian, and that in it the life of the people is reflected and perpetu¬ ated. Many of its works, the best in prose and in verse, breathe the perfume of the soil, and are the expression — original, sincere and profound — of the Canadian spirit.**

In closing this sketch it is proper to refer to some of the intellectual influences that have helped to make Canadian literature what it is. First of these are the universities. McGill and Laval in Quebec, Toronto and Queen's in On¬ tario, King's and Dalhousie in the maritime provinces, to mention but a few of the more prominent colleges, have had an increasing in¬ fluence in moulding the intellectual life of the Dominion. The establishment of the Dominion Archives at Ottawa, and provincial archives at Toronto, Victoria and other provincial capitals, with their growing treasures of documentary material, has helped to turn Canadian historians from secondary to original sources, and to make their product more scholarly and more accurate. In this and other ways one sees also the influence upon Canadian writers and Cana¬ dian literature of such societies as the Royal Society of Canada, the Ontario Historical So¬ ciety, the Royal Canadian Institute, the Quebec Literary and Historical Society, the Nova Scotia Historical Society and the Champlain Society; and of such periodicals as the University Maga¬ zine, Revue Canadienne and Canadian Maga¬ zine, and the annual Review of Historical Publications Relating to Canada. Nor, finally, should we overlook the peculiar influence of two great writers who for many years were closely associated with Canada, and who each in his own way did much for Canadian scholarship — Francis Parkman and Goldwin Smith.

Bibliography. — Among a number of books and articles dealing with Canadian literature the following are worthy of particular mention :

Adam, G. Mercer, (Ap Outline History of Canadian Literature* (in Withrow's (History of Canada,' Toronto 1887) ; Bourinot, Sir John, intellectual Development of the Canadian

People* (Ottawa 1881) ; Hopkins, J. C., and others, (Canadian Literature* (in (Canada, an Encyclopaedia of the Country,* Toronto 1898) ; Lareau, Edmond, (Histoire de la litterature Canadienne* (Montreal 1874) ; McMurchy, A., (Handbook of Canadian Literature* (Toronto 1906) ; Marquis, T. G., (English Canadian Lit¬ erature* (in (Canada and Its Provinces,* Toronto 1912) ; Roy, Camille, (French Cana¬ dian Literature* (in (Canada and Its Prov¬ inces,* Toronto 1912).

Lawrence J. Burpee,

Secretary Canadian Section of International Joint Commission, Ottazva.

24. CANADIAN UNIVERSITIES. There

are in Canada 22 universities, and some of these have federated and affiliated colleges. As each of the universities and colleges men¬ tioned in this article is separately dealt with under its own name only a general summary, following the line of the provinces from east to west is attempted here.

Maritime Provinces.— The University of King's College, Nova Scotia — the oldest uni¬ versity in the British overseas dominions — had its rise in the foundation of an academy at Windsor in 1788 by the provincial legislature. In the following year an act was passed incor¬ porating King's College, and in 1802 it received a royal charter and a provincial grant. It was founded as an Anglican institution — a charac¬ ter it still retains. One of its statutes provided that <(no member of the university shall fre¬ quent the Romish Mass, or the meeting-houses of Presbyterians, Baptists, or Methodists, or the Conventicles or places of worship of any other dissenters from the Church of England.** As three-fourths of the population came under this comprehensive <(test,** an agitation was speedily set on foot for its removal, which failing, Pictou Academy was founded in 1816 as an undenominational college. Two years later Dalhousie College was founded at Halifax as a provincial university modeled on the Scottish pattern, and was opened for teaching in 1838. An applicant for a position on the original teaching staff of Dalhousie College was a

distinguished Baptist, the Rev. Dr. Crawley, but as his application was not enter¬ tained — it was alleged on sectarian ground — and the Baptists were unrepresented on the staff, the drastic remedy was taken of founding (1838) a denominational institution, Acadia College, Wolfville. The Presbyterian College, established in affiliation with Pictou Academy in 1820, has made no fewer than four migra¬ tions, and is now located at Pine Tree Hill, near Halifax. Saint Francis Xavier College was founded at Antigonish in 1854, and is the chief Roman Catholic foundation in the mari¬ time provinces. Other institutions belonging to the same communion in Nova Scotia are Saint Mary's College, Halifax, founded in 1860; Col¬ lege Sainte Anne, founded on behalf of the French population by the Endist Fathers in 1890; and the Seminary of the Holy Heart, founded at Halifax in 1895, also by the Eudist Fathers. Two attempts have been made to unify the university system of the province by the foundation of a University of Halifax, embracing all the degree-conferring colleges of the province, but these have been unsuccessful. New Brunswick College was founded at Fred-389

ericton in 1800 as an Anglican institution; in 1829 it received a charter as King's College, and in 1859 it became undenominational • and re¬ ceived a charter as the University of New Brunswick. The University of Mount Allison College was founded in 1862 to serve the higher educational needs of the Methodists of the maritime provinces; and in 1864 Saint Joseph's College, Memramcook, was established by the Roman Catholics for the Acadians and others of that communion.

Quebec. — McGill University, Montreal, had its origin in the bequest by James McGill, a public-spirited citizen of Montreal, of land and buildings on the outskirts of Montreal, and the sum of £10,000 for university purposes. The college received a royal charter in 1821, was formally opened in 1829, and has always been undenominational. The University of Bishop's College, Lennoxville, is an Anglican institution, was founded as a high school in 1843, and re¬ ceived a royal charter as a university in 1853. Laval University, Quebec, was founded in 1852 and named in honor of the first bishop of New France, who founded the seminary of Quebec in 1663, and of which it is the legitimate descendant. This university has a branch establishment, or second seat, at Montreal.

Ontario. — Governor Simcoe was the first to propose the establishment of a university in Upper Canada, but it was long after before any scheme took definite shape. The contiguity of the province to the United States, the high educational standard even then attained in that country, and the absence of educational facil¬ ities in upper Canada, forced the well-to-do to send their sons across the border for education, where, at the formative period of their lives, they were subjected to the influence of Ameri¬ can textbooks and American teachers ancf breathed the atmosphereˆj&l-— an anti-British democracy — a condition of affairs that was little to the liking of the zealous church-and- state men who formed the official class in Upper Canada. John Strachan afterward Anglican bishop of Toronto, obtained in 1827 a royal charter for the founding of King's College, which was to be an Anglican institu¬ tion, subscription to the Thirty-nine Articles being a condition for the holding of office by the staff and council. This attempt to estab¬ lish an Anglican monopoly in higher education was as hotly resisted by the majority of the people of Upper Canada was the endeavor to create a monopoly in religious endowments, and gave rise to an educational controversy that continued for 22 years. Little was accom¬ plished toward founding the college for a num¬ ber of years; in 1837 an amended charter abolished the denominational test, but left the sore open by permitting the theological chair to remain in Anglican control. In 1843 King's College began operations in Toronto. Other colleges were concurrently founded under denominational auspices. Regiopolis College was founded by Bishop Macdonell at Kingston as a Roman Catholic institution in 1837, but owing to financial difficulties, closed its doors in 1869. Queen's College, Kingston, a Presby¬ terian institution, was incorporated in 1839 and began the work of teaching in 1842 in a <(clap-board building.® Victoria College, a Meth¬ odist institution, was incorporated by act of

Parliament in 1841 and opened at Cobourg in 1843. Knox College, Toronto, which derived its impulse from the Scottish Church disruption of 1843, was opened by the Free Church of Scotland in 1844. Saint Joseph's College, Ottawa (College of Bytown), was founded by Bishop Guigues of Ottawa as a Roman Catholic institution, and erected into the University of Ottawa in 1866. Between 1843 and 1849 five legislative attempts were made to deal compre¬ hensively with the university problem, and in the latter year the Baldwin Act completely secularized King's College and transformed it into the University of Toronto. Bishop Strachan, now an old man of 72, faced the new situation, which imposed a (tgodless uni¬ versity® on the

province, with indomitable courage ; he proceeded to England and after a vigorous campaign obtained a royal charter in 1852 for the University of Trinity College, which remains to this day a monument to his pertinacity and embodies his ideals in higher education — a denominational, collegiate and residential institution modelled on Oxford and Cambridge, in preference to the professorial teaching of the Scottish university system of which he was himself the product. Huron College (now the Western University) was established at London in 1863, and Wycliffe College, Toronto, was founded in 1879 by the Low Church party, both being offshoots of Trinity College. Saint Michael's College, Toronto, was founded as a Roman Catholic institution by Bishop Charbonnel in 1851. A bill introduced into the Parliament of United Canada, by Mr. (afterwards Sir Francis) Hincks, providing for the separation of the teaching function from that of examining and conferring degrees, received the royal assent in April 1853, and from that date until federa¬ tion University College represented the teaching side of the University of Toronto. In 1860 a Baptist college was opened at Woodstock, the theological teaching in which was later merged in McMaster University, Toronto, founded by the munificence of Senator William McMaster, and which obtained a charter in 1887. The provision of denominational colleges in Ontario was thus more than ample and had vastly out¬ run the means of subsistence, and meantime adequate funds with which to finance the ex¬ pensive modern equipment in science and medicine were urgently required. A movement for federation had been gathering force since 1874, and 10 years later it took active shape when Mr. G. W. (afterwards Sir George) Ross, the then provincial minister of education, sum¬ moned a meeting representative of the various colleges, to consider the question. Following on a series of discussions extending over three years, a federation act was passed in 1887, under which all the federating colleges find representation on the senate of the University of Toronto. The theological colleges of Wycliffe, Knox and Saint Michael's were the first to accept federation ; Victoria entered in 1890; and the medical faculty of Trinity Uni¬ versity was incorporated in 1903. Queen's Uni¬ versity, which ceased to be a distinctly Presby¬ terian institution in 1912, and McMaster Uni¬ versity remain ouside federation.

Prairie Provinces. — The University of Manitoba was first established at Winnipeg in 1877 as a federation of denominational colleges

on the model of London University — the con¬ stituent colleges being those of Saint Boniface (Roman Catholic), Saint John's (Anglican), and Manitoba (Presbyterian). Wesley College (Methodist) became affiliated in 1888. The University of Saskatchewan was founded at Saskatoon in 1909, when Emmanuel College, Prince Albert, which was originally founded by Bishop McLean in 1879 as a college for native helpers, was transferred to that city. The Uni¬ versity of Alberta was founded by the pro¬ vincial legislature in 1906, provision was made for a site at Edmonton in 1907, and the first session opened in 1908.

British Columbia. — In 1907 an act was passed by the provincial legislature setting apart lands as a university endowment, in the following session the institution was incor¬ porated, and in 1915 it was opened at Van¬ couver.

D. S. Douglas,

Editorial Staff of The Americana, Toronto.

25. RELIGIOUS CONDITIONS. The

religious and ecclesiastical life of Canada can¬ not be understood without some reference to the sources from which it sprang. The same great forces and influence which molded the history of the Old World re-appear here, but modified in their action and combinations by the new and freer environment in which they work. Broadly speaking, the three great Brit¬ ish peoples which form the bulk and basis of the Dominion, brought with them the Angli¬ can, Presbvterian and Methodist forms of re¬ ligion, while latterly the tides of alien immi¬ grants have brought with them varieties of the Eastern and Western Catholic churches. The dominating religious life of Canada is Protest¬ ant, save in the province of Quebec which is almost exclusively Roman Catholic and French-speaking. As a whole Canada is distinctively a Christian country, not so conservative on the one hand as Great Britain, or on the other hand so liberal as the United States, 85 per cent of the population belonging to the Roman, Presbyterian, Methodist and Anglican churches.

General History. — The Roman Catholic Church is the oldest and largest of the ecclesi¬ astical bodies in Canada. It has its chief seat in

the province of Quebec. In Canada, under French rule, it was all-powerful, and in its origin it was distinctively missionary. The Jesuits were the pioneers and, from the Saint Lawrence to the Rockies, have left an imper¬ ishable record. While to-day the largest section by far of the Roman Catholic is French speak¬ ing, a considerable body of Roman Catholics is found in the other provinces representing in their lineage and traditions the Catholics of the north of Scotland and south of Ireland. In the western provinces from Winnipeg to the Pacific the Roman Catholic Church is strong in influence and membership. See the article on the Roman Catholic Church.

The Church of England in Canada began with the settlement in Nova Scotia (known of old as Acadia) of certain English immigrants who came in government ships to Halifax in 1749, and built Saint Paul's Church for the peoples' worship (1750). The incoming of the United Empire Loyalists (Americans who determined to remVn loyal to the Brit¬

ish Crown) in 1783-84 gave a great impetus to the Church of England, for the vast ma¬ jority of them were Episcopalians, and in 1787, Dr. Chrales Inglis was consecrated in Lambeth in England, as bishop of Nova Scotia, the first bishop of the Church of England in Canada. His diocese included New Brunswick, Newfoundland, Prince Edward Island and Upper and Lower Canada. In the year 1793 Dr. Jacob Mountain was consecrated as bishop of Quebec, and all Canada west of Quebec was under this jurisdiction until 1839 when Dr. John Strachan was made bishop of Toronto, the Anglican population of Upper Canada com¬ prising his episcopate. About this time the new Canadian spirit of the church began to manifest itself. Before this the Anglican Church had de¬ pended for its support largely upon the charity of the missionary organizations of the mother church in England, especially the Society for the Propagation of the Gospel, but in 1842 it was felt that self-respecting Canadian church¬ men should begin to support their own church and ministry, and the Church Society of the Diocese of Toronto became the pioneer of the system of parochial self-support now almost universal in the Canadian church. Another very remarkable event in the life of the Cana¬ dian church was the emergence of the demo¬ cratic and independent spirit of self-govern¬ ment. All the bishops of the Anglican Church in Canada were accustomed to receive their commission from the British government, and their consecration in England, and the members of the church had nothing whatever to say in the matter. But after no little discussion and difficulty the Canadian bishops determined to have their own

jurisdiction and synods, and in the years 1857-59 asserted their ecclesiastical independence by holding synods in Toronto and Quebec where the clergy and laity meeting on equal footing might transact the affairs of the church. The year 1862 marked also a new era in the history of the Canadian Church, for in that year Dr. Lewis was elected bishop of the diocese of Ontario, and instead of crossing the ocean for consecration at the hands of the archbishop of Canterbury was consecrated on Canadian soil by Canadian bishops. From that time the church expanded remarkably, and whereas a little over a century ago there was only bishop and a few scattered clergy for all Canada there are now 28 dioceses with 1,750 clergy, nine church colleges and three church universities; two missionary dioceses in China and Japan, a large body of missionaries in Japan, China, India, Africa, Palestineand South America with native workers, and Christian schools and orphanages and hospitals; over 2,000 churches and Sunday schools ; and over $3,500,000 contributed annually for church pur¬ poses and missions. The laws of each diocese are under the control of the Synod of the Diocese which as a rule meets annually and is composed of the clergy and lay representatives from each parish and mission. The whole church in Canada is represented in the General Synod which meets once every three years, pre¬ sided over by the leading archbishop, who is the Primate of the Church of England in Canada. The outstanding features of the pro¬ gressive life of the Anglican (or Protestant Episcopal) Church in Canada during the past few years, have been the remarkable progress

of the missionary life of the church at home and abroad, the stimulation of the Sunday school and educational work by the establish¬ ment of the Sunday school commission, the authorization of the new Canadian Church Hymn Book (the Book of Common Praise) as the one book for use in all the churches, and the revision of the Prayer Book as the Cana¬ dian Book of Common Prayer approved by the General Synod held in Toronto, September

1915.

The Presbyterian Church in Canada traces its descent to several distinct sources. The at¬ tempt made in the 17th century to found Huguenot settlements failed disastrously and few traces remain of their existence. Among the Presbyterian Loyalists who came to Canada at the close of the Revolutionary War there was a goodly number of descendants of Hugue¬ nots. In 1749 Protestant colonists were brought into Nova Scotia from England and the Con¬ tinent, in order to counteract the disaffection of the Acadians. Again in 1755, after the expul¬ sion of the Acadians, many Protestants from Great Britain and older colonies along the At¬ lantic coast were induced, by the promise of liberty of conscience and of worship, to occupy the vacant lands. Then there was a large in¬ flux of immigration from the north of Ireland and from Scotland. Some districts, such as the county of Pictou, were almost exclusively occupied by Scotch Presbyterians. These peo¬ ple naturally clung to the various ecclesiastical bodies into which Scotch Presbyterianism was divided. And accordingly there were Presby¬ teries constituted with relations to the Kirk of Scotland and the Secession Church in its two subdivisions of Burgher and Anti-Burgher, and also adherents of the Reformed Presbyterians or Covenanters. The great disruption of the Church of Scotland in 1843 extended to the colonies and added to the existing divisions the Free Presbyterian Church. But in 1861 the process of reunion began with the union of the United Secession Church (inclusive of both Burgher and Anti-Burgher) and the Free Church of the Maritime provinces into one synod.

The history of the Presbyterian Church in the Western provinces followed similar lines but with new complications. Soon after the conquest, Presbyterian congregations were or¬ ganized in the cities of Quebec and Montreal. Among the Loyalists were not a few Presby¬ terians. But there was scanty provision for their religious needs. Applications for minis¬ ters made to the churches in Scotland met with no response for many years. A similar appeal made to the f(Associate Reformed Church® in the United States resulted in the incoming of a number of ministers from that country. Other ministers followed from Scotland and Ireland. In 1818 was organized ((The Presbytery of the Canadas.® In 1831 there was organized a synod in connection with the Church of Scotland. In 1840 the two synods were united into one. But in 1843 the great disruption in Scotland again rent it assunder and two synods resulted, one in connection with the Established Church of Scotland and the other in connection with the Free Church of Scotland. Besides these there were other independent Presbyteries, one at Niagara and the other at Stamford, composed of

ministers from the United States, and a third

originated by ministers from Scotland and from Nova Scotia, connected with the ((United Pres¬ byterian Church.® The first two were dis¬ banded and absorbed into the larger bodies. The third, in 1861, united with the Free Church and the combined body received the name of the Canada Presbyterian Church. In 1875 the greater union was consummated by which all the Presbyterian bodies throughout Canada from east to west, were united in one great Canadian Presbyterian Church. This was an epoch making, and epoch-marking event in the history of Canadian Presbyterianism. It uni¬ fied the life of the church, and became the start¬ ing point of its missionary energy both in the Canadian and world-wide field.

Until the greater union was consummated little had been attempted by the Presbyter¬ ians in the evangelization of the Northwest. In 1812 and 1816 a large body of Highlanders had settled in the Red River district, but the only ministers they had were those of the Church of England until 1852, when the Rev. John Black, a devoted missionary, organized them into a congregation. Little more was done until after the federation of Canada and the complete union of the Canadian Presby¬ terians. In 1881 the General Assembly ap¬ pointed. the Rev. Dr. James Robertson to be mperintendent of Presbyterian missions in the Northwest. This remarkable man laid the foundations of Presbyterian organization throughout those vast territories and covered the whole country with a network of Presby¬ terian missions, so that now (1916) in place of one there are eight district superintendents. The Presbyterian Church in Canada is one of the dominating religious forces of the Do¬ minion, and to-day with 1,899 ministers, 3,815 Sabbath schools, 333,457 communicants, eight theological colleges, church property valued at $23,447,000, it stands at the very forefront of the Protestant life of the Dominion. The Pres¬ byterian Church in Canada was the first branch of the church in the world to put social service and evangelism together, having evangelical social settlements and redemption homes from Sydney and Montreal and Toronto to Winnipeg, Calgary and Vancouver.

The Methodist Church in Canada traces its origin to two distinct sources, England and the United States. In 1770 Lieutenant-Governor Franklin sought English settlers for the prov¬ ince of Nova Scotia in the East Riding of Yorkshire. Among them were the earliest Methodists of Canada, one of whom was the noted preacher and evangelist, John Black. In 1784 he went to the United States, and his

ap¬ peal to the Baltimore conference led to the coming of a number of Methodist ministers to the Maritime provinces. In Quebec the first Methodist preachers were connected with the British regiments. As early as 1778 Methodists from New York State came to the Eastern Townships and to Upper Canada. The Metho¬ dists did a noble work in laying the founda¬ tion of religious life and worship in many dis¬ tricts in Canada, especially in the province of Ontario, a great impetus being given by the labors of Barbara Heck. Until the War of 1812 Canadian Methodism was closely connected with that of the United States. Negotiations were then entered into with the British Wesleyans. Unhappy dissensions followed. While

one party was anxious to maintain the Ameri¬ can connection, the other insisted that, as loyal British subjects, they should look to the mother land. A compromise was arrived at by which the American connection was to be observed in Upper Canada, while the British missionaries were to be free to enter Lower Canada, and the Maritime provinces. This compromise was of short duration; for when, in 1828, the American conference relinquished its jurisdiction over the Canadian conference and the latter was in¬ dependently organized under the name of the Methodist Episcopal Church in Canada, the British conference decided not to confine its work to Lower Canada. After much contro¬ versy, in 1833 a union between these two branches of Methodism was consummated under the name of (<The Wesleyan Methodist Church in North America.® But, notwithstanding this union the Methodist Episcopal Church sur¬ vived in a new form and increased very rapidly.

Methodist missionary work had its origin among the Indians of Ontario in 1829, and in the Northwest began about 1840. Its annals abound with noble achievements. There then existed in Canada five principal Methodist bodies. In addition to the two main bodies already mentioned, different branches of British Methodism had been brought into the country, namely, the Methodist New Connection, the Primitive Methodist body and the Bible Chris¬ tians. All these became

firmly rooted in Canada and developed into strong bodies. The need of unification began to be earnestly discussed as early as 1866. In 1873 a union was consum¬ mated between the Wesleyan, the New Connec¬ tion, and the Eastern British-American Con¬ ference, but it was not until 1883 that, at a general conference held in Belleville, the union was consummated. Then all the Methodist bodies, hitherto locally or ecclesiastically separated, were brought together; and, from the Atlantic to the Pacific, there is now one great Methodist Church of Canada, with 2,337 or¬ dained ministers, 3,821 churches and 1,639 other preaching places, 376,761 church members, and 3,824 Sunday schools, with 41,929 officers and teachers and 420,210 scholars. There was contributed for all missionary work, through her various boards and funds, $1,170,434; she has invested $7,200,391 in her educational in¬ stitutions, and her activities seek the evangelism of both the individual and society, and the ap¬ plication of the principles of the gospel of Jesus to all the moral, economic, social and political relations of life.

The Baptist Churches derived their origin from the American Baptists. From 1760 on¬ ward there are traces of individual Baptists in different localities in Nova Scotia. In 1820 the first Baptist association was formed for the Maritime provinces. The first Baptist Church in Lower Canada was formed in 1794, and con¬ sisted chiefly of Loyalist refugees from Con¬ necticut. In 1795 another was organized in Upper Canada. The first Baptist Church in Montreal was not organized until 1830. The Baptists of Canada to-day (1917) occupy a very strong position. With 885 ordained ministers, 1,335 churches, and a membership of 138,197, they represent a very strong religious force in the life of the Dominion. Their leading edu¬ cational institutions are the Acadia University and Seminary in Wolfvi11” Nova Scotia, the

Woodstock College in Woodstock, Out., the Brandon College in Brandon, Manitoba, and chiefly the McMaster University in Toronto. In Sunday school work, missions both home and foreign, and in social service, the Canadian Baptists are always to the fore.

Congregationalism has never found a strong footing in Canada. A few scattered adherents came from New England to Nova Scotia in 1758. In the eastern townships Congregation¬ alism was founded in 1811 by settlers from Massachusetts, and in Ontario some 10 or 12 years later. Nothing was done west of Ontario until 1879, when work was begun in Winnipeg. There are in Canada about 13,000 members, and 100 ministers mostly in Ontario, with a few congregations in Nova Scotia,

Quebec and the Northwest.

The Evangelical Lutheran Church in Canada dates from the middle of the 18th century. The first German Lutheran landed at Lunenburg, Nova Scotia, in 1749. The first Lutheran con¬ gregation in Upper Canada was founded in 1775. Others came in with German immigra¬ tion. In 1853 the Canada Conference of the Lutheran Church was founded. The main body of Lutherans is in the district of Ontario near he city of Berlin (in 1916 changed to Kitchener) and in the Northwest where large numbers of Swedes and Norwegians are found. There is an Icelandic branch of the Lutheran Church in the Northwest.

There are a number of small religious bodies in Canada, none of which exercises any appre¬ ciable influence upon the religious life of the country; chief among them are The Disciples and The Brethren, The Adventists and Mennonites. There are a few Unitarians and Quakers, and the Russellites, Theosophists and Christian Scientists have increased not a little, especially in the cities. The Salvation Army has acquired a considerable foothold in the larger cities and towns, and has latterly given much of its strength to the development of social work in the towns and cities.

There are four paramount considerations which have profoundly affected the whole religious history and development of the Do¬ minion namely, the relations of the churches to the state and to education, their beneficient and missionary activities, and the problem of church union.

Church and State. — In the 18th century the authorities believed that an Established Church was necessary in order to secure the loyalty of the colonists, and it was, without doubt, the intention of the British government to maintain an Anglican establishment in Upper Canada the counterpart of the Roman Catholic establishment in Lower Canada. In 1791 the Constitutional Act was passed reaffirm¬ ing the provision of previous legislation which gave the King the right to set apart for the support of the ((Protestant clergy® the seventh part of all ungranted Crown lands. This was the origin of the ((clergy reserves® (see Can¬ ada — The Clergy Reserves). The ambiguity of the term (<Protestant clergy® admitted of a variety of interpretations. The Anglican clergy maintained that they alone were intended by the designation. The few clergy connected with the Established Presbyterian Church of Scot¬ land contended that they had an equal right to it, and their claim was supported by eminent

legal authority in England. The Methodists, in general, resisted such an appropriation of the public lands, but the British YVesleyans urged an acceptance of a portion of the ((clergy reserves.® After years of fruitless ecclesiastical strife, an act was passed by the legislature of Upper Canada, by which the lands were handed over to the municipal corporations of the prov¬ ince for secular purposes, provision being made to satisfy the claims of existing incumbents. In lieu of these claims there was paid over to the Church of England the sum of $1,103,405; to the Church of Scotland, $509,739; to other Pres¬ byterians, $8,962; to the Wesleyan Methodists, $39,074; and to the Roman Catholics in Upper Canada, $83,731. The Anglican Church was thus delivered from what might have been its ruin in Canada, and the people of the province released from a grievous injustice and a source of political discontent and strife. In those days the representatives of the churches of England and Scotland, especially the former, had a cer¬ tain status accorded to them, denied to other denominations. The Methodists were most un¬ justly charged with disloyalty, to which their connection, in origin and government, with the United States gave some color of plausibility. Until 1830 the Methodists and other dissenters had no right to hold land for places of worship or for the burial of their dead, nor had the Methodists and their ministers the right to solemnize matrimony, even among their own people. It was only after long and bitter con¬ troversy that laws were passed authorizing the various religious bodies to hold land for churches, parsonages and burial grounds, and empowering their ministers to celebrate mar¬ riages. At the present time all the leading Christian bodies are in a position of practical equality, and marriages can be performed by members of every church and religious de¬ nomination duly ordained, and also by any elder, missionary or evangelist of the socalled Congregation of God and of Christ, the Dis¬ ciples of Christ, the Brethren or any duly ap¬ pointed commissioner or staff officer of the Salvation Army. Marriages by a magistrate or justice of the peace are unknown in Canada. No civil official is qualified by any legislative act in Canada to celebrate marriage. It is evident then that there is throughout Canada complete separation of church and state, with the exception of the peculiar position held by the Roman Catholic Church in Quebec, secured by treaty and the terms of British occupancy of

that province. Canadians believe in a church-supported state, not in a state-supported church, and with a few exceptions the religious spirit of the Dominion is remarkably free and democratic.

The Church and Education. — So long as France held Canada, education was entirely in the hands of the Roman Catholic Church. The Jesuits, Franciscans and other orders laid the foundations of the colleges and seminaries which hold an important place in the education of Lower Canada. Thus the system of educa¬ tion was entirely ecclesiastical. Under British rule the attempt was made to establish free schools common to the whole population and unsectarian in character. This was found to be impracticable. With the union of the two provinces in 1841 separate schools had to be conceded to the Protestants in Lower Canada

because the public school system was essentially Roman Catholic ; and when, in the same year, the first attempt at a general system of public schools was made in Upper Canada, the Roman Catholics there secured the concession of separate schools, but in a very limited way. This, for many years, was a subject of con¬ troversy, political as well as religious, the Liberal party demanding the abolition of separ¬ ate schools and the Roman Catholic authorities seeking the complete control of the education of their children. Finally, on confederation in 1867, the separate school system was bound upon the province of Ontario; although, as is noteworthy, there are more Roman Catholic children in the public schools of Ontario than in the separate schools. In the Maritime prov¬ inces and in northwestern Canada there are no separate schools.

While public school education has been re¬ moved from the control of the churches (ex¬ cept in Quebec) the great body of the people are anxious that it should not be divorced from the sanctions and influences of religion. In the province of Ontario, the public schools are, with few exceptions, opened daily with prayer and the reading of the Scriptures. In not a few, the Bible is carefully taught. But much depends not only upon the character of the teachers, but also upon the disposition of the school trustees, to whom the law gives a large discretion in this matter. There is a strong feeling growing in the community at large and expressed by resolutions of the different church legislatures that there is urgent need of more ethical and Biblical teaching in the schools and that it is possible to secure it upon lines accept¬ able to the great majority of the people and with proper regard for the conscientious con¬ victions of those who may differ

from them.

Sectarian jealousies greatly hindered the de¬ velopment of higher education in all the older provinces. The struggle in Ontario occupied a very large place, both in the politics and the religious life of the province. The attempt to create a national university was for a long time prevented by the exclusive policy of the An¬ glican authorities, who used public funds for the establishment of King's College in 1843 (the charter was obtained in 1827) upon an ex¬ clusively Anglican basis in spite of the desire of the first bishop who desired to have it upon a broader national line. In 1849 King's College became the University of Toronto, upon a broad undenominational basis, but not until the Church of Scotland, shut out from King's Col¬ lege, had established Queen's University, and the Methodists founded Victoria University, which is now federated with the University of Toronto. Other denominational colleges sprang into existence. After the secularization of King's College, Trinity University was estab¬ lished by Bishop Strachan, upon an exclusively Anglican basis. The leaders of the broader policy had been broad-minded Anglican laymen, and it was laymen of the same t}q>e who, in 1877, established Wycliffe College, federated with the University of Toronto and upon a dis¬ tinctively evangelical or Low Church basis, as opposed to the Fligh Church position of Trinity University. The latter has not realized the expectations of its founders, and in 1904, abandoned its position of isolation and con¬ nected itself with the University of Toronto as

a federated college. The result is that, in On¬ tario to-day, there are Church of England, Presbyterian, Methodist and Roman Catholic colleges federated with the Provincial Uni¬ versity; while, apart from it, there still stand the Presbyterian University of Queen's, the Baptist University of McMaster and several Roman Catholic institutions. In Montreal, McGill is virtually a Protestant university, and has affiliated with it Presbyterian, Methodist, Congregational and Anglican schools of the¬ ology, which are themselves affiliated in a measure of theological teaching. In Quebec, Laval University is a Roman Catholic

institu¬ tion and the oldest in Canada. In eafch of the provinces of Nova Scotia and New Brunswick a university was founded under the name of King's College and sustained by means of land and money from the public treasury, but upon an exclusively Anglican basis. The one in Fredericton was remodeled and became the University of New Brunswick, upon a broad, undenominational basis ; the other, in Windsor, Nova Scotia, ceased to receive provincial sup¬ port but remained an Anglican university and theological college. Dalhousie University, in Halifax, while undenominational, has not the status of a provincial university. The Presby¬ terians have a theological college in connection with Dalhousie. The Baptists have a university in Acadia, Nova Scotia; and the Methodists a university and theological college in Sackville, New Brunswick.

The Work of the Churches. — The Roman Catholic Church carries on a great variety of charitable work in asylums, houses of refuge and reformatories. In the province of Quebec all the provincial institutions are under Roman Catholic control. In the cities the Protestants have distinct institutions controlled by boards representative of the chief Protestant churches. In Ontario, the Roman Catholics are upon the same footing with Protestants in the provincial institutions. In many cities and towns the former have their own hospitals and reform¬ atories, which receive provincial aid in propor¬ tion to the number of patients treated. This plan also prevails in the other provinces to a less extent. In other cases, special provision is made for Roman Catholic religious services in addition to the Protestant services.

The charitable work of the Roman Catholic Church is carried on by the various religious orders, many of which are specially devoted to the relief of the poor, the sick, and the fallen.

The work of home missions within the Dominion in connection with the different churches reaches out to every corner of the land, and to the Indians and Eskimos. For¬ eign missionary work is prosecuted with great vigor by all denominations. Among other good works of an inter-denominational character may be mentioned the Bible Society, the Religious Tract Society, the Evangelical Alliance, the Young Men's Christian Association, the great Christian movement organized by Mr. Mott among university students, the young people's societies, such as the Christian Endeavor, the Epworth League and the Saint Andrew's Brotherhood, and above all the Laymen's Mis¬ sionary Movement which has done so much to unify the evangelical forces of the Dominion, and to stimulate the missionarv and evangelistic life of all the churches in Canada. The or¬

ganization of women in the home and foreign missionary work of all the churches and in various other associations has greatly stimulated religious life and work. The reverent observ¬ ance of the Lord's Day throughout Canada has been a marked feature in its religious life. Church attendance has, on the whole, been well maintained. The laws against Sunday excur¬ sions and other violations of the Sabbath rest are effectively enforced. The Lord's Day Alli¬ ance has the cooperation of the labor unions as well as of the churches in the protection of the Lord's Day. The Protestant churches in Canada exercise a very strong influence upon legislation, education and the press. While not unaffected by modern controversy, their attitude generally has been, on the whole, conservative, while the general tone is more liberal and less acrimonious than in the past.

Old prejudices are passing away. A note¬ worthy illustration of this is furnished in the public worship of the Presbyterian Church, one section of which refused to use anything ex¬ cept the metrical version of the Psalms, regard¬ ing even the use of the paraphrases as a serious and hurtful innovation. Now all are united in the use of a hymn book which contains hymns of all sections of the Church of Christ. In many cases the worship has become more liturgical even in non-liturgical churches. Old controversies have passed into oblivion. Greater liberty both in action and in thought is found in all communions.

It is more than possible that with this en¬ largement and liberty, there has been a cor¬ responding diminution in the intensity of the religious spirit and a growing laxity within the churches which many regard with apprehension. Family worship is not observed as it once was, the children are not as familiar with the Scrip¬ tures as were their parents, and many things are tolerated in professedly Christian families which would a generation ago have been rigidly excluded. It is a time of unrest and transition. But in the midst of much change, the churches in the main hold firmly to the fundamentals of the Christian faith, and in all are found devoted men and women who earnestlv follow after the ideals of truth, purity and righteousness.

Among the Anglicans, while the Oxford or Tractarian movement has exercised considerable influence, especially among the clergy, it has seldom reached the extremes seen in England. The majority of the laity have only been slightly affected by it, and they have continued decidedly Protestant. The Presbyterians have exercised a strong influence upon the national ideals of righteousness, and have set a high standard in the education of the ministry. The Methodists have

been leaders in Christian liberality and in benevolent • enterprises. The Baptists and Congregationalists have borne con¬ sistent testimony to the supremacy of the in¬ dividual conscience and the independence of the Church from state control. Thus each de¬ nomination has contributed essential elements to the general religious well-being of Canada, each has in its own sphere accomplished a good work and manifested distinctive excellence, the value of which is coming, more and more, to be recognized by all.

Church Unity. — The general tendency among the Protestant denominations has been toward the unifying of the Christian churches,

and this appears the more remarkable when the present religious condition is compared with that of 100 or even 50 years ago, with its polemics and antagonisms. There has been a breaking down of barriers and a marked dimi¬ nution of the jealousies and rivalries of the past. The old sectarian spirit has, to a large extent, disappeared and a cordial spirit of good¬ will has manifested itself even in those bodies which special privileges or exclusive theories had tended to separate from others. This is seen in the increasing cooperation in good works, in the frequent inter-denominational comity and in the general attitude of the churches toward each other. It is remarkably manifested, as we have seen, in the changed attitude of most of the churches in regard to higher education. Federation of denomina¬ tional colleges in a common state university has been accepted by many who were once stren¬ uously opposed to it, as the best solution of our educational problems. In the three chief Protestant churches of Canada, the Methodist, the Presbyterian and the Anglican (they are named in the order of their numerical strength), which are each now a unit throughout the Do¬ minion, the tendency is toward a still larger union. In 1902 a joint committee of the Pres¬ byterian and Methodist churches met to con¬ sider the problem of cooperation, and com¬ mended the principles of comity and non-in¬ trusion, until some scheme of organic union was agreed upon. For some years after this

the union movement progressed, the Anglicans and Baptists favoring cooperation and fra¬ ternal comity, the Presbyterians, Methodists and Congregationalists an organic union of their churches. In 1909-10 the Congregational and Methodist bodies approved of the union scheme by large majorities, the Presbyterian Church referring the basis of union to the presbyteries, 793 of which approved and 476 opposed. The general assembly of the Presbyterian Church in Canada, which met in Winnipeg June 1914, definitely committed their Church to union with the Methodist and Congregational churches by a very large majority. The name of the church formed by the union is to be ((The United Church of Canada,55 with 20 articles of faith as doctrine, and an accepted polity of church government, administration and ecclesiastical laws. There is however a small but powerful minority in the Presbyterian Church opposed to the unity movement, and it is possible that the protest of this opposing section and the ex¬ istence of various practical difficulties may pre¬ vent the consummation of the scheme for some years to come.

Dyson Hague,

Vicar of the Church of the Epiphany, Toronto; Professor of Liturgies, IVycliffe College, To¬ ronto; Sometime Canon of Savnt Paul's Ca¬ thedral, London, Ontario.

26. ROMAN CATHOLIC CHURCH IN CANADA will be treated in this article under three headings: 1. The Church under the French, from the discovery of Canada until the conquest by England (1534— 1763) ; 2. The

Church under the rule of Great Britain, from 1763 until the present day; 3. Present condi¬ tion.

1. Before 1763. — Catholicism was planted in

Canada by France, through whose sailors, Au-

bert de Dieppe (1508), Verazzano (1522), and especially Jacques Cartier (1534), it was dis¬ covered about the beginning of the 16th cen¬ tury. Cartier penetrated the estuary of the Saint Lawrence (10 Aug. 1535), and took possession of the country in the name of King Francis I. While endowing his fatherland with new countries, he proposed also to disseminate therein the Catholic faith, as related in the ac¬ count of his travels inserted in the (Histoire de la Nouvelle France5 by Marc Lescarbot (Paris 1609).

From Cartier to Champlain (1542-1608) a few attempts at colonial settlement in Acadia were succeeded by the foundation of Port Royal (now Annapolis, N. S.). There appeared the first missionaries, Jesuits and secular priests. Champlain visited Canada in 1603, and in 1608 founded the town of Quebec and settled there. In 1615 he invited Recollet Fathers from France, who became the first apostles to the Indians, and inaugurated those missions in the interior of Canada so famous during the 17th century, and in which the Jesuits (1625) and the Sulpicians (1657) soon took such a glorious part.

Two distinct and savage races, the Algonquins and the Huron-Iroquois, inhabited the countries just opening up to missionary zeal. To the Algonquin race belonged the Abenakis, the Montagnais, the Attikamegues or Poissons-Blancs, the Otawawas, and several other tribes scattered from Hudson Bay to the western prairies. From the Huron-Iroquois source sprang two great branches: the Yendats or Hurons established between Lakes Huron, Erie, Saint Claire and Simcoe, and the Iroquois who dwelt south of Lake Ontario, and were divided into five nations : Mohawks, Onondagas, Sen-ekas, Oneidas and Caiyoquos. It would appear that the total population of these tribes was not above 100,000 individuals.

The Recollets were the first to devote them¬ selves to evangelization among the Indians. Father d'Olbeau instructed the Montagnais ; Father Le Caron penetrated deeply into the land of the Hurons to carry them the true faith, while several fathers remained at Quebec preaching among the colonists and the sur¬ rounding savages. During 10 years they multi¬ plied their travels, their preachings, opened schools for Indian children, called to their as¬ sistance new recruits, and among them Father Viel, who perished in the Ottawa River, victim of the perfidy of a Huron. Consult Sagard, F., (Histoire du Canada5 (Paris 1686) ; Bcaubien, Ch., (Histoire du Sault-au-Recollet5 (Montreal 1897). Unable to fill the wants of the missions alone, the Recollets called upon the Jesuits (1625), and on their invitation Fathers Brebeuf and Lalemant with other missionaries came to Canada. Their efforts for the conversion of the savages were not attended with the success hoped for, owing to the opposition of the Com¬ pany of Merchants, to whom the French King had conceded the monopoly of traffic in these regions, on the condition of founding a colony. Louis XIII and Richelieu replaced them (1627) by the Company of New France who engaged to lead (<the people inhabiting Canada to the knowledge of God, and to instruct them in the Catholic, Apostolic and Roman religion.55 There was no time to see the effects of these good intentions, for less than two years later

(1629), Quebec and the colony fell into the power of David Kerth, who fought on the side of England. The missionaries and their helpers were obliged to return to France.

When Canada was returned to France by the Treaty of Saint German-en-Laye (1632), the Jesuits at the request of Cardinal de Riche¬ lieu again took up their missions. Father Lejeune organized religious service at Quebec and opened the college of that town (1635), then he plunged into the interior in search of the wandering tribes of Montagnais. Others established a mission at Miscou, and from there branched forth into the peninsula of Gaspe, into Acadia and Cape Breton. Trois Rivieres and Tadousac on the banks of the Saint Lawrence became centres of evangelization. Consult (Les Jesuites et La Nouvelle France au XVIIe siecleC par le Pere de la Rochemontaix, S. J. (Paris 1895).

Meanwhile hospital religious and Ursulines arrived at Quebec (1639), the first to direct a Hotel-Dieu endowed by the Duchess of Aiguil-lon, niece of Richelieu ; the second at the head of whom was Marie de l'lncarnation, to pro¬ vide for the education of the girls. These heroic women were rivals in zeal for the con¬ version of the savages. Consult Abbe Casgrain, (Histoire de l'Hotel-Dieu de Quebec } (Quebec 1878) ; id., (Histoire de la Venerable Marie de l'Incarnation) (Quebec 1880) ; ˆettres de Mere Marie de l'Incarnation) (Paris 1681).

About this time the Company of Montreal was formed. Its originators were two men of God, M. Olier, founder of the Seminary of Saint Sulpice, and M. de la Dauversiere, a pious laic. Its sole aim was the (<glory of God and the establishment of religion in New France without charge to the clergy or to the people.® Encouraged by Urban VIII, it found in Paul Chomedey de Maisonneuve a faithful executor of its intentions. This illustrious man landed on the island of Montreal which the Society had acquired, 18 May 1642, and laid the founda¬ tions of Villemairie, now Montreal. With him came Mile. Mance, foundress of the Hotel-Dieu, and they were soon joined by Marguerite Bourgeoys, an energetic and saintly woman, who organized the

religious of the Congregation of Our Lady (1653) for the education of Canadian girls. In 1657, Mr. Olier, when dying, sent to the colony the first four Sulpicians : de Queylus, Souart, Gallinier and d'Allet. Consult Dollier de Casson, S. S., (Histoire du Montreal,* pub¬ lished by the Historical Society of Montreal (1869); Faillon, S. S., (Histoire de la colonie frangaise en Canada* (Montreal 1865) ; id., (Vie de la Venerable Mere Bourgeoys* ; (Vie de Mile. Mance) (Paris 1854) ; id., (Vie de M. Olier, founder of the Seminary of Saint Sulpice) (3 vols., Paris 1873) ; P. Rousseau, S. S., (Vie de Paul Chomedey de Maisonneuve> (Montreal 1886).

The hour of martyrdom sounded for the Jesuits. After escaping twice from the ferocious Mohawks, Father Jogues died beneath their blows (1646). Two years later (1648), the flourishing mission among the Hurons was completely destroyed by the Iroquois, and five Jesuits, Fathers de Brebeuf, Daniel, Lalemant, Gamier and Chabanel, were overwhelmed in the massacre of their neophytes. Father Buteux also fell a victim to the Iroquois when

going to the Attikameques (1652), and Father Bressani escaped with difficulty from these barbarians. Consult Charlevoix, (Histoire et Description generale de la Nouvelle France) (Paris 1744) ; (Relation des Jesuites J (Quebec 1858) ; these two works with the (Relations inedites de la Nouvelle France) (1672-1779), and other documents have been collected and pub¬ lished with an English translation in the edi¬ tion of Reuben Thwaites, Cleveland, 1897, un¬ der the title: (Travels and Explorations of the Jesuit missionaries in New France) (1610-1791) ; Parkman, (The French pioneers in North America.* These attacks of the Iroquois became the terror of the colony. Montreal owed its salvation only to the bravery of Maisonneuve and to the heroic devotion of young Dollard, who at the head of 16 companions for several days faced over 700 Iroquois, and resisted them to the death.

The year 1659 marks the commencement of the ecclesiastical hierarchy in Canada. Mon¬ signor Frangois de Montmorency-Laval was named bishop of Petrea and apostolic vicar of New France bv Alexander VII. The prelate had numerous difficulties with the governors d'Avangour and de Mesy (1663-65) over the traffic in brandy which was causing ruin among the Indians. He opened a small seminary for the training of future clerks, and 10 years later (1678) laid the foundations of a large seminary for preparation for the priesthood. In 1674 Quebec was created a bishopric by Clement X ;

the jurisdiction of the new see extended over all North America until 1789, the year in which the bishopric of Baltimore was created. To Monsignor Laval are also due the creation of charges with resident priests, the incorporation of the Seminary of Quebec and its union with the Seminary of Foreign Missions at Paris, the creation of a chapter of canons ; in one word a good diocesan organization. He came in con¬ flict with Governor Frontenac and Intendant Talon to maintain the rights of the Church and to extirpate the abuse of the liquor traffic.

Under his episcopacy the missionaries con¬ tinued their work. The Sulpicians saw two of their number fall beneath the blows of the Iroquois at Villemarie (1663). Shortly after Messieurs Trouve and de Salignac-Fenelon, brother of the illustrious archbishop of Cambrai, founded the mission of Rente (1668), at the point on Lake Ontario where debouches the Saint Lawrence. During 14 years it was a centre whence the true faith radiated through¬ out all the surrounding region as far as Niagara. The following year (1669) Messieurs Dollier de Casson and Brehan de Gallinee, Sulpicians, left Villemarie in the company of Cavalier de La Salle with the resolution of advancing west to the Mississippi. Abandoned by the dis¬ coverer they traversed alone the region of the Great Lakes, and returned to Montreal after one year of exploration and research ; there M. de Gallinee prepared a relation and made a map of the expedition. We should mention also the Sulpician missions of la Montagne, Gentilly, lTle-aux-Tourtes and Lac-des-Deux-Montagnes, all in the environs of Montreal. The Jesuits on their side prosecuted arduously their missions. Father Menard evangelized the Outaouais, Father Allouez penetrated as far as Lake Superior (1665) and Fathers d'Ablon

and Marquette planted the cross at Sault Sainte Marie. Other Jesuits joining the explorers Saint-Lusson and de La Salle, took possession of the banks of Lake Huron ; and two years after (1670) Father Albanel penetrated, while traveling by the Saguenay, as far as Hudson Bay. The missions to the Iroquois were re¬ sumed, but without great

success. In 1669 the sedentary mission of the Prairie de la Madeleine was founded to the south of Montreal. There expanded the lily of Canada, that Catherine Tegakouita, who died in her 23d year, and for whom the III Council of Baltimore has asked the process of canonization. This mis¬ sion transferred to Sault-Saint-Louis, now Caughnawaga, is still flourishing (having over 2,000 members), and after numerous vicissitudes has again come into the hands of the Jesuits. From Canada also went Joliet and Father Mar¬ quette on their discovery of the Mississippi (1673). Consult (Recit des voyages et de-couvertes du Pere Marquette) (New York 1855) ; Thwaites, Reuben Gold, (Father Mar¬ quette) (New York 1902).

Recalled to Canada by Talon, the Recollet Fathers (1670) established themselves at Que¬ bec and had four missions: Trois-Rivieres, File Percee (Gaspe), Saint-John River and Fort Frontenac on Lake Ontario. In 1682, Mr. Dollier de Casson called them to Montreal, and in 1692 the missions of Cape Breton and of Plaisance in Newfoundland were confided to them.

Meanwhile Monsignor Laval, worn out with his administration, gave in his resignation to Louis XIV (1684). After four years' sojourn in France, he returned to Quebec (1688), where he lived in profound retirement until his death in 1708. The episcopacy of Monsignor Laval marks one of the most prosperous epochs of the Canadian Church and of the colony. Be¬ tween 1665 and 1680, thanks to the intelligent activity of Colbert and de Talon, more colon¬ ists came to Canada than in the preceding half century. A strict supervision was exercised in the choice of the young women sent, as much as regarded their physical as their moral quali¬ ties. Several whose loose manners might have become a cause of corruption and decadence rather than of growth were rejected. Consult Gailly de Taurines, (La nation canadienne) (Paris 1894) ; Ferland, (Cours d'histoire du Canada) ; Verreau, (Des Commencements de l'Eglise du Canada — Archives Societe Royale) (Mai 1884) ; (Souvenir des fetes du 2me cen-tenaire de Frangois de Laval > (Quebec 1908) ; Gosselin, (Eveques de Quebec. >

Monsignor de Sai;it-Vallier succeeded Mon¬ signor Laval. The new bishop founded the general hospital of Quebec, endowed it with his own contributions, built the episcopal palace, published a catechism for the diocese, estab¬ lished ecclesiastical conferences and held the first synods. In 1690, the American Phipps, having attacked Quebec with 32 vessels the prelate in a pastoral letter exhorted the Cana¬ dians to bravely do their duty. When after useless efforts the enemy had departed the bishop dedicated to Our Lady of Victory the church

in the Lower Town, still standing, as a monument to Heaven's protection.

The era of great missions passed ; neverthe¬ less Cadillac and a missionary founded the town

and colony of Detroit (1700) ; the priests of the Seminary of Quebec became the apostles of the Tamarois, between the Illinois and the Ohio rivers; the Jesuits evangelized the Miainis, the Sioux, the Otawawas, the Illinois and held their ground amid the Iroquois. With the opening of the 18th century, commenced the furious and repeated assaults of England and its American colonies against the little Catholic colony, in which the French government, careless of the future, became less and less interested. The emigration to New France ceased toward the end of the preceding century. No more were to be seen the great convoys setting sail for America crowded with new populations full of faith and energy. In 1713 the French Canadian population was 18,000, and in 1739 scarcely reached 42,000. It was a small number to re¬ sist an adversary which counted in 1706 260,-000 individuals, and which was increasing each year.

Acadia especially was weak, having but 2,000 inhabitants of French origin. The first attacks' were directed against her. After having resisted in 1704 and in 1707, she fell (1710) into the power of the English colonists, and three years later, the Treaty of Utrecht (q.v.) (1713) ceded Acadia, Newfoundland and Hudson Bay to England. From this epoch to that of the violent dispersal of the Acadians by Lawrence (1755), the Catholics found de¬ voted support in the Sulpicians and the priests of the Seminary of Quebec who were their mis¬ sionaries. The names of Geoffroy, Baudoin, Trouve, de Breslay, Metivier, de la Goudalie, de Miniac, Chauvreuse and Desenclaves, of Saint-Sulpice ; of Petit, Thury, Gaulin, of the Seminary of Quebec, deserve to be remembered by posterity. Mention should also be made of Father Rasies, S. J., missionary to the Abenakis, who was killed by the English. We will not re¬ call here the incredible atrocities which have relegated Lawrence's memory to the execra¬ tion of humanity, and which Longfellow has immortalized in his touching poem (Evangeline. } Consult Richard, (Acadia, Missing Links of a Lost Chapter of American History) (Montreal 1895) ; Abbe Casgrain, (Les Sulpiciens en Acadie) (Quebec 1897) ; id., (Un pelerinage au pays d'Evangeline^ (Quebec 1885).

These painful events only too plainly fore¬ shadowed the fate

awaiting the Canadian col¬ ony. Instead of sending men, France persisted in raising at great expense useless fortifications at Louisburg and at Quebec. Canada was to fall through lack of foresight.

The episcopacy of Monsignor de Saint-Val- lier lasted until 1727. The endowments with which he enriched the various religious estab¬ lishments of the country have been estimated at £600,000. His successor, Monsignor Du-plessis-Mornay, never came to Canada. He governed his diocese by an administrator. _ Re¬ signing in 1734, he was replaced by Monsignor Dosquet who devoted himself to promoting the education of youth and the religious life in the communities. Monsignor de Lauberiviere, who succeeded him, died a month after his arrival in his diocese, victim of his charity in attending soldiers attacked with scurvy (1740). His suc¬ cessor was Monsignor de Pontbriand (1741-60), the last bishop under the French regime. He built a cathedral, restored the Ursuline

monastery at Trois-Rivieres and the Hotel-Dieu of Quebec, which had been destroyed by fire, established ecclesiastical retreats, and by his science and virtue was the model of his clergy.

Among eminent priests of this epoch should be mentioned M. de Belmont, superior of Saint-Sulpice at Montreal (1701-32), who covered the region with his liberalities and his works; M. Normant du Faradon, his successor (1732-59), who with the Venerable Mother d'You-viile shares the glory of having founded the admirable charitable institution of the Grey Sisters. Consult Faillon, S. S., (Vie de la Venerable Mere d'Youville' (Montreal 1852). To Saint-Sulpice belonged also that abbe Pic-qu t to whom the town of Ogdensburg erected (1899) a monument, as well as to its founder. Consult (Lettres edifiantes et curieuses) (Lyon 1819) ; (Memoire sur la vie de M. PicqueD by M. de la Lande, of the Acadamy of Sciences, p. 262; (Biographie universelle ancienne et moderne) (Paris 1823, Vol. XXXIV, p. 289) ; (Revue canadienne, janvier et fevrier 1870, > Vol. VII; Tabbe PicquetP by J. Tasse.

The events which precipitated the fall of Canada are well known. Quebec was taken (1759), but the bishop, Monsignor de Pontbriand, died at Montreal (1760) without seeing that town in the hands of the English. M. Briand undertook the administration of the region of Quebec ; M. de Montgolfier, Sulpician, of that of Montreal. The Treaty of Paris which ceded Canada to England was signed 10 Feb. 1763. The period of establishment closed for the Canadian Church, and that of conflicts and of progress opened.

2. After 1763. — All the natural chiefs of the Canadians recrossed the ocean with the French flag. A population of 70,000 souls was abandoned without a guide. The clergy alone remained, invested with the double mission to preserve the ancestral faith and direct the peo¬ ple in the attainment of their civil and political rights. They understood their mission and it can be truthfully said that they did not fail therein.

The Treaty of Paris, it is true, guaranteed the Canadians (<the free exercise of their re¬ ligion, ˆ but with the addition <(so much as the laws of Great Britain will permit.® This re¬ striction left a great latitude in the interpreta¬ tion of the treaty. In fact it was a species of persecution. The government of London thought to substitute the Anglican hierarchy and religion for the Catholic hierarchy and re¬ ligion and flattered itself in easily overcom¬ ing the conscience of a handful of colonials. The French laws were abolished and the oath of allegiance exacted from all Canadians. They notified the priests that they would have to subscribe to it or prepare to leave Canada. It was a demand to abjure and rebel against the authority of the Roman See. At the same time they prepared a list of the churches, the priests, their charges, their revenues, their property, also one of the religious communities with their constitutions, rights, privileges and prop¬ erties. In addition George III encouraged the governors to found Protestant schools so that the Church of England could be established in principle and in practice, and the inhabitants gradually be brought to embrace the Prot¬

estant religion, and their children educated in the principles of that religion.

The communities of men were also con¬ demned to die out. Recollets, Jesuits and Sulpicians were prohibited from recruiting in the country or from receiving members from abroad. They took possession of the properties of the first, and as to the Sulphicians, they were reduced

from 30 which they were in 1760, to two septuagenarians, whose deaths they awaited to take possession of their effects, when the French Revolution broke out. The English government then relaxed its rigorous attitude and offered the victims of the furious revolutionists an hospitality which does them honor. The people though were not better treated. For them there were no public posi¬ tions, no place in the councils of the colony. A. species of ostracism followed them every¬ where. In the midst of these painful con¬ junctions the Catholics did not despair; they sent to London petition upon petition claiming on the faith of the treaties the preservation of their religion, their priests, their language and their civil rights. At last in 1766, George III consented to the consecration of Monsignor Briand, as bishop of Quebec, without recogniz¬ ing any other title, however, than that of superintendent of the Catholic cult.

Meanwhile a storm was arising in the Anglo-American colonies. The metropolis understood that it should conciliate the Canadians. The Act of Quebec (1774) restored the French civil laws, dispensed with the test-oath and rec¬ ognized their civil and political rights. Dur¬ ing the war which followed and which termi¬ nated with the death of Montgomery (1775) under the walls of Quebec, the Canadian people, docile to the voice of their clergy, remained faithful to the sovereign which Providence had given them.

During these years the Catholic population had grown : in 1784, it numbered 130,000 French-Canadians ; the Maritime provinces were being peopled by Irish and Scotch Catholics, and the Acadians, dispersed in 1755, were grouping silently and multiplying, supported by such apostles as the abbes, Desjardins, Sigogne, de Calonne and Ciquart, Sulpician. <(To these con¬ fessors of the faith the Acadian race owed its organization; these were the true founders of its nationality.® Consult (Vie de l’abbe de Calonne) (Trois-Rievieres 1892) ; Casgrain, (Pelerinage au pays d’EvangelineP

After having courageously combated, Mon¬ signor Briand resigned in 1784. His successor, Monsignor d’Esglis, was an old man of 75 years! He speedily took a coadjutor in the person of Monsignor Frangois Hubert, who became titular bishop in 1788. In a remarkable memoir to the Holy See (1794), the prelate states that his diocese contained 160,000 Catholics; that the efforts of the Anglicans to win the Canadians to their religion were in vain; that his diocese is too vast for him to administer conveniently. But, he added “every plan of ‘division would find insurmountable obstacles on the part of Great Britain which is occupied on the other side in the means to establish in this country a Protestant clergy.® Consult <Mandements des eveques de

Quebec,* Vol. XI, p. 474.

Monsignor Denaut (1797-1806) succeeded Monsignor Hubert. Under his episcopacy the

light against Anglicanism is summed up in the Royal Institution. Thus was named a cleverly composed organization designed to monopolize instruction of every degree by concentrating the power in the hands of the governor. The Anglican Bishop Mountain was chosen as presi¬ dent of the institution. Profiting by a legal restriction the Catholics prevented its success. Consult Pagnuelo, S., (Etudes historiques et legales sur la liberte religieuse en Canada) (Montreal 1872).

From 1806 to 1825 the Episcopal See of Que¬ bec was occupied by Monsignor Octave Plessis, a prelate distinguished as much by the breadth of his intelligence and the force of his char¬ acter, as by his courtesy in all proceedings. He had to hold his own against a powerful oli¬ garchy which would not recoil from extreme measures, and which was resolved to make the Church the vassal of the civil power, the slave of the government ; in fact to lead insensibly Canada to Anglicanism by the governmental channel. The soul of this plan was a certain Witzius Ryland, secretary of the governors of Canada from 1790 to 1812. It would take too long to enter into the details of this struggle, into which Sir James Craig was weak enough to enter; it suffices to say that Monsignor Ples¬ sis by his individuality embodied Canadian re¬ sistance without ever wounding English senti¬ ment; that he obtained for himself official recognition of his title, bishop of Quebec (1818) ; that he removed the pretensions of the government to nominate rectors ; that he en¬ sured the independence of the Church against the State; and that he inspired his adversaries, even, with respect and admiration for his great character. Faithful besides to the Crown of England, his was the act of a loyal subject in calling to arms his diocesans, on the occasion of the invasion of the United States in 1812. Well and justly could Lord Bathurst reply to the Anglican bishop of Quebec, J. Mountain, who protested again the favors accorded Mon¬ signor Plessis by the London government. ((It is not when

Canadians are fighting for Eng¬ land that such questions should be agitated/ Consult Pagnuelo, (Etudes sur la liberte re¬ ligieuse en Canada,) c. IX-XI, p. 86-120; (Le Correspondant,* April 1877 ; (La France Canadienne/ by J. Guerard ; Garneau, (Histoire du Canada, } t. Ill, 1 XIII, c. 11 and 1 XIV, c. I; (Mandements des eveques de Quebec/ t. Ill; (Conversation entre Sir J. Craig et Mgr. Ples¬ sis, } p. 59; {Memoire au gouverneur/ p. 79; French, (Biographical notice of J. O. Plessis, Bishop of Quebec* (Quebec 1864) ; L. O. David, /Biographies et portraits) (Montreal 1876, p. 80) ; Bedard, (Histoire de Cinquante ans* (1791-1841), (Quebec 1869, c. IV et V).

Monsignor Plessis understood the necessity for dividing his vast diocese so that it might be efficiently administered. Already in 1817 New Scotland was detached with Monsignor E. Burke as apostolic-vicar. This did not suf¬ fice. Soon the apostolic-vicarates were created of Upper Canada with Monsignor MacDonell as titular; of New Brunswick and Prince Ed¬ ward's Island, with Monsignor MacEachern ; of the Northwest with Monsignor Provencher; of the district of Montreal with Monsignor Lartigue, Sulpician (1820). These divisions were completed after the death of Monsignor

Plessis, by the creation of the sees of Kings¬ ton (1826) ; Charlottetown (1829) ; and of Mon¬ treal (1836).

In the course of years the number of French-Canadians kept on increasing. In 1831 it at¬ tained 380,000. In less than 50 years, it had increased by nearly 280,000 souls. This prog¬ ress was not of a nature to reassure the intol¬ erant and exclusive set which existed on the side of the Anglo-Protestants. Already, about 1820, they had tried to abolish the constitu¬ tion of 1791, which assured an independent ex¬ istence to the province of Quebec, and wished to unite Upper and Lower Canada, with the scarcely veiled object of outnumbering the French Catholic population. This plan had failed, thanks to the firmness of Bishop Plessis and his clergy, who, rallying the forces of the country, victoriously opposed Protestantism. Unfortunately, after the death of the bishop, several influential members of the legislative body deserting the sure ground of legal resist¬ ance, slipped upon the slope of revolution, fanned the spirit of revolt by their indignant philippics, and provoked the troubles of 1837-38, when several hundred countrymen, led astray by their representatives, flew to arms. Neverthe¬ less, let us say that the voice of the Catholic clergy was sufficiently powerful to keep the mass of the population in the path of duty. The result of this insurrectional movement was the union of the

two Canadas. The Act of Union was passed by the Britannic Parliament 23 July

1840.

Before this act of despotism (consult Turcotte, (Le Canada sous l'Union/ p. 60), which marks an important date in the history of Canada, several works had been created, several deeds accomplished which interest the Church. The seats of education had multiplied: the Col¬ lege of Montreal (1767) founded by M. Curat-teau, priest of Saint-Sulpice, and then (1806-28) so prosperous under the direction of M. Roques; the colleges of Nicolet (1804), of Saint-Hyacinthe (1811), of Sainte-Therese (1825), of 1' vssomption (1832), of Sainte-Anne de la Pocatiere (1827). Mention should be made also of the formation of the Societe d'education of Quebec, to promote primary in¬ struction, and the acceptance of ˆFabriques** Schools Law (1824), so favorable toward the same end. To this same period belongs the acknowledgment of the properties of the Seminary of Saint-Sulpice at Montreal by the government of Queen Victoria (1839). This act of justice allowed this venerable institu¬ tion to follow the course of its charities and to cover the Montreal region with its intelligent liberalities.

To Monsignor Panet, who had replaced Monsignor Plessis (1825-32), succeeded Mon¬ signor Signay. His episcopacy was marked by many misfortunes: cholera (1832), civil war (1837-38), two fires in Quebec (1845), typhus brought by the Irish driven from their country (1847). The 15 years which followed 1840 were more fruitful for the Canadian Church. Five communities of men, and 15 of women dedicated to the ministry, to teaching or to charity, came from France to settle in Canada. The Oblate Fathers of the Immaculate Mary (1811), the Jesuits (1842), the clerks of Saint-Viatcur, the Congregation of Sainte-Croix (1847), and the

Brothers of the Christian schools answered to the call of Monsignor Ignace Bourget, bishop of Montreal (1840-79). Then were founded the Sisters of Providence (1843), of the Holy Names of Jesus and Mary (1843), of Mercy (1848), of Saint Anne (1849). At the same time the Episcopal Sees were multiplied: To¬ ronto with Monsignor de Charbonnel, S. S. (1842) ; Saint John, N. B. (1842). Quebec ele¬ vated to the dignity of an archbishopric received as suffragan sees Montreal, Kingston and To¬ ronto. The same year (1844) the bishopric of Arichat, N. S., transferred to Antigonish since 1886, was created: in 1847 the see of Bytown or Ottawa and of Saint John, Newfoundland. United in council at Quebec (1851), the bishops decided on the foundation of Laval University and asked the Holy See to establish the sees of Trois Rivieres and Saint Hyacinthe (1852). Let us mention also the foundation of societies for colonization, for temperance, of Saint-Vin- cent de Paul and of an educational system for separate schools for Catholics.

Meanwhile the Catholic population had in¬ creased considerably. In the province of Que¬ bec it more than doubled in 30 years ; in 1831 it counted 425,000, in 1861, 942,800 souls; in On¬ tario it attained 260,000. This development de¬ manded the multiplication of primary schools. This was the work of J. B. Meilleur, of whom it can be said, (<he undertook the direction of Public Instruction from its cradle; that he had to create everything even to the love of in¬ struction among the people.® Consult Meilleur, J. B., (Memorial sur l'education au Bas—

Canada) (Quebec 1876). The Catholic colleges were opened of Joliette (1846), of Rigaud (1850), of Saint-Lawrence (1847), of Saint Mary of Monnoir and Levis (1853). That same year (1853), the Seminary of Quebec un¬ dertook the heavy but glorious task to build Laval University which was inaugurated in the presence of Lord Elgin, 14 Sept. 1854, and which since has rendered such immense serv¬ ices to the Catholic cause and to the country. Consult Roy, C., (L'Universite Laval et les fetes du Cinquantenaire) (Quebec 1903).

While these works were being accomplished in the East, the West was opening to evangeliza¬ tion. With Monsignor Provencher, the first apostles of these districts had penetrated along the Red River. Wishing

to ensure the future of these missions, the bishop of Sainte-Boniface called to his assistance the Oblate Fathers and even chose from them Father Tache as coadju¬ tor. Monsignor Provencher died in 1853 and was succeeded by Monsignor Tache. He had to expend his intelligence and his strength dur¬ ing 40 years (1853-94). It does not enter into the limited scope of this essay to recount the works of the Oblates in the Far West, although they constitute one of the most remarkable chapters of the Catholic missions. The apostolic-vicarates and the Episcopal sees embrace in their jurisdiction every point in these distant regions which came under the indefatigable zeal of these missionaries. Consult Dugas, G., (Monsigneur Provencher et les Missions de la Riviere-Rouge* (Montreal 1889) ; Piolet, S. J., (Les missions Catholiques frapqaises* (Paris 1902) ; Monsignor Tache, (Vingt annees de missions dans le Nord-Ouest de l'Amerique* (Montreal 1869) ; Don Benoit, (Vie de Monsigneur Tache * (Saint Boniface 1904) ; Pere Jonquet, O. M. I., <Vie de Monsigneur Gran-din (Montreal 1904) ; Cooke, R., O. M. I.,

(Sketches of the Life of Monsignor de Ma-zenod* (London 1879) ; (Dictionnaire des Canadiens de l'Ouest,* par Rev. P. Morice (Quebec 1908) ; (Histoire de l'Eglise Catholique dans l'Ouest Canadien,* 1659-1905 par Rev. P. Morice (Montreal 1912).

The years which followed 1860 were full of solicitude for the Catholic clergy. The coun¬ cils of Quebec show us the bishops preoccupied with the progress of impiety, with evil books, with the weakening of the faith, and painfully affected by the events which led to the invasion of the pontifical domains by the armies of Vic¬ tor Emmanuel. The Canadians flew to arms and several detachments of zouaves offered their services to Pope Pius IX (1868).

The Catholic heirarchy had developed in the course of years. In 1852, Halifax was created an archbishopric with Charlottetown, Saint John, N. B., Arichat, N. S., and soon after Chatham, N. B. (I860), as suffragan sees. The year 1871 marked the creation of the ecclesias¬ tical province of Saint Boniface (Manitoba), with the bishopric of Saint Albert (1871), and the apostolic-vicarates of Athabasca-Mackenzie and of Saskatchewan for suffragans. In the preceding year (1870) Llpper Canada was created an ecclesiastical province with Toronto for archbishopric and Kingston and Hamilton for suffragans. Since then Kingston has become an archiepiscopal see (1878) with two suffra¬ gans : Peterboro (1882) and Alexandria (1890). In the province of Quebec, Sherbrooke (1874), Chicoutimi (1878), Nicolet (1885) became bishoprics. In 1886, Montreal was created an archbishopric under Monsignor Fabre, with Saint Hyacinthe and

Sherbrooke as suffragans, to which have since been added Valleyfield (1893), and Joliette (1904). The same year Leo XIII created the ecclesiastical province of Ottawa, which received as suffragan the Episco¬ pal See of Pembroke (1898). To crown this flourishing hierarchy, Leo XIII honored with the cardinal purple Monsignor Taschereau, archbishop of Quebec (1886). To conclude the study of the second half of the 19th century, mention must be made of three particular points: (a) The Awakening of the Acadian Race, which had expanded imperceptibly. — From the 25,000 that they were in 1815, the Acadians increased to the number of 80,000 (1864), and 125,000 (1899). To Father Lefebvre, a Canadian priest, is due the merit of having amalgamated them and, in founding the college of Memramcook, N. B., of having con¬ tributed powerfully to render them a force for Catholicism in the Maritime provinces. To¬ day the Catholics of French origin in that region amount to 155,000. Consult P. Poirier, (Le Pere Lefebvre et l'Acadie* (Montreal 1898). (b) The Schools of New Brunswick and of Manitoba. — In 1867 when the Canadian Con¬ federation was founded, the educational system of New Brunswick allowed the Catholics of that province to have separate schools. This right was refused them in 1871, the aim being to compel them to send their children to the public schools, that is to say, Protestant schools. An organized resistance spread everywhere and to avoid a sanguinary conflict a compromise was

effected. The unjust law was not abrogated but the concessions were of such a nature that peace was re-established (1874).

An injustice of the same kind wronged the Manitoban Catholics in 1890. Despite the vigor¬ ous fight led by Monsignor Langevin, successor to Monsignor Tache in the see of Saint Boni¬ face, the iniquity was not amended, but a com¬ promise was arranged between the Laurier gov¬ ernment and the Holy See, which for want of a better softened without destroying the dis¬ astrous effects of the law. This question which so impassioned the minds in 1896 gave rise to the creation of the Apostolic Delegation to Can¬ ada. (c) The foundation

of Laval University at Montreal. — For a long time Montreal was in want of a Catholic university. Monsignor Bourget applied to the Propaganda. Not to in¬ jure the rights of Quebec, a branch in Mon¬ treal was granted by the pontifical bull Inter varias sollicitudines (1876). The powers and the autonomy of this branch were signally in¬ creased by Leo XIII (1889). In need of the necessary buildings, the liberality of the Semi¬ nary of Saint Sulpice, governed then by M. Colin, filled this void. Laval University at Mon¬ treal now has spacious premises and numerous professorships.

3. Present Condition. — (a) Ecclesiastical provinces. — The total Canadian population in Canada is estimated at 2,230,008 by the census of 1901. Since then it has increased about 100,000 through immigration. With 1,430,000 Catholics, the province of Quebec alone com¬ prises three-fifths of the faithful followers of Rome in Canada. Nearly 900,000 are scattered throughout the other provinces. Everywhere, except in Ontario, in Manitoba and in British Columbia, Catholicism exceeds in the number of its adherents any of the separate Protestant sects. It embraces 42 per cent of the total population of the Dominion, which is 5,371,315. From 1890 to 1900 the Catholics increased by over 250,000 souls. This gain was effected despite a very pronounced emigration movement of French Canadians to the Northeast of the United States. The following table gives at a glance the ecclesiastical divisions of the Domin¬ ion of Canada :

(Y)

c/3 ’a >

C/3

« Q,

So

Titulars in 1921

Catholics

C/3

.a

Oi

U C

aJ

Card. L. N. Begin Auxil. P. E. Roy. .

} 380,000

679

286

F. X. Cloutier… .

95,884

143

76

Vacant .

135,628

158

124

T. Labrecque …

81,000

136

68

H. Bruneault ….

90,000

163

68

P. Chiasson .

9,650

} 545,406

19

39

P. Bruch6si .

824

263

G. Gauthier, aux.

X. Bernard .

116,000

250

120

P. Larocque .

H. Chalifoux, aux.

} 95,000

148

86

M. Emard .

56 , 363

104

44

G. Forbes .

65,000

127

53

H. Gauthier .

138,000

38,500

310

141

P. Ryan .

49

71

F. X Brunet .

34,500

58

46

E. Latulipe .

25,000

51

38

Archbishoprics

Suffragan

Bishoprics

Quebec . j

Trois-Rivieres . .

Rimouski .

Chicoutimi .

Nicolet .

Vic. Apost. du Bas St Laurent…

Montreal . j

Saint Hyacinthe… .

Sherbrooke . j

Valleyfield .

Joliet te .

Ottawa .

Pembroke .

Mont-Laurier .

Haileybury .

VOL. 5 — 26

Archbishoprics

Suffragan

Bishoprics

Toronto . Hamilton . London …

Kingston .

Peterboro .

Alexandria .

Sault Sainte-Marie. .

Halifax .

Charlottetown .

Saint Jean, N. B… . Antigonish .

Chatham . j

Saint Boniface, in¬ cluding the new archd.of Winnipeg, the limits of which are not yet known

Saint Boniface .

Winnipeg .

Vicariateo f Keewatin

Edmonton .

Calgary .

Athabaska (Vic.) .

Mackenzie .

Regina .

Prince Albert .

Vancouver . Victoria … . Yukon .

Titulars in 1921

N. Mac Neil. T. Dowling. . M. Fallon …

M. J. Spratt. . M. O’Brien… W. MacDonell . D. Scollard

E. McCarthy …

H. O’Leary .

A. Leblanc .

J. Morrison .

J. Barry .

L. O’Leary, aux.

A. B616veau .

A. Sinnott .

O. Charlebois… .

E. Legal .

J. McNally .

E. Grouard .

C. Joussard, aux . . G. Breynat .

E. Mathieu. A. Pascal…

T. Casey .

A. MacDonald. E. Bunoz .

Catholics

75,000

62,000

65,000

43,000

27,000

25,500

40,000

55,000

50,000

61,385

87,000

80,000

62,454

10,500

40,426

29,000

57,900

35,000

38,000

10,000

(/)

4~ >

w

0)

C

a.

140

70

106

57

31

20

60

74

54

80

108

114

181

16

121

37

27

23

106

73

57

19

10

<L>

a

rt

X

O

a

rt

108

60

84

75

52

25

91

86

51

100

108

80

181

114

51

19

22

117

129

60

24

12

The Catholics number about 2,873,700, for the whole Dominion, the province of Quebec having about 1,766,000. The other eight provinces have about 1,107,700. It is to be remarked also that of the 1,107,700 Catholics disseminated throughout the eight provinces, a little over one-third (400,000) are Catholics of French descent.

On the death of a bishop, the bishops of the province send a list of three names to Rome and the Pope chooses and names a successor. The bishop-designate cannot be consecrated be¬ fore receiving his bull from the Holy See. He enters immediately on his functions without having to fulfill any civil formality, and the diocesans render their homage and obedience as to his predecessor. The state recognizes in him the rights of a civil corporation. He enjoys besides the greatest liberty while regarding canonical rules, in nominating vicars, creating parishes, erecting churches and parsonages. Each vicar keeps a registry of births, marriages and deaths. In French-Canada the vicar has the right of tithes for his maintenance. This tithe in spite of its name is but a twenty-sixth part ; it is raised on grain alone, and the tend¬ ency is more and more to pay it in money. No vicar is irremovable.

(b) Religious Communities. — There are to¬ day in Canada about 38 communities of men, either priests or brothers ; and about 83 com¬ munities of women. The priests devote them¬ selves to various forms of charity, of teaching, to parochial ministry or to preaching. They include Sulpicians, Jesuits, the Oblate Fathers of Mary the Immaculate, the clerks of Saint Viator, Dominicans, Franciscans, Redemptor-ists, the Fathers of the Holy Cross, of the Company of Mary, Eudistes, Basilians, of the Holy Sacrament and several others. The

Brothers of the Christian Schools to the num¬ ber of 760 have 66

establishments, and instruct 25,000 pupils. The Sisters are to be found in every kind of devoted work : hospitals, asy¬ lums, industrial schools, almshouses, refuges, orphanages, in one word all the miseries that the crowded cities multiply find succor from them. Mention will be made only of the orders found in Canada:

Names

Diocese

Year of

Foun¬

dation

Members

Houses

Ursulines of Quebec .

Quebec .

1639

101

5

Congregation of Our Lady

Montreal .

1657

2,000

156

Montreal .

1747

1,097

64

Grey Nuns, divided since

Quebec .

1849

990

44

1854, in 5 independent

<

St. Hyacinthe..

1840

450

19

provinces.

Ottawa .

1845

1,060

96

Nicolet .

1886

129

10

Sisters Mercy of Jesus…

Quebec .

1693

83

3

Ursulines .

Trois-Rivieres… .

1697

179

5

Sisters of

Providence .

Montreal .

1843

2,065

99

Jesus and Mary .

Montreal .

1843

1,818

133

Holy Cross .

Montreal .

1847

841

51

Mercy .

Montreal. …….

1848

220

14

Saint Ann .

Montreal .

1850

1,236

71

Immac. Conception …

Montreal .

1902

3

Saint Joseph .

Montreal .

1857

80

5

Servants of the Immaculate Heart of Mary…

Quebec .

1850

480

30

Sisters of the Assumption

Nicole t .

1853

646

57

Providence of Kingston. .

Kingston .

1860

167

14

Precious Blood .

St. Hyacinthe…

1861

350

14

Holy Family .

St. John, N. B …

1874

723

45

Institut de Saint Joseph .

St. Hyacinthe… .

1877

200

28

Our Lady of Holy Rosary

Rimouski .

1879

168

27

Saint Martha .

St. Hyacinthe… .

1883

62

2

Dominican Sisters of the

Holy Child .

Quebec .

1887

172

8

Franciscan Sisters of Mary

Quebec .

1889

253

12

Our Lady of Perpetual

Help .

Ouebec .

1892

198

21

Servants of Jesus and

Mary .

Ottawa .

1895

48

2

(c) Universities and Seminaries. — There are three Catholic universities in Canada : Laval in Quebec, Laval in Montreal, and the Univer¬ sity of Ottawa, founded by Monsignor Guigues. The first two comprise all faculties except sciences. Medicine, law and letters have well-endowed chairs. Theology has distinctive faculties in the great seminaries of Quebec and of Montreal, the last opened by the Sulpicians in 1840. The University of Ottawa has only the faculties of theology and arts. Secondary education is disseminated by 17 colleges in the province of Quebec, all affiliated to Laval Uni¬ versity, which

alone confers university degrees. To these colleges must be added others opened in recent years, namely Loyola College in Mon¬ treal, Sudbury in Ontario, Saint Albert in Alberta and Saint Boniface in Manitoba. Saint Augustine's Seminary in Toronto, opened in 1913, is a faculty of theology. Young men destined for the priesthood prepare by two years of philosophy and four of theology. This preparation begins in a great seminary ; that of Montreal has nearly 30.0 aspirants for the priesthood, that of Quebec over 100. There is besides, one at Halifax; and each religious community of men is endowed with an academy where dogmatic and moral theology, the Holy Scriptures, patrology, canon law, Church history and the pastorate are taught. Those young priests who are most distinguished

for their intelligence are sent by their bishops to Rome to the Canadian College, founded by the Sulpicians in 1888, where they follow courses given by learned professors of the Roman universities and return with the degrees of doctors in philosophy, in divinity or in canon law. Consult Hopkins, (Canada: an Encyclopedia of the Country,) Vol. V (To¬ ronto 1898). Two important events took place in recent years; one in 1910, the Plenary Coun¬ cil of Quebec, at which all the bishops of Canada assisted, under the presidency of the papal delegate, Monsignor Sbaretii. At this council new laws were enacted and the old laws were confirmed. The other eveiU was the solemn Eucharistic Congress, the XXIst of the series, which proved to be a wonderful success, the whole population of Montreal, Protestants as well as Catholics, joining hands in the cele¬ bration of this great event.

French -Canadian Catholics believe that they have been called by Providence to personate on American soil the role that France personated in the Old World. They look upon them¬ selves as destined to fill a mission, and that mission the one that France has filled in Eu¬ rope ; to carry high the banner of the Catholic Church, and among races more inclined to positivism, maintain and propagate the instinct of disinterested devotion, and the worship of the ideal. Consult Casgrain, (Histoire de la Venerable de 1'IncarnationP t. 1. p. 95; Gailly de Taurines, (La nation CanadienneP ch. XXV, pp. 280-91 ; Massom, (Le Canada francais et la Providence) (Quebec 1875) ; Ragey, P., (Une nouvelle France y (Paris 1902).

A. Fournet, S.S., Late Professor in Montreal College. Revised by J. R. Neveu, Professor of Church History, University of Montreal.

27. THE FRENCH CANADIAN. Geo¬ graphical Distribution.— In 1911, according to the last Dominion census, 2,055,000 inhabitants of Canada were of French origin, being over 28 per cent. of the whole population, and showing an increase of 24 per cent since the census of 1901. Of these by far the greater part, 1,605,- 000, were settled in the province of Quebec, forming 80 per cent of the total population of that province. But considerable numbers were located in some of the other provinces : 202,000 in Ontario, 98,000 in New Brunswick, 51,000 in Nova Scotia, 13,000 in Prince Edward Island, 31,000 in Manitoba, 23,000 in Saskatchewan, 20,000 in Alberta, and 700 in the Yukon and the Northwest Territories. The French population of Canada has doubled every 27 years for the past 200 years. Then, according to the last Uni¬ ted States census, there were, in 1910, through¬ out the Union, over 400,000 Canadian-born French; and the total number of people of French Canadian extraction in the United States, if local statistics are to be credited, would exceed 1,000,000. From the point of view of physical and social geography, the French Canadian element in North America is made up as follows :

(1) The main body, 1,800,000 strong, ex¬ tends uninterruptedly over Quebec, eastern and northern Ontario and northern New Bruns¬ wick. The nucleus of this main body is a com¬ pact community of farmers occupying the banks of the Saint Lawrence and the valleys of its

tributaries. On the outskirts of this central group, over the wooded and rocky highlands, north and south of the great river, but more especially throughout the plateaus of northern Quebec, northeastern Ontario and northern New Brunswick, farming is largely supple¬ mented by lumbering, and not infrequently by mining; while along the Gulf and seacoast of Labrador, the Gaspe Peninsula, Chaleurs Bay and eastern New Brunswick it is more or less superseded by fishing.

(2) Then hardly separated from these, and from one another, we have, off the extreme eastern limit of this central group, the French-speaking communities of fishermen of Nova Scotia and Prince Edward Island; while, as a projection from the opposite extreme western border, in

Ontario, we find, along the shores of the Saint Lawrence and the Great Lakes, a string of small settlements of French Canadian rivermen, boatmen and woodsmen, forming an almost continuous chain around that province and connecting, as it were, the two large French groups of Detroit River and Georgian Bay with the still larger one occupying the western bank of the Ottawa. Over one-third, namely, about 680,000 of the total French element composing this main body and its projections are congre¬ gated in villages, towns or cities, where they make a living through physical labor, trading, the crafts and the liberal professions.

(3) As distinct outliers from the above main group, we have, in the first place, the many French-speaking communities of urban population, which, in very large, though fluctu¬ ating numbers, are spread throughout the man¬ ufacturing towns of the North Atlantic States of the Union, principally Massachusetts; in the second place, smaller and sparser groups of French-speaking farmers (at times woodsmen and miners as well), to be found in the Western country, in Manitoba, Alberta and in some States of the North Central division of the Union, especially Michigan, Wisconsin, Minne¬ sota and Illinois; in the third place, still smaller and sparser groups of French Canadian pros¬ pectors or miners, spread in the camps and towns of British Columbia, the Yukon and some of the States of the Western division of the Union, principally Montana and California. Lastly, French Canadian families or individuals are to be found in every part of the Union, though in the States of the South Atlantic, South Central and Western divisions they ag¬ gregate in most cases a few units or a few hundred only. About 40 per cent of the total French Canadian element in the United States are located in 160 principal cities.

Social Features. — The most widespread, fundamental and characteristic type of the French Canadian is the habitant, or farmer, of the province of Quebec (q.v.). From a study of his conditions there may be gathered the clearest idea of the capabilities and limitations of the race as a whole.. Three main groupings are distinctive of social life in the French Canadian country : the habitant's household, the range, the parish.

(1) The habitant's household normally con¬ sists of two families, that of the senior house¬ holder, and that of an associate son and heir; it includes generally sisters and younger brothers of the heir, children of the younger couple, and, in some cases, sisters of the senior

father of family. We have thus a group of some 10 or more persons, closely bound to¬ gether, not only by ties of kinship and family love, but by co-operative effort, community of interest and habits of mutual dependence, which extend, in a measure, even to those mem¬ bers of the group who have settled outside of the family circle. The habitant's household is primarily a labor organism, a workshop. Agri¬ culture is its mainstay ; but it is of a type neither extensive nor intensive, its scope being nar¬ rowed down to the task of satisfying directly the household's needs, and limited by the house¬ hold's internal supply of. labor. The farms seldom exceed 100 acres in area, and outside help is resorted to in very exceptional cases only. To avoid this contingency, women and children are called upon to work in the fields, especially in haying and harvesting time. On the other hand, the object being to provide directly, as far as circumstances will permit, for all the requirements of the family, habitant farming is greatly diversified. On almost every farm there are to be found, beside the kitchen-garden and its few fruit trees, small patches of flax, tobacco, potatoes, Indian corn, buckwheat and barley, while larger areas are given to other cereals, hay and pasturage. Similarly, all kinds of stock are kept on each farm, though seldom any in large numbers or of excellent quality. Various home industries, such as the spinning and weaving of both flax and wool, the manufacture of maple syrup and sugar, car¬ pentry, joinery, cooperage, brush-making, leather-working, etc., are an important factor on many farms. Agriculture, is seldom the sole means of living of the habitant, since in the newer settlements the mere gathering of natural products, such as fish, game, wild fruits and wood is largely resorted to, while in the older and more densely populated sections by¬ industries are conspicuous. Then again tempo¬ rary emigration to and employment in the man-facturing, mining and lumbering centres of Canada and the United States is, in all situa¬ tions, an occasional means of securing capital to start out in life or of bridging over hard times. The methods of farming of the habitant, his rotation of crops, his processes of retting and breaking flax, dyeing wool, making candles, etc., are traditional and have been in use for centuries in certain provinces of France. How¬ ever, in recent years, the wave of modern prog¬ ress has been felt, agricultural machinery has come into fairly general use, co-operative butter and cheese factories have been established, and, especially in the vicinity of railways, improved methods and a more specialized type of farm¬ ing have been adopted. Through hard work and close economy a capable habitant will suc¬ ceed, with the help of his family, in building up a homestead of sufficient area to meet the wants of the household. Should his acquisitions of land during his lifetime remain within that limit, then the homestead will be

transferred in its entirety to the associate son or heir, who in turn will be charged with providing for the whole family, in the same way as the testator would have done. On the other hand, should the acquisitions of the father of family exceed the area required for the support of an ordinary household, the lots in excess are freely used in helping out other sons who, after contrib¬ uting to the sustenance and welfare of th-e pater-404

rial household in their early life, undertake to make an independent living through agriculture. Girls receive very little aid from the family estate, as it is considered they will be provided for either through remaining as members of the paternal household, or through marrying into some neighboring family. Likewise, sons who are sent to college and enter the liberal profes¬ sions or the priesthood receive very little else from their parents. In the management of the family affairs, the influence of the mother is about on a par with that of the father. As a rule she is better educated than her husband, sees to the correspondence and accounts, is consulted in all matters of importance and leads in the family worship. Through working with their parents on the farm the children acquire a variety of aptitudes, but no particular proficiency in any of the arts, nor any strong desire of attaining eminence in the various walks of life, barring possibly priesthood and politics. Education is reserved for the few who take to the liberal professions and the Church. The style of living is plain, and in many respects old-fashioned. Food is in abundance, though lacking in delicacy. The house, usually of wood and whitewashed, is often rather small for the accommodation of its inmates, but as a rule kept clean and tidy. Homespun, still in use in a few families in isolated sections, is fast being replaced by the cheap cotton and woolen goods supplied by the trade. Births are numerous, but owing to defective hygienic conditions, or to overwork on the part of mothers, this ad¬ vantage is partially offset by the high propor¬ tion of deaths among infants. Amusements are simple, pertaining to the daily work, the family circle, Church festivals. Many of the songs and dances are importations or adaptations from Old France. However, here, as throughout the whole range of social phenomena, outside influ¬ ences are apparent, and features of recent origin are found grafted on old and quaint usages.

(2) The farms are in the shape of long, narrow rectangles, 20 or 30 arpents in length, by 2 or 3 in breadth. The farm buildings are all built at one end of these rectangles, along the public road, which crosses them at right angles, thus giving a close succession of houses and barns. Not infrequently the buildings of two abutting ranges are situated on opposite sides of the same road, making a double row of almost contiguous houses, somewhat like a vil¬ lage street. The ranges, of which there are four or five in parallel line in every parish, connect with one another and with the village by means of “routes® or transverse roads, along which no buildings are erected ; so that each range is iso¬ lated from the rest and forms a distinct group¬ ing within the parish. This type of settlement, which differs from that of the isolated home¬ stead to be found in some parts of France and throughout the Anglo-Saxon world, and also from the central village type observed in other parts of France and Europe, is a distinctly French Canadian creation, which the habitant takes with him wherever he settles in num¬ bers. The range seems to have been the out¬ come of the desire on the part of the habitant, while residing on his own farm (which the vil¬ lage settlement would not allow him to do), to secure the benefit of his neighbor’s assist¬ ance and company in a more effective way than the isolated homestead would permit. What

the habitant cannot accomplish with the help of his family he endeavors to do through the free help of his neighbors. However, while the nearest neighbor, on either side, may be called upon now and then to lend a hand in the ordi¬ nary work of the farm, the summoning in num¬ bers of the near-by farmers is resorted to in exceptional cases only, such as the clearing of land, the “lifting® of a barn or the relief of some destitute family. Each range looks after its poor, by means of voluntary contributions, principally in kind. Each range has its cheese or butter factory, its schoolhouse, also its large wooden cross along the highway, in commem¬ oration of some religious revival.

(3) The roads leading from the various ranges all centre toward a village, generally small, comprising a few lodgings, workshops and stores, besides the priest’s house and the church. A community wherein the highest aim of the farmer, the basal element, is to cater to all the needs of his household directly through the labor of his own family and the occasional assistance of his neighbors does not leave much scope for the development of other social fac¬ tors. The ambitions and efforts of the most capable being restrained within that

limit, equal¬ ity and similarity of condition is the rule. Com¬ merce, industry, the liberal professions remain embryonic. In the absence of leaders in agri¬ culture, industry and commerce, learning be¬ comes the standard of distinction. A few wise old farmers, the doctor, the notary, the lawyer, are looked up to ; but, on account of the exalted nature of his function, the parish priest is de¬ cidedly the dominant factor. Like the family and the range, the parish is primarily an organ¬ ism for mutual support, both in the physical and moral order. It plays to a certain extent the part of an insurance company, as barns, for instance, destroyed by fire are restored through contributions from all the parishioners in material or labor. On Sundays and feast days the habitant meets at church his coparish¬ ioners, who are all relatives or close acquaint¬ ances, the doctor, the notary ; he listens to the admonitions of the “cure,® to the announcements made by the public crier, and receives the intel¬ ligence and impressions which will be his mental food for the remainder of the week. To all in¬ tents, the parish may be considered as an en¬ largement of the family with the parish priest as its patriarchal head. Then, the parish is the main organ of local government in the French Canadian country, the school commission and the municipal corporation, of British origin and of comparatively recent introduction, remaining mere adjuncts, only partially developed, of the parish proper. The revenues of the latter often exceed those of the school commission and municipal body put together. Many localities have no townhall other than the vestry. In practice the cure is much more the maintainer of the peace and the arbitrator of disputes within the parish than are the mayor, the local magistrates and court. His powers extend even to a close supervision of family affairs. The law of the province allows him ‘the 26th bushel of all cereals grown by his parishioners within his territory, and his influence over the church wardens and flock enables him to obtain from close-fisted farmers the expenditure of comparatively large sums of money on church

buildings. His influence is exerted as well over the school commission and municipal council, whose policy and decisions are usually made

to conform to his wishes. On the other hand, practically the only check on the cure is the far-off bishop, who visits the parish and inspects the books every third year, and may remove him at will. The school commission and municipal corporation are administered in a spirit of parsimony. School buildings are in¬ adequate, and the teachers, generally girls, re¬ ceive very little pay and give correspondingly poor results. Illiterates are still in large num¬ bers. As each individual farmer is required to look directly after that part of the public high¬ way which faces his property, and to contribute his share of the labor necessary for the mainte¬ nance of the cross-road leading to the village, the municipal council has little to do apart from supervising, in a general way, the repairing of roads or the occasional building or repairing of bridges within the limits of the parish. Sim¬ ilarly, county councils have not acquired in the French country anything like the importance which they have in English sections, and are content with looking after roads, bridges or water courses common to two or more parishes. On the other hand, provincial and Federal poli¬ tics have taken quite a hold on the habitant ; but the interest which he takes in them is more the outcome of his inclination for clannish warfare and oratory, and of his craving for the petty favors of officialism, than the result of a desire on his part to ensure the proper man¬ agement of public affairs, which he does not always grasp. These are the prey of organized political parties, whose leaders are recruited mainly from the liberal professions and the cities. Church and politics are, in the mind of the habitant, the only avenues open to those desirous of rising in the world. And this ac¬ counts for a rather remarkable development of institutions of classical and literary teaching in a community wherein common schools are markedly deficient and technical and business training neglected.

Evolution. — On the basis of the classifi¬ cation of societies proposed by F. LePlay and his followers, H. de Tourville and the French school of social science, the French Canadian is a semi-patriarchal or semi-communistic type; that is one in which social organization and life, while swayed by tradition and habits of mutual dependence to a less degree than in the purely patriarchal or communistic types of the Orient, still are not permeated and uplifted by that spirit of private independence and enterprise dis¬ tinctive of the individualistic or “particularistic® types, as exemplified in the Anglo-Saxon races. His semi-communistic training the French Canadian holds from France. His social an¬ cestors were mainly the Gaul, on the one hand, the Frank on the other. The former, with his clan organization, village life and neglect of agriculture, was a distinctly communistic type. The particularistic Frank broke up, to some ex¬ tent, the clannish and

communistic spirit and in¬ stitutions of the Gaul, and gave a strong im¬ pulse to agricultural pursuits ; but his influence, for reasons which it would be too long to set forth here, was not so lasting nor so far-reach¬ ing in France as was that of his duplicate, the Saxon, in England. Thus there sprang up an intermediate type presenting many of the qual¬

ities and defects of the Celt, with something of the qualities of the Saxon. A farmer, an artisan, a trader, though generally in a small way and still conserving a fondness for nature and primitive, easy-going occupations ; a race lacking ambition and ability to rise in the ordi¬ nary callings of life, having for its sole leaders the clergy and the military or civil officers of the Crown ; and these leaders, though in many cases sprung from the people, isolated from them by class interests and training and unfit to lead adequately in practical pursuits. Under the trying conditions of New France — the dense forest to clear, the rigorous climate to provide against, the lurking Iroquois to evade — the peasant from north central France, sin¬ gle-handed, made rather slow progress at colo¬ nization. Agriculture was neglected, while the more attractive, more remunerative, though de¬ ceptive, fur trade became the means of sus¬ tenance of both the individual and the colonial government, with a consequent rapid but su¬ perficial expansion of the colony and constant warring. The French settler, fond of home and of quiet, evolved into the adventurous and hardy type of the courcur des bois. Under British rule, and especially in the course of the 19th century, through the restoration of peace and the advent from Great Britain of a class of business men, the fur trade, carried on by large companies, receded toward Hudson Bay and the Far West, vast lumbering opera¬ tions were carried on, with a consequent im¬ pulse to agriculture, extension of settlements, increase in population ; a period of unprece¬ dented prosperity for French Canada. Then, in the latter half of the 19th century, the world¬ wide evolution of commerce and industry set in, with its marvelous applications of steam and electricity, its powerful machinery and means of transportation, the progress of manu¬ facturing centres; and the French Canadians developed a class of factory operatives, to¬ gether with a vigorous undergrowth of artisans and traders in the large cities. See also the articles in this series: Under French Rule; Population and Racial Distribution ; Cath¬ olic Education ; Religious Conditions.

Leon Gerin, LL.B., F.R.S.C., Member de la Societe Internationale de Science Sociale.

28. POPULATION; RACIAL DISTRI¬ BUTION AND IMMIGRATION. In a new

country, population grows by additions from without rather than by natural increase, and questions relating to immigration and the for¬ eign element become of primary significance. Especially is this the case in Canada after the experiences of the present century, when in less than 20 years the inflow from abroad amounted to not less than 60 per cent of the original people. A considerable portion of this was “floating® labor whose stay in the country was brief, but even so the situation which the figures reveal is sufficiently arresting. When it is remembered that the stock of 1900 was in its turn largely composed of persons born in other countries, the importance of a careful analysis of the Canadian population from the point of view of origins is further emphasized.

Population According to Origin. — The immigration returns do not offer the final ave¬ nue to racial origins, yet, as above hinted, they

throw so powerful a light on Canada in the making — on the process whose result it is the purpose of the present article to describe — that comparative statistics of 1900, 1911 and 1914-16 may be quoted as having a bearing on the matter to follow. The accompanying tabu¬ lar statement (Table I) shows also the extraor-

Tablf. I. Immigration to Canada by Nation¬ alities, from 1 July 1900 to 31 Mar. 1916 (Fiscal Year).

1900—

1901

1910—

1911

1914—

1915

1915—

1916

Totals

1901-1916

Total British Isles

11,810

123,013

43,276

8,664

1,168,292

Total British Colonies .

3

2,697

433

316

21,737

Austro-Hungarian .

5,692

16,285

7,150

15

200,015

Belgian .

132

1,563

1,149

172

15,982

Bulgarian .

1,068

4 , 048

1

18. 171

Chinese .

7

5,278

1 , 258

88

31,874

Dutch .

25

931

605

186

9,793

French .

360

2,041

1,206

180

25,154

German .

984

2,533

2,472

27

38,798

Greek .

81

777

1,298

149

9,178

Hebrew .

2,765

5,146

3,107

65

75,808

Hindu .

5

1

5,297

Italian .

4,710

8,359

6,228

388

119,346

Japanese .

6

437

592

401

16,466

N egro .

12

202

34

1,234

Persian .

19

7

3

192

Polish .

162

2,177

1,976

8

36, 173

Portuguese ….

13

8

109

Rumanian .

152

511

361

4

8 , 666

Russian .

1,726

8,794

5,660

179

118,938

Scandinavian… .

1,750

6,167

2,175

591

58,497

Serbian .

23

50

220

6

1,264

Spanish .

14

197

755

11

2,801

Swiss .

30

270

209

42

2,483

Turkish .

661

616

148

3

12,320

U. S. A. Citizens,

via ocean ports.

68

203

41

15

1,577

West Indian .

455

389

47

3,577

Other .

1

16

37

5

231

Total Continental, etc .

19,352

66,620

41,734

2,936

835,681

From the U. S. A.

17,987

121,451

59,779

36,937

1,095,375

Total immigration

49,149

311,084

144,789

48,537

3,099,348

dinary range from which Canada has drawn population since 1900, whether as settlers in¬ tending to adopt the country permanently, or as laborers attracted by the great construction < <boom)) of 1900-12. The figures of earlier years are not available in similar detail, but doubtless differ mainly in degree. It will be seen that roughly 38 per cent of the recent heavy drafts came from the British Isles, 35 per cent from the United States and 27 per cent from the countries of continental Europe.

As has been said, not all of this influx re¬ mained. Indeed the census shows an increase in the number of those resident in Canada, but born outside, of only 887,461 during the first decade of the century (see Table II), whereas the immigrants during the same years were at least double that number. The two sets of figures, however, in the absence of statistics of emigration and of reliable vital statistics cannot be collated with the immigra¬ tion returns, and Table II is to be regarded merely as a further introductory sidelight on the subject in hand.

Latest Census Reports. — For the analysis of the population as it stands to-day from a racial standpoint, recourse must be had to the specific results of the decennial census. The last census for the whole

of Canada was taken in June 1911. It contained altogether 41 questions on population, one of which required the ra¬ cial or tribal origin of each individual. The Canadian census does not take cognizance of ˆcolor,® as there is only a small admixture of the red, black and yellow races, which it is thought is sufficiently indicated by the returns of origins. Enumerators in taking the census are instructed to trace racial or tribal origin through the father. A person, for example, whose father is English, but whose mother is Scotch, would be ranked as ˆEnglish.® It was pointed out, however, to the enumerators that such terms as ˆAmerican" or (<Canadian)) ought not to be applied in a tribal sense. In the case of Indians, the origin is traced through the mother, and the name of their tribe given, as Chippewa, Cree, *etc.* Persons of mixed white and red blood, usually called ˆhalf-breeds,ˆ were to be described, in addition to the tribal name, with the name of the white race infused in the blood. Thus ? Cree F. B.}) would denote that the person is a mixture of Cree and French. ((Chippewa S.B.)} that the person was a mixture of Chippewa and Scottish. Children of marriages between white and black or yel¬ low races were to be classed as Negro, Mon¬ golian (Chinese or Japanese) as the case might be. Throughout the census no attempt was made at classification by physical types, such as form of the head, facial features, etc., as this is essentially a matter of expert inves¬ tigation. A question as to country of birth was added in which distinctive sections are particularized, as for example, between Bo¬ hemia and Galicia in Austria-Hungary, England and Scotland in Great Britain, etc., *etc.* This question was inserted largely as a check on the

Table II. Population of Canada by Birthplace.

Population born in specified birthplace by —

/ i —

Totals

Per cent population

Birthplace

1901

1911

Increase

1901

1911

Increase + Decrease —

Total .

5,371,315

7,206, 643

1,835,328

100.00

100.00

—

Empire 1 …

6,453,911

1,361,045

94.82

89 . 56

—5.26

Canada .

4,671,815

5,619,682

947,867

86.98

77.98

—9.00

British Islands .

390,019

784,526

394,507

7.26

10.89

+3.63

British possessions .

15,864

29,188

13,324

.30

.41

+ .11

British unknown and at sea … .

15,168

20,515

5 , 347

. 28

.28

+ .00

Europe .

125,549

404,941

279,392

2.34

5.62

+3.28

Asia 2 .

40,946

17,366

.44

.57

+ .13

United States .

127,899

303 , 680

175,781

2.38

4.21

+ 1.83

All other countries .

1,421

3,165

1,744

.02

.04

+ .02

1 Includes British of unrecorded birthplace and “ born at sea.”

2 Exclusive of natives of British India.

population immediately derived from the Uni¬ ted States.

The general results of the census are exhib¬ ited in Table III, which has been constructed so as to afford comparisons with 1901, the pre¬ ceding census year, and thus to reveal recent tendencies as well as present facts. Of the total Canadian population (7,206,643), it will be seen those of British race make up well over one-half, whilst the other pioneer race, the French, contribute considerably more than half the re¬ mainder. Together, the British and French races represent 82.6 per cent of the population. Those of German extraction follow with 5.5 per cent. Of the 20 other racial strains that are enumerated, only four — the Austrian, the Scandinavian, the Indian and the Jewish — amount to more than 1 per cent, none of them exceeding 2 per cent.

which has for many years been characteristic m the province of Quebec. (The number of Canadian residents born in France was only 7,944 in 1901, and rose to only 17,619 in 1911). The German proportion has similarly fallen slightly, though a substantial flow of immi¬ grants persisted up to the outbreak of the wrar. For the very marked percentage in¬ creases wdiich are shown in the Austro-Hun¬ garian, Scandinavian and Italian elements we have undoubtedly to thank the great railway-and town-building era of 1900-13, which, financed by British capital, drewˆ so heavily upon these reservoirs of labor. It need occa¬ sion no surprise to see a recession in these elements by the time of the next census, for the enumeration of 1911 came when the ex¬ pansion was at its height and the numbers of these more or less temporary residents wrere

10 Years and Proportion Per

Table III. Origins in 1911 and 1901. Increase in the

Cent of Population.

Number per cent

Increase in io years of population

Origins

1911

1901

Actual

Per cent

1911

-\

1901

British .

3,896,985

3,063,195

833,790

27.22

54.08

57.03

English .

1,823,150

1,260,899

562,251

44.59

25 . 30

23.47

Irish .

1,050,384

988,721

61,663

6.24

14.58

18.41

Scotch .

997,880

800, 154

197,726

24.71

13.85

14.90

W elsh .

24,848

13,135

11,713

89.17

.34

.24

Other .

723

286

437

152.80

.01

.01

French .

2,054,890

1,649,371

405,519

24.59

28.51

30.71

German .

393,320

310,501

82,819

26.67

5.46

5.78

Austro-Hungarian .

129,103

18,178

110,925

610.22

1.79

.34

Austrian .

42 , 535

10,947

31,588

288.55

.59

.20

Bukovinian 1 .

9,960.

9,960

14

Galician .

35,158

5,682

29,476

518.76

.49

.11

Hungarian .

11,605

1,549

10,056

649.19

.16

.03

Ruthenian 2 .

29,845 .

29,845

41

Belgian .

9,593

2,994

6,599

220.41

.13

06

Bulgarian and Rumanian .

5,875

354

5,521

1,559.60

.08

.01

Chinese .

27,774

17,312

10,462

60.43

.39

.32

Dutch .

54,986

33,845

21,141

62.46

.76

.63

Finnish .

15,497

2,502

12,995

519.38

.20

.05

Grecian .

3,594

291

3,303

1,135.05

.05

.01

Hindu .

2,342 .

2,342

03

Indian .

105,492

3 127,941

—22,449

—17.55

1.46

2.38

Italian .

45,411

10,834

34,577

319.15

.63

.20

Tapanese .

9,021

4,738

4,283

90.39

. 13

.09

Jewish .

75,681

16,131

59,550

369.16

1.05

.30

Negro .

16,877

17,437

—560

—3.21

.23

.32

Polish .

33 , 365

4 6,285

27,080

430.87

.46

. 12

Russian .

43,142

19,825

23,317

117.61

.60

.37

Scandinavian .

107,535

31,042

76,493

246.42

1.49

.58

Swiss .

6,625

3,865

2,760

71.41

.09

.07

Turkish .

3,880

1,681

2,199

130.81

.05

.03

Various .

18,310

1,454

16,844

1,158.45

.25

.03

Unspecified .

147,345

31,539

115,806

367.18

2.04

.59

Total population .

7,206,643

5,371,315

1,835,328

34.17

1 Included under the general term “ Austrian.”

2 Included under the general term “ Galician.”

3 Included half-breeds in 1901.

4 Included with Austro-Hungarians, Germans and Russians in 1901, but given separately in this table.

The columns which analyze the trend be¬ tween 1901 and 1910 are also interesting, es¬ pecially when read in conjunction with the im¬ migration statistics of Table I. The largest absolute gain during recent years has been in the persons of British origin; it has not suf¬ ficed, howrever, to prevent a falling off in the proportion of British to the wTole, which dropped from 57 per cent to 54 per cent in the decade, notwithstanding the heavy immigration from the British Isles shown in Table I. The French stock has similarly declined from 30 to 28 per cent of the whole, but its net accre¬ tion of 405,519 (less than half that of the Brit¬ ish), has been without anv such adventitious help as the latter received, being accounted for almost wholly by the large natural increase

at their maximum. Many, of course, came as agriculturists, and these will count as perma¬ nent. The Greek and Balkan races made prac¬ tically their first appearance in Canada since

1900.

It is interesting to note that among British stocks, the English alone have increased their proportion, advancing from 23.4 to 25.3 per cent of the wrhole, and gaining 44.5 per cent in actual numbers. The Scotch have gained 24.7 per cent, but this has not prevented them from shrinking from a proportion of 14.9 per cent in 1901 to one of 13.8 per cent in 1911. The Irish on the other hand have risen only 6.2 per cent in numbers and have rather markedly declined in proportional standing, namely, from 18.4 per cent to 14.5 per cent. The Eng-

lish in Canada numbered 1,823,150, the Irish 1,050,384 and the Scotch 997,800, in 1911. The French totaled 2,054,890.

Distribution of Races by Provinces. — To describe the distribution of the different races by provinces would be to write the history of the settlement of Canada. Table IV will show the general situation as it exists to-day. The earliest movement to dispossess the native In¬ dian was, of course, that of the French into Acadia and Quebec. It ceased at the Conquest, 1759, when the population of Canada was esti¬ mated at 82,000, but the remarkable natural fertility already remarked upon has left the French not only paramount in Quebec, but con¬ stituting the second element, and that a con¬ siderable one, in New Brunswick, Nova Scotia and Prince Edward Island, the third in Ontario and the fourth in Manitoba. The first marked infusion of British stock, on the other hand, was that of the Loyalists from the thirteen Table IV.

Dominion also witnessed three special immigra¬ tions — the precursors of several of like nature — into the West. These early movements con¬ sisted of Mennonites, Icelanders and Russian Jews, the victims, for the most part, of eco¬ nomic or political disadvantage, from which they sought a refuge, and with success, in the New World. A better remembered episode of the kind is the migration of the religious body known as Doukhobors, who came to Canada in the closing years of the 19th century to escape the long and relentless

persecution with which they had been followed in Russia. The table will show how all these newer elements have been distributed, and what the racial problem connotes for each of the provinces. How that problem is capable of taking on new and unex¬ pected forms has been demonstrated since the outbreak of the great war, when extensive internments of alien enemies, as well as modi¬ fications of the Franchise Act, have been made

Origins of the Canadian People by Provinces, 1911,

New Prince

British

Bruns—

Nova

Edward

Saskatch—

Origins

Alberta Columbia Manitoba

wick

Scotia

Ontario

Island

Quebec

ewan

British .

192,698

252,683

266,415

229,896

378,700

1,927,009

78,949

316, 103

251,010

English .

97,955

133,186

122,798

106,017

177,701

884,432

22,176

153,295

124,091

Irish .

36,739

40,642

58,463

74,570

54,244

608, 137

19,900

103,147

53,865

Scotch .

54,884

74,493

82,861

47,949

145,535

424,873

36,772

58,555

70,753

Welsh .

3,065

4,186

2,247

1,348

1,184

9,470

101

948

2,248

Other .

55

176

46

12

36

187

158

53

French .

19,825

8,907

30,944

98,611

51,746

202,442

13,117

1,605,339

23,251

German .

36,862

11,880

34,530

3,144

38,844

192,320

550

6,145

68,628

Austro-Hungarian1 .

26,427

7,015

39,665

73

1,089

11,771

4

1,289

41,651

Belgian .

1,269

938

2,453

76

555

633

8

2,103

1,538

Bulgarian and Rumanian. .

956

219

123

101

26

1,483

618

2,336

Chinese .

1,787

19,568

885

93

134

2,766

6

1,578

957

Dutch .

2,951

1,255

2,853

4,320

4,179

35,012

213

1,505

2,684

Greek .

129

810

317

40

114

1,304

39

768

55

Hindu .

3

2,292

13

2

17

14

Indian .

11,630

20, 134

7,876

1,541

1,915

23,044

248

9,993

11,718

Italian .

2,139

9,721

972

384

960

21,265

23

9,576

310

Japanese .

247

8,587

5

4

35

12

57

Jewish .

1,486

1,265

10,741

1,021

1,360

27,015

38

30,648

2,066

Negro .

979

473

209

1,079

6,541

6,747

81

401

336

Polish2 .

2,243

561

12,310

67

535

10,602

3,228

3,785

Russian2 .

9,421

6,896

8,841

60

601

12,618

1,684

18,413

Scandinavian .

28,047

15,968

16,419

1,479

912

8,250

32

1,756

33,991

Swiss .

1,200

796

396

63

746

1,930

2

397

1,073

Various .

1,598

2,438

4,829

433

1,153

6,184

36

2,369

1,358

Unspecified .

32,766

20,074

14,818

9,406

2,224

30,737

382

7,706

27,215

Total .

374,663

392,480

455,614

351,889

492,338

2,523,274

93,728

2,003,232

492,432

including Austrians, Buckovinians, Galicians, Hungarians, etc,

2 Not given separately in 1901. ,

including Finns in 1911. i I i i .

colonies, 40,000 of whom crossed into Canada during the years immediately following the Treaty of Versailles, 1783. About one-half of these were divided between New Brunswick and Nova Scotia, and the rest between Quebec and Ontario, where, and especially in Ontario, they became the nucleus of a fast-growing popula¬ tion recruited from the British Isles. In On¬ tario alone by 1841, the population had risen to 455,688, and to-day, as the accompanying state¬ ment shows, the British is the predominant race in all but one of the provinces. The pre¬ dominance, naturally enough, in view of recent history, is less marked in the West, but even Saskatchewan, which may be said to have been created as a community by the immigration of the past quarter of a century, has more than half of its people of British extraction, whilst the next prevailing strain numbers but 14 per cent. The German movement to Canada began to be noticeable about the time of Confedera¬ tion (1867). The first 10 years of the new

in the national interest. It was already appre¬ ciated in the increasing stringency which may be seen in the regulations regarding immigrants during the past few years. On the whole, in the absorption of these diverse and polyglot additions to her population, Canada has pro¬ ceeded rapidly and with success, and if the result still leaves some unevenness, it will com¬ pare not unfavorably with the same in other new countries.

Racial Concentration. — Special examples of local racial concentration may be noted in the presence of Jews to the number of 27,948 in Montreal, 18,237 in Toronto and 9,023 in Win¬ nipeg; of Germans to the number of 10,633 in Kitchener, 9,775 in Toronto, 8,912 in Winnipeg, 4,619 in Hamilton and 2,7 58 in Regina; and of Chinese and Japanese in Vancouver to the num¬ ber of 3,559 and 2,036, respectively.

Aboriginal Population.— The aboriginal population of Canada, in

points of numbers, is standing still. The latest census (1916) by

principal tribes is given in Table V. There has been so much admixture by intermarriage at several of the government's Indian agencies that it is impossible to classify the present Indian population completely according to tribes, and the table accounts for only 72,509. There are, however, 106,511 Indians on the official records which differentiate the Canadian Indians according to linguistic stocks. Of these 59,222 are Algonkins, 13,747 Athabascan, 595 Haida, 12,142 Iroquois, 515 Kutenai, 9,888 Salish, 1,838 Siouan, 2,834 Tsimshian, 3,230 Kwakiutl-Nootka (Wabaskau) and 2,500 nomads of British Columbia unclassified.

Table V. Census of Canadian Indians, 1916, by Principal Tribes.

Tribe	Location	Num—bers
Abenaki (Algonkin stock)	Quebec	333
Algonquin (Algonkin stock)	Ontario and Quebec	822
Assiniboine (Siouan stock)	Sask. and Alta	207
Athabascan tribes (Atha-baskan stock)	N. W. T., Alta., British Columbia, Manitoba and Sask	7,976
Bella Coola (Salish stock)	British Columbia	215
Bella Bella (Wabaskan stock)	British Columbia	311

Blackfoot (Algonkin stock) Alberta . 2,317

Coast Salish (Salish stock) British Columbia . 4,126

Delaware (Algonkin stock) Ontario . 127

Haida (Haida or Skittaga—

tan stock) . British Columbia . 595

Hurons (Iroquoian stock) . Quebec and Ontario . 519

Interior Salish (Salish

stock) . *. . British Columbia . 5 , 480

Iroquois (Iroquoian stock) Ontario, Quebec and

Alberta . 11, 623

Kutenai . British Columbia . 582

Kwakiutl (Wabaskan

stock) . British Columbia . 1,140

Malecites (Algonkin stock) Quebec and New Bruns¬ wick . 898

Micmacs (Algonkin stock) Quebec, New Brunswick

and Nova Scotia . 3 , 590

Montagnais (Algonkin

stock) . Quebec . 2,071

Nootka (Wabaskan stock) British Columbia . 1,779

Ojibwa or Chippewa (Al¬ gonkin stock) . Saskatchewan, Alberta,

Ontario and Manitoba 16,315

Plain Cree (Algonkin

stock) . Saskatchewan and Al¬ berta . 6,816

Pottawatomi (Algonkin

stock) . Ontario . 178

Sarcee (Athabaskan stock) Alberta . 188

Sioux (Siouan stock) . Manitoba, Saskatchewan 590

Swampy Cree (Algonkin Manitoba and Saskatch—

stock) . ewan . 877

Tsimshian (Tsimshian

stock) . British Columbia . 2 , 834

Total . 72,509

Negro Population. — The Negro is not a problem in Canada. All told, he numbers less than 17,000. More than three-fourths are divided between Nova Scotia and the southern counties of Ontario. The latter are descend¬ ants mainly of fugitive American slaves, but the former came originally from Jamaica, a band of negro ˆmaroons® having been brought by the British government to construct the citadel of Halifax, whence they scattered over the neighborhood. Windsor, Ontario, has over a thousand negroes and Halifax 800, and these are the largest colonies.

Oriental Population. — The problem of the Oriental immigrant • calls for special remark. Against the Oriental alone as a race has Can¬ ada reared a barrier which is intended to pre¬ vent ingress. In the case of the Chinese, a head tax of $50 was imposed as far back as 1885. In 1901 this was increased to $100, and in 1904

to $500. So many, however, have been the opportunities for profitable labor for the China¬ man in Canada that after a couple of years' cessation the movement recommenced, and over 28,000 landed in Canada, paying over half a million dollars in head tax, between 1905 and 1915. In the case of the Japanese, the matter was less easy of adjustment: no such means could be employed against a proud and power¬ ful nation, the ally of the mother country. An arrangement, however, was arrived at by nego¬ tiations, and since 1907 the arrivals

of Japanese have been voluntarily limited to a few hundred a year. The Plindu immigration presented a scarcely less embarrassing problem, owing to the inter-imperial relations of the two coun¬ tries. In all cases, the policy of the Dominion was based on the same principle — the desire not to be overstocked by a people of lower standards of living, incapable of assimilation with European races. The employing class upon the whole has favored the freer admission of Orientals, but labor has resolutely set its face against it, and has thus far secured the backing of public opinion.

Population and Language. — Race and language go hand in hand. By the British North American Act, 1867, the Dominion has two official languages, English and French. The province of Quebec is likewise bilingual. With the growth of the French population in Ontario, an agitation has arisen for the exten¬ sion of the privileges conferred upon the French tongue in the schools, and the door has been opened upon a persistent and disturbing controversy. No record of the language spoken by the people was taken at the 1911 census, but in 1901 there were 3,709,370 over five years of age able to speak English and 1,514,977 able to speak French. The number of French able to speak both languages has always exceeded that of the English similarly endowed. In 1901 it was 529,552, compared with 126,078 English able to speak French. There were in 1901 1,019,261 unable to speak English, 3,213,654 unable to speak French and 160,814 (chiefly Indians and recent immigrants) unable to speak either of the official languages.

R. H. Coats,

Dominion Statistician and Controller of Census.

29. IMMIGRATION. Opportunities for.

The Dominion has witnessed within recent years a great increase of immigration, more especially from the British Isles and the United States, but also from the Scandinavian king¬ doms, France, Belgium and other countries of Europe. Within the past decade the Dominion has received more than 2,000,000 immigrants, nearly all of a most desirable class, and the large majority devoted to agriculture, ready and able to do their part in developing the practically unlimited wealth of Canada’s vast grain-growing area, estimated at 171,000,000 acres, of which about 35,000,000 acres are now under cultivation. During the year 1915, 12,- 986,400 acres produced wheat, and the entire wheat crop harvested was more than 393,000,000 bushels, almost double the annual importation of wheat for the British Isles.

The cheapness of land, its unparalleled pro¬ ductiveness, the certainty of comfort and inde¬ pendence as the reward of industry and thrift, and the security of life and property under a

well-regulated administration, are the chief in¬ ducements which have already attracted hun¬ dreds of thousands of Britons and Americans to the Canadian West, and which are continuing to bring them.

English-speaking settlers from the British Isles and the United States form the much greater part of the new population. Scandina¬ vians, French, Belgians, Russians, Swiss, Ital¬ ians and other nationalities are also repre¬ sented in the arrivals. The Doukhobors, from Russia, have proved an industrious and valu¬ able addition to Canada's population. They are almost exclusively engaged in farming.

The lands offered to settlers by the Cana¬ dian government are situated west of Lake Superior, and to the north of Minnesota, North Dakota and Montana, and east of the Rocky Mountains, in the provinces of Manitoba, Sas¬ katchewan and Alberta. The land is for the most part prairie, and can be secured abso¬ lutely free from timber and stones, if desired, the soil being the very best alluvial black loam, from one to two feet deep, with a clay sub¬ soil. It is just rolling enough to give it good drainage, and in a great many places there is plenty of timber, and in other places it is underlaid with good coal. The land may be secured by homesteading. The entry fee for a homestead of 160 acres is $10, there being no further money consideration. The settler, be¬ fore receiving his patent, must live upon the land three years, a residence of six months in each year being necessary, and he must also do a small amount of cultivation.

An alien that is a person not a British sub¬ ject, may make application for a free-home¬ stead at once on his arrival in Canada, but he must become naturalized, or give proof of in¬ tention to become naturalized, before he can obtain a patent for the land. A residence of five years in British Dominions — the last year Canada — is necessary to acquire naturalization. In the meantime the homesteader may

reside on, and exercise every right of, possession, save that he may not mortgage or sell the land until he gets his patent or title.

Though there are tracts of forest in the Canadian Northwest, there are localities where the quantity of building timber and other build¬ ing material is limited, and the government has made provision for such cases. Should a man settle on a quarter section of land void of tim¬ ber, he can, by making application to the Do¬ minion lands agent in the locality, obtain a per¬ mit to cut on government lands free of charge the following: (1) 3,000 lineal feet of building timber, measuring no more than 12 inches at the butt, or 9,250 feet board measure. (2) 400 roofing poles. (3) 2,000 fencing rails and 500 fence posts, seven feet long, and not exceeding five inches in diameter at the small end. (4) 30 cords of firewood. The settler having all these free of charge has only the expense of cutting and hauling them to his homestead, which cannot cost him a great deal. He is also very likely to have the benefit of cheap coal ; there are areas of coal in western Can¬ ada of such an extent as to be practically inex¬ haustible. The principal districts of western Canada are within easy reach of firewood, while the settlers of Alberta and Saskatchewan arc- particularly favored, especially along the vari¬ ous streams, at which they may get all the coal

they require, very frequently at the cost of handling and hauling it home. If a settler should desire to go into stock raising, and his quarter section of 160 acres should not prove sufficient to furnish pasturage for his stock, he can make application to the land commissioner for a lease of grazing lands at a very low cost.

The public school system is established all through the country, and there are schools in all the organized school districts. There is a ready market for cereals and other produce; the climate is healthful and agreeable.

The aim of the Dominion government is to attract to Canada industrious, intelligent, ener¬ getic settlers with the purpose and ability to do their part in building up a nation imperial in its natural resources and in the extent of its magnificent territory : in the carrying out of this policy the government is meeting with eminent success. See Canada — Population, Racial Distribution and Immigration.

W. D. Scott,

Superintendent of Immigration, Ottawa.

30. MILITARY SYSTEM. Historical.

The Canadian military system has its roots in the principle of universal, compulsory mili¬ tary service. This principle was firmly estab¬ lished in the French colony on the Saint Law¬ rence; when this colony passed under the Brit¬ ish flag and was supplemented by English-speaking colonies to the east and the west the principle was maintained. The general system of defense in use by Great Britain for her North American colonies in the first half of the 19th century provided wholly against attack from the south; at that period there existed an antagonism between the British empire and the United States which a century of peace fortunately has removed. The method adopted was (1) to maintain in the North American colonies (Upper and Lower Canada, New Brunswick, Nova Scotia, etc.) a garrison of the British regular army, which until about 1840 was roughly equal in strength to the regular army of the United States; (2) so to organize the male inhabitants of the colonies as to facili¬ tate their embodiment in emergency in firmly organized corps, under regular conditions and discipline and under the leadership of regular officers; (3) to provide in advance arms, stores and equipment for these native troops. B} the militia until 1862 was meant the peaa organization of the male inhabitants of the country suited to this scheme. No attempt was made at peace training; the effort made was to impress upon the people's minds the uni¬ versal obligation of service and to provide for the rapid and orderly raising of service corps. There was an annual muster parade of all men of military age, and all liable to serve were divided into regiments and companies; loca' officers were appointed, but these officers wen. for duties of administration rather than of leadership, and if the need of mobilization had occurred their function wrould have beer to select from their formations suitable men to be organized into service corps, wdiich as already stated, would have been trained and led under the supervision of the regular army. The mainspring of this system was the presence in the country of a com¬ paratively large force of regulars, and when, after the Crimean War, the government of

Great Britain gradually denuded the colonies of regular troops, and at last withdrew these almost altogether from Canada, the old organ¬ ization fell into decay. Early in the second half of the 19th century the second phase set in with the organization of a number of sepa¬ rate volunteer corps; the citizen soldiers com¬ prising these drilled in their spare time after the manner now familiar on the North Ameri¬ can continent, and the volunteers gradually supplanted the old militia. The slight Fenian raids of 1866 and 1870 were repelled mainly by the use of these volunteers, and after con¬ federation in 1867 the whole defense of Canada was committed to a new volunteer militia of this type. The principle of universal compul¬ sory service remained on the statute book, but in practice there was no compulsion and the Dominion kept up a voluntarily enlisted citizen force. In corps enlisted in the cities the regi¬ ments trained by evening drills ; the corps raised in rural districts went to camp for 12 days in the year. The training was imperfect, and higher organization, stores for mobiliza¬ tion and staff services were neglected. In 1870 the British troops were finally withdrawn from the Dominion, with the exception of the naval stations of Halifax and Esquimalt, and from that year to the period of the South African War the military equipment of the country was slight. A revolt by a few half-breeds and Indians in the Northwest territories in 1885 was put down wholly by the forces of the Do¬ minion, about 5,000 being employed. To the struggle in South Africa the Dominion con¬ tributed about 8,000 men ; of these 7,000 crossed the sea, while the remainder undertook the garrisoning of Halifax, and so released an equivalent number of the British regular army for active service. All the corps so employed were specially raised for the war. The ex¬ perience of this war, and the gradual deepen¬ ing of the diplomatic dangers which led to the great European War, caused Canadian states¬ men and soldiers to reorganize the defensive forces of the country. The process was a gradual one ; it began about 1902 and was still in progress when the explosion of 1914 oc¬ curred.

The Militia Act. — The foundation of the new organization is the Militia Act of 1904, and as this constitutes the legal authority by virtue of which the land forces of Canada exist, it may be noticed at some length. During the Great War it has been modified in some re¬ spects, partly by statutes and partly by regula¬ tions enacted under the authority of the War Measure Act. The command in chief is vested in His Majesty the King, with the gov¬ ernor-general as his representative. The ad¬ ministration of the force is entrusted to the Minister of Militia and Defense; he is a mem¬ ber of the Dominion Cabinet, he must be a member of Parliament and he can be held to

account by that body. In the summer of 1916 a parliamentary undersecretary was appointed to assist the Minister in administering the de¬ partment; early in 1918 this office was discon¬ tinued. Following recent British example, the Minister is assisted by a militia council, com¬ posed of four military and two civil members. The military members are the chief of the gen¬ eral staff, the aaiutant-general, the quarter¬ master-general and the master-general of the

ordnance. The civil members are the deputy minister and the paymaster-general. Each of these officers presides over a branch of the de¬ partment, and the business of administering the force is distributed among these branches. The Minister presides over the meetings of the council and acts affecting the administration of the militia technically issue from the Minister in council ; in practice the decision lies with the Minister. Outside of the militia council stand two inspectors-general, officers of rank, who report upon the quality of the training, etc., of the troops. The country is divided into 11 military districts, each under a district officer commanding, who is either a colonel or a gen¬ eral officer; in the interests of decentralization considerable powers of administration are en¬ trusted to these officers.

All the male inhabitants of Canada from 18 to 60 years of age are liable to military service. To this general rule there are some exceptions, such as judges, clergymen and pro¬ fessors in colleges. In cases of great emer¬ gency a ((Levee en Masse® may be ordered, when all male inhabitants capable of bearing arms can be summoned. Those ordinarily lia¬ ble to service are divided into four classes : (1) Those 18 years of age to 30, unmarried, or widowers without children; (2) 30 years of age to 45, unmarried, or widowers without children; (3) 18 to 45 who are married, or widowers with children; (4) 45 and upwards, but under 60. The principle of substitution is recognized. It is in this order that the Militia Act of 1904 contemplated the summoning of the male population to the colors. When in the stress of the Great European War resort was had to compulsion for overseas the foregoing classification was rearranged, and the principle of substitution disappeared. The Militia Act limited compulsory service in the field to 18 months at most ; this limitation disappeared. The militia may be sent on active service “anywhere in Canada and also beyond Canada for the de¬ fense thereof.® When in time of war the “militia is called out for active service to serve conjointly with His Majesty’s regular forces, His Majesty may place in command thereof a senior general officer of his regular army.® In the census year of 1911

the number of males in Canada between 18 and 45 was 1,720,000; of these 1,109,000 were native-born, 306,000 were British born and 304,000 were foreign-born.

Later Organization. — During the period 1902 to 1914 the professional soldiers of Great Britain once more influenced the military pol¬ icy of Canada, but this time in a manner con¬ sistent with the autonomy attained by the Do¬ minion in the British empire. During the greater portion of this period the sailors and soldiers of the empire were preparing, as far as political policy allowed, for the great war which they foresaw, and which came in 1914. The general policy pursued was for the United Kingdom to prepare its forces to meet the first shock of the conflict, and for the Dominions - — Canada, Australia, New Zealand and South Africa — so to organize their citizen forces as to enable them in the event of war rapidly to raise forces which would fit into the general British military system. This implied (1) common establishments; it was understood, for example, that if Canada raised a division for war service, it would be identical as to number

of battalions, proportion of artillery, details of staff, etc., with the divisions of the British army. (2) A considerable amount of staff work, in the shape of mobilization arrange¬ ments, plans of organization, *etc.* (3) The provision of arms, stores, equipment, etc., for a force of the size which Canada might reason¬ ably be expected to raise. Such plans were prepared and carried out to a certain extent in Canada. The foundations of them are to be found in a series of agreements made at the Imperial Conferences of 1907, 1909 and 1911 and set forth in bluebooks published in those years; these agreements were concluded between the statesmen of the mother country and the Do¬ minions, assisted by soldiers and sailors rep¬ resenting the several parts of the empire con¬ cerned. The details were worked out by a number of staff officers, in part supplied from the British army, in part belonging to the Canadian establishment. The organization of the Canadian forces was stimulated by two visits of inspection paid by distinguished of¬

ficers, by Sir John French in 1910, and by Sir Ian Hamilton in 1912; their advice proved of great value. The general Canadian organiza¬ tion was based on the theory that the militia was to provide the framework of corps, offi¬ cers, arms, training establishments, etc., of an army to resist invasion ; the first line was to lie 125,000 strong and behind was to be a sec¬ ond line of reinforcing units, also 125,000 strong. The country east of Lake Superior was divided into six areas, each of which was to provide a self-contained division of all arms. In the region west of Lake Superior were a considerable number of mounted units and a number of infantry corps, which it was planned ultimately would form a Seventh Di¬ vision. Provision also was made for a num¬ ber of mounted brigades. Theoretically this organization faced southward ; in point of fact, the real danger apprehended was across the Atlantic.

In this period the organization and num¬ bers of the militia changed rapidly, the gen¬ eral aim being to attain a proper distribution of arms; the force had comprised too large a proportion of infantry, with too small a supply of cavalry and artillery. Several instructional corps, known as the Permanent Force, had ex¬ isted from about 1880; early in the 20th cen¬ tury this force was considerably increased, partly because the Dominion undertook to gar¬ rison the Imperial fortresses of Halifax and Esquimalt, and partly because the militia needed more ample facilities for training. By 1914 the authorized establishment of this Per¬ manent Force was 5,000 and the actual strength was about 3,000. The organizations included: cavalry, 4 squadrons; horse artillery, 2 bat¬ teries ; garrison artillery, 5 companies ; engi¬ neers, 3 companies; infantry, 1 battalion; and also army service corps, army medical corps, army veterinary corps, ordnance corps, army pay corps, military staff clerks, *etc.* The active militia comprised in 1914: cavalry, 130 squad¬ rons; field artillery, 38 batteries; heavy artil¬ lery, 5 batteries ; siege artillery, 2 batteries ; garrison artillery, 13 companies; engineers, 4 field troops, 9 field companies, 9 telegraph de¬ tachments, 1 wireless telegraph detachment ; infantry, 104 battalions; signal corps, 4 com¬

panies and 3 independent sections ; army service corps, 18 companies; army medical corps, 21 field ambulances; and sundry auxiliary serv¬ ices. The war establishments of these units would not be far short of 150,000.

These corps were distributed into higher formations in accordance with the plan already outlined : the organization was not complete in

1914, there still being an excess of infantry and deficiency of some of the other arms, notably of artillery. A feature of this period was the provision of special troops for the auxiliary serv¬ ices — army medical corps, army service corps (for supply and transport), ordnance store corps, a corps of guides (for intelligence work), and similar organizations. Citizen soldiers proved particularly adapted to these ancillary services, and often at¬ tained much proficiency in them. The number of the active militia trained, which before the South African War had been fewer than 20,000, by 1914 had risen to nearly 60,000. With all this improvement in organization the progress in training was slower. Something was done in substituting practical work for the older close-order drill and ceremonial, and rifle¬ shooting was encouraged, but the bulk of the militia had to content themselves with 12 days' training in the year.

Training establishments had been increased during these years. The oldest of these is the Royal Military College at Kingston ; founded in 1876 in professed imitation of West Point, this institution gives an excellent general education, and in addition fits its graduates to be officers in the regular army. A proportion of its graduates have entered the Imperial forces, others are in the Canadian Permanent Force, while the larger number have entered civil life, but have constituted a reserve of military skill. Schools of artillery, cavalry and infantry long have been conducted at certain centres, and these of late have been multiplied, while instruc¬ tion has been carried to the militia by detach¬ ing instructors from the permanent corps to conduct temporary courses at the headquarters of militia units. Rifle-shooting, for many years a popular pastime, has been stimulated, partly by the establishment at Rockliffe, near Ottawa, of a School of Musketry, modelled upon the British institution at Hythe, partly by the en¬ couragement of rifle clubs, both for military and civilian. Persons enrolling themselves in civilian rifle clubs did so on the condition that (<in case of emergency^ they should at once be¬ come members of the active militia. The gov¬ ernment in addition to annual grants supplied a limited number of rifles to each club, with a fair proportion of free ammunition; much energy was shown in providing ranges for these numerous and widely scattered clubs. By 1914 these institutions had increased to 167 military and 433 civilian clubs, and had attained a mem¬ bership of 52,000. Shooting by members of the militia is actively encouraged. Both the Dominion and provincial governments give monetary grants to the Dominion and provin¬ cial rifle associations, the annual meetings of these bodies being well attended, both by militia¬ men, members of the rifle associations and cadets.

To serve as feeders to the militia, and to disseminate military knowledge and aptitude at

an age when lessons are easily learned, the militia department before 1914 had done its utmost to encourage the cadet movement. Corps were formed in the schools, the provin¬ cial governments (in whose hands the control of education is vested under the Canadian con¬ stitution) co-operating with the Dominion gov¬ ernment. The movement began in 1908; by

1911 there were 492 companies and 19,250 cadets; by 31 March 1916 the numbers had in¬ creased to 1,428 companies and 57,000 cadets. Of these units 76 were affiliated or attached to militia organizations ; 26,000 cadets were drawn from secondary schools, 25,500 from primary schools and 5,000 were in corps fostered by municipalities or government institutions. In

1912 cadet camps were formed, and in the years before the outbreak of the war these camps were attended by from 12,000 to 20,000 lads ; a good deal also was done to teach cadets rifle-shooting.

In regard to the provision of arms the most important step taken was the establish¬ ment in 1904 of the Ross rifle factory at Quebec; this institution until the summer of 1916 manufactured the Ross rifle, a type of weapon differing in many respects from the Lee Enfield, the military rifle used elsewhere in the British empire, but of the same calibre and taking the same ammunition. The capacity of this factory before the war was 12,000 rifles a year, and in 1914 there were about 70,000 Ross rifles in the country, some of them of an earlier make which was un¬ suitable for campaigning. In 1916 the Cana¬ dian troops in France were rearmed with the Lee Enfield, and the Ross rifle factory, which had been much enlarged, was changed to the manufacture of that weapon. In 1917 this factory was taken over by the government. A small arsenal exists at Quebec, capable in 1914 of turning out several million rounds annually; it also made a limited quantity of 18-pounder shells. A second arsenal has been established

at Lindsay, Ontario ; it began to manufacture ammunition in 1917. The government by 1914 had provided about 100 guns, mostly 13-and 18-pounder horse and field quick-firing guns; it also had a few medium guns, 4.7-inch and 60-pounders. The supply of machine guns was scanty. Something was done toward providing mobilization stores, i.e., clothing and other necessary articles which would be required by the new men who would be brought into the regiments when they were increased to their war strength.

Participation in the Great War. — Canada unhesitatingly took part in the European War. Mention already has been made of the plans framed by the military authorities; these in¬ cluded confidential plans for the dispatching abroad, in the event of a war in Europe, of an expeditionary force comprising a division (i.e., 12 battalions of infantry, with the necessary complement of artillery and other troops, in all about 18,000 men) and a mounted brigade (about 2,000 mounted rifles). Detailed plans for the enlistment and mobilization of these had been matured ; the troops were to be specially enlisted, the militia organization being em¬ ployed to raise this force. On 1 Aug. 1914 the Canadian government telegraphed to Lon¬ don offering a contingent, and on 6 August the British government replied accepting, and

suggesting that the force sent consist of one division and a (<first reinforcement® of 10 per cent; in all, including subsidiary services, some 22,000 of all ranks. Recruiting was so ardent and districts so vied in providing corps, that instead of 12 battalions 17 were raised almost instantaneously ; in addition another battalion, the Princess Patricia's Canadian Light Infantry, was raised from former Brit¬ ish soldiers residing in Canada. These 18 battalions, with other corps, numbering in all 33,000 all ranks, sailed from Quebec late in September and landed at Plymouth on 15 Oct. 1914. This was a force raised ad hoc, and in a sense was outside the active militia, although it was based upon that force. The liability of the militia to serve abroad has been noted earlier; no attempt was made to apply this liability, the course followed being to organize, under the Militia Act, a new force known as the Canadian Expeditionary Force. The term of service is the duration of the war, with a minimum of one year. The active militia supplied nearly all of the officers and many of the men of the first division, and its whole machinery was employed in raising, organizing and outfitting this overseas army. Many, however, of the rank and file had not previously served in the militia, and this fact, coupled with the slight training afforded in any case, made it

necessary to give the whole force several months of training before sending it to the Continent. Something was done, especially in the way of musketry, at the great mobilization camp at VTalcartier, near Quebec. On landing in Eng¬ land the division was placed under the com¬ mand of a British general, and it spent the winter upon Salisbury Plain, training amid discouraging conditions of weather — condi¬ tions which were shared by scores of divisions of new troops which had been raised in Great Britain. In February 1915 the First Division, as it now was, crossed the Channel, leaving the surplus five battalions in England to serve as feeders. This division was heavily engaged in April at the second battle of Ypres, or Saint Julien as it sometimes is termed, sus¬ taining some 6,000 casualties. Before the First Division was well clear of the Saint Lawrence a Second Division was offered ; its organiza¬ tion went on through the winter of 1914-15, the battalions crossing the Atlantic in single ships instead of in one great convoy as with the First Division. The same deliberate train¬ ing was given to the new troops, and the Second Division was fairly organized by mid¬ summer of 1915. When it was sent to France the two divisions were united in a Canadian Army Corps. New battalions kept working their way across the Atlantic and through the training camps in England, and by the end of the winter of 1915-16 a Third Division was complete and the Canadian Army Corps had three divisions and upward of 60,000 men. The army corps suffered upward of 10,000 casualties at Hooge in May 1916, the Third Division being the heaviest loser. A Fourth Division was then organized and in the summer of 1916 it joined the Canadian Army Corps in France. The Canadian corps was heavily en¬ gaged in the Battle of the Somme in 1916, and at Vimy, Lens and Passchendaale in 1917. Its casualties in 1917 were in excess of 84,000. At

the beginning of the campaign of 1918 the Canadian Army Corps consisted of four di¬ visions, numbering 78,000 all ranks, and about 11,000 ((corps troops,® principally artillery; altogether the Army Corps comprised some 90,000 troops, this being the standard large formation in the British Army. The general commanding the Army

Corps, Sir Arthur Cur¬ rie, was a Canadian militia officer, who had raised a battalion of the First Division. In addition there wras a Canadian Cavalry Brigade serving elsewhere in the British Army, and there were large numbers of railway and forestry troops, as well as many line of com¬ munication units ; all told, the Canadian troops in France of the various categories mustered approximately 150,000.

To provide for a steady flow of reinforce¬ ments to the troops in France, and for the care of wounded and sick, an extensive estab¬ lishment was maintained in England, over which after the autumn of 1916 a Minister of the Canadian Cabinet presided with the title of Minister of the Overseas Military Forces of Canada. At one time a fifth division was formed, but the need for drafts to keep the other divisions up to establishment was so great that it was broken up. The establishment in England comprised numerous training schools, and the general policy settled upon in 1917 and 1918 was to forward recruits from Canada to the United Kingdom as soon after their em¬ bodiment as convenient, so as to receive their training close to the fighting. This was part of a general reorganization, more especially of the infantry. At first the method of recruit¬ ment was to authorize the raising of numerous single unrelated battalions, and in all more than 250 such battalions were formed. The four divisions in the field comprised no more than 52 battalions of infantry and pioneers, and these were reinforced whenever depleted; as a necessary consequence on arriving in England four-fifths of the infantry units raised were either converted into depot or reserve bat¬ talions, or were broken up to furnish drafts for the battalions in the fighting divisions : a course which entailed considerable hardships upon the senior officers of corps so treated, as the majority of them could not obtain employ¬ ment in France. In 1917 the raising of new battalions was discontinued and the whole of the Canadian infantry were organized in 12 territorial regiments, each of several battalions. These regiments were: The Western Ontario Regiment; the 1st Central Ontario Regiment; the 2d Central Ontario Regiment ; the Eastern Ontario Regiment; the 1st Quebec Regiment; the 2d Quebec Regiment; the Nova Scotia Regi¬ ment; the New Brunswick Regiment; the Manitoba Regiment ; the British Columbia Regiment ; the Saskatchewan Regiment ; the Alberta Regiment. Each of these regiments had several fighting battalions in France, one or more reserve battalions in England, and one or more depot battalions in Canada. By this arrangement steadier and more equitable rela¬ tions were established between the several services of procuring men, training them and employing them in battle. Canada maintained in England and France numerous auxiliary services, such as hospitals, Y. M. C. A. huts, *etc.* In

addition to the forces despatched to Europe, the Dominion contributed tc the gar¬

risons of Bermuda and the West Indian island of Saint Lucia. Many individual Canadians obtained commissions in the forces of the United Kingdom, the air services in particular attracting several thousand men.

The reorganization just described coincided with a change in the method of recruitment from voluntary enlistment to compulsory serv¬ ice. At the outset recruiting was voluntary and in 1914 and 1915 great eagerness was shown. In all about 375,000 effective recruits were obtained in this manner, or more than 5 per cent of the population. In 1916 the stream of enlistment slackened and in 1917 the government decided to have recourse to com pulsion. After some delay due to political difficulties the Military Service Act was passed, and its operations began in October 1917. The general principle was that 100,000 men were to be drafted from the unmarried men of the country between the ages of 20 and 34; liberal provision was made for exemption on grounds of medical unfitness, the dependence of others upon the draftee, indispensability for purposes of food production, war industries, *etc.* A system of tribunals was set up, the general prin¬ ciple of administration being that the draftees were obtained by the civil power, and by it turned over to the military authorities, who did not themselves come into contact with the civilian population. The military authorities on receiving the recruits so produced outfitted them in depot battalions, gave them preliminary training, and sent them to Great Britain in comparatively small drafts. In 1916, toward the close of voluntary enlistment, replacement troops were sent across the Atlantic at the rate of about 10,000 a month; in the early months of 1918, when the new system was beginning to work well, the rate of reinforce¬ ment was about the same. Side by side with compulsory service volunteering persisted and was encouraged; those coming forward volun¬ tarily going principally into the air forces and special services.

A feature of Canadian participation in the war . has been the unexpected production of munitions of war. Soon after the outbreak of the war the then Minister of Militia, Maj.- Gen., the Hon. Sir Sam Hughes, formed a shell committee, composed mainly of manufacturers, and this body, acting for the British government, placed large orders for munitions, both in Canada and in the United States. In the latter part of 1915 it was re¬ modelled, the new

organization being styled the Imperial munitions board. The two bodies were remarkably successful in inducing and en¬ couraging Canadian industries originally de¬ signed for peaceful purposes to turn to the making of munitions. Up to the end of January 1918 the orders given to firms in Canada and the United States aggregated rather over a $1,000,000,000. It may be added that the voluntary giving of the people of Canada to Red Cross, Belgium Relief, the Canadian Patriotic Fund |an organization for caring for soldiers' dependents] so far have been about $50,000,000.

Naval Defense. — Canada took little inter¬ est in the question of helping with the naval defense of the empire until March 1909. The excitement which arose in England in that month over the naval rivalry of Germany

deeply impressed Canadian public opinion, and the Canadian House of Commons by a unan¬ imous resolution approved the principle of par¬ ticipation. In the autumn of 1909 representa¬ tives of the Canadian government attended the defense conference of the several parts of the empire held in London, and as a result the government of the day put forward in 1910 a project for the establishment of a separate Canadian navy; two old cruisers, the Niobe of 11,000 and the Rainbow of 3,600 tons, were bought to serve as training ships, and it was proposed to build in Canada four light cruisers of the Bristol class and six destroyers. In time of war this force was to be placed under the British Admiralty. A number of officers were borrowed from the Royal Navy, and a few hundred men enrolled, many of these also coming from the British navy. This proposal encountered political resistance on two grounds, one school of thought regarding it as insufficient, and another school disliking any contribution to naval defense. The ad¬ ministration was defeated at the polls in 1911 and retired without having ordered the ships. The administration which suc¬ ceeded it consulted the Imperial govern¬ ment afresh, and in 1912 proposed to drop the idea of a separate navy and to present to the British navy a gift of three battleships. The opposition resisted

this, putting forward an alternative plan for a Canadian navy of 2 battle cruisers, 6 light cruisers and 12 destroyers. The proposal of the government passed the House of Commons, but was re¬ jected by the Senate, in which the opposition commanded a majority. The great war began before any further steps were taken by the government. On the outbreak of hostilities the Canadian naval forces — ‘the two cruisers al¬ ready mentioned and two submarines hastily purchased from an American shipyard on the Pacific coast, with some hundred seamen — were placed at the disposal of the Admiralty. The Canadian vessels took part in the patrol¬ ling of the Atlantic and Pacific oceans for the protection of commerce. The department of the Naval Service administered the movement of ships from Canada to Great Britain.

C. T. Hamilton,

Department of Militia and Defense , Ottawa.

31. THE ACADIAN REFUGEES. After the conquest of Acadia in 1710 — the first and only fruit of Samuel Vetch’s grand design for the conquest of Canada, — the Treaty of Utrecht (see Utrecht, Peace of) provided for the free exercise of the Roman Catholic religion by such of the French inhabitants as were willing to re¬ main there, but also stipulated that any who should choose might remove within a year. Nearly all remained; but, under various ex¬ cuses, in the hope of a return of French power, they postponed taking the oath of allegiance to the British Crown until 1730. In 1745 war broke out again, and in 1749 the founding of Halifax (q.v.) by several thousand British emi¬ grants excited the jealousy of the officials of Canada and priests of Acadia. The people were a simple and densely illiterate peasantry, taught to obey their missionaries in everything. These missionaries were chosen and directed by the bishop of Quebec and the governor of Canada as agents of French policy, and hence a very diffi¬

cult position existed, both for the English and for the Acadians. Through the promptings of the fanatical Abbe Louis Joseph Le Loutre (q.v.), and the duplicity of Governor La Jonquiere of Canada and the court of France, the Indians were encouraged to murder English settlers and commit other outrages, some of the Acadians even taking part in these crimes. These charges are proved by the citations from French secret documents given in Parkman’s (Montcalm and Wolfe) ; and have not been effectively answered. Le Loutre, who was vicar-general of Acadia and missionary to the Micmacs, even paid 100 livres each for English scalps in time of peace ; and the money was re¬

imbursed to him by the intendant of Louisburg. He held constant threats of Micmac massacre over the Acadians themselves, compelling them to acts antagonistic to the English, and moving many of them from their farms and possessions to suit his plans. Yet his inhumanities were evidently justified in his own warped heart and intellect as services to his Church and country. The people, as a whole, would have been quite content to live in peace, being very well treated. In 1751, La Jonquiere issued a proclamation commanding all Acadians to enroll themselves in the French militia. A claim was put forward that only a small part of the province was “Acadia,® as ceded to the British under the Treaty of Utrecht, and consequently that all the rest was still under the rule of the French. The latter now conceived the definite design of reconquering the province ; but the English, ob¬ taining exact information through the spy Pichon, struck first by capturing Fort Beausejour, on the neck of the Acadian peninsula, on 16 June 1775. Fort Gaspereau, 12 miles distant, then surrendered, and the French fort at Saint John being burnt and abandoned on the ap¬ proach of an English force, the whole country was left under British control. This entire plan of re-establishment was due to the forethought of Governor Lawrence, aided with due vigor by Governor Shirley (see Shirley, William) of Massachusetts.

The chief interest in the Acadians will al¬ ways, however, he centred in the incidents of the famous dispersion, which were now about to begin. The projected French invasion had aroused the apprehension of the small British population and authorities, an apprehension deepened by the Indian outrages of Le Loutre and the fear of the neighboring stronghold of Louisburg. The whole of the Acadians also persistently refused the oath of allegiance. In this state of affairs, which not only seemed a great danger but appeared to imply a great in¬ gratitude, after the mild treatment and privi¬ leges of property and religion so long extended to them, it was determined by Governor Law¬ rence that the only safety lay in removing the Acadian population and replacing them by New Englanders. That view had been held for some time by Governor Shirley of Massachusetts and others. Lawrence had complained bitterly to the Lords of Trade before the capture of the French forts “that this lenity has had so little effect, and that they still hold thesame conduct, furnishing them [the French | with labor, pro¬ visions, and intelligence, and concealing their designs from us.® On the capture of Beausejour, Lawrence exacted an unqualified oath of allegiance from the Acadians; and in response

V

- •)

two successive deputations came to Halifax, representing together nine-tenths of their entire population. Both absolutely refused to take the simple pledge of fidelity and allegiance to the British sovereign. The governor and coun¬ cil therefore resolved that it was necessary to deport their people, and in order that they should not strengthen the enemy, they were to be distributed among the English colonies. Lawrence now ordered Colonels Moncton and Winslow and Major Hanfield, — at Beausejour, Basin of Minas and Annapolis, respectively, — to seize the inhabitants, and if necessary to burn their houses. The principal scenes of the ex¬ pulsion took place under Winslow at Grand Pre and Fort Edward, in the Basin of Minas, just after completion of the harvest at those fair and populous settlements. At Grand Pre all the males over 10 were ordered to the parish church, where Winslow read them the order of removal and detained them as prisoners. They were kept several weeks before deportation, and the year was nearly ended before all were gone. Tragic scenes of lamentation and distress ac¬ companied the leaving, although it was carried out as humanely as possible. The whole num¬ ber removed from the province is usually stated as a little over 6,000, although Richard and others place the figures much higher. Some took refuge in the forests or fled to the French territories. Lawrence sent the ships deporting them to the different colonies from Massachu¬ setts to Georgia, where they became a charge on the people and their gradual departure was connived at. Many in the South eventually reached the French settlements of Louisiana, where their descendants are still found in cer¬ tain parishes and were estimated at 40,000 a few years ago. The sorrows of the dispersion were great, and the death rate considerable. It is regrettable that those who reached Canada and the French West Indies suffered perhaps the most terrible miseries of all from neglect and ill-treatment. Most of the refugees at length found their way back to Nova Scotia and were progenitors of the greater part of the present French population. Their woful story was told in an idealized form in the pages of Haliburton, from whom, passing

through a medium of fem¬ inine sentimentality in the pages of a lady writer, it reached Longfellow and was immor¬ talized in his (Evangeline. 5 The unhappy facts were afterward the subject of heated recrimina¬ tions, especially by French writers such as Abbe Casgrain and Rameau, against the New Eng¬ landers, whose leading defenders are Parkman and Hannay. Edouard Richard in his (Acadia > ascribes all to Lawrence personally. The dis¬ passionate view would seem to lie in fair allow¬ ances for the difficult situation and training of the actors on both sides. In this light the Acadian population must be remembered as a densely ignorant people. Without some educa¬ tion, the measure of natural shrewdness they possessed could not be expected to clear up for most of them the moral problems connected with allegiance to the British Crown, and the political problem of the ownership of Acadia as it was represented to them. Most of them were undoubtedly trying to be loyal to France and ready to return the country into its pos¬ session, and duplicity did not seem to them improper. This is not only deducible from all the events but plainly set forth in the petition

of 3,500 Miramichi refugees to Governor de Vaudreuil in 1756.

For the Indian atrocities, to which some of them gave support, we cannot hold the people as a whole responsible. In view of these con¬ siderations the Acadian people must be regarded as unfortunate and misled, and their condition as a conquered people, torn from their com¬ patriots and coreligionists by the fortune of war, as they hoped only temporarily, must be considered. As in the case of ignorant popu¬ lations generally, it is chiefly their leaders and advisers — Le Loutre, Jonquiere and the bishop of Quebec — who must be held responsible. Re¬ garding Le Loutre, although his character of the peculiarly savage and relentless fanatic led him into acts which place him among the class of murderous criminals, his guiding motives appear to have been a distorted patriotism and allegiance to his religion. These are in a dif¬ ferent class from the mean duplicities and false quibbles of La Jonquiere and the French min¬ istry, who were well aware both of the untruth of their pretensions concerning the extent of Acadia, and of the dangerous position in which they were placing the Acadian people. When we examine the motives of the British side, we have to deal with practically only Lawrence and his council at Halifax. A state of war existed, and in their judgment desperate meas¬ ures were necessary for the safety of the little British colony. The British settlers were greatly outnumbered and held but a small part of the country. Le Loutre and the French authorities were

pursuing a treacherous course of savage murder against them, with Acadian participation. The entire people absolutely re¬ fused to take a simple oath of allegiance, al¬ though repeatedly and plainly warned of the consequence. In Lawrence's judgment no other1 course than deportation then seemed safe; and although a harsh measure, like its modern ana¬ logue, Reconcentration, it proved effectual in removing all doubt respecting the security of the colony. Harsh and drastic as his measures were, he is entitled to be judged, in part at least, as a military man bound to perform a duty; and his freedom of discretion at a diffi¬ cult juncture must be respected even if it may have been badly used. On the side of France, two instances of a similar deportation policy are cited in defense — the proposal of Governor de Callieres, endorsed by the French King in 1689, to seize the province of New York and deport all the Protestant population (Doc. Hist. N. Y. Vol. I, pp. 285-97) ; and the actual de¬ portation of the English settlers from the island of Saint Kitts in 1666, to the number of 2,500, an occurrence marked by the striking of a medal by Louis XIV, inscribed (<Ang. Ex Insula St. Christoph Exturbat.55

Bibliography. — Abbe Raynal, (Histoire des Indes,5 2d ed. ; Haliburton, (History of Nova Scotia) (1829) ; Rameau, (La France aux Colonies) (1859) ; (Une Colonie Feodale en Amerique5 (1889) ; Murdoch, (History of Nova Scotia5 (1865) ; Akins, (N. S. Archives5 (1869) ; Campbell, (History of Nova Scotia5 (1873) ; Moreau, (Histoire de l'Acadie5 (1873) ; Hannay, (History of Acadia5 (1879) ; and (The Story of Acadia5 0904) ; Smith, (Acadia5 (1884) ; Casgrain, '-Pelerinage au Pays d'Evangeline5 (1888) ; Parkman, Mont¬ calm and Wolfe5 (1884) ; Hart, (Fall of New

France5 (1888) ; Richard, (Acadia5 (1894). See also Nova Scotia — History.

William Douw Lighthall, Author of (The False Chevalier* ; Founder of Chateau de Ramezay Historical Museum , *etc.*

32. THE QUEBEC ACT. From the capitulation of Montreal in 1760

down to the ratification of the Treaty of Paris in 1763 Can¬ ada was without any form of civil government, the affairs of the colony being administered by the officer in command of the British armies of occupation. But with the conclusion of peace and the definite cession of the colony to the British Crown this tentative arrangement came to an end and in the autumn of 1763 a royal proclamation decreed the establishment of a civil government in the newly-acquired colony, prom¬ ising that as soon as circumstances would per¬ mit representative assemblies would be con¬ vened. In the meantime the laws of England were to be in force. In virtue of this arrange¬ ment Gen. James Murray (q.v.) was appointed to the governorship of the colony and a council of eight members was nominated to assist him in the work of administration. For the time being, justice continued to be administered by the military courts at Quebec, Three Rivers and Montreal, but in September 1764 a proclamation was issued by the governor-in-council establish¬ ing a Court of King's Bench for the trial of all causes, both civil and criminal, agreeably to the laws of England which the royal proclamation of the preceding year had declared to be in force. At the same time a Court of Common Pleas was established for the trial of actions which had arisen before the publication of the proclamation of 1763 and in regard to which the old French law had to be applied.

The immediate result of this change was to inaugurate a regime of utter judicial chaos, for the new judges were completely at a loss to apply the principles of English common law to the causes which came before them, especially where questions of real property were con¬ cerned. Accordingly, the governor-in-council during the month of November 1764 issued a further proclamation declaring that (<in all ac¬ tions relative to the tenure of land or the rights of inheritance, the French laws and usages shall be observed as the rule of decision.55 But in all other civil cases and in all criminal cases the common law of England was to be applied. This change improved matters but slightly for the new English judges were slow to master the intricacies of French law and applied it very imperfectly where they endeavored to make it apply. To the application of the English criminal law the French inhabitants of the province made no great objection, although for the time being many of them failed to take kindly to the institution of trial by jury; but there was a widespread demand for the exten¬ sion of French law to all civil causes. Com¬ plaints were likewise made that the judicial officers of the colony were for the most part ignorant of the French language; that they were often dishonest and that the legal fees charged the inhabitants were exorbitant. For all of these complaints there seems to have been considerable foundation

and in fact the law officers of the Crown in England reported a recommendation that the French language should be restored in judicial proceedings and vol. 5 — 27

that the old French law should be extended to all civil cases.

Matters rested as they were until the ap¬ pointment of Gen. Sir Guy Carleton (q.v.) to the post of governor in 1767. The new gov¬ ernor was not long in grasping the situation and in deciding that the restoration of the whole fabric of French civil law would be advisable. To this end he had the coutume de Paris of the old regime carefully re-edited by several colonial jurists of acknowledged ability and the revised text at once became the acknowledged source of law in all cases of land tenure and inheritance. Carleton pressed his proposal on the home authorities and in 1770 went to England to urge its adoption. There he man¬ aged to secure the ‘appointment of a commission to examine into the merits of the whole matter and the report of this body, although it was not presented until the closing days of 1772, was on the whole in favor of the governor’s recom¬ mendation. In the meantime, however, there was a growing demand among the British inhab¬ itants of the colony for the establishment of a representative assembly in accordance with the promise made in the proclamation of 1763. At meetings of the British inhabitants resolutions calling upon the home authorities to take steps in this direction were passed and forwarded to England. But to the adoption of such a step there was grave difficulty, namely, the decision of the question as to whether Roman Catholics would be permitted to sit in the new assembly. The disabilities of Roman Catholics had not been removed in England at this time and it was hardly to be expected that Parliament would extend to Roman Catholics in a colony privileges which it denied them at home. On the other hand, an assembly from which Roman Catholics were excluded would be very far from representative in a colony where nine-tenths or more of the population professed that religion. This difficulty, together with the fact that the position assumed by the representative assemblies in the British colonies on the Atlan¬ tic seaboard at this time was not calculated to inspire the home authorities with a favorable regard for popular colonial representation, seems to have determined the ministry in its decision that Canada, for the time being, should not be trusted with an assembly representing the people. On some other points, however, the home authorities evinced a desire to meet the wishes of the colonists.

On 2 May 1774 a bill, popularly known as the Quebec Bill, was introduced into the House of Lords where it passed with little opposition. In the House of Commons the measure was vigorously opposed by a strong minority, but with some amendments was eventually passed, and toward the end of June received the royal assent. By the provisions of the act the boundaries of the province of Quebec were ex¬ tended to include all ancient Canada, including Labrador, and all the territory King north of the Ohio and west of the Mississippi. Roman Catholics were released from all penal restric¬ tions ; the obligation of the tithe was reimposed in favor of the Church, and all classes, with the exception of the religious orders, were con¬ firmed in the full enjoyment of their proprie¬ tary rights. French law was hereafter to be applied in all civil cases while the law of Eng-418

land was retained for the decision of all crimi¬ nal causes. Both, however, might be modified by ordinances of the governor and legislative council. Inasmuch as it was ˆinexpedient to call an Assembly® the act provided for the establishment of a legislative council to consist of not less than 17 nor more than 23 members nominated by the Crown. To this body in con¬ junction with the governor was given a limited power of internal administration, including the right to levy internal and local taxes. But Parliament expressly reserved to itself the right of external taxation and every ordinance passed by the council was to be transmitted to England where it might be disallowed if the home au¬ thorities deemed advisable.

In the New England colonies the passage of the Quebec Act was bitterly resented, partly be¬ cause of the privileges which it granted a French and Roman Catholic population but more especially because it placed under the almost complete control of the British authori¬ ties the vast expanse of territory west of the Alleghanies in the conquest of which the sea¬ board colonies had borne a heavy share. In Quebec the French inhabitants, while many re¬ gretted that provision had not been made for the establishment of a popular assembly open to Roman Catholics, for the most part wel¬ comed the substantial concessions which the act conveyed. There is little doubt that these con¬ cessions served in some measure to assure the British authorities

of at least their neutrality during the turbulent days of the next few years. The British inhabitants of the province, on the other hand, were naturally disappointed but the course of events during the next half-decade was such as to preclude any important mani¬ festation of their feelings. Under the provisions of the Quebec Act the administration of the province was carried on for the ensuing 17 years.

Bibliography. — Coffin, (The Province of Quebec and the American Revolution (1896) ; Hart, (The Quebec AcC (1885) ; Kingsford, (History of Canada,* passim; Marriot, (Plan of a Code of Laws for the Province of Quebec (London 1774) ; Maseres, ˆProjet des Lois pour Quebec* (Quebec 1770).

William Bennett Munro, Professor of Municipal Government , Harvard University.

33. THE ASHBURTON TREATY.

The Ashburton Treaty (also called Treaty of Washington), a treaty between the United States and Great Britain, signed 9 Aug. 1842, is chiefly important for its settlement of the northeast¬ ern boundary question. The boundary between Massachusetts (subsequently Maine) and Brit¬ ish North America had been in dispute since 1783. The treaty of that year (Art. 2) had made the following provision : C(And that all disputes which might arise in future on the subject of the boundaries of the said United States may be prevented it is hereby agreed and declared, that the following are and shall be their boundaries, namely, from the northwest angle of Nova Scotia, namely, that angle which is formed by a line drawn due north from the source of the Saint Croix River, to the High¬ lands ; along the said Highlands which divide those rivers that empty themselves into the river Saint Lawrence from those which fall into

the Atlantic Ocean, to the northwesternmost head of the Connecticut River; east, by a line to be drawn along the middle of the river Saint Croix, from its mouth in the Bay of Fundy to its source, and from its source di¬ rectly north to the aforesaid Highlands which divide the rivers that fall into the Atlantic Ocean from those which fall into the river Saint Lawrence.® The article was doubtless drawn in good faith, but owing to the imper¬ fect knowledge of the geography of the terri¬ tory concerned, its meaning was soon involved in doubt. The identity of the river Saint Croix, the location of the Highlands referred to and the ownership of the Passamaquoddy Islands became matters of

dispute. The identity of the Saint Croix was. settled by a commission in 1798, appointed under the treaty of 1794. Un¬ der the Treaty of Ghent (see Ghent, Treaty of) (1814) a commission was appointed which settled the Passamaquoddy question by com¬ promise (1817). But the demarcation of the inland boundary seemed long impossible of solution. The American claim located the (<northwest angle® at the point where the line due north from the source of the Saint Croix met the Highlands between the rivers flowing into the Saint Lawrence and those flowing into the Atlantic ; this established the angle in ques¬ tion ((at a place about 144 miles due north from the source of the River Saint Croix, and about 66 miles north of the River Saint John® (United States commissioner, 4 Oct. 1821). The extreme British claim (at any rate after 1814) placed the angle (<at or near the mountain or hill called Mars Hill, distant about 40 miles on a due north line from the source of the River Saint Croix, and about 37 miles south of the River Saint John® (note of British com¬ missioner 4 Oct. 1821). In each case the boundary proceeded westward and southward along the Highlands to the headwaters of the Connecticut. Between the two there thus lay a disputed territory of 12,000 square miles. After fruitless negotiations a convention of 27 Sept. 1827 referred the boundary to the arbi¬ tration of the King of the Netherlands. His award, however, in 1831 was rejected by the United States.

Meantime the district of Maine had become (1820) a State, and was eager in the defense of its claim to the disputed region. The prog¬ ress of settlement naturally led to conflict and disturbance on the border line, known as the (< Aroostook War.® By the year 1840 matters had reached an apparent deadlock in which the adoption of a conventional line seemed the only solution. In addition to the northeastern bound¬ ary, various other matters of controversy were outstanding between the two nations. The English claim of a <(right of search® for the suppression of the slave trade created a stand¬ ing difficulty. The destruction of the Caroline (q.v.), an American vessel, by a party of Cana¬ dians during the revolt of 1837 had led to a demand for redress. The British government had met this claim by asserting that the destruc¬ tion of the vessel was a legitimate act of war, the Caroline having carried supplies for the in¬ surgents. A Captain McLeod, a Canadian, ac¬ cused of participation in the affair, was arrested and brought to trial in New York; in all prob¬ ability nothing but his acquittal prevented actual

hostilities. A further complication had arisen in the case of the Creole, a slave ship on which the negroes had revolted (1841), and which they had carried to a British port in the West Indies, where they were allowed to go unmo¬ lested. There was also in question the bound¬ ary of Oregon. To settle these various points at issue, Lord Ashburton (see Ashburton, Alexander Baring, Lord) was sent to Wash¬ ington (April 1842) and in conjunction with Daniel Webster, Secretary of State, arranged the treaty commonly known by his name. Ash¬ burton, formerly Mr. Alexander Baring a prominent financier, and for nearly 20 years a member of the House of Commons, had previ¬ ously resided in America, where he married a daughter of Senator Bingham. His known de¬ sire for a good understanding between Britain and America rendered his relations at Wash¬ ington most cordial. He was widely enter¬ tained, and is said to have ((spread a social charm over Washington, and filled everybody with friendly feelings toward England.® With Webster his relations were especially amicable, and their negotiations assumed an altogether informal character. (See Schouler, his¬ tory of the United States,* Vol. IV, ch. xvii). To this fact has been partly due the impression ever since prevalent in Canada that the inter¬ ests of that country were sacrificed to the ex¬ pansiveness of Lord Ashburton's feelings. Under the terms of the treaty, the northeast boundary was settled thus (Art. I) : (<It is hereby agreed and declared that the line of boundary shall be as follows: Beginning at the monument at the source of the River Saint Croix, as designated and agreed to by the com¬ missioners under the fifth article of the treaty of 1794 between the governments of Great Britain and the United States; thence north, following the exploring line run and marked by the surveyors of the two governments in the years 1817 and 1818, under the fifth article of the Treaty of Ghent, to its intersection with the River Saint John, and to the middle of the channel thereof ; thence up the middle of the main channel of the said River Saint John into the mouth of the River Saint Francis; thence up the middle of the channel of the said River Saint Francis, and of the lakes through which it flows, to the outlet of the Lake Pohenaga-mook; thence southwesterly in a straight line to a point on the northwest branch of the River Saint John.® This locates the main part of the boundary; for details of the further extension of the line, the text of the treaty may be con¬ sulted ((Treaties and Conventions,* Washing¬ ton 1889; (Annual Register,* 1842). The

treaty provided further for the survey and per¬ manent marking of the boundary, which was completed in 1847. Of the disputed territory the United States received about seven-twelfths and Canada five-twelfths. Rouse's Point, on Lake Champlain, was also declared to belong to the United States, the government of that coun¬ try binding itself to pay to Maine and Massa¬ chusetts $300,000 on account of the relinquished territory. The right to carry timber down the Saint John River was granted to the United States." By article 8 of the treaty, it was agreed that each country should maintain on the coast of Africa a sufficient naval force, carrying not less than 80 guns, for the purpose of enforcing, separately and respectively, the

laws, rights and obligations of each contracting party for the suppression of the slave trade. The treaty passed over the Caroline and Creole cases (see Creole Case), but declared (Art. 10) that ((each party, on requisition from the other, shall deliver up to justice persons charged with murder, assault with intent to murder, piracy, arson, robbery or forgery, upon sufficient proof of their criminality.® The ques¬ tion of the Oregon boundary was also omitted.

The boundary award of the treaty met with great dissatisfaction in Canada. It was cur¬ rently believed, and the belief largely persists, that the interests of Canada had been unduly sacrificed. The Canadian view of the case is presented in Dent's (Last Forty Years of Can¬ ada* (1881), and in more extreme form, in Coffin's (Quirks of Diplomacy *(1874). The supposed sacrifice of Canada by Lord Ashbur¬ ton has become a commonplace of Canadian political discussion. Later investigation, how¬ ever, is strongly in favor of the American claim. The whole subject of the boundary has recently been exhaustively treated in an admi¬ rable paper by Dr. William Ganong of Smith College (Proceedings of the Royal Society of Canada,) 2d series, Vol. VII, 1901). Dr. Ganong, though a Canadian, decides that Maine was right and New Brunswick wrong in the northwest angle controversy. He bases his de¬ cision on the text of the treaty of 1783, on the maps of the time, on the admissions of Gov¬ ernor Carlton and others and on a petition of the New Brunswick legislature of 1814, virtu¬ ally admitting the American claim. The Mars Hill boundary line was not advanced, he says, until 1814. In the controversial discussion of the treaty the episode of the ((red line® map has played a considerable part (see North American Review, April 1843, and Winsor's (America, } VII, 180). This was a map found in the French archives and supposed to have been given to Vergennes by Franklin in con¬ nection with the treaty of 1783. A boundary line favoring the English claim was marked upon it in red ink. A copy of this map was in Webster's*

possession during the negotiations but was not shown by him to Lord Ashburton. It was shown by him to the Maine commission¬ ers and played some part in securing their as¬ sent to the Ashburton Treaty. But it is not proved that the marking of the map was by Franklin, and it is also possible that it was wrongly marked with intent to deceive (see Hinks, (Boundaries Formerly in Dispute, 1885). To offset this map, the original of which has disappeared, there is still in the Brit¬ ish Museum an English map favoring the Amer¬ ican claim.

Stephen Leacock,

Professor of Economics and Political Science,

McGill Un iversi ty.

34. CLERGY RESERVES, The. The

clergy reserves were lands set apart, by virtue of the Constitutional Act of 1791, for the maintenance of the Protestant clergy in Tipper and Lower Canada. The intention of the act was to reproduce in the colony an episcopal establishment similar to that of Great Britain, to whose primate it was to be. subordinate. The provincial governors were directed under the act to reserve one-seventh of the land for the support of the Protestant clergy. The re-

served blocks of land were to be distributed among those granted to settlers. In Upper Canada a full seventh of all the land was to be granted. In Lower Canada reserves were to be made only in proportion to new settlement and not in respect of lands already occupied. No reservations were made in the latter prov¬ ince until 1796. Reservations were made each year until 1838 (except in 1813). The total reservations made in Lower Canada amounted to over 930,000 acres : in the upper province to about 2,400,000 acres. The Crown was also em¬ powered to authorize the lieutenant-governor of each province from time to time to erect parsonages, to endow them with a portion of the reserve lands and to present incumbents to them

(Constitutional Act, Secs. 38, 39, 40). The operation of the system thus established was not at first felt as a serious grievance. Land being still plentiful, the reservations remained unsold and were leased at extremely low rentals (10 shillings for 200 acres during first seven years). With the progress of settlement how¬ ever the rentals constantly rose. The question of the clergy reserves became a subject of in¬ creasing complaint. The members of the Church of England were in a decided minority, not only in the lower province, but in Upper Canada itself. The question early arose whether the wording of the act — (<allotment and appropriation of lands for the support of a Protestant clergy® — could not be construed in favor of the Presbyterian and Dissenting denominations. The matter being referred to the home government, the law officers of the Crown decided (November 1819) that ithe Scotch Church Lad a claim for a share of the rentals, but that no other denominations had a claim at all. The irritation thus caused ren¬ dered the question one of acute difficulty during the succeeding 30 years, and has been desig¬ nated by Dr. Bryce, the Canadian historian, the (<Thirty Years' Religious War in Upper Canada.® The distribution of the population of Upper Canada among the different denom¬ inations in 1839 was as follows : Church of England, 79,754; Methodists, 61,088; Presby¬ terians, 78,383 ; Roman Catholics, 43,029 ; Bap¬ tists, 12,968; others, 57,572. The claims of the Church of England were stoutly upheld by the Rev. John Strachan, subsequently bishop of Toronto (1839). Egerton Ryerson (see Ryerson, A. E.), a young Methodist minister, strove with equal zeal on behalf of the Methodist Church.

In 1827 the assembly of Upper Canada asked the Crown to devote the reserves to the creation of schools and of churches of all de¬ nominations. The same request was repeated in each of the three following years with con¬ siderable popular agitation. Meantime the en¬ dowment of rectories as provided by the act of 1791 was authorized by instructions from the Crown in 1825. The excited state of public feeling delayed for some years the execution of this project, but in 1836 54 rectories were endowed with 400 acres each. The discontent thus caused helped to precipitate the rebellion of 1837. With the suppression of that move¬ ment the question of the clergy reserves still earnestly demanded solution. An act of the legislature of Upper Canada in 1839, pro¬ posing to reinvest the reserves in the Crown,

was disallowed by the home government. In the following year the legislature passed an act for the sale of the reserves, one-half of the

proceeds to go to the churches of England and Scotland, and the other to be divided among the other religious denominations. This again was abortive, the British judges, on question by the House of Lords, deciding that the provincial legislature had exceeded its authority. The Imperial Parliament now in¬ tervened and passed an act (7 Aug. 1840) for the settlement of the question. Part of the reserves had already been sold by authority of a statute of 1827. The proceeds of these sales were to be divided between the churches of England and Scotland, the former receiving two-thirds; the unappropriated lands (1,800,000 acres) were to be sold, and the amount realized to be invested, one-half of the interest being given to the two above churches, in the pro¬ portion already mentioned, the other half to be applied by the governor and executive council for public worship and religious instruction. The income thus accruing was divided in the ensuing years among the churches of England and Scotland, the Wesleyan Methodist, Roman Catholic and Synod Presbyterian churches and the United Synod Presbytery. The question was still far from settled. It was claimed that the lands were sold by the Crown at insufficient prices, and Bishop Strachan led an agitation for the sharing up of the lands themselves. The assembly refused to petition the Crown to this effect, but demanded the repeal of the act of 1840. The Imperial Parliament complied by a statute of 1853, which placed the reserves in th? control of the provincial Parliament (the two Canadas being now united). The Canadian Parliament elected in 1854 strongly reflected the general public feeling in favor of secularization. A statute to that effect was passed. A lump sum of £188,342 was paid to the Church of England, representing the guarantee of stipends then charged on the re¬ serve fund, called for by the Imperial act. The reserved lands were sold and the proceeds given to the municipal authorities for educa¬ tion and local improvement. Consult Lindsay, (The Clergy Reserves) (1851) ; (Memoir of Bishop Strachan* (1870); Ryerson, (Story of My Life> (1883).

Stephen Leacock,

Professor of Economics and Political Science, M cGill U n iversity.

35. SEIGNipRIAL TENURE. The sys¬ tem of Seigniorial Tenure was that system of public and private, relations based upon the tenure of land which the French government undertook, during the course of the 17th and 18th centuries, to introduce into its North American colonies, and more especially into the colony of New France., now Canada. The sys¬ tem of feudal — or. as. in its later stages it came to be called — - seigniorial tenure, was deeply rooted in France, and it is easy to understand how its introduction into the colonies appealed to

Richelieu as a means of providing estates for many of the landless aristocrats of France. Moreover as feudalism was now so far ad¬ vanced in decay as to be no longer a menace to the central power, it is easy to see how the system appealed to the Bourbon monarchs as likely to permit, mi the colonies, of that cen-CANADA — SEIGNIORIAL TENURE (35)

tralization of authority which characterized France at this time.

As regards Canada, the seigniorial system had its origin in 1627 when the French King granted to the Company of New France, more commonly known as the Company of One Hundred Associates, the whole of the French possessions in North America as one immense fief with full power to sub-grant it in seign¬ iories to settlers. During the whole 35 years of its existence, however, this company de¬ voted almost its entire attention to the develop¬ ment of the lucrative fur trade; very few settlers were sent out to the colony, with the result that while over 60 in extenso grants of seigniories were made, almost none at all were ever taken possession of by the grantees. But in 1663 the company was compelled to sur¬ render its charter and extensive territorial rights, the Crown taking into its own hands the supervision of colonial affairs and providing New France with a royal government corre¬ sponding roughly to that established in the French provinces at home. From this time on settlers came in increasing numbers ; power was given the colonial governor and intendant to make grants of seigniories subject to royal ratification, and during the last quarter of the 17th century these were made freely. In no case were grants made to absentees ; each ap¬ plicant for a seigniorial grant had to prove himself a bona-fide colonist. Large numbers of the settlers were sent over at the royal ex¬ pense and once in the colony, every induce¬ ment was given them to remain. Even the detachments of French regular troops sent out to the colony were disbanded there and both officers and men were encouraged, by liberal grants both of land and money, to become permanent residents of New France.

As to the size of the seigniories granted, there was no fixed rule : they varied from small plots containing a few square arpents to huge tracts 10 by 12 leagues in area. Much de¬ pended on the position occupied by the settler before his immigration to the colony and upon the

available means which he had for the de¬ velopment of his grant. But whatever the area of the grants, they almost invariably assumed the same shape,— that of a parallelogram with the shorter end fronting on the river. On re¬ ceiving his grant the new seignior was under obligation to repair at once to the Chateau de Saint Louis in Quebec, there to render his fealty and homage to the governor as the representative of the Crown. Within the next 40 days he was required to file with the registrar-general his aven et dinombryment, or statement showing clearly the location, extent and nature of his seigniory. A similar state¬ ment containing full information regarding the development of the holding was required every time the seigniory changed owners. .No pay¬ ment was exacted from the seignior in return for the original grant, but an exaction known as the quint became payable on each mutation of ownership by sale, gift or inheritance other than in direct succession. This amounted to one-fifth of the estimated value of the seign¬ iory, but of this amount it was the custom of the Crown to give a rebate of one-third. As the seigniories increased in value very slowly this burden was never an onerous one. In making the grants, the authorities usually re¬

served the right of taking, from the granted seigniories, such locations as might at any time be found necessary for the construction of fortifications or other public works, such oak and pine timber as might be found suitable for use in the royal shipyards and the right to a share in all mines and mineral deposits found in the seigniory.

In France the seignior was under no obliga¬ tion to sub-grant the lands within his seigniory, but by a series of royal edicts, — more notably the Edict of Marly (1711), this obligation was imposed upon the seigniors of New France in the interest of colonial development. From 1711 onwards it was incumbent on all seigniors in Canada to sub-grant portions of the unoc¬ cupied lands of their seigniories to any settlers who applied for such grants, on whatever terms were customary in the neighborhood without exacting any bonus or prix d'entree. If the seignior refused to do this, power was given the governor and intendant to step in and to make the grant, the seigniorial dues in such case to become payable to the Crown. Further¬ more, from time to time various edicts revoked or curtailed the grants made to such seigniors as did not seem to be showing sufficient zeal in having their lands granted to settlers. In this way every seignior was compelled to become, after a fashion, the immigration agent of the colonial authorities, and it was this particular feature which serves most prominently to dif-erentiate the

seigniorial system in Canada from its prototype at home.

Grants made by the seigniors to settlers were called grants en censive. These likewise varied considerably in size, but almost in¬ variably assumed the same shape as the seign¬ iory wdthin which they lay. Over them the seignor retained a variety of rights, some financial, some judicial and some merely cere¬ monial or honorary in their nature. Among the former was the annual payments known as the ecus et rentes , the former payable in money, the latter usually in produce. The cens was a very small due, amounting usually to a few sons per superficial arpent and valuable to the seignior mainly as establishing his claim to other and more important rights. The rentes was payable annually in grain, cattle or poultry but might be commuted by agreement of the parties into a fixed money payment. Then there was the lods et ventes , a mutation fine payable at every change of ownership. This amounted to one-twelfth of the mutation price, and of it the seignior usually remitted one-fourth, although he was under no legal obliga¬ tion so to do. To guard himself against loss of his proper lods et ventes through sales of en censive holdings at less than their actual value, the seignior possessed the droit de retraite by virtue of which right he might pre¬ empt any holding thus sold by payment to the purchaser of the mutation price, within 40 days from the date of the sale. Then there was the droit de banalite or the exclusive right of the seignior to erect a grist mill within the limits of his seigniory and to compel his cen-sitaircs to have their grain ground there and not elsewhere on pain of confiscation. The amount of toll receivable for this service was fixed by a royal edict at one-fourteenth of the grain ground. During the greater part of the French regime this incident bore more heavily

upon the seignior than upon his censitaires, for except in the more populous seigniories, the amount of toll received rarely sufficed to pay expenses. At the same time the colonial au¬ thorities compelled the seigniors to provide mills in their seigniories on pain of losing the right for all future time. Finally, there was the much-detested corvee,

or right of the seign¬ iors to exact from their censitaires a certain quota of labor on the seigniorial lands without compensation. The amount allowable varied in different seigniories but as a rule the censitaires were permitted to commute it into a fixed money payment. An ordinance of the superior council in 1716 forbade the exaction of corvee during seed time and harvest. In addition to the foregoing main rights the seignor ordinarily reserved for himself the privilege of taking from the lands of the censitaires such wood and stone as might be found necessary in the erection of the seigniorial manor house, mill or church, and in some cases the right of taking wood for fuel. In many cases he likewise re¬ served the right of claiming a share in all the fish caught by his censitaires in the waters of the seigniory.

Most of the seigniors possessed certain judicial rights. These, however, were not in¬ herent in the ownership of a seigniory, but were specifically granted by the Crown. This grant might convey merely the right of basse justice in which case the seignior was em¬ powered to deal with minor causes in which the amount in dispute did not exceed a few sols. The grant of moyenne justice gave him a large jurisdiction, while the grant of haute justice gave full judicial power in all cases except those such as treason and counterfeiting in which the Crown was directly concerned. As a rule all three degrees of judicial power were conferred on the seignior. But in every case an appeal lay to the royal courts of the colony. As the exercise of his judicial powers brought the seignior very little profit the seign¬ iorial courts never became a very important element in the colonial judicial system.

The remaining rights of the seignior were merely honorary and afforded him no financial return. He was entitled to the fealty and hom¬ age of his censitaires, to a front pew in the parish church, to certain precedence at the sacraments, to the erection of a Maypole at his door each Mayday and, in general, to the re¬ spect and deference of his dependents. A number of seigniors who showed zeal in the development of their holdings received patents of nobility but it must be borne in mind that the possession of a seigniory in New France did not of itself give noble rank. Herein Canadian feudalism again differed from its prototype in France. The French seignior was always a noble ; the Canadian very rarely.

At the close of the French regime nearly 8,000,000 arpents of land had been granted out to be holden under the seigniorial tenure. The system had become so deeply rooted in the colony that the English authorities, after the conquest, did not venture to take the drastic step of supplanting it in favor of the English system of tenure in free and common socage. The old system was allowed, therefore, to re¬ main

intact, but as the colony became more thickly settled many of the seigniorial ex¬ actions became burdensone. The droit de

banalite became especially so. Moreover, the new English courts failed utterly to afford the censitaires that protection against the seigniors which the authorities of the old regime had given. From time to time the legislature of Lower Canada sought to deal with the growing complaint that the operation of the system was retarding the development of the province but found it extremely difficult to devise any plan which would be satisfactory to the tenants and at the same time protect the vested interests of the seigniors. In 1825 an act was passed giving to the parties concerned the right to commute all seigniorial dues into a lump sum by mutual agreement but very few took ad¬ vantage of the legal permission thus accorded. It was not until 1854 that by the Seigniorial Tenures Abolition Act a general scheme for the compulsory commutation of all seigniorial obligations received the assent of the Cana¬ dian legislature. This act provided for the establishment of a special court to deter¬ mine just what seigniorial claims were justi¬ fiable and on a basis of its decisions each seign¬ ior was awarded a certain indemnity for the loss of his rights. Part of the amount was paid him from the public treasury; the balance became an annual rent charge on the lands of the tenants, which annual charge, again, might be commuted into a lump sum if the tenant so desired. In any case all lands formerly holden en seigneurie or en censive were thereafter to be holden in fee simple. Thus by one stroke of legislation the whole system of territorial law in Lower Canada was revolutionized and the last vestige of Canadian feudalism disap¬ peared.

Bibliography.— Parkman, <The Old Regime in Canada) ; Kingsford, (History of Canada,) Vol. X; Wrong, (A Canadian Manor and Its Seigneurs) (1912) ; La Fontaine, (Judgments and Deliberations of the Special Court for the Abolition of the Seigniorial Tenure) ; Lareau, (De la Feodalite en Canada) (in his (Melanges historiques et litteraires)) ; Doutre et Lareau, (Histoire du droit Canadien) ; Titles and Documents relating to the Seigniorial Tenure (1854) ; Daniels, (Histoire des Grandes Families Canadiens-Frangais) ; Munro, (The Seigniorial System in Canada) (1907), (Docu¬ ments Relating to the Seigniorial Tenure) (1908) and (The Seigneurs of Old Canada)

(1914).

William Bennett Munro, Professor of Municipal Government, Harvard

University.

36. HUDSON'S BAY COMPANY, The *

This great trading company has been in opera¬ tion under its present charter for two and one-third centuries. Its charter, which is a very generous one, was given by easy-going Charles II. The company owes its origin to the adven¬ tures in the New World of two French Hu¬ guenots, Pierre Esprit Radisson and Medard Chouart (afterward Sieur de Groseilliers, or familiarly «Mr. Gooseberry))). It is claimed that in 1662 these daring spirits reached James

* The charter of this company is given to the "Gov ernor and Company of Adventurers of England trading into Hudson's Bay." From this it has been usual to employ the title "Hudson's Bay Company," using the possessive form of the name of Hudson, the discoverer. The bay itself, as in the case of Hudson River, has its name spelt by the geographers without the apos¬ trophe and s.

Bay, the southern lobe of Hudson Bay. This is entirely improbable, as in that year they are known to have been in Lac des milles Lacs, now northern Minnesota. (See the discussion on this matter in the author's (Remarkable History of the Hudson's Bay Company*)• Persecuted in French Canada, the adventurers fled to New England and thence to England, where they had an audience with the King, and through the influence of Prince Rupert (see Rupert, Prince), the King's cousin, a strong company Was afterward formed, being created by royal charter. The first expedition to Hudson Bay was made for the adventurers in the ship Non¬ such Ketch, Capt. Zachariah Gillam, a New England mariner. Arrived at the destination, a fortress was erected on James Bay (lat. 51° 20' N., long., 78° W.), called Charles Fort. On the return of the vessel to England the charter was granted (1670). Prince Rupert was made the first governor, and the vast territory cov¬ ered by the charter became known as Rupert's Land. He

was followed by the King's brother, James, Duke of York, and the third governor was the famous Duke of Marlborough, who has left his family name on Fort Churchill. Eng¬ land's great rival, ((La Belle France,® immedi¬ ately began to lay claim to the bay as a part of Canada. Several expeditions were sent out to drive off the English, the most notable being that under Pierre Le Moyne d'Iberville. (See Iberville, Pierre Le Moyne d'.) He achieved so great a naval victory that the whole bay fell into French hands, comprising at that time seven forts, of which Charles, Nelson, Moose and Albany were the chief. The territory under dispute was restored to England by the famous Treaty of Ryswick, 1697. Up to the time of the French forays rich dividends had been declared by the partners, that of 1690 being 75 per cent of the original stock, and the King's share was rendered in guineas instead of pounds. The company, which included many distinguished men such as the Duke of Albe¬ marle (General Monk), (see Monk, George), and Sir George Carteret (see Carteret, Sir George) was very influential. Prince Rupert presided at the London meetings, and a sub¬ committee met regularly to buy and sell, went to Gravesend to see the goods shipped, the men paid, and the like, in the good ships Prince Rupert, Wyvenhoe, or Bark Craven, which sailed around the north of Scotland and thence to Hudson Bay. Every year, about 1 June, for more than 200 years, one ship at least has cleared for its northern port on the bay, lat¬ terly generally York Factory. How small the beginnings of trade were may be seen in the inventory of goods sent out in 1672: ((Two hundred fowling-pieces, and powder and shot; 200 brass kettles, size from 5 to 16 gallons; 12 gross of knives; 900 or 1,000 hatchets.® In October the ship returned with its valuable cargo of furs, which was sold in London, often by auction.

The second period of Hudson's Bay Com¬ pany history is that involving the local opposi¬ tion in England to the traders. Between the treaties of Ryswick (1697) and Utrecht (1713), the menaces of the French destroyed the fur trade, but after the latter treaty, from which time the bay has remained continuously Eng¬ lish, the affairs of the company improved. This roused the. envy of a number of merchants, a

leader among them being an Irish gentleman named Arthur Dobbs. He advocated an expedi¬ tion to explore the Northwest Passage, raised by subscription a large sum to send out a ship to rival the company, and though his expedition did not accomplish much, yet the Hudson's Bay Company was disturbed, was put on its mettle, and the struggle as recorded in the government bluebook of 1749 became very interesting. A more serious movement, however, began in French

Canada. The charter of the company gave it the trade of all the lands and streams within ((Hudson's Streights,® with one most important limitation, namely, except those ((which are not now actually possessed by any of our subjects, or by the subjects of any other Christian prince or state.® Long before the Hudson's Bay Company penetrated Rupert's Land, the French ascended the Great Lakes, and 20 or 30 years before the English had reached the Saskatchewan River from Hudson Bay explored the river system of Rupert's Land and came in sight of the Rocky Moun¬ tains. This feat was accomplished by Sieur de la Verendrye, who in 1738 caused a fort to be erected on the site of the present city of Winni¬ peg, and took possession of the country for the King of France. The conquest of Canada by Wolfe put an end to this French occupation, but as later discussions show left it a part of Canada. Soon after the conquest of Canada, however, a critical movement took place in the effort of the Hudson's Bay Company to pene¬ trate the interior from the bay, on whose shores for nearly a century it had lain in slumber. This advance was under the leadership of one of the captains of exploration, Samuel Hearne, a Hudson's Bay Company officer, sometimes called the <(Mungo Park of Canada.® Hearne discovered the Coppermine River and followed it to its mouth on the Arctic Sea. He, too, first of white men saw Great Slave Lake. But, also, shortly after the transfer of Canada from France to England, Scottish traders from Montreal began to ascend the waterways of Canada, and to pass from Lake Superior on to Lake Winnipeg and the Saskatchewan River, the very centre of Rupert's Land. Alexander Henry (1760), Thomas Curry, James Finlay and the brothers Frobisher, traders from Montreal, led the way and reached the Saskat¬ chewan. Hearne from Hudson Bay heard of the Canadian traders having built a fort at Sturgeon Lake, and two years later (1774) ac¬ cepted the gage of battle, and built Fort Cumberland alongside of his rivals on the Saskatchewan. The war of the giants had now begun, and for well-nigh 50 years it raged with increasing rancor and bitterness. Out of the movement of the Scottish merchants named, from Montreal, grew the union of traders (1783-84) known as the Northwest Company, Its leading traders were Frobisher, Mackenzie, McLeod, McGillivray, Grant, Cameron and greatest of all Simon McTavish — familiarly called (<Le premier,® and the founder of the Northwest Company. The magnates of this great company Washington Irving has charac¬ terized as the <(Lords of the Lakes and Forests.® Their trade was enormous and extended to the coast of the Pacific Ocean itself. Toward the end of the century (1795-99) one year's produc¬ tion of furs was 106,000 beavers, 32 martens, 11,800 mink, 17,000 musquash — counting alto-424

gether 184,000 skins. At this time the North¬ west Company employed, besides officers and partners, 50 higher clerks, 71 interpreters and clerks, 1,200 canoemen and 35 guides. But the Hudson’s Bay Company was not to be beaten. They were able to carry goods from the seacoast of Hudson Bay to the inland parts of Rupert’s Land earlier in the season, even in the Red River districts, than the Nor’-Westers were able to do by the long river and lake route from Montreal. They duplicated all the forts of the Northwest Company. The confusion be¬ came worse confounded when the Northwest Company divided (1796) into two rival fac¬ tions, the rebels forming themselves into the <(New Northwest Company® or (< Alexander Mackenzie and Company,® more familiarly, however, known as the ((XY,® the name being from the letters of the alphabet following the initials of the old company N.W. The young company was intensely active, and about this time, but only for a short period, the introduc¬ tion of dangerous amounts of strong drink took place among the Indians. After eight years of unprofitable trade the two sections were reunited as the ((Northwest Company.® Early in the 19th century a new problem arose. A Scottish nobleman, the Earl of Sel¬ kirk, obtained control of the stock of the Hud¬ son’s Bay Company and proceeded to settle up the fertile lands along the Red River, bringing his colonists chiefly from Scotland by way of Hudson Bay. This invasion of the fur-country (1812-15) by farmers the Nor’-Westers strongly resented. They several times drove out, or in¬ veigled away many of the Highland settlers, who were beginning to till the soil within two or three miles of the site of the present city of Winnipeg. Two forts represented the oppos¬ ing parties — Fort Gibraltar, the Northwest Company fort — Fort Douglas, the Lord Sel¬ kirk stronghold. The descendants of the Nor’- Wester French voyageurs, whose mothers were Indian women, were now becoming numerous and went by the name of Metis (Half-breeds) or Bois-Brules (Charcoal faces). They were chiefly in the employ of the Montreal Company, while the servants of the Hudson’s Bay Com¬ pany, largely Orkneymen, were called by their opponents <(Les Orcanais.® Attacks on the forts were begun by the hostile factions, and in 1816 Governor Semple and 20 of his officers were killed by the Bois-Brules, and Fort Doug¬ las was captured. In the next year Lord Sel¬ kirk arrived supported by a band of several hundreds of discharged mercenary soldiers who had fought in the War of 1812-15 in eastern Canada.

These his lordship had hired and with their aid Fort Douglas was retaken and the colonists re-established in their farms. About the year 1811 John Jacob Astor of New York engaged a number ot men who had been in the Northwest Company and with these estab¬ lished Astoria, a trading post, on the Columbia River. This movement took place by way of the Cape Horn route and the rendezvous was in what was known as the Oregon region. The Nor'-Westers taking advantage of the state of war between Great Britain and the United States seized Astoria and employed the greater number of the Astorians in their posts in New Caledonia, as the region of British Columbia was then called. The conflicts of the various companies in different parts of Rupert's Land,

the Mackenzie River district and New Cale¬ donia well-nigh destroyed the fur trade. Now arose a man who was to be the pacificator and leader of all the fur-traders. This was a young Scottish clerk in the Hudson's Bay Company — George Simpson (see Simpson, Sik George). On the union of the worn-out companies in 1821, Simpson was made chief officer and in time he became (<Emperor® of the fur company. For 40 years he built up the united company, and spent a portion of his time at Fort Garry, the chief point in Rupert's Land, as it was also the capital of Assiniboia, as the Selkirk colony was legally called. In Assiniboia a community of 12,000 grew up, 5,000 Metis, 5,000 English-speaking or locally called Scotch half-breeds, and some 2,000 whites. Not only in this chief settlement, but from Labrador in the Atlantic Ocean to Vancouver Island on the Pacific did the little despot rule. Great forts were scat¬ tered over this wide domain, such as Fort Victoria on the Pacific shore, Fort Simpson in the Mackenzie River district, Fort Chipewyan on Lake Athabasca, Fort Edmonton on the Saskatchewan River, old Fort Cumberland on the same river, Norway House on Lake Winni¬ peg, York Factory and Fort Churchill on Hud¬ son Bay, Fort William on Lake Superior, Sault Sainte Marie, between Lakes Huron and Su¬ perior, the King's post on the lower Saint Law¬ rence River, and Rigolette in extreme Lab¬ rador. From Lachine, his residence, Sir George Simpson dictated law throughout this vast ex¬ tent of country, and compelled order and industry. The company quoting its charter-rights was from the first repressive in dealing in its territory with traders other than its own. The usual metaphor for describing Rupert's Land was that it was "surrounded by a Chinese wall.® After a revolt of the Metis in 1849 this largely ceased to be the case. The company always retained the confidence of the Indians, and with practically no police or mili¬ tary maintained a fair state of law and order. The fertile plains of Rupert's Land were visited by several

exploratory expeditions shortly after the middle of the 19th century. Some of these were that of Palliser and Hector, 1857, of H. Y. Hind in the same year and of Milton and Cheadle a few years afterward. A famous par¬ liamentary investigation took place in London in the year of Palliser's expedition. Canada was at this time becoming alive to the import-ranee of the Northwest. Negotiations took place between the British and Canadian govern¬ ments which culminated in 1868-70 in the vir¬ tual decision that Rupert's Land, and the North¬ ern and Western territories which were leased to the Hudson's Bay Company, should become Canadian. Unskilful dealing on the part of the Dominion government with the people of Red River Settlement led, however, to the Riel re¬ bellion, 1869-70. A military expedition of British troops and Canadian volunteers was sent by the old fur traders' route to Red River, but the rebels disappeared before the arrival of the troops. In 1870 the sum of $1,500,000 was paid by Canada to the Hudson's Bay Company to satisfy its claims, the new province of Manitoba was formed by the Canadian Parliament, and thenceforward the West as far as the Rocky Mountains became a part of Canada. Several years afterward British Columbia came into the Dominion as a province.

The Hudson's Bay Company, though shorn of all political power, still survives, and is vigorous. It still seeks for furs in the far North, and is the largest land company in Canada, owning one-twentieth of every new township, which the government surveys. This serves to give the Hudson's Bay Company a strong interest in building up and developing the newer portions of the country. In addi¬ tion to this the companv has largely devoted it¬ self to conducting large shops in the leading business centres of western Canada. The largest of these is the store in Winnipeg. This with its different departments does an enormous trade not only in Winnipeg, but in supplying by the use of the mails the needs of all parts of the country. Important stores are maintained by the company in Portage la Prairie, Rat Portage, Fort William, Calgary, Vancouver, Edmonton and Prince Albert. The governor of the Hudson's Bay Company till 1914 was the

predominating figure, Lord Strathcona, the Canadian commissioner in London. As the writer has elsewhere said, ((for the last 15 years the veteran of kindly manner, warm heart, and genial disposition, Lord Strathcona and Mount Royal (q.v.), has occupied this high place. The clerk, junior officer and chief factor of 30 hard years on the inhospitable shores of Hudson Bay and Labrador; the com¬ missioner who, as Donald A. Smith, soothed the Riel rebellion, and for years directed the reorganization of the company's affairs at Fort Garry and the whole Northwest; the daring speculator who took hold with his friends, of the Minnesota and Manitoba Railway, and with Midas touch turned the enterprise to gold ; a projector and a builder of the Canadian Pacific Railway ; the patron of art and education, and the patriot who sent out at a cost of between $1,000,000 and $2,000,000 the Strathcona regi¬ ment of horse to the South African War has worthily filled the office of governor of the Hud¬ son's Bay company, and with much success re¬ organized its administration and directed its affairs.® See also the articles The Era of Early Discovery; and Commerce, Tariffs and Transportation.

George Bryce,

Author of (History of the Hudson s Bay Com¬ pany P

37. WASHINGTON TREATY, The.

The Treaty of Washington, between the United States and Great Britain, was signed on 8 May 1871, and had reference to the Alabama claims (q.v.), the fisheries question, the lake, river and canal navigation, the bonding privilege and the Vancouver water boundary question. In the years immediately following the Civil War sev¬ eral causes of acute friction existed between the two countries. Of these the principal was the question of indemnity for the depredations committed by the Alabama and other Southern cruisers, whose construction in England was claimed by the United States to be a violation of neutrality. The second main cause of con¬ tention was the question of the coast fisheries. Under the Reciprocity Treaty of 1854, the fish¬ ermen of each nation were admitted to the in¬ shore coast fisheries of the other. With the expiration of the treaty in 1866 the rights of American fishermen on the Atlantic Coast of Canada were limited to the privileges secured

under the convention of 1818, with a modifica¬ tion of 1845 admitting them to the Bay of Fundy. By this they were excluded from

tak¬ ing fish within three marine miles of any coasts, bays, creeks or harbors of British North Amer¬ ica, except in special parts of the Newfound¬ land and Labrador coast, and off the Magdalen Islands. The proper interpretation of this three-mile limit had been a standing subject of contro¬ versy. It was claimed by Great Britain that the terms of the treaty precluded entrance into the bays : by the United States that it merely forbid a nearer approach to the shores of the bay than a distance of three miles. This left in dispute the right to fish in the Bay of Chaleurs and other important places. (See Cushing, (Treaty of Washington, } ch. v). As a temporary ex¬ pedient since 1866, the Canadian government had sold licenses to American fishermen for a nominal fee. This scheme had proved abortive, for the raising of the license fee in 1868 had re¬ sulted in an almost complete cessation in their use, only 25 being taken out in 1869. The Do¬ minion government, in consequence, by an order in council (8 Jan. 1870) abandoned the system of licenses and equipped cruisers to protect its claims of the coast fisheries. The Alabama claims and the fisheries had been for some time a standing subject for negotiations. A treaty of January 1869 (known as the Johnson-Claren- don Treaty) was rejected by the Senate. Negotiations were renewed under President Grant and, at the suggestion of the British government, it was finally decided to appoint a joint high commission to meet at Washington to settle outstanding matters of dispute. The commissioners for the United States were Hamilton Fish, Secretary of State; Gen. Robert Schenck, Judge Nelson of the Supreme Court, Ebenezar Hoar and George H. Williams. The British commissioners were Lord de Grey, Sir Stafford Northcote, • Sir Edward Thornton, Prof. Montague Barnard and Sir John Macdonald, Prime Minister of Canada. Their deliberations lasted from 27 Feb. until 6 May 1871. Of the different points in the treaty agreed upon the most important is that in reference to the Alabama claims, on account of its bearing upon international law. The matter at issue here was the extent to which Great Britain had been guilty of a breach of neutrality. The Alabama had been built in Birkenhead. The purpose of her construction had been a matter of general notoriety. The British gov¬ ernment had refused to listen to any representa¬ tions that fell short of being technical evidence. Even when the American consul at Liverpool furnished the needed proof, the dilatory action of the government permitted the cruiser to de¬ part unmolested. The question was whether, in reference to the Alabama and other Con¬ federate cruisers, the government of Great Britain had shown the diligence demanded of a neutral power (see 42d Congress, 2d Sessn. Senate Exec. Doc. 31 November, pp. 146-51). The commission decided that the claims thus arising ((shall be referred to a tribunal of arbi¬ tration to be composed of five arbiters,® one to be

named by the President of the United States, one by Her Britannic Majesty, one by the King of Italy, one by the President of the Swiss Confederation and one by the Emperor of Brazil, The questions considered were to be

decided by a majority. Article 6 of the treaty declares : <(In deciding the matters submitted to the arbitrators they shall be governed by the following three rules, which are agreed upon by the high contracting parties as rules to be taken as applicable to the case, and by such principles of international law not inconsistent therewith as the arbitrators shall determine to have been applicable to the case : A neutral government is bound : First, to use due dili¬ gence Jo prevent the fitting out, arming or equipping, within its jurisdiction, of any vessel which it has reasonable ground to believe is intended to cruise or to carry on war against a power with which it is at peace ; and also to use like diligence to prevent the departure from its jurisdiction of any vessel intended to cruise or carry on war as above, such vessel having been specially adapted, in whole or in part, within such jurisdiction, to warlike use. Sec¬ ondly, not to permit or suffer either belligerent to make use of its ports or waters as the base of naval operations against the other, or for the purpose of renewal or augmentation of military supplies or arms, or the recruitment of men. Thirdly, to exercise due diligence in its own ports and waters, and, as to all persons within its jurisdiction, to prevent any violation of the foregoing obligations and duties.® The tribunal thus arranged met at Geneva (December 1871) and in September 1872 rendered its decision <(that the British government had failed to use due diligence in the performance of its neutral obligations,® and awarded an indemnity of $15,500,000 to the United States. In regard to the fisheries, the treaty practically re-estab¬ lished the status under the Reciprocity Treaty of 1854, throwing open the inshore fisheries of the Atlantic Coast north of latitude 39° to the fishermen of both nations (Art. XVIII, XIX). It also established reciprocal free trade in fish and fish oil (Art. XXI) and decided that com¬ missioners should be appointed to determine what extra compensation, if any, should be paid by the United States for the

privileges thus acquired. A compensation of $5,500,000 was subsequently awarded by the Halifax Fisheries Commission (1878). The location of the north¬ western boundary (see Northwest Boundary Dispute) which under the treaty of 1846 was declared to follow the 49th parallel ((to the mid¬ dle of the channel which separates the conti¬ nent from Vancouver's Island and thence south¬ erly through the middle of the said channel and Fuca Straits to the Pacific Ocean,® was left (Art. XXXIV) to the decision of the Ger¬ man Emperor. It was further agreed (Art. XXVI) that the navigation of the river Saint Lawrence shall forever remain free and open for the purpose of commerce to the citizens of the United States. The United States in re¬ turn declared the Yukon, Porcupine and Stikine open to British commerce (Art. XXVI), granting also to British subjects the right of navigating Lake Michigan, the use of the Saint Clair Flats Canal on terms of equality with inhabitants of the United States. The bonding privilege (Art. XXIX) was mutually conceded. The fisheries provisions were not to go into effect until the <(laws required to carry them into operation® should be passed by the British and Canadian Parliaments, the legisla¬ ture of Prince Edward Island and the Congress

of the United States. The entire treaty was to remain in force for 10 years, after which certain articles — the fisheries arrangement, the right of navigating Lake Michigan and the bonding privilege — might be terminated on two years' notice from either party. The fisheries clauses of the treaty were subsequently renounced by the United States, and after due notice ex¬ pired 1 July 1885. For further details the work of Cushing (mentioned above) may be con¬ sulted. The text of the treaty is in (Treaties and Conventions of the United States } (1889). For the part played by Sir John Macdonald (q.v.) in the negotiations and their relation to Canadian politics, see Pope, (Memoirs of Sir John A. Macdonald, > Vol. II, ch. xix-xxi.

Stephen Leacock,

Professor of Economics and Political Science, McGill University.

38. JESUIT ESTATES ACT. This meas¬ ure, passed by the legislature of Quebec in 1888, gave rise to an agitation which occupied public attention throughout all parts of Canada during the following year and for a time threat¬ ened to bring about a reconstruction of political parties. Under the French regime, which ended in 1763, the Jesuits had owned considerable landed estates at various points in the valley

of the Saint Lawrence — particularly at Quebec, Montreal and Laprairie. After the conquest of Canada by the English the religious orders were permitted to retain the property wdiich they held under grant from the French Crown or by other legal title, with the exception of the Jesuits. This order had been banished from France, 1767, and was suppressed generally by the papal brief Do minus ac Redemptor (1773). Although General Amherst brought influence to bear upon the government to secure for him¬ self the estates of the Jesuits in Canada, his efforts proved unsuccessful. Despite personal pressure and the papal brief the (<Llack robes® at Montreal and Quebec were not immediately molested by the British authorities who re¬ frained from taking over their property until the death of Father Casot, the last remaining member of the Society. This event occurred in 1800. Once possessed of the Jesuits' estates the Crown had to determine what should be done with them, and after a certain amount of indecision it was decided that their income should be used for the support of education in the province of Lower Canada. In vain the Roman Catholic bishops maintained the legality of the Church's claim to the property. The government stood its ground and appropriated the revenues.

From having been originally assigned to Lower Canada, the Jesuits' estates passed at Confederation (1867) into the hands of the province of Quebec. It was found, however, by the local government that their actual value was impaired by the ecclesiastical claims which stood against them. The bishops did not cease to protest against their retention by the state and the Jesuit order, revived under papal war¬ rant, defended the justice of its own title. Had these lands been situated in a Protestant com¬ munity the representations of bishops and Jesuits might have carried little weight, inas¬ much as they could not be vindicated by an appeal to the courts, but where the mass of the population was Catholic the reiterated claims of

the Church had their effect upon the market. After Confederation the rent of the property decreased until it became almost negligible in

comparison with the valuation, and when the government sought to effect a sale no purchaser could be foundIn 1887 after the question had been put off by several preceding administra¬ tions, Mr. Mercier, a French Nationalist of pronounced views, endeavored to effect a final settlement of it. Whatever the motives which actuated him, to criticize them would be to raise a matter of opinion. He introduced a bill which gave $400,000 to the Roman Catholic Church as compensation for the property which the Crown had seized in 1800. This sum was, for the moment, to constitute a special deposit which eventually should be distributed by the Pope in return for a relinquishment of all claims to the Jesuits' estates that had been ad¬ vanced by the bishops or by the Jesuits them¬ selves. As a matter of fact the Pope divided the money between the Jesuits, the bishops and Laval University, but in the meantime this rec¬ ognition of his right to allot what were consid¬ ered public funds among members of his own Church drew forth crFs of remonstrance from a large number of Protestants. A simultaneous grant of $60,000 to Protestant schools in Quebec did not allay the feeling of hostility.

It should be observed that two distinct ques¬ tions were raised by the agitation which pro¬ ceeded from the Jesuits' Estates Act. The first had its root in the opposition of religious sys¬ tems ; the second was due to Federal char¬ acter of the Canadian constitution. In 1888, Colonel O'Brien, a Protestant member of the House of Commons, proposed that the Dominion Parliament should disallow the action of the Quebec legislature in appealing to the Pope and setting aside $400,000 as a subsidy to Roman Catholic institutions. The debate which fol¬ lowed was marked "by a series of able and ag¬ gressive speeches from all quarters of the House. The chief supporter of Colonel O'Brien's motion was Mr. Dalton McCarthy, while against him were ranged the Premier, Sir John Macdonald, and Mr. Laurier, the leader of the Opposition. On the one side an appeal was made to the alleged political misdeeds of the Jesuits throughout the whole course of their history and to their expulsion from the chief countries of the civilized world. On the other, it was maintained that the Dominion Parliament could not, without extreme danger, disallow provincial legislation and that <(the subject-mat¬ ter of this act was one of provincial concern, only having relation to a fiscal matter entirely within the control of the legislature of Quebec.® The vote of 188 to 13 against Colonel O'Brien's motion conveys but a faint idea of the public interest in this debate and in the issues which lay behind it. The fundamental claim of the extreme Protestant party was that recognition of papal authority and the encouragement of the Jesuits were direct blows at British free¬ dom; while the leaders of both

parties united to point out the constitutional dangers which would accompany disallowance.

Outside the House of Commons the agita¬ tion caused by the Jesuits' Estates Act led to the formation of an ((Equal Rights® party which was recruited from the ranks of the more pro¬ nounced Protestants. It proved impossible, however, to break down existing political lines

by giving central importance to an anti-Catholic movement. Despite many public meetings and an active campaign in the newspapers, the at¬ tack upon the Jesuits' Estates Act has left no lasting trace upon party organization in Canada.

Charles W. Colby,

Formerly Professor of History , McGill Uni¬ versity.

39. AGRICULTURE. At least half of the population of Canada is directly or indi¬ rectly dependent upon agriculture, the chief in¬ dustry of the Dominion. During the present century agricultural development in Canada has been extremely rapid, and although violent dis¬ locations were caused by the European War there are indications that after the conclusion of peace a new period of rapid agricultural ex¬ pansion will begin.

Political Boundaries. — Extending west¬ ward from the Atlantic to the Pacific and north¬ ward from the United States boundary into the Arctic circle, Canada, in size, embraces a total area computed at 3,729,665 square miles, of which 125,755 square miles are water. Politi¬ cally, Canada is divided into nine provinces, in addition to which there are the Northwest and Yukon territories. Each province has control over its own affairs. Agricultural conditions vary with climate and physical characteristics, density of population, accessibility of markets and special aptitudes of the people. In 1912 took place the latest adjustment of the pro¬ vincial boundaries when by act of the Dominion Parliament portions of the Northwest terri¬ tories were added to the provinces of Manitoba, Ontario and Quebec. The effect was to extend the province of Manitoba northward to the 60th parallel of north latitude and the southern shores of Hudson Bay, to extend the northern limits of Ontario to Hudson Bay and to throw into the province of Quebec the whole of the huge territory of Ungava and Labrador with the exception of that part of the coast line which belongs to Newfoundland. Manitoba thus re¬ ceived about

113,984,000, Ontario 93,696,000 and Quebec 227,175,000 acres of additional territory. The agricultural possibilities of these new areas are at present unknown.

Effects of Climate. — Extending over such a large area and presenting topographical and orographical features of considerable variety, the Dominion of Canada possesses a series of different, climates which influence and modify the local agriculture. The Atlantic provinces (Prince Edward Island, Nova Scotia and New Brunswick) have comparatively mild winters with a moist, cool atmosphere. Potatoes and root crops do well, and buckwheat is a special crop. In Quebec and in the eastern and northern parts of Ontario the winters are colder and the summers are warmer than they are at the coast on either seaboard. The ground is usually covered by deep snow during winter, and there are occasionally spells of severe cold in winter and of intense heat in summer, the latter usually tempered however by cool nights of great benefit to vegetation. A special characteristic is the rapidity with which the spring advances and merges into summer, and the rapidity of vegetation when once the winter snows have melted. In the southern parts of Ontario, es¬ pecially that part of it which is known as the Niagara peninsula, the climate is considerably

milder. Fruit cultivation is therefore a great feature, and tender fruits such as peaches, pears and grapes are grown to perfection. Corn is an important crop grown both for grain and green fodder or silage. The Prairie provinces (Manitoba, Saskatchewan and Alberta) have cold winters, but the air is dry and bracing. Usually, especially in Manitoba and Saskatche¬ wan, an abundant snowfall protects the soil and ensures ample moisture during the early stages of plant growth. In Alberta the winter climate is variable, but milder as a rule than in the other Prairie provinces. Cattle ranching is a feature in certain parts, the animals being able during winter to remain out of doors and find their own food. The Chinook winds, which blow down from the Rocky Mountains, often cause a rapid increase of temperature to the extent sometimes of 60 degrees. In southern Alberta are large semi-arid areas

in which irri¬ gation and methods of dry farming are being successfully practised. Finally in British Co¬ lumbia the climate varies greatly with altitude, latitude and coast proximity. The valleys are warm and suitable for a great variety of crops and for mixed farming. The areas near the coast have mild winters and .a long spring, the conditions resembling those of the south of England. The precipitation varies a good deal. It is as much as 100 inches per annum in some parts ; in others it is so scanty that agriculture is dependent upon artificial irrigation. This is being resorted to with marked success for fruits and vegetables.

Economic Factors. — Since the beginning of the present century agriculture in Canada has been profundly influenced by immigration and railway construction. The total number of immigrant arrivals in Canada during the 16 years ended 31 March 1916, was 3,099,348, of whom 1,168,292 came from the United Kingdom, 1 ,095,375 from the United States and 835,681 from all other countries. The largest number of immigrants in a single year was 402,432, who arrived in 1913. Partly dependent upon immi¬ gration and partly stimulating it there has been during the same period an extraordinary activ¬ ity in railway construction. Two additional transcontinental lines, the National Transcon¬ tinental, constructed by the Dominion govern¬ ment and the Grand Trunk Pacific Railway, and the Canadian Northern, have been added to the previously existing line of the Canadian Pacific Railway opened in 1886. Altogether, during the first 16 years of the present century 19,773 miles have been added to the railway systems of Canada, the total mileage of which on 30 June 1916 stood at 37,430.

With a total land area of 1,401,316,413 acres, only 109,948,988 acres, or less than 8 per cent, were returned as occupied farm lands at the census of 1911, this area representing an in¬ crease since 1901 of 46,526,650 acres. Of the occupied area in 1911, 48,733,823 acres were re¬ turned as improved and 61,215,165 acres as un¬ improved land. The unimproved occupied land consists of 17,477,526 acres of natural forest, 4,174,270 acres of marsh land, etc., and the remainder of 39,563,369 acres of unbroken prairie or other iand that is gradually being brought under the plough. Of the improved area of 48,733,823 acres, field crops occupy 35,- 261,338 acres, orchards and nurseries 403,596

acres, vegetables 206,011 acres, vineyards 9,836 acres and small fruits 17,495 acres. The re¬ maining 12,835,547 acres of improved land

con¬ sist of pasture, fallow or otherwise uncropped land. In 1911 the total number of occupiers of land was 714,646, an increase of 169,958, or 31 per cent, since the previous census of 1901. About 74 per cent of the holdings in Canada were over 50 acres in extent as compared with 68 per cent in 1901.

Field Crops. — During the decade 1900 to 1910 the area under field crops increased from 19,763,740 acres to 30,556,168 acres, a ratio of 54.6 per cent. In 1911 field crops oc¬ cupied 35,261,338 acres, the increase for the 11 years representing over 78 per cent. During the past five years the total area under field crops has continued to be about 35,000,000 acres; but in 1915, under the stimulus of war, the acreage arose to its highest point, viz., 39,140,460 acres. The recent expansion of area has been chiefly in wheat, oats and flax, and is due to the opening up and settlement of the Prairie provinces — the great feature of Cana¬ dian progress since the beginning of the present century. The area under wheat, which was a little over 4,000,000 acres in 1900, increased to over 10,000,000 acres in 1914. Similarly, the acreage under oats has practically doubled, and flaxseed which only occupied 23,000 acres in 1900 occupied over 1,000,000 acres in 1914. During the last 30 vears the distribution of the principal crops in Canada has undergone con¬ siderable change. In the 19th century the chief wheat-growing province of Canada was Ontario, and in 1890 the wheat acreage of this province was 1,430,532. But with the completion of the Canadian Pacific Railway in 1886 the fertile prairies of the West began to be opened up for wheat growing, and in 1890 the wheat area in Manitoba had grown to 896,622 acres from 51,293 acres in 1880. At the close of the cen¬ tury the wheat area of Manitoba was 1,950,200 acres, as against 1,487,633 acres in Ontario. In the first decade of the 20th century wheat growing in Ontario began to decline, while in the West it progressively increased so that in 1910 wheat in Ontario occupied only 870,354 acres, and in 1914 only 834,000 acres. The ter¬ ritories to the West of Manitoba also pro¬ gressed ; and since 1905, when the provinces of Saskatchewan' and Alberta were formed, the three Prairie provinces have become the great wheat-producing area of the Dominion. The following statement showing the area under the principal grain crops in the Prairie prov¬ inces, as compared with the rest of Canada for the year 1915, will make this point clear:

Prairie Rest of

provinces, Canada,

Crop	acres	acres	Total acres
Wheat .	13,868,000	1,241,400	15,109,400
Barley .	1,171,000	547,000	1,718,000
Oats .	6,481,000	5,075,000	11,556,000
Flaxseed .	458,000	5,000	463,000

In the Prairie provinces, therefore, for the year 1915, wheat occupied 92, barley 68, oats 56 and flaxseed 99 per cent of the total area under these crops in the Dominion.

In most parts of Canada wheat is sown in the_ spring; but in the southern parts of On¬ tario and in Alberta, wheat, sown in the fall, ripens earlier and gives usually a

higher yield than the spring sown varieties. With fall sown wh«at there is always a proportion, — varying from about 5 to 30 per cent according to the mildness or severity of the season, — of the area that is winter-killed, but reploughed and resown in the spring in Manitoba, Saskatchewan and British Columbia there are also small areas upon which fall sown wheat is grown. Other crops that have a more or less local importance are buck¬ wheat which is grown in the Atlantic provinces, in Ontario and in Quebec, corn, grown chiefly in Ontario and Quebec, and potatoes, which are an important crop in Nova Scotia and New Brunswick, where they occupy a larger area than does wheat.

The following table gives the area and production of all the principal field crops of Canada for the years 1900, 1914 and 1915 with annual averages for the five years 1910-14.

AREA

Crops 1914, acres 19 IS, acres 1910-14, acres

Fall wheat . 973,000 1,030,600 1,010,000

Spring wheat . 9,321,000 14,078,800 9,444,000

All wheat . 10,294,000 15,109,400 10,454,000

Rye . 111,000 122,000 121,000

Barley . 1,496,000 1,718,000 1,500,000

Oats . 10,061,000 11,556,000 9,749,000

Peas . 206,000 196,000 267,000

Beans . 44,000 43,000 48,000

Buckwheat . 354,000 344,000 375,000

Mixed grains . 463,000 467,000 478,000

Flaxseed . 1,084,000 463,000 1,224,000

Corn for husking… 256,000 253,000 290,000

Potatoes . 476,000 486,000 476,000

Turnips, mangolds,

etc . 175,000 157,000 189,000

Hay and clover. .. . 7,997,000 7,777,000 8,268,000

Alfalfa . 90,000 98,000 88,000

Fodder corn . 317,000 332,000 302,000

Sugar beets . 12,000 18,000 17,000

PRODUCTION

Bushels Bushels Bushels

Fall wheat . 20,837,000 29,321,000 22,003,000

Spring wheat . 140,443,000 364,222,000 174,023,000

All wheat . 161,280,000 393,543,000 196,026,000

Rye 2,017,000 2,486,000 2,155,000

Barley 36,201,000 54,017,000 41,436,000

Oats . 313,078,000 464,954,000 343,612,000

Peas . 3,363,000 3,464,000 4,140,000

Beans . 797,000 723,000 874,000

Buckwheat . 8,626,000 7,866,000 8,631,000

Mixed grains . 16,382,000 17,518,000 15,652,000

Flaxseed . 7,175,000 6,114,000 13,033,000

Corn for husking… 13,924,000 14,368,000 16,231,000

Potatoes . 85,672,000 60,353,000 75,190,000

Turnips, mangolds,

etc . 69,003,000 60,175,000 69,181,000

Tons Tons Tons

Hay and clover _ 10,259,000 10,612,000 11,706,000

Alfalfa . 218,000 261,000 217,000

Fodder corn . 3,251,000 3,383,000 2,856,000

Sugar beets . 109, 000 141, 000 1 64 , 000

It should be observed that in the preceding table the years 1914 and 1915 represent op¬ posite extremes as regards production, the year 1914 being one of the poorest grain sea¬ sons on record, while in 1915 circumstances combined to produce the most abundant grain crops in the history of Canada. Yields in particular cases are frequently high, occasion¬ ally reaching for wheat 60, for barley 50 and for oats

100 bushels per acre; but the average rate in production for wheat in Canada is about 18ˆ4 bushels per acre; in 1914 it was only 154 bushels; in 1915 the average was 26 bushels. The average yield per acre of oats reached 404 bushels in 1915; over a series of

years the annual average is about 354 bushels. Other crop averages in bushels per acre are as follows: Rye 21.3; peas 15.5; beans 18.2; buck¬ wheat 23; flax 10.5; corn 56; potatoes 158; turnips, mangolds, *etc.* 366; hay and clover average about 1.42, alfalfa 24, fodder corn 94 and sugar beets 94 tons. Among the numerous varieties of grain grown in Canada those most widely sown comprise for winter wheat Dawson's Golden Chaff in Ontario and Turkey Red in Alberta, for spring wheat the Marquis, Red Fife and White Fife, for barley Mensury, Mandscheuri and O. A. C. 21 and for oats American Banner and Siberian.

The average cost of grain production runs from about $12 to $14 per acre, the profit de¬ pending upon the yield and price which vary with the season and the world's crops. Corn costs more to produce, averaging from $19 to $22 per acre, but the value of the crop and the profit are correspondingly higher. The surplus of grain over home requirements is annually exported, and the Canadian grain trade is highly organized. Exports of wheat and flour, principally to the United Kingdom, have increased with the increasing production. In 1914, after the abundant yield of 1913 they were upwards of 142,000,000 bushels, and in 1916 after the record harvest of 1915 they reached the total of 289,794,162 bushels. There is usually a small surplus of barley, oats and other grains for export, and practically the whole of the flaxseed crop goes across the southern border. Hay, compressed mechan¬ ically, is also exported both to the United Kingdom and to the United States. The larg¬ est export in recent years was 784,864 tons in 1912 ; but the annual average is between 200,000 and 250,000 tons. Flour milling is an important Canadian industry and in 1915 the value of flour and grist mill products was $114,483,924 from 1.644 establishments.

Sugar beet for the manufacture of beetroot sugar has been grown in Canada since the beginning of the century. At present two factories, those of the Dominion Sugar Com¬ pany at Wallaceburg and Kitchener in Ontario, are in operation for the manufacture of sugar from Canadian beetroot. For the season of 1915 the production of sugar beet was 141,000 tons from 18,000 acres, and the production of refined beetroot sugar was 39,515,802 pounds. Tobacco is grown in

parts of Quebec and southern Ontario. In 1910 the production was 17,632,342 pounds from 18,928 acres. In 1915 the estimated production was about 9,000,000 pounds, and in 1916 about 5,943,000 pounds. The production of honey in 1910 was 6,089,784 pounds, the number of hives being returned as

100,372.

Farm Live Stock. — Canada is well suited to the raising of all descriptions of farm live stock, although sheep in the central and colder parts cannot be kept out of doors during winter in the large flocks that are customary in countries with milder climates. As a general rule, Canadian farm animals are remarkably free from disease, and the more virulent con¬ tagious maladies are entirely absent. The accompanying table shows the total number of horses, cattle, sheep and swine in the census years 1901 and 1911, and as estimated annually at the end of June by the Census and Statistics Office for the years 1912 to 1916.

Fine horses, both light and heavy, are bred in all the provinces. Horse ranching is prac¬ tised largely in southern Alberta and in south¬ west Saskatchewan under the favorable con¬ ditions of comparatively mild winters and light snowfall with abundant wild hay and pasture. There is a good demand for heavy horses, both for agricultural purposes and for the drawing of logs from the lumber camps. The favorite draught horse is the Clydesdale, a medium size being usually preferred for farm work. Next in importance comes the Per-cheron of which by far the larger number are in Alberta. The French Canadian is the draught horse of the French farmers in Quebec. The English Shire horse is also raised principally in Ontario, and there are small numbers of the Suffolk Punch and of Belgian breeds. Among the light breeds the Standard Bred trotter, used largely in trotting and pac¬ ing races, and the Hackney predominate. Thoroughbreds and coach horses are also raised. Animals for cavalry and mounted in¬ fantry remoiyits are

produced in all the prov¬ inces, and have been especially in demand for the war. In 1911 the number of pure-bred horses was 33,149, an increase of 22,393, or 208 per cent since 1901. Of the total, 19,911 or 60 per cent were Clydesdales. During the five years ended 31 March 1910-14 the average number of horses annually exported, chiefly across the southern border, was about 2,600 ; but in 1916 the exports rose to 26,818, of which

Livestock	1901	1911
Horses .	1,577,493	2,598,958
Milch cows .	2,408,677	2,595,255
Other cattle .	3,167,774	3,930,828
All cattle .	5,576,451	6,526,083
Sheep .	2,510,239	2,174,300
Swine .	2,353,828	3,634,778

21,833 went to Great Britain, most of them as military remounts.

Cattle, principally of British origin, are bred in all the provinces, and, as in the case of horses, there are large ranches in Saskatche¬ wan and Alberta. The beef breeds include Shorthorns, Herefords, Aberdeen Angus and Galloways, Shorthorns comprising the great majority. In Ontario cattle raising is a very important industry, the animals being fattened on grass lands during summer and in the stable during winter. Of late years, especially in the western counties of Ontario, fine herds of pure¬ bred cattle have gradually been established, and their quality has been maintained by large im¬ portations from the mother country. As a consequence the trade in pure bred stock with the United States has been considerably de¬ veloped. Cattle throughout Canada have been reduced in numbers by slaughter for the pur¬ pose of meat exports to Great Britain in con¬ sequence of the war, but herds are being gradually replenished by the breeding of young stock. Amongst dairy cattle are the Short¬ horn, Ayrshire, Jersey, French Canadian and Holstein-Freisian breeds. Many parts of the Dominion are quite favorable for the keeping of sheep and for the production of mutton and wool of the highest quality; but for various reasons this branch of the live stock industry has not been followed so generally as it might have been. In individual cases, however, sheep

raising has proved very profitable under the

management of skilled flockmasters. Nearly all the leading British breeds are to be found in Canada, the most numerous being the Shrop¬ shire, Oxford Down, Leicester, Cotswold and Southdown breeds. At the census of 1911 there were 53,616 pure bred sheep in Canada. The industry, in spite of earnest efforts to en¬ courage it on the part of the government, has steadily declined. In 1881 the total number of sheep in Canada wae 3,048,678; in 1911 the number was 2,175,302, a falling off of 873,376, or 28 per cent. Since the census of 1911 the numbers have continued to decline, and the estimated number on 30 June 1916 was 2,022,941, a further decline, since the census of 1911, of 152,361. The average price of wool has in¬ creased materially during the war; the' prices in 1916 for washed and unwashed wool being respectively 50 and 37 cents per pound, as com¬ pared with 26 and 19 cents in 1914. Swine, unlike sheep, have increased steadily in num¬ bers during the last 30 or 40 years. In 1881 they numbered 1,207,619, and in 1911 3,634,778. Swine raising, especially in the West, is a fluctuating industry, being largely dependent upon cheap feeding grain. When for instance prices rose suddenly on the outbreak of the war, pig feeding on the Prairie provinces be¬ came unremunerative, and large numbers were immediately thrown on the market at nominal prices. On 30 June 1916, the estimated number of swine in Canada was 3,474,840. The prin¬ cipal breeds are the Yorkshire, Berkshire,

1912 1913 1914 1915 1916

2,692,357 2,866,008 2,947,738 2,996,099 2,990,635

2,604,488 2,740,434 2,673,286 2,666,846 2,603,345

3,827,373 3,915,687 3,363,531 3,399,155 3,313,519

6,431,861 6,656,121 6,036,817 6,066,001 5,916,864

2,082,381 2,128,531 2,058,045 2,038,662 1,965,101

3,477,310 3,448,326 3,434,261 3,111,900 2,814,672

Chester White and Tamworth; but the York¬ shire largely predominate. In 1911, 56,457 pure bred swine were returned as on Canadian farms. Poultry raising as an adjunct to ordi¬ nary farming has made great strides. In 1911 the numbers of all descriptions of poultry were 31,793,261 of the value of $15,047,009, as com¬ pared with 17,922,658 in 1901 of the value of $5,723,890. The production of eggs in 1911 was 123,071,034 dozen, value $23,501,173. Tur¬ keys are easily reared in Canada, and are often a valuable source of additional farm revenue.

Dairying Industry — Dairying is practised in all the provinces of Canada, but it is car¬ ried on chiefly in Ontario and Quebec. The factory system for the manufacture of cheese and creameries for the making of butter have been largely instrumental in the development of the industry. Cheese factories date from the early sixties, the first cheese factory in Canada having been established on the farm of G. V. de Long at Norwich, Oxford County, Ontario, in the spring of 1864. Much has been done by both the Dominion and provincial governments to improve the methods of cheese making in Canada, as well as to repress fraudu¬ lent practices injurious to its reputation. Since 1890 Canadian trade in agricultural products to Great Britain has greatly developed and there has gradually been built up an increasing export trade in Canadian cheddar cheese which in the British markets now enjoys a high repu¬ tation for purity and excellence of quality.

Butter made under the creamery system was formerly exported in considerable quantities to Great Britain; but during the past decade, — a period coincident with a marked increase of the population of Canada by immigration — the exportation of butter has been greatly reduced, whilst for the same reason the quantities manu¬ factured and exported of cheese have dimin¬ ished. The production of milk has increased, but its use has been diverted from the making of cheese to the making of butter, of which comparatively little is available for export after satisfaction of home requirements. Since 5 Aug. 1909, when the Payne-Aldrich tariff took effect, there has been a considerable exporta¬ tion of fresh cream from Canada into the United States. In the year 1916 the pro¬ duction of cheese in factories amounted to 192,968,597 pounds of the value of $35,512,622 as compared with 220,833,269 pounds of the value of $22,221,430 in 1900. The production of creamery Dutter in 1916 was 82,564,130 pounds of the value of $26,966,357, as com¬ pared with 36,066,739 pounds of the value of $7,240,972 in 1900, the number of factories and creameries being 3,446 as against 3,576 in 1900. The production of homemade butter in 1910 was 137,110,200 pounds as compared with 105,343,076 pounds in 1900, and in 1910 the production of homemade cheese was 1,371,092 pounds. For 1910 the total production of cheese was 201,275,297 pounds and of butter 201,808,365 pounds. In 1910 condensed milk products were made in 11 factories amounting to 27,831,596 pounds of the value of $1,814,871. During the five fiscal years ended 31 March 1916 the average annual exports of cheese have been 153,941,732 pounds as compared with 215,137,339 pounds for the first five years of the century. Similarly, for the same periods in the case of butter the exports have averaged 3,413,515 pounds as against 26,930,551 pounds. There is on the other hand a comparatively small im¬ portation of varieties of cheese not manufac¬ tured in Canada, amounting annually to about 1,500,000 pounds. Dairying in the Prairie provinces has recently made considerable progress, and there is every indication that the dairy products of these provinces will soon be more than sufficient to supply all the west¬ ern requirements and leave a substantial sur¬ plus for export.

Fruit Growing. — This is an increasingly important branch of the agricultural industry in Canada. Apples, plums and small fruits are grown successfully all over Canada; but the production of fruits on a large scale is con¬ fined practically to three well-defined fruit growing districts, viz., the Annapolis Valley in Nova Scotia, the eastern, southern and western parts of Ontario, especially in the southern part of the Niagara peninsula, and in the val¬ leys of British Columbia. In Nova Scotia apples for export are the chief fruit; but in the Niagara peninsula pears, peaches, grapes and other tender fruits, as well as apples, grow to perfection. In British Columbia great progress in fruit growing has taken place dur¬ ing the present century, and in certain parts of the province, where the rainfall is scanty, irrigation has been resorted to with marked success for the growth of all kinds of fruit. The census returns of 1911 show an increase in the area devoted to orchards of 47,490 acres,

the area having grown from 356,106 acres in 1901 to 403,596 acres in 1911. Grapes are grown for wine making to a small extent in southern Ontario, and the total acreage under vineyards was 9,836 in 1911. The total number of fruit trees in bearing in 1911 was 14,002,145 and of non-bearing fruit trees the number was 8,315,236. The output varies considerably with the season and the prevalence of insect pests, but in 1910 the production of the following fruits was, in bushels, as follows: Apples 10,618,666; peaches 646,826; pears 504,171; plums 508,994; cherries 238,974; other fruits 47,789. Apples are exported principally to the United Kingdom, the quantity ranging during the past five years from 523,658 barrels in 1911 to 1,664,165 barrels in 1912. In 1916 the ex¬ ports were 577,451 barrels. One barrel holds on the average about three bushels. A certain amount of cider is annually made in the apple growing districts, the exports being upward of 150,000 gallons and occasionally exceeding 200,000 gallons. Maple sugar and maple syrup are made on farms where the maple tree flourishes, chiefly in Quebec and Ontario. In 1910 the total production of maple sugar was 10,488,340 pounds and of maple syrup 1,802,581 gallons.

Value of Agricultural Production. — In

1915 the estimated value of the field crops of Canada was $825,370,000, but this was a year of exceptional abundance. For 1916 the total value was $886,494,900, owing to the high prices caused by the war. The average annual value of the total agricultural production of Canada may be placed at about $782,000,000, including field crops

$650,000,000, dairy prod¬ ucts $70,000,000, wool $2,000,000, poultry and eggs $25,000,00, and fruits and vegetables $35,000,000. The total value of horses, cattle, sheep and swine estimated at $903,686,000 for

1916.

Agricultural Organization. — Associated effort for the improvement of agriculture is largely directed and controlled by the state. There is not only a strong and many-sided De¬ partment of Agriculture of the Dominion gov¬ ernment, but each of the nine provincial gov¬ ernments has also a department of agriculture serving local needs. Since 1911 an important advance has been made by the Dominion Par¬ liament in appropriating large sums annually for the encouragement of agriculture under the Agricultural Instruction Act of 1913. The funds thus available are divided amongst the nine provinces and administered in close co¬ operation with the provincial departments of agriculture. The amount now annually appro¬ priated under this act is about $1,000,000. A great deal of the work of the Dominion depart¬ ment is carried on through the experimental farms and stations which are situated in dif¬ ferent parts of Canada. A central farm at Ottawa and four branch farms in Nova Scotia, Manitoba, the Northwest territories and Brit¬ ish Columbia were originally established in 1886 under the Experimental Farm Stations Act. These five farms continued in operation for 20 years when their usefulness became so apparent that steps began to be taken for their extension ; and two new stations were established in Alberta in 1907. Since then development has been rapid; and in 1917 the experimental farms and stations of the Dominion government originally

five in number with a total acreage of 3,472, number 21 with an acreage of 11,148, not count¬ ing seven smaller substations at points in British Columbia, Alberta and the Northwest territories. The more strictly scientific work of the farms is organized at the central farm,

Ottawa, in 13 divisions, comprising field hus¬ bandry, animal husbandry, horticulture, cereals, chemistry, forage plants, botany, poul¬ try, tobacco, economic fibre, illustration sta¬ tions, apiculture, extension and publicity. Amongst the results of greatest general influ¬ ence upon Canadian agriculture, due directly to the experimental work of the farms, may be mentioned the practice of early sowing, the adoption of summer fallowing and the distribu¬ tion of improved varieties of seeds of cereal and other plants, especially in the West. Phenomenal success has indeed attended one branch of the work of the experimental farms by the introduction of the Marquis variety of hard wheat. This wheat, which possesses all the good qualities of the Red Fife with the added advantages of an earlier ripening habit and superior yield, leaped into fame by taking the champion prize for the best hard -wheat at the first American Land Show, held in New York from 3-12 Nov. 1911. Since then it has taken many similar prizes, and is now in proc¬ ess of rapid distribution throughout the west¬ ern grain-growing area in replacement of the Red Fife. The work of the Dominion De¬ partment of Agriculture extends over many other important fields, including the seed branch for the analysis of seeds in respect of germination and purity; the dairy and cold storage branch; the fruit branch; the health of animals branch under a veterinary director-general; the live stock branch for improvement of farm live stock; and an entomological branch. All these branches not only administer laws affecting the subjects with which they deal, but also carry on scientific investigation at field and other laboratories. Important work in the improvement of farm seeds is be¬ ing accomplished by the Canadian Seed Growers' Association, who work in close asso¬ ciation with the seed branch of the department. The maintenance of pedigree registers of pure¬ bred live stock is in charge of a National Record Board which receives special grants, facilities and privileges from the Dominion government. Under the Live Stock Pedigree Act, 1900, the pedigree records of live stock were both unified and nationalized. Each of the breed societies in Canada, while remaining responsible for the local management of its own affairs, is represented upon the National Record Board for the issue of pedigree certifi¬ cates, which before issue are certified by an officer of the live stock branch of the Depart¬ ment of Agriculture; so that every pedigree certificate has behind it a government guarantee of accuracy, a matter of considerable advantage in connection with international trade. Only the Holstein-Freisian Society of Canada re¬ mains outside this scheme. Much is being done to test experimentally the varieties of tobacco best suited to the Canadian climate and the best methods of cultivation, curing, marketing, *etc.* Canada is an adhering country of the In¬ ternational Institute of Agriculture, and an offi¬ cer of the

Department of Agriculture acts as

Canadian commissioner of the Institute. The publications of the various branches of the de¬ partment, most of which are issued gratis, are voluminous and diverse; so much so that within recent years a special branch of the de¬ partment has been organized for their more effective distribution. This branch also issues monthly the Agricultural Gazette of Canada.

Of the provincial departments of agriculture, the oldest and most thoroughly organized are those of Ontario and Quebec. Farmers' insti¬ tutes and clubs, women's institutes, agricultural and live stock associations and fairs are amongst the agencies employed; but probably the agricultural colleges and experiment sta¬ tions in each province have the greatest influ¬ ence. Foremost amongst these institutions are the Ontario Agricultural College at Guelph under the provincial department of agriculture and the Macdonald Agricultural College at Sainte Anne de Bellevue in the province of Que¬ bec. The college at Guelph is remarkable for the comprehensive thoroughness with which it covers the whole wide field of agriculture. Its departments comprise field and animal hus¬ bandry, dairying, poultry, apiculture, horticul¬ ture, pomology, agricultural chemistry, bac¬ teriology, zoology, entomology, botany and physics. The Ontario Agricultural and Experi¬ mental Union, which is organized by officers of the college for the conduct of annual co¬ operative experiments by farmers throughout the province, has been in existence for 38 years, and the average number of annual experiment¬ ers is about 4,500. The Macdonald College at Sainte Anne de Bellevue is a newer institution dating from 1907; but is gradually covering much the same ground for English-speaking students of the province of Quebec. Both col¬ leges provide courses for the graduation of students with the degree of B.S.A. (Bachelor of Science in Agriculture) conferred by the uni¬ versities to which they are respectively affili¬ ated, viz., Toronto for Guelph and McGill for Macdonald. In the other provinces agricul¬ tural colleges and experiment stations exist at Truro (Nova Scotia). Oka and Saint Anne de la Pocatiere (Quebec) ; Winnipeg (Mani¬ toba) ; Saskatoon (Saskatchewan) ; Edmon¬ ton (Alberta) and Point Grey, Vancouver (British Columbia). Agricultural fairs, shows or exhibitions are held all over Canada, usually by the aid of grants from the provincial gov¬ ernments or municipalities. The largest of these exhibitions is held annually in August and Sep¬ tember at Toronto by the Industrial Exhibition Association.

Future Prospects. — At present the great war in which the British empire is strenu¬ ously engaged affects Canadian agriculture by the absence at the front of many of its citi¬ zens, which renders more acute the scarcity of farm labor, limits production and increases its cost. These conditions are of temporary dura¬ tion, and will change on the return of the sol¬ diers and resumption of the immigration that was stopped on the outbreak of the war. It is probable that the immigrants who enter Can¬ ada after the war will settle upon agricultural lands instead of flocking to the towns for the development of municipal enterprises by means of borrowed capital, as was largely the case before the war. Conditions in Canada will

make it essential that the actual development of agricultural resources shall in future be the first consideration. To what extent home¬ steads may be prepared in advance for settle¬ ment by returned soldiers and immigrants is engaging attention, and it is possible that the policy of ready-made farms on lines already adopted in Alberta by the Canadian Pacific Railway may be more extensively adopted. Future agricultural production in the West is likely to be largely influenced by the facilities of the Panama Canal, and already the Cana¬ dian government have constructed grain ele¬ vators at interior western points in anticipa¬ tion of new grain movements in this direction. A railway from Le Pas in Manitoba to the southern shores of the Hudson Bay is under construction by the Dominion government with the object of providing an additional outlet for western grain through the Hudson Strait. A change in the direction of a more general adoption in the Prairie provinces of the prac¬ tice of mixed farming is already in progress and will probably be hastened by the poor wheat seasons of 1914 and 1916, which have shown farmers the unwisdom of trusting to a single crop. But, probably, this will not entail any total decrease in the growing of wheat which will continue to be sown on newly-broken areas. Larger grain production is possible in Canada by an increase in the rates of yield per acre. Improved agricultural methods, including the more general adoption of mixed farming, the use of judicious rotations and more care in the selection of seed, will result

in a large average yields per acre in the grain-growing provinces, as has already been the case in the older and more thickly settled parts of Ontario. Here there is evidence to show that during the past 35 years the average yields per acre have been increased by 3ˆ2 bushels for fall wheat, 2 1/. bushels for spring wheat, 4}4 bushels for barley and 1ˆ4 bushels for oats. Similar future prog¬ ress in the Prairie provinces will mean a large aggregate addition to the annual output. New lands in nearly all the provinces are available for settlement, and have been made easily ac¬ cessible by the construction of railways. It is estimated that there are 56,000,000 acres of land more or less immediately available for agricultural settlement in Canada. Of this area about 31,000,000 acres are Crown lands at the disposal of the provincial governments in New Brunswick, Quebec, Ontario and British Columbia and about 25,000,000 acres are free grant surveyed lands at the disposal of the Dominion government in the Prairie prov¬ inces and the Railway Belt of British Columbia. The lands available in northern Ontario, through which run the new National T ranscontinental and Canadian Northern railways, including an immense area of excellent agricul¬ tural soil, the great clay belt alone consisting of 24,500 square miles, or 15,680,000 acres, spe¬ cially suitable for the growth of wheat.

Bibliography. — Official Reports of the Gov¬ ernment of Canada, Ottawa, including the Re¬ port on the Fifth Census of Canada, 1911 (Vol. IV, Agriculture,* 1914) ; Report on the Postal Census of Manufactures (1916) ; Annual Re¬ ports of the Departments of Agriculture. (Ex¬ perimental Farms), of the Interior, of Railways and Canals, of Customs and of Trade and Com¬ merce, the Agricultural Gazette of Canada

(monthly), (The Canada Year Book,* the Monthly Bulletin of Agricultural Statistics , formerly the Census and Statistics Monthly; Griffin, Watson, (Canada, the Country of the Twentieth Century* (Department of Trade and Commerce, Ottawa 1915) ; Ruddick, J. A., (An Historical and Descriptive Account of the Dairying Industry of Canada* (Department of Agriculture, Ottawa 1911) ; Annual Reports of the Ontario Bureau of Industries, the Onta¬ rio Agricultural College and Experimental Farm and the Agricultural and Experimental Union, Toronto.

Ernest H. Godfrey, F.S.S., Editor, Census and Statistics Office, Ottawa.

40. FOREST AND LUMBER IN¬ DUSTRY. A great forest stretches

across the Dominion of Canada from the Atlantic seaboard to Alaska and the Pacific Ocean, and may be roughly divided into a northern forest and a southern forest. The northern forest may be subdivided into a sparsely wooded portion lying north of a line extending from the Strait of Belle Isle westward to the south¬ ern end of James Bay, and thence northwest¬ ward to Lake Athabasca and the Yukon River. South of this line lies a rather densely wooded portion separated from the southern forest by an irregular line running from Anticosti Island north of Lakes Saint John and Abitibi, south of Lake Nipigon, across the southern end of Lake Winnipeg, and northwestward to the head¬ waters of the Athabasca and Liard rivers. With the exception of the great plains region of southern Manitoba, southern Saskatchewan and southern Alberta, the southern forest extends as far south as the international boundary. Around the coasts of Nova Scotia and New Brunswick, along the Saint Lawrence River and in the southwestern part of Ontario it is largely cleared off for farming; while in Mani¬ toba, Saskatchewan and Alberta there is a fringe of mixed prairie and woodland lying just south of the heavily wooded portion of the northern forest. In British Columbia is what is usually described as the Cordilleran forest. Along the Pacific Coast and on Vancouver and Queen Charlotte islands this forest has heavy stands of timber; in the southern interior part there is what is known as the ((dry belt® forest ; be¬ tween the southern end of Kootenay Lake and Quesnel Lake lies the ((wet belt® forest; while all the rest of the province and the southern part of the Yukon territory is occupied by an interior mountain forest with extensive fire-swept and grassland areas.

Total Forest Area. — The total land area of the Dominion is 3,603,910 square miles, or 2,306,502,400 acres, but it is not known with any degree of accuracy how much of this vast territory is covered with forest growth. The most reliable information available places it somewhere in the neighborhood of 700,000,000 acres, which is approximately 30 per cent of the total area. The exact areas of the forest con¬ taining timber of commercial sizes cannot be known until the Federal and provincial gov¬ ernments complete the surveys now in progress. For the present we may safely assume that Nova Scotia has 5,000,000 acres; New Bruns¬ wick 9,000,000; Quebec 100,000,000; Ontario 70,- 000,000; Manitoba 1,920,000; Saskatchewan 3,584,000; Alberta 5,416,000, and British Colum¬ bia 30,000,000 acres — making a total of about

225,000,000 acres or 9ˆ2 per cent of the total land area.

Control of Forest Lands. — In the prov¬ inces of Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia the licenses to cut timber on specified tracts, known as <(Tim-ber Limits,® are issued by the provincial gov¬ ernments ; while in the provinces of Manitoba, Saskatchewan and Alberta and in the <(railway belt® in British Columbia (a strip of 11,000,000 acres extending 20 miles on each side of the main line of the Canadian Pacific Railway) the Federal government, at Ottawa, controls the lands and issues licenses and permits to cut timber on (<timber berths® and forest reserves. These licenses are obtained .by public competi¬ tion and the sum paid for the right to cut timber for a specified time is known as the ((bonus price.® In addition to the bonus price there is also paid a specified sum per annum per square mile (or per acre) known as the (<ground rent,® and when the timber is cut the <(stumpage dues® are paid at the rate of so much per M (log scale), or per cord. These fees are the source of considerable revenue to the respective governments, which impose cer¬ tain ˆregulations® regarding the methods of cutting and removing timber, protection against fire, *etc.* In no case does the holder of a license or permit acquire a right to the land, which reverts to the Crown as soon as his license expires or is canceled for non-fulfil¬ ment of the existing timber regulations.

Forest Reserves. — For many years both the Dominion and provincial governments have followed the policy of setting aside forest re¬ serves and national parks for the purpose of providing a permanent supply of timber, of maintaining conditions favorable to a continu¬ ous water supply, and of protecting mammals, fish and birds within the boundaries of the reserves and parks. The Dominion forest re¬ serves in Manitoba have an area of 2,941,600 acres; in Saskatchewan 6,748,954 acres; in Alberta 21,643,814 acres, and in the railway belt in British Columbia 3,485,590 acres — making a total of 34,819,958 acres. In British Columbia there are still 27,931,482 acres under provincial control while Ontario has 14,430,720 acres in forest reserves, and Quebec the huge total of 111,400,320 acres. Neither New Bruns¬ wick nor Nova Scotia have, as yet, established forest reserves; while all the land in Prince Edward Island has been alienated for farming purposes.

Federal Forest Service. — In 1899 the for¬ estry branch of the Department of the Interior was established and at once inaugurated a pol¬ icy of increasing the number and extent of the forest reserves upon Dominion lands. In 1900 arrangements were made to furnish settlers in Manitoba, Saskatchewan and Alberta with young trees and cuttings for the planting of windbreaks and shelter belts. The settler entered into an agreement with the foresty branch to set aside a certain portion of his land as a permanent tree plantation, to care¬ fully prepare his ground according to the direc¬ tions of the tree inspectors, to plant the trees upon their arrival and to cultivate and keep the ground clean until the trees are large enough to take care of themselves. The species planted vary according to the climatic and soil conditions, and the great success of this co¬

operative plan is proved by the fact that approx¬ imately 95 per cent of the 20,000,000 trees and cuttings sent out to settlers are growing and are a source of great pleasure and comfort to all who have taken care of them. In 1906 the work of surveying and mapping the Dominion forest reserves was begun, and has been carried on ever since. In 1908 the work of collecting forest statistics from reliable sources was begun. In 1911 the work of examining and reporting upon lands thought to be suitable for forest reserves was begun, and has resulted in the creation of new reserves and additions to those already existing. In 1914 forest pro¬ duct laboratories were established at McGill University, Montreal, where exhaustive tests are being carried on to determine the technical properties of Canadian timber and the solution of problems connected with the pulp and paper industry. So rapidly has this most useful branch of the public service grown that in May 1914 it had 159 officers on its payroll, and the expenditure for the year amounted to $571,798. Since the outbreak of the European War many of these highly trained men have enlisted for overseas service and the work of the branch is considerably hampered.

Other Forest Services. — In 1909 the prov¬ ince of Quebec began the extension of its for¬ est service by employing two technically trained foresters as advisers, and most encouraging progress has been made all along the line of developing a progressive forest policy.

In 1911 the British Columbia department of land and forests established a forest branch which has made remarkable progress in the scientific administration of her forest lands and in making known to the world the extent and variety of her forest resources. Just before the outbreak of war the staff consisted of 170 mem¬ bers (including

female clerks and stenogra¬ phers), but the enlistment of 60 of its most effi¬ cient members badly crippled the service.

In 1912 the Canadian Pacific Railway Com¬ pany established a department of natural re¬ sources and charged the forestry branch with the responsibility of administering timber lands owned by the company and the investigation of problems arising out of the use and preserva¬ tion of timber for railway purposes.

In 1909 the Dominion government estab¬ lished a commission of conservation, which has devoted much time and energy to the pro¬ tection of timber from fire, the making of forest surveys and the lessening of logging waste.

In 1912 the Dominion Railway Board intro¬ duced regulations for the protection of forest properties traversed by the steam roads, and the number of fires has been greatly reduced. In every province of the Dominion fire has done a tremendous amount of damage to stand¬ ing timber and impoverished the soil for the growth of future wood crops. Now, however, the Federal and provincial authorities have realized the seriousness of the situation and effective steps are being taken to reduce the number, of forest fires. Measures are also being taken to reduce the waste incident to logging operations; such as the waste in tree tops, the disposal of logging slash, *etc.*

Forestry Education.— In 1900 the Cana¬ dian Forestry Association was organized for the purpose of getting the public to realize the

necessity of conserving the forest resources of the Dominion. Its membership is now 4,350 and it has been largely instrumental in securing advanced legislation in the matter of increasing the forest reserve area, a more careful admin¬ istration of timber lands and protection from fire.

In 1907 the faculty of forestry was estab¬ lished in the University of Toronto for the purpose of giving young men a thorough tech¬ nical

training along lines required for the scientific management of forest properties, and in 1908 a similar department was established in the University of New Brunswick at Fred¬ ericton, N. B. A couple of years later a depart¬ ment of forestry was established in Laval University, Quebec, and plans are now under way for the establishment of a course in forest engineering in the University of British Colum¬ bia, Vancouver, B. C. Nearly all the graduates of these schools are employed by the Dominion forestry branch, the British Columbia forestry branch, the Quebec forest service, the New Brunswick forest service, and the forest serv¬ ice of the Canadian Pacific Railway Company.

Estimate of Standing Timber. — During the summer of 1909 and 1910 a reconnaissance survey was made of the forest lands of Nova Scotia. For the mainland the estimate is placed at 94,496 acres of virgin and semi-virgin coniferous timber with a stand of 1,133,952,000 board feet; 1,318,964 acres of moderately culled conifers carrying 3,956,892,000 board feet; 3,192,175 acres of severely culled and burned timber estimated at 3,192,175,000 feet, and 1,138,- 730 acres of green barrens and burns with 341,619,000 board feet. This makes a total of 5,744,365 acres with 8,624,638,000 board feet of coniferous timber. In addition to this there is the island of Cape Breton, which is estimated to have an area of 1,535,000 acres under forest more suitable for pulpwood than for saw tim¬ ber. For the whole province the coniferous saw timber is approximately 10,000,000,000 feet, and the hardwoods probably amount to 5,000,- 000,000 feet.

New Brunswick is now engaged in the work of mapping and classifying lands still in posses¬ sion of the Crown, and in the course of two or three years will have a close estimate of the amount of timber thereon. The present esti¬ mate for the whole province (Crown lands and alienated lands) is 12,000,000 acres, carrying 22,000,000,000 feet of saw timber — mostly spruce, pine, tamarack and cedar.

Quebec has at least 265,000,000 acres of nearly pure coniferous forest, 52,000,000 acres of mixed conifers and hardwoods, and 5,000,000 acres of hardwoods, but no reliable figures are available for the amount of standing timber. Most of it is more suitable for pulpwood than for saw timber, although large quantities of the latter are taken out every spring — especially from lands tributary to the rivers flowing into the Saint Lawrence and Ottawa rivers.

Ontario probably has more saw timber than any other province except British Columbia. The northern forests contains something like

180,000,000 acres of spruce, jack pine, balsam fir and tamarack (much of it of little value), and the southern forests about 100,000,000 acres carrying approximately 200,000,000,000 feet of saw timber. In 1917 the Department of Lands and Forests made extensive preparations for the

organization of a thoroughly efficient fire pro¬ tection service, and introduced stringent regula¬ tions regarding the disposal of logging slash, which in times has been a menace to both lum¬ bermen and settlers.

In the case of the <(Prairie provinces^ there are less than 11,000,000 acres of timberland with a total stand of approximately 42,000.-000,000 feet of timber distributed as follows: Manitoba with 1,920,000 acres and 6,850,000,000 board feet; Saskatchewan, 3,584,000 acres and 14,000,000,000 board feet ; Alberta, 5,416,000 acres and 21,000,000,000 board feet.

In the Yukon and Northwest territories the timber has practically no commercial value, because of its inaccessibility, smallness and low stumpage per acre.

In British Columbia the forest branch esti¬ mates the total stand of commercial timber at somewhere between 350,000,000,000 and 400,-000,000,000 feet. Approximately one-third of it is Douglas fir and one-fifth western cedar; the remainder being almost entirely made up of western hemlock, larch, yellow pine, white pine and jack pine. The estimate of timber suitable for pulpwood is placed at 250,000,000 cords.

From the above estimates it will be seen that the total amount of merchantable saw tim¬ ber is somewhere in the neighborhood of seven hundred billion feet — approximately 28 per cent of the merchantable timber in the United States of America.

Annual Cut of Timber. — Nearly all the coniferous timber cut in the eastern and cen¬ tral parts of Canada is floated down the creeks, lakes and rivers to convenient milling points, from which it is shipped by rail or water to market. In the case of hardwoods the usual method of removal is by sleigh-haul, as they are generally used for fuel, distillation, cooper¬ age — only a limited amount being used for furniture and interior finishing. In British Columbia the absence of drivable streams ren¬ ders the use of logging railways, yarding en¬

gines and aerial skidders necessary for the removal of Douglas fir and other large timber.

For the year 1915 the production of sawn lumber was as shown below :

No. of firms Cut, in

Province

reporting

board feet

Quebec .

1,578

1,078,787,000

Ontario .

656

1,035,341,000

British Columbia .

238

669,816,000

New Brunswick .

240

633,518,000

Nova Scotia .

366

294,475,000

Saskatchewan .

13

62,864,000

Manitoba .

37

42,357,000

Alberta .

13

17,975,000

Prince Edward Island .

43

7,543,000

Totals .

3,239

3,842,676,000

The value of this cut of lumber was esti¬ mated at $61,919,806, which gives an average price of $16.11 per M. Although 25 different kinds of wood were sawn ; the five leading species being spruce, which made up 40.7 per cent of the total cut; white pine (eastern and western) 22.1 per pent; Douglas fir 11.8 per cent; hemlock (western and eastern) 6.2 per cent, and balsam fir 6.1 per cent. For the re¬ maining 13.1 per cent of the total cut the next five species were red pine, birch (yellow and white), cedar (western and eastern), maple (sugar and red), and larch (western and east¬ ern) — which made up 10 per cent of the total

cut. The remaining 3.1 per cent was made up of western yellow pine, jack pine (eastern and western), basswood, elm, ash, poplar, beech, oak, yellow cypress, hickory, chestnut, cherry, butternut and walnut.

The quantity of lath manufactured was:

Number of

Percentage

Province

thousand

of total

Ontario .

_ 309,022

39.0

New Brunswick .

_ 288,951

36.4

Nova Scotia .

59,921

7.5

Quebec .

_ 55,204

7.0

British Columbia .

_ 46,345

5.8

Saskatchewan .

_ 23,611

3.0

Manitoba .

. ... 8,910

1 . 1

Prince Edward Island .

_ 1,262

0.2

Totals .

_ 793,226

100.0

The total value of the 7 93,226,00 lath sawn was placed at $2,040,819, which gives an aver¬ age price of $2.57 per M. The five leading species of wood used were spruce, white pine, cedar. Douglas fir and hemlock.

The cut of shingles was as follows:

Number of

Percentage

Province

thousand

of total

British Columbia .

_ 1,894,642

61.3

Quebec .

_ 574,794

18.6

New Brunswick .

. … 458,987

14.9

Ontario .

_ 93,497

3.0

Nova Scotia .

_ 30,733

1.0

Alberta .

_ 18,740

0.6

Prince Edward Island .

. … 17,589

0.6

Saskatchewan .

… . 404

Manitoba .

… . 81

Totals .

. … 3,089,470

100.0

The total production of 3,089,470,000 shingles was valued at $5,734,852, which gives an aver¬ age value of $1.86 per M. Cedar made up 90.5 per cent of the total cut; with spruce, white pine and jack pine next in order.

Pulpwood, Poles and Ties. — Since 1908 .the consumption of wood for the manufacture of pulp has increased almost threefold, and is certain to increase still more. The annexed table shows the consumption and average price per cord for the year 1915 :

No. of Average

firms value

reporting Cords Value per cord

Quebec . 24 697,962 $4,227,033 $6.06

Ontario . 15 480,627 3,806,804 7.92

New Brunswick… 4 115,842 732,521 5.32

British Columbia. 2 90,535 550,809 6.08

Nova Scotia . 5 20,870 99,050 4.75

Totals . 50 1,405,836 $9,426,217 $6.71

These figures show that 49.6 per cent of the pulpwood was used in Quebec, 34.3 per cent in Ontario, 8.2 percent in New Brunswick, 6.4 per cent in British Columbia and 1.5 per cent in Nova Scotia; while the total consumption of 1,405,856 cords is an increase of 14.8 per cent over that for 1914. Spruce made up 71 per cent of the total, balsam fir 21 per cent, hem¬ lock 4 per cent, jack pine 3 per cent and poplar 1 per cent. Of mechanical pulp the amount produced was 743,770 tons, of sulphite 235,474 tons, of sulphate 92,404 tons and of soda pulp 3,150 tons. This makes a total of 1,074,805 tons, which is an increase of 15 per cent over the production of 1914. The manufacture of pulpwood is one of the few industries, not engaged in the production of munitions, which

have not suffered from war conditions. Al¬ though labor conditions have been disturbed and the cost of raw materials has increased, the American demand for pulp has increased and the difficulty of obtaining it from Scandinavian sources has increased the overseas demand.

The total number of telegraph and tele¬ phone poles sold in 1915 is reported as 179,248; at an average price of $2.52 each. Exactly 67.4 per cent of them were of eastern cedar, 11.1 per cent of western cedar, 9.3 per cent of tam¬ arack, 5.6 per cent of spruce, and 2.3 per cent of jack pine — the remaining 4.3 per cent being of fir, hemlock, chestnut and oak.

The total number of cross-ties sold in 1915 is given at 7,592,530, and their average price at 44 cents each. Jack pine made up 32.4 per cent of the total, eastern cedar 25.8 per cent, hem¬ lock 11.1 per cent, tamarack 8.3 per cent, east¬ ern spruce 6.7 per cent, Douglas fir 5.3 per cent and oak 4.3 per cent — the remaining 6.1 per cent being made up of yellow birch, chest¬ nut, maple, elm and western cedar. It is worthy of note that the total number of ties sold in 1914 was 19,403,646, or more than two and a half times that for 1915.

The following figures show the values of the exports of forest products for the year ending 31 March 1916:

Destination Unmanufactured Manufactured

United States . $34,573,005 $9,555,016

Great Britain . 14,125,537 1,008,821

Other countries … 2 , 504 , 428 934 , 033

Totals . $51,292,970 $11,497,870

The manufactured articles consisted mainly of pulpwood, saw logs, ties, posts, poles, piling, firewood, tanbark, square and waney timber, planks, boards and scantling, and the manu¬ factured articles of wood pulp, furniture, bar¬ rels, *etc.* ; the value of both amounting to

$62,790,840.

Total Value of Forest Products. — The

following table is based partly upon actual sta¬ tistics and partly upon the estimates of the Dominion forestry branch, and shows the esti¬ mated value of different classes of forest prod¬ ucts for the calendar years 1913 to 1915, inclusive :

Kind of Forest

Product 1913 1914 1915

Lumber, lath and

shingles . $71,000,000 $67,500,000 $69,750,000

Pulpwood . 15,000,000 15,500,000 15,750,000

Poles . 1,800,000 700,000 500, OOo

Ties . 9,000,000 9,000,000 3,500,000

Round mining tim¬ bers . 600,000 500,000 680,000

Posts and rails . 10, 000 , 000 9,500, 000 9 , 000 , 000

Firewood . 55,000,000 60,500,000 60,650,000

Cooperage . 1 , 900 , 000 1 , 900 , 000 1 , 400 , 000

Tanbark . 20,000 22,000 170,000

Miscellaneous prod¬ ucts . 11,000,000 10,000,000 9,500,000

Logs exported . 900,000 850,000 1,325,000

Square timber ex¬ ported . ‘ 500,000 400,000 480,000

Miscellaneous ex¬ ports . . 400,000 300,000 175,000

Totals . $177,120,000 $176,672,000 $172,880,000

This table gives a fairly accurate idea of the magnitude and stability of the forest in¬ dustries of Canada.

A. H. D. Ross,

Consulting Forest Engineer , Toronto.

41. THE GRAIN TRADE. The Cana¬ dian grain trade has been subject to legisla¬ tive control from an early date; but the first enactment after confederation applicable to the whole of Canada was in 1874 when the Dominion Parliament passed the General In¬ spection Act dealing with a large variety of staple commodities. Under this act the dif¬ ferent brands of flour and meal were legally defined, and special provisions were included for the grading of grain. After the establish¬ ment of a grain-growing industry in the prov¬ ince of Manitoba, an

act of 1885, in further amendment of the General Inspection Act of 1874, considerably extended the grades of grain and introduced for the first time grades descriptive of the hard wheats of Manitoba and the Northwest territories. Subsequently the legislation affecting the warehousing and transportation of grain became merged in the Manitoba Grain Act of 1900 and amending acts. The Inspection Act covered the inspec¬ tion, grading and weighing of grain up to 1904, when all matters affecting grain were with¬ drawn from that act and embodied in the Grain Inspection Act, 1904, which on the re¬ vision of the statutes in 1906 became Part II of the Inspection and Sale Act.

The Canada Grain Act. — Four years ago the Dominion legislation affecting the Canadian grain trade was codified by the Canada Grain Act of 1912, which also included numerous ad¬ ditional provisions of important character. The act provides for the appointment by order in council of a board of three commissioners, known as the Board of Grain Commissioners for Canada, who are charged with the manage¬ ment and control of the grain trade for the whole of Canada in accordance with the terms of the act. The offices of the board are at Fort William where, and at the twin city of Port Arthur, are situated the large terminal elevators from which grain is discharged into the lake steamboats plying eastward. For the purposes of grain shipment Canada is divided into two inspection divisions, the Eastern and Western. The former comprises the portion of Ontario lying east of Port Arthur and Que¬ bec and the Maritime provinces, while the lat¬ ter comprises the portion of Ontario lying west of and including Port Arthur, the North¬ west provinces and territories and British Columbia.

Grain Elevators. — These constitute an integral part of the grain trade as controlled by the act, and the development of grain growing in the Northwest made their introduction into Canada a necessity. The first Canadian grain elevators were constructed shortly after the year 1880. Before this date grain grown in Canada was shipped through flat warehouses built by grain dealers at points along the rail¬ way line. The grain was bought by the deal¬ ers, stored in the warehouse and shipped in car lots for sale in Winnipeg. The warehouse was a simple wooden storehouse, built parallel with the railway track. A passageway across divided the house in two and each end was sub¬ divided into bins. The machinery usually con¬ sisted of a scale in the passageway, a trolley for pulling the sacks and a grain cart to han¬ dle the grain in bulk. The grain was weighed, piled loose in the bins and drawn in the cart to the railway car, This system has become an¬

tiquated, and the flat warehouses, of which there are now only about 24 in Canada, tend annually to disappear.

Dissatisfaction on the part of grain grow¬ ers with the management of the elevators led to the introduction of what are called ((loading platforms.® The platform is a wooden struc¬ ture on a railway siding to which a farmer can drive his team and from which he can shovel the grain into the car. When the grain has been loaded, he can either sell it on the spot as track grain, or consign it to a commis¬ sion firm in Winnipeg to be sold for his ac¬ count. By using the platform a farmer can protect himself from the possibility of mal¬ practice on the part of the elevator, and can save the elevator charges amounting to about $17 per car. On the other hand he has to se¬ cure the car, make his own arrangements for selling the grain and load the grain into the car with his own labor. In spite of these dis¬ advantages as compared with the elevators, the loading platforms are popular, and applications for new and larger ones are constantly being made. There are at present about 1,600 of these platforms, and Dr. Magill, when chair¬ man of the Board of Grain Commissioners, in a report on grain inspection in Canada, estimated that the proportion of grain loaded over platforms was about one-third of the whole.

With regard to the elevators themselves it will be understood that the name refers origi¬ nally to the mechanical devices employed for hoisting grain in order to store it in bulk. The mechanical device most generally employed is on the endless chain and bucket principle. This is applied for lifting the grain perpendicularly, whilst belts called conveyors are also used to convey it horizontally for the purpose of shooting it into different bins. But the term elevator, whilst originally employed to desig¬ nate the machinery for hoisting, has come to signify also the building used for the storage and handling of grain. It is in this sense that the term is employed for the purpose of this article.

There are now in Canada six different kinds of grain elevators. There are first what are called the ((country elevators.® These, as de¬ fined by the Canada Grain Act, include all ele¬ vators and warehouses which receive grain for storage before inspection and which are erected at a railway station or on railway lands. As a general rule the country elevators are owned and operated by commercial companies or by farmers' co-operative companies. When the farmer takes his grain to a country elevator he can either sell the grain to the operator, in which case it is called <(street grain,® or he can hire a bin in the elevator to keep his grain dis¬ tinct from all other grain, in which case it is called ((special binned grain,® or he can store it with other grain

of the same grade. If he stores the grain either in a special or general bin, he arranges with the railway company for a car, and the elevator loads the grain into the car to his order. When the grain is loaded he can either sell it on the spot as track grain or send it forward consigned on commission. In 1916 the total number of country elevators and warehouses was 3,014 with an aggregate storage capacity of 94,322,000 bushels.

‘ Next in order come the large terminal ele-

vators, which are situated at Fort William and Port Arthur, the twin cities at the head of Lake Superior, to which the country elevators are tributary, and from which the grain is shipped by the lake steamboats to Montreal, or to the lake ports of Canada and the United States. These elevators are called ˆterminal® not because they are situated at the railway termini, but because the inspection of western grain ends at them. Of these terminal ele¬ vators at Fort William and Port Arthur there are 13 with a total capacity of 40,435,000 bushels.

Other descriptions of elevators include 22 <(public elevators® with a capacity of 29,250,000 bushels, 19 “hospital elevators® with a capacity of 2,560,000 bushels for the cleaning or other treatment of rejected or damaged grains and three milling elevators with a capacity of 1,700,000 bushels used in connection with the manufacture of grain products in the western inspection division. Under powers conferred by the Canada Grain Act, and partly for the pur¬ pose of meeting a contemplated western ex¬ pansion of trade through the opening of the Panama Canal, the Dominion government has erected and is operating four new interior ter¬ minal elevators. These are situated at Port Arthur, Saskatoon, Moosejaw and Calgary, and have an aggregate capacity of 9,500,000 bush¬ els. At Vancouver, also, a public or transfer elevator, with a capacity of 1,250,000 bushels, has been erected by the government to facili¬ tate the loading of grain in ocean steamships. Altogether the Dominion government has li¬ censed 3,078 grain elevators and warehouses with an aggregate storage capacity of 180,988,- 000 bushels. In 1901 the licensed grain eleva¬

tors in Canada numbered 523 with a total stor¬ age capacity of 18,329,352 bushels; so that the difference between these figures and those just quoted for 1916 shows how great has been the development of the trade since the beginning of the 20th century.

Inspection and Grading. — Under the Canada Grain Act all Canadian grain shipped in car load lots or cargoes from elevators is subject to government inspection and grading, and the grain is sold both at home and abroad on the inspection certificate entirely by grade and not by sample. As each car arrives at an inspection point it is sampled and graded by qualified samplers and inspectors appointed under the act. When the grain arrives at the terminal elevators it is weighed, cleaned and binned according to grade under the direct su¬ pervision of the inspectors, and a warehouse receipt is issued by the elevator operator to the owner of the grain. When the grain leaves the terminal elevator in car or cargo lots it is again weighed and inspected, and it must be graded out as graded in ; that is, if it was received into the terminal elevator as ((No. 1,® grain of equal quality must be shipped out. Thus the identity of the grade of exported grain is carefully preserved through every stage of movement. There are a number of inspection points ; but for grain going west the principal inspection point is Calgary. Duluth is the in¬ spection point for bonded grain going through the United States. Winnipeg is the inspection point for all eastward bound grain and Fort William and Port Arthur are the points of in¬

spection for grain leaving the terminal eleva¬ tors.

Under the act Canadian grain is divided into five general classes, viz., <(Statutory grade,® <(Commercial grade,® “Rejected,® “Condemned,® and ((No grade.® The statutory grade means for each grain the highest grades, as defined in the act. There are four of these grades for western spring wheat, viz., No. 1 Hard and Nos. 1, 2 and 3 Northern. The act prescribes that the first two of these grades shall be <(sound and well cleaned, weighing not less than 60 pounds to the bushel and composed of at least 75 per cent for No. 1 Hard and 60 per cent No. 1 Northern of hard Red Fife wheat.® No. 2 Northern must be <(sound and reasonably clean, of good milling qualities and fit for warehousing, weighing not less than 58 pounds to the bushel and composed of at least 45 per cent of hard Red Fife wheat.® No. 3 North¬ ern comprises grain not good enough for No. 2 that is graded No. 3 at the discretion of the in¬ spector. A variety of other “statutory grades® are established under the act for spring wheat, goose wheat,

winter wheat, Indian corn, oats, rye, barley, peas, buckwheat and flax, with distinctions for grain grown in the West. In addition to these statutory grades, other grades are established each year under the authority of the act by the Standards Board consisting of experts appointed by the Grain Commission¬ ers to establish <(commercial grades® in addi¬ tion to the statutory grades. These extra com¬ mercial grades vary with the season, whilst the statutory grades remain invariable. The ef¬ fect of these arrangements is that there may be as many as 31 grades of western spring wheat alone, 30 grades of western winter wheat, 30 grades of oats, 15 of barley and 15 of flax. Of the other three classes, i.e., grain not graded, ((rejected grain® means all grain that is unsound, musty, dirty, smutty or sprouted or that contains a large admixture of other kinds of grain, seeds or wild oats or that from any other cause is unfit to be classed under any of the recognized grades. <(Condemned grain® means all grain that is in a heating condition or is badly binburnt, whatever grade it might otherwise be, and “No grade® means all good grain that has an excessive moisture, being tough, damp or wet, or otherwise unfit for warehousing.

All grain in Canada is sold, unless otherwise contracted for, by certain legal weights per bushel. These were originally fixed by an act of the Dominion Parliament passed in 1879. At the present time the legal weights per bushel for the principal grains are as follows : Wheat 60 pounds, rye 56 pounds, barley 48 pounds, oats 34 pounds, Indian corn 56 pounds.

Exports of Canadian Grain.— Although the acreage and production of wheat and oats, the two principal grain crops of Canada, are similar in extent and quantity, it is only the wheat that figures very largely in the export returns. Oats are used mainly for the home feeding of live stock, and the surplus for ex¬ port is not considerable except after very abun¬ dant seasons. The following table shows for each of the five years ended 31 March 1916 the quantity and value of the principal grains ex¬ ported to the United Kingdom, to the United States and to other remaining countries :

Exports of Grain from Canada for the Five Fiscal Years Ended 31 March 1912-16.

Quantities.

Grain and Year

To

United

States

To

United

Kingdom

To

other

countries

Total

Wheat and wheat

flour:

Bushels

Bushels

Bushels

Bushels

1912… .

1,265,342

71 ,062,771

9,274,505

81,602,618

1913… .

9,971,952

90,923,185

12,795,236

113,690,373

1914… .

7,611,109

121,383,242

13,579,733

142,574,084

1915 ‘… .

4,332,326

78,679,788

11,599,483

94,611,597

1916… .

9,516,756

158,264,253

19,298,774

187,079,783

Rye:

1912… .

11,670

616

11,670

26,160

1913… .

25,544

1914… .

16,978

95,413

45

112,436

1915… .

146,055

87,282

30,085

263,422

1916… .

426,437

153,883

64,400

644,720

Barley:

1912… .

919,967

921,757

219,943

2,061,667

1913… .

773,281

5,556,090

126,604

6,455,975

1914 . .

1,584,851

10,905,712

541,806

13,032,369

1915… .

366,101

4,388,577

821 ,968

5,576,646

1916 …

366,573

4,915,517

646,283

5,928,37 3

Oats:

1912… .

203,560

7,014,645

1,662,470

8,880,675

1913… .

1,726,580

7,293, 004

1,458,970

10,478,554

1914… .

18,928,221

13,903,389

2,165,054

34,996,664

1915… .

3,825,549

8,537,236

5,405,381

17,768,166

1916… .

1,364,479

17,597,470

7,854,373

26,816,322

Flaxseed:

1912… .

991,802

495 , 496

17,230

1,504,528

1913… .

7,561 ,004

2,536,336

26,353

10,123,693

1914… .

10, 164,536

8,579,713

1,903,078

20,647,327

1915… .

7,006,249

675,318

7,958

7,689,525

1916… .

1,930,592

13,951

1,944,543

Values

Wheat and wheat flour:

1912… .

$1,055,437

$68,409,868

$9,159,322

$78,624,627

1913… .

8,487,726

87,420,634

12,671,059

108,579,419

1914… .

6,977,369

118,281,074

13,041,853

138,300,296

1915… .

4,456,472

82,264,757

12,183,265

98,904,494

1916… .

10, 102,339

175,520,423

23,040,727

208,663,489

Rye:

7,685

14,908

1912

7,685

603

1913… .

14,305

1914 …

11,473

64,393

22

75,888

1915… .

138,855

93,291

27,476

259,622

1916… .

362,654

136,017

57,346

556,017

Barley:

1912… .

588,026

607,933

158,341

1,324,300

1913… .

440,468

3,315,172

96,020

3,851,660

1914… .

709,092

5,514,016

290,449

6,513,557

1915… .

203,118

2,520,084

538,823

3,262,025

1916… .

225,843

3,229,986

319,512

3,775,341

Oats:

1912… .

90,920

2,903,708

825,014

3,819,642

1913… .

739,357

3,592,247

736,346

5,067,950

1914… .

6,802,403

5,644,951

932,495

13,379,849

1915… .

1,536,465

4,067,540

3,357,121

8,961,126

1916 …

632,748

8,606,102

5,398,999

14,637,849

Flaxseed:

1912… .

1,802,894

1,004, 888

34 , 460

2,842,242

1913… .

11,885,186

4,537,360

26,353

16,448,899

1914… .

11,910,681

10,482,556

2,423,096

24,816,333

1915 . .

9,420,263

928,346

11,094

10,359,703

1916… .

2,926,421

47,511

.

2,973,932

It will be seen from this table that the bulk of the exports of both wheat and oats goes to the United Kingdom. In the case of wheat the percentage proportions for the last fiscal year were for quantities 85 per cent to the Uni¬ ted Kingdom, 5 per cent to the United States and 10 per cent to remaining countries. In Ontario and Quebec, and to a less extent in the Atlantic provinces, there is a large produc¬ tion of all kinds of grain, a considerable pro¬ portion of which enters into commerce, but of which very little is available for export from Canada.

It is estimated that of wheat Canada re¬ quires annually tor home consumption about 96,000,000 bushels, of which 48,000,000 bushels or one-half represents food for the population of eight millions, and 48,000,000 bushels are either used for seed or are grain of inferior qualities kept on the farm for the feeding of live stock. Following the great increase of set¬ tlement during the present century the exports of wheat from Canada, especially to the mother country, have been rapidly expanding; and have reached in recent years a total equiva¬ lent to about 144,000,000 bushels, or about 67 per cent of the total British imports of wheat and flour. After the season of 1915, when high tide was reached by the most abundant harvest ever reaped in Canada, the Canadian exports of wheat (including flour) for the crop year ended 31 Aug. 1916 were 289,794,162 bushels.

Ernest H. Godfrey, F.S.S., Editor, Census and Statistics Office, Ottawa.

42. MINERALS. From a country so vast and of such varied geological structure as Canada one expects a wide range of mineral deposits, and

the expectation is not disappointed, for already most of the minerals known to exist elsewhere have been found in the Dominion, and often in important deposits, though only its southern fringe has been explored. How¬ ever, up to the present, Canada's mineral pro¬ duction must be looked on as at the stage of promise rather than performance, except in a few substances where nature has given her the lead. For example, the world's supply of as¬ bestos comes from the province of Quebec, and more than three-quarters of its supply of nickel is obtained from mines in Ontario, while rich placer mines have produced largely in the Yukon, and Cobalt supplies the needs of the world for that metal and has attained a great place in silver production. Canada is back¬ ward in the production of iron and steel, basic factors in the development of a country, and stands relatively low as a producer of coal, though the fact that the only deposits of good coal on tidewater in America, both on the At¬ lantic and Pacific, are Canadian, is a fact of much importance which has produced great metallurgical industries in Nova Scotia.

Until recently the exploitation of Canadian mineral resources has been largely due to for¬ eigners, especially Americans ; but Canadian and British capital are now turning in this di¬ rection.

In 1913, the year of greatest output, the total value of the mineral products of Canada was $145,634,812, about $18.75 for each inhabit¬ ant, as compared with $24.50 per capita in the United States, where the total reached $2,445,- 805,017 in the same year. The area of Canada is about equal to that of the United States and in the parts best explored its mineral re¬ sources give promise of equalling in value those of corresponding States of the Union ; so that an immense expansion in mining is to be looked for in the next generation.

The mineral production of Canada is very unequally distributed among the provinces, On¬ tario coming first with nearly 45 per cent of the whole, followed by British Columbia with 21 per cent and Nova Scotia with 13 per cent and the other provinces with smaller percent¬ ages. It is interesting to note that Ontario, one

of the oldest and presumably best known of the provinces, has had important mineral dis¬ coveries in recent years increasing its output threefold in the last decade. Of the Maritime provinces of eastern Canada only Nova Scotia can be described as a mining region, gold and coal having been produced there for nearly half a century. Quebec is not of great import¬ ance except for its asbestos mines. Ontario produces a variety of minerals, nickel, silver and gold being foremost, while British Colum¬ bia provides gold, silver, copper, lead, zinc and coal, and the Yukon gold.

Following the usual classification, the min¬ erals of Canada may be taken up under three heads, metals, non-metallic minerals and struc¬ tural materials.

METALS.

Ores of 15 metals have been mined in Can¬ ada — antimony, chromium, cobalt, copper, gold, iron, manganese, mercury, molybdenum, nickel, palladium, platinum, silver, tungsten and zinc, and minerals containing a number of other metals have been found, though they have not yet been mined. Only eight of these metals are prominent economically, gold, silver, nickel, copper, lead, cobalt, zinc and iron, and attention will be directed mainly to them.

Gold. — The gold areas of Canada are wide¬ spread but the production has been very fluctu¬ ating the value in recent years varying from $907,601 (in 1892) to $27,908,153 (in 1900) and standing at $15,983,007 in 1915. In 1900 Canada was third in rank as a producer of gold, being surpassed by the United States and Australia only; but has dropped to the fifth place since then, yielding to South Africa and Russia. Three provinces and one territory are gold pro¬ ducers at present. Nova Scotia has carried on quartz mining, on ((saddle reefs® like those of the famous Bendigo region in Australia, for more than 50 years, but has seldom exceeded $500,000 per annum, the value falling to $137,- 178 in 1915. Ontario also produces gold from quartz mines, but until recently only in small amounts. Since the opening up of the important Porcupine gold region in 1912 the output has rapidly increased, reaching $8,386,956 in 1915. The Porcupine district is now the most productive in the Dominion. Before the sudden rise of the Klondike, British Columbia was the greatest gold region of Canada, its history be¬ ginning with the times of wild excitement in the sixties, when thousands of miners from California swarmed into the rich placers of the Fraser and Columbia rivers and washed out millions of dollars worth, reaching the climax of $3,913,563 in 1863. The easily available placers were gradually

exhausted, the value falling in 1893 to $379,535, a little less than the output of Nova Scotia in the same year; but the production of lode gold, especially from the smelting ores of Rossland on the southern edge of the province, once more placed British Co¬ lumbia in the first rank. In 1908 the yield was $9,529,880, of which $3,600,000 came from placer mines, mostly in the Cariboo and Atlin districts in the north, the rest from smelting ores and a few quartz mines in the south ; but this has fallen off to $5,628,982.

The prairies furnished a small amount of placer gold from bars on the Saskatchewan and other rivers for a number of years, but it was

not until the working of the Klondike placers in 1897 that gold mining assumed importance in the north. This region, in lat. 64°, 500 miles below the headwaters of the great Yukon River, was unique as a placer mining country, reminding one of the famous placers of Cali¬ fornia and Australia, but surpassing them in difficulty of access and of working conditions, as well as in richness. For its length Eldorado Creek, a tributary of Bonanza Creek, was the most productive ever mined, but its gravels are nearly worked out, and the yield of gold, though still great for so small a region as the Klondike, which is about 40 miles square, has fallen since 1900, when it was estimated at $22,27 5,000, to $4,755,721 in 1915. The gold-bearing gravels were perpetually frozen and usually buried under several feet of frozen muck, so that the ground had to be thawed before it could be worked. At first this was done by building fires, but later steam delivered from steel pipes driven into the ground was employed, and it was found, also, that when stripped of moss the warm summer's sun thaws layer after layer, which may then be sluiced off in the ordinary way. All the rich placers have now been worked, but dredges and hy¬ draulic plants are covering the ground again with good results. In 1915 these methods pro¬ duced the amount mentioned above, but a gradual falling off may be expected in the future.

Silver. — F or many years Ontario was the chief province for silver, the mine at Silver Islet near Thunder Bay on the north shore of Lake Superior being credited with a total out¬ put of $3,250,000, while several other mines to the west of Thunder Bay were also worked. For a while British Columbia took the lead in the production of silver, beginning in 1892, and culminating in 1897 with an output of over $3,000,000. In 1897, Ontario produced only 5,000 ounces, worth about $3,000, but from that date onward there was a yearly increase in her out¬ put, until in 1911 it was 30,540,754 ounces, valued at

$16,279,443. British Columbia's production was only 1,887,147 ounces in the same year. Cobalt has been declining in its silver produc¬ tion since 1911, the amount in 1915 being 23,- 568,147 ounces, while British Columbia's pro¬ duction rose to 3,628,727 ounces.

Nickel. — This metal has become of prac¬ tical value only since 1889 and methods of reducing its ores are still somewhat in the experimental stage. The world's supply comes almost entirely from two regions, the Sudbury district in northern Ontario and the French penal colony of New Caledonia. In early years New Caledonia was somewhat in advance, but in 1903 Sudbury passed it in production and seems likely to hold its position in the future. The mines are all situated round the edge of a basin-shaped sheet of eruptive rock 37 miles long and 15 broad, and among them the Creigh¬ ton is the greatest nickel mine in the world, supplying more than half of the total output. About >half as much copper as nickel is pro¬ duced in these mines and also small amounts of gold, palladium and platinum, the last metal occurring in the rare arsenide sperrylite, first found in the district. In 1915 matte smelted from the roasted ore contained 34,000 tons of nickel, mostly mined and treated by the Cana¬ dian Copper Company, though the ˆtond Com-CANADA — MINERALS (42)

pany of England was of some importance, also. The value of the nickel in the matte was placed at $10,352,344, while the refined metal was esti¬ mated to be worth $20,423,348. The demand for nickel steel for war purposes has greatly helped the industry.

Copper. — Copper has been mined in New¬ foundland, Nova Scotia, New Brunswick, Que¬ bec, Ontario and British Columbia, but only the last two provinces are important producers. The copper of Quebec is a by-product of the iron pyrites of the Eastern Townships; and most of the copper from Ontario is, as shown above, produced as an accompaniment of the Sudbury nickel ores, though mines of copper alone are worked on a small scale at Massey in western Ontario, not far from the once well-known Bruce mines, north of Lake Huron, which were prosperous half a century ago but are no longer in operation. British Columbia supplies more than three-fourths of the copper mined in Canada, chiefly from the gold-copper ores of the

Rossland region, the large low grade deposits of the boundary districts and of the Pacific Coast of the province, while a small amount comes from the White Horse district of Yukon territory. The total production of copper in the Dominion in 1915 was 51,306 tons, valued at $17,726,307. The demand for copper for war purposes has greatly increased the production.

Lead. — Almost the whole of the lead mined in Canada comes from the silver-lead ores of southern British Columbia, which began to be opened up extensively in 1893 and furnished 31,500 tons in 1900. Since then there have been great fluctuations in the amount mined, which was 22,184 tons in 1915, the production depend¬ ing largely on the prosperity of the silver min¬ ing industry, since the two metals occur to¬ gether.

Cobalt. — The whole of the cobalt produced in Canada, and practically all that is used in the world, comes from the silver mines of Cobalt in northern Ontario, where the metal occurs in arsenides, especially smaltite. Though the metal is better suited for plating than nickel, very little is employed in this way. Its chief use is in the preparation of cobalt blue and in giving a blue color to glass or porcelain. In 1914 there was a production of 871,891 pounds of cobalt, mostly disposed of as the oxide, and the value is estimated at about $550,000.

Zinc. — Zinc ores, chiefly blende, have been mined in Quebec, Ontario and British Colum¬ bia, and have been shipped to the United States or to Belgium for treatment, but the recent high price of zinc, due to the European War, has encouraged two companies, one at Welland, Ontario, the other at Trail, B. C., to produce the metal from its ores. In 1915 15,553 tons of ore were reported, mainly from British Colum¬ bia, and the value is given as $636,204.

Iron. — In regard to the most important of all metals, iron, Canada is backward, largely from the fact that the ore deposits and the fuel for treating them are generally widely sun¬ dered. Nova Scotia, Quebec and Ontario have been producers of iron and steel, the first prov¬ ince having the great advantage of supplies of coking coal on the seaboard, at Sydney in Cape Breton Island and other points, so that two large iron and steel plants are in operation

there. Most of the ore smelted is, however, in a sense foreign, coming from Bell Island, off the coast of Newfoundland. The province of Que¬

bec has for generations smelted a small amount of bog iron ore in charcoal furnaces near Three Rivers, the product being of high grade and used for special purposes, but since 1912 these furnaces have been shut down. Char¬ coal iron furnaces were operated on a small scale in different parts of Ontario, also, from 50 to 100 years ago, but when railways began to bring in British iron the industry ceased. Within the last few years large furnaces using American fuel and in part American ore have sprung up at Hamilton, Midland and the Sault Sainte Marie.

Deposits containing millions of tons of fair grade ore have been found in Hutton township, Michipicoton and other points in northern Ontario in rocks similar to those of the great iron regions of Michigan and Minnesota, so that iron production is likely to increase in the future. British Columbia also possesses large deposits of iron ore and excellent coking coal, so that an iron industry like that of Nova Scotia may be expected to grow up as the province becomes more populous. The amount of pig iron smelted in Canada in 1915 was 913,- 719 tons, of which Ontario produced more than half, but of this amount only 158,598 tons came from Canadian ore, the rest coming from American or Newfoundland ore. The amount of steel produced was 1,020,335 tons.

Platinum and Palladium. — Among the rarer and more precious metals it is perhaps worth while to mention platinum, which has been obtained from placers in the Similkameen region, B. C., and which occurs also in the form of the arsenide, sperrylite, in the Sudbury nickel ores. A few hundred ounces of the metal have been obtained annually as residues after the separation of the nickel and copper in the Bes¬ semer matte from Sudbury. The way in which palladium occurs in the nickel ore is unknown, but it is obtained in larger amounts than the platinum.

NON-METALLIC MINERALS.

Twenty-two non-metallic minerals are re¬ ported in the statistics for 1915, and several others occur in lists of former years, but atten¬ tion may be confined to a few of the more important ones, beginning with the mineral fuels.

Coal. — In 1915 the coal mined in the Do¬ minion amounted to 13,209,371 tons, valued at $31,957,757. Of this Nova Scotia supplied 7,429,888 tons, Alberta 3,320,431, British Colum¬ bia 2,089,966, New Brunswick 236,940, Saskat¬ chewan 122,422, and the Yukon territory 9,724. The coal supply of the great manufacturing province

of Ontario comes entirely from the United States, and much of that used in Quebec is obtained from the same source; but as a small offset Nova Scotia exports coal to the New England States, and British Columbia to the Western States, the total amount being 1,766,- 543 tons. The coal of Nova Scotia is bitu¬ minous and of Carboniferous Age; most of the coal mined in Alberta and British Columbia is bituminous, also, but of Cretaceous Age. A small amount of coal approaching anthracite is mined in Bow Pass, where .seams, of Creta¬ ceous coal have been nipped in during moun-442

tain building; and a considerable tonnage of lignitic coal and of lignite of poorer quality is mined at numerous points on the prairies. In general the older the deposits and the more they have been disturbed in the rise of the foothills, and especially of the mountains, the better is the quality of the coal.

Excellent coke is made from the coal of Cape Breton Island, Nova Scotia, and of the Crows Nest region of Alberta and British Columbia, and also of Nanaimo on the Pacific Coast, the amount in 1915 being 884,555 tons.

Though Canada is surpassed in the extent of its coal deposits by only two or three countries in the world, their distribution, mainly in the foothills and mountains of the West, leaves the populous central provinces and the largest cities mainly without a native coal supply.

Petroleum and Natural Gas. — At present Ontario is practically the only producer of petroleum, which comes from a small area in its southwestern peninsula. Crude oil and its products to the extent of 215,464 barrels valued at $300,572 are reported in 1915, but the supply is slowly diminishing and before long will be exhausted unless other pools are struck. Petro¬ leum is known from Gaspe in Quebec and from southern Alberta, and great stretches of <(tar sands® along the Saskatchewan and Athabasca suggest oil deposits, though productive wells have not been sunk in these regions. See Petro¬ leum Industry, The.

Natural gas has been exploited in Essex and Welland counties of southwestern Ontario. In 1915 the wells of Ontario furnished gas to the value of $2,202,5 23. Natural gas is obtained on a large scale in

Alberta, especially near Medicine Hat and between it and Calgary, where the production is valued at $1,037,919; and on a much smaller scale in New Brunswick.

In addition to the mineral fuels just men¬ tioned Canada has large areas of bituminous shale from which oil may be distilled and of peat bog from which fuel may be obtained when the need arises.

MINOR ECONOMIC MINERALS.

After the fuels come several less important minerals, asbestos being the chief one, with an output of 113,115 tons in 1915, valued at $3,491,450. The whole product, which means practically the world's supply, comes from a few mines in serpentine rocks in the Eastern Town¬ ships of Quebec. The value of this beautiful silky-fibred mineral depends on the fact that it is an incombustible material which can be spun or woven or felted together into non-conducting sheets. Next in value is pyrites, of which 296,910 tons were mined in the provinces of Quebec and Ontario, having a value of $1,028,- 678. Gypsum, the raw material of plaster of paris, was quarried mainly in New Brunswick and Nova Scotia, to the amount of 470,335 tons, valued at $849,928. Salt prepared from wells in southwestern Ontario reached 119,900 tons in weight and $600,226 in value. In addi¬ tion quartz, chromite, white arsenic, magnesite and graphite reached values1 of over $100,000, and mica, feldspar, corundum, talc and ochres were produced in smaller amounts. The corundum mined in Ontario is used only as an abrasive ; the gem varieties, ruby, sapphire, etc., have, so far, not been found.

STRUCTURAL MATERIALS.

Building stone, clay for brick making and marl or limestone and clay for the manufacture of cement are, of course, found in all the provinces; but the greater part of the clay products and most of the cement are manu¬ factured in Ontario and Quebec where the demand for structural materials is greatest. In 1915 5,681,032 tons of Portland cement were made with a value of $6,977,024; and clay products were valued at $3,918,200. Statistics of other structural materials of importance are given as follows: Lime, $1,015,878; sand and gravel, $2,098,683; sand-lime brick, $182,651; granite, $1,634,084; limestone, $2,504,731; mar¬ ble and sandstone, $365,784. The total value of structural materials is given as $18,712,074.

MINERAL PRODUCTION.

The mineral productions of all kinds sum up to a value of $138,513,750 in 1915, repre¬ senting an advance of 7.49 per cent over the previous year, but a falling off of $7,121,062 as compared with that of 1913, the year of greatest prosperity. The falling off in 1914 was due to the general collapse of the world's in¬ dustries because of the war, and one may con¬ fidently expect the usual advance in output when peace is restored and conditions become normal again.

The following table, showing the produc¬ tion at five-year intervals, illustrates the rapidity of the increase since statistics have been kept by the Geological Survey :

1886 (first year of statistics) .	$10,221,255
1888 .	12,518,894
1893 .	20,035,082
1898 .	38,697,021
1903 .	63,226,510
1908 .	85,927,802
1913 .	145,634,812

From this table it will be seen that the mineral industries of Canada increased the value of their output more than eleven-fold in the 25 years between 1888 and 1913, often nearly doubling in the five-year intervals, an almost unexampled advance. That the rate of increase will be as rapid in years to come can scarcely be expected, but so little of the area of Canada has yet been carefully explored that many important discoveries may be looked for as the great northern regions are mapped and opened up.

Sources of Information. — Statistical in¬ formation as to the mineral production of the country as a whole may be found in the annual reports of the Geological Survey of Canada, Department of Mines,

compiled by John Mc-Leish, and in the annual volumes of the Min¬ eral Industry. The mining departments of the provinces of Nova Scotia, Quebec, Onta~io and British Columbia also publish annual -e- ports of much value in which information is given as to their special mining industries. The statistical materials for this paper have been largely drawn from these sources.

A. P. Coleman,

Professor of Geology , University of Toronto.

43. FISHERIES. Among the great indus¬ tries of Canada the fisheries stand fifth in the order of value. The farming industry (mainly grain growing) is estimated to yield $500,000,- 000 per annum; the lumber industry $100,- 000,000; stock raising $100,000,000; mining

$105,000,000, while the fishing industries are estimated to produce, on the whole, $39,000,000 to $40,000,000 annually. The latest report of the Marine and Fisheries Department, which gives the value for 1916-17, places it at $39,- 208,378, but when account is taken of the amount of fish consumed by wandering tribes of Indians and Eskimo, with their hordes of fish-eating dogs, as well as the amount used as food by isolated settlers, miners, prospectors, lumberers and sportsmen, and, above all, the employees at the Hudson's Bay Company's posts in the remoter parts of northern Canada, the total amount must be greatly in excess of offi¬ cial statistics.

Completely accurate returns are hardly pos¬ sible, admirable as the Canadian system of gathering statistics is, so admirable that the late Prof. Brown Goode, head of the United States Fish Commission, declared at a fisheries conference in 1883 that <(... other countries ought to study it with a great deal of care.®

The expansion of the Canadian fisheries since 1870 is sufficiently shown by the figures given below :

1870 .

. … $6,577,391

1901 .

… $25,737,153

1876 .

_ 11,117,000

1908 .

25,451,094

1880 .

_ 14,499,979

1911 .

29,965,433

1890 .

_ 17,714,902

1913 .

33,389,464

1893 .

_ 20,686,661

1915 .

31,264,631

1897 .

_ 22,783,546

1916 .

35,860,708

1900 .

_ 21,557,639

1917 .

39,208,378

Number of Boats, Fishermen, *etc.* — Over 1,300 vessels (valued at $4,961,343) and 40,105 boats, including 12,828 with gasoline engines (valued at $4,829,493), are employed, while the fishing gear used, including nets, lines, lob¬ ster-traps, etc., is valued at over $5,690,002. Certain branches of the fisheries have developed in a special degree, such as the salmon canning industry on the Pacific Coast and lobster pack¬ ing on the Atlantic Coast. The former, em¬ bracing about 80 canneries, represents an in¬ vestment of about $3,000,000, while the Atlantic lobster canneries, in Quebec and the three Mari¬ time provinces, numbering 700, are valued at about $660,000. Smokehouses, curing and re¬ frigerating establishments, in operation, are officially recorded at $4,025,371 in value. In other words, a capital of over $28,000,000 is employed in the fisheries. In three years (1911-14) the total increased by nearly $5,000,000.

The total number of persons engaged either in fishing or in handling fishery products in Canada reaches to over 90,000, of whom 70,000 take part in Atlantic fishery enterprises. On the Pacific Coast 10,000 fishermen follow salmon netting, and 8,000 hands find employment as cannery workers, *etc.* The inland (fresh-water) fisheries engage a considerable number of fisher¬ men, over 4,000 being employed in the Ontario or Great Lake fisheries, while, in Manitoba and the Northwest territories, 3,000 or 4,000 men take part in the fishing operations.

Seven Fishery Districts. — Seven territorial divisions may be distinguished in a general sur¬ vey of the fisheries of the Dominion, *viz.* :

1. The Atlantic division, from Grand Manan in the south to the coast of Labrador, including the Bay of Fundy (8,000 square miles) and the Gulf of Saint Lawrence (80,000 square miles), and characterized by deep-sea and inshore fish¬ eries for cod, mackerel, haddock, halibut, her¬ ring, hake, lobsters, oysters, seals and white whales (beluga).

Annual value, over $14,000,000.

2. The estuarine and inland waters of Que¬ bec and the Maritime provinces, including fish¬ eries for salmon (by stake-nets, drift-nets and angling), striped bass, smelt, shad, gaspereau (alewife) ; and in the lakes, ouananiche or landlocked salmon, lake trout, togue or lunge, *etc.* Annual value, nearly $2,000,000.

3. Great Lakes division, including Lakes Ontario, Erie, Huron and Superior, which Canada shares with the United States, the in¬ ternational boundary passing practically through the centre of these vast inland seas, all of which finally empty into the river Saint Lawrence. This complex system of waters, with innumer¬ able subsidiary lakes and rivers, abounds in lake whitefish (Coregonus) , great lake trout (Cristivomer namaycush), lesser whitefish (er¬ roneously called lake herring), sturgeon, pike-perch (doree or pickerel), black bass, brook trout, maskinonge, pike and numerous carpoid suckers, and bearded catfish. Annual value, nearly $3,000,000.

4. Manitoba and northwestern division, in¬ cluding Keewatin, etc., whose wide expanses of fresh water, such as, Lake Winnipeg, Great Bear Lake and Great Slave Lake, yield enormous quantities of whitefish, sturgeon, pike-perch, tullibee (a peculiar lesser whitefish), pike, gold-eye (a true fresh-water herring), large river trout and catfish. Value, inclusive of an extensive ˆcaviare® or sturgeon-roe in¬ dustry, over $1,000,000.

5. Pacific Interior division, extending from the Okanagan, Kootenay and Arrow waters, in the south, to the Yukon district, in the north, and covering an area of plain, valley and moun¬ tain 1,000 miles north and south, by about 500 miles east and west, intersected everywhere by rivers and lakes, and comprising limited fish¬ eries for lake trout, whitefish, landlocked salmon, river trout, grayling and numerous carps or suckers, not identical, for the most part, with eastern species. Annual value prob¬ ably not exceeding $500,000.

6. Pacific Coast division, the fisheries of which are little developed, if we except the estuarine and coastal salmon fisheries. The various species of salmon, include the blue-black or sockeye, the spring salmon or quinnat, the coho, dog-salmon, humpback and a true salmon, namely gairdner's salmon or steel-head. Skill, or black cod, oulachan (candle-fish), anchovy, herring, sardine, smelt and a great

variety of other fishes abound which are not utilized to any great extent. Shark, dogfish, rat-fish and whale fisheries exist; and there are limited oyster fisheries. The halibut fishery is of great importance and yields upward of $2,000,000 annually. With the shipping facili¬ ties provided by the extension of the Grand Trunk Pacific to Prince Rupert, in the vicinity of which port are located the best fishing banks, this fishery will develop greatly in the near future.

7. Hudson Bay and Peri-Arctic division, from Ungava Bay, Labrador, to the Mackenzie River, or rather Herschell Island, Yukon dis¬ trict. Whale, walrus, sea trout, Hearn's salmon (a great spotted trout), the inconnu (resembling a river whitefish), pike, suckers, sturgeon and, possibly, salmon and cod occur in these vast northern waters, of which Hudson Bay alone exceeds the Mediterranean in extent and has

an estimated drainage area of 2,700,000 square miles. The richest whaling grounds in the world are in these remote regions of the Do¬ minion, whose tidal channels, as the late Sir John Schultz declared, ftare destined to be the last home of the leviathans which within the memory of living man have been driven from Newfoundland latitudes to the places where their survivors have now sought retreat.® Hair-seals of various species and white whales (Beluga) abound in these sub-arctic waters, and constitute valuable fisheries ; one station, according to Dr. Robert Bell, securing no less than 2,800 of these small whales in one season.

Marine Fishing Grounds: Area, Kinds of Fish, *etc.* — The waters grouped in this seven¬ fold manner afford a field, hardly to be sur¬ passed, for the development of extensive fish¬ eries. The grounds where fishing can be remuneratively carried on, off the eastern and western seaboard, embrace a total area of no less than 200,000 square miles, the Atlantic shore being over 5,000 miles in length, while the Pacific shore (British Columbia) exceeds 7,000 miles. On this latter coast, Hecate Straits (20,000 square milds) and the straits between Vancouver Island and the mainland, namely, the straits of Georgia and Fuca (15,000 square miles) afford the most remarkable sheltered

fishing grounds in the world, being for the most part shielded from the open ocean, and extend¬ ing inland as placid fiords and deep, salt-water inlets, the total area of these inshore waters being no less than 40,000 square miles in ex¬ tent. TheCanadian fishing banks on the Atlan¬ tic Coast are historic. They stretch from Labrador, Anticosti and Gaspe in the north to the West Isles in the southern Passamaquoddy waters, including famous areas like the Bay of Chaleurs, off Quebec province, Northumberland Straits, off Prince Edward Island, and New Brunswick, and Chedabucto Bay, off eastern Nova Scotia. Between the outer edge of the inshore areas and the deep-sea waters of the Atlantic the feeding and breeding grounds occur for cod, haddock, mackerel and other valued edible fishes. ((There is probably no part of the world,® said Mr. P. L. Simmonds, the well-known fishery authority, ((where such extensive fisheries are to be found, as in the Gulf of Saint Lawrence.® Among the series of banks mainly resorted to by Canadian fishing boats are (passing from north to south) Great Bank, Green Bank, Bank Saint Peter, Misaine, Canso, Quero, Howe, Roseway, La Have and Western Banks, apart from the great fishing areas in the open Atlantic, such as the Grand Banks, which are not really in Canadian limits and are indeed mainly exploited by fishermen from more dis¬ tant countries.

Fresh-water Fisheries. — If, owing to the superficial extent, and, no less, the coldness and purity of the marine waters of Canada, as well as the abundance of natural food, upon which cod, mackerel, halibut, herring, etc., subsist, the sea fisheries rank amongst the best in the world, it may be said of the fresh-water fisheries that they are hardly inferior in these characteristics. The total area of the fresh waters of the Do¬ minion (lakes and rivers) is estimated at 140,000 square miles. From a fishers' point of view the lake systems of Canada may be arranged under five principal heads, namely:

Five Lake Systems 1. The maritime lakes,

embracing the numerous lakes of Labrador, Quebec and the Atlantic provinces. Certain of these, notably Lake Saint John, Quebec (366 square miles), and the Chamcook Lakes, N. B., are famous for landlocked salmon, so prized for their unique game qualities. Black bass, pickerel or dore, lake trout, red and speckled trout abound in these waters, while Clear Lake, Little Seal, Mistassini and most of the northern lakes swarm with whitefish and sub-arctic vari¬ eties of trout.

2. The central lake system, including the Great Lakes (76,562 square miles in total area) and innumerable subsidiary lakes, all utilized for commercial purposes and for sport. The areas and maximum depths of the more im¬ portant of these lakes are as follows: Superior, 31,200 square miles, 160 fathoms deep; Huron, 23,800 square miles, 145 fathoms deep ; Erie, 10,030 square miles, 35 fathoms deep ; Ontario, 7,330 square miles, 123 fathoms deep ; Lake Nepigon, 1,450 square miles; Lakes Saint Clair and Simcoe, 300 square miles each.

3. The Manitoba and Keewatin system, the principal waters of which are Lake Winnipeg, 9,400 square miles ; Lake Winnipegosis, 2,030 square miles; Lake Manitoba, 1,900 square miles; and Lake of the Woods, 1,500 square miles ; and in these waters enormous fishing operations are carried on for whitefish, pickerel or dore, sturgeon, pike, *etc.*

4. The Athabasca and Mackenzie system, extending from Reindeer Lake to Great Bear Lake, the latter lake no less than 11,200 square miles in area, while Great Slave Lake is 10,100 square miles, and others are : Athabasca 4,400 square miles ; Reindeer Lake, 4,000 square miles; Woolaston and Doobount lakes, each over 2,000 square miles in extent. These waters have been little fished, excepting by In¬ dians, Hudson's Bay Company employees and the like, but being prolific in whitefish, sturgeon, etc., the development of great commercial fish¬ eries in the near future is assured.

5. The Pacific Interior system from Lakes Labarge and Atlin to Shuswap Lake, and the Kootenay, Arrow and Okanagan lakes near the United States boundary. None of the lakes in this western series are comparable in area to the vast inland seas referred to above ; but such waters as Babine Lake (250 or 300 square miles) at the head of the Skeena River, and Stuart Lake and Quesnelle lakes (respectively 100 and 750 square miles in area) at the head of the Fraser River, have an importance wholly disproportionate to their size, owing to the fact that their creeks and tributary streams are the great spawning resorts of various species of Pacific salmon. Whitefish, lake-trout, Pacific trout of various species and grayling occur in these waters.

Rivers of Canada. — Fisheries are also con¬ ducted upon the rivers, which almost without exception are abundantly supplied with the most esteemed fishes. Apart from a great stream like the river Saint Lawrence, whose drainage area is estimated to be 367,000 square miles, there are rivers, like the Mackenzie (2,400 miles long) ; the Great Saskatchewan (1,900 miles); the Churchill and Black rivers (each 1,500 miles) ; the Fraser (750 miles long and draining 100,000

square miles) ; the Red River (600 miles), and others like the Peace, Nelson, Albany, Great Whale, Skeena (300 miles) ; Ottawa (600

mile.'); Saint John (500 miles) Restigouche, Saguenay and Miramichi ; all of which are great rivers, presenting for the most part unsur¬ passed scenic grandeur, and affording notable sport and extensive commercial fishing. It would indeed be difficult to parallel the Fraser River, with its incredible multitudes of sal¬ mon, while the Restigouche and other famous angling rivers emptying into the Atlantic Ocean have no peers in the annals of sport. <(Canada,® as Professor Elwyn said, ((is the paradise of the angler.®

Minor Fisheries, Oysters, Smelts, *etc.* — The shores of Prince Edward Island, New Brunswick and parts of Nova Scotia furnish oysters of unequalled flavor and comestible qualities. Owing to over-fishing and inade¬ quate protection the yield has seriously de¬ clined from 70,000 or 80,000 barrels per annum to half that quantity, valued at about $180,000 yearly. On the other hand, such an industry as the smelt fishery, mainly carried on through the ice in December and the early months of the year, has grown from $117,000 in 1881 to over $800,000 in value. These dainty fish, for¬ merly used as fertilizing material on farm lands, are now shipped, four or five thousand tons per season, in a frozen condition, mainly to the United States markets. The estuaries of the Miramichi, Restigouche and other New Brunswick rivers are the centres of this re¬ markable fishery.

The sturgeon fishery has witnessed a great development recently, and has much greater possibilities before it. This fish became com¬ mercially valuable in Canada, first on the Saint John River, N. B., in 1880, when 602,500 pounds were shipped to New York. In four years the catch fell to 126,000 pounds, and in 1895 barely 27,000 pounds were secured ; but in Lake of the Woods, and on the Great Lakes, and above all, in the illimitable waters of Mani¬ toba, the Northwest and British Columbia, the sturgeon fishery has received a great im¬ petus during the last five or six years. In 1902 the yield of sturgeon was valued at $173,315, as compared with $90,000 20 years ago. Canada,

in the opinion of some authorities, is now one of the chief producers of ((caviare,® which formerly brought 10 cents to 15 cents per pound, and now sells in the cleaned, partly pre¬ pared condition at 90 cents to $1 per pound. Catfish and similar species, as well as eels and coarse fish generally, formerly little valued, are now in demand, bringing to the fisherman from $750,000 to $1,000,000 per annum.

Fishing Bounty. — • For the encouragement of the Atlantic deep-sea fisheries a bounty sys¬ tem is carried out, the fund for which ($4,490,882) was provided by the Halifax Award, 1877. The bounties paid annually to vessel-owners, vessel-fishermen and boat-fisher¬ men amount to about $160,000.

Government Hatcheries. — An important adjunct to the natural reproduction of fish aided by close seasons, size, limits, etc., is the artificial culture of fish. Sixty-four hatcheries are in operation. The output of fry in 1916 amounted to 1,624,924,254 and included Atlan¬ tic and Pacific salmon, lake trout, brook trout, whitefish, pickerel, or dore, lobsters, *etc.* Sev¬ eral of the provincial governments also aid in fish-culture to a limited extent.

Scientific Stations. — Three scientific bio¬

logical stations are maintained by the govern¬ ment for the study and solution of fishery problems. One is situated at Saint Andrews, N. B., another at Georgian Bay, Lake Huron, and the other at Departure Bay, B. C. The staff at all three institutions consists of pro¬ fessors and specialists from Canadian uni¬ versities.

Bait Freezers and Guano Works, *etc.* —

In order to meet the needs of deep-sea fisher¬ men, who suffer much from irregular supplies of bait, the Canadian government assists in the building and maintenance of bait-freezers at convenient and suitable ports. The incursions of hordes of destructive dogfish and the injury to the fisheries resulting from the dumping of fish offal in the sea have moved the govern¬ ment to start fish waste reduction works at various localities on the coast. Under govern¬ ment management these works purchase dog¬ fish, cod-heads, etc., and convert them into guano and fish oil.

Inspection and Branding of Pickled Fish.

— In June 1914, the Dominion government passed an act to provide

for the inspection and branding of pickled fish, such as mackerel, herring, alewives and salmon. The object of the act is to bring into use a strong, well-made barrel of a standard size for marketing such fish in ; also to raise the standard of curing and grading the fish, so that the cured article may secure the confidence of dealers and consum¬ ers at home and abroad and be traded in with advantage to the producer and dealer alike. A staff of competent inspectors carry out the provisions of the act, and if they find the fish cured and graded in accordance with the act, and packed in barrels that are of the standard size and make, a mark in the form of a crown is branded on the side of each barrel of fish so conforming to the act. The brand shows the grade and kind of fish contained in the bar¬ rel. It is expected that the pickled fish trade will be greatly extended and its value en¬ hanced by means of this system of inspection.

Inspection of Fish Canneries. — A sys¬ tematic inspection of all lobster, salmon and other fish canneries is maintained by officers of the Fisheries Department for the purpose of ensuring that the various kinds of fish and shellfish are canned under proper sanitary con¬ ditions, and to prevent the canning of unsound fish.

Fisheries Protection Vessels. — A fleet of 45 vessels of various kinds patrols the Atlantic and Pacific coasts and the inland lakes for the protection and regulation of the fisheries.

Central Administration. — For the adminis¬ tration of fishery affairs a special government Department of Marine and Fisheries was cre¬ ated at Confederation (1867) under a minister of the Crown. A deputy minister and a large staff of inside and outside officials carry out the administrative duties which fall to the Fed¬ eral authorities. Statistics of the quantities and kinds of fish landed in all parts of Can¬ ada are carefully collected by officials of the department and published first in the form of a monthly bulletin and afterward in the form of an annual detailed report. The Dominion ex¬ penditure on fisheries, including fisheries pro¬ tection, amounts to nearly $1,500,000 annually.

John J. Cowie,

Department of Marine and Fisheries, Ottawa.

44. MANUFACTURES. The 1911 cen¬ sus of Canada, which affords the latest com¬ prehensive view of Canadian manufacturing, gave the total value of manufactured products in establishments employing five hands and over as $1,165,975,639, and placed a value on the raw materials consumed in the manufactur¬ ing process at about half that amount. A pos¬ tal census of manufactures for the year 1915 shows an annual production over $240,000,000 in excess of the total above quoted. Compared with the beginning of the century, the latter figures reveal a growth of nearly three times in the value of products.* They also effectively reveal the important place which manufactur¬ ing has come to occupy within the Canadian economic scheme. Only one other total, that of agriculture, vies with manufactures. From the billion dollars' worth of cereals and ani¬ mals produced on Canadian farms in 1915 there are, of course, comparatively few deductions to be made an account of raw materials con¬ sumed, the allowing for which is one of the vexing problems of statistics of manufactures. It would apparently, however, be safe to say that the manufacturing industry of Canada con¬ tributes a new value approaching half a billion dollars annually to the production of the coun¬ try, a total which places manufacturing an easy second to agriculture in the Canadian indus¬ trial organization.

Anything like a detailed description of man¬ ufacturing in Canada exceeds the intention of the present article. It may, however, be prac¬ ticable to run over in a summary way the lead¬ ing groups into which the industry may be di¬ vided. These divisions are necessarily some¬ what arbitrary, but perhaps the best initial ap¬ proach is from the standpoint of the primary extractive industries, whose products it is the function of the manufacturer to turn into the forms required for final use.f

Food Production. — First then with regard to manufactures using Canadian farm products as raw materials. The most important indus¬ try under this heading is flour and grist milling which had a production valued at $114,483,924 in 1915, the larger mills being located at points strategic to the grain fields of Ontario and the West. Exports of flour in 1915-16 amounted to $35,767,044 and of oatmeal to $471,298. Bread and biscuit-making establishments re¬ ported a total product of $40,772,216.

The butter and cheese factories of Canada yielded a product valued at

about half that of the flour mills in 1915, a total which does not include farm-made produce. These are chiefly small establishments owned for the most part by associations of farmers. The ma¬ jority are in Ontario and Quebec, though the Maritime provinces have a well-developed dairying industry, and rapid progress is being made in the West, where the provincial govern¬ ments have in some cases operated the plants. Condensed milk factories yielded $3,725,668 in 1915. Exports of butter, once a very heavy item, have decreased in recent years with the great increase in home consumption. Cheese

* The rise in prices accounts for perhaps one-third of this increase.

t The statistics which follow are quoted from the 1915 Postal Census of Manufactures. Where the war has pro¬ duced somewhat abnormal conditions mention is made of the fact.

exports, however, have steadily increased, reaching a total in 1915-16 of $26,690,500.

Against the live stock branch of farming may be placed a large meatpacking industry, the total product of which reached $96,789,731 in 1915. Meat packing has increased very rap¬ idly in Canada during the past few years, and there has also grown up an important whole¬ sale fresh meat trade. The latter was practi¬ cally non-existent in 1900. Soap making, which is usually subsidiary to meat packing, is not so in Canada ; the product reached a value of $6,445,939 in 1915. Leather making is more directly associated with live stock ; the total Canadian product was valued at $3,654,491 in 1915, most of it, however, from imported hides. The boot and shoe industry, based on the leather trade, had an output of $34,064,696, the city of Quebec being the main manufacturing point. The harness and saddlery output ac¬ counted for $8,739,278 more, and gloves and mitts for an additional $1,899,092.

Fruit and vegetable canneries, located chiefly in southern and southwestern Ontario, reported a product of $3,794,922 in 1915. Jams and jellies added over a million to this total, evaporated fruits and vinegar and pickles an¬ other million and a quarter each. Starch pro¬ duction exceeded $2,600,000.

The Canadian fisheries (which it may be re¬ marked in passing are potentially the most im¬ portant in the world, both from the

standpoint of area of fishing grounds and the abundance, variety and quality of the catch), are also the basis of a large manufacturing industry. The salmon canneries of British Columbia and the lobster canneries of the Maritime provinces are world famous. Altogether the value of preserved fish products in 1915 was about $15,000,000. There is a large dried fish in¬ dustry (domestic) in Nova Scotia, which, for two generations, has found its chief market in the West Indies. Factory production in the same district, however, is growing, and is be¬ ginning to enter into competition with Glouces¬ ter, Mass., and other centres of the cured fish trade. The future of Canada's status in this industry seems assured. See Canada — Fisheries (article 43).

The above includes the more important items of Mood production,® which is one of the stock grouping of manufactures. The chief omissions are the industries whose raw materials are imported into Canada, e.g., sugar. Eight sugar refineries are in operation in Can¬ ada, yielding in 1915 a product valued at $37,- 752,235. Manufactures of cocoa and chocolate, coffee and spices, baking powder, etc., yield a product of $10,278,000.

Wood and Paper. — The lumbering indus¬ try of Canada is one of its most historic and picturesque industries, and the unrivalled for¬ est wealth which forms its background vouches for its continuance. It is also one of the most widely diffused of Canadian industries. South¬ western Nova Scotia is important for its saw¬ milling, though less so than the interior of New Brunswick tapped by the Saint John and Miri-michi rivers. Northern Quebec, the Ottawa Valley, the Georgian Bay district and the ter¬ ritory north and west of Lakes Huron and Su¬ perior are the sources o4 an extensive lumber trade. Northern Saskatchewan and Manitoba have also important timber areas, though

dwarfed by the wealth of British Columbia in this respect. The total product which these various sources yielded in sawn lumber, shin¬ gles and laths, reached a value of $68,815,472 in 1915; this, however, was under war con¬ ditions, which were perhaps more depressing in the lumber trade than in any other branch of industry. In 1911, the

output was almost exactly half again as large. Side by side with this initial working up of the raw material may be placed the manufacture of sashes and doors, blinds, boxes and similar products, the output of which in 1915 was over $18,370,604. Cooper¬ age added $1,989,564. A higher grade of manu¬ facture is represented by furniture, the value of which was well over $9,765,339 in 1915; car¬ riages and wagons with a somewhat higher value ; musical instruments and materials with a value of $4,500,000 ; and brooms and brushes with a value of $1,378,828. Cars, car works and car repair shops reported a product of $39,-

794,379.

Wood pulp and paper making may be treated in close connection with lumbering. The total output of both in 1915 was $40,348,000. Paper bags and boxes manufactured in 1915 were val¬ ued at $5,350,667, and stationery at $3,306,545.

The printing and publishing trade is scarcely to be linked with the paper industry. It may, however, be noted here as well as elsewhere that the output of Canadian printing, book¬ binding and lithographing establishments in 1915 was valued at over $33,000,000.

Mineral Products. — The manufactures which have mining for basis are very import¬ ant in Canada. It is usual to group iron and steel production by itself. There are over 20 blast furnaces in Canada with a total daily ca¬ pacity of, say, 4,500 tons. The value of the pig iron product in 1913, a high year, was $16,540,000. Steel ingots and castings went over a million in the same year. Total smelter products (in which the above are in¬ cluded) were valued at $102,000,000 in 1915. Some of the most extensive and distinctive Canadian industries are engaged in iron and steel manufacture, such as the Dominion Iron and Steel Company, the Nova Scotia Steel and Coal Company, the Algoma Steel Company, the Steel Company of Canada, the Canada Car and Foundry Company, *etc.* Based on the raw materials which these supply is a large and varied industry. Foundry products totalled over $36,736,000 in value in 1915 ; electrical ap¬ paratus and supplies, $18,108,241; iron and steel bridges, $9,611,000; boilers and engines, $8,546,488; brass castings, $7,787,302; wire,

$6,280,000; aluminum, $4,071,000; plumbers' supplies, $2,268,800;

coke, $4,416,000. Other great industries that may be regarded as in a way subsidiary to this branch are the automo¬ bile industry, the production of which with its accessories totalled over $28,000,000 in 1915; and the agricultural implement industry with a total product of over $13,370,000. The latter is perhaps the leading example of a Canadian industry having a market in practically every quarter of the globe.

Cement and cement products were valued at $11,676,000 in 1915; brick and tile at $2,931,575; paints and varnishes at $8,373,746. The cut stone industry had a product of $2,568,491. The glass product was valued at $4,718,000, to which mirrors and plate glass added $1,095,000.

Textiles, Rubber, Liquors and Tobacco. — There remain several groups of manufactures whose connection with the primary industries of the country is not so immediate. Among these is the textile industry. Canadian cotton mills had a product of $20,512,909 in 1915; woolens a product of $12,889,708; while silk and silk products aggregated $1,277,044. The clothing industry associated with these raw materials is also very considerable. Men's and women's factory clothing was approximately $41,000,000 in value; hosiery and knit goods over $16,096,800; hats, caps and furs $7,559,000; and carpets $1,500,000. Dyeing and cleaning establishments valued their total contribution at $3,986,670. The rubber industry approxi¬ mated $14,500,000 in value of product. Liquors and tobacco is a second important group of this kind. Distilled and malted liquors were produced in Canada to the value of $30,756,000 in 1915, while manufactures of tobacco in all forms aggregated $28,987,250. Tobacco grow¬ ing has made rapid strides in Quebec and south¬ western Ontario recently, and British Columbia is beginning to introduce the industry.

Summing up by provinces, approximately half of the Canadian manufacturing industry is in Ontario, and well over half of the re¬ mainder in Quebec. British Columbia stands third with about one-fifth the output of Quebec, while Nova Scotia and Manitoba follow close behind. Saskatchewan has a very slight manu¬ facturing industry, though larger than Prince Edward Island, which stands lowest.

The accompanying tables, showing the num¬ ber of establishments, number of employees and value of products in certain of the more important groups of manufactures and in the several provinces, will be of interest for pur* poses of more detailed reference.

Manufactures of Canada, 1915, by Provinces.

Provinces

Estab¬

lish¬

ments

Capital

Employees on salaries

Employees on wages

Cost of materials

Value of products

No.

Salaries

No.

Wages

Canada .

Alberta .

British Columbia .

Manitoba .

New Brunswick .

Nova Scotia .

Ontario .

Prince Edward Island… .

Quebec .

Saskatchewan .

No.

21,906

584

1,007

840

714

968

9,887

291

7,158

457

$

1,994, 103,272 42,239,693 158,636,983 95 , 845 , 845 46,290,014 126,539,183 956,883,423 1,906,564 548,972,575 16,788,992

52,683

1,242

2,376

2,427

1,482

2,330

27,763

224

14,084

755

$

60,308,293 1,456,574 3,050,303 3,012,197 1 , 465 , 384 2,277,622 31,460,937 120,033 16,723,756 741,487

462,200

6,325

26,477

17,459

16,219

31,423

220,016

2,132

139,224

2,925

$

229,456,210 3,660,549 12,837,442 10,650,600 7,391,949 14,073,758 113,502,779 438,389 64,931,720 1 ,969,024

$

802,135,862 21,121,439 42,284,883 38,513,514 21,495,324 3 7,738,161 415,285,954 1,520,327 216,497,844 7,678,416

$

1,407,137,140

30,592,833

73,624,431

61,594,184

37,832,034

70,860,756

727,923,274

2,646,469

387,900,585

14,162,574

448

CANADA-MANUFACTURES (44)

Manufactures of Canada, 1915, by Groups of Industries.

Estab—

Employees on salaries

Employees on wages

Cost of materials

Value of products

Groups of Industries

lishments

Capital

No.

Salaries

No.

Wages

1. Food products .

No.

7,072

$

199,205,254

7,250

$

7,333,245

55,085

$

22,026,238

$

301,618,217

$

388,815,362

2. Textiles .

2,671

126,490,509

5,827

6,462,926

68,624

27,044,812

81,429,429

144,686,605

3. Iron and steel products .

851

195,877,015

5,683

6,833,897

53,678

27,267,716

59,207,670

120,422,420

4. Timber and lumber and their remanufacture .

3,187

263,588,882

4,707

5,725,475

63,663

28,964,555

59,212,349

123,396,686

5. Leather and its finished products .

524

60,269,498

2,279

2,540,270

20,307

10,306,114

45,201,497

71,036,644

6. Paper and printing .

1,306

138,544,786

6,247

6,879,560

30,817

18,780,569

29,324,906

74,038,398

7. Liquors and beverages. .

341

52,283,857

1,016

1,712,503

4,376

2,961,993

10,129,252

34,859,927

8. Chemicals and allied products .

255

52,248,588

1,993

2,302, 447

10,436

5,413,846

24,930,308

45,410,486

9. Clay, glass and stone products .

772

96,376,57 3

1,269

1,713,189

14,498

8,249,184

10,971,641

27,244,813

10. Metals and metal prod¬ ucts other than steel

1,173

174,621,994

2,781

3,418,307

27,011

17,557,632

45,931,080

90,943,27*

11. Tobacco and its manu¬ factures .

166

23,066,898

1,081

1,445,524

8,532

3,083,000

16,017,707

28,987,250

12. Vehicles for land trans¬ portation .

464

125,965,499

2,630

2,652,568

34,195

18,637,539

40,547,113

73,878,212

13. Vessels for water trans¬ portation .

103

12,331,341

270

326,954

5,261

2,467,074

3,035,857

8,419,648

14. Miscellaneous industries

1,437

441,132,723

8,367

9,334,448

47,901

25,934, 136

56,324,658

134,268,231

15. Hand trades .

1,584

32,099,855

1,283

1,626,980

17,816

10,761,802

18,254,178

40,729,180

Total of groups…

21,906

1,994,103,272

52,683

60,308,293

462 , 200

229,456,210

802,135,862

1,407,137,140

Comparative Statement of the Returns of the Postal Censuses of 1906 and 1916.

Increase

Items 1905 1915 Amount Per cent

Establishments, No . 15,796 21,906 6,110 38.68

Capital . $846,585,023 $1,994,103,272 $1,147,518,249 135.54

Salaries . 30,724,086 60,308,293 29,584,207 96.29

Wages . 134,375,925 229,456,210 95,080,285 70.76

Value of products . 718,352,603 1,407,137,140 688,784,537 95 88

The preceding brief review will serve to show the substantial status that has been achieved by manufacturing in Canada. Two remaining points may be touched upon. Apart from an abundance of raw material, the first requisite in manufacturing is cheap motive power. Canada is well supplied with bituminous coal. The fields of Nova Scotia are extensive, and are cheaply worked, and the prod¬ uct is accessible to Quebec and Montreal by water transportation. Ontario, however, is largely dependent for its coal on Pennsylvania, and in the

west a long and difficult haul sepa¬ rates the exceedingly rich deposits of Van¬ couver Island and the Crow's Nest Pass from the prairie centres. In the other great power factor, however, that on which the future of manufacturing will more and more depend, viz., the <(white coal® of water power — there is probably no other country in the world more fortunately endowed than Canada. Practically every large centre from coast to coast has abundance of water power available not only for present, needs, but for all requirements within anticipation. Quebec and Montreal tap the resources of the Shawinigan and the Cedar Rapids of the Saint Lawrence ; central and eastern Ontario the Trent Valley and the Ot¬ tawa ; southwestern Ontario has the three great plants at Niagara Falls; Winnipeg the two large plants of the Winnipeg River; Calgary those of the Bow River; while Vancouver has developed the Coquitlam with its 400 feet of head. Altogether there are in Canada exclu¬ sive of the Northwest terrritories, the Yukon

and the northern and eastern portions of Quebec, approximately 17,750,000 horse power available, this amount including in the case of Niagara Falls and other border powers only the development permitted by international treaties, and excluding the possibilities of storage for the enlargement of present capacities. Of this, considerably less than one-tenth has as yet been developed — two-thirds of the development hav¬ ing been carried out only within the past 10 years. The <(Hydro Electric Power Commis¬ sion® of the Ontario government is perhaps the most extensive experiment in government own¬ ership and operation of an important utility in Canada. In 1915 not less than 73 municipali¬ ties and 96,744 consumers were obtaining elec¬ tric power through this body, whose invest¬ ments in power development in the six pre¬ ceding years reached a total of approximately

$25,000,000.

The labor factor may be mentioned briefly. A heavy immigration has in recent yearsi main¬ tained the labor supply, and though government encouragement is extended only to agricultural¬ ists and domestic servants, the influx has in¬ cluded considerable numbers of skilled artisans. The census of occupations, 1911, credited 491,- 342 (98,561 female) <(workers® to manufac¬ tures, the largest total outside of agriculture. These were further divided as follows : Me¬

chanical 303,471; textiles 20,642; food 45,816; clothing 80,409; other factories 41,000. From the standpoint of organized labor, several of the most powerful unions are among employees of industrial establishments. In the metal

trades, 186 unions with a membership of 11,813 exist; in the boot and shoe and clothing trades, 59 unions with a membership of 4,966; and in the printing and allied trades, 91 unions with a membership of 6,614. These unions are international,® i.e., are part and parcel of the similar movement in the United States, though with a Dominion <(Congress,® which plays much the same role in Canada as the American Fed¬ eration of Labor in the United States. There is a purely Canadian ((Federation of Labor,® but its following is small. The technical educa¬ tion of labor has made a substantial beginning in Canada and the country is alive to its import¬ ance. Its development was the subject of inquiry by a royal commission of seven mem¬ bers, appointed in 1910, who after two years' investigation brought in a comprehensive scheme for Dominion and provincial cooperation.

Historical Sketch. — The Canadian manu¬ facturing industry may be said to have been born of the protective tariff of 1878. There were manufactures, of course, before that date. Iron working had been an industry in Quebec from the days of Frontenac, and the ship¬ building yards of New Brunswick were famous half a century ago the world over. Prior to Confederation, however, the greater opportuni¬ ties and more imperative tasks of agriculture forced manufacturing into the background, and such industries as arose were small and catered to local markets. Flour mills and saw mills were the most numerous ; tanning also was a flourishing industry. The woolen mills of Ontario in these early days were of considerable relative importance. In 1876, however, it was still possible for a captain of industry to de¬ clare that <(there isn't a manufacturer of us all who has not come up from five dollars.® To this phase the tariff of 1878, which banished the policy of "incidental protection® and aimed to found a well-rounded manufacturing industry, was the end. A notable expansion set in with

1879 and lasted until 1882, after which the general stagnation accompanying the fall of prices told unfavorably. The “national policy® (as the protective scheme of 1878 was styled) may, however, be said to have doubled the extent of the industry within about a decade. It was not until after the end of the century that a like forward movement was repeated. Throughout the nineties, in fact, manufacturing no more than held its own, employing fewer wage-earners and paying out less for labor, though showing a gain in capitalization and value of products. With the opening of the 20th century, however, this was rapidly over¬ come. Manufacturing within a decade nearly trebled its capitalization ; increased the number of its employees by one-half ; considerably more than doubled the amounts paid out in salaries and for raw materials, and increased the value of its product from $481,053,375 to $1,165,975,639. A strong tendency toward specialization and merger made itself felt after 1907, over 40 combinations having been made in the three years 1908, 1909 and 1910; it passed away, however, rather quickly, not having proved the success that was expected. The general expansion continued during 1911 and 1912, but sank back with 1913, being revived, though in a new direction, by the heavy orders for war materials that came from Lurope shortly after the declaration of war in August vol. 5 — 29

1914.* In the remarkable story of expansion, therefore, which constitutes the history of Canada during the 20th century, and which had its basis in the opening up of the Canadian west to agriculture and the building of rail¬ ways on an unprecedented scale as feeders of the new territory, manufacturing contributes one of the most important chapters. With the growth of western agriculture the claim of the Canadian manufacturer to special favors under the tariff has been challenged with more in¬ sistence than previously. Independently of fiscal policy, however, which has shown no tendency to fundamental change, it may be predicted with assurance that manufacturing will play an important role in Canadian de¬ velopment, and that in many lines of products Canada bids fair to become one of the world’s growing sources of supply.

R. H. Coats,

Dominion Statistician and Controller of Census, Ottawa.

45. WATER POWERS. Some years ago the late T. C. Keefer, C.M.G., a distinguished Canadian engineer, in a presidential address before the Royal Society, described the water resources of Canada in the

following words :

“An examination of any good map of our broad Domin¬ ion, reveals, as its most striking feature, an extraordinarily wealthy and remarkably uninterrupted succession of lakes and rivers, suggestive of ample rainfall, the first great requi¬ site in the occupation of any country. Over a length of several thousand miles, between Labrador and Alaska, and over a width of several hundred miles, there is an almost continuous distribution of lakes, lakelets and rivers; the lakes of varied outlines, dimensions and elevations above sea-level, and many possessing facilities for the storage of their flood waters. In many places the outlet from the lake or the connection between a chain of lakes is a narrow cleft in rock where an inexpensive dam will hold back the water supplied by the winter’s accumulation of snow.”

These words were written shortly after the first successful transmission of high voltage electricity had opened a new era to water power, and they were designed to emphasize the fundamental advantages that Canada possessed under the new regime. Even in the days of the first Canadian settlers, however, when the harnessing of Niagara would have seemed the wildest of dreams, the earliest manufactures were prescribed by water power, and it was not until the late seventies that the water-driven saw mills and flour mills of Ontario ceased to occupy the premier place in the Canadian in¬ dustrial scheme.

It would be easy, of course, to exaggerate the importance of water power and of Canada’s wealth in that particular. Thus, though the Dominion has a water area of 125,755 square miles, as compared with only 52,630 square miles in the United States, many factors must be considered before such figures are taken at their face significance. The development of power is only one of many uses to which the water resources of the country may be put, and these uses include such important ones as navi¬ gation, irrigation and domestic and municipal supply. Moreover, water area is not the same as volume of water, and the volume of water is only one factor in water power, the other being hydraulic head, or the vertical distance through which the water falls.

Nevertheless the resources of Canada in

* Up to 1 June 1917, the Imperial Munitions Board alone had forwarded war materials to the value of $510,000,000 to the government of the United Kingdom from Canada.

this respect are so great as to make moderate statement difficult. Within the nine provinces of the Dominion, excluding the Northwest ter¬ ritories and the northern and eastern portions of Quebec, it is estimated that 17,746,000 horse power are available. Of this amount, — includ¬ ing in the case of Niagara Falls and other international streams only such development as is permitted by .treaty, and taking no account of the increases that would be rendered pos¬ sible by storage, — fully 8,000,000 horse power are readily available to present markets.

Not more than one-fifth of this latter total and less than 10 per cent of the whole has been developed up to the present. By provinces, the record is as follows:

Nova Scotia .

New Brunswick .

Prince Edward Island

Quebec .

Ontario .

Manitoba .

Saskatchewan .

Alberta .

British Columbia… . Y ukon .

Developed horse power

21,412 13,390 500 520,000 789,466 56,730 45

33,305 265 , 345 12,000

Total

1,712,193

Of the above, about 75 per cent goes to the production of electrical energy, and over half the remainder to pulp and paper manufacture.

It is impossible within brief space to de¬ scribe in any detail the progress that has been made in bringing this great asset into the serv¬ ice of the community. It will be of interest, however, to run over the several districts into which the country may be divided from this standpoint, noting in each the main develop¬ ments and the promises that the future holds out.

The Maritime Provinces. — Coal, timber and fish rather than secondary production are the industries for which the Atlantic provinces are known. The land area is not extensive and it is so cut Up by the sea that with one or two exceptions no large river systems exist, while the smaller streams are tidal for considerable distances inland. Offsets, however, are found in the heavy rainfall and in the dispersion of water power sites, most of the seaports, where industrial activity may be expected to increase, having water powers in close proximity. Upon the whole, therefore, the power equipment of these provinces is considered satisfactory for present and future needs, though the latter include the heavy demands represented by the smelting of iron ores on a large scale and a considerable steel industry. Existing develop¬ ments are mainly of two types : Saw, pulp and paper mills, based on the timber resources of the country; and municipal lighting plants. A few woolen and grist mills driven by water are also found. New Brunswick to date has de¬ veloped about 13,000 horse power, the largest plant being at Aroostook Falls, where 3,800 horse power is manufactured, for sale chiefly in the State of Maine. Nova Scotia has over 21,000 horse power developed, more than half for the manufacture of pulp and paper; gold mining employs 1,150 horse power in this prov¬ ince. The largest water power in the Maritime provinces and one of the largest sites in Canada is at Grand Falls on the Saint John River, where it is now proposed to instal 80,000 horse

power. The Nepisguit is another New Bruns¬ wick stream which offers 10,000 horse power for development. The Mersey River in south¬ western Nova Scotia has a potentiality of 30,000 horse power, of which only 4,250 is now in use.

Quebec and Eastern Ontario. — Coming to Quebec (where 75 per cent of all the power consumed is water power) and eastern Ontario, five groups of water powers — all part of or subsidiary to the Saint Lawrence River — may be distinguished. The first has the city of Quebec for centre. It comprises the Chaudiere River to the south, the Montmorency and Saint Anne in the near vicinity (whose combined present development of 19,000 horse power operates the tramways and many of the fac¬ tories of Quebec) and the Lake Saint John region to the north. On the Saguenay, the outlet of Lake Saint John, it is estimated that a continuous supply of 300,000 horse power can be obtained — a supply that could be doubled by storage — whereas on the rivers flowing into the lake several additional hundreds of thousands of horse power are available. The second group is that of the Saint Maurice, which joins the Saint Lawrence at Three Rivers, and which alone offers a potentiality of 650,000 horse power. Two very large plants are already installed ; that of the Shawenegan Water and Power Company at Shawenegan Falls, where 155,000 horse power is produced for local manufactures and for Montreal, Three Rivers and other neighboring cities ; and that of the Laurentide Company which controls the fall at Grande Mere, with its 300,000 horse power, 12 miles above Shawenegan, and which manufactures 250 tons of paper daily. At La Tuque, 103 miles from Three Rivers, is a third fall of 70 feet, capable of generating 75,000 horse power, of which only 3,500 is developed. A third group has Montreal, the commercial capital and outport of Canada, for central market. In it are included the Cedar Rapids of the Saint Lawrence, which have a poten¬ tiality of 160,000 horse power, of which 90,000 is developed by one company and 20,000 by a second. Another 13,000 horse power is avail¬ able for Montreal from the Soulanges Canal, still another 13,000 from the Lachine Rapids, whilst Chambly on the Richelieu River con¬ tributes 20,000 horse power to this favorably situated metropolis. It is estimated that an additional 240,000 horse power can be developed for Montreal as the demand arises. The fourth group is that of the Ottawa Valley, on the Quebec tributaries of which several hundred thousands of horse power remain to be devel¬ oped, the Gatineau alone having 225,000 horse power, none of it utilized. Further north and west on the Ontario side the Cobalt mines are supplied by the Northern Light and Power Com¬ pany, who, in a

single year, reduced the con¬ sumption of coal in the camp from 63,000 tons to 17,000 tons. On the Ottawa River itself 600,000 horse power would be rendered available by the canalizing of the river. Development, however, is at present confined to the large industries of Ottawa and Hull operating at the Chaudiere Falls and consuming about 36,000 horse power. The rapids of the upper Saint Lawrence may be considered a fifth and last group in this area. They have been utilized only to a small extent for local purposes.

Central and Southwestern Ontario. — The

1 rent River system is the main supply of cen¬ tral, and Niagara Falls that of southwestern, Ontario. No event in the history of the sub¬ ject has so appealed to the imagination as the harnessing of Niagara Falls and the employ¬ ment of its gigantic energy to turn the factory wheels and light the streets and houses of the scores of towns and cities dotting the thickly populated area between Lakes Huron, Erie and Ontario. Under franchises granted by the province of Ontario 405,000 horse power is to be developed at Niagara Falls, 100,000 by the Canadian Niagara Power Company, 125,000 by the Electrical Development Company and 180,- 000 by the Ontario Power Company. Between 1905 and 1914, 369,000 of this was placed on the market, chiefly in the districts between Toronto and London. Linked with Niagara is the plant of the Dominion Power and Transmission Com¬ pany at Decew Falls, where 57,000 horse power is developed by drawing water from the Wel¬ land Canal and carrying it over the Niagara escarpment, a development which renders pos¬ sible the operation of an extensive system of radial and street railways in the Niagara Pen¬ insula and lies at the basis of the rapid indus¬ trial development of the city of Hamilton. Another international power is that at Sault Sainte Marie, where the Algoma Steel Company and allied industries have developed 17,000 horse power. Returning to the Trent system, about 75,000 horse power is there rendered available by the construction of the canal ; of this 45,000 horse power is already in use, the Electrical Power Company having seven plants and sup¬

plying a wide territory. The deforestation of southern Ontario and consequent alteration of the regimen of the rivers has greatly reduced the power potentialities of the province.

New Ontario. — The northern and western portions of Ontario are rich in water powers. Of developed works, that of the Canadian Cop¬ per Company at Spanish River (10,000 horse power) and that of the Kaministiquia Power Company at Kakabeka Falls near Port Arthur and Fort William (15,500 horse power) are the most important. The Lake Nipigon region and the rivers flowing into James Bay offer per¬ haps 2,000,000 horse power for future develop¬ ment, only a few thousands being now in use.

The Prairie Provinces. — The two chief de¬ velopments in the prairie sections of Canada are those on the Winnipeg River, which supply Winnipeg with power, and those on the Bow River, acting as feeders to Calgary. The Win¬ nipeg municipal plant and the Winnipeg Elec¬ tric Railway Company's plant on the former aggregate a turbine capacity of 79,700 horse power, but this is only a fraction of the total capacity of the river. On the Bow River, the three plants now installed at Eau Clair, Horse¬ shoe Falls and Kananaskis Falls, respectively, yield altogether over 32,000 horse power. The above, however, are merely the first beginnings of power development in western Canada. The North and South Saskatchewan have several important power sites, while the Nelson, with one of the principal drainage areas of the con¬ tinent, has been estimated to offer no less than 2,500,000 horse power, there being 19 power sites on it, each of which would produce from 75,000 to 235,000 horse power. The Churchill, the Athabaska and the Peace are likewise

rivers of great potentialities. For the moment, however, these, like the Nelson, lie beyond reach of a market.

British Columbia. — The <(sea of moun¬ tains " which constitutes the interior, and the heavy precipitation of a mild and equable cli¬ mate, makes British Columbia a country of numerous lakes, large and rapid rivers and abundant water powers. The latter early at¬ tracted attention. The first development was made 18 years ago at Bonnington Falls on the Kootenay, where 23,000 horse power is now available for the important mining and smelt¬ ing industries of Rossland and Trail. About the same time the British Columbia Electric Railway Company developed the Goldstream plant on Vancouver Island; but this has been completely eclipsed by the later plants of the same company at

Lake Buntzen on Burrard Inlet (being the largest in the province with 84,500 horse power), and at Jordan River on Vancouver Island (25,000 horse power). Other large British Columbia plants are those of the Northwestern Canada Power Company at Stave Lake (26,000 horse power) and of the Powell River Company, Limited, at Powell River, the latter a newsprint establishment generating 24,000 horse power. Altogether over 265,000 horse power has been developed, but it is esti¬ mated that there are nearly three times that amount available within market distance of Vancouver and Victoria alone.

The foregoing rapid sketch will serve to show the importance both present and to come of the water power resources of the Dominion. Next to their great extent — Canada in this re¬ spect standing second only to the United States, and higher than any other country in the world except Norway on a per capita basis — their proximity to leading centres of population will have been apparent. All across the continent the great cities of Canada have at their disposal an enormous supply of the power which is so essential to their future as industrial centres. Another feature which it has been possible to mention only incidentally is the rapidity of the strides with which Canada is now entering upon her inheritance. Of the total horse power at present in use not less than two-thirds have been developed within the past 10 years, whilst a quarter of a century ago it may be said that the present development had not even been begun.

As an evidence of the awakening of public opinion on the importance of water power, reference may be made to the organization of the Hydro-Electric Power Commission of Ontario, whose operations represent the largest effort in Canada in the way of public adminis¬ tration of a national utility. The Commission was created in 1906, largely upon the report of a previous royal commission of inquiry into the possibilities of Niagara power. Public sentiment had become aroused through fear that the only great source of hydraulic power for southwestern Ontario might be exploited in private interests. The Hydro-Electric Commis¬ sion began by conducting an extensive series of investigations under direct governmental aus¬ pices into the power resources of the province. The next step was the vesting of the Com¬ mission with powers of administration, under which it at once contracted for supplies of power at Niagara and elsewhere, and consti-452

tutcd itself a great transmission and supplying agency. Within four years over 1,000 miles of transmission lines and over 1,500 miles of tele¬ phone lines had been constructed. In 1915, the Commission was supplying 73 municipalities, and its distribution of power from Niagara alone amounted to 63,500 horse power, the number of consumers reaching nearly to 100,- 000. The investment by the Commission and its customers to date approximates $24,500,000. The outlook is that within a few years/ these totals will be largely exceeded.

For official information regarding water powers in Canada, application may be made to the water powers branch of the Department of the Interior of the Dominion government, which exercises jurisdiction in the provinces of Manitoba, Saskatchewan, Alberta and in the unorganized territories of Canada. For the provinces, the following officers are in control : Nova Scotia: the secretary of the Nova Scotia Water Power Commission, Halifax, N. S. ; New Brunswick: The surveyor-general of New Brunswick, Fredericton, N. B. ; Quebec: The chief engineer, hydraulic service, Department of Lands and Forests, Quebec, Quebec; Ontario: The Deputy Minister of Lands, Forests and Mines, Toronto, Ontario; also, the secretary of the Hydro-Electric Power Commission of Ontario, Toronto, Ontario; British Columbia: The comptroller of water rights, Victoria, B C

R. H. Coats,

Dominion Statistician and Controller of Census.

46. COMMERCE, TARIFFS AND TRANSPORTATION. Early Trade Rela¬ tions. — In their earlier condition the various provinces of British North America, now form¬ ing the Dominion of Canada, were all alike subject to those general laws which embodied the principles, if not always the practice, of the British colonial system. Owing, however, to variations in location, natural resources and the character of the inhabitants, the commerce and tariffs of the various provinces were more or less adapted to their special conditions.

Before the conquest of Canada the Mari¬ time provinces, under the general name of Nova Scotia, were valued as a market for British goods and as a field for the furnishing of naval supplies, chiefly sailors, fish and timber. Nova Scotia's trade was almost entirely devel¬ oped in connection with New England and the West Indies. Trade with French Canada was illegal, on both sides, and for the most part

unprofitable, except for furs in exchange for British manufactures. It was but natural, therefore, that after the conquest of Canada and the independence of the United States, Nova Scotia should still continue to trade chiefly with the New England States and the West Indies, and only to a limited extent with Canada.

Owing to their extensive coast line and nu¬ merous harbors, New Brunswick being also well supplied with river navigation, the question of transportation was long a simple one for the Maritime provinces. For Canada, the Saint Lawrence and its tributaries had always fur¬ nished the great highway of the country. But above Montreal the river was greatly obstructed by rapids, hence the trade to the West was first developed along the easier Ottawa route, which passed by way of Lake Nipissing to the

Georgian Bay. There it followed the sheltered northern channel and the Saint Mary River, with a portage at Sault Sainte Marie, up to Lake Superior, and on, by numerous lakes and streams, to the vast Indian country beyond.

The coming of the Loyalists, the first settlers in what is now the province of Ontario, ren¬ dered necessary a regular traffic up the Saint Lawrence and along the lower lakes. From Montreal to Prescott and Kingston this traffic was carried on by means of various forms of large flat-bottomed boats, known as bateaux, which were towed up the rapids, later with the aid of horses. These bateaux brought up lim¬ ited supplies of European imports, chiefly Brit¬ ish goods, and took down the furs and, so far as their space would allow, the potash and flour of the Western settlements. The Revolutionary War had led to the building of the first British vessels on the lakes. After the peace, several of these became trading vessels and others were built, the number steadily increasing with the growth of the Canadian and American settle¬ ments on either side of the lakes. The pres¬ ence of lake vessels diverted the greater part of the Indian trade from the northern to the southern route.

At first most of the surplus produce of the Western settlements found a ready local market in supplying the temporary needs of new settlers, and in furnishing provisions for the Indian posts and the British garrisons. With increasing crops, however, there soon arose a necessity for export, especially of such articles as wheat, flour, peas, salt meat and various minor provisions. About the beginning of the 19th century the amount of provisions produced in western Canada

was nearly equivalent to the amount purchased by the British govern¬ ment for consumption at the garrisons and posts. In 1801 the total exports of Canada amounted to $4,800,000. This growing trade required a more extensive and economical means of conveyance than that afforded by the bateaux. A trade in staves and various forms of timber having developed about the same time, and being sent to market in the shape of rafts, these were utilized to convey such pro¬ visions as might suffer a little exposure. Large square scows were also built for the purpose of taking provisions to market in bulk.

As regards tariffs and trade regulations in the earlier Colonial period, nothing was left to the provincial authorities ; all was regulated by British statutes and administered by Imperial officers. In the matter of taxation, after the American Revolution the British North Amer¬ ican colonies had little to complain of, for in¬ stead of being taxed to assist Britain the British people were taxed to assist the colonies. In return for her freedom to determine the com¬ mercial policy of the colonies and to appoint their officials, Britain had to meet their deficits, besides furnishing the whole of the naval and military services.

The first important change in Colonial com¬ mercial relations resulted from the recognition of the independence of the United States in 1783. Pitt and Shelburne had desired to con¬ tinue practically the same commercial relations with the late colonies after the separation as had existed before it, considering that political independence did not alter the value of a profit¬ able mutual trade. Technically, however, such

a policy would do violence to the whole com¬ mercial and colonial system, including the Navi¬ gation Acts, — the system of ((ships, colonies and commerce, }> upon which the whole British empire was supposed to rest — and this could not be permitted.

Canadians were for a long time too com¬ pletely absorbed in questions connected with the control of their internal affairs to be much concerned with the fiscal policy of the country. Indeed they rather looked upon Britain's con¬ trol of the fiscal policy as a means

of obtaining increasing assistance from the mother country. The earlier tariffs were simple affairs, the rev¬ enue being derived chiefly from duties on spirit¬ uous liquors and the molasses from which rum was distilled. The sweeping prohibitions of the Navigation Acts simplified matters very much. There was no trouble with foreign European goods, because they were forbidden to be ad¬ mitted to the colonies even in British ships, except when they had passed through British ports. It was in Britain, therefore, that the tariff dealt with them and qualified them for entrance to the colonies. In the matter of spirits and such things as wTere dealt with in colonial tariffs, a variety of preferential duties favored the more as against the less direct trade with Britain and the colonies. After the granting of representative legislatures in the colonies (1791 in Canada) they were permitted to impose customs duties on imports, for rev¬ enue purposes only. The right of disallowance exercised by the Crown prevented any unfavor¬ able treatment of British goods.

By the Act of 1778 the British Parliament maintained and freely exercised the right to regulate, by tariff or other restrictions, the com¬ merce of the colonies, but explicitly stated that all revenue incidentally obtained, after paying the expenses of its collection, should go to the treasury of the colony in which it was collected. There was thus a double jurisdiction in the mat¬ ter of tariffs, the Imperial and the colonial. But, so far as the colonial and Imperial tariffs covered the same ground, only the colonial tariff was enforced. The Imperial tariff applied only where its rate of duty exceeded that of the colonial. The colonial tariff looked only to revenue; the Imperial tariff to the regulation of commerce in the interests of Imperial trade.

The first legally recognized trade between the United States and Canada was provided for in the Quebec Ordinances of 1787-88, which permitted the free export of all goods except furs and peltries, and the import of all forms of timber and naval stores, all kinds of grain and other natural products, and settlers' effects. Rum, spirits and manufactured goods were en¬ tirely prohibited, but in 1790 pig iron was added to the list of permissible imports. Pitt's com¬ mercial treaty with the United States in 1794 greatly promoted trade between the British American provinces and that country. In this he partly realized his earlier idea of permitting a free mutual trade in all ordinary goods be¬ tween the United States and the British col¬ onies. But, in deference to the Navigation Acts, so far as the trade was conducted by sea, it must be in British ships. A direct trade to the East Indies was also permitted to the United States. Later this led to several important re¬ laxations of the British colonial policy.

The trade relations of the Maritime prov¬

inces, as we have seen, were well established before the United States secured its independ¬ ence, but, while the United States enjoyed great freedom of trade with all countries, the Maritime provinces still remained under the close restrictions of the Navigation Acts and the colonial system. Thus general merchan¬ dise, even British and East Indian goods, was cheaper in the United States than in the British American ports. As a natural result there was extensive smuggling along the coasts of Nova Scotia and New Brunswick, and especially among the islands of Passamaquoddy Bay. American vessels supplied the colonists with liquor, tea, tobacco, molasses and other East and West Indian produce, and the chief lines of European and American goods. They received in return furs, fish, lumber, grain, etc., which they carried to their own ports and to the West Indies. Thus the restrictions designed to give Britain a monopoly of the colonial trade and shipping worked to the opposite purpose. Plainly the system had either to be given up or enforced by quite drastic measures. On the death of Pitt the latter policy was adopted, be¬ ginning with the Orders in Council, which in turn induced the non-intercourse policy of the United States, and ultimately the War of

1812-15.

While disastrous to the West Indies and most injurious to Great Britain, yet the troubles between Britain and the United States were im¬ mensely profitable, for the time being, to the British North American colonies. To ensure the carrying of the West Indian supplies in British ships, American produce was collected in ports of the Maritime provinces and in Can¬ ada, where it might be. taken by sea in either American or British vessels, by overland trans¬ port or by inland navigation. This stimulated the trade and shipping of the Canadian and Maritime provinces and enriched the colonial produce dealers. The ultimate benefit, however, of these and later abnormal conditions was more than doubtful. After the Peace of 1815, Can¬ ada suffered a severe reaction, emphasized by an unfortunate land and immigration policy.

The enormous preference in the British market on British North American timber, which had been built up during the Napoleonic wars, was retained and developed because it en¬ riched British

shipowners and timber merchants. By the new Corn Law of 1815 a preference was granted to Canadian grain, but it was very un¬ certain in its operation, since the grain was not admitted at all until the price had risen to quite a high level, in the case of wheat to about $2.10 a bushel.

The international restrictions necessary to preserve a fair equality for British shipping, under the disadvantages of her colonial system, involved further trouble with the United States. Britain admitted a reciprocal shipping trade be¬ tween the home country and the United States, and between her colonial possessions and the United States in the inland waters of North America, but denied corresponding reciprocity by sea between the United States and her Amer¬ ican colonial possessions. In 1818 the United States retaliated, and direct trade with the West Indies was again suspended. Halifax in Nova Scotia and Saint John in New Brunswick were then made free ports for American vessels bringing certain lines of goods necessary for

the supply of the West Indies. In 1823 Ameri¬ can vessels were admitted to the colonial trade generally, for all direct dealings between the United States and the colonies. Once more the trade of the Saint Lawrence languished, and complaints poured in upon the home government.

In 1825 Mr. Huskisson, who had revived the policy of Pitt, sought to promote freer trade in America. But he found it impossible as yet to grant perfect reciprocity in shipping. Differen¬ tial duties were imposed in favor of British shipping in the trade between the United States and the West Indies. The Americans applied the same differentials on their side, and there resulted another period of non-intercourse, from 1826 to 1831, with corresponding activity and prosperity for the Saint Lawrence route and the British North American ports. By admitting to the colonies provisions from the northern nations of Europe in their own ships, Huskisson managed to prevent the Americans from forcing his hand. They came to terms in 1831 and normal trade was once more resumed. But by this time the

Colonial System was badly shattered, and almost the only thing left of the Navigation Acts was the British monopoly of the domestic shipping of the empire. The way was being gradually prepared for the final stroke of colonial economic emancipation.

In 1825 Huskisson weakened the corn laws by greatly increasing the preference on Cana¬ dian wheat. Regardless of the local price, Canadian wheat was to be admitted at a uni¬ form duty of five shillings per quarter. For a time the exports of wheat were greatly stimu¬ lated, but the benefit was not permanent, and the cry for additional preferences was soon resumed.

The prosperous period of 1826-31, aug¬ mented by large expenditures on Canadian pub¬ lic works and an increased emigration, con¬ tinued for a couple of years after the resumption of normal relations with the United States. But trade depression and political troubles brought Canada to a very low ebb in 1837-38. In 1841 the two Canadian provinces were united, and their political freedom was greatly enlarged and trade revived.

In 1843, after urgent petitions, which more or less coincided with the rising demand in Britain for free food, Canada obtained the ominously liberal concession of access to the British market, at the nominal rate of one shil¬ ling per quarter, for all the flour she could grind from her own, or imported American wheat, while the corn laws still stood against the rest of the world. Bad harvests and higher prices in Britain tended to enrich the Canadian merchants and millers, but precipitated the re¬ peal of the corn laws in 1846, and the adoption of a free trade policy generally. .

Free trade carried with it important changes for Canadian commerce, tariffs and transporta¬ tion. The preference on Canadian grain had gone, and the preference on British North American timber soon followed. In 1847 Britain renounced the right to regulate Canadian trade, and in 1849, by the final repeal of the Navigation Acts, she gave up her monopoly of the domestic carrying trade of the empire. The general result was that the colonies were left to face the world on much the same terms as other countries. Though lacking in the experience which breeds prudence, those interests which

had not been specially pampered entered upon their new career with much zest and enterprise, tending sometimes to rashness.

Canal Building. — At this stage questions of transportation began to be of vital importance to Canada. After the War of 1812 attention had been directed to the necessity for improv¬ ing the Saint Lawrence route between Montreal and the lakes. A canal to surmount the Lachine Rapids had long been talked of and even abor¬ tively attempted. Finally, in 1821, the work was seriously undertaken by the government of Lower Canada, and completed in 1825. This was the year of the opening of the Erie Canal, which, coming at the beginning of a decade of unusual expansion and prosperity for the lake regions, proved a phenomenal success, com¬ mercially and financially. This gave an im¬ mense impetus to canal building in Canada and the United States. Canals, instead of build¬ ing public debts, were to abolish them and sup¬ port States and provinces without taxation. See Canals.

In 1824 the Welland Canal was undertaken by a joint stock company with a capital of only $150,000, mostly subscribed in the United States. After many vicissitudes and appeals for both Imperial and provincial assistance, it was opened for traffic in 1832. The locks were of wood, 100 x 22 feet with 7 feet of water. However, neither the Lachine nor the Welland Canal could be of much more than local im¬ portance until the remaining Saint Lawrence rapids were surmounted. This task the Im¬ perial government was prevailed upon to under¬ take. But, in doing so, it disregarded all com¬ mercial considerations and followed a short¬ sighted but very round-about military idea. The Rideau Canal was the result, extending from Kingston to Ottawa, which was afterward connected with Montreal by improvements of the Ottawa River navigation. The locks as constructed were 134 x 33 feet with 5 feet of water. It was opened in 1832 and cost the Imperial government about $4,000,000, or be¬ tween six and seven times the original estimate. Though of necessity carrying considerable traf¬ fic, it soon proved that it was not to be a commercial success, since it could not compete with the Erie Canal and did not even super¬ sede the bateaux on the Saint Lawrence. The Upper Canadian legislature determined to com¬ plete the Saint Lawrence svstem and the Corn¬ wall Canal was begun in 1834. But the financial crisis and political troubles of 1837 suspended operations.

The union of the provinces in 1841 brought with it an Imperial guaranteed loan for $7,500,000, with which to complete the public works already planned and partly undertaken. The Welland Canal was taken over by the gov¬ ernment and reconstructed. The new locks were 150 x 45 feet, with 9 feet of water, after¬ ward increased to 10ˆ feet. These were smaller than the locks of the Cornwall Canal, which were 200 x 45 with 9 feet of water. The latter was opened in 1843.

The Beauharnois and Williamsburg canals completed the Saint Lawrence system. They were built on the same scale as the Cornwall Canal, and the last lock was opened in 1847. The completing of these canals necessitated the enlargement of the Lachine on the same scale, which was completed in 1848. Thus, in 1849, after the expenditure

of upward of $20,000,000, the new Canadian canal system was prepared to accommodate ves¬ sels drawing nine feet of water, and Canada ex¬ pected to realize her eagerly awaited control of the growing traffic of the great basin of the lakes.

But many changes in commerce and trans¬ portation had taken place between the opening of the Erie Canal and the opening of the Saint Lawrence system. The British protec¬ tive and colonial system had been aban¬ doned, and grain from the ports of the United States entered Britain as freely as from those of Canada. Moreover, railways were transform¬ ing the carrying trade, making time and contin¬ uous service essential features in commerce. While the Canadians were preparing their canals to capture the American carrying trade of the West, the American government was in¬ duced, in 1846, to establish the drawback or bonding system. This enabled the American railroads and other transportation companies to make a successful bid for a large share of the western Canadian carrying trade to Atlantic ports. Finally, though after 1849 western prod¬ uce could be landed at Canadian seaports much more cheaply than at American ports, yet this advantage was lost through higher ocean freights and higher insurance from Canadian ports. The total suspension of shipping for half the year also discounted the natural advantages of the Canadian route, especially in competition with the railroads.

Nothing daunted, the Canadians with their new energy and self-reliance grappled with the changed conditions. On the one hand the gov¬ ernment undertook the improvement of the navi¬ gation of the Saint Lawrence below Montreal, especially by deepening the channel of the river. The depth of 11ˆ2 feet at the time was in¬ creased to 18y2 by 1860, and has since been in¬ creased to 2 1/2 feet as far as Montreal. The navigation of the gulf was also improved.

About 1850 the ocean steamer was rapidly re¬ placing the sailing

vessel. The Cunard line of steamers, running to New York and Boston, was subsidized by the British government, doubtless a profitable venture for Britain, but appearing to Canadians as an additional handi¬ cap for the Saint Lawrence route. Canada was constrained to subsidize a line of its own, — the Allan — for weekly service, at an annual cost to the country of $225,000.

The American boom in railroad building, and railroad activity, convinced the Canadians that they must have railroads to supplement their canals. They desired independent winter outlets on the Atlantic, and connection with American markets to which the attention of Canada was now turning. While absorbed in their canals the Canadians had given little prac¬ tical attention to railroads. Hence, before 1840 only 16 miles of railroad had been built, con¬ necting Montreal with Saint John's on the Champlain route to New York. Much discus¬ sion took place and many charters were obtained during the forties, but little of a serious nature was attempted. In 1849 the Canadian govern¬ ment, chiefly under the influence of Mr. (after¬ ward Sir) Francis Hincks, adopted a vigorous railroad policy by undertaking to guarantee 6 per cent interest on a sum not to exceed half the cost of any railroad of not less than 70 miles in length. Among the first lines to be

undertaken was the Saint Lawrence and Atlan¬ tic, connecting Montreal with Portland, and opened in 1853. In western Canada the North¬ ern Railway, from Toronto to Collingwood, was the first to be built, being begun in 1850 and opened in 1853. The Great Western Railway, between Niagara and Detroit, was the next to be undertaken, and was opened in 1854. Under the fostering direction of Mr. Hincks, the Grand Trunk Railroad was chartered in 1852, as the great central line of Canada. In 1853 it leased the Saint Lawrence and Atlantic, and when, in 1856, the main line was opened from Toronto to Montreal, the chief commercial districts of Can¬ ada were connected with the Atlantic by a Canadian line.

The railroad boom lasted from 1849 to 1857, involving an immense outlay of capital, chiefly British. Both the central government and the municipalities were deeply pledged in support of the numerous lines undertaken. The crisis of 1857 brought the movement to a close, and the pecuniary embarrassments of most of the lines effectively discouraged further railroad enter¬ prises for the next 10 years. In Nova Scotia and New Brunswick large projects were also afoot to connect Halifax and Saint John with the New England States, and also

with Canada. But, beyond small sections of these plans, chiefly for local traffic, little was accomplished before Confederation. The general situation is reflected in the following figures. In 1840 there were in the British North American provinc«s 16 miles of railroad; in 1850, 66 miles; in 1860, 2,065 miles, and in 1870, 2,617 miles.

Tariffs and Expansion of Trade. — With regard to tariffs, the central feature of the period between 1850 and Confederation, in 1867, was the Reciprocity Treaty with the United States, signed in 1854 and abrogated in 1866. It established reciprocal free trade between the British North American provinces and the United States, in all natural products. This se¬ cured free entry to the United States for prac¬ tically everything which the British provinces had to sell. (See Canada — Reciprocity with the United States). The special attraction for the United States was the freedom of ac¬ cess to the Canadian fisheries (q.v.) ; though the Americans also enjoyed large local markets for agricultural products in many parts of the eastern provinces. According to the statistics of trade, Canada appeared to have the best of the bargain. But the statistics require interpre¬ tation. Much of the Canadian export to the United States was really only a transit trade; either the same goods, or their equivalent, being shipped from Atlantic ports. Again, be¬ tween 1854 and 1858 the decline in the amount of manufactures imported from the United States was due to the financial crisis of 1857 and the cessation of public works in Canada. Then, during the Civil War the United States was extensively purchasing supplies, and had little to sell. The Canadians themselves have been greatly deceived by the figures of the reci¬ procity period, and imagined that a like result would flow from the renewal of reciprocal trade.

The other feature of importance in this pe¬ riod was the increase in the Canadian tariff on manufactured goods, in 1858 and 1859. Owing to the large public debt contracted for the build¬ ing of the canals, the interest on which was not

offset by tolls as expected, and, more imme¬ diately, owing to the

great obligations incurred in guaranteeing railroad investments, the Cana¬ dian government was in great financial straits after 1856 and was therefore forced to seek a larger revenue. Accordingly, in 1858 the tariff on imports was raised the general rate being increased from about 12ˆ4 to 15 per cent, and in 1859 it was still further increased to 20 per cent. The British merchants and manufacturers vigorously protested against such an increase of duties on the goods of the mother country, and the manufacturers of the United States con¬ sidered the increase of duties a breach of faith, inasmuch as they had expected their advantage from reciprocity to come from the sale of man¬ ufactured goods. The Canadian government replied that its sole object was to relieve its financial obligations, not to check imports.

The abrogation of the Reciprocity Treaty in 1866 produced a strong effect upon the British North American provinces' and undoubtedly precipitated Confederation. The Canadian tariff of 1866 was lowered to a 15 per cent standard, as a concession to the freer trade leanings of the Maritime provinces, and became the first tariff of the Canadian Dominion. Canada re¬ tained the general principles of a tariff for revenue until, in common with other countries, she suffered from the world-wide depression of 1875-78. An effort was made to secure the renewal of the Reciprocity Treaty. This failed, however, and a change of government took place on a promise of relief by means of a protective tariff. This new tariff of 1879 raised the general standard of duties from 1 7}4 to 20 per cent. Times revived throughout the world and the relief promised actually came. The tariff, however, did not prevent the country from suffering with all others dur¬ ing the next period of depression, from 1884 to 1886, though the tariff had been raised some¬ what in the interval. Nor did the country escape during the next depression, from 1894-96, when another change of government took place after a general election. The Liberal party being more or less pledged to a reduction of duties, found this more difficult to accomplish than to promise. In 1897, however, the tariff was considerably amended in-the interest of the consumer, and the happy expedient was de¬ vised of offering to the world at large a reduc¬ tion of 25 per cent on the general tariff, wherever Canada was treated with equal favor. As Britain was practically the only important country fulfilling these universal conditions, the policy which was entered upon as a redemption of the party pledge ended in the preferential treatment of British goods only. This limita¬ tion was explicitly recognized in 1900, when the preference on British imports was increased to 33*4 per cent. Since, for various reasons, Canadian imports from Britain were declining, relatively at least, this concession did not ad¬ versely affect important Canadian industries ex¬ cept in

the department of textiles. Accordingly in 1904 this part of the preferential tariff was amended and the duties were raised. At the same time a new principle of maximum and minimum tariffs was outlined for the future.

For a decade and a half after 1897 a steady tide of population and capital set in toward Canada. In a new region such as the virgin plains of western Canada, the new and exten¬

sive employment of labor and capital resulted in the most obvious prosperity and radical changes on the face of nature. In planting the wilderness with the homes and busy trade centres of men, a lively market was created for all manner of wares for construction and consumption. Even the wilderness itself soon came to have a highly speculative value, whether in the gross, as prospective farms, or in detail as metropolitan city lots estimated at so much per foot. Thus the investment of one dollar in actual capital called into existence several other dollars of prospective value, and the real and imaginary wTere exchanged indiscrimi¬ nately.

Again, the building of modern railroads into unexploited territory is like the letting out of water upon the thirsty earth. Even in the process of construction they irrigate the country with millions of wealth, producing large harvests of profit for contractors and the pur¬ veyors of supplies. They afford markets for armies of workmen, and for all manner of machinery, implements and materials of con¬ struction and equipment, When > completed these agencies of transportation open the wilder¬ ness to the home seeker, who, merely as home builder, furnishes them with employment for years, and, as town and city builders, for dec¬ ades. Soon the speedy returns from agricul¬ tural industry furnish the railroads with traffic ; alike in the export of bountiful harvests and the import of the implements with which they are to be increased, and the myriad of miscel¬ laneous supplies which the ingenuity of the modern trader brings to the door of the settler with actual or prospective crop returns.

All these features were strikingly realized in Canada between the years 1897 and 1913 and may be illustrated by some typical con¬ crete facts. The immigration from the ad¬ joining agricultural and industrial regions of the United States was very marked during this period. The annual immigration from the United States was but little over 2,000 in 1897 but it rose to 139,000 in 1913. During the same period, the annual immigration from Britain in¬ creased from 11,000

in 1897 to 150,000 in 1913. The total annual immigration from all countries increased from 21,000 in 1897 to 402,000 in 1913. The British immigrants as a rule pre¬ ferred settlement in the towns, while the Amer¬ ican settlers preferred the farms, thus indi¬ cating the life to which the respective immi¬ grants had been accustomed before coming to Canada.

The natural effect of the modern tendency toward highly specialized production, as ap¬ plicable to agriculture as to other industries, has enhanced the activities of urban life and reduced proportionately the occupations of rural life. Agricultural machinery and the supplies for the farmers' homes are now chiefly pro¬ duced in the cities. The rural population of Canada, which amounted to 63 per cent in 1901, fell to 55 per cent in 1911. This decline was marked in all the older parts of the country and even in southern and central Manitoba where the earliest settlements had been made in the West.

The trade of Canada no less than its popula¬ tion testified, not only to the rapiditv of the development of the country between 1897 and 1913, but to the fact that this was largely due

to the influx of immense volumes of foreign capital, which came almost entirely in the shape of goods and not in the form of money. Thus the total trade of the country, which had stagnated from 1875 to 1895, having increased barely 12 per cent in those 20 years, rose from $224,000,000 in 1895 to $550,000,000 in 1906. In another eight years it had increased to $1,129,- 000,000, in 1914. It then fell off some $9,000,- 000 during the first year of the war, but, under the stimulus of war expenditure and munition supplies, rose to $1,447,000,000 in 1916.

Under the influence of the capital invest¬ ment already referred to, the imports of the country rose much faster during the period of expansion than did the exports. Thus at the beginning of the period of expansion in 1897, the exports of the country exceeded the imports by $18,000,000 on a total trade of $257,- 000,000. But by 1906 the

imports had already exceeded the exports to the extent of $37,-000,000, and in 1913 the exports had reached an excess of $298,000,000. These excesses were completely offset by borrowings abroad, much the greater part being obtained in the London market. With the rapid falling off in 1913-14 in the supply of borrowed capital, with a corre¬ sponding reduction in capital expenditure, there was a severe shrinkage in importation and a corresponding liberation for export of much Canadian produce hitherto purchased for use in the country itself. _ This transition was greatly emphasized during the first year of the war, when British capital was practically entirely cut off for all but military service.

This sharp reversal of the movement of the previous decade immediately revealed it¬ self in the trade statistics of the country. The surplus of imports of $298,000,000 in 1913 was reduced to $171,000,000 in 1914, was further reduced to $26,000,000 in 1915 and in 1916 was converted into a surplus of exports of $149,-000,000. In the trade returns for the last two years, the export and import of bullion has been eliminated as it was abnormally influ¬ enced by financial arrangements between Great Britain and the United States with which Can¬ ada had no special concern.

Britain and the United States have con¬ tinued throughout to be the all-important fac¬ tors in Canadian foreign trade. Thus Britain is the chief market for Canadian exports, while the United States furnishes the chief source of supply for Canadian imports. The Canadian trade with all other countries combined makes but a relatively small showing in comparison with the trade carried on with either of these two countries. In the decade between 1904 and 1914, out of a total of $2,892,000,000 of exports, Great Britain took $1,447,000,000 and the United States $1,1 57,000,000, leaving only $287,000,000 as taken by all other countries, including the other sections of the British empire. During the same period Canada imported for home consumption a total of $4,160,000,000, of which the United States furnished $2,601,000,000. and Great Britain $952,000,000, leaving only $605,-000,000 as supplied by all other . countries, whether within or without the British empire.

Such being the case, the tariff relations be¬ tween Canada and her two chief customers, Great Britain and the United States, are of chief interest in this field. Until the outbreak of the European War, however, few changes

were made in the tariffs applicable to these two countries. Treaties had been negotiated with several of the British West Indian Is¬ lands on the basis of mutual preference. As already indicated, however, for the past cen¬ tury and more, many attempts have been made to break the natural trade relations originally established between the West Indies and the Atlantic States when they were British colonies. The British island colonies on the Atlantic Coast are loath to invite unfavorable tariff treatment from the United States by grant¬ ing special favors to Canadian trade. Hence, while some of the smaller islands accepted the Canadian offer, the larger colonies of New¬ foundland, Bermuda, Jamaica and British Honduras declined to respond to the Canadian preference extended to them for three years from 1912.

On the other hand, as regards Canadian tariff relations with the United States, the situation for Canada has considerably im¬ proved since the opening of the century. On the one hand, Canadian products have been coming ever more fully into world markets ; while, on the other, the increasing population and industries of the United States have ren¬ dered the Canadian supplies of raw materials and food products a matter of undoubtedly in¬ creasing importance. Further, the Canadian market for American raw material such as coal, cotton, corn, etc., and for many important lines of manufactured goods has been steadily increasing. These changing relations naturally affected the traditional attitudes of the respec¬ tive countries toward the perennial question of reciprocity. The discussion of this question was renewed in 1910, and, after considerable negotiation, centring around the higher and lower schedules of the Payne-Aldrich tariff, there emerged the reciprocity agreement of 1911, which followed fairly closely the previous treaty of 1854. The new treaty was passed by the United States Congress in July 1911, but was successfully blocked by the opposition in the Canadian House of Commons in the expir¬ ing days of the parliamentary term of 1911. The general election which necessarily fol¬ lowed largely turned on this issue, and revealed the strength of the growing Canadian senti¬ ment in favor of maintaining not only political but commercial independence. The existing government was defeated in the election of September 1911. In consequence the treaty was not confirmed and the tariff relations be¬ tween the two countries remained upon the basis of the ordinary tariff legislation of each country.

Such modifications as have been made in the general Canadian tariff since 1911 have been due to special local interests. The changes introduced since the outbreak of the war have been determined almost entirely on revenue grounds and will be dealt with under the sec¬ tion

on Public Finance.

Incidentally to the process of granting pref¬ erential treatment to Great Britain, Canada has secured complete fiscal independence, being no longer bound by the commercial treaties negotiated between Great Britain and other countries, unless she explicitly agrees to accept the terms of any treaty. Incidentally to the same process of tariff emancipation, Canada found herself involved in a tariff

quarrel with Germany. This lasted for some seven years, from 1903 to 1910, ending in favor of the Canadian contention. During this period most German imports reached Canada as Dutch, Belgian or British goods, and Cana¬ dian supplies went to Germany through similar channels.

Of late years Canada has virtually established an independent consular service under the guise of a system of trade commissionerships. They were established at first chiefly with Great Britain and other portions of the British em¬ pire, but now extend to several foreign coun¬ tries with which it is desired to promote direct trade relations. This system is certain to be more fully developed after the war.

Railways. — As a condition of Confedera¬ tion, in the East, the Intercolonial Railway, con¬ necting the Maritime provinces with Canada, was constructed by the government at a cost of upward of $20,000,000. A corresponding condi¬ tion of western federation was the construction of a transcontinental line to British Columbia. This was ultimately realized in the Canadian Pacific Railway, begun in 1881 and completed in 1885 at a cost to the country of $62,000,000 in cash and 25,000,000 acres of land.

The rapid development of Canadian rail¬ ways since 1900 centres upon the actual and prospective needs of the immense inland areas west of the Great Lakes. The need for addi¬ tional facilities for main line transportation has been largely incidental to the need for ex¬ tended systems of branch lines for the settle¬ ment and development

of so extended an area. A solution of the problem has been largely effected, but unfortunately without any very obvious regard to either economy or efficiency. The combination of transcontinental and local service has been attempted, and, so far as con¬ struction is concerned, has been largely realized by three independent and competitive systems, the Canadian Pacific Railway, the Grand Trunk and Grand Trunk Pacific Railway and the Canadian Northern Railway. In various por¬ tions of the western provinces other more or less independent but chiefly provincial lines have been partially constructed, largely on the basis of liberal financial assistance by the re¬ spective provinces in which they are located. Most of the larger railroad extensions in the East, including the government Transconti¬ nental Railway, have been necessitated by the western developments of the three larger com¬ panies. Since 1870 the mileage of the railroads has increased as follows: 1870, 2,617 miles; 1880, 7,174 miles; 1890, 13,151 miles; 1900, 17,657 miles; 1910, 24,731 miles; 1915, 35,582 miles.

The total capitalization of the Canadian railways in 1914 was $1,808,820,000, nearly evenly divided between stocks and bonds. In addition the Dominion government has sub¬ sidized the railway systems to the extent of $178,834,000 in cash. It also granted to them 31,864,000 acres of land and has guaranteed their bonds to the extent of $127,965,000. The Dominion government has also expended $323,-596,000 in building or purchasing certain rail¬ road lines of its own, chief of which are the Intercolonial Railway and the Transcontinental, both built entirely by the government. The provincial governments have subsidized the rail¬ roads to the extent of $37,023,000 in cash, and

23,876,000 acres of land, and have guaranteed their bonds to the extent of $107,500,000. To these subsidies must be added the cash con¬ tributions of the municipalities, amounting to

$17,914,000.

The outbreak of the European War naturally disturbed the calculations of the railroads as to their normal prospects, affecting them both as to their capital financing and their traffic earn¬ ings. The results, however, have not always been adverse, since in many lines their earnings have been greatly increased, owing to the ex¬ ceptional Western crop of 1915 and the great transportation needs incident to

the war. All of the Canadian railways, and especially the Canadian Pacific Railway, found the year 1915-lb an exceptionally profitable one. The net earnings of the Canadian Pacific Railway sys¬ tem for that year amounted to over $49,000,000, being more than $15,000,000 in excess of the net earnings of the previous year. At the same time the Grand Trunk Pacific and the Canadian Northern railroads experienced difficulties in connection with their capital financing, which forced them to come to the government for assistance and which it has not been found pos¬ sible to resist. At present a commission is investigating the whole railroad problem of the country with a view to some permanent re¬ organization of the internal transportation s}‘stem of Canada.

Canals. — Confederation also directed atten¬ tion to the renewed importance of the Saint Lawrence route and the economy of large ves¬ sels for the carrying trade. It was determined to enlarge and deepen the canal system. The new movement was once more begun at Corn¬ wall, in 1876.* The dimensions of the new locks were 270x45 feet with 14 feet of water. The other canals were enlarged or quite new ones constructed on at least the same scale. The Soulanges Canal, the last to be built, has locks of 280x45 feet with 15 feet of water. In 1895 a Canadian canal at Sault Sainte Marie was opened with one lock of 900x60 feet and with 18 feet of water. There is now, therefore, a continuous waterway with a minimum depth of 14 feet from Lake Superior to the sea.

As usual it was expected that when the new canal system on a 14-foot basis was fully completed, the grain and other traffic from the West would be largely diverted to the Saint Lawrence route. This expectation, how¬ ever, was but slightly realized, there being many factors to be taken into account, among them the construction of still larger vessels upon the upper lakes and the changed conditions of transatlantic shipping, tending to favor the larger American ports. The forwarding of grain tended to shift from the Saint Lawrence route below Lake Erie to the New York and other transatlantic routes through Buffalo, which, at present, furnishes the chief exit for western Canadian as well as American grain Still another attempt, therefore, is being made to readjust matters by a further enlargement of the Welland Canal. After elaborate sur¬ veys and much discussion, with incidentally a considerable agitation from Montreal and northeastern Ontario for the construction of a new canal route via the Ottawa River and Georgian Bav, it was decided in 1912 to under¬ take the enlargement of the Welland Canal. This involves widening and deepening the un-

locked section of the canal from Lake Erie to Thorold, and the construction of a new system of seven very large locks from that point to Lake Ontario, serving the purpose of the 25 locks on the existing canal. Ultimately, the new canal will furnish a water way of 30 feet in depth although in the meantime of 25 feet for the unlocked section of it. This will amply accommodate all present vessels from the head of Lake Superior, the Sault Sainte Marie having a minimum depth of only 18 feet 3 inches. The estimated cost of the new canal is $50,000,000, $20,000,000 have been voted and $10,000,000 expended, but further operations are likely to be suspended until the close of the war.

The full benefit of the new Welland Canal for the Saint Lawrence route cannot be realized until the Saint Lawrence River canals from Prescott to Montreal are also enlarged, the present locks on this section ranging from 14 to 18 feet, the majority with the lesser depth.

Meantime, extensive improvements in the harbor accommodation at Saint John, N. B., and the construction of new terminal facilities at Halifax are expected to have an important influence on the transatlantic facilities from Canada, without which the mere improvement of the canals would not be sufficient to in¬ fluence the present and possibly future trend of Canada's external trade through American ports. See Canadian Canals.

Adam Shortt,

Commissioner of the Dominion Civil Service.

47. BANKING SYSTEM. The first bank¬ ing establishment in Canada was a private bank founded in Montreal in 1792, under the name of the Canada Banking Company, and evidently intended to be modeled after the English pri¬ vate banks. It opened for business and issued notes, but its life was very short. In 1807-08 an unsuccessful attempt was made to obtain from the legislature of Lower Canada a char¬ ter for the Bank of Canada, which would have been a semi-government bank, resembling in many respects the first Bank of the United States, though naturally on a much smaller scale. In 1817 the ((Montreal Bankˆ began business in Montreal as a private partnership, this being the origin of the Bank of Montreal, which was for many years, and still in some respect remains, the most important bank on the

continent, while from its ((Articles of Association" there has been developed, with steady continuity, the scientific system of banking law which exists in Canada to-day. In the follow¬ ing year two similar associations — the Quebec Bank and the Bank of Canada — were formed, on almost identical lines, and in 1822 all three obtained legislative charters of incorporation, valid for 10 years, which followed the articles of association in almost every important par¬ ticular. They differed very considerably, how¬ ever, from the abortive bill of 1808. Framed to give legal recognition to associations of merchants already actively engaged in com¬ mercial banking, they were throughout de¬ signed to meet ordinary commercial require¬ ments, and although they are perhaps more remarkable for what they omitted than for what they included, most of their provisions were sound. They confined the bank's business to legitimate lines, they prohibited lending upon

the pledge of goods or upon mortgage, or deal¬ ing in real estate, and they provided that all notes issued were to be redeemable on demand in specie. Power to open branches was not expressly given, but as it was not denied, its existence was assumed, and the banks did, as a matter of fact, open branches or agencies in both Lower and Upper Canada. The English private banks and the Scottish chartered banks were the joint parents of these Lower Canadian charters, and of the Canadian banking system which has sprung from them. Various changes and additions were made to suit Canadian re¬ quirements, while in the phraseology used, as well as in some of the internal regulations, the influence of the chartered banks in the United States may be seen, but it may safely be said that practically everything which has proved of permanent value was derived from English, Scotch or native sources.

In Upper Canada the earliest banking legis¬ lation was on political, rather than commercial, lines, and the first charter, that of the Bank of Upper Canada, granted in 1821-22, followed the Lower Canadian bill of 1808 rather than the articles of association of the ((Montreal Bank.** The plan as first adopted was not sound, and as it had little permanent influence upon later legislation no description of it is necessary. The Imperial authorities, by pres¬ sure persistently exerted, succeeded in securing the adoption of two important amendments which are still part of Canadian banking law. In 1832 banks were prohibited from holding, or lending on, their own stock, while in the char¬ ter of the Gore Bank, granted in 1835, it was provided that the shareholders should be in¬ dividually liable for the debts of the bank

to an amount equal to their respective holdings of subscribed stock. The prohibition of the lend¬ ing of money on mortgage, which from the first had been embodied in Lower Canadian charters, was never adopted in Upper Canada, although strongly urged by the Colonial Office.

The Union of the two Canadas took place in 1840, and at its first session in 1841 the legislature of the province of Canada adopted the report of a select committee, favoring a uniform system of banking, and approving a number of important regulations emanating from the Colonial Office, some of which already existed in individual charters. All notes were to be payable on demand in specie, they were not to be issued to an amount exceeding the bank's paid-up capital, and suspension of specie payments for a given number of days (not in any case exceeding 60), either consecutively or at intervals within any one year, was to forfeit the charter. The bank was not to hold its own stock, or to make advances against it, nor was it to lend money on security of lands or houses, or ships, or on pledge of merchandise. These and a few less important regulations were incorporated in every new and renewal bank charter thereafter granted, the double liability clause was made applicable to every bank, and one bank was prohibited from holding stock in another, except such as might be taken for bona fide debts, contracted in the usual course of business. In this act we have the first attempt to deal with banking in a systematic way and to lay down general rules to which all banks must conform.

Only a passing mention need be made of

the free banking law which, avowedly an imi¬ tation of the free hanking laws of the State of New York, was passed in 1850. By 1854 its failure was evident, the free banks gradually died out or obtained charters, and the act was repealed in 1866. The only vestige of it now to be found is the provision, revived in the Dominion Act of 1880, that notes issued by a bank should be the first charge upon its assets.

Up to 1859 banks had been prohibited from lending money upon the pledge of goods, but in that year an act was passed authorizing a bank to take bills of lading, warehouse receipts, etc., as collateral security for the payment of any bill or note discounted by it, providing the security was taken at the time the bill was negotiated.

Little need be said as to the banking history of the other provinces. The charters in the Maritime Provinces were very similar to those of Lower Canada, Manitoba had no existence as a province before it joined the Confedera¬ tion, while British Columbia had passed no banking legislation, its only bank having been incorporated under an Imperial charter, which has now been surrendered.

At Confederation, in 1867, all right to legis¬ late regarding banking was vested in the Fed¬ eral government, but the initial task of fram¬ ing a comprehensive banking law which should be uniform for the whole Dominion was by no means an easy one. Banking experiences during the previous two or three years had not been altogether happy, very divergent views were held, and even among bankers there was a wide difference of opinion, a difference which to some extent followed geographical lines, the existing system being generally up¬ held in Ontario, while in Quebec and the Maritime Provinces there was a widespread desire for a change. A system which in its main features would have followed pretty closely the banking practice of the United States was in 1869 proposed to Parliament by Mr. Rose, then Minister of Finance, and was strongly supported by representatives of the Bank of Montreal and the Bank of British North America. But determined opposition developed, and the proposals were withdrawn. A new Finance Minister, Sir Francis Hincks, having taken office, an act was passed in 1870, continuing many existing features and intro¬ ducing some new ones. But the first really important Bank Act passed after Confedera¬ tion was that of 1871 (34 Viet. Chap. V), which embodied all the provisions of any charter or general act then in force which it seemed desirable to perpetuate, making them applicable immediately to all new banks, and to all the existing banks as soon as their re¬ spective charters expired. A few small banks in the Maritime Provinces continued for sev¬ eral years under their old charters, the last one coming under the operation of the act on 1 March 1892. While each bank retained the necessarily individual features of its own charter — those relating to its name, capital, chief place of business, *etc.* — and while it still remained necessary for every new bank to obtain a special act of incorporation (which it could do as a matter of course during any ses¬ sion of Parliament, if it conformed to the prescribed conditions), the new act made all other regulations uniform, with some unimport¬

ant exceptions in the case of the Bank of British North America, which was incorpo¬ rated under an Imperial charter, and La Banque du Peuple, which has since passed out of existence. Except for the express right given to a bank to make advances on the stock of other banks (a most objectionable enact¬ ment, repealed in 1879), no new features of special consequence were introduced. It pro¬ vided that no bank should issue notes of less than $4 each, and that every bank should hold as nearly as practicable one-half, and never less than one-third, of its cash reserves in Dominion notes (both provisions designed to increase the issue of Dominion notes') : but the importance of the act rests on the fact that it firmly established in Canada a banking system based upon Canadian and British prin¬ ciples, a system which, modified and improved from time to time, exists in Canada to-day. Its chief features are : large banks, the branch system, an elastic assets currency, no fixed re¬ serves and the double liability of shareholders. In 1879 the Bank Act was revised, and> in 1890 it was revised and re-enacted, while an amend¬ ing act (63, 64 Viet. Chap. 26) was duly passed in 1900, but only two new provisions require mention. Special powers were given in 1900 under which any bank might sell the whole or any portion of its assets to any other bank, and the Canadian Bankers' Association was formally recognized and given certain definite legal powers and duties. For a long time past it had been an established rule to enact the Bank Act for 10 years only, thus ensuring a periodical discussion of the whole theory and practice of banking, while during the 10-year intervals the banks could enjoy comparative peace. A revision of the act was accordingly due in 1910, but at that time the public mind was much disturbed over two or three recent bank failures, and it was therefore deemed best to postpone discussion and revision. But the act of 1900 would expire on 1 July 1911, so in order to keep the bank charters in force the act was extended from year to year until 1913, when it was decided to deal with the matter.

As a result of public, feeling, and of a persistent anti-bank agitation which had been going on in some of the newspapers, the whole banking system was subjected to very close and searching criticism. Many radical changes were proposed, some of them meeting with strong support both in Parliament and in the country. But while some important alterations were embodied in the new act, there was no real departure from the principles of the es¬ tablished system, which may be said to have encountered successfully the hostile criticism to which it was exposed. The new act (3-4 George V, Chap. 9) came into force on 1 July 1913 and will expire on 1 July 1923. Until that date it is the charter of every Canadian bank (except a couple of savings banks in

the prov¬ ince of Quebec), and under it every bank has exactly similar rights, privileges and limita¬ tions*; the Bank of Montreal, with paid-up capital and reserve fund of $32,000,000, and the Wevburn Security Bank, which has a paid-up capital and reserve fund of $535,320, standing on precisely the same legal footing. The mini-

* An unimportant exception in the' case of the Baijk of British North America is noted later on.

mum subscribed capital necessary before a new bank can begin business is $500,000, of which at least $250,000 must be actually paid up in cash and deposited with the Minister of Fi¬ nance. After the bank is in operation the shareholders may, by passing a by-law at a general meeting, and afterward obtaining the approval of the Treasury Board, increase or reduce the capital stock, but it must not be

any part of it without being authorized to do so by the Bank Act or by some other act, nor may he use foreign words equivalent to "banker® or "private banker.® There are now very few private bankers in Canada, and their operations are on quite a small scale. The fol¬ lowing tables give the principal items in the combined balance sheets of the banks at dif¬ ferent dates since Confederation.

LIABILITIES (000 Omitted).

31 Dec.

No. of banks

No. of branches

To shareholders

To public

Canada

Elsewhere

Paid-up

capital

Surplus

Average capital per bank

Notes in circulation

Deposits

Total liabilities to public

1870 .

(a) 20

(e)

(e)

$33 , 449

(e)

$1,672

$18,526

$52,056

$72,494

1880 .

(b) 36

(e)

(e)

59,819

(e)

1,661

27,328

90,387

121 ,471

1890 .

(c) 38

(e)

(e)

60,057

$21,940

1 ,580

35 , 006

139,701

178,826

1900 .

36

(e)

(e)

67,087

34,501

1,863

50,758

325,824

392.150

1910 .

28

2,368

57

99,676

83,965

3,559

87 , 694

926,391

1,036,076

1911 .

29

2,570

69

107,995

96,868

3,724

102,037

1,016,781

1,174,323

1912 .

27

2,808

76

114,882

106,840

4,255

110,048

1,139,081

1,292,451

1913 .

24

3,008

86

114,809

112,118

4,783

108,646

1,141,780

1,308,757

1914 .

22

3,130

92

113,917

113,070

5,178

105,970

1,153,196

1,314,646

1915 .

22

3,161

98

113,988

112,457

5,181

122,199

1,326,448

1,499,284

1916 .

22

3,198

109

113,346

113,383

5,152

148,785

1,509, 083

1,706,948

1917 .

(f) 21

2,976

124

111,673

114,100

5,318

192,923

1,822,979

2,081,723

ASSETS (000 Omitted).

31 Dec.

Specie and Dominion notes

Securities

Loans and discounts

Total

assets i

In banks

Gold

reserve

Total

1870 .

$14,018

$14,018

(d) $4,847

$78,064

$110,973

1880 .

16,485

16,485

(d) 2,687

124,869

192,537

1890 .

16,328

16,328

(d) 8,603

202,056

260,137

1 900 .

31,558

31,558

50,248

362,043

501,542

1910 .

109,418

109,418

97 , 303

880,857

1,239,791

1911 .

135,121

135,121

94,906

983 , 444

1,390,069

1912 .

128,364

128,364

102,140

1,107,992

1,526,081

1913 .

150,201

$7,597

157,798

104,398

1,108,426

1,551,263

1914 .

200,610

9,700

210,310

105,661

1,046,522

1,555,557

1915 . ‘ .

213,543

17,360

230,903

122,495

1,111,870

1,737,992

1916 .

195,922

43,700

239,622

262,777

1 , 188,978

1,948,044

1917 .

249,542

97,270

346,812

468,406

1,227,363

2,323,163

(a) Five other small banks not reporting.

(b) Eight other small banks not reporting.

(c) Two other small banks not reporting.

(d) Government securities only.

(e) Exact figures not available. , „ . . , . T .

(f) Since this report was made, the number of banks has been reduced to 19; the Bank of Bntish North America, which operated on an Imperial charter, was incorporated by the Bank of Montreal, and the Northern Crown Bank by the Royal Bank of Canada — both in the early part of 1918.

The dividends paid vary from 5 to 14 per cent, the average rate being 10.

reduced below $250,000. Before a bank may begin business it must obtain from the Treas¬ ury Board a certificate that it has complied with all the requirements of the law, this cer¬ tificate to be obtained within one year of the date of the act of incorporation. The Treasury Board is the financial committee of the Privy Council for Canada, composed of five Cabinet ministers, with the Minister of Finance as chairman. No person or corporation may use the word “bank,® or the words “savings bank,® “banking company,® “banking house,® “banking association® or “banking institute,® or any word or words of import equivalent thereto in any foreign language, to describe his business or

The chief place of business of most of the banks is at either Montreal or Toronto, only three having their head offices west of Ontario. The

right to establish branches is specifically granted, and most of them have numerous branches, several being represented in nearly every Canadian town of any importance. The Bank of Montreal, for instance, has about 174 branches in Canada and 10 elsewhere, the Canadian Bank of Commerce about 374 in Canada and 7 elsewhere, and the Royal Bank of Canada about 366 in Canada and 65 else¬ where. Several have branches or agencies in London and some of the more important cities in the United States, those represented in New

York being among the largest dealers in for¬ eign exchange. Newfoundland is entirely de¬ pendent for its banking facilities upon the Canadian banks, which have some 28 branches there, while a large proportion of the whole banking business of the West Indies, including Cuba, Porto Rico, British Guiana, etc., is done by two Canadian banks — the Royal Bank of Canada and the Bank of Nova Scotia, — which have between them about 70 branches in the West Indies and adjoining districts. The fore¬ going tables show that the 21 banks in existence at the end of 1917 had 3,100 branches, an average of 148 branches per bank. Each bank is administered by directors, not less than five in number, who are elected annually by the shareholders, each share carrying one vote. Directors must each hold paid up stock of from three to five thousand dollars, according to the total amount of the capital stock ; the majority of them must be British subjects domiciled in Canada. A general meeting of shareholders must be held annually at which directors must submit a clear and full state¬ ment of the affairs of the bank. Statements of assets and liabilities (in a prescribed form) must be sent monthly to the Minister of Fi¬ nance, by whom they are published in the Canada Gazette. Two or three other returns are also required, and the Minister of Finance has power to call for special information from any bank. The banks have long made a prac¬ tice of having all their branches and depart¬ ments inspected at least once a year by their own inspectors, but until 1913 no system pre¬ vailed either of audit by the shareholders or of examination by the government. In that year, in deference to popular sentiment, provision was made for an audit by a person or persons

appointed by the shareholders of each bank in general meeting, such persons being selected each year from a list of persons (not less than 40 in number) chosen by ballot by the general managers of all the banks at a meeting called annually for that purpose, and approved by the Minister of Finance. Every such auditor has a right of access to the books and accounts, cash, securities and documents of the bank, and is entitled to require from the directors and officers such information and explanations as may be necessary for the performance of his duties. The auditor must certify to the correctness of the statement presented to the annual general meeting of shareholders, and of any other statement which the shareholders may by by-law require. Provision is made for special audits at the direction of the Min¬ ister of Finance. The practical working out of this audit system is still on trial, but it may be anticipated that at the next revision of the Bank Act the selection of the panel of auditors will be removed from the general managers, the persons against whom the audit is more particularly directed, that more practical op¬ portunity for independent selection will be given to the shareholders, and that a restriction will be placed on the number of banks for which any one person (or members of the same firm) may act as auditor.

In the United States the bank's president is generally its chief executive officer, but in Can¬ ada this is not the case. British precedent is followed, and the bank is managed by a general manager, who accepts the fullest responsibility

for the conduct of its business. The Board of Directors deliberate on all important transac¬ tions and all applications for large credits which have been approved by the general manager are submitted to them. The branch managers are responsible for the general business of their respective branches, and, as a rule, are allowed to use their own discretion in making advances up to certain amounts, varying according to the importance of the particular branch. Any loans applied for in excess of the limit fixed must be referred to the general management at the head office. By means of the branch sys¬ tem credit is distributed throughout the whole country; money borrowed from depositors in the rich but less progressive portions of On¬ tario may be lent out again in the newest parts of the Northwest, and interest tends toward a common level. The average rate obtained in western Canada is only about 1 per cent more than in Ontario. The banks being large, and under no restrictions as to the amount which they may lend to any one customer, are able to supply the total needs of any person with whom they are willing to do business. They grant

yearly credits, and practically undertake to supply their customers' wants up to the limit fixed at any time during the continuance of the credit. As a corollary to this they almost invariably require that each customer shall borrow from only one bank.

No special percentage of cash reserves is required to be kept — in fact, the banks are not required by law to keep any cash or other reserves — but of whatever cash reserves are kept in .Canada at least 40 per cent must be in Dominion notes. Percentages of cash re¬ serves to total liabilities to the public held by all banks on 31 December in certain years were as follows :

(000 Omitted).

31 Dec.

Specie

Domin¬

ion

notes

Total

cash

reserves

Total liabilities to public

Per¬ centage cash to liabili¬ ties

1900…

$11,773

$19,785

$31,558

$392,150

8.4

1910…

33,411

76,007

109,418

1,036,075

10.5

1911…

37,464

97,657

135,121

1,174,323

11.5

1912. ..

33,780

94,584

128,364

1,292,451

9.9

1913…

46,620

111,178

157,798

1 ,308,757

12.0

1914…

67,070

143,240

210,310

1 ,314,646

15.9

1915…

74,205

156,698

230,903

1,499,284

15.4

1916…

83,132

156,490

239,622

1,706,948

14.0

1917…

101,712

245 , 099

346,812

2,081,733

It must not be forgotten that the banks' cash reserves are only their first line of de¬ fense. Their real reserves are in the shape of call loans in New York against stocks and bonds, balances in the hands of their corre¬ spondents and securities lodged with their agents in Fondon and elsewhere, against which they are entitled to draw at any moment. New York and Fondon are the final settlement points, and it is there that real strength is most necessary and most effective.

On 31 Dec. 1917 there were 25 clearing¬ houses in Canada, the oldest being that at Halifax, which was established on 1 July 1886. Montreal followed in January 1889 and Toronto in July 1891. The others, listed in order of

age, are Hamilton, Winnipeg, Saint John, Vancouver, Victoria, Quebec, Ottawa, London, Calgary, Edmonton, Regina, Brandon, Leth¬ bridge, Saskatoon, Brantford, Moose Jaw, New Westminster, Medicine Hat, Peterboro, Fort William, Kitchener and Sherbrooke.

The total clearings in certain years have been: 1900, $1,584,869,240; 1910, $6,115,039,241;

1911, $7,343,729,546; 1912, $9,147,334,855; 1913, $9,230,096,680; 1914, $8,063,814,799; 1915, $7,- 276,476,210; 1916, $10,557,187,917 ; 1917, $12,552,- 821,949.

The right to issue notes intended for cir¬ culation (other than notes issued by the Do¬ minion government, see Currency, Coinage and Legal Tender) is confined to the char¬ tered banks. The bank may issue and re¬ issue notes of $5 and multiples thereof, which must circulate at par in any and every part of Canada and must be

redeemed on demand in specie or Dominion notes. In order to ensure this the bank must establish agencies for the redemption and payment of its notes at To¬ ronto, Montreal, Halifax, Saint John, Winni¬ peg, Victoria, Charlottetown, Regina and Cal¬ gary, and at such other places as are, from time to time, designated by the Treasury Board. In addition, the bank must accept its own notes in payment at any of its branches. The notes issued by a bank are a first charge upon all its assets, and they are also especially secured by the Central Gold Reserve and by the (<Bank Circulation Redemption Fund,0 to which all the banks have contributed 5 per cent on their average circulation and which is held by the government for the purpose of redeeming with interest at 5 per cent any notes of a suspended bank which the bank or its liquidator is not ready to redeem within two months after the date of suspension. The result of this is that the other banks readily accept at par the notes of a suspended bank, the notes remaining in their hands earning interest at 5 per cent until they are redeemed. As the banks are obliged to replenish the Redemption Fund gradually if it ever becomes depleted, they are all practically guaranteeing the notes of each. The amount at credit of this fund on 31 Dec. 1917 was $5,769,631, bear¬ ing interest at 3 per cent. No call has yet been made on it. Since 1841 the limit of the bank's authorized note issue had been the amount of its unimpaired paid-up capital, and for many years the banks had found no diffi¬ culty in keeping well below this limit. So late as 31 Dec. 1890 the total paid-up capital of all the banks was $60,000,000, while their note issue was only $35,000,000. But early in the present century conditions began to change, and by 1907 the increase in capital had so far failed to keep pace with increase in business that on 31 October of that year the total note issue had reached its legal maximum, un¬ less and until some of the banks increased their capital. But as the acute need for the issue of additional notes only existed during four or five months each year, the banks were loath to increase, for this purpose alone, cap¬ ital which was otherwise sufficient, so in 1908 each bank was authorized to issue Muring the season for moving the crops,® that is, from 1 October to 31 January, <(excess circulation® to the extent of 15 per cent of its combined un¬ impaired paid-up capital and rest. In 1912 this

period was extended to run from 1 September to the end of February. On this (<crop-moving® issue the bank must pay to the government inter¬ est at a rate to be fixed by the government, but not exceeding 5 per cent per annum. In 1913 provision was made for ((central gold reserves.® 1 rustees are appointed by the Canadian Bank¬ ers'

Association and by the Minister of Finance, who receive such amounts in current gold coin and Dominion notes, or either, as any bank may desire from time to time to deposit. Against the geld and notes thus act¬ ually held for it, any bank may at any time issue notes of an equal amount, in addition to the amount which it may otherwise issue. The (<excess circulation® provision was also continued. Although this arrangement makes it easy for the banks to furnish all the cur¬ rency needed, it may be doubted whether, from the public standpoint, it is altogether wise. The ((gold reserve® feature is illogical, inas¬ much as assets which already form part of the general security for the total note issue are placed in the hands of trustees, and there used as special security for an additional issue. All that is gained is the physical certainty of their actual and continued existence, and pos¬ sibly some small increase in total cash reserves. But as the security is ample in any event, this is of little consequence. A serious objection is that the banks are thereby relieved to a con¬ siderable extent from the necessity of increasing their capital from time to time as their business increases, and thus the "margin of safety,® in the form of capital and double liability, which is the general creditors' insurance against loss, tends constantly to become proportionately less at a more rapid rate than it otherwise would. And in this way, too, any tendency to undue concentration in banking is strengthened.

Very heavy fines are imposed in the case of over-issue, these fines varying from the amount of the excess circulation, if the ex¬ cess is not over $1,000, up to $100,000, if the excess is over $200,000.

The security behind the total bank issue is shown by the following figures :

Total note issue 31 Dec. 1917 (of this

$24,078,909 held by banks) . $192,923,824

Specie held:

By banks (about 90 per cent gold) . $82,032,863

In central gold reserve (gold) . 19,680,000

Dominion notes held by banks . 245,099,000

(Gold held against notes by govern¬ ment, say $103,000,000)

Circulation Redemption Fund . 5,769,631

Dominion and provincial government se¬ curities . ’ . 188,703,175

$541,284,669

Other assets . 1,781,879,114

Total assets . $2,323,163,783

Double liability of shareholders . 106 , 807 , 1 10

Unpaid stock . 417, 690

Total security . $2,430,388,583

The bank’s unissued notes cost it nothing, except for paper, printing and transmission, and it is thus enabled to keep at each of its branches a sufficient supply of currency for ordinary requirements, without any loss of interest except on a trifling amount of change¬ making currency. This has an important bearing upon the cost of establishing and con¬ ducting small branches. As the note issue is

a source of profit, each bank pays out within its limit only its own notes and sends in for redemption the notes of other banks which it receives. Daily exchanges are made at every point where two or more

banks are represented, each bank sending in to the other all the notes issued by the other bank which it received the previous day. The resulting balances are set¬ tled at the smaller places by drafts on the Clear¬ ingHouse centres. In this way an automat¬ ically elastic currency is obtained, and the banks are enabled, up to the extreme limit of their issuing power, to meet the annual demand for currency to (<move the crops® — a demand which in an agricultural country like Canada is very urgent — while at the same time the daily re¬ demption provides that the extra supply of notes will be forced out of circulation as soon as the need of them has passed. The elasticity of the note issue is shown by the following table :

TOTAL NOTE ISSUE OF THE CHARTERED BANKS. (000 omitted)

Year

Lowest point reached

Highest point reached

Per¬ centage of in¬ crease

Amount

Date

Amount

Date

1900…

$41,320

January

$53,198

October

28.75

1910. ..

73,379

«

95,992

U

30.8

1911…

77,111

U

105,855

a

37.2

1912…

88,065

u

115,473

November

31.1

1913…

94,576

u

119,497

ii

26.3

1914…

93 , 064

April

123,745

October

32.9

1915…

96,288

U

124,154

November

29.9

1916…

111,029

January

148,785

December

34.0

1917...

133,358

U

196,135

November

47.0

In the course of each bank's daily business, it receives notes issued by other banks, which are not sent in for redemption until the follow¬ ing day, at the earliest — sometimes not for two or three days. A certain proportion, therefore, of the total note issue is always in the hands of the banks themselves, and of total notes in circulation on 31 Dec. 1917, of $192,923,824, the amount thus held was $24,- 078,909, or about 12.5 per cent of the total out¬ standing, leaving $168,844,917, or about 87.5 per cent actually in the hands of the public.

The Canadian Bankers' Association is by statute charged with the duty of supervising and controlling all details connected with the issue of notes. The merits of the Canadian bank note may be thus summed up : First, it is safe ; nothing but national insolvency could make its ultimate redemption doubtful. Second, it is redeemable on demand in specie or Dominion notes; if suspension of payment occurs, the note bears interest at 5 per cent until it is redeemed, and if not redeemed by the bank within two months, it will be paid out of the Redemption Fund. Third, it passes at par from one end of Canada to the other. Fourth, the amount in circulation always tends to be the exact amount demanded by the industrial activity of the country. The bank is obliged to confine its business within the limits which are almost universally assigned to the banker. Speaking generally, it may not deal in merchandise, or be engaged in any

trade; it may not lend money upon the security of goods, or ships, or lands, and other immov¬ able property, nor may it advance against its own stock, or the stock of any other bank, but it may lend against or take as security bonds of an incorporated company, even though the bonds are secured by mortgage on real estate. It may, however, under certain conditions, lend money to wholesale manufac¬ turers, and to wholesale purchasers, shippers of or dealers in various products, on the secu¬ rity of the goods they manufacture or deal in, and it may lend to any person on the security of a bill of lading or of a warehouse receipt. It may also lend money on the security of standing timber, and may make advances for shipbuilding, taking security on the ship. As additional collateral to a debt already con¬ tracted it may take security of almost any kind, except goods or documents representing goods, and it has a first lien on its own stock for any liability due to it by a stockholder. It cannot recover by process of law any interest in ex¬ cess of 7 per cent, but no penalties for usury now exist.

In addition to carrying on the ordinary business of a commercial bank, the Canadian banks receive money on deposit at interest, the prevailing rate at present being 3 per cent. Probably about 60 per cent of their total de¬ posits would in the United States be deposits in savings banks. No securities are specially set aside against any deposits. Deposits due to the Dominion government are a second charge on all the assets of the bank (the notes being the first), and those to any provincial government are a third charge. One bank may sell out all its assets to another bank, proper provision being made for the assump¬ tion of the liabilities of the selling bank. The purchase price may be in stock of the pur¬ chasing bank, or in such other form as may be arranged. No agreement to sell, however, may be made unless and until the Minister of Finance, in writing, gives his consent. In at least one recent instance the Minister has, on grounds of public policy, withheld his con¬ sent. In the event of a bank suspending pay¬ ment, it is taken in charge by a curator ap¬ pointed by the Canadian Bankers' Association, who controls and supervises it until it either resumes payment or goes into liquidation. Sus¬ pension for 90 days, consecutively or at in¬ tervals within 12 consecutive months, consti¬ tutes the bank insolvent. If it becomes in¬ solvent the shareholders are each individually liable for an amount equal to the amount of their respective holdings of subscribed stock in addition to any amount not paid up on such stock. This double liability did not exist in the case of the Bank of British North Amer¬ ica (now incorporated in the Bank of Mon¬ treal), and its ordinary note issue was therefore confined to 75 per cent of its paid-up capital. Against any portion of the other 25 per

cent which it might desire to issue, it had to make a special deposit with the government.

The giving of a fraudulent preference to any creditor, the corrupt acceptance of a gift, commission or other consideration in respect of dealing with the bank's affairs, or the mak¬ ing of false returns, etc., on the part of any director or officer of a bank, is punishable by heavy fines or by terms of imprisonment, or

both. Since Confederation 25 banks working tinder Federal laws have gone into liquidation, iheir paid-up capital at the time of suspension aggregating some $17,000,000, and their total liabilities about $62,500,000. At least 14 of these paid noteholders and depositors in full, and all those chartered since Confederation paid their noteholders in full. Three, which failed before notes were made a first charge on assets, paid neither in full, but varying per¬ centages to depositors, while one of these was a fraudulent affair, which was only in operation for a few months.

Savings banks under the management of • the government are of two kinds : Government savings banks, under the control of the Fi¬ nance Department, and post office savings banks, which are part of the post office system. The former were in existence in the Maritime Provinces for several years previous to 1867 and were taken over by the Federal government when the provinces entered into Confederation. In British Columbia savings banks controlled by trustees existed before Confederation, and these banks were wound up and (<government savings banks® established in their stead. A government savings bank was opened in Win¬ nipeg in 1871 and another in Toronto in 1872. In 1888 there were 50 offices with 57,367 depos¬ itors, having $20,682,025 to their credit, an aver¬ age of $360 for each depositor. It has now been recognized that these banks are no longer necessary, and whenever the position of super¬ intendent of any office becomes vacant, the de¬ posits in that office are transferred to the post office savings bank.

By 31 Dec. 1917 the number of offices open had decreased to 14, all of them, except those at Winnipeg and Victoria, being in the Mari¬ time Provinces. The total amount on deposit was $13,61o,069. In 1868 the system of post office savings banks which had proved so successful in Great Britain was introduced into Canada, 81 offices being opened on 1 April in that year. On 31 Dec. 1916, there were 1,269 savings bank offices in Canada with 134,345 depositors and total balances of $40,478,123. In order to give some support to the theory that both kinds _ of public savings banks are intended primarily as safe places of deposit for persons of limited means, the net amount which may be received from any person dur¬ ing one year is $1,000, while the total amount which any depositor may have at his credit is $3,000. The rate of interest paid in both classes of savings banks was formerly 4 per cent but on 1 Oct. 1899 it was reduced to 3l/2 per cent and on 1 July 1897 to 3 per cent. Until recently there was, however, no justifica¬ tion for even 3 per cent being paid. Canada in normal times was able to negotiate term loans (against which no reserves need be kept) at a net interest rate of about 2.86. By an act passed in 1903 the Department of Finance is obliged to hold as reserves against savings bank deposits an amount in gold, or in gold and Canada securities guaranteed by the gov¬ ernment of the United Kingdom, equal to not less than 10 per cent of the deposits. When to the rate actually paid on these deposits is added cost of reserves and expense of manage¬ ment (from one-fourth to one-half of 1 per

cent per annum), the money held on deposit actually costs the country about 3.75 per cent. This fact was fully recognized by the govern¬ ment, and some years ago they proposed to reduce the rate paid to 2l/2 per cent, but, for political reasons, the proposal was withdrawn. Having regard to the high rates at which the government at present has to borrow for war purposes, it is a question whether the rate should not be raised to — say — 4 per cent.

Amounts held on deposit by the government in certain years were as follows :

Year

Government

savings

bank

Post office savings bank

Total

30

1870 June .

$1,822,570

$1,588,849

$3,411,419

1880 “ .

7,107,287

3,945,669

11,052,956

1890 “ .

19,021,812

21,990,653

41,012,453

1900 “ .

15,642,267

37,507,456

53,149,762

31

1908 March .

15,016,871

47,564,284

*62,581,155

1913 “ .

14,311,542

42,728,941

57,140,483

1914 “ .

13,976,317

14,006,312

41,591,286 39 , 995 , 406

55,567,603

54,001,718

1913 “ .

1916 “ .

13,480,348 13,340, 181

38,404,932

51,885,280

54,511,841

1917 “ .

41,171,660

* Highest point reached.

Apart from the public savings banks, the only savings banks of any importance are the Montreal City and District Savings Bank, of Montreal, and La Caisse d’Economie de Notre Dame de Quebec. The former has a paid-up capital of $1,000,000, and a reserve fund of $1,350,000; its deposits are about $31,000,000, it holds securities of about $19,000,000, and has loans against securities of over $8,000,000. The latter has a paid-up capital of $250,000, and a reserve fund of about $1,000,000; its deposits are about $10,000,000, it holds securities of about $8,000,000 and has loans of about $3,000,000 against securities. These banks may invest 80 per cent of their deposits in certain approved securities, including the stock of chartered banks, and may make advances against such securities. These are the only classes of investments which they may make. They

are specially prohibited from lending on real estate, promissory notes or commercial paper. Unlike the ordinary chartered banks, they have not the right to issue notes for cir¬ culation.

At the outbreak of the European War it became necessaiy to take steps to conserve the financial resources of the country. On 3 Aug. 1914, an Order in Council was passed, giving authority as follows: (1) To the Minister of Finance, to issue Dominion notes to such an amount as might be necessary against such securities as might be deposited by the banks and approved by the Minister; (2) To the banks, to make payment in bank notes, instead of in gold or Dominion notes; (3) To the banks, to issue at any time excess circulation not to exceed 15 per cent of their respective combined unimpaired capitals and rests.

This Order in Council (together with one dated 10 Aug. 1914, suspending the redemption in specie of Dominion notes (see Canada —

Currency, Coinage and Legal Tender), was confirmed by an act (5 George V Chap. 3) dated 22 Aug. 1914, which continued it in force until 15 Sept. 1914, and gave the governor-in¬ council statutory power ttIn case of war, in¬ vasion, riot or insurrection, real or appre¬ hended, and in case of any real or apprehended financial crisis, M to make effective proclama¬ tion provisions similar to those contained in the Orders in Council of 3d and 10th of August, the only change being that advances to the Quebec savings banks were also authorized. On 3 Sept. 1914, a proclamation was duly issued, revoking the Orders in Council, and putting into force the provisions of the act. These provisions will doubtless be retained for some time after the end of the war. The effect of them is that the banks can at any time obtain from the government advances (unlimited in amount, so far as the law is concerned) of Dominion notes against ap¬ proved securities deposited (these securities being deemed to be the security required by the Dominion Note Act to be held against Dominion notes: i.e., gold), that they may make all payments in bank notes including the payments necessary to redeem their own notes, which they are thus

by law relieved from redeeming, and they may during the whole year issue excess circulation to the extent of 15 per cent of their combined unimpaired capital and rest, instead of only during the period from the beginning of September to the end of February. The practical effect of these provisions is that no gold and only change¬ making quantities of Dominion notes are paid out over the counter, so that the obtaining of gold by the public for hoarding, export or any other purpose is absolutely prevented. In order, however, to retain the daily redemption of notes not needed by the public, and to pre¬ vent large quantities of notes of one bank being held by other banks, the Clearing-House rules provide that the daily settlements at the chief redemption points shall continue to be made in Dominion notes. The whole arrange¬ ment has worked remarkably well ; even in the disturbed da}rs at the beginning of the war, when all commercial and industrial interests were in a state of absolute uncertainty, and no one knew how things would go from day to day, there was not the slightest tendency toward a run on the banks, which continued to pay their depositors and to all outward ap¬ pearance to transact internal business as usual.

* F. G. Jemmett,

Colonial Bank, London; Formerly Secretary, The Canadian Batik of Commerce.

48. PUBLIC FINANCE, 1867-1917. Up

to the time that the various provinces, which originally constituted the Dominion of Canada, entered into Confederation, they had depended almost entirely for their provincial revenues upon customs duties upon imports, supple¬ mented by a limited set of excise taxes. Direct taxation upon property and income had been practically entirely reserved for the municipali¬ ties, both rural and urban. These municipal revenues, however, had been regularly supple¬ mented from the provincial treasuries by grants

in aid of specific requirements, chief of which were education and transportation, or schools and highways and bridges. The larger public works, such as railways and canals, harbors and roads, were for the most part undertaken by the provincial governments, or by corporations chartered by them and heavily subsidized or aided in other ways, including authorized municipal assistance.

Source of Revenue. — Such being the finan¬ cial conditions of the provinces at the time of Confederation, one of the chief difficulties to be faced was that of persuading the individual provinces to resign almost their only methods of taxation, customs and excise, into the hands of the new Federal government, and thus be left to cast about for other and hitherto but little developed sources of revenue. After much discussion, but under the somewhat stimulating pressure of necessity, a compromise was arrived at. The new Dominion or Federal government was granted sole control of the customs, excise and all other socalled indirect methods of taxation ; while the provinces and their subordinate municipal institutions were confined to direct methods of taxation without, however, excluding the Dominion government from these sources also. On the other hand, the Dominion, in view of these sacrifices on the part of the provinces, not only assumed the future costs, management and maintenance of all the larger and expensive public works and public services, but also assumed the previously accumulated funded debts of the provinces. In addition, the Dominion was required to grant to the respective provinces, on a speci¬ fied basis, certain annual subsidies in cash. These for some time furnished the most im¬ portant element in their respective provincial revenues. The amounts of these provincial subsidies have been the occasion of much agita¬ tion and not infrequent revision ever since. To the provinces were also assigned the various public lands, including the timber and mines on or within them. At the same time, the British North America Act authorized both the provin¬ cial and Dominion governments to borrow money on the basis of their respective public credits.

The very strong and long grounded dislike of the Canadian people, both French and Eng¬ lish, to direct taxation led not only, as we have seen, to the confinement of this method of taxa¬ tion to the self-imposed levies on the property owners of the municipalities, but steadily pre¬ vented, until quite recently and chiefly under the temporary requirements of the war, the levy of direct property and income taxes for pro¬ vincial or Dominion purposes.. Thus in most cases, up to the outbreak of the present great war, there had remained a sharp distinction be¬ tween the sources of the revenues of the Dominion, provincial and municipal gov¬ ernments. This separation has been of the greatest value to the people of Canada in sim¬ plifying their fiscal problems, and in keeping be¬ fore them the distinct fields of responsibility for the levying and expending of the various con¬ tributions which the citizens are called upon to make in support of the different public admin¬ istrations under which they live.

As already indicated, the revenues of the Dominion are, for the most

part, derived from

customs duties on imports and excise duties on certain lines of manufactured goods, chiefly liquors and tobaccos. Owing to the customary method of presentation and discussion of the annual budgets and public accounts of the Dominion, the very limited source of the chief revenues of the country is apt to be overlooked. The present situation arose from historic con¬ ditions and the necessity for remedying certain obvious abuses under former methods of deal¬ ing with public accounts. Thus, at one time, the officials connected with the collection of the public revenue, whether levied as taxes or ob¬ tained in connection with certain public services, were permitted to retain, chiefly in the shape of fees and expenses, the cost of collection, re¬ turning to the government only the balance in its favor. When combined with the prevalent system of political patronage, the abuses con¬ nected with this method can be readily under¬ stood. In order, therefore, to bring as much as possible of the receipts and payments from the various departments to the attention of Parliament and the country, the ordinary re¬ ceipts from the different sources, except from loans and trust funds which are otherwise ac¬ counted for, were combined in what is known as the consolidated fund. Out of this is paid both the ordinary and miscellaneous charges and expenses of the government, except what is applied in the way of capital expenditure or the redemption of debt, or special subsidies and grants. At the same time, in connection with some of the public service, as for instance the postal service, a very considerable element of the expense connected with it is deducted before the remaining funds are handed over to be¬ come part of the consolidated revenue. Thus the total gross revenue of the Post-Office De¬ partment amounted to upwards of $16,750,000 in 1914—15, but charges to the extent of almost $4,000,000 were deducted therefrom before the remaining amount of nearly $13,000,000 was handed over as part of the consolidated revenue.

For the fiscal year ending 31 March 1915, the consolidated fund amounted to $133,073,481 and the expenditures chargeable to it

amounted to $135,523,206, representing a deficit of nearly two and a half millions, to be met from loans or other available resources not constituting part of the consolidated fund. When, how¬ ever, we come to analyze the sources of revenue making up the $133,000,000 of the consolidated fund, and the items of expenditure which are charged upon it, we find that a large portion of the fund represents simply the gross income from various government services, such as the postal and government railway services ; while the charges upon it include also the working expenses of these same enterprises, so far at least as they have not been already deducted before being brought into the budget, as indi¬ cated above in the case of the Post-Office De¬ partment. Thus, for instance, the consolidated fund includes receipts from the postal service of slightly over $13,000,000, but when we turn to the expenditures from the fund, we find that the operating expenses of the postal service amount to almost $16,000,000. This takes no account of the considerable portion of an ex¬ penditure of some two millions on mail sub¬ sidies and steamship subventions. Further the

central or administrative staff of this service at Ottawa costs an additional $800,000, being included in the item of c< civil government.® If one cares to go further and turn to the detailed expenditures of the Public Works Department, it will be found that of the expenditure for the year of $7,750,000, a large section is represented by either new post-office buildings, separatelv, or combination public buildings, the chief sec¬ tions of which are commonly devoted to the postal service. Thus instead of the Post-Office Department furnishing any real revenue to the government, it represents a very extensive ad¬ ditional charge upon the real revenues of the country. The same is true of the large revenue item of $12,000,000 from the government rail¬ ways, — the Intercolonial, Prince Edward Is¬ land, Transcontinental and one or two small lines. We find on referring to the operating expenses of these lines that not only is this revenue entirely absorbed but there is left in its place some $325,000 of a deficit on operat¬ ing expenses. This does not take into account the share of the Railway Department in the ex¬ penditure under civil government of $188,000 for the staff of the Department of Railways and Canals. Neither does it take into account the interest on the enormous capital expenditure on the government lines and which constitutes so large a part of the interest charge on the public debt, amounting to over $15,000,000.

It might appear that the sale of Dominion lands, amounting to over $2,800,000 in 1914. would furnish a very considerable surplus of

revenue. But we find that the annual cost of the administration of the Dominion lands amounted to $3,700,000 in the same year. Another important item in the annual receipts included in the consolidated fund is that of $2,900,000 of interest on investments. But this, it is found, represents chiefly the interest on the advances to the Grand Trunk Pacific, amounting to over one and a half millions, on Montreal Harbor debentures, the sinking fund, advances to banks, *etc.* Altogether the inter¬ est on investments represents but a small offset on the interest requiring to be paid by the Dominion on the public debt, which, directly or indirectly, was partly incurred for these pur¬ poses.

Income from Taxation. — One of the tables in the Annual Report on Public Accounts, pre¬ pared by the Finance Department, sets forth separately the income from taxation, which is the real income of the country, and the income derived from other sources, largely, as indi¬ cated, the gross receipts from certain govern¬ ment services. Up to the outbreak of the European War, there were, as mentioned, only two real sources of revenue : customs and excise duties. The Chinese immigration tax, though listed separately, is really a customs tax on imports with the usual protective ob¬ ject in view. Since 1914, to these two sources of direct revenue the special war taxes, to be referred to, must be added.

Distinguishing taxes proper from the other sources of income, we find that of the total receipts of $133,073,481, constituting the con¬ solidated fund for the year 1914—15, $97,7 1 5,440 were derived from taxes proper, while $35,- 358,041 were derived from the other sources. Of the charges which are almost entirely paid

out of the $97,000,000 of taxation, the chief are the following:

Interest and management of the national debt. $16,188,000

Customs and excise collection . 4 , 605 , 000

Subsidies to the provinces . 11,451, 000

Sinking funds . 1 , 645 , 000

Civil government . 6,157, 000

Administration of justice . 1 , 469 , 000

Legislation . 2,376,000

Arts, agriculture and statistics . 3,618,000

Immigration . 1,658, 000

Militia (apart from the war) . 10,000,000

Public works (not charged to capital) . 19,343,000

Mail subsidies and steamship subventions . 2, 162,000

Ocean and river service . 1 , 133,000

Lighthouse and coast service . 2 , 583 , 000

Trade and commerce . 2 , 943 , 000

Indians . 2 , 400 , 000

These items account for somewhat oyer $89,500,000 of the regular revenue, leaving about $8,000,000 to meet other minor items of unremunerative expenditure and cover the de¬ ficits on the various remunerative government enterprises whose gross revenue furnishes the other $35,000,000 of income. This $35,000,000 of revenue partly meets what we have called the working expenses of the departments ; the chief

of these items are :

Post-office . $15,961,000

Public works, collection of revenue . 799,000

Railways and canals . 13,876, 000

Dominion lands . . 3,701 ,000

Weights, measures, gas and electric light in¬ spection, etc . 288,000

These items alone amount to $34,500,000, leaving about $750,000 for all the other smaller items of this character. As a matter of fact, as already indicated, most of the deficits, repre¬ senting the surplus of costs over revenue in these branches of the service, have to be met out of the additional $8,000,000 remaining from the tax revenue as indicated above.

Special Funds. — The Dominion government has the use of several trust funds, such as the post-office and savings bank deposits on which a comparatively low interest is paid. It enjoys also the issue of Dominion notes to a specified amount in excess of the specie reserve. The other funds, beyond the consolidated fund, which are available for expenditure within the year are, first, any surplus of revenue from the consolidated fund ; second, loans, whether permanent or temporary, raised during the year. Under normal conditions these extra funds are applied to meet any deficit in the consolidated fund, for the redemption of debt, capital ex¬ penditure on public works, or subsidies to rail¬ roads, and other special grants.

As to what works may be chargeable to capital expenditure or to annual revenue out of the consolidated fund is largely a matter of expediency. In the history of the Dominion since Confederation, the views and the practices of finance ministers and governments have varied very considerably. Thus, items which at one time are regarded as properly charged to consolidated revenue are, at another, charged to capital account. Apparently the most in¬ fluential element in determining the variations in practice has been the condition of the public purse, and the very natural disinclination of ministers of finance and their colleagues to present budgets showing deficits on the ordinary annual expenditure. The lack of any definite principle in the division between expenditure from consolidated revenue and expenditure on

capital account will be recognized in a survey of the details of the items charged to capital account and annual revenue in the Departments of Public Works and Railways and Canals.

Changes Resulting from the War. — We turn now to take a brief survey of the financial changes which have resulted from the voluntary participation of Canada in the present great war. Canada has undertaken to bear the entire cost of placing half a million troops in the field, fully equipped, transporting them to and from Europe, maintaining them on the front with provisions, munitions, ambulance and hos¬ pital equipment and all the other expenses in¬ cidental to war. In so doing the country has necessarily to face new and hitherto untried problems of finance. The government has fol¬ lowed the British example of meeting as large a share as possible of the expense from in¬ creased taxation, and the remainder from loans. Both old and new forms of taxation have been employed in raising additional revenue. In 1914 additional customs duties were levied on a list of articles mostly of foreign production, and more or less in the line of what are now considered necessary luxuries, and therefore likely to increase revenue rather than curtail consumption. Excise duties on liquor and tobacco were also increased. The additional revenue expected from these sources was about $1,000,000 per month.

In 1915 the customs dues were still further augumented by a general increase of 5 per cent on the British preferential rates and of 7ˆ4 per cent on all other rates. This additional tax was applied, with a few specific exceptions, to goods both free and dutiable in the regular tariff. As a result, although the imports of the previously dutiable goods fell off in 1915— 16 while the total imports increased only $32,- 500,000, yet the customs revenue increased $24,735,000 over the previous year.

The government issue of Dominion notes, supported by a 25 per cent reserve instead of 100 per cent reserve, was increased from $30,000,000 to $50,000,000, thereby securing an additional free loan of $15,000,000. So large, however, was the volume of notes fully secured by gold that this change reduced the reserve on the total issue merely from 81 to 71.7 per cent.

New features of Federal taxation were first introduced in 1915, and consisted of special taxes of 1 per cent on bank notes, 1 per cent on the interest income of loan and trust com¬ panies and the net premium of insurance com¬ panies, except life and marine. Telegraph and cable messages were taxed one cent each, and railway and steamship tickets at graduated rates. Other features were a two-cent stamp on bank cheques, bills of exchange, money and postal orders, travelers' cheques, and notes discounted at banks. There was .also a levy of one cent extra on letters and post cards. Additional excise stamps of varying amounts were levied on proprietary medicines,

perfumery and wines. During the first year the revenue from these special taxes amounted to somewhat over

$3,000,000.

In 1914 the special appropriation for war purposes was $50,000,000, the following year $100,000,000, and for 1916-17 $250,000,000. In this connection two quite new departures in

Federal finance were mad'e. During the summer of 1915, the first Dominion loans to be nego¬ tiated in the United States were arranged. The first was for $25,000,000 and the second for $20,- 000,000. These were followed in the spring of 1916 by another loan of $75,000,000, floated in New York. The other departure was the rais¬ ing of a domestic loan for $50,000,000, in the autumn of 1915. This was so successful that over twice that amount was subscribed and $100,000,000 accepted. In the autumn of 1916, the experiment was repeated for another $100,- 000,000 with perfect success. Exchange condi¬ tions, owing to the enormous surplus of British imports from America during the earlier period of the war, rendered it undesirable to borrow in Britain for use in America. A mutual arrangement was therefore effected by which the British treasury advanced funds for Canadian war expenditure in Europe and the Canadian government, partly from its own borrowings and partly by credit arrangements with the banks, financed British purchases in Canada, thus naturally relieving the transatlantic exchange situation.

As the Canadian war expenditure increased, additional taxes were imposed. The new taxes of 1916 took the form of a levy on exceptional profits, most of which were naturally due to the production of army supplies. The tax consisted of one-fourth of all profits in excess of 7 per cent from incorporated companies, and in ex¬ cess of 10 per cent in other cases. Naturally in the administration of such a tax a good deal of discretion had to be allowed to the

officials of the Department of Finance.

One of the most interesting questions which arises in connection with the new departures now being made, both as to methods of taxation and sources of loans, is as to whether and how far these experimental ventures may perma¬ nently affect the future financial practice and policy of Canada.

Provincial Finance. — We may now take a brief survey of the leading features of Cana¬ dian provincial finance. As already indicated the provincial subsidies of the Dominion treas¬ ury constituted the original basis of provincial revenue. The Dominion having assumed, up to a certain specified amount, the debts of the four original provinces of Ontario, Quebec, Nova Scotia and New Brunswick, found it necessary to make corresponding allowances for the other provinces as they entered Confederation, or were created out of the vast western territories held by the Dominion government, on much the same basis as those territories out of which have been created the Western States of the American Union were held by the Federal gov¬ ernment at Washington. In view of the reasons for granting them, these were known as (<debt allowances,® and interest is paid on them at special rates. The object of the debt allow¬ ance was, of course, to enable the new prov¬ inces to equip themselves with such provincial public works and buildings as would place them on a fairly equitable footing with the older provinces when they entered Confederation. In the case of the two last provinces to be created, Alberta and Saskatchewan, no definite debt allowances were fixed, but they were granted specific annual subsidies in lieu of the interest upon fixed capital sums.

The details of the frequent agitations for readjustment of the original financial arrange¬ ments with the provinces, either at the time of Confederation or on their subsequent entrance or creation, and the actual changes effected from time to time, are quite beyond the scope of this article. Suffice it to say that the grounds on which these relations at present stand, though still subject to demands for revision, are as follows :

1. A fixed grant according to population.

2. A per capita grant of 80 cents per head up to a population of 2,500,000, and at the rate of 60 cents per head above that number.

3. Special grants for buildings, in lieu of public lands.

4. Interest upon debt allowances, or annual grants in lieu thereof.

In raising the remainder of their revenues, the provinces, especially of recent years, have devised many new taxes. As in the case of the Dominion, however, their budgets combine purely revenue taxes and incomes from various forms of provincial service, and these incomes are either wholly or partially offset by the cost of rendering these services. For a considerable time, as already indicated, the taxes on real estate and provincial income were exclusively assigned to the municipalities for the support of their local requirements. Up to 1915 only two provinces had departed from this policy, British Columbia and Prince Edward Island. Both levy a tax upon real estate and income, while British Columbia alone has resorted to that old standby of the American States, the personal property tax.

It is impossible to go into details with ref¬ erence to the very varied financial arrangements, and classifications of revenue and expenditure, of the different provinces. In their provincial accounts, the combinations of items in some provinces and the separation of them in others render it very difficult to make any detailed comparisons of their budgets. Certain broad facts, however, stand out as indicative at once of those features common to the majority of the nine provinces and those which are peculiar to individual provinces owing to their special historic or physical conditions, though some¬ times due also to special lines of policy. Tak¬ ing the last available returns for all the prov¬ inces up to 1914, we find that beyond the Dominion subsidies, the most common sources of provincial revenue are succession duties, taxes on corporations and various special fees. In these all the provinces share. In some cases the returns from certain fees and licenses are set forth separately. Thus licenses for the sale of liquor, for motor vehicles, moving pictures, hunting and fishing, etc., are listed separately in a number of accounts. Six provinces derive revenues from Crown lands, timber and mines, and from interest on investments. Most of them derive a certain revenue from hospitals and public charities which tends to offset the cost of these institutions. Revenues come also from certain public works, and from activities in aid of agriculture. Certain revenues, as re¬ gards their relative importance at least, are peculiar to individual provinces. Among these are the tax on fox farms in Prince Edward Island, royalties on coal mines in Nova Scotia and British ‘Columbia and to a lesser degree in Alberta, also on other mines in Ontario, Que-470

bee and British Columbia. The income from the Timiskaming and Northern Railway, and the investments of the Hydro-Electric Com¬ mission, are characteristic of Ontario. Revenues from provincial telegraph and telephone lines are important in Manitoba, and from Chinese restriction in British Columbia. On the side of expediture there is more uniformity. All of the provinces have large outlays for interest and sinking funds, the administration of justice, for legislation, the civil service, education, public charities, agriculture and public works. Five of them expend considerable sums on colonization and immigration, several on mines, lands and forests. Ontario spends much on its Hydro-Electric Commission ; Manitoba on tele¬ graphs and telephones and British Columbia on its fisheries.

In six of the provinces the Dominion sub¬ sidy constitutes the largest item in revenue. In Nova Scotia the first place is taken by mines; in Ontario, lands, forests and mines ; while in British Columbia no less than five sources of revenue take precedence of the Dominion sub¬ sidy, in the following order, timber royalties and licenses, Chinese restriction, land sales, wild land taxes and registration fees. Of those in which the subsidy takes the first place, the land tax comes second in Prince Edward Is¬ land, territorial revenue in New Brunswick, succession duties in Quebec and land title fees in the three Prairie provinces of Manitoba, Saskatchewan and Alberta. In Manitoba, how¬ ever, the gross revenue from the telegraph and telephone service, and in Alberta the special tax on railway bonds, exceeded these items in 1914, but these do not represent normal revenues available for general purposes.

In the line of expenditure, education ranks first in five provinces, second in two, third in one and fourth in another. Where education is not first, public works in one form or another take precedence. In Manitoba, however, the gross outlay on the telegraph and telephone service exceeded all other items. In British Columbia public works, divided into two branches of (a) railroads, bridges and wharves, and (b) other public works, occupy the first and second places, with the civil service third and education fourth. The following table gives the total revenue and expenditure and the amounts per capita for the different provinces for the fiscal year ending at various periods in 1914:

Expendi—

Revenue Total ex-ture per Province Total revenue per head penditure

head

Prince Edward

Island . $525,555 $5 61 $445,396 $4 75

Nova Scotia . 1,885,458 3 75 2,098,893 4 18

New Brunswick.. 1,505,229 4 25 1,493,774 4 22

Quebec . 9,000,377 4 25 8,624,368 4 07

Ontario . 11,121,382 4 23 11,819,311 4 49

Manitoba . 5,512,163 10 28 5,638,658 10 52

Saskatchewan… 5,866,220 8 12 5,396,380 7 47

Alberta . 4,522,513 9 27 4,409,795 9 04

British Columbia. 10,479,259 21 46 15,766,912 32 30

The budgets of the provinces have not been materially affected by the war and yet it has had its influence in various ways. When the war broke out, largely as an expression of their enthusiastic support of the action taken by Great Britain, each of the provinces made typi¬ cal contributions vof supplies for the British army-Ontario and Manitoba contributed flour ; Quebec,, cheese ; New Brunswieh, potatoes ; Al¬

berta and Prince Edward Island, oats; Sas¬ katchewan, horses and British Columbia canned salmon. These contributions amounted to nearly $2,250,000. Another large factor has been the provincial contributions toward the patriotic fund, to provide supplementary assist¬ ance for the wives, children and other depend¬ ents of the Canadian soldiers. To meet these and any other miscellaneous outlays connected with the war has already entailed the levying of additional taxation in most of the provinces.

Adam Shortt,

Commissioner of the Dominion Civil Service.

49. CURRENCY, COINAGE AND LE¬ GAL TENDER. Interesting as it would be to trace the history of the currency and coin¬ age of the various British provinces from the time when grain and furs were the actual cur¬ rency, down through the card money of de Meulles, the ordonnances of Bigot and the Army Bills of 1812 to the present satisfactory system, such a task is quite impossible within the limits set for this article. <(Broadly speak¬ ing, says Chalmers, <(the currency history of Canada consists in the transition from the French ecu to the silver Spanish dollar, and from the Spanish dollar to the gold dollar of the United States. But this transition has reference exclusively to the standard coin; the characteristic feature of Canadian currency, both in the 1 7th century and at the present day, is paper.® During the French regime a special colonial coinage was struck in France, but until the period when the chartered banks began to provide a stable medium of exchange, we find a large proportion of the currency consisting of the gold and silver coins of various countries, passing current and made legal tender at rates which were changed from time to time in the hope of keeping coin within the country. Brit¬ ish, French, Spanish, Portuguese, German, Mex¬ ican and American coins were all legal tender, while for the first 50 or 60 years after the British conquest the actual currency of old Canada consisted chiefly of Spanish silver and some British gold, together with paper, more or less doubtful in value, issued by merchants, private bankers and others.

By ordinance of 1 777, followed up by acts of the legislatures of Upper and Lower Canada in 1796, the Halifax currency, with the Spanish dollar valued at five shillings, or four to the pound currency, was made the standard of the country, and new rates were established at which different coins should pass current. The British guinea, which appears to have been the gold coin most in use, was worth £1 3s 4d cur¬ rency. The Halifax currency, it will be ob¬ served, was to sterling money in the proportion of 10 to. 9, £10 currency being the equivalent of £9 sterling. In Lower Canada, however, ac¬ counts were for many years afterward kept in livres and sols, six livres being equal to one Spanish dollar, while in Upper Canada the York (or New York) currency was more or less in use, its basis being the Mexican real, known in North America as the York shilling' eight of which went to the dollar. Its use' however, was prohibited after 1 Tuly 1822! With many attempts at change, and with varia¬ tions in the ratings of different coins from time to time, the Halifax currency, which, it must be remembered, was a money qf account only, re¬ mained as the legal currency system-until' 1-853,

when, after previous consultation with New Brunswick and Nova Scotia, a decimal system having as its unit a dollar equal in value to the American dollar was introduced and placed on an equal footing with the Halifax currency, and the British sovereign was made full legal tender at $4.8667. On 1 Jan. 1858, the decimal system was finally adopted as that in which all public accounts should be kept, and since that date Canadian currency has been on a gold monometallic basis, with a unit of value equal to the gold dollar of the United States.

On 1 July 1867, the Dominion of Canada came into being, uniting in one Confederation the provinces of Ontario, Quebec, Nova Scotia and New Brunswick; currency, coinage and legal tender were thereafter under the sole con¬ trol of the Dominion Parliament.

The first Federal Act dealing with the stand¬ ard of value and the metallic currency was passed in 1868. It declared that it was desirable that the currency of Canada should be assimi¬ lated to the basis agreed on at the monetary conference held in Paris earlier in the year, and also that it should be of the same value as the metallic currency of the United States. It pro¬ vided, however, for the continued use of the old

It will be observed that although the Cana¬ dian currency has a unit of value equivalent to that of the. United States, the standard of value is the British sovereign.

Power was taken to make any foreign gold coins legal tender in Canada, and the American gold eagle of the weight and standard of fine¬ ness then existing, together with its multiples and halves, was made legal tender, each coin at its face value.

In 1910 the Act now in force (9-10 Edward VII, Chap. 14) was enacted. Its reads in part as follows :

“The denomination of money in the currency of Canada shall be

dollars, cents and mills, — the cents being one-hundredth part of a dollar, and the mill one-tenth part of a cent.

‘The standard for gold coins of the currency of Canada shall be such that of one thousand parts by weight, nine hundred shall be of fine gold and one hundred of alloy; and the standard for silver coins of such currency shall be such that of one thousand parts by weight nine hundred and twenty-five shall be of fine silver and seventy-five of alloy.

“Gold, silver and bronze coins, struck by the authority of the Crown for circulation in Canada, of the respective denominations mentioned in the schedule to this act, and of the standard weight and fineness therein set out, shall be equal to and pass current for the respective sums in the currency of Canada following, to wit: for twenty dollars, ten dollars, five dollars, two and one-half dollars, fifty cents, twenty-five cents, ten cents, five cents and one cent.”

SCHEDULE

Remedy allowance

-

Least

^ -

— - - ■ - v

Standard

current

Weight

Millesimal

Denomination of Coin

weight

weight

Standard fineness

per piece

fineness

Grains

Grains

Grains

Gold

Twenty dollar .

516

513.42

Nine-tenths fine gold,

.50

1

Ten dollar .

258

256.71

one-tenth alloy; or

.40

1

Five dollar .

129

128.355

millesimal fineness,

.25

1

Two and one-half dollar .

64.5

64.178

900

.20

1

Silver

One dollar .

360

Thirty-seven-fortieths

1.50

4

Fifty cent .

180

fine silver three-

1.00

4

Twenty-five cent .

90

fortieths alloy or

.60

4

Ten cent .

36

millesimal fineness,

*2.50

4

Five cent .

18

925

*3.00

4

Bronze

Cent .

87.5

Mixed metal, copper,

*140.00

tin and zinc

* This remedy is on a group of one dollar’s worth, ten pieces, t This remedy is on a group of one dollar’s worth, twenty pieces.

j This remedy is on a group of eighty pieces weighed against a weight of one pound avoirdupois.

<(pound currency® when this was desired. This Act was repealed by the Act of 1871, which established the metallic currency on its present basis throughout the whole of the Dominion except Prince Edward Island (entered Con¬ federation, 1873) and British Columbia (entered Confederation, 1871) extension to these prov¬ inces being effected in 1881. In 1886 a consoli¬ dating act was passed, providing that :

“The denominations of money in the currency > of Canada shall be dollars, cents and mills — the cent being one hundredth part of a dollar, and the mill one-tenth part of a cent.

“The currency of Canada shall be such, that the British sovereign of the weight and fineness now prescribed by the laws of the United Kingdom, shall be equal to and shall pass current for four dollars eighty-six cents and two-thirds of a cent of the currency of Canada, and the half sovereign of proportionate weight and the fineness, for one-half the said sum.

“Any gold coins which Her Majesty causes to be struck for circulation in Canada, of the standard of fineness pre¬ scribed by law for the gold coins ‘of the United Kingdom,, and bearing the same proportion in weight to that of the British sovereign, which five dollars bear to four, dollars eighty-six cents and two-thirds of a cent, shall pass current and be a legal tender in Canada for five dollars; and any multiples of divisions of such coin, which Her Majesty causes to be struck for like purposes, shall pass current and be a legal tender in Canada at rates proportionate to their intrinsic value respectively.”

It also provides that the British sovereign and multiples and divisions thereof, and the five, ten and twenty dollar gold coins of the United

States shall pass current and be legal tender, and gives the governor in council au¬ thority to fix, by proclamation, the rates at which any foreign gold coins shall pass current and be a legal tender.

The actual currency of the country consists almost entirely of paper (see Canada — Bank¬ ing System) and this has been found entirely satisfactory. Until recent years there had been no Canadian gold coinage, while the silver and bronze coinage needed had been obtained from England, through the Royal Mint, an arrange¬ ment which had always worked very well. In¬ fluenced, however, by the large production of gold in the Yukon territory the government took authority, during the session of 1901, with the concurrence of the Imperial govern¬ ment, to establish at Ottawa a branch of the Royal Mint, which came into operation in 1908.

Since that date all Canadian coinage has been minted in Ottawa. In 1912 the Ottawa Mint began the coinage of Canadian five dollar and ten dollar gold pieces, and up to 31 Dec.

1915 $4,868,420 had been coined and issued. Practically none of this is in the hands of the public, which does not want and will not use gold, except very occasionally for some special purpose, and almost the whole of Canada's gold currency is held by the government or the banks, forming a small part of the country's gold reserves. These reserves are drawn upon or added to in the settlement of international balances, and for this purpose British and American gold is better adapted than is. Canadian.

The subsidiary or token coins in use are five, ten, twenty-five and fifty cent pieces, all silver, and one cent, bronze. The total amount of silver coined and put into circulation in Canada (including $95,000 old coinage of New Bruns¬ wick) up to 31 Dec. 1915 is $19,848,323 and of bronze $1,212,933. Silver of the face value of $1,259,750 has been withdrawn for recoinage, and it is estimated that the amount now in circulation is from one-third to one-half of the total coined.

The history of the paper obligations of the Dominion government really begins before Confederation, when in 1866 the legislature of the province of Canada sanctioned an issue of provincial notes to an amount not exceeding $8,000,000. At Confederation this issue, amount¬ ing to $3,113,700, together with $605,859.12 issued by Nova Scotia, was assumed by the Dominion, and the “Dominion Notes® system was thus inaugurated. In 1868 provision was made for securing by specie the note issue up to $5,000,000 and 25 per cent of any excess, the balance up to the limit of $8,000,000 to be covered by provincial or Dominion debentures. In 1870 the issue limit was raised to $9,000,000, secured by 20 per cent of specie and 80 per¬ cent of debentures, with authority to increase to any amount, providing the excess above $9,000,- 000 was covered by specie. In 1872 it was pro¬ vided that only 35 per cent of this excess need to be so covered, while in 1875 it was enacted that for any issue between $9,000,000 and $12,- 000,000 specie to the extent of 50 per cent must be held, any excess above $12,000,000 being en¬ tirely covered by specie. In 1880 the issue was raised to $20,000,000 to be covered to the ex¬ tent of at least 15 per cent by gold, an addi¬ tional 10 per cent by gold or Dominion secu¬ rities guaranteed by the Imperial government and the remaining 75 per cent by ordinary Dominion securities. The issue might exceed $20,000,000 to any extent provided the whole of any excess was covered by gold. In 1903 an issue of $30,000,000 was authorized, secured as to not less than 15 per cent by gold, and another 10 per cent by gold or guaranteed debentures. Any notes_ issued in excess of $30,000,000 were to be secured by gold.

Immediately after the outbreak of war in 1914 the Act (5 George V, Chap. 4) now in force was passed, its main provisions being as follows :

“Dominion notes may be issued and outstanding at any time to any amount, and such notes shall be a legal tender in every part of Canada except at the offices at which they are redeemable”.

“Dominion notes shall be of such denominational values as the Governor in Council determines, and shall be in such form, and signed by such persons, two in number, as the Minister directs”.

“Dominion notes shall be redeemable in go. on pres¬ entation at branch offices established, or at banks with which arrangements are made for the redemption thereof as hereinafter provided”.

“The Minister of Finance shall always hold as security for the redemption of Dominion notes up to and including fifty million dollars, issued and outstanding at any one time, an amount equal to not less than twenty-five per centum of the amount of such notes in gold”

“As security for the redemption of Dominion notes issued in excess of fifty million dollars, the Minister shall hold an amount in gold equal to such excess”.

“The Governor in Council may establish branch offices of the Department of Finance at Toronto, Montreal, Hali¬ fax, Saint John, Winnipeg, Victoria, Charlottetown, Regina and Calgary, for the redemption of Dominion notes, or may make arrangements with a chartered bank at any of the said places for the redemption thereof”.

Under the authority of this Act the following notes were outstanding on 31 March 1917 :

Provincial notes . $27,769.25

Fractionals . 1,085,481.54

$1, $2 and $4 . 24,085,893.50

$5 . 3,253,092.50

$50 and $100 . 11,750.00

$500 and $1,000 . 6,526,500.00

$34,990,486.79

$500, $1,000, $5,000 (for use of banks only). 148,258,500.00

Total . $183,248,986.79

A very large proportion of the large notes in circulation is held by the chartered banks for reserve purposes, and also as a medium in which to make their daily settlements with each other. A special form of note has therefore been issued, negotiable only between banks, and of no value except to a bank. This materially lessens the risk of loss by robbery when large amounts are being carried from one bank to another, or at any other time. Of the notes in circulation as above $148,258,500 were the special notes for the banks, while of the total issue of $183,248,986 the banks held $160,291,577, leaving only $22,957,409 in the hands of the public.

To comply with the provisions of the Act, the Minister of Finance should have held on 31 March 1917, as security for the note issue, gold or securities deposited by the banks under 5 Geo. V, Sec. 4, Subsec. 2 (see Canada — Banking System) as follows:

Up to and including $50,000,000, 25 per cent. $12,500,000
$50,000,000 to $183,248,986, dollar for dollar. 133,248,986

Legal requirements . $145,748, 986

Of this total $113,110,154 was in gold.

Immediately following the outbreak of the European War, redemption in specie of Dominion notes was suspended, the necessary instructions being given by the Minister of Finance on 4 Aug. 1914. These instructions were approved by an order in council dated 10 August and given full legal confirmation by an Act (5 Geo. V, Chap. 3) passed on 22 August. Under the authority of this Act, the redemption in specie of Dominion notes is still (31 Dec. 1917) suspended, and the suspension will doubtless continue until the end of the war.

In recent years the following amounts of Dominion notes (including a petty amount of old provincial notes) were outstanding:

1900

1910

1911

30 Tune .

31 March .

a

. $26,134,348

. 87,173,342

. 90,033 509

1912

• u

. 113 368 858

1913

a

112,141 106

1914

« .

117 834 859

1915

u

157.095 339

1916

u

176 969 ?93

1917

u

CANADA — THE GRANGER MOVEMENT (50)

473

Legal tender in Canada is :

(1) Full legal tender, (a) Any Canadian

gold coins struck under the authority of the Currency Act of 1910. (b) The British sov¬

ereign, and any divisions or multiples thereof, at $4.86ˆ to the £. (c) Gold coins of the

United States of five, ten and twenty dollars each, at their face value, (d) Notes of the Dominion government, redeemable in specie on

presentation (redemption suspended since 4 Aug. 1914).

(2) Limited legal tender, (a) Silver coin¬ age of Canada up to $10. (b) Bronze coinage

of Canada, up to 25 cents.

(3) Potential legal tender. Any foreign gold coin, at rates to be fixed by proclamation.

F. C. Jemmett,

Colonial Bank, London; Formerly Secretary The Canadian Bank of Commerce.

50. THE GRANGER MOVEMENT. The

Granger movement in Canada closely resembles in its economic and social features the move¬ ment of the same name in the United States from which it derived its initial inspiration. The Grange was first established in the prov¬ ince of Quebec in 1872 by Eben Thompson, a deputy from the United States. Two years later representatives from several Canadian Granges met at London, Ontario, and organized the Dominion Grange of the Patrons of Hus¬ bandry. In the declaration of principles then adopted the motto, (<Unity, Liberty and Charity, w was heartily endorsed. The objects of the organization were declared to be to de¬ velop a higher and better manhood and woman¬ hood among the agricultural class; to enhance the comforts and attractions of their homes ; to encourage farmers to buy less and produce more ; to diversify their crops ; to condense the weight of exports, selling more on hoof and in fleece, and less in the bushel. The society ex¬ pressed itself as opposed to the credit system, and the mortgage system. It declared itself to be independent of political organizations and disassociated from political parties. At the same time it was ˆreserved for every patron as his right as a freeman to affiliate with anv party that will best carry out his principles. w The declaration of principles laid stress upon the importance of the abilities and sphere of women, who were admitted both to membership and to office in the order. The growth of the Grange during the next few years was very rapid. With the Dominion grange as its centre, it was organized in provincial granges, division granges and subordinate granges. In 1876 the secretarv reported a total membership of 17,500 patrons, with 33 division and 530 subordinate granges. Of the latter 4 were in Nova Scotia, 7 in New Brunswick, 16 in Quebec and 503 in Ontario. There were also six subor¬ dinate granges in Quebec, organized under

the National Grange of the United States. In the following year the Grange was incorporated by the Dominion Parliament, and in 1879 its mem¬ bership reached 31,000. The Grange not only sought to exert an educative influence on the farming population by the distribution of litera¬ ture, etc., but also set on foot, directly or in¬ directly, various economic enterprises of a co¬ operative nature intended to enable the farmers to buy and sell more cheaply bv acting in union. Of these the most important was the Grange

Wholesale Supply Company of Toronto, with a branch establishment at Halifax. This was a joint stock company whose capital was supplied by members of the society, and which sold farmers' supplies, seeds and minor machinery to the patrons at greatlv reduced prices. The local distribution was effected by the members of the subordinate granges. The company is¬ sued for some years a paper devoted to the interests of the patrons under the title of the Grange Bulletin. In this were printed ex¬ tensive price lists of farmers' supplies offered for sale. A similar undertaking was established in the form of the People's Salt Company of Kincardine. The economic enterprises of the Grange have not, however, met with marked success. The demands made upon the initiative of the co-operative purchasers have proved too exacting. After some 10 years of successful existence the enthusiasm which the institution of the Grange had at first aroused began to cool, and many of the subordinate granges died of inanition. In the year 1876, 271 new granges had been reported in Ontario alone ; in 1891 only two subordinate granges were organized in Canada, and in 1898 no new organizations were reported. Meantime the constant lapse 'of those in existence, through the apathy of their previous supporters, greatly reduced the numbers of the active patrons. The total number of granges instituted had reached about 1,000, but at the 29th annual meet¬ ing (2 and 3 Feb. 1904) the secretary's statement shows that only 13 division granges and 30 subordinate granges (with a member¬ ship of 411) had reported during the last year. The receipts of the treasury of the Dominion grange, which amounted to $6,900 in 1876, fell to $134 in 1906. In that year the Grange was amalgamated with the Farmers' Association, a society reformed from the Patrons of Industry, but since 1909 no statistics of membership and no annual reports of this body have been issued. During the whole history of the order there were organized at one time or another 57 division granges, 976 subordinate, 2 provincial (Ontario and Maritime provinces), and one Dominion, making a grand total of 1,036 separate Grange organizations in the Dominion. Many persons had been led to join in the move¬ ment from the sanguine hopes of profit to be

derived from the co-operative side of the enter¬ prise, and fell away when these were not realized. On the whole, the Grange movement must be regarded as a failure in the direction of its economic enterprises, but its influence for the social and educational advancement of the farming class has undoubtedly been great. During the flourishing period of the movement literary exercises alternated with the conduct of business matters at the local meetings. It has especially been instrumental in promoting va¬ rious legislative measures in the interests of the farming class. Among these may be mentioned the Provincial Drainage Acts (R. S. O. C. 37, 38), the Dominion statute known as the Butter Act, *etc.* On the tariff question the opinion of the patrons has been divided ; it has been difficult for the Grange to adopt any decided position in the matter without identifying itself with party politics. The Grange was, however, instrumental in securing the re¬ peal of the duty on binder twine. The patrons have constantly sought to foster the

cheese industry and the cattle trade with Great Britain; have succeeded in having agriculture taught in the public schools ; and have strongly supported the agricultural college at Guelph. The Grange has also agitated in favor of the inflation of the Dominion paper currency, the reduction of railroad rates and the appoint¬ ment of a railroad commission. Consult Michell, H., (The Grange in Canada* (Bulletin, Department of History, Queen's University, Kingston 1914).

Stephen Leacock,

Professor of Economics and Political Science, McGill University.

51. THE LABOR MOVEMENT IN CANADA. In Canada, as elsewhere, the labor movement has been shaped by political and economic environment. The presence of the French in Quebec has been an important factor. The existence of free land and the large part played by transportation and construction trades in a country of great distances and under rapid development are others.

The history of organized labor in Canada is in the main that of a series of outposts of the larger movements of Great Britain and the United States. The legislative aims of Cana¬ dian labor have been derived largely from the United Kingdom, but the working mechanism of trade unionism has come almost entirely, and especially in recent years, from the United States. Few data on the subject prior to Con¬ federation (1867) exist. The newness of the country and the lack of industrial population were against organization. There were <(labor circles,® socalled, in the province of Quebec as early as 1825. In 1827 a printers' organiza¬ tion in the city of Quebec took cognizance of wages and cared for its sick. A similar union among the printers of York was recorded when that municipality became the city of Toronto in 1834. The larger seaports, being the locali¬ ties in closest touch with Great Britain, were the first to develop trade unionism. Prior to 1850, however, the movement was negligible. The railway and land <(boom® of 1850—54 brought important changes, especially in Ontario, and there were strikes of printers, shoemakers and molders at Toronto in the latter year. The Typographical Union of the United States crossed into Canada in the sixties. But it was not until 1872, and the winning of a celebrated conspiracy trial arising out of a strike of printers at Toronto, and the passing by the Dominion government of ftAn Act re¬ specting Trade Unions,® which repealed the harsh measures previously in effect against as¬ sociations of employees (an echo of the repeal of the Combination Laws of England), that the labor movement had its real birth in Canada. In that year, which was the apex of a period of great industrial and commercial prosperity, the first general assembly of Canadian labor met at Toronto. It was attended by the representa¬ tives of 31 unions, though there were 70 unions in existence by that time in Ontario alone. The organization with some initial successes to its credit in securing legislation in the province of Ontario waned with the depression which fol¬ lowed the panic of 1873, and disappeared en¬ tirely three years later. In 1883, under more direct encouragement and support from the unions of the United States, the attempt to

found a central labor body in Canada was re¬ peated, this time with permanent success, and after 1886 <(The Trades and Labor Congress of Canada® secured a firm place among Cana¬ dian institutions, holding annual meetings and consistently increasing in strength and influence ever since. Since 1900 alone the increase in the membership of the Congress and its adhering bodies has been tenfold.

The constitution and general position within the Canadian labor

movement of the Trades and Labor Congress as it exists to-day is of considerable significance and interest. From the outset, as already remarked, the typi¬ cal local trade union in Canada has been a branch of a large <(craft® organization having its headquarters in the United States. Even where the parent body is British, the immediate affiliation has usually been from a continental head office situated in the United States. Canadian trade unionism, accordingly, has reflected rather accurately the conflicts and gen¬ eral fortunes of the unions of the neighboring republic. The Congress is in effect an organi¬ zation on the federal principle of the Canadian members of the general international labor movement, for the purpose primarily of direct¬ ing public opinion and influencing legislation in the Parliament of Canada and the legislatures of the several provinces, a function which obviously a foreign organization could not ade¬ quately perform. The Congress accordingly has always been closely allied with the federated bodies of the United States, deriving its revenues not only from its own members but by grant from the federal head bodies whose work it carries out in Canadian territory.

This status of the Congress has in large part determined its history. In the great conflict which was waged in the closing decades of the 19th century between the Knights of Labor and the American Federation of Labor for suprem¬ acy in the federal field of American trade unionism, the Congress at first held the balance even. Later on, however, with the increasing strength of the Federation, the influence of the Knights of Labor in the Congress declined. Eventually an open rupture occurred, and in 1904 the “Canadian Federation of Labor® was organized of unions cast out of the Congress on the ground of adherence to the principles of the defeated movement. The new organ¬ ization adopted as its leading policy the foster¬ ing of a purely Canadian as opposed to an international trade union movement. Outside of the province of Quebec, however, where the Knights of Labor had attained an exceptionally strong position, no numerous following was obtained. The Federation has at the present time a membership of about 50 unions. There have always been, of course, a limited number of purely local organizations of labor in Canada, and even of central craft associations, outside the international movement. The boot and shoe workers and textile workers of the province of Quebec had at one time consider¬ able organizations. The Canadian Brotherhood of Railway Employees has more recently be¬ come prominent, and there are at present at least 10 other Canadian associations of a cen¬ tral character. Of these the best known, both because of its history and its present import¬ ance, is the. Provincial Workmen’s Association of Nova Scotia, a-body founded in 1879,

nally of coal miners. After a career of 30 years replete with successes, the Association had established its influence throughout Nova Scotia, when a strike of the Dominion Coal Company's employees threatened to involve the great majority of its members and accord¬ ingly to place an undue strain on its resources. The incident is somewhat typical of organiza¬ tions having a limited field of operations. It caused a section of the membership in the present case to look for help to the United Mine Workers of America, the international body established throughout the continent, which at once threw organizers into the field. After a bitter struggle of several years' duration, a compromise was effected in 1917, by which the two series of local organizations have become merged, but have continued on a Canadian basis. As to the present position of trade unionism in Canada, the following is a brief review :

Local Unions. — Beginning with the unit of trade union organization, namely, the local union, — usually the craft union — there were in 1916 some 1,842 bodies of this character in Canada. Of these, 1,626 were branches of in¬ ternational organizations, 189 were branches of purely Canadian organizations, whilst 27 were entirely independent and local. The total trade union membership was estimated at 160,407 in 1916, of which 129,123 was international. This does not represent the highest point reached by the Canadian labor movement ; in 1913, there were 2,017 local unions and the total member¬ ship was over 175,000. By provinces, Ontario stands first with 753 unions, and Quebec second with 306. British Columbia follows with 202 and Alberta with 147. Manitoba has 130, Saskatchewan 116, Nova Scotia 100, New Brunswick 80 and Prince Edward Island 8. Trade unionism naturally predominates in the larger industrial centres, and 18 Canadian cities contain 828 of the 1,842 local branches, and over 40 per cent of the entire membership. Montreal with 127 unions, Toronto with 111, Winnipeg with 75, Vancouver with 56, Hamil¬ ton with 50, Ottawa with 46, Edmonton with 42 and London with 40 are the leading centres of the labor movement. The most highly unionized group of workpeople is the railroad employees, who constitute 30.5 per cent of all Canadian trade unionists. The clothing and boot and shoe trades account for 10.6 per cent of the locals and the metal

trades for 9.5 per cent. Building trades and mining and quarry¬ ing tie for next place with 9.4 per cent each. The printing trades have 4.5 per cent. These proportions vary from year to year with gen¬ eral economic conditions. In 1914 the building trades made up 18.9 per cent of the total trade union membership, whilst the railway employees were at that time only 24.9 per cent.

With regard to the central international craft organizations, it may be noted that of a total of 143 operating on the North American continent, 91 are represented in Canada. The American Federation of Labor constitutes the federal head of 112 of these; within Canada 84 are in affiliation with the Trades and Labor Congress. Naturally the Canadian representa¬ tion in the international movement is but a small proportion of the whole. It was esti¬ mated in 1916 that the American Federation of Labor embraced a total of 24,360 local "branches,

with a membership of 2,529,198. The Trades and Labor Congress of Canada could speak at the same time for 1,138 local branches having a membership of 66,573. Of the 91 organiza¬ tions above mentioned, 41 have 10 or more branches in Canada. Those having 25 or more branches are as follows :

Reported

Number mem-of bership

Canadian of all local units in

Name of Organization units Canada

Barbers' International Union of America,

Journeymen . 40 1,193

Bricklayers, Masons and Plasterers'

International Union of America . 56 3,755

Carpenters and Joiners of America,

United Brotherhood of . 101 5,000

Electrical Workers, International

Brotherhood of . 29 1 , 760

Locomotive Engineers, Brotherhood of . . 90 5,013

Locomotive Firemen and Enginemen,

Brotherhood of . 92 6,512

Longshoremen, International Associa¬ tion.. . 26 1,600

Machinists, International Association of 69 7,108

Maintenance-of-Way Employees. Inter¬ national Brotherhood of . 157 5,419

Mine Workers of America, United . 25 4,426

Molders' Union of North America,

International . 31 2,152

Musicians, American Federation of… . 40 4,574

Painters, Decorators and Paperhangers

of America, Brotherhood of . 28 1,196

Plumbers and Steam Fitters of America,

United Association of . 40 1,827

Railway Conductors, Order of . 61 3,026

Railway Carmen of America, Brother¬ hood of…. . 73 4,658

Railroad Trainmen, Brotherhood of … . 86 10,684

Stonecutters' Association of North

America, Journeymen . 26 750

Typographical Union, International. … 44 4,647

Totals . 1,114 75,300

Trades and Labor Councils. — These are the municipal parliaments of labor, of some¬ what loose organization, supported by a small per capita assessment. They are most import¬ ant bodies under the Canadian system. All matters of general as opposed to craft interests are particularly their concern. In 1916 they numbered 46, of which 42 were chartered by the Trades and Labor Congress and 3 by the Canadian Federation of Labor. Nineteen of the trades councils are in Ontario. Perhaps the most historic labor body in Canada is the Toronto Trades and Labor Council. It was the body chiefly instrumental in calling together the first congress of labor in Canada, and it represents to-day over 10,000 members of the rank and file.

Federal Councils. — Canada has also its quota of trade federations, i.e., local associa¬ tions of the unions of similar or allied trades. Thus there are nine allied printing trades coun¬ cils, six building trades councils, six federal councils of railway employees and four federa¬ tions of theatrical employees. A considerable number of the craft unions have also what is termed ((district councils,® which usually com¬ prise all the branches of the same craft organi¬ zation within the given area. Thus the Provin¬ cial Conference Board of Ontario of the Brick¬ layers, Masons and Plasterers' International Union is made up of 30 local unions scattered throughout the province. Similarly the United Mine Workers of Alberta and British Columbia have a district association. There are alto¬ gether 38 district councils of labor unions in Canada. It should, be .noted that in Canada as

in the United States the large international rail¬ way organizations have been chary of entering into definite affiliation with the general labor movement. They are not represented for example in the Trades and Labor Congress. They maintain instead a series of ˆprotective® and ˆlegislative® committees. Certain of the railway organizations have special officers under salary to watch their interests during the ses¬ sions of the Dominion Parliament.

Beneficiary Work. — The beneficiary work of the Canadian unions is inextricably inter¬ woven with that of the continental movement. It may be remarked that the total expenditures on benefits of the international organizations represented in Canada was $12,502,128 in 1916, of which the Canadian membership doubtless received its proportional share. In addition, the Canadian unions paid out independently and on a purely local basis the following sums :

Death benefits .	$56, 646
Unemployed benefits .	2,121
Strike benefits .	15,542
Sick benefits .	146,592
Other benefits .	27,279

Labor Legislation. — The main body of labor legislation in Canada is of provincial origin — the provinces being vested, under the British North America Act, with the protection of civil rights. In the rise and development of the factory system in the older provinces, and of the mining and construction trades there and elsewhere, will be found the conditions which have created most of the Canadian labor laws. Factories and Shops Acts exist in all the provinces, and Mines Acts in those which have an active mining industry. Acts defining the relations of master and servant and protect¬ ing the wages of the latter found their way into provincial statutes at an early date. In legislation of this character the model followed has been that of Great Britain. In workmen's compensation legislation, for example, marked diversity has resulted from the different pace with which the provinces have followed British precedent. The Dominion Parliament, however, as responsible for the peace, order and good government of the country, the regulation of trade and immigration and the scope of the criminal law, has also been largely interested in labor problems. A Dominion Department of Labor has existed since 1900, and has been the chief Canadian agency for the settlement of disputes between capital and labor. The evolu¬ tion of the Dominion policy in intervention in labor disputes, culminating in the Industrial .Disputes Investigation Act of 1907 — a measure which forbids a strike or lockout in the more important industries prior to investigation by a board, of inquiry — constitutes perhaps the most interesting chapter

in the subject of Cana¬ dian labor legislation. Labor departments in more or less developed form exist in most of the provinces.

R. H. Coats,

Dominion Statistician and Controller of the Census.

CANADA HEMP, INDIAN HEMP, or AMY-ROOT, a perennial herb Apocynum cannahinum of the dogbane family (Apocyna - cece), a native of North America (British Co¬ lumbia, Florida and Lower California) gener¬

ally found growing along the banks of streams or in moist ground. It has a strong fibre used by the Indians for twine, nets, woven fabrics, *etc.* They root deep, the stem and branches are upright and the leaves oblong, lanceolate-oblong and ovate-oblong, acute or obtuse and mucronate at the apex but narrow and rounded at the base. Above they are glabrous and sometimes pubescent beneath and range from two to six feet in length and six inches to three feet in width. The cymes are dense; the pedicels short and bracteolate at the base; and the flowers are from two and one-half to three inches broad. The calyx-segments are nearly as long as the tube of the greenish-white corolla. Consult Britton, illustrated Flora of the Northern United States and Can¬ ada > (New York 1897) ; Gray, (Manual of Botany } (New York 1889), *etc.*

CANADIAN BOUNDARIES. See

Boundaries of the United States.

CANADIAN CANALS. The outstanding

feature of water transportation in Canada is the Saint Lawrence system of rivers and lakes stretching from the Strait of Belle Isle to the head of Lake Superior — a distance of 2,340 miles. The shoals of the Saint Lawrence River in Lake Saint Peter between Quebec and Montreal have been dredged to give a waterway with a minimum of 30 feet in depth. Above Montreal the difficulties to navigation begin, and here begin a series of canals which over¬ come rapids and other obstacles. This work of canalizing the Saint Lawrence was not ef¬ fectively begun till about 60 years after the British occupation. The canal system then embarked upon has been subsequently improved and enlarged, and in 1875 it was decided to increase their depths to a minimum of 14 feet. There is a difference in level between Lake

Superior and tidewater of 600 feet, the total length of the canalization at different points being 73 miles. The following gives a summary of traffic during the past five years: 1911, 38,- 030,353 tons, of which 20.5 per cent was freight of Canadian origin, and the balance American ; 1912, 47,587,245 tons (19.7 Canadian); 1913, 52,053,913 tons (21.3 Canadian) ; 1914, 37,023,237 tons (25.3 Canadian) ; 1915, 15,198,803 tons (44.7 Canadian). It will be observed that 1915 shows the extraordinary decrease of 21,824,434 tons, or 58.9 per cent, over the figures of 1914. Of that decrease 91 per cent occurred at Sault Sainte Marie (see p. 477, Sault Sainte Marie Canal). _ The canals of Canada, like those of the United States, are free of toll or restric¬ tions of any kind, and there is thus absolute reciprocity in the use made of them by the vessels of each nation. The following is a brief summary of the principal canals of Canada :

Saint Lawrence Canals. — The Saint Law¬ rence canals, Lachine, Soulanges, Cornwall and Williamsburg, had a total traffic of 3,409,467 tons in 1915, a decrease of 982,026 tons over the figures of 1914.

Lachine Canal. — This canal was built across a portion of the island of Montreal in order to avoid the Lachine Rapids. It was opened in 1824, and has been subsequently enlarged three times. The present canal has five locks 275 feet long, of which two have a depth of 18 feet of water on the sills.

Soulanges Canal. — Between Lake Saint Louis and Lake Saint Francis three rapids are passed — the Cascades, the Cedars and the Coteau. In order to avoid these rapids the Beauharnois Canal was built on the south shore of the river and completed in 1845. It was 11ˆ miles in length, with nine locks. The Soulanges Canal, completed in 1899, and built on the north shore, has now superseded the Beauharnois Canal. Its length is 14 miles, and it has a depth of 15 feet of water available on the sills.

Cornwall Canal. — The Cornwall Canal was built to overcome the Long Sault Rapids at the head of Lake Saint Francis. It extends from

Cornwall to Dickinson's Landing, and was opened for navigation in 1843.

Williamsburg Canals. — These begin with the Farran's Point Canal, five miles above the Cornwall Canal, and are continued by the canals at Rapide Plat and the Galops. They were completed and opened for navigation in 1846-47, and have been recently deepened and enlarged.

Chambly Canal. — The Chambly Canal at one time formed an important link in the chain of communication between the Saint Lawrence and the Hudson River via Lake Champlain. A lock at Saint Ours, 14 miles above Sorel, was finished in 1839. The Chambly Canal was opened in 1843, but was improved in 1850, giv¬ ing a navigable depth of about seven feet of water. The canal is 12 miles long, the connec¬ tion from Lake Champlain being by the Cham¬ plain Canal, built in 1822. The Chambly Canal, owing to the building of railways and the in¬ creased draught of vessels, is now of little commercial importance, and is chiefly used by barges carrying lumber from the Ottawa River to New York. In 1915 478,707 tons passed through, an increase of 41,802 tons over the preceding year.

The Rideau-Ottawa Canal System. — This system was designed to provide safe water communication between Kingston and the lower Saint Lawrence by way of Ottawa (then called Bytown) and the Ottawa River. In its concep¬ tion the requirements of commerce were sec¬ ondary to military considerations. Water communications with Upper Canada had been seriously interrupted during the War of 1812, and the system was intended to form, so to speak, a back-door between the two great rivers. At Sainte Anne, where the Ottawa joins the Saint Lawrence, private interests had con¬ structed a lock in 1816. Twenty-seven miles farther up the Ottawa, the Carillon Canal was built to avoid the Carillon Rapids ; the Chute a Blondeau Canal four miles above that, and the Grenville Canal a mile and a half above the Chute a Blondeau Canal. The Ottawa River canals handled 272,370 tons of freight in 1915, a decrease of 62,762 tons in comparison with the preceding year.

The Rideau Canal, formed by canalizing the Rideau and Cataraqui rivers, and by making use of the Rideau lakes, was constructed as a military work, and was opened for navigation in 1832. The locks were 134 feet long by 33 feet wide, with five feet depth of water on the sills. In 1915 120,781 tons of freight passed through, a decrease of 30,958 tons from 1914.

Trent Navigation System. — A plan has been projected to construct a navigable water¬ way over 200 miles in length, connecting the

rivers and lakes between the Bay of Quinte and the southeastern shore of Georgian Bay. In 1907 it was decided to proceed with the im¬ provement of the Trent River from the Bay of Quinte to Lake Simcoe, with an eight and one-half-foot navigation to Rice Lake, and a six-foot navigation from that point to Lake Simcoe. Contracts were let to a value of over $5,000,000. Two great hydraulic lift locks have been constructed in connection with these works, the one at Peterborough being the largest in the world, and is able to lift vessels of a capacity of 800 tons vertically a distance of 65 feet. In 1915 49,904 tons passed through the Trent canals, a decrease of 17,811 tons on the figures of 1914.

Welland Canal — This is the most extensive of the public works of this character under¬ taken by the Canadian government, and is de¬ signed to overcome the 27 miles that separate Lake Erie from Lake Ontario. The difference in level between the two lakes is 326ˆ4 feet. The first canal was opened 27 Nov. 1829, and extended from Port Dalhousie on Lake Ontario to the Welland River, which was util¬ ized as far as its outlet to the Niagara River. Vessels then ascended the Niagara to Lake Erie. In 1833 a diversion was made by extend¬ ing the canal to Port Colborne on Lake Erie. In 1842 improvements and enlargements were made, and in 1875 a new cutting was begun from Allanburg to Port Dalhousie. In 1912 * further enlargements were undertaken, at an estimated cost of $50,000,000. The present channel will be used from Port Colborne to Thorold, and from there a new cutting will be made to Lake Ontario, entering the lake about three miles east of Port Dalhousie. This canal will be 25 miles in length, and in place of 25 locks will have seven locks, all of which are to be between Thorold and Lake Ontario. Each lift lock will be 800 feet by 80 feet in the clear with 30 feet of water above the sills, and will have a lift of 46ˆ4 feet. Provision is to be made to admit of a future 30-foot naviga¬ tion. It is believed the opening of the new canal will favorably affect wheat freights and will result in the diversion of much traffic from the Buffalo-New York route to the Saint Law¬ rence. In 1915 3,061,012 tons passed through the Welland Canal, a decrease of 982,026 tons on the figures for 1914.

Sault Sainte Marie Canal.— Built to over¬ come the falls and rapids of Saint Mary River connecting Lake Superior with Lake Huron, it was opened for navigation in 1895. This was not the first canal to be

constructed, the North¬ west Company having built a small canal at the end of the 18th century. The Sault Sainte Marie Canal has a lock 900 feet long with a width of 60 feet and depth of water on the sills of 18 feet 3 inches at the lowest known water level. In 1897, 4,947,065 tons of freight passed through the Canadian Canal, and by 1913 the tonnage had increased to 42,699,324 tons. These figures had declined in 1914 to 27,599,184 tons; and the following year, 1915, an extraordinary reduction took place, the freight passing through being only 7,750,957 tons — a decrease for the 12 months of 19,848,- 227 tons. Of the decline of traffic at this gate¬ way. 1,049,241 tons (or 5.1 per cent) attached to Canadian traffic, and 18,798,986 (or 94.9 per cent) to American traffic. The decrease was

largely in the nature of a diversion to the American Canal at Sault Sainte Marie. The cause of this diversion was the availability of a new lock on the American side, having a much larger capacity than the lock on the Ca¬ nadian side. The practicability of carrying a heavier load through the new American lock drew away nearly all the iron ore trade and a good deal of wheat from the Canadian canal.

Saint Peter's Canal. — The Saint Peter's Canal connects Saint Peter's Bay on the Atlan¬ tic Ocean with Bras d'Or Lake, a salt-water estuary in Cape Breton Island. It was com¬ pleted in 1869, was enlarged between 1875 and 1879, and has a lock 200 feet long, 48 feet wide, with 19 feet depth of water. A new entrance from the Atlantic is being made, with enlarge¬ ment of the lock.

D. S. Douglas.

CANADIAN COPYRIGHT. See Copy¬

right, Canadian.

CANADIAN EMBROIDERY, a kind of

embroidery formed from small pieces of snake skin, fur, etc.,

intermingled with flexible pieces of split porcupine quills dyed in various colors.

CANADIAN GOVERNMENT RAIL¬ WAYS. The following lines were owned and operated by the Dominion government as the government railways in 1917 : The Intercolo¬ nial Railway (1,562 miles), with which is asso¬ ciated the Prince Edward Island Railway (275 miles), the International Railway of New Brunswick (112 miles), and the Saint John and Quebec Railway (105 miles) ; and the National Transcontinental Railway, from Moncton, N. B., to Winnipeg (2,009 miles), giving a total of 4,063 miles. In 1917 a measure passed the Dominion Parliament providing for govern¬ ment ownership and operation of the Canadian Northern Railway. The Hudson Bay Railway, now (1918) in course of construction from The Pas, on the Saskatchewan River, to Port Nel¬ son, on Hudson Bay, a distance of 410 miles, is to be operated as a government line. After the Canadian Northern Railway passes into govern¬ ment hands, there will remain only three lines of any importance under private ownership — the Grand Trunk, Canadian Pacific, and Grand Trunk Pacific railways. See separate articles on before-mentioned railways — Canadian Northern; Canadian Pacific; Grand Trunk; Grand Trunk Pacific; Intercolonial; and National Transcontinental.

CANADIAN NORTHERN RAILWAY.

The Canadian Northern Railway system may be said to have had its origin in the construction in 1896 by Mackenzie and Mann, contractors, of a line of railway between Gladstone and Dauphin, in Manitoba, under the charter of the Lake Manitoba Railway and Canal Com¬ pany. During the next few years construction was carried on under a variety of company names, but by virtue of an order in council, passed 13 Jan. 1899, the Canadian Northern Railway Company was brought into existence. In that year there were 252.6 miles in operation. In 1901 the lines of the Northern Pacific and Manitoba Railway Company in the province of Manitoba were leased for a very long term of years, and on 1 Jan. 1902, the last spike was driven upon a line connecting Winnipeg and Port Arthur, on Lake Superior, giving the Canadian Northern its own independent outlet

from the wheat fields of the prairies to the cargo carriers of the Great Lakes. Since then the lines have been extended over the Prairie provinces of Manitoba, Saskatchewan and Al¬ berta, to the Pacific at Vancouver and Victoria, and to the principal centres of Ontario and

Quebec, while in Nova Scotia, Canadian North¬ ern lines serve the Atlantic shore from Halifax to Yarmouth, and cut across the province to the Bay of Fundy side. To-day the system com¬ prises more than 9,000 miles of line. It con¬ nects Atlantic and Pacific ports and serves centres containing 60 per cent of the population and producing 70 per cent of the manufactured products of the provinces of Ontario and Que¬ bec; 97 per cent of the urban population of Manitoba; 97 per cent of that in Saskatchewan, and 90 per cent in Alberta; in British Columbia it opens up the North Thompson Valley to set¬ tlement, and serves anew the old places such as Kamloops, Ashcroft, Yale, Hope, New West¬ minster, Vancouver and Victoria — in all 78 per cent of the urban population of the prov¬ ince. It has contributed measurably to the prosperity of the Dominion through opening up vast areas to settlement, by encouraging immigrants to make the new country their home and by opening up timber and mineral¬ bearing lands to development. The possibilities for economical operation in the future are exemplified by the fact that this transcon¬ tinental line possesses the easiest gradient of any of the great systems on the continent of North America.

Collecting elevators for grain having 26 per cent of the total capacity of western Canada are served by the Canadian Northern Railway; licensed terminal elevators having 47 per cent of the total capacity in Canada are on the Ca¬ nadian Northern Railway lines. Flour mills having 51 per cent of the total daily capacity of Canada are on the lines of the Canadian Northern Railway. In British Columbia the Canadian Northern Railway proportion is 90 per cent ; in Alberta 44 per cent ; in Saskatche¬ wan 74 per cent; in Manitoba 81 per cent; in Ontario 34 per cent; in Quebec 90 per cent; in Nova Scotia 15 per cent. Lumber mills produc¬ ing 30 per cent of the total output in Canada are served by the Canadian Northern Railway, while 32 per cent of the total is marketed by water. In British Columbia the Canadian Northern proportion is 34 per cent; in Alberta, Saskatchewan and Manitoba 70 per cent; in Ontario 33 per cent; in Quebec 28 per cent; in Nova Scotia 28 per cent. Pulp and paper plants having 53 per cent of the capacity of Canada are served by the Canadian Northern Railway lines. In Ontario the Canadian North¬ ern proportion is 60 per cent, in Quebec 64 per cent and in Nova Scotia 50 per cent. The company owns 3,245,987 acres of land, 843,127 of which are prairie land.

Its grain elevator at Port Arthur is the largest consolidated grain elevator plant in the world — capacity 10,000,000 bushels. Its coal docks at Port Arthur, Ontario, have a storage capacity of 660,000 tons, an unloading capacity of 700 tons per hour and an annual

capacity of over 1,000,000 tons. The shipping capacity of the Canadian Northern Railway ore docks at Key Harbor, on Georgian Bay, is 8,000 tons of ore daily.

The lines of the system are located as fol-

lows: Nova Scotia, 369.90 miles; Quebec,

626.77 miles; Ontario, 2,219.10 miles; Manitoba, 1,989.10 miles; Saskatchewan, 2,178.10 miles; Alberta, 1,181.21 miles; British Columbia, 516.40 miles; State of Minnesota, 215.42 miles; a total of 9,296 miles.

During the fiscal year ended 30 June 1916, the Canadian Northern Railway system carried 9,384,056 passengers, and 13,353,381 tons of freight. The gross earnings for that period were $35,476,275.06, the expenses $26,102,744.52, and the net earnings $9,373,530.54. There has been expended upon the construction of the sys¬ tem $433,918,288.18, and upon equipment $60,- 844,201.16, a total of $494,762,489.34. The head office is located at Toronto. In 1917 a measure passed the Dominion Parliament providing for government ownership and operation of the Canadian Northern systems.

CANADIAN PACIFIC RAILWAY, The.

A Canadian railway running across the con¬ tinent from Saint John, N. B., on the Atlantic, to Vancouver, B. C., on the Pacific, with lines owned or leased, running from Montreal to Quebec, Ottawa, Toronto, London and Windsor, on the Detroit River, and branch lines through¬ out the provinces of Ontario and Quebec; with other branch lines to various points in New Brunswick; with a network of lines throughout the Canadian West and British Columbia, in¬ cluding the Souris branch, the Manitoba South Western, the Manitoba & North Western, the Great North West Central, the Crow's Nest Pass and Columbia & Kootenay lines, the Calgary & Edmonton, the Columbia & Western and many others ; making a total mileage of 12,917 covered by the traffic

returns of 30 June 1915. Other lines worked by the railway at that date aggregated 383 miles, and there were under construction 60 miles, while the mileage of the Minneapolis, Saint Paul & Sault Sainte Marie Railway and the Duluth, South Shore & Atlantic' Railway (lines controlled by the Cana¬ dian Pacific) was 4,103 and 626 miles, re¬ spectively; a grand total of 18,090 miles of road built, acquired, leased or controlled since the company was chartered early in 1881. Con¬ struction of the main line was commenced in June 1881 and completed on 7 Nov. 1885.

By the terms of the government contract with a company whose directorate included George Stephen (now Lord Mount Stephen), Donald A. Smith (afterward Lord Strathcona and Mount Royal), Richard B. Angus, and others, it was agreed to build a railway from Callander, in northern Ontario, to the Pacific, for a consideration of $25,000,000 in money and 25,000,000 acres of selected land, together with various privileges as to right of way, *etc.*

The original share capital of the company was $5,000,000, increased in 1882 to $25,000,000, and then to $100,000,000, of which $35,000,000 was canceled in 1885.' Various financial changes and difficulties occurred during construction, and it became necessary to secure government loans of $30,000,000 in 1884, and $5,000,000 in 1885; these loans were repaid in full and the efforts of the promoters and management of the railway were eventually crowned with success.

By owning and operating all of the ad¬ juncts of the railway service — telegraphs, ex¬ press, sleeping cars, dining cars, grain elevators, as well as hotels at the leading points, steam¬

ship lines on the lakes and on the Pacific and Atlantic oceans, the Canadian Pacific adopted special methods of management which have worked out to the material advantage of the company.

According to its statement of 30 June 1911, the cast of the railway and equipment was $503,584,724 and of its various steamship lines $24,208,595. It then held in Manitoba, Western provinces and in British Columbia 8,214,186 acres of land.. Its capital stock was $200,000,000, receiving dividends at the rate of 10 per cent per annum ; its 4 per cent preference stock, $80,681,921 ; its 4 per cent consolidated deben¬ ture stock, $176,284,882; its bonded debt, $6,399,- 180; 6 per cent note certificates, $52,000,000.

The company issued $25,000,000 5 per cent land grant bonds in 1881, which have been paid off. In 1888 a further issue of $15,000,000 3J4 per cent land bonds was made, and of these $3,500,000 had been provided for at 30 June 1904 by payment of that amount to the govern¬ ment out of the proceeds of land sales in terms of the mortgage, leaving $11,500,000 outstanding. These were afterward paid off.

The following table illustrates the diversified nature of its traffic during the three years, each ending June 30:

Description of Freight Carried	Year ended June 30th		
	1902	1911	1915
Flour, barrels ….	4,921,993	8,469,744	8,538,600
Grain, bushels…	52,719,706	111,169,982	126,909,828

Live stock, head.

963,742

1,567,665

2,833,726

Lumber, feet ….

1,033,569,377

2,441,007,107

2,180,735,600

Firewood, cords. .

204,963

298,345

254,428

Manufactured

articles, tons…

2,288,234

5,759,344

6,024,590

All other articles,

tons .

2,571,136

8,971,037

7,423,16 3

Freight traffic Number of tons

carried .

8,769,934

22,536,214

21,490,596

Of tons carried 1

mile .

3,247,922,167

8,062,102,013

7,940,151,342

Earnings per ton

per mile .

$0 75

$0 81

$0 76

Passenger Number of passen

traffic

gers carried. .

12,080,150

13,202,603

Number of passengers carried 1 mile .

1,457,332,932 $1 93

1,164,488,630 $2 06

Earnings per passenger per mile .

The gross earnings of the system for the year ending 30 June 1915 were $98,865,209, and the working expenses $65,290,582, with net earnings of $33,574,627.

Lord Mount Stephen, the first president of the company, resigned from that office in 1888 and was succeeded by Sir William C. Van Horne, who retired in 1899, when Lord Shaugh-nessy, K.C.V.O., the present president and chairman of the company, became his successor. The general offices of the company are at Montreal, Canada.

CANADIAN RIVER, a river that rises in the northeast part of New Mexico, and runs generally eastward through Texas and Okla¬ homa to the Arkansas. Its length is about 900 miles, but it is rather shallow and not import¬ ant for navigation. Its largest tributary is the

Rio Nutria, or North Fork of the Canadian, which runs parallel to the main stream for about 600 miles.

CANADIAN SERIES, the lower of the three series into which the rocks of the Ordo¬ vician system are divided by American geol¬ ogists. It comprises the Chazy and Calciferous stages, principally limestones. See Ordovician.

CANAIGRE, kan-yi' -gra, a species of dock (Rumex hymenoscpalus) indigenous to the arid region of southern California, Arizona, New Mexico, northern Mexico and western Texas. It is a perennial herb with tuberous roots from which a reddish or green stem rises to a height of about two feet and bears rather large leaves resembling those of other docks. The tubers, which resemble those of the dahlia, have long been used locally as a source of tan¬ nin, and attempts have been made to grow them upon a commercial scale for this purpose.

CANAJOHARIE, kan'a-j o-ha're, N. Y, an Indian word, meaning, ((The pot that washes itself.)) A village on the south bank of the Mohawk River in Montgomery County, 55 miles west of Albany, in the most picturesque part of the Mohawk Valley. Canajoharie was first settled about 1740 by the Dutch and Germans. It was the home of Brant, chief of the Six Nations, and place of departure from the Mo¬ hawk to the southern interior. The Erie Canal, the New York Central and West Shore rail¬ roads pass through the village. The village has two banks, a library, six churches and a school of high standing; two weekly local news¬ papers and one hay-trade publication ; flour mills, limestone quarries, paper and cloth bag manufactory and meat and fruit packing¬ houses. It is equipped with electric light and power, sewers and an abundant water supply. It is governed by a board of trustees and a council of five members, elected annually. Pop.

(1920) 2,500.

CANAL DOVER, Ohio, city of Tuscarawas County, 70 miles south of Cleveland, situated on the Tuscarawas River and the Ohio Canal, and

on the Pennsylvania and Baltimore and Ohio railroads. There are deposits of coal, iron and building stone in the vicinity. The city owns and operates its waterworks and electric lighting plant. The chief industries are in iron and steel, and the manufacture of rac¬ ing-sulkies, babv-carriages, roofing, *etc.* Pop.

(1920) 8,101.

CANAL DU MIDI, or CANAL DU LANGUEDOC, a canal in the south of France, connecting the Mediterranean Sea and the Atlantic Ocean. See Canals — Historical.

CANAL RING. See Tilden, Samuel J.

CANAL ZONE BOUNDARY. See

Boundaries of the United States.

CANALE, ka-na'le, Nicolo, Venetian ad¬ miral, who flourished in the second half of 15th century. In 1469 he was commander of the Venetian fleet at Negropont (the ancient Chalcis), and succeeded in seizing the Turkish town of Enos. The cruelties perpetrated upon the inoffensive inhabitants created great indig¬ nation at Constantinople, and Mohammed II, with a view of resenting the outrages, besieged Negropont with a force of 120,000 men, and

after a violent contest expelled the Venetians. Canale, to whom this defeat was attributed, was sentenced to death by the Council of len, but at the instance of Pope Paul II and of other influential persons, his punishment was com¬ muted to exile for life.

CANALEJAS, ka-na-la'has, Don Jose, Spanish statesman: b. 1854; d. 12 Nov. 1912. The son of humble parents, he was originally trained for the law, but took to politics at an early age. Working his way up the political ladder he held several portfolios, including those of Finance and Justice, and was for a time President of the Chamber. In February 1910 he was called by King Alfonso to succeed Senor Moret, the Premier, whose administra¬ tion had lasted only four months. Moret had bitterly attacked the Maura ministry on the campaign in Morocco and their strong action in suppressing the Barcelona riots. Maura was compelled to resign and Moret, a Liberal, assumed office, but was soon forced to resign owing to dissensions in his party. Canalejas was

called to the helm and formed his Cabinet in one day, distributing the portfolios among the Democrats, of which party he was the leader. On 15 June 1910 he disclosed his policy in the King's speech, which, whilst containing expressions of filial consideration for the Pope, clearly indicated that the government in¬ tended to take action against ˆunauthorized® religious orders and congregations. Canalejas speedily found himself in conflict with the Vati¬ can when he canceled the prohibition, which was then in force, of the use of ((any emblem, attribute, or lettering® on the exterior walls of Protestant places of worship. A number of prominent Carlists seized the occasion to send a testimony of their regard to Don Jaime of Bourbon, son of the late pretender, Don Car¬ los. Don Jaime, however, wisely repudiated any intention of disturbing the peace of Spain. The financial policy of Canalejas also ran counter to vested interests. Among his pro¬ posals was a tax on sums bequeathed for masses for the souls of the dead. A grave po¬ litical crisis shook his administration early in 1911, when the question of the execution of Ferrer was revived. The responsibility for that sentence, however, did not rest upon Canalejas, for he was not in office when Fer¬ rer was shot. In a speech he stated that he would have been in favor of a reprieve — as a matter of policy — which offended the military authorities. The War Minister sided with the army, but the King and the Cortes supported the Premier. Barcelona was said to be the home of 10,000 anarchists. In September 1911 these malcontents broke out in fierce riots, which spread with alarming rapidity. Canalejas was equal to the occasion. He proclaimed martial law throughout the country, seized the ring¬ leaders and broke up the menace in a few days. A democrat in sentiment, his sense of justice was strong, if severe. He resigned twice because the king hal reprieved criminals condemned to death for atrocious murders. The king wished to bestow a title upon him, but the honor was refused by Canalejas, who said he preferred to remain associated with the proletariat from whom he was sprung. While looking in the window of a bookstore he was shot and killed by an anarchist.

CANALETTO, or CANALE, name ap¬ plied to two Venetian painters: (1) Antonio, b. 18 Oct. 1697; d. 20 Aug. 1768, first fol¬ lowed his father's profession as scene-painter, but having studied in Rome, where he employed his time depicting ancient ruins in studied light and shade effects. He was the first to employ the camera obscura practically. He returned home and devoted his work to views of the palaces and scenes of Venice, which he painted with fine perspective, a clear and firm touch and an excellent mastery of color. He has been given both favorable and unfavorable criticism, the latter for the me¬ chanical nature of his art. The National Gal¬ lery, London, has five pictures by him, among them (View on the Grand Canal, Venice' and the (Regatta on the Grand Canal.' (2) Ber¬ nardo Bellotto (q.v.) nephew of the former, also a landscape painter, who imitated his uncle and master. He lived in Dresden wherˆ he was a member of the Academy of Painters.

CANALS. Canals are waterways, wholly or partially artificial, used for conveying water or for providing navigation. Those used for irrigation, drainage and water-power develop¬ ment are of the first class and, being closely related to the subjects of their purpose, are not considered here.

Navigation canals have been designated according to the size or kind of boats that can navigate them, as boat, barge or ship canals ; according to the nature of the channel, whether purely artificial or in natural streams, they have been known as artificial canals or canalized rivers ; and according to geographical location they have been called isthmian canals, penin¬ sular canals,* canals around falls or rapids, arti¬ ficial seaport canals or canals connecting water¬ way systems. Also there are sea-level canals — built at sea level — and tidal canals, which are sea-level canals subject to tidal flow.

The term ship canal is commonly applied to those canals intended for ocean-going ves¬ sels, but the other terms — boat and barge — are not so generally used, probably because they fail to convey any definite idea as to size. However, the term thousand-ton barge canal, which was used to designate one particular canal, gives a fairly close idea of the boats that can be accommodated. As no standard of size has ever been or is likely to be established, the size of a canal is truly defined only by stating the maximum dimensions of the boats that can be accommodated. These are usually given in terms of draft, beam and length, but sometimes the form of bow and stern must also be considered.

Until a few years ago the great majority of canals were of small size,

and before the advent of the lock, unless a canal could be built at one level, the boats used were limited to a size which could be transferred from one level to another by some mechanical device. After locks came into use, France, in the 17th century, undertook considerable canal construction. England followed next, but did little until the latter half of the 18th century. Early in the 19th century the beginning of canal construc¬ tion was witnessed in America. This was all prior to the coming of railroads and at a time when canals furnished the only cheap means of transportation. The sizes of the canals up to vol. 5 — 31

this time seem, in the light of present dimen¬ sions, but very small. During the latter part of the. 19th century several of the European countries began enlarging and improving their more important canals, making some radical changes in size and in manner of construction and operation. These changes were worked out by careful study, made in accordance with modern scientific methods rather than by the rule-of-thumb procedure of former years. American waterway improvement along mod¬ ern lines did not become very active until the beginning of the present — 20th — century, but now various Federal projects, also the Panama Canal and New York State Barge Canal have caused a reawakening of canal construction in America.

The artificial channel, which among engi¬ neers is now known as a land-line, was the prevailing type of construction for many years, even where the route was parallel and in close proximity to a natural stream, as was often the case. To control a river sufficiently for naviga¬ tion by small boats was often considered im¬ practicable and the cost, prohibitive. The liabil¬ ity of damage to canal structures by floods and the damage to adjacent territory resulting from backwater caused by canal structures at flood time argued against the use of the natural channels. Later, when larger canals were built and methods for the control of rivers were improved, it became more economical to utilize the natural channels, where available.

Isthmian and peninsular canals, so called from the neck of land crossed, provide shorter and safer routes between certain ports. Canals around falls or rapids connect navigable por¬ tions of a river above and below the fall. There are several of these on the Saint Law¬ rence River. Artificial seaport canals extend from the coast inland and are designed to permit sea-going vessels to reach inland ports. Canals connecting waterway systems enable boats to pass from one system to another, thereby increasing the utility of both systems, and often also

they possess other features of much importance.

Of canal structures, the most important probably is the lock, a device to raise or lower boats from one level to another. A lock, placed at the meeting of two canal levels, is simply a chamber or basin which has a gate or set of gates at each end and side walls extending from a little above the water-surface of the higher level to the bottom of the lower level. When a boat enters a lock the closed gates at the other end maintain the difference in elevation between the two levels. After the gates are closed behind the boat, water is ad¬ mitted to or drawn from the lock chamber, so as to raise the boat to the upper level or lower it to the lower level. Then the gates ahead of the boat are opened and it passes to the new level, the point of difference in elevation be¬ tween the two levels having been transferred to the gates through which the boat entered the lock.

Various kinds of lock-gates have been em¬ ployed, the most common being the mitre-gate. This consists of two leaves swinging on ver¬ tical axes from the side walls and meeting at an angle in the centre with the apex toward the upper level. Wood was the material formerly used for mitre-gate construction, but now steel

is generally used. Improvement in gate design has made possible locks of more than 40 feet lift, whereas 10 or 12 feet was the usual maxi¬ mum. The tumble-gate, sometimes used at the upper end of the chamber, is mounted on a horizontal axis at the bottom and is raised or lowered mechanically. Lift-gates, which can be raised high enough to clear the boats, and rolling-gates, which roll back into a recess formed outside the lock at right angles to the side wall, have also been used.

On the smaller locks, when mitre-gates were used, the water in the lock chamber was con¬ trolled by means of wickets or valves in the gates, but where the other kinds of gates are used and in all large locks, culverts are em¬ ployed. These are built in the side walls or under the floor of the lock chamber, and in the larger locks usually

extend just beyond the gates at both ends of the lock, connecting with the pools above and below the lock. They have several openings to the lock chamber, in order that the lock may be filled or emptied in a reasonable time with the least disturbance to the craft in the lock. The flow in these culverts is usually controlled by means of lift-gates or valves, located near each end. The Stoney gate, which operates on a nest of rollers, is being used largely on the New York State Barge Canal. There are a few instances of locks in which the culvert has been formed near each end into a siphon that has its neck above the highest water in the upper pool. A closed tank built in the masonry, which is filled from the upper pool and has an outlet to the lower pool and air pipe connection with the neck, primes the siphon, the water flowing from the tank tending to create a vacuum, which is filled by air from the neck.

The quantity of water required for one complete lockage is equal to the volume of the lock chamber between the elevations of the two pools. However, when the lockages alternate up and down, this quantity of water will serve to lock a boat each way. Where conditions permit, a saving of water is sometimes effected by the construction of a side pool. When the lock is to be emptied, some of the water is drawn into the side pool and retained above the level of the lower pool, thereby being available for filling the lower portion of the lock cham¬ ber at the next lockage. Evidently the quantity of water thus saved must be somewhat less than half the quantity required for one lockage.

There are a few examples of another type of lock — a structure consisting of a tank into which the boats pass and which is raised or lowered by power. Gates are provided at each end of the tank and also in the canal adjacent to the tank. Sometimes two tanks are operated side by side on a kind of balance. Since the weight of a tank and its contents is nearly constant, very little power is required and that mostly to overcome friction. With this type no water is consumed for lockage and but a small amount for power. On account of cer¬ tain structural difficulties, however, very few locks of this variety have been built.

Inclined planes have been used occasionally in small canals in place of locks, the boats being hauled out of the water and up or down the incline in a saddle. Obviously these are not suited to large boats on account of the

difficulty of safely supporting the boat and also because of the great amount of power required.

Of the other structures used in canals the movable dams deserve special mention, because of the part they play in the utilization of nat¬ ural streams for canal purposes. These struc¬ tures are designed to fulfil all the functions of a fixed dam, when it is desired to maintain the pools for navigation, and at other times, when a fixed dam would cause excessive floods, to be capable of being removed from the channel area either by being lowered to the river bed or by being raised above the flood level. Many kinds have been devised and used, the bear trap, of which there are several varieties, the Chanoine wicket, the Boule gate, the Taintor gate, the rolling drum and the Poiree needle dam being best known. Boule gates are often used in connection with a sort of bridge superstructure, forming what is com¬ monly called a bridge dam. Many types of automatic crests and also of controlled flash-boards have been devised for special cases, to serve partially the same purpose as the movable dam, but their use is less general.

In the operation of the larger canal struc¬ tures mechanical power has almost entirely superseded hand-operation. The great advances made in the development of electrical equip¬ ment render electric power particularly suitable for canal service. Also by its use the best means of lighting for night operation can be obtained. Where water power is available at a lock, a hydro-electric plant may be installed. In some cases, where power may be needed at times when water power is not available, as at movable dams, the electric generators are driven by gasoline engines. Electric power has the advantage of ease in distribution to points where it is needed and also flexibility in the amount employed. In addition, the modern equipment for lock operation is damaged very little by flood water. The equipment is often quite extensive, as on the Panama locks at Gatun, where all the operations are indicated on a board or diagram, which automatically shows the position of all the moving parts of the locks at all times.

Any project for canal construction must necessarily be considered from three stand¬ points — the commercial, the engineering and the financial. . From these standpoints there must be considered not only the subjects that have already been discussed, such matters as terminals, power-supply and types of locks, dams and a host of lesser structures, but also the more general problems that arise in canal¬ building, and which remain for discussion.

These problems are so many and so inter¬ dependent that they do not

readily lend them¬ selves to brief classification. However, under three main heads — (1) dimensions, (2) route and (3) \vater-supply — the most important can be considered.

1. Several elements enter into a determina¬ tion of the dimensions for a canal. In general a large boat can carry freight cheaper than a small boat, but unless the traffic is sufficient and of the proper kind to keep the large boat working to. capacity, a canal of large size is not economical. A canal often terminates at a large lake or river or at the ocean. The ques¬ tion then arises as to whether it is advisable to make the waterway to fit the boats which

. • , • f • *

navigate these adjacent channels or to use smaller boats and transfer the cargoes. The nature of the territory traversed is also a de¬ termining factor. If natural waterways are available, then a larger channel may be de¬ sirable, since it can be made without excessive cost and will permit greater speeds. The necessity of bridges has a bearing on the sub¬ ject. If they must be fixed bridges, the mini¬ mum clearance tends to limit the boat dimen¬ sions and through them the channel dimensions.

Until recent times the question of speed has not had much bearing on canal dimensions. On the old and small canals the permissible speed did not exceed three and a half or four miles an hour, this limit being necessary because of injury to the banks by wave action. Since larger channels and canalized rivers have come into use, higher speeds are obtainable. Just how high speeds will eventually be attained is hard to say. The economical speed probably has not yet been worked out ; at least it is not generally recognized. Doubtless higher speeds are attempted than are warranted economically. In a restricted channel, such as most canals must necessarily have, the power required for a speed in excess of about five miles per hour increases much more rapidly than does the resulting speed attained. The necessity for a considerable amount of water under the keel has not been appreciated

by canal boatmen of the old order. They have usually crowded the channel dimensions beyond a reasonable limit by the boats they have used, not realizing that they were defeating their own ends by in¬ creased cost for traction. On some of the recently improved canals the allowable speeds change with the locality. For example, on the New York Barge Canal they range from 4 to 10 miles. From this discussion it appears that, if a given speed must be attained on a canal, then the channel dimensions must be planned accordingly.

Closely allied to the question of speed is that of power. In the primitive canals man furnished the motor power, pushing the boats by poles, rowing them or drawing them by ropes from the banks. Then came the use of animals on a towpath. This was the common method until the modern era of improvement. Sometimes locomotives have replaced the ani-nals. Steam propulsion has been in use to a limited extent on various canals for many years. Experiments in electric propulsion have been numerous, but no very successful system has yet been developed. A cable or a chain along the bottom of the canal has been used in some places, especially in Europe. These are either gripped or wound over a drum on the boat. According to modern methods canal boats are self-propelled or move in fleets of one power boat and one or more consorts. The newer canals are not provided with towpaths.

2. The early canals followed the natural contours of the ground much closer than do modern canals. Because of difficulties con¬ nected with stream canalization, preference was usually given to the building of independent channels, which often were close to but slightly above the streams. As previously stated, mod¬ ern practice favors river canalization. After certain general features of location have been determined by commercial and broad topo¬ graphical considerations, the detailed location

of a canal is distinctively a technical problem, in which questions of engineering expediency and relative costs play the chief part. The desiderata sought in canal location are short¬ ness of route, minimum of curvature, least num¬ ber of locks, all possible elimination of inter¬ mediate summit levels, minimum of excavation and embankment, avoidance of a channel above surrounding country, greatest ease of excava¬ tion consistent with stability, suitable founda¬ tions for structures, accessibility to water-supply, least interference with adjoining private, municipal and industrial interests, utilization of natural water courses, *etc.* This subject of location, like that of

dimensions, is complicated. Only by careful surveys and comparative plans and estimates can the questions be solved.

3. The supplying of water is one of the most important problems connected with canals. In the old canals, which were generally small and ran beside natural streams, the water require¬ ments could be readily met by damming the stream and leading a short feeder to the canal. Under more difficult conditions, lakes or arti¬ ficial reservoirs and sometimes long feeders have to be resorted to. It is almost essential that the supply be such that it can reach the canal by gravity flow, since in a canal of any magnitude the question of pumping is seldom to be considered.

Water has to be supplied to canals for three main purposes, namely, to fill the canal prism and to replenish loss in the levels between locks ; to furnish water sufficient for lockages and for unavoidable leakage at locks ; and to furnish power for operating the machinery at locks and other structures, and for electric lighting along certain portions of the canal, particularly at the locks.

An independent water-supply for filling the canal prism is required only in land-lines and then only at the opening of navigation or after water has been drawn out of the levels for repairs or other purposes. In river-lines the natural flow of the stream will, of course, fill the canal prism. The losses in land-lines in¬ clude seepage through embankments, waste over spillways, evaporation from water-sur¬ faces and transpiration through aquatic plants. For river-lines there is less waste through seepage and none over spillways.

The amount of water required for a lock varies not only with the height of the lift, but also with the volume of traffic. The same quantity of water is used in lockage, whether the boats are large or small and whether the lockage is up or down. Therefore the effi¬ ciency, or economy, of the lifting operation is increased with the larger boats. For a given amount of traffic the water-supply varies ac¬ cording as the boats are large or small and according to the manner in which they pass the lock — whether singly or in groups and whether lockages in the same direction are made in sequence or alternate with lockages in the opposite direction. A canal is essentially an inland transportation line in which the grades are overcome by water-power. That the po.wer is applied directly from water to boat does not alter the case. All things considered, the canal lock is a fairly efficient water-driven machine. In addition, the lock has the ad¬ vantage of simplicity, quick operation and avoidance of strain on the boat.

CANALS

The critical points of supplying water to canals are usually the summit levels. Although lower levels may require more water, it is generally more readily obtainable for such portions, especially under the modern method of stream utilization. Proceeding downward in either direction from a summit, the water-supply required at any lock is equal to the sum of the losses from the source of supply down to the lock, plus the water required at the lock, minus the natural inflow, if any, between the source of supply and the lock. From this it appears that the water-supply required may vary greatly from point to point. In providing water for a summit level of a canal it is neces¬ sary, therefore, to obtain a supply adequate for the points of greatest demand on both sides of the summit.

Thus it will be seen that the problem of estimating the water-supply required by a canal, like the problems already discussed, is also complicated. Many items can be deter¬ mined only approximately. It is necessary to allow a liberal excess, or reserve supply, as a factor of safety.

Historical. — The earliest artificial water channels were for irrigation and drainage ; not to reclaim swamp land, other soil being too plentiful, but to regulate the overflow of rivers. These date from an immemorial past, certainly 3500 b.c. in Babylonia and Egypt, more prob¬ ably 7000 at least. Very early also the larger ones must have been used for boat navigation, to transport agricultural and building materials ; these combined drains and canals still exist in England, called “navigations,® and the workers on them “navigators,® and have given to the language the word “navvy® for construction laborers. At what period the first ones were dug primarily for navigation, and incidentally for irrigation, cannot be told. There is a tradition that the Suez Canal was dug under the old kingdom of Egypt before 2000 b.c. ; it was certainly opened or reopened for small boats by Necho, about 600 b.c. About this time also Nebuchadrezzar of Babylon opened the Royal Canal between the Tigris and Euphrates, but Mesopotamia had been well canalized be¬ fore. These two

countries, indeed, invited canals, with their flat surface and long levels, and easy digging in sand or clay. It is probable that China also had canals before the Christian era, but evidence is wanting. The first canals were of course on one level ; but with the light boats and great engineering skill of the ancients the step was not long to damming the water at different levels and hauling the boat over. The first system, not yet disused, was to pull the boat up an inclined plane and let it down by gravity; and this remained the only available method till modern times. Under Alexander and his successors in Egypt and the Seleucid empire canals were much used : an important one was from Alexandria to the Nile, whose mouths were shut off by sandbars. Marius had one constructed 102 b.c. from the lower Rhone to the Mediterranean. Under Claudius there was one from the Tiber to the sea; and in Great Britain there are two which date from the Roman time, the Foss Dyke and the Caer Dyke, in Lincolnshire, of 40 and 11 miles respectively. In the 4th century Lombardy was canalized, — a very favorable spot from its great plain and many rivers; and near the end of the 5th cen¬

tury Odoacer carried one from the Adriatic to Mentone above Ravenna. The downfall of Roman civilization stopped their development for a while; but under Charlemagne a fresh extension began, that monarch building canals to connect the Danube both with the Rhine and the Black Sea. In the Netherland bogs the system is that of nature itself, and began very early; here the canal is not so much an artifi¬ cial channel as a remnant of the original sea, around which the land is built. In Britain as early as 1121 Henry I deepened and made navigable the old Foss Dyke. The Grand Canal of China, about 1,000 miles long, a large part of it made up of canalized rivers, was completed in 1289. That countrv has many other great systems connecting its internal waterways.

But obviously the boats transferable by such machinery must be small and lightly loaded ; and the modern canal system, with long, heavy boats and large cargoes, was first made possible by the invention of the lock. This doubtless developed out of putting dams close together with gates in them ; but neither inventor nor even country of first use is certain. It has been claimed for two brothers, engineers at Viterbo in Italy, in 1481 ; also for Leonardo da Vinci, the universal genius ; and again for Holland a century earlier. The one certain fact is, that in the latter part of the 1 5th century they were in use in both countries, and spread rapidly through Europe. The first country to under¬ take on a large and systematic scale the con¬ nection of its leading systems by

canals was France, in the 1 7 th century. The Briere Canal, connecting the Seine and Loire, was begun in 1605 under Henry IV, and completed 1642 under Louis XIII. The Orleans Canal, uniting the same basins by the Loing, was completed 1675, under Louis XIV. The greatest of all, the Languedoc Canal, to connect the Bay of Biscay with the Mediterranean, was finished 1681. It is 148 miles long, 6ˆ2 feet deep, with a summit level of 600 feet; has about 119 locks and 50 aqueducts, and floats barges of 100 tons. France in 1879 passed a law making all its canals uniform at 6j4 feet deep, with locks 126ˆ4 feet long by 17 wide. England was much later in taking up the system on a large scale, but when it did so, carried out a remarkable one, with great feats of engineering. The fathers of it were Francis, Duke of Bridgewater and his famous engineer, James Brindley; and the beginning was the charter for the Bridgewater Canal in 1759. The names of Watt, Tel¬ ford, Nimmo, Rennie and other noted engineers are associated with it. The last inland canal in Great Britain was built in 1834. Among the leading ones are the Grand Junction, 128 miles; Leeds & Liverpool, 128; Trent & Mer¬ sey, 93; Kennet & Avon, 57. The great Irish canals are the Grand Canal, from Dublin to Bal-linasloe, 164 miles, uniting the Irish Sea to the Shannon ; and the Royal Canal nearly parallel to it for the same traffic, from Dublin to Torinansburg, west of Longford. The great canals of Scotland are the Caledonian and the Forth & Clyde, described under Ship Canals. Early in the 18th century Peter the Great con¬ structed a great system of canals and canalized rivers, 1,434 miles long, to connect Saint Peters¬ burg with the Caspian. The Danish Canal, 100 miles long, from the North Sea to the Baltic, was finished in 1785. The Gotha Canal, 280

miles long, connecting Stockholm with Gothen¬ burg across Sweden, was planned 1716, but opened the first part 1810, the whole 1832. In 1836-46 Louis of Bavaria revived Charle¬ magne’s old plan, connecting the Main (and so the Rhine) with the Danube, by a canal 108 miles long, 650 feet above the Main, and 270 feet above the Danube.

United States Boat Canals. — The first canal in this country was built in 1793, around the falls of the Connecticut River at South Hadley Falls, Mass.; the engineer was Benjamin Pres¬ cott of Northampton, afterward superintendent of the Springfield armory. The lift was not by locks, but by inclined planes, the boats being run into a movable caisson, filled with water and hauled up by cables operated by water power; locks were introduced later. In 1796 a canal was completed around Turner's Falls farther north in the same river, at Montague. (<The Proprietors of the Locks and Canals on Merrimack River8 were incorporated 1792, and opened their canal around the falls at Lowell to the mouth of the Concord, one and a half miles long and with four locks, in 1797 ; it was for the lumbering business, rafts, masts, *etc.* But the first general canal for passengers and mer¬ chandise opened in the United States was the Middlesex, a rival to the last, incorporated 1793, and completed 1804 at a cost of $700,000; it ran to Charlestown, 31 miles, was 24 feet wide and 4 feet deep, and fed by the Concord. A packet boat, the Governor Sullivan , plied regu¬ larly between Boston and Lowell, taking nearly a day. The first boat voyage to Concord, N. H., was made in 1814, and a steamer began passages in 1819. The canal was disused 1851. But much broader projects had been set on foot about the time of these local ventures; and several of the greatest afterward carried out, as well as some which have been chimeras rather from political developments than from any inherent impracticability, were broached even before the Revolution. Washington was deeply interested in canal schemes all through his life, and favored canals to connect all the great Ameri¬ can water systems. The Potomac and Ohio, the James and Ohio, and the Mohawk Valley and Great Lakes connections, were all examined by him. The last named he looked over during the Revolution. In 1792 the Western Inland Lock Navigation Company was formed, and by 1797 had finished six miles of canals around the rapids at Little Falls, making a navigable way for 15-ton barges to Lake Ontario. Pennsyl¬ vania built several small canals in the two decades from 1790 to 1810, but they had little success. In 1784 Maryland and Virginia jointly granted a charter for a canal from Georgetown on the Potomac to the Alleghanies, under which up to 1822, when it was abandoned, some three-quarters of a million dollars were spent in excavations, dams and locks.

Chesapeake and Ohio. — The fortunes of this system have shown how difficult it is to fore¬ cast business developments. As designed by Washington, it was to connect the Chesapeake and ocean navigation, by way of the Potomac, with that of the Ohio, by portages and high¬ roads from its terminus, Cumberland, at the foot of the Alleghanies ;

as a fact, its use has been mainly from the accidental fact that Cumberland is near the Pennsylvania coal fields. The for¬ tunes of the first company have been described.

In 1823 commissioners appointed oy Maryland and Virginia reported in favor of a new route in place of attempting to complete the old one; * in 1824 the national system of internal improve¬ ments was inaugurated by act of 30 April, and a board of engineers in October 1826 reported on a canal from Georgetown to Pittsburgh. As the cost was over $22,000,000, it was considered prohibitory then ; and in 1829 the <(eastern division8 to Cumberland was authorized, by national, State, municipal and private stock subscriptions. But the work had been inaugu¬ rated on 4 July 1828 by President J. Q. Adams, who struck the first spade ; and it was fully opened in 1850. It is 184 miles long and 6 feet deep, 60 feet wide from Georgetown to Har¬ per's Ferry, and 70 on an average from thence to Cumberland. It is fed from the Potomac by seven dams. The aqueduct at Georgetown over the Potomac was a very considerable engineer¬ ing feat for its time ; it rests on 12 masonry piers constructed by coffer-dams on rock 28 to 40 feet below the surface. At Paw Paw Bend, 27 miles east of Cumberland, the canal saves six miles by a cut-off and tunnel through the mountain, 3,118 feet long. The summit level is 613J4 Uet above tidewater ; the rise is accom¬ plished by 74 locks from 6 to 10 feet lift. The whole work had cost over $9,500,000 when opened, and its total capitalized outlay had been over $15,000,000 when the bondholders foreclosed in 1890.

Erie Canal. — The best known of the New York State canals is the Erie Canal, which joins the Hudson River and Lake Erie. The original Erie Canal was the great pioneer work of engineering in America, standing as the model for canal-building for a half century. The work of opening navigation to the interior which was undertaken by the Western Inland Lock Navigation Company in 1792 did not ac¬ complish all that was needed and early in the 19th century agitation began for something more adequate. In 1808 the legislature ordered a survey of the route between the Hudson and the Lakes for the purpose of securing informa¬ tion to set before President Jefferson, who a short time before had recommended that Con¬ gress appropriate surplus moneys for building canals and highways. In 1810 the legislature appointed a commission, Gouverneur Morris and De Witt Clinton being two of the mem¬ bers. In 1811 Robert Fulton and Robert R. Livingston were added. This commission made reports from year to year and in 1816 was ordered to make complete surveys and

esti¬ mates. On 15 April 1817 construction of the Erie and Champlain canals was authorized and on 4 July 1817 the first ground was broken at Rome. On 26 Oct. 1825 the canal was formally opened from Albany to Buffalo, 363 miles. Its success was so marked that it gave rise to a veritable mania for canal-building throughout the country. There can be no doubt that it was the greatest single factor in bringing to the State and the city of New York their re¬ markable development and prosperity during the first half of the 19th century, giving the latter the initial impetus which has made it the chief metropolis of the Western world. The channel was 28 feet wide at bottom, 40 feet of water-surface and 4 feet deep. It had 84 locks, 90 feet long between gates and 15 feet wide, with a total lift of 689 feet. It cost $7,143,790,

The first enlargement, begun in 1836, was not finished till 1862. It shortened the canal to 35014 miles; gave a channel of 70 feet wide at water-line, 52 or 56 feet at bottom, accord¬ ing to side slopes, and 7 feet deep ; made 72 locks, each 110 feet long between gates and 18 feet wide, having a total lift of 654.8 feet; and cost $31,834,041. At the close of 1882, when all tolls were abolished, gross revenues to the amount of $121,461,871 had been collected on the Erie Canal ; the cost of construction, im¬ provements and maintenance had been $78,-862,154, leaving a balance of $42,599,717 to its credit. The preceding decade was a period of adverse public sentiment toward the State canals and several of the lateral branches were abandoned. In 1884 there began a series of lock-lengthenings which continued for about 10 years and marked the beginning of renewed interest in canals which has endured until the present time, finding expression in two enlarge¬ ments. The first of these, 1896 to 1898, which was the second enlargement of the canal, at¬ tempted a deepening to nine feet, but because of exhaustion of funds it was never completed. The third enlargement, authorized in 1903, is an improvement in more things than size ; it is a rebuilding along modern lines. It was originally planned for barges of 1,000 tons, but before work was begun the size was increased to accommodate boats of two or three times that capacity. The Erie Canal has had a re¬ markable history. It

occupies a strategic posi¬ tion ; it connects the Lakes and the Atlantic along the only feasible canal route in the United States. It has played an important part in industrial development and regulation of com¬ merce between the great interior and the coast, and it promises to continue exercising a mighty influence. See Barge Canal.

Hennepin Canal. — -This is one of the few boat canals which have been dug in the United States since 1850. It was begun June 1892 and completed in 1908, at a cost of $75,000,000. It affords a short route from the upper Mississippi to Lake Michigan, extending from the Illinois River at Great Bend, about two miles from Hennepin, Ill., to Rock Island, Ill. Its entire length is 77 miles, but of this distance 27 miles are along the slack waters of the Rock River. The canal proper and its summit level feeders are 7 feet in depth and 80 feet wide. There are 37 locks, each 35 by 70 feet in size and with lifts ranging from 3 to 10 feet in height.

Illinois & Michigan Canal. — This route connects the Mississippi system with the Great Lakes, and, by the Welland Canal, with the Saint Lawrence. Its inevitability was plain by reason of the extensive use of the Chicago portage (from the Chicago River to the head¬ waters of the Kankakee, an affluent of the Illinois) by the Indians and trappers, it being only half a mile for boats, the shortest import¬ ant portage on the continent. Chicago was one of the best trodden sites in America before white men came here. As early as 1822 Con¬ gress granted a right of way for such a canal, and in 1827 and 1854 made further grants. For some reason it hung fire for many years, though a host of surveys and estimates were made by the State and the nation. Work was prosecuted on it 1836-41, then suspended till 1845, and the canal was finally opened in April 1848. It had then cost $6,170,226. The western

terminus is La Salle, at the head of steamer navigation on the Illinois River; its eastern is on the south branch of the Chicago, about five miles from its mouth in the city. The en¬ tire length is 96 miles, and the rise from La Salle to Lake Michigan is 145 feet, surmounted by 17 locks, 110 by 18; the capacity of boats is 150 tons. The original intention was to make a straight cut from Lake Michigan to the Des Plaines River, the chief branch which with the Kankakee forms the Illinois; but to save ex¬ pense it was decided to use the Chicago River instead. Thence it runs to Summit on the Des Plaines 8 miles; then 42 miles to the junc¬ tion with the Kankakee ; thence through the Illinois Valley to La Salle. It has five navi¬ gable feeders, the Calumet, Des

Plaines, Du Page, Kankakee and Fox ; and five large stor¬ age basins. The summit level at Bridgeport required pumping for supply ; and two steam engines, delivering 15,000 cubic feet of water per minute, were used till 1870. These were also used for many years to help draw off the sewage of Chicago, which empties for miles into the river. By supplying the canal from the river, the lake water was drawn in to fill the vacancy, and so kept the river comparatively sweet. But the system was expensive, and the canal was deepened for some years, ending 1870, to carry the sewage by its own flow to the Des Plaines, reversing the current of the river. It proved insufficient, and in 1892 the Chicago Drainage Canal (q.v.) was begun, which was finished in 1900. It is 40 miles long to Joliet, 22 feet minimum depth, and 162 to 290 feet wide at top. A scheme has been mooted for years to convert this into a huge ship canal to enable ocean-going steamers to ascend from New Orleans to Chicago, and so through the Great Lakes and to the Saint Law¬ rence^ but it depends on the cooperation of the national government. Consult Putnam, J. W., (The Illinois and Michigan Canal } (Chicago 1918).

James River & Kanawha Canal. — This is a line partly existent and partly on paper, but interesting as probably the oldest North Amer¬ ican canal scheme. The idea is accredited to Governor Spotswood in 1716, when he explored the Blue Ridge ; but the first active part was taken, as in all these early ventures, by Wash¬ ington, who saw from his backwoods days the necessity of joining the eastern seaboard to the trans-Alleghanian territory by lines of com¬ munication. He personally explored the James River route in 1784, and induced the Virginia legislature on 5 Jan. 1785 to pass an act for improving the navigation of the James. Under this the James River Company was organized, 25 Jan. 1785, with Washington as president. No work was done, and in 1835 another com¬ pany of the same name took up its task, be¬ ginning the construction of the section from Richmond to Lynchburg in 1836, and complet¬ ing it near the end of 1841. The second divi¬ sion, from Lynchburg to Buchanan on the upper James, was begun before this was opened, and completed in 1851. In 1853 an extension of 47 miles to Covington on Jackson River was begun, but the war interrupted it, and it has never been resumed. In 1874 the cost of completing it to the Kanawha, includ¬ ing an improvement of the navigation of that river, was estimated at $60,000,000.

The Ohio Falls Canal. — This is a short canal, but from its location a very important one; it makes continuous navigation in one of the chief waterways of the continent. The first canal was built 1825-30, and called the Louisville & Portland. It was 1 7-10 miles long, 64 feet wide, had 82/z feet lift, and three locks, one at the head and two at the foot. An enlargement was begun in 1861, but inter¬ rupted by the war; in 1868 the national govern¬ ment included it in its river and harbor appro¬ priation, and it was opened February 1873, having cost about $4,000,000. It runs west from in front of Louisville, Ivy., to Portland; is a little over 11,000 feet long and 86J/2 feet wide, with a minimum depth of 6 feet assured by a dam at the falls. The water in the river varies from 6 to nearly 43 feet, and earthen parapets on the sides of the canal rise to 44 feet, based on stone walls, themselves built on the limestone rock through which the canal is cut. The upper lock has been raised, the lower two left as they were, but a branch with two locks has been added. At the head are flood-gates 46 feet 11 in. high. The upper entrance is 400 feet wide.

Among others existent or of past importance are the canal between the Chesapeake and Dela¬ ware bays, across the Delaware isthmus, built 1824-29, 13*4 miles long, and supplied by pumps for 10 miles of it. An enlargement has been projected. This system has recently been ac¬ quired by the Federal government. (See Ship Canals). The Morris Canal, 101 miles long, built in 1830, connects the Hudson at Jersey City with the Delaware at Phillipsburg, N. J.; it is owned by the Lehigh Valley Rail¬ road. The Delaware & Raritan, 43 miles long, built 1831-34, connects those rivers, and there¬ fore New York and Philadelphia. The Dela¬ ware & Hudson, completed 1820, was once the great coal freight route between New York and the Pennsylvania mines ; its company trans¬ formed itself into the railroad company of the same name, and has abandoned the canal. The Schuylkill Coal & Navigation Company's canal is 108 miles long. The Ohio & Erie Canal from Portsmouth, Ohio, to Cleveland, and the Wabash from Toledo, Ohio, to Evansville, Ind., were once of importance in building up these sections.

The initiative taken by New York in the construction of the great barge canal seems to have had the effect of causing a new era of canal building. Several projects have been begun and several of these have almost been completed, among these latter being the Lake Washington Canal, which connects Lake Washington, near Seattle, Wash., with

Puget Sound by means of a canal nearly two miles in length, a 17-foot lock being required to lift the vessels from the waters of the Sound to the lake. The Dalles-Celilo Canal is another enterprise practically completed, which opens up the Columbia River to light draught ves¬ sels as far up stream as Priest Rapids, on the main river above Pasco, and to Lewiston, on Snake River, in Idaho. It is 8/2 miles in length and climbs to a height of 82 feet above low water, the cost of building having been $5,000,000. During 1915 the Illinois legislature appropriated $5,000,000 for a 65-mile canal, 8 feet in depth, from Joliet to Utica, the canal to start from the end of the Chicago Sanitary District Canal. The Pennsylvania legislature,

too, has authorized an issue of bonds for the construction of a canal from Pittsburgh to Lake Erie. According to the plans already roughly drafted this canal will put Pittsburgh into water communication with 27 States.

Bibliography. — Hepburn, Artificial Water¬ ways and Commercial Development y (1909) ; Moulton, (Waterways vs. Railways) (1912) ; Bellasis, (River and Canal Engineering* (1913); (The International Yearbook (1916).

Revised by Noble E. Whitford, Senior Assistant Engineer, Department of State Engineers, New York.

CANANDAIGUA, N. Y., city and the county-seat of Ontario County, 29 miles south¬ east of Rochester, at the northern end of Can¬ andaigua Lake, and on the New York C. and H. R. and Northern C. railroads. It is situ¬ ated, on high ground, with a commanding view of the lake amid attractive scenery, Canandai¬ gua is a popular holiday resort. The fishing and boating accommodations are excellent. The chief manufactures are those of ale, pressed brick and anti-rust tin and enameled ware. The power-house and shops of the Rochester and Eastern Interurban Electric Railway are located here. The public institutions include the Thompson Memorial Hospital, the On¬ tario Orphan Asylum (private), a private sana¬ torium, an association library, two banks and churches of six denominations. It is also the seat of Canandaigua Academy, a public high school, and of the Granger Place School for Girls, a private secondary school. The govern¬ ment is administered by a mayor and a board of aldermen. Municipal waterworks, a sew¬ age system, public playground and swimming schools are modern developments. Canandaigua was settled by New Englanders in 1789, became a village in 1815 and received a

city charter in 1913. The name was originally Canandarqua, an Indian word thought by some to signify (<the chosen spot,® by others The site of a for¬ mer settlement.® Pop. (1920) 7,356.

CANANDAIGUA LAKE, N. Y, a body of water lying chiefly within the limits of On¬ tario County. It is 668 feet above the sea and 437 feet above Lake Ontario, and has an ex¬ treme length of 15 miles and an average width of one mile. Its outlet is the Clyde, a tribu¬ tary of Seneca River.

CANANI, ka-na'ne, Giovanni Battista, Italian anatomist: b. 1515; d. 1579. He discov¬ ered certain of the hand muscles, and was the first to observe the use of the valves in the veins.

CANAR, ka -nar', Ecuador, a small province situated among the Andes, between the prov¬ inces of Chimborazo and Azuay; capital, Azo-gues. It has the Eastern Cordillera of the Andes on the eastern border, and is watered by the tributaries of Paute River. Numerous Inca remains are found there. Pop. 64,000.

CANARD, ka-nard', or ka-nar', a false re¬ port; a silly rumor. The origin of this use of the term is not known. It is the French word meaning ((duck,® and is thought by some to be derived from the old phrase, V endeur de canard a moitie, one who half-sells a duck or cheats in such a transaction ; hence a liar, a guller, *etc.* According to an account of wide currency in different versions, the usage arose from a story

of cannibalism among a flock of ducks that ate one of their number each day until they were reduced to a single survivor, who, it was argued, had eaten all his companions. The story became common in Paris, and afterward, when any marvelous recital was heard, the listener would shrug his shoulders and exclaim, C'est un canard! (<(That's a canard, or duck!®).

CANARIES. See Canary Islands.

CANARIUM, a genus of plants of the order Burseracece. There are about 90 species, in¬ habiting tropical Asia and Africa. The gum of C. commune, known as Elemi, has the same properties as balsam of copaiva. The nuts are eaten in the Moluccas and Java, but are apt to bring on diarrhoea. An oil is expressed from them, used at table when fresh and burned in lamps when stale.

CANARY, a small domesticated finch (Car - duelis canaria), closely allied to the goldfinch (q.v.), and found throughout the Canary Islands, Cape Verde and Madeira. Domestica¬ tion, besides having modified the size and colors of this bird, has developed its power of song. It was introduced into Europe as a cage-bird early in the 16th century, and is now familiar in all parts of the world. Canaries in their wild state are about five inches long, and, like other finches, live mainly upon seeds, seldom eating insects. They build nests of moss and feathers in bushes and trees, often near dwellings; and their pale-blue eggs number four or five. Cana¬ ries are bought, bred and sold in large numbers in England, Scotland, Belgium and in the Hartz Mountains, where their breeding forms an im¬ portant household industry. The varieties are named, to a great extent, from the localities in which they are bred. Among birds valued for their beauty rather than for their power of song are: the British crested Norwich canary, the Manchester canary, which is noted for its abnormal size, it sometimes reaching a length of eight inches. The Scotch Fancy is a slender bird with long neck, its body, trunk and tail, when in certain positions, curving into almost a half circle. The gold-and silver-spangled canaries are considered the handsomest. Their ground color is dull, spotted with gold or silver markings. The Belgian or humpback canaries are also bred for their beautv of plumage, and are remarkable by reason of the peculiar appear¬ ance they present by their broad shoulders, short neck' and small head. Canaries bred for their power of song, and selling for from $1 to $75, are those of the Hartz Mountains, which vary in color from a clear yellow to a bright green. The most valuable of all varieties is the South Andreasberg bird, bred solely for their power of seng. Single birds are fre¬ quently utilized for the instruction of young birds, and are known as (<campaninis.® Other varieties are the cinnamon canaries and the cayennes, the brilliant red and scarlet of the latter being due to judicious feeding with red pepper. Canaries are also crossed by fanciers, with other finches; the resulting hybrids are called ((mules,® and are usually from the mating of hen canaries with other cock birds, great difficulty being experienced in keeping female goldfinches, linnets, etc., on the eggs in cap¬ tivity.

Canaries are easily cared for, the only essen¬ tials being cleanliness,

food and water. The

principal danger to the bird is a cold draught. The best food consists of canary-grass seed, hemp-seed and a certain amount of greens. Acids are to be avoided, but sugar is beneficial in small quantities. Lime is essential to its wel¬ fare and is most easily obtained in cuttle-fish bone. If their nails grow so long as to be trou¬ blesome to the bird, they should be occasionally cut with a very sharp scissors, thus running no chance of injuring the foot. Attention must also be given to the perches. These should be no thicker than a thin lead pencil, so that the birds' toes may meet around them. Consult Wallace, (The Canary Book) (London 1893) ; Belts, (The Pleasurable Art of Breeding Pet Canaries) (London 1897) ; Blakston, Swaysland and Miener, (The Book of Canaries and Cage Birds) (London) ; Holden, (Canaries and Cage-Birds) (New York 1883) ; Robson, (Canaries, Hybrids and British Birds in Cage and Aviary } (London 1912). Consult also the weekly, Cage-Birds (London).

CANARY-CREEPER, or CANARY-BIRD FLOWER, an annual climbing plant (Tropceolum peregrinum) , of the nasturtium family, a native of Colombia, cultivated for its showy yellow flowers.

CANARY-GRASS. See Canary-Seed.

CANARY ISLANDS, or CANARIES,

a cluster of islands in the Atlantic, politically forming a province and military district of Spain, but geographically considered as belong¬ ing to Africa, the most easterly being about 150 miles from Cape Nun. They are 13 in number, 7 of which are of considerable size, namely, Palma, Hierro, Gomera, Teneriffe, Grand Canary (Gran Canaria), Fuerteventura and Lanzarote. The other six are little more than mere rocks. The population numbers about 526,400, the area being about 3,216 square miles. Lanzarote and Fuerteventura lie in the north¬ east of the group. Hierro is the farthest south¬ west. Through Hierro the first meridian used to be drawn. All are rugged and mountainous, frequently presenting deep ravines and precipi¬ tous cliffs to the sea, though having also fertile valleys and verdant slopes. The principal peaks are those of Teneriffe, 12,182 feet, and La Cruz, in Palma, 7,730 feet. Fuerteventura and Lanzarote, which are nearest the African coast, are less elevated than the others, and have more strongly marked African characteristics. Evi¬ dence of volcanic action is almost everywhere present, and volcanic disturbances have tak n place on

some of the islands in quite modern times. The flora of the central and western islands generally resembles that of the Mediter¬ ranean region, the trees and shrubs including the oak, chestnut, pine, cedar, laurel, heather, etc.; but there are (particularly on the eastern islands) plants that belong to the African region, such as the dragon-tree and euphorbias. Among the fauna may be mentioned the canary, the red partridge, and several kinds of lizards; there are no snakes. Goats and camels are the chief domestic animals. The islands are deficient in moisture and severe droughts sometimes occur ; tornadoes also are not infrequent. The climate is hot on the low grounds, temperate higher up, and generally healthy. The soil where suited for cultivation readily produces all kinds of grain, fruits and vegetables in abundance, three and even four crops being raised yearly; some

of the islands furnish good wine, especially Teneriffe and Palma. The Canaries constitute a valuable possession of Spain and they serve as a winter resort for invalids from colder regions. This has led to the erection of hotels specially intended for visitors, to the making or improvements of roads and to the providing of attractions of various kinds, including golf-courses, lawn-tennis grounds, *etc.* There are several places of worship for English-speaking visitors. The exports at present consist chiefly of bananas, tomatoes, onions and potatoes, shipped in great quantities to London and Liver¬ pool, cochineal, sugar, wine, *etc.* The imports chiefly consist of textiles and other manufac¬ tured goods, cereals, coals, *etc.* Peaches, oranges, lemons, figs and other fruits are culti¬ vated. Teneriffe and Grand Canary are the two chief islands. Santa Cruz, the capital of the islands, is a port on the northeast coast of the former, and on the western coast of the same island is Orotava, a favorite resort of for¬ eign visitors. Las Palmas, on the northeast coast of Grand Canary, is a more important place, with its new harbor, Puerto de la Luz, between three and four miles distant, protected by a breakwater. The city is rapidly extending, its streets have been improved and lighted by electricity. In 1917 it had about 43,000 inhabit¬ ants. Numerous steamers engaged in the trade between Europe and Africa call here, and also at Santa Cruz.

Wireless telegraphic stations, one of 860 miles range, carry out the service with Spain and another of 250 miles range the service with ship and shore traffic.

Historical Outlines. — The half-fabulous <(Fortunate Isles,® as the Canary Islands were called in the classical ages, were undoubtedly known to the Semitic merchant-adventurers from the south-southeast Mediterranean coasts (including the Carthaginians) long before the Roman conquests extended to Spain. But it is possible that, as Mr. Royale Tyler suggests, the Carthaginians may have kept the secret of their whereabouts for fear that others might share with them such advantages as the astute traders of those days were anxious to keep to them¬ selves. Contact with the outside world appears to have been interrupted for centuries. Finally, the Arabs “discovered® the Canaries in the 13th century; the Portuguese and Majorcans visited them in the 14th ; and in the early years of the 15th a Norman adventurer, Jean de Bethen-court, established himself at Fuerteventura and founded his capital in a village that still exists under the name of Betancuria (more correctly, Bethencuria), on the western side of that island. The King of Castile was his protector, and toward the end of the 15th century Ferdinand and Isabella took possession of the islands. At that time the Canaries were in¬ habited by people of different races, some of whom were Semites, as we have said; but the bulk of the population was formed by a people called the Guanches who had been in possession of the islands for ages. The blood of the Guanches still flows in the veins of many of the inhabitants; and even to-day, in Gomera and Teneriffe especially, the old race appears to have maintained itself almost without admix¬ ture.

CANARY-SEED, the seed of a plant

(Phalaris canariensis) , belonging to the order

of Graminacece , cultivated for its seed, which is used principally as food for birds. In its early growth it is scarcely distinguishable from oats or wheat. With good cultivation it attains a height of three or four feet, and terminates in egg-shaped heads or ears, each containing upward of 100 seeds. The straw is of little value, either as fodder or litter, but the ears, especially when mixed with other kinds of chaff, are good food for horses. It requires a deep adhesive soil, and its produce per acre is about the same in quantity as wheat. It is a native of the Canary Islands, but is successfully cultivated elsewhere.

CANARY WINE, a wine that comes from the Canary Islands, chiefly from the island of Teneriffe. It is not unlike Madeira, but the name is properly applied only to the Bidogne wine.

CANARY-WOOD, the light orange-colored wood of Phoebe indica and P. canarien¬ sis, trees of the laurel family of the Azores and Madeira, so called because it was brought originally from the Canaries. It is also called Madeira mahogany.

CANASTER, or KANASTER, originally the rush-basket in which South American to¬ bacco was packed and exported, and hence applied to a kind of tobacco consisting of the leaves coarsely broken for smoking.

CANASTOTA, N. Y., village in Madison County, on the Erie Canal, and on the New York Central, the West Shore and the Lehigh Valley railroads, 21 miles east of Syracuse. It is the centre of an agricultural district and manufactures agricultural implements, gasoline engines, boats, canned goods, cut glass, *etc.* It has two banks, public library, churches, high school, hospital and two grammar schools. Canastota was settled about 1806 and was first in¬ corporated in 1835. The government is admin¬ istered by a president, elected annually, and a board of trustees. Seneca turnpike, built in 1790 and now a State road, runs along the southern boundary of Canastota. Pop. (1920)

3.995.

CANBERRA, the new Federal capital of the Commonwealth of Australia, situated in lat. 35° 15’ S. and long. 149° 15’ E. on a plateau about 2,000 feet above sea-level in the Yass Can¬ berra district, New South Wales, 70 miles dis¬ tant from the eastern coast line of Australia. The constitution of 1900 provided for a new capital, and after nearly 10 years’ search and deliberation the present site was chosen. The territory is 900 square miles in area, and in¬ cludes a spot of two square miles at Jervis Bay for the construction of a port and a naval college. In 1911 the Australian government offered $15,000 in three prizes, for the best plans submitted, the competition being open to all architects of the world. A serious difference of opinion between the Minister for Home Af¬ fairs and British architects caused all the best of the latter to withdraw from the competition. On 23 May 1912 it was announced that the first prize, $8,750, had been awarded to an .Ameri¬ can architect, Mr. Walter Burley Griffin of Chicago. The second prize ($3,750) went to M. Eliel Saarinen, of Helsingfors, Finland, and the third to Alfred Agache, of Paris. From

these three plans the work of designing the

future city was begun. The population contem¬ plated for the capital was fixed at 25,000, and a period of eight years in four stages was esti¬ mated for the completion of the preliminary works, at a cost of $10,000,000. According to Mr. Griffin's plan the city will be divided by three large sheets of water, with parks and boulevards; a capitol of 600 feet frontage and 200 feet depth; accommodation for all the great departments of state; courts of justice, mint, art gallery, museum, churches, a university, post-office, hospital, stadium, gasworks, *etc.* A large reproduction of the winning design ap¬ peared in the London Times of 24 May 1913.

CANBY, Edward Richard Sprigg, Ameri¬ can army officer: b. Kentucky 1817; d. 11 April 1873. He was graduated at West Point in 1839; served in the Mexican War, 1846-48; com¬ manded the United States troops in New York during the draft riots of 1863; succeeded Gen¬ eral Banks in the command of the army in Louisiana, 1864; became brigadier-general, United States army, and major-general of volunteers, 1866. After the war special duties were assigned to him, and in 1869 he took com¬ mand of the department of the Columbia. He was treacherously shot by an Indian chief, while negotiating for the removal of the Modocs from northern California, in the ((Lava Beds.ˆ

CANBY, William Marriott, American botanist: b. Philadelphia, Pa., 1831; d. 1904. He was educated privately, and though a busi¬ ness man, devoted much time to the study of botany. He gathered a fine herbarium of over 30,000 species of plants, which is now owned by the New York College of Pharmacy. A smaller collection was brought together for the Delaware Society of Natural History. He was one of the botanists attached to the North¬ ern Pacific Transcontinental

Survey.

CANCALE, kan'cal', France, fishing port of Ille-et-Vilaine department, on the Bay of Mont Saint-Michel, 10 miles east of Saint-Malo. Oyster culture and shipbuilding are busy industries, and it is a popular seaside resort. Pop. 8,000.

CAN-CAN, a dance, something of the nature of a quadrille, but accompanied by violent leaps and indecorous contortions of the body origi¬ nated by the demimonde of Paris, and re¬ sembling the old Bacchic dances. The earlier and usual meaning of the word in French is noise, racket, scandal and is derived, oddly enough, from the Latin conjunction quamquam, ˆalthough,® — a great squabble having arisen in the French mediaeval law schools as to the pro¬ nunciation of this word.

CANCELLARIA, a genus of Gastropods belonging to the family cancellariidce, in which the shell is turbinate, scabrous and generally reticulated, the spire and aperture nearly equal and the body ventricose. Tate in 1875 estimated the known recent species at 71, and the fossil ones, at 60, the latter from the Upper Chalk till now.

CANCELLATION, a method of abbrevi¬ ating certain arithmetical and algebraic opera¬ tions. When the product of several numbers is to be divided by another such product, any factors common to both products may be left out, or ˆcanceled.ˆ If divisor and dividend do not appear in extenso as products, the process

of cancellation may yet be applied if common factors exist and can be detected. The work is substantially the same as that of reducing frac¬ tions to their lowest terms.

CANCER, Luis, early Spanish-American missionary : b. Barbastro, near Saragossa; d. Florida 1549. After missionary labors in Dominica and Haiti, he was very successful with the antagonized Indians of the mainland and supported their cause in an ecclesiastical assembly at Mexico in 1546. He was killed by Florida Indians 26 June 1549.

CANCER. Nature of Cancer. — A tumor is a growth of abnormal size and situation, com¬ posed of cells of the body. Some tumors are not dangerous to life, because they do not in¬ crease after they attain a certain size; others, and these are cancers, have no limit to their growth, and destroy life by extending into healthy tissue or by interfering with digestion or some other important vital function.

While a cancer is a particular sort of tumor, there are also many varieties of cancer; and these vari¬ eties are classified according to the tissue from which the growth originates. If the cancer be¬ gin in the skin or epidermis, it is called an epithe¬ lioma; if it begin in a gland, it is called a carcinoma; if it begin in muscle, fibrous tissue, tendon or bone, it is called a sarcoma. These kinds of cancer grow progressively and are fatal if not promptly removed.

Sarcoma of arm

In the beginning a cancer is composed of a few microscopic cells, much smaller than the point of a pin. Depending upon the type, it may grow in a few months to the size of a grape¬ fruit, or may require years to reach the size of a pea. When it first begins to grow there are no symptoms — no pain and no bleeding; but later, when the cancer presses on the nerves, pain results. Bleeding begins only when the cancer ulcerates. Any other symptoms to which a cancer may give rise are due solely to its interference with some normal function of the body. A cancer looks like a lump of tissue. It has no roots, as is popularly believed, but it may grow out through the vessels of the body to distant parts.

Cancer is not a new disease but one which has been recognized since earliest times. It is mentioned by the Egyptians in the Papyrus Ebers, and by the Hindus in their medical writ¬ ings, both of which probably date back to about 2000 b.c.

Occurrence of Cancer.— While cancer oc¬ curs not only in man but in all warm-blooded animals, it is not equally frequent at all ages.

Certain types of cancer may be found in a new¬ born infant, in other words, are congenital; but these are very rare. The usual rule is that cancer begins to appear at the age of 35, and increases rapidly in frequency until the age of 65 — a little earlier in women, a little later

in men. After 75, the rate of occurrence of cancer decreases very rapidly, until it practically dis¬ appears at 90. The same frequency distribution according to age is seen also in mice, rats, dogs, cats, *etc.* ; that is, the disease appears only in older animals, but is less often seen in the very old.

Sex Variations. — Sex has some influence on the rate of occurrence of cancer; for ex¬ ample, between the ages of 35 and 45, men show the disease less often, practically only one-third as often as women; between the ages of 55 and 65 the frequency in men is about 65 per cent of that in women of corresponding age ; while in old age, men have more cancer than women. This is due to the fact that in women a great many cancers occur in the breast and in the womb at about the beginning of the change of life, that is, from 45 to 50 years of age. On the other hand, cancers of the lip and tongue attack men only, practically ; and these, with cancer of the skin, appear late in life. Similar variations in the occurrence of cancer are noted also in the different organs of the body; for example, the more frequent site for cancer is either the stomach or the liver. Thus, while in 1913, in the United States, 30,205 people died of cancer of the stomach or of the liver, only 2,633 died of cancer of the skin, and 3,007 of cancer of the tongue and mouth.

Race Variations. — The differences noted in the occurrence of cancer in organs are also noted in the occurrence of cancer in different races ; for example, the negro race is attacked by cancer much less frequently than the white race, and cancer seems to be more frequent in people of the northern European states than it does in those living in the tropics or in South America, although the population of South America is much the same as that of Spain. There is, also, a difference in the organ dis¬ tribution in different countries. In England and Wales, out of 100,000 women, 18.6 indi¬ viduals will have cancer of the breast, while in

Epithelioma of ear

Japan, only 1.8 women out of 100,000 will suffer from the disease. The occurrence of cancer of the skin in the negro race in the State of Mary¬ land is only half that in the white population.

Occupation also plays a still but little under¬ stood role; thus in England from 1890 to 1892,

the death rate per 100,000 from cancer was 67 in clergymen and 265 in chimney sweeps. The irritation resulting from the soot may explain this difference.

Increase of Cancer.— There is a widespread opinion that cancer is increasing rapidly in frequency of occurrence. This question has been subjected to elaborate statistical analysis by Hoffman in a volume on (The Mortality of Cancer Throughout the Worlds Hoffman comes to the conclusion that there is a gradual increase in the number of cases of cancer oc¬ curring in most of the countries of the world, but that this ‘increase tends to reach a certain maximum and not to pass that point. This maximum has already been reached in Switzer¬ land, where the cancer death rate is now 124 per 100,000, while in the United States it is only 74 per 100,000. There are, however, many authorities who consider that this increase in cancer is due not to an absolute increase in the number of persons with cancer, but to an in¬ crease in reported cases; in other words, that improvements in diagnosis and in our under¬ standing of the nature of the disease and the increased accuracy of statistics have resulted in an increase in the number of cases of cancer which are reported. The matter cannot be con¬ sidered as finally settled, however ; and only greatly improved statistical reports from dif¬ ferent countries can throw any light upon the problem.

Heredity. — The question of heredity in cancer has long occupied the attention both of statisticians and of workers with experimental cancers in animals. While there is no doubt that an individual family may show a large number of cases of cancer for one or two generations, this is by no means a proof that the disease itself is hereditary. It is not even a proof that a liability to the disease is heredi¬ tary. If we realize that out of every 100,000 people living in the United States, 80 will die from cancer, it is easy to see that, as age increases and’ the frequency of cancer becomes greater (so that between the ages of 45 and 65 one woman in 6 and one man in 12 will die from the disease) the occurrence of several cases in a family, especially if it be long lived, is not astonishing. It is evident that if cancer occur so frequently, some families are bound to have a larger number of cases than others, merely by chance. This point is illustrated in the ((cancer villages® which will be discussed in the next paragraph. The problem of heredity in cancer has interested the life insurance com¬ panies, also, because if cancer be hereditary, it is very important that no one in whose family cancer has occurred shall be accepted by the companies. But a careful analysis of a large

number of persons insured shows that the lia¬ bility of death from cancer is no greater be¬ cause that disease has occurred in one's family than it is if no cancer death has been recorded; so that the insurance companies do not regard a history of cancer in the ancestry as any evi¬ dence that cancer will occur in the descendants.

It has been shown, however, by breeding mice of cancerous ancestry, that is, by selecting both father and mother from a highly can¬ cerous strain, that the amount of cancer occur¬ ring in the descendants after many generations of such selected breeding, is apt to be about twice as much as occurs in the stock in which

no special selection was made. Such a con¬ centration of cancer heredity in man is quite impossible, as the stock would die out long before the 8 or 10 cancerous generations could be produced.

Contagion in Cancer. — It is a popular su¬ perstition that cancer is contagious, and that it is very dangerous to nurse a person with an ulcerating cancer; but there is not the slightest foundation for this belief. There is no recorded evidence of a case in which cancer has been transferred from one person to another or in which a surgeon has contracted the disease dur¬ ing an operation on a cancerous patient. If cancer were a germ disease, it would probably be very easily transmitted in this way; but there is no evidence that a germ has anything to do with the development of the tumor; and the only way in which the disease can be trans¬ ferred is by direct grafting of a piece of the growth from a cancer patient to a healthy person. It is very difficult even to graft a cancer from one mouse to another. Often hundreds of animals are inoculated in order that one or two cancers may be grown. Ani¬ mals bearing cancer and healthy animals have been kept together in large numbers for long periods, and not the slightest evidence of any transfer has been shown.

It has been popularly supposed that cancer is very abundant in certain districts or villages or houses, and that this fact pointed to the con¬ tagiousness of the disease; but when the popu¬ lation of these districts

is studied, it is usually found that all the young people have gone to the neighboring large towns or cities, leaving only those whose age is such that they are especially liable to cancer. Consequently, the number of cases seems very large and the percentage is increased for that particular locality; but if the cancer incidence is considered in conjunction with the age of the population, it will be found that no greater number of cases has occurred, for example, between the ages qf 45 and 50, than has occurred in the general population elsewhere in the country within the same age limits. It follows that ((caricer villages® do not exist, although old-age villages do.

Human cancer is not derived from animal cancer, for it has been shown that it is impos¬ sible to transplant, even with the greatest care, a tumor from a mouse to a rat or a tumor from a rat to a mouse; in other words, cancer of one animal will not grow in any other ani¬ mal except it be one of the same species ; that is, no animal cancer can be transplanted to a human being and remain alive and grow.

The theory of the origin of cancer from the socalled cancers of vegetables, which are really not cancers but only inflammations, seems too foolish to have any wide credence ; but oc¬ casionally the newspapers take up some such wild story and people are led to believe that there may be something in it. It is, however, not true.

Cause of Cancer. — The cause of cancer is not known, though there are two popular superstitions regarding it. One is, that cancer may be produced by a blow ; and the other, that cancer is due to a germ. To uphold either of these there is not the slightest evidence. A large number of cases in which it was claimed that a blow had caused the growth of the can¬ cer have been investigated, and it has been

found that the disease existed before the blow was received. And when we compare the large numbers of people who in their lifetime have received blows in various portions of their bodies, with the small numbers relatively who have developed cancers, it is evident that there can be no relationship between the blow and the beginning of the tumor. It is true that a blow may stimulate a cancer which is already exist¬ ing, but usually on investigation of such cases it will be found that the growth had reached a considerable size before the injury occurred. The same thing is true of the growth of cancer in a broken bone; the presence of the tumor in the bone makes it liable to break, and often the fracture is the first evidence of the tumor. But the fracture did not cause the tumor, even though it may appear to have

grown after the break occurred or was not discovered until after the injury.

The reasons for believing that bacteria have nothing to do with cancer are based upon ex¬ perimental work on animals. If a cancer is transplanted from one animal to another of the same species, it will grow and ultimately kill the second animal ; some cancers are so very virulent that they will, when properly transplanted, grow in every mouse in which they are implanted and cause the ultimate death of the host. But if some of this cancer tissue is crushed or frozen so that all the cells present are broken up, it will not produce a tumor when grafted on to another animal. Now we know that bacteria will live in liquid air which is about 400° F, below freezing, and that they are not killed merely by being crushed; and for these very good reasons we believe that cancer is not produced by bacteria.

While we do not know the cause of cancer, we do know the conditions under which it is liable to arise, and these are any chronic inflam¬ mation or ulceration of the skin or of any organ of the body. If, for instance, the skin is burned, and the burn remains for a long time, there is always risk that a cancer may develop in the site. The burns due to X-rays are very chronic; and cancers frequently de¬ velop in them. Cancers frequently follow irri¬ tation of the lip, tongue or cheek, by smoking or by a rough tooth or an ill-fitting plate.

This relationship between chronic irritation and cancer is well shown by the fact that women of the white race very rarely suffer from cancer of the cheek, while in Ceylon and the Philippine Islands where women chew a highly irritating substance known as the betel-nut, and keep the chewed mass in the cheek over night, they very frequently have cancer arising on the inside of the mouth. Chronic ulcer of the stomach in persons over 40 is another condition which has the same relation¬ ship to cancer, for it has been shown that most of the cases of cancer of the stomach arise in one of these ulcers. Chronic ulceration or irritation of the intestine, also, is a cause of the beginning of cancer; and cancers of the womb often result from tears or injuries following childbirth.

Cancer of the breast occasionally begins in lumps which are the seat of chronic inflamma¬ tion, so that it is well in case a woman has a lump in the breast to have it carefully examined by a physician every six months or so in order to be sure that a cancer is not beginning.

Chronic irritation, therefore, is the only cause for cancer which we know of, and yet it is curious that not everyone who has chronic irritation develops cancer. There is some peculiar personal quality in the tissue which is necessary before a cancer will develop. An example of this is the fact that leg ulcers which are so very common among old people almost never give rise to cancer, although ulcer of the stomach so frequently does. There is, there¬ fore, something besides the ulceration and the chronic irritation which makes the cancer start.

Cure of Cancer. — The only generally suc¬ cessful cure for cancer is its removal as early as possible by surgical means. The use of the knife is preferred to caustics or cautery be¬ cause it permits of a cleaner cut and more rapid healing. Of course, the knife is the only possibility for deep internal cancers involving the stomach or intestines ; but occasionally cancers of the skin are treated by caustic with fair results. It is, however, better to have the cancer cut out clean, as the scar is then much less marked and the healing is more rapid. It is, also a satisfaction for the patient to know that all the cancer is out of the body, instead of having it burned out by some slow caustic. A certain number of cancers of the face, and especially small early cancers in other sites, can occasionally be cured by either radium or X-ray, but as yet we have no published statistics to show what proportion of cases can be per¬ manently cured by either of these agents ; the number of cures reported after some 10 years of use of both these is exceedingly small, and the results are not nearly so good as those which follow surgical removal of the entire tumor. For it must be remembered that cancer is not a blood disease and that when it begins it is no larger than a pin-point, so that if we could make a diagnosis and cut it out in time, every cancer would be curable. The difficulty is to make a diagnosis and as the symptoms of cancer are obscure and often are entirely absent, it is impossible for a physician to learn of the beginning of the disease in time to cut it all out. With every improvement in diag¬ nosis of cancer, the possibility of curing the ‘ disease is increased.

Bibliography. — Hoffman, F. L., (The Mor¬ tality from Cancer Throughout the World5 (Newark, N. J., 1915) ; Kettle, E. H., Pathol¬

ogy of Tumors5 (New York 1916) ; Williams, W. Roger, (The Natural History of Cancer5 (New York 1908) ; Woglom, William H., (The Study of Experimental Cancer: A Review5 (New York 1913).

Francis Carter Wood, M.D., Director of Cancer Research, Columbia Univer¬ sity.

CANCER, in astronomy, fourth sign in the zodiac (q.v.) marked thus 55. The sun enters this sign on or about the 21st of June. He is at his greatest northern declination on entering the sign, and the point which he reaches is called the summer solstice, because he appears for the moment to stop in his progress northward and then to turn south again. The sun is then 23j4° north of the equator, and a small circle of the sphere parallel to the equator at 23ˆ4° distant from it is called the Tropic of Cancer. The sun leaves this sign about the 22d of July. The constellation Cancer is no longer in the

sign of Cancer. At present it occupies the place of the sign Leo. The constellation Can¬ cer contains within it the cluster of Praesepe or the Manger. This lies between two stars of the fourth magnitude, the Aselli or Asses, whose disappearance, according to the ancients, pre¬ saged rain. The arrangement of the stars is in the triple or quadruple system C Cancri. Two close stars of the fifth and sixth magni¬ tudes which revolve about each other during 60 years ; and a third part which has a retro¬ grade motion of longer period, which is still un¬ known and variable, form the constellation. It is probable that the third component is a satel¬ lite of a larger body, and that the other two stars also revolve about this larger unknown.

CANCER-ROOT, or BEECH-DROPS, a

branched parasitic plant (Leptamnimn virgin-iamim), of the family Orobanchacece, with brownish scaly leaves, indigenous in eastern North America, growing almost exclusively on the roots of the beech tree. The whole plant is powerfully astringent, and the root of a brown¬ ish color, spongy and of a very nauseous bitter taste. It was once popularly believed to be a cure for cancer. Other plants of the same family are also called cancer-root.

CANCRIN, kan-kren', Georg, Count, Rus¬ sian general, statesman and financier : b. Hanau, Prussia, 8 Dec. 1774; d. Saint Petersburg, 22 Sept. 1845. He studied at Giessen and Marburg. In 1812 he was commissary-general of the Rus¬ sian forces, and in 1814 accompanied

Tsar Alexander I to Paris; was Minister of Finance from 1823 to 1844; and wrote on military and economic subjects, his most noted works being (Military Economy in Peace and War5 ; (The Economy of Human Societies5 (1845).

CANCRUM ORIS, or NOMA, gangrene of the cheek, due to bacterial infection and mostly occurring in sickly children, especially those with scarlet fever or measles. The im¬ mediate cause is infection from a fusiform bacillus and the spirillum of vincent, associated with other pus-producing microorganisms. It begins as a red spot on the cheek or at the angle of the mouth, spreads rapidly, and soon eats away the whole cheek, even the bone. There is fever, and death usually results in 75 to 80 per cent of the cases. As soon as the dis¬ ease is recognized it should be freely cauterized and the parts kept bathed in antiseptic solutions.

CANDACE, kan'da-se, a name apparently common to the warrior queens of Ethiopia (Upper Nubia), between the Nile and the Atbara, in the later period of the kingdom of Meroe. The most distinguished of them in¬ vaded Egypt 22 b.c., was defeated by the Romans and obliged to sue for peace, which she obtained with a remission of the tribute im¬ posed on her by Petronius. One of her suc¬ cessors is mentioned in Acts viii, 27 ; her high treasurer was baptized by Philip the Deacon on the road to Gaza.

CANDAHAR. See Kandahar.

CANDAULES, kan-dodez, king of Lydia, who lost his throne and life through his be¬ sotted admiration of the beauty of the person of his Queen in 718 b.c. See Gyges.

CANDEE, Helen Churchill, American writer: b. New York 1868. She was educated at various private schools in New Haven and

Norwalk, Conn. Has published (An Oklahoma Romance* (1902); 'Styles and Periods in Furniture and Decoration * (1908) ; (The

Tapestry Book> (1912); (Jacobean Furniture® (1916). Is also a specialist and lecturer on fine antiques, tapestries and decorations.

CANDEILLE, kan'di'e, Amelie Julie,

French actress, singer and composer: b. Paris, 31 July 1767 ; d. there, 4 Feb. 1834. At a very early age she began to take leading parts in classical opera. Later she abandoned opera and made her apoearance at the Comedie Frangaise in 1785, in (Andromaque,* <Bajazet) and ˆfancrede.* In 1790, she composed both libretto and music of (Catherine ou la belle fermiere,* a very popular operetta in three acts, in which she took the leading part and accompanied her¬ self on the harp and on the piano. She also made several tours through the Continent, wrote novels and several other operettas.

CANDEISH. See Khandesh.

CANDELABRUM, a word originally sig¬ nifying candlestick, but usually denoting a sup¬ port for a lamp or lamps among the Romans. The candelabra were of considerable size and often intended to stand upon the ground. They were made of wood, bronze, silver or marble, and were often elaborately and beautifully adorned. Sometimes they had shafts in the shape of columns, which could be shortened or drawn out; sometimes the luxuriant acanthus formed a part of them ; sometimes they repre¬ sented trunks of trees entwined with ivy and flowers, and terminated by vases or bell-flowers, at the top, for the reception of the lamps; and not infrequently the lamps were supported by figures. In ancient times Tarentum and iEgina were famous for their elegant candelabra, and Corinth also manufactured them. The Etrus¬ can candelabra of bronze were celebrated. Ex¬ amples may be found in the plates of the (Museo Gregoriano> or in the works of Over¬ beck, (Pompeii in seinen Gebauden, Alter-thiimern und Kunstwerken* (4th ed., Leipzig 1884), and Mankelsy, (Pompeii: Its Life and Art* (New York 1902).

CANDIA. See Crete.

CANDIA, or MEGALOKASTRON,

Crete, a fortified seaport and capital of the island, situated on the north coast, 65 miles east of Canea ; lat. 35° 20' N. and long. 25° 9' E. Its harbor admits only vessels of small draught. The governor and the Greek archbishop reside here. Soap is manufactured and exported. The fortifications of the city date from the time of the Venetian occupation, and in 1669, after a prolonged siege, it submitted to the

Turks. These fortifications have been much demolished by frequent earthquakes. Pop. estimated at

20,000.

CANDIDA. George Bernard Shaw's play *Candida* belongs to that early group of the author's plays that followed hard upon the close of his novel-writing period. Written in 1894 for Richard Mansfield, who had that year produced (Arms and the Man,* it had its first production on any stage in 1897 when the In¬ dependent Theatre Company offered it in Aber¬ deen and on tour, with Janet Achurch in the title role and Charles Charrington in the part of the Rev. James Mavor Morell. It was

printed the following year as the second play in the volume of "pleasant® plays in the (Plays Pleasant and Unpleasant* series. The theme of love, marriage and the artist had been treated by Shaw in his novel, (Love Among the Artists. > It is returned to as a minor theme in (The Doctor's Dilemma.* In (Candida) it is handled in a spirit of combined disillusion and reverence that raises the play to first rank as a work of art and as a psychological document. Into the contented household of the Rev. James Mavor Morell and his wife, Candida, comes the poet, Eugene Marchbanks. The action that fol¬ lows is not so much a development of the tri¬ angle theme, as the testing of the marriage com¬ pact of Morell and Candida before the acute perceptions of the poet. Marchbanks' temporary error in thinking he is in love with Can¬ dida but raises her to a greater clarity of insight; happily too it gives the masterful Mor¬ ell a quarter of an hour of keen self-distrust. But there is no real struggle between Morell and Marchbanks. Each man has what he most desires and most needs. In Marchbanks, who all through is too much "aware® to be really in love, the author is revealing the lonely soul of the poet, as in Candida and Morell he is un¬ covering the secret places in the marriage bond. "One of the noblest, if not the noblest, of modern plays,® Chesterton calls (Candida.* This nobility appertains not only to the theme, but as well to the manner in which the play is written. In its freedom from "gallant, wicked and poetic attitudes,® in its lofty idealism as well as in its searching of human weaknesses it is a work of genius. Unlike the greater number of Shaw's plays (Candida) is a true theatre-piece. Against all the dramatic anarchy of his discursive plays it is Shaw's indubitable war¬ rant as a great dramatist. The stage history of the

play has been distinguished. Finally produced by Mansfield in 1903, it was the same year given notable productions in Dresden and by Arnold Daly in New York. The following year it was a part of the Court Theatre rep¬ ertory of the Vedrenne Barker management in London. It was given in French in Brussels - in 1907 and in Paris in 1908. In recent years it has occupied a leading place in the repertories of “new® theatres. Consult Henderson, Archi¬ bald, (George Bernard Shaw: his Life and Works) (London 1911) ; Chesterton, G. K., (George Bernard Shaw* (ib. 1909) ; Burton, Richard, < George Bernard Shaw: the Man and the Mask* (New York 1916) ; Hamon, Au¬ gustin, (Le Moliere du XXe siecle : Bernard Shaw) (Paris 1913) ; (The Technique of Bernard Shaw’s Plays, * translated by F. Maurice (London 1912).

Thomas H. Dickinson.

CANDIDATE, an applicant for an office, from the Latin candidatus, “white-robed,® be¬ cause, among the Romans, a man who solicited a public office appeared in a white garment — toga Candida — and wore this during his can¬ didature, which lasted for two years. In the first year the candidates delivered speeches to the people, or had them delivered by others. After this year they requested the magistrate to enter their names on the list of candidates for the office sought for. Before this was done the previous life of the candidate was subjected to a scrutiny in the Senate, after the praetor oi*

consul had received his name. If the Senate accepted him he was permitted to offer himself on the day of election as a candidate. The formula by which permission was granted was <l Rationem habebo, renuntiabo ® ; if he was not accepted he received the answer, ((Rationem non habebo; non renuntiabo? The tribunes often opposed a candidate who had been accepted by the Senate. The morals of the aspirants, in the purer ages of the republic, were always severely examined. In the later period of the republic, nobody could obtain an office if he was not present and if he had not offered himself on three market days. On these days the candi¬ dates tried to insinuate themselves into the favor of the people. They went from house to

house (ambitio , whence the word ambition), shook hands with everybody whom they met (prcnsatio) , addressed each one by his name, for which purpose they generally had a nomen-clator with them, who whispered the names of those whom they met into their ear. Cicero, therefore, calls the candidates natio ojficio-sissima. They placed themselves on market days in elevated places in order to be seen. On the day of election they did the same. Favorites of the people accompanied them (dednctoes) ; some of their suite (divisores) distributed money among the people, which, though pro¬ hibited, was done publicly. Interprets were employed to bargain with the people, and the money was deposited in the hands of sequestres. Sometimes a number of candidates united into parties (coitiones) , in order to defeat the en¬ deavors of the others. At last the grounds on which each candidate rested his claims to the office were read, and the "tribes® delivered their votes. The successful candidate then sacrificed to the gods in the capitol. To oppose a can¬ didate was called ei refragari ; to support him, su ffragari, or stiff ragatores esse. In the early Church newly-baptized Christians were called candidates, on account of the white robes worn by them for a certain period after celebrating the rite. The word "candidate® is also used by Protestants to designate a theologian who, hav¬ ing finished his studies at a university, is wait¬ ing for an appointment in the Church. At present it means, in English-speaking countries, an applicant for any office whatever. (See Con¬ vention, Political; Corrupt Practices Act). Consult the treatise known as (Quinti Ciceronis de Petitione Consulatus ad Marcum Tullium FratrenP (printed with Cicero's letters) ; Greenidge, (Roman Public Life) (London

1901).

CANDIDE, OR OPTIMISM GCandide, ou l'Optimisme)), kan'ded, oo lop'te'mes'm', is one of the most characteristic works of Vol¬ taire. It is the longest and the best known of the Philosophic Tales) (Pontes Philosophiques)), in which he let his incomparably nimble intelligence play over all questions of human interest, — politics, religion, morals. The story of the remarkable adventures of Candide and his tutor, Pangloss, in search of his beloved cousin, Cunegondi, is merely the thread on which are strung the flashing gems of his wit, his satire and his irony. In substance it is a pitiless attack on the easy optimism of "What¬ ever is, is rights Earlier Voltaire had shown decided leanings toward such a view. He had translated Pope's (Essay on Man,* and in an¬

other philosophic tale, (Zadig,> in 1747, he had, though with some mental reservations, ap¬ parently “justified the ways of Providence to man.® But his optimism, such as it was, was shattered by the Lisbon earthquake, and in Candide, in 1752, he disposed the wanderings of his personages so that they are witnesses not only of its horrors but of a thousand others. The endless panorama of human sufferings and meanness is unrolled before us, — plague, pesti¬ lence and famine, war, lust, greed, injustice, cruelty, disease. Pangloss, academic champion of optimism, long maintains in the face of each new disaster, that, after all, this is the best of all possible worlds. But even he is finally reduced to silence. Cunegondi, when found, is a mere wreck, diseased in body and soured in temper. Candide buys a little plot of ground and installs himself and his companions in a modest cottage. Life is a sorry snarl. Phi¬ losophy is powerless to untangle it. “To work without philosophizing is the only way of mak¬ ing life tolerable,® is Candide’s conclusion. And to every attempt of the incorrigible Pangloss to discuss “cause and effect® and other high problems he opposes the famous final word of experience and common sense; “// faut cultivcr notre jandiri* — (<We must attend to our hoeing.®

Arthur G. Canfield.

CANDLE, a solid cylindrical rod composed of beeswax, tallow, paraffine or some other fatty substance, with a wick running longitudi¬ nally through its centre, designed for slow com¬ bustion with illumination. The wick is gen¬ erally composed of a few threads of cotton yarn lightly twisted or plaited; but formerly, in homemade candles, dried rushes (Juncus effusus) were employed for this purpose. The process of making rushlights is described at length by the Rev. Gilbert White in his well-known (History of SelborneP

Candles are mentioned in several places in the Bible, but no direct evidence is given as to their form or of what they were made. There seems to be a distinction, however, between can¬ dles and lamps, — the latter specifically calling for oil, while the candle is spoken of as being lighted and placed on a candlestick.

Considerable modern improvements have been made in the manufacture of candles. One of the most important of these consists in not employing the whole of the fatty or oily sub¬ stances, but in decomposing them, and then using only the stearin or stearic acid of the former, and the palmitine of the latter class of substances. The

animal fats are combinations of glycerine and fatty acids, principally stearic and palmitic, both solids, and oleic acid, which is liquid. If the latter be in excess, the fat will be a liquid and constitute an oil ; if, on the contrary, the solid acids predominate, we shall have a more or less concrete fat, such as the tallow of the ruminants and lard of the hog. Stearic acid now constitutes the principal raw material for the manufacture of candles.. The chief chemical agents employed to obtain the stearin are caustic lime, which, setting free the glycerine, produces stearate, margarate and oleate of lime, in the form of a solid soap; and dilute sulphuric acid by which this solid soap, after being reduced to powder, is effectually freed of its lime. By means of a subsequent bleaching process cakes of a perfectly white

color, free from impurities, and fit for the manufacture of candles, are obtained.

Candles are commonly made by dipping, molding or rolling. The former is the older method, and consists in arranging in a frame a number of wicks of the proper length and thickness, and dipping them a number of times successively in a tank of melted tallow or other fatty composition, with intervals for the incipi¬ ent forms to cool and harden. These dippings are repeated until the candles have assumed the requisite thickness and weight.

Molded candles, as their name implies, are formed in molds. These are generally made of pewter, or an alloy of 20 parts of tin and 10 of lead, though glass has also been introduced. They are hollow cylinders of the length of the candle, and open at both ends, but provided at the upper end with a conical cap, in which there is a hole for the wick. A number of these molds are inserted in a wooden frame or trough with their heads downward ; the wick is then drawn in through the top hole by means of a wire, and kept stretched and in the centre by a peculiar arrangement. The molds thus prepared are filled by running melted tallow of the proper temperature from a boiler into the trough. The candles remain in the molds for about 24 hours, but, as they improve by keeping, generally re¬ main in the storehouse for a few

months before they are exposed for sale.

The rolling of candles is confined principally to those made of wax. Although the bleaching of wax was described by Pliny, the use of this material for the manufacture of candles dates back only to the beginning of the 4th century. From its tenacity, and the contraction which it undergoes in cooling, wax cannot be formed into candles by melting it and then running it into molds. Instead, wicks, properly cut and twisted, are suspended by a ring over a basin of .liquid wax, which is poured on the tops of the wicks, and, gradually adhering, covers them. Or the wicks may be immersed, as in the case of tallow ˆdips.® When a sufficient thickness is obtained, the candles, while hot, are placed on a smooth table kept constantly wet, and rolled upon it by means of a flat piece of wood. In this way they assume a perfectly cylindrical form. Machines have been constructed, how¬ ever, for the manufacture of such products. The large wax candles used in Roman Catholic churches are merely plates of wax bent round a wick and then rolled.

For preparing wax tapers, the wick is wound around a drum and is then made to pass into the melted wax under a hook placed at the bot¬ tom of the kettle. The wick, coated with wax, traverses a draw-plate which gives it the de¬ sired diameter, and then winds around a sec¬ ond drum. A little tallow, resin and turpen¬ tine is often added to the wax in order to give it greater ductility.

Wax matches, also, which are generally of paraffine, are made with the draw-plate. They are afterward cut to the proper length and tipped with a paste of inflammable material. The use of wax for candles, by reason of their cost, was never very widely diffused, and of course at the present day is likely to diminish greatly. .See Wax.

Hollow candles are provided with three apertures extending throughout their entire length. They offer the advantage of not gutter¬

ing when burning. They are manufactured by means of a special machine, the molds of which contain three solid rods, which are withdrawn before the solidification of the mass.

At the beginning of the 18th century, sper¬ maceti, a product of the cachalot, or sperm whale, came largely into use for the manufac¬ ture of candles. The competition of other ma¬ terials and the decline of the

whale fisheries limit its use at the present day.

Cetin, a form of spermaceti, is too brittle and lamellar in texture to use alone in candle¬ making. These defects are corrected by the addition of about 3 per cent of wax.

Paraffine candles came into general use about 1850. When crude petroleum is distilled the products obtained consist of light oils em¬ ployed for illuminating purposes, and heavy oils used as lubricants. These latter, upon cool¬ ing, yield a solid substance of waxy consistence and deep color, called paraffine. This material, when purified, gives a white, odorless com¬ bustible substance, which is made into candles which give a brilliant but slightly smoky flame. Objections to their use are that at the moment of extinction they emit a disagreeable odor, and that they are too fusible and apt to become dis¬ torted in a warm atmosphere. For these rea¬ sons paraffine is generally mixed with stearic acid. The use of paraffine candles is most com¬ mon in Great Britain. See Paraffine.

Ozokerit, or ceresine, which is also used in the manufacture of candles, resembles paraffine in appearance. It is obtained by purifying a sort of natural mineral wax, the principal de¬ posit of which is found in Galicia. It is not much used except in Germany and Austria. Since ceresine candles melt at a higher tem¬ perature than paraffine, they undergo no de¬ formation when used.

Palm-oil is obtained from the west coast of Africa, especially the neighborhood of Lagos. The palm which yields it is the Elias guineensis, . which produces a golden-yellow fruit of the size and shape of a pigeon's egg. By detaching its pulp from the kernel, bruising it into a paste, and then agitating it in boiling water, the oil is separated, and, rising to the surface, con¬ cretes as the water cools. About two-thirds of it in weight consists of a peculiar, white, solid fat, called palmitine; the remainder is chiefly olein.

The manufacture of candle-wicks is fully as important as the treatment of the combustible fats, and candle-makers have studied the princi¬ ples of combustion with a view to discovering methods of producing the clearest light with the minimum of smoke, odor and trouble in snuffing.

A flame is the result of the combustion of a gas. In a burning candle the fatty or other substances are melted and carried by the wick into the interior of the flame, where they are continuously converted into gas. We may com¬ pare the combustion of a candle to a micro¬ scopic

gasworks, and, just as the gas-burner gives more or less light according as the pres¬ sure is varied, or the tip is more or less foul, or the proportion of air that reaches the gas is greater or less, just so a candle will give a different light according to the draft of air, the size and nature of the wick. Too large a wick would absorb the melted material too rapidly, the flame would be unduly increased,

and the feeding of it would be effected under unfavorable conditions. Too small a wick would produce the opposite effect ; around the periphery of the candle there would form a rim, which, no longer receiving a sufficient quantity of heat, would remain in a solid state; the cavity that serves as a reservoir for the liquefied material would become too full ; and the candle would gutter. So the section of the candle, the size of the wick and the draft of air in the flame must be apportioned in such a way that there shall always be an equilibrium between the quantity of material melted and that decomposed by the flame. The purity of the air, too, must be taken into account, for, just as a man needs pure air in order to live in health, so a candle has need of the same in order to burn well. During an evening party it may be observed that the brilliancy of the candles diminishes in measure as the air be¬ comes impoverished in oxygen and enriched with carbonic acid.

The wick must be placed in the centre of the candle, or else it will remain too long, produce smoke, and darken the flame. If the end re¬ mains exactly in the centre the air will not reach it, and the wick will carbonize and form a (<thief)} or <(waster,® which, falling into the cavity at the top of the candle, will make the latter gutter, and end by obstructing the wick. It then becomes necessary to snuff it. In order to do away with this inconvenience, Gay-Lussac and Chevreul, in 1825, recommended the use of flat or cylindrical wicks of an uneven texture, having the property of curving over. In the same year Cambaceres proposed the use of hol¬ low plaited wicks, which, in measure as the candle burned, had the property of curving toward the white part of the flame. But ashes nevertheless formed, and, obstructing the wick,

affected the light. In the month of June 1826 De Milly finally succeeded in solving the prob¬ lem by impregnating the wick with boric acid. This latter, uniting with the ashes of the wick, gives rise to a fusible body, which is rejected in the form of a drop or bead toward the ex¬ tremity of the wick. In Austria, wicks are impregnated with phosphate of ammonia, which gives analogous results. Bailey has proposed a. solution of sal-ammoniac of 2° or 3° Baume. Consult Calderwood, (Manufacture of Candles > (London 1891) ; Lamborn, (Modern Soaps, Candles and Glycerine) (ib. 1906) ; Lewko-witsch, (Chemical Technology and Analyses of Oils, Fats and Waxes) (Vol. II, London and New York 1909).

CANDLE, Electric. See Electric Light¬ ing.

CANDLE-FISH, OOLAKAN, oo'la-kan, OULACHON, -kon, or EULACHON, u'la—

kon, a sea-fish (Thaleichthys pad ficus), of the salmon family, frequenting the northwestern shores of America, of about the size of the smelt, to which it is allied. It is a greenish olive on the back, with a white belly, spotted with yellow. It is converted by the Indians into a . candle simply by passing the pith of a rush or a strip of the bark of the cypress-tree through it as a wick, when its extreme oiliness keeps the wick blazing. Oulachon oil, a substitute for cod-liver oil, is obtained from it. This fish is a favorite article of food in British Columbia. The name is also applied to a fish in San Fran-vol. 5 — 32

cisco (anoploma fimbria), or Pacific coalfish. Consult Swan, in Proceedings of the United States National Museum* (Vol. Ill, Washing¬ ton 1881).

CANDLE-FLY, or LANTERN-FLY, a

hemipterous insect of the group Homoptera, family Fulgoridce. The large Chinese candle-fly (Fulgora candelaria) is remarkable for its greatly prolonged head, which was formerly believed to be luminous. Compare Lantern-fly.

CANDLE-NUT, the nut of Aleurites mo-luccana, the candleberry-tree, a native of Malaysia, belonging to the family Euphorbiacece. It is about the size of a walnut, and yields an oil used for food for lamps, and in the manu¬ facture of varnish, while the oily kernels are also strung together and lighted as torches.

CANDLEBERRY, BAYBERRY, CANDLEBERRY MYRTLE, TALLOW-TREE, or WAX MYRTLE, a shrub (Cerothamnus cerifera) common in eastern North America, where candles are made from the waxy sub¬ stance collected from a decoction of the fruit. It grows abundantly in sandy soil, and seems to thrive particularly well in the neighborhood of the sea, nor does it ever seem to be found far inland. The berries intended for making candles are gathered late in autumn, and are thrown into a pot of boiling water, where the fatty or waxy substance floats on the top and is skimmed off. When congealed this substance is of a dirty-green color, somewhat intermedi¬ ate in its nature between wax and tallow. After being again melted and refined it assumes a transparent green hue. Mixed with a propor¬ tion of tallow it forms candles, which burn better and slower than common tallow ones, and do not run so much in hot weather. They have also very little smoke and emit a rather agree¬ able odor. Soap and sealing-wax are also made of this substance. The plant has been cul¬ tivated in France and Germany, where it grows in the open air. Another plant belonging to the same family is the sweet-gale (Myrica gale), which grows abundantly in bogs and marshes in Europe. It is a small shrub with leaves somewhat like the myrtle or willow, of a fragrant odor and bitter taste, and yielding an essential oil by distillation. It was formerly used in the north of Europe instead of hops, and in some places it is still so used. The catkins or cones boiled in water throw up a scum resembling beeswax, which, collected in sufficient quantities, would make candles. The plant is used to tan calf-skins. Gathered in the autumn, it dyes wool yellow, and is thus used both in Sweden and in Wales. The dried leaves are used to scent linen.

CANDLEMAS, an ecclesiastical festival in¬ stituted by Pope Gelasius I in 492, in com¬ memoration of the presentation of Christ in the temple, and of the purification of the Virgin Mary. It is celebrated on 2 February, and has its name from the fact that in the Roman Catho¬ lic Church candles are blessed and carried in procession, in allusion to the words of Simeon, spoken of the infant Christ, (<a light to lighten the Gentiles.® See Purification.

CANDLER, Warren Akin, American cler¬ gyman : b. Carroll County, Ga., 23 Aug. 1857. He was graduated from Emory College, Ox-

ford, Ga., in 1875, being licensed to preach and entering the North Georgia Conference of the Methodist Episcopal Church in that year. He was in the pastorate until July 1886, when he became editor of the Nashville Christian Advocate (the organ of the M. E. Church South), serving in that capacity until 1888. In the latter year he became president of Emory College, but resigned in 1898 when he became a bishop of the M. E. Church South. He has written (History of Sunday Schools) (1880) ; ˆGeorgia's Educa¬ tional Work) (1893) ; <Christus Auctor) (1899) ; (High Living and High Lives) (1901) ; <Great Revivals and the Great Republic (1904) ; (Dangerous Donations and Degrading Doles* (1909) ; (Wesley and His Work* (1912) ; Practical Studies in the Fourth Gos-pel> (1913).

CANDLISH, Robert Smith, Scottish clergyman : b. Edinburgh, 23 March 1806 ; d. Ed¬ inburgh, 19 Oct. 1873. He was educated at Glas¬ gow University; in 1828 was licensed as a preacher, and in 1834 was transferred from Bonhill to Saint George's, Edinburgh. In 1839 he threw himself into the conflict with the civil courts in the matter of the congregational right of election and independent church jurisdiction in matters spiritual, and soon became, next to Chalmers, the most prominent leader of the ˆnon-intrusion** party and of the movement that culminated in the Disruption of 1843, and the formation of the Free Church of Scotland. From the death of Chalmers till his own death, Candlish was the ruling spirit in the Free Church. In 1862 he was made principal of the New College (the theological college of the Free Church), Edinburgh, and was one of the founders of the Evangelical Alliance. He was the author of Contributions Toward the Expo¬ sition of the Book of Genesis) (1842) ; (Reason and Revelation> (1859) ; (The Fatherhood of God* ; (The Two Great Commandments) (1860), *etc.* Consult <Life,) by Wilson and Rainy (1888).

CANDOLLE, kan-dol, Alphonse Louis Pierre Pyramus de, Swiss botanist : b. Paris, 28 Oct. 1806; d. 4 April 1893. He was son of Augustin de Candolle (q.v.). He was professor of botany and director of the Botanical Garden at Geneva, published numerous works on botani¬ cal subjects, and continued his father's Hntroduction to a Natural System of the Vegetable Kingdom.) In 1714, he succeeded Agassiz in the Academy of Sciences at Paris.

CANDOLLE, Augustin Pyramus de,

Swiss botanist: b. Geneva, 4 Feb. 1778; d. there, 9 Sept. 1841. He studied at Paris, where he made his reputation by his (History of Suc¬ culent Plants,) and (Essay on the Medicinal Properties of Plants.* In 1808 he took the chair of botany at Montpellier, where he re¬ placed the artificial method of Linnaeus by the natural method of Jussieu, and published the remarkable (Elementary Theory of Botany. *After the Restoration of 1815, he returned to Geneva, where he devoted the rest of his life to his great work, (Introduction to a Natural System of the Vegetable Kingdom,* the contin¬ uation of which he entrusted to his son, to¬ gether with an herbarium of 70,000 species of plants.

CANDON, kan-don', Philippines, a town of the province of Ilocos Sur, situated in the northwestern part of the island of Luzon, very near the coast. It manufactures cotton. Pop. about 15,797.

CANDY. See Confectionery.

CANDY, or KANDY, a measure of weight in the East Indies. In Madras the candy is equal to 493.7 pounds, in Bombay it is 560 pounds and in Ceylon it is equal to 500 pounds. It is divided into from 20 to 22 maunds. In Bombay there is a unit of capacity called the candy, equal to 8.2 Imperial bushels, and else¬ where a dry-measure candy is found varying from 15 to 30 bushels.

CANDY CEYLON. See Kandy.

CANDYLARTHRA, a group of primitive animals, ancestral to the ungulate type and especially the perissodactyls, remains of which are found fossil in Cretaceous rocks, and on into the Eocene, where they disappear. They were animals of moderate size, imperfectly plantigrade, with five toes on all feet, teeth adapted to both animal and vegetable diet, and small, smooth brains. The best-known example is Phenacodus, found in the lower Eocene formation of the Rockv Mountain region. It had the form of a small tapir, but had a long tail. Their nearest modern representatives of the condylarths, structurally, are the African conies (Hyrax).

CANDYTUFT, a genus of plants (Iberis), of the natural order Crnciferce, flowering in dense corymbs, and distinguished by an emarginate pouch with keeled and winged valves. Some species are shrubs ; some, her¬ baceous perennials and some, annuals. It is in¬ digenous to the countries bordering on the Mediterranean, and several species, as Iberis umbellata, Iberis odorata and others, are culti¬ vated

in gardens.

CANE, kan, or KEN, a river in Bundelcund (q.v.), British India, a tributary of the Jumna River. It follows a northeast course and is about 250 miles long.

CANE-BRAKE, a term applied to the ex¬ tensive growths of Arundinaria macrosperma, the most gigantic of United States grasses, which occur in the southern portions of the United States, often covering vast extents of country. The plant's stalks are much used for fishing-rods. Cane-brakes are indicative of rich land, as they are only to be found in per¬ fection in the most inexhaustible soils, where, having obtained a foothold, by their more rapid growth they usurp the place of the timber. In the southern portions of the United States the plant often reaches the height of 15 to 25 feet, with a base one to one and a half inches diameter. It grows as straight as an arrow from the root, tapering off finally in a beauti¬ ful, threadlike, feathery top. The leaves com¬ mence at about two-thirds of the height of the plant, and seem to be attached directly to the • stalk, as the branches on which they grow, save the very top ones, are not perceptible to ordi¬ nary observation. To the hunter, progress through a cane-brake is one of the most toil¬ some journeys that can be undertaken. Each step is disputed by the dense vegetation, which rises before the intruder like a wall. In places the cane is sometimes pressed down and inter-CANE SUGAR — CANFIELD

laced, and then it becomes quite impenetrable. Under the most favorable circumstances the knife has to be freely used. Cane-brakes are often many miles in extent, always lessening in density as they reach high ground. They are favorite haunts for all kinds of game, which seek their solitudes either for protection or for the leaves for food. The deer are particularly fond of the young green leaves, and upon them often become exceedingly fat. Cane-stalks being hollow, having no pith, and being divided inside every few inches into sections, are very combustible when dried in the sun ; and the air confined within the hollow sections, warming by the external heat, explodes with very con¬ siderable force, so that a cane-brake on fire gives the idea of a continued roar of distant musketry.

CANE SUGAR. See Sugar and Sugar-Making.

CANEA, ka -ne'a (Greek Khania), Crete, the chief commercial town of the island, situ¬ ated on the northwest coast, with a good har¬ bor. It occupies the site of the ancient Cydonia, but the present town is due to the Venetians, from whom it was wrested by the Turks, after a two years' siege in 1669. Canea is the prin¬ cipal mart for exporting the productions of the island. Pop. about 20,000. See Crete.

CANELLA, a genus of plants belonging to the family Canellcicecc. They are ornamental shrubs or trees. C. alba, the wild cinnamon, is a common West Indian aromatic evergreen tree, growing to a height of from 10 to 50 feet, with a straight stem branched only at the top. It is covered with a whitish bark, by which it is easily distinguished at a distance from other trees ; the leaves are placed upon short leaf¬ stalks and are alternate. They are oblong, obtuse, entire, of a dark, shining green hue, and thick like those of the laurel. The flowers are small, of a violet color, and grow in clusters at the tops of the branches on branched stalks. The fruit is an oblong berry containing four kidney-shaped seeds of equal size. The tree is very aromatic, and when in blossom perfumes the* whole neighborhood. The berries, when ripe, are greedily eaten by the wild pigeons of Jamaica, and impart a peculiar flavor to their flesh. The canella of commerce is the bark of the tree freed from its outward covering and dried in the shade. It is brought to Europe in long quills, which are about three-fourths of an inch in diameter, somewhat thicker than cinna¬ mon, and both externally and internally of a whitish or light-brown hue, with a tinge of yellow. This bark is moderately warm to the taste, and aromatic and bitterish. Its smell is agreeable, and resembles that of cloves. In distillation with water it yields an essential oil of a dark-yellowish color, and of a thick tenacious consistence, with difficulty separable from the aqueous fluid. The remaining decoc¬ tion, when evaporated, leaves a very bitter ex¬ tract composed of resinous and gummy matter imperfectly mixed. It has been supposed to possess a considerable share of active medicinal powers, and was formerly employed as a cure in scurvy. Now it is merely esteemed as a pleas¬ ing and aromatic bitter, and as a useful adjunct in correcting more active though nauseous medicines. The powder is given along with aloes as a stimulating purgative.

CANEPHORUS, a term applied to one of the bearers of the baskets containing the im¬ plements of sacrifice in the processions of the Dionysia, Panathemea and other ancient Grecian festivals. It was an

office of honor, much coveted by the virgins of antiquity. The term is often applied to architectural figures bearing baskets on their heads, and is some¬ times improperly confounded with caryatides.

CANES VENATICI, ka'nez ve-nat'isi ((<the hunting dogs55), one of the northern con¬ stellations added by Hevelius in 1690, between Bootes and Ursa Major. Coming in after the time of Bayer, it has none of his assigned let¬ ters; but Baily, in the (<B. A. C.5> in 1845, as¬ signed the letters a and (3 to the two brightest stars, and they will probably stand, though they have not been universally accepted by astrono¬ mers. The former of the two stars is a well-known double. On the maps, the two dogs, Asterion and Chara, are represented as held in leash by Bootes, and pursuing Ursa Major and the celestial pole, but this change in the figure of Bootes has of course been made since the introduction of Canes Venatici into the celestial train. The constellation is surrounded by Ursa Major, Bootes and Coma Berenices. The great whirlpool nebula of this train was discovered by Lord Rosse in 1845, and a fine globular cluster of stars of the 11th magnitude and fainter, notable for the large (nearly one-seventh) pro¬ portion of variables among them. Its principal star, to which Halley gave the name Cor Caroli, is a double star with components of the third and sixth magnitudes.

CANETE, kan-ya'ta, Manuel, Spanish author: b. Seville, 6 Aug. 1822; d. 4 Nov. 1891. He was educated in Cadiz. For a long time he was an official in the ministry of the interior, and was later chamberlain to King Alfonso XII. His lyric poems, published under the title, <Poesias,) are highly esteemed, and his dramas, also successful, include (Un Rebato en Granada5 ; (E1 Duque de Alba5 ; (La Flor de Besalu5 ; and (La Espcranza de la Patria5 (with Tammayo). He is best known, however, as a dramatic critic and a writer on the history of the Spanish stage. His writings in the field of criticism had much influence in the reform of the stage and were not unconnected with his advancement to important posts in the corfimis-sions of Historic and Artistic Monuments and the Inspection of Museums. Among his other works are (Farsas y filogas de Lucas Fer¬ nandez5 (1867) ;(La Tragedia Llamada Josefma5 (1870); (Escritores Espanoles e Hispano-Americanos5 (1884); and (Teatro Espanol del Siglo XVI5 (1885).

CANEY, ka' -ne, Kan., city, Montgomery County, on the Missouri Pacific and on the Atchison, Topeka and Santa Fe railroads, 144 miles southwest of Topeka. It has smelting plants, municipal operated waterworks, and manufactures of glass, oil, flour and bricks. Pop. (1920) 3,597.

CANFIELD, James Hulme, American educator : b. Delaware, Ohio, 18 March 1847 ; d. New York city, 29 March 1909. He was graduated from Williams College in 1868; ad¬ mitted to the Michigan bar, 1872, and practised law at Saint Joseph, Mich., 1872-77.. He was professor of history in the State University .of Kansas, 1877-91 ; chancellor of the University

of Nebraska, 1891-95; president of the Ohio State University, 1895-99, when he was ap¬ pointed librarian of Columbia University, New York. He was secretary of the National Ed¬ ucation Association for five years, and its presi¬ dent for one. Oxford conferred on him the degree of Litt.D. in 1902. He published tax¬ ation : Plain Talk for Plain People) (1883); the College Student and His Problems) (1902); (A Short History of Kansas> (1885); (Local Government in Kansas5 (1887).

CANG, CANGUE, or KIA, the wooden collar or portable pillory, weighing from 50 to 60 pounds, and fitting closely round the neck, imposed upon criminals in China, who are then paraded through the streets and exposed in the public thoroughfare. It renders the wearer un¬ able to feed or otherwise care for himself. On the cang is inscribed the nature of the crime and duration of punishment.

CANGA ARGUELLES, kan'ga ar-gwel'- yes, Jose, Spanish statesman: b. Asturias 1770; d. 1843. In 1812 he was a member of the Cortes from Valencia, and rapidly rose to the leader¬ ship of the Constitutional party; hence on the accession of Ferdinand VII he was banished. Recalled in 1816, he became Minister of Finance in 1820, when the constitution was restored. Through the abolition of certain direct taxes, he caused financial disorder, and was forced to resign in 1821 ; was a member of the Cortes in 1822, but fled to England at the time of the revolution of 1823. Returning in 1829, he again was elected to the Cortes, where he remained true to his liberal principles. He wrote (Memoria sobre el Credito Publico5 (1820) ; (Elementos de la Ciencia de Hacienda5 (1825) ; (Diccionario de Hacienda5 (1827, and 2d ed., 1833-34) ; (Observaciones sobre la Guerra de la Peninsula5 (1833-36)

; and poems, translations in verse from the Greek, *etc.*

CANGAS DE ONIS, Spain, town, Oviedo province, on the Sella River, 35 miles east of Oviedo. It has busy stock raising and coal mining industries, and is noted for historic in¬ cidents. Here the first Spanish Kings resided after the Moorish invasion and here in the 8th century King Pelayo started the Spanish Con¬ quest. The famous cave of Covadonga where he hjd is eight miles distant. There are Roman ruins of bridges, etc., and the 19th century church of the Assumption is a replica of the mediaeval church which it replaced. Pop. 9,100.

•CANGAS DE TINEO, Spain, town of Oviedo province, 37 miles southwest of Oviedo on the Rio Narcea, here spanned by an historic bridge. Situated in a well-watered mountain¬ ous and wild region, stock raising, farming and coal mining are active industries and cloth, leather, pottery, liquors, flour and linen are manufactured. Pop. 24,000.

CANIAPUSCAW, kan-i-ap'us-ka, a river in Labrador, outlet of a lake of the same name, flowing northwest into Ungava Bay, Hudson Strait; length, 400 miles.

CANICATTI, ka-ne-kat'te, Sicily, a city in the province of Girgenti on the Naro, situ¬ ated in a grain and fruit region. Here are also sulphur mines. The inhabitants are mostly engaged in agriculture. Pop. (1911) 31,204.

CANID2E, the dog tribe, comprising wolves, foxes, jackals, dogs and the like, a family of

carnivores, intermediate in structure and phylogeny between bears, hyenas and weasels. Their legs are long; the claws non-retractile, and in all except the lycaon there are five toes in front and four behind. The dentitions usually consist of three incisors, a great canine (a tooth which takes its name from its prom¬ inence in the dog, and is the seizing and tearing instrument) ; four small premolars, and two molars on each side of each jaw; but in the lower jaw there are three molars. All these teeth have the carnivorous characteristic of sharp-cutting crowns rather than broad, grind¬ ing surfaces, such as characterize the molar teeth of vegetable-eaters. Dogs are mainly diurnal and live in open uplands rather than in forests, where they' obtain their prey by chasing it down ; they occupy dens and burrows, and possess keen senses and great intelligence. See Dogs. For the fossil history of the

family, see Carnivora.

CANIDIA, a Neapolitan woman (real name probably Gratidia), whom Horace loved, and who deserted. him. Horace, in an epode and the Satires, gives her name to a sorceress.

CANIGOU, ka-ne-goo', one of the peaks of the Pyrenees in France. It is in the depart¬ ment Pyrenees-Orientales, 24 miles from Per¬ pignan; height, 9,137 feet.

CANINA, ka -ne'na, Luigi, Italian archaeol¬ ogist and architect : b. Casale, Piedmont, 23 Oct. 1795; d. Florence, 17 Oct. 1856. He was for some time professor of architecture at Turin, and afterward lived in Rome, where he published works of great value on the antiq¬ uities of Rome, Veii, Etruria and Tusculum, among them ^'Architettura antica descritta e dimostrata coi monumenti5 (1839^46).

CANINDE, ka-nen'da, a river of Brazil, flowing into the Paranahiba; length, 200 miles.

CANIS MAJOR (<(the greater dog55), a constellation of the southern hemisphere, re¬ markable as containing Sirius, the brightest star in the heavens, by means of which the con¬ stellation may be located on a continuation of the line through the belt of Orion.

CANIS MINOR (<(the lesser dog55), a constellation in the northern hemisphere, im¬ mediately above Canis Major, the chief star in which is Procyon, lying between Sirius and Pollux. Procyon has a satellite of a star of the 13th magnitude, and the pair revolve about each other about every 40 years.

CANISIUS, ka-nTsh'i-us, Petrus (Lat. trans. of Dutch name, De Hond), Dutch theo¬ logian: b. Nimeguen, 8 May 1524; d. Freiburg, Switzerland, 21 Dec. 1597. He was the first man in Germany who entered the order of the Jesuits, of which he became a very active member. In 1549 he was made professor of the¬ ology, rector and vice-chancellor of the uni¬ versity at Ingolstadt, and in 1551 court preacher at Vienna. He afterward reformed the Univer¬ sity of Vienna, according to the views of the order. His catechism, which has passed through more than 400 editions, is yet in use. He per¬ suaded Ferdinand I to adopt stringent measures against the Protestants, and founded the col¬ leges at Prague, Augsburg, Dillingen and Frei¬ burg in Switzerland. He was beatified 20 Nov. 1864. For his life, consult Reiss (Freiburg 1865); Drews, P. (Hale 1892); Mehler, J. B.

(Berlin 1897) ; Michel, L. (Lille 1898) ; Kross, A., (Canisius in Oesterreich* (Vienna 1898); Braunsberger, O. (editor), <Epistolae et Acta' (8 vols., Freiburg 1896 et seq.).

CANISIUS COLLEGE, an educational in¬ stitution in Buffalo, N. Y. ; organized in 1870 under the auspices of the Roman Catholic Church; reported in 1917: Professors and in¬ structors, 25 ; students, 530 ; volumes in the library, 45,000; value of property (including endowment) about $385,000.

CANITIES. Graying of the hair. See Hair.

CANITZ, caA-nits, Friedrich Rudolf Lud¬ wig, German poet and diplomat : b. Berlin, 27 Nov. 1654; d. there, 16 Aug. 1699. He studied law at Leyden and Leipzig, and was made state counsellor in 1697 under Frederick I of Prussia; in 1698 he was given the rank of baron. His poems were first published anonymously after his death (1700) under the title (Nebenstunde unterschiedener Gedichte) ; the second edition with the name of the author appeared in 1719. They had influence on style in opposition to the mannerisms of Lohenstein and other writers of the time. Those most popular with his contemporaries are the satires, elegies and odes, imitating Boileau ; and also an elegy on the death of his first wife, Dorothea von Arnim. Consult Konig, (Des Freiherrn von Canitz Gedichte) (Leipzig 1727) ; Varnhagen von Ense, (Biographische Denkmale> (Vol. IV, Berlin 1824-45) ; and Lutz, (Canitz und sein Verhaltnis zu dem franzosichen Klassicismus* (Munich 1887).

CANKER, a disease of plants. See Apple.

CANKERWORM, a caterpillar of a geo-metoid moth of the genus Anistopteryx, de¬ structive to fruit-trees, especially apples. See Apple.

CANLASSI, kan-las'se, Guido, Italian painter : b. Sant Archangelo 1601 ; d. Vienna 1681. He studied under Guido Reni at Bologna, and lived at Venice as court painter under the Emperor Leopold I, and later at Vienna. He is to some extent an imitator of Guido Reni, but is especially distinguished for his use of color. His chief works, mostly

biblical or mythologi¬ cal subjects, are in Vienna, Munich and Dres¬ den.

CANNA, one of the Hebrides, 12 miles southwest of Skye, and 3 miles northwest of Rum. It is 4*4 miles long, 1 mile broad and 4*4 square miles in area. The surface, nowhere higher than 800 feet, consists of trap. A hill here of basalt, called Compass Hill, reverses the magnetic needle.

CANNA, a genus of plants, some species of which have fine flowers, and some, from their black, hard, heavy seeds, are called In¬ dian shot. There are about 50 species in tropi¬ cal America and Asia, with ornamental leaves, creeping rootstock, and panicles of red or yellow flowers. C. indica is the best-known species, and the roots of C. edulis yield starch. The plants are very popular in cultivation, es¬ pecially the hybrids between various species and the improved varieties obtained by selective breeding. A very large number of named hor¬ ticultural varieties has been produced in recent years.

CANNABIS INDICA. See Hemp, Indian.

CANNiE, kan'e, Italy, an ancient town in Apulia, on the river Aufidus. Its site was be¬ tween the modern Canosa and Bartletta, and was famous for the battle in which the Romans were defeated by Hannibal (216 b.c.). The Roman army under the consuls /Emilius Paulus and Terentius Varro consisted of 87,000 men, while that of the enemy amounted only to 50,000, among whom were 10,000 horse. The battle was brought on by Varro against the bet¬ ter judgment of his colleague. The Romans left their strong position at Canusium on the banks of the Aufidus, and the whole army crossed the river. Varro drew up his troops on the plain, with his right wing protected by the river. At the same time Hannibal forded the Aufidus and led his small army to the attack. The battle was long, and the Romans fell in great numbers, among them the consul, ˆEmilius Paulus, and both the proconsuls Servilius and Atilius. Hannibal's Numidian horse destroyed those who fled from the field. The victor made 13,000 prisoners. The Romans lost, ac¬ cording to their own lowest statements, 45,000 men ; according to the highest, 70,000. Hanni¬ bal collected the gold rings of the knights who had fallen and sent some pecks thereof to Carthage.

CANNAN, Edwin, English economist : b. 1861. A student at Balliol, Oxford, he was en¬ gaged as lecturer at the London School of

Economics (1897) and became professor of political economy in the University of London (1907). He is widely known in advanced circles as author of (Elementary Political Economy* (1888, 3d ed., 1903) ; (History of the Theories of Production and Distribution* (1893, 2d ed., 1903) ; (History of Social Rates in England* (1896, 2d ed., 1912); (The Economic Outlook* (1912); (Wealth* (1914). He also edited Adam Smith's (Lectures on Justice, Police, Revenue and Arms* (1896), and the same author's (Inquiry into the Nature and Causes of the Wealth of Nations* (2 vols., 1904).

CANNEL COAL. See Coal.

CANNELTON, Ind., city and county-seat of Perry County, 150 miles south of Indianapolis, on the Southern Railroad, and on the Ohio River. It has cotton mills, flour mills, foundry and machine shops, potteries, brick yards and sewer-pipe manufactories. Coal and sandstone are mined in the neighborhood and gas and oil are also found. The city owns the electric¬ lighting plant and the waterworks. Pop. 2,008.

CANNES, kan, France, a seaport and health resort on the shore of the Mediterranean at the west end of the Riviera, 22 miles south¬ west of Nice, in the department of Alpes-Mari- times. It is beautifully situated in a rich fruit district. It is famed for its mild and equable climate, with an average winter temperature of 50°, and an average of about 70 days on which rain falls in the year. Since its discovery as a health resort by Lord Brougham in 1831 it has become celebrated as a wintering station. There are many hotels and fine villas, charm¬ ing public walks, *etc.* Perfumes and soap are made here and anchovies, oils and fruit are among the articles exported. It is a place of great antiquity, and twice suffered destruction at the hands of the Moors. On the island of Sainte Marguerite opposite, the Man with the Iron Mask was imprisoned from 1686-98. Near

Cannes, 1 March 1815, Napoleon landed on his escape from Elba. Pop. (1911) 29,656.

CANNIBALISM, the act or practice of eating human flesh by mankind. In his acci¬ dental discovery of the West Indies Columbus heard of, if he did not himself see, the Carib Islands, the inhabitants of which were spoken of as Caribales, or, owing to the customary dialectical interchange of /, n and r, Canibales. These Canibales or Caribales were reported to be man-eaters. This terrible association of Canibales with the practice of eating human flesh naturally enough led straightway to the transfer of the name of the people to their horrid custom. The Greek word, anthro¬ pophagy (av6puno(j)dyog) , coming down from pre-Christian times, indicates that the practice, though unknown to Columbus, was ancient and well enough known to be in the literature of the older peoples. The story of Polyphemus devouring human flesh as told in the <Odyssey) and other legends of semi-divine man-eaters is evidence enough that the ancient authors knew, by hearsay at least, of this practice. It is a well-established fact that all races of men have at some time, in a greater or less degree, been guilty of the practice of eating human flesh for one purpose or another. It is very generally believed, and with a good show of reason, that there never has been a time, since man first appeared, down to and including our own, when the world has been free from canni¬ balism. It is nearer being free from it now than it has been perhaps in all past time. To-day it exists among isolated South American tribes ; in West Equatorial and Central Africa; in the Malay Archipelago, some of the South Sea Islands (mainly in Melanesia) and in parts of Australia. Excluding Australia cannibalism may be said to be confined to a belt of land extending to a little more than 10 degrees north and south of the equator.

How far back the practice goes it is not possible to tell. So far as is known there is nothing to warrant the belief that the ancestors of the human species or the first of the human species ate one another. There is little if any evidence to indicate that down to as late a period as the close of the Old Stone Age the several races of men which had successively inhabited Euro-Asia and northern Africa prac¬ tised cannibalism. Cannibalism is not univer¬ sally characteristic of the savage state. A few charred and broken and scraped human bones from the cave-dwelling period are substantially all that has been found which can by any stretch of the imagination be supposed to hint at this practice. Tylor goes as far as the facts seem to warrant when he says that this evidence may <(perhaps be taken to show that prehistoric savages were in this respect like those of modern times neither free from cannibalism nor universally practising it.® Cannibalism originates in and is carried on from widely different motives, ranging all the way from eating human flesh as a regular part

of daily subsistence to the eating of it for purely magical or ritualistic reasons. It is not possible to draw a dividing line between the several kinds because all or nearly all forms are more or less interrelated. This may arise from the fact that usually the practice does not begin in a single motive.

As a Means of Subsistence. — The most repulsive and degrading form of cannibalism is that of eating human flesh as a part, the main part, of the regular diet. The negro tribes along the Guinea Coast southwards into the Kongo and for some distance eastward eat human flesh as food. It is treated just as other races treat animal flesh. Raids are made to capture prisoners and they are herded and kept till wanted. Sometimes they are fattened just as other races fatten animals for the slaughter. Under great stress of hunger occasioned by shipwrecks, sieges and famines civilized persons have been driven to the eating of human flesh. The siege of Samaria about the middle of the 8th century b.c. (II Kings vi, 24ff) ; the siege of Paris in 1590; and the famine in Algiers in 1868 furnish instances of this. What civ¬ ilized people are driven to do by the pressure of hunger it is not surprising that the savage should do with even greater readiness under similar circumstances. Many savage races have resorted to cannibalism only in times of famine. The Mungerra tribe in Queensland in times of severe famine <(kill and eat some of their female children.® The natives of Tierra del Fuego, when starving in winter, <(throttle and devour the oldest woman of the party. When asked why they did not kill and eat the dogs, they reply (Dogs catch otters.) ®

As Manifestation of Affection. — In¬ credible as it may seem cannibalism in some instances seems to be prompted by affection. The Binderwurs of Central India killed and ate the sick and aged, <(thinking this an act of kindness and acceptable to the goddess Kali.® The aborigines of southwest Victoria practise eating human flesh in a solemn service of mourning for the dead, particularly for those killed by accident. ((The Tangara carry their dead about with them, and whenever they feel sorry for their death, they eat some of the flesh till nothing remains but the bones.® Among still other peoples parents partake of the flesh of their dead children (<as a token of grief and affection for the deceased.® The practice of eating flesh for the purpose of honoring dead kinsmen is of a similar charac¬ ter. Herodotus, writing of the Massagetse, a Scythian people living in the northeast of the Caspian, relates that when a man has attained a great age among these people it is the custom for his kinsmen to sacrifice

him, boil his flesh with the flesh of cattle and eat it. This is accounted an exceedingly happy ending. Lyden describes a cannibalistic custom which has the appearance of a very pious ceremony. The aged and infirm invite their descendants to eat them. The victim ascends a tree around which the others assemble singing a funeral dirge : <(The season is come, the fruit is ripe, and it must descend.® He then descends, and is put to death and eaten in a solemn banquet.

As a Ritualistic Practice. — Cannibalism as a religious institution is one of the most widespread and persistent forms of the practice and it ranges all the way from almost a pass¬ able refinement to the most revolting orgies. The religious purpose is not always the same. In some instances it is due to a desire, as among some Australian tribes, who make a practice of eating their totems, to become identified with the totem or god. In other cases the desire is simply to establish a close bond of friendship

between the flesh-eating god and themselves. The peoples who offer human sacrifices to the god eat of these sacrifices, believing that by so doing they directly and surely become possessed of the divine virtues supposed to proceed from such sacrifices. With the Khonds it was the custom for a girl representing the goddess Tari to be sacrificed and torn limb from limb by the worshippers eager to obtain a piece of the deified victim. Cannibalism as a purely re¬ ligious exercise among people possessing a high degree of culture is best and most notoriously illustrated by the Mexican custom of offering human sacrifices to the god Huitzilopochtli. ((The victims were enemies or slaves and were offered before the images of the gods. The priest cut open the breast with an obsidian knife, tore out the heart and offered it to the gods ; then he sprinkled his assistant and the offerers with the blood. After this a cannibal feast on the body took place, priest and offerers partaking.® Early writers say these cannibalis¬ tic sacrifices reached yearly into the thousands. To obtain rain from the rain-god Quiateot, children and adults were sacrificed to him and his images were sprinkled with their blood.

As Magic and Medicine. — One of the most varied forms of cannibalism is that orig¬ inating in the belief that by eating human flesh or certain parts of the human body very im¬ portant advantages would be gained. Dead rel¬ atives in some instances are eaten in the belief that the soul of the deceased will thus pass into the eater, and he thereby become possessed of all the desirable qualities of the dead man. In other instances the body of an enemy was eaten because that was the way to destroy the soul and thus put an end to further menace. Landor reports that in Tibet the dead is eaten partly by the Lamas and in part by the relatives, it being believed that the spirit whose flesh has been eaten will always remain friendly. The Boto-cudos ate an enemy to render themselves invul¬ nerable against the arrows of the hostile tribe. Among some peoples at the founding of a new town a human victim was slain and the heart and liver eaten by all present so that they might not die within the year. In I Kings xvi, 34. is reflected a survival of a similar custom. The idea that the eating of human flesh endows the eater with distinctly magical or supernatural powers is frequently met with in the savage world. In East Central Africa it is quite gen¬ erally believed that the uncanny powers sup¬ posed to be possessed by witches and wizards are obtained by the feeding of the latter upon human corpses. From this comes, naturally enough, the belief that whoever feeds on human flesh will have the power of witches and wizards.

Not infrequently cannibalism has arisen from an almost uncontrollable passion for re¬ venge, and a savage belief that eating an enemy is the surest way of bringing about his lasting disgrace. The ferocious natives of New Cale¬ donia do not consider that revenge is complete until they have devoured the slain. The can¬ nibal practices in Samoa seem to have had hatred and revenge as the motive. ((I will roast thee® was the greatest insult that could be offered a Samoan. For a long time after the practice was abandoned, captives, in token of submission, would offer burning wood and say

(<Kill and cook us when it seems good to thee.® The Tupis of South America ate their dead enemies, and the children were brought home captive and cared for till the age of 14 when they were slain and eaten. Instances have been met with where the criminal enemies within the tribe are slain and eaten. Where this is the custom it is usually the chief alone who has the privilege of eating the offending tribesmen. In some cases it is not easy to distinguish between this custom and that of mere glut¬ tonous cannibalism. The chief goes so far as to cause a tumult to be raised. As a punishment the offender is

slain and the chief invites guests to share in the meal of human flesh. So power¬ ful an incitement to cannibalism is this passion for revenge that quite civilized peoples have been guilty of it.

Other Motives. — There are several other motives leading to cannibalism more or less dis¬ tinct from those mentioned. Among some peo¬ ples the flesh of a fallen enemy was eaten after the fight by both contending parties as a token of entering into a binding covenant of peace. At the coronation of a king in the Sandwich Islands it was the custom for the new king to swallow the left eye of a human victim that he might thus receive an accession of strength. Among the Indian tribes of the Northwest of America cannibalism took the form of initia¬ tion into certain secret societies — a sort of ritualism. At the beginning of the initiation into the cannibal society the person is supposed to become possessed of the cannibal spirit, and so of a violent desire to eat human flesh. In olden times, when the cannibal was in a state of ecstasy, slaves were killed for him and he devoured them raw. Cannibal practices are of almost infinite variety, and perhaps all, except where human flesh is eaten simply as food, have their root in a superstitious view of life and the world. Naturally the practice has been disap¬ pearing before the progressive enlightenment of the world, and even the tribes who are still guilty of eating human flesh as food are in¬ creasingly ashamed of it, very often carrying on the practice in closely guarded secrecy.

The bibliography of the subject covers a multitude of publications. Articles on an¬ thropology and ethnology in journals devoted to such subjects will yield much information; also the narratives of travel and adventure by well-known explorers of early and later times. A few might be mentioned simply as sugges¬ tions : Weeks, Among Congo Cannibals) ;

Frazer, J. K., (Totemism and Exogamy) ; Stan¬ ley, H. M., (In Darkest Africa) ; Landor, W. S., (In the Forbidden Land) ; Rannie, (My Ad¬ ventures Arnon? South Sea Cannibals> ; Dennys, folklore of China.*

CANNIFF, William, Canadian physician : b. Thurlow, near Belleville, Ontario, 1830; d. 1910. He was educated at Victoria College, Cobourg, and studied medicine in Toronto, New York and London, England, where he took the degree of M.R.C.S. He served in the Crimean War, 1856; returned to Canada, became profes¬ sor of pathology in Victoria College ; visited the Washington hospitals during the Civil War, and finally settled in the practice of his profession at Toronto. He was one of the originators of the <(Canada First® movement. .He was the author of (The Medical Profession in Upper

Canada, 1783— 1850) (1894) ; (The Settlement of Upper Canada > (1872).

CANNING, Charles John (Earl), English statesman, son of George Canning (q.v.) : b. near London, 14 Dec. 1812; dˆ London, 17 June 1862. He was educated at Eton and Oxford. He entered Parliament in 1836 as member for Warwick, and in the following year succeeded to the peerage, on his mother's death, as Vis¬ count Canning. In 1841 he was appointed undersecretary for foreign affairs in Peel's government, and in 1846 commissioner of woods and forests. In the Aberdeen ministry of 1853, and under Palmerston in 1855, he held the Post¬ master-Generalship, and in 1856 went out to India as governor-general. Throughout the mutiny he showed a fine coolness and clear¬ headedness, and though his carefully pondered decisions were sometimes lacking in prompt¬ ness, yet his admirable moderation and the im¬ plicit trust he imposed in able military sub¬ ordinates did much to re-establish the British empire in India. In 1858, when the govern¬ ment of India was transferred from the East India Company to the Crown, Canning became the first viceroy; and in the succeeding year he was raised to the rank of earl. From that time till his retirement in March 1862, the arduous task of undoing the mischief wrought by the mutiny devolved upon him, and his great suc¬ cess was a witness to his ability. Consult Cunningham, (Earl Canning) (1891) ; Hare, A. J. C., (The Story of Two Noble Lives) (1893).

CANNING, George, English orator and statesman: b. London, 11 April 1770; d. Chis¬ wick, 8 Aug. 1827. His father offended his family by marrying a lady of beauty and ac¬ complishments, but without fortune, and died in 1771, leaving her destitute. She however lived to see the success of her son, from whom she ever received the tenderest marks of filial love. Canning, who had inherited a small estate in Ireland, was educated at Eton. In 1787 he was entered at Oxford. His vacations < were passed with Sheridan, by whom he was intro¬ duced to Burke, Fox and other distinguished Whigs. But although Sheridan had already an¬ nounced him in Parliament as the future

orna¬ ment of his party, Canning entered into terms with Pitt, by whom he was brought into Parlia¬ ment in 1793. During the first session he re¬ mained silent. In 1796 he was undersecretary for foreign affairs. In 1797 he projected, with some friends, the Anti-Jacobin, of which Gif¬ ford was appointed editor. Canning contri¬ buted many poetical and other articles to this periodical, the happiest of his efforts in this direction being the (Needy Knife-grinder. } In 1798 he supported Wilberforce's motion for the abolition of the slave-trade. In 1800 Canning increased his fortune and influence by a mar¬ riage with Joanna, daughter of General Scott, a lady of ample fortune. The adminis¬ tration being dissolved in 1801, Canning became a member of the opposition until the restoration of Pitt in 1804. In 1807 he was appointed Secretary of State for Foreign Affairs in the Portland adminis¬ tration. A political misunderstanding with Lord Castlereagh led to a duel between that minister and Canning, in which the latter was slightly wounded. This dispute occasioned the dissolution of the ministry. In 1810 he opposed

the reference of the Roman Catholic claims to the committee of the whole House, on the ground that no security or engagement had been offered by the Roman Catholics. Some of his most brilliant speeches were on this subject. The adoption of the measure being a matter of policy, the state of opinion, the condition of affairs, and the securities with which it should be accompanied, were with him elements of the question. He proposed securities in 1813, which, with the bill, were rejected. He supported in 1812 and 1813 the same motion which he had opposed in 1810. To Canning was principally owing the first blow which shook the throne of Napoleon: the British policy in Spain was directed and animated by him. In 1812 he was elected member for Liverpool, from which he was also returned in 1814, 1818, 1820. In 1814 he was appointed Ambassador Extraordinary to Portugal, and remained abroad about two years. In 1819 he declared his decided hostil¬ ity to parliamentary reform in whatever shape. On the occasion of the proceedings relative to Queen Caroline, the discarded wife of George IV, he declared that Howard the object of that investigation he felt an unaltered regard and affection® ; and soon after resigned the presi¬ dency of the board of control and went abroad. Having been nominated governor-general of India, he was on the point of embarking when the death of the Marquis of Londonderry called him to the Cabinet as Secretary for Foreign Affairs, 16 Sept. 1822. One of his earliest acts ki this situation was to check the French in¬ fluence in Spain, the French having sent an army into that country to put down the revo¬ lutionary party. By way of withdrawing the

Spanish-American colonies from French influ¬ ence he decided to recognize their independ¬ ence ; thus, as he afterward phrased it, ((calling the New World into existence to redress the balance of the Old.® He continued to support the propositions in favor of the Roman Cath¬ olics, and in 1825 communicated to foreign ministers the determination of the government to appoint charges d'affaires to Colombia, Mex¬ ico and Buenos Aires. In consequence of the attempts made by Spain to assist the malcon¬ tents of Portugal, it was immediately deter¬ mined by the ministry to support the regency in that country, and troops were sent to Lis¬ bon in January 1827. On 12 April 1827 his ap¬ pointment as Prime Minister was announced. His administration was terminated by his death, but not until it had been crowned by the Treaty of London (6 July), for the settlement of the affairs of Greece. As an orator Canning was showy and graceful, with a brilliant wit and caustic satire, though neither formed on a very masculine taste. During his career the leading domestic subjects on which the British Parlia¬ ment was called upon to legislate were the fol¬ lowing: the liberty of the press, the emancipa¬ tion of the Roman Catholics, the test and cor¬ poration acts, the corn-laws and reform in Parliament. Those of a foreign nature were, among others, the various overtures of peace between Britain and France, the settlement of Europe on the overthrow of Napoleon, the treatment of Italy by the Austrians, the Span¬ ish revolution and recognition of the South American republics. On all these questions, with one or two exceptions, he supported the high Tory side. The chief exceptions were

the emancipation of the Roman Catholics and the recognition of the South American repub¬ lics. He was also desirous of reforming the corn-laws. His speeches, edited by Thierry, were published in six volumes in 1830. Con¬ sult Stapleton, Political Life of Canning) (1831) ; Stapleton, (Canning and His Times) (1835) ; Temperley's (Life of Canning) (1905) ; Bagot, (George Canning and His Friends* (1909); Marriott, (George Canning and His Times* (1905) ; Lord Dalling, historical Characters) (1867). _

CANNING, Sir Samuel, English civil en¬ gineer: b. Wiltshire 1823; d. 24 Sept. 1908. He is best known in connection with the laying of the Atlantic cables, and those in the Medi¬ terranean and North seas. He was knighted in

1866.

CANNING, Stratford (1st Viscount Stratford de Redcliffe), English diplomatist, cousin of George Canning (q.v.) : b. London, 4 Nov. 1786; d. 14 Aug. 1880. His father, Strat¬ ford Canning, who had been disinherited owing to an imprudent marriage, and had gone into business as a merchant, died a few months after his son's birth, and in consequence young Strat¬ ford and his mother removed to Wanstead. He went to Eton, and in 1805 he was elected to a scholarship at King's College, Cambridge. Before graduating he was in 1807 appointed by his cousin, George Canning, then Foreign Sec¬ retary, to be his precis wrriter, and in the latter part of that year was sent as second secretary with a mission to Denmark. In the following year he accompanied as first secretary an im¬ portant mission to Constantinople, which re¬ sulted in the conclusion of a treaty of peace with the Porte on 5 Jan. 1809. In the summer of 1810 his chief, Sir Robert Adair, was trans¬ ferred to Vienna, and Canning temporarily suc¬ ceeded him as Ambassador at Constantinople. Before the arrival of Adair's successor, Can¬ ning made his reputation as a diplomatist by the masterly way in which he conducted the dif¬ ficult negotiations which led to the signing of the Treaty of Bucharest on 28 May 1812. This treaty put an end for the time to the war be¬ tween Russia and Turkey, and thus left Rus¬ sia free to resist the advance of Napoleon. Moreover, it firmly secured English predomi¬ nance at Constantinople, and was in this re¬ spect the first notable triumph in the tradi¬ tional British policy on the Eastern Question. In 1812 Canning returned to London, and after declining in 1813 the offer of the chief secre¬ taryship to Lord Aberdeen's Vienna mission, accepted in the following year the post of Envoy Extraordinary and Minister Plenipoten¬ tiary in Switzerland. He held this post till 1818, and was completely successful in his en¬ deavors to free Switzerland from French domi¬ nation and to erect it into a neutral federal republic. Shortly after his return he was ap¬ pointed Ambassador to the United States and he arrived at Washington in the autumn of 1820. He was again in London in 1823. The diplo¬ matic agreement arrived at in 1824 was, how¬ ever, thrown out by the United States Senate. After a brief but important mission to the Rus¬ sian capital he was again sent to Constanti¬ nople in October 1825 as Ambassador. In the following year he succeeded in

again patching lip a peace between Russia and Turkey, and

thus prepared the way for a joint representa¬ tion by England, France and Russia on behalf of insurgent Greece. Negotiations were, how¬ ever, abruptly broken off by the Sultan's indig¬ nation on learning of the battle of Navarino, and Canning was later in the same year en¬ gaged, along with the representatives of France and Russia, in drawing up proposals for estab¬ lishing a Greek kingdom. These were ulti¬ mately forced on the acceptance of Turkey in a more stringent form as part of the peace treaty which ended the Russo-Turkish War of 1828-29. In 1829 he resigned his position and returned to England, where he wras created G.C.B. He entered Parliament as member for Old Saruin, but he ultimately secured election for King's Lynn. In 1830 he drew up the Brit¬ ish case in the Saint Croix-Saint Lawrence boundary dispute with the United States for submission to the King of the Netherlands. After acting as special envoy to the Porte in 1831-32, and to Portugal in 1832-33, he was in 1841 appointed for the third time Ambassador at Constantinople. For a considerable period he was mainly engaged in assisting and encour¬ aging the Sultan, Abd-el-Mejid, in his policy of reform, but after a visit to England in 1852, during which he was raised to the peerage, his efforts had to be directed to thwarting Russian designs. His diplomatic triumph over Prince Mentchikoff caused the Tsar in a moment of irritation to precipitate the Crimean War. He resigned in 1858, and the remainder of his ca¬ reer was passed mainly in retirement. In addi¬ tion to a few volumes of poetry, he published works entitled (Why am I a Christian ?> (1873), and (The Greatest of Miracles) (1876). A se¬ lection of his articles on Eastern affairs was published in 1881 under the title of (The East¬ ern Question.), See (Life) by Stanley Lane-Poole (1888).

CANNING AND PRESERVING IN¬ DUSTRY. The hermetical sealing of food, generally termed "canning,® has long since passed the experimental stage and is now one of the leading industries of the country. The inventive genius of man has from the earliest times turned toward some method of prevent¬ ing articles of food from deteriorating, and toward some way of preserving food so that it will be palatable at some future time. "Desicca¬ tion® or drying was probably the first method used, but the food thus preserved lost its natural flavor and became tough in texture. Prior to 1750 this method of drying, and that of using salt and sugar, were the only methods in use for preserving food. From 1809-10 a French¬ man, Nicholas Appert (b. 1750; d. 1841), evolved a plan for hermetically sealing foods for use at sea, and his process was purchased by the French

government, which gave it to manufacturing firms in France and England for use in producing canned goods. Appert described his invention as an inexpensive and simple method of preserving various sorts of animal and vegetable food in perfect condition for an indefinite period. He gave the world one of the principles involved in the art of canning, and since his time there have been several new principles discovered equally as important as his sterilizing process, which did not take in the prevention of souring prior to sterilization. There have also been other im-506

provements in machinery especially adapted to the principles involved, whereby cost has been enormously reduced, so that food preserved in tins is within reach of all classes of consumers. He was later awarded a prize of 12,000 francs by Napoleon, but spent most of this money for further experiment and died when over 90 years of age, after having seen his process thoroughly tested and put into operation.

In 1810 the English government granted a patent to Peter Durand for the preservation of fruits, vegetables and fish in hermetically sealed cans, made of tin, glass or other fit material. He made no claims to the discovery of the process, and it was stated at the time that he received his information in regard to it from a ˆforeigner residing abroad.® The methods, despite the secrecy in their use, gradually be¬ came known, and in the course of time came to America. It is believed that a man by the name of Ezra Daggett was the first to put the prac¬ tice of canning goods into actual use in this country, in the years from 1815 to 1818. He with his son-in-law, Thomas Kensett, began to manufacture hermetically sealed goods, on a large scale in the year 1819, and the principal foods thus packed were salmon, lobsters and oysters. A patent was granted them in 1825 on the use of the tin can, or <(case)) as it was then called, and they immediately started the use of this process in their factory. Glass jars were then very little in use, because of their costli¬ ness, bulk and inability to withstand the ex¬ tremes of temperature.

In 1820 William Underwood and Charles Mitchel combined, in Boston, for the purpose of manufacturing foods in hermetically sealed cans. The principal business engaged in during the early days of the

combination was the prep-eration of pickles, jams, jellies, sauces and mus¬ tard; but they also put up quinces, cranberries, currants, *etc.* About the same time, Allen Tay¬ lor and M. Fallagher, who had learned their trade in Ireland, came to this country and were for some time employed in New York. They with Kensett did much to put the industry on a permanent basis. In 1839 William Under¬ wood began to substitute tin for glass, though it was a number of years before the jar and bottle gave way entirely to the ((tin can.® The methods of can-making were for many years very slow and primitive. A tinker who could turn out 60 cans a day was a master workman, for every can was made by hand. The body for each had to be measured, marked and cut out from the plate by hand shears, and, to make the seam or lap secure and air-tight, it was thought necessary to pile on the solder until a ridge an eighth of an inch thick was built up from end to end. It was also a slow and difficult operation to make the covers and bottoms. Each one had first to be drawn on the tin with compasses and then cut out with the shears, and finally, with a mallet, the edges struck up or bent, over an upright piece of iron called ((a heading stake.® The tops and bot¬ toms, like the seams, were soldered on with a heavy beading of metal, and enough solder was used on one can to make a dozen of to-day's manufacture.

So was born the tin can that now is scat¬ tered in every direction, along the paths of travel and progress ; but, strange enough, this growing infant had, in its younger days,

another name, one which more became its in¬ fantile and clumsy form — ((The Tin Canister.®

In all the correspondence for the next 10 or 15 years, cans or canned goods never seem to be mentioned. They were always spoken of as hermetically sealed goods in canisters or tin cases. In the salesbook or <(Waste,® as it was then called, canisters were abbreviated thus, <(Cans,® and probably by such abbreviations, tin packages for food came ultimately to be known as cans.

The stamp-can was invented in 1847 by Allen Taylor and was a decided improvement over any previously made. Two years later, 1849, Henry Evans, Jr., of New Jersey, brought forth the ˆpendulum" press for making can tops, and so the improvement in the manufacture of cans has gone on till now we have the key-opened can, the invention of a Mr. Zimmerman. While the manufacture of cans has become a distinct industry and not now generally connected with the

canning industry, nearly 10 per cent of those now in use are made by the canning es¬ tablishments. These cans are made from sheets of tinned steel, 14x20 inches in size and weighing about one pound. The objection to tin cans as containing poisonous acid or in¬ jurious substances has caused the methods of manufacture to be carefully scrutinized, so that now all cans are subjected to an acid prepara¬ tion for removing dirt, grease, etc., and then coated with pure tin by the acid process or palm-oil process, the latter of which is consid¬ ered the safer.

In the methods of cooking there have been many improvements, the slowness and low tem¬ perature of 212° F. allowable in the Appert process being gradually raised by the use of chloride of calcium, till now a temperature of 250° F. is possible, although this process is more expensive, as the cans become discolored and have to be cleaned before they can be put on the market. The <(closed-kettle® process of cooking goods by means of superheating water with steam was invented by A. K. Shriver of Baltimore, and about the same time, the in¬ vention of the patent-process kettle, securing similar results by the use of dry steam, was brought out by John Fisher of the same city. One of the modern systems for sterilization is the Continuous Calcium Process System, pat¬ ented by the Sprague Canning Machinery Com¬ pany of Chicago. Another is the Continuous Process System in oil, used by the packers of-canned meats. Another is the Polk Agitating System, patented by Ralph Polk, of Greenwood, Ind. By this system the time of sterilization is materially shortened.

The canning industry, although established in the United States as early as 1825, did not become of much importance until the middle of the century, but from 1850 came to the front by leaps and bounds. In 1889 the products of the industry were valued at $46,600,000; in 1899 at $99,335,000; in 1904 at $130,466,000; in 1909 at $162,000,000; and in 1914 at $235,000,000. This last tremendous increase appears to be partly fictitious, owing to the fact that more foods are now reported by the census under the heading of ˆcanning.® For instance, condensed evaporated milk totaled $58,747,000 in 1914, or nearly one-sixth the entire production.

Many unaccountable losses were met with, when in certain years the canned goods would

not all keep. Numerous theories were experi¬ mented with, in vain efforts to learn the cause of these mysterious deteriorations.

In some cases it seemed certain that spoiling was caused by freezing. Some salmon had been stored in a warehouse, which, during the winter, had not been constantly heated. Many cans of this lot spoiled; so the freezing theory was accepted and held good, until some other cans from the same packing spoiled, which could not possibly have frozen. To explain this new phase of the situation, another theory had to be concocted.

In searching for the probable origin of these mysterious losses, the real cause was not suspected. The exclusion of air was thought to be one of the most important factors in keep¬ ing th-e goods, and, until recently, this opinion has prevailed.

The researches in bacteriology in 1895-99 at the Massachusetts Institute of Technology brought out the fact that in some cases the spoilage of canned goods was due to imperfect sterilization through lack of sufficient heat to destroy all bacteria. This, however, accounted for only a small per cent of the spoilage cases. There are several other causes which have been brought out by the research work of Edward W. Duckwall, M.S., in the Sprague Canners' Laboratory, an institution which was founded in August 1903 by Mr. Daniel G. Trench of Chicago. (The name of this laboratory has since been changed to the National Canners' Laboratory). It was discovered that a large per cent of what is known as <(sour® corn and peas was due, not to insufficient sterilization, but to souring which had been accomplished by bacteria in the raw product prior to the steriliz¬ ing process. It was also discovered that some of the spoilage was due to the evolution of carbonic acid gas from the seeds of certain fruits and vegetables. The germ life of the seeds was not destroyed by the heat, and car¬ bonic acid was liberated when the seeds sprouted in the cans. Gradually all obsta¬ cles are being overcome ; new processes have been invented, the purity of the canned article has been proved by expert chemists and the manufacture has become general in every part of the United States where fruits or vegetables are grown or where the supply of fish and oys¬ ters is nearby.

The installation of labor-saving machinery, the remarkable growth in the number of firms, the decline in the market value of the goods, made necessary uniform grades and rates of sale throughout the country. In October 1872 the first organization of canned goods packers met in Philadelphia, but this was only short¬ lived, and it was not until February 1883 that a permanent exchange was established. The (<Canned Goods Exchange® of Baltimore was at that time organized, with the intention of hav¬ ing sales on the floor daily, but after a thorough trial they abandoned that plan and adopted grades for goods, and rules and terms govern¬ ing transactions. These exchanges began rap¬ idly to come into existence. In 1885, the ˆWestern Canned Goods Packers' Association® was formed, composed of those doing business in the Mississippi Valley. In the same year the New York State packers organized, and two years later those of New Jersey and Virginia. In May' 1889 the National Association was

formed at Indianapolis, followed by the <(Peninsula Packers' Association® of Delaware, formed in 1894, and the "Atlantic States Canned Goods Packers' Association® of Baltimore, organized in the fall of the same year.

1 he localization in the canning industry is principally due to climatic conditions. California has forged ahead and monopolized one-fourth of the industry, New York producing over 10 per cent and Maryland iy2 per cent, in 1914. Thus we have Illinois, Maine, Iowa, New York, Ohio and Maryland as the principal corn-pack¬ ing States ; Maryland, New Jersey, Delaware, Indiana, Virginia and California as the tomato¬ canning States; while Wisconsin, New York, Illinois and Ohio produce the largest amount of canned milk ; Maine is the principal packer of sardines, while Washington and Oregon monopolize the salmon canneries. Peaches are principally canned in California, Maryland, Michigan and Georgia; New York, Michigan, Maryland, California and Maine put up the major portion of the apples packed, though the industry is carried on to some extent in Washington and Oregon. Pears are packed mainly in California, New York and Mary¬ land, while pineapples are almost wholly packed in Baltimore, Md. Beans are canned mainly in Indiana, New York, Maryland and Illinois; peas in Wisconsin and New York; prunes and raisins are dried almost wholly in California; nearly all the salt fish is packed in Massachusetts.

For general purposes of comparison, the canning and preserving industry may be divided on the lines of the United States census statistics into four distinct classes : Fruits and vegetables; fish, both

canned smoked and dried ; oysters and clams ; and pickles, preserves, jellies and sauces; and un¬ der these headings the industry may be more comprehensively discussed. The canning and preserving of fruits and vegetables gives em¬ ployment to over 50,000 persons; that of fish to 9,000; and that of oysters, etc., to over 2,000.

Fruits and Vegetables.— Fruits were the first foods to be successfully canned, as the low temperature used in the early methods was more easily applied to this class of goods because less heat is required to preserve them than all others. Glass bottles were filled up to the neck, loosely corked, and then placed in tepid water, the temperature of which was gradually raised from 170° to 190° F., re¬ maining there for a period varying from 30 to 60 minutes according to the article being preserved. In 1823 Pierre Antoine Angilbert made an improvement on this method by placing the fruit in a tin can containing water, then placing on the cover in which there was an aperture to allow for gas escape. It was then placed in water and heat applied; after boiling a sufficient length of time, the aperture was closed by a drop of solder.

Not much is known of this branch of the canning industry between the years 1820-45, and it probably was not very extensive, and it is certain that tomatoes and corn were not put up to any great extent during those years. It appears from a narrative presented bv William Lyman Underwood that his grandfather, Wil¬ liam, began to use the Appert process about 1820, and exported preserved goods to Manila in 1821. In 1830 he packed pie fruit in bottles,

and in 1830 imported tomato seed. His son, William J., has a label used in 1845 on “her¬ metically sealed tomatoes,® and which contains the following : “This is prepared by straining the skins and seeds from the tomatoes, evap¬ orating the particles by slow heat. The bottles contain the substance of about two dozen tomatoes, and it will keep good any length of time.® The style of the label is in marked contrast to those now in use. In 1847 Harrison W. Crosby, when he was steward of Lafayette College, at Easton, Pa., first used tin cans to seal tomatoes hermetically, and in 1893 the canning of corn was begun by two firms, one in Baltimore, Md., and one in Portland, Me. The establishment in Portland gained little headway until 1852, in which year Isaac Wins¬ low, who was in charge, applied for a patent on his process, but which was not granted him until 8 April 1862. His method was sub¬ stantially the same as the Appert process, with the exception that the first cooking was done away with by the introduction of “cookers,® which are steam retorts used to cook the corn before placing it in the can. Prior to 1846 numerous canneries were in operation in New York, Boston, Baltimore, Portland and Eastport, Me., and in Newark, N. J., and it was in the latter place that the fruits and vegetables were prepared for Kane’s Arctic Expedition.

In 1860 factories began to spring up in all the great fruit and vegetable raising sections of the country. The Middle West loomed up as a manufacturing centre. Thomas Duckwall erected the first canning factory in Claremont County near Cincinnati, and Albert Fisher fol¬ lowed at Cincinnati. A few years later a can¬ nery was started at Circleville, Ohio, and at Indianapolis, Ind. From that time up until 1880 factories sprang up all over the Middle States like mushrooms.

California then began to be heard of, and rapidly came to the front as a producer of canned fruits, now being in the lead in the pre¬ serving and canning of small fruits, such as the plum, pear, peach and cherry, and such vegetables as asparagus, tomatoes and peas. The dried fruit industry, in which prunes and raisins lead, and which has reached its fullest development in California now exceeds in volume the

production of canned fruit.

The canning of fruits and vegetables has grown more rapidly in the last 30 years than any other branch of the industry, due to the greater territory in which it may be carried on and to the unlimited cultivation of these articles. The canned vegetable branch of the industrv yielded products of $29,000,000 in 1899, $53,000,000 in 1909, and $84,000,000 in 1914. The dried fruit production of 1909 was $22,000,000, and about $35,000,000 in 1914.

The tomato has proved the most popular of canned vegetables, and the manufacture in 1909 was valued at $18,747,000, rising to $25,-532,000 in 1914. Corn and peas represented a value of about $15,000,000 each, and beans $16,- 500,000. Of fruits, peaches now lead, apples having fallen into fifth place. Of dried fruits, raisins and prunes are far in the lead. In 1915 leading canneries contracted for the largest acreage recorded to that date — 190,106 for sweet corn, 140,000 for tomatoes and 102,000 for peas, this last figure being a reduction from the 1914 acreage, contracted for, of 126,000.

Fish. — All the known processes are used in the preservation of fish, which of all foods is the most rapid to putrefy. Smoking and drying are the older methods, and they are still in use. The Hollanders put up fish in cans long before the Soddington and Appert methods were known. About 1845, sardine canning was successfully established on the coast of France. Prior to 1843 the canning of fish in the United States was little known, but in that year lobster and mackerel canneries were successfully established at Eastport, Me., and the business grew rapidly till 1860, when the supply of lobsters decreased and the preju¬ dice against the canneries resulted in the enact¬ ment of strict laws restricting the time of operation of canneries and the canning of short lobsters, so that in 1895 the last factory so engaged suspended, and in 1900 there were no lobsters canned. Mr. Underwood established the first lobster-packing factory in this country at Harpswell, Me., in 1848, and in 1853 started a factory for packing salmon at Bathhurst, N. B., at one time the only source of supply. Quantities of this fish were sent to California prior to salmon being taken from the Columbia River. He died in 1864, and was succeeded by the firm of William Underwood Company, of which his grandson, H. O. Underwood, is president. Prior to 1864 salmon-canning was carried on to a small extent, but after that year the industry grew rapidly; factories were established on the Pacific Coast at Washing¬ ton, Cal., on the Sacramento River, and in 1866 on the Columbia

River. Perhaps the most striking illustration of the growth of this busi¬ ness is in that almost universally used article, canned salmon. In 1864 the firm of Hapgood, Hume & Company, consisting of William Hume, G. W. Hume and A. S. Hapgood, canned a few cases of salmon on the Sacra¬ mento River, where William Hume had been a hunter and fisherman for several years. William Hume carried the samples around to introduce them, using a basket for that pur¬ pose, from which the salmon were sold. In 1866 the business was transferred to Eagle Cliff, Wash., on the Columbia River, where William Hume had been prospecting the year before, and there (in 1866) the first Columbia River Royal Chinook salmon were packed, thus introducing to the trade what is unques¬ tionably the finest food-fish known. That year they packed about 4,000 cases of 48 1-pound cans each, or 192,000 cans. Most of this was shipped to Australia, selling at about $4 in gold (which was at a heavy premium at that time), and a small amount was shipped to New York, around Cape Horn, bringing $5 per dozen there at wholesale. In 1883 there were in Alaska 5 canneries, which in six years increased to 37 with an output of 714,196 cases.

Next in importance comes the sardine can¬ ning of Maine, which did not come to a point of success until 1875, and this branch of the business outranked all others. The process of putting up fish is extensive and complicated, and since the beginning of the industry many changes have been made, more especially in the time allowed for _ cooking, softening the bones of the fish, and in filling, capping, label¬ ing and boxing the same. Up to 1880 the business done in this line was very small, but gradually grew after that, and the establish-

merits at Eastport, Robinson, Lubec, Jones-port, East Lamoine and Camden, all in Maine, are now thriving.

Besides the fishes named, smelt, sturgeon, menhaden, halibut, Spanish mackerel, eels and herring are put up in large quantities. The canning of fish is generally divided into five classes: (1) Those plain boiled or steamed, which include salmon, mackerel, halibut, lob¬ sters, etc.; (2) those preserved in oil, of which sardines constitute the major portion;

(3) those preserved with vinegar, sauces, spices, etc., among which are herring, eels and sturgeon ;

(4) those cooked with vegetables, namely, fish chowder, clam chowder and codfish balls;

(5) those preserved by any o.ther process, such as smoking and salting, and which are put into cans for convenience. Smoking and salting of fish is principally confined to the Eastern States lying along the Atlantic Coast, although the industry is carried on to some extent in the Pacific States.

In 1855 one-pound lobsters sold at $2.75 and salmon at $4 a dozen. No one believed him when William J. Underˆvood made a predic¬ tion that the prices of salmon and lobsters would cross each other during his generation, the lobster tending upward and the salmon dropping down, a situation which has come about even earlier than he anticipated.

The canned fish production of 1909 was $14,500,000 ; smoked fish $3,000,000, and salt fish $7,000,000. In 1914 the total canned fish production rose to $19,000,000 ; smoked fish fell off to $2,760,000 and salt fish increased to over

$8,000,000.

Oysters and Clams. — The oyster is a lamellibranch or bivalve mollusk of the genus Ostrcea, the most important in commercial value to be found in American waters being Ostrcea virginiana, which are generally found attached to some solid substance in the brackish waters at the mouth of rivers or in the shallow waters along the seacoast, the depths of the water in which they lie varying from 15 to 180 feet, according to temperature. The principal and most productive beds in which they were found in the early history of the industry were in Chesapeake Bay, Cape Cod and Long Island Sound, but the constant fishing up to 1860 soon, depleted these, and the supply in the public beds along the coast of Connecticut, New York, New Jersey and Dela¬ ware would have been exhausted long ago but for the systematic breeding and cultivation of this succulent bivalve. Maryland, Louisiana, California, Mississippi and South Carolina are now the chief sources of supply.-

The canning of oysters has grown simul¬ taneously with the canning of fish, and the two were generally carried on, in the early days of the

industry, under the same roof. Thomas Kensett was probably the pioneer of oyster canning, and commenced operations in Balti¬ more as early as 1820, later being followed by others, but it was not until 1850 that the in¬ dustry was put on a permanent basis. Origi¬ nally, the oysters were opened by hand, but Louis McMurray, of Baltimore, introduced, in 1858, a new method, that of scalding the oysters before removing the shells, and this method made the removal of the oyster from the shell much easier. Two years later steam¬ ing took the place of McMurray's method, and

this process consisted of placing the oysters in baskets having a capacity of three pecks or more, and then putting these baskets into a box through wrhich steam was passed. In 1862 Henry Evans introduced the method of ((shucking,w his process being as follows : The oysters were placed in cars of iron framework, six to eight feet long, which held about 20 bushels of unshucked oysters; the cars were then run on a track from the wharf to an air-tight and steam-tight box; after steaming for about 15 minutes, the cars were run into the shucking shed and opened; after shucking they were washed in cold water, packed in air¬ tight cans, hermetically sealed and weighed; the cars were then run on a track to a steamer and treated to a sufficient degree to kill all germs of fermentation, and then cooled off in a vat of cold water. The total cost of handling a bushel of oysters by this method was estimated at 29 cents. In canning the variety of oysters found in the Gulf of Mexico, the following process was introduced in 1880 by William T. J. Mayburg: eTo 10 gallons of pure water add one-ihalf gallon of good com¬ mercial vinegar and one-tenth gill of a sat¬ urated aqueous solution of salicylic acid, to which mixture sufficient common salt is added to impart the requisite salty flavor to the oyster. The mixture is boiled a few minutes and poured over the oysters in the cans, which are at once sealed and placed in a steam bath, the temperature of which is 202° F. This temperature is gradually raised to 240°, and maintained at that degree for about 40 minutes. The cans are then vented, resealed and steamed as before for about 30 minutes, after which they are ready to be labeled and packed.ˆ

It seems rather extraordinary, but in 1850 oysters were packed in Boston, which found a ready sale in direct competition with Baltimore goods, and for a number of years there was considerable rivalry between the two markets. The oysters were brought from the coasts of New Brunswick and Prince Edward Island, and were said to have a finer flavor and to keep much better than those from the warmer waters of the South. They were packed in one-and two-pound

canisters, and large sales were made in Saint Louis at $4 and $7.50 per dozen. The canned oyster production of 1909 was valued at $2,443,000, and clams at $402,000. In 1914 the figures increased to $2,677,000, and

$670,000.

Pickles, Preserves, Jellies and Sauces. —

This important branch of the industry is of more recent development. It can hardly be called canning because most of it is put up in glass. The methods of cooking and pre¬ serving are very similar. The trade consists mainly of branded goods whose sale is created and maintained largely by advertising. The brands are put up attractively, trade marks are used to protect them, and notwithstanding criticisms of pure food agitators, they have moved steadily forward in popular favor. The goods packed in glass are more liable to con¬ tact with the air, and therefore the manufac¬ turers have depended more on artificial pre¬ servatives, of which benzoate of soda is the most common. The difficulties of making the goods keep and of avoiding harmful preserva¬ tives seems to have been met successfully, as shown by the vast sale. In 1909 the total for

pickles, preserves, jellies and sauces was $48,500,000, and in 1914 the estimated figure was $66,000,000 worth.

Canning Tools and Processes. — In 1876, at the Centennial Exposition in Philadelphia, the Ferracute Machine Company, of Bridge-ton, N. J., displayed a collection of tools for making cans and canners' goods, and imme¬ diately thereafter secured large sales. To Oberlin Smith, president of the concern, and also for a time president of the American Society of Mechanical Engineers, must be given a great deal of the credit for supplying canneries with simple and inexpensive machin¬ ery. A line of presses was marketed for stamping out the tops and

parts of cans of all sizes; gasoline firepots were made for heat¬ ing the capping steels and tinning-coppers, or tools for closing the cans. These firepots were provided with air-pumps for driving air into the gasoline tanks and thus forcing out the oil, which was vaporized by the heat and burned as a gas under the pot. These pots for heating the soldering tools are designed to stand on the capping-tables where the tops of the cans are soldered. Among special machines made for the canner are hulling machines with a capacity of 1,000 bushels of peas in 10 hours, and rotary separators that grade the peas into sizes at about two-thirds this speed. There are also pea-sieves for sort¬ ing peas in small quantities, and pea-blanchers for scalding and blanching peas. There are corn-cutters on the market with a capacity of 4,000 ears an hour, and corn-silking machines for removing the silk and refuse from the corn. Many automatic can-filling machines will handle 1,200 cans an hour. There is a great variety of machines for handling the different fruits and vegetables, as well as numerous parers, graters, corers and seeders.

In canning fruit, steam-boilers are necessary to supply the various tanks and kettles, which are used in washing and scalding. Baskets of heavy galvanized wire are used for handling tomatoes and various fruits when dipping into the scalding kettles. For steaiTHCooking a common method is to fill a large wire tray with filled cans which have been capped but not wholly closed, a vent being left for the escape of air and steam. Immediately after cooking, while yet hot, this vent is sealed with a drop of solder, so that the destructive germ has no chance to enter. Salmon is cooked and sealed afterward in the same manner.

Statistics. — California is now the leading State in the canning and preserving industry. Her production increased 120 per cent in the decade ending in 1909, in which latter year over $33,000,000 worth of goods, mostly canned fruits, were placed to her credit, this being 20 per cent of the country's total. New York was the second State, with $19,000,000 pro¬ duction, and Maryland has fallen to third place with $14,700,000. Washington advanced from 13th to fourth rank with a production of $9,600,000, a gain of 88 per cent; Pennsyl¬ vania continued the normal output of $9,500,- 000; Indiana developed wonderfully, showing $8,758,000, a gain of 158 per cent. The other States of large production are Maine, Illinois, Massachusetts, Michigan, Wisconsin, Ohio and New Jersey. Of these, Wisconsin is making the most rapid progress, showing an advance

of 253 per cent in the census period. There is really only one State that shows a consider¬ able falling off in canning, Mississippi, where the fish and oyster industry has decayed.

The average number of people employed in canning and preserving in the United States is 72,000, but this is a very variable figure, because canning is largely a seasonal business. Only 20,000 people find employment in Janu¬ ary, while the demand from July to October runs from 100,000 to 155,000, September being the busiest month. Nearly one-half of the employees are women and children, but the proportion of men increases, and the disposi¬ tion to employ children diminishes.

A total of $119,000,000 capital is invested in the industry; the earnings are nominally $235,- 000,000, but subtracting the cost of the ma¬ terials, the real income being the value added by manufacture, gives about $85,000,000 as the real measure of the industry annually.

Charles H. Cochrane, Author i Modern Industrial Progress P

CANNIZZARO, kan-ne-tsa'ro Stanislao, Italian chemist: b. Palermo, 16 July 1826; d. 1910. He studied medicine at Palermo, and chemistry at Pisa. In 1848 he was a member of the Sicilian Parliament and had part in the revolution in Sicily. In 1852 he became pro¬ fessor of chemistry in Alessandria ; in 1857 in Genoa; in 1860 in Palermo; and in 1870 in Rome. He emphasized by clear definition the difference between atomic and molecular weights, and was one of the most influential in establishing Avogadro's law as a maxim of chemical science. He also discovered benzvl-alcohol and cyanamide. He wrote (Sunto di un Corso di Filisofia Chemica, e Nota Sulle Condensazioni di Vapore) (1880) ; (Relazione Sulle Analisi di alcune Acque potabilP (1882) ; and (Abriss eines Lehrganges der theoretis-chen Chemie,* which appeared in Ostwald's (Klassiker der exakten WissenschaftenP

CANNOCK, England, an urban district and parish in West Staffordshire, eight miles north-northwest of Walsall, in the district known as Cannock Chase, which is rich in coal and ironstone. Manufactures of boilers, edge-tools, bricks and tiles are carried on, and there are numerous collieries. Pop. (1911) 28,586.

CANNON, Annie Jump, American astron¬ omer : b. Dover, Del., 11 Dec. 1863. A student at Wellesley College, she was engaged in 1897 as staff assistant in Harvard College observa¬ tory and in 1911 became curator of astronom¬ ical photographs. During her photographic work she discovered three new stars, one spectroscopic binary and 150

variable stars, and completed a voluminous bibliography of variable stars with 45,000 references. She also wrote (Second Catalogue of Variable Stars* (1907) ; (Maxima and Minima of Variable Stars of Long Period) (1909); and (William Paton Fleming* (1911).

CANNON, Frank Jenne, American politi¬ cian, son of George Q. Cannon (q.v.) : b. Salt Lake City, Utah, 25 Jan. 1859. He was grad¬ uated from the University of Utah in 1878, and in the same year engaged in the printing busi¬ ness, acquiring interests also in western mining enterprises. He was a delegate to the Republi¬ can National Convention in 1892 and 1896, and a delegate to Congress from the Territory of

Utah in 1895. In 1896, against the wishes of the Mormon leaders, he became candidate for and was elected to the United States Senate, serving until 1899. As a result of political differences, he separated himself from the Mormon Church and, joining the Democratic party in 1900, was State chairman from 1902 to 1904. He became managing editor of the Rocky Mountain News and contributed articles on political subjects to magazines. He has published (Under the Prophet in Utah,* with Harvey J. O'Higgins (1911), and (Brigham Young and the Mormon Empire* (1913). Both works are exposes of conditions in Utah under the Mormon domination.

CANNON, George Quale, American poli¬ tician : b. Liverpool, England, 11 Jan. 1827 ; d. Monterey, Cal., 12 April 1901. He went with his parents to Nauvoo, Ill., in 1844, and was one of the earliest settlers in Salt Lake City. He was a member of the legislative council of Utah in 1865-66 and 1869-72, and was a delegate to Congress from 1872 to 1881, where he was seated only after a long fight against him on the ground that he was a polygamist. At a Constitutional Convention at Salt Lake City in 1872 he was chosen to present the con¬ stitution and memorial to Congress for the admission of the Territory into the Union as a State. He translated the (Book of Mormon) into the Hawaiian language. He held various positions of importance in the Church, includ¬ ing that of first councillor after

1880, and wrote a number of pamphlets in support of Mormonism, and a biographv of Joseph Smith (1888). His son, Prank J. Cannon, was elected one of the first two United States senators from Utah in 1896.

CANNON, Henry White, American bank president : b. Delhi, N. Y., 27 Sept. 1850. He was educated at Delaware Academy in his na¬ tive town and engaged in banking. He was comptroller of the currency, 1884-85, and was a member of the International Monetary Con¬ ference at Brussels in 1892. He is a director of several important railroads and of the Man¬ hattan Trust Company, and was president of the Chase National Bank in New York, 1886-1904. He is vice-president and director of the United States Guarantee Company, and of the Brooklyn Union Gas Company.

CANNON, James Graham, American financier, brother of Henry White Cannon (q.v.): b. Delhi, N. Y., 1858; d. 5 July 1916. Besides being director in several banks and in¬ fluential corporations, he was for some time president and director of the Fourth National Bank of New York. He is author of the standard work (Clearing Houses; Their His¬ tory, Methods and Administration) (New York 1908), and of an address (Clearing Houses and Currency) (1913).

CANNON, Joseph Gurney, American politician: b. Guilford, N. C., 7 May 1836. Admitted to the Illinois bar, he was State's attorney of Vermillion County, 1861—68. He was a member of Congress from 1873 to 1891, and again, 1893-1903. He was 20 years on the Committee on Appropriations, and its chairman in the 55th and 56th Congresses. .He was speaker of the House of Representatives in the 59th and many succeeding Congresses. His autocratic power was greatly limited by

the House resolution of 19 March 1910, en¬ larging the Committee on Rules and taking its appointment from the speaker and giving it to the House. In 1911 Champ Clark, Demo¬ crat, succeeded him as speaker, and in 1912, he failed of re-election as representative but was elected from the 18th Illinois District to the 64th Congress (1915-17). He was a leader of the reactionary branch of the Republican party, to whose methods the downfall of the party in 1912 was generally attributed.

CANNON, William Austin, American botanist : b. Washington, Mich., 23 Sept. 1870. He studied at the University of Michigan and at Columbia University and from 1903-05 was resident investigator at

the Desert Laboratory. He became staff member in 1905, and 1911-12, was acting director of the department of botan¬ ical research of the Carnegie Institution. He is author of (Studies in Plant Hybrids) (1903); ‘Studies in Heredity as Illustrated by the Trichomes of Species and Hybrids of Juglans, CEnothera, Papaver and Solanum) (1909) ; ‘Root Habits of Desert Plants> (1911) ; ‘Botanical Peatures of the Algerian Sahara* (1913).

CANNON. See Ordnance.

CANNON-BALL TREE, a large tree (Couroupita guianensis) of the family Lecy-thidacecc, a native of Guiana, with a hard, woody, globular fruit six or eight inches in diameter ; — whence the popular name of the tree. It has large white or rose-colored flowers growing in clusters on the stem and branches. The pulp of the fruit is pleasant to eat when fresh.

CANNSTADT, kan’stat, CANNSTATT, or KANSTATT, Germany, town in Wurtern-berg, in a beautiful and fertile district on the Neckar, two miles northeast of Stuttgart with which it was incorporated in 1905. Its antiq¬ uity is proved by the Roman remains found. It has celebrated and much-frequented mineral springs. The Neckar is here crossed by three bridges. The newer portion of the town is well built, with handsome streets and pleasant recreation grounds. Overlooking the Neckar, near by, is the castle of Wilhelma. Of late years Cannstadt has entered to a considerable extent into industrial pursuits, and has rail¬ way shops, and flourishing manufactures of machinery, cooking utensils, woolen goods, fur¬ niture, electrical supplies, *etc.* It suffered much during the Thirty Years’ War and through the repeated invasions of the Prench. It was the scene of the victory of the French under Moreau over the Austrians under Arch¬ duke Charles, 21 July 1796. Pop. 26,497. Con¬ sult Beck, ‘Cannstatt and the New Neckar Bridge* (Cannstatt 1893).

CANO, ka’no, Alonzo, Spanish painter, sculptor and architect : b. Granada, 19 March 1601; d. 5 Oct. 1667. When quite young he went to Seville, where he studied both nainting and architecture, and at Madrid in 1637 he be¬ came intimate with Velasquez who helped him in many ways, among others by introducing him at court where he became a court painter in 1639. He was forced to leave Madrid in 1644 because he was suspected of having mur¬ dered his wife; and he went to Valencia. He returned to Madrid and was there subjected

to the rack. But his innocence being proved he went to Granada where he spent the rest of his life and where he was made a canon, and chief architect of the cathedral, to which he devoted much of his attention, carving statues and painting pictures for it. He became so distinguished in each of these arts that his countrymen called him the Michelangelo of Spain, although the title is due more to his versatility than to any resemblance in points of genius to the great Florentine. His Con¬ ception of the Virgin,* in the church of San Diego, at Granada, is considered his master¬ piece. His works in sculpture and architec¬ ture are numerous. Among the best of these works are his series of pictures (The Seven Joys of the Virgin,* his busts of Adam and Eve and his various statuettes of the Virgin. In carefulness of design and in the execution of his work Cano ranks high ; but in the mas¬ tery of coloring he is inferior to the really great artists of his day. His contemporaries ranked him with Velasquez, but time has not sustained this verdict.

CANO, Juan Sebastian del, Spanish navi¬ gator: b. Guetaria, about 1460; d. on the Pacific, 4 Aug. 1526. He was one of the first to circumnavigate the globe (1522), as captain of one of Magellan's fleet, which he after¬ ward commanded. In 1525 he was placed second in command of a similar expedition and became its commander by the death of Loaisa.

CANO, Melchior, Spanish theologian: b. Tarancon 1523; d. Toledo, 30 Sept. 1560. He was a member of the Dominican order and an opponent of the Jesuits. He was professor of theology at the universities of Alcantara and Salamanca, and was made bishop of the Canaries, but did not live in his see. He wrote (De Locis Theologicis* ((On the Source of Theological Knowledge* 1563) and many other theological works. He was sent as the representative of the Crown to the Council of Trent in 1551 to maintain the court theological traditions. His complete works were published at Padua in 1720.

CANOE, ka-noo', a light boat designed for propulsion with a paddle or paddles. The term is very commonly used to designate the small vessels used by uncivilized people living near the water. The name is

of West Indian origin, the Carib word being canaoa. Canoes are built in divers forms and of various materials. The primitive canoes were light frames of wood over which skins or barks of trees were stretched. The most common form was the hollowed tree-trunk ; the excavation, before the advent of adequate cutting-tools, being accomplished by means of fire. This form is of wide distribution, being found in Africa, South and Central America, China and the islands of the south Pacific and Indian oceans. In the form known as a (<dugout** it is com¬ mon in the United States. Among the island races of the Pacific the stability of the canoe is largely increased by the adoption of an outrigger, which, of varying forms, prevents capsizing on the one side by its weight and leverage, and on the other by its buoyancy. Many of these islanders sew planks together to form their canoes, making the joints water¬ tight by means of gums, *etc.* Others use

double canoes united by a strong platform. Such a vessel is capable of carrying a num¬ ber of persons and a considerable lading. In South America, where large trees are abundant, very large canoes are constructed. The same is true of Africa, where the war-canoes of the native kings carry very large crews. They are often fantastically carved and ornamented.

As stated above, the propelling force of the canoe is usually the paddle, but sails are often used, particularly on sea-going craft.

The Esquimaux canoe is known as a kayak. This consists of a light wooden or bone frame covered with seal-skins sewed together with sinews. The skin covering extends across the top, forming a water-tight deck with but one opening amidships to admit the boatman. A hoop is fitted to this opening, and after the boatman has entered he fastens himself in by means of an apron so that the whole boat is water-tight, and he becomes, as it were, part of the craft. So intimate is this union, and so skilful are the Esquimaux in the manage¬ ment of their kayaks, that the boatman can with a twist of his paddle capsize the craft and turn completely around under water, coming up again on the opposite side to that he went over. The paddle is about 10 feet long and double-bladed. The oomiak, or women's boat, is also made of seal-skins sewed over a frame¬ work ; but it is of large, even clumsy build, and but for its propulsion by paddles might be classed as a boat rather than as a cgnoe. It is designed as a transport for women, children and household goods rather than for the chase, for which the kayak is principally used.

The Aleuts build large skin boats, somewhat resembling the Esquimaux oomiak, which are propelled by paddles. Such a boat is known as a bidarkee. Other tribes of the west coast build large canoes of wood, the war-vessels being, like those of Africa, curiously decorated.

A peculiar form of canoe is found in the Kootenai district and on the Columbia River. While most canoes are constructed with the bow and stern either perpendicular or with a flaring overhang, these Kootenai craft are shaped, both at bow and stern, like the ram of a warship. In other words, the greatest length is along the bottom. These canoes are gener¬ ally about 15 feet long and are constructed with a light framework of cedar covered with spruce or white-pine bark. This bark is cut off in one piece in the spring, when the sap is running, and is turned inside out, bringing the smooth side in contact with the water. The canoes are sewed with rawhide or tendons, and cracks and knot-holes are stopped with resin. Two squaws will make a canoe in four or five days ; the chief difficulty being to get the bark off whole and to turn it wrong side out successfully.

The North American Indians have brought the canoe to its highest state of perfection. With the most frail material, birch bark, they construct a craft so light that it may be carried by one man, and yet so strong and buoyant that it will carry a very considerable load. A framework of light but tough wood is covered with sheets of birch bark, which are sewed together, the seams being waterproofed with resinous gums. They are propelled by means of a single-bladed paddle, which is dipped on one side only (a slight twist correcting the

tendency to swerve from a straight line), or alternately on either side. The use of the birch-bark .canoe by the Indians of the United States is rapidly becoming a thing of the past ; but the art of building them has been preserved by their construction as pleasure-craft.

A form of canoe of recent invention is used solely for pleasure. About 1865 John MacGregor, impelled by a love of adventure, sought

recreation on the rivers and fjords of Europe as well as on the waters of Egypt and Palestine. He developed his model from the Esquimaux kayak, and evolved a clinker-built craft of cedar, about 14 feet long and 2 feet in beam, depth 10 inches to 16 inches, entirely decked over with the exception of a “well® in which the canoeist sits. This is propelled by means of a double-bladed paddle, but a short mast enables the carrying of a sail. In a canoe of this type, which he named the Rob Roy, MacGregor cruised on the Danube, the Jordan, the Nile, the Seine and on Norwegian fjords. From this early model other forms have been evolved, notably the Nautilus and Shadow types. Water-tight compartments en¬ sure permanent buoyancy. Centre-boards counteract leeway when under sail on a wind. The interior space is so arranged as to pro¬ vide a sleeping-place for the cruiser.

There are many canoe clubs in the United States, England and Canada, and the canoe may be seen on all the coastwise and inland waters of those countries, as well as on the continent of Europe. Consult MacGregor, (A Thousand Miles in the Rob Roy Canoe) (1866) ; (The Rob Roy on the Baltic) ; Powell, W. B., ‘Canoe Traveling) (1871); Alden, W. L., ‘Canoe and the Flying Proa* (New York 1878) ; Hayward, T. D., ‘Camping out with the British Canoe Association ; Vaux, C. B., ‘Canoe Handling) (New York 1888) ; Stephens, (Canoe and Boat Building* (New York 1881) ; (Canoes and Canoeing,) (Spald¬ ing’s Athletic Library* (New York, annually).

CANON, ka’non, Johann, Austrian painter: b. Vienna, 13 March 1829; d. there, . 12 Sept. 1885. He studied with Rahl, but imitated the old masters more closely. He entered the Austrian army and in 1848 — 55 was lieutenant of cuirassiers, but even while in the army had given much attention to painting and finally devoted his whole time to it. His name first became known through his picture ‘The Fishermaiden,* exhibited in 1858. His work in¬ cludes genre pictures, historical paintings, and portraits; the latter are thought to resemble Rubens or Van Dyck in style. Among his other paintings are (Cromwell Beside the Corpse of Charles D ; ‘The African Lion Hunt) ; ‘Flamingo Hunt-*; and the ‘Fish Market.* His decorative paintings are in Vienna, Karlsruhe and New York. There is a monument dedicated to him at Vienna. Con¬ sult his obituary in ‘Zeitschrift fur bildende Kunst* (1886).

CAffiON. See Canyon; Grand Canyon.

CANON (Greek, a rule, measure or stand¬ ard). 1. In the arts. — When art has succeeded in producing beautiful forms the question arises, with what proportions beauty of form is united. Artists of genius first

started this question, and imitators, inferior to them in talents, scrupu¬ lously followed their results, and naturally ex-vol. 5 — 33

alted some existing work into a model for every performance. Among the Greeks the celebrated statuary Polycletus (452ˆ112 b.c.) first insti¬ tuted such inquiries ; and as he generally repre¬ sented youthful, pleasing figures, it is probable that he fixed the standard of beauty in the youthful form. The canon (the model statue) of Polycletus was accordingly a statue which was made principally for the purpose of show¬ ing the beautiful proportions of the human form in a youth just ripening into manhood. No copy of it is known to exist; the artist probably gave his model of proportion a quiet, simple attitude, without any strong distinguishing marks. His successors imitated it without de¬ viation. Polycletus was not the only Greek artist who pursued such investigations respect¬ ing the proportions of form. Among the moderns, Diirer and Leonardo da Vinci have devoted themselves to similar inquiries.

2. In Scriptural literature, a term employed to designate the collection of books con¬ taining the rule or standard of primitive Christianity; that is, the canonical books of the Holy Scriptures. The canon of the books of the Old Testatment, as contained in the Hebrew Bible, receives in this form equal respect among all Christians, because Christ and the apostles have expressly appealed to them, and in this way pronounced them writings inspired by God. There are certain books, however, belonging in subject to the Old Testament, but whose canoni¬ cal character the Jews did not acknowledge, and which Protestants class together under the head of Apocrypha, and reject from the canon. For these there is only a Greek, and not a Hebrew, text. The Western Church accepted them as canonical in the African council, about the end of the 4th century; but the opinions of the clergy respecting them remained for a long time divided. Saint Jerome denied their canonicity, and many theologians coincided with him. The Roman Catholic Church finally declared them canonical in the Council of Trent. (See Apoc¬ rypha). Respecting the number of books be¬ longing to the canon of the New Testament, the opinions of Christians were much divided till the 6th century. As early as the 2d century the separation was made into the Evangelicon (the four Evangelists) and the Apostolion (the Acts and Epistles of the Apostles) . The five his¬ torical books, the Epistles of Paul, the First Epistle of Peter, and the First Epistle of John were universally acknowledged to be genuine in the 3d century; hence Eusebius, in his ‘Ec¬ clesiastical History,* written about 325 a.d., calls them Homologomena

(universally re_ ceived). The other five Catholic epistles (Second of Peter, Second and Third of John, Jude and James) he calls Antilegomena (doubt¬ ful, not universally received). At that time the Epistle to the Hebrews was considered genuine by most persons, and the Apocalypse by many. These books were received in the second half of the 4th century in the Egyptian Church (where Athanasius first used the term canoni¬ cal), and in the Western Church. In the East¬ ern Church, properly so called (the dioceses of the patriarchs of Constantinople, Antioch and Jerusalem), only the Catholic epistles were of canonical authority at that time ; the Apocalypse not till the 6th century. The canon of the New Testament has since remained unaltered, and the Protestant churches hold it in common with

the Greek and Catholic churches. The results of critical examinations of the genuineness and canonical character of the single books of the Bible, even when they were unfavorable to the books, have produced no alteration in the estab¬ lished canon. The reasons of the ancient fathers of the Church for or against the canoni¬ cal character of the biblical books were merely historical and traditional, and built on philologi¬ cal criticism ; they are still the most tenable and rational; the philosophical grounds are more subject to be affected by extraneous influences. For bibliography see Bible.

3. In ecclesiastical use, a rule or law of doc¬ trine or discipline as established by ecclesiasti¬ cal authority. The term is further applied to various matters of church organization and ceremony; also to books containing the rules' of religious orders, etc., and to a list or cata¬ logue of acknowledged and canonized saints in the Roman Catholic Church.

Another distinctive ecclesiastical use of the term is that which designates a dignitary pos¬ sessing a prebend, or revenue allotted for the performance of divine service in a cathedral or collegiate church. Canons were originally priests who lived in community, appointed to assist the bishop in his duties, and supported by the revenues of the bishopric. Secular canons are those who, in progress of time, have left

off the custom prevalent in monasteries of living a community life, and have the privilege of enjoying the returns of their respective bene¬ fices. The obligations of the canons are con¬ tained under three heads: (1) The duty of re¬ siding in the place where the church they be¬ long to is situated; (2) assisting at the canoni¬ cal offices which are celebrated in the church ; and (3) attending the meeting of the chapter at the appointed times. They cannot be absent from their benefices for a longer period than three months, and are obliged to sing or recite their office in choir. In their collective capacity they are called a chapter, and form the council of the bishop. In each chapter there are digni¬ taries. The name was originally applied to all the clergy, but was afterward confined to those who were connected with the cathedral church, or to specially privileged churches.

4. In music, with the ancient Greeks, the term canon signified what now is called mono¬ chord. At present it signifies a composition in which the several voices begin at fixed inter¬ vals, one after the other, and in which each successive voice sings the strain of the preced¬ ing one. In Italian, therefore, it is called fuga di conseguenza ; in Latin, canon perpetuus, or continuous fugue; in German, Kreisfuge (circu¬ lating fugue). Sometimes each voice begins with the same, sometimes with different notes. The phrase or passage for imitation is called the theme or subject, the imitation, the reply. Canons may be finite or infinite. The former end, like any other compositions, with a cadence, while the infinite canon is so contrived that the theme is begun again before the parts which follow are concluded. A canon may consist of two, three, four or more voices. Canons differ from ordinary fugues; for, in the latter, it is sufficient that the subject be occasionally re¬ peated and imitated according to the laws of counterpoint ; but, in the former, it is essential that the subject be strictly repeated by all the succeeding parts ; which repetition may be made

in the unison or octave, the fourth, or the fifth, or any other interval of the scale. There are several other canons, as canon polymorphus, canon per diminutionem and canon per augmen-tationem. Sometimes, also, a musical passage of a composition in which one voice repeats for a short time another is called, improperly, a canon. Consult Ouseley's (Treastise on Coun¬ terpoint, Canon, and Fugue) (1869).

5. In printing, canon is the name given to a large type which is so called from the early use of it for printing the canon of the mass and the Church service-books.

CANON CITY, Colo., a city and county-seat of Fremont County, situated on the Arkansas River, near the mouth of the Grand Canon, and on the Denver and Rio Grande, and the Atchison, Topeka and Santa Fe rail¬ roads. It is a well-known health resort, over 5,000 feet above the sea-level, with an excellent climate and hot and cold mineral springs. It is the seat of the State penitentiary and Odd Fellows' sanatorium and home, an academy for young women, and has a Carnegie library, two hospitals, seven public parks and a hot-water natatorium. The city has abundant water power, with an excellent gravity system ; the soil is fertile, and in the vicinity are rich de¬ posits of iron, coal, silver, copper, marble, lime¬ stone and petroleum. Fruit growing is an im¬ portant industry, and there are canning and brick and tile factories, a large smelter and a reduction mill. Pop. (1920) 4,551.

CANON FINCH, TOWHEE, WREN.

See Finch, Towhee, Wren.

CANON LAW. Canon law is so named because it consists of rules or canons, which are established to guide the faithful to eternal hap¬ piness. In a strict sense, canon law comprises only those laws which emanate from an ecclesi¬ astical authority that has supreme and universal jurisdiction. In a wide sense, it takes in also those laws enacted for the good of the faithful by anyone having ecclesiastical authority. The sources or fountains from which canon law has originated are sacred Scripture; divine tradi¬ tion ; laws made by the Apostles ; teachings of the Fathers ; decrees of the sovereign pontiffs ; ecumenical councils ; certain congregations of cardinals under orders of the Pope; custom, which, however, could in no case be contrary to divine law, common sense, good manners, pub¬ lic order or the spirit and the rights of the Church. The Old Testament contains three sorts of precepts, moral, ceremonial, judicial. The moral code remains in full force under canon law; the ceremonial and judicial laws have lapsed. The New Testament is the chief source of ecclesiastical law. It contains also dogmas of faith, but with these canon law does not deal except indirectly. By tradition is meant a doctrine not written by its first author, but conveyed by word of mouth. Usually it is subsequently put into writing. Traditions, con¬ sidered in their source, are divine or human. Divine are those which have God for their au¬ thor, and which the Apostles received either directly from Christ or by the suggestion of the Holy Ghost. Human traditions are termed apostolic if they originate with the Apostles, or ecclesiastical if they come from the successors of the Apostles, called bishops of the Church. Divine traditions bind all the faithful; human

only those of the localities and times to which they are applicable. Some of the enactments attributed to the Apostles are the Apostles' Creed; abstinence from things sacrificed to idols and from blood and from things strangled, part of which prohibition has lapsed; the sub¬ stitution of Sunday for the Sabbath of the Jews; the institution of certain feast days; the fast of Lent. The sentences of the Fathers, ap¬ proved by the Church and made into universal laws by councils or the Roman pontiffs, are part of canon law. These sayings were not inserted in the collection of canons before the 6th cen¬ tury, John Scholasticus being the first to do this in the East in that century, and Regino first in the West in the beginning of the 10th century. To the student it is evident that the constitu¬ tions or decrees of the Roman pontiffs consti¬ tute the chief source of canon law; in fact, the entire canon law in the strict sense of the term is based upon the legislative authority of the Pope. To understand this it is necessary to recall that in the Catholic doctrine all authority in the Church comes from above, not only in the office of priesthood, but also in the matter of jurisdiction or power of ruling. Catholic writers hold that the primacy or headship in the Church was established by Christ in Peter be¬ fore the priesthood was conferred on him and the other Apostles, the purpose of the Saviour being to effect unity in his organization. The Church thus organized is a spiritual monarchy; elective it is true, but not an aristocracy or democracy. Other religious organizations hold quite the opposite doctrine and would make their unity a coalition of equal parts. This point of primacy of the Roman pontiff is also the line of separation betweep the canon law of the West and that of the separated Greek and the Russian churches, the review of which is given later in this article. Ecumenical councils, whose decrees are a source of canon law, are those meetings of the bishops of the Church throughout the world, which are held under the presidency of the Pope or his legates, and whose acts are by him confirmed. There are 20 councils recognized as ecumenic ; the first being that of Nicsea in 325; the latest that of the Vatican in 1870.

During the first three centuries, the Church was administered

according to the Scriptures only and the rules laid down by the Apostles and bishops, as occasion required. Thus Clement, the disciple and successor of Peter, mentions the rule given by the Apostles concerning the succession of bishops, and Ignatius the Martyr, in his epistles, exhorts his followers diligently and tenaciously to observe the traditions of the Apostles. Thus, too, in the controversy con¬ cerning the celebration of Easter, the contest¬ ants on each side alleged the apostolic tradition. But councils were held at Ancyra and Neo-Cesarsea in 314, at Nicaea in 325, at Antioch in 322, at Sardica in 347, at Gangra from 362 to 370, at Laodicaea between 337 and 381, at Con¬ stantinople in 381, at Ephesus in 431, and in the council of Chalcedon in 451 a collection of canons made up from these previous councils was read and partly authorized for the entire Church. With the exception of those of Sar¬ dica, which are in Latin, the canons of all these early councils were formulated in Greek. The name of the compiler of this first collection is unknown and few of these early canons have

reached our times, only their tenor being known through subsequent use in the Western Church, especially in Spain. After the emperors as¬ sumed the Christian religion, ecclesiastical legis¬ lation became important, and the laws of the Church were therefore in the year 438 inserted in his collection by the Emperor Theodosius II. Valentinian III afterward adopted this collec¬ tion for the West. About this time — the latter half of the 5th century — a compilation was made of the socalled apostolic canons and con¬ stitutions together with decrees of some of the councils. Originally there were 50 canons called apostolic, but their number was afterward increased to 85, some of which are certainly spurious. In the East these were received as having the stamp of authority, but not so in the West, where their origin was doubted. How¬ ever, Dionysius adopted the smaller collection of 50, considering them useful for discipline, and thereby without determining their origin procured for them in Rome the stamp of au¬ thority. John Scholasticus made a collection of canons for the Greek Church in 564, to which he added 68 canons taken from Saint Basil. He divided the work into 50 titles. To this he later added the laws of the empire which had relation to the laws of the Church, and the new compila¬ tion became known as Nomo-canon. The Em¬ peror Justinian II in 692 assembled a council in his palace at Constantinople, called the Trullan council from the room in which it was held, and 102 canons were enacted. When the acts and canons of this council were submitted to Pope Sergius at Rome for approval he re¬ fused even though the Emperor ordered his armor-bearer to bring

the Pope to Constanti¬ nople. The Trullan compilation consisted of the socalled canons of the Apostles, those of the 10 councils previously mentioned, the canons of the synod of Carthage, the decrees of a synod in 394 at Constantinople under Nectarius, the canonical decisions of the 12 eastern patriarchs and of some bishops from the 3d to the 5th centuries, the canon of a council held at Carthage under Cyprian in 256, to all of which were added the 102 canons drawn up by the Trullan council itself. Afterward 22 canons of the second council of Nicaea held in 787 were added. On this foundation the Church law of the East was based up to the middle of the 9th century. By the Trullan synod, priests were allowed to marry, which up to that time was against the canon law of both the Eastern and the Western Church. The Trullan synod also sanctioned the canons of the Apostles, one of which teaches the doctrine of the re-baptisers, which had been previously repudiated by Pope Gelasius. Herein is noticed the first real di¬ vergence between Eastern and Western canon law. Photius, who was intruded into the see of Constantinople, called a council against the patriarch Ignatius in 861, and 17 canons made by this council were added to the codex of the Greek Church. He also formulated a new col¬ lection, in which the second part, called the Nomo-canon, remained unchanged. The Em¬ peror Leo the Philosopher, who deposed Photius, rescinded his collection of laws, but nevertheless the seeds of the separation of the Greek Church from that of Rome had been im¬ planted by the work, although a complete schism took place only later in 1054 under Michael Cerularius. From time to tipie new

ecclesiastical constitutions issued from the em¬ perors, as from Leo Philosophus in 911, from Constantine Porphyrogenitus in 961, from Alexius Commenus in 1118, from Isaac Alexius in 1185-90. The resolutions of synods sum¬ moned by the patriarchs of Constantinople, epistles of renowned bishops and their de¬ cisions, formed another addition to the canon law of the Eastern Church. The first com¬ mentary on the Greek codex was undertaken by Theodore Prodromos in the 8th century. The second, containing the text with a

commentary, is the Nomo-canon of Doropater. The monk John Zonares composed a comprehensive verbal interpretation in 1120, using the collection of Photius as a basis. Fifty years later, Theodore Balsamon made a commentary with a view to practical questions, comparing the canons with the civil law and insisting that Justinian's maxims only applied when conformable to the Basilica. He added many matters not found in the collection of Photius. Epitomes of canon law were composed at a comparatively early period, the author of the first of which appears to have been Stephen of Ephesus in the 5th cen¬ tury. There is a synopsis by Aristenus aug¬ mented by Alexius Aristenus in 1160, and another by Arsenius, a monk of Mount Athos, in 1255. Constantine Harmenopoulos in 1350 composed an epitome of the spiritual law in six parts, using, with some omissions, the col¬ lection of Photius as altered by Zonares. In order to reduce canon law to a more practical form than it appeared in the collection of Photius and at the same time present a more comprehensive work than these epitomes, Mat-thaeus Blastares drew up his syntagma in 1335, divided into chapters of different lengths and arranged according to the principal word of these rubrics, the numbers of the chapters com¬ mencing anew under each letter. Each chapter begins with the ecclesiastical law, followed by the civil law applicable to it, without, however, mentioning the source of the latter. This work came into very general use among the clergy. The collection of Photius and the syntagma of Blastares continued still in use under the Turk¬ ish rule and were alike termed Nomo-canon and, metaphorically, the (Rudder.) The col¬ lection and interpretation of Zonares also ob¬ tained canonical authority. From these ma¬ terials many extracts were translated into modern Greek up to the 18th century, and sev¬ eral textbooks composed for the use of the clergy, some of which were printed in Venice. Lastly a comprehensive collection was pub¬ lished in 1800 at the instance of the patriarch and synod. It contains the old Greek text of all the authentic canons of councils since Photius and Zonares. to which are added interpretations of the authentic commentators in modern Greek, especially those of Zonares and Balsamon. In the interpretation, the canons of those fathers are taken into account which had not been con¬ firmed by any general synod, but had obtained a canonical authority. Nothing was inserted from the municipal law works which did not agree with the canons. Several appendices were added, including formulas for ecclesiasti¬ cal business, and upon these and similar collec¬ tions is founded the present law of the Greek separate church. The Russian followed the Greek Church in adopting compilations of Church law up to the end of the 15th century.

In 1550 certain regulations respecting the juris¬ diction of bishops were introduced. Some canonical epistles and rules drawn up at coun¬ cils are used in addition to the Greek codex, and manuals adapted to the country have been compiled therefrom. Peter the Great in 1721 changed the chief executive authority in the Church from a patriarch into the Holy Synod, by decrees of which the Church to-day is ruled. By an arrangement lately made with the Roman pontiff the bishops and priests under Roman jurisdiction are ruled by the canon law of Rome, subject to the civil laws of the Russian empire, and to prevent complications, Russia, besides a resident minister and two secretaries, has at the Vatican a representative agent for ecclesiastical affairs.

In the Western or Latin Church the canons of Nicaea and Sardica were the only code pub¬ licly received up to the end of the 5th century. About this time the Spanish translation of the Greek code was turned into barbarous Latin, and became known as the Prisca. The decre¬ tals of the Roman pontiffs were added to the canons of the Greek code, as found in the Prisca, but it seems that Dionysius the Little, about the year 500, was the first to formulate a collection of the councils and the decretals. He had previously made a collection of the concilia for Stephen, the bishop of Dalmatia. The dea¬ con Theodosius later made a new collection founded on the old Spanish and the Dionysian. A third collection termed the Avellanian, val¬ uable for the historical documents it contains, appeared in the latter half of the 6th century. These, however, were superseded by a second edition of Dionysius, made probably in 731 under Pope Gregory II. In this edition some decrees overlooked previously were added, to¬ gether with an appendix consisting of the statutes of the Roman pontiffs from Linus downwards, those up to Sericius, however, be¬ ing given only in an historical form as no longer actually in existence. The German con¬ querors of Italy in 476 did not, although Arian, interfere with the laws by which the Church was governed, but when Justinian reconquered Italy he introduced his Novelise in the Julian translation in place of the codex of Theodosius II, and this order of things was later upheld by the Lombard kings in their edicts. In Africa the deacon Fulgentius Farrandus made the first collection in 547, termed Breviatio. This was an excerpt in 232 numbers of nearly all the Greek canons, including the Nicaean, to which was added the African concilia under Gratus in 348-49, under Genethlius in 390, and that of Carthage in 419 with its 33 canons, together with 304 taken from synods as well as an ex¬ tract from the canons framed at Hippo in 393. The second African work was the Concordia of Bishop Cresconius in 690, founded upon the Dionysian, but arranged in 300 titles instead of in chronological

order. This work was incor¬ porated with the Dionysian and appeared under the name Breviarium. But the Arabs now put a sudden stop to all further development of canon law in this quarter. As early as the 5th century, as noted above, there was in Spain a translation of the Greek canons ; in the 6th cen¬ tury Martin of Braga made a collection of canons, but in the 7th century Isadore of Seville held two councils, half church, half civil, the canons of which may be said almost

to haye^ formed the basis of the constitutional law of Spain in both Church and State down to the 15th century. The collection of canons known as Collectio Isadoriana or Hispana was divided into two parts ; the first containing the classified series of Greek, African, Frankist and Spanish canons, and the second the de¬ cretals from Pope Damasus in 366 to Gregory the Great in 604. In the 5th century an exten¬ sive but confused collection of councils and de¬ cretals was compiled in Gaul under Gelasius. It was founded upon the old Spanish version and some peculiar version of the canons of Nicaea and the Prisca. Out of it sprung several other collections; the first in the middle of the 6th century, containing the councils of Nicsea, and of Sardica, some Frankist concilia and papal decretals; the second of the same date containing Greek, African and Gallic canons, and papal decretals in a confused order; the third in the 7th century, containing 103 num¬ bers, many decretals, Frankist, Roman and Italian concilia. A fourth and a fifth collec¬ tion of the same century contained chiefly Frankist and Spanish conciliar decrees. After Charlemagne in 774 on his first visit to Rome had received from Pope Hadrian a copy of the Dionysian collection with some additions, he had it sanctioned in a synod at Aix-la-Chapelle as the codex canonum for the Frankist empire. In addition to these principal works many of the bishops composed capitularies for th ir own dioceses, as Boniface of Mayence, Theodulph of Orleans, Hincmar of Rheims. The (PIis-pana) circulated among the Franks in a more or less corrupt form. One edition, which ap¬ peared between the years of 829 and 857, has caused great controversy, and is known as { Col¬ lectio Pseudo-IsadorianaP or False Decretals. The author called himself Isadore Mercator, and the name led many to believe the work

that of Isadore of Seville. The best evidence shows that Levites Benedict of Mainz was the com¬ piler, but no purpose for the forgeries in the work has been conclusively shown. After the preface and some minor apocryphal documents, the first part contains 50 of the apostolic canons taken from <Hispana) and 60 supposed decre¬ tals of the Popes from Clement in 92 to Mel-chiades in 314, arranged chronologically. The second part consists chiefly of canons taken from the MlispanaP In the third part, founded also on the (Hispana, } the compiler has inter¬ polated 35 decretals. A supplement contains some brief regulations regarding processes against bishops, said to be by Capitula Angil-ramni, a bishop of Metz. The collection was regarded as genuine by all canonists and theolo¬ gians for 700 years from the 9th to the 15th century. Cardinal Nicholas of Cusa in the 15th century first expressed doubis of the genuine¬ ness of some of its contents. In the following century religious bitterness overshadowed scholarly inquiry, but it is now admitted by Protestant writers that the compilation was pro¬ duced, not in the interest of the Pope but of the Frankist bishops in order to protect them¬ selves against oppression by temporal rulers on the one hand and Church councils on the other. For this reason such insistence is found in the collection on the right of appeal to the Pope in every major cause of a bishop and also that the Pope's permission is necessary to the holding of a provincial synod. The sources from which

the compiler chiefly borrowed his materials were the Bible, the Fathers, genuine canons and decretals, Roman law, the works of Rufinus and Cassiodorus on Church history and the lives of the Popes in (Liber PontificalisP Of the sup¬ posed decretals a large number are authentic although antedated and ascribed to earlier Popes to give them the value of antiquity, while others embody the traditional contents of actual but lost decretals. The influence of the pseudo Isadorian collection has been much ex¬ aggerated, for it wrought no material change either in the faith or the discipline of the Church, since it merely put into enactments the prevailing ideas and doctrines of that period on Church government. Had it introduced a vio¬ lent change the innovation would have caused a speedy inquiry-into the genuineness of the work. However, it cannot be doubted that a written text often in controversy is a more forcible argument than traditional law, and hence the false decretals naturally exerted some influence.

To meet the necessity of rendering canon law more accessible from the 10th to the 12th century at least 36 compilations were made, only the authors, titles and dates of which seem necessary for this article.

The first was a manuscript under 12 heads, divided into 354 chapters, abstracted from Cresconius. The sec¬ ond was extracted from Dionysius and the pseudo-Isadore collection. The third is very voluminous, and taken from Hadrian's codex with numerous additions. The fourth, by an unknown author, contains portions of concilia, decretals and extracts from the Fathers. The fifth, made by Regino, abbot of Prum, between 906 and 915, is founded on three Frankist col¬ lections, the Fathers and the West Gothic Bre¬ viary. The sixth is a Leipzig codex; the sev¬ enth a Darmstadt codex. The eighth is attrib¬ uted to Rotger, bishop of Treves in 922. The ninth is a Viennese manuscript. The 10th is also a manuscript of five books, composed in Italy in the middle of the 10th century, and is founded upon the Irish collection in 65 titles, on fragments of the Fathers, lives of the saints, decretals, Julian's (Novelise^ with capitularies of the emperors added up to Henry I. The 11th was addressed by Abbo, abbot of Fleury, to King Hugo and his son Robert, and consists of a treatise of 52 chap¬ ters on the Church and clergy. The 12th was composed by Burchard, bishop of Worms, in 1012-23, and contains the canons of the Apostles, the transmarine, German, Gallic and Spanish councils, papal decrees and other passages. The 13th is a manuscript in 12 books made in Germany or France. The 14th is a Terraconian manuscript belonging to the 11th century. The 1 5th is an introduction to disci¬ pline. The 16th is a collection taken chiefly from Halitgar, Rasbanu, Manurus and Bur¬ chard. The 1 7th is a rich collection in man¬ uscript by Anselm, bishop of Lucca in 1086. The 18th is 74 titles taken from the above work, and the 19th and 20th appear about the end of the 11th century, both taken from the works of Anselm and Burchard. The 21st is a work in 13 books. The 22d is the capitu¬ laries of Cardinal Atto in 1081 and excerpts from decretals. Cardinal Dcusdedit composed the 23d in four books at the end of the 11th cen¬ tury, from Dionysius, the Greek canons, the

old Italian and Spanish-Saxon and Roman rec¬ ords. The 24th is by Bourgo, bishop of Satrim in 1089, and is in 10 books. The 25th is in two books and belongs to the 11th or the 12th cen¬ tury. The first

chapter is inscribed from the Primate of the Roman Church and is published with the Dionysian collection. The 26th is the decree attributed to Ivo, bishop of Chartres, and the 27th is the Pannormia in eight parts by the same author in 1090. The 28th is a large manuscript collection; first of decretals, second of councils, third of fathers, then Roman and Frankish legal collections. The 29th was made under Pascal II in 1102-18 in seven books. The 30th is attributed to Hildebert, bishop of Tours, in 1134, and may be the same as the 10 books attributed to Ivo. The 31st is a manuscript in 15 books called the collection of Saragossa. The 32d is wholly extracted from the above. The 33d is taken from Burchard and Ivo. The 34th is a penitential book in nine titles belonging to the 12th century. The 35th belongs to the middle of the 12th century and is taken chiefly from Anselm of Lucca and the collection dedicated to Ansel-mus. Gregory, a Spanish priest, is the author. Lastly, Algerius of Liege in the beginning of the 12th century compiled a work on 'Justice and Mercy,) which contains a treatise on Church discipline in three parts, taken from Anselm and Burchard for the most part. Gratian, a Benedictine monk, composed at Bologna in the middle of the 12th century a scientific and practical work on the canon law with references and proofs. The first part treated of ecclesiastical administration, the second contained 26 legal positions, with their answers, the third part concerned the liturgy of the Church. The whole work is founded on previous collections and contains many mistakes. It was never approved by the Church though it obtained great authority and superseded all other collections. Other col¬ lections are by Cardinal Laborans in 1182, that of Bernard of Pavia in 1190, that by Gilbert, an Englishman, in 1203. The universities of Bologna and Paris at an early period began to exercise great influence on canon law and their opinion in controverted questions was considered decisive, and was termed the au¬ thority of the schools. Gratian's collection was made the basis of lectures in Bologna and teachers of the canons were called magistri and doctores decretorum. Their teachings were soon gathered together in books of com¬ mentaries. Soon after the collection by Gra¬ tian, the Extravagantes, or decrees not vet collected, were gathered together, there being between the years 1179 and 1227 14 different compilations, only five of which received the stamp of authority. Pope Gregory IX ordered a code to be published in which the entire body of law was to be properly arranged. What was useless was to be cut out, what was am¬ biguous was to be corrected. Raymond of Pennafort was entrusted with this task, which he finished in the year 1233, and the collection was sent to the universities of Bologna and Paris with instructions that it was to be the sole authority. The whole work is divided into five books. The first treats of ecclesiastical judicature and

of prelates; the second of civil suits ; the third of civil causes before the episcopal forum ; the fourth of betrothals and

marriage; the fifth of judicial proceedings in criminal matters and of punishments. To these five books was added by Pope Boniface VIII, in 1298, a sixth book of decretals. This was followed in 1334 by the Clementinae or collection of decretals by Pope Clement V. The Extravagantes of John XXII in 1334 and the Extravagantes Communes (73 decretals from Boniface VIII to Sixtus V) wTere gathered by authority and made part of the code or (Corpus Juris CanoniciP Commen¬ taries on the <Corpus) were made by the doctors, and systematic works for the use of courts were published. In the 15th century legal literature seems confined to these efforts. But in the 16th century Pope Paul IV con¬ fided to a congregation of cardinals, with canonists as consultors, the work of revising and correcting the (Corpus Juris. > Gregory XIII approved the work of the committee and an authentic edition was published, in 1580, in which the glosses are retained, and on which all subsequent editions have been based. The corrections made by the commission are marked <(cor . Rom A in the text. Two append¬ ices were added, one the Institutiones Lancelotti, the other Septimus Decretalium, which con¬ tained the Extravagantes of Sixtus V in 1590. Neither is of public authority, but both are very useful and recognized by scholastic ap¬ proval. Since then the Bullarium Benedicti XIV, which contains the constitutions of that Pope, has been made of public authority. There is also a collection of papal bulls, called Bulla¬ rium Magnum Romanum, made up in 14 vol¬ umes, which was published in 1744 and con¬ tinued in 1840; but it is very imperfect and only a private collection. Anyone who desires to know canon law must learn the (Corpus Jurist even though to-day many parts have been changed by the councils of Trent and the Vatican and by new papal decrees. In the (Corpus) itself the different portions stand as lex prior and lex posterior, so that in cases of contradiction the latest is preferred. With certain modifications the ‘Corpusˆ still has the force of law in matters relating to ec¬ clesiastical judicature, to divine worship, to doctrine and discipline. It is the code still followed in the schools and u-sed in Church courts, not only as the source of argument but also as the method of procedure in many cases. The (Jus NovissimunP in canon law consists of laws published from the time the (Corpus Juris > was closed, that is, since the Extravagantes were inserted down to the present day, and includes the decrees of the councils of Trent and the Vatican. Except the Bullarium of Benedict XIV, mentioned above, no authentic collection has been made of the various constitutions and laws made by the Roman

pontiffs since the close of the (Corpus. } Still every genuine decretal is part of the canon law. The same may be said of the decisions of certain congregations of cardi¬ nals which have the force of law, especially that of the council which authoritatively in¬ terprets the decrees of the Council of Trent. So evident was the need of a revision of canon law. that^at the ecumenic Vatican Coun¬ cil, held in 1870, proposals were made by a number of bishops to have a committee ap¬ pointed, consisting of the most eminent canon¬ ists, to revise the (Corpus Juris) or rather

prepare a new one, omitting whatever owing to changed times was no longer applicable. Nothing was done before the adjournment of that council, but Pope Pius X by a motn proprio in the year 1904 appointed a special committee of cardinals, with a number of consultors, and a canonist from each nation, to revise thoroughly not only the (Corpus Juris) but all the canon law of the Church, that general for the world and that special to the various nations. He himself was president of the committee to which he assigned the fol¬ lowing cardinals : Seraphin Vanutelli, Agliardi, Vincent Vanutelli, Satolli, Rampolla, Gotti, Ferrata, Cassetta, Mathieu, Gennari, Cavic-chioni, Merry del Val, Steinhuber, Segna, Vives y Tuto and Cavagnis. Archbishop (later Cardinal) Gasparri was appointed secretary. The plans of the various titles have been con¬ fided to canonists in every country. The gen¬ eral plan of the Code includes (after the pre¬ liminary section) four main divisions: per¬ sons, things (with subdivisions for the sacra¬ ments, sacred places and objects, etc.), trials, crimes and penalties. The articles are num¬ bered consecutively. The work is now com¬ pleted and embodies several modifications and reforms in the ancient law. This code is now the only authorized canon law of the Latin Church.

It will have been noticed that canon law is not traceable to any original code, but is a development founded on the general moral rules laid down in the Scriptures and especially in the New Testament. Neither is the Roman civil law traceable to any code, but is a gather¬

ing of principles suggested by good reasoning for promoting the civil interests of its subjects. Compared to the Jewish law, the principle upon which Roman jurisprudence was founded was very different — • the former treats prin¬ cipally of criminal matters and is most severe in its penalties ; the latter on the contrary treats all questions as civil, and prefers resti¬ tution to punishment. When the Roman em¬ perors had been converted to Christianity, in promoting its progress by special constitutions which then became part of the canon law, they necessarily gave to canon law much of the spirit of their civil law. Thus it happens that in the canon, as in the Roman civil law, there was little severity in criminal matters, and many cases which other peoples than the Romans treated as criminal were cognizable by a civil tribunal and an indemnification was effected by damages. Generally no crime was punished capitally, especially where no force or violence was employed. This spirit of leniency is manifest throughout canon law to the present day. During and after the 4th century wherever Roman power conquered the nations and wherever Christian missionaries converted the pagans canon law was intro¬ duced through the influence of the Pope and the Emperor. It permeated and modified the laws of the peoples of northern Europe, as well as those of England to a certain extent. With it necessarily came the principles of Ro¬ man civil law. The rules for the application of canon law were as follows: (1) In cases not contained in the civil law, or the rule for which was obscure, open to doubtful inter¬ pretation, or not expressly determined, if ex¬ pressly and clearly resolved by the canon law,

this latter formed the basis of the decision ; and on the contrary, if the case was not pro¬ vided for, or ambiguously resolved by canon law, when it was expressly met or its solution more clearly indicated by the civil law, this latter was to be preferred. (2) In cases of conflict, the civil law formed the rule for courts of civil, and the canon in those of ec¬ clesiastical, jurisdiction. Thus, when a matter of canon law cognizance arose in the civil courts the decision was given according to the rules of the canon law ; and vice-versa, when a question of civil cognizance occurred before an ecclesiastical tribunal. (3) Within the Im¬ perial states the civil law formed the basis, and the canon law in the papal states. (4) In matters of a feudal nature the civil was pre¬ ferred to the canon law. (5) In forensic causes the. canon is not presumed to differ from the civil law. When the Western empire passed under the rule of a barbarian race the Roman and the canon law were not only pre¬ served, but to a great extent they influenced the legislation of the conquerors. Alaric, Attila, Ricimir did not disturb

the outward form of Roman government. In the collec¬ tion of West Gothic laws, gathered in 672 a.d., there are evident traces of the part which the Roman clergy took in the compilation. The Burgundian laws also show literal excerpts from the Roman law. Roman law is found also in the Bavarian code composed in the 7th cen¬ tury, as well as in the capitularies of the Franks, which commence in the year 560 and are introduced by a literal transcript of a novel of Valentinian. It is noteworthy that the German tribes did not force their laws upon their subjects in those portions of their conquests where the Roman law was acknowl¬ edged. It was natural, too, that the Churches, as juristical persons, should follow the Roman law, not only on account of its connection with religion and the great degree of favor it manifested toward the Church, but also of the accuracy of its provisions in this respect. Like the law of the Teutonic tribes, that of Eng¬ land is an accumulation of individual laws While Britain was conquered by Julius Caesar in 54 B.C., still it was only at the end of the 1st century of the Christian era that Roman manners, arts, architecture, language and laws were introduced. The Roman law superseded the customary laws of the island and remained in force until the year 455, when Britain be¬ came derelict because of the removal of the seat of empire to Constantinople and the im¬ possibility of the emperors defending it against the Piets and Scots. Christianity was intro¬ duced into Britain under the Roman dominion and was preached in Scotland and Ireland be¬ fore the year 430. Roman literature, arts and law, however, received a sudden check by the Saxons, who, when they invaded Britain, im¬ posed their law upon the conquered people. The Danes subsequently did the same. Still we are informed by the Venerable Bede that Ethelbert, king of Kent, in 613, with the as¬ sistance of his wise men, made certain decrees and gave judgments between his subjects in conformity with the principles of Roman and canon law, at least so far as regarded sacrilege, bishops, and the like. Indeed, it is not sur¬ prising that the Saxons and Danes, whose codes contained a great admixture of Roman

law, should have carried the same principles with them into their new

settlement in England. Traces of a Roman original may be seen in the laws of Ina, king of the West Saxons, Offa, king of the East Angles, and in the laws pub¬ lished by Canute which were translated into Latin. Thus it happened that, when Edward the Confessor compiled a code out of the materials then at hand, much of the Roman and canon law was inserted and thus became the basis of much of the common law of Eng¬ land and the United States. During the do¬ minion of the Saxons and Danes, those Britons who had fled to Wales were governed by their own princes. Howel Dha, in 940, is said to have assembled his bishops and the more literate among the laity for the purpose of revising the law which was translated into Latin at his command. In the 85th article he approves the Roman rule of two witnesses being sufficient in cases where no specific num¬ ber is stated, and for holding the testimony of one to be insufficient, except of a woman in cases of rape, of a lord between two tenants, an abbot between two monks, a father between two of his children, a priest in a matter at¬ tested in his presence, and a thief turning king's evidence in the place of execution. Most of the Roman laws of this age seem to have been taken from the Theodosian code. Although the foot of the Roman soldier never trod on the bosom of Ireland, nor did a Roman general have a chance to introduce the Roman law, still the principles of canon law were enforced throughout Ireland and Scot¬ land by Saint Patrick in his canons. One of them, translated by the Anglican Bishop Usher, reads : "Wherever any cause that is very diffi¬ cult and unknown to all the judges of the Scottish nation shall arise, it is rightly to be referred to the see of the archbishop of the Irish (that is, of Saint Patrick) and to the examination of the prelate thereof. But if there, by him and his wise men, a cause of this nature cannot easily be made up, we have de¬ creed it shall be sent to the see apostolic, that is, to the chair of the Apostle Peter, which hath authority of the city of Rome.®

In 680, at the command of Ethelred, Egfrid, king of Northumberland, Aldwulf, king of the East Angles, and Lother, king of Kent, Theo¬ dore, at that time archbishop of Canterbury, summoned a synod at Hatfield, in which the canons of the five general councils of Nicsea, Constantinople, Ephesus, Chalcedon, the second of Constantinople, were enforced, together with the concilia drawn up under Pope Martin at Rome in 648. He also collected in his capitu¬ laries the most important points of Church discipline. Later he wrote his (Book of Pen¬ ances.) In the latter half of the 8th century', Egbert of York made an extensive collection of canon law from the sources then existing. He also wrote the book (De Remediis Peccatorum.* In the 8th century a collection was made in Ireland in which the Dionysian

collection and Roman, Gallic and Irish councils are used. King Henry I, in 1100, endeavored to repudiate a number of Church laws and ordered that Peter's Pence was to be paid to the King in¬ stead of the Pope. Henry II entered into a controversy over the enforcement of canon law with Thomas a Becket. In 1215, by the Magna Charta, King John confirmed to the prelates

and barons of his kingdom the freedom of election of the clergy, and this acted as a gen¬ eral acknowledgment of ecclesiastical rights and liberties. In 1230, Otho, the legate of Pope Gregory IX, held a national synod, and in 1268 Othobon, the legate of Pope Clement IV, held a second, both of which, as Blackstone says, had a great effect on the ecclesiastical jurispru¬ dence of England. Under King Henry' III, Boniface, archbishop of Canterbury, enacted several canons which seemed against the exist¬ ing laws of the realm, and under Stephen an ecclesiastical and a secular party were formed, the latter adhering to the common law as tenaciously as the clergy' and nobility' did to the canon and civil law. In the Parliament of Merton, however, the adherents of the canon and civil law were defeated on the proposition to make legitimatio per subsequens matrimonium legal also in England as it was under canon and civil law. Under Richard II, more than 100 yrears later, the feud still existed. Anglo-canon law was further augmented by the de¬ crees of provincial councils held under the arch¬ bishops of Canterbury', from Stephen Langton to Henry Chichiley', which were glossed by' William Lindwood, and later enforced also by the archbishops of York. The king meantime had also enacted many statutes on the relations between secular and ecclesiastical jurisdiction. A statute of Henry VIII rendered void all canons which were contrary to the law of the realm or hurtful to the royal prerogatives, and provided a commission to revise them. Edward VI renewed the commission, but the code was not confirmed before his death. Mary repealed all these acts, but Elizabeth revived the first act of Henry VIII. In 1603 some canons were made in the convocation of the province of Canterbury and confirmed by the king but not by Parliament. It is held that, therefore, these bind the clergy in Church matters, but not the laity, except in so far as not repugnant to the laws of the realm. By acts of Parliament (26 Henry VII, 1; 35 Henry VIII, 3; 1 Elizabeth 1) the king was declared the supreme head of the Church, and it became treason (1 Ed. VI, 12; 5 Eliz., 1) to doubt it or to defend the supremacy of the Pope as head of the Church. These acts and subsequent ones reversed canon law in England, Ireland and Scotland. Speak¬ ing of the courts of the archbishops and bishops of the English Church to-day, Blackstone says: "An appeal lies from all these courts

to the sovereign in the last resort, which proves that the jurisdiction exercised in them is derived from the crown of England.

… It appears beyond a doubt that the civil and canon laws, though admitted in some cases by custom in some courts, are only' subordinate and leges sub graviori lege. They are by no means with us a distinct, independent species of law, but are inferior branches of the cus¬ tomary or unwritten laws of England.® In Scotland many of the provisions of canon law became the law of the land. During the 16th and 17th centuries canon law was taught in the Scottish universities, and from very early times many of the youths of Scotland attended the schools of the Continent, whence not a few returned as doctors in utroque jure, that is, canon and civil law. The canons of provincial councils, held yearly, and at whose meetings representatives of the king were

present, constituted a national canon law which was recognized by the Pope and by Parliament and enforced in the courts of law. Even to this day, though the ecclesiastical system of the country is Presbyterian, the old canon law still prevails to a certain extent. (<So deep hath this canon law been rooted,® -says Lord Stair in his institutes of the Law of Scot¬ land,ˆ (<that even where the Pope's authority is rejected yet consideration must be had to these laws, not only as those by which the Church benefices have been erected and ordered, but as likewise containing many equitable and profitable laws which, because of their weighty matter and their once being received may more fitly be retained than rejected.® In two old acts of the Scotch Parliament, made in 1540 and 1551, the canon and Roman law are men¬ tioned as the common law of the country, the clause used being (<the common law, baith canon, civil and statutes of the realme.® Since the restoration of the Catholic hierarchy in England in 1850, and in Scotland in 1878, t,he churches under Roman jurisdiction have held various councils and enacted laws to fit the changed conditions. These laws, having been examined by the committee of cardinals in Rome appointed for such purpose, have become, as it were, a national

canon law for the Cath¬ olics of those countries. In a similar way the Catholics of newly established nations, owing to various reasons, are ruled by a modified canon law which gives the bishops and superiors a very extensive authority. Such is the case at present in Canada, Australia and the United States. These modifications pertain chiefly to the election of bishops, the appointment and removal of parish clergy, the tenure and ad¬ ministration of Church property. The second and third plenary councils of Baltimore con¬ tain special modifications for the United States. For Mexico, West Indies and South America a council was held in Rome of the bishops of those countries, and its decrees were published in 1901. Other national modifications of canon law in the course of time have been introduced by concordats made by . the Pope with the rulers of Christian nations by which he grants them certain concessions. As a nation Spain enjoys the greatest concessions. The councils held in Gaul in the 4th and following centuries show the beginning of a national canon law for France. The fourth canon of the Council of Arles, convoked by King Clovis in 511, prohibited certain laymen and teachers from receiving holy orders without the king's con¬ sent. The Council of Orleans, in 549, shows that at that time the king's consent was neces¬ sary for the election of bishops. Many points regarding a special liturgy, the administration of the sacraments, the matter and forms of ecclesiastical trials are to be found in these same early councils. The laws of Dagobert, in 620, show special protection given the Church but also lay the foundation for future subjection; for councils could not be held with¬ out consent of the king, and bishops were elected not infrequently at the dictation of roy¬ alty. But the capitularies of Charlemagne and his successors, collected in 825 by the abbot Ansegiso, were very favorable to the Church. Under the third dynasty, especially because of the feudal law, bishops, abbots and chapters exercised almost complete civil authority over

the people in their charge ; but the oath of fealty was imposed on the prelates as vassals of the king. On the other hand, the kings took upon themselves the defense and guardian¬ ship of the Church, and on the pretext that at the death of the prelate they were the guardians of the vacant see, they performed many acts of ecclesiastical jurisdiction, among which was the administration of the temporalities of the vacant church. This was not done, however, without the assent of the sovereign pontiffs. Herein is found the origin of jus Regalice which later caused such trouble. In the year 1268 a pragmatic sanction was issued by Saint Louis which gave liberty of election of bishops and ordered that the general canon law should be observed throughout

France. However, the genuineness of this law has been seriously questioned. Under Philip the Fair the seeds of absolute independence of the secular from the spiritual authority were sown ; and about the same time serious contests arose between clerical and lay judges concerning their juris¬ diction. On appeal to the king the clergy won ; but the jurisdiction of the Church was gradu¬ ally lessened, and at this time the appeal ((as from abuse® was introduced, that is, a clergy¬ man might appeal to the king from an abuse of the power exercised by a bishop. This was diametrically opposed to general canon law. The great schism of the West brought out the question whether the Pope or an ecumenical council were superior, and the controversy be¬ came especially bitter in France. Charles VII selected certain passages from the Conciliabule of Basel, and in 1438 issued a pragmatic sanc¬ tion in which the superiority of the council over the Pope was declared, and elections both to episcopal sees and in monasteries were to be held after the ancient law of France. Louis XI suppressed this decree, but it was revived after his death until finally condemned by the Fifth Lateran Council, and changed by the concordat made between Leo X and Francis I. In this concordat many of the dispositions of the pragmatic were preserved; but the con¬ cordat differed from the pragmatic in this : that in place of the election of bishops and prelates in case of vacancy the king was given the right to present to the sovereign pontiff, within six months, a doctor or licentiate in theology who should be at least 27 years of age and other¬ wise competent. The pontiff would grant insti¬ tution. The Parliament, after a long contest, agreed to the execution of this concordat. Herein is seen the beginning of the system of government nomination of bishops, concern¬ ing which, in 1903-04, the Pope and the French government were at variance. In the 16th cen¬ tury the government long opposed the publica¬ tion of the decrees of the council of Trent, but finally, without mentioning the source, the chief decrees, word for word, were published in 1579 by royal order. In 1681 the Gallican clergy, at the instance of the government, met in extraor¬ dinary convention and adopted a declaration favoring the extension of the Regalia to all France. This was repudiated by Pope Innocent XI. The next year the Gallican clergy adopted four propositions in which they attacked the Holy See in administering temporal matters, and declared that the judgment of the Pope on a matter of faith was not irreformable except when the consent of the Church had been added.

The king ordered the observance of this dec¬ laration, but it was condemned by Alexander VIII. Later, King Louis XIV wrote the Pope that he had ordered that the decree should not be observed. Nevertheless, the Re¬ galia was observed up to 1789 throughout all France, and the government continued taking the revenues of all vacant bishoprics and ap¬ pointing to benefices during the interregnum. In an edict of 1695 a code of ecclesiastical law as observed in France was enacted, and in it •was the appeal ((as from an abuse,® that is, from the ecclesiastical to the civil authorities. The national convention in 1790 passed a civil con¬ stitution for the clergy by which dioceses and parishes were suppressed and the Church made subject to the state. In 1801 Napoleon, as First Consul, and Pope Pius VII made a con¬ cordat in which the Catholic Church was ac¬ knowledged as the state Church, and by which new limits were assigned to dioceses and par¬ ishes, and by which especially the right of nominating bishops was given to the ruler of France. To the nominees the Pope would grant institution. Various other regulations were made, and the French government took upon itself the support of the bishops and par¬ ish priests in place of restoring the immense Church properties which had been confiscated. During the year 1904 a great agitation occurred for the suppression of this concordat because of controversies over some bishops held delin¬ quent and suspended by the Pope. The con¬ cordat was suppressed in 1906. With the abro¬ gation of the concordat the state no longer supports the clergy, nor can it nominate to bishoprics. There is complete separation of Church and State in France since the passage of the law abrogating the concordat of 1801. During the 19th century the liturgical worship of the Church in France was made conformable to that of Rome, and other matters of discipline were brought under general canon law.

Undoubtedly canon law has exerted a wide and lasting influence on the nations of Europe and America. It made them Christian states and directly or indirectly modified their consti¬ tutions. State legislative assemblies based their proceedings on the methods of Church councils. The law of nations is simply the application to nations of the principles of Christian law taught to individuals. The ancient Romans as well as barbarous tribes considered all foreign¬ ers enemies; the Church taught the brother¬ hood of all men. The Pope, as the common father of all Christians, acted as arbitrator in the disputes

between nations, and so noteworthy became the Roman Rota, to which the Pope referred international disputes, that at times much of its work was deciding important ques¬ tions for rulers of nations. The system of Church administration served as a model for that of states, and the clergy, especially in the earlier and Middle Ages, being the educated class and following canon law, naturally intro¬ duced many of its rules into everyday life. The elevated condition of woman is due to the canon law prescriptions regarding marriage, which the Church enforced on all nations converted to Christianity. Questions relating to widows and orphans were within the jurisdiction of canon law and Church courts. The incorporation of Church bodies, from which other corporations took their origin, had its foundation in the law

of Justinian and was imported into Engia: with the civil and canon law. As in the Roman law, the charter of the sovereign is always ex¬ pressed, or at least implied. From England the idea of corporation and corporation sole came into American law. The writ of habeas corpus had its origin in the Roman law ((interdictum de libero homine exhibendo .® Inheritance by will and the rule for the descent of real prop¬ erty came from Roman law, while trial by jury, with challenges of the jurymen, was determined in the Roman Lex Servilia and Lex Cornelia. While in England (<Christianity is part of the law of the land,® in the United States this <(is true only in a qualified sense® (33 Barb. 548), and owing only to ((the fact that it is a Christian country and that its constitution and laws are made by a Christian people® (23 Ohio St. 211). Nevertheless (<the decision of ecclesiastical courts or officers having, by the rules or laws of the bodies to which they belong, jurisdiction of such questions, or the right to decide them, will be. held conclusive in all courts of civil admin¬ istration, and no question involved in such de¬ cisions will be revised or reviewed in the civil courts, except those pertaining to the jurisdic¬ tion of such courts or officers to determine such questions according to the laws or usage of the bodies which they represent.® (Quoted with ap¬ proval in 98 Penn. 213). (<Civil courts will not review the action of ecclesiastical tribunals ex¬ cept where rights of property are involved® (62 Iowa 567; 23 Ill. 456). Justice Strong, in de¬ lations of Civil Law to Church Policy,* con¬ cludes: ((I think it may be safely asserted, as a general proposition, that whenever questions of discipline, of faith, of church rule, of member¬ ship, or of office have been decided by the Church in its own modes of decision, civil law tribunals accept the decisions as final and apply them as made.® See also Law ; Catholic Church, Roman.

P. A. Baart, S.T.L., LL.D., Author of (Church and State in the United States of America, > iThe Roman Courts (Legal Formulary f* (Tenure of Church Prop¬ erty in the United States, > *etc.*

CANON OF THE MASS, that part of the

mass following the sanctus. The rule of the Roman Catholic Church for celebrating the Eucharist is contained in this canon.

CANON OF SCRIPTURE. See Bible.

CANONESS. At the close of the 8th

century the title of canoness was given to a class of women who took the vows of chastity and obedience, but not that of poverty, and were not cloistered, though they had a common table and dormitory, and were bound to the recitation of the breviary, as were nuns. They derived their name from their being enrolled in the canon or official list of the Church. Their occupations were chiefly education of girls, transcription and embellishment of Church office-books and embroidery of vestments. The advantages of such institutions as asylums in a rough age were soon visible, and they multi¬ plied in consequence, but as in many houses the religious motive had little to do with entrance, a distinction was drawn ere long between canonesses regular and secular. The secular canonesses were for the most part members of princely or noble families, practised much state and luxury and retained none of the rule save

the common dormitory and the recitation of the Hours in choir. In Germany, several abbesses of canonesses were princesses of the empire, kept up feudal state and furnished contingents to the Imperial army from their vassals; and at the Reformation some chapters adopted the new opinions, and subsist to the present day as Protestant foundations, enjoying the revenues, and admitting to membership only ladies of noble birth or daughters of distinguished mem¬ bers of the military and civil service, whose sole obligation is celibacy during

membership. The institute never spread beyond the limits of the empire, and the non-German houses were chiefly in Hainault, Flanders and Lorraine.

CANONGATE, The, the principal street in the Old Town of Edinburgh. It is upward of one mile in length, rising gradually with a regular and steep incline from a small plain at the east end of the town, on which stands the palace of Holyrood, and terminating at the castle. The appearance of this street, the scene of many interesting historical incidents, is ren¬ dered remarkable by the loftiness and antique aspect of the nouses with which it is lined, most of them ranging from five to seven stories in front, and often more behind. At different points it is known by other names, High street, Lawnmarket, *etc.*

CANONICAL BOOKS, the books of Scripture belonging to the canon. See Bible; Canon.

CANONICAL HOURS, certain times of the day set apart by ecclesiastical law in the Roman Catholic Church to the offices of prayer and devotion, namely, matins with lauds, prime, tierce, sext, nones, even-song or vespers and compline. These hours of prayer originated early in the Church's history, being mentioned by Clement of Alexandria, Tertullian, Jerome and others. The day was divided into seven parts and the observance of the canonical hours was as follows : prime, tierce, sext and nones at the first, third, sixth and ninth hours of the day, counting from six in the morning; vespers at the eleventh hour, compline at midnight and matins shortly after midnight. These times are no longer strictly adhered to. In England the canonical hours are from eight to twelve in the forenoon, before or after which the marriage service cannot be legally performed in any parish church. See Breviary and consult Bing¬ ham, (Origines Ecclesiastic^ ; Proctor, (On Common Prayer.*

CANONICALS, the prescribed dress or vestments worn by the clergy of the Roman Catholic, Protestant Episcopal and other churches when officiating at religious services. The wearing of vestments is of. ancient origin. In all the pagan religions the priests wear sym¬ bolic garments, and in the Jewish system the priestly robes were very elaborate and signifi¬ cant. The modern Jewish system retains these ecclesiastical vestments and the ministers of many Protestant denominations wear such at¬ tire. See Chasuble; Costume, Ecclesiastical; Stole; Vestments.

CANONICUS, Indian chief : b. about 1565; d. 4 June 1647. When the Pilgrims landed, he and his nephew Miantonomo (q.v.) were associate sachems of the fierce Narragan¬

setts, mustering some 3,000 warriors. In the winter of 1621-22 he sent to the little colony, with about 50 fighting men, a bundle of arrows bound with a snakeskin, either as a preliminary of war or a demand of gifts to avert it. They returned the skin stuffed with powder and ball, and the frightened savages did not dare keep it. A lasting treaty was negotiated, and it was ow¬ ing to the influence of Canonicus that the tribe never made war against the English, even many years after his death, till <(King Philip's War® of 1675. In 1636, Roger Williams and his company sought refuge from the Massachusetts authorities among the Narragansetts. They were kindly received, and to them was granted the peninsula where Providence stands. In 1637 the Pequots of Connecticut were attempt¬ ing to form a general Indian league to extermi¬ nate the English settlements, and the Massa¬ chusetts government sent an embassy to pre¬ vent the Narragansetts from joining it. Canonicus received them with great Indian pomp in his wigwam of poles and mats, sur¬ rounded by his ˆmugwumps® and leading war¬ riors, gave them a feast with boiled chestnuts and huckleberry Indian pudding for dessert; and probably more from kind regard for Wil¬ liams than through the embassy's persuasions, kept the peace, and even furnished a couple of hundred warriors to help the English. These allies, however, played the usual ambig¬ uous Indian part, ready to massacre the beaten side. In 1644 the Gorton (q.v.) party suc¬ ceeded in persuading the chiefs that it was under the protection of irresistible powers in England ; and on 9 April Canonicus, his son Mixan and his nephew Pessacus, brother and successor of Miantonomo, signed two astonish¬ ing documents, of whose purport it is very un¬ likely* that they had been correctly informed. One of them ceded the land and people of the Narragansetts to his Majesty of Great Britain, placing the Indians themselves under his pro¬ tection, and appointing Gorton and three others their attorneys to carry the instrument to him. The other, addressed to the Massachusetts au¬ thorities, was the refusal of their invitation to visit Boston. It also menaced the authorities on account of Miantonomo's death and threat¬ ened to revenge it on Uncas. Finally, however, a truce was signed, and three years later Canonicus died.

CANONIZATION, a rite in the Roman

Catholic Church by which a deceased person is inscribed in the catalogue of the saints and by which it is publicly, solemnly and canonically declared that such person is to be honored as a saint by all the faithful.

The desire to honor the dead is an instinct of human nature. The state picks out its great ones for civil honors ; the Church holds up to the veneration of its members those who by the sanctity of their lives and their love of God and their fellowmen merit imitation.

The state honors its heroes on account of intellectual ability, oratorical gifts, courage or patriotism ; the Church demands purity of life and eminent virtue in her spiritual heroes. As a proof of that virtue she requires, miracles wrought by or through their intercession. The virtues, which must be heroic, and the miracles, are proved by a process most minute and searching.

CANONS

During the early centuries the deeds of the martyrs were recorded by Christian notaries. For this purpose Pope Clement divided the city of Rome into seven quarters with a special notary for each quarter. The letters of Saints Cyprian, Jerome, Augustine and Epiphanius tell us of the efforts of the bishops to collect the deeds of the martyrs and to have them venerated.

In the early times individual bishops sifted the testimony regarding those brought to their notice as worthy of veneration and declared for or against it. But this gave rise to inconven¬ iences and the necessitv of a central authority for judging in such cases was made manifest.

As early as the 4th century the case of Saint Vigilius, bishop of Trent, who was martyred a.d. 399, was brought to Rome to secure the consent of the Pope for his veneration as a saint.

Gradually the procedure in these matters was elaborated and in 1587 the Congregation of Rites was charged with the duty of investigat¬ ing the causes of Beatification and Canonization.

Beatification precedes Canonization, and is a decree which permits the honoring of a servant of God by public worship in a certain place. It differs therefore from Canonization in that the latter not only concedes but declares that ven¬ eration be paid by the universal

Church to the canonized one whilst Beatification permits only in a certain place the honoring of the beatified.

The process by which Beatification is reached is a lengthy one. “The fierce light which beats upon a throne® is nothing to the minute and protracted inquiry which turns upon the every¬ day life of the person submitted to it.

Thirteen or fourteen steps may be distin¬ guished in the process of Beatification. The bishop of the diocese first inquires at to the reputation of the person proposed for virtue and miraculous powers. Then the question of <(non-cultus ® is examined ; namely whether any veneration was paid to the servant of God or whether any thing was done contrary to the de¬ crees of Urban VIII which prescribes the form of Beatification and Canonization.

As a third step the minutes of these two in¬ quiries are sent to Rome. The process is then opened before the Congregation of Rites. See Congregations, Sacred.

The Promoter Fidei (called in popular lan¬ guage the (<devil’s advocate®) is appointed. His duty is to raise objections against the proc¬ ess and person. All the works printed or in manuscript, if the nerson were an author, are then examined. If a favorable report is made, then begins what is called the Apostolic Proc¬ ess. A commission is given to the Congrega¬ tion of Rites to investigate the notoriety, real¬ ity and nature of the virtues and miracles as-scribed to the one to be beatified.

Five judges are appointed. Their findings are sent to the Congregation of Rites and examined, and arguments are heard pro and contra.

A new delegation makes another and more searching inquiry, if the result of the last ex¬ amination is favorable. The process is again returned to the Congregation of Rites to be again examined. In three successive meetings, at the last of which the Pope is present, the virtues and miracles of the subject for beati¬ fication are again discussed.

Flaving sought to know the will of God by prayer the Pope confides his judgment to the secretary of the Congregation.

In a new general assembly the question is considered whether the Beatification may pro¬ ceed without further delay. In the event of an

affirmative decision the Pope appoints a day for the ceremony, and orders a brief to be prepared setting forth the Apostolic sentence.

The Beatification takes place in Saint Peter's with ceremonies appropriate to the oc¬ casion.. Proof of at least two miracles is neces¬ sary in the case of Beatification, and before proceeding to Canonization it must be proved that at least two more miracles were wrought through the intercession of the "Blessed® per¬ son.

So strict is the examination of these mira¬ cles, that according to an Italian proverb, "It is next to a miracle to get a miracle proved in Rome.® To prove the truth of miracles worked after Beatification, the same formality and rigorous conditions are required as are neces¬ sary in the case of miracles before Beatifica¬ tion.

The three congregations or assemblies which were required before Beatification are again convoked and after mature deliberation if everything is favorable to the Cause, declare for it. A decree is drawn up by the direction of the Pope expressing that decision. Canon¬ ization then takes place in Saint Peter's.

Most solemn ceremonies mark the event and never does the venerable Basilica with its thou¬ sands of worshippers look so grand and in¬ spiring as when the Pope declares and ordains that the servant of God in question shall be in¬ scribed in the register of the Saints ("Canon Sanctorum®) and that his (or her) memory shall be celebrated on a given day in every church.

Consult the celebrated treatise of Pope Benedict XIV, (De Servorum Dei Beatifica-tione et Beatorum Canonizatione) (1734—38), the standard work on the subject; a portion of it has been translated under the title (Heroic Virtue) (3 vols., 1856) ; also Addis and Arnold, (The Catholic Dictionary) (1893) ; Aichner, Compendium Juris Ecclesiastic^ (1900); Baart, (The Roman Court > ; Bargilliat, (Prse-lectiones Juris Canonici,* Vol. 1, pp. 344-45 (1903); Bouix, (Tractatus de curia RomanaC 180 p. 183 (1880) ; Ferraris, (Bibliotheca Canon¬ ical Fornari, (Codex pro Postulatoribus) ; Gardellini, (Decreta authentica S. C. Congre-gationis RituunP ; Reiffenstiil, <Jus Canonicum UniversunP ; Schmalzgruber, <Jus Ecclesiasti-cum UniversunP ; Catholic Encyclopedia) (New York 1912). Consult also Catalogus ac Status Causarum Beatification^ (Rome

1901).

CANONS, Book of, a system of canons or rules prepared for the Church of Scotland by its bishops, in accordance with the direction of Charles I. It was published in 1636, hav¬ ing undergone revision at the hands of Arch¬ bishop Laud. It limited greatly the power of the Church courts inasmuch as their findings were now subject to ratification by the bishops, and also asserted the king's supremacy in spiritual matters. Its promulgation was felt to be arbitrary, and the strongest objections were made against it.

CANONS OF THE CHURCH OF ENGLAND, the ˆconstitutions and canons ecclesiasticalˆ drawn np in convocation in 1604 by the synod in London. These canons, still in force as revised, number 141, and were de¬ signed to confirm the established system of the Church of England, particularly through the test oath, aimed at the Puritan party, in which the clergy were sworn to subscribe willingly to the supremacy of the sovereign, to the Articles and to the Prayer-book. Consult Walcott, (The Constitutions and Canons Ecclesiastical of the Church of England> (Oxford and London

1874).

CANONS OF HIPPOLYTUS, The, a

book divided into 38 canons, believed to have been written by Hippolytus, archbishop of Rome, about the middle of the 3d century. It contains instructions in regard to the selection and ordination of Christian ministers, conver¬ sion and baptism of the heathen, rules for the celebration of the Eucharist, for fasting, *etc.* The book originally was made from a Coptic version of the Greek but has been handed down only in Arabic. It first attracted attention in the 17th century, was published in 1870 by Haneberg, who added a Latin translation, and was revised by Achelis in 1891. A German translation was made by Reidel in 1900 from new manuscript, which showed that the book had been previously thrown into disorder by the displacement of two

pages, and which also removed other difficulties upon which the theory of interpolation was based. There has been much controversy about the authorship of the book and as to whether the canons were the original form from which the Egyptian Church Order was derived, but all documents, as well as the general style of writing, point to Hippolytus as the author.

CANONSBURG, Pa., borough of Wash¬ ington County, on the Pittsburgh, Cincinnati, Chicago and Saint Louis Railroad, 18 miles southwest of Pittsburgh. Named after Col. John Canon, who plotted the town in 1789. It was the active centre in 1794 of the Whisky Insurrection. In 1802 it received a borough charter. It is situated in a rich coal region and has manufactures of sheet iron, structural steel, tin plate, stove pipes, pottery, *etc.* The original building of Rev. Dr. John McMillan's Latin School, founded in 1780, the Pennsyl¬ vania Training School, the buildings of Jeffer¬ son College founded in 1802, now part of Wash-inton and Jefferson College (p.v.), are situated here. Pop. with South Canonsburg annexed

(1920) 10,632.

CANOPIC VASES, or CANOPI, certain

large-bellied vessels found in tombs of Egypt, containing the embalmed viscera of bodies that had been converted into mummies. Four of these were placed in a tomb, each appropriated to a particular deity, and surmounted by the effigy of the head of such deity, as of a man, an ape, a jackal or a hawk. It is to those with the human head that the term canopi has been more particularly applied. They were frequently made of basalt, and decorated with figures in relievo or paintings ; . or of costly white alabaster, with spiral flutings; or they were formed from black burned clay. The name is derived from the town Canopus.

CANOPPI, ka-no'pe, Antonio, Italian scene-painter: b. 1773; d. Saint Petersburg 1832. He received his first education from his father, who was employed as civil engineer by the Duke of Modena, and after occupying him¬ self for some time with fresco-painting, was subsequently employed as scene-painter in Ven¬ ice and Mantua. Compelled to resort to flight at the time of the French invasion, he first betook himself to Vienna and afterward to Mos¬ cow, where he

was engaged in the decoration of many places, which, however, were burnt in the great fire of 1812. From that time until his death he was engaged as scene-painter of the Imperial theatre of Saint Petersburg. His most admired efforts in that branch of art were his architectural scenes for Mozart's (Magic Flute, > and for ˆemiramisP

CANOPUS. (1) In Egyptian mythology, a water-god, represented on vessels of a spheri¬ cal shape. These vessels were used by the ancient Egyptians to keep the water of the Nile in good drinking condition. The worship of Canopus was superseded under the first Ptol¬ emy by that of Serapis — a Greek inscription in honor of Serapis at Canopus having been dis¬ covered by Mr. Hamilton amid the ruins of Alexandria. (2) In ancient geography, one of the most remarkable towns of lower Egypt, near the most western mouth of the Nile, about 14 miles east of Alexandria. The name of the town is variously ascribed to the divinity of the same name and to Canopus, or Canobus, the helmsman of Menelaus, who died in Egypt of the bite of a serpent, after his return from Troy, and who was buried on the site of the town. It became important after the founda¬ tion of Alexandria, as a summer resort of doubtful reputation. It was an important port, and although the channel is now filled up, there are still ruins of the old city on the shore at Aboukir. It was the seat of a temple at Sera¬ pis (successfully excavated in 1893), whose oracle was celebrated, especially among the sick seeking for restoration to health.

CANOPUS, or CANOBUS, the. brightest star except Sirius of the first magnitude, be¬ longing to the southern constellation Argo, and invisible in the north or middle parts of the United States, on account of its nearness to the South Pole. It is one of the few brilliant stars for which no sensible parallax has been found. The name, according to Plutarch, was derived from Canopus, the pilot of Menelaus.

CANOPY, in general, any suspended cover¬ ing that serves as a protection or shelter, as an awning, the tester of a bed, or the like; espe¬ cially, an ornamental covering of cloth sus¬ pended on posts over a throne or the seat of a high dignitary, or any covering of cloth so disposed. In architecture, it is the decorative hood or cover supported or suspended over an altar, throne, chair of state, pulpit and the like; also the ornamented projecting head of a niche or tabernacle. Early English canopies are generally simple with a trefoiled or cinque-foiled heads. The triangular arrangement over an early English and decorated doorway is often called a canopy.

CANOSA, ka -nos'sa, DI PUGLIA, Italy, city in the province of Bari delle Puglie, 14 miles to the southwest of Barletta on the Adriatic.

The cathedral of San Sabino, with pavement several feet below the surface of the street, was built about 1101. In an adjacent court is the tomb of Bohemond I ; it has bronze doors by Ruggieri of Amalfi. There is a ruined cas¬ tle, built by Charles I of Naples. It was the ancient Canusium, and various relics of Roman times, including an ampitheatre, have been found. Between Barletta and Canosa was the ancient Cannae (q.v.), where in 216 b.c. Hanni¬ bal defeated the Romans. Tombs cut in rock on a hill have been found in the neighborhood, and in 1813 a beautiful burial-chamber was opened, which contained the corpse of a war¬ rior in armor. A copper lamp and a number of beautiful vases were also found here. The paintings upon the vases were the most import¬ ant part of this discovery. They refer to the Greek-Italian mysteries. The town was founded by the Greeks, and till the Second Punic War was an important commercial cen¬ tre. Pop. about 26,000. %

CANOSSA, small village in northern Italy, 12 miles southwest of Reggio. On a rock near by are the ruins of Canossa castle, which was destroyed by the inhabitants of Reggio in 1255. In the 11th century the castle belonged to Countess Matilda of Tuscany, with whom Pope Gregory was staying in 1077 when the German Emperor Henry IV came to render submission after his excommunication by the Pope. The monarch was compelled to stand barefooted in the courtyard for three days and nights before the pontiff would receive him. Bismarck in 1871 used the historic phrase, ((We are not go¬ ing to Canossa,® in a speech directed against the clerical party. Hence, <(going to Canossa® signifies submitting to humiliation.

CANOT, ka-no', Theodore, Italian adven¬ turer and slave trader: b. Florence 1807; d. 1850. His father was a French officer. He visited Boston, sailed to various parts of the world, was shipwrecked near Ostend, and again on the coast of Cuba, where he fell into the hands

of a gang of pirates, one of whom claimed to be his uncle, befriended him for some time, and finally sent him to an Italian grocer at Regia, near Havana, who was secretly concerned in the African slave trade. Canot made his first voyage to Africa in 1826, landing at the slave station of Bangalang, on the Rio Pongo, Senegambia. After quelling a mutiny on board and helping to stow away 108 slaves under 15 years of age, the young adventurer entered the service of the owner of the station. Pie visited various parts of the neighboring country, collecting by aid of the African princes a stock of slaves for his newly-established depot at Kambia near Bangalang, which in May 1828 was destroyed by fire. He afterward pur¬ chased a vessel at Sierra Leone, in which with a cargo of slaves wrested from a trader in the Rio Numez, he sailed to Cuba. Three more expe¬ ditions soon followed; in the first he lost 300 slaves by smallpox ; in the last he was taken by the French and condemned to 10 years' con¬ finement in the prison of Brest, in France, but after a vear's durance was pardoned by Louis Philippe, He returned to Africa, and was the pioneer of the slave traffic at New Sestros. After a pleasure trip to England he returned to New Sestros and in 1840 shipped to Cuba 749 slaves. He now resolved to abandon his

illicit course, and obtaining from an African chief a valuable grant of land at Cape Mount, established there in 1841 a trading and farming settlement under the name of New Florence, which in March 1847 was destroyed by the British, who suspected it to be a slave station. Canot subsequently removed to South America, then to Baltimore, Aid., and finally received from Napoleon III an office in one of the French colonies in Oceanica. Consult Mayer, (Captain Canot, or Twenty Years of an African Slaver) (1854).

CANOVA, ka-no'va, Antonio, Italian sculp¬ tor: b. Possagno, Treviso, 1 Nov. 1757 ; d. Venice, 13 Oct. 1822. He was the founder of a new school of Italian sculpture in which soft¬ ness and delicacy of expression predominate. Canova came of a family of stone-cutters and makers of small statuary. At a very early age he was taught by his grandfather to draw, design and copy the statuary in his workshop. He very early showed talent and great interest in the traditional trade of his family; and in this he was encouraged by his grandfather, who acted as his guardian, for his parents had died while he was still an infant.' Before his tenth year Canova had begun to imitate the work of his elders; and two small shrines executed by him at this period are still in exist¬ ence. From this time on he worked continu¬ ously in the shop of his grandfather, who had some knowledge of painting,

drawing and archi¬ tecture, a strong love for his profession and a desire to see his grandson distinguish himself in it. At the age of 13 the boy had already acquired a local reputation which attracted the attention of Giovanni Falieri, senator and mem¬ ber of an old patrician family, and a man of great influence in the community, who intro¬ duced him to Torretti, a local sculptor. Canova worked with and studied under the latter for two years and went with him to Venice, where Torretti died a few months later. The boy continued with Ferrari, a nephew of Torretti, who made marble house decorations. While here Canova made for his patron Falieri two statues (Orpheus } and ˆurydiceP in which the latter saw evidence of great talent, and gave him an order for more. The next three years were, for Canova, a period of study, at¬ tendance at the art and other classes in the school and of investigation in anatomy and working from natural objects; at the end of which time he presented to his patron work much superior to anything he had previously done, among them (Daedalus and Icarus,) the best known of his works of this period. As his reputation grew he turned his eyes toward Rome, then the centre of Italian art, as it is to-day. Falieri came to his aid and secured for him a pension of 300 ducats ($290) a year for three years from the Venetian Senate to enable him to continue his studies. In 1779, at the age of 22, he went to Rome with a letter of introduction to the Venetian ambassador, who became his friend and patron. There Canova applied himself to study and work with enthusi¬ asm ; and under the influence of the city, its ancient monuments, its traditions and the en¬ thusiasm inspired by Winkelmann and other students and reformers of art, the young Vene¬ tian developed rapidly and soon acquired, in the Imperial city, a reputation superior even

to that he had left behind him in Venice. (Theseus Sitting upon the Slain Minotaur5 was the first large work by Canova in Rome (1783). In 1783 he undertook the execution of the tomb of Pope Clement XIV, in the church Degli Apostoli. He retained the usual style of com¬ position, and only improved on the depraved taste of the school of Bernini. He next exe¬ cuted the group of (Cupid and Psyche,5 in

which he first displayed his own peculiar style, of which loveliness is a striking characteristic. The figures are exceedingly delicate and grace¬ ful. He was employed on a second public monument, the tomb of Pope Clement XIII, in Saint Peter's, which was finished in 1792. It is distinguished for its colossal size and sim¬ ple style. Meanwhile the fame of the artist continually increased. He established in the palace of the Venetian Ambassador a school for the benefit of young Venetians. His next works were a winged Cupid, standing; another group of (Cupid and Psyche5 ; a group of (Venus and Adonis5 for the Marchese Verio, in Naples; the tomb of the Venetian Admiral Emo, for the republic of Venice. This latter is a combina¬ tion of bas-reliefs with figures in full relief. In a very lovely (Psyche,5 standing, half-dressed, with a butterfly in her left hand, which she holds by the wings with her right, and contemplates with a calm, smiling mien and a (Repentant Magdalene,5 natural size, he has carried the expression of blending and softness to the highest degree. His (Hebe 5 is a delight¬ ful figure. In an easy and animated attitude the smiling goddess of youth hovers over a cloud, pouring nectar with her right hand into a bowl which she holds in her left. Both ves¬ sels, as well as the coronet of Hebe and the edges of her garment, are gilt. Canova is fond of a variety of material, and often endeavors to give to his statues the effect of pictures. He displaved his talent for the tragical in the raging (Hercules Hurling Lichas into the Sea.5 The group is colossal, and Hercules is some¬ what larger than the Farnesian ; but it makes a disagreeable impression, for the genius of Ca¬ nova was not adapted to such subjects. His representation of the two pugilists, (Kreugas and Demoxenos,5 is much more successful. A standing group of (Cupid and Psyche5 was the triumph of his art. Psyche here appears again holding the butterfly. In 1796 and 1797 Canova finished the model of the celebrated tomb of the Archduchess Christina of Austria, wife of Duke Albert of Saxe-Teschen, which in 1805 was placed in the church of the Augustines at Vienna. In 1803 he made the colossal statue of the King of Naples, one of his finest works, which is 15 palms high, and executed in marble. During the revolution of 1798 and 1799 Canova accompanied Prince Rezzonico on a journey through Germany. On his return he remained for some time in the Venetian territory, and painted for the church of his native village an altar-piece, in which are represented the dead Christ, the Marys, Nicodemus and Joseph and, on high, God the Father. He afterward executed, in Rome, his (Perseus with the Head of Medusa,5 which, when the Apollo of Belvi-dere was carried to France, occupied its place and pedestal. This statue increased the fame of Canova more than any of his preceding works. But Perseus is only an imitation .of the Apollo. The separate parts are of exquisite

beauty in form as well as in masterly, delicate finishing. In 1802 he was invited by Bonaparte to Paris to make the model of his colossal statue. In the beginning of 1803 the model of the Emperor's bust, and afterward that of his statue, was to be seen in the workshop of the artist. There is not a more successful work of the kind than this bust : the figure of the statue is not so good. Among the later works of the artist are a Washington, of colossal size, in a sitting attitude; the tombs of the Cardinal of York and of Pius VII; an imitation of the Medicean Venus; a (Venus Rising from the Bath5 ; the colossal group of (Theseus killing the Minotaur,5 far surpassing his earlier works in the heroic style; the tomb of Alfieri, for the Countess of Stolberg, in Florence, and erected in that place (the (Weeping Italia,5 a colossal statue in marble, is particularly admired) ; the traces Rising from the Bath5 ; the monument of the Marchioness of Saint Croce; a (Venus5 ; a (Dancing Girl,5 with almost transparent gar¬ ments; a colossal (Hector5 ; a (Paris5 ; a (Muse,5 larger than natural size; a model of a colossal (Ajax5 ; and the model of a sitting statue, in rich robes, of the Archduchess Maria Louisa of Austria. After the second fall of Napoleon, in 1815, Canova was commissioned by the Pope to demand the restoration of the works of art carried from Rome. He went from Paris to London, and returned to Rome in 1816, where Pius VII inscribed his name in the golden book of the capitol, declared him <(to have deserved well of the city of Rome,55 and made him Marquis of Ischia, with a pension of 3,000 scudi.

As a man Canova was active, open, mild, obliging and kind toward everybody. His opin¬ ion of himself was very modest, notwithstanding his fame. He assisted promising young artists, and established prizes for the encouragement of the arts. When the Pope conferred upon him the title of Marquis of Ischia, with a pension, he dedicated the latter to the support and encouragement of poor and deserving artists. Canova was also an agreeable painter, but, strangely enough, more of a colorist than a correct designer. Engraved copies of all his works have appeared in Italy and at Paris. Consult Missirini, Melchior, (Vita di Canova5 (1824) ; Cicognara, (History of Modern Sculp¬ ture5 (Venice 1825) ; Quatremere de Quincey, (Canova et ses ouvrages5 (Paris 1834) ; Tri-paldo, (Biographia degli Italiani Illustri 5 ; An-zelmi, (Opere Scelte di Antonio Canova5 (Naples 1842) ; Meyer, A. G., (Canova5 (1898) ; Borzelli, Angelo, (La Relazione del Canova con Napoli5 (1901) ; Malamani, Ba¬ nova5 (Milan 1911).

CANOVAI, ka-no-va'e, Stanislao,ˆ Italian

ecclesiastic and historian : b. Florence, 27 March 1740; d. Parma, 17 Nov. 1811. Having taken holy orders, he officiated afterward as pro¬ fessor of mathematics at Parma. In 1788, as a member of the academy of antiquities, he contended for the prize which was offered for an essay on Amerigo Vespucci. He opposed the common opinion that Columbus was the first discoverer of the New World, claiming that Vespucci one year before him had touched upon the northern part of the continent and had landed in Brazil. His paper gained the prize, but produced much discussion. He was

also the author of several books on mathe¬ matics and history.

CANOVAS DEL CASTILLO, ka'no-vas del kas-tel'yo, Antonio, Spanish statesman and man of letters: b. Malaga, 8 Feb. 1828; d. Santa Aqueda, 8 Aug. 1897. He was editor of the Conservative journal, P atria, and in 1854 entered the public service as member of the Cortes; thereafter he held various posts in the government. At his death he had been for two years Prime Minister, and had held the same position three times previously. He is author of (Literary Studies* (1868) ; (History of the Austrian Dominion in Spain) (1869) ; <Problems of the Time) (2 vols., 1884) ; <Studies on the Reign of Philip IV) (3 vols., 1888-90). He was editor-in-chief of a (General History of Spaing consisting of monographs by sundry writers (1890-97). He was assassinated at the baths of Santa Aqueda. Consult Pons y Humbert, (Canovas del Castillo* (1901).

CANROBERT, kan-ro-bar, Francois Cer¬ tain, marshal of France: b. Saint Cere in Lot, 27 June 1809; d. Paris, 28 Jan. 1895. He was educated in the military academy of Saint Cyr, and in 1828 entered the army. He had seen nearly 20 years' brilliant service in Algeria, and had actively supported the future emperor at the coup d'etat of 1851, when he received the rank of a general of division in 1853. As such he commanded the first division of the French army under Marshal St. Arnaud, sent to the Crimea in 1854; and at the battle of the Alma was wounded in the breast and hand by the splinter of a shell. On St. Arnaud's death, nine days later, Canrobert assumed the chief

command of the French army and was sent to Sweden and Denmark on diplomatic missions. According to the historian, King-lake, he deliberately retarded the progress of operations, let slip many opportunities and hampered the English — his object being to for¬ ward Napoleon's design of coming out to head a final and victorious campaign. In the war in Italy against the Austrians (1859) Canrobert had the command of the third division of the French army, and at the battles of Magenta and Solferino his corps d'armee was engaged. In the Franco-German War of 1870 he was shut up in Metz with Bazaine, and became a prisoner in Germany. He was an ardent Imperialist till the death of the Prince Imperial (1879). In 1876 he became a member of the Senate and was returned in 1879 and 1885. Consult Martin, <Le Marechal Canrobert* (Paris 1895).

CANSO, Gut or Strait of, a narrow strait or channel, about 17 miles long and 2*/2 miles in width, separating Nova Scotia from Cape Breton Island, leading from the Atlantic Ocean into Northumberland Strait. It is navigable by the largest ships, and its scenery is very beautiful.

CANSTADT, kan'stat, the name given, from Cannstatt or Canstadt, Germany, to the dolicho-cephalic or long-headed man of the Quaternary Age, whose existence was inferred from a piece of skull found near there in 1700, by Duke Eberhard Ludwig. Consult Mortillet, (Le prehistorique* (Paris 1900).

CANSTEIN, kan'stln, Karl Hildebrand von, German philanthropist : b. Lindenberg 1667; d. 1719. He studied at Frankfort-on-the-

Oder, traveled much in Europe, went in 1688 to Berlin, where he was appointed page of the Elector of Brandenburg, and served as a vol¬ unteer in the Netherlands. A dangerous sickness obliged him to leave the military service. He went to Halle, where he became familiarly acquainted with Spener and Francke, and be¬ came eager to spread a knowledge of religion among the common people. He was especially anxious that the poor should have Bibles at as low rate as possible, and thus originated the famous institution called the Canstein Bible Institution, which after the death of Canstein in 1719 became associated with the institutions founded by Francke, and still continues its benevolent operations. He wrote a (Harmony of the Four Evangelists> and a (Life of Spener. J Consult Francke, (Memoria Can

—

steiniana) (Halle 1722) and Bertram, (Geschichte der cansteinischen Bibelanstalt* (Halle

1863).

CANT-TIMBERS, in shipbuilding, those timbers which are situated at the ends of a ship. They derive their name from being canted, or raised obliquely from the keel, in contradistinction from those the planes of which are perpendicular to it.

CANTABILE, kan-ta'bi-la, in music, a term applied to movements intended to be per¬ formed in a graceful, elegant and melodious style.

CANTABRI, the rudest and most savage of all the Iberian tribes who inhabited the greater part of what is now La Montana and the northwest part of the province Burgos. They defied Roman arms for a long time, and though the campaign against them began in about 150 b.c., they were not subdued until Augustus and Agrippa had carried out a series of campaigns against them. They were in¬ cluded in a part of the province of Hispania Tarraconensis, with some measure of self-gov¬ ernment. But some time elapsed before they became romanized. In ancient history CantabYi is used to denote all of the inhabitants of the northern mountains of Spain.

CANTABRIA, the name applied to a dis¬ trict of Spain on the south coast of the Bay of Biscay, the home of the Cantabri (q.v.).

CANTABRIAN MOUNTAINS, the gen¬ eral name of the various mountain ranges ex¬ tending for a distance of over 300 miles from the western Pyrenees along the north coast of Spain to Cape Finisterre. They attain in some parts a height of about 9,000 feet, and are rich in minerals, especially copper, lead, iron and gold. Large forests of oak, chestnuts and other trees are also found on their slopes. On the western coast they are very steep and form a bold seacoast, but on the southern and eastern slopes, they are less rugged and descend gradually to the Castilian plateau. Local names are given to different portions of the ridge.

CANTACUZENUS, kan-ta-koo -za'noos, John, Byzantine emperor and historian : b. about 1292; d. about 1380. While minister of Andronicus III he negotiated a favorable peace with the Genoese in 1336, and repelled the en¬ croachments of the Turks in 1337. On the death of Andronicus in 1341 Cantacuzenus be¬ came regent during the minority of the young emperor, John Pakeologus. He defeated the

Bulgarians and Turks, assumed the diadem and entered Constantinople, victorious over his rivals, in 1346. In 1347 he became joint em¬ peror with John Palseologus, but really usurped the royal authority. He used his power with moderation, and endeavored to heal the wounds which five years of civil war had inflicted on the state'; but religious disputes, civil dissensions and foreign enemies soon disturbed his govern¬ ment ; and the jealousy of Palaeologus, the rebellion of his own son, war, plague, the frightful disorders which prevailed in the em¬ pire, and his own loss of popular favor, induced him to renounce the crown. He retired to a monastery (1355), where he employed himself in literary labors. He is considered one of the greatest among the successors of Constantine. His (Four Books of Byzantine History > were printed in 1645, and belong to the collection of the Byzantine historians. His other works, principally theological, are partly printed in the collections of Byzantine historians and partly in manuscript. Consult Pears, destruc¬ tion of the Greek Empire* (London 1903) ; Val-Paricot, (Cantacuzeme, homme d'etat et his¬ tories (1845).

CANTAGALLO, kan-ta-gal'ld, Brazil, town, Rio de Janeiro state, 100 miles by rail northeast of Rio de Janeiro. The chief industry is coffee growing; sugar cane and fruits are also cultivated and cattle and swine raised. The former gold placer mines have been ex¬ hausted. Pop. 26,000.

CANTAL, kah' tab, France, a central de¬ partment; area, 2,215 square miles; capital, Aurillac. It is named from its highest moun¬ tain, the Plomb du Cantal, Mons Celtorum of ther ancients, which rises to the height of 6,094 feet. The department is one of the poorest and least productive districts of France. The climate is rather severe near the mountains, and agriculture is in a backward state. The prin¬ cipal crops are rye, buckwheat, potatoes and chestnuts and some hemp and

flax. Of wheat and oats the product is insufficient for the con¬ sumption. In the declivities of the mountains there is excellent pasturage ; cattle, sheep, horses and mules are raised in large numbers; and on the refuse of the dairies numerous pigs are fed. The fat cattle from this department are much esteemed, and are sent to all parts of the country. Large quantities of cheese are made, and sold principally in the south of France under the name of Auvergne cheeses. There are deposits of coal and marble. Hot mineral springs are abundant, those of Chaudes-Aigues being the most frequented. Cantal is divided into four arrondissements, contain¬ ing 23 cantons and 267 communes. Pop. 223,361.

CANTALOUPE, a small round variety of muskmelon, globular, ribbed, of pale-green or yellow color and of delicate flavor; first grown in Europe at Cantalupo, in Italy. See Musk¬ melon.

CANTANI, kan-ta'ne, Arnaldo, Italian physician : b. Hainsbach, Bohemia, 15 Feb. 1837 ; d. Naples, 30 April 1893. He was educated at Prague, and was physician in the general hos¬ pital there. In 1864 he became professor of pharmacology and toxicology at Pavia ; in 1867 he was director of the clinical institute at Milan, and in 1868 of that at Naples. In 1889 he became a senator of Italy. He investigated

chiefly malaria, typhus and tuberculosis ; and was influential in introducing the methods of German medicine into Italy. He wrote (Manuale di materia medica e terapeutica) (1865) ; (Manuale di farmacologia clinica) (1885-90).

CANTARINI, kan -ta-re'ne, Simone, also known as II Pesarese, Italian painter: b. Pesaro 1612; d. Verona 1648. He studied un¬ der Guido Reni at Bologna, where he after¬ ward painted a large number of pictures, all much in the style, but without the grace and delicacy, of his master's work. His 37 etch¬ ings more closely resemble those of Guido. Throughout his life Cantarini's intolerable ar¬ rogance made him numerous enemies ; and after a quarrel with his chief patron, the Duke of Mantua, he died in Verona. Among his best-known paintings are an (Assumption * ; (A Holy Family) ; and (Joseph and Potiphar's WifeP

CANTATA, kan-ta'ta, literally, ((sung music® to distinguish it from <(sonata® or ((sounded music.® A musical term applied to an elaborate vocal composition, with different movements, arias,

recitatives, with piano ac¬ companiment. Orchestral accompaniments are also found, and in character the cantata may be anything from a short oratorio to a slight opera not intended for dramatic representation. In early times the cantata was sung by a single vocalist to the accompaniment of one instru¬ ment, in which form it was called cantata da camera to distinguish it from the church can¬ tata - which had a religious text.

CANTEEN, in the United States, a soldier's metallic water flask, containing two to three pints, and covered with a woven fabric. In England the canteen is combination pan, dish and plate, for use at mess by the army. (2) The departments of the British garrison store, usually divided into a dry canteen and wet canteen, the former being for general groceries and provisions, and the latter for liquid refreshment, excluding spirituous liquors.

Previous to 1901, beer and wine were sold at canteens in the United States army, though spirits were prohibited. In that year an anti-canteen law went into effect, as the result of temperance agitation. Strong efforts were made in 1910 and 1911 to repeal the anti-canteen law, but they were unsuccessful. The canteen was succeeded by the ((post exchange® (q.v.). The name (<canteen,® was given, during the World War, to the stores and restaurants for soldiers established at the front by such institutions as the Y. M. C. A. (q.v.).

CANTERBURY, England, cathedral city, a parliamentary and a municipal borough, and a county borough under the Local Government Act of 1888. It is situated in the eastern divi¬ sion of the county of Kent, 55 miles distant by road from London and 62 by rail. It stands on the banks of the river Stour, is 14 miles from Margate and 16 from Dover. It is connected with Whitstable by means, of a branch line of railway about seven miles in length. The town is on the lower London tertiaries.

Industries. — The district is chiefly agricul¬ tural. Canterbury was formerly noted for its silks, velvet and brocade manufacture. Breweries, linens and worsteds, leather, bricks and lime are the main industries, it is the centre of important corn and hop markets. Ex-

cepting the supply of electric light, there are no great municipal undertakings, not only the gas and waterworks but also the swimming baths being managed privately.

Churches, Buildings, Educational Institu¬ tions, *etc.* — There are 14 parish churches and various chapels. In addition to the churches, of which the most historic is Saint Martin's, built originally by the Romans, Canterbury con¬ tains a number of interesting buildings, the principal of which are ((The Guildhall® (built 1439, rebuilt 1697), Market House, Saint Augus¬ tine's College, Chaucer's Inn, the 'Chequers of the Hope (1477), and the Crown Inn, erected by Prior Chillenden in the 15th century. The only remaining city gate is the West Gate, re¬ built by Archbishop Sudbury, 1380, and now used as a Museum of Arms and Armory. Saint John's Hospital, East-bridge Hospital and Saint Nicholas Hospital at Harbledown are picturesque survivals of ancient charitable foundations.

The public library was established in 1858. The museum, which has been in existence since 1825, is, together with the public library, housed in the Beaney Institute. This institute was partially paid for out of a legacy of £10,000, left to the city by the late Dr. Beaney, a native of the city, who amassed a large fortune in Australia. The Cathedral library, which was founded in 1660, contains about 13,000 volumes, and the library at Saint Augustine's College has about 18,000 volumes. An art gallery was pre¬ sented to the town in 1882 by Mr. T. Sidney Cooper, the famous artist, who was born in the city. Attached to the cathedral is a school founded by Henry VIII, and until recently a bluecoat school founded by Queen Elizabeth, now merged into a scheme called the Simon Langton schools. Saint Augustine's Monastery has been restored and enlarged and is now used as a Church Missionary College.

Canterbury Castle, one of the largest in England, was of Norman construction, but all that now remains of it is the keep.

The Cathedral. — The most remarkable ob¬ ject in the city is the cathedral, which is one of the finest ecclesiastical structures in England. No part of the original building remains. The cathedral is built on the site of a Roman church, which was renamed Christ Church by Saint Augustine when he was elected arch¬ bishop of Canterbury. The church was de¬ stroyed by fire the year after the Norman Con¬ quest, 1067, but rebuilding was commenced three jˆears afterward and was completed in 1130. This was again destroyed by

fire four years afterward. It contains the tomb of Edward the Black Prince, 1376, also that of Henry IV and his Queen in the Trinity Chapel; the stone chair in which the archbishops are enthroned; and some beautiful 13th-century stained glass. The principal historical event connected with the cathedral is the murder of Thomas a Becket, which took place in 1170. The archbishop of Canterbury is Primate of all England and metropolitan for all the dioceses south of the Trent. See Cathedral and Church.

Government. — Canterbury sends a member to the House of Commons and is governed by a mayor, aldermen and councillors. Several charters have been granted to the city from

time to time, the first by Henry II and the last by Charles II, who granted a charter of incor¬ poration in 1686. The first mayor was elected in the year 1448.

History. — Canterbury is supposed to have been a place of importance before the Roman invasion, the Roman name Durovernitm show¬ ing apparently the British prefix Dwr, water, although antiquaries differ in the interpretation of the remainder of the compound. Druidical remains have been found here, together with the British weapons termed celts. Its import¬ ance during the Roman occupation is proved by the discovery of a great variety of remains and it is interesting to note that bricks of Roman manufacture have been found in cer¬ tain portions of the remaining walls. It derives its present name from the Saxon Cant-wara - byrig, the Kentishmen's city. During the resi¬ dence of Ethelbert, king of Kent, the memor¬ able arrival of Saint Augustine took place in 597 — an event rapidly followed by the conver¬ sion of this King and his people to Christianity and the foundation of the archiepiscopal see of Canterbury. In the 8th and the three following centuries, the city was from time to time dread¬ fully ravaged by the Danes, and on one oc¬ casion, in 1011, nearly the whole of the inhabit¬ ants, including women, children and the arch¬ bishop himself, were barbarously massacred, and the cathedral burned to its bared walls. It was gradually reconstructed and at the Con¬ quest its buildings exceeded in extent those of London. The ecclesiastical importance of the place, in particular, advanced with great rapid¬ ity, and was consummated by the murder of Thomas a Becket, whose canonization by the Pope rendered Canterbury the resort of pil¬ grims from every part of Europe. Not only were the priory and see enriched by the offer¬ ing of the wealthy devotees, but the prosperity of the town itself was greatly advanced by the money

spent in it by so many strangers. Erasmus describes the church, and especially the chapel in which Becket was interred, as glitter¬ ing with the gold and jewels offered up by the princes, nobles and wealthy pilgrims to his shrine. Henry VIII appropriated all its revenues on the dissolution of the priory in 1539, when he ordered the bones of Becket to be burned to ashes. Several of the English monarchs have made a temporary residence at Canterbury, which was also occupied by Oliver Cromwell in the civil war, whose troopers made a stable of the cathedral. Pop. (1911)

24,626.

Bibliography. — Willis, Architectural His¬ tory of Canterbury Cathedral* (1845-69) ; Stan¬ ley, (Historical Memorials of Canterbury > (1883) ; Hook, (Lives of the Archbishops of Canterbury) ; Jenkins, R., < Diocesan History of Canterbury > (1880) ; Cox, Canterbury: A His¬ torical and Topographical Account of the City) (1905); Taylor, <Canterbury) in the Mediaeval Towns Series (1912).

H. T. Mead.

Librarian of the Public Library.

CANTERBURY, New Zealand, a provin¬ cial district occupying the centre of South Island; capital, Christchurch. Its area is 14,040 square miles. The interior is mountainous, and covered with dense forests. The famous Canterbury Plain, of 2,500,000 acres, slopes

CANTERBURY CATHEDRAL

Photograph by J. Horace McFarland Co.

CANTERBURY BELLS (CAMPANULA)

gradually down over a descent of 40 miles to¬ ward the sea. A rich loamy tract, admirably adapted for agriculture and cattle grazing, ex¬ tends along the east coast, while the interior is a true pastoral country, well watered by numerous streams, and covered with a per¬ petual herbage of various grasses. A vast coal¬ field seems to underlie the whole country, and coal is worked in the districts of Timaru and Malvern. Good fire-clays, quartz, sand for glassmaking, marble, limestone, etc., are also found. The productions include wool, grain, frozen meat, skins and hides, butter, cheese and some silk. Pop. including Maoris, 173,185.

CANTERBURY-BELL, a name given to species of Campanula (q.v.), especially C. medium.

CANTERBURY TALES, The. (The Book of the Tales of Canterbury) has a per¬ manent claim on the attention of reading men. It represents the most mature and the most variously brilliant achievement of the man whom the world will always regard, and in many respects rightly, as the father of English poetry. In its structure it is, though uncompleted, the happiest scheme of the many that have been devised for presenting a series of stories in a manner at once natural, dramatic and the re¬ verse of monotonous. In its setting it intro¬ duces us to an acquaintance on terms of in¬ timacy with the society, high and low, of merry England's 14th century, an age of color, of contrasts and of essential liveliness. In its contents it offers an inviting approach, for most men probably the readiest, to the literature of the late Middle Ages, a realm of gold for all its dross, whose literary coin still bore, after its own peculiar fashion, some stamp of the antique Roman world and is still current in the world of beauty to-day.

(The Canterbury Tales,) as we know it, is a collection of 24 stories, two of them unfinished and two, for dramatic reasons, interrupted and not continued. These stories are bound to¬ gether in a scheme, only partly realized, by means of the words of the host, Harry Bailey, toast-master of the occasion ; by the talk of the pilgrims — the tellers of the tales — among themselves ; and by occasional narrative and descriptive touches on the part of Chaucer, himself a pilgrim and reporter of the whole. Though some of the stories were composed earlier, the writing of many of them and the work of weaving them all into a garland seem to have been the chief literary activity of the last 15 years of the poet's life. For death found him with the work still

unfinished.

The plan which the poet proposes at the be¬ ginning is characteristically ambitious; char¬ acteristically, again, it underwent modifications and adjustments as the work proceeded; this fact, together with the further rearrangements introduced by different copyists, makes it im¬ possible always to speak with certainty of Chaucer's final intention. But enough of the structure emerges to give to the collection as a whole vastly more significance than any one story, or all of them arranged in a manner not so original, could possibly possess. It is per¬ fectly possible for a continental critic, steeped in the literatures of the Romance tongues, to assert that he finds little in the (Tales } that is

new to him. He might be understood, if he preferred, as most English readers would not, Boccaccio's version of the story of Palamon and Arcite to that which Chaucer puts in the mouth of the Knight. He might assure us with some truth that the story of the patient Griselda is a translation and nothing more of Petrarch's Latin version of the <Decameron) story. And so he might go through the list, conceding, however, perhaps more readily than the English reader, the originality of Chaucer's adaptation of the fabliau type in the (Miller's TaleP (The Reeve's Tale) and the like, being more capable of appreciating these things in the Chaucerian spirit than the English reader' who is troubled, as Chaucer's audience plainly was not, by the indecorous character of the material upon which such splendid narrative artistry is lavished.

But to proceed thus is to refuse the poet credit for much that he has tried to do. He has not assembled his company of nine and twenty — perhaps there were a couple of priests besides — merely to treat us to a portrait gal¬ lery. High and low, every one, be it noted, succeeded in the life he had chosen, Knight, Squire, Monk, Prioress, on the one hand, Yeoman, Cook and Plowman on the other; rascals like the Friar, the Pardoner, the Summoner; professional men and tradesmen, and the never-forgotten Wife of Bath, all step before us, it is true, in the general prologue. Under the clear, encouraging eye of Chaucer they declare themselves for the folk they are, so that Dryden could see <(their humors, their features and their very dress, as dis¬ tinctly as if [he] had supp'd with them at the Tabard at Southwark.® If Chaucer had stopped here, if he had given us nothing beyond his prologue, he would still have written some¬ thing more brilliant, more sympathetic than any¬ thing that can be found in mediaeval literature before him,

but nothing essentially different from, let us say, the (Ltats du monde) of many' a French satirist. But Chaucer, fortunately, does not stop there. Having got his characters, he set out to order his material in. terms of drama. Tale was to be adjusted nicely to teller; character was to play upon character ; little personal hostilities, class prejudices, different individual reactions upon some general theme of discussion were to bring the successive stories naturally and dramatically into being, as the pilgrims took their leisurely way along the well-known road to the shrine of the martyred saint. There was to be a constant flow of narrative, washing pleasantly upon the alternate shores of fiction, grave or gay, and of the real life of his own time. This plan, as has been said, is imperfectly carried through. To have conceived it at all, however, and even in part to have given to it poetic expression is to have made a distinct and permanent contribution to the literature of the world.

The reader to-day, making his way through this ((God's plenty® of stories, serious and trivial, dignified and the reverse, will find his pleasure in tracing out some of the threads of Chaucer's interests, which make up a strand capable of giving, in spite of imperfections, unity and significance to the whole. He will start easily with the (Knight's Tale,* noting its nice adaptation to its grave, gentle, its thoroughly chivalrous teller, and he may, if he like, pass

from this sort of serious, quasi-historical romance to romance of Oriental character in the multiplied wonders of the (Squire's Tale,* to Arthurian matter in the (Wife of Bath's Tale,* and to Chaucer's gentle and searching ridicule of degenerate romance in his own (Tale of Sir Thopas.) But if he is wiser he will read the tales in their setting, interrupting with the drunken Miller the Host's well-laid plans and sharing with the Reeve his resulting indigna¬ tion, noting in the stories of both the robustness of the characters and the richness of the

social background. A like situation he will observe in the tˆles of the Friar and Summoner. With the (Physician's Tale) — and the experience will doubtless be repeated in the case of the tales of the Man of Law, the Shipman and the Man¬ ciple — he will miss the sense of delicate and inevitable adjustment; temporary assignments, stop-gaps, perhaps some of them were. But the (Pardoner's Tale) is one of the most effectively told of all, and his prologue an amazing and subtle piece of psychologizing. With it he will be interested to compare that other essay in the ((literature of exposure,® the tale of the Canon's Yeoman. (The Monk's Tale) and the (Parson's Tale> do not spring of sheer neces¬ sity from the situation, but they are excellent in character, and because informing and edify¬ ing, more delightful to contemporary readers than can nowadays be easily appreciated. And to the (Monk's Tale* the humor of the Nun's Priest, set off with all the arts of a skillful preacher on a holiday, affords a perfect foil, just as Chaucer's ponderous <Melibceus) con¬ trasts with the gaiety, imperfectly grasped by the host, of his own (Sir Thopas.* No more delicate adjustment is to be found between tale and teller than in the (Prioress's Tale,* a story current all over Europe, but here enhanced in value by the artistic uses to which it is put.

Very much on Chaucer's mind, apparently, was the problem of what to do with a certain coarse, forth-putting type of woman whose de¬ termination to carry things in her own high¬ handed way was sure to make trouble for what¬ ever member of the inferior sex she chanced to mate with. Harry Bailey has such a wife, and he has already confided some of his woes on this score to the pilgrims, when the presi¬ dent of this sect of ˆarch-wives,® the very em¬ bodiment of all their awful power, steps for¬ ward in the person of the Wife of Bath, and in good scholastic style, with full illustration from her own experiences, states her case. Such a subject will not down, and it is the clerk who makes the story of Griselda serve the end of a savage, though delicately administered, satire upon the extravagant positions advanced by the Wife of Bath. At once the Merchant cuts in with a hint of his own miseries in marriage and a story which makes clear his own theory of the bitter disillusion in store for those who trust their wives. It is possible that the (Squire's Tale,* which treats of love, some¬ thing quite apart from marriage, according to the mediaeval view, might when finished have been brought into closer relation with what goes before. It is certain that it prompts the Franklin to tell his story presenting a husband, a wife, a clerk and a squire in such an amiable light, developing at the same time a theory of mutual forbearance and trust in marriage which is the finest flower of <(gentilesse.® One can,

if one wishes, push on further and tag the (Second Nun's Tale) as presenting the ecclesias¬ tical view of marriage as something inferior to celibacy.

But it would probably be wrong to do so or to insist that Chaucer, throughout the tales discussed, felt himself constrained to a rigid, doctrinaire discussion of marriage as a problem. Fie is concerned with the expression of human character in conduct, with the relations of man to his fellow men and women, and to God. Be¬ ing of the Middle Ages he exhibits some of the conventions of the Middle Ages; the talk of his pilgrims unashamedly informs, it frankly edifies, it indulges in class satire and sex satire, it inevitably finds itself revolving around tradi¬ tional questions — how do rogues thrive in the world? how shall we make terms with fortune? how is man to succeed in civilizing woman? what is the nature of true gentility? It is impossible for Chaucer to look thought¬ fully on human conduct without proceeding in this way to raise these questions. Human conduct, again, for him, as for his time, falls naturally into the elastic and all-embracing category of the seven deadly sins. But this does not mean that Chaucer is writing a tract on marriage or a book of exemplary anecdotes to illustrate the seven deadly sins. It is unlike him to attempt anything so rigidly schematic; certainly whatever his intention he achieved nothing of the sort; it was not for nothing that Dryden called him <(a perpetual fountain of good sense.® It is this good sense of his which has led him to pierce through the conventions in which he inevitably worked to the plane of our common humanity on which all who love good literature can affectionately meet with him.

Consult Skeat, Complete Works of Geoffrey Chaucer* (7 vols., Oxford 1894), and Student's Chaucer) (complete text in one volume, Ox¬ ford 1894); Hammond, Eleanor P., (Chaucer: A Bibliographical Manual* (New York 1908) ; Kittredge, G. L., (Chaucer and His Poetry* (Cambridge 1915) ; Legouis, E., (Chaucer* (trans. by Lailevoix, London 1913) ; Tat-lock and Mackaye, (The Modern Reader's Chaucer* (New York 1914) ; Wells, John E, (A Manual of Writings in Middle English) (New Haven 1916).

Harry Morgan Ayres,

Assistant Professor of English , Columbia U niversity.

CANTHARELLUS. See Fungi, Edible.

CANTHARIDES, or Spanish Flies, the blister-beetle (q.v.), when prepared for medical use. Their value is due to the presence of a chemical principle, called canthariden, which constitutes from Y2 to \ per cent of cantharides, with the formula C10H12O4. On hydrolysis, this is converted into cantharidic acid, CioHwOo. Cantharadin is obtained by treating the pulver¬ ized insects with a solvent, such as alcohol, ether or chloroform (not water), the last being preferable. The solution is evaporated, and the residue is purified from a green oil which ad¬ heres to it obstinately, by digesting with bisul¬ phide of carbon or by redissolving in alcohol. Purification is further affected by animal char¬ coal and the cantharidin crystallized from hot alcohol or chloroform.

Cantharides is used externally for its

counter-irritant action. It must be used with discretion especially in cases of older persons, children or paralysis. It must not be used in renal disease, owing to the risks attendant on absorption. It is administered internally in cases of impotence. Its criminal employment is usually intended to heighten sexual desire, and has frequently led to death. It produces severe gastro-intestinal irritation, and has toxic qual¬ ities, the patient usually dying from arrest of the renal functions. The antidote is the admin¬ istering of bland fluids, such as milk, soda-water and plain water, to dilute the poison ip the blood.

A number of insects other than cantharides possess the vesicant property, such as the Chinese beetle (Mylabris cichorii) which is especially rich in cantharidin, yielding about twice as much as the cantharides. Our native blister-beetles, when powdered, nearly resemble Mylabris in color, and are used as adulterants to cantharides.

CANTHOPLASTY (Gr. kanthos, ((the angle of the eye® and plastikos, Normative®), the operation of slitting up the outer canthus or corner of the eye, so as to enlarge the opening between the lids, an operation proposed by Ammon when the eyelids are not sufficiently cleft, or

when the eyelids produce tension on the eyeball, as in inflammatory processes.

CANTICLE OF THE SUN, The (II

Cantico del Sole), known also as the Praises of the Creatures, is the only work in Italian that we possess of Saint Francis of Assisi. Giulio Bertoni calls it (<the most brilliant gem of the Italian religious poetry of the 13th cen¬ tury.® Renan goes even so far as to term it <(the finest piece of religious poetry since the Gospels.® Written in the Umbrian dialect of the Saint's native region, its assonanced prose and occasional rhymes constitute in its primitive form one of the oldest monuments of mediaeval Italian. It was improvised at San Damiano in the fall of 1225 at a moment of great spiritual exaltation during a reaction from a period of severe illness and mental stress. Tradition claims the last two stanzas as subsequent addi¬ tions, the final one having been composed by Saint Francis just prior to his death, 3 Oct. 1226. Consult (Mirror of Perfection Chap. Cl, CX1X, CXX, CXXIII.

In this canticle Saint Francis lays bare his own simple, naive soul, his wonderful love of inanimate nature, his artless faith and innate mystic love. He raises to the Creator a paean of praise for the light of the sun, the moon and stars, the air and clouds, rain and fire, for mother earth, for those who forgive and endure in peace, and finally for the bodily death ((from which no living man can flee.® In the loftiness of its inspiration the (Canticle of the Sun} must be compared to Psalm 148 of David. Like the famous <Fioretti) of Saint Francis, a work of later date, the (Canticle of the Sun) has touched the souls of men and has preserved in Italian hearts the popular tradition of their great Saint. It became in his last davs the favorite song of Saint Francis, and must be regarded as the mes¬ sage of the Saint himself in all his joyousness, his hopefulness, his broad sympathy toward all things, his feeling for universal brotherhood. We must not look for great literary merit in this canticle. Francis was not a man of learning,

nor in those primitive times was the art of verse in the vernacular sufficiently developed to be compared with the perfected compositions of the following century. Yet in his religious poetry Saint Francis is of the lineage of Jaco-pone da Todi, his Franciscan successor, who in turn is the precursor of Dante (consult (Par-adiso, > canto XI). For a critical study of the writings of Saint Francis consult Robinson, Paschal, (The Writings of Saint Francis of Assisi* (Philadelphia 1906). For the Italian original text consult Sabatier, Paul, speculum

perfection^ (Paris 1898). For an English translation consult Cuthbert, (Life of Saint Francis of Assisi > (1914).

Alfred G. Panaroni.

CANTICLES. One of the canonical books of the Old Testament. The name is derived from the Latin canticula, plural of canticulum, ((a little song.® In the Vulgate it is called canticum canticorum, ((song of songs.® This is a literal translation of the Hebrew title which is generally understood to mean (<the best song.® It may, however, signify ((the best songs,® if the first word is taken in a collective sense, as it probably should be in the superscription ((Songs of the Ascents® in the Pilgrim Psalter (Pss. cxx-exxxii). The Alexandrian MS of the Greek version has the plural ; the Old Latin apparently rendered the title canticula cantic-ulorum; and the Targum paraphrases it ((songs and hymns which Solomon uttered.® This is likely to be the original meaning. When the name of Solomon was added, it may have been the intention to characterize the collection as the choicest of the 1,005 songs ascribed to this monarch in 1 Kings v, 12. The conception of the work as a unit naturally led to understand¬ ing the title in the former sense. At the time when the canon was reduced as a result of the critical inquiry caused by the idea that holy books possessed a sanctity rendering it improper to touch profane things without a ceremonial washing after they had been handled, the ques¬ tion of canonicity arose ; but it was settled at the Council of Jamnia (c. 90 a.d.) in favor of the book, probably through the weight of the traditional authorship and the allegorical inter¬ pretation R. Akiba seems to have adopted. Whenever in earlier times the allegorical exegesis was rejected, there was a tendency to question again the canonicity. To-day the literal sense is generally accepted, and most modern interpreters either look upon the love expressed in the poems as typical of spiritual devotion or seek for no ulterior significance, feeling with the historian Niebuhr that <(something would be missing in the Bible, if there were not in it some expression of the pro-foundest and strongest of human emotions.® There is no intimation of anything but the obvious meaning in the oldest Greek version, and the book is not mentioned by Philo or in the New Testament. But R. Akiba affirmed that the whole world was not worth the day when it was given to Israel, since all Scriptures were holy but this the holiest of all ((Yadaim) iii, 5), and declared that (<whoever sings from the Song of Songs in the wine-houses and makes it a (profane) song shall have no share in the world to come® ((Tosephta Sanhedrin) xii). He no doubt saw in the book a descrip¬ tion of the love of God and Israel, and this

continued to be the interpretation in the syna¬ gogue. Hippolytus (c. 200 a.d.) applied it to the relation of Christ and the Church. In spite of his suggestion that the literary form is that of an epithalamium, Origen rejected the literal sense as inadmissible, and explained that ac¬ cording to the moral or tropological sense the love of the soul for the heavenly bridegroom was represented, and according to the mystic sense the union of Christ and the Church. The mediaeval church also saw the love of Christ and the Virgin Mary depicted in the book. Bernard of Clairvaux wrote 86 sermons on it. A fine type of mystical interpretation is found in Teresa de Qepeda's commentary on the first chapter. Nicolaus de Lyra saw in the poem a prophetic adumbration of the course of ec¬ clesiastical history, and Cocceius discovered in it the history of the Church down to the synod of Dort in 1618 a.d., just as the author of the Aramaic Targum had found in it the history of Israel down to 586 b.c. In the same way ingenious exegetes have discerned veiled de¬ scriptions of the political courting of the 10 tribes by Hezekiah, or of Samaria by Tirhaka. A different method was suggested by Honorius of Autun (died 1140), who held that the literal sense might be accepted, if a typical significance were attached to it, and this view has been adopted by Vatable, Bossuet, Lowth and many Catholic and Protestant scholars in recent times. The type may then be thought of either as having already been in the mind of the author or only subsequently recognized. From the former standpoint a comparison has been made, e.g., by Harper with the poems of Hafiz, Jami and Jeyadeva, where a double meaning seems to be intended, while the recognition of an original literal sense, having no mystical mean¬ ing, afterward legitimately receiving an addi¬ tional typical significance, is characteristic, e.g., of Gigot's interpretation.

Theodore of Mopsuestia (d. 429) refused to recognize any other than the literal sense. For this he was condemned by the council of Constantinople in 553. Some of the Anabaptists seem to have taken the same view. Sebastien Chateillon recognized the secular character of the poem, and for this offense he was driven out of Geneva through the influence of Calvin. Luis de Leon (d. 1591) made a Latin translation of it for a sister in a convent with¬ out suggesting any

mystical sense, and was in¬ carcerated by the Inquisition for five years as a punishment. Jean le Clerc maintained that only earthly love was depicted in the songs ; and J. D. Michaelis, regarding the work as in part obscene, was unwilling to give it a place in his translation of the Bible. The growing con¬ viction that the poet, or poets, had no other purpose than to depict the love of man and woman has not strengthened this feeling as regards the book ; * on the contrary there has been during the last century a decidedly higher estimate of its moral worth as well as a greater admiration of its literary charm.

On two important points there is as yet no consensus of opinion. Is Canticles a drama or a mere collection of lyrics? And is the love described that of husband and wife, a bride¬ groom and a bride, a betrothed couple, or only that of man and woman. Caspar Sanctius, in 1616, affirmed that Canticles was a sacred drama; Cornelius a Lapide (d. in 1637)

divided it into five acts ; Laurentius Petraeus, a Danish pastor, arranged it in dramatic form, translated it metrically and set music to it in 1640; Huet, in 1670, declared it to be a drama; Hermann von der Hardt (before 1706), an anonymous Breslau pastor in 1720, G. Wachter in 1722, and Nicholas Nonnen in 1725 presented various attempts to indicate a plot. A shepherd lover as a rival of Solomon was introduced by J. F. Jacobi in 1771. While Franz Delitzsch gave the most perfect expression to the type of dramatic construction which made Solomon and Sulamith the real lovers, it was largely through £wald that the idea of a heroine, faithful to her absent shepherd in the face of the blandish¬ ment of the infatuated despot, became widely popular. It furnished an ethical motive, pre¬ sented a moral struggle and suggested the ulti¬ mate triumph of virtue. Duhm in 1902 and Driver in 1910 still adhere to this view. The chief difficulties that have been raised against it are that the ancient Hebrews possessed no theatre ; Canticles has no plot, on which two interpreters can agree ; Solomon's character and conduct are unintelligible ; Sulamith's speeches, ostensibly answering his, in reality addressed to her absent friend, place her in an absurd situa¬ tion and a morally dubious light; the tone of the King's words, those assigned to the shep¬ herd, and those placed on her own lips is very much the same ; and the necessity for putting her to sleep on the stage, to dream through entire scenes, is not less embarrassing because these scenes are so short that they can scarcely have occupied more than a minute or two.

Already Bossuet and Lowth suggested that Canticles may have been

written for a royal wedding, and divided it in sections for the seven days of the festival. Renan (1860) threw out the idea that it may be the libretto of a simple play performed at some rural wedding, where the singers took the parts of Solomon's guards, ladies of Jerusalem and others. He was in¬ fluenced by Charles Schefer who had seen such performances in Egypt and in Syria. In 1873 J. G. Wetzstein described, in an article on the <(Syrian Threshing Table® a wedding at El Hamma, near Damascus. On the morning after the wedding night the husband and wife played king and queen, sitting upon the threshing table as a throne, dancing and listening to songs in their praise. At a Jewish wedding in Tunis similar ceremonies were observed by Saint Haon in 1882 ; though there was no sword-dance by the bride. Especially through Budde the view has gained much currency that Canticles is a collection of songs brought to¬ gether by an old wedding poet from his lore. This scholar insists that throughout the col¬ lection wedded love is described. All pictures of natural scenery are covered allusions to the complete satisfaction of the sexual instincts in wedlock. The purpose is to commend matri¬ mony^ Against this view it has been urged that it is difficult to see wedded love in scenes which describe the husband, according to the theory, as knocking at his wife's window and being re¬ fused admittance because she is not dressed, or the wife as expressing a wish that he were her brother so that she might kiss him without being reproved.

According to Luis de Leon (1569), Rene Rapin (1659), Charles Cotin (1662), Richard Simon (1678), Jean le Clerc (1685), Claude

Genest (1707), J. T. Lessing (1777), J. G. Herder (1778), E. Reuss (1879), W. W. Baudissin (1901), L. Gautier (1906), Paul Haupt (1907), N. Schmidt (1911) and H. Gressmann (1913), Canticles is an anthology of love-songs, idyls, eclogues or madrigals. Reuss has especially called attention to the poet's peculiar manner of making the woman with whom he is in love the speaker by preference. There is an un¬ mistakable. similarity of this diwan to the ((Anthologia Palatina.55 Greek influence seems certain ; it is not impossible that

the poet had heard some idyl of Theocritus ; and his sense of beauty in nature reminds of Meleager. Nevertheless, it may not be safe to go as far as to the reign of Aretas IV (c. 85-63 b.c.), while it would seem necessary to assume a date later than the 3d century b.c. The language, with its Aramaisms, neo-Hebraic turns, and Persian and Greek loanwords appears to be as late as the 2d century b.c. But if the author lived in the East-Jordan country this appearance mav to some extent be due to dialectical differences. There is no hint that he was a married man, or a wedding poet. He did not sing to teach the value of a social institution, but to voice, in the most delicate and beautiful terms he could master, the joy with which the glories of spring and the impulses of love filled his heart. The mention of Solomon by way of comparison naturally led to the idea that he, who had so much experience with love, was the author, and Solomon's reputation for wisdom led to the search for a hidden meaning. This meaning made it appropriate to read the book at the Passover when the intimate relation between Yahwe and Israel was celebrated. There does not seem, therefore, to be any occasion on this account to suspect, as Erbt and Sellin do, that originally these songs were composed in honor of a sun-god and a moon-goddess whose nuptials were celebrated at the feast of the vernal equinox.

Bibliography. — Baudissin, W. W., (Einleitung in die Bucher des A. TP (Berlin 1901) ; Castelli, I., (I1 cantice dei cantici5 (Milan 1892) ; Cornill, C. H., (Einleitung in das Alte Testa¬ ment (7th ed., 1913) ; Comely, R., Hntroductio in V. T. Libros Sacros5 (Paris 1897) ; Cunitz, Edouard, (Histoire critique de l'interpretation du cantique des cantiques5 (Paris 1834) ; Delitzsch, Franz, (Hoheslied und Ko-heleth5 (Leipzig 1875) ; Driver, S., (Introduc¬ tion to the Old Testament (New York 1910) ; Ewald, Heinrich, (Dichter des alten Bundes) (Gottingen 1871) ; Erbt, W., (Die Hebraer5 (Leipzig 1906) ; Gautier, L., Hntroduction a l'Ancien Testament (2d ed., Lausanne 1914) ; Gietmann, E., Commentarius in Ecclesiasten et Canticum canticorunt (Paris 1890) ; Gigot, F. E., Hntroduction to the Study of the Old Testament (New York 1906) ; Ginsburg, F., (The Song of Songs5 (London 1857) ; Gratz, H., <Das Salomonische Hoheslied) (Leipzig 1839) ; Harper, A., (Song of Solomon5 (Cam¬ bridge 1902) ; Haupt, Paul, in American Journal of Semitic Languages (Chicago 1902) ; id., (Biblische Lie'beslieder5 (Leipzig 1907) ; Her¬ der. J. G., (Lieder der Liebe5 (Leipzig 17781 : Hontheim, L, (Song of Solomon) (London 1908) ; Kaulen, F., and Hoberg, G., (Einleitung in die heilige Schrift (5th ed., Freiburg 1913) ;

Martineau, Russell, in American Journal of Philology (Vol. XVIII, 1892) ; Martin, G. C., (Song of Songs5 (New York 1906) ; Moore, G. F., (The Literature of the Old Testament (ib., 1913) ; Renan, E., (Le cantique des can¬ tiques5 (Paris I860) ; Reuss, Edouard, (Le can¬ tique des cantiques) (Paris 1879) ; Schmidt, Nathaniel, (Messages of the Poets5 (New York 1911) ; Sellin, E., (Einleitung in das Alte Testa¬ ment5 (Leipzig 1914) ; Siegfried, K., (Prediger und Hoheslied5 (Leipzig 1898).

Nathaniel Schmidt,

Professor of Semitic Languages and Literatures, Cornell University.

CANTIUM, can'ti-um, England, an ancient territory in South Britain, whence the English word Kent is derived, supposed to have been the first district which received a colony from the Continent. See Kent.

CANTO FIGURATO, fe-gu-ra'to, a term applied by the old Christian ecclesiastics to the chant in its more florid forms, or in which more than one note was sung to a syllable.

CANTON, John, English electrician: b. Stroud, 31 July 1718; d. 22 March 1772. He settled as a schoolmaster in London, and was elected a fellow of the Royal Society in 1749. He invented an electroscope and an electrom¬ eter; originated experiments in induction; was the first to make powerful artificial magnets; and in 1762 demonstrated the compressibility of water. He and Franklin discovered almost simultaneously that some clouds were charged with positive and others with negative elec¬ tricity.

CANTON, William, English writer: b. Isle of Chusan, China, 27 Oct. 1845. He was edu¬ cated in France for the Roman Catholic priest¬ hood, but decided upon a secular career and was for many years on the staff of the Glasgow Herald. He is author of (A Lost Epic and Other Poems5 (1887) ; (The Invisible Playmate,5 a strikingly original piece of work (1894) ; (W. V., Her Book, and Various

Verses5 (1896) ; (The Invisible Playmate, and W. V., Her Book> (with final chapter) (1897) ; (A Child's Book of Saints,5 republished in the United States as (W. V.'s Golden Legend5 (1898); Children's Sayings5 (1900); CA Child's Book of Warriors5 (1912) ; (Saint

Elizabeth of Hungary5 (1912) ; (The Bible and the Anglo-Saxon People5 (1914).

CANTON, China (more correctly Quang-chow-foo) , a large and

important city on the Pearl River, at a distance of 80 miles from the sea. It is. situated in the province of Quang-tung (of which name Canton is a corruption), and consists of the city proper and of many suburbs, and its total population is estimated at from 1,250,000 to 1,800,000 with 500 foreign residents. The city proper is enclosed by walls, forming a circuit of six miles, and is divided into two parts by a partition wall running east and west ; the portion north of this wall, which is much the larger, being called the old, that on the south of it the new city. The walls mainly of brick, rise to the height of 25 feet, with a thick¬ ness of about 20 feet. There are 12 gates, all of which are shut at night. The streets are long and straight and in general paved with flat stones, but they are very narrow, the average brpadth not exceeding eight feet. The

houses of the poorer classes are mere mild hovels; those of the shopkeeping class are com¬ monly of two stories, the lower of which serves as the shop. The streets are to a great extent lined with these shops, in which are to be found the productions of all parts of the globe. Neat and gaudily painted signs and names give a gay appearance to the narrow streets ; in most cases there are no windows in front, but the whole is thrown open by day and closed at night. Temples and other religious edifices are very numerous, but few of them are in any way remarkable. There are two lofty pagodas, forming a notable feature in any general view of the city. One of these, 170 feet high, is about 1,300 years old, the other, 160 feet high, about 1,000. Among the chief temples, which are far from attractive buildings, may be men¬ tioned those of the Ocean Banner, of the Five Hundred Gods, of Longevity and of the Five Genii. Among other buildings may be men¬ tioned the residences of the governor-general, the commander-in-chief, the treasurer, the pre¬ fect, *etc.* There are four large prisons, one of them capable of holding 1,000 prisoners. In the European quarter are churches, schools and other buildings in the European style. Wheeled carriages are not in use in Canton ; goods are transported on bamboo poles laid across the shoulders of men, while people who can afford it have themselves carried about in sedan-

chairs. The river opposite the city for the space of four or five miles presents a most interesting scene. The prodigious number of boats with which it is crowded is the first thing that strikes the eye. A large number of these — as many, it is said, as 40,000, containing a population of 200,000 — are fixed residences, and most of them moored stem and stern in rows. The inhabit¬ ants are called tankia or boat-people, and form a class with many customs peculiar to them¬ selves. Millions are born and live and die in these floating dwellings without ever having put foot on dry land ; while their ancestors for generations were all amphibious like themselves. The family boats are of various sizes, the bet¬ ter sort being from 60 to 80 feet long, and about 15 feet wide. A superstructure of considerable height, and covered with an arched roof, occu¬ pies nearly the whole of the interior of the boat. This structure is divided within into several apartments, devoted to different domestic pur¬ poses, all of them being kept very clean. The smaller boats of this description are not above 25 feet long, and contain only one room. By far the handsomest boats are the hwa-ting or flower-boats, which are graceful in form and have their raised cabins and awnings fancifully carved and painted. These are let to pleasure-parties for excursions on the river. The foreign mercantile houses and the American, British and French consulates have as their special quarter an area in the suburbs in the southwest of the city, with water on two sides of it. The river banks are faced with a granite wall ; hand¬ some hongs or factories have been built, and much money has been spent on improvements. The manufactures and other industries of Can¬ ton are varied and important, embracing silk, cotton, porcelain, glass, paper, sugar, lacquered ware, ivory carving, metal goods, *etc.* Its foreign trade has been known for three cen¬ turies throughout the world, and it was the chief foreign emporium in China. until 1850,

when Shanghai began to surpass it. Since then the opening of other ports and various other causes have interfered with its prosperity, but it still carries on a large traffic, its exports and imports together amounting in 1912 to about $50,000,000, and its total trade to upwards of $70,000,000. Business transactions between na¬ tives and foreigners are transacted in a jargon known as ˆpidgin-EnglishT Since the estab¬ lishment of the colony of Hongkong there has sprung up quite a flotilla of river steamers, which ply daily between Canton, Hongkong and Macao, and convey the greater part of the produce and merchandise for native and foreign consumption. These steamers equal the best-river boats of Europe, and carry large numbers of passengers. The climate of Canton is healthy; in July and August the

thermometer may rise to 100° F. in the shade, and during winter it is at times below freezing-point. Can¬ ton was first visited by English vessels in 1634. From 1689 to 1834 the East India Company had a monopoly of the English trade. In 1839 war was declared by Great Britain against China, and Canton would have been occupied had it not been ransomed by the Chinese. In the war of 1856 the foreign factories were pillaged and destroyed, and about a year after this Canton was taken by an English force. From this time to 1861 it was jointly occupied by an English and French garrison. Since then it has been open to foreign trade. Of revolutionary move¬ ments that have affected the political life of China Canton has been the centre.

CANTON, Conn., town, Hartford County, on Farmington River and on the Central New England Railroad, 15 miles northwest of Hart¬ ford. The manufacture of edged tools and the bottling of plain and carbonated waters are thriving industries. The town includes the village districts of Canton, Canton Centre, North Canton and Collinsville. Pop. 2,732.

CANTON, Ill., city of Fulton County, sit¬ uated on the Chicago, B. & Q. and the Toledo, P. & W. railroads, 28 miles west of Peoria. It is the trade centre of the fertile agricultural and coal-mining region ; and has numerous indus¬ trial interests, including a large manufactory of agricultural implements, cigar factories and several lesser plants. The United States cen¬ sus of manufactures' for 1914 reported 34 in¬ dustrial establishments of factory grade, em¬ ploying 1,113 persons, of whom 920 were wage earners, receiving $829,000 annually in wages. The capital invested aggregated $9,733,000, and the year's production was valued at $2,577,000: of this, $1,451,000 was added by manufacture. It has a public library, a high school and municipal waterworks. Canton was settled in 1832, first incorporated in 1849 and is governed under a charter of 1892, providing for a mayor, elected every two years, and a city council. Pop. (1920) 10,928.

CANTON, Mass., town in Norfolk County, about 15 miles southwest of Boston, on the New York, New Haven and Hartford Railroad. It includes several villages. The town contains a public librarv, the Massachusetts Hospital School and has manufactories of felt goods, cotton padded goods, blacking, woolens, rubber goods, patent and enameled leathers, electrical supplies, fire hose, *etc.* Canton was settled about 1690 and was separated from Stoughton

in 1/97 and incorporated. The waterworks are the property of the town, the government of which is carried on by town meetings. Pop. 5,945. Consult Huntoon, (History of the Town of Canton) (Cambridge 1893).

CANTON, N. Y., village and county-seat of Saint Lawrence County, on Grass River, and the Rome, W. & O. Railroad, 59 miles northeast of Watertown. It is the seat of Saint Lawrence University, a State school of agriculture, a government weather bureau, and has large flour and lumber interests, boat building industries, a national bank, a public library, county almshouse, several churches and an assessed property valuation of over $3,000,- 000. Canton was settled in 1803 and incor¬ porated in 1846. Pop. 3,000.

CANTON, Ohio, city, county-seat of Stark County, on the Nimishillen Creek, and on the Pennsylvania, Wheeling & Lake Erie, Baltimore and Ohio railroads, 60 miles southeast of Cleveland. Interurban electric railroads con¬ nect all cities and towns within a radius of 50 miles. The commercial centre of the second richest agricultural county of Ohio, also rank¬ ing among the six richest of the nation, Canton has an extensive grain trade, and manufactures of brick, sheet steel and iron, watches, enamel ware, roller bearings, safes, bridges, toys, knives, *etc.* The total manufacturing output is valued at $52,000,000 annually. Neighboring deposits of coal, limestone and pottery clay are also extensively worked. An immense plant supplies electric light and power, natural gas is piped at a domestic rate of 30 cents; an artesian water supply is maintained and operated by the municipality, and a fire department with a modern motor-equipped apparatus. Bank clearings in 1915 amounted to $95,873,208, an increase of $16,000,000 over 1914; bank de¬ posits totaled $27,000,000, resources over $30,- 000,000. Canton was the home of President McKinley and one of the city's features is the stately National memorial erected in 1907 on Monument Hill in West Lawn Cemetery, where the President and his wife are buried. Of granite, with a bronze statue of the President and with two sarcophagi containing the bodies, the monument stands in beautiful grounds covering 26 acres; from the lowest step it reaches a height of 163 feet 6 inches and 78 feet 9 inches in diameter. The memorial to the American soldiers of the Spanish-American War is also noteworthy. The city's principal

buildings include the Federal building, city hall, city auditorium, county administration building, public library, high and other schools, several theatres, numerous handsome churches which cost $250,000, membership 1,500. Nimisilla park and Meyer's Lake park are at¬ tractive outing resorts. Canton was settled about 1805, was incorporated as a village in 1822 and received a citv charter in 1854. It is administered by a mayor and nine aldermen, elected under a law of 1902. Pop. (1920) 87,091.

CANTON, S. D., city, capital of Lincoln County, on the Chicago, M. & Saint P. Rail¬ road, and on the Sioux River, 20 miles from Sioux Falls, is the seat of Augustana College and of the government asylum for insane In¬ dians. The city owns its waterworks and has a Carnegie library, a handsome courthouse, churches, public schools and important manu¬

factures of concrete, engines and agricultural implements. The commission form of govern¬ ment exists since 1909. Pop. (1920) 2,225.

CANTON, a small division of territory, constituting a distinct state or government, as in Switzerland, where each of the 22 states is so designated. In France judicial districts comprising a number of communes, but consti¬ tuting in the case of very large cities only a part of such commune, are called cantons.

CANTONI, kan-to'ne, Carlo, Italian phi¬ losopher: b. Gropello 1840; d. 1906. He studied law and philosophy at Turin, and philosophy at Berlin and Gottingen (under Lotze). He was professor at the lyceum at Turin, and in Milan ; since 1878 he has been professor of philosophy at the University of Pavia. In his philosophi¬ cal theory he agrees in general with Kant, ex¬ cept his theory of phenomenon and noumenon. He wrote (G. Battista Visco, studii virtu e com-parazione) (1867) ; (Corso elementare di filosofia) (1870) ; Giuseppe FerrarP (1878) ; (Emanuele KanL (1879-84).

CANTONMENT, the district in which troops are quartered when they are not col¬ lected into a camp, but detached and distributed over the neighboring towns and villages. The object of sending troops into cantonments is to be able to concentrate them as quickly as pos¬ sible on one spot, when circumstances do not admit of a camp being formed, or do not render it advisable to form one. In India the perma¬ nent military stations erected in the neighbor¬ hood of the principal

cities are so called. The larger types contain barracks for European cavalry, infantry and artillery, houses for offi¬ cers, huts for native troops, gymnasiums, store¬ houses, parade grounds and administrative buildings.

CANTOR, Georg, Russo-German mathe¬ matician : b. Saint Petersburg 1845. After 1879 when he became professor of mathe¬ matics at the University of Halle, he orig¬ inated the theory of assemblages or systems of numbers which may contain — as does the universe — a finite or an infinite number of numbers, or an infinity of such infinities ; this last class he termed transfinite numbers and made a classification of the systems, relating the potency or degree of infinitude of each. His learned contributions appear chiefly in the Mathematische Annalen.

CANTOR, Moritz, German mathematician: b Mannheim 1829. From 1853 he was pro¬ fessor of mathematics and privat-docent in the University of Heidelberg and became widely known by the standard (Geschichte der Mathe¬ matic — History of Mathematics, which brings the subject down to the year 1799 (4 vols., Leip¬ zig 1880-1909).

CANTU, kan'too, Cesare, Italian historian, poet and philosopher: b. Brivio, 7 Dec. 1804; d. 11 March 1895. He was educated at Sondno in the Valtellina, where he taught belles-lettres at a youthful age, resided afterward in Como, and next at Milan until 1848. One of his earliest works, entitled (Ragionamenti sulla Storia Lombarda nel Secolo XVII) ((Lec¬

tures on the History of Lombardy in the 17th Century*) appeared in a second edition in 1 842—44, and contained liberal ideas that brought upon tke author the animadversion of the Aus-

trian government, which condemned him to a year's imprisonment. During his confinement he composed a historical romance, entitled (Margherita Pusterla) (1845), which became very popular. His great

work, on which his reputation will chiefly rest, (Storia Universal (ˆUniversal History*) appeared first in 1837, at Turin. It has been since revised and re¬ printed at Palermo and Naples, and translated into German. A French translation by Aroux and Leopardi was published in Paris in 1843. Cantu became director of the archives of Lom¬ bardy in 1874. Other works are (Storia degli Italiani* (1854) ; (The Last One Hundred Years* (1864); (The Italian Heretics) (1866-68), and monographs on various men of letters. Consult Bertolini, (Cesare Cantu e le sue opere) (1895). See Margherita Pusterla.

CANTUS FIRMUS, an ancient chant of the Roman Catholic Church. These chants were adopted as standing melodies, and until counterpoint was discovered, were unaccom¬ panied, or only harmonized with octaves.

CANUCK, a term sometimes used in the United States to denote a Canadian.

CANUTE IV, Saint, King of Denmark 1080-86. He suppressed the ancient heathen customs of his people, and thus aroused opposi¬ tion ; .in 1085 he started on an expedition against William the Conqueror, but was murdered by rebels in his own army in 1086. He was canon¬ ized in 1100 and in the Middle Ages was con¬ sidered the patron saint of Denmark.

CANUTE, ka -noot ‘, THE GREAT, Knud, or Knut, the second king of Denmark of that name, and first Danish king of England : b. in the former country, about 995 ; d. Shaftes¬ bury, England, 1035. He was the son of Sweyn, King of Denmark, and accompanied his father in his victorious campaigns in England. Sweyn, having proclaimed himself king of England, died in 1014, before his power was established, and appointed Canute his successor there. The latter was immediately driven out by Ethelred, the representative of the Saxon line, and fled with 60 ships to the court of his brother, Harold, king of Denmark. Harold enabled him to collect a large fleet in the north to prosecute his cause in England. He invaded that country anew in 1015. He fought many battles with Edmund Ironside, who had suc¬ ceeded his father, Ethelred, in 1016, and was finally victorious at the battle of Ashington. After this battle, Edmund and Canute agreed upon a division of the kingdom. To Canute were assigned Mercia and Northumbria, while the Saxon Prince reserved West and East Anglia. By the death of his brother Harold, he obtained the crown of Denmark (1016). In the same year, and but one month after the ratification of the treaty of partition, Edmund died, and Canute became sole king of

England without further resistance. He refrained from murdering the children of his late rival, and sent them to his half-brother, Olave, king of Sweden. He put awav his wife, Alfgive, the daughter of the Earl of Northampton, and es¬ poused Emma, the widow of Ethelred, the Saxon monarch (1017), on the condition that their children should succeed to the throne of Eng¬ land. He made the greatest exertions to gain the affections of his English subjects, to whom his Danish origin was no recommendation. He

accordingly disbanded his Danish army, retain¬ ing only a bodyguard. He endeavored to blend the two races as far as possible and to induce them to live in harmony with each other. He erected churches, and made donations to abbeys and monasteries on the scenes of former conflicts and massacres. In a witenagemote at Winchester, he compiled a code of laws which is still extant. In this code he denounced those who kept up the practice of pagan rites and superstitions, and forbade the sending of Christian slaves out of the country for sale. Al¬ though Canute srenerally resided in England, he made frequent visits to Denmark. He carried with him on these occasions an English fleet, English missionaries and English artisans. He promoted three Englishmen to the newly-erected oishoprics of Scania, Zealand and Fionia. In 1025 he was attacked bv the King of Sweden and defeated; but in the night, Earl Godwin, at the head of the English contingent, sur¬ prised the Swedish camp and dispersed the enemy. His absence from Denmark, and the bestowal of so many dignities in Denmark upon his English subjects, made him unpopular in that kingdom. To appease this discontent, he left behind in Denmark his son, Hardicanute, then aged 10 years, under the guardianship of his brother-in-law, Ulf (1026). In this year he made a pilgrimage to Rome. He was well received there by the Pope, John, and by the Emperor, Conrad II, who gave up to the Danish King all the country north of the river Eider. From the Pope he obtained privileges for the English school established in Rome, and an abatement of the sums demanded from his archbishops for the pallium; and from the various princes, relief for all English and Dan¬ ish pilgrims and merchants from all illegal tolls and detentions which they had endured on their route to Rome. Fie returned from Rome to Denmark. In 1028 he made an expedition into Norway, expelled Olave and restored Haco who swore allegiance to him. In 1029 he re¬ turned to England, and his Danish subjects proclaimed Hardicanute king of Denmark. Canute immediately returned to Denmark, put down the revolt and executed the traitor, Ulf. In 1030 Canute was acknowledged king of Nor¬ way, and laid claims to the crown of

Sweden. On returning again to England, he allowed his son Hardicanute to share with him the Danish crown. His reign is very important in the con¬ stitutional history of Denmark. Canute issued the first national coinage of Denmark, and pub¬ lished the first written code of Danish law wherein the custom of private vengeance was prohibited. He raised the clergy in their cor¬ porate capacity to a separate estate of the realm, and instituted the Thinglith or royal guard of 3,000 men. The members of this body were all men of good family and rich enough to equip themselves at their own expense. From them sprang the Danish order of nobility; they were tried only by their peers and formed with the king the highest court of justice. Canute's last compaign was against Duncan, king of Scotland, respecting the possession of Cumber¬ land, but before the armies could engage the two kings were reconciled, and ancient stipula¬ tions concerning the tenure of Cumberland were renewed (1033). Canute was buried at Win¬ chester. By Emma he had two children, namely, Hardicanute or Canute the Hardy and

a daughter, Gunhilda, married to Henry, the son of Conrad II, of Germany, Emperor. By Alfgive he left two sons, Sweyn and Harold. To Sweyn was given the crown of Norway; Hardicanute retained that of Denmark, and Harold, surnamed Harefoot, took possession of that of England. Canute is most popularly known, not by his extended rule and legislative enactments, but by the familiar story of the monarch, the courtiers and the disobedient sea. Consult Larson, (Canute the Great) (New York and London 1912) ; Freeman, (The Norman ConquesD (Vol. I, Oxford 1870) ; Green, (The Conquest of England) (London 1883).

CANVAS, a textile fabric made of the fibres of hemp; or any strong, firm cloth, whether of hemp or flax. It is chiefly used for tents, and for the sails of sailing vessels, for which its strength makes it well adapted. Canvas for sails is made from 18 to 24 inches wide, and numbered 0 to 8, No. 0 being the thickest. A bolt is 39 to 40 yards long, and weighs 25 to 48 pounds. Varieties of it are also used as the

ground of tapestry work and of oil paintings. A finer description is used for many common domestic purposes, as for towels, table-cloths, *etc.* The canvas used by artists is commonly of linen, varying in size and. thickness, stretched on a frame or (<stretcher,® and made tight by <(keys® or wedges inserted in the four inside corners. There are several sizes of canvas which are generally used and are kept stretched.

CANVAS-BACK, a widely distributed fresh-water duck (Aythya vallisneria) , much sought as a table luxury, as its flesh is con¬ sidered superior to that of all other ducks. It is about 22 inches in length and its reddish-chestnut head and neck are much shaded with dusky hues ; the lower neck, breast and fore¬ part of the back, with the rump and tail-coverts, are black; and the back and sides gray, covered with fine lines and dots, so that the plumage re¬ sembles canvas. By reason of its similarity, this duck is frequently confounded with the red-head (q.v.). ((The canvas-back is larger, its head darker, and its bill a deep black, while that of the red-head is deep blue, or a slatish color. The shape of the bill of the canvas-back is wedged and long; of the red-head moderately long and concave… . They are

very tenacious of life, their bump of stubborn¬ ness being fully developed, and they will dive long distances, and prefer death by any other means than human agency. When one is crippled it will usually look around for an in¬ stant, to see where the danger lies, then down it goes, and if rushes or cover are near, it is good-bye to that duck, — it will not be seen again. When one is crippled it should be shot again, and at once.® The food of the canvas-back consists chiefly of the roots of wild celery (Zostera vallisneria') , which resembles the cul¬ tivated celery in appearance. It grows densely in the shallow parts of the Chesapeake Bay and Susquehanna River about the Great Lakes and in the Mississippi Valley. Few canvas-backs are found east of the Hudson and Delaware rivers. It is almost safe to say that where the plant grows in abundance, the canvas-back is almost sure likewise to be found; consequently the peculiarly delicate flavor of its flesh, and the market value of this duck, increase with the amount of celery it consumes, as otherwise it is

hardly distinguishable from the red-head in flavor. 1 he canvas-back breeds north of Dakota, building its nest on the ground, in a marsh, and laying from 6 to 10 greenish-buff eff8s-Consult Elliot, (Wild Fowl of North America) ; Job, (Among the Wild Fowl.*

CANYON, kan'-yon, a valley that is notably deep in proportion to its width. The average idea as to the depth of canyons is much exag¬ gerated, however. Most canyons are much wider than they are deep. The Grand Canyon of the Colorado is as much as 10 miles wide at many points, and averages only about a mile deep, and yet it is one of the most stupendous chasms in the world. In rare cases gorges are deeper than they are wide, but this is the ex¬ ception. Since the work of a river is not only to cut a valley but to carve away the entire surrounding region, it is evident that canyons represent a youthful stage in river erosion, be¬ fore there has been time to widen the valley. See Grand Canyon of Colorado.

CANYON DE CHELLY (Shay), Ariz., a canyon in the Navajo Indian Reservation in the northeastern corner of the State, famous for its picturesque walls and monuments of red sandstone. Two branch canyons, del Muerto and Monument, are similar. The walls are from 800 to 1,290 feet high and while mostly vertical, present many erosion forms. The canyons have been cut by creeks rising in Chuska Mountains on or near the Arizona-New Mexico State line. The rock is a light red massive, crossbeddea sandstone locally devel¬ oped between Shinarump conglomerate above and Moenkopi formation below, possibly of Permian age. Some notable cliff dwellings re¬ main in the canyon walls. These wonderful canyons can be easily visited by leaving the Santa Fe Railroad at Gallup, taking automobile 70 miles to Chinlee and there obtaining horses for a 35-mile round trip. The canyon was dis¬ covered by Doniphan's expedition in 1847 and Simpson who visited the place in 1850 ob¬ tained the name from Sr. Vigil, secretary of the province of New Spain. It is believed to be a Spanish version of the Navajo term, Tsc-yi, meaning ((in the canyon.®

CANYON DIABLO, a noted canyon crossed by Santa Fe Railroad in eastern Ari¬ zona. It is 225 feet deep, with steep, step-like walls of the limestone which constitutes the adjoining platform. It was cut by a small stream, tributary to the Little Colorado River, which is not far north.

CANZONE, kan-tso'na, a particular variety of lyric poetry of Provengal origin. It is found in the Italian poetry of the 13th century. At first it was quite irregular, but was confined by Petrarch to more fixed and

regular forms. Hence it is called canzone Petrarchesca ; it is also called canzone Toscana, because it originated in Tuscany. It is divided into several stanzas, in which the nature and disposition of the verses, which are of 11 and 7 syllables, and the place of the rhymes, are uniform. The can¬ zone-strophe consists of two parts, the opening one being distinguished by Dante as the fronte, the closing one as the sirma, and these parts are connected by rhyme, it being usual to make the rhyme of the last line of the fronte identi¬ cal with that of the first line of the sirma. In

other respects, the canzone has great liberty. The canzone usually concludes with a stanza which is shorter than the others, and is called ripresa, congedo, comiato, signifying dismis¬ sion or taking leave. There are different kinds of canzoni, and different names are given to the different parts. The canzone Anacreontica is divided into small stanzas, consisting of short verses, with a regular disposition of the rhymes through all the stanzas. Not only light, pleasing songs of love, gaiety and mirth, but poems on solemn and lofty subjects, and of an elevated dithyrambic strain, are included under this name. The latter subjects, however, are better adapted to the canzone Pindarica, which was first introduced in the 16th century by Luigi Alamanni, and owes its perfection chiefly to Chiabrera. It is distinguished from that of Petrarch by a bolder flight, loftier ideas, greater freedom in the choice and disposition of the verses, and by the form of the stanzas, which is borrowed from the Greek chorus. The Pindaric canzoni are divided into strophe, antistrophe and epode, and are called canzoni alia Greca. Those divisions are sometimes called ballata, contraballata and stanza • or volta, rivolta and stanza; the Greek names are the most common. There is also the canzone a ballo, an old Italian poem, originally intended to be sung at a dance (ballo). It is called also ballata. It is not em¬ ployed by the Italian poets later than the 16th century. In England, the canzone was intro¬ duced at the end of the 16th century by William Drummond of Hawthornden, who has left some fine examples. In Germany, the poets of the Romantic period imitated it, especially A. W. von Schlegel.

CANZONET, kan-tso-net', CANZO-NETTA, in Italian poetry a canzone (q.v.) consisting of short verses, much in use with the poets of the 1 5th century. Rinuccini, and after him Chiabrera, have used it in modern times, and given it more grace. Canzonets are generally expressive of tender feelings. In music, canzonet signifies a song, shorter and less elaborate than the aria of the oratorio or opera.

CAONABO, ka-o-nabo*', Indian chief of Hispaniola (Haiti) at the time of its discovery by Columbus : d. 1496. The latter built a fort which he called La Navidad, and in which he left, when sailing for Spain early in 1493, a garrison of 40 men. Returning before the end of the year, he found that Caonabo had burned the fort and killed the garrison. According to the account of a friendly native, the Spaniards had drawn this fate upon themselves by their evil conduct. In 1494 the Indians in great num¬ bers attacked the Spaniards, having been pro¬ voked by the misconduct of one of the lieu¬ tenants of Columbus, Pedro Margarite. Co¬ lumbus overthrew them, first at Magdalena, and later (1495) on the plains of the Vega Real — where, tradition has it, 100,000 hostiles were assembled. Caonabo meanwhile threatened the garrison of Saint Thomas. Alonzo de Ojeda was sent by Columbus to cajole Caonabo into coming to a conference. Ojeda went alone among the hostiles. As presents he took gyves and manacles of shining metal ; treacherously persuaded the Prince to show himself to his subjects wearing these novel ornaments, and

even, while thus adorned, to ride Ojeda's horse; then, mounting also, he dashed through the. crowd of savages and carried his victim into the presence of Columbus. He was sent to Spain for trial and died en route.

CAOUTCHOUC, koo'chook, an elastic, gum-like substance, obtained from the juice of certain tropical trees and shrubs, and commonly known as India-rubber or ˆrubber.® The best caoutchouc comes from the Pam region, in Brazil; but supplies are also obtained from Central America and the West Indies, from Africa and from tropical Asia, especially from Ceylon and Malaya. The details of collect¬ ing the juice and preparing it for market vary somewhat according to the locality, and with the nature of the trees or shrubs from which the juice is obtained. In the Amazon region, w'hen the source is a tree, incisions are made in the bark each morning, and the milky sap that exudes is collected in little tin or clay cups that are secured to the tree for the pur¬ pose. At the end of about. 10 hours these are emptied into larger collecting vessels, and on the morning of the following day

new incisions are made in each tree, some eight inches be¬ low the first ones. This process is continued until incisions have been made in the bark from a height of about six feet down to the ground. The poorest quality of sap is obtained from the highest wounds, and the best from the low¬ est ones. To evaporate the juice, a fire is first built of materials that yield dense volumes of smoke. A workman then dips a wooden paddle into the collected sap, after which he holds it in the smoke until the sap solidifies and ac¬ quires a slight tinge of yellow. He then dips the paddle into the sap supply again, repeats the smoking process, and so proceeds until the paddle is covered with a layer of the dried gum that is perhaps an inch and a half thick. He then slits this layer, removes it from the paddle, hangs it up to dry, and starts a fresh evaporation.

Pure caoutchouc from Para is light-colored below the surface, but superficially it is dark-brown from oxidation. It has a specific gravity of about 0.92, and consists chiefly of carbon and hydrogen in'the proportion of about 87 per cent of carbon to 13 of hydrogen. Small quantities of oxygen are always present, however, as the best of the Para product contains as much as one-half of 1 per cent of a sort of resin that contains oxygen, and is undoubtedly produced by the oxidation of the gum. In fact, it is known that caoutchouc will oxidize slowly in damp air, even after it is vulcanized, and par¬ ticularly when exposed to the action of light. Caoutchouc consists, apparently, of two differ¬ ent kinds of gum, one of which is fibrous, while the other is viscous, though the two are chemi¬ cally identical. It is slightly soluble in ether, turpentine, chloroform, petroleum, naphtha, benzine, and carbon disulphide, the viscous por¬ tion being more soluble than the fibrous part. At 250° F. caoutchouc begins to melt, and be¬ comes permanently transformed into a sticky substance which retains its peculiar consistency almost indefinitely. At 400° F. the transforma¬ tion is more complete, and the black, adhesive mass that results makes an excellent lute for sealing glass bottles and jars if it is thoroughly incorporated with 50 per cent of its own weight

of dry slaked lime. By careful destructive distillation caoutchouc is resolved into a num¬ ber of hydrocarbon oils that are of interest to the chemist.

As early as 1615 the Spaniards used the crude gum (<for waxing their cloaks, which were made of canvas, so as to make them resist water.** But it was not until about 200 years later that caoutchouc began to attract general attention in such w7ays. At first it was applied to cloth by the aid of heat ; but improved meth¬ ods followed the discovery of solvents for the gum, and the invention, by an Englishman named Thomas Hancock (about 1820), of the <(masticator,** a machine by which the caout¬ chouc is thoroughly worked over and brought to a uniform consistency. But the greatest step in the development of the rubber industry was the discovery of the process of vulcanization, — a discovery that appears to have been made in¬ dependently and at about the same time (1843) by Charles Goodyear, of New Haven, Conn., and Thomas Hancock, to whom reference has previously been made. The credit of priority belongs to Goodyear, but Hancock did a great deal to make the discovery a commercial suc¬ cess. Unvulcanized caoutchouc is softened by heat, and is made hard and inelastic by cold; but upon being vulcanized the gum becomes comparatively insensible to ordinary extremes of temperature, arid also has its elasticity ma¬ terially increased. The process of vulcanization depends upon the fact that the crude rubber will absorb sulphur, and combine with it at a temperature that is easily attainable without injury to the product. The details of the vul¬ canization differ somewhat, according to the nature of the article that is being manufactured. If sheet rubber is submerged for a few mo¬ ments in melted sulphur at a temperature of 250° F., it absorbs about one-tenth of its weight of that element; but although its color changes somewhat, it is otherwise apparently unaltered. Upon exposure for a somewhat longer time to a temperature of 285° F., however, true com¬ bination of the sulphur and caoutchouc ensues, and the gum is said to become ((vulcanized.** It is not necessary that the sulphur should be ac¬ tually melted in order that the sheet rubber may absorb it, for sheets that are laid in powdered sulphur that is heated nearly to its melting-point will absorb the proper amount for good vulcanization in the course of a few hours. Vulcanization of rubber sheets can even be brought about without the action of. heat, by dipping the sheets for a few seconds in a solu¬ tion of chloride of sulphur in carbon disulphide. It is more common, however, to knead the requisite amount of sulphur directly into the caoutchouc by mechanical means. The article to be manufactured is then brought into shape by the action of pressure and moderate heat (or in any other manner), and

the final opera¬ tion consists in heating it to the vulcanizing temperature by the aid of a steam bath. Chem¬ ically considered, the process of vulcanization appears to consist in the substitution of one or more sulphur atoms for a portion of the hydro¬ gen of the hydrocarbons of which the caout¬ chouc is composed. For many years chemists have been interested in synthetic rubber to take the place of natural caoutchouc,. but the arti¬ ficial product has not yet come into extensive use. See India Rubber; Rubber Manufacture.

CAP, the cover of the end or head of any¬ thing. Caps were not worn by the Romans for many ages. When either the rain or sun was troublesome the lappet of the gown was thrown over the head; and hence all the ancient statues appear bareheaded, excepting sometimes for a wreath or the like. The same usage prevailed among the Greeks, to whom, at least during the Heroic Age, caps were unknown. The sort of caps or covers of the head in use among the Romans on divers occasions were the pitra, p ileus, cucullus, galerus and palliolum, which are often confounded by ancient as well as modern writers. The general use of caps and hats is referred to in the year 1449. The first seen in Europe were used at the entry of Charles VII into Rouen. From that time they began to take the place of chaperons or hoods. When the cap was of velvet they called it mortier; when of wool simply bonnet. None but kings, princes and knights were allowed to use the mortier. The cap was the head¬ dress of the clergy and graduates. Pasquin says that it was anciently a part of the hood worn by the people of the robe ; the skirts whereof being cut off, as an encumbrance, left the round cap an easy, commodious cover for the head; which cap, being afterward assumed by the people, those of the gown changed it for a square one, first invented by a Frenchman called Patrouillet. He adds, that the giving of the cap to the students in the university was to denote that they had acquired full liberty, and were no longer subject to the rod of their superiors, in imitation of the ancient Romans, who gave a pileus to their slaves in the cere¬ mony of making them free: whence the prov¬ erb vo care servos ad pileum: hence, also, on medals, the cap is the symbol of Liberty, who is represented holding a cap in the right hand by the point.

Cap of Maintenance, one of the ornaments of state carried before the sovereigns of Eng¬ land on the occasion of their coronation. It is also applied to an ornament borne before the mayors of certain cities on state occasions, and to a device in heraldry.

In shipbuilding a cap is a square piece of timber having two holes cut

through it, — one square, to fit on the squared or tenon head of the lower mast ; the other round, to take the heel of the upper mast. Also a similar con¬ trivance affixed to the end of the bowsprit, through a round hole in which the jib-boom is rigged; and a covering of metal or tarred can¬ vas to protect the end of a rope from fraying.

In mining a mass of unproductive rock overlying valuable ore. In coal mining, the bluish halo of ignited gas which appears above and around the flame of a safety-lamp when a dangerous amount of fire-damp is present. In physical geography a similar mass, as of ice overlying the surface of a country; as, the ice¬ cap of Greenland. The word is also used in carpentry, in book-binding, in machinery and in ornithology to denote coverings for protec¬ tion. The term as used in military parlance is percussion cap, a small copper cup containing fulminating powder, used in a percussion lock to explode gunpowder.

CAPANEUS, one of seven legendary heroes who warred against Thebes, killed by Jupiter.

CAP-A-PIE, kap'a-pe' (O. Fr. de cap a pie; Mod. Fr. de pied en cap), a term signify¬ ing from head to foot, and used with reference to a complete suit of armor covering the body of a knight at all points ; as, ((He was armed cap-a-pie for the encounter.®

CAPE ANN, Mass., the southeast point of the town of Gloucester, Mass., 31 miles from Boston, the northern limit of Massachusetts Bay; in lat. 42° 38' N., and long. 70° 34' W. The whole of the rocky peninsula forming this part of Gloucester is also called Cape Ann, including the village of Squam in its north¬ eastern part. This peninsula is a headland of syenite, which forms low hills, over the sur¬ face of which the rock is very generally ex¬ posed to view. It projects about 10 miles into the Atlantic Ocean. Valuable quarries of syen¬ ite for building purposes are worked most con¬ veniently for shipment. The place is much ex¬ posed to the prevalent northeast storms; but it offers a small, well-sheltered harbor among the rocks, where coasting vessels often take refuge. There are on the shores of

this harbor two fixed lights about 165 feet above mean high water, and visible for 19 nautical miles ; there is also a 10-inch steam fog whistle. The south and east shores have many attractive summer resorts.

CAPE ANN SETTLEMENT, the first within the limits of the Massachusetts Bay ter¬ ritory. In 1622, the New England Company, to push the settlement of its grant and give it some value, divided the land in severalty among its members. The region about Cape Ann fell to Edmund, Lord Sheffield, who sold a patent for it in 1624 to Robert Cushman and Edward Winslow of the Plymouth colony. They found some English hunters and fishers who had been there since the year before ; these acknowledged the rights of the Plymouth people, and the two parties planted and fished amicably; but shortly after a London vessel which had taken up the quarrel of the firebrand, Rev. John Lyford, seized the Plymouth men's fishing stage. Miles Standish came up from Plymouth to settle the trouble by force, but against his wish the settlement compromised the matter by the crew agreeing to build them another stage. In 1624 Winslow's company sold the site of Gloucester to the (<Dorchester Ad¬ venturers,® an unincorporated English joint-stock company recently formed. These had anticipated the bargain by sending out a band of settlers the fall before, with live stock, im¬ plements, etc., and they made Thomas Gardner overseer. The attempt was unsuccessful, and in 1625 the Dorchester company engaged Roger Conant, then at Nantasket with Lyford, to be governor, Lyford to be minister. But the next year the ((Adventurers® dissolved, and most of the settlers went home ; the few remaining ones, however, removed to <(Nahumkeike® (Naum-keag), where they founded Salem.

CAPE ARAGO, or GREGORY, a cape on the western coast of Oregon, on the south of Coos Bay in Coos County. Its lighthouse, which is on a small island, is at lat. 43° 20′ 38″ N., and long. 124° 22′ 11″ W., and shows a white, flashing light 84 feet above sea-level.

CAPE or POINT BARROW. See Barrow, Cape or Point.

CAPE BLANCO, Africa. See Blanco, Cape.

CAPE BLANCO, Ore., a cape forming the most western point of the State, situated in lat. 42° 50' N., and long. 124° 37' W. It has a lighthouse with a white fixed light 256 feet above sea-level.

CAPE BOEO, bo-a'o, or LILIBEO, the

ancient Lilybceum Promonlorhim, a cape, on the western coast of Sicily, one mile from Marsala. It is the point of Sicily nearest to ancient Car¬ thage, and at an early period became an import¬ ant naval station. The naval victory of the Romans over the Carthaginians, which put an end to the first Punic War, was gained near this point.

CAPE BOJADOR, boj-a-dor'. See Boja-dor, Cape.

CAPE BON, or RAS ADDER, a headland

of Tunis, on the Mediterranean, forming the northernmost point of Africa, in lat. 37° 6' N. and long. 11° 3' E., and a few miles north of the town of Kalibia. "

CAPE BRETON, bret'un, Canada, an island of the Dominion of Canada, separated from Nova Scotia, to which province it be¬ longs, by the narrow gut or strait of Canso ; area 3,120 square miles; length about 110 miles. It is of very irregular shape, the Bras d'Or, an almost landlocked arm of the sea (with most picturesque scenery), penetrating its interior in various directions, and dividing it into two peninsulas connected by an isthmus, across which a canal has been cut. The surface is rather rugged, and only small portions are suited for agriculture ; but it possesses much timber. The chief towns are Sydney and Arichat.

The mineral deposits are very rich ; iron and copper ore is abundant, and over 400 square miles is underlaid with seam upon seam of valu¬ able bituminous coal. The Dominion Steel Cor¬ poration had in 1912 over 10,000 men on its pay roll in and about the mines in Cape Breton discovered by John Cabot in 1497, and originally part of the French possession of Acadia; it was captured by the New Englanders in 1745, retro¬ ceded under the Treaty of Aix-la-Chapelle in 1748 and became a British possession under the Treaty of Paris in 1763. It was governed as a separate province from 1784 to 1820. It is divided into four counties, Richmond, Inver¬ ness, Victoria and Cape Breton.

CAPE CANAVERAL, a cape on the east¬ ern coast of Florida, in lat. 28° 27' N. and lonˆ. 80° 33' W. There are dangerous shoals at this point, and navigation is protected by a revolv¬ ing light 137 feet above sea-level and a coast signal station.

CAPE CANSO, the eastern extremity of Nova Scotia, at the southern entrance of Chedabucto Bay, in lat. 45° 19.5' N. and long. 60° 55' W.

CAPE CARTHAGE, a headland on the northeast coast of Tunis, jutting out into the Mediterranean. Traces of the ancient city of Carthage are found on it to the north of the Tunis lagoon.

CAPE CATOCHE, ka-to'cha, a headland

at the northeastern extremis rJ '.he peninsula of Yucatan, Central America, in lar. 21° CM' N.

and long. 86° 57' W. It is the northeast ex¬ tremity of the Mexican state of Yucatan. It was here that the Spaniards first landed on the Mexican coast in 1517.

CAPE CHARLES, a cape at the northern entrance of Chesapeake Bay, forming the southern extremity of Northampton County, Va., in lat. 37° 7' N. and long. 75° 53' W. Northeast of it, on Smith's Island, is a first-order lighthouse with a revolving white light, signaling 45" every minute and is 180 feet above mean high water.

CAPE CITY. See Cape May, N. J.

CAPE CLEAR, a headland forming the southernmost extremity of Ireland, in lat. 51° 26' N. and long. 9° 29' W. It is on an island of 1,506 acres, with a lighthouse on an abrupt cliff 455 feet high. Fastnet Rock, with a light 148 feet above high water, is distant three and one-half miles to the southwest. These are generally the first points of land seen by trans¬ atlantic voyagers eastward bound.

CAPE COAST CASTLE, a town and fort of western Africa on the Gulf of Guinea, in the British colony of the Gold Coast, in lat. 5° 5' N. and long. 1° 13' W. The place lies in a chasm, and is defended by the great castle near the water's edge, and by three small forts on the hills behind, one of which serves as a lighthouse and signal station. With the excep¬ tion of a few houses for Europeans, the town consists of straggling lines of mud huts, with clusters of palm-trees and an occasional tama¬ rind attached. It is a principal mart for native trade.

It is connected by telegraph with Accra (the capital) and by road with Prahsue. The climate is unhealthy ; mean temperature, 78°. The principal exports are gold-dust, ivory and palm-oil. Cape Coast Castle was ceded by the Dutch to the English in 1665, and from 1672 was possessed by several British African com¬ panies till 1843, when it was taken over by the British government. Pop., mainly Fantis (1911)

11,364.

CAPE COD, a cape and peninsula on the coast of Massachusetts, on the south side of Massachusetts Bay, forming the county of Barnstable; lat. of the cape, 42° 3' N., long. 70° 15' W. The peninsula is 65 miles in length and from 1 to 20 in breadth, and is in the form of a man's arm, bent inward both at the elbow and the wrist. Though mostly sandy and bar¬ ren, it is nevertheless populous ; and the inhab¬ itants derive their subsistence chiefly from the sea. The best harbor on the peninsula is at Provincetown. There is a lighthouse known as the Highland Light, on the northeast shore, and one at Race Point almost directly west of the former. The navigation around the cape is peculiarly baffling and hazardous, and the saving to commerce and human life resulting from the short-cut waterway will undoubtedly be very great. A proposition to cut a canal from Buz¬ zard's Bay to Barnstable Bay dates from the early part of the 17th century, but nothing was actually done until 1878, when a charter was granted by the legislature of Massachusetts, a company was formed and work begun. A new charter was granted in 1906, the canal was be¬ gun in 1909 and completed in 1914. The Old Colony division of the New York, New Haven & Hartford Railroad extends through the peninsula. The cape was discovered 15 May

1602 by Bartholomew Gosnold, who gave it its name from having taken a great quantity of codfish near it. In 1620 the Pilgrims of the Mayflower made a temporary landing at the site now occupied by Provincetown.

CAPE COLONNA. See Sunium.

CAPE COMORIN, kom'o' rin, the most southern extremity of the peninsula of Deccan, British ˆ India, in lat. 8° 5' N. and long. 77° 37' E., forming a circular, low, sandy point, which is not discernible above the dis¬ tance of 12 to 16 miles from the deck of a large ship.

Eighteen miles north from the cape is a bold summit called Comorin Peak, the south¬ ern termination of the western Ghauts, which has, from a distance, been often taken for the cape itself. Within a short distance of the cape lies a rocky islet, high above water; and about three miles from this islet are a fort and a village, a few fishermen's houses, a church and some ancient temples, being the remains of the once famous town of Cape Comorin.

CAPE DIAMOND, Canada, the extremity of an abrupt promontory in the province of Quebec at the junction of the Saint Charles and Saint Lawrence rivers. On the promon¬ tory stands the citadel of Quebec, and on the west and nearly on a level with the ramparts lie the Plains of Abraham. It rises precipi¬ tously over 300 feet from the river level. Here was gained in 1755 the memorable victory by the English under Wolfe, over the French under Montcalm.

CAPE DISAPPOINTMENT, or CAPE HANCOCK, Wash., a cape at the north side of the mouth of the Columbia River, forming the southwest point of the State of Washing¬ ton, in lat. 46° 16' N. and long. 124° 3' W. There is a lighthouse at this point with a flashing light 233 feet above sea-level.

CAPE DUCATO, doo-ka'to, the southern extremity of Santa Maura, one of the Ionian islands. It is identical with the ancient prom¬ ontory of Leucadia, commonly called the Lover's Leap, or Sappho's Leap. The famous Greek poetess, according to an ancient tradi¬ tion, threw herself from the top of this prom¬ ontory. It lies in lat. 38° 34' N. and long. 20° 32' E. The strong currents which sweep around the cape and the frequent fierce gales render it a dread to mariners.

CAPE ELIZABETH, Me., a headland pro¬ jecting into Casco Bay, between Portland har¬ bor and the Atlantic Ocean, in lat. 43° 33' N. and long. 70° 11' W. The coast is rocky, made up of ledges of talcose slate, traversed by dikes of trap. There are two lighthouses on the outer point, which stand 300 yards apart, the lights being 140 feet above the sea.

CAPE DE ESPICHEL (probably the an¬ cient Barbarium Promontorhim) , a cape on the western coast of Portugal, 121 miles south¬ west of Lisbon. It rises abruptly from the sea, and is crowned by a small chapel and a light¬ house.

CAPE FAREWELL, the southern extrem¬ ity of Greenland, at the eastern entrance to Davis Strait. A strong current sets around this cape, and continues north along the eastern coast of the strait. On

account of the ice and the current the cape is seldom visited.

CAPE FARO, fii'ro, the northeast extrem¬ ity of the island of Sicily, known to the an¬ cients as Pelorus. It is at the narrowest part of the strait of Messina, opposite the rock of Scylla on the coast of Italy.

CAPE FEAR, the south point of Smith's Island, near the mouth of Cape Fear River, N. G, in lat. 33° 35' N. and long. 77 0 5 7' W. About one mile from the shore stands Bald Head lighthouse. Navigation of the surround¬ ing waters is attended by many dangers.

CAPE FEAR RIVER, a river of North Carolina; navigable for steamboats for 150 miles from its mouth to Fayetteville. Its length, including one of the head branches, is about 300 miles. Formed by the junction of the Deep South and Cape Fear rivers, its course is generally southeast till it reaches the Atlantic Ocean. This is the largest and most important river which lies wholly within the State. Rice growing is an important industry along its lower region.

CAPE FINISTERRE, fin-is-tar', (Lat.

finis terree, land's end), the westernmost point of Spain, in the province of Corunna, extending southwest into the Atlantic, in lat. 42° 54' N. and long. 9° 21' W. Several naval battles were fought off this cape, of which the most important were the victories of the English over the French, 3 May 1747 and 22 July 1805.

CAPE FLATTERY, the most westerly point of the State of Washington and of the United States, excluding Alaska, at the en¬ trance to the Strait of Juan de Fuca, in lat. 48° 23' N. and long. 124° 44' W. On the island of Tatoosh, opposite the cape, there is a light¬ house 155 feet above sea-level.

CAPE FLORIDA, the southern extremity of Biscayne Key off the southeast coast of Florida, in Dade County, at the north entrance to Biscayne Bay, in lat. 25° 39' N. and long. 80° 9' W. There is a

lighthouse on the shoals op¬ posite this point. It has a fixed red beacon light.

CAPE FOULWEATHER, a cape project¬ ing into the Pacific Ocean from the coast of Oregon, in lat. 44° 50’ N. and long. 124° 5’ W.

CAPE FOX, or LALANDE’S DOG, a

peculiar canine animal (Otocyon lalandii), dif¬ fering from other dogs principally in tne pos¬ session of an additional molar in each jaw. Other characters in the structure of the jaw and dentition suggest that Otocyon is a per¬ sistent creodont-like form which has developed from a primitive arctoid stock in a direction curiously parallel to that of the true dogs. No other mammal outside the marsupial order ever has four molar teeth in both jaws, and this may indicate a still more remote marsupial ances¬ try. This wild dog is generally found in open country, dwelling among small bushes in pairs, exceedingly shy, and not gathering into packs. It is rather smaller than a fox and resembles a fennec in having enormous ears and a thick bushy tail. In general color it is brownish or iron gray, mottled with yellow and with the limbs nearly black.

CAPE FRIO, fre’o (Port. Cabo Frio, <(cold cape®), a promontory on the coast of Brazil, in the state of Rio dc Janeiro. It forms the ter¬ minus of a range of mountains running parallel

to the coqst, and consists of a huge oval mass of granite. There is a lighthouse at this point.

CAPE FROWARD, the southern extremity of the continent of South America, lying north¬ west of Cape Horn in lat. 53° 53’ S. and long. 71° 18’ W. It is a bold promontory of dark slaty rock.

CAPE GASPE. See GaspL

CAPE DE GATA, ga’ta, a promontory of Spain, on the coast of Granada, 150 miles east of Gibraltar, 24 miles in circuit and 13 miles broad. It was formerly a resort of Moorish pirates.

CAPE GIRARDEAU, je-rar-do’, Mo, a city of Cape Girardeau County, on the Missis¬ sippi River and on the Cape Girardeau and Northern Railroad and the Frisco Lines, 150 miles southeast of Saint Louis. It is a well-cultivated region and has a large commerce, by river and railroad, in lumber, Hour, limestone and mineral paints. There are

also manufac¬ tories of Portland cement, shoes, bentwood, bricks, tobacco, wrashtubs, veneer, threshing machines, beer, *etc.* The United States census of manufactures for 1914 recorded 42 in¬ dustrial establishments of factory grade, em¬ ploying 1,397 persons, of whom 1,259 were wage earners, receiving annually $607,000 in wages. The capital invested aggregated $3,074,000, and the year's production was valued at $3,888,000; of this $1,532,000 was the value added by manufacture. The no¬ table institutions include Saint Vincent's College and Academy, the Southeast Mis¬ souri State Normal School, Saint Francis Hospital and the Loretto Convent. The gov¬ ernment is administered by a mayor, elected biennially, and a city council. Pop. 10,252.

CAPE OF GOOD HOPE, a province in the Union of South Africa, formerly Cape Colony, is situated at the southern extremity of Africa, washed on the west, south and east by the ocean, and having on the north and north¬ east the German territory of Great Namaqualand, the British territory of Bechtianaland, Orange Free State province, Basutoland and the province of Natal. A considerable portion of the boundary on the north is formed by the Orange River. The colony extends about 450 miles from north to south, and 600 from east to west; the coast line is about 1,300 miles. The area is 276,000 square miles. The principal indentations of the coast are Saint Helena, Saldanha, Table, False, Walker, Mossel, Plet-tenberg, Saint Francis and Algoa bays.

In the interior almost every variety of soil and surface is found, but a great part of the colony is arid and uninviting in appearance. Several ranges of mountains, running nearly parallel to the southern coast, divide the coun¬ try into successive terraces, rising as they re¬ cede into the interior, between which lie belts of fertile land, or vast treeless and barren¬ looking plains. One of these, called the Great Karoo, is 300 miles long and 100 broad, and presents a desolate appearance, having a dry and often baked soil, with small shrubby plants scattered over it. Yet these plains make val¬ uable sheep-walks, the flocks thriving exceed¬ ingly well upon the scanty vegetation; and the soil, where water can be obtained by collecting the rain, is generally very fertile. Oarge reser-

voirs have been constructed in many places, and permanent homesteads established where for¬ merly flocks could only be maintained for a month or six weeks at a time. The principal and farthest inland mountain terrace averages 6,000 or 7,000 feet in height, and, commenc¬ ing in Namaqualand, runs eastward under the names of Roggeveld, Nieuwveld, Sneeuwber-gen, Stormbergen, etc., to the northeast fron¬ tier. The culminating point is the Compass Berg, over 8,000 feet high. The Table Moun¬ tain at Cape Town is a stupendous mass of naked rock, rising almost perpendicularly, about 3,585 feet in height. The colony is deficient in rivers, though in this respect the eastern half is more favored than the western. The. Orange River is the largest in this part of Africa, but is of little or no use for navigation. Others are the Elephants or Olifants River, flowing into the Atlantic ; the Gatiritz, Gamtoos, Great Fish, Sunday and Great Kei, emptying themselves into the sea on the south and southeast.

The most valuable mineral product is dia¬ monds ; copper ore is largely exported, coal is mined, and iron ore, gold, amethysts, agates, etc., are found. The bulk of the diamonds that come into the markets of the world in the rough state are now obtained from Cape Col¬ ony. The great mining centre is Kimberley, in the far north of the colony, about 10 miles from the Vaal River, and near the frontier of the Orange River Colony. So far as is known, the first of the South African diamonds was casually picked up in 1867, and soon after sev¬ eral others were found, including a fine large stone known as the “Star of South Africa.® By the early part of 1870 so many diamonds had been found that a rush of people to the diamond district began to take place, and the banks of the Vaal were soon covered with thousands of diggers. At first the precious stones were found on or near the surface, but subsequently it was discovered that they were to be found deeper down, and latterly they have been obtained many hundreds of feet below the surface, great open excavations having been made at the localities where they are plentiful. The richest mine has been the Kimberley mine, situated in the centre of the town of the same name, which sprang up around it. For the first hundred feet in depth the diamonds were found embedded in a soft, friable, yellowish earth; below that the soil changed to a slaty-blue color, and was of a firmer consistency, and the diggers then thought that the bottom of the mine had been reached. It was soon dis¬ covered, however, that the blue ground yielded as many diamonds as the yellow, if not more, and this productivity has still continued. An¬ other famous mine is the De

Beers mine. Both these mines have yielded a remarkable number of large stones, but a great many of the dia¬ monds have been “off-color,® that is, yellow, spotted or otherwise defective in water or lustre. One of the finest yet found in South Africa is the “Porter Rhodes,® a beautiful stone weighing 150 carats, and valued at $300,-000. One much larger, a yellow stone, weigh¬ ing 302 carats, was found in 1884, and a still larger, weighing 428ˆ4 carats, was found in the De Beers mine in 1888. The largest in the world, weighing 971 carats, but with a large flaw, was found in the Orange Free State in 1893. Although mining operations have been

carried on at great expense, owing to the depths to which the workings have been sunk (some 600 feet or more), the profits of the companies which latterly have owned the mines have been enormous. The rough work has been done almost entirely by the native Africans, of whom 10,000 or 11,000 have been in employment in the mines at one time. Very stringent regu¬ lations have had to be enforced to prevent theft of the precious stones, and also illicit dealing in stones unlawfully acquired.

The climate is very healthy and generally pleasant, though in summer the heat is great in some parts. The mean temperature for the year at Cape Town is about 62°. The climate of the dry and elevated inland districts is con¬ sidered remarkably suitable for persons of con¬ sumptive tendency, and many have been at¬ tracted to the colony on this account.

Except along the coast line, especially the southeast coast district, where there are exten¬ sive forests, timber is scarce. There are up¬ ward of a hundred different kinds of woods, however; many of them extensively employed for such purposes as house-building, wagon¬ making and furniture-and cabinet-work. With irrigation, trees can be grown anywhere. The aloe and the myrtle attain a great size. ‘

The quadrupeds of the province comprise the African elephant, still found in the forests of the south coast region ; the buffalo, equally restricted in locality; the leopard, jackal, hyena, numerous antelopes, baboon, aardvark, *etc.* Lions, at one time numerous, are not now to be met with in the colony, nor is the giraffe. The birds include vultures, eagles and other Rap-tores (the most remarkable of which is the serpent-eater), pelicans, flamingoes, and most important of all, the

ostrich, now bred as a do¬ mestic animal for the sake of its feathers, those plucked from an adult bird in a season being sometimes worth from $50 to $90. Other na¬ tive animals are large snakes, the venomous cobra di capello and scorpion. Along the coast whales and seals abound, and salt-and fresh-water fish are plentiful.

The province is better adapted for pasturage than for agriculture, but wheat, maize and other cereals can be grown almost everywhere, the only drawback to their cultivation being the want of moisture in certain localities and in certain seasons. In some years a surplus of grain is left for exportation; in others grain has to be imported. All kinds of European vegetables and pot-herbs, and all the fruits of temperate climates, such as apples, pears, plums, peaches, melons, apricots, walnuts, almonds, oranges, limes, etc., thrive excellently, and fruits, dried and preserved, are exported. The vine is cultivated and some excellent wines (notably those of Constantia) are made. The colony is said to be particularly well suited for grape-culture, and the vines produce heavier crops than are known almost anywhere else. Viticulture, it is believed, is yet only in its in¬ fancy, though there are 67,000,000 vine-stocks. The colonial government had up to the end of 1911 alienated 140,000,000 acres.

Sheep-raising is the most important indus¬ try, and wool the chief export (although sur¬ passed in value by diamonds). The amount of this article exported to the United Kingdom in 1913 was 92,813,330 pounds. Most attention is now devoted to the breeding of pure merinoes,

the consequence being a great improvement in the wool. Goats are also bred, both the na¬ tive and the Angora, and the export of goats' wool or hair to Great Britain was valued at $4,600,000 (1913). Cattle-breeding is carried on to some extent, especially along the coasts and in the eastern and northern districts.

There are no manufactures of any import¬ ance, and consequently the imports consist largely of manufactured goods, chiefly from Great

Britain. The exports to the United Kingdom (1913) totaled $47,000,0000, and the imports (British and foreign) to nearly $60,-000,000. The export of diamonds in the same year was over $60,000,000. This industry suf¬ fered great disorganization during the European War. The other exports of importance be¬ sides wool, are ostrich feathers, copper ore, skins and hides. There are 3,813 miles of rail¬ way in operation. Lighthouses have been built round the coast and harbor works constructed.

The coinage is that of Great Britain, as are also the weights and measures, except that for land, the morgen— 2. 116 acres is employed.

On 31 May 1910 the colony, under the name of the province of the Cape of Good Hope, was merged in the Union of South Africa (q.v.).

The European population consists in part of English, Scottish and Irish settlers and their descendants, but the majority is of Dutch origin (see Boers), with a considerable number of German origin. The colored people are chiefly Hottentots, Kaffirs, Bechuanas, Basutos, Griquas, Malays and a mixed race, the off¬ spring of black women and white fathers. The laborers are chiefly Hottentots and Kaffirs. The prejudices and ill feeling once subsisting between the different nationalities of which the population is made up are now fast disappear¬ ing. Education is advancing, though it is not compulsory. The returns show a steady in¬ crease in the numbers of children of all classes receiving instruction. For the higher education there are seven colleges, besides a university (at Cape Town) incorporated in 1873. The colleges have each a staff of instructors in classics, mathematics, science, etc., but the uni¬ versity is merely an examining and degree-conferring institution. The religious bodies in the colony with the greatest number of adher¬ ents are the Dutch Reformed Church, the Church of England, the Methodist Independ¬ ents and Presbyterians, in the order here given. There is no Established Church.

The chief towns of the colony ranking after Cape Town are Port Elizabeth and Kimberley (qq.v.).

The Cape of Good Hope was discovered by Bartholomew Diaz in 1486, and rounded by Vasco da Gama in 1497, but was first colonized by the Dutch under Van Riebeek in 1652. Re¬ ducing the Hottentot inhabitants to slavery, or driving them beyond the mountains, they ex¬ tended the Cape settlement over a pretty large area. But the colony was under the rule of the Dutch East India Company, and owing to their restrictive regulations, made very slow progress. It was

captured by the British in 1795, restored at the Peace of Amiens (1802), and again taken in 1806, Sir David Baird being sent at the head of an expedition to take pos¬ session of it, and so prevent it from falling into the hands of the French. From this time

it has remained in the possession of the British, to whom it was formally assigned in 1815, along with Dutch Guiana, Holland receiving in return £6,000,000. It now began to advance in prosperity, but the progress of the colony was greatly retarded by the Kaffir wars of 1834, 1846 and 1851-53. Subsequently the area of the colony was greatly enlarged by the succes¬ sive annexations. The most important of these annexations were: British Kaffraria (1866); Griqualand West (1876) ; Kaffraria proper, or the Transkeian districts (Transkei proper, Griqualand East and Tembuland), including nearly the whole of the region between the Kei and the Natal border (1875-80) ; Pondoland (1894)), and part of Bechuanaland (1915). Pop. (1911) 2,564,965, of which 582,377 were Europeans. See South Africa, Union of.

CAPE DE GRISNEZ* gre-na', a headland

of France in the department of Pas-de-Calais, the nearest point of the French coast to Great Britain. It has a revolving light 195 feet high.

CAPE GUARDAFUI, gwar-da-foo-e', or GARDAFUI, a cape on the east coast of Africa in Italian Somaliland, situated in lat. 11° 50' N. and long. 51° 16' E. at the entrance to the Gulf of Aden.

CAPE DE LA HAGUE, hag (written also, but less correctly, La Hogue), a headland of Normandy, France, opposite the island of Alderney, 20 miles northwest of Cherbourg, and forming the northwestern extremity of the peninsula of Cotentin, in the English Channel. It is often confounded with Fort La Hogue or La Hougue, on the opposite side of Cotentin. Near this latter promontory the united English and Dutch fleets defeated the French, 19-24 May 1692.

CAPE HAITIEN, a-e-te'aii, or CAPE HAYTIEN, Haiti, a town on the north coast of the island. It was formerly known as Cap Frangais, Le Cap or Guarico, the latter being the native name. It has an excellent harbor. The town is well laid out and has the appearance of the older European towns. Before the earthquake in 1842 it was known as <(Little Paris, but as most of the white settlers did not rebuild, the town has not recovered since. During the French occupation, Cape Haitien was the capital of the island. It was bombarded by the English

in 1865. The commerce is very important, and the chief ex¬ ports are coffee, logwood, cacao, hides and honey. In 1913 the exports from Cape Haitien amounted to $1,254,407 ; in 1915 they amounted to only $352,418, the shrinkage being due to the hampering of commercial activity by the war in Europe ; the imports in the same years amounted to $1,194,453 and $560,881 respec¬ tively. Pop. about 30,000.

CAPE HATTERAS, the easternmost point of North Carolina, a sandy insular spit, or nar¬ row beach, separated from the mainland by the broad bay called Pamlico Sound. South of the capes of the Delaware, no land stretches so far out into the Atlantic as Cape Hatteras. The Gulf Stream, in its eastern and western vibra¬ tions, often flows within 20 miles of the cape, crowding toward the shore coasting vessels bound south. The difference of temperature between the hot airs of the Gulf and the breezes along shore and from the land engender

frequent commotions in the atmosphere at this place ; and no point on the coast is more noted for its frequent and dangerous storms. A light¬ house is kept a little over a mile north of the outermost point. Also about three-quarters of a mile south a fixed white beacon light is placed about 35 feet above sea-level.

CAPE HENLOPEN, a cape on the eastern coast of Delaware at the south side of the en¬ trance of Delaware Bay, in lat. 38° 47’ N., and long. 75° 5’ W. It is 13 miles south of Cape May, on the opposing New Jersey shore. The Cape Henlopen light, 126 feet above sea-level, is a fixed white light.

CAPE HENRY, a cape on the coast of Virginia at the southern entrance of Chesa¬ peake Bay in lat. 36° 56’ N. and long. 76° 1’ W., opposite Cape Charles. It has a fixed white light with fixed red sector between south-south¬ east and southwest by west 157 feet above the level of the sea. Cape Henry has also a life¬ saving station.

CAPE HORN, the southern extremity of an island of the same name, forming the most southerly point of South America. It is a pre¬ cipitous headland, 500 to 600 feet high, and run¬ ning far into the sea. Sailing vessels often en¬ counter dangerous tempests in passing round the Horn ; steamers generally pass through the Straits of Magellan. The cape was first doubled in 1616 by the navigator Schouten, a native of Hoorn, Holland, whence its name. It is sit¬ uated in lat.. 55° 59' S. and long. 67° 16' W. The climate is perennially Antarctic.

CAPE HUNTING-DOG, a wild dog of Africa (Lycaon pictus), which is placed in a separate genus because it differs from all other dogs in having only four toes on each limb, in lacking one pair of molars in the upper jaw and in certain other features. It resembles a hy¬ aena in form, and is yellowish-gray, with irreg¬ ular, black markings. It hunts in packs and is one of the enemies most dreaded by all the African antelopes. Since the decrease of this, its natural game, it has played havoc with domestic cattle and sheep, and is killed off by the settlers wherever found. It is fast becom¬ ing rare. Consult Ingersoll, (The Mammals* (New York 1906).

CAPE ISLAND CITY. See Cape May, N. J.

CAPE JUBY, Africa, a barren, sandy pro¬ jection into the Atlantic Ocean, 67 miles due east from the island of Fuerteventura of the Canary group. It is part of the section of the western Sahara which extends along the At¬ lantic Coast between the Mogador district and Rio de Oro. Water is very scarce on the cape, but is obtained in the ravines by sinking wells. The interior supports great numbers of sheep and produces large crops of wheat, bar¬ ley and corn. The ocean fisheries at this point are abundant, and most of the catch is mar¬ keted in the Canary Islands. There is a monthly steamship service between Cape Juby and Santa Cruz de Teneriffe. A wireless station was erected on the cape in 1916, thus establishing communication with the large station on Tene¬ riffe, and through this, with the Spanish main¬ land.

CAPE LINGUETTA, lm-gwet'ta, a head¬ land of Janina, Greece, 2y290 feet high. It

forms the termination of the Chimara, or Acroceraunian Mountains and bounds the east entrance into the Adriatic at the Strait of Otranto.

CAPE LOOKOUT, a cape situated on an island off the southeast coast of North Carolina, in lat. .34° 37’ N. and long. 76° 31’ W. There is a lighthouse with fixed white light at a height of 156 feet above the sea. It is 63 miles southwest of Cape Hatteras and 12 miles south¬ east of Beaufort.

CAPE LOPATKA, the southern extremity of Kamchatka. At the northern part of the headland is a mountain, bearing the same name, whence the land gradually slopes and narrows until it terminates in a low and barren tongue.

CAPE LOPEZ, lo’path, the southern ex¬ tremity of the Bight of Biafra, on the west coast of Africa. It is situated in lat. 0° 36’ S. and long. 8° 44’ E.

CAPE MATAPAN, ma-ta-pan’, a promon¬ tory of Greece, forming the southern extrem¬ ity of the Peloponnesus, in lat. 36° 23’ N. and long. 22° 29’ E. The name Tcenarum, or Promontorium Tcenarium , was applied by the Greeks to the headland, and to the small penin¬ sula north of it, connected with the great Tay-getic Peninsula by a narrow isthmus. It was sacred to Neptune, whose temple stood nearby.

CAPE MAY, N. J., a city and watering place in the southern part of Cape May County, having good railroad and water communica¬ tion. It has a fine beach and is very popular as a seaside resort, providing accommodations in hotels and boarding-houses for guests 10 times exceeding in number the permanent in¬ habitants. The industries include fishing, can¬ ning, oyster raising, gold beating and sand washing. Its harbor has an area of 500 acres and an average depth of 35 feet. It is the only port of refuge south of Sandy Hook on the New Jersey coast and is the scene of many important yachting events. The government is administered by a mayor, elected for three years, and a city council. The place is some¬ times called Cape City or Cape Island City. Pop. 3,000.

CAPE MAY COURT HOUSE, N. J

town and county-seat of Cape May County, 70 miles south of Philadelphia, and 11 miles north of Cape City, or Cape May, on the Atlantic City, and Pennsylvania railroads. Glass blow¬ ing, fishing and agriculture are among its chief industries. It contains two churches and a penitentiary. Pop. 1,300.

CAPE MAY POINT, the southern ex¬ tremity of New Jersey, at the northern entrance to Delaware Bay, situated in Cape May County, in

lat. 38° 56’ N. and long. 74° 57’ W. It has a revolving light about 160 feet above sea-level.

CAPE MENDOCINO, men-do-se’no, the westernmost point of the coast of California, projecting into the Pacific Ocean in lat. 40° 26’ N. and long. 124° 25’ W. It has a very, high lighthouse, 422 feet above sea-level, with a flashing light.

CAPE NEDDOCK, Me., a promontory 35 miles southwest of Portland, with a light¬ house on Goat Island near it, containing a fixed light, 33 feet above the sea.

CAPE NOME, nom, a cape on the south coast of the peninsular projection of Alaska which separates Kotzebue Sound on the north from Bering Sea on the south. In the vicinity of the cape is a remarkably rich gold mining region. The Nome district as settled centres about the lower course of the Snake River, an exceedingly tortuous stream in its tundra course, which emerges from a badly degraded line of limestone, slaty and schistose mountain spurs, generally not over 700 to 1,200 feet ele¬ vation, but backed by loftier granitic heights, and discharges into the sea at a position 13 miles west of Cape Nome proper.

The first discovery of gold was made in September 1898, but it was not until July 1899 that the beach gold was discovered. In the middle of October following, Nome City had 5,000 inhabitants all living in tents on the hith¬ erto barren shore. For a time it appeared as if this region would rival in richness the fa¬ mous Klondike district, but this anticipation has not been realized.

CAPE NORTH, the northeast point of Cape Breton, east of Saint Lawrence Bay, pro¬ jecting into the Gulf of Saint Lawrence.

CAPE NORTH, northernmost promon¬ tory of Europe. See North Cape.

CAPE NUN, noon, a headland on the west coast of Morocco, extending into the sea at the southwestern extremity of the Atlas range, in lat. 28° 45’ N. and long. 11° 5’ W.

CAPE ORTEGAL, or-ta-gal’, a rugged promontory forming the northern extremity of Spain, extending into the Bay of Biscay, in lat. 43° 45’ N. and long 7° 56’ W. The coast at this point is barren and rugged.

CAPE PALMAS, a cape on the western coast of Africa, situated in the southern part of Liberia, in lat. 4° 22’ N. and long. 7° 44’ W. In 1834 the Maryland colony of free colored emigrants settled on this point.

CAPE PETREL, or CAPE PIGEON, a

large petrel (Daption capensis), about the size of a pigeon, exceedingly numerous about the Cape of Good Hope, and widely distributed throughout the Southern Ocean. Consult Milne-Edwards, A., in (Annales des sciences naturelles) for 1882.

CAPE PILLAR, a high mass of rocks ter¬ minating in two tower-shaped cliffs on the northwest coast of Desolation Island, at the southwest entrance from the Pacific Ocean into the Straits of Magellan.

CAPE POGE, a cape on the coast of Mas¬ sachusetts, in lat. 41° 25’ N. and long. 70° 26’ W. It is the extreme northeast point of the Martha’s Vineyard Island group. It has a lighthouse with a Hashing white and red light, every third flash red, with five seconds interval.

CAPE PRINCE OF WALES, a promon¬ tory on Bering Sea, the most northwest point of North America. It terminates in a peaked mountain, presenting a bold face to the sea, and is a dangerous point on account of a shoal which stretches to the northeast. It lies op¬ posite East Cape on the coast of Siberia. Bering Strait between the two is the narrowest water between America and Asia.

CAPE RACE, a promontory at the south¬ eastern extremity of Newfoundland, in lat. 46°

39’ N. and 53° 4’ W. The fogs of this part of the coast make navigation hazardous. The British government maintains a light here.

CAPE RIVER, or RIO DE SEGOVIA,

known also as Coco or Wanks, a river of Nica¬ ragua, Central

America, which after a gen¬ erally northeast course of nearly 300 miles en¬ ters the Caribbean Sea at Cape Gracias a Dios. It is navigable for a considerable distance from the sea, but the upper part of its course is ob¬ structed by cataracts and shallows. It forms part of the boundary between Honduras and Nicaragua.

CAPE ROMAIN, a low and barren point of land, with a lighthouse, 37 miles northeast of Charleston, S. C.

CAPE SABLE, the name of two capes in North America: (1) The southernmost point of the mainland of the United States at the ex¬ tremity of Florida, in lat. 25° 8’ N. and long. 81° 9’ W. (2) A point at the southwest ex¬ tremity of Nova Scotia, in lat. 43° 23’ N., and long. 65° 37’ W.

CAPE SAINT ROQUE, ro’ka, SAN ROQUE, or SAO ROQUE, a cape on the east coast of Brazil, in lat. 5° 29’ S. and long. 35° 14’ W.

CAPE SAINT VINCENT, a headland at

the southwestern extremity of Portugal, in lat. 37° 3’ N. and long. 8° 58’ W. Off this cape, 14 Feb. 1797, an English naval force, consisting of 15 ships of the line, under Admiral Jervis, defeated a superior Spanish fleet. This point was known to the ancients as Promontorium Sacrum.

CAPE SAN ANTONIO, san an-to’ne-o,

the name of two capes: (1) A high, barren and precipitous headland, on the coast of Va¬ lencia, Spain, opposite the island of Iviza. On its summit are a convent, a watch tower and several windmills. (2) A lofty and nearly perpendicular promonotory, at the mouth of the Rio de la Plata, in the province of Buenos Aires, Argentina.

CAPE SAN BLAS, san bla, a low point

of land, about two miles long, on the south coast of western Florida, in Calhoun County, 123 miles east-southeast of Pensacola. It lies between San Bias Bay and Saint Joseph’s Bay. It has a revolving light 98 feet above sea-level.

CAPE SAN LUCAS, loo’kas, the southern extremity of the peninsula of Lower California, Mexico, in lat. 22° 44’ N. and long. 109° 54’ W.

CAPE SPARTIVENTO, the ancient

Herculis Promontorium, a promontory of south¬ eastern Italy, forming the southeastern extrem¬ ity of Calabria, in lat. 37° 57’ N. and long. 16° 5’ E.

CAPE OF STORMS. See Cape of Good

Hope.

CAPE TINDARO, tin-da’ro, a headland of Sicily, near Falcone, extending into the Gulf of Patti. The remains of the ancient Tyndaris are in its neighborhood.

CAPE TOWN, Africa, capital of the prov¬ ince of the Cape of Good Hope in the Union of South Africa and the seat of the legislature under the Union, is situated in the midst of striking scenery, rather more than 30 miles from the Cape of Good Hope, at the head of

Table Bay, which opens into the Atlantic on the northwest, and at the foot of Table Moun¬ tain. It was founded by Johann van Riebeck in 1652, on behalf of the Dutch East India Company. It is regularly laid out and has some good streets, with well-built business premises and other buildings, and is furnished with most of the institutions and conveniences of a European town (including tramways). The electric lighting and water supply are in the hands of the corporation. The finest edi¬ fice is that which accommodates the legisla¬ ture, a handsome structure of modern erec¬ tion ; another good edifice is that containing the public library (40,000 volumes) and mu¬ seum built in the Roman-Corinthian style. The Standard Bank of South Africa occupies hand¬ some premises. Other buildings are the gov¬ ernment house, the courts and government of¬ fices, the town house, the gallery of fine arts, the railway station, the post-office, the exchange, *etc.* The best ecclesiastical building is the Roman Catholic cathedral ; there is also an English Episcopal cathedral and Dutch, Pres¬ byterian, Lutheran, Independent and Methodist churches. There is a well-equipped college, the South African College, which trains stu¬ dents for the degrees of the Cape University, which is merely an examining

body. There are beautiful botanic or government gardens in the town, occupying 14 acres and forming a fine promenade. The Cape Observatory is a cele¬ brated institution supported by Imperial funds. The port has been provided with an extensive breakwater inside of which ships can safely ride at anchor protected from the northwest gales ; and there are two docks 16 acres in area, an outer harbor of 62 acres, a large graving dock, *etc.* The net tonnage cleared in

1912 was 3,979,527 tons. The population is very mixed, a large number consisting of colored people of negro or other African descent. In

1913 a number of contiguous municipalities were incorporated within the boundaries of Cape Town, the population of which was then composed of 81,600 Europeans and 73,623 col¬ ored persons and the valuation nearly $110,-

000,000.

CAPE TRAFALGAR, traf-al-gar, or tra-fal'gar, a headland on the coast of Cadiz, Spain. It is memorable for the naval battle fought near it, 21 Oct. 1805, between the English under Nelson and the combined fleets of France and Spain. The English gained a complete victory, though with the loss of their commander. It was known to the Romans as Prornontorhini Junonis.

CAPE VERDE, the most westerly head¬ land of Africa, in Senegal, jutting out into the Atlantic Ocean, between the rivers Gambia and Senegal, in lat. 14° 43' N. and long. 17° 34' W. It was discovered by the Portuguese navigator, Fernandez, in 1445, and is said to have derived its name from a group of gigantic baobab trees adorning its summit and forming a green patch on the white coast.

CAPE VERDE ISLANDS, a group of islands west of Africa, in the Atlantic Ocean, so called from Cape Verde, opposite to which they are situated, 320 miles west of Cape Verde, and between lat. 15° and 18° N. and between long. 22° and 25° W. They belong to Portugal. As to their number, some reckon 10, others 14

or more, by giving the name of islands to masses which are only rocks. The 10 principal islands are Sao Thiago, Fogo, Brava, Maio, Boavista, Sao Nicolao, Santo Antao, Sao Vicente, Santa Luzia and Sal. The total

area of the group is 1,516 square miles. They are, in general, mountainous. The island of Fogo, one of the group, consists of one single mountain, a volcano, sometimes active, about 10,000 feet above the level of the sea. Some of the islands are very bare ; in others the lower hills are cov¬ ered with a beautiful verdure, as well as the valleys between ; but there is little water, ex¬ cept what is found in ponds and wells. Long droughts have occurred, sometimes causing great loss of life. The climate is hot and un¬ healthy in most of the islands. The soil is, for the most part, not very fertile ; nevertheless some parts produce sugar, coffee, rice, tobacco, maize, etc., with bananas, lemons, oranges, citrons, grapes and other fruits. European do¬ mestic animals abound and thrive well. Marine turtles are plentiful. The ports of the archi¬ pelago were visited in 1913 by 1,696 merchant vessels of 6,136,784 tons, besides coasting trade. In 1914 the imports were valued at $2,306,610; the exports in the same year were valued at $332,739. The total population amounted to 143,929 in 1912, of whom 4,799 were white, the rest being chiefly negroes. The chief town is Praia on Sao Thiago (Santiago), and Porto Grande on Sao Vicente is a coaling station for steamers. Salt is an export of importance. Coffee, hides and physic-nuts are also exported. There is a resident governor at Praia. Consult Ellis, (West African Islands* (London 1885) ; Fea, (Delle Isole del Capo Verde) (Rome 1899) ; Lima, ((Rapport sur les lies du Cap Vert® (in (Recueil consulaire,* Vol. CX, Brus¬ sels 1900).

CAPE WRATH, a pyramidal promontory of unrivaled wildness and grandeur, forming the northwest extremity of Scotland and run¬ ning out into the Atlantic; in lat. 58° 38’ N. and long. 4° 58′ 5″ W. It presents deep fissures and tall pinnacles. From it a reef of rocks, per¬ forated with arches and caverns, juts out into the sea. Off the cape is Stag Rock, a pillar 200 feet high. Cape Wrath is 525 feet high, and there is a lighthouse near it, 400 feet above the sea, visible 25 miles off.

CAPEFIGUE, kap-feg, Baptiste Honore Raymond, French historian and journalist: b. Marseilles 1802 ; d. Paris, 23 Dec. 1872. He en¬ tered the field of journalism and contributed to various publications under the signature (<Un homme d’etat.® He was appointed to a post in the Foreign Office, holding it until 1848. He thus had access to various documents unknown or closed to others. He was a prolific writer, producing about 100 volumes of history, many being biographies of famous women. They were hastily written, are uncritical and tinged with the Bourbon sympathies of the author. His most important contributions to historical science are the (History of Philip Augustus* (4 vols., 1829) ; (History of the Restoration and of the Causes that Led

to the Fall of the Elder Branch of the House of Bourbon (1831-33) ; (Histoire de la reforme, de la ligue, et du regne de Henri IV* (8 vols., 1834-35).

CAPEL, Arthur, Lord, English soldier: b. about 1610; d. 9 March 1649. He was son of

Sir Henry Capel ; was raised to the peerage as Lord Capel, of Hadham, by Charles I in 1641. He sat for Hertford in both the Short Parlia¬ ment and the Long Parliament, and took sides with the popular party under Pym in demanding redress of various grievances. He strongly op¬ posed revolution, however, and during the revo¬ lutionary war he fought bravely as one of the royalist generals in the west in the engagements at Bristol, Exeter and Taunton. Having been at length forced to surrender at Colchester to General Fairfax, he was imprisoned and, after some vicissitudes, executed. His (Daily Ob¬ servations or Meditations5 was published posthumously with a memoir.

CAPEL, Arthur, Viscount Malden and Earl of Essex, English statesman, son of the preceding: b. January 1631; d. July 1683. He fought for the King in the civil war and on the accession of Charles II was appointed lord-lieutenant of Hertfordshire. In 1661 he wras created Viscount Malden and Earl of Essex and appointed Ambassador to Denmark in 1670. He served as lord-lieutenant of Ireland, 1672-77, and was for a few months in 1679 head of the treasury commission. He opposed the court party and supported the Exclusion Bill. Arrested for his connection with the Monmouth conspiracy (1682) he was sent to the Tower, and is supposed to have committed suicide there.

CAPEL, Thomas John, Monsignor, Eng¬ lish Roman Catholic ecclesiastic: b. London, 28 Oct. 1836; d. Sacramento, Cal., 24 Oct. 1911. He was ordained to the priesthood in 1860. He conducted a mission for English-speaking Catholics at Pau 1868-73, and was given the title of Monsignor by Pope Pius IX. He after¬ ward devoted himself to education, establish¬ ing a Roman Catholic public school at

Ken¬ sington in 1873 and achieved celebrity as a preacher and proselytizer. He came to the United States in 1883, and after a lecture tour settled to private life in California. He is the author of (The Holy Catholic Church) ; (Con¬ fession ; (The Name Catholic) ; (The Pope the Head of the Church.5 He is the original Monsignor Catesby in Disraeli's (Lothair.5

CAPEL, or CAPLE, a term used by miners to indicate the wall of a lode, espe¬ cially in a tin or copper mine. It is generally of quartz, black tourmalin and hornblende. The capels sometimes contain sufficient metallic particles to make it worth while to work them. In these cases they may be considered as form¬ ing part of the lode. The word <(cab55 is an equivalent used by Cornish miners. In the United States, ((casing" is nearly synonymous.

CAPELINE, or CAPELLINE, a small piece of armor, consisting of a skull cap of iron, worn in the Middle Ages by light armed men such as archers.

CAPELL, Edward, English Shakespearean scholar: b. Throston, Suffolk, 1713; d. London, 24 Feb. 1781. He was educated at Cambridge; he was deputy inspector of plays after 1737 and devoted his life to the study of Shakes¬ peare. He transcribed this author's plays 10 times. .He collated the quartos and the first two folios with greater care than any previous editor. He published (Prolusions or Select Pieces of Ancient Poetry) (1760); (Mr. Wil¬

liam Shakespeare, His Comedies, Histories, and Tragedies) (10 vols., 1768); (Notes and Various Readings of Shakespeare) (1783) ; and (The School of Shakespeare. 5

CAPELLA, Martianus Mineus Felix,

Latin writer probably of the 5th century : b. probably in Carthage, Africa. His extant work, (Satiricon,5 consists of nine books, the first two under the title, (De Nuptiis Philologiae et Mercurii,5 being an introductory allegory, while the others treat of grammar, logic, meta¬ physics, geometry, arithmetic, astronomy and music. It is a sort of encyclopaedia and was much esteemed in the Middle Ages. His state¬ ment of the heliocentric system of astronomy in the eighth book may possibly have given hints to Copernicus, who quotes him occasion¬ ally. The best edition is that of Eyssenhardt (Leipzig 1886). Consult Teuffel, (Geschichte der romischen Litteratur5 (6th ed., Leipzig

1911).

CAPELLA, a star situated in the constella¬ tion Auriga, on the ˆCharioteers® left shoul¬ der. It is of remarkable brilliancy, only four stars exceeding it in that respect. Its color is nearly that of solar light. It is one of Secchi's solar stars, whose spectra closely resemble that of the sun, being ruled with dark lines due to metallic vapors. Its parallax, determined by Elkin, is 0".08, corresponding to a distance nearly 26,000,000 times the distance from the earth to the sun. Its light takes about 40 years to reach us. It is often called Capra. In mythology Capella was Amalthea's goat, which suckled Jupiter.

CAPELLINI, ka-pel-le'ne, Giovanni, Ital¬ ian geologist and palaeontologist: b. Spain, 13 Aug. 1833. He studied at Pisa and traveled widely. In 1860 he became professor at Genoa, and later at Bologna. He has emphasized the importance of prehistoric discoveries which re¬ lated archaeology to palaeontology and defended the Darwinian theorv. He was influential in calling the International Congress of Anthro¬ pology and Prehistoric Archaeology in 1865. He founded in Bologna a geological museum. His publications include (Delfini fossili del Bolognese5 (1864); (Relazione d'un viaggio scientifico nell' America settentrionale) (1867) ; and (Armi e utensili di pietra del Bolognese5'

(1870).

CAPELLO, ka-pel'lo, Bianca, Italian ad¬ venturess: b. Venice 1542; d. in the Castle Paggio di Capano, 11 Oct. 1587. In 1563 she eloped with a banker's clerk named Pietro Buonaventuri, who put himself under the pro¬ tection of Francesco de Medici at Florence. 1 he latter made Bianca his mistress and her husband his steward, but had him put to death in 1570, and after the death of his wife, Joanna of Austria, married Bianca in 1578. She and Francesco are supposed to have been poisoned by his brother and successor, Cardinal Fer¬ nando.

CAPEN, Elmer Hewitt, American clergy¬ man educator : b. Stoughton, Mass., 5 April 1838; d. Medford, Mass., 22 March 1905. He was graduated at Tufts College in 1860, and was elected to the Massachusetts legislature while still an undergraduate, 1859. After studying at the Harvard Law School, he was admitted to the bar in 1863 and practised at

Stoughton for a short time; began the study of theology, was ordained pastor of the Independ¬ ent Christian Church of Gloucester in 1865, held pastorates at Saint Paul, Minn., and Providence, R. I., 1865-75, when he was elected president of Tufts College, a position he held till his death. His administration was most successful in every way, and under him the institution grew to be one of the most progres¬ sive of American colleges. His collected ad¬ dresses appeared, entitled (Occasional Ad¬ dresses) (1902). Consult Tombo, A., (In Memoriam E. H. Capen) (New York 1905).

CAPEN, Nahum, American historical writer: b. Canton, Mass., 1 April 1804; d. 4 Jan. 1886. In 1825 he began business in Bos¬ ton as a publisher, with the firm of Marsh, Capen and Lyon. He was among the first to agitate the matter of an international copy¬ right, his memorial to Congress on the subject being one of the firM presented to that body ; a letter of his, printed by the Senate, led to the organization of the census bureau at Washing¬ ton and as postmaster of Boston in 1857-61, he established the custom of collecting letters from street boxes. He contributed to the press many articles on history and political economy. He edited a translation of the (Works of Dr. GalP (6 vols.) ; the (Annals of Phrenology) (2 vols.) ; (The Writings of Hon. Levi Wood¬ bury, LL.D.' and (The Massachusetts State Records ' from 1847 to 1851 (5 vols.). He pub¬ lished (The Republic of the United States ' (1848) ; (Reminiscence of John G. Spurzheim and George Combe' and a (Review of the Science of Phrenology ' (1881). He left an unfinished (History of Democracy) (Vol. I,

1874).

CAPENA PORTA. See Campus Scelera—

TUS.

CAPER-BUSH, a shrub of the genus Capparis of the family

Capparidacece. The genus includes about 150 species of trees and shrubs, distributed throughout the warmer regions of the earth. Capers are pickles made by pre¬ serving the flower buds of C. spinosa, a strag¬ gling spiny shrub of the Mediterranean region

CAPERCAILZIE, kap-er-kali, CAPER¬ CAILLIE, or CAILZIE, ka'li, a readily do¬ mesticated, polygamous grouse (Tetrao uro-gallus), about the size of a turkey, widely dis¬ tributed throughout the pine-covered mountains of Europe. Eormerly it inhabited Ireland and Scotland, where it was known as ˆblackcock,® but it was entirely extirpated toward the end of the 18th century. It has since, however, in small numbers, been restored to Scotland by stock imported from Scandinavia. The ground color of the cock is muddy black, spotted with gray and brown; quill feathers dark brown; tail feathers nearly black; a glossy dark green chest ; whitish bill and a small patch of naked skin above the eye, which is scarlet. The feet are feathered to the toes. The hen and young are dark brown, covered with freckles of a lighter shade; neck and chest yellowish chest¬ nut, and the feathers of the under part usually edged with white. It feeds chiefly upon berries, seeds, insects and the young shoots of the pine and other trees, which give its flesh a delicate turpentine flavor. They are hunted with the aid of dogs, which < <trce)) them, when they are

easily shot. In the early spring, at the approach of the breeding season, the cocks meet at an accustomed place, to give the hens the ben fit of their annual ˆdances,® at which assemblies the hens seem to choose their mates by th: amount of plumage, color, daring and extraor¬ dinary gestures which each displays. On such occasions the cock is oblivious to all else save the winning of his mate, and may easily be approached and killed. The female bird builds her nest on the ground among the pines, gen¬ erally laying from 6 to 12 eggs, few of which reach maturity, owing to the carelessness of the mother. They are spotted red or yellowish brown, and are over two inches long. The bird is readily domesticated if it has the range of a space containing a few pine trees. Consult Lloyd, Tame Birds of Sweden and Norway' (London 1867) ; Morris, (British Game Birds) (ib. 1891) ; Darwin, (Descent of Man' (2d ed., ib. 1874) ; Millais, (The Nat¬ ural History of British Game Birds' (London

1909).

CAPERN, Edward, English minor poet : b. Tiverton, Devonshire, 21 Jan. 1819; d. 1894. He was long in the mail service in his native county, and was often styled ((The Postman Poet.” The poet Landor, attracted by the verse of Capern, procured him a pension from the civil list. His published works include ’Poems by the Biddeford Rural Postman’ (1856) ;

(Ballads and Songs’ ; (Wayside Warbles’ ;

(Sun-gleams and Shadow Pearls. ’ His verse is mainly descriptive of Devon life and char¬ acter and a number of his lyrics were set to music by the poet himself.

CAPERNAUM, a city of ancient Palestine, on the west or northwest side of the Sea of Tiberias. This place is famous in Christian history, because Jesus often visited it during the time of his ministry, and in its vicinity he delivered the Sermon on the Mount. Nothing of the city now remains.

CAPERS, Ellison, American Protestant Episcopal bishop : b. Charleston, S. C., 14 Oct. 1837 ; d. Columbia, S. C., 22 April 1908. He was graduated at the South Carolina Military Academy 1857, and was a professor there 1858-60. He entered the Confederate army, was successively major, lieutenant-colonel and brigadier-general, and received several severe wounds. He was secretary of State of South Carolina in 1867-68, then entered the Protestant Episcopal ministry, and was rector of Christ Church, Greenville, S. C., for 20 years, and at Columbia, S. C., for six years where he re¬ mained until his elevation to the episcopate. He was secretary and treasurer of the diocesan board of missions 1879-93 and deputy to the general conventions of 1880, 1883, 1886. In 1893 he was consecrated seventh bishop of South Carolina, succeeding Bishop Howe.

CAPERS, William, American Methodist Episcopal bishop: b. South Carolina 1790; d. 1855. He was educated at South Carolina Col¬ lege, became an itinerant preacher and minis¬ tered to the Indians in Georgia from 1821 to 1824. He was presiding elder _ in Charleston for four years and for a short time was editor of the Wesleyan Journal, later merged in the New York Christian Advocate. In 1837 he founded and edited the Southern Christian Ad¬ vocate. He also did missionary work among

the negroes. In 1846 at the first general con¬ ference of the Methodist Episcopal Church he was chosen bishop. Consult his autobiography, with memoir by Wightman (Nashville 1858).

CAPERS, the unopened flower-buds of a low shrub (Cap paris spinosa), which grows from the crevices of rocks and walls and among rubbish in the southern parts of France, in Italy and the Levant. The stems of the Caper-bush are trailing and two or three feet long. In the south of France the caper-bush is very common. It grows wild upon the walls of Rome, Siena, and Florence, and, when trained against a wall, flourishes even in the neighborhood of Paris. It was introduced into Great Britain as an exotic as early as 1596. Modern horticulturists are of opinion that with care it might be raised in the open air in Eng¬ land, but this has never been accomplished to any practical extent. It is cultivated on a large scale between Marseilles and Toulon and in many parts of Italy. In northern United States it is propagated by cuttings in green¬ houses, but is grown from seed in the South¬ ern States. In the early part of summer it be¬ gins to flower, and the flowers continue suc¬ cessively to appear until the commencement of winter. The buds are picked every morning before the petals are expanded; and as they are gathered they are put into vinegar and salt. When a sufficient quantity is collected they are distributed, according to their size, into dif¬ ferent vessels, again put into vinegar, and then packed up for sale and exportation. The small¬ est capers are the dearest, simply from the rea¬ son that they are more troublesome to gather. This pickle is much used in sauce for boiled mutton. To persons unaccustomed to it the taste of capers is unpleasantly sharp and bitter, but after a little while the palate becomes recon¬ ciled to it. The flower-buds of the marsh-marigold (Caltho palustris) and the seeds of nasturtiums are frequently pickled and eaten as a substitute for capers. The bark of the root of the caper cut into slices and dried in small rolls or quills is sometimes used in medi¬ cine as a diuretic and in cases of obstruction of the liver. The caper-tree (Capparis Jamaicensis) is found in tropical America.

CAPERTON, Allen Taylor, American Confederate statesman : b. near Union, Monroe County, Va. (now West Virginia), 21 Nov. 1810; d. Washington, D. C., 26 July 1876. After attending school in Huntsville, Ala., and enter¬ ing the University of Virginia, he went to Yale, where he was graduated in 1832, and studied law at Staunton, Va. He was a director of the James River and Kanawha Canal, and served in both

houses of the Virginia legislature, his last term in the senate being in 1859-60. He was a member of the Constitutional Convention of 1861, and opposed secession until the begin¬ ning of hostilities. He was elected to the Con¬ federate States Senate in 1863, and served till the fall of the Confederacy in the spring of 1865. He was chosen to represent West Vir¬ ginia in the United States Senate for the full term beginning 4 March 1875, and was a mem¬ ber of the committees on claims, railroads and the revision of the laws. After the close of the war Caperton took an active part in bring¬ ing the coal, timber and grazing lands of West Virginia to the notice of distant capitalists.

-CAPET

CAPERTON, William Banks, American naval officer: b. Spring Hill, Tenn., 30 June 1855. He was graduated at the United States Naval Academy in 1875. Through the various grades of the service he rose to the rank of lieutenant in 1889. He has had over 23 years of sea service and about 19 years of shore and other duty. He has seen service in every sea, and has shown that he is one of the great men of the United States navy. He was an officer on board the Marietta when she accompanied the Oregon in her famous race from the Pacific to the Atlantic to take part in the fight with Admiral Cervera's fleet in the Spanish War. Previous to that he was one of the young American naval officers who were sent to Paris to the Exposition there in 1878. He was at one time assigned to duty with the coast and geo¬ detic survey and served as an officer aboard the Vesuvius. He was in command of the naval station at Newport, R. I., and supervisor of the second naval district 1913-14. He was named rear-admiral in 1913 and was assigned to the command of the cruiser squadron of the At¬ lantic fleet in 1915. In 1914-15 he was in the Caribbean trying to bring peace to the war-torn republics of Hayti and San Domingo. When it was time to fight he showed that he was a fighter, and he has been equally proficient in diplomacy. He brought the most turbulent of the revolutionary leaders at least to make believe they liked peace. In July 1916 he was promoted to admiral (<for valuable and satis¬ factory service in Hayti and San Domingo and his efficient record as a high executive officer.® On 29 July 1916 he took command of the Pacific fleet, succeeding Admiral Winslow.

CAPES, Bernard, English novelist. His works include (The Lake of Wine> (1898) ; (The Adventures of the Comte de la Muette) (1898) ; (Our Lady of Darkness) ; (At a Win¬ ter's Fire) (1899) ; (From Door to Door) (1900); (Joan Brotherhood) (1900); (Love Like a Gipsy) (1901) ;

(A Castle in Spain > (1903); (A Jay of Italy* (1905); (A Rogue's Tragedy* (1906) ; (The House of Many Voices* (1911); (The Story of Fifine) (1914); (The Fabulists* (1915).

CAPET, ka-pa, or kap'a, the name of the French race of kings, which has given 118 sov¬ ereigns to Europe, namely, 36 kings of France, 22 kings of Portugal, 11 of Naples and Sicily, 5 of Spain, 3 of Hungary, 3 emperors of Con¬ stantinople, 3 kings of Navarre, 17 dukes of Burgundy, 12 dukes of Brittany, 2 dukes of Lorraine and 4 dukes of Parma. The history of this royal race is, at the same time, the his¬ tory of the rise and progress of the French monarchy. The fate of one of the most inter¬ esting countries and nations in Europe is con¬ nected with the name of Capet. After having been deprived of four thrones, and again re¬ stored to them, this family stood forth as the first and most ancient support of the European principle of political legitimacy, that divine right, which in this house commenced with treason. Its origin is remarkable. Pepin the Short, the father of Charlemagne and mayor of the palace under the Merovingian dynasty, had displaced that royal house and usurped the throne of the ancient kings of the Franks. After a space of 235 years his own descendants, the Carlovingian monarchs, experienced a sim-CAPGRAVE — CAPIAS

ilar fate. Under the last Carlovingians, desti¬ tute alike of energy and wisdom, Hugh the Great, Duke of France (by which was then understood the Isle of France), Orleans and Burgundy, exercised a power as unlimited as that of the mayor of the palace under the Merovingians. On the death of Louis V, with¬ out children, in 987 his uncle, Charles, Duke of Lower Lorraine, laid claim to the throne, which the Franks had sworn to preserve to the family of Charlemagne. The French nobility, dis¬ gusted at the German leanings of the Carlovin¬ gians, whose domains and influence lay in the eastern provinces, preferred that a member of their own class, whose possessions were situ¬ ated in the centre of the country, and whose power was so great as to outrival that of the old dynasty, should rule over them, and ac¬ cordingly chose as their king Hugh, son of Hugh the Great, Duke of France and Count of Paris, and had the support of the Church in their favor. The valiant Charles of Lor¬ raine was surprised in Laon by the treachery of a bishop and made prisoner. He died soon afterward in prison, and his son, Otho, Duke of Lower

Lorraine, died in 1006. Both his younger brothers died childless in Germany. Thus the race of Capet was left in possession of the throne of France. According to some historians, Hugh Capet was descended from a Saxon family. He married a German princess, Adelaide, daughter of King Henry I of Ger¬ many (Duke of Saxony). Hugh was crowned at Rheims, and swore to preserve to the nation, and particularly to the powerful feudal nobility and clergy, all their existing privileges. Hugh and the succeeding monarchs, till Louis VII, took the precaution to have their successors invested with the royal title during their own lifetime. Thus Hugh had his son, Robert, crowned and anointed as his colleague as early as 1 Jan. 988. He abolished by law the partition of the hereditary estates among the sons of the kings and forbade the alienation of the family domains. The daughters of the kings were endowed from that time with money, and the appanage which was given to the princes of the blood returned to the Crown in default of male heirs. Both these principles were more fully confirmed by later laws. Thus Hugh Capet, by uniting his hereditary duchy, consisting of Paris, Isle of France and Burgundy, inalien¬ ably with the Crown, may be regarded as the founder of the French monarchy. What he had begun was completed by his successors, particularly in the times of the Crusades, and by the establishment of standing armies. On the failure of the direct line at the death of Charles IV (1328) the French throne was kept in the family by the accession of the indirect line of Valois, and in 1589 by that of Bourbon. Capet being thus regarded as the family name of the kings of France, Louis XVI was ar¬ raigned before the National Convention under the name of Louis Capet.

CAPGRAVE John, English historian: b. Lynn, Norfolk, 1393; d. there 1464. The most of his life was passed in the Augustinian friary of his native place. He was provincial of the order of Austin Friars in England, and was one of the most learned men of his day. He wrote in Latin numerous commentaries, ser¬ mons and lives of the saints. His most import¬ ant work was his (Chronicle of England, > in

English, extending from the creation to the year 1417. Other works were a (Libcr de Illustribus Henricis) and a (Life of Saint Katherine. J Many of his works are lost, others have never yet been printed. His < Chronicle* and his (Liber de Illustribus Henricis) have been edited by F. C. Hingeston and printed in the Rolls series (London 1858).

CAPHTOR, the country in which the Phil¬ istines originated mentioned in Deut. ii, 23; Jer. xlvii, 4, and Amos ix, 7. Until recently

the location of Caphtor was not certain; it had been variously identified with Cappadocia, Cy¬ prus, Crete and Cilicia. It is now practically certain that it was Crete on account of the frequent connection of the Philistines with the Cherethites (or Cretans). Consult Hall, (Kef-tin and the Peoples of the Sea* (in Annual of the British School, Vol. VIII, pp. I57ff. and cf. Vol. X, p. 154, Vol. XIV, p.' 254); _ Muller, W. M., in (Mitteilungen der vorderasiatischen Gesellschaft* (1900), and Meyer, Ed., (Geschichte des Altertums, (I, 2, pp. 798ff. ; 3d ed.,

1913).

CAPIAS, kap'e-as (((that you take®), a writ or process in a civil action whereby the sheriff is ordered to arrest the body of the defendant. The writ so framed as to call for the arrest of the defendant before judgment, in order to compel him to answer a suit, is called a capias ad respondendum ; if after the judgment, to compel him to satisfy the judgment, it is called a capias ad satisfaciendum, commonly abbrevi¬ ated ca. sa. In case of injuries without force, the civil law, and originally the common law, did not authorize the arrest of the defendant before judgment, that is, the arrest to answer; and upon feudal principles, says Sir William Blackstone (3 Com. 281), <(the person of a feudatory was not liable to be attached for injuries merely civil, lest thereby the lord should be deprived of his services.® The first writ of capias ad respondendum was given by act of Parliament in 1267, 52 Hen. Ill, c. 23, § 1, which provided that (<if bailiffs, which ought to make account to their lords, do withdraw themselves, and have no lands nor tenements whereby they may be restrained, they shall be attached by their bodies, so that the sheriff shall cause them to come to make their account.® This act applied to a particular description of receivers, and supposed them not only to be debtors, but also to have in their own hands the evidence of the amount of the debt, the production of which was one object of the process. The statute of 13 Edw. I, c. 11, passed in 1285, 18 years after the. former, extends this process to (<all manner of receivers bound to yield account,® and provides ((if they be found in arrearages upon this account, their bodies shall be. arrested, and, by the testimony of the auditors, shall be sent into the next jail, and be imprisoned in irons under safe custody, and remain in prison at their own cost until they have satisfied their master (the creditor) fully of their arrearages.® It would appear that the practice of arresting on mesne process, that is before judgment, to answer in civil suits, grew out of these statutes ; for the subsequent stat¬ utes of 25 Edw. Ill, c. 17 (1350), providing

that ((such process shall be made in writ of debt, detinue of chattels and taking of beasts, by writ of capias, as is used in writ of account® ; and of 21 Hen. VII. c. 9 (1503) ; evidently have

reference to an arrest to answer. Formerly, a writ upon which a suit was commenced was either a capias, distress or summons ; either the person of the defendant was seized, and (un¬ less he was bailed) imprisoned until the trial, or his goods and lands were seized as a guar¬ antee of his appearance to answer; and more often, in modern times, to obtain a lien to secure satisfaction of the judgment; or he was only summoned, that is, merely had notice that a suit had been commenced before such a court, by such a plaintiff, and was to be heard at such a time. The commencement of an action by summons is now the usual course of procedure ; recent legislation, and especially the practical abolition of imprisonment for debt, having greatly restricted the use of writs of capias of any kind. By the Debtors' Act, 1869 (32 and 33 Viet. c. 62), the writ of capias ad satisfacien¬ dum is abolished, except in cases in which the defendant can pay, but will not. The same act provides that when a plaintiff has good cause of action against a defendant to the amount of £50 or upward, and the defendant is about to quit England, and the absence of the defendant from England will materially prejudice the plaintiff in the prosecution of his action, a judge may order the defendant to be arrested unless or until security be found. A supple¬ mentary or second writ, issued when an ordi¬ nary capias has been placed in the hands of the sheriff and has been returned with the endorse¬ ment that the defendant could not be found, is called a testatum capias. See Arrest; At¬ tachment; Execution.

CAPILLARIES, the extremely minute blood vessels that make the connection between the arteries and the veins. They are extremely abundant, being present in practically all parts of the body and in enormous numbers. It is by means of the capillaries that most of the in¬ terchange of nutrition takes place in the various tissues of the body. The arteries bring the fresh oxygenated blood to the parts, to

which it is distributed by the rich network of capil¬ laries, through the walls of which the waste products pass and are carried on by the blood pressure into the veins, to be eliminated by some one of the large excretory organs, the liver, etc., or carried to the lungs to be thus modified or cast off. The arrangement, width and capacity of the capillaries varies in every tissue of the human body. In general they are arranged as a close network about the parts to which they are distributed, and in width they vary from one two-thousandths to one twro-hundredths of an inch in diameter. They are largest in the marrow of bone and smallest in the brain. In muscular tissue they are generally parallel one to another, but in numerous cases, as around fat cells, they are arranged spherically and in the intestines they form loops. See Arteries; Blood, Circulation of.

CAPILLARITY. The subject of capillarity takes its name from the circumstance that it was first studied in connection with the rise of liquids in tubes having a bore so fine as to be comparable in diameter with a hair (capillus). When one end of such a tube is immersed in water, the water rises in the tube above the general level of the surface outside it, in a way which is not in accord with the general law of hydrostatics, that a liquid will stand at

the same level in two communicating vessels. Many other instances can be found in which liquid surfaces, especially in the neighborhood of solid bodies, assume shapes and positions which are equally at variance with the laws of hydrostatics. All such cases are now treated as belonging to the general subject of capillarity. Examples of capillary actions are the soaking up of water by a sponge; the penetration of var¬ nish into wood; the rising of oil in a lamp wick: the clinging of ink to a properly nibbed pen; the running off of the ink from pen to paper ; the soaking up of the superfluous ink in blot¬ ting paper; the falling of drops of uniform size from the lip of a bottle or from a medicine dropper; the rounding of drops of melted lead into pellets of shot as they fall in a shot-tower.

When we consider such examples as these, it becomes clear that they are to be explained as the result of forces acting between the parts of the liquid, or between the liquid and the solid with which it is in contact. These forces are often called the forces of cohesion and ad¬ hesion. Very little is known about them. The one thing definitely known is that they are very great when the parts of the body or bodies be¬ tween which they are exerted are so near to¬ gether that they are said to be in contact, and fall off rapidly in magnitude as the parts are

separated, so as to become inappreciable when the distance between the parts becomes discern¬ ible. It is customary to think of these forces as exerted between the molecules of matter, and so to call them molecular forces. The very small distance within which the action of a molecule on its neighbors is appreciable is called the range of molecular action.

By reflection upon the effects of such molec¬ ular forces acting in a liquid, Young (1804) was. led to assume that a tension exists in a thin layer of molecules at the surface of a liquid, comparable in general to the tension in a stretched membrane. The magnitude of this surface tension depends upon the nature of the liquid, or, more exactly, upon the nature of the two media, of whatever sort they may be, sep¬ arated by the surface. It is independent of the shape of the surface, provided that its radii of curvature are always great in comparison with the range of molecular action or the thickness of the surface layer. Young added to this hy¬ pothesis the observation that the angle of con¬ tact between a liquid surface and a solid is always the same for the same pair of substances. The angle of contact is generally measured, at the line of contact, between the external normals to the solid and the liquid surfaces. In the case of mercury and glass, which Young particu¬ larly observed, this angle is obtuse, and seemed to him to be about 135°. In the case of water and glass it is acute, and so small as to seem evanescent, or equal to zero. Young assumed that the like is true for all contacts of liquids with solids which are wetted by them.

Young's two principles are clearly not proved to be consequences of the more fundamental hypothesis of molecular force ; but, accepted as generalizations from observation, they may be used to explain all the forms of liquid surfaces. For example, let us consider the rise of water in a glass tube. The water wets the inner wall of the tube, and so meets it everywhere in the cir¬ cle of contact at an angle equal to zero. Owing to this, the surface of the water in the tube will

be concave upward. In a tube of very small bore, it will be

approximately hemispherical. The tension strives to straighten out the sur¬ face, and since the contact condition prevents its doing this, it lifts a column of water up the tube, to a point such that the weight of the uplifted column is sustained by the upward force due to the tension, while at the same time the curvature of the surface is consistent with the contact condition.

When the column is stationary, the tension in the surface can be considered as acting ver¬ tically upward at all points in the circle of con¬ tact of the surface with the wall of the tube. Representing by T the tension in the surface, or the force acting in the surface across a line of unit length, and by r the radius of the tube, we have the expression 2nrT for the upward force acting on the column. Representing by p the density of water, by g the acceleration of grav¬ ity, and by h the height of the column above the general level of the water surface outside the tube, we have the expression pg%rh for the weight of the column. Setting the two forces equal, we obtain 2 T—pgrh, and conclude that the height of the column is inversely as the radius of the tube. This law was made known by the experiments' of Jurin (1718), and is gen¬ erally known as Jurin's law.

By a slight extension of Young's conception of surface tension, we may deduce from it the constancy of the contact angle. We need only to suppose that a tension exists, in any surface separating two substances, which has a particu¬ lar value for each pair of substances. Consider then three fluids in contact along a line. It is evident that the line of contact will be at rest when the angles made with each other, at that line, by the three surfaces in which the fluids meet in pairs, are such that the tensions in the three surfaces are in equilibrium. These angles are therefore obtained by constructing the tri¬ angle of forces, with the three tensions as sides, and the}' are constant, for the three substances.

We may consider more particularly the spe¬ cial case in which one of the three substances is a solid. Suppose, for convenience in statement, that the three substances are a liquid, air and a solid. Represent by 7V, 7Y and 7V the ten¬ sions in the surfaces separating the liquid from air, the liquid from the solid, and air from the solid, respectively. Denote the angle of contact of the liquid-air surface with the solid by <t> . The line of contact will be at rest when the sum of all the tensions or components of tension in the plane of the solid is equal to zero, or when

T 12 cos <t> + 7\3 — T 23 — 0.

The angle of contact is therefore given by

T 23 T 13

cos <j> = - ,

Tn

and is constant. It is acute or obtuse, accord¬ ing as T2s is greater or less than 7V In the case of mercury and glass, Tn is the greater, and <t> is obtuse. In the case of most liquids and glass, the tension corresponding to Vs is the greater, and <P is acute. When 7 23 equals or exceeds 7V + 7Y, the angle <t> becomes evanes¬ cent.

Almost contemporaneously with Young, La¬ place (1805) formally applied the hypothesis of molecular forces to the study of the forms of liquid surfaces. He considered the pressure at

the end of a liquid filament, beginning in the surface and drawn normal to it, and terminating in the interior of the liquid. He proved that it may be expressed by the sum of two pressures. One of these, called the molecular pressure, is very great, and is constant at all points of the liquid that are not in the surface layer. This pressure is eliminated from all equations of equilibrium of liquids, and plays no part in determining the forms of liquid surfaces. The other pressure depends upon the shape of the liquid surface, and is given by the formula H 1 1 \

— , in which 77 is a constant, and R

and R' the two principal radii of curvature of the surface. This pressure, at any point under the surface layer, is in equilibrium with the hydro¬ static pressure at that point. Under a flat sur¬ face, and therefore under the level surface of a large expanse of liquid, the radii of curvature are infinite and this pressure vanishes. If h is the height of a point in the curved surface above the general level, we then have for

.77 / 1 1 \

equilibrium the condition — (— -j -) = pgh.

2 \R R J

This relation may be deduced from Young's hypothesis of surface tension, and it is found that Laplace's constant 7/ is equal to 27'. As an example of the use of this equation, consider again the rise of water in a tube. The surface in the tube, if its bore is small enough, may be considered a hemisphere, and therefore R—R' = r, the radius of the tube. Accordingly we have H — pgrh, as we obtained before by Young's method.

Laplace's theory did not suffice to demon¬ strate the constancy of the contact-angle, and Laplace was forced to assume it as a fact of observation.

A more profound and successful application of the hypothesis of molecular forces to the problem of capillarity was made by Gauss (1829). He showed, by means of the principle of virtual work, that a system of substances in contact possesses a certain amount of potential energy arising from the molecular forces. For each pair of substances the energy is propor¬ tional to the extent of surface separating them, and the factor of proportion is a characteristic constant for the two substances. This constant is called the surface energy. The existence of such a surface energy may readily be deduced from the hypothesis of molecular forces. Con¬ sider, for example, a mass of liquid surrounded by another liquid of the same specific gravity. If its surface is enlarged, it can only be by the movement of some of its parts out of its in¬ terior into the surface layer, and it is evident that, as they move out through the layer, work is done against the molecular forces, which will be proportional, generally, to the area bv which the surface is increased. The liquid acquires potential energy equal to the work done in in¬ creasing its surface. As the potential energy of a system in equilibrium is always a minimum, the condition of equilibrium of such a mass of liquid is, therefore, that the area of its surface shall be a minimum. If the liquid is entirely free, its surface will be spherical. If it is sub¬ ject to conditions, so that portions of the sur¬ face are limited by certain fixed boundary lines, it may be proved that the forms of the various

portions of the surface, which will make the surface energy a minimum, are such that the sum of the reciprocals of the principal radii of curvature is the same for all parts of all the surfaces. We are thus led to the same rule for the form of a liquid surface as that reached by Laplace.

It may be shown that the constants denoting the surface energy and the surface tension are the same. To do this, consider a film of liquid bounded by the sides of a rectangle, one of which can be moved so as to increase or dimin¬ ish the area of the film. Since both faces of the film act alike, we need consider only one of them. The force applied by the tension T in the film to the movable side, the length of which is represented by s, is Ts\ and if the movable side moves in toward the opposite side through the distance r, the work done by the surface tension is Tsr. This is, therefore, the measure of the change in the energy of the film, and since sr is the change of area, T equals the energy per unit of area, or the surface energy.

The method of Gauss furnishes a proof that the contact-angle should be constant. If we consider that the potential energy of the system is a minimum, when the surface tensions which arise from the surface energies are in equi¬ librium, this may be proved in the way already indicated ; or a direct proof may be given.

The argument by which these conclusions have been reached fails if we take into consid¬ eration the heat that must be introduced into the surface film to keep it at constant temperature during its enlargement. When this heat is taken into account it appears that the surface energy differs from the surface tension by a quantity equal to the product of the absolute temperature and the rate at which the surface tension changes with the temperature. In all known cases the surface tension decreases as the tem¬ perature rises and the surface energy is greater than the surface tension. The surface tension, while not equal exactly to the total surface energy, is equal to the socalled free energy of the surface. Since equilibrium depends on the free energy having a minimum value, the test of equilibrium based on the condition that the area of the liquid surface shall be a minimum, consistent with the boundary conditions, is not impaired by this modified statement.

A very interesting set of verifications of the theories of capillarity was devised by Plateau. In order to be able to examine a liquid taking shape under its surface tension only, he pre¬ pared a mixture of alcohol and water having the same density as olive oil, in which the oil could be suspended. A mass of oil, freely float¬ ing in this mixture, assumed a spherical form. This form is manifestly that which would be

produced by a tension acting uniformly in all parts of the surface; it is also that for which

H /! I\

the internal pressure represented by — (— • -| - 1

2 \R R'/

is the same everywhere ; and also that for which the surface, and consequently the potential

energy, is a minimum. When the oil was sus¬ pended in a wire frame, it assumed various forms, depending on the shape of the frame and the quantity of oil, which were always such that the internal pressure, determined by Laplace's equation, was the same everywhere.

A similar set of verifications was afforded by the use of films of soapy water. Such films are so thin and light that their weight hardly distorts them at all, and the positions they as¬ sume are due almost solely to the surface ten¬ sion. Such a film, blown into a bubble, is spherical. When formed on a wire frame lying in a plane, the film is a plane. When the frame is twisted out of the plane, the surface of the film is the least that can be constructed with the edges of the frame as a boundary. It is one of the socalled minimal or ruled surfaces. Various films of this sort were examined by Plateau, and found to fulfil the geometrical conditions of the minimal surface.

Observers have ordinarily tested the theory by determining, from Laplace's equation, the various forms and dimensions of liquid sur¬ faces, subject to various boundary conditions, and comparing the actual forms obtained by experiment with those deduced from the theory. For example, rough observations show that for any one liquid that wets glass, the heights to which it rises in various capillary tubes are inversely as the radii of the tubes, as the ele¬ mentary theory declares they should be. More refined observations show that this statement is not strictly accurate, and a more complete theory leads to certain corrections of the state¬ ment, to which the better observations conform. In a similar way, the rise of a liquid between parallel plates, the forms of large drops of mercury on a horizontal plate, or of large bubbles of air in a liquid under a horizontal plate, the force needed to lift a horizontal plate from the surface of a liquid which wets it, the maximum pressure exerted in a small bubble as it is enlarging in a liquid at the end of a tube, have all been used as means

of testing the theory. Generally the observations are used in the appropriate formula to obtain a value for the surface tension T, or for the constant

a‘ - —p~Q (Called Poisson’s constant) and the

verification of the theory is found in the fact that the values of these quantities obtained by different methods are in good agreement with one another.

The determination of the surface tension is complicated by the fact that many of the formu¬ la containing it involve the contact-angle also. In such cases the contact-angle may be deter¬ mined by an independent observation, as was done by Young in the case of mercury in con¬ tact with glass; but in most cases the liquids examined wet, or seem to wet, the solid walls, and it is then assumed that the contact-angle is evanescent or zero. The results obtained on this assumption may be compared with those ob¬ tained by methods in which the contact-angle is not involved, to test the validity of the as¬ sumption, and if it is found in error, to deter¬ mine the magnitude of the contact-angle.

It is of interest to consider some examples of the constants of capillarity. The units com¬ monly employed are not those of the absolute c. g. s. system. It has been found more con¬ venient to use the millimetre as the unit of length, and the weight of a milligram as the unit of force. Poisson’s constant a2, being al¬ ways determined, as in the example given of the rise of a liquid in a tube, by the product of two lengths, is a number of square millimetres. The surface tension T, or the force which acts

across a unit of length in the surface, is ex¬ pressed in milligram weights per millimetre. In these units Poisson’s constant for mercury is about 6.75, and the surface tension 45.7. For water at 20° C. we may take a2~ 15.0 and T = 7. 5; for chloroform at 23° C., a2 — 3.7, T — 2.73 \ for refined petroleum at 22° C., a 2 = 6.75, T = 2.64. These

numbers are simply cited as examples of the magnitude of the two constants in typical cases. Their exact deter¬ mination is beset with such difficulties that it is doubtful whether any results have been obtained which can be accepted as definitive.

The constant contact-angle of mercury with glass is about 135°, or a little larger. Most liquids wet glass, and their contact-angles are assumed to be 0°. Evidence has been adduced to show that in some cases, with water or pe¬ troleum, for example, the contact-angle with glass is not 0°, but has a finite, though not a large, value. This question is not yet definitely settled.

The principal difficulty in determining the constants of capillarity with accuracy lies in the effect of impurities on the surface tension. This is especially felt with the liquids which have high surface tension, like mercury or water. The least trace of oil or grease will spread out over a water surface in a thin film, and alter its surface tension very considerably. It is very difficult to get the vessels clean, which are used in the experiments, and much more difficult to keep them clean, so that the con¬ stants obtained for any liquid are always open to a certain degree of suspicion. Impurities dis¬ solved in the liquid affect the surface tension also, though not to so great a degree as those which spread over its surface.

The surface tensions, of all liquids which have been tested, become less as the temperature rises. It has been shown to be a consequence of the principles of thermodynamics that, pro¬ vided the specific heat of the liquid is inde¬ pendent of the extent of its surface, the amount by which the surface tension changes is pro¬ portional to the change in the absolute tem¬ perature. Most of the older measurements of the temperature coefficients do not confirm this conclusion, but the observations of Knipp on water and of Feustel on various organic liquids are in agreement with it.

The magnitudes of the constants of capil¬ larity manifestly depend on the magnitudes of the forces between molecules and on the range of molecular action. The theory of van der Waals leads to an estimate of the molecular pressure within a liquid/the values obtained for it ranging from 1,430 atmospheres in the case of ether to 10,700 atmospheres in the case of water. , The same theory indicates that the range of molecular action is proportional to the linear dimensions of the molecule, and is of about the same magnitude as the radius of the molecule. By the help of a modified form of this theory, Eotvos came to the conclusion that the rate of variation with the temperature of the product of the surface tension and the two-thirds power of the

molecular volume should be constant, and the same for all liquids, within a certain temperature range, if their molecules are single, and not double or compound. Ob¬ servation shows that this law holds true for many liquids, and in cases in which it fails, there are often other reasons to support the

conclusion that the molecules of the liquid are compound.

Before closing, we may consider a few ex¬ amples of the effects produced by surface ten¬ sion.

When waves are set up on the surface of water, they are transmitted across the surface at a rate which depends on the hydrostatic pres¬ sure and on the surface tension. The surface tension is practically the only agent in transmit¬ ting the waves when they are very short. Such waves may be set up by the use of a vibrating tuning fork, and the measurement of their lengths furnishes a means for the determina¬ tion of the value of the surface tension. The ripples set up on the smooth surface of a pond by a breath of air, or which proceed in front of a slowly moving boat, are largely due to sur¬ face tension.

When a glass tumbler is partly filled with water, the surface tension draws the water up the sides. As more water is carefully poured in, the line of contact rises until it reaches the edge of the glass. It often happens that the line of contact is checked at the edge, so that the water does not run out over the top of the glass. In this case the glass can be filled above the level of its edge, and the water will stand in it under a surface that is convex upward, the surface tension in which keeps the water from running out.

The surface tension in the convex surface of the mercury in the tube of a barometer pro¬ duces a pressure downward, which has to be estimated and allowed for when accurate ob¬ servations are to be made.

A fine needle that has been slightly oiled or greased if laid gently down on the surface of water will float there. It lies in a concave trough formed in the water surface. The water cannot wet the needle, because of its coating of oil, and so the needle is supported by the uplift due to the surface tension acting in the concave surface in which the needle rests. In a way generally similar, the insects which run over the surface of water are supported in little hollows in the water surface. Their feet are not wetted by the water.

When two light bodies, floating on the sur¬ face of a liquid, are moved toward each other until the curved parts of the liquid surface near them intersect, they seem to exert forces on each other. If they are both wetted by the liquid, or are both not wetted by it, they move together and adhere to each other. If one of them is wetted by the liquid and the other not, they move apart. If water is run in between two parallel sheets of plate glass, they are drawn closely together and adhere very strongly to each other. These actions are ascribed to differences in the pressures on opposite sides of the bodies. In case the bodies are wetted by the liquid, the pressure in the region between them, in the elevated portion of the liquid under its concave surface, is less than the pres¬ sure on their outer sides and they are pushed together. This action takes place even in a vacuum, in which case the pressure under the concave surface is a negative pressure or ten¬ sion. In case the bodies are not wetted by the liquid the liquid is depressed between them, and the pressure inward on their outer sides is greater than that acting outward, and they are pushed together. A curious effect, pre-558

dieted by Laplace from the theory of capillarity, and verified by experiment, is exhibited by two bodies, one of which is wetted by the liquid and the other not. These bodies, as the distance between them is diminished, at first appear to repel each other, but as the distance is re¬ duced the repulsion changes to an attraction and the bodies come together.

If a small lump of camphor is dropped on clean water, it begins to move about over the surface in an irregular way, and continues to do so, generally for some time. These motions are explained by noticing that one part of the lump of camphor dissolves more freely than the rest, and so, near it, the surface tension of the water surface is lowered below that near the other parts of the lump. The camphor is accordingly drawn toward that part of the sur¬ face in which the tension is greatest.

If a thread of water is at rest in a horizon¬ tal capillary tube, and one of its two end sur¬ faces is touched by a wire that has been dipped in turpentine or benzine, the tension at that end will be diminished, and the greater tension of the other end will draw the water along the

tube. This effect is taken advantage of in cleaning off grease spots from cloth. The sur¬ face tension of benzine is very low, and when benzine is applied in a gradually narrowing ring around the spot of grease, the grease is drawn in toward the centre of the ring, and if the cloth is laid on a piece of blotting paper, the grease will be taken up by it. This action is promoted if a hot iron is applied to the other side of the cloth, for the heat lessens the tension in the ends of the pores nearest the iron, and the greater tension at the other ends draws the grease into the blotting paper. Con¬ sult Boys, (Soap Bubbles, and How to Blow Them) (New York 1900; new ed., London 1912) ; Lori Rayleigh, (Collected Scientific Papers) (1901).

William Francis Magie, Professor of Physics , Princeton University.

CAPILLARY ATTRACTION. See Cap¬ illarity.

CAPILUPI, ka-pi'-loo-pi, Camillo, Italian

poet: b. Mantua 1504; d. 1548. He was the author of a work issued in 1572 entitled (The Stratagem of Charles IX against the Hugue¬ nots, J in which the massacre of Saint Barthol¬ omew was justified, and which made the action appear premeditated. Cardinal Lorraine, who at the time was attending the Pope in Rome, endeavored to suppress the book from motives of policy.

CAPISTRANO, ka-pe-stra'no, Giovanni di, or CAPISTRANUS, Johannes, Saint,

Italian monk: b. Capistrano, a small Neapolitan town of the Abruzzi, 24 June 1386; d. Illock, Slavonia, 23 Oct. 1456. He at first studied law, but in his 30th year, impelled by a vision, entered the Franciscan order, and was soon distinguished by the austerity of his manners, and a great zeal against the numerous heretical sects in Italy. The Popes Martin V, Eugene IV and Felix V, often employed him as legate and inquisitor in suppressing the sect of the Fraticelli, which had spread widely over Naples and the Papal States. In 1444 he became vicar-general of the strict order of Franciscans called Observants, and in 1450 proceeded as legate to Germany with a view to suppress the Hussites,

and rouse the Germans to a crusade against the Turks. Although he was successful in his op¬ position to the Hussites in Moravia, he was ex¬ pelled from Bohemia by George Podiebrad. His fanaticism often led him into many acts of cruelty, one of the worst being the racking

and burning of 40 Jews in Breslau, on the charge of profaning the Host. His harangues in favor of a crusade against the Turks failing to make much impression on the German princes he resolved to try their effect on the populace, and easily persuaded great numbers to join him in marching against the Turks, who were advancing under Mohammed II, and had closely invested Belgrade, the key of Hungary, with an army of 150,000 men. At the instiga¬ tion of Capistranus, John Corvinus Hunnyades furnished a force of 60,000, destroyed the Turk¬ ish fleet on the Danube, and threw into Bel¬ grade succors both of men and provisions. On this expedition Capistranus in person com¬ manded the left wing of the party, forced his way into Belgrade, repulsed a general assault by the Turks, and on 6 Aug. 1456, in conjunc¬ tion with Hunnyades, signally defeated the whole Turkish host. His exertions, and the pestilential atmosphere caused by the dead bod¬ ies lying unburied around Belgrade, laid him on a sick-bed, and he died in the same year in the Franciscan monastery at Illock. He was beatified in 1690 and canonized in 1724 by Bene¬ dict XIII. He was the author of (Speculum Conscientise.) Consult Jacob, Johannes von Capistrano* (2 vols., Breslau 1903-06).

CAPISUCCHI, ka-pe-sook'ke, or CAPX-ZUCCA, Biago, or Biasio, Marquis of Mon-terio, Italian general : b. Rome about the middle of the 16th century; d. Florence 1613. He was in the service of Spain in the Low Countries, under the Duke of Parma, in 1584, afterward be¬ coming lieutenant-general and commander of the army of Ferdinand I de Medici, Duke of Tuscany. He fought the French Protestants in the reign of Charles IX, and distinguished himself at Clain, near Poitiers, in 1569.

CAPISUCCHI, Paolo, Italian ecclesiastic: b. Rome 1479 d. there 1539. Having become bishop of Neocastro he was summoned to Rome by Clement VII, who referred to him the ques¬ tion of a divorce between Henry VIII of Eng¬ land and Queen Catherine. In this matter Capisucchi made a report against Henry in 1534.

CAPITAL. Capital as a factor in the mod¬ ern economic system is wealth, other than land, which is used by its owner to secure an income rather than for direct enjoyment. Land as a natural agent is usually treated in a class by itself, and is distinguished from products of human industry and enterprise. These products are subdivided, according to the uses to which they are put, into producers' goods and con¬ sumers' goods. Producers'' goods include all tools, machines, buildings and appliances which are used in production, while consumers' goods include only such goods as are used for direct enjoyment. Capital includes all producers' goods, and some

consumers' goods. It includes all producers' goods since they are not used for direct consumption or enjoyment, but rather for the purpose of securing other goods. The term capital, however, is usually made to in¬ clude, in addition to producers' goods, such consumers' goods also as are used by their

owners for the purpose of securing an income. A pleasure automobile which is let for hire is a consumer's goods from the standpoint of so¬ ciety, but it is capital to its owner, since he gets no consumer's enjoyment from it. He keeps it for the income which it brings him. A dwelling-house is likewise a consumer's goods, but if it is rented, it is capital to its owner. Some writers have accordingly spoken of two kinds of capital, first, social or productive capi¬ tal, and second, private or acquisitive capital. Social or productive capital is synonymous with producers' goods, while private or acquisi¬ tive capital includes such consumers' goods as are let, rented or hired by their owners to other people.

Capital is sometimes thought of not as a class of goods but as a fund of value. There are two reasons which lead to this way of thinking. In the first place, however capital may have originated historically, the charac¬ ter method through which one comes into posˆ-ssion of it nowadays is that of purchase and .he means of purchasing is money. What¬ ever the form of capital which one ultimately possesses, it is almost certain to be in the form of money at one time or another. It is, of course, a mistake to say that capital is money. A work-horse is a form of capital, but capital is not work-horses, neither is capital money, though money is a form of capital. Money may be used as a tool or a means of accom¬ plishing more than could be accomplished with¬ out it. After one comes into the possession of money, he then has the power of exchanging it for consumers' goods or for sources of in¬ come as he may choose. If he decides to pur¬ chase sources of income, he is said to invest his capital. As a matter of fact, he is merely ex¬ changing one form of capital for another. This habit of speaking as though one had in¬ vested capital when one had merely

invested money, has led naturally to the idea that capi¬ tal is money.

Another reason is found in the fact that capital, like all wealth, is measured in terms of money, and its quantity so expressed. There is no good way of saying how much capital one possesses except bv stating it in terms of money. If any business man were to state how much capital he used in his business, he would be reduced to the necessity of saying so many dollars or so many dollars' worth. However, he is not likely to labor under the delusion that capital is money. If he were to state in what his capital consists, he would not, unless he were a money lender pure and simple, say that it consisted of money. He would give an in¬ ventory of his productive property, or of the property which he used in his business.

Others who reject the idea that capital is money still hold to the idea that it is a fund of value. The distinction is made between capi¬ tal and capital goods, capital being the fund of value and capital goods being the goods in which that fund is embodied. No great harm can come from this use of words so long as they are properly understood, but they are not strictly accurate and may lead to confusion. The value of the goods is not capital, the goods are capital. Value is the important quality which they all possess in common, and, there¬ fore, it is the only quality in terms of which their quantity can be stated. Money is the

commodity used in measuring that quantity. See Value.

The function of productive capital is to aid in production. Except in the case of money, its value is not an aid in production, it is only a symptom of the aid which it is anticipated that it will render in production. In this re¬ spect the value of a piece of land resembles the value of a piece of capital. It is not its value which makes the land productive; it is its productivity or its usefulness in production which gives it its value. Similarly it is the productivity of any piece of capital, or its use¬ fulness in production, which gives it its value. In the case of that special kind of capital known as money, and in this case alone, its productivity, or its ability to aid in production, depends upon its value or its purchasing power. In all the other cases, it is the various tools, machines, buildings and other bits of equip¬ ment which perform the function of aiding in production. They derive their value from the fact that they perform that function. It is not the value which performs the function.

Capital is the combined result of labor per¬ formed in the making of the things which con¬ stitute it, and of the waiting which is neces¬ sary to the performance of work long in ad¬ vance of the maturing of a consumable product. The labor and the waiting may both be per¬ formed by the same person, or by different persons. They are performed by the same per¬ son when a man, say a farmer, makes his own plow, and then waits during the lifetime of the plow for the benefits in the form of income or the products of the plow. They are performed by different men when the farmer buys the plow from a blacksmith, paying him cash. The blacksmith performed the labor of making it, but does not have to wait for its benefits, since he is already paid for his work. The farmer does the waiting, having surrendered present cash long before he receives the benefits in the form of larger crops year after year, from its possession. At the present time, in our highly complicated industrial system, with its increase of specialization, the working and the waiting are generally performed by differ¬ ent persons. Even the case of the plow made by a blacksmith and sold to a farmer, while a real case, is exceedingly simple as compared with the average process of capitalistic accu¬ mulation. A modern plow factory is using machinery and equipment, that is, capital, which was made in other factories, and these, in turn, are using other capital made in still other fac¬ tories, and so on back to the mines, and there machinery is used which also can be traced back to other factories and other mines. But in all this complex system, those who labor will generally be paid wages as they go along, while others will do the investing, which means that they must spend considerable money in advance and get it back with an increase over a period of years. Thus the two functions of the laborer and the capitalist, or of labor and capital as they are sometimes called, are pretty sharply separated.

Capital has existed, of course, as long as tools and equipment have existed, but this separation of the two functions has become general only since the rise of machine pro¬ duction. Before that time, the function of the capitalist was not important enough to create

an opportunity for many men. Not enough capital was needed in the more primitive forms of industry which preceded the present to enable any large number of men to live on its earnings. It is this fact which is probably meant when it is erroneously stated that capi¬ tal in the modern sense came into existence with the rise of the factory system. Capital in the modern sense does not differ, except in its greater quantity and in the greater oppor¬ tunity it gives to the capitalist, from capital in any other sense. See Income; Wealth of Nations.

Thomas N. Carver,

Professor of Political Economy, Harvard Uni¬ versity.

CAPITAL, in architecture, the uppermost member of a column, that is to say, a separate piece of stone set upon the shaft and supporting an epistyle or the abutment of an arch — in short the mass of the building which is imposed upon the column.

A column must always have a shaft and a capital ; without these features it would be a post, perhaps a pillar or a pier, but would have no architectural character. The capital, more¬ over, has generally received the most elaborate decorative treatment of the whole composition. Thus in Egypt while the shaft' might be cylin¬ drical or conical, the capital would spread out immediately in curves either concave or convex, and would be carved and painted. It is even practicable to divide Egyptian columns into four orders by their capitals, which spread in different ways, and are ornamented by differ¬ ent sculpture more or less imitative of nature. The idea of the spread given to the capital is, of course, that in this way the superstructure is taken more easily, as it is always and of neces¬ sity much larger horizontally than the column itself.

The stone uprights left in rock-cut temples in India and called ordinarily pillars, because of their varied forms — octagonal, square and the like — are still divided into shaft and capital, though the forms of these are entirely remote from Egyptian or later European examples. Thus, some capitals consist of a mere enrich¬ ment of the uppermost band of the shaft and a superincumbent block very elaborately carved. In some cases this upper block gives off corbels and consoles which help to carry the roof by their greater spread.

The capitals which have excited the most in¬ terest among European students of art are those of the three Greek orders and of the five Renaissance orders which were deduced from the first three. The

capital of the Grecian Doric is a reversal cone rounded off at top and carrying a square plinth or die; this plain echinus was richly painted in bright colors. The capital of the Ionic order is a curious de¬ vice consisting of scrolls or volutes, two on each of the two opposite sides, so that this capital, almost alone, has not the same appear¬ ance from every point of view. The capital of the Corinthian order is a circular bell, sur¬ rounded by acanthus leaves and having at each corner a couple of projecting scrolls not un¬ like those of the Ionic order but small. This Corinthian order received many modifications in ancient Roman practice, and one of these was erected by the Renaissance men into a

separate order, the socalled Composite. From the Grecian Doric the Roman Doric took shape, and this was used by the Renaissance men, while a still simpler order was made from it and called the Tuscan. The capitals of these two orders are very thin and low in vertical measurement, and consist of moldings running round the continuation of the shaft, and either plain or slightly carved into the simplest of the egg and dart moldings or the like.

In mediaeval architecture, both Romanesque and Gothic, the capitals are almost infinitely varied. The strong tendency of the time to¬ ward elaborate carving made this block of stone, from 5 to 20 feet above the aisles and in a prominent place, a most tempting vehicle for sculpture, and the abandonment of the classical orders left every artist free to design his own system of leafage, animal forms and the like. In this way mediaeval capitals are often of extraordinary beauty; but no a*' ',mpt has been made to classify them except a hey form part of a style. See Column.

Russell Sturms.

CAPITAL (Das Kapital), a noted work by Karl Marx, published in 1867 ; English trans¬ lation edited by Fred Engels, 1887; a book of the first importance, by the founder of interna¬ tional socialism. The conservative aspect of Marx's teaching is in the fact that he honestly seeks to understand what, apart from any man's opinion or theory, the historical development actually is ; and that he does not think out and urge his own ideal program of social reform, but strives to understand and to make under¬ stood what must inevitably take place.

CAPITAL PUNISHMENT (Latin caput, ((the head® ; hence capitalis, <(pertaining to or affecting the head®; hence ˆaffecting the life®),

the punishment of death. The questions most commonly discussed by philosophers and jurists under this head are: (1) As to the right of governments to inflict the punishment of death ;

(2) as to the expediency of such punishment;

(3) as to the crimes to which, if any, it may be most properly confined and limited; (4) as to the manner in which it should be inflicted.

1. As to the right of inflicting the punish¬ ment of death. This has been doubted by some distinguished persons and the doubt is often the accompaniment of a highly cultivated mind, inclined to the indulgence of a romantic sensi¬ bility, and believing in human perfectibility. One of the first men of prominence to advocate the abolition of capital punishment was Robes¬ pierre, the French revolutionist, who not only wrote many pamphlets against it, but re¬ signed his position as criminal judge of Arras, to avoid pronouncing a death sentence. The right of society to punish offenses against its safety and good order will scarcely be doubted by any considerate person. In a state of nature individuals have a right to guard themselves from injury, and to repel all aggressions by a force or precaution adequate to the object. This results from the right of self-preservation. If a person attempts to take away my life, I have, doubtless, a right to protect myself against the attempt by all reasonable means. If I cannot secure myself but by taking the life of the assailant, I have a right to take it. It would otherwise follow that I must sub¬ mit to a wrong, and lose my life rath-r than

BELL-SHAPED CAPITAL FROM THE HYPOSTYLE HALL BELL-SHAPED CAPITAL FROM THE RAMESEUM

KARNAK, EGYPT THEBES, EGYPT

PIERS WITH CAPITALS

CAPITAL PUNISHMENT

preserve it by the means adequate to maintain it. It cannot, then, be denied, that in a state of nature men may repel force by force, and may even justly take away life, if necessary, to preserve their own. When men enter so¬ ciety, the right to protect themselves from in¬ jury and to redress wrongs is transferred gen¬ erally from the individuals to the community. We say that it is generally so, because it must be obvious that in many cases the natural right of self-defense must remain. If a robber at¬ tacks one on the highway, or attempts to mur¬ der him, it is clear that he has a right to repel the assault, and to take the life of the assail¬ ant if necessary for his safety, since society in such a case could not afford him any adequate and prompt protection. The necessity of instant relief, and of instant application of force, justi¬ fies the act, and is recognized in all civilized communities. When the right of society is once admitted to punish for offenses, it seems difficult to assign any limits to the exercise of that right, short of what the exigencies of so¬ ciety require. If a state has a right to pro¬ tect itself and its citizens in the enjoyment of its privileges and its peace, it must have a right to apply means adequate to this object. The object of human punishments is, or may be, threefold: (1) To reform the offender (2) to deter others from offending; and (3) to secure the safety of the community, by depriving the offender of the power of doing mischief. The first consideration has only lately entered into human legislation, because of the inadequacy of our means to produce great moral results by the infliction of punishment. The two latter considerations enter largely into the theory and practice of legislation. Who is to be the judge in such cases? what is the adequate punishment for any offense? Certainly punishments ought not to be inflicted which are utterly dispro¬ portionate to the offense, and beyond the exi¬ gencies of society. No government has a right to punish cruelly and wantonly and from mere revenge ; but still, the discretion must be vested somewhere, to say what shall be the degree of punishment to be assigned to a particular offense. That discretion must be, from its nature, justly a part of the legislative power, and to be exercised according to the actual state of society. It may, — nay, it must, — be differ¬ ently exercised in different ages and in differ¬ ent countries; for the same punishment which in one age or country may be sufficient to sup¬ press an offense, or render it comparatively harmless, may, in another age or country, wholly fail of the effect. If mild punishments fail of effect, more severe ones must be re¬ sorted to if the offense be of a nature which affects society in its vital principles, or safety, or interests. The very frequency of a crime must

often furnish a very strong ground for severe punishment, not only as it furnishes proof that the present punishment is insufficient to deter men from committing it, but from the increased necessity of protecting society against dangerous crimes. But it is often said that life is the gift of God, and therefore it cannot justly be taken away, either by the party himself or another. If he cannot take it away, he cannot confer that power on others. But the fallacy of this argument is obvious. Life is no more the gift of God than other personal endow¬ ments or rights. A man has, by the gift of

God, a right to personal liberty and locomo¬ tion, as well as to life; to eat and drink and breathe at large, as well as to exist, yet no one doubts that, by way of punishment, he may be confined in a solitary cell ; that he may be per¬ petually imprisoned or deprived of free air, or compelled to live on bread and water. In short, no one doubts that he may be restrained in the exercise of anv privileges or natural rights short of taking his life. Yet the reason¬ ing, if worth anything, extends to all these cases in an equal degree. If, by his crimes, a man may justly forfeit his personal rights, why not his life? But we have seen that it is not true, even in a state of nature, that a man's life may not be taken away by another if the necessity of the case requires it. Why, then, may not society do the same if its own safety requires it? Is the safety of one person more important than the safety of the whole com¬ munity? Then, again as to a man's inability to confer on others a right which he does not himself possess. Suppose it is so ; the conse¬ quence which is deduced from this does not, in fact, arise. Blackstone, indeed, seems to de¬ duce the right of society to punish capital offenses in certain cases (that is, in cases of mala prohibita and not mala in se) from the consent of the offenders. The Marquis Beccaria, on the other hand, denies that any such consent can confer the right, and therefore objects to its existence. But the notion of consent is, in nearly all cases, a mere theory, having no foundation in fact. If a foreigner comes into a country and commits a crime at his first entrance, it is a very forced construc¬ tion to say that he consents to be bound by its laws. If a pirate commits piracy, it is absurd to say that he consents to the right of all nations to punish him for it. The true and rational ground on which the right rests is not the consent of the offender, but the right of every society to protect its own peace, interests, property and institutions, and the utter want of any right in other persons to disturb or destroy or subtract them. The right flows, not from consent, but from the legitimate institution of society. If men have a right to form a society for mutual benefit and security they have a right to punish other persons who would over¬ throw it. There

are many cases where a state authorizes life to be taken away, the lawfulness of which is not doubted. No reasonable man doubts the right of a nation, in a just war, espe¬ cially of self-defense, to repel force by force and to take away the lives of its enemies. And the right is not confined to repelling present force, but it extends to precautionary measures which are necessary for the ultimate safety of the nation. In such a war a nation may justly insist upon the sacrifice of the lives of its own citizens, however innocent, for the purpose of ensuring its own safety. Accordingly we find that all nations enroll militia and employ troops for war, and require them to hazard their lives for the preservation of the state. In these cases life is freely sacrificed by the nation; and the laws enacted for such purposes are deemed just exercises of power. If so, why may not life be taken away by way of punishment if the safety of society requires it? If a nation may authorize, in war, the destruction of thousands, why may it not authorize the destruction of a single life, if self-preservation requires it?

The mistake, however, is in supposing that life cannot be taken awaj^ without the consent of the party. If the foregoing reasoning be cor¬ rect, such consent is neither supposed nor necessary. In truth, the supposition of an original compact between all the persons who are subject to the regulations of a society, by their own free consent, as the necessary and proper basis on which all the rights of such society depend, is at best a gratuitous supposi¬ tion, and it sometimes leads to very incorrect results. It may be added that the Scriptures most clearly recognize and justify the infliction of capital punishments in certain cases.

2. As to the expediency of capital punish¬ ment. This opens a wide field for discussion. Some able men who do not doubt the right do still deny the expediencv of inflicting it. It may be admitted that a wise legislature ought to be slow in affixing such a punishment to any but very enormous and dangerous crimes. The frequency of a crime is not of itself a sufficient reason for resorting to such a punishment. It

should be a crime of great atrocity and danger to society, and one which cannot otherwise be effectually guarded against. In affixing punish¬ ments to any offense, we should consider what are the objects and ends of punishment. It is clear that capital punishment can have no effect in reforming the offender himself. It may have, and ordinarily does have, the effect of deterring others from committing a like offense ; but still, human experience shows that even this punishment, when inflicted for small offenses, which are easily perpetrated, and to which there is great temptation, does not always operate as an effectual terror. Men are some¬ times hardened by the frequent spectacles of capital punishments and grow indifferent to them. Familiarity deprives them of their horror. The bloodiest codes are not those which have most effectually suppressed offenses. Be¬ sides, public opinion has great weight in pro¬ ducing the acquittal or condemnation of offenders. If a punishment be grossly dispro¬ portionate to the offense, if it shock human feelings, there arises, insensibly, a sympathy for the victim and a desire to screen him from punishment; so that, as far as certainty of pun¬ ishment operates to deter from crimes, the ob¬ ject of the legislature is often thus defeated. It may be added that a reasonable doubt may fairly be entertained whether any society can lawfully exercisˆ the power of punishing be¬ yond what the just exigencies of that society require. On the other hand, a total abolition of capital punishments would, in some cases at least, expose society to the risk of deep and vital injuries. A man who has committed murder deliberately has proved himself unfit for society and regardless of all the duties which belong to it. .The safety of society is most effectually guarded by cutting him off from the power of doing further mischief. If his life be not taken away, the only other means left are confinement for life or trans¬ portation and exile for life. Neither of these is a perfect security against the commission of other crimes, and may not always be within the power of a nation without great inconvenience and great expense to itself. It is true that the latter punishments leave open the chance of reform to the offender, which is indeed but too often a mere delusion; but, on the other

hand, they greatly diminish the influence of another salutary principle, the deterring of others from committing like crimes. It seems to us therefore that it is difficult to maintain the proposition that capital punishments are at all times and under all considerations inex¬ pedient. It may rather be affirmed that in some cases they are absolutely indispensable to the safety and good order of society. Some states have, however, entirely abolished capital pun¬ ishment, as is

the case in Holland, Rumania, Portugal, a certain number of the Swiss can¬ tons, and some States of the American Union, including Michigan, Wisconsin, Maine, Rhode Island and Kansas. It was entirely abolished in Switzerland in 1874, but a few years after, owing to the increase of murders, it was again made permissible. It was also for a time done away with in Austria and in one or two of the States of this country, while in Russia it was abolished in 1750, only to be revived for politi¬ cal offenses when the Revolutionary agitators became numerous. It was again abolished in 1917 by the Revolutionary government.

3. As to the crimes to which capital pun¬ ishments may most properly be limited. From what has been already said it is plain that this must depend upon the particular circumstances of every age and nation ; and much must be left to the exercise of a sound discretion on the part of the legislature. As a general rule humanity forbids such punishments to be ap¬ plied to any but crimes of very great enormity and danger to individuals or the state. If any crimes can be effectually suppressed by mod¬ erate means, these ought certainly to be first resorted to. The experience, however, of most nations, if we may judge from the nature and extent of their criminal legislation, seems to disprove the opinion so often indulged by phi¬ lanthropists that capital punishments are wholly unnecessary. The codes of most civilized na¬ tions used to abound with capital punishments. That of Great Britain long continued to be very sanguinary. Blackstone, in his (Commentaries, } admits that in his time not less than 160 crimes were, by the English law, punishable with death. Forgery was one of these up to the reign of W illiam IV. The only crimes for which capital punishment may now be inflicted, according to the law of England, are high treason and mur¬ der. The law in Scotland is substantially the same, a sentence of capital punishment now being competent only in cases of treason, mur¬ der and attempts to murder in certain cases. By United States statutes nine crimes are so punishable, including treason, murder, arson, rape, piracy and robbery of the mail. In several States of the Union still fewer crimes are gen¬ erally punishable with death. Beyond treason, murder, arson, piracy, highway robbery, bur¬ glary, rape and some other offenses of great enormity and of a kindred character, it is ex¬ tremely questionable whether there can be ne¬ cessity or expediency in applying so great a severity. Beccaria, with his characteristic hu¬ manity and sagacity, has strongly urged that the certainty of punishment is more important to deter from crimes than the severity of it.

4. As to the manner of inflicting the punish¬ ment of death. This has been different in dif¬ ferent countries, and in different stages of civi¬

lization in the same countries. Barbarous nations are generally inclined to severe and

vindictive punishments ; and, where they punish with death, to aggravate it by prolonging the sufferings of the victim with ingenious devices in cruelty. And even in civilized countries, in cases of a political nature or of very great atrocity, the punishment has been sometimes in¬ flicted with many horrible accompaniments. Tearing the criminal to pieces, piercing his breast with a pointed pole; pinching to death with red-hot pincers ; starving to death ; break¬ ing his limbs upon the wheel ; pressing to death in a slow and lingering manner ; burning at the stake ; crucifixion ; sawing to pieces ; quartering alive ; exposure to wild beasts ; and other sav¬ age punishments, have been sometimes resorted to for the purposes of vengeance, public ex¬ ample or public terror. Compared with these the infliction of death bv drowning, strangling, poisoning, bleeding, • beheading, shooting or hanging is a moderate punishment. In modern times public opinion is strongly disposed to dis¬ countenance the punishment of death by any but simple means ; and the infliction of torture is almost universally reprobated. Even in gov¬ ernments where it is still countenanced by the laws it is rarely resorted to ; and the sentence is remitted, by the policy of the government, beyond the simple infliction of death. In Prus¬ sia, where atrocious criminals were required by the penal code to be broken upon the wheel, the King latterly used always to issue an order to the executioner to strangle the criminal (which was done by a small cord not easily seen) before his limbs were broken. So in the same country, where robbery attended with destruction of life was punished by burning alive, the faggots were so arranged as to form a kind of cell in which the criminal was suffocated by the fumes of sul¬ phur, or other means, before the flame could reach him. Not only is torture now abolished by civilized nations, but even the infliction of capital punishment in public has been given up by most of them. In England, in high treason, the criminal is sentenced to be drawn to the gallows, to be hanged by the neck until he be dead, to have his head cut off, and his

body divided into four parts, and these to be at the disposal of the Crown. But, generally, all the punishment is remitted by the Crown, except the hanging and beheading, and these too may be altogether remitted according to circum¬ stances. In other cases the punishment is now simply by hanging, or, in the military and naval service, by shooting. In France formerly the punishment of death was often inflicted bv breaking the criminal on the wheel. The usual punishment now is beheading by the guillotine. In 1853 a kind of guillotine (Fallschwert) was introduced into the kingdom of Saxony, and it has since been adopted as the means of execu¬ tion in several other German states. In Aus¬ tria the general mode of punishment is by hanging. In Prussia hanging is rarely inflicted ; but the usual punishment is beheading with a heavy axe, the criminal's head being first tied to a block. In one or two German states execu¬ tion by the sword still exists. It should be remarked, however, that in Germany hanging has always been deemed the most infamous sort of punishment; and the sentence has often been commuted for beheading by the sword as a milder or less dishonorable mode of punishment. In the United States of America hanging is the almost universal mode of capital punish¬

ment, though electrocution has been adopted in New York and Massachusetts, and several other States. The Constitution of the United States contains a provision against <(cruel and unusual punishments. }> In China decapitation by the sword is the usual form : murderers are cut to pieces ; robbers not. In Russia the punishment of death was until 1917 frequently inflicted by the knout. In Turkey strangling and sewing the criminal up in a bag, and throwing him into the sea, are common modes of punishment. In the Roman code many severe and cruel punishments were prescribed. During the favored times of the republic many of these were abolished or mitigated. But again, under the emperors, they were revived with full severity. In the ancient Grecian states the modes of punishment were also severe and often cruel. The ancient Greek mode of capital pun¬ ishment by taking poison at such hour as the condemned party should choose, seems never to have been in use among any Christian people.

Whether execution ought to be public or private has been a question much discussed, and one upon which a great diversity of opinion exists among intelligent statesmen. On the one hand, it is said that public spectacles of this sort have a tendency to brutalize and harden the people, or to make them indifferent to the punishment ; and the courage and firmness with which the criminal often meets death have

a tendency to awaken feelings of sympathy, and even of admiration, and to take away much of the horror of the offense as well as of the punishment. On the other hand it is said that the great influence of punishment in deterring others from the like offense cannot be obtained in any other way. It is the only means to bring home to the mass of the people a salutary dread and warning; and it is a public admonition of the certainty of punishment following upon crime. It is also added that all punishments ought to be subjected to the public scrutiny, so that it may be known that all the law requires, and no more, has been done. Since 1868 the law of the United Kingdom has required all executions to take place privately within the prison walls, and this system seems to have given general satisfaction. The same method is also practised in various other countries. In 1870 a similar measure was proposed in the French Assembly, but the war prevented it being passed and it is not yet law.

In England, the court before which the trial is held declares the sentence and directs the execution of it. In the courts of the United States there is a like authority ; but in the laws of many of the States there is a provision that the execution shall not take place except by a warrant from the governor, or other executive authority. In cases of murder and other atro¬ cious crimes the punishment in England is usually inflicted at a very short interval after the sentence. In America there is usually al¬ lowed a very considerable interval, varying from one month to six months. In Great Britain appeal is allowed, on a point of law, and on a question of fact, if the judge certifies the case as fit for appeal, or the Court of Criminal Ap¬ peal grants leave to appeal. On conviction the judge can reserve a question of law, but not of fact, for the Court of Criminal Appeal, which can reverse or affirm the judgment. The only other method of securing a revision of a

sentence is by ffie Royal Prerogative, exercised on the advice of the Home Secretary. In the United States there is considerable latitude of appeal. In France there may be a review in the Court of Cassation. In Germany there is, in criminal as in civil cases, a right of appeal ;

hence, in that country, few innocent persons have suffered capitally since the 16th century. Capital punishment cannot be inflicted, by the general humanity of the laws of modern nations, upon persons who are insane or who are pregnant, until the latter are delivered and the former become sane. It is said that Frederick the Great required all judgments of his courts condemning persons to death to be written on blue paper; thus he was constantly reminded of them as they lay on his table among other papers, from which they were readily distinguished. He usually took a long time to consider such cases, and thus set an excellent example to sovereigns of their duty. Consult Curtis, N. M., (Capital Crimes> (New York 1894) ; Actes du 8me Congres peniten-tiaire international (1910).

CAPITALS (majuscula), the large letters used in writing and printing, most commonly as the initial letters of certain words, or of all words in certain positions, and distinguished from the small letters (minuscula). As among the ancient Greeks and Romans, so also in the early part of the Middle Ages, all books were written without any distinction in the kind of letters used ; but gradually the practice became common of beginning a book, subsequently, also, the chief divisions and sections of a book, with a large capital letter, usually illuminated and otherwise richly ornamented. In legal or state documents of the 13th century capital letters are found dispersed over the text as the initial letters of proper names, and of the names of the Deity, and in the next century the same usage was followed in ordinary manuscripts. The practice with regard to the use of capitals varies in different countries. Sentences and proper names begin almost universally with capitals, but there are several other cases in which the usage is not so general. In English there cannot be said to be any invariable rule regulating their use. The first personal pro¬ noun is always written and printed with a capi¬ tal letter, and it is common also to begin titles and the names of well-known public bodies, societies, institutions, etc., with capitals. For¬ merly, it was a frequent practice to begin all substantives in English with a capital, which is still the rule in German. The Germans also be¬ gin all titles and pronouns of address with capi¬ tals, but not the first personal pronoun. One point in which the English practice differs from that of Germany, France, Italy and other con¬ tinental countries, is in beginning adjectives derived from proper names, such as Spanish, Italian, etc., like proper names themselves, with capitals, such adjectives being printed in other countries entirely with small letters. See Al¬ phabet; Writing, and consult Pron, (Manuel de paleographie latine) (3d ed., Paris 1910) ; Thompson, E. M., (Greek and Latin Palaeog¬ raphyˆ (Oxford 1912).

CAPITANIS, kap-i-ta'nes. See Arma—

toles.

CAPITATION is applied to anything that concerns a number of persons individually.

Thus a capitation tax is a tax imposed upon all the members of a state, each of whom has to pay his share, and is distinguished from taxes upon merchandise, *etc.* A capitation-grant is a grant given to a number of persons, a certain amount being allowed for every individual among the number. Class capitation taxes, when differentiated according to fortune, be¬ come income taxes. In France of pre-revolu¬ tionary days graduated capitation taxes were levied and were intended to reach all classes. The privileged classes, however, succeeded by various means in evading either whollv or in part these taxes and the unequal burden thus thrown on the great unprivileged class was one of the fundamental causes of the Revolution.

CAPITO, cape-to, or KOPFEL, Wolf¬ gang Fabricius, Alsatian reformer: b. Hage-nau 1478; d. Strassburg, November 1541. Entering the Benedictine order, he became pro¬ fessor of theology at Basel, where he showed in his lectures a tendency to shake off the tram¬ mels of the scholastic writers. In 1523 he was made provost of Saint Thomas, Strassburg. He approved of Luther's action, but nevertheless in 1519 entered the service of Albert of Mainz; and it was not till some years later that he finally declared for the Reformation. He then entered zealously into its work, shared with Bucer the composition of the Confessio Tetra-politana, and took part in the Synod of Bern in 1532. His earnest work for Christian unity caused him to be viewed with suspicion by the narrower-minded among the Reformers. Con¬ sult Baum, (Capito und Bucer) (Elberfeld

1860).

CAPITOL, now Campidoglio, the citadel of ancient Rome, standing on the Capitoline Hill, the smallest of the seven hills of Rome, an¬ ciently called the Saturnine and the Tarpeian Rock. It was planned and said to have been begun by Tarquinius Priscus, but not completed till after the expulsion of the kings. At the time of the civil commotions under Sulla it was burned down, and rebuilt by the Senate. It again suffered the same fate twice, and was restored by Vespasian and Domitian. The

lat¬ ter caused it to be built with great splendor, and instituted there the Capitoline games. Diony¬ sius says the temple, with the exterior pillars, was 200 feet long and 185 broad. The whole building consisted of three temples, which were dedicated to Jupiter, Juno and Minerva, and separated from one another by walls. In the wide portico triumphal banquets were given to the people. The statue of Jupiter, in the capi¬ tal, represented him sitting on a throne of ivory and gold, and consisted in the earliest times of clay painted red. Under Trajan, it was formed of gold. The roof of the temple was made of bronze; it was gilded by Quintus Catulus. The doors were of the same metal. Splendor and expense were lavished upon the whole edifice. On the pediment stood a chariot, drawn by four horses, at first of clay, and afterward of gilded brass. The temple itself contained an immense quantity of the most magnificent presents. The most important papers were preserved in it. The Capitoline Hill consists of three parts, namely, the north¬ ern summit, now occupied by the church of Santa Maria in Aracceli ; the southern summit, crowned by the Palazzo Caffarelli, usually oc-CAPITOL AT WASHINGTON

cupied by the German ambassador ; and the depression between these, in which is now the Piazza del Campidoglio. The above church, which is approached from the northwest by a lofty flight of steps, is of great antiquity. In 1888 the Franciscan monastery which was con¬ nected with it was replaced by a large monu¬ ment of Victor Emmanuel II. The Piazza del Campidoglio was designed by Michelangelo. In its centre is a fine equestrian bronze statue of Marcus Aurelius. On the southeast side there is the Palazzo del Senatore, with a fine flight of steps erected by Michelangelo. The Palace of the Conservatori occupies the south¬ west side of the square, and contains valuable collections in art and antiquities. Directly op¬ posite is the Capitoline Museum, founded by Innocent X. The southern summit of the hill is now called Monte Caprino, and on it, beside the Palazzo Caffarelli already mentioned, stands a hospital and a German archaeological institute. (See Rome). Consult Platner/Topography and Monuments of Ancient Rome,* pp. 291-308, New York 1911. Besides the edifice in Wash¬ ington where Congress assembles, the state-houses in States of the Union are officially called capitols. Of these the most noteworthy are those at Albany, Hartford, Providence, Austin, Jefferson City and Saint Paul.

CAPITOL AT WASHINGTON, The.

After the national capital had been located on the Potomac in 1789, Washington and Maj. P. C. L'Enfant selected sites for the public buildings. On the first map (1791), the ((Congress House® is situated as now, on a low hill commanding the best view in Washington, with 12 broad streets radiating from it, so that it closes the vista of every main avenue. On the decision of a board of three commissioners, with Washington and Jefferson, the plans of the capitol and the President's house were given out in 1792 to public competition, for a prize of $500 or a medal of that value, at the winner's option. For the President's house James Hoban's plans were accepted at once, and he was made super¬ intendent of its erection. For the capitol none were satisfactory, but the three foremost com¬ petitors were given another trial, and one, Stephen Hallet, a French artist living in Phila¬ delphia, was employed at a salary and indem¬ nity to revise his plans under the commission¬ ers' criticism. But later in the year Dr. William Thornton of Tortola Island, W. I., submitted plans whose ((grandeur, simplicity, beauty and convenience® forced the committee to accept them. They were too grand for the commis¬ sioners' ideas of national needs or resources at the time, however, and specified too costly materials. Thornton wished marble and mahogany and the best of construction, and un¬ der a bitter assault from several of his re¬ jected competitors, headed by Hallet, whom the commissioners had joined with Thornton in a revising board, he was forced to reduce its scale and material greatly. Their suggested modifica¬ tions of his general plan were, however, disap¬ proved. These plans were for what is now the central portion of the capitol.

Work was begun about 1 August. The cornerstone was laid 18 September in the southeast corner of the old north wing, now the Supreme Court section, with imposing cere¬ monies, Masonic rites and procession, and a barbecue. Hoban was made superintendent,

and Hallet his assistant; but Hoban gave his whole time to the White House, as the Presi¬ dent's house came to be called, and Hallet was the real manager. He proceeded to change Thornton's plans and specifications at will, was repeatedly censured for it and at last ordered to stop it. He resigned, but refused to give up the drawings ; the commissioners at last secured them and discharged him, 15 Nov. 1794. Thorn¬ ton, now one of the commissioners of the Dis¬ trict of Columbia, was asked by Washington to obliterate Hallet's changes as injurious, and did so. Hoban now acted as superintendent until George

Hadfield, an English architect, was en¬ gaged to succeed Hallet, on Jonathan Trum¬ bull's recommendation of him as a modest man and good artist. He outdid Hallet; spent his whole energy in fighting Thornton and Hoban (who always worked in harmony), and after re¬ peated resignations and reconsiderations, was discharged for practical incompetence 10 May 1798. Hoban again took charge. On 17 Nov. 1800 the second session of the sixth Congress met in the north wing of the building. Much of this early construction was of wood or poor material. This was on account of haste, the local interests being very urgent for the com¬ ing of the government to that seat. A few years later more durable material was substi¬ tuted. The commissionership was abolished May 1802, and Thornton and Hoban ceased direct superintendence, though often called in consultation. At this time the north wing was complete, the foundation of the central rotunda and dome in place and the basement story of the south wing partly done. These are still as Thornton planned them.

On 6 March 1803 Jefferson appointed Benja¬ min H. Latrobe (q.v.) <(surveyor of public buildings.® He at once began, like the others, to besiege the President with the bitterest as¬ saults on Thornton's designs, and when the for¬ mer declined to interfere, appealed to Congress. Thornton, however, now in charge of the patent office, though he defended himself with energy, made no further attempt to prevent the altera¬ tion of his plans, and Latrobe made many serious changes, some of them since judged harmful to beauty and utility. Thus, the Repre¬ sentatives' hall was changed from a graceful ellipse to a square with semi-circular ends ; a bad echo gave trouble for many years, caused by the changes. The number and size of entrances to the rotunda were curtailed, the splendid open staircases, cut down and placed in obscurity, were difficult for strangers to find; and the grand semi-circular western portico was abol¬ ished. The principal entrance was also changed from the west front, facing the White House, to the eastern side. Latrobe was constantly in hot water with both Jefferson and Congress, and published a pamphlet against them in 1806; but till 1811 had pretty much his own way. When the War of 1812 broke out, the capitol consisted of the north and south wings, connected by a corridor of rough boards over the central foun¬ dations. On 24 Aug. 1814 the British burnt it as. far as possible, piling the furniture and plat¬ forms in the rooms with rocket stuff and ignit¬ ing them ; the interior was dreadfully damaged, but the outside walls remained, also the inside brickwork and some stone. A strong movement arose for removing the capital elsewhere; but the same considerations prevailed against it as

later. In fear of such a result, however, the local interests formed the (<Capitol Hotel Com¬ pany, w and erected a building for government occupancy till the repairs on the capitol were finished. It was occupied, 1815-19, and was afterward known as the (<01d Capitol,® and used in the Civil War as a military prison. In the reconstruction the House wing was entirely altered.

Near the end of 1817 Latrobe became em¬ broiled with a new commissioner of the Federal building, Samuel Lane, and resigned. In his place was appointed Charles Bulfinch (q.v.), from 1 Jan. 1818; he remained supervising architect for the next decade. In the winter of 1819-20 Congress took its seat in the new hall. The centre was pushed forward to completion, and on 10 Dec. 1824, the entire interior was finished. In 1825 a public competition was held for the figures on the pediment of the eastern portico. From 1826 on, Bulfinch was employed on special detail, and the landscape gardening and work on the grounds, which were of his de¬ signing. The capitol was set in a park of 22ˆ4 acres, encircled by an iron railing somewhat taller than a man, affixed in the sandstone cop¬ ing of a low wall. There were four carriage and five pedestrian entrances. On 2 March 1828 the position of architect of the capitol was abol¬ ished ; but Bulfinch remained in employment till the end of June 1829, when Jackson dismissed him. He designed and planned the modern form of the then west extremity of the build¬ ing, the Senate galleries and the terraces on the east; and made the dome higher than in Thornton's plan. Among others who should have great credit for the beauty of the capitol are Peter Lenox, clerk of works under Latrobe; George Blagden, superintendent of stone¬ cutters; and Giovanni Andrei, an Italian, super¬ intendent of carvers. That so beautiful and harmonious a structure should have emerged from the contentions of so many different minds is due partly to the really great ability of the three chief architects, Thornton, Latrobe and Bulfinch, and partly to the determination of suc¬ cessive Presidents that the changes should har¬ monize with the original design. Latrobe's ma¬ terial external alterations of Thornton's plan have been mentioned ; Bulfinch designed the western central portico

as it now stands.

From 1829 to 1836 there was no architect of the capitol. On 6 June 1836, Jackson appointed as Federal architect Robert Mills (q.v.), who had studied under Latrobe; and he held the place till 1851. Thomas U. Walter (q.v.) then took the post, having drawn the plans for the two modern wings that extended the original capitol; which the government needs had out¬ grown, into the modern one. The cornerstone of the extension was laid by President Fillmore, 4 July 1851 ; the new Representatives' hall was occupied in 1857 ; the Senate hall in 1859. The great lengthening of the dimensions required a correspondent heightening of the dome; and Mr. Walter designed a new one, which was con¬ structed during the Civil War, and completed at the close of 1863, the statue of Freedom being then lifted into place. Mr. Walter, however, had foreseen a future need of still further ex¬ tension, and had drawn plans for it while the other work was going on. Congress in the spring of 1903 authorized their execution, at an expenditure of $2,500,000 and three years'

time, under the supervision of the Federal architect, Mr. Woods. As now completed the capitol cost over $16,000,000. It covers an area of about four acres standing amid beauti¬ ful park grounds of nearly 50 acres, adorned with fountains and classic statuary. The build¬ ing is 750 feet long, from 121 to 140 feet deep and rises to a total height of 285 J4 feet from the base of the capitol to the top of the final figure of Freedom, 19 J4 feet high, on the dome. Massive cast bronze doors, depicting events famous in the nation's history, grace the three main entrances on the east front — to the Ro¬ tunda, the Senate and the House. In the Rotunda under the dome are many priceless historical paintings, and in Statuary Hall is an assemblage of portrait statues, gifts from various states. The Supreme Court occupies a room in the Central building; the Senate chamber is in the north wing, the House of Representatives in the south.

CAPITOLINE GAMES, games held in ancient Rome in celebration of the deliverance of the city from the Gauls, and in honor of Jupiter Capitolinus, to whom the Romans as¬ cribe the salvation of the capitol in the hour of danger. They were instituted 387 b.c., on motion of Camillus, after the departure of the Gauls. They were in charge of the guild of the Capitolini, whose members were chosen from those who lived on the capitol. In later times it appears they were discontinued. In 86 a.d., Domitian instituted Capitoline games, which were held every four years down to a late period of the empire.

CAPITOLINUS, Julius, Roman historian, who lived at the beginning of the 3d century, and wrote the lives of the emperors — - An¬ toninus Pius, M. Aurelius, L. Verus, Pertinax, Albinus, Alacinus, the Maximini, the Gordiani, Balbinus and Pupienus. He is one of the writers of the (Historia Augusta,) in the edi¬ tions of which his works are to be found.

CAPITULARY, (Lat. capitula,a chapters®), a writing divided into heads or chapters, es¬ pecially a law or regal enactment so divided into heads. Laws known by this designation were promulgated by Childebert, Clothaire, Carloman and Pepin, kings of France; but no sovereign seems to have put forth so many of them as the Emperor Charlemagne, who appears to have wished to effect, in a certain degree, a uniformity of law throughout his extensive dominions. With this view it is supposed he added to the existing codes of feudal laws many other laws, divided or arranged under small chapters or heads, sometimes to explain, sometimes to amend, and sometimes to reconcile or remove the differences between them. These were generally promulgated in public assemblies composed of the sovereign and the chief men of the nation, both ecclesiastical and secular. They regulated equally the spiritual and tem¬ poral administration of the kingdom ; and the execution of them was entrusted to the bishops, the courts and the missi regii, officers so called because they were sent by the French kings of the first and second race to dispense law and justice in the provinces. Many conies of these capitularies were made, one of which was generally preserved in the royal archives. The authority of the capitularies was verv extensive. It prevailed in every kingdom under the do-THE NATIONAL CAPITOL, WASHINGTON,

minion of the Franks, and was submitted to in many parts of Italy and Germany. The earliest collection of the capitularies is that of Ansegise, abbot of Fontenelle. It was adopted by Louis the Debonnaire and Charles the Bald, and was publicly approved of in many councils of France and Germany. But as Ansegise had omitted many capitularies in his collection, Benedict, the Levite or deacon of the church of

Mentz, added three books to them (before 858). Each of the collections was considered to be au¬ thentic, and of course was appealed to as law. Subsequent additions have been made to them. The best editions of them are those of Baluze, (Capitularia Rcgum FrancorunP (2 vols., Paris 1677), Walter, (Corpus Juris Germanici An¬ tique (3 vols., Berlin 1824), and of Pertz in the (Monumenta Germania Historica) (2d div., Vols. I and II, Hanover 1835-37). The best of all is Boretius, (Mon. Germ. Hist. Legum Sectio IP (Vols. I and II, Hanover 1883-97). The capitularies remained in force in Italy longer than in Germany, and in France longer than in Italy. The incursions of the Normans, the intestine confusion and weakness of the government under the successors of Charle¬ magne, and above all the publication of the epit¬ ome of canon law termed the Decretum of Gratian, about the year 1150, which totally superseded them in all religious concerns, put an end to their authority in France.

CAPITULATION (((a writing drawn up in heads})), in military language, the act of sur¬ rendering to an enemy upon stipulated terms, in opposition to a surrender at discretion. The word is also used to designate the instrument containing the terms. The proposition to enter into such a compact may originate either with the commander of the successful or of the de¬ feated party. Based on the terms proposed by either, the conditions are agreed upon, being modified by the relative strength of the belligerents. Consult Article XXXV of the Second Peace Conference at The Hague (1907).

In the 15th century capitulations, as they were called, were presented by the ecclesiastical establishments in Germany to their newly-chosen abbots and bishops, who were obliged to swear to observe them as laws and conditions for their future rule. The ecclesiastical electors ob¬ tained, after the fall of the Hohenstaufen family, certain advantageous promises from the new emperors, which were called capitulations. When Charles V was proposed as emperor, and it was apprehended, on account of his foreign education, that he would disregard the German constitution, he was obliged to make oath that he would not reside without the German em¬ pire, nor appoint foreigners to office in the empire, *etc.* This was called his “election capit¬ ulation.)} Such a W cihlcapitulation was after¬ ward presented to every new emperor as a fun¬ damental law’ of the empire. In this way the authority of the German emperors was con¬ stantly more and more diminished, so that at last it became merely nominal, since the elec¬ tors, at the choice of every new emperor, made some new infringement on the imperial privi¬ leges. The Wahlcapitiilationen were acknowl¬ edged bargains, certainly unique in history.

CAPITULATIONS, Turkish, the decrees governing the privileges and powers of Eu¬ ropeans resident on Turkish soil, so called ap¬

parently for the reason that they were divided into articles or chapters. After 1453 such privileges were frequently granted by the sultans ; they were personal grants, however, and valid only for the life of the grantor. Hence they were renewed, often with modifica¬ tions, by each new sultan. So we find many capitulations made with France, England and other states. The earliest of the capitulations, to which reference is often made for precedent, dates from 1535 and was granted to Francis I of France. It was more specific and formal than any preceding grant of the kind and re¬ mained in force for over 350 years. By it the French were permitted to travel and to trade according to their own customs and usages ; it granted them freedom from all imposts except customs duties, also liberty in matters of re¬ ligion, inviolability of domicile and the extra¬ territorial jurisdiction of consuls. Even if they committed a crime, they were to be arrested by an Ottoman official only in the presence of a consular or diplomatic officer of their own country. Ottoman officers, if asked by a con¬ sular or diplomatic officer to aid in the arrest of a French subject, were compelled to per¬ form such service. The French had the full right of making wills. If they died intestate in Turkey, their own consul must take possession of their estate and liquidate or administer it for their heirs. Soon after this grant to France other nations of the Occident sought similar privileges. In 1583 Queen Elizabeth after four years of effort succeeded in establishing rela¬ tions of this nature with the Sultan. This capitulation was afterward many times renewed. The Netherlands received a capitulation in 1609, and Austria in 1615.

In 1673 a new power was granted to France, namely, the exclusive right of protecting under her flag the subjects of sovereigns who had received no capitulations. This gave France prestige in Europe by placing several powers under obligation to her. But in 1675 England succeeded in gaining a right to the protection of other nations jointly with France, so that some states had the option of English or French pro¬ tection. Austria in 1718 got permission for Genoa and-Leghorn to use her flag.

No concession made in the capitulations to foreign powers led to greater abuses than this grant of the right to protect the citizens of sovereigns or states without capitulations. The French and English sold to native Greeks and Armenians the privilege of protection by a document which exempted them from paying duties on goods

imported. Many of these be¬ came rich through this advantage, and were per¬ mitted to make a transfer of their privilege for a consideration. Ambassadors became rich through the traffic; one of the French ministers, it is stated in an official report, received more than 400,000 francs from this source, and the English Ambassador is said to have received from £2,000 to £3,000 as his share. Russia and Austria abused this right of protection for political ends. Rivals in seeking influence in Moldavia and Wallachia in 1780-82, their con¬ suls competed with each other in granting patents of protection to the natives. By 1800 Austria had by this process more than 200,000 subjects in Moldavia and 60,000 in Wallachia. These latter were later given to Russia. In 1806 in order to embarrass Russia Napoleon

put an end to the abuse and Turkey succeeded in persuading most of the foreign powers to follow his example. But this did not prevent many of the great Powers, through their con¬ suls, taking large numbers of Turkish rajahs under their protection under one pretext or another. Many of these formed lawless crowds claiming exemption from police supervision. Many were men of wealth whose acts led to frequent diplomatic difficulties. We need not wonder, then, that in 1869 the Sultan issued an trade forbidding the naturalization of his sub¬ jects under a foreign government unless they had previously obtained his consent. All treaties since 1800 between Turkey and European powers are based on the capitulations, notably that of 1740. Down to the 19th century foreign¬ ers could not hold real property except under borrowed names. Since 1867 they have been allowed to hold it. After 1868 the inviolability of the domicile of a foreigner was limited to residences within nine hours' journey of a consular post. Questions of real property were determined by an Ottoman court. Religious freedom was confirmed in all treaties.

Turkey made repeated efforts to annul the capitulations. She attempted to do so at the Paris Congress of 1856, and again in 1862. But the Powers were unwilling to accede to her request. Germany renounced the capitulations in 1891, but under the most favored

nation clause in her treaties she still enjoys the same privileges as formerly. All the Powers except the United States had been gradually yielding on the point of extraterritorial jurisdiction, though the consul of one accused of crime attended the trial, and if there was a denial of justice imminent, the case was made one for diplomatic intervention. America's insistence often led to a miscarriage of justice because the Ottoman government refused to furnish witnesses, and permitted the culprit to escape. Another fruitful source of trouble was in re¬ spect to Armenians, who take out naturalization papers in America and return home as Ameri¬ can citizens. The Sultan has not recognized such naturalization since 1869, unless it has been made with his consent. England, has side¬ stepped this difficulty by stating on the pass¬ ports of Turkish subjects naturalized in Great Britain that such passports are not valid on the return of the bearer to Turkey.

The Young Turks after their advent to power repeatedly denounced the capitulations and on 11 Nov. 1914 the Ottoman government announced their abolishment. However, until the Western Powers are satisfied that the judicial system in Turkey has undergone reform suffi¬ cient to ensure an impartial administration of justice, it is not likely that the Porte will be permitted to ignore these agreements alto¬ gether. See Extraterritoriality and consult Moore, John Bassett, (Digest of International Law) (1906) ; Angell, J. B., (Turkish Capitulations) (in American Historical Review, Vol. VI, 1901) ; McLaughlin, A. C., and Hart, A. B., (Cyclopedia of American Government) (Vol. I, New York 1914).

CAPIZ, ka peth', Philippines, capital of the province of Capiz, situated in the northern part of the island of Panay, four miles from the mouth of the Panay or Capiz River. The river is navigable to the city, and there is also an

excellent roadstead at its mouth. There is a large local trade, particularly in rice, and con¬ nection by steamer with Manila. Capiz is also a telegraph and military station. Highroads connect the town with Iloilo and Miagao. Pop.

18,525.

CAPLIN, or CAPELIN, a small savory smelt (Mallotus villosus), found in large num¬ bers on the Arctic Coast as far south as Cape Cod. The

inhabitants of Newfoundland and Labrador catch it in large quantities at certain seasons, and many are dried and exported to Great Britain. The eggs are deposited in very great numbers in the sand along the Arctic shores, are then washed ashore by the waves, where they hatch, the fry being washed back into the sea. Adults are also washed ashore in great numbers and perish. In Greenland fossil caplin have been uncovered, enclosed in clay nodules of recent shales.

CAPMANY Y DE MONTPALAU, kap-ma-ne e mont-pa-lau', Antonio de, Spanish critic and historian: b. Barcelona, 24 Nov. 1742; d. Cadiz, 14 Nov. 1813. He served in the wars with Portugal in 1762, left the army in 1770 and joined Olavide in his scheme for colonizing and cultivating the Sierra Morena. This en¬ terprise terminated disastrously, and Capmany removed to Madrid, where he was chosen sec¬ retary of the Royal Historical Academy of Spain in 1790, and filled several offices in the gift of the government. He traveled in Italy, Germany, France and England. When the French entered Madrid in 1808 he fled to Se¬ ville, arriving there destitute and in rags. He was chosen a member of the Cortes of Cadiz, in which capacity he made himself conspicuous by his patriotism and active opposition to the new rulers. His works, which enjoy a high reputa¬ tion in Spain, are numerous ; among them are (Memorias historicas sobre la marina, comer-cio y artes de la antigua ciudad de Barcelona) (4 vols., 1779-92) ; ˆCuestiones criticas sobre varios puntos de historia, economica, politica y militar) (1807) ; (Teator historico-critico de la elocuencia espanola) (5 vols., 1786-94) ; (Diccionario Frances-EspanoP (1805) ; (Codigo de las costumbres maritimas de Barcelona) (2 vols., 1791). Of these, the (MemoriasP the (Cuestiones) and the <Codigo> contain valuable de¬ tails on the commerce, industry and maritime laws of the Middle Ages. He is equally famed for his philological works, the chief of which are (Discursos analiticos sobre la formacion y perfeccion de las lenguas, y sobre la castellana en particular (1776) and (Filosofia de la elocuencia) (1776; London 1812; Gerona 1826). The purity of his language led the Real Acade¬ mia Espanola to include his name in the (Catalogo de Autoridades del IdiomaP Consult Sempere y Guarinos, (Ensayo de una biblioteca espanola) (6 vols., Madrid 1785-89).

CAPNOMANCY, divination by smoke, one of the modes of divination resorted to by the ancients. They used to burn vervain or some other sacred plant, and observe the form and direction which the smoke topk in escaping, and from these circumstances they drew their auguries. Sometimes the smoke of sacrifices was observed instead of that of vervain. When this smoke was thin and transparent and ascended in a straight column, it was considered a good omen; if, on

the contrary, it was thick

and opaque, the omen was bad. Another method of acquiring a knowledge of the future by cap-nomancy was to throw the seeds of jasmine or poppy on burning coals, and to observe the smoke which rose from them.

CAPO D'ISTRIA, Austria (the ancient 2Egida, later Justinopolis), seaport on the Gulf of Trieste, nine miles south of Trieste, in the crownland of Istria. It is connected with the mainland by a causeway rather more than half a mile long. It is defended by an old fort now going to decay. It contains a cathedral, a lofty edifice, faced in the Venetian style with marble, and containing some fine paintings, sculptures and arabesques. It is the seat of a bishop, and has six monasteries and two nunneries, a gym¬ nasium, several hospitals and a penitentiary. There are manufactories of soap, candles, leather and sea-salt ; and there is also a con¬ siderable trade in wines, oil and fish. After the 10th century Capo d'Istria belonged, alternately, to the Venetians and Genoese, till finally, in 1478, it succeeded in making itself independent of the latter with the aid of the former. Capo d'lstria now became the capital of Istria, and along with it came into the possession of Aus¬ tria in 1815. Pop. 11,765 (largely Italian).

CAPO DTSTRIAS, ka-po-des'-tre-as, or CAPO DTSTRIA, Ioannes Antonios, Count, Greek statesman: b. Corfu, 11 Feb. 1776; d. Nauplia, 9 Oct. 1831. His family had been settled in Corfu since 1373, but originally came from the Illyrian town of Capo d'lstria. He devoted himself to political life, and in 1809, after holding a high place in the Ionian Islands, entered the diplomatic service of Russia. Here his policy tended to the separation of Greece from Turkey. In 1828 he entered on a seven years' presidency of Greece; but whether from his attachment to Russian interests, or from the jealousy and impatience of restraint of the chiefs, he speedily became extremely unpopular. Several of these unruly chiefs belonging to the islands and to the province of Maina at last, in the spring of 1831, rose in open rebellion against him, demanding a convocation of the National Assembly, the

establishment of the liberty of the press, and the release of certain state prisoners, especially of Petros Mauromichalis, one of their own number whom D'lstrias had arrested and imprisoned. The President obtained the aid of Russia, but before the insurrection could be quelled he was assassinated in a church at Naup¬ lia, by Constantine and George Mauromichalis, the brother and nephew of Petros Mauromicha¬ lis. Consult Phillips, (The War of Greek In-dependcnce) (1897).

CAPONIERE, ka-po-nyar, or CAPON-NIERE, in fortification, a place covered against the fire of the enemy on the sides, sometimes also above, and serving for the connection of two works or for maintaining an important point. In particular: (1) A passage secured by two parapets, in the form of glacis, which leads through the dry ditch from one work to another; for instance, from the chief wall to the ravelin. If danger is to be apprehended only from one side, and consequently only one parapet is made, it is called a demi-caponiere ; if it is covered above with hurdles or with wood, it is called a coffer: but this word is often used indifferently for caponiere. (2) Small block-houses so located as to fire along a

dead angle. Coehorn laid out similar but less useful works below the glacis, and Scharn-horst proposed them, under the name of field-caponieres, for the salient angles of field for¬ tification. Caponieres are also known as tam¬ bours in many recent works on field fortifica¬ tions. See Fortification; Tambour.

CAPOTE, ka-po'ta, Domingo Mendez,

Cuban statesman : b. Cardenas 1863. He was graduated at the University of Havana and became one of the best-known lawyers in Cuba. Subsequently he was a professor in the Uni¬ versity of Havana for many years. In Decem¬ ber 1895 he joined the insurgents under Gen. Maximo Gomez ; became a brigadier-general, and was appointed civil governor of Matanzas and of Las Villas. In November 1897 he was elected Vice-President of the Cuban republic. When the Cuban Constitutional Convention appointed a commission of five members to con¬ fer with President McKinley and Secretary Root concerning the future relations of the United States and Cuba, he became its leader. The conference was held in Washington, D. C., in April 1901.

CAPOUL, ka-pool, Joseph Amedee Victor,

French tenor singer: b. Toulouse, 27 Feb. 1839. He was educated at Paris, and sang there in the Opera Comique, 1861-72, where he was very popular, especially in his role as Gaston de Meillagre in Auber's (Premier jour de bonheur.* He has also sung in New York, London, Vienna, Saint Petersburg and other cities, being everywhere very successful. In 1892 he accepted the position of professor of operatic singing at the National Conservatory in New York. In 1898 he took up his resi¬ dence in Paris, being in great demand as a singing teacher. In 1900 he became stage director at the Grand Opera.

CAPPADOCIA, kap-pa-do'shi-a, in an¬ tiquity, one of the most important provinces in Asia, once a famous kingdom ; in its widest extent bounded west by Lycaonia, south by Cilicia and Syria, east by Armenia and north by the Pontus Euxinus. In the period of the Persian government Cappadocia comprehended all the country between the Halys and Eu¬ phrates. By the former river it was separated from Phrygia and Paphlagonia ; by the latter, from Armenia: therefore the region afterward, called Pontus was comprehended in this terri¬ tory. The Persians divided it, according to Strabo, into two satrapies, which bore the name of Cappadocia Magna, afterward Cappadocia Proper, and Cappadocia Minor, afterward Pon¬ tus. This division, however, was not always strictly observed. The Persian satraps gov¬ erned, at a later time, under the title of kings, and sometimes made themselves independent. At the time of the famous retreat of the 10,000 Greeks, both the Cappadocias seem to have been under the rule of Mithridates I, who had participated in the conspiracy of Cyrus the Younger, but retained his government and be¬ came, after the defeat of Cyrus, again depend¬ ent upon the kings of Persia. Alexander the Great received tribute from Ariarathes, but the latter's son did not recognize Alexander's suc¬ cessors. It changed sides frequently during the civil struggles of Caesar and Pompey, Octavian and Antony and became a Roman prov-570

ince in 17 a.d. Cappadocia Magna was a good grazing country, and also well adapted for the cultivation of grain, especially wheat; but wood was scarce. Mazaca, afterward Caesarea, now Kaisariyeh, was the residence of the kings of Cappadocia. The name of Leukosyri (White Syrians) is said by Strabo to have been applied to the Cappadocians, as if to distinguish them from the dark Syrians who

dwelt on the east of Mount Amanus. The ancient population is at present represented by a few mountain tribes called Taktadji. Some anthropologists connect them with the Hittites. However, there is considerable difference of opinion in regard to their ethnic origin. Consult Chantre, (Recherches anthropologiques dans l'Asie occi¬ dental (Lyons 1895) ; Grothe, (Mcine Vor-derasienexpeditionen) (Leipzig 1911); Von Luschan and Petersen's (Reisen in Lykien) (Vienna 1889) ; Von Luschan, (Tachtadschy) (in Archiv fur Anthropologic 1901).

CAPPONI, kap-po'ne, Gino, Marchese. Italian scholar and historian : b. Florence, 14 Sept. 1792; d. there, 3 Feb. 1876. He traveled widely and devoted himself almost entirely to his studies in spite of the fact that he became blind early in life. Returning to Italy he founded at Florence the Antologia 1 tali ana, which was suppressed in 1832, when he at once founded the Archivo Istorico Italiano. For a short time in 1848 he was at the head of the Tuscan government, attacks by the Radicals causing his temporary retirement to private life. In 1859 he was a member of the Con¬ stitutional Convention of Tuscany; he was also made a senator of Italy; and in 1862 was at the; head of the Historical Commission for Tus¬ cany, Umbria and the Marches. He wrote (Storia della repubblica di Firenze) (1875), a standard work; and had a part in the prep¬ aration of a lexicon by the Accademia della Crusca, and in the editing of texts of Dante's (Divine Comedy* (Florence 1837). Consult Tabarini, (Gino Capponi* (Florence 1879), and Von Rcumont, (Gino Capponi ein Zeit-und Lcbensbild) (Gotha 1880).

CAPPS, Edward, American philologist : b. 21 Dec. 1866. He was graduated from Illinois College, 1887; took his doctor's degree at Yale, 1891 ; and was tutor in Latin at the latter place, 1890-92. He was successively associate pro¬ fessor and professor of Greek in the University of Chicago from 1892 to 1907. In the latter year he became professor of classics at Prince¬ ton University. Besides a number of philologi¬ cal papers, he has written (From Homer to Theocritus) (1902) ; (Four Plays of Menander* (1910); and sundry other articles in classical philology.

CAPPS, Washington Lee, American naval constructor: b. Portsmouth, Va., 31 Jan. 1864. A graduate of the United States Naval Academy in 1884 he rose by grades to the po¬ sition of naval constructor in 1895. After service at the Union Iron Works 1896-98, and at Washington 1899-1901, in 1903 he was ap¬ pointed chief constructor of the navy with the rank of rear-admiral. Reappointed four years later, he retired in 1910. President Wilson ap¬ pointed him commissioner to represent

the United States at the International Maritime Conference in 1913.

CAPRARA, ka-pra'ra, Giambattista, Car¬ dinal, Italian ecclesiastic: b. Bologna, Italy, 29 May 1733; d. Paris, 21 June 1810. He studied theology, became vice-legate of Ra¬ venna in 1758 under Benedict XIV, and in 1785 was sent by Pius VI, as nuncio to Vienna, to remonstrate with the Emperor Joseph on his conduct in relation to Church matters. His re¬ monstrance proved ineffectual, but in 1792 he was appointed a cardinal, shortly afterward a member of the state council, and in 1800 bishop of Jesi. In 1801 he went to Paris as legate of Pius VII, and conducted the negotiations with Napoleon with so much success that the first concordat was speedily concluded. Shortly after he was appointed archbishop of Milan, and in 1805 he crowned Napoleon king of Italy, placing on his head the iron crown of Lombardy. The cardinal left his fortune to the hospital in Milan.

CAPRERA, ka-pra'ra, a small island to the northeast of Sardinia, and separated from it by a narrow strait. It is six miles long from north to south, and two miles broad. It is fertile, and produces both corn and good pas¬ ture and is connected with the island of Mad-dalana Dy a causeway and drawbridge. It is well known as the ordinary residence of Gari¬ baldi, who after 1854 possessed a dwelling-house on the island, along with a piece of ground which he farmed until his death there 2 June 1882.

CAPRI, ka'-pre, Italy, an island in the beautiful Gulf of Naples, which contributes not a little to the charms of this favorite scene of nature. Capri, five miles long and three broad, lies at the entrance of the gulf, and ˆonsists of two mountains of limestone, v remarkable for their picturesque shape, and a well-cultivated valley. The inhabitants amounting to about 5,000, are occupied in the production of oil and wine, in fishing and in catching quails, which come in immense numbers from Africa to the shores of Italy. Every spot on the island which can be made productive is culti¬ vated. In fact, agriculture all around Naples is in the highest state of perfection. The town of Capri is the seat of a bishop. A high rock separates Capri from the little town of Ana-capri, which is reached by 522 steps cut in the rock in 1876. The highest point on the island is Mount Solaro, which rises 1,920 feet above the sea. Capri has a delightful climate and pure air, and is visited annually by over 30,000 tourists. It is a favorite summer resort for the Neapolitans, being distant but 20 miles southwest of their city. The supply of drink¬ ing water is far from satisfactory.- With the Romans Capri was called Capreie. Augustus obtained it from the

Neapolitans in exchange for Ischia, and made it a place of agreeable retreat, but never made use of it. Tiberius spent here the last seven years of his life in degrading voluptuousness and infamous cruelty. The ruins of his palaces are still extant, and other ruins are scattered over the island. The island of (Capri is notable for several re¬ markable caverns or grottoes in its steep, rocky coastA Bv far the most remarkable of these is unquestionably the celebrated Grotta azzurra (Blue Grotto), which was discovered by a singular accident in the summer of 1832, an Englishman while bathing having observed

the opening in the rocks which forms the en¬ trance to the grotto, and swum into it. It gets its name from the fact that, while the sun is shining outside, all the objects within the cavern — rocks, water and sand — are tinged with a beautiful blue color, very soft and agreeable to the eye. The cavern is ellip¬ tical in form, measuring about 1,200 or 1,300 feet in circumference; its height is about 41 feet with water 48 feet deep, and its roof and sides bristle with stalactites. The blue color within the grotto is supposed to be caused by the refraction of the rays of light in passing through the water before entering the cave. The blue rays, with those next to them, the violet and the indigo, being the most refran¬ gible, are the only rays that are admitted, the others — red, orange, etc., being dispersed in the water. In another part of the coast there is another grotto which exhibits phenomena precisely similar, except that the objects in this one are clothed with a green instead of a blue color. It is hence called the Grotta verde (Green Grotto). The English captured the island in 1806 and fortified it, but lost it to the French two years later. They recovered it in 1813 and restored it to King Ferdinand IV of Sicily. Consult Allers, (Capri 5 (Munich 1894) ; Furchheim, (Bibliographia dell' isola di Capri 5 (Naples 1899) ; Gregorovius, (Die Insel Capri) (Leipzig 1897) ; Weichardt, (Das Schloss des Tiberius und andere Romerbauten auf Capri5 (Leipzig 1900).

CAPRIC ACID. See Decoic Acid.

CAPRICCIO, ka-pre'cho (Caprice), is the name applied to a musical

composition, in which the composer follows the bent of his humor, the aim being to produce piquant and striking effects. The capriccio may be used with pro¬ priety in pieces for exercise, in which the strangest and most difficult figures may be in¬ troduced, if they are not at variance with the nature of the instrument or of the voice. A shorter piece of the same nature is often called capriccietto.

CAPRICORNUS (Lat. caper , <(a goat,55 and cornu, ((a horn55), <(the goat,55 one (the 10th) of the 12 signs of the Zodiac, between Sagit¬ tarius and Aquarius; also the corresponding zodiacal constellation, one of Ptolemy's original 48 and designated by the sign Y3, representing the horns of a goat. One of its brightest stars, Alpha, is a wide double, easily separated by the naked eye by anyone with good eyesight. Ca-pricornus is surrounded by Aquila, Aquarius, Piscis Austrinus, Microscopium and Sagit¬ tarius. The star was celebrated among the ancients, who regarded it as of good omen, and as marking the southern tropic or winter solstice, whence it was known as ((the Southern Gate of the Sun. 55

CAPRIFICATION, the fertilization of the flowers of the Smyrna fig with pollen derived from the wild fig, or caprifig. From time im¬ memorial it has been the custom of Orientals to break off the fruits of the caprifig, bring them to the edible-fig trees and tie them to the limbs. From the caprifigs thus brought in there issues a minute insect, which, covered with pollen, crawds into the flower receptacles of the edible fig, fertilizes them, and thus pro¬ duces a crop of seeds and brings about the sub¬

sequent ripening of the fruit. It has been shown that the varieties of the wild fig or cap¬ rifig are the only ones which contain male or¬ gans, while the varieties of the Smyrna fig are exclusively female. In the caprifig there are said to exist in Mediterranean regions three crops of fruit, — the spring crop, a summer crop and a third, which remains upon jhe trees through the winter. The fig-insect (Bias - tophaga grossorum) over-winters in the third crop, oviposits in the spring crop, develops a generation within it, each individual living in the swelling of a gall-flower (a modified and unfertile female flower), and, issuing from it covered with pollen, enters the young flower receptacles of the young Smyrna fig, which are at that time of the proper size, and makes an attempt to oviposit in the true female flowers, fertilizing them at the same time by means of the pollen adhering to their bodies. The life history of the insect from that time on is not well understood, but the Blastophaga has been known to

occur again in the over-win¬ tering crop of figs. The effect of caprification on the youne Smyrna figs becomes readily visible within a few days; before the Blasto-pliaga enters the fig the latter is transverse and strongly ribbed, while a few days after fertili¬ zation the fig swells up and becomes rounded and sleek. The male Blastophaga is always wingless. It has no ocelli, and its compound eyes are greatly reduced in size. The fact that the male rarely leaves the fig in which it is hatched might almost be inferred from these facts of winglessness and partial blindness. When this wingless male issues from the seed-like gall in which it is contained, it seeks a female gall in the interior of the same fig, gnaws a small hole through its cortex, inserts its extremely long, almost telescopic, abdomi¬ nal extremity through the hole, and fertilizes the female. The female subsequently, with her powerful jaws, gnaws the top of the gall off and emerges, crawling around the interior of the fig, and eventually forcing her way through the ostiolum, almost immediately seeking for young figs, which she enters, and should the fig entered prove to be a caprifig, lays her eggs at the base of as many flowers as she can find, ■and then dies. Should the fig entered, how¬ ever, be a Smyrna fig, either through the fact of the caprifig from which she issued having been hung in the branches of a Smyrna-fig tree, or from the fact that she has flown to an adjoining Smyrna-fig tree, she walks around among the female flowers seeking for a proper place to oviposit. It is this futile, wandering search, when her body is covered with pollen from the caprifigs, that produces the extensive and almost perfect fertilization of the entire number of female flowers. The young larva is a delicate little maggot curved upon itself and showing no visible segmenta¬ tion. In the full-grown larva the segments are more apparent, and with the growth of the larva the gall at the base of the male florets becomes hard, and greatly resembles a seed, turning light brown in color. The male and the female pupa each occupies a greater por¬ tion of the interior of the gad. Consult (The Fig5 (United States Department of Agricul¬ ture, Washington 1901).

Although fi”s are raised in California and

the Southern States they have long been in¬ ferior to the Smyrna hg, the standard kind of commerce, which owes its peculiar flavor to the number of ripe seeds which it contains. These seeds are obtained only by the process described above, and the United States Depart¬ ment of Agriculture devoted .much attention to caprification, with a view to the development of the American fig industry. The fig insects were introduced in California in 1899 and have greatly benefited the fig industry. It is now possible to produce Smyrna figs of the fine quality. About 250 tons were produced in 1915. See Fig.

CAPRIMULGID7E, kap-ri-mul'ji-de, the goatsuckers, better nightjars (so called from a superstition regarding their habits), a family of birds of puzzling affinities, but nearest to the swifts {Cypselidce) , with which, and the hum¬ ming-birds, they are often considered to constitute an order, Macrochires. The fam¬ ily is characterized by a small bill, enor¬ mous gape, fringed with elongated, stiff bristles, elongated tail of 10 soft rectrices, long pointed wings, very small feet with the middle claw pectinate, and very lax plumage. Two subfamilies, the Caprimulgmcz or true goatsuckers, and the Nyctibiinc ? of tropical America, are recognized, to which the oil-birds (Steatornis) , and Podargus and its allies, are sometimes added as two more. The family is nearly cosmopolitan, and comprises 12 or 15 genera and perhaps 100 species, all birds of more or less crepuscular habits, which catch insects on the wing like swallows. The ˆnighthawk® and ˆwhip-poor-will® are the com¬ mon species of the eastern United States.

CAPRIVI, ka-pre've, Georg Leo, Graf von, sometimes called Caprivi de Caprara de Montecuculi, German soldier and statesman ; second Chancellor of the German Empire: b. Charlottenburg, 24 Feb. 1831 ; d. Skyren, 6 Feb. 1899. He studied in Berlin ; entered the army in 1849 ; fought in the campaigns of 1864 and 1866; and was appointed major and a member of the general staff of the First Army Corps. In the Franco-German War of 1870 he was chief of staff to the 10th Army Corps, served with distinction at Metz and Orleans and in the Loire campaigns. In 1882 he became com¬ mander of the 30th Infantry Division at Metz and in 1883-88 he was at the head of the Ad¬ miralty. This appointment was made by Bis¬ marck and caused great dissatisfaction among the officers of the navy. Caprivi, however, soon mastered the details of the department, and the successful reorganization of the navy upon its present basis is in great part due to his capable and energetic direction. In 1888 he became commander of his old army corps. Hence he was removed, on the fall of Bis¬ marck, in 1890, to become Imperial Chancellor and Prussian Prime Minister. His principal measures were the army bills of 1892 and

1893, and the commercial treaty with Russia in 1894, in which year he retired. He was made a count in 1891. His position as Bismarck's successor was one of peculiar difficulty and trial, but he showed himself an able and faith¬ ful administrator. Like Bismarck he was a man of giant stature, of great mental power and with an incredible capacity for work. Con¬

sult (Die Reden des Grafen von Caprivi … 1883-93 > (Berlin 1894).

CAPROIC ACID. See Hexoic Acid.

CAPRON, Allen Kissam, American mili¬ tary officer (son of* Allyn Capron, q.v.) : b. Brooklyn, N. Y., 24 June 1871 ; d. Las Guasimas, Cuba, 24 June 1898. He enlisted as a private (1890), and rose to a second lieutenancy (1893), joining the <(Rough Riders® on the out¬ break of the war with Spain. He was made a captain for bravery, and was the first Ameri¬ can army officer who fell in that war.

CAPRON, Allyn, American soldier : b. Tampa, Fla., 27 Aug. 1846; d. Fort Myer, Va., 18 Sept. 1898.. He was graduated at West Point, 1867, and entered the 1st Artillery, re¬ ceiving his captaincy 4 Dec. 1888. During the Sioux campaign of 1890 he made a brilliant record at the battles of Wounded Knee and Drexel Mission. During the war with Spain, 1898, he opened the fight at El Caney, Cuba, and shattered the first flagstaff in Santiago. During this campaign he was taken ill with typhoid fever, and succumbed to its attack. He was a fine mathematician, and a recognized authority on artillery and tactics. His father, Erastus Allyn Capron, was killed at Churubusco, in the Mexican War, 20 Aug. 1847.

CAPRYLIC ACID, or HEXOIC ACID

(C6H1202), an acid found in butter and cocoanut oil. It is obtained from the latter by sa¬ ponification with caustic potash and distillation with dilute sulphuric acid. It is a fermentation product of butyric acid. It has an oily appear¬ ance and an unpleasant odor resembling sweat.

CAPSICIN, a name given to two appar¬ ently different substances. One described by Braconnot, obtained from chilli pepper, is an acrid oil or oleoresin, of a reddish-brown color, the vapor of which excites sneezing and cough¬ ing. It is probably a mixture of different bodies. The other is a resinoid substance ob¬ tained from cayenne pepper; it is brown with a golden tint, has the consistency of tar, an aromatic smell and pungent taste, and is used in America as a powerful

stimulant in influenza, fever, indigestion and other disorders, and ex¬ ternally as a rubefacient. Quite recently a vola¬ tile alkaloid, also called capsicin, has been ob¬ tained from chilli pepper, by first removing the acrid resin, then making the fluid alkaline, and extracting with petroleum spirit. On evaporat¬ ing, a substance is produced with an odor like that of conia. It is distinguished from conia and nicotine by a variety of reactions.

CAPSICUM, a genus of plants of the or¬ der Solanacccc, consisting of annual or biennial plants, bearing membranous pods containing several seeds, noted for their hot, pungent qualities. C. annuum, a native of South Amer¬ ica, furnishes the fruits known as chillies. These, as well as the fruits of C. frutescens and other species, are used to form cayenne pepper. For this purpose the ripe fruits are dried in the sun or in an oven, and then ground to powder, which is mixed with a large quan¬ tity of wheat flour. The mixed powder is then turned into cakes with leaven ; these are baked till they become as hard as biscuit, and are then ground and sifted. Cayenne pepper is largely adulterated with red lead and other substances. C. fructus is the dried ripe fruit of C. fastigva-

turn, imported from Zanzibar. It is a small, oblong, scarlet, membranous pod, divided in¬ ternally into two or three cells containing numerous flat, white, reniform seeds. It has no odor ; its taste is hot and acrid. C. baccatnm, or bird pepper, is a perennial in tropical lati¬ tudes. C. grossum has a large, long, ovate fruit, known as bell pepper, and is used either ripe or unripe, except for cayenne pepper, when the dried ripe fruit is employed. Capsicum fruits are used medicinally, in powder or as a tincture, externally, or as a gargle in cases of malignant sore throat, and internally as a stim¬ ulant in cases of impaired digestion.

By reason of the resin-like body, capsicin, which is contained in the fruits of these plants, they possess very active irritant properties. The pure crystals of capsicin are extremely virulent, and readily cause severe poisoning; but the ground fruit is less active, and is of service

in medicine, both for external and internal medica¬ tion.

Externally, capsicum is used as an irritant to cause redness of the skin or to blister, thus affecting related visceral areas within the body. It is thus employed in bronchitis, in early stages of pneumonia, in pleurisies, and in joint and nerve affections. Internally, capsicum is used to stimulate the appetite and to increase the amounts of gastric and intestinal juices. It is particularly serviceable in the gastritis of alco¬ holism. All capsicum should be excluded from the diet of patients with disease of the kidneys or acute disease of the genito-urinary system. See Pepper.

CAPSTAN (Fr. cabestan, probably from a derivative of Lat. capistrum, a halter, from capere, to hold), an apparatus largely used on ships for moving heavy weights and by various methods for the application of power. Con¬ structed on the mechanical principle of the wheel and axle, its axis, unlike that of the windlass, is vertical. The capstan may be oper¬ ated either by steam power or by means of a lever set in its socket and worked by horses or pushed by hand, the last method usually re¬ quiring several men. When used elsewhere than on shipboard, the capstan generally has some specific name. Thus, when employed for raising coal from pits it is commonly called a gin ; if worked by horses, it is known as a whim-gin. Capstans were formerly made of wood, but are now almost universally of iron. The upright barrel of a capstan is constructed around a spindle. The barrel is sometimes smooth, and sometimes for increase of friction has, running up and down its surface, ribs or ridges called whelps. In the capstan-head or drum-head, surmounting the barrel are holes for the levers or capstan-bars used to revolve the barrel. Being smaller at its centre than at the top or bottom end, the barrel has a curve from above and below, whereby a rope wound by working the capstan slips toward the concave part so formed. By this device a length of rope may be compactly and securely wound and kept in place for repeated use. On the circumference of a pawl-head at the bottom of the barrel are pivoted pawls which catch a pawl-rim or ratchet-ring fastened to the plat¬ form or floor on which the capstan is fixed. There are various other devices for increasing friction, the prevention of slipping and reverse operation of the mechanism.

CABSCJLE, in botany, a dry fruit contain¬ ing several seeds, sometimes a large number, and opening of itself by means of valves or pores when it comes to maturity. According as it contains one, two, three or more cells, the capsule is called unilocular, bilocular,

trilocular, etc., and when it has many cells it is called multilocular.

In anatomy a capsule is a mass of fibrous, connective tissue cells surrounding or support¬ ing an organ, either as a bag, as is the case in the kidneys; or as a framework, as in the liver. The capsule is usually an integral portion of the structure of an organ.

In bacteriology, the term is applied to the thin envelope which surrounds certain micro¬ organisms.

In pharmacy gelatin capsules are widely used for purposes of rendering medicines tasteless.

CAPTAIN. This is one of those many words derived from the Latin of the Middle Ages, and now to be found in all the different idioms of Europe. Captain comes from the Latin capitaneus, from caput, head, and signi¬ fied, first, a governor of a province, who in the first half of the Middle Ages was generally a military man. Thus the word captain soon came to be used chiefly to denote a high, or rather the highest, military officer. In the lat¬ ter part of the Middle Ages, when armies were not yet so regularly divided and subdivided as at the present time, captains were the com¬ manders of those small bodies of which the armies consisted. These were generally col¬ lected by their commander, who entered with his company into the service where most pay or most booty could be obtained. The prac¬ tice of waging war by troops collected in this manner prevailed to the greatest extent in Italy, where the continual quarrels of the nu¬ merous small states afforded ample employ¬ ment to the unsettled and the dissolute. These companies play an important part in the his¬ tory of the Middle Ages, particularly that of the two centuries preceding the Reformation, and had a very important influence on the man¬ ners and morals of the south of Europe.

Captain, in most modern armies, is the commander of a company of foot, a battery of artillery, or a squadron of horse, or a staff-officer of equivalent rank. In England com¬ panies and batteries are often commanded by majors. In the United States cavalry a cap¬ tain commands a troop, and a major a squad¬ ron of four troops. In the United States army the captain nominates the non-commissioned officers of his company who are appointed by the colonel of the regiment; and from the ser¬ geants he selects the first sergeant, mess-ser¬ geant and supply-sergeant.

Captain, in the navy, an officer command¬ ing a ship of war or a staff officer of equiva¬ lent rank. The naval captain is next in rank above

the commander, and in the United States ranks with a colonel in the army.

Captatn-General, the commander-in-chief of an army or of all the military forces of a country. In France it was an ancient title which conferred an almost unlimited power on the person who possessed it in the district where he commanded. But it never corre¬ sponded to that of generalissimo except in the case of the Duke of Savoy, in 1635, in the

time of Louis XIII. The title is not in use at present, nor would it agree with the existing organization of the administration. In Spain the rank of a captain-general corresponds with that of a marshal of France, the captain-gen¬ eral having command of an army or army corps. The title was also given to the head of a province in the Spanish colonies in South America, which were divided into vice-royalties and captain-generalships (capitanias-gener - ales) ; thus Chile used to be a captain-general¬ ship. The captains-general were not placed under the viceroys, but accountable only _ to the king through the council of the Indies. The captain-general of Venezuela, for instance, had no connection with the viceroy of New Granada. They decided, in the last instance, on all legislative, judicial and military affairs, and presided in the real audiencia. The time during which these governors remained in power was limited to a few years, probably in order to prevent them from becoming too pow¬ erful. The consequence was, that the colonies were oppressed the more to enrich the govern¬ ors, for rich every one was when he left his office.

Captain of a merchant ship, he who has the direction of a ship, her crew, lading, *etc.* In small vessels he is more ordinarily called mas¬ ter, which indeed is the correct title.

CAPTION, in law , signifies the heading or that part of a legal instrument such as an in¬ dictment or commission, which states when, where and by what authority it is executed. In Scotch law it signifies a warrant of impris¬ onment issued against a party to enforce an obligation, being now confined to a warrant served upon a party who has illegally retained papers in a lawsuit that had been borrowed by him, and intended to compel the return of the papers. The word is not now used with any other signification in Great Britain ; it is never employed to denote the heading of, for instance, a newspaper article.

CAPTIVI, cap-te'-ve ((The Captives>), a comedy of Plautus, declared by Lessing to be the finest piece that had ever been put upon the stage. Such an estimate, even from so great a literary critic, savors rather of enthu¬ siasm than of judgment. But the play has unusual merits. The plot, while simple, is very closely woven ; the deception and its disastrous discovery, upon which the action turns, are handled to a certain extent in the spirit of tragedy ; and the portrayal of character is so sympathetic that the interest of the audience is aroused almost equally for the deceivers and for the deceived. Plautus himself, both in the prologue and in the epilogue, dwells upon the elevation of tone which distinguishes this play from the usual run, and expresses his re¬ gret that playwrights find few comedies, such as this, through which good men may be made better. This conception of the function of comedy is very rare indeed in Plautus, whose chief concern was to make his plays amusing but not necessarily edifying. In (The Cap¬ tives J the moral lesson is the more impres¬ sively taught because the hero has known only the life and outlook of a slave ever since he was stolen from home in early childhood. But this slave has the soul of a gentleman, and no scene in the play is greater than that in which,

after the discovery of his real status, he fear¬ lessly defends his loyalty to the master, now happily beyond reach, for whose sake he has imperilled his own life. There is a vivacious translation in the (Loeb Classical Library* by Paul Nixon, { Plautus, Volume P (New York 1916). Consult also the excellent chapters on Plautus in Sellar, W. Y., (Roman Poets of the Republic (3d ed., reissued, Oxford 1908) and Duff, J. W., (A Literary History of Rome' (2d ed.. London 1910).

Nelson G. McCrea.

CAPUA, ka'poo-a, Italy, city in the prov¬ ince of Caserta, 18 miles north of Naples, on the Volturno, which is crossed by a handsome bridge. The district is very fertile, but some¬ what unhealthy. It is the

seat of an archbish¬ opric, and was the principal fortress that cov¬ ered the approach to Naples from the north. It was in consequence of great importance to the former kingdom of Naples. It has two magnificent gates, three principal streets, two handsome squares and three public fountains. The town is dirty and badly built. The prin¬ cipal public buildings are the cathedral with a cupola supported by 18 columns, entirely mod¬ ernized ; the church of the Annunciation ; the governor's palace, the townhall, a museum with many ancient works of art, *etc.* The an¬ cient city was situated two and a half miles southeast from the modern town, which was built from its ruins on the site of the an¬ cient Casilinum by the Lombards in the 9th century. The site is now occupied by a consid¬ erable town called Santa-Maria-di-Capoa-Vet-ere. The ancient Capua, one of the finest and most agreeable cities of Italy, was of such ex¬ tent as to be compared to Rome and Carthage. Hannibal wintered at ancient Capua after the battle of Cannae, and thus not only lost time, but also is commonly said to have rendered his army unfit to follow up the advantage he had gained. It was a favorite place of resort of the Romans, on account of its agreeable situa¬ tion and its healthy climate ; and many existing ruins attest its ancient splendor. In 456 a.d. it was devastated by the Vandals under Genseric, and in 840 the Saracens completely de¬ stroyed it. The Torre Mignana inside, and the Capella de' Morti outside, the town, commem¬ orate the bloody attack on Capua in 1501 by Caesar Borgia. Not far from the city is the field where the soldiers of Garibaldi" and of Piedmont defeated King Francis II of Naples, 1 Oct. 1860. Pop. 13,319.

CAPUANA, ka-poo-a'na, Luigi, Italian poet, novelist and critic : b. Minco, Sicily, 27 May 1839. Having devoted himself to journal¬ ism, he settled in Florence in 1864, where he wrote dramatic criticisms; from 1868 until 1877 he lived in his native town, then in Milan, again as a journalist. In 1902 he became professor at Catania. With Verga he stands at the head of the Sicilian group of ˆrealists® who, with their vivid portrayal of Italian regional life, represent one of the most virile branches of Italian fiction. His best-known work is (Gia-cinta) (1879), a naturalistic novel. Besides this he has nublished several volumes of short stories, among them: (Profiles of WomeiP (1881); (Homo) (1883); and two collections of charming fairy tales: (Once upon a Time> (1882) and (Fairy Land) (1883). A curious

specimen of rhythmical prose is his (Semi-Rhythms ' (1888), in praise of worldly joy and beauty.

CAPUCHIN, kap-u-shen or kap-u-chen, the name of several animals in which the growth of the hair or feathers upon the head forms a sort of hood suggesting that of a Cap¬ uchin friar. Certain monkeys are so called, especially the South American sapajous of the genus Cebus and one or more of the macaques (q.v.). A breed of domestic pigeons is also so called.

CAPUCHINS, an order of mendicant friars in the Roman Catholic Church founded in 1528 in virtue of a bull of Clement VII. Its founder, Matteo di Bassi, was a member of the rigorist section of the Observantine Franciscans, who sought to restore the rule of perfect poverty and humility, and to be of aid to parish priests in the cure of souls. The Capuchin friars ob¬ tained their name from the capuerce, cowl or hood which they wore. They were vowed to live according to the rule of Saint Francis in hermitages and to labor for the conversion of notorious sinners. Their churches were to be bare of ornament. Soon after their foundation they did heroic service in ministering to those strick n by the plague which at that time rav¬ aged all Italy. The third vicar-general of the order, Bernardino Ochino, brought the Capu¬ chins into discredit by his notorious lean¬ ings toward Protestantism, and the fraternity was interdicted from preaching by Paul III, and would have be:n suppressed had not Car¬ dinal Sanseverino, archbishop of Naples, in¬ terceded for them. Paul also forbade them to establish any convents beyond the Alps, but his successor, Gregory XIII, revoked that de¬ cree. Again, Gregory XIV in 1591 withdrew from them the faculty of ministering in the confessional ; but it was restored to them 10 years later by Clement VIII. Finally, in 1619 the fraternity was restored to good standing, and was even erected into an order adminis¬ tratively independent of the general of the Franciscans, and their vicar-general assumed the style of minister-general. Ever since, the Capuchins have been recognized as eminently useful servants of the Church. The order con¬ ducts missions in all quarters of the globe, and has the reputation of being very successful in winning converts. In 1775, the order had 64 provinces, with 31,000 members, the largest number reached in their history. In Austria, they are most numerous, but there are also 22 scattered missions. Two provinces exist in the United States, — one centres at Detroit, Mich., and one at Pittsburgh, Pa. There is also a

missionary district in California. An order of Capuchin nuns was established at Naples in

1538.

CAPULETS AND MONTAGUES, the

English spelling of the names of the Cappel-letti and Montecchi, two noble families of northern Italy, according to tradition of Verona, chiefly memorable from their connection with the legend on which Shakespeare has founded his tragedy of (Romeo and Juliet.' Consult Daniel, (Originals and Analogues of Romeo and Juliet' (in (New Shakespeare Society Pub¬ lications, J London 1875) ; Furness, H. H., (Romeo and Juliet' (New Variorum edition, Philadelphia 1871; last revision 1903).

CAPUS, ka-pii' (Vincent Marie), Alfred,

French litterateur: b. 25 Nov. 1858. He was educated at Aix-en-Provence and at the Lycee Condorcet, Paris. He was intended for the engineering profession and to this end received a technical training. His tastes, however, turned him to literature; he entered the jour¬ nalistic field as member of the staff of the Figaro. He soon became known as a master¬ ful critic and satirist. He published (Qui perd gagne' in 1890; (Faux depart' (1891) ; (Monsieur veut rire' (1893); cAnnees d'aventures' (1895). These novels, while very successful, have been overshadowed by his dramas, in which his genius is best revealed, and which in 1914 led to his selection as a member of the French Academy. The plays are (Brignol et sa fille ' (1895); L'lnnocent,' wflth Alphonse Alais (1896) ; (Rosine) (1897) ; (Mariage bourgeois' (1898); (Les maris de Leontine' (1900) ; (La veine' (1901); (La petite fonc-tionnaire' (1901); (Les deux ecoles' (1902); (La chatelaine' (1902) ; L'Adversaire,' with Emmanuel Arene (1903); (Notre jeunesse'

(1904); (Monsieur Piegois' (1905); L' Atten¬ tat,' .with Descaves (1906) ; (Helene Ardouin' (1913). He also published (L'Institut de beaute,' and (Notre epoque et le theatre.'

CAPUT MORTUUM (Latin), literally, a dead head; a fanciful term much used by the old chemists to denote the residuum of chem¬ icals when all their volatile matters had es¬ caped; hence the word is

figuratively used of anything from which all that rendered it valu¬ able has been taken away. It is used in histori¬ cal research in this sense.

CAPUTIATI, ka-pu-shi-a'tl (from Lat. caput, head), a Christian sect which arose in France in the 12th century, and so called be¬ cause they wore as a distinguishing badge on their heads a leaden image of the Virgin Mary. They advocated liberty, equality and the aboli¬ tion of all civil government. Hugo, bishop of Auxerre, was compelled to use military force to suppress them.

CAPYBARA, ka-pe-ba'ra, an aquatic rodent (Hydrochoerus capybara) , of the family Cavii-dcc, native to South America. It is the largest rodent known, being four feet long, and weigh¬ ing nearly 100 pounds. It has a rough brown coat, a heavy flat head, small pig-like eyes and ears, and a blunt muzzle. Its feet are supplied with hoof-like claws, and its tail, unlike that of most rodents, is very short. The animal is herbivorous, browsing on grass along river banks, and often creating havoc in sugar plan¬ tations. It is awkward on land, but swims and dives well, and can remain under water a long time. The flesh is edible, except that of very old males. It is known throughout Spanish South America as carpincho, but is called water hog and water horse in British Guiana. Con¬ sult Proceedings of Zoological Society of London' (1894).

CARABAO, ka-ra-ba'o, a small variety of water buffalo (B . Bubalus) found in the Phil¬ ippines. See Buffalo.

CAR BUILDING INDUSTRY. The memory of men still living is sufficiently elastic to stretch back to the beginnings of steam rail¬ roads in this country, and to comprehend the various changes bv which the modern railway has become a highly organized and elaborately

equipped mechanism. We borrowed the rail¬ way from England, but developed it on our own lines. The invention of the locomotive at first

simply furnished a mechanical power to transport freight in cars that had formerly been hauled by horses. Tramways were in use in the Hungarian mines during the 16th cen¬ tury; and Ralph Allen's English stone-car of 1734, with its flanged wheels and its hand¬ brake, is clearly the forerunner of the freight-cars of to-day.

The term <(railway® was invented in 1775, when it was first used in Smeaton's reports on English transportation, a quarter of a cen¬ tury before steam was applied to locomotion. Thanks to the recent researches of Mr. Clem¬ ent E. Stretton, we now know that the first persons ever conveyed by a locomotive on rails traveled, on 24 Feb. 1804, behind Trevethick's locomotive on the Pennydarran cast-iron plate¬ way or tram-road to Merthyr-Tydvil, in Wales, a distance of nine miles. In order to transport long bars of iron and timber, the cars were made in pairs, coupled together by an iron draw-bar having a joint at either end. The ears had no sides, but in the middle of. each was fixed a centre-pin upon which worked a cross-beam or bolster, and upon this cross¬ beam the timber or bars of iron were placed. On the occasion referred to the trucks were loaded with 10 tons of iron bars, and 70 per¬ sons stood on the iron. Here we have the origin of the bogie or truck, the invention of which has been claimed for this country, as we shall see hereafter. Also the capacity of the freight-car, fixed at the beginning at 10 tons, remained at that figure for half a century or more.

In 1812 John Blenkinsop of Leeds had a pri¬ vate car built to carry himself and his managers to his Middleton colliery, while the workmen rode on the coal-cars. On 27 July 1814, George Stephenson's first locomotive, Blucher, drew over the Kenilworth colliery line a passenger-car made by placing the body of Lord Ravens-worth's four-in-hand coach on a wooden frame fitted with flanged wheels. This car was used for 20 years. On 27 Sept. 1825, the Stockton & Darlington Railway was opened, and trains of coal-cars were run, with one passenger-coach named the Experiment. This was the first pas¬ senger-car to be run regularly for the use of the public. It was placed on four wheels, and had a door at each end, with a row of seats along either side and a long deal table in the centre. This car was operated 10 days, until the novelty was worn of? ; and then the faster stagecoaches carried the passengers. It was not until 15 Sept. 1830 that the Liverpool & Manchester Railway opened its line with a train carrying 600 passengers, and immediately there¬ after began to run the first regular passenger-trains.

It is a striking fact in the history of car construction that the English invented both the truck and the long passenger-car with the door at

each end; and that these forms, once in¬ vented, were almost immediately discarded in England, so that it was left for this country to reinvent them and to make them the distin¬ guishing features of American car building as contrasted with English construction. Indeed, it has been with great reluctance that we have ceased to claim them as original discoveries.

The fact that passenger trains, by displacing stages, threw out of use many of those vehicles, coupled with the other fact that the stage owners, submitting to the inevitable, often be¬ came railroad promoters, furnishes a reason why the early masters of transportation both used the stagecoach body as a matter of econ¬ omy, and also built their new cars on the model in which the conveniences of travel had been most highly developed. The first passenger-coach used in Pennsylvania in 1832 was a stage¬ coach slightly enlarged. To be sure, the early prints show that in 1830 Peter Cooper's first locomotive hauled an open boat-shaped car from Baltimore to Ellicott's Mills, on the Balti¬ more & Ohio Railroad; but this model must have been adopted for economy's sake, because in 1833 that railroad placed in service the Ohio, a car, stagecoach in shape, with seats on top as well as inside.

As president Mendes Cohen well observed in his address before the American Society of Civil Engineers in 1892, the first important mod¬ ifications in car-building were called forth by the speed developed in the locomotive. Nat¬ urally the wheels first demanded attention. The names of four men are connected with early wheel improvement. Mr. Knight improved the shape of the tread and flange; John Edgar and Ross Winans developed the chilled features; and Phineas Davis further improved and per¬ fected the wheel by altering the disposition of the metal in the tread and the angle of the flange, and hy introducing within the cast-iron wheel a wrought-iron ring of five-eighths or three-quarters of an inch round iron both per¬ mitted the chill and added strength to the wheel. Mr. Winans' shops turned out thousands of these wheels for use not only in this country, but' also in Germany and Switzerland. From 30,000 to 50,000 miles represented the capabili¬ ties of a Winans wheel.

With increased speed came the need for in¬ creased steadiness, and it occurred to Ross Winans that by adopting the device of the bogie, or swiveling truck used in the trans¬ portation of freight, he could build an easy-riding passenger-car. A bogie-truck is a pair of wheels, or more commonly two pairs of wheels, connected by a framework, and

having a very strong vertical central king-pin, on which one end of a locomotive or railway car is supported. The device facilitates rounding the curves of a railway track. In 1833 Mr. Winans constructed three long houses on wheels, each capable of seating 60 passengers. Having patented his invention, he was con¬ fronted by the fact that the principle he had used was one that had been utilized frequently on tramways, and finally the courts annulled the patent.

We now konw that prior to 1830 England had three bogie-engines at work; that in 1831 Stephenson's John Bull, built for the Camden & Amboy road, was made into a bogie after it reached this country; that Horatio Allen used a bogie-engine on the South Carolina Railroad in 1832, the same year in which the bogie-locomotive Experiment was built for the Mohawk & Hudson Railroad. Moreover, the bogie principle was patented in England in 1812. Yet it is certain that the American pas¬ senger-car of to-day originated with the three passenger-coaches built in Ross Winans' shops

m 1833. England discarded the bogie principle for engines in 1830, and did not return to it until 1876; and that country to this day has not adopted the bogie for passenger-or freight-cars. In 1889, the Paris, Lyons & Mediter¬ ranean Railway adopted the bogie for certain passenger-cars; and in 1895 the Great Western Railway of England began to experiment with the bogie-truck. In America the Winans pas¬ senger-coach almost immediately supplanted everywhere the stagecoach form, which Eng¬ land still retains in a modified shape, excepting only on the Pullman cars, introduced into that country in 1874. With us not only the passenger-cars, but the baggage, mail and freight-cars, all were placed on swiveling trucks.

That the early railroads of this country were designed to carry passengers rather than freight is to be seen by their reports. The Baltimore & Ohio road, from 1 Jan. 1831 to 1 October carried over its 13 miles of track 5,931 tons of freight and 81,905 passengers; and so late as 1839 the Camden & Amboy carried only 13,520 tons of merchandise as against 181,479 passengers. In fact, the railways as

freight carriers could not compete with the canals, which in those days were the traffic routes. In 1831 the Tuscarora & Port Carbon Railroad could not meet canal rates by 39fd cents per ton, the railway charges being 40 cents, plus a toll of 15 cents per ton, while the canal rates were 10ˆ4 cents, plus 5 cents toll.

Mr. John Kirby, describing from memory the freight-car of 1848, says that it was the same square box it is to-day; its capacity was from 6 to 10 tons; the roof was covered with cotton duck painted and sanded. The hot sun cracked this covering and let the water in on the freight, an annoyance common also to pas¬ senger-coaches of that day. Few freight-cars were used in New York State at that date, the Erie Canal being sufficient for summer freight. Wood was the universal fuel, so there was no coal transportation. Wooden brakeheads were used, and it required three men to turn the screw that pressed the wheels on and off the axles. The ripping of planks was done by hand, as was also the dressing up; and when one man had tools to grind, a fellow-workman turned the stone. Carpenters and car builders of six years' experience commanded $1.1214 a day wages.

Viewed from the standpoint of to-day, the passenger-car of the early fifties, built at a cost of about $2,000, was a combination of in¬ conveniences. The cast-iron stove in the centre of the car broiled those who sat immediately around it, while the unfortunates one seat re¬ moved from its satanic glare shivered and froze. In summer the dust was intolerable, and, notwithstanding elaborate devices for ven¬ tilation, the dust problem did not begin to be solved before the appearance of the monitor roof or clearstory in 1860. Hot-water heating and the abolition of the deadly car-stove came with the Pullmans.

In 1856 Capt.. (later Sir) Douglas Galton, of the Royal Engineers, was sent to America to investigate our railways. His report to the lords of the Privy Council for Trade gives a straightforward and unbiased account of his investigations. Perhaps there is extant no other report which so comprehensively discusses the vol 5 — 37

railway situation in the United States about that date.

((The practice of constructing railways [in AmericaJ in a hasty and imperfect manner,® says Captain Galton, (<has led to the adoption of a form of rolling stock capable of adapting itself to the inequalities of the road; it is also constructed on the principle of diminishing the

useless weight carried in a train. The principle is that the body of the car is carried on two four-wheeled trucks, to which the body is at¬ tached by means of a pintle in the centre, the weight resting on small rollers at each side. The framing of the truck is supported on springs resting on the axles, and the pintle and rollers are fixed to a cross-beam which is at¬ tached by springs to the main framing; so that between the body of the car and the axles are a double set of springs. India-rubber springs are in general use, but they often become hard; consequently sometimes steel springs are used, with great advantage. Any side movement which might result from the slight play allowed to the cross-beam is counteracted by springs placed between its ends and the framing. An iron hoop attached to the framing passes under the axle on each side, so as to support the axle in case it should break.®

The bearings Captain Galton found not un¬ like those used in England, but the use of oil as a lubricator was novel. He was told that under favorable circumstances the oil in an axle-box needed to be renewed but once a month ; but that it was difficult to obtain good oil. The wheels were of cast-iron, with chilled tires; they were from 30 to 36 inches in diameter, weighed rather more than 500 pounds and were without spokes. When made by the best makers they would run from 60,000 to 80,000 miles before the tires were worn, and they cost from $14.50 to $17.00 each. The iron used in making wheels was of very superior quality; and so great was the practical skill required that but three firms in the United States could be relied on to furnish wheels of the first grade.

The most approved form of draw-bar -was continuous under the car, and was attached to the elliptic springs, acting in both directions. The iron shackle was in general use, but some railways preferred an oak shackle 18 inches long, 2 inches thick and 6 inches broad. This block was bound with an iron band di¬ vided on each side at the centre, so that a car on leaving the rails would break the shackle transversely.

Already the automatic coupler for freight-cars was prefigured in a device by which the pin in the bumper of one of the cars was sup¬ ported by means of a ball, so that the shackle of the oncoming car pushed back this ball and let the pin fall into its' place. All passenger-cars and most freight-cars were supplied with brakes ; and the Philadelphia & Reading Rail¬ road was endeavoring to anticipate the day of train-brakes by an invention whereby a sudden check in the speed of the engine applied the brakes to the wheels of all the cars. The toilet, the car-stove and the ice-water tank all had established themselves in the best cars.

On the Illinois Central, between Cairo and Dubuque, some of the cars were filled with compartments in which the backs of seats turned up and so formed two tiers of berths

or sofas for the accommodation of persons who might wish to lie down and were willing to pay for the privilege. The passenger-car had attained a length of 60 feet, though the 30-and 45-foot cars were more common ; the baggage-cars, with their compartments for mail and express, were 30 feet long, and the freight-cars from 28 to 30 feet. In those days the freight-cars were constructed more strongly than were the passenger-coaches ; a Baltimore & Ohio freight-car 28 feet long, and with a capacity of nine tons, itself weighed six tons.

Of necessity progress in car-building had to wait for the development of the railroads. The original roads were not constructed as through lines between the larger cities, but as the connecting-links between natural water¬ ways, answering to the portages or carrying places of the old days when commerce was conducted in canoes. Often built as the result of local or State enterprise, a short line was sufficient to use up the scanty capital available, or to exhaust the willingness of the people to be taxed for public improvements. The great systems of to-day represent survivals of the fittest early ventures, and development accord¬ ing to environment. Thus the various small roads which traversed the present main line of the New York Central were not consoli¬ dated until 1853, and the same year the roads between Philadelphia and Pittsburgh came un¬ der one control. So late as 1862 there were five separate companies operating the lines between Lake Erie and Lake Michigan ; and as each road had a gauge of its own, it was regarded as a triumph in car construction when freight-cars of compromise gauge were built to run over all five roads. In 1869, how¬ ever, the Lake Shore & Michigan Southern lines came under a single head.

When in October 1865 a combination was formed among eight railroads to establish a fast freight line between New York and Boston and Chicago, the maximum difference in the gauges of the several

lines was one inch; and this was compensated for by a broad tread wheel. Each company contributed a number of cars proportionate to its mileage, one car for every three (afterward increased to one for every two) miles. In 1865 the quota of the Lake Shore & Northern Indiana was 179 cars; while in 1894 that road's quota of Red Line cars was 2,200.

In 1862 the United States government con¬ ducted the greatest railroad business known up to that time. With headquarters at Nashville, the government operated 1,500 miles of road with 18,000 men, whose monthly wages amounted to $2,200,000. The rolling stock consisted of 271 engines and 3,000 cars. No en¬ tirely new locomotives were built, but the 3,000 men employed in the locomotive repair shops pieced out fully equipped engines founded on a serviceable boiler or a pair of sound driving-wheels. Among the triumphs of the national car-shops were, first, a headquarters car for General Thomas, the car being 50 feet long, iron-plated, and provided with a kitchen, a dining-room, a sleeping apartment and an office ; and, secondly, the hospital trains, in which the jars and jolts were reduced to a minimum. It was during the year 1864 that General McCallum and Colonel Wyman came to Detroit and summoned the managers of the

Michigan Car Company to stop all building then in progress and to work solely for the government. They gave a contract for a number of box-and flat-cars to be operated on Southern roads ; and inasmuch as the gauge differed from that of the Northern roads, the new cars were loaded on flat-cars and sent to Cincinnati. The government officials fixed the price of the cars and made payment in certifi¬ cates, some of which the company exchanged for materials, and the remainder were held until money could be obtained for them.

The enormous transportation business de¬ veloped by the war, together with the labor conditions and the paper-money issues, com- • bined to raise the price of cars; so that the standard freight-car of 1864, a car 28 feet long and with a capacity of 10 tons, cost $1,000 or more. About 30 years later a car 34 feet long, with a capacity of 30 tons, and provided with automatic couplers, air-brakes and other im¬ provements, could be purchased for about $500.

When the war ended the managers of rail¬ ways were called on to face a heavy decline in both freight and passenger traffic, due to the disbanding of the armies. Money was not plentiful, cars were very

expensive and the mania for extending lines into new territory had begun. Under these conditions the roads began a system of borrowing cars from the builders or from car-trust companies. The Michigan Car Company was probably the first to make contracts on a car-loaning basis ; be that as it may, this company had at one time loaned to railroads between 6,000 and 7,000 cars, payment being made according to the car's mileage. With better times and better credit the roads began to buy cars for cash or on long time, as was most convenient ; and loaning freight-cars to railroads on a mileage basis was practically discontinued. A majority of the refrigerator-cars, however, continued to be owned by private parties and run on a mileage basis. The reduction in the mileage rate practically killed the business of private ownership, since the new rate did not much more than pay for the repairs.

In the winter of 1868-4)9 the first Westinghouse air-brake was used on the Steubenville accommodation train running on the Pittsburgh, Cincinnati & Saint Louis Railroad. The Penn¬ sylvania road adopted it, and since the auto¬ matic feature was added, in 1873, it has come into almost universal use on passenger-trains, while by far the larger proportion of new freight-cars built are equipped with it. In 1887 a train of 50 freight-cars made a triumphal tour of the great lines, and by repeated tests, under varying conditions, proved that the Westinghouse brake can stop a train in one-tenth the space required by the hand-brake. In 1867 Colonel Miller placed his patent plat¬ form, buffer, and coupler on three cars building in the shops at Adrian, Mich. ; and with great rapidity the dangerous old platform, with its loose link coupling, disappeared. In 1860 the Post-Office Department began to demand more room from the railroad companies, and year by year the mail-cars were increased from 17 to 20 feet in length, then to 35, and finally to 60 feet.

The interchange of cars among the various roads made it necessary to adopt standards in car construction, in order to facilitate repairs

to cars when away from the home road. Some authority, too, was

needed to settle disputes between roads, arising from charges for re¬ pairs ; to investigate new brakes and couplers ; and, in general, to keep the work of construc¬ tion fully abreast of the times. The Master • Car Builders' Association, organized in 1867, amply fills this need; and the reports of its annual meetings contain the latest word on all subjects relating to car-building. Its arbitra¬ tion committee also acts as a court of concilia¬ tion for the various roads.

Car-building has undergone a revolution during the past 25 years, due in part to in¬ creased demands on the railways, and in part to improved methods of construction. The use of wood as a material is markedly less, and the use of steel is steadily increasing, so that both passenger and freight cars of recent date seem to be of better and more durable type than ever before. Modern cars are a develop¬ ment, built for service and long life, and to meet the numerous demands of shippers and the traveling public. The parlor car has de¬ veloped into an entire series of sumptuous apartments on wheels built to transport those who want comfort and luxury in their journey-ings, and are willing to pay for them; the dif¬ ference in the needs of the commuters around a large city and of passengers going long dis¬ tances has called for a differentiation in pas¬ senger cars. For express and mail service there has been developed a line of cars that enable business to be properly handled en route, avoiding delays at terminals. For freight transportation there have been put into use lit¬ erally hundreds of styles of cars, adapted to convenient carrying of special goods of widely varying nature.

Passenger Cars. — The standard passenger car is termed a day coach, and is 78 feet long, 10 wide and 14ˆ4 high; it weighs 112,000 pounds, is practically all steel, and has 40 dou¬ ble seats, automatic windows, racks for coats, grips, etc., a toilet, ice-water supply, Pintsch gas or electric lights and minor conveniences. If for through traffic it has a vestibule, so that passengers can walk from car to car with¬ out exposure to the weather. The construc¬ tion cost is about $10,000. For suburban serv¬ ice, non-vestibuled cars are used, and many have cane-covered seats that do not hold the dust. There were 53,500 passenger cars in use on the steam railways of the United States in 1915, or about one car to five miles of tracks.

A cheaper grade of passenger car is known as the emigrant or tourist car, equivalent to the second-class car of Europe. Many companies use their older wooden cars for this service, but the cars built for this traffic are simply a cheap grade of car, with usually cane-covered seats, fewer conveniences and slight decoration.

The standard sleeping car is 72*4 feet long, of all-steel construction, has 24 berths and weighs 152,000 pounds. It is increasingly common to build them with two to a dozen separate compartments, like state-rooms on a steamboat, each compartment having two to four berths and toilet conveniences. Some sleepers are built with several compartments and the remainder of the car constructed as a parlor and observation compartment, so that a party or small number of passengers can have

the conveniences of both bedrooms and draw¬ ing-room. The form of sleeper that is alter¬ able to a day coach, the berths folding awˆay, appears to be less popular than formerly.

Observation cars, with extra large windows, and often with individual seats, have come into considerable use in transcontinental travel. The term parlor car is now used by the railways for a day coach, handsomely fitted up with in¬ dividual chairs, and for which an extra charge is made. Sometimes these are called chair cars. The terms palace car and drawing-room car are going into disuse.

Smoking cars are run on practically all pas¬ senger trains, and have usually imitation leather covered seats. Sometimes they are provided with card tables. The cafe car is not only a smoker, but card-room and bar-room combined — a high-class cafe or saloon on wheels. The dining car is fitted up with a kitchen, and the passengers are expected to come in to the tables to take their meals, or sometimes the service is extended through the train. The buf¬ fet car is fitted up for a simpler class of meals and a less extended menu than the dining car.

The business car is a recent innovation, hav¬ ing tables, desks and stationery for correspond¬ ence ; also typists and stenographers in attend¬ ance. The private car, built for railway offi¬ cials and people who wish to travel in luxuri¬ ous seclusion, is fitted up as a living suite of rooms, with hotel conveniences and elegant ap¬ pointments.

Sleeping Car. — Improved railway travel may be said to date from 1836, when the first sleeping car was offered to the traveling pub- -lic. In that year the Cumberland Valley Rail¬ road of Pennsylvania installed a sleeping-car service between Harrisburg and Chambers-burg. This first sleeping car was an adapta¬ tion of an ordinary day coach to sleeping re¬ quirements. It was divided into four com¬

partments in each of which three bunks were built against one side of

the car, and in the rear of the car were provided a towel, basin and water. No bed clothes were furnished

and the weary passengers fully dressed reclined on rough mattresses with their overcoats or shawls drawn over them. Candles furnished the light, and the heat was supplied by box stoves burning wood or sometimes coal. Other similar cars were adopted soon after by various railroads and for a number of years these cars found an appreciative patronage, and tem¬ porarily served the patrons of the railroads. Improvements were negligible and the only justification for such cars existed in the ability of the passengers to recline at length during the long night hours. The first fundamental improvement came in 1858 when George Morti¬ mer Pullman put several revolutionizing ideas to practical test by remodelling two Chicago and Alton coaches into sleeping cars. In these Mr. Pullman introduced his invention of upper berth construction by means of which the upper berth might be closed in the day time and also serve as a receptacle for bedding. Other improvements were worked out and tested, and from these first experiments were drawn the plans from which the first cars entirely con¬ structed by him were made. These cars were popular with the traveling public but in 1864 Mr. Pullman put in service a model car, en¬ tirely built according to his own ideas, at the

then unprecedented cost of $18,000. This car, named the Pioneer, had improved truck springs reinforced by blocks of solid rubber; it was a foot wider and two and a half feet higher than any car then in service. Other cars of the same type were soon put in service and were universally admired. Within a com¬ paratively short period railroads adopted new and superior accommodations at the popular demand for the increased comfort and safety offered by the new type of sleeping cars. Various companies began the building of sleep¬ ing and parlor cars in competition with the Pullman Company, incorporated in 1867. The Gates Sleeping Car Company and the Wagner Palace Car Company were for a time serious competitors and from 1870 to 1890 the Wagner and Pullman companies were the strongest in the field.

Through the control of better patents and in course of competition the Pullman Com¬ pany soon became the only important sleeping-car company in the United States. Its business grew rapidly an I now it builds and operates sleeping cars throughout the United States, Canada and Mexico on all important lines, and also builds other types of cars, both freight and express, for Europe, South America and England. A few railway companies operate their own sleeping cars. The general arrange¬ ment between the Pullman Company and the railroad companies, over whose lines it operates its cars, differs widely as between different companies. Where the average number of passengers traveling in Pullman cars per car mile is very high, as it is on the line between Boston and New York, the Pullman Company pays the railway company something for carry¬ ing the car on its trains. Where the passenger traffic in Pullman cars per car mile is very light the railway company pays a rental to the Pullman Company for its cars. The Pullman service has kept in advance in service and efficiency of all its competitors. Its standard has always been high. It was a pioneer in in¬ stalling electric lighting and steam heating systems in its cars and many other devices tend¬ ing to increased comfort and safety have been adopted and it is ever ready to adopt new ideas in the construction and equipment of its cars. Its service is superior to that on rail¬ ways which operate their own sleeping cars. Its cars are now constructed entirely of steel and are especially designed to secure the safety and comfort of passengers. Their rates were found to be entirely reasonable after an exhaustive investigation by the Interstate Com¬ merce Commission in 1910. To-day the Pull¬ man Company operates 7,500 cars over 137 rail¬ ways, or a total of 223,489 miles of track. To operate these cars over 10,000 car employees are required, while 7,000 more are employed to keep the cars in repair, and maintain them in a clean and sanitary condition.

Baggage and Combination Cars. — The rail¬ ways define a baggage car as one built for car¬ rying trunks and passengers' baggage and having large side doors. There are usually end doors and a few windows. Where trains have short runs and consequently light demands for baggage, it is common to combine the smoker and baggage car in one, with a bulkhead di¬ viding the compartments. Sometimes the bag¬ gage and mail are combined in a similar way, and a few cars are made with three compart¬

ments, for baggage, mail and smoking. Bag¬ gage compartments are also sometimes built as parts of regular passenger cars.

Freight Cars. — There were 2,500,000 freight cars in service on the steam railways of the United States in 1917, and about 125,000 new cars of this class are being built annually. This is only a small increase in number, but the increase in carrying capacity is probably 6 to 8 per cent, owing to the larger size of the mod¬ ern-built cars. Much of the recent construc¬ tion is pressed steel, that is, soft steel plates for the car-bodies, sheared to size at the rolling mill, and pressed into form and riveted and bolted together. The larger steel plates of simple form are cold-pressed, those of intri¬ cate form and small parts are mostly hot-pressed. The bolsters and framework of the trucks are also now mostly made of steel by machine forging, the tie-rods and attachments are mostly steel and the wheels are either iron or steel. The notion that some car-wheels are of paper is a pleasing fiction, originating with some newspaper reporter. Its only basis is the use of paper in compound wheels placed be¬ tween the two parts of a car-wheel to deaden the ® ringing® or noise of vibration. These all-steel cars involve higher first cost than the wooden cars, but being made in larger sizes and having much greater life, are coming more and more into use. The typical old-fashioned wooden box car is 40 feet long, 8 feet 10 inches wide and 8 feet high, weighs 36,000 pounds and cost, before the war, $1,300, having a carrying capacity of 60,000 pounds. The all-steel cars are built of capacities ranging from 80,000 to 120,000 pounds.

Box cars are ventilated when designed for carrying food stuffs and double-walled or in¬ sulated for fruit transportation. When pro¬ vided with icing conveniences they are termed refrigerator cars, and are specially built for carrying meat, beer, produce, *etc.* Stock cars are built with stalls for horses and cattle and pens for sheep, swine or poultry. Flat cars are the cheapest railway cars, many of them costing not more than $800. They consist sim¬ ply of the running gear, that is, a pair of trucks, with a deck and brakes. Keepers are inserted in the sides of the deck in which up¬ rights can be inserted to keep the load from falling off. They are used for carrying stone, ore, lumber, glass, ordnance and any heavy-freight that will bear exposure to the weather. When provided with low sides they are termed gondolas, and may be used for conveying coal, coke, *etc.* Hopper cars are built with slanting bottoms and gates below, so that the contents can be discharged by opening the gates ; two hoppers to a car is a common construction. Dump-cars usually are arranged to tip side¬ ways so as to slide off the load. These are used for conveying earth, gravel and ballast for road filling. Tank cars are built for oil, acids and other fluids that have to be handled in large quantities, and they are usually cylin¬ drical in form.

Special Service Cars.— The steam railways of the United States have in service 125,000 cars designed for their own use, a number twice as great as the total of passenger cars. Perhaps the most familiar of these to the pub¬ lic is the freight caboose, seen on the tail end of railway trains, and serving to house the

crew and carry their tools and supplies. There are repair cars with a general equipment of tools — traveling machine shops. Wrecking cars are supplied with very heavy and power¬ ful cranes for lifting wrecked cars or loco¬ motives that have left the track. Every rail¬ way has to keep them at convenient points for use in case of accident, but they also have their uses in construction work. Steam-shovel cars are utilized to dig sand and gravel from banks, and pile-driver cars for construction in boggy places. There are ditching cars for ex¬ cavating, track-layer cars and an entire series of other special cars used for modern scientific railway construction and repair work. The snow-removal car plows, some of which have great rotating heads, are among those most readily noted by the public.

The smallest of all railway cars is the push-car, made of two pairs of wheels and a slight deck, designed for the convenience of track-workers. Next comes the handcar, with a hand lever connected by a crank to the wheels. A few active men can operate one for a short distance at almost railway speed. A new form of inspection car is an improvement on the handcar, having a small gasoline engine for working the lever.

Street Railway Cars. — Since power was ap¬ plied to street railway cars they have increased in size and developed along lines similar to steam railway practice. The earlier electric cars were short and mounted on a single truck. As traffic developed the two-truck car came in, and is now the accepted type. Open cars with cross seats and a running board are favored for summer traffic, but the standard car has seats of railway pattern, the tendency being to substitute reversible seats for two persons in place of longitudinal side seats. The front and rear platforms are now generally en¬ closed, to protect the

motorman and conductor from the weather. Electric light and heat are commonly supplied, though in some the car-stove burning coal is still in use. Since 1910, the ftpay as you enter® type of car has become popular with the companies and passengers are detained in a rear vestibule until they have de¬ posited their fares in a box.

For subways, all-steel car construction is preferred, and in some cases is, obligatory by law. These cars have both side and end doors, for the quick transfer of passengers. Elevated electric railway cars for city traffic follow closely the lines of development of steam pas¬ senger cars, but are of lighter construction.

Features of Construction. — The typical modern railway car is the day coach. It has spokeless wheels of either cast iron, wrought iron or cast steel, with a steel tire shrunk on. The wheels are fixed solid on the axles in pairs, and two pairs of wheels form a truck, though eight-wheeled trucks have been built. The body of the car rests on and is fixed to each truck by a central pin on which it turns. There are rolls and springs for steadying the car and preventing jolting. Between the trucks, under the deck, is located the air-brake, consisting of a reservoir of compressed air, a brake-cylinder and connections. (See Air-Brake). Cars are provided with couplers at the end of the car-deck and automatic couplers are now generally in use, which hook the cars together when gently bumped. The car roof

has a raised central section called the clear¬ story, in which ventilators are placed, so that air circulation may be maintained without drafts. The car-seats have been the subject of hundreds of patents, but the accepted form is now a metal framed seat for two, with double levers for reversing the back, which is ordi¬ narily high. Both seat and back are cushioned, most commonly covered with plush. See Rail¬ way.

Statistics. — There are 110 establishments in the United States manufacturing strictly rail¬ way cars. The American Car and Foundry Company and the Pressed Steel Car Company are the largest, but a large business is done by the Southern Car and Foundry Company, Standard Steel Car Company, the Pullman Com¬ pany, Haskell & Barker Car Company and West¬ ern Steel Car and Foundry Company. Each railway has its own repair shops and many of these make cars, their output being about 15 per cent of the total production. In addition, a number of foundries and machine works make some cars as a side line, their production being about 9 per cent of the total. All

these shops have a total capacity of nearly 300,000 cars a year, but rarely have more than 125,000 been made in a year. In 1909 the production was 101,243 cars, of which 1,601 were passen¬ ger, and 603 were for electrical use on trunk line terminals, and 2,089 were for street rail¬ ways. It is estimated that there are in use now (1917) 2,800,000 cars of all sorts on the trunk line railways of the United States.

Railway cars are made by so many differ¬ ent concerns that are also engaged in other manufacturing that it is impossible to state with accuracy the capital invested in the busi¬ ness. The total manufacture, while given as 135,000, valued at $165,000,000 in the 1914 census, is really much higher, because the large rail¬ ways all maintain very large repair shops, and often cars are made of two-thirds new and classed as ˆrepairs.® These repair shops in 1914 added a value of $243,000,000 to the roll¬ ing stock of the United States railways. Penn¬ sylvania is the leading State in the steam-car building industry, with $93,600,000 production in 1914; Illinois was next with $41,496,000, Ohio third with $33,286,000; and New York produced $30,893,000. Indiana and California follow, but in other States the production is small.

Charles H. Cochrane,

Author of (Modern Industrial Progress d

CARABAS, Marquis of, the exalted per¬ sonage who figures in Perrault's story of (Le Chat Botte) ((Puss in Boots*)- The name is often applied to an extremely conservative aris¬ tocrat. In Disraeli's (Vivian Grey) the Mar¬ quis of Clanricarde is satirized as the Marquis of Carabas.

CARABIDiE, the family of Coteoptera, comprising the ground-beetles. See Ground Beetles.

CARABINE, or CARBINE. See Small Arms.

CARABOBO, a state of Venezuela, bounded on the north by the Caribbean Sea; area, 2,984 square miles. The capital is Valencia, and the chief port Puerto Cabello. Coffee, cacao and sugar are cultivated. The village of Carabobo,

20 miles southwest of Valencia, was the scene of the battle fought 24 June 1821, which was decisive of the independence of Colombia.

CARACAL, a lynx-like wild cat of Africa and southern Asia, slender in form and usually red-brown in color. See Lynx.

CARACALLA, Roman emperor: b. Lyons 188 a.d. ; d. 217. His real name was Marcus Aurelius Antoninus Bassianus, and he was the eldest son of Septimius Severus. He ac¬ companied his father on his expeditions, notably to Britain ; and on the death of his father he succeeded to the throne with his brother, Antoninus Geta, whom he speedily murdered. To effect his own security upward of 20,000 other victims were butchered. In 212 he gave citizenship to all free inhabitants of the em¬ pire, his motive being to increase revenue from the taxes on inheritances. His reign as sole emperor was occupied largely with military campaigns. Among the buildings of Caracalla in Rome the baths' — Thermce Caracallce — near Porta Capena, were most celebrated, and their ruins are still magnificent. He was him¬ self assassinated by Macrinus, the pretorian prefect, near Edessa, in 217.

CARACARA, a genus of large carrion-eat¬ ing hawks of the tropical parts of America, with black and white plumage, the head some¬ what crested, legs long and naked, and the general aspect vulture-like. They have in¬ creased greatly with the spread of the cattle¬ raising industry in South America, and have proved of much service as scavengers about the ranches and villages. They erect nests of sticks in trees or cliffs and lay only two eggs, heavily blotched and spotted. The species to which the name most strictly applies is Polyborus cheriway, which is found from Venezuela to Texas and southern California. Another prominent species is the carancho (P . tharus), numerous and well known all over Brazil and Argentina. Compare Chimango. Consult Sclater and Hudson, (Argentine Ornithology) (Vol. II, London 1889) ; Darwin, (A Natural¬ ist's Voyage) (London 1860).

CARACAS, Venezuela, city and capital of the United States of Venezuela, was founded in 1567 by Diego de Lazada, who called the city Santiago de Leon. But in popular usage a more distinctive name was adopted — that of the Ca¬ racas tribe of Indians, formerly

inhabiting the valley in which the city is built. It was twice destroyed — in 1595, when it was sacked by the English, under Preston, and in 1766, when the French put it to sack and pillage. But it con¬ tinued to grow, and played an important part in the war of independence against Spain, claiming the honor of having been the first colony in South America that succeeded in throwing off the yoke of Spain. Caracas was the birthplace of Simon Bolivar. The great earthquake of 1812 killed 12,000 persons and laid half the city in ruins. The last serious shock occurred in 1900. Its altitude being about 3,000 feet above sea-level, the climate is generally mild and agreeable, the temperature seldom rising above 82° F. (with 84.2 as a maximum), or falling below 65° F. (with a minimum of 48.2). Toward the end of Decem¬ ber the temperature is lowest, and it is highest from June to September. Mean temperature, 66.2° F., lat. 10° 32' N., long. 67° 4′ 45″ W.

The streets cross each other at right angles, running due east and west, or north and south, and the principal thoroughfares are paved with stone, and have sidewalks of cement. The capitol building occupies an entire square, an area of more than two acres. It includes the halls in which both chambers of the national Congress hold their sessions. The rooms of the High Federal Court and the Departments of Public Instruction and the Interior are in the galleries on the east and west sides of the capitol. La Casa Amarilla (the Yellow House), official resi¬ dence of the President of the republic, is situ¬ ated west of the Plaza Bolivar. On the north side of the same square is the main post-ioffice. Near-by are the archbishop's palace, the cathe¬ dral and the municipal palace. Opposite the southern fagade of the capitol are the university buildings (Gothic architecture, with interior gardens) ; the old temple of San Francisco and the Exposition Palace, the western wing of wThich contains the Bolivar Museum, the head¬ quarters of the Academy of History, and the corresponding branch of the -Spanish Royal Academy. The national library and museum are housed by the university. Other character¬ istic buildings are: The National Pantheon, the Masonic Temple, the three markets, the National Benevolent Institute, the Arsenal, the Institute of Arts and Trades and the Municipal Theatre. Besides the Plaza Bolivar, the prin¬ cipal public squares are the Washington, Pan¬ theon and Fifth of July (Independence Day). The cathedral, dating from 1614, the Basilica de Santa Ana, and the Santa Capilla, are note¬ worthy among the churches of the city. Inter¬ esting relics of the heroes of the struggle for liberty, Miranda, Bolivar and Paez, are shown in the National Museum. There are several promenades (called ((Iron Bridge,®

((Paradise Avenue® and independence®) and among the places of amusement are a Plaza de Toros, baseball grounds and a bicycle park. An im¬ portant institution supported by the govern¬ ment is the Vargas Hospital. The Linares Hospital for children is maintained by private contributions. Leading clubs are the Union, German, Italian and Agricultural. Caracas does little manufacturing but is the centre of the export trade of the district, wdfich produces cacao, coffee, tobacco, *etc.* Street railways are controlled by the Caracas and Bolivar com¬ panies. The city has cheap telephone service, furnished by two companies, and is lighted by gas and electricity. All telegraph lines through¬ out the republic are owmed by the government. Four lines of railway start at Caracas, thiee of which are designed to place the capital in com¬ munication with the interior, while the most important runs to Port La Guayra. Pop. in¬ cluding the six suburban parishes making up the Federal district is about 90,000.

CARACCIOLI, ka-ra-chd'lo, Francesco, Italian admiral: b. Naples 1752; d. 29 June 1799. He was distinguished in the Neapolitan service, but entered the service of the Parthe-nopean Republic set up by the French republi¬ cans in 1799, and repelled a Sicilian-English fleet. When Ruffo took Naples, Caraccioli was arrested, and being tried by court-martial was condemned to death, and hanged at the yard¬ arm of a Neapolitan frigate. His corpse was thrown into the sea. The court-martial was ordered by Nelson, to wrhom the King had given

command of the Neapolitan navy. Nelson is said to have been influenced in his decision by the notorious Lady Hamilton.

CARACTACUS, British king. He was a son of Cunobelin, King of the Trinovantes, and in 43 a.d., when Plautius landed, was at the head of the Catuvellauni. Plautius and his lieuten¬ ant, Vespasian, who afterward became emperor, defeated the British forces under Caractacus on several occasions, the chief battle probably tak¬ ing place about Wallingford. When the Ro¬ mans had pushed well down the Thames the Emperor Claudius arrived and took part in further military operations, but his stay was a very short one. Caractacus now

established himself in South Wales among the Silures, whence he took every opportunity of harassing the Romans. In 47 a.d. Plautius was replaced by Ostorius Scapula, and that commander com¬ pletely defeated Caractacus in a battle some¬ where about Shropshire, probably at Caer Caradoc. The wife, daughter and brothers of the British leader were captured, and Caractacus himself fled to the country of the Brigantes in the north, only to be delivered up by their Queen, Cartimandua, into the hands of the Romans. He was taken to Rome and made to take part in a triumphal procession. Here he was led before the Emperor Claudius and an assembly of the people. According to Tacitus (<Annales,) book XII, chapter XXXVII) when he came to the seat of the Emperor he stopped and addressed him, and so won upon the monarch by his noble behavior and pathetic speech that the other pardoned him. Accord¬ ing to the Welsh Triads he lived four years longer, and his children became Christians and introduced Christianity into Britain. He is in¬ troduced among the dramatis personae of Beau¬ mont and Fletcher's play, ˆonducaP

CARADOC GROUP. See Bala Beds.

CARADOC SANDSTONE, the name given by Murchison to a thickness of about 4,500 feet of sandstones, shales, grits, flags and sandy limestones on the border between England and Wales, which he made a separate series. Sub¬ sequent investigation has shown that the Caradoc series is of the same age as the Bala, and the series is sometimes called Bala and Caradoc by English geologists. The Caradoc and Bala beds are fossiliferous and have been used largely as the basis of comparison in geological study. The rocks are of the uppermost division of the Ordovician system of England. See Ordovician.

CARAFE, ka-raf', the French name for an ordinary glass bottle or decanter for holding drinking water.

CARAFFA, a celebrated Neapolitan family, which has produced several distinguished com¬ manders and statesmen: 1. Oliviero, b. 1406; d. Rome 1511. He was made a cardinal by Pope Paul II in 1467. Sixtus IV appointed him his legate to Alfonso of Naples, and in 1472 made him admiral of his fleet against the Turks, from whom he captured Smyrna, and the port of Satalia in Asia Minor. 2. Carlo, b. Naples 1517; d. 1561. He served first in the Netherlands under the Spaniards, then en¬ tered the order of Malta, and was made a car¬ dinal by his uncle Pope Paul IV, who, for his sake, stripped the Colonnas of their possessions. This involved them in a war with Philip of Spain, but the result proved favorable to the

Caraffa family. Paul IV who succeeded Pius IV appointed a commission of eight cardinals who tried Carlo and on 3 March 1561 put him to death for high treason. 3. Antonio, b. Naples 1538; d. 1591. He was made cardinal by Pius V, and entrusted with the superin¬ tendence of the congregation for the revision of the Bible, and an exposition of the canons of the Council of Trent. Under Gregory XIII he became librarian of the Vatican. He translated Theodoret's Commentaries on the Psalms, and the Orations of Gregory Nazianzus from Greek into Latin. 4. Antonio, another member of the family, distinguished himself in Hungary in the service of Austria, but made himself universally hated by his cruelty; d. Vienna 1693.

CARAMBOLA, the fruit of an East In-* dian tree of the same genus as the bilimbi, the Averrhoa Carambola, order Oxalidacece. It is of the size and shape of a duck's egg, of an agreeable acidulous flavor. The rind is yellow and smooth with five longitudinal ribs. In British India it is used for flavoring sherbets, tarts, etc., and is known as the caromandel gooseberry. The leaves are characterized by an extreme irritability and a tendency to display the phenomenon of sleep in plants.

CARAMEL. When sugar is gradually heated, it loses water and other substances, and is converted into a dark mass with a characteris¬ tic smell and taste. All materials containing sugar form the same substance, such as coffee, malt, chicory. This is crude caramel, which is used in cookery as a coloring and flavoring in¬ gredient. It is a mixture of several bodies, of which three have been described: Carame-lane, a brown bitter body, soluble in water; Caramelene, a dark brown body, also soluble in water, and possessed of great tinctorial power; and Caramelin, a black substance, of intense coloring power, which exists both in a soluble and insoluble modification. A kind of brown soft candy is also called caramel.

CARAN D'ACHE, ka'ron d'ash' (French for leadpencil), or POIRE, Emmanuel, French caricaturist and artist; b. Moscow, Russia, 1858; d. Paris, 26 Feb. 1909. His am¬ bition was to be a military painter, but he is best known for his series of pictorial anecdotes contributed to La Vie Parisienne, La Carica¬ ture, le Figaro illustre, le Chat Noir, *etc.* Be¬ sides illustrating Bemadaky's (Prince Kozako-kofP and other celebrated books he published several albums of sketches, the (Carnet de cheques } depicting the Panama scandals; Al¬ burn de croquis militaires et d'histoire sans legendes} ; (Histoire de Marlborough, > *etc.* Consult Spielmann, M. H., Introduction to (Works of Caran

d’Ache) (London 1898).

CARANGIDiE, ka-ran’ji-de, a family of marine fishes, the pompanos. Among the more widely known members of the family are the leather jackets, pilot fishes, amber fishes, run¬ ners, horse mackerels, crevalles, moonfishes and pompanos. There are about 200 species in the family, and nearly all are good for food. They abound in the warmer seas, and many of them are remarkable for their graceful or strange forms.

CARAPA, a small genus of tropical trees of the family Meliacece, with mostly imparipinnate leaves and regular flowers. A South

American species (C . guiancnsis) is a fine large tree, whose bark is in repute as a febrifuge. Oil made from its seeds (called carap-oil or crab-oil) is used for lamps, and masts of ships are made from its trunk. The wood is called crab-wood. The oil of the African species (C. procera), called coondi, kundah or talli-coona oil, is used by the negroes for making soap and anointing their bodies in order to protect them against insects. The oil of the South American carapa is used for the same purpose also.

CARAPACE, the upper part of the hard shell or case in which reptiles — turtles, tor¬ toises, etc, — belonging to the order of the Che-lonia are enclosed, the lower part being called • plastron. The same name is also given to the upper part of the shell of the Crustacea, and to the case enclosing certain of the Infusoria (qq.v.).

CARAPEGUA, ka-ra-pa-gwa’, Paraguay, interior town 37 miles southeast of Asuncion. Settled in 1785 it is situated in a fertile country, producing cotton, tobacco, corn, sugar cane and manioc. It has modern public buildings, in¬ cluding a church and two schools. Pop.

13,000.

CARAQUET, ka-ra-ket', Canada, port of entry, Gloucester County, New Brunswick, on the Bay of Chaleur and on the Caraquet Rail¬ road. The settlement consists of Upper and Lower Caraquet and is noted for its fisheries. Pop. 4,621.

CARAT, derives its name from qirrat, which in Arabic signifies the pod of the Erythrina abyssinica, the coral tree of Abys¬ sinia, the seeds of which have, from time im¬ memorial, been used in the East in weighing gold, because they never vary in weight when once dry. It is a weight of three and a sixth troy grains, used in weighing pearls and precious stones, and also serves to express the relative fineness of gold. Twenty-four carats being assumed as the standard of gold perfectly free from alloy, every specimen, in proportion as it falls short of this purity, has a fineness of less than 24 carats — for example, if the alloy amounts to a sixth of the whole, it is 20 carats fine; or to a fourth, it is 18 carats fine.

CARAUSIUS, ka-ro'shi-us, Roman gen¬ eral : b. among the Menapii, in Gallia Belgica. He was sent by the Emperor Maximian to de¬ fend the Atlantic coasts against the Franks and Saxons; but being suspected of permitting those pirates to commit their ravages in order to in¬ crease his own plunder when he afterward cap¬ tured their vessels, and foreseeing that he was likely to fall into disgrace, he landed in Britain and had himself proclaimed emperor by his legions (287 a.d.). In this province he was able to maintain himself six years by guarding the English Channel with his fleet. He became co-emperor with Diocletian and Maximian in 289 ; but under Constantine his reign came to an end. Boulogne fell in 293 and in the same year he was assassinated by one of his officers named Allectus. Consult Gibbon, (Decline and FalP (Vol. I, chap. XIII, ed. by Bury, with notes, London 1896) ; Webb, (The Reign and Coinage of Carausius) (London 1908).

CAR A VAC A, Spain, town in the province of Murcia, about 40 miles west by north of the

town of Murcia. It occupies the side of a hill crowned by an ancient castle and overlooking the river Caravaca, here crossed by a stone bridge; is well built and has a handsome townhouse and church, the latter with a lofty tower and some good sculptures and paintings. Its trade is chiefly in cattle, grain and manufactures of woolen and hempen goods, paper, soap, earthen and copper ware, chocolate and

oil. Pop. 17,349.

CARAVAGGIO, ka-ra-vad'jo, Michel-Angelo Merisio (or Merisi) da, Italian painter : b. Caravaggio, in the Milanese, 1569; d. near Porto Ercole 1609. He was at first a journey¬ man mason, but soon applied himself to the study of painting, studied in Milan and Venice, and afterward went to Rome where he was for a time associated with Cesare d'Arpino and Prospero Orsi, and distinguished himself as the founder of the naturalistic school. His char¬ acteristic traits are vigor and truth of chiaros¬ curo, combined with excellent coloring. He was fond of introducing broad and deep masses of shade, whereby a great effect is given to the light. To aid him in producing this effect the room in which he worked was illuminated by a skylight, and the walls were painted black. He excelled in the painting of naked figures. His faults are obvious. Narrow and servile imitation of nature was his highest aim. Annibale Caracci and Domenichino were, perhaps, less distinguished than Caravaggio dur¬ ing their lives, but after their death were ranked higher because, without neglecting coloring and the study of nature, they aimed at correct¬ ness of design and dignity of conception. His violent character involved him in many difficul¬ ties. He died in consequence of wounds re¬ ceived in a quarrel. The painters who have been influenced by him most are Manfredi, Valentin, Guido Reni, Guercino, Domenichino and Ribeira, called Espagnolet. His first paint¬ ings are genre pieces, of wdiich the best are (Card Players) in the Sciarra Palace, Rome, and the (Gipsy Fortune Teller) in the Palazzo dei Conservatori, on the Capitoline Hill. The works of his later life are large religious pieces, which aroused great opposition in Rome be¬ cause he used to portray the saints as common types of humanity. (Saint Matthew Writing the Gospel, } and the (Death of Mary > are among those which were removed from the churches in Rome; the former being now in the Berlin Museum and the latter in the Louvre. The most renowned of his religious works and his gen¬ erally accepted masterpiece is the (Burial of Christ } now in the Vatican, but originally painted for the church of Santa Maria in Trastevere. The facial expressions of all of the figures are remarkable for the depth of the emotion portrayed. It shows great care in execution and harmonious grouping. Accuracy and realism are used in the representation of the figure of Christ. Numerous pieces ascribed to him are to be found in the various galleries of Europe, notably at Berlin and London; but it is doubtful if all are originals. Among his portraits' may be mentioned one of himself in the Uffizzi at Florence, and that of the Grand Master of the Knights of Malta (Louvre). His influence as a master of realism in painting was widely diffused over Italy; and the Dutch Naturalists profited much by the careful study

of his works. Consult Baglione, (Le vite de' pittori) (Rome 1649) ; Fornome, (Michelangelo Caravaggio } (Bergamo 1907).

CARAVAGGIO, Italy, town and commune in Lombardy in the province of Bergamo, 24 miles east of Milan, on the Gera d'Adda. A steam tramway connects it with Monza and Milan. It is celebrated as the birthplace of the two great painters, Polidoro Caldara and Michelangelo Merisi, both called da Caravaggio. It was formerly surrounded by walls and de¬ fended by a strong castle. The site of its ancient fortified walls is now occupied by promenades, but the moat remains and is spanned by six bridges. Its principal church has some good paintings, and a lofty campanile. The commune is famous for its melons. Pop. about 10,000.

CARAVAGGIO DA POLIDORO, Ital¬ ian painter: b. Caravaggio 1495; d. 1543. His real name was Caldara, but he was surnamed Caravaggio from his birthplace. He went to Rome in his youth and carried bricks at first for the masons who worked in the Vatican. He first felt a great desire to become a painter from seeing Giovanni da Udine and the other painters who were occupied in the Vatican. He formed a close friendship with Maturino of Florence, who assisted him with his advice. Caldara soon surpassed him, and exerted him¬ self to introduce improvements in drawing, having always in view the antiques. Raphael employed him in the galleries of the Vatican, where he painted, under his direction, several excellent friezes. At Messina he executed an oil-painting, representing Christ bearing the cross (1534; in the Museum of Naples), which contains a number of beautiful figures, and proves his ability to treat the most elevated subjects. He has approached more than any one to the style and the manner of the ancients, particularly in imitating their bas-reliefs. His figures are correct, well distributed and ar¬ ranged; the positions are natural, the heads full of expression and character. It is evident that he would have acquired great celebrity if he had undertaken greater works. He applied himself to the chiaroscuro, particularly to that kind of it which is called sgraffiato. He showed, also, much talent in his

landscapes. At the sack of Rome in 1527 he fled to Naples, and on his re¬ turn from that place to Rome, in 1543, he was murdered by his domestic. Consult Bertolotti, (Artisti lombardi a Roma) (Milan 1881).

CARAVAN, a Persian word, used to de¬ note large companies which travel together in Asia and Africa for the sake of security from robbers, having in view, principally, trade or pilgrimages. Such companies often have more than 1,000 camels to carry their baggage and their goods. These walk in single file, and the line is often four or five miles long. To avoid the excessive heat, they travel mostly early in the morning. As every Mohammedan is sup¬ posed to visit the tomb of Mohammed once at least during his life, caravans of pilgrims go to Mecca every year from various places of meeting. Of the various caravans which pro¬ ceed to Mecca every year, the most important has always been the Syrian. The place at which it meets is Damascus, and here the pilgrims and merchants assemble many weeks before the day of departure, which is always fixed according to

the season of the year in which the feast of Bairam occurs, the pilgrims requiring to be at Mecca on the day of the feast. As these cara¬ vans serve mercantile as well as religious pur¬ poses, Mecca, on the arrival of the caravans, resembles a great fair, and this fair is indeed the most important in all the East. The journey from Damascus to Mecca and back occupies about four months. The leader of such a cara¬ van to Mecca, who carries with him some can¬ non for protection, is called Emir-el-Hadj (Prince of the Pilgrims). Trading caravans choose one of their own number for a leader, whom they call Karwan Bashi. Besides a leader, each caravan has its servants, guides, military escorts and priests. Obedience is en¬ forced by the leader in the matter of internal discipline, but in trafficking, each member is independent. Much information on the subject of caravans is to be found in the travels of Nie¬ buhr, who made many journeys with them, and describes them, as is well known, minutely and faithfully.

CARAVANSARI, in the East, a sort of inn, situated in countries where there are no cities or villages for a considerable extent, to furnish travelers with a shelter. The building is generally spacious, enclosing a courtyard con¬ taining a fountain or well. Small unfurnished rooms constitute the interior, poorly ventilated and lighted. The interior court is entered at a large gateway, through which loaded camels may pass. Some of them are built with much splendor, though they are generally unfurnished, and the traveler is obliged to bring with him not only his bed and carpet, but also all his provi¬ sions and

necessaries. In many, the hospitality is gratuitous. It is common for a pious Mo¬ hammedan to establish, during his life or by will, one or several of such caravansaries. This kind of benevolence is considered peculiarly agreeable to the Deity, and promotive of the eternal happiness of the founder. Sometimes persons are kept in these establishments to guide the caravans for some distance. See Khan.

CARAVEL, formerly the name of dif¬ ferent kinds of vessels; one used in Portugal of 100 to 150 tons burden; another, a small lateen-rigged fishing vessel used on the coasts of Normandy and Picardy of 10 to 15 tons; and a third, a large Turkish ship of war.

CARAWALA, ka-ra-wa'la, a large viper (Hypnale nepa) of Ceylon and southern India, numerous, and greatly dreaded by the natives, especially those who work in the pineapple plantations. It is of small size, rarely exceed¬ ing 20 inches in length, and has the extremity of the upturned muzzle covered with scales. Its poison has the peculiarity of not affecting the system until several days after the bite, so that proper remedies immediately applied will counteract the venom.

CARAWAY, an umbelliferous biennial plant (Carum carui), with a tapering fleshy root, a furrowed stem, and white or pinkish flowers. It produces a well-known seed used in confectionery, and from which a carminative oil is extracted and a spirit cordial distilled. The plants found wild in America are the descendants of naturalized European plants,

that have escaped from cultivation. It is large¬ ly grown in England, on strong and rich clays, and is sometimes sown with beans, but more usually with coriander and teazel, or coriander alone. After the coriander, which is only a preparatory crop, has been removed the plants of the caraway are singled out and repeatedly hoed and cleaned. It is cut about the beginning of July, and produces on an average about 900 pounds per acre. It is a favorite crop with the Dutch. The volatile oils in caraway render it of much service in medicine. The action of these oils is to stimulate peristalsis and thus

overcome flatulency. They are further antisep¬ tic and check excessive intestinal putrefaction. They act also as mild local anaesthetics and are useful in nausea and vomiting.

CARAYON, ka -ra-yori, Auguste, French historian: b. Saumur, 31 March 1813; d. Poitiers, 15 May 1874. A distinguished Jesuit, he wrote (First Canadian Missions of the Jesuits > (1864) ; (Banishment of the Jesuits from Louisiana > (1865), and similar studies.

CARBAJAL, kar-ba-hal', Francisco,

Spanish soldier: b. Alavaro 1464; d. near Cuzco, 10 April 1548. He served in 'the army in Europe; went to Mexico in 1528; and when Pizarro appealed for help against the Inca up¬ rising he was one of the force sent by Cortez to Peru. He was marshal under Vaca de Cas¬ tro, in the battle of Chupas. He later took office under Gonzalo Pizarro, in the war against Diego Centeno and De la Gasca. At first he was triumphant over Centeno in the Collao, but at the battle of Sacsahuana, 8 April 1528, he was taken prisoner with Pizarro and executed. Because of his remarkable activity in this campaign, despite his years, he was known as the <(Demon of the Andes.® He was extremely cruel in his treatment of his enemies, but was not less noted for his humor which never failed him, not even at his own execution. Consult Markham, (A History of PeriP (Chicago 1892).

CARBALLO, kar-bal' yo, Spain, a town in the province of Coruna and near the coast of the northwestern extremity of the peninsula. It has warm mineral springs and baths. Pop.

13,513.

CARBAZOTIC ACID. See Picric Acid.

CARBERRY HILL, Scotland, a rising ground in Mid-Lothian, about seven miles southeast of Edinburgh, between Musselburgh and Ormiston, where Mary, Queen of Scots, surrendered herself to the confederate nobles of the kingdom, 15 June 1567, just before her confinement in Loch Leven Castle.

CARBIDE, in chemistry, a binary com¬ pound of carbon with a metallic element, or with certain of the non-metallic elements. Of the known carbides those of iron and calcium are most important. Carbide of iron occurs in steel, and is undoubtedly concerned in some manner,

with the hardening of that metal, al¬ though the authorities are not agreed as to the precise role that it plays. The best-known car¬ bide of iron is the one having the formula CFe3; but Campbell has shown (American Chemical Journal , XVIII, 836) that a series of iron carbides probably exists, having the gen¬ eral formula CnFes», and corresponding in a

certain sense to the hydrocarbon series CnH2n ; so that when any one of the carbides of iron is treated with an acid, the corresponding hydro¬ carbon is set free. Calcium carbide is formed by the action of carbon upon lime at the tem¬ perature of the electric furnace. It has the formula CaC2, and its commercial value de¬ pends mainly upon the fact that it is readily de¬ composed by water, with the copious liberation of acetylene gas (q.v.). Carbide of magnesium is not formed at the temperature of the electric furnace, probably because it is not stable at that temperature. It may be prepared, how¬ ever, by the action of calcium carbide upon magnesium fluoride, in accordance with the equation CaC2 + MgF2 = CaF2 + MgC2. Like calcium carbide it is decomposed by water with evolution of acetylene gas, the yield being 50 per cent greater, per pound of the carbide, in the case of magnesium carbide. It is not un¬ likely that magnesium carbide will one day replace calcium carbide for the production of acetylene gas, on account of the larger yield : but this substitution cannot be made on a com¬ mercial scale until some cheaper mode of manu¬ facture is found. The chemistry of the car¬ bides is still in its infancy, but within the past few years, and largely owing to the splendid work of Moissan, many new bodies belonging to this class have been discovered. Gold, bis¬ muth, lead and tin do not form carbides at the temperature of the electric furnace, nor do they dissolve carbon at that temperature. Platinum and iridium dissolve carbon freely, but deposit it again, upon cooling, in the form of graphite. Aluminum absorbs carbon freely, with the formation of AhCs, and similar re¬ sults are obtained with many other metals and metallic oxides. The carbides of chromium, molybdenum, titanium, tungsten and zirconium do nc>t decompose water. Those of calcium, strontium, barium and lithium decompose it with liberation of pure acetylene; but the car¬ bides of aluminum and beryllium yield pure methane, and carbide of manganese gives a mixture of equal parts of methane and hydro¬ gen. Other carbides decompose water with more complex results. Thus the carbides of the rare metals of the cerium group yield com¬ plicated mixtures of hydrogen, acetylene, methane and ethylene, and the carbide of ura¬ nium gives all these products (except, perhaps, acetylene), and, in addition, copious quantities of

various liquid and solid hydrocarbons. The carbides of sodium and potassium, which are best prepared by passing dry acetylene gas over the corresponding metals at a temperature of about 450° F., decompose water with liberation of acetylene. The carbides of titanium and of silicon are characterized by extreme hard¬ ness, and it is said that they will even cut the diamond with facility. Carbide of silicon is an exceedingly stable substance, and is now largely used under the trade name of ˆcarborundum,® as an abrasive material in the manufacture of grinding-wheels, whet-stones and polishing-cloth.

Moissan's researches with the electric fur¬ nace are reported chiefly in the Annales de Chimie et de Physique, and useful reviews of them have been printed at frequent intervals in Nature. Moissan claims to have been the discoverer of the crystalline carbide of calcium

that is now commercially familiar; but in the United States this honor is usually accorded to Mr. Willson, whose labors were certainly quite independent of those of Moissan. See Calcium Carbide; Carborundum; ElectroChemical Industries.

Richard Ferris.

CARBIDE FURNACES. See Electro¬ chemical Industries.

CARBOHYDRATE, in chemistry, a com¬ pound consisting of carbon, hydrogen and oxygen, and having the general formula CcnH2pOp. As will be seen, the number of car¬ bon atoms in a carbohydrate is always divisible by six, and the oxygen and hydrogen are present in the same proportion in which they occur in water. It is not implied, however, that the compound contains water as such, but only that the oxygen and hydrogen atoms are present in the proportion of two atoms of the latter to one of the former. It will also be ob¬ served that a carbohydrate and a hydrocarbon are two essentially different things, inasmuch as a carbohydrate contains oxygen, while a hydrocarbon is a compound containing no ele¬ ment but carbon and hydrogen.

The carbohvdrates constitute a large and very important class of substances, embracing the starches, sugars, glucoses and gums, as well as cellulose. Their chemical relations are in¬ tricate, and are far from being thoroughly understood. Several schemes have been pro¬ posed for their classification, but owing to the present imperfection of our knowledge none is entirely satisfactory. The classification pro¬ posed by O'Sullivan is convenient, however, and will be adopted here.

Class 1. — Saccharans: Amorphous substances, having the general formula nCeHioOs, soluble in water but insoluble in alcohol, and further characterized by the fact that* when they are treated with acids they yield substances of the type nCetUOe, directly, and without the formation of intermediate compounds. Dextran, laevulan, the amylans and the galactans are examples. (These bodies are gums).

Class 2. — Saccharens: Substances possessing a certain amount of structure, having the general formula nCsHioOs, insoluble in either water or alcohol, and transformed by the action of acids and certain ferments first into nCˆHˆOn, and finally, by the action of acids, into nC6Hi2C>6. Cellulose, starch, inulin and tunicin are examples; the first two falling under "amylose" in the less elaborate classification which divides the carbohy¬ drates merely into amylose, saccharose and glucose. Class 3. — Saccharins: Amorphous substances, having the general formula nCeHioOs, soluble in water, but insoluble in alcohol; converted by acids first into nCi2H220n, and finally into nCeHˆOe; and by certain ferments into T1C12H22O11. Glycogen, dextrin and malto-dextrin are examples.

Class 4. — Saccharoses (sugars).

Group (a). — Saccharons: Sweet, crystallizable bodies, soluble in water and in moderately strong alcohol, having the general formula nCi2H220n, and convert¬ ible by acids and sometimes by ferments into nCeHi206. Sucrose (cane sugar), lactose (milk sugar), maltose and raffinose are examples.

Group (b). — Glucoses; Substances crystallizing,

though not so readily as the members of the preced¬ ing group; having the general formula nCsHˆOe; soluble in both water and alcohol; and converted by the prolonged action of acids into substances that are no longer carbohydrates. Some of these, such as dextrose, laevulose and galactose, are fermentable by yeast; while others, such as sorbinose, are not fermentable.

Group (c). — Certain substances, such as inosite and scyllit, which probably belong in the aromatic series and bear no special resemblance to the other mem¬ bers of the carbohydrate family.

O'Sullivan has also a fifth class, including those substances which, though they may not be

carbohydrates in the strict sense, are neverthe¬ less closely allied to the carbohydrates and are easily converted into them when hydrolysed. In this class he places the glucosides and cer¬ tain of the gums, mucilages and pectins.

The carbohydrates are exceedingly import¬ ant elements in the world's food supply, and may indeed be said to be essential to the mainte¬ nance of life. They are practically all of vege¬ table origin, and are derived ultimately from certain simple fundamental substances that are formed in the green leaves of plants. Under the influence of sunlight the chlorophyll con¬ tained in the leaves is competent to split up the carbon dioxide of the air, retaining the carbon and setting the oxygen free. The carbon that is abstracted in this way is caused to combine with the water that the leaves contain, with the production of carbohydrates ; but the identity of the carbohydrate that is first formed in this way, and which serves as the starting-point for the others, is not yet established. According to the views of Sachs the <(first obvious product® is starch, the formation of which he explained by the equation :

Carbon Water Starch Free

Dioxide Oxygen

6C02 + 5H20 = CeHxoOs + 120 It appears more likely, however, that formic aldehyde, CH20, is the first product, as is indi¬ cated by the equation

H20 + C02 = CH20 + 20,

and that the subsequent products are built up by polymerization.

Carbohydrate metabolism is one of the most important pnysiological processes of the animal body. The carbohydrates are the chief source of energy and heat in the body. Most of the carbohydrates are converted into maltose by the digestive processes. This, during the proc¬ esses of absorption and assimilation, becomes dextrose, which

sugar is the only normal sugar of the circulating fluids and the tissues. The dextrose is taken up by the blood, conveyed to the liver by the portal vein and a part stored up in the liver cells. Some of the dextrose is also stored in muscle, and certain portions of it are utilized by the nucleoproteids of the body. The fate of the glycogen of the body is to be oxi¬ dized into carbon-dioxide and water. The steps of this process of oxidation are very much in¬ volved, but it seems certain that an oxidizing ferment, perhaps from the adrenal glands, act¬ ing in conjunction with the pancreas, is largely influential in the process. A failure to bring about sufficient oxidation of the sugar in the body causes the well-known symptom of gly¬ cosuria, one of the features of diabetes (q.v.).

Richard Ferris.

CARBOLIC ACID, a substance having a formula CJL.OH, possessing feebly acid properties, and occurring chiefly in that part of the distillate from coal-tar which passes over at temperatures between 310° and 440° F.,

known as the ((middle oils® or ˆcarbolic oils.® It is also found in small quantity in the later distillate, between 450° and 520°, known as ((creosote oil.® Chemically, carbolic acid has the structure of an alcohol (q.v.), and is an aromatic compound derived from benzene bv the substitution of the hydroxyl group, OH,

for one of the typical hydrogen atoms. It is also known as phenol, phenyl hydrate or phenyl alcohol.

Carbolic acid is obtained for commercial purposes almost exclusively from gas-tar. The carbolic oil is washed with a solution of caustic soda of a specific gravity 1.075 to 1.100. In quantity the solution is somewhat more than sufficient to extract all the carbolic acid, but not enough to take up all the cresylic acid also. The resulting phenate of soda solution is drawn off and is used to wash another por¬ tion of the oil, when the cresylate of soda is decomposed, and the cresylic

acid is replaced by carbolic acid. In this way a solution con¬ sisting almost wholly of carbolate of soda is obtained. This is purified by blowing steam through it, as long as it carries away any oils. The purified phenate of soda is then decom¬ posed by carbonic acid gas and a small quan¬ tity of sulphuric acid, and the carbolic acid set free floats on the surface and is skimmed off. The crude carbolic acid thus obtained contains about 15 per cent of water, and a little cresylic acid. It is purified by distillation and crystal¬ lization. A part remains liquid, and this is sold as liquid carbolic acid, or it is turned back to be worked up again. The drained crystals are treated with concentrated sulphuric acid and potassium bichromate, and redistilled. For medicinal purposes it is again distilled in glass vessels.

Carbolic acid, in the pure state, crystallizes in white, deliquescent needles, having a strong characteristic smell slightly suggestive of tar. The reddish color noted when it has been ex¬ posed to the air is attributed to minute traces of lead. It melts at 106° F., and boils, under ordinary atmospheric pressure, at about 360° F. Its specific gravity is about 1.07. It dissolves in alcohol, ether and many other organic liquids, but is only moderately soluble in water under ordinary atmospheric conditions. It readily absorbs a small quantity of water from the air, forming a hydrate which is fluid at temperatures above 63° F. If the liquid so formed is shaken with water, the greater part of the carbolic acid separates out upon stand¬ ing, and the vessel is found to contain an upper layer consisting of water in which a small amount of carbolic acid is dissolved, and a lower layer of carbolic acid in which a little water is dissolved. It does not exhibit very marked acid properties, but dissolves in the alkalis with the formation of salts called phenates. It does not have a strong affinity for the alkaline bases, however, and from a strong solution of sodium phenate (for example) it may be again separated in the form of an oily liquid by the addition of another acid ; the new acid appropriating the base to itself, and setting the carbolic acid free. A solution of carbolic acid, even when very weak, develops a red color when boiled with a solution of mercurous nitrate and nitrous acid. This reaction, which serves for the detection of carbolic acid, is said to be delicate enough to indicate one part of the acid in more than 100,000 parts of water. In the arts large quantities of carbolic acid are used in the manufacture of salicylic acid (q.v), and it is an important source of picric acid and coralline in the dye-making industry. It is consumed in immense quantities in making high

explosives after transformation into picric acid.

In medicine, carbolic acid has many uses. It is highly poisonous to living matter, and is used extensively to kill bacteria. In surgery jt it used to disinfect wounds, and as an antiseptic dressing in proportions of from %-2 parts of acid to 100 of water. It, or some of its derivatives or allies, is used to sterilize instru¬ ments and bed linen, the walls and floors of rooms (by washing) and dejecta. Internally, carbolic acid is used as a bactericide, limiting excessive intestinal putrefaction. It is also an anaesthetic, and is at times of service in irri¬ tability of the stomach. When used in too concentrated a solution it is an active caustic, causing a white, painless burn. Alcohol is an excellent antidote. Taken internally in pure form in doses over two to three drops it causes poisoning with a characteristic series of symp¬ toms. There is burning in the mouth, fauces, oesophagus and stomach. The whitish scars of the lips and mouth are characteristic. There is great pain, with vomiting of large quantities of mucus, clamminess of the skin and restricted respiration. There is usually ringing in the ears, headache and vertigo ; the urine may be suppressed, reddish or greenish ; and death re¬ sults with small, rapid pulse, collapse, and, may be, convulsions. Similar symptoms may de¬ velop slowly in sub-acute forms of poisoning. The urinary symptoms usually lead to the diagnosis. The treatment of the acute form of poisoning is the free use of gastric lavage, in¬ gestion of alcohol usually in the form of whisky slightly diluted and the use of lime water, and solutions of sulphate of soda or sulphate of magnesia. Symptomatic treatment and careful nursing are necessary for other symptoms.

Richard Ferris.

CARBOLINEUM, derived from the Latin word carbo, coal, oleum , oil, to form a trade name for a new commodity, is a distillation from coal-tar or bituminous shale, con¬ taining phenoloid hydrocarbons of a highly pre¬ servative nature. Extensive deposits from which carbolinuem is obtained are found in the grape-growing countries bordering on the Rhine, various other parts of Europe and some places in America. The liquid in its commer¬ cial form is of a nut-brown color, but it is a stain rather than a paint. However, it can be washed off a person's hands with cold water without leaving any stain. Tests made with it prove that it has many times greater penetrating power than linseed-oil. It never crystallizes. When it has been painted upon wood and has become apparently thoroughly dry, its action does not cease. If the wood is then painted with a heavy coat of white-lead mixed with linseed-oil, the carbolineum will make its appearance through the paint in a short time. Consequently, any wood that is first treated with carbolineum cannot be painted v/ithout previous sizing. Owing to carbolineum being composed of heavy hydrocarbons, it is

only slightly inflammable ; but when ignited by holding a match in contact with the carbo¬ lineum for a short time, it burns with a bright red light, giving off considerable carbon in the form of a dense smoke. Large quantities of carbolineum are made by subjecting crude

anthracene (green oils) to heavy pressure, and adding zinc chloride and chlorine. There are also on the market imitations of carbolineum, made from the heavy oils of petroleum. These are deficient in the specific preservative qual¬ ities which have given the original carbolineum its reputation. As made from coal-tar, carbo¬ lineum is a substance with distinctive physical and chemical qualities. It distils between the temperatures of 570° and 735° F., follow¬ ing the creosote oils. Unlike the latter it has no destructive effect upon wood fibre, nor does it have to be applied under heat (350°) and pressure (125 pounds) as with creosote oils, cooking the wood and deadening its fibre. Once the outer layer of the wood is dry the carbo¬ lineum enters, leaving the pores open so that interior moisture escapes as the preservative makes its way in. The creosote oils close the pores and confine the interior moisture.

Carbolineum first came into use about the year 1876. The grape-growers of the Rhine valley were much annoyed with insects and sus¬ tained considerable loss by the rotting of the posts and poles used in their vineyards. It is said that Richard Avenarius, who was an officer in the German army, first suggested the use of carbolineum as a wood preservative.

Carbolineum is usually shipped in barrels and then put in small packages to accommodate the retail trade. It is retailed at about 75 cents per gallon. The most extensive users are the tanners, railroad companies, maltsters and farmers. Railroad ties and posts are dipped in it in an open tank before setting.

Some of the railroad companies after due experiment have made extensive use of it, even “painting® parts of the woodwork of their freight cars with it. It is used in a modified form by dyers. Farmers use

it for painting hog-pens, chicken-coops and barns for the pur¬ pose of destroying lice and other vermin. The carbolineum may be applied directly to the skin of animals, without injury.

Considerable litigation has grown out of the promiscuous use of the word “carbolineum® by manufacturers. Richard Avenarius did not obtain a trade-mark on the word “carbolineum® when he first used it, and never obtained a patent on carbolineum, and many others began its manufacture under that com¬ mercial name. Eventually he filed the word “carbolineum® as a trade-mark in Austria, but subsequently his trade-mark was revoked and protection refused on the ground of the general use of the word. Also, he registered the word “carbolineum® as a trade-mark in the Patent Office of the United States, as No. 14,048, dated 8 Feb. 1887. His right to such use was questioned and considerable litigation en¬ sued. The matter had not been settled definitely when, in 1917, American manufacturers were permitted to use German patents and trade¬ marks under license.

Richard Ferris.

CARBON, a non-metallic element, exist¬ ing in nature in large quantities, both in the free and combined states. It exhibits marked allotropy, at least three distinctly different forms, of it being known. These are (1) amorphous carbon; (2) graphite; and (3) diamond. Amorphous carbon is formed when wood or coal or almost any vegetable matter is

heated strongly, out of contact with the air, and is familiar to everybody as charcoal, coke and lampblack. Graphite (q.v.) occurs native, and may also be artificially prepared in various ways. Diamond »(q.v.), which is crystallized carbon, also occurs native in certain regions, and pure specimens that are devoid of color, or which have certain special tints, are highly esteemed as gems.

Carbon has the chemical symbol C, and an atomic weight of 12.005 if 0 = 16, and 11.91 if H = l. The specific gravity of diamond is 3.51, that of graphite is from 2.11 to 2.26 and that of hard gas-coke is about 2.35. The linear coefficient of expansion of diamond (Fahren¬ heit scale) is 0.00000066 at ordinary tem¬ peratures, and that of graphite is 0.0000044. Graphite has an electrical conductivity of about one-twelfth of that of mercury, and hard gas-coke, about one one-hundredth. Diamond is practically a non-conductor. The specific heats of diamond and graphite are quite different at ordinary temperatures.

Thus at 50° F. dia¬ mond has a specific heat of 0.113, graphite 0.160 and wood charcoal about 0.165. These values increase as the temperature rises, and at about 1100° F. all three varieties have a com¬ mon specific heat of about 0.44.

Carbon is infusible, and insoluble in any known liquid at ordinary temperatures. It dis¬ solves to a limited extent in melted cast iron, and in melted platinum it dissolves freely, separating out again in the form of graphite upon cooling. It is unaltered by the action of acids, except when some powerful oxidizing agent like chlorate of potassium or bichromate of potassium is also present. Chemically it is tetravalent in nearly all of its compounds. It combines with oxygen in three different pro¬ portions, with the formation of a monoxide CO, a dioxide C02 and a suboxide C3O2. It also forms, with hydrogen, a great number of compounds known as hydrocarbons (q.v.) ; and it combines with many of the metals to form carbides (q.v.). With hydrogen, oxygen, nitro¬ gen and small quantities of other elements, it constitutes the entire substance of animals and plants ; and the coal beds upon which our modern civilization is founded are composed of vegetable remains from which the elements other than carbon have been mostly expelled by the combined action of heat and pressure. See Aromatic Compounds ; Carbon Com¬ pounds ; Charcoal; Coal; ElectroChemical Industries; Diamond; Fatty Compounds; Graphite.

Richard Ferris.

CARBON BISULPHIDE. See Electro¬ chemical Industries.

CARBON BLACK, the trade term given to black made from gas.* It was originally called hydrocarbon gas black, and a black of a similar nature to that now made was manufac¬ tured both in this country and in Europe from artificial gas. The industry did not, however, assume any importance before 1872, when the first patent was obtained for producing this black from natural gas. Since that date, many patents have been taken out in connec¬ tion with the manufacture of this black from natural gas, and at the present time there are 10 distinct processes in use.

The abundance of natural gas in the United States, and the automatic method used in mak¬ ing the black, have enabled manufacturers in this country to produce it at so much lower prices that little of this blackˆs now made from artificial gas, and large quantities of the prod¬ uct are exported annually. The total produc¬ tion of carbon black in this country in 1914 was valued at $900,630, of which about one-seventh was exported. See Blacks.

CARBON COMPOUNDS, in chemistry, those compounds which contain the element carbon. These are of two classes, the organic and the inorganic, the former being by far the larger and more important ; so much so that the chemistry of the carbon compounds is practically synonymous with ((organic chem¬ istry.® Until within the past half-century it was thought by many authorities that the com¬ pounds that occur in animals and plants are essentially different in nature from those that are produced in the laboratory, and that they cannot be obtained without the action of the <(vital principle.® This idea received its first blow in 1828, when Wohler prepared urea from substances that had been previously considered to be inorganic ; yet as late as 1849 the great chemist, Berzelius, defined organic chemistry as <(the chemistry of compounds formed under the influence of life.® A vast number of sub¬ stances that were formerly classed as organic have now been prepared in the laboratory, and the old classification of chemistry into organic and inorganic branches has broken down, the organic division being now more correctly called the ((chemistry of carbon compounds.®

The organic carbon compounds form a group of great complexity, and are apparently unlimited in number. The reasons for this are that carbon is quadrivalent; that it forms multitudes of compounds with hydrogen alone, in many of which more or less of the hydrogen can be replaced by other elements, with the formation of new and altogether different sub¬ stances ; that its chemical bonds are apparently powerful ; and that it unites with elements of the most widely different nature.

In a general way, the better-known carbon compounds are mostly divided into two great classes, according to the type of the ((graphical® or ((structural® formula that must be used in order adequately to represent their chemical re¬ lations. The first class includes all those bodies whose structural formulae are distinguished by the fact that the atoms (or radicals) that are present form <(open® chains, which do not any¬ where return into one another. The

hydrocar¬ bon ˆpropane,® which has the structural formula

H

i

H

1

H

I

• 1

H — C —

l

C —

l

C — H,

H

H

H

illustration of

this

class. The

chain® compounds are called fatty compounds, and are treated under that heading. The name was originally given because many of the sub¬ stances that are included in the class have long been known in connection with fats and allied bodies ; but it would be more logical

to call them ((methane derivatives,® since they may be

considered to be obtainable from the hydrocar¬ bon methane, CFB, by a process of substitution.

The second great class of carbon com¬ pounds is distin¬ guished by the fact that the structural formulae that are re¬ quired in order to ex¬ hibit the chemical properties of its mem¬ bers return into them¬ selves, so as to form ((closed® chains or rings, which (at least in the fundamental forms) contain six carbon atoms. Ben¬ zene is a familiar example. From the fact that many of the first known representatives were balsams, oils and resins, these substances are known collectively as aromatic compounds, and are described under that heading. A better name would be (<benzene derivatives,® since all the members of the class are derivable from benzene by substitution. See Aromatic Com¬ pounds.

In addition to the aromatic and fatty com¬ pounds, others are known which do not prop¬ erly come under either heading. Thus the structural formula of furfuran contains a closed ring, formed by the union of four atoms of carbon and one of oxygen. Closed rings, consisting of three, four and five atoms of carbon, are also known. The pronounced analogies and affinities that exist among the members of the aromatic and fatty groups, respectively, have forced those two groups upon the attention of chemists. Those com¬ pounds of carbon which are not strictly in¬ cluded within either have not yet been classified upon a similarly broad basis.

The principal phenomena of the carbon compounds are given under special headings. In addition to those already given, see, par¬ ticularly, Isomerism ; and Radical. For an excellent presentation of the whole subject, consult Hjelt, Principles of General Organic Chemistry.)

Among the inorganic carbon compounds the more important are dealt with under sepa¬ rate headings : see Carbonic Oxide, Carbon Dioxide and Carbon Disulphide. With few exceptions the others are interesting chiefly as chemical substances, with no distinctive use in the arts. The most useful of all is

Carbon tetrachloride (CCh), at first pro¬ duced by exposure of chlorine and chloroform in mixture to the action of sunlight, it is now generally prepared by the chlorination of carbon disulphide in the catalytic presence of powdered aluminum chloride. It is a colorless

liquid, with a pungent aromatic odor, boiling at 170° F. It is soluble in alcohol and ether, and is itself a solvent of fatty organic substances. Through this property it is of considerable importance in manufactures, replacing carbon disulphide, as its vapor is not inflammable. In its effects on the human system it closely resembles chloroform.

Carbon trichloride (C2C16) is produced by exposing ethylene chloride (or other deriva¬ tives of ethyl and ethylene) to the action of chlorine in sunshine; or by heating propyl

H

C

CH

CH

H

chloride with iodine trichloride. It is colorless and nearly tasteless, and has an aromatic odor resembling camphor. It is insoluble in water, but dissolves in all oils and in ether and alcohol, from which it crystallizes in right rhombic prisms. It vaporizes at ordinary tem¬ peratures.

Carbon dichloride (C2CI4) is prepared by adding carbon trichloride in small portions to an alcoholic solution of hydrated potassium sulphide

as long as sulphureted hydrogen is evolved. The liquid is then distilled, and the distillate diluted with water, upon which the carbon dichloride separates. It is a stable liquid at zero F. and boils at 240°. It dis¬ solves in alcohol, ether and the oils, but not in water, acids or alkalis. It absorbs bromine, in direct sunshine, forming carbon cliloro-bromide.

Carbon oxychloride (COCk), a colorless liquid obtained when a mixture of carbon monoxide and chlorine is exposed to sunshine ; and also by heating a mixture of chloroform, potassium dichromate and sulphuric acid. Its boiling point is 47° F.

Carbon sub oxide (C3O2), or carbon car¬ bonyl, discovered by Diels and Wolf in 1906, is formed by treating a solution of dibrom-malonyl chloride in ether with zinc shavings. The pure suboxide is a colorless liquid with a pungent odor resembling mustard oil, and is quite poisonous. It boils at 44° and is solid at — 224°. At low temperatures carbon suboxide is quite stable, but between 30° and 60° if even a trace of impurity be present, it polymerizes into a dark red solid. It is inflammable, burn¬ ing with a bright blue flame and the emission of much smoke.

Carbon nitride (C2N2), see Cyanogen.

Carbon subnitride (C4N2), at temperatures below 70° a solid substance crystallizing in fine white needles. Above 70° it is a liquid with an odor resembling cyanogen, boiling at 170°, and breaking into flame if heated to 265°.

Carbon oxysulphide (COS), a colorless gas soluble in water, with .an odor resembling sul-phuretcd hydrogen, and highly suffocative. It has the notable specific gravity of 2.10, and may easily be poured from one vessel into another. It is inflammable, passing when burn¬ ing into carbon dioxide and sulphur dioxide. At zero F., and under a pressure of 1 2f4 atmo¬ spheres it becomes a colorless and highly re¬ fractive liquid which dissolves sulphur, and mixes with either ether or alcohol, but not with water.

Several compounds of carbon and bromine are important to the student of chemistry. They are carbon tetrabromide (CBn) ; carbon tribromide, or he xabroniide (C2Brti) ; carbon dibromide (C2Br4) ; and carbon bromide (C :CBr2) . The last named is spontaneously inflammable in contact with atmospheric air, and highly explosive. From these carbon com¬ pounds with bromine springs an extended list of derivatives.

Richard Ferris.

CARBON DIOXIDE, CARBONIC ACID GAS, or CARBONIC ANHYDRIDE,

CO2, is formed whenever carbon is burned in the presence of excess of oxygen or air. It is a colorless, odorless gas about 1.53 times as heavy as air, bulk for bulk, and soluble to a considerable extent in cold water, especially

when subjected to pressure. Its solution pos¬ sesses feebly acid properties, and has a pecul¬ iarly pungent taste, on account of which the aqueous solution of the acid is greatly used as a constituent of various beverages. The effervescence accompanying the opening of a bottle of beer, soda-water or champagne is due to the escape of the carbon dioxide that was previously held in solution under pressure. Carbon dioxide occurs in great abundance in nature, both free and in combination with vari¬ ous elements in the form of carbonates. Car¬ bonate of lime, CaC03, is one of the most com¬ mon carbonates. It is formed when the gas is allowed to bubble up through a solution of lime water and exists in nature in vast masses as limestone and marble. (Other carbonates are described under the metals that constitute their bases). Carbon dioxide is a constant con¬ stituent of the atmosphere (see Air), occur¬ ring even at the tops of mountains and in the air collected by balloons at great height. It is generated by the combustion of fuel, by respira¬ tion, by fermentation and by the decay of ani¬ mal and vegetable matter. In some localities, too, immense quantities of the gas are emitted from the ground, or from mineral springs and wells, as at Saratoga Springs in the United States, and in the Grotto del Cane, the Cave of Montjoly in Auvergne, in the valley of Wehr, in the Eifel and at many other places in Europe. It is being simultaneously abstracted from the air by plants, which in thei sunlight decompose the gas, nxing the carbon that it contains, and setting the oxygen free. Carbon dioxide has but feeble affinity for the bases with which it combines, and is readily displaced by almost any other acid. In preparing the gas for experimental purposes the usual method is to add a dilute mineral acid to pulverized mar¬ ble or other carbonate, the carbon dioxide then being liberated continuously and in large quan¬ tities. On a large scale carbon dioxide is made by heating limestone to redness in closed re¬ torts, at the bottom of which superheated steam is blown in. This passes up through the heated limestone carrying with it the liberated car¬ bon dioxide, and through outlets at the top into coolers and compressors. Besides its

large use in the manufacture of aerated drinks, carbon dioxide is used in sugar factories to clarify the cane juice after treatment with lime. It is also used to preserve wines from deterioration by certain molds, and other organisms which set up acetic fermentation. Wine thus treated is distinctly improved in quality. Carbon dioxide is the active principle in baking pow¬ ders, being liberated from the soda carbonate by the acid constituent of the powder, and in its efforts to escape from the dough produces the lightening effect.

The critical temperature of carbon dioxide is about 88° F., and at any temperature lower than this it can be reduced to a liquid by the application of pressure. Liquid carbon dioxide is colorless. It will not mix with water, but dissolves readily in alcohol, ether and volatile oils. When the pressure is released, part of the liquid vaporizes rapidly, and the remainder solidifies through the production of intense cold. Solid carbon dioxide is a white mass resembling snow. It remains for some time open to the air without melting. Its in¬ terior temperature, however, as shown by a

thermometer sunk into the mass, is — 110° F. Its melting point is — 70°.

Poisoning by this gas frequently results in closed rooms crowded with people. The sjˆmp-toms may be very slight, consisting of a mild indisposition, or they may be severe — head¬ ache, nausea, vomiting, *etc.* In poisoning in the severer grades there is cyanosis, coma and unconsciousness. Carbon dioxide is not in it¬ self a fatal poison; it becomes so, however, in the absence of a sufficient supply of oxygen, death being produced by simple asphyxiation.

Richard Ferris.

CARBON DISULPHIDE, or SULPHO-CARBONIC ACID, CS2, a liquid formed when the vapor of sulphur is passed over red-hot charcoal and the resulting gases cooled in a condenser. Under normal conditions it is a very volatile, inflammable liquid, with a spe¬ cific gravity of 1.29,

and boiling at 115° F. It burns with a blue flame, giving off sulphurous and carbonic acid gases. Burned in a Bunsen burner, with proper precautions against ex¬ plosion, it produces a flame of actinic power exceeding that of burning magnesium. A special light for photographic purposes is pro¬ duced by burning a mixture of vapor of carbon disulphide and nitric oxide, which yields a bluish flame rich in actinic rays. Mixed with three parts of oxygen, or an equivalent (in oxygen) of atmospheric air, the vapor forms a dangerously explosive mixture. Practically the whole commercial supply of carbon disul¬ phide is made from coke and sulphur in the electric furnace. (See ElectroChemical In¬ dustries). The commercial disulphide has an exceedingly disagreeable smell, but this is due to the presence of impurities. The pure liquid, produced by simple distillation, has a pleasant, ethereal smell. Carbon disulphide (or bisul¬ phide) dissolves sparingly in water, in the pro¬ portion of 1 part in 1,000, forming a valuable disinfectant. It mixes freely, however, with alcohol, ether, benzene and the fixed oils in almost every proportion. It dissolves sulphur, phosphorus, caoutchouc and many other or¬ ganic bodies that are almost insoluble in other menstrua, and it is to this property that it owes its commercial value. It is used in largest quantity in the rubber goods manufacture, not only in the preparation of a cement, but also in the making of rubberized cloth by coating or infiltrating with a thin solution of rubber. It is also used to dissolve the natural grease out of wool, and fatty oils out of seeds and oilpress residues, or oilcake ; and in the re¬ covery of oils from all kinds of waste material. In its purest refined state the disulphide is employed to extract the most delicate essential oils from aromatic seeds and spices, and per¬ fumes from flowers. In quite another direction it is efficient in preserving furs and woolens from moths, as an insecticide upon infested plants and in the burrows of such animal pests as moles, gophers, woodchucks, etc., to destroy them. As a chemist's aid in quantita¬ tive analysis it is indispensable. It has a wide chemical interest as the most energetic of sul¬ phurizing agents, aiding in the production of many sulphides not obtainable otherwise. Be¬ cause of its high degree of volatility it is used in the production of low temperatures by its own evaporation. Under the air-pump a cold of —76° F. has been attained by its use.

Poisoning by carbon disulphide is becoming very prevalent since the use of rubber goods has become so extensive. The symptoms of acute poisoning are due to a poisoning of the blood and a central paralysing action on the nervous system. The blood action is that of a breaking up of the red blood cells, haemolysis. This results in cyanosis, pains,

headache, ver¬ tigo, nausea, vomiting, weakness, unconscious¬ ness, coma and death. Such acute cases are rare, the poisoning developing as a rule much less rapidly. In workers in rubber factories, in which there is much vapor of CS2, there develop disturbances of temper, loss of mem¬ ory, pressure feelings on the head, heat, and the feeling as if the blood would burst through the skull, with headache. There may also be symptoms of irritation of the bronchi, cough¬ ing and roughness of the voice, *etc.* Treat¬ ment is fresh air and symptomatic.

Richard Ferris.

CARBON MONOXIDE, or CARBONIC OXIDE, CO, is produced in addition to the dioxide, when carbon is burned with a limited supply of air or oxygen. It is also generated by passing carbon dioxide through a red-hot bed of carbon, in accordance with the equation C02 + C = 2C0. For experimental purposes the gas may be generated by decomposing oxalic acid by heating it with strong sulphuric acid, and passing the gases that are evolved through a solution of caustic soda or lime to absorb the carbon dioxide that is present. Another method is by passing electric sparks through carbon dioxide. It is evolved in large quantities in the manufacture of carbides, and is collected as a valuable by-product useful in the making of special steels. Carbon mon¬ oxide is a colorless gas with a density about 0.97 times that of air. It burns with a lam¬ bent blue flame that is often seen in coal fires that have been freshly supplied with fuel. Carbon monoxide is highly poisonous, produc¬ ing first giddiness and then asphyxiation, as small a quantity as one-half of 1 per cent in the air breathed being fatal, and even as small a percentage as one-fifth of 1 per cent result¬ ing in death if breathed for any length of time. It combines with the haemoglobin of the blood, and destroys the efficiency of that fluid as an oxygen-carrying medium. Carbon monoxide poisoning is often followed by seriohs degen¬ erative changes in the brain. This gas is often evolved by self-feeding stoves with deficient draft.

CARBON OXYCHLORIDE. See

Phosgene.

CARBONADO, a massive, black or dark-gray variety of diamond, also called ((black diamond.® Though possessing the adamantine or resinous lustre of the crystallized variety, it is opaque and, therefore, of no value as a gem. It is the hardest substance known and this fact makes it the most desirable for use in diamond drills; it therefore sells for as high a price per carat as one carat rough gem dia¬ monds _

(q.v.) . Being without cleavage it is less brittle than the crystals, and owing to its somewhat porous structure, its specific gravity is less, 3.15 to 3.29. The commercial supply comes exclusively from the province of Bahia, Brazil, where it occurs in angular fragments which occasionally show a rough cubic outline.

FOSSILS OF THE CARBONIFEROUS, I

1 Actinocrinus pyriformis

2 Platycrinus trigintadactylus, a single arm with tendrils

3 Plaeechinus elegans

4 Chonetes Dalmanni

5 Goniates Jossae

6 Phillipsia

7 Eophrynus Prestwichi

8 Cyclophthalamus Bucklandi; beside it is the wing—

sheath of a beetle

9 Lepidodendron dichotomum, showing the stig¬

mata of the leaves

10 Aletopteris Serli

11 Sphenopteris obtusiloba

FOSSILS OF THE CARBONIFEROUS

The Tooth-Fern — 0 < The Scale Tree — Le] Cordaites Borassifolia Pecopteris Cyathea

1H

ip/;

Ip

511

5 Calamites

6 Sigillaria

7 Rhizome of Sigillaria in Water o r oliation of Aunularia

CARBONARI, kar-bo-na’re (colliers, or more strictly, charcoal-burners), the name of a large political secret society in Italy. Accord¬ ing to Botta’s (Storia d’Italia) the Republicans fled, under the reign of Joachim (Murat), to the recesses of the Abruzzi, inspired with an equal hatred of the French and of Ferdinand. They formed a secret confederacy, and called themselves carbonari. Their chief, Capobianco, possessed great talents as an orator. Their war-cry was <(Revenge for the lamb mangled by the wolf P When Murat ascended the throne of Naples he employed Maghella, a Genoese, in the Department of Police, and after¬ ward as minister. All his efforts were directed to the union and independence of Italy, and for this purpose he made use of the Society of the Carbonari. The ritual of the Carbonari was taken from the trade of the charcoal burner. Clearing the wood of wolves (opposition to tyranny) was the symbolic expression of their aim. By this they are said to have meant at first only deliverance from foreign dominion; but in later times democratic and antimon¬ archical principles sprang up. They called one another good cousins. No general union of the order under a common head seems to have been effected. The separate societies in the small towns entered into a connection with each other, but this union extended no farther than the province. The place of assembly was called the hut (barraca) ; the surrounding neighbor¬ hood was called the wood ; the meeting itself was distinguished as the sale (vendita). The confederation of all the huts of the province was called the republic, generally bearing the ancient name of the province. The chief huts (alta barraca) at Naples and at Salerno en¬ deavored to effect a general union of the order, at least for the kingdom ; but the attempt ap¬ pears to have been unsuccessful. The order, soon after its foundation, contained from 24,- 000 to 30,000 members, and increased so rapidly that it spread through all Italy. In 1820, in the

month of March alone, about 650,000 new mem¬ bers are said to have been admitted ; whole cities joined the Society. The military, in particular, seem to have thronged for admis¬ sion. The religious character of the order ap¬ pears from its statutes : (<Every Carbonaro has the natural and inalienable right to worship the Almighty according to the dictates of his con-scienceA After the suppression of the Neapoli¬ tan and Piedmontese revolution in 1821, the Carbonari throughout Italy were declared guilty of high treason, and punished by the laws. Meantime societies of a similar kind hˆd been formed in France, with which the Italian Car¬ bonari amalgamated, and Paris became the headquarters of Carbonarism. The organiza¬ tion took on more of a French character, and gradually alienated the sympathies of the Italian members, a number of whom dissolved connection with it, in order to form the party of Young Italy, under Mazzini. Consult (Memoirs of the Secret Societies of the South of Italy, particularly the Carbonari > (London 1821); Cantu, (I1 Conciliatore e i CarbonarP (Milan 1878); Johnston, R. M„ 'Napoleonic Empire in Southern Italy, and the Rise of the Secret Societies) (London 1904) ; Bandini, (Giornali e scritti politici clandestini della Carbonaria Romagnola, 1819—21 * (Rome

1908).

CARBONATES, salts of carbonic acid (HvC03). The carbonates constitute a very im¬ portant group of minerals. Among econom¬ ically valuable minerals of this group are the iron carbonate, siderite (FeCCh), the zinc car¬ bonate, smithsonite (ZnC03), the basic copper carbonates, azurite (2CuC03.Cu(OH)2) and malachite (CuC03.Cu(0H)2), and the lead car¬ bonate, cerussite (PbC03). Among the import¬ ant rock formers are calcium carbonate, calcite (CaC03), and the double carbonate of lime and magnesia, dolomite (Ca,Mg)COs. Many other carbonates are known. See Min¬ eralogy; Carbon Dioxide; Calcite, *etc.*

CARBONDALE, Ill., city, Jackson County, on the Illinois Central Railroad, 95 miles south¬ east of Saint Louis, Mo. In a farming and coal-mining region, it ships fruit, flour, live stock and coal, and has numerous industrial plants manufacturing railroad ties, bottles, bricks, flour, *etc.* Pop. (1920) 6,267.

CARBONDALE, Pa., city of Lacka¬ wanna County, situated on the Lackawanna River, 110 miles north-northwest of Philadel¬ phia, and on the Erie, the Delaware & Hudson and the New York, Ontario and Western railroads. It is the centre of an important anthracite coal-field, and the principal industry is mining. A variety of other industries are represented, including foundries and machine shops, car shops, metal working plants, glass works and textile mills. The United States census of manufactures for 1914 recorded 43 industrial establishments of factory grade, em¬ ploying 2,090 persons, of whom 1,897 were wage earners, receiving annually $945,000 in wages. The capital invested aggregated $2,896,000, and the year's output was valued at $3,170,000; of this, $1,639,000 was the value added by manu¬ facture. As it is in a mountain region with fine scenery, it is also a summer resort. The city has a public library, emergency hospital, hos¬ pital for the criminal insane, fine Federal build¬ ing, and a park in the heart of the city, contain¬ ing a soldiers' monument. Settled in 1824, it was incorporated in 1851, and has adopted the commission form of government. Pop. (1920)

18,640.

CARBONEAR, kar'bon-er, Newfound¬ land, a port of entry on the eastern side of the peninsula separating Trinity Bay from Concep¬ tion Bay, 25 miles in a northwesterly direction from Saint John's. Pop. 3,540.

CARBONIC ACID GAS. See Carbon Dioxide; Gases, Compressed.

CARBONIC ANHYDRIDE. See Car¬ bon Dioxide.

CARBONIC OXIDE. See Carbon Mon¬ oxide.

CARBONIFEROUS, the name applied to the last period of the Paleozoic era, and to the system of rocks formed during that ' period. The Carboniferous has been variously subdi¬ vided, the following being the current usage of the United States Geological Survey :

Permian.

Pennsylvanian (coal measures, Upper Car¬ boniferous).

Mississippian (sub-Carboniferous or Lower Carboniferous).

Many geologists divide the Carboniferous into Lower and Upper, but

give the Permian

the rank of a period. Mississippian and Penn¬ sylvanian are terms derived geographically in the United States, and are not used abroad. A few American geologists consider that they too are of the rank of periods, and would discard the old term Carboniferous altogether. Permian is derived from the province of Perm, in Russia, and Carboniferous from carbon (coal) in the rocks of the system.

Palaeogeography of the Carboniferous in North America. — ■ The Mississippian opened with shallow epicontinental seas widespread over central United States, as at the close of the Devonian (q.v.). In the east the Pocono and Mauch Chunk formations are largely terrestrial, being a great series of delta and coastal plain deposits built up at the west edge of a land mass, Old Appalachia, which was persistent through several of the preceding periods, on the site of the present Piedmont, Coastal Plain, and farther east into the present Atlantic Ocean. In the seas of the great interior the sediments of the epoch are largely limestone. At the close of the Mississippian there was widespread emer¬ gence east of the Rocky Mountains, with fold¬ ing in the Ouachitas and also in Europe. This emergence was accompanied by widespread erosion, and the Pennsylvanian rocks rest un-conformably on the Mississippian and older beds. Throughout Pennsylvanian times most of eastern United States was low and swampy with luxuriant vegetation, which accumulated and was buried to form coal. Occasional submer¬ gences occurred and marine beds are inter¬ calated with coal seams. The marine beds are more abundant in central than in eastern United States ; and in the Rocky Mountains and Great Basin the sea persisted practically through the epoch, and the rocks are almost wholly marine. During the Permian the region east of the Mississippi River was land, and humid during the early part of the epoch, as shown by coal beds. West of the Mississippi River, the land gradually emerged during late Pennsylvanian and early Permian and the climate grew arid. Great salt lakes were extensive and beds of salt and gypsum are abundant. At the

same time there were similar deserts in Germany, in which the great German salt deposits were formed. Strangely enough, other continents, even within the torrid zone, were undergoing glaciation at the same time, particularly Africa, Australia and India. These extreme conditions, together with the great period of folding that formed the Appalachian Mountains, wrought a pro¬ found change in types of plants and animals, and brought to a close not only the Carbon¬ iferous Period, but the Paleozoic Era as well.

As the rocks laid down in Carboniferous time furnish by far the greater part of the world's supply of coal, they have been very carefully studied in many different places and accurately mapped, so that more is known of the Carboniferous rocks than those of any other Paleozoic system.

The Lower Carboniferous or Mississippian series, in Nova Scotia and New Brunswick, is made up of thick beds of sandstone and lime¬ stone overlaid by limestones containing masses of gypsum. The total thickness of the series is 6,000 feet. In Pennsylvania the Lower Car¬ boniferous series has a total maximum thick¬ ness of 4,000 feet of sandstone and shale. Farther west the Lower Carboniferous is rep¬

resented largely by limestones with a maximum thickness of over 1,200 feet in southern Illinois. In southwestern Virginia are limestones, sand¬ stones and shales of Lower Carboniferous Age, 2,000 feet thick, and containing a few workable beds of coal. In the Rocky Mountains the Lower Carboniferous rocks are, with few ex¬ ceptions, limestones.

The rocks of the Upper Carboniferous or Pennsylvanian include the great coal fields of eastern North America. . (For the origin of coal fields, see Coal). They are sandstones or conglomerates, grits, shales, clays, limestones and seams of coal. The total thickness of the Nova Scotia coal measures is 7,000 feet, and 76 distinct seams of coal are known. In Penn¬ sylvania the coal measures have a total thick¬ ness of 4,000 feet. In Michigan the coal meas¬ ures are about 300 feet thick; in the eastern interior (Illinois-Indiana) field 600 to 1,000 feet, and in the western interior field the thick¬ ness varies widely, reaching a maximum in Arkansas.

The Upper Carboniferous rocks cover wide areas in Utah, Colorado and Arizona ; they also occur in the Black Hills in South Dakota, and in California, and British Columbia. They are generally limestones or

sandstones and contain no coal beds. The distinction between Upper and Lower Carboniferous is not as sharp as in the Mississippi Valley. The total thickness of the whole Carboniferous series in Nevada and Utah is about 13,000 feet.

Carboniferous in other Continents. — In western Europe the Lower Carboniferous limestones reach from Ireland to Central Ger¬ many, with a maximum thickness in England of 6,000 feet, and are overlaid by coal measures. In Asia the Chinese coal measures are of Upper Carboniferous Age, and are underlaid by Lower Carboniferous limestone. In South America the Lower Carboniferous is mostly made up of sandstones, and the upper of limestones, with very few coal seams.

Life of the Carboniferous. — The plant—

life of the Carboniferous Period showed some advances from the Devonian. The ferns were most abundant, some being like tall trees, others as small as the maidenhair fern of to-day. The most conspicuous growths in the Carboniferous forests were the Lycopods or club-mosses, now represented by insignificant forms, but then growing sometimes 75 feet or more high, with trunks three feet in diameter, and spreading branches (Lepidodendron) . Other Lycopods (Sigillana) had short, thick trunks with few if any branches. Still another group, the horse¬ tail ruslies, were of far greater importance in Carboniferous times than now. Of these the calamitcs, with their tall, slender stems, must have been one of the commonest plant forms of the Carboniferous forest. No plant with con¬ spicuous flowers existed.

Of animal life, corals were abundant; and the Foraminifera, especially the genus Fusn-lina, became of importance. The extinct blas-toids were abundant, and the Carboniferous is the period in which the crinoids, or sea-lilies, reached their highest development. Sea-urchins were more plentiful than in the De¬ vonian, but the trilobites were slowly dying out. Scorpions were fairly abundant, and the first true spiders appeared. The brachiopods were less abundant than in the Devonian. Bivalve

mollusks were numerous, among them being the first land shell. Of the fishes, the sharks were remarkably developed. Amphibians, which probably existed in Devonian, increased greatly in Carboniferous time, but belonged to an order now extinct, and were of moderate size, no species being over eight feet long. Consult Chamberlin and Salisbury, (Geology y (Vol. II, New York 1907) ; Cleland, H. F., (Geology, Physical and HistoricaP (New York 1916) ; Dana, (Manual of Geology) (New York 1895) ; Geikie, (Text Book of Geology) (London 1903)

(Report of the United States Geological Sur¬ vey > (1900-01, part III). See Coal; Clay; Geology.

Charles Lawrence Dake, Assistant Professor of Geology and Mineralogy, University of Missouri, School of Mines.

CARBONIFEROUS LIMESTONE, or MOUNTAIN LIMESTONE, certain lime¬ stones of Lower Carboniferous Age, as named by Murchison and other English geologists. In the United States the silver-lead ores of Lead-ville and other Rocky Mountain camps, and the zinc and lead ores of southwestern Mis¬ souri, are in limestones of Carboniferous Age. See Carboniferous.

CARBORUNDUM, a trade name for silicon carbide (SiC). This compound is produced by heating sand and carbon together in the electric furnace. It is characterized by extreme hardness, and its principal use is for abrasive purposes, as a substitute for corundum and emery. It was discovered in 1891 by E. G. Acheson, and is now manufactured in large quantities in the great electric laboratories at Niagara Falls. The operation is carried on in a furnace in which the bed and ends are per¬ manent, and the side walls temporary, being made up of loose firebrick for each charge treated. The furnace is 16 feet long and 5 feet wide. The electrodes enter the interior through the ends. They consist of clusters of carbon rods, interspersed with copper connec¬ tions. The material used consists of 54.2 parts of sand, mixed with 9.9 parts of sawdust and 1.7 parts of common salt — the last acting as a flux. The amount of each charge is about 30,000 pounds, and this weight includes 34.2 parts of coke broken into pieces about the size of pea coal. A part of the charge is spread on the bed of the furnace so as not to touch the electrodes but up to their level. In the centre of this is built a core of coke connecting the electrodes. The remainder of the charge is then heaped upon the core, the walls being built up to a height of five feet, and the heap between them reaching eight feet. The current used is at the beginning of the process 165

volts and

1.700 amperes. Later this is reduced to 125 volts but increased to 6,000 amperes. The run continues for 36 hours, during which 1,000 horsepower is expended. The furnace is then allowed to cool for two days, when the walls are torn down and the contents removed. The coke core has been graphitized by the heat, and outside of this is a layer a foot thick of gra¬ phitic carbon. Next to this layer is the crys¬ tallized carborundum, amounting to about

6.700 pounds, and in addition there is about 5,000 pounds of amorphous silicon carbide. The carborundum is broken up in a crusher and the crushed material digested with sul¬

phuric acid for three days at a temperature of 212° F. It is then washed, and after being kdn-dried it is graded by screens to the sev¬ eral degrees of fineness in which it is sold. Carborundum in powdered form is placed on the market in considerable quantities as car¬ bide of silicon for the introduction of silicon into iron, the material being very readily dis¬ solved by the fused metal. Since carborundum is infusible and is only oxidizable at extremely high temperatures in a large amount of free oxygen, it follows that the temperatures ordi¬ narily generated for smelting ores and metals are much below its point of destruction. Finely powdered carborundum is made up into a highly refractory paste with fire clay, lime and sodium silicate, which is applied by means of a brush or otherwise to bricks which are intended to be used for building a furnace, or the bricks are actually immersed in the viscous liquid for a certain time. If the furnace has already been built, the paste can be painted on the sur¬ faces exposed to the fire. It is stated that a coating one-twelfth of an inch thick will pro¬ tect the bricks from the attack of the highest temperature that is ever produced by combus¬ tion methods in ordinary work.

Richard Ferris.

CARBUNCLE, a general term used to describe any red garnet when cut en cabochon. Pliny and other early writers apparently ap¬ plied the name “carbunculus® indiscriminately to ruby, ruby spinel and garnet. The best usage at the present time confines it to the almandite garnet when cut en cabochon, that is, with a rounded convex surface. Usually such stones are hollowed out at the back and a piece of metal foil is inserted in order to lighten the otherwise too dense red colon

CARBUNCLE, in pathology a deep infec¬ tion of the subcutaneous tissues by means chiefly of the Staphylococcus organisms, which are always present in the air. These infections take place through minute cuts or the hair follicles and are located chiefly in the nape of the neck. In addition to the local discomfort graver constitutional symptoms such as fever, headache, loss of appetite and loss of flesh are present. The local discomfort is apt to develop into deep, painful burning and throbbing. Pus is formed and gradually makes its way to the surface through minute orifices, or the whole area breaks Gown into a sloughing ulcer with a hard, deep, angry centre called the “core.® The whole process may take one or two months be¬ fore complete recovery occurs. The treatment is dietetic, hygienic and surgical.

CARBURETOR. An essential adjunct to internal combustion engines of the explosion type, performing the twofold operation of vaporizing the fuel (gasoline, benzol or alcohol) and mixing this vapor with the proper propor¬ tion of air to form an explosive compound. The instrument consists of a tubular air-in¬ take into which is projected the fuel tube. The liquid fuel is atomized into a fine spray by the rush of air past the open mouth of the tube through which the fuel is fed in a constant flow regulated by a float valve in a float cham¬ ber. The importance of the delicate adjust¬ ment of the carburetor appears in the fact that upon the accurate admixture of the air and fuel depends the smooth working of the

engine. The proportion of air to gasoline re¬ quired tinder ordinary running conditions is 8,400 parts to one. In starting a cold engine, however, a larger percentage of gasoline is needed, and to supply this an auxiliary carbu¬ retor is sometimes arranged to cut in tempo¬ rarily, until the engine gets warm. Many varie¬ ties of the carburetor are in existence, but all are the same in principle. Special forms of

carburetor have been devised for kerosene and other liquid fuels, with but partial success. See Automobile; Automobile Engine; Internal Combustion Engine. Consult Bramley, F. H., (Modern Carburetters) (London 1913) ; Brewer, R. W. A., (Carburetion) (London 1913) ; Browne, A. B., (Handbook of Carburetion) (New York 1916).

CARCAGENTE, kar-ka-han'ta, Spain, town of Valencia province, on the river Jucar, at the junction of the Valencia-Murcia and Carcagente-Denia railways. The centre of a region of orange, palm and mulberry trees, it also cultivates rice extensively, for which climate and soil are particularly well adapted, and it has modern linen and silk mills. Carcagente is of great antiquity with interesting Roman ruins. Pop. 12,300.

CARCANET, kar'ka-net, a jeweled neck¬ lace or chain, an ornament referred to by Shakespeare, and by Tennyson in (The Last Tournament.) Venice was famous for its manufacture of carcanets in the 15th century.

CARCANO, kar-ka'no, Giulio, Italian poet : b. Milan 1812 ; d. 1884. He was ap¬ pointed professor at the Academy of Fine Arts in Milan in 1859, and became a senator in 1876. He wrote a narrative poem, Hda della Torre, } while a student at Pavia (1834). His next work, (Angiola Maria* (1839), had extraor¬ dinary success ; it is a deeply sympathetic story of Italian family life, and is regarded as the highest type of that class in Italian. In the same vein is the volume (Simple Narratives> (1843). He wrote also (Damiano, the Story of a Poor Family) and other works. Consult Prina, (Giulio Carcano* (1884) ; and Rizzi's preface in (Lettere di Giulio Carcano) (Milan

1887).

CARCAR, kar'kar, Philippines, a city on the northern coast of the island of Cebu, situ¬ ated on the Bay of Carcar, 23 miles from the city of Cebu. It is near the head of the bay and on the road running along the eastern coast of the island. Pop. 31,895.

CARCARILLA, the bark of a tree (Cro¬ ton el criteria), of the family Euphorbiacece. This is a shrub of the Bahamas and now yields most of the cascarilla of commerce, although in former years other species were used. It contains tannic acid, volatile oils, cascarillin, a glycoside and some resin. In medicine it is used as an aromatic bitter in combination with other remedies for constipation, indigestion and loss

of appetite.

CARCASS, in military language, an iron spherical case filled with combustible materials, which is discharged from a mortar, howitzer or gun. It does not burst, but has three fuseholes through which the flame rushes, firing every¬ thing within its influence. Carcasses are of considerable use in bombardments for setting fire to buildings, vessels lying in harbors, *etc.*

They will continue to burn for 8 or 10 minutes, and are not even extinguishable by water.

CARCASSONNE, kar-ka-son', France, capital of the department of Aude, on both sides of the river Aude and on a branch of the Canal du Midi, 53 miles south of Toulouse. It consists of an old and a new town which communicate by a bridge of 12 arches spanning the river. The old town is surrounded by a double wall, part of it so ancient as to be at¬ tributed to the Visigoths, and is defended by a castle. Its streets are narrow, dirty and deso¬ late, forming a striking contrast to those of the new town, which is regularly built, and has many handsome modern houses. The princi¬ pal buildings are the restored cathedral of Saint-Nazaire, the courthouse, the prefecture, the old market and the churches of Saint Michel and Saint Vincent. The town . con¬ tains a lyceum, a teachers' college, a seminary, a public library and a museum. The boulevards are finely planted. The chief manufacture is that of woolen cloth which is exported chiefly to the Levant, the Barbary states and South America. Carcassonne also manufactures paper, leather, linen, soap, ironware and pot¬ tery, and there is also a considerable trade in wine, grain, brandy, fruit and leather. The whole department is represented at its Novem¬ ber fair. The ancient city, Carcaso, in the province of Gallia Narbonensis, fell into the hands of the Visigoths about 725 ; it was ruled by viscounts from the 11th to the 13th century and was united to France in 1209. In 1247 King Louis the Saint founded the lower town. It was pillaged and burned by the Black Prince in 1355, and in 1566 a Huguenot massacre took place within its walls. Consult Fedie, L. x His¬ tory of Carcassonne * (Carcassonne 1888).

CARCHEMISH, kar'kem-ish, an ancient city on the Euphrates, formerly thought to be the same as the Roman Circesium, but now more generally located near Jerabis, a village on the west bank of the Euphrates. The earliest known references to Carchemish are found in the Cuneiform texts in the British Museum (II Bu. 88-5-12, 163; 11

and 88-5- 12, 19, 8.) It was the northern capital of the Hittites. Thotmes III met the people of Carchemish in battle about 1501-1447 b.c. and in 1140-05 b.c.; it was once captured by Tiglath-Pileser I. It was made to pay tribute by Asurnazirpal III, and Shalmaneser III, whose artists represented the famous fortress on the walls of Balawat, but was not finally subdued by the Assyrians until taken in 717 b.c. by Sargon II, who deported the inhabit¬ ants and settled Assyrians in the city. In 608 b.c. it was captured by the Egyptian Pharaoh, Necho. At this time Josiah, king of Judah, was killed (mentioned in 2 Chron. xxxv) ; but the city was retaken by Nebu¬ chadnezzar in 605. Consult Rawlinson, G., (The Five Great Monarchies) (2d ed., Vol. II, p. 67) ; Finzi, (Ricerche per lo studio dell' antichita Assira* (pp. 257ff. 1872) ; Maspero, (De Carchemis Ceppidi Situ et Historia An-tiquissima) (1873) ; Schrader, (Keilinschriften und Geschichtsforschung) (pp. 221ff. 1878) ; Delitzsch, (Wo lag das Paradies?) (pp. 265ff. 1881), containing extracts from the notebooks of George Smith; Hoffmann, G., (Ausziige aus syrischen Acten persischer Martyrer* (p. 163,

1880) ; Sachan, (Reise in Syrien und Mesopo¬ tamian* (pp. 168f. 1883) ; ' Muller, W. Max, (Asien und Europa* (p. 2'63, 1893) ; Johns, in Proceedings of the Society of Biblical Archceology (p. 141, 1899) ; Sarsowszky, in Zeitschrift fur Assyriologie (pp. 377 seq. 1911); Ben-zinger, in Baedeker's ˆPalestine and Syria*

(1912).

CARCINOMA. A tumor of the epithe¬ lial-tissue type. See Tumor.

CARD INDEXING, Commercial, the

adaptation of the principle of the modern library card catalogue to the multifarious uses of industrial, mercantile and commercial life. Following the practical American development and improvement of the various Old-World principles and rules laid down for the cata¬

loguing of libraries, and the establishment after 1876 of library bureaus for furnishing standard supplies, it was speedily recognized that card systems for facilitating the record of the affairs of business life and their multitudinous details, were henceforth to be — as in the case of the telephone, the typewriting machine and acces¬ sories — indispensable adjuncts to the equip¬ ment of every well-appointed office, store, fac¬ tory or institution throughout the world.

The invention of time and labor-saving sys¬ tems and devices of all kinds speedily followed, and now, any branch of any kind of business, from the simplest to the most complex, can ad¬ vantageously install and use a card system, and procure standard supplies of blank or special printed ruled forms with full information as to their application for the keeping of accurate records of all affairs in the most practical way.

The development of commercial card sys¬ tems also led naturally to a corresponding and commensurate growth of office furniture, fix¬ tures and accessories for their accommodation, which include : box trav and drawer cases for card indexes; various kinds of folders, guides, indexes, storage and binding cases for vertical files; indexed transfer cases for flat files, elastic or expanding filing and other cabinets for docu¬ ment, check and mercantile reports, *etc.* ; spe¬ cially devised stands, tables, desks, *etc.*

For classifying work by separating miscel¬ laneous information — grouping information of the same kind together — no other method has been found to equal the card-index system, the impossibility of keeping different facts about the same business or profession recorded in a bound book with any degree of sequence or order being now universally recognized. The card indexing system has proved of especial advantage, and is now extensively utilized in the offices of government, state and municipal departments, of railroad, telegraph, telephone, electric light, gas and waterworks companies, real estate and trust corporations, building and loan associations, fire, life and accident insur¬ ance companies, solicitors' and underwriters' agencies, benevolent societies, lodges, banks and other financial institutions, factories, wholesale commercial and mail order houses, publishers, advertising agencies, professional men, clergy¬ men, lawyers, physicians, oculists, dentists, specialists, *etc.*

By means of the card index system, names, facts, figures of any description, recorded on cards of uniform size, are arranged alphabet¬ ically, numerically, territorially, chronologically,

or according to any suitably defined order in boxes, trays or drawers of cabinets of special design. Various plans, ranging from simple to complex, are used for special indexing. All, however, are transparently concise in arrange¬ ment %and of facile adaptation for reference. The most simple form of card-indexing is the alphabetical-subject plan in which the name is indexed alphabetically and the subject indicated by different tab cards. In territorial card-in¬ dexes, the names are first classified by states, with alphabetical guides for each city or com¬ mercial community in the state, the cards bear¬ ing the records of firms or individuals being filed back of the alphabetical guides. Chrono¬ logical card-indexes are divided into monthly, daily and alphabetical sections, distinguished by different colored cards, and back of each monthly guide is arranged a set of blank daily guides, so that cards may be filed in advance for attention on any day of any month. Each card with its record has an individual existence in its relations to others of the system, and is always to be found in its place, notwithstanding the cumulative and expansive principle of the index, which allows cards to be added or with¬ drawn as needed. Guide or signal cards of different colors with projecting edges or tabs facilitate the immediate finding of the card for rapid reference; the liberal use of these signal cards, carefully inserted in long lists of the same surnames, also obviates a considerable amount of handling and saves time, labor and the wear and tear of the cards.

One of the most ingenious uses of the card system for commercial purpose is its applica¬ tion to the keeping of ledgers, of which the loose-leaf ledger is an offshoot in the develop¬ ing process of commercial card-indexing. The card ledger does away with the necessity of purchasing books, ledgers or binders and ac¬ counts can be posted, checked up, trial bal¬ ance taken off and statements mailed in ap¬ proximately half the time required for a book ledger. Accuracy is also promoted by each card representing one account only, which can be laid on the sales sheet or other original record, thus lessening the liability to error in posting. Each account being on a separate card is easily indexed, and no separate or cross-index is required; more perfect indexing is thus en¬ sured; as the number of accounts increase year by year, sets of index cards, with as many subdivisions of the alphabet as desired to facili¬ tate quicker reference, may be substituted for the original set. Statements can be taken off promptly at the first of the month, and where necessary, several clerks can do the billing at the same time, which is impossible with the book ledger. Open accounts only are kept on the regular file ; all closed accounts are removed and indexed in a separate file, the only practical method

of providing for closed accounts, which can be easily referred to as open ones. The card being removed from the files when the account is closed, and replaced when opened, also obviates the former necessity of trans¬ ferring accounts from one ledger to another, at the end of each year. Finally the card index ledger can be profitably used for mailing and circular lists. Modern business houses no longer file their correspondence in the old letter boxes. There are various card systems, but the primal scheme is to have a cabinet in place

of the separate pasteboard letter boxes. This cabinet is divided into drawers, each deep and wide enough to hold the largest business letter¬ heads when standing in a vertical position. The drawers themselves are divided into com¬ partments for classifying the letters and sepa¬ rated by manila dividers, between which are folders of heavy paper. Marginal index guides on the dividers afford a mechanism for quickly finding any name or classification desired. Sup¬ plementing this are various schemes involving different kinds of cabinets for cross-indexing cards, by which the subject matter of letters or the names of the writers as well as of the firms from which letters are received may be indexed. Consult Byles, B. B., ‘The Card Index System) and articles in System (Febru¬ ary 1912) and Engineering Magazine (July

1913).

CARDAMINE, kar’da-min, a genus of plants of the family Brassicacecc, containing about 60 species with a very wide distribution. They are herbaceous plants with usually pin¬ nate leaves, white or lilac flowers of the usual cruciferous type, and the siliquose fruit which characterizes a section of the family. One of the best-known European and American species is the cuckoo-flower (C. pratensis) , growing in wet places from Vermont to New Jersey, westward to Wisconsin, and northward. C. hirsuta is a common weed in eastern North America, varying in size, according to soil, from 6 to 18 inches in height. The

leaves and flowers of this species form an agreeable salad. Numerous other species also occur in North America.

CARDAMON, the seeds of several species of plants of the family Zingiberacece, perennial plants growing in Asia and Africa. The fruit is used as a stimulant and aromatic. Triangular capsules, from four to five inches in length, contain the seeds, which are of a brown color, a pleasant, aromatic odor and a warm, pepper-like taste. The cardamons known in the shops are produced by Amomum augustifolinm, a Madagascar plant, and A. cardamon, a native of Sumatra and other Eastern islands. Those recognized in the United States pharmacopoeia, called true or officinal cardamons, and known in commerce as Malabar cardamons, are the produce of Elettaria cardamomum, a native of India. The seeds of cardamon are widely em¬ ployed in medicine as the basis of vehicles for carrying disagreeable drugs, and also as car¬ minatives and digestants. The volatile oils of cardamon act like other volatile oils in stimu¬ lating peristalsis, thus expelling excess of in¬ testinal gases, and they also increase the gastric and intestinal secretions.

CARDAN, or CARDANO, Girolamo,

Italian philosopher, physician and mathemati¬ cian : b. Pavia, 24 Sept. 1501 ; d. Rome, 21 Sept. 1576. He was educated from his fourth year in the house of his father. At 20 he went to Pavia to complete his studies, and after two years began to explain Euclid. In 1524 he took the degree of doctor of medicine at Padua and spent the following seven years practising medicine at Sacco. He was sub¬ sequently professor of mathematics and medi¬ cine in Milan (1534). In 1552 he journeyed through Europe. He became professor of medicine at Pavia and at Bologna, where he

remained eight years. He was forced to re¬ sign from the university after his imprison¬ ment on the charge of teaching heretical doc¬ trines. Pope Gregory admitted him to the College of Physicians at Rome, where he con¬ tinued until his death. His biographers differ with regard to his religious opinions, but he was lost in cabalistic dreams and paradoxes, and pretended to have a familiar demon from whom he received warnings, *etc.* All this ex¬ cited the theologians against him, who even accused him of atheism, though the charge was without foundation. He believed so implicitly in astrology that he drew his own horoscope several times, and ascribed the falsehood of his predictions, not to the uncertainty of the art, but to his own

ignorance. His two works, (De Subtilitate Rerum > (1551) and (De Varie-tate Rerum } (1545) contain the whole of his natural philosophy and metaphysics. Cardan wrote also on medicine, and hk fame as a physician was very great. His highest claims to the gratitude of the learned rest on his mathematical discoveries. Cardan, it is said, was told that Tartaglia had discovered the solution of cubic equations, and obtained the secret from him by stratagem and under prom¬ ise of silence, but published the method in 1545, in his (Ars Magna.) The honor of giving his name to the invention has remained to him who first made it known, and it is still called the formula of Cardan. It is universally be¬ lieved that Cardan discovered some new cases, which were not comprehended in the rule of Tartaglia; that he discovered the multiplicity of the roots of the higher equations, and finally the existence of negative roots, the use of which he did not, however, understand.

Besides the works already mentioned there remain also (Practica Arithmeticae Uni¬ versalˆ (1539); 'De Vita Propria) and 'De Libris Propriis> (1571-75); (Encomium Geometriae) (1535) ; 'De Regula Aliza, Exoereton Mathematicorum, Sermo de Plus et Minus) (1540-50). The standard collection of Car¬ dan's works is that of Sponius (Lyons 1663). Consult Morley, 'Jerome Cardan) (London 1854) ; Rixner and Siber, 'Leben und Lehr-meinungen beriihmter Physiker am Ende des XVI und am Anfange des XVII Jahrhunderts) (Sulbach 1820) ; Firmiani, 'Girolamo Cardano, la vita e l'opere) (Naples 1904).

CARDAUNS, kar'downs, Hermann, Ger¬ man Catholic writer : b. Cologne, 8 Aug. 1847. He was educated at the universities of Bonn, Munich and Gottingen, lectured on history at Bonn in 1872-76 and from 1876 to 1907 was editor-in-chief of the Kolnische V olkszeitung. After 1907 he was engaged in literary work at Bonn. He also served as general secretary of the Gorresgesellschaft after 1891 ; was presi¬ dent of the German Catholic Congress at Mannheim in 1902. He has published 'Die Reformatione BernensP (1868); 'Papst Alex¬ ander IIP (1874); 'Der alte FuhrmaniF (1875); 'Chroniken der Stadt Koln) (3 vols., 1875-78) ; 'Erzbischof Konrad von Hostaden) (1880); 'Der Sturz Maria Stuarts) (1883); 'Friedrich von Spee> (1884); 'M. Stuart,

1566-68, Memoiren ihres Sekr. Cl. NaiP (1884); 'Die Erzahlung Walters des Erz-poetenP a novel (1887; 1899) ; 'Die Abenteuer des Johannes Reuschp novel (1888; 1908);

cDie Marchen Clemens Brentanos) (1895); (Geschichte aus dem alten Koln) (1899); (Der Stadtschreiber,> novel (1900; 1908); <Alte Geschichte vom Rhein) (1901); (Die Briefe der Dichterin Annette von Droste-Hfilshoff > (1909) ; (Die Entdeckung des Siidpols) (1909) ; (Funfzig Jahre Kolnischer Volkszeitung> (1910) ; cDer Kampf urn den NordpoP (1910); (Aus dem Leben eines deutschen Re-dakteurs) (1912) ; (Fiinfzig Jahre Kartellver-band* (1913) ; and contributions to newspapers and periodicals. Since 1886 he has edited Vereins-Gaben der Gorresgesellschaft.

CARDBOARD, a thick paper, or aggrega¬ tion of paper or paper-stock, made by pasting several sheets of paper together and compress¬ ing the product between rollers. The finest cardboard, or Bristol board, such as is used for visiting-cards and in the arts, is so made of white paper only, the enamel being produced by brushing China or Ivremitz white, a fine variety of white lead, over the surface, drying and rubbing with a piece of flannel previously dipped in finely powdered talc, and polishing with a close-set brush. It is known as three-, four-, six-or eight-sheet board, according to the number of layers of paper. A cheaper grade of white cardboard is composed of coarse white paper for the inner layers and a finer facing paper on the outside. Another variety of cardboard is that used by boxmakers, and is made from coarse brown paper glued and rolled, and faced with white or colored paper, or unfaced, according to the use to which it is to be put. A coarser grade yet is known as millboard. This is used by book¬ binders for the covers of books, by boxmakers and for other work in which strength is of more value than appearance. Fine qualities of millboard are also made to some extent. See Paper.

CARDEN, Sir Lionel Edward Gresley,

British Ambassador: b. 15 Sept. 1851. After education at Eton College, he went to Havana in 1877 as vice-consul, and in 1883 accompanied Sir S. St. John's special mission to Mexico. In 1885 he was appointed British consul in the city of Mexico, and until 1889 was British commissioner on the Mexican Mixed Claims Commission. From 1898 to 1902 he was con¬ sul-general and from 1902 to 1905 British

Minister to Cuba. In 1911 he was appointed Envoy extraordinary and Minister plenipoten¬ tiary to the republics of Central America; in 1912 was created K.C.M.G. ; and in 1913 went to Mexico as British Minister. His recognition of the Huerta government was regarded in some quarters as indicative of an anti-American policy.

CARDEN, Sackville Hamilton, British admiral : b. 1857 ; entered the navy in 1870, served in the Egyptian War of 1882, in Suakim in 1884 and with the Benin Expedition in 1897. After holding various commands afloat and ashore he became admiral superintendent of Malta dockyard in 1912. In the European War he commanded the British naval force that made the first attempt to break through the Dardanelles in February 1915, assisted by a French squadron under Rear-Admiral Gue-pratte. After operating for a whole month the great attack on the Narrows failed, with

a loss of three battleships and more than 2,000 men. The failure clearly demonstrated that ships, alone could not force the passage. Vice-Admiral Carden was compelled by ill health. to relinquish his command in March 1915. See War, European — Turkish Campaigns.

CARDENAS, kar'da-nas, Cuba, a seaport in the province of Matanzas, situated on Car¬ denas Bay, due east of Havana on the north coast of the island. It is connected with Ha¬ vana by rail, and has a large trade in sugar and molasses. On 11 May 1898 the Spanish shore batteries and gunboats at Cardenas at¬ tacked the United States vessels blockading the port, and in the engagement the United States torpedo-boat Winslow was disabled, and Ensign Worth Bagley (q.v.) and four sailors were killed. Pop. 32,028.

CARDI, kar'de, Lodovico, surnamed Cigoli, Italian painter and architect: b. on an estate in the Arno Valley known as Castel-vecchio, 12 Sept. 1559; d. Rome, 8 June 1613. The name by which he is commonly known, Cigoli, is that of the village near his birth¬ place. He studied painting under Allori in Florence and architecture under Buontalenti, who introduced him to Sante di Tito of the same city. His first important work dates from about 1581 ; it is a representation, in fresco, of Christ that the young artist made for the grand cloister of Santa Maria Novella at Florence. His most celebrated picture, (The Lame Man Cured, > which unfortunately no longer exists, formerly adorned Saint Peter's at Rome. Sacchi thought that it was entitled to hold the first place among the pictures in Rome, after (The Transfiguration) of Raphael and the (Saint Jerome) of Domenichino.

His (Martyrdom of Saint Stephen, } executed for the convent of Monte Domini, his (Tobias the Angel, } in the Hermitage at Petrograd, the (Saint Francis,) in the Borghese, Rome, his own portrait, in the Uffizi, Florence, and (The Flight into Egypt,) in the Louvre, Paris, are all noteworthy. <(His influence was extraor¬ dinary,® according to Thieme-Becker, because he was the founder, in Florence, of the baroque style as exemplified in painting.

CARDIA, the upper or cardiac orifice of the stomach, where the gullet or oesophagus enters it, as distinguished from the intestinal opening or the pylorus.

CARDIAC MEDICINES, medicines which act upon the heart. See Heart.

CARDIALGIA, an intense pain over the general heart region. It is usually due to stomach disturbance, heartburn, and is often accompanied by pains in the oesophagus. Heart¬ burn is nearly always due to the presence of large amounts of gas, causing pressure. These gases usually accompany and cause an in¬ digestion. See Heart.

CARDIFF, Ira D., American botanist: b. Stark County, Ill., 20 June 1873. After study at Knox College, at the University of Chicago and at Columbia University he was appointed

1906-07 assistant professor of botany, and

1907-08 professor at the University of Utah. In 1908 he became professor of botany at Washburn College, Topeka, Kan., and in 1909 director of the Washburn Summer School. He

was professor of botany in the University of Kansas summer school 1911-12. His contribu¬ tions to Plant World, the Botanical Gazette and the Torrey Botanical Club's Bulletin made him well known to fellow botanists.

CARDIFF, Wales (Welsh, Caerdydd, per¬ haps the fortress on the Taff,

but derivation uncertain), a municipal and parliamentary borough, raised to the rank of a city (with the title of lord mayor for its chief magistrate) by royal charter in 1905, a seaport on the Bristol Channel, the capital of Glamorgan and the largest town in Wales. The city is built on both banks of the river Taff, a mile above its junction with the estuary of the Severn (known as the Bristol Channel) and extends to the • rivers Rhymney on the east and Ely on the west. It is 135 miles west of London, on the Great Western main line from London to New Milford and Fishguard (for Ireland).

Geology. — Almost every geological forma¬ tion from the Silurian up to the coal measures is found in the ring of higher ground sur¬ rounding the plain of recent alluvial deposits on which the city stands.

Trade and Development. — The rapid in¬ crease of the last half century is due to the development of the coal trade consequent upon the construction of the Bute docks. The first dock, completed in 1839, was built by the sec¬ ond Marquess of Bute, and five great docks have since been constructed at a cost of £5,500,000. Their total water area is over 200 acres, and the shipments of coal exceed 20,000,- 000 tons per annum. There are also docks at the adjoining ports of Penarth and Barry. The coal is worked in collieries to the north (near¬ est colliery nine miles) and shipped at the docks below the city, which is singularly free from any evidence of the staple trade. The fine, wide streets, abundance of trees, freedom from smoke and other evidences of progressiveness are a surprise to visitors. Besides the dock operations, the most important works are the Cardiff Dowlais steel works, the Tharsis Cop¬ per Works, numerous ship repairing yards, extensive flour mills, biscuit works, ice and cold storage (with large import trade) and steam trawlers for the fishing industry. The import trade has been developed of late years and Cardiff is now the chief wholesale centre for supplying the teeming populations of the min¬ ing valleys of Glamorgan and Monmouth.

Railways. — The Great Western Railway and its connections provide a good and quick service to distant places, while the local rail¬ ways constructed primarily for mineral traffic, the Taff Vale, Rhymney and Barry respect¬ ively, communicate with the districts adjacent. The Midland and London and North Western companies have good depots.

Government and Public Works. — The government of the city is vested in the lord mayor, aldermen and councillors. The oldest surviving charter, granted sometime before 1147, evidences the existence of rights and privileges extending to a much earlier time. Other charters were given by the feudal lords, and later by the Crown.

Cardiff returns one member to the House of Commons.

Public Buildings. — The public buildings are being grouped in a park of 50 acres. The townhall and law courts (cost, £330,000) are

completed, as are also the offices of the Uni¬ versity of Wales, new buildings for the Univer¬ sity College of South Wales and the Welsh National Museum. The secondary and ele¬ mentary schools are modern, and efficiently equipped and administered, and special pro¬ vision is made for blind, deaf and dumb, and defective children. Other public buildings in¬ clude the post-office, custom-house, offices of the Board of Trade and Mercantile Marine, hospitals, *etc.* The castle, restored and ex¬ tended at great cost by the third Marquess of Bute, is maintained as one of the residences of his successors.

Libraries. — The public libraries contain 156,000 volumes and include the largest collec¬ tion of Welsh books and manuscripts in exist¬ ence. The school library system of the city is one of the best in existence. The museum and art gallery, about to be merged in the National Museum of Wales, contains modern paintings and sculpture; Swansea, Nantgarw and other porcelain, and examples of pre-Norman sculp¬ tured stones and crosses.

Churches. — The only ancient church is Saint John's with a fine decorated tower, built in 1473, by Anne Nevill, who inherited the lordship of Glamorgan. She was the wife of Richard Nevill, Earl of Warwick (((the king-makerw) and mother of Ann, wife of Richard III. There are numerous modern Episcopalian, Roman Catholic and Nonconformist churches. The ancient cathedral of Llandaff is just out¬ side the city boundary.

History. — The Romans had an important station here, extensive remains of their fortifi¬ cations having recently been discovered in the castle grounds. According to tradition, Cardiff was an important place under the Welsh princes before the Roman occupation ; it was certainly a stronghold of the Welsh after the departure of the Romans, and was ravaged by Danes and Norsemen. After the Norman con¬ quest the district was subdued by Robert Fitz-hamon and his followers, who established a powerful Marcher Lordship with Cardiff as the capital. The Castle Keep was erected in¬ side the Roman fortification by the Norman lords. The town and district were in the hands of the feudal lords for centuries, and the scene of several bitter contests between the Welsh and their alien masters. Cardiff was at this

time surrounded by a high and massive wall and a moat, while the castle, with its law courts and other appanages of feudalism, was a very strong place, guarded by relays of soldiers supplied in rotation from the forces of the under lords, who had castles in the surrounding districts. The lordship reverted to the King in 1495 and was in 1550 granted, stripped of its feudal privileges, to Sir William Herbert, afterward first Earl of Pembroke, from whom it has descended to the Marquess of Bute.

During the civil war Cardiff was an im¬ portant centre of operations, and was held by the forces of the King and of Cromwell in turn. It was visited by Charles I in 1645, who there sought to revive the loyalty of his fol¬ lowers, but with poor success. The decay of feudalism stripped the town of its importance and it continued to decline until the dawn of the era of coal and iron. Sir Thomas Button, the navigator, was a native of Cardiff.

Population. — In 1801 the population was 1,870, and 50 years later, 18,351. In 1911 it was 182,259.

Bibliography. — (The Cardiff Records) (6 vols., published by the city council) ; (Cardiff,) an illustrated handbook, edited by Ballinger

(1896).

. John Ballinger,

Librarian of the Public Libraries.

CARDIGAN, Adeline Louisa Maria,

Countess of, Comtesse de Lancastre : b. 24 Dec. 1824; d. England, 25 May 1915. She was the daughter of Spencer de Horsey, M.P., a notable man of fashion in his day, and her mother was a, daughter of the 1st Earl of Stradbroke. One of her brothers was a gen¬ eral in the

army, and another an admiral in the British navy, while a son of the latter is a rear-admiral. Miss de Horsey was highly educated in several languages, ancient and modern, and was reported an expert in fencing, riding, danc¬ ing and music. In 1858 she married the Earl of Cardigan (q.v.), who died in 1868. She married, secondly, the Count de Lancastre Saldanha, a Portuguese nobleman, who died in 1898. She was a celebrated beauty in her day, and had known Tennyson, Wellington, Talley¬ rand, Theodore Hook and Tom Moore. In 1909 she startled British society circles with a volume of (Recollections, } a collection of an¬ ecdotes of prominent people she had met in her early life. Some of the tales were of a scan¬ dalous nature and not all of them were true, which raised a storm of protest from the descendants and relatives of the people referred to. She was in her 91st year when she died, and it is not improbable that old-age garrulity and confused memory were responsible.

CARDIGAN, James Thomas Brudenell,

Earl of, English general : b. Hambleton, 16 Oct. 1797; d. 28 May 1868. He was educated at Christ Church, Oxford, and was gazetted 6 May 1824, as cornet in the 8th Royal Irish Hussars, under the courtesy title of Lord Bru¬ denell. His family influence and wealth in England procured for him a rapid promotion, and in a few years he had attained the rank of major. Lord Brudenell was next, 3 Dec. 1830, made lieutenant-colonel of the 15th Hussars. He was a member of the House of Commons from the period of his coming of age in 1818, until 14 Aug. 1837, when on the death of his father, he became Earl of Cardigan. After his regiment returned from India Lord Cardigan got himself into difficulties with the officers, who, one by one, had to sell out until the feel¬ ing of the regiment broke into mutiny in what was known as the ((black bottle quarrel.® This quarrel arose in 1840, while Lord Cardigan's regiment was stationed at Canterbury. One of his officers, Captain Reynolds, having caused wine to be placed on the table in a (<black bot¬ tle,® Lord Cardigan accused him of degrading the mess to the level of a pothouse. This led to angry words : Captain Reynolds was placed under arrest, demanded a' court-martial, but this privilege was withheld from him, and, as the public thought, unjustly. The excitement created by this affair and by his subsequent misunderstanding with another officer, also of the name of Reynolds, had hardly subsided, when he fought a duel with Capt. Harvey Tuckett because this officer had censured his

conduct in the Morning Chronicle. Captain Tuckett was wounded, and

Lord Cardigan tried before the House of Lords, but, although acquitted, public opinion was against him. His reputation, however, as an accomplished cav¬ alry officer, and the satisfaction which the Duke of Wellington expressed in 1848 with the effi¬ ciency of the 11th Hussars' Regiment, which was under Lord Cardigan's charge, led to his promotion. On the outbreak of the Crimean War Lord Cardigan was raised to the rank of major-general and appointed brigadier in com¬ mand of the light cavalry brigade. This bri¬ gade constituted the celebrated (<Six Hundred,® whose charge at Balaklava will long be remem¬ bered as one of the bravest yet wildest feats, perhaps, ever told in the history of war. On that occasion (25 Oct. 1854), Lord Cardigan is said to have received from Lord Lucan, his brother-in-law, an order to capture certain guns from the Russians. A mile and a half had to be traversed, under fire, before the enemy could be met, and the Russian forces stood in formi¬ dable array in every direction. The enterprise seemed hopeless. Cardigan, however, led on the charge, and actually took the guns, his men cutting their way through the infantry support and through the cavalry, and then back again, under the play of the Russian batteries, but with fearfully diminished numbers, the sur¬ vivors not exceeding 150. As the hero of this daring exploit, Lord Cardigan was received with great enthusiasm on his return to England and appointed inspector-general of the cavalry. The charges, however, subsequently alleged by the Crimean commissioners, tended to reduce the high estimate placed upon his services. He published (Cavalry Brigade Movements J (1861). See Cardigan, Countess of.

CARDIGAN, Wales, a seaport town and municipal borough, capital of Cardiganshire, on both banks of the Teifi, about three miles from its mouth, and 42 miles northwest of Carmar¬ then by rail. The most noteworthy buildings are the ancient chancel of Saint Mary's Church, a fine specimen of early Perpendicular archi¬ tecture; the shire hall, Cardigan county school, *etc.* Cardigan Castle, originally built in the 11th century and famous in Welsh history, stands at the foot of an eminence near the bridge, two circular bastions only now remain¬ ing of it. Brick, tile and pottery works are here, and two iron-foundries are employed chiefly in the manufacture of agricultural im¬ plements. The salmon fishery is extensively carried on in the neighborhood, and many of the male population are engaged in the mercan¬ tile navy. Pop. 3,578.

CARDIGANSHIRE, Wales, a maritime county, having Cardigan Bay on the west and on the land side chiefly Carmarthen, Brecknock, Radnor and Montgomery; area 443,189 acres. The northern and eastern parts are mountain¬ ous, the southern and western districts more level. The

soil in the vales is chiefly peat, ca¬ pable of growing either grain or grass, by the application of lime ; the higher grounds consist of a light sandy loam, and the mountains, are composed chiefly of clay-slate. The agricul¬ tural produce is comparatively small. Cattle, sheep and wool are the staple commodities. The chief crops are barley and oats, very little wheat being grown. The lead mines still yield

largely, and zinc is obtained in several places. The coastline is long, and many of the male population are sailors and fishermen. The principal towns are Cardigan, the county capi¬ tal, Aberystwith, Lampeter, Tregaron and Aberaeron. There are manufactures of gloves and woolens. The county returns one member to Parliament. Pop. 59,870.

CARDINAL-FISH, a fish of the family

Cheilodipteridcu, characterized by two dorsal fins, the anterior of which consists of from six to nine spines. The anal fin is short and has only two spines. The scales are large and the color is often bright red, whence the name. They are especially abundant in the East Indian seas ; but several species are found in America, one of which is known as (<king of the mullets.®

CARDINAL FLOWER,, the name com¬ monly given to Lobelia cardinalis, because of its large, very showy and intensely red flowers. It is a native of eastern North America, grow¬ ing on the muddy banks of streams. The stems are two or three feet high, the flowers in racemes. It admits of cultivation and is much prized abroad, particularly in England.

CARDINAL GROSBEAK, or RED-BIRD, a large song-bird (Cardinalis cardi¬ nalis) of the finch family, very numerous in the southern United States. It migrates north¬ ward in spring, but never farther than Massa¬ chusetts. It is particularly distinguished for its loud, clear, sweet song, whose quality makes it popular as a cage-bird. It is a brilliantly red bird, with a vermillion head, its bill surrounded with

a small band of glossy black, and having the long feathers of the crown erected into a conical crest. The female builds her nest, which is made of twigs, grasses, roots, etc., in bushes, and frequently breeds twice in a sea¬ son, her bluish, brown-spotted eggs numbering about four. This bird is migratory only to a small degree, moving southward only along the northern limits of its range, and occasion¬ ally passing the winter in village gardens even in New England.

CARDINAL NUMBERS. See Algebra.

CARDINAL POINTS, the four inter¬ sections of the horizon with the meridian and the prime vertical circle. They coincide with the four cardinal regions of the heavens, and are, of course, 90 degrees distant from each other. The intermediate points are called col¬ lateral points. See Compass.

CARDINAL VIRTUES, in morals, a name applied to those virtues to which all the rest are subordinate, or which comprehend all the others. The distribution of the virtues, which lies at the foundation of this notion, had its origin in the old Grecian philosophy, and the same number is found here as in the elements of nature. These principal virtues, as enumerated by Plato, are prudence, temperance, fortitude and justice. The first three seem to relate to the duties of man toward himself and to correspond with the triple division of the soul into the intellectual, the irrational (the seat of the sensual desires) and the seat of the affections. Justice either relates to our duties to others (God and men), or is the union of the three first virtues. This division appears to be peculiar to the old Pythagoreans.

Aristotle divided them still further. The Stoics, too, made the same division in their system of morals and Cicero introduced it into his (De OfficiisP Plotinus and many New Platonists divide the virtues into four classes — civil or political, philosophical or purifying, religious, and, lastly, divine or pattern virtues ; a division coinciding with the rest of his philo¬ sophical views. In Roman Catholic theological systems, the cardinal virtues follow Plato. But there is a prior division into theological and moral virtues, the former being faith, hone and charity. The imagination of artists has rep¬ resented the cardinal virtues under sensible images. In modern times this division is re¬ garded as useless in treating of ethics.

CARDINAL VON WIDDERN, kar’de-nal fon vid’dern, Georg, German military his¬ torian : b. Wollstein, 12 April 1841. He en¬ tered the

army in 1859; was engaged in the war of 1866 and the Franco-Prussian War; and was professor of the military school at Neisse. He retired in 1890 and has since lived in Berlin. He wrote (Der Rhein und die Rheinfeldziige) (1869); (Belgien, Nordfrankreich, der Nieder-rhein und Holland als Kriegsfeld) ; (Die Russis-chen Kavallerie-divisionen und die Armeeopera-tionen im Balkanfeldziige) (1878) ; (Das 76 Armeekorps und die 7 Kavallerie-division wah-rend ihrer selbstandigen Operationen im Mosel-feldzug bei Metz) (1886); (Das Gefecht an Flussiibergangen, und der Kampf an Flussli-nien) (1890) ; (Kritische Tage) (1900) ; (Ver-wendung und Fiihrung der Kavallerie 1870-7U (1903) ; (Eroberungszuge der Polen im heuti-gen Deutschland* (1912).

CARDINALS, College of, an ecclesias¬ tical body consisting of the highest dignitaries in the Roman Catholic Church. The name car¬ dinal is applied to one of the principal advisers of the Supreme Pontiff as it is to the principal virtues or to the four points of the compass ; etymologically cardinal is from car do, hinge, pivot, tenon, point around which anything turns. In the 11th century the term cardinal appears to have come into use to designate the <(bishops collateral to the Pope,® those whose sees are in the neighborhood of Rome, and to the clergy of the principal churches, parishes or tituli of the city; but probably cardinalis was at first said of a principal church rather than of its ministers. Nor was the term cardinal at first restricted to designation of churches and their clergy in Rome and its vicinity; for a long time, even down to 1585, date of the bull Postquam of Sixtus V, which forbade the ap¬ plication of the term to any but members of the sacred college, it was customary to call the ecclesiastics attached to mother-churches or to all cathedrals even, cardinales. The use of the word cardo or its equivalent to express the relation of a bishop to his clergy and peo¬ ple is very ancient : Saint Ignatius, bishop of Antioch (d. about 202), speaks of the bishop of a church as the pivot on which it turned. Till the issuance of the bull Postquam the title of cardinals was currently bestowed, but not by authority from the centre, upon the clergy of cathedral chapters in countries beyond the Alps, as those of the sees of Bourges, Metz, Cologne, Compostella and other cities in Ger¬ many, Spain and France; even in Italy the same usage was common; for it was with the

name Cardinal is as with the name Papa: they both were originally applied to church digni¬ taries, to pastors and Church officers generally; later their application was restricted.

Ever since the reign of Nicholas II the car¬ dinals have possessed the privilege of electing the Pope. The decree of Pope Nicholas (1059) provides that on the death of the Pope the cardinal-bishops shall assemble in council and then the rest of the sacred college shall join them. In naming the Pope the college must take into account the choice of the clergy and people ; only in case no Roman priest is found eligible in every way, shall the choice fall upon one that is not a Roman. In the 12th century the sacred college comprised seven cardinal-bishops of the <(suburbicarian® churches, Ostia, Rufina, Porto, Albano, Tusculum, Sabina and Palestrina; the cardinal-priests were 28, and were the rectors of as many churches in the city; there were 18 cardinal-deacons, of whom 14 belonged to the clerical staff of churches in the city and A to the papal court or household. The members of the sacred college are yet styled by the titles of churches in the city, but are no longer in any sense ministers of those churches or parishes. And, like other Church offices and Church dignities, the cardinalate be¬ came an object of ambition or of cupidity; popes bestowed the honor, princes and popes bestowed the dignity and the emoluments of episcopal and primatial sees, with the cardi¬ nalate annexed upon minors and infants; thus, John de Medici was raised to the cardinalate at the age of 14 years, being already vested with a number of highest Church dignities; and as late as 1740 a prince of the house of Bourbon was archbishop of Toledo and cardinal at the age of eight years.

According to the present constitution of the sacred college that body consists of 70 mem¬ bers — though very rarely indeed, if ever, are all the places filled. Of the 70 six are cardinal-bishops, and they are the ordinaries of sees in the neighborhood of Rome; 50 cardinal-priests and 14 cardinal-deacons. In 1916 the cardinal-bishops numbered 4, all Italians ; the cardinal-priests 48, and of these 5 were Spaniards, 5 were Frenchmen, 2 German, 1 Belgian, 3 Amer¬ ican, 3 British and Irish, 3 Austrians, 2 Hun¬ garians, 1 Bohemian, 1 Portuguese, 1 Cana¬

dian, 1 Brazilian ; the rest were Italians. There were 8 cardinal-deacons, among them 1 Dutch, 1 German ; the rest wrere Italians.

The scarlet hat is distinctive of the cardinalitial dignity, and above the double cross in the arms of the archbishop who is a cardinal is the figure of the scarlet hat with its tasseled pend¬ ants. The gown of the cardinal is scarlet (pur¬ pura, commonly rendered purple, but our (Jpur-ple® in the language of the ritual is violet, violaceus). Hence (<to receive the hat® means to be made a cardinal ; and to aspire to the purple is to aim at the cardinalitial dignity. Etiquette requires that a cardinal be addressed as Eminence; in English usually <(your Emi¬ nence,® and every cardinal is eminentissimiis. A bishop or archbishop who is a cardinal uses such a formula as the following in official in¬ struments (the example is taken from the ap¬ probation of a book by an archbishop of Mech¬ lin or Malines in Belgium) :

((Engelbert, by the divine mercy, cardinal-

priest of the holy Roman Church, of the title of Saint Bartholomew in the Island, archbishop of Mechlin, primate of Belgium,® *etc.*

CARDING, the process which wool, cot¬ ton, flax, etc., are made to undergo previous to spinning, to lay the fibres all in one direction and to remove all foreign substances. The card formerly consisted of a number of iron teeth arranged in a piece of leather of various lengths and the material was combed by hand. For many years this work has been done by machinery, invented in 1738 by Lewis Paul, a Birmingham mechanic. The cards have fine, long teeth fixed on leather strips called card-clothing, which are arranged on a series of cylinders so placed that the material is carried from one to another, until removed by still another and much smaller cylinder called the dolfer, from which it is stripped by a mov¬ ing comb, and then by a series of rolls is de¬ livered in the form of a ribbon into a can, wffien it is ready for the drawing-frame, on which it is prepared for spinning. Consult Murphy, (The Textile Industry> (Vol. II, Lon¬ don 1912).

CARDIOID, a heart-shaped curve. It is produced by drawing a great number of chords from a single point of the circumfer¬ ence of a circle, prolonging each beyond the further crossing of the circumference to a distance equal to the diameter of the circle, and joining the free ends by a smooth curve. It is a special case of the limagon, in which the extension of the chords is of any uniform length. The limagon was invented by Pascal, early in the 18th century.

CARDITIS, kar-di’tis, an inflammation of the heart. The word is not now used, since more definite terms are accessible to designate particular types of inflammation. Thus myo¬ carditis is an inflammation of the heart mus¬ cle, endocarditis, of the lining membrane, the endocardium ; pericarditis, of the external membrane, the pericardium.

CARDONA, kar-do’na, Spain, town in the province of Barcelona, on the right bank of the Cardoner, 50 miles north-northwest of Bar¬ celona. It is a picturesque town of great an¬ tiquity, surrounded by Moorish walls and cas¬ tle, and a church dating from the 14th cen¬ tury. In its vicinity is a hill of rock salt 265 feet high and three miles in circumference, which affords inexhaustible supplies of salt. Pop. 4,002.

CARDOON, a garden vegetable (Cynara cardunculns) , of the natural order Composite v. It so closely resembles the artichoke (Cynara scolymns) that some botanists consider the two species merely as horticultural varieties. The plant, which is a native of southern Europe and the northern part of Africa, Js a thistle¬ like, tender perennial which is cultivated as an annual. Seed is usually sown in spring in a hotbed; the young plants are transplanted to the rich soil of the garden about four feet apart each wray and kept cleanly cultivated until the leaves are nearly full grown, when the plant is tied up, covered with straw and earth, to blanch for two or more weeks. The thick leaf-stalks and the midribs are the parts de¬ sired. In America the plant is not very popular except with the foreign population.

CARDS, pieces of cardboard, oblong in shape, bearing certain figures and spots ; spe¬ cifically, playing-cards used in various games of chance and skill. Playing-cards are prob¬ ably an invention of the East, and some assert that the Arabs or Saracens learned the use of cards from the gypsies and spread them in Europe. The Chinese dictionary (Ching-tze- tung} (1678) states that they were invented for the amusement of Seun-ho’s concubines in the year 1120 a.d. The course that card-play¬ ing took in its diffusion through Europe shows

that it must have come from the East, for it was found in the eastern and southern countries before it was in the western. The historical traces of the use of cards are found earliest in Italy, then in Germany, France and Spain. The first cards were painted, and the Italian cards of 1299 are found to have been so. The art of printing cards was discovered by the Germans between 1350 and 1360. The Germans have, moreover, made many changes in cards, both in the figures and the names. The Lanzknechtsspiel, which is regarded as the first German game with cards, is a German invention. Of this game we find an imitation in France, in 1392, under the name of lans¬ quenet, which continued to be played there till the time of Moliere and Regnard, and per¬ haps still longer. The first certain trace of card-playing in France occurs in the year 1361, and Charles VI is said to have amused him¬ self with it during his sickness at the end of the 14th century. The modern figures are said to have been invented in France between 1430 and 1461. It has been said that cards were known in Spain as early as 1332; but what is certain is that card-playing must have become prevalent in the course of the century, seeing it was prohibited by the King of Castile, John I, in 1387. Mr. De la Rue, the most extensive manufacturer of cards in England, obtained in 1832 a patent for various improvements in man¬ ufacture. The figures on cards had been gen¬ erally produced by the outlines first being printed from copper plates, and the colors then filled by stencilling. Mr. De la Rue's process was to print them from colored types or blocks exactly in the same way as calico-printing, but all the colors being in oil.

As early as the 15th century an active trade in cards sprung up in Germany, and was chiefly carried on at Nuremberg, Augsburg and Ulm, the demand from France, England, Italy, Spain and other countries producing great prosperity among the manufacturers. In England the manufacture of cards flourished especially under Elizabeth. But no sooner had cards come to be generally used in Europe, than they were prohibited by several governments, partly from moral considerations, the first games being games of chance; partly from considerations of political economy, as in England, where the im¬ portation of foreign cards was considered in¬ jurious to the prosperity of home manufactur¬ ers. The prohibition, however, only tended to increase the taste for cards. In England, under Richard III and Henry VII, card-playing grew in favor. The latter monarch was very fond of the game, and his daughter Margaret was found playing cards by James IV of Scotland, when he came to woo her. The popularity which cards gradually obtained in England may

be inferred from the fact that political pam¬ phlets under the name of <(Bloody Games of Cards,® and kindred titles, appeared at the com¬ mencement of the civil war against Charles I. One of the most striking publications of this kind was one in 1660 on the royal game of ombre. Pepys, in his (Diary,) under the date of 17 Feb. 1667, states that on Sabbath evenings he found (<the Queene, the Duchesse of York, and another or two, at cards, with the rooms full of ladies and great men.®

The modern pack of cards, used in most of the familiar games, is 52 in number, containing four suits; clubs and spades (black) and hearts and diamonds (red). Thirteen cards compose a suit, consisting of king, queen, knave or jack, and 10 pip-cards ranging in number of spots from one (ace) to 10. The figures of the four suits are supposed to have been originally in¬ tended for symbolical representations of the four great classes of men, and the names at¬ tached to these figures in England arose from a misapprehension of the names originally as¬ signed to them. Thus, by the hearts are meant the gens de chceur (cceur), the choir-men or ecclesiastics, and hence these are called copas, or chalices, by the Spaniards, whose word espada, sword, indicating the nobility and war¬ riors of the state, has been corrupted into the English spade. The clubs were originally tre-fles (trefoil leaves), and denoted the peasantry; while the citizens and merchants were marked by the diamonds (carreaux, square tiles). The word knave (German, knab, boy), was used, of course, in its older sense of servant, or attend¬ ant on the knights. The natural rank of the cards in each suit is, king highest, and so on down to ace lowest ; but in many games this rank is varied, as in whist, where the ace is put highest of all, above the king; in ecarte, where it is put between the knave and the 10; and in bezique, where it is made the highest, but where the 10 is put between it and the king; in qua¬ drille, the rank of some of the cards is variable in every hand. Sometimes the pack of cards is reduced to 32, by excluding the six, five, four, three and two of each suit ; it is then called a ((piquet pack.® An immense variety of games may be played with cards, some involving chance only, others combining chance and skill, the best furnishing intellectual amusement. There are round games, in which any number of persons may join, as poker, hearts, loo, etc.; games for four persons, as whist, in its differ¬ ent forms, and euchre; for two, as piquet, ecarte, bezique, cribbage and pinochle, closely resembling bezique, and at present much played in the United States; and there is one game, solitaire, played in many ways, at which a sin¬ gle person often finds both restful diversion and pleasant occupation for the mind.

Consult Singer, Researches into the History of Playing Cards* (London

1816) ; Chatto, (Origin and History of Playing Cards* (Lon¬ don 1848) ; Willshire, (Descriptive Catalogue of Playing and Other Cards in the British Museum* (London 1876) ; Taylor, (The His¬ tory of Playing Cards) (London 1848) ; Mer¬ lin, R., (Origine des cartes a jouer* (Paris 1869) ; Van Rensselaer, <The Devil's Picture Books-* (New York 1890) ; id., (Prophetical, Educational and Playing Cards) (Philadelphia 1912) ; Jessel, bibliography of Works in Eng-

lish on Playing Cards and Gambling) (Lon¬ don 1905) ; D'Allemagne, (Les cartes a jouer) (Paris 1906), a very detailed account.

CARDUCCI, kar-doo'che, Giosue, Italian poet: b. Valdicastello, Tuscany, 27 July 1835; d. Bologna, 15 Feb. 1907. During his boyhood, which was spent in Tuscany, his father, a dis¬ sipated, hot-headed doctor, was his only teacher. An ardent admirer of Manzoni, Latin literature and the French Revolution, he in¬ spired his son with his own love of literature, thus giving him early those ideas and senti¬ ments that were, later on, to make him one of the great leaders of his country, and the most distinctive Italian innovator in literature of all time. (I Promessi SposP the boy read and re-read until the characters of Manzoni's great work became living, breathing human beings to his vivid boyish imagination. (Geru-salemme Liberata,5 Rollings (History of Rome,5 Thiers' (History of France,5 the <Iliad) and the (2Eneid5 were also his constant compan¬ ions. In 1849 Dr. Carducci, owing to his revo¬ lutionary sympathies, was forced to take refuge in Florence, together with his family; and there Giosue was sent to school, where he proved an excellent student and incidentally read the works of the foremost French, Ger¬ man, Italian and English writers. His youthful poems attracted the attention of the rector of the Normal School at Pisa, then attached to the university, and he was admitted to this in¬ stitution, receiving board and tuition free. He worked with furious energy, read omnivorously, wrote for the press and compiled an anthology of poetry. Graduating from the Normal School in 1856 he became teacher in the San Miniato Lycee, which he was forced to leave the following year on account of his liberal tendencies. In 1857

his first volume of poems appeared under the title of <Rime.) He went to Florence with the intention of making litera¬ ture his life work, but the suicide of his brother Dante and the death of his father in 1858 threw upon him the support of the family. Then began a long and bitter struggle against poverty. He wrote for magazines, tutored and lived, with the family, in a small, ill-fur¬ nished garret. For the Edizione Diamante he wrote articles covering almost every imagi¬ nable subject, and everything he did with the utmost care, devoting his days and nights to research; so that his work ever exhibited the ear-marks of the scholar. During his 10 years with the Edizione he produced literary mate¬ rial sufficient in volume and quality for the life work of most men. In 1859, after 10 years' en¬ gagement, Carducci married his cousin, Elvira Minicucci. The war with Austria, which broke out in the same year, inspired his poetic muse, and he began contributing stirring poetic odes to the press. Italy began to be curious about this young man who spoke with so much radical enthusiasm and authority. His poems to (Vittorio Emanuele) and (Alla Croche di Savia5 received enthusiastic welcome, and the latter was set to music, sung in the theatres, recited in the schools and salons, whistled on the streets and repeated among the heists of the army of liberty. Carducci was appointed pro¬ fessor of Greek in the Lycee of Pistola, a posi¬ tion he resigned in a few months to accept the professorship of literature in the University

of Bologna which he was destined to hold for 44 years. He continued working with the same prodigious energy, writing poetry and prose, editing works for the publishing house, prepar¬ ing university lectures and making extensive researches. His earnestness, brilliant imagery, strong originality and oratorical powers at¬ tracted to his classes students from all over Italy and, later, from all over Europe, and Car¬ ducci became a name to conjure by. His grad¬ uated students formed Carducci societies for the propagation of his ideas round which the literary battle of the century in Italy had al¬ ready begun. Never before had such lectures on literature been given in any university in Italy as Carducci furnished in his conferences on the development of the National Literature) and its relation to the social history of the Italian people from the earliest days to his own time. In them he became the prophet of Italy whose glorious past he depicted as it had never before been painted. In her he saw Rome living over again in all the majesty and glory of Roman tradition. His intense patriot¬ ism brought all liberal, progressive Italy to his feet, and his ardent admiration of ancient Italy and Rome revived the <fglorious paganism® of classical days. He attacked bitterly the liter¬ ary,

political and artistic views then generally accepted in Italy; and the more the battle raged the larger grew his classes and his followers which included most of the younger generation. He fought the suzerainty of Austria over Italy, the temporal power of the Catholic Church and the apathy of Italy herself. In turning away from Romanism he set his face against Christianity, as he knew it in Italy, and asceticism which he declared opposed to all progress, beauty and truth. This hatred showed itself in his (Ode to Satan5 (1865), the ((immortal foe of autocracy and the ban¬ ner-bearer of the great reformers and inno¬ vators in all ages.® In (Giambi ed Epodi) he struck a new and passionate note that roused all Italy and finally led to his suspension from his classes in the university (1868-70). (Nuove Poesie) (1873), a collection of 44 new poems, added very greatly to his reputation at home and abroad and made his position secure. The (Odi Barbare) (1877) had still greater success, the first edition being sold out in a few weeks. In these he discards rhymes and adopts the various metres of Horace with success, in lyrics of great beauty, force and originality.

Gradually, in his later days, Carducci, the ardent Republican, became a convert to mon¬ archism and he was elected member of the Senate in 1890. His last volume of poems (Ritmi e Rime5 appeared in 1899. He re¬ signed his professorship in 1904 and two years later he received the Nobel prize for literature. His published works, which treat of history, biography, political and other controversy, lit¬ erary criticism, philosophy, lyrical, erotic, de¬ scriptive, pastoral and dramatic poetry are among the most extensive in the history of Italian literature. Consult Zanichelli, (Opere de Giosue Carducci5 (Bologna 1909) ; Chiarini, G. L., < Carducci 5 (1913); Granett, R., Utahan Literature5 (1908) ; Holland, Maud, (Poems of Giosue Carducci5 (20 poems translated, 1907) ; Williams, Orlo, (Giosue Carducci5 (1914).

John Hubert Cornyn, Editorial Staff of The Americana.

CARDWELL, Australia, town of Cardwell County, Queensland, on Rockingham Bay, 800 miles direct northwest of Brisbane. Its fine

harbor has a depth varying from 24 to 60 feet, accessible in all weathers. Dugong fishing and oil extracting, cedar lumber, canning meats, preserve and sauce manufactures are thriving industries, and minerals including gold and tin are found in the vicinity. Pop. 3,500.

CARE SUNDAY, sometimes taken to be the Sunday immediately preceding Good Fri¬ day; but generally used to signify the fifth Sunday in Lent. Same as Passion Sunday.

CAREME, ka-ram, Marie Antoine, French cook: b. Paris, 8 June 1784; d. there, 12 Jan. 1833. He was chef de cuisine to many cele¬ brated persons, including Talleyrand, King George IV and one of the Rothschilds. He cooked for the Congress of Aix-la-Chapelle, Vienna and Laibach. He wrote (Le patissier pittoresque) (2d ed., 1842) ; <Le mail re d'hotel frangais) (2d ed., 1842) ; *Le patissier royal parisien} (1828) ; (L'art de la cuisine fran¬ chise au XIX siecle) (1833).

CARET, kara, a turtle. See Hawksbill.

CAREW, ka-roo', Richard, English an¬ tiquarian and poet : b. East Antony, Cornwall, 17 July 1555; d. there, 6 Nov. 1620. He was a member of the House of Commons, high sheriff of Cornwall in 1586, and the author of a much valued (Survev of CornwalP (1602) ; and an English translation of a portion of Tasso's Jerusalem Delivered) (1594), and from an Italian version of Huarte de San Juan, (The Examination of Men's Wits.)

CAREW, Thomas, English poet: b. 1598; d. 1639. He was educated at Corpus Christi College, Oxford. Cultivating polite literature in the midst of a life of affluence and gaiety, he was the subject of much eulogy by Ben Jonson, Davenant and other writers of the pe¬ riod. He was made gentleman of the privy-chamber to Charles I. The King bestowed on him the royal domain of Sunning Hill, a part of Windsor Forest. In him was exhibited the not unusual transformation of the courtly and libertine fine gentleman into the repentant devo¬ tee. Carew is coupled with Waller as one of the improvers of English versification. The first collection of his poems was printed in 1640, and the last in 1824. His elegant masque of (Coelum BritannicunP was printed both in the early edition and separately in 1651, and the whole were included in Chalmers' (British Poets.) Carew was much studied by Pope, and Dr. Percy also assisted to restore him to a por¬ tion of the favor with which he has come to be regarded. Specimens both of the sublime and the pathetic may be found in his works; the former in his admirable masque, and the latter in his epitaph on Lady Mary Villiers. Recent editions are by Hazlitt for the Rox-burghe

Library (London 1870) ; by Ebsworth (London 1893) ; and by Vincent for the Muses Library (London 1899). (Poems,) edited by Arthur Vincent in 1899, is the best edition of Carew.

CAREX, kar'eks, a genus of plants, be¬ longing to the family Cyperacecr, or sedges, and containing numerous species, which are found in nearly all parts of the world where vegetation can exist, on the driest upland as

well as the wettest marsh. The plants are perennial, often creeping, with mostly sharp-keeled leaves and solid triangular stems. The flowers are without perianth and unisexual, being grouped in spikelets. The male flowers have usually three stamens, the female having a single style with two or three stigmas. The number of known species is above 800, and of these the United States has about 300. Hardly any of them have any agricultural value, but C. arenaria, the sand-sedge, is of use in bind¬ ing the sand on many seashores. In parts of the United States a poor quality of hay is made from some of the sedges. C. morrowi is an elegant variety with white-edged leaves cultivated by florists.

CAREY, Henry, English composer and poet: b. London 1696; d. there 1743. He is supposed to have been a natural son of George Saville, Marquis of Halifax. His first in¬ structor in music was a German, named Lin-nert, but he was afterward more thoroughly trained under Roseingrave and Geminiani. He was inexhaustible in the invention of new, pleasing and often deeply pathetic melodies, to which he not infrequently furnished the words. His (Sally in Our Alley) is still a well-known song. He has also been said to be the author of (God Save the King,) but this appears to have been doubtful until substantiated by Chrysander. He supported himself by public and private teaching, but his whole life was a continued struggle with poverty, and it has been said that at last, in a fit of despair, he committed suicide (1743). His collected songs were published in 1740. Among other works are <Teraminta) (1732) and other operas;

(Chrononhotonthologos, y . (<the most tragical tragedy ever yet tragedizedˆ (1734), a bur¬ lesque; (The Wonder, or An Honest York-shireman) (1735) ; (The Dragon of Wantley> (1737); and the (Musical Century, or a Hun¬ dred English Ballads) (1737; 3d ed., 1743).

CAREY, Henry Charles, American polit¬ ical economist: b.

Philadelphia, 15 Dec. 1793; d. there, 13 Oct. 1879. He was the eldest son of Mathew Carey, and in 1814 became a part¬ ner in his father's bookselling and publishing firm, where he continued until 1835. In that year he published an essay on <The Rate of Wages,) which he afterward expanded into (The Principles of Political Economy) (1837-40). His other important works are <The Credit System in France, Great Britain and the United States) (1838); (The Past, the Present and the Future) (1848); (The Prin¬ ciples of Social Science) (1858-59); (Letters on Political Economy) (1860 and 1865); <The Unity of Law) (1872). Originally a free¬ trader, he became an advocate of protection on the ground of temporary expediency; held that the growth of population was self-regulating; and was opposed to the theories of Ricardo and others on the law of diminished returns from the soil and on rent. He was also op¬ posed to any arrangement on the subject of international copyright. Some of his works have been translated into other languages, and his writings have had considerable influence on economic writers such as Frederic Bastiat and Diihring.

CAREY, James F., American Socialist leader; b. Haverhill, Mass., 19 Aug. 1867. He

received a common school education and learned shoemaking. In 1895 he was chair¬ man of a convention at Boston, which amal¬ gamated three national organizations of shoe¬ makers into, one union. In 1894 he was one of the leaders in the agitation of the unemployed on Boston Common, and the governor ap¬ pointed him a commissioner of the unemployed, but he was not confirmed. He was later elected president of the Haverhill common council. In 1898, 1899 and 1900 he was elected to the Massachusetts house of representatives, twice defeating a combination of the Demo¬ cratic and Republican parties. He was the first Socialist ever elected to political office in New England.

CAREY, Mathew, Irish-American writer and bookseller: b. Dublin, 28 Jan. 1760; d. Philadelphia, 16 Sept. 1839. An address to the Irish

Roman Catholics emphasizing the op¬ pression by the penal code brought about his expulsion from Ireland. Later he returned and established The Volunteer's Journal. But his radical views invited Parliament's distrust and he was imprisoned until the session was over. He came to the United States in 1788, and in Philadelphia began to pub¬ lish the Pennsylvania Herald. He was sub¬ sequently connected with the Columbian Mag¬ azine and the American Museum. A few years later he became a bookseller and an extensive publisher. When the yellow fever epidemic was especially virulent in 1793, he spent great energy in combating it and wrote a history of the disease. In the same year he founded the Hibernian Society and in 1796, with Bishop White, established the first Sun¬ day-School society. The best known of his political writings was his (Olive Branch* (1814). It was an effort to promote harmony among political parties during the War of 1812. It passed through 10 editions. In 1819 he pub¬ lished his (Irish Vindications) and in 1822 'Essays on Political Economy.*

CAREY, Rosa Nouchette, English novel¬ ist: b. London 1840; d. 1909. She began writ¬ ing novels in 1868, and her fictions (of which she wrote nearly 40), in which the literary element is not a very strong feature, were very popular with girls, to whom they were excellently adapted. They include (Wee Wifie) (1869); (Wooed and Married* (1875); (Not Like Other Girls> (1884); (Uncle Max* (1887) ; (Only the Governess) (1888) ; and (The Sunny Side of the HilP (her last novel, 1908), *etc.*

CAREY, William, English Orientalist and missionary: b. Paulerspury, Northampton¬

shire, 17 Aug. 1761; d. Serampore, India, 9 June 1834. He was early apprenticed to a shoemaker, and continued to work at his trade till he was 24. With what assistance he could procure he acquired Latin, Greek and Hebrew, and studied theology. In 1786 he became pas¬ tor of a Baptist congregation at Moulton, and in 1787 was appointed to a similar situation in Leicester. In 1793 he sailed for the East Indies as a Baptist missionary, but became overseer of an indigo factory. He studied languages and natural history, and collected a rich store of Oriental knowledge. In 1800, in conjunction with Marshman, Ward and others, he founded the missionary college at beram-

pore ; the year following he became professor of Sanskrit, Bengali and Mahratta at the newly-erected Fort William College, Calcutta. In

Serampore he had a printing-press for more than 40 different Indian languages, and issued various translations of the Scriptures. His first work was a Mahratta grammar. It was followed by other works, including a Bengali (Lexicon,* in which he was assisted by Felix Carey, his son. Under his direction the whole Bible was translated into 6 and the New Tes¬ tament into 21 languages or dialects of Hin¬ dustan ; and considerable progress was made with the translation of the whole Scriptures into Chinese. He also edited Shroeder's lexi¬ con of the Thibetan language and Roxburgh's (Flora Indica,* in which a genus of plants which he discovered is named after him, Careya. He established an agricultural society at Calcutta, and a botanical garden, at his own expense, at Serampore. For biography consult Culross (London 1882) and Smith, G. (London

1885).

CAREY ACT. See Reclamation Laws.

CARGILL, Donald, Scottish covenanting preacher: b. Rattray, Perthshire, about 1619; d. Edinburgh, 27 July 1681. He was educated at Aberdeen and Saint Andrews, and became minister of the Barony Church in Glasgow in 1655. At the Restoration he refused to ac¬ cept collation from the archbishop and was exiled beyond the Tay. In 1679 he took part in the battle of Bothwell Bridge, where he was wounded, but succeeded in escaping to Holland. In 1680 he published, along with Richard Cameron, the (Sanquhar Declaration.* In September of the same year he formally ex¬ communicated King Charles II, Duke of York and other great personages. After avoiding pursuit for several months, in May 1681, he was captured, and at Edinburgh tried and sen¬ tenced, and 27 July was beheaded.

CARGO, in law, the entire amount of goods carried by a ship ; also, loosely, persons col¬ lectively carried by a ship. The term is oc¬ casionally applied also to the invoice of the cargo. The bill of lading (q.v.) contains a list of the goods constituting the cargo. The goods on deck, although constituting a part of the cargo, are usually not covered bv the insurance policy. The master of a coasting vessel is required by law to keep a record of the goods constituting the cargo, the shippers, consignees and various other particulars, all of which is entered in the cargo book. See Freight.

CARHART, Henry Smith, American sci¬ entist ; b. Coeymans, N. Y., 27 March 1844 ; d. 13 Feb. 1920; graduated at Wesleyan Univer¬ sity in

1869, and thereafter taught physics and chemistry. In 1886 he was appointed pro¬ fessor of physics at the University of Michigan, where he remained until his retirement as professor emeritus in 1909. Professor Carhart devoted himself largely to the study of electricity, particularly the subject of standard cells and primary batteries, one of the best types of the former having been devised by him and known as the Carhart-Clark cell. He was a delegate from the United States to several international electrical congresses. He wrote (Primary Batteries^ (1891); (University Physics) (1894); (Electrical Measure-

merits1* (1895) ; (High School Physics) (1901) ; (College Physics) (1910), and other books.

CARHEIL, kii-ra-e, Etienne de, French Jesuit missionary in North America: d. after 1721. He labored for more than half a cen¬ tury among the Canadian Hurons and Iroquois, and was long stationed at Michilimackinac.

CARIA, in ancient geography, the country forming the southwest corner of Asia Minor, bounded on the north by Lydia or Maeonia, from which it was separated by the Maeander ; on the east by Phrygia, on the southeast by Lycia and on the south and west by the Medi¬ terranean. Some confusion, however, exists in regard to its boundaries. Part of it was settled by Greek colonies of Ionians and Dorians, who dispossessed the original inhab¬ itants. It was included in the dominions of Croesus, King of Lydia, and on his overthrow by Cyrus was transferred to the Persian monarchy, under whose protection a dynasty of Carian princes was established. Halicar¬ nassus was the residence of these sovereigns, among whom were the two celebrated queens, the first and second Artemisia. The progress of the Roman conquests ultimately extin¬ guished the independence of Caria, and about 129 b.c. it was incorporated in the Roman prov¬ ince of Asia.

CARIACO, ka -re-a'ko, Venezuela, a sea¬ port in the state of Bermudez, situated to the east of the Gulf of Cariaco, near the mouth

of a river of the same name, adjoining a large plain covered with plantations. Its trade is chiefly in cotton and sugar. The Gulf of Cariaco is 38 miles long, from 5 to 10 broad, from 80 to 100 fathoms deep, surrounded by lofty mountains. Pop. 7,000.

CARIACOU, kar'i-a-koo, the name given to American deer of the genus Cariacus, found in all parts of North America up to lat. 43° N. It is smaller than the common stag, and its color varies with the seasons from reddish-brown to slaty-blue.

CARIAMA, sa-re-a'ma, a bird (Cariama cristata), a native of Brazil and Paraguay, where its loud scream is a familiar sound on the campos, and where it is domesticated and trained to guard fowls. With an allied Argen¬ tine bird (Chung a burmeisteri) it constitutes a family (Cariamidce) of great zoological inter¬ est, combining as it does characters of the bustards, caracara eagles and cranes, with each of which it has been at times associated. It is larger than the common heron ; the plumage is brown, finely waved with darker brown, whitish on the lower parts. It uses its legs rather than its wings in seeking safety. According to W. H. Hudson, the Argentine naturalist, it is of the family of one of the great extinct birds of Patagonia, Phorophacos inflatus. Consult Pro¬ ceedings Zoological Society of London for 1889 and 1899.

CARIB, kar'ib, a native American race which attained its highest development in the West Indies. Originating in the valley of the Orinoco, this race spread along the coasts, northward and southward, to a great distance, and especially from island to island of the Lesser and Greater Antilles and the Bahamas. At the time of the discovery of America its language was spoken, with dialectic variations,

from the coast of Florida to lower Brazil,— wherever large canoes could carry the swarm¬ ing, warlike tribes. The Caribs were the vikings of South America. The race name survives in "Caribbean® Sea, "Caribbee® Islands, the word "cannibal,® etc.; the race itself is still well represented at various points in South America. In the West Indies, however, the large native population disappeared rapidly after the Spanish conquest, Caribs and other tribes of the same stock (Arawaks, Lucayos, Boriquenos, etc.), either succumbing under the new conditions or losing their distinctive char¬ acteristics by blending with Europeans and Africans. Surviving groups of West Indian Caribs may be studied to-day in the island of Dominica. A few remained in Martinique and Saint Vincent up to the time of the volcanic eruptions

in 1902. Great Britain deported 5,000 Caribs from Saint Vincent to the island of Ruatan in the Gulf of Honduras in 1796; thence they migrated to the Central American coast, where their numerous descendants have become a not inconsiderable element in the population of the-mainland. In the Proceedings of the American Association for the Advancement of Science* (Vol. LI, 1902), Mr. J. Walter Fewkes of the Bureau of American Ethnology calls attention to the different characteristics which the Caribs displayed in different circumstances and localities. Thus the natives in the Baha¬ mas, Cuba, Haiti and Porto Rico were mild, agricultural people who had lost in vigor, while gaining a rudimentary knowledge of the arts of peace, by their sedentary life. On the other hand, constant incursions from the home of the race (the Orinoco region in Venezuela) kept alive the savage customs and ferocious spirit of the Caribs of the Lesser Antilles. Such incur¬ sions took place even after the date of the Spanish settlements. The houses of the more peaceful Carib communities did not differ greatly from those of the peasantry in the same regions at the present time. In lieu of clothing, Carib men and girls covered their bodies, as well as their faces, with paint, to protect them from the bites of insects and the heat of the sun. A woven cloth of palm fibre, called nagua, — a breech-cloth with long ends, — was worn by the chiefs and the married women. For purposes of decoration, and to distinguish members of one family or community from those of another, designs of animals and plants were painted on the body. Their social organ¬ ization closely resembled that of the North American Indians, the unit of organization being the clan, ruled by a cacique (chief). Combinations were sometimes formed by a number of caciques for mutual defense, and extensive territories were subjected to the con¬ trol of the more ambitious leaders. Among the insignia of the cacique's rank were the gold disc called guarim, worn on his breast, and a stone amulet tied to his forehead. His numer¬ ous wives were practically slaves. Ex officio, he was a member of the priesthood. Columbus at first received the impression that the Caribs lacked spiritual insight ; longer sojourn among them, however, convinced him that they wor¬ shipped many supernatural beings whom they represented by idols, called semis ; they had temples for this purpose, in which rude idols were set up to be consulted as oracles by the priests. It is probable that belief in a future

life, although not universally held, as some authorities assert, was generally taught by the priests ; and it is quite certain that the latter possessed great influence, being physicians to the people as well as ministers to the zemis.

Like other savage races of the region from which they came, the Caribs were anthro¬ pophagi ; yet the evil prominence given to them through the coining of the word cannibal (a Latinized form of Carib) is not wholly merited. The discoverers, finding a great num¬ ber of human skulls in the Carib houses, jumped to the conclusion that each skull was the trophy of some revolting feast. In point of fact, the Caribs, being ancestor-worshippers, preserved these relics in honor of defunct mem¬ bers of their family. Consult Adam, (Le Cara'ibe du Honduras et le Caraibe des Isles* (in Internat. Amerik.-Kongr., Vol. XIV, 1904); Rat, J. N., (The Carib Language as now Spoken in Dominica) (in Journal Anthrop. Inst., Vol. XXVII, London 1897-98) ; Koch - Griinberg's (Die Hianakoto-Umana* (in Anthropos, Vol. Ill, 1908) ; id., (Zwei Jahre unter den Indianern* (Berlin 1909-10).

Marrion Wilcox.

CARIBBEAN, kar-i-bean, SEA, a part of the Atlantic Ocean occupying a basin 750,000 square miles in area, bounded by South and Central America and the Greater and Lesser Antilles. Its perimeter is wholly mountainous. Mountain folds (continued in submarine ridges from the Greater Antilles to Honduras) mark its limits on the north and south; but the vol¬ canic chain of the Lesser Antilles rises on the east, and the volcanoes of Central America in the remote past formed a wall separating it from the Pacific on the west. Separating it from the Atlantic are steep submarine ridges, of which the Lesser Antilles are the summits. A portion of the broad equatorial stream, which flows from east to west, from the coast of Africa to that of Brazil, enters the Caribbean between the islands at the southern end of the Antillean chain : the waters of this sea, there¬ fore, move from east to west and northwest, and seek an exit through the Yucatan Channel — a passage 120 miles wide between Cuba and the peninsula of Yucatan. On its South Ameri¬ can coast are the gulfs of Paria, Triste, Darien, Venezuela, Cariaco ; on the west are the Mos¬ quito Gulf and the Gulf of Honduras. But the latter is too small to allow an outflow equal to the inflow into the Caribbean ; so that, after the trades have forced the equatorial water into the Caribbean basin, it must remain there a con¬

siderable length of time, thus becoming super¬ heated, before it passes into the Gulf of Mexico, where, owing to similar differences between the rate of inflow and outflow, the water be¬ comes still more superheated before passing through the Florida Strait as the Gulf Stream. The main westerly current in the Caribbean, after passing through the Banks Strait, between the Mosquito Reef and Jamaica, is joined by the current of the Windward Channel. The tradewinds, blowing with a steady velocity across the Caribbean region, from east to west, make the surface of this sea much rougher than that of the Gulf of Mexico; they mitigate the tropical heat at all points where their influence is felt ; and the moisture they bring from the Atlantic is precipitated in the form of abundant VOL. 5 — 39

rains against the eastern slopes of the moun¬ tains, both on the islands and the mainland. Hence the distinction between ((windward® and (<leeward® regions, insisted upon especially in the West Indies. The Gulf of Mexico, shel¬ tered behind the Antilles and Yucatan, is prac¬ tically a <(leeward® expanse ; but the summer climate of Texas and the great plains is some¬ what modified by Caribbean tradewinds.

Recent studies of the Caribbean basin have disclosed its interesting submarine topog¬ raphy — ((a configuration which, if it could be seen, would be as picturesque in relief as the Alps or Himalayas. Nowhere can such con¬ trasts of relief be found within short distances. Some deeps vie in profundity with the altitudes of the near-by Andes… . Some of the de¬

pressions, like the Bartlett Deep, are narrow troughs, only a few miles in width, but hun¬ dreds of miles in length, three miles in depth, and bordered by steep precipices… . There

are long ridges beneath the waters, which if elevated, would stand up like islands of to-day.

… Again, vast areas are underlain by shal¬ low banks … often approaching the sur¬

face of the water, like that extending from Ja¬ maica to Honduras… . The greater islands and the mainlands are bordered in places by submerged shelves.® (From (Cuba and Porto Rico) : see authorities below). All the islands are, then, to be regarded, from a physiographic point of view, as the ((tops of a varied con¬ figuration, which has its

greatest relief beneath the sea® ; and some of these submarine valleys and mountains have yielded a surprising num¬ ber of animal forms previously unknown. Dredgings in depths of over 2,000 fathoms have brought to light new species of Crustacea, and forms resembling the fossils of past geo¬ logical epochs are taken alive in those profound marine valleys. Many phosphorescent creatures are found; in certain places ((dense forests of pentacrini undulate on the bottom like aquatic plants® ; on the submerged banks and in the shallows, coral polyps and mollusks are em¬ ployed as actively now as ever, in extracting the lime carried in solution by the sea-water, to build its shells and corals which are so large a part of the rock-making material in all this region, from Yucatan to Porto Rico. The most important marine highways for Caribbean com¬ merce are those on the north : the Windward, Anegada and Mona passages and the Yucatan Channel. The Caribbean has attained a new importance since the completion of the Panama Canal. It is now traversed by several world trade-routes directed to the Pacific through the canal. The United States has a naval base at Guantanamo Bay, Cuba; the British have bases at Bermuda and Jamaica; the Virgin Islands ac¬ quired by the United States from Denmark in 1916 and occupied 31 March 1917, form another naval base for the defense of the canal. Sev¬ eral steamship lines make winter cruises from New York. (For the origin of the name, see Caribs). Consult Agassiz, (The Gulf Stream* (in annual report Smithsonian Institute to July 1891, Washington 1893) ; Hill, of United States Geological Survey, (Cuba and Porto Rico)

(1898).

Marrion Wilcox.

CARIBBEAN, American Interests and Diplomatic Relations in the. The United

States has had a long historical interest in the Caribbean and its

problems. This interest was early expressed by the long struggle to obtain trade with the British West Indies, the western desire for a trade outlet at the mouth of the Mississippi, the sympathy for the Spanish colo¬ nies in their struggle for independence and the American annexation of territories fronting on the Gulf. In the decade and a half after 1845 its continuation and increase was indicated by the Panama transit treaty with Colombia (then New Granada) in 1846, the ship canal agree¬ ment with Nicaragua in 1849, the famous An¬ glo-American Clayton-Bulwer treaty of 1850, a series of negotiations for the acquisition of Cuba and certain West Indian naval stations and various efforts to prevent the danger of European interference in Central America and the West Indies. In the Civil War American attention was attracted toward the Caribbean by the problem of blockading Confederate ports against blockade runners operating from cer¬ tain West India bases; and after the war, the earlier propositions for greater influence in the region were kept alive by the memory of the difficulties and limitations of the American navy in maintaining the blockade of the Con¬ federate ports, and also by the unsatisfactory conditions of Spanish rule in Cuba.

The Spanish-American War, resulting in the American possession of Porto Rico and the assumption of new international duties in Cuba, brought the vision of new economic and politi¬ cal advantages in the Caribbean and the real¬ ization of new responsibilities. The develop¬ ment following the war revolutionized the American national position. By the logic of events the United States was forced into a place of increasing importance in international leadership in the Caribbean. The construction of the Isthmian canal under American control, the logical conclusion of a long series of events and the immediate result of a wise diplomacy and policy which terminated a long period of irritating discussion and delay, attracted the attention of the United States to the neces¬ sity of larger responsibilities in the develop¬ ment of the Caribbean tropics to serve the world's needs.

Under the administrations of Roosevelt, Taft and Wilson, the general policy of the American government toward Caribbean coun¬ tries was fundamentally the same in the as¬ sumption toward weaker neighbors of increasing responsibilities which might involve inter¬ vention to keep order. A positive policy, preventative rather than remedial, gradually supplanted the former negative or passive policy which involved intervention only after a wrong was done. In 1903, under President Roosevelt, the government extricated Venezuela from a humiliating experience with Germany and other European powers. In 1905 it assumed control of customs collection in the Dominican Republic, and soon thereafter exercised its treaty right to interfere in

Cuba to preserve order. Later, under President Taft, it actively intervened to terminate a revolution in Nicara¬ gua, and negotiated with Nicaragua and Hon¬ duras treaties for the extension of agreements similar to the one in force in the Dominican Republic. Later, under President Wilson, it retained forces in Nicaragua for the preserva¬ tion of order, and sent a force of American

officials to the Dominican Republic to supervise the elections, and (in 1916) ratified convention arrangements for establishment of fiscal protec¬ torates over Nicaragua and over Haiti. In 1917 the policy of increased police duties in the Caribbean also resulted in the acquisition ot the Danish colonies.

The object lesson of Porto Rican develop¬ ment under American control, and of American supervision in Cuba and San Domingo — a practical demonstration that public order and security of life and property is an essential condition for economic development — has made a deep impression upon all Caribbean peoples.

As a result of the construction of the Pan¬ ama Canal, the international importance of the Caribbean has greatly increased by the develop¬ ment of new trade routes which will make it the trade centre of the American tropics — the cross-roads of the western world; and the United States more than any other great power is concerned in the political ownership of the territory, the fiscal policies of their govern¬ ments, the extent and direction of their foreign trade, the problems arising from the peculiari¬ ties of their population, their financial status, the exploitation of their natural resources, their foreign investments, the protection of health, and other problems which have a bearing on foreign policy and necessitate more intimate American relations with these communities.

Bibliography — Blakeslee, George H. (ed¬ itor), (Latin America > (1913) ; Callahan, J. M., (Cuba and International Relations) (1899) ; Jones, Chester Lloyd, (Caribbean Interests of the United States) (1916) ; Latane, J. H., dip¬ lomatic Relations of the United States and Spanish America) (1900).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

CARIBBEE, ka-ri-be’, or SAINT LUCIA BARK, a bark sometimes substituted for cinchona (q.v.), though not containing its characteristic

alkaloid. It is procured from the Exostemma Caribceum, a tree growing in the West Indies. This bark is in convex frag¬ ments, covered with a yellow epidermis and has a very bitter taste and very faint smell.

CARIBBEE ISLANDS, a name com¬ monly given to that portion of the chain of Lesser Antilles between the Virgin and South American groups. See Antilles.

CARIBE, any of a group of small, robust, voracious fishes, often of singular form, and allied in structure to salmon, which abound in South American tropical rivers. They have numerous teeth, well fitted to biting out pieces of flesh, and instantly seize upon any disabled or soft-bodied creature in the water and de¬ vour it or worry it. Hook-and-line fishing is almost useless where these little bandits are numerous, as they rob the hooks of bait, or tear to pieces anything caught before it can be lifted out of their reach. They will even attack and badly wound human bathers. One of the best known and most dreaded is the piraya of the Amazon, which is said to come in crowds wherever blood is shed in the water. These fishes constitute the subfamily Serrasalmoni-nce, of the family Characinidce, and are inter¬ mediate between the cyprinoids and the salmon-CARIBOU — CARICATURE AND CARICATURISTS

oids. A distinguishing characteristic is the fact that the abdomen is serrated with sharp spines. Consult Gunther, introduction to the Study of Fishes > (Edinburgh 1880).

CARIBOU, ka-ri-boo', the name of two or more species of reindeer inhabiting ˆCanada, which are of great importance as a source of food and clothing to the natives of Arctic and sub-Arctic regions, and also are of much inter¬ est to sportsmen. The caribou is so completely a reindeer (q.v.) that there seems little prac¬ tical reason for separating it specifically from that of Europe, whence no doubt it came by migration in early Pleistocene time; and still less for the division of this very variable deer into the many species and subspecies that have been described (tby those who believe that the infinite variations of nature must be followed by an infinity of names? It will be convenient, nevertheless, to follow the general practice and recognize

two groups — the Arctic or Barren-Grounds caribou (Iiangifer arcticus), and the Woodland caribou (Rangifer caribou).

The Arctic caribou is to be found from Greenland to Alaska wherever tundras and a few plains exist north of the limit of tree-growth, and on all the islands of the Polar Sea. This is in summer, when herbage springs up along the coasts and watercourses, and reviving lichens and mosses furnish abundant fare. The does and fawns scatter in little parties by themselves at this season, separated from the widely wandering stags. Their coats are gray or light brown, varying locally, and the summer-coat is acquired in July when the old winter-coat is shed. This new summer hair is long and soft, and is white at the roots, but tinted toward the end. As it grows and thickens the hair becomes brittle, the white base lengthens as fast as the brown tips wear or break off, and finally the color of the coat disappears and it is virtually white all over the body. Thus is acquired the white winter-coat characteristic of this species. As autumn approaches these caribou gather toward the south from the outlying coasts and islands, until huge herds are brought together and travel south to the northern edges of the Canadian forests, in whose shelter they pass the winter, shedding and renewing their antlers at that season. In the spring they go north as soon as the snow permits.

These semi-annual migrations are the har¬ vest times of the Eskimos and northern Indians, and a successful attack on a helpless herd pro¬ vides them with a supply of flesh and useful materials that ensures a comfortable winter; but the slaughter has been so inconsiderate that even on the Barren Grounds these herds are now small and scattered as compared with a century ago, and local famines are more and more suffered, or districts have been perma¬ nently abandoned by the inhabitants in conse¬ quence. Every edible part of the animal, even to the entrails and marrow of the bones, is eaten. From the bones and horns various im¬ plements are made, while the hide furnishes the best of clothing and bedding. The Arctic folks are as dependent on their caribou as are the desert-people on the camel.

The Woodland caribou has never been so necessary, although always valuable, to the In¬ dians of central and southeastern Canada, ex¬ cept perhaps in Labrador, because there was

plenty of other game. This species is in gen¬ eral of larger size and darker color, and has heavier antlers with more points, than the Arctic species just described. It is variable in all re¬ spects; and two or three

forms from the Rocky Mountains and westward have been called sep¬ arate species ; but the distinctions are obscure. The largest specimens recorded come from southwestern Alaska. This species avoided the open plains, but in summer once roamed through all the wooded region of Canada south to the Great Lakes and central New England. It is now to be seen in the United States only in northern Maine and along the rough northern border of Minnesota, and in Canada has been so threatened with extinction that it has long been protected by law. This decrease is owing mainly to the acquirement of firearms by all the Indians of the interior, and to the exten¬ sion of settlements far toward the north ; but it is largely due, also, to the work of sports¬ men. To these men caribou hunting in autumn and early winter yields sport of a high order. This deer, sensitive in sight, hearing and smell, and exceedingly wary, affords an object of stalking-tactics so difficult as to make the get¬ ting within rifle range of, and finally obtain¬ ing, a ((good bead,® a feat to be proud of. An easier and more deadly way is to track and overtake a band on snowshoes, but this also requires great skill and endurance, and good shooting. The writings of sportsmen-travelers in all parts of Canada and Alaska abound in narratives of this sport, and describe the habits of this fine deer. Consult Elliot, (The Deer Family) (in (Sportsman's Library,) New York 1902) ; Ingersoll, (Life of Mammals) (New York 1909) ; Seton, (Northern Mammals> (New York 1909) ; Tyrrell, (Report Canadian Geological Survey for 1896) (Ottawa 1897).

Ernest Ingersoll.

CARICA (from carta, a district of Asia Minor, whence it was supposed to have come), a genus of plants, the typical one of the order of Papayads {Papayacecc) . See Papaw.

ˆ CARICATURE AND CARICATUR¬ ISTS. A tendency to burlesque and caricature is a feeling deeply implanted in human nature, and it is one of the earliest talents displayed by people in a rude state of society. An ap¬ preciation of, and sensitiveness to, ridicule, and a love of that which is humorous, are found even among savages, and enter largely into their relations with their fellowmen. When, before people cultivated either literature or art, the chieftain sat in his rude hall sur¬ rounded by his warriors, they amused them¬ selves by turning their enemies and opponents into mockery. They laughed at their weak¬ nesses, joked at their defects, whether physi¬ cal or mental, and gave them nicknames in accordance therewith, — in fact, caricatured them in words, or by telling stories which were calculated to excite laughter. When the agricultural slaves were indulged with a holi¬ day from their labors, they spent it in unre¬ strained mirth. And when

these same people began to erect permanent buildings, and to ornament them, the favorite subjects of their ornamentation were such as presented ludicrous ideas. The warrior, too, who caricatured his enemy in his speeches over the festive board, soon sought to give a more permanent form

to his ridicule, which he endeavored to do by rude delineations on the bare rock or on any other convenient surface which presented itself to his hand. Thus originated caricature and the grotesque in art. In fact, art itself, in its earliest forms, is caricature ; for it is only by that exaggeration of feature which belongs to caricature that unskilful draughtsmen could make themselves understood. The field of the history of comic, satiric literature and art is very large, and many nations, ancient and mod¬ ern, Egypt, Greece, Rome, India, pagan and Christian are represented. During the period of transition from antiquity to the Middle Ages, the Roman mimi continued to exist, and the evolution of the religious and secular cari¬ cature of the period and of the caricatures preceding the Reformation was associated with the mimi performers who sung songs and told stories, accompanied with dancing and music, an ever-popular form of amusement. In the 4th century Saint Augustine calls these per¬ formances nefaria, — detestable things — and says, that they were performed at night. The songs as they are called continued to consist not only of general, but of personal, satire and con¬ tained scandalous stories, frequently accom¬ panied by rough illustration or caricature, of persons living and well known to those who heard and saw them. The Reformation and Puritan periods furnish many amusing and historically illuminative specimens of carica¬ ture, domestic and political, as represented in the Flemish school of Breughel, the Italian school of Salvator Rosa and the French school of Callot of the 16th century. The com¬ manding figure of the 1 7th century in caricature is William Hogarth, the English¬ man, whose new style of design raised him to a degree of fame as an artist few men have ever attained. A little known fact is that Benjamin Franklin, the friend of Hogarth, to whom the dying artist wrote his last letter, also wras a capital caricaturist, and

used his skill in this way as he did all his other gifts and powers in behalf of his country and his kind. James Gillray was the prominent figure in English caricature in the latter half of the 18th century, Gavarini in France; George Cruik-shank and John Leech in England were the noted caricaturists of the early part of the 18th century. The two great cartoonists of recent times have been Sir John Tenniel and Thomas Nast, the former being to all Europe what the latter was to all America, and in connection with these two can be said all that need be said of caricaturists of our time. True, Nast was practically alone in his field, and he did not work as long as did Tenniel, still, to judge him at his best, though the period was compara¬ tively short, he stood high as a picture-maker of that class. Nast was as brave as his sub¬ ject, Tweed, the New York city boss, was crooked, and the two furnished the best series of caricatures bv far that have ever been seen in this, or, it might be said, in any other coun¬ try. Nast, however, was not the draughtsman that Tenniel was, but what he lacked in artistic finish he made up in power and force of ex¬ pression.

Since the day of Tenniel and Nast, cari¬ caturing seems to have fallen into less virile hands. Tenniel and Nast each drew a cari¬ cature once a week, while now caricaturists

draw seven or eight in that time. Formerly the best caricaturists were employed on the weekly papers, while now the better class are employed on the great dailies. But the times have brought this about, not necessarily the caricaturists. Workingmen have no time to read, and a picture which may tell all at a glance means more to them than the ablest editorial that the combined editors of the country could write. A picture can be under¬ stood by all, whereas we have many languages and we speak but few, and read fewer. Words we forget, but pictures stay, filed away in our minds, and we refer to them on a moment's notice. Every day, as the pace quickens, and the press for time increases, we find our time for reading diminishes, thus the moving-pic¬ ture excels the finest description ever written of the same thing.

We sometimes see socalled comic art, which is not comic, and that called caricature which is not true caricature. A man who draws a pic¬ ture of a man with a broad grin and winking with one eye, or cross-eyed, or perhaps a man standing with one foot on his other, is not necessarily a caricaturist any more than is the man who puts big feet and big noses on every person he draws. A young caricaturist who had submitted a picture to a critic for his judgment and had received a

severe lecture on the bad drawing it displayed made an attempt to hide behind the fact that it was a caricature, and therefore shouldn't be con¬ sidered as the critic was considering it. Where¬ upon he replied : <(No, never try to hide behind that. Remember one thing : that poor draw¬ ing is not caricature, and another, that all the bad artists in the country are not caricaturists. On the contrary, those who exaggerate the salient features must draw them even better, as more attention is called to a big nose or large ears if they are made conspicuously large, than would be the case otherwise.®

But there is something else that a success¬ ful caricaturist must possess. That one thing, whatever it may be called, is of more import¬ ance than the art of drawing properly, and is a certain force of character, or of individuality which at once suggests strength of purpose and power. It can convey the feeling of sadness, of brute force, or excruciating mirth, yet many very fine draughtsmen who are styled carica¬ turists never draw with that spirit predomi¬ nant, and without it their productions are not true caricatures.

Thus, in trying to be caricaturists, such men are robbed of the chance of being serious illus¬ trators, in which work they might succeed; and they never succeed as caricaturists.

There are three kinds of good caricatures: First, the strong, powerful, almost brutal; sec¬ ond, the humorous, the one instantly compelling laughter ; and last, but not the least in effect, the pathetic; a picture capable of causing men to weep. The most effective are the powerful and the pathetic. The humorous is indeed attrac¬ tive, jf not overdone, but you soon forget its meaning. It can attack any and all things, from the weather to the President, without of¬ fense. But the most effective caricature is one that the subject of it would rather you would not print. Probably none can be made more powerful than the pathetic when it is timed and tempered just right, as its appeal to

the sympathy is the surest way to the emotions. No caricaturist ever drew a caricature that would cause people to shed tears on seeing it,

unless the artist shed tears when he drew it, any more than one could draw an angry political boss unless at the time of drawing one wore the same angry and hateful expression on one's own face. So with the humorist. One must wear a broad smile when he draws a man laughing, unless one is drawing him from life; and unless one is smiling when drawing smiling people, the subjects will seem to look and laugh only in mechanical fashion.

If the caricaturist is strong enough in his line to be called one, the first person he wins is himself. Once he has settled in his own mind that he is working for a just cause, it will be noticed at once that his work improves, and if he continues to study and put his heart and soul into it, others will be converted and he will acquire a following. If a cartoonist in his poli¬ tics keeps side by side with his pictures he will be much more of a caricaturist than one who will work on a Democratic paper one day and the next on the Republican side. A young man in starting out should study and choose for him¬ self and in that way he will find that he can lend more power and force to his work. It would be hard to imagine Thomas Nast being in private life a sympathizer with Tweed. The difficulty with caricaturists is that they are sometimes like the politician after the election, when he says: ((No wonder the other side won; (they bought us. * What interest could one take outside of the mechanical reproduction if one knew that the caricaturist who had one year drawn powerful caricatures for one party -would turn around the next year and work for the opposition. The power of a caricature becomes power only when the reader of the picture is convinced that that which is repre¬ sented in the picture really did happen, and that cannot be done by a caricaturist if one day he is with the poor, and the next day with the rich ; or in the same relation with any case that comes up.

The late John J. Ingalls said that the carica¬ ture did harm that good might follow. Cari¬ catures, to be effective, should be founded on fragments of truth, though you are permitted to dig below the frost line. Without truth at the bottom they are powerless, and with truth at the bottom they are powerful and everlast¬ ing. Though Tweed, the man, is dead, Tweed, in the caricature, still lives, a prisoner in stripes, with ball and chain to his leg. A good caricature may be called an exaggeration of the truth. In these times there are great oppor¬ tunities for the cartoonist. The billionaire will have to deal kindly and justly with his fellowmen, or else he will be more of a target than ever before, but the honest man need never fear a caricature ; on the contrary, he can laugh and go about his business, and if he is attacked, the attacks will react in his favor. But they cannot be recommended as the steady diet for a dishonest person, since whether he has a

conscience or not, if they don't bring him to justice they will give him many a sleepless night.

Bibliography. — Flogel, E., (Geschichte des Grotesk-Komischen) (Leipzig 1778) ; Champ-fleury, F., (Histoire generale de la caricature) (Paris 1865-80) ; Wright, F., 'History of

Caricature and Grotesque) (London 1875) ; Parton, J., (Caricature and other Comic Arts* (New York 1877) ; Grand-Carteret, J., (Les mceurs et la caricature en Allemagne, en Autriche et en Suisse* (Paris 1885) ; Everitt, W., (English Caricaturists of the 19th Century > (London 1886).

CARIES, kar'i-ez, a form of local death in-bone, due to a variety of agents. Caries is usually distinguished from necrosis, another type of local death in bone, by the slower dis¬ integration of the bone affected by the carious process. Necrosis usually results in the death of large pieces of bone, with the formation of sequestra. Caries is a gradual disintegration without sequestration. Caries is the result of inflammation of the softer tissues in the bone spaces, and is due usually to some definite form of irritant. It may be that of a gas, such as chlorine, or phosphorus, the latter causing in match-works a form of caries of the jaw; but bacteria of tuberculosis and syph¬ ilis are the most frequent causes. Tubercu¬ lous caries is the most frequent form of the disease. See Hip Joint Disease; Tubercu¬ losis. For caries of the teeth, see Teeth.

CARIGARA, ka-re-ga'ra, Philippines, a town of the province of Leyte, situated on the north coast of the island, 22 miles west of Tacloban. It has a harbor formed by a bight extending 11 miles inland, carries on a con¬ siderable coast trade and is an important hemp port. Pop. about 16,000.

CARIGNANO, ka-ren-ya'nd, Italy, a city in the province of Turin, 11 miles south of the latter on the left bank of the Po. It is sur¬ rounded by old walls, and has a handsome square ornamented with arcades, some fine churches, some silk-spinning mills and sugar-refineries. From this town is named a branch of the house of Savoy. Pop. 7,000.

CARILLON, ka-re-yon, a kind of chime, played either by hand or clockwork on a num¬ ber of bells, forming a complete series or scale of tones or semi-tones, like those of the organ or harpsichord. See Chimes.

CARIMATA, ka-re-ma'ta, or KARI-MATA, a name applied to the strait between Borneo and Billiton; also to a cluster of a hundred islets and reefs (area, 57 square miles; pop. 500) in that strait ; and lastly, to the prin¬ cipal member of the group, whose highest point reaches 2,600 feet, and is in lat. 1° 36' S. and long. 108° 54' E.

CARINI, ka-re'ne, Italy, city in the prov¬ ince of Palermo, island of Sicily, 17 miles north¬ west of the city of Palermo. It is beautifully situated four miles from the sea, in a fertile region. It has a Gothic castle of the 14th century. In the vicinity are caves in which animal fossils are found. The Sicilian revolu¬ tionists were defeated here, 18 April 1860, by the Bourbon troops. North of the town was the ancient Hyccara, from which the Athenians carried off the 12-year-old Lais, who grew up to be so famous a courtesan. Fishing is the chief occupation. The district produces much corn and wine. Pop. about 14,000.

CARINTHIA (Ger. Karnthen), a duchy and crownland, between lat. 46° 24' and 47° 7' N., and long. 12° 35' and 15° 10' E., bounded on the north by Salzburg and Styria, on the

east by Styria, on the south by by Carniola and on the west by Italy and Tyrol ; area, 3,986 square miles. It is extremely mountainous, gen¬ erally sterile, and one of the most thinly popu¬ lated provinces of Austria. The arable land does not exceed 290,000 acres, but there are some fertile valleys, and a considerable extent of rich pasture land. It has several rivers and lakes. Of the former the principal is the Drave. All of them abound with fish. The country does not yield corn enough for the consump¬ tion of the inhabitants, who import the defi¬ ciency from Hungary. The cereals most exten¬ sively cultivated are rye and oats. Some wine is produced in Lower Carinthia, but it is of inferior quality. Cattle, sheep and horses are raised in considerable numbers, but the mines of Carinthia are the main sources of its wealth. The chief of these are lead, iron and calamine. Various kinds of gems are met with. Its operative industry is chiefly confined to the working of its metallic ores, though there are also manufactories of

woolens, cottons, silk stuffs, etc., most of which are in Klagenfurt, the capital. Bessemer steel rails, wire, wire nails and bar-iron are produced in great quan¬ tities. Some machinery, firearms, textiles, leather goods, cement and wood pulp are ex¬ ported. Klagenfurt is the centre of the rail¬ way lines, of which there are about 385 miles. The Diet consists of 37 members and the crownland sends nine members to the Lower House of the Austrian Reichsrat. The prin¬ cipal towns are Klagenfurt and Villach. Carinthia formed part of the empire of Charlemagne, and afterward belonged to the dukes of Friuli. It subsequently passed through various hands, and finally be¬ came an appendage of the Austrian Crown in 1321. In 1809 it was annexed to the empire of Napoleon, but was restored to Austria in 1814. Nearly all the inhabitants are Roman Catholics. The population of Klagenfurt, the capital, is 24,284 ; that of the crownland 396,200.

CARINUS, Marcus Aurelius, Roman Em¬ peror: d. 285 a.d. He was the elder of the two sons of the Roman Emperor Cams, who con¬ jointly succeeded to the throne on the death of their father, 284 a.d. His brother was supposed to have been murdered on his return from the East, and Carinus, ruling alone, became one of the most profligate and cruel of the Roman emperors. The soldiers having rebelled and proclaimed Diocletian emperor, Carinus col¬ lected the troops that were in Italy and marched into Moesia to meet Diocletian and quell the revolt. A decisive battle was fought near Mar-gus, in which Carinus gained the victory, but in the moment of triumph he was slain by one of his own officers, whom the vices of the Em¬ peror had outraged.

CARIPE, ka -re’pa, Venezuela, town situ¬ ated in a valley in the northern part of the province of Bermudez. It was formerly the headquarters of the Capuchins, and contains the ruins of their church cloister. In the vicin¬ ity is the large cave described by Humboldt (2,800 feet from front to back and from 70 to 80 feet high) in which lives the bird known as guacharo, a kind of nighthawk. Pop. about

5,000.

CARISBROOKE, England, a village pleas¬ antly situated near the centre of the Isle of

Wight, and overlooked by the ruins of its an¬ cient castle, where

Charles I was imprisoned 13 months, previous to his trial and execution. The castle and grounds cover 20 acres. Within the walls is a well 200 feet deep. The parish church of Saint Mary is a venerable structure, with a fine perpendicular tower containing a chime of bells. It was formerly attached to a Benedictine priory founded under William the Conqueror, but the priory no longer exists. In 1859 a Roman villa was discovered at Caris-brooke, and the place seems to have been a fortress at the time of the Roman occupation. Pop. 5,139.

CARISBROOKE, Marquis of. See Bat—

TENBERG, PRINCE HENRY MAURICE.

CARISSIMI, ka-res'se-me, Giacomo, Ital¬ ian composer: b. Marino 1604; d. Rome, 12 Jan. 1674. In 1624—28, he was Kapellmeister at, Assisi, and then became musical director of the church of Saint Apollinaris in Rome, and con¬ tinued in that position until his death. He wrote many oratorios, cantatas and motets, and has been praised for his characteristic ex¬ pression of feeling and his easy, flowing style. He deserves most honor for the improvement of the recitative, having given it a more ex¬ pressive and natural language, and he greatly de¬ veloped the sacred cantata. His oratorio (Jonah5 has been revived in recent times. It anticipates in the descriptive passages some of the effects since elaborated by the modern classical com¬ posers, and it is altogether distinguished by freedom, boldness and striking antiphonal imitations. Other works are jephthah5 ; judi¬ cium Salomonis) ; (Baltazar5 ; (Jonas5 (in Vol. II of Chrysander's (Denkmaler der Tonkunst5 1856); Motets5 (1664 and 1667); Masses5 (1663 and 1667); (Arie da camera5 (1667); and /Ars Cantandi5 (3d ed. 1696). As a teacher Carissimi was greatly esteemed, Alessandro Scarlatti, Buononcini, Cesti,' Kerll, Krieger and Charpentier being among his pupils.

CARL, William Crane, American organist : b. BloOmfield, N. J., 2 March 1865. He was educated in Paris under Alexander Guilmant ; received the degree of Mus.D. from the Uni¬ versity of New York 1911 — Officier de ˆIn¬ struction Publique, and member of the French Academy of Music (conferred by the French government). He is organist and musical director of the old First Presbyterian Church, New York, and has given over 150 free organ concerts there ; is director of the Guilmant Organ School, New York; inaugurated many of the large organs in America, including a series in Dawson City (Klondike) ; has appeared with the leading orchestras at expositions, and at music festivals. He toured Japan and made successful study of the music of the Orient. Author Masterpieces5 (1898) ; (Ecclesiae

Organum5 ; (Festival Music for Organ5 (5 vols.) ; Master-studies5 ; <Novelties for Organ5 (2 vols.) ; also anthems, songs and articles on musical subjects. A founder of the American Guild of Organists; membre de 1' Alliance Frangaise; member of the National Association of Organists and Fraternal Society of Musicians.

CARLEN, kar-lan', Emilia Smith Flygare,

Swedish novelist: b. Stromstad, 8 Aug. 1807; d. Stockholm, 5 Feb. 1892. In 1827 she married a physician named Flygare. In 1838 she published

»

her first novel, (Waldemar Klein,5 and among the best of her subsequent works are the (Pro¬ fessor (1840); (A Year> (1846); <The Brother's Bet5 ; and <The Guardian) (1851). Several of her novels have been translated into English. After his death in 1833, she decided to devote herself to literature. In 1841 she married J. G. Carlen, a lawyer and poet. After his death in 1875, her literary activity ceased altogether, although her salon had been the centre of literary life at the capital. In 18/8 she published a volume of (Reminiscences of Swedish Literary Life.5 She had clear in¬ sight into the conditions of human life, es¬ pecially of life in the middle class, and she describes it with admirable fidelity. Character¬ istic are (Gustav Lindorni5 (1839); (The Rose of Tistelon) (1842); (The Maiden's Tower) (1848), all translated into English. Consult Svanberg, (E. F. Carlen 5 ; (En studie) (Stock¬ holm 1912) ; Schoeldstroen, (E. F. Carlen5 (ib. 1888).

CARLETON, Guy, 1st Lord Dorchester, British general and colonial governor: b. Ire¬ land 3 Sept. 1724; d. Maidenhead, England, 10 Nov. 1808. Efe served under General Amherst at the second siege of Louisburg 1758, and under Wolfe in 1759 at Quebec, where he was wounded. In 1762 he greatly distinguished him¬ self in the British attack on Havana. Sent out as lieutenant-governor of Quebec in 1766, he remained closely identified with Canada for well-nigh 40 years. He inspired the Quebec Act (1774) ; when the Revolutionary War broke

out he was commander of the British army in Canada, defended Quebec with great skill, and, reinforced by a British squadron in May 1776, forced Benedict Arnold's army to retire. In 1782 he became commander-in-chief of the British army in North America and dur¬ ing his command peace was finally concluded. Again appointed governor of Quebec in 1786 he was soon rewarded with a peerage as Baron Dorchester. He helped to frame the Consti¬ tutional Act of 1791, which divided Canada into two provinces. He remained at Quebec until 1796, and died in England in 1808, aged 84. By defeating Arnold's attack on Canada, Carleton really saved British North America to Great Britain. He was a stern but humane officer, and was especially loved by the newly-conquered French whom he ruled in Canada.

George M. Wrong.

CARLETON, James Henry, American soldier: b. Maine 1814; d. San Antonio, Tex., 7 Jan. 1873. In February 1839 he took part in the ((Aroostook War,55 relative to the northeast boundary of the United States, and later was commissioned 2d lieutenant in the 1st United States Dragoons. In 1846 he took part in btearny's expedition to the Rocky Mountains, served on General Wood's staff in the Mexican War, received the brevet rank of major for gallantry at Buena Vista ; and later was chiefly employed in exploring expeditions and against hostile Indians. In 1861 he was ordefed to southern California, raised the famous "Cali¬ fornia column,55 and marched across the Yuma and Gila deserts to Mesilla on the Rio Grande. As commander of the Department of New Mex¬ ico he was active in a number of severe en¬ gagements. For his services he was brevetted major-general, 13 March 1865; became lieuten¬

ant-colonel of the 4th Cavalry, 31 July 1866; and was promoted colonel of the 2d Cavalry, June 1868, and ordered with his regiment to Texas. He wrote cThe Battle of Buena Vista)

(1848).

CARLETON, Mark Alfred, American grain expert: b. Jerusalem, Ohio, 7 Mar. 1866. After studying at the Kansas Agricultural Col¬ lege he was appointed in 1894 cerealist in the United States Department of Agriculture. In 1898-99 he proceeded to Russia and Siberia to

investigate agricultural conditions, and on his re¬ turn introduced among several other new crops durum wheat. Durum wheat has now taken the place of the soft spring wheat varieties in Texas, Nebraska, Oklahoma and Kansas, with an annual yield estimated at $40,000,000. His writ¬ ings, chiefly bulletins of the United States De¬ partment of Agriculture, include (Cereal Rusts of the United States, 1899) ; <The Basis for the Improvement of American Wheats) (1900) ; (The Commercial Status of Durum Wheat5 (1904); (Barley culture5 (1908); (Ten Years experience with Swedish Select Oat5 (1910); (Winter Eymper5 (1911).

CARLETON, Thomas, English soldier and administrator: b. Newry, County Down, Ireland, 1735 ; d. 1817. He entered 'the 20th Regiment in his 18th year, was present at the battle of Minden and served in Canada under his brother, Sir Guy Carleton, during the American Revolutionary War. He was first governor of New Brunswick, 1784-1817. In his administration of that province it was said that he showed ((a generous contempt of his own private wealth, and an exact frugality in the management of that which belonged to the public.55

CARLETON, Will, American poet: b. Hudson, Mich., 21 Oct. 1845; d. 1912. Soon after his graduation at Hillsdale in 1869, he traveled widely as a lecturer in the northern and western states, Great Britain and Canada. He is best known in literature by his ballads of home life, many of them having gained great popularity. His books include (Poems5 (1871) ; (Farm Legends5 (1875) ; (City Ballads5 (1888) ; (City Legends5 (1889); (City Festivals5 (1892); (Rhymes of Our Planet5 (1895); (The Old Infant, and Similar Stories5 ; (Young Folks' Centennial Rhymes5 ; (Songs of Two Centuries5 (1902) ; (Drifted In5 (1908) ; (A Thousand Thoughts5 (1908). He was also for a time editor of Everywhere , an illustrated magazine.

CARLETON, William, Irish novelist and short-story writer: b. Prillisk, County Tyrone, 20 Feb. 1794; d. Sandford, 30 Jan. 1869. His father was a farmer on a small scale. The son, intended for the priesthood from a tender age, spent his boyhood in pursuit of an education, and managed, in spite of difficulties, to acquire a fairly creditable one. With no other equip¬ ment, and without a penny in his pocket, he set out on foot from his native county, at about the age of 24, to seek his fortune, for he had long abandoned all ambition for the sacerdotal dignity. Arrived in Dublin, he decided to change his religion, and he became a member of the Established Irish Protestant Church. He subsisted for a time on some tuitions, and when he obtained a clerkship, with a salary of £60 a

year, in the Sunday School Society, he thought that he was provided for for life. On the strength of this clerkship and the income de¬ rived from some evening tuitions, he married Jane Anderson, his faithful and loyal com¬ panion for the remainder of his life; but before his first child was born he was ousted from his position in the Society. A period of school¬ mastering, first at Mullingar and afterward at Carlow, followed; but he eventually gravitated back to Dublin. At that time (1828), the United Kingdom was rocked to its base by the climax of the agitation for Catholic Emancipa¬ tion. The Evangelicals, an aggressive party which had taken the Church of Ireland under its special protection, were then powerful in Dublin. For the propagation of their views they had a monthly publication, The Christian Examiner , and to this magazine Carleton was invited to contribute stories and sketches based on the superstitions of the Catholic Irish peasantry, a subject with which he was thor¬ oughly acquainted. He made his first ap¬ pearance in its pages in April 1828 with the first part of (A Pilgrimage to Patrick's Purga¬ toryˆ in which several Catholic tenets and practices were savagely ridiculed. He con¬ tinued to write for the Examiner, along much the same lines until December 1831. In the meantime, he brought out, in 1830, the first series of his inimitable (Traits and Stories of the Irish Peasantry,5 and he followed this up, in 1833, with the second series. Both collec¬ tions are brimful of humor and pathos, the second containing, among other pieces, (The Poor Scholar5 and Rubber Derg,5 two of the finest things he ever wrote. For some years Carleton contented himself with producing short stories and sketches, so that it became a by-word among his friends that a long novel, with an intricate and sustained plot, was be¬ yond his range. (Jane Sinclair5 (1836) did not do much to dissipate this belief, but when (Fardorougha the Miser5 came out in 1837-38, it became evident that a new star had risen above the literary horizon. This pathetic novel excels in the portraiture of the vice of avarice : Fardorougha has been compared, and not un¬ favorably, with Moliere's Harpagon in (L'Avare5 and with Balzac's Pere Grandet in (Eugenie Grandet.5 In Honor O'Donovan Carleton has presented to us one of those heroines in humble life in whose delineation he admittedly excels.

The success of the Nation newspaper, founded in Dublin in 1842, gave a new direction to Carleton's thoughts. Hitherto his attitude had been, on the whole, one of satirical censure on the religion of the great majority of his fellow-countrymen and of more or less open hostility to Irish national aspirations. He now saw that, if he wished to be popular, he must espouse the popular side. Accordingly, in (Valentine McClutchy5 (1845), he made a regu¬ lar right-about-face, and let himself go, almost without restraint, in attacking Orangeism, the Grand Jury system, the methods by which the Union was carried, the Charter Schools, absentee landlords with their conscienceless agents, the corruptions of Irish Protestantism, and even the practices and pursuits of the Evangelical party. (Valentine McClutchy,5 al¬ though loosely constructed, is yet instinct with the power of genius. Two of its characters,

Solomon McSlime, the hypocritical attorney, and Darby O'Drive, the apostatizing bailiff, are great original creations. This was Carleton's most prolific period. In rapid succession work after work flowed from his pen : (Art Maguire,5 (Tales and Stories of the Irish Peasantry5 (not to be confused with <Traits and Stories5), (Rody the Rover,5 and < Parra Sastha.5 In 1846 he wrote (The Black Prophet,5 one of his best works, with two wonderfully contrasted heroines. This was followed in 1847 by the pathetic (Emigrants of Ahadarra.5 (The Tithe-Proctor5 (1849) showed another kaleidoscopic change. It gave mortal offense to many of his readers, both from the stand it takes regarding the Anti-Tithe War of the thirties, and from the aspersions deliberately cast in the preface on the character of the Irish people and the popular movements of the forties. (The Squanders of Castle Squander5 (1852) is also full of rancorous and bitter political and religious discussion. He is seen to greater advantage in (The Black Baronet,5 originally published in 1852 as (Red Hall.5 This is a story depicting love, ambition, and revenge, and has a most intricate and baffling plot, not discoverable until the very end. One of its great characters is Father MacMahon, the prototype of many of those clerical oddities who have since contributed to the gaiety of nations. The popularity, which Carleton won with (Valentine McClutchy5 and lost with (The Tithe-Proctor,5 he regained in full measure with (Willy Reilly and his dear Colleen Bawn5 (1855). The scene is laid in the days of the Penal Laws, and the obvious sympathy dis¬ played with the cruelly oppressed Catholics re¬ stored the author to the affections of his warm¬ hearted and forgiving fellow-countrymen. The novel itself is poorly constructed, and the plot hinges on a series of improbabilities, but its subject has made it the most popular of Carle¬

ton's works. Other novels are (The Evil Eye5 (1860), (The Double Prophecy5 (1861), and (Redmond Count O'Hanlon, the Irish Rapparee5 (1862). Carleton wrote some verse and one play. His verses are generally of a pensive and meditative cast. His best and best-known poem is the ballad (Sir Turlough, or the Churchyard Bride5 (1830), which has been pronounced the most successful legendary ballad of modern times. His solitary play, (The Irish Manufac¬ turer, or Bob Gawley's Project,5 produced at the Theatre Royal, Dublin, in March 1841, was not a success, and was withdrawn after a few nights. On some of his novels plays have been founded by other hands, and several of his books have been translated into French and German. From the time of his return to Dub¬ lin in 1828, Carleton's life was singularly un¬ eventful. He was a devoted husband and father, and loved to spend his time in the bosom of his family. He was always poor, and nearly always in debt, and even a literary pension of £200 a year, which was granted to him in 1848, and which he drew for the re¬ maining 21 years of his life, did not help materially to mitigate his financial troubles. Cancer of the tongue was the cause of his death, which occurred at Sandford, County Dublin, on 30 Jan. 1869. He died, as he had lived, in the profession of the Protestant faith.

Carleton made some incursions into middle-class life, and even into the domains of higher

society, but it is with ordinary people, and es¬ pecially with the peasantry, that he is in his element and entirely at home. No one ever understood or described the Irish peasant of 75 or 100 years ago as he did. The faction fight, the party fight, the courtship, the wed¬ ding, the christening, the deathbed, the wake, the funeral, the hedge school, the secret so¬ ciety, the workings of landlordism, the practices of the unjust and rapacious land agent, the eviction, the revenge, the piety, superstitions, customs, peculiar expressions, modes of thought and outlook on life of the people — he brings them all before us clearly, vividly, un¬ mistakably. Consult O'Donoghue, D. J., (Life of Carleton > (1896).

Patrick J. Lennox,

Professor of English Language and Literature,

Catholic University of America.

CARLETON COLLEGE, Minn., at Northfield was founded in 1866, and named in honor of William Carleton of Charlestown, Mass., who bequeathed for the purpose $50,000. While conducted under Congregational auspices, its instruction is undenominational. The prop¬ erty valued at $600,000 includes a campus and grounds of over 120 acres. The endowment is over $1,000,000. There are well-equipped chemi¬ cal, physical, biological and astronomical labora¬ tories, a conservatory of music and growing library. There is a general annual attendance of over 400 pupils, with a college faculty of 34 professors and instructors.

CARLETON PLACE, Canada, town of Lanark County, Ontario, on a navigable tributary of the Ottawa called the Mississippi River, at the foot of Mississippi Lake, and on the Ca¬ nadian Pacific Railway, 28 miles southwest of Ottawa, 46 miles northwest of Brockville. It has a fine water power, large lumber and shingle mills and woolen and iron manufactories; water and sewerage systems ; and is lighted by gas and electricity. The neighborhood is a favorite camping ground for summer pleasure parties. Pop. 3,621.

CARLI, kar le, Giovanni Rinaldo, Count, Italian economist and antiquarian : b. Capo d'lstria, 11 April 1720; d. 22 Feb. 1795. He was of an ancient, noble family, and early manifested an inclination for the study of the Middle Ages, with which he connected the study of belles-lettres and of poetry. In his 24th year the senate of Venice made him professor of astron¬ omy and naval science. He published his works (1784-94) in 15 volumes, under the title (Opere del Sig. Commendatore D. Gian Rinaldo, Conte Carli, PresidenteC etc., but this edition does not include his work on the coins of Italy (Delle Monete) (3 Vols., 1754-60) ; and (Delle Antichita Italiche> (5 vols., 1788-91). His com¬ plete works appeared in 18 volumes, 1784-94.

CARLILE, John S., American lawyer and statesman: b. Winchester, Va., 16. Dec. 1817; d. Clarksburg, W. Va., 1878. After admission to the bar in 1840 he settled at Beverly, Randolph County, and began the practice of law. From 1847 to 1851 he served in the State senate. He was also a delegate to the Virginia Con¬ stitutional Convention of 1850-51, and repre¬ sented his district in Congress 1855-57. At the outbreak of the Civil War, he was an avowed Unionist. He was a

member of the Wheeling Convention which established the

Reorganized Government of Virginia and urged quick action in the erection of a new State. He was elected to Congress in 1861 to represent the Wheeling district of the Reorganized Govern¬ ment of Virginia, but soon thereafter was pro¬ moted to the senate, where he served until

1865.

CARLILE, Richard, English freethinker and publisher : b. Ashburton, Devonshire, 8 Dec. 1790; d. London, 10 Feb. 1843. First ap¬ prenticed to a chemist, then to a tinman, he found employment in the latter line as a journeyman worker in London, where after reading Paine's (Rights of Man, > he became a bold freethinker, and a publisher and pur¬ veyor of its forbidden literature. He reprinted William Horne's <Parodies) and an imitation entitled (The Political Litany* (1817), for which he underwent 18 weeks' imprisonment. In 1819 he was fined $7,500 and imprisoned for three years for publishing the works of Paine and other freethought writers. While in prison he conducted the publication of the first 12 volumes of The Republican (1819-26), for which his wife was sentenced to two years' imprisonment. Started by the Duke of Well¬ ington, a fund of $30,000 was raised to prose¬ cute Carlile's assistants, his property was con¬ fiscated, his sister was fined $2,500 and with nine assistants received terms of imprisonment, ranging from six months to three years. Public opinion made the government discontinue the prosecutions. On his release Carlile started The Gorgon, a radical weekly periodical. Be¬ fore his death he was again imprisoned for terms of three years, and of 10 weeks for refus¬ ing to pay church rates. He was the boldest agitator and the greatest factor for freedom of public speech and printing of his period.

CARLIN, Thomas, American politician : b. Kentucky 1790; d. 2 Feb. 1852. He removed to Illinois in 1813, and gradually accumulated wealth, and became known and respected among the scattered population about him. He was elected governor in 1838, and retained that office for four years, during a period of unusual and violent political excitement. Illinois, hav¬ ing engaged largely in internal improvements, suffered severely from the commercial revul¬ sion which was then paralyzing the whole coun¬ try. She was much in debt, and had within her borders no specie, and no available means of

payment. The discussion of the slavery question, too, was then furious, and had just led to the tragic death of E. P. Lovejoy. At the same time the Mormons took up their position at Nauvoo, and politicians were beginning those movements for partisan ends which seemed likely to throw the State into anarchy, and which ended ere long in the violent death of the Mormon leader. That Governor Carlin, amid such a condition of affairs, was three times reelected to the chief magistracy affords a sure indication both of his popularity and his force of character.

CARLINE THISTLE. See Thistle.

CARLING, Sir John, Canadian statesman : b. Middlesex County, Ontario, 1828; d. 1911. He received early education in public schools ; in 1839 he removed to London, Ontario, where he joined his father in the brewing and malting business. After serving in the public capacities of school trustee and alderman, he was elected

in 1857 Conservative member for London in the Canadian legislative assembly. From 1867-72 he represented London in both the House of Commons and the Ontario legislature, resign¬ ing his seat when dual representation was abolished. In 1862, he was Receiver-General ; in 1867-71 Commissioner of Agriculture and Public Works; 1882-85 Postmaster-General; 1885-91 Minister of Agriculture. In 1891 elected to the senate, he resigned in 1892 but was reappointed in 1896. He received the honor of knighthood in 1893. His efforts on behalf of Canadian agriculture were of in¬ calculable value.

CARLINVILLE, Ill., a city and county-seat of Macoupin Countv, 60 miles southwest of Springfield, on the Chicago & Alton and other railroads. It has a prosperous local trade and manufactures of bricks and tiles, agricul¬ tural implements, *etc.* There are coal-mines, oil and natural gas wells in the vicinity. It is the seat of Blackburn University, a Presby¬ terian institution. Its courthouse is considered one of the finest public buildings in the State. It was settled in 1833 and incorporated in 1865. Pop. (1920) 5,212.

CARLISLE, kar-lll', Charles Arthur,

American business man : b. Chillicothe, Ohio, 3 May 1864. He received a public school ed¬ ucation, and early in life began work on the Marietta & Cincinnati Railway as messenger boy. From 1884—86 he was connected with the Ohio State Journal; and in the latter year re¬ turned to railroad work in the freight depart¬ ment of the ((Nickel Plate® road; in 1890 he was made purchasing agent of the ((Burke Sys¬ tem® of railroads; later became director of the Studebaker Brothers Manufacturing Company at South Bend, Ind., and in 1904 was elected president of the American Trust Company of South Bend. He is vice-president of the National Association of Manufacturers; is a member of the American Academy of Political and Social Science, and of the American In¬ stitute of Civics, and is prominent in charitable work and public affairs in his home city.

CARLISLE, George William Frederic Howard, English statesman and author, 7th earl : b. London, 18 April 1802 ; d. Castle Howard, 4 Dec. 1864. He was educated at Eton and at Christ Church, Oxford, where in 1821 he won the Chancellor's and the Newdi-gate prizes with a Latin and an English poem. He became earl 7 Oct. 1848, previous to which, as Lord Morpeth, he had traveled extensively in the United States. He was a long time attache to the British embassy at Saint Peters¬ burg. In the reformed House of Commons he represented the West Riding of Yorkshire, and under the Melbourne ministry was secretary of state for Ireland. In 1841 he was defeated in the West Riding by his Conservative opponents. In 1846, under the administration of Lord John Russell, he was appointed commissioner of woods and forests, and chancellor of the duchy of Lancaster. He was the first of the Whig noblemen of the official class to give in his adhesion to the views of the Anti-Corn Law League. In 1856 he delivered before the Mechanics' Institute at Leeds two lectures, since published, on the life and writings of Pope, and on the United States. Previous to the Crimean War, he made a tour in the east

of Europe, and published his (Diary in Turkish and Greek Waters.* On the accession of Lord Palmerston in 1855, he was nominated lord lieutenant of Ireland, which office he held till the resignation of the Palmerston ministry in 1858. His works include (The Life and Writ¬ ings of Pope> (1851) ; a tragedy, (The Last of the Greeks) ; and a volume of <Poems) issued posthumously. His (Viceregal Speeches,* ed¬ ited by J. Gaskin, appeared in 1866.

CARLISLE, John Griffin, American states¬ man : b. Kenton County, Ky., 5 Sept. 1835; d. 31 July 1910. He received a common-school ed¬ ucation, studied law and was admitted to the bar in 1858. He served several terms in the State legislature. During the Civil War he actively opposed secession, and in 1866 and 1869 was a member of the State senate. He was lieutenant-governor of Kentucky, 1871-75; was elected to Congress, 1876, and five times re¬ elected. His ability soon made him one of the Democratic leaders. In the 48th, 49th and 50th congresses he was chosen speaker. In 1890 he was elected United States senator, but resigned in March 1893, to accept the portfolio of Sec¬ retary of the Treasury in President Cleveland's Cabinet. At the close of his term he settled in New York to practise law. In 1896 he opposed Bryan and made able (<sound money® speeches.

CARLISLE, England, city, capital of Cum¬ berland County, on the river Eden, eight miles from the Solway Firth, and eight miles from the Scottish border, 300 miles by rail north¬ west of London. One of the oldest cities of England, important during the Roman occupa¬ tion, its nearness to the border made it a prominent military station in the wars between the English and the Scotch. The Norman castle built in 1092 is well preserved and is still used as a garrison fortress. In the Civil War Carlisle sided with the King against Crom¬ well, and in 1745 declared for the pretender. The bishop's see dates from 1133; the cathedral, built in the Middk Ages, has no great archi¬ tectural interest. The city is well supplied with municipal institutions and its chief industries are the manufacture of cotton and woolen goods, iron foundries, railway workshops, tan¬ neries and breweries. Pop. 46,500.

CARLISLE, Pa., borough and county-seat of Cumberland County, on the Cumberland Valley and Philadelphia and Reading railroads, 18 miles west of Harrisburg. It is the farming and manufacturing trade centre of Cumberland County, and is the site of Dickinson College, founded 1783, Metzger Female College and the United States Indian Training School. It has a national bank, large manufacturing establish¬ ments, Hamilton Library, Todd Hospital, and an assessed property valuation of $3,000,000. The industries include machine shops, chain and switch works, axle factory, cotton-weaving and silk-throwster mills, body and gear works, ribbon mills, shoe factories, flour mills, hosiery, paper-box and carpet factories. Mount Holly Springs, in the mountains just outside the city, is a popular summer resort. The government is administered by a burgess elected for three years and a borough council. It was the head¬ quarters of Washington during the Whisky Rebellion in 1794, and was bombarded by the Confederates in 1863. Pop. 10,916. Con-CARLISLE INDIAN SCHOOL — CARLOS

suit Wing, (History of Cumberland County, Pa.> (1879). ˆ

CARLISLE INDIAN SCHOOL. See

United States Indian Training and Indus¬ trial School.

CARLISTS, a Spanish political faction which advocated the claims of Carlos of Bour¬ bon and his descendants to the Spanish throne. In 1833 the Carlists, whose chief strength lay in the Basque provinces, and who, because of their Catholic traditions and tendencies, were se¬ cretly favored by the Pope and the Eastern powers, raised the standard of revolt. They had the advantage until 1836, when Espartero inflicted on them a terrific defeat at Luchana. In August 1839 their commander, Maroto, treacherously made peace, and the remaining Carlists soon fled to France. In 1873 the grand¬ son of the first pretender raised another re¬ volt in the Basque provinces of Navarre and Biscay, but after several sharp conflicts the rebels were hemmed in along the north coast, and in 1876 the pretender and his chief sup¬ porters fled into France. See Carlos de Bourbon.

CARLONE, kiir-lo'na, the name of an Italian family of distinguished artists, who flourished in the 16th, 17th and 18th centuries. The most celebrated of them are: 1. Taddeo, a native of Rovio, who excelled in sculpture and architecture, and was employed principally in Genoa: b. 1543; d. 1613. 2. Giovanni An¬ drea, eldest son of Taddeo: b. Genoa 1590; d. 1630 in Milan. He made great progress in painting under the tuition of Pietro Sorri in Stena, and, having afterward studied under Passignano, distinguished himself particularly by his frescoes, in which the freedom and spirit of design, the depth of expression, grandeur of conception and richness of coloring are ad¬ mired. 3. Giovanni Battista, brother of Giovanni Andrea: b. Genoa 1592; d. in Turin 1677. He was also a scholar of Passignano, and, like his brother, painted for years in Genoa, but ultimately entered the service of the Duke of Savoy. He excelled particularly in frescoes. 4. Andrea, son of Giovanni Battista: b. 22 May 1639 in Genoa ; d. there, 4 April 1697. He studied in Rome, in Venice (where he was powerfully influenced by the style of Ver¬ onese) ; lived for several years in Perugia and founded an academy of art there. The ancestor of this branch of the family was Giovanni Carlone, who came from Rovio to Genoa about

1570. Another branch is traced back to Scaria, near Rovio. Carlones of more or less artistic distinction are more than 50 in number, as shown in Thieme-Becker, Vol. VI, pp. 3-10.

CARLOS, Don, don kar'los, Infanta of Spain, son of Philip II and Maria of Portugal : b. Valladolid, 8 Tuly 1545; d. 1568. He was sickly, and one of his legs was shorter than the other. The extreme indulgence with which he was educated by Joan, sister of the King, confirmed his violent, obstinate and vindictive disposition. Recent historical research has proved that he was afflicted with hereditary in¬ sanity, which an accident (occurring in 1562) involving skull fracture, emphasized. In 1560 Philip caused him to be ac¬ knowledged heir of the throne by the Estates assembled at Toledo, and in 1562 he sent him to the University of Alcala de Henares in

hopes that the study of the sciences would soften his turbulent character. Contemporary historians differ in the description of the Prince. According to some he had a thirst for glory, an elevated courage, pride and a love of power. According to others he was fond of whatever was strange and uncommon ; an accident or opposition irritated him to frenzy; address and submission softened him. He is also repre¬ sented as a favorer of the insurgents in the Netherlands, and in particular as an enemy of the Inquisition ; yet he possessed neither knowl¬ edge nor principles, nor even sufficient under¬ standing to be capable of liberal views. With him all was passionate excitement, which re¬ sistance converted into fury. Llorente, the historian of the Inquisition, has corrected the accounts of the character and fate of this Prince from authentic sources in his work on the Spanish Inquisition (q.v.). According to him Don Carlos was arrogant, brutal, ignorant and ill-educated. So much is certain, that at the Congress of Cateau Cambresis (1559) the marriage of Don Carlos with Elizabeth, daughter of Henry II of France, was proposed; but Philip, being left a widower by the death of Mary of England, took the place of his son. Don Carlos is said to have loved Elizabeth, and to have never forgiven his father for hav¬ ing deprived him of her. Llorente proves, how¬ ever, that Don Carlos never had fallen in love with the Queen, and that she was never too intimate with him. In 1563 Philip, who had no other heir than Don Carlos, considering him unfit for the throne, sent for his nephews, the archdukes Rodolph and Ernestus, to secure to them the succession to his dominions. Don Carlos, who lived in continual misunderstand¬ ing with his father, resolved in 1565 to leave Spain, and was on the point of embarking when Ruy Gomez de Silva, a confidant both of Philip and Carlos,

dissuaded him from his resolution. In 1567, when the rebellion in the Low Countries disquieted Philip, Don Carlos wrote to several grandees of the kingdom that he had the intention of going to Germany. He disclosed his plan to his uncle, Don Juan of Austria, who told Philip what Don Carlos had confided to him. It is believed that he was touched by the sufferings of the people of the Netherlands. Philip himself seemed to believe that his son intended to go to the Netherlands. The Infant had often shown a vehement desire to participate in the government. But Philip, jealous of his own authority, treated his son coolly and with reserve, while he gave his con¬ fidence to the Duke of Alva, to Ruy Gomez de Silva, Don Juan of Austria and Spinola. Don Carlos conceived an invincible aversion to them. The architect of the Escurial, Louis de Foix, narrates the following story relating to Don Carlos, which has been preserved to us by De Thou. The Prince had always under his pillow two naked swords, two loaded pistols, and at the side of his bed several guns, and a chest full of other firearms. He was often heard to complain that his father had de¬ prived him of his bride. On Christmas even¬ ing he confessed to a priest that he had re¬ solved to murder a man. The priest, therefore, refused him absolution. The prior of the monastery of Atocha artfully drew from him expressions from which it could be inferred that he meditated an attempt upon his own

father. The story was then communicated to the King, who exclaimed, t(I am the man whom my son intends to murder ; but 1 shall take measures to prevent it.® Thus Philip, impelled by hatred or fear, by policy or superstition, re¬ solved on the destruction of his only son, in whom he saw only a criminal, unworthy of the crown. On the night of 18 Jan. 1568 while Don Carlos was buried in a deep sleep, Count Lerma entered his chamber and removed his arms. Then appeared the King, preceded by Ruy Gomez de Silva, the Duke of Feria, the grand prior of the order of Saint John, brother of the Duke of Alva, and several officers of the guard and state councillors. Don Carlos still slept. They awoke him : he beheld the King, his father, and exclaimed, ((I am a dead man.® Then, addressing Philip, he said, ftDoes your

Majesty wish to kill me? I am not mad, but reduced to despair by my sufferings.® He conjured with tears those who were present to put him to death. (<I am not come,® an¬ swered the King, ((to put you to death, but to punish you as a father, and to bring you back to your duty.® He then commanded him to rise, deprived him of his domestics, ordered a box of papers under his bed to be seized and committed him to the care of the Duke of Feria and six noblemen, enjoining them not to permit him to write nor to speak with any one. These guards clothed Don Carlos in a mourning dress, took from his chamber the tapestry, the furni¬ ture and even his bed. Don Carlos, full of rage and despair, caused a large fire to be kindled, under pretext of the extreme cold of the winter, and threw himself suddenly into the flames. It was with difficulty that he was rescued. He attempted by turns, to finish his life by thirst, by hunger, by eating to excess. After Philip had endeavored to justify his measures to the Pope and the principal sovereigns of Europe, and had also given notice to the superior clergy, the courts of justice and the cities of his empire, of what had passed, he referred the case of the Prince, not to the In¬ quisition, but to the council of state, under the direction of Cardinal Espinosa, who was state councillor, grand inquisitor and president of the junta of Castile. This court is said, after a minute examination and hearing many wit¬ nesses, to have condemned him to death. Other accounts, however, state that he died of a malig¬ nant fever before anv judgment was passed, after having taken the sacrament with much devotion, and having asked his father's pardon, 24 July 1568. The melancholy fate of Don Carios has served as a subject for several dramas. The romantic story may be found in works by Lord John Russell and M. J. Chenier, and in the following : C. V. de Saint-Real, (Don Carlos, nouvelle historique) (Paris 1672) ; Schiller, (Don Carlos) ; Alfieri, c Philip the Second* ; de Campistron, J. G., (Andronic) ; Otway, T., (Don Carlos, Prince of Spain* ; Nunez de Arce, (Haz de Lena.* For a discussion of plays on this subject, by Ximenez de Enciso and Juan Perez de Montlavan, consult Bacon, G. W., (The Life and Dramatic Works of Doctor Juan Perez de Montlavan* (1602-38) (in Revue Hispanique, Vol. XXVI, pp. 1-474, 1912). For the histori¬ cal account consult Ranke, in (Wiener Jahr-bficher der Litteratur* (Vol, XLVI, Vienna

1829) ; Gachard, L. P., (Don Carlos et Philippe IP (Paris 1867) ; Maurenbrecher, (Don Carlos* (Berlin 1876) ; Prescott, cPhilip II* (Boston 1855); Hume, (Spain: Its Greatness and De¬ cay, 1479-1788* (Cambridge, 1st ed., 1898; 2d ed., 1899, reprinted 1905)*; Hume, (The Spanish People* (London 1901).

CARLOS I, King of Portugal 19 Oct. 1889-1 Feb. 1908: b. 28 Sept. 1863; assassinated Lisbon, 1 Feb. 1908. He was son of King Luiz I and Queen Maria Pia who was the daughter of King Victor Emmanuel II of Italy; and was a descendant of King John IV, sometimes called ((The Restorer® — that Dom Joao, Duke of Braganqa, who was proclaimed king when the revolution of 1640 wrested (with English aid) Portugal from Spain. In 1905, when Carlos visited King Edward VII, the historic friend¬ ship of Portugal and England was strengthened. Carlos married Princess Marie Amelia, daugh¬ ter of Philippe d'Orleans, Comte de Paris. Prince Louis Philippe, heir apparent, born 1887, was assassinated with his father, and Prince Manuel, born in 1889, was proclaimed King Manuel II 2 Feb. 1908, and exiled 5 Oct. 1910.

CARLOS DE BOURBON, Don Maria

Isidor, second son of Charles IV of Spain and brother of Ferdinand VII: b. 29 March 1788; d. Trieste, 10 March 1855. In 1808 he was com¬ pelled by Napoleon along with his brother, who had now succeeded to the throne, to renounce all claims to the succession, and was detained with Ferdinand in captivity at Valengay in France till 1814. In 1816 he married Maria Francisca d'Assis, daughter of John VI of Por¬ tugal, his brother, the King of Spain, having at the same time espoused another daughter of John as his second wife. This last marriage, like Ferdinand's first, having turned out un¬ productive of issue, a prospect opened to Don Carlos of succeeding to the crown, which al¬ most assumed the shape of absolute certainty when a third marriage contracted by Ferdinand proved equally unsuccessful with the two for¬ mer in producing an heir to the Spanish mon¬ archy. On the death of Ferdinand's third wife in 1829 he again married, and, by a pragmatic sanction, the contingency of a female heir was provided for by the repeal of the Salic law, which excluded such from the throne. On 10 Oct. 1830, Maria Isabella, afterward Queen of Spain, was born. In 1832 Don Carlos' party succeeded by taking advantage of the King's imbecile condition in obtaining a repeal of the pragmatic sanction ; but this advantage was temporary, as Ferdinand disowned his act on recovering the use of his reason. The follow¬ ing year Don Carlos was exiled with his wife to Portugal ; and having refused to return to be present at the taking of the oath of alle¬ giance to the young Queen, he was commanded by Ferdinand to retire to the Papal States. On 29 Sept. 1833 Ferdinand VII died, and a few days afterward his consort, the Queen-regent, repeated the order to his brother to quit the country. The latter, however, now announced himself as legitimate King of Spain, and was recognized as such by a considerable party who excited a civil war in his favor, and thence¬ forward were designated by the title of Carlists. After a course of hostilities

extending over several years with varying success, he found himself obliged in 1839 to take shelter in

France. In the meantime he and his descend¬ ants had been formally excluded from the succession by a vote of the Cortes in 1836. On arriving in France the castle of Bourges was assigned him as a residence, and he was also detained a prisoner there for a considerable time owing to his refusal to make the renuncia¬ tions demanded of him. In 1845 he resigned his claims in favor of his eldest son, and in 1847 was permitted to take up his abode in Trieste, where he died. Consult Baumgarten, (Geschichte Spaniens) (Leipzig 1861) ; Butler-Clarke, (Modern Spain > (Cambridge 1906) with a useful bibliography; Hume, (Modern Spain > (London 1906), an account by one whose family took a considerable part in the events of the first half of the book, and who himself witnessed much of what is related in the last half.

CARLOTA, kar-lo'ta, Philippines, (1) a town of Negros Occidental, situated in the west¬ ern part of the island of Negros, 20 miles south of Bacolod. Pop. 13,097. (2) A town in the

eastern part of the island of Negros (Negros Oriental). Pop. 6,386.

CARLOTTA (Marie Carlotta Amelie), Empress of Mexico: b. near Brussels, 7 June 1840. She was the daughter of Leopold I, King of Belgium, and married Maximilian, Archduke of Austria, 27 July 1857. In 1863 she went with her husband to Mexico and remained there till 1866, when the dissatisfaction against the empire forced her husband to send her from the land of their adoption to ask help in France. She could obtain no assistance from Napoleon III and went to Rome to appeal to the Pope. Before negotiations there were completed, her health gave way under the strain, and after the end of the empire and the execution of her husband (19 June 1867) she became totally in¬ sane. She was taken at first to the Chateau of Laeken, and afterward to the Chateau de Bou-choute, near Brussels, Belgium, where she was still living in seclusion at the time of the in¬ vasion of her native land

and the beginning of the war in Europe.

CARLO VINGIANS, or CAROLINGIANS, the second dynasty of the French or Frankish Kings, which supplanted the Me¬ rovingians, deriving the name from Charles Martel or his grandson Charlemagne (that is, Karl or Charles the Great). Its origin is usu¬ ally traced to Saint Arnulf, bishop of Metz (d. 641), whose grandson, Pepin of Heristal, held the office of mayor of the palace in Bur¬ gundy, Neustria and Austrasia. This Pepin of Heristal, who died in 714, left as his successor a young grandson; but the actual inheritor of his ability was Charles Martel, a natural son. Charles Martel became mayor of the palace in 714 to the Merovingian rot faineant Childeric, and in this office was succeeded by his son Pepin le Bref, who in 751 deposed the merely nominal King and himself assumed that title. He was succeeded by Charlemagne and his brother Carloman (768-71). Charlemagne became sole king in 771, and extended greatly the dominions of the family. In 800 Leo III crowned him Emperor of the West. On his death in 814 he was succeeded by his son Louis the Pious, who divided his empire among his sons, and at his death, in 840, his son Charles the Bald became King of Neustria, the Spanish Mark and

Aquitania, and is therefore regarded as the founder of the French dynasty. He died in 877, and was succeeded by a number of feeble princes. The dynasty came to an end with Louis V who died in 987. The house of Capet followed it, and the Capets also traced their descent from Charlemagne, but only because they were connected by marriage with the Carlovingians.

CARLOVITZ, or CARLOWITZ. See

Karlowitz.

CARLOW, Ireland, an inland county in the province of Leinster, surrounded by Kildare, Wicklow, Wexford, Kilkenny and Queen’s County. It is generally level or undulating ex¬ cept in the southeastern parts. The chief rivers are the Slaney and Barrow. From the remark¬ able fertility of its soil it is almost entirely an agricultural county, producing a great deal of butter, corn, flour and other agricultural produce for exportation. Agriculture is here carried on with as much skill and knowledge of recent improvements as anywhere in Ire¬ land, and there is less poverty than in most parts. There is abundant limestone, and granite is quarried. Area 346 square miles. Pop. (1911)

36,252, of which 89.2 per cent are Roman Catholics.

CARLOW, Ireland, the capital of the county of Carlow, on the Barrow, 56 miles southwest of Dublin by rail, with which it is also connected by canal. It has two principal streets intersecting at right angles. A bridge of five arches leads over the Barrow to the suburban village of Graigue, in Queen's County. The principal public buildings are the Roman Catholic cathedral and college and the Prot¬ estant parish church. It is lighted by electricity, and has an excellent water supply. Carlow is the principal mart for the agricultural produce of the surrounding country, has brewing and corn milling industries, and anthracite coal is worked. On rising ground to the south stand the ruins of the ancient castle of Carlow, still presenting a very imposing appearance. In the Rebellion of 1798 Carlow was unsuccessfully attacked by the insurgent forces. Pop. (1911)

6,619.

CARLSBAD, karls'bat, Bohemia, a town on the Tepl, near its influx into the Eger, 116 miles west by north of Prague by rail. It is widely celebrated for its hot mineral springs, and is perhaps the most aristocratic of the watering places of Europe. In the season, April to October, the visitors may number from 50,000 to 60,000. Set in most lovely scen¬ ery 1,165 feet above sea-level, the town is well built and offers good accommodation for its guests. The temperature of the hot springs varies from 47° to 165° F. The principal spring, the Sprudel, has a very large volume, and is forced up to a height of three feet from the ground. Altogether, the daily flow of the springs of Carlsbad is estimated at 2,000,000 gallons. Somewhere approaching 2,000,000 bottles of water are exported annually. The principal ingredient in the water is sulphate of soda. The whole town of Carlsbad appears to stand on a vast caldron of boiling water, which is kept from bursting only by the safety-valves the springs provide. Ascribing its foundation to the Emperor Charles IV (1347), Carlsbad was made a free town by Joseph I. Here were

formulated in 1819 the reactionary Carlsbad Decrees (q.v.). Pop. 17,446.

CARLSBAD, Congress of, a conference of ministers representing Austria, Prussia and many small German states, which met at Carls¬ bad in August 1819 to concert measures to ar¬ rest the democratic tendencies then manifesting themselves in Germany. Its members recom¬ mended to their governments and to the Ger¬ man Diet the famous ˆCarlsbad Decrees,* which were adopted by the Diet, 20 Sept. 1819. Among the most important of the decrees were those recommending severe press censorship, the es¬ tablishment at Mainz of a central commission for the investigation of political intrigues, the suppression of the secret student organization, the Burschenschaft, and government inspection of the universities.

CARLSBAD DECREES, the resolutions adopted in the summer of 1819 at the con¬ ference of the German ministers at Carlsbad, for the suppression of the socalled Demagogic Movement. The fear of a far-spreading con¬ spiracy against the German princes, which had been excited by the murder of Kotzebue by Karl Sand, was skillfully employed by Metternich as an excuse for combining the German governments for the extermination of Liberal¬ ism. The representatives of Austria, Prussia, Bavaria, Saxony, Hanover, Wiirtemberg, Baden, Mecklenburg, Nassau and Saxe-AVeimar participated in the meeting. It was decided, that the censorship of the press should be rendered more strict, that the universities should be forbidden to spread liberal doctrines, that secret societies should be suppressed, and that a commission to sit at Mainz should bˆ appointed to extirpate the revolutionary con¬ spiracy which was supposed to exist. An at¬ tempt to determine more precisely the nature of the constitution permissible for the states of the German Confederation led to a stalemate between the conservative Austrians and the Wiirtembergers who already had a liberal con¬ stitution. This was only solved at the con¬ ference of Vienna the following year. (See Metternich) . Consult de Martius, (Nouveau’ recueil general des traites* (Gottingen 1846).

CARLSBURG, karls’boorg, or KARLS-BURG, Rumania, a royal free city (ancient Apulum) on the ricrht bank of the Maros, 48 miles south of Klausenburg. It con¬ sists of an upper and a lower town, situated on opposite sides of the river, and communicat¬ ing by a long bridge. It is defended by a citadel, and has a cathedral (dating from 1443) with a number of ancient monuments, a mint where the gold and silver

obtained in Transyl¬ vania are purified and coined, an observatory with a good collection of instruments, an ex¬ cellent library, a theological college, a gym¬ nasium, arsenal and barracks. Pop. about

12,000.

CARLSCRONA, karls'kro-na, or KARLS-KRONA (((Charles' Crown®), Sweden, a sea¬ port at the southern extremity of the peninsula, on the Baltic, capital of the lan or province of Blekinge or Carlscrona, 55 miles east by north of Christiansand. It stands on several rocky islets connected with one another and with the mainland by bridges, has broad, clean but somewhat steep streets, with houses mostly

built of wood. The harbor is safe and spacious and the entrance is protected by forts. It was founded by Charles XII in 1680. As the chief Swedish naval station the town largely de¬ pends on the trade thereby occasioned, but it has also a considerable export trade in timber, tar, potash, fish, *etc.* Pop. 27,434.

CARLSEN, Emil. American artist : b. Copenhagen, Denmark, 19 Oct. 1853. He came to the United States in 1872 and studied art in Boston. Since 1891 he has lived in New York and has exhibited frequently there. His especial field is still life painting, but he is also favor¬ ably known as a landscape artist. His land¬ scapes are sincere and direct in presentation, and his marines are particularly good in the movement of the water. He excels especially in line and in arrangement. Among his bes-t known works are (Sooty Kettle) ; (A Connecti¬ cut Hilltop) ; (The Rising Storing (Night — Old Wyndham* (1905, Webb prize, Society of American Artists) ; (Wind in the East) ; (A Lazy Sea*; (A Stormy Afternoon) (1909); (The Sky and the Ocean) (1914). He is repre¬ sented in the Metropolitan Museum, New York, by a still life and two marines, of which (Surf Breaking) is especially fine; also in the Brook¬ lyn Institute Museum and the Worcester Museum. He received a gold medal at the Saint Louis Exposition in 1904, and is a member of the National Academy of Design and of the National Institute of Arts and Letters.

CARLSHAMN, karls'ham (<(Charles' Ha¬ ven®), Sweden, a seaport town 27 miles west of Carlscrona, in a beautiful valley at the mouth of the Mie-A. It is regularly built, and its square market-place, planted on all sides with trees, has a fine a.ppearance. It has an elegant

townhouse, a good harbor and an active trade. Timber and articles of timber, granite, charcoal and fish constitute the chief exports. The manufactures are sail-cloth, sacking, tobacco, leather, *etc.* ; and there is also some shipbuild¬ ing. It was founded in 1664. Pop. about 7,000.

CARLSON, Anton Julius, American phys¬ iologist: b. Bohuslan, Sweden, 1875. In 1891 he came to the United States, and after studying at Augustana College, Ill., and Leland Stanford University, he became instructor and assistant professor in physiology in 1904 at Woods Hole laboratory. In 1909 he received the appoint¬ ment of professor of physiology at the Univer¬ sity of Chicago. He is the author of Phys¬ iology of the Nervous System of the Snake and the California Hagfish* (1904) and of numerous articles in physiological journals on saliva and saliva secretion, on the thyroids, parathyroids and pancreas, lymph and lymph formation, heart and circulation.

CARLSON, Fredrik Ferdinand, Swedish historian: b. Upland, 13 June 1811; d. Stock¬ holm, 18 March 1887. After leaving the Uni¬ versity of Upsala, he became tutor to the royal family at Stockholm (1837-46). He returned to the university as professor of history (1849) and became rector (1860). He repre¬ sented the university in the National Diet; later he sat for the Swedish Academy of Sciences (1858) ; and represented Gefleborg in the first chamber from 1873. He was ap¬ pointed head of the Department of Public Wor¬ ship, which post he held from 1863-70 and

again from 1875-80. He was prominent in public matters for many years, being Minister of Ecclesiastical Affairs, 1863-70 and again, 1875-78. He completed Geijer's (History of Sweden* (7 vols., Stockholm 1855-85).

CARLSRUHE, karls'roo-u, or KARLS¬ RUHE (((Charles' Rest**), Germany, the capital of the state of Baden, 39 miles north-northwest of Stuttgart. It was laid out in 1715, and is one of the most regularly built towns in Europe. The castle of the Grand Duke stands in the centre of the city, and from this point a number of streets radiate fan

fashion, at regular distances from each other. Other streets intersect these in parallel circles. The roads leading to the city correspond to this regular disposition, which, as is apt to be the case in strictly regular cities, often leaves upon the traveler the impression of monotony rather than that of agreeable order. The city is or¬ namented with several beautiful public build¬ ings, including the palace, in front of which is a bronze statue of the founder of the city, the Margrave Charles William, the Parliament house, townhall, *etc.* The court library con¬ tains 150,000 volumes; there are also here sev¬ eral valuable museums and cabinets, a botanic garden, several institutions for the promotion of literature and the fine arts. The city has a largely developing trade in engines, carriage works, furniture, paper and plated goods. Pop.

(1911) 134,313.

CARLSTAD, karl-stat, Sweden, town and the capital of the lan of Vermland, on an island in Lake Wener formed by the two mouths of the Klar, and connected with the mainland by a bridge across either stream. It is beautifully situated, regularly built, is the seat of a bishop, and has a cathedral, gym¬ nasium, townhouse, etc., and some trade in cop¬ per, timber, iron, machinery, tobacco, matches and grain, and also exports wooden ware and iron. The city was founded in 1584 and rebuilt after the fire of 1865. A conference between Sweden and Norway was held here in 1905 to decide on the discontinuance of the union be¬ tween these countries. Pop. 17,000.

CARLSTADT, Andreas Rudolf Boden-stein, German theologian: b. Carlstadt, Fran¬ conia, 1480; d. Basel, Switzerland, 25 Dec. 1541. He is celebrated in the history of the Reforma¬ tion for his fanaticism as well as his misfor¬ tunes. He studied at Erfurt (1500-03), Cologne (1503) and Wittenberg (1510), where he was finally appointed professor of theology in 1513. In 1515 he went to Rome to study law and took the degree of LL.D. His learning enabled him to render great support to Luther in his first steps for the introduction of a reforma¬ tion. In 1520 he was included in the bull which condemned Luther; and his spirited appeal from the Pope to a general council, of which he gave the first example, as well as his opin¬ ion openly expressed, in favor of the marriage of the priesthood, was among the many proofs which he gave of his zeal for the Reformation. While Luther was at Wartburg Carlstadt's zeal urged him to acts of violence. He even insti¬ gated the people and students to the destruction of the altars and the images of the saints, greatly to the displeasure of

Luther, who lost the friendship of Carlstadt by his opposition to his excesses. He publicly declared himself the

opponent of Luther, and the Elector Frederick banished him from the country in September 1524. Carlstadt then commenced the contro¬ versy respecting the sacrament, denying, in op¬ position to Luther, the bodily presence of Christ in the sacramental elements, and recog¬ nizing in the rite a token of remembrance sim¬ ply. This controversy was carried on with the bitterest animosity; and Zwinglius having declared himself in favor of Carlstadt's doc¬ trine, a dispute ensued between the Swiss and Wittenberg theologians which ended in the sep¬ aration of the Calvinists and Lutherans. Carl¬ stadt in the meantime being suspected, not with¬ out reason, of having taken part in the revolt of the peasants in Franconia, was obliged to wander through Germany, and being ultimately reduced to extreme distress, sought relief of Luther who procured him an asylum at Kem-berg, on condition that he should refrain from the expression of his opinions. Here he lived nearly three years. His xestless mind, however, soon led him to break his promise, by the publication of some writings in 1528; and he even went so far as to plot against Luther's person. To escape from the consequences of his conduct he repaired to Switzerland at the end of the same year, where he was appointed vicar of Altstadt, in the valley of the Rhine; in 1530, deacon at Zurich; and in 1534, vicar and professor of theology at Basel. Consult, for his biography, lager, J. C. (Stuttgart 1856) and Lindsay, (History of the Reformation (Vol. I, New York 1906). Many of his letters are in Olearius, (Serinium Antiquarium) (Halle

1698).

CARLSTADT, Jugo-Slavia, a town in Cro¬ atia, 34 miles southwest of Agram, agreeably situated in a perfectly level and richly cultivated plain near the junction of the Kulpa, Korana and Dobra, which are here navigable. It con¬ sists of the town proper and the citadel, to¬ gether with the suburb of Dubovacz. It is the seat of a Greek bishopric, is tolerably well built and has an important trade. It also has a higher gymnasium and military school and has a distillery and a turbine rolling mill. Pop.

16,000.

CARLSTADT, N. J., borough of Bergen County, 10 miles north of Jersey City, on the Erie Railroad. It has brass, onyx and marble works, silk mills, cotton cloth mills, sable cloth works and air valve manufactories. It is gov¬ erned by a mayor and council, the former be¬ ing chosen for a period of two years. Pop.

(1920) 4,472.

CARLYLE, kar-lil', Alexander, Scottish clergyman: b. Prestonpans, 26 Jan. 1722; d. Inveresk, 28 Aug. 1805. He was educated at the universities of Edinburgh and Glasgow, and afterward studied at the University of Leyden. Licensed as a preacher in 1747 he became min¬ ister of the parish of Inveresk, in Midlothian, where he continued to the end of his life. He was one of the leaders of the Moderate party in the Scottish Church, the party which, during the latter half of the 18th century, ruled with such predominating sway, and included the names of Robertson, Blair and Home among its members. As an eloquent debater and skil¬ ful ecclesiastical leader in the General Assem¬ bly he had no rival. He was of such striking personal appearance that he was called (<Jupiter

Carlyle. ® He strenuously resisted all attempts to give additional influence to the popular ele¬ ment in ecclesiastical matters. He left behind him a well-known autobiography, which, though commenced in his 79th year, is a sin¬ gularly interesting production, both from the vigor and sprightliness of its style, and the pictures which it presents of Scottish society in the 18th century, and the more or less intimate account it gives of such noted characters as Home, the dramatist, Adam Smith and David Hume. After remaining long in manuscript it was published in 1860, under the editorship of John Hill Burton.

CARLYLE, Jane Baillie Welsh, Scottish letter writer: b. Haddington, Scotland, 14 July 1801 ; d. London, 21 April 1866. She was the daughter of John Welsh, a Haddington sur¬ geon, and was married to Thomas Carlvle (q.v.) 17 Oct. 1826. Her letters, edited by her husband, were published in 1883. Consult Ireland, (Life> (London 1891) ; and (New Let¬ ters and Memorials) (London 1903).

CARLYLE, John Aitken, English physi¬ cian, brother of Thomas Carlyle : b. Ecclefechan, Dumfriesshire, 7 July 1801; d. Dum¬ fries, 15 Dec. 1879. He studied at Edinburgh where he took his degree of M.D. in 1825, and later completed his education in Germany. He practised for a short time at London, where he was unsuccessful. He attempted literature for a while, assisting his brother in translating Legendre's (Geometry. > He then received an appointment as traveling physician to Lady Clare (1831-37), and later to the duke of Buccleuch (1838-43). Retiring to a place near the Chelsea residence of his brother, he de¬ voted himself to literary labors and in 1849 published a translation of Dante's (Inferno, > a very scholarly and finished work. A very friendly relation existed between the brothers, as evinced by letters and the will of Thomas. Dr. Carlyle edited also Irving's (History of Scottish Poetry } (1861).

CARLYLE, Joseph Dacre, English Orien¬ talist : b. Carlisle 1759; d. Newcastle-upon- Tyne, 12 April 1804. He was graduated from Cambridge, became chancellor of Carlisle in 1793, professor of Arabic at Cambridge in 1795 and was subsequently appointed to the Turkish embassy. He published Specimens of Arabic Poetry > (1796) ; <Poems) (1805), and a trans¬ lation of an Arabic history of Egypt. His Arabic Bible was published in 1811, completed and edited by H. Ford, professor of Arabic at Oxford.

CARLYLE, Thomas, Scotch essayist, his¬ torian and miscellaneous writer: b. Ecclefechan, near Annandale, in Dumfriesshire, Scot¬ land, 4 Dec. 1795; d. London, 4 Feb. 1881. Carlyle's ancestors were said to have come to Annandale from Carlisle, England, in the time of David II, but at the author's birth the im¬ mediate family was living in very straitened cir¬ cumstances at Ecclefechan, where the grand¬ father, Thomas, was village carpenter and his five sons masons. The second of these, James, a man of "largest natural adornment,® assertive, choleric, honest and pious, with an uncommon gift of forcible expression, married as his second wife Margaret Aitken, a woman of affectionate nature and piety of mind. By her he had four sons and five daughters, of whom

the eldest was Thomas. The third son, John Carlyle (q.v.), became distinguished as the translator of Dante. Thomas, like the other children, was brought up with much affectionate care. His parents intended him for the Church and gave him all the education in their power. He early learned his letters and soon became a voracious reader. At 10 he was sent to the grammar school at Annan, where, as a moody, sensitive child, he was much bullied by the other boys, and probably suffered acutely. At the age of 13 he was ready to enter Edinburgh University, which he attended from 1809 to 1814, without, however, taking a degree. His individuality did not readily allow itself to be molded to the academic routine. Finding him¬ self unable, because of religious doubts, to enter the ministry, he went to Annan Academy as tutor in mathematics, in 1814. Later he taught at Kirkcaldy, where he made the ac¬ quaintance of Edward Irving (q.v). one of his warmest friends. Irving's friendship was of great value to Carlyle, and his library enabled the latter to gratify his love of reading and to mitigate the distaste which he felt for teaching. In October 1818 the work became so repellent that he resigned from his school, saying that "it were better to perish than to continue schoolmastering.® Then he went to Edinburgh to try to earn his living.

The next three years were perhaps the most trying of his life. He was tormented to an un¬ common degree by his lifelong enemy, dyspep¬ sia, and as a result was greatly depressed in spirit. Uncertain what career to follow, trying his hand at many vocations and different studies, miserably poor, finding his only em¬ ployment for a time in writing hack articles, he was "mentally and physically adrift® in the sense that is described in his <(Everlasting No® of (Sartor ResartusP Toward the middle of 1821, however, he seems, by much resolution and energy of will, to have shaken off much of the depression, to have attained the position of the "Everlasting Yea.® The men who at this time most influenced him were the Ger¬ mans, particularly Goethe, the mystic Richter, and the philosopher Fichte. German literature was now his most absorbing study, and later this study bore fruit in his (Life of Schiller* (1823-24), his translation of Goethe's (Wilhelm Meister* (1824) and in several essays. These books mark his formal entrance into literature. Up to the time of their publication Carlyle's published writing had been a series of articles for Sir David Brewster's (Encyclopedia, } a translation of Legendre's (Geometry, > to which he prefixed an (Essay on Proportion,) and miscellaneous hack work. The (Life of Schiller) and the translation of (Wilhelm Meister* met with favorable reviews, and the transla¬ tion is usually regarded as one of the best of all renderings into English. While he was at work on

these books he was (1822-24) tutor in a well-to-do family, the Buffers, from whom he received £200 a year for not disagreeable work. In spite of the kindness of his patrons, he managed, as was usual with him during life, to find much fault with his surroundings and to utter complaints with very little fair¬ ness or reserve. A trip (1824) to London and Paris broke the monotony of his existence, and gave him many new impressions and opinions in what was a critical period of his growth.

Returning to Scotland in 1825 he established himself at Hoddam Hill, a farm near the Sol-way, where he farmed and wrrote. On 17 Oct. 1826, Carlyle, after a somewhat prolonged, vacillating and rather stormy wooing, succeeded m marrying Jane Baillie Welsh, a woman in many ways as remarkable as himself and dis¬ tinguished as a descendant of John Knox. The humors and distempers of their married life have become proverbial and are to be found most fully recorded in Froude's biography. Both seem to have been extremely and un-intelligently self-willed and so vain as to be wholly lacking in reticence about their domes¬ tic life. For two years they lived at Scotsbrig near Edinburgh, where they had the advan¬ tage of the intelligent society of the capital, and where Carlyle supported himself by writing for the reviews. In the Edinburgh Review, under the editorship of his friend Jeffrey (q.v.), he published, in 1827, his well-known essay on ' Richter > and (The State of German Literature,* an article which led to the famous correspondence with Goethe. For several years the Edinburgh and other reviews were his only medium of publication. He essayed a novel but failed, and was disappointed in his attempts to secure the chair in moral philos¬ ophy at Saint Andrews and a professorship in London University.

In May 1828 the Carlyles removed to a lonely farm, Craigenputtoch, overlooking the Solway. Here he wrote his 'Essay on Burns, *one of his*

most sympathetic pieces of criticism (Edinburgh Review, 1828), several other essays of much importance, as 'Voltaire, 'Novalis* and his (Sartor Resartus,* the book for which he is perhaps most famous. Refused by sev¬ eral publishers, (Sartor Resartus) first saw light in Fraser's Magazine, between December 1833 and August 1834, where it excited such a storm of protest that no separate English edition appeared till 1838. Meanwhile (1836) it first appeared in book form in America, where it was especially commended by Emerson. This most characteristic book of Carlyle purports to be a review by an English editor of a treatise by a learned German professor, Herr Teufelsdrockh, with whose life and opinions it deals. The book is written around the famous Phi¬ losophy of Clothes, designed by Swift (q.v.), and is in the main symbolical of Carlyle's creed at this time — that as clothes express the taste of the wearer, so life in all its forms may be regarded as the vesture of the mind. The idea is not a very original one, but is expressed with such oddity of phrase and image that it appears as profound as forcible. The most interesting feature is the account of the moral and spiritual attire of Teufelsdrockh, who is Carlyle himself. It is the querulous, stormy tale of early suffering, lack of sym¬ pathy from fellowmen, disappointment alike in the business of the head and the affairs of the heart, despondency and despair over the great question why man is in the universe, doubt and wavering, and final acceptance of the facts of existence with the hope of solu¬ tion through stern endeavor. The book might be called a prose epic of the inner life, and it is wholly egoistic and anthropocentric.

In 1834 the Carlyles removed to London, where they settled in Cheyne Row, Chelsea, and here were their headquarters for the re-vol. 5 — 40

mainder of their lives. Soon after the change he began his (French Revolution,* which was completed in 1837 and which gave him much more reputation than he had heretofore en¬ joyed. During the same period he wrote the (Diamond Necklace > and the articles on 'Mirabeau) and 'Sir Walter Scott,* the honorarium from which was of great benefit in his im¬ pecunious state. The success of the history enabled him, in the four following years, to gain audience for four series of lectures, 'German Literature,* the 'History of European Literature, * (Revolutions) and the more char¬ acteristic 'Heroes and Hero-Worships Pub¬ lished in book form in 1841, this series remains to-day one of the most widely read of Carlyle's works and is perhaps the clearest expression of his philosophy of history. "As I take it,® he says, "universal history, the history of what man has accomplished in this world, is at bottom the history of the great men who have worked

there.® The moral animus of the book is expressed farther on in the same introduc¬ tion : “We cannot look, however imperfectly, upon a great man, without gaining something by him. He is the living light-fountain which it is good and pleasant to be near.® Again, speaking of the Hero as a man of letters, he tells us the purpose of all his own writing: “The writer of a book, is he not a preacher, preaching not to this parish or that, on this day or that, but to all men in all times and places?®

The book may conveniently mark an im¬ portant time in Carlyle’s life. The pamphlet on ‘ Chartism) of 1840 had enunciated a doc¬ trine, of a political sort, that “Might is right,® — “one of the few strings,® says Nichol, “on which, with all the variations of a political Paganini, he played through life.® About this time, in short, his ideas of history, of morals, of politics, of his own mission, seem to have crystallized. Furthermore, his circumstances had definitively bettered. His name was well known and he was able to refuse a chair of history at Edinburgh University and later an¬ other at Saint Andrews. In 1842 the death of Mrs. Carlyle’s mother threw an income of at least £200 in the hands of the Carlyles and relieved them of the fear of penury.

From this time on Carlyle’s work falls mainly into two main classes: (1) the lives of great individuals and (2) pamphlets of a quasi¬ political sort, powerful lashings of modern in¬ stitutions. The most important of the latter, ‘Past and Present, > written in seven weeks, appeared in 1843. Herein Carlyle commits a common and characteristic fallacy in comparing a charming picture of monastic England with some of the worst things of modern life, to the obvious disadvantage of the latter and, by extension and implication, to modern civiliza¬ tion as a whole. Nevertheless, the book makes a strong appeal to our humanity, and is per¬ haps the best example of Carlyle’s many pro¬ tests against modern barbarism. It is said to have been productive of good in factory legis¬ lation. Meanwhile he was engaged on an im¬ portant work of the first class spoken of, — ‘Cromwell, * which, after three years’ prepara¬ tion, appeared in 1845. Carlyle, with charac¬ teristic thoroughness, spent a large part of the summers of 1842 and 1843 in visiting the battle¬ fields of the Civil War. It is significant that the “great man® was now, with Carlyle, not

necessarily a man of letters, as in his works previous to the (French Revolution,* but a man of political prowess as well, and this tendency to exalt the man of might reached its climax in the (History of Frederick II. *The years between (Cromwell* and the beginning of (Frcderick) are marked by his notable Latter-Day Pamphlets) (1849), one of the most de¬ nunciatory of his books, and his Life of John Stirling) (1851), a dear friend who had died six years before and who, like Edward King and Arthur Hallam, is chiefly remembered through the work of a greater man. After a trip in the fall of 1851, with the Brownings, to France, where he met the chief literary celeb¬ rities of the time — and passed unfavorable comment on them as on all affairs French — he settled down to the planning of the (History of Frederick IIP On the preparation of this work and the composition of it he was engaged for the next 13 years. His study was inde¬ fatigable and he made two trips to Germany, in 1852 and 1858, to study the battlefields of Frederick. In 1850 the first two volumes were published with great success, the third in 1862, the fourth in 1864 and the fifth and sixth in 1865. During the composition he had done practically no side work ; a somewhat un¬ intelligent dialogue, Lias Americana in Nuce,* on the American War, and his Lrinzenraub* are the only pieces.

The compilation of Lrederick* marks the climax of Carlyle's life. It won for him recog¬ nition in England as the foremost of prose writers, and in Germany, too, his fame was naturally great. Even the Scotch decided to honor a prophet of their own country; he was elected lord rector of Edinburgh University, and in the spring of 1866 delivered the in¬ augural address, on the Leading of BooksP While on his trip he received news of the death of Mrs. Carlyle, which, in spite of their dis¬ agreements, was a severe blow to him and may be said to mark the beginning of his decline. He was over 70 years of age and the labor of Lrederick* had left him worn and weary. Thereafter he wrote only three books of com¬ parative importance. (Shooting Niagara — and After, *of the type of Last and Present,* the (Early Kings of Norway,* of the hero type, and (Reminiscences of Jane Carlyle and of Jeffrey and Edward Irving,* written in the months following the death of his wife, but not published until after his death. His last public utterance, according to Froude, was a letter which he wrote, in May 1877, to the Times , protesting against the moral support which England was giving to Turkey in the war with Russia. His life at this time is de¬ scribed as one surrounded by honors and sup¬ ported by a few

staunch friends, but as one of growing weariness and desire to be at rest, until, after two years of physical feebleness, he died quietly in his 86th year.

Carlyle's character and place in literature have, since his death, as during his life, been subjects of much comment and of comment of the most diverse sorts. He has been extolled on the one hand as the greatest of prophets, the most eloquent of sages ; and condemned, on the other, as the noisiest of egoists. It is therefore impossible to fix with any approxima¬ tion his value as a character or as a man of letters, in the sense that Milton, Addison, Gray

and others may be tolerably well characterized. His severest critics, like Mr. Robertson, are undoubtedly right when they accuse him of inconsistency and irrationality and when they point out in his character certain elements of brutality and narrow egoism, and yet the fact remains that he has been the awakening force of many men and that there is a feeling abroad that he is one of the great names in English prose. Perhaps the most sensible of these opposing views may best be summed up in

Huxley's words (letter to Lord Stanley, 9 March 1881) : Lew men can have dissented more strongly from his way of looking at

things than I ; but I should not yield to the

most devoted of his followers in gratitude for the bracing, wholesome influence of his writings when, as a very young man, I was essaying without rudder or compass to strike-out a course for myself. **

In view of such diverse opinions, all of

which contain truth, it seems necessary merely to protest against those extremist views which have just been referred to. Whether one re¬ gards him as the wisest of men or the noisiest of hypocrites is, after all, a question of temper or of what one regards as valuable in the uni¬ verse, and usually has value only as the ex¬ pression of personal opinion. Carlyle's influ¬ ence, like that of Dr. Johnson, is the personal influence of a powerful and upright man rather than that of a philosopher or a discoverer of new truth. His personal qualities as expressed in his writings — his integrity, his earnestness, his independence, his sincerity, his hatred of sham, cant and affectation, his vigor — are what count in his hold on people. As a system, his work, as his critics justly remark, is unscientific and untrue. His work,

so voluminous and, on the face of it, consisting of translations, liter¬ ary, biographical, historical essays and books, tracts of the times and satires, comes down to the glorification of a galaxy of interesting and, in different ways, powerful individuals : Schil¬ ler, Goethe, Cromwell, Frederick, himself (in (Sartor Resartus*) and others, and to the doc¬ trine that their power is good. There is, of course, no means of testing the general truth of such views. They are really personal. He is, therefore, to be regarded as a seer, a prophet, a preacher, who feels deeply a, rather than the, meaning of life, and exhorts his readers to feel rightly and live rightly, to ((do the duty which lies next them,® to ((work and despair not.® These things he said with an impressiveness equaled by few men and to a very large Lody of listeners. See French Revolution, The; Hero and Hero Worship; Sartor Resartus ; Frederick the Great.

Bibliography. — Of the numerous editions of Carlyle's writings the best, aside from his correspondence, is probably the Ashburton Edi¬ tion, in 17 volumes. The (Early Letters of Thomas Carlyle) (1886 ; 2d series, 1888); the (Correspondence between Goethe and Thomas Carlyle) (1887) ; and the (Correspondence of Thomas Carlyle and Ralph Waldo Emerson > (1883), edited by C. E. Norton are the best editions of his letters. Froude's (Thomas Car¬ lyle* (in 4 vols., 1882-84) is the great biography, and is, incidentally, the most censured biog¬ raphy of recent times, because of the frankness with which it discloses the domestic life of the Carlyles. Excellent short lives are those of

John Nicoll, in the (English Men of Letters Series) (1894), Richard Garnett, in the 'Great Writers Series* (1887) (to which there is added a very full bibliography), and Sir Leslie Ste¬ phen, in the Dictionary of National Biography. The critical essays of Matthew Arnold, Emer¬ son in discourses in America,* Augustine Birrell, 'Ooiter Dicta*, J. R.

Lowell, ‘Prose Works,* Vol. II, John Morley, (Miscellanies, *Vol. I, J. M. Robertson, (Modern Humanists,* the severest of Carlyle’s critics, and Stephen, (Hours in a Library,* Vol. Ill, may be cited as representing different views among the most eminent of modern critics. Consult also Froude’s (Letters and Memorials of Jane Welsh Carlyle* (1883) ; Roe, F. W., /Carlyle as a Critic of Literature> (1910) ; Craig, R. S., ‘The Waking of Carlyle) (1909) ; Wilson, ‘Froude and Carlyle> (1898) ; Shepherd and Williamson, (Memoirs of the Life and Writ¬ ings of Thomas Carlyle * (1881) ; Wylie, ‘Thomas Carlyle the Man and his Books)

(1881).

William T. Brewster, Professor of English, Columbia University.

CARLYLE, William Arthur, Canadian mining engineer: b. Hamilton, Ontario, 1862. A graduate of McGill University in 1887, he afterward was appointed at his alma mater spe¬ cial lecturer in mining and metallurgy (1891-95), and in 1895 professor of mining and engineer¬ ing. He was provincial mineralogist and director of the Department of Mines, British Columbia, for three years, and from 1898 to 1908 was general manager of the Rio Tinto Company’s mines in Spain. In 1908 he settled in London, England, as a consulting engineer, and the following vear received the appoint¬ ment of professor of technology and metallurgy in the Imperial College of Science.

CARLYLE, Ill., city and county-seat of Clinton County, 45 miles east of Saint Louis, on the Baltimore and Ohio Southwestern Railroad, and on the Kaskaskia River. It has flour mills and paper manufactories and a large trade in flour and grain. It contains a county court¬ house and a hospital. Carlyle was in pioneer times a station on the Vincennes trail. The electric-lighting plant and waterworks are the property of the municipality. Pop. (1920) 2,027.

CARMACK, Edward Ward, American politician : b. near Castalian Springs, Sumner County, Tenn., 5 Nov. 1858; d. Nashville, Tenn., 9 Nov. 1908. He studied law and after ad¬ mission to the bar practised his profession at Columbia, Tenn. He was member of the State legislature in 1884; was on the editorial staff of the Nashville American (1886-88), and in 1892 became editor of the Memphis Commercial. He served two terms in Congress as Demo¬ cratic representative from the 10th Tennessee district 1897-1901, was United States senator 1901-07, and later editor of the Nashville

Tennesseean. In 1906 he contested the Demo¬ cratic nomination for governor, but was de¬ feated. He was assassinated 9 Nov. 1908 by Robin J. Cooper, son of his long-time bitter political opponent, Col. Duncan Cooper. He published ‘Character; or, The Making of the Man> (1909).

CARMAGNOLA, kar-man-yo’la, Fran¬ cesco, Italian condottiere : b. Carmagnola, about 1390; d. Venice, 3 May 1432. His real

name was Bussone, but he adopted as his own the name of his birthplace. The son of a peasant, he was a herdsman in his youth ; but enlisting in the service of the Duke of Milan (Filippo Maria Visconti), he rapidly rose in rank, and aided his master in regaining a great part of Lombardy, and in extending his pos¬ sessions. The Duke, however, became suspicious of his loyalty, confiscated his property, cast his wife and children into prison and banished him ; upon which Carmagnola entered the serv¬ ice of the republic of Venice, from which he received the appointment of generalissimo. He wrested Brescia from the Duke of Milan, and entirely routed his army at the battle of Macalo in 1427. After the battle he released his prison¬ ers, which was frequently done at that time by condottieri, but incurring the suspicions of the Venetian senate for doing so, and his subse¬ quent military operations not proving success¬ ful he was recalled to Venice, under the pre¬ text that his advice was needed for affairs of state, placed under arrest, accused of treason, put to the torture and beheaded. His fate has been celebrated in Manzoni’s tragedy, (I1 Conte di Carmagnola) (1820). Consult Brown, Horatio, ‘Studies in Venetian History) (London 1907).

CARMAGNOLE, kar’man’yol’, a name applied in the early times of the French repub¬ lic (1792-93) to a song which was accompanied by a dance. The song contained 13 couplets and the following refrain :

“ Dansons la carmagnole Vive le son, vive le son Dansons la carmagnole,

Vive le son du canon.”

The author and composer of the song are unknown. It is notab. e simply for its historical associations, not for the intrinsic merits of words or music. The song and dance were first used at the time of the indignation of the people on account of the veto allowed to the King on the resolves of the National Assembly. The Carmagnole was

commonly sung and danced at popular festivals, executions and eruptions of popular discontent. Afterward the name was also applied to the national guards, who wore a dress of a peculiar cut, and to the enthusiastic supporters of the Revolution. Several members of the National Convention — Barere, for instance — by way of jest, gave this name to their communications to the assembly.

CARMAN, Albert, Canadian Methodist bishop and college president: b. Iroquois, Ontario, 1833. A pupil of Dundas Grammar School and of Victoria University, Cobourg, he was graduated in 1855. He received the ap¬ pointment of professor of mathematics in Albert College, Belleville, in 1857, the follow¬ ing year being selected principal. Ten years later in 1868 he was appointed first chancellor of Albert University, to which standard, with a charter in all the faculties, he had raised Albert College bv his persistent and successful work. From 1876 to 1883 he was bishop of the Methodist Episcopal Church, having been ordained minister in 1859. When the various Methodist bodies united in 1883, Carman be¬ came general superintendent for over 36 years. He was also a senator of Toronto and Victoria universities, a governor of Wesleyan Theologi¬ cal College, Montreal, and was one of the

founders of Alma Ladies' College, Saint Thomas. He made a missionary tour of the world in 1906. He was long known as a prominent force among the ranks of prohibitionists.

CARMAN, Bliss, Canadian poet and journalist: b. Fredericton, N. B., 15 April 1861. He was educated at the universities of New Brunswick, Edinburgh and Harvard. In 1890 he became office editor of the New York In¬ dependent, where he remained about two years; since then he has had editorial positions on The Literary World, The Cosmopolitan and several other magazines. In 1894 he was associated with the late Herbert S. Stone in founding the ChapBook, the first of the little pocket maga¬ zines. He received the degree of LL.D. from the University of New Brunswick in 1906. His verse has been widely read and his successive volumes include (Low Tide on Grand Pre) (1893);

(A Sea Mark* (1895); (Behind the Arras* (1895) ; (Ballads of Lost Haven* (1897); (By the Aurelian Wall> (1897);

(Songs from Vagabondˆ,* joint author with R. Hovey (1894) ; (More Songs from Vagabondia) (with Hovey) (1896); (Last Songs from Vaga¬ bondˆ (1900); (A Winter Holiday) ; (St. Kevin,* a ballad (1894) ; (St. Michaelmas* (1895) ; (The Girl in the Poster> (1897) ; <The Green Book of the Bards* (1898) ; ˆhe Ven¬ geance of Noel Brassard) (1899); (Ode on the Coronation of King Edward* (1902); (From the Book of Myths) (1902) ; (Pipes of Pan,* No. 1 (1902) ; (Pipes of Pan,* No. 2 (1903) ; (Pipes of Pan,* Nos. 3, 4, 5 (1904-05) ; (Poems* (collected ed., 2 vols., 1905) ; kin¬ ship of Natureˆ (1903); friendship of Art* (1904) ; From the Book of Valentines) (1905) ; (The Making of Personality) (1907) (The Gate of Peace) (1907) ; (The Rough Rider* (1909) ; (A Painter's Holiday) (1911) ; (Echoes from Vagabondia* (1912) ; (Daughters of Dawn,* with Mary Perry King (1913) ; (Earth Deities,* with M. P. King (1914).

CARMARTHEN, or CAERMARTHEN

(Welsh, Caer Fyrddyn), South Wales, a sea¬ port town, capital of Carmarthenshire, nine miles from Carmarthen Bay, Bristol Channel, and 14 miles northwest of Llanelly, on the right bank of the Towy. The principal buildings are the county hall, Saint Peter's Church, with some interesting monuments — one an altar tomb of the 16th century — and Saint David's Church. There are excellent schools, two in¬ firmaries and a literary and scientific institu¬ tion. There are some tin and lead ore works, cloth manufactories, slate quarries and iron foundries, and the salmon fishery is exten¬ sive. Carmarthen was the Maridunum of the Romans, and under the native Welsh Princes the capital of South Wales. Pop. 10,221.

CARMARTHENSHIRE, or CAERMAR-THENSHIRE, South Wales, a maritime county and the largest of all the Welsh coun¬ ties; extreme length, 45j4 miles; breadth, 26 miles ; area, 588,472 acres. It is mountainous generally, but not so rugged as some other Welsh counties. Some of the vales are beauti¬ ful, particularly that of Towy, which is 30 miles in length. This river and the Tave are the only navigable streams in the county. The val¬ leys are fertile, and numerous herds of small black cattle are raised on the hills. The min¬ eral products are copper, silver, iron, lead, coal,

marble and building stone. There are consid¬ erable fisheries. The

Rebecca Riots (1843-44 \ in opposition to turnpike gates, originated in the county. Carmarthenshire returns two mem¬ bers to Parliament. Pop. 160,406.

CARMAUX, kar-md, France, a city in the department of Tarn, nine miles northeast of Albi by rail. It is one of the great coal-mining centres of France, the annual output sometimes reaching as high as 600,000 tons. Serious strikes and riots took place here in 1892. There are also glass manufactures. Pop. (1906) 8,618.

CARMEL. (1) A mountain ridge in Palestine, constituting part of Lebanon, on the southern frontier of Galilee, in the pashalic of Acca. It consists of several rich woody heights, separated by fertile and habitable valleys within a circuit of about 28 miles, and terminates at the mouth of the Kishon in a lovely plain, which forms the southern coast of the Gulf of Ptolemais or Acca, on the Mediterranean. Upon different parts of this mountain there are ruins of churches and monasteries from the time of the Christian kingdom of Jerusalem, and the cave which, according to tradition, was inhabited by the prophet Elijah. (2) A city of Judah, about eight miles southwest of Hebron. Eusebius mentions it and calls it a very great town. The modern city is Khirbet Kurmul.

CARMELITES, one of the four mendi¬ cant orders of the Roman Catholic Church ; its full title is Friars of Our Lady of Mount Car¬ mel. The order has, traditionally, a very an¬ cient origin, but as a religious order approved by the Roman Catholic Church is contemporary with the Dominican and Franciscan orders. According to the legends the Carmelites trace the origin of their order back to the early days of the kingdom of Israel, the time of the prophets Elijah (Elias) and Elisha (Elisaeus). Elias, in his early manhood, says the legend, retired for religious contemplation to Mount Carmel, and there, taught by an angel, gathered to himself a number of men of like disposition, and instituted a society of contemplatives for worship of the true God and the attainment of spiritual perfection. Among the disciples attracted to the school of religion were the youths who afterward were the minor prophets Jonah, Micah and Obadiah ; and at a later period the renowned philosopher of Magna Grsecia, Pythagoras, was numbered among the inquirers after the true religion and the sci¬ ence of divine things in this great school of the prophets : Pythagoras' instructor was the prophet Daniel. Elijah's wife instituted an order of female recluses. As pointing to the existence on Mount Carmel of some such insti¬ tution as the legend postulates, reference is made to 1 Kings xviii, 19 and following; 2 Kings ii, 25 ; and 2 Kings iv, 25.

The world outside the precincts of those re¬ ligious communities appears to have been en¬ tirely ignorant of this ancient institution till early in the 13th century, when Phocas, a Greek monk of Patmos, brought to the Latin Patri¬ arch of Constantinople intelligence of the exist¬ ence in olden time of a great monastic or eremitic establishment on Mount Carmel, of which traces still remained. The learned ed¬ itors of the Acta Sanctorum were able to dem¬ onstrate that the present order owes its origin to the Crusader Berthold who, having become

a monk in Calabria, took up his abode on Mount Carmel in 1156, with 10 companions. For these Phocas petitioned the patriarch to formulate or to approve a rule of monastic or eremitical life. This was done, and afterward the rule was approved by Pope Honorius III in 1224. The connection of this order with the ancient school of the prophets, even if the tra¬ ditional story be accepted, seems to lack proof. All that we are told which could give color to the claim that the new eremites are in the line of succession from the eminent school of prophets is, that in a vision Elias gave orders to the monk from Calabria to found a religious establishment on the ancient site. The com¬ munity was expelled by the Saracens from its seat on Mount Carmel and took refuge in the West. One of the earliest houses of the Car¬ melite order in the West was founded at Aln¬ wick in England ; and about the same time, near the middle of the 13th century, Saint Louis the King, founded at Paris the first Carmelite house in France — the Cannes, of terrible celebrity in the great Revolution. Pope Innocent IV modified the rule of the order and assimilated it to the Dominican and Franciscan rule. One of the traditions represents Jesus and his mother as initiates of the ancient order; and Saint Simon Stock, sixth general of the order, ap Englishman, received from the hands of the Virgin the scapulary of Mount Carmel with the assurance that whoso should die wearing that scapulary would surely not be damned. A relaxation of the primitive severity of the rule was permitted by Eugenius IV in 1431, and this led to a scission of the order into two sub¬ orders, the Conventuals or Calced (wearing shoes) and the Observants or

Discalced (shoe¬ less or barefooted). Pope Benedict XIII in 1725 permitted the order to add to the statues in Saint Peter's Church of founders of religious orders one to their founder, which was erected with the inscription : (<Universus Ordo Carme-litarum Fundatori suo Sancto Eliae prophetse erexit® (((The whole order of the Carmelites erected this statue to their founder, Saint Elias the prophet®)- The order of Carmelite nuns dates from the middle of the 1 5th century. In 1562 the great mystic Saint Teresa, who was a Carmelite nun, in virtue of a papal brief estab¬ lished a separate branch of the sisterhood, under a very severe rule : these are the Barefoot Car¬ melite Nuns. She then undertook to restore in the original order of Carmelite Friars the ancient severity of discipline, and succeeded ; the result is the order or suborder of the Bare¬ foot or Discalced Carmelites. The Carmelite order, in its several forms, has establishments all over the world. The headquarters of the order in America are at Niagara Falls.

CARMEN. Merimee's short novel, bar¬ men,) is probably less known than the opera to which it gave its name. This story, like many of Merimee's literary productions, appears merely as an incident in the course of more seri¬ ous work. Indeed, it begins w;ith an archaeo¬ logical discussion and ends with a disserta¬ tion on gypsy dialects and manners. The inter¬ vening 90 pages contain however a vivid picture of gypsy life in Spain in its strangest and most picturesque features. Merimee's travels in Spain, his acquaintance with the history of the country, its literature, its language and dialects,

including the difficult Basque and that of the Romani or gypsies, furnished him abundant ma¬ terial for his story. This material he handles in his impersonal manner, with a logical devel¬ opment, a precision and a finish of style which make of his works little gems of literary achievement. In spite of his detached attitude toward his characters, he endows them with an impressive or rather oppressive realism. Few characters in French literature are more skilfully drawn or more strongly alive than those found in Merimee's stories. In (Car¬ men, y the heroine is a romantic conception of the classic Gitanilla of Cervantes. She com¬ bines the virtues and vices of her race carried to extremes. In her many-sided roles, either as cigarette-maker, a fortune teller, a secret agent of highwaymen and smugglers, or as the fun-loving dancer and the devoted nurse of her wounded companions, she is intensely passionate or revengeful, greedy or extravagant, selfishly sensuous or ideally self-sacrificing, but always exercises a strong fascination upon all of those who willingly or unwillingly come under

her fateful influence. This fascination has transformed the hero, Don Jose, from an honest sergeant in the army into a smuggler, a bandit and a murderer, when, driven by jeal¬ ousy, he stabs Carmen herself after he had gained undisputed possession of her by killing her gypsy husband in a trumped-up duel.

Although such adventures and strange pic¬ tures may startle and puzzle the reader, they nevertheless leave a strong impression because in spite of an exaggerated individualism, they show a solid humanistic foundation, and on the part of the author an accurate sense of ob¬ servation even if tinged with a certain dilet¬ tantism and indifference bordering on cynicism. Dramatized by Meilhac and Halevy, (Carmen) was set to music by Bizet and played for the first time in Paris on 3 March 1875 ; since then it has been one of the most popular operas of the French school. Consult Ives, George Burn¬ ham (translator), <Carmen and other stories) (New York 1903).

L. A. Loiseaux.

CARMEN, an opera comique in four acts by Georges Bizet (libretto by Meilhac and Halevy, founded on a tale by Prosper Merimee) first produced at Paris on 3 March 1875. Not only Bizet's masterpiece, but the greatest opera that has come out of France, (Carmen) was not at first a success, and the coolness of its reception is generally believed to have hastened the composer's death, which occurred three months later. The story of the beautiful Spanish gypsy, flirtatious and fickle, cruelly oblivious to the ruin she spreads, until her career is tragically ended by Don Jose, one of her lovers, is familiar to every opera-goer. There is no more popular song in the modern repertory than that of the Toreador with its graphic portrayal of the character of Esca-millo, the bull-fighter. In the Habanera, sung by Carmen in the first act, use is made of an old Spanish song; but except in that instance, the music is all Bizet's and not the least note¬ worthy fact is its convincing Spanish color, as realistic and as warm as a Sorolla painting. The rhythmic lilt of the Seguidilla, with which Carmen subjugates Don Jose, and of her dance with castanets in the second act, is not easily

forgotten. Indeed, the whole score is a mine of rhythm of inexhaustible variety. The ro¬ mantic charm of Michaela's aria in the third act is so compelling as easily to overcome the nat¬ ural reluctance of the most celebrated prima donna to taking second place. While the Wag¬ nerian influence is in a general sense present in the orchestral portion of Carmen, harmonic¬ ally and rhythmically it is Bizet alone ; and his originality and dramatic power as displayed in this work (think of the eloquent Fate motif) suggest that he might have risen to the great¬ est heights had he lived beyond the short 37 years of life permitted to him. It was Nietzsche who said: ((Bizet was the last genius to discover a new beauty. — Bizet discovered new lands — the Southern lands of music.® Carmen has always enlisted the powers of great dramatic singers. The original was *Mme.* Galli-Marie. Minnie Hauck introduced the role in London and New York. But the great¬ est of all Carmens was Emma Calve, who made her American debut in 1893. Her sensa¬ tional performance was long before the public in this country and will not soon be forgotten.

Lewis M. Isaacs.

CARMEN SECULARE. See Horace.

CARMEN SYLVA, pen name of Eliza¬ beth, Queen of Rumania (q.v.).

CARMI, Ill., city and countv-seat of White County, 150 miles southeast of Springfield, on the Louisville and Nashville Railroad and the Little Wabash River. It is the centre of an agricultural region and exports fruit, grain, flour, tile and lumber. It has flouring and saw mills, brick works, machine shops, a stave and heading factory, an ice factory, *etc.* Pop.

(1920) 2,667.

CARMINATIVES, remedies that cause a warm, pleasant sensation in the stomach and act as stimulants to the muscles, causing peri¬ stalsis, thus relieving flatus ; and that increase the flow of the gastric and intestinal secretions. Most of the drugs containing volatile oils are carminatives ; as, the mint family, parsley, anise, fennel, caraway, cardamon, ginger, cinnamon, cloves, *etc.* See Volatile Oils.

CARMINE, the most splendid of all the red colors, is made from cochineal insect, or Coccus cacti. It was first discovered by a Franciscan monk at Pisa, while compounding some medicine containing cochineal, and in 1656 it began to be manufactured. The

finest is that which is thrown down from an aqueous infusion by chloride of tin. This, after de¬ positing, is collected and dried. The opera¬ tions require the greatest care, for the brilliancy of the color is affected by the weather, light and temperature. The color produced by alum has a darker tint, and constitutes lake. Car¬ mine, or carminic acid, is also the name given by chemists to the coloring matter of cochineal. The acid is a purplish body, extremely soluble in water and in alcohol. It forms salts with the heavy metals, and it yields various prod¬ ucts when acted on by chlorine, nitric acid and other reagents. Carmine is used to some extent in dyeing, in water-color painting, to color artificial flowers, confectionery, *etc.*

CARMONA (ancient Carmo), a town in Spain, 20 miles from Seville, on a height over¬ looking a large plain covered with olive-trees.

It is well built, containing many handsome man¬ sions belonging to the nobility, who though usually resident in Seville spend part of the year there. The principal square is well planted, and, among other edifices, possesses a hand¬ some Gothic church with lofty spire. Another conspicuous object is a Moorish castle, flanked with massive towers, and there are two old Roman gates. The manufactures are chiefly woolen hats, leather and earthenware. Recent important excavations on the site of the ancient necropolis, to the west of the modern town, have brought to light a large number of tombs and funeral triclinia in almost perfect preserva¬ tion. Considerable portions of the Moorish wall and Alcazar still remain. The city retained its prominence throughout the Middle Ages. It fell into the power of the Moors, but was recaptured by Saint Ferdinand of Castile in 1247. Consult M. Sales y Ferre, (Estudios arqueologicos e historicos) (Madrid 1887). Pop. 18,855.

CARMONTEL, kar-mon-tel, or CAR-MONTELLE, Louis Carrogis, French poet: b. Paris, 15 Aug. 1717 ; d. there, 26 Dec. 1806. He is best known by his (Proverbes drama-tiques) (10 vols., Paris 1768-81, new ed., 4 vols., Paris 1822). These are without much connec¬ tion in themselves, being, in. fact, only a series of dramatic scenes, but are well adapted for private theatres. The fertility of Carmontel was as extraordinary as his ease in writing. His (Theatre de campagneˆ a collection of more than 25 comedies, was published in 1775 (4 vols.). He painted portraits, mostly profiles, of some of the most eminent persons of the 18th century. (Proverbes et comedies posthumes de Carmontelle) was published, with a memoir by *Mme.* de Genlis (3 vols., Paris

1825).

CARNAC, kar-nak, France, a Breton vil¬ lage in the department of Morbihan, on a height near the coast 18 miles southeast of Lorient, and remarkable for the socalled Druidical monuments in its vicinity. These consist of more than 1,100 rude blocks of gray granite, some of which are upward of 18 feet high, standing on end in the midst of a wide heath. They are in the form of unpolished obelisks, with the vertex reversed, and are arranged in 11 lines, forming 10 avenues, with a curved row at one end. There are many gaps in the lines ; almost every house and wall in the vicinity is seemingly built from this artificial quarry. They are evidently of very ancient date, but their origin is unknown. At a dis¬ tance of a mile and a half from Carnac there is a wonderful group of mounds called the Bossenno, and the remains of a Gallo-Roman town were uncovered in 1874. Pop. 3,250. Consult Lukis, (Chambered Barrows and Other Historic Monuments in Morbihan > (1875) :

Miln, (Excavations at Carnac > (1877-81) ;

Worsfold, (The French Stonehenge) (British Arclucological Association Journal. 1898).

CARNALL, Rudolph von, German min¬ ing engineer: b. Glatz 1804; d. 1874. He began the study of mining in Berlin in 1823, was connected with the mining industry in Upper Silesia and rose to be superintendent of mines and director of the general mining office in Breslau. He took part in founding the German Geological Society, lectured at the University

of Berlin on the science of mining engineering, and rendered important service to the develop¬ ment of German mining. He was councillor in the mines and mining section of the Prus¬ sian Ministry of Commerce from 1855 to 1861. The Zeitschrift filr das Berg-,

Hiltten-und Sal-inenwesen im preussischen Staate was founded by him.

CARNALLITE, a hydrous double chloride of potash and magnesium, one of the prin¬ cipal potash-yielding minerals of the great Ger¬ man potash deposits at Stassfurt, Germany. In composition it consists of potassium chlor¬ ide, 26.8 per cent, and magnesium chloride, 34.2 per cent.* Its equivalent in potash is 14.1 per cent.

CARNARVON, kar-nar'von, Henry How¬ ard Molyneux (4th Earl of), English states¬ man: b. London, 24 June 1831 ; d. 28 June 1890. He received his education at Eton and Christ Church, Oxford, taking his degree in 1852. After this he spent several years in travel in the Orient. He succeeded his father in the earldom in 1849, and was secretary of state for the colonies, June 1866 to March 1867. He was chosen high steward of Oxford University and created D.C.L. (1859). During his secretaryship he devised a scheme for the federation of the British North American Colonies, subsequently approved by Parliament. He was again colonial secretary, 1874-78, and lord-lieutenant of Ireland, 1885-86. He pub¬ lished (The Druses of Mount Lebanon) (1860) ; an address on Berkshire Archaeology (I860) > edited (Reminiscenses of Athens and the Morea by the late Earl of Carnarvon, > his father, and published translations of the (Agamemnon> (1879), the (Odyssey } (1886), and Prome¬ theus Vinctus) (1893).

CARNARVON, or CAERNARVON, Wales, a seaport town and parliamentary bor¬ ough, on the southeast side of the Menai Strait, and capital of the county, 209 miles northwest of London. The ancient walls thrown around it by Edward I, and flanked by round towers, are still fairly entire. The magnificent castle or palace of Edward I, and in which Edward II was born, stands at the west end of the town, almost overhanging the sea, and is ex¬ ternally entire. Including its courtyards, etc., it covers about two acres of ground. There are extensive ironworks in the town, which supply machinery for steamers, *etc.* The chief exports are copper ore, coal and slates, of which the town is a centre of distribution for the neighborhood. It is much frequented by summer tourists. Consult Hartshorne, (Car¬ narvon Castle > (in the Archceological Journal, Vol. VII, London 1850).

CARNARVONSHIRE, or CAERNAR¬ VONSHIRE, a maritime county of North Wales, having Carnarvon Bay on the west ; Denbigh on the east; the island of Anglesea and the Irish Sea on the north and Cardigan Bay on the south. Its extreme length, south¬ west to northeast, is about 52

miles; extreme breadth, 20 miles, although the greater portion of it does not exceed seven or eight miles on an average ; area, 365,986 acres. This county is traversed throughout its whole length by lofty mountains, including the Snowdon range, whose highest peak is 3,557 feet above the sea. There are other summits varying from 1,500

feet to more than 3,000 feet. Dairy farming, and cattle, horse and sheep breeding are the principal occupations of the farmer. The cattle and sheep are of a small breed. Lead, zinc and copper ores are found in the moun¬ tains in the south, and granite is worked ; but slate is the principal mineral product of which there are extensive quarries at Bethesda. The county returns two members to Parliament. Pop. 125,043.

CARNATIC, kar-nat'ic, former province of British India, on the east coast of the pen¬ insula. Its limits were ill defined, but it is commonly thought to have extended from Cape Comorin to lat. 16° N., and from the coast line to an average of about 80 miles inland. It was formerly included in the dominions of the Nabob of Arcot, and the contentions arising from a disputed succession first brought the French and English into collision, and ended by the subjugation of the Carnatic under the British influence, which was completely effected in 1801. The Carnatic as one of the wealthy provinces has been the cause of endless native warfare and bloodshed, by which, whoever was victor, the unhappy cultivator suffered in the end ; as each successive ruler, feeling his tenure uncertain, cared only to make revenue while the power lasted, an example which was but too closely imitated by his unscrupulous minis¬ ters and officials. The Carnatic is now in¬ cluded within the administration of the presi¬ dency of Madras. •

CARNATION, a half-hardy perennial herb (Dianthus caryophyllus) of the family Silenacece, a native of southern Europe. It has more or less erect stems with enlarged joints, linear opposite leaves covered with a bloom, and solitary, variously colored, terminal, perfumed flowers, which naturally appear dur¬ ing summer, but which are produced artificially in certain varieties throughout the year. The plant has been in cultivation for its flowers for more than 2,000 years, but not until the early years of the 16th century did its flowers be¬ come greatly differentiated from their original flesh tint, which suggested the popular name (Latin carnatio). So numerous became the varieties that systems of classification were adopted. The popular European system of to¬ day is: (1) ˆSelfs,® flowers of one color; (2) ˆflakes,® flowers with yellow or white ground and striped with either rose, scarlet or

purple; (3) ˆbizarres,® resembling flakes except that they are striped with more than one color; (4) ˆpicotees,® with white or yellow petals margined with red, *etc.* The summer-blooming carna¬ tions which suggested this classification are little grown in America, but are very popular in Europe. They seem to demand a moist, cool climate. The group most cultivated in America, known as perpetual-flowering tree, or monthly carnations, originated in France about 1840 as the result of crossing and selec¬ tion. The first of these varieties imported into America is said to have arrived in 1856, since when the growing of carnations under glass as a crop has developed. The extent of the in¬ dustry is very great and is steadily growing. According to the census report of 1900 the value of the carnation crop in 1899 was about $4,000,000, produced in about 9,000 American commercial greenhouses.

Propagation of the monthly carnations is usually effected by means of cuttings of young stems. When well rooted they are potted in good soil and kept until late spring, when they are transplanted to the open ground or to the benches where they are to blossom. A winter temperature ranging between 50° and 55° at night and preferably only 10° higher during the day is desirable. At the end of the winter they are thrown away.

The most common insect pests of the carna¬ tion are the red spider and the green aphis. The red spider thrives best in dry atmosphere, and is most easily controlled by syringing with water and evaporating (not burning) sulphur in the greenhouse once a week for about five weeks, when the insects become troublesome. The green fly or green aphis seems to thrive under any ordinary conditions. It is usually fought with tobacco fumes of various extracts of tobacco. Three fungous diseases are often troublesome, rust (Uromyces caryophyllinus) , spot, or blight (Septoria dianthi), and anthrac-nose (Volutella Sp.). These are largely pre¬ vented by judicious management, and when they occur may be controlled by destroying diseased plants and by spraying with Bordeaux mixture (See

Fungicide). Rust appears on the stems and leaves as blisters which break and expose brown spores. Spot consists of brown dots with black centres where the spores are borne. Anthracnose is characterized by grayish-brown spots. (Bailey, (Cyclopedia of American Horticulture, } New York 1914). Thirty-seven acres of land are devoted to the raising of carnations at a nursery in Los Angeles, Cal. Nine greenhouses, each 200 feet long and 15 feet wide, together holding 35 tons of glass, are used to raise the young plants.

CARNATION (Latin, caro, carnis, ˆflesh®), in painting, the representation of the color of flesh. It is also used in the fine arts to signify the nude or undraped parts of a figure. The use of carnation requires very attentive study and great skill in the artist. It varies with the sex of the individual, with the classes and countries to which the subjects belong, with the passions, the state of the health, *etc.* The cheeks are, in a healthy sub¬ ject, of a lively red; the breast, neck and upper part of the arms of a soft white; the belly yellowish. At the extremities the color becomes colder, and at the points assumes a violet tint, on account of the transparency of the skin. All these shades require to be softly blended. Two faults in carnation are chiefly to be avoided, — hardness, the fault of the mas¬ ters of the 15th century, and too great weak¬ ness. Guido Reni not infrequently painted his flesh so that it appeared almost bloodless. The French school has gone farthest in this respect. The flesh of the followers of this school often looks like porcelain or wax. Titian and Rubens are unrivaled in carnation.

CARNAUBA, kar-na-oo'ba, the Brazilian name of the palm, Copernica cerifcra, which has its leaves coated with waxy scales (whence the name wax-palm), yielding a useful wax by boiling. It withstands drought excellently. A slight saline composition in the soil pro¬ duces the best trees. The fruit and pith are

eaten, the leaves, are variously employed and the wood is used in building.

CARNEADES, Greek philosopher: b. Cyrene, Africa, about 214 b.c. ; d. 129 b.c. The date of his birth is uncertain. Cicero states he was 90 years old at the time of his death, which would place his date of birth in 219 b.c. He studied first under Diogenes the Stoic, but subsequently attended the lectures of Egesinus, who explained the doctrines of Arcesilaus; and succeeding his master in the chair of the Academy, he restored its reputation by softening the prevailing pyrrhonism and

admitting prac¬ tical probabilities. The doctrine of Carneades specifically was, that ((as the senses, the under¬ standing, and the imagination frequently de¬ ceive us, they cannot be the infallible judges of truth, but that from the impression made by the senses we infer appearances of truth, which, with respect to the conduct of life, are a suffi¬ cient guide.® He was a strenuous opposer of Chrysippus, and attacked with great vigor the system of theology of the Stoics. He was an advocate of freewill against the fate of the same sect, and urged just the same difficulties in reconciling divine prescience with the freedom of human actions as have divided some con¬ tending sects of Christianity. One of the most distinguished events of his life was his being joined in an embassy to Rome with Diogenes the Stoic and Critolaus the Peripatetic, in order to gain the mitigation of a fine levied by the Roman Senate on the Athenians. This extraor¬ dinary embassy was successful, and Carne¬ ades so captivated the people by his elo¬ quence, one day delivering a harangue in praise of justice, and on the next proving it to be an odious institution, that Cato the censor, fearful of its effect on the Roman youth, persuaded the Senate to send the philosophers back to their schools without delay. In his latter years Carneades became totally blind and continually complained of the shortness of life, lamenting that the same nature which composed the human frame could dissolve it. Consult Hicks, (Stoic and Epicurean) (New York 1910).

CARNEGIE, Andrew, American iron¬ master, and philanthropist: b: Dunfermline, Scotland, 25 Nov. 1835; d. Lenox, Mass., 11 Aug. 1919. None of the great makers of their own fortunes began closer to absolute zero; cer¬ tainly none who have owed success not to fortunate speculations, but to steady labor, sagacity and self-culture, the natural working of the highest powers on opportunities open to all and less to him than to most. His father owned a small hand-loom business, which was closed in 1848 by the competition of steam. He then emigrated to the United States and settled in Allegheny City, Pa. The 10-year-old child here became a bobbin-boy at 20 cents a day ; his alertness in a few months brought him trans¬ ference to an engine-room, his penmanship and arithmetic a chance to do clerical work. Next a telegraph messenger boy at Pittsburgh (with a mother and younger brother to support from his slender wages), he promptly mastered teleg¬ raphy, was soon given a place as operator, and won himself extra earnings and experience in composition as a newspaper telegraph re¬ porter. Superior fitness brought him the post of telegraphic train dispatcher to the Pennsyl-ANDREW CARNEGIE

Photograph by J. Horace McFarland Co,

CARNATION

vania Railroad ; then of secretary to its general superintendent, Colonel Scott; and in 1860, when his chief became vice-president, Mr.. Carnegie was made superintendent of the Western Division. Meantime his business fortune had opened with the tentative adoption by the road, through his agency, of the Wood¬ ruff slecping-car system, in which he shrewdly embarked some borrowed money; his expert knowledge made it investment, not speculation ; and his dividends went partially into oil lands around Oil City, selected with equal judgment. At the outbreak of the war, Colonel Scott was made Assistant Secretary of War, and gave Mr. Carnegie charge of the eastern military railroads and telegraph lines, and of this de¬ partment there was no complaint or scandal, and no breakdown except of Mr. Carnegie's health from overwork. He was also the third man wounded on the Union side, while remov¬ ing obstructions from the Washington tracks.

Already a small capitalist, in 1862 the Penn¬ sylvania road's experiments in replacing wooden with iron bridges led him to forecast the future monopoly of the latter, and organize the Key¬ stone Bridge Works, which built the first iron bridge across the Ohio. To increase their profit by furnishing their own iron, he entered the field which has made him one of the indus¬ trial sovereigns of all time. The first step was the erection of the Union Iron Mills, furnaces and rolling mills ; the last, after inspection of the Bessemer process in England, to establish it in this country in 1868. The story since is one of swift aggregation of plant to plant, till they have dominated their class, and become one of the chief industrial factors of the entire busi¬ ness world in this its greatest age. By 1888 he had acquired a controlling interest in his fore¬ most rival, the Homestead Steel Works, and in seven other immense establishments centred around Pittsburgh ; in

1899 he consolidated all these into one giant structure, the Carnegie Steel Company; and in 1901 he retired from business life, transferring his company at a valuation of $500,000,000 to be merged into one still vaster, the United States Steel Corporation, formed by J Pierpont Morgan. His United States residence was in New York; his summer establishment at Skibo Castle, in the extreme north of Scotland.

Such supreme success, fairly won in a strug¬ gle with the world, is of course the result of a supreme individual genius not to be taught or explained, but as the amount of work any one man can do unassisted is a trifle, the chief in¬ strumentality is always the faculty of organi¬ zation. Mr. Carnegie himself once said that the organization the business; that if

stripped at a blow of all his material property and business connections, but left his organiza¬ tion, in four years he would have re-established himself. But the organization is simply the men who work it, wi:h their capacity of select¬ ing capable subordinates, and understanding public needs and the means of supplying them; and this leaves the faculty of creating and sus¬ taining it no nearer solution than before. In the last analysis it means a nicely accurate judgment of men , resulting from an intuitive gift informed and tested by long experience; and as men are not pawns, it implies the power of persuading them into and keeping them in alliance as well.

Always a generous and helpful man, he had definitely begun, a few years before his retire¬ ment, a new existence consecrated to public serv¬ ice, and to which he will owe enduring re¬ membrance. Another generation would have forgotten the mere business man, however great; for after all it would have had steel from some source, if perhaps less cheaply; but it could not have had from lesser men, and would not have had from any, the splendid, judicious and permanently useful gifts with which he has endowed it, and which no change of social ideals can render obsolete or harmful. No one has ever so royally returned to the public what he had (to its own benefit) drawn from the public. This is his own expressed conviction of duty; that ((surplus wealth is a sacred trust to be administered for the highest good of the people, M and that sometime ((the man who dies possessed of millions free and ready to be distributed, will die disgraced. But he is equally emphatic in declaring that indiscriminate giving is mostly sheer mischief, and that no person and no community can be permanently helped except by their own co¬ operation. Therefore, every gift of his to a community is conditioned on the latter

support¬ ing it; and all those to institutions are thought out, and so bestowed that they forward the work without impairing the springs of public interest, or the ties to the public, which must after all be their permanent stay. These gifts are mostly not to charities in the current sense, relief of material distresses, for which the spirit of human brotherhood should be adequate; but for that mental and spiritual cultivation which should raise communities out of the lowest plane of social evils. An apparent exception, which, however, is not charity but justice and business sense, is the endowment of $4,000,000 given for an annuity fund to the workers at Homestead. The remainder of his benefac¬ tions may be divided broadly into institutions for research and the discovery of fertile new ideas ; those for teaching the best of ideas and their practical appliances already known ; and those for storing the results of knowledge and creation and distributing them to the public — in a word, universities, colleges and technical schools and libraries. Even the organs he has presented to several hundred churches may be classed in this category ; as he genially ob¬ served, he is willing to endorse unreservedly all the utterances of the organs, but not of the preachers. The greatest single foundation will be the Carnegie institute at Pittsburgh an enormous technological school, with library, art gallery and every imaginable accessory, — the people's college of what he thinks the coming type, — which has received $25,000,000 in all.

Next is the Carnegie Institution (q.v.) at Washington, to promote original research and enable original workers to use their whole time for study, experiment and creation; per¬ haps his most valuable benefaction ultimately, since new ideas are at once the scarcest and the most valuable items of the world's income, and the work of one great man outweighs that of 10 generations of small ones. Of the others, perhaps the most useful, considering the work, and the chief, is the gift of $600,000 to the Tus-kegee Normal and Industrial Institute in Ala¬ bama, conditioned on the trustees using enough of its income annually to free its president

from money cares and the need of ˆdrumming® support for his college. Sixty-five libraries in New York have received $5,200,000, one in Saint Louis $1,000,000, and two in Detroit and San Francisco $750,000 each; libraries at Homestead, Braddock and Duquesne $1,000,000; and the universities in Scotland $10,000,000. In 1905 he established the-Carnegie Foundation of $10,- 000,000, the income from which provides retir¬ ing pensions for teachers in colleges, universi¬ ties and technical schools ; and in December 1910 a Peace Fund of $10,000,000; $5,000,000 to the Carnegie Hero Fund Commission, Pitts¬ burgh; $1,500,000 to the Carnegie Hero Fund Trust, Dunfermline, Scotland; and the follow¬ ing amounts to various Hero Funds : France $1,000,000; Germany $1,500,000; Belgium $230,- 000; Denmark $125,000; Holland $200,000; Sweden $230,000; Switzerland $130,000; Italy $750,000; Norway $125,000.

He has also given $3,500,000 to the Carnegie Dunfermline Trust; $1,500,000 for the Peace Temple at The Hague; $1,500,000 to the Allied Engineers' Society; and his total benefactions exceed $300,000,000, including over $60,000,000 for over 3,000 municipal library buildings ; also the building and grounds for the Pan-American Union, Washington, 1906; $16,150,000 for Foundation for the Advancement of Teaching in United States, Canada and Newfoundland.

He was a life trustee of the Carnegie Corpo¬ ration of New York ($125,000,000) which was founded to carry on the various works in which he had been engaged and to which he announced in 1912 that he had given all his fortune except $25,000,000. He was lord rector of Saint An¬ drew's University in 1901-02 and 1906, and of Aberdeen University in 1912.

Mr. Carnegie also won repute as an author. His first works, (Notes of a Trip Around the World) (1879) and (Our Coaching Trip) (1882) were printed first for private cir¬ culation, but published in consequence of the great pressure for private copies. (An Ameri¬ can Four-in-Hand in Britain5 (1883) and (Round the World5 (1884) followed; but his greatest success was attained with (Triumphant Democracy5 (1886), which sold 40,000 copies within two years. (The Gospel of Wealth5 (1900); (The Empire of Business5 (1902, since translated into eight languages) ; (James Watt5 (1906); and (Problems of To-day5 (1909) have maintained his reputation as a clear, forcible and interesting writer and thinker. Consult Alderson, (Andrew Carnegie: the Man and His Work.5

CARNEGIE, Pa., borough in Allegheny County, five miles southwest of

Pittsburgh, on the Pittsburgh, Cincinnati, Chicago and Saint Louis, the Pittsburgh, Chartiers and Youghio-gheny and the Wabash Pittsburgh railroads. It has a Carnegie library, an Elks' Home, a high school and a fine orphan asylum. It is the centre of a coal-mining region and has ex¬ tensive steel works. There are also lead works and manufactures of granite ware and stoves. In 1914 there were 432 persons engaged in manufactures in 19 establishments, the salaries and wages amounted to $328,000, the capital in¬ vested amounted to $2,202,000, the value of the materials used was $902,000, and the value of the products amounted to $1,724,000. The borough was formed in 1894 by the consolida¬

tion of Chartiers and Mansfield. It is gov¬ erned by a burgess, who is chosen for a term of three years, and a council. Pop. (1910) 10,009;

(1920) 11,516.

CARNEGIE DESERT LABORATORY,

one of the most important of all the many research departments allied with the Carnegie Institution at Washington, situated near Tuc- •son, Ariz. In connection with the department of botanical research, this laboratory was es¬ tablished in 1903 and almost at once took its place among the great institutions of the world. It concerns itself chiefly with the plant life of the desert, seeing how the impover¬ ished plants which grow there can be made to thrive and improve and become of benefit to mankind, and is a movement of great agricul¬ tural import.

The equipment of the Carnegie Desert Lab¬ oratory is in proportion to the elaborate work undertaken there. The area of ground em¬ braced for experimental work comprises 860 acres, situated just west of Tucson. Within this tract Tunamoc Hill rises to a height of 800 feet above the lower mesas. These topo¬ graphical features present a wide range of varied conditions for plant growth. The lab¬ oratory proper is located halfway up the hill, and the entire grounds are fenced in. The laboratory forms three sides of a quadrangle 126 feet long with a short axis of 85 feet. Be¬ sides this is a small glass house for experi¬ mental purposes along special lines, and also a workroom.

The laboratory is conducting interesting work on Alpine and Austral plantations, located on the mountains, for the furtherance of which work it is provided with a complete pack equip¬ ment, including two

pairs of heavy rawhide kyacks suitable for transporting instruments without damage. Although the greater part of the departmental work is carried on here, it is essential to a comprehensive study of desert plant life to explore distant as well as adjacent arid regions and much important work has also been carried on in the Salton Basin, where it has been established that the highly special¬ ized flora is of comparatively recent origin. This basin and its accompanying vegetation have suggested experiments relative to the in¬ fluence of altitude and climatic factors upon vegetation. To carry on these, plantations have been established on the Santa Catalina Mountain at various altitudes, ranging from 2,300 feet to 8,000 feet in height. Thermo¬ metric observations are made at each of these plantations. Culture has also been carried on at the tropical station at Cinchona, island of Jamaica, for comparisons. In order to obtain more complete comparisons the establishment of a station is now being contemplated in the San Francisco Mountain in northern Arizona, having an elevation of about 12,000 feet. Nota¬ ble experiments have also been made in demon¬ strating the movements of vegetation over desert areas, and the distribution of native and alien plants. This study has been greatly facili¬ tated by a topographical survey and a geological survey, both of which were conducted under the direction of the University of Arizona. Twelve well-defined plants were considered by the staff in this field of science, and various stations established, to demonstrate correlate plant be-CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE

havior with known factors of environment, with special attention to water supply, condi¬ tions of soil, exposure and drainage.

Other notable work of the laboratory has been the measurements of bodies of certain succulents in which the storing of water has been developed ; experiments in the physiology of stomata, covering research in relation to the colors in flowers. In this, convincing data have been collected through the agency of the dark room, starvation and feeding. Similar investiga¬ tion has been made in regard to the topography of chlorophyll masses, one of the distinct char¬ acteristics here noted being the depth to which the chlorophyll has been deposited in some desert plants, primarily, it is believed, because of the highly intensified light of the desert regions. Experiments have

also been carried on in regard to the habits of roots in the desert regions, with comparative results obtained in the New York Botanical Gardens and data from the Jamaica institution. A great deal of highly interesting work has also been done in studying the water storage capacity of certain desert plants. Many specimens which grow in the desert have de¬ veloped this capacity to a remarkable extent in order to tide them over through the long droughts which often occur there. The work of the Carnegie Desert Laboratory is thorough and exhaustive. It is not spectacular, since years are often required before even a single fact can be absolutely assured, but the work is cumulative in its nature, and in the future its importance will be adequately realized by the nation at large, and particularly by that portion of the population which is interested in the deserts of the West and other cultivation.

CARNEGIE ENDOWMENT FOR IN¬ TERNATIONAL PEACE, an institution created and maintained by a fund of $10,000,000 set apart by Andrew Carnegie in 1910. The purpose of the Endowment, as outlined by one of its prominent active members, Dr. Nicholas Murray Butler, president of Columbia University is (<to work for the promotion of peaceful de¬ velopment of civilization by aiding and develop¬ ing, supporting and directing the forces needful to bring about the prevention of war, the per¬ fection of means for the establishment of arbi¬ tral justice between nations, and the develop¬ ment of a world congress or parliament, a high international court, and an international police, and to take such steps and promote such under¬ takings as shall bring about the substitution of law and justice for war as a means of settling international disputes and difficulties*

The trustees selected by Mr. Carnegie to re¬ ceive the fund and administer its income met at Washington on 14 Dec. 1910. At this meet¬ ing Mr. Carnegie read a letter informing the trustees of his gift of $10,000,000 in 5 per cent first mortgage bonds, the revenue of which, he stated, (<is to be administered by you to hasten the abolition of international war, the foulest blot upon our civilization.* The donor made no restrictions of the gift, but left discretionary with the trustees the expenditure of $500,000 annually accruing from the fund; he did not attempt, moveover, to outline future action as regards the measures, methods and policies that were to be adopted to the end of accomplishing the purpose specified. The only stipulation made was that the trustees were to “keep un¬ ceasingly in view, until it is attained, the speedy

abolition of international war between socalled civilized nations.* The original trustees selected by Mr. Carnegie were : United States Senator Elihu Root, representative of the United States at The Hague Tribunal; Nicholas Murray Butler, president of Columbia University ; Henry S. Pritchett, president of the Carnegie Foundation for the Advancement of Teaching; Joseph H. Choate, former Ambassador to Great Britain; Albert K. Smiley, educator and hu¬ manitarian ; Charles W. Eliot, president-emeri¬ tus of Harvard University; James Brown Scott, solicitor for the State Department ; John W. Foster, ex-Secretary of State; Andrew J. Montague, ex-governor of Virginia; Congress¬ man William M. Howard, Lexington, Ky. ; Congressman James L. Slayden, San Antonio, Tex.; Judge Thomas Burke, Seattle, Wash.; Andrew D. White, ex-Ambassador to Germany ; Robert S. Brookings, lawyer, Saint Louis, Mo. ; Samuel Mather, banker, Cleveland, Ohio; J. G. Schmidlap, railroad man, Cincinnati, Ohio ; Arthur W. Foster, regent of the University of California; Robert A. Franks, banker, Ho¬ boken, N. J. ; Charlemagne Tower, ex-Ambas¬ sador to Germany and Russia; Oscar S. Strauss, Ambassador to Turkey; Austen G. Fox, lawyer, New York; John Sharpe Williams, senator-elect from Mississippi; Charles L. Taylor, chairman of the Carnegie Hero Com¬ mission; John L. Cadwalader, lawyer, New York; George W. Perkins, financier, New York; Cleveland H. Dodge, philanthropist and financier; Luke E. Wright, ex-Secretary of War; Robert S. Woodward, president of the Carnegie Institution.

At their first meeting these 28 trustees ac¬ cepted the fund by formal resolution, and ap¬ pointed a committee on organization which at the next meeting, held in Washington on 9 March 1911, presented the following statement of the aims and purposes of the Endowment :

(<That the objects of the corporation shall be to advance the cause of peace among nations, to hasten the abolition of international war, and to encourage and promote a peaceful set¬ tlement of international difficulties, and, in par¬ ticular — (a) To promote a thorough and scientific investigation and study of the causes of war and of the practical methods to prevent and avoid it; (b) to aid in the development of International Law, and a general agreement on the rules thereof, and the acceptance of the same among nations; (c) to diffuse informa¬ tion, and to educate public opinion regarding the causes, nature, and effects of war, and the means for its prevention; (d) to establish a better understanding of international rights and duties, and a more perfect sense of interna¬ tional justice among the inhabitants of civil¬ ized countries; (e) to cultivate friendly feelings among the inhabitants of the different coun¬ tries, and increase the knowledge and under¬ standing of each other by the several nations;

(f) to promote a general acceptance of peace¬ able methods in the settlement of international disputes; (g) to maintain, promote, and assist such establishments, organizations, associations, and agencies as shall be deemed necessary or useful in the accomplishment of the purposes of the corporation, or any of them.*

At this same meeting the following officers were elected: President, Elihu Root; vice-presi¬ dent, Joseph H. Choate; secretary, James Brown

Scott; treasurer, Walter M Gilbert (temporary appointment).

At the same time the by-laws of the asso¬ ciation were drawn up. and provision was made, inter-alia, fcr the establishment of an executive committee (consisting of the president, the sec¬ retary and five trustees), which at its first meet¬ ing, h«.id likewise on 9 March 1911, decided to divide the work of the Endowment into three divisions: (1) The Division of Intercourse and Education, to promote the objects specified in sections (c), (e), (g) ; (2) the Division of Economics and History, to promote a scientific investigation and study of the causes of war and of the practical means to prevent and avoid it, as specified in section (a) ; (3) the Division of International Law, to promote the objects specified in sections (b), (d), (f). These three divisions may be described as popular, scientific and juristic, departments in which the work of the Endowment naturally falls. Thus the main activities of the Endowment were established on definite lines, and a world-wide cooperation in each branch of its work was planned. It was decided to inaugurate a series of conferences with foreign publicists, economists and states¬ men, to be held in European cities, and a large number of eminent and influential men of all nationalities were invited to take a more or less active part in the propaganda.

While the outbreak of the European War in the summer of 1914 seriously interfered with the carrying-out of the program, that catas¬ trophe only emphasized the incalculable im¬ portance and need of the work to which the Endowment is dedicated. War itself, indeed, is

throwing light on the main problem, that of preventing war, and is bringing the solution of the problem nearer. On 20 April 1917, the trustees of the Endowment unanimously adopted a formal resolution, declaring their <(belief that the most effectual means of promoting durable international peace is to prosecute the war against the Imperial German government to final victory for democracy, in accordance with the policy declared by the President of the United States.® On the same day, more¬ over, a sum of $500,000 was appropriated, by formal resolution, ((for the reconstruction of devasted homes of Belgium, France, Serbia or Russia.® The main office of the Endowment is located in Washington, D. C., while a branch office is located in New York, where the direct¬ ors of the divisions of intercourse and educa¬ tion and of economics and history have their desks ; the director of the division of interna¬ tional law, who is also secretary of the En¬ dowment, has his office at the Washington headquarters.

Paul B. Thomas.

CARNEGIE FOUNDATION. The Car¬ negie Foundation for the Advancement of Teaching had its inception on 16 April 1905, with a fund of $10,000,000. The act of incor¬ poration was passed by Congress and approved by the President of the United States on 10 March 1906. The aim of this institution is the establishment of an agency to provide retiring allowances for teachers in colleges, universities and technical schools of the English-speaking countries of North America, and to serve the cause of higher education by advancing and dignifying the profession of the teacher in

these higher institutions of ˆearning. In order to be admitted to the retiring allowance sys¬ tem of the Foundation, the essential work of an institution must be that of higher education and of such a character that graduation from a four-year high school course, or equivalent training, constitutes a prerequisite therefor.

A technical school, to be eligible, must have entrance and graduation requirements equiva¬ lent to those of the college, and must offer courses in pure and applied science of equiv¬ alent grade.

Institutions which maintain a course or courses for which high-school graduation, or equivalent training, is not required for admis¬ sion, must present to the Foundation the num¬ ber of students and the names of the teachers in such course or courses ; also, separately, the

number of students of whom high-school train¬ ing, or the equivalent, was required for admis¬ sion, and the names of the teachers engaged exclusively in instructing the latter class of students.

No institution will be accepted which is so organized that stockholders may participate in its benefits.

Institutions of higher learning are recog¬ nized as eligible, under the following condi¬ tions :

1. Colleges, universities and technical schools of requisite academic grade, not owned or con¬ trolled by a religious organization, whose char¬ ters specifically provide that no denominational test shall be applied to trustees, officers, teach¬ ers or students.

2. In the case of colleges, universities and technical schools, not owned or controlled by a religious organization, the trustees of such institutions are asked to certify that, notwith¬ standing the lack of specific prohibition in the charter, (<no denominational test will be im¬ posed in the. choice of trustees, officers or teachers, nor in the admission of students, nor will denominational tenets or doctrines be taught to the students.® Upon the passage of such resolution by the governing bodies of such institutions, they may be recognized as entitled to the benefits of the Foundation, so far as considerations of sectarian control are concerned.

An institution not supported by taxation must have a productive endowment of not less than $200,000 over and above any indebtedness of the institution.

A tax-supported institution must be in re¬ ceipt of an annual income of not less than

$100,000.

Retiring allowances are granted in the col¬ leges, universities and technical schools on the accepted list of the Foundation on two distinct grounds: (1) To a teacher of specified service on reaching the age of 65; (2) to a teacher after 25 or 30 years of service in case of physical disability. To these two main divisions the trustees have added many extra conditions.

At the instigation of the Carnegie Founda¬ tion, a plan for an exchange of teachers be¬ tween the United States and Prussia was put

into effect in 1908. This plan has been in active operation ever since. During the year 1910 a sensation was created in educational circles through the rejection by the Foundation of several western colleges which did not, in the opinion of the trustees, come up to the require-

ments set by Mr. Andrew Carnegie in his deed of trust. In the same year, Mr. Morris Llewellyn Cooke, a member of the American Society of Mechanical Engineers, undertook at the instigation of the Carnegie Foundation a detailed study of some of the American institu¬ tions of learning, with a view to ascertaining whether they were being conducted in a proper manner and whether or not the large sums of money being expended by all of them were put to the best and most practical uses. In the course of his investigation Mr. Cooke examined at length the departments of physics at the uni¬ versities of Harvard, Columbia, Toronto, Wis¬ consin and Princeton, at Haverford and Wil¬ liams colleges, and at the Massachusetts Institute of Technology. His opinion was considered of great importance, it being the first time that a practical business man had officially applied the principles of practical business to the system of education in the United States. His ver¬ dict was that there was a very decided waste apparent at all of the institutions he visited. In his report he allowed facts to speak for themselves for the most part and rarely ut¬ tered any direct criticism, although he did take occasion to score the life tenure of professor¬ ships where they occurred, the committee sys¬ tem of management and the stress laid on the importance of research work. Mr. Cooke de¬ clared that he found researches being pursued in some of the colleges for which no possible excuse was offered, except by the man who happened to be conducting them, and he be¬ lieved that altogether too much attention was uniformly paid to this branch of collegiate work.

Owing to the requirements already men¬ tioned for admission to the benefits of the Foundation Fund, the list is somewhat limited of institutions which can apply for pensions. In welcoming eligible institutions to this limited list, the Foundation has sought to dis¬

tribute them not only geographically, but among colleges of different types. In 1915, 73 institu¬ tions shared in the pension fund. Twenty were small colleges of the type of Middlebury Col¬ lege in Vermont and Franklin College in Indiana. Twenty-five were strong colleges like Williams College in Massachusetts and Colo¬ rado College in Colorado. The remaining 28 were about equally distributed between uni¬ versities like Lehigh University in Pennsylvania and Tulane University in Louisiana, and a similar group of the strongest universities in the country, whether privately endowed like Harvard in the East or State-supported like the University of California in the West. Ac¬ cording to the ninth annual report for the fiscal year 1914—15, the income received from the general endowment of the Foundation was $696,038.60; from the endowment of the divi¬ sion of educational inquiry, now kept as a sep¬ arate budget item, $50,358.34. The total ex¬ penditures under the general endowment were $669,532.99, of which $510,750.97 went to pay the retiring allowances and pensions in insti¬ tutions on the accepted list of the Foundation, and $124,112.80 to allowances and pensions to individual officers, teachers and widows in in¬ stitutions outside of this list. Forty-four al¬ lowances were granted during the fiscal year, involving an expenditure of $70,900. _ The num¬ ber of deaths during the year was 15, making a

net increase of 29 to the number of allowances and pensions in force, which at the end of the year were 432, with a total grant of $687,370 The grants made during the year represented in all 32 institutions. The trustees held in trust at the close of the fiscal year under the general endowment securities of the face value of $14,129,000; under the division of educational inquiry $1,250,000. The Foundation and its work have received considerable adverse criti¬ cism and opposition. ((The spectre of a baneful educational influence® writes President Henry S. Pritchett, (<exercised by a remote agency upon the policy of struggling colleges and universities is one that has been successfully invoked in some quarters. The apprehension that college professors could be influenced in their attitude by the pensions they are to re¬ ceive rests upon two misconceptions; the first, as to the methods of administration. The teacher in the associated colleges does not deal with the Foundation at all. He deals entirely with his college and receives his pension from the college exactly as he receives his salary. The other misapprehension rests upon a mis¬ conception of the character of the American college professor. The university teacher in America has a fairly stiff backbone. Nothing would so arouse his opposition as any effort, however indirect, to control his opinions

about education, college administration or any other subject. The sole opportunity the Foundation has to influence the educational judgment of professors is through its publications, and these have weight only as they are sound and prove in the end to be wise.®

CARNEGIE HERO FUND. During 1904, through the munificence of Mr. Carnegie, a fund called the Carnegie Hero Fund was created for adequately rewarding such persons as should perform deeds of heroism which would otherwise receive no appreciation beyond a possible paragraph in a daily newspaper. Mr. Carnegie endowed the Fund with $5,000,000, the expenditure of which was to be directed by a commission of his own naming, of which Mr. Charles L. Taylor was appointed president. In his deed of trust to the commission Mr. Car¬ negie expressed himself as having long felt that heroes and those dependent upon them should be freed from pecuniary cares resulting from their heroism. In establishing the Fund it was his purpose to place in a somewhat better pecuniary position than before those fol¬ lowing peaceful vocations who have been in¬ jured in heroic efforts to save human life, and, in case of their death, to provide for the widows and children as long as that should be necessary and advisable. He made the stipu¬ lation, however, that no grant was to be con¬ tinued unless it were soberly and properly used and unless the recipients remained sober, re¬ spectable, well-behaved members of the com¬ munity. In all cases a medal of gold, silver or bronze, according to which the deed in ques¬ tion was believed by the commission to call for, was to accompany each grant, and, in cases where no monetary aid was called for, an ap¬ propriate medal was in any event to be awarded, setting forth the heroic deed it com¬ memorated. Subsequent resolutions and by¬ laws passed by the commission govern the operative work of the Fund, but the broad,

general lines of its scope remain those which Mr. Carnegie recited. It has been widely praised for its work on all sides, and has been an incalculably powerful factor in relieving people in want whose real worth was fully revealed for the first time perhaps through their deeds of unselfish heroism.

The field embraced is the United States, the Dominion of Canada, the

colony of New¬ foundland and the waters thereof.

Such acts must have been performed on or after 15 April 1904 and brought to the atten¬ tion of the commission by letter addressed to the manager, Oliver Building, Pittsburgh, Pa., within three years of the date of the act. Up to 1915 the commission had awarded 723 bronze, 387 silver and 18 gold medals; $1,249,656 had been awarded for disablement benefits and for educational and other specific purposes, and for the dependents of heroes who lost their lives. Pensions in force on 31 Dec. 1915 amounted to $79,200 annually. The commission had also awarded $169,462 for the relief of sufferers from disasters; Brockton, Mass., $10,000; Cali¬ fornia earthquake, $54,462 ; Monongah Mines, W. Va., $35,000; Darr Mine, Pa., $25,000; Lick Branch Mine, W. Va., $10,000; McCurtain Mine, Okla., $15,000; Jed Mine, W. Va., $10,000 ; and for the relief of Ohio and Indiana flood sufferers, $10,000.

CARNEGIE INSTITUTION OF WASHINGTON. This institution was founded by Andrew Carnegie on 28 Jan. 1902, with an endowment of $10,000,000 of registered 5 per cent bonds; to this fund he added $2,-000,000 on 10 Dec. 1907, and $10,000,000 on 19 Jan. 1911. The Institution was originally organ¬ ized under the laws of the District of Columbia and incorporated as the Carnegie Institution, but was reincorporated by an act of the Con¬ gress of the United States, approved 28 April 1904, under the title of The Carnegie Institu¬ tion of Washington. The articles of incorpora¬ tion of the Institution declare in general <(that the objects of the corporation shall be to en¬ courage in the broadest and most liberal man¬ ner investigation, research and discovery, and the application of knowledge to the improve¬ ment of mankinds Three principal agencies to forward these objects have been developed. The first of these involves the formation of departments of research within the Institution itself, to attack larger problems requiring the collaboration of several investigators, special equipment and continuous effort. Eleven such departments have so far been established. The second provides means whereby individuals may undertake and carry to completion investigations not less important but requiring less collabora¬ tion and less special equipment. The third agency aims to provide adequate publication of the results of research coming from the first two agencies and to a limited extent also for worthy wTorks not likely to be published under other auspices. The Institution is placed under the control of a board of 24 trustees, which meets annually in December to consider the affairs of the Institution in general, the progress of work already undertaken, the initiation of new projects and to make necessary appro¬ priations for the ensuing year. During the intervals between

the meetings of the trustees the affairs the Institution are conducted by

an executive commission chosen by and from the board of trustees and acting through the president of the Institution as chief executive officer. A view of the history of the Institu¬ tion may be gained from the contents of the <Year Books) and from its other more formal publications, general and classified lists of which may be had on application. The publi¬ cations themselves, numbering over 300, may be found in nearly all the greater libraries of the world. The executive offices of the Insti¬ tution are in its Administration Building, 16th and P streets, northwest, Washington, D. C.

CARNEGIE TECHNICAL SCHOOLS,

Pittsburgh, Pa., a coeducational institution founded by Mr. Andrew Carnegie with an en¬ dowment of $4,000,000. The schools are housed in five buildings. The United States Geological Survey has established in Machinery Hall the main laboratory of the Chemical Division, Technologic Branch, where investigations of fuels from all parts of the country are con¬ ducted. The courses in the schools are ar¬ ranged for day and night students. There are four departments: 1. The School of Applied Science, offering preliminary and specialized courses in the fields of engineering and chemical practice. The time for completion of the course depends on the aptitude and application of the individual students; (2) the School for Ap¬ prentices and Journeymen, which gives general training to supplement the usual apprentice¬ ships in order to counteract the dangers of specialization and overemphasis of the practi¬ cal as opposed to the theoretical sides. Courses as given during slack seasons, etc.; (3) the School of Applied Design, offering courses in architecture and interior decoration. The standards for admission are high school or equivalent certificate and an entrance examina¬ tion; (4) the Margaret Morrison Carnegie School for Women, giving training in the home¬ making arts, dressmaking and design and secretarial work. Candidates are admitted on personal interview if they are over 18, and by examination if they are under 18.

CARNEGIE YACHT. The Carnegie is one of those little known developments which prove, first, how far from perfection the science of to-day is, and, on the other hand, how far it has advanced even within a quarter of a century. The peculiarity of this yacht is that it is non-magnetic ; in other words, the only magnetic steel on board her is

the compass.

The compass does not, as common thought conceives, point directly to the pole. It is deflected by the variations in the magnetic in¬ fluence of the earth, by the presence of large masses of iron on board ship and by the neigh¬ borhood of certain mountains and islands of volcanic origin. Along the inner passage from Seattle to Alaska the attraction from shore affects a ship's compasses a mile away. Navi¬ gation to-day involves the possession of correct information as to these variations of magnetic attraction. This information the Carnegie is engaged in securing.

The yacht is neither owned nor controlled by the man for whom she is named. She was built from the funds of the Carnegie Institu¬ tion of Washington, founded by Andrew Car¬ negie, and was launched on 12 June 1909. In six weeks, with the appliances on board, a single

cruise enabled her officers to discover syste¬ matic errors of importance in the best charts now available. For 10 years the existence of these errors had been more or less suspected, and thousands of observations had been taken by skilful and experienced navigators without definite results. The information gained by the Carnegie is accepted as correct by the leading hydrographic offices of the world.

The best that the commanders of iron ves¬ sels have been able to do, hitherto, has been to entrust the examination of their compasses to a professional adjuster, who, when his work is completed, furnished what is called a devia¬ tion card showing the corrections or errors of the compass on the various headings of the ship. The investigations of the Carnegie will enable the steamer captain to check up these adjustments with full knowledge of the correct or undisturbed variation, or direction of the compass, in all waters he is likely to traverse. Hitherto the captain's only means for this (<checking upw was by personal astronomical observations when the state of the weather per¬ mitted. From the aid of the Carnegie, he will soon be

able to know exactly how the compass would point were it mounted on a non-magnetic vessel. Comparing this with his compass as adjusted, he has the satisfaction and security of being able to make his calculations on a mathematical certainty.

The ingenuity of the Carnegie's construc¬ tion merits the attention of even the casual reader. Her dimensions are : Length over all, 155*4 feet; length on load water-line, 12814 feet; beam, molded, 33 feet; mean draft, 12 feet 7 inches ; displacement, 568 tons ; regis¬ tered tonnage, 246. The materials used were mainly white oak, yellow pine, Oregon pine, and teak. The fastenings are locust treenails, copper and Tobin bronze bolts and composi¬ tion spikes. The anchors — four in number — are of manganese bronze with a total weight of 5,500 pounds.

There are no anchor chains ; instead, three 11-inch hemp cables are used. She is of brig¬ antine rig, with 12,900 square feet of plain sail ; riggings, special Russian hemp; metal work on spars, rigging and blocks, of bronze and gun-metal. The auxiliary power consists of one 150 indicated horsepower producer gas engine, built practically of non-magnetic metals, such as bronze, copper and non-magnetic manganese steel. There are two non-magnetic 20-foot whale-boats and one 16-foot gig. The cooking ranges qnd refrigerating plant are of bronze or copper. The cutlery is Mexican silver. The Carnegie is the first sea-going vessel equipped with a producer gas engine. In calm weather a day's run can be made with auxiliary power alone, of 144 nautical miles, at a cost of $7 for coal consumed. The scientific staff consists of 7 men, and the crew of 14.

Before the building of this unique little ves¬ sel (described as a yacht for convenience in entering port, and making arrangements with customs, etc.), the magnetic observers of the Carnegie Institution had sent its brigantine, the Galilee, on cruises amounting in the aggregate to 60,000 miles. Its magnetic observers had penetrated to nearly every part of the earth, and have been, and still are, co-operating with various polar expeditions, securing magnetic data in those regions. The result is a set of

magnetic charts for the greater part of the earth at least, the first which can be said to be based upon uniformly and systematically acquired data. The good will and cooperation of every civilized country have been mani¬ fested in this great work.

The usefulness of the Carnegie, and of the various forms of work akin to that which she has done, has practically no limitations for the simple reason that not only has the magnetic state of our globe been hitherto unascertained with certainty, but it is constantly changing. This became known as early as 1634, when Henry Gellibrand noted that since 1584 the easterly direction of the compass had changed by seven degrees. Obviously, this affects more or less every survey that is made. Hence the work of the Carnegie Institution extends not only over the sea but also on land. The work by sea is, however, of far greater significance from the point of view of the security of human life, since a variation of a minute frac¬ tion in the compass may result — as has been the case once or twice — in the wrecking of a liner on rocks supposed to have been cor¬ rectly charted. On 8 June 1914, after refitting at New York the Carnegie left for an expedi-dition in the North Atlantic. After visiting Norway, Spitzbergen in the latitude of 79° 52', and Iceland, and covering 10,600 miles, she re¬ turned to her base station at Greenport, Long Island, 9 Oct. 1914. She refitted at Brooklyn for a longer cruise during 1915-16, in southern latitudes (50° to 75°), where magnetic obser¬ vations required supplementing.

CARNEIA, national festival of the an¬ cient Spartans celebrated in honor of Apollo, and in the Spartan month Carnejos. The festi¬ val lasted nine days, during which the Spartans were not allowed to enter on a hostile campaign. It was originally a herdsman's festival, but at Sparta had assumed a military character. The men bivouacked in booths, in nine divisions, and all the exercises were governed by the com¬ mands of the herald. There were musical con¬ tests, and a singular foot race, in which one man was pursued by a number of others. If he was caught, it was a sign of good luck; his escape foreboded evil.

CARNEIRO, kar-na' rd, Joaquim da Silva,

Portuguese engraver and writer : b. Oporto in 1727; d. Lisbon 1818. When 12 years of age removed to Brazil, where he lived 17 years. As he began early to display his artistic talents, he was placed under the tuition of Joao Gomez, the celebrated engraver, at Rio de Janeiro. In 1756 he returned to Europe to complete his studies where, in 1769, he became the head of the royal engraving school at Lisbon, and later was made teacher of design in the royal col¬ lege. He studied art for a time in Rome and did some of his best work there. He was also a prolific writer and translator of technical books relating to the engravers' art, and author of a great number of engravings of high merit for which he is chiefly remembered, especially for (The Child Jesus carried by Saint Joseph, > and the even more celebrated

picture, (The An¬ nunciation of the Virgin MaryP

CARNELIAN. See. Cornelian.

CARNIFEX FERRY, W. Va„ place at which occurred a battle of the Civil War, 10 Sept. 1861. On 23 August Gen. John B.

Floyd, who had marched from Lewisburg, crossed to the north side of Gauley River at Carnifex Ferry with five regiments of Virginia infantry, 100 cavalry, and five guns, aggregat¬ ing about 2,600 men. The 7th Ohio had been guarding the ferry, but had been recalled to within six miles of Gauley Bridge, and then ordered to return to Cross Lanes, two miles from Floyd's position, which it reached in the night of the 25th. Early on the morning of the 26th Floyd advanced, surprised the regi¬ ment while at breakfast, and routed it, killing and wounding 45 and capturing 96. About 200 men escaped to Gauley Bridge and about 400 were collected and led by Major Casement to Charleston on the Kanawha. Floyd's intention in crossing the Gauley was to force the retreat of Gen. J. D. Cox from Gauley Bridge down the Kanawha Valley, whither he proposed to follow him and make a raid of 50 miles into Ohio, but Gen. H. A. Wise, who commanded one of his two brigades, had refused to obey his order to cross the Gauley, upon which Floyd aban¬ doned his idea of invading Ohio, and intrenched his position in a bend of the Gauley, both flanks resting on the precipices rising abruptly from the river. The presence of Floyd north of the Gauley gave General Rosecrans some un¬ easiness, and turned his attention from the Cheat Mountain region where he had been con¬ fronting Gen. R. E. Lee. Leaving Gen. J. J. Reynolds to oppose Lee, he dre\v troops from posts in the rear and assembled at Bulltown seven and a half regiments of Ohio infantry, two batteries of artillery and three companies of cavalry, which were formed into three brigades, commanded by Gen. H. W. Benham and Cols. E. P.

Scammon and R. L. MeCook. On 9 September he marched from Bulltown, crossed Big Birch Mountain, drove the 36th Virginia and a company of cavalry from Sum-mersville, on the morning of the 10th, and fol¬ lowed to Cross Lanes, which he reached at 2 p.m., and heard that Floyd was intrenched about two miles distant. Benham, command¬ ing the leading brigade, was ordered to advance cautiously and feel Floyd closely, but not to engage him until the entire column came up, unless he saw a good opening. Benham drove in Floyd's pickets, and believing that he was in full retreat, pushed rashly forward in the face of a severe artillery fire, becoming closely en¬ gaged and making some spirited charges upon Floyd's works, which were repulsed. He then called for help. Rosecrans hastened up the brigades of Scammon and McCook, and going to the front, was surprised that the reconnais¬ sance ordered had developed into a severe and badly conducted engagement. It was too late to withdraw without giving the appearance of defeat ; other efforts were made, in which Scammon and McCook participated; but it was growing dark, the men were exhausted after their march of 17 miles, and Rosecrans with¬ drew, intending to renew the fight in the morn¬ ing. During the night Floyd recrossed the Gauley, destroyed the foot-bridge behind him, sunk the ferry-boat and, with Wise, retreated to Sewell Mountain. The Union troops, fully exposed and not well handled, had 17 killed and 141 wounded. The • Confederates, well pro¬ tected by log-works, had none killed and 21 wounded. Consult 1 Official Records) (Vol. V) and (Battles and Leaders of the Civil WaD

(Vol. I, New York 1887, ed. by Johnson and Buel).

E. A. Carman.

CARNIOLA, Jugoslavia, a province with an area of 3,856 English square miles. It is bounded by Carinthia on the north, Styria on the northeast, Croatia on the east, southeast and south, and Istria and Gorz on the west. It is covered with lofty mountains, some of which are about 10,000 feet high, and, generally speaking, is one of the most unfertile regions of the empire. Some districts, how¬ ever, produce considerable quantities of wheat, barley, wine and, in the south, fruits of various kinds and excellent flax. There are some iron, lead and quicksilver mines, the latter exceed¬ ingly rich. It abounds in clays and valuable stones, and in coal and marble. There are con¬ siderable manufactures of iron, fine linen, lace, woolen cloth, flannel, worsted stockings, leather, wooden articles, *etc.* Its chief exports are steel-wares, quicksilver, hats, linens, glasswares, wax, wine, lignite, flour,

etc. ; principal imports — salt, oil, fruit, coffee, sugar, tobacco, cloths, cattle, *etc.* Nearly 300 miles of railway lines, with Laibach, the capital, as the centre, facili¬ tate the commerce of the crownland. There are about 380 elementary schools, attended by over 75,000 children. Carniola is represented in the Lower House of the monarchy by 11 dele¬ gates, of whom two are drawn from the landed aristocracy, three from the towns, five from the rural communities, and one elected by the peo¬ ple at large. Its own Diet consists of 36 mem¬ bers drawn from the same classes and in about the same proportion. Nearly 94 per cent of the people are Slovenes, and the remainder con¬ sists of Germans, Serbo-Croatians and Italians. Almost the entire population belongs to the Roman Catholic Church. Carniola was made a duchy in the 12th century, under the dominion of the counts of Tyrol, who became extinct in 1335, and were succeeded by the earls of Gorz. After the Treaty of Vienna, in 1809, it was ceded to France, and incorporated in the king¬ dom of Illyria. In 1814 it came again into the possession of Austria. Capital, Laibach with a population of 36,547. Pop. 525,083.

CARNIVAL. The same views which led men to propitiate the higher invisible powers by gifts, sacrifices and purifications, also intro¬ duced fasts, abstinence from pleasure, and pen¬ ances. By fast is meant an abstinence from the usual means of nourishment, in order to mortify the appetites, and thereby to propitiate the Deity. In every nation of importance cus¬ toms of this kind are found. Their historical origin is in the religious customs of the East, where the priests were originally the physicians of the people, and prescribed these fasts as a part of the regimen necessary in this warm region, as well as from religious views. Fasts are observed to this day in the East. The re¬ ligions of the Persians and the Hindus, those of the Mohammedans, and of the worshippers of the Lama, insist much on fasts. Few traces of them are found in the religion of the ancient people of the North. The earliest Christians fasted on the vigils (q.v.). The fasts on the jcjunia quattuor temporum, which continued for three days every quarter of the year, were penances, as was that of the period of 40 days (before Easter, or rather before Good Friday,

CARNIVOROUS ANIMALS— I

Fig. 1 Lion

2 Lioness

3 Skull of Lion

4 Tiger

5 Jaguar

6 Leopard

7 Serval

8 Wild cat

ull of the Cat

10 Lynx

11 Skull of Lynx

12 Spotted Hysena

13 Skull of Hysena

14 Chetah

CARNIVORA

641

Quadrigesimce) , which was called, by way of excellence, the fast, and which commemorated the 40 days' fast of Jesus in the wilderness. With regard to the origin of Christian fasts, opinions differ. The most common is, that Telesphorus, bishop of Rome, in the middle of the 2d century, first instituted the 40 days' fast as a rule of the Church. By Pope Greg¬ ory the Great, about 600, Ash Wednesday was made the beginning of the fast, and the day before was called fast eve, because in the night of this day, at 12 o'clock, the fast began. This fast was preceded by a feast of three days, very obnoxious to the strict zealots. ˆChristians,® it is said, (<on these davs deliver themselves up to voluntary madness, put on masks, exchange sexes,- clothe themselves like spectres, give themselves up to Bacchus and Venus and con¬ sider all pleasure allowable.® This is the origin of the present carnival, or Fasching, as it is called in the south of Germany, and which con¬ tinues in that country from Twelfth Day to Ash Wednesday. The name carnival is de¬ rived from the Latin caro, carnis, flesh, and vale, farewell (according to Ducange, from the Latin denomination of the feasts in the Middle Ages, carnis levamen, solace of the flesh), be¬ cause at that time people took leave of flesh. Previously to the commencement of their long abstinence, men devoted themselves to enjoy¬ ment, particularly during the last three days of the carnival. The carnival is nothing but the Lupercalia of the Christian Romans, who could not forget their pagan festivals. At least it greatly resembles the Saturnalia which were celebrated annually in December, with all kinds ot mirth, pleasure and freedom, in honor of Saturn, and the golden age when he governed the world, and to preserve the remembrance of the liberty and equality of man in the youth of the world. In Rome, the carnival brought to view, in a lively manner, the old Saturnalia in a new form. During the last days of the carnival, and particularly during the day which preceded the long fast, mummeries, plays, tricks and freedom of every kind abounded. From Italy, the modern Saturnalia passed to the other Christian countries of Europe. The wealthiest class commenced their amusements 8 or 10 days before

Ash Wednesday, the middle classes two or three days, the poor only ob¬ served one day (the Fastnacht of the Germans). In the amusements of this period the dramatic poetry of Germany had its origin, after the cities had attained a flourishing condition. Its first traces appeared in the 13th century. The mummeries of the carnival produced the idea of adopting some character, and carrying it through. To please the multitude, and make the laugh more certain, the manners of common life were caricatured. There exhibitions after¬ ward became more cultivated and developed. On fast eve persons in disguise sometimes went from one house to another, to make sport with their friends and acquaintances. A merry so¬ ciety of this kind formed a plan to represent some scene in their disguises, and hold a regular conversation at one of these mummeries. The unknown players received praises, entertain¬ ments or presents. Encouraged by this success, the company grew stronger, their fables and speeches became longer by degrees, until they attained to regular representations of human life. It was in Nuremberg, renowned for its

wares and its wit, that the first fast eve's play was produced, coarse and frolicsome, to suit the taste of the citizens. The earliest of these pieces that have come down to us date from 1450-70; they have a near relationship to the masques of the English and the farces of the French, as have the spiritual fast eve's plays, religious burlesques, to the Mysteries and Moralities. In Italy the carnival is now cele¬ brated with the greatest show and spirit at Rome. It lasts for the 10 days preceding Ash Wednesday, certain observances taking place on certain days. Some days, for instance, are devoted to the throwing of comfits, or of small plaster pellets that take their place, these being flung from the balconies of the houses upon the persons in the streets — especially in the Corso — who retaliate in the same way, and in order that they may do this many of them are mounted upon lofty cars or other vehicles, all being masked. On other days the finest equi¬ pages move along in procession, and flowers in¬ stead of comfits are thrown. Races of riderless horses in the Corso are another prominent feature of carnival time. After sunset on Shrove Tuesday everybody carries a lighted taper (these being known as moccoletti) , and each tries to extinguish as many others as he can while keeping his own alight. Venice, Turin, Milan, Naples, Florence, etc., also cele¬ brate the earnival with more or less ceremony, and the same can be said of various towns of the south of France, Nice in particular. The carnival at Rome has been excellently de¬ scribed by Goethe. In Germany the carnival is celebrated with brilliancy only in the Cath¬ olic cities of

the Rhine Valley, Mayence, Bonn, but above all Cologne. In Protestant countries, generally, the feast is not observed to any ex¬ tent. In the United States the principal observ¬ ance of this nature is that held annually at New Orleans. Various civic organizations take part in a great street pageant, in which are elaborate tableaux, brilliantly illuminated and placed on vehicles. Historic, poetic and other scenes are artistically portrayed often at great expense. In Paris a fat ox (bccuf gras) was led in the procession, followed by a child in a triumphal car, who is named (<king of the butchers.® From this taking place on the Tuesday (Mardi) preceding Ash Wednesday the festival came to be known under the title Mardi Gras, which name is now generally applied to such festivals in America and elsewhere. See Pageant.

CARNIVORA, broadly, those animals which prey upon other animals; but in a re¬ stricted sense, that order of mammals more or less adapted for predatory life and including most animals popularly called beasts of prey. To this order the cat, dog, bear and seal be¬ long. The head is small in proportion to the bulk of the body, and the skin is well covered with hair. The limbs, four in number, are fully developed, and are adapted either for walking or swimming. Two sets of teeth, de¬ ciduous or milk and permanent, are always de¬ veloped in succession, and in both sets incisors, canines and molars, are distinguishable. 1 he order is divided into two groups, the Fissipedia, which include such animals as the lion, wolf, bear, etc., whose life is terrestrial; and the Pinnipedia, or those which are specially adapted for aquatic life. The Carnivora are found in

all parts of the world except Australia and New Zealand, where flesh-eating marsupials prevail. The ermine is probably the smallest specimen of this order, being but a few inches in length. The largest is the bear, some of the latter weigh¬ ing as much as a ton. The carnivores serve as a check on the too rapid multiplication of her¬ bivores, rodents, *etc.* From this class man has derived two valued pets — the dog and the cat. With the other genera of the order his relations

are those of constant warfare. Some genera he hunts for their fur or flesh, others for sport, others he kills to protect his domestic animals. In civilized areas, consequently, the larger carnivores disappear entirely or to a great extent, and the result is the increase of various pests, as rats, mice, *etc.* In lands less civilized the larger carnivora hold their own even against man, tigers, lions and leopards killing thousands of human beings annually.

1. Fissipedia. — All the carnivores of this division, except the sea-otter (Enhydra), have six incisor teeth in each jaw, the canine teeth are prominent, and one of the molar series in each jaw is usually compressed laterally, so as to present a cutting edge. The toes are fur¬ nished with claws, and the anterior limbs are used for seizing and holding prey as well as for walking. The skull is contracted behind the orbits, so as to give an hour-glass form when seen from above. The hollow formed by this constriction on each side of the head is bridged over by the wide zygomatic arch, and thus gives room for the powerful muscles of mastication. The lower jaw is articulated to the skull, so that it can only be moved up and down. The incisor and canine teeth are represented by the

3-3 1-1

formula i - , c - . The teeth behind the

3-3 1 -1

canines increase in size from before backwards,

4-4 8-8

and vary from - in the cat, to - in the

3-3 8-8

South African otocyon, the total number of teeth of all kinds ranging from 30 to 48. The posterior teeth are divided into premolars and molars ; the last of the premolar series in the upper and the first of the molar series in the lower jaw presenting the lateral compression and trenchant margin which earns for them the name of sectorial or carnassial teeth. Behind the carnassial teeth the molars have tuberculated crowns. The stomach is simple and undivided, and, as a general rule, is more rounded in the flesh-eating genera. The limbs terminate in digits, which are never fewer than four, and are furnished with sharp claws, which in the Felidae are retractile within sheaths of the integument on the dorsal surface of the toes. In walking, the extremities of the toes are applied to the ground, as in the "digitigrade® cat and dog; or the whole sole of the foot is put down, as in the "plantigrade® bear. The six families in¬ cluded under the fissipede carnivores are: (1) Felidce: lion, tiger, leopard, cat, *etc.* These present the highest type of the carnivorous structure. The claws are retractile. (2) Canidce: wolf, dog, jackal, fox, *etc.* The claws are not retractile, and the gape is longer. The toes in this and the previous family are five on the anterior and four on the posterior ex¬ tremities. (3) Hyenidce: myaena, aardwolf, *etc.*

The hyenas have the anterior limbs longer than the posterior, and both terminate in four toes. The skull and dentition approximate to those of the Felidae. (4) Viverridce: The supple elongated bodies of these animals are inter¬ mediate between those of the cats and the mar¬ tens. Some, as the civet, gennet, zibet, have the claws retractile ; in others, as the ichneumon and rasse, they are not retractile. Those men¬ tioned are digitigrade, but the suricate of Cen¬ tral Africa is plantigrade. In this family glands are found under the tail, the secretions of which have powerful odors. The diet of this family is not purely animal. (5) Must elide? : The members of this family have elongated bodies with short limbs, terminating usually in five-toed feet with retractile or non-retractile claws. The marten, wreasel, polecat, glutton or wolverene, constitute one subfamily of ex¬ clusively terrestrial life. The badgers, the skunks and the like constitute another division. (6) Ursidce: In this family the carnassial tooth is no longer trenchant, but tuberculated. All are plantigrade, but the habits and aspect vary considerably, and include, besides the bears, the raccoons, panda and several lesser forms. The raccoon and its allies are some¬ times made a family with the name Procyonidc?. See Mammalia; Bear; Cat; Dog, *etc.*

2. Pinnipedia. — The aquatic carnivores comprise three families, represented by the walrus or sea-horse, the eared seals and the common seals. They are related to the preced¬ ing families through the otters and the bears, and agree in having the extremities modified into swimming organs or flippers, and the teeth more uniform in character. See Seals; Wal¬ rus.

CARNIVORA, Fossil. A few remains of animals regarded as belonging to the Carnivora have been found in rocks of Eocene Age, but they are extremely generalized forms, and have a doubtful, if any, connection with the earlier creodonts (see Creodonta). The Miocene rocks have yielded more, but still of very generalized or “synthetic® types, suggesting the ancestry of the dogs and civets; one is the European fossil genus Cynodvctis, called a “viverrine dog,® because it combines rudely characteristics of the fox and civet. “This,® says Ernest Ingersoll ((Life of Mammals) New York 1909), “shades off into the many species of Galecynus, and of Amphicyon, plantigrade animals existing in all parts of the Miocene world, and varying in size from that of a small fox to that of a long¬ bodied bear, — a huge combination of wolf, mungoos, and bear ! Others of the same or a later time are more nearly typical civets, or stand between such and the linsangs, or con¬ nect civets and weasels ; while at the beginning of the next, or Pliocene, period, there appears a curious animal, the ictithere, which com¬ pletely unites the civets with the hyenas. Amphicyon was plantigrade and had other bearlike characteristics. Besides it, as we know from Miocene fossils, lived another animal (Hemicyon) , which was more dog than civet, plus bearlike features; and later we find Hyenarctos still more ursine, so that these rep¬ resent a line of change from bearlike dogs into doglike bears, and connect the Amphicyon stock with the true bears and raccoons. In a similar way fossil forms of the Upper Eocene

CARNIVOROUS ANIMALS.— II

Fig. 1 Aard Wolf 2 Hunting Dog or Hyena-Dog

3 Wolf 4 Skull of Wolf 5 Dhole or Kholsun 6 Jac£.al 7 Brazilian Fox

14 Rasse 15 Marten 16 Skull of Marten 17 “tasel 18 Polecat

8 Common Fox 9 Fennec 19 Otter 20 Skull of Otter

10 Civet

11 Genet 12 Zibet

13 Ichneumon

and Lower Miocene connect the civet stock with the apparent ancestors of the fur-bearers (weasels, badgers, otters, etc.). It is not, in¬ deed, until the late Miocene, near the end of the Tertiary period, that the groups of Carniv¬ ora as we now see them became distinctly set apart from one another by the dying out of the old intermediate stock forms." Consult Os¬ born, (Age of-Mammals* (New York 1910); Scott, (History of Land Mammals in the West¬ ern Hemisphere* (New York 1913).

CARNIVOROUS PLANTS, plants of various genera which subsist partly upon insects and other small animals which they entrap in various ways. The apparatus in each case is a modified leaf or part of a leaf, and in some cases the modifications are so curious, so well adapted to the use to which they are put, and so perfect in action, that the plants seem al¬ most intelligent. The object sought by these plants seems to be to supply themselves with nitrogenous food, which is generally in meagre supply where they usually live — undrained swamps. Probably, too, such carnivorous plants as do not live in these habitats for¬ merly did, but have not yet lost the use of the apparatus. A case of this kind is exhibited by the genus Utricularia (see Bladderwort). In this genus various species provided with active bladders, which act like eel-traps, live sub¬ merged in ponds ; other species, also possess¬ ing active but less perfect and useful traps, live in the marshy soil of swamps. Still others live on dry ground, but these have usually abortive traps. The conclusion is that as the ponds be¬ came swamps, and the swamps were converted into dry land, the supply of nitrogenous food increased, and hence the traps became aborted, because they were no longer needed.

Probably the most nearly intelligent of these carnivorous plants is the Venus' fly-trap (Dioncea) , found in North Carolina. The trap (leaf-blade) consists of two pieces hinged together. On the margins are bristles, and in the interior a few sensitive hairs, which, when touched, act like a trigger, and the apparatus closes. Should an insect

cause this action the bristles will prevent its escape and the trap will remain closed until digestion is complete, when it will open, cast out the indigestible portions and be ready for another victim. If the trap fails to catch its prey, or if it be sprung by something it cannot utilize, it will open again in a short time. In the sundew (Dr o sera) the leaves are not provided with glandular hairs, which close over the insect that alights upon the leaf, and a glistening sticky substance holds it fast until its digestible parts are absorbed by the plant.

In the pitcher-plants (Sarracenia , Nepen¬ thes), the pitcher consists of a tube-like leaf either with or without a lid or hood. Around the mouth there is usually a sugary secretion which acts as a lure. The insect that alights cannot escape because the tube is lined with hairs that force him downward to the bottom of the tube, which is usually partly filled with water. Some other genera in which the carniv¬ orous habit is developed are Darlingtonia, Aldrovcindra and Pinguicula. Consult Darwin, (Insectivorous Plants.)

CARNOCHAN, kar'no-kan, John Murray, American surgeon, famous for his bold and

skilful operations: b. Savannah, Ga., 4 July 1817; d. New York, 28 Oct. 1887. He studied at Edinburgh and at various European uni¬ versities; and began his practice in New York in 1847. In 1851 he became professor of sur¬ gery at the New York Medical College, and surgeon-in-chief to the State Immigrant Hos¬ pital. At one time he cured neuralgia by excis¬ ing the whole trunk of the second branch of the fifth pair of nerves. In 1852 he tied the femoral artery to cure exaggerated nutrition. He also tied the primitive carotid artery on both sides, to cure elephantiasis of the neck. In 1853 he exsected the entire radius, in 1854 the entire ulna. He published a treatise on Con¬ genital Dislocations* (1850); a translation of Rokitausky's (Pathological Anatomy, *and Contributions to Operative Surgery* (1858 and 1877-86), besides numerous monographs of value on subjects connected with his profes¬ sion.

CARNOT, kar-no, Lazare Hippolyte,

French statesman and journalist, second son of the following: b. Saint Omer, 6 April 1801; d. 16 March 1888. He studied for the law but was debarred from practice for refusing to take the oath of allegiance to the Bourbons. He was of liberal opinions, became a disciple of Saint Simon, and wrote the exposition generale de la doctrine Saint

Simonienne,* the authorship of which was, with his consent, as¬ cribed to Bazard. He became editor of Le Prodnctcur, a radical journal of the day. But as soon as Saint Simonism assumed the form of a religious creed, Carnot parted with his friends, and became a journalist, and the chief editor of the Revue encyclopedique. He was also entrusted with the publication of Gregoire's and Bareres (Memoires.* He was elected to the Chamber of Deputies in 1839, and reelected in 1842 and 1846. After the revolution of February 1848, he was Minister of Public In¬ struction until 5 July, and improved, as such, the condition of the teachers, rendered the nor¬ mal schools free and established free lectures. In 1848 he was elected to the Constituent, and 10 March 1850, to the Legislative, Assembly. After the coup d'etat of December 1851, he left France; during his absence, he was elected a member of the corps legislatif, but refused to take the oath. He was reelected in 1857, but again refused to serve. He did not take his seat until 1864, and was made a life senator in 1875. He spoke for the last time in 1888, a few weeks after his son Sadi had been elected President of the Republic, and was the author of <Memoires sur Carnot par son fils> (2 vols., 1861-64) ; (La Revolution frangaise* (2 vols., 1867) ; (Lazare Hoche) (1874) ; and with M. d' Angers, (Memoires de Bertrand Barere* (4 vols., 1842-43). For his biography, consult the Proceedings of the Academie des Sciences, Morales et Politiques (Paris, January 1894) ; also Hubbard, (Une famille republicaine : les Carnots * (Paris 1888).

CARNOT, Lazare Nicolas Marguerite,

French soldier and statesman: b. Nolay, Bur¬ gundy, 1753; d. Magdeburg, 2 Aug. 1823. From his youth he exhibited an uncommon talent for the mathematical and military sciences, entered the corps of engineers, and rose in office by the favor of the Prince of Conde. He pub¬ lished, afterward, Mathematical Essays,* which

i

caused him to be elected a member of several learned societies. His

eulogy on Vauban re¬ ceived the prize of the Academy of Dijon. In 1791 he was appointed deputy to the Constituent Assembly, but at first took part only in mili¬ tary affairs. On his proposal the officers of the nobility were removed from the army, and others substituted from the citizens. He also proposed that implicit obedience should only be demanded of the soldier in presence of the enemy, at other times he should have all the privileges and rights of the citizen; a strange proposal to come from a military chief. As a member of the convention he voted for the death of Louis. In the following March he was sent to the Army of the North, where he put himself at the head and repulsed the enemy. On his return to the convention he was made a member of the Committee of Public Safety. The influence of Carnot in the military operations now began to be more deeply felt. In posses¬ sion of all the plans deposited in the archives of Louis XIV, he organized and directed the French armies; and his direction undoubtedly contributed very much to their success. After the fall of Robespierre he was often accused, but always acquitted, because his duty had been to take care of the defense of the country, and he could not be made answerable for the cruel decrees of Robespierre, in which Carnot's name, as he was a member of the committee, was of course to be found. At the establishment of the Directory in 1795 Carnot was chosen a mem¬ ber, and for some time maintained an import¬ ant influence. Barras at length succeeded him in the Department of War, and was ever after his enemy. His plan for the overthrow of Bar¬ ras was unsuccessful, and with some others he was sentenced to transportation on the 18th Fructidor (4 Sept.) 1797. He fled to Germany and published a defense, which was eagerly read in Paris, and by the exposure of the conduct of his former colleagues hastened their over¬ throw on the 30th Prairial (18 June) 1799. After the 18th Brumaire Carnot was recalled, and appointed inspecteur aux revues, and two months later, in April 1800, Minister of War. He soon after retired into the bosom of his family, but was called to the tribunate, 9 March 1802. He often opposed the views of the gov¬ ernment, voted against the consulship for life, and his was the only voice raised against the proposal for the Imperial dignity. He remained, however, a member of the tribunate till it was abolished, passed the next seven years of his life in retirement and published several valu¬ able military works. In 1814 Napoleon gave him the chief command at Antwerp. He con¬ nected a vigorous defense with a careful re¬ gard for the interest of the city, which, by the command of Louis XVIII, he afterward sur¬ rendered to the British General Graham. He still retained his titles and his honors, but as a firm republican he could never expect the favor of the court; particularly as, in his me¬ morial to the King, he openly and severely cen¬ sured the measures of

government, in conse¬ quence of which he was passed over in the new organization of the Academy of Sciences. When Napoleon was once more at the helm of state in 1815, he made Carnot count and peer of the empire, and pressed upon him the Min¬ istry of the Interior. Carnot discharged the difficult duties of this office with his usual in¬

tegrity. After the Emperor's second fall he was made a member of the provisory govern¬ ment of France, and was afterward the only one of the members of it comprehended in the ordinance of 24 July. He retired to Cerney, where he employed his pen on political subjects; then to Warsaw with his family; and finally to Magdeburg. Among Carnot's writ¬ ings the most valuable are his (Essai sur les ma¬ chines >; 1 Reflexions sur la metaphysique du calcul infinitesimal } ; (Sur la geometrie de posi¬ tionˆ (De la defense des places fortes) ; Ex¬ pose de la conduite politique de Carnut, depuis le 1 Juillet 1814P In Magdeburg Carnot pub¬ lished (Memoire sur la fortification primitive) ; and a volume of poems. He was rigid in his love of virtue, a scholar, a general and an in¬ flexible republican. He was universally es¬ teemed, both in France and in foreign lands, and was honored by all parties. Consult Arago, (Eulogy of CarnoC (in Vol. I of Arago's (CEuvres completes, J Paris 1854).

CARNOT, Marie Frangois Sadi, Presi¬ dent of the French Republic, grandson of Lazare Nicolas Carnot (q.v.) : b. Limoges, 11 Aug. 1837; d. Lyons, 24 June 1894. He was educated at the Ecole Polytechnique and be¬ came a civil engineer. His construction of the large tubular bridge at Colognes-sur-Rhone brought him to the public's attention. He was stationed as government engineer at Annecy in 1870 and in 1871 M. Gambetta appointed him prefect of the Seine-Inferieure, entrusting him with the duty of seeing to the defenses of his department, a task which he fulfilled with great ability. After Paris capitulated, he resigned, to become deputy from Cote d'Or in the Na¬ tional Assembly. In 1876 he was elected mem¬ ber of the new Chamber of Deputies; the year following, secretary to that Chamber; and oc¬ cupied and important post with the Public Works Committee, becoming its minister in 1880-81, and was reelected in 1885 in M. Brisson's Cabi¬ net ; in 1886 he became Minister of Finance, re¬ taining this post under Brisson's successor, De Freycinet. In 1887 he was elected President of the French Republic in succession to M. Jules Grevy, but before his term of office had ex¬ pired he was assassinated at Lyons by an Italian anarchist named Caserio. Consult Hubbard, <Une famille republicaine, les Carnot > (Paris

1888).

CARNOT, Nicolas Leonard Sadi, French physicist: b. Paris, 1 June 1796; d. there, 24 Aug. 1832. He was educated at the polytechnic school ; in 1814 he entered the engineer corps, where he served until 1828, becoming captain in 1826. In 1824 he published his book, (Re¬ flexions sur la puissance motrice du feu,> in which he laid down the principle that the effi¬ ciency of a thermodynamic engine is propor¬ tional to the amount of heat transferred from the source of heat to the condenser ; and that heat passes only from a warmer to a colder body. This is called the second law of thermodynam¬ ics . and is known also as Carnot's principle. It is also significant that he observed the prin¬ ciple of the constant quality of energy, a theory which was later developed as that of the <(conservation of energy.® An English translation of his great work was made by R. H. Thurs¬ ton ; Kelvin's elaboration is appended (New York 1890).

CARNOTITE, a mineral first described in 1899, and now one of the most important ores ot uranium. It is a hydrous vanadate of ura-anˆ potassium, its formula being, perhaps, K20. 2U2O3. V2O5. 3H20. Radium has been shown to be present in it and radiographs may be made from the crude mineral. It seems likely that it will become an important ore of radium. It is a canary-yellow crystalline pow¬ der, usually occurring disseminated through sandstone, but sometimes in earthy masses of considerable richness. Its chief locality is in Montrose County, Colo., but it has recently been reported from Utah.

CARNUTES, kar-nutez, or CARNUTI,

an ancient tribe living in central Gaul, at war with Caesar in 52 b.c., having joined Ver-cingetroix. Caesar burnt their chief town, called Cenabum. Augustus made the Carnutes, a (<civitas foederataˆ (an allied state) and per¬ mitted them to retain their own institutions. Their chief city was also called Carnutes. Con¬ sult Holmes, (Caesar's

Conquest of GauP (2d ed., Oxford 1911).

CARO, ka'ro, Annibale, Italian author: b. Civita Nuova 1507; d. 1566. In 1543 he was appointed secretary to Pietro Ludovico Farnese, Duke of Parma and Piacenza, who entrusted him with several missions to Charles V. After the assassination of the Duke his own life was in considerable danger. He took refuge in Parma, and was treated in a friendly manner by the new Duke, Ottavio Farnese, whose two brothers, the cardinals, Ranuccio and Alessan¬ dro, took him successively into their service. With the latter he remained from 1548 to his death in 1566, and received from him several ecclesiastical preferments. Caro devoted him¬ self chiefly to the study of numismatics and the Tuscan language, and his pure and elegant style in verse and prose soon became generally ad¬ mired. His translation of the TEneid in blank verse is excellent. After his death appeared a translation by him of Longus, and of Aristotle's (Rhetoric J ; also <Rime) (1569), and (Lettere familiarP (1572-75), the former of which are admired for the elegance of the verse, and the latter as models of beautiful Italian prose. The best editions of Caro's works were published in Venice (1757), in. Milan (1806), and a vol¬ ume of selected works appeared in Florence

(1864).

CARO, Elme Marie, French philosopher: b. Poitiers, 4 March 1826; d. 13 July 1887. He studied at the Stanislas College and the Lcole Normale, graduating in 1848. He was at first professor in several provincial universities, and, having received the degree of doctor, was ap¬ pointed master of conferences at the Lcole Normale (1858). In 1861 he became inspector of the Academy of Paris; in 1864 professor of philosophy; in 1874 a member of the French Academy. He married Pauline Cassin, the author of (Peche de Madeleine. } He was a very popular lecturer on Christianity. He con¬ tributed to magazines; and wrote (L'Idce de Dieu> (1864); (La Philosophic de Goethe' (2d ed., 1880) ; <Etudes morales sur le temps present* ; (Melanges et portraits) (1888).

CARO, Jakob, German historian : b. Gnesen, 2 Feb. 1836; d. 1904. He was educated at Berlin and Leipzig, traveled in Galicia and southern Russia, and in 1863 became lecturer

at the University of Jena and later professor; in 1868 he was professor at Breslau. He has written (Das Interregnum Polens 1856) (1861) ;

< Liber Cancellariae Stanislai Ciolek' (1871-74) ;

(Lessing und Swift, Studien fiber Nathan den Weisen* (1869) ; (Aus der Kanzlei Kaiser Siegsmunds) (1879) ; (Das Bundniss zu Canter¬ bury } (1880) ; (Beata und Halszka, eine Pol-nisch-Russische Geschichte aus dem 16. Jahr-hunderp (1880) ; and a continuation of Ro-pell's (Geschichte Polens.*

CARO, Mich., village and county-seat of Tuscola County, on the Cass River, 25 miles southeast of Bay City, on the Michigan Central and the Detroit, Bay City and Western rail¬ roads. It contains flour mills, grain elevators, lumber mills, foundries, machine shops, beet-sugar refinery, telephone works, marble yards, brick and tile works, harness factories and a fireless cooker manufactory. Beans and sugar beets are extensively cultivated in the neighbor¬ hood. Pop. (1920) 2,704.

CAROB, kar'ob, a tree, Ceratonia siliqua, of the family Cccsalpiniaccce , native of the Mediterranean region, now widely cultivated in warm countries. It is known also as algaroba, karoub, carouba and Saint John's bread. It has shining pinnate leaves, racemes of red flowers, and flat pods 4 to 12 inches long filled with a pulp in which are embedded numerous seeds. The pods are an important forage crop in some countries, being eaten by all kinds of stock, and they are frequently used for human food, the sweet pulp being very palatable. They are reputed to be the locusts and wild honey found by Saint John in the wilderness, hence one of the common names. Thousands of tons of the pods are imported into England annually to be ground and used for stock-feed. In the United States they are sometimes seen on fruit-stands. The seeds are said to have been the original carat weight of goldsmiths.

CAROE, ka'ro-e, William Douglas, Eng¬ lish architect of Danish parentage : b. Liver¬ pool 1857. He was educated at Trinity College, Cambridge, and studied architecture with the eminent architect, John L. Pearson. He is architect to Southwell Cathedral, to the dean and chapter of Canterbury and to the eccle¬ siastical commissioners. Among his principal works are the archbishop's palace at Canter¬ bury; bishop's palace at Bristol; Saint David's Church at Exeter ; Wycombe Abbey School ; the Jubilee Monument to Queen Victoria at Mentone, France. He has also restored many buildings of historic interest. He was president of the Architectural Association in 1895.

CAROL, a song of praise sung at Christ¬ mas or Easter. It originally meant a song ac¬ companied with dancing, in which sense it is frequently used by the old poets. It appears to have been danced by many performers, by taking hands, forming a ring and singing as they went round. It has been said that the oldest carol was that sung by the heavenly host when the birth of the Saviour was announced to the shepherds on the plains of Bethlehem. It is probable that the practice of singing carols at Christmas-tide arose in imitation of this, as the majority of the carols declared the good tidings of great joy; and the title of Noels, nowells or novelles, applied to carols, w;ould seem to bear out this idea. Carol singing is of

great antiquity among Christian communities, as the carol by Aurelius Prudentius, of the 4th century, will show. The Middle Ages were especially familiar with these songs. The first authorization for a collection of such carols to be made was issued to Thomas Tysdale (1562). For a while they disappeared under the Puritan regime, but with the Restoration a new book appeared called (The New Carols for the Merry Time of Christmas, to Sundry Pleasant Tunes. > In England, the custom of “waits,® i.e., groups of boys and men who go about singing in the village, still prevails in some sections. (Hark the Herald Angels SingP (1739) and (While Shepherds Watched Their Flocks by NighD are two well-known carols. Collections have been made by H. R. Bramley and Sir J. Stainer under the title (Christmas Carols, Old and New) (London 1874) ; and by Martha E. Rickert, (Ancient Christmas Carols, 1400—1700 > (New York 1910).

CAROLAN, or O’CAROLAN, kar‘6-lan, Turlogh, Irish musical genius: b. near Nobber, County of Westmeath, about 1670; d. 1738. Having lost his sight at the age of 16, he studied the harp, and in after life not only maintained himself thereby, but even became famous. A collection of his ballads was pub¬ lished during the 18th century, but others have been handed down by the peasantry.

CAROLI, Pietro Francesco, Italian painter: b. Turin 1638; d. Rome 1716. He studied painting at Venice, Florence and Rome, and was

professor in the Academy of Rome at his death. He is celebrated for his careful execution and beautiful coloring, and excelled particularly in perspective, of his skill in which he has left excellent specimens in his drawings of the interior of some of the Roman churches. Consult de Boni, F., (Biografia degli artistP (Venice 1840).

CAROLINA, P. R., town 15 miles south¬ east of San Juan, with which it is connected by rail. It is well built, has a fine climate and is in good sanitary condition. It contains a city hall, public schools and churches. Dairy farming and sugar-planting are the chief in¬ dustries. Pop. 3,250.

CAROLINA, ka-ro-le'na. This name is generally given to a famous law of the German Empire, of the year 1532, under Charles V, which he himself called an ordinance of crim¬ inal procedure (Peinliche Gerichtsordnung) . From him it was a later period called Constitutio criminalis Carolina , or shortly Carolina. The arbitrary administration of justice, the dis¬ order and cruelty which had become customary in the courts of Germany, where many a process was begun and ended with torture, and persons were sentenced even to death without regular process, gave occasion to this law. From the beginning of the peace of the land the necessity of such a law was felt throughout the country; but it was difficult in this, as in all other cases, to make the different members of the empire agree on one general measure. The Baron Jo¬ hann von Schwarzenberg was chiefly instru¬ mental in introducing this ordinance. He be¬ came Minister of State of the Prince-bishop of Bamberg, and succeeded in procuring an ordi¬ nance of criminal procedure for Bamberg to be drawn up and published in 1507. The same was also adopted in 1510 by the Margrave of Bran¬

denburg and Franconia; and at last a law of criminal procedure for the empire at large was passed by the Diet at Ratisbon, in 1532. The Carolina contains 219 articles, which regulate the standing and oaths of judges, the character of witnesses, the penalties of different crimes, and the circumstances in which torture at that time common in criminal jurisprudence should be applied. Several German princes, as the Elector of Saxony, the Elector of Brandenburg, and of the Palatinate, protested against it, in order to protect the laws of their state* arid their own privileges against-the legislative power of the Emperor; but at last the Carolina was established in almost every part of the empire. From the connection of Switzerland with Germany, and the fact that several Swiss towns were Imperial cities, German laws fre¬ quently passed into Switzerland, and the Car¬ olina became the

law by which even the Swiss troops in the service of the kings of France were governed until the French Revolution. Consult Zopfl, (Die peinliche Gerichtsordnung Kaisers Karl V® (Leipzig 1883) ; Esmein, (Histoire de la procedure criminelle en France) (Paris 1882, pp. 300ff.) ; Daguin, F., (Intro¬ duction d'un code de procedure penale alle-mande) (Paris 1884, pp. 30ff.).

CAROLINA, Original Constitution of.

For many years after the subversion of the old English order by political and religious in¬ subordination, 1642-60, the dominant idea of the conservatives was to prevent its recurrence, as with the conservatives after the French Revolution ; and their chief dread was of re¬ publicans and dissenters. It is an almost grotesque incident of this reaction, that by far its narrowest embodiment came from a liberal philosopher and an unbelieving incendiary poli¬ tician, — John Locke and Lord Shaftesbury (Anthony Ashley Cooper). A group of eight noblemen, headed by the famous Lord Claren¬ don, and including Shaftesbury, were granted, on 24 March 1663, a tract called the province of Carolina, after Charles II; as extended 30 June 1665, it included the present North and South Carolina and Georgia, and in theory stretched west to the Pacific. "To avoid erect¬ ing a numerous democracy,® in their own words, they had Locke, who was Shaftesbury's secretary, draw up (whether on his own lines or Shaftesbury's is a moot point) a form of government called the "Fundamental Constitu¬ tions,® which is a classic for impractical ab¬ surdity even among Utopias. The mass of the people (not alone, be it remembered, the future immigrants, but a considerable population al¬ ready living there in pure democracy) were to be hereditary "leet-men,® or serfs of the soil. Next above them was a sort of upper middle-class commons called "lords of the manor,® who could let out 10-acre tenant farms. Over both (as the charter gave the proprietors the right to create titles of nobility other than English ones) were a fantastic self-perpetuat¬ ing colonial noblesse, of "landgraves® and "caciques.® Crowning the whole were the pro¬ prietors ; the eldest was "palatine® or viceroy, the others were admiral, chamberlain, high con¬ stable, chief justice, chancellor, high steward and treasurer. The "leet-men® held three-fifths of the land; the nobility and "lords of the manor® one-fifth, not to be alienated after 1700; the proprietors the remaining fifth. The prov-CAROLINA ALLSPICE — CAROLINE

ince was divided checkerboard fashion into squares, first of counties ; then each county into eight useigneries® for the proprietors, eight (<baronies,) for the nobility (each seignory and barony to contain 12,000 acres, perpetually an¬ nexed to the title), and four (<precincts,® and each precinct into four ((colonies)) for the serfs. There was a parliament; but the commons were carefully kept powerless by giving them only 10 members out of 50, making only freeholders of 500 acres eligible to seats, and electing them for life ; with the further proviso that land¬ graves could sit in either house at will, and vote on the same measures in both. All initiative was in a supreme executive council, which pre¬ pared and submitted all legislation to Parlia¬ ment ; and the proprietors had a veto on all. Each proprietor had a superior court at which he presided in person or by proxy ; each noble¬ man held a court-leet for his barony, and there were precinct courts. The laws were worthy of this closet constitution. The English Church was established and supported by public taxa¬ tion, in a province inhabited largely by Quakers, and the rest by Scotch Presbyterians, Hugue¬ nots, Lutherans, *etc.* No one could live or hold property in or be a freeman of the province who did not acknowledge God, and that he is to be publicly worshipped. Every person above 17 not a member of some church, or who did not subscribe the fundamental Constitutions® and promise in writing to defend and maintain them, should be an outlaw. There was a severe censorship of the press, of ceremonies, of fashions and of sports, in the hands of the nobility. Paid lawyers were prohibited ; thus compelling the commons to put themselves un¬ der a relation of Clientage,® in Roman fashion, to the nobility to avoid ruin. All commentaries on the constitution or laws were forbidden. This constitution was to replace one under which the people were ruled by a council of 12, chosen half by the proprietors and half by the assembly; that assembly consisting of 12 elected freeholders, so that the people had 18 out of 25 votes ; with entire freedom of re¬ ligion, civil marriage, security for five years from suit on cause arising outside of the country (for protection of emigrant debtors), exemption from taxation for the first year and no political or social superiors anywhere. That is, free Englishmen in virtual democracy were to become at a blow the serfs and villeins of the time of the Norman Conquest. The pro¬ prietors bound themselves by solemn compact to maintain this incredibly foolish instrument as unalterable forever, and evidently expected men to emigrate to a savage wilderness on such terms. Five successive forms of this constitu¬ tion were promulgated before its entire aban¬ donment in 1693, each in turn proclaimed permanent and unalterable ; and the

result, especially in Albemarle County (afterward North Carolina), was simple anarchy. The people set them utterly at naught; and while the former system had been legally abolished, it continued in force by sufferance. Resistance to law as a first principle of life became in¬ grained in them ; and the character of the col¬ ony was long and deeply injured by the quar¬ ter-century of attempt to force its people, new and old, into this iron mold of extreme feudal¬ ism. For further history see North Carolina ; South Carolina.

CAROLINA ALLSPICE. See Calycan—

THUS.

CAROLINA-PINK, MARYLAND PINKROOT, or WORM-GRASS, names given to the Spigelia marilandica, a plant of the order Loganiacece, bearing scarlet flowers, and having a root used as a vermifuge. It occurs in rich woods and extends from New Jersey west, north and south to Wisconsin and Texas.

CAROLINA RIDGE, in geology, the name given to an elevation of the bottom of the Atlantic Ocean off North Carolina, that occurred in Miocene time. It deflected the Gulf Stream and caused a great change in climate along the Atlantic Coast. See Miocene; Tertiary Period.

CAROLINE, The, an American steamboat used in 1837 by the American sympathizers with the Canadian insurgents under William Lyon Mackenzie (q.v.). The latter, after years of agitation, had gathered a band of insurgents in December, and attempted to seize Toronto, capture the lieutenant-governor and his cab¬ inet and proclaim a republic. He was defeated, and fled to Navy Island on the British side of the Niagara River. Some hundreds of Ameri¬ can sympathizers joined him, and he set up a ˆprovisional government,® issued paper money and offered bounties for volunteers and a re¬ ward for the apprehension of the lieutenant-governor. On 29 December an American steamer, the Caroline, crossed over to his camp from Schlosser on the American side, laden with reinforcements, provisions and munitions; and returning, lay at Schlosser that night full of men presumably ready for a similar trip the next day. The Canadians, incensed at this outrageous violation of neutrality, sent over an armed party in boats to enforce it. They boarded the Caroline, hustled the passengers and crew ashore, killing one man (Amos Dur-fee) on shore in the fray, towed the vessel out into the stream, set it on fire and sent it over Niagara. A great uproar ensued. President Van

Buren issued a proclamation ordering the neutrality laws to be respected, and, calling out the militia under Winfield Scott, he then de¬ manded reparation from the British govern¬ ment. The latter naturally showed no great alacrity in responding. Shortly afterward, one Alexander McLeod came over to the American side, boasting that he was one of the boarding party and had killed one of the Caroline's men with his own hand. He was arrested, indicted by the grand jury for the murder of Durfee and imprisoned to await his trial. Fox, the English Minister, demanded his release; the Secretary of State (Forsyth of Georgia) re¬ plied that he was in the hands of justice in New York State and must await its course; Lord Palmerston thereupon assumed for the English government full responsibility for the assault on the Caroline and again demanded his release. But Fox in his letter curiously added that the government had every reason to be¬ lieve that McLeod was not one of the boarding party; in which case, of course, he was either a mendacious braggart or a common murderer, and the 'matter of the Caroline was irrelevant. Webster, now Secretary of State, replied, ignoring this point, that if the case were in a Federal court the President would order a nolle prosequi entered; but it being in a State

court, he could only await its action, and if it did not discharge McLeod, the case should go up to the United States Supreme Court. In the July term of 1838 a writ of habeas corpus was sued for in the New York Supreme Court, but refused. McLeod was acquitted, however, and the whole affair dropped. See Canada — Diplomatic Relations of the United States with.

CAROLINE AMELIA ELIZABETH,

Queen of England, wife of George IV, King of Great Britain and Hanover, second daughter of Duke Charles William Ferdinand of Bruns¬ wick: b. 17 May 1768; d. London, 6 Aug. 1821. She was married to the Prince of Wales, after¬ ward George IV, in 1795. After the birth of her daughter, Charlotte Augusta (7 Jan. 1796), her husband abandoned her, declaring that no one could force his

inclinations. This was the beginning of the .disgraceful dispute between the two parties, which lasted till the death of Caroline, and exposed her honor to repeated accusations from her husband. The Princess of Wales lived retired from the court, at a country-seat at Blackheath, till 1808. In 1813 the contest was renewed between the two parties, the Princess of Wales complaining, as a mother, of the difficulties opposed to her seeing her daughter. In 1814 the Princess obtained per¬ mission to go to Brunswick, and afterward to make the tour of Italy and Greece, in which the Italian Bergami was her confidant and at¬ tendant. Many infamous reports were after¬ ward circulated, relating to the connection be¬ tween the Princess and Bergami. When the Prince of Wales ascended the throne, 29 Jan. 1820, he offered her an income of £50,000 sterling, on condition that she should renounce the title of Queen of England, and every title appertaining to that dignity, and should not again return to England. She refused the pro¬ posal, returned to England, 5 June, and the next day entered London amid public demon¬ strations of welcome. She was now tried for adultery, but not convicted, and in this trial Brougham acted as the Queen's attorney-gen¬ eral. Though banished from the court, the Queen still lived at Brandenburg House, main¬ taining a style suitable to her rank. She was re¬ fused admission to Westminster Abbey on the occasion of the coronation of her husband, on 19 July 1821, and published a protest in the newspapers. Her tomb at Brunswick has a very short inscription, in which she is called the unhappy Queen of England. Consult Nightingale, (Memoirs of Queen Caroline> (London 1820) ; Adolphus, (Life) (London

1821) ; Huish (London 1821) ; Wilk (London

1822) ; also Clerke, (Life of Her Majesty Queen Caroline) (London 1821).

CAROLINE BOOKS, or LIBRI CAR¬ OLINE a theological work in four books, pre¬ pared under the direction of Charlemagne (Carolus Magnus), in connection with the dis¬ puted question of image worship that seriously agitated the Church during the reign of that monarch. The second synod of Nicaea had given its approval to the use of images, agree¬ ing in this point with the views of the*Eastern Church. Owing to a misunderstanding of the Nicaean canons through a bad translation, which seemed to make the Eastern synod declare that the worship due to God alone, latria, should be

paid to images, the (Libri CarolinP severely reviewed the doctrine. The

condemnation of image worship as formulated in the Caroline Books does not, however, bear upon the in¬ ferior honor, dulia, paid to the saints and their images, or that given to the Virgin, liyperdulia. The author is unknown. Consult Hefele, (Conciliensgeschichte) (Vol. Ill, bk. XX, chap. II, 2d ed., Freiburg 1877).

CAROLINE ISLANDS, a large archipel¬ ago in the north Pacific Ocean, between lat. 3° and 12° N., and long. 132° and 163° 6' E., and between the Philippines and the Marshall Isles. Area, about 560 square miles. It contains many groups, embracing in all about 525 islands and islets. Many of them are mere coral reefs, lit¬ tle elevated above the ocean. The most west¬ erly group is the Paloas, or Pelew Islands, which contain seven large and many small ones, all of coral formation. The next group, Yap or Gouap, lies northeast of the last. In its chief island, which is mountainous, precious metals have been found. The other principal groups are Lutke, Mortlock, Siniavin, Enderby and Hogoleu. The most easterly island is Ula-lan. The most important vegetable productions are palms, bread-fruit trees and bananas. Copra is also an important product, while some of the islands also yield shells. The com¬ merce is mostly in the hands of the German Jaluit Company, which has stations on every important island. The inhabitants, numbering about 55,000, though mainly Micronesians, in¬ clude various races, and have made very differ¬ ent degrees of .progress in civilization. In the central groups they are of a handsome physical type, active and industrious, and have some commerce. On the east generally, and on the west, with the exception of the Pelew Islands, the inhabitants, though apparently of the same stock, are far less advanced. The islands were discovered in 1527 by the Portuguese, who gave them the name of Sequeira. In 1686 they were annexed and renamed in honor of Charles II by the Spaniards, who soon changed the name to New Philippines. After several futile mis¬ sionary attempts in the 18th century, Spain took little active interest in the group until August 1885, when the German flag was raised over Yap. A serious dispute followed this act, and the question being submitted to the Pope as arbitrator, he decided in favor of Spain, re¬ serving special trade privileges to Germany. In 1887 disturbances broke out at Ponape, in which the governor, who had arrested one of the American Protestant missionaries, was killed by the natives ; but the rising was soon suppressed. In February 1899 Germany pur¬ chased from Spain for about $3,300,000 the Caroline and Pelew Islands, and all of the La-drones, but Guam, which had been ceded to the United States in the treaty of peace that ended the Spanish-American War. Consult Chris¬ tian, (The Caroline Islands } (1899) ; Furness, 'Island of Stone Money* (1910); Salesius, (Die Karolinen Insel Jap) (1904).

CAROLINE MATILDA, Queen of Den¬ mark, daughter of Frederick Louis, Prince of Wales: b. 1751; d. Celle, Hanover, 10 May 1775. She was married in 1766 to King Chris¬ tian VII of Denmark. She became the object of court intrigues caused by the jealousy of the grandmother and stepmother of her hus-

band. These led to the execution for treason of Counts Struensee and Brandt, who were of the Queen's party, and to the imprisonment of the Queen herself, who was liberated through the interference of her brother, George III of England. She received a pension of £5,000 and was allowed to retain the title of Queen. She spent her last years in a castle at Celle, Han¬ over. Her last hours are described in a small work, (Die Letzten Stunden der Konigin von Danemark.* Consult Lagreze, (La reine Caroline-Mathilde) (Paris 1887), and Wilkins, (A Queen of Tears.)

CAROLINGIANS. See Carlovingians.

CAROLUS, a gold coin struck in the reign of Charles I, and originally 20 shillings in value, afterward 23 shillings. The name was given also to various other coins.

CAROLUS-DURAN, ka-rd-liis-du-ran, Auguste Emile, French portrait painter: b. Lille, 4 July 1838; d. Paris, 18 Feb. 1917. His name was originally Charles Emile Auguste Durand. He studied under Souchon at the Lille Academy of Art, and afterward in Paris, where he copied the old masters in the Louvre, especially Velasquez and Leonardo. In 1861 he obtained the Wicar prize for painting and went to Italy and Spain, continuing his study of Velasquez, who remained his chief model. During his stay in Rome he completed his first important work, (The Evening Prayer.*

His first painting to receive a medal was a historical subject, HAssassine,* in 1866. It was presented to the Lille Museum by the French government. After 1866 Mr. Carolus-Duran turned his attention to portraiture, and in 1869 exhibited <The Lady with the

Gloved a full length portrait of his wife in outdoor costume. The portrait was placed in the Lux¬ embourg. Mr. Carolus-Duran made a spe¬ cialty of painting portraits of women and children. He had painted portraits of the Duchess of Marlborough, the Marchioness d'Adda, the Princess de Wagram, Mrs. Astor, the Countess of Warwick, the Comtesse Cas-tellane, Queen Maria Pia of Portugal and the Princess Obolinsky. His first exhibit in Amer¬ ica was at Philadelphia during the Centennial Exposition of 1876. He exhibited a portrait of Mile. Sophie Croizette, a well-known actress, who was his sister-in-law. He made several trips to this country. On one occasion he gave a lecture at the Chase School of Art and illus¬ trated it by painting a portrait. In 1889 he was made commander of the Legion of Honor and was made a director of the French Academy at Rome in 1905. He also was made president of the Societe Nationale des Beaux-Arts and was a member of the Institute. He painted a series of historical and genre subjects, among them being (The Bathers* ; /Gloria Marias Medici,* a decorative composition for a ceiling in the Louvre; (The Burial of Christ*; <Dawn* and <The Vision.* His portraits of men included those of Pope Pius X, Emile de Girardin, Gounod, Gustave Dore and Alphonse Carr. In his younger days Mr. Carolus-Duran gave fencing exhibitions and was known as one of the best swordsmen in France. He also showed skill as a sculptor. He married Mile. Pauline Marie Croizette, herself an artist. *Mme.* Carolus-Duran received a medal at the

Salon of 1875. The couple had a son who joined the French army.

Mr. Carolus-Duran was commander of the Order of Leopold, grand officer of the Order of Saint Maurice et Lazare, commander of the Order of Charles III of Spain, commander of the Order of Christ de Portugal and grand •officer of the Legion of Honor. He received the Grand Croix of the Order d'Isabelle la Catholique of Spain and the Medaille de Sauvetage; Consult Muther, < History of Mod¬ ern Painting) (New York 1907) and the bi¬ ography by Alexandre (Paris 1902).

CARON, Rene Edouard, Canadian states¬ man : b. Sainte Anne, Lower Canada ; d. 1876. He was educated at the Quebec Seminary and College Saint Pierre and called to the bar of Lower Canada in 1826. He was mayor of Que¬ bec 1833-37 and was a member of assembly 1834-36. He was called to the legislative coun¬ cil in 1841, of which he was speaker 1843— 47 and 1848-53. After holding office in the La Fontaine-Baldwin and Hincks-Morin govern¬ ments, he became a

judge of the Superior Court of Quebec, and afterward of the Court of Queen's Bench. He was one of the judges of the special Seigniorial Court, which in 1855 adjudicated on the questions arising out of the abolition of seigniorial tenures in Lower Can¬ ada.

CARORA, ka-ro'ra, Venezuela, city of the state of Lara, situated 95 miles south of Coro and 40 miles southwest of Barquisimeto on a tributary of the Tocuyo River. It was founded by the Spaniards in 1572. It has a considerable trade in gums, rubber and cochineal, tanneries and the raising of cattle, horses and mules are the chief industries. The city dates from the Spanish foundation of 1572. Pop. 6,000.

CAROTID ARTERY, either of the two great arteries which convey the blood from the aorta to the head and the brain. In the article on the aorta (q.v.) the origin of the carotid arteries is described — that from the right side springing from the innortiinate artery to sup¬ ply most of the right side of the head; that on the left side arising directly from the aorta to supply all of the structures of the left side of the head. Apart from these slight variations in their origin on the two sides, the carotid arteries and their branches are practically du¬ plicated in the two halves of the head. T hus the main branches, the common carotids, soon branch into two, the external and internal caro¬ tids. This division takes place about the level of the thyroid cartilage. The external carotid supplies the upper part of the front and side of the neck, the tongue, larynx, pharynx, face, the pterygoid regions, the upper part of the back of the neck, the scalp and the major por¬ tions of the brain membranes. The internal carotid soon enters the skull and supplies the greater part of the brain tissue, the orbital structures (the eye, etc.) and portions ol the brain membranes. The branches of homolo¬ gous arteries of the two sides anastomose some¬ what, although many of the arteries of the brain are terminal arteries and do not anas¬ tomose. Occlusion of one of these vessels in the brain usually results in permanent injury. In deep cuts of* the throat these arteries may be involved, but they lie very deep as a rule

and are not often severed. (Morris, (Anat¬ omy } ; Gray, Anatomy*)-

CAROTIN (Lat. carota, ((a carrot®), the coloring-matter of the carrot. It always ac¬ companies chlorophyll and xanthophyll in the chlorophast, and is the coloring matter of some petals, fruits and other plant organs. The sub¬ stances described by the terms erythrophyll, chrysophyll and etolin are probably carotin. Carotin is a hydrocarbon of the empirical formula CioH.-,o and is closely related to xan¬ thophyll, which has the formula C40H56O2 and is possibly an oxidation product of carotin. It differs from xanthophyll in its ease of crys¬ tallization, solubility in various solvents, slightly different melting points and spectra. It may be extracted from the chopped carrot by the action of carbon disulphide, in which (as also in benzene) it is very soluble. It crystal¬ lizes in small, red plates, which are insoluble in water and in alcohol. A similar compound, called hydrocarotin,® is also known.

CAROTTO (ka-ro to) FAMILY. 1. Gian Francesco, jan franches'ko, Italian painter: b. Verona 1470; d. there 1546. He studied under Liberale at Verona and under Andrea Montegna at Mantua. His earlier productions are in imitation of the style of Montegna; but at a later period the study of the works of Leonardo da Vinci and Raphael produced a decided change. Carotto is not distinguished by the grandeur of his conceptions, but excels in character and expression, and in the soft¬ ness and warmth of coloring. Verona contains most of his works. Among these is the his¬ tory of Tobias,* a series of pictures in the church of Saint Eufemia. Others are the fresco of the (Annunciation (San Girolamo 1508) ; the altar of San Fermo Maggiore (1528); various frescoes and panels in San Giorgio in Braida and several panels in the Pinacoteca Communale. Good examples of his art are in the Castello, Milan, the Chiesa di Carita, Mantua, in the Ufffzi and Pitti, Florence, and in the museums of Dresden, Budapest, etc., 2. Giovanni, jo-van'n.e, Italian painter: d. 1555. He was the brother of Gian, and his pupil. He was chiefly an architectural painter and is cele¬ brated for his copies of ancient ruins. He is also said to have given instruction to Paul Veronese.

CAROUGE, ka-roozh', Switzerland, a town of the canton of Geneva, on the left bank of the Arve, opposite Geneva, with which it is connected by a bridge. It has machine works, foundries, dye works and manufactures of watches. Founded in 1780 by one of the Sar¬ dinian kings as a rival of Geneva, the capital of the province of Carouge, it was ceded to Switzerland in 1816. Pop. (1911) 7,890.

CARP, a name applied to many fishes be¬ longing to the Cyprinidce.

The members of this family inhabit fresh waters and are extremely numerous in genera, species and individuals. It is estimated that there are more than 1,000 species. One group of the family, found in North America, includes fishes known as suckers, buffalo-fishes, redhorses and mullets, while another group contains the minnows, dace, fatheads, chubs, *etc.* They are all soft-finned fishes, with a stout, serrated spine, which stands in front of both the dorsal and anal fins. There are no teeth in the mouth, but they are

developed in the pharyngeal bones; that is, in the throat. The flesh is not of the best quality and is full of fine bones. The name carp is especially applied to one fish — Cyprinns carpio. This was introduced into North America from Europe by the United States Fish Commission, but it came originally from Asia. It inhabits our streams and lakes, where it is increasing rapidly in numbers. It reaches a length of two feet and may attain a weight of 40 pounds. It is a scaly, compressed, robust fish, with well-developed barbels and dorsal fin, and a short anal one; it is of brownish hue. Owing to its hardiness, its durability under extreme tempera¬ tures, the facility with which it may be raised because of its adaptability to sluggish ponds and swampy lakes, it might form an important element in the fish food-supply of the North American interior, since farmers can raise it easily in their mill-ponds. It feeds upon vege¬ table fare, larvae, insects, etc., and during the winter months hibernates, at which time it re¬ quires no food. The eggs, also, are very hardy, and number several hundred thousands to each individual. They adhere to aquatic grasses and weeds.

The carp is usually covered with large scales; but one variety of it, the <(mirror carp,® has only a few large scattered scales; while another species, the Heather carp,® is wholly without scales. Consult the publications of the United States Fish Commission, and Gill, (Smithsonian Miscellaneous Collections) (Vol. XLVIII, Washington 1907).

CARP-SUCKER, a common and little¬ valued fresh-water fish of the genus Carpiodes, related to the buffalo-fishes and suckers. It is found throughout the central part of the United States, takes its name from its carp-like form, averages about two feet in length and is a dull green above, grading into silver beneath.

CARPACCIO, kar-pa’chd, Vittore, Italian

artist: b. Venice about 1450; d. 1525. He was one of the most celebrated masters of the old Venetian school, and was the rival of Bellini and the last Vivarino. He studied probably with Bastiani, and came also under the influence of Gentile Bellini. All that is known of his life is that he belonged to Venice, of which he has reproduced in the background of his pictures the streets and monuments. His dis¬ tinguishing characteristics are natural expres¬ sion, vivid conception, correct arrangement and great variety of figures and costumes. He also excelled as an architectural and landscape painter. His favorite employment was the dramatic representation of sacred subjects, sev¬ eral of which he has illustrated by a series of paintings. Of these the most celebrated are the histories of Saint Ursula and Saint Stephen. The former, consisting of nine pictures, is now in the Academy of Venice, and has been en¬ graved; the latter, in five pictures, is in Paris, Milan and Berlin. The (Madonna and Child Enthroned,) supposed to be an earlier produc¬ tion, is in the National Gallery, London. He also painted a number of smaller pictures. The latest research on Carpaccio may be found in the monograph by Ludwig and Molmenti (Milan 1906; trans. by Cust, London 1907).

CARPANI, kar-pa'ne, Giuseppe, Italian dramatist and writer on music : b. Villalbese, near Milan, 28 Jan. 1752;' d. Vienna, 22 Jan.

1825. Having prepared for the profession of the law, he afterward devoted himself to liter¬ ary pursuits, and produced a great number of plays and operas, partly translations and partly original. In 1792 he was editor of the Gazetta di Milano, and wrote violent articles against the h rench Revolution. He was obliged to leave the city a.fter the invasion of the French and went to Vienna, where he was appointed censor and director of the theatre. In 1809 he accom¬ panied the Archduke J ohn in the expedition against Napoleon. Under the title of (Hay-dineF he published a series of curious and in¬ teresting letters on the life and works of his friend Haydn, the composer. These letters, published in a French translation as an original work by L. A. C. Bombet, or, as other biog¬ raphers state, by Beyle (known under the

nom-de-plume of Stendhal), gave rise to a great literary controversy, in which Carpam vindicated his authorship most successfully. Consult Tipaldo, (Biographa degli Italiani illus-trF (giving a complete list of the works of Carpani) ; Colomb, M., (Notice sur la vie et les ouvrages de M. Beyle) (1846).

CARPATHIAN MOUNTAINS, a range of mountains in central Europe, forming for the greater part of their extent a natural boundary of Hungary, in the shape of a semi¬ circular belt of nearly 800 miles in length, ex¬ tending from Orsova on the Serbian frontier, to Pressburg. Its breadth is considerable, reach¬ ing a maximum of 240 to 250 miles, between the Banat and Transylvania. The Carpathian chain may be divided into two great sections, the East and the West Carpathians, the former curving from the mouth of the Nera to the source of the Theiss, and forming the boundary between Austria and Rumania ; the latter proceeding from the sources of the Theiss and the Pruth, and terminating on the banks of the Danube west of Pressburg, and forming the boundary between Hungary and Galicia. To the western Carpathians belongs the remarkable group of the Tatra, in which is situated the culminating summit of the whole system, the Gerlsdorf Peak, 8,737 feet. Several other peaks exceed * 8,000 feet. The loftiest summit of the eastern Carpathians reaches an elevation of 8,318 feet. The most remarkable and frequented passes are those of Teregova, leading from Orsova to Temeswar; of Vulkar, forming the valley in which the Schyl flows ; and of the Rothen-thurm, in a gorge formed by the Aluta at the foot of Mount Szurul. The outer bend of the Carpathians is much steeper than that which descends toward the valleys of Transylvania and Hungary. The only important rivers which actually rise in the chain are the Vistula, the Dniester and the Theiss. Small lakes abound in the interior of the mountains, some at great elevations and of great depth. The formation of the Carpathians took place mostly in the Tertiary period, and was practically completed at the end of the Miocene. The eastern part of the Carpathian chain, from Orsova to the source of the Burcza, near Kronstadt, is en¬ tirely composed of primitive rocks. These are succeeded by grauwacke, which extends to the sources of the Theiss, and is only interrupted by a primitive group between the pass of Borgo and the source of the Viso. A great chain of trachyte appears on the frontiers of the Buko-wina and stretches to the point where the Aluta

begins to flow southwest. To the west of this chain, on approaching the plains, an extensive tract of sandstone belonging to the coal forma¬ tion begins to appear and covers the greater part of

Transylvania. Tertiary formations surround the vast plains of Hungary, which consist of a rich alluvium and must once have been the bed of a lake. Basalt frequently oc¬ curs, but no distinct traces of extinct volcanoes have been found. The Carpathian range is rich in minerals, including gold, silver, lead, quicksilver, copper and iron. Salt occurs in beds which have sometimes a thickness of 600 or 700 feet and are apparently inexhaustible. On the plateaus corn and fruit are grown to the height of 1,500 feet; higher up the moun¬ tain steeps are covered with forests of pine, oak, beech, chestnut and fir, some of them as high as 5,500 feet. Bears, lynxes and wolves are numerous in the forests. About 6,000 feet seems to be the vegetable limit. Above it a few lichens may be found, but in general nothing is seen but bare, steep rocks, many of them in the form of conical peaks. There are no glaciers nor perennial snow fields. Numerous passes across the system facilitate communication be¬ tween Hungary and her neighbors to the east. See Hungary; Galicia; Rumania.

CARPATHOS, kar'pa-thos, an island in the 2£gean Sea, now called Scarpanto. In ancient times it belonged to Rhodes. It has been under Italian rule since 1912. It is sit¬ uated midwav between the island of Rhodes and Crete. It is 31 miles long and 8 miles in extreme breadth. Area 126 square miles. It has bare mountains, reaching a height of 4,000 feet. There are ruins of towns in several places. Pop. about 8,000, mostly Greek workers in wood and fishermen.

CARPEAUX, Jean Baptiste, zhon bap'test kar-po, French sculptor: b. Valenciennes, France, 14 May 1827; d. Courbevoie, near Paris, 12 Oct. 1875. He studied at the School of Architecture in Valenciennes, and later went to Paris, becoming a pupil of Rude and of Duret. In 1854 he obtained the Prix de Rome. His bronze (Neapolitan Boy) attracted notice; and (Ugolino and His Four Sons* (1863), also in bronze, though it defied the canons of sculp¬ ture, made him famous. He settled in Paris in 1862. His masterpiece, a marble group, (The Dance, *in the facade of the New Opera in Paris, fully showed his dramatic power and the exuberance of his imagination ; but it pro¬ voked much hostile criticism as involving an attempt to stretch beyond their natural province the limits of the plastic art. The most notable of his later works are the great fountain in the Luxembourg Gardens, representing (Four Quarters of the World Sustaining the Sphere* ; a monument to Watteau at Valenciennes, and a painting of (Napoleon in His Coffin* in the same museum. For his originalitv and virility he has been ranked with Rodin, Rude and David d'Angers. In painting he exhibited the same fearless handling of theme. Paris con¬ tains several thousand of his drawings ; the Louvre possesses many of these as well as notable portrait busts of Alexandre Dumas fils, Napoleon III and the Princess

Mathilde. Con¬ sult biographies by Claretie (Paris 1875) ; Chesneau (ib. 1880). Consult also Gonse, (La sculpture franˆaise* (ib. 1895).

CARPEL, the leaf forming the pistil. Sev¬ eral carpels may enter into the composition of one pistil. See Flower.

CARPENTARIA, Gulf of, a large gulf indenting the northern coast of Australia, named for its discoverer, Pieter Carpenter. Cape York Peninsula, the northern extremity of Queensland, is on the east and Arnhem Land on the west. It contains a number of islands, among them Groote Eylandt, Sir Edward Pel-lew Islands and Wellesley Islands. Its maxi¬ mum width is about 400 miles and its length 460 miles, stretching from lat. 11° to 17° 30’ S. and from long. 136° to 142° E. The land around is generally low.

CARPENTER, Charles Carroll, American naval officer: b. Greenfield, Mass., 27 Feb. 1834; d. Jamaica Plain, Mass., 1 April 1899. He was promoted commodore 15 May 1893 and rear-admiral 11 Nov. 1894; was commander-in-chief of the United States Asiatic squadron from 27 Aug. 1894 till 9 Nov. 1895; and was retired on reaching the age limit, 28 Feb. 1896. During the summer of 1895 he rendered invaluable service in China in protecting American mis¬ sionaries and in co-operating with United States Minister Charles Denby and the British and Chinese authorities to preserve peace, par¬ ticularly after the Kucheng massacre.

CARPENTER, Edmund Janes, American journalist : b. North Attleboro, Mass., 16 Oct. 1845. After graduation from Brown Univer¬ sity in 1866 he engaged in business until 1878, when he entered journalism. He was for many years on the editorial staffs of Providence, New Haven and Boston papers, and is contributing literary reviewer to the Boston Transcript. He has published (A Woman of Shawmut : a Ro¬ mance of Massachusetts Bay Colony, 16405 (1892) ; (America in HawaiP (1898) ; (The American Advance) (1903) ; (Long Ago in Greece) (1906); (Roger Williams5 (1909); (The Pilgrims and their Monument5 (1911) ; (Memoirs and Letters of James Kent, LL.D.,5 in

collaboration with William Kent ; is also the author of many editorials, newspaper articles, literary reviews, translations and vers.es. In 1905 he received the degree of Litt.D. from Brown University.

CARPENTER, Edward, English social¬ istic writer : b. Brighton, England, 20 Aug. 1844. He was educated at Trinity Hall, Cambridge, and was for some time fellow and lecturer there, as well as curate under the noted F. D. Maurice. In 1874 he gave up his fellowship and left the ministry, and until 1881 lectured on science and music in university extension work. He has since devoted his time to literary work, market gardening and socialist propaganda. In 1884 he visited the United States in order to meet Walt Whitman. He has published (Towards Democracy5 ; (Love's Coming of Age5 ; (Angels' Wings5 ; Edam's Peak to Ele-phanta5 ; (Iolaus: an Anthology of Friendship5 ; (Days with Walt Whitman5 ; (The Drama of Love and Death5 ; (The Healing of Nations,5 *etc.*

CARPENTER, Francis Bicknell, Ameri¬ can painter: b. Homer, N. Y., 6 Aug. 1830; d. New York, 23 May 1900. He studied with Sanford Thayer at Syracuse, N. Y. (1844), and in 1852 became an associate of the National Academy. Among his works are a portrait of

President Fillmore, in the City Hall, New York; a portrait of President Lincoln, in the capitol at Albany, N. Y. ; and the Emancipation Proclamation5 (1864), in the capitol at Wash¬ ington. While executing the last-named paint¬ ing he was closely associated with President Lincoln, and his observations during this period are embodied in his book entitled (Six Months in the White House with Abraham Lincoln.5

CARPENTER, Fred Warner, American diplomat : b. Sauk Centre, Minn., 12 Dec. 1873. He received a public school education, studied law at the University of Minnesota, in 1898 was admitted to the bar and was stenographer to a law firm for several years. He became private secretary to William H. Taft, governor of the Philippines in 1901, continuing while Mr. Taft was Secretary of War and during part of his term as President. He was ap¬ pointed Minister to Morocco in 1910, and 191 1— 13 was Minister to Siam.

CARPENTER, Joseph Estlin, English

Unitarian scholar : b. Ripley, Sussex, 5 Oct. 1844. He was educated at University College, London, and Manchester New College (now at

Oxford). He was minister of Oakfield Road Church, Clifton, 1866-69, and of Mill Hill Chapel, Leeds, 1869-75 ; was lecturer in Man¬ chester New College, 1875-1906, and principal, 1906-15. He is one of the very foremost living authorities as a Sanskrit scholar and biblical critic, and besides editing Ewald's (History of Israel5 (Vols. III-V) and translating Tiele's (Outlines of the History of Religion,* is the author of (Life and Work of Mary Car¬ penter5 (1879); (Life in Palestine5; (The First Three Gospels: Their Origin and Relations) (1890) ; (The Bible in the Nineteenth Century5 (1903) ; (James Martineau, Theologian and Teacher5 ; (The Historical Jesus and the Theo¬ logical Christ5; Comparative Religion5 (1913). With Rhys Davids he has edited the (Sumair-gala Vilasini5 (1886) ; and the (Digha Nikaya5 (1889). With Harford-Battersby he has also edited the Hexateuch according to the revised version.

CARPENTER, Lant, English Unitarian •

clergyman: b. Kidderminster, 2 Sept. 1780; d. at sea, 5 April 1840. Designed for the minis¬ try, he was sent in 1797 to the Northampton Academy. That school being temporarily dis¬ continued, young Carpenter was placed at Glas¬ gow College, where, however, he did not con¬ tinue the length of time necessary to take his degree. Leaving college in 1801, he spent some time in teaching, and as librarian of the Athenaeum, Liverpool. At Liverpool, Carpen¬ ter's views were so clearly in sympathy with those of the Unitarian denomination generally that he received several invitations to the pas¬ toral charge of Unitarian congregations, and a call to a professorship in their college at York. In 1805 he accepted a call to Exeter, where he continued for 12 years. In 1806 the University of Glasgow gave him the degree of LL.D., al¬ though he had applied only for the degree of M.A. From Exeter he removed to the pastoral charge of the Unitarian congregation at Bristol (1817), where he continued until his death, which occurred by falling from a vessel be¬ tween Naples and Leghorn, while on a tour for his health. Dr. Carpenter's piety was of an eminently practical turn. The instruction

of children was an object of constant interest. Amid all his pastoral and literary labors he always found time and energies to devote to juvenile instruction, and, even against the prejudices of his congregations, established Sunday-schools among the children of Exeter and Bristol. In his pastoral charges at Ex¬ eter and Bristol he was active in cooperation with others in the establishment of libraries, schools, savings banks and institutions for gen¬ eral improvement and welfare. His published works are mainly theological and doctrinal, in support of the Unitarian sentiments he had early espoused. Among his more important works are (An Introduction to the Geography of the New Testament* ; (Unitarianism, the Doctrine of the Gospel* (1809) ; Examination of the Charges Against Unitarianism* (1820) ; (Harmony of the Gospels*; Systematic Edu¬ cation (2 vols., 1815) ; Principles of Educa¬ tion } (1820) ; and a volume of sermons. Mild in controversy, faithful in humane labors and practically devoted to the improvement of so¬ ciety, Dr. Carpenter was greatly respected even by those who were his most staunch antag¬ onists in theology. Consult his (Memoirs,* edited by his son, R. L. Carpenter (London

1842).

CARPENTER, Louis George, American engineer: b. Orion, Mich., 28 March 1861. He was graduated at Michigan Agricultural Col¬ lege in 1879, and after serving there as in¬ structor in mathematics and engineering took post-graduate courses at the University of Michigan and Johns Hopkins University. In 1888 he became professor of engineering at the Colorado Agricultural College and meteorolo¬ gist and irrigation engineer at the Agricultural Experiment Station, and organized the first systematic course in irrigation engineering given in any American college. He founded the American Society of Irrigation Engineers in 1891. He was special agent of the United States artesian wells investigation in 1890, and in 1899 was appointed director of the Agricul¬ tural Experiment Station at the Colorado Agri¬ cultural College. He is a member of many American and foreign engineering societies. He has published government reports, (Artesian Wells in Colorado) (1890) ; Urrigation Prog¬ ress in Colorado * (1891) ; and many papers on irrigation.

CARPENTER, Margaret Sarah, English painter: b. Salisbury, England, in 1793; d. Lon¬ don, 13 Nov. 1872. Her first studies in art were obtained from the collection of Lord Rad¬ nor at Longford Castle, and later she competed for several years for the prizes offered by the Society of Arts, several times successfully, and once being awarded the

gold medal for the study of a boy's head. In 1814 she went to London, where she secured for herself a wide reputation as a portrait painter; in that year her exhibits of a portrait of Lord Folkestone at the Royal Academy and the pictures Eor-tune-Teller) and (Peasant Boy* at the British Institution at once gained for her great popu¬ larity and marked the beginnings of her rapid rise. In 1866 upon the death of her husband, W. H. Carpenter, keeper of the prints and drawings in the British Museum, she was granted by the Queen an annual pension of £100. Between the years 1816-66 she exhibited

147 pictures at the Royal Academy, 50 at the British Institution and 19 at the Society of British Artists. Chief among her pictures are (Lord Kilcoursie and Lady Sarah de Cres-pigny> (1812); (Lord Folkestone) (1814); cMr. Barring* (1815) ; (Sir Henry Bunbury* (1822) ; (Lady Eastnor* (1825) ; (Lord de Tab-ley *(1829); justice Coleridge) (1830); (Lady Denbigh* (1831); (Mrs. Herries) (1832); (Lady King, daughter of Lord Byron) (1835); ˆArchbishop Sumner * (1852), *etc.* In the Na¬ tional Portrait Gallery are also three portraits from her brush — those of Richard Parkes Bonington, the painter; John Gibson, the sculptor; and Patrick F. Tytler, the historian. In the South Kensington Aluseum are three pictures: (Devotion> (1822); Ehe Sisters> (1840) ; and (An Old Woman Spinning. * Con¬ sult Clayton, E. C., English Female Artists> (Vol. I, pp. 386-88, 1876).

CARPENTER, Mary, English philan¬ thropist; b. Exeter, 3 April 1807; d. Bristol, 15 June 1877. She was the eldest daughter of Lant Carpenter (q.v.). Her special work was for the neglected children of the poor and young criminals. She established a number of schools and reformatories, including the Red Lodge, a girls' school at Bristol, of which she was superintendent. She visited India in 1866, 1868, 1869 and 1875; and came to the United States and Canada in 1873, where she spoke on prison reform. She wrote (Reformatory Schools for the Children of the Perishing and Dangerous Classes) (1851) ; (Juvenile Delinquents) (1853) ; (Our Convicts) (1864) ; and cSix Months in India1* (2 vols., 1868). Con¬ sult Carpenter, J. E., Eife of Mary Carpenter* (London 1879).

CARPENTER, Rolla Clinton, American engineer: b. Orion, Mich., 26 Tune 1852; d. 19 Jan. 1919. He studied at the Michigan Agricul¬ tural College, was graduated at the Univer¬ sity of Michigan in 1875 ; student Cornell, 1888; was professor at the Michigan Agricul¬ tural College, 1878-90; professor of experi¬ mental engineering, Cornell University, since 1890; member American Society Mechanical

Engineers (vice-president; chairman Commit¬ tee on Research) ; American Society Civil En¬ gineers; American Society Mining Engineers; American Society Heating and Ventilating En¬ gineers (president, 1898) ; Society Automobile Engineers (vice-president) ; consulting engi¬ neer for Helderberg Portland Cement Com¬ pany, Cayuga Lake Portland Cement Company, Quaker Portland Cement Company, Great Northern Portland Cement Company, Belle¬ ville Portland Cement Company, Atlas Port¬ land Cement Company, Kosmos Portland Cement Company, California Portland Cement Company and others ; has constructed numer¬ ous power stations for electric railways and has had active charge of many engineering constructions ; patent expert in several im¬ portant cases; judge of machinery and trans¬ portation, World's Fair, Chicago, 1893, Pan-American Exposition, Buffalo, 1901, Jamestown Exposition, 1907; member of committee to re¬ port to President of United States respecting slides in Panama Canal 1915-16; author Ex¬ perimental Engineering) (7 eds., 1890, 1902, 1909) ; (Heating and Ventilating Buildings* (7 eds., 1898, 1902, 1909) ; and numerous papers

in transactions American Society Mechanical Engineers, 5 transactions Heating and Venti¬ lating Engineers,5 *etc.*

CARPENTER, William, English editor and author: b. Saint James, Westminster, 1797 ; d. Colebrooke Row, Islington, 21 April 1874. Being the son of a poor tradesman he was put to work early in life and obtained no education, but entering the service of a bookseller he soon learned to speak fluently several ancient and modern languages, and took great interest in the study of biblical subjects. With William Greenfield he edited the Scripture Magazine, which was later known as <Critica Biblica) (4 vols., 1824-27) ; in rapid succession he be¬ came editor of Shipping Gazette (1836) ; Era (1838); Railway Observer (1843); Lloyd's Weekly News (1844) ; Court Journal (1848) ; Sunday Times and Bedfordshire Independent (1854). He issued a publication ˆPolitical Letters) (1830-31), which he claimed was not liable to the stamp duty on newspapers, but at his trial in 1831 was

convicted and imprisoned for some time. Carpenter wrote many treatises on the subject of political reformation and from 1851-53 was honorary secretary to the Chancery Reform Association. Among these works are (The Elector's Manual5 (1832); <The Political Text-book5 (1833); (Peerage for the People5 (1841) ; (The Corporation of London as it is and as it should be) (1847). Of his other pub¬ lications the most noteworthy are (Sancta Biblica) (1825) ; c Anecdotes of the French Revo¬ lution of 1830) (1830); (Life and Times of John Milton5 (1836) ; <The Biblical Com¬ panion (1836); (Relief for the Unemployed: Emigration and Colonization Considered) (1841); (A Comprehensive Dictionary of Eng¬ lish Synonyms) (6th ed., 1865) ; (An Introduc¬ tion to the Reading and Study of the English Bible5 (3 vols, 1867-68), *etc.*

CARPENTER, William Benjamin, Eng¬ lish physiologist and naturalist: b. Exeter, 29 Oct. 1813; d. 19 Nov. 1885. He was the eldest son of Lant Carpenter (q.v.) ; was educated in his father's school at Bristol, and in 1833 en¬ tered University College, London, as a medical student. Two years later he went to Edinburgh University, where he was graduated as M.D. in 1839; and in that year also he produced his first important work, (The Principles of Gen¬ eral and Comparative Physiology.5 In 1844 he was elected a fellow of the Royal Society and also obtained the Fullerian professorship of physiology at the Royal Institution. From 1847 to 1852 he was editor of the British and Foreign Medico-Chirurgical Review, was one of the editors of the Natural History Review, and in 1856 he was appointed registrar of the Univer¬ sity of London, a post which he resigned in 1879. He wrote several well-known works on physiology, one of which has been already re¬ ferred to. Others are Principles of Mental Physiology5 (4th ed, 1876) and Principles of Human Physiology (1846, new edition by H. Power 1881). Still other works of his are introduction to the Study of the Foraminif-era5 (1862) ; (The Microscope and Its Revela-tions) (1868 ; 6th ed, 1881); <The Physiology of Temperance and Total Abstinence5 (1853) ; (Zoology and the Instincts of Animals5 (1857) ; (Mesmerism and Spiritualism5 (1877); (Nature and Man5 (1888) ; besides many papers in sci¬

entific journals. He took a leading part in the expeditions sent out by the government in 1868-70 for deep-sea exploration in the north At¬ lantic and contributed largely to the discussion of ocean circulation. He advocated the doc¬ trine of vertical circulation independently of Dr. Lenz of Saint Petersburg, who in 1845 had begun to advance that theory. He was chosen president of the British Association at Brighton

in 1872.

CARPENTER, William Henry, American philologist: b. Utica, N. Y, 15 July 1853. He received a university education at Cornell and Johns Hopkins, and at Leipzig and Freiburg universities ; became instructor in rhetoric and lecturer on North European literature in Cor¬ nell University in 1883 ; instructor of German and Scandinavian languages in Columbia Uni¬ versity, 1883-89; assistant professor of Ger¬ manic languages and literature in the same institution, 1889-90; adjunct professor, 1890-95 ; and in 1895 professor of German philology there. Since 1912 he has been provost of the university. He is vice-president of the Germanistic Society of America and editor of the Germanist ic Society Quarterly ; and trustee and secretary of the Columbia University Press. He is a member of the Authors and Century Clubs of New York. He has published several works in the line of his specialty, and has con¬ tributed largely to dictionaries and encyclo¬ paedias and to magazines and reviews.

CARPENTER-BEE, a species of bee (Xylocopa virginica) which burrows into dead tree-trunks, lumber and even into woodwork of buildings. It is a large, black-bodied bee, as big as the biggest bumblebee. Its burrow is about half an inch in diameter, runs horizon¬ tally across the grain of the wood for a short distance, then forms a tunnel at right angles to this entrance, running sometimes 12 to 18 inches. When the tunnels are complete, the cells are made and supplied with pollen. The cells are about seven-eighths of an inch long, and are separated from each other by partitions made of sawdust glued together. When the eggs, which are laid one in each cell, are hatched, the larvae feed on the pollen-deposit until they are ready to bore their way out. The carpenter-bee will use the same burrow again and again, and its home is sometimes utilized by other species of bees.

CARPENTERS' HALL, Philadelphia, on

the south side of Chestnut street between Third and Fourth. It was built shortly after 1770 (as an assembly house and club) for the carpenters' guild of that city, and probably for civic uses if desired. In 1774 it became famous as the chosen meeting-place of several conven¬ tions for the liberation of the colonies. The first was on 15 July, when the committee of correspondence of the colony appointed a ses¬ sion of committees from each county, as ((the most effective means toward a union.55 Later, on 5 September, the first Continental Congress met in its <(plain but spacious rooms55 on the lower floor, although the State House had been offered them. Behind its closed doors were prepared the papers which Chatham said ranked with the

greatest of the world. The second Congress also began its sessions there, 10 May 1775.

CARPENTRAS

CARPENTRY

CARPENTRAS, kar-pan-tra, France, a town of the department of Vaucluse, situated 16 miles northeast of Avignon. In Roman times it was known as Carpentoracte, was a place of importance and possessed many handsome edi¬ fices, of which a few traces are left. The prin¬ cipal structures are an aqueduct, which crossed the valley of the Auzon by 48 arches; a Roman triumphal arch, a Gothic cathedral, a museum containing a collection of Phoenician bas-reliefs and the library containing 50,000 volumes. Carpentras has a considerable local trade, and weekly markets, which are among the most important in southern France. It was formerly the seat of a bishopric, and Pope Clement V had his residence there in 1313. The chief products are leather, wax, chemicals and fruit. It has also a considerable trade for its manu¬ factures of silk, dyed fabrics and hats. Pop.

11,390.

CARPENTRY, the art of combining pieces of timber to support a weight or sus¬ tain pressure. The work of the carpenter is intended to give stability to a structure ; that of the joiner is applied to finishing and decora¬ tion. The scientific principles of carpentry are founded on the doctrines of the composition and resolution of mechanical forces, and a knowledge of these doctrines, either theoretical or practical, is indispensable to the skilled car¬ penter. To go into the principles of the art would be merely to explain a particular appli¬ cation of these mechanical forces, which would be beyond the scope and limits of this work. An explanation of the terms employed in car¬ pentry may, however, be useful to the general reader. The term “frame” is applied

to any assemblage of pieces of timber firmly con¬ nected together. The points of meeting of the pieces of timber in a frame are called “joints.” “Lengthening” a beam is uniting pieces of tim¬ ber into one length by joining their extremities. When neatness is not required this is done by “fishing.” In this mode the ends of the beams are abutted together, and a piece of timber placed on each side and secured by bolts passed through the whole. Sometimes the parts are indented together, and pieces termed “keys” are notched into the beams and side pieces. When it is desirable to maintain the same depth and width throughout the beam, “scarfing”’ is em¬ ployed. This is cutting from each beam a part of the thickness of the timber, of the length of the intended joint, and on opposite sides, so that the pieces may be jointed together and bolted or hooped. In bolting scarfs, side plates of iron are used to protect the wood. \ hen greater strength is required than can be pro¬ duced by a single beam, “building” and “truss¬ ing” beams are resorted to. Building beams is combining two or more beams in depth so as to have the effect of one. In trussing the beam is cut in two in the direction of its length, and supported with cross-beams, as in roofing. “Mortise” and “tenon” is a mode of jointing timber. An excavation called a mortise is made in one piece and a projecting tongue to fit it, called a tenon, in the other. The tenon is confined in the mortise by a pin penetrating it laterally through the side of the mortised beam, or by an external strap of iron passing round the mortised beam and rivetted in the one terminating in the tenon. The timber

framework of floors is called “naked flooring.” It is of three kinds — single, double and framed. Single flooring consists of a series of joists stretching across the whole void from wall to wall, without an intermediate support. The flooring boards are laid on the top of these, and the ceiling of the lower story fixed to the under side. Double flooring consists in laying binding joists across the floor about six feet apart, crossed above by bridging joists and also crossed below by the ceiling joists. Framed flooring is provided with girders or beams in addition to the binding, bridging and ceiling joists. To prevent the transmission of sound, a double ceiling of lath and plaster is some¬ times used, but generally pugging is inserted between the roof and the ceiling. “Cornice bracketing” consists in rough wooden profiles of the room cornices, which are afterward lathed around and plastered. Partitions, when not required to bear weight, are formed by lay¬ ing along the floor a piece of timber called a “sill,” together with a corresponding piece along the ceiling joists, the space within being filled with vertical pieces called “quarters,” to which the lath is nailed.

When the partition has weight to support, it has to be trussed with posts and braces. The timbers which support the steps of a wooden staircase are termed the “carriage.” They consist of two pieces of tim¬ ber inclined to the “rake,” or projection of the steps, and termed “rough strings,” which may rest upon a piece of timber projecting horizon¬ tally from the upper wall, called a “pitching” or “apron” piece, which also supports the joists of the landing or “half pace.” The “roof” is the framework by which the covering of a building is supported. It may consist of a series of timbers which are called “rafters” with the ends resting on the opposite walls, and the other ends meeting in a point. When loaded with the weight of the covering, this frame¬ work would be apt to thrust out the roof ; a third piece is consequently added, which, like a string, connects the lower extremities of the rafters and prevents them from spreading. This is called a “tie,” and the whole frame a “cou¬ ple.” When the tie is of such a length that it is apt to droop in the middle, or “sag,” by its own weight, a fourth piece is added to unite it directly with the apex of the rafters; this is called the “king-post.” If the rafters, too, are liable to sag, cross pieces called “struts” are introduced, uniting their centres with the centre of the tie. Instead of the king-posts and struts, the centre of each rafter may be joined to the tie by a piece falling perpendicularly on the latter, and to each other by a piece running across parallel to and above the tie, forming a parallelogram with the perpendiculars and the section of the tie enclosed by them. The suspending pieces are called “queen-posts,” and the horizontal one a “collar-beam.” The whole frame, constructed in either way, is called a truss. The trussed frames are placed at in¬ tervals of about 18 feet apart, and support hori¬ zontal pieces called “purlins,” which run the whole length of the roof and support the com¬ mon rafters with their covering. Ship carpen¬ try is a special form of carpentry. The tim¬ bers are larger and heavier and of the harder kinds of wood. These must be shaped to the curved lines of the vessel and properly beveled to make close joints. This branch of carpen-656

try is now confined to small vessels such as yachts, coasting schooners, barges, scows, *etc.*

The principal instruments used in carpentry are saws, as the circular-, band-and tenon-saws; planes, as the jack-plane, smoothing-plane,

molding-plane, *etc.* ; chisels, gouges, brad-awls, gimlets, descriptions of which will be found in their places. See Building; Cabi¬ netMaking; Joinery; Shipbuilding.

Bibliography. — Fletcher and Fletcher,

(Carpentry and Joinery for Architects, etc.* (London 1898) ; Hatfield, (The American House Carpenter > (New York 1880) ; Hodg¬ son, (Modern Carpentry and Joinery *(ib. 1906) ; Jacoby, Structural Details, or Elements of Design in Heavy Framing) (ib. 1909) ; Riley, (Manual of Carpentry and Joinery* (ib.

1906).

CARPET (Lat. carp ere, to < <pluck)) or ((card,® as wool), a thick woolen fabric used for covering floors. The word originally meant (in old French) a coarse cloth in which pack¬ ages were wrapped for packing upon the backs of men and animals. As man advanced in civ¬ ilization and desire for comfort, he began to use his packing car pit e as a wrap for himself and to cover his feet and limbs at night. From that he began to use it to protect his sandaled feet from cold stone floors. Then the ma¬ terial was made finer and gradually embellished with colors and designs. The art progressed most rapidly in the cold mountain districts of western Asia — Persia, Turkey, Syria. The people of these regions had time, patience and a love for things beautiful. They produced wonderful results with wool, camel's hair, or goat's hair, combined with a flaxen warp. All their work was (and still is) done most labori¬ ously by hand on looms of the crudest sort. These fabrics of the better sort are almost in¬ destructible with ordinary wear. Carpets are still in use in some of the palaces of Persia which have been constantly used since the end of the 16th century.

When woven floor-coverings were first used by man is hard to tell. Fragments of what might be such are found in Egyptian excava¬ tions indicating a possible use of them as early as 3000 b.c. That the skins of animals and rush mats were used by prehistoric man as protection from the cold stone of the cave dwelling is cer¬ tain. Cyrus the Great had wonderful carpets when he placed Persia at the forefront of na¬ tions. Alexander found them in use in his vic¬ torious march through Asia to India.

The art of carpet-making in its best sense still remains with the Orient. No Occidental possesses the matchless patience properly to weave by

hand the marvelous creations of the Far East. Some of the Indian carpets approach the fineness of those of Persia. The jute and cotton rugs of Japan, and the grass mattings of China, are samples of this art in poorer material.

In the United States there are samples of native workmanship which compare well with the productions of the East. The work of, the Navajo Indian in particular is very quaint and perfect. His rugs or blankets, colored with na¬ tive pigments and laboriously woven by hand, Avill wear for many years. Cortez found the palaces of Montezuma covered with grand rugs, many of them made of the skins of humming¬

birds sewn together. See Carpet and Rug Industry.

CARPET-BAGGERS, CARPET-BAG GOVERNMENTS. The admission of the Southern negroes to the franchise after the war involved their organization and leadership, and their representation in State and national offices by intelligent whites. As no Southern whites of character would undertake what they re¬ garded as a crusade against civilization, the task fell to Northern Republicans. Those who undertook it were of all grades of personal integrity and honesty of purpose, from sincere old-fashioned abolitionists to mere scalawag adventurers ; but they had one characteristic in common: the lack of property interests in the South to make its injury theirs. Hence the name, implying that their only possessions were in their carpet-bags. The name was at first given only to those whose one motive for residence there was election to office by aid of the negro vote; and the purpose of many was voiced in the utterance of one high official, that when he could no longer hold office from there he would no longer live there. But the regime of monstrous plunder and social and industrial ruin which the system brought on, the levying of fraudulent taxes, and the piling up of huge State debts for the future, soon effaced all distinctions. All Northerners who upheld the system or tried to protect the negroes' voting rights were confounded under the name; all State governments in any way protected from overthrow by United States troops were ((carpet-bag® governments ; and finally the entire years of Reconstruction, and that attempt itself, are compendiously known as the ((Carpet-Bag Regime.®

CARPET-BEETLE, a small beetle (An-threnus scrophiilarice) , often wrongly called <(buffalo bug.® In the grub or larval state, it is injurious to carpets and similar fabrics. It is an active, brown, hairy

larva, the size of a grain of wheat, which works in a hidden manner from the under surface, sometimes making ir¬ regular holes, but more frequently following the floor-cracks and cutting long slits in a carpet. This insect was brought from Europe about 1874, and is abundant in the New Eng¬ land States and westward to Kansas. The adult insect is a minute, broad-oval beetle, about three-sixteenths of an inch long, with a red stripe down the middle of the back. When disturbed it folds up its limbs and feigns death. As a general thing the beetles begin to appear in the autumn, and continue to issue, in heated houses, throughout the winter and fol¬ lowing spring. Soon after issuing they pair, and the females lay their eggs in convenient spots. The eggs hatch in a few days, and the larvae develop rapidly. Their development is retarded by cold weather or by lack of food, and they may remain alive for an indefinite period. When, under normal conditions, the larva reaches full growth, the yellowish pupa is formed within the last larval skin, from which the beetle emerges later. The beetles are day-fliers, and when not engaged in egg-laying are attracted to the light. They fly to the windows, and may often be found upon the sills or panes. The carpet-beetle is very difficult to exterminate, and the best preventa¬ tive is the use of movable rugs on hardwood

floors. Suspected carpets should be taken up, beaten, sprayed out of doors with benzine, and then be well aired. Before relaying the carpet, tarred roofing-paper should be laid upon the floor.

Another similar pest is the black carpet-beetle (Attagenus piceus), whose larva is read¬ ily distinguished from the buffalo-bug by its cylindrical shape and lighter color. It is not so fond of working in cracks and cutting long slits in carpets, and in general is not so danger¬ ous a species as the other. It sometimes pro¬ duces in feather-beds a peculiar felting of the ticking. It has also been known to infest flour¬ mills, and is to a certain extent a feeder upon cereal products. Two years are required for its development from egg to beetle. Consult Howard and Marlett, (Household Insects5 (United

States Department of Agriculture, Washington, 1896).

CARPET AND RUG INDUSTRY. Like many American industries, the manufacture of carpets had its beginnings in the Old World.

Probably the first carpetings made on a large scale were made in an establishment founded by Henry IV, King of France, at the Louvre in 1607. This establishment was followed in 1627 by one called the ((Savonnerie)) at Chaillot, the building having previously been used as a soap factory, and by one at Beauvais, established in 1664 by Colbert, minister of Louis XIV. Many of the weavers employed in these factories were Protestants and the revocation of the Edict of Nantes in 1685 caused a tremendous emigration of these people to other countries, more particu¬ larly to England, Holland and Flanders. Thus in England in 1735 we find that in the town of Kidderminster the manufacture of ingrain car¬ petings had been established, and although car¬ pet-making had been attempted as far back as the reign of Edward III at Bristol, it did not gain a permanent foothold in the country until after the immigrations from France. In 1745 the Earl of Pembroke established a factory at Wilton in which he employed only French weavers, and this was followed in 1750 by an establishment founded at Fulham by a Capuchin friar for the manufacture of Savonnerie carpet¬ ings, but this was a failure.

The manufacture of Brussels carpet was in¬ troduced into England from Flanders, where it undoubtedly originated, by John Broom, who put the first loom into operation in 1749. This loom, though the secret of its operation was carefully guarded, was copied, and within a short time there was a number of similar looms in operation, and so successful were the makers of this kind of carpet that Kidderminster rapidly became the centre of trade for this class of goods.

With the opening up of trade with the colo¬ nies, the carpet manufacturers of the Old World began to look westward for new markets, and along with the early settlers came men who had learned the art of weaving and were seeking new fields in which their energies might have full sway.

Of the early carpet dealers in this country the first records are meagre, but in Parker's New York Gazette, issue of 30 June 1760, an advertisement appeared reading as follows: (<J. Alexander and Company have removed their store to Mr. Kayne's house on Smith Street, where Mr. Proctor, watch-maker, lately lived, vol. 5 — 42

where they sell check handkerchiefs, linens of different kinds, lawns and minonets, Scot's car¬ pets, broad and narrow cloths, shoes of differ¬ ent kinds, undershirts, hats, stockings, with several other goods ; Fine Scot's barley and herrings. Also a choice parcel of Old Madeira in pipes.® Thus we see that carpets were sold in this country as early as the middle of the 18th century, but the manufacture did not com¬ mence until many years after the introduction.

The history of carpet-making in America may be divided into two periods, the first cover¬ ing the times when all carpets were made on hand looms, and extending up to the year 1841, when the perfected power loom was introduced ; the second period extending from 1841, when Erastus B. Bigelow of Boston, Mass., brought forth his perfected power loom and completely revolutionized the methods of carpet-making, up to the present time.

The earliest records show that W. P. Sprague was the pioneer in the weaving of car¬ pets, and in 1791 opened a factory in Philadel¬ phia for the manufacture of Axminster carpet¬ ing. It was the importation of this style of carpet that first suggested the principle of the protective tariff duty. At the time Alexander Hamilton, as Secretary of the Treasury, trans¬ mitted a message to the House of Representa¬ tives in which he recommended that a duty of 2ˆ2 per cent be laid on all imported carpets ((to which the nature of the articles suggests no ob¬ jection, and which may at the same time furnish a motive the more to the fabrication of them at home, toward which some beginnings have been made.® This factory was followed in 1804 by one at Worcester, Mass., owned by Peter and Ebenezer Stowell, in which were six looms invented and constructed by themselves.

The manufacture of ingrain carpets in this country was begun early in the 19th century, the first ingrain mill probably being that estab¬ lished in 1810 by George M. Conradt, a native of Wurtemberg, Germany, at Frederick City, Md. There carpets were made on a hand loom, on a drum having rows of pegs similar to the cylinder of a music box, by which the harness was worked. In 1821 a factory was established in New York by John and Nicholas Haight, with J. W. Mitchell, a Scotchman, who had come from Kilmarnock, the centre of the in¬ grain trade in Scotland, as superintendent. In 1825 Alexander Wright, who was the superin¬ tendent of a factory at Medway, Mass., owned by Henry Burdette, attempted to learn the processes of the Jacquard system, but was un¬ able to gain any knowledge of them because the secrets were so jealously guarded that he was not even permitted to enter the mill. He there¬ upon went to Scotland, and after purchasing the best hand looms on the market and securing

mechanics to operate them, returned and started the manufacture of carpets on a scale which for those times was very extensive. The factory was in 1828 sold complete to the Lowell Manu¬ facturing Company, the machinery and looms being transferred to their new mill in Lowell upon its completion. Alexander Wright was the first superintendent of this mill, and to¬ gether with Claude Wilson, one of the mechanics whom he had brought with him from Scotland, devised many improvements in the Jacquard loom, making it simple in construction, eliminat¬ ing the more complex parts in the machinery,

and making the operation more easy and cer¬ tain. Of course these looms did not reach a state of perfection till many years afterward, and the machinery was so expensive, the opera¬ tion so tedious, and the skill required so great, in the making, that it was thought the de¬ mand for carpets would not justify such an out¬ lay, but through perseverance and the gradual introduction of improved methods the efforts put forth by the Lowell company were amply repaid, and the founders lived to see the estab¬ lishment become one of the largest carpet fac¬ tories in the country.

In 1840 the carpet industry was started in New York by Robert Beattie, followed in 1841 by E. S. Higgins and Company, who engaged in the manufacture of ingrain carpetings. In 1844 Alexander Smith started a factory at West Farms, N. Y. In 1845 John Bromley com¬ menced to manufacture in Philadelphia and was practically the pioneer in what has grown to be the largest manufacturing centre of the coun¬ try; where more yards of carpet of all grades are made than in any other city in the world, and where some of the finest factories in the world are located.

At this period the manufacture of carpet in this country was far from being a large indus¬ try. In Massachusetts there were seven factories in operation; in Connecticut there were four ; in New York, eight; in New Jersey, four; Mary¬ land had one ; and in Pennsylvania there were only five, all of which were in or near Phila¬ delphia. Of the total number of looms then in operation, 1,500, probably not more

than 1,250 were used for ingrains, the others being used for the manufacture of Brussels, damasks, Venetian or rugs. The largest mills then were: The Lowell company, operating 150 looms ; W. H. McKnight, Saxonville, Mass., 150 looms; Orrin Thompson, Thompsonville and Tariffville, Conn., 250 looms; and W. H. Chatham, Philadelphia, 160 looms, while num¬ bered among them were the first plants of such concerns as the Hartford Carpet Company, Robert Beattie and Sons, E. S. Higgins Carpet Company and McCallum and McCallum.

It was in 1841 that the second period in the history began. Erastus B. Bigelow (q.v.), a young medical student in Boston, 20 years of age, in 1839 became interested in the weaving of coach-lace, and started in to improve on the machinery, by which this class of goods was made, with the result that inside of two years he had brought forth an invention by the use of which the cost of the manufacture of these goods, which had been 22 cents a yard, was re¬ duced to three cents. - The same year he intro¬ duced a power loom for weaving ingrain car¬ pets, raising the product of eight yards a day possible on the hand loom to 10 or 12 yards, and later, after making several improvements, extending this total to 25 or 27 yards a day. He also invented and patented the power loom for weaving Jacquard Brussels, Wilton and tapes¬ try carpets. He was, however, unable to inter¬ est any of the manufacturers in his inventions and finally started a plant of his own at Clinton, Mass., and which was later organized as the Bigelow Carpet Company, now one of our greatest and most progressive companies. The exclusive right to use his process of manufac¬ ture in England was at once purchased by the Crossleys of England and A. & E. S. Higgins

of New York, and the Roxbury Carpet Com¬ pany of Massachusetts acquired the use in the United States of his loom for tapestry and vel¬ vet during the term of the patent.

To John Johnson of Halifax, England, be¬ longs the credit of first manufacturing tapestry Brussels and velvet carpetings in this country. He began operations at Newark, N. J., in a mill with 25 looms, but this later was moved to Troy, N. Y., and in 1855 was purchased by the Roxbury Carpet Company and moved to Rox¬ bury, Mass. The product of these looms origi¬ nally was 5 yards per day; in 1856 it had ad¬ vanced to 16 yards under the management of the Roxbury company, and now the average output per loom ranges from 60 to 65 yards, mainly possible through the introduction of the Bigelow

inventions.

In 1856 Halcyon Skinner, a mechanic in the employ of Alexander Smith at his West Farms factory, began his investigations into the con¬ struction of a power loom with the intention of making one himself of superior capabilities, and the result of his labors was that about a year later his' patent was brought forth, but owing to the destruction of the mill by fire it was not until 1864 that his loom was put into operation in the new factory which Smith had built at Yonkers, N. Y. In January 1877 Skin¬ ner invented his power loom for the manufac¬ ture of moquette carpetings and later several important improvements were made on this, not only by him but by his sons, Charles and A. L. Skinner. This increased the output of one and one-half yards a day, the result of the labors of two men and a boy, to about 11 yards a day, and this has gradually been increased till the output now reaches about 15,000,000 yards a year, made on 1,000 power looms and employ¬ ing over 5,000 people.

Of the more recent inventions the most in¬ teresting is perhaps that of James Dunlap of Philadelphia, who patented a process of print¬ ing tapestry carpeting in the cloth, a marked improvement over all other previous methods because of the fact that the coloring matter was pressed down into the roots of the pile and extended entirely through the fabric.

The employment of power looms for making rugs is comparatively modern. The importa¬ tion of Oriental hand-made rugs led to imita¬ tions being woven, and so successful was this branch of the industry that a large proportion of dwellings is now supplied with one-piece rugs in place of carpeting made in breadths.

Ingrain was the first machine-made carpet to be widely introduced. It was first manufac¬ tured as a two-ply cloth, with two colors of yarn, the pattern on one side appearing in reverse colors on the other side. Later a three-ply was made with concealed cotton string warp. No pile is used with either two-or three-ply. Ingrain has also been known as Kidderminster or Scotch, from the place of its origin.

Brussels, like most carpets, is made with a pile. This is a thick, hairlike surface given to a fabric-, so that the weaving is covered. A cut pile leaves short, protruding ends, as in plush ; an uncut pile leaves protruding loops. In Brussels the pile is uncut, being looped tight, these loops forming the pattern. The body labric may be woven of linen, cotton or jute; dyed worsted is used for the pile.

\ ilton carpets or rugs, sometimes known as imperial Brussels, and also velvet, are made similarly to Brussels, except that the pile is cut automatically in the loom during the process of weaving.

Axminster carpet, sometimes termed chenille Axminster, has a fluffy thick pile, with a linen or hemp warp and chenille filling. This chenille cord may be of worsted or other material, but its distinguishing characteristic is that it has four or more soft threads.

Tapestry carpet resembles Brussels, being really an imitation, more loosely woven, and having the warp-yarn forming the pile colored, or printed in the warp. Upon tapestry are built various tufted fabrics as moquette. Per¬ sian or Smyrna rugs have usually a linen or hempen warp and filling, and a pile or tufts of colored wool twisted about the warp. The Turkish rug is very similar, but the manner of attaching the tufts is different.

Rag carpet is a separate industry, carried on by a considerable number of very small concerns, mainly by some lone weaver, who has a suitable loom, and makes a living by weaving up the rags saved by economical housewives of the neighborhood. There are no statistics of the rag carpet industry.

In 1849 there were 116 establishments mak¬ ing carpets and rugs in the United States. They employed over 6,000 hands, and their product in that year -was worth $5,400,000. In 1914 there were only 97 factories, but the volume of business had increased many times, and some of the factories, as in Philadelphia and Yonkers, are very large. The wage earners numbered 31,309, besides 1,720 salaried men. Nearly half the employees were women and children, and their average earnings were under $10 weekly. The salaried men averaged $33 weekly. The capital invested was $85,153,000, and the annual product was valued at $69,- 128,185, of which $25,847,962 was the value added by manufacture. The industry ex¬ perienced its greatest growth during the dec¬ ades from 1880 to 1890, and from 1900 to 1910, showing 50 per cent gain in each 10-year period specified.

Pennsylvania was the leading State in the industry almost from its inception, but New York State was in the lead in 1914. Each of these States produces about one-third of the carpets and rugs manufactured in the country. Massachusetts was third with 16 per cent, and no other State made much showing. There are now about 12,000 carpet and rug looms in operation, and the annual yardage manufac¬ tured is close to 100,000,000.

Axminster and moquette carpets and rugs ranked first in respect to quantity produced in 1914, and also in respect to value. The output reported for that year was 15,742,835 square yards, valued at $18,578,693.

Tapestry Brussels carpets and rugs had the second largest output in respect to quantity, 13,614,354 square yards being produced, the decrease since 1909 being 20.3 per cent. In respect to value, however, this class of products occupied fourth place, being led by Axminster-moquette, tapestry velvet and Wil¬ ton.

Tapestry velvet carpets and rugs ranked third as to quantity and second as to value of output in 1914, and showed pronounced in¬ creases in both respects as compared with the

1909 figures. The production in the later year was 13,227,819 square yards, valued at $12,867,- 635, representing increases of 24.1 per cent in quantity and 42.5 per cent in value as compared with 1909.

Wilton carpets and rugs which ranked fifth in respect to quantity and third in respect to value in 1914, also showed pronounced gains, the output in that year amounting to 5,616,263 square yards, valued at $11,929,605, and repre¬ senting increases of 5.1 per cent in quantity and 17.9 per cent in value over the correspond¬ ing figures for 1909.

The remaining products of the industry — consisting of body Brussels carpets and rugs, ingrain carpets and rugs, Smyrna rugs, Colonial or rag rugs, wool and paper-flbre rugs, other wool rugs, and other products — were valued at $15,899,605 in 1914. The production of body Brussels, ingrains and Smyrna rugs showed pronounced declines in 1914 as compared with

1909.

The chief constituent material of the carpet and rug industry is wool, either in raw or in partially prepared form. The raw wool used in 1914 amounted to 52,552,449 pounds and cost $10,493,743. Woolen and worsted yarns also constituted important materials. Of woolen yarn, 21,626,360 pounds, costing $5,821,848, was used ; of worsted yarn 9,267,278 pounds, costing $4,592,906 ; of materials other than wool, yarn made of jute,, ramie and other vegetable fibre is of greatest importance, the amount consumed being 59,148,266 pounds, costing $6,040,186; cotton yarn to the amount of 24,619,137 pounds, costing $4,637,673 ; and linen yarn amounting to 7, 602,200 pounds, costing $1,414,824.

More than three-fourths of the mills pur¬ chased the yarn which they used in weaving carpets, there being only 22 establishments which bought the wool, hair or cotton, and themselves spun the yarn they consumed. These establishments produced, for their own con¬ sumption, 35,615,821 pounds of woolen, 10,253,- 791 pounds of worsted and 2,068,435 pounds of cotton yarn. Thus the total amount of woolen yarn used in the manufacture of carpets and rugs was 57,242,181 pounds ; of worsted yarn, 19,521,069 pounds; and of cotton yarn, 26,687,- 572 pounds.

CARPET-SNAKE, the name of two dif¬ ferent snakes, given in reference to the varie¬ gated pattern of their coloration. (1) An Australian python, about six feet long when fully grown, and beautifully marked, but sub¬ ject to much variation. ((The more typical specimens are black above, each scale with a yellowish dot, with yellow spots … more

or less arranged in rows. The under parts are yellow.® It is widely distributed and numerous in Australia, except in the northern deserts, and is now regarded as a variety (variegata) of the diamond python (Python Spilotes), In their habits they are quite alike. They fre¬ quent open, stony ridges, well supplied with water, or the banks of swamps and lagoons, where they find the small mammals and young waterfowls on which they feed; they also spend much of their time in trees. (2) A viper (Echis carinatus) of northern Africa, and southern Asia, buff in color, marked with whitish spots and dark Y-shaped marks on the head. It rarely exceeds two feet in length, but

is very active and highly venomous, is semi-nocturnal in habits and causes the death of many persons annually, especially in southern India.

CARPET SWEEPERS. Carpet sweepers of a crude pattern were made in England hun¬ dreds of years ago, but not until 1876 was this device seriously considered as a time-saving, labor-saving household article. Several at¬ tempts had been made in this country as early as 1856 to produce a satisfactory carpet sweeper, but all fell short of the requirement. To Mr. M. R. Bissell is due the credit of producing the first carpet sweeper that did its work properly and satisfied the user, and millions of Bissell carpet sweepers are now in use throughout the world. It consists of a brush enclosed in a wooden or metal dustpan carried on four wheels, which also cause the brush to revolve. A later type is fitted with an air pump and in this the dust is drawn into the dustpan by suc¬ tion as in the vacuum cleaner.

It is justly claimed for the carpet sweeper that it is at once the modern sanitary device for sweeping carpets and rugs ; that it performs the work in one-quarter the time the corn broom requires and with 95 per cent less effort; that it raises no dust, thus protecting the furniture, draperies, bric-a-brac, *etc.* ; that it confines all the dangerous germs within the pan receptacles, after which the contents can be burned or buried, thus promoting health and cleanliness at the same time.

The carpet sweeper has been constantly im¬ proved until to-day it is a thing of beauty as well as utility, and its use is recommended by the leading physicians of the world. As dust is admittedly a carrier of disease, it is clearly apparent that the sweeper is invaluable as a health-promoting appliance in the home, con¬ fining as it does all the dust and dangerous germs, to say nothing of its labor-saving, time¬ saving qualities. Where power or electric cur¬ rent is available the vacuum cleaner is fast dis¬ placing the early type of mechanical sweeper. In the vacuum cleaner the dust is drawn into a receptacle by suction.

CARPI, kar'pe, Italy, a town in the prov¬ ince of Modena and nine miles north of the city of Modena. It is the seat of a bishopric, suffragan to Bologna. It is surrounded by walls, defended by a citadel, and has two cathe¬ drals, a seminary and manufactures of straw hats and spun silk. The neighborhood pro¬ duces rice, wheat, hemp and

flax. The chief industry, however, is the cultivation of the silk¬ worm. Carpi was formerly the capital of the principality of Carpi. Pop. (1911) 27,465.

CARPIO, Manuel, ma'noo-el kar'pe-o, Mexican poet and physician : b. Casamaloapan, 1 March 1791; d. 11 Feb. 1860. He studied medicine, translated the (Aphorisms) of Hippoc¬ rates (Mexico 1823) ; and became professor of physiology in the University of Mexico. Entering political life he became a leader of the Conservatives. In 1825 and 1848 he was deputy, in 1851 senator and in. 1853 councillor of state. Several editions of his <Poesias) have been published, the latest at Vera Cruz and Paris in 1883.

CARPOPHORE, a stalk of a sporocarp; the stalk raising the gynecium above the whorl of the stamens, as in Passiflora. Also a pro¬

longation of the axis between the carpels, as in Umbelliferce.

CARPUS, in anatomy, the bones between the forearm and hand, the wrist in man, or cor¬ responding part in other animals. See Hand.

CARPZOV, karp'tsof, the name of a Ger¬ man family which has furnished several eminent jurists and theologians. The founder of the family was Simon Carpzov, burgomaster of Brandenburg, in the middle of the 16th cen¬ tury. He had two sons: Joachim, who at his death at Gliickstadt in Holstein, in 1628, was commander-in-chief of the Danish army; and Benedict, b. 22 Oct. 1565; d. 26 Nov. 1624. He was appointed professor of law at Wittenberg in 1595, became chancellor of the Dowager-Electress Sophia at Kolditz, but afterward re¬ turned to Wittenberg. A second Benedict, son of the former, b. Wittenberg 1595; d. 1666; be¬ came assessor of the Supreme Court and pro¬ fessor of law at Leipzig in 1645, then councillor of the Court of Appeal and member of the privy council at Dresden. He was one of the most eminent jurists of his day, and is the author of several valuable legal works; but is justly censured for the severity and cruelty of his proceedings. He is said to have signed the death-warrants of not fewer than 20,000 per¬ sons. Johann Benedict Carpzov, his brother (b. Rochlitz 1607; d. 1657); became professor of theology at Leipzig, and is famed as the author of the (Systema TheologicunP (1653). He left five sons, one of whom, Johann Bene¬ dict (b. 1639; d. 1669), became professor of theology and pastor of Saint Thomas' Church at Leipzig, distinguished himself by his knowl¬ edge of Hebrew language and literature and translated several rabbinical works. Another

member of the family, Johann Gottlob Carp¬ zov, born at Dresden in 1679, became professor of Oriental languages at Leipzig, and died as superintendent at Liibeck in 1767. He was one of the most eminent theologians of his time, and wrote, among other treatises, (Critica Sacra Veteris Testamentˆ (1728) ; Untroductio in Libros Canonicos Veteris TestamentiP On the family of Carpzov, see Dreyhaupt, <Beschrei-bung des Saalkreises5 (Beilagen zu Theil 2 S. 26).

CARQUINEZ, kar-ke'nes, or KAR-QUENAS, a strait between Contra Costa and Salano counties, California; its greatest width is two miles and its length seven miles; it is navigable, and connects the bays of San Pablo ana Suisun. Benicia is on the north and Mar¬ tinez, Port Costa and Crockett are on the south shore.

CARR, Dabney, American colonial politi¬ cian : b. 26 Oct. 1743; d. May 1773. He was graduated at William and Mary College in 1762 and entered the profession of law. He was a member of the house of burgesses of Virginia, and moved and eloquently supported a resolu¬ tion to appoint a committee of grievances and correspondence, in consequence of British en¬ croachments. His resolution was adopted, 3 March 1773. He married a sister of Jefferson, by whom he is described as a man of sound judgment and inflexible purpose, mingled with amiability, and of a fanciful eloquence.

CARR, Eugene Asa, American army officer: b. Concord, N. Y., 20 March 1830; d

1910. He was graduated at the United States Military Academy in 1850, and joined the Mounted Rifles. He accompanied the Sioux Expedition in 1855, and was active in suppress¬ ing the insurrections on the Kansas border in 1856. In 1860 he was engaged in a campaign against the Comanche Indians. He was in active service throughout the Civil War, com¬ manding the 4th division of the Army of the Southwest and subsequently acting as com¬ mander of the same army. He commanded a division in the Vicksburg campaign in 1863, and led the assault on the works of that city, 18 May. In December 1863 he

was assigned to the Army of Arkansas. At the close of the war he was promoted to brigadier-general, United States Army, and brevetted major-general of volunteers. In 1868-69 he was engaged against the Sioux and Cheyenne Indians, and afterward took part in other expeditions against hostile Indians. He fought in 13 engagements with Indians, was four times wounded in action, and received a congressional medal of honor and the thanks of the legislatures of Nebraska, Colorado and New Mexico. He was retired in

1893.

CARR, Joseph Bradford, American mil¬ itary officer: b. Albany, N. Y., 16 Aug. 1828; d. Troy, N. Y., 24 Feb. 1895. He joined the militia in 1849, and rose to the rank of colonel. In 1861 he was appointed colonel of the 28th New York Volunteers, and led them at the bat¬ tle of Big Bethel and in McClellan's Peninsular campaign. He took part in the battles of Chancellorsville and Gettysburg, and for his bravery throughout the war he was brevetted a major-general of volunteers. After the war he became prominent in Republican politics in New York State, and was elected secretary of state in 1879, 1881 and 1883. In 1885 he was an unsuccessful candidate for lieutenant-governor.

CARR, Joseph William Comyns, English art critic and dramatist : b. 1 March 1849. He was educated at London University and was admitted a barrister of the Inner Temple in 1869.He has been English editor of L'Art and art critic of the Pall Mall Gazette. He has published (Drawings by the Old Masters) (1877); (The Abbey Church of Saint Albans) (1878) ; (Examples of Contemporary Art5

C 1878) } (Essays on Art5 ; <Papers on Art5 ; (A Fireside Hamlet5 ; (The United Pair55; (The NaturalisD ; <The Friar) ; (Forgiveness5 ;

(King Arthur5 ; 'Some Eminent Victorians) ; 'Coasting Bohemia.5

CARR, Lucien, American archaeologist: b. Troy, Lincoln County, Mo., 15 Dec. 1829; d. Cambridge, Mass., 27 Jan. 1915. He was graduated at Saint Louis University in 1846. Having marked literary ability he turned to journalism, and from 1848 was connected with the Missouri Republican. Editorial work be¬ gan to undermine his health and he retired for a time to the country, where he devoted himself to study. In 1867 he removed to Cambridge, which was his home for the rest of his life. Having early taken an interest in the study of the Indians and of American archaeology, he was soon recognized as an expert in that

field, and after the establishment of the Peabody Museum he was closely associated with its work, serving as assistant curator of the

museum from 1877 to 1894. With Prof. N. S. Shaler of the Lawrence Scientific School he wrote (Prehistoric Remains of Kentucky.5 Among his independent publications are (The Mounds of the Mississippi Valley Historically Considered5 (1883) ; and an historical volume on Missouri (1888).

CARR, or KER, Robert, Viscount Rochester, Earl of Somerset, a British politi¬ cian : b. Scotland; d. July 1645. He followed James I to England, when that monarch be¬ came Elizabeth's successor. James chose him as his chief favorite and adviser, knighted him, gave him a seat in the House of Lords and as¬ sisted him in his schemes for a marriage with Lady Essex. The latter after procuring a divorce was married to the Earl, and in 1615 the couple were tried for the murder of Sir Thomas Overbury, who had been Carr's confidant in the amorous intrigue with Lady Essex. They were condemned to death but pardoned. Somerset lived in obscurity until his death. Consult Ranke, (History of Eng¬ land, Principally in the 1 7th Century5 (Vol. I, Oxford 1875) ; Gardiner, (History of England> (Vol. II, London and New York 1889) ; the latter's article in the dictionary of National Biography> (Vol. IX) ; Archbishop Abbot (The Case of Impotency in that Remarkable Tryal An. 1613 Between Robert, Earl of Essex, and Lady Frances Howard5 (London 1715) ; Amos, 'The Great Oyer of Poisoning5 (London

1846).

CARR, Sir Robert, British commissioner in New England: b. Northumberland; d. Bris¬ tol, England, 1 June 1667. He was appointed to that office by Charles II in 1664, in conjunc¬ tion with Nicolls, Cartwright and Maverick. In 1664, Nicolls and Carr captured New Amster¬ dam from the Dutch, calling it New York, in honor of the King's brother, the Duke of York, after James II. Carr forced the Swedes and Dutch on the Delaware into a capitulation. He returned to Boston in 1665, but met with stub¬ born opposition from the authorities, who re¬ fused to acknowledge his commissionership, as did also the people of New Hampshire. Maine, however, submitted and was governed sepa¬ rately from Massachusetts from 1666-68.

CARRACCI, kar-ra'che, or CARACCI, Agostino, Italian artist: b. Bologna 1558; d. Parma 1602. One of a family of artists who founded the Bolognese or Eclectic school of painting. He was a brother of Annibale Car¬ racci, and distantly related to Lodovico Car¬ racci, under whose guidance he studied art. He studied painting under Fontana and engrav¬ ing with Tibaldi and Cornelis Cort. He at¬ tained great masterv in engraving, and en¬ graved more pieces than he painted, in order, it is said, to please his brother Annibale, who be¬ came envious of his fame after one of Agostino's pictures had obtained a prize in prefer¬ ence to one of his own, and another excellent picture — (The Last Communion of Saint Jerome5 (now in Pinacoteca of Bologna, 1592) — had gained his brother universal admiration. In 1600 Agostino accompanied Annibale to Rome, and assisted him in designing and paint¬ ing the Farnesian Gallery. He painted the two principal features of the long walls, the 'Triumph of Galatea5 and the (Rape of Cephalus.5 As many persons said that the en-662

graver worked better than the painter, An¬ nibale removed his brother, under the pre¬ text that his style, though elegant, was not grand enough. Agostino went then to the court of the Duke of Parma, and painted there a picture representing the heavenly, the earthly and the venal love. There was only one figure wanting when, exhausted by labor and mortifi¬ cation, he retired to a Capuchin monastery where he died. He wrote a treatise on per¬ spective and architecture. As an engraver he deserves great praise, and often corrected the imperfect outlines of his originals. He left behind 278 plates, a large number of which are original. He was distinguished for his exact¬ ness in drawing, his harmonious composition and the extreme delicacy of his coloring. For bibliography see Carracci, Lodovico.

CARRACCI, Annibale, Italian painter: b. Bologna 1560; d. Rome 1609. He worked first with his father, who was a tailor. By the advice of Lodovico Carracci he learned draw¬ ing, and made the most astonishing progress, copying first the pieces of Correggio, Titian and Paul Veronese, and painting, like them, small pictures, before he undertook large ones. In the academy founded by the Carracci he taught the rules of arrangement and distribu¬ tion of figures. He is one of the greatest imi¬ tators of Correggio. His (St. Roque Dis¬ tributing Alms,' now in Dresden, was the first painting which gave

him reputation. His (Genius of Glory) is likewise celebrated. In the Farnesian Gallery at Rome, which he, aided by his brother Agostino, painted (1600-04), there breathes an antique elegance and all the grace of Raphael. You find there imitations of Tibaldi (who painted at Bologna about 1550 with Nicolo del Abate), of Michelangelo

(the style, indeed, somewhat softened), and the excellencies of the Venetian and Lombard schools. Outside of Bologna he is acknowl¬ edged as the greatest of the Carracci. In that city, however, Lodovico is more admired. Agostino, perhaps, had more invention, and Lodovico more talent for teaching; but Annibale had a loftier spirit, more spon¬

taneity, naivete and naturalness, and his style is more eloquent and noble. His

atelier in Rome was the workshop of many famous artists, among them Domenichino and Albani. He was buried at the side

of Raphael in the Pantheon. His best picture is that of (The Three Marys,' now at Castle Howard, in Yorkshire, England. He excelled in landscapes, many of which may be found in Paris, Petrograd, Madrid, Florence and espe¬ cially in the Palazzo Doria Panifili, Rome. Consult Tietze, <(Annibale Carraccis Gallerie in Palazzo Farnese und seine romische Werk-statte,® in (Jahrbuch der kunsthistorischen Sammlungen des allerhochsten Kaiserhauses XXVP (Vienna 1906) ; Schmerber, (Betrach-tungen fiber die italienische Malerei im 17ten Jahrhundert' (Strassburg 1906).

CARRACCI, Lodovico, lo-do-ve'ko, Italian painter: b. Bologna 1555; d. 1619. He was the eldest of the three Carracci, and is regarded as the chief founder of their school. He was the son of a butcher, and appeared at first to be more fit for grinding colors than for trans¬ ferring them to canvas. But his slowness did not arise from deficiency of talent, but from

zeal for excellence. He detested all that was called ideal, and studied only nature, which he imitated with great care. At Florence he studied Andrea del Sarto, and enjoyed the in¬ struction of Passigano. He went to Parma for the purpose of studying Correggio, who was then imitated by almost all the Florentine painters. At Bologna he endeavored to gain popularity for his new principles among the young artists, and united himself with his rel¬ atives, Agostino and Annibale

Carracci, whom he sent in 1580 to Parma and Venice. In 1589 they established an academy for painters at Bologna, called the (< Academia degli Incaminati" (i.e., ((of those on the right way®), which they directed jointly till 1600, the year of the de¬ parture of Agostino and Annibale for Rome. From that time till his death Lodovico was sole director. The academy was so successful that similar institutions in Bologna had to be closed. Among his most famous pupils were Domen¬ ichino and Guido Reni. His first principle was, that the study of nature must be united with the imitation of the best masters. He soon gave an example of this principle in his (Prophecy of John the Baptist, ' in the monastery of the Carthusians, imitating in single figures the style of Raphael, Titian and Tintoretto. With his two relatives he painted the frieze of the Palazzo Magnani, showing the (Story of Rom-ulus) ; the frieze of the Palazzo Sampiere, in which his share was the (Battle of a Giant with Zeus' ; the frescoes of the monastery of Santa Maria in Bosco, representing scenes from the lives of Saint Benedict and Saint Cecilia. The finest works of Lodovico are in Bologna, espe¬ cially in the picture gallery or Pinacoteca, and among them are (The Annunciation' ; (The Transfiguration'; and (St. George and the Dragon.' For the cathedral of Piacenza he painted in 1608-09 two large canvasses repre¬ senting the (Burial of Mary' which are now in the Galleria Farnese, Parma, and a series of fine frescoes; in the sanctuary, (Choruses of Angels,' a (Limbus,' and in the arch over the tribune (Angels Strewing Flowers.' In the same year, he executed (Conversion of Saint Paul' for the Munich Gallery. He excelled in architectural views and in drawing, and in general was very thorough in all the branches of his art. He also executed several fine engravings. Con¬ sult <(Die Malerschule von Bologna" in Dohme, (Kunst und Kfinstler Italiens' (Vol. Ill, Leip¬ zig 1879) ; Bolognini-Amorini, (Vite dei pittori ed artefici Bolognesi' (Bologna 1843) ; id., (Le vi te di Lodovico, Agostino, Annibale ed altri dei Caracci' (Bologna 1842) ; contemporary ac¬ counts by Malvasia, (Felsina pittrice' (Bologna 1678; new ed., 1841) ; Baglione, (Le vite dei pittorfi dal pontificato del Gregorio XIII' (Rome

1649).

CARRAGEEN, kar'ra-gen, CARRA¬ GHEEN, or IRISH MOSS, a name applied to several species of marine algae found abun¬ dantly near Waterford, Ireland, at a place called Carragheen, from which the name is derived. It abounds also on the rocks in other localities in Great Britain and Ireland, and is found on the east coast of North America. The species from which the. carrageen of commerce is chiefly derived

is seaweed called Cliondrus crispus. The frond is thick, cartilaginous,

somewhat fan-shaped, and repeatedly forked ; color, various shades of purple or green. It is gathered from the rocks, washed, bleached in the sun and dried, and is then the Irish moss of commerce. In hot water it swells up, and on boding it dissolves. The results of the analysis of Irish moss are somewhat discord¬ ant; but the main constituent is a mucilage, which differs from gums, starches and jellies by not giving their characteristic reactions. It is nutritious, and is substituted for animal jelly and starches in the preparation of soup, jellies, creams and similar dishes. It is of value in pulmonary troubles, and is also used by painters and others in preparation of size. It is some¬ times confounded with Iceland moss, which is a lichen. See Iceland Moss.

CARRAN'ZA, Venustiano, Mexican sol¬ dier and statesman : b. Cuatro Cienegas, Coahuila, 1859 ; d. 22 May 1920. He studied* law in Mexico City and then returned to his farm in Coahuila. In 1893 he led a successful rebel¬ lion against Garza Galam, governor of Coa¬ huila; in 1910 he joined the revolutionary forces of Madero, and was elected governor of Coa¬ huila after peace was established. He became president of Mexico in 1914. Hjs troublous administration ended 8 May 1920 when, as the result of a revolt against him, he fled from Mexico City, and two weeks later was killed, his own troops being accused of his murder. For details of his career see Mexico' — History.

CARRARA, kar-ra'rii, Italy, city in the province of Massa-e-Carrara, Tuscany, on the Lavensa, near the Mediterranean, and 60 miles west-northwest of Florence, and in a valley surrounded-by the marble hills to which it owes its celebrity. An academy of sculpture is established here', and several artists have their residence, attracted by the convenience of ob¬ taining marble almost cost-free. Carrara has some fine churches, an academy of the fine arts, a statue of Garibaldi. From 400 quarries 4,500 workmen cut and ship more than $1,000,000 worth of marble yearly, and 600 quarries in the neighborhood help to swell the total. The finest and whitest Italian marble, of which the most valuable varieties are Polvaccio, Bettogli and Cre'stola, is found

in the valley of Torano, although in recent years the bluish marble of Bardiglio has come into favor. The Romans, whose tools are frequently discovered, called the stone ((marmor lunense,® from the city of Luni, whose ruins are about three miles distant from-Carrara. There is a museum containing numerous statues and Roman antiquities, also several fine churches. Pop. (1911) 49,492. See Carrara Marble.

CARRARA, kar-ra'ra, MARBLE (so called from the city of Carrara), the variety of marble generally employed by statuaries. It. is a white crystalline limestone, sometimes with black or purplish veins, and occurs in deposits of enormous extent — veritable "marble monu-tainsd Carrara marble., . which was formerly supposed to be a primitive limestone, is now considered an altered sub-carboniferous lime¬ stone. The plutonic action to which it has been subjected has served to obliterate the traces of fossils. The mountains containing the marble are situated a few miles from the sea, and reach the height of over 5,000 feet. Although the quarries have been worked for 2,000 years,

having furnished the material for the Pantheon at Rome, the supply is still practically inex¬ haustible. Those quarries supplying the pure white marble used for statuary are the most valuable. The socalled <(Carrara district,)} em¬ bracing the communes of Carrara, Massa, Pie-trasanta, Seravezra, Stazrema and Arni, is the centre of the marble industry. Carrara and Massa are the two most important. Broadly speaking, the entire male population of these two communities is actively engaged in some branch of the marble industry. Under the sanc¬ tion of ancient laws, the mountains where the quarries are found are the property and under the direct control of the municipality of the district in which they are located. Applications for leases are made to the syndic of the town, and within a reasonable time, after survey, etc., the concession is granted. The concession is permanent, the only condition being that the grantee should formally renew it every 30 years, pay the annual rent, and work the prop¬ erty. The rent is merely nominal. Failure to pay it for two successive years or to develop the property in the same length of time renders the concession void. Quarries thus leased may be sold or transferred, or left as an inheritance by the grantee at any time, without formal per¬ mission from the grantor. Until 1890 most of the output of the quarries was transported to the local mills, and to the Marina for shipping, by ox-teams. But now the quarry railroad, completed in 1890, greatly facilitates this trans¬ portation. From Carrara it makes the difficult ascent of the mountains, through many tunnels and over

high viaducts, to a point some 1,500 feet above the sea-level. Tremendous obstacles were overcome in the construction of these 15 miles of railroad, the completion of which cost about $4,000,000. Although largely patronized by the quarry owners, it has not as yet entirely supplanted the former method of hauling by ox-team. The United States is represented by a consular agent. The buildings of the city of Carrara are of marble, and in the churches of Sant' Andrea (13th century) and of the Madonna della Grazie are splendid marble statues of Rossi, Garibaldi and Mazzini. There is also a museum containing numerous statues and Roman antiquities.

CARRARAY, Philippines, a small island about 30 miles long and 6 miles wide. It has coal deposits. The population is sparse and wholly uncivilized, subsisting by trade with the neighboring islands of Samar and Luzon. Pop. about 2,000.

CARRE, ka-ra, Michel, French dramatist : b. Paris 1819; d. Argenteuil, near Paris, 27 June 1872. He first published a volume of poems, 'Folles rimes) ; then turned to the drama and wrote 'La jeunesse de Luther) (1843) and 'Scaramouche et PascarieU He then worked in collaboration with other au¬ thors, especially with Jules Barbier. With him he wrote many dramas, vaudevilles and opera librettos, several of which met with much suc¬ cess; among their joint works are Wan Dyck a Londres) (with Narrey, 1848) ; 'Jobin et Nanette) (with Battu, 1849) ; and 'Le Tour-billon) (with Deslandes, 1866); <Galatee) (1852) ; 'Faust et Marguerite) (1859) ; 'Lalla RauklP (1862): 'Romeo et Juliette) (1867); 'Mignon) (1867) ; 'Hamlet* (1868) ; 'Paul et VirgimV (1876).

CARREL, ka-rel, Nicolas Armand,

French writer and republican leader: b. Rouen. 8 May 1800; d. 24 July 1836. He was educated at the military school of Saint Cyr. He entered enthusiastically into several of the secret politi¬ cal societies which were numerous in France after the restoration of the Bourbons. In 1819, when lieutenant of the garrisons of Belfort and Neubreisach, he

became implicated in a conspiracy, and though his conduct escaped in¬ vestigation he was removed with his regiment to Marseilles. He resigned his commission to take an active part in the politics of his time. Finally settled in Paris, he zealously prosecuted his historical and political studies, and became intimate with Thiers, Mignet and Augustin Thierry, particularly the last. He published a (History of the Counter Revolution in Eng¬ land, } ,and in 1830 united with Thiers and Mignet in editing the National, which soon rose to be the leading opposition newspaper. After the revolution his colleagues joined the govern¬ ment, and he was left with the chief direction of the paper, which still continued in opposi¬ tion. In 1832 the National became openly re¬ publican. Carrel was mortally wounded in a duel with Emile de Girardin. He has been called the Bayard of republican journalism. Littre republished his articles under the title, (CEuvres politiques et litteraires> (5 vols.,

1854-58).

CARREftO, ka-ra'nyo, Teresa, Vene¬ zuelan pianist : b. Caracas, 22 Dec. 1853. She was educated by her father and by Julius Ho-heni ; in 1862 she appeared as a concert player in New York and attracted the interest of Gott-schalk, who gave her some instruction espe¬ cially in regard to playing his own composi¬ tions. She has traveled widely in America, and given many concerts ; she not only has a high rank as a pianist, but also has won success as a concert singer, and has published a num¬ ber of musical compositions. Her first husband was Sauret, the violinist, from whom she was divorced; she has also married and divorced Tagliapietra, the singer, and Eugene d'Albert, the pianist. In 1902 she married the younger brother of her second husband. A woman of many talents, she composed a string quartet, piano pieces of the salon order and the Ven¬ ezuelan national hymn; she won admiration as a concert singer, and, while managing an opera company, successfully wielded the baton during the absence of the conductor. The chief traits of her playing are brilliancy, dash and mascu¬ line vigor, for which she gained the appellation of ((the Valkyr of the piano.® The softer qualities are not greatly in evidence, but her intellectual grasp and breadth of interpretation place her among the greatest pianists.

CARREftO DE MIRANDA, Juan, Span¬ ish painter: b. Aviles, Asturias, 25 March 1614; d. Madrid 1685. He was a pupil of Bartolome Roman and Pedro de Las Cuevas in Madrid, and became court painter to Philip IV and Charles II. He painted many portraits and excelled in

religious subjects. He succeeded Velasquez as the first portrait painter of the Spanish court. As a colorist the Spaniards rank him with Titian and Vandyke. His prin¬ cipal paintings are a (Magdalen in the Desert,) at Madrid; a (Holy Family,* at Toledo; and a (Baptism of our Saviour,* at Alcala de

Henares. His principal surviving frescoes were commissioned in 1669 by Velasquez and painted with the assistance of Francesco Rizi. They are at Saint' Antonio de los Portugeses in Madrid and at the cathedral in Toledo. Con¬ sult Beruete y Moret, (The Madrid School of Painting* (London 1909).

CARRER, kar'rer, Luigi, Venetian poet: b. Venice 1801 ; d. 23 Dec. 1850. He was pro¬ fessor of philosophy at Padua from 1830 to 1833, when he went to Venice, where he con¬ ducted a literary journalˆ for nine years, during which time he was also** appointed by the mu¬ nicipal council professor in the school of arts and sciences, and director of the museum. Here he published several works, the most popular of which is (L'Anello di sette gemme) a poetic description of the history and customs of Venice. His works were published with a biography by Crespan (Venice 1869) and by Abrate, (L'opera poetica di L. Carrer) (Turin

1905).

CARRERA, kar-ra'ra, the name of three brothers distinguished as Chilean revolutionists — Jose Miguel, Juan Jose and Luis. The chief of them, Jose Miguel, was born at Santiago, 15 Oct. 1785; d. 5 Sept. 1821. They were the sons of a rich landholder in Santiago, Don Ignacio Carrera. Jose Miguel Carrera be¬ came a major in the Spanish army. The revo¬ lution attracted him to Chile where he became a member of the junta in 1810, usurping the presidency, and, in 1811, becoming military dic¬ tator. His internal administration was most effective. He established the newspaper La Aurora, the first paper in Chile. In 1813 he was deposed and succeeded by O'Higgins. The brothers Juan Jose and Luis were apprehended in 1817 near Mendoza, on a political charge, and having been first induced to attempt an escape, were brought to trial and executed 18 March 1818. Jose Miguel raised a body of troops to revenge their death, and a conspiracy was formed in his favor ; but it was detected and suppressed, and he himself being defeated and taken prisoner, was

executed on the same spot as his brothers. A bronze statue to Jose Miguel was erected at Santiago, Chile, 1864.

CARRERA, Rafael, Guatemalan revolu¬ tionist : b. Guatemala 1814; d. there, 14 April 1865. He was of mixed Indian and negro blood. In 1837 he placed himself at the head of a band of insurgent mountaineers. Enlisting the sympathies of the Indian population, the ‘rebel¬ lion spread. Carrera was in turns courted and caressed by members of the opposite factions which divided the government. In February 1838, he occupied the city of Guatemala with 6,000 Indians, and succeeded in restraining his followers from anticipated pillage and massacre. Having secured his victory, he became dictator in 1840, and from 1844 to 1848 was President of Guatemala; was reelected in 1852, and made President for life in. 1854. He recalled the Jesuits, who in 1767 were banished, and in 1863 he engaged in war with Salvador. After cap¬ turing San Salvador, the capital, he deposed President Barrios and appointed Duenas in his stead.

CARRERA, Valentino, Italian dramatic poet: b. Turin, 19 Dec. 1834. He was con¬ nected with the Italian Customs Department

until his retirement from office in 1878. He is one of the most original dramatists of Italy, especially in comedy. Among his many com¬ edies, vaudevilles, etc., the play which won for him a wide reputation was (La quaderna di Nanni> (1870), a perfect picture of Florentine Other works are (Galateo nuovissimo) (1875), (Bastoni fra le ruote) (1884) and <La filosofia di Giannina) (1885). A collective edi¬ tion appeared in Turin in 1887-90 (4 vols.).

CARRERE, John Merven, American architect: b. Rio de Janeiro, Brazil, 9 Nov. 1858; d. 1 March 1911. He was of American parentage and his education was obtained in Switzerland. He was graduated from the Ecole des Beaux Arts, Paris, in 1882, and since 1884 was a partner in the firm of Carrere & Hastings, New York. The firm rapidly ac¬ quired a distinguished reputation for the imag¬ inative and artistic quality of its work, strongly colored by French influence. The first import¬ ant

commissions of the young practitioners were the Ponce de Leon and Alcazar hotels at Saint Augustine, Fla. Other early works were the Central Congregational Church at Provi¬ dence, R. I., and the Mail and Express and Edison buildings in New York. The list of their later works is very long; by far the most notable is the Public Library of New York, erected at a cost of over $8,000,000 from de¬ signs which won the prize in a competition in which many of the ablest architects of the country were employed. He died 1 March 1911, as the result of an accident. The body was laid in state in the still unfinished Public Library, and the great throngs that pressed to view it attested the high regard in which he was held.

CARRHiE, kar're, the name of the site of an ancient city in northwestern Mesopotamia, supposed to have been the biblical Haran. It is famous in history for the disastrous defeat of Crassus by the Parthians, 53 b.c.

CARRIAC'OU, kar-re-a-koo', the largest of the Grenadine Islands, in the British West Indies, seven miles long and from two to four broad. It is well cultivated and produces good crops of cotton. The town and harbor of Hills¬ borough are on its west side. Area, nearly 11 square miles. Pop. (1911) 6,886.

CARRIAGE, a general term for vehicles of all sorts, especially wheeled vehicles ; in a narrower sense confined to those vehicles that carry persons only, for pleasure or business. The carriage is as old as the wheel. The first man who cut two slices from a tree-trunk and mounted them on an axle was the builder of the first carriage. The early Egyptians and Assyrians knew how to make wheels, as evi¬ denced by carvings on their monuments. Some of these show a wheel made with tire and spokes, a construction indicating considerable mechanical knowledge.

Wheels held in place by wooden pins in the axle, a pole to which the horses were attached, and a rude box open at the rear, constituted the early chariots. These and the primitive carts were always two-wheeled. Four-wheeled car¬ riages came into use with the formation of comparatively smooth roads, being ill adapted to rough and unkept highways. The earliest vehicles were made almost wholly of wood, pinned together, the holes being often burned

in, and the parts tied with thongs. The Romans made use of the two-wheeled carruca (from which word ˆcarriage* is derived), but

although chariots of war and carts for transportation were comparatively common from early times, the carriage proper, for conveying persons, was in very slight use before the 16th century.

As late as 1550 there were only three coaches in all Paris, and the stage coach did not make its appearance in England until 1555. When, the coach and covered carriage first came into use they were considered fit only for women and children, men scorning to seek such protection from the weather as is afforded by a covered vehicle. By the opening of the 17th century the coach had become popular, and not only crowned heads, but titled families, commonly employed them, emblazoned with their arms and decorated to the highest de¬ gree.. Some of the most beautiful and elegant handiwork of that period was expended in the ornamentation of coaches. Elaborate painting, upholstery and joiner-work combined to pro¬ duce the most sumptuous of vehicles. No such extreme effort at display has characterized car¬ riages of later generations.

About 1625 the hackney coach came into ex¬ istence in London, and the hired cab soon be¬ came an established institution. The increase of post-roads and general improvement in high¬ ways caused a gradual increase in private car¬ riages and wheeled vehicles of all sorts during the 17th and 18th centuries. The bodies of these early carriages and coaches were sus¬ pended by leather straps, and depended on these, in combination with the springiness of the timber employed, to reduce the shocks and jolts to the occupants. That they were jolty enough to afford considerable exercise can be testified to by those who have taken up the modern sport of coaching in imitation of the old-time tally-ho coach. About 1700, steel springs were introduced, but they did not make very rapid headway. The C spring was a radi¬ cal improvement, but gave way to the elliptic spring, which was invented in 1804 and remains in use to the present day. The rubber-tired wheel was borrowed from the bicycle about 1875, and still further added to the comfort of carriage riders, while the pneumatic tire of more recent date affords the latest refinement of comfort.

The various wheeled vehicles that may be grouped under the name ˆcarriage® embrace a wide nomenclature, the best known being here grouped.

Auto-car, Auto-truck, *etc.* A car, truck, etc., having an automatic engine. See Automobile.

Barouche, a four-wheeled, falling top car¬ riage, with low body, two

inside seats facing, and an outer driver's seat.

Berlin, a four-wheeled covered carriage hav¬ ing a rear seat behind the body.

Britzska, or Breet, a four-wheeled Russian carriage with falling top and a rear seat un¬ covered.

Brougham, a four-wheeled covered carriage with outer driver's seat, and the fore body cut under so as to turn short. The miniature brougham seats only two.

Buckboard, a very simple form of carriage, in which a springboard of. wood takes the place of the .springs, the seat being placed in the cen¬ tre of the springboard.

Buggy, a light carriage with either two or four wheels, and with or without a top.

Cab (short for cabriolet , but of more gen¬ eral meaning), a carriage licensed to carry pas¬ sengers for hire, usually closed, with an outer driver's seat.

Cabriolet, a two-wheeled (later four-wheeled), two-seated, covered carriage with falling top.

Calash, or Caleche, a two-wheeled carriage with a falling or folding top, a seat for two passengers and a narrow seat on the dashboard for the driver; much used in Canada. The top itself is also called a calash.

Car, (1) An automobile with two or more seats; (2) a railway carriage; (3) a carriage of unusual magnificence, as for use in a proces¬ sion; (4) a van; (5) one of various special forms of vehicle, as the Irish jaunting-car.

Carryall, a four-wheeled covered carriage, light and commodious, having two or more seats.

Cart, (1) a two-wheeled, light, topless pleas¬ ure vehicle; (2) a heavy two-wheeled spring¬ less vehicle, with a strong box, for carrying rough material.

Chaise, originally a two-wheeled, one-horse vehicle with a top, the body being hung on straps; later, a light, topless, four-wheeled car¬ riage of varying construction.

Chariot, the early two-wheeled war-carriage ; also a light 18th-century coach, with one inner seat and a driver's seat.

Coach, a four-wheeled covered carriage of large size, having two or more inner seats and one or more outside — a tally-ho; also, a two-seated four-wheeled cab, or large hack.

Coupe, a four-wheeled carriage, low-bodied, with an outer driver's seat.

Curricle, a simple form of two-wheeled two-horse carriage.

Dogcart, a light pleasure cart with back-to-back seats, the rear seat covering a box to carry a dog or dogs.

Drag, a form of coach or tally-ho, some¬ times uncovered.

Drosky, a long-bodied, four-wheeled Rus¬ sian carriage. In its primitive form the body is a plank on which the passengers ride astride ; also, in some European cities, a public hack.

Fiacre, the French name for a public cab.

Gig, a very light, small-bodied, two-wheeled, one-horse vehicle, with seat for one.

Hack, a hackney coach ; loosely, any cab.

Hackney Coach, a four-wheeled coach kept for hire.

Hansom, or Hansom Cab, a two-wheeled, low-bodied, one-horse, covered carriage, hav¬ ing a single seat closed in with front doors, and a seat for the driver behind.

Jaunting-Car, a light two-wheeled, some¬ times four-wheeled, vehicle having a perch in front for the driver, and longitudinal seats extend over the wheels, and a well between them for baggage.

Landau, a coach-like vehicle having a top, the forward part of which is

removable and the rear part folding.

. Landaulet, a oneseated landau.

Omnibus, a four-wheeled covered carriage with long body, seats running longitudinally, a rear door with steps ; often with seats on the roof.

Phaeton, a light pleasure carriage of vary¬ ing construction, usually low-bodied.

Rockaway, a four-wheeled pleasure carriage with two seats and permanent top.

Sociable, a four-wheeled topless pleasure carriage, with facing seats.

Stage, a four-wheeled carriage of large size, with several seats inside and on top, for long journeys; called also stage coach; loosely, an omnibus.

Sulky, a two-wheeled carriage, of skeleton construction, with a seat for one directly on the shafts.

Surrey, a light four-wheeled box carriage with two seats and often side-bars.

Tally-ho, a four-in-hand coach.

T Cart, a pleasure cart having a T-shaped body.

Trap, a pleasure carriage; a term used very

loosely.

Van, a very large covered wagon for con¬ veying bulky articles, as furniture.

Victoria, a four-wheeled carriage with fall¬ ing top, a seat in the body for two and an ele¬ vated driver’s seat cut under.

Wagon, a heavy four-wheeled vehicle, usu¬ ally with rectangular box, for carrying goods, sometimes with removable seats, and often with removable top.

Wagonette, a light wagon for pleasure rid¬ ing, with longitudinal

seats facing each other, and entered by steps and a door in the rear.

To these might be added many more com¬ pound names, as top-buggy, box-buggy, post-chaise, *etc.* It is difficult sometimes to draw the line of distinction absolutely between many of the forms of carriages here named. Even the very common names of “coach® and “cab® overlap in use, that which one would call a cab in one. part of the country being known as a coach in some other section.

The important parts common to the typical form of carriage are as follows : Body, seat, top, hood, dashboard, apron, step, springs, run¬ ning-gear, perch, forward gear, clip, fifth-wheel, tongue, shafts, swingletree, doubletree, axle, wheel, hub, spoke, felloe, tire. The body of a carriage is commonly made of selected hard wood, ash, oak, hickory, etc., being pre¬ ferred. It is put together with iron braces, screws, mortises, and tenons, and glue. The top, if permanent, is supported on selected wood uprights, or, if falling, is framed of iron or steel rods that fold up and open into a braced position. Leather, canvas and leather¬ ette are used as coverings. The gear, axles, shafts, poles, etc., are commonly of wood, selected with special reference to straight grain and consequent strength. The parts are largely reinforced with metal at all points where spe¬ cial strength or resistance to friction is essen¬ tial. The tendency is to increase the use of metal to replace wood, and many carriages are made with steel axles and side-bars.

The fifth-wheel is the circular device in which the forward axle turns, and is made of iron or steel. The axles have metal boxes, which in the old style are lubricated with axle-grease, but in many modern vehicles roller-bearings are being substituted that run with very little or no lubrication. The regulation wooden carriage-wheel has spokes let into the hub and felloes, the whole being held together

by the pressure of an iron tire. Instead of making a wheel in the form of a flat disc, the practice is to make it dishing; that is, with the spokes inclining slightly away from the body of the carriage. The reason for

this is that a vehicle wheel that is one of a pair receives the most strain when the vehicle is on an incline tipped to one side. In this position of severest strain the spokes of the wheel on the lower side nearest the ground bear the weight, and when dished are inclined to the best position to receive the load.

This dishing of the wheel produces a neces¬ sity for placing the axle box slightly out of alignment. A dished wheel running on a straight axle tends to bear against the end nut and work off the axle. By drawing the axle skein slightly inward at the forward side this tendency is overcome and the wheel runs true. The wire wheel, or bicycle wheel, as it is com¬ monly called, is made on a different principle, and dishing of the spokes and drawing of the axle are unnecessary. In these wheels the hub may be regarded as suspended from the tire, and the wire spokes are so spread that they receive the strains due to an inclined roadway to as good advantage as would the spokes of a dished wooden wheel.

Previous to 1850 most carriages were built by wheelwrights, assisted by blacksmiths, and the wheelwright's shop was to be found beside the blacksmith's shop in nearly every village. The development of carriage manufactories changed all this. The carriage factories buy their lumber and hardwood and supplies in large quantities, and use up the raw material in a more economical manner than could the wheelwright; but their greatest advantage is the use of special machinery.

The term (<railway carriage® was commonly employed in the early days of railroads, and is still in use in Great Britain, where ((coach® is, however, the technical word, but in the United States it has given way almost wholly to the shorter and more distinguished <(car®. See Car Building Industry.

Charles H. Cochrane, Author of (Modern Industrial Progress?

CARRIAGE AND WAGON INDUS¬ TRY. Probably one of the most salient fea¬ tures in the progress of the world and one which has added greatly to the sum-total of human happiness has been transportation by means of vehicles. The attempt to discover the birthplace of the industry and the study of the advancement in the art of construction are of great interest not only for the history itself, but for the fact that in it are bound the true history of the advancement of the world; the histories of peoples, long forgot, who have con¬ tributed largely to the comfort and ease which we now enjoy. The historical records of which we are possessed prove that mankind has

util¬ ized wheels as a means of transportation from the earliest periods. The float was undoubt¬ edly the first means of constructive transporta¬ tion and from this we find the inventive genius of man devising all manner of conveyances for use on land. First came the sledge and this gradually developed into a more perfect mode of conveyance, mounted on rollers, until wre have the axle and the wheel. The roller made from a tree trunk with the centre shaped

down so as to make a rotating axle was the most primitive form of wheel. The next move came in the shape of the substitution of two shorter sections of tree trunk attached to a rotating axle ; then came the stationary axle on which the wheels revolved. Carts drawn by men and by oxen and innumerable chariots may be seen on the great sculptured stones now in the British Museum, taken from the ruins of the city of Nimrod near Nineveh. The body is framed up with posts and a top rail and the basket is made of handsome wicker-work; the wheels are about 42 inches in height, well pro¬ portioned, have six spokes and over them is an arched guard to prevent anything from com¬ ing into contact with them. On another slab, the king's chariot with an elegant canopy over¬ head, and carrying also the charioteer and an arms-bearer, is shown. The next noteworthy advancement was in the cart wheel, which was similar in shape to that now in use in the in¬ land districts of Mexico. The Assyrian Em¬ pire, though founded prior to that of the Egyp¬ tians, did nothing whatever to advance the methods in construction, and it was left to the Egyptian to originate and develop the more perfect chariot, which for centuries afterward was the sole means of land transportation and which was connected with all great undertak¬ ings. In Biblical, mythological and all ancient history, chariots form an interesting and im¬ portant part. In Biblical history the chariot is frequently referred to; the strength of a na¬ tion was determined by the number of chariots in its army. Pharaoh gave much time and thought to the improvement and use of the chariot, with such effect that he was enabled to overtake the children of Israel in their flight, although his whole army was eventually en¬ gulfed in the Red Sea. In the New Testa¬ ment we find the word ((carriage® referred to as baggage. <(After those days we took up our carriages and went to Jerusalem.® During these years the chariot developed and finally wagons for use on the farm made their ap¬ pearance, some having two and others four wheels. To the Etrurians must be given the credit for first putting into use the canopy. Solomon tells in one of his songs of a beauti¬ ful stage coach which he built for his ((Beloved,® of cedarwood, having a canopy of wonderful beauty and richness, supported by pillars of gold. According to Herodotus (450 b.c.), the

Scythians built and had in daily use two-wheeled carts with a platform and basket and thatched with the reeds among which these people lived, and when not in use these bas¬ kets were taken off the carts and used as tents. The Greeks and Romans had of course made use of the horse in drawing their chariots, and in the story of the Trojan War, Achilles is described as dragging the body of Hector, lashed to his chariot, around the walls of Troy.

There was little of luxury in any of the ve¬ hicles of ancient days; the chariot with all its splendor and decoration was a _ comfortless thing without springs ; even the triumphal and funeral cars of early history were springless; their demand and use for other than warlike or agricultural purposes was limited; but as the world progressed so did the vehicle, and though the improvement was slow, it was nev¬ ertheless sure. The Arc era was developed and first used in Rome as an ambulance; then fel-

lowed the Lectica and the Basterna , similar to the Palanquins of India to-day, ˆsuperbly dec¬ orated and upholstered in finest silk, with cush¬ ions stuffed with rose leaves. Following this came the Carpentum, decidedly a ladies' vehi¬ cle, which became very popular and was named in honor of Carmenta, the mother of Evander, the leader of the Arcadian colony into La-tium. Then followed the Carruca, from which our modern name of ˆcarriage® undoubtedly comes. This was a gorgeous affair, mounted originally upon one wheel after the fashion of a modern wheelbarrow, but later on two and then four wheels. The Romans considered it a great honor to ride in a Carruca and those vehicles were often highly decorated in gold, silver and ivory. • As the Carruca became the popular vehicle for pleasure use, the Chariot for warlike purposes, so did the Benna come into general use as the popular vehicle for agri¬ cultural purposes. Julius Caesar (55 b.c.) brought back with him from his triumphant visit to Britain a chariot that surpassed for destructiveness and convenience any then known, indicating that other nations were mak¬ ing progress in the manufacture of vehicles even beyond the confines of Rome.

During the <(Imperial Reign of Terror® under the brutal ruler, Nero, we find but slight improvement in construction, although vehicles were extensively used. The practice of letting out vehicles for hire is of quite respectable, not to say hoary, age, for Suetonius, a noted Roman biographer and historian, mentions the custom as very general in his day, 150 a.d., and in his writings refers to these hired vehicles under the name of Rheda, the Rheda Meri-toria, and the Vehicular Meritorice, both the latter on the order of a hackney coach open and closed.

When the world awakened from its apparent long sleep of the Middle Ages, during which the art of vehicle construction, like all other arts, sank into oblivion, manufacturing was re¬ vived and from this awakening, about 1400 a.d., very marked improvements are found. Emperors and kings vied with each other in the effort to outshine and outclass one another, and through this rivalry we note substantial advancement. In 1550 it is said that there were but three coaches in Paris, and within the next century we find the feudal lords throughout continental Europe supplying themselves with the most extravagant and luxurious of equi¬ pages, some costing more than $10,000 each. The artist's skill was employed, poets sang beautiful songs in their praise, and the epi¬ demic spread, creating an eager desire in all to outrival their neighbors. Legislators be¬ came alarmed and a bill was introduced into the British Parliament seeking ((to restrain the excessive use of coaches.® Taylor, the poet, complained as follows :

Carroaches, coaches, jades and Flanders mares,

Do rob us of our shares, our wares, our fares;

Against the ground we stand and knock our heels,

Whilst all our profit runs away on wheels.

Stow, in his survey of London, gives credit to Gulliam Booner, a Dutchman, who in 1564 became the Queen's coachman, as being the first to bring coaches into England. In 1582 the French King presented to Queen Elizabeth an exceedingly marvelous (<coache® with four of the fairest white <(moiles.® This wonderful

state coach, with its highly ornamented and canopied body, was without springs. It was a sort of triumphal car for state parades. Her usual mode of locomotion was by water or on horseback. Captain Bailey introduced hackney coaches into England in 1625, and by his

wide¬ awake advertising methods, made them the talk of all London.

Carriages without wheels were in use as late as the 1 7th century and were known as litters and were supported upon the backs of horses by means of shafts attached before and behind the litter. Carriages on wheels pro¬ pelled otherwise than by horses are to be found in Japan, known as the Jinrikisha, and are drawn by a man running between the shafts. The modern vehicle has assumed almost limit¬ less shapes and forms, and ages of progress lie between the gorgeous chariots and state cars of the ancient Romans and the modern buggy. From the old time stage coach we have pro¬ gressed to the dray or tally-ho ; we no longer have the post-chaise or the curricle ; but many of the olden types are still to be seen, of course with many changes and improvements, of which the American buggy probably represents the acme of development of the carriage-maker's art. Many of these types have been imported from abroad, among them the English brougham, named for Lord Brougham; the landau, taking its title from the German town where it originated ; and a few specimens of the Irish jaunting-car, which were so popular in their native land. In 1834 the hansom cab was patented by Mr. Hansom, and this originally was a square body hung in the centre of a square frame, with twx) wheels seven feet six inches in diameter and of the same height as the vehicle. The hackney coach was purely an English product, but to-day we see its lineal descendant in the American hack.

It was not, however, until after the middle of the 17th century that the manufacture of carriages gained much impetus, but from that time we find the brains and ingenuity of the American constantly making changes and im¬ provements and, while the progress was slow but steady, the industry took a wonderful place in the history and development of our nation. All vehicles prior to 1750 were absolutely springless as previously stated; the running gears were very imperfect; the leather thor¬ ough-brace, which preceded the steel spring and which gave the first relief from the jolting of the old dead-axle carriage, was the first step in advancement in this line. The body of the carriage was suspended on these thorough-braces which were stretched from upright iron jacks at each end of the running part, and gave the carriage a long swinging motion, which, even though extremely uncomfortable, was far superior to the jolt caused by the springless vehicle. Next came the spring jack, made of steel plates, and which later was given a sweep¬ ing curve, and from which our more modern C spring evolved. The elliptic spring came into use about 100 years ago, and at about the same time the Codings axle was invented.

The post-chaise began to be used as a general means of travel in the

beginning of the 18th century. It was a rambling affair, the body hung very high on leather straps, the wheels were far apart, and the postilions rode the ((near® horses. This was improved upon until

we see the stately chariot with its richly draped coachman's seat, but which, however, was not used except at state functions or at royal receptions. Before the Revolution, very little manufacturing was done in this country, the main business being repairing. The aristocracy of those times living in the large cities im¬ ported their coaches, carriages and phaetons from England and France, and of course the manufacturing end of the business languished through lack of customers. The number of repair shops grew as the number of vehicles increased and in all the large cities these estab¬ lishments thrived, employing, for the most part, the skilled workmen who came from England, Ireland and Scotland,

The Revolution had left its mark upon the land, and during the times of poverty and dis¬ tress which followed there was little use made of vehicles of any kind except among the wealthier class, and it was fortunate for the mechanics and tradesmen that this class found the means of transportation inadequate and insufficient to cope with the amount of travel made necessary by the foundation of the new republic. The next development was the chaise set upon two wheels, and it became very popu¬ lar and came into greater demand as the prosperity of the country grew. It was known as the shay and became the subject of the well-known poem by Oliver Wendell Holmes, en¬ titled (The One-Horse ShayP At the begin¬ ning these chaises were built without dashers, had high wheels and the tops were stationary. This style of vehicle grew to be very popular and for some years there were no changes made in construction.

In the early part of the 18th century the stagecoach was introduced into England and in 1745 the first line was established between London and Edinburgh, a distance of 400 miles, and it was stated <(that a two-end glass coach machine, hung on steel springs, exceeding light and easy, would go through in 10 days in sum¬ mer

and 12 in winter, the passengers lying over during the Sabbath at one of the villages on the route.® They were introduced into the United States some years later and it is a mistaken idea that the stagecoach was unknown in America prior to 1810, for William Brant, attorney for General Hancock, states that in 1776, when Hancock married Dorothy Quincy, he took her by stage coach to Philadelphia on his wedding journey. The roads at this time were little better than bridle-paths and in them were many ruts or quagmires, making travel uncertain, slow and uncomfortable. In 1770 President Quincy of Harvard College wrote as follows of the stage journey between Boston and New York: ((The carriages were old and shackling and much of the harness made of ropes. One pair of horses carried us 18 miles. We gen¬ erally reached our resting place for the night, if no accident intervened, at 10 o'clock, and after a frugal supper, went to bed, with a notice that we should be called at 3 o'clock next morning, which generally proved to be half past two, and then, whether it snowed or rained, the traveler must rise and make ready by the help of a horn lantern and a farthing candle, and proceed on his way over bad roads, sometimes getting out to help the coachman lift the coach out of a quagmire or rut, and arriving at New York, after a week's travel, wondering at the

ease, as well as the expedition, with which our journey was effected.® In 1791, there were only 1,905 miles of post-roads in the United States, and in these roads were many bottom¬ less sloughs, and corduroy bridges which con¬ sisted of logs laid crosswise over swamps sometimes for long distances, but with the im¬ provement of the roads and the advancement of civilization we find the industry of vehicle con¬ struction developing and spreading in America. Military roads and post-roads were built by the government across the mountains of Vir¬ ginia, connecting the East with the valley of Ohio; through the forests of Maine to the town of Houlton on the New Brunswick frontier, and also in other parts of the country. Stage lines were established on these roads and thrived; much capital was invested; the busi¬ ness rapidly grew, and the returns from the in¬ vestments proved enormous. Factories began to spring up here and there. The great Can-estoga wagon, with its broad wheels and canvas-covered body, and drawn by six or eight horses, came into use in New York, New Jersey and Pennsylvania for the transportation of freight and passengers. Troy, N. Y., became famous for its coaches and wherever used they were sure of patronage; Salem and Worcester, Mass., loomed up as manufacturing centres, but the most famous was undoubtedly the Concord coach, originally made in Concord, N. H., by

the house of Abbot, Downing & Company, who later, in 1815, moved to Salem, Mass.

The War of 1812 further helped the industry in that it threw us upon our own resources and started the emigrant and pioneer toward the great unknown West. This necessitated the emigrant wagon or prairie-schooner as it was called, and after that the lighter farm wagon. Stylish carriages and fine coaches began to come into demand in all the large cities. Boston, New Haven, Bridgeport, Newark, all had flourishing shops, and New York, Philadelphia, Baltimore and Wilmington were rapidly coming to the front. A considerable trade with the planters in the West Indies grew up, the vehicles being exchanged for the products of the planta¬ tions. These vehicles, which were two-wheeled and had very long shafts, were known as volantes. The wheels were placed in the rear, thus throwing a large portion of the weight on the horse's back, and besides this, the postilion rode the horse, giving him a double load.

As the emigration toward the West became greater and greater, the establishment of per¬ manent factories and repair shops became nec¬ essary and the volume of business began to assume considerable proportions. One of the first to enter this new field was Tobn Studebaker, who in 1835 settled at Ashland, Ohio, and there opened a small shop, though it re¬ mained, however, for his five sons to lay the foundation of the business at South Bend, Ind., operating under the name of Studebakcr Brothers Manufacturing Company, and who are now among the largest of the 4,870 car¬ riage and wagon manufacturers in the Uni¬ ted States. It is a far cry from a village blackstnith shop with its solitary forge and one anvil to the marvelously equipped factories now operating, and when one considers the vast out¬ put (1,600,000 carriages, wagons and sleighs annually) he wonders where the markets are and where the purchasers are to be found. In

the early part of the 19th century, the business was carried on by what was known as the "dicker® system. Money was seldom used in

the transactions ; the woodworkers, black¬ smiths, etc., taking parts in exchange or as they said, “swapping,® and the final settlement was made in the finished carriage. This involved less chance of being in debt, and, according to the old operators, was much safer than the cash payments. . But the country rapidly outgrew this system and well-organized and well-equipped shops took their places, and it seems as though we have almost reached the limit in quick and cheap methods of production, but undoubtedly the inventive genius of the Ameri¬ can will continue to assert itself along this line and, instead of retrograding, we shall advance and always keep abreast of the times.

The modern system of factory production, making all parts in large quantities, and using special machinery, template and dies has to a great extent lessened the labor and cost of pro¬ duction; hence the cheapness in the price of vehicles at the present time. Of course there are many different grades of vehicles made in this country and, while in some instances the price is a fair indication of the quality of stock employed in the making, yet the tendency of the times is that the best grade of workman¬ ship and material obtainable shall be put in all styles of vehicles, regardless of price, and the manufacturer who disregards this tendency may some time regret it. There is no reason why the downward rush of the selling price, which has been made possible only by the decline in the cost of production, should lower the quality or grade of the article produced; nor is this true of the large manufacturer in this country, who, realizing that the average American has neither the time nor the ability to make a close examination of the construction, and would not if he had, is perfectly willing to pay well for a good article, and who is bound by this trust put in him to give to the public the finest grade of work which the highest skill and care of the best designers and mechanics can produce. The most noteworthy feature in vehicle construction at the beginning of the 20th century is the rapidly increasing use of rubber tires. These tires first came into use about 1890, but were used mainly for trotting sulkies or runabouts and were not adaptable for the majority of pleasure vehicles for some time. The tires were then made solid and universally approved and broader tires were later adopted, especially in wagons to carry heavy loads, owing to the strong movement for good roads throughout the United States.

In 1872 the Carriage Builders National As¬ sociation was founded by the leading manu¬ facturers of the country. Realizing the neces¬ sity of having skilled workmen for the trade, a fund was raised to establish a school in New York city, where carriage -drafting and con¬ struction was to be taught. This was a great success and has contributed largely to the ad¬ vanced methods now in use in all our modern factories.

From the census tables it is apparent that there was a fair growth in number of estab¬ lishments doing business during the 10 years from 1890 to 1900 but a decline from 1900 to 1905, which decline continues. The invested capital has increased, but the number of wage

earners is reduced. The total production showed a gain of 10 per cent from 1900 to 1905, but since then has been stationary. The develop¬ ment of the automobile in place of the carriage and of the auto-truck in place of the wagon is, of course, responsible for the slowing down in the carriage and wagon industry.

This loss is in part compensated for in that carriage factories make a vast number of auto¬ mobile tops and other parts and fittings of motor vehicles. The United States census of manufactures for 1914 classes carriages and wagons together as one industry, and the fig¬ ures show that it is still large and prosperous. In that year there were built 558,492 family and pleasure carriages of the value of $34,193,518; and 572,613 wagons, three-fourths of which were farm wagons; and 1,287 miscellaneous buses, vans, *etc.* ; besides 54,700 sleighs and sleds. There are 5,320 establishments, which produced $135,792,357 worth of vehicles, with an invested capital of $175,474,000, and em¬ ploying 52,540 workers. To the above might be added the 622 establishments which make mate¬ rials sold to carriage and wagon builders, with products of $16,500,000 above the cost of their materials and over 17,000 employees. If the children's carriage industry be added this gives a count of 84 more factories, with 5,769 em¬ ployees, turning out over $4,000,000 worth of goods.

Ohio and Indiana are the leading States in the carriage building industry, closely followed by Pennsylvania and New York. There are also a considerable number of factories in Illinois, Michigan, Wisconsin, Missouri, Ken¬ tucky and Massachusetts.

J. M. Studebaker.

CARRICKFERGUS, kar-rik-fer'gus, Ire¬ land, a seaport town in the county of Antrim, 10 miles by rail northeast of Belfast. It is a municipal borough, and also a county of itself, called the county of the town of Carrickfergus. It comprises an area of about 25 square miles, of which only 120 acres is embraced in the town proper, the remainder belonging to the terri¬ tory of the county. The Bay of Carrickfergus is a small indentation on the north side of Bel¬ fast Lough. It is memorable in history as the landing-place of King William

III, who dis¬ embarked on its shore at the quay of the town of Carrickfergus on 14 June 1690. The castle stands upon a rock projecting into the bay and is still maintained as a fortress, having a num¬ ber of guns on the walls and a small garrison. The public buildings, besides the Episcopal, Ro¬ man Catholic and other churches, are a townhall, courthouse, market-house, *etc.* Pop. about

9,000.

CARRIER, Common. See Common Car¬

rier.

CARRIER, ka-re-a, Jean Baptiste, French Jacobin: b. Yolet, near Aurillac, 1756; d. Paris, 16 Dec. 1794. At the beginning of the Revo¬ lution he was an obscure attorney, but in 1792 was chosen a member of the convention. He aided in the establishment of the revolutionary tribunal, 10 March 1793, and exhibited the wildest rage for persecution. He voted for the death of Louis XVI, demanded the arrest of the Duke of Orleans, 6 April 1793, and con¬ tributed greatly to the outbreak of 31 May. On 8 Oct. 1793 he was sent to Nantes with a

commission to suppress the civil war and finally put down the Vendeans. Multitudes, informally and precipitately condemned, were executed daily ; but Carrier resolved to destroy the prisoners by numbers at a time and without a trial. He first caused 94 priests to be conveyed to a boat with a perforated bottom, under pretense of transporting them, but in reality with a view of having them drowned by night. This artifice was repeated a number of times, and the victims were of every age and of both sexes. These wholesale murders by drowning were called noyades. It has been estimated that 15,000 individuals perished in this manner. The banks of the Loire were strewed with the dead, and the water was so polluted that drink¬ ing it was prohibited. Out of terror people re¬ frained for a time from

drawing public atten¬ tion to these atrocities, but at last the truth began to become known and Carrier was re¬ called. Shortly after the fall of Robespierre he was arrested and brought before the revo¬ lutionary tribunal, which condemned him to death, and he was guillotined accordingly.

CARRIER-BELLEUSE, ka-re-a-bel-lez, Albert Ernest, French sculptor: b. Anizy-le- Chateau, 12 June 1824; d. Paris, 3 June 1887. He was a pupil of David d' Angers, and while studying was compelled to earn his living by making models for the manufacturers of bronzes. His first work, a marble statue rep¬ resenting (The Death of General Desaix,5 brought him to the notice of the public (1859) ; and it was followed a few years later by a Bacchante. (The Messiah,5 a group now at Saint Vincent de Paul's at Rome, won him the medal of honor 1867. Toward the close of his life he was director of the art department of the porcelain works at Sevres. His works in¬ clude marble sculptures and terra-cotta busts ; among them are Angelica5 ; (Madonna and Child) (in the church of Saint Vincent de Paul in Paris) ; (Sleeping Hebe) ; (Forsaken Psyche-* ; and of busts of remarkable truth¬ fulness to life of Gauthier, About, Renan, where he is seen at his best.

CARRIER-PIGEON. See Homing Pig¬ eon.

CARRIER SHELL, or MASON SHELL,

a gastropod mollusk of the genus Phorus, which covers its shell with grains of sand, shell, coral, *etc.* These bits are fastened by an exudation from the mantle, and are appar¬ ently protective in their purpose.

CARRIERA, ka -rya'ra, Rosalba, an Ital¬ ian miniature painter: b. Venice 1675; d. 1757. After learning lace-making from* her mother she applied herself to decorating snuff-boxes. After this she studied miniature and pastel, but soon surpassed her teachers and became known throughout Italy. Her early portraits include those of Maximilian II of Bavaria, Frederick IV of Denmark, 12 Venetian ladies, portrait of the artist and her sister Naneta (at the Uffizi Palace) and August the Strong, who was one of her early patrons. In 1720 she paid a visit to Paris, where she was enthusiastically received and elected a member of the Royal Academy. Her picture of reception was (Muse Crowned with Laurel. > She kept a very inter¬ esting diary in Paris, which has been published by the Abbe Vianelli (1793). In 1721 she re¬

turned to Venice and visited Modena, Parma and Vienna. Her colors are extremely deli¬ cately laid ; and her works, though often faulty in design, are full of a vivacious charm, which ranked her as the leading miniature and pastel painter of her day and comparable with Correggio. Specimens of her art are to be found in all the galleries of Europe, especially at Dresden and in the Louvre. (The Four Seasons} (Dresden), six pastel portraits (Royal Gallery, Venice) and the portrait of the Prin¬ cess Pia di Savoia Valcarel are excellent ex¬ amples. In her old age she became blind and died insane. There are good biographies by Sensier (with a translation of her diary, Paris 1865), Von Hoerschelmann (Leipzig 1908) and Malamani (Milan 1910).

CARRIERE, Moritz, German philosopher: b. Griedel, Hesse, 5 March 1817 ; d. Munich, 19 Jan. 1895. He studied philosophy at Giessen, Gottingen, Berlin and in Italy. In 1849 he be¬ came professor of philosophy at Giessen and after 1853 held that position at Munich. He was a defender of Christianity, opposed Ultra-montanism and was of the liberal school. He also took high rank as an art critic. Among his published works are (Der Kolner Dom als freie deutsche Kirche) (1843); <Abalard und Heloise) (1844) ; (Die Religion in ihrem Be-griff5 (1841) ; (Die philosophische Weltan¬ schauung der Reformationszeit5 (1847) ; (Das Charakterbild Cromwells5 (1851); (Die Kunst im Zusammenhang der Kulturentwickelung und die Ideale der Menschheit5 (5 vols., 3d ed., 1876-86) ; ˆsthetik5 (2d ed., 1873) ; <Ge-schmack und Gewissen5 (1882). His (Gesam-melte Werke5 (14 vols.) appeared in Leipzig in 1886-94.

CARRIERES, Louis de, French theolo¬ gian of the Roman Catholic Church: b. Auvile 1662; d. Paris, 11 June 1717. In 1689 he joined the Congregation of the Oratory and became well known as a theologian. At the request of Bossuet he published a (Commentaire litteral de l'Ecriture5 (24 vols., 1701-16), reprinted Paris 1872.

CARRINGTON, Edward, American sol¬ dier: d. Charlotte County Va., 11 Feb. 1749; d. 28 Oct. 1810. He was lieutenant-colonel of General Harrison's artillery regiment, quarter¬ master-general under General Greene, a dele¬ gate to the Continental Congress and foreman of the jury in Aaron Burr's trial for treason.

CARRINGTON, Edward Codrington,

American lawyer: b. Washington, D. C., 10 April 1872. He was educated under private tutors ; was admitted to the Maryland bar in 1894 and has practised in Baltimore and New York. He is a member of the firm of Carring¬ ton & Carrington of Baltimore and New York, and

specializes in corporation law. Governor Goldsborough appointed him a member of his staff with the rank of colonel. He was cam¬ paign manager for Theodore Roosevelt in Maryland in 1912, and was delegate-at-large to the Republican National Convention in Chi¬ cago the same year. He signed the call for the Progressive National Convention in 1912, and later became delegate-at-large to same ; was a member of the Progressive National Commit¬ tee 1912 and chairman of the Maryland Pro¬ gressive State Committee. After the presi-

dential election of 1912, he led a movement in Maryland, having for its object the union of the Republicans and Progressives. He was the regular Republican nominee for the United States Senate in 1914, but was defeated. He is a member of the Maryland State Bar Asso¬ ciation. Mr. Carrington is interested in many large enterprises, is president of The Ameri¬ cana Corporation and treasurer of the J. B. Lyon Company, Albany, N. Y.

CARRINGTON, Fitzroy, American print expert and lecturer: b. Surbiton, Surrey, Eng¬ land, 6 Nov. 1869. He was educated in the island of Jersey at Victoria College, and came to the United States in his 17th year. From 1892-1913, a period of 21 years, he was con¬ nected with the art firm of Frederick Keppel & Company, in 1899 becoming a member of the firm. He became known by his illuminating ana¬ lytical introductions to art editions of works such as Dante, (New Life) ; (The Queen's Garland) (Elizabethan verse) ; Rossetti's (Pictures and Poems) ; William Morris's (The Doom of King j7Erisius) ; (The King's Lyrics) (1899); (The Shepherd's Pipe) (1903) ; (The Pilgrim's Staff* (1906). He published (Prints and their Makers * (1912) and was editor of the unique Print-Collector's Quarterly from 1911 to 1913, when he retired from business to become lec¬ turer on the history and principles of engrav¬ ing at Harvard University, and curator of prints at the Museum of Fine Arts, Boston.

CARRINGTON, Henry Beebee, Ameri¬ can lawyer, soldier and historian : b. Walling¬ ford, Conn., 2 March 1824; d. 1912. He was

graduated at Yale in 1845; taught at Tarry-town, N. Y., 1846 and at Yale Law School 1847 ; began the practice of law in Columbus, Ohio, in 1848, and took an active part in the anti-slavery movement. In the convention which met in 1854 to organize the Republican party, Carrington was a member of the com¬ mittee appointed to correspond with persons in the different States with a view of making the movement national. In 1857 he was adju¬ tant-general on the staff of Governor Chase and organized the State militia in preparation for war. In 1861 he was appointed colonel of the 18th United States infantry, served through the Civil War, and afterward was in service on the plains; was wounded in war with Sioux Indians and retired in 1870; he became pro¬ fessor of military science and tactics in Wa¬ bash College, Ind., a position which he held till 1873. In 1890 he took a census of the Six Nations and the Cherokees. He wrote Rus¬ sia as a Nation* (1849); (American Classics*; (Ab-sa-ra-ka, Land of Massacre* ; (Battles of the American Revolution (1876) ; (Washing¬ ton the Soldier* ; (The Washington Obelisk and its Voices) (1887); 'Lafayette and Amer¬ ican Independence) and other works.

CARRINGTON, Paul, American states¬ man : b. Charlotte County, Va., 16 March 1733; d. 23 Jan. 1818. He was graduated at the Col¬ lege of William and Mary. During the Revolu¬ tion he was a member of various conventions and of the Committee of Safety; opposed the Stamp-Act resolutions of Patrick Henry; be¬ came a member of the Court of Appeals, and in the Virginia convention voted for the adop¬ tion of the Federal constitution.

CARRINGTON, Richard, English astron¬ omer: b. Chelsea, 26 May 1826; d. November 1875. Carrington entered Trinity College, Cambridge, in 1844, to prepare for the Church, but his scientific tendencies being awakened by the lectures of Professor Challis he turned his attention to astronomy. He held the post of observer at the University of Durham from 1849 to 1852. He was elected a fellow of the Royal Society (7 June 1860). His work Ob¬ servations on the Spots on the Sun* (1863) furnished data that materially affected the study of solar physics.

CARRION CROW, any of several large carrion-eating birds. The only true carrion crow (Corvus cor one) is found in England. It is larger than a crow, of black plumage and with feathered neck. It is seldom seen in flocks, and lives upon carrion, small mam¬ mals, eggs and birds. In the southern United States the name is locally given to the black vulture (Catharista atrata) , a bird closely re¬ lated to the

turkey-buzzard (q.v.), but smaller, and resembling it in habits and public service as a scavenger. Its bluish and spotted eggs number from one to three and are placed in a nest built under logs and bushes.

CARRION-FLOWERS, certain species of the genus Stapelia (natural order Asclepiada-cece), so called because of their putrid odor. See Smilax.

CARRIZO MOUNTAIN, a prominent

peak in the northeastern corner of Arizona; altitude 9,420 feet. It consists of a laccolith or core of igneous rock which has uplifted the Dakota sandstone capping its summit. Consult W. B. Emery (in American Journal of Science, Vol. XLII, p. 349, 1916).

CARROLL, Charles, “of Carrollton,® American patriot : b. Annapolis, Md., 20 Sept. 1737 ; d. Baltimore, 14 Nov. 1832. He attended several schools abroad ; studied law in Paris and London, where he became a member of the Inner Temple ; returned to his native country in 1764. In 1775 he became a member of the “Committee of Observation® at Annapolis and in the same year was chosen member of the provincial convention. In 1776, he was one of the commission sent to persuade Canada to join the War of Independence. He was elected to the Continental Congress in 1775, and with the other members signed the Declaration of Independence, on 2 August of the following year. To make certain his identity, he added “of Carrollton® to his signature, thus distin¬ guishing himself from another by using the name of his family mansion. After many more years of important public service to the State of Maryland and to the new republic, as drafter of the Maryland constitution, State senator, congressman, again senator (1789) and member of the Maryland and Virginia Boundary Commission, in 1804 he withdrew to private life at Carrollton, which was his patri¬ monial estate. There as his life advanced he became an object of universal veneration. He survived by six years all the other signers of the Declaration. Consult Latrobe, J. H. B., ‘Life* (Philadelphia 1824); Mayer (ed.), ‘Journal of Charles Carroll of Carrollton during his Visit to Canada in 1776, as One of the Commissioners from Congress) (Baltimore

1845) ; Rowland, (Life of Charles Carroll of Carrollton* (2 vols., New York 1898).

CARROLL, Henry King, American cler¬ gyman and editor : b. Dennisville, N. J., 15 Nov. 1848. He was on the staff of Hearth and Home (Methodist), and from 1876 to 1898 was religious and political editor of the Independ¬ ent. He has written (The Religious Forces of the United States) ; and many reviews, reports and miscellaneous papers. He super¬ vised the compilation of religious statistics for the 11th census, and in 1898 was appointed to prepare a report on the internal conditions of Porto Rico. In 1900 he became a secretary of the Methodist Episcopal Church Missionary Society. He was executive secretary of the western section of the Ecumenical Methodist Conference of 1911. Besides government re¬ ports and numerous reviews, he has published (Missionary Growth of the Methodist Episco¬ pal Church * (1907).

CARROLL, Howard, American journalist and politician: b. Albany, N. Y., 1854; d. New York, 30 Dec. 1916. After his family moved to New York he was educated in the old Henry street grammar school in that city. His later education was completed by study at Hanover, in Germany, and at Geneva. He then (1877) became a reporter on the New York Times, and later received a roving commission from the Times as a political correspondent. While en¬ gaged in this political work he became ac¬ quainted with the late John H. Starin, whose daughter he married. Some time spent as spe¬ cial correspondent in Washington was followed by his reporting the yellow fever epidemic in the South. He was a close friend of President Arthur, but declined when President Arthur offered to make him his private secretary and later Minister to Belgium. General Carroll for many years never missed a Republican national convention and had a country-wide acquaint¬ ance among the Republican leaders, who enter¬ tained much respect for his ability. He was chief of artillery in the New York National Guard from 1895 to 1898. During the Spanish-American War he was inspector-general of the New York troops. General Carroll, whose father had died while leading his brigade in the 2d Army corps at the battle of Antietam, was well qualified for his post. While in Hanover he had for three years studied for¬ tification and drilled with the Polytechnic Cadet Corps. General Carroll was a thorough German scholar and was able to use this lan¬ guage in some of his campaign work. His interest in German affairs caused the Kaiser to bestow on him the order of the Red Eagle. He was the author of several books and plays, among his books being (Twelve Americans, Their Lives and

Times,* (A Mississippi Inci¬ dent and (The American Countess. * General Carroll was president of the Sicilian Asphalt Paving Company and a director in the Boston Asphalt Company, Sicily Asphaltum Company, Ulster Stone Company and the Fultonville National Bank.

CARROLL, John, American prelate: b. Upper Marlborough, Md., 8 Jan. 1735; d. Georgetown, D. C., 3 Dec. 1815. He was a cousin of Charles Carroll of Carrollton and first Roman Catholic bishop in the United States. At the age of 13 he was sent to VOL. 5 — 43

Europe to be educated. He studied at Saint Omer for six years and later at the University of Louvain. , He was professor (1759-71) at Saint Omer's and Liege ; then, becoming a Jesuit, he was made prefect of the Jesuit Col¬ lege at Bruges. On the suppression of the Jesuits in 1774, he returned to the United States. In 1784, at the suggestion of Franklin, he was appointed superior of the Roman Cath¬ olic clergy in the United States ; was made bishop in 1789; and in 1808 w*as created arch¬ bishop of the archdiocese of Baltimore. Georgetown College was founded by Bishop Carroll in 1791. Consult Shea, (Life and Times of the Most Rev. John CarrolP (New York 1888), being Volume II of his (Historyof the Catholic Church in the United States) ; Brent, (Biographical Sketch of the Most Rev. John CarrolP (Baltimore 1843); White's <Appendix> to Darras' (History of the Catholic Church.*

CARROLL, John Joseph, American Ro¬ man Catholic clergyman : b. Enniscrone,

County Sligo, Ireland, 24 June 1856; d. - .

He came to the United States in infancy, was educated in Saint Michael's College, Toronto, Ontario, and at Saint Joseph's Theological Sem¬ inary in Trpy, N. Y. He became assistant priest in the Cathedral of the Holy Name, Chicago, in 1880, and subsequently rector of Saint Thomas' Church there. He is a Gaelic scholar of prom¬ inence and has written (Notes and Observa¬ tions on the Aryan Race and Tongue* (1894) ; Prehistoric Occupation of Ireland by the Gaelic Aryans* (1908) ; (Tale of the Wander¬ ings of the Red Lance* (1909) ; translation into Gaelic verse of (The Rubaiyat* of Omar Khayyam (1909).

CARROLL, Lewis. See Dodgson-, Charles Lutwidge. •

CARROLL, Iowa, city and county-seat of Carroll County, on the

Chicago Great Western and the Chicago Northwestern railroads, 98 miles northeast of Omaha, Neb. It has manu¬ factures of tractor engines, wire fencing and wire novelties, *etc.* ; roller and flour mills, ice factory, cream factory, marble, cement and brick works, and owns and operates municipal waterworks. The settlement of Carroll dates from 1867. Pop. (1920) 4,254.

CARROLLTON, Ga., city and county-seat of Carroll County, 50 mile's southwest of At¬ lanta, on the Little Tallapoosa River, and on the Central of Georgia Railroad. It has exten¬ sive cotton, fruit and live stock interests and contains flour mills, rolling mills, foundries, cottonseed-oil mills, machine shops, fertilizer works, broom factories, brick and marble yards. The city owns the waterworks. Pop.

(1920) 4,363.

CARROLLTON, Ill., city and county-seat of Greene County, 55 miles southwest of Springfield, on the Chicago & Alton Railroad. It has a large trade in the products of the region, has flour mills, a public library and a county courthouse. The city operates the water supply system. It was settled in 1819 and laid out in 1821. Pop. (1920) 2,323.

CARROLLTON, Mo., city and county-seat of Carroll County, 65 miles northeast of Kansas City, on the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Kansas City and the

Wabash railroads. It has flour mills, wagon and harness factories, foundry and machine shops, agricultural implement works, furniture works and a creamery. It has in addition a poultry-feeding station and is the commercial centre for a thriving agricultural region. It was settled in 1819 and incorporated in 1830. It contains a monument erected b}' the govern¬ ment to Gen. James Shields. Pop. (1920) 3,453.

CARROLLTON, Ohio, village and county-seat of Carroll County, 25 miles southeast of Canton, on the Wheeling & Lake Erie Railroad. It is located in an agricultural region which also has deposits of clay, coal and natural gas. It has manufactories of pottery, rubber, toys, granite and paving brick. The village owns the waterworks. Pop. (1920) 2,192.

CARRON OIL, a mixture of equal parts of linseed oil and lime water, much used as a dressing for burns. It has no particular advan¬ tages over other simpler and neater dressings, notably vaseline or oxide of zinc ointment. Its name is derived from its use in the Carron Foundry, Scotland.

CARRONADE, an iron gun introduced in 1779 by the director of the Carron Foundry, in Scotland, from which it took its name, said to have been invented in 1752 by General Melville, and first used in the American Revolutionary War. See Ordnance.

CARROT, a biennial plant (Dancus carota) of the family Apiacece. It is a native of Europe, introduced into America, and is known as a troublesome weed upon poor land, especially in the eastern United States. It is more favorably known by its cultivated varieties which are said to have been derived originally from Holland prior to the 16th century, since when it has become de¬ servedly popular in all temperate climates. Cer¬ tain large-rooted varieties are raised for stock feeding. The most popular culinary varieties are small, rapidly growing plants with diversely formed roots. Since they are most used as a flavoring in soups, stews and other dishes which have not become specially popular in America, they are less cultivated here than in Europe. The plants succeed best in a warm, friable, rich soil, well supplied with moisture, free from stones, weeds, etc., and in the best physical condition. The seed may be sown in drills one-half foot apart as soon as the ground has become warm, since they are slow to ger¬ minate and since the seedlings are very tiny. A few radish seeds of an early maturing variety are usually planted with them to break the soil and indicate the positions of the rows, so that cultivation may be commenced early. The radishes are pulled when they reach edible size and the carrots given clean cultivation, the plants being thinned to stand two or three inches apart. When they reach edible size they are bunched and marketed. The larger growing kinds are planted in rows 24 to 30 inches apart and the plants thinned to three or four inches. When mature they are stored in pits or root cellars. Few diseases attack the carrot and the few harmful insects are usually controlled by their parasites.

The average percentage composition of car¬ rots is: Water, 88.6; nitrogen-free extract, 7.6; carbohydrate, 1.3; protein, 1.1; fat, a trace; ash, about 1 per cent. They resemble other root and tuber vegetables in their succulence

and nutritive value. They are greatly relished by stock, especially horses, but are usually re¬ placed in American rations by cheaper foods.

CARROUSEL, ka-roo-sel', formerly an exhibition of various knightly exercises, as riding at the ring, throwing the spear, etc., which were celebrated at the courts of princes on festival occasions with great pomp and splendor. They are very ancient, but are first mentioned in history in 842, on occasion of the meeting held by Charles the Bald and Louis the German. They were superseded by tourna¬ ments, but when these had fallen were again revived. Their introduction or revival in France took place after tournaments had fallen out of fashion in consequence of the accident which ended in the death of Henry II. Similar fetes had already long existed among the Moors, Spaniards and Italians. These exhibi¬ tions were common during the continuance of the old French monarchy. The Place du Carrousel in Paris was so called from one of these fetes given there in 1662,. in honor of Mademoiselle de la Valliere. The greatest ex¬ travagances were enacted at these displays. Recitations accompanied them, some verse in outrageous taste and full of absurd allegorical personages, being usually recited in honor of the heroine of the fete, although genuine dramatic performances were sometimes given by professional actors. A revival of the carrousel was attempted in Berlin in 1750. In the United States the name carrousel is ap¬ plied to a merry-go-round, a machine with a revolving circular platform and fixed wooden horses, etc., upon which both children and grown people ride for amusement.

CARRUTH, (Fred) Hayden, American journalist: b. near Lake City, Minn., 31 Oct. 1862. He studied at the University of Minne¬ sota 1881-82, and began his journalistic labors at Minneapolis and afterward had a country newspaper in Dakota 1883-86. He was on the editorial staff of the New York Tribune 1888-92; had charge of the Editor's Drawer depart¬ ment of Harper's Magazine 1899-1901. Since 1905 he has been on the editorial staff of the Woman's Home Companion ; is a frequent con¬ tributor to many magazines, such as Youth's Companion, Saturday Evening Post, Collier's, Century, *etc.* He has published (The Adven¬ tures of Jones) (1895) ; (The Voyage of

the Rattletrap' (1897) ; (Mr. Milo Bush and Other Worthies) (1899) ; 'Tracks' End' (1911).

CARRUTH, William Herbert, American

scholar and author : b. Osawatomie, Kan., 5 April 1859. He was educated in the University of Kansas and at Harvard, and was professor of German in the former institution from 1887 to 1913. Since 1913 he has been professor of comparative literature and head of the English department at Stanford University. He has published (Schiller's Wallenstein with Intro¬ duction and Notes' (1894) ; (Scheffel's Ekke-hard' (1895) ; (Schiller's Wilhelm Tell' (1898); (Auswahl aus Luther's Deutschen Schriften' (1899) ; (Schiller's Die Brant von Messina) (1901) ; (Otis' Elementary German Grammar' (1904) ; (German Reader' (1904) ; (Letters to American Boys' (1907) ; 'Each in His Own Tongue and Other Poems' (1909) ; translator of Cornill's (History of the People of Israel' (1898) and Gunkel's 'Legends of

Genesis) ; and is a contributor to philological journals and literary magazines.

CARRYING-TRADE, a phrase used in political economy and also in commercial transactions. It usually refers to the com¬ merce of different countries with each other, and is most frequently applied to carriage by sea. In a purely commercial sense the carrying-trade is simply the carriage of commodities from one place or country to another, irre¬ spective of the mode of conveyance. In polit¬ ical economy the term is used in a special and restricted sense. In considering the entire commerce of a country it may be found that a part of that commerce is not directly with any one foreign country, but consists in supplying facilities for the conveyance of goods from one foreign country to another. The ships of the United States, for example, may be employed in carrying goods between India and China. This is called a carrying-trade. The carrying-trade does not consist merely in the occasional charter of vessels to foreign

merchants for a foreign voyage. Though this may be included in it, its regular organization implies more than this. A shipowner, instead of lending his ves¬ sels incidentally to foreign merchants, may build or purchase them expressly for the pur¬ pose of conveying goods between different for¬ eign ports at his own risk, and may even invest capital in merchandise to be so conveyed. It is to this abnormal development of commerce that the term carrying-trade in its restricted sense is applied. It is an investment of capital common in the case of commercial communities which have acquired great surplus wealth, or from the limited range of their territory have few home investments. From the earliest time the principal commercial communities, espe¬ cially the great trading cities of antiquity and those of the Middle Ages which have formed communities in themselves, have embarked largely in this kind of commerce.

CARSON, Christopher, popularly known as Kit Carson, American mountaineer, trapper and guide : b. Madison County, Ky., 24 Dec. 1809 ; d. Fort Lyon, Colo., 23 May 1868. While yet an infant his family emigrated to what is now Howard County, Mo. At 15 years of age he was apprenticed to a saddler, with whom he continued two years, when he joined a hunting expedition. The next eight years of his life were passed as a trapper, which pursuit he relinquished on receiving the appointment of a hunter to Brent's fort, where he continued for eight years more. At the expiration of this ' time, he chanced to meet Fremont, by whom he was engaged as guide in his subsequent ex¬ plorations. In 1847 Carson was sent to Wash¬ ington as bearer of dispatches, and received an appointment as lieutenant in the rifle corps of the United States army. In 1853 he drove 6,500 sheep to California, a difficult but suc¬ cessful undertaking, and on his return to Taos was appointed Indian agent in New Mexico. He served in the Federal army during the Civil War, attaining the rank of brevet brigadier-general. Consult Bradley, (Winning the Southwest* (New York 1912) ; Sabin, (With Carson and Fremont * (Philadelphia 1912).

CARSON, Sir Edward Henry, Irish Unionist leader: b. Dublin, 9 Feb. 1854. He was educated at Trinity College, Dublin, was

called to the Irish bar in 1889, and became solicitor-general for Ireland 1892. He was called to the English bar in 1894; and was solicitor-general for England in the Unionist administrations 1900—06. He became very prominent during the passage of the Irish Home Rule Bill in 1912 ; organized the resist¬ ance of Ulster to that measure; inaugurated and was the first to sign the Solemn League and

Covenant which pledged the Ulster Protes¬ tants to resist, by force of arms if necessary, submission to a Dublin Parliament ; and he was the head of the provisional government nominated in 1913 to administer the province in that event. This work of organization and the ensuing political campaign entailed enor¬ mous inroad? on his time and strength, and in order to carry it through he surrendered a great practice at the bar that was yielding him an income of $100,000 a year. For a time it appeared as if civil war might be the issue; when the Great European War intervened to put an end, for a time at least, to factional strife in Ulster; and Sir Edward's energies became devoted to stimulating the government to stronger measures with a view to winning the war. He became Attorney-General in the Asquith Coalition Government in June 1915, but resigned on _ 18 October following, owing to divergencies of view, mainly on the Balkanˆ question. He negotiated with Mr. Lloyd-George and Mr. Redmond the provi¬ sional agreement on the Irish question, which, as modified by the Cabinet, was repudi¬ ated by the Nationalist members, and subse¬ quently withdrawn. On the occasion of that withdrawal, on 24 July, he made in the House of Commons what was perhaps the greatest speech of his life, and one which showed that the European War had sensibly altered his horizon when he declared that it would be a good thing for Ireland if he and Mr. Redmond could shake hands on the floor of the House, and gave a contingent hint that Ulster might become reconciled to Home Rule and desire inclusion, if she saw the rest of Ireland well governed by a Dublin Parliament.

CARSON, Hampton Lawrence, American publicist : b. Philadelphia, Pa., 21 Feb. 1852. He was graduated at the University of Penn¬ sylvania in 1871, and became a lawyer, rising speedily to prominence by speeches and addresses on topics of the time. He has writ¬ ten 'History of the Supreme Court of the United States) ; (The Law of Criminal Con¬ spiracies as Found in American Cases* ; his¬ tory of the One Hundredth Anniversary of the Promulgation of the Constitution of the United States* ; also many papers in law journals and addresses. He is a lecturer on law at the Uni¬ versity of Pennsylvania.

CARSON CITY, Nev., city, capital of the State and county-seat of Ormsby County, on the Virginia & Truckee railroad, 32 miles south¬ east of Reno. The city is in a mining and agri¬ cultural district, and is the location of a branch mint, a Federal building, State capitol, State prison, an orphans' home and an Indian school. The business is mainly connected with mining, agriculture and lumbering. Here are railroad and machine shops, *etc.* Carson City is only 12 miles from Lake Tahoe, and on accoun/ of its beautiful scenery at the base of the Sierra

Nevada is a popular summer resort. The State prison is two miles southeast of the city, and a United States government Indian school is three miles to the south. Founded in 1858, it became the capital of Nevada in 1861 and was chartered as a city in 1875. Pop. (1920) 1,685.

CARSON RIVER, a river of Nevada, ris¬ ing in the Sierra Nevada and flowing north¬ east for about 150 miles. It then divides, and the main branch flows into Carson Lake, a small lake with no apparent outlet. The other branch flows in the opposite direction and is lost in Carson Sink.

CARSTAIRS, or CARSTARES, William,

Scottish clergyman of political eminence : b. Cathcart, near Glasgow, 1649; d. 1715. He pur¬ sued his studies at the universities of Edin¬ burgh and Utrecht. He returned to Scotland with the view of entering the ministry, but after receiving a license to preach resolved to return to Holland. As he was to pass through London, he was employed by Argyle and his party to treat with the English exclusionists and became privy to the Rye-house plot. On the discovery of that conspiracy he was appre¬ hended. After a rigorous confinement in irons he was subjected to the torture and endured this trial with great firmness; but being after¬ ward deluded with the hopes of a full pardon, and assured that his answers should never be made evidence against anyone, he submitted to make a judicial declaration. Being released he returned to Holland, and was received by the Prince of Orange as a sufferer in his cause. The Prince made him one of his own chaplains and procured his election to the office of min¬ ister of the English congregation at Leyden. He accompanied the Prince in his expedition and always remained about his person, both at home and abroad. During this reign he was the chief agent between the Church of Scotland and the court, and was very instrumental in the establishment of Presbyterianism, to which William was averse. On the death of William he was no longer employed on public business ; but Anne retained him as her chaplain-royal and made him principal

of the University of Edinburgh. When the union of the two king¬ doms was agitated he took a decided part in its favor. The memory of Carstairs is for the most part revered by his countrymen as that of an enlightened patriot; and few men of active power and influence have steered between parties more ably apd beneficially. Consult McCormick, (<Life of Carstairs,® prefixed to (State Papers and Letters Addressed to Wil¬ liam Carstairs) (London 1774) ; and Story, 'Character and Career of William Carstairs. }

CARSTENS, Asmus Jakob, Danish painter: b. Saint Jurgen, near Schleswig, 10 May 1754; d. 26 May 1798. He was a miller's son, but received a superior education from his mother. He had a youthful passion for paint¬ ing, but after his mother's death was placed in a mercantile house. After quitting his master, he went to Copenhagen, where he struggled on for seven years, supporting himself by portrait painting, at the same time working on a large historical picture on the (Death of ˆEschylus.* He went to Italy after finishing this work, then lived at Lubeck for five years, toiling on in obscurity, when he was introduced by the poet Overbeck to a wealthy patron, by whose

aid he went to Berlin, where the merit of his 'Fall of the Angels,* a colossal picture, con¬ taining over 200 figures, gained him a profes¬ sorship in the Academy of Fine Arts. Two years' labor in Berlin enabled him to accom¬ plish his cherished wish to go to Rome and study the works of Michelangelo and Ra¬ phael. His best works were designs in aqua¬ relle and painting in fresco; he rarely painted in oil. His cartoons at Weimar have been en¬ graved by Muller. Homer, Pindar, Aristo¬ phanes and Dante supplied him with Jtiis best subjects; and among the painters who endeav¬ ored to infuse a classic spirit into the fine arts of the 18th century, he holds a prominent posi¬ tion. His works are distinguished by correct¬ ness of form and outline, gracefulness of atti¬ tude and loftiness and vigor of expression; but they frequently exhibit a certain harshness, arising from too close imitation. He was often defective in anatomy and perspective and, hav¬ ing begun late to paint in oil, was unacquainted with the secrets of coloring. Consult Fr. Pauli, (A. Carstens) (Berlin 1876) and Fernow, 'Carstens Leben und Werke) (new ed. by Rie-gel, Hanover 1867).

CART (A. S. craet, Gaelic cairt ; connected with "car®), a carriage with two wheels, fitted to be drawn by one horse or other animal and used in husbandry or commerce for carrying many sorts of goods. There are various de¬ scriptions of carts used in agriculture, and for

many kinds of agricultural work the cart is preferable to the wagon. The ordinary cart for heavy goods has no springs, but there are many carts provided with springs. In France and Germany, the carrier's cart is built to carry heavy loads. Other varieties of cart are the dump cart, constructed so that it can be emp¬ tied by tilting the body; the dogcart, originally used for conveyance of sporting dogs ; gad¬ about, a lower form of dogcart ; the white-chapel cart, for tandem driving; the gig, with a single seat ; the Canadian calash, with a low seat for the driver; the trotting sulky, used with race-horses; and numerous road carts.

CARTAGENA, kar-ta-je'na, Colombia, capital of the department of Bolivar, founded 21 Jan. 1533, by Pedro de Heredia. Early in the 17th century it ranked next below Mexico among the cities of the Western world, and was called "Queen of the Indies.® At that time its inhabitants numbered about 20,000, of whom 3,000 were Spaniards ; it was strongly fortified, and one of the main entrepots of commerce between the hemispheres — a distinction due, in part, to its proximity to the Isthmian route, but even more to the excellence of its harbor, which is one of the best on the northern coast of South America. As the principal strong¬ hold of Spanish America, it was repeatedly attacked: by a French fleet in 1544; by the English under Drake in 1585 ; again by the French in 1697; and by the English under Ver¬ non in 1741. The town remained Spanish until 1815, when Bolivar took it; but the same year it was surrendered to the royalists, after a memorably heroic defense; and finally it was taken by Republican forces 25 Sept. 1821. Its population at present is little' more than one-half the number accredited to it three centuries ago. Cartagena is situated in lat. 10° 25′ .48″

N., long. 75° 34' W. Its temperature averages 82° F., and its location is unhealth fill. The city is surrounded by the old fortifications and possesses a cathedral, two fine churches, a government building, a college, seminary and a theatre. The town manufactures chocolate and candles, and exports cattle, hides, fine woods, precious stones and

tobacco. Pop.

14,000.

CARTAGENA, Spain, a city and fortified seaport and naval arsenal in the province of Murcia, and 27 miles south-southeast of the city of Murcia. Its harbor is one of the larg¬ est and safest in the Mediterranean. The city, located at the northern end of the harbor, is surrounded by a lofty wall, flanked with bas¬ tions. The principal buildings are the cathe¬ dral dating from the 13th century, now con¬ verted into a simple parish church ; the old castle, supposed to date from the foundation of the city by the Carthaginians ; the barracks, arsenal, presidio or convict establishment, the military hospital, the Hospital de Caridad, the artillery park, the observatory, the convents of Saint Augustine and Monjas, and several other convents and churches. Great improvements have been made recently in the accommodation for shipping by the construction of moles, wharves, breakwaters and a floating dock. Lead smelting is largely carried on ; and there are also in the neighborhood rich mines of excellent iron, which are connected with the harbor by means of a tramway about eight miles in length. Esparto grass, compressed by hydraulic power, is largely shipped ; other ex¬ ports are metallic ores, wine and fruit. Timber, coal and codfish are the principal imports. Cartagena (ancient Carthago Nova) was founded by the Carthaginians about 228 b.c., and it was the Carthaginians who first worked the copper mines. It was taken by Scipio Africanus 210 b.c., and afterward became a Roman colony. In 425 a.d. the Vandals largely de¬ stroyed it; and in 711, after having been in possession of the Visigoths, it again suffered destruction at the hands of the Saracens. Un¬ der them it became an independent principality, which was conquered finally by James I of Aragon in 1276. In 1585 it was sacked by the English fleet under Sir Francis Drake. When Spain possessed her colonies and was in a flourishing condition, Cartagena was one of her most important naval stations and carried on a very extensive commerce. In 1873 a body of communists obtained possession of the city and fortifications, but they were compelled to surrender in the following year. Pop. (1911) 102,542. In 1870 the population was 26,000.

CARTAGO, kar-ta'go, Colombia, town in the valley of the Cauca, 150 miles west of Bogota on the Viega, a tributary of that riyer. Its trade is principally in dried beef, pigs, fruits, coffee, cacao and tobacco. The sugar¬ cane thrives well here. Cartago is the entrepot for the trade of Santa-Fe-de-Bogota. The cli¬ mate is hot, but dry and healthful. Pop.

about

10,000.

CARTAGO, Costa Rica, _ city, formerly capital of Costa Rica, now capital of the prov¬ ince of Cartago, on the right bank of a river of its own name, 14 miles east-southeast of San Jose. It was once a place of considerable commercial importance, and had a population

of about 37,000. It was so ruined by an earth¬ quake 2 Sept. 1841, that only 100 houses and a church were left standing. It had already been superseded both as a capital and a seat of com¬ merce by San Jose. The railroad from San Jose to Limon passes through it. Near the town are the springs of Aguacaliente, and also Mount Cartago or Irazu, an active volcano, rising 11,480 feet above the sea-level. The town has a considerable coffee trade, and de¬ rives much importance from its position on the interoceanic railway. Pop. about 4,536.

CARTAS OF FEIJOO. The <Cartas> (Letters) and (Teatro critico universaP (Treasury of Universal Criticism) of the Ben¬ edictine monk Benito Geronimo Feijoo y Mon¬ tenegro, constitute collectively one of the most important contributions made to Spanish thought during the 17th century, the period of its awakening from the political and intellectual stagnation consequent upon the collapse of the Hapsburg dream of world dominion. They are associated with the earlier days of Spanish journalism, when miscellanies of encyclopaedic character had not yet given way before the periodical press. The <Letters,) as well as the essays of the <Teatro critico, > a prior and more vigorously written work, cover a wide range of topics, from natural history and the then known sciences, education, history, religion, literature, philology, philosophy and medicine, down to superstitions, wonders and salient points of contemporary journalistic interest, all in a spirit of candor and cool judgment, which proved to be of decisive influence in the assault upon 18th century Peninsular scholasticism. The style, especially in the letters, is encum¬ bered by the prolixity of formal eloquence, while philologists have questioned its purity. Nevertheless, Feijoo's was a comprehensive, catholic mind, familiar with the European thought of his day to an extent unprecedented among his countrymen. In temper and content, Feijoo is suggestive of the inchoateness of Montaigne, with his mixture of the rational and the fabulous, rather than of the polished sophistication of Addison and

Steele. His fame spread quickly throughout Europe, but in the advancement of learning, his writings have been relegated to a place of mere historical interest. It has been commonly said that a monument should be erected to Feijoo, at the foot of which all his works should be burned. The (Teatro) was first published at Madrid (1726-41) the <Cartas) at the same city (1742-60). In the edition of 1777 they oc¬ cupy nine and five volumes respectively, to which three supplementary volumes must be added. A modern reprint occurs in volume 56 of the (Biblioteca de Autores Espanoles,* with an introduction by Vicente de la Fuente. Consult also Bazan, Emilia Pardo, 'FeijooP

John Garrett Underhill.

CARTE, Thomas, English historian : b. Clifton-upon-Dunsmoor, Warwickshire, April 1686; d. near Abingdon, 2 April 1754. He was educated at University College, Oxford, and Cambridge, where he received his M.A. in 1706. He took holy orders in 1707 and was appointed reader at Abbey Church, Bath ; on account of his allegiance to the Stuarts he re¬ signed. His first publication was entitled (The Irish Massacre Set in a Clear Light, etc.,* in

which he defended Charles I. from the common charge of secretly instigating the rebellion and massacre in Ireland in 1641. During the rebel¬ lion of 1715, a warrant was issued for his apprehension, which he eluded by concealment; and later ' when it was supposed that he was concerned in a conspiracy, and a reward of £1,000 was offered for his capture, he escaped to France. Here he collected material for an English edition of the (History of Thuanus) (de Thou). At length Queen Caroline pro¬ cured leave for his return to England. His important work, the (Life of James, Duke of Ormonde, > was published in 1 7 35—36, and gained him great reputation, especially with the Tory party. In 1744 he was arrested on a suspicion of being employed by the Pretender, but was discharged. His other works include illustra¬ tions for the 'History of Thuanus) (edited by S. Buckley, 7 vols., 1733). He published three volumes of his (History of

England) between 1747 and 1752, the fourth, which brought down the history to 1654, not appearing until after his death. The character of this work is de¬ servedly high for research. Numbers of his manuscripts are preserved in the Bodleian Library, Oxford. Hume and other historians have been indebted to it, but the prejudices of the author are everywhere conspicuous. Con¬ sult Nichols, (Literary Anecdotes5 (Vol. II, London 1812-15), and his (Literary Illustra¬ tions of Literary History5 (London 1817-58, Vol. V. pp. 152-56).

CARTE BLANCHE, kart blanch, a blank sheet of paper with an authoritative signature, to be filled up with such conditions as the per¬ son to whom it is given may think proper; hence absolute freedom of action.

CARTE DE VISITE, kart de ve-zet, literally a visiting card, a photographic likeness executed on a card somewhat larger than a visiting card, and usually inserted in a photo¬ graph album. For an historical account of these <(Cartes,55 consult 'La Grande Encyclo¬ pedic5 (Vol IX, pp. 568-69).

CARTEL, an agreement for the delivery of prisoners or deserters; also, a written chal¬ lenge to a duel. A cartel-ship is a ship com¬ missioned in time of war to exchange pris¬ oners; also to carry proposals between hostile powers, and is not permitted to carry instru¬ ments of warfare.

CARTER, Elizabeth, English poet and linguist: b. Deal, 16 Dec. 1717; d. London, 19 Feb. 1806. She was the daughter of Dr. Nich¬ olas Carter, a clergyman of Kent, and was educated by her father, soon becoming master of Latin, Greek, French and German ; to which she afterward added Italian, Spanish, Portu¬ guese, Hebrew and Arabic. She was for 50 years the friend of Dr. Johnson to whose Rambler she contributed two papers. Several of her poetical attempts appeared in the 'Gentleman's Magazine5 before she attained her 17th year, and these procured her much celebrity. In 1739 she translated the critique of Crousaz on 'Pope's Essay on Man,5 and in the same year gave a translation of Algarotti's explanation of the Newtonian philosophy. She published a translation of 'Epictetus,5 in 1758.

CARTER, Franklin, American educator: b. Waterbury, Conn., 30 Sept. 1837; d. 22 Nov.

1919. Educated at Yale, at Williams and at the University of Berlin,

received many honorary degrees, and began his professional career at Williams, where he was professor of French and Latin 1865-68 and of Latin 1868-72. In 1872 he became professor of German at Yale, and during this period studied theology and was licensed to preach. In 1881 he was chosen president of Williams College and administered the affairs of this office with signal ability until 1901, when he resigned. He lectured on Theism in Williams College 1904—10, and is president at the Clarke School for the Deaf since 1896; fellow of the American Academy of Arts and Sciences. He published 'Life of Mark Hep-kins5 (1892) ; and a translation of Goethe's 'Iphigenia in Tauris5 (1870).

CARTER, Sir Frederic Bowker Terring-ton, Newfoundland jurist: b. Saint John's, Newfoundland, 12 Feb. 1819; d. Saint John's 28 Feb. 1900. He was called to the Newfound¬ land bar in 1842, served in the Newfoundland assembly from 1855 to 1878, and two years later became chief justice of Newfoundland. He was created K.C.M.G. in 1878.

CARTER, George Robert, American poli¬ tician: b. Honolulu, Hawaii, 28 Dec. 1866; was educated at Phillips Andover College and Yale University. In 1891 he was appointed Hawaiian consul at Seattle, Wash. He returned to Hono¬ lulu in 1896 and was governor of Hawaii by appointment of President Roosevelt 1903-07.

CARTER, Henry. See Leslie, Frank.

CARTER, James Coolidge, American lawyer: b. Lancaster, Mass., 14 Oct. 1827; d. New York, 14 Feb. 1905. He was educated at Harvard, and his admission to the bar took place in New York in 1853. He was counsel for the city of New York in the famous case of the people against William Tweed, and in 1875 was appointed a member of the commis¬ sion to devise a system of municipal rule for the cities of the State of New York. In 1892, he shared as counsel in representing the claims of the United States to the Bering Sea tribunal. He published 'The Proposed Codification of Our Common Law5 (1883); 'The Provinces of the Written and the Unwritten Law5 (1889); 'The Ideal and Actual Law5 (1890); 'Law: Its Origin, Growth and Function5

(1907).

CARTER, James Madison Gore, Ameri¬ can author: b. Johnson County, Ill., 15 April 1843 ; d. 3 Mar. 1919. He was educated at the

State Normal University, Saint John's Col¬ lege and Northwestern University Medical School. He served in an Illinois regiment dur¬ ing the Civil War, being captured and taken to Libby Prison. Was professor of pathology and hygiene 1891—95 ; clinical and preventive medicine 1895—99 ; professor emeritus since 1900, at the College of Physicians and Sur¬ geons, Chicago. Among his works are 'Out¬ lines of Medical Botany of the United States5 (1888); 'Catarrhal Diseases of the Respiratory Organs5 (1895) ; and 'Diseases of the Stomach5 (1902) ; and various monographs on medical and literary topics.

CARTER, Jesse Benedict, American class¬ icist : b. New York, 16 June 1872; d. 21 July 1917. He studied at New York and Princeton universities, at Berlin, Leipzig, Gottingen and

6? 9

Halle. From Latin instructor in 1895 and assist¬ ant professor in 1898, he became professor in 1902 at Princeton University. He had lectured on Roman religion at the University of Wiscon¬ sin in 1900, and in 1904 was appointed professor of Latin at the American School of Classical Studies in Rome, three years later (1907) be¬ ing made director. His published writings include (De Deorum Cognominibus) (1898); 'The Roman Elegiac Poets1 (1900) ; 'Epitheta Deorum1 (1902); Virgil's 'ZEneid1 (1903); (The Religion of Numa) (1906) ; 'The Re¬ ligious Life of Ancient Rome) (1911), *etc.* He also translated Hudson's ' Forum 1 (1906), and wrote a 'Memorial Service to J. Pierpont Mor-gan) (1913).

CARTER, Louise Leslie, American actress : b. Lexington, Ky., 1862. Her stage career began 10 Nov. 1890, when she appeared in the 'Ugly Duckling) in New York. Her other roles have been the Quakeress in 'Miss HelyetU ; Maryland Calvert in (The Heart of Maryland1 ; Zaza in <Zaza) ; Madame Du Barry in (Du B,arry) ; and Adrea in 'Adrea.1 She was married to William L. Payne 13 July 1906. Consult Strang, 'Famous Actresses. 1

CARTER, Samuel Powhatan, American naval and military officer ; b. Elizabethtown, Tenn., 6 Aug. 1819; d. Washington, D. C., 26 May

1891. After attending Princeton for a short time he became a midshipman in 1840, fought in the Mexican War in coast attack, and in 1856 took part in the capture of the barrier forts, Canton, China. In 1861 he was detailed to go to Tennessee, where he started the Ten¬ nessee brigade. All through the Civil War he was of great service to the government, and for his gallantry was brevetted major-general of volunteers. He returned to the navy and from 1869-72 was commandant of the Naval Academy at Annapolis. In 1882 he was pro¬ moted rear-admiral on the retired list.

CARTER, Thomas Henry, American politician : b. Scioto County, Ohio, 30 Oct. 1854; d. 1911. He was bred to farming, but later became a lawyer, removing to Montana in 1882. He was Montana's first representative in Congress (1891), United States senator from that State from 1895 to 1901, chairman of the National Republican Committee in 1892-96, and was appointed in 1900 United States, commis¬ sioner to the Saint Louis Exposition. He served a second time as United States Senator in 1905-11, and in the latter year was appointed a member of the international boundary com¬ mission of the United States and Canada. In 1901 he spoke for 16 hours against the riyer and harbor bill with appropriations for

$50,000,000.

CARTER, William Harding, American army officer and author: b. Nashville, Tenn., 19 Nov. 1851. He is a graduate of the United States Military Academy, West Point, N. Y ; was on duty on the Western frontier, 1873-97 ; promoted from captain of cavalry, by selection, to major and assistant adjutant-general, and to duty at War Department, 1897-1902; promoted from colonel to brigadier-general and duty on the War College Board 1902-03. He was a member of the General Staff to 31 Dec. 1903; was sent to England and Europe to investigate remount systems 1903. He has held the fol¬ lowing commands: Department of Visayas,

Philippine Islands 1904-05; Department of Lakes 1906-08; provisional division, manoeuvers, regulars and national guard, 1906-08; Depart¬ ment of Missouri, 1908-09. He was promoted to major-general, 13 Nov. 1909; Department of Luzon, Philippine Islands 1909-10; to the Gen¬ eral Staff, 1910-12; Manoeuvre Division, Texas, 1911; Central Division, 1912—13 ; Central De¬ partment, 1913-14; Second Division

(Mobile Army) Texas, 1913; Hawaiian Department, 1914—15; retired from active service, 19 Nov. 1915. He received medal of honor “for dis¬ tinguished bravery in action,11 and is author of ‘The American Army) ; ‘From Yorktown to Santiago with the Sixth Cavalry1 ; ‘Old-Army Sketches) ; ‘Horses, Saddles and Bridles) ; ‘Giles Carter of Virginia1 (genealogical memoir).

CARTER-COTTON, Francis L., Cana¬ dian editor and statesman: b. Yorkshire, Eng¬ land, 1847. After early education in England, he emigrated to Canada, and settled at Vancouver, B. C., where he founded the Daily News-Advertiser in 1886 and became its editor. A Conservative, he was elected a member of the British Columbia legislature in 1890, and was appointed minister of finance 1898-1900; a position to which his writings and speeches on financial and economic questions added considerable weight. He was chief commissioner of lands and works (1906—10) , and subsequently president of the council. He was elected first chancellor of the University of British Columbia in 1902, and in 1906 en¬ dowed a professorship of pure and applied mathematics in the McGill University College of British Columbia.

CARTERET, kar'te-ra, Antoine Alfred Desire, Swiss statesman and fabulist : b. Geneva, 3 April 1813; d. there, 29 Jan. 1889. His political career was long and brilliant; and in literature he made a name with pleasing 'Fables1 (1873), and a novel, 'Two Friends1 (1872), descriptive of Genevese customs. For the history of his political career see 'La Grande Encyclopedic1 (Vol. 9).

CARTERET, kar'te-ret, Sir George, Eng¬ lish provincial proprietor: b. Saint Ouen, Jer¬ sey, between 1609-17; d. 14 Jan. 1680. He had a distinguished career in the British navy, was an active supporter of the royalist cause, was made lieutenant-governor of the island of Jer¬ sey and vice-admiral. He manifested an inter¬ est in colonization and received a royal grant, "in perpetual inheritance,11 of certain lands in America "to be called New Jersey,11 the name being taken from the island of which he had been governor. In 1651 he surrendered to the Commonwealth and served for a time in the French navy, returning to England at the Resto¬ ration. He was made treasurer of the navy in 1661 and suspended in 1669 for mismanagement of funds. Nevertheless he was appointed deputy treasurer of Ireland in 1667 and con¬ tinued in royal favor. In 1664 he was made joint proprietor with Lord Berkeley of the province of New Jersey under a grant from the Duke of York, and in 1676, when the prov¬ ince was divided, East Jersey fell to his share. He was one of the first proprietors of Carolina.

CARTERET, John, Earl Granville, Brit¬ ish statesman : -b. 22 April 1690; d. Bath, 2 Jan. 1763. He received his education at West-

minster School and Christ Church College, Ox¬ ford. From Oxford he proceeded to London, plunged into the political and social excite¬ ments of the period, made the acquaintance of Swift and in 1710 married Lady Frances Worsley. Entering the House of Lords on 25 May 1711, as second Baron Carteret, he es¬ poused the side of the Whigs, then led by Stan¬ hope and Sunderland, and in 1714 made his first speech in the House of Lords in support of the Protestant Succession. On the accession of George I Carteret became a lord of the bedchamber. In 1719 he was appointed by Stanhope Ambassador Extraordinary to Sweden, and succeeded in arranging two treaties of peace, the first between Sweden, Hanover and Prussia, and the second between Denmark and Sweden. In 1721 he was ap¬ pointed to one of the two foreign secretary¬ ships, that for the <(Southern Department® of Europe, and as such, attended, in 1723, the con¬ gress of Cambria, which attempted the settle¬ ment of differences between Germany and Spain, and accompanied George I to Berlin. In 1724 Carteret was appointed lord lieutenant of Ireland. Though he came into collision with Swift over the Drapier prosecution, the two ultimately became warm friends. Between 1730 and 1742 Carteret took the lead in the House of Lords of the party opposed to Sir Robert Walpole. When this opposition succeeded in overthrowing Walpole, Carteret became the real head of the administration, but was driven from power by the Pelhams in 1744. In the same year he became Earl Granville on the death of his mother, who had been created Countess Granville in her own right. In 1749 he became Knight of the Garter, and from 1751 to his death was lord president of the council under Henry Pelham. Consult Ballantyne, (Lord Carteret : A Political Biography* (London 1887) ; Lecky, (History of England in the 18th Century* (New York 1878-91) ; and Mahon, (History of England* (Vols. II-IV, London 1836-54).

CARTERET, Philip, English provincial governor : d. 1682. He was appointed governor of the province of New Jersey by the proprie¬ tors, Berkeley and George Carteret, and was given power to grant land to settlers. He reached New Jersey in 1665, bringing with him about 30 settlers, and settled at Elizabethtown. He avoided trouble with the Indians by adopt¬ ing the wise policy of buying the land from them or requiring the colonists to do so. In 1672 he went to England for a time, but re¬ turned in 1674, and during his absence New Jersey was

in the possession of the Dutch for a year, 1673-74. In 1676 when the division of the province into East and West Jersey was completed he became governor of East Jersey, holding the position till his death, although the office was contested by Sir Edmund Andros, governor of New York, who demanded control of New Jersey as well.

CARTERVILLE, Ill., city in Williamson County, 100 miles southeast of Saint Louis, on the Illinois Central and the Saint Louis, Iron Mountain and Southern railroads. Coal mining is the principal industry. Pop. (1920) 3,404.

CARTERVILLE, Mo., city of Jasper County, on the Frisco and the Missouri Pacific railroads, 10 miles southwest of Carthage, the

county-seat. Carterville was founded in 1875 in a rich lead-mining and zinc silicate-bearing region and has smelters, foundry and machine shops, iron works, boiler works and stone quar¬ ries. Pop. (1920) 2,434.

CARTERSVILLE, Ga., city and county-seat of Bartow County, 45 miles northwest of Atlanta, on the Seaboard Air Line, the Western and Atlantic and the Nashville, Chattanooga and Saint Louis railroads. The city is the centre of a region producing cotton, fruit and grain in abundance and of a mining district with rich deposits of gold, graphite, iron, man¬ ganese, ochre and other minerals. The indus¬ trial establishments comprise cottonseed-oil mills, fertilizer works and cotton mills. The city has a county courthouse and a public library. The electric-lighting plant and water¬ works are the property of the municipality. The commission form of government was adopted in 1911. Pop. (1920) 4,350.

CARTESIANISM, the philosophy of Rene Descartes (q.v.) and his school, among whom may be reckoned Geulincx, Malebranche, Arnauld, Nicole, and even many who stood out¬ side the circle of professional philosophers like Bossuet and Fenelon. Spinoza and Leibnitz have much in common with Descartes in stand¬ point and method, but the divergencies of their systems from his are too great to justify us in classifying them as Cartesians. Among the many noteworthy points in Descartes' system we may mention the deliberate determination to doubt everything that could intelligibly be called in question. This was not scepticism, but a principle of method that he employed to enable him to reach something absolutely cer¬ tain. This basal fact he found in the famous proposition, (<I think, therefore I

am® (Cogito ergo sum, je pense done je suis). No doubt could shake the certainty the ego possesses of its own existence. Moreover, Descartes finds in consciousness certain ideas that are not due to experience and not the product of the imag¬ ination. These ideas he pronounces connate, original possessions of the mind. Among them the chief is that of the conception of God as an infinite and all-perfect being. Now the presence of this idea, Descartes argues, proves the actual existence of God as its cause, for no finite being can be the author of the idea of infinity. Having thus established the existence of God, Descartes maintains that the veracity of God warrants us in believing that whatever we perceive through the medium of clear and distinct ideas must be true. Adopting the traditional notion of substance he holds that besides the infinite substance, God, there are two finite created substances, namely, matter or extended substance, and mind or thinking substance. These have no attributes in com¬ mon, and are absolutely opposed to each other. Thus his philosophy is a Dualism (q.v.). In the human organism these two substances are united. The soul has its seat in the pineal gland, and at this point receives influences from the body, and in turn controls and governs the direction of bodily movements. Descartes' ac¬ count of the physical world is given in terms of the mechanical theory, the principles of which he was one of the earliest thinkers to formulate clearly. All bodies are extended, figured, substances, without any internal prop-CARTHAGE

erties or differences. Everything that takes place in the physical world consists in the movement of an extended body. Thus the sciences of physical nature can be compre¬ hended in a mathematical physics which has for its data the size, shape, velocity (amount of motion) and direction of the various bodies of which the physical world is composed. God at the beginning created bodies with a fixed quantity of motion and rest ; and since God is unchanging, this amount is subject to no in¬ crease or diminution. From this statement, which is couched in scholastic language, has come, through a closer analysis of conceptions, the modern principle of the conservation of energy. Descartes' view of the relation of body and mind was not satisfactory even to the members of his own school, and led to the doctrine of Occasionalism and with Spinoza to a thorough-going Parallelism (q.v.). He also left to his successors the further elaboration of the

problem regarding the relation of the one infinite substance, God, to the two created sub¬ stances. In the (Passions de flame* he made an important contribution to the psychology of the emotions, deriving all forms of emotional experience from the six primary emotions, wonder, love, hate, desire, joy and grief.

Bibliography. — Bouiller, (Histoire de la Philosophic Cartesienne* (3d ed., Paris 1868) ; Descartes, (Discours de la methode* ; Medita¬ tions on the First Philosophy,* and Principles of Philosophy* (in Veitch's or Torrey's trans¬ lation) ; Fisher, Kuno, (Descartes and His School* (English translation by J. Gordy) ; Mahaffy, J. P., (Descartes > (in (Blackwood Philosophical Classics*); Smith, Norman,

(Studies in the Cartesian Philosophy.*

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

CARTHAGE (conjectural native name, the Phoenician Kereth-hadeshotli, new city, from which the Greek Karchedon, and the Roman Carthago are supposed to have been derived), the most famous city of Africa in antiquity, capital of a rich and powerful com¬ mercial republic. It was situated on the north coast, not far from the modern Tunis. Ac¬ cording to tradition, Dido, fleeing from Tyre, came to this country, where the inhabitants agreed to give her as much land as could be compassed by an ox-hide. Dido cut the hide into small thongs, with which she enclosed a large piece of land. Carthage was founded, according to Aristotle, 287 years later than Utica. Becker supposes it to have been a joint colony or factory, in the Anglo-Indian sense, of Tyre and Utica. The actual date of its foundation is much contested. The date com¬ monly given is 878 b.c. The history of Car¬ thage is usually divided into three periods. The first is the epoch of its gradual rise; the second that of the struggles with other states occa¬ sioned by its extended power ; the third that of its decline and fall. These epochs inter¬ lock each other, and it is only as a matter of convenience that we can interpose exact divid¬ ing dates between them. The first epoch has been extended as far as to 410 b.c. ; the. sec¬ ond limited to the period chieflv distinguished by wars with Greece, 401-265; the third is the period occupied with the Roman wars, and end¬ ing with the fall of Carthage.

Carthage appears early to have been inde¬ pendent of Tyre. There

existed, however, a close relationship between them, due to affinity of race and religion. This appears from various incidents in their history, as when the Tyrians refused to follow Cambyses in a contemplated attack on Carthage, and when Alexander, hav¬ ing attacked Tyre, the women and children were sent to Carthage. There is no evidence that the government of Carthage was ever mon¬ archical. She appears soon to have acquired an ascendency over the earlier Tyrian colonies, Utica, Tunis, Hippo, Leptis and Hadrumetum. This was probably gained without any effort as the result of her material prosperity. The rise of Carthage, then, may be attributed to the superiority of her site for commercial purposes, and the enterprise of her inhabitants. Her relations with the native populations, as is evident from her subsequent history, would always be those of a superior with inferior races. Some of them were directly subject to Carthage, others contributed to her strength by recruiting her armies, although frequently in hostility with her. She established colonies for commercial purposes along the whole north¬ ern coast of Africa, west of Cyrenaica, and these colonies enabled her to maintain and ex¬ tend her influence over the native tribes. These colonies, together with most of the earlier Phoenician colonies subject to her, possessed little strength in themselves, and easily fell a prey to an invader; hence they were in the end a source of weakness, although it is not easy to see how her prosperity could have been attained without them. It is only after the north of Africa has thus been placed at her com¬ mand that Carthage appears formally on the stage of history. One of her earliest recorded contests is that with Cyrene, when the bound¬ ary between the two states was fixed, to the advantage of Carthage, at the bottom of the Greater Syrtis, the Carthaginian envoys, ac¬ cording to the traditional story, consenting to be buried on the spot. The immediate wants of the city were provided for by the cul¬ tivation of the surrounding territory, which alone was directly dependent on her.

Commerce naturally led Carthage to con¬ quest. The advantages, both for the promotion and protection of her trade, of possessing islands in the Mediterranean, led to her first enterprises. Expeditions to Sicily and Sar¬ dinia appear to have been undertaken before the middle of the 6th century. The war was carried on in the latter half of this century by Mago and his sons Hasdrubal and Hamilcar. At the same time a war arose with the Africans on account of the refusal of the . Carthaginians to continue the payment of a ground-rent for their city. In this the Cartha¬ ginians were unsuccessful, but at a subsequent period they achieved their object. Sardinia was their first conquest. They guarded it with the utmost jealousy. 4 he Romans, by the first treaty 509 b.c., were allowed to touch at it ; but this permission was

withdrawn in the second. It was the entrepot of their trade with Europe, and lessened their dependence on their own territory for corn. They founded its cap¬ ital, Caralis, now Cagliari. They soon after occupied Corsica, where they united with the Tyrrhenians, its previous possessors, against the Greeks. Sicily was already occupied by

Greek and Phoenician colonies. The latter, on the decline of Tyre, seem to have fallen under the dominion of Carthage, which gave her a footing on the island. The Greeks were still the more powerful party, and the Carthaginians occupied themselves in promoting dissensions among their cities. When the Greeks were occupied with the Persian invasion, they organ¬ ized a great expedition to take possession of the island, in which they landed 300,000 men, contributed by all their dependencies. Among these Sardinians, Corsicans and Ligurians, the latter from the gulfs of Lyons and Genoa, are enumerated. They were totally defeated by Gelon, tyrant of Syracuse, and their leader slain, in the battle of Himera, 480 b.c. The Balearic, and many smaller islands in the Med¬ iterranean, had already been occupied by the Carthaginians. Spain had also been colonized by them with peaceable commercial settlements. No other great enterprise took place in the first period of her history.

The war with the Greeks in Sicily was re¬ newed in 409. Hannibal, the son of Gisco, landed an army at Lilybaeum, in the spring of that year, and reduced Selinus and Himera. In a subsequent expedition Agrigentum was sub¬ dued. A pestilence seconded the efforts of Dionysius and saved Syracuse, 396 b.c. A treaty put an end to the war in 392. The struggle between the Greeks and the Carthaginians con¬ tinued with varying success throughout the remainder of this period. Its most remarkable event was the invasion of Africa by Agathocles, 310 b.c. Defeated in Sicily by the Carthagin¬ ians, to avert the total ruin of his affairs, he raised an army and passed over to Africa. The most extraordinary success awaited him, show¬ ing at once the weakness of the hold which Carthage had of her external possessions on the continent, and the danger she constantly en¬ countered from

factions and dissensions within the city itself. Agathocles was the precursor of Scipio. After the death of Agathocles the Carthaginians renewed their enterprise in Sicily, and had nearly completed its conquest when the Greeks called in the aid of Pyrrhus, who for a time arrested their progress, 277-75 b.c. Notwithstanding numerous and disastrous defeats in their contests with the Greeks, the Carthaginians seemed, after the departure of Pyrrhus, to have the conquest of Sicily at length within her power. A dissension with the Mamertines, their former allies, called in the Romans, and with their invasion, 264 b.c., the third period of Carthaginian history begins.

The First Punic War, in which Rome and Carthage contended for the dominion of Sicily, was prolonged for 23 years, 264 to 241 b.c., and ended, through the exhaustion of the re¬ sources of Carthage, in her expulsion from the island. The Second Punic War, conducted on the side of the Carthaginians by the genius of Hannibal, lasted 17 years, 218 to 201 b.c., and after just missing the overthrow of Rome, ended in the complete humiliation of Carthage. The policy of Rome, at the end of this war, in placing Carthage, disarmed, at the mercy of her African enemies, and raising her a powerful opponent in Masinissa, occasioned the Third Punic War, in which Rome was the aggressor. It lasted only three years, but served to throw a halo of glory round the fall of Carthage, in whose total ruin it ended. This war, begun 150

b.c., ended, in 146 b.c., in the destruction of the last vestige of its power.

The repeated and not always unsuccessful struggles of Carthage with her African neigh¬ bors, in the very midst of her schemes of for¬ eign conquest, indicate the marvelous tension to which a power inherently so weak was wrought in those great enterprises which vir¬ tually grasped at the supremacy of the world. In this matter the experience of Carthage was not unparalleled by that of Rome ; but the great difference between them was that the former was surrounded by alien tribes, the latter by races kindred in language and manners, with whom, after conquest, she could easily unite. The invasion and conquest of Spain, begun by Hamilcar and carried on by Hasdrubal and Hannibal, and which led to the Second Punic War, can only be mentioned in passing.

Carthage perished leaving no historians to tell her tale ; hence many interesting circum¬ stances in her history can never be known, and what is preserved has the color of partial and often hostile authority.

Recent excavations show that the streets crossed each other regu¬ larly at right angles. The long streets ran parallel to the quays and were distant from each other about 150 feet. The inhabitants are said to have numbered about 700,000 in 149 b.c. No foreign traders were allowed at any of her western colonies, and only the port of Carthage was open to foreigners. Traders found elsewhere were drowned. The revenue to cover her great military and naval expendi¬ tures appears to have been derived from tribute imposed on the neighboring subject races, from mines in Spain and from import duties on her vast commerce. Her merchant ships reached to every coast and island of the Mediterranean, and even to Britain and the Baltic shore. Her caravans penetrated far into the Dark Continent to the gold districts of the Niger and up the Nile. Many citizens, however, were not en¬ gaged in commercial pursuits, but cultivated large estates by means of slaves. The consti¬ tution of Carthage has occupied much of the attention of scholars, but still remains in many points obscure. The name of king occurs in the Greek accounts of it, and the first Cartha¬ ginian general who is recorded to have invaded Sicily and Sardinia is called Malchus, the Phoe¬ nician for king, but the monarchical constitution, as commonly understood, never appears to have existed in it. The officers called kings by the Greeks were two in number, the heads of an oligarchical republic, commonly called suffetes, the original name being considered identical with the Hebrew shofetim, judges. These offi¬ cers were always chosen from the principal families, and were elected annually. It is not known if they could be reelected. There was a senate of 300, and the citizens were divided into classes similar to the Roman tribes, curiae and gentes. There was a smaller body of 30 chosen from the Senate, sometimes another smaller council of 10. Various other officers are mentioned, but the particulars regarding them are often obscure, and sometimes contra¬ dictory.

After the destruction of Carthage, her terri¬ tory became the Roman province of Africa. A curse was pronounced upon the site of the city, and any attempt to rebuild it prohibited. The attempt was, however, made 24 years after her

tall, by Caius Gracchus, one of the leading men ot Rome. The same plan was entertained by Julius Caesar, and it was accomplished by Au¬ gustus. Lhe new city became the seat of the proconsul of Old Africa in place of Utica, and continued to flourish till the Vandal invasion. It became distinguished in the annals of the Christian Church. Cyprian was its bishop, and Tertullian is supposed to have been a native of it. Genseric made it the capital of the Vandal kingdom in 439. Belisarius took it in 533, and named it Colonia Justiniana Carthago. It was taken and destroyed by the Arabs, under Has-san, in 647. A few miserable hamlets and ruins mark its site. In recent times many ex¬ cavations have been made, uncovering parts of the ancient walls and remains of the har¬ bors ; the citadel, the forum and the amphi¬ theatre have been almost completely excavated, and have yielded many small objects and in¬ scriptions, principally those from tombs of Punic and Roman times.

The religion of the ancient Carthaginians was essentially that of their Phoenician ances¬ tors. They worshipped Moloch or Baal, to whom they offered human sacrifices ; Hercules, the patron deity of Tyre and her colonies; Astarte, and other deities, which were identified with the heavenly bodies, but propitiated by cruel or lascivious rites. Their religion was considerably modified by their intercourse with the Greeks. After their defeat by Gelon he made it a condition of peace with them that they should abandon human sacrifices. Some of their deities were identified with those of the Greeks, and they adopted others of that people, and no doubt received also some of their ideas regarding them. Consult Arnold's and Mommsen's histories of Rome; Smith, R. B., (Carthage and the Carthaginians y (London 1877) ; Church, A., (Carthage, or the Empire of Africa) (New York 1886) ; Davis, N., (Carthage and Her Remains) (London 1861) ; Melt-zer, (Geschichte der Karthager) (Berlin 1913) ; Moore, (Carthage of the Phoenicians in the Light of Modern Excavation* (London 1905) ; de Sainte-Marie, E. de, (Mission a Carthage* (Paris 1884) ; id., (Atlas archeologique de la Tunisie* (Paris 1893) ; Audollent, (Carthage romaine) (Paris 1901) ; also (Comptes Rendus de l'Academie des Inscriptions et Belles Lettres) (Vol. XXVIII, Paris 1901), and map issued in 1907 by the French Minister of Public Instruction.

CARTHAGE, Ill., city and county-seat of Hancock County, on the Chicago, Burlington and Quincy and the Wabash railroads, 32 miles south of Burlington, Iowa. It is noted as the place where Joseph Smith, the Mormon prophet, was imprisoned and killed in 1844. Carthage was settled in 1837 and received a city charter in 1883. It operates its

own waterworks. Car¬ thage (Lutheran) College was opened here in 1872. Pop. (1920) 2,129.

CARTHAGE, Mo., city and county-seat of Jasper County, in the southwestern part of the State, on Spring River, and on the Saint Louis & San F., Missouri Pac., Iron M., Carthage and Western and Southwest Missouri Electric rail-wa}% 150 miles south of Kansas City. It is the' centre of a fertile, farming and fruit-raising region, and in the vicinity are rich mines of zinc and lead and extensive quarries of marble

and building stone. The city exports large shipments of stone, marble, grain, flour, straw¬ berries and other fruits, poultry, live stock and hides. It has 10 large quarries, zinc and stone works, bed-spring, shoe, overall, broom and cigar factories, flour mills and machine shops. There are five banks with $450,000 capital and an annual business of $2,000,000; and daily and weekly newspapers. Carthage has a county courthouse (cost $100,000), government post-office building (cost $90,000), a public library, high school building (cost $110,000), good public schools, a business college and a piano school. The following churches are represented : Pres¬ byterian, Congregationalism Baptist, Methodist (North and South), Episcopal, Christian, Ro¬ man Catholic, Christian Scientist, Dunkard and Adventist. The site of the city was first settled in 1833 by Henry Piercy. On 28 March 1842 it was made the county-seat and named Carthage. The town was practically destroyed in the Civil War (see Carthage, Battle of) and has been almost entirely rebuilt since 1866. The govern¬ ment is vested in a mayor and 10 councilmen elected for a term of two years. Pop. (1920)

10 068 '

CARTHAGE, N. Y., village of Jefferson County, at the terminus of the Black River Canal and on the New York Central Railroad 18 miles east of Watertown. With West Car¬ thage, joined by a bridge across the Black River, it forms a busy manufacturing centre with paper mills, machine shops, foundries, ice plants, house woodwork and furniture factories, brick works, *etc.* The village operates its own waterworks and maintains a public library. Pop. of West Carthage, a separately incorporated village, and of Carthage combined, over 6,500.

CARTHAGE, Battle of. On 17 June 1861, Gen. Nathaniel Lyon, U. S. A., drove the Con¬ federates from Boonville, Mo., and Claiborne F.

Jackson, the disloyal governor of Missouri, ordered a concentration of the State troops, who adhered to him, in the southwestern part of the State, to unite with the Arkansas troops, under the command of Gen. Ben. McCulloch. Anticipating McCulloch's movement into Mis¬ souri, Lyon ordered Gen. T. W. Sweeny, with three Union regiments, a small detachment of regulars and some artillery, from Saint Louis to Springfield. These were pushed forward by rail to Rolla and thence by road, and 28 June Col. Franz Sigel, with the 3d Missouri, arrived at Sarcoxie, southwest of Springfield, and 15 miles southeast of Carthage, Jasper County. Here Sigel learned that Gen. Sterling Price, with about 800 Missourians, was near Neosho, 22 miles south, and that Jackson, with other State troops, was to the north, 15 or 20 miles beyond Lamar, marching south. He concluded to move first on Price to disperse him, and then turn north on Jackson, his object being to prevent a junction of the two forces, and to open communication with Lyon, who was marching south from Boonville; but when he started after Price, on the morning of the 29th, he heard that he had retreated to join Mc¬ Culloch, upon which he turned his thoughts toward Jackson, but continued his march to Neosho, where he was joined a few days later by Colonel Salomon, with the 5th (Union) Mis¬ souri. Captain Conrad's company of the 3d was left to hold Neosho, and on the 4th of July Sigel, with the two regiments and two bat-684

teries of four guns each, marched to Spring River, a short distance southeast of Carthage, where he heard that Jackson, with over 4,000 men, was but nine miles in his front in the direction of Lamar. On the morning of the 5th, with about 1,000 men and eight guns, he advanced slowly, his train three miles in the rear, driving back the enemy's mounted skir¬ mishers, and about nine miles beyond Carthage came upon Jackson's troops in line of battle on elevated ground, four divisions under com¬ mand of Gens. James S. Raines, John B. Clark, M. M. Parsons and W. Y. Slack, numbering nearly 5,000 men, 1,200 of whom were unarmed. About 1,800 were mounted men, armed with shotguns, and judiciously posted on the flanks of the infantry. Jackson had eight guns. After some skirmishing Sigel, at 10 o'clock, brought up seven guns and opened fire, which was promptly returned, but not effectively, for, be¬ ing in want of proper ammunition, the Con¬ federate guns were charged with pieces of chain, iron spikes, broken iron and round stones or pebbles. After a

desultory artillery fire of three hours the Confederate horsemen advanced from both flanks and making a wide circuit, to avoid Sigel's artillery, began to close in on him and threaten his train, whereupon, disposing four guns in rear and two on either flank he fell back, harassed at every step, until he reached Carthage, where he made a stand. But, as the enemy was still pressing hard on him, working on both flanks and threatening the road to Springfield, he again fell back, skirmishing all the way, some two or three miles beyond Carthage, where pursuit ended, and Sigel marched to Sarcoxie, and thence by way of Mount Vernon to Springfield, where Lyon joined him on the 13th. The Union loss was 13 killed and 31 wounded, to which must be added the loss of Conrad's company of 94 men surprised and captured at Neosho, on the 5th, by Churchill's Arkansas regiment of Mc¬ Culloch's command. The Confederate loss was about 30 killed and 125 wounded. The day after the engagement Jackson marched from Carthage and met McCulloch and Price coming to join him. Consult Official Rec¬ ords, Vol. Ill; Century, (Battles and Leaders of the Civil War> (Vol. I).

E. A. Carman.

CARTHAGE, New. See Cartagena.

CARTHAGENA. See Cartagena.

CARTHUSIANS, an order of monks in the Roman Catholic Church founded in 1084 by Saint Bruno (q.v.), a priest of the diocese of Rheims and principal of the theological school there. Displeased with the impiety of his bishop, Bruno and several friends sought soli¬ tude in the diocese of Grenoble, and settled in a bleak and rocky wilderness near that city, called Cartusium (La Grand Chartreuse). The rule was at first not written, the followers imitating Bruno. The order was very rigid, prescribing perpetual silence, abstinence from flesh, habitual wearing of the cilicum or horse¬ hair shirt, the eating of meals only once a day, excepting festival days. A Carthusian mon¬ astery covered a great deal of ground. It con¬ sisted usually of the great cloister around which were separate houses or <(cellsˆ of the monks ; the lesser cloister with cells of various officials ; worships of lay brothers, chapter¬

house, refectory, *etc.* The time of the monks was spent in oral and silent prayer, in manual labor and in study and a little recreation. The organization was democratic. The prior, who was elected by the

professed monks of the community, was the general of the order. The visitors and priors formed the governing body, and all of these might be removed or reinstated at will. The officials assisting the prior were the vicar, or vice-prior, the procurator, the temporal administrator, the coadjutor, or host, the antiquior, who takes the vicar's place, the sacristan and the novice master.

A written rule was given to the Carthusians in 1129, by Guigo, the fifth prior. It comprised the hitherto unwritten laws of Saint Bruno, and additional rules for the government of the then much larger establishment. The order grew slowly. In 1300 there were but 39 monasteries. The order extended to Spain, England and even to Mexico. The original house, La Grande Chartreuse, existed, the troublous times of the Revolution excepted, down to 1903, when it was suppressed. In 1907, there were seven monasteries in Italy; four in Spain ; the largest of all at Parkminster, Sus¬ sex, England ; one in Germany, Switzerland and Austria. Some of the distinguished Carthusians were Saint Hugh, Saint Stephen, Saint Arthold and the famous copyists and authors, Ludolf of Saxony, Tromby, Sirius, Denis the Carthusian and Henry of Kalkar.

An order of Carthusian nuns was formed in the priorship of Saint Anthelm, about 1245. The arrangement of their day, with a few ex¬ ceptions, is the same as that of the monks. Among the famous nuns have been Roseline of Villeneuve and Blessed Beatrix of Ornacieux. (See Chartreuse). Consult Heimbucher, (Orden und Kongregationen der katholischen Kirche) (Paderborn 1907) ; (La Grande Char¬ treuse par un Chartreux) (Lyons 1898) ; Le Couteulx, (Annales Ordinis Cartusiensis) (8 vols., Montreuil 1901). The best description of Carthusian life is Thorold, (Six Months at the Grande Chartreuse* (in the Dublin Review, April 1892).

CARTIER, kar-tya, Sir George Etienne,

Canadian statesman : b. Saint Antoine, Vercheres County, Quebec, 6 Sept. 1814; d. London, 21 May 1873. He claimed descent from the family to which Jacques Cartier belonged; was among the followers of Papineau in the rebel¬ lion of 1837, distinguishing himself for his courage, but ultimately was obliged to take refuge in the United States. Returning when amnesty was decreed, he resumed the practice of law and attained to some eminence in his profession. He entered the Canadian Parlia¬ ment as a Conservative in 1848, became a Cabinet Minister in 1855, and from that time till his death was closely associated with the Eng¬ lish-speaking Conservative leader, Sir John A. Macdonald (q.v.). Cartier was Prime Minister 1858-62. When

Canadian Federation was set on foot he took a prominent part in the negotia¬ tions, and it was under his leadership, aided by the Church, that French-speaking Canada was reconciled to the Federal system. He carried on the negotiations with the Hudson Bay Com¬ pany which resulted in the surrender to Canada of the company's rights in the Northwest, and it was he who carried through the Canadian

Parliament the bill creating the province of Manitoba. This bill embodied elaborate safe¬ guards for Roman Catholic separate schools, but its provisions were swept away in the well-known later agitation for a uniform school sys¬ tem in Manitoba. Perhaps Cartier's principal domestic achievement was the enactment in 1864 of the Civil Code for what is now the province of Quebec. In 1868 he was created a baronet to reward his services in establishing the new Dominion. He carried through the Canadian House of Commons in 1872 the first charter of the Canadian Pacific Railway. When Sir John Macdonald's government fell in 1873, Cartier was involved in the discredit to his chief, springing from what is known in Canadian history as the Pacific Scandal. Sir John Macdonald relied greatly upon Cartier's influence with the French Canadians, which, however, had declined before his death. See De Celles' <Cartier) in the (Makers of Canada) series.

George M. Wrong,

Professor of History, University of Toronto.

CARTIER, Jacques, French navigator: b. Saint Malo, 31 Dec. 1491 ; d. 1 Sept. 1557. After gaining some experience in fishing-fleets off the Labrador coast, he commanded an expedition to North America in 1534, entering the Strait of Belle Isle and sailed down the whole west coast of Newfoundland. He discovered Magdalen and Prince Edward Islands which he took for the main shore. He decided to wait before exploring further, and returned to Saint Malo. In 1536, he set sail again and, passing through the Strait of Belle Isle, anchored on the 9th of August in Pillage Bay. He named this the Saint Lawrence, and the name was gradually given to the entire river. In the same year he took

possession of the mainland of Canada in the name of Francis I. The next year he sailed up the Saint Lawrence as far as the present Montreal. In 1541 he went out as captain-general in command of a first detach¬ ment of ships to prepare the way for Roberval, who had been named viceroy. Finding, how¬ ever, that his chief did not arrive, after he had waited some time, he returned to Saint Malo. The natives usually received him well, but when about to return from his second voyage he treacherously kidnapped Donnaconna, one of the chiefs, and some others, in order to show them in his native country. In 1544 he set out to bring Roberval back. From this time until his death he gave technical advice in nautical matters and acted as Portuguese interpreter. His book, < Discours du voyage fait par le capitaine Jacques Cartier aux terres neufves de Canada, y was published in 1598. A critical edition has been published by the University of Toronto and the best English version is that by James Phinney Baxter, published at Port¬ land, Me., 1906. *

CARTILAGE, one of the primary tissues of animal structures, of the connective-tissue class (q.v.), characterized by its peculiar base¬ ment substance. The most abundant form of cartilage is the hyaline variety, but there are also fibrous and fibro-elastic cartilages. Hya¬ line cartilage, particularly abundant on the ends of the bones, is whitish and translucent, firm and elastic. The cells are imbedded in an abundant homogeneous basement substance

which is made up largely of chondrin. Fibrous cartilage is less abundant, and its basement sub¬ stance is fibrillated. It is found about the in¬ tervertebral cartilage masses, about the joints and around the tendons of some of the larger muscles. The fibro-elastic form is found only in certain structures, — the epiglottis, the larynx, the Eustachian tube and in the external ear. Cartilage tissues protect the ends of the long bones by reason of their firm elasticity. They provide strong, firm and yet moveable structures, where bone, by reason of its rigidity, would not be serviceable, as in the epiglottis, larynx, *etc.* See Joints.

CARTON, Richard Claude, English actor and playwright : b. 1856. His real name is R. D. Critchett, and he early appeared in plays in Bristol and London. After being known as a collaborator with Cecil Raleigh on (The Great Pink Pearl > (1885) ; (The Pointsman) (1887); and (The Treasure) (1888), he pro¬ duced two original sentimental plays, Sun¬ light and Shadow) (1890) ; and (Liberty HalP (1892; revived New York 1913). Among his light comedies are (The Home Secretary) (1895); (The Tree of Knowledge) (1897); (Lord and Lady AlgyJ (1898)

; (The Ninth Waltz > (1900) ; (A Clean Slate > (1902) ; JThe Rich Mrs. Repton* (1904) ; (Lorrimer Sabiston, Dramatist* (1909) ; (The Bear Leaders) (1911) ; (A Busy Day > (1912).

CARTON, Sydney, the hero in Dickens' (Tale of Two Cities. >

CARTOON (It. cartone, from Lat. charta , paper) a term having various significations. In painting, it denotes a sketch on thick paper, pasteboard or other material, used as a model for a large picture, especially in fresco, oil, tapestry and sometimes in glass and mosaic. In fresco painting, cartoons are particularly use¬ ful, because in this a quick process is necessary, and a fault cannot easily be corrected. In ap¬ plying cartoons, the artist commonly traces them through, covering the back of the design with black-lead or red chalk; then, laying the picture on the wall or other matter, he passes lightly over each stroke of the design with a point, which leaves an impression of the color on the plate or wall ; or the outlines of the figures are pricked with a needle, and then, the cartoon being placed against the wall, a bag of coal-dust is drawn over the holes, in order to transfer the outlines to the wall. In fresco painting, the figures were formerly cut out and fixed firmly on the moist plaster. The painter then traced their contour with a pencil of wood or iron, so that the outlines of the figures ap¬ peared on the fresh plaster, with a slight but distinct impression, when the cartoon was taken away. In the manufacture of a certain kind of tapestry the figures are still cut out, and laid behind or under the woof, by which the artist directs his operations. In this case the cartoons must be colored. In very modern times the term is commonly applied to pictures caricatur¬ ing' notable characters or events of the moment. See Caricature and Caricaturists.

Among the most famous cartoons in exist¬ ence are those executed by Raphael for the celebrated tapestries of the Vatican, which were made at Arras, and hence called Arazzi. Two sets of these tapestries were ordered by Leo X, one for the Vatican and the other for pres-

entation to King Henry VIII. The second set, or fragments of it, are still in existence on the Continent. The cartoons lay for a time neglected at Arras, and have repeatedly fallen into neglect again, so that out of 25, the original number, only seven remain, and these have had to be restored. They were purchased at the advice of Rubens by Charles I about 1630. On the sale of his effects they were purchased by the order of Cromwell for the nation, but again fell into neglect in the time of Charles II. William III had them restored, and built a gal¬ lery for them at Hampton Court, where they remained, until in 1865 they were lent to the South Kensington Museum. The subjects of the seven are: (1) Paul Preaching at Athens; (2) The Death of Ananias; (3) Elymas the Sorcerer Struck with Blindness ; (4) Christ's Charge to Peter; (5) The Sacrifice at Lystra; (6) Peter and John Healing the Cripple at the Beautiful Gate of the Temple; (7) The Miraculous Draught of Fishes. The cartoons have been repeatedly engraved, among others by Dorigny, Holloway and Gribelin. They have also been extensively made known by photographs. Other celebrated surviving ex¬ amples are Mantegna's nine cartoons of the (Triumph of Julius Caesar,* now preserved at Hampton Court.

The cartoon of the School of Athens, car¬ ried to Paris by the French, and a fragment of the battle of Maxentius and Constantine, are preserved in the Ambrosian Gallery at Milan. There are, likewise, cartoons by Giulio Romano in the Sala Borgia, by Domenichino and other Italian masters, who caused their pictures to be executed, in a great degree, by their scholars, after these cartoons. The value set upon car¬ toons by the old Italian masters may be seen by Giovanni Armenini's (Precetti della Pittura) (1687). In later times large paintings, particu¬ larly in fresco, were not executed so frequently. The artists also labored with less care, and formed their great works more from small sketches. In modern times some German artists have prepared accurate cartoons. Among them is Cornelius, whose cartoons for his fresco paintings in Munich have acquired much celebrity. He prepared, too, a cartoon for the fresco picture representing (Joseph Interpret¬ ing the Dream. * Overbeck and Julius Schnorr may also be mentioned for their cartoons.

CARTOUCHE, kar-toosh, Louis Domi¬ nique, French robber: b. Paris about 1693; d. Chatelet, France, 28 Nov. 1721. He was the leader of a noted company of robbers, and being captured was broken alive on the wheel in 1721. His life has formed the subject of a modern French drama, and was formerly represented on the English stage. Consult Maurice, (Cartouche, histoire authentique> (Paris 1859).

CARTOUCHE, or CARTOUCH (French cartouche) . (1) A wooden case about three

inches thick at bottom, and girt round with marline, holding 200, 300 or 400 musket-balls, with 8 or 10 iron balls weighing one pound each, to be fired from a mortar, gun or how¬ itzer for the defense of a pass, retrenchment, *etc.* Such missiles have been superseded. In French military language cartouche signifies the entire charge of a firearm. (2) In archi¬ tecture, sculpture, etc., an ornament represent¬

ing a scroll of paper, being usually in the form of a table, or flat member, with wavings, where¬ on is some inscription or device. (3) The name given by the French literati to that oval ring or border which includes, in the Egyptian hieroglyphics, the names of persons of high distinction. (4) In heraldry a name given to a sort of oval shield, much used by the Popes and secular princes in Italy, and others, both clergy and laity, for painting or engraving their arms on.

CARTRIDGE, a case of paper, parchment, metal or flannel suited to the bore of firearms, and holding the exact charge, including, in the case of small arms, both powder and bullet (or shot). In loading with the old style of cart¬ ridge for muzzle-loading rifles before the Civil War, the paper over the powder was bitten or twisted off and the powder poured in, the bullet being then inserted and rammed home. In the first breech-loaders similar cartridges were used but trouble developed through the escape of gas from the breech to the mechanism and the metallic cartridge was developed to obviate this difficulty. At first copper was used, with the priming in the rim, but the danger of accidental discharge being very great the primer was placed opposite the centre of the head in a small cap outside the case, for which brass was now used. The cartridges used for breech¬ loading rifles contain the powder in a case of solid brass, and have the percussion-cap by which they are ignited fixed in the base. Such cases can be refilled and used a number of times in succession. Cartridges for shotguns are similar to those for rifles, but are usually of less solid construction, being commonly of strong paper with a base of metal. Those for large guns are usually made of flannel and con¬ tain only the powder, the projectile being loaded separately. Machine guns became possible after the advent of metallic small-arms am¬ munition, and in turn developed it. This kind of gun increased in calibre and fixed ammuni¬ tion continued to be used and many difficulties in manufacture were overcome. Cartridge cases now are generally drawn from one piece in dies, whether they are small or

large cases. Blank-cartridge is a cartridge without ball or shot. It is used for practice, salutes or signals. A dummy cartridge has no powder, and is used for drill purposes only. Cartridges for blasting are filled with dynamite or other ex¬ plosive. See Ammunition.

CARTRIDGE-PAPER, a thick paper originally made for the manufacture of cart¬ ridges, but extensively used in the arts, its rough surface giving it an advantage for drawing upon, as a wall paper and for other purposes.

CARTWRIGHT, Edmund, English cler¬ gyman and inventor: b. Marnham, Notting¬ hamshire, 24 April 1743; d.* Hastings, Sussex, 30 Oct. 1823. He was educated at University College, Oxford, and having taken orders in the Church, obtained first the living of Bramp¬ ton, near Chesterfield, and afterward that of Goadby-Marwood, in Leicestershire. It was, however, only after he had reached 40 years of age that his attention wasj, first turned to the subject on which his claim to remembrance is founded. In the summer of 1784 he began to investigate the subject of mechanical weaving,

and experiment regarding improvements. His efforts were crowned with success, and in April of the following year he brought his first power-loom into action. It was not, in fact, in respect of economy of labor, any advance upon the ordinary hand-loom; but the idea which subsequent improvements have carried so far in advance of hand-loom weaving was there. I he introduction of Cartwright's loom was opposed both by manufacturers and work¬ men; and the first mill erected for them, con¬ taining j)00 looms, was burned down. His at¬ tention once turned in the direction of mechan¬ ical improvement, he continued to make prog¬ ress in discovery. He not only perfected his power-loom, but took out 10 patents for dif¬ ferent inventions, among which was one for combing wool. He also assisted Robert Fulton in his steamboat experiments. He expended much of his means in these investigations, and in 1809 he received as an acknowledgment of their value a grant from Parliament of £10,000, which relieved him from straitened circum¬ stances, although, it is said, it did not cover his

expenditure. He also received premiums for various improvements from the Society of Arts and the Board of Agriculture. His life was published by his daughter (London 1843).

CARTWRIGHT, John, English reformer, brother of Edmund Cartwright (q.v.) : b. Marnham, Nottinghamshire, 17 Sept. 1740; d. London, 23 Sept. 1824. He entered the navy in 1758, and became a first lieutenant in 1766. In 1774 his attention was turned to politics. In his (Letters on American Independence* (In¬ dependence of America considered as supremely useful and glorious to Great Britain), written in this year, he advocated a union between the colonies and the mother state, under separate legislatures, and argued this great question on the foundation of natural, inherent right ; main¬ taining (<that the liberty of man is not derived •from charters, but from God, and that it' is original in every one.® In 1775 he was appointed major of the Nottinghamshire militia, and after several ineffectual attempts on the part of government to remove him from that post, his dismissal was finally accomplished in 1792, in consequence of an act of Parliament. In the American war Lord Howe was desirous of having him with him in America; but Major Cartwright, although always eager for pro¬ motion in the navy, refused the proposal, alleg¬ ing that he could not fight in a cause which he disapproved. From this time he devoted him¬ self to the favorite objects of annual parlia¬ ments and universal suffrage. He was the author of a Declaration of Rights, distributed by the Society for Constitutional Information. The French Revolution was warmly welcomed by Cartwright. In the trials of Tooke, Hardy, Thelwall and other reformers, Cartwright was present as a witness, and displayed much firm¬ ness and fearlessness. By his writings, public addresses, etc., he continued to promote the work of reform and constitutional liberty; and as late as 1820 was tried for conspiracy and sedition, for advising the inhabitants of Birm¬ ingham, which had then no parliamentary representative, to send what he called their ((legislatorial attorney® to the house; but he escaped with a fine of £100. Major Cartwright was not a political reformer only. The plan of making the slave-trade piracy is said to have

been first developed in his (Letters on the Slave-Irade. *A statue has been erected in London to his memory. A list of his writings has been edited by his niece, F. D. Cartwright, (The Life and Correspondence of Major Cartwright* (2 vols., London 1826).

CARTWRIGHT, Peter, American Metho¬ dist clergyman: b. Virginia, 1

Sept. 1785; d. near Pleasant Plains, Ill., 25 Sept. 1872. He was ordained in Kentucky in 1806, and in 1823 removed to Illinois, where he labored for nearly half a century. He also sat in the State legis¬ lature there, and in 1846 was defeated by Abra¬ ham Lincoln in an election for congressman. Admired for his eloquence and strong common sense, he was also loved for his quaint eccen¬ tricity of manner, and possessed great influence in his own denomination. He published many pamphlets, among which the best known is (Controversy with the DeviP (1853). Many of the stories of his adventures with the back¬ woodsmen are found in Eifty Years a Presid¬ ing Elder, *and (Autobiography of Peter Cart¬ wright* (New York 1856). Consult Stevens, Observations on Dr. Cartwright and the Backwoods Preacher* (London 1869).

CARTWRIGHT, Sir Richard John, Cana¬ dian statesman: b. Kingston, Ontario, 4 Dec. 1835 ; d. 24 Sept. 1912. He was educated at Trinity College, Dublin, and entered the Cana¬ dian Parliament in 1863 as a Conservative, but on account of a disagreement with Sir John A. Mac¬ donald joined the Liberal party. He was Minister of Finance from 1873 until 1878; and Minister of Trade and Commerce, 1896-1911. He was a member of the Joint High Commis¬ sion of 1897 appointed to settle outstanding questions with the United States, and was in favor of the establishment of freer trade rela¬ tions with that country. He was created G.C.M.G. in 1879.

CARTWRIGHT, Thomas, English Pu¬ ritan divine: b. Hertfordshire 1535; d. War¬ wick, 27 Dec. 1603. He studied theology at Cambridge and was elected to a scholarship at Saint John's College there in 1550. He was active in defending the new religious opinions then current at Cambridge. He withdrew in Mary's reign from the university and was a law clerk for a time. He suffered imprisonment and exile more than once for his nonconformist opinions. He was a learned man, and at one time professor of divinity at Cambridge. He made a visit to Geneva, where he met Theodore Beza. In 1572 he returned to England just at a time when intense excitement was being caused by the publication of (Admonition to the Parliament,* written by Field and Wilcox. Cartwright espoused the cause of the authors, who were imprisoned, and defended the book in a second (Admonition to the Parliament.* This was answered by Whitgift and was followed by another paper from Cartwright. The con¬ troversy led Hooker to publish his Ecclesias¬ tical Polity.* In 1573 Cartwright, learning of a warrant being issued for his arrest, fled to the Continent. His chief books are (A Confu¬ tation of the Rhenish Translation *; (Harmonia Evangelica) ; and a criticism of Hooker's Ecclesiastical Polity.) Consult Dexter, ˆCon¬ gregationalism J (New York 1880) ; Mullingcr, (Thomas*

Cartwright (In Diet. Nat. Biog., Vol. IX).

CARUCATE, kar'u-kat, in mediaeval times, as much land as one team could plow in the year. The size varied according to the nature of the soil and practice of husbandry in dif¬ ferent districts.

CARUPANO, ka-roo'pa-no, Venezuela, seaport of the state of Bermudez, on the north coast of the peninsula of Paria, with a light¬ house and good roadstead. The surrounding district is fertile, and has mines of copper, sul¬ phur, silver, lead and lignite. The city exports cotton, dyewoods, cocoa, coffee, fish, etc., and manufactures hats, ropes, soap, brandy, sugar and earthenware. Pop. about 9,000.

CARUS, ka-rus, Julius Victor, German

zoologist : b. Leipzig, 25 Aug. 1823 ; d. 1903. After studying at Leipzig, Wurzburg and Frei¬ burg, he became at the age of 26 keeper of the Oxford museum of comparative anatomy. In 1853, two years after his return to his native city, he was appointed professor of comparative anatomy and director of the Zoological Insti¬ tute there where subsequently he was made professor extraordinarius of zoology. Among his numerous writings are (System der tier-ischen Morphologie) (1853) ; (Handbuch der Zoologie) ; and (Geschichte der Zoologies He has translated most of Darwin's works into German and in 1878 became editor of the Zoologischer Anzeiger.

CARUS, Karl Gustav, German physician and physiologist: b. Leipzig, 3 Jan. 1789; d. Dresden, 28 July 1869. He became professor of obstetrics at the Medical Academy of Dres¬ den, and then royal physician, being subse¬ quently a privy councillor. He published a great number of writings covering a wide field of science, including medicine, physiology, anatomy, psychology, physics, painting, besides memoirs of his life. Among these are (System der Physiologie) (1838-40) ; (Lebenserinnerun-gen und Denkwiirdigkeiten5 (1865-66) ; (Lehr-buch der Zootomie) (1818) ; (t)ber den Blut-kreislauf der Insekten5 (1827) ; <Psyche)

(1851).

CARUS, Marcus Aurelius, Roman Em¬ peror: b. Nerona, Dalmatia, about 222 a.d. ; d. near Ctesiphon, Mesopotamia, 283. His father was an African and his mother a noble Roman lady. He was proclaimed emperor by the legions, on the assassination of Probus, 282. He caused justice to be executed upon the as¬ sassin. He gained a signal victory over the Sarmatians, and prosecuted the war against the Persians. Undertaking the campaign in mid¬ winter, and making a rapid march through Thrace and Asia Minor, he ravaged Mesopota¬ mia, made himself master of Seleucia and car¬ ried his arms beyond the Tigris.

CARUS, Paul, American philosophical writer: b. Ilsenburg, Germany, 18 July 1852. He was educated in the universities of Strassburg and Tubingen, and has been a resident of Chicago for several years, where he is editor of The Open Court and The Monist. Under his direction the Open Court Publishing Com¬ pany has done fine service in putting before the public valuable works on philosophy and religion. He has published (The Ethical Prob¬ lem } ; fundamental Problems) ; (The Soul of Man5 (1891); (Primer of Philosophy5 ; (Truth in Fiction5; (Monism and Meliorism5 (1891);

<The Religion of Science5 (1893) ; (The Philosophy of the Tool5 ; (Our Need of Philosophy5; (Science: a Religious Revela¬ tion5 ; (The Gospel of Buddha5 ; (Kanna5 ; (Nirvana5 ; (Homilies of Science5; (Chinese Philosophy”* ; (The Idea of a God5 ; (Buddhism and Its Christian Critics5 ; (The Dawn of a New Era5 ; (Kant and Spencer5 ; (The Nature of the State5 ; (The History of the Devil5 (1900) ; (Whence and Whither?5 ; (Eros and Psyche5; (God: an Inquiry into Man’s Highest Ideals5 (1908); (The Mechanistic Theory, and the non-Mechanical5 (1913) ; (The Principle of Relativity5 (1913) ; (Truth on Trial: a critique on Pragmatism5 ; (Philosophy as a Science5 ; (Goethe: the man and his work5; (Nietzsche; and other Exponents of Individualism5 (1914) ; (Venus and Woman as the Cosmic Principle.5

CARUSO, Enrico, Italian operatic tenor: b. Naples, 25 Feb. 1873; d. there 2 Aug. 1921. At the age of 11 he began singing in the churches of his native city. He studied under Guglielmo Vergine and, also, was a pupil of Lamperti and Concone. He made his debut in (L’Amico Francesco5 at the Teatro Nuovo, Naples, in 1895, but achieved his

first real suc¬ cess as Marcello in (La Boheme5 at the Teatro Lirico, Milan, 8 Nov. 1898. He toured Italy and Sicily and was engaged for four seasons at La Scala, Milan. He also filled engagements in Egypt, Paris, Berlin, Buenos Aires, Rio Janeiro and various other capitals. Everywhere he was acclaimed one of the most promising tenors Italy had produced. His American debut was made 23 Nov. 1903 as the Duke in (Rigoletto5 at the Metropolitan Opera House, New York City. From that day his success was assured. Called by many <(the greatest voice of his century,55 no other singer of his day, perhaps no _ other musician, approached him in popu¬ larity. Year after year he was the chief attrac¬ tion at the Metropolitan Opera House. His repertoire included more than 40 operas, among* them (Rigoletto,5 (Trovatore,5 (Traviata,5 <Forza del Distino,5 (Masked Ball,5 (Pagliacco,5 <Manon Lescaut, fa Gioconda,5 (Lucia 5 and (Le Prophete.5 His last appearance on the stage was in (La Juive5 at the Metropolitan Opera House 24 Dec. 1920. He was ill at the time.

CARUTTI DI CANTOGNO, ka-rut'te de kan-ton'yo, Domenico, Baron, Italian historian and publicist: b. Cumiana, 26 Nov. 1821; d. Turin, 1909. As a young man he took to romance writing, but was speedily absorbed in politics and rose to great distinction. When he resumed the pen, it was to compile such solid works as cHistory of the Reign of Victor Amadeus II5 (1856) and (History of the Reign of Charles Emmanuel IIP (1859), which are in¬ teresting and scholarly. In 1884 he became president of the Royal Commission on the Study of National History at Turin and in 1889 was made senator of the kingdom. Other works, in addition to those mentioned above, are (History of the Diplomacy of the House of Savoy5 (Turin 1876) ; fount Um¬ berto I5 (Florence 1878) ; (Poems5 (Rome 1872) and an essay on Propertius.

CARVAJAL, kar-va-hal', Gaspar de,

Spanish missionary: b. Spain, early in the 16th century; d. Lima, Peru, 1584. He entered the Dominican order and went to Peru in 1533.

In 1538 he accompanied the expedition of Gonzalo Pizarro to the countries east of the Quito as chaplain. He was appointed subprior of the convent of San Rosario at Lima; after the pacification of Peru he was sent to the mission of lucuman and after working among the Indians there was made vicar-national of the province of Tucuman. With the aid of the Dominicans, whom he brought into the country, he established several Indian towns and Span¬ ish colonies. He wrote (Descubrimiento del Rio de las Amazonas) unedited until 1894.

CARVAJAL, Tomas Jose Gonzales,

Spanish statesman and author : b. Seville, 21 Dec. 1753; d. 9 Nov. 1834. He was educated in Seville, where he studied theology and juris¬ prudence, becoming also famed as a Latinist. He was appointed in 1795 governor of the new colonies in Sierra Morena and Andalusia, and protested against the French invasion of Spain in 1808. From 1809 to 1811 he served as com¬ missary in the Spanish army against Bonaparte ; in 1813 became Minister of Finance; relin¬ quished these offices to assume the directorship of the Royal University of Isidro, where he be¬ came involved in difficulties by establishing a professorship of constitutional law. He was arrested and detained in prison from 1815 to 1820, when the revolution reinstated him at San Isidro. A counter revolution brought his opponents into power, and he was exiled from 1823 to 1827. However, at the time of his death he was member of the supreme council of war, of the military department of the Span¬ ish and Indian boards and a grandee of Spain. He learned Hebrew at the age of 57 in order to translate the Psalms. This translation has gained for him a high reputation for poetical power. He also wrote metrical translations of the other poetical books of the Bible and other works in prose and verse, of which the high quality brought him membership in the Real Academia Espanola and in the Real Academia de la Historia. The Spanish Academy included his name in the (Catalogo de autoridades de la lengua CastellanaP

CARVALHO, kar-val'yo, Jose da Silva,

Portuguese statesman: b. Beira 1782; d. 3 Feb. 1845. He studied law at the University of Coimbra, and became a judge in 1810. His prominent part in the revolution of 1820 caused him to become a member of the provisional government. He was a member of the regency and appointed Minister of Justice until 1823, when, on the downfall of the constitutional government, of which he was a foremost cham¬ pion, he was obliged to resort to flight to Eng¬ land, where he remained until 1826, when he returned to Lisbon, but Dom

Miguel's success again compelled him to leave. Eventually he was named a member of the council of guard¬ ianship instituted by Dom Pedro for the young Queen, Donna Maria, and succeeded in nego¬ tiating the first English loan for Portugal. Having accompanied Dom Pedro to the Azores, he filled, on his return to Portugal, important offices, and became Finance Minister in 1832. In 1835 he retired with the Palmella administra¬ tion, and was presently obliged to leave for Eng¬ land, where he remained until 1838, when a general amnesty was proclaimed. He returned in 1842. When the constitution of Dom Pedro was re-established, he became councillor of state.

CARVALHO, Paez de Andrade, Manoel de, Brazilian politician: b. about 1795; d. Rio de Janeiro, 18 June 1855. Elected temporary President of Pernambuco in December 1823, he led a revolt the next year against Pedro I, the Emperor, and on 2 July 1824 announced a re¬ public entitled (Confederagao do EquadorP On the suppression of the revolt in October, Carvalho fled to England, but subsequently returned to Brazil and was a senator from

1835.

CARVELL, Frank Broadstreet, Canadian legislator : b. Bloomfield, County Carleton, New Brunswick, 14 Aug. 1862. He was graduated LL.B. at Boston University in 1890, and called to the bar of his native province in the same year. He represented Carleton in the provincial assembly as a Liberal, 1899-1900; resigned his seat in the latter year to contest (unsuccessfully) the same county for the Dominion House of Commons, but was elected in 1904 and has since retained the seat. He made his mark in the House in the debates on the administration of the Militia Department under the Borden government during the Great War, and his searching criticisms on the subject were followed by investigation by a commission appointed by Parliament but he supported (1917) the principle of compulsory military service with which that government identified itself, and on that question voted against his leader, Sir Wilfrid Laurier. In October 1917 he became Minister of Public Works in the Union government of Sir Robert Borden.

CARVER, John, first governor of the Ply¬ mouth colony: b. England, about 1575; d. Ply¬ mouth, Mass., April 1621. He joined the Leyden colony of English exiles about 1608, and as their agent assisted in

securing a char¬ ter from the Virginia Company and in select¬ ing and equipping the Mayflower. He was elected governor, probably 11 Nov. 1620, after the Mayflower reached Provincetown, showed great ability and judgment in governing the infant colony after the landing at Plymouth, and established by a treaty with the Indians peaceful relations that remained for many years undisturbed. He was reelected in March 1621, but died a few days afterward. His chair and sword are still preserved as Pilgrim relics.

CARVER, Jonathan, American traveler: b. Stillwater, N. Y. (the universal ascription to Connecticut is an error), 1732; d. London 1780. He embraced a military career, and in the French War of 1756 commanded a company of provincials, in the expedition across the lakes against Canada. When peace was concluded in 1763, Carver undertook to explore the vast ter¬ ritory which Great Britain had gained. His object was to acquire a knowledge of the manners, customs, languages, soil and natural productions of the nations and region beyond the Mississippi, and to ascertain the breadth of the continent by penetrating to the Pacific over its widest part, between lat. 43° and 46 N. He accordingly set out from Boston in 1766, and having reached Michilimackinac, the remotest English post, applied to Mr. Rogers, the governor, for an assortment of goods as presents for the Indians dwelling in the parts through which his course was to be directed. Receiving a portion of the supply which he

desired, and a promise that the residue should be sent to him at the falls of Saint Anthony, he continued his journey. But not obtaining the goods at the appointed place, owing to their disposal elsewhere, after exploring the Minne¬ sota River over 200 miles west of the Falls, he was forced to return to La Prairie du Chien. ˆ He then, in the beginning of the year 1767, directed his steps northward, with a view of finding a communication from the heads of the Mississippi into

Lake Superior, in order to meet, at the grand port¬ age on the northwest side of that lake, the traders that usually came about this season from Michilimackinac, from whom he intended to purchase goods, and then to pursue his journey. He reached Lake Superior in good time ; but unfortunately the traders whom he met there could not furnish him with any goods, as they had barely enough for their own purposes, and, in consequence, he was obliged to return to the place whence he first departed, which he did in October 1768, after remaining some months on the north and east borders of Lake Superior, and exploring the bays and rivers that empty themselves into that body of water. He soon after repaired to England with the view of publishing his journal and charts, and of ob¬ taining reimbursement for the expenses which he had incurred. Having undergone a long ex¬ amination before the lords commissioners of trade and plantations, he received permission to publish his papers ; but when they were nearly ready for the press an order was issued from the council-board, requiring him to deliver im¬ mediately into the plantation office all his charts and journals. He was, consequently, obliged to repurchase them at a great expense from the bookseller to whom he had disposed of them — a loss for which he received no indemnification, but was forced to be satisfied with that obtained for his other expenses. He had fortunately kept copies of his papers, and he published them 10 years afterward in Boston, while in the situation of a clerk of a -lottery. His works are (Travels Through the Interior Parts of North America) (1778); (Treatise on the Culture of the Tobacco Plant5 (1779) ; (The New Universal Traveler5 ; (Literary History of the American Revolution.5 Consult (The Carver Centenary5 (1867 published by the Minnesota Historical Society) ; Bourne, E. G. (in the American Historical Review , January

1906).

CARVER, Thomas Nixon, American

economist : b. Kirkville, Io-wa, 25 March 1865. He studied at Iowa Wesleyan University, the University of Southern California, Johns Hop¬ kins and Cornell ; was professor of economics at Oberlin College from 1894 to 1900, when he became assistant professor of political economy at Harvard University and full professor in 1902. In 1913 he was given charge of the rural organization service of the Department of Agriculture to investigate the marketing and distribution of farm products. A frequent con¬ tributor to economic reviews, his published works include (The Theory of Wages adjusted to Recent Theories of

Value5 (1894) ; (The Distribution of Wealth5 (1904) ; Sociology and Social Progress5 (1905) ; Principles of Rural Economics5 (1911); (The Religion Worth Having5 (1911-12).

CARVING, as a branch of sculpture, the art of cutting a hard material by means of a sharp instrument : but there are extended uses of the term, as shown below.

The term is generally employed for work which is strictly decorative as distinguished from grand sculpture ; thus the wrought stone leafage, scroll work and even animal forms in a Gothic porch, are carving in common parlance, and so are the human figures of the porch if they are conventional or stiff, as often happens in mediaeval work. In a Roman temple or a neo-classic edifice the leafage of Corinthian capitals or of any panel or string-course would be called carving , while the statues and even the reliefs of human subjects would be spoken of as sculpture (q.v.). Small pieces, even of human subjects, such as decorative statuettes and groups, are spoken of as carving, and these may be wrought in wood, ivory, bone, marble, and other stones, and even in hard and semi¬ precious stones, such as agate and jade. The carvings of the Chinese and Japanese are espe¬ cially in demand in Western lands, because of their picturesque beauty. When they are of wood they are often painted, gilded or lacquered with a rich polychromatic effect.

Throughout the middle ages of Europe, ivory statuettes, backs of mirrors and purely orna¬ mental objects were treated in the same way, the carving being helped out by color and gold with extraordinary results.

Carving, when done in very hard material, such as rock crystal and jade, requires much use of the drill, in which case the meaning of the term must be extended to include the result produced by a rapidly revolving pin with emery powder or the like. One of the most ingenious and useful purposes to which carving has been converted in more modern times is that of en¬ graving woodcuts or blocks for printing. (See Wood-Engraving). Carving has been applied to almost innumerable uses in manufactures as well as in art. Some of these applications have given way to the art of engraving in metal and other processes, but new ones are continually arising. The first carving-machine was in¬ vented about 1800, and many others have since been patented.

CARY, Alice, American poet : b. near Cin¬ cinnati, Ohio, 26 April 1820; d. New York, 12 Feb. 1871. When quite young she began writing sketches and poems for the press, and in 1852 she, with her sister, Phoebe (q.v.), removed to New York, where they lived during the rest of their lives. In 1850 the sisters published a volume entitled (Poems by Alice and Phoebe Cary.5 Alice soon after published (Clovernook, or Recollections of Our Neighborhood in the West5 (1851-53) ; (Lyra, and Other Poems5 (1853) ; (Hagar, a Story of To-dav5 (1852) ; (Married, not Mated,5 -a novel (1856) ; (Lyrics and Hymns5 ; (The Bishop's Son5 ; <The Lover's Diary5 (1867) ; and (Snow Ber¬ ries : A Book for Young Folks5 (1869). The verse of the Cary sisters still retains a hold upon the affections of readers and not a few lines of theirs have become familiarized by frequent quotation. While living in New York they attracted about them a circle of liter¬ ary people, and for 15 years their Sunday even¬ ing receptions were a feature in the literary life of the city. Consult Ames, Mary C.,

(Memorial of Alice and Phcebe Cary) (New York 1873).

CARY, Annie Louise, American singer: b. Wayne, Me., 22 Oct. 1842; d. 4 April 1921. Studied in Milan, made operatic debut in Copen¬ hagen in 1868, had a successful European career for three years, and returned in 1870 to the United States, where she won great popularity and remained, with the exception of one brilliant European tour, until 1882, when she married Charles M. Raymond, and retired from the stage while her voice was still unimpaired. Since then she has sung only in private or for charity. She created, in New York, the part of Amneris in (A'ida) (1873).

CARY, Archibald, American statesman : b. Virginia, about 1730; d. Chesterfield, Va., Sep¬ tember 1786. He early became a member of the House of Burgesses, and in 1764 served on the committee which reported the address to the King, Lords and Commons, on the principles of taxation; and in 1770 was one of the signers of the ((Mercantile Association, which pledged its members to use no British fabrics thereafter, the design being to resist by practical measures the

encroachments of the government. In 1773 he was one of the celebrated committee of cor¬ respondence by which the colonies were united into one great league against Parliament. When the State government was organized he was re¬ turned to the senate, where he presided with great dignity and efficiency. At this time oc¬ curred the incident with which his name is most generally connected. The scheme of a dicta¬ torship had been broached, and without his knowledge or consent Patrick Henry was spoken of for the post. In the midst of the general agitation Cary met Henry's half-brother in the lobby of the assembly, and said to him : (<Sir, I am told that your brother wishes to be dictator. Tell him from me, that the day of his appointment shall be the day of his death, for he shall find my dagger in his heart before the sunset of that dayA The project was speedily abandoned. He was a good representative of the former race of Virginia planters, delighting in agricultural pursuits, in blooded horses and improved breeds of cattle, which he imported from England, and attended to with great care.

CARY, Henry Francis, English clergy¬ man, translator of Dante : b. Gibraltar, Spain, 6 Dec. 1772; d. London, 14 Aug. 1844. In 1790 he entered Christ Church, Oxford, and he took orders in 1796. In 1796 he was presented to the vicarage of Abbot's Bromley, Staffordshire, and in 1800 he removed to Kingsbury, in War¬ wickshire, another living to which he had been presented. His studies while at college had em¬ braced a wide range of Italian, French and English literature, and in 1805 he gave proof of his Italian scholarship, as well as of his poetic powers, by the publication of the (Inferno) of Dante in English blank-verse, accompanied by the Italian text. The entire translation of the (Divina Commedia) was accomplished in 1814, and the work was now published complete, but it lay unnoticed for several years, till Samuel Taylor Coleridge drew attention to its merits. It has since been recognized as a standard Eng¬ lish work. Cary subsequently translated the <Birds) of Aristophanes (1824), and the (Odes) of Pindar, and wrote a continuation of John¬ son's (Lives of the English Poets, > and a series

of (Lives of Early French Poets.) He was for some time curate of the Savoy, London, and in. 1826 was appointed assistant keeper of printed books in the British Museum, which office he resigned in consequence of his being passed by on the appointment of Mr. Panizzi in 1837 to the office of keeper of the printed books. The government in 1841 granted him a pension of £200 a year as a recognition of his literary abilities, and he devoted himself hence¬ forth to the annotation of a

new edition of his translation of Dante, and to editions of the English poets, Pope, Cowper, Milton, Young, *etc.* He was buried in Westminster Abbey. His son, Henry Cary, has written a (Memoir > (London 1847).

CARY, Lott, American negro slave : b. Vir¬ ginia 1780; d. Africa 1828. He educated him¬ self, became a Baptist minister, purchased the freedom of himself and his two children for $850, and joined the colony sent in 1822 to Liberia, where he performed inestimable serv¬ ices in behalf of the new republic. He was act¬ ing as vice-agent with full power when he was accidentally killed while making cartridges for defense against the slave traders.

CARY, Lucius. See Falkland.

CARY, Phoebe, American poet and prose-writer, sister of Alice Cary (q.v.) : b. Cincin¬ nati, Ohio, 4 Sept. 1824; d. Newport, R. I., 31 July 1871. She contributed numerous sketches to various periodicals ; and with her sister pub¬ lished several books, among which are (Poems and Parodies) (1854); and (Poems of Faith, Hope and LoveP She will be longest remem¬ bered as the author of the popular hymn be¬ ginning, (One Sweetly Solemn Thought. 5 Consult Trent, (A History of American Literature) (New York 1903).

CARY REBELLION, in North Carolina, an outcome of the religious and political dis¬ turbances set going by the constitution of Locke and Shaftesbury, whose laws and discrimina¬ tions survived itself. (See Carolina, Original Constitution of). One of these, requiring an oath to support the constitution and laws, de¬ barred the Quakers (who were among the most influential of the early settlers, and by no means inclined to submit peaceably to oppres¬ sion) from voting or holding office, or being witnesses in criminal suits. The establishment of and taxation for the Church of England was a common grievance to all the colony, nearly all its population being dissenters ; and there were other obnoxious ordinances. At this time Albemarle County (North Carolina) had its separate deputy governor, appointed by the governor of the entire colony; and in 1704 Sir Nathaniel Johnson so appointed Robert Daniel, a churchman, and Uandgrave® or hereditary noble and councillor. He tried to enforce the laws; and one John Porter, an influential Quaker, shortly went to England to complain of him and of vexatious legislation against his sect. One of the proprietors, John Archdale (q.v.), ex-governor, was himself a Quaker, and induced the other proprietors to remove Daniel ; and Johnson appointed Thomas Cary, a Car¬ olina merchant, said to have been Archdale's son-in-law, in his place. Cary, however, felt bound to enforce the laws, and again

the Quakers complained. Cary was removed (the

accepted account says he was in ill odor with ihe proprietors for having been short in his accounts as collector of revenue for them) ; and this time the appointment of a deputy for Albemarle was taken from the governor, and a new proprietary council formed, with Porter and several other Quakers on it. On Porter's return to America in 1707, he convened the council, which elected William Glover, a churchman, president. Glover insisted on en¬ forcement of the laws as before, and Porter's party turned against him, declared his election illegal, struck a bargain with Cary and elected him president in Glover's place. Glover and his section refused to recognize the validity of the new election, and held their meetings in one room of the executive mansion, while Cary and his councillors met in the other. Daniel, as a landgrave, was ipso facto a councillor, and sat alternately in both. Each party issued writs for election to the assembly, and it seems to have held without formal recognition of either ; but Cary's party held the majority. In 1710 Edward Hyde, a relative of Clarendon's, was appointed deputy governor by the proprietors, and came out in August 1710 to assume office. Elis commission was to be taken from Tynte, who had succeeded Johnson; but Tynte had died, and Hyde had only his letters from the proprietors to show. The Cary party, how¬ ever, was glad to acknowledge him so long as it held the power and he confirmed it; but the next assembly was held by its enemies ; Hyde apparently aided it in enforcing the laws in favor of the Church, and Cary's party promptly refused to acknowledge his authority and made open war on him. Cary attacked Edenton with two armed vessels, but was repulsed, and Hyde called on Governor Spotswood of Virginia for help. Spotswood admitted that the revolters were (<dangerous incendiaries,® but said the country was almost inaccessible, and he had only militia; but finally sent some of his marines from the guard-ships at Hampton Roads. Cary, with his chief men, Levy, Truitt, etc., thereupon went to Virginia, apparently for temporary refuge, declaring that they would go to England and appeal to the proprietors. Spotswood took them at their word, and sent them,

seemingly against their will, to England ; and they disappear from history. That they were discharged, however, is apparent from a circular letter of Lord Dartmouth to the colo¬ nies, at this juncture, to sefid no more prisoners to England for trial without proof of their guilt. At home, the burgesses refused to pro¬ vide for the defense of the colony unless they could have share in the government and what they held to be their rights; and the result was a fearful desolation in a war which soon broke out with the Tuscaroras.

CARYATIDES, or CARYATIDS, kar-i- at'i-dez, in architecture, a name used to desig¬ nate female figures made to support a roof, cornice, etc., instead of columns. The goddess Artemis (Diana), who had a temple in Caryse, a Peloponnesian city, was for this reason called Karyatis. In honor of her, virgins danced in a festive procession during an annual feast, which suggested to architects the idea of adopting the images of virgins to serve as columns. Thus Lessing and others explain the name and form of the caryatides. Another explanation of their origin is the following: The inhabitants of

Caryie allied themselves with the Persians in their war with the Greeks. The Greeks, on the successful termination of that struggle, exter¬ minated the males of Caryse, and reduced all the women to slavery. As a mark of infamy, and to perpetuate the memory of the transaction, the architects of the time made statues repre¬ senting these women in the servile office of sup¬ porting entablatures. The figures are distin¬ guished by gracefulness and quiet dignity of pose. There are fine examples in the Erectheum at Athens and British Muse¬ um. Consult Homolle, in Bulletin de Cor-rcspondance hellenique (Vols. XXIII, XXIV, Paris 1899).

CARYOCAR, ka-ri'6-kar, a genus of plants belonging to the family Caryocaracece, consisting of lofty trees, natives of tropical America, which produce good timber. They have evergreen, ternate or pinnate leaves, and flowers in racemes. C. nuciferum, a species abundant in British Guiana, yields the kidney¬ shaped souari-nuts, or butternuts. Other spe¬ cies are C. glabrum and C. amygdaliferum.

CARYOPSIS, the small, peculiar, one—

seeded, dry indehiscent fruit of the grasses, as wheat, barley, *etc.*

CAR YOTA, a genus of palms, with doubly pinnate leaves, the best-known species of which (C. urens) is a native of most of tropical Asia.

It supplies an inferior kind of sago, and from its juice is made toddy or palm-wine. The leaf-stalks yield kittul fibre, which is used in making baskets, brooms, *etc.*

CARYSFORT REEF, a dangerous coral reef near the southern extremity of Florida, lat. 25° 13’ N., long. 80° 13’ W., lying about five miles east of Key Largo, on which is erected a lighthouse of the first order, 106 feet high.

CASA, ka’ za, Giovanni della, Italian

writer: b. Mugello, near Florence, 1503; d. Rome, 14 Nov. 1566. He studied in Bologna, Florence and Rome, and entered as an eccle-siatic into the service of the two cardinals Alessandro Farnese, the first of whom in 1534 ascended the papal chair, under the name of Paul III. He rose through various offices in the Church, including the archbishopric of Benevento, till Paul IV made him his private secretary. His most celebrated work is (Galateo, ovvero de’ CostumP (1560), a manual of good-breeding, to which another book, <Degli Uffizi communi tra gli Amici Superiori e In¬ ferior^ forms a supplement. This last is a translation of his Latin treatise, (De Officiis Inter Potentiores et Tenuiores AmicosP The best and most complete edition of his works ap¬ peared at Venice (1752).

CASA BRACCIO, brach’o, Italian ro¬ mance, by Francis Marion Crawford, published 1896. The first half of the novel is much the better.

CASA GRANDE, gran’da, or the Casa

Grande Ruin (see National Parks and Monuments), the Spanish name (signifying ((large house®) of the ruins of a prehistoric building in Arizona, near the Gila River, about 12 miles from Florence, Ariz., and somewhat farther from the Casa Grande station. It is the best-preserved structure of a type which was widely distributed. The space enclosed by

the walls now standing measures about 43 by 59 feet ; and the walls, which are high, show that there were three habitable stories. A large area surrounding this building is covered with mounds and debris of other buildings, indicat¬ ing that there was originally a considerable settlement on the site. It was set aside, as the most interesting object in a small reservation, by executive order dated 22 June 1892, under the act approved 2 March 1889. By presidential proclamation of 10 Dec. 1909 the boundaries of the reservation were changed by the elimina¬ tion of 120 acres on which there were no pre¬ historic ruins and the inclusion of a tract of equal size adjoining the reservation on the east, on which are located mounds of historic and scientific interest. Casa Grande was a ruin when discovered. Since that time the identity of its builders has furnished a theme for spec¬ ulation ; and although it has been ascribed to the Aztec, the better opinion seems to be that the ancient people who inhabited this building were not closely related to any tribes of the Mexican plateau, whose culture was different from that of the sedentary tribes of Arizona. The walls are of a fawn color slightly tinged with red. They are constructed of a cement called caliche, composed of lime, earth and pebbles ; this was made into blocks, which were laid in courses. Consult Fewkes, J. W., de¬ tailed report in Twenty-eighth Annual Report Bureau American Ethnology.

CASABIANCA, ka-za-be-an'ka, Louis, French naval officer: b. Bastia, Corsica, 1755; d. 1 Aug. 1798. With the Comte de Grasse, he took part in the American Revolution. He sat in the National Convention of 1792; and in 1798 was captain of the flagship L' Orient in the expedition to Egypt. He was mortally wounded at the battle of the Nile, 1 Aug. 1798; the ship caught fire; his 10-year-old son would not leave him, and both were killed by the ex¬ ploding of the ship. The story of their death is the subject of Mrs. Hemans' well-known poem.

CASAL, ka-sal', Julian del, Cuban poet: b. 1863; d. 1893. He was a half morbid striver after the super-aesthetic and a pronounced lover of the luxury and elegance of the Orient and of Paris. Endowed with a fervid imagination and a strongly poetic touch he found followers not only in Cuba, but throughout Latin America, and later in Spain itself. None of the countries that he loved and whose manners and customs and modes of thought he imitated, had he ever visited. Highly colored were his mental pictures of them, by wonderful visions from the land of imagination and of dreams in which he lived. Yet, with all his love of beauty, luxury and elegance, he was very much a pessimist and his discontent with life finds constant expression in his writings. He handled the sonnet with a master-hand and made it do duty in picturing the many phases of life into which his active imagination

constantly led him. His work covers a wide variety of subjects, ranging from clear-cut pictures of heroic characters of classi¬ cal Greece, to sketches of native life in Havana, in prose and poetry, and side-stepping at times into politics, society and biography. Casal was an intimate friend of Ruben Dario, the Nicara¬ guan poet and leader of poetic thought through¬ out Latin America from 1895 to 1915; and the latter borrowed a number of his reactory

ideas from the young Cuban poet, whose writ¬ ings in La Habana Elegante and other periodi¬ cals had early made him the leading figure of his day in Cuban literature. Among Casal's published work are (Hojas al Viento) (1890) ; (Nieve> (1891) ; (Bustos y Rimas) (prose, 1893). In a study of Jaris Karl Huysmans, he displays his critical ability and his love of the exotic and sensuous. Consult Meza, Ramon, (Julian del CaseP (Havana 1910).

CASAL, or CAZAL, Manoel Ayres de.

See Cazal.

CASALE, ka-sa-le, or CASALE DE MONFERRATO, Italy, city in the province of Alessandria, on the right bank of the Po, 18 miles north-northwest of Alessandria. The citadel, founded by Duke Vicenzo in 1590, was one of the strongest in Italy, and within recent years the fortifications have been greatly strengthened and extended. In 1640 the Spaniards were defeated here by the Due d'Harcourt, and the possession of the town was repeatedly contested by the Austrians and French during the wars of Napoleon. Casale was the capital of the ancient Montferrat. It is the seat of a bishop ar.d of a district court of justice, and has a cathedral which is said to have been founded in the 8th century. Its church of San Domenico, containing a tomb in memory of the Princess Palaeologi, is re¬ markable for the elegance of its design, and several fine works of art are found in other of its churches. The mediaeval history of Casale goes back to its settlement in 730 by Lintprand, on the site of the ancient Roman city Bodincomagus. The church of San Ilario replaced the former pagan temple of worship which stood here. In 1215 Casale was almost totally destroyed by its neighbors, but in 1220 was rebuilt and in 1292 became the property of the marquises of Montferrat. Modern Casale has tramway communication with the neighbor¬ hood and nearby is the famous Sacro Monte di Crea with its 18 chapels. Cement, liqueurs, silk, fertilizers, tools and machinery, constitute the chief industries. Pop. about 34,000.

CASALE PUSTERLENGO, pus-ter-len'- go, Italy, town in the province of Milan, south¬ east of Lodi, beautifully situated in a fine plain between the Po and the Adda. It has a trade in Parmesan cheese. In 1796 the Austrians were attacked here by the French, and driven back to Lodi. Pop. 7,000.

CASALMAGGIORE, ka-sal-mad-jo're, Italy, a town in the province of Cremona, 15 miles north of Parma, and 22 miles southeast of the city of Cremona (with which there is railway connection), on the left bank of the Po. There are a cathedral and other churches, theatre, *etc.* The manufactures include pottery and glassware, leather and chemicals; and there is a trade in wine, grain, hemp and cheese. In 1448 the Venetians were defeated here by Francesco Sforza. Pop. 17,500.

CASALS, Pablo, Spanish violoncellist : b. Vendrell, Catalonia, 1876. He studied at Barcelona with Garcia and Rodereda, and in 1894 in Madrid with Breton. He made his debut in 1898 at one of the Concerts Lamoureux in Paris. His success was immediate and he devoted himself to the concert stage. He has

toured Europe and both North and South America where he has been met with much acclaim. His interpretation is excellent and his technique perfect. As a composer, he has won recognition with two symphonic poems, several smaller works for orchestra and numer¬ ous pieces for piano and 'cello and for piano and violin.

CASAMICCIOLA, ka-sa-me'cho-la, Italy, favorite watering-place on the island of Ischia, beautifully situated in a valley on the north side of Monte Epomeo, with hot springs (158° F.), baths, hotels, *etc.* The season ex¬ tends from June to September. By the earth¬ quake of 28 July 1883, the place was almost entirely destroyed, and even at present, al¬ though the government has aided in its rebuild¬ ing, a considerable part of the town is in ruins. Pop. (1911) 3,490.

CASANARE, ka-za-na're, a river of the Republic of Colombia, which rises in the moun¬ tains of Chita, flows through a region called by the

same name, and after an easterly course of 180 miles empties into the Meta, lat. 5° 58’ N. It is navigable for small craft.

CASANOVA, ka -sa-no’va, Francesco, Italian painter: b. London 1727; d. Briihl, near Vienna, 1805. He studied in Florence under Simonini. He went to Venice with his parents, was in Paris in 1751, but after a brief stay went to Dresden, where he remained from 1752-56. Here he studied and copied the paint¬ ings of Wouverman. He acquired renown as a painter of battle pieces, and was admitted to the Academy of Fine Arts in 1763. Catherine II of Russia employed him to paint her vic¬ tories over the Turks. He settled in Vienna in 1785, and the gallery there contains several of his paintings. At Paris he was painter to the King. Among his pictures are (The Battle of Freiburg, } (Hannibal Crossing the Alps} and (The Battle of Lyons.)

CASANOVA DE SEINGALT, ka-sa- no’va de san-gal, Giovanni Giacomo, Italian adventurer: b. Venice, 2 March 1725; d. Dux, Bohemia, 4 June 1798. The year of his death is uncertain, some maintaining that he lived until 1803. He was the son of an actor and actress ; he studied law at Padua, but gave this up to study for the priesthood. He was ex¬ pelled from the Seminary of Saint Cyprian for a scandalous intrigue, and was also imprisoned for a short time. The influence of his mother procured him a place in the establishment of Cardinal Acquaviva, but he did not retain it long; and after visiting Rome, Naples, Corfu and Constantinople, in the characters of diplo¬ matist, preacher, abbot, lawyer and charlatan, he was imprisoned at Venice in 1755, but es¬ caped owing to his wonderful keenness and skill. In his travels throughout Europe he formed associations with many distinguished characters, Louis XV, Rousseau, Voltaire, Suvaroff, Frederick the Great and Catherine II. Plis most celebrated work is his (Memoirs } (1828-38), in which he relates with a cynical freedom the whole of his extraordinary adven¬ tures, and presents a picture of society without conventional disguise. Among his dupes were *Mme.* de Pompadour, Frederick the Great, and even that other prince of charlatans, Cagliostro.

Besides his (Memoirs, > Casanova was the author of several works of history or imagina¬ tion in French and Italian, which show the ver¬ satility of his genius. The most remarkable are (Recit de sa Captivite) (1788), and a trans¬ lation in verse of the Iliad. His (Memoirs } are now recognized as of important historical value as a portrayal of private life in the 18th century. A complete critical edition is in preparation by Brockhaus of Leipzig from the original text. The

general reliability of the (Memoirs) is attested by (Lettre di donne a G. Casanova, > edited by Rava (Milan 1912). Consult Rava, (Contribute alia bibliographia di G. Casanova) (Turin 1910) ; Maynial, (Casanova et son temps* (Paris 1911) ; Symonds, (Casanova at Diix) (in North American Review, 1902).

CASARTELLI, Louis Charles, English Roman Catholic prelate and writer : b. Man¬ chester, England, 14 Nov. 1852. He was edu¬ cated at the Salford Grammar School, Ushaw College and Louvain University. He was ordained to the priesthood in 1876; was pro¬ fessor at Saint Bede's College, Manchester, 1877-91, and was rector there from 1891-1903. He edited Illustrated Catholic Missions in 1889-1903 and from 1900-03 was professor of Zend and Pahlavi languages at Louvain Uni¬ versity. In 1903 he was consecrated bishop of Salford. He has been lecturer on Iranian lan¬ guages at Manchester University. In 1908-10 he was president of the Dante Society of Man¬ chester and of the Manchester Egyptian Asso¬ ciation. He represented the universities of London and Manchester at the jubilee of Lou¬ vain University. He is president of the Man¬ chester Oriental Society and member of the Royal Asiatic Society. He has published (Lectures on Commercial Geography* (1884) ; (La philosophic religieuse du Mazdeisme sous les Sassanides* (1884) ; (Traite de medicine Mazdecnne* (translated from Pahlavi 1886) ; (Sketches in History0 (1906). He contributed to the (Catholic Encyclopedia *; was a collab¬ orator in Encyclopaedia of Religion and Ethics.* He is a frequent contributor of articles on religious and Oriental topics to periodicals.

CASAS, ka' sas, Bartolome de las, Spanish prelate, better known as ((the Apostle of the Indies:® b. Seville 1474; d. Madrid, July 1566. In his 19th year he accompanied his father, who sailed with Columbus, to the West Indies. Five years afterward he returned to Spain, and pursuing his studies he entered the priest¬ hood. He accompanied Columbus in his second voyage to Hispaniola (Haiti), and on the con¬ quest of Cuba settled there, and distinguished himself by his humane conduct toward the op¬ pressed natives. Pie set at liberty the Indians who had fallen to his share in the division ; and so much was he interested for them, that in 1516 he went to Spain to lay a statement of their case before King Ferdinand, whose death at that time prevented any measures for their benefit. The regent, Cardinal Ximenes, how¬ ever, appointed a commission to examine cir¬ cumstances on the spot, and to determine ac¬ cordingly. Las Casas was to accompany them, with the title of Protector of the Indians. The commissioners found that it was impos¬ sible to liberate the Indians, and therefore en-CASAS GRANDES — CASATI

deavored to secure their humane treatment; but Las Casas, still dissatisfied, remonstrated so warmly that he was obliged to take refuge in a convent from the rage of the planters. He again returned to Europe ; and on the accession of Charles V, in consequence of his representa¬ tions, the council appointed a chief judge to re-examine the points of controversy between the partisans of Indian liberty and the colonists. Las Casas, in his zeal for the Indians, became the author (or the encourager at least) of the slave-trade, by proposing to purchase negroes from the Portuguese in Africa to supply the planters with laborers, of the want of whom they complained ; and this was unfortunately put into execution. He next applied for a grant of an unoccupied tract, in order to try his own plan with a new colony. This he at length obtained, and with 200 persons, whom he persuaded to accompany him, landed at Porto Rico in 1521, but found that an expedi¬ tion was advancing to ravage this very tract, and convey its inhabitants to Hispaniola as slaves. He endeavored in vain to prevent the threatened danger, and with the few who still adhered to him returned to Hispaniola to solicit succor. During his absence the natives at¬ tacked the colonists with such success that in a short time not a Spaniard remained in that part of South America. Las Casas, in despair at the failure of his project, retired to the Domini¬ can convent at Saint Domingo, and assumed the habit of the order. Notwithstanding his retirement his zeal in the cause of the Indians did not abate; and being sent on a mission to Spain by a chapter of his order at Chiapas in 1542, he pleaded their cause with his pristine warmth, and composed his famous treatise (Brevisima Relacion de la Destruccion de las Indias,' in which he exposed the cruelties prac¬ tised by the Spaniards. His unremitting perse¬ verance at length obtained a new set of laws and regulations, by which the natives were greatly relieved. In 1544 he returned to America as bishop of Chiapas, but left it three years later, and resigned his bishopric in 1550. Besides the treatise above named he wrote (Historia de las Indias.' This was first printed in 1875-76. It is one of the most notable of books, not only in its contents, — as a history of Spanish discoveries from 1492 to 1520, and a contemporary Spanish Catholic criticism as well as story of Columbus, — but in the circum¬ stances which prevented its publication for more than 300 years, and which still leave it in¬ accessible except to readers of Spanish. Con¬ sult Llorente, (CEuvres de las Casas ' (1822) ; Quintana, <Vidas de Espanoles Celebres' ;

Helps, (Life of Las Casas and Spanish Conquest) (Philadelphia 1868) ; Fabie, (Vida y Escritas de Las Casas 1 (Madrid 1879) ; Sabin, (Works of Las Casas- (New York 1870) ; Pres¬ cott, (Conquest of Mexico' (Philadelphia 1902) ; MacNutt, F. A., (Bartholomew de Las Casas' (New York 1909).

CASAS GRANDES, ka'sas griin'das (Span. ((great houses"), a town in Chihuahua, Mexico, on the Casas Grandes or San Miguel River, 35 miles south of Llanos, and 130 miles southwest of El Paso, remarkable for a num¬ ber of ruins, apparently relics of an aboriginal race. These ruins are found about half a mile from the small Mexican village, partly on the

declivity of a small hill, and partly on the plain at its foot. They consist chiefly of the remains of a large edifice of the pueblo type, built en¬ tirely of a substance resembling adobe, mud mixed with gravel and straw and formed inio blocks 22 inches thick and about three feet long. The portions which must have been con¬ structed of wood have entirely crumbled away. The outer walls are almost all prostrate, except at the corners, and were probably only one story high; the inner walls are better preserved, varying in height from 5 to 50 feet, and being in some cases five feet thick at the base. The portions remaining erect seem to indicate an original height of from three to six stories. The doorways have the tapering form noticed in the ancient structures of Central America and Yucatan, and over them are circular open¬ ings in the partition walls. The stairways were probably of wood and placed on the outside. Clavigero, in his (History of Mexico,' tells us that the building, according to popular tradition, was erected by the Mexicans in their peregrina¬ tion, and that it consisted ftof three floors, with a terrace above them, and without any entrance to the lower floor. The door for entrance to the building is on the second floor, so that a scaling ladder is necessary." The main features of the edifice seem to have been three large structures connected by ranges of corridors or low apartments, and enclosing several court¬ yards of various dimensions. The extent from north to south must have been 800 feet, and from east to west about 250 feet. A range of narrow rooms lighted by circular openings near the top, and having pens or enclosures three or four feet high in one corner, supposed to be granaries, extends along one of the main walls. Many of the apartments are very large, and some of the enclosures are too vast ever to have been covered by a roof. About 200 feet west of the main building are three mounds of loose stones and 200 feet west of these are the remains of a building, one story high and 150 feet

square, consisting of a number of apart¬ ments ranged around a square court. The in¬ habitants of this communal structure seem to have disappeared long before the Spaniards noticed the ruins in the latter part of the 17th century. Throughout the northern part of Mexico the name Casas Grandes is applied to deserted buildings of a similar type.

For some distance south the plain is covered with tracts of ancient buildings, and for 20 leagues along the Casas Grandes and Llanos rivers are found artificial mounds from which have been dug up stone axes, corn-grinders and various articles of pottery, such as pipes, jars, pitchers, etc., of a texture far superior to that made by the Mexicans of the present day, and generally ornamented with angular figures of blue, red, brown and black, on a red or white ground. The best specimens command a high price in Chihuahua and neighboring towns. On the summit of a mountain, about 10 miles from the ruins above described, are the remains of an ancient stone fortress, attributed to the same people who built the Casas Grandes, and prob¬ ably intended as a lookout. See Pueblos.

CASATI, ka -sa'te, Gaetano, Italian ex¬ plorer in Africa: b. Lesmo, Italy, 1830; d. Como, 7 March 1902. He entered the army of Piedmont at 21, and resigning in 1879 went

to Africa, commissioned by the Societa d'Es-ploragione Commerciale d'Africa. He fol¬ lowed the Welle River and explored the basin of the Bahr-el-Ghazal. He joined his country¬ man, Gessi Pasha, there, but the schemes of the Mahdi in 1883 shut him up in the Niam-Niam region with Emin Pasha. At the request of the latter he consented to act as ˆPresident® in King Kabba Rega's country, but after being at first well treated by that monarch he was later condemned to death. Escaping with great dif¬ ficulty to the Albert Nyanza Lake, and losing

all his notes and manuscripts, he was finally rescued by Emin Pacha in 1888. The expedi¬ tion of Stanley came a little later to the relief of both. ' On his return to Italy Casati pub¬ lished a volume descriptive of his adventures, entitled (Dieci anni in Equatorial

CASAUBON, ka-zo-bon, Isaac, Swiss classical scholar and theologian : b. Geneva 1559; d. London about July 1614. In his ninth year he spoke Latin fluently. In his 19th year he entered the university at Geneva, where he studied Greek, theology, the Oriental languages, etc., and in 1582 succeeded Portus as professor of the Greek language. In 1586 he married the daughter of the famous printer, Henry Stephens, In 1596 he accepted a professorship of Greek and belles lettres at Montpellier, but held it only two years. In 1600 Henry IV invited him to Paris. His Protestantism, the jealousy of other scholars, and perhaps his rather unyielding character, were the occasion of many unpleas¬ ant occurrences, for which, however, he was indemnified by the office of royal librarian. After the death of Henry IV in 1610 he went to England oh the invitation of the archbishop of Canterbury, where he was received with distinction, was presented with a prebend in Canterbury Cathedral, and had a pension con¬ ferred on him by James I, with whom he was a great favorite. He was buried in Westmin¬ ster Abbey. Casaubon was a liberal theologian, a man of extensive learning, a good translator and an excellent critic. As a critic, he com¬ mented on Diogenes, Laertius, Aristotle, Theo¬ phrastus, Suetonius, Persius, Polybius, Theoc¬ ritus, Strabo, Dionysius of Halicarnassus, Athenaeus, Pliny the Younger, *etc.* Nearly all the ancient classics are indebted to his valuable researches. His profound dissertation on the satirical poetry of the Greeks and the satire of the Romans ((De Satyrica Graeca Po.si et Romanorum SatiraQ deserves particular praise. His theological writings are of less value. His diary, which had been preserved by his son, Meric, was edited by Russell (Oxford 1850) under the title of ˆphemeridesP Casaubon's <Letters) were published at Rotterdam (1709). A (Life of Casaubon* was written by Mark Pattison (1875; id. ed., ed. by Nettleship, Ox¬ ford 1892,. Consult also Nozelle, (Isaac Ca¬ saubon, sa vie et son temps * (Paris 1897).

CASAUBON, Meric, son of the preceding, Swiss classical scholar in England : b. Geneva, 14 Aug. 1599; d. Oxford, 14 July 1671. He went to school at Sedan, and in 1611 followed his father to England, and studied at Eton and Christ Church, Oxford* He held successively several livings in the Church, when the revolu¬ tion, which brought Charles I to the scaffold, deprived him of his income. Still he rejected the proposal of Cromwell to write the history

of his time, as also the invitation of Queen Christina to live in Sweden. On the return of the Stuarts he was rewarded for his loyalty bv restoration to his offices in the Church, which he held till his death. Besides various works in Latin, he wrote several in English on theo¬ logical and other subjects. Through the efforts of Charles I, he became doctor of divinity. He also wrote some critical works on the classics, a treatise, <De Verborum Usu) (1647), *etc.*

CASBIN. See Kasbin.

CASCA, Publius Servilius, Roman states¬ man : d. 42 b.c. He assisted in the assassination of Julius Caesar in 44 b.c., and, according to Plutarch, he struck the first blow, in the back of the neck.

CASCADE MOUNTAINS, a range in the western United States and Canada, the north¬ ward continuation of the Sierra Nevada (q.v.). The range begins in California near the Oregon boundary and extends across Oregon and Washington into British Columbia. It parallels the Pacific coast at a distance of from 100 to 150 miles. The Columbia River and the Klamath have cut their way across the south¬ ern portion of the range and the Fraser River passes across the northern end. The range is extremely rugged in outline. The greater part of its mass is composed of igneous and vol¬ canic rocks. Firs, pine and hard wood cover a goodly portion of the slopes. The highest peaks are Mount Shasta, 14,380 feet ; Mount Hood, 11,225 feet; Mount Jefferson, 10,200 feet; Mount Rainier (Tacoma), 14,363 feet; Mount Baker, 10,500 feet; Mount Adams, 12,470 feet. Some summits are recently extinct volcanoes and there are large snowfields, which feed several glaciers. The range was first folded about the close of the Jurassic. During Tertiary time it was re-elevated, with the out¬ pouring of great lava sheets.

CASCAPEDIAC RIVER, Great, a river of Canada, in the province of Quebec, flowing southeast into Chaleur Bay. Its length is 150 miles.

CASCAPEDIAC RIVER, Little, a river of Canada, in the province of Quebec, east of the Great Cascapediac, and with an almost parallel but shorter course.

CASCARA SAGRADA, the bark of a northwestern tree (Rhamnus Purshiana, or California buckthorn), of the natural order Rhamnacece. The composition of cascara is extremely complex, but its main action is due to the volatile oils, the anthracene resins, at least three, the

amaroids and the tannin, malic and oxalic acids. It stimulates peristalsis, in¬ creases the intestinal juices and has marked effects on general excretion. It is an excel¬ lent laxative and one of the very best cathar¬ tics for habitual and chronic constipation. It is best used in the form of a fluid extract. Be¬ cause of its valuable properties, many patent drugs with similarly sounding names have been foisted on the public. These mostly contain other and more powerful and pernicious ca¬ thartics. See Buckthorn.

CASCO BAY, a bay on the southwest coast of Maine. It is about 20 miles wide and so deep as to constitute one of the best harbors

of the world, for all kinds of vessels. It con¬ tains many islands. Portland is located on the west side.

CASE, Augustus Ludlow, American naval officer: b. Newburg, N. Y., 3 Feb. 1813; d. Washington, D. C., 17 Feb. 1893. He entered the navy as a midshipman in 1828. In the Mex¬ ican War he took part in the capture of Vera Cruz and Tabasco, and during the Civil War served as beet captain of the North Atlantic blockading squadron. He took part in the cap¬ ture of Forts Hatteras and Clark, and cut out the blockade-runner Kate, under the fire of the forts at New Inlet, N. C. He was a lighthouse inspector in 1867 ; chief of bureau of ordnance, 1869; commander of the European squadron in 1873 ; was placed in command of the fleet at Key West at the time of the Virginias affair; and was retired in 1875, with the rank of rear-admiral.

CASE, Leonard, American philanthropist : b. Cleveland, 27 June 1820; d. 6 Jan. 1880. He was graduated at Yale College in 1842, and continued to pursue literary and scientific studies, contributing to the best magazines. Inheriting from his father a large estate in the city of Cleveland, he deeded a certain part of it for the founding and maintenance of an edu¬ cational institution, which was incorporated after his death as the Case School of Applied Science (q.v.).

CASE, Theodore Spencer, American phy¬ sician : b. Jackson, Ga., 26

Jan. 1832; d. Kansas City, Mo., 16 Feb. 1900. He was graduated at Marietta College in 1852 and at the Starling Medical College, Columbus, Ohio, in 1856. In 1883 he received the honorary degree of Ph.D. from the University of Kansas. Subsequent to the receipt of his medical degree he settled in Kansas City, and from 1860 to 1861 edited the Medical Reviezv there, also holding the office of alderman in 1860. He became second lieutenant of the 25th Missouri infantry in June 1861, and later captain and assistant quartermaster. In February 1865, he was made colonel and quartermaster-general of Missouri, and in 1866-68 was curator of the University of Missouri. From 1873 to 1885 he was postmas¬ ter of Kansas City and in 1885 became pro¬ fessor of chemistry in Kansas City Medical College. He edited the Kansas City Review of Science and Industry from 1877 to 1885, and in 1886 became president of the Kansas City real estate and stock exchange.

CASE, Thomas, English philosophical scholar. He was educated at Rugby and Balliol College, Oxford, was Waynflete pro¬ fessor of moral and metaphysical philosophy at Oxford from 1889 to 1910, and was appointed president of Corpus Christi College in 1904. He has published (Materials for History of Athenian Democracy from Solon to Pericles* (1874) ; (Realism in Morals* (1877) ; ‘Physical Realism) (1888); (Saint Mary’s Clusters) (1893).

CASE, in grammar, a form, modification or inflection of a noun or pronoun, indicating or corresponding to its relationship to some other word or words in a phrase or sentence, as, John (nominative case) speaks; Johns (possessive) dog barks; John beats his dog (objective). In adjectives, case is. merely sym¬ pathetic, the adjective agreeing in case with the noun which it qualifies. In English, nouns

undergo only one inflection representing a dif¬ ferent case from the nominative or general form of the noun ; all other cases are repre¬ sented either by prepositions or by the posi¬ tion of the noun in the sentence, the nominative case usually preceding the verb, the objective or accusative following it. The single in¬ flected case in English is the possessive or geni¬ tive (John’s). English pronouns have three cases — nominative, genitive and accusative, as he, his, him. The last often serves as a dative. Adjectives undergo no modifications in Eng¬ lish. In Sanskrit there are eight cases — nomi¬ native, accusative, instrumental, dative, geni¬ tive, ablative, locative and vocative. In Latin there are six cases — nominative, genitive, dative, accusative, vocative, ablative. In Greek there are five, the ablative not

being used. In both Latin and Greek there are traces of a locative case. In French, Italian, Spanish and Portuguese, the nouns have no case-inflections. In German both nouns and adjectives are in¬ flected for case. There are four cases in Ger¬ man — nominative, genitive, dative, accusative.

In law, the word has various meanings. An ((action upon the case® is one in which damages are sued for, for some cause of complaint where the injury done is not direct, as in trespass, but consequential. A <(case stated® is a state¬ ment prepared by one court for the decision of a point of law by a superior court. A (<special case® is a written statement of facts agreed on by two or more litigants in an action, in order that a court may decide their legal effect. In the United States the term is used in brief for ((case on appeal,® meaning the statement laid before a court of appeal by an appellant and presenting .the complete record of the original trial in the lower court. Thus the appellate court is allowed to review the findings as well as the points of law involved and here case differs from a ((bill of exceptions® in which points of law only are submitted for the con¬ sideration of the appeal court. (<Case reserved® is a statement drawn by counsel and certified by the judge, to be used as a basis for argu¬ ment on points of law before a full bench of the court.

In letter-press printing, a case is a receptacle for types, generally made of wood, 34 inches long, 15 inches wide and 1ˆ4 inches deep, and divided into compartments or (<boxes,® each of which contains types of one class or letter. A pair of cases consists of an upper and a lower case; the upper one has 98 boxes, and contains the capitals, small capitals and some other signs that are only occasionally required in com¬ position ; the lower one has 54 boxes, and holds the letters of the small characters, figures, spaces and most of the points. Thus the small characters are habitually spoken of by printers as Uower-case® letters, and the capitals, etc., as «upper-case® letters. The places assigned to the several letters of the alphabet in the boxes ol the case are not precisely the same in all printing-offices, but the differences are few. The different sizes of the boxes in the lower case depend upon the comparative frequency with which the several letters occur in the com¬ position, and the position in the case allotted to each letter is such as to afford the greatest fa¬ cility in composing. The letter e, which is most run upon in the English language, has a box much larger than any of the other compart-698

merits, and is placed directly in front of the compositor. In the upper case the boxes are of uniform size, and the letters are placed in nearly alphabetical order, the comparatively rare oc¬ currence of capitals rendering it less important which letter is nearest the compositor's hand. Cases are mounted in a slanting position upon a frame of convenient height.

Cases are named from their use or construc¬ tion, as ((Italic case,® a two-third case for hold¬ ing Italic type ; ((two-third case,® a single case in which two-thirds of the space is equivalent to the ordinary lower case, and the remaining third is occupied by the capitals, etc.; ((job case,® a single case suited to holding a small job font of type; <(rule case,® a case for holding brass rule ; ((sort-case,® a case for containing asorts.® The manufacture of cases has re¬ ceived a serious set-back since the introduction of type-composing machines. See Printing.

CASE-HARDENING, the process of con¬ verting the surface of certain kinds of mal¬ leable-iron goods into steel, thereby making them harder, less liable to rust and capable of taking on a better polish. Fire-irons, gun-locks, keys and other articles of limited size, are very commonly so treated, but the process is sometimes applied to large objects, such as iron railway-bars. The articles are first formed, and heated to redness with powdered charcoal or cast-iron, the malleable iron taking carbon from either of these to form a skin of steel upon it; the heated objects are then cooled in cold water, or in oil when they are of a deli¬ cate nature. Yellow prussiate or potash or parings of leather have also been a good deal used for coating iron articles with steel by heating them together. Some chemists con¬ sider that in this case nitrogen combines with the iron and effects the hardening. The coat¬ ing of steel is very thin, seldom exceeding one-sixteenth of an inch. Where a thicker coating is needed the articles are treated several times. The socalled <(Harveyizing® process of harden¬ ing steel armor plate is similar to case-harden¬ ing in that the surface is made very resistant to the entrance of projectiles by heat treatment in carbon, while the back is softer and tough in order to resist the smashing effect of the projectile after it has penetrated the hardened surface. A Swedish ironmaster has found that a very excellent case-hardening is ob¬ tained by treating iron or steel objects with a mixture of animal matter, such as rasped leather or liorn, and arsenious acid dissolved in hydrochloric acid, asd heating as usual. Charcoal alone is also used with success.

CASE SCHOOL OF APPLIED SCI¬ ENCE, The, at Cleveland, Ohio, founded by Leonard Case (q.v.) of that city. In 1877 a deed of trust was executed setting apart cer¬ tain real estate for the support of the institu¬ tion, the deed to take effect upon his death, which occurred in 1880. The Case School was incorporated 29 March 1880. Instruction be¬ gan in 1881, with a class of 16 students, the school being carried on from that time until the summer of 1885 in the old Case homestead. A commodious building having been erected for the use of the school, it was occupied at the beginning of the term in September 1885. A year later the building with all that it con¬ tained was destroyed by fire. It was promptly

rebuilt and occupied in 1888. Since that time several additional buildings have been erected, with superior apparatus and appliances. The Case School of Applied Science offers six reg¬ ular courses of instruction, each requiring four years. They are civil engineering, mechanical engineering, electrical engineering, mining engineering, physics and chemistry. ˆ There are 53 professors and instructors and 557 students. The degree of bachelor of science is granted to all who complete one of the regular courses. That of master of science may be conferred upon graduates who have devoted at least one year exclusively to graduate studv. Profes¬ sional degrees, namely, civil engineer, me¬ chanical engineer, electrical engineer and en¬ gineer of mines may also be conferred after one year of graduate study or after profes¬ sional work in positions of responsibility, for three years after graduation. The property left by Mr. Case as an endowment for the sup¬ port of the school is valued at about $2,500,000, and the amount invested in buildings and equip¬ ment is about $1,000,000. The school derives its support in part also from tuition fees.. Its government rests with a corporation consisting of 20 men, from whom six, known as trustees, are selected.

CASE-SHOT, a projectile formed by put¬ ting a quantity of bullets into a cylindrical tin box called a ((canister,® that just fits the bore of the gun. In case of necessity, the canister is filled with broken pieces of iron, nails, stones, *etc.* The case is closed at both ends by a disc of wood or iron. Shot of this sort is thrown from cannons and howitzers, and is very in¬ jurious to the enemy, because the balls con¬ tained in the canister spread, diverging in pro¬ portion to the distance. The balls vary in weight, according to the character of the ordnance, from one or two pounds to half an ounce each. The range within which case-shot are used sometimes extends to 500, but seldom exceeds 200 to 300, yards. It is also called ((canister-shot.® The shrapnel-shell, in

its pres¬ ent cylindrical shape, may be considered a variety of case-shot. See Ordnance.

CASE-WORM. See Caddis-fly.

CASEIN, ka'se-in (Lat. caseus, <(cheese®) a colloidal substance resembling albumen in its general constitution, and obtained from milk. The older chemists gave the name ((casein® both to the precipitated substance that is now known by that name, and to the corresponding substance as it exists in solution in the milk; but it is the scientific practice at the present time to distinguish the latter as ((caseinogen.® Caseinogen is the principal nitrogenous con¬ stituent of milk, in which it occurs to the extent of about 3 per cent, forming 80 per cent of the proteid content. It is precipitated by a curdy mass, when acetic acid or a mineral acid is added to milk that has been previously diluted by the addition of its own bulk of water. If the caseinogen so prepared is made into a paste and then treated with a small quantity of ren¬ net, the mass sets at once into a solid clot, consisting of true casein; but Hammarsten has shown that if the caseinogen is first washed entirely free from calcium phosphate, rennet is without action upon it. The precise function of the calcium phosphate is obscure, and the same may be said of the chemical relations of

the proteids in general. If rennet is added to fresh milk a bulky deposit of casein and butter fat comes down immediately; but to obtain the casein in pure form, the oily matters in the milk should be first refnoved by the action of a centrifugal separator. Caseinogen is not pre¬ cipitated by heat, nor does it (like fibrinogen) coagulate spontaneously. The coagulation ob¬ served when milk is boiled is due to the albu¬ men present, and not to the casein; and that which occurs upon standing may be due either to the generation of lactic acid through the fermentation of the lactose present, or to the rennet-like action of the ptomaines liberated by microorganisms that happen to fall into the milk from the air. According to the analyses of Chittenden and Painter, the elementary per¬ centage composition of casein is as

follows : Carbon, 53.30; hydrogen, 7.07; nitrogen, 15.91; sulphur, 0.82 ; phosphorus, 0.87 ; oxygen, 22.03. Casein is insoluble in water, alcohol or ether, but dissolves easily in alkaline solutions. It also dissolves in very weak hydrochloric acid, from which it is again precipitated upon the addition of the same reagent in more con¬ centrated form. Casein for commercial pur¬ poses is prepared almost wholly from cow's milk. The milk is first put through a centriflu-gal separator to remove the fat, and then from 4 to 6 per cent of caustic alkali is added. The milk is then run into a vat, and dilute sulphuric acid is added, the whole being stirred con¬ stantly. When the curd has settled it is washed with cold water and drained on cheesecloth filters. It is pressed in a cheese press as dry as possible, and then broken up into very small pieces in a curd mill; after which it is dried at a low temperature in a vacuum. The chief use of casein in the arts is as a glue. In this form it is widely utilized in the wall paper industry in the production of washable wall papers, and also in the production of enameled papers, in which casein glue is used as the binder for the materials of the enamel coating. It is also used in the making of erasable tablets, paper <(slates,55 *etc.* As a binder for various ˆfillers® many solid articles are produced in imitation of ivory and tortoise-shell. A compound of casein and lime is made use of in the dyeing industry for ˆanimalizing55 cotton fabrics so that the fibres will retain the colors applied to them. In medicine, casein is being more and more em¬ ployed, its combination with certain drugs im¬ mensely enhancing their efficacy. This is par¬ ticularly marked in the administration of iodine, phosphorus, arsenic, mercury and iron, as well as many alkaloids and organic compounds. See Proteids. Consult Hammarsten-Mandel, Phys¬ iological Chemistry) (New York 1914) ; Sherer, R., (Casein: Its Preparation and Technical Utilization5 (London 1906).

CASEMATES (Sp. casa, (<a house,55 and matarc, <(to kill55), in fortification, vaults which are proof against bombs, and which may be constructed under a parapet and provided with embrasures or ports through which guns are fired. They may serve, at the same time, as a place for keeping the heavy ordnance and vari¬ ous stores, and in case of necessity as habita¬ tions for the garrison or shelter for sick or wounded.

CASEMENT, Sir Roger, Irish revolution¬ ist" b. Ireland, 1 Sept. 1864 ; executed in Lon¬

don, 3 Aug. 1916. Though born in Ireland, Casement was of English

parentage and a Protestant by creed. He entered the British consular service at the age of 28, and served in the Niger Coast Oil Rivers Protectorate from 1892 to 1895, when he was appointed con¬ sul in the Portuguese province of Lorenzo Marques. In 1898 he was made consul for the Portuguese possessions in West Africa, south of the Gulf of Guinea. During the war in South Africa he was engaged on special service at Cape Town in 1899 and 1900, and on the conclusion of hostilities he was decorated with the Queen's medal. In 1900 Casement was transferred to the Belgian Kongo, and in 1901 was appointed to act as consul also for part of the French Kongo. In 1905 he was made a C.M.G. and in the following year was ap¬ pointed consul for the state of Sao Paulo. His next promotion took place in 1908, when he was made British consul-general at Rio de Janeiro. Between 1909 and 1912 he was em¬ ployed in making inquiries relative to the rubber industry atrocities, and retired on a pension in 1913 after an honorable and useful career. He . received his knighthood in June 1911, on which occasion he wrote the follow¬ ing letter to the Secretary of State for For¬ eign Affairs :

"I find it very hard to choose the words with which to make acknowledgment of the honour done me by the King. I am much moved at the proof of confidence and appreciation of my services on the Putumayo, conveyed to me by your letter, wherein you tell me that the King had been graciously pleased, on your recommendation, to confer upon me the honour of knighthood. I am indeed grateful to you for this signal assurance of your personal esteem and support. I am very deeply sensible of the honour done to me by his Majesty. I would beg that my humble duty might be presented to his Majesty, when you may do me the honour of conveying to him my deep appreciation of the honour he has been so graciously pleased to confer upon me. I am, dear Sir Edward Grey," *etc.*

In view of his tragic end and the circum¬ stances that brought it about, this expression of Casement's sentiments was strangely at vari¬ ance with his subsequent action during the European War. Suspicion was first directed toward him a few months after the war broke out, when it became known that Casement was moving about at large in Germany at a time when all British subjects in that country were either interned or under police supervision. Questions were asked in the British Parliament, and Casement's pension was withdrawn on 30 Sept. 1914, up till which time it had been paid to him. A large number of British prisoners of war had fallen into German hands between September and December 1914. In the latter month a great many Irish soldiers were col¬ lected in a large camp at Limburg, apparently for a special purpose. These prisoners were assembled on several occasions

and addressed collectively and individually by Casement, who moved about the camp freely with the full ap¬ proval of the German authorities. He intro¬ duced himself as Sir Roger Casement, the (<organizer of the Irish volunteers.55 Telling the men that he was forming an Irish brigade, he invited all Irish prisoners to join it. Those who agreed, he said, would be sent to Berlin as the guests of the German government, and that, if Germany won a sea battle, the <(Irish brigade55 would be landed in Ireland to fight against England. In the event of Germany losing the war, each man would receive from

Casement or the German government $50 or $100 and a free passage to America. Those who renounced their allegiance were given a green uniform with a harp worked on the collar and provided with German side arms. About the middle of April 1916 Casement and an Irish soldier named Bailey, together with a ((Mr. Monteith,® were put on board the German submarine U-19 at Wilhelmshaven. They sailed round the Shetlands and the west coast of Ireland. Meanwhile, a small Wilson liner, disguised as a timber ship and carrying 10 machine guns, bombs, 20,000 rifles and millions of cartridges, had been sent from Germany to a place near Tralee. When the submarine had reached as near land as possible before dawn, Casement, Monteith and Bailey were put into a collapsible boat, armed with revolvers and ammunition. The boat overturned and the ad¬ venturers had to wade ashore, where they buried the weapons. Casement remained be¬ hind; the other two made their way to Tralee by land. On Good Friday, 21 April 1916, the British sloop Bluebell was patrolling near Tra¬ lee when she sighted a suspicious vessel flying the Norwegian ensign and with four of those ensigns painted forward and aft on each side. In reply to signals she said she was the Aude, bound from Bergen to Genoa. The ship was ordered to follow the Bluebell to harbor, but when about a mile and a half from the Daunt Rock lightship (near

Queenstown), the Aude suddenly raised two German naval ensigns and blew up, sinking immediately. The crew, who had destroyed the ship, clambered into two boats and surrendered to the Bluebell. The collapsible boat from the submarine was found by a farmer at four in the same morning on which Casement had landed. A tin box con¬ taining pistol cartridges was exhumed. The police searched the neighborhood and discov¬ ered Casement hiding in an excavation known as McKenna's Fort. He gave his name as Richard Morton, of Denham, Buckinghamshire, and described himself as an author. He was taken to Ardfert Barracks, and on the way dropped a paper, which was found to be a cipher code. Some of the sentences read, <(Cannons with plenty of ammunition are

needed. Send them to - ® ; <(Send more

explosives,® *etc.* Casement was taken to Eng¬ land the next day and handed over to the metropolitan police, when he disclosed his identity. He was tried before the lord chief justice .and a jury on 26 June, found guilty of high treason and sentenced to death. The penalty was carried out at Pentonville Prison, at 9 a.m. on 3 August. Many prominent persons both in Great Britain and the United States made strenuous efforts to save Casement from the gallows, but in vain. The grounds on which the British government refused a re¬ prieve — after Casement's appeal had failed — were thus stated by Lord Robert Cecil in Par¬ liament: <(No doubt of Casement's guilt ex¬ ists… . The only ground for a reprieve would be political expediency, a difficult ground to put forward in this country. This country never could strain the law to punish a man for the same reason that it could not strain the law to let him off… . The Irish rebellion be¬ gan with the murder of unarmed people, both soldiers and police. No grievance justified it and it was purely a political movement organ¬

ized by a small section of Irish people who still hate England and was assisted by Ger¬ many… A Shortly before his execution Casement was received into the Roman Catho¬ lic Church. He was unmarried. In November 1917 the Volksrecht of Zurich, Switzerland, the official organ of the Swiss Social Democrats, published a number of German official docu¬ ments relating to Casement's activities in Ger¬ many. One of them gives the agreement signed between Casement and the German Foreign Minister, Herr von Zimmermann. Nine of these documents were reproduced in the New York Times of 16 Dec. 1917. See Ireland — Revolution.

CASERTA (formerly Terra di Lavoro), a province of Italy, north of Naples, along the Mediterranean Sea. Its chief industries are agriculture and cattle raising; there are also some flourishing manufactures. Area, 2,033 square miles. Pop. 749,414.

CASERTA, ka-zar'ta, Italy, capital of the province of Caserta, 17 miles northeast of Naples. It is the seat of a bishop, and contains many fine buildings. The principal edifice is a palace, one of the finest in Europe, a large and richly decorated structure commenced in 1752 by Charles III of Spain, and designed by Van-vitelli. This magnificent edifice forms with its four courts a huge rectangle, whose south side is 830 feet long and 134 feet high, and has 37 windows in each story. Through the middle of the rectangle runs a splendid colonnade 541 feet long, from the centre of which rises the beautiful marble stairway with 116 steps. The chapel of the palace is richly decorated and contains many noteworthy works of art. The theatre of the palace has 40 boxes and 12 Corinthian columns of African marble from the palace of Serapis at Pozzuoli. The water for its fountains is brought 26 miles from Mount Taburno by an aqueduct which crosses the Maddeloni Valley on a daringly constructed bridge, 1,700 feet long and 190 feet high, and situated among gardens adorned with numerous ancient and modern statues. The principal manufactures are silk goods, carpets, linen, *etc.* The district produces excellent fruit and wine. About two and a half miles to the northeast is Caserta Vecchia (Old Caserta), the new town being distinguished as Caserta Nuova. In 1860 Caserta was the headquarters of Garibaldi and his army. The province of Caserta is the an¬ cient Campania Felix. Pop. 33,000.

CASEY, Silas, American army officer : b. East Greenwich, R. I., 12 July 1807; d. Brook¬ lyn, 22 Jan. 1882. He was graduated from the United States Military Academy at West Point in 1826; served in the Mexican War, being present at the battles of Contreras, Churubusco, Molino del Rey and the siege of Chapultepec. When the Civil War broke out he was given charge of organizing the volunteers near Wash¬ ington; later served in the Army of the Poto¬ mac, and won much distinction at Fair Oaks ; was president of the board to examine candi¬ dates for officers of colored troops in 1863-65 ; brevetted major-general, U. S. A., 13 March 1865; and retired in 1868. His publications in¬ clude (System of Infantry Tactics> (1862); and (Infantry Tactics for Colored Troops*

(1863).

CASEY, Thomas Lincoln, American mili¬ tary engineer: b. Sackett's Harbor, N. Y., 10 May 1831 ; d. Washington, D. C., 26 March 1896. He was graduated from West Point in 1852, and entered the engineer corps of the army. During the Civil War he was superin¬ tending engineer of defenses on the coast of Maine, and on special duty with the North At¬ lantic squadron in the first expedition against Fort Fisher. In 1865 he was brevetted colonel for gallant services during the war. In 1868 he was put in charge of one of the departments in the chief engineer's office at Washington ; in 1873 was sent abroad for professional service; and in 1877 was placed in charge of the con¬ struction of the state, war and navy building, and of the Washington aqueduct, and also of the Department of Public Buildings and Grounds. Later he built the White House conservatory and the Army Medical Museum, completed the Washington monument and took charge of the construction of the Congressional Library. He was president of the board of engineers for fortifications at New York in 1886-88; was promoted chief of engineers and brigadier-general in 1888 ; and was elected to the National Academy of Sciences in 1890.

CASEY, Timothy, Canadian Roman Cath¬ olic bishop : b. Flumeridge,

County Charlotte, New Brunswick, 20 Feb. 1862. He was edu¬ cated at Saint Stephen Grammar School, Saint Joseph's College, Memramcook, and Laval University. After his ordination to the priest¬ hood in 1886, he became successively curate at Fredericton, rector of the cathedral of Saint John, chancellor of the diocese, and rector of Saint Dunstan's Church, Fredericton. In 1899 he was appointed bishop of Utica and coadjutor to Bishop Sweeny of Saint John, being con¬ secrated 11 Feb. 1900, and he succeeded to the bishopric 25 Mar. 1901. He was appointed archbishop of Vancouver 2 Aug. 1912. He at¬ tended the Eucharistic Congress at Montreal in 1910, and is known as an ardent temperance reformer.

CASGRAIN, kas-gran', Henri Raymond,

French Canadian author: b. Riviere Buelle, Quebec, 1831 ; d. Quebec 1904. He was educated at College Sainte Anne and Quebec Seminary, and was ordained to the priesthood in 1856. He relinquished the ministry in 1872, owing to an affection of the eyes, and subsequently devoted himself to literature. His works include (Legendes Canadiennes> (1860); Uiistoire de la Mere Marie de l'Incarnation) (1864); (Histoire de I'Hotel-Dieu de Quebec) (1878); <Pelerinage au Pays d'Evangeline,) which was crowned by the French Academy (1885) , (Biographies Canadiennes> (1885) ; (Montcalm et Levis* (1891); (Une Seconde Acadie* (1894) ; (Les Sulpiciens et les pretres des Mis¬ sions etrangeres en Acadie) (1897).

CASGRAIN, Philippe Baby, Canadian lawyer, statesman and historian : b. Quebec 1826. A student of Saint Anne's College, he was admitted a lawyer in 1850, and for several years was deputy prothonotary of the provincial Superior Court, before becoming clerk of the Circuit and Revision Court. From 1872 to 1891 he was a Liberal member of the House of Com¬ mons, prominent in public affairs and notably in a program for a Canadian navy. He was also known for high historical and literary

gifts and on three occasions, 1898, 1899 and 1906 was elected president of the Literary and Historical Society of Quebec. Besides numer¬ ous contributions to the Transactions of the Royal Society of Canada and the Transactions of the Quebec Literary and Historical Society, his published writings include: (Letellier de Saint Just et son temps) (1885) ; (La fontaine de Champlain a Quebec* (1888); (La vie de Joseph-Frangois Perrault* (1898) ; (Les Plaines d' Abraham * (1900) ; (Seconde bataille des

Plaines d' Abraham et de Sainte Foye) (1900) ; (La maison de Montcalm* (1902) ; (La maison de Borgia* (1904) ; (Le moulin de Dumont *(1905) ; (Cadet, sa maison et sa residence a Quebec* (1906) ; (A Few Remarks on Various Gallicisms and French Locutions in the Plays of Shakespeare) (1907) ; (La Chapelle et le tombeau de Champlain* (1907) ; (Notre systeme judiciaire) (1911).

CASGRAIN, Thomas Chase, Canadian statesman: b. Detroit, 28 July 1852; d. 29 Dec. 1916. He was educated at Quebec Seminary and Laval University, Montreal. He was called to the bar of Quebec in 1877, and was junior council for the Crown at the trial of Louis Riel for high treason at Regina in 1885. He was returned to the provincial assembly of Quebec in the Conservative interest 1886-90, 1892-96, holding office as attorney-general 1891-96. He was chairman of the Royal Com¬ mission appointed in 1894 to revise and amend the civil procedure. He represented Mont¬ morency in the House of Commons, 1896-1904. He opposed the Taft-Fielding reciprocity agreement of 1909. He was appointed a mem¬ ber of the International Joint Commission in 1911, and was chairman of the Canadian sec¬ tion, and held the office of Postmaster-General in the Borden administration from 1914 until his death, during which period he represented Quebec County.

CASH REGISTER, an automatic device for recording all transactions handled in retail stores. It is probably the most antique, and yet in its improved form the most modern device known to commerce. More than 6,000 years ago the ancients used a registering device known as the Abacus (q.v.) for the purpose of showing visibly to the buyer and seller the amount purchased.

The modern cash register was invented by Jacob Ritty, of Dayton, Ohio, patented 1879, it being suggested to him by the dial on a steam¬ ship which recorded the number of revolutions of the propeller. The first practical cash regis¬ ter was a crude device which punched holes in a strip of paper. By counting the number of holes the merchant could tell how much money he should have in his cash drawer. The present day cash register is a combination adding ma¬ chine and printing press, which, by its perlect mechanism, provides a record of all transac¬ tions handled. It tells instantly how much busi¬ ness each clerk has done ; how many customers each clerk has waited on; who, if anyone, has made a mistake; the total amount of. money taken in; the number of charge, received on account and paid out transactions handled. It issues a receipt, which bears printed, figures of the amount of the transaction, the initial of the clerk who handled it, the consecutive number of the sale, the kind of sale and the date. In

addition, this receipt contains the merchant's name and address, together with any advertis¬ ing he may care to use. Some registers do not issue a receipt, but print the same information on a sales slip inserted in the register. This receipt or slip is wrapped in the package with the goods going to the customer. At the same time the receipt is issued, the miniature print¬ ing press prints the detail of every transaction that occurs upon a roll of paper locked up in¬ side the register. This gives the proprietor full information concerning every detail of his busi¬ ness, offering him at a glance facts showing the progress of his store, as well as the industry of each clerk.

The object of the cash register is to stop mistakes, remove temptation, eliminate careless¬ ness, increase trade and increase profits. It furnishes information concerning a business which could be obtained in no other way except through a large amount of detail work. It pro¬ tects the money received by providing a correct account of all incoming cash, and accounts for the money paid out, and at the same time pro¬ vides a record of the amount of credit business handled. It not only indicates the amount of each and every transaction, as well as the initial of the clerk who handled it, but at the same time transmits the amount indicated to various sets of adding wheels, and also prints that amount on the receipt going to the customer. A receipt going to the customer bearing printed figures of the transaction makes it necessary to record the correct amount on the register. This ensures the proprietor that he will get an accu¬ rate record of every transaction handled in his business. More than 2,000,000 of these ma¬ chines are in use the world over. See Calcu¬ lating Machines.

CASHAN or KASHAN or KASHIN,

Persia, a town in the province of Irak-Ajemee, noted for its production of shawls, silk stuffs and other goods. It is one of the most flourish¬ ing towns in Persia, and has a royal palace, numerous mosques, colleges, bazaars and baths. The inhabitants are noted for their industry, and besides shawls and silk stuffs already men¬ tioned, they manufacture copper goods, gold and silver articles, brocade and

cottons. They also carry on an active trade in agricultural produce, and carry on commerce with all parts of the Orient and with Europe by way of Ispahan. The silk stuffs produced at Cashan are held in high esteem, and are worn by the Shah and his entourage. Foreigners from the West who have visited the place have found the inhabitants, who belong chiefly to the Shiite sect of Mohammedans, more enlightened and liberal in their treatment of strangers than most Orientals. Many of the merchants are very wealthy, but are compelled by the oppressive exactions of public officials to hide their riches as much as possible from view. The interior of the homes of some of them, which present a neglected aspect on the outside, are said to be palatial in splendor. The province of Irak-Ajemee, in which Cashan is situated, has nearly the same boundaries as the country known to the ancients as Great Media, or Media Proper. It is the most productive portion of Persia, fertile and with a flourishing trade. Cashan has a population of about 30,000. See Persia.

CASHEL, Ireland, town in Tipperary County, about 49 miles northeast of Cork;

noted as containing the most interesting ruins in Ireland. These consist of a Gothic cathedral founded in 1169; a stone-roofed chapel, built in 1127; Hore Abbey, founded in 1272; the palace of the Munster kings; and a round tower, 80 feet in height and 50 feet in circum¬ ference. They are built on the Rock of Cashel, an elevation 300 feet high, and form the sum¬ mit of the slope which the town occupies. Here was held the great synod, in 1172, when the Irish priests first acknowledged the authority of the English Church and state. Cashel is a Roman Catholic archdiocese. Dean Swift was a native. Pop, 2,813.

CASHEW (a corruption of acajou, the French form of the native Brazilian name acajaiba), a tree (Anacardium occidentale) of the order Anacardiacece, common in the West Indies. It is a spreading tree, from 20 to 40 feet high, and is a native of the tropics. It has alternate, obtuse, ovate leaves, and bears bunches of red, scented flowers. The juice of the stem is used as a varnish ; and an aromatic drug is prepared by decoction and maceration of several parts of the tree, afterward consoli¬ dated by evaporation. The nut is small, kidney¬ shaped, ash-gray, about an inch long, and is seated on the end of a large fleshy receptacle varying in size from that of a cherry to a medium-sized pear. The shell consists of three layers, the outer and inner of which are hard and dry, but the intermediate layer contains a quantity of black, extremely acrid, caustic oil, which is destroyed by

roasting the nuts before eating them. The oil is applied to floors in India and elsewhere to protect them from the attacks of white ants. In the West Indies it is put into wine, especially old Madeira, to which, it is said, it imparts an especially agreeable flavor. It is also used in chocolate. A gum with properties similar to those of gum arabic is obtained from the plant.

CASHEW-BIRD, kash‘6-berd, another name for the galeate curassow. See Curassow.

CASHGAR, or KASHGAR, Turkestan, the capital city of the Chinese dependency of eastern Turkestan, in the province of Sin-Kiang or Kashgaria. It is situated on the Kizil-Daria or Kashgar River, in a position of strategic importance, 100 miles northwest of Yarkand, and comprises an old and a new town. They are both surrounded by mud walls and moats, and the new town is also defended by a citadel. The latter was built in 1838, is strongly garrisoned and contains the palace of the Chinese governor. There are considerable manufactures of cotton, gold and silver cloths, carpets, etc., and an extensive trade, its position at the junction of several great routes making it the emporium of much of the commerce of central Asia. It was the capital of an inde¬ pendent kingdom till conquered by the Chinese during the 18th century. In 1865 it revolted but was again subdued in 1876-77. The civil goyernment of the region is in charge of a Chinese official, with the rank of Laotai. Pop. about 62,000. Consult Lansdell, (Chinese Cen¬ tral Asia* (1894) ; Younghusband, (The Heart of a Continent (1904).

CASHIBO, ka-she’bo, or CACHIBO, a

savage tribe of Panoan stock living near the Ucayale River, a tributary of the Amazon, in

eastern Peru. They are said to eat their old people at death, and have repeatedly killed the white missionaries who attempted to convert them. The men are bearded and wear long skirts. The women go

entirely naked until after marriage.

CASHIER, To, in a military sense to dis¬ miss from the service by annulling or with¬ drawing an officer's commission. It is not an official term in the United States, and is com¬ monly construed among military men as having a more disgraceful significance than ˆdismissal.® although there is no analogy or precedent in the use of the word by leading English authors to support this construction. Macaulay uses the term in the sense of simple dismissal or annul¬ ment of commission. Nevertheless in ordinary military parlance it means dismissal in disgrace, and its use in any other sense is regarded as unjustified.

CASHMERE, or KASHMIR, a princi¬ pality in the northwest of Hindustan, subject to a Maharajah belonging to the Sikh race, but under British protection and supervision. It is an irregularly shaped mountainous region, noted for its gorgeous scenery and the healthfulness of its climate. It is composed of various prov¬ inces or districts, of which Cashmere proper is the most famous a-nd interesting. It is situ¬ ated in the southwestern portion of the state, and largely consists of an elevated valley inter¬ sected by the Jhelum. Besides Cashmere proper, the state embraces the territory of Jamoo, Balti or Iskardo, and Ladakh and Gilghit. The whole principality thus formed is estimated to cover about 84,432 square miles, and its population in 1911 was 3,158,126. It extends from about lat. 32° to 37° N. and from about long. 73° to 80° E. Srinagar is the capi¬ tal. The territory of Jamoo, which forms the most populous portion of the principality, lies to the north of the Punjab, between the spurs of the Himalaya Mountains leading up to Cashmere and enclosed by the upper courses of the Chenab and Ravee. Its chief town is of the same name. Balti, also called Little Tibet, is an elevated region on the upper Indus, to the north of Kashmir proper, lying to the south¬ west of the Karakorum Mountains, and having for its capital Iskardo or Skardo. Ladakh, also called Middle Tibet, lies to the southeast of Balti, between the Himalaya and Karakorum Mountains, and is also traversed by the Indus. Its passes form some of the most important media of communication for central Asia. Its capital is Leh on the Indus. Gilghit is a district on the northwest of Balti. Sheep are largely kept by the inhabitants ; and the main crops grown are maize, cotton, saffron, tobacco, hops, wheat, barley and beans. Butter is one of the exports. Within recent years great activity has been shown in improving means of communica¬ tion, but in many parts of the country wheeled traffic is unknown, and there are only a few miles of railway. Educationally it is the most backward part of India, with 98 per cent of illiterates. An independent monarchy until 1586, it was

thereafter successively ruled by Moguls, Afghans and Sikhs, and was placed under British protection in 1846. The present Maharajah, Sir Pertab Singh, is a distinguished soldier, and fought in Flanders with the British army in the Great European War.

The language of the people is called Kash¬ miri and is descended from the Middle Indian vernaculars, and is thus ultimately related to the Sanskrit, although many Arabic and Per¬ sian words have been adopted into it. The lan¬ guage has no written literature of native origin, but portions of the Bible have been translated into the vernacular. The script in which it is written is generally Persian; but the older Sharada alphabet, derived from the Devanagari, is sometimes used. Kashmiri folk literature is rich in tales and proverbs, many of which have been published in Knowles' (Dictionary of Kashmiri Proverbs and Sayings) (London 1885) ; and (Folk-Tales from Kashmir) (ib. 1888). Ethnological and anthropological infor¬ mation of value will be found in the following works: Duke, (Kashmir Handbook (Leipzig 1903) ; Pirie, (Kashmir) (New York 1909) ; Bruce, cKashmir) (ib. 1911) ; Grierson, (Manual of the Kashmiri Language, comprising Gram¬ mar, Phrase-Book, and Vocabularies> (2 vols., Oxford 1911) ; Neve, Arthur, (Thirty Years in KashmiU (London 1913).

CASHMERE GOAT. See Goat.

CASIGURAN BAY, ka-se-goo'ran, an in¬ let on the east coast of the province of Principe, Luzon, Philippine Islands, reached through Casiguran Sound. The sound is about nine miles long from Cape Ildefonso to a narrow passage affording access to the bay. The bay itself is about three-quarters of a mile long and two and a half miles wide. Its depth is some 16 to 26 fathoms.

CASIMIR, kas-i-mer, properly KAZI-MIERZ (ˆfounder of peaceˆ), was the name of many Polish princes and kings. (1) Casimir I : b. 1015; d. 1058. During his minority he was under the regency of his mother and was driven from the kingdom with her. In 1041 his power was re-established, and through his efforts the predominance of Christianity was decided in Poland. (2) Casimir II, the Just: b. 1145; d. d. 1194. He was a son of Boleslas III, and ascended the throne in 1179. He pushed his armies into Volhynia and Lithuania and re¬ conquered several places formerly belonging to Poland. He abolished tithes and other illegal imports and in 1180 convened an assembly at Lenczyga, which in time became the Polish Senate. In 1185 he repulsed an attack by

the Hungarians and four years later was in con¬ flict with his brother Micislas, who aimed to seize the throne. In 1192 he fought the Prus¬ sians. He renewed with the Hungarians the treaty fixing the Carpathians as the boundary between the two nations. (3) Casimir III: b. 1309; d. 5 Nov. 1370, called Casimir the Great, who succeeded his father, Vladislav Loketek, as king of Poland in 1333, was the most distinguished of this name. He added Little Russia and Red Russia to his do¬ minions, and repelled the Tartars, who then threatened Poland. He founded the University of Cracow (1364), as well as several schools and hospitals, and showed great anxiety for the advancement of the arts and of learning in his kingdom. In 1347 he caused a new code of laws to be compiled, and protected the peasants, on which account he was called the peasants' king. He had a Jewish mistress who pro¬ cured for her nation great liberties and protec¬ tion. With him the line of the Piasti, which

had ruled in Poland for nearly 530 years, be¬ came extinct. (4) Casimir IV: b. 1427; d. 1492. He was the second son of Ladislaus II Jagiello; was crowned King of Poland in 1447, three years after the death of his elder brother, Ladislaus III, at the battle of Varna. His reign was epoch-making for Poland. The kingdom was threatened from three sides. On the south the Turks were encroaching and aiming to capture Constantinople. On the north¬ east the Muscovites were beginning to spread and make their weight felt, while on the north¬ west the Teutonic Knights were ever seeking aggrandizement at the expense of Poland. After 13 years of conflict Casimir finally subdued the Teutonic order and by the Treaty of Thorn (1466) compelled them to cede West Prussia to Poland. Casimir was one of the great states¬ men of his age, was possessed of profound political sagacity, great common sense and great patience and moderation. His only sub¬ jects gave him more trouble than his power¬ ful enemies from without. The nobles threat¬ ened to depose him and from his time onward Poland became more and more an aristocracy. His personal character was marked by extreme simplicity and sobriety. Consult Morfill, Po¬ land 5 (New York 1893) ; Sokolowski, A., Hllustrated History of Poland)

(Vienna 1904).

CASIMIR-PˆRIER, pa’rya, Jean Paul Pierre, fifth President of the French Republic: b. Paris, 8 Nov. 1847; d. there, 11 March 1907. He was the grandson of Casimir Pierre Perier, famous Premier of Louis Philippe. He entered public life as secretary to his father, A. V. C. Perier, who was Minister of the Interior dur¬ ing the presidency of Thiers. In 1871 he was decorated with the Legion of Honor for bravery in the Franco-Prussian War. In 1874 he became general councillor of the Aube and two years later was sent to the Chambre des Deputes as representative of that department, and was always reelected until he reached the presidency. He also held under-secretaryships in the departments of Public Instruction and War. Despite the monarchist traditions of his family Casimir-Perier sided with the Re¬ publican group of the Left. He refused to vote the expulsion of the princes in 1883, and resigned as deputy when the law was enacted. In 1890-92 he was vice-president and in 1893 president of the chamber. On 3 December of the latter year he became Prime Minister un¬ der Carnot and president of the council. He resigned in May 1894 and was reelected presi¬ dent of the chamber. On 24 June 1894, after the assassination of Carnot, Casimir-Perier was elected, on the first ballot, to the presi¬ dency of the republic. He retained the office only six months, surprising the world by re¬ signing on 15 Jan. 1895 and retiring to private life. The reasons impelling him to resign were stated by him to be the restrictions imposed on the President under the constitution. He found himself ignored by his ministers who failed to consult him or even to keep him in¬ formed on important questions and business of state. He remained strictly aloof from politics for the remainder of his life, and en¬ gaged in mining. At the Dreyfus trial, Casimir-Perier’s evidence, as opposed to that of Mercier, greatly aided the cause of the accused officer.

CASINO, ka-se’no, or MONTE CASINO,

a celebrated Benedictine abbey in Italy, in the Neapolitan province of Caserta, near the small town of Cassino and about 45 miles from the city of Naples, founded by Saint Benedict of Norcia in 529 on the site of a temple of Apollo. It was the original home of the Benedictine order. It is situated on a mountain, from which it derives its name, near the ruins of the ancient Casinum, and is approached by a well-paved and winding road. The abbey, after having suffered repeated reverses, finally be¬ came considerable for its privileges and its wealth, and in the 11th and 12th centuries was the seat of science,

particularly of medicine, the celebrated school of Salerno having been founded by the monks of Monte Casino. The church is very magnificent, although overloaded with ornament, and contains the tomb of the founder. The present buildings were erected from 1637 to 1727. The library and archives contain 50,000 printed books and 30,000 incu¬ nabula. The monastery has served as a place of refuge to several sovereigns and pontiffs, and was formerly much visited by pilgrims and trav¬ elers, who were entertained free of expense. It is still visited by travelers or tourists, but it is no longer a conventual institution, being enrolled as a national monument in 1866. The railway from Rome now passes near it. Con¬ sult Clausse, (Les origines benedictines) (Paris 1899) ; Rickenbach, (Monte-Cassino von seiner Griindung bis zu seiner hochsten Bliite unter Abt Desiderius) (Einsiedeln 1884-85) ; Taeggi, ˆaleografia artistica di Montecassino) (Monte Cassino 1876 et seq.) ; Tosti, <Storia della badia di Montecassino) (Rome 1889-90).

CASINO, a name generally given to a kind of club-house or place of amusement, contain¬ ing rooms for dancing, playing at billiards, *etc.* The word is originally Italian, being a diminu¬ tive of the Italian word casa, signifying a house ; and was at first applied to small houses which the nobles of Florence, Venice and other Ital¬ ian cities often possessed at a distance from their ordinary residences, and which were de¬ voted to purposes of social enjoyment.

CASIRI, ka-se’re, Michael, orientalist and Syro-Maronite clergyman: b. Tripoli, Syria, 1710; d. Madrid, 12 March 1791. He studied in the College of Saint Peter and San Mar-cellino ; and in 1734 entered the clerical pro¬ fession. The following year he accompanied the learned Assemanni to Syria, where he was going, at the command of the Pope, to attend the synod of the Maronites, and in 1738 gave, at Rome, an exact account of the religious tenets of the Maronites. He afterward taught in his monastery the Arabic, Syrian and Chal¬ dee languages, theology and philosophy ; and in the year 1748 was invited to Madrid, where he was appointed to an office in the royal library. In 1749 he devoted his attention, by the King’s orders, to the library of the Escurial, of which he subsequently became the superin¬ tendent. Here he collected the materials for his celebrated work, (Bibliotheca Arabico-His- pana} (2 vols., 1750-70), which enumerates in 1,851 articles the manuscripts of the Escurial library, perhaps the richest in Europe i-n Arabic manuscripts. This work, though not entirely free from errors, contains very important in¬ formation and valuable extracts, and is indis-CASKETS — CASS

pensable to every orientalist. In the Madrid National Library are other interesting manu¬ scripts of Casiri, including a copy and Latin translation of an ancient Arabic version of the canons of the Visigothic Church.

CASKETS, The, a group of rocks in the English Channel, seven miles west of Alderney. They have often been fatal to vessels, and, in 1119, Prince William, son of Henry I, and his suite, perished here. In 1744 the Victory ship of war, of 110 guns, also was shipwrecked upon them. On the highest there is a lighthouse. Victor Hugo has immortalized them in his (Toilers of the SeaP

CASLER, John Overton, American sol¬ dier: b. Frederick County, Va., 1 Dec. 1838. He served in the Confederate army during the Civil War and was a prisoner of war from February to May 1865. He lived in Texas 1877-89, and has since been a resident of Oklahoma City, where he is justice of the peace. He is the commander of the Oklahoma division of United Confederate Veterans, and has published (Four Years in the Stonewall Brigade > (1893) ;

(Lilian Stuart, the Heroine of the Rappahan¬ nock > (1889).

CASORIA, ka-so-re'a, Italy, town in the province of Naples (Napoli), six miles north-northeast of Naples. It has four fine churches and is the residence of a district judge. Silk and wine are produced in the neighborhood. Pietro Martino, the painter, was born here. Pop. about 14,000.

CASPARI, kas-pa're, Karl Paul, German Church historian: b. Dessau, 8 Feb. 1814; d. 11 April 1892. He was born of Jewish parents, and studied in Leipzig and Berlin. He was converted to Christianity in 1838, and subse¬ quently became instructor of theology in the University of Christiania, Norway, in 1847. He became full professor in 1857. His Arabic grammar is in high repute, and his contribu¬ tions to the study of the Old Testament in¬ clude works on Obadiah, Isaiah, Micah and Daniel. He published besides the (Grammatica Arabica) (1844-48) ; the (Beitrage zur Einleitung in Jesaga) (1848); (Alte und neue Quellen zur Geschichte des Taufsymbols und der GlaubensregeP (1879).

CASPE, kas'pa, Spain, town in the prov¬ ince of Saragossa, 12 miles north-northeast of Alcaniz, left bank of the Guadalupe, near its

confluence with the Ebro, on several small hills and in the intervening valleys. It has paved streets, one principal and nine smaller squares, a handsome Gothic college and two churches, several chapels, three schools a townhall and prison in a suppressed convent, an hospital and several public fountains. Olive and mul¬ berry trees are extensively cultivated, and coal and iron are mined in the neighborhood. Manu¬ factures — wine, oil and soap. Some trade is also carried on in grain and cattle. A congress of Aragonians, Catalonians and Valencians assembled here in 1412 to settle the royal suc¬ cession. Pop. 8,427.

CASPER, Wyo., town and county-seat of Natrona County, 150 miles northwest of Chey¬ enne, on the Platte River, the Chicago, Burl¬ ington and Quincy and the Chicago and North¬ western railroads. It contains a Carnegie li¬ brary, the Wyoming General Hospital, and is vol. s —

t* ■

the site of Fort Casper. It has extensive in¬ terests in live stock, oil and wool. The town owns the waterworks. Pop. (1920) 11,447.

CASPIAN GATES, a name given to the Russian fortress Dariel, situated in a narrow defile of the Caucasus, on the Terek, 80 miles north of Tiflis.

CASPIAN SEA, a large lake or inland sea between Europe and Asia, now nearly sur¬ rounded by Russian territory but having Persia on the south; 730 miles in length from north to south, and from 130 to 270 in breadth ; area about 170,000 square miles; the largest isolated sheet of water on the globe. The water is less salt than that of the ocean, of a bitter taste and of an ochre color, without ebb or flow. In some places it is exceedingly deep, yet it abounds in shallows, so as to prevent the navi¬ gation of ships which draw more than 9 or 10 feet of water. The level of the Caspian Sea is considerably lower than that of the ocean. Among the rivers which flow into it are the Volga, Ural, Terek and Kur. In ancient times the Oxus (Amoo Daria) also flowed into it. It has no outlet) The fisheries here, which are very valuable, Occupy and train many seamen. Sturgeons and sterlets are caught in great quantities, and there are also salmon-trout, perch, Silurus glams, two kinds of carp and porpoises ; seals abound in the upper coasts, and tortoises between the mouths of the Volga and the Ural. In the northern region the first fishing season, called the caviar season,

occurs between March and May, when the Volga, Ural, etc., are getting cleared of ice. The second season is in July, when the sturgeon descend the rivers ; and the third open-sea fish¬ ing goes on from September to November. The only ports at all worthy the name on or near the Caspian are Astrakhan, Baku, Derbend and Astrabad (in Persia). The navigation is at all times difficult and often perilous. Steam packets are now established on this sea. The Russians have also a fleet of war vessels in the Caspian, and a new naval station has been established at Krasnovodsk, on the east side of the sea. By means of river and canal there is water communication between the Caspian and the Black Sea, Baltic and White Sea.

CASS, Lewis, American statesman, diplo¬ matist and soldier : b. Exeter, N. H., 9 Oct. 1782; d. Detroit, Mich., 17 June 1866. In 1800 he removed to Marietta, Ohio, where he entered on the study of the law. He was admitted to the bar in December 1802, and soon after estab¬ lished himself at Zanesville, where he gradually acquired practice. In 1806 he was elected to the Ohio legislature. He served in the first year of the second war with England and in 1813 was appointed governor of Michigan Ter¬ ritory, holding office till July 1831. Michigan at this time had no territorial legislature, and the business of selecting laws for it from the codes of the States devolved on Governor Cass and the territorial judges. Governor Cass was also ex officio superintendent of Indian affairs for the territory, which then included what now constitutes the two States of Michigan and Wis¬ consin, and this remained for several years the most important part of his duties. Of all this extensive territory, it was only a little tract bordering on Lake Erie and the Detroit River to which the Indian title had not been ex-706

tinguished. Within the bounds of his Indian superintendency, ultimately made to embrace all the tribes northwest of the Ohio, there were reckoned to be 40,000 Indians, mustering at least 9,000 warriors. The recent hostilities, and the distrust and suspicions of the Indians, occa¬ sioned by the constant calls upon them for addi¬ tional cessions of land, rendered this office one of great delicacy and difficulty. But Governor Cass, while steadily carrying out the policy of acquisition, succeeded also in maintaining the respect, and even in securing the affection of the Indians. In 1817 he obtained, in conjunction with Governor McArthur, a cession of most of the

remaining Indian lands within the State of Ohio, with adjoining tracts in Indiana and Michigan, to the extent of 4,000,000 acres in the whole. This cession removed the Indian barrier hitherto intervening between the settle¬ ments of Ohio and those of Michigan. In 1819 he met the Chippewas at Saginaw, and obtained a cession of lands in the peninsula of Michigan to the extent of 6,000,000 acres. As yet the northwestern regions were very imperfectly known. At the suggestion of Governor Cass, an expedition, in which he himself bore a conspic¬ uous part, and of which an account has been published by Schoolcraft, was set on foot in 1820, for exploring the northern shore of Lake Superior, and the course of the upper Missis¬ sippi. The next year, by a long, circuitous river navigation, he visited Chicago, then nothing but a military post, with a wide wilderness all about it, and there made a treaty with the Chippewas, Ottawas and Potawatamies, by which a large additional tract was obtained, completing the extinction of the Indian title to the peninsula of Michigan south of Grand River. In 1828 he made two treaties, one at Green Bay, the other at Saint Joseph's, by which many millions of acres were credited to the United States. Up to his resignation of the office of governor of Michigan, in July 1831, he had concluded 22 treaties with the Indians, by which cessions had been acquired in Ohio, Indiana, Illinois, Michi¬ gan and Wisconsin, to an amount equal to nearly or quite a fourth part of the entire area of those states. When President Jackson re¬ constructed his Cabinet in August, 1831, Cass was appointed Secretary of War. The policy of the removal of the Indians, especially the southern tribes, to districts west of the Missis¬ sippi, had been warmly espoused by General Jackson. The defense of this policy, which had elicited much criticism and a warm oppo¬ sition, was ably entered upon by Secretary Cass in his first annual report. In 1836 he was appointed Minister to France, a post which he held till 1842. He was on excellent terms with Louis Philippe, of whose character he gave a very friendly and favorable account in his (King, Court and Government of France, } pub¬ lished in 1840, originally as an article in the Democratic Review. By far the most remark¬ able incident of his diplomatic career occurred just at its close, in his attack on the quintuple treaty for the suppression of the slave trade. He was United States senator (1845-48), and having opposed the Wilmot Proviso, became the Democratic candidate for President in 1848, but was defeated. He returned to the Senate in 1849, and was Secretary of State (1857-60), resigning because President Bu¬ chanan would not consent to strengthen the

garrison at Fort Sumter. He wrote (History, Traditions and Languages

of the Indians) (1823); (France, Its King, Court and Government) (1840). See (Lives) by Schoolcraft (Albany 1848) ; Smith, W. L. G. (New York 1856) ; McLaughlin, Andrew C. (Boston 1891) ; Young, (Life and Public Service of General Lewis Cassˆ (Detroit 1852).

CASSABA or KASSABA, kas-sa-ba, Tur-key-in-Asia, town of Manisa Tanjak, 63 miles by rail east of Smyrna. It is noted for the (melons of Cassaba) which are widely ex¬ ported, along with cotton, silk and other prod¬ uce. Pop. 23,000.

CASSAGNAC, kas'san'yac', Bernard Adolphe Granier de, French journalist and Bonapartist : b. Averon-Bergelle, 11 Aug. 1806; d. Chateau de Coulomme, 31 Jan. 1880. He studied at Toulouse and then began his career at Paris as contributor of literary criticisms to the Journal des Debats. He embraced the cause of Romanticism and his attacks on the conservatism of Racine were the talk of Paris. In 1840 he was sent by the government on a mission to Antilles, where he married a Creole. On returning to France he devoted himself to politics and published a (Histoire des classes ouvrieres et des classes bourgeoises) ; a (Histoire des classes nobles, et des classes anobiles,* a (Monographie de l'eglise de la Madeleine) ; and a romance entitled ˆanaeP During the revolution of 1848 he left Paris, but returned in 1850 as a Bonapartist. He became editor of the Pouvoir, Le Reveil , Le Pays. His entire career was filled with duels, lawsuits, arrests and other sensational indiscretions. After the revolution of 4 September, he left France and published Le Drapeau which was sent gratuitously to the prisoners interned in Germany. In 1876 he was chosen deputy by the Anti-Republican party. He defended the Jesuit cause and opposed the creation of de¬ partmental normal schools. In addition to the works mentioned above he wrote (Histoire de la Revolution frangaise) (1850) ; (Histoire du Directoire) (1851-56) ; (Histoire des Giron-dins) ; (Histoire populaire de Napoleon HIP His works are not authentic. They are highly colored, superficial but rich in a vigorous jour¬ nalistic style.

CASSAGNAC, Paul-Adolphe Marie Pros¬ per Granier de, son of Adolphe; had a career and a reputation not dissimilar to those of his father. He was born 2 Dec. 1842; d. at Saint Loir-et-cher, 4 Nov. 1904. He was taken pris¬ oner at Sedan in 1871, and underwent eight months' confinement in Silesia. His violent advocacy of Bonapartism led him into innu¬ merable duels, and he was on several occasions summoned for libelous articles in the Pays and other newspapers. He was also a vigorous sup¬ porter of General Boulanger. After the death of the Prince Imperial de Cassagnac supported Prince Victor Napoleon. After 1884 he edited a journal known as L' Autorite. He wrote a

(Histoire de la troisieme Republique) (1875) ; (Empire et royaute) ; (Memoires de Chisle-hursP ; and in collaboration with his father, (Histoire populaire abregee de Napoleon IIP

(1874-75).

CASSANDER, King of Macedon, son of Antipater: b. about 354 b.c. ; d. 297 b.c. He disputed the sovereignty of Macedon with Poly-sperchon, whom Antipater had appointed regent

at his death in 319 b.c. Allying himself with Ptolemy and Antigonus, he conquered Athens; captured Olympias, the mother of Alexander the Great, and put her to death ; and connected himself with the royal family by marrying Thessalonica, half-sister to Alexander. He joined, in 315 b.c., the coalition against the growing power of Antigonus ; murdered the rightful heir to the throne, Alexander yEgus, and his mother Roxana ; and took the title of king in 306 b.c., which was confirmed to him by the decisive battle of Ipsus in 301 b.c. In 297 he was succeeded by his son Philip.

CASSANDRA, also called ALEXANDRA,

daughter of Priam and Hecuba, and twin-sis¬ ter of Helenus. Both children, according to tradition, were playing in the vestibule of the temple of the Thymbraean Apollo, not far from Ilium ; and having stayed there too late to be carried home, a couch of laurel twigs was pre¬ pared for them in the temple. When the nurses went to them the next morning they found two serpents at the side of the children, which, in¬ stead of injuring them, harmlessly licked their ears. This miracle produced a still greater one : the hearing of the children was

rendered so acute that they could distinguish the voices of the gods. Cassandra subsequently spent much of her time in the temple of Apollo, who, becoming enamored of her charms, disclosed to her all the secrets of the prophetic art, and in return demanded her love. But Cassandra, when her curiosity was satisfied, refused the dishonorable reward. Apollo, incensed at this, solemnly decreed that her prophecies should never find belief. She frequently and contin¬ ually foretold the destruction of Troy, and warned her countrymen in vain against the de¬ ceitful horse. When Troy was conquered, and Cassandra, with the other maidens, fled to the temple of Minerva, Ajax, son of Oi'leus, tore her from the altar, deflowered the virgin in the sacred place, and dragged her away to the other female slaves, with her hands tied. On the division of the booty she fell to Agamemnon, who carried her as his slave and mistress to Mycenae. Clytaemnestra murdered them both. Agamemnon had twins by her — Teledamus and Pelops, who were put to death by yEgis-thus. The ancients regarded this rape of Cas¬ sandra as a most infamous atrocity. It has often afforded a subject to poets and sculptors. The Locrians, the countrymen of Ajax, were afflicted on this account for many years with storms, and their country was desolated with the plague. Hischylus tells her story in the (Agamemnon. >

CASSANDRA, the most westerly of the three tongues of the Chalcidic peninsula, be¬ tween the gulfs of Salonica and Cassandra. Its ancient name was Pallene. The Gulf of Cas¬ sandra was anciently Toronaicus Sinus.

CASSANO D'ADDA, kas-sa'no dad'da, Italy, town in the province of Milan, and 16 miles north-northeast of the town of Milan, pleasantly situated on a hill on the right bank of the Adda. It is very old, and built mostly of bricks. A bridge of 800 paces connects it with the opposite bank of the river. There are numerous silk-mills. Its military position on the right bank of the Adda has caused it to be the scene of several battles. Here Ezzelino da Romano, the leader of the Ghibellines in Italy,

in the time of the Emperor Frederick II, was defeated in 1259; here also Prince Eugene was defeated in 1705, by the Due de Vendome, and the French under Moreau, by Suvaroff in 1799. Pop. of commune 9,150.

CASSAREEP, kas'sa-rep, CASSIREEPE, or CASSIRIPE, the concentrated juice of the roots of the common or bitter cassava (Manihot

utilissima) , flavored by aromatics, and deprived of its poisonous properties by boiling. It is used to give a relish to soups and other dishes, and forms the basis of the West Indian ˆpepperpot.®

CASSAS, kas-sa, Louis Frangois, French

landscape-painter and architect : b. Azay-le- Feron, 3 April 1756; d. Versailles, 2 Nov. 1827. A pupil of Jean-Jacques Lagrenee, he journeyed in Italy and in the Levant. On his return he wTas appointed inspector and professor of design at the Gobelins in Paris. From the materials collected in his travels have been compiled (Voyage pittoresque de la Syrie, de la Phenicie de la Palestine, et de la Basse Egypte) (30 vols., Paris 1799), and (Voyage historique et pit¬ toresque de l'lstrie et de la Dalmatie) (1802, with 69 copper plates). The original drawings for both works were oil paintings, and they were deposited in the Bibliotheque Royale. His (Galerie d'architecture des differentes peuples,* a collection of models of restorations of ancient architecture, has been placed in the Ecole des Beaux Arts in Paris.

CASSATION, a term used in the courts on the continent of Europe. It is derived from the Middle Ages, and signifies the annulling of any act or decision if the forms prescribed by law have been neglected, or if anything is con¬ tained in it contrary to law.

CASSATION, Court of (Cour de Cassa¬ tion), one of the most important institutions of modern France, which gives to the whole juris¬ diction of that country coherency and uniform¬ ity without endangering the necessary inde¬ pendence of the courts. It was established by the first National Assembly, and has been pre¬ served in every essential respect, under all the changes of the Revolution and Restoration. It has been maintained even in those districts which, by their union with France became subjected to French laws, but by the Peace of Paris again became part of the Prussian mon¬ archy. In France, as early as the reign of Louis IX (1226-70), though a separate court of justice had come into being, petitions were presented to the King by appellants from the decisions of the courts. In later times appeals to the parliaments, as the highest courts of the kingdom, came into use, and their decisions were not liable to be set aside by the ordinary forms Qf law. Yet the parties were allowed to dispute even these decisions if they were founded upon errors of fact or violated undis¬ puted principles of law; and by an ordinance of 1302 it was provided that the parties should be allowed royal letters for the defense of their rights against the decisions of the Supreme Courts (lettres de grace de dire contre les arrets), which should be issued from

the chancery (by the chancellor of France). The case was then sent back to the Parliament for further investigation, but was examined and decided in the presence of the king himself, or

of a special commissioner. An abuse, however, crept in of transferring these cases to the royal council, where they were decided by officers called maitres des requites. These letters re¬ ceived the name of lettres de proposition d'er-rcur, and during the civil commotions at the end of the 14th century began to be more frequently presented to the council, which, as soon as one party complained of the partiality of the parlia¬ ments, transferred the case to its own bar, and obstructed the course of justice hy lettres d'etat, suspensions of the process, on the pretext of the absence of one of the parties in the service of the king. Under the Chancellor Poyet (1538-42), this abuse reached its highest pitch; but the Chancellors Olivier (1545-51) and Hopital (1560-68), the two great reformers of French jurisprudence, limited the use of these lettres till, by the Ordinance of Blois (1576), all the provisions against the decisions of the parliaments were reduced to these three : — the proposition d'erreur, for an error of fact; re¬ quite civile, to restore the parties to their for¬ mer condition on account of the fraud of one of the parties or the mistakes of the attorney; and cassation (petition for abrogation), for vio¬ lation of forms or settled principles of law. By the famous Order of Procedure of 1667 the first of these provisions was abolished, but the province of the requite civile and cassation was enlarged and more precisely defined. , The former was always brought before the court itself and decided there, the latter before the council. For this purpose, in the conseil prive, or conseil des parties , a particular committee was formed, consisting of the chancellor, the four Secretaries of State (Ministers of the De¬ partments), the Council of State, and all the maitres des requites (in 1789, 78 in number). The decisions of this committee were too much influenced by the will of the king and the ministers, and by various other circumstances, so that they did not enjoy great respect, though they often exposed acts of great in¬ justice on the part of the Parliament and other high courts. It was therefore abolished in the

first National Assembly, and its place supplied by an independent court — the tribunal de cas¬ sation (decrees of 27 Nov. and 1 Dec. 1790), which was retained in all the constitutions and received under the Imperial government (1804) the name cour de cassation, which it still re¬ tains. It consisted, according to the organiza¬ tion of 1800, of 48 members, chosen from the Senate, on the nomination of the consuls, who elected their own president from among them¬ selves. The appointment of president was afterward vested in the emperor. In the Charte Constitutionelle of 1814 the number of members of the Cour de Cassation was fixed at 49, at which it still remains. The members are appointed for life by the President-of the Republic, and consist of a first president, three presidents of sections, and 45 councillors, a public prosecutor, the procureur-general and 6 substitutes, the avocats-generaux. The Minister of Justice, or Keeper of the Seals (garde des sceaux) has the right of presiding on certain occasions. This court never decides on the main question at issue, but on the competency of the other courts and on the petitions to have their decisions reviewed or annulled, and assigns the question to another court if a decision is to be set aside for an evident violation of the forms

or the principles of the law. For this purpose it is divided into three sections or chambers : — the chambre des requites, which decides on the admissibility of the petitions in civil cases; the chambre de cassation civile; and the chambre de cassation criminelle. After a decision has been reversed, if a second court decides the same case in the same way, and an appeal is entered again, the Court of Cassation must either request an authentic explanation of the law from the government, or at least all the three sec¬ tions must unite, to pronounce a second reversal or cassation ; and if a third decision is the same as the preceding, the court before which the case is again brought must submit to the doc¬ trine of the Court of Cassation on the point of law in dispute. This system, which dates from 2 April 1837, gives great authority to this court in matters of jurisprudence. According to the law in force before 1837, the court before which a case was brought for decision a third time was not required to adopt the views of the Court of Cassation, but after the third decision there was no further appeal. The government, how¬ ever, in that case gave an authentic interpreta¬ tion of the law if there was any occasion for so doing. Until the end of 1852 there was a simi¬ lar Court of Cassation for the Prussian province of the Rhine, but in 1853 its jurisdiction was transferred to the supreme Prussian tribunal sit¬ ting at Berlin. The sentences of the Court of Cassation are not only

recorded in the journals of the courts, the decisions of which are re¬ versed, but published likewise in an official bulletin, by which consistency and uniformity are preserved. The tribunal of cassation has enjoyed from its commencement the respect and confidence of France, and has numbered among its members several of the most dis¬ tinguished lawyers; as the President Henrion de Fansey, the councillors, Chabot, Merlin and Carnot. The court possesses disciplinary powers over the judges of other courts, and the procureur-general over other procureur-generaux. See Appeal; Court.

CASSATT, Alexander Johnston, Ameri¬ can railway president : b. Pittsburgh, Pa., 8 Dec. 1839; d. Philadelphia, Pa., 28 Dec. 1906. He was educated in the University of Heidel¬ berg, and the Rensselaer Institute, Troy, N. Y., and in 1859 was employed as civil engineer in surveying a railroad route in Georgia. He entered the service of the Pennsylvania Rail¬ road as rodman in 1861, became general super¬ intendent of the Pennsylvania system and gen¬ eral manager of the lines east of Pittsburgh, 1871-74; third vice-president, 1874; and first vice-president, 1880. He resigned this last-named post in 1882, but was elected a director in 1883, and in June 1899 was elected president of the Pennsylvania system and was the suc¬ cessful procurer of the terminal for this rail¬ road in New York city. He was president of seven companies, and a director in 23, including transportation, banks and trust companies.

CASSATT, Mary, American artist: b. Pittsburgh, Pa., about 1855. In 1875 she went to Europe to study art, and lived for some years in Spain, where she gave particular attention to the works of Velasquez. Removing to Paris, she was influenced by the work of Manet and Legas, and exhibited in the Impressionist Expo¬ sition about 1880. In 1898 she exhibited some

of her works in New York city. Returning to Europe, she established a studio in Paris, where she has since lived. She has gained consider¬ able fame as an etcher, ranking among the first of the modern artists in this medium. Her subjects are almost invariably women and chil¬

dren, particularly mother and child, in the environment of home. The children, especially, are depicted with truth, originality and a re¬ markable power of observation, but without prettiness. Among her best-known paintings are (The Bath) ; (Breakfast in Bed) ; (Mother's Caress*; (In the Garden*; (At the Mirror) ;

(Maternity * ; (Child Playing with a Dog) ;

(Child's Toilet* ; (In the Box.* Miss Cassatt is represented in the Luxembourg by (The Young Mother,* a pastel; in the Metropolitan Museum, New York, by (Mother and Child, J and in the museums of Boston and Worcester by similar subjects. She is also known for her tinted etchings, the best known of which is a series of 10 entitled Maternity.

CASSAVA, kas-sa'va, MANIOC, man'i-ok, or MANDIOC, a South American shrub (Manihot utilissima) belonging to the natural order Euphorbiacece, suborder Crotonece. There are two forms, popularly known as bitter and sweet, both of which are widely cultivated in tropical America for their fleshy, cylindrical, starchy roots, which form a large part of the food of the natives, and from which tapioca is made. They have also been introduced into other warm countries, especially Africa, and have quickly gained important positions as food crops.

The plant, which attains a height and breadth of four feet or more, is rather bushy, since its numerous knotty, brittle, pithy stems have many palmate leaves. The flowers, which appear in midsummer, are green or yellovvish and inconspicuous and are succeeded by wing¬ angled capsules. The best results are obtained on light, sandy, well-drained soils. The land is prepared as for corn, but instead of plant¬ ing seed, stem cuttings are covered by the plow, and when the plants appear they are cultivated with the same implements used in corn-growing. In about seven months the white soft roots, which occasionally weigh 30 pounds, and are sometimes three feet long and three inches thick, are dug by hand, washed, grated or ground to pulp. The juice, or poisonous part, is carefully pressed out, and when boiled, becomes the delicious sauce called casareep (q.v.), much esteemed by epicures. The flour that remains after pressure is formed into thin, round cakes and bak d. To a European accus¬ tomed to eat bread, these, though sweetish and not unpalatable, have an insipid taste. If placed on close vessels, and preserved from the attacks of insects, cassava bread may be kept for several months without injury.

Poisoning by the bitter cassava is due to the presence of minute

quantities of hydrocjˆanic acid (q.v.)- This is a very common ingredi¬ ent of many fruits and seeds, but usually is modified as the fruit ripens. The general process of manufacture of cassava destroys or drives off the free hydrocyanic acid.

The natives of South America throw a num¬ ber of cakes of cassava together to heat, after which they soak them in water, which causes a rapid fermentation to take place; and from the

liquor thus obtained they make a very sharp and disagreeable, but intoxicating, beverage, which will not keep longer than 24 hours with¬ out spoiling.

From the pure flour of cassava is formed the substance called tapioca, which is frequently used for jelly, puddings and other culinary pur¬ poses. This is separated from the fibrous parts of the roots by taking a small quantity of the pulp after the juice is extracted and working it in the hand till a thick, white cream appears on the surface. This, being scraped off and washed in water, gradually subsides to the bot¬ tom. After the water is poured off the remain¬ ing moisture is dissipated by a slow fire, the substance being constantly stirred, until at length it forms into grains about the size of sago. These become hard by keeping, and are the purest and most wholesome part of the cassava. The starch of cassava, separated from the fibre by the usual processes, is known as Brazilian arrowroot.

The roots of another species of this shrub, called sweet cassava (Manihot aipi), the juice of which is not poisonous, are usually eaten with butter, after being roasted in hot ashes. They have much the flavor of chestnuts, and are an agreeable and nutritive food, containing about 30 per cent of carbohydrate materials. The roots of the sweet cassava are also used as stock-food and to make glucose and starch. Florida is the only State in which sweet cassava has attracted much attention, but it seems to be not very profitable there on account of the high price of labor and fertilizers. .Consult United States Department of Agriculture, Bureau of Chemistry, Bulletins 44 (1894), 106 (1907), and Farmer’s Bulletin 167 (1903).

CASSEGRAINIAN TELESCOPE, a

form of the reflecting-telescope in which the great speculum is perforated like the Gregorian, but the rays converging from the surface of the mirror are reflected back by a small convex mirror in

the axis of the telescope, and come to a focus at a point near the aperture in the speculum, where they form an inverted image, which is viewed by the eyepiece screwed into the tube behind the speculum. In use this tele¬ scope thus possesses the convenience that the observer looks directly through the tube at the object to be examined, exactly as in using the more usual refracting telescope. Moreover, as in all reflecting telescopes, the light, as it is merely reflected, is not separated into its com¬ ponent colors, as is the case when it passes through a lens. For this reason reflecting tele¬ scopes are widely used in certain branches of astronomy, especially in spectroscopic and photographic work. In particular, an enor¬ mous Cassegrainian telescope has been com¬ pleted (1916), for use in the new Dominion Astronomical Observatory at Victoria, Canada. The mounting of this instrument is by Warner and Swasey of Cleveland, Ohio ; the great 72-inch mirror was figured by the John A. Brashear Company of Pittsburgh.

CASSEL, kas'sel, or KASSEL, formerly the residence of the Elector of Hesse-Cassel, and now the chief town in the Prussian prov- •ince of Hesse-Nassau, lies on the Fulda, 35 miles southwest of Gottingen and 91 miles north-northeast of Frankfort-on-the-Main. Tt is divided into the Altstadt, or Old Town; the

Ober Neustadt, or Upper New Town; the Unter Neustadt, or Lower New Town; and the new West Quarter; ail but the third being on the left bank of the river. Cassel has several fine squares, or open areas, on the principal of which, the Friedrichsplatz, stands the electoral palace, an indifferent structure ; and next to it the museum, a handsome building, containing a library of 235,000 volumes, and many valuable MSS, including the Hildebrandslied dating from the 8th century. The brothers Grimm were librarians here from 1814 to 1830. The Murhard Public Library contains 155,000 volumes. At one end of this area is a hand¬ some triumphal arch and war monument over¬ looking the Fulda Valley, in which is the Karl-saue, finely laid out, and forming a favorite promenade. On this side of the city are also the building for

the courts and government officers, the Bellevue palace containing the academy of arts, and the handsome picture gallery containing some fine examples of the old masters, especially the Flemish and Dutch. The other more noticeable public areas are the Konigsplatz, in the form of a circle; the Friedrich-Wilhelmsplatz, with an ornamental foun¬ tain ; the Standeplatz, a broad tree-planted ave¬ nue, *etc.* The most noteworthy church is the Protestant church of Saint Martin, with a nave of the 14th and a choir of the 1 5th cen¬ tury. An observatory is likewise situated here. Cassel is the seat of the provincial and district government and of the supreme provin¬ cial court. The town's affairs are administered by a municipal council of 48 and an executive board of 21 members. There is a modern sewage system and a copious water supply, and the town owns and operates gasworks, an electric-light plant and a slaughterhouse. There are numerous educational institutions, in¬ cluding two gymnasia, three municipal high schools and a score of technical schools. There are many hospitals and other charitable institu¬ tions. Cassel has excellent railway facilities, and two electric street-railway lines accommo¬ date the city traffic. It is the seat of a United States consulate. Cassel has iron-foundries and machine-shops, works for railway-carriages, mathematical instruments, pianos, gloves, jute works, *etc.* The town dates from the)'ear 913, when, under the name of Chassala, it was the residence of King Conrad I. It received its first municipal rights in the 13th century from the landgraves of Thuringia. In the Seven Years' War it was several times captured by the French. Landgrave Frederick II sent 12,000 Hessians to aid the British in the American Revolution and was paid $22,000,000. In 1807 it was made the capital of the newly-formed kingdom of Westphalia. In 1866 it was oc¬ cupied by Prussian troops and became a part of Prussia. In the vicinity is Wilhclmshohe, the ex-elector's summer palace the temporary resi¬ dence of Napoleon III after Sedan. Pop. about 107,000.

CASSELS, Sir Walter (Gibson Pringle), Canadian judge: b. Quebec city, 14 Aug. 1845. He was educated at the high school, Quebec, and Toronto University, and graduated B.A. in 1865. He was admitted a barrister in 1869, became one of the leaders of the Ontario bar,, and held briefs in many important causes. He was appointed a judge of the Exchequer Court of Canada in 1908, and was knighted in 1917.

CASSIA, a genus of leguminous plants, of the family Cccsalpiniacecc, inhabiting the tropi¬ cal parts of the world, consisting of trees, shrubs or herbs, the leaflets of several species of which constitute the well-known drug called senna. That imported from Alexandria is ob¬

tained from C. acutifolia. C. fistula is found wild in India. Its legumes contain a quantity of thick pulp, which is a mild laxative and cathartic, and enters into the composition of the confection of cassia and the confection of senna. It belongs to the sugar class of laxa¬ tives, its properties being due for the most part to the water-attracting properties of sugar while in the intestinal canal. The leaves and flowers are also purgative. The bark and roots of several of the Indian species are much used in medicine. Cassia barkˆ is a common name for the bark of an entirely different plant, Cinnamomum cassia, belonging to the laurel family. It is much imported into Europe, mostly from China, and is also called (f Cassia lignea P Its flavor somewhat resembles that of cinnamon, and as it is cheaper it is often sub¬ stituted for it, but more particularly for the preparation of what is called oil of cinnamon. The cassia of the Bible was probably cassia bark. Cassia buds, which are similar in flavor, are the unripened fruits of this tree.

CASSIANUS, otherwise called Joannes Massiliensis and Joannes Eremita, early theological writer and zealous advocate of the monastic system : b. about 360, probably in Provence; d. Marseilles about 435. It is cer¬ tain however, that he traveled extensively in the East, spent a few years in Bethlehem, traveled to Egypt and seems to have visited the hermits in the desert. He was deeply attached to Saint Chrysostom and when the latter, through the intrigues of his opponents, was re¬ moved from the episcopal chair, Cassianus was sent with Germanus to Rome to present a memorial from the clergy who adhered to Chrysostom. Here he became personally ac¬ quainted with Pelagius. About 415 he went to Marseilles, where he continued a course of rest¬ less activity as a presbyter till his death. He founded a monastery and a convent on the principles laid down by him in his works (De Institutis CcenobiorunP and Collationes Patrum SceticorunP (that is, Conferences of the Fathers in the Desert of Sketis)). The views advanced in these works, and still more the strong leaning which he showed to the dog¬ mas of Pelagius, involved him in a controversy with Augustine. He ultimately modified his opinions so far as to adopt the system to which theologians have given the name of Semi-pelagianism, holding that man, since the fall, is not absolutely incapable of good, but, on the contrary, both derives from nature the seeds of virtue, and is able of himself to commence their primary development, though he requires the aid of divine grace to bring them to maturity. These views found great favor with the monks of France, and long maintained their ground in opposition to the efforts of Augustine and his friend Prosper of Aquitania. At the desire of Leo, then Pope, he wrote against Nestorius his (De incarnatione Domini }

in seven volumes. The best edition of the works of Cassia¬ nus is that of Frankfort (1722, fob). They are found in the English translation by E. C. S. Gibson in volume IX of (Nicene and

Post-Nicene Fathers) (2d series, London and New York 1884). Consult Harnack, A., his¬ tory of Dogma) (Vol. V, pp. 246ff., 253ff.) ; Moeller, W., (History of the Christian Church > (Vol. 1, pp. 368-70).

CASSIN, John, American ornithologist : b. near Chester, Pa., 6 Sept. 1813 ; d. Philadelphia, 10 Jan. 1869. He resided in Philadelphia from 1834, and excepting a few years partially given to mercantile pursuits, devoted himself to the study of ornithology. He contributed descrip¬ tions of new species and synoptical reviews of various families to the (Proceedings) and the (Journal) of the Philadelphia Academy of Natural Science; and his more elaborate pub¬ lications are (Birds of California and Texas) (1862), containing descriptions and colored en¬ gravings of 50 species not given by Audubon ;

(Mammalogy and Ornithology of the Wilkes Exploring Expedition* (1858) ; Ornithology of the Japan Expedition* ; Ornithology of Gilliss's Astronomical Expedition to Chile) ; and the chapters on rapacious and wading birds in the Ornithology of the Pacific Railroad Ex¬ plorations and Surveys * (Washington 1858) ; (The Birds of North America) (1860). His works are the result of careful research, and are especially valuable for their descriptions and classification of many birds not given in the previous works of Wilson and Audubon. According to Coues he was the only American ornithologist as familiar with the birds of the Old World as with those of America.

CASSINI, kas -se'ne, Arthur Pavlovitch,

Russian diplomat : b. 1835. He began his pub¬ lic career in 1855, being attached to the Depart¬ ment of Foreign Affairs. He held various minor diplomatic offices in Europe and in 1891 became Minister at Peking, during the war with China and Japan successfully advancing Russian interests. He became Minister at Wash¬ ington in 1897 and

later the first Russian Am¬ bassador to the United States. In 1905 he went as ambassador to Madrid and represented Russia at the Algeciras conference.

CASSINI, Giovanni Domenico, Italian

astronomer: b. Pcrinaldo, near Nice, 8 June 1625; d. Paris, 14 Sept. 1712. He studied at Genoa with the Jesuits. Chance turned his at¬ tention to astronomy, in which he made such rapid progress that in 1650 the senate of Bologna bestowed on him the first professor¬ ship of astronomy at the university. He worked out more correct tables of the sun and a more precise determination of its paral¬ lax. By an observation at Citta della Piave he discovered the shadows cast by the satellites of Jupiter on the disc of that planet when they are between it and the sun. By means of these he corrected his theory of the motion of the satellites; he also determined the period of Tupiter's revolution. In 1668 he published his (Ephemeridcs of the Satellites of Jupiter.* In 1671 he became director of the observatory at Paris and in 1673 became naturalized as a French subject. He discovered four new satel¬ lites of Saturn and the zodiacal light ; proved that the axis of the moon is not perpendicular to the plane of the ecliptic, and showed the causes of her libration. The. laws of this motion are one of his finest discoveries. He also wrote observations on the Indian calendar.

He believed that the planetary orbits were not ellipses, but members of a family of curves called after him Cassinian ovals (q.v.). The meridian commenced by Picard and Lahire was continued by Cassini in 1700 to the extreme limits of Roussillon, and when measured 100 years later showed a difference of only 21 toises (about 134 feet). His (Opera Astronomica> was published at Rome in 1666.

CASSINI, Jacques, French astronomer: b. Paris, 18 Feb. 1677 ; d. Thury, department of Oise, 16 April 1756. He was the son of Gio¬ vanni Domenico Cassini and succeeded him in his post at the Paris observatory. In 1694 he was admitted into the Academy of Sciences. His labors to determine the figure of the earth are well known. The first measurement of 1718 made the degrees of the meridian shorter toward the north than toward the south, whence it was concluded that the earth was an oblate spheroid. Cassini continued the measurement, and maintained this opinion in his work (De la grandeur et de la figure de la terre.* In order to settle the question the Academy was commissioned in 1733 to measure the whole length of France from Brest to Strassburg. Cassini directed this undertaking, but was led into

some errors by the defective instruments of former observers. The astronomical tables which he compiled were published at Paris in 1740. He compiled the first tables on the in¬ clinations of the orbits of Saturn's satellites and ring. In addition to his astronomical works, he wrote several essays on subjects in natural philosophy, *etc.*

CASSINI, Jacques Dominique, Comte de, French astronomer: b. Paris, 30 June 1748; d. Paris (?), 18 Oct. 1845. He was the son of Cassini de Thury and succeeded his father in 1784 as director of the Paris observatory. He was a member of the Academy, and a states¬ man of ability as well as a mathematician. In 1789 he completed the topographical work which was begun by his father. The (Atlas National *was a reduction of it on a scale of one-third. Cassini was arrested by order of the revolutionary tribunal. He escaped with life, but lost the copper-plates of the (Carte de France,* which had cost 500,000 francs. Napoleon made him a count of the empire.

CASSINI DE THURY, tii-re, Cesar Frangois, French astronomer: b. Paris, 17 June 1714; d. 4 Sept. 1784; son of Jacques Cassini. He was a member of the Academy from his 22d year, and director of the observatory in 1756. He undertook a geometrical survey of the whole of France in 1744. When the support of the government was withdrawn in 1756, Cassini formed a society for advancing the requisite sums, which were to be repaid by the sale of the maps constructed from the survey, ffhe work was almost entirely finished when he died.

CASSINIAN, or CASSIAN OVAL, the

locus of a point the product of whose distances from two fixed points is constant. It varies in shape as the constant product and the distance between the fixed points are differently chosen, and may break up into two separate but sym¬ metrical figures. A special form is that of Bernoulli's lemniscate. Its general Cartesian

equation referred to its axes of symmetry is (x2 + y2 + a2) 2 — 4a2

x2 + a4 = tn\ and the corresponding polar equation is r* — 2a2 r2 cos 2 & —

See Briot et Bouquet, (Geometrie analytique) (4th ed., Paris 1890; tr. Chicago 1896).

CASSINO, Italy, until 1871 known as San Germano, city of Caserta province, on the Rapido, 85 miles southeast of Rome. Of great historic interest, and the scat of the celebrated monastery of Monte Cassino, nearby are in¬ teresting ruins of the village of M. Terentius Varro where, according to Cicero, Antony led a dissipated life, also a ruined amphitheatre built by Ummidia Quadratilla, a Roman lady of whom Pliny writes in his letters. Popes and emperors resided at San Germano and here Frederick II and Gregory IX effected a peace in 1230. It was the scene of an Austrian victory over Murat 16 March 1815. Pop.

14,220.

CASSINO, a game at cards usually played by four persons (although more can enter the game), two on each side. In it the ten of diamonds, technically called big cassino, counts two ; and little cassino, the two of spades, counts one. The points possible to be scored in one deal (exclusive of sweeps) number 9. They are: Big cassino, 2; little cassino, 1; cards, 1 ; spades, 1 ; each ace, 1 = 4. A sweep is counted when a player takes up all the cards on the table. The object sought in the game (besides the points already enumerated) is to arrange the cards on the board in combination so that the sum of the spots on the cards thus combined may equal those on one card in the hand of the player, who has the right to take as many cards from the board as he can thus combine; or he may capture any card from the board the counterpart of which he has in hand. This can be done also by playing cards from the hand in such a manner that the sum of the spots on these cards and on cards on the board equals that on a card in the player's hand.

CASSIODORUS, Flavius Magnus Aure¬ lius, Roman historian and statesman, who lived from about 468 to 568. He entered the service of the Ostrogoth king of Italy, Odoacer, at the age of about 20 years and under him and his successor, Theodoric, was treasurer of the kingdom and councillor, ad¬ ministering his office with extraordinary prudence in a most difficult time. As states¬ man, scholar and historian he kept alive the lamp of the Gneco-Roman learning after the overwhelming of the ancient civilization by the barbarians. After a term of 50 years in public station he withdrew to a monastic institution founded by

himself in his native province, Bruttium, and there spent the remaining 30 years of his useful life, imbuing his monks with a love of the ancient learning and employing them in copying the ancient texts of profane no less than of religious writings. He may be regarded as the father of the monastic Scrip¬ torium to which modern learning is indebted for a great part of what has come down to us of the ancient literature and of the history of the West in those troublous times. He com¬ posed manuals of rhetoric and grammar which were used as textbooks in the schools of the Middle Ages till the revival of the ancient

learning, which inspired men with a longing for the ancient knowledge. Of great service also were his works (De Artibus ac Disciplinis Liberalium Litterarum) (of the liberal arts and courses of study), and his <De Institution^ Divinarum LitterarunP (instruction in scrip¬ tural knowledge) ; but above all his 12 books of (Epistolae Variae) (various letters), contain¬ ing decrees of the Ostrogothic kings, upon which is based the whole history of Italy under the rule of those barbarian potentates. This collection was first printed at Augsburg 1533. With one Epiphanius he made a compendious Latin version, entitled tripartita Historia* (tripartite history) of the history of the Church as written by the three Greek historians, Socrates, Sozomen and Theodoret, and con¬ tinued Socrates' history to the year 518. An edition of his complete works was printed at Rouen in 1679 and at Venice in 1729. His (Life) was written by the eminent Benedictine, Sainte Marthe, and published in Paris in 1694. His works are published in Migne, (Patrologia Latina* (Vol. LXIX). Consult Sandy s, (A History of Classical Scholarship* (Vol. I, especially pp. 258-270, Cambridge 1906).

CASSIOPEIA, kas-i-o-pe'ya, in Greek my¬ thology, daughter of Arabus and wife of Cepheus, King of Ethiopia, to whom she bore Andromeda. She dared to compare her own beauty to that of the Nereids, who, enraged thereat, besought Poseidon for vengeance. The god, in compliance with the request of the water-nymphs, laid waste the dominions of Cepheus by means of a deluge and a dreadful sea-monster.

In astronomy Cassiopeia is a conspicuous constellation in the northern hemisphere, sit¬ uated next to Cepheus. In 1572 a new and brilliant star appeared in it, which, however, after a short time, gradually diminished, and has been identified by Hinal and Plummer with a reddish, llth-magnitude variable which is still visible. The five

brightest stars in the constellation of Cassiopeia are arranged in the form of a straggling W, which is easily recog¬ nized.

CASSIQUIARI, kas-se-ke-a’re, or CAS-SIQUIARE, a deep rapid river of South America, in Venezuela, branching off from the Orinoco, and forming a waterway by which that river has navigable communication with the Rio Negro. It leaves the Orinoco in lat. 3° 10’ N.; long. 66° 20’ W., about 20 miles west of Esmeralda, and, after a southwest course of 128 miles falls into the Rio Negro near San Carlos, in lat. 2° 5’ N. ; long. 67° 40’ W. It is estimated to carry off about a third of the water of the Orinoco, being 100 yards broad where it leaves that river, and about 600 yards at its junction with’ the Rio Negro. By means of this river, the Rio Negro, the Amazon and its tributaries, it is practicable to sail from the interior of Brazil to the mouth of the Orinoco.

CASSITERIDES, kas-si-ter’i-dez, a name derived from the Greek kassitcros, tin, and an¬ ciently applied, but with no uniformity or pre¬ cision, to the tin district of Cornwall, to the Scilly Isles or to small islands off the north¬ west coast of Spain.

CASSITERITE, native dioxide of tin. Sn02) crystallizing in the tetragonal system, and

also occurring uniform and in rolled grains. The crystals are usually brown or black, brittle with an uneven fracture, and with a specific gravity of from 6.8 to 7.1, and a hardness of from 6 to 7. Ordinary massive or crystallized cassiterite is often called ((tinstone,® especially in England ; ((wood tin® is a botryoidal form, <(stream tin® is the mineral in small rolled pebbles found in the streams or placer deposits and is formed by the disintegration of stan¬ niferous rocks. Cassiterite is the most import¬ ant ore of tin. It occurs in Cornwall (Eng¬ land), Saxony, Bohemia, Galicia, Greenland, Sweden and in Australia, the Malay Peninsula, Banca, Bolivia and Mexico. In the United States it is found in small amounts in various States, and it has been mined to some extent in Virginia, in South Dakota and in San Ber¬ nardino County, Cal.

CASSIUS, kash'us, Andreas, German phy¬ sician who was born in the first half of the 17th century at Schleswig; d. Hamburg 1673. He was graduated at Leyden in 1632, was phy¬ sician to the Duke of Holstein and bishop of Liibeck, and practised at Hamburg. His name is best known in connection with a purple color obtained from gold, which was briefly described in a treatise published by his son in 1685.

CASSIUS, Purple of. See Purple of

Cassius.

CASSIUS LONGINUS, Gaius, the friend of Brutus, was the quaestor of Crassus, and pre¬ served the few troops of that general who escaped from the bloody battle with the Parthians. With these he defended Syria against the Parthians till the arrival of Bibulus. In the famous civil war that broke out between Pompey and Caesar he espoused the cause of the former, and, as commander of his naval forces, rendered him important services. When Caesar, after the victory of Pharsalia, was in pursuit of Pompey, he advanced with a few vessels, while crossing the Hellespont, against a fleet of 70 sail commanded by Cassius, and called upon him to surrender. The latter, astonished by his daring courage, surrendered at his summons. Caesar pardoned him, and afterward bestowed various honors on him ; but Cassius, who had always cherished feelings of bitter hatred toward Caesar, joined in the conspiracy against him, and, with the aid of several fellow-conspirators, assassinated him, 44 b.c. He then, together with Brutus, raised an army to maintain the cause of their faction. They were met by Octavianus and Antony, who professed themselves the avengers of Caesar, at Philippi. The wing which Cassius commanded being defeated, he imagined that all was lost, and killed himself, 42 b.c.

The name is also applied to a Roman jurist who flourished about 3y75 a.d., consul in 30, proconsul of Asia (45-50). After serving as governor of Syria, he was banished for his loyalty to the memory of Cassius, the murderer of Caesar. In the reign of Vespasian, he was recalled. His book, /Libri Juris Civilis) was used by Justinian in his codification. See Brutus; Cesar.

CASSIVELLAUNUS, kas-i-ve-16'nus (in Shakespeare's (Cymbeline, } Cassibelan), a noble and warlike British chief of the Catuvellauni, who, when Caesar invaded Britain in

54 b.c., held sway over several tribes living to the north of the Thames, and led the resistance to the advance of the Roman general. Having advanced to the Thames, Caesar found the Britons under Cassivellaunus posted on the north bank of the river prepared to dispute his passage. He crossed, however, without much difficulty, but the British charioteers persist¬ ently harassed his line of march. The Trin-obantes, a tribe of Essex and Middlesex, soon sent in their submission to Caesar, and as their example was followed by others, Cassivellaunus found himself unable to oppose resistance to the Romans. His stronghold, which contained many cattle, was captured by Caesar ; and an attempt made to storm Caesar's naval camp proving unsuccessful, Cassivellaunus sued for peace, gave hostages and promised an annual tribute. Consult Caesar, (Gallic War) (bk. V).

CASSOCK, a name formerly applied to a long loose gown worn over the other garments, in which sense the word is found in Shakes¬ peare. It is now applied to a long, close-fitting garment worn by priests and clerics and in Catholic countries forming the ordinary dress of the priest. In the Roman Catholic Church, priests wear a black cassock ; bishops and other prelates, purple ; cardinals, red ; and the Pope, white. In the Anglican Church, black is worn by all three orders of clergy, but bishops on state occasions often wear purple.

CASSOWARY, a corruption of the Ma¬ layan name for ratite birds of the family Casuariidce, inhabitants of the Papuan Islands and Australasia, and forming, with their near allies the emus, the group Mcgistanes. They are large birds, the females standing five or six feet high (males are less in stature), and are clothed in hairlike feathers, which appear double, as the aftershaft is as large as the feather proper; these may reach a length of 12 inches or more on the rump, where they drape over the invisible tail. This coat is glossy black in both sexes and all species, whose dis¬ tinguishing marks are found in the varying colors about the head. Like other ratite, or ˆwingless® birds, the wings are so reduced as to be hidden beneath the drooping plumage, except the ends of five stiff quills ; these wings are quite useless for either flight, or aid in running, but are of some service as weapons. The legs are extremely stout, and are actuated by powerful muscles ; and the three toes are armed with strong scratching-claws. The special feature of this family of birds, however, is the head, which is almost naked of feathers, and carries a crest, (<helmet,® or ((casque® of spongy bone which in some is flattened, and in others rises into a triangular or a pyramidal boss. The beak is stout, and keeled on top. The neck is naked, and in most cases adorned with one or more pendent wattles. These naked parts, and the head and helmet are bril¬ liantly colored, differing in the various species of which 10

have been described. Thus the Casnanus papuanus of New Guinea is de¬ scribed as having ((a dusky-black casque, blue head, throat and fore-neck, gray-green occiput and auricular region, and orange hind-neck, changing into rosy flesh-color toward the sides.® All the others are nearly as gaudy.

The cassowaries are forest-keeping birds, and have become very wary since their

jungles were invaded by hunters. They are swift runners, hurling themselves forward with a peculiar striding gait, and bounding over obstacles. They are almost omnivorus, but feed mainly on berries, fallen fruit, bulbs and insects scratched out of the forest floor. They defend themselves vigorously when at bay, kicking powerfully in any direction, and strik¬ ing with wings and beak. Vet they are tam¬ able, and are kept like fowls by the natives of some districts. They are hunted in Australia for the sake of their skins from which are made mats, rugs, feathered ornaments, *etc.* The nest is a rough structure on the ground in a thicket. The three to six eggs are green, and incubation is done mainly if not exclusively by the cock-bird. Consult Salvatori, (Ornitologia della Papuasia) (Turin 1882) ; Rothschild, (Trans. Zool. Soc. of London > (1901) ; Evans, <Birds) (New York 1900).

Ernest Ingersoll.

CAST, in the fine arts, is an impression taken by means of wax or plaster of Paris from a statue, bust, bas-relief or any other model, animate or inanimate. In taking a cast from a living person's face, it is necessary, first, to anoint the eyebrows and eyelashes, and any hairs about the cheeks and temples, with a little sweet-oil; then to insert two tubes (oiled also) of pasteboard into the nostrils, so that breath¬ ing may be performed through them ; a hand¬ kerchief is then to be tied loosely over the face, and the head sloped backward in an elbow chair or sofa. Powdered and calcined plaster of Paris is then mixed with spring water to the consistence of cream, and poured in between

the face and handerkerchief to the depth of half an inch. On becoming fixed or hard, it is removed and left to dry. When dried thor¬ oughly it is well soaked with linseed oil, and an impression may then be taken from it, in plaster of Paris or soft clay; the hollow cast being first split longitudinally down the nose, so that the object cast may be more easily re¬ moved.

It ought to be observed that all models should be divided into several pieces or joints; thus, in that covering any round body, one side must be covered first with the plaster, and the sides pared with a knife, and smeared with clay and water, then the remaining part of the object covered with plaster, and a joint will thus be formed between the two parts ; for, wherever the mixture of clay and water has been applied with a hair brush, the cast will not adhere, and therefore will be easily separated with the blunt edge of a knife. It is usual also to make small pits or depressions of the size of small buttons, on the edges of the joints of molds so that they may lock together well when added, and thus fit closely.

Plaster casts are varnished by a mixture of soap and white wax in boiling water. A quar¬ ter of an ounce of soap is dissolved in a pint of water, and an equal quantity of wax after¬ ward incorporated. The cast is dipped in this liquid, and after drying a week is polished by rubbing with soft linen. The surface produced in this manner approaches to the polish of marble. When plaster casts are to be exposed to the weather, their durability is greatly in¬ creased by saturating them with linseed oil, with which wax or resin may be combined. When intended to resemble bronze, a soap is

used made of linseed oil and soda, colored by the sulphates of copper and iron. Walls and ceilings are rendered waterproof in the same way.

CAST, or CASTING-LINE, a gut line

used in angling, from two to four yards in length, having artificial flies attached to it at intervals of about two feet. For trout fishing the line is generally made of braided water¬ proof silk, and a leader of silkworm gut at¬ tached to the end of the line.

CAST IRON, Malleable. Malleable cast iron is a grade of metal which has a special composition, such that when annealed for a continued period of time it becomes malleable, can be bent and twisted. The castings, when taken from the sand of the foundry, are very hard and

brittle. The fracture is dead white (the ordinary iron casting appearing gray to black when freshly broken).

The tensile strength of a good malleable casting should run between 42,000 and 48,000 pounds per square inch, though for ordinary purposes 35,000 pounds is quite good enough. Castings have been made running up to 63,000 pounds per square inch, but these would not be soft enough for general use, being better adapted for conveyor chains and castings which must not stretch. The elongation of a malleable casting runs between 2.5 to 7 per cent measured in two inches. The transverse strength measured by a 1 inch square bar, placed on supports 12 inches apart, and load applied at the centre, should be from 3,000 to 5,000 pounds for high quality material, and at least 2,500 for the ordinary product. The resilience of a malleable casting may be taken as eight times as high as a gray-iron one. Hence the great advantage of using malleable castings to resist shock. In fact where the shocks are light and often repeated, this cast¬ ing will stand up better than a steel one.

The malleablization of cast iron has been known since the early part of the 18th century. The first record we have is by Reaumur in 1722. He states that a hard casting, by being embed¬ ded in ore and kept at a high temperature for a number of days, changed its structure and became soft and malleable. The process as then practised is still in vogue, and all attempts to hasten or otherwise modify it have not given continuously good results. The fundamental principle upon which the whole bined carbon in a white casting of a suitable process rests is the conversion of the corn-composition to an amorphous form of carbon, which remains in the casting as a mechanical admixture. It is not crystalline like graphite, but in other respects behaves like it, and is determined chemically in the same manner.

To understand this, let us consider the two great divisions of cast iron — the Gray and the White. In the former we have nearly all the carbon present in a mechanical admixture, as graphite flakes situate between the crystals of the iron proper. But little carbon is present in the combined state, and if less than 0.20 per cent, the casting is dead soft. If the combined carbon is as high as 0.80 per cent, the rest of about 3 per cent being in the form of graph¬ ite, the casting will be a hard one. Now in the case of the white irons, the carbon is nearly all combined, and almost no graphite in mechanical admixture is present. Hence an exceedingly

hard material is the result. It is the object of the malleablizing process to convert this chem¬ ically combined carbon in a white iron, or in a hard gray one for that matter, to an amorphous form, to which the name “temper carbon® has been given (from “Temperguss,® German for malleable casting). Any graphite present in the original casting is not changed, but with long-continued heat gives an opportunity for the entrance of oxjˆgen, with ruinous results to the casting. Hence the short annealing of gray castings to benefit them, while the white cast¬ ing can be annealed for six days, and then re-annealed again, without seriously hurting its strength.

There are two tendencies in the malleable casting industry, which result in different grades of metal. In Europe, from whence the process came, and where the irons used are not as pure, the annealing process is carried out longer than here, and hence much of the carbon present is removed from the casting by oxidizing it out. The result is a very ductile casting, but with a gray to white fracture (the fracture of a steel however, not of a hard white iron). The cast¬ ings, moreover, are nearly all very light. In this country, with better irons, we have short¬ ened the anneal to get just the conversion of

per foot, but in annealing one-half of this is taken up by expansion, and hence the ordinary gray iron shrinkage is allowed for in making the patterns. For special work, however, it will pay to watch the action of the metal in the sand mold, and due allowances should be made in the pattern for abnormal contractions on the part of the casting, so that the dimensions of the annealed casting may come out all right.

As the metal when ready to pour may not always be of the desired temperature (in fact the temperature changes during tapping, going up steadily), it is best to pour the thin castings first, provided the iron be hot enough for this, then the medium weight castings, and finally the thick ones. By this time the metal will be very hot and the danger from excessive mottling avoided. Great care should be exercised to see that patterns are so proportioned that no shrinkage occurs in the

interior of the metal. This is certain to take place at abrupt changes of section, at sharp angles and in heavy parts. Hence all sharp junctions on patterns should have fillets, and where great changes of section cannot be avoided, chills should be placed against the work. This will send the shrinkage into the interior of the casting where it will not matter so much.

Fig. 1. — Longitudinal Section of Air Furnace for Malleable Castings

the carbon, without attempting to burn it out by prolonged annealing, and hence we have a black heart in the casting. This is especially notice¬ able as we make very heavy work, compar¬ atively speaking. Sections of one inch are common, and even heavier work is done, but with the use of chills in casting them, so that the carbon be surely all combined, and the cast¬ ing dead white before the annealing is begun. Otherwise, if more than a slight mottling is present in the fracture, the casting is sure to come out “rotten® in strength (as it is called) when leaving the anneal. The temperature of the bath of molten metal has an important bear¬ ing on this, for with a very hot metal, heavy sections can be cast and still have their fracture white, while the same castings would be gray were the bath of melted metal colder.

Recent developments have brought about a division of the American “black-head® malle¬ able process into the making of very low car¬ bon, soft, but weak castings on the one hand, and medium carbon, strong, but stiff castings on the other. The former is for general use, and the latter for specification work of very high grade. .

The contraction of a white casting, as made for malleable purposes is 3/16 inch to g/16 inch

In general three things affect the state of a hard casting which will allow it to anneal prop¬ erly or not. First the chemical composition of the metal itself. Second the thickness of the sections of the casting, and third the pouring temperature. The last two items have been gone over above. It remains to give specifica¬ tions for the first. The most powerful agent affecting the state of the carbon present in a casting is the silicon. As it is necessary to have a casting white in fracture as it leaves the sand, the silicon must be very low. 1 hen with the proper pouring temperature, and when poured into sections suitable for the

composi¬ tion employed, the results will be good. Natu¬ rally this will principally depend upon the thick¬ ness of the work made, as this cannot be changed, and then upon the heat of the iron, which can be regulated by careful melting. The thinner the castings, the higher the silicon the mixture can stand. Thus for pipe fittings, the silicon may run up to 1 per cent in the casting. For ” exceptionally heavy sectioned castings the silicon may have to run down as low as 0.45 per cent in order to get the best results. When charcoal irons were used exclu¬ sively (these standing more punishment in melting than the coke irons of the present day),

the silicon oftentimes ran as low as 0.28 per cent in a casting and still this was first-rate. The general average, however, for all around medium and fairly heavy work is 0.65 per cent silicon in the casting, which means about 0.85 per cent to 0.90 per cent in the mixture ; 0.45 per cent may be considered the lowest range for heavy work, and 1.25 per cent the highest for the lightest of castings.

The phosphorus should not exceed 0.225 per cent, the manganese not over 0.30, the sulphur as low as possible, preferably not over 0.05 in the casting, though in Europe, where the long anneal counteracts this evil, the sulphur goes very high, sometimes even up to 0.40 per cent.

The lower the total carbon, down to 2.75 be¬ low when trouble arises, the stronger will be the casting. (The total carbon may be run as low as 2.25, but only with the best of melting and annealing practice). Hence steel scrap is added to make the metal low in its carbon con¬ tent. This is a much better plan than to refine the iron in the process to get the carbon low. In general it is best to simply melt a mixture, and then get it out of the furnace as quickly as possible, in order to get it away from oxidizing

Fig. 2. — Section Through Fire-Box of Air Furnace for Malleable Castings

influences as quickly as may be. Five to 10 per cent of steel may be added, also malleable scrap, if necessary. In a 10-ton heat the best propor¬ tion of the mixture is five tons of pig iron, one ton malleable scrap, 500 pounds steel scrap and the balance the sprues of the previous work. The practical effect of these steel and other additions is about as follows : 100 pounds,

wrought iron scrap equal 250 pounds steel, equal 2,000 pounds malleable scrap. Mixtures thus arranged come out about the same in strength, all other things being equal.

Charcoal iron is now being used only where the source of supply is close, and its cost is but a dollar or two over the best ((Coke Mal¬ leable® or ((Bessemer Malleable,® as coke irons made specially for the malleable foundry are called (the last named being a Bessemer iron with the phosphorus a little higher than is allowed for steel). It is best to use these classes of <(malleable® instead of the socalled <(off® pig irons, for they are made with an extra amount of coke, and are much less oxidized than the irons blown under poor furnace con¬ ditions.

The mixtures used in the malleable foundry are as follows : Where the cupola is used for

malleable castings in addition to making pots for annealing, the regular mixture as used for the air furnace or open hearth furnace must be reduced slightly in silicon, as the cupola burns out less of this element. Hence about 0.25 per cent is to be added to the amount of silicon required in the casting. In the case of the furnaces, about 0.30 per cent to 0.35 per cent must be added. For pots it is advisable to use good pig irons and to utilize salamanders and the large scrap pieces that are unsafe to put into - the furnace. The silicon in the pots as cast should be about 0.60 per cent and hence about 0.85 per cent should go into the cupola.

The mixtures for air furnace and the open hearth furnace are about the same. Possibly the air furnace should have a little more sili¬ con, as it is under the influence of the gases from combustion longer. There is also necessary an occasional use of ferrosilicon, especially in the open hearth, as through acci¬ dent the metal may be badly burnt and the addition of ferrosilicon brings about the proper composition, though the metal should not be put into castings, but cast into pigs, to be fed subsequently into the regular mixtures in small quantities at a time. About 250 to 500 pounds ferrosilicon is usually all that is necessary for this purpose. The actual amount can be calcu¬ lated at the time from the supposed loss of silicon in the bath.

Malleable castings are made in the cupola, the air furnace, the open hearth furnace, the electric furnace and in the crucible. The last named process is now only practised in Europe, being too expensive in this country, though turning out a most excellent product. The cupola process makes the poorest castings, as the metal is in contact with the fuel in this method. Hence the absorption of sulphur and oxidizing influences which are partly avoided in other processes. The peculiar constitution of the metal as cast makes it necessary to anneal it at a temperature some 200 degrees F. higher than ordinary air-furnace iron, which means a greater expense for wear and tear on the ovens and annealing pots. This class of castings is therefore only used for the cheaper grades of malleable casting, such as pipe fit¬ tings and hardware castings, where great strength is not essential, and enough ductility is had to satisfy the demands made on the work. The selling price is also about half a cent a pound less than the high grade metal.

The bulk of the malleable castings made in this country comes from the air furnace. This is an excellent melting process, can be manipu¬ lated easily, is not too expensive, and will prob¬ ably continue to be the method used in most of our mall.eable works. The air furnace, as used for malleable purposes is somewhat dif¬ ferent than that used for making rolls and gun castings. It is illustrated herewith.

The entire roof can be taken off in sections, called (<bungs,® so that the sand bottom can be made, and the charge put in. Where more than one heat is made without remaking the bottom, only a few bungs are lifted away after the first heat and the furnace is charged quickly, so as to keep it hot as long as possible. Fir¬ ing is done at one end, and the charge when ready is tapped at one side, or both if two spouts are provided. It is very important to get a heat out quickly, as the metal is continu-

ously oxidizing while in the furnace, after it has reached the proper composition. A 10-ton heat, when poured into small castings often takes three-quarters of an hour to tap, and hence the first iron and the very last may be two different things. Hence the dividing up of the work to get the class of metal best suited to the castings to be made. The amount of coal used to melt in a well-constructed air furnace is four pounds iron to one pound coal. In the case of the cupola, while ordinary gray iron practice requires one pound coal to every eight pounds iron, in malleable work, it takes one pound coke to only four pounds iron, or just the same as good air furnace practice. It is but just to say, however, that in many foundries of the country the air furnaces are so poorly constructed, kept in repair and operated that oftentimes one pound coal melts only two pounds iron.

Bottom is made placing layers of fire sand, that is, sand with about 98 per cent silica, and very free from fluxing impurities, on the brick¬ work and burning or partly fusing it together. The layers are about one inch thick, and are

heat still has to run until ready to tap. After the iron has melted, the slag is skimmed off, and this gives a good chance for refining action, which means the burning out of silicon. The test plug is always taken after skimming, which is often done for the second time. When the heat is tapped, the men take it off in hand ladles, and pour the molds, throwing the iron into them as quickly as possible so that the necessarily small gates do not prevent the metal from filling the molds by chilling and resulting in (<short pours.®

The open hearth process (see Steel — Crucible Process) is by far the best one in general use, but is confined to those works where great quantities are made year in and year out. Thus there are several works where about 80 tons of castings are made daily, and in which the use of the open hearth is a pay¬ ing proposition, especially as the same furnace can be used for making acid steel heats in place of malleable cast iron, as desired. The fuel consumption for the open hearth corre¬ sponds to one pound coal for six pounds iron melted ; showing a

considerable economy over

repeated until the proper shape is made. It takes from four to five hours to melt a 10-ton heat after this is charged, depending upon the quality of the bituminous coal used, and the condition of the furnace. From 6 to 10 heats can be made on the same bottom, with but little repairing, but the usual run is from two to four. In order to know when the heat is ready, a test plug, so called, is cast. This plug is about of a diameter equal to the heaviest section of the castings to be made. It is about eight inches long, and the mold for it is made by simply pushing the pattern into the sand in a box. The metal is taken from the bath by a small ladle dipped into it as deeply as possible. After pouring, as soon as the iron is set, the plug is grasped with a tongs, is dipped into water to cool it and then broken across. The fracture is observed, and if properly crystalline, and with but little or no mottling, the heat is ready to tap. If there is too much mottling, that is, too much graphite left, the process is continued to burn out more silicon, and also get the metal hotter, and another test plug taken. Experience will tell just how long a

all other methods. The use of a gas producer system, however, where natural gas is not available, makes the installation an elaborate one, and not desirable where the proper class of help is not available.

In the case of the open hearth, the furnace is always hot, and hence a heat is finished about an hour sooner than in the air furnace. The iron gets hotter, and can be taken out in five-ton ladles to be distributed afterward and as the metal is not as long in contact with the gases as in the air furnace process, it is of better quality. The most economical size of furnace is the 20-ton, with the crane ladle to take off the metal in large quantities, so that tapping is not so long continued a matter as in the air furnace. The latest patented invention to assist in this is the application of two or more spouts to the furnace, so that metal may be taken out at different levels. In this way the surface of the bath, which is punished most by the gases, may be taken off first. Then while this is being poured off, the next part of the heat, now the top, is again taken off, and finally if three spouts are used, the bottom may

be taken out as long as half an hour afterward without any deterioration or change in the metal.

From the foundry the castings, after shaking out the molds, go to the hard tumbling room, where they are freed from the adhering sand. This is done by means of tumbling barrels into which the castings, and a supply of “stars® made of the same hard iron, are placed. Where castings are liable to crack by this tumbling about, sticks of wood are introduced so that as they strike them, no damage is done. Where delicate castings are made, these are pickled in dilute sulphuric or in hydrofluoric acid.

After cleaning the hard castings, they are

has been allowed to get too low in silicon, or “high® as it is called, in contradistinction to “low® iron, where the silicon is too high, and the metal mottled or even gray, the sand is apt to burn on so hard that the tumbling all day does not remove it all. Here the sand blast is excellent.

From the sorting room the castings go to the annealing room, or rather to a part of it in which the packing is done. To anneal the hard castings they are placed into socalled “saggers® or annealing pots. These are simple, box-like shells, with no bottom, about one inch thick, and say 18 inches x 24 inches x 15 inches high. Three or four of these are placed

Be a rr

Fig. 4. — Plan of Annealing Oven for Malleable Castings

e

carefully sorted out, the cracked or otherwise defective pieces thrown out, to go back into the furnace again, and the good ones are sent into the annealing room. Where castings are made which crack as soon as they cool, on account of their shape, such as the hand wheels of freight cars for braking purposes, these while still red hot in the sand, are taken into small ovens where they are kept quite hot for a time, and are then allowed to cool very slowly with the oven. In this way they will not be cracked before going into the annealing ovens. The modern tendency is to introduce the sand blast for cleaning, as this removes every particle of sand from the hard castings. Where the iron

over each other, and on a “stool® high enough to allow a free circulation of the gases under it. The castings are care¬ fully placed in these pots and packed with “scale® in such a way that when red hot the whole may not settle and warp the work. This scale is puddle scale, hammer scale, or even iron ore. For that matter, as the process is more of a conversion of the combined carbon into the “temper carbon® the castings can be packed in fire clay or sand and good results obtained. But the puddle scale seems to give the best results, with greatest cheapness. The flakes that fall from the annealing pots, these lasting only for 7 to 14 heats, can be crushed

and make the finest kind of packing material, being pure oxide of iron, and no further scale than the initial lot need be purchased.

The pots, properly filled, are covered with a “mud® made of the sand rolled off the hard castings mixed with water. The joints of the pots are also carefully daubed up with this mud ; the pots are introduced into the oven, either run in by a special carriage in the old style ovens, or lowered in from the crane in the new ovens, the tops of which can be re¬ moved. The ovens are now fired and within 36 to 48 hours the full temperature of 1,350 de¬ grees F. in the coldest portion of the

coldest pot is reached. This temperature is kept up preferably 60 hours, and the oven then allowed to cool slowly before the pots are withdrawn. The ovens are so constructed that they are heated inside and under the whole bottom, so that a difference of not more than 100 degrees F. throughout the portion filled with work may exist.

After the pots are taken out, they are dumped, the castings taken from the scale and the former sent to the soft tumbling room. Here they are packed with small pieces of an¬ nealed malleable castings, or with wood and leather, such as old shoes, etc., so that the adhering scale is removed, and a fine coat of graphite is given them. They come out shining black, and can be shipped direct, or else coated with asphalt, as required. Sometimes the cast¬ ings must be straightened which should always be done cold, either by drop hammer or hydrau¬ lic press. Test plugs are usually cast on the important work, so that breaking these off on inspection the quality of the metal in the par¬ ticular casting is revealed at a glance. Test bars for physical test should also be taken off with the first and last portion of every heat, so that all work from that heat can be traced and its quality known. The test bar has the further advantage of showing up the condition of the furnace, poor working on the part of which is immediately detected by a white rim on the casting.

The production of malleable castings in this country runs up to the enormous figure of 1,- 000,000 tons annually. In Europe about 75,000 tons are made in the same time. Most of the large companies now make steel castings in ad¬ dition, as malleable cast iron, though most ex¬ cellent for shock, is not strong enough to stand under the terrific strains that are now put on the structures where this work is used. Thus the 100,000-pound cars now require steel couplers, as the malleable ones tear apart, yet the latter will stand all the bumping that comes along while steel will not. The principal use for malleable castings is for railroad work. Next comes agricultural machinery. After that a great variety of work, such as pipe fittings, hardware, machine parts, chain links, tools, *etc.* The demand is constantly growing, and while steel was supposed to be replacing the malleable casting, this has not turned out to be the case.

Richard Moldenke,

Specialist on Metallurgy of Cast Iron and Ex¬ pert in Malleable Castings.

CAST IRON PIPES. See Pipes.

CAST STEEL, blister steel which has been broken up, fused in a crucible, cast into ingots and rolled. The process of making cast steel

was invented by Benjamin Huntsman, of Atter-cliff, near Sheffield, in 1770. See Steel — Open Hearth Manufacture; Steel — The Bessemer Process ; Steel — Electrical Proc¬ esses of Manufacture; Steel — Manufac¬ ture of Crucible; Steel — Special or Alloy Steels.

CASTAGNO, kas-tan'yo, Andrea del,

Italian painter: b. Castagno, Tuscany, about the end of the 14th or beginning of the 15th century; d. Florence, 9 Aug. 1457. Being early deprived of his parents, who were extremely poor, he was employed by his uncle to tend cattle in the fields, and in that situation, by his surprising and untutored essays in the art, at¬ tracted the notice of Bernardetto de Medici, who placed him under the tuition of one of the best masters Florence then afforded. He was greatly influenced by the works of Donatello. At first he painted only in distemper and fresco. His drawing is bold but his color is crude. On the return of Cosimo de Medici he was com¬ missioned to paint portraits of his opponents. These he portrayed hanging by their feet on the walls of the Palazzo de' Medici, which won him the nickname of "Andreino degli Impiccati.® He is the author of a series of <Heros) and (Sibylles 5 at Legnaia; where are also life-size figures of Dante, Petrarch, Boc¬ caccio, Niccolo Ceccianote, founder of the Chartreuse at Florence ; Farinata degli Uberti, liberator of his country; Pippo Spano, the conquerer of the Turks, and the fine eques¬ trian statue of Niccolo da Tolentino. In the monastery Degli Angeli are several religious works, including a crucifixion. Another is at the Santa Maria Novello. Vasarie's story concerning the murder of Domenico Vene-ziano in order to procure his art of coloring in oils has been discredited, since it has. been proved that Domenico survived him by several years and finished his paintings at the Santa Maria before Andrea was called there. Con¬ sult the monograph by Waldschmidt (Berlin 1900) ; Crowe and Cavalcaselle, (History of Painting in Italy) (Vol. II) ; Muntz, E., (Histoire de l'art pendant la Renaissance) (Vol. I,

1889).

CASTAIGNE, Andre, an-dra kas-tan, French artist: b. Angouleme 1861. He studied at the Suisse Academy and at the Lcole des Beaux Arts in

Paris; he exhibited at the Paris Salon in 1884 and several times in later years. Among his pictures are (Dante and Beatrice } ; (The Deluge) ; (Portrait of Vicomte de Dam-pierre) ; and (After the Combat* (in the Pea¬ body Gallery at Baltimore). In 1890 he came to the United States and remained here until 1895. He was director of an art school in Baltimore and in 1891 began the illustrating work by which he is best known to the Amer¬ ican public. His first work of this character was (The Forty Nlners' BalP in the Century Magazine for May 1891 ; since then he has il¬ lustrated for several of the leading magazines; his designs include the pictures of the Texas cowboys in Scribner's Magazine and the World's Fair drawings and illustrations for (Polly* in the Century. He illustrated B. I. Wheeler's (Life of Alexander the Great) (1900). On his return to France he became instructor in the Colarossi Academy and opened a studio in Paris. He published (Fata

Morgana, } a novel dealing with the art life ot Paris and illustrated by himself (1904). His work is characterized by spirited movement and dramatic feeling. Consult The Critic (Vol. XXIII, 57); The Bookbuyer (XII, 506).

CASTALIA, a celebrated fountain in Greece, the sacred spring of the Delphic oracle, at which all the pilgrims to Apollo's shrine were obliged to purify themselves. It issues from a fissure between two peaked cliffs, which form the summit of a semi-circular range of rocks, anciently called the Phaedri-ades. These immediately adjoin Mount Par¬ nassus, and rise to the height of 2,000 feet. The Castalian spring was said to impart poetic inspiration to those who drank of it, but it was only latterly by the Roman poets that it was invested with this attribute. It is now called the Fountain of Saint John, from a small chapel dedicated to Saint John which stands near its source.

CASTALIDES, kas-tal'i-dez, the Muses, so called from the fountain Castalia (q.v.), at the foot of Parnassus (q.v.).

CASTALIO, kas-tal-vo, Sebastien, CASTELLIO or CASTELLION, French theolo¬ gian : b. Dauphiny 1515; d. Basel, 20 Dec. 1563. His original name was Chateillon. Through the influence of Calvin he was made professor of classical literature at Geneva. Having quarreled with the reformer, who caused his banishment in 1544, he repaired to Basel, where he taught the Greek language ; but as his sti¬ pend did not suffice to support his numerous family, he was compelled to employ part of his time in agricultural labors. His writings include (De HsereticisP a treatise opposing the punishment of heresy by civil authority, a Latin translation of the Bible, the best edition of which is in folio, Basel 1573, and a French translation of the Bible, dedicated to Henry II of France. Consult Buisson, (Life of Castalio) Paris 1892). He defended the right of free discussion in a collection of maxims compiled from various sources.

CASTANEA, a trade name for the Brazil-nut and a genuine name for the chestnut (qq.v.).

CASTANETS, small wooden rattles, made in the shape of two bowls or cups, fitted to¬ gether and tied by a string, and then fastened

to the thumbs. The fingers being rapidly struck upon them, a tremulous sound is produced, which marks exactly the measure of the dance. Something similar to this was the krotalon of the ancients, who also made use of small cymbals in their dances and festivals in honor of Bacchus. It is probable, however, that they had their origin in the East, and were brought by the Moors into Spain. Here, too, they re¬ ceived their name castahuelas, from being com¬ monly made of the wood of the chestnut (castaho), or from their color. They are still in use in Spain, and here and there in the south of France. The charm of variety has also pro¬ cured for them a place in ballets and operas.

CASTANHEDA, kas-tan-ya'da, Fernao Lopez de, Portuguese historian : b. Santarem about 1500; d. Coimbra, 23 March 1559. His father having been appointed to an important post in India, he was taken thither in youth, and was thus led to make the careful and un¬ remitting researches embodied in the (Historia do descobrimento e conquista da India pelos Portugezes) (1551-61), a work upon which Camoens drew largely in the course of his epic activity. It has been translated into French, Spanish, Italian and English.

CASTAfiOS, kas-ta'nos, Don Francisco Xavier de, Duke of Bailen, Spanish military officer: b. Madrid, 22 April 1756; d. Madrid, 24 Sept. 1852. Educated in military science in Germany, at the age of 16 he became captain of Grenadiers, of the Savoy Regiment, and dis¬ tinguished himself in the reconquest of Minorca. On the invasion of the country by Napoleon, he received the command of a division of the Spanish army, and in July 1808 compelled 18,000 French, under General Dupont de l'Etang, to surrender at Bailen, but was in turn defeated by Lannes in November of the same year at Tudela. Under Wellington he served as general of the 4th Spanish corps d'armee, and took part in the battles of Al-buera, Salamanca and Vittoria. In 1815 he was placed at the head of the Spanish army for the invasion of France, which was ren¬ dered unnecessary by the victory at Waterloo. In 1825 he was called to the State Council, where he became a decided opponent of the Carlist party. He was made Duke of Bailen in 1833 and in 1843 became guardian of the Queen Isabella.

Vol. 6, CASTE TO CIVIL LAW

Americana

.

1

■

I

i

i

j

$

■8

I

I

i

§

$

i

I

i

I

1

i

i

I

1

1

cd

THE

ENCYCLOPEDIA

AMERICANA

im^r

Universal

JQowledgEj

In Thirty Volumes

> 3

} >

>) >

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK CHICAGO

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

t\ *

•

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING

BY

J. B. LYON COMPANY ALBANY NEW YORK

JAN 1 8 1922

e > R.A654317

PARTIAL LIST OF CONTRIBUTORS TO VOLUME VI ABT, ISAAC A., M.D.

Editor of “ A System of Pediatrics.”

CHILDREN, DISEASES OF

BARRETT, J. PRESSLEY

Editor of “The Herald of Gospel Liberty”

CHRISTIAN CHURCH, THE (DENOM¬
INATION)

BEACH, CHARLES F., LL.B.

American Lawyer in Paris

CIVIL LAW

BEETS, HENRY, LL.D.

Editor in chief of “ The Banner ”

CHRISTIAN REFORMED CHURCH IN
NORTH AMERICA

BENNETT, CHARLES E., Litt.D.

Late Professor of Latin, Cornell University CICERO'S LETTERS

BERRY, GEORGE R., Ph.D., D.D.

Professor of Old Testament Interpretation and Semitic Languages, Colgate University

CHRONICLES, BOOK OF

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University CASTLE RACKRENT

BURNS, JAMES A., Ph.D.

Professor of Moral Theology, Holy Cross College CATHOLIC EDUCATION IN THE

UNITED STATES

BURR, ANNA ROBESON

CELLINI'S AUTOBIOGRAPHY

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

CENTRAL AMERICA, DIPLOMATIC

RELATIONS OF UNITED STATES

WITH

CHINA, DIPLOMATIC RELATIONS OF

UNITED STATES WITH

CANFIELD, ARTHUR G., A.M.

Professor of Romance Languages, University of Michigan

CAUSERIES DU LUNDI

CHARACTERS

CARROLL, HENRY K., LL.D.

Author of " Religious Forces in the United States,"

etc.

CHRISTIAN CHURCH, DIVISIONS AND

STATISTICS OF THE

CHURCH GOVERNMENT

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

CELL

CENTROSOME

CHROMOSOME

CLARKE, FRANK W., S.B., D.Sc., LL.D.

Chemist for United States Geological Survey CHEMISTRY

CLOPPER, EDWARD N., Ph.D.

Secretary for Northern States' National Child Labor Committee

CHILD LABOR

COCHRANE, CHARLES H.

Author of “ Modern Industrial Progress ”

CHEESE AND CHEESE-MAKING

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

CHIPPEWA

CASTRO Y BELVIS

CATALAN LANGUAGE

CATALAN LITERATURE

«

COUMBE, CLEMENT W.

Technical Art Expert

CERAMICS

CHAIN ARMOR’

CHALICE

CHELSEA WARE

CHINESE CERAMICS

CHIPPENDALE FURNITURE

DAVIS, C. HENRY, M.D.

Author of “ Painless Childbirth, Entocia and Nitrous Oxide-Oxygen Analgesia ”

CHILDBIRTH, PAINLESS

DOLE, NATHAN HASKELL, A.B.

Editor of “ Masterpieces of Famous Literature ”

CHERRY ORCHARD, THE

DOUGLAS, D. S.

Editorial Staff of The Americana

CHATHAM, WILLIAM PITT

DRUM, WALTER, S.J., A.B.

Professor of Scripture, Woodstock College, Mary¬

land

CHRISTOLOGY

DUNN, JOSEPH, Ph.D.

Professor of Celtic Languages and Literatures, Catholic University of America

CELTIC LANGUAGES

CELTIC LITERATURES

CELTIC PEOPLES

Contributors to Volume VI — Continued

DUNN, WALDO H., Litt.D.

Professor of English Languages and Literature, College of Wooster

CHRISTIAN YEAR, THE

ERSKINE, JOHN, Ph.D.

Adjunct Professor of English, Columbia University CAVALIER POETS

FARROW, EDWARD S., A.B.

Consulting Civil and Military Engineer

CAVALRY

FERRIS, RICHARD, C.E., D.Sc.

Editorial Staff of The Americana

CHEMICAL INDUSTRY, THE

FINCK, HENRY T., A.B.

Musical Critic of “ New York Evening Post ”

CHOPIN

FOIK, PAUL J., C.S.C.

Librarian of Notre Dame University

CATHOLIC PRESS OF AMERICA

GEDDES, JAMES, Jr., Ph.D.

Professor of Romance Languages, Boston University CAVALLERIA RUSTICANA

GRANT, FREDERICK C., A.M.

Editorial Staff of The Americana

CHESS

GRIFFIS, WILLIAM ELLIOT, D.D., L.H.D.

Author of “ The Mikado’s Empire;” ” China’s Story;” “ The Mikado: Institution and Person,’4

etc.

CHINA

CHINA AND JAPAN

CHINESE LANGUAGE, THE

CHINESE LITERATURE

HALPIN, PATRICK A., Ph.D.

Late Professor of Metaphysics and Ethics, New Rochelle College

CHURCH AND STATE

HART, HASTINGS H., LL.D., B.D.

Director of the Department of Child-Helping, Russell Sage Foundation, New York

CHILDREN, LEGAL CODES RELATING

TO

CHILDREN, DEFECTIVE

CHILDREN, DELINQUENT

CHILDREN, DEPENDENT

CHILDREN, NEGLECTED

HENDRICK, ELLWOOD

CHEMISTRY, PROGRESS OF

INGERSOLL, ERNEST

Naturalist and Author

CAT

CAT, DOMESTIC, THE

CAVE ANIMALS

CAVE DWELLERS

CHIMPANZEE

ISAACS, EDITH J. R.

Critic and Essayist

CHILDREN OF THE WORLD

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

CAVALLERIA RUSTICANA (OPERA)

CHAMBER MUSIC

CHIMES OF NORMANDY, THE

JELLIFFE, SMITH ELY, M.D., Ph.D.

Formerly Professor of Pharmacognosy, Columbia University; Adjunct Professor of Diseases ol Mind and Nervous System, Post Graduate Hos¬

pital and Medical School; Professor of Psychiatry, Fordham University, *etc.*

CATARRH

CHLOROSIS

CHOREA or SAINT VITUS DANCE

JUDSON, HENRY PRATT, LL.D.

President of The University of Chicago

CHICAGO

KETCHAM, WILLIAM H., LL.D.

Director of the Bureau of Catholic Indian Missions, Washington, D. C.

CATHOLIC INDIAN MISSIONS OF THE

UNITED STATES

KLEIN, HENRI F.

Editorial Staff of The Americana

CAVELL, EDITH

CHECKERS

CHURCHILL, WINSTON LEONARD

SPENCER

KOESTER, FRANK

Author of “ Modem City Planning and Main¬

tenance ”

CASTLES, HISTORIC

LEONARD-STUART, CHARLES, B.A.

Editorial Staff of The Americana

CHRISTIAN DOCTRINE, DEVELOP¬

MENT OF

LAW, JAMES V. S.

Emeritus Professor of Veterinary Science, New York State Veterinary College, Cornell University CATTLE, DISEASES OF

LENNOX, PATRICK J., B.A., Litt.D.

Professor of English Language and Literature, The Catholic University of America

CELTIC RENAISSANCE

MACDOUGALL, DUNCAN

CHILDREN'S THEATRES

McDANIEL, WALTON BROOKS, Ph.D.

Professor of Latin, University of Pennsylvania CATULLUS, GAIUS VALERIUS

McDonnell, John b.

Editorial Staff of The Americana

CATHOLIC CHURCH, THE — RECENT

GROWTH AND STATISTICS

MODELL, DAVID A., A.M.

Editor and Encyclopedist

CHILD STUDY

CHILDREN'S COURTS

CHILDREN'S CRUSADE

CHILDREN'S LITERATURE

CHILDREN'S PLAYGROUNDS

MORRIS, EDWARD P., L.H.D., Litt.D.

Professor of Latin, Williams College, Yale Uni¬

versity

CICERO

MOSES, ALFRED J., Ph.D.

Professor of Mineralogy, Columbia University CHEMICAL CRYSTALLOGRAPHY '

MOSES, MONTROSE J., B.S.

Dramatic Critic

CHILDREN OP THE EARTH

MUNRO, WILLIAM B., LL.B., Ph.D., LL.D.

Professor of Municipal Government, Harvard Uni¬
versity

CITIES, AMERICAN, GOVERNMENT OP
CITIES, EUROPEAN, GOVERNMENT OF

PACE, EDWARD A., Ph.D.

Professor of Philosophy, Catholic University of America

CATHOLIC UNIVERSITY OF AMERICA

PLUMB, CHARLES S., B.Sc.

Professor of Animal Husbandry, The Ohio State University

CATTLE

QUINLAN, THOMAS

Cincinnati Chamber of Commerce

CINCINNATI, OHIO

RYAN, JOHN A., D.D.

Professor of Moral Theology and Industrial Ethics, Catholic University

CATHOLIC CHURCH, SOCIAL SERVICE

IN THE

RICE, WILLIAM GORHAM

New York State Civil Service Commission, Albany, New York

CHIMES

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers In¬

surance Company, Hartford, Conn.

CHEMICAL ANALYSIS

RITTENBERG, SIDNEY

Charleston Chamber of Commerce

CHARLESTON, S. C.

SHAW, WILLIAM, LL.D.

General Secretary of United Society of Christian Endeavor

CHRISTIAN ENDEAVOR

SHERMAN, STUART P., Ph.D.

Professor of English, University of Illinois CHARACTERISTICS

SHOWERMAN, GRANT, Ph.D.

Professor of Latin Literature, University of Wis¬

consin

CHAPMAN'S HOMER

SINGLETON, ESTHER

Author of " Famous Cathedrals "

CATHEDRALS AND CHURCHES

SMITH, CLIFFORD P.

Committee on Publications, Boston

CHRISTIAN SCIENCE

SULLIVAN, JAMES, Ph.D.

State Historian, State of New York

CIVICS AND CIVIC TEACHING

TATLOCK, JOHN S. P., Ph.D.

Professor of English Philology, Leland Stanford Junior University

CHAUCER, GEOFFREY

TEMPLE, WILLIAM, Ph.D.

Formerly Professor of Philosophy, Saint Joseph's Seminary, Dunwoodie, N. Y.

CATACOMBS, ROMAN

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

CHILDE HAROLD'S PILGRIMAGE

CENCI, THE

CHILDE ROLAND TO THE DARK

TOWER CAME

WALSH, JAMES J., Ph.D., M.D., LL.D., Litt.D., Sc.D.

Author of " Catholic Churchmen in Science " The Popes and Sciences," *etc.*

CATHOLIC CHURCH AND SCIENCE

CATHOLIC CHURCH IN THE UNITED

STATES

WEEKS, RAYMOND, Ph.D.

Professor of Romance Languages and Literatures, Columbia University

CINQ-MARS

WELLS, BENJAMIN W., Ph.D.

Author of Modern* French Literature

CESAR BIROTTEAU

CID, THE

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

CATEGORY

WILCOX, MARRION, A.M., LL.B.

Coeditor of “ Encyclopedia of Latin America ”

CENTRAL AMERICA

CHILE

WILTSE, HAL F.

Secretary of Chamber of Commerce

CHATTANOOGA, TENN.

WYNNE, JOHN J., S.J.

Editor “ Catholic Encyclopedia ”

CATHOLIC CHURCH, ROMAN

YOUNG, STARK, B.A.

Professor of English, Amherst College

CHRISTABEL

KEY TO PRONUNCIATION.

a

far, father

n

Span, h, as in canon (can’yon),

pihon (pen’yon)

a

fate, hate

ng

mingle, singing

a or

a

at, fat

nk

bank, ink

a

air, care

ado, sofa

6

no, open

a

all, fall

o or 6

not, on

a

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or

e

bed, end

o

book, look

e

her, over: also Fr. e, as in de ;

en, as in neuf ; and ocu, as in

oi

oil, soil ; also Ger. eu, as in beutel boeuf, coeur; Ger. d (or oe),

as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or

H

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

ii

between u and e, as in Fr. sur,

Ger. Muller

i or

1

him, it

between e and i, mostly in

V

of, very

A

1

Oriental final syllables, as,

Ferid-ud-din

y

(consonantal) yes, young

j

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n •

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents, to indicate

point, Jean, temps

syllabic stress

CASTE, a social class whose burdens

and privileges are hereditary. The

word is from the Portuguese casta,

race, and was applied by the Portu¬

guese, who became familiar with Hindustan, to the classes in India whose occupations, privileges and duties are hereditary. This term is sometimes applied to the hereditary classes in Europe ; and we speak of the spirit or the prerogatives and usurpations of a caste, to express particularly that peculiar con¬

stitution of society which makes distinction de¬

pendent on the accidents of birth or fortune.

The division into castes, where it appears in its most typical form, comes to us from a period to which the light of history does not extend; hence its origin cannot be clearly traced : but it is highly probable that wherever it exists it was originally grounded on a difference of descent and in modes of living, and that the separate castes were originally separate races of people. This institution has been found among many nations. According to the ac¬

counts collected by Clavigero, some traces of it were apparent among the Peruvians and Mexi¬

cans ; but it prevails principally in the East, where it has existed from the earliest times, and has become blended with the political con¬

dition of the people. The division into castes was entirely interwoven in the whole fabric of civil society, in ancient Egypt, in India and ancient Persia. In Egypt this division was supposed to have been perfected as a political institution in the flourishing period of the Pharaohs; and the lines of separation which had been drawn in earlier times by a difference of descent and different modes of living were then rendered still more distinct. The number of castes in that country is variously stated by Herodotus, Plato, Diodorus and Strabo.

Recent evidence however has made the exist¬

ence of a strict caste system in Egypt rather doubtful. The institution of caste is best known to us as it exists in Hindustan, where it is well known to have existed since perhaps 1,500 or 2,000 years before the Christian era.

The great Indian castes arc four in number, namely, the Brahmans or sacerdotal class ; the Kshatriyas or military class ; the Vaisyas or mercantile class ; and the Sudras or servile class. The division of castes in ancient Persia was essentially similar, as one would expect on the basis of the intimate relation between the religions of two countries. The three Indian castes first named are regarded as being al¬

together of a higher character than the fourth, rejoicing in the peculiar religious distinction of being ((twice-born® as contrasted with the ((once-born® Sudras. This distinction is undoubtedly ethnical in its origin, the twice-born castes being descendants of the Aryan invaders and conquerors of the country, while the once-born are the representatives of the conquered.

Caste, however, is a much more complicated thing than would be supposed from this brief statement, since the principle of caste classifi¬

cation according to employment as well as to race has long prevailed, and from early times there has been an intricate mingling of castes.

At present, marriage within the caste is gen¬

eral. However, the wife is allowed to be of a lower caste than the husband, provided the children revert to the lower or to an inter¬

mediate caste. The Brahmans are the sacer¬

dotal caste, but, according to Sir W. W. Hunter ((The Indian Empire, > 2d ed., 1893), ((Even among the Brahmans, whose pride of race and continuity of tradition should render them the firmest ethnical unit among the Indian castes, classification by employment and by geograph¬

ical situation, plays a very important part; and the Brahmans, so far from being a compact unit, are made up of several hundred castes, who cannot intermarry or eat food cooked by each other. … In many parts of India, Brahmans may be found earning their liveli¬

hood as porters, shepherds, cultivators, potters and fishermen, side by side with others who would rather starve, and see their wives and little ones die of hunger, than demean them¬

selves to manual labor, or allow food prepared by a man of inferior caste to pass their lips.®

Altogether some 1,886 separate Brahmanical tribes have been enumerated, and the Ksha¬

triyas or Rajputs now number 590 tribes in dif¬

ferent parts of India. (<In many outlying prov¬

inces we see non-Aryan chiefs and warlike tribes turn into Aryan Rajputs before our eyes.

Well-known legends have been handed down of large bodies of aliens being incorporated from time to time even into the Brahman caste.® While there has been a tendency in the different provinces for every separate em¬

ployment to develop into a distinct caste, there are also instances of castes changing their em¬

ployment and raising themselves in the social scale. Thus the Vaisyas, who were anciently that Aryan caste upon whom the tillage of the soil fell, have become the merchants and bank¬

ers of India, leaving to the Sudras and mixed 2

castes the labor of cultivation. (<Each caste is to some extent a trade-guild, a mutual assur¬

ance society, and a religious sect. As a trade union it insists on the proper training of the youth of its craft, regulates the wages of its members, deals with trade delinquents, supplies courts of arbitration and promotes good fellow¬

ship by social gatherings… . The caste or guild exercises a surveillance over each of its members, from the close of childhood until death. If a man behaves well he will rise to an honored place in his caste ; and the desire for such local distinctions exercises an import¬

ant influence in the life of a Hindu. But the caste has its punishments as well as its re¬

wards. The fine usually takes the form of a compulsoty feast to the male members of the caste. This is the ordinary means of purifica¬

tion or of making amends for breaches of the caste code.® A person who has become an <(out-caste,® or lost his caste position and privileges, may generally recover them in this way. In southern India the castes are divided into two large classes, those of the right hand and those of the left hand. The suggestion has been made that this is a survival of Buddhism.

Bibliography. — Bhattacharya, Jogendra

Nath., (Hindu Castes and Sects> (1896); Buchanan, F. H., (A Journey from Madras*

(London 1807) ; Crooke, W., (Things Indian*

(London 1906) ; Geiger, Civilization of the Eastern Iranians* (tr. 1885) ; Hopkins, (The Mutual Relations of the Four Castes according to the Manavadharmasastram* (1881); Rhys Davids, I. W., (Buddhist India* (London 1911) ; Risley, Census of India Report* (Chap.

XI, Vol. I, Calcutta 1901) ; Senart, (Les Castes dans l'lnde* (Paris

1896).

CASTEL VETRANO, va-tra'no, Sicily,

town in the province and 27 miles southeast of Trapani, on a rocky hill. It lies in a fertile district, is regularly built, has several churches, grammar school with municipal museum of antiquities, many of whose objects were found at Selinus, in the vicinity. Grapevines, olives and rice are extensively cultivated. The white pine produced in the neighborhood is esteemed the best in Sicily. Articles of coral and ala¬

baster are manufactured here. Pop. 25,000.

CASTELAR, kas-ta-lar', Y RIPOLL,

Emilio, Spanish orator and statesman: b.

Cadiz, 8 Sept. 1832 ; d. Murcia, 25 May 1899.

He was left an orphan when quite young and his early life was spent in boarding schools. .

At the Institute of Alicante (1845-48) he was distinguished for his ability to memorize, for his intellectual grasp and his oratorical powers.

His knowledge of philosophy, history, litera¬

ture and the Latin and Greek classics was very extensive, in fact, much more so than of law, which he went to Madrid to study in 1848.

He obtained his degree in law in 1852 and that of doctor of literature the following year. On leaving the university Castelar entered political life as a member of the Progressive party and before the end of the year he had already be¬

come a noted character, thanks to his wonder¬

ful oratorical gifts, and one of the shining lights of republican democracy. His youthful speeches were collected, published and spread broadcast by the ultra-Republicans, and the press of Madrid opened its arms to him. He accepted a position as editorial writer on

El Tribuno, which he left some time later, when the latter went over to the monarchy. He joined the staff of the Soberania National, which he also left when the latter became alto¬

gether radical. Finding La Discnsion, whose staff he next joined as chief editorial writer, too timid in its advocacy of Republican prin¬

ciples, he founded La Dcmocracia, dedicating it to the overthrow of the monarchy and the house of Bourbon (1864-66). He took part with the Democrats against the Socialists. It was at this period that he wrote and published, in the Ateneo, (La historia de la civilizacion en los cinco primeros siglos del cristianismo*

(1855-58). In the latter year he became pro¬

fessor of Spanish history in the Central Uni¬

versity. This gave him an opportunity to preach from two great tribunals, the university and the press, his democratic ideas. He was finally deprived of his chair in the university on account of his radical republicanism. The substitute professors in the department of Spanish history at once resigned out of sym¬

pathy with Castelar ; and this was followed by a revolutionary demonstration which was put down with considerable bloodshed (10 April 1865). But the revolutionary fire was still smouldering and very active plotting went on in secret. Castelar, arrested in 1866 for par¬

ticipating in revolutionary activity, was tried and condemned to be hanged ; but he succeeded in escaping, in disguise, to France, where he continued his editorial, journalistic and literary work and wrote (Semblanzas,* (Un ano en Paris,* (Recuerdos de Italia,* (Vida de Lord Byron* and (Introduction al estudio de la historia.* He was one of the most active spirits among the revolutionary party in Paris, and on the triumph of the latter in 1868 he returned to Spain, resumed his chair in the university and was elected a member of the Cortes, where he became the leading advocate of republicanism and the most distinguished orator of the nation. On the establishment of the republic in 1873 Castelar became Minister of State. He was instrumental in the abolish¬

ment of the military orders of Santiago, Calatrava, Alcantara, Montesa and San Juan de Jerusalem; and later on, those of Carlos III, Maria Luisa and Isabel la Catolica. On 6

Sept. 1873 he was elected president of the executive, a position he

held until the follow¬

ing January, when a counter revolution once more forced him into exile in France, where he continued actively his literary work. He fin¬

ished his (Historia del movimiento republicano en Europa* and the second part of (Recuerdos de Italia,* (La redencion del esclavo* (poem) and (E1 ocaso de la libertad.* Returning to Spain in 1876 he was elected to the Cortes, of which he remained an active and prominent figure for 17 years, always dreaming of the ultimate establishment of the Spanish republic by peaceful means. Thus his discountenancing revolutionary means to gain revolutionary ends helped the cause of the monarchy and of law and order, although he continued the leader of the opposition. Gradually he greatly modi¬

fied his republican and revolutionary attitude until he had come, in 1893, to see that Spain was not yet fit for any other than a monarchical form of government.

Castelar was the mouthpiece of the Repub-CASTELEIN — CASTELLI

3

lican ideal in Spain, which his brilliant ora¬

torical gifts, his writings and his ceaseless activity kept constantly before the people. He fought for universal suffrage and the abolition of. slavery in Porto Rico; he defended the principle of religious liberty ; advocated the election by popular vote of the alcaldes; and he was a powerful champion of universal mili¬

tary service. He strongly influenced the poli¬

tics of his age in Spain; and this influence extended to all the Latin countries in Europe and America. His literary works, which are very voluminous, include, in addition to those already mentioned, the following: <La revo-lucion religiosa) ; (Perfiles de personajes y bocetos de ideas) ; (Estudios historicos sobre la Edad Media) ; (La formula .del progreso } ; (Defensa de la formula del progreso) ; (La cuestion de Oriente) ; (Cuestiones politicas y sociales* ; (Cartas sobre

politica europea) ; (Recuerdos y esperanzas) ; (La rendicion del esclavo) ; (La hermana de la caridad) ; (Historia de un corazon) ; (Discursos politicos y literarios-* ; (Fra Filippo Lippi) ; (Tragedias de la historia) ; (E1 suspiro del Moro) ; (Discurso de recepcion en la Academia Espanola) ; (Discurso en la Coruna sobre literatura gal-lega) ; (Galeria historica de mujeres celebres.*

CASTELEIN, kas'te-lin, Matthiis de,

Dutch poet: b. Painele (Oudenarde) 1485; d. 1549. He was the acknowledged lawgiver and pattern of all the Dutch rhetoricians of his time in his (De Cunst van Rhetoriken) (1555).

He composed many plays, but only two of them were published ; one of these is the (Story of Pyramus and ThisbeP He wrote also a volume of (Diversche Liedkens,* in melodious verse.

CASTELLAMARE, kas-tel-la-ma're, or

CASTELLAMMARE DI STABIA, Italy, a

seaport town on the Gulf of Naples, 17 miles southeast of the city, at the beginning of the peninsula of Sorrento, and 10 miles northeast of that town. It extends for a mile along the shore at the base and on the slope of a spur of Monte Sant' Angelo (4,735 feet high), a mountain which commands a splendid pros¬

pect. From its pleasant surroundings, shady walks, sea baths and other attractions it is a favorite summer resort of the Neapolitans, as well as tourists, and has several good hotels, one of them formerly a royal residence. The harbor is protected by a mole and there is an arsenal with a dockyard. It contains a tech¬

nical school, a theatre and a large royal arsenal.

The principal imports are grain, coal and iron; the principal exports wine and fruit. The fisheries are important, and there are macaroni, soap, leather and cotton factories. The town owes its name to a castle built by the Emperor Frederick II in the 13th century. Castellamare occupies the site of the ancient Stabiae, over¬

whelmed, with Herculaneum and Pompeii, by an eruption of Vesuvius, 79 a.d. ; and it was here that the elder Pliny met his death by ap¬

proaching too near the mountain while it was in a state of eruption. The modern town was afterward built from the ruins of Stabiae. Here :'n 1799 the French general, Macdonald, defeated the allied English and Neapolitan forces. Pop.

about 33,000.

CASTELLAN, or CHATELAIN, prop¬

erly the owner or commander of a castle. In Flanders and France the title went with the possession of certain districts, and in Nor¬

mandy and Burgundy chatelains ranked next after bailiffs, with both civil and military au¬

thority. In Germany the chatelains were Im¬

perial officers with military and civil jurisdic¬

tion in fortified places. Consult Luchaire, (Manuel des institutions francaises) (Paris 1892).

CASTELLANE, kas'tel-lan', Esprit Vic¬

tor Elizabeth Boniface, Count of, French marshal: b. Paris, 21 March 1788; d. Lvons, 16

Sept. 1862. He entered the army in 1804 and took part in most of Napoleon's campaigns.

After the Restoration he became colonel of the Hussars of the Royal Guard. He fought in Spain (1823) and at the siege of Antwerp (1832), and as lieutenant-general commanded the Army of the Pyrenees. In the February revolution (1848) he lost his command, and in consequence went over to Louis Napoleon. In 1850 he became commander at Lyons and in 1852 marshal and senator. His (Memoirs, >

published in 1896, though crude in style, are valuable for their mass of minute detail.

CASTELLANETA, cas-tel-la-na-ta, Italy,

city of Bari delle Puglie province, 24 miles northwest of Taranto. It is a thriving trade centre for local produce, olives, fruit, wool and cotton, and is a bishop's see with an interesting cathedral. Pop. 11,550.

CASTELLI, kas-tel'le, Benedetto, a pupil of Galileo: b. Brescia 1577 ; d. Rome 1644. He was a monk and became abbot of a Benedic¬

tine monastery of the congregation of Monte Cassino. He afterward became a professor of mathematics and taught with distinguished suc¬

cess both at the University of Pisa and at the Collegio della Sapienza at Rome. Torricelli was his pupil. He distinguished himself in hydraulics and rendered important services to Urban VIII in his projects for the regulation of Italian rivers. He may be regarded as the founder of that branch of hydraulics which relates to the velocity of running water, though his fundamental principle, that the velocity is proportional to the height of the reservoir, is inaccurate, and was demonstrated to be so by Torricelli, who showed that the velocity is pro¬

portioned, not to the height, but to the square root of the height. In his investigations as to the measurement of time Castelli made use of the pendulum. His principal work, entitled (Della Misura dell' acque correnti,* published at Rome in 1628, was translated into French in 1664.

CASTELLI, Ignaz Franz, Austrian drama¬

tist: b. Vienna, 6 May 1781; d. there, 5 Feb.

1862. He was educated for the law, but fol¬

lowing his inclination for the drama, gained access to the orchestras of theatres as a player of the violin. His circumstances compelling him to look out for some means of support, he accepted various subordinate offices, but using his leisure in composing patriotic songs for the

Austrian army, he was brought into favorable notice. His songs having given umbrage to Napoleon, he fled to Hungary. In 1815 he accompanied Count Cavriana as secretary to Paris, and afterward he served in the same capacity with Baron Munch von Bellinghausen in Upper Italy. Because of the success of his opera, (Die Schweizerfamilie) (music by

Weigl), he was appointed court poet at the Karntnerthor Theatre. In 1840 he retired with a pension and the office of state librarian. The author of many poems, popular songs and mis¬

cellaneous writings, he was at various times connected with the press of Vienna, but is best known by his voluminous productions for the stage. Over 100 plays, partly adapted from the French, partly original, are attributed to him.

He was a zealous collector of plays, handbills of the theatre and portraits of actors, covering the years from 1600-1862. The collections are now at Vienna in the Imperial Library. In 1848 more than 100,000 copies of his political pamphlets in favor of the Revolution found eager purchasers. His most popular drama was (Die Waise und der MorderP His last publication was his (Memoiren meines Lebens) (4 vols., 1861-62).

CASTELLIO, kas-tel'li-6, Sebastianus,

French theologian and humanist, translator of the Bible into pure and classic Latin ; he was a native of Dauphiny: b. 1515; d. Basel 1563, in exile and in extreme poverty. His family name was Chateillon, which

he latinized after the fashion of that time into Castellio. At the invitation of Calvin he settled at Geneva, where he became professor of the ancient classic literatures, but because of differences regard¬

ing questions of religious belief he was deposed from the professorship and banished from Geneva. His Latin version of the Bible re¬

tained little or nothing of the profoundly Hebrew character of the scriptural writings and was justly censured by Calvin and the Calvinists. Theodore Beza, to offset this <(work of Satan,® as he called it, made a Latin translation of the Bible himself, striving to retain the Oriental flavor of the original in every respect. Castellio also wrote a book in defense of the right to hold and publish views deemed by Church and state to be heretical ; this, too, evoked a reply from Beza. Castellio wrote also a tractate on (Predestination Op¬

posed to the Views of Calvin) ; it was published after the author's death by Faustus Socinus in 1578.

CASTELLO, kas-tel'lo, Gabriele-Lanci—

lotto, Sicilian antiquary, Prince of Torre-muzza: b. Palermo 1727; d. 1794. He studied science and archaeology. He formed a splendid collection of the remains of antiquity found in Sicily. He bequeathed a large quantity of books, etc., to the public library of Palermo.

At his death he was honorary member of the Royal Society and of the Academy at Paris.

His important works are (Storia d'Alesa, antica citta di Sicilia J (Palermo 1753) ; Hnscrizioni Palermitane) (1758); (Sicilise populorum veteres nummi' (1781) ; (Siciliae et adjacent veteres Inscriptiones) (1769).

CASTELLOBRANCO, Camillo, Portu¬

guese novelist and poet: b. Lisbon, 16 March 1825; d. 6 June 1890. He studied in Oporto and Coimbra with great irregularity and en¬

tered the career of letters. After a short jour¬

nalistic career in Oporto and Lisbon he entered the Episcopal

Seminary and took minor orders.

His restless nature prevented his adherence to this course and he abandoned it to resume a feverish literary activity. Having lost his sight, and suffering from a nervous disease, he committed suicide. He is the most popular of the modern romancists of Portugal, and at the same time the most national in tone, spirit and form. He composed romantic novels, of which the most notable are (0 Romance de un Homcm Rico) and the series, (Novellas do MinhoP To the romances he owes his reputa¬

tion. His novels of manners created a new style of narrative, in which he describes with great nicety the social and domestic life of Portugal in the 19th century. In the domain of history, biography and literary criticism he is the author of (Noites de Lamege) ; (Cousas leves e pesadas) ; (Cavar em ruinas) ; (Memorias do Bispo do Grao Para> ; and Bo¬

hemia do EspiritoP His verses are mediocre.

Llis collected works have been published by the Companhia Editora of Lisbon. Consult Frei¬

tas, (Perfil de Camillo Castello Branco) (Sao Paulo 1889) ; Osorio, Paula, (Camillo, a sua vida, o suo genio, a sua obra} (Oporto 1908).

CASTELLON, kas-tel-yon', Francisco,

Nicaraguan revolutionist: b. about 1815; d. 2

Sept. 1855. He was the leader in a revolt at Leon in 1853, which was unsuccessful, and fled to Honduras, whence he returned in June of the next year. It was largely by his invita¬

tion that the filibustering expedition under William Walker (q.v.) went from the United States in 1854. See Nicaragua, History.

CASTELLON DE LA PLANA, Spain,

capital of the province of Castellon, 40 miles north-northeast of Valencia. It stands in a large and fertile plain, watered by the Mijares, from which an ample supply of water is brought into the town by an aqueduct supposed to have been constructed by Jayme I of Ara¬

gon, who, in 1233, wrested Castellon from the Moors. It is well built and has considerable manufactures of sailcloth and woolen and hempen fabrics, ropes, porcelain, leather, cork, etc., and. some trade in hemp, grain and fruit.

The jiainters Ribalta, father and son, were born here. The original town occupied a hill north of the present site. Pop. of town 32,309; of province, 322,537.

CASTELNAU, kas-tel'nd, Edouard de

Curieres de, French general: b. Saint—

Affrique 1851. He entered the Saint-Cyr mili¬

tary school in 1869, and in the following year, when the Franco-Prussian War broke out, he was given a commission. He served through the whole campaign and emerged with the rank of captain. During the Commune he took part in the street fighting. For over 40 years de Castelnau was one of that little band of French soldiers — Joffre, Gallieni, Foch, *etc.* —who devoted their entire strength to the prob¬

lem of preparing the army against a repetition of the disasters of 1870-71. He rose through the successive grades, passed the Ecole de Guerre, was promoted general in 1906 and be¬

came chief of staff to General Joffre when the latter was designated (in 1913) as commander-in-chief in case of war. The two men had long worked together and closely studied all possible aspects of a future war. At the com¬

mencement of the European War de Castelnau was placed in command of the Army of Lor¬

raine, charged with the defense of Nancy. His forces were drawn up across the Gap of Nancy to prevent the army of the Crown Prince of Bavaria from turning the Allied front. The CASTELNAU — CASTIGLIONE

fiercest fighting on this sector began 6 Sept.

1914, when the Bavarians were incited to make a desperate, overwhelming assault. Without intermission the battle raged for three days.

By the 12th the main fighting was over; Nancy was saved ; de Castelnau's resistance contrib¬

uted directly to the victory of the Marne. In 1915 he commanded the French offensive in Champagne and was made chief of the gen¬

eral staff when General Joffre was appointed commander-in-chief of all the armies of France. General de Castelnau lost three sons on the battlefield during the first two years of the war.

CASTELNAU, Francis, Comte de, French

traveler: b. London 1812; d. Melbourne, Vic¬

toria, 4 Feb. 1880. He traveled extensively in Canada, the United States and Mexico, and under the protection of the French government undertook an exploration of South America in 1843, accompanied by D'Osery, a botanist ; Weddell, a botanist; and Deville, a taxidermist.

After his return to France, in 1847, Count Cas¬

telnau published (Expedition dans les parties centrales de l'Amerique du Sud' (1850-51), a work in six volumes, of which one was by M. Weddell. Castelnau afterward traveled in Arabia, and was successively consul at Bahia, the Cape of Good Hope and Singapore, and at the time of his death was consul-general at Melbourne.

CASTELNAUDARY, kas-tel-no-da-re,

France, a town in the department of Aude, on a height above the Canal du Midi, 22 miles west-northwest of Carcassonne. It was built

by the Visigoths on the site of a rich town which had been destroyed, and was named Castellum Novum Arianorum, from which its

present name is corrupted. It rises in the form of an amphitheatre, and was anciently the cap¬

ital of a district and strongly fortified. It was the scene of much barbarity by the inquisitors in 1237, was almost totally destroyed by Ed¬

ward the Black Prince in 1355 and is famous for the battle fought beneath its walls in 1632

between the troops of Louis XIII and those of Gaston of Orleans, which resulted in favor of Louis chiefly in consequence of the inactivity of the Duke of Orleans. The Duke of Mont¬

morency was wounded in this battle and taken prisoner, and afterward executed at Toulouse by order of the King, Louis XIII. It is in¬

differently built, has manufactures of coarse cloth, several distilleries and tanneries and one of the largest grain and flour markets in the south of France. It contains specimens of mediaeval architecture, among them the church of Saint Michel (14th century). Pop. about 10,000.

CASTELNOVO, kas-tel-no'vo, Leo di.

See Pulle, Leopoldo, Count.

CASTELNUOVO, kas-tel-nw6-vo, Enrico,

Italian novelist: b. Florence 1839. His stories have attained great popularity; among them (Prof. Romualdo) (1878) ; (Two Conventions'

(1885) ; (Reminiscences and Fancies' (1886).

He is one of the acknowledged Italian masters of the <(novel of the inner life" (romano intimo).

CASTELVECCHIO, Riccardo, re-car ‘do

kas-tel-vek’e-o. See Pulle, Giulio, Count.

CASTER-KELLNER ELECTROLYTIC

PROCESS. See Electrochemical Industries.

CASTI, kas’te, Giambattista, Italian poet: b. Montefiascone 1721 ; d. Paris, 7 Feb. 1803.

He studied at Montefiascone, became professor there, was appointed a canon and made a jour¬

ney to France. Receiving an invitation from the Prince of Rosenberg, who became ac¬

quainted with him in Florence, he .went to Vienna and was presented to Joseph II, who knew how to appreciate the genius of the poet, and delighted in his conversation. Casti took advantage of every opportunity of visiting other courts and joined several embassies with¬

out office or title. Catherine II received him in the most flattering manner. He visited also the court of Berlin and several other German courts. After his return to Vienna, Prince Rosenberg, the director of the Imperial Theatre, caused him to be appointed poeta Cesorco on the death of Metastasio. After the death of Joseph II Casti requested his dismission and retired to Florence, where he wrote many of his works. In 1783 he went to Paris. His (Novelle galanti’ were republished at Paris (1804), under the title (Novelle di Giamb.

Casti’ in three volumes. They are 48 in num¬

ber. Almost all are of a licentious character, but written in a lively, original and graceful style. The same may be said of his didactic-satirical poem, (Gli animali parlanti, poema epico di Giamb. Casti’ (Milan 1802, 5 vols.).

There are translations of it in French, German and English. Casti’s (Rime anacreontiche’ are pleasing, and his comic operas, (La grotta di

Trofonio' and HI re Teodoro in Venezia,' etc., are full of wit and originality. His letters have been published in (Miscellanea di storia italiana' (Vol. XII, Turin 1883). Consult Tommaseo, N., (Dizionario d'Estelica' (Vol.

II, p. 75, Milan 1860) ; Foscolo, (Opere' (Vol.

IV, Florence 1850-62).

CASTIGLIONE, kas-tel-yo'na, Baldas—

sare, Italian writer: b. Casatico, in the terri¬

tory of Mantua, 1478; d. 8 Feb. 1529. He studied at Milan, and entered into the services of the Duke Ludovico Sforza, and afterward of the Duke of Urbino, of whose elegant and splendid court he soon became an ornament.

By him he was sent as an envoy to Henry VII of England, and afterward in the same capacity to Louis XII, at Milan. In 1513 Castiglione appeared as ambassador at the court of Leo X, where he became intimate with the most distin¬

guished literati and artists. In 1521 he obtained for the newr Duke of Urbino, Federigo, the command of the Papal troops, and in 1524 was employed bv Pope Clement VII to conduct his negotiations with Charles V. When Rome was plundered by the Constable of Bourbon in 1527

he was accused of negligence and his health was undermined by chagrin. He refused to accept the rich bishopric of Avila, which was offered to him by the Emperor, until the Pope should be reconciled with Charles. Among his works, the (Libro del Cortegiano' is the most celebrated. It teaches the art of succeeding at court. The best edition is by Cian (Florence 1894). His few Italian and Latin poems are elegant. His letters are valuable contributions to political and literary history. (See II Cor¬

tegiano). Consult Cartwright, Julia, (Baidas-6

sare Castiglione : His Life and Times) (New York 1908, trans. by Opdycke, New York 1903).

CASTIGLIONE, Carlo Ottavio, Count,

Italian scholar: b. Milan 1784; d. Genoa 10

April 1849. His magnum opus, published in 1826, is a work in which he seeks to ascertain the origin and the history of the towns in Bar¬

bary whose names are found on Arabic coins.

Out of. Italy, however, he is best known by his edition of some fragments of the Mceso-Gothic translation of the Bible by Ulfilas, which had been discovered in 1817 by Cardinal Mai among the palimpsests of the Ambrosian Library. His biography has been written by Biondelli (Milan 1856).

CASTIGLIONE, Giovanni Benedetto,

Italian painter: b. Genoa 1616; d. Mantua 1670.

He was a pupil of Paggi and Ferrari, studied at Rome, Florence, Parma and Venice, and formed his style on the best masters. He is particu¬

larly celebrated as a painter of animals, and in these subjects, as well as his other paint¬

ings, is remarkable for softness, elegance and beauty. Of his larger pieces, the most cele¬

brated are the (Creation of the Beasts, y (Their Entrance with Noah into the Ark} and (Jacob's Return with His Family and Servants, His Flocks and Herds) at the Uffizi, Palazzo Bianco, Genoa, Dresden, Vienna. He also dis¬

tinguished himself as an engraver, and from his skill in the production of light and shade has been called the second Rembrandt. In 1564

he became court painter to Duke Charles I of Mantua and in that city he lived until his death.

Consult Bartsch, (Le peintre-graveuD (Vol.

XIX, p. 71) ; Hubert et Post, (Dictionnaire des GraveursF

CASTIGLIONE DEL STIVIERE, stev—

ya'ra, Italy, a small city in the province of Man¬

tua, 17 miles southeast of the town of Brescia, 22 miles northwest of Mantua. It is well built, surrounded by walls, defended by an ancient castle and contains a large square adorned with a central fountain, three churches and a town-hall. A well-attended annual fair is held in June. The French obtained here a decisive victory over the Austrians on 5 Aug. 1796, which gave to Marshal Augereau his title of Due de Castiglione. Its chief industry is silk spinning. Pop. 7,124.

CASTILE, New. See New Castile.

CASTILHO, kas-tel'yo, Antonio Felici¬

ano, Portuguese poet: b. Lisbon, 26 Jan. 1800; d. 18 June 1875. Though almost blind, he was educated by a brother and studied jurispru¬

dence at Coimbra. His first poetical compo¬

sition, (Cartas de Echo a Narciso) (1821), pub¬

lished while he was a student, won him great celebrity. He excelled in pastorals ; and to this class belong his (A primavera) and 'Amor e melancholia. } He had a deep sympathy with nature and was a master of elegiac verse. In prose he wrote a treatise on Portuguese versi¬

fication and (Quadros historicos de PortugaP

(Lisbon 1838; Rio de Janeiro 1847).

CASTILLA, kas-tel'ya, Ramon, Peruvian

soldier and politician : b. Tarapaca, 30 Aug.

1796; d. there, 30 May 1867. He served in the Spanish cavalry until 1821, when General San Martin proclaimed Peruvian independence.

Castilla, then a lieutenant, joined the liberating army, in which he distinguished himself. He was appointed prefect of his province. In 1830

he became brigadier-general of the army; and, after the treaty with the President of Bolivia, went to Chile. There, in 1837, he joined the Peruvians in their attack on Santa Cruz, the President of Bolivia. Gamarra was proclaimed President of Peru, with Castilla as Minister of War. In 1841 he was one of the leaders of the Bolivian invasion. He was elected Presi¬

dent of Peru in 1845. At the expiration of his term of office, in 1851, he was succeeded by Gen. Jose Rufino Echenique, but usurped the power in 1855, and was, by a majority of 70,374

votes, reelected to the presidency in August 1858. He introduced several important re¬

forms, such as the abolition of slavery; and of the tribute paid by the Indians; the grant¬

ing of universal suffrage; and the prohibition of the practice of all religions save the Roman Catholic. After being succeeded by San

Roman in 1862, Castilla lived in retirement till his appointment to the presidency of the Senate in 1865. Consult Markham, (History of PeruP

CASTILLEJO, kas-tel-ya'ho, Cristobal

de, Spanish poet, the last representative of the ancient Spanish poetry : b. Ciudad Rodrigo about 1494; d. Vienna, 12 June 1556. He served first as page to the Infanta Fernando, younger brother of Charles V. He took orders and in 1525 became secretary to that prince. The en¬

nobling of his family in 1532 was another mark of royal favor, followed by his appointment in 1536 to the benefice of Perdegge in the bish¬

opric of Passau. This he resigned in 1539 in order to accompany Mendoza, then Ambassador to Venice. He opposed the introduction of Italian styles into the poetry of Spain, and justified his opposition by demonstrating in his own work the competence of the traditional styles of Spain for the expression of all moods and all sentiments. Of his comedies, none are extant. A number of his poems survive, first collected at Madrid 1573. They include love poems, poems of every day life and religious and moral works. Some satires and ballads are also to be found in the collection. Con¬

sult Adolfo de Castro, (Biblioteca de autores espanoles) (Vol. XXXII, Madrid 1854) :

Nicolay, C. L., (Lif-e and Works of de Castil-lejo) (Philadelphia 1910).

CASTILLIAN, The. See Wasp, Rein¬

deer, Avon and Castillian.

CASTILLOA ELASTICA, a lofty forest—

tree, belonging to the Bread-fruits (Artocar -

paceoz). Some specimens have near the ground a circumference of from 10 to 12 feet. The tree is native to southern Mexico and the Cen¬

tral American countries and supplies the Cen¬

tral American rubber of commerce. This rub¬

ber, instead of being molded, as is Para rubber, is made into sheets (hence called sheet-rub¬

ber) and hung up to dry. Castilloa elastica has been found to be cultivable in India and Ceylon.

CASTILLON, kas -te-yon, France, town in the department of Gironde, on the right bank of the Dordogne, 33 miles east of Bordeaux by rail. Beneath its walls, on 17 July 1453, was fought the battle which terminated the Hun¬

dred Years' War, when the English met a sig¬

nal defeat, their leader, Earl Talbot of Shrews¬

bury, and his son, being slain. Part of the bat-CASTINE — CASTLE

tie is described in the fourth act of Shakes¬

peare's (King Henry VI, Part I\ Pop. 3,300.

CASTINE, kas'-ten, Vincent, Baron de,

French soldier: b. Oleron 1650; d. 1722. He went to Canada in 1665, established a mercan¬

tile house at Penobscot (now the town and port of entry of Castine, Me.), in 1687, and married the daughter of the Penobscot chief.

In 1696 he captured Pemaquid, at the head of 200 Indians. He assisted in the defense of Fort Royal, in 1706, arid was there wounded the following year. His son, who succeeded him in command of the Penobscots, was made pris¬

oner and taken to Boston in 1721.

CASTING, the running of melted metal

into a mold, so as to produce an object in metal having the shape of the mold. Iron-casting or iron-founding is carried on by three methods, the first called <(open sand-casting,® the second, <(sand-casting between flasks,® and the third, (<loam-casting.® The casting of small articles, as type, is done by machines. See Composing

Machines. See also Foundry Practice; and Foundry and Forge Terms.

CASTING AWAY OF MRS. LECKS

AND MRS. ALESHINE, The, a humorous

story by Frank R. Stockton, in which the two delightful old ladies who give their names to the narrative are constantly before the foot¬

lights. They set out for Japan, and on the way they are shipwrecked, but escape from the sinking vessel in a leaky boat which finally sinks under them. They make their way to a small coral island with their companion, Mr.

Craig, where they take possession of the sum¬

mer place of the Dusantes and make them¬

selves at home. A missionary and his daugh¬

ter are added to the party. The two old ladies decide that, as they have come unbidden into the place, everyone should pay for his board so much a week ; and the money is put in a ginger jar. They also make up their mind that Mr. Craig should marry the missionary's daugh¬

ter; and they accomplish their ends in their own inimitable way. Escaping from the island they make their way to San Francisco, after the wedding; and from there they proceed to their home in the East, their sayings and doings on the way being fully as entertaining as those on the island. In a stage coach wreck they meet with the Dusante party and Mr. Dusante attempts to return the <(board money® left on the island; and the comedy of the ginger jar enlivens the rest of one of the most character¬

istic of the Stockton stories.

CASTLE, Egerton, English novelist : b.

12 March 1858; d. London, 17 Sept. 1920. He was educated at Paris, Glasgow and Cambridge universities. After a brief military career he turned to journalism and literature and pub¬

lished: (Schools and Masters of Fence) (1884) ; <Saviolo,) a play

(1893) ; (The Light

of Scarthey > (1895) ; (The Jerningham Letters > (1896) ; (The Pride of Jennico)

(1898) ; (Desperate Remedies, > a play; (The Bath Comedy* (1899); (Marshfield the Ob¬

server) ; (The House of Romance * (1902) ; (The Rose of the World) (1902) ; (If Youth but Knew) (1905) ; (Flower o' the Orange) (1908); (The Grit of Life) (1912); (The Ways of Miss Barbara) (1914)- (The Hope of the House) (1915), *etc.* The greater num¬

ber of his later novels were written jointly with his wife, Agnes Castle.

CASTLE, Vernon, English actor and

aviator: b. Norwich, England, 2 May 1887; d.

Fort Worth, Tex., 15 Feb. 1918. Vernon Cas¬

tle Blythe, to give him his real name, was educated for a civil engineer at Birmingham University. He made his professional debut in 1907 with Lew Fields, as the Head Waiter in ((The Girl Behind the Counter,® at Herald Square, New York, and later played minor parts in other productions. But his outstand¬

ing talent was dancing and inventing new fig¬

ures and steps. He opened a dancing school, which proved a most profitable venture, and after his marriage with Irene Foote of New Rochelle in 1911 devoted himself entirely to exhibition dancing and teaching the art. Cas¬

tle took up aviation in 1915 and received his pilot's certificate from the Aero Club of Amer¬

ica in February 1916, and a month later was attached to the British Royal Flying Corps in France. He served at the front for a year, making about 200 flights over the enemy lines.

He was killed in an airplane accident while acting as instructor with the Canadian con¬

tingent of the flying corps, which had been transferred to Texas for winter training.

CASTLE, William Ernest, American zool¬

ogist : b. Alexandria, Ohio, 25 Oct. 1867. He studied at Denison and Harvard universities ; became Latin instructor at Ottawa (Kan.) University from 1889 to 1892; in 1895—96 was instructor in vertebrate anatomy at the Uni¬

versity of Wisconsin; and in 1896-97 instructor in biology at Knox College. After instructor-ship at Harvard University, he became there in 1908 professor of zoology. His numerous articles on embryology', animal morphology and heredity appeared in the Contributions from the Zoological Laboratory of Harvard and in the Publications of the Carnegie Institution of Washington. His published works include

(Heredity in Relation to Evolution and Animal Breeding* (1911); (Heredity and Eugenics*

(1912) ; (Reversion in Guinea Pigs and its Ex¬

planation, J with C. C. Little (1913).

CASTLE, a word derived from the Latin

castellum, a diminutive of castrum, a fortress or stronghold. The word castellum was fre¬

quently applied by the Romans as a military term to denote a redoubt. The word has come to be used as the designation of those strong¬

holds which, in feudal times, served at once as residences and as places of defense for the nobles, and which continued to exist until the invention of gunpowder changed the whole system of fortification. The royal residences among the Franks resembled in some points both the Roman villa and the Roman camp, and those of the Frankish nobles differed little from those of the kings except in point of simplicity.

Strictly speaking, only the grand feudatories had the right to erect fortified castles, and then only after receiving the royal consent ; but

the grand feudatories very early began to take it upon themselves to grant the privilege of erect¬

ing castles to their vassals, and these again to those of a still lower grade. In this way large numbers of castles began to spring up at an early period in France, Germany, England and elsewhere.

land were probably the first stone buildings erected there. The great square keep of Roch¬

ester Castle is probably of this period; it is about 70 feet square, with projecting corner turrets, and as it now stands is 100 feet high, but the battlements have been altered and its original character lost. A heavy wall divides the huge structure into two nearly equal parts, and within this wall a well is arranged which communicates with all three stories ; the outer walls are 12 feet thick at the base and the masonry is very perfect. Little is known of the ancient disposition of the minor buildings.

There is no doubt that a high and battlemented wall enclosed a court or perhaps two courts, an inner and an outer bail, as they are called ; that the keep was enclosed by the inner wall, but al¬

ways so near the wall that a postern could com¬

municate with the outer moat, and that within the enclosing wall, often built up against its in¬

terior face, were stables and storerooms, and also lodgings for the garrison, which last, how¬

ever, might be temporary structures. This wall was always surrounded by a deep and broad moat, which might be filled with water in a low country, or, when dry, served merely to in¬

crease the effective height of the walls and to disarrange the approach of the besiegers. There was always a chapel, but in Rochester Castle

this is built against the southeast corner of the keep and opens from its principal floor. In such an early castle the keep is the only very strong place, as a vigorous attack would breach or scale the outer wad very soon.

The castles of the 12th and 13th centuries were far more elaborate, and their tendency was toward separate posts, each defensible by itself. Every tower could be shut up and de¬

fended, its little garrison resisting even after the neighboring works had been captured or rendered indefensible. This arrangement had the disadvantage that a very bold and sudden attack might capture the strongest parts of the castle, even the keep itself, before assistance could come to it. The typical castle of the 12th century is the famed Chateau Gaillard in Nor¬

mandy, and of the 13th century the famous castle at Coucy, near Laon in northern France; and in the British Isles, Kidwelly in Wales, which remains in a perfectly traceable condi¬

tion.

The perfect castle was not developed until the time when gunpowder was about to make it useless. Thus the Chateau of Pierrefonds, north of Paris, and near Compiegne, was built about 1400, and in this the faults of the earlier castles were avoided. The walls are every¬

where of nearly equal height, the galleries of defense are continuous so that the soldiers of the garrison may run easily the whole length of the walls, and these galleries are two or even three deep, allowing the defenders to throw a prodigious rain of projectiles upon any attacking party. These galleries, built of stone, replace the temporary wooden galleries, always put up on the walls of earlier castles when an attack was anticipated. It is to be noted that the attack and defense in mediaeval fortifica¬

tions was vertical ; the higher the wall the more formidable was the blow delivered by a falling ball of stone, or a timber or iron bar; while the projectiles from crossbows and mili¬

tary engines would certainly lose nothing, and the garrison in this way was removed far above the assailant, who must come close under the

walls to attack. This attack, then, consisted, in the case of a well-defended place, chiefly in breaching or undermining the walls. Escalade was only possible where the garrison was weak or in poor condition or surprised.

Castles often had outer works, thus the barbican or barbacan is strictly a defense built outside of the principal gate and intended to keep the enemy away from it for a certain length of time. When a castle was near a river an outwork would be built on the other bank, covering the bridge leading to the castle.

When the site was high, with steep approaches, a covered way might be built to protect the whole of the path leading up to the castle, and the foot of this would have an outwork or strong post capable of some defense.

The introduction of firearms and especially of cannon heavy enough to breach the walls compelled a change in the old castles, which were often ruined as consistent pieces of me¬

diaeval fortification by having their towers cut down to accommodate artillery of defense.

A round stone tower 200 feet high would be cut down to a kind of bastion 30 feet high, with a parapet and embrasures for cannon around its platform. Even this was only temporary, for it was soon found that the effect of artillery fire was irresistible by stone walls, and these were abandoned for the sloping rampart of earth introduced in the 16th century. See Fortification.

The term castle was applied to the seacoast forts which defended our modern seaports pre¬

vious to 1870, and of which some still remain.

It was held that the stone wall, 8 or 10 feet thick, carefully built of granite blocks, with the embrasures covered by wrought iron plates and allowing of a great accumulation of guns within a small space, were proof against the attack of a fleet; and this because the fire from the decks of ships cannot be so exact as to pro¬

duce a breach. It was assumed that the enemy would not be able to make a landing near with effective guns. Thus, at the entrance to Savannah, Fort Pulaski was a <(seacoast cas¬

tle® of that type, but it was breached in a few hours by the rifled guns landed on Tybee Island.

In modern English nomenclature, a name

compounded with castle (such as Castle How¬

ard, Berkeley Castle and the like) is used for habitable buildings which may have been erected on the site or immediate grounds of an ancient building of defense or within its old walls; but this is a mere whim in the selection of an arbitrary name. On the other hand, Windsor Castle, the favorite residence of Queen Victoria, has retained much of its mediaeval de¬

fensive character, but the rooms inhabited by the royal family are of the reign of George IV, and the only part of the ancient work which re¬

mains in full use is the great chapel dedicated to Saint George, a famous and beautiful build¬

ing completed in the time of Henry VII. See Castles, Historic.

CASTLE GARDEN, the former immi¬

grant depot in New York, at the point of Man¬

hattan Island, in Battery Park. In the early days of the city the place was a small, forti¬

fied island a few feet from the mainland; later it became a public hall for assemblies and CASTLE OF OTRANTO — CASTLEREAGH

concerts. Here Jenny Lind made her Amer¬

ican debut. Many years ago the island was in¬

corporated with the general area of the Bat¬

tery by filling the intervening space with earth and rock ; new buildings were erected and the place was devoted to the purpose of landing steerage immigrants. In 1890 it ceased to be used as an immigrant depot and was turned over to the park commissioners of the city of New York. The old fort is now used as a pub¬

lic aquarium.

CASTLE OF OTRANTO, The. Horace

Walpole's (The Castle of Otranto,) published in 1764, owes its importance to the fact that it is the first example of the so-called Gothic romance, a type of fiction which, in the hands of writers like Mrs. Radcliffe, became highly popular in the late 18th century as a reaction against the sentimental and realistic novel of the school of Richardson, and prepared the way for the great exploitation of mediaeval romance in the historical novels of Sir Walter Scott. Intrinsically (The Castle of Otranto) is interesting chiefly by virtue of its absurdity.

The scene is a mediaeval castle, with frowning battlements, trap doors and intricate sub¬

terranean cloisters ; the theme, the mysteries which it harbors within its walls. The plot, involving a gloomy tyrant, a persecuted wife, a lovely young prince and two romantic girls, and employing the supernatural crudely at every turn, is not worth rehearsing. A gigan¬

tic helmet comes crashing from heaven into the courtyard. An ancestral portrait steps forth from its frame and becomes a ghost, Walpole was a mere dilettante, trying what he could do to wring sensation out of a spurious medievalism. He is entirely lacking in the delicate skill and the genuine historical sense of Scott. Yet the credit of originality cannot be denied him. He is the father of all those who cast reality to the winds and carry the reader deep into the heart of romantic mystery.

(The Castle of Otranto > was reprinted with a memoir by Scott in

1823 ; a convenient edi¬

tion is that in Cassell's National Library. Con¬

sult Beers, H. A., English Romanticism in the Eighteenth Century > (1898).

James H. Hanford.

CASTLE PEAK, in Mono County, Cal.,

one of the highest peaks of the Sierra Nevada, rising to 12,500 feet above the sea, in lat. 38°

10' N. and long. 119° 30' W. It is about 25

miles northwest of Mono Lake. The lower slopes are covered with forests.

CASTLE RACKRENT. This story, writ¬

ten in 1800, was the first of Maria Edgeworth's novels and is still regarded by many as her masterpiece. It belongs to that series of novels dealing with Irish life, which elicited the praise of Sir Walter Scott and other contemporaries.

The opportunity which Miss Edgeworth had of studying Irish conditions at first hand en¬

abled her in these novels to draw a powerful and substantially accurate picture of contem¬

porary conditions in Ireland. The theme of (Castle RackrenD is the wasting fortunes and the final disaster of an honorable Irish family as the result of carelessness, improvidence, folly and absenteeism. The story, of only a few score pages, is told bv a faithful old re¬

tainer of the family, Thady Quirk, who lives through the successive reigns of Sir Patrick, who drank himself to death; of Sir Murtagh, the close-fisted, who wasted his substance in lawsuits; of the dashing Sir Kit, an absentee landlord who married a Jewess whom he

despised and confined for seven years in her chamber, and who met his death in a duel ; and finally of Sir Condy, under whose easy ways the estate finally passed from the hands of the Rackrents into those of creditors, par¬

ticularly of Jason Quirk, the son of old Thady, who had bought the debts of the property.

The story is told throughout in a vigorous phraseology and is full of local touches of a lively character. Leslie Stephens' article in the dictionary of National Biography* and

Helena Zimmern's (Marie Edgeworth * in the (Eminent Women Series) may be consulted.

William T. Brewster.

CASTLEBAR, Ireland, the capital of

County Mayo. It is on the Castlebar River, 11 miles northeast of Westport, has infantry and cavalry barracks and some linen manu¬

factures. In 1641 the Parliamentary forces that held the city were massacred after the capitulation by the infuriated besiegers; in 1798

Castlebar was held for a fortnight by the French general, Humbert; and in 1846-47 it suffered greatly from famine. Pop. 3,698.

CASTLEFORD, England, a thriving man¬

ufacturing town in the West Riding of York¬

shire, on the Aire, here crossed by a bridge, 10 miles southeast from Leeds. The public buildings include the church of All Saints, several denominational chapels, schools, a market-hall, mechanics' institute, *etc.* There are numerous collieries in the neighborhood ; and the town has extensive manufactures of glass bottles, earthenware and chemicals. Pop.

23,090.

CASTLEMAINE, Australia, a municipal

town in the state of Victoria, in the county of Talbot, at the junction of Barker and For¬

rest creeks, 78 miles northwest of Melbourne, on the Melbourne & Echuca Railroad. The town is pleasantly situated and well laid out, and the buildings, both public and private, are of a superior character. Castlemaine owes its importance to the mining industry carried on in its neighborhood, and it has a reputation as a resort for persons suffering from pulmonary complaints. Pop. 5,228, exclusive of aboriginals.

CASTLEMON, Harry. See Fosdick,

Charles Austin.

CASTLEREAGH, kas'el-ra, Robert Stew¬

art, Viscount, English statesman: b. 18 June 1769; d. 12 Aug. 1822. He was educated at Armagh and at Saint John's College, Cam¬

bridge. He entered the Irish Parliament in 1790, became Viscount Castlereagh (1796). He turned Tory in 1795 and next year became keeper of the privy seal, but he continued a steadfast supporter of Catholic emancipation.

Still, he believed that emancipation with an independent Irish Parliament would mean sim¬

ply a transference of tyranny from the Prot¬

estant oligarchy to a Catholic democracy; hence, as chief secretary from 1797, he bent his whole energies to forwarding Pitt's meas¬

ure of union. Transferred by the union from Dublin to Westminster, he accepted office in the Addington ministry (1802) as president of the

board of control; but the true second era in his career was as War Minister under Pitt from July 1805 to January 1806, and again under Portland from April 1807 to September 1809. His real greatness begins with March 1812, when, as Foreign Secretary under Lord Liverpool, he became the soul of the coalition against Napoleon, which, during the momentous campaigns of 1813-14, was kept together by him, and by him alone. He represented Eng¬

land at the congresses of Chatillon and Vienna in 1814-15, at the Treaty of Paris in 1815, at the Congress of Aix-la-Chapelle in 1818. As the leader of the Liverpool government in the lower house, he carried the suspension of the Habeas Corpus Act in 1817. ihe (<Six Acts® of 1819 made him extremely unpopular.

The retirement of Canning from the ministry (1820) threw the whole weight of business on Castlereagh. By the death of his father in 1821 he became Marquis of Londonderry. He was preparing to start for a congress at Verona, when, in a fit of insanity, he commit¬

ted suicide with a pen-knife at Foots Cray, his Kentish seat. Consult his (Memoirs and Correspondence) (12 vols., London 1848-53) and Hassall, Arthur, <Viscount Castlereagh>

(ib. 1908).

CASTLEREAGH, Ireland, a market-town

of Roscommon County; also a barony in the county of Down. The castle stands on the sum¬

mit of a Danish rath and was once the seat of an O'Neill. It is now the property of the Mar¬

quis of Devonshire. The barony gives the title of viscount to the Marquis of Londonderry.

CASTLES, Historic.. Of castles and

ruins of castles to be found to-day, perhaps the most interesting are

those of Germany. These (<Burgen,® whether of the feudal lords or of the <(Robber Knights,® on account of their rugged situation, protected by mountain fast¬

ness, forests and rivers, were peculiarly adapted to the feudal period, and their remains stand as representative of the best of that time.

And nowhere else has greater effort been made to preserve these relics of the Middle Ages, or to keep alive the history and romance with which they have been identified. The district having the greatest number of especial interest is that along the Rhine, from Coblenz to Bingen, where in the course of a five-hour trip by steamer 20 or more castles may be seen ; however, below Coblenz are a few notable castles, for instance, near Konigswinter stands above the mountainous terrace the ancient and famous castle of Drachenfels, or (<dragon's rock® (so called in reference to the dragon slain by Siegfried). It was erected by Arnold, archbishop of Cologne, in 1147 and bestowed by him as a fief on the Cassius Monastery at Bonn in 1149. The keep is one of the rare examples of pure ashlar work in the district of the Rhine. From 1176 on the castle was in the hands of the Burggraves of Drachenfels, whose race became extinct in 1530. The red wine grown on the southwest slope is known as <(Drachenblut® or dragon's blood. The castle of Ehrenbreitstein at the junction of the Mo¬

selle and the Rhine, just opposite the city of Coblenz, was an ancient stronghold of the Electors of Treves (Coblenz). It played an important part in the Thirty Years' War; it was taken by the French in 1799 after a gal¬

lant resistance. Since 1826 it has been a fortress.

One of the most imposing is the Castle of Stolzenfels — (<The Proud Rock® — near the village of Capellen. Built in 1250 by Arnold, archbishop of Treves, destroyed by the French in 1688, it remained in ruins until 1823, when the city of Coblenz purchased and presented it to the Prince Royal Frederick William IV, who at an expenditure of a quarter million dollars restored and furnished it (1836-42).

While greatly modernized, the original pentag¬

onal tower, 110 feet high, has been retained.

Also on the Rhine near the village of Ober-lahnstein is the Castle of Lahneck, with its pentagonal tower, of the 12th century. De¬

stroyed by the French in 1688, it was. restored during the last century. It is noted in litera¬

ture as being the inspiration of Goethe's (Geistes-Gruss) (1774). Commanding Brau-bach is the Castle of Marksburg, 490 feet above the river. It is the only ancient fortress on the Rhine that has escaped destruction. Built in 1437, it received its name from its chapel dedi¬

cated to Saint Mark; from 1479 to 1803 it belonged to Hesse-Darmstadt, in the latter year being turned into a state prison. Since 1900 it has been in the possession of the Society for the Preservation of German Castles, which has had it restored in 1 5th century style. Near the town of Saint Goar are the ruins of the Castle of Rheinfels, the most imposing and extensive on the Rhine. It was built in 1245 by Count Diether III of Katzenbogen, for the purpose of forcing payment of tribute for the right of navigating the river. The exactions of this robber knight becoming onerous, the neighbor¬

ing inhabitants rebelled and for 15 months be¬

sieged the castle in vain. The siege being raised, a league was formed to relieve navi¬

gators of the river from such tolls, as a result of which many of the Rhine castles were de¬

stroyed. Near Saint Goarshausen is the Castle of Reichenberg, built by Count Wilhelm I (1284), of Katzenbogen, rebuilt in 1319 and subsequently the residence of the governors during the Hessian supremacy.

For romantic interest the Castle of Schonburg is especially notable. Erected in the 12th century near the town of Oberwesel, it stands proudly to-day with its four towers. It was the birthplace of Frederick Hermann of Schonburg, who, as Marshal Schonburg, was killed at the battle of the Boyne in the wars of Wil¬

liam, Prince of Orange, against his father-in-law, James II of England. Innumerable

legends cluster about the castle, the best-known being of the seven

beautiful daughters of one of the Counts of Schonburg, who through their coquetry caused such havoc with their admirers that the Lorelei, the river fairy, to punish them, drowned the seven and turned them into rocks, which rocks are to-day pointed out by the boatmen during low water. Another is the Castle of Gutenfels, one of the most ancient on the Rhine. Built by the Knights of Falken-stein, it was sold, along with the little town of Caub, to the Palatinate in 1277. Its lofty, square-pinnacled tower still stands as originally built. Recently the castle has been restored.

The Pfalz, near Caub, is a splendid example of the 14th century castle, being well pre¬

served within and without. It has a pentagonal tower — a favorite form among the Rhine CASTLES

1, 3, Copyright by Underwood & Underwood, N. Y.

1 Windsor Castle, England 3 Arundel Castle 2 Castle at Coburg, Germany 4 Castle Heidelberg, Germany CASTLES

castles — and numerous turrets and jutting corners, loopholes and one entrance only, a door situated six feet above the rock and reached by a ladder. It was built on a ledge of rock in the middle of the Rhine by Louis the Bavarian for the purpose of exacting tolls from passing boatmen.

The Castle of Stahleck (12th century),

near the town of Bacharach, was formerly the residence of the Counts Palatine. Taken and retaken eight times during the Thirty Years'

W ar, it was finally destroyed by the French in 1689, but its picturesque ruins are of great interest to travelers. Near it are the ruins of the Castle of Nollich, 580 feet above the Rhine, the subject of

mail}’ a legend. Near the vil¬

lage of Rheindiebach is the Castle of Fiirsten-burg, also in ruins. It was here that in 1292, when Adolph of Nassau was on his way to be crowned at Aix-la-Chapelle, the garrison of the castle detained his vessel for the purpose of levying toll. It was destroyed by the French in 1689. The massive tower of the Castle of Heimburg (13th century), near Niederheim-bach ; the Castle of Nollich, near Lorch ; and Sooneck (a.d. 1010), with its slender tower, are interesting, as well as the Falkenburg —stronghold of the (<robber knights, ® and for this reason destroyed in 1252 by the Rhine League, but later restored and again destroyed in 1689.

An example of a castle entirely surrounded by water is the Mouse Tower, near Bingen, in the middle of the river. It was built in the 13th century by Archbishop Siegfried as a toll¬

house. It fell into ruins, was restored in 1856

and is now used as a signal station. The Castle of Klopp, at Bingen, stands upon the site of a former Roman fortification. It has been re¬

stored and is now the municipal seat of Bingen, and in it are preserved many of the antiquities of the Roman and Mediaeval periods. It was at this castle that Emperor Henry IV was seized by his treacherous son — afterward Henry V — on Christmas Day, 1105. Other castles of interest are Ehrenfels (ruined) and Rheinstein, the latter one of the oldest castles on the Rhine. In 1825 it was purchased by Prince Frederick of Prussia and has since been carefully restored, even to the interior furnish¬

ings. Its collection of mediaeval armor is notable.

The castle of Saarsbruck is a splendid ex¬

ample of the feudal castie, having all the ap¬

purtenances of mediaeval times. Located on the river Saar, the castle was until 1793 the residence of the family of Nassau-Saarbriicken, when it was destroyed by the French. Later it was restored in part and was used as a nunnery. While it is strongly fortified, many of the buildings are devoted to residential pur¬

poses. Being situated upon a height, its natural location is defensive. Its walls, with their towers and upper corridor, portholes, etc., are built for repelling attack from any quarter, and within is sufficient space to accommodate a large number of retainers or a garrison, with living accommodations superior to the ordinary castle. The court is divided into two wards, in addition to the divided garden plot, the last a later development. The donjon is the tower¬

ing structure at the upper corner, overlooking the valley and inaccessible from the outside.

In addition the wrall is plentifully supplied with watch and defensive towers. The lack of a moat is explained by the fact that the ground surrounding the castle slopes away in every direction. Another fine example of the mediae¬

val castle of . the “robber knights® is Castle Wildenstein. Its location on a high cliff over¬

looking the Danube River is an ideal one for protection against sudden attack. Such loca¬

tions were usual for the castles of the free¬

booters of the Middle Ages. The stone tower in the centre was connected by bridges that could be lifted or destroyed with the two castles on the cliff, and in case of siege, the knight and vassals, taking refuge in the one on the isolated cliff, were able indefinitely to withstand attack.

Other notable German castles are those of lower Bavaria planned and constructed by Lud¬

wig II, the Mad King. They are the castles of Neu-Schwanstein, Hohen-Schwangau, Linderhof and Herrenschiemsee. The Neu-Schwanstein is modern, its construction being begun in 1869 on the site of the old castle, Vonder-Hohen-Schwangau, on a precipitous

rock. Its style is Romanesque, and the great¬

est German architects of the day — « Hoffmann, Riedel and Von Dollmann — are responsible for its completion. Its fittings, while mod¬

ernized, are connected with the past, particu¬

larly in the mythological subjects known to us from Richard Wagner's operas, and events in the history and life of Louis XIV, King Lud¬

wig being particularly proud of both. Its tower rises to a height of 195 feet, from which there is to be had a splendid view of the Pollat River with its gorge and waterfall and the surrounding country. Schloss Hohen-Schwangau (12th century),- formerly called Schwanstein, was originally the seat of the house of Guelph; in 1191 it came into posses¬

sion of the Hohenstaufen Dukes of Swabia, and in 1567 passed to the Dukes of Bavaria.

Fallen into ruins, it was purchased in 1S32 by King Max II of Bavaria, who restored it, decorating the interior with frescoes depicting German legends. Later, King Ludwig made additions. Schloss Linderhof, erected by King Ludwig II (1869-78) in the rococo style, is notable for its unique furnishings and garden, particularly its grotto with a subterranean lake and swan-drawn boat, Moorish kiosque and the cascades. Schloss Herrenschiemsee (1878-85), near the ancient castle of the same name, is another of King Ludwig's creations, and in it also the motive is Louis XIV and Wagner. The decorations are sumptuous and many of the halls are notable. The Gallery of Mirrors, 245

feet long, is lighted with 35 lustres and 2,500

candles. One of the most novel features, how¬

ever, is its dining-hall with its table ascending and descending, so that no servant need be in the room.

Other notable German castles are Heidel¬

berg, an interesting ruin with rich decorations, the statue of Charlemagne and other sovereigns in particular. Built in the 12th century, it has been added to and improved at various times since, and in it are the remains of the best examples of the different styles of archi¬

tecture through which it has passed. Destroyed by the French (1689), it has since remained a ruin, but perhaps one of the most picturesque

to be found anywhere. The Heidelberg Tun, the castle cellar, is notable for its 800 hogs¬

heads of wine, and its general mediaeval ap-12

pearance. At Nuremberg are two famous

castles — Burgrafsburg and Kaiserburg, both of the 11th century. The former is the oldest building in the town. Its only remains is the Pentagonal Tower, wherein are kept relics of the antiquity of the city and castle. Its moat is still to be seen, as likewise its well, 338 feet deep. Kaiserburg, or the Imperial Castle, was formerly the residence of Fred¬

erick Barbarossa, who enlarged it. It has been added to from time to time, and is to-day in a state of splendid preservation, being greatly modernized during the last century. Its fur¬

nishings and decorations are magnificent, and at the same time representative of the age of the castle.

A famous castle in Alsace is the Hoh—

Konigsburg; it is built upon a ridge mentioned in a document of 774 as the “StophanberclF

(Staufenberg) ; was in the possession of the Hohenstaufen family about 1147 and was later held in fee by the Counts of Werd. In 1462

it was destroyed by the League of Rhenish Towns, but in 1479 it was rebuilt by the Counts of Thierstcin. From 1533 to 1606 it was held in pledge by the Lords of Sickingen, from whom it passed successively into the hands of the Lords of Bollweiler and the Counts Fug-ger (1617). In the Thirty Years’ War the cas¬

tle was destroyed by the Swedes (1633). To¬

ward the end of the 17th century it fell again into the hands of the Lords of Sickingen, who sold it in 1770. After various. other changes

of ownership it was acquired in 1865 by the town of Schlettstadt, which presented it to Em¬

peror William II in 1899. The Emperor caused it to be rebuilt (1901-08) at the expense of Alsace and the German empire from the plans of Bodo Ebbhardt, who restored it as far as possible to its appearance in the 1 5th century.

Its huge walls and towers of red sandstone, towering above the dark-green chestnut wood, are strikingly picturesque.

Beyond Colmar (Alsace) above the village of Egisheim stands the castle of Hohen-Egisheim or Dreien-Egisheim, with its three towers, viz., the Wahlenburg and Wekmund of the 11th century and Dagsbtirg of the 12th century, to¬

gether known as the ˆDrei-Exen.® In Egis¬

heim itself is the recently restored palace “Pfalz** that is said to date back to the 8th century.

Near Strassburg is the ancient Imperial fortress Trifels. It was founded as early as the 10th century, but the present scanty ruins date from about the middle of the 12th century. Tri¬

fels was not infrequently occupied by the Ger¬

man emperors. Its walls protected the un¬

happy Henry IV, when excommunicated by

Pope Gregory VII in 1076 and deserted by his nobles. It was here that Richard Cceur-de-Lion is said to have been confined for more than a year (1193-94) by the Emperor Henry VI, until his liberation was effected by the faithful Blondel. After the Thirty Years’ War the cas¬

tle fell to decay. The central tower, 33 feet in height, and the chapel have recently been re¬

stored. In cleaning the castle-well, the spring, cut in the rock, was discovered at a depth of 270 feet.

The Castle of Coburg (16th century) is a late-Gothic structure used as a fortress and later as an arsenal. At present it is a museum.

Its collections of arms and armor, woodcuts (200,000), paintings relating to German his¬

tory and natural history are notable. It was here that Martin Luther resided for a time (1530) and translated the Prophets and Psalms.

In connection with Luther, the picturesque Castle of Wartburg (12th century) at Eisen-bach is of interest. This castle was the centre of German letters and art for many genera¬

tions, and in early days it was the scene of contests in minstrelsy for all Germany. Here Luther sought asylum and found refuge

when he translated the greater part of the Bible. At Munich is the castle, a large group of buildings (1663-1728). It is in reality a palace, with beautiful grounds, conserva¬

tories, cascades, etc., and its decorations are of the best of the rococo period. It is the residence of the king, and its fittings are in regal magnificence ; as an instance, the curtains of the Bedchamber are of gold brocade valued at $400,000. Here also is the “Schatzkammer,**

or Treasure Chamber, containing the crown jewels and other priceless objects of historic interest.

At Wurzburg is the old Castle of Marien-berg (12th century), formerly the residence of the prince-bishops. It is a magnificent structure containing 285 apartments. Besides its Echter-Tor (1606) and Neu-Tor (1657), it has another tower, the “Alarm-Batterie**

commanding the city. Especially notable is its chapel, richly decorated in the florid style of Louis XIV. A later castle, or Royal Palace, built 1720-44, is one of the finest specimens of 18th century construction to be found, an ex¬

ample of the baroque style from designs by Neumann. Its size is 550 by 290 feet, and it contains 312 rooms, a chapel and a theatre, all uniformly decorated in keeping with the general purpose of the structure. In connec¬

tion with the palace is an orangery of great beauty. At Schwerin, the

Palace (1845-57) has been built on the site of a 12th century castle of the Princes of Mecklenburg, parts of the original structure, as rebuilt in the 15th and 16th century, being incorporated into the present building. It is an extensive structure with lofty towers, enclosing a pentagonal court.

Of its rooms, the Waffenhalle, Thronsalle and Gothic Chapel (1560-63) are especially notable.

At Dresden there is a famous castle, the Royal Palace, founded in 1530, and enlarged early in the 18th century, with extensive altera¬

tions during recent years. Its Grimes Tor is the highest structure in Dresden (331 feet).

The original staircase, towers at the four cor¬

ners and the gallery over the gate (1549-51) still stand. The Palace is a veritable museum of the history of art, particularly of the art of Dresden, famous as the centre of the por¬

celain industry, and the Green Vault, on the ground floor, contains one of the richest col¬

lections of the goldsmith's and other handi¬

craft of the Renaissance and later periods.

In Berlin, the castle, once the residence of the Kaiser, is representative of the medieval castle changed into a palace. The original castle was built by the Great Elector Frederick II (1443-51), was altered (1698-1716) and en¬

larged until to-day it is 650 feet in length by 380 in width. In the reign of William II it became the residence of the reigning sovereign.

Its decorations and appointments are in keep¬

ing with the purpose for which it is used. It CASTLES

IS

represents the work of two of Germany's greatest architects, Schliiter and von Goethe.

The western part is an imitation of the trium¬

phal arch of Septimius Severus at Rome. Other former royal seats at Berlin are the Palace of the Crown Prince, the Palace of Emperor Wil¬

helm I, the Palace of Prince Frederick Henry of Prussia, that of Prince Frederick Leopold, erected 1737, and the Palace of the Princesses, connected with that of the Crown Prince by an arch over Oberwall-Strasse.

At Potsdam, (<the Versailles of Prussia, w is the Palace of ˆSans-Souci,® erected by Knobelsdorff in 1745-47 for Frederick the Great. It is copied after the Palace of Ver¬

sailles. It was here that Frederick the Great spent the greater part of his life, the rooms and objects connected with his history remain¬

ing as he left them. In addition, Frederick built a New Palace (1763-69), a magnificent building with 200 rooms, once the summer resi¬

dence of William II.

Wherever one goes in Germany, he finds evidences of mediaeval life in the castles that served their day, are now ruins or intact as fortifications or adapted to residential or mu¬

seum and civic purposes. With few excep¬

tions, the public is admitted at stated times to these relics of the past, sometimes free, but generally for a small fee used for their upkeep.

In France, feudalism took deep root, and everywhere is evidence of its existence in the castles or their ruins to be found in every city and hamlet. Even later, when kingcraft had subdued the barons, these castles became fortresses in the civil and religious wars that disturbed

the country for three centuries, and later yet when the Crown of England was at¬

tempting to keep its hold on Normandy and France, and quarter was a thing unasked for.

As to their form, the castles of France were very similar to those of Germany, with the exception that, save in exceptional instances, the territory to be protected by them was wfithout the natural fastnesses and barriers of the territory adjacent to the German castles.

Architecturally they show more of the Roman and Byzantine influence. What is reputed to have been the greatest example of the mediae¬

val castle was the Castle of Coucy (1230-42) built by the Seigneurs of Coucy, near Soissons.

Guarding the castle and covering an area of more than 10,000 square yards, the donjon towered 210 feet above its walls, at the base being 34 feet thick. This castle was destroyed in 1916 by Germany in the European War. Sec¬

ond to it in France is the Castle of Vincennes, in the park of the same name, just outside the fortifications of Paris. Built originally in 1137

by Louis le Jeune, it was demolished by Philippe de Valois in 1333, and the present foundations were laid. It was built in a rect¬

angle, 1,200 by 672 feet, and flanked by nine square towers. It contained a donjon, a cita¬

del and a prison, notable for the prisoners that it has held — Mazarin, Diderot, Mirabeau, Henri IV, the Princes of Conde, Cardinal de Retz and others equally famous. In 1784, after the publication of Mirabeau's ((Essai sur les lettres de cadiet,® it ceased to be a state prison, and fell into decay after the Revolution.

In 1818, most of its old towers were torn down and the castle was turned into an arsenal. At present it is a fortification. The buttressed entrance tower and the donjon, repaired in part, still stand intact, the latter 115 feet high.

The donjon is isolated from the rest of the castle wall, with which it is

connected by drawbridges over a deep moat. It is in the middle of the court, has four towers, and stands four stories above ground, access from floor to floor being by spiral stairways in each of the towers. Its architecture is Gothic, the large central room (30 feet square) on each floor being vaulted, with a supporting column in the centre. Its walls are 17 feet in thick¬

ness.

Northwest of Paris, near Les Andelys, are the ruins of the Chateau Gaillard, built by Richard Coeur-de-Lion, and finished in one year. On a high cliff overlooking the Seine, it was erected to control the navigation of this river and to protect Normandy against the French monarchs. It was considered impreg¬

nable to military attack, but after a siege of Gx months by Philip Augustus starvation forced its defenders to capitulate. Lest it fall into the hands of a too powerful enemy, Henry IV in 1603 destroyed it with several other castles belonging to Norman barons. For its total demolition, however, 16 years were re¬

quired, and even to-day its ruins appear for¬

midable from the Seine. It is famous in art from a painting made by Turner. At Dieppe stands the Tour de Jeanne d'Arc, the remain¬

ing relic of the citadel in which the Maid of Orleans was tried and condemned. It was erected by Philip Augustus in 1204. The tower in which Jeanne d'Arc was imprisoned was demolished in 1809. At Dieppe also are ruins of two other castles, one the ˆCastle,® occupy¬

ing a commanding position on a precipitous cliff overlooking the sea, erected in 1433 as a defense against the English. Sixty-four years later it, with the entire town, was destroyed by the bombardment of the English fleet. The other is the Castle of Arques, famous as the scene of victory of Henri IV over the League in 1589. The Castle of Gaillon, erected in 1500 and destroyed during the Revolution, stands in the town of the same name, its partly destroyed ruins now used as a prison. In its day it was considered as one of the finest in Normandy, its architecture being of such excellence that the lofty facade has been re¬

moved and is now in the court of the Ecole des Beaux-Arts at Paris. This castle was erected by Pierre Fain, one of the greatest architects of

the 1 5th century, for the Cardinal d'Amboise, Minister of Louis XII, and a patron of the Renaissance in France, and is of mixed Gothic and Renaissance style.

At Provins stands the ruin of an ancient castle whose erection dates back to the con¬

quest of Gaul. It is known as the Grosse Tour de Cesar. While reputed to be of Roman origin, it has many evidences of origin in the Middle Ages. Its massive tower is square at the base, but as it rises it separates into four turrets, and the base at the height where they begin becomes octagonal. The turrets are con¬

nected by flying buttresses. This donjon, as such it originally was, has two curious rooms or dungeons evidently used for the confinement of military and state prisoners. The structure now serves as the bell tower of the neighboring church of Saint Quiriace, likewise a relic of the Middle Ages. Off the coast of Normandy

the Castle of Mont Saint Michel (q.v.) is a picturesque example of the mediaeval strong¬

hold. Situated on a lofty rock and surrounded entirely by water at high tide, it was almost impregnable, except for the fact that it had no fresh water, which itself was responsible for its surrender by its defender, Henry, to his brothers, William the Conqueror and Robert, in the year 1091.

Around the city of Paris are many famous castles, some in ruins, but the greater number restored or altered, as residences, museums, or municipal and state buildings. To the east on the Marne is the Chateau Thierry; to the northeast the Chateau de Villers Cotterets, with gabled roof and towers, situated in the beauti¬

ful forest of the same name ; the Chateau de Pierrefonds, a perfect example of the feudal stronghold, at one extreme of the Forest of

Compiegne, while another is the Chateau de Compiegne, modern, now a museum ; the Vieux Chateau de la Ferte, in ruins, with its five towers and gate still standing. Near Nanteuil-le-Haudouin is the old ruin Nantouillet sur les Fosses, and in the Forest of Ermenonville is the Chateau of the same name, Ermenon¬

ville, a square and a round tower with part of the wall yet remaining. To the north is the Chateau de Chantilly, a palace, and the Chateau de Mouchy. To the northwest is the ruin of the Chateau de Gisors, a famous castle during the wars between France and Normandy, and near the city of Paris the Chateau or Palace of Saint Germain, residence of the kings of France. To the west, the Chateau d'Anet, the portal of which, due to its chaste design, is preserved in the court of the Ecole des Beaux-Arts at Paris; and the "Donjon,® the massive remains of a mediaeval castle at Houdan, near which, at Boutigny, is La Vieille Porte feodale, the gateway to another castle of the same age.

At Montfort is the Porte Bardou, a fragment of mediaeval fortification, and in the Forest of Rambouillet, southwest of Paris, is the donjon of the original Chateau de Rambouillet, with later additions, south of which is the Chateau de M,aintenon, a palace, and further to the south, near Auneau, a single corner of an old castle known as "Lpaule de Gallardon.® Like¬

wise, to the southwest of Paris is the Chateau de Versailles, now a state museum, the magnifi¬

cent palace of French royalty, and the scene of many of the most notable events in French history, particularly the Revolution. (See article on Parks). To the south of Versailles is the mediaeval Chateau de la Madeleine, with donjon and a few other parts intact. South of Paris is the Chateau and Tour de Montlhery, in ruins, and to the southeast, the famous chateau and Forests of Fontainebleau, noted as the country residence of French royalty, and one of the showplaces of France to-day.

In Italy, with the exception of the northern part, the feudal system did not have the hold that it had in western Europe, and such castles as it possessed were rather of the paternal or family type, and the castles to be found differ likewise from those !here de¬

scribed. Such seats as were depended on for protection were usually

the palaces of former Roman governors, built with a view to guard against the depredations of the Goths, Huns and Vandals from the north.

Spain in many ways is looked upon, particu¬

larly for romantic reasons, as the country of castles. “Castles in Spain® bring to the imag¬

ination feudalism and chivalry. Castile, one of the most important provinces, means

“castle,® and throughout its whole extent are numberless ruins of Moorish and Gothic feudal fortifications. The Spanish castle differs ap¬

preciably from those of the northern countries, in that it was an appendage of the religious wars that were waged for centuries between Moor and Christian, and wherever a castle is found, there also is a cathedral or chapel or mosque. The Arab word for castle — Alcazar or Alcazaba — is found throughout the Iberian Peninsula, often as the denomination of the most important of the Moorish remains. The Alhambra, in part, was a castle, and here the Chalifs of Granada fortified themselves and founded a civilization of which the remains, yet visible, are a credit to Oriental culture.

At Cordoba is the Alcazar, a famous sight to-day, and at Gibraltar, in the year 725 a.d., the Moors had a castle, the remains of which are still to be seen. The Alcazar of Alfonso the Learned, at Segovia, is a striking example of the combination of Moorish and Gothic architecture, a structure buttressed and turretted, with a square donjon in the centre, which was also buttressed and turretted, like a citadel.

The city of Burgos, Spain, takes its name from the word “Burg,® it being erected by the “German son-in-law® of Diego Porcilos, in the 9th century.

In the British Isles there are evidences of castles or rude fortifications dating from the days of the Roman conquest. It is, however, from the

days of William the Conqueror that the castle as we know it took its rise, as this monarch, familiar with feudal and state forti¬

fications on the Continent, found such of the greatest utility in maintaining Norman suprem¬

acy over the English barons. As to the archi¬

tecture of British castles, they combined all styles used on the Continent with a purely English form that differentiates them from others. But the principles of fortification were the same.

On the eastern limits of the town of Dover there stands to-day the Castle, the modern fortification standing on the site of the original Dover Castle, the “Key to England.® The remains of the original, altered by the vicissi¬

tudes of time and civil and foreign wars, have been incorporated in the present fortress.

Within sight of Calais, the nearest and most formidable foreign enemy, it was constructed on a hill 320 feet high, and was fitted to with¬

stand long sieges, the necessity for which was frequently . proved. At York, one of the most ancient cities in the kingdom, and the reputed birthplace of the Emperor Constantine, there are many relics of the Roman occupation of England, the most interesting being the Mult¬

angular Tower. This tower is 30 feet in diam¬

eter in the interior, and was originally of a 13-sided form, 10 of the 13 walls still remain¬

ing. Of the remains of the Middle Ages, the castle still stands, and within its walls are at present the law courts and jail. The donjon, known as Clifford’s Tower, is intact. Of other remains of the feudal days are portions of the ancient walls, beyond which the city has ex¬

tended. The gates, known as “bars,® are an interesting feature found in many English CASTLES

cities. They are usually towered and em¬

battled, with portholes, and locations on the streets that they cross are usually spoken of as below or above the bar. Other castles are found in the neighborhood of York, among them being Pontefract Castle, where Richard II was murdered, and Conisborough Castle, near Doncaster. At Durham is the ancient Norman Castle founded by William the Con¬

queror, and now in possession of the university.

Near Newcastle-on-Tyne is Alnwick Castle (11th century), occupied continuously from the 14th century by the Percy family. Formerly an important border fortress, it is noted in England as being one of the finest examples of feudal dwellings in the kingdom, and with modern restorations it is in a perfect state of preservation. It covers five acres of ground.

Malcolm, King of Scotland, and his son, Prince Edward, were killed here in 1094, and in 1174, while besieging the castle, William the Lion was taken prisoner. Near Alnwick Castle is the ruin of Warkworth Castle, and a few miles away on the sea shore is the recently restored Bamborough Castle, standing on a rock 150 feet high. It was a Saxon fortress, built in the 7th century. Near it is the ruined Castle of Lindisfarne, referred to by Sir Walter Scott in <Marmion.)

At Rochester on the river Medway is the ruins of one of the finest castles in England.

The walls and the donjon are in almost per¬

fect condition. At the town of Newport is the ruins of Carisbrook Castle, the donjon of which is supposed to have been a Saxon strong¬

hold. The tower, ivy covered, reaches high above the rest of the structure. The outer walls of the castle enclosed about 20 acres.

The ancient well, 240 feet deep, is still in use.

It was here that Charles I was a prisoner in 1647. At Kenilworth is a

noted castle, made famous by Sir Walter Scott. The ruins are extensive and picturesque. It was the strong¬

hold of Simon de Montfort, Earl of Leicester, and the insurgent barons during the reign of Henry III, and was likewise the abode of Robert Dudley, the favorite of Queen Eliza¬

beth. Its donjon is known as Caesar's Tower, and is the most ancient portion of the castle.

Its walls in places are 16 feet thick. The remains of the banquet hall, 86 by 45 feet, are still to be seen. Near the borough of Grantham is Belvoir Castle, the magnificent manor house of the Duke of Rutland, with one of the best collections of paintings in the kingdom, and furnishings of ducal splendor.

At Rochester is the remains of a castle notable in English history, the keep still standing, 104

feet high. At Norwich is a castle architectur¬

ally known for its ornately designed arches.

The castle in which Edward II was murdered is still seen at Berkeley, occupied by the de¬

scendants of the family that then possessed it.

Of all the castles in England none is better known than that of Windsor, typical in its magnificence of the feudal stronghold, and to¬

day the residence of the royal family. On a height overlooking the Thames, it commands a great stretch of territory. It has 13 towers, and within its walls are two rectangular wards, the lower and upper. The keep is in the centre.

It has many sumptuously decorated and fur¬

nished halls and rooms, in keeping with its regal uses, and one octagon room, 38 feet in diameter. It is surrounded by a large park.

Historically, however, no English castle is better known than the Tower of London.

Erected on the site of a Roman fortress, the Tower as it exists to-day

was originated by William the Conqueror (1078). At first a stronghold and palace, it is best known as a prison. It is at present a fortress, a museum, and depository of the Crown jewels. It over¬

looks the Thames, a moat being between the river and the castle. The most conspicuous part is the White Tower, or donjon, in the centre, having four entrances, the Iron, Water, Traitor's and Lion's Gates, the last the prin¬

cipal one. Other towers are the Bell Tower and Bloody Tower. The walls of the towers are from 13 to 15 feet in thickness, and are sur¬

mounted by turrets at the angles. The chapel is considered one of the finest examples of Norman architecture in the kingdom. In the inner ward are 12 smaller towers, all of which have been used as prisons, mostly for state prisoners, among whom were Queen Mary,

Princess Elizabeth, Sir Walter Raleigh, Lord Dudley, Henry VI and the Earl of Warwick.

Wales, Ireland and Scotland, likewise, have their castles, resembling those of England, with the exception that they were clan strongholds rather than feudal residences. Near Cardiff, Wales, are the remains of four famous castles — Caerphilly, Neath, Swansea and Oyster-mouth. Of these, Caerphilly in size and gran¬

deur — judging from its ruins — is the greatest of all. In Ireland, the most famous to-day is Blarney Castle, near the city of Cork. It is now a picturesque ruin. It was erected in 1449 by Cormac M'Carthy. Its chief feature is its embattled square tower. It is visited by thousands of tourists on account of its world-renowned (<Blarney Stone,® a small stone on the highest point of its northern turret, which is supposed to give those that kiss it the power of fluent and witty speech. In Scotland, the best known is Edinburgh Cas¬

tle, the immense fortress overlooking the city of Edinburgh. The fortress as it stands to-day is on the spot of an ancient castle erected before the first records of Scottish history. It has one entrance, across a draw¬

bridge through a portcullis, above which is the old state prison. Within is a Norman chapel built by Queen Margaret (11th century), and restored in 1853. The castle was formerly a palace of the Scottish kings, but to-day is an object of antiquarian interest, aside from its

military uses. Among the relics in its collec¬

tions is (<Mons Meg,® one of the earliest ex¬

amples of cannon, cannon such as were used to batter down the castles of the feudal barons.

It is 13 feet long, 20 inches in diameter, and weighs five tons. It is formed of long strips of iron, held together by hoops. Of as much interest, but less known, is the Castle Dunie, the seat of Lord Lovat, perhaps the last example of a castle being used for feudal purposes. In 1740 mediaeval service was still required of the retainers of this eccentric Lord, who lived in one room, her Ladyship in another and the servants — of whom there were many — below in a covered court with straw for beds. (See also Castle). Consult Piper, Otto, ˆurgenkunde* (Munich 1895) ; Eberhardt,

Bodo, < Deutsche Burgen) (Berlin 1908) ; Clark, (Medieval Military Architecture > (Lon-16

don 1884) ; Larned, (Churches and Castles of Medieval France } (New York 1895).

Frank Koester,

Author of (Modern City Planning and Main¬

tenance.)

CASTLETON, England, a village in the

County of Derby, 10 miles northeast of Bux¬

ton, situated at the bottom of a rugged emi¬

nence, on which stands the ancient castle called Peak Castle, erected by William Peveril, nat¬

ural son of the Conqueror. The houses are chiefly of stone. It contains the parish church of Saint Edmund, a fine specimen of the early pointed style and the vestry of which con¬

tains a valuable library. The inhabitants are mostly employed in mining ; but many derive a subsistence from the manufacture of orna¬

mental articles from spar. The Castle of the Peak is celebrated in Scott's novel, (Peveril of the Peakˆ Pop. 581.

CASTLETOWN, Great Britain, a seaport

and former capital of the Isle of Man, on Castletown Bay, 10 miles southwest of Douglas.

Castle Rushen, now a prison, occupies the site of a Danish fortress of the 10th century, which was almost wholly demolished by Robert Bruce in 1313. The grounds of Rushen Abbey (11th century), near the station, are now market gardens. Near by is the small building where the House of Keys assembled for about 170

years. Castletown was the seat of government of the Isle of Man from the 6th to the middle of the 19th century. Brewing, tanning and lime-burning are carried on. Near Castle¬

town is King William's College, an Elizabethan pile, rebuilt after the fire of 1844. Pop. 1,817.

CASTOR, or CASTOREUM, an odorous

substance obtained from two glandular sacs connected with the sexual organs in both sexes of the beaver. In past years it was utilized for medical purposes, especially as a remedy in diseases of the uterus, and in the case of cata¬

lepsy, hysteria and other spasmodic diseases.

What little now reaches market is used an an ingredient of perfumes, but most of it is kept by northern trappers as a scent for baiting their traps, and is known as barkstone.

CASTOR OIL (Oleum ricini) , the fixed oil expressed from the seeds of Ricinus com¬

munis, of the family Euphorhiacece. The oil is obtained from the seeds by various processes.

The seeds are sometimes boiled and the oil skimmed from the water, or the oil may be taken up by solvents, such as alcohol, ether, *etc.*

In the large manufacturing pharmacy houses in the United States the seeds are first warmed slightly and then passed between rollers, or other forms of pressure apparatus. The oil is collected and decanted, or mixed with boiling water and purified. The average yield of high-grade oil is from 40 to 50 per cent in weight.

Care must be exercised in the amount of heat¬

ing of the seeds, else a very active and acrid tox-albumin, ricin, which is present in the seed coat, is added to the oil. This tends to render the oil very griping in its action. Unscrupulous manufacturers have been known to add small quantities of ricin to adulterated oil. Seconds, or sorts, are inferior qualities of oil.

When fresh and pure castor oil should be a clear, colorless, viscid oil, with a faint, mild odor, a bland and unpleasant taste. Its specific gravity should be .950-.970 at 60° F. It should be soluble in equal parts of alcohol, in all pro-1

portions of absolute alcohol, or in glacial acetic acid, and tested to exclude other mixed oils ; is soluble at 60° F. in three times its volume of a mixture of 19 parts of alcohol and one part of water. This test will detect an admixture of over 5 per cent of other oils. Castor oil con¬

geals at 15° F. The chemical structure shows castor oil to be composed almost entirely of ricinoleic acid, C1SH34O3. It also contains palmitin, stearin, myristin and an acid prin¬

ciple. This is broken up in the intestines by saponification, and sets free the active agent of the drug's action. Castor oil is a reli¬

able cathartic. It empties the bowel com¬

pletely, largely by its stimulating intestinal peristalsis, and is probably the best cathartic for children with overloaded intestines. In intestinal fermentation and putrefaction ac¬

companied by diarrhoea, it is excellent. It causes a number of loose, not very watery movements, attended with mild griping. There is a tendency to constipation following its use ; hence, it is not of service in habitual consti¬

pation. As it is extremely disagreeable for many, its taste may be disguised by orange peel, or best in some aromatic frothy or carbonated mixture, as in coffee, soda water, or in gelatin capsule form. From a teaspoonful to a table¬

spoonful is the usual dose.

CASTOR-OIL PLANT, CASTOR—

BEAN, or PALMA CHRISTI, a tropical

herb (Ricinus communis) of the family

Euphorhiacece, a native of Africa and Asia, whence it has become distributed in warm countries throughout the world. In cool cli¬

mates it is a half-hardy annual, but in frostless regions it is a perennial, often becoming a small tree. Its large palmate leaves, sometimes more than two feet in diameter, and its green or red stems, which in the central United States may attain a height of 12 feet, and in the tropics 30 or 40 feet, are very striking in flower borders and clumps of shrubbery. The unisexual flowers are borne in terminal racemes, and the female ones are succeeded by three-celled spiny capsules which explode when the seed is ripe, throwing the seed to a considerable distance. The seeds have long been employed for making castor oil, which is used for lubri¬

cating, for making sticky fly-paper and in medicine. About half the demand of the Amer¬

ican market is met by the crops grown in Kan¬

sas, Missouri, Oklahoma and adjacent territory, but since the

introduction of petroleum products the oil has a smaller use as a lubricant than formerly, and since the importation of various palm oils its use in soapmaking has declined.

It is also less popular as a medicine than it used to be. The crop is not considered a pay¬

ing one. Castor-oil pomace (the oil cake after the oil has been extracted) is a highly valuable nitrogenous fertilizer.

CASTOR AND POLLUX (the latter

called by the Greeks Polydeuces), the sons of Tyndareus, King of Lacedaemon, and Leda, or, according to some, of Zeus and Leda. The fable runs that Leda to whom the god came in the form of a swan brought forth two eggs, one of which contained Pollux ajid Helen, the other Castor and Clytemnestra. Pollux and Helen, being the offspring of Zeus, were immortal ; but Castor and Clytemnestra were

begotten by Tyndareus, and mortal. Homer's account is that both Castor and Pollux were the sons of Tyndareus, and that Helen was the daughter of Zeus. The two brothers were inseparable companions, equally brave and spirited, and attached to each other with the fondest affection. Castor was particularly skilled in the art of breaking horses, and Pol¬

lux in boxing and wrestling. They were among the heroes of the Argonautic expedition, in which they acquired divine honors ; for a terrible tempest having arisen on the voyage, and all with loud voices calling on the gods to save them, there suddenly appeared over the heads of Castor and Pollux two star-like me¬

teors, and the tempest subsided. From this time they were the patron deities of mariners, and received the name of Dioscuri (((sons of Zeus®) ; and from them the name of Castor and Pollux was given to the fires that are often seen on the masts of vessels in storms, and which are electrical phenomena. After their return they released their

sister Helen from the confinement in which Theseus had for some time held her. They were also among the he¬

roes of the Calydonian hunt. They wooed the daughters of Leucippus, Phoebe and Hilaeira or Elaeira, and carried them off and married them.

Having become involved in a quarrel with Idas and Lynceus, the sons of Aphareus, Castor killed Lynceus, and was slain by Idas. Pollux • revenged his brother's death by killing Idas, but full of grief for the loss of Castor, he besought Zeus either to take away his life or grant that his brother might share his immor¬

tality. Zeus listened to his request, and Pollux and his brother alternately resided one day on earth and the other in the heavenly abodes of the gods. It is doubtful whether the an¬

cients understood them as being together or separate in their alternate passage between the upper and lower worlds. The former opinion seems to be the older ; the latter to have gained ground subsequently. Temples and altars were consecrated to them. In great perils, especially in battles, the ancients believed that they fre¬

quently appeared to mortals as two youths on white steeds, in shining garments, with meteors over, their heads. They were also represented side by side, either riding or standing, each holding a horse by the rein, with spears in their hands and stars on their heads. Rome accorded them special homage because of their supposed assistance at the battle of Lake Regillus. In the heavens the Dioscuri appear as one of the 12 constellations of the zodiac, with the name of Gemini (the Twdns). Con¬

sult Albert, (Le culte de Castor et Pollux en Italie) (1883) ; Paton, (De Cultu Dioscurorum apud Grsecos) (Bonn 1894).

CASTORIDZE. See Beaver.

CASTOROIDES, a gigantic, extinct,

beaver-like rodent of the Pleistocene Epoch in North America. It was nearly as large as a black bear, and inhabited the cold, swampy, evergreen forests of the north, its remains be¬

ing found chiefly in peat-bogs along with bones of the mastodon.

CASTRAMETATION. The art of lay¬

ing out camps and of placing the troops so that the different arms shall afford support to each other in the best manner. No definite rules can be laid down, but the proper exercise of the vol. 6 — 2

art of encamping is so to place the troops that they can quickly form line of battle on the position they are to occupy. In the presence of the enemy the troops bivouac in line of battle; if safety permits, the tents may be pitched im¬

mediately in rear of the line of stacks, the tents of the company officers in rear of their com¬

panies/the tents of the Field and Staff in rear of the centre of the line of company officers. When not in the presence of the enemy, each bat¬

talion usually camps in column of divisions.

The tents of each division are arranged in two lines facing each other; those of the right company face to the rear; those of the left company face to the front. The company officers' tents are arranged in line parallel to the flank of the column, facing the division-streets; the tent of the captain of the right company of each division is to the right (or left) of the line passing through the centre of the street, according as the officers are on the right (or left) flank of the column; his lieu¬

tenants are on his right (or left) ; the captain of the left company is on the left (or right) of the captain of the right company, the lieuten¬

ants of his company on his left (or right). The first sergeant's tent is on the flank of the com¬

pany toward the officers' tents. The tents of the Field and Staff, when practicable, are in line parallel to those of the company officers, the colonel is opposite the centre of the column, lieutenant-colonel and major are on his right, the adjutant is on the left of the colonel; the other staff officers are on the left of the adjutant. The tents of the non-commissioned staff are in rear of the tents of the staff ; they may be

assigned to tents in the divisions.

The kitchens of the men are in line on the flank opposite the company officers ; the sinks for the men are outside of the line of kitchens.

The kitchens of the officers are in rear of their tents, the sinks for the officers are in rear of the line of tents of the Field and Staff. The positions of the color-line, guard-tents, sutlers'

store, officers' horses and baggage wagons are prescribed by the colonel. The width of the division-streets, and the streets in front of the company officers, varies with the nature of the ground and the strength of the battalion.

When the companies are large, the camp may be formed according to the above principles, in column of companies, the tents of each com¬

pany being in one line, or in two lines facing each other.

A battalion of cavalry being in line with the usual intervals, to encamp, the men dismount, and, without forming rank, unsaddle and place their arms and equipments in line 10 yards in front of the horses; the blanket is placed on the equipment, moist side up. The picket-line is stretched between posts about six feet high, or is stretched on the ground, the ends being firmly secured ; the horses are tied to the picket¬

line by the halter at intervals of a yard; if the picket-line be on the ground, they may be fastened to it by a strap about two and a half feet long, the strap being provided with a collar which is buckled around the pastern of the left fore-foot. The tents of the men are pitched in line about 15 yards in front of the picket-line, the intervals between companies being left free; the tent of the first sergeant is on the right; the arms and equipments are kept in the tents of the men. The kitchens ©f 18

CASTRATION

the men are in line in front of their tents; the sinks in front of the line of kitchens. The tents of the company officers are in line about 30 yards in rear of their tents.

When artillery camp, the pieces and caissons are parked at 14 yards interval. The harness of the team of each carriage is on a rack on the right, and close to the carriage, so that the paulin can cover the harness. Horse equip¬

ments are kept on the racks or in the tents.

The picket-line is 15 yards in rear of the cais¬

sons ; it is stretched between posts about six feet high, the ends being firmly secured; the horses are tied to the picket-line by the halter at intervals of a yard. The men's tents are pitched in line about 30 yards in rear of the picket¬

line ; the first sergeant's tent covers the car¬

riages of the right section; the left guard-tent covers the carriages of the left section; the tents of each section are in the order of their pieces in park, and are closed on the centre, or to the right, so as to have a vacant space be¬

tween the guard-tents and the tents of the left section. The men's kitchens are in line 10 yards in rear of the guard-tents, which may be faced to the right so that No. 1 can overlook the kitchen. The officers' tents are in line 30 yards in rear of the battery-tents; the captain's tent is on the right, covering that of the first sergeant. The officers' kitchens are 10 yards in the rear of the officers' tents ; the battery wagon covers the captain's tent ; the forge covers the left guard-tent. The sinks are 50

yards in rear of the wagons; the officers' sink on the right, the men's sink on the left.

The preceding order may be modified if cir¬

cumstances require it. The battery wagon and baggage wagons may be in line with the pieces, the interval between the battery wagon and nearest piece being 14 yards, that between the battery wagon and left

baggage wagon about 30 yards; the guard-tents half-way between the battery wagon and baggage wagons, facing to the rear; the forage pine between the guard-tents and the baggage wagons, the forge in line with the caissons and covering the right bag¬

gage wagon, the men's kitchens in line with the caissons, and covering the left baggage wagon, the officers' tents on a line perpendicular to the men's tents, facing them, and on the prolonga¬

tion of one of the baggage wagons ; the officers'

kitchen in rear of the officers' tents, and on the prolongation of the forge. In a horse battery, if but one picket-line be used, it may be turned equally to the front around the flanks of the park; the battery wagon, forge and baggage wagons may be divided equally and placed on the flanks of the men's tents, facing inward, and so as to be on the prolongation of the bent portions of the picket-line. The picket-line may also be in one straight line, in which case the baggage wagons should be equally divided upon lines to the rear of its extremities. The horses are sometimes picketed in two lines, in which case the second line is 14 yards, in rear of the first, and the wagons are placed in line 30 yards in rear of the men's tents. See Camp.

CASTRATION, the removal of the testi¬

cles or ovaries of animals. Castration is usually performed to limit reproduction, to change the character of the working animal, making him more docile and easier to train, or to improve the quality of meat for eating, as in capons. In human beings castration is a sur¬

gical procedure and is usually performed for the relief of some irremediable or malignant disease. Thus in tuberculosis and cancer of the testicles, and in malignant or painful disease of the ovaries, the operation is justifiable. There has been a large amount of needless removal of the ovaries in women. The after results are often more annoying than the original disease.

The change produced in men by emascula¬

tion is highly remarkable, giving rise to physi¬

cal and psychical alterations nearer the female type. The elasticity of

the fibres and muscles is weakened, and the subcutaneous tissues be¬

come filled with a much larger quantity of fat; the growth of the beard is prevented ; the upper part of the windpipe contracts considerably, and the castrate acquires the physiognomy and voice of a female. The most numerous class of castrates are those who are made such by the removal of the testicles. Another class are not deprived of the parts of generation, but have them ingeniously injured in such a manner as to leave them the faculty of copulating, but deprive them of the power of begetting.

Juvenal mentions these as the particular favor¬

ites of the licentious Roman ladies. To the third class belong those who are entirely de¬

prived of their genital members. They are used in preference, by the Turks, as keepers of their women. The castrates of all three classes are called eunuchs. Those of the third class, to distinguish them from the two others, are frequently termed entire eunuchs. The word eunuch is Greek, and signifies “guard® or <(keeper of the bed.® The castration of adults produces some change in the disposition, but little in the bodily constitution. According to the accounts of ancient historians, the Lydians, celebrated for effeminacy, castrated women.

The latter are said to have used these beings as guards of their wives and daughters. With females the operation produces a completely opposite effect to that which it has on men.

The character changes, a beard appears on the chin and upper lip, the breasts vanish, the voice becomes harsh, *etc.* Boerhaave and Pott relate mediaeval instances of this kind. Among the evils which religious fanaticism has at all times produced, castration is conspicuous. The Emperors Constantine and Justinian were

obliged to use their utmost power to oppose this religious frenzy, and could put a stop to it only by punishing it like murder. The Valer¬

ians, a religious sect whose minds had been distracted by the example of Origen, not only considered this mutilation of themselves a duty which religion imposed on them, but believed themselves bound to perform the same, by fair means or foul, on all those who came into their power. In Italy the castration of boys, in order to form them for soprano singers, was in use for a long time. Clement XIV prohibited this abuse, which, notwithstanding, did not cease till comparatively recent times, and in some Italian towns was not only suffered but

exer¬

cised with such shameful openness that the practitioners gave public notice of their pro¬

fession. In modern times severe laws were enacted against castration, and the custom is probably now extinct. Beings thus mutilated were common on the European stage. It is remarkable that so odious and unnatural an CASTRO N — CASTRO

operation should produce the fine effect on the tones of the singer, which all had to acknowl¬

edge notwithstanding the disagreeable effect of the association.

CASTREN, kas-tran', Matthias Alexan¬

der, Finnish philologist: b. Tervola, 2 Dec.

1813 ; d. Helsingfors, 7 May 1852. While at¬

tending, as a young man, the University of Hel¬

singfors he conceived the project of tracing out the various detached branches of the Finnish races and languages, and presenting their ethnological and philological phenomena in one general view. Following out this idea he under¬

took in 1838 a pedestrian excursion through Finnish Lapland, and another in 1840 through the district of Karelia, with the view of study¬

ing the primitive language of that country, and enabling himself to translate therefrom into Swedish the great Finnish epic of the Uvale-valaP This last work was accomplished by him after his return. He soon, however, re¬

sumed his travels, and for several years con¬

tinued to prosecute his researches among the nations of the Arctic regions, both in Europe and Asia, including the Norwegian and Russian Lapps, and the Samoyeds of Siberia and the coasts of the White Sea. Naturally of a weakly constitution, and in a failing state of health, he was frequently obliged in addition to submit in the course of his journeys to the most extreme privations. Having returned home from his last journey to the Samoyeds, he was appointed in 1851 professor of the Finnish and old Scandinavian languages in the University of Helsingfors, but died before he had been able to add much more to his work — a martyr to the cause of science. Among his writings are his translation of. the (Kalevala) ; (Elementa Grammaticae Syrjsenae) ; (Elementa Gram¬

matics Tscheremissae) ; and (De Affixis Per-sonalibus Linguarum AltaicarunP ; besides travels and other works published after his death. His works were edited in Swedish (in 5 vols., 1852-58) and were supplemented in 1870

by another volume containing a biography by I. V. Snellman. A German translation was published between 1853 and 1862, under the auspices of the Academy of Saint Petersburg, by Anton Schiefner. They include, besides the works enumerated, grammars of the Samoyed, Buryat, Tungus, Koibalic languages.

CASTRES, kastr, a town of southwest

France (ancient Castrum Albiensum) in the department of Tarn, 46 miles east of Toulouse, on the Agout, which divides it into two parts —Castres Proper, north side, and Villegoudon, south side of the river. The public buildings include the hotel de ville, formerly the epis¬

copal palace, which contains a public library, and has a garden laid out on the plan of the Tuileries; cavalry barracks, *etc.* The manufac¬

tures consist of fine cloths, coarse cloth for the troops, flannels, blankets and other woolen goods, linen, glue and black soap. There are also bleaching-grounds, dyeworks, tanneries, paper-mills, forges, brass-foundries and earthen¬

ware works. Trade is also carried on in silk, cotton, liqueurs and confectionery. Castres has a communal college and two seminaries. The town arose round an abbey of the Benedictines (which is said to have been founded in the 7th century), and was already in the 12th century a place of importance. During the religious wars of the 16th

century, in which its inhabit¬

ants espoused the Protestant cause, Castres was the scene of many conflicts. Louis XIII, to whom the town surrendered in 1629, ordered its fortifications to be razed to the ground. Pop.

27,830.

CASTRIES, kas'tre', Charles Eugene

Gabriel de la Croix, Marquis of, French soldier: b. 27 Feb. 1727; d. Wolfenbiittel, 11

Jan. 1801. He entered the army, fought at Dettingen and in lower Alsace, became lieu¬

tenant of Languedoc and governor of Mont¬

pellier and Cette, and under Marshal Saxe com¬

manded the army in Flanders, where he covered the sieges of Menin, Ypres and Courtray, and ended the campaign with the battle of Courtray.

He afterward fought at Fontenoy, Raocoux and Laufeld. During the Seven Years' War he added greatly to his fame, was made lieutenant-general and was dangerously wounded in the battle of Rossbach. In 1783 he was marshal of France, and emigrating in 1791 found an asylum with the Duke of Brunswick. He sub¬

sequently commanded the army of the French princes in Champagne, and countersigned the manifesto issued by Monsieur in 1793. In 1797

he formed, in conjunction with Saint Priest, the so-called cabinet of Louis XVIII, at Blank-enburg.

CASTRO, kas'tro, Agustin, Mexican

poet: b. Cordova, Vera Cruz, 24 Jan. 1728; d.

Bologna, Italy, 1790. He became a Jesuit priest and a teacher of philosophy, and was a skilful translator of classical authors. Among his original works in poetry are (Hernan Cortez) and (Charts,) a

guide for young poetic genius.

His versions of Sappho, Euripides, Horace, Seneca, Milton and Fenelon have received high praise from scholars. See Mexico,

Literature.

CASTRO, Cipriano, Venezuelan military

leader: b. Capacho, Venezuela, near the frontier of Colombia, about 1855. His parents were Spanish mestizos of the peasant class. He at¬

tended school in Capacho. While still a very young man he took an active part in politics in Capacho, as a Liberal. His first military ex¬

ploit consisted in scoring a moderate success in the so-called (<Battle of Capacho® (1886) against Morales, the local representative of the Lopez government. He remained a leader of the Lib¬

eral party in his state until 1892. In that year began Crespo's rebellion against Andueza. Cas¬

tro, supporting Andueza's cause, was victorious in the battle of 15 May 1892, in Tariba, defeat¬

ing Morales who now was under Crespo's com¬

mand. In Caracas, however, the insurgents tri¬

umphed. Crespo entered the capital 6 Oct.

1892. Castro remained in control of Tachira and Merida, but before the end of the year withdrew across the Colombian frontier and bought a farm near Cucuta in the department of Santander. For the next six or seven years he was a farmer and cattle-raiser. Invited by Crespo to take office as head of the custom¬

house at Puerto Cabello, he declined this offer, but promised Crespo not to join his enemies or attack his government. Andrade was Crespo's successor. Castro went to Caracas and called on the new President. Accounts of this visit differ. Castro's partisans assert that he again refused the tender of an office under the gov¬

ernment; according to another version he was 30

insulted, and left the Yellow House vowing vengeance. When he returned to his home some political friends and relations of Andrade's who lived in Cucuta procured from the

Colombian government an order for his arrest.

For about two months he was in hiding; then he invaded Venezuela with only 60 men (23

May 1899). His old followers in Tachira join¬

ing him, in three days he collected a force of 1,500. The first skirmish was in the country between San Cristobal and Rubio. In Las Pilas the commander of the government's fron¬

tier troops fell. At Zumbador about 2,000 men led by Morales were defeated. Castro laid siege to San Cristobal, where Penalosa was strongly entrenched. About 6,000 men under Hernandez were sent against him from Caracas. An inde¬

cisive engagement occurred. Then Castro left Hernandez in the rear, and marched toward the capital, defeating several government forces on the way. Andrade having fled the country, Castro entered the capital, opened the prison in which Hernandez had been confined for many months, and declared himself <(jefe supremo®

— ■ neither President nor dictator but ((supreme military leader.® The Constituent Assembly made him provisional President of Venezuela, 30 March 1901, and on 20 Feb. 1902 he was elected President for the term of six years.

Hernandez promptly revolted, and was put back into prison. Celestino Peraza was the next rebel; and after Peraza came Matos, who intrigued to gain the support of foreign govern¬

ments. He resigned the presidency temporarily on 9 April 1906, but soon resumed it. Castro involved Venezuela in dangerous quarrels abroad; the most important being those with the European creditor nations in 1902-03, with the United States 1904—08, with Colombia and France in 1905. In all these difficulties Castro acted in a high-

handed, unprincipled manner.

He was reelected unanimously for a full term in 1905, and proclaimed a general amnesty for all political prisoners. His difficulties with the United States arose over the confiscation of the properties of the New York and Bermudez Asphalt Companv. In 1907 Venezuela satisfied her obligations with Great Britain, Germany and Italy in accordance with the awards of The Hague Tribunal. In the same year Castro sup¬

pressed two rebellions with great cruelty, exe¬

cuting many of the leaders and those connected with their plots. Further trouble ensued with the United States over the claims of the New York and Bermudez Asphalt Company. Castro held out but in December 1908 went to Europe to undergo a surgical operation. A revolution broke out soon after which placed Vice-Presi¬

dent Juan Vicente Gomez in the presidency.

Castro's policy was reversed, and all claims amicably adjusted. Castro made several at¬

tempts to return to Venezuela, but was unsuc¬

cessful. He resided in Spain and France for several years and in 1916 came to the United States. See Venezuela.

CASTRO, Inez de, Spanish lady: d. 1355.

She was descended from the royal line of Castile. After the death of Constantia, wife of Pedro, son of Alfonso IV, King of Por¬

tugal, in 1345, Inez was secretly married by Pedro, whose mistress she had already been.

As he steadily rejected all propositions for a new marriage, his secret was suspected, and the envious rivals of Inez were fearful that her brothers and family would gain a complete ascendency over the future King. At length Alfonso resolved to put Inez to death. The first time that Pedro left Inez, the King hastened to Coimbra, where she was living in the convent of Santa Clara with her children.

The arrival of Alfonso filled the unhappy lady with terror. She threw herself with her children at the King's feet, and begged for mercy.

Alfonso was softened, but afterward gave his counsellors permission to commit the murder, and it was executed that very hour.

Inez expired under the daggers of her enemies.

She was buried in the convent where she was murdered. Pedro took arms against his father, but soon became reconciled to him. Two years later Alfonso died; the assassins had already left the kingdom and taken refuge with Pedro the Cruel of Castile. An exchange of fugitives was carried out. Of the three murderers of Inez, one escaped, but the other two were tortured in the presence of the young King Pedro at Santarem in 1360. Their hearts were torn out, their bodies burned and their ashes scattered to the winds. Two years later, it is said, King Pedro at Cataneda declared on oath that after the death of Constantia he had ob¬

tained the consent of the Pope to his union with Inez, and had married her. The arch¬

bishop and Lobato confirmed the assertions of the King; and the Papal document to which the King referred was publicly exhibited. The King caused the body of Inez to be disinterred, and placed on a throne, adorned with the diadem and royal robes, and required all the nobility of the kingdom to approach and kiss the hem of her garment, rendering her when dead that homage which she had not received in her life. The body was interred at Alcobaga, where a splendid monument of white marble was erected, on which was placed her statue, with a royal crown on her head. The history of the unhappy Inez has furnished many poets of different nations with materials for trag¬

edies, and the Portuguese muse has immortal¬

ized her through the pen of Camoens, in whose celebrated <Lusiad) the history of her love is one of the finest episodes.

CASTRO, Joao de, Portuguese navigator:

b. Lisbon, 7 Feb. 1500 ; d. 6 Tune 1548. In 1538

he accompanied the viceroy Garcia de Neronha, his uncle, to India, as commander of a vessel, and in 1540 was in the expedition that explored the Red Sea, of which he made charts and scientific descriptions. His profound knowl¬

edge of mathematics and languages made these works of great value. They were published under the title of <Roteiro) (latest ed. by Corvo, Lisbon 1882). After his return he was made commander of a fleet to rid the European seas of pirates ; was appointed governor of India in 1545, in which office he defeated the great army of the Moors, under Adhel Khan, and completely subjugated Malacca. In 1547

he was commissioned viceroy of India, but died shortly afterward. A statue was erected in his honor at Goa.

CASTRO, Jose Maria, Costa Rican states¬

man : b. San Jose, 1 Sept. 1818; d. 1907. He was educated at the University of Leon, Nicaragua, and held positions under the government of CASTRO Y BELLVIS

Costa Rica. As minister under Jose Maria Alfonso, he was instrumental in establishing the University at Santo Tomas. In 1846 he was Vice-President and in 1847 was elected President. Among his reforms were the

founding of a normal school, girls' school, the creation of the office of ((City Physician, » local public charities bureaus; abolishment of the death penalty for political adversaries ; and the establishment of Costa Rica as an independent state. After Costa Rica withdrew from the Central American states, he resigned the presidency, but held diplomatic positions. He received the official designation of <(Founder of the Republic of Costa Ricafl* From 1866 to the rise of the Jimenez government (1868) he was again President.

CASTRO Y BELLVIS, bel'ves, Guillen,

Spanish poet and dramatist: b. Valencia 1569; d. Madrid, 28 July 1631. Next to Lope de Vega he is the greatest Spanish dramatic poet of his day. He lived at an, age when Spanish drama was almost at its best ; for the dramatic writers who followed him and Lope de Vega

added practically nothing to the essentials of the drama. Their efforts were spent in adding literary adornments to it. Castro's work had a strong influence on his own and succeeding generations of dramatists and, in a secondary sense, on all Spanish literature. He was born of an old and noble family; and such com¬

paratively slight information as survives rela¬

tive to his life shows that he had always friends in high positions who were constantly interesting themselves in his welfare. He was successively captain of the mounted coast guard of Valencia, governor of Seyano and oc¬

cupant of other high positions under the government. From the Duke of Osuna he

received a pension of 1,000 crowns; and the Count of Olivares secured for him a pension of like amount from the King. Through this same strong court influence he was created a knight of the Order of Saint James in 1623.

All his friends, admirers and followers ranked him as at least the equal in dramatic talent to Lope de Vega.

The age in which Castro lived was one of encouragement of literature; and Valencia, the (<romantic home of the Cidw was one of the two great literary centres of Spain. Literary societies and guilds formed a prominent part of the life of the city; and literary contests, lyrical, epic, dramatic and pastoral, formed a part of the order of the day. Castro took a prominent part in these literary contests and won many prizes and honors in competitions held by the Church, the State and the literary guilds. A very active theatre completed the incentive to literary and, more especially, dramatic life, to which Castro was irresistibly drawn. At the age of 20 he was already counted among the promising young poets of his day and he apparently counted among his friends the powerful and brilliant literary set of Valencia. He appears to have been much of a spendthrift and to have been cursed with an imperious and haughty temper which con¬

tinually estranged from him friends of high estate ; and as his reputation as a poet and dramatist grew, his infirmities of temper seem to have increased and to have been the direct cause of the loss of many of the social and material advantages which he had enjoyed in his earlier life. It was maintained by his earlier biographers that he

finally became re¬

duced to such poverty that he was buried at the public expense. But his will, which was signed a few days before his death, and which is _ still in existence, would seem to disprove this, as it disposed of considerable property.

He undoubtedly had, to the end of his days, a certain income from his literary work which was in constant demand by the regular

theatres and the Church, and must, therefore, have been well paid for. Moreover it is known that the habit of the Order of Santiago was conferred upon him in Madrid in 1623, only eight years before his death.

To Castro the historical drama in Spain owes much ; and his influence in this literary field was strongly felt in France and England.

Castro's (Don Quixote* was imitated by

Guerin de Bouscal and presented in Paris in 1635; Moreto found his model for (E1 Ligno don Diego* in (E1 Narciso en su opinion *; Fletcher's (Love's Care* is derived from (Fuerza de la costumbre) ; and Calderon's (Magico prodigioso) from (E1 prodigio de los montes.* Even to-day the best known of his dramas, (Las mocedades del Cid,* slightly modified, is ever welcome on the Spanish stage ; and it is looked upon in Spain as one of the great literary inheritances of the Spanish people. This play is avowedly the inspiration of Corneille's (Le Cid.* From the purely dramatic point of view the (Cid) of Castro is superior to that of Corneille, though the latter gains in simplicity what it loses in the pic¬

turesque effects of the Spanish original.

Castro set a taste in Spanish drama which long prevailed, and wffiich, fo a certain extent, per¬

sists to-day. His characters reflect, especially in the (Cid,* the chivalrous or romantic times in which they lived. His plot and characters are very animated and are dressed out in beauty of imagery and thought. Castro is, therefore, in a sense, the father of the drama of chivalry. His inventiveness and his manage¬

ment of plot are superior to that of any Spanish dramatist previous to

his time. In all of these respects Castro's (Mocedades del Cid*

is superior to Corneille's (CidP The former and (Las Hazanas del Cid) together, in a sense, form one dramatic work which has made the name of Castro known among all the literary nations of Europe. In France Castro was held in even higher esteem than in Spain ; and to the popularity of his numerous dramas, some 40 in all, is due his literary influence on succeeding generations for both good and for bad. While he bequeathed to the drama a vividness, reality, force and action previously lacking in Spain, he also left it a tendency to licentiousness and disrespect for the laws and customs of con¬

ventionality; and he glorified the romantic age with its intrigues, its rule of force, its duels and other conflicts. Born in Valencia, the home of the Cid, he was deeply inspired by the legends and glorious traditions of his native city; and his patriotism frequently bursts out into ardent flame. With wonderful facility and an appearance of reality and truth, he re¬

creates chivalric conditions and feudal man¬

ners; and the old sentiments of honor and patriotism are ever at his beck and call. But he is lavish in more titanic effects. The meet-22

ing of infidel and Christian, the life of the Crusades and the shock of battle he handles with equal facility and familiarity.

When he turns to comedy, which he fre¬

quently does, Castro lays bare the follies, vices and customs of his age. Life as he knows it he put on the stage. For the most part, the life of his day was not a good life; and Castro makes it no better than it actually was.

Hence his plays have been condemned for their immorality and his detractors have lost sight of his vast and many-sided contributions to the stage, in their efforts to discredit him, which unfortunately were, for a time, only too successful. His dramatic work covers the whole

wide dramatic field. His most noted historical dramas are : (Las mocedades del Cid) ; (La justicia en la piedad) ; (Pagar en propia moneda^ ; (Alla van leyes do quieren reyes) ; (La humanidad soberbia y el amor constanteL To his romantic dramas belong (E1 Conde de Alarcos) ; (E1 nacimiento de Montecinos) ; and (E1 desengano dichoso) ; while to the capa y espada class belong (E1

narciso en su opinion > ; (La fuerza de la cos-tumbre5 ; and (Los mal casados de Valencia. }

His dramas of costumhres y caracteres in which he displays criminal loves, intrigues and, in general, the follies of his day, and holds the mirror up to life in a masterly manner, include (E1 curioso impertinente) ; (Don Quixote) ; (La verdad averiguada y enganoso casamiento) ; (E1 pretender con pobreza) ; (En-ganarse enganado) ; and (E1 perfecto caballeroL

His freedom in depicting society as he found it has placed his dramas on the taboo list in most Protestant countries. Mythology, too, met with skilful and sympathetic treatment at the hands of Castro in the drama (Progne y Filomena.* The semi-mystical, semi-religious drama he also handled better than his prede¬

cessors in (E1 mejor esposo San Jose) ; (Las maravillas de Babilonia) ; (E1 prodigio de los montes y mario del cielo Santa Barbara* and (La degollacion de San Juan Bautista*. He has attempted heroic tragedy with considerable success in (Dido y Eneas. *Among his other dramas are (E1 Conde de Irlos) ; (Los enemi-gos hermanos) ; (Cuando se estima el honor) ; (E1 vicio de los extremos) ; (La fuerza de la sangre.* The following works have also, with apparently good reason, been attributed to Castro: (E1 caballero bobo* ; (E1 dudoso en la venganza) ; Hngratitud por amor) ; (E1 nieto de su padre* ; (Donde no esta su dueno esta su duelo) ; (E1 enamorado mudo) ; (Quien malas manas ha* ; (Quien no se aventura) ; and (La tragedia por los celos.* He also wrote dramas in collaboration with other dramatists. In two of these, (La manzana de la discordia,* and (E1 robo de Elena,* he worked with Mira de Mescua. In 1621 (La primera parte de las comedias de don Guillen de Castro* was pub¬

lished at Valencia; and the second part four years later at the same place. See Poem of the Cid. Consult (Biblioteca de autores espanoles Vol. XLIIP (which contains seven of his plays); Fcerster, W., (Las mocedades del Cid) (Bonn 1878) ; Merime, E., (Premiere partie des mocedades del Cid) (Toulouse 1890) ; Rennert, H. A., Hngratitud por amor' (Philadelphia 1899).

John Hubert Cornyn,

Editorial Staff of the Americana.

CASTR'O-DEL-RIO, Spain, a town in the

province of Cordoba, 16 miles southeast of Cordoba, on a slope above the Guadajoz. The more ancient portion is surrounded Ly a dilapi¬

dated wall, flanked with towers, and entered by one gate, which was defended by an Arab castle, now also ruinous. The modern portion is outside the walls, and extends along the foot of the hill on its north side. The most of the streets are wide and regular, lined with well-built houses and handsome public edifices. The church is large and handsome, and there are also several convents, two colleges, primary schools, hospitals and manufactures of linen, woolen and earthenware. There is a con¬

siderable trade in agricultural produce. Pop.

about 12,000.

CASTRO-URDIALES, oor-de-a'las, Spain,

seaport town, Santander province, on the Bay of Biscay, connecting by a branch line with the Bilbao-Santander Railway. An an¬

cient town with a mediaeval castle and parish church, it has grown rapidly since 1870, through the development of neighboring iron mines and increased railway facilities. In a recent year, exports of iron rose to 277,200 tons. Fishing and the canning of fish, especially sardines in oil, is also a thriving industry. Pop. 14,200.

CASTROGIOVANNI, ka -stro jo-van'ne,

or CASTRO GIOVANNI (anc. Enna), a

city of Sicily, in the district of Caltanissetta, on a plateau in the centre of the island, 4,000

feet above the sea. The climate is healthful, the soil fertile and water abundant. The old feudal fortress of Enna is the chief edifice.

It contains also a cathedral, founded in 1307, a public library, a museum, a technical institute and a castle built by Frederick II of Aragon.

It was the fabled birthplace of Ceres, and the site of her most famous temple. About five miles distant is the lake of Pergusa, where Proserpine, according to the poets, was car¬

ried off by Pluto. During the first servile war the insurgent slaves made Enna their head¬

quarters. It was captured by the Saracens in the 9th and by the Normans in the 11th cen¬

tury. It has trade in sulphur and rock salt.

Pop. 28,932.

CASTRUM DOLORIS, a Latin term

signifying camp of grief, has a different mean¬

ing from catafalque (q.v.). The latter is used to denote an elevated tomb, containing the coffin of a distinguished person, together with the tapers around, ornaments, armorial bear¬

ings, inscriptions, etc., placed in the midst of a church or hall. The castrum doloris is the whole room in which the catafalque is elevated, with all the decorations. The sarcophagus, usually empty, is exposed for show upon an elevation covered with black cloth, under a canopy surrounded with candelabra. Upon the coffin is laid some mark of the rank of the deceased, as his epaulette or sword, and, when the deceased is a sovereign or a member of a ruling family, princely insignia are placed on surrounding seats. The French call the

castrum doloris, chapellc ardentc, sometimes also chambre ardente; but the latter has also a separate meaning.

CASTUERA, kas -too-a’ra, Spain, town in the province of Badajoz, near the right bank of the Guadaleja. Most of its streets are straight, clean and well paved. It has two CASUARINA — CAT

squares, lined with substantial houses ; the prin¬

cipal one contains the town-hall, prisons and spacious modern parish church. The inhab¬

itants are engaged in weaving, making earthen¬

ware, tiles, bricks, shoes. Trade is carried on in cattle, wool, wine, grain and oil. Pop. 6,322.

CASUARINA, kas-u-a-rl’na, or BEEFWOOD, the single genus of the family

Casuarinacece , or cassowary-trees. There are about 30 species, natives chiefly of Australia.

They are jointed leafless trees or shrubs, hav¬

ing their male one-stamened flowers in whorled catkins, and their fruits in indurated cones.

Some of them produce timber called beefwood, from its color. C. quadrivalvis is called the she-oak. C. equisetifolia is the best-known species, and is much cultivated in Florida and California, and in tropical regions generally.

CASUISTRY, the science or art of deter¬

mining cases of conscience and the moral character of human acts; so called from casus conscientice, a case of conscience. Wherever the question arises, Is such an act allowable by moral law? there is a case of conscience and matter of casuistry, and in deciding the ques¬

tion for himself, as everyone habitually does, everyone is a casuist. But in current usage a casuist is one who, skilled in the prescriptions of the divine moral law and its interpretation whether by lawgivers, moralists or theologians, studies either supposititious or actual cases of conscience and judges whether a given act, or even a given thought is consistent with or in violation of moral law — for, unlike the civil lawgiver or the ministers of civil law, the cas¬

uist must determine the moral character of thoughts no less, or rather more, than of acts.

The professional casuist is inevitable in the system of the Catholic Church, where the min¬

ister of religion, in his capacity of confessarius or confessor must be the counsellor and direc¬

tor of penitents and resolve for them questions of guilt or innocence, questions touching the obligation to restitution, for example of goods, or reparation of damage to a neighbor's reputa¬

tion by slander; granting or withholding abso¬

lution according to the merits. For the minis¬

ter of the sacrament of penance acts under Jesus Christ's commission, whose sins ye shall forgive, whose sins ye shall retain, shall be forgiven or retained ; and to execute that com¬

mission the minister of the sacrament must de¬

cide for himself and the penitent the moral character of the acts. The science or art of casuistry has doubtless been carried to extraor¬

dinary lengths ; but though the questions which it treats are such as touch individually and most intimately daily and hourly the many millions of souls who resort to the confessional, the works of writers on casuistry, though vo¬

luminous, would count as a scant armful com¬

pared with only one part of the works con¬

tained in a law library — those which record the decisions of the civil courts. It is true also and inevitable that casuistry like law lore is often employed as a means of escaping from legal penalty or of quieting the

sense of guilt.

As there are lawyers who for a fee will defend any cause however defenseless morally, even to the extent of working injustice — loss of prop¬

erty, loss of reputation to the party opposite — so there are casuists who by their overin¬

clining to an indulgent interpretation of the divine moral law, release or cut the nerve of moral responsibility, administer an opiate to conscience.

Probabilism is the name given to the doc¬

trine which declares to be lawful in foro con¬

scientice an act the moral correctness of which is affirmed by any moral theologian of weight (doctor gravis) ; or, as defined by Liguori, a probable opinion is one which rests on a solid foundation (fundamento gravi) both of reason and of authority, so that it is able to move the assent (flectere assensum) of a prudent man, though with fear regarding the opposite. But a writer in a great encyclopaedia, who regards probabilism as Hhe most remarkable doctrine they (the casuists) promulgated — a doctrine which it is hard to believe that any one ever ventured to assert® teaches that <(according to probabilism® (<any opinion which has been ex¬

pressed by a (grave doctor) may be looked upon as possessing a fair amount of probability, and may, therefore, be safely followed, even though one's conscience may insist upon the opposite course® : the last clause is gratuitous and has no warrant in the teachings of Catholic moralists, who unanimously hold that an act done in defiance of conscience, even be it a plainly erroneous conscience, is a sin.

Viewed in the abstract, the rule of the probabilists is not an unreasonable one; it is acted upon daily by whoever, doubting his own judg¬

ment, asks counsel of others whom he regards as trustworthy advisers, even though they be not grave doctors (graves doctores). It is admitted that some of the probabilists, even the greatest of them, as

Escobar, Suarez, Busem-baum, did not always guard the doctrine against misconstruction, and gave occasion for views of moral obligation which were too lax: but the ecclesiastical censure has fallen upon such erroneous teachings, without discrediting for Catholic moralists the principle of probabilism.

Let any other school of moral teaching set to itself the same task which confronts the moral theologian of the Catholic Church, that is, to define with precision the moral character of every act, every thought, every imagination that has relation to the moral law, and it will be seen whether probabilism must not have a place in its system.

CASUS BELLI, the material grounds

which justify (or are alleged by one of the parties concerned to justify) a declaration of war (q.v.). The casus belli is not seldom a very trifling one, and does not necessarily indi¬

cate the real causa belli or cause of the war.

CASWELL, Richard, American lawyer : b.

Maryland, 3 Aug. 1729; d. Fayetteville, N. C., 20 Nov. 1789. He removed to North Carolina in 1746; practised law and was a member of the colonial assembly (1756-70). He was a delegate to the Continental Congress 1774-75; was president of the Provincial Congress which framed the State constitution (1776), and 1st governor of the State 1775-79; reelected 1784-87; comptroller-general of the State 1782-84; was also a delegate to the convention which framed the Federal constitution in 1787. He was major-general of the Newbern district in the Revolution.

CAT, a predatory animal of the family

Felidce (q.v., for physical characteristics). All 24

feline animals are “cats® in the broader sense; but in the more restricted and common usage the name refers to the smaller, long-tailed, typi¬

cal members of the genus Felis. The type is the wildcat (F. catus) of Europe and western Asia, but now extinct in Great Britain, and very rare except in the wilder forests of Germany, Austria and eastward. It is somewhat larger and of stouter build than the domestic cat ; its body is yellowish gray, with a dark line along the back, and many darkish stripes on the sides and across the legs; its tail, of moderate length, is ringed and tipped with black ; and the soles of the feet are black. It is a fierce animal, preying upon anything it is able to overcome, goes abroad chiefly at night, and makes its lair in hollow trees and crannies among rocks, and is almost untamable. This brief descrip¬

tion of habits will answer for most of the other cats to be mentioned, varying with their diverse habitats ; but some of the others have shown themselves far more amenable to domestication.

It should be noted that the American “wildcat®

is not this species, but a very different one —the short-tailed lynx (q.v.).

Mivart . enumerates in his monograph 36

species of these smaller cats, but some of them are probably mere varieties of others; and we can here mention only a few of the better known ones, larger descriptions of which may be found under their names. The most im¬

portant one is the Egyptian or Caffre cat (F .

libyca), the main source of our household pets, described in the article Cats, Domestic. An¬

other important African species is the widely distributed serval (q.v.) whose fur is valuable.

A reddish-brown species, called the golden¬

haired (F . rutila) , and two or three others, little known, inhabited the West African forests.

Asia has many varieties of cats, some of which are of large size. Thus the spotted cat (F.

tristis) of the interior of China has a body nearly three feet long; and nearly as big is the handsome, spotted and striped fishing cat (q.v.) of eastern India and the Malayan Peninsula.

Others of note are the leopard cat (q.v.) of Bengal and eastward; the common Indian

jungle cat or chaus (q.v.) ; the little rusty-gray jungle cat (F. rubiginosus) , which is the small¬

est of its tribe; the Manul of northeastern Asia; the flat-headed Malayan cat (F. plani-ceps), which is uniformly brown in hue; the marbled cat (F. marmorata), richly orna¬

mented with wavy, irregular lines and blotches of color, and the bay or golden cat (F. aurata) of northern India, Malaya and the East Indies.

This last animal is of special interest as it is believed to be the parent stock of the Siamese domestic cat, which was formerly reserved for royalty alone. Its fur is pale golden-chestnut in color, becoming bay along the back ; the throat and under parts are white, while the face is strikingly ornamented with stripes of black, white and orange.

America has several species of wildcats besides the large jaguar (q.v.) and the puma or cougar (q.v.) ; those of North America are more properly defined as lynxes (see Lynx), but Central and South America have several typical felines. Of these the ocelot, the margay, the eyra and the jaguarondi, are described elsewhere under their names. A very distinc¬

tive and well-known species of the plains'

region south of Brazil is known as grass cat, pajero and pampas or grass cat (q.v.). See Cheeta, Felidae; Lynx.

Bibliography. — Eliot, (Monograph of the Felidae* (folio, colored plates, London 1878); Jerdon, (Mammals of British India) (London 1865) ; Anderson, (Zoology of Egypt * (London 1902) ; Mivart, <The

Cat) (New York 1892) ; Hamilton, E., <The Wildcat of Europe) (Lon¬

don 1896) ; Hamilton, J. S., (Animal Life in Africa) (New York 1912) and Cassell's, the Royal and the Standard Natural Histories.

Ernest Ingersoll.

CAT, Domestic, The. The influence of

the domestic cat upon American civilization has received less consideration than it deserves, for a great deal of the advance of agriculture as well as of the spreading out over the vast wood¬

land and prairies has been made possible by this much abused and misunderstood animal. How much food cats have saved, how much property they have guarded from destruction, what plagues of vermin they have kept in check, from the time America was first settled, it is im¬

possible to compute. But for their sleepless vigilance the large cities would quickly be over¬

run with rats and mice.

The government appropriates money every

year for the maintenance of cats in the post-offices and other public buildings of the larger cities, in order to keep down the vermin that would gnaw holes in mail-sacks and destroy public records and other property. It is recog¬

nized in the national printing office of France, where vast quantities of paper are stored, and where an army of cats is retained to keep the mice in check. In Vienna it is regarded as a part of good municipal government to take care of the cats. The United States government has systematized its cat service in public insti¬

tutions, and in Pittsburgh a certain strain has been bred to live in cold storage houses, and is developing characteristics peculiar to this kind of life. In warehouses, corn-cribs, barns, mills and wherever grain or food is stored, cats must be kept. But to be effective, they must be

taken care of, for well-fed cats are the best mousers.

Origin and History of the House Cat. —Formerly it was carelessly thought that our house cats were simply the progeny of tamed pairs of the European wildcat ; but anatomy denied the probability of this, and historical in¬

vestigation showed that they came from another source. This source is the North-African “gloved® or “Caffre® cat (Felis libyca), which, as historical evidence, including innumerable mummies, shows, was domesticated by the Egyptians before the time of the oldest monu¬

ments of their civilization. Moreover, the characteristic specific markings of the caffre cat (still wild as well as tame in the Nile Val¬

ley) reappear unmistakably in our common house cats, in spite of the fact that interbreed¬

ing with other species, and various local races, has intervened. A well-marked variety of this cat was to be found anciently, and now, in Syria and eastward, known as the Mediter¬

ranean cat. It is established that many cen¬

turies before the Christian era the Egyptians, Cretans, Phoenicians and other men of the Levant were constantly voyaging all over the Mediterranean Sea, and founding trading-posts on both its shores, where finally arose and spread the extensive civilizations of Greece and CATS

1 Manx

2 Brown Tabby

3 Smoke Persian

4 Silver Tabby

5 White Persian

6 Shaded Silver

CATS

1 White Persian

2 Light Silver

3 Cream Persian

4 Siamese

5 Silver Persian

6 Short Hair Tortise Shell

CAT

25

of Rome on the north, and of Carthage on the south. With these colonists undoubtedly went their friendly and useful mousers. That they then were crossed somewhat with the native wildcat seems to be shown by the appearance of the peculiar form we call (<tabby® cats.

This, in brief, is the history of the common European house cat, whence have come, by emi¬

gration, those of America and most of the civilized world.

In the remote and isolated East, however, exist races of domesticated cats of more local origin. Prof. G. Martorelli, of Milan, Italy, has made a special study of this whole sub¬

ject; and he has concluded that the ordinary domestic cat of India has descended from the Indian desert cat (Felis ornata). From it, he says, are derived their common spotted breed, while the fulvous breed seen in India has been produced by a cross with the native jungle cat (Felis chans). Both these have interbred with the imported western cats in recent years. The Persian or <(Angora® long-haired breeds may probably have come from Pallas' cat of cen¬

tral Asia ; and the curious Siamese cat is re¬

garded as derived from the golden cat. The intermingling accidentally, or by the design of breeders, of these various species and races has produced the bewildering variety of forms now seen. Consult on this subject Ingersoll, (Life of Mammals) (New York 1909, with bibliography).

American Interest in Cats. — American

interest in the cat is often said to have origi¬

nated within the last 20 years, that is, since the advent of exhibitions and the taking up of the cat-cult by the public. This impression is not borne out by facts, for we have exhibitors who have intimately studied cats, have bred and raised them, and have cared for them for over 60 years, and cat-shows were held in Maine be¬

tween 1860 and 1870, even before the great ex¬

hibition instituted in London by the well-known animal painter, Harrison Weir, in the year 1871. But cat-shows in America were not known outside of Maine until one was held in the Madison Square Garden, New York, in 1895. The exhibitions in England have gone on from Mr. Weir's first show up to the pres¬

ent time, so that the marking epochs in modern cat history may be dated from the Crystal Palace show in 1871, and the New York show in April 1895. From these shows has arisen what may be described as a cult, or in some ways an industry. Numbers of individuals, principally women, have taken up the cat as a partial means of livelihood, selling those they rear by exhibiting them to the public, the out¬

come of which has been the production of dif¬

ferent colors, strains and families. Clubs have arisen for the care and maintenance of exhibi¬

tions ; registers and studbooks have been started ; and the importance of cats of known pedigree is duly recognized by our government as one of the many things to be considered and provided for in a tariff schedule.

The varieties or breeds recognized in shows are the Persian, Siamese, Abyssinian and or¬

dinary domestic short-haired cats. The Per¬

sian and Angora may be said to be the same cat, though distinctions were drawn in old days ; but these were very indefinite, and at the pres¬

ent time we draw up rules and regulations for two large groups, the long-haired cats and the short-haired cats, and these are judged by points and classified by color distinctions. An¬

gora is a small place, and comparatively few cats could have come from there, but many have come from other parts of Asia. Taking the long-haired division first, because commer¬

cially it is the most prominent, the judge re¬

quires that the cat shall be short in body with a short tail and short legs, the latter shorter in front than behind. The chest should be wide, the loin square and firm, the bones of the legs well delevoped and the frame sturdy. The head that corresponds with this formation and is required is a broad, round head with short, wide nose, eyes large and round and set well apart. The ears, a most important feature, should be as small as possible and placed on the side of the head, the base of the ear being narrow, not gaping wide open, with a tuft of hair at the apex. This standard is more or less based upon original imported specimens from Asia. The colors most valuable and most approved are the light silvers, smokes, blues (or slate color) white, black, orange, cream and tortoiseshells; and the tabbies of different colors are also favorites. The tabby cat is a cat that has a light ground-color and is spotted, barred or striped with darker color, and the word <(tabby® has no reference to the sex of the animal. The name ((tabby® is derived from Atab, a street in Bagdad celebrated for its manufacture of watered or moire silks, which in England were called atahi or (<taffety.® The most usual colors in tabby cats are yellow, marked with orange or red, making what are called orange tabbies ; yellow brown, marked with black, making the brown tabbies ; gray, marked with darker stripes, giving us the gray tabbies; and pale silver, marked with black or a sort of dark blue verging on black, from which we have the silver tabbies. The great feature required in tabby cats is that the ground-color should afford as distinct a con¬

trast to the stripes, bars or spots as possible; the colors should be vivid and the marks very plain. There are spotted tabbies, and in these the spots must be round, clear and distinct ; but we seldom see a good one of this variety unless it come from India, the home of the best spoted tabbies. The solid-colored cats are the whites, blues, blacks and smokes ; although recently the silvers, creams and oranges have in a few instances almost attained perfection in being without marks or foreign color. The tortoise¬

shell cats are black, red and yellow ; when ac¬

companied by white, the patches are clearer and distincter, and this feature is what is aimed at. Tortoiseshell males are almost unknown, and orange females are very scarce.

Points of Show Cats. — The eyes of a cat are an important feature, and should be large, round and pleasant in expression. Although color of eye is a great feature, many judges prefer' large, well-placed, pleasant eyes to those that are more correct in color but badly placed, or are small and mean in expression, or give the cat a sour look. The color of eyes required may be briefly summed up as blue (as deep as possible) for a white cat; emerald-green for light silver or chinchillas, as they have been called ; and vellow to orange, as deep as pos¬

sible, for all other varieties. The color and beauty of the cat's eyes vary according to the state of health, the light and the time of day, 26

and judges have to be careful in this matter.

The body-colors can be defined as white, as pure as possible; black, deep and glossy; blue or slate, sound and pure from root to tip of hair, showing no light shadings or light under¬

color; smoke, a deep plum-color, silver under¬

coat, ruff and stomach; cream, light fawn or cream color; orange, whether marked or un¬

marked, should be as rich and strong as pos¬

sible. The tortoiseshells marked with clear distinct patches, clean-cut and free from each other. The fur of the long-haired cats should be fine, long, silky and glossy; wooliness is deprecated, but is more inclined to appear in certain colors, such as orange and cream ; and blacks may have a rather coarser texture of coat if they make it up in color. But in whites, silvers, blues, smokes and in brown tabbies there can be no excuse found for anything but exquisite quality.

In the short-haired division we must con¬

sider our old fireside friend first, and colora¬

tion in this variety is much the same as in the long-hairs, though we do not often find smokes or so many silvers, and the blue-eyed whites have probably been bred from the long-haired cats. But as to color, color of eyes and clas¬

sification, the rules specified for long-hairs fit the short-hairs except that the tabby cats are more distinctly marked and more brilliant, as the colors are not clouded or mixed by the length of the hair. White cats with blue eyes are generally deaf, but not always. The short-haired cat is rather different in formation to the long-haired cat, the face is more angular, or rather the nose may come to a finer point, though its cheeks should be well developed.

The eyes are differently placed yet should be full and large, the ears larger, closer together, more toward the top of the head, wider at the base and more pointed at the apex. The body should be moderately long, slender and ele¬

gant. The great thing to avoid in all cats is coarseness, and size alone is not a recommenda¬

tion.

Foreign Cats Exhibited. — The Siamese is a distinct variety which comes from the palace of the -King of Siam or from a few families of nobles. These cats are conceded to be the most intelligent and companionable of all cats, but having been much inbred are not easily reared and do not increase very fast. The climate of California suits the Siamese cat, and the variety is found there in fair numbers and doing well.

The points valued in this cat are a rather small and flat head, a small and elegant body of a light fawn or biscuit color, with chocolate-colored legs, mask and tail. The more decided the contrast — that is, the lighter the body-color and the darker the points — the better.

The Siamese are much appreciated as show-cats. Chocolate-colored cats of this variety are found and are valuable. The fur most ap¬

proved is very fine and glossy, resembling beaver. The eyes are blue,

the color as rich as possible.

The Manx cat makes a distinct species in our exhibitions, and is classed by itself. Be¬

sides the absence of tail, which is the distin¬

guishing feature of this cat, a different forma¬

tion of body is required; namely, that the fore legs should be short and the rump rise as abruptly as possible, making the hind legs longer than the fore legs, so that the cat seems to jump forward like a rabbit, and is sometimes called a rabbit cat. The head should be neat, round and rather small, and the cat itself small, short and compact. The Manx cat may be of any of the recognized colors. There is a dis¬

tinction between this variety and our other domestic cats. Gambier Bolton who studied the question and traveled to collect specimens for the British Zoological Society coincides with the naturalist Kempfer, and recognizes a strong likeness in these cats to those of the islands in the East, the Malay Peninsula, Japan, China and lands contiguous. All the cats in those parts, even the Siamese, seem to have peculiar formations of the tail, whether cut short, forked, kinked or otherwise. These cats are smaller; there are differences in the call or language, ways and character, that have been observed by these students. The origin of the Manx cat is now attributed to the arrival of these cats on the Isle of Man from ships belonging to the Spanish Armada that were wrecked there.

These cats were most probably previously brought from Japan or other parts of eastern Asia, for cats now brought from Japan are exactly like our Manx. A cat with his tail cut off, showing a stump, does not constitute a Manx cat for the student.

Other cats found in showrooms are the Abyssinians, but they do not make much head¬

way and have not vet arrived in America. The males are generally darker than the females, and the color of these cats should be a deep brown ticked with black, somewhat resem¬

bling the back of a wild rabbit, with a distinct black band running

down the back to the tip of the tail. The inner sides of the legs and belly are more of an orange tint than the body, and are marked in some cases with a few dark patches. The eyes are deep yellow, tinged with green; nose dark-red, edged with black; ears rather small, dark-brown, with black edges and tips; and the pads of the feet are black. At¬

tempts have been made to copy this cat, and it has been attempted to exhibit, as such, slightly marked, ordinary short-haired cats, but they are not the genuine breed. The absence of tabby-markings is the point most sought and prized, and if kept pure the characteristics of these cats are peculiar. The Abyssinian cat has never been very numerous at exhibitions, perhaps because it is a short-haired cat, though short-haired cats, when good exhibition speci¬

mens, bring large prices. Cats marked with white have not found much favor in British exhibitions, but have always been popular at American shows, and Madame Ronner, the

great French painter of cats, usually depicts her cats — that is, the dark ones — with some white patches. If cats are marked with white, they are preferred with four white paws and a white face; that is, the white starting in a sharp point between the eyes, spreading out onto the lips, making a triangle with the apex on the forehead, and continuing thence down the chest, but not spreading to the shoulders or going round the neck or over the back. Any marking, in an <(any other class, >} that is regu¬

lar and even, and forms anything like a regu¬

lar pattern, should be recognized and encour¬

aged by a judge; besides which, any effort made to bring out a new variety or color must be taken note of and encouraged. There is now a tendency to encourage Dutch marked cats, CAT

which means black patches on the cheeks, a white blaze np the face, joining a broad, white belt which goes completely round the cat half¬

way between the ears and tail.

Possibilities in Native American Species.

— Of the cats indigenous to the American con¬

tinent, which might be suitable for domestica¬

tion, few have been tried in a domestic way, and the species that inhabit this country are not many. I have seen the wildcat or gray lynx, at shows, behaving in the most exemplary manner.

Having been brought up from infancy by children, and perfectly tame, it was more at ease in a large showroom, and not nearly as nervous as the ordinary feline. So that if it were not for the size of the creature, its pos¬

sibilities as a domestic animal would be good ; but unfortunately our time does not seem to be destined to take in hand or give us anv fresh species of domesticated animals; what we have are handed down through the ages. In this particular we are not original, for we destroy more often than we create, and we seem to have no time for trying to subdue or lead into bondage any new varieties of mam¬

mals. The puma, cougar or mountain lion ranges over the whole of North and South America, but is too large for domestic pur¬

poses ; yet it has never been aggressive against man, and, if history is to be thoroughly credited, was quite the reverse with early set¬

tlers till driven to exile and filled with fear by man himself. The ocelot is one of our most beautiful varieties, and varies somewhat in color, with sometimes a gray body-color, but more often yellow. It is clearly marked with dark color in spots, bars and splotches, and is very handsome, but larger and more powerful than the domestic cat. These cats have been taken when young and reared ; and although comparatively tame and sociable till about a year old, they then become savage and impos¬

sible and have to be caged or killed.

A very pretty cat that has been exhibited in America is the margay from Central and South America, where it inhabits the woods. This cat has been handled at an exhibition and found tame and with a passion

for being caressed.

The margay is light red or orange, beautifully and regularly spotted with small black spots, the ears small, round and pointing forward, whitish-gray at the backs, edged with black.

It is a small cat, very handsome and refined, and if the effort could be made to obtain some more of the species these cats would be a very valuable addition to our varieties and to our home circles. Geoffroy's cat is another small spotted cat, of which a few have been intro¬

duced into England, but it is too early to state what the future increase may be. The pampas cat is another feline not amenable to domestic life.

Asiatic Races. — As a rule our best white cats with blue eyes come from India and some of the best are brought from Tibet. In cross¬

ing the Himalaya Mountains with these cats carriers slit their noses to enable them to breathe with greater ease the rarified atmos¬

phere of the high altitudes. Cats with slit noses are much valued. As to cats coming from this place or that, such as Persia, Angora, etc., a good deal of proof is required before any particular claim can be accepted. The writer has failed to find any long-haired cats at Teheran, and Angora, as has been said, is but a small place. We probably obtained many of our long-haired cats from around the Persian Gulf, and more from India, many of which come down from the interior of Asia with the Arab horse-traders. Cats vary in their adaptability to changes of climate, and no doubt to this factor we owe what we have and what breeds we can retain and perpetuate.

The Siamese soon succumbs to dampness, but the long-haired cats, in some cases, took to the climate of Maine early in the century, when brought from the East. They bred extensively, and increased and became an article of com¬

merce to the large cities, long before these cities held shows. These cats went by the name of Angoras, and in fact the ordinary nomenclature of the country defines all long¬

haired cats as Angoras. The Maine cats were often carelessly bred, and when shows com¬

menced and competition came they had to give way to the more finely bred English cats, but in other cases they held their own and the blood has been perpetuated. The Maine cats are found in all colors, and some are very big' and strong, but these have been probably crossed with short-haired cats, and a great deal of hybridizing has been done even in England.

There is a Russian long-haired cat, but it has not gained much favor, being solitary in its habits, unsociable in character, coarse in body and fur and dingy in color. A few have been brought from Persia, but they had the faculty of attaching themselves more to other cats than to their owners. They are originally the same cat as the Asiatic, — that is, the Persian or Angora ; and the first long-haired cats must have been brought over by sailors and travelers from the East. All long-haired cats seem to have a common origin in Pallas' cat (Felis manul).

Another cat that has created a great deal of interest is the Maltese. This cat is hard to account for, but should be blue or slate in color and greatly resembles what in Great Britain is called the Russian or Archangel cat, specimens of which have often been brought from Russia; but Lately quite an influx of blue cats has come from Iceland. Whether cold winters are cal¬

culated to develop blue cats I do not know, but it is sufficiently evident that northern climates have produced most cats of that color. Blue cats are not numerous in Great Britain, although they are becoming more so by introduction.

Here in America we have plenty scattered all over the United States, but how they gained their name of Maltese the writer has been unable to discover, for there is no blue cat indigenous to the island of Malta. Probably the cats were brought there in early times from the same source whence the English now obtain theirs, and, the color being peculiar, these cats were selected or by superior hardiness they may have selected themselves. However many people who are not cat exhibitors or who do not know much about cats scientifically keep their short-haired blue ˆMaltese® and are proud of them.

The Chartreuse monks had blue long-haired cats many years ago.

Temperament and Intelligence. — Some

writers have told us that long-haired cats are less affectionate than short-haired cats. This is a mistake, although long-haired cats, on the average, are more intense, more nervous, 28

more highly strung, more pugilistic and have more pluck and daring than the short-haired cats. The cat has great intelligence ; in fact, is one of the most intelligent if not the most in¬

telligent, of the domestic animals, and it is this fact that precludes the possibility of teaching the average cat tricks. For the cat sees through the manoeuvre, and refuses to be made a fool of. In respect to memory they are phenomenal and far exceed the average dog in this quality.

Their powers of conversation are well devel¬

oped, accompanied by delicate inflections of the voice that need to be known to be understood.

Dupont de Nemours says: <(The cat has also the advantage of a language in which the same vowels as those pronounced by the dog exist, with six consonants in addition, m, n, g, h, v, and f.® It requires study to get to know cats, and Rouviere, the actor, said that no one could really understand a cat unless he himself be¬

came one. A cat, of all the domestic animals, has retained the greatest part of its wild nature and traits, and the easiest way to get at a cat is by kindness and by trying to learn cat ways.

A cat never gives in to coercion. Liberty is the last thing it will resign; and often it will not resign that except in exchange for death.

The cat should be used as the emblem of liberty.

It is a mistake to suppose that a cat cares only for places, for it is only the innate con¬

servation of the animal that gives this impres¬

sion. Regularity is the keynote of its existence and -what it does one

day it likes to do the next; and certainly to places where it has been reared and has lived it shows great attachment.

But on the contrary there are cats that would settle down anywhere, that have crossed and re¬

crossed the Atlantic Ocean, and have lived quietly in any locality their owners chose. A cat is one of the finest mothers on earth.

Cat-fanciers' Associations. — The fortunes of the cat are now more or less regulated by clubs and associations, and there are homes, hospitals and refuges in many places and in many lands. The principal clubs are the Na¬

tional Cat Club founded in 1887, with head¬

quarters in London ; the Scottish Cat Club, founded in 1894; the Cat Club, London, founded in 1898; the Northern Counties Cat Club, the Silver and Smoke Persian Cat Society, the Siamese Club and the Orange, Cream, Fawn and Tortoiseshell, founded in 1900; the Black and White Club, the Blue Persian Society, the Chin¬

chilla Cat Club, the Short-haired Cat Club, the Midland Counties Cat Club, the British Cat Club and the Manx Cat Club, founded in 1901.

All the above are in Great Britain, but many have members in America. In the United States there are the Beresford Cat Club, founded in 1899, with headquarters in Chicago ; the At¬

lantic Cat Club, with headquarters in New York; the Chicago Cat Club, the Louisville Cat Club, the Pacific Cat Club, the Orange and Cream Society, with headquarters in Chicago, the Washington, D. C., Cat Club, the Detroit Club, *etc.* All these have been founded since 1899; so we can see that the advances made of late years have been sudden and rapid ; and they will continue to grow ; for shows are held in many of the principal cities and are yearly fixtures. Prices for cats increase; and whereas $25 was considered a good price a few years ago, some of the best have been recently sold for $250 each, and many at $75 and $100. The largest price of which we have record as having actually been paid in cash for a cat is $300, which was the price Lady Decies paid Mrs.

Greenwood for Lord Southampton ; although I expect to see this exceeded in time to come, for competition enhances values, and the

best speci¬

mens and most perfect will bring high prices from those who want them. All this will tend to draw attention to the cat and better the race and its general conditions.

•Cats have had their artists : the Egyptians, the Japanese, the Chinese, Salvator Rosa, Gott¬

fried Mind (((The Raphael of Cats®), Burbank (a master little known), Cornelius Wisscher, the Dutch artist, whose (<Tom® cat has become typical, J. J. Grandville, Harrison Weir, Louis Wain, Madame Ronner and Adam.

Members of the English royal family breed and exhibit cats at the regular exhibits of the present day. The Duchess of Connaught, the sister-in-law of the late King, was the organizer of the National Cat Club, one of the associations which maintains a thoroughly re¬

liable studbook for cats ; the Queen mother Alexandra herself is one of the active members of the Ladies' Kennel Club, and both Princess Christian and her daughter, Princess Victoria of Schleswig-Holstein, have taken many first prizes with their valuable feline pets.

A Few Hints to Breeders. — Do not try to keep too many; a good cat well reared will bring more money than 8 or 10 badly nurtured, undersized kittens. Cats are not gregarious, and when crowded together become diseased and mangy, and prematurely die. One litter of really good cats will give more pleasure and profit to the owner than five or six litters of poor ones.

Liberty is necessary to the health alike of the present and of the coming generations, and these latter should never be out of our minds when mating.

Meat is the main diet of all the carvivora to which order domestic cats

belong. The best diet for cats is composed largely of meat, for which their teeth are adapted. Without meat they will not long remain healthy. They vary in their tastes, and what is fancied by one is not always preferred by another. Fish they are fond of, but as a rule house cats should not be given much raw fish. Cats kept in confinement should have grass, vegetables and changes of diet provided for them. Grass is a necessity.

Epidemics that sweep through different coun¬

tries and continents at stated periods decimate the cat family, and it is well to be prepared for such occasions by having none but the health¬

iest and best of animals. Distemper, the great¬

est of cat scourges, is best treated by nursing, care and cleanliness. Fleas convey embryonic worms which infest cats, and should be rigor¬

ously kept down. They breed in cracks in the floor, in bedding and in the ground, and war waged upon their haunts will be work well laid out.

Do not use nauseating drugs for ailing cats, but choose the mildest remedies that will effect a cure. Do not be prejudiced against a course of treatment till you have tried it well ; and re¬

member that supposed cures suddenly made are not always effectual. Cats, when ill, require sympathy as much as human beings, and more so than any other animal, in order to battle suc¬

cessfully with disease, for they have a tendency CAT-BIRD — CAT-OWL

to be very pessimistic and sorry for themselves, and to recover or fail quickly. They suffer mostly from distemper, worms, eczema, bron¬

chitis, pneumonia and liver diseases, and occa¬

sionally from catarrhal fever. If you are acquainted with a good homoeopathic physician, and have any idea of what ails your cat, consult him and abide by his advice.

Do not breed from your queens too young, although many good kittens have been raised from queens not a year old, if strong and healthy. Male cats will not mate as early in life as the queens, and are seldom of much use till a year old. Do not cross long-haired cats with short-haired cats, for you spoil the type of both. Siamese cats will breed with other cats, but the progeny are never good for the show¬

room ; and the Siamese being a distinct breed, does not amalgamate with any of the other varieties. The Manx cat is better kept pure, or the type degenerates and the result is not satis¬

factory.

Remember, when trying to rear good cats, that what goes in at the mouth and the care bestowed upon the young and growing animals cover 50 or even 75 per cent of essential re¬

quirements. The best blood in the world will not bring prize-winners or nice pets if they are badly reared. The crucial period takes in the first six months ; when the young cat is well grown, and at seven months of age is through teething, you will have an animal that may live 20 years or more. Healthy cats are more long-lived than dogs, and authentic records tell of not a few over 20 years of age, and of some even 30.

Kittens should not be taken away from their mothers before they are at least eight weeks old; and if three months old, it will be still better. Care should be exercised in the diet of kittens at an early age. Sudden changes or sudden chills will bring on gastritis. Milk, unless pure, is more dangerous than meat, which in a raw state may be given scraped or minced at a very early age. Milk is better when mixed with Robinson’s prepared barley according to the directions on the box, unless you can obtain warm milk from a cow that has not been too long in milk. The most dangerous diet for highly bred kittens is cold

skimmed milk of an uncertain age.

To destroy a cat, or put it out of its misery when too sick to recover, administer a few drops of chloral, place the cat, if possible, in a tight box, and when the cat is fast asleep drop into the box a sponge saturated with two or three ounces of chloroform.

Bibliography. — Barton, (The Cat : Its

Points and Management (New York 1910) ; Champfleury, (Les Chats) (Paris 1870) ; Cham¬

pion, Everybody's Cat Book' (New York

1909) ; Dawson, (Mammalian Anatomy, with Special Reference to the Cat (Philadelphia 1910) ; Hehn, (Kulturpflanzen und Hausthiere) (Berlin 1894) ; Hill, W., ˆDiseases of the Cat ; Hoey (Mrs.), Cashel, (The Cat, Past and Present ; Huidekoper, <The Cat (New York 1903; standards of form, treatment, etc.) ; Hunt, (The Life Story of a Cat (London 1910) ; Jennings, (Domestic and Fancy Cats> (London 1893) ; Marks, (The Cat in History, Legend an-d Art (ib. 1909) ; Repplier, Agnes, (The Fireside Sphinx) (New York 1901 ; historical and literary) ; Rolleston, En Domestic Cats' in Journal of Anatomy and Physiology (Vol. II, London 1868); Ross, C. H., <Book of Cats'; Simpson, Frances, (The Book of the Cat' ; Stables, G., Eats: Handbook to their Classifi¬

cation, Diseases and Training' (London 1897) ; Warwick, Eats Eyes' (ib. 1911) ; Weir, Harri¬

son, Eur Cats: Varieties, Habits and Manage¬

ment' (New York 1889) ; Williams, (The Cat: its Care and Management' (Philadelphia 1908) ; Winslow, H. M., Eoncerning Cats' (Boston 1900).

Revised by Ernest Ingersoll.

CAT-BIRD, one of two kinds of birds.

(1) In North America a familiar songster (Galeoscoptes carolinensis) , so-called because of its mewing call-note, which is strikingly similar to the plaint of a kitten in distress.

This, however, is not its only note, its wild and melodious warbling in the morning and the evening being also typical of the musical thrush family to which it belongs. It is about nine inches long, and of a dark slate color, with a black cap, and a reddish patch under the tail.

It is migratory only in the Northern States, spends its winters in the South, and frequents bushy pastures and gardens, being one of the few species which follow the course of agri¬

culture., and being rarely found far from the habitations of the farmer. It is of great service to the agriculturist in devouring wasps, grubs, worms and insects, which, with fruits and berries of all kinds, especially of sumach, sweet gum and poke, constitute its food. It has a brilliant and varied song, in which it seems to mimic the notes of other birds ; when in a domestic state it will imitate strains of instru¬

mental music. The nest, generally built in bramble thickets, is large, and constructed of twigs and briers mixed with leaves, weeds and grass, lined with dark fibrous roots arranged in a circular manner. Its eggs, from four to six in number, are of a greenish-blue color, without spots. Its attachment to its young is remark¬

able, and it will often feed and raise the young of other birds. It migrates during the night.

It frequently attacks the common blacksnake, which, in the absence of the bird, rifles its nest.

(2) In Australia, one of the bower-birds (JElurcedus viridis), so named because of its cat-like call.

CATBOAT, a boat having one mast

stepped just abaft the bow and carrying a sail laced to a boom and

gait, resembling a schooner's mainsail. In general catboats are very broad in beam, averaging 1 :3. They are usually equipped with a center-board, which, with the extreme forward position of the mast, enables them to point high into the wind, and makes them remarkably quick in stays. They are principally employed as pleasure craft on the coasts and inland navigable waters of the United States, and are consequently of shallow draft.

CAT ISLAND, one of the Bahama Islands, about 36 miles in length from north to south, and three to seven miles in its mean, breadth.

Pop. 3,000. This island was long identified with the Guanahani or San Salvador of Colum¬

bus, the first portion of land belonging to the New World on which he landed.. 12 Oct. 1492, an honor now conceded to Watling Island.

CAT-OWL, any of several widely dis¬

tributed large owls, so called because of their 30

feline habits and cat-like face; also, locally, the common little screech owl. The best known American cat-owl is the barred owl (Strix varia), one of the largest birds of its kind, large specimens reaching 24 inches in length.

It has no ear-tufts, and the general color is whitish, everywhere transversely barred with deep umber brown, except on the abdomen, where the stripes run lengthwise. It is a lover of the woods, where its coughing cry resounds afar in the darkness, and where it breeds in hollows or among the branches of trees. It is not migratory, and often nests very early in the spring. This owl has the reputation of being especially destructive of poultry, but in truth it lives mainly on mice,

of which it devours vast numbers each season, and hence is the benefactor rather than the marauder of the farm. Consult Fisher, < Hawks and Owls of the United States. }

CAT-SHARK, any of various members of

the S cylliorhinidcB , a group of true sharks which are characterized by having two dorsal fins, the anterior of which is placed over or behind the ventral, and by having the tail not bent upward. Some of these are called also ˆroussettesA

CATABANGENES. See Catubanganes.

CATACLYSM, in geology, a physical

catastrophe of great extent, supposed to have occurred at different periods, and to have been the efficient cause of various phenomena ob¬

served in the surface configuration of localities.

The belief in cataclysmic movements as ge¬

ological agents has largely given place to that in the working of ordinary agencies over long periods of time.

CATACOMBS, subterranean caves or

vaults used as burial-places. All nations have been accustomed to some outward manifesta¬

tion of regard for the dead, such as funeral solemnities, the consecration of grounds for sepulture, the erection of monuments, *etc.*

Some nations, as the Egyptians, constructed pyramids and labyrinths to contain the remains of the departed. Others, as the Phoenicians and after them the Greeks, hollowed out the rocks for tombs, surrounding their towns with vast magazines, containing the bones of their fathers. Asia Minor, the coast of Africa and Cyrenais, afford instances of these

singular and gigantic works. The discovery of these mon¬

uments has always excited the curiosity of travelers and the attention of artists. The latter have applied themselves to learn from them the character of architecture and paint¬

ing at different epochs ; and though they have often found only coarse representations, the productions of art in its infancy or decline, they have occasionally met with types of per¬

fection. Many monuments of this description have been preserved to our days, and still con¬

tain traces of the painting and architecture with which they were decorated. There are catacombs existing in Syria, Persia and among the most ancient Oriental nations. But the revolutions in these countries, and the changes which they have occasioned, have deprived us of the documents which would have given us exact information regarding them.

The description of the catacombs in Upper Egypt gives us an idea of those whose loca¬

tion is still unknown to us. They contain the history of the country, and the customs and manners of the people, painted or sculptured in many monuments of the most admirable

preservation. The subterranean caves of these countries, like almost all of the kind, have their origin in quarries. From the depths of the mountains which contain them, stone was taken, which served for the building of the neighbor¬

ing towns, and also of the great edifices and pyramids which ornament the land. They are dug in a mountain situated in the neighborhood of the Nile, and furnished the Romans with materials for the construction of buildings in their colonial establishments. The excavations in these mountains are found throughout a space of 15 to 20 leagues, and form subter¬

raneous caverns which appear to be the work of art ; but there is neither order nor sym¬

metry in them. They contain vast and obscure apartments, low and irregular vaults, supported in different parts with piles left purposely

by the workmen. Some holes, of about six feet in length and two feet wide, give rise to the conjecture that they were destined for sepul¬

chres. Cells of very small dimensions, formed in the hollows of these obscure caverns, prove them to have been the abode of recluses.

In Sicily and Asia Minor a prodigious num¬

ber of grottoes and excavations have been dis¬

covered containing sepulchres. Some appear to have served as retreats to the victims of despotism. The greater part are the work of the waters which traverse the mountains of these regions, as for instance the great cave of Noto, which passes for one of the wonders of Sicily. This cave, the height, length and breadth of which are equal, has been formed by the Cassibili River, which runs at the bot¬

tom, and traverses it for the length of 100

fathoms. In the interior of this cave are a number of houses and tombs. At Gela, on the south coast, there are abodes for the living and sepulchres for the dead, cut in the rocks ; at Agrigentum subterraneous caves, labyrinths and tombs, arranged with great order and sym¬

metry. There are. also caverns in the environs of Syracuse which may be ranked with the principal monuments of this description, from their extent and depth, their architectural orna¬

ments, and from some historical recollections attached to them. The catacombs in the tufa mountains of Capo di Monte, near Naples, con¬

sists of subterraneous galleries, halls, rooms, basilicas and rotundas, which extend to the distance of two Italian miles. Throughout there are seen niches for coffins (loculi) and bones. A description of them was given by Celano in 1643. They probably owe their origin to the quarries which afforded tufa for the walls of the cities Palaeopolis and Neapolis, and afterward served as sepulchres for the Christian congregations.

The most numerous and extensive cat¬

acombs are those in the immediate neighbor¬

hood of Rome, at San Sebastiano, San Lorenzo, etc., the earliest of which of certain date be¬

longs to the year 111 a.d. They are composed of interminable subterraneous galleries, extend¬

ing underneath the town itself as well as the neighboring country, and are said to contain not less than 6,000,000 tombs. The name of catacombs, according to Saint Gregory, was at first applied to designate exclusively the cave in which the bodies of Saint Peter and Saint CATACOMBS

Paul were buried, and it was only at a later period that it came to be given to all the sub¬

terraneous passages which were used as public burying-places. It is now regarded as certain that in times of persecution the early Christians frequently took refuge in the catacombs, in order to celebrate there in secret the cere¬

monies of their religion ; but it is not less certain that the catacombs served also as places of burial to the early Christians, and that in spite of the contrary opinion which prevailed for two centuries, and even down to our day, the catacombs were not for the most part abandoned quarries, but were excavated by the Christians themselves. It is found that orig¬

inally the cemeteries of Rome were made up of separate tombs, which rich Christians con¬

structed for themselves and their brethren, and which they held as private property under the protection ‘of the law. But in course of time this was changed. At the end of the 2d cen¬

tury there existed certain cemeteries not the property of individuals but of the Church.

Such was that which Pope Zephyrinus (202-19) entrusted to the

superintendence of Calixtus, and which took its name from that bishop.

Some years later, under Pope Fabian (236-51), there were already several such common bury¬

ing-places belonging to the Christian congre¬

gations, and their number went on increasing till the time of Constantine, when the cat¬

acombs ceased to be used as burying-places.

From the time of Constantine down to the 8th century they continued to be used as places of worship by the Christians, but during the siege of Rome by the Lombards they were in part destroyed, and soon became entirely in¬

accessible, so that they were forgotten. The first excavations in them were made by Antonio Bosio between 1560 and 1600. The results of these excavations were published in his (Roma Sotterranea) (Rome 1632), which was translated into Latin by P. Aringhi (Rome 1657). Among the more modern works on the subject may be mentioned Rochette's (Tableau des Catacombes de Rome) (Paris 1837) ; Perret's (Les Catacombes de Rome) (Paris 1851-56) ; and (La Roma Sotterranea Cristiana) by De Rossi (kome 1864-77), contain¬

ing the results of very careful investigations made by the author, who is justly regarded as the foremost student, in fact, father of this branch of archaeology.

The catacombs of Paris, situated on the left bank of the Seine, are almost equally cele¬

brated. The name itself, which has been given to this labyrinth of caverns and galleries from its resemblance to the asylums and places of refuge of the persecuted Christians under Naples and Rome, informs us of the purpose to which it has been applied since 1786. These galleries were originally the quarries from which materials were excavated for construct¬

ing the edifices of the capital. The weight of the super-incumbent houses rendered it neces¬

sary to prop them ; and when the cemeteries of the demolished churches and the burying-grounds were cleared in 1786, the government resolved to deposit the bones in these quarries, which were consecrated for that purpose. The first cemetery that was suppressed was the Cimetiere des Innocents, and the bones from it were deposited beneath what is now Petit-Montrouge. The ossuary now extends much farther. The relics of 10 or more generations were here united in the repose of the grave.

Many times as great as the living tide that rolls over this spot is its subterraneous pop¬

ulation. By the light of wax tapers, a person may descend about 70' feet to a world of silence, over which the Parisian police keep watch as strictly as over the world of noise and con¬

fusion above. He will then enter a gallery where only two can go abreast. A black streak on the stones of the walls points out the way, which, from the great number of by-passages, it would be difficult for the visitor to retrace without this aid or without guides.

Among the curiosities here is a plan of the harbor of Mahon, which an ingenious soldier faithfully copied from memory, in the material of the quarries. Entering the hall, one is ushered into the realms of death by the in¬

scription which once stood over the entrance to the churchyard of Saint Sulpice : aHas ultras metas requiescunt beataru spent exspec-tantes ® (((Beyond these bounds rest those awaiting the hope of bliss fulfilled®). Narrow passages between walls of skeletons ; chambers in which monuments, altars, candelabra, con¬

structed of human bones, with festoons of skulls and thigh-bones, interspersed occasionally with inscriptions, not always the most happily selected, from ancient and modern authors, ex¬

cite the gloomy impression which is always pro¬

duced, even in the most light-minded, by the sight of the dissolution of the human frame.

Wearied of these horrible embellishments, the visitor enters a simple chapel, without bones, and containing an altar of granite. The inscrip¬

tion «D. M. II et III Septembr. MDCCXCII®

recalls to memory the victims of the September massacres, whose remains are here united. On leaving these rooms, consecrated to death, where, however, the air is always preserved pure by means of air-holes, the visitor may pass to a geological cabinet, formed by Hericart de Thury, the director of the Carrieres sous Paris. Specimens of the minerals furnished by the regions traversed, and a collection of diseased bones, in a contiguous hall, scien¬

tifically arranged, are the last curiosities which these excavations offer. More than 600 yards to the east of the road to Orleans the visitor finally returns to the light of day. Strangers may visit the catacombs in company with the government officials at the periodical visits.

An account of these subterranean passages is that which was published by M. Dunkel in 1885.

The Etruscan tombs were not, strictly speak¬

ing, catacombs, yet as subterranean places of sepulture they may appropriately be referred to. They were usually hewn out of cliffs on the sides of a hill and were variously arranged, sometimes tier above tier and sometimes on a level. There was a central chamber with smaller ones opening from it. In the latter there were stone benches to receive the bodies of the dead. See Catacombs, Roman.

CATACOMBS, Roman. The ((Catacombs

of Rome® is the name given to the underground cemeteries in which were laid to rest the Chris¬

tians of the Eternal City during the first four centuries. The word itself seems to be a hybrid from the Greek Kara and the Latin climb ere, and signifies ((next the sepulchres.®

It first came into use at the end of the 3d cen¬

tury as a topographical term for a point of the 32

Appian Way. In the course of time it was applied to the adjoining cemetery of Saint Sebastian, and in the Middle Ages, when the other cemeteries were forgotten, it became a general designation for all the early Christian burial-places at Rome. It was a word un¬

known, however, to the first followers of Christ, who called the sepulchres of the saints cemeteries, (<places of sleep, owing to their faith in the Resurrection. There are some 32

of these larger early Christian cemeteries be¬

yond the Aurelian wall, bordering the ancient Roman roads and encircling the city of the living with a silent city of the dead. The most important are the Catacombs of Priscilla on the Via ‘ Salaria, of Calixtus on the Via Appia, of Domitilla on the Ardeatina and the Ostrianum on the Via Nomentana. In this Roma Sotteranea there are some 550 miles of underground corridors, honeycombing the soil of the deserted Campagna and running like streets in all directions and at every angle, now near the surface and again descending to the depth of 75 feet, expanding here into a room and there into a crypt or chapel, along whose sides the faithful were buried in rows one above the other like the shelves of a shop or the bunks of a vessel. The corridors average about three feet in width and six feet in height and were dug generally in three or four levels, ranging from 30 to 50 feet below the surface of the soil. The niches, called loci, or loculi, which contained the bodies, were closed by a marble slab or a series of tiles, on which was frequently carved some inscription. To under¬

stand the origin of the Catacombs it is necessary to keep before our minds (1) the funeral customs and laws of Imperial Rome; (2) the early Christian mode of burial ; and (3) the nature of the soil out of which sprung the famous seven hills. (1) The ancient Romans had a great reverence for their dead. Religi-osum locum units quisque sua voluntate facit, dum mortuum infert in loco suo. Wherever a body rested became terra sancta, sacred soil, subject to the authority of the pagan pontiffs.

Hence burials were forbidden inside the walls, and the ways leading out of the city were lined from the first to the third milestone with the mausolea, whose richness was one of the glories of the Imperial City, as their ruins are one of the beauties of modern Rome. The pagan

mausoleum consisted of three parts, the monu¬

ment proper, the area or lot of ground and the underground vault in which the ashes were placed in dovecot niches, known as columbaria.

These burial plots with their magnificent monu¬

ments were owned by burial societies as well as by families and were fully protected by the law. The Christians likewise, either singly or collectively, erected their mausolea along the highways beyond the walls, and this prop¬

erty, even in times of persecution, was safe¬

guarded by the majesty of Roman law. Hence it often happened that while the law spilled the blood it spared the body of the Christian.

The opinion sometime current that the bodies of the martyrs were buried by stealth, and that the pagan authorities were ignorant of the existence and extent of the Catacombs, is altogether unfounded. The Catacombs were registered under and recognized by the law.

They enjoyed the privilege of sacrosanct soil.

Indeed many of the bodies were interred in surface cemeteries as to-day. (2) The first faithful originated no special mode of burial.

They generally followed the customs of the people among whom they lived. They adopted the Jewish practice of interring, instead of the Roman method of cremating, on account of their belief in the resurrection of the flesh.

The sepulchre hewn in the rock, where the body of Christ was laid, was the resting place too of the Christian body. This was first wrapped in a tunic or winding sheet previously coated with a preparation of plaster, was covered with perfumes and flowers and placed in one of the niches cut out of the subterranean crypt or along the corridor. In the case of the martyrs or wealthier converts the bodies were laid sometimes in a marble sarcophagus or in an arched grave hewn out of the rock, termed arcosolium, and called bisomus or trisomus, according to number of bodies it contained.

(3) The soil of the Roman Campagna is of volcanic origin and consists of three distinct sorts of tufa: (1) the lithoid tufa or peperino, a hard building stone ; (2) the fine pozzalana sand used in making the Roman cement; (3) a granular tufa, of no commercial value. How¬

ever this granular tufa was readily worked, and it is precisely in this stratum that we find the Catacombs. The workmen followed these veins in excavating, whence the apparent con¬

fusion of the courses and distance of the depths. It was thought at one time that the Catacombs, like the arenaria, were excavated for building purposes, but modern research has shown that they are of distinctively Christian origin and have nothing in common with the arenaria either in mode or material of con¬

struction.

Origin. — The genesis of the grave among the faithful at Rome was something like this.

The wealthier Christians owned their burial lots along the public roads leading out of the city. They had their monument fronting the way, marked with the name of the family.

This, for instance, was the case with <(Sepul-chrum FlaviorurcC on the Ardeatine Way. The crypt beneath, instead of being fashioned into a columbarium, had the graves cut out of the soil. At first this crypt \vas placed at the dis¬

posal of the brethren of the Ecclesia Fratrum, and, as the number of burials increased, the crypt was gradually^ extended under the entire surface of the lot. Thus the Catacombs in the 1st and 2d centuries were little more than the private burial vaults of the wealthier Chris¬

tian converts. These original centres of exca¬

vation have been recognized in many cases, as, for instance, the crypt of Lucina in Calix¬

tus, the Greek Chapel in Priscilla and the Spelunca magna in Praetextatus. At the begin¬

ning of the 3d century the cemeteries passed from private to Pontifical control. About the year 197 Zephyrinus appointed the deacon Ca¬

lixtus to take them in charge, and the latter has bequeathed his name to the best known of them, which became the official burying place of the bishops of Rome in the 3d century^ and contains the famous papal crypt. Henceforth the Catacombs were owned and administered by the

Church. Each one of the 25 parishes in which ecclesiastical Rome was divided in the 3d and 4th centuries had, roughly speaking, its corresponding cemetery. The identification of the tituli and the cemeteries has been estab-CATACOMBS

lished in a number of instances. With the increasing number of the faithful were formed burial societies among the brethren, which, like the pagan societies, provided by the payment of dues for the benefits of burial to deceased members. They owned their own lots, had their own houses built above the ground, in which they met to celebrate their agape and funeral feasts. Hence there was nothing incongruous in the Christians assembling at the Catacombs on stated occasions to keep the anniversary feasts of their martyrs. Similar celebrations were held by the pagans themselves, and there is a striking resemblance between the liturgy of these pagan funeral feasts and the language of the Roman martyrology. The inviolability of the cemeteries was undisturbed even in times of persecution, save by Valerian, in 258, and Diocletian, in 303. The part played by these burial societies in the Church is still in dis¬

pute. De Rossi has advanced the theory that the Church in the 3d century owned its prop¬

erty as a burial society, as Ecclesia Fratrum or Ecclesia Cultorum Verbi. Duchesne, how¬

ever, contends that even in period of persecu¬

tion, the Church was recognized as a religious society, capable of holding property. The work of excavating was under the care of a distinct class, called fossores or diggers. They were regarded as an inferior sort of clergy, and many of the rude inscriptions were made by them.

The Constantine Period — It has often

been said that the victory of Constantine brought the Church from the Catacombs to the cathedral. The reverse is literally true. It was

precisely in the era of peace that the Church betook itself to the Catacombs and that they attained their largest growth and grandeur.

Everyone wished to be buried close to the martyrs of Christ. Quod multi cupiunt et rari accipiunt, we read in an inscription of the year 381, of one who had obtained burial near the sepulchre of the saints. The crypts of the martyrs were changed into triumphal halls of fame. They were decorated with the choicest of marbles from the wealth of the Imperial City. New corridors and entrances were cut, the old ones were joined together. Metrical hymns of praise were placed above the graves of the chief martyrs, especially by Pope Damasus. Lights were kept burning before their shrines, and thither the devout of the city were continually flocking to implore the intercession of the saints or to honor their memory. Even the great Constantine basilicas of Saint Peter on the Vatican, Saint Lawrence on the Labi-cana, Saint Paul on the Ostian, Saint Agnes on the Nomentana, were but triumphal canopies erected over the tombs of these Christian heroes. Toward the end of the 4th century the custom of burying in the surface cemeteries began to prevail, and after the sack of Rome by Alaric, in 410, interment in the Catacombs ceased altogether.

Period of Decline. — In the succeeding cen¬

turies they were chiefly centres of devotion and terms of pious pilgrimages from the North.

The itineraries of these pilgrimages from Eng¬

land and Germany, some of which have been preserved, were veritable Ariadne-clues in the rediscovery of these buried labyrinths. For some time the Popes of Rome, notably Vigilius (“537-55), John III (561-74) and Honorius I vol. 6 — 3

(625-38) kept the shrines in a state of repair; but after the ravages wrought in the Cata¬

combs by the invading Lombards, Paul I in 757 and Paschal I in 817 translated the relics of the martyrs to churches within the walls.

Despoiled of the treasures which had attracted visitors, they rapidly fell into decay. With the exception of the Catacomb of Saint Valentinian on the Flaminian, and Saint Sebastian on the Appian Way,

their very existence passed out of the minds of men in the Middle Ages.

Rediscovery and Research. — In 1587 some workmen, excavating on the Via Salaria, chanced upon a Catacomb corridor, rich in paintings and inscriptions. The interest aroused by this discovery has never since died out.

Antonio Bosio (1576-1614), the Columbus of the Catacombs, devoted his life to their explora¬

tion. His (Roma Sotteranea) is the first classic on the Catacombs. The researches made by Boldetti and Battari and others in the 18th century were mainly in the interest of contro¬

versy. To the Jesuit, Father Marchi, belongs the glory of having inaugurated, in 1841, a strictly scientific study of these early monu¬

ments and memorials, and the still greater glory of being the master of Giovanni Battista de Rossi (q.v.), the father and founder of the science of Christian archaeology. By his genius and labors he explored and excavated the buried crypts and corridors of the Catacombs, established their identity and called them by name. From broken stone and damaged fresco and forgotten tomb, he gathered together the materials of a monumental Encyclopaedia Romana, a storehouse of the treasures of early Christian belief and behavior.

Paintings. — In regard to the many paint¬

ings found in the Catacombs, it may be said in general that the history of the decline of Classic is that of the beginning of Christian art. In fact nearly all the examples extant of Roman paintings in the 2d, 3d and 4th cen¬

turies are in the Catacombs. They show us that the Church baptised the art as well as the language of the Graeco-Roman world.

While the themes treated for the most part have a direct reference to the grave and be¬

yond, they still illustrate a large part of the creed of the early Church. The Catacomb frescoes belong to three distinct periods. In the 1st and

beginning of 2d century, there was properly speaking no Christian art. The methods and motifs of the pagan painter, such as abound at Pompeii, vines, garlands, flowers, fishes, fruits, birds, cupids, etc., appear likewise in the Catacombs. However even among these designs, those that were capable of symbolizing some Christian truth, as the vine, peacock, dove and fish, predominate. In the 2d and 3d cen¬

turies, as the cemeteries pass from private to public control, a series of paintings distinctly Christian begin to appear. They are symbolical in meaning and similar in execution.

In the third epoch which corresponds to the time of peace, the pictures tend to become more and more realistic, until they are petrified in the 5th and following centuries in the rigid forms of Byzantine art.

The Biblical Cycle. — A remarkable parallel between the prayers of the Roman Breviary for the commendation of the soul in the hour of death and the Biblical Cycle of cemeterial paintings was first pointed out by Le Blant.

This correspondence is so exact as to leave little doubt that these paintings derive their inspiration from the funeral liturgies of the Church. The deliverance of Noah in the flood, of Isaac from the sacrificing hand of his father, of Daniel from the lions' den, of the three children from the fiery furnace, of Susannah from her false accusers, of Jonah from the whale, are the ever-repeated themes, and they all correspond to the liturgical prayers for the dying. The raising of Lazarus completes the Biblical Cycle, and this scene is the gospel for the Requiem Mass. Of this series Jonah and Lazarus are most frequently depicted. The designs are evidently symbolic. A man

stand¬

ing in a chest serves to recall Noah and the ark; the story of Jonah is often told in three scenes; the casting from the ship, the vomit¬

ing forth from the dragon fish and the resting under the gourd. But not infrequently the last scene alone is portrayed. In the same spirit the raising of Lazarus is depicted by a man standing upright at the entrance of a tomb.

Pictures of the Saviour. — There is no like¬

ness of Christ attempted in the Catacombs.

He is represented by the symbol of the fish and the hidden cross. The fish, in Greek, formed the famous acrostic'I yoovg Xp icto?, QeovYiogZuTyp (Jesus Christ Son of God, Saviour) and whether written or pictured was a mystic symbol of the Saviour. The transpierced dol¬

phin in Calixtus is the earliest copy of the Crucifixion. The disguised cross was also of frequent use, and never has this sign been in higher esteem than in the first ages of the Church. It was sometimes represented thus)(; again as an anchor now as the gamma cross rb other times as a trident *jJ. The Constantine monogram X » so called from its use on the Labarum, was the common symbol of the 4th century. It was used even in in¬

scriptions, as in nomine X or in pace X-This X was the early monogram of Christ, as IHS

became the later one, of Jesus. There was no real representation of the Crucifixion till the Middle Ages. The Crucifix is the creation of the ages of faith, and not of the formative period of Christianity. The first pictures in the Catacombs represent Christ as young and beardless, but in the 5th century the Byzantine bearded face with severe features came into vogue. The picture of the Good Shepherd is the Catacomb Christ par excellence. It is found everywhere in the frescoes of the 2d, 3d and early 4th centuries. The Saviour is represented in the garb of a young Roman shepherd, wear¬

ing the short sleeveless tunic, his right shoul¬

der bare, his feet and legs sometimes bare, again covered with shoes

and leggings. In some scenes he carries one of the flock upon his shoulders, in others he plays the pipe while they listen, in others still he leads them to pleasant pastures, but always and everywhere it is the Good Shepherd who seeks and saves.

This picture of love was the reply of the Ro¬

man Church to the harsh doctrine of the Nova-tians in the 3d century.

The Saints. — Most of the pictures of the martyrs belong to the 4th, 5th, 6th and even 7th centuries when their graves became shrines, and were richly decorated. Thpy are Byzantine in execution and resemble the mosaics of that period. They are valuable as witnessing the style of vestments worn by ecclesiastics of the day. The Virgin Mary appears most frequently in the Catacombs as the central figure in the Adoration of the Magi. These vary in number from two to six, but uniformly wear the Phrygian cap. The two most interesting pic¬

tures of the Madonna are in Priscilla and Ostriano. The former is a 2d century repre¬

sentation of the Virgin with child in her arms, with a prophet in front of them, pointing to a star. It is a picture of much grace and excel¬

lent execution. Its classic lines do not appear again in Christian art for more than a thousand years. The latter is a 4th centum Madonna and child, where the X is placed on either side, as though it were a painted echo of the Council of Ephesus. The divine maternity of Mary was certainly in the mind of the artist, and the features of this painting are still preserved in Greek and Russian images. The saints are sometimes portrayed as ˆadvocates® introducing into heaven the souls of those whose bodies were buried near their shrines. This ministerial mediatorship of the saints, exhibited in the Catacomb frescoes of the 3d and 4th cen¬

turies, became a common theme of the apsidal mosaics of the basilicas.

The Soul. — The soul is frequently repre¬

sented by a young woman standing with arms outstretched in an attitude of prayer, called the orans. In paradise the soul is depicted as

a bird flying among the flowers or feasting on the fruits or drinking from the chalice of heavenly delights. The celestial banquet is represented some six or seven times in Saints Pietro and Marcellino by the blessed seated at a semi-circular table, feasting upon the mystic fish under the guidance of Peace and Charity.

The judgment of the soul standing before Christ in the presence of the martyrs seems to be the subject of some obscure frescoes.

The Sacraments. — In the cemetery of Ca¬

lixtus are a series of so-called Sacrament chapels, where the decorations are arranged to set forth a number of Christian truths. First, comes the scene of Moses (Peter) striking the rock. (<And the rock was Christ.® (1 Cor. x, 4); In the mystic water of grace a small fish is being caught by the Apostolic fisherman. Tertullian has painted the thought in words. ((We as little fish are born in the water after our ‘ixdv c, Jesus Christ.® (Tert. de Bapt.) Then succeeds the Sacrament of Baptism, the source of the new life. The catechumen stands in the water, and the priest pours the laver of regeneration on his brow. Next follows the Eucharistic action, portrayed by a priest stand¬

ing beside a tripod altar containing a fish and some bread, while an orante at the other side lifts her hands in prayer. The multiplication of the loaves and fishes and the banquet of Christ with his disciples by the sea of Tiberias next represent the Communion. And finally the resurrection as a result of the Communion is shown in the raising of Lazarus and the deliverance of Jonah. ((He that eateth my flesh and drinketh my blood hath life everlasting, and I will raise him up on the last day.®

(John vi, 55). There are two representations of the Eucharist worthy of remark. In the crypt of Lucina, the primitive centre of Ca¬

lixtus, there are two frescoes (about 150 a.d.), in which two large fish carry on their back baskets containing bread and wine. Here Christ, the fish, the bears the Eu-CATACOMBS

charistic bread and wine, which is himself.

Saint Jerome would seem almost to speak of this scene: uNo one is so rich as he who carries the body of Christ in a wicker basket and his blood in a cup of glass® (Ep. ch. xxv ad Rus¬

tic). Another painting of the first half of the 2d century, discovered by Wilpert (1894), in the archaic part of Priscilla, the Capella Grseca, seems to be a real representation of the Eucharistic action of the <(Breaking of the Bread.® Seven persons, one of them a woman, are seated at a semi-circular table, on which are two plates with five loaves and two fishes.

These, however, are evidently symbolical, for the priest at the head of the table is engaged in the very act of breaking the bread, and before him sits the Eucharistic chalice. This fresco is in a chapel, and seems to be an early representation of the Eucharistic sacrifice. The representations of the other Sacraments are rare and of doubtful interpretation. A gen¬

eral survey of these paintings leads to the con¬

clusion that the early Christians saw nothing in religious representations hostile to the law of Moses; that the early Church had no repug¬

nance to art, and that the art of the Catacombs is Roman and not of Oriental origin. Mgr.

Joseph Wilpert has just published an accu¬

rate and complete edition of the (Pictures of the Roman Catacombs } with German and

Italian texts (Rome 1903).

Sculpture. — Christian sculpture barely ex¬

isted before the 4th century. Catacomb condi¬

tions were not favorable to its growth. A fresco could easily be painted in the gloom of the grave, but carved marbles were both ex¬

pensive and required light and space for execution. Moreover the sarcophagi in the pagan shops were often covered with idolatrous

scenes. Some of these have been found in the Catacombs with the pagan images effaced.

With the era of peace, however, the faithful began to use sculptured sarcophagi, and a number of them are preserved in the Lateran Museum. As far as workmanship is concerned, they are of inferior merit, being executed at a time when art had greatly degenerated. Some of them are little less than carved creeds, con¬

taining on their faqade the main mysteries of the Christian religion. They shed much light on the earlier paintings. The clear carving of the 4th and 5th centuries illumines the doubt¬

ful fresco of the 2d and 3d. In the sarcophagi, it is Peter striking the rock and Peter to whom Christ gives the law. Hence in the earlier paintings Moses typified Peter. Daniel among the lions on the sarcophagi is evidently Christ on the Cross. Hence we have a key to the early representations of this scene.

Statuary. — But few pieces of statuary have been found in the Catacombs. While idols were on all sides, the faithful seem to have held aloof from this branch of art. However several statues of the Good Shepherd were executed, and one of the 3d century preserved in the Lateran is a most beautiful representa¬

tion of the subject. The sitting statue of Hippolytus of the first part of the 3d century, found in the cemetery of his name, is unique among early monuments. It contains inscribed on the cathedra a list of his works and his com¬

putation of the Easter Cycle.

Gold Glasses. — The gold glasses of which many have been found in the Catacombs con¬

sist of a design made of gold leaf, enclosed between two pieces of glass, ordinarily at the bottom of the glass. The subjects treated in these glasses of the 3d and 4th centuries are of two classes. Some of them are genre pic¬

tures, ornamented with the portraits of a newly-married couple of a family group, and inscribed with such toasts as ((Drink ! Live !® They were probably gifts for wedding and family feasts.

Others used probably in the liturgical functions and perhaps as Eucharistic chalices were orna¬

mented with the ordinary Catacomb cycle of paintings, but especially with the images of the Saints. Peter and Paul, Agnes and the Virgin Mary are the subjects most frequently represented. Eighty out of the 300 published by Garuicci portray Saints Peter and Paul.

The constancy of the types, their correspond¬

ence with tradition, and the medallion of the same characteristics found in Domitilla and attributed to the early part of the 2d century, indicate that these are portraits of the Princes of the Apostles.

Mosaics. — There are but few mosaics in the Catacombs, and most of these are of the age of peace. The mosaic is the distinctive Christian decoration of the basilica of the 5th and 6th centuries, as the fresco was of the Catacomb in the 3d and 4th.

Lamps. — The common clay lamp is the ob¬

ject most frequently found in the Catacombs.

Most of them are in no respect different from those used by the pagans. However in the 3d and particularly in the 4th centuries, they were marked with the Christian emblems of the fish, the Constantine monogram, the Good Shepherd, the palm, *etc.* They illustrate the way the Christian faith entered into domestic life after the advice of the Apostle : (<Whether you eat or drink — do all to the glory of God.® (I Cor.

x, 31). The wine flagon and the wine cup, as well as the lamp and the loaf, were stamped with the sign of the cross in the 4th and 5th centuries. The few bronze lamps unearthed are of much more elaborate workmanship and

symbolism.

Other Objects. — Rings, seals and coins adorned with the characteristic symbols of early Christian art have been found frequently in the excavations, as well as a number of miscellane¬

ous objects, such as children's toys, combs, *etc.*

Inscriptions. — The numerous Catacomb in¬

scriptions are of the greatest interest to the Christian scholar. The most precious of them have been arranged in the Lateran Museum by De Rossi. The bulk remains yet in the Cata¬

combs and in the gallery of Christian inscrip¬

tions at the Vatican. They may be divided according to the method of execution into carved, painted and Sgraffiti® inscriptions, the latter being writings rudely scratched on the plaster or tufa; according to time, into the original epitaphs and later laudatory inscrip¬

tions ; according to language, into Greek and Latin ; according to content, into dogmatic and domestic. Many of the tombs are without any inscription whatsoever, and many more are distinguished but by a rude mark or some ob¬

ject pressed into the fresh plaster. As a rule the early epitaphs are the shorter, although brevity is a distinguishing trait of Catacomb epigraphy, in marked contrast to the lengthy pagan eulogies of the time. The name of the 36

departed, with a short prayer and some symbol as the fish, palm, anchor or Constantine mono¬

gram, to which were sometimes added the date of burial and age, forms the ordinary inscrip¬

tion. ((Gerontius, may you live in God,® ((Lu-cilla in peace,® are characteristic epitaphs. The word ˆdeposition® is peculiar to Christian

epig¬

raphy, implying that the body is consigned but for a time to the soil. The short prayers and symbols on the tombs are in general but a reproduction of the ((Memento of the Dead in the Mass,® Ip sis, Domine, locum refrigerii, lucis, et pads , ut indulgeas, deprecamur, t(Re-freshment, light and peace grant to them, O

Lord.® This is the requiem chanted and carved in the Catacombs. Despite the fact that the inscriptions are sepulchral, they yet contain much matter of dogmatic and historic interest.

They express belief in the unity and trinity of God, in the divinity of Christ, in the Holy Spirit, in the resurrection, and almost every article of the creed is carved on some monu¬

ment. Especially strong is the testimony of the Catacombs to prajˆers for and to the dead.

Both are sometimes found in one inscription, as this from Domitilla :

VIBAS

IN PACE ET PETE

PRO NOBIS.

((Gentianus, — pray for us because we know that thou art with Christ,® we read in another.

<(Holy Martyrs, remember Mary,® comes from Aquileia. Januaria bene refrigera et Roga pro nos. This last inscription from Calixtus is a fair sample of Catacomb Latinity. It is orna¬

mented with a small box, containing the rolls of the law, the customary representation of the Bible in early Christian art.

Papal Crypt. — The inscriptions of the crypt where the Popes of Rome were interred in the 3d century are of peculiar interest.

These inscriptions show that Greek was still the official language of the Church in the 3d century. The monogram Mr, martyr, was the official canonization of the Catacombs.

Damasene Inscriptions. — Pope Damasus

(304-85), the first Christian archaeologist, em¬

bellished the tombs of the martyrs with a series of metrical inscriptions, carved on large slabs of marble by his secretary, Furius Dionysius Filocalus. The texts of 40 of these are pre¬

served in the ancient itineraries, and many of the original slabs have been discovered in the excavations of the last 50 years. The inscrip¬

tion of the papal crypt was found broken in 125 small pieces, which, when joined together, gave the entire text. Of all these inscriptions, but a fragment of the title at the tomb of Pope Cornelius remains in its primitive position, so thorough was the work of the devastating Lombard and destroying time. The tomb of Damasus himself, so long sought by the archae¬

ologists, was discovered at the close of 1903 by Monsignor Wilpert. The work of excavating is still going on, but enough data have already been dug from the depths to make it certain that whoever would go back to Christ must pass through the corridors of the Catacombs. Here he will find the mind of the Master in the might of the Martyr, and the love of the Saviour in the liberty of the slave. Here he will find Church and Sacrament, rite and ritual, creed and deed. Here he will come upon a society, Catholic in composition and in charity, Chris¬

tian in faith and in hope, sleeping the sleep of peace and awaiting the resurrection of the flesh in X. The scientific study of the Cata¬

combs has shown that the Christians were numbered in Rome by tens of thousands in the 3d century. ((We are of yesterday yet we fill all that belongs to you ; we leave to you only your temples.® The rhetoric of Tertullian is the reality of the Catacombs. The researches of

De Rossi have shown, too, that the acts of the martyrs have much more historical value than the critical school of history was formerly inclined to give them. Further and fuller research will act as luminaria to dissipate the darkness which controversy has gathered

round the Catacombs. And when the treasures of Roma Sotterranea are all unearthed, should all other witnesses of the faith once delivered to the Saints become silent, the very stones of the Catacombs will cry out to the world the wis¬

dom and grace of Christ.

Consult Lowrie, (Monuments of the Early Church* (1901), which gives in an appendix the best Catacomb bibliography accessible to the English reader.

William Temple.,

Formerly Professor of Philosophy , Saint Jo¬

seph's Seminary , Dunwoodie , N. Y.

CATACOUSTICS, kat-a-koos'tiks or

-kows'tiks, the science which treats of reflected sounds, or that part of acoustics which con¬

siders the properties of echoes.

CATAFALQUE, kat'a-falk, an ornamental

structure, in the form of a scaffolding or stage, for temporarv use at ceremonious funerals. On it is placed the coffin containing a body lying in state, as in a church or other public edifice, and it is sometimes used as a hearse, or set, as the representation of a tomb, over a grave.

CATALA, Valentin, Cuban poet: b.

Havana, 3 May 1829; d. Havana, 7 Sept. 1877.

He studied medicine in Paris and practised his profession there and in Barcelona. Later on he returned to Havana where he graduated in pharmacy in 1868. He had already given con¬

siderable attention to literature while in Europe ; and almost immediately, on his arrival in Havana, he began to write for the Cuban press under the nom-de-plume of <(Claudio,®

and sometimes under his own name. The two principal journals to which his contributions were made were La Prensa and Cuba Literaria.

He was a prolific writer and, like most news¬

paper men, careless of his literary offsprings ; so, much of his best work is still buried in the files of the Havana papers. Among his works which have been collected and issued in book form are (Higiene de los Literatos* ; (Noches de insomnia) ; and <La dalia negra del cementerio de G'iunesP The (Noches) is a col¬

lection of poems, and (La dalia } a legend.

Catala's work displays considerable originality and command of language.

CATALAN, a native of Catalonia (q.v.)

and certain other parts of northeastern Spain.

For the language of Catalonia see Catalan Language and Literature.

CATALAN FURNACE, a blast furnace

for reducing ores, extensively used in the north of Spain, particularly in the province of Cata¬

lonia. It consists of a four-sided cavity or hearth, which is always placed within a build¬

ing and separated from the main wall thereof by a thinner interior wall, which in part con¬

stitutes one side of the furnace. The blast-pipe comes through the wall and enters the fire through a twyer which slants downward. The bottom is formed of a refractory stone, which is renewable. The furnace has no chimneys.

The blast is produced by means of a fall of water, usually from 22 to 27 feet high, through a rectangular tube, into a rectangular cistern below, to whose upper part the blast-pipe is connected, the water escaping through a pipe below. This apparatus is exterior to the build¬

ing, and is said to afford a continuous blast of great regularity ; the air, when it passes into the furnace, is, however, impregnated with mois¬

ture.

CATALAN GRAND COMPANY, The,

a-name of a troop of adventurers raised by Roger de Flor about the beginning of the 14th century. Roger first gave his services to Fred¬

erick, King of Sicily, in his war with Robert, Duke of Calabria, but when peace was con¬

cluded between the two princes, being at a loss how to maintain his soldiers, he proposed to lead them to the East to contend against the Turks, who were then desolating the Eastern empire. Andronicus, then Emperor of the East, gladly accepted the offered assistance of Roger, and submitted to all the conditions which he imposed. Roger set sail from Messina, Sicily, in 1303, with 26 vessels partly equipped at his

own expense. The number of the troops em¬

barked with him is said to have amounted to about 8,000 men of different nations, Sicilians, Catalans, Aragonese, *etc.* The Catalans, either because they were the most numerous or for some other reason, gave their name to the whole company. On his arrival at Constanti¬

nople Roger was received with great rejoicings, and was elevated to the dignity of grand duke.

A bloody affray between the Genoese and the Catalans marked the first period of the stay of these adventurers in Constantinople. An¬

dronicus hastened to get them to cross over into Asia. This they did in the spring of 1304, and in the same year they defeated the Turks completely. In 1305 he took Ancyra and forced the Turks to raise the siege of Phila¬

delphia, but he was not so successful in his attempt to take Magnesia. After a long and ineffective siege he recrossed into Europe in 1306, bringing along with him his Catalans, who left behind them everywhere traces of their plunder and violence. When they had reached Europe they took up their quarters at Gallipoli.

But Andronicus, who was by this time very anxious to be rid of his formidable allies, now received Roger with great coldness, and even obliged him to give up his title of grand duke in favor of Berengarius. The sudden depar¬

ture of Berengarius, however, and the simul¬

taneous incursions of the Turks into Asia Minor, compelled Andronicus again to appeal to Roger and his Catalans for assistance. Roger was raised to the dignity of Gesar to appease him for the slights that had been put on him.

But this only caused him to be regarded with more jealousy by the Greeks, and especially by Michael, the son of Andronicus, who was as¬

sociated with his father in the empire. The re¬

sult was that before he could start once more for Asia he was assassinated (1306 or 1307).

The Catalans now turned their arms against the Byzantines, in order to

avenge the death of their leader, and defeated them in several battles. They then passed into Greece and en¬

tered the service of the Duke of Athens, but no long time afterward they turned against him and defeated him in the battle of Cephissus (1311). They now became masters of Attica, where they maintained themselves for four years, when they were finally defeated by Philes near Bizyn (1315). Consult Gibbon, (Decline and Fall of the Roman Empire) (Chap. LXII).

CATALAN LANGUAGE, one of the

groups of the Romance tongues which has been considered politically in Spain as but a dialect of Spanish. It is, however, as distinctly dif¬

ferent from Spanish and the other Romance languages as is Portuguese. Catalan was long the language of an independent kingdom ; and the influences under which the Latin language passed in Catalonia and the other districts where the ancient Catalan was spoken were quite distinct from those of the other countries of Roman conquest. And it is these influences which have made the Catalan tongue. Modern Catalan seems to be a mixture of the ancient language spoken on the west coast of Spain and the north of Italy on the coming of the Romans for the first time to the Iberian Penin¬

sula, and the Latin of the lower class of Italy influenced in a literary way by classical Latin.

But Catalan has come under other influences.

The Phoenicians, even before the arrival of the Romans in Spain, carried on a trade of some considerable extent and importance with the west coast of Iberia, the people of which, we are told, had attained to considerable civic organization and had important cities in many parts of their territory. It has been claimed for the people of this region, wdth some show of reason, that they were of the same origin as the Romans and that they spoke a Latin tongue, which differed, however, very widely from that of the Italian Peninsula, which was itself divided into widely different dialects.

Others claim that the Catalonians were of Phoenician origin, or that the country had been populated from Carthage, and that there¬

fore the original language of the east coast of the peninsula was Carthaginian. According to various other accounts of their origin, they came variously from Palestine, Greece, Britain, central Asia or even Mongolia. Still others have claimed for them a Celtic origin common with that of the other Celtic inhabitants of various parts of Europe.

Thus there is no certainty as to the origin of the ancient inhabitants of Catalonia. But that their language persisted throughout the Roman occupation of their country seems cer¬

tain, during which period it continued to amalgamate with that of the Latin soldiers.

If the ancient Catalan were really a Latin tongue which had gone the road toward the formation of an analytic language, ˆ the rise of modern Catalan soon after the disappearance of the Roman power about the beginning of the 5th century would be easily explained. But

this ancient tongue would have to have been dialectically decidedly different from that of the Italian Peninsula.

Catalan is spoken in a part of France bor¬

dering on Spain, in the greater part of the Pyrenees Orientales, Barcelona, Lerida, Tar¬

ragona, Gerona, Valencia, Alicante, Castellon de la Planta, a part of Sardinia and the Balearic Islands. It has also had a strong influence on the pronunciation of the Spanish spoken throughout the Latin American countries, notably in Cuba and some parts of Central America. While Catalan was strongly in¬

fluenced by Provencal in a literary way, the language of the people of Catalonia and ad¬

jacent territory resisted this foreign and un¬

natural influence. The result was somewhat curious. Catalan poetry, strongly influenced by the Provengal troubadour, reflected the Provencal mode of thought and form of verse, while Catalan prose, which at first was not looked upon as worthy the name of litera¬

ture, is instinct with Catalan genius and racial feeling, idiom and point of view. This is one of the best proofs of the artificiality of the Provengal influence in Catalonia and of the unfoundedness of assertion that Catalan was nothing more than a variation of Provengal.

Catalonia, owing to the fact that it came into contact, at such an early period in its history, with the Phcenicians, Carthagenians, Romans, British, Celts, Greeks and probably other races, and that it was later conquered or partially conquered by Romans, Carthaginians and

Goths, assumed a mixed character. This was accentuated, in the first half of the 8th century, by the very considerable foreign population which had flowed into the country for com¬

mercial and other purposes. At this time the population of Catalonia was made up of the ancient native stock, Latins, Greeks, Arabians, Chaldeans, Hebrews, Celts, Valencians, Canta¬

brians and people from other parts of Spain.

Business seems to have been carried on in the Catalonian country, or more properly speaking, where the Catalonian tongue or some dialect thereof was spoken, that is, all along the east coast of Spain, from Alicante to Genoa, and over most of the adjacent islands. And it was undoubtedly during this protracted trading period that the Catalan language assumed more or less definite form. Certainly by the 9th century it had become a strong independent language spoken over all the country already indicated. It had discarded Latin grammar, if it had ever had it as a part ot the tongue of the masses, and had assumed all the earmarks of a living, aggressive, popular language. There can be no doubt that Catalan existed apart from Provengal, as the speech of the masses of Catalonia and the countries where Catalan is still spoken; for we find the writers of the later period of Provengal influence in Catalonia conforming to the popular and court usage of the age and writing poetry in Provengal and prose in Catalan. Moreover, when the Provengal influence was suddenly removed, after domina¬

tion of considerable time, the native Catalan sprang up fresh and vigorous as the medium for both prose and poetic expression.

The people of Catalonia have ever shown strong individuality. When they first came into contact with Carthaginians, Greeks, Romans and other civilized races they were given to agriculture, commerce, industry and the sailing of the sea. So venturesome were they that they had coasted out through the Strait of Gibraltar and down the west coast of Africa before Caesar had visited England.

This strength of character they showed in their stubborn retention of their native tongue long after the greater part of the rest of the Iberian Peninsula had adopted Latin. Cicero states that, in his day, which was some considerable time after the conquest, the Catalonians possessed and used a distinct language of their own.

This is all the more strange since the other parts of Spain came much less into contact with the Romans than did all the east coast of the peninsula. We are also told that the Cata¬

lonians spoke different dialects in different parts of their own country. This is born out by the fact that even to-day there is a con¬

siderable variation in the Catalan speech throughout the extensive territory in which it is spoken. If we are to judge from the re¬

mains of early Catalan literature of the popu¬

lar kind and the distinct difference between the pronunciation of Catalan to-day and that of the districts where Provengal had its home, it is more than doubtful if Provengal, even in the days of its popularity in Catalonia and Valencia, was ever understood by the masses of the peo¬

ple ; or by anyone except the nobility and the followers of the court, who through intermar¬

riages and other relationships, had made of Provengal a common tongue for Valencia, Catalonia and the Provengal country. It was, therefore, in a sense, artificial. This explains why Provengal, after it lost its literary in¬

fluence in Catalonia and Valencia, dropped sud¬

denly out of sight, while the native tongue came out from its literary retreat, vigorous and individualistic, capable of expressing all the needs and aspirations of a distinctly individual people. Even at the

date of the earliest Cata¬

lan manuscript it has every evidence of being a distinct tongue with fixed grammatical and other forms; and soon afterward there sprang into existence Catalan grammars, dictionaries and a large body of distinctive literature ; and from this and a later period there survive many manuscripts and printed books ; so that the comparison of Catalan with the other Hispanic languages is rendered easy.

One of the distinctive features of Catalan which distinguishes it from the other Hispanic tongues is its tendency to suppress many of the consonant and unaccented vowel endings so common in Spanish. Thus the Spanish horn-bye, man, becomes horn in Catalan; ciudadano, citizen, becomes ciudadd; bueno, good, bo.

There is also a tendency to other contractions not seen in Spanish. Catalan had early be¬

come an analytical language and had thrown overboard all Latin declensions and other forms peculiar to Latin grammar. Catalan has its own distinctive accent and rough throat sounds different from the other dialectic forms of Spanish. The Catalan speaks very fast, and this combined with his cutting of the Latin final vowel forms (except a) makes it dif¬

ficult for even the Spaniard to understand him when he speaks Spanish. In Catalan the absence of noun declensions is noticeable ; and there is a tendency to strongly accentuate z be¬

tween vowels ; the Latin u is never modified as in French and the Provengal au becomes o.

CATALAN LITERATURE

Finally the b and v are kept distinct. Consult Baellot y Torres, (Gramatica de la lengua catalana) ; Jubert de Passa, (Recherches

historiques sur la langue CatalaneF

John Hubert Cornyn,

Editorial Staff of the Americana.

CATALAN LITERATURE, the litera¬

ture of Catalonia and adjacent districts speak¬

ing the same form of the Romance tongues. It had its origin in the movement started by the troubadours who overran Catalonia, Valencia and Provence, and it attained its highest de¬

velopment in the 14th and 15th centuries. The literature of Catalonia and Valencia is, there¬

fore, closely related to that of Provence, and the two may be said to be practically the same development of the Latin tongue subject to dif¬

ferent influences. The former is naturally di¬

vided into three distinct periods, the first of which embraces the history of the Catalan lit¬

erary movement from the first appearance of Provencal influence to the early part of the 13th century. Catalonia was closely united to the Latin-speaking people across the Pyrenees by origin, interests and customs ; and the influence of Provence, which had early felt the literary movement, became supreme. But under Jaime I the Barcelona dynasty set itself to develop the national spirit of Catalonia with success. This first period of Catalan literature, therefore, was naturally Provencal in character. Troubadours were to be found all over Catalonia as they were first in Provence and later all over France and most of Spain. Up to the coming of this exotic influence there had been no native litera¬

ture in Provence, unless it may have been pop¬

ular songs which, if they ever existed,, have al¬

together disappeared or become so mingled with the Provengal literature as to be undistinguishable. But though the Provencal forms

dominated the Catalan literature during this first period there are signs that the Catalan spirit was beginning to assert itself. The form is Provencal, but much of the spirit of the lit¬

erature is native in forms of expression, modes of thought and subject of poetical effort.

Count Berenguer, toward the end of this Pro¬

vencal period, thinks like a Catalan ; and through his troubadour poetry march Catalan thought, characters and customs proclaiming the com¬

ing of a national literature. Yet his work is still Provengal. Other Catalan writers, toward the close of the 12th century, show the same influence. The rugged spirit of Catalonia had begun to assert itself over the more effeminate Provencal.

The Rise of Catalan. — About the begin¬

ning of the 13th century the Provencal influ¬

ence begins to give way before the new Italian literary domination which was ultimately des¬

tined to sweep over all the Latin countries.

Catalonia and Valencia, lying close to Italy and being in constant touch with it, soon came un¬

der the influence of the new Italian literary re¬

vival ; and imitations of the Italian poets be¬

came the order of the day. Renascent Provencal worshipped at the shrines of Boccaccio, Dante and Petrarch, while still casting loving glances to the Laws of Love and the Romance of the Rose. In Catalonia and Valencia the floral games became an institution patronized alike by sovereign, nobles and the many dabblers in lit¬

erature who seem to have literally overrun the land. At these games poets contested for prizes and kings graciously and proudly award¬

ed them. Among these contestants for poetical honors were many men bearing the highest titles of nobility; for literature was fashionable in

Catalonia and Valencia, where even the sov¬

ereigns themselves aspired for honors higher than their royal distinctions. Under the influ¬

ence of the powerful personality of Jaime I, himself one of the most distinguished of the native writers of his age, the exotic Provencal gave way rapidly to the customs and beliefs of Spanish and Catalan; and under the king's patronage, encouragement and example the Cat¬

alan speech rose into a national language and created a national literature. One of the most noteworthy monuments of the 13th century is the (Chronica o ComentarP of Jaime I, which is at once a biography of his life and a history of his kingdom for that period. It was the first work of true history to appear in Spain.

About it there is a freedom, naturalness and sincerity, and at times a loftiness of style com¬

bined with simplicity of diction and thought, which mark it as a real work of literature, throughout which the king's strong love of everything Catalan is constantly in evidence.

Under the protection of her sovereigns Cata¬

lonia produced poetry, history, moral philosophy and scientific works superior to any other lit¬

erature in Spain at this time ; and she may be said to have led the way for the brilliant Span¬

ish drama which followed. Among the other very notable patrons of literature was Pedro III of Aragon, known as ((the great, }) himself no mean poet and a noted writer on scientific subjects.

Catalan literature attained its highest devel¬

opment in the 14th and 15th centuries. During this period two names, Ramon Llull and Ausias March, stand prominently forth. Llull, who was born in 1235, was a voluminous writer of great talent who had a powerful influence upon the literature of his age. He seems to have cov¬

ered almost every field of literary endeavor and to have done well nearly everything he at¬

tempted. He was a noted orator, naturalist, musician, mathematician, scientist, philologist, jurist, theologian and poet. His works cover almost the whole field of human knowledge.

His hymns to the Virgin are sincere, tender and sweet. Devotion, love of country and the triumphs of religion are his chief themes, as they were those of most of the Catalan writers of his day. Between Llull and March (who died in 1460) there is a long list of Catalan writers who have remained unknown to the outside world simply because they unfortu¬

nately wrote in a language which was destined through the fortune of conquest to be looked upon as a dialect. These include Ramon Vidal whose (La dreta maniera de trovar) (The Art of Poetry) had a powerful influence upon the most notable Catalan poets who followed him; Pedro de Aragon, Ramon de Muntaner, an ex¬

cellent didactic poet, chronicler and historian; Bernat des Clos, a learned writer and historian of note who took for his special theme the counts of Barcelona and Pedro III. Muntaner writes as a soldier of what he saw during his long life, (<so as not to lose the memory of those wonderful feats with which the Catalans and the Aragonese astonished the world. ® His work is extensive, varied, regular and me¬

thodical ; and he writes with authority, in his 40

capacity of chancellor to the eastern expedi¬

tion of the army under Roger de Flor. His work bristles with customs, characters, battles, sieges, speeches and conversations of leaders and warriors ; descriptions of cities, districts and people, all presented in an original and sim¬

ple, direct manner that makes camps and cam¬

paigns stand forth in relief. No such history had been written before in

Spain. Among the other writers of this period were Llorens Mayol, Luis de Villarrasa, Arnaldo March, En Dalman Rocaberti, Juan Ruiz de Corelia, An-dreu Faber, Jordi de Sent Jordi, Jaume March and Mossen Vallmayna, all of whom have left important literary remains. Faber translated the (Divina Commedia) in 1428, Sent Jordi wrote excellent sonnets, and Vallmayna, a poet of note, was an authority on troubadour poetry.

Alfonso V so stirred up the literary en¬

thusiasm of his people that it became the fash¬

ion among his nobles to patronize literature.

Leonardo des Sors, Jaume de Aulesia and Jaume Roig, Lord Francesch Farrer and Lord Torrellas were all writers immensely popular in their day; and Marco is specially worthy of note as a dramatist whose plays appeared to¬

ward the close of the 14th century and prob¬

ably, through their popularity, helped to inspire the noted Spanish drama which followed short¬

ly afterward.

The Golden Age . — Between this latter period and that of the rise of Catalan as a lit¬

erary language is a short and very active period which began about the middle of the 15th cen¬

tury and ended with its close. The bright pecu¬

liar light of this, the height of Catalan literary activity, was Auseas March, the greatest and most original of the Catalan poets. He was a follower of Petrarch; but no servile imitator.

Filled with the troubadour spirit, he wrote ten¬

der love songs, moral didatic poems and senti¬

mental sonets full of true feeling and simplicity of diction. (Cants

d’amor) and (Cants de Mort) are his best and most original poems.

He was very popular during the 16th century when his works passed through several editions and were translated into Spanish (1539). With him Catalan begins to die as a national litera¬

ture, as Catalan individuality soon merged it¬

self into that of the United Spanish kingdom under Ferdinand and Isabel the Catholic. Yet Jaume Roig, who survived March 18 years, helped to keep alive Catalan traditions in his (Libre de Consells) of which many editions were published. A caustic satire on women by Roig is a brilliant and trustworthy picture of Valencian life and habits in the latter half of the 15th century. It is especially valuable from a historical point of view. Contrary to the popular belief, native poetry was not dead in the Catalan country; for as dialect literature it was alive at the beginning of the 18th century. But from 1714 it lay practically dormant for over a hundred years.

Catalan Renaissance may be said to have begun with the works of Verdaguer, Soler and Rubio between 1840 and 1850, though some little interest had been taken in the language by philologists and literary historians previous to this time. Carlos Areban, a noted Spanish poet, wrote in his native Catalan, a fervid ode to his patron, Remisa, in which he painted the past glories of Catalan and mourned its neglected estate. This proved a powerful . inspiration to native Catalans. It was extensively printed, re¬

cited and imitated, and brought vivid, patriotic imitators in its train who urged the study of the ancient Catalan literature; and, wonderful to relate,, this artificial movement was immense¬

ly successful and it became the popular thing in Spain and elsewhere to praise and encour¬

age Catalan. Rubio’s poems, which began to appear in the public press in 1841, stirred up enthusiasm wherever Catalan was read. Look¬

ing to the past and praising the glories of an¬

cient Catalan, they turned attention to a long-neglected and almost forgotten literature. Then came Sol y Padris, young, energetic and enthu¬

siastic, who, taking men's eyes from the past, set them on the future. His became the voice of the prophet proclaiming the renaissance of Catalan. Borafull added to the movement aesthetic taste and good literary style ; Villar-raya, with his ˆancoR and Pascula Perez, with his (Sent Vicente FererP gave a new impetus and enthusiasm to the renaissance movement.

After 1850 Bonilla and Baldovi added a new patriotic note. In 1861 Mila added still more to the Catalan revival by the publication of his (Trovadores en EspanaP which painted, in glowing colors, the early literary history of Spain and especially Catalan. This was fol¬

lowed by Astorch's (Catalan Grammar.) Bla-guer became the bright particular propagandist for the return to Catalan; and Borafull, Mila and Rubio succeeded in restoring the ancient floral games which had done so much to en¬

courage literature • under the native kings.

Teodoro Llorente and Vincente W. Queral add¬

ed fervor, inspiration and correctness of style to the new movement and showed what Catalan was capable of producing in the way of mod¬

ern literature.

Robreno y Renart revived the traditions of the ancient Catalan theatre in his very popular comic drama ; and Federico Soler produced a series of musical parody comedies which were immensely popular, the first of these appearing in 1864. Vidal y Valenciano, in (Tal faras tal trovaras) revolutionized the Catalan drama, in¬

spired numerous other writers of note, and es¬

tablished the popularity of the rising Catalan theatre. Damaso Calvert, Conrado Roure and Francisco Pelayo Briz and numerous lyric poets helped along the Catalan revival. News¬

papers and journals in Catalan appeared in va¬

rious cities and Catalan theatres and good act¬

ors sprang up all over the land. Among the later names of this

movement the most noted are Ignacio Iglesias, Rusignol and Angel Guimera. Of these the latter is by far the greatest name in Catalan literature and his is the foremost name in modern Spanish drama, even though his plays have had to be translated from Catalan into Spanish. Guimera's name is synonymous with Catalan drama. He began exhibiting his plays when there wras no theatre which would take them, for they had no com¬

mercial value ; and he has lived to see Catalan drama in possession of the Teatro Principal of Barcelona, the largest playhouse in all Spain, and to rejoice over its possession of excellent theatres not only in Catalonia, but in all the principal cities of the land. Guimera has been proclaimed, by the whole Spanish people, one of the greatest geniuses of the Spanish stage and of Spanish literature, of wrhich Catalan is nationally looked upon in Spain as a dialect.

CATALANGANES

CATALEPSY

He is very emotional, imaginative, strong, fierce at times; a master of situations and all the tricks of the drama. He always goes straight to the heart of the situation and he has as strong a dramatic sense as Shakespeare and Hugo, his two great masters. His early plays were written in blank verse ; but later he adopted a peculiarly vivid and exact prose in which redundances and verbosity of all kinds were avoided. Rapidity of movement distin¬

guishes all his work. Among his dramas, which are numerous, are (Gala Placida) ; (Mar y CeP ; (L'Anima Morta) ; (Lo Fill del Rey) ; (Las Mon j as de Sant AymaiP ; (En Polvora) ; (Terra Baixa) (translated into English under the title of (Marta ot the Lowlands*) ; (Aygua que Corre) ; cLas Pecadors) ; (Sol Solet) ; (Lo Cami del SoP ; (Jesus de Nazareth) ; and (La Reyna Jove.* He has also written comedies of local customs, farces and distinctly romantic dramas, poems and patriotic songs. He was the first to carry Catalan drama beyond the

bound¬

aries of Spain. His plays have been trans¬

lated into more than a score of languages and the best of them have been played in nearly all the great capitals of Europe and America.

(Tierra Baja,* in the translation made by Wallace Giilpatrick of New York, was presented on the metropolitan stage in 1903 and since then it has been periodically revived, has traveled across the continent several times and has been taken to England. (Maria la Rosa* has also been translated into English.

Bibliography. — Cambouliu, (Essai sur l'histoire de la litterature catalane > (Paris) ; Mila y Fontanals, (Observaciones sobre la literatura catalana popular* (Barcelona) ; Pers y Ramona, (Historia de la lengua y de la litera¬

tura catalana) (Barcelona) ; Rubio y Ors, (Renacimiento de la lengua y literatures catalanas) (Barcelona) ; Tubino, (E1 renacimiento literario contemporaneo en Cataluna,* *etc.*

(Madrid) ; Wolf, (Proben Portugiesischer und catalanischer Volks-Romanzen) (Vienna).

John Hubert Cornyn,

Editoral Staff of The Americana.

CATALANGANES, ka-ta-langans', a

Malay people of Mongoloid type, living in the flood plain of the Catalangan River (province of Isabela, Luzon, Philippines). They are clean and industrious, and dress like the Chris¬

tian Malays. They worship two pairs of gods, and their ancestors. They are heathen and peaceable and speak the same language as the Irayas. Consult Sawyer, (The Inhabitants of the Philippines* (1900).

CATALANI, ka-ta-la'ne, Alfredo, Italian

composer: b. Lucca, 19 July 1854; d. Milan, 7

Aug. 1893. He was graduated at the Paris Con¬

servatory and settled in Milan, where he achieved fame with brilliant operas, especially <Dejanice,) (Lorely> and (La Wally.*

CATALANI, Angelica, Italian singer: b.

Sinigaglia, most probably in 1782, although several other years are given; d. Paris, 13 June 1849. As early as her seventh year her mag¬

nificent voice had become the subject of gen¬

eral remark, but it was not till the age of 14

that she received any instruction in the higher departments* of the musical art. At 16 she was compelled by family misfortunes to turn her talents to account, and made her first appear¬

ance on the stage at Venice. She afterward filled the grand soprano parts at the operas of Milan, Florence, Rome and Naples and in 1799

accepted an engagement at the opera of Lis¬

bon, where she continued for five years. She then visited successively Madrid, Paris, Lon¬

don and the principal towns of Great Britain, in all of which her success and profits were im¬

mense. In 1814 she returned to Paris to take the management of the Italian opera there, but sustained thereby severe pecuniary losses from the injudicious interference of her husband, de Valabregue, formerly a captain in the French army. On Napoleon's return in 1815 she was obliged to resign the direction of the opera, but resumed it again on the second restoration. In 1818 she again resigned the direction of the opera, and from that year till 1828 made re¬

peated professional tours through the Continent and Great Britain. In 1830 she retired from public life to a villa in the neighborhood of Florence, and here she resided with her fam¬

ily and gave instruction to girls who manifested indications of local talent, one condition being required from them that they should adopt the name of Catalani. She was a woman of ma¬

jestic appearance and her voice displayed a wonderful degree of power, flexibility and compass. She rather astonished and over¬

powered an audience than touched or subdued their hearts by her marvelous execution. Con¬

sult Edwards, (The Prima Donna) (Vol. I, London 1888) ; Ferris, (Great Singers) (New York 1893) ; Needham, (Queens of Song*

(London 1863) ; Lahee, H. C., (Famous Singers of To-Day and Yesterday) (Boston 1900).

CATALAUNIAN PLAIN, the ancient

name for the wide plain around Chalons-sur-Marne, in France, famous as the field where Aetius, the Roman general, and Theodoric, King of the West Goths, gained a complete vic¬

tory over Attila and the Huns, 451 a.d.

CATALDO, ka-tal'dd, SAINT, Italy, town

in the province of Caltanissetta, five miles west-southwest of the town of Caltanissetta.

The sulphur works in the environs produce annually about 1,875 long tons. Pop. 12,800.

CATALEPSY, a peculiar motor phenom¬

enon, not a disease, that is found in a number of nervous disorders. It consists of a persist¬

ent muscular attitude of some part of the body, and may or may not be attended by uncon¬

sciousness. Thus a person may place the right arm or leg, or another

may so place the limb, in a peculiar, or awkward, or in fact any posi¬

tion. This position is maintained by the pa¬

tient for a very long time, usually a time much longer than a normal individual could maintain it. Almost any muscle group may be involved.

The patients may squat on the floor, or stand on one leg for hours, or hold both arms in the air almost all day. There seems to be some form of muscle anaesthesia and the position of the limb seems to be unknown and unfelt by the patient. This symptom is very frequent in cases of true hysteria (q.v.), and it is also found in a number of other affections that cluster about hysteria. Thus it is present in somnambulism, in hypnosis, in a peculiar men¬

tal state known as catatonia (q.v.) and in stu¬

porous melancholia,— all of which have much in common, being affections superimposed on the hysterical nervous organization,, a type of make-up of a character, whose main features 42

are assuming a definite recognition by students of the functions of the nervous system. The normal functions of respiration, digestion and circulation continue. Prolonged cases demand forced feeding. Between attacks cold baths, tonics and various remedies are recommended.

An emetic or a pinch of snuff may sometimes avert an attack. The disease still demands in¬

vestigation, as its immediate cause is not known. Consult Janet, (Mental State of Hys¬

terical } ; Raymond, (Obsessions et Psychas-thenies) ; Starr, (TextBook of Nervous Dis¬

eases^

CATALOGUES. See Library Adminis¬

tration.

CATALONIA (Spanish Cataluna), for¬

merly a semi-independent principality of Spain, then a part of the domains of the Crown of Aragon and now a captaincy-general of the Spanish kingdom. Catalonia, which is com¬

posed of the four provinces, Gerona, Lerida, Barcelona and Tarragona, occupies the north¬

east corner of Spain. It is bounded on the east by the Mediterranean Sea, on the north by the Pyrenees, on the west by Aragon and on the south by Valencia. It comprises about 12,-

500 square miles of territory and has a popu¬

lation of about 2,000,000. The country, on the whole rugged, contains many fertile valleys watered by numerous streams and rivers, none of which are navigable. Along its coast of 240 miles are numerous harbors, the best of which are Barcelona, Tarragona, Mataro and Rosas. Of the rivers of the country, all of which flow into the Mediterranean, the Ebro alone is worthy of note, though most of the streams are famed in the traditions of the peo¬

ple and its rulers. In the regions of the inte¬

rior, which are traversed by a spur of the Pyrenees running in a southern direction in a very broken formation, are many wooded hills and peaks from which much commercial wood is taken. But the non-wooded lands, wherever workable, are nearly all devoted to agriculture.

The rugged hillsides, however, support many goats and sheep; but comparatively few cattle.

Everywhere the country is visited by mists and rains, and these make the low coast lands fer¬

tile. Though hot they are healthful except in the low and swampy parts, which are compara¬

tively few. In the higher regions the climate passes from cool and temperate to quite cold, for the snow lies on the mountain summits

nearly the whole year.

The people of Catalonia, owing to the fact that for centuries they have had to defend their language, customs and individuality, have become clannish. They had originally a clan system, the country being occupied by numerous independent tribes who never united except in case of common danger. Among these tribes who distinguished themselves during the

Roman connection with Catalonia or later were the Ceretanos, Russinos, Indigentes, Lacetanos, Laletanos, Suesetanos, Sedetanos, Cosetanos, Acetanos, Ilergentes, Ilercanos and Ausetanos.

These and the other tribes of Catalonia, not¬

withstanding their lack of political unity and nationality, were great traders and very active in all the occupations and pursuits of life.

They were venturesome sailors and traded up and down the coast, along which they appear to have planted colonies before the coming of out¬

siders to their land. The first of these were the Phoenicians who for a considerable space of time carried on trade relations with the east coast of Spain. The natives learned much from their more cultured neighbors; and, imitating them, they became still bolder sailors and are said to have sailed out through the Straits of Gibraltar and to have coasted down the west coast of Africa for a considerable distance.

The Greeks followed the Phoenicians to Cata¬

lonia, and were also received in a most friendly manner by the natives, who also increased their knowledge of civilization through their contact with the Greeks.

This prosperity and peace was broken up by the Carthaginians under Hamilcar, who, hearing that Catalonia was rich in gold mines, landed a large force of trained soldiers on the coast with a view of conquest. A prolonged and desperate struggle followed ; and several times the Carthaginians suffered defeat. Hannibal fol¬

lowed his father to Spain and had the same fierce struggle. Whenever the invaders were victorious they put the natives to the sword. It was during this struggle that Barcelona was founded on the coast as a fortress and place of refuge for the invaders driven back from the interior. When war broke out between Rome and Carthage, C. Scipio seized the coast of Catalonia, and P. Cato, after a long and desperate struggle, finally reduced the country to slavery. The devastated land was redi¬

vided, policed by the Roman army and peace finally settled down upon it. In the course of time many of the natives rose to prominence throughout the conquered land and the Romans and the Catalans intermarried and formed a mestizo race which had already become a strong factor in the national life before the over¬

throw of Roman power. Flourishing towns and cities sprang up all over Catalonia. Over 600 of these are mentioned on the Roman tribute lists, which were kept at Tarragona, the capital of the province. Roman law was ex¬

tended everywhere throughout Catalonia ; and roads, temples, theatres, circuses, public baths and magnificent private residences and stately temples existed in all the chief cities, until at last Catalonia became another Italy and the favored province of the Romans. The Em¬

peror Adrian gave a special constitution to Catalonia ; and Rome looked upon the country as one of the storehouses of the empire.

But the invasion of the Goths and other bar¬

barians once more arrested the prosperity of Catalonia; which finally, after another period of desperate struggle, became the head of a kingdom founded by Ataulfo. In the time of Teodorico a popular insurrection against the harshness of the government of the native rulers started in Catalonia and spread rapidly over all Spain. Civil war lasted for over half a century and numerous Spanish generals sent to reduce Catalonia were themselves signally defeated. Shortly after peace had been re¬

stored the Arabs overran the coast; but they found the Catalans as hard to conquer as had the other invaders, for they were defeated several times, and signally so in 756. Other bands of Saracens were driven out with the help of Charles the Great. Catalonia was an¬

nexed to Aragon through the marriage of the heads of the two countries, and it was under French rule three different times between 1640

and 1813. It fought gallantly and savagely in the wars against Napoleon and took part in the civil wars in Spain in 1820, 1823, 1827 and in the later Carlist troubles. In 1842 Barcelona was bombarded by the Spanish army; and dur¬

ing the struggle that preceded and followed this bombardment it several times defeated noted Spanish leaders. Barcelona is the great revolutionary centre of Spain to-day; and this is probably why the people cling so tenaciously to their customs and language.

Bibliography. — Balaguer, (Historia de Cataluna> (Madrid) ; Balari y Jovany, (Origines historicos de Cataluna) (Barcelona) ; Bofarull y Sans, (Antigua marina catalana) (Barcelona) ; Campany, (Memorias historicas) (Madrid) ; Gil Maestre, M., (Anarquismo en Espana) (Madrid) ; Pefferrer and others, (Cataluna, sus monumentos, artes, etcC (Barcelona) ; Tomich, (Historias e Conquetas de los Comtes de Barcelona) (Barcelona).

CATALPA, ka-tal'pa, a genus of trees of the family Bignoniacece , consisting of about 10 species in North America and Asia. They have large, entire or lobed leaves, large pani¬

cles of showy white, yellow or pink flowers, and fruit of long, slender, cylindrical pods. C.

catalpa, the common catalpa or Indian bean, is a native of the southern United States. C.

speciosa , a similar species, the western catalpa, ranges from Illinois

and Indiana to Louisiana and Mississippi. The wood of these two spe¬

cies is coarse-grained and soft but very dur¬

able in the ground, consequently it is much val¬

ued for fence-posts and railroad ties. These species and some of the Asiatic ones are very widely used as shade trees.

CATALYSIS, or CATALYTIC ACTION

(Gk. KaraXveiv , to dissolve). Certain chemical reactions are very markedly accelerated in the presence of substances which emerge from the reaction unaltered. For example, cane sugar is inverted (changed into a mixture of dextrose and levulose) in the presence of acids with a velocity that increased with the strength of the acid. This phenomenon is called catalysis, and the acid is said to be a catalyst. Water, which delays the reaction, is said to be a negative cata¬

lyst. Again, it is possible by the formation of an arc under water to obtain ultramicroscopic suspensions of many of the metals, such as gold, silver or platinum. These suspensions have the remarkable property of decomposing hydrogen peroxide very rapidly into water and oxygen, while they themselves remain un¬

changed. A similar action is shown by cer¬

tain organic ‘ substances, the enzymes. In the case both of the enzymes and of the ultrami¬

croscopic colloidal metallic suspensions, the catalytic action is immensely diminished by the presence of very slight quantities of certain poisonous substances such as hydrocyanic acid or hydrogen sulphide. Another interesting ex¬

ample of catalysis is the action of platinum —black or sulphur dioxide and oxygen, which unite in its presence to form sulphur trioxide.

Water vapor is often a catalytic agent ; dry ammonia vapor and dry hydrochloric acid will not unite. This example illustrates the fact that catalytic agents accelerate both halves of a reversible reaction, for dry ammonium chlor¬

ide can be vaporised without dissociating into ammonia and hydrochloric acid. Catalysis is an extremely common phenomenon in chemis¬

try. Its nature is not well understood; it is agreed that in certain reactions which appear catalytic the ˆcatalyser® enters into the reac¬

tion and is ultimately regenerated, but this ex¬

planation does not cover all the cases found.

In the case of platinum black, which acts as a catalyser in many reactions, Faraday consid¬

ered that the action was due to the approxima¬

tion of the molecules of absorbed gases. This case, however, has also been explained as due to the formation of intermediate products into which platinum enters. In general, most catal¬

ysis is a surface action, and is accelerated by fine subdivision of the catalyst because of the immense areas thus brought into play. Cer¬

tain substances are known to catalyse them¬

selves. See also Enzymes.

Bibliography.— Mrs. Fulhame, <An Essay

on Combustion > (London 1794) ; Melloi, (Chemical Dynamics) (London 1909) ; Ostwald, (t)ber die Katalyse) (Zeitschrift fur Elektrochemie, Vol. VII, 1901) ; Rosanoff, M.

A., (Outline of a Theory of. Homogeneous Catalysis > (Jour. Am. Chem. Soc., Vol. XXXV, 1913) ; Woker, J., (Die Katalyse) (Stuttgart 1910).

CATAMARAN, kat'a-ma -ran, a sort of

raft used in the East Indies, Brazil and else¬

where. Those of the island of Ceylon, Madras and other parts of the Indian coast are formed of three logs. The timber preferred for their

construction is the dup-wood or cherne-maram, the pine-varnish tree. Their length is from 20

to 25 feet and breadth 2U> to Zl/2 feet. The logs of which they are constructed are secured together by means of three spreaders and cross lashings through small holes. The centre log .is much the largest and is pointed at the fore end. These floats are navigated with great skill by one or two men in a kneeling posture.

They think nothing of passing through the surf which lashes the beach at Madras, and at other parts of these coasts, when even the boats of the country could not live upon the waves, and they are also propelled out to the shipping at anchor when boats of the best construction would be swamped. In the monsoons, when a sail can be got on them, a small outrigger is placed at the end of two poles as a balance, with a bamboo mast and yard, and a mat or cotton-cloth sail. The name is applied also to the double boat in the United States. These have almost always proved very slow. How¬

ever, some have been built for racing purposes which were satisfactory. In the United States navy the term ˆcatamaran® is sometimes ap¬

plied to the balsa or to a float used for the men who clean the ship's side along the water line.

CATAMARCA, ka-ta-mar'ea, Argentina,

province, bounded north by Salta, east bv Tucu-man and Santiago del Estero, south by Cordoba and Rioja and west by Rioja and Chile; area, about 47,530 square miles. The surface is very mountainous in parts, except the southern, where it stretches out into a large plain. The loftiest and best known of the mountains is the Sierra de Aconquija, which stretches from south to north and attains in its culminating point near its southern extremity a height of more than 16,000 feet. The Santa Maria, flow¬

ing north to the Huachipas, is the only river of any importance, but as every valley has its 44

mountain stream, the whole province is well watered. Most of the smaller streams are dry in the summer, but overflow in the winter.

There are also a number of salt lakes. The soil is fertile, producing large crops of maize and wheat and supporting large numbers of live stock, especially goats. The vine is also cultivated and yields wine and spirits which bear a high name in the surrounding countries.

The principal exports are beasts of burden, horned cattle and hides and goatskins, raw or tanned. The principal mineral is iron, but gold, silver and lead are also found. The capital is Catamarca. Pop. 110,317, chiefly of In¬

dian extraction, with a considerable mixture of Spaniards.

CATAMARCA, Argentina, the capital of

the province of Catamarca, situated on the Valle River, 82 miles northeast of Rioja and about 250 miles northwest of Cordoba. It is connected by rail with Rioja and all the chief towns of the republic. It is regularly and mod¬

erately well built and contains a fine town-hall, a Franciscan monastery, a national college and a normal school for women. There are con¬

siderable imports of European goods and the place is the centre of distribution for a flourish¬

ing district. Dried figs, wines, brandy and cotton are the principal articles of export, together with the curious form of embroidery for which the women are celebrated. It was founded in 1683. Pop. 13,900.

CATAMOUNT, a short form of the

phrase <(cat of the mountain,® frequently found in the older books

about America and still occasionally used as a name for the lynx of the eastern United States, and sometimes for the puma, or (<panther,® once common in New England. The term is so indefinite that it is well that it has fallen into disuse.

CATANDUANES, ka-tan-dwa'nez, Philip¬

pines, an island lying northeast of the prov¬

ince of Albay, Luzon; its length is 44 miles north and south; width, 29 miles at the southern end; area, 704 square miles. The mountain system consists of three ranges that radiate from Mount Catilamong near the centre of the island; the rest of the surface is irregular, cov¬

ered with low hills. The most important rivers are the Oco and the Bato or Cabugao ; there are also a number of smaller rivers, and the island is well watered. The soil is fertile, and rice, cotton, corn and hemp are raised; indigo and cocoa'nuts are exported. The natives find gold, both dust and nuggets, in the gravel beds of many of the rivers. The largest town is Birac (pop. 5,832). The island does not form a province of itself, but is a constituent part of the province of Albay, and is included in the military department of Luzon. Pop. 33,300.

CATANIA (ancient Catana), Italy, city

of Sicily, in the province of Catania, on the borders of the valley of Noto, the see of a bishop, the suffragan of Monreale, 47 miles south-southwest of Messina, 85 east-southeast of Palermo. It is situated on a gulf of the Mediterranean, at the foot of Mount ˆEtna.

This city has been repeatedly visited by violent earthquakes, and partially laid in ruins by lava from eruptions of Mount ˆEtna. The most disastrous eruption was that of 1669, by which many of the antiquities of Catania were overwhelmed, and the worst earthquake was that of 1693 when 18,000 people were destroyed.

Although again greatly injured by the earth¬

quake of 1783, Catania is now reviving with great splendor and has much more the features of a metropolis than Palermo. The principal streets are wide and well paved with lava.

Most of the edifices have an air of magnificence unknown in other parts of the island, and the town has a title to rank among the elegant cities of Europe. An obelisk of red granite, placed on the back of an antique elephant of touch¬

stone, stands in the centre of the great square, which is formed by the town-hall, seminary and cathedral. The cathedral, a fine building, was founded in 1091 by Count Roger, but required to be mostly reljuilt after the earth¬

quake of 1693. It is dedicated to Saint Agatha, the patroness of the city. The suppressed Bene¬

dictine monastery of Saint Nicholas, comprising a church (with splendid organ), library, mu¬

seum and other extensive buildings, was long celebrated for wealth and splendor. The uni¬

versity, founded about 1445, has about 1,200

students, a school of pharmacy, a library of over 130,000 volumes and a fine collection of shells. The ruins of the amphitheatre, which was more extensive than the Coliseum at Rome, are still to be seen, as also the remains of the theatre, baths, aqueducts, sepulchral chambers, hippodrome and several temples. The indus¬

tries include the manufacture of silk, linen and cotton goods, and objects in lava, wood, mar¬

ble and Sicilian amber, and the mining of sulphur. The harbor was formerly a good one, but by the eruption of 1669 its entrance was almost entirely choked up, and it is only in recent times that it has been improved, a con¬

siderable amount of money having been spent on it. The trade of Catania is of some im¬

portance, the principal export being sulphur, next to which come oranges and lemons

almonds and other fruits and wine. Cereals, textiles and other manufactures are the chief imports. The exports have an average annual value of about $5,000,000. A circular railway runs from Catania round the base of Mount .TEtna. The classic Catana was founded by Greeks from Chalcis about 729 b.c. and soon became

prosperous. It was the Athenian head¬

quarters in the war between Athens and Syra¬

cuse 432 b.c. It flourished under the Romans, by whom it was taken in 263 b.c. It was plun¬

dered by the Saracens and fortified by the Normans, and in 1169 a.d. almost destroyed by an earthquake. It was restored in 1232 and fortified by Frederick II, and again flourished for four centuries until the great earthquake and eruption of 1669, which nearly filled up the harbor. Pop. 211,699.

CATANZARO, ka-tan-za'ro (ancient Ca—

tacium), Italy, city and capital of the southern province of the same name, on a height, eight miles from the Gulf of Squillace. It suffered severely from the great earthquake of 1783, but is still a place of some importance, de¬

fended by a citadel, and containing a cathedral and various other churches, an academy of sciences, one of the four great civil courts of the kingdom, a lyceum and three hospitals.

The climate being cool and healthful in sum¬

mer, many wealthy families reside here. The manufactures consist chiefly of silk and velvet, CATAPHORES1S — CATARACTS

and there is some trade in wheat, wine, oil, *etc.*

Pop. 34,103.

CATAPHORESIS, kat-a-for-e'sis, a

method of introducing remedies into the body by means of electricity. While certain sub¬

stances can be made to penetrate the skin by means of electrical currents, the general cata-phoretic method has not found favor with conservative and careful observers.

CATAPHRACTI, a group of fishes known

also as ˆmailed-cheeked,® characterized by hav¬

ing a bridge-like bone running from below the eye to the gill covers. The group includes the rock-fishes, scorpion-fishes, sculpins, sea-poachers, gurnards, lump-suckers and sea-snails.

Most of these live in the sea, but there are several species of sculpins which dwell in fresh-water streams and lakes and are known as miller's thumbs. The names Loricati and Pareioplitca? are also applied to this group.

Consult Jordan and Evermann, (Fishes of North and Middle America.)

CATAPLASM, poultice or plaster applied

to sore parts to increase suppuration, relieve pain, stimulate the skin or some similar pur¬

pose. It may be composed of any moist and pulpy substance that will retain the water with¬

out dripping or soaking through thin muslin covering in which it is usually wrapped. Cata¬

plasms are not official in the United States Pharmacopoeia. The linseed-meal poultice is the most easily made, and most satisfactory of all soothing applications. The meal is stirred gradually into a sufficient quantity of boiling water, placed in the bottom of a small basin or teacup, until a perfectly smooth pulp is formed of the proper consistency, and in quantity suffi¬

cient to cover completely, to the thickness of three-quarters of an inch, the whole painful part. The pulp is then folded up in muslin or thin calico and applied as soon as the heat will permit it to be borne. The bread and milk, or even bread and water poultice, is also very good; as is also the oatmeal-porridge poultice, to which a little butter may

be added with advantage. A spoonful or two of yeast may be added, if there are foul discharges, or char¬

coal may be sprinkled on the surface of the poul¬

tice before it is applied. Poultices made of clay and glycerin have the great advantage over linseed or bread poultices in that they can be made aseptic. When considerable irritation of the skin in a short time is desirable, a mustard plaster or sinapsim [sinapi, mustard] is used.

The making of-an effective poultice, however, is rather a delicate operation, since numerous little niceties must be considered and proper conditions observed before a desirable prepara¬

tion is obtained.

CATAPULT, an engine of war, which

had considerable vogue among the ancients. It somewhat resembled a crossbow, and was

operated by means of a string or rope, suddenly freed from great tension, which gave a power¬

ful impulse to an arrow placed in a groove.

There were various modifications of catapults, but in essential purpose and construction they were all alike. Thus, there were catapults fixed upon a scaffold with wheels, which were used for hurling huge stones in sieges; smaller machines that were readily portable were em¬

ployed in field operations. A toy catapult was and still is used by boys at play for throwing stones or similar projectiles.

CATARACT. An opacity of the lens of

the eye. See Eye.

CATARACTS (from Latin, cataracta, a

ˆwaterfall®), one of the names given to sud¬

den descents in streams of water, the more general English term being fall or falls. A considerable declivity in the bed of a river pro¬

duces rapids. When it shoots over a precipice it forms a cataract. If it falls from steep to steep, in successive cataracts, it is often called a cascade. In rocky countries rivers abound in falls and rapids. In alluvial districts, falls, of course, are very rare. Rapids and cataracts are often a blessing to rugged countries, since they furnish the cheapest means of driving machines in manufactories, *etc.* In recent times waterfalls have been utilized in the fur¬

nishing of electric power in addition to ordi¬

nary water power. Many cataracts are remark¬

able for their sublimity, the grandest known being Niagara Falls (q.v.), on the Niagara River, between Lakes Erie and Ontario. Some others of note are mentioned below.

The Montmorency River, which joins the

Saint Lawrence a few miles below Quebec, forms a magnificent cataract, 250 feet high.

The Missouri, in the upper part of its course, descends 357 feet in 16ˆ2 miles. There are four cataracts, one of 87, one of 19, one of 47

and one of 26 feet high. The Yosemite River in California forms a series of magnificent falls, with a total descent of 2,600 feet. The first of them is a plunge of 1,500 feet, and is followed, after a series of beautiful cascades, by a final plunge of about 400 feet. Fully 200

miles from the mouth of the Hamilton River in Labrador there is a magnificent series of cataracts known as the Grand Falls, the largest having a height of over 300 feet. In Colombia, South America, a great cataract, that of Te-quendama, is formed by the Bogota River.

The river precipitates itself through a narrow chasm, about 36 feet broad, to the depth of over 600 feet. On the Potaro River in British Guiana, the Kaieteur Fall, 740 feet high, and about 370 broad, is a splendid spectacle, and just below it is a second fall of 88 feet.

The most remarkable waterfall in Africa is one with which Dr. Livingstone’s missionary travels first made us acquainted. This is a

cataract on the Zambesi, called by the natives Mosioatunya (((smoke sounds here®), named by him Victoria Falls. The stream, about 1,860

yards broad, flowing over a bed of basaltic rock, is suddenly precipitated into a tremen¬

dous fissure, extending across the bed of the river from the right to the left bank, to the depth of about 370 feet. The breadth of this fissure or crack is only from 80 to 90 yards, and the pent-up wTaters, from which immense col¬

umns of vapor are continually ascending, are then hurried through a prolongation of the chasm to the left with furious violence. The so-called Cataracts of the Nile are not, prop¬

erly speaking, cataracts. A more correct desig¬

nation for them would be ((rapids.® The Stanley Falls on the Kongo comprise seven cataracts. On the Tugela River in Natal there are the Tugela Falls. On the Umgeni River, 46

in the same country, are the falls of the Great Umgeni (364 feet) and the Kar Kloof Falls (350). There seem to be no waterfalls of more note in Asia than those of the Cavery River of India.

One of the grandest falls in Europe is that of the Ruikanfoss (((smoking fall®), on the Maan River in Norway. The height of the cataract is 805 feet. In Sweden, on the Gotha River, a few miles below its outlet from Lake Wener, are the celebrated falls of Trollhatta, which have a height of over 100 feet. The cas¬

cade of Gavarnie, in the Pyrenees, is reputed the loftiest in Europe, being over 1,300 feet high.

Its volume of water, however, is so small that it is converted into

spray before reaching the bottom of the fall. Another waterfall in the Pyrenees is that of Seculejo, in the neighbor¬

hood of Bagneres-de-Luchon. It descends from the Lac d'Espingo, into the Lac de Seculejo, or d'Oo, a singularly romantic mountain reser¬

voir, from a height of 820 feet, and is the most copious of the Pyrenean waterfalls. The Swiss Alps likewise contain some falls of great sub¬

limity. At Lauterbrunnen, in addition to numerous other cascades, is the renowned fall of the Staubbach, about 870 feet high, which, however, from its small volume of water, has none of the terrific adjuncts of a cataract, and resembles, in front, a beautiful lace veil suspended from the summit of the precipice.

Near Martigny is the picturesque waterfall of the Sellesche or Pissevache, the final leap of the cascade being 128 feet. The falls of the Rhine at Schaffhausen are renowned over Europe.

They are 300 feet broad and nearly 100 feet high. In Italy the falls of Terni, or the Cascate del Marmore on the Velino, have been immor¬

talized by Lord Byron, and, though artificial, are justly regarded as among the finest and most picturesque in Europe. They consist of three falls, the aggregate height of which may be estimated at 550 feet. The falls of the Anio or Teverone, at Tivoli, are likewise very beauti¬

ful. They, too, are artificial, and have a fall of about 80 feet.

CATARMAN, ka-tar-man', Philippines, a

town on the north coast of the island of Samar, situated on the Catarman River, 55 miles north¬

east of Catbalogan. It has a good anchorage ground. In 1871 the town was destroyed by a volcano which burst forth in July from low land on the west side of the island, and in two months had thrown up a hill two-thirds of a mile long, one-third of a mile wide and about 450 feet high, destroying all vegetation for miles around. At the time of the visit of the Challenger, January 1875, the volcano had at¬

tained a height of 1,950 feet, and was still active, there being visible

columns of smoke by day and series of small fires at its summit by night. Pop. 10,482.

CATARRH, ka-tar', a flow from a mucous membrane. It is a symptom purely, and not a disease, and any mucous membrane of the body may be affected by an acute or chronic inflam¬

mation, usually entitled an acute or chronic catarrh ; as, catarrh of the nasal mucous mem¬

brane, of the pharynx, larnyx, stomach, intes¬

tines, rectum, bladder, vagina, *etc.* The word has general significance only, but it is much used by vendors of nostrums. See Nose and Throat.

CATASAUQUA, Pa., a borough of Le¬

high County, on the Philadelphia and Reading, the Central of New Jersey and the Lehigh Valley railroads, and on the Lehigh River, three miles north of Allentown; settled in 1805, chartered as a borough in 1853. Anthra¬

cite pig iron was made a commercial success here as early as 1839, and Catasauqua became a busy manufacturing centre, developing blast furnaces, foundry and machine shops, hard¬

ware factories, silk mills, rubber goods, car wheels, *etc.* Pop. 5,250.

CATATONIA, a variety of schizophrenia

— or dementia prsecox, which latter is the most frequent of all mental disorders. The catalonic variety is the most severe and is usually marked by a greatly increased tend¬

ency toward excessive motor reactions, such as negativism, catalepsy, mannerisms and violent tempestuous outbreaks, often ex¬

tremely furious in their character. It is a form of the mental disorder which most fre¬

quently exhausts the patient and leads more often to tuberculosis.

These patients often will stand in one posi¬

tion, often an extremely strained one, for hours at a time, sometimes days, often weeks.

Some cases are known, for instance, to lie rigid in bed like a corpse for six months or a year at a time, refusing to pay any attention to the external world. They urinate and defecate in bed and may have to be tube fed all this time.

Others will make incessant stereotyped move¬

ments, walking backward and forward like animals in a cage, or go through certain occu¬

pational movements, sawing, hammering, etc., hour upon hour without interruption. They may stand in a rapt attitude all day long with¬

out so much as winking. Sometimes they talk incessantly, saying the same thing over and over again. Others make wild rushes here and there in their rooms, beating their fists against the walls or a piece of furniture.

Careful study of these cases shows that the movements always have a certain symbolic significance for the individual. They are fre¬

quently made in response to hallucinatory voices or images and can usually be resolved to certain elementary instinctive desires of the individual, usually connected with sexual taboos of some kind.

The causes are not completely revealed. In some there are obvious endocrinopathic dis¬

turbances. Certain psychiatrists regard these latter as primary; others are disposed to view them as secondary to the disturbances in the emotional fields of activity. Thus these hold the primary defect to lie in patients' incapacity to make social adjustments along the line of the love-life of mankind. This incapacity is revealed in the unconscious

strivings which are greatly distorted in the behavior of the indi¬

vidual and hence are uninterpretable, so modi¬

fied are the symbolic expressions of this internal conflict. The catatonic cases occasion¬

ally get well following an acute maniacal period, but when the disease is prolonged 5

to 10 years they usually make up a great mass of the chronic incurable lunatics of our hospi¬

tals for mental diseases. See Dementia Prˆecox. Consult Jelliffe and White, (Diseases of the Nervous System* (2d ed., 1917).

Smith Ely Jelliffe.

CATARACTS

Comparison of Victoria Falls (Afnca), 400 feet high, with Niagara Falls, 168 feet high. The tower of the Singer Building (New York), 612 feet high, rises above the crest.

.

I

CATAWBA, or GREAT CATAWBA,

RIVER. See Wateree River.

CATAWBA, a light, sparkling wine, of

rich Muscatine flavor, produced in several parts of the United States. It is made from the Catawba grape, first found growing on the banks of the Catawba River in the Carolinas.

This wine is now in extensive use, and is gradually superseding Rhenish and French sparkling wines, to which, in general character, it bears a resemblance.

CATAWBAS, derived from the Choctaw,

signifying “divided,® a tribe of Indians for¬

merly inhabiting Nauvasa and five other towns on the Catawba River, an attractive region in North and South Carolina. The tribe is now represented by about 100 half-breeds, some of whom speak the ancient lan¬

guage, on a small State reservation on Ca¬

tawba River, in York County, S. C. In early colonial times they were a powerful tribe num¬

bering about 6,000, including 1,500 warriors.

Wars and degeneracy reduced their numbers until they dwindled to 450 in 1822. Peter Harris, the last pure-blooded Catawba, was a Revolu¬

tionary soldier. Longfellow’s verse popularized Catawba wine, the grapes for which, found near the banks of the Catawba River in 1801, were named in 1828 by Major Adlum.

CATBALOGAN, kat-ba-lo-gan’, Philip¬

pines, capital of the province of Samar, sit¬

uated on a small bay at the mouth of the Anti¬

gas River on the west coast. It is protected by a number of islands, Daram being the largest.

The anchorage ground is not safe during mon¬

soon weather; Parasan Island Bay, 10 miles west, is then the refuge for vessels. The town has a large trade in hemp and cocoanut-oil with Manila, which is 338 miles northwest, and steamers from Manila call every two weeks.

Pop. 7,758.

CATCH, a short piece of music peculiar to England, written generally in three or four parts. It is a sort of short canon, the second voice taking up the theme when the first has completed the first phrase, the third following the second in same manner. These composi¬

tions are most frequently of a humorous and bacchanalian character and have been from Purcell's time very popular in England. There is a Catch Club in London which was founded in 1761.

CATCHFLY, any one of several plants of various genera. The name is perhaps most commonly applied to species of Silene, of the family Silenacece, since their calyces and stems exude a clammy, sticky substance which at¬

tracts flies and holds and kills those that alight.

Certain species of Lychnis , a closely related genus, especially L. viscaria, are also popularly called by this name. Sometimes, too, the Venus flytrap is called Carolina catchfly. See Car¬

nivorous Plants ; Lychnis ; Silene.

CATEAU, ka-to, Le, or CATEAU-CAMbr£sis, kan-bra-ze, France, a town in the department of Nord, on the right bank of the Selle, 15 miles east-southeast of Cambrai. It was once fortified, though now open, and is famous for the treaty of its name signed here in 1559, by which Henry II of France gave up Calais to the English ; and agreed to aban¬

don all he had conquered from Spain on con¬

dition that that country would do the like with her French conquests. Altogether France lost 189 fortified towns by the treaty. Le Cateau has manufactures of cotton, wool, merinos, cambric shawls and a considerable trade in them and in wine, iron, coal and agricultural products in general. Pop. 10,500.

CATECHESIS, kat-e-ke'sis, the science

which teaches the proper method of instructing beginners in the principles of the Christian religion by question and answer, which is called the catechetical method. Hence catechist and catechize. The art of the catechist consists in being able to elicit and develop the ideas of the youthful mind. This part of religious science was first cultivated in modern times, and Ro-senmuller, Daub, Winter, Heinrich, Muller, Schwarz, Palmer and others have particularly distinguished themselves by their writings upon it.

CATECHETICAL (kat-e-ket'i-kal)

SCHOOLS, institutions for the elementarv education of Christian teachers, of which there were many in the Eastern Church from the 2d to the 5th century. They were different from catechumenical schools, which were attached to almost every church and which were intended only for the popular instruction of proselytes and children; whereas the catechetical schools were intended to communicate a scientific knowledge of Christianity. The first and most renowned was established about the middle of the 2d century, for the Egyptian Church at Alexandria, on the model of the famous schools of Grecian learning in that place. (See Alexandrian Age). Teachers like Pantsenus, Clement and Origen gave them splendor and secured their permanence. They combined in¬

struction in rhetoric, oratory and music, in classical Grecian literature and the Eclectic philosophy, with the principal branches of theo¬

logical study, exegesis, the doctrines of re¬

ligion and the traditions of the Church ; dis¬

tinguished the popular religious belief from the Gnosis , or the

thorough knowledge of religion ; established Christian theology as a science and finally attacked the dreams of the Chiliasts (believers in a millennium) ; but by blending Greek speculations and Gnostic phantasies with the doctrines of the Church, and by an alle¬

gorical interpretation of the Bible, contributed to the introduction of heresies. The distrac¬

tion of the Alexandrian Church by the Arian controversies proved the destruction of the catechetical schools in that place about the middle of the 4th century. The catechetical school at Antioch appears not to have been a permanent institution like the Alexandrian, but only to have been formed around distinguished teachers, when there happened to be any in the place. There were some distinguished teachers in Antioch about the year 220. We have no certain information, however, of the theological teachers in that place, such as Lucian, Diodorus of -Tarsus and Theodore of Mopsuestia, until the latter part of the 4th century. These teach¬

ers were distinguished from the Alexandrian by more sober views of Christianity, by confining themselves to the literal interpretation of the Bible, by a cautious use of the types of the Old Testament and by a bolder discussion of doc¬

trines. The Nestorian and Eutjˆchian contro¬

versies, in the 5th century, drew after them the ruin of the schools at Antioch. Of a similar character were the schools instituted at Edessa

in the 3d century and destroyed in 489, and the school afterward established at Nisibis, by the Nestorians, in its stead; both of which were in Mesopotamia. To these schools succeeded, at a later date, the cathedral and monastic schools, especially among the Western Christians, who, as late as the 6th century, made use of the heathen schools, and had never established catechetical schools even at Rome.

CATECHISM, a form of instruction by

question and answer, ‘especially in Christian doctrine by that method; and not the instruc¬

tion only, but the book in which the questions and answers are contained. The catechetical school of Alexandria was an institution de¬

signed to instruct pagans in the doctrines of the Christian Church (2d century). Its

founder, Pantenos, was a Greek convert deeply learned in the Grecian philosophy and in the Hebrew Scriptures. Among his disciples was Titus Flavius Clemens, who became his suc¬

cessor as head of the school ; and to Clemens (Clement of Alexandria) succeeded the illus¬

trious Origen, who, at the early age of 18, was deemed worthy to be named to so respon¬

sible a post.

The catechetical instruction given by these masters of the Alexandrine school was con¬

veyed rather in the form of lectures than in that of question and answer. The more

familiar instruction given to catechumens in the early Church was of the same nature, but more simple and elementary. In the latter half of the 4th century Saint Cyril, bishop of Jerusalem, composed 23 lectures, or in Greek katacheseis, of which 18 were addressed to postulants for baptism (catechumens) and five to the neophytes after their baptism. These latter he called mystagogic catacheses, or in¬

struction in the mysteries of Christianity.

They are of a more popular character than the catacheses of the Alexandrines and are believed to be the first example of a popular compen¬

dium of the Christian doctrines.

In the Roman Catholic Church the Cate¬

chism of the Council of Trent, or Roman Catechism or Catechismus ad

Parochos (Cate¬

chism for Parish Priests) is addressed espe¬

cially to pastors and others having cure of souls, suggesting to them the manner of ex¬

pounding Christian doctrine and of enforcing the precepts of Christian morality in their sermons from the pulpit and in conveying re¬

ligious instruction to the young. It is also designed as a basis and model in composing short expositions of Christian doctrine for popular use among the laity. The Catechism of the Council of Trent was first published in 1566 in Latin and formed a considerable vol¬

ume, 500 pages 8vo. A decree of the Council of Trent ordered all bishops to Hake care to have the Catechism faithfully translated into the vernacular language and expounded to .the people by all pastors.® Translations were ac¬

cordingly made into Italian, French, Spanish and German. The first English translation was not published till 1829. It is a large octavo, closely printed, of over 400 pages. The work possesses high authority, but not the highest ; it does not rank with the creeds of the Church or with the canons and decrees of councils or the dogmatic definitions of Popes.

All the principal divisions of Protestantism CATECHUMEN

— the Anglican Church and its offshoots, the Lutheran and Calvinistic Churches, the Pres¬

byterians, Methodists and Baptists — have cate¬

chisms. Many of these Protestant catechisms, as the catechism of Luther, the Calvinist of Geneva, the Westminster Larger and Shorter catechisms, the Catechism of the Church of England, possess in their several Churches an authority equal or comparable to that of their several creeds or confessions of faith.

CATECHU, an earthy or resin-like sub¬

stance, used in dyeing and calico-printing, and in medicine as an astringent. It is obtained by boiling the leaves, wood and fruit of certain plants growing in India and other Eastern countries (notably the Acacia catechu) and concentrating the extract by evaporation until it will solidify. Catechu (known also in the trade as Hutch®) consists mainly of catechu-tannic acid, which is soluble in cold water, and catechin, which is insoluble in cold water, but soluble in hot water. In medicine catechu is of service because of the tannin that it con¬

tains. It acts as an astringent and is service¬

able in diarrhoea and dysentery. Catechu is also used in lozenges for affections of the mouth and throat.

CATECHUMEN, a person who is under

instruction and probation preparatory to admis¬

sion to membership in the Christian Church through baptism. On the day of Pentecost and in the early days of the Church's mission the converts to the religion of Jesus Christ were admitted through baptism to fellowship in thousands at a time, without any preliminary inquiry into their dispositions, and without any instruction in the articles of Christian belief or the new obligations contracted by admission into the Christian body. But when the first enthusiasm of conversion had cooled doubtless many were found who Svalked no more® in the way of the apostles and went back to their pagan or their Jewish beliefs and practices, or worse, who after two changes of religion lapsed into open contempt of all religion and of all morality. To guard against the scandal of such apostasies the Church provided a system of preliminary, graduated instruction and pro¬

bation for those who desired admission to the Christian communion. The candidates for ad¬

mission to the Church, to the body of the faith¬

ful (believers, fideles, pistoi) were called catechumeni (persons under instruction) and even in this class there were three or even four separate grades. There was the first grade, that of those who, having expressed a desire for admission, were put under instruction privately

by some officer of the Church : this class was not admitted at all to the assemblies of the faithful. Those in the second grade, that of the acouoinenoi, audientes, hearers, were ad¬

mitted to the assembly for worship, but were required to withdraw after the reading of the stated passages from the evangelic and apos¬

tolic books and the sermon or exhortation by the bishop. Those of the third grade, the gonyc tin antes, genuflectentes, those <(bending the knee,® that is, who join in the prayers of the faithful, remained in the congregation till certain prayers in the liturgy were said and the bishop had pronounced his benediction. The fourth grade included all those who, having passed the first three, were to receive the rite

of baptism and thereby were to be admitted to full communion with the faithful on the next stated day for administration of that sacra¬

ment : these are the photizomenoi, instructed, or competentes, or electi. The first two grades are not recognised as two by all Church his¬

torians.

Such a term of preliminary instruction and probation was imperatively necessary in the ages of persecution, to save the Christian body from the scandal of apostasy on the part of converts who entered the Church either from unworthy motives, as, for example, to act as informers; or who entered without weighing the obligation they assumed to lead a holy life void of all offense, and who disgraced their Christian profession by their disorderly lives.

The institution of the catechumenate persisted after the peace of the Church was proclaimed by the first Christian emperor, and indeed the

need of it was greater now that the profession of the Christian religion seemed the gateway to honor and power in the state instead of to martyrdom. The press of candidates for ad¬

mission to the Church was great ; and even the children of believers like converts from the pagan religion had to pass through the catechumenal grades. Out of this grew a great abuse and a great scandal. Men who sought admission to the Church for other reasons than a desire to lead a Christian life would enter themselves as catechumens, postulants, and would continue in that grade for an indefinite period not pledging themselves to observance of the law of Christ and the Church till the end of their life was at hand. Nor was it the converts from paganism alone who thus de¬

ferred baptism, as Constantine did, but the children of Christian parents often followed their example. Yet the motive for deferring baptism was not always a desire to evade the obligations of the Christian profession ; in very many instances the delay was prompted by a conscientious scruple lest the baptized person falling from grace afterward should commit a sin that could never be condoned: among il¬

lustrious men who for a time acted on this scruple are numbered even doctors of the Church — Saints Ambrose, Gregory of Nazian-zus, Augustine.

The ancient church edifices provided for the separation of the catechumens from the faith¬

ful that were in full communion. In the an¬

cient church of Saint Clement in Rome, the body of the building is divided off by stone constructions into the presbyterium, chancel or sanctuary for the clergy at the eastern end, a middle compartment for the faithful in full communion — the galleries here being reserved for the women — and in the western end, or front, a much larger compartment of the nave for the catechumens.

CATEGORY (Gk. KdTTjyopia f an accusa¬

tion), in logic and philosophy, one of the great natural divisions into which all conceivable ob¬

jects fall. The ancients, following Aristotle, generally made 10 categories. Under the first all substances are comprised, and all accidents or attributes under the last nine, namely, quan¬

tity, quality, relation, action, condition, time, place, situation and acquired nature. A some¬

what similar arrangement is to be found in the works of the Hindu philosopher Kavada. This vol. 6 — 4

arrangement, however, is now obsolete. Des¬

cartes thought that all nature may be better considered under the seven divisions : spirit, matter, quantity, substance, figure, motion and rest. Plato admitted only five categories —substance, identity, diversity, motion and rest.

The Stoics held four — subjects, qualities, in¬

dependent modes, relative modes. Plotinus ap¬

plied to the intelligible world the categories the One, motion, rest, identity and difference ; to the world of sense the categories being, re¬

lation, quantity, quality and motion. Kant's list of categories is: 1. Categories of quantity: unity, plurality, universality. 2. Categories of quality : reality, limitation, negation. 3. Cate¬

gories of relation : substantiality, causality, reci¬

procity. 4. Categories of modality: possibility, actuality, necessity. Kant considered that these categories corresponded to the different classes of judgment, but it was soon realized that the basis these give to the categories of the list is merely specious. In accordance with his cus¬

tom of deducing matter of the most concrete nature by a priori methods, Hegel calls a large number of notions categories which other phi¬

losophers would regard as grounded in experi¬

ence. Mill substitutes for Aristotle's set of categories the classification of all things into feelings, minds, bodies and temporal or quali¬

tative relations between feelings. In the phi¬

losophy at the present day, though there are certain writers and schools who make a con¬

siderable use of the process of classifying things in categories — Hussere and Hartmann, for example — there is much less discussion of categories than there used to be. This is due to the fact that wc are coming to see that the taking of an inventory of the universe is one of the least of the tasks of metaphysics, which is rather concerned with the analysis of the re¬

lational structure of things. However, even in a view of the world which regards it as a re¬

lational structure, there are bound to be a num¬

ber of siimma genera, such as class, relation, proposition, *etc.* For a discussion of the cate¬

gory-system of a view of this type, see Logic, Symbolic. Consult the works of the various writers mentioned, and especially von Hart¬

mann, E., <Kategorienlehre) (1896).

Norbert Wiener, Ph.D.,

Editorial Staff of The Americana.

CATEL, Franz, German artist: b. Berlin, 22 Feb. 1778; d. Rome, 19 Dec. 1856. His earliest efforts were wood cuts for illustration of books. He then painted in oil and water colors, and took up his abode in Rome in 1812.

Overbeck, Schadow and Cornelius gave him much encouragement, and he painted historical and genre pieces and landscapes, in which last-named department of his art he was especially successful. He became a member of the Acad¬

emy of Berlin (1806) ; and professor of the Royal Academy (1841). During a residence in Sicily, about the year 1818, he painted a large number of views of Mount 2Etna, and other prominent places on the island. He directed his fortune to be invested for the benefit of poor

artists.

CATENARY, the curve assumed by a per¬

fectly flexible chain of small links supported at both'ends and allowed to hang freely under the influence of gravitation between supports. This is the simple catenary. The geometrical cate-50

nary supposes the curve of a perfectly flexible, inextensible and infinitely fine cord of infini¬

tesimal weight hanging at rest between two points of suspension. The equation of the /x x\

catenary is expressed thus : y = J4 h fl - .

The cables of a suspension bridge hang in' cate¬

naries before any of the other parts of the bridge are attached. The effect of the weight of the roadway, etc., is to draw the cables into curves more nearly approaching the parabola.

CATERPILLAR, the larva of a moth or

butterfly. The body is long and cylindrical, consisting, besides the head, of three thoracic and 10 abdominal segments, the last one form¬

ing the suranal plate. The three pairs of thor¬

acic legs are solid, horny and jointed, while the supports of the abdominal segments, of which there may be five pairs, are soft and fleshy. Caterpillars are very voracious, the di¬

gestive canal being very large. The American silkworm (Telea polyphemus) , at the end of its life as a caterpillar, has eaten not less than 120

oak leaves weighing three-fourths of a pound ; its food, taken in 56 days, equals in weight 86,000 times the primitive weight of the worm.

The jaws of caterpillars are large, black, horny appendages, and are toothed on a cutting edge so as to pass through a leaf somewhat like a circular saw. The eyes are minute, simple eye¬

lets, three or four on each side of the head, and only useful, probably, in distinguishing day from night. The silk is spun through the tongue-like projection (spinneret) of the under lip. It is secreted in two long sacs within the body. The thread is drawn out by the two fore feet, which are three-jointed and end in a single claw. The legs on the hind body, sometimes called prop-legs, are fleshy, not jointed, and end in a crown of hooks which curve outward, enabling the caterpillar to firmly grasp the edge of the leaf or a twig of its food-plant. Most caterpillars are more or less hairy or spiny, rendering them, when es¬

pecially so, disagreeable to birds ; besides this, they are bright colored, so that birds readily recognize them and waste no time over them, but search for the common green smooth-bo.died ones, which are, however, so difficult of detection by the birds that plenty are left to become moths or butterflies. Certain cater¬

pillars, as the currant-worm, though smooth¬

bodied, are brightly spotted; these, however, often have a disagreeable taste. The bright colors are thus danger signals, hung out to warn the birds and other enemies. (See Larva).

Consult authorities mentioned under Butter¬

fly, Moth, Insect, especially Holland, but¬

terfly Book0 (New York 1898) and (Moth Book0 (New York 1903) ; also Elliott and Soule, (Caterpillars and their Moths) (New York 1902; directions for breeding).

CATESBY, kats-bi, Mark, English natural¬

ist : b. probably in London about 1679 ; d. Lon¬

don, 23 Dec. 1749. He traveled in North America in 1710-19 and 1722-26, and published (Natural History of Carolina. Florida and the Bahama Islands > (2 vols., 1731-43), (British-American Flowers,* and a work on the fishes, reptiles and insects of the isle of Providence; and (Migration of Birds) (1747). German translations of the first and last appeared at Nuremberg.

. CATFISH, any of the fishes of the family Siluridce. This large family is characterized by having the body naked or covered with bony plates, but without true scales. About the mouth there are two or more barbels, the longest of which are at the corners of the mouth. There is usually a stout, generally ser¬

rated, spine in front of the dorsal fin, and often another in front of each pectoral fin. These spines are likely to inflict considerable injury on the careless fisherman. There is what seems to be a poison-gland connected with the pec¬

toral spine of some of the smaller species, and wounds are very painful. This is one of the most widely distributed families of fishes, and is especially abundant in South America and Africa. Most of them live in fresh waters.

There are estimated to be about 1,000 species.

The catfish are sluggish in their movements, securing their prey rather by stratagem than by swiftness. They are bottom-feeders and indis¬

criminate, so that although, on account of their size and abundance, they constitute an import¬

ant element in the fish food of the countries they inhabit, their flesh is. not considered of high quality in taste. North and middle Amer¬

ica contain 100 or more species, of which a third, perhaps, are to be found in the United States and Mexico. The majority are not of much importance, but some are of great local value. At the head of the commercial list stands the channel cats of the genus let alums, which are found throughout the Mississippi Valley and Gulf States, and are caught in vast quantities not only for home use, but for ex¬

port, as much as 2,000,000 pounds annually being dressed, packed in

ice and shipped from Morgan City, La., the central mart of the Atchafalaya River fisheries, which are in operation from September to May. The method of cap¬

ture is by ˆtrot-lines® from a few yards to a mile long. The catfish move with the season's temperature of the water, going down stream in winter and up in summer. At the season of the spring floods they are carried over the swamps and adjacent lands, and thousands are caught by the shorter <(brush® lines. There is a regular collecting service of tugs. The Louisiana species most taken is the chuckle¬

head (I. furcatus), which loves sluggish waters.

A more northerly species, ordinarily 20 to 25

pounds in weight, is the (<blue® or <(white®

channel cat (/. punctatus), which thrives in the colder, swifter waters of the Tennessee, Cumberland and neighboring rivers, whose flesh is declared equal to that of the black bass.

Both these have been acclimated in California.

The largest of the American species is the great fork-tailed Mississippi cat (7. lacustris) , which inhabits all the lakes and big rivers from the Saskatchewan and Great Lakes to Florida and Texas, and reaches a weight of 150 pounds or more. The so-called Potomac River cat (A.

catus) is the one most familiar in the east, since it abounds from the Delaware River to Texas, but is most common in the waters of Chesapeake Bay and southward to Florida. It is next in commercial value to the Great Lakes fish. It has a very wide head and large mouth, but seldom exceeds two feet in length. The smaller yellow cat (A. natalis). and other CATGUT — CATHARINE

species of this genus are numerous in the in¬

terior, but not of great importance. (See Bullhead). The mud cat or goujon (Leptope olivaris) is a slender pike-like fish with a very-large, wide head and mouth, and thick skin, which lives in the sluggish

rivers of the South¬

ern States. It is sometimes five feet long and 100 pounds in weight, but is most repulsive in appearance ; its flesh, however, is excellent, and is often sold, dressed, for that of the favorite western channel cat. Other genera and species go by such names as horned pouts, mud-cats, stone-cats, mad toms, etc., and will be found elsewhere described, as well as many for¬

eign species of interest and value.

Consult, besides general works, Jordan and Evermann, (Food and Game Fishes of Amer¬

ica, } and the publications of the United States Fish Commission.

CATGUT is made from the intestines of

different quadrupeds, particularly those of sheep, but never from those of the cat. The manufacture is chiefly carried on in Italy and France. The texture from which it is made is that which anatomists call the muscular coat, which is carefully separated from the peritoneal and mucous membranes. After a tedious proc¬

ess of steeping, scouring, fermenting, inflat¬

ing, etc., the material is twisted, rubbed with horsehair cords, fumigated with burning sul¬

phur to improve its color and dried. Cords of different size and strength and delicacy are obtained from different domestic animals.

The intestine is sometimes cut into uniform strips with an instrument made for the purpose.

To prevent offensive effluvia during the process, and to get rid of the oily matter, the French make use of an alkaline liquid called eau de javelle. Catgut for stringed instruments, as violins and harps, is made principally in Rome and Naples. For the smallest violin strings three thicknesses are used; for the largest seven ; and for the largest bass-viol strings 120.

It is well known that the membranes of lean animals are tougher than

those in a high-fed condition, and there can be no doubt that from the lean and small-sized Italian sheep strings superior to all others are produced. In Naples, whence the best treble strings, commonly called “Roman,® are obtained, there are large manu¬

factories of this article. Catgut is also used for surgical sutures and for bow-strings.

CATHA, a genus of plants belonging to

the order Celastracece, or staff-tree family.

The species are mostly natives of Africa, form¬

ing small shrubs, sometimes with spiny

branches. Catha edulis is a native of Arabia, and from the leaves the Arabs make a beverage possessing properties analogous to those of tea or coffee. Under the name of kat or cafta, the leaves form a considerable article of commerce among the natives. Chewed, they produce wakefulness and hilarity of spirits.

CATHARI, the name given to themselves

by the adherents of numerous heretical sects, undoubtedly of Gnostic and Manichean origin, which swarmed in western Europe, and partic¬

ularly in northern Italy and southern France in the 12th century. At that period society had much advanced in wealth and power, which brought their concomitant vices. There were many abuses prevalent in the Church, and some of the clergy led scandalous lives. The numer¬

ous heretical sects won adherents by violently and indiscriminately denouncing the entire hier¬

archy, from the Pope down to the monastic orders; but their tirades were not more em¬

phatic than the philippics launched against the same scandals by sincere Catholics, their con¬

temporaries, such as Saint Bernard, Saint Hildegarde, Saint Malachi, archbishop of Armagh, and others. But while these sought to pro¬

cure the eradication of the current abuses by a reformation from within the Church, the Cathari (Gr. kat liar os, Lat. mundus, purus, and puritanus, pure, clean) aimed at nothing short of the total destruction of the dominant re¬

ligion, of its whole system of belief and even of its moral teaching. For not only were the sects styled Cathari (including a host of off¬

shoots of eastern Manicheism), heretics and reformers, but in their inner circles, dualists, believers in the existence of two supreme prin¬

ciples, the one a good . principle, God, and the other an evil principle, the creator of the material world. But open profession was not made of this tenet ; it was communicated only to the inner circle in the several Manichean sects, to the elect ones, the perfccti, but with¬

held from the mass of their followers, the credentcs, the faithful vulgar. To these latter and to outsiders the adepts of the arcana of catharism made profession of being strictly reformers of a corrupt ecclesiastical system, and of profound regard for the letter and spirit of the moral law as taught in the apostolic writ¬

ings. As already said, they enthroned the evil principle as creator of the physical universe; they believed in the divine mission of Jesus Christ, the Son of God, that is, of the good principle ; but with the Docetae they denied that the Son of God had assumed human nature really, and held that his humanity was phan¬

tasmal only. In conformity with their tenet of a supreme principle of good and a supreme principle of evil, the initiates condemned as works of the flesh the sacraments of the Church as a whole, and looked on the contract of marriage as sinful. They held absolute pre¬

destination : that all men belong to one or other of two classes, those who will infallibly be saved, and those who cannot possibly attain holiness : hence their doctrine that an infant dying immediately after birth, if it belongs to the class of those predestined to be lost, is punished as is Judas in hell. They dared not confess that on their principles the elect cannot lose the divine favor by sin ; but they did teach that repentance is of no account, and that the sins of the people are forgiven by the rite (consolamentum) of laying on hands. This honor was only a concession to the prejudices of the ignorant vulgar : the perfccti, the initi¬

ates of the arcana of Catharism held themselves to be superior to the moral law.

CATHARINE, the name of several Chris¬

tian saints: 1. Saint Catharine of Alexan¬

dria, a virgin of royal descent in Alexandria, who publicly confessed the Gospel at a sacrifi¬

cial feast appointed by the Emperor Maximinus, and was therefore put to death, after they had vainly attempted to torture her on toothed wheels, 307 a.d. Hence the name of Catharine wheel (q.v.). No less than 50 heathen philos¬

ophers sent by the Emperor to convert her in prison were themselves converted by her win-52

ning eloquence; whence she is the patroness of philosophers and learned schools. Hav¬

ing steadily rejected all offers of earthly marriage, she was taken in vision to heaven, where Christ plighted his troth to her with a ring. This subject has been a favorite one with many artists (as signifying the union of the redeemed soul with Christ) ; the Christ being usually represented as an infant. It has been suggested that the attributes of the unhistorical Saint Catharine seem to have been derived from those of the actual Hypatia, a heathen who suffered death at the hands of Christian fanatics. Saint Catharine's festival falls on 25

November. 2. Saint Catharine of Siena,

one of the most famous saints of Italy, was the daughter of a dyer in Siena, and was born there in 1347. While yet a child she practised extraordinary mortifications and devoted her¬

self to perpetual virginity. She became a Dominican, and therefore afterward a patron saint of the Dominicans. Her enthusiasm con¬

verted the most hardened sinners, and she was able to prevail upon Pope Gregory XI for the sake of the Church to return from Avignon to Rome. She was given, it was said, extraordi¬

nary tokens of favor by Christ, whose stigmata were imprinted upon her body. She wrote de¬

votional pieces, letters and poems, an edition of wdiich is Tomasseo's (Florence 1860). Her festival falls on April 30. 3. Saint Cath¬

arine of Bologna (1413-63), festival 9 March, and Saint Catharine of Sweden (d. 1481; festival 22 March), are of less note.

CATHARINE, Saint, Order of, the name

of two organizations of very different charac¬

ter: (1) The Knights of Saint Catharine on Mount Sinai, an ancient military order, insti¬

tuted for the protection of the pilgrims who came to visit the tomb of Saint Catharine on this mountain. (2) An organization in Russia, constituting a distinction for ladies, and in¬

stituted by Catharine, wife of Peter the Great, in memory of his signal escape from the Turks in 1711.

CATHARINE I, Empress of Russia: b.

Ringen, near Dorpat, Livonia, 15 April 1684; d.

Saint Petersburg, 17 May 1727. The early his¬

tory of this remarkable woman is uncertain. Ac¬

cording to some accounts she was the daughter of a Swedish officer named Rabe, who died shortly after she was born ; according to others her father was a Roman Catholic peasant. She at first bore the name of Martha and entered the service of a clergyman named Gluck, at Marienburg, who caused her to be instructed in the Lutheran religion. Here she was mar¬

ried to a Swedish dragoon. But a few days after he was obliged to repair to the field, and the Russians, within a short period, took Marienburg in 1702. Martha fell into the hands of General Tcheremetieff, who relin¬

quished her to Prinz Mentchikov. While in his possession she was seen by Peter the Great, who made her his mistress. She became a proselyte to the Greek Church and assumed the name of Catharine Alexiewna. In 1708

and 1709 she bore the Emperor the Princesses Anna and Elizabeth, the first of whom became the Duchess of Holstein by marriage and mother of Peter III. The second became Empress of Russia. In 1712 the Emperor pub¬

licly acknowledged Catharine as his wife. She was subsequently proclaimed Empress, and crowned in Moscow in 1724. Besides the daughters above named she bore the Emperor five more children, all of whom died early.

The Princesses Anna and Elizabeth were de¬

clared legitimate. When Peter, with his army, seemed irreparably lost on the Pruth in 1711

Catharine endeavored to win over the grand vizier; and having succeeded, by bribing his confidant with her jewels, she disclosed her plan to the Emperor, who gave it his approba¬

tion, and was soon relieved. She afterward received many proofs of the gratitude of her husband. Peter even deemed her worthv of being his successor. But in the latter part of 1724 she fell under his displeasure. Her cham¬

berlain, Moens, with whom she was suspected of being on too intimate terms, was beheaded on pretense that he had been bribed by the enemies of Russia. Mentchikov, who had always manifested much attachment to her, had now been in disgrace for some time and Peter had very frequent attacks of bodily pain, with inter¬

vals only marked by dreadful explosions of rage. These circumstances made Catharine's situation critical and her anticipations of the future must have been the more melancholy, as the Emperor had uttered some threats of a change in the succession to her disadvantage.

To prevent such an event she applied to Ment¬

chikov; and by the prudence of Jaguschinski a reconciliation was effected with the Emperor.

The Empress and the favorite were laboring to confirm their improving prospects when Peter the Great died, 28 Jan. 1725. Catharine, Mentchikov and Jaguschinski considered it nec¬

essary to keep the death of the Emperor a secret until, by judicious arrangements, they had se¬

cured the succession of the throne to the Em¬

press. Theophanes, archbishop of Plescow, swore before, the people and troops that Peter on his death-bed had declared Catharine alone worthy to succeed him in the government. She was then proclaimed Empress and autocrat of all the Russias and the oath of allegiance to her was taken anew. At first the Cabinet pur¬

sued the plans of Peter, and, under Mentchikov's management, the administration was conducted with considerable ability. But the pernicious influence of favorites was soon felt and great errors crept into the administration. Catharine died suddenly, her death being probably has¬

tened by excess in the use of ardent spirits.

Consult Lavisse and Rambaud, (Histoire gen¬

erate* (Vol. VII, Paris 1896), and Schuyler, (Peter the Great) (New York 1884).

CATHARINE II, Empress of Russia: b.

Stettin, 2 May 1729; d. Saint Petersburg, 17

Nov. 1796. She was a daughter of the Prince of Anhalt Zerbst and her name was originally Sophia Augusta. The Empress Elizabeth chose her for the wife of Peter, her nephew, whom she appointed her successor. The young Prin¬

cess accompanied her mother to Russia, where she joined the Greek Church and adopted the name of Catharine Alexiewna, given to her by the Empress. The marriage was celebrated 1 Sept. 1745. It was not a happy one, but Cath¬

arine found relief in the improvement of her mind. She was endowed with uncommon

strength of character ; but the ardor of her tem¬

perament and the ill treatment of her husband led her into errors which had the most injuri¬

ous influence on her whole political life. In January 1762 the Empress Elizabeth died and CATHARINE II

Peter III ascended the throne. He lived in the greatest dissipation, and on such intimate terms with a lady of the court, named Elizabeth Woronzoff, that it was generally thought that he would repudiate Catharine and marry his mis¬

tress. The Empress, therefore, was obliged to take measures for her personal security. At the same time Peter grew continually more and more unpopular with his subjects, which led to a conspiracy, at the head of which were the hetman, Count Rasumowski, Count Panin, the enterprising Princess Daschkoff and .i young officer of the guards, Gregory Orloff.

All those who were dissatisfied, or who ex¬

pected to gain by a change, joined this con¬

spiracy. Panin and the greater part of the conspirators were actuated only by the desire to place the youthful Paul on the throne, under the guardianship of the Empress and a council of the empire. But this plan was changed through the influence of the Orloffs. The guards were the first to swear allegiance to the Empress on her presenting herself to them at Peterhof on the morning of 9 July 1762; and Alexei Orloff prevailed on Teplow, after¬

ward appointed senator, to read at the Kazan Church, instead of the proclamation of the conspirators in favor of the young Prince, one announcing the elevation of Catharine to the throne. Peter died a few days after in prison.

The accusation against Catharine of having contributed to hasten this event is without foundation. The young, ambitious Princess, neglected by her husband, whom she did not respect, remained passive on the occasion, yielded to circumstances which were, it is true, propitious to her, and consoled herself for an event wffiich she could not remedy. She knew how to gain the affections of the people by flattering their vanity; showed great respect for their religion ; caused herself to be crowned at Moscow with great pomp; devoted herself to the promotion of agriculture and commerce and the creation of a naval force ; improved the laws ; and showed the greatest activity in the administration of the internal as well as the external affairs of Russia. A year after her ascension to the throne she forced the Cour-landers to displace their new Duke, Charles of Saxon}', and to recall Biron, who was ex¬

tremely odious to the nobles. After the death of Augustus III, King of Poland, she was the means of Stanislaus Poniatowski's being

crowned at Warsaw. But while she was forcing this king on the Poles, the number of the mal¬

contents in her own empire increased, and sev¬

eral attempts against her life were made at Saint Petersburg and Moscow. The young Ivan was the person to whom the hopes of the conspira¬

tors were directed ; but his sudden death at the fortress of Schlusselburg overthrew the plans of the disaffected. After this the court of the Empress was only disturbed from time to time by intrigues, in which gallantry and politics went hand in hand, and which had no other object than to replace one favorite by another.

In the midst of pleasure and dissipation Catha¬

rine did not neglect the improvement of the laws. Deputies from all the provinces met at Moscow. The Empress had herself prepared instructions for their conduct, which were read at the first session; but it was impossible for so many different nations to understand each other, or to be subject to the same laws. Catha¬

rine, who presided at the debates, and received from the assembly the title of mother of the country, soon dismissed the discordant legis¬

lators. About this time France formed a party in Poland against Russia; but these at¬

tempts only served to accelerate Catharine's plans. The war to which the Porte was in¬

stigated had the same result. The Turks were beaten. 1 he Russian flag was victorious on the Greek seas; and on the banks of the Neva the plan was formed of re-establishing the republics of Sparta and Athens as a check to the Ottoman power. The advancement of

Austrian troops into Poland inspired Catha¬

rine with the desire to aggrandize herself in this quarter. She therefore entered into an agreement for the division of the country with the courts of Berlin and Vienna in 1772, by which the governments of Polotzk and Mohilev fell to her share, and she ensured to herself exclusive influence in Poland by undertaking to guarantee the Polish constitution. At the same time she abandoned all her conquests, with the exception of Azoph, Taganrog and Kinburn, in the peace with the Porte, con¬

cluded at Kainardschi in 1774, but secured to herself the free navigation of the Black Sea, and stipulated for the independence of the Crimea. By this apparent independence the Crimea became, in fact, dependent on Catha¬

rine. This peace was as opportune as it was advantageous to Russia ; for in the third year of the war Moscow and several other cities were desolated by the plague ; and about the same time an adventurer named Pugatscheff, assuming the name of Peter III, had excited a revolt in several provinces of eastern Russia, which was soon suppressed. At this time Potemkin exercised an unlimited influence over the Empress. In 1784 he succeeded in con¬

quering the Crimea, to which he gave its an¬

cient name of Tauris, and extended the confines of Russia to the Caucasus. Catharine upon this traversed the provinces which had revolted under Pugatscheff, and navigated the Volga and Dnieper, taking greater interest in the expedition, as it was attended writh some danger. She was desirous, likewise, of seeing Tauris. Potemkin turned this journey, which took place in 1787, into a triumphal march.

Throughout a distance of nearly 1,000 leagues nothing but feasts and

spectacles of various kinds were to be seen. Palaces were raised on barren heaths, to be inhabited for a day. Vil¬

lages and towns were built in the wildernesses, where a short time before the Tartars had fed their herds. An immense population appeared at every step — the picture of affluence and prosperity. A hundred different nations paid homage to their sovereign. Catharine saw, at a distance, towns and villages, of which only the outward walls existed. She was sur¬

rounded by a multitude of people, who were conveyed on during the night, to afford her the same spectacle the following day. Two sovereigns visited her on her journey — the King of Poland, Stanislaus Augustus, and the Emperor Joseph II. The latter renewed his promise, given at Saint Petersburg, to assist her in her projects against the Turks. The result was a new Turkish war, which by the Peace of Jassy (1792), ended not less favorablv for Russia than the first. The power of Russia was also increased by the war with Sweden 54

which terminated in 1790, and by the last two partitions of Poland and the incorporation of Courland. Catharine took no part in the war against France, though she broke off all con¬

nection with the French republic, actively as¬

sisted the emigrants, and entered into an alli¬

ance with England against France. She like¬

wise made war against Persia, and, as some historians assure us, entertained the project of destroying the power of the English in Bengal, when a fit of apoplexy put an end to her life.

Catharine II has been equally censured and praised. With all the weakness of her sex, and with a love of pleasure carried to licentious¬

ness, she combined the firmness and talent of a powerful sovereign. Two passions were pre¬

dominant with her until her death, love and ambition. She was never without her favorite, yet she never lost sight of her dignity. She W’as

distinguished for activity, working with her ministers, writing letters to Voltaire and Diderot, and signing an order to attack the Turks, or to occupy Poland, in the same breath.

She favored distinguished authors, and was particularly partial to the French. At Paris she had a literary agent (Baron Grimm). She several times invited Voltaire to her court, pro¬

posed to D'Alembert to finish the (Encyclo¬

paedia } at Saint Petersburg, and to undertake the education of the Grand Duke. Diderot visited her at her request, and she often allowed him the privilege of familiar conversation with her.

By these means she gained the favor of the literati of Europe, who called her the greatest of rulers; and, in fact, she was not without claims to this title. She protected commerce, improved the laws, dug canals, founded towns, hospitals and colleges. Pallas and others trav¬

eled at her expense. She endeavored to put a stop to the abuses which had crept into the administration of the different departments of government ; but she began without being able to finish. Civilization advanced but slowly in Russia under her reign ; and her anxiety to enlighten her subjects ceased when she began to entertain the idea that the French Revolution had been brought about by the progress of civilization. Laws, colonies, schools, manufac¬

tures, hospitals, canals, towns, fortifications, everything was commenced, but frequently left unfinished for want of means. Consult Bil-basoff, (Geschichte Katharina IP (Berlin 1893) ; Bruckner, (Katharina die Zweite1 (ib.

1883); Bury, (Catharine IP (New York 1900) ; Castara, (Vie de Catharine IP (1796) ; Her¬

zen, (Memoires de lTmperatice Catharine IP

(1859) ; Tannenberg, (Leben Catherinens IP

(1797) ; Hotzsch, ftCatharine II11 in (Cambridge Modern History> (Vol. VI, New York and London 1906) ; Lavisse and Rambaud, (Histoire generale1 (Vol. VII, Paris 1896) ; Waliszew-ski, (The Romance of an Empress, and the Story of a Throne> (London 1895).

CATHARINE OF ARAGON, Queen of

England, the youngest daughter of Ferdinand of Aragon and Isabella of Castile: b. Alcala de Henares, Spain, 15 Dec. 1485; d. Kimbolton, Pluntingdonshire, 7 Jan. 1536. In 1501 she was married to Arthur, Prince of Wales, son of Henry VII. Her husband dying about five months after, the King, unwilling to return her dowry, caused her to be contracted to his re¬

maining son, Henry, and a dispensation was pro¬

cured from the Pope for that purpose. In his 15th year the Prince made a public protest against the marriage; but at length yielding to the representatives of his council, he consented to ratify the contract, and on his accession to the throne in 1509 was crowned with her. The inequality of their ages and the capricious dis¬

position of Henry were circumstances very adverse to the durability of their union, and it seems surprising that Catharine should have acquired and retained an ascendancy over the affections of the King for nearly 20 years. The want of male issue, however, proved a source of disquietude to him, and scruples, real or pretended, at length arose in his mind con¬

cerning the legality of their union, which were greatly enforced by a growing passion for Anne Boleyn, one of the Queen's maids of honor. He made application to Rome for a divorce from Catharine. But all that Henry could obtain at Rome was a promise to investigate the case.

Catharine, meanwhile, conducted herself with gentleness and firmness, and could not in any way be induced to consent to an act which would render her daughter illegitimate, and stain her with the imputation of incest. Be¬

ing cited before the papal legates, Cardinals Wolsey and Campeggio, in 1529, she declared that she would not submit her cause to their judgment, but appealed to the court of Rome; which declaration was declared contumacious.

His failure to secure the sanction of the Pope to the divorce induced the King to decide the affair for himself ; and the condemnation of his conduct expressed on this occasion by the court of Rome provoked him to throw off his submission to it, and declare himself head of the

English Church — an act of royal caprice and of great importance in English history. In 1532 he married Anne Boleyn ; upon which Catharine, no longer considered Queen of England, retired to Ampthill in Bedfordshire. Cranmer, now raised to the primacy, pronounced the sentence of divorce, notwithstanding which Catharine still persisted in maintaining her claims.

Shortly before her death she wrote a letter to the King, recommending their daughter (after¬

ward Queen Mary) to his protection, praying for the salvation of his soul, and assuring him of her forgiveness and unabated affection. The pathos of this epistle is said to have drawn tears from Henry. He had never presumed to call the virtues of his injured wife in question, and she certainly acted throughout with eminent dignity and consistency. Several devotional treatises have been attributed to Catharine which belong to Queen Catharine Parr.

Bibliography. — The Calendar of State

Papers (for the reign, edited by Brewer and Gairdner1 (1880-90) ; and the Spanish theories (edited by Bergenroth and Gayango, Vol. II, 1868) ; Hall, <Chronicle) (London 1809) ; (The Divorce) (1527-33, 2 vols., Oxford 1870); Le Grand, (History of the Divorce of Henry VIII and Catharine1 with Burnet's answer (London 1690) ; Froude, (The Divorce) (New York 1891) ; id., (History of England1 (Vols. I— II, New York 1871) ; Dixon, (Two Queens1 (Lon¬

don 1873-74) ; Brewer, (Reign of Henry VHP

(ed. by Gairdner, 2 vols., London 1884) ; Huth, { Marriage of Near Kin1 (2d ed., London and New York 1887).

CATHARINE OF BRAGANZA, bra-

gan'za, wife of Charles II, King of England,

and daughter of John IV, King of Portugal : b. Villa Vigosa, Portugal, 25 Nov. 1638; d.

Portugal, 31 Dec. 1705. In 1662 she married Charles II, in whose court she long endured all the neglect and mortification to which his dissolute conduct necessarily exposed her, and which became still more galling from her hav¬

ing , no children; still she conducted herself with great equanimity, and after the death of Charles received much attention and respect.

In 1693 she returned to Portugal, where, in 1704, she was made regent by her brother, Don Pedro, whose increasing infirmities rendered retirement necessary. In this situation Cath¬

arine showed considerable abilities, carrying on the war against Spain with great firmness and success. Consult Strickland, (Lives of the Queens) (Vol. IV, London 1888) ; Jesse, (Memoirs of the Court of England) (Vol.

Ill, London 1876) ; Ranke, (Histo'ry of Eng¬

land, Principally in the Seventeenth Century) (Oxford. 1875) ; Davidson, (Catharine of Braganga* (London and New York 1908).

CATHARINE OF FRANCE. See

Catharine of Valois.

CATHARINE HOWARD, Queen of

England. See Howard, Catharine.

CATHARINE DE MEDICI, madi-che,

Queen of Henry II of France : b. Florence 1519; d. Blois, France, 5 Jan. 1589. She was the only daughter of Lorenzo de Medici, Duke of

Urbino, and the niece of Pope Clement VII.

Francis I consented that his son, Henry, should marry her only because he did not believe she ever would ascend the throne, and because he was in great want of money, with which Lorenzo could furnish him. The marriage was celebrated at Marseilles in 1533. She was the mother of four sons, of whom three became kings of France in her own lifetime. They were Francis II, 1559-60; Charles IX, 1560—74; and Henry III, 1574-89. Catharine was equally gifted with beauty and talents, and had cultivated her taste for the fine arts in Florence; but at the same time imbibed the perverted principles of politics then prevailing in Italy. Catharine's ambition was unbounded.

She sacrificed France and her children to the passion for ruling; but she never aimed steadily at one great end, and had no profound views of policy. The situation in which she was placed, on her arrival at the French court, gave her great opportunity to perfect herself in the art of dissimulation. She flattered alike the Duchess d'Etampes, the mistress of the King, and Diana de Poitiers, the mistress of her own husband, though these two ladies hated each other. From her apparent indifference she might have been supposed inclined to shun the tumult of public affairs ; but when the death of Henry II in 1559 made her mistress of herself, she plunged her children in a whirl of pleasures, partly to enervate them by dissipa¬

tion, partly from a natural inclination toward prodigality; and in the midst of these extrav¬

agances cruel and bloody measures were ex¬

ecuted, the memory of which still makes men shudder. Her authority was limited under the reign of Francis II, her eldest son, who, in consequence of his marriage with the un¬

fortunate Mary Stuart, was entirely devoted to the party of the Guises. Jealous of a power she did not exercise, Catharine then decided to favor the Protestants. If it had not been for her patronage, by which the ambition of the chiefs of the Huguenots was stimulated, the conflicting religious opinions in France never would have caused such lasting civil wars. Cath¬

arine felt herself embarrassed by this indulgence toward the innovators, when the death of Francis II placed the reins of government, dur¬

ing the minority of Charles IX, in her hands.

Wavering between the Guises on one side, who had put themselves at the head of the Roman Catholics, and Conde and Coligny on the other, who had become very powerful by the aid of the Protestants, she was constantly obliged to resort to intrigues, which failed to procure her as much power as she might easily have gained by openness of conduct. Despised by all parties, but consoled if she could deceive them; taking arms only to treat, and never treating without preparing the materials for a new civil war, she brought Charles IX, when he became of age, into a situation in which he must either make the royal authority subordinate to a powerful party, or cause part of his subjects to be mas¬

sacred, in the hope, at best a doubtful one, of subduing faction. The massacre of Saint Barthol¬

omew was her work. She induced the King to practise a dissimulation foreign to his character; and as often as he evinced a disposi¬

tion to free himself from a dependence of which he was ashamed, she knew how to prevent him, by the fear and jealousy which she excited in him by favoring his brother Henry. After the death of Charles IX Catharine became again regent of the kingdom, till the return of Henry III, then king of Poland. She contributed to the many misfortunes of his reign by the meas¬

ures which she had adopted previously to its commencement, and by the intrigues in which she was uninterruptedly engaged. At her death, France was in a state of complete dismember¬

ment. The religious contests were in reality very indifferent to her. The consequences she was not able to conceive. She was ready to risk life for the gratification of her ambi¬

tion. She was equally artful in uniting her adherents, and in promoting dissen¬

sion among her adversaries. To those who directed her attention to the prodigal expendi¬

ture of the public treasure, she used to say, <(One must live.® Her example contributed greatly to promote the corruption of morals which prevailed in her time. Her manners, however, were elegant, and she took a lively interest in the sciences and arts. She procured valuable manuscripts from Greece and Italy, and caused the Tuileries and the Hotel de Soissons to be built. In the provinces, also, several cas¬

tles were erected by her order, distinguished for the beauty of their architecture, in an age when the principles of the art were still un¬

known in France. She had two daughters, Elizabeth, married to Philip II of Spain in 1559, and Margaret of Valois, married to Henry of Navarre, afterward Henry IV. Consult Alberi, (Vita de Caterina de' MedicP (Florence 1838) ; Balzac, (Sur Catherine de Medicis* (Paris 1864) ; Cheruel, (Marie Stuart et Catherine de Medicis) (id. 1858) ; Sichel, (Catherine de'

Medici and the French Reformation* (London 1905) ; (The Later Years of Catharine de'

MedicP (ib. 1908) ; Zeller, (Catherine de Medicis et les Protestants) (Paris 1889) ; La 56

Ferriere, (Lettres de Catherine de Medicis) (1880-91).

CATHARINE PARR. See Parr, Cath¬

arine.

CATHARINE PAULOVNA, Queen of

Wurttemberg: b. 21 May 1788; d. 9 Jan. 1819.

She was a daughter of Paul I of Russia, and in 1809 married George, Duke of Holstein Oldenburg. After his death in 1812, she accom¬

panied her brother, Alexander, on his cam¬

paigns in Germany and France (1813-14), to Paris, London and the Congress of Vienna (1815), assisting him by her talents and reso¬

lute spirit. The marriage of her younger sister to the Prince of Orange is said to have been effected by her influence. In 1816 she married William, Crown Prince of Wurttemberg, whose acquaintance she had

made during her travels.

During the famine of 1816 in that country she proved her benevolence by the formation of female associations and an agricultural society.

She was active in promoting the education of the people.

CATHARINE OF VALOIS, val'wa,

Queen of England, youngest child of Charles VI and Isabella of Bavaria: b. Paris, 27 Oct. 1401; d. 3 Jan. 1438. In 1420 she was married to Henry V of England, who was then declared successor to the crown of France. To this prince she bore Henry VI, crowned in his cradle king of both countries. After the death of Henry, in 1422, Catharine went into retire¬

ment and privately married Owen Theodore, or Tudor, a Welsh gentleman of small fortune, but descended from the ancient British princes.

By this marriage she had two sons, the eldest of whom, Edmund, Earl of Richmond, by a marriage with Margaret Beaufort, of the legitimated branch of Lancaster, became father of Henry VII and founder of the house of Tudor. Consult Strickland, A., (Lives of the Queens of England) (Vol. Ill, London 1840) ; De Viriville, (Histoire de Charles VIP

(Vol. I, pp. 143, 187, 189, 218 et seq).

CATHARINE-WHEEL, a window or

compartment of a window of circular form, sometimes with radiating divisions or spokes, used in mediaeval buildings, called a rose, or marigold window. It is a memorial of Saint Catharine's martyrdom. The term is also applied to a kind of firework in the shape of a wheel, made to revolve automatically when lighted; a pin-wheel.

CATHARTIC, any remedy that will cause

an increased discharge from the intestinal canal.

For purposes of general description there are four classes of cathartics. These are mild cathartics, or laxatives ; simple purges, drastic purges and hydragogues. Catharsis is accom¬

plished either by increasing the amount of water in the intestines or by stimulating the movements of the intestines — peristalsis. The laxatives are water, sugar, honey, fruits, stringy vegetables, coarse bread, cassia fistula, sulphur, figs, *etc.* ; these act either by giving bulk, stimulation of peristalsis, or by adding water, all of the sugars attracting water from the intestinal wall. The simple purges act usually by stimulating peristalsis. These are castor oil, cascara sagrada, rhubarb, aloes, senna, iris, podophyllum, leptandra, calomel, *etc.* The drastic purges stimulate peristalsis, and many of them cause a flow of water into the intestine. The simple purges in large doses are drastic. Gamboge, jalap, colocynth, scam-mony, croton oil and elaterium are drastic.

Another class of cathartics are salty, and by osmosis attract water into the intestines and stimulate the motor activity of the intestines ; they thus act as hydragogues and are termed the saline cathartics. Those most commonly used are epsom salts, rochelle salts, magnesium oxide, citrate, sodium phosphate, tartrate and bitartrate. Most of the mineral waters belong to this class of cathartic. In former times cholagogues were described as cathartics that ((stirred up the liver secretions.ˆ It is now fairly well recognized that those drugs that stimulate peristalsis affect the gall bladder, causing it to empty itself more actively, and that the liver is unaffected. The only true hepatic stimulant that is now recognized is ox-gall. This is fre¬

quently employed as a cathartic. Abuse of cathartics is an evil above all description. It is almost safe to assert that the injudicious use of the many patent cathartic pills on the market is responsible for more intestinal trouble than any other agent. They teach people to be unduly occupied with their intestinal functions and work incalculable injury. See Constipa¬

tion.

CATHARTIDiE, the American vultures,

a family of birds of the order accipitres or Raptores, differing from the more eagle-like Old World vultures (Vulturida) in having the beak comparatively slender, straight and blunt, the complete absence of a

septum between the nostrils, the much more largely naked head and neck, and the weak feet with elevated hallux and but slightly curved claws. Alto¬

gether they are less predaceous birds, which feed exclusively on carrion or attack weakling animals. Five genera, each with but one or a few species, are found in America, more especially in the warmer parts. Among them are the carrion crow, the condor and the turkey buzzard (qq.v.).

CATHAY, kath-a', a name by which Marco Polo designated a part of Asia, probably North China.

CATHCART, Sir George, son of William

Schaw Cathcart (q.v.) : b. London, 12 May 1794; d. Inkerman, Crimea, 5 Nov. 1854. He entered the Life Guards in 1810, accompanied his father as attache to Russia, and subsequently acted as aide-de-camp to the Duke of Welling¬

ton at Waterloo. He served in Nova Scotia and the West Indies, quelled the rebellion in Canada in 1837, and was appointed in 1852 gov¬

ernor at the Cape ot Good Hope, where he showed ability in subduing the Kaffir insur¬

rection. On the outbreak of the Crimean War great things were expected of him, but he fell as divisional commander at Inkerman. He was the author of Commentaries on the War in Russia and Germany in 1812 and 1813' (Lon¬

don 1850).

CATHCART, William Schaw, Earl of,

English soldier and diplomatist : b. Petersham, England, 17 Sept. 1755; d. near Glasgow 16

June 1843. He studied at Dresden and Glas¬

gow, then entered the army, and served with distinction first in the American war and after¬

ward in the campaigns against the French CATHEDRAL — CATHEDRALS AND CHURCHES

republic in Flanders and Germany. In 1801 he was made lieutenant-general, and in 1803 commander-in-chief for Ireland. In 1807 he was appointed commander of the land forces in the expedition against Copenhagen, and was

created a viscount for his services on this occasion. In 1812 he proceeded to Russia as Minister-Plenipotentiary, joined the Emperor Alexander at the headquarters of the Russian army and accompanied him through the cam¬

paigns of 1813-14. He entered Paris with the allied sovereigns, and was present at the Con¬

gress of Vienna. The same year he was created an earl. Subsequent to this he resided for several years at Saint Petersburg as Am¬

bassador to the Russian court.

CATHEDRAL. See Cathedrals and

Churches.

CATHEDRAL,- The, a poem by James

Russell Lowell, published in Boston in 1869.

The particular cathedral which suggested the thought of the poem is that of Chartres.

CATHEDRAL PEAK, a peak of the

Sierra Nevada range, situated in the north¬

eastern part of Mariposa County, Cal., near lat.

37° 50’ N. It is of granite formation and con¬

tains the source of the Merced River. It is 11,000 feet high.

CATHEDRAL OF SAINT JOHN THE

DIVINE. See Cathedrals and Churches.

CATHEDRAL SCHOOLS. All of the

schools of western Europe were derived from bishop’s schools (q.v.). The manifold duties of the bishop, however, which often caused his absence from his diocese, forced the con¬

trol of the school to devolve on those members of the chapter who were bound to stationary residence. In the process of time, the cathe¬

dral school developed into three or sometimes four schools : the theological school, the music or song school, the choristers’ school, a com¬

bined grammar and song school, and the grammar school itself, which became the cathedral school par excellence. These institu¬

tions were the first public schools of the Mid¬

dle Ages ; and continued their high importance in England down to the 18th century. They were open to all students, and taught the classics in general, together with the rhetoric and logic of the scholastic trivium. The four principal dignitaries as the schools were organ¬

ized at the end of the 11th century throughout Europe were the dean, precentor, chancellor and sacrist or treasurer (in order of rank, generally). The head of the school was gen¬

erally a master of arts. When the monastic cathedrals at Canterbury, Rochester, Durham, Worcester, Norwich, Ely and Carlisle were abolished in 1540, and replaced by secular canons, a master and an usher were added to each new grammar school ; provision was made for the admission of fee students; and exhibits planned, to take the best scholars to the universities. This last provision was soon canceled. The monastic cathedral schools meanwhile suffered through lack of funds and eventually became annexed to some other charitable enterprise of the cathedral or died out altogether. When in 1863 the great inquiry into the secondary schools was conducted for the purpose of revival, the old monastic schools were entirely overlooked and

arrangements were made for the exten¬

sive assistance of the newer secular cathe¬

dral schools from the funds of the ecclesi¬

astical commissioners. Westminster, through¬

out the 17th and 18th centuries, con¬

ducted the best and most famous of public schools; York had the chief school of the north ; Durham has been the most uniformly successful; Canterbury, for many years deca¬

dent, has increased recently; Norwich, Here¬

ford and Ely have been fairly successful as local schools; Bristol and Chichester have declined notably. See Almonry Schools.

CATHEDRALS AND CHURCHES, the

latter name derived from the Greek avpianog-Lord's House, the former from the Greek nadedpa, a "seat.® Thus, "to speak ex cathe¬

dra,® is to speak as from a seat of authority.

A cathedral city is the seat of the bishop of the diocese and his throne is placed in the cathedral church. From the early days of the Christian

Church the bishop presided in the presbytery or assembly of priests. He was seated on a chair, a little higher than those of the others. The whole meeting of priests was called cathedra; and at a later period, when Christians were allowed to build churches, this name was applied to the episcopal churches.

Besides the cathedral churches we find those distinguished as collegiate, conventual, parochial and abbey, according to the classification of the Roman Catholic Church. The governing body of an English cathedral is called the dean and chapter. The cathedral is commonly, though not invariably, the most important church build¬

ing, architecturally speaking, in the diocese. Its usual form is the Latin cross. From the com¬

paratively simple outline of the early Christian basilica lias been evolved the complex cathedral structure of the Middle Ages. In its outline a typical cathedral exhibits nave, extending east and west, transepts, north and south, choir, retro-choir, and, sometimes, lady chapel. A tower rises where the transepts cross the nave.

Two towers usually flank the western front, which contains a large rose window. But it must be borne in mind that in size and archi¬

tectural style the cathedral is not necessarily superior to the other churches of a diocese. The dimensions of some of the abbey and parish churches are greater than those of some cathe¬

drals. French cathedrals are distinguished by their great height, chevets, or apsidal east ends with a corona of chapels, elaborate and logical vaulting system, and, in the later Gothic styles, by extremely profuse adornment. The portals of French churches are generally lofty and imposing and richly sculptured. English cathe¬

drals are much longer and lower than French ones. Their east ends are usually square and their portals small, and, in some examples, as at Wells, even insignificant.

Early Roman and Italian Edifices. — The earliest churches that we know were of the time of Constantine. They were of the form known as the basilica, consisting of three aisles (or, rarely, five) separated by columns.

The middle aisle, which is the nave, was higher and broader than the

others and always ended in a round apse, which bowed outward from the wall at the rear of the church. This type was much used in Italy. The church of Saint John Lateran in Rome is also called the “Ba-58

silica of the Saviour.® Over its chief portal is the inscription (< Omnium urbis et orbis ec-clesiarum mater et caput (mother and head of all the churches of Rome and the world).

Saint John Lateran is the cathedral of the diocese of Rome. The Pope as Bishop of Rome performed episcopal functions there until 1870, since when a deputy has officiated in his stead.

Valentini calls it (<this venerable temple, the first that was raised to the true God of the Christians.® It was built in the 4th century, but the interior has been entirely remodeled, and unfortunately by Borromini (q.v.). The fagade is still later, for it was designed by Galilei in 1734; but this, with the effective deep shadows produced by the double porch gallery, deserves praise.

The great church of Saint Peter’s at Rome is surpassed by no cathedral in splendor of design and equaled by none in magnitude. It marks the culmination of Renaissance church architecture. Its interior is 619 feet in length and 449 in width (along the transepts). The diameter of the cupola is 141 feet; the height, from the ground to the top of the cross meas¬

ures 470 feet. Saint Peter’s is the largest church in the world. About the middle of the 15th century plans were discussed for a new building to replace the ancient structure that occupied the same site. The foundation stone was laid 18 April 1506, for a building according to the designs by Bramante, an Umbrian, who,

through his plans for the basilica of Saint Peter and the Vatican palace, became the most famous of Italian architects. Bramante’s in¬

fluence was greater than that of any of his predecessors. Subsequently assigned to the work were Raphael, Michelangelo, Barozzi, Giacomo della Porta, Maderna and Bernini — the last mentioned designed the

colonnades.

The completed church was consecrated by Urban VIII on 18 Nov. 1626. Thus 120

years passed between the first planning and the dedication of the building, that period covering the reign of 20 popes ; and, besides the seven architects mentioned, eight others succeeded one another in the construction of the edifice. The effect of the church itself, marred by Maderna's fagade in the first part of the 17th century, is wonderfully enhanced by Bernini's colonnade, added about the middle of the same century. The dome is its most striking feature.

Conspicuous examples of Italian Romanesque are the cathedral of Pisa, a.d. 1067-1118, with the Leaning Tower and the Baptistry; S.

Miniato at Florence; Genoa, 989-1199 and 1260; Pistoja, 1166- enlarged in the 13th century; and Monreale in Sicily. The Italian Gothic is exemplified very nobly by Milan Ca¬

thedral, 1385-1418, and the cathedral of Flor¬

ence, 1294—1462 (though here we must note that the octagonal dome, 138ˆ2 feet in diam¬

eter, was added by Brunelleschi and belongs to the Renaissance period). Other fine Gothic Italian cathedrals are Siena, 1243; Arazzo, 1278; Orvieto, 1290; Lucca, 1350; and Bo¬

logna, 1390. Saint Mark's, Venice, 1063-1350, that wonder of Byzantine architecture is in the form of a Greek cross, of equal arms. The delicate sculpture in every part and <(inex-pressible color® Ruskin regarded as the char¬

acteristics upon which, as he expressed it, <(the effects of Saint Mark's depend.®

French Cathedrals and Churches. — The

two most famous French cathedral churches are here briefly described.

Pope Alexander III, being at the time a refu¬

gee in France, laid the first stone of Notre Dame, Paris, in 1163. The northern transept and por¬

tal were built in 1312 by Philip le Bel. Porte Rouge, on the north side, was erected in 1407 by the Duke of Burgundy, assassin of the Duke of Orleans, as expiation of his crime. But not until about 1714 was the choir completed as it now stands. The building is in the form of a Latin cross, with an octagonal east end. Two towers of equal height (204 feet) embellish the western fagade. The spires have never been constructed. The length of the building is about 390 feet ; its width at transepts 144

feet. It was the scene of the coronation of Napoleon on 2 Dec. 1804, and the wedding of the youthful Francis II and Mary, Queen of Scots. The capacity of the building is about 22,000 persons.

Reims (or Rheims) Cathedral was pro¬

claimed long ago, by Charles VIII in 1484, ((The Noble Church among all those of the king¬

dom.® The learned M. Demaison (see Bibli¬

ography) writes: (< Among all our Gothic churches I should not dare to say that Reims ought to hold first place. It would be very puerile to desire to open thus a kind of argu¬

ment and try to answer a question in respect to which every one has his preferences and personal tastes. But it is none the less true that in certain details the superiority of the cathedral at Reims can be asserted in a manner almost beyond dispute. Its lateral fagades especially are of incomparable beauty.®

With infinite regret .we must change the tenses of this distinguished writer’s verbs from present to past. The barbarous in¬

vaders in the European War have utterly de¬

molished the noble fane. The building had the form of the Latin cross and was 453 feet long. It contained a collection of 5,000 stat¬

ues. In it the French kings were crowned down to the time of Charles X. First of that brilliant succession, Philip Augustus, in 1179, was crowned in the old cathedral which was destroyed by fire, 6 May 1210. On 6 May 1211, the first stone was laid for the new edifice.

For two centuries and more the builders toiled to produce a great church which should express the beliefs of their day in nobly as¬

piring lines and sculptural adornment of rare charm. And after the fire of 24 July 1481, the work of reconstruction and the works for the completion of the edifice went forward.

The fagade with its twin towers (263 feet), its rose-window, 120 feet in circumference, and the doorways with 530 statues, was of ma¬

jestic beauty.

The principal Gothic cathedrals of France, besides Notre Dame of Paris and Notre Dame of Reims, are Leon, a.d. 1113-1200; Chartres, 1194-1260; Amiens, 1220—28 ; Rouen, 1202-20; Coutances, 1254—74; Beauvais, with the most lofty choir in Europe, rebuilt 1 337—47; Bourges, 1190; Bayeux, with its 22

chapels. In addition there are (or were until the coming of the Germans), Chalons-sur-Marne, 1248; Soissons, 1175-1212 (demol¬

ished by the Germans) ; Meaux, 1170; Orleans, 13th centum, reconstructed by Henry IV ; Rennes, 1180-1389; Saint Brienne, finished 1248; CATHEDRALS

2, 3, 4, Copyright by Underwood A Underwood, N. Y.

1 Saint Patrick's Cathedral, New York City 2 Antwerp Cathedral 3 Lincoln Cathedral 4 Cologne Cathedral CATHEDRALS

1, 2, 3, Copyright by Underwood <fe Underwood, N. Y.

1 Durham Cathedral 2 Notre Dame, Paris 3 Saint Isaac's Cathedral, Petrograd 4 Saint Mark's Cathedral, Venice CATHEDRALS AND CHURCHES

Tours, 1170-1550; Angers, 12th century; Laval, 12th to 16th century; Le Mans, 11th to 13th century; Nantes, 1434-1840; Clemont-Perraud, 1248; Le Puy, 12th century; Verdun, 13th, 14th and 15th centuries; Saint Die, 13th, 14th and 18th centuries; Belley, 1413; Saint Fleur, 1396-1466; Limoges, 1273-1510; Tulle, 12th century; Sens, 1124-68; Moulins, 1465-1885; Nevers, 11th century (Romanesque) ; Troyes, 1208-1640; Lyons, 1107-1480; Autun, 1060-1178; Dijon, 1280; Grenoble, 11th, 12th, 16th cen¬

turies (Gothic and Romanesque) ; Saint Claude, 1340-1726; and Besanqon, 11th and 15th cen¬

turies. Southern France boasts of Bordeaux, 13th and 14th centuries (Gothic) ; Agen, 12th and 16th centuries; Luqon, 13th and 17th cen¬

turies (various styles) ; Angouleme, 12th cen¬

tury (Romano-Byzantine) ; Perigueux, 1047

(Byzantine and Aquitaine) ; Poitiers, 1 162—1379; Auch, 1 5th and 17th centuries; Bayonne, 1213; Tarbes, 12th and 14th centuries; Tou¬

louse, 15th and 16th centuries; Carcassonne, 13th century; Albi, 1272-1512, one of the most original buildings in Europe ; Cahors, Romano-Byzantine ; Perpignan, begun in 1324; Rodez, 1277 and 15th century; Avignon, 11th century; Nimes, 11th century; Valence, 1095; Viviers, 14th and 15th centuries; Aix, 13th and 15th centuries; Frejus, 11th-13th century; and the modern La Major, Marseilles, 1852-93.

Of French Romanesque, the most famous ex¬

amples are the Abbaye-aux-Hommes (S.

Etienne) ; Caen, commenced in 1066 by Wil¬

liam the Conqueror, to expiate his fault in marrying his closely related Matilda; also, in the same place, the Abbaye-aux-Dames (La Trinite). The Classic movement in Paris produced the Madeleine (1764—1806), which combines Hellenic and Roman elements. It is an excellent reproduction of a Corinthian tem¬

ple.

English, Scotch and Irish Cathedrals. —

Of English church buildings the most in¬

teresting is Westminster Abbey, begun in 1050

by Edward the Confessor, who died soon after the choir was finished in 1065 and was buried there. Mr. Allen (see Bibliography) writes that <(Edward the Confessor was interred before the high altar eight days after the dedi¬

cation. 8 To be crowned beside that tomb lent additional sanctity to the rite of coronation ; and every British sovereign, from William the Conqueror to George V has received the crown before its altar. Henry III, who rebuilt the church, palace and monastery at Westminster, ((chose his own burial-place on the north side of the stately shrine to which he had trans¬

lated* the body of the Confessor. There, in due time, lay his son Edward I and his Queen ; there king after king was buried® ; there Chau¬

cer was laid to rest, and there, nearly two cen¬

turies later, the poet's poet, Spenser, — and after¬

ward the other poets of the famous ˆcorner.®

Nelson's cry: ((Westminster or victory®! epi-grammatized the feeling and settled conviction of Englishmen that to be laid to sleep <(in ground sacred with the dust of kings, warriors, churchmen, statesmen and poets, was an honor of the highest order.® For three centuries Par¬

liament met in Westminster's Chapter House, the cradle of

Parliamentary government of the British empire. Edward III spoke of the Ab¬

bey as not only <(thc monastery church of West¬

minster,® but also as the <(special chapel of our principal palace.® Twice in its long history a bishop's throne has adorned its choir stalls ; but to-day it is not a cathedral it is — Westmins¬

ter Abbey. Ihe nave is the loftiest in Eng¬

land and the transepts contain some of the most beautiful work that can be found any¬

where. The south transept is the ((Poets' Cor¬

ner,® a name given by Goldsmith. Chaucer's tomb is here. Henry VII's chapel is the most perfect example of Perpendicular in exist¬

ence. The vault is beautiful with ((fan-tracery.® Above the superbly carved stalls of the Knights of the Bath hang ancient banners. In this impressive and elaborate chapel the tombs of Queen Elizabeth and her victim, Mary, Queen of Scots, are side by side !

The famous ˆJerusalem Chamber® (see

Shakespeare's (Henry IV, > Part II, Act V, Sc.

IV) is on the right of the chief, or west, en¬

trance. In this room the Assembly of Divines met in 1643, to frame the Westminster Cate¬

chism.

Saint Paul's Cathedral, in London, replaces the first Saint Paul's which was destroyed in the great fire of 1666. The first stone of the present edifice was laid 21 June 1675 by Chris¬

topher Wren, who drew up a comprehensive scheme for the new streets and squares of Lon¬

don, but was permitted to exercise his great talent only upon this

main building in his general plans. Sir Christopher's son laid the last stone, the highest slab on the top of the Lantern, 363 feet above the pavement, in 1710.

The entire building was finished in 35 years under one architect, one master mason, and while one bishop, Dr. Henry Compton, occu¬

pied the see. Compare what is said above about Saint Peter's. The plan of the building is the Latin cross surmounted by a dome 145 feet in diameter, and the latter combines characteristics of both Bramante's and Michelangelo's designs for the dome of Saint Peter's in Rome. The dome is the great feature of Saint Paul's and almost seems to typify London. The length of the building, east to west, is 500 feet; its width is 125 feet, except at the west end where two towers extend the width to 180 feet.

The choir stalls, carved by Grinling Gibbons, are superb.

Saint Paul's is second only to Westminster Abbey in its number of monuments to the celebrated dead. Here lie Wellington, Nelson, Rodney, Gordon, Lord Cornwallis, Sir Joshua Reynolds, Landseer, Turner and the American painter, Benjamin West. Westminster Abbey is the church of the king: Saint Paul's is the church of the citizen. It has always been chosen as the scene for stirring commemora¬

tions and thanksgivings ever since Queen Anne celebrated Marlborough's victories there. The streets around Saint Paul's bear such names as Amen Corner, Creed Lane, Canon Alley and Paternoster Row.

Canterbury Cathedral, founded soon after the Norman conquest, is 545 feet long and the greater transept is 170 feet. It has three towers, the central one being 230 feet high. The crypt, which extends under the entire structure, is the finest in England. In 1561 Elizabeth gave it to the Flemish and French refugees fleeing from the bloody wars of the Spanish Alva. The choir is the earliest example of the importation of the pure Ile-de-France style of transitional Gothic. After a fire which de-60

stroyed the original choir (that of the Norman Church) the work of reconstruction was en¬

trusted, in 1174, to the French architect, Wil¬

liam of Sens, who naturally supplied a purely French contemporaneous design. As Canter¬

bury was four centuries in building it contains specimens of all classes of Pointed Architec¬

ture. The tomb of Stephen Langton, first sub¬

scribing witness of the Magna Charta, is here.

The shrine of Thomas a Becket, who was murdered here in 1170, became a pilgrimage place of great celebrity and veneration.

Salisbury Cathedral, begun in 1220 and fin¬

ished in 1258, is universally selected as the best embodiment of Early English design; and this for the good and sufficient reason that it has the excellent quality of unity, which bears the same relation to architecture that com¬

position does to painting. The plan is a double cross; extreme length, 474 feet, and width along greater transept, 230 feet. The great east win¬

dow is the finest specimen of its kind in England.

In Lincoln Cathedral was developed the first complete form of the Pointed Arch. Lincoln greatly resembles the Cathedral of Dijon, but is earlier. It was begun by Hugh of Burgundy in 1185, after an earthquake had destroyed the earlier building. The Lincoln east front is regarded as almost perfect in design. The main stylistic divisions at Lincoln are given as : First, Saint Hugh's choir and east transept, 1191-1205; second, nave and west front, 1205-50; third, presbytery or Angel choir, 1256-80; fourth, upper portions of towers, 14th century.

Lincoln Cathedral has a length of 524 feet ex¬

ternally, and measurement inside gives 482 feet.

Its central tower is 300 feet high.

Peterborough Cathedral has been called a monument of the latest English Romanesque style. The first part of this building to be erected was the apse, about 1120. A critic says: (<nothing of the Romanesque architecture in England is quite so fine® as that rounded apse, the east end of Peterborough. According to the same observer, ((the interior of the church is even more impressive, relatively speaking, than the outside, and is probably the finest early interior in England.®

There is much Early English work and some Perpendicular in this cathedral. The west front with its three enormous doors is famous.

Ely is one of the long and comparatively narrow English cathedrals, whose main struc¬

tures, the nave and transepts, are Norman. Its length is 516 feet and its width 190 feet. The great west door is both Early English and Decorated and the Galilee Porch is one of the finest examples of Early English in existence.

The Octagon, the work of Walsingham (13th century), is the gem of Ely. The choir-stalls are the finest Decorated stalls known.

The cathedral at York is 524 feet long, 250

feet wide and has a superb central tower. The nave is 93 feet high. This (<King of Cathe¬

drals® is always called York Minster. Gen¬

erally speaking it is of the Perpendicular style.

The west front is Early Decorated, Late Dec¬

orated and Perpendicular. The towers rise to 200 feet. The south transept (1216-41) and the north transept (1241-60) are Early English.

For stateliness and magnificence the choir is unrivaled. The glass is magnificent and there is more ancient glass here than in any other building in the world.

Winchester, the largest cathedral in Eng¬

land, represents every style from pure Norman to early Renaissance. It has the most beautiful nave in England. The choir-stalls are magnifi¬

cent. Alfred the Great was crowned here. It is pre-eminently a cathedral of royal associa¬

tions.

Exeter is the best specimen of the Decorated style. The finest work of the 14th century is here. Its special features are the screen on the west front, lady chapel, bishop's throne, east window and minstrels' gallery with wonderful carvings.

Lichfield, Early English and Decorated, of the 13th and 14th centuries, is famed for its three lovely and delicate towers, west front and lady chapel.

Chichester, though small, is a treasure-house ; for it contains every style without a break from the 11th to the 16th century. It is called <(an epitome of English architecture.®

Gloucester is noted for the most beautiful choir in England with the magnificent east window, 72 feet high and 38 feet wide, the largest window in Europe. The central tower, cloisters and lady chapel are also famous.

Gloucester offers splendid examples of the transition from the Decorated to the Perpen¬

dicular.

Wells is celebrated for the carvings of its capitals, its chain-gate, chapter-house, inverted arches in the nave, east end and singular west front. It was built in 1206-42.

Rochester has the finest of all Norman door¬

ways in its west front. This cathedral was built in the 12th century.

Durham is the most picturesquely situated of all English cathedrals. Its Galilee chapel, choir of nine altars, Neville screen and Joseph's win¬

dow (a splendid example of Early Decorated tracery) are its features. Early Norman, Early English and Early Decorated are found here.

The tomb of the ˆVenerable Bede® is here.

In Scotland there are, besides modern

edifices, only two complete and entire cathe¬

drals — those of Glasgow and Kirkwall. Con¬

sult Addis, M. E. L., (The Cathedrals and Abbeys of Presbyterian Scotland,) Philadelphia 1901.

In Dublin there are two cathedrals : Christ Church, built in 1038, restored and, in 1878, reopened; Saint Patrick's, erected 1190 and restored between 1860 and 1865.

German Cathedrals and Churches. —

Turning now to German cathedrals, we may mention as typical structures the enormous structure at Cologne and the new cathedral at Berlin. The former was begun in the middle of the 13th century and only in part finished by 1509, after which date work was discon¬

tinued, and not resumed until 1830. In 1863

it was thrown open to the public, and in 1880

it was finished. It is 511 feet long and 231

feet wide. The towers reach the height of 513

feet above the ground. The nave, although five feet narrower, is 11 feet higher than that of the cathedral at Amiens. Consult Fergusson, J., (A History of Architecture in All Countries*

(London 1874, Vol. I, p. 533 and Vol. II, p.

67) ; also Moore, C. H., development and Character of Gothic Architecture) (2d ed., COPYRIGHT BY EDWARD STERN & CO., INC. FROM PAINTING BY H. SCHAEFER

INTERIOR OF CATHEDRAL AT TOLEDO, SPAIN

New York 1906, p. 253). The new cathedral at Berlin, dedicated in 1905, has its princi¬

pal entrance for the people of that city and for the general public at the side ; the traditional west-faqade door or doors are reserved for (<exits and entrances® of the Imperial family, and for entrances not followed by exits — since this cathedral is intended to serve as an Imperial mausoleum. The archi¬

tect, apparently striving after Italian Re¬

naissance effects, has produced a mere <(school classic,® architecturally commonplace in execu¬

tion though unusual in plan. Examples of Ger¬

man Romanesque are the cathedrals at Mayence (1036), Worms (1110-1200), Treves (1047), and Speyer (11th century) — these four being regarded as representative cathedrals of that period. France and Germany claim the Cathe¬

dral of Aix-la-Chapelle, built by Charlemagne as a royal tomb for himself. It (<is interesting as resembling Saint Vitale at Ravenna,® says Prof. Banister Fletcher in (A History of Architecture on the Comparative Method*

(London 1901). <(In plan it is a polygon of 16

sides, 105 feet in diameter. Internally, every two angles converge on to one pier, which thus number eight. These support a dome 47 feet 6 inches in diameter. It is of historic in¬

terest as the crowning place of the Western Emperors. Liibeck Cathedral is a type of brick architecture peculiar to North Germany; the nave and transept are of this period, being founded in 1173.® Examples of Gothic in Ger¬

many (besides Cologne Cathedral) are Strassburg Cathedral, 1240-1365, which has two west¬

ern towers, though only one spire (which dates from 1429) of open work tracery; Ratisbon Cathedral, 1275-1534, the open spires of which were added in 1859-69 ; Ulm Cathedral, spacious and lofty, with fine choir stalls; Magdeburg, 1208-11; Halberstadt, 1250; Altenburg, 1255; Freiburg, 1270; Meissen, 1274; Osnabriick, 1318; Augsburg, 1321-1431; and Metz, 1330.

Saint Elizabeth, Marburg, 1235-83, has the side aisles raised to the same height as the central aisle, a new type which Germans call the ((Hall Church® — as is also Munich Cathedral ; Saint Stephen, Vienna, 1300-1510, a splendidly impres¬

sive church in the heart of the city with traceried vaults, a spire and the original stained glass. The cathedral of Prague (1344-52) shows French influence.

Russian Ecclesiastical Edifices. - In Rus¬

sia, the largest and most famous of Petrograd's churches is the cathedral of Saint Isaac of Dalmatia, which was erected 1819—58) in

nlace of an earlier church, after plans by R. de Monferrand, and at an

expense of about $12,000,000. Its plan is a cross 364 feet long, and the extreme width is 315 feet. It is built of granite and marble.

The central dome, which is gilded and is 87 feet in diameter, is crowned by a lantern more than 40 feet high. Above the floor the dome rises to the measured height of 269 feet (interior), and 333l/> feet (exterior) to the top of the cross on the lantern. The walls of the interior are lined with marble of many dif¬

ferent kinds, and each of the chief entrances is ornamented with 16 monolith columns, 7 feet thick and 54 feet high, of red granite from Finland. In the same city, the cathedral of Saints Peter and Paul is the mausoleum of the Russian Imperial family. It is a domed structure 210 feet in length and 98 feet wide.

In Moscow, and near the centre of the Kremlin, which is in the very heart of the city, stands the cathedral of the Assumption, the church in which the Tsars are crowned, built by Fiora-venti of Bologna in 1475-79. Its form is rect¬

angular and its dimensions moderate (length 125 feet and width 82 feet). Its central dome rises to a height of 138 feet, and there is a smaller dome at each of the corners. Arch¬

angel Cathedral in Moscow was, before the time of Peter the Great, the mausoleum of the Tsars; and near it is the building in which rulers of the same family are christened and married, the cathedral of the Annunciation.

The Inner City contains one of the most revered sanctuaries in Russia, that of the chapel of the Iberian Virgin. Saint Basil's, with its variety of domes and strange colors, is one of the most famous churches in Russia. The cathedrals at Moscow, Kiev, Novgorod, and elsewhere, have an eastern aspect, because of their bulbous-shaped domes and barbaric details.

Prof. Banister Fletcher writes: <(In Greece and Russia the Byzantine style has been the accepted treatment of the Greek Church up to the present day. In Greece the

buildings are small, but often exquisitely executed, as the church of Daphni, near Ath¬

ens ; the well-known cathedral at Athens,®

etc. Saint Sophia at Constantinople, built by order of Justinian a.d. 532-37, is a masterpiece of Byzantine architecture; the minarets were added many years later.

Spanish and Portuguese Cathedrals. —

Spanish Gothic cathedrals of special in¬

terest or beauty are Burgos Cathedral,

dating from 1230; Toledo, 1227 ; Tarra¬

gona, 1235; Barcelona, 1298; and Seville, 1403-1520, the last-mentioned being the largest mediaeval cathedral in any country. Its tower, called the Giralda (upper part rebuilt in 1395; the lower built in 1195) is not Gothic but Span¬

ish Saracenic. Others are Zamora, 1151; Leon, 1250; Valencia, 1262; Oviedo, 1388; Pamplona, 1397 ; Gerona, 1312 ; Salamanca, 1510-60; Segovia, 1525, and Valladolid, 1585.

Also Spanish Saracenic is the great Mosque at Cordova (a.d. 786), some portions of which were destroyed by Charles V to build his church, described by Russell Sturgis as an ˆinterpolated Christian cathedral church in the very heart of the great prayer-hall of the mosque.® In Portu¬

gal the cathedral at Coimbra is a fine example.

Flemish, Dutch, Scandinavian and Swiss.

— In the Netherlands, the famous ecclesiasti¬

cal buildings are the cathedral of Sainte Gudule of Brussels; Saint Martin at Ypres, begun in 1254; the cathedral of Antwerp with six aisles; the cathedral of Liege; Saint Sanveur, Bruges, 13th and 14th centuries ; Saint Bavon, Ghent, made a cathedral in 1559; Tournai (11th and 12th centuries) ; Saint Rombaut, Malines (Mechlin), with its huge spire; the cathedral of Bois-le-Duc (1419) in Holland, and that of Utrecht (1251). Norway, Sweden, Denmark

and Switzerland have borrowed architectural forms or received guidance for the. construc¬

tion of their most important buildings from other countries. Thus, the Cathedral of Upsala was built from the designs of Etienne de Bonneval of Paris. Switzerland has Lausanne and Bern (1421).

American Ecclesiastical Architecture. —

In the United States some churches show independent architecture while others are in¬

fluenced by foreign styles.

The cornerstone of Saint Patrick's Cathe¬

dral, New York, was laid 15 Aug. 1858, exactly six centuries to the year, after the com¬

pletion of Salisbury Cathedral, England, and about six centuries after the laying of the cornerstone of Saint Patrick's Cathedral in Dublin. The original plans of its architect, Mr. James Renwick, were drawn in 1853.

The ground on which it stands (Fifth

and Madison avenues, 50th and 51st streets) was bought in 1852 by the trustees of the cathedral for $59,500. The building admirably and quite frankly perpetuates the decorated and geometric style of Gothic architecture which prevailed in Europe from 1275 to 1400, examples of which are the cathedrals of Rheims and Amiens and the naves of York Minister, Exeter and Westminster. Its plan is a Latin cross. The exterior dimensions are: Extreme length (with lady chapel), 398 feet; extreme breadth, 174 feet; towers at base, 32

feet ; height of towers, 330 feet. The interior dimensions are: length,

370 feet; breadth of nave and choir, including chapels, 120 feet ; length of transept, 140 feet; central aisle, 48

feet wide and 112 feet high; side aisles, 24

feet wide and 54 feet high ; chapels, 18 feet wide, 14 feet high and 12 feet deep. Above the granite base-course, the exterior is entirely of white marble. The lady chapel, which was finished in 1906, is of 13th century French Gothic design, by Mr. Charles T. Mathews.

Its length is 56 feet, its width 28 feet and its height 56 feet. The cost of the building was about $4,000,000. The ceremony of dedication took place 25 May 1879, somewhat less than 21 years after the laying of the cornerstone.

Between the lady chapel and Madison avenue stand the archbishop's house and the presby¬

tery.

The cathedral church of Saint John the Divine, situated on Morningside Heights, in New York city, was begun in 1892. It has been under active construction since 1901. The design of Heins and LaFarge was adopted in 1891, and the consecration of the choir occurred 19 April 1911. The material of the walls is Mohegan granite; wrought work of exterior, Frontenac stone and Mohegan granite ; wrought work of interior, Frontenac stone; columns of apse, Penobscot granite ; marbles in choir and chapels, Siena, Cipollino, serpentine, Alps green, Belgian black, yellow Numidian, red Numidian, Hauteville, Skyros, Briche violaces and Grueby tile. The rose red bases of walls and piers are of South Dakota jasper. The total projected length of the building is given as 520 feet; the total projected breadth, across transepts, 290 feet; total projected height, to crown of dome, 254 feet; total projected height, to top of spire, 425 feet. Both The American Architect (Vol. XCIX, p. 146) and Mr. LaFarge (in Scribner's) lay special stress on the octagon of Ely Cathedral when tracing to its source the idea carried out in Saint John's rtof the arrangement proper to the modern and Protest¬

ant Cathedral in which the preaching is as important as the procession. Stated in sim¬

plest terms, this is to be essentially a modern cathedral ; not a mere copy of any ancient one or a reproduction of an ancient type; and it

borrows suggestions not alone from Ely but also from Spanish churches, perhaps particu¬

larly that of Toro.® The Architectural Record reminds us that (<the winning design was de¬

scribed, at the time of the competition of 1891, as a domical church in a Gothic shell.® Up to 1916 somewhat less than $4,000,000 had been spent for the choir, with its ambulatory and chapels, the arches of the crossing and the crypt.

Saint Thomas's Church, New York, was

founded in 1823. In 1867 the present site was acquired (Fifth avenue at 53d street) ; three years later the ((old® Saint Thomas's was dedi¬

cated, and for a third of a century its tower was a noted landmark on the avenue ; more¬

over the church was beloved on account of its magnificent altar, with LaFarge's decorations, and for its organ. That earlier building was destroyed by fire 8 Aug.

1905; a competition for architects' designs was held ; the design by Messrs. Cram, Goodhue &

Ferguson was selected. Adequate size was achieved (the nave is 43 feet wide and the vault rises 90 feet above the pavement), de¬

spite the limited area available, by the success¬

ful solution of novel problems in ecclesiastical architecture. The building-stone employed for the exterior is the oolithic limestone of Bowling Green, Ky. ; for the interior, soft yellow sandstone from South Carrollton in the same State. Guastavino tile was used for the vault. The cost of the new Saint Thomas's was approximately $1,000,000. The interior is simple, though restful rather than severe, as to its main lines and proportions.

Other beautiful, or historically interesting churches in New York are Trinity; Grace; and Saint Paul's Chapel (Colonial period and single example of original church architec¬

ture of that period remaining in the city), *etc.* Among the American cathedrals and

churches outside of New York city are th°

Roman Catholic Cathedral at Baltimore, which dates from 1800; that of Saint Peter and Saint Paul at Philadelphia, a domical Renais¬

sance structure (height of dome, 210 feet) ; the Immaculate Conception Cathedral at Den¬

ver; Saint Joseph's Church, and the Cathedrals at Hartford, Saint Louis, Providence, Boston, Albany, Buffalo and Rochester.

Montreal, Canada, is fortunate in the pos¬

session of the Catholic Cathedral of Saint James on Dominion .Square; the large church of Notre Dame, built 1824; and the Anglican Christ Church Cathedral (Early English archi¬

tecture).

Finally, looking southward to Mexico and other New World countries, attention should be called to the powerfully designed and exe¬

cuted cathedral at Puebla before mentioning the enormous jumbled mass of the cathedral in the Citv of Mexico, which has Italian Renaissance and Oriental domes and Churrigueresque

fagades. In Peru the most noteworthy eccle¬

siastical buildings are the cathedral and the church of the Compania in Cuzco and the cathedrals in Arequipa and Lima. The Brazil¬

ian capital possesses, in its not quite appreciated cathedral, a building of rather impressive dig¬

nity. The wide fagade of the shallow cathe¬

dral at Buenos Aires does not harmonize with the genius of a country that sends the roots of its power every year deeper into the soil.

Bibliography. — Allen, F. H., <The Great Cathedrals of the World) (Boston 1886) ; (American Churches) (New York 1915) ; Demaison, L., (La Cathedrale de Reims) (Paris, undated) ; Moreau-Ncalton, L., (La Cathedrale de Reims) (Paris 1915) ; (Saint John the Divine, Cathedral of) (in The Architectural Record , Vol. XXX, pages 185-92) Sturgis, R., and Frothingham, A. L., (A Flistory of Architecture) (New York 1906-15) ; Valentini, A., <La Patriarcale Basilica Lateranense>

(Rome 1834) ; Rodin, A., G_.es cathedrales de France5 (Paris 1914) ; Singleton, Esther, (How to Visit the English Cathedrals5 (New York 1912) ; Rudy, Charles, (The Cathedrals of Northern Spain5 (Boston 1905) ; Hartley, Cath¬

erine G., (Cathedrals of Southern Spain5 (Lon¬

don 1913) ; Bumpus, T. F., (The Cathedrals of Central Italy5 (London 1914) ; Edwards, George Wharton, (Vanished Halls and Cathe¬

drals of France5 (Philadelphia 1917).

Esther Singleton,

Author of (Famous Cathedrals .5

CATHELINEAU, ka’te-le’no, Jacques,

French Vendean general: b. Pin-en-Mauge, Anjou, 5 Jan. 1759; d. 11 July 1793. On the breaking out of the French Revolution he was living quietly with his family, when an unfore¬

seen event suddenly called him forth from obscurity. In March 1793, during the levy of the conscription which the National Assembly had decreed, the youth of the district of Saint Florent rose in insurrection, and put the officials and gens d’armes to flight. They then returned home, and were awaiting the terrible revenge of the Republicans,

when news of the outbreak reached Cathelineau. He instantly determined to put himself at the head of his countrymen.

Causing the alarm-bell to be rung in different places, he was soon followed by almost all the men capable of bearing arms, surprised several Republican posts, carried off their cannon and now mustered several thousand strong. As he did not deem himself equal to the post of com¬

mander, he placed himself under Bonchamp, and Elbee, but after the victory of Saumur, 9

June 1793, was formally invested as commander-in-chief. On this he resolved to make a decisive attack on Nantes, and appeared be¬

fore it with 80,000 men, still further increased by 30,000, whom Charette brought from lower Poitou. Notwithstanding these vast numbers, and the greatest display of undisciplined gal¬

lantry, the attack was repulsed, and Cathelineau died shortly after of the severe wounds which he had received. For his piety he was called the (<Saint of Anjou.55 Consult La Porte, (La legende de Cathelineau5 (Paris 1893) ; Muret, (Vie populaire de Cathelineau5 (Paris 1845).

CATHERINE. See Catharine.

CATHERINE'S SAINT, or SANTA

CATHARINA, an island close to the coast of Brazil, between lat. 27° and 28° S., and b°longing to the province or state of Santa Catharina (q.v.). It is 30 miles long and 10 broad, and contains Desterro, the state capital. The sur¬

face is mountainous.

CATHETER, any tubular organ used to

insert into a mucous canal or hollow organ.

Thus, there are nasal catheters for the nose, eustachian catheters for

the internal ear, urinary catheters for the bladder. This laiter is the more frequently used. Materials used in making urinary catheters arc silver, glass, rubber, woven linen and gum elastic. A stylet is generally used for putting the less flexible catheters in place. Catheters used for male patients are about 10 inches with a curve of two inches at the extremity in metal instru¬

ments. For females, five inches is the proper length, the metal instruments curving a half¬

inch. Great care should be exercised in its use, that it be kept clean, to avoid cystitis (q.v.).

CATHETOMETER, in physics, an instru¬

ment for the exact measurement of small verti¬

cal distances. In its usual form it consists of a horizontal telescope, mounted so as to slide upon a fixed, graduated, upright support or post. The telescope is raised or lowered until its cross-hairs coincide with one of the objects whose difference in height is to be determined, and the position of the telescope upon the vertical, graduated post is noted by means of a vernier or micrometer. The telescope is then brought to the elevation of the second object in the same way, and the difference in the two readings gives the desired difference in height.

A cathetometer that is well designed and con¬

structed is an instrument capable of giving very precise results when in the hands of a skilful observer. It is greatly used in accurate barometry, for determining the height of the barometric column above the mercury in the cistern.

CATHODE, the negative pole of any given portion of an electric circuit, such as a battery, an electrolytic cell, vacuum tube, a motor, *etc.*

CATHODE RAYS. See Ether; Elec¬

tron; Molecular Theory; Radiation, *etc.*

body of Christians founded by Rev. Edward Irving, in London, England, in 1835, hence often called ((Irvingites.55 Irving was pastor of a Scotch Presbyterian Church, but, changing his views, was dismissed. He held that the gifts bestowed upon the Apostolic Church — words of wisdom and prophecy, powers of healing and miracles, discerning of spirits and speaking in divers tongues and interpretation thereof —were not meant exclusively for the apostles and their immediate successors, but are given to all who have the living faith. He died soon after he ceased to be pastor of the Presbyterian Church, but his followers developed his ideas and completed the organization of the Catholic Apostolic Church, which has four classes of ministers: Apostles (the chief of all), prophets, evangelists and pastors, each comprising 12

members, when complete these 48 presiding over the 12 tribes of the general church. Each congregation has its ((Angel,55 or bishop, with 24 priests, six of each class of the ministry; there are also elders and deacons for temporal affairs, and a corps of subdeacons, acolytes, singers and doorkeepers. The service is highly ritualistic, with ((High55 and ((Low55 celebrations, vestments, candles, incense, holy oils, *etc.* The Church accepts the Apostles', Nicene and Athanasian creeds, and expects soon the second coming of the Lord. The denomination was established in the United States before 1851.

The New Apostolic Church arose in Europe as the result of a difference of view as to the number of apostles who might be appointed.

The original body limits it to 12; the new branch holds that a larger number may be 64

created. The latter has in the United States 13 churches, 19 ministers and 2,020 members; the former, 1 1 churches, 14 ministers and 2,907

members. These figures are those of the cen¬

sus of 1906. Consult Life of Edward Irving (of which there are several)* and E. Miller's 'History and Doctrines of Irvingism) (London, Eng., 1878).

CATHOLIC BENEVOLENT LEGION,

a fraternal society for Roman Catholic laymen, designed to afford to the members facilities for intellectual improvement, social advancement and such other advantages as are offered by similar non-Catholic fraternities. It was or¬

ganized in 1881 and incorporated under the laws of the State of New York with 11 charter members. Thirty years later the Society had 17,000 active members, and had paid to widows and orphans of 8,000 deceased members the sum of $21,000,000. The organization is incor¬

porated under the style of the Supreme Coun¬

cil, Catholic Benevolent Legion, and to the Supreme Council final appeal is made on all matters of importance emanating from State or subordinate councils. Male Roman Catholics who are personally acceptable, of sound bodily health, and between the ages of 18 and 55, are alone eligible to membership. There is a relief fund on behalf of sick and distressed members, and a benefit fund, out of which a sum not exceeding $5,000 is paid to the beneficiaries of deceased members, and a sum not exceeding $2,500 to a member who is permanently dis¬

abled. A subordinate council of the Catholic Benevolent Legion may be formed in any con¬

gregation or parish ; a charter is granted by the Supreme Council to a group of 15 or even of 7 eligible persons who associate themselves with a view to enter the fraternity. The or¬

ganization has the express approval of the Pontiff and of all the archbishops and bishops in whose jurisdictions councils of the fraternity have been formed.

CATHOLIC CHURCH, a phrase signify¬

ing universal Church, the whole body of true believers in Christ ; but the ‘term is commonly used as equivalent to the Roman or Western Church. Like most other words used in

ecclesiology, the term Catholic was borrowed at first from the New Testament. It occurs in some editions of the Greek original — including that issued in connection with the last revision — in the titles prefixed to the Epistles of James, 1 and 2 Peter, 1 John and Jude, and is the word translated “general® in the King James Bible. The first to apply it to the Church was the Apostolic Father Ignatius. When he and his successors used it they meant tp indicate that the Church of which they constituted a part comprised the main body of believers, and was designed, as it was entitled, to be universal.

In this sense the Church was opposed to the sects and separate bodies of heretics who had separated themselves from it and were now outside its pale. When, in the 9th century, the separation between the Eastern and West¬

ern churches took place, the latter retained as one of its appellations the term “Catholic,® the Eastern Church being contented with the word “Orthodox® still used by the Russian emperors in their politico-ecclesiastical manifestos. When the Protestant churches separated from their communion with Rome in the 16th century, those whom they had left naturally regarded them as outside the Catholic pale. They, on the other hand, declined to admit that this was the case, and the term “Catholic Church® is used in the English Liturgy apparently in the sense of all persons making a Christian pro¬

fession.

CATHOLIC CHURCH, Roman. By this

name is designated the large body of Christians, united in doctrine and worship under the su¬

preme jurisdiction of the Pope, the bishop of Rome. (See Papacy). The members of this communion are wont rather to speak of it as the

“Catholic Church,® but admit the term ((Roman® in the sense that ((to be Roman is to be Catholic and to be Catholic is to be Roman.®

They hold that their Church alone possesses in its fullness the system of truths, laws and prac¬

tices for the worship of God which was insti¬

tuted by Jesus Christ (q.v.). Hence a brief statement of Catholic teaching on the origin, nature and properties of the Church of Christ will enable us to understand why the Roman Catholic Church demands that all men submit to her authority as a teacher, divinely appointed to make known with absolute certainty the con¬

ditions of salvation.

From the Four Gospels, considered as trust¬

worthy historical documents, we learn that Jesus Christ was certainly a divine messenger to all mankind, and that therefore all men are bound to receive His message with implicit submission. The doctrine which He teaches may be an enforcement of truths which man might have learned, however imperfectly, by the use of his natural powers, or may include new truths which his natural powers would never have discovered. As Christ did not re¬

main on earth to teach all men in person, He chose a band of apostles, whom He commis¬

sioned to preach to all nations the truths He had taught them, promising His assistance unto the end of the world, and imposing upon all men, under penalty of losing their souls, the obligation of receiving His doctrine. The presence of the Holy Spirit was to preserve the Apostles from error and keep them perfectly united in their teaching.

Besides the gift of infallibility (q.v.), He conferred on them jurisdiction over all be¬

lievers, the right to govern with threefold power, legislative, judicial and executive.

Moreover, they were to sanctify men by certain religious rites, called sacraments (q.v.), and for this purpose received the gift of Holy Orders (q.v.). To Peter (see Saint Peter), one of the Twelve Apostles, was granted a primacy, not merely of honor, but of jurisdic¬

tion. On him was Christ's Church to be built; he was to feed the entire flock, the lambs and the sheep. By thus organizing a body to teach, govern and sanctify men under the primacy of Saint Peter, Christ founded a religious society, supernatural in aims and means, and he chose for it the special name, the Church. (See Church, an Organization of Christians).

This society was to last even unto the day of judgment; its duty was to teach all men; where¬

fore the Apostles appointed their successors and transmitted to them the authority received from Christ. As the primacy of Saint Peter was the first foundation, necessary to ensure the unity and stability of the Church, it too was to CATHOLIC CHURCH

last forever. The power he received was for him and his successors. There never should come a time when the doctrine of Christ would be lost through corruption.

Whence we gather that there exists to-day a religious society, empowered to teach with certainty all the truths of Christianity, and that it is a visible body, united in its government and religious teachings. The members of this society submit to its infallible teaching by pro¬

fession of the faith, to its sacred ministry by the reception of baptism (q.v.) and to its ecclesiastical rule by obedience. If all men are obliged to enter this society, it is evident that Christ provided some signs, notes or marks by which His Church can become known to all earnest inquirers, by which it can be distin¬

guished from other associations. Christ in¬

tended that His Church should be known by Unity. It was to be one in faith, one in gov¬

ernment, one in worship and one in the charity uniting all its members. It was to be known by Holiness. The Church is holy in its Founder ; in its aim to lead men to God ; in its means of sanctification, in the heroic virtue of many members and in the permanence of miracles among them. It was to be Catholic ; that is, conspicuously diffused everywhere.

Finally it was to be Apostolic. The governing and teaching body is the continuation of the Apostolic body to which Christ gave His mis¬

sion and with which He promised to remain until the end of time. Whoever is not in communion with the successor of Saint Peter cannot possess union with the Apostolic body.

The obligation of becoming a member of the Church is often expressed in these words: (<Out of the Church there is no salvation. They do not mean that all who die out of the visible communion are lost. God does not inflict pun¬

ishment but for a wilful fault, and those who without fault cannot see their obligation of joining the Church are not to blame. If, how¬

ever, anyone, knowing this obligation, refuses to comply with it, he puts himself out of the way of salvation. The same holds true for those who neglect to examine properly into a matter of so great importance.

Catholics hold that the marks of the true Church of Christ are found only in the Church in which the bishop of Rome holds the primacy.

The bishops of this Church all over the world are the successors of the apostles, possessing the right to teach, to rule, and to sanctify. The gift of infallibility, that is, the right to declare that certain doctrines have been revealed by God is not personal to each bishop, but belongs only to the whole body of bishops, whether gathered in general council or not. The consent of the universal Church according to Christ's promise is a sure criterion of revelation. To the bishop of Rome as the successor of Saint Peter belongs the primacy of jurisdiction over the whole Church, complete, supreme, ordinary, and immediate over each and all the churches of the world, over each and all the bishops and the faithful.

In this primacy is included the supreme au¬

thority as teacher of the Church, or the pre¬

rogative of papal infallibility. By virtue of a special supernatural assistance of the Holy Spirit promised to Saint Peter and his succes¬

sors, the Pope cannot err when, as supreme teacher of the universal Church, he defines a vol. 6 — 5

doctrine concerning faith or morals to be held by the whole body of the faithful. Only when these four conditions are fulfilled is the Pope infallible : First, he must speak not in his pri¬

vate capacity, not merely in his official charac¬

ter, but as supreme teacher. Secondly, the matter defined must concern faith or morals.

Thirdly, the judgment must be delivered with the manifest intention of commanding intellec¬

tual assent. Fourthly, the definition must be given to the whole body of the faithful. It is clear that infallibility has absolutely no connec¬

tion with the Pope's personal qualities and is entirely distinct from impeccability, or incapa¬

bility of sinning. The extent of papal infalli¬

bility is the same as that of the Church's in¬

fallibility. It embraces all the truths that God has revealed as the object of faith, and extends to other truths and matters of faith without as¬

surance of which it would be impossible or very difficult to preserve the deposit of revealed truth.

It follows from what we have hitherto said that whoever wishes to know Christ's doctrine must appeal to the living authority. The Church

as teacher, that is, the bishops now living in union with the Pope, can alone tell us what doctrines were revealed. This knowl¬

edge is not acquired from new revelations, but with the assistance of the Holy Ghost from various sources, chief among which is the preaching of the Gospel, by which the doctrines of Christ are handed down as a sacred heritage from age to age. Thus, even if nothing had ever been written, we should have to-day, in¬

corrupt and infallible, the means of preserving religious truth which Christ established, namely Tradition. However, it was natural that those who were commissioned to teach should also set down their teaching in writing. Hence we possess many documents and monuments from which we learn what the Church taught in past ages and what it now teaches ; the truths re¬

vealed remain unchanged. Moreover, we learn from the Church that God Himself provided, by means of men, certain writings, containing revealed truth, and gave them to the Church for the instruction and direction of the faithful.

(See Bible). From it alone we learn what books have been so inspired and constitute Holy Scripture ; the Church alone can au¬

thoritatively interpret these writings. Tradi¬

tion, therefore, is prior to the Christian scrip¬

tures both in time and in thought. It is wider in its scope, for it embraces Scripture as an instrument by which tradition is handed down and on the other hand contains matters which are not in Scripture. First and principally, tradition teaches us the authoritative character of Scripture itself. Even were all the copies of Scripture destroyed, the living voice would still proclaim the entire Christian teaching.

Catholics yield to none in their esteem of Holy Writ, as the inspired word of God, but they so esteem it because of what they learn con¬

cerning it from tradition. The chief sources from which this tradition is learned are the acts of councils, the writings of the Popes, of the Fathers of the Church, inscriptions, mon¬

uments, pictures, liturgies, rites and pious cus¬

toms, in a word, every way in which the Church is wont to profess her

faith.

The Chief Doctrines of the Catholic

Faith — Catholics believe in one, true, living 66

CATHOLIC CHURCH

God, the Creator and Lord of heaven and earth and of all things visible and invisible, almighty, eternal, immense and incompre¬

hensible; infinite in will and intellect, and in all perfection, who, being one, singular, ab¬

solutely simple and unchangeable spiritual sub¬

stance is to be regarded as distinct really and in essence from the world, infinitely happy in and from Himself and unspeakably elevated above all things that exist or can be conceived.

He knows all things in the most perfect man¬

ner, by one all-embracing act of His intellect, from eternity to eternity ever the same. He knows His own being, all things that are pos¬

sible, past, present and future, and all things that are not and never have been nor will be, but which would be if some condition were fulfilled. He is all-wise, allholy, all-just, true, faithful and bountiful. Moreover, in God as there is one divine nature, so there are three divine persons, Father, Son and Holy Ghost, really distinct from one another, perfectly equal to one another. Nevertheless there are not three Gods, but one God. TFe Father is un¬

begotten, the Son is begotten of the Father, and the Holy Ghost proceeds from the Father and the Son. (See Trinity, Doctrine of the).

This one true God of His goodness and by His omnipotent power, not in order to increase His happiness, not to acquire perfection, but to manifest it by the good which He imparts to His creatures, in accordance with His ab¬

solutely free decree, at once from the beginning of time framed out of nothing as to the whole of their substance, two kinds of creatures, spiritual and material, the angels and the world, and then man, in whom spirit and matter were united. God preserves and governs by His providence all things that He has created.

To the angels He gave sanctifying grace and with it the power to merit eternal happiness by free service. Many of them rebelled and were cast into everlasting fire, the rest were con¬

firmed in grace and admitted to the beatific vision of God. God ((formed the body of the first man out of the slime of the earths He created his soul immediately, as He creates the soul of every man ; the soul is a spirit, endowed with intellect and free-will and immortal. All men are descended from Adam (q.v.) and Eve.

Like the Angels, our first parents were also raised to a supernatural state by the infusion of sanctifying grace into their souls, being made adopted children of God,- destined to the en¬

joyment of the beatific vision. This is the prin¬

ciple of supernatural life, whereby man can produce works that merit a heavenly reward.

Moreover, God bestowed on man other preter¬

natural gifts : great powers of mind and in¬

fused knowledge, complete control of the pas¬

sions, immortality and exemption from suffer¬

ing and decay. This original justice our first parents lost by mortal sin, that is, by a grievous, wilful violation of God's law; in consequence of Adam's sin all of his descendants were deprived of those privileges, are conceived in original sin and cannot of themselves enter the kingdom of heaven.

To atone adequately for the grievous insult to God and to repair the evil done to mankind, the second person of the Trinity became man.

Jesus is true God and true man, one Divine Person subsisting in two

natures, divine and human, not by the conversion of Divinity into flesh, but by the assumption of humanity unto God. He was born of the Virgin Mary, who was truly the Mother of God and remained a Virgin in conceiving and bearing her divine Son and ever after till the end of her life. By singular privilege of God through the merits of Christ, the Redeemer, the Blessed Virgin was preserved free from original sin (q.v.), that is, in the first moment of her conception, when her soul was created, it was endowed with sanc¬

tifying grace. By further privilege she was never guilty of any actual sin, mortal or venial.

See Mary; Immaculate Conception.

Christ, the God-man, became our Redeemer, not by the mere effect of His preaching and example, but by His bloody death on the cross.

He made Himself our mediator with His

Father, offering atonement for the sins of all men. This satisfaction is not applied to those who have use of reason without their free em¬

ployment of the means ordained by Christ. He merited for us the remission of sins, sanctify¬

ing grace and all other graces conferred on man. After His death, He rose again on the third day, ascended into Heaven, where He sits at the right hand of the Father, whence He shall come with glory to judge the living and the dead, and of His kingdom there shall be no end. He founded a Church and confided to it the task of teaching His doctrines and apply¬

ing to men's souls the means of sanctification.

This Church is the guardian and interpreter of revelation; for though the existence of God can be known with certainty by the light of reason, it has pleased the Divine Wisdom to reveal many natural truths as well as all those that regard our supernatural life. This revela¬

tion is contained both in written books and in unwritten traditions. The books of the Old and New Testament, held by the Church to be sacred and canonical, were written by the in¬

spiration of the Holy Ghost and have God as their author. In matters of faith and morals the true meaning of Scripture is that which is maintained by the Church. All interpretations at variance with the unanimous consent of the Fathers, when they speak as witnesses of tradi¬

tion, are false and forbidden.

Whatever is presented to us by the Church as revealed truth must be accepted by the free assent of the intellect, not because of its in¬

trinsic truth seen by the light of reason, but on the authority of God who has given the revelation, and who can neither be deceived nor deceive. This divine revelation has been made credible by external proofs, especially by mir¬

acles and prophecies; >et as faith is a super¬

natural virtue, the act of faith requires the assistance of divine grace, enlightening the in¬

tellect and strengthening the will and making our act supernatural. Without faith there is no justification, but as God wishes all men to be saved, all receive, either proximately or re¬

motely, the grace to believe. Among revealed truths some are mysteries that cannot be demonstrated by human reason, but must be believed. The demonstrations of reason can¬

not contradict revelation, hence any assertions of human science that are at variance with what the Church teaches to be revealed must be false.

As grace is necessary for the beginnings of faith, and even for the pious affection toward believing, so it is needed to make our good

works deserving of a supernatural reward.

Grace is needed even for the just to avoid sin.

Final perseverance is a special privilege of dying in the state of grace. Apart from a special revelation, no one can know that he will re¬

ceive this blessing. Without grace, however, it is possible to resist less urgent temptations and perform acts that have natural goodness ; hence all works done before justification are not sins.

According to Catholic doctrine, actual grace is a rea(influence exerted by the Holy Ghost upon the soul, but it does not destroy the free-will of man. A grace may be fully sufficient for a supernaturally good act, but if a man refuse to act with it, the grace will not be efficacious.

God will not save us without our co-operation.

See Grace of God.

Actual graces aid us to obtain habitual or sanctifying grace, that is, to be justified by the remission of original sin or of grievous actual sin. This sanctifying grace makes us like unto Christ, holy and supernaturally pleasing to God, and brings with it the infused virtues and the gifts of the Holy Ghost (q.v.). There are many grades of habitual grace; it may be in¬

creased by good works, and on the other hand may be entirely lost by mortal sin. God in His mercy offers to man supernatural happiness and makes this offer known by the preaching of His Church, which he accompanies by an in¬

terior stirring grace. When a man co-operates with this grace, he believes the truth with absolute certainty and is moved by the thought of God's love; he sees reasons to fear God's justice and throws himself on God's mercy, trusting in the merits of Christ; hence he con¬

ceives a love of God and a detestation of sin.

Thus by the working of grace and the co¬

operation of man's free will, the way is pre¬

pared for justification; and, provided that man puts no obstacle, the Holy Ghost works this justification by infusing charity into his soul,

thereby destroying sin. Thus purified, he enters on a virtuous life, hoping by the merits of Christ to enter heaven, but he has no absolute certainty of his salvation.

In the process of justification, the first grace cannot be merited at all ; for no supernatural reward is due to natural acts. With the aid of grace both sinners and just can merit further actual grace, but only congruously and not with any strict right in justice. The just, that is, those in a state of grace, can merit final perseverance congruously, and, because of God's promises, can merit in justice the in¬

crease of habitual grace, eternal life and in¬

crease of glory. By mortal sin, all merit is lost.

As a means of justification Christ has en¬

trusted to His Church seven Sacraments (q.v.), or sensible rites, instituted by Him to effect in the soul the grace which they signify. When the necessary conditions are placed, the Sacra¬

ment works by its own efficacy and not through the piety of the minister nor of the recipient.

The Sacraments are Baptism, Confirmation, Holy Eucharist, Penance, Extreme Unction, Holy Orders and Matrimony. Baptism and

Penance remit sin ; the others cannot lawfully be received in mortal sin. Baptism, Confirma¬

tion and Holy Orders can be received only once, because they imprint on the soul an inef¬

faceable mark, called the sacramental character.

All the Sacraments, if properly received, give sanctifying grace or increase it, if already in the soul. Since the promulgation of the Gos¬

pel, justification cannot be obtained without Baptism of water, which blots out original sin and all actual sin. Infants who die without Baptism cannot enjoy the supernatural vision of God. In adults, when Baptism of water cannot be received, pardor of sin can be ob¬

tained by the baptism of desire, which consists in a perfect love of God and a sorrow for sin, including, at least implicitly, the desire of the Sacrament. Remission of sin is also granted to all who suffer martyrdom for Christ. Sins committed after Baptism are remitted by the Sacrament of Penance (q.v.), in which the sinner confesses with contrition all his mortal sins to the duly authorized priests of the Church, from whom he receives absolution.

Sins are also remitted by perfect contrition, but the obligation of Divine Law requires that even then, if possible, they must be confessed.

Penance pardons the guilt of sins confessed and repented of, infuses or increases sanctify¬

ing grace, remits eternal punishment, if it was due, secures actual graces to avoid sin in future, and may also remit, wholly or in part, the temporal punishment still to be undergone for sins the guilt of which has been pardoned.

The whole punishment is not always remitted with the fault ; for the remaining debt satis¬

faction is made to God by sufferings patiently borne or voluntarily inflicted. For this purpose also the Church has the power of granting indulgences which are not a remission of sin, much less a permission to commit sin, but the remission of the whole or part of the temporal punishment which may be due for sins, after the guilt has been pardoned. See Indulgence.

In the Holy Eucharist there is really and substantially present the Body and Blood, Soul and Divinity of our Lord Jesus Christ, under the appearances of bread and wine. By the words of the priest at the consecration, there is effected a conversion of the whole sub¬

stance of the bread into the Body and of the whole substance of the wine into the Blood, which conversion is called transubstantiation (q.v.). By force of the words, the Body is under the species of the bread and the Blood under the species of the wine, but in virtue of the natural connection and concomitance by which the parts of Christ are linked together, He exists whole and entire under each species and every part of the species. In the Mass (q.v.) there is offered to God a true, proper and propitiatory sacrifice for the living and the dead. To offer up this sacrifice, Christ insti¬

tuted a visible and external priesthood and the Sacrament of Holy Orders (q.v.) ; the minister of this Sacrament must be a bishop, who has received the fullness of the sacred ministry.

The various orders constitute the Hierarchy.

Priests cannot ordain or confirm. Other orders are the diaconate, subdiaconate and the minor orders (Acolyte, Exorcist, Lector and O-stia-rius). Before the minor orders, the tonsure is conferred as a sign of enrolment among the clergy, who are separated from the rest of the faithful, called the laity. The right to exercise the sacred functions within appointed limits is called jurisdiction; it is required for the law¬

ful performance of all functions ,and for the validity of some. The Roman pontiffs have, by Divine institution, universal jurisdiction. The other bishops have power to govern the 08

dioceses to which they have been assigned by the Pope.

Marriage between Christians was raised by Christ to the dignity of a sacrament. Its es¬

sence lies in the contract freely made between man and wife ; the grace conferred is first an increase of sanctity, and, secondly, actual grace to fulfill the duties of the married state. The bond of Christian marriage after consumma¬

tion is absolutely indissoluble ; it is also exclu¬

sive, no man can have several wives, no woman several husbands, at the same time. Those who, with the aid of God's grace, fulfil the obliga¬

tions of virginity or celibacy live in a state more holy and better than the state of matri¬

mony. From the fact that Christian matrimony is a Sacrament, it follows that it has been en¬

trusted to the Church and is subject to the laws of the Church, not to those of the State; hence the Church has the power of assigning condi¬

tions necessary for the validity or lawfulness of the contract between those who have been baptized. See Marriage.

The means of sanctification are given to men to enable them to live and die in the state of sanctifying grace. At the hour of death each soul is judged by Christ, and if in mortal sin, is condemned to hell to be punished by eternal torments, varying in intensity according to the degree of guilt. Those who die free from all sin, mortal and venial and from all the tem¬

poral punishment for sin, are admitted at once to life everlasting, to perfect beatitude in the vision of God. The saints and angels in heaven offer up prayers for men, and it is good and useful to invoke their intercession that we may obtain favors from God through Jesus Christ, who is our sole Redeemer and Saviour. Catho¬

lics honor and worship the saints and angels, and especially the Blessed Virgin Mary, be¬

cause God loves and honors them, and because of their own personal sanctity ; not, however, with the supreme worship that belongs only to God. Because of their special connection with holy persons, honor is also given to relics of the saints, to images and paintings of Christ and His saints. If men die in venial sin, or temporal punishment be still due, their souls are detained in purgatory (q.v.) until expiation is made. In this state they can no longer merit for themselves, but can be assisted by the pray¬

ers and good works of the faithful and par¬

ticularly by the holy sacrifice of the Mass. The Church has the power to apply indulgences for their relief. In addition to the particular judg¬

ment, immediately after death, there will be a general judgment at the end of the world. The body will rise from the grave reunited to the soul, and share for eternity either happiness in heaven or punishment in hell.

The chief duties of Christian life are ex¬

pressed in the Ten Commandments of God and the commandments of the Church. Many laws have been imposed by the Church on particular classes or for special purposes; all Catholics, however, are bound, under pain of mortal sin, to hear Mass and rest from servile work on Sundays and Holydays of obligation, to fast and to abstain from certain food on the days appointed, to confess all mortal sins at least once a year ˆnd to receive the Holy Eucharist during the Easter time.

A Catholic must believe all the truths God has revealed and teaches through His Church.

Denial of one such would mean either the de¬

nial of God's veracity or of the Church's in¬

fallibility. But it is not necessary that he should know explicitly more than the principal truths; all others are included in his acceptance of the Church as a divine teacher, alone capable of declaring what truths are contained in the deposit of faith handed down from the apostles.

The definition of a dogma by the Church brings no change in doctrine ; for no truth once taught as of faith is ever given up nor can any point be added which was not contained, at least implicitly, in the original teaching. However, the Church's infallibility is not limited merely to revealed doctrines; she can also speak infal¬

libly on matters necessary to safeguard re¬

vealed teaching. Belief in such decisions is called ecclesiastical faith. Outside the domain of divine or ecclesiastical faith, there are many subjects of pious belief among Catholics. Some of these may perhaps belong to the deposit of faith, but they are not yet authoritatively pro¬

posed. Others depend on human testimony, and are accepted with that degree of certitude which the testimony warrants.

In the expression of revealed truths and in the defense of faith from the charge of con¬

flict with demonstrated truths of science and philosophy, the Church makes use of terms derived from the philosophy current among its subjects. Thus it has come about that the dogmas are expressed in the terms of scholas¬

tic philosophy and officially in the Latin lan¬

guage. As its doctrines can be taught in any language, so, too, the expression of them may be harmonized with whatever is found to be true in any system of philosophy.

In the worship, liturgies, discipline and practices of the Church, some regulations may be of divine origin, others are of ecclesiastical origin, and still others arise from the voluntary piety of individuals. Besides the ordinary obli¬

gations of Christian life, she invites those of her children who feel the call from God to bind themselves by vow to His service. The principal vows are those taken to observe the evangelical counsels of poverty, chastity and obedience. Those who have thus bound them¬

selves in approved congregations or religious orders are called religious. (See Orders, Re¬

ligious). As a matter of discipline all those in Sacred Orders in the Latin portion of the Church are bound to observe celibacy. In the Greek portion, to-day, no priest can marry, but married men may receive Holy Orders, except episcopal consecration.

External Organization of the Church. —

Supreme jurisdiction, as we have seen, resides in the Pope; the bishops are the rulers of dioceses, which are subdivided into parishes or missions under a parish priest or rector, as¬

sisted by curates. The dioceses are united into provinces, over each of which is an archbishop or metropolitan, the other bishops being called his suffragans. The archbishop convokes pro¬

vincial synods, hears certain appeals from the episcopal court, watches over the observance of ecclesiastical law in some particulars, and, under certain circumstances, appoints an ad¬

ministrator when a suffragan dies. The patri¬

archate is to-day only an honorary rank. The Pope is represented in some countries by ap¬

ostolic delegates, to whom are referred appeals from the lower courts and through whom the CATHOLIC CHURCH

Pope sends his communications. In some

countries there are apostolic nuncios, who deal directly with the various governments that have their representatives at Rome.

The Pope is assisted immediately by the Sacred College of Cardinals and by the Sacred Congregations. The College of Cardinals, when complete, contains 70 members : 6 Car¬

dinal Bishops of the Suburban Sees, 50

Cardinal Priests and 14 Cardinal Deacons.

The Sacred Congregations, 21 in number, are committees of Cardinals to whom special affairs are entrusted. They were arranged, almost as at present, by Pope Sixtus V. The Cardinals alone cast votes for the final decisions, but they are assisted by secretaries and consultors. The Pope himself acts as prefect of some congre¬

gations (the Inquisition, the Apostolic Visita¬

tion and the Consistorial) . A Cardinal pre¬

sides over each of the others. The acts of all congregations are submitted to the Pope for his approval. These acts, unless promulgated in a solemn manner as the acts of the Sov¬

ereign Pontiff himself, are subject to change; though not infallible, they must be received by the faithful with an internal assent, such as is due to religious authority and obeyed as laws of the Church. The more important congre¬

gations are : the Holy Roman Inquisition (the supreme tribunal to judge of heresy and crimes allied with heresy), the Consistorial (which selects the matters that are presented and sanc¬

tioned by the College of Cardinals assembled in the Papal Consistories), the Apostolic Visita¬

tions, Bishops and Regulars, and Council of De Propaganda Fide (which cares for mission¬

ary countries), Sacred Rites, the Index (which prohibits the reading of books condemned as contrary to faith or good morals), Indulgences and Relics, and the congregation of Studies.

The Church and Civil Authority. — The

Church was established by Christ as a perfect, independent religious society. Its authority de¬

pends on God's ordinances alone ; wherefore it has always denied any right on the part of the state to interfere in its internal affairs. In Catholic countries, the Church claims im¬

munity for its officials from the authority of civil tribunals ; in past ages this immunity was often absolutely necessary for their just pro¬

tection. Sometimes the Pope makes a Concordat with temporal rulers ; that is, a treaty whereby, in consideration of certain promises of these rulers, the Pope abstains from urging certain of his rights. To exercise the prerogatives which we have described, the Pope, his Car¬

dinals and other officials must be exempt from the jurisdiction of any civil tribunals. Prac¬

tically this cannot be secured without the Tem¬

poral Power (q.v.), or better, the Temporal Independence of the Sovereign Pontiff. It is not enough for the Pope to be free, he must be known to be free; suspicion of being under the influence of a

sovereign would be fatal to his influence. This independence he possessed for more than 15 centuries; it was assured by the recognition of his sovereign authority in the states of the Church. Since the usurpation of these states by the Italian government, the Popes, Pius IX, and his successors, have not ceased to proclaim: (1) That this seizure was an act of injustice; (2) that the Pope no longer possesses the freedom, security and in¬

dependence demanded by his dignity, his rights and for the proper exercise of his authority; and (3) that the Holv See must insist on these facts and look forward to some efficient remedy for the injustice and indignity of present con¬

ditions. To deal rightly with Catholics of all nations, the Pope must be extranational. As the seat of our general government, the Dis¬

trict of Columbia, is independent of all the States, so the seat of the general government of the Church should be independent of all the countries of the earth.

History. — The history of the Roman Catho¬

lic Church may be divided into three great epochs: (1) Christian Antiquity, embracing the first seven centuries, during which Christian civilization was chiefly Greek and Roman. (2) The Middle Ages, from the 8th century to the 16th, characterized by the Church's action among the various peoples of north and central Europe, who were molded into organized na¬

tions by her influence. (3) The Modern Age, from the rise of Protestantism to the present day, during which the Germanic nations sepa¬

rated from the Church and attached them¬

selves to various sects, and the Church has had to struggle against the modern, infidel spirit in science and government.

The first epoch contains two periods. First comes an era of persecution, during the strug¬

gle with paganism, which was terminated by the edict of Milan (313) ;

then, an era of develop¬

ment in definitions of dogma against the at¬

tacks of heresy. The second epoch embraces four periods: I. The conversion of the bar¬

barians. II. The development of the Western Empire and the Church's struggle to maintain her independence (800-1073). III. The su¬

premacy of the Church maintained (1073-1300).

IV. Attacks on the Church's supremacy, from Boniface VIII to Protestantism.

During the third epoch three periods may be distinguished: 1. The period of religious war¬

fare, ending with the Peace of Westphalia, 1648. II. From 1648 to the French Revolution, the era of established Churches. III. Dawn to the present day: Neo-paganism in science and life, the age of unrestrained freedom to accept or deny the truths of religion.

Even while the Church was undergoing cruel persecution, she was also developing her dis¬

cipline and defending her doctrines against the pagans and heretics. From the first three cen¬

turies have come down to us the valuable works of Ignatius, Polycarp, Justin, Clement of Alex¬

andria, Origen, Tertullian, Cyprian and many others. The mightier struggle with heresy, and her marvelous growth after she emerged from the catacombs, gave renown to Athanasius, Basil, the Gregories in the East and West, Chrysostom, the Cyrils, Hilary, Ambrose, Je¬

rome, Augustine, Leo and a host of other Christian writers, of whose works the modern world knows very little. The growth of monasticism is one of the glories of this age.

Monks and nuns consecrated their lives to God's service by prayer and study and labor, thus preserving the ancient civilization from utter

destruction by the barbarians, and prepar¬

ing for the Church the means of converting these barbarians and transforming them into the civilized communities of Europe. The intimate union which existed between Church and State gave rise to the Holy Roman Empire (q.v.) and to the great body of laws by which their 70

mutual relations were regulated. Frequent at¬

tempts were made later to subject the Church to the Empire. They were frustrated by the Popes, and especially by Gregory VII, after whom comes the glorious period of vigorous life and eminent learning. Among the orders that were then founded we may mention the Car¬

thusians, Cistercians, Franciscans, Dominicans and Servites, fruitful in numerous saints and scholars. The Church boasts of Saint Anselm, Peter Lombard, Albertus Magnus, Saint Thomas Aquinas, Saint Bonaventure, Duns Scotus, Saint Bernard and others. It was also the age of Crusades (q.v.) for the recovery of Pales¬

tine. The 14th and 1 5th centuries are noted for the revival of interest in pagan literature, the sad exile of the Popes at Avignon and frequent movements to effect a much-needed reformation of morals. In this work, many rejected the divine authority of the Church and were cast out as heretics ; they are generally regarded as forerunners of Martin Luther (q.v.), who succeeded in separating whole sec¬

tions of Germany from the Church, and became the occasion for the counter reformation that was effected by men like Francis de Sales, Ignatius Loyola and Peter Canisius during the 16th century, and especially by the great work of the Council of Trent (1545-63). In this same period, millions of pagans were brought into the Church by the heroic labors of her missionaries, notably in South America, India, Ethiopia and Japan. England, under Henry VIII and Elizabeth, renounced the supremacy of the Pope, made a state religion of its own, and by the penal laws almost annihilated the Catholics. France remained Catholic, but, be¬

coming infected with Jansenism and Gallicanism (qq.v.), and later with atheism and social¬

ism, brought about the utter disorganization of Continental society. In the reconstitution of the shattered nations, Napoleon (q.v.) thought to make the Papacy his tool, and thus ruin the Church ; but he failed, and the 19th century witnessed the gradual revival of the Church in almost all European countries, and its stu¬

pendous growth in the United States and other English-speaking countries. Catholic emancipa¬

tion in England (1829), the Tractarian move¬

ment (see Tractarianism) in the Established Church, that resulted in so many converts to Rome, and the restoration of the Catholic hier¬

archy (1850), have given Catholics prominence in English life. In France, though the people are loyally Catholic, the government is engaged in controversy with the Church and in the at¬

tempt to control Catholic education. When the French garrison was withdrawn from Rome in 1870, the Papal states and the city of Rome were annexed and added to the Italian kingdom.

For the past 34 years the Pope has never left the Vatican Palace. Shorn of their earthly kingdom, Pope Pius IX (q.v.) and Leo XIII (q.v.) witnessed the attempt of Bismarck (q.v.), in Germany, to subject the Catholic Church to the state; but they witnessed also the failure of the attempt and the repeal of almost all the iniquitous laws. Persecution served only to unite all Catholics and revealed to them the power of united action. In continental United States the Church has grown from 244,500 in 1820 to 17,416,303 in 1918. This great in¬

crease has been due mainly to immigration from Europe and Canada. Irish, Germans, French Canadians, Italians, Poles and Bohemians have come in large numbers. Meeting with no offi¬

cial opposition, the Church has prospered and is regarded even by many non-Catholics as a strong power for the preservation of the re¬

public from the new social dangers that threaten the United States as well as the whole civilized world.

The activity of the Church in the mission field was almost destroyed by the wholesale confiscations of the French Revolution. As soon as order had been established in Europe, the missions revived, and, especially since Greg¬

ory XVI, have spread to every land of the world. Dioceses are mapped out and bishops appointed as soon as the circumstances warrant.

The reorganization of the Congregation De Propaganda Fide by Pius IX, with separate sec¬

tions for the Latin and the Oriental Churches, has been of great advantage. College, institutes and special religious congregations have been founded in various cities of Europe for work in the foreign missions. The Association for the Propagation of the Faith is the largest of the societies among the laity for the collection of funds. Missions are also conducted with success in the Oriental Churches in communion with the Holy See. These Churches hold the same doctrines as the Latin Church, but have special rites, discipline and liturgical language.

There are four chief groups : I. The Greek, subdivided into Greek proper, Melchite, Slav (which is Ruthenian and Bulgarian) and Ru¬

manian. II. The Syrian, subdivided into Syrian proper, Syro-Chaldean (which also included the Malabar) and Maronite. III. The Coptic, which is Egyptian and Abyssinian or Ethiopian.

IV. The Armenian. Pope Leo XIII was much interested in these eastern churches, and had the joy of receiving many converts into com¬

munion. For bibliography see article Catholic Church in the United States.

John J. Wynne, S.J.

CATHOLIC CHURCH, Roman. Recent

Growth and Statistics. — To-day the Catholic Church contains within its fold 294,583,000

souls, or about 48 per cent of the entire Christian population of the

globe. It is found in all continents and among all nations but is strongest in southern countries and among the Latin and Celtic races in Italy, Spain, France, Austria, Ireland and South America. Its his¬

tory during the 19th century discloses the re¬

markable fact that while it lost somewhat on its own ground, especially in France and Italy, these losses have been more than offset by the gains throughout the English-speaking world, especially in the United Kingdom, the United States and Australasia. In England the con¬

version of Newman, Manning and others was the beginning of a movement which brought and still brings thousands into the Catholic Church.

Pope Pius IX took official cognizance

of the movement by re-establishing the Roman Catholic hierarchy in England in 1850. The growth of the Church in Holland led to a similar re-establishment of the hierarchy there in 1853. The Irish emigration to Scotland after 1847 led to a great increase in the number of Catholics in that country, where the Oxford movement also exerted considerable influence CATHOLIC CHURCH

and in 1878, Leo XIII re-established the Catholic hierarchy there. Great and numerous, how¬

ever, as were the gains in the Old World, they were greatly overshadowed by the vast growth and spread of the Church in the New and in the British dominions overseas. The Irish famine of 1846—47 caused millions to emigrate from that country to the British colonies and to the United States and to these emigrants and their descendants are to be ascribed the flourish¬

ing condition of the Church to-day in Australia, New Zealand, Canada and South Africa. In the United States the Church, in addition to the Irish immigrant, was reinforced also by immigration from Catholic

Poland, and the Kulturkampf of the seventies in Germany caused great numbers of German Catholics to seek religious freedom in the Great Republic of the West. In later years Moravians, Copts, Ruthenians and Greeks have been added in ever increasing number to the Catholic forces in the United States. In Canada, the growth of the French-Canadian population, Irish immigration and the settlement of great numbers of the Catholic Gaels of Scotland have placed the Church of the Dominion in a flourishing con¬

dition. In Latin-America, the losses incurred during the breaking up of Spain's colonial em¬

pire and the establishment of new autonomies have been repaired. The Church well or¬

ganized in those countries and while it labors under annoying restrictions in some of the re¬

publics, it is in the main at liberty to proceed in its work of evangelization. Millions of aborig¬

ines have come within its fold and as of old its missionaries still labor on the outposts of civilization.

We are thus face to face everywhere in the modern world with an organization stretching in unbroken succession back to the palmy days of heathen Rome ; an organization which has outlived all the governments and dynasties of Europe, and is likely to see the end of the national groups as at present constituted. Its losses in the Old World it has recouped in the New; its vitality and energy are evidently un¬

impaired ; in general culture and intelligence it is the equal, while in eleemosynary and reform work in our complex modern social life it sur¬

passes most other Christian denominations. It has a rich and remarkable history and still exer¬

cises a greater power over the masses of the people than any other body of Christians. The 294,583,000 Roman Catholics in the world are distributed as follows: Europe, 183,760,000; Asia, 5,500,000; Africa, 2,500,000; North America, 50,000,000 ; South America, 44,623,000 ; Oceania, 8,200,000. The estimated number in the chief countries of

Europe in 1918 was : Austria, 26,000,000; Hungary, 13,000,000; Bel¬

gium, 7,000,000; Denmark, 9,821; France, 35,-

000,000; United Kingdom, 6,000,000; Greece, 35,000; Sweden, 2,378; Italy, 32,983,664; Nether¬

lands, 2,053,021; Norway, 2,046; Portugal, 5,-

597,985; Russia, 1 1,467,994 ; Switzerland, 1,593,-

538; Spain, 20,325,986; Germany, 24,000,000.

In Egypt are 706,000 Copts who are in union with the See of Rome.

In 1918 there were 24,922,062 Catholics under the United States flag. Of these, 17,416,303

were in the United States proper, 7,285,458 in the Philippines and 1,072,495 in Alaska, the Canal Zone, Guam, American Samoa, Hawaii, Porto Rico and the Virgin Islands. There were 19,572 Catholic clergymen in the United States, of whom 14,318 were secular clergy and 5,254 were members of religious orders.

There were 10,058 Catholic churches with resi¬

dent priests, 5,105 mission churches, 85 semi¬

naries with 6,201 students preparing for the priesthood, 112 homes for the aged, 210 col¬

leges for boys, 685 academies for girls and 5,588 parochial schools. In the parochial schools were enrolled 1,497,949 children. The Catholic orphan asylums number 283, with 48,089 orphans. See Christian Church,

Divisions and Statistics of the.

John B. McDonnell,

Editorial Staff of The Americana.

the. Definition. — Etymologically, the phrase social service comprises all activities for the benefit of social groups. In modern usage, however, it is restricted to works on behalf of the more needy and weaker sections of the population, and to benefits that are mainly physical, although it does include certain intel¬

lectual and moral kinds of betterment. The present article will present the social service of the Catholic Church under the heads of charity and social reform.

Doctrinal Viewpoint. — A few words con¬

cerning the doctrinal attitude of the Church toward social service will help us to understand her practice. In the first place, the Church does not conceive her mission as primarily that of reforming society or improving the temporal condition of the individual. Her main and specific concern is with the individual's spiritual welfare. In old-fashioned terms, her func¬

tion is to save souls by inducing men to avoid sin and live virtuous lives. In her eyes the temporal condition of the individual, whether it be of riches or poverty, of sickness or of health, of freedom or of bondage, is in itself comparatively unimportant. Even less is she concerned with the forms of social organiza¬

tion, with economics, or with politics. She knows that men have served God faithfully and saved their souls in every kind of individual and social condition, and she holds that no tem¬

poral condition has value or importance except in so far as it conduces to union with God in this life and in the life to come.

This attitude is based on the words of Christ and on the Christian tradition. Through¬

out the Gospels the Founder of Christianity lays supreme emphasis upon the life of the spirit and the transcendent value of eternity.

He neither attempted to found nor directed His followers to found a new social system. So little value did he attach to temporal goods that

He counseled the seekers after perfection to give up their material possessions. ((Seek ye first the Kingdom of God and His justice.®

((What doth it profit a man if he gain the whole world and suffer the loss of his soul?® ((If thou wouldst be perfect, go, sell what thou hast and follow me.® All through her history the Church has maintained this same attitude and held to this comparative estimate of temporal and eternal values.

Nevertheless, the Church has always held that social service is among her ordinary func¬

tions. While maintaining that corporal works of mercy are not her supreme mission, any more than they are the main business of the individual, she never allows either herself or 72

her children to forget that charitable assistance is frequently necessary to enable the individual to live righteously. In other words, the Church values social service not as an end but as a means. Since men cannot serve God and pre¬

pare themselves for eternity without a certain amount of physical, intellectual and moral goods, she does all that is within her power to assist them in these respects. It is in this sense that she interprets the second of the two Great Commandments, that of loving the neighbor as the self, as well as all the other injunctions of Christ concerning charity toward our fellowmen. These commands she imposes upon all her children and strives unceasingly to fulfill herself. And she believes that when social service is performed in this spirit, and from this motive, it will be more extensive and more efficacious than when it is undertaken on grounds of mere humanitarianism. She believes that the most effective basis of social service is to be found in the eternal values of God and the soul.

Charitable Activities. — The superiority of social service conceived as active love of the neighbor for the sake of God is clearly mani¬

fest in the history of charity in the Church.

In the words of the rationalist writer, Lecky, <(Christianity for the first time made charity a rudimentary virtue, giving it a leading place in the moral type, and in the exhortation of its teachers.® ((History of European Morals®

II, 79). Some of the principal effects of this conception upon society may be summarized as follows :

In the most civilized countries of the ancient world the prevailing theory of social relations was that expressed by the Roman poet Lucan, <(paucis vivit humanum genus® (<(the human race lives for the few®). A very small minority possessed all wealth and power in society, and the great mass lived in misery. The individual as such was not accorded rights, dignity or sacredness ; a large proportion of the popula¬

tion were slaves, whose sufferings make the con¬

dition of the negro slaves of the United States look like paradise ; the lot of the great mass of the free persons was little better socially and economically than that of the slave popula¬

tion; and if the hunger of the poor was some¬

times relieved by public gifts of corn, the motive was not pity nor brotherly love, but the fear of revolution. Within a few centuries the Christian teaching that all men are persons and therefore essentially equal, that all are brothers in Christ with the same eternal des¬

tiny, and that the possessors of superfluous goods are morally bound to distribute them among the needy, — led to the mitigation and substantial abolition of slavery in Christian countries, to the recognition of labor as some¬

thing honorable instead of degrading, and to a marvelous variety of organizations and works for the relief of distress.

From the beginning the care of the poor was accepted as one of the primary duties of the Church. Every parish had a special organiza¬

tion and special funds for the discharge of this function. The possessions of the Church were called <(the patrimony of the poor,® and one of the four divisions of its revenues was definitely set aside for poor relief. In the second half of the Middle Ages the chief dispensers of all kinds of charity were the monasteries. Indeed, the main reproach brought against the social service of these institutions is that they were too generous. Certain religious communities owe their foundation to the desire to relieve certain special forms of distress. Thus the Brotherhood of the Holy Spirit, the Knights of Saint John and the Hospitalers devoted their energies to the erection and care of hospitals, and the order of Saint Lazarus provided houses for the care of lepers. The Alexian Brothers were mainly concerned with the burial of the dead. The Trinitarians ransomed thousands upon thousands of captives. The Fratres Pontifices built roads and bridges, and in other ways strove to make traveling safe. The Fran¬

ciscans preached and practised a wholesome poverty and induced the rich to share their goods with the distressed. One of the most important functions of the craft and merchant guilds was to make adequate provision for the insurance and relief of their needy members.

The extent to which hospital building was carried may be judged from the fact that as early as the 6th century there was one in almost every city of the Roman empire ; that the hospital of the Holy Spirit, founded by Pope Innocent III at the beginning of the 13th cen¬

tury, accommodated 1,500 patients ; that in the later Midde Ages there was hardly an import¬

ant town in Germany that did not have one or more of ‘these institutions, while there were 20,000 of them in France. And it must be remembered that the mediaeval hospitals were not merely places for the treatment of the sick, but for the refuge and care of the home¬

less poor, the aged and orphans and widows.

One of the chief duties of the bishops has always been the care of orphans. They were provided for either in separate institutions or in connection with hospitals and monasteries.

Owing in great measure to the zeal of Saint Vincent de Paul,

orphanages became so general that 300 of them were to be found in France on the eve of the Revolution.

In the later Middle Ages institutions known as ((montes pietatis® were established by the thousand under the direction of the Church in Italy, France, Belgium and Germany. Their object was to loan money to the poor with no other charge except for the cost of administra¬

tion. In an age when borrowers were largely at the mercy of rapacious usurers, this was not the least important performance of social service.

The charitable activity and efficiency of the Church in the period of its greatest influence may be fairly summarized in the words of Prof. S. N. Patten: ((It provided food and shelter for the workers, charity for the unfor¬

tunate, and relief from disease, plague and famine, which were but too common in the Middle Ages. When we note the number of the hospitals and infirmaries, the bounties of the monks, and the self-sacrifice of the nuns, we cannot doubt that the unfortunate of that time were at least as well provided for as they are at the present.® ((The Development of Eng¬

lish Thought,* pp. 90, 91).

At the present time the relief of physical distress outside of institutions is carried on mainly by the parish churches and by charitable societies. In every Catholic church in the cities will be found a box near the entrance into which the faithful are requested to drop

their offerings for the poor. This money and all other funds that come into the hands of the pastor for the same purpose are administered for the benefit of the needy by him individually or in co-operation with

competent persons and associations. Through this method it is easily possible to reach every case of distress. While the number of such cases is somewhat too great for the available resources, the parish organ¬

ization of relief is in itself admirably adapted to perform its task comprehensively and in detail.

Among the Catholic associations devoted

to the relief of the poor, first in importance is the Society of Saint Vincent de Paul. Founded in Paris in 1833 by Frederic Ozanam and seven companions, it has extended throughout Europe and North and South America, and has

branches in many parts of Asia, Africa and Australasia. Its main features are the per¬

sonal activity of its members among the needy, the emphasis that it places upon improving the moral and religious as well as the material condition of those who are assisted, and the exceptionally small cost of administering physi¬

cal relief. In proportion to its members and resources it is probably the most efficient relief society in existence. The Elizabethan associa¬

tions of Germany are composed entirely of women. They have some 550 branches or con¬

ferences and give assistance to between 10,000

and 12,000 families annually. In one diocese of Germany, Cologne, there are 162 charitable societies with 3,000 members. A federation of all the Catholic charitable societies of Germany was organized in 1897 with a central bureau in Freiburg. It holds conferences, makes investi¬

gations, issues publications and co-operates with many non-Catholic and secular charitable movements. France has more than 4,000 Cath¬

olic charitable societies. In the United States the Queen's Daughters Society has branches in many States and cities, and a local women's charitable organization exists in probably the majority of urban parishes. Frequently the latter are federated into a league or guild which represents the entire city. In 1910 the National Conference of

Catholic Charities was organized and held its first sessions in Wash¬

ington. It meets biennially. At the meeting in September 1916, 500 delegates were registered, representing 78 cities and 28 States. The papers read at these meetings are generally of a high order, and evince a sustained endeavor to know and utilize all that is best in modern methods of charity.

A few brief indications will here be set down of the charitable work of the Church in institutions. Nothing like a complete account is attempted; only a statement of types. For the care and treatment of sick and defectives there exists a great variety of hospitals and homes. The United States alone has more than 400 general hospitals under Catholic direction, whose patients in 1916 exceeded half a million, 5 institutions for the blind, 13 for deaf-mutes and 3 for feeble-minded persons. The princi¬

pal institutions for the care of wayward and delinquent girls are conducted by the Sisters of the Good Shepherd, who have more than 250

establishments in Europe and the United States.

Reformatories for boys are managed by the diocesan clergy and by religious communities.

As examples of these may be mentioned the Catholic Protectory of New York (1,500 in¬

mates), Saint Mary's Industrial School of Baltimore (1,500 inmates) and Saint Mary's Training School of Chicago. Institutions for the helpless, such as orphans, infants, found¬

lings and aged persons, are found in the majority of dioceses. In 1916 the Catholic Church in the United States had 293 orphan asylums with more than 45,000 inmates, 106

homes for the aged, some 35 infant asylums and 30 homes for destitute children. In recent years the movement for the establishment of day nurseries, homes for workingmen and workingwomen and social settlements has

been considerably accelerated among the Catho¬

lics of this country. Education, secular, re¬

ligious and moral, is an important accompani¬

ment of the physical care given in all Catholic institutions for young people.

Social Reform. — The modern Catholic

movement for social and industrial reform originated with Baron Von Ketteler, bishop of Mainz from 1850 until his death in 1877.

His first important work in this field consisted of six sermons, delivered in the cathedral of Mainz in 1848 on the Catholic doctrine of property and the duties of Christian charity.

Aside from the thesis that the sociology of Saint Thomas Aquinas was sufficient to meet every social need of the 19th century, the most striking element of these discourses was the proposition that social questions were more important than political questions. Although we of to-day recognize this statement as a truism it had a strange sound in that year of political revolutions, 1848. ((If we wish to know our age,® said the speaker, ((we must en¬

deavor to fathom the social question. The man who understands that knows his age. The man who does not understand it finds the pres¬

ent and his future an enigma.® In 1864 he wrote (The Labor Question and Christianity, }

which advocated labor associations and co-op¬

erative societies of production. In 1869 he proclaimed the necessity of increased wages, shorter hours and the prohibition of industrial labor in the case of women and children. A conference of the German bishops at Fulda in the same year endorsed his proposals for inter¬

esting the clergy in the condition of the work¬

ing classes. In his last book, (The Catholics in the German Empire,) he emphasized anew the duty of the state to promote the formation of workingmen's co-operative associations, to protect the workers, especially women and children, against unjust exploitation, and to enforce safety and sanitation in work places.

These proposals were afterward embodied in the program of the Catholic party (the Cen¬

trum) in the Reichstag.

Next to Bishop Ketteler, the ablest leader of social reform among the German Catholics is probably Canon Hitze. He advocated a re¬

organization of industry on the basis of le¬

gally recognized occupational associations, which would be open only to persons who had passed a technical examination, and humane regulation of hours, safety and sanitation, woman and child labor, and other conditions of employment. As a member of the Reichstag he has been an active protagonist of many so¬

cial reform measures. Father Kolping organ¬

ized journeymen's clubs (Gesellenverein) to provide lodging and other club facilities for 74

their members, and for mutual protection gen¬

erally. When their founder died in 1865 they had a membership of 80,000.

The Catholic associations for co-operative production, advocated so strongly by Bishop Ketteler, never met with much success, owing to the difficulty of obtaining capital. Among the principal Catholic organizations that have become efficient are savings, credit and labor-protective associations; societies of peasants for promoting the interests of their members as regards prices of products, seeds, fertilizer, loans and co-operative effort gen¬

erally; and organizations of employers to pro¬

vide for the workers' education, improved dwellings, lower rents,

relief and savings agen¬

cies, limitation of working hours, hygienic con¬

ditions and Sunday rest, and to promote better relations between employers and employees.

Indeed, one of the most remarkable features of the German Catholic social movement has been the number of wealthy men in its ranks.

They provided a very important part of the initiative as well as the financial resources.

The greatest general force in promoting Catholic social action in Germany has been the popular congresses which have been held annually since 1848. As the years followed one another they gave more and more attention to the social question. Before long it was found that meetings held once a year were not suffi¬

cient, that an organization was needed which should be in action continuously. To meet the situation the Volksverein was founded in 1892

by Ludwig Windthorst, the great leader of the Centre party in the Reichstag. It formu¬

lated a constructive social program and set to work systematically to educate the German people in Catholic social principles. The or¬

ganization contains a director for each state or diocese, a manager for each town or col¬

lection of villages and a promoter for every 20 to 50 Catholic families. The promoters number 20,000 and each of them comes into frequent personal contact with each of the families in his jurisdiction. In 1903 the Volks¬

verein distributed 13,500,000 tracts and pam¬

phlets and furnished bi-weekly contributions on social and economic subjects to 361 Catholic periodicals. It also conducts annual courses of study in economic and social subjects, and its representatives in the Reichstag have contrib¬

uted effectively to the enactment of workmen's insurance and old age

pension laws and other statutes for the protection of labor in both city and country.

The Austrian Catholic social movement was inaugurated by Baron Von Vogelsang and

Prince Von Lichtenstein. Both were strong in their denunciation of unlimited competition. In their view the doctrines and practices of eco¬

nomic liberalism were giving to the weaker members of society, the wage earners, only the freedom to be exploited by the possessors of the power of wealth and capital. Hence they conceived the first and most urgent reform to be measures which would protect the workers against this abuse of economic liberty and in¬

dustrial power. And they maintained that this protection would have to come from the state.

Through the influence of the Catholic party a law was passed in 1883 re-establishing the corporations or guilds for the protection of labor in the smaller industries. Among the functions of these organizations were the maintenance of systems of apprenticeship, trade education, conciliation and arbitration and mu¬

tual insurance.

In 1885 the Catholic social reformers as¬

sisted in passing a law limiting the hours of labor of women and children and declared in favor of a legal minimum wage. Thus the Austrian Catholics were the first in the world to advocate the establishment of minimum wages by law. They were among the first to realize and proclaim the necessity of protecting labor by international agreements.

The greatest figure in the work of Catholic social reform in France is the late Count Albert de Mun. In the early seventies he founded the

(<Catholic Workingmen's Circles® (((Oeuvre des Cercles Catholiques®), which aimed at a restoration of the ancient guilds along lines suitable to modern conditions and under the direct approval and protection of the state.

Underlying them are the doctrines that the policy of unrestricted competition and govern¬

mental non-intervention have reduced the masses to a condition of intolerable insecurity.

This must be remedied through adequate and compulsory workingmen's associations. In 1884

the French government enacted a law providing for the establishment of labor syndicates, but it did not give them sufficient power to attain the objects of the Catholic reformers. About the same time de Mun offered, in the Chamber of Deputies, a program of labor legislation which included Sunday rest, a working week of 58 hours, abolition of night work for women, the gradual suppression of female and child labor in industry and insurance against acci¬

dents, sickness, unemployment and old age. A little later his group of reformers advocated a legal minimum wage which would be suffi¬

cient for the decent maintenance of the work¬

ingman and his family.

A particular experiment in social service that has assumed considerable importance in France is the establishment of workingmen's gardens. These are cultivated by industrial workers in the suburbs of cities. In 1905 such gardens furnished an important part of the livelihood of some 2,300 persons in the city of Fourmies alone, and of some 50,000 persons throughout France. The originator of the plan was the Abbe Gruson of Fourmies.

Another form of social service strongly ad¬

vocated by the Catholics of France is that limited measure of industrial democracy which finds its best illustration in the factory of Leon Harmel. For more than 25 years a ((board of control,®

composed of representative male and female employees, has met regularly with the employer to discuss their common

interests.

The Catholic social reformers of Belgium have been, as a body, less advanced than those of Germany, Austria or France. Several of them have been rather fearful of the inter¬

vention of the state in this field. Among the leading names identified with the movement are Bishop Doutcloux of Liege, the Abbe Pottier, M. Perin and M. Brants. Before the war the Belgian Catholics had a powerful labor federation, co-operative societies and associa¬

tions of employers. Among the principles of the ((Belgian Democratic League® are the CATHOLIC CHURCH

inviolability of private property; a consider¬

able modification of present property rights; the organization of guilds or trade corpora¬

tions, with power to fix wages, hours and other conditions of employment, and to provide social insurance and old age pensions ; co-operative purchasing and credit associations both in urban industries and in agriculture ; and mixed asso¬

ciations of employees and employers.

The Catholic representatives in the Parlia¬

ment of Holland took an important part in the establishment of boards composed of mas¬

ters and workers which act as advisory bodies to the public authorities on matters affecting labor and which include agencies for the settlement of industrial disputes. In 1893 the ((Catholic Democratic

League® demanded the abolition of industrial work for married women, a family living wage for men, the pro¬

hibition of child labor, a weekly day of rest and insurance against accidents, sickness and old age. In 1897 the Catholic representatives in the national legislature drew up a program which, in addition to the foregoing demands, contained the following: laws for the regula¬

tion of apprenticeship, for laborers' dwellings and a shorter workday for men, women and children.

The founder of the Catholic social reform movement in Switzerland was Cardinal Mer-millod, bishop of Hebron. In a sermon, de¬

livered in 1868, he condemned the gross in¬

equality of possessions that characterized the age and pleaded for an infusion of the prin¬

ciples of Christianity into the social and indus¬

trial situation. The most active and effective worker in the movement was Gaspard Decur-tius. As member of the Swiss Parliament, one of his first acts was to oppose successfully the attempt to abolish the privilege of grazing on the common lands, which had been enjoyed for centuries by the poor peasants. Soon after¬

ward he brought about the enactment of a law providing for the compensation of injured workmen. On this occasion he presented a re¬

port in which he advocates the legal establish¬

ment of a minimum wage which should be suffi¬

ciently high to provide not only for decent living, but protect the worker against sickness, accidents and all other unfavorable contingen¬

cies of life. He was also one of the originators of the movement for international labor legis¬

lation, which finally developed into the Inter¬

national League for Labor Legislation. In 1887 the Swiss bishops

unanimously resolved that the clergy should be instructed to take an active part in the formation of labor associa¬

tions. One of the most remarkable and effect¬

ive elements in the policy of these associations has been their co-operation with non-Catholic agencies for protective labor legislation.

In Italy the Catholic social reform move¬

ment began somewhat later than in the coun¬

tries discussed in the foregoing pages. The principal names connected with it are Padre Curd, Bishop Bonomelli, Cardinal Capecelatro and Signor Toniolo. Among the reforms de¬

manded by the Catholic Congress in Rome in 1894 are the increase of small property owners, the exemption of small holdings from liability to seizure for debt, a living wage, profit sharing and copartnership, better credit facili¬

ties for small business men, the repression of speculation and usury, the re-establishment of workingmen's guilds or corporations and a moderate degree of intervention by the state.

In recent years a considerable number of prac¬

tical works have been inaugurated by Catholics in more than one section of Italy. For ex¬

ample, Bergamo has 45 societies for mutual insurance, a diocesan labor union, co-operative bakeries, mills and other industries, a co¬

operative building association, a people's bank and a wide distribution of social literature.

The Federation of Catholic Rural Credit Banks embraces about 1,800 financial institutions of this type.

Social reform among the Catholics of Spain has likewise been somewhat belated. In some parts of the country unions of agricultural laborers and co-operative savings banks and pawnshops have existed for many years, but it is only since the beginning of the present cen¬

tury that the social movement became general.

The statements of two bishops may be taken as typical of the present trend. In 1907 the bishop of Badajoz declared that the clergy (<must ascertain the actual condition of society, study its necessities, and labor unceasingly not only with the poor but with the rich in Chris¬

tianizing everybody and everything… . and undertake a vigorous campaign of Catholic so¬

cial action.® On the same occasion the bishop of Madrid said that the priests (<must go to the people, and strive to introduce social and economic reforms.® Many of the bishops point out the particular social works with which the clergy ought to co-operate, such as rural banks and labor associations.

The earliest and the greatest name in the Catholic social movement of England is Car¬

dinal Manning. In his famous lecture on the (Rights and Dignity of Labor,) in 1874, he de¬

nounced the policy of laissez faire and pro¬

claimed the duty of the state to protect the rights of labor and to provide such industrial conditions as would assure the working classes decent family life. A few years later he de¬

clared in favor of an eight-hour day in the mining industry, Sunday rest, the limitation of profits and a legal minimum wage. His article in the Dublin Review, July 1891, discussing and interpreting Pope Leo's encyclical (On the Con¬

dition of Labor, > is one of the best and most sympathetic expositions of that great document and did much to popularize it throughout the English-speaking world. Indeed, it is generally understood that the cardinal's .views were sought and utilized in the preparation of the encyclical. The greatest single act of Cardinal Manning was his sympathetic and successful mediation in the famous dockers' strike in London in 1887. It is safe to say that no other Englishman of the 19th century was so generally revered and loved. Bishop Bagshawe of Not¬

tingham and Mr. C. S. Devas were also im¬

portant figures in the Catholic movement. The former took even a more advanced stand than Cardinal Manning in favor of the rights of labor, while the latter was an able author of works on political economy which were pioneers in their insistence upon ethical discussion as a necessary element in economic treatises.

For the last 10 years an organization known as the Catholic Social Guild has been engaged in founding study clubs and producing and circulating books and pamphlets that have ex¬

ercised a very wide influence. The theories

and the legislative proposals set forth by the Guild are well thought out, pertinent and pro¬

gressive.

The agitation for the reformation of the land tenure system of Ireland which was par¬

ticularly active during the last quarter of the 19th century was to a great extent led and supported by the bishops and priests. The names of Archbishops Walsh and Croke, Bishop Nulty and many others will be readily recalled in this connection. If the peasant farmers of the Green Isle have obtained a tolerably satis¬

factory settlement of the land question they owe it at least as much to these spiritual lead¬

ers as to any other agency.

What work has been done for Catholic

social reform in the United States has been carried on mainly by individuals. The rela¬

tively favorable condition of the laboring classes in this country and the preoccupation of Catholics both clerical and lay with the enormous task of building churches and

schools have done much to postpone the organ¬

ization of a social movement. Without doubt the most significant and far-reaching action of any individual Catholic in this field was per¬

formed by Cardinal Gibbons in 1888, when he obtained a revocation of the condemnation pronounced at Rome upon the Knights of Labor. In the memorial which he presented to the Roman authorities on this occasion he declared that labor organizations were neces¬

sary to protect the workers against the tyranny of an omnipotent capitalism and that the Church ought to take the side of humanity and of justice for the toiling masses.

A few years ago the American Federation of Catholic Societies established a Social Serv¬

ice Commission for the study of social ques¬

tions and the promotion of social reform. This organization has endorsed the principle of a living wage and progressive labor legislation generally. The Central Verein, which is a fed¬

eration of the German Catholic societies of the country, is doing important work through its publications, its annual courses of social study and its efforts on behalf of social and labor legislation.

The supremely important event in Catholic social reform was the publication of the en¬

cyclical (On the Condition of Labor) ((Rerum NovarunP) by Pope Leo XIII, 15 May 1891.

In this document the Pope restated the tradi¬

tional CathQlic principles on social and indus¬

trial questions and applied them specifically and authoritatively to the conditions of the present time. The opening paragraphs em¬

phasize the gravity of the social question and the urgent necessity of finding a solution, and include the statement that <(a small number of rich men have been able to lay upon the teem¬

ing masses of the laboring poor a yoke little better than slavery.® The principal declara¬

tion and proposals of the encyclical may be thus summarized: Socialism is unjust because it would prove injurious to all classes, espe¬

cially the workingmen ; employees should ren¬

der an honest day's work ; employers should treat their workers not as chattels but as human beings, should give them opportunity for religious and moral life, not taxing them with labor beyond their strength or unsuited to sex and age ; the possessor of wealth may not use it as he pleases, but is morally bound to administer it for the benefit of the needy; the state is obliged to promote the welfare of all classes, but especially that of the wage earners, on account of their relative weakness, and should intervene whenever the general in¬

terest or any particular class <(is threatened with mischief which can in no other way be met or prevented;® hence the state should en¬

force Sunday rest; limit the hours of labor and restrict the employment of women and children in conformity with their physical and moral welfare; the laborer has a natural right to a decent livelihood, and he is made the victim of force and injustice when he is compelled to accept a wage that is insufficient for reasonable and frugal comfort; the state should also pro¬

mote a wide distribution of property among the laboring masses and foster labor unions, employers' associations and organizations em¬

bracing both employers and employees. Finally, the Holy Father exhorts every minister of re¬

ligion to bring to bear upon the social question ((the full energy of his mind, and all his power of endurance.®

Twelve years later Pope Pius X reaffirmed and supplemented the principles of the great encyclical of his predecessor in an (Apostolic Letter to the Bishops of Italy. J

Inasmuch as the encyclical of Pope Leo was addressed to all the peoples of the world, its propositions and proposals were necessarily stated in general terms. Nevertheless, they were sufficiently specific to meet the needs of every modern society and country. Were they honestly and thoroughly put into practice, they would remove all the serious social and indus¬

trial evils of the time.

Bibliography. — Ratzinger, (Geschichte der kirchlichen Armenpflege) (Freiburg 1884) ; Lallemand, (Histoire de la charite} (Paris 1902) ; Uhlhorn, (Charity in the Ancient ChurclP (New York 1883) ; Henderson, (Modern Methods of Charity) (ib. 1904) ; Nitti, (Catholic Socialism J (London 1895) ; Turman, (Activites sociales> (Paris 1907), and (Le Catholicisme sociale depuis l'encyclique Rerum Novarum) (ib. 1900) ; Plater, (Catholic Social Work in Germany) (London 1909) ; Crawford, Switzerland To-Day) (London).

John A. Ryan,

Professor of Moral Theology and Industrial Ethics, Catholic University.

CATHOLIC CHURCH AND SCIENCE,

The. The development of the history of science in recent years has completely revolu¬

tionized our knowledge of the cultivation of science in the older time and with it many long accepted notions as regards the relation of the Church and science. Little was known about the history of science a generation or so ago even by scientists themselves and it was assumed that there was very little cultivation of science in the centuries preceding our own. It was felt that there must have been some active factor to account for the absence of scientific curiosity which is so natural to man that it would surely manifest itself unless definitely suppressed. The Church came to be looked upon as that factor and

certain incidents in history were pointed out as indicating that her constant and consistent policy had been to hamper science lest it should disturb faith. Many re¬

fused to consider this a stigma on the Church, CATHOLIC CHURCH AND SCIENCE

because it was felt that some such attitude was absolutely necessary for the perpetuation of her sway over the minds of men. Science and faith being as they conceived incompatible, the Church had to take this determined stand of opposition, permitting only such scientific study as could not possibly be suppressed and encouraging only whatever could be directed into safe channels.

The recent development of the history of science has compelled another point of view entirely. The realization has been forced upon us that men have at all times been interested in science and concerned with its development.

They have often followed it from different standpoints from those which now prevail, but they have seldom failed to be attracted by it or to make advance in it. The story of the mediae¬

val universities is particularly striking in this regard. It has been the custom to say that there was no scientific interest in the Middle Ages, but as a matter of fact the mediaeval universities were quite literally scientific. The Seven Liberal Arts as they were called, the trivium and quadrivium of the curriculum, astronomy, music and mathematics, logic, gram¬

mar, rhetoric, metaphysics, were all studied from the scientific standpoint. Huxley (<(Inaugural Address,® Aberdeen) said that the work of these old institutions of learning <(however imperfect and faulty judged by modern lights it may have been, brought them face to face with all the leading aspects of the many sided mind of man.® He even went so far as to add ((I doubt if the curriculum of any modern university shows so clear and generous a com¬

prehension of what is meant by culture as this old trivium and quadrivium does.®

Geography. — This was the first of the sciences to develop and owes very large con¬

tributions to the early Christian missionaries who wandered far afield and wrote accounts of their travels. The Acts of the Apostles and Saint Paul's Epistles are valuable geographical documents. Saint Brendan's wanderings de¬

scribed by Dicuil the Irish geographer are further examples. Gerald the Welshman's

writings are of geographic significance. A whole series of missionary writings down the centuries are now considered geographically very valuable. The stories of Friar John of Carpini and Friar William of Rubruk (Ru-bruquis) doing their missionary work in the Far East in the 13th century and of the Jesuits and Franciscans in the East and in America during subsequent centuries supplied immense amounts of geographic knowledge. The Jesuit <(Relations® recently republished in some 70

volumes are a typical example of such store¬

houses of scientific data. Other missionary letters particularly those of the Recollects are of similar value.' The work of Abbe Hue and of Pere Armand David in the 19th century-show that this good work still goes on. Abbe Hue succeeded in finding his way through Tibet and into Lhasa, two generations ago, while Pere David wandered far beyond the territories familiar to Europeans in China and sent home accounts and even specimens of literally hundreds of species of animals hitherto unknown. Such scientific activity on the part of missionaries instead of being discouraged by the Church authorities was constantly en¬

couraged. The typical demonstration of this is the favor enjoyed by Father Kircher, S.J., who coming to Rome just at the time of Galileo, continued for the next 30 years to be active in the accumulation of scientific information of all kinds so that he published under the patronage of the popes a long series of well-known volumes which have now become bibli¬

ographic treasures. Above all he founded the Kircherianum, as it came to be called, a museum containing many scientific materials which

had been sent him by the missionaries of his own order, the Jesuits, or having been presented to the popes by other missionary orders were transferred here for safe keeping.

Father Kircher was the personal friend of a number of popes who encouraged in every way his scientific work and particularly the growth of his museum.

Astronomy. — The great foundation stone

of modern astronomy was laid by Copernicus.

He was a Pole, who studied in Italy for some 10 years and then spent the rest of his life quietly as the canon of the Cathedral of Frauenberg, where, after making careful observations, he worked out his theory of the universe. He had already begun to think about it while he was in Italy and the Copernican theory was publicly taught in Rome long before Copernicus' great book was published. This work was dedicated with permission to Pope Paul III. Copernicus continued to be until the end of his life a staunch supporter of his friend and patron, Bishop Maurice Ferber of Ermland, who kept his see loyal to Rome at a time when the secularization of the Teutonic Order and the falling away of many bishops all round him made his position as a faithful son of the Church noteworthy in the history of that time and place. When Galileo insisted on stating Copernicanism as an absolute scientific doctrine instead of a theory, Copernicus' book was placed on the index (though not unconditionally, for its author is spoken of as (<a noble as¬

trologer® when the word astrologer meant as¬

tronomer) but only until certain passages in which theories were stated as facts should be modified so as to make their theoretic signifi¬

cance clear.

Before Copernicus a number of distinguished clergymen had attracted attention by their astronomical teaching. Bishop Vergilius, the Irish missionary astronomer of the 8th century, taught that the earth was round and freed him¬

self from the charge that his teaching was con¬

trary to Scripture. Albertus Magnus insisted that there were antipodes, taught the rotundity of the earth and other supposedly modern astronomical doctrines yet was always in high favor, was made a bishop, and after his death canonized as a saint. In the 1 5th century Cardinal Nicholas of Cusa taught that <(the earth is a star as the other stars in the heaven.®

and that it had a movement of its own and could not be the centre of the universe. Though deeply interested in science and teaching many new and startling doctrines for his time he was made Bishop of Brixen, then Papal Legate to Germany for the reform of abuses, and finally a Cardinal, being a close friend of sev¬

eral popes. The first epoch-making astronomer of modern times was Regiomontanus, who

established a regular observatory at Nurem¬

berg. He was summoned to Rome to direct the calculations for the correction of the 78

calendar. His invitation to Rome for this pur¬

pose was within 10 years of the time when Pope Calixtus III is said to have issued a Bull against Halley's comet. The supposed Bull has never been found. Toscanelli who influenced Columbus so deeply was an intimate friend of Cardinal Nicholas of Cusa as well as of Regiomontanus and also of the famous Antoninus, Archbishop of Florence. Antoninus taught very emphatically that comets are celes¬

tial bodies like others in the heavens and had no effect on the physical or moral conditions of the world. Regiomontanus who was also a priest was a close friend of Toscanelli's. The relations between the ecclesiastical authorities and Toscanelli are illustrated by the gnomon which he arranged in the dome of the cathedral at Florence, by the shadow of which it is said that he could determine midday within half a second. Cardinal Ximenes of Spain improved this accuracy of determining noon by similar means so that the cordial ecclesiastical rela¬

tions with science were not confined to Italy.

Toward the end of the 16th century Pope Gregory XIII, intent on the correction of the calendar, had an observatory erected in the Vatican Gardens for astronomical purposes, and here the meetings of the mathematicians and astronomers for the reform of the calen¬

dar were held. After this there was always a Roman Observatory directly under the patron¬

age of the popes, either in the Vatican or the Roman College in charge of the Jesuits. When the Jesuits were suppressed or expelled by the Italian government the Vatican observatory was resumed as at the present time when it is under the charge of Father Hagan, S.J., who was for a time at the observatory at George-towrn University, D. C. The Jesuit astronom¬

ers, though the order was directly under the control of the Pope, taking a special vow of obedience to him, have done some excellent original work in astronomy. Nearly every important Jesuit College in the 17th and 18th centuries had an observatory, and secular students of astronomy made it a point to keep in touch with them. Professor Foster in The Quarterly Journal of the German Astronomi¬

cal Society (1890, page 60) said, ((Among the members of the Society of Jesus in the past and in the present we find so many excellent astronomers and in general so many investi¬

gators of purest scientific devotion that it is of important interest to their colleagues in science to notice them.® The great names among them in astronomy are Father Clavius, to whom the Gregorian reform of the calendar is due ; Father Scheiner, the authority on the sun and particularly on sun spots; Father Grimaldi, an authority on the moon, and Father Riccioli, who introduced the lunar nomenclature in use to-day. Three Jesuits, Fontaney, Noel and Richaud, are mentioned by Humboldt in his <Kosmos) as early observers of double stars.

In the modern time Father Secchi has been of deep influence on present day astronomy, and Fathers Perry, De Vico and Sidgreaves have done excellent work on government astronomi¬

cal commissions.

The Church is supposed by many to have hampered the progress of astronomy, but that is all due to a misunderstanding of the Galileo case. Cardinal Newman once said that the Galileo case is the exception that proves the rule of beneficent patronage of science uni¬

formly practised by the Church authorities.

It is (<the one stock argument to the contrary.®

Prof. Augustus de Morgan, in his article on <(The Motion of the Earth® in the < English En¬

cyclopedia, > an authority not likely to be sus¬

pected of Catholic sympathies, has expressed exactly this same conclusion. <(The Papal power,® he says, <(must upon the whole have been moderately used in matters of philosophy, if we may judge by the great stress laid on this one case of Galileo. It is the standing proof that an authority which has lasted a thousand years was all the time occupied in checking the progress of thought ! There are certainly one or two other instances, but those who make most of the outcry do not know them.® Pro¬

fessor Huxley, waiting to St. George Mivart, 12 Nov. 1885, says that, after looking into the Galileo case while he was on the ground in Italy, he had arrived at the conclusion that ((the Pope and the College of Cardinals had rather the best of it.® In our own time M. Bertrand, the perpetual secretary of the French Academy of Sciences, declared that <(the great lesson for those who would wish to oppose reason with violence was clearly to be read in Galileo's story, and the scandal of his condemnation was brought about without any profound sor¬

row to Galileo himself ; and his long life, considered as a whole, must be looked upon as the most serene and enviable in the history of science."

As Father Secchi, S.J., pointed out: ((None of the real proofs for the earth's rotation upon its axis were known at the time of Galileo, nor were there direct conclusive arguments for the earth's moving around the sun.® Even Galileo himself confessed that he had no strict demonstration of his views. Lord Bacon re¬

fused to accept Copernicanism in Galileo's time and science was so far from determining the question of the truth or falsity of either the

Ptolemaic or the Copernican system, that shortly before 1633, the year of Galileo's con¬

demnation, a number of savants such as Fro-mond in Louvain, Morin in Paris, Berigario in Pisa, Bartolinus in Copenhagen and

Scheiner in Rome wrote against Copernicanism.

It was under these circumstances that Galileo was condemned for contumaciousness in teach¬

ing as positive science what was only theory, though he had given a solemn promise that he would not until further information was ac¬

quired. His punishment consisted in being placed in the custody of a Cardinal friend.

He was never an hour in prison. His next custodian was another dear friend in Florence and then eventually as a matter of form his son. The principal part of Galileo's punish¬

ment consisted in the recital of the Seven Penitential Psalms every day* for three years.

The expression e pur se muove ((and yet it moves® was never uttered by him. It appears in history first a century after his death. The corresponding expression <(the earth is a star like the other stars and moves in the heavens as they do® was used by Cardinal Nicholas of Cusa nearly two centuries before, but Cardinal Nicholas advanced the •expression as a theory to be discussed and studied and not to be im¬

posed as scientific, and so he continued to be looked up to as one of the great pillars of the Church.

Anatomy. — Anatomy after astronomy is

the science oftenest said to have been hampered in its development by

the Church because of the prohibition of dissection. As with regard to astronomy this is entirely a misunderstand¬

ing. The papal document which is not a bull, though often quoted as such, declared to forbid the cutting up of human bodies for anatomical purposes, only forbade their being cut up and boiled for transportation to long distances for burial. This was an abuse that had crept in during the Crusades. The records of public dissection in Italy begin just after the issuance of that papal decree. Dissection was done at Rome at all times and a number of papal physicians are famous for discoveries made as the result of dissection. Bealdo Colombo, the discoverer of the circulation of the blood in the lungs, Caesalpinus the first to describe the circulation of the blood in the body, Eustachius after whom the tube is named, Varolius of the Pons Varolii in the brain, Malpighi, after whom more structures in the human body are named than any other and deservedly because he was their discoverer, and Lancisi, the great anatomical teacher, wrere all papal physicians. Bodies were supplied freely for dissecting purposes in Italy during the later Middle Ages and the Renaissance, directly under the influence of the Church. All the great artists of the Renaissance period made many dissections. Whenever anyone anywhere in Europe before the 19th century wanted to have special opportunities for anatomical study he went dowTn to Italy. The case of Vesalius the Belgian who, unable to secure dissecting material in the early 16th century at Louvain or Paris, went down to Italy, where he wrote his great textbook of anatomy illus¬

trated by dissections, which is still a classic exemplifies this very well. Stensen the Dane after having studied for a while in the Nether¬

lands also went down to Italy to complete his studies and there became a Catholic and later a priest and even a bishop. In the meantime, however, he had been a professor of anatomy at Copenhagen. The prejudice against dissec¬

tion is Puritanic and modern and reached its height in the late 18th century. In nearly every city in the United States, in the early 19th century, mobs attacked dissecting rooms, destroyed property and even put the lives of physicians and medical students in serious danger. It is only by recent legislation that English and American physicians have suc¬

ceeded in securing the privilege of dissection and the material for that purpose as freely as they had it in Italy in the later Middle Ages.

Surgery. — President White suggested that the reason why surgery was neglected in the Middle Ages and the ignorant barber surgeon the only resource of afflicted humanity suffer¬

ing from surgical disease was that the Church had forbidden clergymen to practise surgery because it was not proper for them to shed blood, and as the only educated people of the time were clerics, hence surgery fell into the unworthy hands of the barber surgeons. Re¬

cent developments in the history of surgery contradict this idea completely. Really great surgery began to develop at the University of Salerno before the end of the 12th century.

The surgical textbooks of Roger and Roland and of the Four Masters were written down there and then surgical development continued in North Italy. These wonderful Italiaft sur¬

geons of the later Middle Ages anticipated most of our modern surgery. We have their textbooks which were fortunately printed in the Renaissance time and have now bden re¬

printed in modern editions. They were operat¬

ing on the skull for tumor and for abscess, on the thorax for pus and other fluids and on the abdomen for many conditions. They insisted on sewing up intestines when wounded or the patient would surely die. They used various devices, tubes of metal, of bone, and the trachea of animals to help them in these intes¬

tinal anastomosis operations and seem to have gotten very good results. They could not have done such extensive operations without

anaesthesia, but we know now that for two centuries all important operations were done under an anaesthetic and we know the mode and means by which they produced anaesthesia.

Their death rate would have been very high without antisepsis, but they employed strong wine as a dressing, insisted on utter cleanliness and got union by first intention, — the very ex¬

pression is mediaeval Latin — and were proud of their ((pretty linear cicatrices.®

So far from there being any Church opposi¬

tion to the development of surgery one of the greatest of these surgeons of the 13th century, Theodoric, who left an important textbook which has attracted a great deal of attention in our time, was actually a bishop. He depre¬

cated strongly the idea that the development of pus was necessary in the healing of wounds ; he discusses fracture of the skull and of the vertebrae quite thoroughly, gives rather elabo¬

rate directions for intestinal anastomosis over a metal tube ; insisted that abdominal wounds should be closed and not left open and depre¬

cated the use of the probe and of manipulations in fractures of the skull, in compound fractures or in wounds of the abdomen. Theodoric was made a special confessor (penitentiarius) by Pope Innocent IV and later was made a canon and then a bishop. He had a lucrative practice in surgery but left the money he made for charity. So far from surgery being neglected in the Middle Ages this is one of the most im¬

portant periods in its history. Among the great Italian surgeons are William of Salicet and Lanfranc, who afterward taught at Paris, and* Guy de Chauliac who is usually spoken of as the Father of French surgery. Chauliac studied in Italy and became the papal physician of the popes at Avignon, where he wrote his (Chirurgia Magna,) a great textbook in which many supposedly modern developments of

surgery are anticipated. Chauliac was a cleric, probably a priest, a great personal friend of the Avignon popes, one of the most respected men of his own time and high in the estima¬

tion of modern historians of surgery. He de¬

clared that a surgeon who did not know anatomy was like a blind carpenter sawing wood. Chauliac told of his own studies in anatomy in Italy and his expressions demon¬

strate that there was not the slightest opposi¬

tion to dissection or anatomical study by the ecclesiastics. The great Italian and French surgeons of the later Middle Ages worked out the laws for the proper administration of mercury, which is one of the greatest triumphs in the history of therapeutics.

Chemistry. — Some historians have sug¬

gested that a Papal bull of the later Middle Ages forbade alchemy and therefore hampered the development of chemistry just as the sim¬

ilarly quoted Papal bull, which we have seen had no” such import, forbade dissection and therefore prevented the proper evolution of anatomy. The bull as to chemistry referred to is one issued by Pope John XXII, and its text, as also the text of the corresponding decree with regard to the cutting up of bodies, may be found in (The Popes and Science) (Walsh, New York 1915). The ˆalchemies” that were forbidden under this technical term were op¬

erations for the supposed manufacture of gold and silver out of base metals. As pointed out by the Pope these were bringing about debase¬

ment of the coinage and so were very prop¬

erly prohibited. The popes of the time issued bulls for the chartering of universities and the regulation of education generally and this being an international matter very naturally came within their purview. There is not the slightest evidence for any Church opposition to chemistry at this time or subsequently.

There had been a good deal of interest in chemistry during the 13th century and Albertus Magnus and Roger Bacon made distinct con¬

tributions to the science under the name of alchemy, Raymond Lully wrote on it some 16

treatises, Arnold of Villanova gave special at¬

tention to it and the Hollanduses, father and son, continued it in the 14th century. Al¬

bertus Magnus was highly honored in his own time, was made a bishop and subsequently was canonized. That is his life was held up as a model of what a Christian should be Roger Bacon is sometimes said to have been perse¬

cuted for his work in science and particularly in chemistry, but not by those who know his life. Bacon was placed under custody — 'there is no evidence for imprisonment — because of the violation of disciplinary regulations within his own order, the Franciscans, but it was due to the request of a pope that his great works on science were written and Roger Bacon him¬

self never withdrew from the Franciscans, but continued to be a member of the order until his death, well past 80 years of age.

There was abundant interest in chemistry in the 16th century, and it is curious how many of the men connected with it were ecclesiastics.

Basil Valentine, the German Benedictine Monk, may be only a name for a group of men, but the writers were surely Benedictines. Para¬

celsus, the great chemical investigator for medical purposes of the 16th century, mentions that he was helped in his chemical studies by the Abbot Trithemius of Spanheim ; by Bishop Scheit of Stettbach ; by Bishop Erhardt of Lavanthol ; by Bishop Nicholas of Hippon ; and by Bishop Matthew Schacht. In more modern times there has been no question of any opposition to chemistry, and pharmaceuti¬

cal chemistry at least has had some magnifi¬

cent contributions made to it by the drugs obtained from the Indians by missionaries.

These include cinchona, which was for so long known as ((Jesuits' baric* ; cascara sagrada, se¬

cured by the Franciscans from the American Indians; a number of valuable laxatives from the same source, grindelia robusta and other pharmacals.

Medicine. — It has been suggested that the Church was so much interested in cures by relics, prayers, masses, pilgrimages to holy places, and the like, that naturally her policy was to discourage the development of medi¬

cal science. The historical contradiction of this suggestion is to be found in the list of papal physicians. The popes summoned to Rome to

be their personal medical attendants and as a rule at the same time to teach in the Papal Medical School at Rome some of the most distinguished scientific physicians of medical history. No list of physicians con¬

nected by any bond in the history of medicine, not even that of the faculties of the older med¬

ical schools, can compare in personal prestige and scientific achievements with the roll of papal physicians. In the section of this article on anatomy a few of them are named, but there are literally dozens of others who have an enduring place in the history of medicine.

Among them are Guy of Montpellier, a great reorganizer of hospitals ; Richard, the English¬

man, famous throughout Europe in his time; Taddeo Alderotti and Simon of Genoa, both well known in medical history; William of Brescia; Gentilis ; John Philip de Lignamine, bibliophile and hygienist ; Bartholomew of Pisa; Paulus Jovius; Brasavola; Alfonso

Ferri, the authority on gunshot wounds ; Manovelli ; John of Aquila, referred to by his contemporaries as <(a second .ZEsculapius" ; Frigimelica, famous for his study of baths; Maggi, who made the study of gunshot

wounds so clear ; Cananus, the well-known dissector; Simon Pasqua, who wrote on the gout ; Gymnasius, who was summoned on con¬

sultation to many of the princes of Italy; Mal¬

pighi; Gesalpinus; Jacobus Bonaventura; the brothers Castellani ; uncle and nephew Syl¬

vester and Taddeus Collicola; Zacchias who wrote on medico-legal problems, and so on through many other names that have a place in the history of medicine.

The Church's attitude toward medicine is very well illustrated bv the regulations for the maintenance of high standards in medical edu¬

cation which were enforced by papal bulls.

According to these there had to be three years of preliminary study at the university, then four years at medicine and a year of practice with a physician before personal practice could be taken up. We have climbed back in many schools, but by no means in all, to this stand¬

ard in the 20th century. In the mid-19th cen¬

tury we required only two terms of four months each, ungraded lectures, for the degree in medicine, and that was a license to practise in any State in the Union.

The Church's greatest contribution to

medicine was the hospitals. Mediaeval hos¬

pitals were beautiful buildings, well planned, roomy, airy, with an abundance of water and well-organized nursing. Virchow has told the story of these old hospitals and their foundation.. The main factor was (<the papal en¬

thusiasm. ˆ He adds : <(Though hospitals had existed in the East it was reserved for the Roman Catholic Church … to establish

institutions for the care of those suffering from disease." Miss Nutting and Miss Dock in their < History of Nursing* have emphasized the contrast between the sordid municipal and State institutions of the modern time with the ((beautiful gardens, roomy halls and springs of

water of the old cloister hospitals of the Middle Ages with the comforts of their friendly interiors.® It was these finely organized hos¬

pitals and the good nursing that made the astounding surgery of the later Middle Ages possible. The three things go together, — good surgery, good nursing, good hospitals. The mediaeval hospitals were very numerous. Vir¬

chow points out that in Germany every city of 5,000 inhabitants had

its hospitals. They were at least as numerous in the Latin countries.

An old proverb ran ((where there are three physicians there are two atheists.® This is not true so far as Catholic physicians are con¬

cerned and especially not as regards great scientific physicians. The illustrations will serve to show at the same time the relations of the Church and medicine in the last two cen¬

turies. Morganig C(the father of modern pathol¬

ogy® (Virchow), was a devout Catholic, one of whose sons became a Jesuit and all of his eight daughters nuns, with their father's full approbation. Laennec, the greatest of clinical physicians, was a devout Breton Catholic whose favorite devotion was the Rosary.

Auenbrugger, the inventor of auscultation, Corrigan, of Corrigan's disease, Schwann, the founder of the cell doctrine, Johannes Muller, the father of modern German medicine, Claude Bernard and Pasteur, were not merely nominal, but thoroughly practical, Catholics. The same thing can be said of such men here in America as Sir William Hingston of Montreal, Prof.

Thomas Dwight, Parkman professor of anat¬

omy at Harvard for 25 years, Thomas Addis Emmet, pioneer in American gynaecology, Hora¬

tio Storer, a leader in the organization of hpspi-tal nursing and the reform of hospitals, John B.

Murphy, our greatest surgeon in this genera¬

tion, and many others who might be mentioned.

Biology. — The biological sciences are

usually supposed to have been the focus of the danger area for faith in modern times, and especially since the theory of evolution has gained ground the Church presumedly had to take an attitude of opposition. As a matter of fact many of the epoch-making workers in biology have been devout ecclesiastics. Experi¬

mental and observational biology begins with Abbe Spallanzani (1729-99), whose work

(Regeneration) (1770) opened our era. The discoverer ‘ of the cell theory was Theodor Schwann, a Catholic from the Rhineland, who refused flattering offers of professorships in German universities because he wished to remain among his Catholic students in Belgium. Jo¬

hannes Miiller, the great German physiologist, to whom modern biology owes more than to any others, was a devout Catholic. So was Pasteur, the father of modern bacteriology.

Claude Bernard, like many Frenchmen, neg¬

lected religion in mid-life, but for some years before his death was a faithful Catholic. Men¬

del, the revolutionizer of modern biology in all that relates to heredity, was an Augustinian monk, who, in the midst of his scientific work, was elected the abbot of his monastery and died in the odor of sanctity. Father Armand David, the missionary in China, probably de¬

scribed more hitherto unknown species of ani¬

mals and plants than any other in the last generation.

One of the greatest of modern entomologists is Father Wasmann, S.J. In archaeology

vol. 6 — 6

Catholic churchmen have rendered brilliant service: Abbe Breuil and Father Obermaier are the greatest living authorities on the cave man. The greatest name in Babylonian archae¬

ology is Pere Scheil, the Dominican, who so promptly translated the Code of Hammureabi and has done so much else to put archaeology in his debt.. Far from the Church discouraging such scientific work by priests they are given opportunities for it, can readily command the aid of other ecclesiastics and, above all, are free from solicitude as to worldly cares while carrying it on. The hierarchy and the religious

orders to which they belong take pains to show them how proud they are of their achievements, and they themselves, far from having their faith disturbed by their science, are usually known for their devotion to their religious duties. As it is now it has always been. At times there have been unfortunate misunder¬

standings. These occur also at the present time. They are entirely personal. They do not represent the policy of the Church. Occa¬

sionally it seems as though a scientist is being hampered in his work by religious superiors, but thorough knowledge of the case always shows other factors at work.

Physical Science. — The policy of the

Church as to the physical sciences, apart from those mentioned, is clear from history. Many of the distinguished names in the scientific de¬

velopment of electricity from Father Diwisch, Franklin's rival in bringing lightning from the clouds, and Father Beccaria, who, through Priestley's influence, was elected Fellow of the Royal Society of England, and Abbe Nollet, famous for his series of experiments on the effects of electricity on animals and plants, were Catholic priests. A great many of the distinguished pioneers in electricity were faith¬

ful Catholics. To take only the names of the men after whom units in electricity are named we have Galvani, who asked to be buried in the Third Order of Saint Francis, to which he belonged; Volta and Ampere, both of them well known for their devout faith and practice ; Coulomb, a good French Catholic, and Ohm, who was teaching at a Jesuit school when he made his great discovery of the law of resist¬

ance. Meteorology, in the older time as well as now, and seismology in recent years, owe much of their development to the scientific sta¬

tions established by the religious orders, espe¬

cially the Jesuits in connection with their col¬

leges in various parts of the world. These brought precious information from which laws were deduced. The Jesuits solved the secret of the severe storms of the Philippines and the United States government recognized their work.

Essays) (Oxford University Press 1915) ; Bertholet, (Histoire de la chimie au moyen age* (Paris 1893) ; Buck, (The Growth of Medicine* (Yale University Press 1917) ; Gar¬

rison, (History of Medicine> (Philadelphia 1913) ; Gurlt, Ceschichte der Chirurgie* (Ber¬

lin 1898) ; Humboldt, <Kosmos) ; Meyer, his¬

tory of Chemistry* (trans., London 1898) ; Neuberger, Ceschichte der Medizin) (Stutt¬

gart 1906-11) ; Nutting and Dock, (History of Nursing* (New York 1907) ; Potamian and Walsh, (Makers of Electricity) (New York 1909) ; Walsh, (The Popes and Science) (New 82

York 1915) ; (01d-Time Makers of Medicine*

(New York 1911) ; (Makers of Modern Medicine) (New York 1915) ; (Catholic Churchmen in Science) (3 vols., Philadelphia 1906, 1909, 1917) ; Whewell, (History of the Inductive Sciences } ; Virchow, (Gesammelte Abhandlun-gen) (Berlin 1879).

James J. Walsh,

Author of ((The Catholic Churchmen in Sci¬

ence ®; <(The Popes and Sciences? *etc.*

UNITED STATES, The. Recent historical

developments as to the Norsemen on the Amer¬

ican Continent show that there was a bishop in Greenland and missions on the mainland before the end of the Middle Ages. Whether any of these were in territory now the United States is not sure, but the traditions of Norumbega (q.v.) favor it. The first definite date in United States Catholic History is that of the celebration of mass on Manhattan Island for the expedition of Verazzano, who led French ships here in 1524. The Spanish settlement (1565) of Saint Augustine, Fla., was the first Catholic foundation in the country. The French settlement of Louisiana led to a dis¬

tinct development of Catholicity in that region in the 1 7th century. The Indian missionaries, who in the same century came down from Canada into what is now Maine, New York, Michigan and Illinois, represented further de¬

velopments of early Catholicity here. The Spanish missionaries on the Pacific Coast in the 18th century showed how much could be accomplished by such efforts among the Indians when unhampered by the exploitation of the whites. As the result of the Franciscan mis¬

sions the Californian Indians, some of the lowest in the country, were in the course of a single generation lifted to a comparatively high level of civilization, living peacefully in their mission towns, occupying themselves with agri¬

culture and domestic manufactures, but above all developing what amounted almost to genius in the arts and crafts and leaving monuments of architecture that are standing witnesses, now fortunately being carefully preserved, of the success of their Christian teachers to bring out all that was best in Indian nature.

As a rule, in the 13 original colonies, Catholics were proscribed. Even in Maryland, founded by a Catholic and whose proprietor, Lord Baltimore, had at its foundation pro¬

claimed for the first time in history the practice of religious freedom, proscriptive laws were passed after a time and Catholics were deprived of most of the rights of citizens. In New York under King James II a Catholic governor of the colony, Thomas Dongan, granted a charter (1683) far more liberal than that enjoyed by any American

colony up to that time, above all securing for everyone absolute freedom of worship ; but after the fall of the Stuarts, Catholics in New York came under rather severe laws once more, so that as late as the middle of the 18th century John Ury, convicted of being a Catholic priest, though he was not, was put to death.

Pennsylvania was the only one of the

colonies that tolerated freedom of worship for Catholics before the Revolution, for even Mary¬

land, founded by Catholics on the principle of religions tolerance, had so turned against that original liberal policy that when there was question of building a Catholic church in Phila¬

delphia the project was for a time put off until there was a definite settlement of the dispute then pending, as to whether the land on which Philadelphia was built belonged to Maryland or Pennsylvania.

In spite of this intolerance of the colonists a great many of the Catholics fought bravely for the colonies in the Revolution, so that Washington particularly came to respect them thoroughly. Some, like General Moylan, be¬

came close friends, while the ardent patriotism of men like Commodore Barry heartened the Father of his Country at some of the darkest hours of the Revolution. Catholic toleration in Pennsylvania had its manifest good effect, a large proportion of the famous fighting Penn¬

sylvania Line, — ((the Line of Ireland,® as Gen¬

eral Lee called it, — were Catholics. When Guy .

Fawkes' Day was to be celebrated in Boston with the burning of an effigy of the Pope, Washington wrote a letter, still extant, suggest¬

ing how unsuitable was such a celebration when Catholics were taking their parts whole heait-edly with the colonists. One of the important signers of the Declaration of Independence was Charles Carroll, a Catholic, who, when someone remarked that there were so many Carrolls that the British would not know exactly which one it was,

designated himself beyond all doubt by adding ((of Carrollton.® Even John Jay's bigotry, though it alienated Canada, did not lessen the patriotism of Catholics in the col¬

onies. The alliance with His Most Catholic Majesty of France did much to break down intolerance toward Catholics and the further alliance with Catholic Spain helped the same good cause. Members of Congress from all over the country came to be on terms of in¬

timacy with the French and Spanish Ministers who had Catholic chaplains with them and formal religious celebrations of successes in the Revolution were held in Saint Joseph's Church, Philadelphia, and attended by many prominent in the government of the country. All this helped to break down bigotry. The Chevalier de la Luzerne, the French Minister, who pledged his private fortune to the help of the colonists, was a further important factor in the lessening of prejudice. He won the respect and friend¬

ship particularly of New England members of the Continental Congress and became a close personal friend of Governor Trumbull of Con¬

necticut, the <(Brother Jonathan,® whose name became the popular svmbol of our people until replaced by ((Uncle Sam.® Benedict Arnold's treason plot proposed besides the surrender of West Point a scheme to capture the French Minister on one of his visits to Connecticut.

Among the excuses alleged by Arnold in ex¬

tenuation of his treason was that the Quebec Act had granted freedom of worship to Cath¬

olics in Canada and the toleration of Cathol¬

icity which he saw growing in the Colonies endangered the Protestant religion. It has sometimes been said that the securing of tolera¬

tion in this country was more of an accident than a definite purpose. Anglican and Puritan could not trust each other, so Catholics slipped in under the general religious liberty which had to be voted. As a matter of fact it seems clear now that the first amendment to the constitu¬

tion, guaranteeing religious liberty, was not a little due to Washington's influence and was CATHOLIC CHURCH IN THE UNITED

carried because he wanted to safeguard the rights of the Catholics, whom he had learned to value highly for their heroic efforts for the country during the Revolution. In spite of this amendment, however, the laws of many States continued to bar Catholic citizens from their rights. Pennsylvania and Delaware were the only States whose laws did not need expung¬

ing in order to secure to Catholics the right to vote and be voted for. In 1784 Rhode Island removed from its constitution the clause dis¬

qualifying Roman Catholics from office. This was before the adoption of the Federal Consti¬

tution, but other States were slow to follow this example. In. 1806 New York did so, but Massachusetts waited until 1821, Virginia until 1830, North Carolina until 1836, New Jersey did not remove all disqualifications from Roman Catholics until 1844, while in 1876, fully 100

years after the adoption of the First Amend¬

ment to the Federal Constitution, New Hamp¬

shire still retained disqualifying laws, only re¬

pealed the following year. Shortly after the Revolution the Church was organized inde¬

pendently of all foreign influence with John Carroll, a relative of the signer, as Prefect Apostolic, appointed 26 Nov. 1784. Until the Revolution the Catholics in the colonies had been under the jurisdiction of Bishop Challoner, the Vicar Apostolic of London. His successor refused to exercise any jurisdiction.

It was proposed at first that the Church should be under French ecclesiastical jurisdiction and Franklin as our Minister to France favored this for a time, but was brought to realize the danger there would be in such foreign influ¬

ence. Rev. Dr. John Carroll's appointment fol¬

lowed his recognition of this.

In his letter of acceptance Rev. Dr. Carroll states that there were at this time in Maryland 15,800 Catholics; in Pennsylvania 7,000; in Virginia 200; in New York 1,500; a few in New England and some scattered along the Missis¬

sippi, formerly under the jurisdiction of the bishop of Quebec. Altogether there were less than 30,000 Catholics in the whole country.

The infant Church had some serious troubles, many of them due to what is known as the trustee system. Laymen in control of the funds thought to control also sacerdotal and even episcopal action. The spirit of independence in the new country readily tempted to abuses in this matter and the first half century of Catholic history has many such disputes, which led to the loss by the Church of a number of Catholics, especially of the older families. In 1789, the year of the organization of the gov¬

ernment, Dr. Carroll was made bishop, so that the State and the Catholic Church run parallel in their formal history. Bishop Carroll at once took up the project of a college, already dis¬

cussed in 1786, and Georgetown College in the District of Columbia was founded in 1789.

Bishop Carroll visited Boston and notes with pleasure how the spirit of tolerance is growing.

((It is wonderful to tell what great civilities have been done to me in this town where a few years ago the popish priest was thought to be the greatest monster in creation.8 Previous intolerance can be best understood from the fewness of the Catholic population in New England, for in 1798 the whole number of Catholics was estimated at onlv 750, this figure including some 500 Catholic Indians in Maine.

In 1800 Rev.ˆ Dr. Matignon erected the first building for Catholic services in Boston worthy of the name of a church, (<J°hn Adams, Presi¬

dent of the United States, and other Protestant gentlemen being generous contributors.8 In 1803 the Louisiana Purchase brought New Or¬

leans into the United States, in which there had been a bishop since 1793, and with a large increase in Catholic population. The religious liberty assured in the countrv soon brought large numbers of Catholics and led a great many back to the faith which either they or their fathers had abandoned because of re¬

ligious intolerance and the difficulty of prac¬

tising their religion. At Bishop Carroll's suggestion new bishoprics were created in 1808

in Boston, Philadelphia and Bardstown. He recommended that New York be left under the jurisdiction of Boston, but the Irish bishops succeeded in securing the appointment of Father Luke Concanen as bishop of New York.

Bishop Concanen died before reaching this country. Dr. Egan was chosen bishop of Phila¬

delphia, Dr. De Cheverus bishop of Boston and Dr. Flaget of Bardstown. Baltimore then be¬

came an archbishopric. Archbishop Carroll died in December 1815 and was succeeded by Archbishop Neale, who established the Visita¬

tion Convent at Georgetown, D. C., and restored the Society of Jesus, suppressed by the Pope in 1773, but now permitted to revive. Prince Gallitzin of Russia, who had become a priest, did splendid missionary work in western Penn¬

sylvania in the early part of the 19th century, founding in 1799 the town of Loretto, still famous as a Catholic centre.

The American Church was particularly for¬

tunate in the bishops who occupied these first sees. Archbishop Carroll was a valued and respected friend of the patriots who made the country. Bishop Louis de Cheverus, the first bishop of Boston, had been doing heroic mis¬

sionary work throughout New England for more than a quarter of a century before he was made bishop. He was often consulted by the legislature of Massachusetts and accepted many invitations to explain Catholic doctrine, making use for this purpose even of Protestant churches. Speaking of him, William Ellery Channing said : ((How can we shut our hearts against this proof of the Catholic religion to form good and great men?8 Bishop Flaget, another Frenchman, the first bishop of Bards¬

town, was indefatigable in his missionary labors in the immense territory under his jurisdiction, now divided into 28 dioceses, five of them archdioceses. He won the respect and rever¬

ence of all who came in contact with him.

The Bardstown bishopric was subsequently transferred to Louisville (1841). Bishop Ro-sati, an Italian, the first bishop of Saint Louis, was another one of these marvelous pioneer bishops whose missionary spirit could not be satisfied. In one year his converts numbered 300. Bishop Loras became the first bishop of Dubuque in 1837 with but one priest to help him, and yet he succeeded in accomplishing immense good and stamping his personality on all the future history of Dubuque. Another very successful French bishop was Joseph Cretin, the first bishop of Saint Paul. Some of the problems he had to meet will be understood from the fact that within a period of six years his flock grew from 1,000 to 60,000. Like 84

Bishop Loras of Dubuque he was very success¬

ful in promoting Catholic immigration and lay¬

ing deep foundations for the future of his diocese. The bishops were of all nationalities and Frederick Baraga, a Slovenian from the west of Austria, was appointed the first bishop of Marquette in 1853 after having labored for 22 years as a missionary among the Indians of Michigan. His writings are still recognized as of high authority on the languages of the American Indians.

The Church continued to grow rapidly, par¬

ticularly in the South and West, and two new bishoprics were created in 1820 in Richmond and Charleston. Rev. John England of Irish birth, destined to be a great power in the Ameri¬

can Church, was made bishop of Charleston.

His writings are still a storehouse of informa¬

tion on Catholic subjects. The bishoprics of Cincinnati and Saint Louis were erected in 1821 and 1826. It was felt that the growth of the Church now demanded that the bishops and prominent ecclesiastics of the country should take council of each other for the benefit of Catholicity in America, and the first Provincial Council of Baltimore was held in 1829. The records show that at this time Catholics had in¬

creased more than 12 times in numbers in this country and that there was in 1830 a Catholic population here of nearly 400,000.

New bishoprics continued to be founded in the West and sees were erected at Dubuque in 1837, Chicago and Milwaukee in 1843, Oregon City 1846, Saint Paul and Santa Fe 1850 and San Francisco in 1853. Before the acquisition of California San Francisco had been part of the Mexican diocese of the two Californias erected in 1840. During the decade after 1840

Catholicity increased very rapidly in the United States because of European immigration. The famine in Ireland and political troubles of various kinds in other countries caused a great many immigrants to seek the protection of the United States and the Church had to make pro¬

vision for a very large increase in its member¬

ship. To deal with the new problem thus created the First Plenary Council of Baltimore assembled in 1852. At this time the Catholic population numbered about 2,000,000; there were 30 episcopal sees including the six archdioceses ot Baltimore, New Orleans, New York, Cin¬

cinnati, Saint Louis and Oregon City. In New York and Boston particularly Catholics in¬

creased rapidly in numbers. At the end of the first quarter of the 19th century there were some 15,000 Catholics in the diocese of Boston, about half of whom were in the city, but they were beginning to crowd into all the growing towns of New England, Lowell, Newport, Fall River, Taunton, Providence, Hartford. New York grew even faster. At the end of the first decade of the 19th century Father Kohlman, S.

J., found the parish of Saint Peter's in New York city to contain 14,000 Catholics. He pur¬

chased a site for a second church between Broadwav and Bowery road, then on the out¬

skirts, and with the coming of a bishop to New York this became the cathedral. Father Kohl¬

man who opened a school and was prominent in the intellectual life of the city was once sum¬

moned as a witness against prisoners accused of thievery and asked to tell what he had heard from them in confession. This he refused to do in a most solemn way in court and the presiding justice, De Witt Clinton, supported him, thus settling for America the question of the status of information obtained in confession as privileged. The second bishop of New York was John Connolly, consecrated in 1814. Fie was succeeded by John Dubois in 1826. At his arrival he estimated the Catholics in the city at 25,000 and throughout the diocese 150,000. To serve the spiritual needs of this immense num¬

ber New York city had but six priests and there were but four in the rest of the State. Albany, Rochester and Buffalo though each containing hundreds of Catholics had no resident priests.

Brooklyn had but one small chapel, a mission from New York, visited occasionally by a priest. Newark, Paterson and New Bruns¬

wick, all of them then in the New York diocese, were only building their small churches. Al¬

most necessarily under such difficult conditions a great many Catholics lost their faith because of lack of opportunities to practise their religion and bring up their children in it. Some of the Western dioceses were of course in even worse straits. Bardstown included besides Kentucky and Tennessee all the country known as the Northwest Territory, embracing what is now the States of Illinois, Indiana, Michigan, Wisconsin and Ohio. There were small scattered

Catholic communities of French at Kaskaskia, Kahokia, Prairie du Rocher in Illinois; Vincennes, Ind., along the Raisin River and in Detroit and Mackinaw, Mich., at Sandusky, Ohio, and Green Bay, Wis., though there were only three priests to tend to them all. Bishop Flaget within 10 years was able to report that he had in Kentucky alone 19 churches, 10 priests and 10,000 Catholics.

Some of the pioneer priests were remarkable men. One of these was Father Gabriel Richard, a Sulpician who did so much for Detroit and the neighborhood at the beginning of the 19th century. The Sulpicians, exiled from Paris by the Revolution, were of great help to infant Catholicity in America. They founded Saint Mary's Seminary in Baltimore (1791) which, after a very trying time at first, proved a wonderful nursery of priests for the American Church. In 1831 they founded Saint Charles College for clerical students though it was practically not opened until 1848. Father Richard was assigned to the missions in Illinois about 1795, transferred to Detroit in 1798. He opened a young ladies' academy in 1804 and a seminary for young men the same year. The girls were taught spinning and weaving as well as purely intellectual subjects. With Rev. John Monteith, pastor of the Protestant church of Detroit as president and Father Richard as vice-president, the ((Catholepistemiad or Uni¬

versity of Michiganˆ was founded in 1817.

In 1821 when the University of Michigan was incorporated Father Richard was made a trus¬

tee. He published the first Catholic paper in this country, The Michigan Essay or Impartial Observer. Before he was able to get the print¬

ing press over the mountains he had a public crier who as a ((spoken newspaperˆ gave the news and certain advertisements at the church door on Sundays. In 1823 he was sent to Washington as territorial delegate, the only in¬

stance of a priest having a seat in Congress.

When cholera visited Detroit in 1832 he fell a victim to the disease in his zeal for the sick.

Judge Cooley declared <(he would have been a CATHOLIC CHURCH IN THE UNITED STATES

man of mark in almost any community and at any time.®

One of the greatest of the Catholic prel¬

ates of the United States was John Hughes (1797-1864) who became bishop of New York in 1838 and the first archbishop of that see in 1850. A self-made man who worked his way through Mount Saint Mary's College, Emmittsburg, Md., as a gardener, he demonstrated a high quality of intellect in his controversy with Rev. John Breckenridge which made the American people realize for the first time how strong was the intellectual position of the Catholic Church. He showed his firm char¬

acter during the troublous times of trusteeism in Philadelphia and then was made bishop of New York. He at once took up the correction of abuses that had crept into New York life to the detriment of the Church. It was due to his efforts that the Public School Society, a private corporation which controlled the funds and managed the common schools of New

York, was dissolved, to the lasting benefit of popular education. Bishop Hughes then inau¬

gurated a system of parochial schools which has developed into the magnificent Catholic school system of New York. His controversy with (<Kirwan® (Rev. Nicholas Murray) in 1850

probably did more than anything else to make Americans understand how utterly one-sided were the commonly accepted views of the Church in this country. The firm stand that Bishop Plughes took in New York prevented the rioting, destruction' and bloodshed, which

occurred as a consequence of Native Ameri¬

canism in 1844 in Philadelphia, and of Know Nothingism 10 years later, in many parts of the country, from coming to a head in his diocese.

He was well known for his thorough-going devotion to the best interests of his adopted country, and was a personal friend of Presi¬

dent Polk and of many men prominent in the political history of the time. During the Civil War he was appealed to by President Lincoln and Secretary of State Seward and was en¬

trusted with a diplomatic mission of an infor¬

mal character to Europe and particularly to France in order to neutralize the growing sen¬

timent in favor of European intervention on the side of the South. In spite of failing health which had compelled him to ask for a co¬

adjutor he accepted this mission at the personal solicitation of President Lincoln, had an inter¬

view with the Emperor Napoleon in December 1861 and then proceeded to Rome, where, dur¬

ing many months, he met prelates from Euro¬

pean countries and corrected many false im¬

pressions with regard to the war between the States. The government at Washington felt that his visit to Europe had been of great im¬

portance in making the cause of the North bet¬

ter understood and an official intimation of this was conveyed to the Holy See direct from President Lincoln, suggesting that the Arch¬

bishop could, only be properly rewarded by Rome, but his failing health put that out of the question. President Lincoln wrote a let¬

ter commending Archbishop Hughes' patriot¬

ism. The last public function that he under¬

took was a public address delivered shortly before his death to the Catholics of New York with regard to participation in the ((draft riots,®

which caused so much disturbance to the city and country in July 1863. His address to the crowd had to be made sitting down because of his weakness and his voice could not be heard far, but his published words made it clear be¬

yond all doubt that the Catholic Church com¬

mended to its members their duties as citizens to fight for the conservation of the Union to which they owed so much.

Just before and after the middle of the 19th century the Catholic Church received great ad¬

ditions to its members by the immigration from Ireland, consequent upon the famine and intol¬

erable conditions there, and from Germany be¬

cause of political disturbances in connection with the revolutions of 1848. Undoubtedly the strongest American influence exerted over these newly-arrived Americans was that of the Church, and its effect was seen in the large numbers of Catholics of Irish and German de¬

scent who fought splendidly and so many of whom hed their blood in defense of the Union during the Civil War. There had been organized intolerance under the name of the Native American party, which led to the burn¬

ing of the Ursuline Convent at Charlestown, Mass., in 1834, and of two Catholic churches in Philadelphia (1844) as the result of riots in which a number of people were killed. In the fifties the Know Nothings, so called be¬

cause of their answer to all questions about the organization as directed by its rules was (<I know nothing,® led to serious disturbances, in¬

cluding the killing of Catholics, the burning of churches and other outrages in some 10 States.

The answer to this campaign of bigotry by the patriotism displayed in the Civil War was com¬

plete.

About the same time the Church began to make large gains bv conversion from among the educated people of the country. There was an (<Oxford Movement® in America as well as in England and many distinguished converts were made. Among these the best known was Orestes Brownson, well known as a writer on serious subjects, and Isaac Hecker (of Brook Farm), who gathered round him the group of men who founded the Paulist Congregation, New York, for the conversion of non-Catholics. There were a number of converts from among the Protestant clergy, the most distinguished of them being Rev. Dr.

Levi Silliman Ives, the Protestant Episcopal bishop of North Carolina, Rev. Dr. Preston of New York, Rev. James Roosevelt Bayley of New Jersey, Rev. George Herbert Doane, the son and brother of Protestant Episcopal bish¬

ops of New Jersey and Albany, and somewhat later, Rev. Kent Stone, president of Kenyon and Hobart colleges, who afterward became Father Fidelis of the Passionists.

The best proof of the recognition by Church authorities that the Church in the United States should be absolutely American in character and in sympathy with the republican aims of this country is to be found in the fact that a number of these converts were advanced to the highest posts in the hierarchy. James Roosevelt Bayley became bishop of Newark and later arch¬

bishop of Baltimore and is said to have been offered the cardinalate which he declined in favor of Archbishop McCloskey of New York.

Other converts who became bishops were Tyler of Hartford, Wadhams of Ogdensburg and

Wood of Philadelphia, who later became arch¬

bishop. Father Doane became vicar-general 86

and chancellor of the diocese of Newark and Father Preston became vicar-general of New York and both were made domestic

prelates of the Pope. Dr. Silliman Ives was founder and the first president of the (<Catholic Protectory for Wayward Girls and Boys of New York® and was given as a lay¬

man distinguished opportunities for the accom¬

plishment of great good. Many other distin¬

guished converts were made, among them Dr.

J. V. Huntington, brother of Daniel Huntington, the artist, who wrote a series of Catholic novels ; George Parsons Lathrop and Charles Warren Stoddard, poets ; Edward Lee Greene, the botanist, Rev. Daniel Hudson of the Ave Maria, Molly Elliott Seawell and Frank Spear¬

man, novelists ; Rose Hawthorne, the daughter of Nathaniel, who afterward became Mother Alphonsa of the Cancer Home; Mr. and Mrs.

Bellamy Storer and such distinguished phy¬

sicians as Drs. Van Buren, one of the leaders of the profession of New York city, Plorner, professor of anatomy at the University of Pennsylvania, Dwight, Parkman professor of anatomy at Harvard University for 25 years, Thomas Addis Emmet, of international fame in his specialty of women's diseases, Horatio Storer, vice-president of the American Medical Association and well known for his contribu¬

tions to American medical literature. The number of conversions grew each year after the middle of the 19th century, increasing par¬

ticularly in recent years, until it is calculated that about 25,000 converts are received annually into the Church at the present time. Perhaps the best evidence that the Church appeals to thor¬

oughly practical men as well as to those of spiritual and intellectual tendencies is to be found in the fact that altogether of men who reached the rank of brigadier or major-general in the Civil War, 46 became converts before their deaths.

The Catholic population of the United States had been growing very rapidly during the dec¬

ades just before the war between the States.

The newly made citizens faced their duty to their adopted country bravely and with few exceptions whole heartedly. Archbishop Hughes more than any other gave the keynote to patriot¬

ism for his fellow countrymen at the North.

The archbishop of New York had long con¬

sidered that slavery was a blot on this country and as a young man at college in lyrical mood had invoked Columbia to <(chase foul bondage from her Southern plain.® In his controversy with Breckenridge he had pointed out the absurdity of paying a compliment to our ((memorable Declaration of Independence,®

coupled with an allusion to slavery. He had taken firm ground against the radical abolition¬

ists, however, pointing out that they had com¬

mitted the very crime of attempting to over¬

throw the Constitution and government of the United States which they charged against the Southern Confederacy and urging moderation and conciliation on both sides. Once war was declared, however, there was no half-hearted¬

ness about his support of the Union.

Another of the distinguished prelates of the second half of the 19th century was Archbishop Martin John Spalding (1810-72), a descendant of a family that had been in this country for many generations. He became bishop of Louis¬

ville in 1850 and archbishop of Baltimore in 1864. The growth of the Church, and above all the number of conversions had attracted public attention more than ever to Catholicity and the patriotism of Catholics during the Civil War had moderated much of the intolerance felt toward the Church, and Americans were now more willing to listen to

expositions of Catholic doctrine. Archbishop Spalding re¬

sponded to a deeply felt want by his lectures in many parts of the country and by the breadth of his scholarly erudition succeeded in placing the Church's position properly before the minds of fair-minded Americans. He was the first to suggest the establishment of a Catholic Univer¬

sity and to insist that intensive development of the intellectual life would add greatly to the Church's position. He came to be held in high esteem by prominent men of all classes and sects in the United States. When the Second Plenary Council of the Church in the United States met at Baltimore in 1866 under the pri¬

macy of Archbishop Spalding the Catholic pop¬

ulation had doubled to nearly 4,000,000, and though the increase was very largely due to Irish and German immigration, the feeling was grow¬

ing throughout the country that our new citi¬

zens w'ere being trained to genuine Americanism under the influence of the Church whose hier¬

archy was deeply patriotic in its policies.

Two distinguished prelates who have been called ((Fathers of the American Church® were the Kenricks — Irish by birth but thoroughly American in their influence on the Church.

Francis Patrick Kenrick was for a time bishop of Philadelphia (1830), and was transferred to the archbishopric of Baltimore in 1851. He was honored by his fellow citizens of Phila¬

delphia for his courageous zeal during an awful epidemic of cholera and for his tact during the native American riots when 40 persons were killed in the city. His brother, Peter Richard Kenrick, became archbishop of Saint Louis in 1847 and lived to celebrate the golden jubilee of his consecration. His firm stand with regard to the Drake Test Law led to a decision by the United States Supreme Court which prevented threatened infringement of the constitutional guarantee of religious liberty.

In 1884 when the Third Plenary Council was held, under the primacy of Archbishop (now Cardinal) Gibbons, the Catholic population had actually doubled once more to 8,000,000. The new primate, Cardinal Gibbons, was destined to occupy a place of particular affection in the hearts of the American people and to be looked upon as a typical representative of all that was conservative in American life. His published opinions came to be looked upon as almost national messages, always read with attention and considered with reverence. The Church continued to grow rapidly under the favoring influence of religious liberty and doubled once more in numbers by the beginning of the new century.

Religious education came very early to be recognized as an extremely important factor for the Church's growth in the United States and for the conservation of the spirit of Chris¬

tianity. The Catholic hierarchy was firmly per¬

suaded, to use Herbert Spencer's word, that ((it works grave mischief whenever intellectualiza-tion precedes moralization.® The first Catholic college, that of Georgetown, was established in 1789, the very year of the organization of the CATHOLIC CHURCH IN THE UNITED STATES

Union. Other colleges followed until now there are 22 universities, more than a dozen of them with over 1,000 students in attendance, some 200 colleges for boys with over 50,000 students in attendance, not including 102 ecclesiastical seminaries with some 7,000 students. Catholic higher education for women began with the establishment of the Visitation Academy, Georgetown, D. C., in 1799. Mrs. Seton's organization of the Sisters of Charity and the foundation of Saint Joseph's Academy, Emmittsburg, followed in 1809. The first institu¬

tion for giving anything more than education in the ordinary branches to girls in New Eng¬

land was the Ursuline Academy in Charlestown, Mass., opened in 1834 and though mainly at¬

tended by the children of Protestant parents, burned down that year by a mob from Boston at the risk of the lives of some of the pupils. There are now some 700 Sisters' academies with over 100,000 pupils in attendance. In keeping with the times these have developed 39 colleges for women, some of them offering graduate as well as undergraduate instruction. The Sisters teach in the parochial schools, over 50,000 of them being devoted to this work, teaching more than 1,500,000 pupils.

After education the Church has considered its most important work the organization of charity. The oldest hospital founded by pri¬

vate beneficence still in existence in what is now the United States is the Charity (Sisters) Hos¬

pital at New Orleans dating from 1720. In 1829 four Sisters of Charity went to Saint Louis from Emmittsburg to open the Mullanphy Hospital, which had been endowed by Mr.

John Mullanphy. In 1832 when an outbreak of cholera in Blockley Hospital, Philadelphia, utterly disorganized that hospital, six sisters, by request of Bishop Kenrick, started from Emmittsburg within two hours after the sum¬

mons and took charge, restoring order there and giving the institution (<its one short inter¬

regnum of peace in the distressing reign of violence, neglect and cruelty.® (Nutting and Dock, (History of Nursing*). In 1847 Mercy Hospital, Pittsburgh, was founded, to be fol¬

lowed by a chain of hospitals under the. care of the Sisters of Mercy throughout the country.

In 1849 Saint Vincent's Hospital, New York, was established by the Sisters of Charity, and since then the same sisters have opened 11

other hospitals in the greater city. Carney Hospital, Boston, was founded in 1868, and since then Sisters' hospitals have come to occupy a prominent place in American life, there being now some 530 Catholic hospitals in the country, caring for 1,000,000 patients a year.

Besides they have charge of the orphans, of the found¬

lings and of a number of institutions for the old as well as for the insane and the tuberculous.

Mother Cabrini founded a series of hospitals, beginning with Columbus Hospital, New York, 1892, orphan asylums and schools in this coun¬

try for the Italians, which have helped very much in solving the social problems connected with this large group of new. citizens.

Very early in our history missionaries among the Indians continued some of the good work that had been done in Colonial days in chris¬

tianizing and civilizing the Indians. The <(black robe® of the Jesuits became a power among them. Father Peter de Smet, S.J., the « Apostle of the Rocky Mountains,® served the Indians of the Middle West for fully 50 years (1821-71) and was often called upon to use his influence with hostile tribes. Of the 300,000 Indians in the United States 60,000 are Catholics, ministered to by 160 priests. There are about 100 Catholic schools for Indian children containing some 5,000 pupils. Missionary effort among the negroes has been even more active. More than 100,000 of our colored population are Catholics, served by 170 priests. Nine religious communi¬

ties of men and 23 of women are represented in the negro work. Mother Drexel's founda¬

tions for the Indians and negroes have accom¬

plished magnificent results. There are now 150

Catholic schools for negroes with an attendance of about 15,000 children.

Toward the end of the 19th and the be¬

ginning of the 20th century the Church in the United States received large additions to its number through the immigrants from the Slav countries. At the present time the Slav Cath¬

olics are calculated to number nearly 5,000,000

in the United States. Three millions of these are Poles, 1,000,000 are Bohemians and Slo¬

vaks, 250,000 Croatians, 125,000 Slovenians and 500,000 Ruthenians. Practically all the Poles in the United States are Catholics and very faith¬

ful to their religion. They have 750 priests, more than 500 churches and 20 Catholic news¬

papers in their own language. The Bohemians have 250 priests and 100 churches. The Ruthen¬

ians, the term being applied to those who come from Austria, have become important in our population in Pennsylvania, New York, New Jersey and Ohio. They are practically all Uniats, that is, in union with Rome but not using the Latin rite. They have some hand¬

some churches and 150 priests, some 64 being married. It has been decreed that there should be no addition to the married clergy in this country either by immigration or ordination.

The Greek Catholic Union among the Ruthen¬

ians is a powerful organization with a member¬

ship of nearly 50,000. There is an order of Ruthenian Sisters of the Order of Saint Basil who take charge of parochial schools. The Church demonstrates the validity of her name of Catholic by gathering into the fold here all the foreign nationalities — Rumanians, Alban¬

ians, Syrians and Armenians. All of these have priests of their own and follow their own rites, to which they were accustomed at home.

New York as the port of entry for immigration caught numbers of all these peoples so that mass is now said in New York in seven dif¬

ferent languages, according to a series of rites.

All these peoples, except the Ruthenian Greeks, who are organized in one diocese, under a Ruthenian prelate, are under the jurisdiction of the ordinary ecclesiastical authorities in this country and of course of the Pope.

This large foreign immigration to America has introduced a series of

new problems and ele¬

ments into our political life. They are not very different from those which occurred as a conse¬

quence of German and Irish immigration at the middle of the 19th century. The Church was an important factor in the transformation of these European stocks into American citizens of ster¬

ling patriotism. Her ministrations under the di¬

rection of a hierarchy that has shown itself thor¬

oughly American and free from any political bias that might hamper our free development, is accomplishing a similar transformation for the 88

Slavs and the Italians. President McKinley declared the influence of the Catholic Church in this matter as extremely precious for the future welfare of the country. The decided stand taken by the Church against all the forces of anarchy has meant much for preserving the balance of conservatism among these newly arrived peoples, so liable in the first flush of their enjoyment of liberty to go too far in what they expect of it.

Catholic societies organized to foster social aims, provide fraternal insurance and or¬

ganize public opinion against abuses and im¬

moralities of various kinds have become in¬

creasingly prominent in American life. The Holy Name Society, organized to discourage blasphemy, but doing social work of many kinds, counts a membership of a million. The temperance societies of the Church represent another million. The American Federation of Catholic Societies, organized to oppose immoral tendencies and intolerant legislation, has nearly 5,000,000 members affiliated. The Knights of Columbus, who came into public prominence in connection

with the war in their organization of social life for the soldiers in the canton¬

ments here and behind the line in France, have a membership of 600,000 men definitely engaged by their fraternal pledges to patriotism and work for social purposes. Some 350 Catholic periodicals, most of them weeklies, are pub¬

lished in the United States. They include 46

German, 18 French, 15 Polish, 7 Bohemian, 5

Italian, two each Slovene, Dutch and Magyar and one each Spanish, Croatian and Indian pub¬

lications.

In 1918 the Catholic population in the con¬

tinental United States was estimated to be nearly 18,000,000, with the hierarchy consisting of three cardinals, 16 archbishops and 100

bishops. There are 20,000 priests, about 5,000

of whom are members of religious orders —Jesuits 1,200, Benedictine 750, Franciscans 700, Redemptorists 500, Vincentians 300, Dominicans 250 and many smaller orders. There are some 85,000 women in religious communities. The American occupation of the Philippines added a Catholic population of 7,000,000 with one archbishop, 11 bishops and 1,250 priests; Porto Rico another 1,000,000, with a bishop and 150

priests; Hawaii, 40,000, with a bishop and 50

priests ; Guam, 14,000, with a bishop and 10

priests; Samoa, 1,000, with 4 priests, and the Canal Zone about 4,000, with 4 priests.

Bibliography. — Shea, J. Gilmary, (History of the Catholic Church in the United ‘States>

(1890) ; id., (Life and Times of Archbishop Carroll5 (New York 1888) ;

id., (The Catholic Church in Colonial Days) (ib. 1886) ; De Roo, ‘America Before Columbus5 (Philadelphia

1908) ; Jesuit, ‘Relations5 (Cleveland 1898) ; Campbell, ‘Pioneer Priests in America) (3

vols., New York 1903-11) ; Parkman, ‘The Jesuits in North America5 (Boston 1890) ; Hughes, S. J., (The History of the Society of Jesus in North America5 (Cleveland 1907-10) ; Johnson, ‘Religious Liberty in Maryland and Rhode Island5 (New York 1903) ; Griffin, Mar¬

tin I. J., ‘Catholics in the American Revolu¬

tion5 (3 vols., Philadelphia 1907-09) ; O’Gor¬

man, ‘History of the Roman Catholic Church in the United States5 (in ‘American Church History Series,5 Vol. IX, New York 1895) ; Wedewer-McSorley, ‘A Short History of the Catholic Church5 (Saint Louis 1916) ; Finotti, (Bibliographia Catholica Americana5 (New

York 1872) ; Clarke, (Lives of the Bishops of the United States5 (New York 1872) ; Hughes, Most Rev. John, (A Catholic Chapter in the History of the United States5 (ib. 1852) ; Has-sard, ‘Life of Archbishop Hughes5 (ib. 1866) ; Shea, (The Two Kenricks5 (Philadelphia 1904) ; Richards, (A Loyal Life — The Catholic Move¬

ment in the United States5 (Saint Louis 1913) ; Curtis, (Some Roads to Rome in America5

(Saint Louis 1909) ; ‘Catholic Encyclopedia5

(New York 1909-14) ; ‘Catholic Directory5

(annually) ; files of the American Catholic Quarterly (Philadelphia) ; Catholic Historical Magazine (Washington, D. C.) ; Catholic World (New York) ; Griffin’s Catholic Researches (Philadelphia) ; Records of American Catholic Historical Association (Philadelphia) ; publi¬

cations of United States Catholic Historical Society (New York).

Tames J. Walsh,

Author of ‘ Catholic Churchmen in Science ,5

(The Popes in Science Q *etc.*

CATHOLIC COLLEGES IN EUROPE,

American. (1) The Pontifical College of the United States at Rome, Italy; address: Via della Umilta, 30. This institution was founded by Pius IX and was formally opened by him 8 Dec. 1859. In 1884 Leo XIII ranked it among pontifical colleges, with the privileges thereto appertaining. Ecclesiastical students only are admitted ; students pursuing the courses in the humanities, philosophy and theol¬

ogy at the Urban College of the Propaganda.

In 1916 the number of students was reported as 158. (2) The American College at Louvain, Belgium. This was founded in 1857 by several American bishops. The rules and constitutions were confirmed by Leo XIII in 1895. The objects of the institution are to educate for the priesthood American students sent by their bishops to Louvain, and to prepare students from Belgium and adjacent countries for im¬

portant missions in dioceses of America. Only those students are admitted who have finished a complete course in philosophy at a Catholic college. There is a three years' course in theology at the University of Louvain, followed by higher studies leading to the various degrees in theologv and canon law. Its activities were suspended in 1914 when, early in the European War, the city of Louvain was burned by the Germans.

CATHOLIC COPTS, those native Egyp¬

tian Christians, about 5,000 in number, who acknowledge the authority of the Pope. The word Copt is an adaptation of the Arabic <(Qibt5) or "Qubt55 (a corruption of Alyvrrrog) .

See Copts.

CATHOLIC CREDITOR, in Scottish

law, a creditor whose debt is secured by a lien or charge on more than one subject belonging to the debtor.

CATHOLIC EDUCATION IN THE

UNITED STATES. Historical. — The first

schools within the present limits of the United States were those founded by the Franciscans in Florida and New JVIexico. Saint Augustine, Fla., had a classical school as early as 1606, and there were 2 number of schools in existence for the natives of New Mexico in the year 1629. Schools for the natives were likewise CATHOLIC EDUCATION IN THE UNITED STATES

established in Texas and California, with the foundation of the missions in those regions.

Ursuline nuns from France established a par¬

ish school and academy in New Orleans in 1727, a few years after the foundation of the city.

French schools, for both white and native chil¬

dren, were also opened at Saint Louis, Detroit and other settlements to the north. In general, it may be said that Catholic school work usu¬

ally began in a place, whether it was a white or an Indian settlement, as soon as there was a sufficient Catholic population and organiza¬

tion to furnish support for the school. In the East, the Jesuits in Maryland had opened schools by the year 1650, and a college or (<school for humanities, w was established there in 1677. Later on, a boarding school was opened at Bohemia, on the eastern shore of Maryland; among the famous pupils at this institution were John Carroll and Leonard Neale, who subsequently became archbishops of Baltimore, and Charles Carroll of Carroll¬

ton, one of the signers of the Declaration of Independence. Georgetown College was

founded in the year 1789. A more favorable opportunity for

educational work was offered to the Jesuits in Pennsylvania, owing to the tolerant attitude of the Quakers, and, with the organization of the first Catholic parish in Philadelphia in 1730, the foundation of schools as a regular and permanent feature of parish work may be said to have begun. Philadel¬

phia had a larger Catholic population than any other town in the country, and the system of schools that was gradually established there and throughout Pennsylvania as new parishes were organized became a model to Catholics elsewhere. A new impulse was given to Cath¬

olic education by the American Revolution.

Catholic immigrants came in increasing num¬

bers, and learned priests, exiled by the French Revolution, arrived opportunely to take up the work of organizing parishes, schools and col¬

leges. In 1791 the Sulpicians founded Saint Mary's Seminary at Baltimore. Foremost in Catholic educational work west of the Alle¬

ghenies were Fathers Stephen T. Badin and Charles Nerinckx in Kentucky, Father Ga¬

briel Richard in Detroit and Michigan and Father Edward Fenwick, a Dominican, first bishop of Cincinnati, in Ohio. What was ac¬

complished in these three States had a very important influence in the development of Catholic education throughout the whole Mid¬

dle West later on. During the period 1800-40

the progress of Catholic education, while slow, was steady and solid, and corresponded with the growth of the Church. Catholic text¬

books began to appear, and, more important still, religious sisterhoods were organized to carry on the work of teaching in the schools.

The first teaching sisters in the English-speak¬

ing States were the Poor Clares, who opened a school at Georgetown in 1801. This order soon discontinued educational work; but in 1812 an American branch of the Visitation Order was founded at the same place by Bishop Neale.

Mrs. Elizabeth A. Seton, under the direction of Father Dubourg, organized the Sisters of Charity at Emmittsburg in 1809; this commu¬

nity grew rapidly and furnished teachers to Catholic schools in all parts of the country.

Shortly afterward, three teaching communities were founded in Kentucky — the Sisters of Loretto, the Sisters of Charity of Nazareth and the Sisters of Saint Dominic. These five teaching communities rendered it possible for Catholics to carry on their schools and acad¬

emies without aid from the state, and to ex¬

tend the educational system to new centres of Catholic life as fast as these became organ¬

ized. Among the religious orders of men, the work of the Lazarists and Jesuits during this period deserves particular mention, the “latter having laid the foundations of Saint Louis University in 1828. Another great forward movement in Catholic education originated in the tide of immigration that set in about the year 1840. Hundreds of thousands of Catholic Irish and Germans made their way to the Mid¬

dle Western States and beyond. Zealous

priests and bishops of the newly-created dio¬

ceses labored to erect everywhere not only churches but schools. After the failure of Bishop John Hughes of New York to secure for the Catholic schools of that city a share of the public educational funds, although his efforts were warmly seconded at Albany by Governor Seward, it was more keenly realized by Catholics that it had become a matter of re¬

ligious necessity for them to erect and main¬

tain their own schools and that, as Bishop Hughes declared, ((In this age and country the school is more necessary than the church.ˆ At the instance of the bishops many new teaching communities came from Europe, and their membership was rapidly augmented under the favorable conditions offered for religious and educational work. The result was that, while in the year 1840 there were only about 200 par¬

ish schools in the country, this number was multiplied several times over during the en¬

suing decade. Academies for girls were estab¬

lished by the Ladies of the Sacred Heart and other sisterhoods while the Christian Brothers took the lead in the field of secondary educa¬

tion for boys. Colleges and seminaries also sprang up. The Jesuits carried their work of higher education into every section of the country by founding colleges and preparatory schools. A later phase of the immigration movement resulted in the establishment of schools for French-Canadians, Poles, Italians, Bohemians and other nationalities. Of these, the Polish schools are the most numerous.

School Organization. — In accordance with the Church's organization, Catholic elementary education is framed along diocesan lines. Each diocese has its school system, with the bishop at its head. Bishops, however, are bound by the legislation of the Third Plenary Council of Baltimore, which prescribed a definite form of school organization for all the dioceses.

General legislation has thus operated to give a certain measure of unity to parish-school work the country over, while local needs and inter¬

ests are left to be provided for by the dioc¬

esan authorities Diocesan control over the schools is usually exercised through the dio¬

cesan school board, presided over by the bishop. The members are selected from the clergy of the diocese, in some places the laity are included. In the prevailing type of school organization the school board includes, as its executive officer, a diocesan superintendent of schools. The priest who is selected for this office is specially trained for his work; he de¬

votes his time to the inspection of schools and CATHOLIC EDUCATION IN THE UNITED STATES

to the study of the problems involved in their improvement, and his recommendations are embodied in an annual report submitted to the school board. As assistants to the superin¬

tendent there are in many dioceses community inspectors of schools. As a rule, there are many teaching orders engaged in any given diocese, and when each community appoints one of its members to inspect and study the work that is being done in its own schools in the diocese, the result is to give the superin¬

tendent a corps of zealous and efficient assist¬

ants through whose co-operation his recom¬

mendations may the more easily be given prac¬

tical effect. In the case of the individual par¬

ish school, the pastor is, of course, by right its head ; but generally speaking beyond supervis¬

ing the religious instruction and financial mat¬

ters, he leaves the direction and control of the school to the superior of the Sisters or Brothers in charge. The actual principal of the school is therefore the immediate religious su¬

perior. The teachers usually live in or near the school building, which is in close proximity to the parish church. About nine-tenths of the teachers in the parish schools are religious.

Male teachers are less than one-fifteenth of the total number. Nearly 300 distinct com¬

munities are engaged in the work, including single independent houses as well as congrega¬

tions. Of these, 11 are teaching brotherhoods.

The curriculum of the parish school does not, as a rule, show any substantial difference from the curriculum of the neighboring public schools, except in the matter of religious instruction.

The training course for religious teachers embraces the postulate, the novitiate and the normal school. In the postulate are comprised the

elements of a good common-school educa¬

tion and some high school work; during the novitiate — generally of one year — study is continued, but the chief aim is the religious formation of the candidate ; in the normal school, proximate preparation is made for the work of teaching, through suitable pedagogical studies, while more advanced academic courses, sometimes leading to the college degree, are also taken up. Such is the training course that obtains in the more progressive communities ; in many instances, however, this ideal pro¬

gram is not strictly adhered to in practice, owing to the demand for teachers. But the tendency is steadily toward higher standards.

Much has been accomplished in this direction through the work of summer institutes and summer schools conducted especially for teach¬

ers by colleges and universities. Worthy of special mention in this connection is the Sisters'

College, at the Catholic University of America, Washington, D. C. Many sisterhoods are

now sending picked young teachers to this institution for college and university courses as well as normal-school training. Money for the support of the schools is obtained from three sources, tuition fees, the parish treasury and endowments. The amount derived from the last-mentioned source is practically a negligible quantity, except in the case of a few favored schools. The tuition fee — the fee ranging from SO cents to a dollar a month — was long the prevailing source of school revenue, but of late years it has been replaced to a great extent by the simpler and more direct means of support, the parish treasury, especially in the cities and larger towns. Schools thus sup¬

ported are called ((free schools.® In many places, in accordance with the practice in pub¬

lic schools, textbooks are also supplied free.

The salaries of sisters engaged in parish-school work probably average $25 per month, or $250 per year. Brothers who teach in the parish schools generally receive from $300 to $400 a year. Teachers in Catholic schools thus receive less than one-half the salary of public-school teachers of the same class, and in many parts of the country they receive barely one-third as much. Yet out of their slender sal¬

aries the religious teachers have not only to maintain themselves, but also to save some¬

thing as a contribution to the support of the mother-house and its various establishments, such as the training schools, the infirmary, *etc.*

Only by the practice of the strictest economy, joined to the most devoted personal self-sac¬

rifice, are the members of religious communi¬

ties enabled to accomplish these objects success¬

fully. As might be inferred from the above data elementary education in Catholic schools costs less than one-halt as much as elementary education in public schools. The actual, cost per capita of Catholic elementary schooling throughout the country averages only from eight to nine dollars a year.

Alongside the parish-school system there have been developed secondary schools or high schools. These belong to several distinct types : the college preparatory school ; the parish high school — an adjunct of a particular parish school ; the diocesan high school, under the control of the bishop; and the independent high school, conducted by a religious order and more or less independent of diocesan control.

There is a strong movement toward the more general establishment of diocesan high schools, since these form an integral part of the dioc¬

esan school system and thus contribute more effectively to the unification of Catholic edu¬

cational work. Notable among institutions of this class, for their typical character and in¬

fluence, are the Boys' Central High School and the Girls' High School in Philadelphia.

An important agency in the changes that have been brought about in Catholic education in the direction of more perfect organization has been the Catholic Educational Association, which was organized in 1904, and includes three main departments — schools, colleges and

seminaries.

School Enrolment. — In the year 1918 there were 5,488 Catholic elementary schools in the United States with an enrolment of 1,456,206

pupils, and with about 36,000 teachers. Ele¬

mentary pupils in high schools and academies would make an addition of about 100,000 to this number. Investigation has shown that the total actual enrolment in Catholic schools is not quite one-half that which the Catholic popu¬

lation of the country should normally supply, the proportion being as 893 to 1,948. This means that about the same number of Catholic children go to the public schools as go to the parish schools. There are over 100 Catholic industrial schools ; many girls' schools furnish instruction in the upper grades, in practical household subjects.

Included in the total school enrolment just given are 137 schools for colored children, with an enrolment of 13,885, about one-fourth of these being in the archdiocese of New Or-CATHOLIC EDUCATION IN THE UNITED STATES

leans. A number of teaching communities de¬

vote themselves especially to this work, sev¬

eral of these being composed of colored Sis¬

ters. These schools as a rule derive their sup¬

port from general church collections and gifts from generous individuals. There were also 72 schools for the education of Indians, with 5,674 pupils. Orphanages — not included in the above total — number 293, with 45,059 children.

There are about a dozen Catholic schools for the deaf and dumb, with an enrolment of ap¬

proximately 1,000.

Colleges. — Catholic male colleges and uni¬

versities in the year 1916 numbered 84, with an enrolment of 14,846 students of collegiate grade; of these 6,177 were pursuing profes¬

sional courses, while 974 were registered in engineering courses. Colleges for girls had at least 1,000 collegiate students. The enrol¬

ment in Catholic colleges is increasing rap¬

idly, the ratio of collegiate students in such institutions to every 1,000,000 persons of the Catholic population having increased from 511

in the year 1907 to 896 in the year 1916. The movement toward the development of uni¬

versities, which has been characteristic of the progress of American higher education, has affected many of the larger Catholic colleges.

Thirty-nine institutions now have at least one professional department, while quite a number have several professional departments, in ad¬

dition to post-graduate courses of study. Pre¬

eminent among Catholic institutions of higher education in the United States is the Catholic University of America, which is under the di¬

rection of the bishops, and which has a large post-graduate attendance and many affiliated institutions.

The college department of the Catholic

Educational Association demands a require¬

ment of 16 units for entrance to college and 128 hours as a minimum for graduation. Other requirements relating to the work and equip¬

ment of the college have been adopted, and at the Buffalo meeting of the Association, in 1917, a committee was appointed by the colleges to carry out the work of standardization and classification. Seventy-six institutions are con¬

ducted by the religious orders. Catholic col¬

leges and universities are as a rule self-sup¬

porting; only a few are even partially en¬

dowed, with the exception of the Catholic Uni¬

versity. Religious professors receive no salary, the services they render being entirely gratui¬

tous ; hence the college, being free to a great extent from the heavy financial burden of pro¬

fessors' salaries, is able to devote the revenue derived from student fees to its general ex¬

penses. Lay professors are not excluded, but their number is relatively small, except in a few instances. There is, however, a tendency to increase the numl er of lay professors ; many of the colleges are endeavoring to raise en¬

dowment funds, largely with this end in view, and considerable success has attended these efforts. At any of the large Catholic colleges, if salaried laymen were to replace the religious teachers and officials, the change would in¬

volve an expense ranging from $50,000 to $100,-

000 a year — which would represent a capital between one and two million dollars. The gratuitously rendered services of the religious professors at the Catholic college or univer¬

sity are therefore equivalent to an endowment fund, and in many instances its amount will compare favorably with the endowment of the better equipped non-Catholic institutions.

Seminaries. — Catholic seminaries in the United States are either diocesan or religious, the former being destined for the training of the secular or diocesan clergy, and the latter for the training of the clergy

of the religious orders. Diocesan seminaries are usually con¬

ducted by secular priests under the direction of the Ordinary, while religious seminaries are in charge of members of the respective reli¬

gious orders. The diocesan seminaries, although not nearly so numerous as the religious semi¬

naries, have in the aggregate almost twice as many students as the latter; in the year 1915

there were 21 of the former with an enrol¬

ment of 2,282, and 46 of the latter with an enrolment of only 1,394. Of preparatory sem¬

inaries — these schools cover the ground of the classical course — there were the same year 11

diocesan institutions with an enrolment of 1,727 and 23 belonging to the religious orders with an enrolment of 1,734. Saint Mary's Seminary, Baltimore, in charge of the Sulpicians, is the oldest of the diocesan seminaries, and has over 300 students. The oldest religious seminary is the Jesuit institution at Woodstock, Md., with nearly 200 students. The specific aim of the seminary discipline is the thorough spiritual formation of the candidate for the priesthood. The entrance requirements for ad¬

mission to the seminary, whether diocesan or religious, involve the completion of the classi¬

cal course. The length of the curriculum of the diocesan seminary was fixed by the Third Plenary Council of Baltimore at six years, two to be devoted to the study of philosophy and four to the study of theology. Practically the same length of time was prescribed for the curriculum of religious seminaries by recent legislation at Rome. Lecture courses on peda¬

gogy and social and political science have lately been introduced into a number of the seminaries. On the material side, great changes have been made in recent decades.

The new Kenrick Seminary at Saint Louis and the seminaries at New York, Boston, Philadel¬

phia, Saint Paul and San Francisco, as well as the new religious

establishments at the Catholic University, Washington, are models in the way of modern seminary buildings and equipment. In many other instances, where there has not been a complete reconstruction of the seminary plant, notable changes have been effected, including the erection of new buildings or the extension of old ones, im¬

proved sanitary and cuisine arrangements and additions to the library and its equipment.

Similar improvements have been made in the case of the preparatory seminaries. As a rule, diocesan seminaries are dependent upon the parish collections for their support. See also Parish Schools.

Statistical Summary (1918)

Catholic population of the United States Parish schools .

Parish school enrolment .

High schools .

High school enrolment .

Colleges and universities (1916) .

Collegiate enrolment .

Seminaries .

Seminary enrolment, .

17,416,303

5,488

1,497,949

1,260

74,538

84

14,846

85

6,201

92

CATHOLIC EMANCIPATION ACT— CATHOLIC INDIAN MISSIONS

Bibliography. — Burns, J. A., (Origin and Establishment of the Catholic School System >

(1908); id., (Growth and Development of the Catholic School System) (1912) ; id., Cath¬

olic Education — A Study of Conditions) (1917) ; Annual Reports of the Superintend¬

ents of Parish Schools ; Catholic Directory (Annual) ; Annual Reports and Bulletins of the Catholic Educational Association; Annual Reports and Bulletins of the Commissioner of Education.

James A. Burns, C.S.C.,

Professor of Moral Theology , Holy Cross College, Brookland, D. C.

CATHOLIC EMANCIPATION ACT,

an act of the British Parliament passed in the 10th year of the reign of George IV, 13 April 1829, by which the Catholics of Ireland were relieved of civil disabilities still persisting there after the more odious and oppressive provisions of the penal laws enacted in 1691, in violation of the stipulations of the Treaty of Limerick, had been gradually done away. For 50 years after 1691 those laws were enforced vigorously; from that time to the era of emancipation there was a gradual relaxation. The design of those penal laws was the extermination of the Catholic religion in the island and the adminis¬

tration of the government purely for the be¬

hoof of the ((Protestant interest® and the ((English interest.® A Catholic was not permitted to be a landowner, nor even to hold land on lease, save for a brief term; the son of a Catholic could, by making profession of the Protestant religion, come into possession of his father’s property, allowing to his parent an annuity; if a Catholic owned a horse, what¬

ever its value,- any Protestant might legally seize it on paying to the owner $25 ; no Catholic priest could lawfully exercise his ministry in Ireland save under severe restrictions, and monks and friars were regarded as felons and punished as such ; no Catholic could be a bar¬

rister, nor a schoolmaster; Catholics were ineligible to the Parliament of Ireland, or even as electors; they were not permitted to be freemen of boroughs. When the act of union of the kingdom of Ireland with that of Great Britain was passed William Pitt gave solemn assurance to the Catholics of Ireland that the last of their disabilities would be forthwith removed, and bills to that effect were brought into Parliament; but Pitt, giving way before the insane bigotry of King George III, did not press the measure and went out of office. The Catholics continued to demand their enfran¬

chisement and emancipation, and their appeals were heard in the British Parliament ; but it was seen that the hope of redress of grievances was vain unless a show of force was made, or a popular agitation set on foot. Daniel O'Con¬

nell, already a highly successful counsellor-at-law, though not a barrister, owing to his dis¬

ability as a Catholic, took the leadership of the Catholics of Ireland, and from 1824-till the act of emancipation was passed, Ireland was the scene of an unprecedented popular agita¬

tion, never equalled in any country till the agitation for the repeal of the union with Great Britain was set on foot immediately after the grant of Catholic emancipation. The British Cabinet was alarmed by the outburst of popular enthusiasm in Ireland, and the House of Com¬

mons in 1825 passed a relief bill for Ireland, but the Lords rejected it. A second relief bill, two years later, failed in the House of Commons.

But the following year, 1828, the House, al¬

though the Cabinet (Wellington's) was adverse, passed that second bill. This made the Cabinet and even the King (George IV) pause, and it was confessed that really something might or must be done; but the agitation must cease.

The reply of the Irish Catholics was to nom¬

inate O'Connell, despite his legal disability, for membership in the Parliament and to elect him triumphantly. He wras a member of Parlia¬

mentelect, but he would not take the oath whereby he must accept the King's supremacy in religion. It was the King and the Cabinet that had to retreat now. The bill for Catholic emancipation was brought into

the House of Commons on 5 March 1829, and passed the first reading by a majority of 188 in a House of 508

members; on the second reading the majority was 180, and on the final vote it was 178 in a House of 462. Even in the Lords the measure was passed by a good majority, and the bill received the King's assent. The rights and privileges accorded to the Catholics of Ireland by this act were : That they were not to be required to take the oath of supremacy; that they became admissible to all offices in corpora¬

tions and to enjoyment of all municipal rights.

But no Catholic could be regent or lord chan¬

cellor, either of Great Britain or of Ireland; and they were incapable of holding offices con¬

nected with the Established Church or the universities. In all other respects the Catholics were to stand on an equal footing with Prot¬

estants. In 1871 the Roman Catholic oath and the declaration concerning transubstantiation were abolished.

CATHOLIC EPISTLES, a group of

seven letters in the New Testament which are addressed by apostles to the faithful in general, not to particular churches, as is that to the Philippians, that to the Ephesians, *etc.* ; nor to individuals, as are the epistles of Paul to Timothy, Titus, *etc.* The Catholic or general epistles are those of James, 1 and 2 Peter, 1, 2 and 3 John, and the epistle of Jude. These same epistles are also styled Canonical, signify¬

ing, according to Calmet, that they contain excellent rules (canones) of faith and morals.

Consult Gloag, (Introduction to the Catholic Epistles* (Edinburgh 1887) ; Sanday, W., (Bib¬

lical Inspiration* (London 1896) ; and Bigg, C. A., Commentary on Saint Peter and Saint Jude) (Edinburgh 1902).

CATHOLIC INDIAN MISSIONS, Bu¬

reau of, an organization of the Roman Catholic Church, established in 1874 by the archbishop of Baltimore in behalf of the Catholic prelates having Indian missions within their respective dioceses, in order to represent before the gov¬

ernment the interests of these prelates in all matters appertaining to Indian affairs. By decree of the Third Plenary Council of Balti¬

more it was recognized as an institution of the Church and placed under the charge of a com¬

mittee of seven prelates. This committee was dissolved in 1894 ; and the bureau as then con¬

stituted was superseded by a new corporation.

The chief work of the bureau is the establish¬

ment of schools among the Indian tribes and obtaining funds for their maintenance. The bureau publishes each year a report of the

director, and its past publications include ‘Annals of Catholic Indian Missions in Amer ica} (1877-81) and (The Bureau of Catholic Indian Missions 1874-952 From time to time it circulates statistics concerning its work. See Indian, Catholic Education of the.

CATHOLIC INDIAN MISSIONS OF

THE UNITED STATES (referring exclu¬

sively to actual missionary effort made within the present boundaries of the United States).

Early Period. — Although priests had vis¬

ited the present territory of the United States previous to the advent

into New Mexico of the Franciscan Friar Mark of Nice (1539), Catho¬

lic mission work properly dates from the expe¬

dition of Coronado the year following. Fran¬

ciscan friars were the pioneers ; it was chiefly they who evangelized the tribes of Florida, Texas, New Mexico, Arizona and Upper Cali¬

fornia. Their exceedingly long roll of mission¬

aries, many of them martyrs, contains such illustrious names as John of Padilla, the proto¬

martyr of the United States missions (New Mexico 1542), Francis Pareja (Florida 1612), who published several treatises in Timuquanan, his 'Doctrina Christiana) being the first work in any Indian language of N. America to issue from the press; Ven. Anthony Margil of Jesus (Texas 1716) ; Junipero Serra (California 1769-84). The Dominicans gave to Florida Luis Cancer, the martyr (1549), Dominic of the Annunciation, Salazar and others (1559).

The Jesuits were pre-eminently the apostles of the North, their missions extending from Maine to the Mississippi River. They also announced the Gospel in many other portions of the coun¬

try. Among their best-known missionaries were Martinez (Florida 1566) ; Rogel (South Caro¬

lina 1569) ; Kuhn (Arizona 1687) ; the illus¬

trious martyr Jogues (New York 1646) ; Chaumont and Dablon (New York 1654) ; Le Moyne (New York 1661) ; Allouez (Wiscon¬

sin 1670); Marquette (discoverer of the up¬

per Mississippi 1673) ; Rale (Maine 1724) ; Dupoisson (Natchez 1729). Besides Francis¬

cans and Jesuits, other priests engaged in the work, and Christianity was preached to the natives throughout the length and breadth of the land.

Results. — In many instances the missions flourished exceedingly; the Indians received a rudimentary education and were brought to a high

state of civilization. In 1630 there were in New Mexico about 35,000 Christian Indians, living in 90 pueblos, each pueblo having its church, attended from 25 mission residences.

In 1634 there were in Florida 35 Franciscans maintaining 44 missions, while the Christian Indians numbered between 25,000 and 30,000.

In California the results were equally satisfac¬

tory. The fruits of the labors of the early mis¬

sionaries may still be seen among the Indians of New Mexico, Arizona, California, Minne¬

sota, Wisconsin, Michigan and Maine. The missionaries not only evangelized the Indians, but they have placed the whole world in their debt by their work of exploring and colonizing, and by their contributions to science. They wrote exhaustively on many topics, and, more¬

over, preserved to posterity the Indian lan¬

guages by means of numerous lexicons, gram¬

mars and books of devotion and instruction.

The Missions Revived. — In the last cen¬

tury the tribes of the great Northwest were evangelized principally by the modern apostle of the Indians, Peter John De Smet, S.J.

(1838-73) and his Jesuit colaborers. The Jesuits, moreover, established missions among the tribes of Alaska. Other noted missionaries of the period were the Benedictine monks, who have met with marked success, especially in Minnesota and the Dakotas ; and Bishop Baraga (Michigan 1830-68) ; Archbishop Blanchet (Or¬

egon 1838-80) ; Bishop Marty, O.S.B. (Dakota 1876-94) .

One of the results of President Grant's "Peace Policy" was the establishing, in 1874, at Washington, D. C., of the Bureau of Catholic

Indian Missions to represent Catholic Indian interests at the seat of government, to super¬

intend Catholic agencies and to obtain other agencies falling by the terms of the peace policy to the Catholic Church. Upon the modi¬

fication of the peace policy, the bureau turned its attention to the establishing of schools and the aiding of missions, and since the with¬

drawal of government aid from Indian mis¬

sion schools, it provides financial support for such Catholic institutions. The history of the bureau since its inception is intimately bound up with that of the missions. It has established over 50 schools, which represent an investment of more than $1,000,000. The name most prom¬

inent in Catholic Indian mission work of the present day is that of Mother M. Katharine Drexel, foundress of the Sisters of the Blessed Sacrament for Indians and Colored People, who has devoted her life and a very large for¬

tune to mission work among the Indians and negroes.

Present Status. — The tribes wholly or par¬

tially Catholic are : Arickaree, Assinaboine, Abenaki, Blackfeet, Cceur d'Alene, Chippewa, Crow, Colville, Digger, Flathead, Gros Ventre, Huron, Kalapuya, Mohawk, Mandan, Menomi¬

nee, Mission, Nez Perce, Osage, Ottawa, Pot¬

tawatomie, Piegan, Passamaquoddy, Pueblo, Pa-pago, Pima, Quapaw, Sioux, Saint Regis, Tin-neh, Tulalip, Umatilla, Winnebago, Wenatchi and Yakima. Catholics are also to be found among the Arapahos, Choctaws, Cherokees, Chickasaws, Creeks, Comanches, Cayugas, Miamis, Northern Cheyennes, Otos, Oneidas, Pon¬

cas, Peorias, Stockbridges, Sauk and Foxes and Yumas. Most of these tribes are provided with missions, while a number of others live in the vicinity of missions and fall under Catholic influence. Consequently Catholic Indian mis¬

sion work is carried on in Alaska, Arizona, California, Idaho, Kansas,

Minnesota, Michigan, Maine, Montana, Mississippi, New Mexico, Ne¬

braska, New York, North Dakota, Oregon, Okla¬

homa, South Dakota, Washington, Wisconsin, Wyoming. Elsewhere small remains of tribes are cared for by the parochial clergy. More than 150 priests, both secular and regular, aided by catechists (Indian and white), labor on the Indian missions. The total number of priests, teaching brothers, lay brothers, scholastics, sisters and secular teachers engaged in Indian educational work is about 650. There are about 100 schools (boarding and day), with over 6,000 pupils; about 200 churches and chapels; and the value of church and school buildings is not less than $1,500,000. The mission records show annually about 3,500

baptisms, 600 Christian marriages, 1,200 Chris- tian burials. Of a total Indian population of 291,014 about 100,000 are Catholics.

Consult Shea, (The Catholic Church in

Colonial Days* (1886) ; and (History of the Catholic Church in the United States — 1844 to 1866 J (New York 1892) ; O'Gorman, (A His¬

tory of the Roman Catholic Church in the United States* (ib. 1895) ; Reports of Bureau of Catholic Indian Missions from 1874; Re¬

ports of Commissioner of Indian Affairs.

Rev. Wm. H. Ketcham,

Director of the Bureau of Catholic Indian Mis¬

sions, Washington, D. C.

CATHOLIC KNIGHTS OF AMERICA,

a fraternal organization, founded in Nashville, Tenn., in 1877 and chartered under the laws of Kentucky in 1880. Its object primarily was mutual life insurance, but its scope was even¬

tually extended to include the endeavor to unite fraternally all acceptable Roman Catholics of every profession, business and occupation ; to give all possible moral and material aid in its power to members of the organization, by hold¬

ing instructive and scientific lectures, by encour¬

aging each other in business, and by assisting each other to obtain employment, and to estab¬

lish and maintain a benefit fund for the benefit of the families of the members. The benefit fund is distributed according to well-established insurance rules. The age limits for admission are from 18 to 45. At first men only could be¬

come members; but since about 1901, women have been allowed admission on the same con¬

ditions as men, except the age limits for women are from 18 to 40. The executive power is vested in the Supreme Council (National) with headquarters in Saint Louis, Mo., the State councils and the officers of the local branches.

In 1913 there were 560 branches in the United States, with a membership of 18,300 with a total insurance of $20,610,171. The organization had total assets of $1,168,541, including the reserve fund of $828,000. The claims paid in 1913

amounted to $546,662. Since its organization there has been paid to beneficiaries nearly $15,000,000; but the material aid has been slight compared with the spiritual, moral and intellectual benefit the organization has effected.

This is the pioneer Roman Catholic fraternal organization in the United States.

CATHOLIC MAJESTY, a title given by

Pope Alexander VI to the kings of Spain, in memory of the complete expulsion of the Moors from Spain in 1491 by Ferdinand of Aragon.

But even before that time several Spanish kings are said to have borne this title.

CATHOLIC MISSIONARY UNION,

The, an organization of the Roman Catholic Church established <(to procure the services of clergymen and laymen of the Roman Catholic Church to teach and preach as missionaries of their faith in the United States and in further¬

ance of religious opinion® ; ((to lease, take, hold and purchase places, buildings and lands for such teaching and preaching® ; to provide for the maintenance of the workers ; to publish and distribute books, pamphlets and other reading matter in connection with these efforts, and to aid archbishops, bishops and other Church au¬

thorities in the United States to establish and conduct missions within their respective juris¬

dictions. Its practical activity takes the form of the collection of funds to enable bishops of the various dioceses to reserve diocesan priests for missions to non-Catholics within their various jurisdictions and to maintain such mis¬

sionaries in their work. The Apostolic Mission House, on the grounds of the Catholic Uni¬

versity, Washington, D. C., is the training-school for diocesan missionaries.

CATHOLIC MUTUAL BENEFIT AS¬

SOCIATION, The. This Association was

organized in Niagara Falls, N. Y., July 1876

and was incorporated by the legislature of the State of New York in 1879. It does a fraternal life insurance business, furnishing protection to its members in amounts of $500 to $2,000. It has 64,000 members ; 800 local branches through¬

out United States and Canada ; has $82,000,000

insurance in force; and has disbursed over $31,000,000 to families of deceased members, over $1,500,000 being disbursed annually. Its assets amount to about $2,000,000. The qualifi¬

cations for membership are that a man shall be a practical Catholic, physically sound, of the full age of 16 years and under the age of 50 years. The Corporation is known as the Supreme Council of the Catholic Mutual Bene¬

fit Association, and is composed of representa¬

tives from each Grand or State Council in addi¬

tion to its own officers and holds its conven¬

tions triennially. Grand councils are com¬

posed of their own regular officers and one representative from each branch in their juris¬

diction and meets triennially also. The re¬

serve fund is surrounded by the safest and most reliable safeguards for its protection.

The Association was one of the first to estab¬

lish a reserve fund. It has adequate rates, and has complied with the laws of the State of New York, in which it is incorporated, and also with the laws of other States requiring solvency from an actuarial standpoint.

CATHOLIC PRESS OF AMERICA.

The formative period of Catholic journalism was an era full of struggles and anxieties when unreasonable attacks were made upon the liberties of Catholics ; for at that time the tenets of the Roman Catholic Church were very poorly understood and oftentimes mis¬

represented by those who were ignorant of her beliefs or who mistrusted her sincerity. The forerunners of the Catholic newspaper were the Irish journals. Although these papers were not distinctly Catholic in purpose, their sym¬

pathetic tone toward those of the ancient faith merits for them a place in any descrip¬

tion of Catholic journalism. In fact, more than a decade of American history had passed be¬

fore any Catholic periodical, properly so called, was established. Hence, during this time the principal champions of Catholic doctrines and practices were these Irish papers. As citizens of the United States, the Irish editors fre¬

quently were forced to defend with vigor their civil and religious liberties against their ene¬

mies, through the kingly power of the press.

For years they had fought against British ty¬

rannies in Ireland. In this struggle for free¬

dom they engaged some of the brightest and most intelligent of Erin's sons, many of whom afterward came to America. The soul of this movement was the Society of the United Irish¬

men, founded in 1791. The purpose of this celebrated organization was to unite Catholics and Protestants into one body devoted to the

parliamentary reform of Ireland. The con-tnbutions of Emmet, Sampson, MacNevin and others to the leading newspapers of their nalive land attracted universal attenffon. Mat¬

thew Carey, William Duane and others in America assisted the efforts of the parent so¬

ciety by their fearless advocacy of the doc¬

trines of the United Irishmen, and that in the face of a Federalist opposition which was be¬

ginning to manifest itself at that time. The Federalist press used every

species of attack against these Irish associations. The neutral¬

ization of existing prejudices and the creation of a more favorable public opinion were the chief causes which prompted the establishment of Irish journals in which the affairs of that nation might be truthfully stated. This need was met by the Irish Catholic weeklies pub¬

lished principally in the two great centres of population, New York and Philadelphia. With one or two exceptions the Irish newspapers, down to the year 1840, had an ephemeral and rather precarious existence. The Shamrock, or Hibernian Chronicle, was first issued on 15

Dec. 1810. It suspended publication four times before it was finally discontinued. One of the most eventful years of this paper's career oc¬

curred when Rufus King, formerly Ambassador to England, was running for governor of New York. Thomas A. Emmet, on that occasion, came out openly in the press and attacked King with the overwhelming force of his clear and brilliant mind. In March 1816 a systematic opposition to King, headed by Emmet, swept through New York. As these exiles of Erin smote this Caesar with their trenchant quills they sealed the political fate of one who had been an enemy in their fight for civil and re¬

ligious liberty. The power of Rufus King, the cunning and crafty adversary of the United Irishmen, was broken. It is true that he con¬

tinued in public life until 1826, but he was no longer <(the first man in the country.® His at¬

titude toward the Irish while at the Court of Saint James was exposed by speeches, letters and editorials. Even his own correspondence was used against him with telling effect. He was defeated for the governorship of New York and in 1816 gave up the cherished am¬

bition of his life, the hope of being the chief ruler of the nation. After the checkered ca¬

reer of the Shamrock, other papers began to appear in the great centres of population. The Globe and Emerald began publication in 1824

in New York and Philadelphia respectively.

Then came the Truth Teller with its long and interesting history (1825-53). In 1828 the Irish Shield and Monthly Milesian made a bid for patronage. Its editor entered upon a suicidal policy of persistent attack on a paper already well established and accomplishing much good in Catholic circles. George Pepper became involved in a libel suit and left New York with¬

out a friend. He settled in Philadelphia, where he began the Irish Shield and Literary Pano¬

rama. This was followed in 1832 by the Patriot and Shield, and finally the same year there appeared the Republican Shield and Literary Observer. In 1831 another rival of the Truth Teller, called the Irish Advocate, was started.

In its race for favor the new paper claimed not to enter as an antagonist, but as a fair and honorable competitor. Yet in the course of events it soon became apparent that its jealous editor betrayed at times in his conduct the same picaroon instincts for detraction which had characterized the aspersions of the enfant terri¬

ble, the Irish Shield. Another ephemeral jour¬

nal whose history is shrouded in obscurity was published in Charleston, S. C., in 1829. It was first known as the Irishman and Charleston Weekly Register, but it soon changed its name to the Irishman and Southern Democrat. The last Irish paper of this era, the Green Banner, started 3 Oct. 1835, was a creature of circumstance, and in 1837 on account of certain ecclesiastical difficulties its editor, Father Levins, was obliged to discontinue this otherwise ably-conducted journal. Certain other periodicals, national in their tendencies, were published during this period. Among these we must record the Michigan Essay and Impartial Observer, printed in 1809. This was the earliest effort in Catholic pioneer journal¬

ism. The little paper owes its origin to Father Gabriel Richard. This illustrious American missionary journeyed to Baltimore in 1808 and on that occasion purchased a printing press and a font of type. These he brought overland to Detroit, setting up his press at Spring Wells in the house of Jacques LaSalle. Many persons have claimed for this press the honor of being the first to be set up in the Northwest, but it is to be questioned whether it was the first in operation in Detroit itself, for there were proclamations issued to the people of this vicinity by Lieutenant-Governor Hamilton as early as the year 1777. The documents were dated at Detroit, showing presumably that they had

been printed there. Strange to say, these were the only printed papers that were, over a long stretch of years, credited to Detroit as the place of issue. Some have concluded that the lieutenant-governor's proclamations were

dated from Detroit but printed elsewhere.

Another press was owned by Alexander and William Macomb, who received it from Eng¬

land in 1785, but there is no evidence that it was ever put in operation. The Michigan Essay was not, however, the first newspaper printed in the Northwest. Various papers were already being printed in the territory before the year 1800. Cincinnati and Chillicothe can boast of this means of enlightenment before 1809. In 1824 a Spanish periodical appeared in Philadel¬

phia under the strange appellation, El Habanero.

This magazine was not professedly Catholic, but since it contained articles on ecclesiastical subjects and was conducted by a Catholic priest, the Very Rev. Padre Don Felix Varela,

the journal may with propriety be classed among the contributions to early Catholic peri¬

odical literature. Father Varela figured con¬

spicuously for many years as a newspaper editor and controversialist. In 1829 he wrote also for a magazine called El Messagero Semanal, conducted by Senor Saco, in Philadel¬

phia. The first strictly religious journal estab¬

lished in America in defense of .Catholic doctrines was the United States Catholic Mis¬

cellany. It began on 5 June 1822. One may easily understand the need there was for this paper when one considers that Catholics in the newly founded diocese of Charleston were very few, and were scattered over the territory which now embraces the three States of North Carolina, South Carolina and Georgia. At the period of the American Revolution hardly a 96

single Catholic lived in the whole extent of that country, and the people who inhabited this part of the South were wofully ignorant of Catholic doctrines and practices. Bishop England, the first editor of the Miscellany, was quick to recognize the needs of Catholics in America.

Among other things, he saw the secular press so filled with absurdities and misrepresentations concerning Catholicism that he felt himself obliged to take up the pen to answer some of these attacks against his religion. The prelate was certain that if he could disarm the honest prejudices of the landed aristocracy in the Carolinas he could soon find his way into their esteem. Once the more independent classes of society were won over, he felt that little effort would be required to influence their less wealthy neighbors. Among the papers located in differ¬

ent parts of the United States which helped to defend the faith in these stormy times one might mention the Catholic Press, of Hartford (1829), the Jesuit and Catholic Sentinel and its successors in Boston in 1829, the New York Register and Catholic Diary (1832), the Shep¬

herd of the Valley , of Saint Louis (1832), the Catholic Herald of Philadelphia (1833), the Catholic Journal of Washington, D. C. (1833), the Catholic Advocate of Bardstown (1836), with its immediate precursor, the Minerva, and the New York Catholic Register (1839).

Besides these there were four journals

which were fortunate enough to survive the trials and vicissitudes of this exciting period, the Catholic Telegraph of Cincinnati (1831), Der W ahrheitsfreund (1837), the New York Freeman's Journal (1840), and the Pilot of Boston (1837).

In drawing this brief outline of the pioneer efforts of Catholic journalists we must not fail to notice the deleterious influence exercised by journals relying in a great measure on Catho¬

lic patronage, but whose editors made religion the medium through which much harm was done to the Catholic cause in America. During the year 1822, when the Hogan schism was at its height, the journals

of Philadelphia vied with one another in catering to this unpleasant strife.

The following papers were frequently em¬

ployed as organs by the schismatic Hoganites : the Democratic Press, the Aurora, the Na¬

tional Gazette, the American Sentinel and Mer¬

cantile Advertiser and the Columbian Observer.

Besides the virulent attacks on Catholics con¬

tained in the daily press, there were two weekly papers conducted by the Hoganites, which defended the position of that party with all the ability of which they were capable. These journals were called the Catholic Herald and Weekly Register and the Erin. Of the former we know little, as there are but a few copies extant. It was the chief organ of the schismat¬

ics and was conducted by E. F. Crozet. The witches' cauldron in Macbeth was not filled with worse ingredients than might be found in the Catholic Herald. So blasphemous was its tone tone toward Catholic matters generally that it must have even shocked the slumbering consciences of the stubborn Hoganites. The Erin has been described in Finotti's (Bibliographia* as <(an angel's name with the devil's tongue.® Like every other Irish journal which appeared before or after it, this paper claimed to be a defender of the liberties of Irishmen against persecution. Combating this formidable array of discordant and biased journals, the Catholics possessed one lone journal in Philadel¬

phia which battled gallantly, while it lasted, for truth and justice. It appeared for the first time on Saturday, 22 Feb. 1823, but after a feyv issues ceased publication. The whole disposi¬

tion of Catholic journalism during the first half of the 19th century seems to have been to promote the harmony of society by removing from the pathway of non-Catholics the ground¬

less prejudices and prepossessions which had grown up into social barriers, due chiefly to the circulation of misrepresentations and calum¬

nies by the enemies of Catholicism in

Europe and America, and the supineness of the Catholic body at large in the face of these fabrications. Until the year 1840 the general policy of Catholic journalism was a defense of Catholicism by vigorous appeals to reason and dogmatic principles. The period was above all one of spirited controversy. Catholic doc¬

trines during the epoch were very imperfectly understood by those outside of the Church.

There was a predisposition on the part of all sectarian and secular journals to misrepresent her doctrines in every conceivable way. After the year 1840 there began among the non-Catholics of the land a formulation of better and clearer judgments, which result had been brought about largely by the successful con¬

flicts carried on by Catholic journalists. The newspapers of this period give a contemporary view of the life and spirit of Catholicism in America. It will be impossible, within our space, to give any detailed information regard¬

ing the newspapers and magazines that have been founded since these pioneer days. At the present time there are being published 128

newspapers, 128 magazines, 30 quarterlies, 2

bi-weeklies, 9 bi-monthlies and 16 annuals.

The State of New York leads in number of Catholic newspapers. The checkered careers of these papers only give us an idea of the trials and vicissitudes of editors elsewhere. In 1848

Thomas D'Arcy McGee started The Nation but the editor soon precipitated a controversy with Archbishop Hughes who withdrew his sup¬

port from the paper and The Nation ceased after two years' existence. McGee's next ven¬

ture, the American Celt, had a rather unsettled career. It was published first in Boston, then in Buffalo and finally in New York. It was here purchased by D. and J. Sadlier who gave it the name of The Tablet. Quite a galaxy of famous editors at one time or other enlivened the columns of this journal. Dr. J. V. Hunt¬

ington, Bernard Doran Killian, Wm. Denman, Dr. O. A. Brownson, Dr. Henry J. Anderson, Lawrence Keough and D. P. Conyngham gave

some of their best years in journalism to build up the prestige of this paper. During the course of the year 1859 the New York Free¬

man's Journal, conducted by James McMaster, gave Archbishop Hughes considerable trouble on account of the idiosyncracies of its editor.

This necessitated the establishment of the Metropolitan Record which continued until 1873. In the dying days of the Metropolitan Record there appeared in New York a pro¬

gressive and practical journalist, Patrick V.

Hickey, who edited the Catholic Review until his death in 1889. At that time Dr. John Talbot Smith took up the work and gave to the journal those rare talents which have always CATHOLIC PRESS OF AMERICA

distinguished his writings. In 1886 the Catholic News was founded by Hermann Ridder. Dur¬

ing the first year of this paper's existence Dr.

John Gilmary Shea, the great Catholic his¬

torian, became its editor. Here in the editorial sanctum of the News office, Dr. Shea closed a brilliant career and laid the foundations for that efficiency in editorial and business manage¬

ment which has characterized the efforts of his successors on this paper. The News is now under the editorial direction of Michael J.

Madigan. The neighboring city of Brooklyn made several attempts in Catholic journalism, most of which have been short lived. In 1882

the Catholic Examiner was begun. This was followed by the Leader in 1884. Of more recent origin is The Tablet which is now the diocesan organ. The Catholic Union and Times published in Buffalo has always been under strong editorial management. The Catholic Union was started in 1872 by Rev. Louis A.

Lambert, a man of vigorous yet well-disciplined mind. The editorship later passed to Rev.

Patrick Cronin who was a leader among the journalists of his day. Catholic newspapers have also been established in other cities of New York State, principally in Albany and Syracuse. In Albany the earliest was the Catholic Pioneer in 1853. All succeeding ven¬

tures proved unsuccessful owing to a lack of support. In Syracuse during the second half of the 19th century, several attempts to main¬

tain Catholic weeklies ended in failure. The Catholic Reflector, the Catholic Vindicator and the Catholic Sentinel, each had a feeble existence and ceased publication. At present the Catholic Sun is published there. In Phila¬

delphia the need of a Catholic newspaper was felt more urgently than elsewhere on account of the canker-worm of trusteeism. This led to the establishment of the Catholic Herald in 1833. Moreover the number of religious

periodicals increased with such startling rapidity about the middle of the third decade of the 19th century that very few denominations were without a weekly journal in which they could advance and defend their respective views of doctrine and church government. Needless to say, controversies arose on all sides which became more bitter as time went on and these finally terminated in 1844 in bloodshed, arson, desecration and destruction of church property.

In 1856 the Herald was consolidated with the Visitor, under the management of James

McDonald, Charles S. Greene and Charles A.

Repplier. It ceased publication about the end of the Civil War. Another Catholic Herald was started in 1872 but did not long endure.

In 1866 the Catholic Standard was first pub¬

lished. After a series of trials, such as was the lot of all newspapers of this period, this paper was amalgamated with a rival The Times, started by Rev. Louis A. Lambert in 1892. The new combination known as the Standard and Times, was brought about in 1895. To-day this is one of the most authoritative organs of Catholic opinion in America. The only other city in Pennsylvania which has contributed notably to Catholic journalism is Pittsburgh.

The Pittsburgh Catholic was begun in 1844 by Bishop O'Connor. It has always been ably conducted and it is one of the few early journals to brave the storms of adversity and has grown strong in the defense of Catholicism VOL. 6 — 7

and its ideals. The summary of early New England journalism is but a panorama of the revivals of religious intolerance. Looking back upon the centuries of Puritan ascendency in America, the descendants of the Pilgrim Fathers had little to be proud of in their treat¬

ment of Catholics. As time went on, a little more toleration was practised but Roman Cath¬

olics were long regarded as the objects of Puritan distrust and their religion considered ˆsubversive of society.® With the War of Inde¬

pendence, the condition of Catholics began to improve but in Boston the admonition of Gen¬

eral Washington was required to calm the pas¬

sions and the prejudices of its populace. For years there lingered within the confines of the Puritan heart mistrust and apprehension of the Catholic religion. After the framing of the constitution they threw all their prestige into the Federalist party and succeeded in electing John Adams. Hardly had he gained power than, listening to their promptings, the Congress passed the celebrated Alien and Sedition laws.

These imprudent measures caused the hordes of immigrants that flocked to America to seek refuge in the ranks of their opponents, the Jeffersonian or Republican party. To crown their perfidy as a political organization, the Federalists in 1814, through the Hartford Con¬

vention, called a protest against the War of 1812 and recommended that, ((naturalized foreigners should be debarred from member¬

ship in Congress and from all civil offices under the United Statesˆ® Such in brief, forms, as it were, the historic background of Catholic jour¬

nalism in New England.

Boston, being the chief metropolis of New England, presented a fair field for the Catholic journalist. As early as the year 1829 the Jesuit or Catholic Sentinel was established.

This lasted under various names until 1836.

During the course of seven years this journal had the following titles : The Catholic Intel¬

ligencer, the Jesuit, the Irish and Catholic Senti¬

nel, Literary and Catholic Sentinel and the Boston Pilot. In 1837 it suspended publication and after some months Patrick Donahue sum¬

moned up sufficient courage to give Catholic journalism in New England another trial. The Pilot was the name given to the new journal.

It was at first a national, rather than a religious paper. The Irish of New England read it be¬

cause it containel news from Ireland. They helped to build up the circulation of the Pilot.

In 1842 Thomas D'Arcy McGee, whose brilliant talents were but in their dawn, became the editor. Another editor of some note was Rev.

Father Finnotti, who assumed charge in 1852, but his diary states that he had no great love for Patrick Donahue, the publisher. In 1870

the Pilot was fortunate in obtaining the serv¬

ices of one who has done more to elevate Catholic journalism from mediocrity than any one preceding him, John Boyle O'Reilly. His genius as a writer was recognized both by the religious and secular press and the influence, therefore, of the Pilot became nation-wide.

Two editors that maintained the high standard set by O'Reilly were James J. Roche and Katherine Conway. Among the numerous other papers that soon followed the Pilot, we may mention the Catholic Observer (1847), edited by Orestes A. Brownson, the Republic in 1881, Sacred Heart Review (1888), Connecticut

Catholic in 1876 which afterward became the diocesan organ with the name of the Catholic Transcript. Another well-edited New England paper is the Providence Visitor. Scattered throughout the South various newspapers have from time to time been published, most of them being forced to suspend publication after a few years of precarious existence. The Catholic Mirror of Baltimore, started in 1849, had considerable influence before the Civil War, but after that time its prestige waned although the paper was issued until 1908.

The Catholic Guardian , of Louisville, began in 1858 but lasted only four years. The Catholic Advocate of earlier days was revived in Louis¬

ville under the name of the Central Catholic Advocate. In 1896 it consolidated with the Midland Review but despite the combined cir¬

culation and the services of the versatile editor, Charles J. O'Malley, it died after four years.

In New Orleans the Morning Star was con¬

ducted by Rev. Abram Ryan and James R.

Randall, two poets of considerable ability. In Memphis the Southern Catholic (1874) sus¬

pended and gave place to the Catholic Journal.

At Saint Louis the Western Watchman (1865) has survived mainly through the personality of Rev. D. S. Phelan, who, like McMaster of the Freeman's Journal, was a free lance in Cath¬

olic journalism. In Ohio, the Catholic Universe established in 1874, and the Catholic Columbian (1875), as well as the Catholic Record of Toledo (1905), are still doing excellent serv¬

ice for Catholicism. The earliest venture of Catholic journalism in Illinois occurred in 1852

when the Western Tablet was started in Chi¬

cago. Several feeble efforts were without suc¬

cess until the New World was established in 1892, with Charles J. O'Malley as editor, reach¬

ing the acme of its greatness under his super¬

vision. In 1895 the Western Catholic was started at Quincy, Ill., and is still being pub¬

lished. In recent years Indiana has established two newspapers, the Indiana Catholic, under the able editorship of J. P. O'Mahony, and Our Sunday Visitor, published by Rev. Dr.

Noll. This latter journal has done much in allaying persecution and in counteracting the influence of anti-Catholic journals. Its cir¬

culation at the present time is by far the largest of any Catholic journal in the United States. Our Sunday Visitor has a circulation of close to 2,000,000. The interests of the arch¬

diocese of Detroit are looked after chiefly by the Michigan Catholic.

Within the last quarter of a century many journals have appeared in several States beyond the Mississippi. There are only two that ante¬

date that period that are still being published : The San Francisco Monitor begun in 1852, and the Catholic Sentinel of Portland (1870). The following is a list of the journals that are still being published: The Intermountain Catholic (1899), Catholic Tribune of Dubuque (1899), True Voice (1903), Catholic Register of Kansas City (1899), San Francisco Leader (1892), Catholic Herald of Sacramento (1908), Tidings, of Los Angeles (1895).

The early efforts in magazine editing met with the same discouragements that the news¬

paper men experienced. The first quarterly review of any kind to be started in the United States (The American Review of History and Politics) — was edited by Robert Walsh, a Catholic, during the year 1811-12. In 1819 a magazine was begun, known as the Globe. This was the outgrowth of the Shamrock or Hiber¬

nian Chronicle. It is doubtful whether there are any numbers of it extant. The Metro¬

politan started in 1830 and was the first Cath¬

olic magazine, strictly so called. It was filled with bright gems of Catholic scholarship and had all the claims to immortality but one — patronage. Consequently the monthly was

allowed to perish after a brief existence of only one year. Another magazine by the same name was started in 1853 but shared the same fate. A juvenile magazine was

founded in 1835 in New York city,

known as the Children's Catholic Maga¬

zine. Only one similar venture had pre¬

ceded it, a weekly called the Expostulator pub¬

lished in 1830 under the same auspices as The Jesuit in Boston. In the establishment of the Children's Catholic Magazine , the editor was but following the example of other denomina¬

tions. It was observed that these journals had increased nearly tenfold in a decade and that these periodicals were being liberally patronized and most extensively circulated. Even the most mediocre could claim 5,000 patrons while some of the better class of children's magazines had more than 30,000. The Children's Catholic Magazine had 13,000 subscribers. Due to poor management it lasted only two years and then suspended publication and was later revived under the name of the Young Catholics'

Magazine. In 1842 another monthly magazine was started in Baltimore called the Religious Cabinet. At the end of one year its name was changed to the United States Catholic Maga¬

zine. This review was discontinued in 1847.

It had as its contributors some of the best Catholic thinkers of that time, both lay and clerical. Brownson's Quarterly Review was published in 1844, suspended in 1864, revived in 1873 and finally ceased in 1875. Dr. Orestes A.

Brownson was a man of great erudition and a scholar of national

reputation. He attracted many readers to his review. Catholics and non-Catholics alike regarded him as the best philo¬

sophical thinker of his time in America. The Catholic World, a monthly magazine, was started in 1865 by Father Hecker, founder of the Paulist Fathers. This review is now re¬

garded as one of the most conservative and authoritative Catholic journals in the United States. Its prestige has grown to such a degree that it is consulted by all religious denominations. Another weekly periodical, the Ave Maria , started just one year later, being founded by Father Sorin of the Congregation of the Lloly Cross, Notre Dame, Ind. This magazine enjoys a very high literary reputation and has perhaps the widest circulation of any Catholic magazine in the United States. It has readers in every part of Christendom. Its staff of contributors are some of the best and most representative Catholic writers in Europe and America. In this same year The Messen¬

ger of the Sacred Heart was founded by the Jesuits. This was supplemented by another magazine more literary in character called The Messenger. In 1910 it was replaced by

America, a progressive weekly journal that immediately became a leader in Catholic opinion and now enjoys a national reputation.

The American Catholic Quarterly Review

began in 1876 and is another high class periodi¬

cal occupying a place similar to Brownson' s Quarterly, during the middle of the 19th cen¬

tury. It affords a medium whereby Catholic erudition and scholarship finds expression. The following reviews are of more recent origin : Rosary Magazine (1891), Benziger's Magazine (1898), Extension Magazine (1907), Catholic Fortnightly Review, Saint Vincent de Paul

Quarterly, and Saint John's Quarterly. In the last 50 years many magazines with a more limited scope have been founded. Some have succeeded, others have failed. The Ecclesiastical Review and the Homiletic Monthly are two professional magazines for the clergy. Since 1911 the Catholic Educational Review has done excellent service in its particular field. Another publication that looks after the interests of primary and secondary education is the Cath¬

olic School Journal. Catholic history has been preserved through the efforts of contributors to the American Catholic Historical Researches, Records of the American Catholic Historical Society of Philadelphia, Records and Studies of the United States Catholic Historical So¬

ciety and recently there was added another quarterly called the Catholic 'Historical Review, published at the Catholic University of America.

Another product of the scholarship of the same university is a new monthly periodical, the Catholic Charities Review. Among those that failed we may enumerate the De La Salle Monthly (1867), later changed to the Man¬

hattan Monthly, the Young Crusader (1868), the Catholic Record of Philadelphia (1871), Central Magazine of Saint Louis (1872), Dona¬

hue's Magazine (1878), Catholic Reading Circle Review, Mosher's Magazine, The Dolphin, the New York Review (1905), and the Globe Re¬

view.

As we take a retrospect of the whole history of Catholic journalism we are confronted with the ever-recurring failures, due in large meas¬

ure to a lack of patronage. From this observa¬

tion we are led to inquire why Catholics have not more generously supported the Catholic newspaper. The reason is not far to seek, for the Catholic laity in the past has not been a reading people. There are two elements neces¬

sary for the cultivation of enlightened expres¬

sion on problems of the day. First, we must have a thinking people to

create sound opinion.

Secondly, we must have a means of dissemi¬

nating it among others. There are leaders in all communities who must be moulders of the best thought. There are also master minds who must analyze it and separate the gold from the dross. With no man thinking or leading, generations creep their course and die. One of the ideals, therefore, of Catholic journalism is to develop the Catholic mind along correct principles. The Catholic press is needed - to defend the right, to advance the truth, to main¬

tain order, morality, intelligence and culture among the adherents of the Church. There is no reason in the world why this high moral and intellectual tone cannot be developed to its full¬

est in Catholic journalism. The production of genuine Catholic taste and genius is even more possible now than it ever was in the past.

Spiritual indolence, mental inertia and indiffer¬

ence are the only obstacles to its success. It was the journalistic genius of John Bovle O'Reilly that made the Boston Pilot in his day the greatest Catholic newspaper in America. It was the classic style and polished diction of Bishop England that perplexed his most clever antagonists and compelled them at the end of their controversies with him to admire his can¬

dor, his matchless courage, his firmness and gentleness of character. It was the persuasive¬

ness and mental acuteness in the writings of Archbishop Hughes that vanquished the yellow journalists of his time and covered them with shame and confusion. It was the keen and analytic mind of Orestes A. Brownson, the philosopher, that commanded the spontaneous respect of the intellectual leaders of his age.

But the Catholic press, through the prestige of such thinkers as these, has even a broader aim.

It would have its ethical influence extended to and absorbed by American journalism in gen¬

eral. History has taught that public morality is a condition to any national life. When a nation ceases to esteem and practise the virtues of truthfulness, honesty, integrity and justice, it does not deserve to

live. Our government requires a higher plane of public morality than does despotism or monarchy. It is within our means to make a success of popular govern¬

ment *by formulating principles which regen¬

erate and strengthen the body of ethical truth by the development of correct sentiments in the press. In this effort the thinking people of the Catholic Church, the most powerful numeri¬

cally in the United States, can exercise a tre¬

mendous influence through the service of the Catholic newspaper as a directing force. Very many people get firm convictions by habitually reading a certain journal. Great then is the moral influence of the press for good or evil.

Our modern life mirrors the journal more effectively than news columns reflect life. This is no place for an indictment of the daily press.

It is sufficient to say that our metropolitan newspapers of to-day devote over half of their first page to scandals, suicides, divorce pro¬

ceedings, robberies, murders and other abomi¬

nable social barbarities. If this is evidence of the moral decadence of our democrary, then there is a clear duty for all of us. The failures we see on every side are due largely to the fact that few think of their vocation as being valu-ble chiefly as the means of mental and moral improvement. We would remind the journalist that his office is one of public trust. His moral mission in society is to instruct or direct the masses, but to accomplish this he must practise and pursue a sound moral policy. We ask for editors strong, upright men, whose very utter¬

ance is the touchstone of a moral mind.

Here, then, is our ideal. We know that in the past men like John Boyle O'Reilly, Bishop England, Archbishop Hughes and Orestes A.

Brownson gave a stimulus and a prominence to Catholic journalism that reflected itself in a national way. They compelled recognition and respect from Horace Greeley, Henry Jarvis Raymond, James Gordon

Bennett and a score of other prominent newspaper men. John

Boyle O'Reilly perhaps did more to clear away prejudices than any other editor of his day. He must be regarded as the premier Catholic jour¬

nalist of the 19th century. The needs of Catholic journalism in our day demand that we must secure the best journalistic ability and pay well for it. If the Catholic press is to measure up to the ideal set, if it is to be a mighty power 100

for good, the co-operation of the laity is neces¬

sary. The past has demonstrated that without this generous assistance there can be no great standard of excellence, no great measure of success. It has been also the mediocrities of Catholic journalism that have hindered its growth and development. This need no longer be so. ihree Catholic universities, Notre Dame, Fordham and Marquette, Lave during the past decade established schools of journal¬

ism, where young men may be trained in scien¬

tific, cultural, professional and ethical ways that will enable them to stand in the front rank of editorship. The Catholic laity must in the future respond to the leadership of the schol¬

arly and experienced journalist. They must pay for this high moral and intellectual worth if Catholic journalism is to accomplish its mission.

Bibliography. — ■ (List of Catholic periodi¬

cals published in the United States* (Reprint from the Records of the Catholic Historical Society) ; (Pioneer Efforts in Catholic Journal¬

ism in the United States,* by the author of this article; (Michigan Pioneer and Historical Col¬

lection ; Finotti, Joseph M., (Bibliographia Catholica Americana,* (American Catholit His¬

torical Researches* ; (Records of American Catholic Historical Society of Philadelphia) ; (Records and Studies of the United States Catholic Historical Society of New York) ; (Catholic Encyclopedia) ; (Vida del Presbiter Don Padre Felix Varela) ; Lives of Arch¬

bishop Hughes, Orestes A. Brownson John Boyle O'Reilly, James Gordon Bennett, Henry Jarvis Raymond, Horace Greeley, etc.; Hud¬

son, (History of Journalism* ; (Journal of the American Irish Historical Society) ; Files of Catholic Newspapers and Magazines found at Georgetown University, Library of Congress, and Catholic Reference Library and Catholic Archives of America, at Notre Dame, Ind.

Paul J. Foik, C.S.C.,

Librarian, Notre Dame University.

CATHOLIC SEMINARIES. The name

seminary is generally applied to institutions where candidates for the diocesan priesthood in the Catholic Church receive their spiritual and intellectual training. Preparatory departments (Petit Seminaire) are sometimes found in the same building, but th-e term is generally applied in the United States to those institutions which admit only those applicants who have com¬

pleted the collegiate course.

Saint Mary's Seminary, Baltimore, Md., was the first American Catholic seminary. It was founded at th-e request of Bishop Carroll, who secured from Father Emery in 1791 four priests of the Society of Saint Sulpice, which had been established in Paris by Father Olier in 1642 for the express purpose of training young men for the priesthood. For many years it was the only institution of its kind in the United States, and consequently it supplied to the ranks of the clergy the vast majority of native trained priests. At present there are about 250 semi¬

narians at Saint Mary's. In 1805 it was raised by the Maryland

legislature to the rank of a university.

In Saint Charles Theological Seminary, Over¬

brook, Pa., the aspirants to the priesthood for the archdiocese of Philadelphia are trained.

In 18.35 Bishop Kenrick placed five ecclesiastical students under the care of his brother, Rev.

Peter Kenrick, in a little house on the corner of Fifth and Prune (now Locust street), Phila¬

delphia. This was the humble beginning of the present magnifi:ent establishment. A prepara¬

tory department was begun in 1859 at Glen Rid¬

dle over which the present Bishop Shanahan of Harrisburg presided for nine years. This instit-tution passed out of existence when, in 1871, the students to the number of 128 took possession of the present building at Overbrook, which had been erected by Bishop Wood. For the maintenance of this institution the Catholics of Philadelphia contribute annually about $35,000.

There are approximately 100 seminarists at Overbrook, 15 professors and a library of 25,000 volumes.

Saint Joseph's Seminary, the theological seminary for the archdiocese of New York, is located at Valentine Hill, near Dunwoodie, a station on the Putnam division of the N. Y. C.

Railroad, and within the city limits of Yonkers.

It was founded by the late Archbishop Corrigan and constructed at a cost of nearly $1,000,000.

It was opened in September 1896 and was at first under the direction of the Sulpicians.

The full course of study comprises six years, two of which are devoted to philosophy, the remaining four to theology. The faculty com¬

prises 13 regular professors and a few instruct¬

ors, and the students (who are not admitted until they have completed a classical college course) number about. 161, nearly all from the archdiocese of New York. This institution has taken the place of the old provincial seminary of Saint Joseph, at Troy, N. Y.

Mount Saint Mary's Theological Seminary, Emmetsburg, Md., was founded in 1808 by Rev.

Du Bois during the episcopate of Bishop Carroll of Baltimore, and in the following year 16 young aspirants to holy orders were brought hither from Pigeon Hill, Pa. In 1810 the col¬

lege had 40 pupils, and as a more commodious building had been erected, the founder gave to Mrs. Seton the log house, which thus became the cradle of the great community of the Sisters of Charity in the United States. United to the seminary is the college department, wherein regular classical and scientific studies are pur¬

sued. There are 18 regular professors, several assistant teachers and over 352 students.

Saint Paul Seminary, Groveland Park, Minn., together with the College of Saint Thomas, Merriam Park, was founded by Most Rev.

John Ireland, the late archbishop of Saint Paul. They are the result of the generosity of J. T. Hill, late president of the Northern Pacific Railroad, are located within a few miles of the city, have maintained a high grade of scholar¬

ship from the beginning and are directly affili¬

ated with the Catholic University in Washing¬

ton. At present there are 131 students and 12

professors in the seminary proper ; in the college 368 students and 17 professors.

Niagara PTniversity (formerly Seminary of Our Lady of Angels),

founded by Rev. John Lynch of the Congregation of the Mission, a community organized by Saint Vincent de Paul in France in 1625. Father Lynch, the first presi¬

dent, who afterward became the first archbishop of Toronto, in 1856 opened an institution on the lake shore near Buffalo, but finding the place not quite suited for the purpose, he removed in 1857 to the present site on the New York bank CATHOLIC SUMMER SCHOOL — CATHOLIC UNIVERSITY

of the Niagara River, about four miles north of the great cataract. The university owns 300

acres ; numbers about 200 students, 60 of whom are in the seminary, and has a faculty of 20.

Its library contains 13,000 volumes. The grounds and buildings have a value of over $500,000. The institution was incorporated under the title of the College and Seminary of Our Lady of Angels by an act of the legislature of the State of New York in 1863, and in 1883

it was erected into a university with full powers and authority under the present title of Niagara University, by the regents of the State of New York.

Saint John's Ecclesiastical Seminary for the Boston archdiocese, located at Brighton, a charming suburb, and now under direction of diocesan clergy, was placed by its founder, Archbishop Williams, under the direction of Sulpician Fathers, assisted here, as in Baltimore and New York, by professors taken from the ranks of the diocesan clergy. In the two depart¬

ments, philosophical and theological, there are 12 professors and 100 students.

There are about 85 seminaries in the United States, wherein 6,000

diocesan students and members of religious communities are trained for the priesthood. In Europe two institutions are maintained by the American bishops for the training of American students, the Ameri¬

can College in Rome, and another at Louvain.

CATHOLIC SUMMER SCHOOL OF

AMERICA, a school for higher education es¬

tablished by the Roman Catholics at Plattsburg, N. Y., on Lake Champlain. It was organized in 1892, and met at various places before the pres¬

ent site was decided upon. In 1893 the regents of the University of the State of New York granted a charter by which this school became a legal corporation, and was classified in the system of public instruction devoted to univer¬

sity extension. By this charter certain advan¬

tages are acquired by summer-school students who wish to prepare for the regents' or State examinations. The object of the school is to increase facilities for those who wish to pursue lines of study in various departments of knowl¬

edge. Opportunities for instruction are provided by lectures from eminent specialists. Courses are given in philosophy, anthropology, history, literature, ethics, science, pedagogy, sociology and religion. The school is beautifully located, and though not far from the principal summer hotel on Lake Champlain, has its own cottage accommodations, a club or casino for social re¬

unions, its lecture halls and local book store.

The place is an ideal summer resort and at¬

tracts many friends of education, both Roman Catholic and Protestant, during the school season.

Another summer school, the Columbian

Catholic Summer School, assembled at Madi¬

son, Wis., in July 1898, with lecturers from Washington, D. C., and other centres of educa¬

tional work. In 1901 it removed to Saint Paul, Minn., and adopted the name of the American Catholic Chautauqua.

CATHOLIC TOTAL ABSTINENCE

UNION OF AMERICA, a confederation of

all the Catholic total abstinence organizations in America. It believes that the virtue of temperance is a religious virtue, to be cultivated by religious methods. The membership, amount¬

ing in the year 1920 to nearly 300,000, includes women's and juvenile organizations, as well as men's societies. While the Union urges men to become total abstainers, it does not hold that drink is an evil in itself, or that the use of it is wrong, but that the use of it is for many the proximate occasion of sin; and that by such persons drink should be abandoned altogether.

It does not assert that all goodness and virtue are in total abstinence, but it does hold that total abstinence is a powerful preventive of social disorder and sin. The office of the gen¬

eral secretary of the Union is in the house of the Paulist Fathers in New York. The Union publishes for circulation numerous pamphlets on the subject of total abstinence.

CATHOLIC UNIVERSITY OF AMER¬

ICA, The, an institution for higher education maintained by the Catholic Church in the United States and located at Washington, D. C.

The need of a university in which instruction should be given and research conducted in all the departments of knowledge, under Cath¬

olic auspices, was recognized by the bishops assembled in the Second Plenary Council of Baltimore (1866); and the establishment of such an institution was resolved upon in the Third Plenary Council (1884). Pope Leo XIII in 1887 approved the project and granted the pontifical

charter by the Apostolic Letter <(Magni nobis gaudii® of 7 March 1889. The university was incorporated under the laws of the District of Columbia, and the city of Washington was selected as the site. The first endowment ($300,000) was contributed by Miss Mary Gwendoline Caldwell of Newport, R. I. The Rt. Rev. John J. Keane, then bishop of Richmond, Va., was designated as rector of the university. In November 1889, academic work was inaugurated in the School of the Sacred Sciences. The Schools of Philos¬

ophy and Social Science were opened in 1895

and their departments were subsequently reor¬

ganized in the Schools of Law, Philosophy, Letters and Sciences.

The ((organic lawˆ of the university is embodied in the constitution, which was approved by the Holy See in 1889. It provides that the bishops of the United States shall have plenary authority in all matters pertain¬

ing to organization, instruction or discipline.

This authority is exercised by a board of trustees composed of bishops, priests and lay¬

men, who may elect new members and fill vacancies in the board. The chancellor, as the representative of the Holy See, presides at the meetings of the trustees. Subject to the author¬

ity of the trustees, the immediate government of the university is placed in the hands of the rector, assisted by the academic senate. The ex officio members of the senate are the rector, the vice-rector, the general secretary, the deans of the faculties and the presidents of university colleges. In addition, each facultv elects two delegates to serve in the senate for two years.

The senate acting with the rector has com¬

petency in matters pertaining to the methods of instruction, the appointment of associate pro¬

fessors and examinations for degrees. It pro¬

poses to the board of trustees such measures as may seem advantageous for the develop¬

ment of the university and it recommends to 102

the chancellor successful candidates for degrees.

The work of each school is in charge of a faculty composed of professors appointed by the board of trustees. The school comprises vari¬

ous departments in which courses are given by professors, associate professors, instructors and occasional lecturers. The faculty elects its officers — dean, vice-dean and secretary x- —and two delegates to the senate. It has a con¬

sultative voice in regard to the appointment or removal of professors, and, subject to the decision of the senate, draws up or revises courses of study, examines candidates for de¬

grees and makes recommendations for the development of the school. The teaching staff for 1916-17 includes 32 priests and 47 laymen.

The revenues of the university are derived from endowments, donations for special pur¬

poses, tuition fees and annual collections taken up in each diocese of the United States. A detailed statement of the receipts and expendi¬

ture is published yearly in the rector's report.

In 1916 there were 20 endowed chairs, 4 fellow¬

ships, 37 scholarships and 50 graduate scholar¬

ships, the last named being the foundation of the Knights of Columbus (1914). The terms of award of these endowments for the assist¬

ance of students are published in the (YearBook) of the university.

The student body includes clerics and lay¬

men, the former representing the diocesan clergy and the religious orders. According to the registration lists for 1916-17, the university enrolled 564 students, 131 clerics, 429 lay.

The courses offered by the School of the Sacred Sciences are for graduates only, i.e., for students who have completed both their col¬

legiate studies and the usual course (five years) of the theological seminary. In other schools, some of the courses are for graduates only, but most of them are open to undergraduates, i.e., to students who have completed a four years'

high school course. Students who apply for admission without certificate of previous study must take an examination in accordance with the requirements of the college entrance exami¬

nation board.

Grouped about the university are the

houses of study of the religious orders : the Paulists, Marists, Fathers of the Holy Cross, Franciscans, Sulpicians, Dominicans, Brothers of Mary, Carmelites, Oblates and Missionaries of Divine Love. Each order maintains a col¬

lege which is open only to members of the order, and in which courses of instruction are given with special reference to the needs of the students and their training as religious. For advanced courses these students attend the university. _ Other institutions affiliated with the university are the Saint Paul Seminary, Saint Paul, Minn.; the Institute of Scientific Study, New York city; Mount Saint Mary's Seminary of the West, Cincinnati, Ohio ; and the Apostolic Mission House, Washington, D. C.

The Catholic Sisters College (50 students), established in 1911,

receives only members of female religious communities who desire to prepare for the work of teaching. The courses of instruction are given by professors from the university and the requirements for degrees are the same as those prescribed for candidates within the university.

Trinity College (256 students), founded in 1897, has for its purpose the higher education of women. It is conducted by the Sisters of Notre Dame of Namur and is affiliated with the university, some of the courses being given by university instructors.

Since 1911 summer courses have been given by the university at Washington and since 1914 at Dubuque, Iowa. They are followed by members of the teaching communities and by lay teachers, the average attendance being 600.

In 1912 the university adopted a plan for the affiliation of colleges and high schools. The course of study in the affiliated institution must be approved by the university which also sets the examination. At present 10 colleges and 112 high schools are affiliated.

The publications that issue from the univer¬

sity are: The Catholic University Bulletin; The Catholic Educational Review; The Corpus Scriptorum Christianorum Orientalium; The Catholic Historical Review and The Catholic Charities Review.

Bibliography. — Becker, (Plan for the Pro¬

posed Catholic University > (in American Cath¬

olic Quarterly Review, 1876, p. 655) ; Hewitt, (The Catholic University of America* (in Cath¬

olic World, xlii, 223) ; Keane, (The Catholic University of America and its Constitutions *

(in Catholic World , xlix, 427) ; Mulvany, (The Catholic University of

America) (in American Catholic Quarterly Review, July 1903) ; Shahan, (The House of God) (New York, 1905, p.

326) ; id., (The Catholic University of America, 1 889— 1 9 1 6 > (in Catholic World , June 1916).

Edward A. Pace,

Professor of Philosophy, Catholic University of America.

CATHOLIC YOUNG MEN'S NA¬

TIONAL UNION, an association organized

in 1875, for the furtherance of lay Roman Catholic unity and the moral advancement of its members. The means relied on for accom¬

plishing its object are practical fulfilment by the individual members of the obligations im¬

posed by their religion; fraternal union of all associations that aim in any way at the spiritual, intellectual and moral improvement of Catholic young men, and the privilege assured to each member of being received as a guest by any society in the Union, or as a member by trans¬

fer. The Third Plenary Council of the Roman Catholic Church of the United States, held at Baltimore, thus expressed approval of the Union in its pastoral letter: <(In order to ac¬

knowledge the great amount of good that the C. Y. M. N. U. has already accomplished … we cordially bless their aims and endeav¬

ors, and we recommend the Union to all Roman Catholic young men/-' With this association originated* in 1892 the successful summer school session now annually held at Cliff Haven, on the shores of Lake Champlain, near Piattsburg, N. Y. See Catholic Summer School of Amer-CATHREIN, ka-trln', Victor, Swiss

Jesuit writer and sociologist: b. Brig, Canton Wallis, Switzerland, 8 May 1845. He was edu¬

cated at the Brig gymnasium and at various Jesuit scholasticates. He entered the Society of Jesus in 1863 and in 1867-69 was professor of German at the Belgian colleges of Antwerp and Venders. During the Franco-Prussian

CATHOLIC UNIVERSITY OF AMERICA

1 Cardinal Gibbons Memorial Hall

2 Graduate Hall

War of 1870-71 he was engaged in caring for wounded French soldiers at Coblenz. In 1872

he was expelled from Germany by law against the Jesuits, and was ordained to the priesthood in 1877. From 1879 to 1882 he was on the staff of Stimmen aus Maria-Laacli, and from 1882

to 1912 was successively professor of ethics at the Jesuit scholasticates of Blyenbeck Exaten and Valkenburg, Holland. He wrote (Die

englische Verfassung) (1881) ; cDie Aufgaben der Staatsgewalt und ihre Grenzen) (1882; 10th ed., 1915) ; (Die Sittenlehre des Darwinismus ; eine Kritik der Ethik Herbert Spencers) (1885); <Moralphilosophie) (2 vols., 1891; 5th ed., 1911) ; (Der Sozialismus) (1890; 10th ed., 1910) ; (Das Privatgrundeigentum und seine Gegner> (1892; 4th ed., 1909); (Philosophia moralis in usum scholarunP (1893; 10th ed., 1915) ; (Kirche unde Volksschule) (1896) ; (Durch Atheismus zum Anarchismus) (1895; 2d ed., 1900) ; (Recht, Naturrecht und positives Recht) (1900; 1909) ; (Glauben und Wissen>

(1901; 5th ed., 1911); (Die Grundl>egriffe des Strafrechts) (1905); (Die Frauenfrage) (1901; 3d ed., 1900) ; (Religion und Moral, oder gibt es eine Moral ohne Gott?) (1902; 2d ed., 1904) ; (Die katholische Weltanschauung) (4th ed., 1914), and contributions to periodicals.

CATILINE (Lucius Sergius Catilina),

Roman statesman : b. about 108 b.c. ; d. Pistoia 5 Jan. 62 b.c. Of patrician birth, but poor, he attached himself to the cause of Sulla,

had some share in his success, and still more in his proscriptions. Murder, rapine and conflagra¬

tion were the first deeds and pleasures of his youth. He appears to have served in the army with reputation. Sallust, who has written the history of his conspiracy, describes him as having a constitution that could support hunger, cold, fatigue and want of sleep, to almost any limit; with a spirit bold, cunning, fruitful in re¬

sources; lusting after the wealth of others, prodigal of his own ; a man of fiery passions, but limited judgment. Such was his art, that, while poisoning the minds of the Roman youth, he gained the friendship and esteem of the severe Cato. Equally well qualified to deceive the good, to intimidate the weak and to infuse his own boldness into his associates, he evaded two accusations brought against him by Clodius for criminal intercourse with a vestal, and for monstrous extortions, of which he had been guilty while proconsul in Africa. A confede¬

racy having been formed of many young men of high birth and daring character, who saw no other means of extricating themselves from their enormous debts than by obtaining the highest offices of the state, Catiline was placed at their head. This eminence he owed chiefly to his connection with the old soldiers of Sulla, by means of whom he kept in awe the towns near Rome, and even Rome itself. At the same time he numbered among his adherents not only the worst and lowest of the populace, but also many of the patricians and men of consular rank. Everything favored the audacious

scheme. Pompey was pursuing the victories which Lucullus had prepared for him; and the latter was but a feeble supporter of the patriots in the Senate, who wished him, but in vain, to put himself at their head. Crassus, who had delivered Italy from the gladiators, was now striving after power and riches, and counte¬

nanced the growing influence of Catiline as a means of his own aggrandizement. Caesar, who was laboring to revive the party of Marius, spared Catiline, and perhaps even encouraged him. Only two Romans remained determined to uphold their falling country — Cato and Cicero ; the latter of whom alone possessed the qualifications necessary for the task. The con¬

spirators were now planning the elevation of Catiline and one of his accomplices to the con¬

sulship, by which they hoped to obtain posses¬

sion of the public treasures and the property of the citizens under various pretexts, and espe¬

cially by means of proscription. Cicero had the courage to stand candidate for the consulship; neither insults nor threats, nor even riots and attempts to assassinate him, deterred him from his purpose; and being supported by the rich citizens, he gained his election, 65 b.c. All that the party of Catiline could accomplish was the election of Antonius, one of their accomplices, as colleague of Cicero. This failure, however, did not deprive Catiline of the hope of gaining the consulship the following year. For this purpose he revived the kind of terrorism by which he had laid the foundation of his power.

Meanwhile, he had lost some of the most im¬

portant members of his conspiracy. Antony had been prevailed upon or compelled by Cicero to remain neutral. Caesar and Crassus had resolved to do the same. Piso had been killed in Spain. Italy, however, was destitute of troops. The veterans of Sulla only waited the signal to take up arms. The signal was now given by Catiline. The centurion Manlius ap¬

peared among them, and formed a camp in Etruria. Cicero was on the watch: a fortu¬

nate accident disclosed to him the counsels of the conspirators. One of them, Curius, was on intimate terms with a woman of doubtful repu¬

tation, Fulvia by name, and had acquainted her with their plans. Through this woman Cicero learned that L. Vargunteius, a senator, and C.

Cornelius, a knight, had undertaken to assassi¬

nate him at his house. On the day which they had fixed for the execution of their plan, they found the doors barred and guarded. Still Cicero delayed to make public the circum¬

stances of a conspiracy, the progress and resources of which he wished first to ascertain.

He contented himself with warning his fellow citizens, in general terms, of the impending danger. But when the insurrection of Manlius was made known, he obtained from the Senate the decree, only

promulgated on occasions of the utmost importance, that ((the consuls should take care that the republic receive no detri¬

ment.® It was exceedingly difficult to seize the person of one who had soldiers at his command both in and out of Rome ; still more difficult would it be to prove his guilt before judges who were accomplices with him, or at least were willing to make use of his plans to serve their own interest. Cicero had to choose between two evils — a revolution within the city, or a civil war: he preferred the latter.

Catiline had the boldness to take his seat in the Senate known as he was to be the enemy of the Roman state. Cicero then rose and deliv¬

ered that bold oration against him, beginning, Quo usque tandem abutere, Catilina, patientia nostra? (((How long, then, Catiline, wilt thou abuse our patience?®) Assuming a confidence he did not possess, he attempted a reply, but his 104

words were instantly drowned by the cries of ((Parricide !55 and <(Traitor!55 which rose on all hands. Now fully conscious that his plans were discovered, he rushed from the assembly with threats and curses on his lips, and left Rome at dead of night. The conspirators who remained, Lentulus Sura, Cethegus and other infamous senators, engaged to head the insurrection in Rome as soon as Catiline appeared at the gates.

According to Cicero and Sallust, it was the intention of the conspirators to set the city on fire, and massacre the inhabitants. Lentulus, Cethegus and the other conspirators, in the meanwhile, were carrying on their criminal plots. They applied to the ambassadors of the Allobroges to transfer the war to the frontier of Italy itself. These, however, revealed the plot, and their disclosures led to others still more important. The correspondence of the conspirators with their leader was intercepted.

As the circumstances of the case did not allow of a minute observance of forms in the pro¬

ceedings against the conspirators, the laws relating thereto were disregarded, as had been done in former instances of less pressing

danger. Caesar spoke against immediate execu¬

tion, but Cicero and Cato prevailed. Five of the conspirators were put to death. Caius Antonius was then appointed to march against Catiline, but on the pretext of ill health, gave the command to his lieutenant, Petreius. He succeeded in enclosing Catiline, who, seeing no wav of escape, resolved to die sword in hand.

His followers imitated his example. The battle was fought with bitter desperation. The in¬

surgents all fell on the spot which their leader had assigned them, and Catiline at their head.

Consult Sallust, (Bellum Catilinarium5 ; Cicero, (Orationes in Catilinam5 ; Rose, (History of Catiline's Conspiracy) (1813) ; the biographies of Caesar and Cicero in Plutarch's (Lives, } and Beesley, E. S., (Catiline as a Party Leader5

in Fortnightly Review (June 1865).

CATINAT, ka-te-na, Nicolas de, marshal

of France: b. Paris 1637; d. Saint Gratien 1712.

He quitted the profession of the law for that of arms, and attracted the notice of Louis XIV

at the storming of Lille in 1667, and was pro¬

moted. By a number of splendid deeds he gained the esteem and friendship of the great Conde, particularly by his conduct at the battle of Senef. He was sent as lieutenant-general against the Duke of Savoy, gained the battles of Staffardo, 18 Aug. 1690, and of Marsaglia, 4

Oct. 1693, occupied Savoy and part of Pied¬

mont, and was made marshal in 1693. In the conquered countries his humanity and mildness often led him to spare the vanquished, contrary to the express commands of Louvois. In Flan¬

ders he displayed the same activity, and took Ath in 1697. In 1701 he received the command of the army of Italy against Prince Eugene; but was straitened by the orders of his court, and was destitute of money and provisions, while Eugene was allowed to act with full lib¬

erty. On 6 July he was defeated at Carpi.

Equally unfortunate was the battle of Chiari, where Villeroi had the chief command. In spite of his representations the French court would not believe the disasters in Savoy to be owing to the perfidy of the Duke of Savoy, and Catinat was disgraced. From his unalterable calmness and consideration his soldiers called him ((le Pere la Pensee.55 Consult his <Memoirs) (Paris 1819) and the biography by De Broglie (1902).

CATINEAU-LAROCHE, ka-te-no la—

rosh, Pierre-Marie-Sebastien, French politi¬

cian: b. Saint-Brieu, 25 March 1772; d. 22 May 1828. He studied at Poitiers, and to escape the Re¬

volution emigrated to San Domingo, where he pulished a journal, L'ami de la paix et de l* union.

He was sentenced to death for the opinions which he advocated, but, by the timely assistance of the agents of the king of France, succeeded in escaping to Cape Haytien (then called Cape Frangais), where he alone of 17 of his country¬

men was saved from the subsequent massacre in that city. He now visited the United States and England, and on his return to Paris, in 1797, prepared several dictionaries. His print¬

ing office having been destroyed by fire, the gov¬

ernment employed him in various public capaci¬

ties. In 1809 he was appointed secretary-gen¬

eral of the commission houses and sent to Austria; and in 1810 he was made inspector of Illyria. He was made head of the Library Administration Bureau and served as secretary-general of the department of Aisne, prefect; and sub-prefect of Saint-Quentin. Once more he visited the United States, and on his return in 1819, he was commissioned to go to Guiana, to study the climate and resources of that prov¬

ince. His notes on that country appeared in 1822. He became chief of

the Bureau of Com¬

merce and of the Colonies (1826) and com¬

missary-general of the interior (1828).

CATLETTSBURG, Ky., city and county-seat of Boyd County, on the Ohio and Big Sandy rivers at their confluence, and on the Chesapeake and Ohio Railroad. It has exten¬

sive lumber interests and has flour mills, machine shops, saw mills and wholesale

grocery, hardware and shoe warehouses. Pop.

3,520.

CATLIN, George, American traveler and

artist: b. Wilkesbarre, Pa., 26 June 1796; d.

Jersey City, N. J., 23 Dec. 1872. After prac¬

tising as a lawyer for two years he set up at Philadelphia as a portrait painter, and in 1832

commenced special studies of the American In¬

dians, residing many years among them both in North and South America. In 1840 he went to Europe, and subsequently introduced three parties of American Indians to European courts. His finely illustrated works are Plan¬

ners, Customs and Condition of the North American Indians) (1857) ; (North American Portfolio5 (1844) ; (Eight Years' Travel in Europe5 (1848) ; Past Rambles Among the In¬

dians,5 *etc.* (1868). His 500 portraits from life of American Indians are now in the National Museum at Washington, D. C., constituting what is known as the <(Catlin Gallery.55 About 400 sketches are in the possession of the American Museum of Natural History, New York city. Consult Miner, (Georee Catlin, with an Annotated Bibliography of His Writ¬

ings5 (New York 1901) ; (My Life Among the Indians5 (ed. by M. G. Humphreys, 1909).

CATLINITE (named after Catlin (q.v.),

American traveler and artist), a dull red in¬

durated clay. It occurs in Pipestone County, Minn., as a layer about 18 inches thick in quartzite. It has been extensively manu-CATNIP — CATO

factured by the Sioux Indians into pipes and various ornamental objects.

CATNIP, or CAT-MINT, a hardy per¬

ennial herb (Nepcta cataria) of the family Menthacece. It is a native of the Orient and Europe, and has become distributed in most temperate regions of the globe. It is very com¬

mon in America in the neighborhood of dwell¬

ings. Cats are especially fond of it, rubbing themselves upon it and eating it with evident relish. Like other members of its family, it contains a fragrant volatile oil, for which it is sometimes used in cooking. It grows about two feet tall, bears heart-shaped, velvety, whitish-green leaves, and dense whorls of nu¬

merous small, purplish or rosy-white flowers.

Catnip is sometimes planted in herbaceous bor¬

ders to soften the tinting, at the same time heightening the effect with its erect stems. In medicine, catnip tea enjoys great popularity with the laity. It is brewed hot and is very useful in attempts to avert (<colds.® The heat, volatile oil, and accompanying care that the patient takes are all self-conservative.

CATO, ka'to, Dionysius, the reputed au¬

thor of the small collection of moral apoph¬

thegms known as (Catonis Disticha de Moribus ad Filium.* Nothing is known of him; but the work, which is apparently in large part a genu¬

ine classic, had a high reputation in the Middle Ages.

CATO, Marcus Porcius, The Censor, surnamed Priscus, also Sapiens (<(the wise®), and Major ((<the elder®), Roman statesman and general: b. near Tusculum 234 b.c. ; d. 149 b.c.

The modern village of Monte Porzio Catone near Tusculum perpetuates his memory. He inherited from his father, a plebeian, a small estate in the territory of the Sabines, which he cultivated with his own hands. He was a youth at the time of Hannibal's invasion of Italy, and served his first campaign, at the age of 17, under Fabius Maximus, when he besieged

Capua. Some years after he fought under the same commander at the siege of Tarentum.

After the capture of the city he became ac¬

quainted with the Pythagorean, Nearchus, who initiated him into the sublime doctrines of his philosophy, with which, in practice, he was already conversant. After the war was ended Cato returned to his farm. As he was versed in the laws, and a fluent speaker, he went at daybreak to the neighboring towns and acted as counsellor and advocate to those who ap¬

plied to him. Valerius Flaccus, a noble and powerful Roman, who had an estate in the vicinity, observed the talents and virtue of the youth, conceived an affection for him and per¬

suaded him to remove to Rome, where he prom¬

ised to assist him with his influence and patron¬

age. A few rich and high-born families then stood at the head of the republic. Cato was poor and unknown ; but his eloquence, which some compared to that of Demosthenes, and the integrity and strength of

his character, soon drew public attention to him. At the age of 30 he went as military tribune to Sicily. In the following year he was quiestor, at which period there began between him and Scipio a rivalry and hatred which lasted till death.

Cato, who had returned to Rome, accused Scipio of extravagance; and, although his rival was acquitted, this zeal in the cause of the public gave Cato a great influence over the people. Having been aedile (199 b.c.), he was chosen praetor in the year 198 b.c. and obtained the province of Sardinia. His strict moderation, integrity and love of justice were here still more strongly displayed than in Rome. On this island he formed an acquaintance with the poet Ennius, of whom he learned Greek, and whom he took with him to Rome on his return. He was made consul 192 b.c., having his friend Valerius Flaccus for colleague. He opposed with all his power the abolition of the Oppian law, passed in the pressing times of the Second Punic War, forbidding the Roman

women to wear more than half an ounce of gold, to dress in garments of various colors or to wear other ornaments; but he was obliged to yield to the eloquence of the tribune Valerius and still more potent female im¬

portunities. Soon after, he set out for Spain, which was in a state of rebellion. His first act was to send back to Rome the supplies provided fof the army, declaring that the war ought to support the soldiers. He gained several victories with a newly-raised army, reduced the province to submission and re¬

turned to Italy, where the honor of a triumph was granted to him. He afterward put himself under the command of the Consul Manlius Acilius, to fight against Antiochus, and to carry on the war in Thessaly. By a bold march he made himself master of the Callidromus, one of the highest peaks of the mountain pass of Thermopyke, and thus decided the issue of the battle. He brought the intelligence of this victory to Rome, 189 b.c. Five years after, in spite of a powerful faction opposed to him, he obtained the most honorable, and at the same time the most feared, of all the magistracies of Rome, the censorship. He had not canvassed for the office, but had only expressed his will¬

ingness to fill it. In compliance with his wishes Valerius Flaccus was chosen his colleague, as the only person qualified to assist him in cor¬

recting the public disorders, and restoring the ancient purity of morals. He fulfilled this trust with inflexible rigor ; and though his

measures brought him some obloquy and op¬

position, they met, in the end, with the highest applause ; and when he resigned his office, it was resolved to erect a statue to him with an honorable inscription. He appears to have been quite indifferent to the honor; and when, before this, some one expressed his wonder that no statue had been erected to him, he answered, ((I would rather have it asked why no image has been erected to Cato than why one has.® Still he was not void of self-com¬

placency. «Is he a Cato, then?® he was accus¬

tomed to say, when he would excuse the errors of another. Cato's political life was a con¬

tinued warfare. He was continually accusing, and was himself accused with animosity, but was always acquitted. His last public com¬

mission was an embassy to Carthage to settle the dispute between the Carthaginians and King Massinissa. It is said that this journey was the original cause of the destruction of Carthage ; for Cato was so astonished at the rapid recovery of the city from its losses, that he ever after ended every speech of his with the well-known words, Prceterea censco Carthag-inem esse delendam (((I am also of opinion that Carthage must be destroyed®). He died 108

speculation, but is now supposed to have been a line of defense raised by the Britons against the invading Saxons.

CATS, kats, Jakob, Dutch poet: b. Brou-wershaven, Zealand, 10 Nov. 1577; d. Zorgvliet, near Scheveningen, 12 Sept. 1660. He studied at Leyden, Orleans and Paris. In 1627 and 1631 he was Ambassador to England, and in 1636 grand pensioner of Holland. His poetry is unimaginative an»u didactic, but has been ex¬

tremely popular with the Dutch middle class by whom he is frequently affectionately alluded to as ((Father Cats.® A statue has been erected to him at his birthplace. His works consist of alle¬

gories, according to the taste of his times, poems on the different ages and situations of life, idyls, *etc.* Among the most noted are (Het Houwe-lyck* (Marriage) (1625); (Sinneen-Minnebeel-den> (1618) ; (Trouringh) (1637) ; (Maechden-plicht) (1618); <Selfstryst) (1620); (Spiegel van den ouden en nieuwen tydt) (1632) ; (Faces Agustae) (1653). Consult Derudder, G., (Un poete neerlandais> ; (Cats, sa vie et ses ceuvres) (Hague 1899).

CAT'S-EYE, the name given to several

hard semi-transparent stones used as gems, which, when cut in a certain way, show a line of light giving what is called a chatoyant effect.

The true cat's-eye is a chrysoberyl of a greenish color, found in Ceylon and Brazil. The line of light shown v/hen the stone is cut en cabochon is due to the structure of the crystal, or to included impurities. The common cat's-eye, of little value, is a crystalline quartz sometimes containing fibres of asbestos, which, cut across the fibres, gives a chatoyant effect. It is found in Bavaria. Tiger-eye (q.v.) also shows the chatoyancy of the cat's-eye. Beautiful tourma¬

line cat's-eyes, rivaling the Oriental stones, have recently been found in California. Stones ex¬

hibiting the cat's-eye ray have been cut from various other minerals, including beryl, corun¬

dum, fibrous hornblende, bronzite and hypers-thene.

CATSKILL, N. Y., village and county-seat of Greene County, 30 miles southeast of Albany, on the west side of the Hudson River and on the West Shore and Ulster and Delaware railroads, also connected with the New York Central by a ferry crossing the Hudson. It is connected by steamboat lines with New York and Albany. The village, frequented as a sum¬

mer resort, though important rather as the point of departure for the more popular mountain resorts, has a courthouse, opera-house, free academy and public library. It manufactures woolens, hosiery, cut glass, bricks, etc., and is in a productive fruit-growing region. Catskill was settled about 1680 by Derrick Teunis Van Vechten. The village

owns its water¬

works. Pop. (1920) 4,728.

CATSKILL AQUEDUCT. See Aque¬

ducts.

CATSKILL GROUP, a name given to a

great thickness of red, brown, green and gray conglomerates, sandstones and shales of which the Catskill Mountains are composed. Being well exposed by numerous cliffs and gorges, these deposits were carefully studied by the New York Geological Survey some 50 years ago. The rocks were believed to constitute a series, having a definite place in the classifica¬

tion of the Palaeozoic rocks worked out by the Survey, and were given the name Catskill. Sub¬

sequent investigation has shown that the Cats¬

kill is not even to be called a group. It is simply a succession of shoal-water deposits of Upper Devonian Age, that were laid down along one shore of an interior sea, while normal marine sediments, now represented by lime¬

stones, were being laid down elsewhere. Thus is happens that the Lower Catskill, of the Cats¬

kill Mountains, is represented elsewhere by limestones of the Hamilton stage, the Middle Catskill by the Portage and the Upper Catskill by the Chemung. In the Catskill Mountains the so-called Catskill series is 4,500 feet thick; and where thickest, at Mauch Chunk, Pa., it is 7,500 feet thick. Farther south the rocks thin out and disappear altogether in Virginia.

Though having no standing as a rock group, the Catskill is of interest from its many re¬

semblances to the Old Red Sandstone of Eng¬

land, made famous by Hugh Miller, and is of economic importance from containing some beds of excellent flags, quarried at numerous open¬

ings in Ulster, Greene and Delaware counties, N. Y., and sold as Hudson River bluestone.

See Devonian; Old Red Sandstone.

CATSKILL MOUNTAINS, a group of

moderate elevation, part of the Alleghany Plateau, lying to the west of the Hudson River and situated mainly in Greene and Ulster counties, N. Y. The system covers about 1,400

square miles. The geological formation is very old, the mountains consisting of the shales and sandstone of the Catskill group of the Devonian system. The group contains several summits between 3,000 and 4,000 feet above sea-level. Slide Mountain, 4,204 feet ; Hunter Mountain, 4,025 feet, are the highest. The low lands along the creeks which drain the moun¬

tains and some uplands are cultivated. Many of the slopes form fine pastures ; but the greater part is forested thickly with oak, ash, maple, beech, pine, hickory, *etc.* The pure atmosphere attracts summer visitors in large numbers, and the region is dotted with many hostelries. Railways give access to many parts of the region, and several points can be reached by boats. There are several pretty cascades in the gorges, known here by their Dutch name, cloves. Within recent years part of the Cats¬

kill watershed is being utilized as a water supply source for New York city.

CATT, Carrie Lane Chapman, American

suffrage reformer: b. Ripon, Wis. She was educated at the State Industrial College of Iowa and subsequently studied law. She was for three years principal of the High School at Mason City, Iowa, and in 1884 was married to Leo Chapman, editor of the Mason City

Republican, who died some two years later. In 1891 she was married to G. W. Catt (q.v.).

Since 1890 she has devoted herself to woman suffrage work, lecturing in every State, and also in most of the countries of Europe. In 1904 she was elected president of the Inter¬

national Woman Suffrage Alliance and still holds that office, and in 1915 elected president of the National American Woman Suffrage Association.

CATT, George William, American engi¬

neer: b. Davenport, Iowa, 9 March 1860; d.

BIG INDIAN VALLEY

ENTRANCE TO THE PLAATERSKILL CLOVE

1905. He was educated at the Iowa State Col¬

lege and subsequently studied engineering and law. He was chief engineer of the San Fran¬

cisco Bridge Company, 1887-92 ; president and engineer of the New York Dredging Company, 1893-99 ; and president and engineer of the Atlantic Gulf & Pacific Company from 1899.

He built government dry docks at the navy yards at League Island, Philadelphia, and Mare Island, Cal.

CATTARO, kat'ta-ro, a seaport in Dalma¬

tia, situated at the foot of the Gulf of Cattaro, on the east side of the Adriatic, 38 miles south¬

east of Ragusa. It lies at the foot of steep limestone rocks, strongly fortified and sur¬

mounted by a castle, and is surrounded with walls. The buildings are in the Venetian style, and the streets are narrow, irregular and dark.

It is the seat of a Roman Catholic bishop, and the cathedral is a well-built edifice. The harbor is spacious. The chief trade is with Montenegro. Once a Roman colony, it became part of the republic of Venice in 1420; passed to Austria in 1797; was conquered by Italy 1805 ; restored to Austria 1814. It is now a part of Jugoslavia. Two earthquakes wrought consid¬

erable destruction in the town. Pop. about 6,000.

CATTEGAT, or KATTEGAT, a gulf of

the North Sea, between North Jutland to the west, Sweden to the east, and the Danish islands of Zealand, Funen, etc., to the south; and by joining the Skagerrak on the west and the Little and Great Belts and the Sound on the east, forming the middle link in the chain of waters connecting the Baltic with the North Sea. It is about 150 miles from north to south ; its greatest breadth about 90.

It is difficult of navigation, being not only shallow toward the shores, and irregular in depth, but obstructed by several sandbanks, and the adverse winds which often prevail here increase the danger. The Cattegat is noted for its herring-fishery. It contains the islands Samsoe, Anholt, Lessoe and Hertz-holm.

CATTELL, Henry Ware, American

pathologist : b. Harrisburg, Pa., 7 Oct. 1862.

After studies at Lafayette College and at the universities of Leipzig, Pennsylvania and Freiburg (Baden), he was appointed demon¬

strator of morbid anatomy at the University of Pennsylvania 1892-97, and director of the Ayer Chemical Laboratory in the Pennsyl¬

vania hospital. He was consulting pathologist to numerous Philadelphia hospitals and pro¬

fessional expert in several criminal cases.

Besides editing the International Medical Magazine (1894-97) ; International Clinics (1900-03) and again after 1910; Medical Notes and Queries (after 1905) ; (Lippincott's Medical Dictionary) (1910; 3d ed., 1913), he translated Ziegler's (Special Pathological Anatomy) (1899-97). His published works in¬

clude (Notes on Demonstrations in Morbid Anatomy) (1899-1901) ; (Post Mortem Pathology > (1903; 3d ed., 1906); (606 > (1910).

CATTELL, James McKeen, American

psychologist : b. Easton, Pa., 25 May 1860.

He was graduated at Lafayette College in 1880, and studied at Leipzig, Paris, Geneva and Gottingen. He was assistant under

Wundt at the University of Leipzig, professor of pyschology in the University of Pennsyl¬

vania in 1888-91 and professor of experi¬

mental psychology in Columbia University 1891-96; from 1896 to 1902 head of the de¬

partment of anthropology, and from 1902 to 1905 professor in the department of philos¬

ophy. He resigned in 1917. He is coeditor of the Psychological Review and Science, and The American Naturalist.

CATTERMOLE, George, English water

color painter: b. Dickleborough, near Diss, Norfolk, 8 Aug. 1800; d. Clapham, Surrey, 24

July 1868. Like Turner and William Hunt, he started in life as a topographical draughts¬

man, and was employed as a draughtsman on Britton's (English Cathedrals > when only 16.

He drew the designs for the illustrations of various annuals, the Waverley Novels, for an edition of Shakespeare, and for his brother's (History of the Civil WarsP In 1833 he was elected a member of the Society of Painters in Water Colors. He was a member also of the Academy at Amsterdam, and of the Belgian Society of Water Color Painters. He obtained a medal of the first class at the Paris Exhibi¬

tion of 1855. In 1851 he resigned his member¬

ship of the English Society, and devoted him¬

self to oil painting. Cattermole is one of the most important representatives of the Romantic movement in English art. Among the best known of his pictures are (Hamilton of Both-wellhaugh about to Shoot the Regent Murray* ; (Luther at the Diet of Spires) ; (The Armorer's Tale1* ; (A Terrible Secret,) *etc.*

CATTI, or CHATTI, one of the most re¬

nowned and valiant of ancient German tribes, inhabiting what is now Hesse, also part of Franconia and Westphalia. They carried on bloody wars with the Hermunduri and Cherusci. In the time of Caesar they dwelt on the Lahn, and opposed him with effect. Drusus defeated without reducing them. In the reign of Marcus Aurelius they made incursions into Germany and Thrace, but were afterward de¬

feated by Didius Julianus. In 392 they made their last appearance in history in union with the Franks. According to Caesar, their terri¬

tory was divided into 100 districts, each of which was obliged to send annually 1,000 men into the field, whose place was supplied the following year by those who had before re¬

mained at home to cultivate the ground. Their food was milk, cheese and game ; their dress the skins of animals. Their limited princes, who

governed in connection with a diet, an¬

nually distributed the lands among the families.

CATTLE. Cattle comes from the old

French word catel, which is derived from the Mediaeval Latin captale or capitale, meaning goods or property. The use of the English word cattle ordinarily refers to a group of animals related to the ox or cow, although on occasion it has been applied to all the larger animals of economic value. The present Latin designation for cattle, hos taurus, was given by Linnaeus the Swedish naturalist, but as taurus means bull, this word is unsatisfactory if it is desired to refer to the female, the cow, or to the unsexed male, the steer. The English word ox is traced through several languages to the words urox, aurochs or auerochs, names given the prehistoric ox. This word ox (plural oxen) has been very widely used in reference 110

to cattle, though not entirely satisfactory in its application.

Cattle existed in prehistoric times, and their remains have been extensively found in the more recent geological periods. Wild oxen were hunted in Great Britain and on the con¬

tinent of Europe, and parts of skeletons have been found in which were embedded flint spear heads. The prehistoric ox, known as Bos taunts primigeneus, varied in size in a marked degree, but as commonly found was much larger than the ox of the present day. A com¬

plete skeleton of what has been termed Bos taunts giganteus has been recovered from the English fen lands, and many parts of large skeletons mav be seen in British museums.

There are to-day in England and Scotland a few scattered herds of what are known as wild cattle. These are on large estates where they

are preserved and allowed to reproduce in a state of nature. These wild cattle are as¬

sumed to be lineal descendants of the prehis¬

toric ox. They are white in color, but with dark red or black hairs upon the ears and about the muzzle ; have long, shaggy hair ; heavy, upstanding horns, and are comparable in size with many of our domestic cattle. In a few instances wild females have been mated to domestic bulls, from which through several generations very excellent results have been obtained.

In a zoological way, cattle present certain features of special interest. They belong to the order of Ungulata or hoofed animals, which includes elephants, giraffes and camels. How¬

ever, cattle belong to a suborder of this group, having cloven feet, the horse belonging to another suborder with a solid foot. The skeleton of the ox does not stand as high as that of the horse, and the bony processes of the spine form a line along most of the back that is nearly straight. The horns are essen¬

tially extensions of the corners of the skull, al¬

though there are breeds of cattle that normally have no horns. Cattle have no teeth at the end of the upper jaw; this part being covered with a tough membraneous pad, against which the incisor teeth at the point of the lower jaw press. In grazing the vegetation is caught be¬

tween the teeth and pad, and is pulled rather than cut off. The ox has a compound stomach of four apartments, which occupies nearly three-fourths of the abdominal cavity, and in large animals has a capacity of as much as 60

gallons. When food is first swallowed, it goes into the large first stomach, the paunch, where it is softened and macerated, and over¬

flows through a slit into the much smaller sec¬

ond stomach or honeycomb. From one or the other of these stomachs, by muscular contrac¬

tion, the food is forced back to the mouth in small balls or (<cuds,® when rumination or <(chewing the cud® takes place, which explains

why cattle are generally known as ruminants.

Rumination only takes place under conditions of quiet and rest, and not during grazing.

After chewing the cud less than a minute, the food is swallowed, passing into the third stomach the manyplies, from which it moves on into the small abomasum or true stomach.

In comparison with the stomach, the intestines in cattle are relatively small while with horses and swine the reverse is true.

Cattle are world wide in their distribution, and either exist wild in a state of nature, or are of the domesticated, improved races or breeds. Among the wild cattle are the bison of America and Europe, the buffalo of Asia and Africa, the yak of highlands of central Asia, the gaur of India, the bantin of Java, Siam, Burma and adjacent countries, *etc.*

There are various forms of buffaloes ranging from animals of small size to those of large proportions, and these are especially abundant on the continent of Asia and contiguous islands. South America and Australia possess no native wild cattle. Domesticated cattle are best represented in the various breeds used for food or labor that are found in large numbers in all countries where herbage is easily grown.

In Asia and Africa is found a class of humped domesticated cattle, commonly known as the zebu, of which there are many breeds. These Indian or Brahman cattle, as they are often called, differ from our common domestic cattle in general bodily form, in possessing a more or less large hump over the shoulders, in shape of ears, depth of throat, curve and size of horns and form of skull, especially in its upper part.

What are known as the common domesticated cattle of Europe and America differ in a marked degree in size, color and certain features of form. However, they are all es¬

sentially the same from an anatomical point of view, and belong to the same species. The variations referred to have been due to vari¬

ous factors, among which emphasis may be laid on environment, selection and the artificial breeding operations of man. In general our domestic cattle may now be divided into three classes or what are

commonly known as types, viz., beef, dairy and dual purpose. Beef type cattle have short, thick necks ; smooth shoulders ; wide, prominent breasts ; large heart girth ; broad backs and loins ; deep bodies ; wide, level rumps ; thick, meaty thighs and comparatively short legs. When in good con¬

dition, the body is smoothly covered with a thick layer of flesh indicative of great meat-producing capacity. Good examples of beef cattle have bodies resembling a parallelogram from side view, or square from the ends, hav¬

ing what is known as a ((blocky form.® Dairy type cattle are relatively thin of neck ; some¬

what prominent of shoulder; narrow of breast; deep yet lacking in thickness of chest; narrow at the withers and gradually widening along the back to the hips; long of rib and deep of middle; long and wide of rump; and compara¬

tively narrow behind in the thighs. The females are notable for large udders capable of great milk production. This type is lean and muscular, and good examples show what is termed the <(triple wedge® form. (1) As viewed from one side, the body gradually widens in depth from front to rear. (2) Viewed from above the body gradually widens back to the hips. (3) Seen from in front the body widens in wedge form from the withers (just over the shoulder) downward. The beef type is notably broad and flat, just above the shoulder tops, while the dairy type is narrow and sharp. Superior beef cattle as a rule are small milk producers, while to the contrary high class dairy cows are very inferior meat producers. Dual purpose, oftentimes termed general purpose, cattle, are fair producers of both meat and milk. They lack the thick, CATTLE

1 Dexter Heifer

2 Ayrshire

3 Group of Guernsey Calves

4 Guernsey

5 Holstein

6 Shorthorn

7 Jersey Bull

CATTLE

1 Hereford

2 Holstein

3 Group of Dutch-belted Calves

4 Guernsey

5 Devon

6 Jersey

7 Guernsey

blocky form most desirable in the model beef animal, with less fullness over the shoulders and at the thighs. Dual purpose type cows should have good sized udders and show dis¬

tinct evidence of milk-producing capacity.

Our domestic cattle, are not only divided into types but into many breeds that have origi¬

nated under widely different surroundings.

The influences of climate and food, as well as the breeding operations of man, have resulted in many breeds within these types, each of which is quite distinctive in character and use¬

fulness. The measure of merit in our herds of cattle is absolutely dependent upon the meritorious character in the breeds themselves.

The common herds cannot be improved without the use of sires from pure bred herds.

The following breeds, grouped according to type, are the more important ones to be found in North America.

Beef Type.

Shorthorn cattle originated in north¬

eastern England in the counties of York and Durham, where they first

came into prominence during the last quarter of the 18th century.

The color may be all red, red and white, pure white or roan, the latter being a commingling of red and white hairs without forming solid color. Mature males of this breed commonly weigh from 1,800 to 2,200 pounds, although some bulls much exceed this. Mature cows commonly weigh from 1,400 to 1,500 pounds, though the latter figure is often exceeded. This is a horned breed, very domestic in tempera¬

ment, and is noted for the production of superior beef. It is the most universally dis¬

tributed breed of cattle in the world, and is very popular in the United Kingdom, North and South America and Australia. Among

the beef breeds the Shorthorn is noted for milk production and some families of the breed are especially famous in this regard.

Hereford cattle originated in Hereford¬

shire, western England. It is a very old horned breed. The main body color is red, with white face ; solid white markings usually occur on the legs about the ankles, the lower part of tne belly, brisket and neck, top of neck, withers and brush of tail. Mature males often weigh 2,200 pounds, and females 1,500 pounds or more. Much heavier weights however are recorded. Hereford cattle are noted as

grazers and rustlers, being unsurpassed for the range. They mature early and produce most excellent beef. The breed is largely re¬

stricted to Herefordshire in England, but is deservedly popular on the grazing lands of the United States, Argentina and Australia.

Aberdeen-Angns cattle, a black, hornless breed, originated in the counties of Aberdeen, Kincardine and Forfar in northeastern Scot¬

land. Occasionally a red specimen occurs but these are not used for breeding purposes.

Mature bulls of the breed weigh about 2,000

pounds, and females about 1,400 pounds. This is a famous beef breed, and in the British and American fat stock shows has long secured

premier honors. The crossing of white Short¬

horn bulls on Aberdeen-Angus cows has long been a custom in the English-Scotch border country, their union producing the famous blue-gray steers which yield the best of beef.

Aberdeen-Angus cattle are popular in Scotland, have a strong clientage in the United States west of the Mississippi and are regarded with favor in Australia.

Galloway cattle are black and hornless, and originated in Galloway district, southwest Scot¬

land. It is a beef breed of medium size, mature bulls weighing about 1,900 pounds and cows 1,200 pounds to 1,400 pounds. This breed is especially adapted to grazing, and does not do its best under conditions of small farm¬

ing and confinement. It cannot be regarded as a popular breed, and has a comparatively limited clientage. This is largely due to a nervous disposition and a tendency to fatten slowly, although Galloways make very superior beef. The four beef breeds referred to are the only ones of importance in America.

• Dairy Breeds.

Jersey cattle originated on the Island of Jer¬

sey, one of the group of Channel Islands near the coast of France. There they have been bred pure for more than a century. The law of the island prohibits the introduction of any other breed. Jerseys are fawn in color of various shades, such as yellow, red, brown, mulberry, silver, *etc.* White markings are not rare, though not popular. Bulls at maturity commonly weigh 1,250 to 1,400 pounds, and cows from 850 to 900 pounds, many animals, however, exceeding these weights. The most striking features in the Jersey are the color, the wedge form, the short, dished face, the prominent, beautiful eye, the fine bone, and deerlike character of the young calves. This is distinctly a dairy breed.

The average yield for the better cows is about 7,500 pounds of . milk a year, although the cow Passport 219742

has an official record of 19,695 pounds for a year. Jersey milk usually tests 4ˆ2 to 5 per cent fat, and is of very superior quality. Many Jerseys have produced 400 pounds of butter-fat in a year, Sophie 19th of Hood Farm 189748 having to her credit the great yield of 999.14 pounds. Jersey cattle are very popular in England, the United States and Canada.

Guernsey cattle are native to the island of Guernsey, also one of the Channel Islands.

Guernsey, like Jersey, prohibits the introduc¬

tion of any other cattle, excepting for slaugh¬

ter, and the cattle on Guernsey have been bred pure for many years. Guernseys are fawn of color, usually of a reddish shade, and fre¬

quently have white markings. The standard size for mature bulls is about 1,500 pounds and 1,050 pounds for the cows. In recent years these cattle have made remarkable improve¬

ments and many large records of milk and but¬

ter-fat are credited to the breed. The better class of cows will average about 8,500 pounds per year of milk that is about 5 per cent fat.

Nearly 5,000 cows have averaged 437 pounds of fat in a year, the largest record being 1,098

pounds produced by Murne Cowan 19597.

Guernsey butter is noted for its yellow color.

This breed is more especially known in Eng¬

land and the United States east of the Mis¬

sissippi.

Ayrshire cattk originated in southwestern Scotland, with the county of

Ayr as a centre.

These cattle frequently have rather long, large, erect horns. The color of the hair is a com-112

bination of red, brown and white markings, with white in most favor at the present time.

Ayrshires while a dairy breed tend to be some¬

what smooth bodied, and may be fattened to make very fair beef. At maturity standard weights will approximate 1,500 pounds or more for the bull and 1,100 pounds for the cow.

Ayrshire cows of the better class, when ma¬

ture, will average about 9,500 pounds of milk, testing 3l/z to 3$4 per cent fat. Lily of Wil-lowmoor 22269, a famous cow of the breed, produced 955.56 pounds of fat in a year. In their native land, the milk of thes:j. cattle is in much favor for making cheddar cheese. Ayr¬

shires are little known outside of Scotland, the Scandinavian countries, the eastern United States and Canada.

Holstein-Friesian cattle originated in Hol¬

land, where they have been bred for centuries.

This is a horned breed, and is black-a*nd-white in color, in large markings. Present day pop¬

ularity favors a preponderance of white. This is a large breed, and mature bulls weigh usu¬

ally 1,800 to 2,000 pounds, and cows 1,250 to 1,400 pounds. There is considerable variation in type within this breed, with good examples of both dairy, beef and dual purpose type.

However, the most popular style is the dairy type, with some thickness

of thighs and smooth¬

ness of fleshing. Holstein-Friesian cows sur¬

pass all others in milk production. They have large udders, but produce milk of quite ordi¬

nary quality, testing 3 to 3ˆ4 per cent fat, under average conditions. The better cows of the breed will average about 15,000 pounds of milk in a year and 500 pounds of butter-fat.

The cow Lutscke Vale Cornucopia 110505 pro¬

duced 31,247 pounds of milk, while Duchess Skylark Ormsby produced 1,205 pounds of fat each within a year. Holstein-Friesian cattle, or closely related Dutch breeds, are popular in Holland and much of northern Europe and are looked upon with much favor in the United States.

Dutch Belted cattle originated in Holland, where they have long been bred in a very small way. They are of a dairy type, and are black in color excepting for a white stripe which encircles the body between hips and shoulders. These cattle have thus far made few records of interest, and they are little bred excepting as a fad for their peculiar mark¬

ings.

Kerry cattle are of Irish origin. They are black ih color and comparable with a small Jersey as to size. The Kerry is distinctly a dairy breed, that has been comparatively little improved, but the better cows produce 5,000 to 6,000 pounds of milk a year. This is a very hardy breed, and is but little known outside of Ireland, there being hardly a dozen herds in America.

Dexter cattle are also of Irish origin, and are perhaps an offshoot from the Kerry. This is the smallest breed of British origin, bulls at maturity often weighing 600 to 700 pounds and the cows about 500 pounds. These cattle may be all black or all red. They not only produce choice small carcasses of beef, but some of the cows give comparatively large

yields of milk, one English Dexter being credited with 12,000

pounds in a year. These cattle are little known outside of Ireland and England. In the United States there were not over 10 herds in 1917.

French Canadian cattle originated in the province of Quebec, Canada, perhaps 200 years ago. It is a black or black-fawn breed, small of size, comparable with a small type Jersey.

But little has been done in improving this breed.

French Canadian cows produce a fair amount of milk testing slightly above 4 per cent fat.

These cattle are almost unknown outside of Canada.

Dual Purpose Cattle.

Red Polled cattle are native to the counties of Norfolk and Suffolk in England. As indi¬

cated by the name, these are hornless, red cattle. Mature males ordinarily weigh 1,800 to 2,000 pounds, and cows from 1,250 to 1,300

pounds. This is a distinctly dual purpose breed, and is so advocated in America and England.

A milk record of 5,000 to 6,000 pounds a year is quite common, though Jean DuLuth Beauty 31725 produced 20,281 pounds in a year. The milk is a good standard, testing about 3.75 per cent fat. Cattle of this breed incline to be somwhat nervous of temperament, in compari¬

son with Shorthorns. Red Polled cattle are mostly found in eastern England and in the central United States.

Devon cattle originated in Devonshire, south¬

west England, being a very ancient breed. This is a horned, red breed. There are wide ex¬

tremes in type with the Devon, but most breed¬

ers in the United States, located in the East, regard it as of a dual purpose type. At one time this was a very popular breed in America, but is now rarely seen. There are no official milk records for this breed in America. The better cows produce a fair yield of excellent milk.

Brown Szuiss cattle are native to Switzer¬

land, in the eastern section. This is classed as a dairy breed by the American Brown Swiss Cat¬

tle Association, but is really a dual purpose breed, and is so regarded in Switzerland. The color is usually dark brown, with mealy or creamy marking about the muzzle, the udder, inside the legs, and sometimes along over th-e back bone. This is a large, horned breed, with rather coarse heavy bones ; mature bulls weigh¬

ing 1,800 to 2,000 pounds, and cows 1,300 to 1,400 pounds, with many exceeding these weights.

Brown Swiss cows yield under fair conditions 5,000 to 6,000 pounds of milk a year, testing 3*4 per cent fat. The cow College Bravura 2d has a record of 19,461 pounds of milk. These cattle are comparatively little known in the United States.

Statistics of the Number and Distribution of Cattle.

Statistics relative to the number and distri¬

bution of cattle in the World are of interest.

According to the most recent census figures available, the following are the 10 leading cattle producing countries of the world:

Rank

Year of census

Country

Number cattle

1 .

1910

United States… .

64,149,000

2 .

1910

Russia in Europe.

.. 37,369,000

3 .

1912-13

Brazil .

30,705,000

4 .

1908

Argentina .

29,124,000

5 .

1914

Germany .

21,817,000

6 .

1910

France .

14,533,000

7 .

1914

United Kingdom .

12,185,000

8 .

1910

Australia .

11,745,000

9 .

1910

Austria .

9,160,000

10 .

1908

Uruguay .

8,193,000

GUERNSEY (cow)

mi - - .**£*!&.

BRITTANY(Bull)

RED-POLLED (Cow)

BROWN SWISS

HOLSTEIN

WEST HIGHLAND (C ow

DUTCH BELTED

AYRSHIR

Cow

LONG HORN (Bull)

COPYRIGHT, 1912, BY F. E. WRIGHT.

STANDARD BREEDS OF CATTLE

CATTLE

113

The 10 leading States of the United States in cattle interests are the following, based on statistics of the United States census for 1910:
Rank

State

Number

of cattle

Value

1 .

. Texas .

6,935,000

$132,986,000

2 .

. Iowa .

4,448,000

118,864,000

3 .

. Kansas .

3,079,000

80,557,000

4 .

. Nebraska .

2,932,000

73,074,000

5 .

. Wisconsin .

2,680,000

67,475,000

6 .

. Missouri .

2,561,000

72,884,000

7 .

. Illinois .

2,441,000

73,454,000

8 .

. New York .

2,423, 000

83,062,000

9 .

. Minnesota .

2,347, 000

50,306,000

10 .

. California .

2,077,000

52,785,000

The total value of the cattle of the United States as a whole is given at $1,499,524,000.

In 1910, Wisconsin, New York, Iowa, Illinois and Minnesota each had over 1,000,000 dairy cows, New York leading with 1,500,000. At the present date, 1 Jan. 1917, Wisconsin leads in numbers of dairy cattle. The average value of milch cows in the United States on 1 Jan.

1916, according to United States Department of Agriculture statistics, was $53.90, and of other cattle, $33.49. Chicago is the great cattle market of America. In 1917 there were re¬

ceived at the Union Stock Yards, Chicago, 3,209,427 head of cattle having a valuation of $322,256,581. During the past 50 years there has been a grand total of 106,423,963 head of cattle shipped into the Chicago yards, the largest receipts for one year being 3,571,796 head in 1892. The general tendency in the United States is to an increase in

the number of dairy cattle, and a decrease in beef cattle. With increase in population and the development of large urban communities is associated increased de¬

mand for milk. The census shows that from 1900 to 1910 there was an increase of about 20

per cent in dairy cattle in the United States.

The beef supply, however, has fallen off to a notable degree, in comparison with growth in population, so that we are now hardly produc¬

ing enough beef for domestic use. For the 10 years up to 1915 inclusive we have the fol¬

lowing interesting records of export and import trade on live cattle :

	EXPORTS		IMPORTS	
	Number		N umber	
Year	of cattle	Value of cattle		Value
1906 .	584,239	$42,081,170	20,119	$548,430
1907 .	423,051	34,577,392	32,402	565,122
1908 .	349,210	29,339,134	92,356	1,507,310
1909 .	207,542	18,046,976	139,184	1,999,422

1910 . 139,430 12,200,154 195,938 2,999,824

1911 . 150,100 13,163,920 182,923 2,953,077

1912 . 105,506 8,870,075 318,372 4,805,574

1913 . 24,714 1,177,199 421,649 6,640,668

1914 . 18,376 647,288 868,368 18,696,718

1915 . 5,484 702,847 538,167 17,513,175

Economic Factors.

There are various factors explanatory of the decrease in beef production and our export trade. The area of free grazing lands west of the Missouri has largely diminished, many of the large private ranges have been divided and it has not been possible to produce cattle thereon as cheaply as in the past. In the central-west, in the heart of the corn belt, where beef cattle have been fed in great num¬

bers, land values have increased to such an extent that, considering the cost of corn, many have discontinued feeding beef cattle, VOL. 6 — 8

because of the loss involved, or small margin of profit. On the other hand, in the more thickly settled States, many farmers have changed from beef to dairy cattle, owing to the large demand for milk and the greater profit in its production in comparison with beef pro¬

duction. Experimental research in Europe and America, notably by

Lawes and Gilbert of England and Trowbridge-and Eckles of Mis¬

souri, show the dairy cow to be a much more economical converter of products of the field into human food, than is the beef-producing animal. From 100 pounds of digestible matter in the food eaten, according to Jordan, the cow producing 139 pounds of milk yields 18

pounds of edible solids, while the dressed carcass of the steer yields but 8.3 pounds marketable products, of which but 2.8 pounds are edible solids. These figures show about six times as much edible solids in the milk of the cow as in the carcass of the steer, the result in each case from equal amounts of digestible food.

The feeding of cattle involves a wide range of ages, condition and purpose of the animals fed, availability of feeding stuffs and relationship to markets. Extensive experiments, especially in Germany and America, have resulted in es¬

tablishing feeding standards for cattle and other animals under certain conditions of weight and production. The evidence demonstrates that for 1,000 pounds live weight, or fraction thereof, there is required within limitations a specific amount of dry matter, digestible crude protein and total digestible nutrients, showing a certain nutritive ratio. Modern science has provided the stockman with standards of the composi¬

tion of feeding stuffs, as well as feeding stand¬

ards, whereby he may without difficulty feed his animals rations supplying the correct amounts of digestible food for their several needs. At the present day many stockmen make use of feeding standards as necessary guides to intelli¬

gent practice. Quoting the Wolff-Lehman

standard, as given by Henry and Morrison in (Feeds and Feeding,* we have the following illustrative standards for fattening cattle : PER DAY PER 1,000 POUNDS LIVE WEIGHT

Animal Digest-Total

Dry ible crude digestible

Steer, fattening 2 matter, protein, nutrients. Nutritive yr. old on full feed .lbs. lbs. lbs. ratio First 50-60 days… 22-25 2 0-2.3 18.0-20.0 7.0-7.8

Second 50-60 days . 21-24 1.9-2. 3 17.0-19.5 7.0-7.8

Third 50-60 days. . 18-22 1. 8-2.1 16.0-18.5 7.0-7.8

Ox at rest in stall . . 13-21 0.6-0. 8 8.4-10.4 10.0-16.0

Special tables are prepared for dairy cows, in which certain amounts of nutrients are al¬

lowed for maintenance of the body functions, to which is added required crude protein and total digestible nutrients for each pound of milk based on its percentage of fat.

A large variety of succulent feeds, hay or dry roughage, grain and milling by-products are suited to the needs of cattle. Beef calves as a rule nurse their dams six months or more, while calves from dairy cows are taken from their dams in two or three days, and are grad¬

ually changed from whole to skim milk, being fed the latter from three to four weeks of age up to eight months or so. Among the standard foods much in use for cattle in the United States besides pasturage are the following dry roughages: timothy, blue grass, red top, alfalfa, 114

red clover, corn fodder and stover. Of grains we have Indian corn and oats, with a wide variety of by-products from mills handling wheat,

corn, barley, cotton and flax seeds. Sil¬

age, mainly from corn, is extensively used as a cattle feed, both in milk and beef production.

In making up standard rations, dairy cows are fed approximately two pounds of dry roughage or one pound of this and three pounds of silage daily, for each 100 pounds of live weight, with enough concentrates (grain or by-products) to adjust the entire ration to the feeding stand¬

ard. Experimental results have shown that it is good practice to feed dairy cows daily about one pound of grain for each three to foqr pounds of milk produced, cows producing rich milk, as Jerseys or Guernseys, requiring the lesser amount. Fattening steers may be given daily about two and one-half pounds of dry roughage (or the equivalent in silage) and con¬

centrates for each 100 pounds of live weight, the amount of concentrate ranging from one to one and three-fourths pounds for each 100

pounds live weight, based on the degree of fattening.

Extensive losses occur from disease among cattle, of which the more common are tubercu¬

losis, contagious abortion, black leg and Texas fever. Based on figures reported, we have an annual loss in this country from disease, expo¬

sure, accident, etc., estimated at $177,750,000.

The seven most important losses are as fol¬

lows :

Miscellaneous live stock diseases . $41 ,416,000

Blackleg . 27,551,000

Insufficient or irregular feeding . 27 , 196 , 000

Exposure . 21,686, 000

Tuberculosis . 19,197, 000

Contagious abortion . 16,353,000

Texas fever and cattle tick . 10,487,000

Inquiry was addressed to numerous agents of the United States Department of Agricul¬

ture as follows: “For every $100 worth of cattle in the county what would you consider the extent of yearly loss from all causes indi¬

cated above?® replies to which gave an average of $7.11 for the entire United States. See Animals, Domesticated; Dairy Industry;

Cattle, Diseases of; Live Stock, Feeding of; Stock Breeding.

Bibliography. — Henry, W. A., and Morri¬

son, F. B., (Feeds and Feeding5 (Madison, Wis., 1915) ; Houghton, F. L., ‘Holstein-Friesian Cattle5 (Brattleboro, Vt., 1897) ; Hous-man, William, (Cattle Breeds and Manage¬

ment5 (London 1897) ; Linsley, John S., (Jersey Cattle in America5 (New York 1885) ; Lydekker, R., ‘The Ox and Its Kindred5 (London 1912) ; Mumford, Herbert W., (Beef Produc¬

tion5 (Urbana, Ill., 1907) ; Drs. Pearson, Mur¬

ray, etc., (Special Report on the Diseases of Cattle5 (Washington 1904) ; Plumb, Charles S., ‘Types and Breeds of Farm Animals5

(Boston 1906), and ‘Judging Farm Animals5 (New

York 1916) ; Sanders, A. H., ‘Shorthorn Cat¬

tle5 (Chicago 1900), and ‘The Story of the Herefords5 (Chicago 1914) ; Shaw, Thomas, ‘The Management and Feeding of Cattle5

(New York 1909) ; Sinclair, James, ‘History of Shorthorn Cattle5 (London 1907), and ‘His¬

tory of Aberdeen-Angus Cattle5 (London

1910) ; Storer, John, ‘Wild White Cattle of Great Britain5 (London n. d.) ; Vaughan, H.

W., ‘Types and Market Classes of Live Stock >

(Columbus, Ohio, 1915) ; Wilson, James, ‘The Evolution of British Cattle and the Fashioning of Breeds5 (London 1909) ; Youatt, William, ‘Cattle5 (London 1860) ; ‘Cattle and Dairy Farming5 (Government Document, Washington 1887). Charles S. Plumb,

Professor of Animal Husbandry t The Ohio State University.

CATTLE, Diseases of. Contagious

Diseases. — All such diseases are communicable to other susceptible bovines by a microbe of some kind, which may be large enough to be demonstrated by a good microscope, or so infinitesimal as to remain invisible under the strongest magnifying powers (ultravisible) .

But all alike show their generative power by causing the disease in any susceptible animal inoculated, and this continuously so long as new susceptible subjects are presented — caus¬

ing a plague or epizootic. Plagues of cattle present a different problem from plagues of man, in the entire absence of any moral re¬

striction on the available modes of restricting them or stamping them out. Among the early cattle plagues in the Old World, Rinderpest stood out as the most contagious and deadly, practically all bovine

animals exposed contract¬

ing the disease, and nearly all dying. Since the beginning of the Christian era this plague has prevailed in China, Mongolia, Siberia, etc., and extended west into Europe whenever a great ruler was seized with an extension of territory mania, and involving central Europe in war, created a great demand for large army supplies and the movement of great bodies of cattle from the East. Protected by her enclosing seas Great Britain largely escaped. In the war-ravaged 18th century the resulting losses in Europe were estimated at 200,000,000 head. In the 19th century active commercial intercourse largely displaced war as a cause, unduly tempt-ting corrupt and corruptible dealers. In the 18th century Great Britain, writhing under her unwonted losses, fell back on the rational de¬

vice of quarantine of infected districts and slaughter of the herds, with indemnity to the owners, and, though the effect was slowr under the varying earnestness or intelligence of local authorities, the plague was eradicated. Britain's next invasion (1865) was through a cargo of cattle from Reval, Russia, and spread rapidly through the island, causing ruinous losses, until stockmen could be educated anew to the con¬

ditions, after which it was easily stamped out, as it had been a century before. Again and again (1872 and 1878) it invaded Britain through her active commerce, from Russia and Germany, but the country already instructed and prepared made short wrork of it.

Another pest, lung plague of cattle, invaded the British Isles through the Dutch trade (1839) and prevailed until 1898. Being 26 years before the 19th century experience with Rinderpest, and of slower progress and less fatal, stockmen remained long obtuse to the danger and tem¬

porized with the plague, trusting largely to inoculation from the diseased lung into the tip of the tail, where, in the absence of abundant connective tissue to accommodate the phenom¬

enally large liquid exudate throwm out into the inflamed structures, the lesion remained cir¬

cumscribed and the system at large had become CATTLE

immunized before the ultravisible germ reached the lung, its natural habitat. Though success¬

ful in immunizing and saving the inoculated herd this virtually spread the disease-germ —in the buildings, yards, pastures, manure, fod¬

der, etc., of the animals operated on and the pest was kept alive for 59 years, until more thorough and radical measures were adopted.

Lung plague was imported from England

into Brooklyn, N. Y. (1843), into New Jersey (1847) and into Boston, Mass., from Holland (1859). The New Jersey importer stamped it out by promptly killing the whole herd; the Massachusetts authorities cleared that State by killing all infected herds at a cost of $77,511.07

for indemnities. The Brooklyn outbreak per¬

sisted for 49 years, extending into New Eng¬

land, New York, New Jersey, Pennsylvania, Maryland, Delaware, District of Columbia, In¬

diana, Illinois and Wisconsin. In 1887, when the National Stock Yards, Chicago, became in¬

volved, and the whole continent was imminently threatened, a campaign for extinction was started. In three months the plague-stricken Chicago and Cook County were cleared, and by 1892 the United States was once more free, though at a heavy cost in cattle. For long this outbreak failed to spread widely because the cat¬

tle traffic was practically all eastward to the large cities on the

Atlantic seaboard, and this plague was finally carried West by a comparatively new but considerable traffic in thoroughbreds, and in calves sent to replace losses in the Western herds. This but repeated the Old World experience that in countries breeding their native stock, as in Spain and Portugal, Norway, Scottish and Welsh Highlands, cattle remained long free from this and other plagues.

The same is true of the Channel Islands. It strongly emphasizes the necessity of stopping the movement of all stock, and even men, in dis¬

tricts where a deadly pestilence prevails, of kill¬

ing all infected herds (sick and well) and of thorough disinfection of the carcasses, manure, litter, fodder and articles of all kinds that can by any possibility carry infection. The writer found that sterilized exudate from the diseased lung, when injected under the skin, immunizes such animals against attack on exposure. If prepared without possibility of survival of the living germ this is entirely safe and harmless, but the probable escape of the live germ, ex¬

cepting in the most careful preparation, forbids its general use. In case of high class cattle and under skilful supervision it may be profit¬

ably used on an already infected herd, kept absolutely separate from others.

Foot and Month Disease. — This has been repeatedly introduced into the United States in cattle, sheep and swine, and by cowpox virus, and has secured a wide and threatening prevalence on different occasions. It is per¬

haps the most contagious of cattle diseases, and since other cloven-footed animals (sheep, goats and swine) are about equally susceptible with cattle, and other warm-blooded races and man are only slightly less so, it has at times caused much apprehension and dread ; veterinarians have pronounced it dangerous and fatal, and government authorities have enjoined that all infected animals, herds and flocks be promptly slaughtered and the places disinfected. It is, however, one of the mildest and least fatal of cattle diseases, proving lethal only when the infection has been swallowed in the food (milk, water, soiled fodder, etc.) and has set up the diseased process on the alimentary canal (stomach, bowels). As usually occurring it shows itself in isolated blisters one-third to one inch in diameter on the mucous membrane of the muzzle, lips, cheek, tongue and throat, on

the teats and between the hoofs (extending up in front and behind). Each blister shows but one undivided sac filled with a clear serum ,(a cowpock of about the same size is separated by internal partitions into a number of separate sacs and must be pricked again and again to empty it). The disease has a period of incuba¬

tion of from two to eight davs in cold weather, followed by some dullness in appearance and rise of body heat, a pink color of the membrane of the mouth, heat and some tenderness of the teats and between the hoofs, and soon move¬

ments of the jaws, accumulations of white froth in masses around the lips and a driveling of liquid saliva. A loud smacking usually follows caused by gaping, parting of the lips and sep¬

aration of the tongue from the roof of the mouth. The simultaneous attack of the whole herd and the concentration of the lesions on the three points named make a characteristic picture. The implication of sheep, goats or swine in the same building, yard or road is equally striking. The rule is that when kept clean, fed soft, sloppy food and treated with mild antiseptics, the patients improve rapidly and are well in 14 days, and after an attack they can be considered immune for a length of time. They may have a second attack a year later. As reassuring data it may be stated that in the United States, and in Great Britain it was the rarest thing to have a death occur. McMinn's cattle insurance statistics, cov¬

ering long periods of prevalence of the plague, give not a single reference to a death. The writer's experience, having lived on a Scottish farm in his youth, was that feeding cattle, bought in the fall market, usually brought the infection with them, passed through the attack in the first fortnight and recovered without excep¬

tion ; and that the next spring crop of calves lived and throve without any sign of the mal¬

ady, 'even in cases of neglect of disinfection.

The infection became inert when dried for 24

hours at 88° F., but remained virulent for nine months when kept at 32° F. (Loffler). It in¬

fected men wffio consumed butter and cheese from infected herds; others have eaten this without harm, but these were in infected dis¬

tricts and the experimenters were veterinarians with ample previous opportunity for exposure to the disease and consequent immunization. It should be added that the outbreak of 1870, imported in English cattle landed at Levis (Quebec), which spread through Quebec, On¬

tario, New York and New England, showing its virulence by sparing no bovine in any herd it entered, and extending to swine, sheep and human beings as well on the farm, ran its usual Old World course of two weeks, then subsided for lack of susceptible subjects, and, on the coming of spring and the fresh crop of calves, it failed to attack any one of these.

There had been no killing, not even an official quarantine ; onlv the owners secluded the stock as usual in winter quarters, and this allowed time for the spontaneous death of the germ.

Again, the New England outbreak of 1902 from 116

contaminated cowpox virus occurred, like the Quebec one, in the fall, and should have had an equal chance of dying out quickly but for the fact that it involved a number of large dairies supplying milk to Boston and other big cities and that it was officially subjected to compulsory slaughter, so that dairymen at¬

tempted to hide the existence of the malady as far as possible to prevent the ruin of their milk business, their chief or only source of livelihood. The animals were huddled in close, unsanitary quarters, too often along with con¬

cealed manure, and thus contracted secondary diseases from septic infection of the sores, which rendered the affection much more com¬

plex and injurious. The outbreak and these results lasted until May 1903, seven months after the Federal government took the matter in charge (or a year after the first circum¬

stantial report of the existence of the pestilence in the State). This outbreak is in most marked and unhappy contrast with the experience of the simple disease in Scotland, Canada, New York and New England in 1870; also with a number of more restricted outbreaks in which

newly imported cattle were kept until they had passed through the disease and recovered.

Prevention, Exclusion. — For any disease like this, exclusively microbian, always requir¬

ing importation to start the first case in any outbreak, non-fatal, lasting but two weeks, with microbe easily sterilized, the cheapest and most efficient resort is still to exclude it absolutely from the country by preventing importation.

All warm-blooded animals must be shut out because these can contract the disease under favorable circumstances and can harbor the microbe causing the affection and convey it to other susceptible animals. This would of neces¬

sity shut out not only warm-blooded animals, but also their products : hides, horns, hoofs, hair, wool, bristles, feathers, down, bones, meats, dried muscles, tendons, sausage cases, extracts of all kinds made from such animals, wet or dry, blood, manure, virus, bacterins, miscalled vaccines, real vaccine (cowpox vari¬

ola) and all other products that could convey foot and mouth disease. It would also exclude immigrants, and especially stock men, and those with soiled clothes until these were sterilized by heat. This is confessedly a large order, but we have already suffered through these chan¬

nels and are liable to suffer again and again while present methods continue. Which then is better : to make our own products at home, or to stamp out every few years a pestilence threatening all of our 90,000,000 head of cattle that it can reach, and their yearly offspring, until the pest is thoroughly extirpated? An alternative would be to detain all such im¬

ported animals and animal products at the port of arrival, quarantining the former under the most rigid and inflexible rules for one month, or more if needed, under constant pro¬

fessional supervision ; and sterilizing the latter by heat or by thorough disinfection before they were released. The mere exclusion of live imported cattle or their safe seclusion after arrival would be open to continual accidents and loophole escapes. Birds, insects and even vermin would open the way for escape of in¬

fection. The efficacy of a perfect quarantine and disinfection was evidently recognized by the Federal officials, who, under the urgent protest of the owners of thoroughbreds then on exhibition in the Chicago International Cattle Show, retained the whole exhibit for a length of time and after disinfection finally released them. But inconsistently enough a highly valued thoroughbred herd outside the city was ruthlessly slaughtered ; and again, when the Chicago Stock Yards were closed, several days' grace were allowed so that stock unexpectedly caught there could be disposed of.

As might be expected the disease made its way in several new directions in the interval.

A costly and irremediable result of the slaughter of some of the best stock in the country lay in the sudden removal of priceless cattle that it had cost lifetimes to secure and the rendering impossible of the birth of their equally priceless prospective issue. It was a deed that could in no way be claimed as wise foresight, loyal patriotism nor devotion to the interests of live stock improvement or national prosperity. Official reports of cattle killed and paid for (1902-03) in the New England in¬

vasion were $179,572.37. For that of 1908 re¬

ferred to above the charges for cattle killed were $376,785.39, but these do not take into account the other losses to the stock owners, the interruptions, often permanent, of business connections and enterprises, the outlays made imperative to establish new lines of trade, the losses incident to restocking (when the old stock could have been profitably retained) and the certain loss of all prospective issue of the stock needlessly killed. The officials have sought to excuse their actions by quotations of heavy losses in dairy cows kept day and night in close, offensive city stables, the empty stalls being promptly filled from city markets charged with infection, and again of others from Ger¬

many, where, in addition, every city maintained its Freibank for the sale of defective meat at a cheap rate, and through which there was inevitably a continuous distribution of infection.

Treatment consists in scrupulous cleanliness and dryness, with the use of healing lotions weak enough to be non-irritating — alum, borax,

copperas, blue stone, aniline blue, forma¬

lin, hypochlorite of lime (bleaching powder), or, better still and cheaper, the Carell-Dakin's combination of lime hypochlorite (30 per cent chlorine), ounces put in a bottle with 5

quarts water and shaken often for 6 hours ; 2 ounces dried soda carbonate and 1ˆ2 ounces bicarbonate of soda in 5 quarts water put in a separate bottle, well shaken and set aside for 6 hours ; add the two liquids together, shake well for some minutes; set aside for one-half hour; siphon off the surface water without dis¬

turbing the precipitate ; filter through paper and use.

Immunity. — Viewed broadly, this consists in invulnerability of a living body to the attack of a microbe. Such resistance may apply to a particular microbe or many. Every race of animals shows a susceptibility to its own mi¬

crobian enemies and insusceptibility to others, and where the latter is very pronounced the blood or other serums may often be used on other susceptible races to confer a measure of immunity. But this is not an invariable result ; one animal, with a strong vulnerability to a given microbian affection, when it has once passed through that disease and recovered, shows an equally potent acquired immunity

when again exposed to it. Another animal which naturally shows a strong tendency to suffer from a microbian or other protein poison when once it succumbs to it will show a far greater and more dangerous proclivity when exposed to it again (anaphylactic). This is the exact op¬

posite of immunization. Observation and ex¬

perience must guide as to the result to be ex¬

pected from the use of any microbian or protein poison on an animal

of a given race and in given conditions. The tolerance or intolerance of a given race, or animal, to a microbian poison cannot be asserted until one knows the action of that poison on that race and the his¬

tory of that particular animal as regards pre¬

vious infection, immunization and exposure.

Vulnerability is also liable to be affected by age, by food and by other proteins generated in the body or outside of it. Rats confined to an exclusively animal diet become highly resist¬

ant to anthrax. Algerian sheep bred for long ages in a highly anthrax district now retain a surviving race immune from this disease, whereas elsewhere flocks are quickly cut off in an anthrax environment. Pigs, dogs and fowls (meat eaters) are highly resistant to anthrax, but subjected to a low temperature they succumb readily. The animal food of sucklings largely protects them from diseases to which they are obnoxious when put on a weaned diet.

Some proteins which are highly injurious to man and animals when injected directly into the veins are habitually eaten by the same and prove harmless, once they have been digested by the stomach secretions and absorbed through the gastric mucous membrane. As examples of other poisons which greatly increase sus¬

ceptibility to disease we have the effect of lactic acid, of the sarco-lactic acid developed in the muscles of an animal subjected to hard work and of phloridzin, which greatly increase the virulence and mortality of anthrax. These must serve to illustrate the many loopholes (known and still unknown) which interfere with disease-products in dealing with contagion and in immunization. And yet, where appli¬

cable, such agents act with a success that may be considered almost magical. No known resort is more reliable in appropriate cases, and with care many of the pitfalls can be avoided, while if the protective or curative agent can be taken from the already infected herd and from no other, we safely escape any blunder in diag¬

nosis and the far greater risk constantly present in using commercial products made in labora¬

tories, where they may come from a far differ¬

ent disease, with an utterly different microbe, products, therefore,

which are useless for the disease in hand and even likely to introduce and disseminate the germs of a second malady to complicate the problem we have to meet and add perhaps materially to the mortality. Our repeated unhappy experiences in the importa¬

tion in cowpox germs of an admixture of those of foot and mouth disease should settle for all time the safety of autotherapy from the herd itself and make it first choice oyer the uncer¬

tain and dangerous commercial laboratory products. If taken from the infected herd itself and applied to it, it cannot introduce any new and redoubtable infection, and if the ex¬

isting infection is that of a contagious and self-limiting disease there is every reason to expect that the attack will be shortened and quickly ended. In the case of foot and mouth disease, or any other mild, non-fatal and short¬

lived affection, every animal would be at once put under the sway of the poison, all would recover simultaneously, the herd would be released at an earlier date and any danger to other herds would be at an end.

The process of immunization is confessedly a complex one. If effected through the agency of the antibodies (defensive agents) found in the healthy blood and tissue cells of the sound animal body charged with the duty of protect¬

ing the body when assaulted by the poisons (toxins) produced by the invading microbe (of which a large number have been identified and named), also by bodies that tend to devitalize and destroy the invading microbe, the case is simplified somewhat. These defensive products, in small amount at first, go on increasing in quantity and potency as the disease progresses, and, in favorable cases, the patient recovers.

The body and tissue cells having passed through this extraordinary stimulus to produce these defensive products in excess, continue the same work indefinitely (sometimes for life) and protect the system from any new attack.

If on the contrary the invading organism is too potent, or the system is too feeble to react sufficiently, the victim is doomed and perishes.

We see the working of this defensive re¬

action in all the lesser physical ailments and injuries which have not been habitually classi¬

fied as contagious. This protective power im¬

planted at birth is really the great healer, and the surgeon is condemned to stand by as an assistant, soothing by quiet rest, a suitable posi¬

tion or support and checking infections that fall on the wound, while the body itself per¬

forms the cure through granulating tissue and perhaps with earthy salts (as in broken bones) drawing together the gash in the skin, firmly knitting the broken bone, *etc.* It was in such surgical cases that the auto-cure by the de¬

fensive powers of the body for long main¬

tained its highest reputation, largely because the seat of the trouble could be so thoroughly reached by non-irritating antiseptics, but in too many cases it is prudent to see that the potent powers of the defensive cells against microbian invasions should be no less availed of. Before the days of self-immunization as a medical weapon it was familiar to see poll evils and fistulas of the shoulder, withers and elsewhere persisting for many months, often fed by con¬

tinuous additions of infection from local sources, which to-day would recognize the potency of nature's healer and of the pus dis¬

charge from the open sore (sterilized). So, too, when pus infection from an unseen source keeps up a constant succession of pustules, boils and other surface suppurations, the auto-cure will often restore the balance and strongly contribute to a recovery. In foot and mouth disease, cowpox and vesicular sore mouth, _ of approximately the same period of incubation and duration, and equally mild and non-fatal, the auto-cure is plainly invited. No high mor¬

tality demands slaughter. There are always a few days' delay before such cases are reported ; with a large herd a few days are needed to prepare for burial; the disease has meanwhile reached its height, and, left to itself, recovery would soon have been far advanced. Nothing is

to be gained by killing — not even time; the 118

heating of the saliva for half an hour to 21 2° F.

in a suitable apparatus will insure sterilization so that, in the absence of all living germs, it can be used with full confidence of safety, and even in other diseases (spore-forming), and therefore liable to infect premises and soil, it is only necessary that the virus shall be sub¬

jected to repeated heatings with intervals of 12 to 24 hours to allow for the sprouting of the spores to form microbes, and a sterilized product is obtained.

A list of the more common contagious dis¬

eases is here given, indicating their adaptability or otherwise to the employment of autotherapy : (1) Cattle pests too contagious and fatal to admit safe autotherapy : Rinderpest, canine madness, chronic bovine dysentery (Johne's disease). For these the cheapest, safest and most effective resort is to stop any movement whatever of animals of any kind within a very large area around the herds known to be in¬

fected, to kill the infected herds, to burn or bury the carcasses and products and to thor¬

oughly disinfect the premises, pastures, *etc.*

(2) Cattle pests in which the genus are pre¬

served in dead tissues of the living body, caseated or pus products, etc., to spread the malady after recovery : Lung plague, calf diph¬

theria, tuberculosis, gangrenous coryza (cold in the head), catarrh of the nasal sinuses, caseated lymph glands, anthrax, foot rot. In these autotherapy should be used only under careful restriction and good judgment. (3) Cattle pests in which the germs survive indefi¬

nitely in air, earth or water, to spread the affection later: Anthrax, black leg, tetanus (lockjaw). In these the cattle operated on are likely to prove immune, but susceptible animals coming on the lands later, by birth or from outside, are liable to suffer and start a new outbreak. Flere autotherapy protects the ani¬

mals on the ground, but efficiency demands quarantine, drainage (drying the land), and, for a length of time, seclusion of the area from other live stock. (4) Cattle pests that are not self-limiting (self - immunizing) . Here the disease may show itself a second time in animals treated by autotherapy and may spread to other susceptible or new-born animals, the beginning of a fresh outbreak : Poll evil, fis¬

tulous withers, foot rot, chronic tuberculosis, deep-seated pus pockets having no sufficient dependent outlet, chronic intermittent bovine dysentery (Johne's disease), cancer, actinomy¬

cosis, etc., which, like syphilis in man or glan¬

ders in the horse, may persist for months or years in the same animal and steadily infect others. The danger of such a disease is sel¬

dom clearly appreciated by the owner because the animal spreading it appears to suffer so little. But in such chronic cases the germ carrier has become largely immune or the deadly germ would have cut him off long before, and his individual invulnerability gives him a long opportunity to spread the germ he bears, and thus to become incomparably more destructive to other and more vulnerable sub¬

jects. By this means such splendidly benefi¬

cent enterprises as Pasteur's method of im¬

munizing and saving the life of the already infected victim of hydrophobia has, for lack of necessary accompanying precautions, appar¬

ently become the means of preserving and spreading the germ of this most deplorable affection to which man and beast are so gen¬

erally susceptible. From 1868 to 1878 and later mad dogs and hydrophobic men were alike unknown in central New York, while since the Pasteur laboratory was established mad dogs have been common through the

country as they were earlier in New York city, and there has been no

lack of human patients at the laboratory. The same is true of France, the country made famous by Pasteur's skill.

The Pasteur laboratories have failed to ex¬

tirpate mad dogs or to save people from their bites and canine and human victims have been plentiful in France, while in Great Britain, Australia and other nations, where effective muzzling of dogs is secured, mad dogs and candidates for hydrophobia treatment are alike unknown. It is for the objector to explain why. It is not for us to abolish at once the Pasteur laboratory, but to see that its patients are not allowed to leave the institution and mingle with the general public immediately on completion of the series of injections of the living germ and while that microbe is still alive in their systems. It is equally essential that the strict muzzling of all dogs be enforced (not simply placed on the statute books) until long after the last case of hydrophobia has been effectually disposed of.

In all such cases autotherapy by the steril¬

ized virus is the rational and safe resort.

Tick Fever (Southern Cattle Fever). — In the splendid enterprise of extirpating this by dipping again and again, all cattle in the in¬

fected district (embracing whole States) arc cleared. But as a means to this end the cattle of a district were driven at regular intervals to a place where the baths had been con¬

structed, dropping there and on the roadways the eggs of the liver fluke (Distoma hepaticum and lanceolatum) , thereby infesting the land, the water and slugs and laying the foundation for a plague of flukes in the locality, a con¬

tinuous infestment of the farm animals, a de¬

preciation of values and ruinous losses in sheep especially, and only less so in cattle, pigs and other mammals. Similarly, the opportunity was given for stocking the land and water with germs of anthrax, black leg, tetanus and other plagues, the germs of which survive outside the body. See Cattle-tick.

Tuberculosis. — ‘The most widely prevalent and intractable plague of animals, largely be¬

cause it is often concealed through lack of obvious symptoms, through the variety of or¬

gans attacked in different animals, so that the victims may appear to be in rugged health and yet continually spread the germ. Many of them can be easily traded off on an unsuspect¬

ing customer and will go on unsuspected in the new herd dealing their deadly gift all around, and especially to pigs, through feeding in common or in succession with cattle. In hidden cases germs are preserved in the hard, fibrous tubercle, in the softened and caseated masses and even in partially calcified ones, and, finally, there is no effective legislation nor ad¬

ministration for its suppression. Tubercles ap¬

pear in the throat, the lungs and their covering, on the inner side of the ribs and spine, on the heart and pericardium, on the generative or¬

gans, stomach, liver, pancreas, peritoneum or in any gland or gland group throughout the body (superficial or deep), in bones or joints,

in the brain or its coverings — indeed, any¬

where throughout the body. The majority in an infected herd may escape detection unless the tuberculin test is applied to all. The most simple procedure is to put a drop of tuberculin under the lower eyelid in each animal. If next day that eye is red, inflamed and watering while the other eye has escaped, there is good ground for suspicion and all animals showing this should be separated from others and at once, or better, after a week or two, should have a half-dram of tuberculin injected under the loose skin of the neck or side. The tem¬

perature of each animal taken just before the test to give a normal should be recorded and after eight hours the body temperature should be taken every hour for 12 hours. Any rise above the normal from 103.5° to 106° F. would condemn any subject that had also showed the congested eye. All such should be killed if the aim is to stamp out the disease. The cow-stable should be disinfected with good, fresh bleaching powder, together with mangers, racks and drinking troughs. The remainder of the herd should be tested yearly or half-yearly and reactors removed and killed.

In case of thoroughbred reactors, valuable mainly for their high-priced calves, they may be kept in thoroughly secluded premises and well-fenced pastures, their calves should be taken from them as soon as born and brought up on the milk of sound cows (or on their dams', first thoroughly sterilized by boiling).

Such calves should be kept rigidly apart from other animals, in disinfected premises and safely fenced pastures. They should be tested when one year old.

Protozoa are microscopic (or ultramicroscopic) animal parasites, as bacteria are minute vegetable parasites. Some diseases, above re¬

ferred to, are caused by protozoa in the blood, lymph, tissues and liquids of the host, and others, especially tne ultravisible, have been suspected of belonging to this class ; blackhead in the turkey and the cluster masses of cells (Coccidia) on the skin and in internal organs of birds and mammals, amoebae of the intestinal contents, pirosoma (piroplasma) of Texas (tick) fever and the small piroplasma of the Rhodesian East Coast tick fever. Suspected of being protozoa are the ultravisible germs of hydrophobia, hog cholera, foot and mouth disease, lung plague, rinderpest, cowpox, sheep-pox, contagious cerebro-spinal meningitis, chicken pest, contagious epithelioma, *etc.*

Some of these have been treated by weakened germs (unsterilized autotherapy), but where they are extremely fatal and controlled very uncertainly by the mitigated virus it is more rational to employ the sterilized germ, blood and antitoxins, *etc.* (sterilized autotherapy), rather than to run the risks of mistaken diag¬

nosis and the resulting introduction of an unknown disease.

A widespread family of pathogenic protozoa (Tripanosoma) have eel-like, mobile bodies, with a delicate undulating membrane at one side running into a fine antenna at the tail.

They are found mainly in the blood and animal fluids, but also in the tissues, and can live out¬

side the body. They are found mostly in warm climates, but have no difficulty in surviving, our North American winters when domiciled in a warm-blooded host, as in the case of the breed¬

ing paralysis of horses, which has assumed a place in our studs. This demands castration of both males and females when affected and re¬

manding them to work service by themselves.

A progressive anaemia is common to all forms of tripanosomasis. They are largely carried from victim to victim by predatory flies. Hence they can be checked to a large extent by destruction of insects.

Larger Parasites.— These are usually large enough for recognition without the microscope.

Like the microbes they are amenable to control or extinction in a district or country, thereby extirpating the diseases which they respectively cause. Each parasite must, however, be dealt with on the basis of its own genus and life habits.

Vegetable Parasites. — ‘The cryptogams (non¬

flowering) are allied to bacteria but larger, often quite visible to the naked eye. Fungi attacking the. skin, hair, hair-bulbs and follicles are common in cattle, especially about the head and neck, showing as circular masses of scurf with loosening and dropping hair, leaving bare patches (ringworm). Microscopic examination shows fine filaments and spores, and the bare patches enlarge by extension around the edges.

These are unsightly, but not deadly, and can usually be checked by

pulling out or shaving the hair and applying tincture of iodine or an alcoholic solution of bluestone, repeating this daily. Another filamentous fungus of a snowy whiteness (Fusarium) attacking the skin of domestic animals (including cattle) is overcome by sulphur or coal tar ointment. Thrush of calves' mouths with formation of a filamentous, curd-like accretion, as in children, is to be treated by boric acid or chlorate of potash (powder or solution). The aspergillus of the air passages in mammals (including cattle) causing wheezy cough and breathing, fever and general disorder and an eruption on the bron¬

chia, lungs, pleura, etc., at first as if sprinkled with water, but later with nodules and caseated masses filled with filaments and spores, and death as in acute tuberculosis, is to be met with antiseptics such as fumes of sulphur and alcohol burning in a close room till it causes cough, and repeated two or three times a day. A solu¬

tion of bisulphite of soda may be injected into the windpipe. The walls of the building should be cleaned and thickly coated with a watery solution of bleaching powder.

Animal Parasites. — Two-winged flies (Dip -

tera), larva in wounds: The most prevalent and persistent enemies are the common house flies and near allies, which are not blood suckers. Without perforating stylet they suck off the scurf-skin so as to leave raw surfaces and make spreading sores. The horn fly is a familiar example of this. The maggot-like larvae, like those of the blood suckers, live in almost any decaying organic matter (animal or vegetable) that attracts by its fetid odor.

Suppurating wounds and sores attract them and the ravenous larvae add to the sores in depth and width. These are particularly de¬

structive in sheep infested with intestinal worms and scouring, so that the liquid discharges mat¬

ting the wool make a special protection and feeding ground for the maggot. . The blood suckers are, however, the most irritating by drawing the blood through the stylet; they often transfer the most dangerous diseases, an 120

evil that is not unknown in the case of the flies that suck only. Botflies pass their larval stage mostly subcutaneously in cattle in spring (in fall and winter they are usually near the gullet, being apparently licked in from the skin by the barbed tongue and swallowed). When numer¬

ous they do much damage to health and hide, the loss rising to $15 a head. These grubs should be squeezed out and crushed in early spring to head off the next year's crop.

Mosquitoes and Small Black Flics deserve mention. Their bite is venomous and they may besides implant in the wound the germ of another disease from the blood of the last victim. It is common to cover drinking water by a film of kerosene to destroy their larvae (wrigglers).

Fleas are common enemies and carry disease.

Some carry larva of tapeworms to their next victims ; others infections. The tropical bur¬

rowing flea gets under the skin, forming a hatching nest and suppurating sore. The eggs, larvae and pupae hide in furniture, clothing and even on filthy skin where they can find decaying organic matter for sustenance. Keep buildings scrupulously clean, boil clothing and use freely insect powder, creolin, laurel oil, tar water and even sticky paper to catch the offender in his leaps. Lice are among the most widespread and health-destroying pests. Cattle harbor two kinds, blood suckers and biters. Blood suckers prefer parts covered with long hair and best out of the way of the tongue (head, neck, back, tail). Itching leads to persistent rub¬

bing, and hairless patches indicate the inva¬

sion-areas. The safest remedies are weak tar or tobacco water, decoction of hellebore or stavesacre and naphthalin, though the latter will taint the milk. A second dressing is due in eight days to destroy the new crop hatched from the nits in the interval. Ticks and Mites are eight-legged insects (larva has but six legs), and form large classes,

always injurious when attacking in numbers, which they do on the skin or in internal cavities. They develop through four successive stages : eggs, larva (hexapod), nymph (octopod) and mature.

The larva attacks the mammal and lives on it until mature. Some ticks {Argus) generate a deadly venom and instil it into the victim.

All produce some irritation and swelling where they bite. But they do most harm by trans¬

ferring deadly infections and infestments from animal to animal, as in Texas fever, which long prevented the success of cattle industries in the South and created one of the most deadly epizootics when taken North. This last tick is now being exterminated in State after State in the South, though with imperfect pre¬

cautions to prevent diffusion of other diseases, like anthrax, black leg, flukes., *etc.*

Mites like ticks can carry infection, though in its absence they usually depreciate health, condition and value by irritation. The harvest mite of a dull red color, and an European one of a brilliant crimson, produce great irrita¬

tion for several days, or continuously if the victim goes daily through vegetation. Pro¬

tection is sought by indoor life, by solutions of tobacco or hellebore or by sulphur.

Scabies in man, Mange in cattle are due to any one of various Acari, the burrowing ones (Sarcoptes from Sarx flesh) boring into the skin or sweat-glands, and the others living on the surface, under scurf, scales or scabs.

(Psoroptes Psora itch and Symbiotes live to¬

gether). The mange acari are very prolific, reaching 7,500,000 from a single pair in six generations, 60 days. They can be treated by sulphur or hellebore ointments, naphthalin, potassium sulphide or by simple oil inunction — ‘the oil being applied to the right and left sides of the body on alternate days. Tape¬

worms. These are flat worms consisting of a succession of segments the first of which bears the small head with four suckers on the cor¬

ners, and a proboscis in some species bearing hooks for attachment to the mucous mem¬

brane. Each segment is bisexual, and when mature is a mere bag of eggs. The embryos hatched out, each bores its way into the tissues of its new host, forming the bladder worm or scolex, and the next host devours the scolex which then grows into the mature tapeworm.

If it fails to enter a suitable host it perishes.

But the two hosts usually live in numbers close together, and as each feeds on the products of the other, it follows that the worms multiply so as to cause most deadly plagues in flocks and herds. Cattle harbor in the bowel the following tapeworms : the serrated tapeworm, unarmed, 8 to 15 inches long and 54 inch broad; the broad tapeworm, unarmed, 12 to 18 feet long, segments showing a waving posterior border; the white tapeworm, 18 inches to 7

feet long, 10 to 12 mm. broad, unarmed; in tissues, the narrow-necked tapeworm (diving bladder worm) which becomes the mature

Taenia Marginata in the dog; the Coenurus Cerebralis (rather rare) in the brain which passes into the Tsenia Coenurus in the dog, and the Echinococcus Cyst which is the Tsenia Echinococcus in the dog. Echinococcus being a well-known disease in man, to the ox belongs the odium of forming a link in the chain of its survival. Treatment: after a few days' fast give powdered male shield fern or areca nut, 54 to 1

oz., to the host of the mature tapeworm with an active purgative (Epsom salts 1 to 2 lbs.).

Liver Flukes (Distoma Hepaticum), Y\ to 1 inch long, and Lanceolatum , 54 inch long, are flat, leaf-shaped parasites found in the gall ducts of cattle or of other domestic animals, and the latter of man, near ponds, swamps and wet lands, where there are fresh water snails that harbor the undeveloped fluke as a sporo-cyst. The successive stages of development in the fluke are: (1) The egg in the droppings of the host; (2) the embryo, a flat organism, like a microscopic fluke in

fresh water; (3) the Sporocyst in a fresh water snail; (4) the Redia again floating free in water; (5) in summer often Daughter Redia; (6) in autumn, Cercaria encysted on stems of water plants ; (7) these grasses being eaten by mammals the flukes are set free by gastric digestion and pass into the first intestine, and thence into the gall ducts to form the mature flukes. It seems as if the risks of such a long chain of changes would arrest the increase or even -

annihilate the fluke, but in wet soils with abun¬

dance of fresh water snails, and heavy stocking with sheep, cattle or swine, the parasite pros¬

pers and multiplies, and the fluke plague is constantly increased and extended. The vic¬

tims lose condition, become anaemic and weak, dropsical in lower parts of the body and inter¬

nally and die. Prevention is not to be sought CATTLE

by withdrawing all stock from the land when the products of the soil are so precious. Thor¬

ough drainage is the true alternative and until the land is well dried the cattle and sheep may be confined to dry areas or indoors, by the disuse of all fresh water supplies, the charg¬

ing with sea salt of all retained drinking sources, the adoption of silos and well-salted ensilage, or well-salted dry food when ensilage is not in use and the liberal salting of all re¬

tained pastures (as far as possible without stopping their growth). These are the funda¬

mental precautions needed. The 30,000 eggs deposited at one laying of the fluke constitute a terrible risk if any loopholes are left. Every precaution must be taken to see that no fluke-infested animal can escape to spread the pest on wet lands as yet free from its curse. A census of fluke carriers may be kept and the victims restrained from

traffic (except for im¬

mediate slaughter on the premises) unless first cleared of the parasite. Even the gathering of live stock for sale, market or for some other sanitary object, though called under gov¬

ernment control, cannot palliate the evil done or rendered possible. Frogs and toads have been cultivated in the waters of Hawaii, and carp in the Columbia River, to combat suc¬

cessfully the snails and slugs that form such an important link in preserving this parasite.

Other flukes found in the first stomach and intestines of cattle have rarely proved especially injurious. It is different with the Bilharzia Crassa which produces white, albuminous urine in man, and is charged with causing Epizootic Hematuria in cattle. The giant-fluke of lungs and liver of sheep and cattle encysts itself, causing dark red nodules. Fatal results are common when they are numerous. Prevent and treat as for other flukes.

Round Worms. — These are cylindrical, have true digestive organs and the sexes in two separate individuals. Some produce live young, some through eggs laid, some like Trichina pass their immature life in one host, which being eaten by another goes on to maturity in the latter; others pass through both stages in the same host; some again pass immature life in water outside the mammalian host. Cattle harbor from 15 to 20 species of round worms, a number of which spend their entire life in one host and leave their progeny in the same for the next generation. Some therefore must be treated with vermifuges given to the host, others may have their career cut short by removing the intermediate host that harbors the immature parasite, or the water which favors the survival of the young worm out¬

side. Great factories flourish on medicine intended to destroy the mature worm in its mammal host, which is too often but a closure of the spigot to let the vessel gush at the bung-hole. Worms resemble contagious diseases in this, that they must be destroyed both outside and inside the host wherever found. Much depends on where in the body the worm makes its habitat. If in the solid tissues or even in the blood, it is less effectively reached by medicine; if in the lungs gases and vapors (non-poisonous to the host) are often the most promising

agents, and even in the case _ of worms living free in the bowels, the multiple stomach of cattle and other ruminants en¬

dangers the dilution and weakening of the drug to an extent that is not met with in the small simple stomach of horse, man and other non¬

ruminating animals. All round worms living in the alimentary tract impair digestion and absorption of the foodstuffs by their move¬

ments and the consequent irritation, as well as by consuming of nutriment needed by the host. The bloodsuckers irritate still more by the many punctures and undermine the health by the amount of blood extracted. Some even secrete poisons that destroy the blood .func¬

tions, or even break down blood globules and with them health and vigor. The eggs of many worms fall with the excretions and live in the soil or in water for a year, so that on pastures they are liable to continuous increase, unless all hosts of that worm are excluded for years, or, better, unless ploughed up and put under cultivated crops for years. Among round worms living in the tissues of cattle may be named a hairworm inhabiting the eye and the serous cavity of the abdomen; the encysted trichina in muscles (rare in cattle) ; a hairworm in beautiful zigzag lines in the mucous membrane of the gullet and many em¬

bryo worms in the blood. Among those living in the bowels : one whipworm in the blind gut; one Ascaris (like an earthworm) in the small intestine; five strangles (round) large and small, in the bowels (very irritating) and one hookworm (very injurious) : in the air passages, 2 strangles giving rise to husky paroxysmal cough and much loss of condition, with expectoration containing worms : in or near the urinary organs the giant strangle (very harmful).

Intestinal Worms are liable to cause irregu¬

lar bowel motions, costive or loose, unthrifty skin and a fur around the anus from dried-up mucus. The worms can often be seen in the droppings. As prevention change herd in pasture (horses or swine for cattle), change of water if from a running stream with herd above; feed liberally of salt, give a course of finely powdered copperas, areca nut, naphthalin, quassia water, wormseed or other vermifuge.

For hookworms give thymol and be careful to prevent the embryos

entering through the skin from the infested soil.

Non-contagious and Constitutional Dis¬

eases. — These are not self-propagating nor pestilential and thus make less appeal to the public. They are due mainly to generally operating causes — climatic, dietetic, chemical mechanical, electrical, pluvial or otherwise unhygienic. They are to be prevented by sub¬

jecting each individual in sound health to the conditions that stimulate the healthy bodily functions so as to maintain a normal equilib¬

rium. This would include good air, ample but well-balanced diet, regular exercise, never to extreme exhaustion, the avoidance of all chem¬

ical poisons whether originating inside or out¬

side the body, and of all mechanical injuries that would in any way impair bodily functions.

Yet there may at any time occur a combination of contagious or parasitic disease on the one hand and a sporadic disease on the other, so as to demand a common consideration of the two. A bodily impairment or debility result¬

ing from a contagion or a parasite may make a subject more susceptible to the injurious ac¬

tion of cold and heat, humidity or dryness, electric action or impure air, than would other-122

wise have been the case, and on the other side an injury due to cold or heat, etc., may un¬

balance the functions and system so that a microbe may meet with less resistance when it attacks the enfeebled body. Thus it is often needful especially to guard a patient suffering from a sporadic disease

from the danger of infection and the victim of a plague from any disorder due to defective hygiene or care. It becomes desirable to employ autotherapy in the complex malady, along with the standard treatment for the sporadic affection present.

Inflammation is a vascular and nutrition re¬

action of any tissue to an irritant, and shows a contraction followed by a distension of the capillary vessels, an increased and somewhat depraved action of the tissue cells and an ex¬

udation into the affected and adjacent struc¬

tures, or even into an internal cavity, of a liquid (lymph) and even blood, also a de¬

ranged nervous control. It may kill or it may result in tissue changes of many kinds — death of the part from exclusion of blood, forma¬

tion of new tissue, the formation of pus (abscess) and various degenerations.

Fever is a reaction, marked by an increase of body temperature, derangement of the nerv¬

ous heat-producing centres, and of secretions generally, scanty high-colored urine of in¬

creased density, costiveness, dry skin, *etc.* It attends on all acute extensive inflammations, rises and falls with them, and leads to many derangements and degenerations.

Treatment of Fever and Inflammation. — Up to a given point a general system of treatment can be laid down. The profound changes in the blood, the excess of fibrin and its en-creasing coagulability, increase of white cells, enzymes and other poisons produced in the inflammatory and febrile processes, from the fermentations in the torpid bowels and else¬

where, and from the altered products and sus¬

pended secretions of glands, especially of the kidneys and skin, and from the generally al¬

tered functions of the body cells, the system is charged with deleterious material. This can be to a large extent arrested or counteracted by a dose of laxative medicine (1 lb. Epsom salts) which will clear out the mass of ferment¬

ing materials from the bowels and of fer¬

mented product even from the blood and sys¬

tem at large. If the already-formed poisons have given rise to diarrhoea this may be omitted or given in smaller doses, until the bowels and system have become more normal. With the bowels cleared, saltpetre may be usefully em¬

ployed (fl/2 oz. twice a day) to lower heart action, increase the discharge from the kid¬

neys and eliminate from the blood much injuri¬

ous morbid product. Short of this the free use of water to drink wall do much to activate both kidneys and skin, lowering body heat, and expelling and diluting the poisons. When body heat remains very high (103° F. and +) aspirin (2-4 drams in ball) increases kidney secretion and is especially useful in rheumatism, acetanilid (1-2 drams) or phenacetin (2-4

drams) may be given. A simple course is to give pure cool air and water, clothing if chilly, and even damp compresses covering the af¬

fected region or even the whole trunk. The skin over the region of the affected throat, lung, kidney or other part becomes nervously susceptible and even tender, and the applica¬

tion of warmth relaxes and soothes the deep-seated, inflamed part. The effect is still better if a damp compress is applied, warni if the animal is cold, but cold if the surface is burn¬

ing hot ; it should be well wrung out so as not to drip, and at once covered, closely at all points, by a dry blanket or bandage sufficiently thick to prevent too sudden evaporation of the water and chilling of the skin. It must be a mode of applying warmth and thereby soothing.

The good effect may be secured in other ways —by active friction to the skin, by rubbing actively with stimulating, essential oils, by an electric pad or by detaining the blood for an hour in the skin and then setting it free again. This was formerly effected by cupping. Chase most of the air out of the inverted cup by heating it with a taper; withdrawing the taper, suddenly apply the mouth of the empty cup on the skin over the affected part, and hold it there until it cools, increasing the partial vacuum, draw¬

ing the skin up into the cup, and the blood into the skin. Apply cups over an area correspond¬

ing to the size of the organ affected, and allow them to stay on for an hour. Then they can be taken off by separating the cup from the skin at one side and admitting air, when the blood will resume its original flow and pass out into the system. Biel's modern plan of enveloping an extended area of skin or a whole limb in a rigid, close-fitting cover and exhausting the air is essentially the same in principle. Both alike avail of the autotherapy method, for the blood coming with a ready-prepared charge of toxins and defensive prod¬

ucts from a microbian, inflammatory and febrile source is held for a time semi-stagnant in direct contact with healthy, active body cells until even more fully charged with the defen¬

sive materials evolved from these under the most appropriate stimulus and is then sent back to carry out its recuperative work in the sys¬

tem at large. Similarly, blistering uncon¬

sciously availed of this source of defense and often with excellent results. In diseases of bones and joints even the hot iron judiciously applied will often work wonders.

Softening of Bones (rickets), seen in calves of cows kept on soils rich in organic matter, but deficient in earthy salts, on high, cold, ex¬

posed areas and on damp, stormy seashores, is essentially due to a fault of diet and nutrition and must be met by a richer ration, especially by change to land having an abundance of lime and other phosphates and salts. Tonics are usually necessary as well.

Rheumatism, attacking bones, joints and

other fibrous structures, also claims cold, wet and exposure as an immediate cause, but may be traced as well to an excess of acid in the system or in the food, to defective nutrition, overfeeding with deranged digestion and even local injuries. Warm, dry buildings, dry soil, sunny pastures and more careful feeding are demanded. As a direct anti-rheumatic, salicylic acid or salicylate of soda in full doses daily is desirable, together with active friction over the part affected with a liniment of oil of turpen¬

tine and salicylate of soda.

White Cell Blood, with or without Enlarged Lymph Glands (Leukemia ; Lymphadenoma) . —In this there is a marked increase of white or lymph cells in the blood, in the marrow of cancellated bones, the spleen and the liver, and, CATTLE FEEDING — CATTLE-TICK

still more marked, by the presence of abnor¬

mally large white cells with pale nuclei. Bone marrow and lymph and other glands are the great producers of white cells, and these are liable to be enlarged in one form of the disease (Lymphadenoma) , showing nodular swellings around the throat, in front of the shoulder and stifle and back of the latter. The cattle lose condition and run steadily down. Other con¬

ditions (notoriously hookworms) leading to enlargements of such glands may cause Leuke¬

mia. Bitters (quassia, gentian, quinine) with iron and arsenite of soda solution will often have a good effect.

Progressive Pernicious Ancemia. — This is seen in cattle on mucky or otherwise defective soils, confined indoors or out in poor pastures, and preferably from three-fourths to one year old. No visible microbe

has been clearly dem¬

onstrated. Subject loses condition rapidly even though liberally fed, has a dull yellow tinge of the eyelids or of white ears, pulse 70 to 80 and a hissing (anaemic) murmur with the first sound of the heart. Blood globules are often modified or deformed. Temperature may be normal or subnormal. Blood spots may show on the eye before death, in two or three weeks.

May advance more quickly after calving. Mor¬

tality 50 per cent. Treat as in leukemia.

James Law,

Emeritus Professor of Veterinary Science , Cornell University.

CATTLE FEEDING. See Live Stock,

Feeding of.

CATTLE-PLAGUE, any plague by which

large numbers of cattle are destroyed. Such plagues have existed at intervals, more or less, in all countries and in all ages. Among the severer visitations in centuries preceding the 19th may be mentioned a great plague which arose in Hungary in 1711, whence it spread to other countries, destroying in the next three years about 1,500,000 head of cattle. A second visitation, which affected England and the west of Europe between 1745 and 1756 caused the death of 3,000,000 cattle. See Rinderpest.

Several of the diseases of cattle are due to insects, including that called <(pleuro-pneumonia® or <(Texas cattle fever,® which is caused by a blood-inhabiting sporozoon that is carried by ticks from an infected animal to a healthy one, communicating the disease. Cattle bred in the Southern States have become practically immune,

but the disease affects and kills north¬

ern cattle. The natural limit of the tick con¬

cerned (Boophilus annulatus) nearly coincides with Mason & Dixon's line, and Federal laws prohibit the shipping north of any cattle from south of this line, except between 15 Novem¬

ber and 15 February. Other species of this same genus of ticks transmit similar cattle dis¬

eases in various parts of the world, especially the ((blue tick® (B. decoloratus) of South Africa. The remedy is to dip the cattle in vats of cottonseed oil or some similar mixture.

(See Cattle-tick). The appellation ((cattle-plague® is also loosely given to another disease among cattle in the United States, which is otherwise known as ((lumpy-jaw,® a most vir¬

ulent and incurable affection. Experiments have been time and again ineffectually tried to find a cure for this, though large governmental encouragement has been offered. A rigid ex¬

amination of cattle is made by government in¬

spectors at all receiving and shipping ports.

See Cattle, Diseases of.

CATTLE-TICK, or TEXAS-FEVER

TICK, an arachnid (Boophilus annulatus) re¬

lated to the mites, and prevalent in the western and southwestern States. It is a reddish, coriaceous, flattened or swollen creature from a quarter to half an inch in length. The cattle-tick lays a great many eggs, nearly oval, dark-brown, coated with a hard secretion, the process of egg-laying lasting for several days or a week. The young tick, on hatching, is whitish, afterward turning brown; it has three pairs of legs. After molting it becomes a nymph, when the fourth pair of legs is added. During the nymph stage the reproductive organs develop.

After another molt it becomes sexually mature.

It completes its development from the larva to the adult on cattle. After this second molt the couple pair, and the male grows but little. The female, voraciously feeding on the blood of her host, grows to a gigantic size, her body swelling and becoming gorged with blood and eggs. The males can be easily detected by their smaller size, and by the extension of the shield over the entire back. Ticks live upon the blood of their host. The females, as they increase in size, store away quantities of the ingested food in an immense convoluted chamber or ap¬

pendage of the stomach. In summer only three or four days after the final molt are necessary for the ticks to become large. When fully gorged, and the eggs fertilized, the female loosens her hold in the skin of her host, and falls to the ground, where she lays her eggs, after which her body contracts, shrivels up and then dies. The young ticks get access to cattle by climbing bushes, whence they reach out and attach themselves to passing animals.

It has been proved that ticks, by sucking the blood of cattle infested with the Texas fever germ, which is a sporozoon (Apiosoma bigeminum) , may communicate the disease (bo¬

vine malaria) to healthy cattle, just as the sporozoon blood-parasite of yellow fever, or of malaria, is communicated by a mosquito (Ano¬

pheles). In dealing with ticks it should be remembered that it breathes by spiracles, or minute holes in the sides of the body. By the use of oil, or any greasy substance, those open¬

ings may be covered, thus asphyxiating the creature. The ticks may thus be killed by dipping or spraying the cattle with cottonseed oil. Cattle should be kept away from wooded or bushy pastures. Rotation of pasture is also used by stock farmers, so that the tick may die of starvation. The United States Department of Agriculture has conducted the work of eradicating the cattle tick from the southern States in co-operation with the States affected.

A total area of 275,782 square miles had been made free of this pest up to 1 July 1915.

There are one or two forms very closely allied to the Texas cattle-tick, and named Boo¬

philus australis; they are regarded by experts as either distinct varieties or species from B.

annulatus. They transmit the cattle-fever in the countries above named. Another sub¬

species or variety, the blue tick (B. decoloratus) in South Africa transmits the same disease in that region.

The Lone Star tick (A mb ly omnia uni-pimcta) is, next to the cattle-tick, to be held responsible for the transmission of the Texas fever. It may be recognized by the simple bright silver spot on the back.

Bibliography. — Curtice, (The Cattle-Tick*

((Journal of Comparative Medicine and Veteri¬

nary Archives) 1891-92) ; Salmon and Stiles, (Cattle-Ticks of the United States> ((l7th An¬

nual Report of the Bureau of Animal Indus¬

tryˆ Washington 1902) ; Law, James, (Text Book of Veterinary Medicine* (Ithaca 1911) ; Hutyra and Marek, (Special Pathology and Therapeutics of the Diseases of Domestic Ani¬

mals) (Amer. ed., by Mohler and Eichhorn, Chicago 1912) ; and (Special Report on Dis¬

eases of Cattle) of the United States Bureau of Animal Industry (rev. ed., Washington 1912).

CATTLEYA, a genus of orchids, including about 40 species, natives of

tropical America.

The species are the showiest of all orchids and are the plants best known under this name, be¬

ing widely grown by florists. In their native haunts they are epiphytic upon the trunks of trees. Innumerable hybrids and horticultural forms have been produced by plant breeders.

CATTY, the name given by foreigners to the Chinese kin or pound and used also in the Malayan Archipelago. In China, the Straits Settlements, Java, British North Borneo, etc., it is approximately one and a third pounds.

The Siamese catty is equal to 2.675 pounds. In Burma, it equals one and a ninth pounds.

CATUBANGANES, ka-too-bangans', or

CATABANGENES, warlike tribes settled in

the mountains of Guinayangan, in the province of Tayabas (Luzon, Philippines). Nothing is known about their origin or habits, whether they be pure Malay or Negrito-Malay. They are probably Remontados mixed with Negrito blood and gone wild.

CATUBIG, ka-too-big', Philippines, a small town in the island of Samar, 48 miles north of Catbolagan. The place is garrisoned by United States troops, who, in June 1900, with¬

stood an attack by 600 insurgents. This epi¬

sode was a stirring incident of the war. It ex¬

ports abaca fabrics to Manila. Pop. 9,565.

CATULLUS, Gaius Valerius, Roman poet:

b. Verona 87 or 84 b.c. ; d. probably 54 b.c. He is deemed by some to

be Rome's greatest lyric poet, by others to be second only to Horace.

His family seems to have had social standing and at least moderate means; for his father often entertained Julius Caesar, and the poet apparently never had to earn his living. While still a youth he could go to Rome and there complete an excellent education. It was in the expensive metropolis, too, that he chiefly re¬

sided, although his native town and his villa at Sirmio on the Lago di Garda, and another not far from fashionable Tivoli, would from time to time claim his presence. His one trip abroad may have been a financial venture, but it was perhaps mainly to visit the storied cities of the East that he joined the staff of Memmius, who governed Bithynia in 57-56 b.c. The provincials proved too poor to yield profit even to an un¬

scrupulous official, much less to one of his suite, and Catullus vented his spleen in lampoons that contrast strikingly with the eulogies of the other great contemporary poet, Lucretius, who revered Memmius as his patron. Catullus' trip did, however, allow a visit to the grave in the Troad of his only brother. His expressions of inconsolable grief are among the most affecting in Latin literature. In lively contrast are the two inimitable poems that voice his joy at re¬

turning home. The year's absence had at least quenched the last embers of his passion for Lesbia, who had been for some years the curse and inspiring genius of his life. According to the generally accepted theory, Lesbia is his pseu¬

donym for perhaps the most remarkable woman of the day, Clodia, the sister of Publius Clodius Pulcher. She was at least 7, and perhaps 11, years older than Catullus, and in 61 b.c., when he fell in love with her, was the wife of Metel-lus Celer, a consul-elect. Apparently even Cicero did not wholly escape the fascination of this beautiful though utterly dissolute queen of the Roman Mast set.® The course of the poet's liaison may be traced in a series of poems that expose his inmost feelings with a power and vividness that critics deem almost unequaled.

To the period of difficult courtship belong madly passionate lyrics and the dainty ((sparrow-songs.® Next a lovers' quarrel and recon¬

ciliation engage our sympathies. Soon, how¬

ever, the poet's faith in Lesbia's fidelity wanes, and with it all purer love, although his passion grows only the wilder and more intense.

The poems in which he assails successive rivals, be¬

ginning with the brilliant but disreputable Cselius Rufus, are marvels of invective. It is only after his return from Bithynia that Catul¬

lus seems fully to appreciate the hopeless in¬

famy of his former mistress, when he sends a scathing reply apparently to a proffer of recon¬

ciliation. While it is this cycle of love poems that has immortalized Catullus, he wrrote ad¬

mirably on other subjects. In spite of a life of pleasure, he had energy to study thoroughly the early Greek lyric poets, and especially the technical achievements of the Alexandrine school, which began now to have great influence upon Latin poetry. Although some direct trans¬

lations from the Greek also attest his interest in these models, Catullus remained peculiarly independent. No matter how much his lyrics may show the results of his studies, they were primarily an outlet for feelings that compelled utterance, and not, like Horace's odes, a purely intellectual performance. He is less original in some of his long poems. The longest is an epithalamium, in Alexandrine style, upon the wedding of Peleus and Thetis, introducing also the story of Theseus and Ariadne. While Catullus' work in mythological epic no doubt made that of later writers, including Virgil, easier, his daring dithyrambic poem on Attis has remained unique. On the other hand, his epithalamia are the forerunners of others in Latin literature, as also of the marriage poems of Spenser, Jonson and Herrick. Horace also often appears in his odes the older poet's debtor, though in artistic form his superior. In epigram Martial is ready to concede the palm to Catullus as well as Marsus, though himself the acknowledged master of that form. Fur¬

thermore, in the leading elegiac writers, Tibul¬

lus, Propertius and Ovid, we clearly see their obligations to Catullus and often read his praises. He enjoyed, too, the admiration of contemporary writers, and not alone those of CATULUS — CAUCASIA

his own school of poetry, like Calvus and Cinna ; for the historian Nepos seems to have started him auspiciously in his literary career.

To him he gratefully dedicated a partial edi¬

tion of his poems. Other famous Romans that receive kindly mention are Asinius Pollio, Hor-tensius, Cicero's great rival in oratory, and Cicero himself. Caesar, however, is attacked with a fearlessness as amazing as the language is shocking. But in judging Catullus' obsceni¬

ties, his liaison with Clodia, and other even less creditable relations, moderns are charitable in proportion to their knowledge of the standards of that age. Even the severest are won to sym¬

pathy, if not affection, by happier glimpses of the poet's character. In an age of insincerity every word of his rings perfectly true. His gentler side appears in his verses on babies, flowers and the beauties of nature, in his affec¬

tion for his brother and his friends, and even in the better aspects of his love for Lesbia. Be¬

sides the English poets already named, Prior, Gray, Byron, Landor and Tennyson have

shown especial admiration of Catullus. Among numerous excellent editions of the poet, the text edition of Ellis (Oxford, Clarendon Press, 1904) may be named ; also the editions of Bahrens (Leipzig 1885) ; Merrill (Boston 1893) ; and Friedrich (Leipzig 1908). Besides the com¬

mentary by Ellis (second edition 1889), the English reader has the poetical translations of Theodore Martin (1861), those in prose by Francis W. Cornish (Cambridge University Press 1912), and, perhaps, best of all, Hugh Macnaghten's (The Story of Catullus. J

Walton Brooks McDaniel,

Professor of Latin, University of Pennsylvania.

CATULUS, the name of several distin¬

guished Romans. 1. Gaius Lutatius Catulus, the admiral whose fleet defeated the Car¬

thaginians near the Agates Insulae, off the Sicilian coast in 241 b.c., thus closing the First Punic War. 2. Quintus Lutatius Catulus, Roman general, historian and poet : b. about 152 b.c. ; d. 87 b.c. He was consul in 102 b.c.

with Gaius Marius, and in the following year was proconsul. During his proconsulship he, with Marius, defeated the Cimbri near Vercellae, the modern Vercelli, in northern Italy.

As one of the aristocratic party and a partisan of Sulla, he was proscribed by Marius. With the exception of two epigrams nothing of his work has survived. 3. Quintus Lutatius

Catulus, son of the preceding, consul in 78 b.c., censor in 65. He duelled the revolutionary up¬

rising of M. yEmilius Lepidus, his. colleague in the consulship (78), who had tried to over¬

throw Sulla's constitution, and assisted Cicero in the prosecution of Catiline.

CAUCA, kow'ka, Colombia, one of the

nine departments of the republic, bounded on the northwest by Panama ; on the north by the Caribbean Sea; on the east by the departments of Bolivar, Antioquia, .Tolima and Cundina-marca, and the republics of Venezuela and Brazil; on the south by Brazil and Ecuador; on the west by the Pacific Ocean. The territory of Caqueta and the districts of Huila, Inza and Paez are included in this department. The eastern part of Cauca is watered by the Amazon and some of the affluents of that river; the Guaviare and the Casiquaire flow into the Ori¬

noco the Atrato empties into the Gulf of Uraba; while a dozen smaller rivers flow into the Pacific. On both the Caribbean and Pacific coasts there are several ports. Its original area was 31,388 square miles, but in 1905 was re¬

duced to 20,403 square miles. The centre of population and cultivation is along the Cauca River Valley, where corn, sugar cane, cacao, tobacco, etc., are grown with success. The mineral wealth, especially gold and silver, is extensive. The forests, which cover a large section of the department, yield large quanti¬

ties of rubber and cinchona. Pop., including aborigines (1912), 211,756. The capital is Popayan, with a population of 18,724.

CAUCASIA, that division of European

Russia lying in the extreme southeastern part of that country (38°-46° 30' N.), between the Black and Caspian seas, and bounded on the south by Asiatic Turkey and Persia and on the north by the provinces of the Don Cossacks and Astrakhan. It covers an area of 180,843

square miles and is divided into two separate divisions by the Caucasian Mountains, on the north by Cis-Caucasia, on the south Trans-Caucasia. The physical features are greatly di¬

versified and present an irregular succession of mountains and valleys, table-lands and plains, making description extremely difficult. The cen¬

tral section of the country is one vast mountain-top, 700 miles in length and covering an area of over 12,000 square miles. From the range of mountains the plains of Cis-Caucasia on the north gently slope, ending in the Steppes, a low, marshy country; throughout Trans-Cau¬

casia on the south are chains of mountains running parallel to the central range. The Kuma and Terek rivers, flowing into the Cas¬

pian Sea, and the Kuban River, flowing into the Black Sea, drain the northern section, while the southern part is drained by the Kur and the Aras, its affluent, emptying into the Caspian, and the Rion, leading to the Black Sea. The much smaller Rion flows into the Black Sea.

The water system of Caucasia belongs

wholly to the Black and Caspian seas. Lakes are found only in Trans-Caucasia. The chief of them is the Gotchka, or Sevanga, situated in Erivan. Agriculture is the most productive occupation of the settled inhabitants of the southern section, the principal crops being wheat

and other cereals, cotton and tobacco.

In Cis-Caucasia cattle-breeding is the principal industry and wheat, rye and other grains give large returns in the irrigated districts ; while in the mountainous regions mining is carried on to a great extent, the mineral deposits being very rich, copper, silver, iron and mag-nese ores, cobalt, sulphur, quicksilver, naphtha and rock salt the most important. The region is especially rich in oil, the production of petroleum being very extensive and second only to that of the United States. Coal, of inferior quality, is extracted. About 30,000,000 gallons of wine are produced yearly. Rugs, woolen goods and harness are also made. The exports and imports are rapidly growing, the exports, valued at $30,000,000, being about six times the value of imports. The transportation facilities are far from adequate. In many parts the pack horse is still used for transporting freight. The northern of the two chief lines of railway ex¬

tends along the Caspian coast from Baku to Petrovsk ; thence inland and north into the 126

province of the Don Cossacks to its termina¬

tions at the Sea of Azov. A branch connects the main line with Novorosiysk on the Black Sea. The southern line connects Baku, on the Caspian, with Batum and Poti, on the Black Sea. For higher education there are about 200

schools accommodating 27,000 pupils. There are 5,443 primary schools with 90,000 pupils under the Ministry of Education and 19 secondary and 1,308 primary schools with 56,000 pupils under Cossack supervision, besides numerous religious schools. The majority of the people attend the Greek Orthodox Church, but there are large numbers of Nonconformists, Gregorians, Lama¬

ists, Mohammedans, Buddhists, *etc.* The terri¬

tory is governed by a general governor, acting for the emperor, and the local zemstvos ad¬

minister the economic affairs of their respective districts. Caucasia is

divided into 11 separate governments: on the north are Terek, Kuban and Stavropol ; on the south are Tiflis, Kars, Kutais, Erivan, Daghestan, Black Sea, Yeliza-vetpol and Baku. Prior to 1770 historical in¬

formation is vague, but by the end of the 18th century Russia had acquired Cis-Caucasia, and by 1829 the whole territory was nominally under Russian dominion. Not until 1865, however, could it be said that Russian power was firmly consolidated. The Russo-Turkish War of 1877—78 resulted in the annexation of a considerable portion of Turkish Armenia. In 1905 Caucasia was the scene of violent disturbances, racial and revolutionary. The inhabitants are mainly Russian Armenians, Tartars and Georgians, about 68 dialects being spoken. Pop. (1911) 12,037,200. After the fall of the Empire in 1917

several independent states were set up in Cau¬

casia, including Georgia,, Kuban, Azerbaijan, and Erivan. The boundaries of these are ill-defined. In 1920 Georgia was reabsorbed by Russia. Consult Freshfield, (The Exploration of the Caucasus) (London 1902).

CAUCASIAN, ko-ka/shan, RACE, a term

introduced into ethnology by Blumenbach, in whose classification of mankind it was applied to one of the five great races into which all the different nations of the world were divided.

Blumenbach believed this to be the original race from which the others were derived and he gave it the epithet of Caucasian because he believed, probably erroneously, that its most typical form — which was also that of man in his highest physical perfection — was to be met with among the mountaineers of Caucasus. The Caucasian race comprises the most highly civ¬

ilized nations of the world, including most of the _ inhabitants of Europe (the Turks, Hun¬

garians and Finns being excluded) ; the Hindus, Persians, Arabs, Hebrews and the ancient Phoenicians of Asia; and a large proportion of the inhabitants of northern Africa. See Eth¬

nology.

CAUCASUS MOUNTAINS, a lofty and

rugged range of mountains forming one of the natural barriers between Europe and Asia. It extends in a northwest and southeast direction from near the strait of Kerch on the Black Sea to near Baku on the Aspheron Peninsula pro¬

jecting into the Caspian Sea. The distance between these points in a straight line is 700

miles, but following the main ridge of the mountains about 940 miles. The range varies in width from 60 to 130 miles and may be divided into three parts. The western portion, extending from the Strait of Kerch and the Sea of Azov to the peak of Elbruz, consists of a series of parallel ridges of stratified rocks, the ridges apparently formed by huge, tilted fault blocks. The northern slopes of the northern ridges rise rather gently out of the plain of Caucasia; the southern slopes, along the fault planes, are abrupt ; and the southern slope of the main ridge has in places almost vertical walls 2,000 to 3,000 feet high. There are few passes through this great barrier, and these are difficult. The snow line is at about 9,000 feet.

The highest peaks of the Caucasus are in the central part, from Elbruz to the Adai-Khokh. Here, as to the westward, is a series of parallel ridges, the higher summits all snow-clad, with deep longitudinal valleys ; but some of the highest peaks, Elbruz and Kazbek, are on spurs more or less isolated from the main range.

In this central portion of the Caucasus, as yet but incompletely mapped, there are said to be fully 20 summits higher than Mont Blanc, the highest peaks being Elbruz, 18,470 feet; Dykhtau, 17,054 feet; Koshtantau, 16,881 feet; Janghitau, 16,564 feet ; and Kazbek, 16,546

feet. The snow line is at about 11,500 feet, and the total number of glaciers of the first class is fully 175, while rounded rock surfaces and boulders in the valleys show that glaciation was much more extensive at no very distant time.

East of Kazbek the range narrows and is nar¬

rowest south of Vladikarkaz, where it is crossed by the Russian

military road to Georgia. This road runs over the Kobi Pass and through the great Davial Gorge, one of the greatest moun¬

tain chasms in the world. The eastern part of the Caucasus, from Kazbek to the Caspian, is of much more complicated structure; the range widening and including a high plateau crossed by subordinate ranges having an east-northeast and west-southwest direction, though what may be termed the main axis continues its southeast course.

The plains of Caucasia north of the moun¬

tains are underlaid by Tertiary and Quaternary strata. The foothills of the western Caucasus and the plateau of the eastern Caucasus show rocks of Cretaceous and Jurassic Age, and nearer the main axis of the range are Palaeozoic formations. The main axis shows schists and gneisses with granite and syenite. Trachyte and similar rocks occur, and some of the peaks, Kazbek, are probably in part of volcanic origin.

The scenery of the Caucasus is wild and gloomy rather than beautiful. The lower slopes are thickly wooded, but there is not the com¬

bination of dark forests, beautiful lakes and graceful snow-crowned summits that makes some ranges — for instance the Selkirks in Brit¬

ish Columbia — • so attractive to the mountain-climber.

The mineral wealth of the Caucasus is very great; in fact, in this respect the range is one of the most noteworthy in the world, but owing in part to the very rugged topography much of this wealth is still undeveloped. Among the valuable resources may be named the coal fields near Ochemchiri and at Kuban and Kutais, the copper mines of Tiflis and Elizabethpol and the silver ores of Terek and Kutais. More import¬

ant are the manganese mines near Kutais, whence some 500,000 tons of ore are exported CAUCHY — CAUCUS

annually to various European countries and the United States. Most important of all are the oil wells of the Aspheron Peninsula, the most remarkable in the world, whence some $12,000,-

000 worth of petroleum, benzine, etc., are shipped to foreign countries every year. Con¬

sult Bodenstedt, cThe People of the Caucasus) ; Deniker, (Races of Man) ; Keane, (Man, Past and P resent) ; Ripley, (Races of Europe. >

CAUCHY, ko'she', Augustin Louis, French

mathematician: b. Paris, 21 Aug. 1789; d.

Sceaux, 23 May 1857. Entering the polytechnic school in 1805, he distinguished himself by the solution of difficult problems. In 1816 he won the grand prix of the Institute by his paper on (Wave-propagation.) He qualified as a civil engineer, but selected science for his chief work, owing to health conditions. His political bias barred him from the higher college positions which were his due. He was created a baron by Charles X and in 1848 he became professor of mathematical astronomy until his death, at the Sorbonne. His politico-religious writings attest both his faith in the legitimacy of kingship and in the Catholic religion, one of his characteristic works in this line being the poem (Charles V en Espagne) (1834). He contrib¬

uted to almost every branch of mathematics which he perfected by his discoveries, notably residual and imaginary calculus. Among his numerous works are (Cours d'analyse> (Paris 1821) ; (Legons sur les applications du calcul infinitesimal a la geometrie) (2 vols., 1826-28) ; (Exercices mathematiques) (1826-29) ; (Sur l'application du calcul de residus) (1827) ; (Leqons sur le calcul differentieP (1829) ; (Memoire sur la dispersion de la lumiere) (1839); (Exercices d'analyse et de physique mathematique) (3 vols., 1839). The Academy of Sciences published (Les oeuvres completes d'Augustin Cauchy* (27 vols., Paris 1882-1901). Consult Terquem, (Analyse des travaux de Cauchy* (Paris 1857) ; Valson, C. A., (Le Baron Augustin Cauchy : sa vie et ses travaux* (Paris 1868).

CAUCUS (short for "caucus club®), a po¬

litical party gathering for nominations or con¬

ference on party policy, as distinguished from a merely hortatory one. It may be a town or ward meeting, to nominate local candidates or delegates to higher nominating conventions (the latter sort are also called “primaries®) ; or a party conference of members of Congress or a legislature, to decide on members or confirma¬

tions to office. Originally, a secret gathering on the model of the Caucus Club of Boston, whose leading business was the making of “slates® for local offices, it incidentally came to < be the molding of a policy of local autonomy in oppo¬

sition to British influence. The etymology of the name is pure guesswork. The usual deri¬

vation from “caulkers® (sc. club), or an imag¬

inary “caulk-house,® is most improbable. More plausible would be that from Lat. caucus, Gr.

kaukos, a cup, as originally a convivial society, most secret societies of that day having classical names or initials; the words, however, are not classical, but mediaeval, and so are less likely to have come under their notice. Possibly, though not probably, it is mere alliterative comic jargon. Most probable of all is the adoption of an Algonkin word, kaw-kaw-zmis, to consult: — if the word is real: cf. “pow-wow.® At all events, the club and the elements of the system originated in Boston during the 18th century.

Samuel Adams’ father was accredited as a founder and eminent master of the art, in which his son became immortal, and to which he owed his first election to the legislature. The prep¬

aration and distribution of ballots before the election was one of its chief instrumentalities.

The first mention of the original club is in John Adams’ diary, February 1763: he says the town officers are “regularly chosen there before they are chosen in the town,® and intimates that the distribution of business favors as a quid pro quo was not absent, which might be assumed.

The system rapidly grew ; indeed, in some form it is part of the

inevitable machinery of majority rule, which in constitutional coun¬

tries has supplanted the primitive decision of battle by merely counting the opposing hosts, it being assumed as a basis that, the larger could outfight the smaller. But for common action of that majority there must be some method of determining its will before the elections, as to both measures and men ; and all countries with any measure of popular control have some shaping and testing mechanism of the sort. In England it has been formally established since 1880, by the so-called “Birmingham system® ; but in the higher lines of policy, even before that, the two great political clubs of London, the Carlton and the Reform, Conservative and Liberal, discharged many of the functions of informal caucuses. Nevertheless, the power of the caucus is greatly affected by local and national circumstances. In England and most Continental countries, it is restrained by the still powerful aristocratic system, which forms a counterpoise and provides natural leaders ; in France, by the centralized government sys¬

tem. In no other country has it the same au¬

thoritative power as in the United States. Early in our history it became universal. Said Adams in 1814 : “We have Congressional cau¬

cuses, State caucuses, county caucuses, city caucuses, district caucuses, town caucuses, parish caucuses, and Sunday-school caucuses at the church doors.® This is primarily due to the entire legal equality of all classes ; that absence of prescriptive privileges furnishing a shelter for minorities and independent action, which is considered the chief glory or the chief danger of democracy, according to the point of view. The gradations of the American political system into national, State, district and munici¬

pal powers have produced a corresponding hierarchy of caucuses, each sending delegates to the next higher caucus or convention, and constituting a “machine® of great efficiency and formidableness.

But it has been made at once practically ir¬

resistible, and largely worthless for its osten¬

sible purpose of determining the general senti¬

ment of the party, by the “spoils system,® which throws the organization and management of the caucuses into the hands of those

who can give their whole time to political work, because paid for this service (in reality though not in name) out of the public treasury. Thus managed, the caucus in the larger places does not necessarily represent the views of the majority, and very often the leading object is to prevent the ma¬

jority from meddling with the machine. In theory, the caucus being a voluntary association of the members of a voluntary association, to

deliberate as to its policy and agents, all are fairly bound by its decisions, and have no right to “bolt® afterward; otherwise there is an end of all common action. It is of course to the interest of the managers to cultivate this the¬

ory, and the military similes of “campaigns®

and “forces® and “deserters® and “closing up ranks,® etc., and to stigmatize all individual courses as equivalent to treachery and insubor¬

dination ; and no matter how spurious this technical majority may be, or by what meth¬

ods a real minority may have attained a seem¬

ing vote of confidence, a “regular® nomination will always have enormous weight. In part, it is true, this is because the vast majority have no common wish or purpose, and are destitute of constructive political ideas ; and any pro¬

nouncement of the constituted party authori¬

ties is really their will, which is simply to ob¬

tain such a mapdate. Hence, “regularity® is the test of merit; and this willingness to accord to the show what belongs to the substance is the almost invincible bulwark of political cor¬

ruption.

This has generated in the last few years a host of efforts, public and private, to break down the monopoly of the caucus and substi¬

tute a real and direct control of nominations by the party; control of policy cannot thus be shifted, but corruption is the work of men, not of measures. It cannot be said that any of these movements as yet are very successful or promising, largely owing to the consideration just mentioned, that the initial possession of political ideas is a condition precedent to ex¬

pressing them. One scheme is to have nomi¬

nations made by direct popular vote instead of by primaries ; but this simply shifts the func¬

tion of the caucus one stage back, to decide on the votes for nomination instead of the votes for offices. More elaborate, and in some di¬

rections more efficient, are the legislative pro¬

visions made in several States for taking the primary caucuses themselves under the con¬

trol of the law, as elections have always been.

In this case, all persons who wish to vote in a party caucus must register themselves as mem¬

bers of that party. The effects of this meas¬

ure have been a singular mixture of good and evil, and probably reflect in this regard the motives of the enactment. On one hand, fac¬

tion leaders can no longer swamp a caucus with a rabble of purchased voters from the lowest element of the other party. In theory a check list was always used; but as it had no legal validity, it was scouted whenever a ma¬

jority, real or spurious, was interested in evad¬

ing it. The check list under the law cannot be so treated. On the other hand, an obvious ef¬

fect of the law, probably not absent from the minds of the framers, is

to extinguish as a party force the independent or “mugwump®

element of both parties, who try to reform their own party by a leverage obtained from the other; and are therefore excluded from either, as they cannot keep changing registra¬

tion. If this was a motive, the Nemesis has been speedy. The party managers in various places are greatly disappointed and alarmed to find that only a fraction even of their normal and calculable voting strength will register at all, and therefore they are nominating in the dark, without knowing what the party senti¬

ment is. When they honestly wish to ascertain the party feeling they have great difficulty in doing it. The dislike to sporting a registered, public and unchangeable party label is not con¬

fined to the more intellectual independents, but is strong in the general mass ; and the attend¬

ance at primaries is a much less sure guide than of old to what the party will support at the polls. The precise future of the caucus cannot be forecast ; but there is little evidence thus far of a loosening of its hold.

Congressional Caucuses for President and Vice-President. — These grew out of the Elec¬

toral system (see Electoral College), and perished, significantly, at the same time that the old theories of an educated official class and professional trained office-holders gave place to the inrush of the untrained democracy and ro¬

tation in office. It is no mere coincidence that the last Congressional caucus was held to nomi¬

nate a candidate in the last election that re¬

turned a President of the old school. The masses were taking everything into their own hands; Jackson and popular nominations came in together, though there was one intermediate link when the people acted through the State legislatures. The theory of the electoral sys¬

tem was that the electors, themselves the chosen sages of the people,

should make free choice of the best men in the country for the chief executive offices; but from the first their choice was pointed out in advance. While Washington lived and would take office, no other candidate for President was possible; and for his first Vice-President, John Adams was the choice of New England, and the other States had either their “favorite sons® or no special wish. In 1792 the same circumstances controlled; though New York’s favorite, George Clinton, won the support of several southern States. The electors deferred to the notorious public feeling; but their action was nominally independent. In 1796 this was still true of the Federalists, who made a combination of North and South on Adams and Pinckney; it was substantially true of the Republicans, for Jefferson was the undisputed leader, and while the Republican members of Congress infor¬

mally agreed to support Burr, there was no set ticket for the electors to support at party peril.

But in 1800 both parties held regular but se¬

cret caucuses and adopted tickets which the electors voted solidly and even stupidly, with results still memorable. The Federalists voted that Adams and Pinckney should be supported alike. The point of this was that up to that date, there was no distinct candidate for Presi¬

dent and Vice-President, the one who received the largest electoral vote being President and the next one Vice-President. Adams was cer¬

tain to receive no Republican votes, but if all the Northern Federalists voted for Pinckney, he as a popular Southerner would probably receive some stray votes from that section, and so be elected President over Adams, whom the Fed¬

eralists hated but did not wish to bolt. Thus they would defeat him by appearing to keep strict party faith. The Republicans on their part held a caucus, and made a similar agree¬

ment with regard to Jefferson and Burr; not with similar designs, but to placate New York, which complained that her candidates were “knifed® in the South. Of course in both cases, if the whole electoral body voted “straight,® there would be a tie and no election.

ihis actually happened in the case of Jefferson and Burr, and the struggle was only settled after 36 votes. The results were the adoption of the. 12th amendment to the constitution, regulating presidential elections and compelling electors to state which candidate was to have which office; the implacable hostility of Jeffer¬

son to Burr, which killed the chance of the latter to rise further in his party, drove him into the arms of Federalists and ultimately ended in the murder of Hamilton; and as the presidential electors had simply voted the tic¬

kets dictated by the party representation in Congress, they instantly became, as they have ever since remained, nullities. The second oc¬

casion was on 29 Feb. 1804, when the Repub¬

licans (in open, not secret caucus) renomi¬

nated Jefferson; they dropped Burr for

George Clinton (New York still keeping the place), by 67 votes to 20 for Hugh H. Breck¬

inridge of Pennsylvania, and some scattering.

The Federalists held no ostensible caucus; but as they were scheming to support Burr for governor of New York, and with that prestige nominate him for President, the plan must ob¬

viously have been agreed on in what served the purpose of caucuses. Burr's killing of Ham¬

ilton spoiled this scheme, however; they nomi¬

nated Pinckney and King, and were almost annihilated. The third caucus was on 23 Jan.

1808, also by the Republicans ; but only two-thirds of the party members attended, as the conclusion was foregone. Madison and Clinton were nominated. Meantime the Virginia legis¬

lature had split into Madison and Clinton fac¬

tions, the former much the stronger; nomi¬

nated separate sets of electors and carried the quarrel into Congress, where Monroe's party issued a manifesto protesting against both Madi¬

son and Congressional caucuses. The Federal¬

ists held none, and renominated their previous candidates. On 18 May 1812 the Republican or Democratic party held its fourth caucus, and renominated Madison on his express agreement to declare war against Great Britain; also nom¬

inating Elbridge Gerry for Vice-President. This time they appointed a national committee to see that the nomination was respected. The New York Democrats, however, were very restive under the ((Virginia dynasty® and the ((secretary of state dynasty® ; and their members of the legislature held a caucus, nominated George Clinton and protested against the Congres¬

sional caucus as always nominating a Virginia candidate. A secret caucus or convention of Federalists was held in New York in Septem¬

bers, adopted the Clinton nomination and nom¬

inated Jared Ingersoll for Vice-President. On 29 March 1816 the Democrats, now practically the only existent party, held the last caucus which accomplished anything. Henry Clay

and another member introduced resolutions that the caucus nominations be abolished, but were voted down ; and Monroe was nominated, by no great margin, over William H. Crawford of Georgia. Daniel D. Tompkins of New York was nominated for Vice-President. In 1820 a caucus was summoned, but only about 50 mem¬

bers responded, and they took no action. The general feeling was now strong against the sys¬

tem, as there was but one party, and a nomina¬

tion by Congressional caucus was equivalent to allowing Congress to appoint the President vol. 6 — 9

and Vice-President. In 1824 several State leg¬

islatures passed resolutions forbidding the State representation in Congress to attend a caucus if one were called. But the Crawford party, who wished to give his nomination the prestige of a national verdict, held one at which about a fourth of the members attended, and nominated him and Albert Gallatin. It can hardly have gained him much support, however, and a paralytic stroke finished what¬

ever chance he might have had. In the next (1828) campaign, the State legislatures made the nominations.; and in 1832 the nominating convention was introduced.

In recent years an adaptation of the Senate caucus, known as Aldrichism, was revived in 1910, to replace Cannonism which had become, of ill repute among the voters, and had been partly overthrown in the 61st session of Con¬

gress. The essence of Cannonism had been the control of the House by the speaker, through his power of appointment of commit¬

tees and his domination of the rules commit¬

tee, backed by the power of the majority cau¬

cus. The essence of the new system adopted by the Democrats for the 62d, 63d and 64th Congresses was direct control of legislative ac¬

tion by the caucus itself. As at present con¬

stituted, the Democratic caucus is composed of all members of the majority party in the House. For the election of caucus officers and for the nomination of candidates for House officers, a majority of those voting binds the entire caucus. In deciding upon action in the House involving party policy or principle, a two-thirds vote of those present and voting at a caucus meeting binds all members of the cau¬

cus ; provided, the said two-thirds vote is a majority of the full Democratic membership of the House, and provided further, that no member shall be bound upon questions involv¬

ing a construction of the constitution of the United States or upon which he made con¬

trary pledges to his constituents prior to his election or received contrary instructions by resolutions or platform from his nominating

authority. If a member decides not to be bound by the caucus on any question, he must notify the caucus in advance. See United States — Beginnings of Party Organization.

Consult Haines, W. H., (The Congressional Caucus of To-Day* (Baltimore 1915) ;

Larned, J. N., (The Caucus System; Its Fail¬

ure and the Remedy *(Buffalo 1881) ; Lawton, G. W., (The American Caucus System* (New York 1885) ; Trumbull, B., (The Mischiefs of Legislative Caucuses> (Hartford 1819) ;

Whitridge, F. W., (Caucus System* (New York 1883) ; Ostrogorski, M., (The Rise and Fall of the Nominating Caucus, Legislative and CongressionaP (New York 1900) ; Hal¬

stead, M., (Caucuses of 1860) (Columbus 1860).

CAUDA-GALLI GRIT, or ESOPUS

SHALE, one of the basement members of the Devonian System in New York and New Jer¬

sey. The name (<(cock's tail®) is from a char¬

acteristic fossil, supposed to be a seaweed.

CAUDEX, in botany, the stem of a tree, more especially the scaly trunk of palms and tree-ferns bearing the scars of leaves. It often appears as a rhizome running along the sur-130

face of the earth or underground, as in Lyco¬

podium.

CAUDINE FORKS, a pass of southern

Italy, in the form of two lofty fork-shaped de¬

files, in the Apennines (now called the valley of Arpaia), into which a Roman army was en¬

ticed by the Samnites, 321 b.c., and being hemmed in was forced to surrender.

CAUDLE'S CURTAIN LECTURES,

Mrs., a series of humorous sketches, by Doug¬

las Jerrold (q.v.).

CAUER, kow'er, Emil, German sculptor:

b. Dresden, 29 Nov. 1800; d. Kreuznach, 4 Aug.

1867. He studied at Berlin under Rauch and at Munich under Haller; in 1825 he went to Bonn where he was instructor in art at the uni¬

versity ; in 1832 he was appointed drawing mas¬

ter at the gymnasium at Kreuznach. His fame rests on his invention of the so-called (<Cauer-sche Masse, }) a superior substitute for plaster.

Among his best works are <Sickingen) ; (Charles V) ; (Melanchthon) ; and the repre¬

sentations of Red Ridinghood and other fairy tale characters. He also restored the antiques in the museum at Dresden.

CAUER, Karl, German sculptor: b. Bonn,

14 Feb. 1828; d. Kreuznach, 17 April 1885. He studied with his father, Emil Cauer (q.v.), and with Wolff in Berlin; he also visited London several times in order to study the Parthenon friezes. Among his works are the Schiller monument at Mannheim, (The WitclP and a number of portrait busts. In his later life he became interested in the question of

coloring sculptures, and made a number of experiments in that line. He also designed the tomb of President Garfield at Cleveland.

CAUER, Robert, a younger brother of

Karl Cauer (q.v.): b. Dresden 1831; d. 1893.

He studied at Diisseldorf, and then with his father at Kreuznach and then at Rome. He made hundreds of little statuettes, charming in execution, the motifs of which are taken from romantic or classic tales and poems, such as (The Sleeping Beauty,* {Hermann and

Dorothea,* (Puss in Boots, * (Paul and Vir¬

ginia.) He and his brother Karl were com¬

missioned by the Prussian Ministry of Public Instruction to superintend the reproduction in plaster casts of the principal structures of Italy. Emil the Younger, Hugo, Ludwig and Robert the Younger, sons of Karl Cauer, and Stanislas, son of Robert the Elder are all sculptors.

CAUGHNAWAGA, ko-na-wa'g*, Canada,

town in the province of Quebec, situated on the Saint Lawrence River at the head of the Lachine Rapids, 10 miles west of Montreal. It is an Indian town and was established by the Jesuit missionaries in 1676 as a colony for the Indians who were converted to Christianity.

The converts were Iroquois, mostly Mohawks, and remained loyal to the French during their quarrels with other Indians and the English.

In the Lower Canada insurrection of 1838

Caughnawaga was the first place to be at¬

tacked by the rebels, who were repulsed by the Indians and a number of them taken prisoner.

There were 2,240 Indians in the reservation in 1911.

CAUL, a membrane enclosing the viscera, such as the peritoneum or part of it, or the pericardium ; also the amnotic membrane that surrounds all foetal structures and sometimes becomes caught by the head of a child at birth.

Many superstitions have been connected in the past with cauls. The child that happened to be born with one was esteemed particularly for¬

tunate; and the possession of it afterward, however obtained, was highly prized, as of a.

charm of great virtue. The superstition is thought to have come from the East. With the French, etre ne coiffe was an ancient proverb, indicative of the good fortune of the individual. The alchemists ascribed magical virtues to it; and, according to Grose, the health of the person born with it could, in after life, be judged of by its condition, whether dry and crisp, or relaxed and flaccid. Medic¬

inal virtues were imputed to it by the ignorant, as well as the property of preserving the owner of it from drowning. It has been bought and sold occasionally at a high price, sailors having been known to give as much as $150 for a single caul. Consult Brand, (Popular Antiquities> (London 1870) ; (Notes and Queries) (Vol. VII, London 1849 et seq.) ; Jones, Credu¬

lities, Past and Present* (London 1898).

CAULAINCOURT, ko-lan-koor, Armand

(ar-man) Augustin Louis de, Duke of Vi¬

cenza, French statesman: b. Caulaincourt (Aisne), 9 Dec. 1772; d. Paris, 19 Feb. 1827.

Jle early distinguished himself as an officer, was made a general of division in 1805 and shortly after created Duke of Vicenza. In 1807 he received the appointment of Ambassa¬

dor to Saint Petersburg. There he tried to main¬

tain the alliance of Tilsit, and was successful un¬

til, in 1811, hostilities broke out between France and Russia, and he

resigned his post. Faithful to the last to Napoleon, he was made Minister for Foreign Affairs in 1813, and during the Hundred Days resumed the office, receiving a peerage of France, of which he was deprived after the Restoration. He was then among those proscribed but his name was erased from the list on the intervention of the Russian emperor.

CAULIFLOWER, a member (Brassica

oleracca var. botrytis) of the cabbage tribe, derived from the same original species as cab¬

bage (q.v.), from which it differs in having a more or less compact head of metamorphosed flowers and adjacent parts instead of a bud¬

like head of densely packed leaves. Broccoli is a late hardy form of cauliflower not widely grown in America. Cauliflower is more del¬

icately flavored than cabbage, like which it may be cultivated and prepared for the table. In its cultivation, however, it seems to be more difficult to bring to perfection unless conditions, especially moisture and temperature, are just right. The essentials of its cultivation are highly fertile soil well drained, but well sup¬

plied with moisture, a moist climate or season, and shelter from the direct rays of the sun, as on a northern slope, or reduction of the inten¬

sity of the sun’s heat by planting either very early so as to mature in spring, or late so as to mature after mid-autumn. The heads pro¬

duced in midsummer are generally inferior in both size and quality. When the heads begin to develop, the leaves are tied above them so as to keep out foreign materials, but mainly to make the heads whiter and more attractive CAULKING — CAUSE

U> the purchaser. In preparing for the table the finer heads are usually served with a cream sauce; the poorer ones being pickled. In

com¬

parison with cabbage seed, the seed of cauli¬

flower is very expensive because of the diffi¬

culty of maintaining its high quality. For¬

merly the seed was imported from Denmark and Germany, but Washington and British Colum¬

bia have been gaining in the market with their cauliflower, cabbage and other related seeds.

Cauliflower suffers from the same enemies that attack cabbage. Consult Bailey, L. H., (Standard Cyclopedia of American Horticul¬

ture^ (New York 1914) ; Allen, (Cabbages, Cauliflower, etc.*

CAULKING, CALKING, or CAUKING,

the act of rendering the seams of a ship water¬

tight by driving oakum, cotton or the like, be¬

tween the planks in the ship's decks or sides, in order to prevent the entrance of water.

After the oakum is driven hard into the seams it is covered with hot melted pitch, to keep the water from rotting it.

CAULOPTERIS, a genus of fossil tree-ferns found in the coal-measures. The outer surface is characterized by four or more longi¬

tudinal rows of oval or roundish impressions or foliar scars. Each scar contains a linear cicatrix concentrically disposed either in horse¬

shoe form, with the ends curved inward, or a complete ellipse, the upper portion of which surrounds a transverse trace somewhat like an

inverted U. The inner scars mark the exit of the vascular bands of the petioles. Caulopteris is distantly related to the Marathaceae. It is characteristic of the Carboniferous.

CAURA, kow'ra, a river of Venezuela, trib¬

utary to the Orinoco which rises in the southern part of Venezuela on the northern slopes of the Sierra Pacaraima, and flows north-northwest through the department of Bolivar. It is over 400 miles long. On both sides stretches the territory of Caura (22,485 square miles), with immense forests of valuable woods.

CAUS, ko, or CAULX, Salomon de,

French engineer: b. Dieppe 1576; d. Paris, 6

June 1626. He was in the service of the Prince of Wales in 1612, and of the Elector Palatine, at Heidelberg, 1614—20, but by 1623 returned to France, and became engineer and architect to the King. At Frankfort, in 1615, appeared his (Causes of Kinetic Energy,) a work in which is described an apparatus for forcing up water by a steam fountain, differing only in one de¬

tail from that of Della Porta. There is no reason to suppose that the apparatus ever was constructed, but on the strength of the descrip¬

tion, Arago has claimed for De Caus the in¬

vention of the steam-engine.

CAUSE, that which brings about any

change in the state, condition, circumstances, etc., of things ; that which produces an effect.

In philosophy, that by which something

known as the effect is produced and without which it could not have existed. To give a satisfactory notion of all the senses in which this word has been used it would be necessary to review all the teachings of metaphysics from the time of Aristotle downward. The various positions of the conflicting philosophers can here be only very briefly indicated. Aristotle states causes to be of four kinds : efficient, formal, material and final. The efficient is the force or agency by which a result or effect is produced; the formal the means or instrument by which it is produced; the material, the sub¬

stance from which it is produced; the final, the purpose or end for which it is produced. A scientific cause demands the recognition of all the essential conditions, any one of which being absent the effect could not take place. Locke finds the origin of the notion of cause in sensa¬

tion. Assuming that bodies have the property of modifying each other, it is only necessary to observe them to perceive and be driven to admit the principle of causality. Hume declares the power which we attribute to one object over another to be a chimera ; such a power does not exist, or if it does we can have no idea of it. What we call cause and effect is merely two phenomena always following in the same order and which we have fallen into the habit of associating in our minds in such a way that on perceiving the first we inevitably expect the second. According to Leibnitz there is no existence, however humble, but is a force, that is, a real cause. The notion of force is the base even of the notion of existence; all that which is has a certain virtuality, a certain causative power. The human soul, like all the other limited forces in this world, is but a monad isolated in itself, but yet in whose inner being the whole creation is reflected, and whose move¬

ments have been from the beginning co-ordained by Divine Wisdom with the harmonious move¬

ment of the universe. Kant's doctrine is that the notion of cause and the principle of causality certainly exist in our minds ; but they are only simple forms of our understanding, or the en¬

tirely subjective, albeit inevitable, conditions of thought. We are compelled by a law or a form pre-existing in our intellect to dispose all the objects our imagination represents, or all the phenomena our experience can discover, ac¬

cording to the relation of cause and effect; but we do not know if

anything really exists, in¬

dependent from our intellect, which resembles a cause, a force or effective power. Against the doctrines of the intuitionalists it has been urged that the mere statement that the mind possesses a belief in causation proves nothing; some men believe in it, others do not, and unanimity is necessary to the establishment of a universal belief. Nay, more, the mere univer¬

sality of a belief is no conclusive proof of its correctness, as put in the words of the late John Stuart Mill — ((A mere disposition to believe, even if supposed instinctive, is no guarantee for the truth of the thing believed. If, indeed, the belief amounted to an irresistible necessity, there would be no use in appealing from it, because there would be no possibility of altering it.

But even then the truth of the belief would not follow : it would only follow that mankind were under a permanent necessity of believing what might possibly not be true; just as they were under a temporary necessity, — quite as ir¬

resistible while it lasted — of believing that the heavens moved and the earth stood still. The things which it has been supposed that nobody could help believing are innumerable, but no two generations would give the same catalogue of them.” The theological question of a First Cause is debated on the ground that matter of itself is inert, that spirit is active, that in order of existence one spirit or active force must be 132

the first and uncaused cause. This is based on the common fallacy which demands a first term for every series, even though series with¬

out first terms are common and consistent.

The notion of cause used to be counted among the primary concepts of natural science, but there is a notable tendency nowadays to cut loose from a causal term, and to render the function of science one of description rather than one of causal explanation. This is not merely a

desideratum or a program, but repre¬

sents the attitude really taken by modern sci¬

entists in their work. A causal explanation of an occurrence X consists in a statement of certain events, A, B, C, etc., which, if present, will always evoke X as a temporal consequent.

This causal explanation of X, then, involves the statement of a law according to which X

occurs, but not every descriptive law lends itself to expression in causal terms. In the first place, a causal law in the strict sense involves a definite, irreversible, temporal order between the events it connects ; in the second place, the antecedents, A, B, etc., are definite events, which either are there or are not there.

Now, the laws which have been most fruitful in the expression of scientific data and the stimulation of scientific research have usually been quantitative correlations, in which the cor¬

related terms have not necessarily stood in a unidirectional temporal relation to one another, or indeed in any temporal relation whatever.

The law of gravitation sa}rs that the accelera¬

tion of a body of mass m with respect to a body of mass m' at a distance d from it, if the bodies start from rest and are acted on m .

by no external forces, will vary as Here the acceleration, mf, and d are all contempora¬

neous, and are all more-or-less facts, not yes-or-no facts. As far as the physicist is con¬

cerned, it is utterly meaningless to say that the cause of the attraction resides in the mass m, or the mass m\ or in anything else whatever.

In spite of these facts, the unfortunate tradition which finds its typical exponent in Mill still makes many a metaphysician lapse into causal language in his treatment of natural science.

In law, a cause is a right of suit or action; it is something for which

suit may be brought by someone against another ; it includes the right of action. In practice, a cause of action comes into existence when there is such a state of facts or circumstances as will enable a per¬

son or party having certain relations with particular persons or property to commence a suit.

CAUSE CELEBRE, koz sa'labr', from the

French signifying ' celebrated case,* a term generally applied to any criminal or civil case of special legal importance or interest, national or international. Of such are celebrated trials for political crimes, for treason, of judicial errors, of impostors, poisoners, assassins, mur¬

derers, *etc.* Among causes celebres of modern days may be cited the Dreyfus case 1896-1903, the Steinheil 1912, the Caillaux 1914, in Paris; the Sickles-Key case 1859-60, the Stokes-Fiske case 1872, the Thaw 1906-14, the Becker-Rosen-thal 1912-14, in New York; the Mendel-Bielis ritual murder case in Russia 1912-13, and in England the Tichborne case 1871, when an impostor laid claim to an ancient title and rich estates. A French ritual murder case in which Voltaire championed the cause of the victim was that of Calas broken on the wheel in 1762. The bibliography of French causes celebres is voluminous. Consult Gayot de Pitaval, (Causes celebres et interessantes) (3d ed., 22 vols., Amsterdam 1772-88).

CAUSERIES DU LUNDI, or MONDAY—

CHATS, was the title given by Sainte-Beuve to the articles which he contributed every Mon¬

day for nearly 20 years, beginning with 1849, to the daily newspapers Le Constitutionnel and (after 1852) Le Moniteur. Their 15 vol¬

umes, together with the three volumes of the 'Premiers Lundis) and the 13 volumes of the (Nouveaux Lundis,* which are not to be sepa¬

rated from them, form an unmatched series of critical studies, of which literature is the central but by no means exclusive interest, and present a gallery of portraits in which poets and philosophers, statesmen and savants, artists and actresses, great wits and charming and beautiful women, are painted with a wonder¬

fully animating and revealing touch. The range and variety of the subject matter are surprising. Few figures of significance in French life and letters of the last three cen¬

turies fail to find a place in the collection. Nor was Sainte-Beuve's view confined to his own country. He was widely read in foreign litera¬

tures, particularly English. His curiosity was insatiable and his mind singularly mobile and insinuating. For such a mind criticism had to be something quite different from what it had traditionally been, — a classifying and judg¬

ing of literary compositions-according to some definite, accepted canon of taste. Its task was primarily to understand a work and a person in the light of their intention rather than to measure them by some conventional standard.

Literary works were viewed but as a partial expression of individualities, to be fully com¬

prehended only when illumined by the light thrown upon them by complete knowledge of their author's life, times, family, friends, sur¬

roundings, circumstances and character. The preliminary reading that went to the making of each of these articles was prodigious. The critic could neglect nothing that could add to his knowledge of the man or woman whose work he was assessing. Sainte-Beuve did not, how¬

ever, abandon standards of judgment and give himself up, like Taine, to explaining literature in terms of race, environment and moment.

He maintained, with increasing insistence as he grew older, the tradition of a cultivated and disciplined taste. He furthermore added to his rare qualities of intelligence and discrimina¬

tion the command of an entirely adequate style, of great delicacy, brilliancy and charm, so that the ‘Causeries* delight us no less than they instruct. Taken all in all they constitute, with the companion series of ‘Portraits, > as impos¬

ing a body of criticism as any literature can show, and justify the almost unanimous en¬

dorsement of Matthew Arnold’s estimate of their author as “the finest critical spirit of our time.® Of English translations of some of the Causeries, that by W. B. Matthews. ‘Sainte-Beuve’s Monday-Chats) (Chicago 1877), offers especially essays dealing with great French writers, while that of A. T. Butler, ‘Select Essays of Sainte-Beuve) (London), confines CAUSTIC — CAVA DEI TIRRENI

itself to those of interest to students of Eng¬

lish letters.

Arthur G. Canfield,

Professor of Romance Languages, University of Michigan.

CAUSTIC, in medicine, any agent which

causes a destruction of the parts by local appli¬

cation. Caustics act by withdrawing water from the skin, by coagulation of the albumen or by other chemical change. Thus caustic soda and caustic potash act by the abstraction of water. They further act on fats, saponify¬

ing them, and are particularly serviceable as caustics if penetration is desirable. Sulphuric acid acts in much the same way, but it is very difficult to control its caustic action. Others of the acids are used as caustics, nitric, glacial acetic, trichlor-acetic, *etc.* Many mineral salts, silver nitrate, zinc sulphate, zinc chloride, cop¬

per sulphate, arsenic, etc., are valuable caustics.

The most reliable caustic is the actual cautery using a dull red flame. Caustics are used to stimulate the growth of granulating wounds, to remove warts, condylomata, etc., to cleanse ulcers, remove cancerous growths, to prevent poisoning by dog-bites, *etc.*

In mathematics, the curve to which rays of light are tangent after reflection from a surface or refraction by a lens. Opticians endeavor so to shape their mirrors and lenses as to make the caustic two intersecting straight lines.

When this is achieved, the <(spherical aberra¬

tion® disappears. Caustic curves may often be seen on the bottom of a cup, produced by re¬

flection from the curved wall of the cup. See also Light.

CAUSTIC AND SODA, Electrolytic Pro¬

duction of. See Electrochemical Industries.

CAUTERETS, ko-te-ra, a watering-place

of southwest France, in the department of Hautes-Pyrenees, 3,250 feet

above sea-level, in the valley of the Laverdan, 42 miles south-southeast of Pau. The stationary population of the place is only about 1,550, but it is annu¬

ally swelled in summer by some 50,000 visitors, for whose accommodation numerous sumptuous hotels and bathing establishments have been built. It is a good centre and guide-station for ascents among the Pyrenees. The sulphur¬

ous springs, 24 in number, and varying in tem¬

perature from 75° to 137° F., are the most abundant in the Pyrenees, and have been known from Roman times; though their modern repu¬

tation dates from the 16th century, when Mar¬

garet, sister of Francis I, held her literary court and wrote much of her (Heptameron) at

Cauterets.

CAUTERY. See Caustic.

CAUTIN, kow'ten, Chile, a province di¬

vided into the departments of Temuco and Im¬

perial. It is bounded by the Pacific on the west, Argentine on the east, Malleca and Val¬

divia on the north and south, respectively. It has an area of 5,832 square miles, and a popu¬

lation of 161,000. The city of. Temuco (pop.

11,000) is the capital. Principal towns are Nueva, Imperial, Lautaro and the port of Carahue. There is a regular line of steamers be¬

tween Carahue and Valparaiso. In the prov¬

ince are numerous lakes, one of which, Villa-rica, with a surface of 100 square miles, lies at the base of a volcano of the same name.

The Central Railway connects the capital with other cities of the republic. The soil of the province is fertile. Wheat, fruit and lumber are produced.

CAUTIN, a river in Chile; flows west

through a province named after it, and empties into the Pacific Ocean. Its length is about 200 miles.

CAUTIONARY, a term used in Scotch

law and signifying the (<promise or contract of one, not for himself, but for another.® A simple cautioner is one who binds himself con¬

jointly with the debtor or principal for the greater security of the creditor. The creditor may. proceed against the principal debtor and cautioner, or against either of them. The cau¬

tioner may, however, stipulate on the docu¬

ment constituting the cautionary obligation that the creditor shall take legal measures against the debtor or principal. Cautioners are fre¬

quently taken bound, conjointly and severally, or as full debtors, with the principal, in which case both parties are liable for the whole debt.

It follows, from the nature of the obligation, that a cautioner who has paid the debt has an action against the principal for relief. All cautionary obligations must be in writing, and have the signature of the cautioner attached; the conditions of contract must be clearly stated, which must be strictly observed, otherwise the cautioner is freed.

CAUTIONARY TOWNS, four towns in

Holland, Briel, Flushing, Rammakens and Wal-cheren, so named because they were given to Queen Elizabeth in 1585 as security for their repaying her for assistance in their struggle with Spain. They were restored to the Dutch Republic by James I in 1616, although

only a portion of the sum advanced was refunded.

Consult Cheyne, (A History of England* (Vol.

I, pp. 195, 212, 243).

CAUVERY, ko’ver-i, CAVERY, or kA—

VERI, a river of Hindustan, to the waters of which Mysore and the Carnatic owe much of their agricultural wealth. It rises from several head streams in Coorg and Mysore, near the coast of Malabar, flows southeast through My¬

sore and the Madras Presidency, and after a winding course of about 470 miles falls into the Bay of Bengal by numerous mouths, the largest being the Coleroon. Where it separates Mysore from Coimbatore the Cavery forms an island called Sivasamudram, near which are two magnificent cataracts, each about 200 feet high, and more or less broken into cascades according to the volume of water. In connec¬

tion with this river and its tributaries import¬

ant canals and dams have been constructed for purposes of irrigation, with the effect of render¬

ing the country on either side highly productive.

The Cavery is filled by the monsoon rains in May and July, but is not navigable except by small boats. The irrigation system of its delta, dating from the 2d century, is the most ancient in India.

CAVA, ka’va, DEI TIRRENI, Italy, city

in the southern province of Salerno, situated in the valley of Fenestra, three miles northwest of Salerno. It is the seat of a bishop, suffragan to the Pope, and contains a cathedral, three other churches, a convent, a house of refuge, a hospital and a seminary. Silk, cotton and

linen are manufactured here, and in the numer¬

ous small villages that surround the town. The district is extremely unproductive, but the in¬

habitants have become wealthy by their industry and commerce. About one mile from Cava is the magnificent Benedictine convent of the Trinity founded, in 1025, by Saint Alferius over the cavern he had occupied, which for¬

merly contained an excellent library, now trans¬

ferred to Naples. This convent is now national property and contains a lyceum and boarding-school. It is a resort for Neapolitans in sum¬

mer and for foreigners in spring and autumn.

Pop. 23,817.

CAVAGNAL, Marquis de. See Vau-

DREUIL DE CAVAGNAL, PlERRE FRANgOIS DE Rl-gaud, Marquis de.

CAVAIGNAC, ka-va-nyak', Eleonore-Louis

Godefroy, French journalist and politician, son of Jean Baptiste Cavaignac (q.v.). He op¬

posed Louis Philippe, and was one of the founders of the Societe des Amis du Peuple and of the Societe des Droits de l'Homme (1832), of which he was president in 1843.

He took an active part in the various uprisings of the time, and in 1835 escaped to England.

Returning to Paris in 1841, he became one of the editors of La Reforme, an opposition news¬

paper. An excellent statue by Rude is dedicated to him at Montmarte.

CAVAIGNAC, Jacques Marie Eugene

Godefroy, French politician, son of Louis Eugene Cavaignac (q.v.): b. 22 May 1853; d.

Saint Calais, department of the Sarthe, 25 Sept.

1905. He studied at the Lycee Charlemagne, Lycee Louis le Grand, Ecole Polytechnique and Ecole des Ponts et Chaussees, interrupting his studies long enough to serve in the Franco-Prussian War. In 1882 he was elected to the Chamber of Deputies, and in 1885 was ap¬

pointed under-secretar}' of state. In the Panama revelations of 1892 he bore a conspicu¬

ous part. On the organization of the Bourgeois Cabinet, 30 Oct. 1895, he was appointed Minis¬

ter of War. In August 1898, he added to the excitement over the Dreyfus prosecution by forcing Lieutenant-Colonel Henry to confess to a forgery of certain letters bearing on the Dreyfus case, and the accused officer com¬

mitted suicide within a few hours. In the fol¬

lowing month Cavaignac resigned his office. He was author of (La formation de la Prusse contemporaine) (1897-98).

CAVAIGNAC, Jean Baptiste, French rev¬

olutionist: b. Gourdon 1762; d. Brussels, 24

March 1829. He became an advocate at the Parliament of Toulouse; and in the National Convention acted as deputy from the depart¬

ment of Lot. He rose to be one of the leaders of the Mountain (Extreme Republicans), and, on his various dictatorial missions to the armies of the Republic, displayed the greatest energy, tact and incorruptibility. He was a member of the Council of Five Hundred; and after¬

ward became a councillor of state in Murat's kingdom of Naples. During the Hundred Days he acted as prefect of the Somme. He was banished as a regicide, at the second Restora¬

tion.

CAVAIGNAC, Louis Eugene, French gen¬

eral : b. Paris, 15 Oct. 1802; d. 28 Oct. 1857.

His father, Jean Baptiste Cavaignac (q.v.), was a furious revolutionist, and member of the Council of Five Hundred. Young Cavaignac entered the Ecole Poly technique in 1820, and afterward the military school at Metz, and in 1824 joined the 2d regiment of engineers. He served in the campaign in the Morea, and in 1829 was appointed captain. Being at Arras on the outbreak of the revolution of 1830 he was the first officer in his regiment to declare for the new order of things. In 1832 he was sent to Africa, where he remained for several years, and greatly distinguished himself in defending the French settlement against the Arabs and by his judicious organization of military hospitals, barracks and works of defense. In 1844 he received the appointment of brigadier-general, with the government of the province of Oran in Algeria. Cavaignac was in Africa when the revolution of February 1848 took place. In March of that year he was created by the pro¬

visional government general of division and governor of Algeria. Shortly afterward the office of Minister of War was offered to him, but declined. On 23 April he was chosen repre¬

sentative of the department of Lot in the Na¬

tional Assembly, and proceeding to Paris to take his seat arrived there on 17 May. The capital was then in a state of great excite¬

ment from an attempt on the assembly by the Red Republicans two days before. Cavaignac was offered again the portfolio of the Minister of War, and this time accepted it. The meas¬

ures which he adopted to guard against the crisis which was evidently approaching were prompt and decisive. In a few days an army of nearly 30,000 men was assembled in and around Paris, and this precaution was speedily justified by the events which followed. On 23 June, at 11 o'clock a.m., the terrible Com¬

munist insurrection burst forth, and for three days Paris presented the most dreadful scene of tumult and bloodshed which had been wit¬

nessed there since the massacre of Saint Bar¬

tholomew. About 15,000 persons perished, and property was destroyed to the value of upward of $1,000,000. By the energy of General Cavaig¬

nac, aided by the loyalty of the army and the national guard, the insurrection was suppressed on 26 June. On that day the National Assembly delegated the entire executive power to Cavaig¬

nac as dictator, who resigned it again into its hands on the 29th, and received it anew on the same day, with an acknowledgment by the legislative body of the services rendered by him to his country. Notwithstanding these he was defeated in the elections for the presidency in the month of December following, and Louis Napoleon was preferred to the office. On 20

December he resigned his dictatorship. After the coup d'etat of 2 Dec. 1851, he was arrested and conveyed to the fortress of Ham, but was liberated after about a month's detention. In 1852 and in 1857 he was elected member for Paris of the legislative body, but on both oc¬

casions was incapacitated from taking his seat by refusing to take the oath of allegiance to the Emperor. The last years of his life were spent at his country-seat in the department of Sarthe. Consult Montfort, (Biographie du gen¬

eral Cavaignac) (1848) ; Deschamps, (Vie de Cavaignac) (1870).

CAVAILLE-COLL, ka'vi-ya'kol', Aris¬

tide, French organ builder: b. Montpellier, 2

Feb. 1811; d. Paris, 13 Oct. 1899. He built the organs in the Parisian churches of Saint Sulpice, the Madeleine, etc., and invented the pressure method, for sounding tones of different depths and heights. His writings include a (Projet d'orgue monumental pour la basilique

de Saint-Pierre de Rome) (1875). Consult Lefebvre, (Le grand orgue de l'eglise Saint-Michel du Havre) (Havre 1888), an account of a work executed by Cavaille-Coll in 1887-89.

CAVAILLON, ka-va-yon (ancient Cabel—

lio), France, a town of southeast France in the department of Vaucluse, 20 miles southeast of Avignon by rail. It is an ancient place, and has a cathedral dating from the 12th cen¬

tury. The surrounding district is one vast garden, producing excellent fruit, especially melons and peaches. A considerable trade is carried on in silk, olive-oil, fruit, early vegetables and wool. The industries com¬

prise straw hats, edge-tools, tanning, the pre¬

serving of fruits and vegetables, *etc.* The Ro¬

mans had an important colony here, and erected many edifices, of which almost the only remains are some tombs and the fragment of a triumphal arch. It was an episcopal city as early as the 5th century. Pop. 9,416.

CAVALCANTI, ka-val-kan'te, Guido, poet :

b. probably in Florence about 1252 ; d. there, 28

or 29 Aug. 1300. He was the friend of Dante, in whose judgment he excelled all in lyric verse (Purg. xi, 97) ; and like him a zealous Ghibelline. When the dissensions of the Guelfs and Ghibellines disturbed the public peace of Flor¬

ence the citizens banished the chiefs of both parties. The Ghibellines were exiled to Sar-zana. On account of the unhealthful air of that place they were permitted to return; but Cavalcanti had contracted a disease of which he died at Florence. In his youth he made a pil¬

grimage to Saint Jago de Compostella in Galicia.

Returning home through France he fell in love at Toulouse with a young lady by the name of Mandetta. To her most of his verses which we possess are addressed. They are remark¬

able, considering the period at which they were written, for their beautiful style. His (Canzone d'Amor) have gained him the most fame. The learned Cardinal Egidio Colonna and some others have made commentaries on it. Various editions of his works have appeared, those of Arnone (Florence 1881) ; of Ercole (Leghorn 1885) ; of Rivalta (Bologna 1902), and of E. C.

(Lanciono 1910). Translations have been

made by Ezra Pound (Boston 1912) ; by Fletcher (in Modern Philology 1910). Consult Ercole, (Guido Cavalcanti e le sue Rime) (1885) ; Fletcher, J. B., (The Religion of Beauty in Women1 (New York 1911).

CAVALCASELLE, ka-val-ka-sel'la, Gio¬

vanni Battista, Italian art historian : b. Leg-nano, 22 Jan. 1820; d. Rome, November 1897.

He studied painting at the Academy of Venice and at Munich. He was active in the revolu¬

tion of 1848 and was forced to escape to Eng¬

land. He became the literary associate of J. A.

Crowe (q.v.), with whom he produced the epoch-making ˆHistory of Painting in Italy1

(1864-71), the most complete work on the sub¬

ject; (Early Flemish Painters1 (1857-72) ; (Life of Titian1 (1877) ; (Raphael> (1883).

He was inspector of the National Museum in Florence and director-general of fine arts in Rome. A new edition of his history1 ap¬

peared by Edward Hutton (3 vols., 1909). A revision was begun by Crowe and continued by S. A. Strong and Langdon Douglas (6 vols.).

CAVALIER, ka-val-ya, Jean, French sol¬

dier, chief leader of the Camisards in the wars of the Cevennes: b. Ribaute, near Anduze, 1681 ; d. Chelsea, England, 17 May 1740. He

was at Geneva when the severe measures of Louis XIV against the fanatical Camisards induced him to return home. Several insurrections had already broken out, but he soon so distinguished himself by his courage and success, that, though only at the age of 24, he became the acknowledged head of the insurgents. Not¬

withstanding their gallantry they were obliged to carry on the war on such unequal terms that the impossibility of success became apparent, and Cavalier entered into a capitulation with Marshal Villars, by which he obtained a pension of 1,200 livres, a colonel's commission and per¬

mission to raise a regiment of his own for the King's service. He was summoned, however, to Versailles, and, finding himself looked upon with suspicion, made his escape and soon after visited England. In the Spanish War, being supported by the English and Dutch, he com¬

manded a regiment raised by himself and partly consisting of refugee Camisards, and distin¬

guished himself greatly at the battle of Al¬

manza in 1707, where he was severely wounded.

He was afterward pensioned by the British government, appointed governor of Jersey and made a major-general.

CAVALIER, (1) a horse-soldier; an

armed horseman ; a knight ; the name given to the supporters of King Charles I, during the great Civil War in England, from their gay dress and demeanor, as contrasted with the austerity of the Parliamentary party, who were styled Roundheads, from the mode in which the more puritanical of that body wore their hair closely cropped. (2) In fortifications, a kind of interior bastion, several feet more elevated than the principal bastion of the for¬

tress in which it is formed. The use of the cavalier is twofold: It serves either to defilade the works from the fire of an enemy or an adjacent height, or to command the trenches of the besiegers. Cavaliers are sometimes con¬

structed in the gorges, or on the middle of the curtain, and their form is semi-circular; but when they are within the bastion they are now

built with straight faces and flanks parallel to those of the work in which they are placed.

French cavaliers are works raised by besiegers on the glacis of a fortress for the purpose of enabling them to direct a fire of musketry into the covered way.

CAVALIER POETS, a term properly ap¬

plied to the group of lyrists among the follow¬

ers of Charles I and of his exiled son, from the first actual warfare with the Commonwealth until the Restoration. The term is also applied more broadly to other poets of the time such as Herrick (q.v.) or Donne (q.v.) who wrote in the same style; but the distinction of the manner is due to those loyalists who were pre¬

eminently court gentlemen and fighters for the King.

In literary tradition the Cavalier poets took their descent from Wyatt and Surrey, Sidney 136

and Raleigh, and those other cultured and well-traveled ˆmakers® of the Tudor and Eliza¬

bethan courts, who naturalized the Provencal lyric and its love-system on English soil. This influence, of course, had been strong in Chau¬

cer’s time, but only with this later group did lyric poetry as an accomplishment become well established among the gentlemen around the English sovereign, and take on a native manner, truly expressive of the historical moment.

The early Elizabethan court poets, even in their narrowest imitations of the French son¬

neteers, had some of the largeness of the age in their manner; they spoke consciously to an audience. At th,e end of the reign the Renais¬

sance wealth of scholarship and culture had spread through the nation, in a wide circle from the court. What remained the peculiar inher¬

itance of the courtly poet was undergoing a re¬

finement such as the novel shows in the second part of (EuphuesP in which the story is taken into the drawing-room, where the feminine in¬

fluence is dominant, imposing in a modern way the exquisiteness which is the end of all courts of love. By a similar transition the courtly poets, letting go the larger subjects and the public manner, made the quality of their verse the very qualities of graceful society — the per¬

sonal compliment; the brief sallies that general conversation demands ; the quick turns in which grace and wit count ; that method of society verse which restrains beneath an even manner all feeling that is too personal or too deep. The presence of the ladies is felt — not of one woman alone ; as in the garden scene in the second part of (EuphuesP the lover must find ways to woo his lady under the very eyes of her teasing comrades.

This development of the court poetry was occasioned, no doubt, by the natural growth of culture and the perfecting of manners in Eng¬

lish society, as well as at the court. Some im¬

pression, however, was made upon the court by the change from Elizabeth's manlike rule to the gentle influence of Charles' refined Queen. The influence of Henrietta Maria, however, was not altogether admirable. Refining though it was, it took the direction of effeminacy, and in the precieuse fashion which is fostered, of insincere pedantry. William Harbington (1605-54) in his (Castara) (1634) illustrates the over-refine¬

ment of theme to which the graceful court verse at this moment might have seemed doomed.

The personality of Charles, however, which enlisted the loyalty of the courtiers, his tragic end, and the exile of his family and his follow¬

ers, gave back to the courtly verse the vitality it was losing, and in addition some new char¬

acteristics, which distinguished it as Cavalier poetry. Loyalty to Charles and to his son, un¬

like loyalty to Elizabeth, was personal more than patriotic; it served to revive therefore some of the most ideal conditions of chivalry.

Charles became not so much the sovereign of a country as the head of an order of knights; his exiled son became their leader under all skies. The sufferings that were the cost of their loyalty, their sense of a lost cause and the long tradition of proud breeding that would bear all with outward lightness, made the pathos and the grace of the best Cavalier poets. The Eliza¬

bethan largeness of manner never quite re¬

turned, though the Marquis of Montrose (161 2—50) echoed it nobly in his lines on the death of Charles I, and in those on his own execution; but in general the lighter gracefulness continued to be a mark of the Cavaliers, as in Montrose's most famous lyric, (My dear and only love.-*

In singleness and loftiness of devotion, in the actual sacrifice of his life for the cause, and in the natural, incidental place of literature in his career, Montrose is perhaps the ideal Cavalier poet.

Richard Lovelace (1618-58), author of the best known Cavalier lyric, (Tell me not, sweet, I am unkindp and of the only less perfect (To Althea, From Prison,* illustrates in his life, as does Montrose, the tragedy that often underlay this graceful verse, but the tragedy is here one of sentiment. He impoverished him¬

self to give his fortune to the King. On return¬

ing from the wars abroad, he was imprisoned, and his (LucastaP Lucy Sacheverall, believing him dead, married some one else. Lovelace died, worn out by suffering and poverty.

A similarly typical fate was that of Sir John Suckling (1609P-42), who spent his fortune for the King, became an exile and died abroad.

He wrote several plays, and the clever (Session of the Poets,* the model of much later criticism in light verse; his fame, however, is founded on his Cavalier poems. In his life and in his writing he is neither so noble nor so pathetic as Montrose and Lovelace ; he is a roisterer at heart, as can clearly be seen even in the ex¬

quisite (Ballad upon a Wedding. > But he is master of the reckless tone that finally charac¬

terized the school, the tone that had been caught so finely by George Wither (1588-1667) — who strangely enough lived to be a Roundhead — in his (Shall I, wasting in despair?) In such lines as (Out upon it, I have loved three whole days together,* Suckling turns the bravado note into a pretty compliment ; in his best lyric, the song from <Aglaura> — <(Why so pale and wan, fond lover?® he carries it to its logical conclusion of recklessness.

Among the numerous poets who wrote in the Cavalier manner, though not under strict Cav¬

alier conditions, besides Herrick and Donne, already noticed, should be mentioned Edmund Waller, for his two perfect lyrics of compliment, (On a Girdle,* and (Go, lovely rose.* But far more important is Thomas Carew (1598?-

1639?), probably the most gifted minor poet of the time, with the exception of Herrick. He came of good family, enjoyed an excellent edu¬

cation and, it seems, led a reckless life. In his verse the Cavalier compliment is most elab¬

orate and most noble, as in the incomparable (Ask me no more,* and in the epitaphs on Lady Mary Villers, where he is indeed more the scholar than the Cavalier. <Give me more love or more disdainP and (He that loves a rosy cheek,* are other familiar examples of his felicity. He had in full measure the rhetorical grace of the true Cavalier, the secret of splen¬

did openings and cadences — an unacademic art that began not in literary imitation but in courtly conversation, in the fine compliment

paid to beauty that need not be abashed by praise.

John Erskine,

Adjunct Professor of English , Columbia Uni¬

versity.

CAVALIERE SERVENTE, ka-va-le-ar'e

ser-ven'ta. See Cicisbeo.

CAVALIERI, or CAVALLERI, Fran¬

cesco Bonaventura, Italian mathematician : b.

Milan 1598; d. Bologna, 3 Dec. 1647. He studied mathematics at Pisa under B. Castelli, a dis¬

ciple of Galileo, officiated as professor in Bo¬

logna, and was author of several mathematical works, the most prominent of which was en¬

titled (Geometria Indivisibilium continuorum nova quadam ratione promotaP Having ex¬

pressed in this work some original ideas con¬

cerning the abstruse sciences, the Italians claim him to be the inventor of the infinitesimal cal¬

culus (q.v.). It is indeed true that his method of indivisibles enabled him to attain certain results which we now reach by the integral calculus, but Cavalieri made the false step of regarding a plane figure as the sum of a finite number of narrow rectangular strips and a solid figure as the sum of a finite number of cylindri¬

cal laminae, instead of considering the figures in question as limits of such sums.

CAVALLA. See Kingfish.

CAVALLERIA RUSTICANA («Rustic

Chivalry®). The title of a famous short sketch of how an ((affair of honor® was settled in a country place in Sicily, by Giovanni Verga. The story first appeared in 1880 in a collection of tales entitled (Vita dei campi) (((Life in the Fields®) and subsequently when the stories were reprinted gave its name to the collection. The direct way the story is told, without any elaboration, leaving to the imagina¬

tion precisely what is necessary, makes the tragedy a model of this kind of realistic writ¬

ing, a kind, which has given Verga a very high rank among modern Italian writers. Turiddu, a young soldier, returns from military duty to find that his sweetheart, Lola, during his absence has given her hand to a well-to-do villager, Alfio. To revenge himself Turiddu wins the affection of a young girl, Santa, living directly opposite Lola, and then endeavors to make the latter jealous. He succeeds, abandons Santa, wins back Lola and pays for his treachery with his life in a duel with Alfio.

Such are the bare facts. The way they are presented in rapid succession leading up to the tragedy is realism of the highest order. More¬

over, the local coloring is so strong as to give the sketch a flavor that is peculiarly Italian and which characterizes thoroughly everything that is presented in the tragedy: Turiddu's uniform and red cap with the tassel worn by the Bersaglieri that strangely agitate the young girls and attract the small boys; his reproach in Sicilian dialect to Lola, just before her mar¬

riage; the ostentation of the latter after her marriage, of her jewels and ornaments at the balcony of her house in order to proclaim her wealth; the courtship of Turiddu and Santa, broken by Lola's jealousy, and the resulting consequences, that is the challenge of Alfio to Turiddu; the binding of the promise to fight the duel by embracing and by Turiddu's biting Alfio's ear; the duel at sunrise in the Indian fig field, where Alfio, wounded, stoops down, picks up a handful of dust, throws it into his op¬

ponent's eyes, thus blinding Turiddu, making it possible for Alfio to wreak his revenge by dis¬

patching the betrayer of his honor. In 1884

Verga dramatized (Cavalleria rusticana) as a one-act play containing nine scenes. Several minor characters appear and Santa is called Santuzza. The whole action takes place Easter morning in the village piazzetta, where the wine shop of Turiddu's mother, Nunzia, is seen and the village church. Although Verga's

dramatized version is effective, the drama is hardly the equal of the novella, the charm of which in no small degree lies in the merely suggested background. Undoubtedly much of the celebrity of JCavalleria rusticana) is due to Pietro Mascagni's opera of the same name, the libretto for which was written by Targioni-Tozzetti and Guido Menasci, shortly before 1890. Although the original version of the story is followed quite closely, several lyrics are introduced serving as texts for arias and choruses, which, admirable as they are in their way, by reason of their development, rather detract from the original dramatic effect. A readily available text of (Cavalleria rusticana, >

with English notes and commentary, by Pro¬

fessors Wilkins and Altrocchi of Chicago Uni¬

versity, will be found in a collection: Utalian Short Stories) (Boston 1912). An English translation by Alma Stretell appeared in Eng¬

land in (Cavalleria Rusticana and Other Tales of Sicilian Life) (London 1893), and in this country by Nathan Haskell Dole, in a volume entitled (Under the Shadow of Etna) (Bos¬

ton 1896).

James Geddes, Jr.

Professor of Romance Languages, Boston

University.

CAVALLERIA RUSTICANA, grand

opera in one act by Pietro Mascagni (lib¬

retto by Targioni-Tozzetti and Menasci,

founded on a tale by Verga), first produced at Rome, 17 May 1890. Awarded the prize in a competition for one-act operas offered by the publisher Sozogno, (Cavalleria Rusticana) launched its composer into world-wide promi¬

nence and founded a school of well-defined proportions. All Italy went wild over the work and Mascagni was hailed as the legitimate successor of Verdi. Everywhere the opera created a furore. In New York two managers vied with each other to be the first in the field, with the result that two productions were given in New York on 1 Oct. 1891 and the question of priority rights had to be settled by the courts. In the meantime, both Philadelphia and Chicago had heard it. The compressed emo¬

tional appeal of the work swept critical judg¬

ment off its feet. The hot-blooded passion of the story was raised to a higher power by the music, turbulent, theatrical, but persuasive. The vein tapped by the composer was not all pre¬

cious metal and it petered out suddenly; but while it lasted, the rewards were rich. The Intermezzo alone, an eloquent advance agent of the opera, must have poured a fortune into the composer's pockets. The Siciliana sung by Turridu, Santuzza's romance, the Drinking Song and Lola's aria are all melodious and easily remembered. The orchestration is often crude and blatant, but not unsuited as a vehicle for the <(veristic® and melodramatic musical ex¬

pression. Operatic annals contain few such sensational and meteoric careers as that of <Cavalleria Rusticana, > with the fortunes of

which its composer's fame has been inextric¬

ably bound up. Emma Calve's impersonation of Santuzza is one of the outstanding histrionic 138

features of modern operatic history. For the outline of the story see Cavalleria Rusticana.

Lewis M. Isaacs.

CAVALLI, ka-va'le, Pietro Francesco,

Italian composer: b. Crema about 1600; d.

Venice, 14 Jan. 1676. The name by which he is known was assumed by him in honor of his patron, Federigo Cavalli, podesta of Crema.

His real name was Pietro Francesco Caletti Bruni. He studied under Monteverde whose style he continued. In 1665, he became organ¬

ist at San Marco, and in 1668, Maestro di capella, or <(chapelmaster,55 which office he held for the rest of his life. He is best re¬

membered for his work in dramatic operas.

He introduced solos, freer rhythm and

widened the scope of dramatic possibilities. In all of this he was the direct forerunner of Scarlatti who developed opera along these lines. In spite of obvious crudities of style and weakness of harmony, Cavalli's 42 operas are still noteworthy productions. Among his numerous works may be mentioned Ee Nozze di Tetide e di Peleo) (1639) ; (I1 Giasone) (1649); E'Artemisia5 (1656). In 1656, a col¬

lection of his church music was printed at Venice.

CAVALLO, Tiberius, Italian physician and inventor: b. Naples, March 1749; d. London December 1809. He early removed to England, where he published, in 1775, a notice of Ex¬

traordinary Electricity Observed at Islington.) He invented several ingenious instruments for electrical and chemical experiments. His ap¬

paratus for measuring the force and quantity of electricity is remarkably delicate and ac¬

curate. In 1779 he was admitted to the Royal Society. His study of the influence of air and light on plant development was brilliantly original, and paved the way for valuable dis¬

coveries in organic life. He wrote (Medical Electricity) (1780) ; (A Treatise on the Nature and Properties of Air, etc.5 (1781) ; (Completc Treatise on Electricity) (1786) ; (Treatise on Magnetism in Theory and Practice5 (1787) ; Elements of Natural and Experimental Phi¬

losophy5 (1803), and other scientific works.

CAVALLY, one of the popular names of

the horse-mackerel, Carangus hippos , called also horse-crevalle and jack. It belongs to the family Carangidce (q.v.), and is distinguished by the black spots on the operculum and the pectoral fin.

CAVALOTTI, ka-val-ot’te, Felice, Italian

statesman and poet: b. Milan, 6 Nov. 1842; d.

Rome, 6 March 1898. He fought under Gari¬

baldi and gained celebrity; was a political jour¬

nalist. Elected to the Italian Parliament (1868), he opposed Crispi and became an ex¬

treme Republican, opposing the monarchy with great vigor. He was repeatedly sentenced to imprisonment. He fought 32 duels and was finally killed. The most noted of his tradedies are (Agnes de Gonzaga5 ; and (Alcibiades5

(1874). He also published volumes of lyric verse, his best work being (The Canticle of Canticles.5

CAVALRY, term used to designate soldiers trained to fight mounted and sometimes em¬

ployed on foot. The decisive power and value of cavalry lie in its mobility and in opposing infantry. On foot, the cavalry of to-day can attack positions with the same resolution and determination as can infantry. They use the same weapon — the rifle — and the cavalryman of to-day is the rifleman on horseback who can quickly convert himself into a rifleman on foot, ready to receive and repel the mounted charge of cavalry. There are enormous possibilities for the horseman of the future armed with the rifle, with a great extension of modern battle lines modified by the development of mounted infantry ready to throw itself on the rear or flanks of the distant enemy. The cavalry ac¬

tion of the future can be conceived by a com¬

parison of the cavalry of the Civil War, the Boer War and the European War with that of Wagram and Waterloo.

Cavalry as a distinct military organization dates back prior to the Trojan War. Xene-phon relates that in the first Messenian War, 743 b.c., Lycurgus formed his cavalry in di¬

visions. In the war 371 b.c., Epaminondas had a cavalry force of 5,000 men, and we know their cavalry contributed greatly to the victories of Philip and Alexander of Macedon. It had an important part in the battle of the Granicus, 334 b.c. ; and at the battle of Arbela, 331 b.c., Alexander, who led the Macedonian cavalry of 7,000 men, dashed into a gap of the Persian army, and by this brilliant feat utterly routed the enemy. The Roman cavalry was very in¬

ferior to that of Hamilcar and Hannibal and most of the victories of these two generals were won by cavalry over the splendid infan¬

try of the Romans. Publius Scipio's defeat at the Ticinus, 218 b.c., was due to the superior¬

ity of the Carthaginian horse; and the bitter experience at the Trebia and the battle of Cannae, 216 b.c., taught the Romans the value of cavalry, by which Scipio finally defeated Hannibal at Zama, 202 b.c. Vegetius states that the Roman cavalry was organized into 10

troops or squadrons, forming a regiment of 726 horses, generally attached to some special legion. It is a singular fact that saddles were not in use until the time of Constantine, and stirrups were introduced by the Franks in the 5th century. During the Middle Ages cavalry may be said to have constituted almost the only efficient arm of battle. This was owing to the unwillingness of the nobility in all countries of western Europe to entrust any military power to the serfs; the upper classes went into battle mounted, and both riders and horses had heavy defensive armor. The feudal cavalry con¬

sisted of mail-clad knights with their men-atarms. Their weapons were lances, battle-axes and swords. The infantry was looked down upon during the Middle Ages, being composed principally of serfs and such as had not the means to keep a horse ; but with the invention of gunpowder, the introduction of muskets and the use of field artillery a complete change took place ; the infantry gradually rose in repu¬

tation, and the number of this class of troops was augmented. It seems that light cavalry did not exist as a distinct body, with general officers and a staff, before the time of Louis XII. Montluc, however, mentions a general of 12,000 light horse in the time of that monarch ; and we hear of Henry II, in 1552, taking a troop of 3,000 cavalry in his expedition to Germany. In 1554 Marshal De Brissac formed a corps of mounted infantry, called Dragoons, CAVALRY

trained to fight either on horseback or on foot.

Maurice of Nassau, who saw the importance of giving more mobility to this arm, was the first to organize cavalry regiments, each regiment being composed of four squadrons, formed in five ranks, and numbering about 1,000 horses.

Gustavus Adolphus was a great cavalry gen¬

eral, and used his cuirassiers and dragoons to good advantage. His tactics were much ad¬

mired, and were adopted by many European nations. The French, especially, distinguished themselves after his death in the employment of cavalry. Turenne, Conde, Montecuculi and Marlborough were considered excellent cavalry leaders. Cromwell was indebted to his abilities as a cavalry officer for the victories of Marston Moor and Naseby. Defensive armor for

cavalry had been abolished in his time, and the cavalry troops were taught to use the carbine.

Charges of cavalry were seldom made in battle except by the French. Marshal Saxe made many improvements in this arm, and used guns in connection with cavalry at the battle of Fontenoy, although regular horse-artillery was not introduced till 1762. It was not until the wars of Frederick the Great, however, that the full importance of cavalry was developed; he saw the necessity of training these troops to use swords instead of firearms, and endeavored to make them perfect riders. No firing what¬

ever was allowed in the battle during the first charge ; he claimed that the only two things required to beat the enemy were to charge him with the greatest possible speed and force, and then outflank him. The brilliant victories he obtained from the adoption of these tactics under the able leadership of Seydlitz have prob¬

ably never been excelled. At the battle of Hohenf riedberg the Prussian cavalry of 10

squadrons broke 21 battalions, routed the en¬

tire left wing of the Austrian infantry and captured 66 standards, 5 guns and 4,000 prison¬

ers. Frederick had learned to appreciate the true principles of mounted warfare through long experience and the occasional disasters which he had met in the first and second Silesian wars ; and it was due to the efficient reforms which he instituted in the Prussian cavalry that he was able to win the battles of Rossbach, Striegau, Kesselsdorf, Leuthen and others. One of the first improvements made in the French army by Napoleon was the re¬

organization of the cavalry. He increased the cuirassiers from one regiment to 12, and re¬

introduced the use of the lance and defensive armor. Some of his splendid victories were due to this force, especially at Marengo and Austerlitz ; and it was owing to the loss of the French cavalry in the Russian campaign of 1812 that some of his finest achievements in 1813 proved useless; he was well aware of this, and made the statement that had he pos¬

sessed cavalry at the battles of Liitzen and Bautzen the war would then have been brought to an end.

In modern warfare it may be mentioned

that cavalry was conspicuous at the battle of Solferino ; but in 1866, the first great European war since Waterloo, neither the Austrian nor the Prussian cavalry won great distinction, al¬

though the manner in which the Austrian cavalry covered the retreat of their army at the battle of Koniggratz was a noble example of courage and devotion. In the Franco-Prussian War of 1870, however, the excellence of the Prussian cavalry was the chief means of Von Moltke's ability to carry out his strategic plans. The French cavalry were more remark¬

able for bravery than efficiency. Great progress was made in the cavalry of the United States during the Civil War; a large number of men of both armies were good riders, and under¬

stood the management of horses. They were at first, however, quite ignorant of military tactics, and were used as scouts, as orderlies and for outpost service. General Sheridan, acting under instructions from General Grant, made the first successful organization of cavalry, which was called the Cavalry Corps of the Army of the Potomac, comprising three di¬

visions of 5,000 mounted men each. Their weapons were repeating carbines and sabres.

It was with this force that he defeated the Con¬

federate cavalry at Yellow Tavern, near Rich¬

mond ; and it contributed largely to the defeat of Early at the battle of the Opequan, near Winchester; and later, at the battles near Petersburg and at Five Forks, the cavalry took an important part. General Wilson, wdiom Gen¬

eral Sherman put in command of a force called the Cavalry Corps of the Military Division of Mississippi, did good work in the organiza¬

tion toward the close of the wrar; he had 12,000

mounted cavalry and 3,000 who fought on foot at the battle of Nashville, not including a de¬

tachment of 3,000 men in Kentucky.

Cavalry is usually placed in the rear of the infantry on ground favorable to its manoeuvres, and where it will be masked from fire until the moment arrivesˆ to bring it into action ; here, if acting on the defensive, the cavalry watches its opportunity to support the other troops, driving back the enemy, by prompt and vigor¬

ous charges, when these are hard pressed; or, if on the offensive, biding its time, to rush upon the assailant, and complete his destruc¬

tion, when his ranks commence to waver or show signs of disorganization from the assaults of the other arms. Its habitual formation for the attack is in a line of two ranks, with a reserve, or support, to its rear. The supports are indispensably requisite to guard against those chances of danger in which cavalry is particularly exposed, if attacked in turn, when in a state of partial disorganization, after a successful charge; or when threatened by an offensive movement against its flanks. The supports offer a safeguard against either of these dangers; for, if the front line is brought up by the enemy, after a successful charge, it can retire and rally in the rear of the supports; and if the enemy makes a movement against the flanks, the supports, placed behind them and in column, can form and anticipate the enemy’s charge. For the foregoing reasons, cavalry should not give wav to a headlong pursuit after a successful charge, unless its supports are at hand ; and in cases where a charge is made without supports, a portion only should engage in pursuit, the rest being rallied to form a support.

A body of cavalry which waits to receive a charge of cavalry, or is exposed to a fire of infantry or artillery, must either retire or be destroyed. This essential quality of cavalry renders its services invaluable in retreats where the enemy pursues with vigor. In such cases it should be held in constant readiness to take 140

advantage of every spot favorable to its ac¬

tion, and, by short and energetic charges, force the enemy to move with circumspection. So long as infantry maintains its position firmly, particularly if the ground is at all unfavorable to the movements of cavalry, the chances are against a successful attack by the latter.

Cavalry should therefore either wait patiently until a way is prepared for its action, by a fire of artillery on the enemy's infantry; or until the infantry has become crippled and exhausted by being kept in action for some time ; or else, watching its opportunity, make a charge whilst the infantry is in motion, so as to surprise it before it can form to receive the attack.

Cavalry should direct its charge on that point of the enemy's infantry where it will it¬

self be exposed to the least column of fire. If the infantry is in line, the charge should be made on one of its flanks; if in square, on one of the angles of the square ; and when several squares are formed, so as to afford mutual sup¬

port by their fire, selecting the squares on the flanks as most vulnerable, from their position.

The formation usually recommended for charg¬

ing against squares is that of three squadrons in line at double distance ; the leading squadron being followed by the others, either directly in its rear, or else the squadrons may be formed in echelon, successively overlapping each other by about the front of a platoon. The angle of the square is charged by each squadron in suc¬

cession, if the charge of the one preceding it fails ; the repulsed squadrons each wheeling to the right or left on retiring, to leave the way clear for its successor* A fourth squadron in column follows those in line, to surround the square and make prisoners if it should be broken by the charge. To draw the fire of the infantry before charging, a few skilful flankers may be thrown forward to open a fire on the square. Stratagem may also be tried, by mov¬

ing along the front of the infantry, and then charging, if it is tempted to throw away its fire.

In attacks against artillery, the detachment of cavalry should be divided into three bodies ; one-fourth of the detachment being charged with carrying the guns, one-half to attack the supports of the battery and the remaining fourth acting as a reserve, to cover the parties in advance from an offensive movement

against their flanks or rear. The party to se¬

cure the guns make their attack in dispersed order, and endeavor to gain the flanks of the battery. When the battery has a fair sweep over the ground along-which they must ad¬

vance, they should, by manoeuvring and false attacks, try to confuse the artillerists, and draw their fire before making their charge.

So far as concerns actual duties, heavy cavalry charge the enemy's cavalry and in¬

fantry, attack the guns and cover a retreat : while the light cavalry make reconnaissances, carry dispatches and messages, maintain out¬

posts, supply' pickets, scour the country for forage, and the commissariat, pursue the enemy and try to screen the movements of the in¬

fantry by their rapid manoeuvres on the front and flanks of their army. At the battle of Balaklava the heavy cavalry charge was within the reasonable duties of the troops, but that of the light cavalry was not; the former succeeded, the latter failed. Cavalry cannot wait to re¬

ceive an attack like infantry ; they must either pursue or retreat ; and on this account it has been said, ftRest is incompatible with cavalry.®

The infantry and artillery more frequently win the victory; but the cavalry prepare the way for doing this, capture prisoners and trophies, pursue the flying enemy, rapidly succor a menaced point and cover the retreat of infan¬

try and artillery, if retreat be necessary.

If we study the conditions of modern

cavalry action, it is clearly seen that no one particular formation can be rigidly insisted upon for the mounted charge against cavalry.

The development of long range firearms, their rapidity of fire and great accuracy, has made it possible for cavalry having time to dismount and form up to repel the attack of horsemen as effectively as can ˆunshaken infantry.® By dismounting and using the rifle on foot the cavalry will be able to decimate the attacking force and throw it into utter confusion long before it reaches its objective. Dismounted ac¬

tion in future wars will be the rule, mounted attack the exception.

The battle attacks of the cavalry of the First Empire were simplicity itself. Placed close to the front, it was drawn up in succes¬

sive lines of regiments or brigades, with the light cavalry in front, behind them the dra¬

goons and in rear of all the cuirassiers. The lines thus placed one behind the other formed une colonne serree. It attacked in successive lines of regiments or brigades at varying in¬

tervals, according to the course of events.

After the charge or the melee the rally was to the flanks, where column was rapidly formed in order, if necessary, to advance again by passing through the intervals of the supporting lines. There was little occasion for manoeuvre, owing to the proximity of the cavalry to the front, but all movements were executed at the trot, the gallop only

being sounded for the last 100 or 150 yards. Practically the only manoeu¬

vre attempted was to take ground to the right or left and form again to the front; the suc¬

cess of the charge was due to the irresistible onset of the successive lines and the skill in the melee of the individual swordsman, the whole constituting a moral factor of the first importance and value.

The question is asked : Why, cavalry having attained such super-excellence under Napoleon, has it come to pass that in none of the succeed¬

ing wars from 1815 to 1870 is there any trace of the same emploi intensif? The same thing had already been noticed before in the Prussian cavalry of Frederick; in both cavalries there was a period of uniform success; in both of them when at their zenith the principles of organization were simple, the distribution sup¬

ple and elastic, the commanders young and brilliant and the employment of the arm was the actual embodiment of the offensive spirit.

Either cavalry attained its apogee, followed by a period of decadence ; each in turn was con¬

tent to rest, upon its past fame, to rely merely upon tradition, until reverses and disaster led each in succession to examine into and correct the causes which had resulted in its overthrow.

It is found that during long years of peace men fall back upon mere formula, trust to theory rather than to practice, consult schoolmen rather than leaders; that during peace time the natural tendency is to place undue reliance CAVAN

upon regulations, form and dilettantismc tac-tique, while overlooking the factors of energy and overpowering moral force which, through all

material changes in armament, must ever remain among the keenest weapons of cavalry.

After the war of 1870 it was generally be¬

lieved that cavalry was no longer a weapon for the battle, that all that could be asked of it were certain vaguely defined duties of recon¬

naissance ; it was then recognized that oppos¬

ing cavalries must meet and fight, and by both German and French authorities it was con¬

ceded that the first duty of cavalry is to de¬

feat the cavalry of the opponent, while many efforts wrere made to formulate a doctrine of profitable employment. This heroic age, when it seemed that cavalry should be employed again in masses and by shock, was followed by the Russo-Turkish, the South African and the Manchurian campaigns, where such methods were impracticable, and a reaction set in in favor of the employment of smaller units and of fire action.

The Franco-Prussian War put emphasis

upon the reconnaissance duties of cavalry, be¬

cause the German cavalry took advantage of the fact that the French cavalry mostly was kept concentrated and with the infantry to spread out far in front of the German armies for reconnaissance purposes ; also because both cavalries disdained to fight on foot and, there¬

fore, contented themselves with waiting for opportunities to make mounted attacks. These opportunities came but seldom, and in the majority of cases furnished examples of the failure of the mounted attack rather than the reverse.

Cavalry officers in all countries have felt for years that undue emphasis was being put on the reconnaissance duties of cavalry, and that cavalry should not consider itself an obsolete fighting arm merely because it cannot habitually use the sabre, any more than infantry

should rule itself off the battlefield because it cannot habitually use the bayonet. These cavalry offi¬

cers have welcomed the possibility of the aeroplane taking over the duties of reconnais¬

sance from the cavalry, as that means the end of the period in which cavalry has been split up into small bodies, and the return to its use in large bodies under cavalry leaders. In other words, its use would be on a much larger scale but in the same manner in which Sheridan in the closing days of the Civil War cut off and destroyed Ewell, Lee's rear guard, and after¬

ward stopped Lee until the infantry could arrive.

In the great European War cavalry was in¬

dispensable and variously employed as a cavalry screen ; in reconnaissance ; in patrol duty; in protecting flanks of armies; in filling gaps between armies ; in acting as advance and rear guards ; in pursuing the enemy as inde¬

pendent cavalry; escorting large bodies of in¬

fantry and machine guns moving in automo¬

biles ; seizing and holding important positions until the infantry could come up; holding long stretches of trenches; and acting as a mobile reserve in rear of the trenches. As a result of experience in the Boer War in 1901, in the British drill book the rifle was declared <(the principal weapon of cavalry.ˆ But later when a new drill book was issued in 1907, the policy changed, and the anne blanche was declared to be the cavalry's main reliance. The Boer War was the greatest demonstration of the value of the mounted rifleman the world has ever seen.

It confirmed the experience of the American Civil War. But the lessons it taught Europe went unheeded and in 1914 the French,

Austrian and Italian cavalry were armed with a carbine of little or no value, while in none of these armies was the cavalry properly or suf¬

ficiently trained in marksmanship or in dis¬

mounted action, and as a result, great masses of cavalry were obliged to stand helpless, useless and impotent spectators of fierce battles, whereas had they been trained to use the rifle, they could have moved with the speed of horse¬

men and fought with determination of infantry.

Cavalry played a significant role on both sides in the Allied retreat and the German ad¬

vance to the Marne. During the battle of the Marne, the German cavalry held the gap in the German line between von Kluck's flank guard north of Meaux and his main force on the right flank of the German line. When the Allies were endeavoring to extend their line to Antwerp, and the Germans were trying to reach the Belgian coast, the cavalry of both sides played an extremely important part in the region of Lille and Ypres; in fact, a large part of all the early engagements in this region were fought by cavalry. See Ammunition; Artillery; Infantry.

Bibliography. — Audibert, (Ltude sur le

combat a pied* (Paris 1911) ; Childers, Erskine, (War and the Arme Blanche) (London 1910) ; id., (German Influence on British Cavalry) (ib. 1911) ; French, (Cavalry in Modern War*

(London 1884) ; De Brack, (Cavalry Outpost Duties* (New York 1893) ; Roemer, (Cavalry: Its History, Management, and Uses in War) (ib. 1863) ; Rimington, M. F., (Our Cavalry *

(London 1912) ; The Journal of the Military Service Institution (Governor's Island, N. Y., 1885 et seq.) ; Journal United States Cavalry Association (Leavenworth, Kan., 1890 et seq.) ; Von Pelet-Narbonne, (Role of Cavalry in Modern War> (London 1905) ; id., (Cavalry on Service) (ib. 1906) ; Von Bernhardi, (Cavalry in Future Wars> (London 1906) ; id., (Cavalry in War and Peace) (ib. 1910), and Brackett, (History of the United States Cavalry) (New York 1865).

Edward S. Farrow,

Consulting Civil and Military Engineer.

CAVAN, Ireland, a county in the province of Ulster, having Fermanagh and Monaghan on the north, Leitrim on the west, Longford and Westmeath on the south and Louth

on the east; area, 746 square miles. In the northwestern part is a range of hills called the Ballymageeragh Mountains, but the remaining surface, which is undulating and irregular, is pervaded by bog and interspersed with many fine lakes. The chief rivers are the Erne, the Woodford, the Blackwater and the Annalee, and the chief lakes Lough Ramor, Lough Shee-1 in. Lough Gowna, Lough Oughter and Upper Lough Erne. Mineral springs are numerous.

Much of the soil of this county is cold, spongy and inclined to be marshy. The chief cereal crop is oats, the chief green crop potatoes.

Wheat is little cultivated ; flax is raised to some extent, and the high lands are good for grazing.

Linen-bleaching and the distilling of whisky 142

arc the chief industries. The principal towns are Cavan, Cootehill and Belturbet. There arc some interesting architectural remains. The county returns two members to Parliament.

Pop. 74,271, of which 81.4 per cent is Roman Catholic.

CAVAN, Ireland, town, capital and chief business centre of the above county, 57 miles northwest of Dublin. It has an endowed school founded by Charles I, and a Roman Catholic college, and has some trade in linen. Pop.

2,961.

CAVANILLES, ka-va-nel'yes, Antonio

Jose, Spanish clergyman and botanist :

b. Valencia 1745; d. Madrid 1804. In

1777 he went to Paris and remained there 12 years, occupied with the study of sev¬

eral sciences, but chiefly with botany. In 1785-86 he wrote his great botanical

work, (Monadelphi3e Classis Dissertationes decern* (Paris 1785-89; Madrid 1790, 4to, with engravings). After his return to Spain he wrote (leones et Descriptiones Plantarum, quae aut sponte in Hispania crescunt aut in Hortis hospitantur) (1791-99, 6 vols., folio, with 601

engravings). In pursuance of a commission from the King, Cavanilles traveled in Valencia, and collected the materials for his ˆObservaciones sobre la historia natural, geografia, agricultura, poblacion, etc., del reino de Valencia) (1795-97, 2 vols., folio, with copper¬

plates from the drawings of the author). The work was published at the expense of the King, and intended as the first part of a similar work to embrace the whole of Spain. Thunberg has named a family of plants Cavanilla. His nephew Antonio Cavanilles (1805-64) was a distinguished advocate and the author of a history of Spain (Madrid 1869-64).

CAVATINA, kav-a-te'na, in music, a short operatic air without a return or second part, maintaining the same tempo throughout, some¬

times relieved with recitative, but now extended to the aria generally, especially if the character of expression is tender, hopeful or joyous. In this elegant and gracefully melodic class of composition the Italians naturally eclipse all other musicians; yet the II mio Tesoro of Mozart will bear comparison with the finest cavatinas ever written.

CAVE, or CAVERN, an opening produced

by nature in the solid crust of the earth. Caves are principally met with in limestone and gyp¬

sum as a result of the solvent action of ordinary circulating underground water. Less often they occur in sandstone, and in volcanic rocks (ba¬

salt, lava, tufa, etc.). The form of the caves depends partly upon the nature of the substance in which they exist ; but it is frequently altered by external causes. Out of some caverns rivers take their course ; others again admit rivers, or may be said to swallow them for a space.

There are many and various causes for the formation of caves. Those in limestone and gypsum are unquestionably the results of the dissolving power of water ; in fact the almost perfectly uniform direction, the gentle and equable declivity of most caves, appear to be the effect of the long continuance of water in them, the action of which has widened the ex¬

isting crevices. In trachyte and lava, caves appear to have been produced by the effects of gas. The caves of gypsum often contain foul air; the caves of limestone are commonly marked by various figures of stalactites, pro¬

duced by the deposit of the lime dissolved in the water. Many of these lime caves contain remnants of bones of animals, such as hyaenas, elephants and bears. See Cave-dwellers.

Many caves are remarkable only on account of their great size, or sublime from the awful gloom which pervades them, and the echoes which roll like thunder through their vaulted passages. Some are of great depth, as that of Frederikshall, Norway, calculated to be several thousand feet in depth. One of the grandest natural caverns known is Fingal's Cave (q.v.) in Staffa, one of the Western Islands of Scot¬

land. Its sides are formed of ranges of basaltic columns, which are almost as regular as hewn stone. The grotto of Antiparos, on the island of the same name, in the Grecian Archipelago, is celebrated for its magnificence. The roof is adorned with stalactites, many of them 20 feet long, and hung wTith festoons of various forms and brilliant appearance. In some parts im¬

mense columns descend to the floor ; others present the appearance of

trees and brooks turned to marble. The Peak Cavern in Derby¬

shire, England, is a celebrated curiosity of this kind. It is nearly half a mile in length ; and, at its lowest part, 600 feet below the surface.

Other famous stalactitic caves are the Luray Cavern (q.v.), Page County, Va. ; one near Ma-tanzas, Cuba; one near Adelsberg, Carniola ; the Wyandotte Cave (q.v.), Crawford County, Ind. ; and Madison's Cave, in Rockingham County, Va. The caves of Kirkdale, in Eng¬

land, and Gailenreuth, in Germany, are remark¬

able for the quantities of bones of the elephant, rhinoceros and hyaena found in them. In the rock of Gibraltar there are a number of stalacti¬

tic caverns, of which the principal is Saint Michael's Cave, many feet above the sea. Other celebrated caves in America are Weyer's Cave, in Augusta County, Va., extending 800 yards, but extremely irregular ; the Colossal Cavern, Ky. (q.v.), discovered in 1895, and the Mam¬

moth Cave (q.v.) in Edmondson County, Ky., which encloses an extent of about 150 miles of subterraneous windings. One of its chambers, called the Temple, covers a space of nearly five acres, and is surmounted by a dome of solid rock 120 feet in height. The Cumberland Mountains, in Tennessee, contain some curious caverns, in one of which, at a depth of 400 feet, a stream was found with a current sufficiently powerful to turn a mill. Another cave in the same State is named Big Bone Cave, from the bones of the mastodon which have there been discovered. In the Raccoon Mountains, near the northwestern extremity of Georgia, is Nickojack Cave, 50 feet high and 100 feet wide, which has been explored to the distance of three miles. A stream of considerable size, which is interrupted bv a fall, runs through it. The Ozark region of Missouri is noted for its numerous caves, among which Onondaga cavern is perhaps the best known. Caves are some¬

times found which exhale poisonous vapors.

The most remarkable known is the Grotto del Cane, a small cave near Naples. In Iceland and Hawaii there are many caves formed by the lava from volcanoes. In the volcanic country near Rome there are many natural cavities of great extent and coolness, which are sometimes CAVE ANIMALS

resorted to as a refuge from the heat. In South America is the cavern of Guacharo, which is said to extend for leagues. For in¬

formation concerning human and animal re¬

mains in caves, see Cave-dwellers and consult works there referred to. See also section on work of ground water, in article on Geology.

CAVE ANIMALS. The animal life of

caverns falls into three categories: 1. Animals, mostly extinct, that made their dens or left their bones in caves, and in life were members of the next group. 2. Animals that temporarily, but habitually, resort to caves for refuge, or sleep, or as breeding-places. 3. Animals, de¬

generate, confined to an underground life throughout their whole existence. None of these classes include those making small caves for themselves, the burrowers ; or which, like the mole and many insects, dwell in the soil ; or, like the conies (Hyrax), the pikas and several sea-birds, spiders, etc., seek safe homes among the interstices of loose rocks.

Prehistoric Cave Beasts. — The first group will require little space, as it consists of such extinct animals as the cave bear, cave lions, cave leopard, cave hyaena, cave wolf and some smaller ones that have been given these names because their bones and portraits have been found abundantly in the floors or on the walls of caverns in Europe and Africa. Indications trusted by geologists and archaeologists combine to show that these animals lived there in the latter part, at least, of the third Inter-glacial Epoch, and on through the fourth and last glacial advance, when, although central Europe was free from an ice-cap, an almost Arctic climate prevailed, with much rain. This is what is known as the Reindeer Period, when human¬

ity was represented by the Neanderthal race (see Stone Age). The weaker part of the fauna disappeared, but those hardy carnivores, finding food still plentiful, gradually adapted themselves by increased hairiness to the cold climate ; but apparently they resorted far more

than previously to the shelter of caves. None of those mentioned above is regarded as any¬

thing but a larger, more vigorous variety (spelcea) of the lion, leopard, wolf, spotted hyaena, etc., except the cave bear (Ursus spelanis). This beast was the most thoroughly spelaean of all in its habits, and occupied caves before men began to do so. It was not much if any larger than the ordinary brown bear of to-day, and its claws were shorter and. feebler.

((Hence it would appear,® says Osborn, ((that the Neanderthals had driven out from the caves a type of bear less formidable than the existing species, but nevertheless a serious opponent to men armed with the small weapons of the Mousterian period.® Probably fire and smoke were the most effective means. These bears were numerous, for game was abundant. A single cavern in western France has yielded re¬

mains of more than 800 skeletons; and from these bones and from prehistoric drawings it is possible to know this animal perfectly. With the close of the last period of partial glaciation, and the return in the early Pleistocene of the moderate climate that still continues, these ana the other cave-haunting beasts disappeared, largely, no doubt, killed off by the better-armed Neolithic hunters. The great bear left no descendants, for the modern European brown bear traces its lineage to an older and smaller species, the Etruscan bear, whose bones also are occasionally exhumed from cave-floors.

Caves in North America present different conditions from those of Europe. Those that have yielded animal remains, such as the Port Kennedy and Frankstown <(caves® in Pennsyl¬

vania, and the Concord Fissure in Arkansas, <(are hardly • caverns,® says Scott, ((in the or¬

dinary sense of the word, but rather narrow fissures, into which bones and carcasses were washed by floods.® They contain a great variety of mid-Pleistocene species, at least half of which are extinct. Big Bone Lick Cave, in Kentucky, is more truly a cave, and has fur¬

nished palaeontology with an immense supply of bones of recent time, including several ancient species, such as mastodons, mammoths and the ground-sloth, Megalonyx, and with certain traces of human presence. Caves in northern California are also rich in animal remains,

illus¬

trating the transition from glacial to modern faunas. Brazilian caverns have yielded much also ; and a cavern near Last Hope Inlet, Patagonia, is noteworthy for the finding in it of the bones, and large pieces of the skin, of a great extinct sloth (Megatherium) with the hair still on.

Temporary Tenants of Caves. — In modern times, as anciently, bears and other carnivores use caves as sleeping-places when it is con¬

venient, but they are exclusively resorted to by a few kinds of creatures that may properly be called cave-tenants. The most characteristic of these probably are certain bats, especially such insect-eating kinds as the leaf-nosed, the horse¬

shoe and the true bats of the family Vesper-tilionidse. Caves frequented by bats usually harbor enormous colonies, and one who enters and disturbs them will find himself in the midst of a whirring multitude that it taxes the powers of description to portray. Some caves long occupied contain vast deposits of the rich¬

est possible guano, and this has been extensively utilized in some places as a fertilizer. Such artificial caverns as the deserted tombs of Egypt are filled with bats, one species of which is popularly called tomb-bat, and abounds in the interior of the Great Pyramid.

Birds of two sorts are cave-tenants. The most singular, probably, is the large guacharo, or oil-bird, of the family Steatornithidce, classi¬

fied between the nightjars and the owls, and inhabiting northern South America and the island of Trinidad. It inhabits both seaside and mountain caverns, going forth only at dusk to get its food, which is mainly fruit. ((Visitors to the breeding-caves,® says Evans (‘Birds,*

1900) <(are suddenly surrounded by a circling crowd of oil-birds uttering loud croaking or rasping cries… . The numerous nests …

are flat, circular masses of a clay-like substance placed on ledges or in holes.® Great numbers of these birds are killed by torchlight for the sake of the oil obtained from them, which is excellent for illumination or for cooking pur¬

poses. The other birds choosing sea-caves as a breeding-place are swifts of the genus Collo-calia, whose nests are placed in the depths of caves on the coasts of Ceylon, and eastward and southward to northern Australia. The best known of the many species is that which pro¬

duces the edible nest of which the Chinese are so fond. Huge numbers of these swifts breed 144

in company in dark caves, where they are asso¬

ciated with bats ; but the bats go outside at night and the swifts by day. Such caves con¬

tain exceedingly rich deposits of guano, and return to their owners a large rental for the right to gather the swifts' nests glued to their walls and roofs. See Swifts.

Blind Inhabitants. — A special cave-fauna exists in all parts of the world, consisting of an assemblage of animals of different classes which are blind, and in most cases eyeless. This fauna is evidently of great antiquity, since it exists most plentifully in caves, such as those of the limestone district of the South-Alleghanian region, and in southern Europe, which regions are south of the region of the Pleisto¬

cene glaciation. Within such caves, formed by the action of water (see Cave), are rivers, sink¬

holes and deep wells, all perfectly dark, in¬

habited by blind amphibians, fish, crayfish and other crustaceans, and by many kinds of in¬

sects and spiders. No vegetation exists save a few scattered molds and fungi, and all the animals are carnivorous, preying on each other.

Mammoth Cave in Kentucky contains about 75 species of these blind creatures, to which 40 or 50 more may be added from other south¬

ern caves ; while several hundred kinds have been described from European caverns.

The most striking and interesting form in Mammoth Cave is the blind-fish {Amblyopsis spelcuus). It is about four inches long, color¬

less and blind, the eyes being vestigial. This fish seeks the dark and shuns the light, being much disturbed by a lighted match or bright sunlight, or even by a ray of light. In well-fed adult specimens there is no external indication of an eye; but in young ones, before reaching a length of two inches, the eyes can be distinctly seen, owing to their pigment, which is lost in the adult. The optic nerve can be traced in examples under an inch in length. This will apply to the eyes of other blind fishes and blind insects, Crustacea, *etc.* While the sense of sight is lost, that of touch in the blind-fish, as in most other cave animals, is exalted. Amblyopsis is provided with tactile papillae, arranged in ridges on the front and sides of the head.

They are said to show extreme timidity and caution in their movements.

A still higher type of vertebrate, two species of salamanders, have become adapted to cave life, losing their eyesight by disuse. The species of the genus Spelerpes frequent damp, dark situations and the entrances to caves. An allied form (Typhlotriton spelceus) is distinctly a cavernicolous as distinguished from a twilight species, and has never been found outside of caves. Its eyes. show early stages of degenera¬

tion. It inhabits caves in southwestern Mis¬

souri, and occurs under rocks in and out of water. Still another salamander, whose eyes are the most degenerate known among am¬

phibians, is the Typhlomolge rathbuni. It lives in subterranean streams, tapped by an artesian and also a surface well, near San Marcos, Tex., and in one of the caves near that town.

Its remarkably long and slender legs are too weak to support its body when out of water.

The lower animals tell the same story of de¬

generation, total or partial atrophy of the eye, together with loss of color, and, in a more striking way, the compensation for the loss of vision by a great increase in length of the antennae and other appendages, or by the growth of long, slender tactile bristles.

The blind crayfish (Oreonectes pellucidus) is a common cave form. It differs from its out-of-door allies in being blind, deaf, slender¬

bodied and colorless. Other blind or eyeless crustaceans are various kinds of amphipods and isopods, both aquatic and terrestrial, of which species of Coecidotca are the most abundant, and form the food-supplv of the blind crayfish.

The eyeless beetles of caves (Anophthalmi) have no vestige of eye or of optic nerves, while their bodies and appendages are slender. They grope their way about by means of very long tactile bristles. Other beetles, such as Adelops, which have retained vestiges of the outer eye; some spiders comprising an eyeless species, and others with eyes varying in size, some much reduced, spin little webs on the walls of the chambers. Among the harvestmen some (Pha~

langides) have extraordinarily long legs ; while the Campodea (q.v.), a wingless insect of the Mammoth and other caves of the United States and Europe, differs from the outdoor form in its antennae and abdominal appendages, being greatly exaggerated in length. There are also mites, myriapods, primitive wingless insects (Podurans) , a few flies, worms and infusorians.

Origin and History. — The blind fauna of caves, according to Packard, is composed of the descendants of individuals which have been carried by various means into the subterranean passages, have become adapted to life in per¬

petual darkness, becoming isolated, and thus, as long as they are subjected to their peculiar environment, breed true to their species, and show no tendency to relapse to their originally eyed condition. The absence of the stimulus of light causes the eyes, through disuse, to under¬

go reduction and atrophy. With this goes, in certain forms, the loss of the optic ganglia and optic nerves.

Bibliography.— Packard, A. S., (Cave

Fauna of North America) (Washington 1888) ; Eigeman, C. H., (Cave Vertebrates of America) (Washington 1909) ; Scott, (Land Mammals of Western Hemisphere) (New York 1913) ;

Morgan, T. H., (Evolution and Adaptation (New York 1903).

Ernest Ingersoll.

CAVE-BEAR, an extinct species of Eu¬

ropean bear closely allied to the living grizzly, but attaining a large size. Its remains are found in bone-beds in caverns, whence the name. The habits of the animal were probably not different from those of modern bears. The cave-bear of South America is a different animal. Both species are found in the larger caverns of North and South America. See Bears.

CAVE-DWELLERS. This topic is nat¬

urally divisible into two parts — first, the pre¬

historic aspect, and, second, the modern human occupation. The prehistoric use of shelters and subterranean chambers by the primitive savages, often called ˆcave-men,® was incidental to human existence before civilization, and is fully treated in the article Stone-Age. The present article therefore avoids that phase of cave history, and is confined to the use of un¬

derground chambers, natural or artificial, by civilized mankind for dwellings, refuges, wor¬

shipping places or sepulture.

Caverns naturally occur in limestone regions.

or where soft layers of sandstone or volcanic debris alternate with harder layers (see Cave), and are usually dry, well-ventilated, of a fairly even temperature throughout the year, and often contain streams of running water. They are, therefore, suitable enough for human habi¬

tation, and often are really attractive. It is not surprising, then, that from the earliest times caves have been adopted as human residences and storehouses, and that they continue to be so utilized in various parts of the Old World.

In the Western hemisphere this practice has never been followed, the occasional exceptions here and there being negligible. The reason is that the civilization of both North and South America is an important one. The early immigrants were men and women used to

building houses, and finding in the New World plenty of room and materials for house build¬

ing had no need of, and felt no call to, cave-life; nor have they been driven to it by fear.

The people of the Old World, from the Mediterranean to the China Sea, on the other hand, inherited the practice from remote an¬

tiquity, and maintained it under the pressure of semi-barbarous and crowded social conditions, poverty, danger from incessant wars and robber raids, until now in many places residence in artificial or modified caves is a matter of economy, or choice, or both. This is par¬

ticularly true of southwestern Europe, and es¬

pecially of France, where great areas of lime¬

stone, sandstone, and volcanic breccia underlie the soil. Through these the rivers, especially in the valleys of the Loire, Dordogne and Garonne, have cut deep channels with precipi¬

tous sides. Here scores of natural caves have been human habitations from prehistoric until recent times — some even yet furnishing hu¬

man homes. Baring-Gould pictures a well-known example that has been explored by antiquaries :

<(At the bottom of all the deposits [constitut¬

ing its floor-layers] were discovered the re¬

mains of the very earliest inhabitants, with their hearths about which they sat in nudity and split bones to extract the marrow, trimmed flints, worked horn, necklaces of pierced wolf and bear teeth; then potsherds, formed by hand long after the invention of the wheel; higher up were the arms and utensils of the Bronze Age, and the weights of nets. Above these came the remains of the Iron Age, and wheel-turned crocks. A still higher stratum surrendered a weight of a scale stamped with an effigy of the crusading King, Saint Louis (1226-70), and finally francs bearing the profile of… Leopold [of Belgium].®

Such a record of almost continuous occupa¬

tion might be multiplied by hundreds; and in many cases such ancient resorts have been enlarged and improved. The same is true of northern Africa and northern Asia.

We have to do more especially with arti¬

ficial caves dug out by men for occupation in one or another way. Thousands of habitations, stables and workshops were cut in the hillsides of Nottinghamshire and Staffordshire, in Eng¬

land, and many were occupied until, within a few years, the local health authorities cleared them out. Holy Austin’s rock in Shropshire, a mass of red sandstone, is honeycombed with habitations, whose

neatly framed windows and doors are cut through the rock wall left for VOL. 6 — to

a front, and which even now are greatly liked by their tenants.

The vast expanse of chalk that underlies southern England, Flanders and northern France is easily worked, yet firm enough not to fall in, or crack away, when ordinary precautions are taken by the miner, and one might almost say that wherever it is exposed in river cuttings living rooms have been dug into the cliffs.

Often these are so numerous and deep, that an underground village exists. Thus near Mon-taire, in the department of Loir et Cher, about 150 miles south of Paris, is the little city of Troo, at the base of a cliff of chalk. ((The whole height,® a recent visitor writes, «is like a sponge, perforated with passages giving access to halls, some of which are circular, and into stone chambers; and most of the homes are wholly or in part underground. The caves that are in¬

habited are staged one above another, some reached by stairs that are little better than ladders, and the subterranean passages running from them form a labyrinth within the bowels of the hill, and run in superposed storeys …

The town … is partly built at the foot of the bluff, but very few houses are without exca¬

vated chambers, store places, or stables. The cafe looks ordinary enough, but enter, and you find yourself in a dungeon.®

The valley of the Loir, a northern tributary of the Loire at Angers, abounds in such rock villages, and they occur in many other places in France, Spain and northern Italy. In the department of Maine et Loire, whole vil¬

lages are underground. A man may utilize valuable hillside ground for a vineyard, by building walls to retain level terraces. He quarries the necessary stones from the hill and fences his property. Then for his own dwelling he cuts out chambers in the sides of his quarry, leaving a thin front wall with windows and doorways, and bores a chimney up

to the sur¬

face. Near Loudon the dry moat of a mediaeval castle, cut into the rock, is alive with people inhabiting tenements dug into its sides. It is true that in most cases the families living in such quarters are poor and mean — sometimes degraded; but a great many are the homes of families of honest, working folks ; are decently furnished, and ornamented outwardly by ledge gardens, hanging vines and neatly curtained windows; or regular house fronts may be erected before the caves, as is well known to tourists of the (<chateau country® about Tours.

Caves, natural and artificial, have been and are still valued elsewhere in the Eastern world.

Villages like those described above exist in some parts of Italy, in Sicily, in Egypt and es¬

pecially in Syria. Southeast of Damascus, and not far from Palmyra, is Edrei, the capital of the Amoritish King Og, ruler of Bashan, which was captured by the Israelites in the course of their conquest of Canaan. It was an under¬

ground city cut out of solid rock, which was explored some years ago by Wetzstein, who was astonished at its extent. After threading a long, downward entrance-passage he found himself in a broad street, with dwellings on each side of comfortable height and width.

(<The temperature was mild, the air free from unpleasant odors, and I felt not the smallest difficulty in breathing. Further along there were several cross streets, and my guide called my attention to a hole in the ceiling for air,

like three others which I afterward saw, now closed from above. Soon after we came to a market place, where for a long distance on both sides of the pretty broad street, were numerous shops in the walls, exactly in the style of the shops seen in Syrian cities. After a while we turned into a side street where a great hall, whose roof was supported

by four pillars, attracted my attention. The roof, a ceil¬

ing, was formed of a single slab of jasper, per¬

fectly smooth and of immense size.®

In this region, too, lies Petra, hidden in a gorge of savage grandeur, and often visited by tourists. It also is an excavated city, where temples with their colonnades and facades are let into the red cliff, superimposed one above another. <(From the earliest recorded times the inhabitants of the district were <Horim,) that is to say Troglodytes, whose first rude grottoes, shapeless caverns hollowed out of the hillside, have been transformed to architectural galleries decorated with statues and bas-reliefs.®

Many other most curious examples of the present occupation of cave-dwellings in the East and in northern China might be cited, es¬

pecially where banks and steep hillsides of the stiff earth called loess have been tunneled into, and are occupied by hundreds of dwelling places in which families now live in health and con¬

tentment.

Vast numbers of caverns, with evidences of former domestic occupation, are to be seen also in the mountains about the headwaters of the Yangtse Kiang (Blue River) in southwestern China. They are now left empty, or used oc¬

casionally only as “refugees®; but in Kan-Su and Shen-Si precisely similar caverns are ex¬

cavated in the hillside, and even to-day they are favorite dwellings of the people. Africa is not in general a cavernous region, because of its geology; but in south central Africa, the Bush¬

men were found dwelling to a considerable extent under ground. Dornan (Trans. S. Afri¬

can Philos. Soc. 1909) writing of such inhabited caves in Basutoland says they were the rallying points of the various clans; and Stow

reports that those inhabited by the head chiefs were adorned by paintings of totemic animals and the like.

Caves as Refuges. — Caverns and under¬

ground retreats, natural and artificial, ancient and modern, have always been resorted to as hiding places, not only by individuals fleeing from persecution, or avoiding legal punish¬

ment, or for criminal concealment (as by smug¬

glers and robbers), but by great companies of people with their goods, in times of war or other social disasters. The early history of the Jews as given in the Bible has frequent refer¬

ences to this resort, as when Ahab persecuted the prophets and Obadiah hid them by fifties in a cave; and as when Joshua defeated the Amorites and their five kings hid themselves in the cave at Makkedah. The same sort of thing has occurred wherever men fought in a cavernous region from the beginning of

humanity to the battles in northern France in 1917, where whole regiments were concealed in subterranean chambers north of the Aisne.

Nowhere was the value of such means of safety to a harassed population better illustrated than in the civil wars that have raged in south¬

western China and in the tribal conflicts and blood-feuds of Afghanistan.

The Roman armies were constantly baffled by this method of escape in conquering the Armenians and Arabs in Asia Minor, or Gauls of France and the Teutonic tribes of South Germany. When the Saracens invaded France from Spain in the 8th century, they found that the inhabitants, profiting by experience, had constructed underground retreats inaccessible to them, and by this means, almost alone, was the country saved from utter depopulation.

Scarcely a century passed for several hundred years that this dreadful experience was not repeated at the hands of the Northmen (9th

century) ; at the hands of English conquerors (12th century); at the hands of the Pope of Rome in the persecution of the Albigenses (14th century) and at the hands of local robber barons all the time.

It did not take long for the defenseless peasantry and townsmen to learn that their natural caves were not capacious enough to house the people, and they began to construct great subterranean halls, usually beneath their farms and villages, but often high in the faces of cliffs and ways so difficult of access that one man could defend the ladder or narrow stairs by which they were reached. Flundreds of such underground, labyrinthine, caves of refuge, are known in southern and central France, and have been surveyed and described by French antiquaries, each large enough to contain the people of the neighborhood, with much property and provisions for a siege. Lacoste, in his history of Quercy,* remarks that in Lower Quercy the inhabitants dug souterrains with a labor that only love of life could prompt.

“Three of vast extent have been discovered at Fontanes, Mondoumerc, and Olmie … The vastest and most remarkable for its extent and the labor devoted to it is at Olmie. The chambers are scooped out of a very hard sand¬

stone. In some of them are little wells or reservoirs that were filled with water as a pre¬

caution against thirst.® The entrance to such a hiding place was carefully concealed in a cellar, or under a movable stone in a church floor, or in a thicket ; and all the excavated ma¬

terial was widely scattered so as not to betray the place.

It was the duty of every feudal seigneur to protect his vassals in return for their fealty and service; and every old castle in southern Europe built in feudal times, almost always in some high and preferably isolated situation, stands on rock drilled through and through with galleries and chambers. (<On the alarm being given,® in the words of Baring-Gould, (<of the approach of an army marching through the land … or the hovering of a band of brigands over the spot, within a few hours all this under¬

ground world was filled with plows, looms, bedding, garments,

household stuff of every description, and rang with the bleating of sheep, the lowing of oxen, the neighing of horses, and the whimpering of women and children.® This writer gives a list of 49 places in the depart¬

ment of Vienne alone, where such grottoes have been discovered, mostly under churches and castles, and we believe his statement that they number thousands in France alone. Where the entrance was not within the walls of a castle, defenses were arranged against assault. The entrance was very narrow, steeply inclined, pro¬

vided with concealed pitfalls, and defended CAVE-DWELLERS

by interior doors and by side-galleries from which entering assailants might be speared or otherwise attacked. Nevertheless horrible tales remain in history of large numbers of per¬

sons being burnt out, or suffocated by smoke in these caves, or walled up by their enemies and left to starve.

Such souterrains abound in the northwest of France, also, where the most dreadful wars and oppression have swept the land again and again. Not only under villages, but beneath the scattered woodlands, the chalk was (and is) riddled with chambers and passages like an ant's nest. Victor Hugo has given, in his (Quatre-vingt Treize,* a vivid picture of this state of things in Brittany at the time of the dreadful peasant uprising called La Vendee (1793-96). ®The gloomy Breton forests,® he tells us, were servants and accomplices in the rebellion.® The subsoil of every forest wras a sort of sponge pierced and traversed in all directions by a secret highway of mines, cells and galleries. The underground belligerents lurking in these hovels under trap-doors were kept perfectly informed of what was going on, and would spring up under the feet, or just behind the heels of their ambushed foes. Hugo asserts that in Isle-et-Villaine, in the forest of Pertre, not a human trace was to be found, yet there were collected 6,000 men under Focard.

((In the forest of Meullac, in Morhiban, not a soul was to be seen, yet

it held 8,000 men.® No wonder Napoleon's recruiting-sergeants could find few young men to impress, in the latter years of his campaigns — they had all run to their holes like scared rabbits.

The same arrangements for safety from

massacre and robbery were made farther north ; and we are assured by a recent historian that (<it may safely be said that there is scarcely a village between Arras and Amiens and between Roye and the sea, betwixt the courses of the Somme and Authie, that was not provided with these underground refuges.® One wonders

how large a part they have played in the great war that began there in 1914. It is evident that the <(dugouts® and other subterranean de¬

fenses that held so large a place in the cam¬

paigns that followed were not as novel devices as the surprised Western world considered them.

Caves as Places of Religious Worship. —Whether or not the prehistoric peoples, the cave-men, decorated their cabins with religious intent, or whether anything in the way of wor¬

ship was connected with them, is a matter on which archaeologists are undecided. Primitive man was a worshipper of nature, in the sense that he feared and tried to conciliate the powerful unseen agencies that he believed filled the universe. Supreme among the natural mani¬

festations was the sun, and, as opposed to its brightness, the powers of evil worked in and were represented by darkness. Hence caves, unlighted, deep and mysterious, were logically regarded as abodes of malignant spirits, and perhaps as opening to the dark and horrid underworld. <(The Zulus,® says Tylor, ((can show the holes where one can descend by a cavern into the underworld of the dead, an idea well-known in the classic lake Avernus, and which has lasted on to our own day in Saint Patrick's Purgatory in Lough Dearg [Ireland.]® Such holes might call for pro¬

pitiatory offerings, but would not become temples of uplifting worship. In various parts of the world, however, grottoes were used for the disposal of the dead, and in Egypt this be¬

came a cult of tremendous influence on the people, who, as they advanced, constructed elaborate, rock-cut tombs. Their growing be¬

lief in the immortality of the soul — nowhere more thoroughly realized — led to ceremonials of remembrance and ancestor-worship that de¬

veloped into a philosophy that led to the erec¬

tion of temples, and some of these temples were carved out of solid rock, with an ornate, architectural entrance (see Egypt). The same sequence of religious philosophy seems to. have occurred in the valley of the Euphrates as in that of the Nile. The form of their ancient temples verifies the tradition of the Chaldees that they were evolved from tombs.

The wonderful cave temples of India, es¬

pecially those of Elephanta Island, near Bom¬

bay, are well known, or may be studied in the elaborate book (Cave-temples of India, > by Ferguson and Burgess. Those of Elephanta are Hindu (Sivaistic), but more than 500

excavations made in ancient times by Bud¬

dhists for the purposes of worship are known in northwest India. Buddhist temples in caves, many of them still visited on holy days by priests and devotees, abound in southwestern China — a fact little known even to the Chinese themselves; most of them are natural grottoes, more or less modified for their purpose, and not all can be regarded as Buddhistic. The latest explorer of them is Vicomte D'Ollone, who speaks as follows of them, as seen in the moun¬

tains near the head of the Blue River (Yang¬

tze) in his book (In Forbidden China P

((Sometimes a population of statues slumbers and dreams in the mystery of these caverns, and the visitor experiences a feeling of re¬

ligious awe as the torchlight shows their forms emerging from the shadow, like the very spirits of the earth.®

A new and different impulse toward the utilizing of natural caves, and the construction of underground places of worship was given by the advent of Christianity and the conse¬

quent persecution of its early followers by the Romans, who regarded the sect not only as heretical but as politically dangerous. The faithful victims of this persecution were there¬

fore compelled to seek everywhere secret places for their meetings. Their doctrine of the res¬

urrection of the body, which was new in Rome, required that attention be paid to its proper bestowal after death, and this led, as long be¬

fore it had done in Egypt, to elaborate tombs.

Hence those sacred rock-cut tombs still revered in Palestine ; and hence also the vast cata¬

combs (q.v.) in the suburbs of Rome and of many other Italian cities. Within these cata¬

combs were not only funereal chapels but regu¬

lar churches. The system of hermitage, which became so prevalent in the early centuries of our era throughout North Africa and Asia Minor, sanctified many caves and semi-grot¬

toes once inhabited by anchorites, and led to regular worship in them. Says Dean Stanley (Sinai and Palestine* (London 1856) : (<The moment that the religion of Palestine fell into the hands of Europeans it is hardly too much to say that as far as sacred traditions are con¬

cerned it became a religion of caves. .

Wherever a sacred association had to be fixed, a cave was immediately selected or found as its home.®

In Europe the veneration of the martyrs became in the Middle Ages the leading prin¬

ciple of Christian worship ; and in many places the earth or rock about their tombs was re¬

moved until the sarcophagus was exposed, and then a chapel, wholly or partially sub¬

terranean, was built about it. The crypts of ancient churches owe their origin to this cus¬

tom, and many old cathedrals and churches in Europe rest on such sites.

All these influences resulted in the hewing of early and mediaeval churches out of the masSif of cliffs and hillsides. Egypt has sev¬

eral rock-hewn temples of this kind; and they occur in Palestine, Crete, Spain, France, Eng¬

land and elsewhere. How elaborate many of them are may be illustrated by a single example, that of Saint Emilion, in the valley of the Dordogne River, France, where, in the middle of the 8th century, a hermit named Emilian lived in a small cave, still to be seen. He be¬

came celebrated as a teacher, and finally a monastery and gradually a town grew up in the valley below. Beside the town rises an abrupt mass of rock, hollowed out into a stately church. Its ground-plan measures 120 by 60

feet. The front contains a vestibule, 21 feet high, with doors and windows pierced in the face of the rock. The three lower windows are of the flamboyant order, the upper three (clearstory) are round; the principal doorway through the rock-wall is richly sculptured.

The body of the church stands parallel with the face of the cliff, and is 95 feet long and 60 feet high. It consists of a nave and side-aisles, all excavated out of the living rock, the pillars left square, the ceiling accurately vaulted, and the whole dimly lighted by the vestibule windows. The pillars are plain, and without capitals, but quaint large figures are carved on the walls and at the rear of the choir.

Coincident with these mediaeval churches several famous monasteries began as cave-hermitages, and were enlarged into • series of halls and cells cut out of solid rock. These were in some cases occupied for hundreds of years, supplemented by, or giving place to, buildings erected near them. Examples of such cave-monasteries of old times are to be found even in England.

Bibliography. — The most complete sum¬

mary of information relating to modern cave-dwellers is to be found in Baring-Gould's (Cliff-Castles and Cave-Dwellings of Europe) (Philadelphia 1911) ; for local particulars else¬

where, consult geographical treatises, such as the Universal Geography) of Reclus ; books by explorers and travelers ; the publications of archaeological institutes ; scientific periodicals, and local histories — mostly in foreign lan¬

guages. See Man, Christian Anthropology.

Ernest Ingersoll.

CAVE MEN, are literally men who have

occupied, or do occupy, caves as residences.

In popular use the term most often refers to the prehistoric time, when primitive men dwelt in the shelter of overhanging rocks and cavern roofs, because they had not yet learned how to build houses. This is the fact in a certain early stage of primitive culture; and it will be found treated in its proper historic place in the article Stone Age. For

the human occupation of caves for residence and various other pur¬

poses within historic times see Cave Dwellers.

CAVE-TEMPLE, a cave used as a temple ; but the name is especially applied to temples excavated in the solid rock, such as exist in considerable numbers in India.

CAVEAT, ka’ve-at (Lat. ((let him beware®), in law, a notice served on a public officer or court to refrain from doing a certain act with¬

out first giving notice to the caveator, as the person is termed who enters the caveat. Per¬

haps the best known use of the caveat in the United States is its entry by an inventor in the Patent Office for the purpose of establishing his claim to priority of invention, by enjoining its officers from issuing letters patent for any invention interfering with or infringing the rights claimed by the caveator without first giving him notice of the application for such letters patent. The terms of the caveat must set forth the claims of the inventor and the details of his invention with sufficient particu¬

larity to enable the officials of the Patent Office to determine whether a subsequent application for letters falls within the claims of the first inventor. If such is the case the caveator is entitled to notice of such interfering appli¬

cation, and the new applicant’s claim to letters is suspended for three months, during which period the caveator must complete his speci¬

fications and file his own application for letters patent. If no interfering application is filed, the caveator’s rights remain valid for one year, and may be renewed at the end of that term, for one year more, on payment of a second fee. The law providing for the filing of caveats was repealed by Congress in 1910.

Other uses of the caveat are to prohibit (with¬

out notice to the caveator) the admission of a will to probate, the enrolment of a decree in chancery, the grant of ‘letters testamentary to an executor, the issuing of a commission de lunatic o inquirendo, *etc.*

On the filing of such a caveat and due notice being served there¬

under, a hearing is had before a competent tribunal for the determination of the rights in the matter. (See Patents). Consult (Rules of United States Patent Office > ; Merwin, Patent¬

ability of Inventions) (Boston 1883) ; Luby, Patent Office Practice) (Kalamazoo 1897).

CAVEAT, ka've-at, EMPTOR (Lat. «let

the buyer beware®), a rule of law that warns the purchaser to take care and examine prop¬

erly before he buys it. In sales of real estate the purchaser's right to relief depends on the covenants in the deed in the absence of fraud on the part of the vendor. In 1 Serg. & R. 42, the rule is stated as follows :

"The rule of caveat emptor strictly applies to the pur¬

chase of lands, and the consideration-money cannot be recovered back after a deed executed, unless in case of fraud, where some covenant inserted in the deed has been broken.

The purchaser has it in his power to protect himself by pro¬

per covenants, and there is no reason why the law should provide to him a remedy, where he himself has been wholly inattentive and negligent in this particular."

In sales of personal property the purchaser buys at his own risk, in the absence of an ex¬

press warranty by the seller, or when the law does not imply a warranty from the circum¬

stances of the sale or the nature of the thing CAVEDONE — CAVEN

sold, and when the seller was not guilty of a fraudulent misrepresentation or concealment.

The purchaser must examine the quality of the goods bought and rely upon his own judgment.

Generally, if the article purchased is defective, and an examination, such as a reasonable and prudent man would make, would enable him to see the defect, it is not a fraud on the part of the seller not to call his attention to it.

At common law in the city of London, the law of market overt applied to all stores where articles in that particular line were sold. The purchaser got a good title, but as to the quality the purchaser must examine and judge for him¬

self.

CAVEDONE, ka-ve-do'na, Jacopo, Italian

painter : b. Sassuolo, in the duchy of Modena, 1577; d. Bologna 1660. He was a pupil of Annibale Carracci. His best works are the (Saint AloC for the church of the Mendicanti at Bologna, the (Adoration of the Magi,* the (Four Doctors,* and the (Last Supper,* which are now in the Bolognese Academy. Out of Italy he is frequently mistaken for Annibale Carracci. He became an assistant to Guido Reni in Rome. In his declining years he fell into great neglect and died in extreme poverty.

CAVELL, Edith, an English nurse : b.

Norfolk 1872; executed in Brussels during the German occupation of Belgium on 12 Oct.

1915. She was the daughter of a clergyman; entered London Hospital for training as nurse, 1896; invited to Belgium in 1900 by Dr. Depage, a distinguished medical man who had estab¬

lished a training school for Belgian nurses in a suburb of Brussels, and

desired to modern¬

ize the nursing system of the country. Bel¬

gian nurses up to that time had been recruited chiefly from the ranks of nuns and domestic servants — the former attending mainly to Catholics and the latter to non-Catholic pa¬

tients. Miss Cavell accepted the invitation and threw herself whole-heartedly into the task.

In 1906 she became head of the institution, from which developed a large nursing organ¬

ization throughout Belgium. At the outbreak of the European War in 1914, she was in Eng¬

land on a visit, but returned at once to Bel¬

gium and converted her institute into a hos¬

pital for wounded soldiers. Dr. Depage was called into military service and placed in charge of another Belgian hospital, while Miss Cavell continued her work in Brussels. During the German occupation of the city — from 20 Aug.

1914 — she was permitted to remain in control of the hospital. For the first year of the war she nursed without discrimination Belgians, French, British and Germans. During this time, with the aid of friends in Brussels, she was instrumental in conveying many of the wounded Allied soldiers — upon their recov¬

ery — across the frontier into Holland, whence they were able to rejoin their armies. She also assisted Belgians of military age to escape cap¬

ture by the Germans. Her activities were dis¬

covered by the German authorities through the agency of a Belgian traitor (who was found murdered in the street nearly a year later), and on 5 Aug. 1915 she was arrested and lodged in the military prison of Saint Gilles.

She was kept in solitary confinement for three weeks before the fact of her arrest became known. At the request of the British govern¬

ment the American Minister at Brussels, Mr.

Brand Whitlock, took up the case and ad¬

dressed an inquiry (31 Aug. 1915) to Baron von der Lancken, the chief of the political de¬

partment of the German military government in Belgium. No reply being forthcoming for 10 days, Mr. W hitlock wrote again and was informed (12 September) that Miss Cavell's defense was in the hands of a Belgian advo¬

cate, and that no interview could be permitted.

The legal adviser to the American legation, M. de Leval, then endeavored to communicate with the prisoner and her alleged advocates, but in vain. On 4 October he was informed that the trial would be held on the 7th — nine weeks after the arrest. The defence was kept in the dark as regards documentary evidence in possession of the prosecution. By frankly admitting the charge brought against her, Miss Cavell had given the prosecution evidence that would otherwise have been unobtainable. Ac¬

cording to the German Military Code the offense was treason and punishable by death. The trial ended on the following day (8 October) and judgment was reserved. The officials of the American legation made the most strenuous efforts to obtain information regarding Miss Cavell's fate; at 6.20 p.m. on the 11th, Mr.

Hugh Gibson, the secretary, was officially in¬

formed that the decision had not yet been given. At 8 p.m. M. de Leval heard by acci¬

dent that sentence of death had been passed at 5 p.m., and that Miss Cavell was to be shot at 2 in the following morning. Mr. Brand Whitlock was ill in bed at the time, but he wrote a personal letter to von Bissing, the military governor, while Mr. Gibson, M. de Leval and the Spanish Ambassador formed a deputation of appeal for mercy or at least post¬

ponement of sentence. They were dismissed about midnight and two hours later Edith Ca¬

vell fearlessly faced the firing squad. During an interview with a British chaplain she re¬

marked, ((I have seen death so often that it is not strange or fearful to

me.® Consult Gibson, H., (A Journal from our Legation in Belgium) (New York 1917).

Henri F. Klein.

CAVEN, William, Canadian educator : b.

Kirkcolm, Wightonshire, Scotland, 26 Dec.

1830; d. Toronto, 1 Dec. 1904. In 1847 he emi¬

grated with his parents to Canada, where they settled in Dumfries township, near Galt. After teaching school, he entered at 17 the theological seminary of the United Presbyterian Church at London, Ontario, was licensed to preach in 1852 and held a charge at Saint Mary's until 1866, when he was called to the chair of Old and New Testament Literature in Knox Col¬

lege, Toronto. In 1873 he succeeded Dr. Willis as principal of the college, and held that office until his death. He was largely instrumental in raising the funds for its new buildings, and contributed greatly toward the union, happily finally completed in 1875, of the various Pres¬

byterian bodies of Canada, in which year he was moderator of the united church, and again in 1892. By his wise foresight, statesman-like grasp of affairs and moderating and healing counsels, he rendered service of inestimable value in the consolidation and upbuilding of the Presbyterian Church in Canada. From 150

1900 to 1904 he was president of the Pan-Pres¬

byterian Alliance.

CAVENDISH, kav'en-dlsh or kan'dish,

Frederich Charles, Lord, second son of the 7th Duke of Devonshire, English statesman : b.

Eastbourne, 30 Nov. 1836; d. 6 May 1882. He was graduated from Cambridge in 1858, was private secretary to Lord Granville from 1859

to 1864. He sat in Parliament as Liberal mem¬

ber for the north division of the West Riding of Yorkshire from 1865 till the spring of 1882

and after serving as private secretary to Mr.

Gladstone and acting as financial secretary (1880-82), he succeeded Mr. Forster as

chief secretary for Ireland. He accompanied Earl Spencer to Dublin, and on the evening of 6 May, he and Mr. Burke an unpopular

subordinate, were stabbed to death in the Phoenix Park. Eight months later, 20 <(Irish Invincibles55 were tried for the murder, and, Carey and two others having turned Queen's evidence, five of the rest were hanged, three sentenced to penal servitude for life and the remaining nine to various terms of imprison¬

ment. Carey himself disappeared; but in July news came from the Cape that he had been shot dead by an Irishman named O'Donnell on board an emigrant ship. O'Donnell was taken back to London and hanged.

CAVENDISH, George, English biog¬

rapher: b. about 1500; d. about 1561. He be¬

came Wolsey's gentleman-usher at least as early as 1527. He remained in close attendance upon his great master till the latter's death, 28

Nov. 1530, after which he retired to his house at Glemsford, in Suffolk, where he lived quietly with his wife, a niece of Sir Thomas More, till the close of his own life. His affection for the great cardinal was most devoted, and his (Life of Cardinal Wolsey5 is one of the most inter¬

esting short biographies in the English lan¬

guage. It was written in 1557 and published in an unsatisfactory state in 1641, but it was not until 1905 that it appeared in polished form.

CAVENDISH, Henry, English chemist: b.

Nice, Italy, 10 Oct. 1731 ; d. London, 10 March 1810. He was a grandson of the 2d Duke of Devonshire, and after his education at Peter-house College, Cambridge, devoted himself ex¬

clusively to scientific research. He lived in quiet retirement, having no interests besides his scientific studies. He never married, and left a fortune of £1,175,000. He was rather eccen¬

tric, and had a hesitation in his speech. His first researches dealt with arsenic, and in 1765

he made some notable investigations concerning heats of liquefaction and vaporization which were not published until considerably later. He discovered the peculiar properties of hydrogen, and the qualities by which it is distinguished from atmospheric air. To him we owe the important discovery of the composition of water. Scheele had already observed that, when oxygen is mixed with double the quantity of hydrogen, this mixture burns with an explo¬

sion without any visible residuum. Cavendish repeated this experiment with the accuracy for which he was distinguished. He confined both the gases in dry earthen vessels, to prevent the escape of the product of their combustion, and found that this residuum was water, the weight of which was equal to the sum of the weights of the two gases. Lavoisier confirmed this con¬

clusion in later times. Cavendish also obtained the anhydride of nitrous acid from nitrogen and oxygen by the electric spark.

Cavendish determined to constant K in the law of gravitation f— — ˆ — , where m and m1

are the masses of two bodies, d the distance between them and / the measure of their mutual gravitational attraction, and was thus able to determine the mean density of the earth.

He found it to be 5.45 times as great as the density of water — a conclusion which differs but little from that obtained by Maskelyne in another way. The apparatus used consisted of two large fixed masses of lead and two smaller masses near these at the ends of a rod sus¬

pended by a wire at its middle. It was devised by the Rev. John Mitchell. Cavendish was a member of the Royal Society of London, and in 1803 was made one of the eight foreign members of the National Institute of France.

His writings consist of treatises in the Philo¬

sophical Transactions,5 from 1766 to 1792.

They are distinguished by acuteness and ac¬

curacy. Consult (The Electrical Researches of Henry Cavendish,5 edited by J. Clerk-Maxwell (Cambridge 1879) ; Wilson, (Lifeof Cavendish) (London 1846).

CAVENDISH, Margaret, Duchess of

Newcastle, English writer: b. Essex 1624 (?) ; d. London 1674. She became a maid of honor to Queen Henrietta Maria (1643-45). She married William Cavendish, afterward Duke of Newcastle 0645), and lived abroad with him until the Restoration. She was buried in Westminster Abbey. She wrote Philosophical Fancies5 ; a collection of poems, (The Pastime and Recreation of the Queen of Fairies5 ; Philosophical Letters5 (1664) ; an < Autobiog¬

raphy5 ; and a (Memoir5 of her husband.

Selections of her works have been edited by Lower (in Smith's Pibrary of Old Authors,5

(London 1872) ; by Jenkins (London 1872) ; by C. H. Firth (London 1886). Consult Gosse, E., Seventeenth Century Studies5 (London 1895).

CAVENDISH, or CANDISH, Sir

Thomas, English navigator: b. Trimley Saint Martin, Suffolk, about 1555; d. at sea off Ascen¬

sion Island 1592. Having consumed his prop¬

erty by his early extravagances, he collected three small vessels for the purpose of making a predatory voyage to the Spanish colonies. He sailed from Plymouth in 1586, took and de¬

stroyed many vessels, ravaged the coasts of Chile, Peru and New Spain and returned by the Cape of Good Hope, having circumnavigated the globe in two years and 49 days, the shortest period in which it had then been effected. For this exploit he was knighted by the Queen. In 1591 he set sail on a similar expedition, in which his principal success was the capture of the town of Santos, in Brazil. Accounts of his voyages are to be found in Hakluyt.

CAVENDISH, William, Duke of New¬

castle, English general: b. 1592; d. 25 Dec.

1676. James I made him knight of the Bath in 1610 and in 1620 raised him to the peerage as Viscount Mansfield. In 1628 he became Earl of Newcastle by Charles I and later became the tutor of Charles' son, afterwards Charles II.

On the approach of hostilities between the CAVENDISH — CAVITE

Crown and Parliament he embraced the royal cause, and was invested with a commission constituting him general of all His Majesty's forces raised north of the Trent, with very ample powers. Through great exertions, and the expenditure of large sums from his private fortune, he levied a considerable army, with which, for some time, he maintained the King's cause in the north. In military matters he de¬

pended chiefly on his principal officers, it is said, but the numerous successes obtained by him render this unlikely. In 1634 he obtained a complete victory over Lord Fairfax on Ad-walton Moor, and recovered

all Yorkshire except Hull; but next year on the arrival of the Scottish army and its junction with the Par¬

liamentary forces, threw himself into York.

Having been relieved by Prince Rupert, he was present at the battle of Marston Moor next day, after which he left the kingdom. His term of exile was chiefly spent in Antwerp, where he was for a long time so straitened in circumstances that he had on one occasion to pawn his wife's jewels. He returned after an absence of 18 years, and was rewarded for his services and sufferings with the dignity of Duke of Newcastle. His works include (La methode et invention nouvelle de dresser les chevaux) (Antwerp 1657), <A New Method and Ex¬

traordinary Invention to Dress Horses and Work Them According to Nature) (1667);

some comedies of no merit, and several worth¬

less poems. Consult (Life of the Duke of New¬

castle1 by Margaret Lucas, his second wife (London 1886). Pepys ridicules this work in his (Diary. 1

CAVENDISH, William, English states¬

man : b. 25 Jan. 1640; d. 18 Aug. 1707. He was the son of William, 3d Earl of Devonshire, and 1st Duke of Devonshire. In 1677 began that opposition to the arbitrary measures of the ministers of Charles II which caused him to be regarded as one of the most determined friends of the liberties of his country. Intimately con¬

nected with Lord Russell, he joined him in his efforts for the security of free government and the Protestant religion. In 1684 he succeeded to his father's title. He took an active part in promoting the revolution, and was one of the first who declared for the Prince of Orange.

CAVENDISH, tobacco which has been

softened and pressed into quadrangular cakes and often sweetened with syrup and molasses, for chewing, so called after Thomas

Cavendish, the Elizabethan circumnavigator. It is also called negro-head.

CAVENDISH EXPERIMENT. See

Gravitation.

CAVERYPAUK, India, a town of Hindu¬

stan, in the North Arcot division of Madras Presidency, 57 miles west-southwest of Madras.

It is meanly built, and the adjoining fort, at one time a place of some strength, is now in ruins.

A victory was gained here by the British under Clive over the French and their allies in 1752.

Near the town is an immense artificial pond, eight miles long by three miles broad, by means of which a large tract of country is irrigated.

It is perhaps the finest work of the kind in South India. Pop. 7,000.

CAVIANA, ka-ve-a'na, Brazil, an island 35

miles long and 20 miles wide. It lies in the north mouth of the Amazon, under the equa¬

tor; is level, fertile and well stocked with cattle.

The small town of Roberdello is on its south¬

eastern side and is almost exactly under the equator.

CAVIARE, or CAVIAR, ka-vi-ar', a table

delicacy prepared from the roe of the sturgeon, especially in Russia. This is made in great quantities in Astrakhan, where the fish are

caught in great numbers. Lately the industry has been extended in the western part of the United States. The process is as follows: The ovaries are first removed from the fish and beaten to loosen the eggs, which are then sepa¬

rated from the muscular tissues by being pressed through a sieve and washed in vinegar.

Salt is rubbed in by hand, and the roe is put into a cloth and pressed to remove the liquor, after which it is packed in small kegs for mar¬

ket. The quality of the result depends on the care taken in clearing and drying it. The best is prepared by granulating the roe in linen sacks, which are laid in the brine and then hung up to dry in the sun.

CAVITE, ka-ve'ta, Philippines, province in the southwestern part of the island of Luzon, bounded on the north and northwest by Manila Bay, on the north and northeast by the province of Manila, and on the south by Batangas ; area, 510 square miles, with the dependent islands, 610 square miles. In the south and southwest the proviit.ee is mountainous ; in the northwest there is a gradual elevation, forming a fertile plateau. The chief products are coffee, sugar, fruits and rice (in the lowland regions). In the towns of the interior, hemp and cotton cloth and sugar are manufactured; in the coast towns the chief industries are salt manufacture and fishing. There is export trade in all these products. There is communication with Ma¬

nila by water and good roads throughout the province, connecting the coast with the inte¬

rior. The occupation of Cavite by United States troops was the first event of importance in the Philippines after the naval battle in Ma¬

nila Bay, 1 May 1898. The government of the province was established under the provincial government act of 6 Feb. 1901 ; and later sev¬

eral of the dependent islands were added to the territory in Luzon. Pop. 134,799.

CAVITE, Philippines, town and capital of the province of Cavite, on the eastern shore of Manila Bay. A tongue of land about one and a

quarter miles long, projecting due east, separates waters of Canacao Bay on the north and Bacoor Bay, inner harbor of Cavite, on the south. On this projection are situated forti¬

fications and arsenal. During the Spanish ad¬

ministration Cavite was one of the principal strongholds in the archipelago, and since the Spanish-American War has been made even stronger. The town is walled, and all the buildings are of stone ; it has a parochial church, two convents and a hospital. It has also several manufacturing industries, and is well equipped for building and repairing ves¬

sels. The Spanish fleet had its position off Cavite when attacked by Admiral Dewey on 1

May 1898. The town is the naval headquarters of the United States in the Philippines. Pop.

4,494.

CAVO RELIEVO, ka vo-re-lya vo, Sculp¬

ture in; called also COELANAGLYPHIC

and CONCAVO-CONVEX SCULPTURE, a

system of relief in which the figures do not rise above the general surface of the material on which the carving is done. It may be looked upon as sculpture in relief, of which the background has not been cleared away in the usual manner. Again, it may be considered as sculpture of which the bounding line has been marked by a groove, generally wedge-shaped, that is with a section like a V : the slope of one side being left as the boundary of the pattern or design, while the other slope disappears in the general rounding of the fig¬

ures. This sculpture, in architectural art, is almost confined to the Egyptian buildings of times before the Roman domination ; but in minor decorative arts the Orientals do beauti¬

ful work in this way.

CAVOUR, ka-voor', Camillo Benso, Count

di, Italian statesman: b. Turin, 10 Aug. 1810; d. 6 June 1861. He was the son of the Marquis Benso di Cavour and his mother was the daughter of Count de Sellon of Geneva. He was educated in the military academy at Turin, where he was graduated in 1826 with highest standing in his class. He had shown special aptitude for mathematics, a love for history and great facility for languages. After com¬

pleting his studies he made a journey to Eng¬

land, where he acquainted himself with the principles and working of the constitution.

Finding military life uncongenial, he resigned his commission in 1831, and assumed the management of his father's estates at Leri (Piedmont), which he made one of the model agricultural properties of the country. In 1842

he returned to Turin, where shortly aftemard he published in the (Bibliotheque Universelle) of Geneva his Considerations on the Present State and Future Prospects of Ireland, > which were subsequently translated into English.

With Count Balbo and others he established in 1847 the journal of the ˆisorgimentoP which he devoted to the same cause of reform, inde¬

pendence and national unity. It was not, how¬

ever, till after the battle of Novara that he entered that political arena in which his name his since become so famous. He became a member of the Sardinian Chamber of Deputies in 1849, and the following year succeeded Santa Rosa as Minister of Commerce and Agriculture.

In this office he set himself strenuously to pro¬

mote the internal prosperity of the country by the establishment of railways and an improved system of postal communications. A new or¬

ganization was given to the military and naval forces ; and the monasteries were, with certain exceptions, suppressed.

His aggressive national policy made Cavour very prominent and, in November 1852 he be¬

came Premier, Minister of Finance and

President of the Council and, not long after¬

ward, gave a signal proof of his statesmanship by the part which he took in cementing an alliance with Great Britain and France, and making common cause with these powers

against the aggressions of Russia. The pres¬

tige thus gained to the arms of Sardinia was no less important than that acquired by her liberal and reforming policy in civil matters. The attitude, however, thus taken by Sardinia could not fail to prove extremely offensive to the neighboring power of Austria to whose arbi¬

trary and repressive measures the government of Victor Emmanuel displayed itself as a stand¬

ing reproof, and whose supremacy in Italy was eminently jeopardized by the aspirations of Sardinia. A collision, therefore, was inevitable, resulting in the campaign of 1859. This had been foreseen by Cavour who had made a secret agreement with the French Emperor whereby France was to come to the aid of Italy in case of need (July 1858). The inti¬

mate connection formed at that time with France, who lent her powerful assistance in the prosecution of the war, was mainly due to the agency of Cavour, who was accused, on this occasion, of having purchased the assistance of Louis Napoleon by unduly countenancing his ambitious projects. Napoleon secretly signed a treaty of peace with Austria thus deserting Italy before the close of the war; and Cavour, broken-hearted, retired to private life; but he was recalled to the head of the government in 1860. On 11 Oct. 1860 he secured the passage of

a bill by the Piedmontese Parliament author¬

izing the government to incorporate in one union such provinces of southern Italy as should express their desire therefor by a plebiscite. This had united all Italy, except Venetia and Rome, in 1861.

The marriage of Victor Emmanuel's daugh¬

ter, the Princess Clotilde, with Prince Napo¬

leon, was consummated in the early part of 1859, and the conclusion of the same year wit¬

nessed the cession of Nice and Savoy to France.

In bringing about both of these results Cavour took a leading part. In 1860 Garibaldi's ex¬

pedition to Sicily took place ; but toward this and the subsequent movements of the Italian liberator, Count Cavour manifested an apparent coldness, which diminished somewhat his esti¬

mation in the minds of the more zealous Italian patriots. Consult Romilly, (Reminiscences of the Life of Cavour > (1863) ; Dicey, (Cavour: a Memoir) ; Bianchi, (La politique de Cavour > (1885) ; (Lives) by Massari (1873) ; Mazade (1877) ; Martinengo-Caesar-esco (1897)J Thayer, (The Life and Times of Cavour* (Cambridge 1911) ; Orsini, (Cavour and the Making of Modern Italy* (New York 1914).

CAVY, ka'vi, a small rodent of the family Caviidce, related to the paca and aguti, and char¬

acterized by its stout build, short legs, small ears, pink eyes, and total absence of a tail.

Cavies feed upon roots and vegetable fare, and are widely distributed throughout the plains and unforested highlands of South America.

The only domesticated and familiar species is the much modified guinea-pig (q.v.), which is about eight inches long, and owing to its harm¬

lessness is a great household pet among chil¬

dren. The largest species of cavy (Dolichotis patachomda) , wrongly called <(agouti,** is scantily distributed throughout the plains of Argentina. It is rusty red in color, and about the size of a hare, standing on terrier-like legs. The ˆrestless® cavy (C. porcellus), and Cutler's cavy (C. cutleri), are common in the La Plata Valley, and are uniformly colored with grayish-brown or black. Other species are found in Brazil and Bolivia. Cavies of several species were abundant in the Miocene and Pleistocene CAWDOR

periods in South America, as is shown by numerous fossils ; these extinct forms differed little from the modern cavies. Cavies live in burrows of their own digging, and breed twice a year, the number of young varying with the climate. The young are brought forth in a very advanced state of development. Their eyes are open and they are capable of running by the side of their mother in a few hours'

time. . In less than a fortnight they are quite able to care for themselves. Consult Hudson, c Naturalist in La Plata) ; and Lydekker, (Royal Natural History. >

CAWDOR, ko'der, Scotland, village in

Nairnshire, five and one-half' miles south¬

west of Nairn. Cawdor Castle, near by, the seat of the Earl of Cawdor, was

founded in 1454, but is one of the three places which tradition has assigned as the scene of King Duncan's murder by Macbeth in 1040. A series of papers from the charter-room at Cawdor was edited (1859) by Cosmos Innes under the title of (The Book of the Thanes of Cawdor.) Pop. 847.

CAWDOR, Thane of, in Shakespeare's

(Macbeth, > a character who does not appear upon the stage. On account of his alliance with the Northmen he is condemned to death by Duncan, who calls him <(that most disloyal trai-torP His title is given to Macbeth, in accord¬

ance with the prophecy of the witches. In describing his death it is thought that Shakes¬

peare had reference to the execution of the Earl of Essex.

CAWEIN, kaw'en, Madison Julius, Ameri¬

can poet : b. Louisville, Ky., 23 March 1865 ; d. Louisville, Ky., 8 Dec. 1914. His verse is often exceedingly musical and displays great command of metres. Its defects are over¬

ornamentation, and a too profuse employment of adjectives, but the note which he strikes is distinctive and pleasing. He is at his best in his purely Kentuckian poems. His works in¬

clude (Blooms of the Berry) (1887) ; (The Triumph of Music) (1888) ; (Accolon of GauP

(1889); (Lyrics and Idyls) (1890); (Days and Dreams* (1891) ; (Moods and Memories)

(1892) ; (Intimations of the Beautiful * (1894) ; (Poems of Nature and Love) (1893) ; (Red Leaves and Roses) (1893) ; <Undertones) (1895); (The Garden of Dreams> (1896);

(Shapes and Shadows) (1898) ; (Idyllic Monologues) (1898) ; (Myth and Romance* (1899) ; <One Day and Another) (1901); (Weeds by the WalP (1902) ; (A Voice on the Wind*

(1902); (Kentucky Poems, * with introduction by Edmund Gosse (1902) ; (The Vale of Temple) (1905) ; (Nature-Notes and Impres¬

sions* (1906) ; (Complete Poetical Works) (5 vols., 1907) ; (An Ode in Commemoration of the Founding of the Massachusetts Bay Colony) (1908); (New Poems) (1909); (The Giant and the Star* (1909) ; (The Shadow Garden and Other Plays* (1910) ; Toemsˆ

with foreword by William Dean Howells

(1911); (The Republic (1913); (Minions of the Moon) (1913) ; (The Poet and Nature and the Morning Road) (1914); (The Cup of

Comus) (1915).

CAWNPORE, kon-por, or CAWNPUR,

kon-poor', India, capital city of the district of the same name, in the Northwest Provinces, on the right bank of the Ganges, which is here about a mile wide, 130 miles northwest from Allahabad.

It is a modern town with nothing specially note¬

worthy about it as regards site or buildings, dhere are several churches, a theatre, various military and other offices, high school, club, *etc.*

It manufactures leather and cotton goods, has a large trade and is an important railway centre.

In 1857 the native regiments stationed here mu¬

tinied and marched off, placing themselves under the command of the Rajah of Bithur, the noto¬

rious Nana Sahib. General Wheeler, the com¬

mander of the European forces,, defended his position for some days with great gallantry, but, pressed by famine and loss of men, was at length induced to surrender to the rebels on condition of his party being allowed to quit the place uninjured. This was agreed to; but after the European troops, with the women and children, had been embarked in boats on the Ganges, they were treacherously fired on by the rebels ; many were killed, and the remainder conveyed back to the city, where the men were massacred and the women and children

placed in confinement. The approach of

General Havelock to Cawnpore aroused the brutal instincts of the Nana, and he ordered his prisoners to be slaughtered, and their bodies to be thrown into a well. The fol¬

lowing day he was obliged, by the victorious progress of Havelock, to

retreat to Bithur. A memorial has since been erected over the well in the form of an angel with palm branches, and fine public gardens, covering 50 acres, now surround the spot. Pop. 178,557. Consult Trevelyan, (Cawnpore* (London 1865).

CAXAMARCA. See Cajamarca.

CAXIAS, ka-she-as', the name of two

places in Brazil: (1) A town in the state of Maranhao, on the navigable Itapicuru, 190 miles from its mouth, with an active trade in cotton, cattle and rice, the river being navigable. It is the birthplace of the poet, Luis Gongalvez Dias. Pop. 10,000. (2) An Italian agricultural colony in the Brazilian state of Rio Grande do Sul, founded in 1875. Pop. 13,680.

CAXTON, William, first English printer:

b. Kent about 1422 ; d. London 1491. In 1438 he was bound apprentice to Robert Large, a mercer in London, and soon after his master's death (1441) he went to Bruges, where, in 1446, he went into business on his own account. About 1463 he was appointed ˆgovernor® at Bruges for the English merchants settled in the Low Coun¬

tries, a post in which he continued for some years. About 1471 Caxton entered the service of Margaret, Duchess of Burgundy, sister of Edward IV. He had already begun a transla¬

tion of the popular romance entitled (Le recueil des histoires de Troye,* and this he finished at Cologne in 1471. In order to meet the demand for the book he learned the art of printing, probably at Cologne, and his (Recuyell of the Histories of T roy, *the first English printed book, appeared about 1474, having issued, it is supposed, from the press of Colard Mansion at Bruges. His (Game and Playe of the Chesse,*

also a translation from the French, wasˆprobably a production of the same press in 1475, and is the second English book printed. He left Bruges in 1476, returned to England, and in 1477 had a press at Westminster Abbey, where he printed the (Dictes and Sayings of the

losophers,5 the first typographical work executed in England. Caxton continued to exercise his art for about 14 years, during which time he produced nearly 80 works, many of them trans¬

lated by himself from the French, and one of-them — (Reynard the Fox5 — from the Dutch.

He was patronized by Edward IV, Richard III and Henry VII ; and he was on intimate terms with Earl Rive'rs, the Earl of Worcester and others of the nobility, the two noblemen named having even translated works for his press. He was buried in the church of Saint Margaret's Westminster. Besides the books already men¬

tioned, Caxton printed Chaucer's Canterbury Tales5; (Troylus and Creside5 ; (Book of Fame,5 and translation of Boethius; Gower's Confessio Amantis5 ; works by Lydgate;

Malory's cKing Arthur) ; (The Golden Legend) ; cThe Fables of HLsop,5 *etc.* His books have no title pages, but are frequently provided with prologues, and colophons. His types are in the Gothic character, and copied so closely from the handwriting of his time that many of his books have been mistaken for manuscript. In some no punctuation is used ; in others the full point and colon only; commas are represented by a long or short upright line. Copies of some of his books now bring extraordinary prices when sold. The standard (Life of Caxton) is that by W. Blades (1861-63). Consult also Knight, (The Old Printer and the Modern Press5 (Lon¬

don 1861) ; Blades, (A Catalogue of Books Printed by or Ascribed to William Caxton5

(London 1865) ; (Biography and Typography of Caxton5 (London 1882) ; Cambridge History of English Literature5 (Cambridge and New York 1907-13, in Vol. II) ; and the publications of the Caxton Club.

CAXTONS, The, a novel by Edward Bulwer, Lord Lytton, published in 1850 (3 vols., octavo). Che Caxtons5 was not only in¬

stantly popular in England, but 35,000 copies were sold in America within three years after its publication in 1850. Never before had Bulwer written with so light a touch and so gentle a humor, and this novel has been called the most brilliant and attractive of his pro¬

ductions. His gentle satire of certain phases of political life was founded, doubtless, on actual experience.

CAYAMBE-URCU, ka-yam-ba'-oor'koo, or

CAYAMBE, a volcanic peak of the Colombian Andes, lying directly under the equator in Ecuador. It rises in the shape of a beautiful and regular cone to a height of 19,187 feet. Its top is crowned with perpetual snow, and its geo¬

graphical position and great elevation render it one of the most remarkable mountains of the world.

CAYENNE, ka-yen' or ki-en', French

Guiana, a city and capital of the colony, situated in lat. 4° 56' N,, long. 52° 20' W. Six French expeditions were sent out to Cayenne and other parts of Guiana between 1604 and 1652. The Dutch occupied it in 1654, but were obliged to surrender possession to a new French expedi¬

tion. After the Treaty of Breda in 1667 the Dutch once more took Cayenne, and were at¬

tacked there by the French in 1676. The French settlement was permanently established at the beginning of the 18th century. It was until within recent years a French penal settle¬

ment. The climate of the capital, which is built on an island east of the mouth of the Cayenne River, is rendered exceedingly un¬

wholesome by the low and swampy character of a part of the neighboring coast. The harbor is shallow, yet the products of the country —gold, sugar, molasses, rum, coffee, hides, spices, cocoa, *etc.*

— are shipped in considerable quanti¬

ties each year. Pop. (1911) 13,527. See Guiana.

CAYENNE PEPPER. See Capsicum.

CAYES, ka, Les. See Aux Cayes.

CAYEY, ki-a', P. R., town 35 miles south of San Juan, 2,300 feet above sea-level. It is a favorite summer resort owing to its cool climate and excellent sanitation. It contains old bar¬

racks dating from the Spanish colonial period, a hospital, church and schools. Tobacco grow¬

ing and allied industries, including the manu¬

facture of cigars, are its principal industries.

The grade of tobacco grown in the neighbor¬

hood is the best in Porto Rico. Pop. 5,000.

CAYLEY, ka'li, Arthur, English mathe¬

matician : b. Richmond, Surrey, 16 Aug. 1821 ; d.

London, 26 Jan. 1895. He received his early education at Blackheath and King's College, London, passing subsequently to Trinity College, Cambridge. Called to the bar in 1849, he prac¬

tised for some years as a conveyancer, but in 1863 was appointed first Sadlerian professor of pure mathematics at Cambridge. Trinity Col¬

lege in 1875 accorded him the rare honor of electing him a foundation fellow. He received many distinctions from universities and learned societies both at home and abroad, and in 1883

he presided over the meeting of the British As¬

sociation at Southport. He seldom identified himself with movements outside his own imme¬

diate work, but took a prominent part in the agitation for the higher education of women, which resulted in the foundation of Newnham College. As a mathematician he was character¬

ized by the wide scope and originality of his work. His chief memoirs deal with differential equations, elliptic functions and determinants.

He discovered the higher curve named for him, and the principal proposition of matrices known as Cayley's Theorem. His (Elementary Trea¬

tise on Elliptic Functions5 appeared in 1876, and (Single and Double Theta functions5 in 1881; and in 1889, a collected edition of his papers began to be issued, extending over 13 volumes.

Numerous memoirs were published in the

Cambridge Mathematical Journal. In 1882 he lectured in Johns Hopkins University, Balti¬

more.

CAYLUS, ka-liis, Anne Claude Philippe

de Tubieres, Count of, French archaeologist: b. Paris, 31 Oct. 1692; d. there, 5 Sept. 1765. He was a son of the Marquise de Caylus (q.v.), and after having served in the army during the war of the Spanish succession, he left the serv¬

ice in 1715; accompanied Bonac on his em¬

bassy to Constantinople the following year, and visited Greece, Troy, Ephesus, Byzantium and Adrianople. In 1717 he returned to Paris, and began the arrangement of his extensive collec¬

tions. He commenced a great work on Egyp¬

tian, Grecian, Etruscan, Roman and Gallic antiq¬

uities, with numerous plates. He was a mem¬

ber of the Academy of Painting and of the Academy of Inscriptions,

and divided his labors between them. He made a chemical examina-

tion of the ancient method of encaustic paint¬

ing, investigated the mode of painting on mar¬

ble, the art of hardening copper, the mode by which the Egyptians raised great weights, the mummies, painting on wax and many other subjects. Integrity, simplicity and disinter¬

estedness were united in his character, with occasional traits of dogmatism. He has left numerous works, tales as well as antiquarian researches. Among the. latter is his cRecueil d'antiquites egyptiennes) (1752-67, 7 vols.).

Caylus was also an industrious and skilful en¬

graver, and produced a collection of more than 200 engravings, after drawings in the royal cabi¬

net, and a great number of heads, after the first masters. On this subject he wrote (Nouveaux sujets de peinture et de sculpture) (1755) and (Tableaux tires de l'lliade, de l'Odysee et de l'Eneide) (1757). His stories were collected under the title of (CEuvres badines completes*

(Amsterdam 1787). A number of these were translated into English under the title (Oriental Tales> in Gueulette's (Chinese Tales) (1817).

Consult Rocheblave, (Essai sur le comte de Caylus* (Paris 1889) ; Nisard's ed. of the (Correspondance du comte de Caylus avec le pere Paciaudi* (1877) ; ˆNotice® of Uzanne in his (Faceties* (1879).

CAYLUS, Marthe Marguerite de Villette,

Marquise de, French writer of memoirs: b.

Poitou 1673; d. Paris (?), 15 April 1729. Origi¬

nally of the Protestant family of D'Aubigne, she was converted to the Roman Catholic faith by her aunt, Madame Maintenon. Long an orna¬

ment of the brilliant court of Louis XIV, she passed her declining years in dictating <My Recollections, * in which a valuable insight into the life of Louis XIV is afforded, through the medium of a singularly happy style. The work was edited first by Voltaire (1770) and by Racine (1881). Racine addressed the prologue to his tragedy of (Esther) to her.

CAYMAN, ka-rnan, or CAIMAN, ka-e'-

man, any of the five species of alligators inhabit¬

ing the fresh waters of Central and South America. The caymans are distinguished from other alligators in having an armor of over¬

lapping bony scutes protecting the belly, as well as an armor of bony plates on the back. The black cayman (Caiman niger) of tropical South America east of the Andes is the largest species, reaching a length of 13 feet. In some of the rivers of South America caymans are found in vast numbers and are said to be extremely voracious. Their habits are the same as those of the common alligator (q.v.). See Jacare.

CAYMAN ISLANDS, a group of three

islands in the Caribbean Sea attached to Jamaica. They consist of: (1) Grand Cay¬

man, which is 17 miles long and 4 to 7 miles broad. Pop. 1911, 4,128. Its capital is George¬

town; pop. 1911, 1,446. (2) Little Cayman, 9

miles long and \l/x miles broad; pop. 1911, 136.

(3) Cayman Brac, 10 miles long and 114 miles broad; pop. 1911, 1,300. Education in the is¬

lands is backward, the annual expenditure being very small. They export green turtle, turtle shell, hides, cattle, ponies, cocoanuts. The cli¬

mate is very healthful. A large proportion of the inhabitants are white. The government is administered by a commissioner and 14 justices of the peace appointed by the governor of Jamaica.

CAYUGA, ka-yoo'ga, LAKE, a lake in the State of New York, on the boundary of Cayuga and Seneca counties, and extending south into Tompkins County, 38 miles long and from 1 to 3/i miles wide. It is 381 feet above tidewater.

It empties into Lake Ontario through the Seneca and Oswego rivers. At the north end the lake is shallow, but in other places it reaches a depth of 400 feet. It is navigable for 30

miles. It is much frequented by pleasure par¬

ties. The city of Ithaca stands at the southern extremity of the lake. Aurora is situated near the middle of the shore and Cayuga near the north end. It is connected by a canal with Seneca Lake.

CAYUGAS (ˆswamp-dwellers,® possibly in

reference to their cranberry swamps) a tribe of North American Indians, forming the small¬

est of the original Five Nations of the Iroquois, and according to Onondaga tradition, the last to join the confederacy; whence it was called (<The Youngest Brother.® The tribe was not in¬

ferior in energy and original genius, however ; several of the chiefs were men of superior ability, as Karistagea, or Steeltrap; and Tahgah-jute, or ((Logan,® the son of one of its sachems.

The latter will be ever remembered, not only for the pathetic speech attributed to him, but for his high personal qualities. Nor were the Cayugas inferior in fighting prowess; in one of their Virginia campaigns they seem to have de¬

stroyed the tribe of Tuteloes, and incorporated with their own tribe

the remnant who were not slain. They were friendly to the whites, how¬

ever, and bore a good reputation. They were located along the Cayuga Lake in central New York, and in the valley of its outlet, the Seneca River. At the outbreak of the Revolution, they joined the Mohawks and Senecas in alliance with the British against the Americans, and shared in the devastation of the property of the patriots during Sullivan's campaign ; the most of them settled in Canada with the other Iro¬

quois, 200 remaining in New York, apparently around Niagara. In 1789 they made their first formal cession of territory to the whites, con¬

firming it by a treaty at Fort Stanwix in 1790; in 1795, by a treaty at Cayuga Bridge, they ceded their great reserve in the lake basin and the river valley, retaining only one of four miles square. For these releases they received large money annuities, which they used largely for liquor. In 1806 all the remainder left the reservation and emigrated westward or north¬

ward; some joining their brethren in Canada, some going to Sandusky, Ohio, others settling among the Senecas near Buffalo. There are at present about 1,300 in all, the bulk of them at the Six Nations on Grand River, Ontario, some with the Oneidas in Wisconsin, about 170 with the Senecas in New York State and others with the Senecas in Indian Territory.

CAYUSE, ka -yoos ', CAILLOUX, or

WILLETPOO, a tribe of North American

Indians who formerly inhabited the region be¬

tween the Des Chutes River and the Blue Mountains, Oregon, and also parts of Wash¬

ington, south of the Yakima River. In 1847, their number was greatly depleted by a small¬

pox epidemic. This resulted in a massacre of the Waultpu missionaries

who were thought by the Indians to have introduced the disease.

They now number some 300, mostly of impure 156

extraction, from intermarriage with other races. Their language, which is of Waiilat-puan stock, is spoken by a very few of their number. The pony of the northwest United States takes its name from these Indians, who were doubtless responsible for its introduction among the tribes of that section.

CAYVAN, Georgia, American actress : b.

Bath, Me., 1858; d. 19 Nov. 1906. She went on the stage early in life and won note as Dolly Dutton in (Hazel Kirke.* She was afterward with A. M. Palmer and Daniel Frohman. She became leading lady of the Lyceum Theatre Stock Company in 1897, retiring from the stage soon afterward. Consult Clapp and Edgett, (Players of the PresenD (Dunlap Society, New York 1899) ; and Edmunds, (Famous American Actors of To-Day > (edited by McKay and Win¬

gate, New York 1896).

CAYZER, Sir Charles William (Charles

Whitworth Wynne), English shipowner and

poet: b. Bombay, 19 July 1869. He was edu¬

cated at Rugby and Christ Church, Oxford, where he received the degree of M.A. He be¬

came partner in the firm of Cayzer, Irvine and Company, and director of the Clan Line Steam¬

ers. He retired in 1911. He has published (Ad Astra > (1900), a very

extensively advertised volume; (Songs and Lyrics* (1900) ; (King David* (1902) ; <Undine) (1908) ; (By the Way of the Gate) (1911) ; (Donna Marina* (1905).

CAZAL, Manoel Ayres de, ka-zal', Portu¬

guese historian: b. 1754; d. about 1821. He was for a long period prior at Crato, Goyaz, Brazil, devoting himself to historical and geo¬

graphical research, publishing in 1817 (Coro-graphia Brazilica, ou relaqao historico-geogra-fica do reino do Brazil* (2 vols., Rio de Janeiro 1817; 2d ed., 1845). It was prepared under the auspices of King John VI, and is distinguished for its exactitude, and is the first circumstantial report on the interior provinces of South America. The name of the author appears on the title page as Um Presbytero secular de grao Priorado do Crato. The work earned him the title of <(Father of Brazilian Geography.®

Consult Pereira da Silva, (Plubarco Brazileiro) (1847).

CAZALES, ka -za'las, Jacques Antoine

Marie de, French politician: b. Grenade, Haute-Garonne, France, 1 Feb. 1758; d. Engalin, Gers, France, 24 Nov. 1805. The son of a counsellor of the Toulouse Parliament, he served for some time in Jarnac's regiment of dragoons. Being chosen in 1789 a deputy of the noblesse to the States-General, he became one of the most able and eloquent opponents of the Revolution, but was treated with ingratitude by the Royalists, although he had labored and suffered much in their cause, and barely escaped being put to death. Having traveled abroad during the reign of terror, he returned to France in 1803. Napoleon conferred on him, although he had refused to enter his service, the cross of the Legion of Honor. His (Dis¬

cours et opinions) and his (Defense de Louis XVP were published in 1821. Consult Chare's introduction to his (Discours* ; and Aulard, (Les Orateurs de la Constituante) (2d ed., 1905).

CAZALLA DE LA SIERRA, ka-thal'ya,

Spain, a town in the province of Seville, and 53 miles by rail northeast of the city of Seville, on a declivity of the Sierra Morena. Its streets are clean, paved and well arranged; and it has two squares, in the principal of which are the ancient church and town-hall. The mountains in the vicinity are rich in metals. Pop. 8,044.

CAZEMBE, ka-zem'be, KAZEMBE, or

CAZEMBE'S DOMINION, Africa, a region

formerly constituting a large and well-ordered negro state lying south and southwest of Lake Tanganyika, and taking its name from the title of the sovereign. The country forms a kind of basin, bounded on the east by a plateau which rises to the height of from 3,000 to 4,000 feet; on the west, also, it is bounded by a series of heights. On the south it has the lofty water¬

shed which separates its streams from those of the Zambesi River system. Its principal stream is the Chambezi, which flows westward into Lake Bangweolo, then northward, under the name of the Luapula, into Lake Moero. The ruler, or muata, used to be feared as a great magician ; he had over 600 wives, and maintained a well-armed body of troops, numbering at one time, it is said, 20,000. His dominions were divided into districts, each of which had a governor of its own. These governors and other men of rank formed a body of privileged nobility; all the rest of the inhabitants, farmers, artisans, etc., were looked upon as slaves of the ruler. The population consisted of a ruling race, the Campololos, who had invaded and conquered the country, and the Messiras, the original inhabitants. It was only Campololos that received official posts, and the Campololo language was the one spoken at court. The people were industrious agriculturists, growing crops of mandioc, maize, sorghum, *etc.* They manufactured coarse cloths, cords, nets, lines, etc., from cotton and the fibres of certain plants; made weapons and implements of iron; also earthenware, wooden vessels, *etc.* Cazembe was visited by Lacerda in 1799, and by other Portuguese explorers in 1831. Dr. Livingstone, in 1867, stayed 40 days at the capital, which he found to consist of a number of huts dotted over a large area, and having probably not more than a thousand inhabitants. The Cazembe at this time was a usurper, whose cruelties had done much to depopulate the country, and it was doubtful if he could bring a thousand warriors into the field. The British half of the country is now included in Rhodesia, and Ca¬

zembe is its chief town. Consult (The Lands of the Cazembe * published by the Royal Geo¬

graphical Society (1873).

CAZIN, ka-zan', Jean Charles, French

artist: b. Samer, Pas-de-Calais, 1841; d. 1901.

He studied under Le Coq de Boibaudran. In 1868 he was appointed director of the Ecole des Beaux Arts and conservator of the museum at Tours. He went to England in 1871 where he devoted himself to designing ceramics for the Fulham pottery. It was not until 1876 that he exhibited pictures. At this time his (Le Chantier) appeared, which was generously re¬

ceived. Next came the (Fuite en Lgypte*

(1877); <Le voyage de Tobie* (1878); (Le depart* ; (L'Art,* for which he received honor¬

able mention. By far the best of his works is the (Agar et Ismael,) in which he proved himself a master of the landscape-religious picture. For (La Terre,* an Adam and Eve CAZORLA

theme, he obtained a medal of the first class.

Other works are (Souvenir de fete} ; (Poste de secours> ; (Judith* (1883); and (La Journee faite,* in which he departs from the religious theme to portray a scene of contemporary reality. He is well known as a landscape painter. His figures are always subservient to the scene. But he has a power of idealization which gives to truth the most delicate air of poetry, a tender melancholy and charm. A wistful,

hushed, sympathetic note pervades his works. He attempted to revive the art of en¬

caustic painting. He became a member of the Legion of Honor. He also completed the decorations on the Puvis de Chavannes in the Pantheon (1898). Consult his biography by Benedite (Paris 1901) ; and Marcel, <La Peinture frangaise au XIXe siecle* (Paris 1905).

CAZORLA, ka-thor'la, Spain, a town in

Andalusia and 41 miles east of the city of Jaen.

It rises in the form of an amphitheatre on the slope of the Sierra de Cazorla, and is well built, though much less important and populous than in the time of the Moors, during whose wars it held an important position. It has two castles, both in good preservation. The Sierra de Cazorla is a wooded ridge round which winds the upper course of the Guadalquivir.

Pop. 7,936.

CAZOT, ka-zo', Theodore Joseph Jacques,

French politician: b. Alais, 11 Feb. 1821; d.

1912. In 1848 he was active as a Republican in his home department ; in 1870 he was appointed general secretary in the ministry of the inter¬

ior; in 1871 elected to the National Assembly; and in 1875 was made life senator. From 1879—82 he was Minister of Justice and was inter¬

ested in bringing about a reform in the appoint¬

ment of judges, but retired without passing the law he desired. In this capacity he was also active in the persecution of the Jesuits and other unauthorized assemblies. In 1883 he was president of the Court of Cassation, resigning in 1884 on account of being implicated in fraudulent dealings.

CAZOTTE, ka-zot, Jacques, French poet:

b. Dijon 4720; d. 25 Sept. 1792. His master¬

pieces are <OHivier) (1762), a poem of chiv¬

alry after the manner of Ariosto; and (The Devil in Love) (1772), a tale of wonder, still a popular favorite. He had extraordinary skill in versifying, as shown by his adding a seventh canto to Voltaire's (Civil War of Geneva* with such perfect imitation of Voltaire's style and manner as to deceive all Paris. He joined the < Illuminati *about 1775. For his opposition to the Revolution as a Royalist he was guillotined by the Revolutionary Tribunal. Consult De Nerval, Hllumines* (Paris 1852).

CAZWINI, kaz-we'ne, Zacharia Ben Mo¬

hammed, Arabian naturalist: b. Cazwin,

Persia, 1212; d. 7 April 1283. He was de¬

scended from a family of lawyers, who de¬

rived their origin from Anas Ben Malek, a companion of Mohammed, and had settled in Cazwin, a city in Persia. From that place this author received the surname under which he has become celebrated. Of the circumstances of his life we know little more than that he was cadi of Wazith and Hillah, and died in the year of the Hegira 682 (1283 a.d.). His most im¬

portant work is on natural history — (The Wonders of Nature and the Peculiarities of Creation* — of which Ideler, professor in the University of Berlin, published the chapter on the (Constellations of the Arabians,* and of which there are fragments in Bochart's (Heir-ozoikon,* in Ouseley's (Oriental Collections,*

and in Wahl's, Jahn's and De Sacy's (Arabic Chrestomathies.* It was the object of Cazwini, like Pliny, to describe the wonders of all nature. His work contains a comprehensive view of all that had been written before him, but in so grand and original a manner that it is of higher value than most of the original works which treat of the same subjects. There is an abridged translation of it in the Persian.

CEAN-BERMUDEZ, tha-an' ber-moo'-

dath, Juan Agustin, Spanish art historian and painter: b. Gijon, Asturias, 17 Sept. 1749; d.

Madrid, 3 Dec. 1829. He devoted himself early to the study of the fine arts, into which he was initiated by Raphael Mengs. After heading a public office at Madrid, he retired to Seville, where he founded an academy of fine arts, and occupied himself with the study of their his¬

tory. He was elected a member of the royal academies of history and fine arts at Madrid, and published several valuable works connected with his favorite pursuits. His most important book, entitled (Sumario de las anti-guedades romanas que hayan Espana,* appeared posthu¬

mously in 1832. He published also (Diccionario historico de los mas ilustres profesores de las bellas artes en Espana* (1800); (Descripcion artistica de Sevilla* (1804); (Dialogo sobre el arte de la pintura> (1819)); (Noticias de los arquitectos y arquitectura de Espana* (1829).

CEANOTHUS, a genus of shrubs and

small trees of the natural order Rhamnacece.

There are about 35 species, mostly natives of the Pacific Coast region of North America.

They are characterized by serrate or entire simple leaves; small, perfect, white, purplish or blue flowers in showy clusters, which are often panicledˆ and three-celled drupaceous fruits, which, on drying, separate into three stones.

Many of the species and their hybrids are popular ornamental shrubs, especially in mild regions, their free-blooming habit rendering them specially useful as lawn specimens. Three species, C. americanus, C. ovatus and C.

fendleri, and some of their hybrids, are hardy in the north, but usually the hybrids must either be protected from frost or stored over winter in a plant-pit or frost-proof cellar. They suc¬

ceed in almost any soil, but do best in light, well-drained loams, especially when exposed to the sun. Propagation is easily effected by seeds, cuttings or layers. C. americanus known as New Jersey tea and

red-root, is common from Canada to the Gulf States. Its leaves are said to be used as a substitute for tea, a use to which they are reported to have been put during the American Revolutionary War.

In medicine ceanothus has not been used to any great extent. Its roots contain from 6 to 10 per cent of tannin, and have been used in domestic medicine as astringents. Owing to the close resemblance of the roots, ceanothus has been used as an adulterant for rhatany.

CEARA, sa-a-ra', Brazil, a state bounded on the north and east by the Atlantic Ocean and the state of Rio Grande do Norte, on the 158 CEARA

south by Parahyba and Pernambuco and on the west by Piauhy and Maranhao. Its area is 40,250 square miles, and its population 886,686.

The principal port and capital of the state is Fortaleza (q.v.), which is regarded as one of the most beautiful cities of Brazil. A rail¬

road connects Fortaleza with Baturite. The coast regions are sandy and unproductive, the centre is occupied by an elevated plateau, sparsely watered and fit only for pasture. The climate is hot and dry. The principal exports of Ceara are : rubber, cattle, cotton, hides, mules, preserved fruits and hammocks. Coffee, sugar, wine of the cashew nut, oranges and wax are also produced. The estimated value of all the exports is about $5,000,000 annually, in which amount the United States shares to the extent of nearly one-third. Ceara is divided into 27 comarcas, or counties. The most fertile district is the upper Jaguaribe. Con¬

sult Fontenelle, (The State of Ceara* (1893).

CEARA, Brazilian city. See Fortaleza.

CEARA-MIRIM, a city in Brazil, state of Rio Grande do Norte. It is situated on the Ceara-Mirim River and has important manu¬

factures. Pop. 18,000.

CEBALLOS, tha-bal'yos, Jose, Mexican

soldier: b. Durango, 15 March 1830; d. 1893.

In 1869 he had command of a regiment in the province of Yucatan; while here a portion of his soldiers revolted, but he suppressed the insurrection in three days ; he also executed without authority several private citizens who were implicated in the revolt. In 1870 he was made brigadier-general and given command in the western states, where he had charge of the campaign against the bandit chief, Losada.

When Lerdo de. Tejada became President of Mexico, Ceballos was put in command of the force sent to depose Camerana, the governor of Jalisco. After a severe struggle between the state and government forces, Caballos was successful and became governor, a position which he held till 1876. At that time Tejada was deposed by Diaz; Ceballos joined with Iglesias, but was forced to leave Mexico for a time. He went first to California, then to Guatemala, where he was appointed director of a military school. Though at first plotting a revolution against Diaz he suddenly turned to his support, returned to Mexico, was restored to his rank and made governor of the Federal district. He was a bitter enemy of the press, which he frequently antagonized, and in 1885—86 had a number of students and journalists ar¬

rested and imprisoned.

CEBES, of Thebes, Greek philosopher, a

disciple and friend of Socrates and of Philolaus. He is the reputed author of three dialogues in the Socratic style — the Phry-nichus, the Hebdome and the Pinax, or

<(votive tablet, }> a philosophical dialogue repre¬

senting allegorically the temptations of this life and teaching that true learning can alone make for happiness. In spite of its pure Attic, and its truly Socratic tendency, modern criticism now assigns the work to the 2d century a.d.

It was extremely popular in the Middle Ages, a sort of (Pilgrim's

Progress, * indeed; was translated into all the languages of Europe, as well as Arabic, which latter version, made pos¬

sible in the 9th century, is our sole record of CECCHI

the close of the dialogue. Modern editions are those of Drosihn (1871); Kraus (1882); Par¬

sons (1887); and Prachter (Marburg 1893).

CEBID.7E, seb'i-de, a family of American monkeys, including the howler, saki, sapajou, spider-monkey (qq.v.), *etc.* See also Monkey.

CEBU, tha-boo' or se-boo', Philippines, an island lying between Negros and Bohol, north of Mindanao. Its length northeast and south¬

west is 139 miles; width, about 20 miles; area, 1,668 square miles. It has a mountain system consisting of a chain running the length of the island, nearer the east than the west coast. The mountains are not over 2,200 feet high, but their ascent is steep and it is difficult to cross them. There are six passes, the best being the southernmost, from Sibonga to Dumanjug, over which United States army officers constructed a temporary wagon road in the summer of 1900. The chief products are rice, chocolate, sugar and coffee. There are manufactures of hemp and pina cloth, sugar-sacks, cocoanut, wine, sugar, salt and cheese. In 1827 coal was discovered in Cebu, the first found in the Philippines. It is of good grade, adapted to general use. The trade of the island is exten¬

sive. Besides the mountain passes there are two main highways, one on the east coast, and one on the west coast, while the port of Cebu has communication with Manila and the islands of the Visayan group. Cebu was first oc¬

cupied by United States troops in February 1899. Operations against the insurgents re¬

sulted in driving them from their position, and capturing a large quantity of material of war.

This island, with a few dependent islands, forms the province of Cebu, in which civil govern¬

ment was created under the provincial govern¬

ment act of 1901. At that time several of the cities had organized their municipal govern¬

ments according to the code of the Philippine commission. Though the province was restored to military government for a time in 1901, civil government was permanently resumed in Janu¬

ary 1902. The entire province has about 660-GOO inhabitants ; the island about 600,000 ; the capital about 60,000.

CEBU, Philippines, capital of Cebu prov¬

ince, situated on the east coast of the island of Cebu. The streets are wide and regularly laid out. There is a cathedral in one of the suburbs, and it has also several other churches and an episcopal palace. Cebu is an important port with an extensive trade, being the chief commercial centre of the Visayan group. It is the oldest Spanish settlement in the Philippines.

In the ˆRizal,® a building in front of the Santo Nino Church, is the cross which it is said was planted near the town by Magellan when he took possession of the island. An old fort built by the Spaniards stands within the limits of the town. Pop. about 60,000.

CECCHI, Giammaria, jam-ma-re'a chek'ke,

Italian dramatist: b. Florence, 14 April 1518; d. there, 28 Oct. 1587. He was a lawyer who devoted his leisure hours to writing. He was the rival of Bibbiena, Machiavelli and Ariosto in portraiture of character and in liveliness of dialogue. Of his plays, 95 in number, but few have been printed. These are mainly imitations of Plautus and Terence; the best of them are CECCO D'ASCOLI — CECILIA

(La Dote) ; (I1 Servigiale) ; (La Stiava) ; (La Moglie.-* He wrote also religious dramas ; among them (L'Esaltazione della Croce) (1580).

CECCO D'ASCOLI, chek'kd das'ko-le,

properly Francesco degli Stabili, Italian poet: b. Ascoli about 1257; d. Florence, 16 Sept.

1327 ; a devoted student of astrology and of demonology. For the expression and defense of certain erroneous opinions he was burned at the stake. His heretical or impious doctrines are contained in a poem, unfinished but of encyclopedic compass, (Bitternesses, > of which he lived to complete four books. The subject of the first book was astronomy with meteor¬

ology; of the second, stellar influence with physiognomy ; of the third, minerals ; of the fourth, sundry problems, moral and physical.

Consult Baddely, W. S. C., (Charles III …

also Cecco d'Ascoli, Poet, Astrologer, Physician) (London 1894).

CECH, tschek, Sva'topluk, Czech writer:

b. Ostredek, 21 Feb. 1846. Pie was editor in succession of several journals, and at the same time practised law. He received his education at Prague. After winning some celebrity as a writer of stories and short poems, he made a bolder flight in 1872 with (Dreamsˆ in which he shows great epic power. Besides this he has written several other poems, as (The

Adamites) ; (The Storm* ; (Songs of Morn¬

ing. J He is the most popular of Czech poets.

As a novelist he excels in lively wit and rich humor. Among his works of prose fiction may be named: (Stories Arabesque and Humor-esque* ; and the amusing (Candidate for Im¬

mortality.) He has written also (Memories from the Orient* (1885), as well as later volumes. Consult Sutnar, f., <S. Cechs Leben und Werke> (1898).

CECIDOMYIA, ses-i-do-mi'ya, a genus of

two-winged flies, of the family Cecidomyiidce, a group of gnats which cause galls (q.v.). The Hessian fly (see Wheat, Insect Pests) be¬

longs to the group.

CECIL, Evelyn, English politician : b.

1865. He is the eldest son of Lord Eustace Cecil, who is the second surviving son of the 2d Marquess of Salisbury. He acted as private secretary for several years to Lord Salisbury when he was Prime Minister. Since 1900 he has been Unionist member for Aston Manor, and has served with distinction on various par¬

liamentary committees. He is secretary-gen¬

eral of the Order of Saint John of Jerusalem, and was sworn a privy councillor in 1917, a rank bearing the designation of (<Right Honor¬

able. w

CECIL, Lord Hugh (Richard Heathcote),

English politician : b. 1869. He is the fifth son of the 3d Marquess of Salisbury, and brother of Lord Robert (q.v.). Educated at Eton and Oxford, he acted as private secretary to his father and became a prominent figure in the House of Commons as Conservative member for Greenwich, 1895-1905, first as a supporter of Mr. Balfour's Education Act 1904, and later as one of the leaders of the Unionist Free Traders in opposition to Mr. Chamberlain's Tariff Reform policy. He was defeated in the Greenwich election 1906, but was returned un¬

opposed for Oxford University in 1910. Like his brother an ardent High Churchman, he is one of the few speakers who can venture on the expression of personal religious feelings before a political audience. During the European War he joined the Royal Flying Corps, and in 1916

was included in the Commission of Inquiry on the Mesopotamia Campaign.

CECIL, Robert, Earl of Salisbury, Eng¬

lish statesman, second son of William Cecil, Lord Burleigh (q.v.): b. about 1563; d. Marl¬

borough, Wiltshire, 24 May 1612. Having re¬

ceived the honor of knighthood he went to France as assistant to the English Ambassador.

On the death of Sir Francis Walsingham he succeeded him as principal secretary, and con¬

tinued to be a confidential Minister of Queen Elizabeth to the end of her reign. He gained the enmity of Lord Essex who publicly declared him traitor. Cecil was exonerated, however, and his position remains secure. Having secretly supported the interests of James I previous to his accession to the crown he was continued in office under the new sovereign and raised to the peerage. In 1603 he was created a baron, in 1604 Viscount Cranbourn and in 1605 Earl of Salisbury. In 1608 he was made Lord High Treasurer, an office which he held till his death.

CECIL, Lord Robert (Edgar Algernon),

English lawyer and politician, third son of the 3d Marquess of Salisbury: b. 1864. Educated at Eton and Oxford, he was called to the bar in 1887 and became a Queen's Counsel in 1900, A prominent member of the Conservative

(Unionist) party, he had a large parliamentary bar practice before he entered the House of Commons in 1906 to represent East Marylebone.

He resigned in 1910 as a protest against the Tariff Reform movement in his party. He stood for Blackburn as a Free Trader, but was de¬

feated; in a by-election he was returned for Hitchin in 1911. Deeply versed in ecclesiastical law, he was appointed, in March 1915, to the office of <(Official Principal and Judge and Chan¬

cellor of the Consistory Court of York and Vicar-General in Spirituals of the Archbishopric of York.® On the formation of the Coalition Cabinet in May 1915 he became Parliamentary Under-Secretary for Foreign Affairs, and, in addition, Minister of Blockade for the duration of the war (February 1916).

CECIL, William, Lord Burleigh. See

Burleigh.

CECILIA, Saint, Christian virgin and

martyr ; her day in the Roman calendar is 22

November. Her story as recounted in the 'Breviarium Romanum,* represents her as a Roman lady of noble birth, a Christian from childhood, and from her early years vowed to virginity. Yet her parents gave her in marriage to a young noble, Valerianus, whom Cecilia per¬

suaded not only to respect her vow, but also to become a Christian ; and he, converted, induced also his brother, Tiburtius, and their intimate friend, Maximus, to enter Christ's fold; shortly after these three suffered martyrdom together.

Cecilia now, in anticipation of the same fate or the same crown, distributed her possessions among the poor, and this becoming known to the prefect of Rome, he ordered her to be taken to his own mansion and there burned to death in the bath (in balneo). But the virgin, exposed to the flames for a day and a night, was found 160

unhurt; and after the axe of the headsman had also failed to sever her head from her body, at last she won the double wreath of virginity and martyrdom ; this was in the reign of Alexander Severus and in the pontificate of Urban I, about the year 230. Her festival is celebrated on 22

November. Urban erected a church in her house which was called by her name. The church of Saint Cecilia is still one of the most notable churches of Rome, having b.een again and again repaired or reconstructed. In this account of Saint Cecilia nothing is said of the musical accomplishments of the virgin, but legend makes much of them ; hence, Saint Cecilia is the patron saint of music and musi¬

cians, and musical societies are very commonly called by her name: Dryden's fine ode, Alex¬

ander's Feast: a Song for Saint Cecilia's Day*

is an imperishable monument of the Cecilian legend in English literature. Consult Guer-anger, (Sainte Cecile et la societe romaine) (Paris 1873). Another Saint Cecilia was born in Africa and suffered martyrdom by starvation under Diocletian. The Roman Catholic Church celebrates her festival on 11 February.

CECILIA, a novel by Frances Burney, pub¬

lished in 1782. It is a typical English novel of a century ago. The plot is simple, the story long drawn out, the style stilted, and the characters alone constitute the interest of the book, and justify Dr. Johnson's praise of Miss Burney as ((a little character-monger.®

CECROPIA, a genus of plants of the order Artocarpacece, of which the best known species is the trumpet-tree (C. peltata) of the West In¬

dies and tropical South America. It attains a height of about 50 feet, and has a hollow stem and branches, from which musical instruments are made. Its leaves are very large, circular and peltate, and serve as food for sloths; and its flowers are small and grouped in short spikes, several of which are enclosed at first in a large bract. The wood is light and soft, and is employed by the natives in various ways, particularly for the purpose of obtaining fire by friction. Ropes are made from the inner bark, and the outer bark has astringent prop¬

erties. Caoutchouc is obtained from the juice, and the buds are employed as a pot-herb. Ants utilize the hollow stems as dwellings.

CECROPIA MOTH, a colossal species

(Samia cecropia) of the family Saturniidce.

The moth expands five or six inches and is brick-red in color, the wings tinged with grizzly, each wing with a large crescent-shaped spot near the centre, which is red and white, or white-edged with red and black ; on the apex of each fore wing is a large, black, eye-like spot.

The caterpillar is a large green worm three to four inches in length, protected by large tubercles colored green, blue, yellow or red. It is not uncommon on the elder, willow, apple, currant, pear, thorn, poplar, *etc.* At the end of summer it spins a large cocoon, open at one end, — not oval, as in those of the allied Telea Polyphemus and the luna moth, — and attaches it to a branch of a tree. An allied species in northern Maine and Canada is N. Columbia , while in the Rocky Mountain region, Colorado and Wyoming it is represented by S. gloveri and on the Pacific Coast by S. calif ornica. The silk of this species cannot be used because its fibres are not continuous.

CECROPS, se'krops, according to Greek

tradition, the founder of Athens, and the first king of Attica. He was said to have been an autochthon (sprung from the soil), and was sometimes represented as half man, half dragon.

He taught the savage inhabitants religion and morals, made them acquainted with the advan¬

tages of social life, and laid the foundation of the future city of Athens, which after him was originally called Cecropia. According to later legend, he was responsible for the formation of a confederacy of 12 cities, the introduction of marriage, burial of the dead, writing and other arts. He is also said to have introduced the art of shipbuilding. He died after a reign of 50 years. By the later Greeks he was repre¬

sented as having led a colony to Attica from Sais in Egypt about 1400 or 1500 b.c., but the best modern critics do not look upon this event nor on the life of Cecrops at all as historical.

There is no doubt that Egypt did have a certain influence on the development of civilization in Greece, but how great this influence was, or in what manner exercised, history does not fur¬

nish sufficient data to enable us to decide. It is probable that the true Cecrops was a hero of the Pelasgian race.

CEDAR, various cone-bearing evergreen

trees and their wood; also-several non-coniferous trees. The most widely known are prob¬

ably the cedar of Lebanon (Cedrus libani), the deodar, or goa-tree, of India (C . deodara), and the African or Mount Atlas cedar (C. ailantica). These are large ornamental evergreen trees with widespreading branches, which give them a form distinct from most other cone¬

bearing trees. They are sometimes planted in southern California and the Gulf States, and the last-mentioned species even as far north as Philadelphia, where it can stand the winter in sheltered situations. They are readily propa¬

gated by seeds, and thrive in well-drained, loamy soil. From ancient times their odorous, light-red wood has been used for fine furniture and interior house-finish. The white gum of the cedar of Lebanon, which oozes from the trunk and branches, was formerly employed in embalming, but the forests of this tree have be¬

come so much reduced that neither the resin nor the oil made from it are in commerce. The other species are most abundant, the deodar in India and the Atlas cedar in northern Africa.

Their timber is widely used for fine cabinet work.

The red cedar (Juniperus virginiana) is a well-known very variable tree found from Canada to Florida, a'nd westward to the Great Plains. It attains a height of about 80 feet; has a conical more or less spreading head with upright limbs; evergreen, spiny, pointed leaves and bluish globular fruits covered with bloom.

The wood is largely used for fence-posts, lead pencils, *etc.* The white cedar (Chamcecy paris thyoides) is also a well-known American tree found in wet ground from New Hampshire to Florida. It attains a height of 70 to 80 feet; has erect spreading branches, thin and flat pendulous twigs, fragrant green leaves, and tiny bluish-purple cones covered with bloom.

The trees are highly ornamental, and, being hardy, are general favorites in the North. The wood is especially useful in moist places. The name white cedar is often applied to the arbor CEDAR — CEDAR CREEK

vitae {Thuja occidentalism. The yellow cedar (C hamcecyparis nootkatensis) , a common tree on the Pacific coast from Oregon to Alaska, is valued, in cabinet work and interior house¬

finishing, for its light-yellow wood, which takes a high polish. Like its relative mentioned above, it is often planted for ornament. In its home it often exceeds 100 feet in height.

The best known non-coniferous trees that are sometimes called cedar are probably Cedrela odorata (see Cedar, Barbadoes) and Cedrela toona, the Australian cedar. See Toona ; Juniper.

CEDAR, Barbadoes, SPANISH CEDAR,

or MEXICAN CEDAR, a tall tree {Cedrela odorata) of the natural order Cedrelecce. It is a native of the West Indies, where its wood is highly valued for making certain kinds of fur¬

niture, cigar-boxes, canoes and shingles. It is also exported for the manufacture of lead pencils. It often attains a height exceeding 75

feet and a great girth. It bears pinnate leaves 10 to 20 inches long; pendulous terminal panicles of inconspicuous whitish flowers, fol¬

lowed by dehiscent fruits about half an inch in diameter, containing numerous flat-winged seeds. The bark, leaves and fruits smell like assafcetida, but the wood is pleasantly fragrant.

The tree is often planted for its ornamental qualities, especially along avenues. It thrives in southern California and in the Gulf States.

Several of its relatives, especially C. sinensis , which is hardy as far north as Philadelphia, are also similarly used. See Toona.

CEDAR-APPLES, fungous outgrowths

upon juniper and red cedar trees. They are caused by some species of the parasitic fungus, gymnosporangium, one of the rusts. At the first they appear like warts upon the smaller branches and twigs, becoming chocolate color or brown as autumn advances, and remaining at¬

tached and unchanged until spring, when they enlarge into horn-shaped, jelly-like masses that resemble sponge. At this time they produce their abundant spores which, as the masses be¬

come dry, are blown away by the wind and, alighting on apple-trees, produce rust on the foliage and other green parts. They will not germinate upon cedar or juniper, but require an alternate host, the apple, to complete their life cycle. For methods of control see Apple; Fungicide.

CEDAR-BIRD, the common American

waxwing {Ampelis cedrorum), a bird found throughout North America, breeding from the latitude of Kentucky northward. In most lo¬

calities it is only partially migratory. It is a beautiful bird of delicate unobtrusive colors, generally ashy-brown with a purple tint on the head, the front of which, like the throat, is black. The tail-feathers are tipped with yellow, and the secondaries have red tips. The head is gracefully crested. The cedar-birds spend most of the time in flocks, which wander ac¬

cording to the supply of food and are note¬

worthy for the uniformity with which all mem¬

bers alight or rise together. The food consists chiefly of berries when these are to be had, on which account they have received the name of cherry-birds in some sections. Nesting takes place late, when the summer is well advanced, and the rather bulky structure is usually placed in an apple or other orchard tree. The eggs VOL. 6—11

are four to six in number, pale blue and thickly speckled.

CEDAR CREEK, a stream in Shenandoah

County, Va., flowing into the north fork of the Shenandoah River.

CEDAR CREEK, Battle of. After the

battle of Fisher's Hill, 22 Sept. 1864, General Sheridan followed Early as far as Harrison¬

burg, his cavalry going as far as Port Republic, Staunton and Waynesboro. In view of the difficulty of supplying his army so far from its base, and of other operations by which two corps of infantry and a cavalry division of his army w?re to be sent to the Army of the Poto¬

mac, he holding only the lower valley of the Shenandoah, Sheridan, after ordering the de¬

struction of all mills, barns, grain, forage and provisions of all kinds, began to withdraw down the valley on 5 October, and on the 8th re¬

crossed Tom's Brook. His rear had been so persistently followed and harassed by the Con¬

federate cavalry divisions of Rosser and Lomax that he ordered Torbert, his cavalry com¬

mander, to whip the Confederate cavalry or get whipped. On the morning of the 9th "Torbert fell upon Rosser and Lomax, and in a two-hours' contest routed them, pursuing many miles and capturing over 300 prisoners, 11 guns and 40 wagons. Sheridan then resumed his march, and on the 10th halted on the north bank of Cedar Creek. Wright's 6th corps continued its march to Front Royal, on the way to Wash¬

ington, where it remained two days, and then marched toward Ashby's Gap, but was recalled to Cedar Creek, where it arrived on the 14th.

Early had been reinforced by Kershaw's divi¬

sion and about 600 cavalry, increasing his force to about 18,000 men, and under Lee's order to detain the Union troops in the valley he had followed Sheridan, arriving at Fisher's Hill, six miles from Cedar Creek, on the 13th. On the night of the 15th Sheridan left for Washington to consult with Stanton and Halleck, leaving Gen. H. G. Wright in command of the army.

Sheridan's cavalry accompanied him to Front Royal, from which point he intended to push it through Chester Gap to the Virginia Central Railroad at Charlottesville and raid the country east of the Blue Ridge, but upon erroneous in¬

formation that Longstreet was moving to join Early, the raid was abandoned and Torbert moved the cavalry back to Cedar Creek. On the night of the 18th Emory's 19th corps was on the west side of the valley turnpike, on ele¬

vated ground overlooking Cedar Creek.

Wright's 6th corps in reserve to the right and rear of the 19th, separated from it by Meadow Brook. Merritt's cavalry division was on the right of the infantry, and Custer's division one and one-half miles beyond Merritt's, watching the crossings of Cedar Creek and the roads on the right. Crooks' 8th corps was on the east side of the pike, one of its two divisions (Thoburn's) on a rounded, entrenched hill, one-fourth of a mile in advance of the other, near the junction of the creek and river, and both somewhat in advance of the 19th corps on the right. Two cavalry brigades of Powell's divi¬

sion were far to the left, near Front Royal, and one at Buckton Station, two miles beyond Crooks' left. The Union army numbered about 31,000 men. Reconnaissances were sent out daily from the flanks to see what Early was 162

doing, and that of the 18th reported that the in¬

dications were that he had retreated from Fisher's Hill. He had not retreated, but had matured a plan of attack. A reconnaissance by General Gordon had disclosed the fact that the left of the Union line was lightly picketed, with but a small cavalry force on the north fork

of the Shenandoah, and that it was practicable to move infantry secretly by night across the creek, which was easily fordable, and through the woods to within less than half a mile of Crooks' left and rear. This plan Early adopted, assigning for the movement the divisions of Gordon, Ramseur and Pegram and Payne's

cavalry brigade, all under command of .Gordon.

Early, with the divisions of Kershaw and Wharton and all his artillery, was to co-operate in the effort to crush the Union left and centre.

Two brigades of cavalry were to demonstrate on the Union right, and Lomax's cavalry, mov¬

ing by Front Royal, was to strike the valley pike in the Union rear. The movement began after dark of the 18th. Gordon led his column across the north fork of the Shenandoah, down its right bank, and again crossing below the mouth of Cedar Creek, reached his assigned position before daylight. Early led Kershaw across Cedar Creek, midway between its mouth and the pike, and at the first flush of dawn, covered by darkness and fog, captured or drove in the picket line and rushed over the entrenchments held by Thoburn's division, at a point where they were not manned, surprised the camp, soon swept everything out of it, and captured seven guns, which were turned upon the fugitives. Kershaw then ad¬

vanced on R. B. Hayes' division and Kitching's brigade, and at the same time Gordon charged out of the woods directly upon Hayes'

left and rear, the combined attacks breaking his division and Kitching's brigade, and uncov¬

ering the left of the 19th corps, which was now assailed by Kershaw and Gordon, while at the same time Wharton's division, moving swiftly down the pike, followed by 40 pieces of artil¬

lery, attacked in front, and the greatest part of the 19th corps, abandoning 11 guns, was swept from the field. Wright, who had foreseen at the beginning of the attack that his position was untenable, and a change of front necessary, now ordered the 6th corps, under General Ricketts, who was moving with two divisions to support the left, to fall back to some tenable position, and the 19th corps was ordered to rally on the right of the 6th. The Confederates followed up their advantage, taking many prisoners, but were checked by the 6th corps, Wharton being badly repulsed. Early still pressed matters; it was now 9 o'clock, and Wright, losing six guns of his own

corps, withdrew to a more favorable position one and a half miles north and west of Middletown, where he was joined by the cavalry brigade from Buckton and by Torbert, with the two cavalry divisions that had been ordered from the right to left of the in¬

fantry line; while the division commanders of the 6th and 19th corps were told the enemy would be attacked about 12, noon, as soon as an ample resupply of ammunition could be issued. Meanwhile Sheridan, who had arrived at Winchester on the afternoon of the 18th, was hastening to the front, meeting on the way a stream of fugitives, whom he ordered to turn back, as he intended to reoccupy the old camp that night. He arrived on the field a little after 11 o'clock, during a lull in the fight, after Wright had reunited the divisions of the 6th corps, which had been fighting by themselves during the morning, and after the 19th corps had been rallied and placed in line, also parts of the 8th corps, the only part of the army seriously engaged being a division of the 6th corps and the cavalry, tenaciously holding the valley pike, the key-point of the battle. Wright's disposition of the infantry was approved, and the only change made in the line was to send Custer's cavalry back to the right of the in¬

fantry. About 1 o'clock Early pushed forward his entire line, but was quickly repulsed, and then busied himself in collecting his stragglers, who were plundering the captured camps, get¬

ting his prisoners and captured guns and wagons back to Fisher's Hill, and throwing up a defensive line beyond the reach of the Union artillery. At 4 o'clock Sheridan saw a move¬

ment of Early's, which he thought indicated an attack, and ordered a general advance, the 19th corps on the right, the 6th on the left, with the 8th following in reserve, Custer's cavalry on the right, and Merritt's on the left of the infan¬

try. The movement developed into a left half¬

wheel, and after a very severe and obstinate fight, during which parts of the Union line were repulsed, again to go forward, was suc¬

cessful; the Confederate line was broken near its left, other parts of the line gave way, and soon the entire army fled in panic and disorder from the field and across Cedar Creek, Sheri¬

dan's infantry following as far as the creek, the cavalry continuing the pursuit three miles be¬

yond and until after dark, capturing guns, wagons, ambulances and prisoners. Early, with but few of his men, rested at night in his en¬

trenchments at Fisher's Hill, and at 3 o'clock next morning retreated to New Market, fol¬

lowed by Sheridan's cavalry as far as Woodstock. The 24 guns captured by Early were retaken, and he left in Sheridan's hands 23 of his own. The Union loss was 644 killed, 3,430

wounded and 1,591 missing; of the latter 1,429 were sent as prisoners to Richmond. The Confederate loss was 320 killed, 1,540 wounded and 1,050 missing. Early's offensive movement suspended for a time the transfer of any part of Sheridan's army to the Army of the Poto¬

mac; his defeat ended efforts on the part of the Confederates to invade the North by way of the Shenandoah Valley. Consult (Official Rec¬

ordsˆ (Vol. XLIII) ; Pond, (Shenandoah Val¬

ley in 1864) ; The Century Company's (Battles and Leaders of the Civil War> (Vol. IV) ; Sheridan, (Personal Memoirs) ; Keifer,

(Slavery and Four Years of War) (Vol. II).

E. A. Carman.

CEDAR FALLS, Iowa, city in Black Hawk

County, situated on Cedar River and on the Burlington, C. R. & N., the Illinois Central and the Chicago & G. W. railroads, 85 miles northeast of Des Moines. It is actively en¬

gaged in manufacturing, having flour, oatmeal, paper, harvester, gate, wagon, pump, broom and other factories. The Iowa State Teachers'

College is situated here and has an average at¬

tendance of 3,200. The city owns its water¬

works and electric-lighting plant, and maintains a Carnegie library, good schools, a hospital, CEDAR KEYS — CEDAR MOUNTAINS

two parks and has shown marked growth in re¬

cent years. • It was settled in 1845, incorporated as a village in 1853 and received its civic charter in 1865 providing for a mayor elected every two years and a city council. Pop. (1910) 5,012; 0920) official United States census, not includ¬

ing college students, 6,316.

CEDAR KEYS, Fla., seaport in Levy

County, on the Gulf of Mexico, 118 miles south¬

east of Tallahassee. It takes its name from the keys surrounding the harbor. There is a light¬

house on one of the keys, with a fixed white light, varied by a white flash every minute.

The town has several saw-mills, most of which cut red cedar wood for pencils, which is a leading export. It has a considerable trade also in pine, sponges, palmetto fibre, lumber, fish and oysters. Pop. (1910) 864.

CEDAR LAKE, lake of Canada, in Mani¬

toba, an expansion of the river Saskatchewan, receiving the waters of this large stream to pour them over the Grand Rapids into Lake Winnipeg. Cedar Lake is nearly 30 miles long, and where widest 25 broad ; area, 285 square miles. Its depth of water is sufficient for the largest craft, except on the northwest, where the quantity of alluvium brought down by the Saskatchewan is rapidly filling it up. Both the mainland and the islands are well wooded with balsam, spruce, birch, poplar, tamarack, Banksian pine and cedar, the last growing on the shores of the lake, particularly the northwest, and giving it its name.

CEDAR MOUNTAIN, CEDAR RUN,

or SLAUGHTER'S MOUNTAIN, Battle of.

On 8 Aug. 1862, Crawford's brigade of Banks'

corps marched from Culpeper Courthouse, eight miles to Cedar Run, to support Bayard's cavalry brigade, which was being driven back by Stone¬

wall Jackson, who, with the three divisions of C. S. Winder, Ewell and A. P. Hill, in all nearly 24,000 men, was advancing from Gor-.

donsville to seize Culpeper. On the 9th Banks'

entire corps, at Little Washington, was ordered to follow Crawford, and Sigel was ordered to march his corps from Sperryville to the same point. Banks joined Crawford at Cedar Run about noon and took position on elevated ground just beyond it, covering the road to Culpeper, Crawford's brigade and six companies of the 3d Wisconsin, of Gordon's, on the right of the road, being partially hid in woods. Gordon's brigade was held in reserve on the hither side of the stream. Across the road on Crawford's left was Geary's brigade; Prince's brigade was on Geary's left, and Greene's small brigade to the left of Prince and somewhat removed.

Seven batteries of artillery were distributed on the plateau slightly in advance of the infantry.

Banks had about 8,000 men. Jackson crossed the Rapidan on the 8th, and about noon of the 9th drove back Bayard's cavalry, and follow¬

ing, came under fire of the Union artillery and prepared for battle. Early's brigade was ordered to advance, keeping to the right and close to the Culpeper road, while Ewell led his two other brigades further to the right along the slope of Cedar Mountain. Early advanced un¬

til he came under severe artillery fire, when he halted under cover of a small hill and C. S.

Winder's division and three batteries came up on his left, Campbell's brigade on the extreme left, then Taliaferro's, with Winder's brigade in reserve. While placing his batteries on and near the road Winder was mortally wounded by a piece of shell. It was now 5 o'clock, and Banks

gave the order to advance and attack.

The three brigades of Crawford, Geary and Prince threw out skirmishers, drove in those of the Confederates, and the main line advanc¬

ing became severely engaged. Early's right held its own against Prince, but on the Union right Crawford, advancing with great im¬

petuosity, attacked and routed Campbell's brigade ; then swung to the left, fell upon and (with the assistance of Geary) routed Talia¬

ferro and shook Early's left. It was going hard with Early when Hill's division came up and, forming on his right and left, restored the fight, checked Crawford's further success, drove him and Geary back, and held Prince in check. Then the 10th Maine, of Crawford's brigade, which had been held in reserve, went forward on the extreme right, and in less than 10 minutes was compelled to retreat with a loss of nearly one-half its men. At the same time a battalion of Pennsylvania cavalry charged down the road and was instantly driven back in disorder. Gordon's brigade came on the field as the 10th Maine was going out. In its advance it moved a little to the right of where the 10th Maine had been, and was met by the brigades of Branch, Archer and Winder, with such a withering front and flank fire that it was badly cut up and parts of it driven off, again to rally and go forward ; but, under cover of the woods, Pender's brigade gained its right and rear, poured in a volley and drove it from the field. The artillery had now been with¬

drawn and the Confederates advanced.

Prince's brigade fell back, leaving Prince and many of the men prisoners, and Greene, on the extreme left, who had not been seriously en¬

gaged, but had held Ewell's two brigades in check, was withdrawn. Night had now fallen, but Jackson, desiring to enter Culpeper before morning, gave immediate pursuit,

and when one and one-half miles from

the field was checked by Banks' rallied troops and Rickett's division, which had come up from near Culpeper, followed later by Sigel. General Pope also had arrived and as¬

sumed command. The Union loss was 1.759

killed and wounded and 594 missing. The Con¬

federate loss was 1,338 killed and wounded and 31 missing. Pope and Jackson confronted each other on the 10th and 11th, but on the night of the 11th Jackson retreated, abandon¬

ing many of his wounded, recrossed the Rapi¬

dan and marched to the vicinity of Gordons-ville. Consult (0ffkial Records) (Vol. XII) ; Ropes, (The Army Under Pope) ; Gordon,

(Army of Virginia) ; Allan, (Army of Northern Virginia in 1862 > ; The Century Company's (Battles and Leaders of the Civil War) (Vol.

II).

E. A. Carman.

CEDAR MOUNTAINS, a mountain range

in Cape Colony extending nearly along the meridian of 19° E., for about 25 miles south¬

ward, beginning with lat. 32° S., and rising at some places to a height of 5,000 feet, and separating the valley of the Olifante River on the west from the Doom on the east. Cedar trees of gigantic size formerly covered these mountains, and still do so to a considerable ex-164

tent. The mountains contain many Bosjesman caves. The highest summit is Sneeuwkop, about 6,300 feet.

CEDAR RAPIDS, Iowa, city in Linn

County, on the Cedar River, and the Chicago & N. W., Chicago, R. I. & P., Chicago, M. &

Saint P. and Illinois C. railroads, 219 miles west of Chicago and 310 miles north of Saint Louis. It is an important railway and manu¬

facturing centre, and has valuable waterpower.

The city is built on terraced hills on both sides of the river which is here crossed by several bridges. The streets are paved with brick and asphalt, and it has large and well-planned parks and excellent sewer, water, trolley, gas and electric-lighting systems. Cedar Rapids is the centre for a rich agricultural region and has an extensive wholesale trade. The city con¬

tains about 192 manufacturing establishments; capital, $6,500,000; persons employed, 6,500; wages, $4,500,000; value of products, $47,000,-

000. These figures did not include the Ameri¬

can Cereal Company, whose mills employ 800

persons and have a daily capacity of 5,000 bar¬

rels. The Chicago, Rock Island & Pacific Rail¬

way shops employ nearly 1,000 men. Other in¬

dustries are pork-packing, and the manufacture of flour, cereals, pumps, windmills, starch, furniture, agricultural implements, dairy, creamery and egg supplies, wagons and car¬

riages, planing-mill products and confectionery.

The United States census of manufactures for 1914 recorded 170 industrial establishments of factory grade, employing 5,669 persons, of whom 4,394 were wage earners, receiving yearly $2,727,000 in wages. The capital invested ag¬

gregated $20,281,000, and the year's output was valued at $34,989,000: of this, $9,041,000 was the value added by manufacture. There are three national and seven other banks ; and daily, weekly and monthly newspapers. Cedar

Rapids is the seat of Coe College (Presbyter¬

ian), has excellent public and private schools, a business college and public and Masonic libraries. It has many handsome private resi¬

dences and churches, hospitals, a post office and Federal court building, Masonic Temple, auditorium and fine business and railway build¬

ings. The first settlement at the rapids of the river was in 1845. The city was incorporated in 1856, and the charter revised in 1898. The mayor and city council are elected for two years. Pop. (1920) 45,566.

CEDAR, or RED CEDAR, RIVER, a

river rising in the southern part of Minnesota and flowing southeast through the eastern part of Iowa to Muscatine County, where it turns southwest and empties into the Iowa River at Columbus Junction, aftpr a course of about 350

miles. The chief cities along its course are Waterloo, Vinton and Cedar Rapids.

CEDARTOWN, Ga., city and county-seat

of Polk County, 60 miles north by west of At¬

lanta, on the Central of Georgia, the Louisville and Nashville and the Seaboard Air Line rail¬

roads. The city has important lumbering and mining interests ; cedar and pine abound in the district and there are valuable mineral de¬

posits. The industrial establishments comprise a box factory, planing mills, knitting mills, iron furnaces and foundries, oil mills, fertilizer works, railroad repair shops and marble works.

The city owns the electric lighting and water¬

works. Pop. (1920) 4,053.

CEDILLA, se-dil’la, a mark used under

the letter c in French and Portuguese when the c stands before a, o or u, to indicate that it is to be pronounced like the English s, not like k, as is usual before these letters. A c with the cedilla under it is written q.

CEDRELA, sed’re-la, a genus of large tim¬

ber trees, natives of the tropics of both hemi¬

spheres, giving name to the order Cedrelacece, which is now usually included in Meliacece.

The species have evergreen, equally pinnate leaves, and small bell-shaped white flowers. C.

odorata of Honduras and the West Indies yields bastard cedar. C. australis is a valuable Australian timber tree. C. toona, a native of Bengal, furnishes timber much like mahogany.

The bark is very astringent, and has been found valuable in fevers, dysentery, *etc.* The flowers are used for producing a red dye. The bark of C. febrifuga is used against the intermittent fevers of Java.

CEDRELACEiE, sed-re-la’se-e, the ma¬

hogany family, a natural order of dicotyledon¬

ous plants, nearly allied to, if really separate from, the Meliacecu. They are trees with alter¬

nate pinnate leaves and a woody capsular fruit.

Different species yield mahogany, satinwood, *etc.* The typical genus is Cedrela.

CEFALU, cha’fa-loo’, Italy, seaport city of Palermo province, Sicily, on the north coast, 40 miles east-southeast of Palermo. The town is named from the headland which rises 1,200

feet above it bearing on its summit ruins of an ancient Sicel town. Cefalu is a bishop’s see and its buildings include a fine cathedral and

several other churches. The harbor is small, capable of accommodating only a few vessels.

Sea-fishing is actively engaged in and profitable marble quarrying is carried on. Pop. 13,300.

CEHEGIN, tha-a-hen', Spain, town in the province of Murcia and 39 miles west-north¬

west of the city of Murcia, four miles east of Caravaca, on a declivity facing the south. It has numerous spacious streets, and two squares, lined with substantial houses and neat public buildings, comprising a parish church, three chapels, town-and courthouses, a prison, hos¬

pital, theatre, cemetery and several schools.

The manufactures include paper, cloth, soap, pottery, brandy, wine and oil. There is also trade in grain, oil, wine, fruits, wool, hemp, silk, wax, and cotton. Pop. 13,313.

CEILING, the interior overhead surface

of an apartment usually formed of a lining of some kind affixed to the under side of joists supporting the floor above, or to rafters; the horizontal or curved surface of an interior opposite the floor. The word seems to have been suggested by the use of arched coverings for churches, and even for rooms, which pre¬

vailed in the Middle Ages, and were not un¬

known to the ancients. In Egyptian temples the undersides of the flat stone roofs were ornamented with blue paint and yellow stars and other hieroglyphics of the heavens. The ceil¬

ings of Babylonia and Assyria were often gilded and stuccoed. Greek roofings were dec¬

orated inside with ornaments. Arched ceil¬

ings among the Romans were known by the name camerse or camera, the Greek origin of CELAKOVSKY — CELANO

which seems to furnish an argument in favor of the view that the arch was known to the latter people. The camera was formed by semi¬

circular beams of wood, at small distances from each other, over which was placed a coat¬

ing of lath and plaster. In later times the camerae were frequently lined with plates of glass, when they were termed vitreae. But the ceilings most common among the Romans were flat, the beams, as in modern times, having been at first visible and afterward covered with planks and plaster. Sometimes hollow spaces or panels were left between the planks, which were frequently covered with gold and ivory, or paintings. The arched ceilings of the Romans were commonly of brick or concrete covered with stucco, and were of three kinds : barrel vaults, groined vaults, and domes. The Roman ceilings were always elaborately dec¬

orated with stucco or paintings, as seen in those of the Pompeian baths. After the decline of Roman art, ceiling decoration became obsolete in the West, to be revived after the Roman¬

esque Period. But Byzantine art, with its in¬

ventions of glass, developed new and wonder¬

ful types, using curved roofing and mosaics wherever possible. Good examples are the Saint Mark's in Venice, and the churches at Salonica and Constantinople. Mohammedan

art developed a similar form. In the West, in the Middle Ages, the ceiling design took the form of bare rafters, which was later replaced by vaulting of stone and flat wooden ceilings.

In England, the simpler forms prevailed; while in France, the multiple rib vault and the elabo¬

rate fan vault developed. The wooden ceilings were decorated in the hammer-beam types of English churches and halls, which lasted until the 17th century. During the Renaissance, Italy used three types of ceiling, the smooth vault ; the same with penetrations, having a flat central field and curves ; and the flat paneled ceiling of wood or plaster, of which the most magnifi¬

cent example is that in the Doge's palace at Venice, highly decorated with paintings by Titian, Tintoretto and Veronese. In England, at Coleshill, Berkshire, a ceiling by Inigo Jones (1650) shows a type which became predominant for a century: deeply sunk panels with medal¬

lions around and bands enriched with foliage, fruit, etc., in bold relief. The present type generally used is the one developed by Robert Adam. Modern ceilings are generally flat and are of plaster or wood. When the ceiling is divided into deep panels it is said to be coffered.

CELAKOVSKY, cha-la-kov'ske, Fran—

tisek Ladislav, Bohemian poet and philologist : b. Strakonitz, 7 March 1799; d. Prague, 5 Aug.

1852. He was destined for the pulpit, but from patriotic impulses declined to adopt that pro¬

fession, and engaged in 1821 as instructor in a nobleman's family. In 1828 he became as¬

sociate editor of the Quarterly Review for the Catholic Clergy, published by the consistorium at Prague, and in 1834 editor of the Bohemian Gazette, and of the Bee, a literary journal. He also commenced a series of lectures on_ the Czechic language and literature, at the Univer¬

sity of Prague. He lost both his situation as editor and that at the university, in consequence of a remark against the Emperor Nicholas.

The Bohemian Society for the Propagation of Science elected him a member in 1840. In 1842

he accepted a professorship of the Slavic lan¬

guage and literature, recently established by the King of Prussia for the benefit of his Polish subjects, at the University of Breslau. After the events of 1848, the Austrian government, which now sought for support from the Czech nationality, offered him a professorship at the University of Prague. Of his numerous works, the following are most remarkable: <Poems) (1822); (Slavic National Songs) (1822-27);

Lithuanian National Songs) (1827) ; a metri¬

cal translation of Walter Scott's (Lady of the Lake) (1828) ; a translation of Augustine's (De Civitate Dei) (1829-32) ; (Echo of Russian National Songs) (1829) ; (Echo of Czechic Na¬

tional Songs> (1840). One of his latest works was the Lopular Philosophy by the Slavic Na¬

tions in their Proverbs) (Prague 1851). After 1835 Celakovsky was engaged in a comparative study of all the Slavic dialects, the fruit of which is given in part in his additions to Jung-mann's Czechic dictionary. As a poet he is dis¬

tinguished by the grace and naivete of his popular songs.

CELAKOVSKY, Ladislav, Bohemian bot¬

anist, son of the preceding: b. Prague 1834; d. there 1902. He was educated at Prague, where, in 1860, he was appointed custodian of the botanical department of the Bohemian Museum.

In 1882 he became professor of botany at the Czech University of Prague. His works are numerous and valuable. They include (Pro-dromus der Flora von Bohmen) (1867-81) ; (Uber die morphologische Bedeutung der Samen-knospen) (1874) ; (Vergleichende Darstellung der Placenten in den Fruchtknoten der Phan-erogamen) (1876); Lie Gynmospermen)

(1890); Las Reduktionsgesetz der Bliiten>

(1895).

CELANDINE, sel'an-din (Chelidonium),

a genus of herbs of the family Papaveraceoe.

The few species are natives of Europe, where they are widely distributed, and whence they have spread to other parts of the world. One species is common in some of the older parts of the United States, having escaped from gardens. Common celandine (C. majus), which is most frequently seen, is an ill-smelling bi¬

ennial or perennial plant with brittle hairy stems, pinnate leaves, small yellow flowers in umbels and slender two-valved pods. The plant has long been popular in old-fashioned gardens. It is easily grown from seed and pro¬

duces abundant flowers all through summer.

All parts contain an acrid yellow juice, for which the plant has been sometimes used in medicine, though it is now used practically onlv by the Eclectics. It is a drastic purgative, but its action is very irregular and difficult to con¬

trol, and hence it has not been introduced into regular medicine.

CELANO, cha-la'-no, Tommaso da, one of

the reputed authors of the Latin hymn Lies Irse) : b. Celano, in the Abruzzi, toward the end of the 12th or about the beginning of the 13th century; d. Italy after 1250. He was one of the most devoted adherents of Saint Francis of Assisi, and after the establishment of an order of Minorite friars on the Rhine, was appointed keeper (custos) of the Rhine districts. In 1230

he returned to Italy. He wrote a life of Saint Francis and several hymns. His claim to the authorship of the Lies IraP seems now fairly

well established, blit is still disputed in favor of Matthaus Aquasparta (d. 1303), Cardinal

Frangipani (d. 1294), and even Saint Bernard, Gregory the Great and others. His name is first mentioned in connection with the poem toward the close of the 14th century. See Dies Irˆe.

CELASTRACE.ZE, sel-as-tra'se-e, a fam¬

ily of polypetalous dicotyledons, consisting of shrubs and small trees, natives of southern Europe, Asia, America, Australia, etc., most of them of no great importance. They have gen¬

erally acrid properties. The chief genera are Celastrus and Euonymus.

CELAYA, sa-la'ya, Mexico, town in the

state of Guanajuato, on the Rio Grande de San Jago, about 150 miles northwest of the city of Mexico. It has several fine plazas, handsome churches, among which is that of Our Lady of Carmen, a magnificent structure, and manu¬

factures of cotton and woolen cloths, soap, candles, saddlery and other articles. The burn¬

ing of its bull-ring, on Easter Sunday, 1888, caused considerable loss of life. Near it are thermal springs. Celaya was founded in 1570

and in 1655 was raised to the dignity of a city by Philip IV. It was sacked by the revolu¬

tionists in 1810. Pop. about 25,500.

CELEBES, sel'e-bes or sel'e-bez, Dutch

East Indies, one of the larger islands of the Indian Archipelago, between Borneo on the west and the Moluccas on the east, extending from lat. 1° 45' N., to 5° 45' S., and from long.

118° 45' to 125° 17' E. and remarkable for the singularity of its shape. It consists mainly of four large peninsulas stretching to the east and south, and separated by three deep gulfs. This singular conformation gives it a shore line of 3,500 miles. The total area of the island is a little over 71,000 square miles.

Celebes is high and mountainous chiefly in the centre and the north, where there are several active volcanoes. Mount Bonthain, which is in the southern part of the island, is over 10,000 feet high. The absence of extensive deltas, and the intervention of broad grassy plains between the forests, distinguish it from the other larger islands of the

Indian Archipelago. All that is most majestic and lovely in these are concen¬

trated in this island. It abounds in the most picturesque and varied scenery, and the most beautiful and magnificent tropical vegetation.

Though cut by the equator, and wholly within the torrid zone, Celebes is considered remark¬

ably healthful, the natives often enjoying a vigorous old age, and Europeans living longer than anywhere else in the East. Its extreme heats are tempered by the sea-breezes, by monthly rains, and by the north winds that prevail for part of the year. The east monsoon lasts' from May to November, and the west during the remaining months. The soil gen¬

erally consists of a bed of vegetable mold from 10 to 20 feet thick, on decomposing basalt.

Gold is found in all the valleys of the north peninsula, which is often convulsed by earth¬

quakes and abounds in sulphur. Copper of good quality occurs at various points, and in Macassar tin also, as pure as that of Banka.

Diamonds are sometimes found almost at the surface of the ground, and precious stones are carried down in the sand of the torrents. The island is entirely destitute of the large carnivo¬

rous animals and pachyderms. None of the cat kind are seen in its forests; nor has it the elephant, the rhinoceros or the tapir. Deer and wild hogs abound, together with the babirussa and herds of antelopes. Pouched animals, un¬

known in the Sunda Islands, here first occur, and there is a black tailless baboon or ape.

Among domesticated animals are found small but vigorous horses, buffaloes, goats, sheep and pigs. Trepang and turtle are caught in abun¬

dance. Among the trees are the oak, teak, cedar, upas, bamboo, *etc.* ; among plants requir¬

ing more careful cultivation, the coffee-tree, indigo, cacao, sugar cane, manioc root and tobacco.

The maritime districts of Celebes are inhab¬

ited by Malays ; the peninsula of Macassar by Bugis and Macassars. Mandhars dwell in the west of the island, and the mountainous regions in the interior are inhabited by Alfurese. In the harbors also there are many Chinese and Oorang Badjus or Oorang Laut, a mixed race partly of Malay and partly of Battak origin, who live in their boats, and roam over the whole archipelago, gaining their livelihood by fishing.

The natives are subject to several petty rulers, more or less dependent on the Dutch. The capital is the town of Macassar (pop. 26,000), in the southwest of the island, in the bazaar of which are sold all the products of the neigh¬

boring islands as well as of Celebes itself.

Among these are bamboo canes, sandal-wood, cajeput oil, nutmegs, rice, coffee, pearls, birds'-

nests, trepang, birds of paradise, *etc.* The trade in trepang is very important, Macassar being the chief staple place for this article of commerce. The chief harbor of the north is that of Kema, on the east coast of Minahassa.

The coffee of Menado is excellent, and is even preferred to the best Javanese coffee. The harvest of cocoanuts is considerable. Imports and exports average about $13,000,000. A European controller superintends the cultivation of the coffee-tree in his own district, advises the village chieftains, acts as the protector of the natives and negotiates between them and the Dutch government.

The languages and literature of Celebes differ essentially from those of the countries to the west. The letters of its alphabet are in form as unlike the Javanese as the latter are unlike the Arabic or Roman. The three great languages of the island, not reckoning the dia¬

lects of the savage tribes, are those of the Bugis, the Macassars and of Mandhar. The modern Bugis is the most cultivated and copious; the

Macassar is simpler and its litera¬

ture more scanty; both are distinguished for a soft and vocalic pronunciation. The Bugis have a considerable, body of literature. The more civilized inhabitants profess Mohammedanism ; but previous to the introduction of that faith the Hindus had brought their religion to the island.

The island of Celebes was first visited by the Portuguese in 1512. In 1607 the Dutch entered into commercial relations with Macassar, and gradually acquired and extended control until, early in the 19th century, they made their su¬

premacy complete. There was a serious revo¬

lutionary outbreak in 1905-06. The population is estimated at 2,000,000, of which about 1,400

are Europeans. Consult Lahure, (LTle de Celebes> (1879); Wallace, (The Malay Archi-CELERES — CELESTIAL SPHERE

pelago) (1880); Sarasin, (Reisen in Celebes5

(1905) ; (Versuch einer Anthropologie der Insel Celebes5 (1905-06).

CELERES, a body of horsemen tradition¬

ally said to have been introduced by Romulus, and to have numbered 300, consisting of citi¬

zens rich enough to furnish a horse. They are also described as subdivided into three cen¬

turies, under the name of Ramnes, Titienses and Luceres. The number of the centuries of the Celeres is said to have been raised to six by Tarquinius Priscus, this being the origin of the equites or knights, who in after times formed a separate class of citizens.

CELERIAC, se-ler'i-ak, a plant, Apium

graveolens rapaceum, of the parsley family, and a horticultural variety of celery. It is highly prized as a vegetable in Europe but is little grown in America. Unlike celery, the plant has a very thick, fleshy root ; this is used in flavoring stews or it may be boiled like cauliflower or used in salads. An ex¬

tract obtained from the root is said to have medicinal properties.

CELERY, a biennial or annual herb

(Apium graveolens) of the family Apiacece.

It is a native of Europe, Asia and Africa, in the older civilized parts of which it was cul¬

tivated prior to the Christian era. In nature the plants are commonly found in moist ground, where they attain a height of from 6 to 15

inches. They have numerous leaf-stalks, odd-pinnate leaves and branching, leafy flower-stalks two to three feet tall, bearing many small umbels of small white flowers which give place to small seeds (fruits). Cultivated celery does not differ in general characteristics from the wild plant, but by cultivation its leaf stalks (the part desired for the table) have been made more solid, less stringy and more agreeably flavored. In many instances, too, they have been lengthened or increased in number and made to form more compact plants. Celery is usually blanched and eaten raw with salt, but often it is used as a cooked vegetable, and its leaves, roots or ground seeds are frequently used for flavoring. Celeriac or turnip-rooted celery is largely grown in Europe, but little in America. It does not require blanching, but is otherwise cultivated like celery.

Celery is usually started in unheated beds and the young plants set out in the field when a few inches tall, after being transplanted once or sometimes twice. The soil best suited to the plant is a rich, friable, peaty loam well sup¬

plied with moisture, but well drained. As the plant is a gross feeder

abundant manure must be given. Celery will, however, do well in any moist, rich garden soil. In one method of grow¬

ing, the plants are set about six inches apart in rows spaced from three to four feet, and the ground is kept loose and free from weeds by frequent cultivation, the plants being graduallv covered with earth, or ˆearthed up,® as they approach edible size, or they may be blanched by shading the stems with boards, straw, *etc.*

In another method they are set closer together in the rows, which are rarely more than 12

inches apart. The size of the variety is a governing factor in the matter of distances ; some varieties grow only 12 to 15 inches tall, others more than two and a half feet. In this ((new celery culture® no earthing-up is neces¬

sary, as the plants blanch themselves. Summer celery is blanched quickly by the former method ; autumn and winter celery more slowly.

Indeed, the process is frequently continued in the winter storing quarters, which usually con¬

sist of specially constructed houses or cellars, the floors of which are covered with a few inches of earth, in which the roots obtain some food and water.

Celery is frequently attacked by parasitic diseases, but most of its insect enemies are controlled by parasites and rarely become troublesome enough to demand special atten¬

tion. The chief fungous parasites are sun-scald or rust (Cercospora apii), which appears upon the leaves as yellow or gray blotches which enlarge and gradually destroy the whole leaf. It is more frequent on plants grown in dry soils. Leaf-blight (Septoria petroselini apii) appears on the leaves and stems as watery spots which become dotted with black spores.

These parasites may be controlled by spraying with a standard fungicide (q.v.). Several other parasites are occasionally troublesome, but they can usually be similarly controlled.

In the United States the celery industry de¬

veloped enormously during the closing quarter of the 19th century. From being restricted to the individual gardens and fields of market gardeners who grew it as one of their ordinary crops, it has in many localities become a special¬

ized business, with machinery adapted to its particular needs. And from demanding only part of the time of the market gardener it now occupies the attention of hundreds of men in certain districts. In Michigan, California, Florida and New York there are thousands of acres devoted to this crop, and from some of these districts hundreds of carloads of celery (even trainloads from California) are sent to Chicago, Saint Louis, Kansas City, New York, Boston, Philadelphia and other large distributing centres. Instead of having celery as a delicacy for a few weeks during autumn and winter, American tables are supplied throughout the year with this vegetable, which has risen to the rank of a necessity, a development due mainly to improvements in the management of the crop, but partly to improved transportation and storage methods.

In medicine celery enjoys a certain popular reputation by reason of the apiol which it contains. This has an action similar to that of many of the volatile oils, but in addition it dilates the blood vessels, particularly of the pelvic viscera, and is, therefore, useful in dis¬

orders of menstruation, in chronic constipation and disordered intestinal states in general. It is also diaphoretic and diuretic.

Consult Greiner, (Celery for Profit5 ; Van Bochove, (Kalamazoo Celery5 ; Hollister, (Livingston's Celery Book5 ; Duggar and Bailey, (Notes Upon Celery5 ; Cornell University Agri¬

cultural Experiment Station Bulletin 132 ; Bailey, (Cyclopedia of American Horticulture.5

CELESTIAL EMPIRE, The, a popular

name for the former Chinese Empire, taken from the Chinese appellation for the country, ((Tien Chao® (Heavenly Dynasty). Hence the name ((Celestials,® applied to natives of China.

CELESTIAL SPHERE, the skyey back¬

ground on which all celestial objects appear projected. It is supposed to be of indefinite 168

radius, with the observer at the centre. It is crossed by systems of imaginary circles which serve to fix positions upon its surface by means of spherical co-ordinates. See Co-ordinates.

CELESTINA, The. <The Celestina/ or

(Tragicke Comedy of Calisto and Melibea,) one of the parent sources of modern realism, was the work of Fernando de Rojas, sometime mayor of Salamanca, whose title to the author¬

ship recent Spanish scholarship has established to the exclusion of other claimants. Originally appearing at Burgos in 1499 (?), the 21 acts of this loose drama, or dialogued novel, pro¬

vide a singularly vivid and realistic picture of the night life of a Spanish city of the Re¬

naissance, whose more unsavory features are conveyed with a touch that is absolutely mod¬

ern in its directness. The story, however, of the amours of Calisto and Melibea, as promoted by the activities of the bawd Celestina, is less happy because of the blight of long passages of scholastic dialectic and of pseudo-classical erudition which rest heavily upon it.

(The Celestina) was the point of departure of the Spanish picaresque or rogue novel, which in turn became a dominant factor in the de¬

velopment of the English novel. The night life is often strangely suggestive in detail of that of the roisterers of Shakespeare's (Henry IV, > but the tone of the work is wholly satirical and sardonic. It was translated without delay throughout Europe, and has been continuously influential in Spanish letters, where the natural¬

istic reforms of Galdos in the drama recall its procedure.

A verse interlude based upon the first four acts was published in English in 1530. The standard translation is by James Mabbe (1631) ; reprinted with an introduction in the (Tudor Translations) (1894).

John Garrett Underhill.

CELESTINE I, Saint, a Pope memorable

in the annals of the Church as having convoked the General Council of Ephesus, 431 ; as having given to Palladius and Patricius mission to the Irish and the Caledonians, and as having checked the progress of Pelagianism and Nova-tianism. Of his birth or his age there is no record, but he died in 431 and his day in the Roman calendar (that is, the day of his death) is 7 April; he occupied the see of Peter about eight years and a half. Celestine was repre¬

sented in the Ephesian Council by his legates, and at his instance the council condemned the heresy of Nestorius and of his letters to bishops of various churches both in the East and the West, communicating to them the coun¬

cil's decrees, four are extant, namely : those to the African bishops and to the bishops of Illyria, of Thessalonica and of Narbonne.

CELESTINE IT Pope (Guido di Castello) : b. Tiferno, Tuscany; d. Rome, March 1144. He had studied under Abelard, and suc¬

ceeded Innocent II in 1143. It was this pontiff who granted absolution to Louis VII of France and removed the interdict which for three years was laid upon that country.

CELESTINE III, Pope (Gtacinlo Orsini) : b. about 1106; d. Rome, 8 Jan. 1198. He succeeded Clement III in 1191, when, it is believed, over 80 years of age, and reigned till 1198. He crowned the Emperor Henry VI of Germany in 1191, but afterward excommuni¬

cated both Henry and Leopold, Duke of Aus¬

tria, on account of the captivity of Richard Cceur de Lion. In 1192 he confirmed the stat¬

utes of the Teutonic Order of Knights.

CELESTINE IV, Pope (Goffredo Castiglione) : b. Milan; d. 10 Nov. 1241. When a monk at Hautecombe in Savoy he wrote a history of Scotland. He was elected Pope in 1241, but reigned only 17 days, having died, it is said, of poison before the ceremony of con¬

secration was performed.

CELESTINE V, Saint, a Pope celebrated

as the one occupant of the papal see who, his title undisputed and no demand made for his retirement, voluntarily and of his own motion abdicated the pontificate. He was a Neapolitan, born in 1215, and while a lad entered the order of Benedictines. From the first he practised the greatest austerities, and at the age of 24

years, for the sake of freedom in the pursuit of religious perfection, he quitted the monastery and adopted the solitary or eremitical life in a cave of Mount Morone, whence his surname, Peter di Morone. After five years spent in this solitude he, with two companion hermits, migrated to a similar cave in the Monte di Majella in Bruttium. Here disciples flocked to him in scores, and to these he gave a rule of life and thus laid the foundation of a new monastic order which later

received papal ap¬

proval; after the death of the founder the order assumed the title of Celestines. While Peter di Morone was, as superior-general, governing 36 communities of the new order comprising 600 monks, he was elected Pope, 7 July 1294.

He protested vigorously against this unexpected promotion, but at last was prevailed upon to assume the burden of the papacy. As Pope he promulgated two decrees, one re-enforcing the rule which requires that the cardinal electors of ‘

a Pope shall be strictly secluded in the con¬

clave ; and the other that a Pope may lawfully and validly lay down his office. At the end of five months and eight days he acted on this definition and abdicated, out of a desire, as he publicly declared, ((for humility, for a purer life, for a stainless conscience, and in view of his lack of physical strength, his ignorance, the perverseness of the people, and his longing for the tranquillity of his former life.® All emi¬

nently strong and good and honorable reasons, and worthy of the sincerely religious soul that was moved by them. His successor in the papacy, Boniface VIII, doubtless fearing lest the honest hermit should repent of his abdi¬

cation and resume the papal title, made him a prisoner and confined him in a strong castle where he died, after languishing 10 months, 19 May 1296. He was canonized in 1313. Some commentators of Dante (<Inferno,) iii, 60) think that Celestine is the damned soul, Who to base fear

Yielding, abjured his high estate

(Cary’s trans.), or as the verse is rendered by Longfellow —The shade of him

Who made through cowardice the great refusal.

But as has been well remarked, <(Dante knew better than to consign a man to eternal pain for having declined the path of ambition.® Celes¬

tine V's_ day in the Roman calendar is 19 May, but he is there styled not simply Saint Celes-CELESTINES — CELIBACY

tine, but Saint Peter Celestine (Petrus Cceles-tinus). See Celestines.

CELESTINES, a monastic order of the

Roman Catholic Church, a branch of the great Benedictine order. It was founded by Pi-etro di Morone, afterward Pope Celestine V (q.v.).

To Pietro di Morone, who was leading an eremitical life in a wilderness, so many men re¬

sorted for spiritual guidance that he was in¬

duced to form them into a religious community under a rule drawn up by himself. The in¬

stitute was approved by Pope Urban IV in 1264, 10 years after it had been founded, but not as an independent order, for it was made a branch of the Benedictines, under a rule based on the rule of that order. They wore a white garment with a black hood and scapular and lived a purely contemplative life. The mother house of the institute was on Monte Majella in the Abruzzi, and 30 years after it was affiliated to the Benedictine order its primacy was ac¬

knowledged by 36 establishments having 600

members. The founder now relinquished the office of superior-general and resumed his former eremitical life. After Pietro was made Pope Celestine, the order, till then known as Hermits of Saint Damianus and popularly as Moronites, took the name of Celestines. The order spread throughout Italy and beyond the Alps to France, Germany and Flanders; so strong was its French branch early in the 15th century that it obtained for itself from the Popes bulls that made it in a

measure inde¬

pendent of the superior-general. But in the 17th century the order was already in process of rapid decay, and in the 18th many of its establishments were dissolved by papal decree, and many more by the secular powers. The order is now extinct.

CELESTITE, a native form of strontium

sulphate, SrSCX, crystallizing in the orthorhom¬

bic system, and also occurring in fibrous and radiated forms. The crystals resemble those of barite, and are usually tabular or prismatic.

They have a hardness of from 3 to 3.5, and a specific gravity of 3.96. Celestite is com¬

monly white with a vitreous lustre, but it also occurs with a pronounced bluish tinge, from which circumstance it received its name. When found in quantity it is a useful source of stron¬

tium. Fine crystals of it occur in the limestone about Lake Erie. Other important localities are in Sicily, Hungary, England, Canada, West Virginia and California. Varieties containing large amounts of calcium or of barium are called calciocelestite and barytocelestite re¬

spectively; and the mineral itself is often called celestine.

CELIBACY, the state of being unmarried ; especially the voluntary single life undertaken by religious devotees and by some clerical or¬

ders, as those of the Roman Catholic Church.

Paul (1 Cor. vii) recommends virginity, with¬

out condemning matrimony. The Roman Cath¬

olic Church respects matrimonial chastity, but esteems virginity a higher virtue.

From the time of the apostles it became a custom in the Church for

bishops, priests and deacons to renounce matrimony at their conse¬

cration, and to devote themselves entirely to the duties of their office. One point only was dis¬

puted, whether clergymen were to be merely prohibited from marrying, or whether even those who were married before their consecra¬

tion should be required to separate themselves from their wives. At the Council of Nice several bishops proposed that the bishops, priests and deacons who had received the holy consecration should be directed by an express ordinance to give up their wives. But

Paphnutius, bishop of Upper Thebais, con¬

tended that cohabitation with a wife was a state of chastity. It was sufficient, he said, accord¬

ing to the ancient traditions of the Church, that men in sacred orders should not be permitted to marry; but he who had been married before his consecration ought not to be separated from his lawful wife. As it became the general opinion that a clergyman could not marry, it soon became the general practice to refuse con¬

secration to married men. By this means uni¬

formity was effected. As for the bishops, it soon became a matter beyond dispute. When monachism had become firmly established, and the monks were regarded with veneration on account of their vow of perpetual chastity, pub¬

lic opinion exacted from the secular clergy the same observance of celibacy. Epiphanius as¬

sures us that by the ecclesiastical laws celibacy was commanded, and that wherever this com¬

mand was neglected it was a corruption of the Church. The Council of Elvira (305) com¬

manded all bishops, presbyters, deacons and subdeacons to abstain from their wives, under penalty of exclusion from the clergy. In the Western Church celibacy was rigorously re¬

quired. Pope Siricius, at the end of the 4th century, forbade the clergy

to marry, or to cohabit with their wives if already married.

At the same time the monks received consecra¬

tion, which increased the conformity between them and the secular clergy still further, and indirectly obliged the latter to observe celibacy.

The Emperor Justinian declared all children of clergymen illegitimate, and incapable of any hereditary succession or inheritance. The Council of Tours, in 567, issued a decree against married monks and nuns, declaring that they should be publicly excommunicated, and their marriage formally dissolved. Seculars, dea¬

cons and subdeacons, who were found to dwell with their wives, were interdicted the exercise of spiritual functions for the course of a year.

In Spain, where many priests refused to con¬

form to the requirements of the Church, the bishops were ordered to enforce celibacy upon their abbots, deacons, etc., once a year in their sermons.

As in other points of discipline, in this also the Greek Church dissented from the Roman.

The (Trullan) Council of Constantinople, in 691, in its 13th canon, declares: (< We hereby for¬

bid anyone to refuse the consecration of a priest or deacon on account of his being mar¬

ried, and cohabiting with his wife after he has requested consecration. We will by no means be unjust to marriage, nor separate what God has united.® Celibacy is indeed required of the bishops and monks, but priests and deacons, if married before ordination, are allowed to continue in this state. The Russian Church modified the ancient Greek canons by permit¬

ting priests and deacons to marry after ordination.

The Roman Catholic Church, then, has re¬

tained celibacy as an old apostolical tradition, to which she has added the rule not to conse-170

crate married men unless the wife enter a religious order. As no one has a right to demand to be consecrated a priest, the Roman Church has, by this addition, violated no one's right. Her position, therefore, is expressed by saying that, profoundly convinced that an un¬

married clergy is best suited to her work, she admits to her ministry only those who volun¬

tarily engage to lead a celibate life, and as long as she finds a sufficient number of such candi¬

dates she refuses to hamper her work by the employment of others. While, however, the Church persevered in commanding celibacy, she had to struggle with the opposition of those who among the clergy represented corruption.

A reformer appeared in Gregory VII, who in order to reform the discipline of the Church, was obliged to encounter simony and licentious¬

ness in some of the clergy. The former he checked by opposing the Emperor's right of in¬

vestiture, and he enforced the laws of celibacy by new regulations. In the Council of 1074, at Rome, he ordered that all married clergymen and all laymen who should confess to them, hear mass of them or be present at any divine service performed by them, should be excom¬

municated. This met with much opposition, but in spite of that, Gregory succeeded, as he was supported by the most ancient and most undoubted canons. After Gregory's death the Church continued in the same course. Still the question of celibacy has continued down to recent times to be the subject of fresh agita¬

tions and contests. All through the first half of the 19th century there were periodical at¬

tacks upon this rule of the Church, in which almost every Catholic country of Europe was represented. These movements have occurred alike within the communion of the Church and among secular and political bodies. They have usually been inspired by concern for the wel¬

fare of the Church and for the character and perpetuity of its priesthood, but no result has thereby been gained in any alteration of the ecclesiastical discipline.

The rule of celibacy has been more strictly observed in the Roman Catholic Church since the Reformation than it was before. The far greater number of the Catholic clergy have con¬

tinued to respect it. Among the reasons some¬

times urged against requiring celibacy in the clergy is the scarcity of men willing to devote themselves to a profession which calls for such strict self-denial. This, however, is said to be not true in point of fact, since statistics show a marked increase in the number of candidates for the priesthood at the present time.

Among the United Greeks, Ruthenians, Copts, Maronites and other Oriental rites in com¬

munion with Rome, the discipline is that bishops cannot, after consecration, either marry again or cohabit with the wife married before ordination. Priests and deacons may keep the wives taken before ordination, but must abstain from marital intercourse for some time before officiating at the altar. Priests and deacons cannot marry after ordination. Converts from schism already in orders are allowed to keep the wives taken after ordination. Celibacy is purely a disciplinary law, and has no doctrinal bearing whatever. Dispensations from celibacy have been granted in exceptional cases, notably that of John Casimir, who had been elected King of Poland, and was released from celibacy in order to preserve the succession in 1648.

Consult Carry, (Le celibat ecclesiastique devant l’histoire et devant la conscience } (Paris 1905) ; Lea, (Historical Sketch of Sacerdotal Celibacy) (Philadelphia 1886) ; Schmitt, (Der Priester-colibaC (Munster 1870).

CELINA, Ohio, city and county-seat of

Mercer County, 25 miles southwest of Lima, on the Lake Erie and Western, the Cincinnati Northern and the C. N. and D. railroads. It has manufactories of furniture., acids, buggies, a creamery and two banks. The value of its taxable property is placed at $4,983,720. It has two public and one parochial school and a Carnegie library. Pop. (1920) 4,226.

CELL. The cell is the unit of life. The name was given by Robert Hooke, an English architect, who discovered the cellular struc¬

ture of plants while examining charcoal and cork. In such objects all living contents have disappeared ; so the name, cell, was applied to the honeycomb-like chambers. During the

last half of the 17th century, Robert Hooke and Nehemiah Grew published extensive re¬

searches upon the cellular structure of plants ; while the Italian physician, Malpighi, and Leeuwenhoek, a Dutchman, published sim¬

ilar investigations upon animals. The entire 18th century, with Linnaeus as the dominant figure, was so devoted to the classification of plants that scarcely any microscopic work was done. The prevailingly small size of cells, to¬

gether with the imperfections of the early mi¬

croscopes, made investigations difficult. Most cells are too small to be seen by the naked eye.

Some cells are not more than one micron (one-thousandth of a millimeter, or one-twenty-five-thousandth of an inch) in diameter. The cells which the earlier observers described were generally 10 microns or more in diam¬

eter. In plants, a cell 100 microns in diameter is very large. The internodal cells of Chara, the Stonewort which grows in ponds, some¬

times reach a length of three or four inches.

The eggs of birds, before fertilization, are unicellular. They are the largest cells known.

The egg, when it is laid, contains an embryo and so is already a multicellular structure.

The beginning of the 19th century saw a vigorous resumption of microscopic investiga¬

tion, coupled with great improvements in the microscope. In 1838 Schleiden announced his theory that the entire plant consists of cells.

This theory, now an undisputed fact, is called the Cell Theory. In the next year, Schwann declared that the entire body of even the most complex animal was built up of cells. While the Cell Theory was soon recognized as a fact, the development of tissues and organs from cells, and the growth, differentiation and mul¬

tiplication of cells furnished subjects for re¬

search during the rest of the century. Many fundamental problems along these lines still remain unsolved, but the improved micro¬

scopes, together with improved methods, gave better views of the cell contents and it was soon recognized that the contents are even more important than the cell wall.

The principal contents are the protoplasm and the nucleus. The nucleus was discovered and named by Robert Brown in 1831 ; the term, protoplasm, was first used by Purkinji in 1840

to designate the entire body of young em¬

bryos. In 1846, von Mohl applied the term to the living contents of the cell, so that it is synonymous with the term, protoplast, as we use it to-day. Most writers now restrict the term still further, applying it to

the living contents of the cell, exclusive of the nucleus.

In this sense, it is synonymous with cytoplasm.

All cells of both animals and plants, with the barely possible exception of bacteria, have both nucleus and cytoplasm ; but many cells, both in animals and plants, lack the cell wall.

Besides the nucleus and cytoplasm there are other cell contents which may or may not be present. In the early nineties many believed that the centrosome was a constant and essen¬

tial organ of the cell. This organ attains its highest development in animals, particularly during the formation of the polar bodies; but it must now be admitted that in many animal cells no centrosomes can be demonstrated. In plants, there are genuine centrosomes in many of the algae and fungi; some investigators still claim to have demonstrated centrosomes in the liverworts, mosses and ferns; but all now admit that there are no centrosomes in the flowering plants. However, in the liver¬

worts, mosses, ferns, Cycads and Ginkgo, dur¬

ing the formation of sperms, a centrosome-like body, called the blepharoplast, is very con¬

spicuous. It is probably a genuine centro¬

some. In most Gymnosperms even this ble¬

pharoplast has disappeared and there is no trace of it in the Angiosperms. Plant cells may contain plastids, starch, chlorophyll and other pigments, oil, crystals, mucilage, resin, Fig. 1 Fig. 2

Fig. 1, drawn from the root tip of an onion shows plant cell with a wall. Fig. 2, Amoeba, a unicellular animal, shows a cell without a wall, n, nucleus; p, proto¬

plasm; v, vacuole. Highly magnified.

etc. These, however, are of only secondary importance, as they are

formed under the in¬

fluence of the living protoplasm. Animal cells contain an equally great variety of substances.

Cells of the wood and the bast are easily recognized as plant cells, while muscle and nerve cells are just as characteristically ani¬

mal ; but the similarity of the cells of animals and plants, especially in their younger stages, is so great that it easily leads to speculation.

In both, the mass of protoplasm and the nu¬

cleus are the essential features. In its ulti¬

mate structure, the protoplasm of animals and plants seems to be essentially identical, although the characteristic vacuoles of plants are incon¬

spicuous or lacking in animals and some of the products of protoplasm are different in the two kingdoms. The nuclei of animals and plants are so identical that in multitudes of cases, even an expert could not say whether a given nucleus belongs to an animal or to a plant. Both have a nuclear membrane, nu¬

clear sap, a nucleolus and chromatin. In both, during division, the chromatin breaks up into a definite number of pieces, called chromo¬

somes, each of which splits longitudinally, and one-half passes to each of the two nuclei formed by the division.

This division of the nucleus and cell to form two new nuclei and cells is one of the most familiar and, at the same time, most complicated phenomena of biology. The es¬

sential features of an ordinary division in a vegetative cell are shown in Fig. 3, A-F. The F

chromatin of the resting nucleus (A) forms a more or less continuous

thread, called the spirem (B) ; the spirem segments into a defi¬

nite number of pieces called chromosomes (C), the number being constant for any given spe¬

cies. Each chromosome splits longitudinally into two pieces, forming two new chromosomes (D). The new groups of chromosomes sepa¬

rate (E) and form two new nuclei, while a new cell wall develops between them (F).

This whole process of division, formerly called karyokinesis, is now more generally called mitosis. Preceding the formation of eggs and sperms, there are two peculiar divisions, called the reduction divisions, which reduce the number of chromosomes to one-half the number characterizing the vegetative nuclei.

This reduction of chromosomes is found in all animals and plants which have reached the level of sexuality. The fusion of the egg and sperm at fertilization restores the number. In both animals and plants, it is becoming recog¬

nized that the chromosomes are the physical basis of heredity.

The lowest animals and plants are unicel¬

lular and, since animals are either immediately or ultimately dependent upon plants, it follows that unicellular plants were the first forms of life. The single cell performs all the func¬

tions, ingestion, digestion, assimilation, excre¬

tion, respiration, reproduction, *etc.* The di¬

versity of form attained by these unicellular organisms is amazing.

The first step in the evolution of the plant body was attained when, after the division of a cell, the two resulting cells failed to separate.

Continued division of this sort results in the formation of a filament, either simple or branched, but still consisting of a single row of cells. The next step is attained when divi¬

sions take place in two directions, so that, in¬

stead of a filament, a flat plate, one cell in thickness, is built up. In the filaments and in such thin plates there is little or no differen¬

tiation among the vegetative cells, except that 172

some may be more or less modified as hold¬

fasts to attach the plant to a substratum ; but in both there may be considerable differentia¬

tion of reproductive cells. When divisions occur in three directions, more or less massive bodies are built up and the division of labor is accompanied by extreme differentiation among the various cells. Even in rather small bodies, the outer layer of cells is likely to be modified as a protective layer. If the body is so large that the inner cells are at a considerable dis¬

tance from the surface, some cells will be modi¬

fied for conduction. In large bodies, some cells will be modified to give support and, finally, in complex organisms, the various functions will be performed by the cells which have become modified in various ways. It is interesting to note that these cells which be¬

come so variously modified in their later de¬

velopment are, in their early stages, very much alike; e.g., in the lily the cells which are to form the epidermis, the digesting, assimilat¬

ing, conducting and even reproductive tissues, are strikingly similar. What causes cells which appear to be exactly alike, when first formed, to develop along different lines, so that some become elongated while others remain short, B D

Fig. 4, Unicellular organisms. A and B, plants; C, animal or plant; D, animal. A , a Diatom, Pinnularia; B, sperm of a Cycad, Stangeria; C, a Flagellate, Diplosiga, studied and described by both botanists and

zoologists; D, an Infusorian, Vorticella. All highly magnified.

some become thick walled while others remain thin walled, some function in digestion, others in conduction, etc., is still an unsolved prob¬

lem. The egg cells of the oak, the lily and the sunflower are almost indistinguishably similar and the early stages in the development of their embryos are not very different. What de¬

termines the development is a great problem still unsolved. To say that heredity is the cause merely gives a name to the difficulty.

In multicellular plants it seldom happens that cell division takes place uniformly through¬

out the whole organism. On the contrary, there are definite embryonic regions where new cells are formed by division. These regions are called <(growing points, » a very inaccurate name, since they are dividing regions, the growth taking place after division has been completed. There are two principal methods of building up a body: in one, there is a domi¬

nant apical cell from which segments are cut off, the repeated division of which gives rise to the whole body; in the other, there is a Fig. 5, A, body built up by the continued division of a single apical cell; B, body built up by the division of a group of embryonic cells.

group of embryonic cells (meristem), all of which divide, there being no single, dominant cell. The first type, with the single apical cell, is found in many algae, all liverworts and mosses and the ferns ; the second type is found in lycopods and all the flowering plants.

Beyond the dividing region, cells grow and differentiate. Cells which are to form the conducting system elongate and secondary thickenings of their walls produce the spirals, rings, nets, pits and various markings, all of which are formed by material deposited on the inner surface of the original wall. The young cell wall consists of cellulose

and most thin-walled cells do not get beyond this condition ; but thick walls become impregnated with vari¬

ous substances, the most common of which is lignin , the substance which gives rigidity to all woody tissues. The characteristics of cork and bast are due to suberin; the rigidity of the stems of wheat and oats is due to silica; and there are various other constitutents of adult cell walls.

The duration of the life of a cell is vari¬

ous. Some cells live only a few hours, some a few days, some live for a season and others live for years. A big tree, thousands of years old, consists almost entirely of dead cells, the life of the individual cell being comparatively brief, perhaps only a few years. The spores of the water fern, Marsilia, have germinated after resting for 50 years. Many seeds retain their power of germination for 20 or 30 years, some for 100 years and a few may germinate after 150 years. Tales of the germination of seeds from ancient Egyptian burial places are entirely without foundation. Seeds of corn, wheat and oats live only a few years. Since there is no cell division during the dormant period of the _ seed, the individual cell lives throughout this period, however long the period may be.

In Darwin's time, the great problems of biology were studied in the gross ; but during the last quarter of the century there was an increasing tendency to study, both in plants and animals, the individual cell as the unit of structure and behavior. At present, the great problems of structure, development, physiology, evolution and heredity are becoming recog-CELL — CELLINI

nizccl as cell problems and the increasing at¬

tention now devoted to cell studies promises to answer some of the most difficult questions of biology. (See Plants, Anatomy of; Blepharoplast ; Cycads ; Cytology ; Hybrids in Plants ; Plants,

Morphological Evolution of;

Plants, Recapitulation in ; Plants, Sex in ; Plants, Vascular Anatomy of). Consult

Hertwig, O., (The CelP ; Wilson, E. B., (The Cell in Development and Inheritance. >

Charles J. Chamberlain,

Professor of Morphology and Cytology, Uni¬

versity of Chicago.

CELL, a small chamber; the dwelling of a hermit; a lesser or subordinate religious house dependent upon a greater, by which it was erected, and under whose government it remained. The apartments or private dormi¬

tories of monks and nuns are also called cells.

In early Christian usage, the word was also applied to a chapel erected over a tomb.

CELL, in mechanics. See Peaucellier

Cell.

CELL, Electrical. See Battery.

CELLA, the windowless hall or central

apartment of a Greek or Graeco-Roman temple.

This was often divided into two chambers of unequal size ; the naos, in which was the statue of the divinity for whose worship the temple was built, and the thesauros or treasury. The cella was formerly

supposed to have been roof¬

less, or partially roofless, but later scholars be¬

lieve it to have been lighted only through the doors or by artificial light. In the larger tem¬

ples the roof was internally supported by the rows of columns in the cella, frequently in two superposed ranges.

CELLAMARE, thal-ya-ma'ra, Antonio

Giudice, Prince of, Spanish Ambassador : b.

Naples 1675; d. Seville, 16 May 1733. He was educated at the court of Charles II of Spain, and took a prominent part on the Span¬

ish side in the War of Succession. In 1707 he was taken prisoner by the Imperialists, and detained five years in Milan. On obtaining his liberty he returned to Spain, and in 1715 was appointed Ambassador Extraordinary at the French court. Here, having entered into Alberoni's scheme, he became head of a con¬

spiracy for supplanting the regent, Philip of Orleans, and appointing Philip V regent of Spain and France. The plot was discovered and Cellamare was marched off under a guard to the Spanish frontiers. He was afterward made captain-general of Old Castile and held the office at his death. A romance of Vatout, entitled the Conspiracy of Cellamareˆ gives an account of the conspiracy with tolerable accuracy. Consult Martens, Causes celebres du droit des gens) (2d ed., Leipzig 1861).

CELLAR-SNAIL, a species of land-snail

(q.v.) (Zonites cellaris). It has been intro¬

duced from Europe and has become common in cellars, hot-beds and gardens of the seaport towns along the Atlantic coast. The shell is small, much flattened, thin, and has a large umbilicus.

CELLE, or ZELLE, tsel'le, Germany,

town of Hanover province, Prussia, on the Aller River, here navigable; 24 miles by rail northeast of Hanover. Among its notable buildings are the ducal palace of the 1 5th cen¬

tury, the churches, the 16th century Rathhaus and the museum of mediaeval antiquities. Celle is the seat of the Supreme Court of Hanover, and maintains an agricultural and forestry school, a gymnasium, two libraries with price¬

less collections of books, and other public insti¬

tutions. The principal manufactures of the town are printers' ink, woolen yarn, tobacco, cigars, stearin, soap, and a busy export trade is carried on in honey, wax, wool and lumber.

The annual horse races are noted. Pop. 23,300.

CELLINI, Benvenuto, che-le'ne, ban-va—

noo'-to, Italian sculptor of the Renaissance, engraver and goldsmith: b. Florence, 1 Nov.

1500; d. there, 25 Feb. 1571. It was his father's desire that his son become a musician. For this reason he spent his boyhood practising the flute, but when he became 15 years of age he was apprenticed to a goldsmith named Marcone.

His hot temper soon manifested itself and led to a quarrel with some young men who had attacked his brother. He fled and wandered through Siena, Bologna and Pisa, supporting himself by plying his trade. At this period of the Renaissance the goldsmith's art was by no means a debasing profession and Benvenuto dis¬

tinguished himself in it. In 1518 he returned to Florence and studied the works of Michel¬

angelo, whom he always considered his beloved master and whose works influenced him pro¬

foundly. His reputation secured for him an invitation from Torrigiana to visit England and enter the service of Henry VIII. But having little liking for the English and less for his companion, he refused to

undertake the jour¬

ney. After a quarrel with his father he set out for Rome, where he remained for two years, diligently pursuing his trade. A brutal quarrel, in which he killed his enemy, caused him to leave Rome. He returned in 1523 and his extraordinary abilities secured for him the patronage of Pope Clement VII. Here he was employed in the making of various jewels, ornaments and services of plate. He served also in the Papal band. When Rome was be¬

sieged in 1527, Cellini took part in the protec¬

tion of the Papal palace. His stirring account of the siege reveals his own vanity and boast¬

fulness. He tells us that he himself shot the Constable of Bourbon and wounded the Prince of Orange. When peace was declared Cellini paid a hasty visit to Florence and assassinated the murderer of his brother. Later with a curious domestic fidelity he took upon himself the support of his sister and her children. To escape vengeance at the hands of the friends of the murdered man, Cellini took refuge in the house of the Duke of Civita di Penna and re¬

ceived the Pope's pardon. Free again, it was not long before a passionate quarrel with a personal enemy resulted in another murder, for which he was again pardoned. He spent the next four years at Rome, engaged in constant quarrels ; and having differed seriously from the Pope, departed for France. He passed through Switz¬

erland, stopping at Zurich, Geneva and Lyons and came eventually to Paris. He returned shortly afterward to Rome, was arrested by Paul III and thrown into prison on charge of having stolen the Pope's gold, but really because of the enmity of the bastard son of the Pope. He escaped with the greatest diffi¬

culty, breaking a leg in the attempt, and came

to the house of Cardinal Carnaro, who pro¬

tected him for a time, but finally gave him back to his enemy the Pope

in exchange for a bishopric. Cellini was thrown into a dungeon, where he underwent those remarkable spiritual excesses of devotion in which his enthusiastic nature found consolation and outlet. On solic¬

itation from Francis I, he was freed and entered the service of that king. He followed him to France; immediately forgot his spiritual awakening and once more turned to his pleas¬

ure-loving existence. Francis made him a present of a castle which Cellini had to con¬

quer by force of arms. His life in France was characterized by the same restlessness and passion. It was filled with lawsuits, intrigues, violent outbursts of all sorts, which arose from a lack of ease of manner at court and his violent temper. From these embroilments he always extricated himself with Machiavellian disregard of all except private gain. He exe¬

cuted many minor works for Francis, among them a nymph in bronze, ((a long-limbed, life¬

less figure without meaning — a snuff-box orna¬

ment enlarged to a gigantic size.® In a fit of temper he forsook Paris and returned to Florence and the mean-minded patronage of Cosimo di Medici. The remainder of his life was spent here, in constant quarrels with his rival Bandinelli and the Duke's steward.

In 1558 Cellini received the tonsure of the first ecclesiastical orders, which he renounced two years later and married. He died at the age of 70, leaving three legitimate children.

The great achievement of the last Florentine period was his statue Perseus, a bronze repre¬

senting a beautiful and perfectly molded, but entirely expressionless youth, carrying the head of Medusa. In the niches of its base are small figures of gods, which in their absolute perfec¬

tion of detail are unequalled anywhere; and a relief of (Perseus Rescuing Andromeda, } the original of wdiich is now in the Bargello. The statue was completed in 1554 and was unveiled in the Loggia dei

Lauzi at Florence, where it now stands. He enjoyed lavish praise for this marvelously overwrought masterpiece. Other important statues are the colossal bust of Duke Cosimo I (1545-48) ; the bronze bust of Bindo Aldoviti (1566, Gardner collection, Boston); and the life-size WrucifixionP intended for his own tomb. But it was in the art of the gold¬

smith that Cellini excelled. Unfortunately few of these works survive. Among the most notable that have come down to us are the saltcellar of Francis I (now in the museum at Vienna). It is embossed in gold and enamel, and orna¬

mented with figures of Neptune and Cybele in high relief. Many very beautiful works in the museums of modern collectors have been

ascribed to him — among them two cups in the J. P. Morgan and the Altman collections. The gold cope button of Clement VII, set with precious stones, including the second largest diamond in the world; the medals representing (Hercules and the Nemean Lion,* < Atlas Sup¬

porting the Sphere) in chased gold, and medals of Clement VII and Francis I are among the remnants of his exquisite workmanship.

His fame rests largely on his autobiography, a brilliant work, teeming with his loves and hates and the kaleidoscopic adventures of his restless career. Cellini is chiefly interesting not only as an artist, but also as a mirror of his times. He reflects an Italy, brilliant, super¬

stitious, cruel and sensual. His contemporaries accepted his arrogance, his disregard of the value of human life, his selfishness and vindic¬

tiveness as the rightful attributes of a great man. Law was a matter then for private justi¬

fication. Religion belonged to the ascetic, or was appealed to when human agency failed.

In his works, so flawless in technique and so devoid of spiritual and moral inspiration, one sees Rome's worship of mere physical perfect¬

ion, her love of luxury and her loss of soul.

The autobiography, written in his old age, gives intimate and vivid

touches of the political his¬

tory of the time and the personalities who throng its pages.

In addition he wrote a treatise on the art of the goldsmith and on sculpture (1568), of which a modern edition was published by Milanesi (Florence 1857). His works were published at Florence in 1843. See Cellini's Autobiography.

Bibliography. — The best Italian edition of his (Autobiography* is by Bacci (Florence 1900) ; English translation by Symonds (Lon¬

don 1896) ; by Cust (2 vols., 1910). Goethe rendered a very admirable translation into German. The classic monograph is by Plon (Paris 1882-84) ; others are by Focillon, in (Les grandes artistes* ; Serpino (Florence 1904) ; Torelli (1903) ; De Bouchard (Paris 1903) ; Gailly de Taurines (1908) ; Heiss (Paris 1887) ; Friedlander (Berlin 1880-82). Consult also Symonds, (The Renaissance in Italy) (Vol. Ill, 1885) ; Leader Scott, (Sculpture, Renaissance and Modern* (1886).

CELLINI'S AUTOBIOGRAPHY. Eng¬

lish readers are fortunate in that the transla¬

tion by John Addington Symonds has made the (Autobiography of Benvenuto Cellini*

(1500-71) a piece of English literature. The translation is prefaced by an admirable critical introduction, to which the student is referred for all questions of text and historical setting.

We learn that the book has been valued by such a mind as Goethe's, who translated it into German; by Horace Walpole, who found it ((more amusing than any novel,® and by Au¬

guste Comte, who placed it upon his list of necessary works. In the opening sentences Cellini states his opinion <(that all men …

who have done anything of excellence …

ought, if they are persons of truth and honesty, to describe their life with their own hand.®

He stands before us painted in vivid colors, the typical artist-soldier of the Renaissance, vain and violent, industrious and energetic, sensitive to beauty if not to goodness, often the bully and braggart, but always the exquisite and in¬

defatigable artist. One is interested to note the contrast between his character and his art — the latter, in such pieces as remain to us, appears florid, elaborated, sophisticated; while the former, in its grim lines, seems to be the exact reverse. «A terrible man !® someone termed him, and Cellini records the phrase with pleasure, liking to be thought formidable. But at least we feel him to be as honest a craftsman on paper as on his forge ; he has wrought his own strange shape with the same amount of care and candor as he gave to the Pope's gold button. His story is full of vitality. When he struggles to cast his bronze Perseus and is CELLITES — CELLULOSE

successful, we rejoice in his triumph. We dwell with him in the violent Italy of his day, following the jests of his rowdy supper-parties, his brawls, duels and escapes, his journeys into France, his encounters with those kings, Popes and dukes who roused him to such impatience.

His careless amours, his candid vices, his fears apd superstitions, his illnesses and recoveries, his injuries and revenges, are all told with the quality of life; and the same vividness lies in his incessant grumbling at his bad luck, in his rough and savage humor, his quarrels with Vasari and Bandinelli, his hearty admiration for Michelangelo. Great persons pass across his pages — Cosimo di Medici, Lorenzino, Francis I of France. What turbulent vigor in the episode of the bronze Perseus, or in that of his return to find his family dead in plague-stricken Florence! Such incidents as those of the necromancer raising devils in the Coliseum, or of the mad Castellan, who fancied himself a bat, are unforgettable etchings; while the effect of the whole book is to revive for us a period in the world's history which has incalculable interest for the dissimilar world of to-day.

Anna Robeson Burr.

CELLITES, or ALEXIAN BROTHERS,

a religious order, so called from their patron saint Alexius, and from cella , tomb, from the fact that their life often leads to an early grave.

The brotherhood arose in Mechlin about 1300

to check the ravages of the ((black death, w and soon spread through Germany, Brabant and Flanders. At first the Cellites were merely a pious society, intended to harbor the poor and indigent free of charge, to serve the sick and bury the dead. In 1469 they were organized as a religious order, and, favored by the Popes, they established houses in many parts of Europe. In the United States, they have a hospital in each of the following cities : Chi¬

cago (founded in 1861); Saint Louis (1869); Oshkosh, Wis. (1880), and Elizabeth, N. J.

(1893). They have asylums and hospitals in England, Germany, and Belgium likewise. Con¬

sult Steele, (Monasteries and Religious Houses of Great Britain and Ireland) (London 1903, 1910-13) ; and (A Brief History of the Alexian Brothers) (Chicago).

CELLULOID, an artificial substance in¬

vented in its modern form by the brothers Hyatt of Newark, N. J., in 1869 (U. S. Letters Patent No. 88,634) extensively used as a sub¬

stitute for ivory, bone, hard rubber, coral, etc., having a close resemblance to these substances in hardness, elasticity and finish. It is com¬

posed of the lower nitrates of cellulose, gela¬

tinized in a solution of camphor in methyl or ethyl alcohol. The

nitrates of cellulose are usually prepared by subjecting tissue paper to the action of a bath of mixed nitric and sul¬

phuric acids for 20 minutes at a temperature of at least 30° C. The resulting substance is dried by blotting or by the use of alcohol, and incor¬

porated by heat or mixture with alcohol, cam¬

phor and any pigments or fillers that may be used. The dough-like mass then resulting is worked into form by various means, and these seasoned by being kept from one to six weeks at 30° C. to evaporate the alcohol. Urea is often added as a stabilizer, and various sorts of dyes or pigments may be used. Celluloid is plastic at 75°. It is very inflammable. It is used for films for cameras and moving pictures, but on account of its excessive inflammability is coming to be replaced by preparations of the acetic-acid ester of cellulose. Celluloid var¬

nishes for lacquering on metal are prepared from various pyroxylin preparations and pig¬

ments. Consult Bockman, (Celluloid) (London 1907) ; Ertet, (Die Celluloid Industrie) (1909) ; Lehner, (Imitationen) (Vienna and Leipzig 1907) ; Martin, (Industrial and Manufacturing Chemistry — Organic* (New York 1913);

Masselon, Roberts, Ellard, (Le celluloid) (Paris 1910; translated 1912) ; Worden, Nitrocellu¬

lose Industry) (London 1911).

CELLULOSE, a chemical substance

closely allied to starch, which occurs in all plants, where its compounds form essential constituents of the walls of the cells. It is especially prominent in young plants, and with age it becomes more or less completely con¬

verted into lignin and other analogous prod¬

ucts. Cellulose can be readily digested and absorbed by herbivorous animals, but only to a slight extent by man. Cotton fibres are com¬

posed almost entirely of cellulose, and such other substances as they

do contain are readily removed by treatment with alkalis, alcohol, ether, *etc.* Wood and all textile fibres are mostly compounds of cellulose. Cellulose has the chemical formula n (CcHioOs), and is there¬

fore a carbohydrate. In some respects, it is widely different from starch, but in others it resembles starch very closely. It may be said in general that the chemistry of all the sub¬

stances that are intimately related to the starches, gums and sugars is still very imper¬

fectly known. Cellulose is specially remark¬

able for its insolubility and its chemical stabil¬

ity. It may be decomposed and caused to enter into combination with other bodies, but the only solvent known, which will dissolve it without destroying its chemical identity, is an ammoniacal solution of cupric oxide. From its solution in this menstruum, cellulose may be again precipitated in apparently unchanged chemical form, though in a physically amor¬

phous condition. Unglazed paper (which is nearly pure cellulose) is converted, by the action of strong sulphuric acid, into a parchment-like substance that is known as vegetable parchment, or parchment paper. By the action of a mixture of strong nitric and sulphuric acids, cellulose is converted into nitrates, the higher ones of which are commercially known as gun-cotton (q.v.). Collodion (q.v.) is a solution of the lower nitrates in a mixture of ether and alcohol. Celluloid (q.v.) is a mixture of the lower nitrocelluloses with camphor.

Acetates of cellulose are formed by treatment with acetyl chloride, and are often used as substitutes for celluloid, being less inflammable, and as insulating films. Formates are also used in this way. Xanthogenates of cellulose are used in the production of certain forms of artificial silk, leather and wood. Alkalis react with cellulose, causing it to contract (see Mercerized Cotton). By the prolonged action of sulphuric acid cellulose is partially converted into glu¬

cose, and various other reactions are also known with sulphuric acid according to the conditions under which the experiment is made.

When strongly heated out of contact with the air cellulose is destroyed, with the formation CELMA — CELSUS

of acetic acid, methyl alcohol and many other products. These transformations occur in the distillation of wood in the manufacture of wood alcohol. (See Alcohol). It is probable that true cellulose occurs only in plants ; but a substance that is closely analogous to it, and which is believed by some authorities to be identical with it, is found in the tissues of ascidia.

Cellulose as prepared from corn pith has been used to a considerable extent in ships of war, to prevent the entrance of water through shot-holes. For this purpose it is disposed within the steel hull along the water line, in the form of a belt some three feet in thickness.

For several years a packing of cocoa fibre was used in this way, but corn pith is now preferred, because as soon as the water reaches it the pith swells and automatically closes the shot-hole.

Consult Bersch, (Cellulose* (Philadelphia 1904) ; Cross and Bevan, (Cellulose) (London 1895) ; Researches on Cellulose) (ib. 1901, 1906, 1912) ; Cross, Bevan and Sindall, (Wood-pulp and Its Uses> (ib. 1911) ; Worden, Nitro¬

cellulose Industry* (ib. 1911) ; Schwalbe, (Die Chemie der Cellulose> (Berlin 1911).

CELMA, a Thessalian woman, who, with

her husband, Celmus, was changed into ada¬

mant for denying the immortality of Jupiter.

CELMAN, Miguel Juarez. See Juarez,

Celman.

CELSIUS, sel'sius, the name of a Swed¬

ish family, several members of which attained celebrity in science and literature : 1. Magnus Celsius : b. in the old province of Helsingland 1621 ; d. 1679. Fie became professor of mathe¬

matics in the University of Upsala and published two works on the antiquities of his native province and was the discoverer of the Helsing runes. Besides mathematics and archaeology, he cultivated poetry with some success, and was so skilled in practical mechanics that he himself made all the scientific instruments he required in his astronomical observations, *etc.* 2. His son, Nils Celsius: b. 1658; d. 1724; also filled the mathematical chair in Upsala University.

3. Olaf Celsius, another son of Magnus : b.

1670; d. 1756. He early became famous as an earnest student of the Oriental languages and of botany. He was successively appointed to the chairs of Greek, Oriental languages and theol¬

ogy, and filled the office of provost of the cathedral at Upsala. He devoted a good deal of attention to the study of runology and was among the first to recognize the genius of Lin¬

naeus, whom he liberally patronized. In 1 745—47 he published his voluminous work, (Hiero-botanicon,* a description of all the plants men¬

tioned in the Bible. 4. Anders Celsius, son of Nils Celsius, and the most distinguished of the family; b. 27 Nov. 1701; d. 1744. After being appointed professor of astronomy at the Uni¬

versity of Upsala, he traveled in Germany, Eng¬

land, France and Italy. At his instigation the observatory at Upsala was built, and he became its first director. In 1736 he took part in the famous expedition that was undertaken by Maupertuis, Clairaut, Camus and others for the purpose of measuring a degree of the merid¬

ian in Lapland. For his services in this expe¬

dition he received a pension from the French king. He is best known at the present day as the constructor of the Centigrade thermometer.

He urged the adoption of the Gregorian calen¬

dar. He published (De observationibus pro figura Tel'luris* (1738). 5. Olaf Celsius the younger, son of the Orientalist and naturalist, and cousin of the preceding: b. 1716; d. 1794.

He became bishop of Lund, and devoted him¬

self to history and poetry. His principal his¬

torical works are (Ecclesiastical History of the Kingdom of Sweden* ; (History of Gustavus P ; (History of Erik XIV.*

CELSIUS SCALE, the Centigrade ther¬

mometric scale. The name is from that of the inventor, Anders Celsius, who about 1741 at¬

tempted the precise graduation of thermome¬

ters. He took the melting-point of ice at 0° ; and the boiling-point of water, under standard atmospheric pressure, as 100°. See Thermom¬

eter.

CELSUS, pagan philosopher, an antagonist of the Christian religion in the 2d century. He is believed to have been the same Celsus, friend of Lucian, to whom is inscribed Lucian's satiri¬

cal sketch of the life of the noted impostor and pseudo-thaumaturgus Alexander of Abonotichus, entitled (Pseudomantis.* No work of Celsus has come down to us in its integrity or in its original form, but his (True Discourse) is in substance preserved for us in the eight books of Origen's computation of the arguments brought by Celsus against the truth of the religion of Christ. It was written at Rome in the latter part of the 2d century. Origen quotes textually long passages from the (True Discourse* in his work (Against Celsus.) From these passages it is seen that Celsus had accu¬

rate knowledge of the religious creed and prac¬

tices, both of the Jews and Christians, and he skilfully puts in the mouth of a Jew his criti¬

cism of the life of Jesus as told in the Gospels.

Celsus himself appears to have been an epicu¬

rean and a scoffer at the supernatural, while his Jew is a firm believer in miracle, but for all that he cannot accept the Gospel stories. He rejects the doctrine of the Incarnation of God, and reports a scandalous story of an amour which he offers as a substitute for the evangel¬

ists' narrative; and the fact Origen quotes the passage containing this shockingly blasphemous suggestion (as it must have been regarded by him) is evidence that the Christian polemist is dealing fairly with his antagonist. According to Celsus, Jesus once visited Egypt and there learned the art of the jugglers; in his own country he easily won reputation as a wonder¬

worker, even a god. By his jugglery he might have made the multitude present at his immer¬

sion by John in Jordan believe that they heard a voice from heaven. If he was God, he would have made a better choice of apostles : why did he choose Judas? The story of the resurrec¬

tion is self-contradictory. His death by cruci¬

fixion is undisputed and was a fact of public notoriety; if he rose from the dead, why did he not make the fact equally notorious and public? With such objections Celsus attacks the Christian faith in the first half of his work; in the second half he speaks in the person of a Grecian philosopher. Whatever is true and good in the Christian system exists already in the schools of philosophy; therefore, let the Christians abandon their narrow sectarianism and separatism and combine with all good and wise men in upholding the principles of good CELSUS — CELTIC LANGUAGES

government. Celsus then advances philosophi¬

cal arguments against the credibility of the Christian mysteries, in particular the Incarna¬

tion. God cannot assume a mortal body either in reality or in appearance only: not really, for that would be contrary to his nature ; not in appearance, for that would be a fraud. But the idea of an incarnation of God is absurd : what could be gained by an incarnation? Cer¬

tainly no advantage for God; but neither for men : do men know God better for seeing him in bodily form? Did God a little while ago waken from sleep and resolve to save a few men from sin, leaving the mass of mankind to go down to hell? In his closing appeal he makes overtures for peace with the Christians, urging them to be good citizens and to retain their own private beliefs if they like, but to conform outwardly to the state religion. Con¬

sult Pelagaud, (Etude sur Celse) ; Moeller, W., (History of the Christian Church) (Vol. I, pp.

169ff) ; Harnack, A., (Expansion of Christian¬

ity > (Vol. II, 129 ff); Froude, J. A., < Short Stories) (No. 4).

CELSUS, Aurelius, or AULUS COR¬

NELIUS, Latin writer on medicine who lived, probably, under the reigns of Augustus and Tiberius. He has been called the Roman Hippocrates, because he imitated the Greek physician, and introduced the Hippocratic sys¬

tem into Rome. He also wrote on rhetoric, the art of war and agriculture. He is, how¬

ever, best known as a medical writer. His style is elegant, and, though concise, is very perspicuous. His work on medicine is an inex¬

haustible source from which other authors have drawn materials. Eighty editions of his eight books (De Medicina) have appeared; the first at Florence (1478). There is an English translation by Grieve (1756, 3d ed., Edinburgh 1837), and an edition, Latin and English, by Lee (1831). The edition by Vedrenes (Paris 1876) contains a French translation. The standard text is that of Daremberg (Leipzig 1859).

CELTIBERI, a people of ancient Spain,

supposed to have arisen from a union of the aborigines, the Iberians, and their Celtic in¬

vaders. Various limits have been assigned to their country, which included probably all the north of Spain as far south as the sources of the Guadalquivir. They were divided into four tribes and were of the bravest and best of all the peoples of the peninsula. They ex¬

celled equally in cavalry and infantry. Hanni¬

bal subdued the Celtiberi, and they afterward passed under the Roman yoke. They revolted in 181 b.c., and were subdued by Tiberius Gracchus 179 b.c. Two struggles for inde¬

pendence followed, called respectively the first Celtiberian Numantine, and the second Celtiberian or Sertorian wars, in the latter of which they were finally vanquished, and after 72 b.c.

do not again appear in history.

CELTIC CHURCH, kel'tik, the name ap¬

plied to the Christian Church in Great Britain and Ireland before the mission of Augustine (597) and which for some time thereafter maintained its independence by the side, of the new Anglo-Roman Church. In Britain, the origin of the Christian Church remains in ob¬

scurity. There are sufficient records, however, to prove that throughout the 4th century there

was a well-organized Church in Britain which stood in constant touch with the rest of the Church, particularly in Gaul, and considered itself an active part of that body. In the 4th century, there are records of bishops, but for a hundred years after the mission of Germanus (429) nothing is heard of the Church in Britain. The Anglo-Saxon conquest drove the Britains to the mountains of the West, where, in the 6th century, Christianity again became prominent. There were several minor differ¬

ences between the Roman forms. The day of Easter, according to the former, followed the Eastern calendar; and there were also diver¬

gences in the methods of administering baptism.

The coming of Saint Augustine in 597 intro¬

duced the Roman form of Christianity which gradually gained precedence over and absorbed the Celtic. In 777 its ascendency was complete in Britain and South Wales. Still the Celtic Church continued farther north until 1172 when Queen Margaret introduced complete reforms.

In Ireland, there is much legendary history concerning the foundation of the Church, which indicates that Christianity was brought from Britain to Ireland as the natural result of the close intercourse between those countries.

The establishment of the Church itself seems to have been an outcome of the first mighty wave of monasticism which swept from Egypt over Gaul and Britain and carried a number of half-Romanized Christians to Ireland. The first important figure in the history of the Church in Ireland is Saint Patrick (q.v.), who converted the island and was most active in preaching and founding churches. In the region now known as Scotland, Ninian, Saint Columba and their fellow apostles established institutions which were monastic and mission¬

ary in nature. From Iona (q.v.) as a centre, the movement soon embraced all of North¬

umbria. The Celtic Church there was finally fused with the Roman in 664; and the Scottish and Irish churches lost their individual char¬

acter in the same year, from which time their histories are identical with the Roman Church.

See Culdees.

Bibliography. — Haddan, A. W., and Stubbs, W., (Councils and Ecclesiastical Documents Relating to Great Britain and Ireland* (3 vols., 1869-78) ; Bede, (Historia ecclesiastica gentis Anglorum) (ed. A. Holder, Freiburg 1890; i J.

E. Plummer, 2 vols., Oxford 1896) ; Zimmer, (The Celtic Church in Britain and Ireland) (London 1902) ; Overton, J. H., (The Church in

England) (in Vol. I, (The National

Churches,* London 1891) ; Bund, J. W., (The Celtic Church of .Wales) (London 1897) ; Lani-gan, (An Ecclesiastical History of Ireland to the Thirteenth Century) (4 vols., Dublin 1829) ; Stokes, G. T., (Ireland and the Celtic Church*

(6th ed., London 1907) ; Skene, W. F., (Celtic Scotland* (in Vol. II, (Church and Culture,*

3 vols., Edinburgh 1887) ; Dom Columba Evans, (The Early Scottish Church* (2 vols., Edin¬

burgh 1894-96).

CELTIC LANGUAGES. The Celtic lan¬

guages are the most westerly representatives of the Indo-European (better called, as more clearly indicating their territorial limits, the Indo-Celtic) family of languages, all of which descend from a common origin, with a general system of sounds, roots, and construction ; they

have been spoken by different branches of the Celtic peoples (q.v.) from prehistoric times to the present day. The Celtic-languages are more closely related to the so-called centum, or western, group (Italic, Greek, Germanic) than to the satam group (Armenian, Albanian, Balto-Slavic, Indian, Persian). This classification may be ignored, however, as may the one which, though correct in a purely linguistic sense, divides the Celtic languages into a K

group (Goidelic) and a P group (Gaulish and Brythonic), because this criterion, besides at¬

taching overmuch importance to a single fact of consonantism, collocates two languages, one of which (Gaulish) is practically unknown, and separates two others (Goidelic and Bry¬

thonic), both of which are well known and pos¬

sess many features in common. The most notable characteristics which set off the Celtic languages from the other members of the Indo-Celtic family are: (1) The fall of initial and intervocalic p : cf. Lat. pater, Old Irish, athir.

This change, which is common to both branches of Celtic, took place before 1000 b.c. and before the Goidelic Celts separated from the Brythonic Celts and the invasion of Britain; (2) the change already referred to (viz. of qu to k and p), which took place after the separation and the invasion: cf. Old Irish coic, Old Welsh pimp, ((five® ; (3) the change of Indo-Celtic e to Celtic i : cf. Lat. verus, Old Irish fir, <(true® ; (4) the change of vocalic r and / to ri and li : cf. Gk. aapdia, Old Irish cride, <(heart.®

Within the Indo-Celtic family Celtic is most closely related to the Italic dialects (including Latin), so much so as to form an Italo-Celtic linguistic unity, because of their having, inter alia, similar deponents and passives in -r, a b future and other tense formations in common, the suffix -tio-to form abstract nouns, the genitive singular of masculine and neuter o-stems in i, and many words closely related etymologically. These two branches are there¬

fore more closely related linguistically than, for example, the two classical languages, Latin and Greek, and must have been spoken by a people who remained united and shared the same development for a long time after they had parted from the rest. The outstanding characteristics of Celtic (besides an extreme irregularity of verbal forms and the order of words in the sentence) are (1) the variability of initial and medial consonants. Though traces of similar initial mutation are found in the most various branches of the Indo-Celtic family, it is only in Celtic that the principle developed and became a regular system. The phenomenon is to be explained by the fact that here more than in any other language closely related words are grouped into a unity which dominates the entire mechanism of the lan¬

guage. In fact, without these changes and the after-effects of vowels and consonants, which largely take the place of inflection, there would be no such thing as syntax in Celtic. Un¬

schooled Irishmen, Welshmen and Bretons

operate these initial mutations to express often a very delicate shade of meaning with the same sureness as their ancestors 1,500 years ago. It is most convenient to classify the Celtic lan¬

guages geographically as (1) Continental (or ancient) Celtic, and (2) Insular (or mediaeval and modern) Celtic. By Continental Celtic is meant the Gaulish spoken, e.g., in Gaul in Caesar's time, in Spain and northern Italy. All we have left of it are a few inscriptions, some in the North Etruscan alphabet of the 2d cen¬

tury b.c., some in the Greek alphabet or in the Latin alphabet of Roman Imperial times, names of men and places in classical texts and on coins, and glosses of foreign writers. But no Gaulish literature, not even a fragment of a written text, has been preserved. From the material at hand, however, we may conclude that Celtic speech was pretty uniform in the vast territory over which the Celts held sway.

Celtic survived in Gaul alongside Latin, and also among the Galatian Celts in Asia Minor, at least until the fall of the Roman empire. It was quite forgotten by the 6th century and has left only a few traces in the Romance and Germanic languages. Consequently the Celtic idiom spoken in the Armorican Peninsula (Brittany) is not a survival of the Gaulish nor, in spite of its geographical position, does it belong to Continental Celtic, but is the lan¬

guage carried thither by Britons who had been driven from their homes in Cornwall by the Saxons in the 5th, 6th and 7th centuries.

Each branch of the Insular Celtic comprises three languages: I. Goidelic (called Gaelic by all its speakers) comprises (a) Irish or Irish Gaelic; (b) Gaelic or Scotch Gaelic, sometimes improperly called Erse, i.e., <(Irish.® This dialect was brought over to Scotland since the end of the 5th century by the Scoti, i.e., <(the Irish of Ireland® who gave their name to the north of Britain; and (c) Manx. Linguistically these are really nothing more than dialects of one language. Until the end of the 18th century, though spoken Irish and Gaelic had diverged to a considerable extent, there was a common literary language among them. Of all the Celtic languages Irish is by far the most im¬

portant and may be regarded as the classic be¬

cause of its wealth of forms and abundance of material. The transition from Old to Modern Irish is very gradual. Old Irish is the language of the period from c. a.d. 750 to c. 1100. Most of the Old Irish material has been several times published, but most completely and conveni¬

ently by Stokes and Strachan in their (The-

.saurus Pal3eohibernicus> (Oxford 1901-03).

Middle Irish (sometimes divided into Early Middle Irish and Late Middle Irish) extends roughly from 1100 to 1500. It is the language in which the great collections of religious and profane Irish literature have come down to us, and is distinguished from Old Irish chiefly by the weakening of vowels in unaccented syllables and the reduction of flexional forms. So far the language is not the popular language but rather that of literature and remarkably uni¬

form, in spite of the division of the country into many clans and small kingdoms and of great variations in orthography. With the be¬

ginning of the modern period (from c. 1500 to the present day) dialectic differences become more pronounced and it is now customary to name the Irish dialects after the provinces of the country, Connacht, Munster, Leinster, Ul¬

ster, with many subdivisions. Sister language to Irish is the Scottish Gaelic with two main (northern and southern) and many sub-dia¬

lects. Southern Scottish Gaelic is the more Irish, has better preserved the inflections and CELTIC LANGUAGES

is the form used in literature. The oldest document, (The Book of Deer,* dates from the 11th or 12th century. Modern Gaelic has far more borrowed words than Irish, chiefly from English and Norse. Manx occupies a middle place between Irish and Scotch Gaelic.

Its most noticeable feature, outwardly at least, is its peculiar and far from ideal attempt at phonetic spelling, using the signs and sounds of the English alphabet.

II. Were it not for a common vocabulary and syntax, the Brythonic group of Celtic would be separated, at least since the Christian era in Britain, by an unbridgeable gulf from the Goidelic. This cleavage is observable from the earliest monuments and is chiefly due to the following factors: (1) The different treatment of Indo-Celtic qu, which

at a very early period became p in Brythonic but which in Goidelic was for a long time preserved and then, even in the oldest Irish, changed to k (written c).

Gaulish agrees in making this change with Brythonic of which, rather than of Goidelic, it may be, to that extent at least, regarded as a prehistoric type. E.g., Gaulish pempe, Eve,**

Old Welsh pimp , Breton pemp, Old Irish coic; Old Irish, macc, Welsh map, ˆson.® (2) The difference in the place of accent which in Goidelic (with dialectic exceptions) was and is on the first syllable but in Brythonic on the penult. This is one of the principal reasons for the profound differences which separate the declensional and conjugational systems in these two groups of languages. (3) Contact with the Romans, as a result of which many more Latin words were introduced into Britain than Ireland and the language of the former became much more simplified and ˆcivilized® in its grammatical structure than that of the latter which remained native, wild, unspoiled and, for that reason, more interesting. Unlike the speakers of Gaelic the speakers of Brythonic have no common name for their languages.

Of this group Welsh (native Cymracg) is the most important. Spoken Welsh is commonly divided into four dialects, in the northwest, the northeast, the southeast and the southwest of the Principality, but with relatively slight differences. Old Welsh extends to the end of the 11th century. Middle Welsh is about synchronous with Middle Irish. Cornish

(native Brethonec) is, since the end of the 18th century, a dead language. With Breton it forms a close group over against the Welsh.

Of Breton (native Brezonek), sometimes called Armorican Breton, there are four main dia¬

lects: Leonard (spoken in Finistere and the most literarv dialect), Tregorrois, Cornouaillais and Vannetais, the most distinctive.

Celtic, once spoken almost over the length and breadth of Europe, now survives only in the extreme northwest where it is subordinate to the English and the French and exists as it were by the sufferance of those two languages over which it once was mistress. Of the lan¬

guages of Europe, Irish, farthest to the west, forms a pendant to the

Greek, farthest to the east. Moreover these have the following in common, namely, that they have both fallen low from the place they once held as the cultural languages of Europe and that they are the only languages of Europe which ages ago produced rich literatures independent of foreign litera¬

tures. The five surviving Celtic languages are spoken in the southwest, west and northwest of Ireland, in the Hebrides, parts of the Scottish Highlands, in some fishers' huts in the Isle of Man, in most parts of Wales and in lower Brit¬

tany. Including the Celtic speakers in Aus¬

tralasia, Canada, the United States and other lands to which the Celts came as colonists, the Celtic languages are spoken by approximately 3,500,000 souls, of whom perhaps 1,000,000 are monoglots. Of these over 1,250,000 speak Breton; nearly 1,000,000, or about half the population, Welsh, with more than 250,000

monoglots; nearly 750,000, of whom about 28,000 speak nothing else, Irish; about 250,000, with about 25,000 monoglots, Scottish Gaelic, and about 4,500, Manx. The most marked fall¬

ing off in the use of any Celtic tongue is to be seen in the case of Irish which only about 60

years ago was spoken b\j more than 3,000,000

persons, of whom 1,000,000 spoke only Irish.

The Celtic languages are more flourishing now and receive more official and academic recog¬

nition than at any time in over a generation.

Of all the countries which are at present en¬

gaged in the work of the Celtic revival, Ire¬

land is probably the only one in which the movement embraces the whole of the national life. In Wales the literary position of the national language (largely due to the Methodist revival) is still far and away beyond that of the other Celtic countries, but for that very reason, perhaps, conscious progressive effort is less strenuous than in Ireland. The Pan-Celtic Union was organized a score of years ago to make known to the world the desire of the Celts to preserve their

nationality and to de¬

velop the treasures of language, literature, art and music which they have inherited from their ancestors.

Bibliography. — General: (Die Kultur der Gegenwart, > Teil I, Abteil XI, 1 (Berlin 1909) ; Grober, (Grundriss der romanischen Philologie, Vol. P (2d ed., Strassburg 1904-06) ; Zeuss, (Grammatica Celtica) (2d ed., by Ebel, Berlin 1871) ; the periodicals, Arcliiv fiir celtische Lexikographie (Vols. I -III, Halle 1898-1907) ; Revue Celtique (Paris 1870—) ; Zeitschrift fiir celtische Philologie (Halle 1897-) ; Cel¬

tic Review (Edinburgh 1904-) ; Erin (Dublin 1904—). Dictionaries: Stokes, (Urkeltischer Sprachschatz> (Gottingen 1894) ; Henry, (Lexique etymologique du breton moderne) (Rennes 1900) ; Malvezin, (Dictionnaire des racines celtiques) (Paris 1903) ; Macbain, Etymologi¬

cal Dictionary of the Gaelic Language) (2d ed., Stirling 1911). Grammars: D'Arbois de

Jubainville, Elements de la grammaire celtique) (Paris 1903) ; Pedersen, (Vergleichende Grammatik der keltischen Sprachen) (2 vols., Got¬

tingen 1909-13). Continental Celtic (or

Gaulish) : Blanche!, (Traite des monnaies gauloises) (2 vols., Paris 1905) ; Holder, (Altceltischer Sprachschatz) (3 vols., Leipzig 1896-1911) ; Meyer, K., (Zur Celtischen Wort-kunde) (Berlin 1913) ; Rhvss, < Celtic Inscrip¬

tions of GauP (London 1911); (Celtic In¬

scriptions of France and Italy* (ib. 1907).

Old and Middle Irish Windisch,. (Kurzge-fasste irische Grammatik* (Leipzig 1879) ; translated by McSwinev (Dublin 1883) and by Moore (Cambridge 1882) ; Strachan, <01d-Trish Paradigms and Selections from Old Irish Glosses) (London 1909) ; Thurnevsen, <Handbuch des Alt-Irischen* (Heidelberg 1909) ; 180

O'Connell, 'Grammar of Old Irish) (Belfast, London 1912) ; Pokorny, (A Concise Old Irish Grammar and Reader1 (Part I, Grammar;

Halle and Dublin 1914) ; Vendryes, 'Grammaire du vieil-irlandais) (Paris 1908) ; Dottin, 'Manuel d'lrlandais moyen) (Paris-1913).

Modern Irish: O'Donovan, 'Grammar of the Irish Language1 (Dublin 1845) ; Bourke, 'Irish Grammar 1 (Dublin 1857) ; Joyce, 'Grammar of the Irish Language (Dublin 1878) ; Henry, J. P., 'Handbook of Modern Irish) (Dublin 1904-06) ; Craig, 'Irish Grammar 1 (Dublin 1908) ; O'Growney, 'Simple Lessons in Irish1

(Dublin 1897) ; 'Christian Brothers' Irish Grammar) (Dublin 1901) ; Dinneen, 'Irish-English Dictionary 1 (Dublin 1904) Fournier d'Albe, 'English-Irish Dictionary1 . (ib. 1904); O'Neill-Lane, 'English-Irish Dictionary) (ib.

1904; new ed., New York 1918). Scot¬

tish Gaelic: Gillies, 'Elements of Gaelic Grammar1 (London 1896). Manx: Good¬

win, 'First Lessons in Manx1 (Dublin

1901) ; Jenner, 'Manx Language1 (London 1876) ; Kelly, 'Practical Grammar of Manx1

(2d ed., ib. 1870) ; id., 'English and Manx Dictionary1 (Douglas 1866) ; Rhys, 'Phonology of Manx Gaelic1 (ib. 1894). Cornish: Jenner, 'Cornish Language1 (London 1874) ; id., 'A Handbook of the Cornish Language1 (London 1904) ; Jago, 'Ancient Language of Cornwall1

(Truro 1882) ; Stokes, 'Cornish Glossary1

(London 1869) ; Williams, 'Lexicon Cornu-Britannicum1 (Llandovery 1865). Welsh:

Anwyl, 'Welsh Accidence1 and 'Welsh Syn¬

tax1 (London 1897-1900) ; Evans, 'Dictionary of the Welsh Language1 (Carmarthen 1887-1906, incomplete1 ; Jones, J. M., 'Welsh Gram¬

mar1 (Oxford 1913) ; Spurred, 'Welsh-English and English-Welsh

Dictionary1 (Carmarthen 1903 and later) ; Rowland, ‘Grammar of the Welsh Language1 (4th ed., Wrexham 1876) ; Strachan, J., ‘Introduction to Early Welsh1

(Manchester 1909). Breton: Ernault, ‘Petite grammaire bretonne1 (Saint-Brieuc 1897) ; Vallee, ‘Legons elementaires de grammaire bretonne1 (Saint-Brieuc 1902) ; Troude, ‘Nouv¬

eau Dictionnaire breton-frangais du dialecte de Leon1 (Brest 1886) ; Le Gonidec, ‘Diction¬

naire breton-frangais1 (Saint-Brieuc 1850).

Joseph Dunn,

Professor of Celtic Languages and Literatures, Catholic University of America.

CELTIC LITERATURES. We have no

information as to the literature of the Gauls, if they ever had one, which is not likely, since writing was forbidden to the Druids, who were the repositories of lore and learning among the ancient Celts on the continent of Europe.

If they had a national alphabet, it must have resembled the runic characters employed in north European countries. In Caesar’s time the Greek alphabet was used to some extent amongst them.

Among the insular Celts the oldest sources of the native language are Irish inscriptions written in ogham, which consist of lines hori¬

zontally or slantingly cut, and dots below and above a line made of the edge of an upright stone pillar. Of course this cumbrous method of writing was not used for literary purposes but merely to commemorate the name of the dead. There is no doubt that in Celtic coun¬

tries, as elsewhere, the native tradition was originally and for ages only oral. The very earliest literature of Ireland, which dates from the

period of the conversion of the country in the 4th century, is in Latin. The national litera¬

ture, in Gaelic, first appears in the 8th century at the time of the foundation of the great schools and the activities of the Irish mission¬

aries and scholars on the continent.

I. Irish Literature. — The Gaelic literature of Ireland is vast in extent and rich in quality, and in many respects it is one of the most fascinating literatures of Europe. Yet in spite of its interest and value and of the fact that "it is the oldest existing literature of any of the peoples living to the north of the Alps"

such has been the neglect with which it has been treated that even to this day no satisfactory history of it has been or indeed can be written.

Though the quantity of this literature that has been published is enormous, it is only a frag¬

ment in comparison with what still lies hidden in manuscript. There are thousands of unpublished Irish manuscripts of all kinds ranging from the 11th to the early 19th century, but often con¬

taining material much more ancient, and per¬

haps as many more have perished. These manu¬

scripts have to be collated and the vast material edited and explained and questions of age and source settled, before anything like a complete history of Celtic literature can be written. The oldest monuments of Celtic, next to some scanty remains of Gaulish and the ogham inscriptions, are thousands of Irish glosses which date from the 8th and 9th centuries. These glosses are found between the lines or on the margins of several Latin manuscripts which are kept, for the most part, in continental libraries at Wurz¬

burg, Karlsruhe, Milan and Turin. Texts and glosses show a profound theological and gram¬

matical training and wide reading on the part of the scribes, not only in biblical and patristic literature but also in the classics of pagan antiquity. This gloss material is of scarcely any literary value, however, and is valuable only for the history of theology and the

struc¬

ture of Celtic grammar. In no country did Christianity penetrate more profoundly than in the Island of Saints, and on no literature did it leave a deeper impression than on Irish.

The oldest texts in the language are religious, such as the glosses to the commentaries on Saint Paul and to the Psalms, already referred to, a homily and a tractate on the Mass. Only a few of the hymns in honor of the saints of Ireland have been published. Some of these works are translations or imitations of Latin texts but most of them are genuinely Irish and include popular lives, passions and miracles of saints, pious stories and anecdotes, prophecies, prayers, homilies, hymns called lorica, “corselet or defense,11 and amra , “eulogies11 ; in a word, religious compositions of the most varied kind and of the greatest value for the history of hagiology and liturgiology and of western Christianity in general. The apocalyptic visions are a peculiarly Irish product, although some of them, those of Fursa and Tnugdal, have been preserved only in Latin. The most celebrated is attributed to Adamnan, a monk of Iona who died in the year 703. Another original creation and one of the few specimens of the comic in old Irish literature is the burlesque epic, ‘The Vision of MacConglinne.1 The Felire is a kind of long martyrology arranged in the order of CELTIC LITERATURES

the ecclesiastical calendar. The most important is known as the Felire of Oengus. In modern times the best known religious compositions are the moral essays, (The Three Shafts of Death ˆ and <The Key Shield of the Mass,* by the 17th century priest-historian, Geoffrey Keating, whose works are regarded as the model of modern Irish prose. But the scholars of early Christian Ireland, most of whom were religious, were also interested in preserving the secular literature of their country. It is to them that we owe the compilation of the great collections known as Leabhar na hUidhre, <The Book of the Dun Cow,* dating from the 11th century, the Book of Leinster, dating from the 12th, the Yellow Book of Lecan, from the 15th, the Leabhar Breac or ((Speckled Book,” from the 14th, the Book of Ballymote, and other manuscripts of miscellaneous contents which, though some of them are as late as the 18th century, contain material which can be traced back without a

break to the 8th or 9th century.

The early non-religious literature of Ireland was in the hands of a class of trained narrators, historians or poets called filid , whom the kings and chieftains of Ireland supported at their courts to sing their exploits, write their annals and preserve the legal tradition. They fol¬

lowed a regular curriculum extending over a dozen years and were organized into classes, each rank enjoying certain privileges and mo¬

nopolizing a certain number and variety of stories. Their chief, the ollamh, was supposed to know 250 prime tales and 100 of secondary importance.

Foremost among the tales are the epics, which for richness and originality have no equal in western Europe. Though many of them have been published, some 300 or 400, be¬

longing to the greater or smaller cycles, still remain inedited and untranslated. They are in prose interspersed with verse and show an ex¬

traordinary perfection in the art of narration.

The Irish literati arranged them under sev¬

eral heads, probably as an aid to the memory, such as wars, sieges, expeditions, battles, border forays, cattle-raids, exiles of heroes, great feastings and elopements. Here it will be more convenient to group them broadly according to subject and at the same time chronologically into three great cycles. The oldest and the one we know least perfectly is the Mythological Cycle, which consists chiefly of accounts of the migrations of the races or tribes who succes¬

sively peopled Ireland. How far we have here merely a euphemizing of the old Celtic pantheon and how much, if any, is based on historical events, it would be impossible to say, for only a part of it has been preserved. To this group belong some wonderful tales of rebirth, among which the story of Bran, son of Febal, is the most famous. The best known of the three cycles is the Heroic, called also the Cycle of Ulster, or of the Red Branch. The tales be¬

longing to it bring into view the warriors of Ulster and have at bottom the rivalry and con¬

flict between that Province and the rest of Ire¬

lands, especially Connacht. Though the saga element is predominant here, the background is unquestionably historical. The events narrated are supposed to have taken place at about the beginning of the Christian era. The subjects are most often of tragic interest and many of the smaller tales served as introductions to the grandest and most epic composition of them all, the Cattle Raid of Cualnge. The out¬

standing characteristics of style in the Irish epic tales are movement, life, relief and real¬

istic description. The Fenian or Ossianic Cycle points to the south of Ireland as the place of its origin. It deals with Finn MacCumaill, his son Ossin (Ossian), and the other chieftains of the Fianna (Fenians), half soldiers, half hunt¬

ers, who seem to have flourished in the 2d and 3d centuries of our era. While the two cycles previously _ spoken of have been handed down almost entirely in prose, the Fenian Cycle is in verse and the poems and ballads of which it is composed are on the greatest variety of sub¬

jects and almost without number. Some of these are unmistakably imitated from stories belonging to the earlier groups, and, while many of them contain nothing historical but a few proper names, there can be no doubt of the existence of their principal characters. The most extensive text, and at the same time one of the principal sources of Ossianic poetry, is the Colloquy of the Ancients. Connected with this cycle are a large number of romantic tales which are even now alive in Gaelic Ireland and Scotland. To the comparatively smaller saga-groups belong the Iomhramha or ˆSea-voyages,”

a literary genre as well as a conception peculiar to the Celts. These voyages were undertaken by pious pilgrims who, in search of the Land of Promise or of nothing more than a place of retirement and prayer, trusted themselves in a frail bark on the ocean to the will of God.

They seem to have taken place in the 6th and 7th centuries when the Irish missionary spirit was most fervent. The most famous examples are the Voyage of Saint Brendan and the Voyage of Mael Duin. There are many other interesting tales of adventure in early Irish literature. Most of them are of native origin; for others the Irish story tellers got their char¬

acters and scenes from Greece, Norway and the Orient. Classical and

mediseval literatures also had their influence, and the imitations which the Irish made of them, such as the ver¬

sions of the Odyssey, the taking of Troy, Theseus and the Minotaur, Philip and Alex¬

ander, the loves of Dido and Aeneas, show what foreign books were most in vogue in Ire¬

land. On the other hand, from the debris of the literatures of the Celts have come the in¬

fluences which have revolutionized European art. For the Arthurian romances, the Tristan and Grail sagas and the germ of the Divina Commedia, the world is indebted in the last analysis to Irish imagination. In Ireland, as in all Celtic countries, is to be found the oldest vernacular prose and poetry and the most de¬

veloped folklore in western Europe. Much of this has been published but it represents only a small part of the great body of tradition.

The earliest annals of Ireland have not been preserved. That they existed is proved by later citations. The oldest extant are the Annals of Tigernach (died 1088), of Innisfallen, of Leinster, of Boyle, of Ulster, of Connaught, of Loch Ce, the <Chronicon ScotorumP and those of the Four Masters; in all, they range from the 11th to the 17th century. There are many smaller annals and works on genealogy, geography, topography, and, in modern times, the learned compilations of Geoffrey Keating in his (History of Ireland) (1629). The in-182

terpretation of Irish law was originally in the hands of the filid , later on of the brehons or (< judges.® This law is strictly native and ex¬

tremely interesting. The principal treatises are made up chiefly of texts read and decisions rendered in the Irish law schools. Most of the manuscripts on the subject date from the 16th century, but according to tradition the texts go back to the 4th and 5th centuries. The largest and most important collection is known as the (Senchus Mor,5 which deals with all possible personal relations. There are also treatises and compilations of all kinds, on medicine, phar¬

macy and astronomy, but especially on Latin and Irish grammar and Irish metrics, both of which were favorite studies with the ancient Irish. Valuable native glossaries, such as Cormac's of the 9th century, O'Mulconry's and O'Davoren's, have been preserved; they con¬

sist of words which had become archaic in the time of the compiler and which he explains in more modern Irish.

Early Gaelic poetry is very largely on topo¬

graphical, geographical, historical and chrono¬

logical subjects and of little poetic value. It is the production of the learned court poets in their official capacity as historiographers, whose business it was to praise a king or family or chronicle the death of a warrior, and it is of interest only for history proper and for the history of the Irish language. Of late years only has attention been directed to the genuine old Irish lyric poetry. This is of very high quality and shows, among other things, that in the literature of the Irish, much earlier than in the literature of any other people, the love of nature found expression. From the 17th and 18th centuries, the flourishing period of Munster poetry, to the present day, though hundreds of poems are irretrievably lost, the production has been so great that out of those poems alone could be written a history of modern Ireland.

II. Scottish Gaelic Literature. — The at¬

tention of the world was first called to the literature of the Celts by the publication, in 1760, of some fragments of Gaelic poems, pur¬

porting to be. genuine Gaelic ballads, by the in¬

genious Scottish Highlander, Tames Macpherson.

His <Fingal,) which appeared in 1762, had an extraordinary success with the great writers of France and Germany. Manuscripts containing Scottish literature are neither so old nor so numerous as the Irish and are generally pos¬

terior to the 16th century. The oldest is the Book of Deer, a gospel-book of the 9th century in Latin but containing half a dozen words in

Scottish Gaelic of the 11th or 12th century.

The Gaelic literature of Scotland is almost exclusively in verse. The prose, of which much less is known, belongs chiefly to religious litera¬

ture, which has been extensively cultivated since the Reformation. The first printed Gaelic book was the translation, in 1567, by Bishop Carswell of John Knox's (Prayer Book.5 There are many fine collections of hymns from modern times ; the most celebrated of the religious poets was Dugald Buchanan, who was born in 1710.

The oldest and most precious collection of poems is known as the Book of the Dean of Lismore (James Macgregor) and is now kept in the Advocates' Library, Edinburgh. It was compiled in the first half of the 16th century, at the time of the transition from Irish to Scotch Gaelic, and contains some 30 Ossianic poems. The subjects treated are about the same as are found in Ireland, which is to be ex¬

pected, since the literature of Scotland, in its earlier stages, drew its inspiration and themes from the motherland. In fact, the early poetry of the two countries is so closely intertwined that distinction is scarcely possible. Compara¬

tively few of the Scottish tales deal with the older, or Ulster, cycle. Most of them tell of the deeds of Finn and his companions, and it is this so-called Ossianic saga cycle that has taken on a new life in the Highlands. Much of this ballad material, though appearing only in later texts, can be traced back to the 12th century or earlier.

But it is not so much in compositions whose subjects were derived from the epic legends common to Ireland and Scotland that the great richness of Scottish Gaelic literature consists, as in ballads which sing of events in the history of the country or were inspired by the observa¬

tion of nature. Only the most eminent of the surprisingly great number of poets and poetesses who flourished from the time of Mary Macleod (1650-1720) to that of our contemporary, Mary Macpherson, poets of whom any country might well be proud, can be mentioned here. Alex¬

ander Macdonald and Duncan Ban Macintyre, both of the 18th century, are the most pleasing and may be called the real national poets' of Scotland. To the same century belong Robert Mackay (Rob Donn), distinguished as a satirist, and William Ross, at his best as a

poet of nature, James MacGregor and Ewan Mac

Lachlan. In addition to the work of the known poets, there are great collections, such as the (Leabhar na Feinne5 and the (Leabhar na Gleann,5 and anthologies and periodicals con¬

taining an immense quantity of anonymous verse and one of the richest literatures of folk¬

lore, popular sayings and proverbs in Europe.

III. Manx Literature. — Almost all the

Manx texts which have been printed are of a religious character, namely, the Bible, finished in 1775, the Book of Common Prayer, with the Psalms (1610), and Bishop Wilson's sermons (1783). But the Isle of Man had a share in the earliest legends which take the place of history in Ireland. Some of the figures of the Ulster saga are found in Manx tales, and it is likely that the Manxmen had Ossianic ballads of their own. The most original feature of their literature, however, is the carols or carvels which are still sung on Christmas eve in the churches at the service called in Manx Oiel V orry, ((Mary's Eve.55 Only a small part of these have been published. There is, besides, a fair amount of folklore, some of which con¬

sists of tales belonging to the Gaelic stem and, in 1796, Th. Christian translated into Manx a part of Milton's (Paradise Lost.5

IV. Welsh Literature. — Welsh literature is neither so old, so original, nor so varied as Irish. It has nothing to compare with the Irish epic tales, and the oldest form of Cymric speech consists only of glosses to Latin works in the 9th and 10th centuries. Nor has it any such vellum codices as those mentioned under Irish literature. The oldest and most important manuscripts are the Black Book of Carmarthen, a collection of poetry belonging to the end of the 12th century; the Book of Aneirin, of the middle of the 13th century; the Book of Taliesin, of the end of the same century; the White Book of Rhydderch, and the Red Book CELTIC LITERATURES

of Hergest, both of the 14th century. The Myfyrian Archaiology of Wales, published in 1801, is an enormous, though uncritically edited, collection of old poetry, and other anthologies have appeared since and down to the beginning of the 18th century. The oldest literary pieces are poems ascribed to Aneirin, the author of the heroic poem, the ˆoddodinP to Taliesin, called (<the Head of the Bards,® and to Llywarch Hen, ((the aged,® author of elegies, all of them bards who, according to tradition, lived in the 5th century. Some poems are even ascribed to Myrrdhin (the celebrated enchanter Merlin), but, even though the language of these poets is dark and obscure, it cannot belong to that period. The oldest literary prose texts were not composed before the 12th century. The ancient laws of Wales, codified by King Hwel Dda, ((Howel the Good,® who lived in the first half of the 10th century, are unaffected by foreign influences and are of importance both for the science of law and because they show the life, manners and social conditions of the insular Britons in the early Middle Ages. The original draft of the laws is lost, but there are at hand law books from the 11th to the 14th centuries, containing the laws arranged accord¬

ing to three divisions of the country. All the Welsh epic romances are in prose, as in Irish, but without the interpolation of verse passages.

The oldest and most famous are known as the ˆabinogionˆ by which is meant a collection of tales, marvelous or romantic and of divers nature and origin. The redaction, as we have it, cannot be earlier than the end of the 12th century, and the Red Book and the White Book, in which the tales are preserved, date from the 14th, but the legends which compose them cer¬

tainly record traditions that were in circulation ages before. The word ((Mabinogion® is the plural both of mabinog, a disciple or aspirant bard, and of mabinogi, meaning the state, con¬

dition or training of a mabinog or his literary stockin-trade. The <Mabinogion> differ

greatly in character and in age. Of the 12 tales which are comprised in the collection, only four, (The Four Branchesˆ are rightly called <Mabinogion.) Some of them deal with persons and events of a very remote antiquity; others belong to the age of chivalry. However Welsh literature may be related to Irish, it shows a common origin with it, but the relations be¬

tween these two bodies of romantic fiction have not yet been satisfactorily determined. The oldest historical writings in Wales are in Latin, but there are chronicles in Welsh, called (Bruts, } after Brutus, the eponymous hero of the Britons, and genealogies. Medicine was a favorite study in old Wales, and some frag¬

ments of recipes for curing ailments and pre¬

cepts of hygiene as well as some tracts on physics and natural history have been preserved.

The early Welsh bards were greatly given to abstractions and fine-spun distinctions, and their thoughts were further hampered by the complicated verse of the professional schools.

The theme of their poetry was mostly heroic and elegiac. As evidence of their artificiality we have the Triads, in which personages and deeds of the past are forced into groups of three.

They cover a wide range of subjects — history, bardism, theology, ethics and jurisprudence —and the majority are 1 5th century productions, though some go back to the 12th. Although of doubtful historical value, they are none the less precious as showing the manner in which the scholars of the time codified and handed down their learning.

As in Ireland, the Welsh bards were attached to the houses of the chiefs and formed a guild apart from the rest of the community. Some of them in later days were forced to become wandering minstrels, and the troupes of poets became so numerous and so importunate that complaints are found against them in royal decrees from the 13th to the 16th century.

Their flourishing period was in the 14th cen¬

tury and their most distinguished representative was Dafydd ab Gwilym, a contemporary of Chaucer and in some respects the greatest poet of the entire Middle Ages. Dafydd died in 1368. He sang of many subjects but as a poet of love and of nature he is unsurpassed by any Provengal troubadour or German minnesinger.

Early in the 15th century the deeds of the celebrated Owen Glendower

became the sub¬

ject of patriotic songs, and Iolo Goch, who ranks next to Dafydd ab Gwilym as a poet, in the early part of the 15th century urged on his countrymen in their wars with the English.

Among the hundreds of poets of modern times who have made notable the Welsh renaissance which has lasted to our own times, the most eminent was Goronwy Owen, who, born on the island of Anglesey in 1723, found a grave in America. The religious literature in Welsh is enormous and constantly growing. It began with lives, genealogies and legends of saints and was continued with the translation of the Bible by Bishop William Morgan, in 1588, and by the modern religious movement. There are Welsh versions of (Paradise Lost) and of (The Divine Comedy. > The masterpiece of modern Welsh prose is undoubtedly Ellis Wynne's satire on the follies of the world, namely (Gweledigaetheu y Bardd Cwsc,* i.e., (Visionsof the Bard Sleep. > The Welsh are celebrated for their songs and no occasion is without them.

The most curious are the pennillion, short, epigrammatic poems on every conceivable sub¬

ject. They have been collected by hundreds.

More is printed in Welsh, in books, papers and magazines, than in all the other Celtic lan¬

guages together.

V. Cornish Literature. — Though there are reasons to believe that Cornwall was influenced to some extent by the Welsh literary movement in the early Middle Ages, the earliest extant literary fragments, dating from the 14— 16th centuries and almost exclusively of religious contents, show a closer relationship to the literature of Brittany than to that of the Welsh.

Apart from some old forms of the language which have a linguistic value, Cornwall's con¬

tribution to the literature of the Celts is of the slightest and consists chiefly of mystery plays.

One of these is a trilogy on the Creation of the World, the Passion and

the Resurrection.

These Mysteries show little originality and are clearly modelled closely on Latin sources. The (Life and Death of Saint Meriadek,* which was first performed in 1504, is more interesting but not of much higher literary value. The Lord's Prayer, the Creed, the Ten Commandments, some chapters of the Bible and a few proverbs and maxims is all else that survives of Cornish.

VI. Breton Literature. — Nor have the

earliest literary monuments, such as they were, 184

of the Armorican Bretons been preserved.

There is an abundance of gloss material, which is our best source of information on the earliest form of Brythonic speech, but for literary remains, for a connected Breton text, we have to wait until the beginning of the Middle Breton period at the end of the 15th century.

This early literature, too, is almost exclusively religious and consists of such works as a translation of the (Hours,' the (Death of Our Lady,1* and the 'Life of Man,' all of them be¬

longing to the 16th century. In Brittany, more than in other Celtic lands, the theatre has met with popular favor and the Bretons still have a peculiar fondness for dramatic composition and performances. Upwards of 150 Breton mys¬

tery plays are known to exist, of which about 25 have been published. The oldest is the Life of Saint Nonn, mother of Saint David. The Great Mystery of Jesus, of the Passion and Resurrection was published in 1530. The authors of these pieces were, for the most part, priests or former ecclesiastical students, though in some cases even uneducated artisans and small farmers were the playwrights. The Mysteries were mostly adaptations from the French and betray their foreign source also by the large amount of French words with which they are larded and by the versification.

Most of the subjects are taken from the Bible, lives of saints and pious legends, though a few belong to the romantic cycle and to such beliefs, for example, as the Purgatory of Saint Patrick.

Though they show little art and little origi¬

nality, they are interesting and valuable under several aspects, as for their local color and their picture of the life of the period and as one of the last manifestations of the mediaeval Mystery. In the course of the preceding and present centuries, efforts have been made, and with considerable success, to revive and modernize the Breton theatre, and to provide it with subjects of a moral, historical and humorous character. In this field, the Vannetais poet, J. Le Bayon, is facile princeps. Of much more interest are the ballads, songs and folklore. We owe the beginning of attention to these subjects to the Vicomte Th. H. de la Villemarque (1815-95), who, in 1839, published his famous collection (Barzaz Breiz' which, as in the case of Macpherson's 'Ossian,' enjoyed great success in Europe and gave rise to a protracted and heated discussion. The search¬

ing criticism to which the <Barzaz) were subjected has proved that they were largely due, both as to matter and to form, to the author himself. Nevertheless, just as in Scot¬

land in the similar case, these poems gave the start for a serious study of the popular Breton ballads. The most fruitful endeavors in that direction were made by F. M. Luzel (1821-95) who, in 1868, published the 'Gwerziou,' short ballads or complaints or village tales in verse, of a very dramatic quality and usually of tragic interest, and,

in 1890 and following, with the aid of Anatole Le Braz, the (Soniou,'

sailors', soldiers', scholars' and workmen's songs of love, marriage and satire. The popular literature in Brittany is of extraordinary' wealth and every effort has been made to preserve it, with the result that a great deal has been pub¬

lished, partly as taken down in Breton from the lips of the speakers or, to a larger extent, retold in French. It consists mostly of legends of saints, of death, of the sea and of pardons , and is all of the greatest interest to folklorists.

The contemporary poets, from Brizeux, who died in 1858, to Jaffrenou, still living, to men¬

tion only the best known names, form a bril¬

liant galaxy whose poems are to be found in separate editions, collections and reviews.

Bibliography. — Irish : Arnold, Matthew, 'The Study of Celtic Literature) (ed. by A.

Nutt, London 1910) ; Maclean, Magnus, 'The Literature of the Celto) (Glasgow 1902) ; Hyde, Douglas, 'A Literary History of Ireland'

(London 1899) ; O'Curry, 'Lectures on the Manuscript Materials of Ancient Irish History'

(Dublin 1861) ; Thurneysen, (Sagen aus dem alten Irland' (Berlin 1901) ; Standish H.

O'Grady, 'Silva Gadelica' (London 1892) ; D'Arbois de Jubainville, (Cours de litterature celtique' (Paris 1883 and fob) ; Dottin, 'La litterature gaelique de l'lrlande' (in Revue de Synthese historique, III, 60-97) ; Meyer, K., (Ancient Irish Poetry' (London 1911) ; Hull, E., (The Cuchullin Saga' (London 1898) ; id., (A Text Book of Irish Literature' (Dub¬

lin, London 1906) ; 'Die Kultur der Gegenwart,'

Teil I, Abteil. XI, 1 (Berlin 1909) ; Renan, E., (La poesie des races celtiques' (Essais de Morale et de Critique 1860). Scottish Gaelic: Blackie, J. Stuart, (The Language and Litera¬

ture of the Scottish Highlands' (Edinburgh 1876) ; MacNeill, N., 'The Literature of the Highlands' (Inverness 1892) ; Maclean, Mag¬

nus, (The Literature of the Highlands' (Glas¬

gow 1904) ; Transactions of the Gaelic Society of Inverness; Cameron, Alex., (Reliquiae Cel-ticae' (Inverness 1894) ; Mackenzie, J., (The Beauties of Gaelic Poetry' (Glasgow 1841) ; Campbell, J. F., 'Popular Tales of the West Highlands' (2d ed., Paisley 1890-93) ;

'Waifs and Strays of Celtic Tradition, Argyll¬

shire Series' (London 1889-95) ; Carmichael, Alex., (Carmina Godelica' (Edinburgh

1900) ; Dottin, 'La Litterature Gaelique de l'Ecosse' (Revue de Synthese historique, VIII, 78-90, Paris 1904) ; 'Die Kultur der Gegenwart,'

Teil I, Abteil. XI, 1 (Berlin 1909). Manx: Jenner, H., (The Manx Language; its grammar, literature and present state' (Transactions of the Philological Society, London 1875) ; Moore, A. W., (A History of the Isle of Man,' I, 20-23 (London 1900) ; Publications of the Manx Society, 1859 and fob ; Moore, A. W., 'The Folklore of the Isle of Man' (Douglas 1891) ; Dottin and (Die Kultur der Gegenwart,' as above, under Scottish Gaelic. Welsh : Stephens, (The Literature of the Kymry' (2d ed., London 1876) ; Wilkins, Charles, 'The History of the Literature of Wales from 1300 to 1650' (Cardiff 1884) ; Ashton, Charles, (Hanes Ilenyddiaeth Gymreig 1651 hyd 1850' (London 1891) ; Jones, T. M., (Gwenallt), (Llenyddiaeth fy ngwlad'

(Treffynnon 1894); Y Traethodydd, 1845 fob; Archseologia Cambrensis, 1846 fob ; Y Cym-mrodor, 1877-1905; The Cambrian Journal, 1854—1864; Transactions of the Cvmmrodorion, 1892-1904; Stene, W. F., (The Four Ancient Books of Wales' (Edinburgh 1868) ; 'The Text of the Mabinogion' (ed. by J. Rhys and J. G. Evans, Oxford 1887) ; Dottin, G., 'La litterature galloise' (Revue de Synthese his¬

torique, VI, 317-62, Paris 1903) ; (Die Kultur der Gegenwart,' Teil I, Abteil. XI, 1 (Berlin 1909). Cornish: Jago, W. P,, 'The Remains of Cornish Literature,' in 'An English-Cornish CELTIC PEOPLES

Dictionary) (London 1887) ; Norris, Edward, (The Ancient Cornish Drama) (Oxford 1859).

Breton : Loth, J., (Chrestomathie Bretonne) (Paris 1890) ; de la Villemarque, H., (Poemes bretons du moyen age) (Paris 1879) ; Le Braz, A., (Le Theatre Celtique) (Paris 1905) ; de la Villemarque, H., cBarzaz-Breiz , Chants popu¬

laires de la Bretagne) (Paris 1839; enlarged edition 1845, 1867) ; Luzel, F. M., (Guerziou Breiz-Izel, Chants populaires de la Basse Bretagne) (Lorient 1868, 1874) ; id., (Soniou Breiz-Izel, Chansons populaires de la Basse Bretagne) (Paris 1890) ; id., (Contes bretons recueillis et traduits) (Quimperle 1870) ; id., ‘ Legendes chretiennes de la Basse-Bretagne) (Paris 1881) ; id., (Contes populaires de la Basse-Bretagne) (Paris 1887) ; Quellien, N., (Chansons et danses des Bretons) (Paris 1889) ; Le Braz, A., (Vieilles histoires du pays Breton) (Paris 1897) ; id., (La legende de la mort chez les Bretons Armoricains) (Paris 1902) ; Dottin, (La litterature bretonne-armoricaine) {Revue de Synthese historique, VIII, 93-104, Paris 1904) ; (Die Kultur der Gegenwart,) Teil I, Abteil. XI, 1 (Berlin 1909).

Joseph Dunn,

Professor of Celtic Languages and Literatures, Catholic University of America.

CELTIC PEOPLES. Hecataeus of Mile¬

tus and Herodotus (5th century b.c.) are the earliest authors to mention the Celts, and they speak of them in connection with the Danube.

The Greek geographers got their information at second or third hand from merchants and sailors and their notions on the subject were very hazy. According to Ephorus (4th cen¬

tury b.c.) , of the four peoples who inhabited the extremities of the world, the Celts lived in the west. There are many moot points in the

earliest history of this great race, which may be accounted for partly by the vague and indis¬

criminate use of the names by which the Celts and the peoples identified or assimilated with them in western and northern Europe were known to the ancients; e.g., Hyperboreans, K e7.ro/, Celtae, Celtici, Cimbri, KeAraq Taharai, Galatae, Galli, T aXkoi, Celto-Ligyes, Celtiberians, Celtillyrians, Celto-Thracians and Celto-Scythians, the exact determination of which it may never be possible to decide. It is probable that the name Celt (the meaning of which is unknown ; the one most often given is (<high, noble))) was originally only that of a tribe or fraction — and that not the largest — of the Celtic branch of the Aryan family. The name was never used by the Celts at any time when speaking of themselves. By some authors the Celts were identified with the Germans. There is anthropological reason for believing that, even at the time when they first appear in history, the Celts were a mixed race and in¬

cluded not only other branches of the Aryan family but even non-Aryans as well, the autochthonous inhabitants, Ligurians and

Iberians, of the countries to which the Celts came as a superior people, imposing their language and customs upon them. More than 150 Celtic tribes are known to us by name, due, in part, to numerous migrations. The question : Were the Celts and Gauls ethnically one people?, is now definitely answered in the affirmative; but other questions in Celtic ethnology are still debated, though archaeology, linguistics and craniometry have been brought to bear upon them. The view that there was on the Continent an older group of Celts who preserved the Indo-European sound qu (the so-called qu group) and were followed by a con¬

quering group, who changed that sound to p (the so-called p group) is now almost generally discarded. Though we know but little of the language of the ancient Belgae, it is sufficient to class it with that of the Celts and perhaps to identify the Galates and the Belgae. Anyhow it is clear that Talar ai and K eAroi are two dis¬

tinct words and that neither of them has any¬

thing to do with the modern names Goidelic and Gael. Though antiquity seems to be almost, if not entirely, unanimous in representing the Celts as tall and blond, there is reason to be¬

lieve that there were two so-called Celtic races, clearly distinct, in

ancient Gaul. There, as elsewhere in what is or was Celtic speaking territory, we find short and dark, and tall and fair, longheads and broadheads among them.

Hence <(Celtic)) as an ethnic term is a vague appellation and, as is well known, all those who speak or spoke Celtic do not or did not necessarily belong to the same race. It must have taken many hundreds of years for the Celts to spread all over Europe and their language with them, and they must have mingled with many races. Yet, while we can¬

not speak strictly of a Celtic race ethnologically, we can speak of a Celtic race philologically and culturally, a race which has preserved and transmitted, as a bond of union, a common speech, mentality, institutions, religion and lore from the days of their origin to the present day. For practical purposes it is well to keep to the traditional division of the Celts, and to speak of the ((Celts)) as a generic term for all the branches of this once powerful and wide¬

spread race ; to call ˆGauls® those who oc¬

cupied Cisalpine and Transalpine Gaul, and ((Galates)) those who established a small state in Asia Minor. Some would place the ancestral home of the Celts, about 1,000 years before Christ, in northern Gaul and central Europe; others, in northwest Germany, the Danish is¬

lands and the Netherlands, near the Elbe and the German Ocean ; others, near the Caspian Sea and in southern Russia. The best received opinion, however, is that their home was in southern Germany, between the upper courses of the Rhine, the Main and the Danube. From this comparatively restricted focus they spread out like a fan in all directions but chiefly toward the fertile fields of the peoples more favorably situated to the south and west of them. As early as the 9th century b.c., some of them crossed the Channel and settled in what is now Great Britain, and others, in Ireland, perhaps in the 6th century. Probably in the 7th century b.c. or earlier they crossed the Rhine and firmly established themselves in Gaul. A century later the}" crossed the western Pyrenees, reached Spain and occupied, most of the Iberian Peninsula. Their domination there lasted until the end of the 3d century with the conquest by the Carthaginians. About 300

years b.c. they entered southeastern Gaul. At the end of the 5th or beginning of the 4th century b.c. other detachments invaded northern Italy and Bohemia, the latter probably through the valley of the

Danube. They had previously invaded northern Italy in the 6th century and 186

later they founded a settlement on a large scale north and south of the Po as far as the Alps and broke up the power of the Etruscans. This region afterward became the home of an im¬

portant literary culture, where Virgil, Catullus, the two Plinys and Livy were born. This ex¬

ploit of the Celts is the best known to history and archaeology. In 390 b.c. they sacked Rome except the Capitol. Their fame spread rapidly and made a great impression on the imagination of the Greeks and Romans and for a long time the Celtic peril kept Europe in terror. At the other extremity of Europe they are found as mercenaries in the service of foreign princes, fighting in Greece, Africa and Egypt. Alex¬

ander the Great had dealings and made alliance with them. Celtic bands from Thrace and Macedonia in 279 b.c. pillaged Delphi, crossed the Euxine Sea and founded an independent state in Phrygia and Cappadocia, the kingdom of Galatia. To the descendants of these Asiatic Celts it was that Saint Paul addressed his Epistle to the Galatians.

The Celtic empire, called Celtia by the Romans, was at its greatest extent for some centuries before 300 b.c., and stretched from Ireland to Asia Minor. With their warlike colonies the Celts had ploughed a deep furrow over the ancient world in every direction, in the valleys of the Danube, Rhine, Po, Seine, Rhone, Loire, Thames and Douro ; the Danube continued to remain a Celtic river until its basin was absorbed in the Roman empire. They have left imperishable traces of their wander¬

ings on the topography of Europe. Wherever there is a place the second term of whose name is derived from dunum (a fortified place), e.g., Carrodunum (Krappitz on the Oder) and

Noviodunum (Isaktcha in Rumania), ritum

(a ford), magus (a field), briga (a hill), for example, it marks a Celtic settlement and such places are found over a wide belt as far north as Westphalia and as far east as the Dobrudja and southern Russia. The Celts were known to the Germans as Volcae, the name of a Celtic tribe on the upper Danube, and it is by this name, Germanized to Walah, that the Germans afterward knew the successors of the Celts, viz., the Romans and the Romance speaking peoples of the Empire; whence, Wailachia, Walloons, Welsh, Wales, *etc.* The Celts suc¬

cumbed to the Carthaginians, the Roman

legions and Teutonic tribes. For 250 years, but especially during the 1st century b.c., the Romans fought them in northern Italy and it took 350 years to Romanize them. But, as a result of Roman conquest and Germanic in¬

vasion, the continental Celts were absorbed and lost to history. In modern times they have almost succumbed to the inroads of the Danes, the Normans and the Saxons. They had never formed a political unity under one supreme authority. The nearest they approached to it was under King Ambicatus and their near¬

est approach to a confederation was dur¬

ing the heroic defense, in the year 50 b.c., under Vercingetorix, before the fortress of Alesia.

But if they had no strongly centralized power, they possessed a linguistic unity over against Greek, Latin and German speech and to a cer¬

tain extent a moral, cultural and religious unity which was probably greater than the scattered documents would lead us to believe.

It is a misfortune that their civilization was cut off before it had time to mature. Archaeol¬

ogy and Celtic literature have shown that the Celts possessed a civilization, intellectually, in¬

dustrially and socially considerably higher than that of their German neighbors across the Rhine, and that their influence spread even over regions into which the arms of the Celts never penetrated. What archaeologists call the La Tene period, or Late Celtic, a comparatively high stage of civilization which extended from about 400 b.c. to 1 a.d., arose in southern Ger¬

many along the Rhine in the centre of what was specifically Celtic territory. In certain respects the insular Celts (in Britain and Ire¬

land), even at the time when Christianity was introduced among them, were at a more

primitive stage of civilization than their kins¬

men in Gaul in the time of Julius Csesar. As for the character of the ancient Celts, we must remember that almost all our information on the subject comes from the writings of their enemies. These all agree, however, in empha¬

sizing their love of fighting, daring and ad¬

venture; their contempt of death; their honor, devotion, and fickleness, withal ; their vanity, self-consciousness, imagination, loquacity and religiosity ; and in this characterization they are corroborated by what we know from the ancient literature of the Celts and from the lives of the Celtic peoples of our own times.

Bibliography. — Dottin, G., (Manuel pour servir a l'etude de l'antiquite celtique) (Paris 1906) ; Brinton, (Races and Peoples) (New York 1890) ; Beddoe, (Races of Britain) (Lon¬

don 1885) ; Deniker, (Races of Man> (London 1900) ; Dechelette, J., (Manuel d'Archeologie prehistorique, celtique, et gallo-romaine) (Paris 1910) ; Henderson, Survivals in Belief among the Celt) (Glasgow 1911) ; Logan, (The Scot¬

tish GaeP (London 1855) ; Nicholson, (Keltic Researches > (London 1904) ; Rhys and Jones, (The Welsh People) (London 1902) ; Rhys, (Celtic Britain) (London 1904) ; Grupp, (Kultur der alten Kelten und GermaneiP (Munich 1905) ; Jullian, (Histoire de Gaule) (3 vols., Paris 1908-09) ; Roemer, (Origins of the Eng¬

lish People) (New York 1887) ; D'Arbois de Jubainville, (Les premiers habitants de

l'Europe1* (2 vols., Paris 1889-92) ; Ripley, (Races of Europe) (New York 1899) ; Ber¬

trand and Reinach, (Les Celtes dans les vallees du Po et du Danube > (Paris 1894) ; MacBain, A., (Celtic Mythology and Religion) (New

York 1918).

Joseph Dunn,

Professor of Celtic Languages and Literatures, Catholic University of America.

CELTIC RENAISSANCE is the name

given to that comprehensive intellectual awakening, which manifested itself in a re¬

markable revival of interest, displayed during the latter part of the 19th and the beginning of the 20th century and continued up to the present, in the languages, the literatures, the earlier history, the ethnological groupings, and the ancient religions, laws, customs, modes of life, ways of thought, and amusements of the native inhabitants of Ireland, the Highlands of Scotland, Wales, Brittany, Cornwall, and the Isle, of Man. Included under the general head¬

ing is that splendid outburst of literature, writ¬

ten in English, during practically the same period, by Irishmen and Irishwomen and deal-CELTIC RENAISSANCE

ing with essentially Irish themes, on which, as a distinguishing designation, the specific title Irish Literary Revival has been con¬

ferred. This part of the general movement is so important and so well and widely known that to it, exclusively, the title of Celtic Re¬

naissance is sometimes given in error. To as¬

sign a precise cause or an exact date as the be¬

ginning of the Celtic Renaissance is difficult, if not impossible, for many causes and many dates, each inherently probable, might be named ; but perhaps it may be here tentatively suggested that the publication, in 1853, of J. C.

Zeuss's (Grammatica Celtica,* based on the Old Irish glosses which he rediscovered on the Continent, is an all-important philological fact. It is true that at no time, for several hundred years, were the cultivation and the study of some at least of the Celtic languages and literatures entirely neglected, and many Irish, Welsh, Scottish and European scholars consecrated themselves to such pursuits. The mention, in this connection, of Francis O'Molloy, Edward Lhuyd, Legonidec, H. B.

MacCurtin, Vallancey, Bopp, Pritchard, Pott, Pictet, John O'Donovan, Eugene O'Curry and Whitley Stokes — to name no others — will be sufficient indication of what is meant. But Zeuss's epoch-making work which estab¬

lished definitively, for the first time, that the Celtic group of languages belongs to the great Indo-European family, and was fortunate

enough to have its conclusions accepted, gave an unprecedented stimulus to the examination of those languages in both their earlier and their later developments. On the literary side, Ernest Renan, in 1856, interpreted the Celtic spirit in his (La Poesie des races celtiques,*

and Matthew Arnold's Oxford lectures, pub¬

lished as (The Study of Celtic Literature) in the Cornhill Magazine in 1867, insisted on the benefit to be derived from knowing the Celt and things Celtic more thoroughly. Thence¬

forward French, German and Italian savants, as well as enthusiastic scholars in Ireland, England, Wales, Scotland and America, gave increasing attention to the linguistic peculiarities of the various Celtic languages and dialects, and, almost as a necessary consequence, busied themselves in deciphering, editing and trans¬

lating the many manuscripts in which the litera¬

ture had lain enshrined but to a large extent buried away. Now, some of that literature was so wealthy, so noble, and so diversified, that soon its influence began to filter down from the desk of the scholar to

the easy chair of the ordinary reader, and the movement, while re¬

maining scientific in the hands of the trained linguist, took on, from another point of view, a decidedly popular tone. While old-established societies continued their work along traditional lines, but with increased vigor, new ones were formed, and periodical publications were issued, for the purpose of disseminating a wider knowl¬

edge of the subject, and of still further de¬

veloping its popular scope. In Ireland, the Society for the Preservation of the Irish Lan¬

guage, established in 1877, was followed, in 1880, by the Gaelic Union, and this in turn, in 1893, by the Gaelic League. An organ

for the necessary propaganda, namely, Irisle-abhar na Gaedhilge (The Gaelic Journal), was started in 1882, and this was in due course sup¬

plemented by the official publications of the Gaelic League. Other Dublin publications, printed mostly in English but also partly in Irish, like The United Irishman, Sinn Fein and The Leader, gave hearty support, and even political daily papers found it to their advan¬

tage to print a column or two in Irish. The Feis, or festival of Irish story-telling, poetry, song and recitation, as well as of Irish music, dances and games, was employed throughout the country as a further instrument for the re¬

vival of the old Gaelic spirit. Since 1898, the Oireachtas (assembly), held every year in Dub¬

lin, has been the culmination of those festivals.

See Gaelic League.

In Scotland, the movement also took its rise with the scholars and men of letters, and gradually percolated downward. The Gaelic Society of Inverness, founded in 1871, whose valuable Transactions have now reached over 30 volumes, offered, in 1875, bonuses to teachers who would agree to teach Gaelic in the Highland schools, and more recently it succeeded in having instruction in that lan¬

guage officially recognized and sanctioned by the Scottish Education

Department. Another Highland society for the preservation and cul¬

tivation of the native speech is An Comunn Gaidhealach (The Gaelic Society), founded in 1891, which holds a yearly assembly, called the Mdd, somewhat along the lines of the Welsh Eisteddfod or the Irish Oireachtas.

There is also a vigorous press propaganda in Scotland. The Celtic Review, dealing more particularly with Iris*- and Scottish Gaelic, made its appearance in 1903. Two periodicals, Guth na Bliadna (The Voice of the Year), a quarterly started in 1904, and An Deo-Greine (The Sunbeam), first published in 1905, devote a considerable portion of their space to Gaelic.

In 1908, a weekly newspaper, Alba, printed en¬

tirely in Gaelic, was founded. A fortnightly paper, also wholly in Gaelic, An Mac-talla (The Echo), was published in Prince Edward Island up to 1905. Side by side with this scholastic and popular activity in Gaelic, a Scottish Celtic revival was conducted in English in the quar¬

terly magazine, the Evergreen, published in 1895 and 1896 at Edinburgh. Among its con¬

tributors were Patrick Geddes, S. R. Crockett, Sir George Douglas, Gabriel Setoun, Sir Noel Patton, Riccardo Stephens, William Sharp and ((Fionna Macleod.® The various books writ¬

ten by ((Fionna Macleod,ˆ who has long since been identified with the poet William Sharp, are among the most distinctive literary prod¬

ucts of the Renaissance in Scotland, for they show in a pronounced degree many of the traits of Celtic art.

With some 250,000 speakers of Gaelic, the teaching of the subject in the schools, the fos¬

tering care of the various societies, and an enthusiastic campaign in the press, the preserva¬

tion of the native speech of the Highlands seems assured. The Isle of

Man did not es¬

cape the general movement. This little island, traditionally regarded as the former kingdom of the Gaelic god Manannan, has about 4,500

speakers of Manx out of its total population of about 55,000. It is a dominion of the Crown of England, but enjoys self-government to a very large extent. It has its own Parliament, known as the Tynwald Court, consisting of the Council, or upper branch, and the House of Keys, or lower branch. The decrees of this 188

Parliament, when approved by the representa¬

tive of the Crown, are supreme. They are promulgated in old Manx, as well as in Eng¬

lish, before the people on the sacred Tynwald Hill. Not only do representatives of the island attend the various Celtic gatherings of other countries, but there is also a society for the preservation of the Manx language, services in Manx are held in some of the churches, columns in Manx appear in the papers,

classes in Manx are conducted at Douglas and there is a Manx section at the annual Guild Festival. The one formerly Celtic section in which the Celtic Renaissance might be expected to find no responsive echo was the English county of Cornwall. Its native language was supposed to have finally died out so far back as the last quarter of the 18th century, and its inhabitants seemed completely absorbed in the English nationality. It had, however, Celtic traditions and even some remains of a Celtic literature, and one or two actual speakers of Cornish successfully established their right to represent Cornwall at the Cardiff Eisteddfod in 1899 and at the Pan-Celtic Congress held in Dublin in 1901. In 1902 there was established the Cowethas Kelto-Kernnak (Society of Cor¬

nish Celts), whose object, in addition to saving from destruction the megalithic monuments of the country, the feudal ruins, the old crosses, the ancient chapels and the legendary wells, was to restore the Cornish language and to re¬

vive the popular Cornish open-air dramas and bardic solemnities. It seems a gigantic, almost impossible, undertaking; but, as Charles Le Goffic says, in this connection : ((There is such a power of recovery in the Celtic races that, among them, the wdldest dream of to-day often becomes the established fact of to-morrow.®

In Wales, there was far less need for a linguistic or literary revival than elsewhere, for Welsh nationality remained of a pronounced type, and from early in the 18th century the Welsh language, owing to its constant use by the Methodist preachers, had had a wide vogue both as a spoken and a written medium. The society known as the Cymdeithas y Cymmro-dorion had been established as far back as 1751, and two periodicals entirely in Welsh, namely, Trysorfa y Gzvybodaeth (Treasure of Cymric Knowdedge) and Cylchgrawn Cymraeg (Cymric Review), date, respectively, from 1770 and 1793. In 1792 there was established in London an important society, the Cymdeithas y

Cymreigddion, which engaged in a search for Welsh manuscripts, and published, in 1801-07, the result of its labors under the title of (MyvyrianArchaiologyP Through the exer¬

tions of the prime movers in this Society, the Eisteddfod , or National Assembly, whose origin is lost in the mists of antiquity, but which can with some certainty be traced back to 1135, was revived in 1819, under the direction of the Gorsedd, and has been held every year since without intermission. In Wales, there¬

fore, the seed of the Celtic Renaissance fell on fertile soil and grew apace. Willing workers were not wanting, and, by 1895, no fewer than 57 periodicals in the Welsh language were mak¬

ing a regular appearance. In addition, many newspapers published in the principality and in the near-by large English cities print several columns in Welsh. Nearly a million persons, out of an approximate population of 2,000,000

(2,030,271, according to the census of 1911), are speakers of Welsh. Welsh is used in the pulpit and taught in the schools, and chairs of Welsh have been founded at the colleges of Aberystwyth, Cardiff and Bangor and in the University of Wales.

In Brittany, at the beginning of the 19th century, the native language had sunk almost to the level of a patois. It was restored to some literary dignity primarily by Legonidec, who had fled to Great Britain as a political refugee and, seeing there what was then being done for Wales, determined to try to do as much for his own country. His Grammaire celto-bretonne appeared at Paris in 1807, and his Dictionnaire breton-frangais in 1821. Peo¬

ple of standing and position became interested, and the teaching of Breton was introduced into a number of schools. The native language, however, fell under the ban of the Second Em¬

pire, and the Association bretonne, which was founded in 1844, was dissolved in 1859, and was not re-established until 1873. In 1870, the Revue Celtique was started by Gaidoz, and in a few years chairs of Celtic were endowed in various French centres, and were given to scholars like Gaidoz himself, D'Arbois de Jubainville, Loth and Ernault. However, the ukase against the teaching or the use of Breton in the state schools of Brittany remained, as it still remains, in force. To combat the danger that, while higher Celtic studies flourished, the Breton language might perish in its native home, the Association bretonne appointed, in 1895, a permanent committee for„ its preserva¬

tion. The efforts of this committee were seconded by the Union regionaliste bretonne, founded at Morlaix in 1898, whose object is not only to preserve the Breton speech but also to reconstitute the Breton life in all its forms.

In pursuance of its policy, the Union regiona¬

liste held, in 1899, a meeting similar to the Welsh Eisteddfod, the Irish Oireachtas, and the Scottish Mod, and these festivals took place annually thereafter. The result of all these endeavors is that Breton is now taught in the schools not controlled by the state ; that several periodicals, some partly, some wholly, in Bre¬

ton, are published; and that there are still some million and a quarter of people who use Breton as their native tongue.

The Celtic Renaissance was not confined to Europe. It spread wherever the ubiquitous Celt had made for himself a home: to Canada, to the

United State's of America, to Australasia, to far away India and Ceylon, to Argentina, even to Patagonia. Not to speak of the de¬

partments of Celtic which have been established at Harvard, Yale, Columbia, Johns Hopkins and Chicago, nor of the chair of Celtic founded at the Catholic University of America in Wash¬

ington, sermons, etc., in Welsh and in Gaelic are preached in different parts of the United States and Australia and journals published in these languages in those and other countries, while encouraging their readers to loyalty to the land in which they live, serve also to recall to their minds the homes which they or their forefathers left, and to put before thorn, as a stimulus, the varied achievements of the great race from which they are sprung.

• Bibliography. — Revue Celtique (1870 to date) ; Zeitschrift fiir Celtische Philologie (1896

to date) ; Zimmer, H., (Keltische Studien> (Ber-CELTIS — CEMENT

lin 1884) ; 'Der Pan-Keltismus in Gross-Britan-nicn und Irland) and (Die keltische Bewegnng in Irland* (both in Preussisclie Jahrbucher, 1898) ; (Randglossen einer Keltisten) (Ber¬

lin 1907) ; 'Die keltische Litteratnren) (in Die Kultiir d. Gegenwart, Berlin and Leipzig 1909) ; Windisch, E., <(Keltische Sprachen® (in Ersch and Gruber's (Allgemeine Encyklopadie der Wissenschaften und Kunste)) ; Tour¬

neur, V., (Esquisse d'une histoire des etudes celtiques) (Liege 1905) ; Dotting G., (Manuel pour servir a l'etude des antiquites celtiques) (Paris 1906) ; d'Arbois de Jubainville, H., 'Cours de litterature celtique) ; Le Goffic, C., 'L'Ame bretonne) (Premiere Serie5, Paris 1008) ; Arnold, M., <The Study of Celtic Literature) (ed. by A. Nutt, London 1910) ; Jackson, H., (The Eighteen Nineties5 (New York 1914).

Patrick J. Lennox,

Professor of English Language and Literature , Catholic University of America.

CELTIS, a genus of trees of the natural order Urticacece, closely related to the elm. C.

australis is the nettle-tree. See Nettle-tree.

CEMBRA PINE. See Pine.

CEMENT. A cement is any compound

which, under certain conditions, is plastic and under others develops tenacity and can be used for holding together various materials ; hence glue, lime, asphaltum, mucilage and solder are cements. By far the most important class of cements structurally and commercially are the hydraulic cements, compounds of lime, silica and alumina that have the property when mixed with water to a paste of cohering or setting and finally becoming stone hard, even under water.

The hydraulic cements may be divided into four classes based on differences in the mate¬

rials used. The setting is probably due to the same general chemical reactions in all hydraulic cements ; the silicates and aluminates formed in burning take up water and are converted into hydrated calcium silicate and aluminate and crystalline calcium hydrate. The quickness with which these reactions take place vary, the composition of the original materials and the differences in the methods of manufacture being the controlling factors. Quick-setting cements may become hard in a few hours, while some slow-setting cements require many months to reach their maximum tenacity.

The four classes of hydraulic building ma¬

terial above mentioned are: (1) Hydraulic lime made from a limestone containing a small proportion of clay (8 to 10 per cent) by burn¬

ing at a low temperature and slaking the burned rock with water. (2) Hydraulic or natural-rock cement made from a limestone containing a relatively high proportion of clay, by burning at a low heat and grinding the product to powder. (3) Portland cement made from an artificial mixture of carbonate of lime (either chalk, limestone or marl), with a cer¬

tain proportion of clay, burning at a white heat and grinding the clinker to powder. (4) Pozzuolana or slag cement made by mixing some kinds of finely-ground scoria (volcanic ash) or blast-furnace slag with a small pro¬

portion of slaked lime. Of these the second and particularly the third are of chief import¬

ance in this country, though the manufacture of slag cement is a promising industry.

The manufacture of hydraulic lime, though carried on to a considerable extent in France, has never been established in this country, probably owing to the abundance of excellent cement-rock in New York, Pennsylvania and other States. Hydraulic lime is light and bulky compared with the other cements. It re¬

quires from one to several days to set and hardens slowly, but some grades resist the con¬

tinued action of sea water even better than Portland cement.

Natural-rock Cement. — This material, also known as common cement, hydraulic cement, Rosendale cement and quick-setting cement, is manufactured in considerable quantities in some parts of the United States. It is made also in France, but the German and English output has been insignificant for some years. In the United States the material used is limestone, often containing over 23 per cent of clay, and the limestone is generally dolomitic, that is, contains carbonate of magnesium. In Europe magnesian limestones are seldom

used. The cement rock is quarried, broken and burnt in continuous kilns, much as limestone in the manufacture of ordinary lime. The burnt rock is a mass of partly vitrified clinker not af¬

fected by water. It is ground in mills of sev¬

eral types. Formerly all plants used millstones, and the light yellowish or brownish powder, fine enough to pass a 50-mesh screen, is sent to market in barrels containing about 300

pounds, or in sacks. When mixed with water this cement sets in a few minutes and hardens gradually. It is cheap and when mixed with one part of sand by weight is used for mortar or concrete and for cistern and reservoir lin¬

ings. It has not the great tensile strength of Portland cement, hardens slower and more im¬

perfectly.

The composition of Rosendale cement rock and natural hydraulic cement is as follows : Carbonate of lime .

Carbonate of magnesia .

Silica and insoluble .

Sesquioxide of iron . .

Alumina .

Water and undetermined .

. 45.91

. 26.14

. 15.37

. J 11.38

1.20

100.00

Silica .

Alumina and iron sesquioxide .

Lime .

Magnesia .

Alkalis .

. 22.75

. 16.70

. 37.60

. 16.65

Carbonic acid .

Sulphate of lime .

W ater .

. 5.00

. } 1.30

Total . .

. 100.00

The chief centre of the industry in this country is the Rosendale district of Ulster County, N. Y., where the rock quarried is a limestone of the lower Helderberg series. It is also made in Pennsylvania, the Louisville region of Kentucky and Indiana, at several points in Illinois and around Milwaukee, Wis.

The natural or Rosendale cement industry has weakened since 1903, and the production is now comparatively small.

Production. — The total production of Port¬

land cement in the United States in the year 1916 was 91,521.198 barrels, valued at $100,-

947,881, an increase over the 1915 figures bv 6.5 per cent in amount, and 36.6 per cent ii\ 190

value. The shipments from the mills for the year, however, were 3,031,098 barrels more than the production — from the reserve stock left over from the previous year. The price ob¬

tained by the mills varied from 94 cents per barrel in eastern Pennsylvania to $1.64 per barrel in Utah. (These figures do not in¬

clude the barrel or bag in which the cement is marketed). The production was pretty well distributed over the entire country, but the output in the so-called Lehigh district, com¬

prising eastern Pennsylvania and western New Jersey, was notably larger in proportion, amounting to nearly 30 per cent of the whole.

The reserve for another year's supply left at the mills at the close of 1916 amounted to 8,360,478 barrels.

Of natural cement and puzzolan cement

the production in the United States in 1916

amounted to 842,137 barrels, valued at $430,874

— an average of 51.2 cents per barrel. Only one puzzolan plant (at Birmingham, Ala.) was active during the year.

Consumption. — The total consumption of

cement in the United States is arrived at by adding the shipments from the mills to the imports for the year, and subtracting the ex¬

ports. On this basis the 1916 consumption ap¬

pears to be 91,990,156 barrels — 7,621,288 bar¬

rels (about 9 per cent) more than in 1915. The highest per capita consumption for the year was that of Iowa, 1.77 barrels. Following this were Michigan with an average of 1.58 barrels and California with 1.51 barrels. In 17 of the States the consumption exceeded one barrel per capita, due in large part to extensive con¬

struction of public works in those States. See Concrete; Limestone; Mineral Production

of the United States; Portland Cement.

CEMENTATION PROCESS. See Ar¬

mor Plate; Iron and Steel; Steel Manufac¬

ture.

CEMETERY, a place of sepulture. See

Burying Places.

CEMETERY LAWS, official regulations

governing graveyards where the dead bodies of human beings are buried ; their management and the care of the avenues, walks, grounds, tombstones and sculptures, used for general or ornamental purposes. Two classes of ceme¬

teries are recognized in law : the public ceme¬

tery, used by a community, neighborhood or church, and as much a public place as a court¬

house or a market ; and the private cemetery, used only by a family, or a small portion of a community. Statutes in California and Mon¬

tana define that where six or more human bodies are buried at one place, such place is a cemetery. Cemeteries are controlled by police authority in so far as the private interests in rights of burial relate to public welfare. The establishment or suspension of cemeteries, the regulations for their use, are provided for by legislation. Ordinarily, cemetery corporations are not supposed to be organized for pecuniary profit, but rather for public than for private purposes; jurisdictions, however, differ on these points ; ethical custom inclines to the latter view. Provisions in corporate charters do not prevent the exercise of police power in the public interest ; conversely, a corporation can¬

not be deprived of its charter rights by arbi¬

trary interference of police power. Further burials in a cemetery as dangerous to public health may be prohibited ; to prohibit burials as detrimental to neighboring real estate val¬

ues is considered an unreasonable and oppres¬

sive exercise of police power. Cemetery lots are subject to the rules of sale and purchase made by the corporation or municipality own¬

ing them. Municipalities and corporations usu¬

ally formulate reasonable rules for the care, adornment and management of lots and ceme¬

tery grounds, and heavv penalties are incurred by wilful desecration or unlawful interference with the vested rights of owners. To avoid the possiblity of the sale of cemeteries for non-payment of taxes, State legislatures usu¬

ally exempt them from taxation. Similarly, a grave, vault or burial lot, in which bodies are interred cannot be seized for debt, nor can an owner raise a mortgage or loan on it, this being contrary to public policy. See also Burial; Burying Places; Cremation; Dead, Disposal of the; Funeral Rites. Consult Mack, W., and Hale, W. B., eds., (Corpus Juris* (Vol. XI, pp. 49-69, New York 1917).

CENCI, chen'che, Beatrice, Italian lady, the cause of the extermination of the noble family of Cenci. Muratori, in his (Annals *

(Vol. X, part 1, 136), relates the story as fol¬

lows : Francesco Cenci, a noble and wealthy Roman, after his second marriage behaved to¬

ward the children of his first marriage in the most shocking manner, procured the assassina¬

tion of two of his sons, on their return from Spain, by banditti, seduced and debauched his youngest daughter Beatrice, a maiden of singu¬

lar beauty. She discovered this shocking crime to her relatives, and even sought to obtain pro¬

tection from Pope Clement VIII. It appears, however, that this was not granted ; for, when the guilty father continued his former treat¬

ment with aggravated wickedness, she joined with her brother Giacomo, and hired two as¬

sassins, who put the monster to death as he slept. The guilty parties were discovered, con¬

fessed the murder on the rack and were con¬

demned by the Pope to be torn to pieces by horses. In vain did the learned Farinaceus ex¬

ert himself to obtain a mitigation of their pun¬

ishment by a lively representation of the de¬

pravity of the deceased, 9 Sept. 1598. Accord¬

ing to other accounts, Beatrice and her rela¬

tives appear to have had little or no share in the murder of the old Cenci; but a tissue of villainy and baseness gained belief in the false testimony of two banditti against the Cenci family. So much is certain, that, 11 Sept. 1599, Beatrice Cenci and her stepmother were execu¬

ted with a sort of guillotine called mannaia.

Giacomo was killed with a club; the younger brother was pardoned on account of his youth ; but the estates of the family, to which belonged the Villa Borghese, were confiscated, and in 1605 presented by the reigning Pope, Paul V, of the house of Borghese, to his family. In the Barberini Palace at Rome, travelers are shown an excellent painting, said to be by Guido Reni, as the portrait of the unfortunate parricide ; but this is now controverted, and re¬

cent investigations tend to show that the popu¬

lar version of the whole story is far from the true one. Shelley has made the Cenci the sub¬

ject of a drama. Consult Bertolotti, (Fran-CENCI — CENOBITES

cesco Cenci e la sua famiglia) (1877) ; Muratori, (Annali d'Italia) (Milan 1744-49).

CENCI, The. Shelley's poetic tragedy

(The Cenci) was his one attempt to write <(for the multitude® and for the stage. Though fol¬

lowing the model of Elizabethan tragedy, and containing echoes from Shakespeare, mainly from <Lear,) (Macbeth > and < Othello,* it is yet a work of individual genius. While it may be uncritical to assert that (The Cenci) is ((the greatest English tragedy since Shakespeare,®

it is safe to say that no tragic poet since Web¬

ster has equalled this play in sombre power.

The plot is founded on an old manuscript ac¬

count of the crime, trial and execution of Beatrice, a daughter of the great Roman fam¬

ily of the Cenci, at the close of the 16th cen¬

tury. This particular account, one of many such that appeared within the century following the event, is utterly misleading in its picture of Cenci as an unnatural monster and of his daughter as an angel of light ; but Shelley ac¬

cepted it as authentic, and followed it closely, except that he adds the banquet scene in the first act. His interest was increased by the supposed portrait of Beatrice, once attributed to Guido, then in the Colonna, now in the Barberini, Palace. The play was published in Lon¬

don in 1821, with a second edition in 1822.

Though received with comparative favor by the public, it was rejected by the London thea¬

tre manager on account of the nature of its subject, and was unsuccessful when acted for the first and only time under the auspices of the Shelley Society in 1886. Shelley, who was an almost infallible critic of his own poetry, said, (<It is a work of art ; not colored by my feelings nor obscured by my metaphysics.®

And, indeed, (The Cenci, *intrinsically great, is no less than astonishing as the production of the poet of (Prometheus Unbound.* Except for this evidence, no one could have credited Shelley with such knowledge of human char¬

acter and such power to represent it.

Owing to the difficulty of presenting the in¬

cidents of the story on the stage, the action of (The Cenci* is weak. The fifth act, however, is not only perhaps the finest thing that Shelley ever wrote, but certainly compares favorably in all essentials of tragedy with anything outside of Shakespeare. The characterization is on the whole firm and convincing; though Orsino, whose crafty wickedness is contrasted with the utter insolence of Cenci, seems hardly con¬

sistent. The vacillating Giacomo and the ir¬

resolute Lucrezia throw into high relief the unwavering will of Beatrice, who grows in nobility until at the close she fills the action with the splendor of her purity and strength, a tragic heroine claiming

kinship with the great¬

est of her kind — with Antigone, Electra, Ju¬

liet, Constance, and Webster's Duchess. The diction is simple and concrete ; the style, highly dramatic and appropriate. Except the descrip¬

tion of the chasm in the third act, not a pas¬

sage, scarcely even a line, but contributes di¬

rectly to the action or characterization. The effect of the play is that of unrelieved gloom.

«In it culminates that fascination of horror in Shelley which was as characteristic as his wor¬

ship of beauty and love, though it is less omni¬

present in his poetry® (Woodberry). The <Cenci) has been edited for the (Belles Lettres Series) by Professor Woodberry. Mrs. Shel¬

ley's notes and Shelley's preface to the play are given in the Centenary edition also. Con¬

sult pages 126-29 of Symonds' <Shelley) ({ Eng¬

lish Men of Letters*); Crawford, F. Marion, (The True Story of a Misunderstood Tragedy: with New Documents) (Century Magazine, V ol.

LXXV, No. 3, pp. 449-66).

Marion Tucker.

CENEDA, cha-na'da. See Vittorio.

CENIS, se-ne', Mont, a mountain belong¬

ing to the Graian Alps, between Savoy and Piedmont, 11,755 feet

high. It is famous for the winding road nearly 40 miles in length constructed in 1803-10 by Napoleon I, which leads over it from France to Italy, and for an immense railway tunnel, which required nearly 14 years' labor. It superseded a grip railway which was constructed over the moun¬

tain by Mr. Fell, an English engineer, in 1864 —68. The tunnel does not actually pass through the mountain, but through the Col de Frejus, about 15 miles -to the southwest. The Mont Cenis Pass is 6,765 feet above the level of the sea, whereas the elevation of the entrance to the tunnel on the side of Savoy is only 3,801

feet, and that on the side of Piedmont 4,246

feet. The total length of the tunnel is 42,145

feet, or nearly eight miles. For the sake of the drainage the bottom of the tunnel has a culminating point about the middle, and falls southward 128 feet, and northward 473 feet.

The breadth of the tunnel at the base is about 25 feet, at the widest part about 26 feet; its height at the Modane end is 24 feet 7 inches; at the other end about a foot higher. The de¬

termination of the exact direction and height of the tunnel occupied a full year, and the work of piercing the tunnel was carried out with so much precision that the borers who had begun simultaneously from both ends met exactly. The tunnel is laid out for two lines of railway. The roof and walls are lined with masonry to the thickness of two feet seven inches, and where the ground is not very firm it is underarched. The boring was at first car¬

ried on by hand labor, and one-eighth of the total length of the tunnel was finished in this way, but the rest was constructed by machines specially devised for the purpose. Each boring machine had 18 borers, by which holes about three feet in depth were wrought in the rock.

For the blasting of every yard of the tunnel 97 borings on an average had to be made, and above 100 pounds of gunpowder were employed.

The total cost of the tunnel amounted to $14,-

475,000, which was borne partly by the French and Italian governments and partly by the Northern Railway Company of Italy. The

first mine of the tunnel on the Italian side was exploded by Victor Emmanuel at the end of August 1857 ; on Christmas Day, 1870, the workmen met in the middle of the tunnel; and on 17 Sept. 1871, the tunnel was officially opened. See Tunnels.

CENOBITES (Gr. K oivoc, common, /Loe

life), monks living in community with others, under a common rule instead of seeking the strict solitude of anchorites. The ascetics of the first ages, who dwelt in the deserts together, were usually called by this name, the place in which they lived being called a ccenobium.

Some writers refer the institution of these communities to the times of the apostles, oth¬

ers to Saint Anthony (q.v.).

CENOGENESIS. While many animals

during post-embryonic growth pass through a series of stages which are similar to the ances¬

tral forms of such types (palingenesis), in certain species development is direct. The dif¬

ferent stages of growth or metamorphosis are crowded back to the embryo stage, or abbre¬

viated, and the animals hatch or are born in the shape of their parents. This is called ceno-genesis. Thus certain frogs, as a tree-toad of Guadeloupe, W. I., where there are no marshes, do not pass through a tadpole stage, but hatch without tails, and with legs, and otherwise re¬

semble their parents. The same is the case with certain shrimps and crabs, and is partly the case with the lobster. In all such instances the direct development is apparently due to a difference in the environment, or other condi¬

tions of life, especially in certain Crustacea, to a change from salt to fresh water.

CENOTAPH, sen‘6-taf, a monument

erected in honor of a deceased person, but not containing his body, as is implied from the derivation (Gr. k. evoc empty, and ra < poQ a tomb). They were often erected by the an¬

cients, who believed that when the body was not buried the soul could not be admitted into the abodes of the blessed. Consult Virgil.

ˆAEneid* (3, 304) ; Xenophon, (Anabasis) (6, 4, 9). In Suetonius, (Claudius } (Bk. 1), such a tomb is called < (tumulus honorariusA

CENOZOIC, se-no-zo’ik, ERA, the last of the great divisions commonly used in classify¬

ing geological time, and therefore including the present. As it is the last, its records are much more complete than those of the Mesozoic, but while more complete they are, perhaps, more perplexing. Of the older eras — as, for instance, the Palaeozoic — much of the record left in the rocks has been obliterated, and thus only the traces of the greater changes in the distribution of land or water and of variations of climate have come down to us. Thus, while much is lost, the broader grouping of facts is easier. In the Cenozoic we have such a wealth of detail, such a great mass of evidence to sift and corre¬

late, that geologists differ greatly as to how the record of the rocks shall be translated.

Generally speaking, the rocks of the Ceno¬

zoic Era are less compacted than those of the Mesozoic, being very often beds of loose sand or clay. They usually lie horizontal, though

sometimes upturned in a great mountain range.

Any particular series is seldom of wide extent, and different series tell widely different stories of climatic conditions. Thus, probably no series in the Cenozoic in North America is comparable with the coal-bearing formations of the Creta¬

ceous.

As to the climate of the Cenozoic, it was at first remarkably mild and even, Spitzbergen and Greenland having as mild a climate as that of Ohio to-day. Gradually the climate became colder, resulting in the great continental gla¬

cier of the Ice Age. At a comparatively very recent date these glaciers receded, and the climate of the earth became substantially what it is to-day.

Cenozoic life is, on the whole, well differen¬

tiated from Mesozoic, particularly by the great development of mammals and, probably well along in its last half (reckoning by actual time), by the advent of man. As mammals have de¬

veloped, so reptiles have declined, and to-day only snakes, crocodiles, lizards and turtles rep¬

resent the class; the great ichthyosaurs, pleiso-saurs, dinosaurs and pterosaurs were passing away by the end of the Cretaceous. In fact, as the Mesozoic was the era of reptiles, so is the Cenozoic the era of mammals. Among inverte¬

brates many curious Mesozoic types have dis¬

appeared, but of the genera in existence early in the Cenozoic most still exist. This also is true of Cenozoic plant life.

As has been noted, geologists differ in their divisions and subdivisions of Cenozoic time.

American geologists generally make two great divisions, Tertiary and

Quaternary.

The era is marked off from the Mesozoic, which precedes it, by the great disturbance which formed the Rocky Mountains. Through¬

out, the continent of North America was largely out of water, with a few minor exceptions.

The Atlantic and Gulf Coastal Plain underwent several successive submergences and emergen¬

ces. The present site of the Coast Range was largely submerged till mid-Tertiary time, when a pronounced period of folding formed the Coast Ranges. The Alps and Himalayas were probably also elevated at the same time. A period of submergence occurred in the north¬

east, at the close of the Glacial Period, in late Quaternary, which drowned Lake Ontario and Lake Champlain, separating New England as an island. (See also Geology; Glacial Period; Tertiary). Consult Dana, (Manual of Geol¬

ogy* ; Geikie, (Textbook of Geology) ; Le Conte, < Elements of Geology.*

CENSER, a vessel in which incense is

burned. Censers were employed by the Jewish priests for presenting incense to the Lord in the sanctuary. Josephus tells us that King Solomon made 20,000 gold censers for the temple of Jerusalem to offer perfumes in, and 50,000

others to carry fire in. Censers or thuribles are used in some modern churches, especially in the Roman Catholic Church at mass, vespers and on other occasions. They are suspended by chains, by which they are swung about in the hand to spread the incense in all directions.

They are usually made of brass or copper, sometimes of silver or gold. Of their precise shape before the 12th century there is little record. The earliest ones are richly decorated, set with jewels and sometimes made in the form of small churches. They were also often made in two hollow halves shaped like a ball. The upper half varies very much in form.

The lower half holds the charcoal and the incense, while the upper half is perforated with holes to allow the smoke to escape.

CENSORS, sen’sorz. In ancient Rome,

originally two magistrates whose chief duty it was to keep the register of property, on which all political rights were based ; the community being graded by amount of income from

estates. Being thus arbiters of the political and social position of every freeman, they speedily became the most important officials in the state except the occasional dictators. The supreme judicial functions, and the control of morals (regimen morum), fashion and speech, which CENSORSHIP OF THE PRESS —CENSURE

we associate with ((censorship,® flowed naturally from this. The essence of their duty being to fix the status of each citizen, they took cog¬

nizance of everything which bore upon it ; and became arbiters of the sumptuary laws and customary observances which are the cement of early communities. Not only could they expel a senator from the Senate and take his horse from a knight or even reduce him to the ranks for lack of property qualification, or notorious evil living, but they could punish for slack tillage, celibacy, demeaning occupations, extravagance or any other conduct thought prejudicial to the common weal. There was an appeal to the popular assembly, however, and they had to state their charges publicly.

The censors also filled vacancies in the Senate and appointed its chief, originally at will, later according to a prescribed list. They also administered the state finances, which included the regulation of the tributum or property tax; of the vectigalia, such as the tithes paid for public lands, salt works, mines, customs, etc., which were usually leased out to speculators for five years. Consult Leuze, (Zur Geschichte der romischen Censur) (Halle 1912), and the article <(Censor® in Smith, (A Dictionary of Greek and Roman Antiquities* (3d ed., London 1890). The term, legendarily five years at the outset, was a

year and a half in historical times, and re-election was forbidden ; originally patri¬

cians alone were eligible, but by fully historical times the plebeians had gained one censorship and occasionally secured both. The Emperors assumed censorial power under the title (<prefects of morals.® The last who bore it was the brother of Constantine the Great.

In American history, the title was given to two sets of State officers in imitation of the Roman office. The 1776 constitution of Penn¬

sylvania provided that the people should elect a council of censors once in seven years, two for each city and county, to investigate the acts of the governmental departments, inquire whether or not the constitution had been vio¬

lated, *etc.* This curious article was dropped in the revised constitution of 1790. But in Ver¬

mont a similar article had a far longer life, surviving until a comparatively recent time.

That State in 1777 proclaimed its independence and drewr up a constitution. One article, fol¬

lowing the example of Pennsylvania, provided that on the last Wednesday of March in 1785, and the same day every seventh year there¬

after, the people should choose a council of 13

censors, who should examine whether the con¬

stitution had been preserved inviolate ; whether the legislature had performed its duty as _ a guardian of the people, or had exceeded its powers; whether the taxes had been justly laid and collected, and how the public moneys had been expended ; and whether the laws had been duly executed. They were also empowered, if they thought a change in the constitution was needed, to call a convention to meet within two years thereafter, giving notice of the proposed change at least six months before the meeting.

The last one so called, in 1870, abolished its creator; but the

censorship seems to have worked fairly well for nearly a century.

CENSORSHIP OF THE PRESS, a

regulation subjecting books, pamphlets and newspapers to the examination of certain civil, military or ecclesiastical officers, who are em-VOL. 6 — 13

powered to authorize or forbid their publica¬

tion. Such a regulation was suggested by Plato, and an informal censorship existed in the times of Greece and Rome. After the Roman Catholic Church acquired a share in the civil power it induced the state to condemn heretical books. Throughout the Middle Ages it sanctioned the principle that books objected to by its authorities should be suppressed. The invention of printing and the increasing num¬

ber of books called forth new and stricter pre¬

scriptions of censorship, and copies of books printed in 1479 and 1480 are accompanied with solemn approbations and attestations in their favor. Finally, in 1515, the Council of the Lateran, assembled at Rome, decreed that in future no books should be printed in any town or diocese unless they were previously inspected and carefully examined by the bishop of the diocese or his deputy, or by the inquisitor of the diocese or his deputy, or if at Rome, by the Pope's vicar and the master of the sacred palace. Every work which was approved was to be countersigned by the hand of the censor, and any publication not thus countersigned was to be burned and its author or editor excom¬

municated. See Index Librorum ProhibitOtrum.

In countries where the Reformation pre¬

vailed, the censorship was not abolished.

Licensers of books were appointed in England, who were for the most part bishops. A gen¬

eral system of censorship was established by a decree of the Star Chamber, dated 11 July 1637, which was later confirmed by an act of Parliament. It was against this act that Milton wrote his great plea for freedom of the press, the ˆreopagitica,* but the censorship was not abolished until 1693.

Censorship of the press existed under the old French monarchy. It was abolished at the Revolution, but revived under Napoleon I and again under Napoleon III. Except in France and Spain, where it still exists in modified form, censorship of the press may be said scarcely longer to be maintained in European Christian countries. In the United States there has never been such a censorship, al¬

though there are laws against publications of a scandalous character ; there are various State laws against libel and a government censorship in the Philippines.

In times of war strict censorship of the press is exercised to prevent the publication of information that might be useful to the enemy.

The operations of the British Press Bureau during the great European War were the sub¬

ject of much bitter criticism and frequent de¬

bate. It was stated that Sir Edward Cook and Sir Frank Swettenham were joint directors of the Press Bureau for which, however, the Home Secretary was responsible. It was further ex¬

plained that the actual censorship was super¬

vised by the military and naval authorities and that the Press Bureau was only responsible for permitting publication. The most spectacular act of censorship undertaken by the military authorities and confirmed by the Home authori¬

ties was the suspension of the London Globe from 6 Nov. to 22 Nov. 1914.

CENSURE, in canon law, a spiritual pen¬

alty whereby a contumacious offender is denied the use of certain spiritual goods. It has three degrees, excommunication, suspension and in-194

terdict. By excommunication the offender is cut off from association with the faithful whether in spiritual things or in secular ; by suspension a minister of the Church, a cleric, is deprived of the right to exercise the func¬

tions of his station; by interdict the services and ministrations of the Church are denied to an offender — the sacraments and the right to Christian burial. An interdict may affect places as well as persons ; it may be laid on a church edifice or a burial place. Censures are the pen¬

alties prescribed in the Church's law for definite offenses, and some censures fall upon the offender, ipso-facto or ex ipso-jure, without need of a judgment being pronounced by Church authorities. Such a censure is said to be lata? sentential, that is, providing for its own carrying out; but most censures are feren-dee sent entice, requiring that the sentence be pronounced by some proper authority, as the bishop of a diocese or his deputy. And absolu¬

tion from some censures latce sentential is re¬

served to the Supreme Pontiff, while absolution of other censures can be given by bishops, or other pastors, either in the ordinary course of their jurisdiction or in virtue of special facul¬

ties accorded to them to that end. An example of a censure, release from which is reserved strictly to the Supreme Pontiff himself, is the censure of excommunication incurred by who¬

ever violently assaults a cleric or a member of a religious order (clericus vel monachus) ; but an exception is made of the case where the offender is in danger of death.

CENSUS. The utility to a government of knowing the extent of its

resources in men and property is so obvious that some means of as¬

certaining it were probably employed early in history; but there is no record of it on the Egyptian or Assyrian inscriptions, and the Chi¬

nese accounts are dubious. The first we have reliable mention of is that of the Jews by David, including the males of 20 and over and the cattle ; and the hatred and suspicion aroused by it are witnessed by the belief that God punished the whole people for the impiety. This appar¬

ently irrational feeling was universal in early times, has always been so in the East and is by no means unknown elsewhere and later ; its prevalence in 18th century America, and even later in England, however, is probably due to misunderstood Bible teaching. The real reason was, that the early census had for an object not statistics, but taxation and conscription ; and it was not to the advantage either of offi¬

cials or people that the government should have too minute a knowledge of what could be ex¬

torted from them. Poverty and sparseness of population were too convenient excuses for not paying taxes or not remitting them to the cap¬

ital. In the West, however, when constitu¬

tional government replaced autocracy, the cen¬

sus became a necessity for apportioning political rights and contributions ; as in the Solonian constitution of Attica, where society was divided into four classes, with privileges graded according to income from landed estates. In Rome, whence the name ˆcensus® ((<assess-menU) comes, it was much the same; and as the enumerations were valued merely for the ratings deduced from them, not from any idea that statistics by themselves were of any value, they were discarded as soon as their use had passed, to the irremediable impoverishment of history. These censuses were taken at long and irregular periods, sometimes nearly half a century elapsing. But as the empire grew and the provinces were farmed by proconsuls, these found the same need of a thorough detail of their temporary estates, to know whether their sub-farmers were cheating them, that a capi¬

talist does of his business; and each took a census (professio) of his own province on his own account, whose inquiries were sometimes

almost as minute and exhaustive as those of the latest United States special census report on agriculture.

The mediaeval censuses were of the roughest and far apart, and made only by a few en¬

lightened rulers. Charlemagne attempted one for his dominion; and the Domesday Book of William the Conqueror in 1181 is familiar.

This was a register of estates, with the heads responsible for feudal duties, their slaves and cattle — a census of the primitive type for the primitive objects.

The modern census, as a statistical review for its own sake, has a treble origin, in Sweden, England and the United States. In 1686 the Swedish parish clergy were required to keep a record of births, marriages and deaths, acces¬

sions and removals of inhabitants, unusual hap¬

penings, *etc.* Of course registration, which is a record of changes, is not a census, which is a statement of condition at a certain time ; but with a given basis it can be turned into one.

By request of the Swedish Academy of Sci¬

ences, in 1746, the clergy were directed to com¬

pile statistics of population, etc., for a quarter-century past ; but these were kept rigidly con¬

fidential till 1762. At their publication Dr.

Richard Price, the founder of scientific life-insurance calculation, based his first insurance tables on them. At first annual, then triennial, since 1775 they have been published once in five years. Meantime, in England, the London bills of mortality, first begun after the plague of 1592, had been recorded weekly since 1603, the year of James I's accession; and in the last half of the 17th century Sir William Petty, the noted political economist, used them as a basis for very valuable and stimulating works on the extent and growth of population, human fecun¬

dity, effects of social and political causes, *etc.*

Others took up the subject and made compu¬

tations. In 1791 Sir John Sinclair undertook the most herculean statistical task ever at¬

tempted, perhaps, by a single man — to compile a census of the population, agriculture, trade and industries of the entire kingdom, by in¬

quiries sent to the clergy of the Established Church. He sent out schedules of 160 inter¬

rogatories, received over 900 replies, and in 1798 published 21 volumes of results. His work, and his exhortations made weighty by his work, induced Parliament in 1800 to establish a census office; the first census was taken the next spring, and decennial censuses have been main¬

tained ever since. That of 1851, like the Amer¬

ican of 1850, was a long step in advance. The Russian census had begun earlier, but on the most ancient model, purely for military pur¬

poses, and therefore with no count of females.

There were a few partial censuses from 1700

on. In 1718 Peter the Great ordered all landed proprietors to give in an account of their slaves ; and the same year organized a body of

canvassers to visit all the provinces and make returns to him of peasants, mechanics, domes¬

tics and people without occupation. In 1722 a ukase ordered a census taken every 20 years thereafter, and it was observed till 1782, another taking place in 1796. In 1802 a central bureau was organized and a census taken ; and they have been taken in 1812, 1815 and 1834, decen¬

nially 1850-80, then in 1886 and 1897. France began taking them after the Revolution, Prus¬

sia in 1805 ; Austria, which had made rough counts for military conscription, organized a bureau in 1828; Belgium established one im¬

mediately after winning her independence in 1833, and it has been perfected by' the genius of Quetelet and other eminent statisticians and furnished most valuable contributions to science. Our own census was entirely inde¬

pendent of all these in origin.

The United States Census. — For the various guesses at colonial population and the methods of arriving at them, see United States (Popu¬

lation). It may be mentioned here as germane to this subject that when Governor Hunter of New York in 1712 attempted to take a census, the biblical prejudice before mentioned com¬

pelled him to leave it unfinished; and that when the New Jersey government a few years later wished to do so, it did not dare begin. An accurate determination, however, became vital early in the independent life of the country. To apportion equally the burdens of the Revolu¬

tionary War, the Congress of the Confederation agreed to defray the charges out of a common treasury, to be supplied by the States in propor¬

tion to the value of all the land in each; and to requisition the quotas of land forces according to the quotas of white inhabitants. Under the constitution of 1787 the question of number be¬

came exigent, as direct taxes and representa¬

tives in Congress were apportioned according to the number of free inhabitants in each State (including bound servants and excluding In¬

dians not taxed) and three-fifths of all others.

Censuses, therefore, became part of the ordi¬

nary running machinery of the government ; and the first one was taken in 1790. Nine months were allowed for the work, but the time was extended the next year, as regularly for many a decade thereafter. The scope of inquiries simply included families : the name of the head alone being set down, with the number of others included, and slaves as a property item, the sex and color of free persons, the number of free white males of 16 and upward, number of free white females, and of all other free persons. The enumeration was committed to the marshals of the judicial districts of the United States (16 in all), who were to employ assistants as needed. No form of schedule was provided, each enumerator using any sheets or blank book he chose. This continued till 1830.

There was no central bureau to receive or supervise returns, which were put together by the marshals and transmitted to the President.

A penalty of $200 was imposed for false re¬

turns or delay beyond a certain time ; and the same on individuals for giving false informa¬

tion or refusing any. The returns in the North were given by counties, cities and towns ; in the South by counties only. Two copies of the enumeration of each district were to be posted in some public place therein. The cost of this census was $44,377.28. The result, as usual, pricked many local bubbles ; and as the country was not used to this, there was not only gen¬

eral disappointment but distrust of the census, and the United States officials carefully ex¬

plained to foreigners that the returns were very defective. This is not now believed.

The second census, that of 1800, was spe¬

cifically entrusted to the Department of State.

There was no change in methods, except that the Secretary was to instruct the marshals as to schedules and interrogatories. The only changes in scope were to classify the ages of free white males rather more minutely, extend the classi¬

fication to females and insert the name of county, city or town where

the family resided.

Memorials by Thomas Jefferson and Timothy Dwight, under the names of learned societies, wisely suggesting that Congress utilize the oc¬

casion by having the census include statistics of mortality, nativity and industries, were ignored ; but took root in later censuses. There were 19

districts and the cost was $66,109.04.

The third census, that of 1810, improved somewhat on the loose methods of the two for¬

mer. The enumerators now had to be residents of their districts, which could not be more than one county or city, but might be several contig¬

uous towns, and must be plainly marked off by natural or political boundaries ; and they must make personal inquiries at each dwelling-house or of the head of each family in their district.

In Territories the secretary, or if there was none, the governor, replaced the marshal. At¬

tested copies of the returns must be filed with the Secretary of State. An attempt at a manu¬

facturing census was made, and the Secretary of the Treasury was empowered to give in¬

structions for it. But the time was too short ; the inquiries were too many and injudiciously framed; the manufactories in a district were generally so few that the returns would disclose their private business, and there was no penalty for refusal to answer; and the returns were scattering and valueless for volume, though they had some value as indicating variety and distribution of industries. There were 26 dis¬

tricts and Territories, and the cost was $178,444.

The fourth census, that of 1820, for the first time introduced the valuable feature (suggested by Jefferson and Dwight) of distinguishing

be¬

tween natives and foreigners, naturalized or otherwise. It also discriminated the free col¬

ored and the slaves by sex and age, and the free whites between 16 and 18. It reduced the manufacturing interrogatories to 14, of much the same scope as now, and a digest was or¬

dered made and printed. This department was a failure as before, however. There were 31

districts and the total cost was $208,525.99.

The time of taking the fifth census, that of 1830, was changed on John Quincy Adams' sug¬

gestion to 1 June, as it has ever since remained.

A very significant provision in the act was to prevent the marshals from blackmailing their subordinates, by exacting either bribes in ad¬

vance or part of their pay later. Printed sched¬

ules were sent out, of uniform size, 18x15.

The industrial statistics were dropped alto¬

gether. But inclusion was made of the deaf and dumb — white, free colored and slave —classified by age but not by sex, and of the blind, not classified at all. Ages were also very minutely classified. There were 36 districts and Territories, and the cost was $378,545.13.

The sixth census, that of 1840, was in one respect the beginning of a new era; in most others, the close of an old one. It first at¬

tempted health statistics — those of the insane and idiotic, at public and private charge ; educa¬

tional — scholars in colleges, academies and public schools, illiterates over 20, *etc.* ; besides Revolutionary pensioners, an item wholly aside.

Industrial statistics were also restored, and much matter collected. In a word, it was the first systematic and connected attempt to make the census a general body of usable statistics in the larger sense, a comparative survey of the life and changes of the country. But the effort is all that can be praised; its execution was a national scandal. The errors were so teeming and so monstrous that various bodies sent pro¬

tests to Congress against its publication, and urged that it be either corrected, or if that were not possible, entirely disowned. This result was due partly to inadequate pay and ignorant enumerators, but partly also to the dislike in many sections to the new questions as <(inquisi-torial® and offensive. The old dislike to gov¬

ernmental (<prying® was strong enough to war¬

rant a prominent paper in becoming its spokes¬

man, insinuating that the census was a <(precursor to direct taxes,® and that it was un¬

worthy of ((the dignity and the high functions of the Federal government to pursue such petty investigations.® There were 39 districts, and the cost of the census was $833,370.95. It was published in three volumes.

All these six censuses had a common defect which robbed them of ultimate statistical value: They lacked uniformity in method, and to a large extent could not furnish comparisons or accurate deductions. The enumeration ex¬

tended over long periods, many, months at a time; the results were not summarized by coun¬

ties, nor uniformly by cities or towns; the clas¬

sification of ages of colored people was on a different basis from that of whites, *etc.*

The seventh census, that of 1850, begins a new era. The blunders of the last one, and the public disgust and indignation, had aroused great discussion as to proper methods; and on 3 March 1849, the same act which created the Department of the Interior also created a cen¬

sus board, consisting of the Secretary of State, the Attorney-General and the Postmaster-Gen¬

eral, to prepare a census schedule including not above 100 inquiries. They framed plans which were adopted by Congress 23 May 1850. These schedules comprised: (1) Free inhabitants; (2) Slaves; (3) Mortality; (4) Products of agriculture; (5) Manufactures; (6) Social statistics. But the great advance which it made was in scheduling individuals instead of fami¬

lies, thereby making full statistical comparison for the first time possible. The name, age, se-x, color and place of birth of each person, free or slave, were now set down. Improvements in method were also made. The enumerators' dis¬

tricts were to be not exceeding 20,000, if feas¬

ible, on the basis of the last census; the returns were not to be compiled by the marshals, but at a central office in Washington created within the Department of the Interior. Its head or ˆsupervising clerk,® commonly called <(superintendent of the census,® was Joseph C. G. Ken¬

nedy of Pennsylvania; the latter part of the compilation was done under the charge of James D. B. De Bow of Louisiana. There were 45 districts, and the work cost $1,423,350.75.

The eighth census, that of 1860, was on much the same lines as the previous one. Mr.

Kennedy was superintendent. Fortunately, the enumeration was finished before the war broke out. The principal change in schedules was to classify females as well as males by occupation.

In the compilation, slaveholders and slaves were classified by States and Territories for 1850 and 1860. There were 64 marshals and secretaries. Cost, $1,969,376.99.

The ninth census, that of 1870, was taken under changed conditions, some of which inter¬

fered with its completeness and accuracy. The mass of enfranchised negroes in the South could no longer be counted on plantations by one authority, and were too ignorant to answer questions for themselves ; and the Re¬

construction conditions greatly impeded work.

A new system had been carefully drawn up by Garfield, after consultation with Francis A.

Walker, Edward Jarvis and other eminent statisticians, which would have made partial amends ; but it was killed in the Senate. It formed, however, the basis of the next census.

General Walker, then chief of the bureau of statistics in the Treasury Department, was made superintendent, and his ability did much to redeem the defective system. The heading ((slaves® had of course to be dropped and the number of male citizens of the United States to be substituted. To satisfy the 1 5th Amend¬

ment, a schedule was introduced of the num¬

ber of such citizens whose right to vote was denied or abridged except for crime, *etc.* ; but it was valueless. The month of births and marriages within the year was added. In ((colored,® Chinese and Indians were discriminated from negroes. In ˆilliterates,® those unable to read were distinguished from those unable to write. In nativities, the place of parents' birth was added for the first time giving the number of native citizens of foreign parentage. A statement of public debts, State, municipal, etc., was included. Many changes were also made for clearness, or to remove objectionable in¬

quiries. The enumerators were put under civil-service reform rules.

A strong effort was made to have an inter¬

decennial census taken in 1875, but it was not successful, though Grant recommended it in two annual messages. But for that of 1880, the system desired for 1870 was passed, under Gar¬

field's presidency, completely revolutionizing the census methods. The changes may be summa¬

rized as follows: (1) The superintendent of the census and his chief enumerators, instead of being mere clerks of the Secretary of the Interior, became officials directly appointed by the President and confirmed by the Senate. (2) The marshals — court officers appointed for du¬

ties unconnected with census work and often conflicting with it — were replaced by super¬

visors of the census, not to exceed 150 in all, and each State or Territory to have at least one.

The entire number were appointed and New York State had 11. Their assistant enumera¬

tors were subject to veto by the census office.

(3) The enumerators' districts were reduced to an estimated maximum of 4,000 instead of 20,000, these subdivisions being also subject to the disallowance of the census office. This increased the number of enumerators from CENSUS

about 6,400 in 1870 -to 31,265 in 1880; and en¬

abled not only a swifter completion of work, but much closer local and personal knowledge on the part of enumerators, as each must be a resident of his district. (4) The time of enu¬

meration was reduced to one month, or two weeks in cities of over 10,000 inhabitants by the previous census ; making results more nearly simultaneous. (5) Compensation was more

closely adjusted to work. (6) Industrial sta¬

tistics for 279 cities and large towns, and for the country at large in certain selected indus¬

tries, were withdrawn from the regular enumer¬

ators and given to certain special agents, who need not be residents. The enormous advan¬

tage of this scarcely needs exposition. Not only did it allow the employment of abler experts, but manufacturers will often give information to distant strangers, to be filed far off, which they would not put in the hands of local residents. In this census also a large use was made of <(prior schedules, }) left with parties before the enumerator called; they had been introduced in 1870 but little employed. This census was by far the best, speediest and most helpful of all to that date and marked another era. The scope was also extended. For the first time the statistics of defectives, crime and pauperism were thoroughly and properly classified; those of the factory system, of churches, museums, taxation, insurance, etc., entirely new, with better ones of schools and colleges, collected independently, were of great utility ; and many improvements were made in other schedules. General Walker was the head of this census also and the author of most of its advances. Its cost was $5,790,678.40.

The 11th census, that of 1890, was in gen¬

eral taken by the same methods as the 10th.

Ten chiefs of division were appointed, 175 su¬

pervisors and 47,975 enumerators. The super¬

intendent was Robert P. Porter. The most important additions were: (1) All surviving soldiers, sailors and marines of the Civil War, and their widows. (2) Classification of col¬

ored persons according to amount of white blood, from full-blooded negroes up to octo¬

roons. (3) Indebtedness of private corpora¬

tions and individuals. (4) All Indians in tribes, with Indian and English names of each, age, occupation, and whether paying taxes or not.

(5) Census of Alaska. (6) Unincorporated express companies. An attempt was made to collect statistics of chronic disease ; but the in¬

quiries were too delicate to entrust to local resi¬

dents to expect people to communicate to such, and the statistics gathered were of no value, besides exciting much public ill-will. Special agents were employed for 1,042 manufacturing centres, in place of 279 in 1880. Special atten¬

tion was paid to nativity, to fecundity of native and foreign-born mothers, the expectation of life of children of native and foreign-born parents, naturalization and ability to read and speak English. Prior schedules were exten¬

sively used. Electric tabulation was employed, not alone greatly increasing both speed and accuracy, but enabling various statistical com¬

pilations to be made which were otherwise impracticable. It filled 25 volumes, and cost $11,547,127.13.

For the 12th census, that of 1900, prepara¬

tions had been mooted before the 10th was well under way; and the question of a permanent census bureau, strongly urged over half a cen¬

tury since by the able statistician De Bow, was brought up, and its merits set forth in a valu¬

able and exhaustive report by Superintendent Porter. On 1 July 1902 the Bureau of Census became a permanent office in the Department of the Interior. A year later it was transferred to the newly-created Departm'ent of Commerce and Labor, and since 4 March 1913 it has been under the Department of Commerce. The su¬

perintendent of the census is entitled the di¬

rector of the census. The President, who appoints him, must also appoint an assistant director, who must be an expert statistician; and the director is to appoint five known and tried statisticians as chiefs of divisions, a geog¬

rapher, a chief clerk and a disbursing clerk.

The first director under this bill was William R. Merriam ; assistant director, Frederick H.

Wines; chiefs of divisions, William C. Hunt, population ; William A. King, vital statistics ; S. N. D. North, manufactures; Le Grand Powers, agriculture; Walter F. Wilcox, meth¬

ods and results ; geographer, Henry Gannett.

The law creating this bureau, however, greatly limited its scope. The inquiries were restricted to the four heads of population, mortality, agri¬

culture and manufactures. For the 13th cen¬

sus, E. Dana Durand, of California, was ap¬

pointed director 26 May 1909, to succeed S. N. D. North, resigned. Work began 15

April 1910, with a staff of 70,000 enumerators and 330 supervisors. More than 200,000 per¬

sons took the examinations for the position of enumerators. These examinations were local and those recommended were again examined in Washington. Great improvements had been made in tabulating machinery, 300 of which turned out work faster and cheaper than in 1900. An elaborate card system was emploj^ed.

A card was prepared for each person enumer¬

ated. These were run through the machines and the facts readily compiled in various com¬

binations. Congress appropriated $12,000,000

for expenses of the census, to which an addi¬

tional appropriation of $2,500,000 had to be added.

The methods of presenting the results of the 13th census were a new and, in some re¬

spects, a radical departure from former prac¬

tice. The most important change was in the Abstract. Formerly the Abstract had been included in a small octavo volume, issued after the publication of the complete reports, and contained no text discussions

and very few percentages, averages or comparative statistics.

The Abstract for the 13th census is a quarto volume of 569 pages, presenting the resume of the principal statistics, extensive text discus¬

sions in terms familiar to all, analysis of data and many diagrams and maps, thus visualizing the main facts concretely. And instead of being issued after the complete reports it was pub¬

lished first, thus creating a wider popular in¬

terest in the results than had ever been aroused before. The enumerators employed on the 13th census, for population and agriculture, num¬

bered 70,286, more than the combined popula¬

tions of New York and Philadelphia in 1790; an organization not far inferior to the regular army in numbers. For the gathering of statis¬

tics on manufacturing, mines and quarries an¬

other 1,087 special agents were employed. At one time the clerks and officials employed in 198

the Washington office in compiling and tabu¬

lating the schedules numbered 3,738.

Aside from the taking of the main census, the Bureau of Census carries on many other inquiries, instituting investigations which re¬

quire periods of from seven or eight years to two weeks. Chief of these are the decennial census of wealth, debt and taxation, showing the total assessed valuation of property subject to taxation; the census of re¬

ligious bodies; the census of dependent, de¬

fective and delinquent classes, covering the inmates of benevolent institutions, insane asy¬

lums, penal institutions, *etc.* ; and the annual collection of mortality statistics, to which it is expected soon to add the gathering of vital statistics. By the act of 1916 the director has an office of 569 employees, including a chief clerk, four chief statisticians, a geographer, eight chiefs of division, the rest being special agents and clerks.

State Censuses. — A number of States have constitutional requirements that a State census shall be taken once in 5 or in 10 years, or between two national censuses ; but only a few pay any attention to the matter or attain results of any value. Massachusetts, Rhode Island, New York and Michigan thus far are the only States which have done good work in this line.

The Massachusetts censuses from 1855 on, and the Michigan of 1874 and 1884, are notably good. On 3 March 1879 an act of Congress provided that any State which will take an inter¬

decennial census in all respects equal to that of the United States, and file a copy with the Secretary of the Interior, shall receive from the national government 50 per cent of the amount paid to supervisors and enumerators, plus 50

per cent of the gain per cent in population between the two last preceding national cen¬

suses. Even this lure, however, has not thus far increased the interest of the States in their statistics. Consult (Report of the Director of the Census) (in Report of Department of Com¬

merce, 1915); (Story of the Census: 1790-1915, } issued by the Bureau of the Census.

CENT, a United States coin and money of account, the 1-100 of a dollar. The convenience of decimal computation has caused in various countries the division of the monetary unit into hundredths, with names derived from Latin centum or its adjectives; as the French franc into centimes, the Dutch guilder into cents, the Italian lira into centesimos, the Spanish-Ameri¬

can dollar into centavos, *etc.* Jefferson regu¬

larly used “cent® to mean the hundredth of any unit of measurement ; but in its first suggestion for our coinage it meant 100. The inconven¬

ience of the English system being felt, Congress in 1781 instructed Robert Morris to devise a system of national coinage ; and he proposed a unit of 14 grain of silver (or 1-1440 of a Span¬

ish dollar, familiar in the colonies), of which 100 were to make a cent (about 7c. of ours), 500 a quint (34.7c.), and 10,000 a mark ($6.94). Jefferson proposed instead the dollar as the unit, the smallest coin to be of copper and 1-200 of it (that is, the old English far¬

thing, our half-cent) ; this was adopted 6 July 1785. But on 8 Aug. 1786, an act was passed, still modeled by Jefferson, to coin a cent, of which 100 were to weigh 2T/<\ pounds avoirdu¬

pois (157.5 grains each), and be equal to a dollar, and a half-cent proportionate. This was the first use of the name in our coinage, and doubtless represents Jefferson’s “hun¬

dredth.® The “cents® prior to this have not that name on them, and are really English half¬

pence. The difficulty of displacing a popular name is shown by that of “penny,® which still clings tenaciously though absurdly to our cent, only half its value. Congress in 1787 estab¬

lished a mint in New Haven, and for years coined there the “Fugio® or “Franklin® cents, familiar to collectors. But from 1785 to 1788

several States coined copper “cents® on their own account. Vermont (not yet admitted) be¬

gan in June 1785; Connecticut in October 1785; Massachusetts late in 1786 (real cents and half-cents) ; New York, 1786; New Jersey, 1786

(coppers 15 to the shilling). Under the con¬

stitution the first coinage act was passed 2

April 1792, and raised the weight of the cent to 264 grains; but on 14 Jan. 1793, it was re¬

duced to 208 and on 26 Jan. 1796 to 168, the half-cent always being proportional. The first coinage under the new act was in 1793. This

old-fashioned “copper® remained unchanged ex¬

cept in pattern till 1857, and its forms from 1793 to 1857 are of seven types: (1) (1793), chain or link around the word “cent® ; (2) 1793, wreath in place of chain; (3) 1793-96, liberty cap on pike over left shoulder of “Lib¬

erty® ; (4) 1796-1807, “Liberty® with draped bust; (5) 1808-14, filleted head with 13 stars; (6) 1816-39, plain coronet with coiled hair; (7) 1839-57, same with braided hair. No cents were coined in 1815 or 1835. Those of 1799, 1793 and 1804 are very rare, as are also the copper cent of 1856 and the half-cents of 1793, 1831, 1840 to 1848 and 1852. On 3 March 1851,-

a 3-cent piece was authorized, of I2jg grains, 75 per cent silver, 25 copper, legal tender to 30

cents ; on 3 March 1853, it was raised to .900

fine, but reduced to 11.52 grains, 3/50 of the half-dollar. On 21 Feb. 1857, the half-cent was abolished and the old cent replaced by a small¬

er new one, of 72 grains, .88 copper and .12

nickel. On 22 April 1864 this was supplanted by a bronze cent, 48 grains (the present one), .95 copper and .05 tin and zinc, legal tender to 10 cents ; and a bronze 2-cent piece, twice its weight, and legal tender. On 3 March 1865

a 3-cent piece .was authorized, copper and 54

nickel, 30 grains, legal tender to 60 cents; but the ones and twos were made legal tender to only four cents. On 16 May 1866 a 5-cent piece (the “nickel®) was authorized, same ma¬

terial as the 3, 77.16 grains, legal tender to $1.

On 12 Feb. 1873, all cents and their multiples were discarded except the 1, 3 and 5, as above, each to be legal tender to 25 cents ; and on 26

Sept. 1890, the 3-cent piece was discarded. See Numismatics.

CENT, a name given under the old Ger¬

manic constitution to a small portion of terri¬

tory. Each province or district was subdivided into .so many cents and was placed under the special jurisdiction of an overseer or centenarius. The name corresponds with hundred as in English territorial division.

CENT-GARDES, san-gard, Les (Fr.,

“The Hundred Guardsmen®), a body-guard

acting in the service of the French king dur¬

ing several centuries. See Guards.

Photograph by J. Horace McFarland Co.

CENT JOURS, sail zhoor, Les (Fr., <(The Hundred Days”), the second period of the reign of Napoleon I, so called because it lasted precisely 100 days, from 20 March 1815, when he re-entered Paris on his return from Elba, to 28 June of the same year, when the second restoration was established.

CENT NOUVELLES NOUVELLES,

sail noo-vel, a collection of facetious tales, first published at Paris in

1486. They were told at the table of the Dauphin, afterward Louis XI in the castle of Genappe during his exile. Their arrangement in their present form has been attributed to the Count of Cro'i, to Louis himself and to Antoine de La Salle.

The latter, however, seems to have been the editor. The work is a curious example of a kind of literature distinctively French, and which, since its revival by Voltaire in the last century, has always been successfully culti¬

vated : the literature that considers elegant mockery and perfection of form adequate com¬

pensation for lack of morality and lofty ideals.

The historical importance of the collection arises from its giving details regarding the manners and customs of the 1 5th century that can be found nowhere else. They were first printed by Verard (undated) from a manu¬

script of the year 1456. The (Nouvelles' also show us that the Middle Ages are past, for among the narrators obscure and untitled men, probably domestics of the Duke of Burgundy, figure side by side with some of the greatest names in French history. They were edited in Paris in 1858 by Thomas Wright.

CENTAUREA, sen-ta're-a (commonly

called Bachelor's-Button, Corn-Flow'er,

Dusty-Miller or Knapweed), a genus of an¬

nual or perennial herbs of the family Astcr-acece. There are about 500 much confused species, mostly natives of western Asia and the Mediterranean region. A few are found in the western hemisphere, but only one, C.

am eric an a, is native in the LTnited States. This species, popularly called basket-flower, is a very attractive hardy annual with rose-colored flowers. Many of the species are widely used in ornamental gardening. The following are among the most popular garden sorts : C.

cyanus, the blue-bottle or corn-flower, common in European grain fields and frequently found wild in America. Its blue flowers yield a

blue dye. C. cineraria, the dusty-miller, has white-hairy leaves, and when grown as an edging plant — its most popular use — it is not al¬

lowed to flower. C. moschata, sweet sultan, is widely grown for its large, fragrant flower-heads. C. montana, mountain bluet, which originally had blue flowers, has developed vari¬

ous other tints under cultivation. All the spe¬

cies are easily grown from seed and thrive in any good garden soil.

CENTAURS, sen'torz, in Greek mythology,

a fabulous race dwelling in Thessaly, on Mount Pelion. According to one of many fables, they sprang from the union of Ixion and a cloud.

They were typical of wild savagery, except in the case of Pholus and Chiron. They are said to have been half horse and half man, and the fable is explained by the surprise of the Greeks on meeting with the wild horsemen of the northern tribes. Mythology relates the combats of the Centaurs with Hercules, The¬

seus and Pirithous. The latter, at the head of the Lapithae, another Thessalian nation, their hereditary enemies, entirely defeated the Cen¬

taurs, killed many and drove them from Pelion.

The Centaurs Xessus, Chiron and others are famous in fable. See Chiron; Dejanira;

Hercules.

CENTAURUS, sen'to-rus, or THE CEN¬

TAUR, a southern constellation, only a small part of which rises in our latitude. Two stars of the first magnitude are catalogued in the portion which does not appear above our hori¬

zon. This is one of the 48 ancient constella¬

tions formed by Ftolemy, who first discovered the likeness of a centaur in it. On the celestial maps of the Arabs it is represented by a

bear mounted on horseback. The principal star in this constellation a Centauri, has been found to have a larger parallax than any other fixed star. The researches of Gill and Elkin made at the Cape of Good Hope Observatory in 1881-83 make the distance of this constella¬

tion 4.3 light years ("light year" meaning the distance traversed by light in one year).

CENTAURY, a genus of plants (Ccntau -

rium) of the family Gentianacccc , of about 30

widely distributed species, mostly natives of western Asia and Europe, of which two are of distinct ornamental merit. One of these (C.

vcmistum) is from California; the other (C.

))iassonii) from the Azores. They are hardy little annuals with rose-colored flowers, and are frequently planted in rockeries, in the soil of which the seed mav be sown in early spring.

Some of the related species have been used to a small extent in domestic medicine, but rarely in regular medical practice. American cen¬

taury (Sabbatia angnlaris) , of the same family, is widely distributed in rich soil and sunny situations from Ontario to the Gulf States.

It is often cultivated for its cymes of fragrant showy white or rose-colored flowers. Like the above, it has been used to a small extent in domestic medicine for simple ailments.

CENTAVO, then-ta'vd, a Chilean coin

equivalent to the cent (q.v.).

CENTENARY, the commemoration of any

event, as the birth of a great man, or the founding of a city or institution, which oc¬

curred 100 years before.

CENTENNIAL EXHIBITION, a World's

Fair held in Philadelphia, Pa., from 10 May 1876 to 10 November of the same year. To celebrate the 100th anniversary of American independence, an association of Philadelphians in 1870 proposed an international exhibition of arts, manufactures and agricultural products, to be held in the city where independence was declared. Congress passed an act 3 March 1871, authorizing the exhibition and also appointed a commission of one member and an alternate from each State and Territory, nominated by the governors, to report on dates of opening and closing, plans for buildings, method of re¬

ceiving and classifying articles, custom-house regulations. The commission was organized 4

March 1872, with Joseph R. Hawley of Con¬

necticut as president ; and on 12 May chose as director-general of the exhibition Alfred T.

Goshorn. On 1 June Congress appointed a cen¬

tennial board of finance, to raise funds for the 200 CENTENNIAL STATE — CENTIMETER-GRAMME-SECOND SYSTEM

exhibition. This board was to solicit subscrip¬

tion to $10,000,000 of stock, and the corporators and subscribers were to elect 25 directors, who should apply the funds on the plans of the com¬

mission. Of 227,940 individual subscriptions, Pennsylvania gave $1,749,468. The city of Philadelphia added $1,500,000; the State of Pennsylvania $1,000,000 more. Then Congress appropriated $1,500,000, besides $500,000, for a government building. Fairmount Park was

selected as the site, 236 acres being used for the purpose of the exhibition. The buildings of the exhibition proper consisted of the main building (for manufactured products, mines and metallurgy, the

public works of all nations, and a conspectus of science and education), built of iron and glass with masonry founda¬

tions, 70 feet high, 1,880 x 464 feet, with cen¬

tral transept of 416 feet and two end transepts of 216; Machinery Hall, 1,402 x 360, of wood and glass on masonry foundations, occupying with an annex nearly 13 acres ; Agricultural Hall, 820 x 540, of wood and glass; Horticul¬

tural Hall, built by the city of Philadelphia, a permanent structure of iron and glass in Moorish 12th-century style ; Memorial Hall, in¬

tended as a permanent art gallery, of granite, glass and iron, in Renaissance style, 365 x 210

and 59 feet high, with a central tower 150 feet high, surmounted by a colossal statue ; the United States Government Building, 504 x 306; the Women's Pavilion, an acre in extent, not only for the convenience of women, but for the collection and exhibition of their work; the Shoe and Leather Building and the Carriage Building, besides annexes. Moreover, 26 States erected buildings of their own, costing over $400,000; and a number of foreign countries, out of 49 which took part in the proceedings by invitation, erected their own buildings.

There were over 200 separate buildings in all.

The admission fee was 50 cents; 7,2 50,620

paid it in full, 753,654 paid a special 25-cent rate, and 1,906,692 went in free, making 9,910,-

966 admissions in all.

By the system of awards adopted the ex¬

hibits — to the number of over 50,000 — were divided into 36 groups, and these subdivided again and again into small sections. Each of the last was assigned to a special jury of awards, who had to make a statement in writ¬

ing of the special merits they found in the articles which they esteemed best, and the uses for which each was best fitted, and to sign their names to the award : this left no room for carelessness or

irresponsibility, and gave the maker the benefit of names of known weight.

These judges numbered 233, of whom 118 were foreign and 115 Americans; included many of the ablest and most famous men of science and the professions and other great experts in the Western World; and the awards have been a source of just pride. Awards, consisting of a medal and diploma, were granted to 13,104 ex¬

hibitors, 7,802 of whom were foreign.

The exhibition wa~ a most important land¬

mark in the industrial history of the country, and other countries. Not only did it make later ones possible and successful here, but it diffused inventions, broke down stolid self-conceit and immeasurably advanced the knowledge of all the nations which took part in it. For instance, the Bell telephone was first exhibited there, and gained immediate celebrity from Sir Wil¬

liam Thomson's enthusiastic praise;' and the American bicycle manufacture sprang from Colonel Pope's inspection of English cycles there. It showed European countries with new clearness the marvels of American machinery¬

making, especially the immense development of mechanism with interchangeable parts, from watches to steam boilers and artillery. It made the first collection ever attempted of women's work on a large scale. It first made the beauty and grace of Japanese decoration and patterns populaPy known. It shed new light on art principles in general. It illuminated educational systems with light from foreign sources. No public or private money was ever better invested than that devoted to creating and profiting by this collection. The official account of the exhibition was published in nine volumes by the government in 1880.

CENTENNIAL STATE, a popular name

given to the State of Colorado on account of its admission to the Union in 1876, the 100th year of American independence.

CENTENO, Diego, de-a’go than-ta’no,

Spanish soldier : b. Ciudad-Rodrigo, Spain, about 1504; d. La Plata, upper Peru, 1549.

Going to South America he accompanied Al¬

varado to Peru and soon became famous as a skilful fighter. He gained control of a part of the country by slaying the tyrant Almandras.

In 1544 he took the part of the viceroy against Gonzalo Pizarro, but was defeated by Carbajal.

His army was utterly routed and he himself was forced to flee. The Royalist cause aroused him and he collected an army at Charcas, but again suffered defeat by Pizarro and Carbajal. In the following year he assisted in the downfall of Pizarro and was appointed governor of Rio de la Plata, which office he held but a short time.

CENTER. See Centre.

CENTERVILLE, Iowa, city in Appanoose

County, on the Rock Island, the Chicago, Bur¬

lington & Quincy and the Iowa Central rail¬

roads, 70 miles south of Des Moines. The town was settled in 1832 and was incorporated as a city in 1846. The city has a park, a public hospital and a public library. Coal, gypsum and limestone underlie the vicinity and large quantities are shipped. The exportation of live stock is an important industry, and there are railway shops and manufactures of lumber, flour, iron, skirts, crushed rock, *etc.* Pop.

(1920) 8,486.

CENTESIMO. See Coins, Foreign, Amer¬

ican Values of.

CENTIARE. See Metric System.

CENTIGRADE SCALE. See Thermom¬
eter.

CENTIGRAM, or CENTIGRAMME.

See Metric System.

CENTILITER. See Metric System.

CENTIME. See Coins, Foreign, Ameri¬
can Values of.

CENTIMETER, or CENTIMETRE.

See Metric System.

CENTIMETER-GRAMME-SECOND
SYSTEM. See Units.

CENTIPEDE, or CENTIPED, one of

those myriapods (Chilopoda) with long, many-jointed, flattened bodies, each segment bearing only a single pair of appendages, which take the form of legs behind the head. The mouth-parts, besides a pair of jaws (mandibles), con¬

sist of two pairs of maxillae, those of each pair being fused together in the middle. The first pair of legs are fused at their base, and form the poison-fangs, the poison-gland being situated in the base, and the poison oozing out of an orifice at the end of the leg. The single oviduct and corresponding male duct open at the end of the body in the penultimate segment. The centipedes (S colopcndra) are mostly confined to the tropics, a small species extending as far north as North Carolina. Those of the West Indies and the tropics in general are eight to nine inches in length, one species, however, at¬

taining the length of 18 inches. Their bite is dangerous, quite as much so as the sting of the scorpion. They are ferocious when attacked or seized, biting energetically. In the Northern States the centipedes are represented by the species of Lithobius (L. americanus), which are wrongly called ˆearwigs,® and live under stones, under the bark of fallen trees, *etc.* They prey on insects and worms. They have been ob¬

served to attack earthworms, grappling with them for several hours and, after killing them, sucking their blood. Very long, slender forms are Geophilus and its allies. The body is com¬

posed of from 19 to nearly 200 segments, each bearing a pair of legs. They are eyeless, and live buried in the sand, coming to the surface under stones.

The centipedes are hatched with numerous segments, and corresponding legs. Wood states that the female of a centipede (Scolopocryptops sexspinosa) guards her young by lying on her side, and then coiling her body, passes them along by a quick action of her feet, thus ar¬

ranging them satisfactorily to herself. He also describes the manner of molting in this species.

The chilopods are more nearly related to the insects than are the millipedes. They are a less ancient group. No true Chilopoda are known to exist in rocks older than the Middle Tertiary period, species of Cermatia, S colop endra, Lithobius and Geophilus, having been de¬

tected in amber and the gypsum beds of Aix, Provence, France, of Oligocene age. (See Chilopoda). Consult Latzel, (Die Myriapoden der Oestreschisch-Ungarischen Monarchie)

(Wien 1880) ; Korschelt and Heider, (Lehr-buch der vergleichenden Entwickelungsgeschichte der wirbellosen Thiere5 (Jena 1891) ; Sinclair, articles on Myriapods, (Cambridge Natural History) (Vol. V, London 1895) ; Zittel, (Handbuch der Palaeontologie5 (I Abth., II Bd., Leipzig 1881-85) ; Wood, (The Myriapoda of North America) (transactions,5

Amer. Phil. Soc., Philadelphia 1865).

CENTLIVRE, sant-levr, Susanna Free¬

man, English actress and dramatist : b. Ire¬

land about 1667 ; d. London, 1 Dec. 1723. When very young she married a nephew of Sir Stephen Fox. Becoming a widow within a year she took for a second husband an officer of the army of the name of Carrol, who was killed in a duel the second year of their wed¬

lock. This event in her singular career reduced her to considerable distress, and led her to attempt dramatic composition. Her first pro¬

duction was a tragedy entitled the (Perjured Husband,' performed in 1700. This was fol¬

lowed by several comedies, chiefly translations from the French, which exhibited the vivacity that distinguishes her literary character, and met with some temporary success. She also tried the stage as an actress on the provincial boards, and by that means attracted the atten¬

tion of her third and last husband, Mr. Cent¬

livre, Queen Anne's head cook, whom she mar¬

ried in 1706. She still continued writing for the stage, and produced several more comedies.

Some of these remain stock pieces, of which number are (The Busy Body5 ; the Wonder5 ; and (A Bold Stroke for a Wife.5 They are diverting from the variety of incident and the liveliness of the characters, but want the ac¬

companiments of adequate language and for¬

cible delineation. They partook of the license of the age. Mrs. Centlivre enjoyed the friend¬

ship of Steele, Farquhar, Rowe and other wits of the day. Having, however, offended Pope, she obtained a place in the Dunciad, but is intro¬

duced by no means characteristically. An edition of her works with a biography appended appeared in 1872.

CENTNER, a German weight, in common

use on the continent of Europe, which is nearly the equivalent of the British hundredweight.

It formerly varied in the different German states, but since the introduction of the metric system of weights and measures into the Ger¬

man empire, 1 Jan. 1872, the value of the cent¬

ner has been fixed at 50 kilograms, or 100 Ger¬

man pounds, equivalent to 110.23 pounds avoir¬

dupois. In Austria it is equal to 110ˆ4 pounds, and in Sweeden to 112.06 pounds.

CENTO, chen'to, Italy, city 13 miles north of Bologna, on the eastern bank of the canal of Cento and near the river Reno. It is sur¬

rounded by a rampart and ditch and contains several churches, convents and a cathedral. The celebrated painter, G. F. Barbieri, commonly called Guercino, was born here about 1590. A statue of him stands in front of the Palazzo Governativo. The gates of the ancient town have been preserved. It has a hemp and rice market. Pop. 23,907.

CENTO, sen'to (Latin, ((patchwork55), origi¬

nally a cloak made of patches ; hence, as Less¬

ing observes, the dress of Harlequin is called in Apuleius mimi centuculus. The term has been transferred to such poems as have been formed out of verses taken from other poems.

It was a particular art to combine passages of different authors on different subjects in this manner so as to form a regular whole. Thus there were in early times Virgilian centos (centones virgiliani), in which most of the verses were taken from Virgil; for instance the (Cento Nuptialis5 of Ausonius, and centos from the verses of Homer {Homerici centones) . It was a favorite pastime in the Middleˆ Ages.

Consult Delepierre, (Tableau dc la litterature du centon5 (London 1874-75).

CENTRAL AFRICA PROTECTO¬

RATE. See Nyasaland Protectorate.

CENTRAL AMERICA. Though on the

map Central America appears to be a mere isthmus extending in a southeasterly direction from Mexico to Colombia, between the Carib¬

bean Sea and the Pacific Ocean, it is in fact structurally much more nearly related to the 202

West Indies, including the Gulf of Mexico and the Caribbean Sea, and to the northern coast of South America, than to the main bodies of the larger continents. It has a distinct geologic formation at right angles to those of North and South America. Probably in the Tertiary Period Central America and the Antilles to¬

gether formed a great island or archipelago lying between North and South America.

(Consult Robert T. Hill's cCuba and Porto Rico, } etc.). Guatemala, Honduras, Salvador, Nicaragua and Costa Rica, five republics, are characterized in the treaty of peace signed at Corinto, Nicaragua, 20 Jan. 1902, as ((the Central American family.® The Isthmus of Panama, at the commencement of its history under the Spanish regime, was associated not less inti¬

mately with the settlements in the region north and west of it than with those of South America; British Honduras (Belize) also, a colony lying between Guatemala and the Carib¬

bean Sea, has been connected about equally with the history of the Central American states and with that of Yucatan. The mountains de¬

scribed as extending directly at right angles to the cordilleras of North and South America are part of a great Antillean system. East and west mountain ranges of this type occur in the Isthmus of Panama, Costa Rica and the east¬

ern parts of Nicaragua, Honduras, Guatemala and the adjoining provinces of Mexico, also along the Colombian and Venezuelan coast of South America, and in Cuba, Haiti and the other islands of the Greater Antilles. Two submarine ridges stretching across the Carib¬

bean Sea, between Honduras and the Sierra Maestra range in Cuba, and from Cape Gracias a Dios to Jamaica, are regarded as being geneti¬

cally a part of the same system. The great banks of the western Caribbean Sea were at one time projections of land probably connect¬

ing Central America with Jamaica and possibly Cuba. Therefore Florida, the Bahamas, the Antilles and at least the eastern part of Central America, totally severed from North and South America, together formed either one great is¬

land, or, more probably, a group of several large islands, with volcanic chains on the east and west, and with characteristic rocks, cal¬

careous and igneous, which have weathered into soils of unsurpassed fertility. A Central Ameri¬

can group of volcanoes, with 31 active craters crossing the western ends of the Antillean folds, occurs on the Pacific side of the republics, from Costa Rica to Guatemala. The central and eastern region is well watered, with com¬

paratively low mountains, very rich soil, and a good climate, except the Caribbean coast which, from Trujillo downward, including the Mos¬

quito territory, is hot and insalubrious. Lack of communication and means of transporta¬

tion has led to the abandonment of the inter¬

mediate lands, the most attractive and exten¬

sive part of the country, nearly or quite beyond the influence of the volcanic area. The easily approachable volcanic strip (in Nicaragua, for example, between the lakes and the Pacific) has been preferred hitherto as a place of residence.

Thus one who visits only the principal cities in the centre of population, seeing nothing of the naturally richer and better districts, re¬

ceives the impression that this is the most vol¬

canic region of the globe. The largest volcanoes are, for example in the north, the Acatenango, 14,000 feet elevation, in Guatemala; and in the south, for example, the Irazu and Tu realba, of 12,000 feet, in Costa Rica. In Nicaragua the highest, El Viejo, is only 5,800 feet above sea-level. In Guatemala we find the volcanoes, Fuego, Cerro Quemado and El Chato ; in Sal¬

vador, Ilopango and San Salvador. Earth¬

quake shocks in the republics last mentioned, and also in Costa Rica, have been, as a rule, very severe, while those of Nicaragua are comparatively mild and extend over limited areas. The recorded seismic disturbances that have affected the whole country are those of

1538, 1648, 1651, 1844 and 1865. Central Nica¬

ragua, east of the lakes, Nicaragua and Ma¬

nagua (the largest bodies of fresh water in Central America), is regarded as nearly im¬

mune from such disturbances. Nicaragua's centre of volcanic activity is a ridge, the Sierra de los Morabios, between the Cosigiiina (whose outburst on 2 Jan. 1835 was considered the grandest on record before the eruption of Krakato in 1883), and the Momotombo. In this ridge are 10 vents, two of which, the Telica and Momotombo, are active and none can be properly called extinct. Southeast from the Morabios ridge is the isolated active vol¬

cano Masaya. The Orose is in Costa Rican territory. The island of Ometepe in Lake Nicaragua has two volcanoes, one dormant, the other extinct. Comparatively few members of the Central American chain of volcanoes are of the type with which fierce eruptions are com¬

monly associated; moreover, the fertility of the soil on their flanks, due to the high percentage of soda and potash contained in volcanic dust, tempts agriculturists to remain in this neigh¬

borhood. The line of the intercontinental rail¬

way keeps near to the Pacific coast, and it is probable, therefore, that for many years to come the best part of Central America, the central districts, will receive only secondary consideration, remaining comparatively unde¬

veloped.

History. — Rodrigo de Bastidas, a notary of Triana, was the first Spaniard to explore any portion of the Caribbean coast of Central America. He embarked at Cadiz in October 1500; and, after reaching the mainland of South America near the present Venezuelan boundary, coasted westward and made observations of the isthmus from a point below Darien to Nombre de Dios. Columbus, on the fourth voyage to America, sailing from Cadiz, 9 May 1502, and stopping at Santo Domingo on the way, arrived off the shore of Honduras, 30 July. There he heard reports of the wealth of Mexico, but de¬

cided to continue the voyage southward, search¬

ing for a strait that should lead across terra firma to India. Thus he and his companions, including his son and brother, passed a cape to which they gave the name Gracias a Dios, and on 25 September, reached the river San Juan de Nicaragua, and heard stories from the natives which made them believe they were within a nine-days' journey of a splendid land, such as Marco Polo had described in his account of travels in Asia, and that the river Ganges lay only a little beyond. On 7 October they came to the beautiful Laguna de Chiriqui, and on the adjoining Veragua coast they obtained a large amount of gold by trading with the natives. Columbus lingered in the immediate neighborhood of the Chagre (now CENTRAL AMERICA

called Chagres) River and Colon — at Porto Bello from 2 to 9 November, and at other points within a few miles for three weeks and five days. Thus during more than a month the greater discoverer hovered vol¬

untarily about the spot where the strait he dreamed of was to be cut four centuries later.

And when he thought to return by the way he had come, abandoning the search, stress of weather held his vessels back, so that it was not until 6 Jan. 1503, that they anchored in a little river just west of Colon. He wished to plant a colony on the coast between Veragua and Cerebaro, but, hostilities breaking out between the Spaniards and the natives, the former were obliged to abandon their attempt, and once more Columbus passed the place of the future canal, clinging to the shore before setting a straight course for Jamaica.

In 1506 Juan Diaz dc Solis and Vicente Pinzon sailed along the coast of Honduras westward, exploring the Gulf of Honduras, in search of a passage by water to the Far East — • India and Cathay. Several years passed be¬

fore the Spanish King, Ferdinand, authorized Alonzo de Ojeda and Diego de Nicuesa to colonize and govern, in his name, the northern

coast of South and Central America. The river Darien or Atrato was made the dividing line between their dominions. The eastern or South American portion was called Nueva Andalucia, and of this Ojeda was made gov¬

ernor ; the western division was named ((Golden Castile,® Castilla del Oro, and the command given to Nicuesa. The latter secured the larger number of followers ; the former, however, attracted to his standard Martin de Encisco, afterward governor, Balboa, discoverer of the Southern Sea, and Francisco Pizarro, conqueror of Peru. The forces of both governors suf¬

fered extreme hardships. Nicuesa's capital was at Nombre de Dios, Ojeda's at San Sebastian — so named because the Indians afflicted them as that saint was tortured. Ojeda returning to Espanola, where he died, Encisco, Balboa and Pizarro removed the capital of Nueva Anda¬

lucia to Antigua del Darien, that is, a point within Nicuesa's dominions. In the contest for supremacy that ensued, Nicuesa was the loser.

Balboa assumed command, and Antigua be¬

came the centre of Spanish enterprise in that part of America. On 25 Sept. 1513, Balboa discovered the Southern Sea, and four days later took possession of it, with all its lands and ports and islands in the name of the King and Queen of Spain. Before news of this dis¬

covery reached the Spanish court, a successor to Balboa had been appointed in the person of Pedrarias Davila. In 1517 Balboa was falsely charged with treason, and executed. Pedrarias Davila, being superseded in command, went to the south coast and founded the city of Panama (that is, the old Panama, six miles from the present city), 15 Aug. 1519.

A voyage into the unknown northwest from Panama was made in 1522 by Gil Gonzales, who explored the Dulce and Nicoya gulfs indent¬

ing Costa Rica's southern shore. Thence northward 50 leagues he went, to the domain of a chief whose name was Nicaragua, and who dwelt near the principal lake of that region.

Gonzales learned that this lake, though lying near the Southern Sea, had an outlet to the Caribbean. In his narrative he says that the discovery is important, inasmuch as only ((two or three leagues of very level road separate the two seas.® The expedition returned to Panama in 1523, after baptizing thousands of natives and securing 112,000 pesos of gold.

On 15 Sept. 1521, Panama was made a city with royal privileges ; the episcopal see was trans¬

ferred to it; from this base expeditions were sent out toward Peru and into the northwest.

Pedrarias, in 1524, dispatched Francisco Her¬

nandez ‘de Cordoba with Hernando de Soto and other captains to Lake Nicaragua. Gil Gonzales, continuing his discoveries in Hon¬

duras and Nicaragua, came into collision with De Soto; and only a little later one of the captains of Hernan Cortes, the Spanish con¬

queror of Mexico, appeared as a claimant for the territory of Honduras. In the latter part of October 1524 Cortes set out from Mexico, marching to Honduras with an army of about 100 horsemen, 40 archers and arquebusiers and 3,000 native warriors and servants. After mak¬

ing himself governor of the country, he re¬

turned in triumph to Mexico City in May 1526.

Pedrarias went to Nicaragua about the same time. There were rival Spanish governors even then in Nicaragua and Honduras. Guatemala and Salvador were overrun by Pedro de Al¬

varado, second in command to Cortes. The former country, in which a great empire had existed probably about the beginning of the Christian Era, was inspected by Alvarado in 1522, and conquered with a small force of Spaniards and native allies before two years had passed. In 1535 an unsuccessful attempt to colonize Veragua was made in the interest of the descendants of Columbus (on whom the titles, ((Duke of Veragua,® etc., had been conferred), and a still more calamitous enter¬

prise was that of Diego Gutierrez, a citizen of Madrid who led an expedition to Costa Rica north of Veragua in 1540. Francis Drake,

Eng¬

lish privateersman, attacked Nombre de Dios in 1572. Again, in 1595, Drake (now Sir Francis, knighted for his feat of sailing round the world), Sir John Hawkins and others took Nombre de Dios; but an English force of 750

men sent to attack Panama was defeated by the Spaniards when half-way across the isthmus.

Drake, dying on 28 Jan. 1596, was buried off Porto Bello. The conquest of Costa Rica was undertaken by Nicaraguan Spaniards in 1560.

Partial success rewarded the efforts of the soldiers ; meanwhile, however, great progress had been made in the pacification of that prov¬

ince by the efforts of Franciscan friars.

Captain William Parker, sailing from Ply¬

mouth in November 1601, captured Porto Bello.

In December 1616 the King of Spain informed the governor of Castilla del Oro that he and the commercial world believed that communi¬

cation might be established easily between the oceans by constructing a canal. This was the century of English depredations and of

Spanish idle dreaming, Spain's centuries of vigorous expansion having passed. In 1668

the Welsh buccaneer Morgan plundered Porto Bello, his foul cruelty rivaling any Spanish mis¬

deed in this blood-stained region. Three years later, having at his disposal a fleet of 37 ships and a force of 2,000 fighting men, he captured Panama (January 1671). The inhabitants set fire to their homes, and built a new city of the same name at a little distance in a locality less 204

exposed to attack. That was the beginning of the present city of Panama. Granada, in Nicaragua, was sacked by French and English pirates in 1686. A number of influential Scotchmen, chief of whom was William Pater¬

son, the founder of the Bank of England, were authorized by the Scottish Parliament in 1695

to found colonies in savage lands. They after¬

ward obtained letters patent from William III of England. Paterson chose Darien, believing the control of the traffic of the isthmus to be essential to the prosperity of England; he certainly was not, as is incorrectly and com¬

monly stated, merely anxious to make money for his company, and reckless of consequences to the colonists. (Consult Bannister's <Life> ; Rodriguez's (Anexion de Cuba,* etc.). The largest and most costly expedition that had yet been fitted out for colonization in America sailed from Leith, 26 July 1698, and founded ftNew Saint Andrew.® Subsequently recruits were sent out to them; but the project came to a miserable end. More than 2,000 lives and several millions of money had been lost, when the survivors were starved into surrender by the Spaniards. A British squadron commanded by Adm. Edward Vernon (21 Nov. 1739),

took Porto Bello, but was defeated at Carta¬

gena. Meanwhile English settlements of a very peculiar character had been begun in Mosquitia and at Belize. The Misskito tribe, called by the Spanish and English ((Sambos® or ((Mosquitos,® a hybrid people, descendants of fugi¬

tive slaves, ((Cimarrones,® and natives, ruled by an hereditary king, dwelt on the eastern coast of Honduras and Nicaragua in the 17th century. Unoccupied by the Spanish, this coast was frequented by buccaneers, who made Cape Gracias a Dios, on the dividing line between the colonies just mentioned, their rendezvous.

Small settlements of English adventurers ex¬

isted in this region. By the Treaty of Madrid (1670) certain rights were conceded to Great Britain, and the British claim was asserted (1744) by sending troops and building forts, but it was withdrawn (1786)

when an agree¬

ment was reached as to the cession by Spain of the territory on the north coast of the Gulf of Honduras. The ex-freebooters of Belize, reinforced by other adventurers, were able to exploit the rich forests and hold their own, or more, in the contest for the possession of this territory waged at intervals between the au¬

thorities at Yucatan and the wood-cutters (regarded as interlopers) from 1733 until the end of the 18th century. The Treaty of Ver¬

sailles (1783) defined the limits of Belize; but these were more precisely stated in the treaty signed at London, 14 July 1786. The bound¬

aries were subsequently extended by encroach¬

ments of the wood-cutters. Thus England, retaining the region now known as the colony of British Honduras, abandoned possession of the Mosquito coast, though her claim to exer¬

cise a certain degree of influence in the latter territory (from which the Spaniards were expelled by the Sambos in 1796) was not ex¬

pressly and absolutely surrendered until the middle of the 19th century. Before that de¬

termination, several reverses were sustained in Nicaragua. An English force was repulsed at Fort San Carlos in 1769. A few years later the design to sunder the Spanish provinces of Central America, and, at the same time, to capture a route for an interoceanic canal, by taking possession of Lake Nicaragua and the cities of Granada and Leon (Consult Bancroft's (Central Americaˆ), proved infeasible. An English force of about 1,800 men, including a party of marines under Horatio Nelson, was forced by the deadly fevers to abandon the attempt.

Except Belize, Mosquitia, and large tracts in which the Indians remained nearly undis¬

turbed, Spain now held the land, but no longer had energy or opportunity to develop its natural resources. The natives, more docile and serviceable than in other parts of America, seldom increased the difficulties of the situa¬

tion by uprisings ; there was, however, little incentive to accumulate property in a land menaced constantly for a hundred years by English, Dutch and French pirates. The sev¬

eral divisions of an apathetic population were easily drawn together for administrative pur¬

poses. The captain-general of Guatemala, by the middle of the 18th century, controlled the provinces of Costa Rica, Honduras, Nicaragua and Salvador, beside others now within Mexi¬

can boundaries. Revolt against Spain was the form in which the spirit of the people, awak¬

ened from this lethargy, naturally expressed itself. Unfortunately armed revolt has ever since been too closely identified with progress in the popular conception. The first weak blow for Central American freedom was

struck in San Salvador, 5 Nov. 1811. A sequel to this attempt (in Leon, Nicaragua, 13

Dec. 1811) duplicated this Salvadorean effort, in result as in motive. A third failure was recorded when the Colombian insurgents

(1820) fitted out a combined sea and land ex¬

pedition to operate against the towns of Omoa and Trujillo. The Isthmus of Panama cast in its lot with South America, rather than with Central America, by voluntary annexation to the republic of Colombia on 28 Nov. 1821.

(For its subsequent history see Colombia and Panama). The declaration of independence at the city of Guatemala, 15 Sept. 1821, was little more than an echo of the triumphant cry of other Spanish-American colonies in revolt.

It was followed (5 Jan. 1822), by a decree of the junta dircctiva annexing Central America to Mexico. Salvador refusing to join in this surrender, a war with Guatemala ensued. Be¬

fore 18 months had passed the Central Ameri¬

can provinces resolved to form a union and constitute a single nation. On 1 July 1823 a national constituent assembly expressed this purpose, the name chosen for the nation being Provincias Unidas del

Centro de America.

Though laggards in the race to win freedom, the Central Americans were prompt in bestow¬

ing it. The laws of 31 Dec. 1823, and 17 and 24 April 1824, emancipated their slaves and declared that slaves of other countries on com¬

ing to Central America should be freed. When dissensions and civil war broke up their con¬

federacy, they had at least taken one step for¬

ward, in advance of their neighbors. The con¬

gressional decree of 30 May 1838, granting to the states the privilege of unrestrained action in most important matters, practically dissolved the union, _ though Salvador tried to maintain or renew it long after the other confederates had withdrawn. Nicaragua, on recovering her autonomy, became involved in a dispute with CENTRAL AMERICA

Great Britain, the latter upholding the claim of the Mosquito King to all the territory lying between Cape Gracias a Dios and the mouth of the San Juan River, and sending (January 1848) two warships to occupy the port of San Juan. Nicaragua . yielded provisionally to superior force. At this point the intervention of the United States was felt; and soon after¬

ward the Clayton-Bulwer Treaty, concluded at Washington 19 April 1850, between the United States and Great Britain, provided that neither power should occupy, fortify, colonize or exer¬

cise dominion over any portion of Central American territory (except Belize), or make use of a protectorate in any form. This treaty guarantees Central American independence and encourages the maintenance of English influ¬

ence, which was considered beneficial within certain limits. By the Zeledon-Wyke Treaty of 28 Jan. 1860, England ceded to Nicaragua

absolutely the protectorate over the Mosquito coast. While the diplomacy of the govern¬

ment of the United States was in the main considerate and helpful at this time, the con¬

duct of some of her citizens left much to be desired. San Juan del Norte, or Greytown, was bombarded by the United States sloop-of-war Cyane, and burned to the ground by a landing party from that vessel, on 13 July 1854

(see Walker, William). Renewal of the

efforts to achieve Central American unity was due, in a measure, to President Barrios of Guatemala (1873-85). For the further de¬

velopment of this design ; the attempt (1895-98) to unite Honduras, Nicaragua and Salvador; the treaty of 20 Jan. 1902, and events of the years 1885 to date, see the separate articles on each of the five Central American republics.

All the Central American countries sent delegates to a conference held in Washington, D. C., 14 Nov. to 20 Dec. 1907. As a result of their deliberations eight conventions were signed, in relation to a general treaty of peace and amity, the establishment of a Central American Court of Justice, of an international bureau, of a pedagogical institute also inter¬

national in design, *etc.* The Central American Court of Justice was opened at Cartago, Costa Rica, 26 May 1908 in the presence of repre¬

sentatives of the five Central American nations, of the United States and of Mexico. This international court is now established at San Jose, Costa Rica. On 20 Jan. 1909 a meeting at Tegucigalpa, Honduras, was attended by delegates of the five nations and an agreement was framed to secure the unification of the monetary systems, customs duties, weights and measures, fiscal laws and consular service.

This was the year of the Zelaya episode (see Nicaragua — History) . Other happenings served to concentrate attention upon Nicaragua, which during the latter part of the summer and the entire autumn of 1912 was in a state of revolution which imperiled the lives and property of foreigners and so led to interven¬

tion by the United States. In January 1914

another conference took place, which carried even further the recommendations of the con¬

ference of 1909 and added plans for agreements as to international highways, postal and tele¬

graphic regulations, and coasting trade, as. well as the founding of a central pedagogic insti¬

tute and a central mission of foreign relations.

Although no united action was taken for almost a decade to put in operation the plans of these conferences, good influences were at work mak¬

ing for a better understanding of the essential community of interests and responsibilities and bringing nearer to realization the stabilization of financial and political conditions. Thus, the convention between the United States and Nica¬

ragua, proclaimed 24 June 1916, served to call attention to the need of increasing eventually the solidarity of Nicaragua, Honduras, El Sal¬

vador and Costa Rica; while the establishment of banks in Central America, with the aid of capi¬

talists in the United States, has proved the power of such organizations to aid regular and orderly development throughout all that region, wherever transportation routes can be main¬

tained with reasonable economy. In 1921, Costa Rica, Guatemala, Honduras and Salvador

formed a federation known as the Central American Union. A Provisional Federal Coun¬

cil was held in Tegucigalpa, Honduras, 17 June 1921. A National Constituent Assembly met in the same city 20 July 1921 and a Federal Con¬

stitution was signed 15 Sept, following. This document resembles somewhat the Federal Con¬

stitution of the United States. The constituent states preserve their local sovereignty, while the customs dues, fiscal laws, foreign relations

are delegated to the Federal authorities.

Bibliography. — Charnay, D., (Ancient Cities of the New World) New York 1887) ;

Coloqhoun, A. R. (The Key of the Pacific*

(London 1895) ; Cortes, H., (The Fifth Letter of Hernan Cortes to the Emperor Charles V, containing an Account of his Expedition to Honduras) (London 1868) ; Enock, C. R., (The Republics of Central and South America) (London 1913) ; Fife, D., (Guatemala and the States of Central America) (London 1913) ; Palacio, D. Gariade, (Carta dirigida al rey de Espana, ano 1576) (New York 1860) ; Keane, A. H., (Central and South America) (London 1909) ; Palmer, F., (Central America and its Problems) (New York 1910) ; Phillips, P. L., (A list of Books, Magazine Articles and Maps relating to Central America, 1800-1900) (Wash¬

ington 1902) ; Shepherd, W. R., (Central and South America) (London 1914) ; Squier, E. G., (The States of Central America* (New York 1858) ; Verrill, A. H., (South and Central American Trade Conditions) (New York

1914) ; Walker, W., (The War in Nicaragua >

(Mobile 1860).

Marrion Wilcox.

CENTRAL AMERICA, Diplomatic Re¬

lations with. — The earlier general interest of the United States in Latin America was first attracted to a larger consideration of the prob¬

lems relating to Central America under Mon¬

roe's administration, which in 1818 had an opportunity to consider suggestions for estab¬

lishing the southern limit of the United States at the Isthmus of

Panama, in 1819 completed the establishment of the United States as a Gulf power by the acquisition of Florida, in 1822 recognized the extinguishment of direct Spanish interests in Mexico, and in 1823 re¬

ceived from Salvador diplomatic overtures for annexation or a protectorate — overtures which were later withdrawn by the disappearance of the danger of forced annexation to Mexico.

In 1823, with consent of Mexico the five Central American states were united into a national federation which subsequently adopted 206

a constitution on the model of that of the United States and borrowed the code of Louisi¬

ana.

Central American commissioners presented

their credentials at Washington 10 Sept 1823.

In 1824, Secretary Adams instructed Thomas N. Mann to visit Guatemala to obtain statistics and political information; and in 1825 the American government recognized the Federa¬

tion of Central America, which in the same year was also recognized by Great Britain and the Netherlands. The first American diplomatic agent to the Federation, John Williams, was commissioned on 29 Dec. 1825 ; and the last American representative to the Federation, ap¬

pointed in 1841, left his post in March 1842.

The last Federation representative at Wash¬

ington took his leave 16 March 1828.

On 5 Dec. 1825, the United States negotiated with the Federation a treaty of commerce which expired by its own limitations in 1837

and was never renewed. In April 1825, the American government received from Canaz, the representative of the Federation, a propo¬

sal of co-operation in promoting the opening of a canal through Nicaragua, and, in 1826, through the influence of Mr. Williams, the Central American government contracted with A. H. Palmer of New York for the construc¬

tion of the canal; but failure of plans caused Central America to open negotiations with a Hollanjd company, whose plans failed by the political disturbances in connection with the separation of Belgium from Holland in 1830.

As a result of rebellions, the Federation was partially ended by 1833. It was practically dis¬

solved by 1839 by the legislative decree of 1838

granting each member of the Union the privi¬

lege of unrestrained action in the most im¬

portant matters, and completely dissolved by 1847.

After the complete dissolution of the Fed¬

eration American diplomatic representatives to the separate republics were first sent to Guate¬

mala in 1848, to Salvador in 1849, to Nicaragua ’

in 1851, to Costa Rica in 1852 and to Honduras in 1853. Diplomatic representatives of the sep¬

arate Central American states were received at Washington from Nicaragua in 1849, from Costa Rica in 1851, from Guatemala in 1851, from Salvador in 1853 and from Honduras in 1854. A commercial treaty was negotiated with Costa Rica in 1851. A similar treaty, ne¬

gotiated with Nicaragua in 1849 and at sub¬

sequent periods, did not become operative.

Active American diplomacy affecting Cen¬

tral America really began with the military occupation of California and the resulting Co¬

lombia treaty of 1846 wdiich was ratified in June 1848. The motive which attracted the American government to exercise a larger in¬

fluence over the region was associated with the problem of the establishment and proper con¬

trol of a new route to California. It was also connected with the development of canal plans by Louis Napoleon between 1844 and 1848, and consequent competitive English operations and plans in Central America, especially the occu¬

pation of the Nicaraguan port of San Juan (Grey town) which precipitated the intervention of American diplomacy and the negotiation of the famous Clayton-Bulwer Treaty (q.v.) of 1850 which guaranteed the integrity and inde¬

pendence of Central American territory and prepared the way for the extinguishment of any British claim of sovereignty or protectorate over the Mosquito Indians along the coast of Nicaragua — a claim which was finally termi¬

nated by the English treaty negotiated by Wyke with Nicaragua in January 1.860. On questions connected with these negotiations Central America requested and welcomed the support of the United States.

Boundary questions between Central Amer¬

ican states furnished an opportunity for Eng¬

land to assert her earlier territorial claim. In 1852 Webster, acting under friendly mediation of the American government, submitted propo¬

sitions for adjustment of such questions be¬

tween Costa Rica and Nicaragua, but they were rejected by Nicaragua. In 1853, Marcy, anxious to prevent European intermeddling in Central American affairs (and especially English en¬

croachments in Honduras), encouraged the re¬

establishment of the Central Federation, but he was not ready to pledge the American govern¬

ment to expel the British from the Bay Islands. After 1853, American diplomatic re¬

lations in Central America were affected by the constant apprehension of European influence inimical to American interests, and by a series of irritating events including the bombardment and burning of Grejdown by Americans in 1854

as a punishment for an alleged insult to the American Minister to Nicaragua.

Relations were complicated by Walker's

bold designs in connection with the political factions in Nicaragua, culminating in his con¬

quest of Nicaragua and his election to the presidency of the country. By his expeditions, and by the filibuster diplomacy with which he vainly sought to gain recognition at Washing¬

ton, he caused Nicaragua to present to the American government a series of claims for damages and created an ill feeling of all the Latin American representatives which culmi¬

nated in the draft of the proposed treaty of alliance against the supposed designs of the United States.

The most important result of the Walker episode was the closure of the transit, causing a diversion of traffic which perhaps changed the destiny of Nicaragua.

In this period, by 1856, the American gov¬

ernment adopted a more aggressive American policy in regard to control of transit and canal routes.

During the Civil War, the Central American people, seeing that the causes wdiich produced filibustering were passing away by the results of Union victories, and fearing the designs of all Europe (and especially of France) against American states, became more friendly to the government at Washington and anxiously

hoped for the restoration of the Union. Soon after the fall of Vicksburg and the failure of Lee at Gettysburg, some advocated annexation to the United States. Others relying on the American government as natural protector of American republics requested alliance or aid.

To them Seward replied that the most effective aid to American republics wTas the moral influ¬

ence resulting from the integrity of the Amer¬

ican Union and the stability of republican in¬

stitutions.

The considerate policy of Secretary Seward during the Civil War period in forbearing to press claims of American citizens against the 18°

A.

76°

B

C

12

D

10’

E

8

F

3 Sta. Elena

Central America

DEPARTMENTS.

Orange Wi

Ambergris Cay

5an Pedro

‘Corker Cay

GUATEMALA:

1 Guatemala

2 Amatitlan

3 Escuintla

A Suchitepequez

5 Retalhuleu

6 Quezaltenango

T Solola

8 Chimaltenango

9 Sacatepequez

1 0 Totonicapam

11 San Marcos

12 Baja Verapaz

13 Santa Rosa

14 Jalapa

15 Jutiapa

16 Chiquimula

17 Zacapa

SALVADOR:

1 San Salvador

2 La Libertad

3 Sonsonate

4 Ahuachapan

5 Santa Ana

6 Chalatenango

7 Cuscatlan

8 Cabanas

9 San Miguel

0 Morazan

11 La Union

12 Usulutan

13 Vicente

1 4 La Paz

‘Three Corner Cay

Bell

TUKNj

*’ Lighthouse

Keef

Tlcal

Playa’ˆHenl

“ˆFlores

,S. Juan de Dios’

t Toribio

Tobacco Range

O C-y

L. S. And rA O r

“7° »’<«

La Libertad ° r

’ Glover

Reef

(Jonathan Pt

q \St*A-NDS

^-^lloatan

Roatan 1.

TV j£»RangUa;/

^ay •v/

j)^ljJlcaco8 Pt.*’ A

Mangrove,.4/ F V—

Cays ”’-C U

— ˆ-ˆres-Euntoa-L

Bonaca I.

Maobaqulla’*

A Utiia

Caratasca Shoal

intaGord*

/A)CoaUn|ˆs?3 uV Rˆtcotzal

l”:cCˆ4r‘®u.3

AO*’ ˆ Tfiichitelcnnngo

•fy-7s

S.CrnAjI

Seal Cays 0 Gord.

o Pigeon Cays

VivoRii.la Cays q

li n Piston

*uen o P”ia_*

Jnga U — *c*ry ,

Liinaˆijjjaso ReulL. C

A Siicatara

V IrSta. Maria (lei Realˆ

EayacoVC 0 8anTsteban ˆ

ˆ JJUalucibbˆ.ˆ

Jriatobn

ˆNegrito y

:i ii/os

Babel Cay

Manguallle V

Sabuna

fV.. v

Zacapˆ I

Cape Gracias a .Dios

Colmi

Enquilas V

y I SuWoo o

.Tamon Cays

o; Morrison Cays

＞rdo ’Mosquito Cays

; Nassa Cays

o N i:i＞ Thomas Cays

) Jo86 -

ppoteca

? £rhigla?_

0 racial

L_&2Ss’

Concordia

•y I j San Diego a

;oinn)-aeua

_ ! xxJProtoccionˆr vl

P.U,’ TaGUClSXLPA

ˆ7 /Sta. AnaVˆ-LL -<-■

Chai»periucfe{$

}J*

snti’xTq

La Qofaera*

iALPA Muroielago

Tecojate1

i Pespire .

. -0ˆ2

jradow

.POP

liacuai.

tcente /Vot-.JUCUAJA}

0 C f Sun MigtifcfC:

ieotai

j\® J{notega

Blatugalpa

pSebaoo W

rtAGALPAv

■Mctapai _ c/“

*0 Oi.r > Providence 1

(To Colomuia)

Walpasiesa

pilunja’-^’

/^ejconimd^^v

4| > njieV)i|

ifep-A v

\ L/SomotiUo

:VOd.C£)SEGUlNA

rctnde

Johnny Cay

ElˆleN:

Chinaudegi

Corintoˆi

. Koorimjj

St. And iews I.

Gudeisqda.‘A.

Esquipu

MOMO.Tt

Courtown Cays

Ifearl /^a7cef

| Pearl City’ll

.Rama ^

Albuquerque I.

Little Coiin I

Great Corn I.

(otrert

^Comoapa

O^^BlucClelds/

“? Q ! 1:o ’＞krcr\

.Granada

Bluefidda^Day

C. Dcsolado y

8. Rafael o

5&V > adera 1

> Monkey Pt.

8. TirgeA ˆ vLv. MADERA’

Cit ,:ns j\y jca RA G

.7 > 4%V5 ”“8“ „SE»e

u del SurVt, X, v

C. Na.aNTTLV’L

Pt Qorda

MtV0U

• ”/ft Vn

/ ialinas

C. Ciena < £-•

vG’reytown

v,Er *e ,0’^

v Z L S

fevOL.TENERiO

©LAJUELA

Gorda(

Sard

parA*0

L i M

BARBA

Morro 11 < t

ns oso

Nlcoya qji

.jVˆTerraba A

Botu6®,4:

I E N A S>

R. Rspmo /

-“mtTV

(PLAN CO ,

Rto. .

CENTRAL

AMERICA

. *07VyU£ J.)S

G«nle l>UPANAtlA ,

;to Pt.

edro Gonzales I. (i

8. Jo«b 1.ˆ

Pt Violin

JORWULER-aS

. S. Joec

Jorono I

.. ?\?“‘‘3t°££iJrarita . San

_ ˆfcjMm«oSS5i!“S? .. V —

Salsipucdcs V>.

Matapala Pt.

Pt. Platanal

Statute Miles, 88—1 Inch,

GULF OF

Contreras la. \

0

Afdkra I. q

‘c cri

oIgoana

Ci^”*

p\jva®

Kilometres, 142 =* 1 Inch,

NTOS o

1 Podasl

panama

Mala

Montaosa I,

Rond McNally’s New 11 x H Map of Central America.

Copyright by Rand. McNally « Co,

luanjco’Pt.

Morro

Mariato Pt.

CENTRAL AMERICA

207

government of Nicaragua — claims which had long been a source of diplomatic irritation —unfortunately caused Nicaragua to regard the claims as abandoned and to refuse to negotiate a claims convention in 1871, although she agreed to a treaty of amity, commerce and navigation in 1867. The claims long remained a source of diplomatic discussion at intervals and were never settled.

Until the beginning of the 20th century the chief interest and attention of the United States in Central America, aside from the main¬

tenance of the Monroe Doctrine, was centred in the possibility of constructing a trans-isth¬

mian canal across Nicaragua. With the idea that the Nicaraguan route was more practical than the Panama route, an American canal company wras organized in 1889 — nominally to build a canal across Nicaragua, but really to induce the American government to take the responsibility in the enterprise. Until 1903, a violent controversy ensued between the advo¬

cates of the two routes. With the idea of con¬

structing a canal via the Nicaragua route the American government negotiated for the with¬

drawal of the Clayton-Bulwer Treaty which was finally terminated by the Hay-Pauncefote Treaty of December 1901. Soon thereafter, how¬

ever, a decision was made in favor of the Panama route, disappointing the hopes of Nicaragua.

In recent years, earlier American interests and influence in Central America have been modified and expanded by new American ex¬

pansions in world commerce and larger Amer¬

ican participation in world politics. By 1917

the United States dominated the Central Amer¬

ican market and invested in Central America more capital than any other country, and was thus more closely related to the country by economic bonds.

The American government, with a policy of forbearance and national unselfishness, too long allowed Central America to suffer from divisions, irresponsible leadership, revolution and bankruptcy. True, it sometimes used its good offices to prevent interstate conflicts, il¬

lustrated in 1888 by President Cleveland's ar¬

bitration of a long pending boundary dispute between Costa Rica and Nicaragua. With the hope of reducing sources of conflict it also urged a closer union and co-operation, recom¬

mending a return to the earlier policy of fed¬

eration. In 1874 it began a series of friendly efforts to encourage the establishment of a strong and settled union, but practically aban¬

doned its diplomatic efforts in that direction after the pourparlers of Blaine in 1881.

In 1896, the last attempt to restore the early Federal union was made by the Presidents of Honduras, Nicaragua and Salvador, who (in accord with a treaty of 1895) formed, for the exercise of their external sovereignty, a sin¬

gle loose political organization with the title ˆGreater Republic of Central America® which was promptly recognized by the American government by the reception of a minister, but with the distinct understanding that the rc-sponsibilty of each of the separate republics toward the United States remained wholly un¬

affected. Again the hope of the formation of a permanent federation was disappointed. In 1898, as a result of revolutionary movements — and especially a separatist movement in Sal¬

vador — the provisional executive council of the Greater Republic announced the dissolution of the union by mutual consent.

In 1906 President Roosevelt with the co¬

operation of President Diaz, in order to ter¬

minate a war acted as mediator in a dispute of Guatemala with Salvador and Honduras.

This was in accord with the treaty of peace which received the assent of all the five repub¬

lics except that of President Zelaya of Nica¬

ragua, and directly recognized the obligation of the United States to mediate and intervene in Central American affairs. In February 1907

the American government failed in a friendly mediation to prevent Zelaya from making war against Honduras, but was able to prevent the spread of the conflict to Salvador and Guate¬

mala. In August 1907, by strenuous diplomatic representations, it averted war between Nica¬

ragua and Salvador.

At Washington, in 1907, through negotia¬

tions encouraged and stimulated by the United States on the initiative of President Roosevelt, the diplomatic representatives of the five sep¬

arate republics held a Central American Peace Conference to find a basis of agreement on political, commercial and financial relations.

The chief results were a series of palliative measures : the establishment of a Central Amer¬

ican International Bureau as a bureau of in¬

formation (a miniature of the Pan-American Union) ; the foundation of a Central American Court of Justice (five members) in Costa Rica, for the arbitration of questions of an inter¬

national character affecting the relations of the five republics ; and a provision for later Central American annual conferences to discuss political and economic questions of community interest.

The American government, after the de¬

rision which greeted the first decision of the new Central American court, concluded that a court without means of enforcing its decisions was of no value — and reluctantly, but logically, concluded that American intervention was nec¬

essary to prevent depredations by the Zelaya government in Central America. In 1909, after the execution of two Americans in Nicaragua, it intervened directly, compelled Zelaya to flee and entered into a

treaty agreement (negotiated by Secretary Knox) to act as a receiver for Nicaragua and to aid the new government in the rehabilitation of its finances. In the dim¬

mer of 1912 it landed troops at the request of .the Nicaraguan government to protect Ameri¬

can lives and property and preserve free com¬

munication with the legation, and operated the national railway under the protection of Ameri¬

can soldiers. It also negotiated a treaty, later approved by the Wilson administration, secur¬

ing for its services in rehabilitating the finances sole rights to the construction of a canal across Nicaragua and to a coaling station in the Gulf of Fonseca. In August 1914 the Nicaraguan government was kept in power only by the presence of American troops landed at Bluefields.

The treaty, finally ratified bv the American Senate in February 1916, providing, substantial aid for the support of legally constituted good government in Nicaragua, was opposed by Costa Rica, who complained that it violated her rights.

It was also opposed elsewhere in Central Amer¬

ica on the ground that it would prove an obstacle to Central American union. The gov¬

ernments of Salvador and Honduras joined in 208

the protest. Costa Rica brought suit against Nicaragua in the Central American Court of Justice at Cartago (Costa Rica). The court (in 1916) decided that Nicaragua acted illegally in selling canal rights without consulting Costa Rica, and in threatening the neutrality of Hon¬

duras by permitting a United States naval base to be established on

the Gulf of Fonseca; but Nicaragua refused to be bound by the decision.

Bibliography. — Bancroft, H. H., (Central America) (Vol. Ill, 1886) ; Blakeslee (ed.), (Latin America) (1914) ; Callahan, J. M., (Mon¬

roe Doctrine, 1845— 1870> ((Proceedings) Am.

Soc. Int. Law 1914) ; Foster, J. W., (Century of American Diplomacy > (1900); Latane, J. H., diplomatic Relations of the United States with Latin America) (1900); Jones, C. L., Caribbean Interests of the United States) (1916); Moore, J. B., Unternational Law Digest) (1906) ; Squier, E. G., (Notes on Cen¬

tral America) (1855) ; Scroggs, William O., filibusters and Financiers) (1916).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

CENTRAL BANKS* OF ISSUE. See

Banks and Banking — World's Systems

(Article 3).

CENTRAL CITY, Colo., city and county-seat of Gilpin County, situated on the Union Pacific Railway, 40 miles northwest of Denver and 20 miles southwest of Boulder. It lies in a gold-mining district of the Rocky Mountains and its industries are chiefly connected with the development of the mines, which have been worked for about half a century. The first discovery of gold in paying quantities in the State was made here. Central City was settled in 1859 and was incorporated in 1864. The gov¬

ernment is administered by a mayor, elected bi¬

ennially, and a city council. There are munici¬

pal waterworks. Pop. (1920) 552.

CENTRAL CITY, Ivy., city in Muhlen¬

berg County, on the Illinois Central, the Louis¬

ville and Nashville and the Kentucky and Mid¬

land railroads, 35 miles northwest of Bowling Green. It is the centre of the bituminous coal region of western Kentucky and its coal-mining interests are extensive. It has a public library and railroad repair shops. Pop. (1920) 3,108.

CENTRAL CITY, Neb., city and county-seat of Merrick County, 130 miles west of Omaha, on the Platte River, the Chicago, Bur¬

lington and Quincy and the Union Pacific rail¬

roads. It is the seat of Nebraska Central Col¬

lege and has extensive agricultural and stock-raising interests. The electric plant and water¬

works are the property of the municipality.

Pop. (1920) 2,410.

CENTRAL COLLEGE, a coeducational

institution in Fayette, Mo., organized in 1857

under the auspices of the Methodist Episcopal Church South; reported at the end of 1916: Professors and instructors, 13; students, 252; volumes in the library, 11,460; value of all property, $570,000.

CENTRAL FALLS, R. I, town in Provi¬

dence County, situated on the Blackstone River and the New York, New Haven and Hartford Railroad, four and one-half miles north of Providence. It has a number of large manu¬

facturing establishments, with an aggregate capital of $3,389,000, including cotton, woolen, silk, haircloth, glass, machinery and leather factories. The river supplies excellent power.

There are several churches, newspapers and both national and savings banks. It obtains its water supply from Pawtucket, though it owns the pipe system by which the water is supplied. The town, formerly included in that of Lincoln, was incorporated in 1895.

Under its present charter, the mayor and city council are elected biennially, the latter being a bicameral assembly. The executive, with the consent of the aldermen, nominates police of¬

ficers, and the school committee is chosen by popular election ; all other officers are chosen by the council. Pop. (1920) 24,174.

CENTRAL FORCES. See Mechanics.

CENTRAL OF GEORGIA RAILWAY

COMPANY, a corporation which owns or

operates in Georgia 1,340.47 miles, in Alabama 579.55 and in Tennessee 4.07, a total of 1,924.09

miles of main track. The northern terminus is Chattanooga; the western Birmingham and

Montgomery; the southern Lockhart, Ala.; and the eastern Savannah. The following lines constitute the system :

Owned — Under first, consolidated and gen¬

eral and refunding mortgages: Savannah to At¬

lanta, Ga. ; Gordon to Milledgeville, Ga. : 311.34

miles.

Owned — Under divisional, consolidated and general and refunding mortgages : Dover to Brewton, Ga. ; Milledgeville to Covington, Ga. ; Macon Junction to Athens, Ga. ; Columbus, Ga., to Andalusia, Ala. ; Carrollton, Ga., to Belt Junction, Chattanooga, Tenn. ; Chickamauga to Durham, Ga. ; Lyerly, Ga., to Dewey, Ala. ; Greenville to Raymond, Ga. ; 1.67 Mile Post to Margaret, Ala. : 579.22 miles.

Owned — Under consolidated and general

and refunding mortgages : Savannah to Tybee, Ga. ; Barnesville to Thomaston, Ga. ; Griffin to Carrollton, Ga. ; Meldrim to Lyons, Ga., 58.09

miles, leased to Georgia and Alabama Railway Company; Covington to Porterdale, Ga. ; Amer-icus to Columbus, Ga. ; Columbus to Greenville, Ga. ; Columbus, Ga., to Birmingham, Ala. ; Opelika to Roanoke, Ala. ; Montgomery to Eufaula, Ala. ; Eufaula to Ozark, Ala. ; Henry Ellen to 1.67 Mile Post, Upper Cahaba branch: 541.83 miles. Grand total owned, 1,432.39 miles.

Leased — Augusta and Savanah Railroad,

Southwestern Railroad, Chattahoochee and

Gulf Railroad: 477.52 miles.

Trackage rights, 14.18 miles. Total miles operated, 1,924.09.

Funded Debt. — The funded debt of the

company on 30 June 1915 was $37,032,350.

Earnings. — The general income account for the year ended 30 June

1915 was as follows: Total operating revenues . $12,108,184

Total operating expenses . 8,973,511

Net operating revenues . $3 , 134,673

Taxes . $576,544

Uncollectible revenues . 10,496

Operating income . $2,547,633

Other income . 1,355,998

Total income . $3,903,631

Total charges . 2,701,626

Surplus after charges . $l , 202 , 005

Dividends . 1,150,000

Balance . $52,005

Equipment and Traffic. — Central of Georgia Railway Company owns 336 locomotives, 273

passenger cars, 10,220 freight cars and 389

service cars, and requires the services of more than 10,000 employees. The company trans¬

ports annually about 4,500,000 passengers and 5,000,000 tons of freight.

History. — The company was incorporated

under its present name with a capital of $5,000,000, 17 Oct. 1895. Through the purchase of its entire outstanding capital stock the Illi¬

nois Central Railroad Company acquired con¬

trol in June 1909. On 17 June 1912 the charter of the Central of Georgia Railway Company was amended so as to permit the issue of $15,000,000 (preferred) additional stock. The railroad was originally incorporated 20 Dec.

1833, as The Central Railroad and Canal Com¬

pany of Georgia, with capital of $1,500,000.

In 1835 the corporate name was changed to The Central Railroad and Banking Company of Georgia. The first train passed over the whole line from Savannah to Macon (190 miles) on 13 Oct. 1843; the Macon depot was opened for regular business on 1 Nov. 1843 and trains were regularly operated over the whole line daily thereafter, Sundays excepted. Earnings from carrying passengers and freights are re¬

ported as early as August, September and Oc¬

tober 1839. The road at that time was com¬

pleted to a point about 76 miles from Savannah toward Macon. The road from Savannah to Macon is reported to have cost, including de¬

pots, motive power and rolling stock, $2,581,723, an average of $13,588 per mile. The lines listed above and completing the system were built afterward and incorporated by purchase or lease. The Central Railroad and Banking Company of Georgia was leased to Georgia Pa¬

cific Railway Company 1 June 1891, and passed into receivers' hands on 4 March 1892. Deed of special master to Samuel Thomas and Thomas F. Ryan is dated 17 Oct. 1895, and con¬

firmatory deed from the receivers to Central of Georgia Railway Company is dated 11 Dec.

1896. As already stated above, the company has since come under the control of the Illinois Central Railroad Company.

CENTRAL INDIA STATES, the official

British term for a collection of states in Hin¬

dustan, consisting of five groups or agencies, namely, Bundelkhand, Bhaghelkhand, Gwalior, Rewa and Malwa, covering an area of 121,845

square miles, under the ultimate charge of the governor-general's agent at Indore. The larg¬

est individual states are Gwalior, Indore, Bhopal and Rewa; total pop. 15,699,800.

CENTRAL PARK, the most noted park

in New York city, extends from 59th street to 110th street between Fifth avenue and Eighth avenue. In 1856, the year of its purchase by the city, the land now constituting Central Park was occupied by shanties, bone-boiling establish¬

ments, piggeries and pools of offensive stagnant water, which rendered the neighborhood any¬

thing but park-like. The first full year's re¬

port of the men who were given the work of turning this ground into a park contains the following description of its condition : «It was already a straggling suburb, when purchased bv the city, and a suburb more filthy, squalid and disgusting can hardly be imagined. A considerable number of its inhab-VOL. 6 — 14

itants were engaged in occupations which are nuisances in the eyes of the law and forbidden to be carried on so near the city. They were accordingly followed at night in wretched hovels half hidden among the rocks. During the autumn of 1857, 300 dwellings were re¬

moved or demolished by the commissioners, to¬

gether with several factories and numerous (swill milk and hog-feeding establishments. J

Ten thousand loads of stone were also taken off the land and used to build a rough enclosing wall.® >

This description helps one to appreciate the vast amount of work and artistic planning which has been necessary to bring the park to its present state of beauty and attractiveness, and it is interesting to see how fully the prophecy of a park commissioner, who wrote in 1868, has been fulfilled :

<(But we who are in the middle of life,® he says, ((can never know all its beauty. That is reserved for those for whom we have planted these shrubs and trees, and spread these level lawns. These trees will arch over many happy generations, and thousands who are not yet born will enjoy the sweet green of the grass; and it will ever habitually serve to keep the memory of its founders green.®

The central site was finally selected despite its uncompromising topography in preference to the one first proposed at 66th street on the East River — the Jones' Wood site — because it was central and spacious. It was also thought that the great expense of turning it into

building lots — the extensive filling of low, swampy ground and blasting away of ledges — would enable the city to purchase the land at a low figure. Including a number of acres of water surface, comprising the two reservoirs belong¬

ing to the water department, the cost was about $7,500 an acre. The total acreage, including the subsequent extension to 110th street, was 843, and the price paid $6,348,959.90.

The special committee appointed by the

board of aldermen to select the most desirable park site pronounced emphatically in favor of <(the Central Park,® stating their opinion that ((it could be made to compare favorably with the most celebrated public grounds of the chief cities of Europe, not excepting Hyde Park of London, the Champs Elysees of Paris, the Pra¬

ter of Vienna, the Cascine of Florence, the Corso of Rome, the Prtado of Madrid, or even on the American continent, with the spacious plazas of Havana or the lovely botanical gar¬

dens of Rio de Janeiro.®

It was freely predicted by the opponents of the park that it would prove a white elephant on the hands of the city; that it could never be made into a decent-looking park and was an unnecessary extravagance which the city did not need and could not afford.

The largest settlement of the park seems to have been along the Eighth avenue side.

Mount Saint Vincent was included within the park borders, situated just west of Fifth avenue at 105th street, on the old Boston post road, which ran diagonally through the park. The land and buildings forming the State arsenal were subsequently purchased by the city and added to the park in 1867, the price paid being $275,000.

Owing to the lack of funds no work was done in improving the land

until 1857. In 210

April of this year the legislature authorized the issuance of bonds and in the following June a tentative beginning was made on the park. Pre¬

liminary surveys had been carried out by Egbert L. Viele, the first engineer to the commission¬

ers, but they soon decided that it would be desirable to offer a series of prizes to outside architects for designs for the formal laying out of the land. In 1857 such an announcement was made and on 1 April 1858 30 designs were sub¬

mitted. That of Messrs. Olmsted & Vaux was chosen and they were awarded the first pre¬

mium of $2,000. In 1857 Mr. Olmsted had been appointed superintendent to the board ; George E. Waring, agricultural engineer; Samuel I.

Gustin, nurseryman, and several other landscape offices had been created and filled. In 1858

Mr. Olmsted was promoted to architect-in-chief at a salary of $2,500 a year and the other offices abolished or subordinated to his. The work of putting the successful design into execution was begun by Mr. Olmsted, Calvert Vaux and J. W.

Mould in June 1858. The original plan has been pretty closely adhered to, during the 60 odd years of the park's existence, although there have been times when strong efforts were made to alter it, and even to remodel some of the previous work. In 1871, when the Central Park commissioners were legislated out of office and a board of public parks for the whole city instituted, such an attempt was made, one of its features being an extensive thinning of the trees.

Until 1871 the history of the park was an uneventful one. Most of the

commissioners had served on the board since its first year, and, except for family squabbles over the details of management and construction, the improve¬

ments were carried on without interruption practically in the entire charge of Mr. Olmsted.

The difficulties which began to interfere with the efficiency of the department after its polit¬

ical organization in 1871 are indicated by the following extract from a pamphlet by Mr.

Olmsted, who was subsequently made a commis¬

sioner and president of the board, shortly prior to his dismissal :

(<As superintendent of the park,® he says, (<I once received in six days more than 7,000

letters of advice as to appointments, nearly all from men in office.® Delegations from various political organizations came to find out (<what share of his patronage they could expect,® and in order to make him as little trouble as pos¬

sible in its parceling out <(they took the liberty to suggest that there could be no more con¬

venient way than that you should send us our due quota of tickets, if you please, sir, in this form, leaving us to fill in the name.® Here a pack of printed tickets was produced, which proved to be blank appointments, bearing the signature of Mr. Tweed. ((That,® continued the spokesman of the delegation, <(was the way we arranged it last year, and we don't think there can be anything better.®

There seems to have been some misconcep¬

tion, during the early years of the park, as to its real purpose, and considerable jealousy of its regulations. In April 1864, for instance, one of the regiments of the first division of the National Guard, despite the vehement opposi¬

tion of the park keepers, marched through one of the gates and

proceeded to drill upon the green. Another regiment subsequently at¬

tempted to do the same thing.

An interesting item in the report for 1863 is the announcement that 14 European sparrows, <(moineaux of France,® were let loose in the park in the spring of that year. This original 14, apparently the pilgrim fathers of the pres¬

ent local settlement, must now be represented by several million.

The paving of Fifth avenue up to the park was completed in 1863. Previous to this, espe¬

cially in wet weather, the approaches had been extremely bad, and the completion of the Fifth avenue paving led to an immediate increase in the use of the park for driving. In its early days guards were stationed at each of the park gates, and a part of their duty was to count the number of persons passing in. In 1861 the result of the count was 1,863,263 pedestrians, 73,547 equestrians and 456,849 carriages, the total number of visitors being estimated at 2,404,659.

aFor the purpose of ascertaining the nature of the existing vegetation,® says the first annual report (1857-58), (<a botanical survey of the park has been made. First, to learn how far it can be made available in the projected improve¬

ments and to ascertain what plants will prove most flourishing if transplanted to this ground, and second to discover what alterations the soil will require in order to admit of an increased variety.®

This report details about 70 species of trees, shrubs and vines. Among the trees were in¬

cluded maples, beech, dogwood, chestnut, catalpa, red birch, persimmon, ash, locust, black walnut, red cedar, sweet gum, sycamore, poplar, Ameri¬

can aspen, oak and elm. All told there were about 150,000 trees and

shrubs. Regarding the present vegetation there seems to be no available data, no continuous record of the planting hav¬

ing been kept nor any detailed botanical study of it made during recent years. The soil of the park was never good in quality, nor abundant enough to support the vegetation of a park.

For this reason the public had to be excluded from the meadows and lawns, as a single day's trampling of the grass nearly destroyed it. In 1903 a systematic renovation of the soil was undertaken and continued until nearly the whole planted area was covered with loam, carted from Long Island, at an expense of upward of $2,000,000.

Over $30,000,000 have been spent in bringing the park to its present condition. It is 2y2

miles long, half a mile wide and covers 843

acres, of which 185 are in lakes and reservoirs and 408 in forest containing over half a million trees and shrubs. There are 31 miles of walks, 10J4 miles of roads and $y2 miles of bridle paths. Twenty gates bearing fanciful titles such as Artists, Scholars, Hunters, Strangers, Students, etc., give admittance to the park.

Adding greatly to its attractions are zoological and botanical gardens, conservatories, foun¬

tains, free tennis courts, a field for baseball and other games, tire tree-lined mall with its fine statues of world-wide celebrities and numerous other monuments, notably the Egyptian obelisk and the Maine monument, gracing different points.

CENTRAL PROVINCES AND BERAR,

India, a chief commissionershp created in 1861, CENTRAL RAILROAD OF NEW JERSEY

embracing the former province of Nagpur, the two territories of Sagar and Nerbudda and other territories added since, the present desig¬

nation dating from 1903. It is bounded by the Central Indian Agency and Chota-Nagpur on the north, Orissa on the east, Madras on the southeast and Hyderabad and Bombay on the southwest and west. Its total area is 99,823

square miles, of which the portion under direct British administration contains 82,057 square miles. The surface is covered with numerous hilly ranges, among which the chief, the Sat-pura Range, enters from the west, runs in an easterly direction and has numerous offshoots.

It is traversed by the Nerbudda, Wardha, Wainganga and Mahanadi rivers, all of which are navigable for some distance except during the dry season. The climate is hot and dry and there is a good average rainfall, but the soil absorbs the moisture so quickly that irrigation becomes necessary in cultivation. Of the total area only about one-fourth is cultivated, while the remainder is either unfit for cultivation or is covered with jungle and forest. The culti¬

vated portion consists of rice fields, wheat and other foods, grains, oilseeds and cotton. Coal and iron are found; the manufacturing indus¬

tries are but little developed and consist of iron articles and cotton goods. The Indian Midland, Bengal and Great Indian Peninsula railways traverse the Central Provinces. The administration is vested in a chief commis¬

sioner, assisted by a secretary and a number of commissioners in charge of special departments.

The British possessions are divided into four divisions of Nagpur, Jabalpur, Narbada and Chutteesgurh, each in charge of a commis¬

sioner. The tributary states are 15 in number.

In 1902 the government of India took Berar on lease in perpetuity at a rental of $850,000 an¬

nually to the Nizam of Hyderabad, incorporated the Hyderabad contingent in the Indian army, and in the next year annexed Berar to the Central Provinces under a resident commis¬

sioner. Education is aided partly by the gov¬

ernment and is partly private. The population of the British divisions in 1911 was 10,859,146, and the tributary native states had 3,057,162.

Nearly 82 per cent is Hindu, 16 per cent Ani¬

mistic and the remainder consists of Chris¬

tians and Mohammedans. The chief town and seat of the chief commissioner is Nagpur.

CENTRAL RAILROAD OF NEW JER¬

SEY, The, a system operated in New Jersey, New York and Pennsylvania by the Central Railroad Company of New Jersey and con¬

trolled by the Reading Company which owns over 52.9 per cent of the capital stock. The company was formed 22 Feb. 1849 for the con¬

solidation of the Elizabeth and Somerville Railroad Company and the Somerville and Eastern Railroad Company, and has since ab¬

sorbed the Newark and New York Railroad Company, the Perth Amboy and Elizabeth

Railroad Company, the Constable Hook Rail¬

road Company, the Manufacturers Railroad Company, the South Branch Railroad Company, the High Bridge Railroad Company, the Long-wood Valley Railroad Company and the Lake Hopatcong Railroad Company. In 1915 the company owned, leased and controlled 680. 6a miles of railroad. The lines owned amounted to 156.63 miles; proprietary lines, which had been practically absorbed, to 227.23 miles ; leased lines to 211.24 miles; a jointly leased line to 42.41 miles, and trackage rights 43.14 miles.

The lines owned had 156.63 miles of first track, 96.16 miles of second track, 30.36 miles of third track, the same amount of fourth track, 418.93

miles of side track, total 732.47 miles of track, of which 730.98 miles were steel rails of 70 to 135 lbs. per yard, and 2.49 miles iron rails of

50 to 70 lbs., the gauge being 4 feet 8l/2 inches.

The proprietary roads had 227.23 miles of first track, 12.14 miles of second track, 94.97 miles of side track, total 334.34 miles of track, of whch 327.30 miles were steel rails and 7.04

miles iron. The leased roads since the merger of 4 March 1905 have 211.24 miles of first track, 102.88 miles of second track, 10.65 miles of third track, 228.19 of side track, total 552.96

miles of track, of which 550.42 miles are steel and 2.54 miles iron rails. The jointly leased road had 42.41 miles of first track, 40.73 miles of second track, 43.21 miles of side track, total 126.35 miles of track, of which 126.35 miles were steel rails. The roads with trackage rights had 43.14 miles of first track, 9.66 miles of second track, 30 miles side track, total 53.10

miles of track, all of steel rails. Grand total, 1,799.22 miles of track operated, of which 11.07

miles were of iron rails and the rest steel.

The rolling stock consisted of 523 locomotives, 517 passenger coaches, 108 combination cars, 95

baggage, mail, dining and express cars, 23,917

freight cars of all kinds and 649 service cars.

The marine equipment consisted of 3 steam¬

boats, 10 ferryboats, 11 tugboats, 31 car floats and 93 lighters and barges.

The lines owned were: Jersey City to Phil-lipsburg, N. J., 72.30 miles ; Communipaw to Newark, N. J., 6.22 miles; Brills to Passaic River, N. J., 1.68 miles ; East 22d street, Bayonne, to Constable's Hook, N. J., 1.95 miles; Elizabeth-port to Perth Amboy, N. J], 12.13 miles; Eliza-bethport to Brills, N. J., 5.51 miles; Elizabeth to Elizabeth Docks, N. J., 2.72 miles; Somer¬

ville to Flemington, N. J., 15.78 miles; High Bridge to Wharton, N. J., 25.17 miles; German Valley to Chester, N. J., 4.51 miles; Hopatcong Junction to Nolan's Point, N. J., 5.56 miles; besides two spurs to

factories; total 156.63

miles. The principal proprietary roads were : Cumberland and Maurice River Railroad, with an extension, 22.43 miles; Freehold and Atlan¬

tic Highlands Railroad, 22.75 miles; Navesink Railroad, 4.66 miles;>New Jersey Southern Railroad, 73.62 miles; Sound Shore Railroad, 6.17 miles; Toms River Railroad, 7.57 miles; Toms River and Barnegat Railroad, 14.71

miles; Vineland Railroad, 46.82 miles; total with various smaller branches, 227.23 miles.

The leased lines include : the Lehigh and Sus¬

quehanna Railroad, 105.32 miles; the Nesque-honing Valley Railroad, 16.69 miles; Ogden Mine Railroad, 9.86 miles; Tresckow Railroad, 7.59 miles; Dover and Rockaway Railroad, 5.12 miles; Wilkes-Barre and Scranton Rail¬

road, 4.27 miles ; Hibernia Mine Railroad, 4.20

miles. It leases jointly with the Pennsylvania Railroad Company the New York and Long Branch Railroad, 38.04 miles, and with the Phila¬

delphia and Reading Railroad the Allentown Terminal Railroad, 3.27 miles, and has track¬

age rights on the Union Coal Railroad — Union Junction to Minooka Junction, Pa., 9.66 miles; and on the Philadelphia and Reading Railroad — Tamanend to Silver Brook, Pa., 5.40 miles; 212

Greenwood Junction to Tamaqua, 1.04 miles; Greenwood Junction to Koska William, 9.47

miles. The rentals of the leased lines in 1915

were: Allentown Terminal Railroad, $13,500; Dover and Rockaway Railroad, $11,600; Hiber¬

nia Mine Railroad, $6,500; Lehigh and Susque¬

hanna Railroad, $2,210,229.99; Ogden Mine Railroad, $23,000; Wilkes Barre and Scranton Railroad, $66,606.48; miscellaneous, $284,253.93; total of rentals, $2,615,690.40. The gross earn¬

ings for the fiscal year ended 30 June 1915

amounted to $28,742,255.78 ; the operating ex¬

penses to $18,951,306.70, leaving a balance of net earnings, $9,790,949.08, with $2,170,614.97

non-operating income; this made a total of $11,961,564.05. In 1915 the operating revenue decreased $508,836.50 or 1.74 per cent. The average revenue tonnage per train per mile was 565.7, an increase of 11.0 tons, while the average distance each ton was carried was 71.51 miles, a decrease of 1.29. The total pay¬

ments, interest on funded debt and guarantees, miscellaneous interest, rentals of leased lines and taxes amounted to $6,649,386.47, leaving a surplus of $5,312,177.58, of which $3,292,416 was paid in dividends to stockholders and $2,019,-

761.58 transferred to credit of profit and loss.

The revenue from transportation sources in 1915 was as follows : Merchandise traffic, $12,649,148.92, an increase of $429,046.16 over 1914; anthracite traffic, $8,712,472.26, a decrease of $661,448.05; passenger traffic, $5,487,220.85, a decrease of $369,168.84; express and mail traffic, $480,306.02, a decrease of $47,846.24; and mis¬

cellaneous traffic, $1,413,107.93, an increase of $140,580.47.

Of the $30,000,000 authorized capital stock of the company there was outstanding in 1910

$27,436,800. The total funded indebtedness of the company at the close of the fiscal year ended 30 June 1915 amounted to $45,661,000 as against $46,271,000 at the end of the preceding year, a decrease of $610,000.

CENTRAL UNIVERSITY, popularly

known as Central College, a coeducational in¬

stitution at Pella, Iowa, organized in 1853, under the auspices of the Baptist Church and transferred in June 1916 to the Reformed Church in America. The university reported during the transition year of 1916: Professors and instructors, 17; students, 161; volumes in the library, 8,000; grounds, buildings and equip¬

ment valued at $110,000; budget for the year 1916-17, $18,000. An endowment of $200,000

has recently been' raised, and it is confidently expected that the college will have a large in¬

crease of students under the new administra¬

tion.

CENTRAL UNIVERSITY OF KEN¬

TUCKY, a men only institution at Danville, Ky., under the auspices of the Presbyterian Church. It was given its present organization in June 1901, by the consolidation of the Cen¬

tre College of Danville (founded 1822) and the Central University of Richmond (founded

1874). Number of instructors reported, 50; number of students, 400; volumes in the li¬

brary, 30,000; total value of property, $1,500,000.

CENTRAL VERMONT RAILWAY

COMPANY. This company was chartered in

1898 under .authority of Paragraph No. 6, Act No. 159 of the Laws of the State of Vermont, and was formed for the purpose of acquiring title to, owning and operating the railroads of the Central Vermont Railroad Company, in pursuance of a plan for the reorganization of that company issued 29 Sept. 1898. The prop¬

erty was sold under foreclosure 21 March 1899, and the Central

Vermont Railway Company came into possession 1 May 1899.

Funded Debt. — The funded debt consists of first mortgage 4 per cent 20-year gold bonds due 1 May 1920, interest payable February, May, August and November. The amount au¬

thorized by the mortgage is $12,000,000, but there are only $11,750,000 issued — $250,000

being reserved in the hands of the trustee to be issued for betterments and improvements under proper restrictions. The bonds are se¬

cured on the entire property and assets of the company. Also Montreal and Province Line $200,000 first mortgage 4 per cent 50-year gold bonds, due 1 Oct. 1950, interest payable semi¬

annually in April and October. The mortgage is a first lien upon the Montreal and Province Line Railway, 40.6 miles in length, extending from Saint Lambert to Farnham, Quebec, 32

miles, and Marieville, Quebec, to Saint Cesaire, Quebec, 8.6 miles. The Central Vermont Rail¬

way Company owns the entire capital stock of the Montreal and Province Line Railway Com¬

pany.

Car Trust Notes. — Under date of 1 Aug.

1906, $200,000 in notes were issued in favor of the Royal Trust Company, in part payment for four 10-wheel passenger locomotives and 10

Richmond compound freight locomotives.

These notes, 200 in number, for $1,000 each, are payable in 10 consecutive annual instal¬

ments on the 1st day of August of each year.

These notes bear interest at the rate of 4*4

per cent per annum, payable quarterly on the 1st days of November, February, May and Au¬

gust of each year. Under date of 1 April 1907, $270,000 in notes were issued in favor of the National Trust Company, in part payment for 500 flat cars. These notes, 270 in number, for $1,000 each, are payable in 20 semi-annual instalments on the 1st days of April and Octo¬

ber of each year. The amount so payable on the 1st day of April is $13,000 — and on the 1st day of October, $14,000. These notes bear interest at the rate of 4*4 per cent per annum, payable semi-annually on the 1st days of April and October of each year. Under date of 25

Feb. 1912, $980,000 in notes were issued in favor of Messrs. Blair & Company, ‘in part payment for two standard baggage and express cars, six standard first-class coaches, two standard first-class parlor cars, one standard first-class diner, 1,000 box cars, four Pacific type locomo¬

tives, three switching locomotives and 200 steel coal cars. These notes, 980 in number, for $1,000

each, are payable in 20 semi-annual instal¬

ments on the 1st days of February and Au¬

gust of each year. These notes bear interest at the rate of 5 per cent per annum, payable semi-annually on the 1st days of August and February of each year.

Mileage. — .The company owns and operates the following lines: Between Windsor, Vt., and Saint Johns, Quebec, 177.5 miles; between Bethel, Vt., and Bethel Quarries, 5.4 miles; be¬

tween Montpelier Junction and Williamstown, Vt., 14.9 miles; between Essex Junction and Burlington, Vt., 8 miles; between Essex Junction and Cambridge Junction, Vt., 26

miles ; between Saint Albans and Richford, Yt., 28 miles; between Swanton Junction, Vt., and Rouses Point, N. Y., 17.7 miles; between S. S. and C. Junction, Quebec, and Water¬

loo, Quebec, 40.8 miles ; between Saint Lam¬

bert, Quebec, and Frelighsburg, Quebec, 50

miles ; and between Alarieville, Quebec, and Saint Cesaire, Quebec, 8.6 miles; a total of 376.9 miles. The Central Vermont Railway Company leases the New London Northern

Railroad, extending from New London, Conn., to Brattleboro, Vt., 121 miles; from Montville, Conn., to Palmertown, Conn., 2.5 miles; also the West River Railroad, extending from Brat¬

tleboro, Vt., to South Londonderry, Vt., 36

miles, a total of 159.5 miles, at an annual rental of $216,552.50, payable monthly.

Equipment. — On 30 June 1915 the rolling stock consisted of the following: Locomotives — passenger 29, freight 63 and switching 5, a total of 97; passenger cars — coaches 61, cafe-parlor 2, parlor 2, dining 1, combination pas¬

senger and baggage 12, baggage, mail and ex¬

press 31 and milk 2, a total of 111; freight cars — box 2,108, refrigerator 15, stock 8, coal 215 and flat 655, a total of 3,001; work cars —cinder 18, wreck 21, snowplow 8, construction 84, caboose 45, scraper 14, official and pay 2, store 1, a total of 193; a grand total of 3,402.

The road and equipment up to 30 June 1915

represented an outlay of $16,778,945.96.

Traffic, Earnings, *etc.* — For the year end¬

ing 30 June 1915 there were 3,651,234 tons of freight carried or 292,602,8 72 tons carried one mile, showing a gross earning of $2,822,596.40

or $.0096 per ton per mile. For the same pe¬

riod the number of passengers carried was 1,559,533 or 42,136,108 carried one mile, show¬

ing gross earnings of $1,231,263.65, an average of $.0250 per passenger per mile. The passen¬

ger receipts include the mail and express re¬

ceipts for the year. The total railway operat¬

ing revenue amounted to $4,210,411.07 and the railway operating expenses to $3,300,268.05.

CENTRAL WESLEYAN COLLEGE, a

coeducational institution in YVarrenton, Mo., organized in 1864, under the auspices of the Methodist Episcopal Church ; reported at the end of 1916: Professors and instructors, 25; students, 359; volumes in the library, 10,000; grounds and buildings valued at $173,000; pro¬

ductive funds, $248,213.27 ; income, $25,000.

CENTRALIA, Ill., city in Marion County, on the Illinois Central, Southern, Chicago, B. & Q. and the Illinois Southern railroads, 60 miles east of Saint Louis and 252 miles southwest of Chicago. It is situated in the famous fruit-belt of southern Illinois and car¬

ries on an extensive fruit trade. The Illinois Central machine shops, employing 800 men, are located here, there are two coal mines, em¬

ploying 700 men, an envelope factory with 200

employees, shoe-heel factory with 150 em¬

ployees, and the city carries on many minor industries, such as the manufacture of flour, butter, ice cream, fruit-boxes, knit goods, iron and steel, *etc.* The United States census of manufactures of 1914 recorded 30 industrial establishments of factory grade, employing 309

persons, of whom 237 were wage earners, re¬

newing annually $123,000 in wages. The capi¬

tal invested aggregated $661,000, and the year's production was valued at $768,000: of this, $323,000 was the value added by manufacture.

There are three banks capitalized at $230,000.

Religious services are held in 10 church edi¬

fices and for educational purposes there are an excellent high school and graded public schools, supplemented by a Carnegie library. Centra¬

lia was first settled in 1853 and became a city in 1854, the affairs of the community now being administered by a mayor and council of 10

members elected every two years. The city owns the waterworks. Pop. (1910) 9,680; (1920) 12,491.

CENTRALIA, Wash., city in Lewis County, on the Northern Pacific Railroad, midway be¬

tween Seattle and Portland. The chief re¬

sources of the city are derived from the lum¬

ber industry, from coal and fire clay deposits, from farm and dairy products and canned goods. The city owns its electric lighting plant, its waterworks, has a Carnegie library, two banks, schools and many handsome church edifices. Centralia was first settled in 1857 by James Cochran, became a borough in 1873, a city in 1890 and has adopted the commission form of government. Pop. (1890) 2,026;

(1900) 1,600; (1920) 7,549.

CENTRALISTS, one of the prominent po¬

litical parties of Mexico, organized in 1823 and reorganized in 1837, and of which Santa Anna was long the leading spirit. The Centralists, or reactionaries, favored a single centralized form of government, whereas the Federalists, or States Rights party, favored autonomy of the states. To the keen rivalry of these pol¬

itical parties may be attributed the state of civil war and revolution which for so long a time was prevalent in Mexico. See Mexico — History.

CENTRALIZATION, the placing in the

hands of a central government jurisdiction over matters which might be under the management of local authorities. The term is used to de¬

note the increase of power of a central author¬

ity already established, or the closer union under a central power of a confederation of partially independent states. The adoption of the constitution of the United States was cen¬

tralization in the latter sense. The question of centralization in the first sense has been an important one in United States history, form¬

ing the point of dispute between the first two political parties, and bqjng a frequent subject of discussion at all times. The question as ap¬

plied to the United States is whether to inter¬

pret the constitution liberally, and give the na¬

tional government power in doubtful cases; or whether to put a close construction on the con¬

stitution and give the States the benefit of the doubt.

CENTRARCHID/E, sen-trar'ki-de, a fam¬

ily of fresh-water percoid fishes, confined to North America. The body

is generally short, deep and compressed, with an equal curvature above and below, and covered with rather large, strong ctenoid scales. The mouth is terminal, variable in size, with the premaxillary protrac¬

tile, and numerous fine, close teeth on all of its bounding bones. Both dorsal and anal fins are long, with 6 to 13 strong, sharp spines in the anterior part of the former, and 3 to 8 in the latter. All are active, pugnacious, carniv¬

orous fishes, many of which build nest's. They are important game and food fishes of small or moderate size, of which about 12 genera and 214

30 species are known, almost all of which are confined to the Mississippi Valley and the east¬

ern United States, where they are almost the most characteristic fishes. The most important are the grass bass, black bass, rock bass, war-mouth and sunfish (qq.v.).

CENTRE-BOARD, a contrivance used in

a yacht or shallow, keelless or flat-bottomed vessel, to counteract the tendency to make lee¬

way and to enable the craft to stand up under press of sail. It consists generally of a quad¬

rangular wooden or iron plate which is bolted or hinged by its lower forward corner into a trunk or casing which fits, water-tight, over a fore-and-aft slot in the vessel's bottom, about midway of her length. When running before the wind or in shallow waters the centre-board is hauled up inside the trunk. When on a wind, or with the wind abeam, the centre¬

board is lowered, presenting a broad surface to the water on the same principle as a lee-board. The term centre-board is essentially American ; elsewhere the contrivance is known as a sliding-keel. See Yachts and

Yachting; Speed.

CENTRE OF BUOYANCY. The centre

of buoyancy of a floating body is that point within its boundaries corresponding to the centre of gravity of the volume of water or other fluid which is displaced. It is customary to regard buoyancy as a force acting upward and opposed to gravity. This is not in accord¬

ance with fact, for all the phenomena of float¬

ing in water, air or other fluids are due entirely to the attraction of gravity — 'which acts con¬

stantly downward. (See Hydrostatics). When a body floats in water it sinks into the water and toward the centre of the earth only to the extent where the earth's attraction for the body and its attraction for the volume of dis¬

placed water are equal at that level. And as the weight of a body is the measure of the earth's attraction for it we say a floating body displaces its own weight of water. A floating body will therefore sink into water only to a point where the water beneath it is attracted toward the earth's centre more forcibly than is the floating body. The same phenomena may be observed in the case of a balloon. The bal¬

loon filled with a gas that is lighter than air at the sea-level will rise to a position where the earth's attraction for the balloon and its at¬

traction for the volume of air displaced by the balloon are exactly equal. The centre of buoy¬

ancy of the balloon is the centre of gravity of the body of air displaced by the balloon.

When the centre of gravity of a floating body is below its centre of buoyancy (equivalent to its point of support — see Equilibrium), the body will float in stable equilibrium. When the centre of gravity is above the centre of buoy¬

ancy the equilibrium is unstable, and the body is liable to roll over in the water into such a position that its centre of gravity is below its

centre of buoyancy. The same observations hold good as to bodies floating in air. A body which will float in unstable equilibrium in water would probably be in unstable equilibrium in mercury, the volume of mercury displaced hav¬

ing a much higher centre of gravity than the displaced water, and therefore lifting the centre of gravity of the floating body far above its centre of buoyancy.

CENTRE OF GRAVITY, or CENTRE

OF INERTIA, a point in a body, or in a sys¬

tem of bodies, which in modern works on mechanics is usually and preferably called the ((centre of mass." It is that point such that the vector sum (or integral) of the moments of the particles of the body with respect to it is zero. That is, if suspended by the centre of mass or gravity the system will be in equilibrium in any position. See Mass ; Mechanics.

CENTRE OF INERTIA. See Centre of

Gravity.

CENTRE OF OSCILLATION, or CEN¬

TRE OF PERCUSSION, that point of a

pendulum at which its entire mass may be con¬

sidered as concentrated, for the purpose of de¬

termining its time of oscillation. The pendulum may be suspended by an axis parallel to its original axis and passing through the centre of oscillation without altering its period.

CENTRE OF POPULATION, the cen¬

tre of gravity of the population of a country, each individual being

assumed to have the same weight. The centre of population in the United States has moved in a westward direction dur¬

ing the last 110 years along the parallel of 3£°

lat., in 1910 reaching the city of Bloomington, Ind. The following table shows the movement of the centre of population by decades since 1790:

Years Census

North latitude

West longitude

1790 .

39°

16.5’

76°

11.2’

1 800 .

39°

16. 1’

76°

56.5’

1810 .

39°

11.5’

77°

37.2’

1820 .

39°

5.7’

78°

33. O’

1830 .

38°

57.9’

79°

16.9’

1840 .

39°

2.0’

80°

18.0’

1850 .

38°

59.0’

81°

19.0

I860 .

39°

0.4’

82°

48.8’

1870 .

39°

12.0’

83°

35.7’

1880 .

39°

4.1’

84°

39.7’

1890 .

39°

1 1 9’

85°

32.9’

1900 .

39°

9′ 36″

85°

48′ 54″

1910 .

40°

6′ 24″

84°

59′ 59″

CENTRE OF PRESSURE. See Hydro¬

static Press.

CENTRING, or CENTERING, the fram¬

ing of timber by which the arch of a bridge or other arched structure is supported during its erection.

CENTRIFUGAL FORCE, a ph rase popu¬

larly used to express the tendency manifested by a body revolving about a centre to fly away.

CENTRIFUGAL MACHINES, machines

used for various purposes, in which centrifugal force produced by rapid revolution is utilized.

Such a machine may be used for drying clothes or other goods, the articles being placed inside a hollow cylinder made of wire-gauze or with numerous perforations in its circumference, which, being driven at a high speed, the mois¬

ture is caused to fly off by centrifugal action.

Sugar is now often separated from the molasses by a centrifugal machine, the product being commonly known by the trade name of ((centrifugal sugar.” The cylinder in which the sugar is contained is placed within a larger cylinder in which the molasses is received.

Liquids, such as beer, can also be clarified and cleared of foreign substances by means of cen¬

trifugal action, the extraneous matters being made to collect at the circumference of the CENTRIPETAL FORCE — CENTROSOME

vessel through the high rate of speed at which it is driven, while the clear liquid can be drawn off by an outlet at the centre. Cream is now commonly separated from milk in large dairies by the same method. See Butter.

CENTRIPETAL FORCE, that force

operating on a body moving in a curve which tends to draw the body to the centre of the curve. A moving body tends to move in a straight line. It may be deflected from its course into another straight line by some other impulse. If it is held continually to a curved path, it is under the influence of a centripetal force. A common illustration is the movement of the earth in its orbit. The inertia of the earth's motion tends to send it flying off into space in a straight line, tangent to the curve of its orbit. The attraction of the sun is the "cen¬

tripetal force which overcomes its inertia so far as to hold it steadily to the curve of its path around the sun. If the earth's forward motion were suddenly checked, the sun's centripetal attraction would draw it straight to the sun's centre. See Dynamics ; Energy, Conserva¬

tion of.

CENTROCLINAL FOLD. See Fold.

CENTROSOME. The centrosome was

long thought to be a permanent organ of all animal and plant cells. It is an extremely small body, usually less than 1/25000 of an inch in diameter, and is almost always surrounded by a system of radiating threads. It was first described by the zoologist Flemming in 1875, but was named and brought into prominence by another zoologist, Boveri, in 1888. Three years later a French botanist claimed to have found centrosomes in the lily. The general appearance and behavior of the

centrosome in animal cells may be illustrated by the first division of an egg (Fig. 1).

An examination of the figure will indicate that the centrosome plays an essential role in the division of the nucleus, since it gives rise to the spindle which moves the chromosomes to their place in the new nuclei. On account of this function, it was claimed that the centrosome must necessarily be present in all cells.

However, it proved impossible to demonstrate a centrosome in some resting cells, like muscle cells, and so it was concluded that, in some cases, the centrosome might not be a permanent organ, but, rather, that it must be formed anew at each successive cell division. In the early nineties this view was quite generally accepted.

While a centrosome was described and figured in greajt detail in the lily and various botanists began to find centrosomes in various groups of plants, other botanists could not demonstrate it even in the lily. In 1896 a vigorous investiga¬

tion by several botanists of different nationali¬

ties, but chiefly American, working under the direction of Strasburger at Bonn practically solved the centrosome problem in plants. A centrosome behaving as in animal cells was found in two of the algae and two of the fungi (Figs. 2 and 3).

On the other hand, it was definitely estab¬

lished that in the Scouring Rush, Equisetum, no centrosomes are present during nuclear and cell division. It was also demonstrated that no centrosomes are present in the Gymnosperms and Angiosperms. In all these plants the spindle is formed in another way, no centro-Fig. 1. — First division of an egg in which segmentation is complete. A, fertilized egg with nucleus and two centrosomes. B, the two centrosomes have moved apart, radiations have formed about them and a “spindle” has developed between them. C, the wall of the nucleus is breaking down and fibres of the spindle are becoming attached to the chromosomes. D, the spindle is fully formed and the chromosomes have been drawn by it into an equatorial position. E, the chromo¬

somes have divided and are being drawn to the two poles of the cell by the spindle. Each centrosome has „ divided. F, the first two cells of the embryo have been formed, each with two centrosomes ready to repeat the process at the next division.

some being involved in the process. At the two divisions in spore mother cells a weft of fibres appears, closely surrounding the entire Fig. 2.

Fig. 3.

nucleus ; the weft becomes drawn into many poles, which are gradually drawn together into 216

two opposite groups, so that the familiar bi¬

polar spindle is established (Fig. 4).

In ordinary vegetative divisions, the spindle first appears as a pair of dome-shaped prom¬

inences, or caps, at opposite poles of the nucleus. No centrosome is concerned. Since that time many centrosomes have been demon¬

strated in various algae and fungi ; but in plants A

B

Fig. 4. — Development of a spindle, without centrosomes, in the

pollen mother cells of the lily. A, the weft of fibres surrounding the nucleus. B, the formation of many poles, the “multipolar spindle.” C, the numer¬

ous poles collecting into two groups. D, the completed bipolar spindle.

higher than these no centrosomes have been proved, except as the centrosome may appear as the blepharoplast (q.v.) during spermato¬

genesis. Consult Wilson, E. B., (The Cell in Development and Inheritance > ; also various articles in J ahrbucher fiir wissenschaftliche Botanik (1896 and 1897).

Charles J. Chamberlain,

Professor of Morphology and Cytology, Uni¬

versity of Chicago.

CENTUMVIRI, judges of ancient Rome,

three from each tribe, who determined ordi¬

nary causes. The extent of their jurisdiction is uncertain. Hollweg would confine it to civil cases ; it seems probable that they at first han¬

dled questions relating to quiritarian ownership, which determined the status of the citizens.

During the Empire there were 180 such judges, the presiding officers being the decemviri. The Basilica Julia was the meeting-place of these sessions.

CENTURIES OF MAGDEBURG, a his¬

tory of the early Christian Church, so called because it was divided into centuries, each of the 13 volumes covering a hundred years, and was first written at Magdeburg. Matthias Flacius formed the plan of it

in 1552, but the last volume did not appear until 1574. It is the first comprehensive work of the Protestants on Church history; its main purpose was to prove agreement of Lutheran doctrine with that of primitive Christians, and the difference between the latter and that of the Roman Catholics.

% «

CENTURION, a Roman army officer who

commanded a century, or body of 100 men.

The rank of a centurion corresponded very nearly to that of a captain in modern armies.

There were 60 centurions in each legion, a junior and a senior for each of the 30 mani¬

ples; the senior of the first maniple of the first cohort was the chief centurion, or primipilus, of the legion, and on him often devolved the actual charge of the entire group. See Legion.

CENTURIPE, chen’too-re’pa, Sicily, a

town in the province of Catania, situated on a height above the valley of the Simeto, 28 miles northwest of Catania. It is situated in a dis¬

trict yielding soda, sulphur and marble. The ancient city (Centuripa), considerable ruins of which exist, was at one time among the import¬

ant cities of Sicily. Emperor Frederick II destroyed Centuripe after removing the inhab¬

itants to his new town of Agosta in 1233. It was rebuilt in 1548. Pop. 13,111.

CENTURY, in chronology, a period of 100

years. Modern chronology of Christian na¬

tions centres at the birth of Christ, and the centuries are numbered according to their order either before or after the event, for example, the 20th century a.d., the 4th cen¬

tury B.C.

In Roman times, (1) a division of 100 men in the army, corresponding to the modern com¬

pany, 60 of which formed a legion; (2) a division of the six classes of the people, intro¬

duced by Servius Tullius, for the purposes of taxation and voting.

CENTURY-PLANT, a popular name of

the Agave americana, or American aloe. See Agave.

CEORL, cherl. See Churl.

CEOS, se'os, or KEA, ka'a (sometimes

called by the Italianized name of Zea or T zia) , an island in the group of the Cyclades, in the ˆEgean Sea, 13 miles off the coast of Attica.

It is 13 miles long, 8 broad and 39 square miles in area. The central and culminating point is Mount Elias, 1,863 feet high. It is fairly fertile, raising fruit, wine, honey and valonia. In ancient times Ceos was noted as the birthplace of the poets Simonides and Bacchylides, and the physician Erasistratus, and the Cean laws were famous for their excellence. The capital is Ceos.

CEPHAELIS, sef-a-e'lis, a genus of plants belonging to the order Rubiacecc, natives of tropical America. The roots of C. ipecacuanha furnish the commercial drug of that name.

See Ipecac.

CEPHALASPIS, sef-al-as’pis, a genus of

ostracoderms (q.v.) of the Devonian Period, characterized by a semi-circular or semi-oval head-shield, with spines at the angles. It has a curious superficial resemblance to the head-shields of certain trilobites.

CEPHALIZATION, the tendency exhib¬

ited in many different phyla of animals toward the specialization of the region about the mouth into a distinctive head, and the concentration there of nervous and sensory organs. In the chordates we find a clear development starting from the undifferentiated oral region of Amphioxus without any very special differentiation of its central nervous system and sense organs of the most generalized sort. The cyclostomes

and fishes form the next stage, in which there is a definite, though small, brain, and the more important of the special senses (those of smell, sight, hearing, equilibrium) are centralized in the head, which acquires a special skeleton, the skull. We finally come to the terrestrial ver¬

tebrates, in which all the special senses be¬

come located in the head, the lateral-line sense and dermal chemical sense being lost. The in¬

creasing size and complexity of the brain is one of the outstanding features of vertebrate evolution. In the arthropods we find a regular graduation from the equal segments of the chaetopod worms, which are probably not far removed from the primitive arthropod, to the well-defined head of the crayfish or insect, with its specialized eyes, antennae, jaws and ganglia.

The tendency toward cephalization is associ¬

ated with the fact that the head is often the first part to take shape in

the embryo ; however, this fact, as exemplified by the trochosphere larva of the annelids, may indicate that the head of certain segmented forms is the true representative of the entire body of their an¬

cestors, and that the formation of the seg¬

mented body may be the reminiscence of an ancestral multiplication by budding.

CEPHALOCELE. Hernia of the brain is

either a congenital or an acquired (accident) condition. The former is rare, 1 case in 10,000; the latter, by reason of the World War, with its enormous number of gunshot wounds of the head, is very common. Following operation upon the skull, decompression for tumors, or for severe bony losses by gunshot wounds, the brain tends to protrude through the bony open¬

ing and forms a soft mass beneath the skin of the scalp. There may be no symptoms. When the defect lies in the motor regions epileptic convulsions are the most frequent effects noted.

CEPHALOCHORDA, a group of Chor¬

data (q.v.) represented by the lancelet or Amphioxus (q.v.). Other names for the group are Leptocardii and Acrania. The Cephalocorda are fish-like in shape and have a notochord ex¬

tending the length of the body, beginning in the head; hence the name Cephalochorda. The notochord is situated between the nervous sys¬

tem and the digestive canal. The central nerv¬

ous system lies entirely on one. side of the digestive canal, while numerous gillslits extend from the pharynx to the exterior.

CEPHALONIA, sef-a-16’m-a, or KE—

PHALLENIA, an island of Greece, the largest of the Ionian Islands, northwest of the Morea, at the entrance of the Gulf of Patras, about 31 miles in length and from 5 to 12 in breadth area, about 266 square

miles; between lat. 38°

and 38° 31’ N. and long. 20° 21’ and 20° 49’ E.

The coastline is very irregular and deeply marked with indentations,, and the surface is rugged and mountainous, rising in Monte Negro, the ancient Tinos, to a height of 5,380 feet.

There is rather a deficiency of water on the island. The principal towns are Argostoli, the capital, and Lixuri. The chief exports are cur¬

rants, oil and grain; wine, cheese, etc., are. also exported. The manufactures are inconsider¬

able, consisting of some cottons, carpets of mixed wool and goats’-hair, with some potteries and distilleries of liqueurs. The island is sub¬

ject to frequent earthquakes. One of the most destructive was that of the year 1867. The greater part of the population are of the Greek Church ; the others belong to the Catholic Church. By Homer the island was called Same or Samos, though he speaks of the inhabitants as Cephallenes. The island adhered to Athens during the Peloponnesian War. In 189 b.c. it came under the Roman dominion and after the division of the empire it became subject to the Byzantines. In the 12th century it was taken by the Normans, and afterward fell successively into the hands of the Venetians and Turks, and then again into the hands of the Venetians, who retained possession of it until 1797, when the French seized it. From 1815 it belonged to the republic of the United Ionian Islands, and in 1864 was united with the other islands to the kingdom of Greece. With Ithaca and a few other adjacent islands it forms a nomos or province of the kingdom of Greece. Pop. of nomos 83,363 ; of the island about 72,000.

CEPHALOPODA, a class of mollusks rep¬

resented by the squid, cuttle-fish, octopus, nau¬

tilus, argonauts, *etc.* In these mollusks the head-lobe bears arms or lobes, as the animal has no ˆfoot® or creeping-disc like that of other mollusks, though its homologue is found in the siphon and tentacles. They have an unpaired muscular mantle, which forms the walls or out¬

side, so that as in the squids, where there is no outer shell, the body is naked. The nervous system is much concentrated, for not only are the cerebral ganglia, pedal and visceral ganglia in the head, but also the ears and osphradia, or olfactory organs. The large complicated brain, thus composed of the three primary pairs of ganglia with some accessory ones, are enclosed in a cephalic cartilage which suggests a com¬

parison with the cartilaginous skull of the lam¬

prey and sharks. In the body behind are the sympathetic and stellate ganglia. The eyes as a rule are highly developed, with a retina, cho¬

roid, iris, cornea, vitreous body and lens. The gills are well developed, either as one or two pairs situated within the mantle-cavity. The water is forced from the mantle-cavity, which is open behind the head, through the siphon.

There are two kinds of hearts. The systematic heart consists of two or four (nautilus) auricles receiving the blood from the gills, and a median ventricle from which arise the anterior and posterior aortse. There iˆ also, at the base of each gill, a branchial heart, which receives the blood from the vena cava and pumps it into the gill. These branchial hearts are not known to exist in other mollusks, and no other mollusks possess an ink-sac. The armature of the mouth, however, as in gastropods, consists of two horny jaws, enormous in most cephalopods, and an odontophore with its lingual ribbon for cut¬

ting flesh, *etc.* In many forms one of the arms of the wall is peculiarily modified for sexual purposes — the so-called hectocolylized arm. The eggs in developing undergo a super¬

ficial or discoidal development; and the young undergo no metamorphosis. The shell of cephal¬

opods is either chambered, as in orthoceratites, nautiloids and ammonoids, or, as in argonauts, forms a simple deep basin ; in all the Dibranchiata it is at least partly internal. In the squids and cuttle-fish it takes the form of an internal pen or ˆbone.®

The cephalopods are divided into two orders, according to the number of their gills: 218

Order 1. Tetrabranchiata. — This group, in which the gills are four in number, is rep¬

resented by the nautilus, the sole living repre¬

sentative of a number of fossil forms, such as Orthoceras, Goniatites and Ammonites. Nau¬

tilus pompilius and Nautilus umbilicatulus are the only survivors of about 1,500 extinct species of the order. See Nautilus.

Order 2. Dibranchiata. — The dibranchiates are so called from possessing but two gills, while the tetrabranchiates had, as in Nautilus, numerous unarmed tentacles ; these are now represented by 10 (Dccapoda) or 8 (Octopoda) arms, provided with numerous suckers. To the 10-armed forms belong Spirula, a diminutive cuttle with an internal coiled shell. The shells of Spirula peronii are rarely thrown ashore on Nantucket; it lives upon the high seas. The ex¬

tinct Belemnites had, like the recent Moroteji-this, a straight conical shell, the ˆthunderbolt®

fossil. Allied to Loligo and Ommastrephes are gigantic cuttle-fishes which live in mid-ocean, but whose remains have been found at sea or cast ashore on Newfoundland and the Danish coast. Their jaws also occur in the stomachs of sperm whales.

Fossil Cephalopods. — The greater propor¬

tion of cephalopod mollusks are fossil. They began to exist in the Cambrian period, and, as nautiloids and ammonoids, flourished in great profusion in the Palaeozoic and Mesozoic eras, the ammonites (q.v.) of the Jurassic and Creta¬

ceous beds numbering about 5,000 species. For bibliography see Mollusca.

CEPHALULA, sef-a-loo'la, the name ap¬

plied by Packard to the stage of the embryos of mollusks and of worms immediately suc¬

ceeding the gastrula (also the trochosphere) when the larva is still a surface-swimmer and the head is beginning to be formed. Consult Packard, (Life-Histories of Animals,* p. 94.

CEPHALUS, sef'a-lus, the son of Creusa; according to some the son of Deion, King of Phocis, and of Diomede. He was the husband of Procris, or Procene. Shortly after his mar¬

riage Eos (Aurora) carried off the beautiful youth while he was hunting on Mount Hymet-tus. He refused the love of the goddess, who induced him to put the virtue of his wife to a trial which it could not withstand. Procris, in return, tempted him likewise, and he yielded also. Learning their mutual weakness, they became reconciled. But Procris subsequently became jealous of her husband, and concealed herself in a wood to watch him. He mistook her among the leaves for a wild animal, and killed her with a javelin.

CEPHAS, se'fas, a surname given by Christ to Simon. In the Greek it is tt erpos (((a rock®), in Latin Petrus, and in English Peter.

CEPHEUS, se'fus, a king of Ethiopia and husband of Cassiopeia ; his name was given to a constellation of stars in the northern hemi¬

sphere, surrounded by Cassiopeia, Ursa Major, Draco and Cygnus. See Cassiopeia.

CEPHISSUS, the name of three rivers of Greece. (1) A river which waters the Athenian plain. It rises on the west slope of Mount Pentelicus and the south side of Mount Parnes and flows past Athens

on the west into the Saronic Gulf near Phalerum. (2) A river of Attica emptying into the Gulf of Eleusis. (3) A river flowing through eastern Phocis and northern Boeotia and emptying into Lake Copais (Topolias).

CERACCHI, cha-ra'ke, Giuseppe, Corsican

sculptor: b. on the island of Corsica, 4 July 1751, or, according to others, about 1760; d.

Paris, 29 Jan. 1801. In 1798 he took part in establishing the republic of Rome, of which he was among the warmest partisans. On the re¬

establishment of the papal authority he was obliged to leave Rome, and went to Paris, where he was employed in making a bust of the First Consul. Nevertheless, he joined the young French artists whom he had known at Rome, and whose ardent republican opinions coincided with his own, in a conspiracy against Bonaparte, in whom he saw only the oppressor of his country. On 9 Nov. 1800 he was arrested at the opera, with Arena, Damerville and Topino Lebrun. Before the tribunal he answered only in monosyllables to the questions put to him.

He was sentenced to death, together with his accomplices, and ascended the scaffold with great firmness. The death of this disciple, and almost rival, of Canova, was a great loss to sculpture.

CERAM, se-ram', CEIRAM, or ZERAM,

called by the natives Zeram or Serang, an island of the Moluccas, the second of the group in size, lying west of New Guinea, be¬

tween long. 127° 55' and 130° 50' E. and lat.

2° 45' and 3° 40' S., in the Indian Archipelago; area, about 7,000 square miles. Its interior is traversed by mountain ranges from 6,000 to 8,000 feet high, and culminating in Noosaheli, which is 9,600 feet. The vegetation is luxuriant and gigantic, some of the sago palms growing 100 feet high. Sago forms the chief food of the inhabitants and is an article of trade. The inhabitants of the cost are of Malay

origin, and have extensive fisheries. The interior is peopled by Alfoories or Alfuros, long known for their barbarous custom of using human skulls for public and private ornament, and the still more barbarous atrocity of committing murder in order to procure them. They are said to have become more civilized, and many of their rajahs have adopted the European dress and manners.

They are divided into various independent tribes.

Christianity has been introduced into several villages on the south coast, but not with any great success, though it is said that in some of the villages a considerable number of those professing Christianity can now read and write.

At Amahai is the only good harbor, although Sawaai on the north is frequented by whalers.

The island belongs to the Dutch, who have established several stations there under the charge of an official residing at Wahai on the north coast. The country is governed by native chiefs under Dutch supervision. Pop. estimated at 100,000.

CERAMBYCIDiE, se-ram-bis'i-de, a fam¬

ily of beetles of great extent, readily known by their very long antennae, which give its members the name of ((longicorns.® The fam¬

ily already numbers some 12,000 or 13,000 spe¬

cies, though probably not over half of the ex¬

isting forms are known. It comprises some of the largest, _ most showy, as well as the most destructive insects of the suborder. They are readily recognized by their oblong, often cylin¬

drical bodies, the remarkably long, filiform, usually recurved antennae and the powerful in-CERAMICS

curved mandibles. Their eggs are introduced into ciacks in the bark of plants by the long, fleshy, extensile tip of the abdomen. The lar¬

vae are long, flattened, cylindrical, fleshy, often footless, whitish grubs, with very convex rings, the prothoracic segment being much larger and broader than the succeeding, while the head is small and armed with strong, sharp mandibles adapted for boring like an auger in the hardest woods. These borers live from one to three years before transforming, at the end of which time they construct a cocoon of chips at the end of their burrows, the head of the pupa lying next to the thin portion of bark left to con¬

ceal the hole.

The species of the American genus Oncideres are called girdlers, because the parent bee¬

tle, after laying an egg in a small branch, gir¬

dles this round with a deep incision, so that the portion containing the larva sooner or later falls to the ground. The growth of a longicorn larva frequently takes more than a year, and under certain circumstances it may be enormously prolonged. Monohammus con -

fnsor has been known to issue from wooden furniture which was 15 years old. Individuals of another longicorn have issued from the wood of a table 20 and even 28 years after the felling of the tree from which it was made.

Watson has related a case from which it ap¬

pears probable that the life of a longicorn bee¬

tle dwelling in household furniture extended over at least 45 years. It is generally assumed that the prolongation of life in these cases is due to the beetle resting quiescent long after it has completed the metamorphosis ; but more probably it is the larval life that is prolonged; the larva continuing to feed, but gaining little or no nutriment from the dry wood in these unnatural conditions. A large number of longicorns stridulate loudly by rubbing a ridge in¬

side the pronotum on a striate surface at the base of the scutellum. A few produce noise by rubbing the hind femora against the edges of the elytra, somewhat after the fashion of grasshoppers ; and some possess

highly devel¬

oped stridulating surfaces on the hind and mid¬

dle coxae.

CERAMICS. The fictile art; the art of

the potter. The word ceramics is derived from the Greek keramos, the potter's clay. It is often spelled kcramics following the Greek spelling direct, instead of taking the word from the French ceramique. The subject cer¬

amics can be primarily divided into two basic divisions: (1) the technique; (2) the product.

The essential features of the technique are the selection and preparation of the clay; the ma¬

nipulation of a lump of the clay into its de¬

sired form: by hand unaided (as done by primitive peoples), by <(th rowing® on the pot¬

ter's wheel, by molding soft clay in a form or mold. And, lastly, the baking of the clay in its acquired form either in the sun or in an oven. Formerly, the entire product of the pot¬

ter was included in the term <(pottery.®

Among experts, recently, it has become usual to divide all the wares into two classes, ((pottery® and <(porcelain.® In this system of the connoisseur's and collector's nomenclature the term ((pottery® includes all classes of earthen¬

ware and stonezvare. By this method we bring the different earthenware products, terra cotta, majolica, faience, Delft, etc., together with Aˆjˆare under one generic class — pottery.

Additional refinements to the crude primitive fictile ware are glaze and decoration.

Technical Terms. — A few of the technical terms used for the above

processes in produc¬

tion may be here concisely defined as follows: Paste (French pate) is the material of which tire fictile ware is constructed ; it is often termed body. The bare body baked is termed biscuit. Glaze is the glassy coating given to the outer or inner surface of the ware. Paste or body may be either ((hard® or (<soft,® the former term indicating that it is not ’easily scratched with a steel point, and the term soft implies that the metal point, or a file, easily abrades the surface. Glaze may be either translucent or opaque. The former is a kind of glass (silicate of soda or potash), usually, or is produced by throwing table salt (chloride of sodium) into the hot oven when it creates a chemical action on the surface of the in¬

candescent clay, producing ((salt glaze.® The addition of oxide of lead to the silicate of soda or potash produces a more brilliant and easier fusible, but softer, glaze (plumbiferous or lead glaze). By adding oxide of tin to the translu¬

cent glaze material, it becomes white and opaque (stanniferous glaze) . Earthenware has a porous body which is permeated by liquids ; this defect may be corrected by glazing or by dipping into a fine liquid clay, termed slip or engobe, and then baked. By adding certain metallic oxides, (as coloring matter) ground with fusible glasses a colored glaze or pigment is produced. When rendered opaque with tin oxide, this vitrifiable composition is termed enamel, and is used as a glaze or as a medium for painted decoration to be fused to the sur¬

face of the ware in the oven. When a glaze, through faulty firing or defective composition, cracks into numerous parts divided by crevices it is termed crazed. When the same effect is caused intentionally, the term crackle is used.

Crazed glaze is liable to keep peeling off from time to time, also to increase the number of fissures. Crackle is a permanent effect and considered decorative. Ware decorated with enamel coating is called faience, or, quite commonly, majolica. The latter term, however, correctly belongs to the ˆnamel art ware, de¬

rived from old Arabic and Moorish methods, made in Italy. (See Majolica). Some small, delicate low relief decoration is done by dry¬

ing liquid clay in a mold or form, or by stamp¬

ing; when well set it is applied by hand to the body of the ware, and is known as sprigging.

History. — Proof of the great antiquity of the potter's art is found in the fact that fine, gracefully formed fictile ware was produced in Egypt before the potter's wheel was known, some pieces being painted by hand. The process of covering clay vessels with hard glass glaze was used in the time of Egypt's first historic king, Mena, over 7,000 years before Christ.

In 1500 b.c. the Nile potters used glazes of seven different colors, greenish-blue predomi¬

nating. The excavations at Nineveh brought to light wall-tiles having polychrome enamel coat¬

ing. Cyprus was a connecting link between Egypt and East Asia, and we, accordingly, find Cypriote clay vessels of grayish yellow with brown paintings, some with Egyptian tenden-220

cies, others of Grecian or East Asiatic styles.

Excavating the hill of Hissarlik (ancient Troy) , Schliemann and others discovered clay vessels of a cultured people. Best known of ancient fictile wares are the beautifully formed and decorated Greek vases (long called erroneously Etruscan) of terra cotta coated with thin black polished glaze. The Arretine ware, made from the read earth of Arretium, was highly prized by the Romans. In the East, clever ceramic work was done by the ancient Chaldeans, As¬

syrians and Persians, as their lovely hand-painted enamel tiles testify. But in the Far East the Chinese had arrived very early at a quite advanced stage of perfection of the ceramic art. The earliest pieces we know of date from the Han period (206 b.c. — 220

a.d.) with early earthenware celadon (see Chinese Ceramics) attempting imitation of their beloved Jade stone, advancing to the discovery of stoneware, then porcelain (see Porcelain) in the early Ming dynasty (middle 14th century a.d.). The wide range of dis¬

covery and invention in ceramics of the ancient Chinese is ever a

matter marveled at by Western connoisseurs, with their lovely

crackle, flambe (transmutation), self-colors, and numerous other glaze effects ; their delicate egg-shell ware, much admired blue-and-white, Kang-Hsi polychrome, highly decorative motifs of symbolism and mythology; which latter ware represents the bulk of the pieces in our private collections and museum exhibits. These at¬

tractive wares of the royal Chin-te-chen ovens have been actively bid for by the wealthy Westerners. The opening up of railroads in republican China has brought to light great quantities of ancient ceramic pieces of great beauty that were reposing many centuries in graves. Their presence in the markets has revolutionized the aims of the wealthy collec¬

tors, and ancient celadon is having its previous mysteries solved.

The Japanese declare they received their first knowledge of art pottery from the Ko¬

reans, but Western experts place their earliest glazed pieces not earlier than the 12th century a.d., and state that Kato Shirozaemon, in the 13th century, brought (after six years' study in China) over ceramic refinement to a factory at Seto. The connoisseurs at Nippon, with their (<tea ceremonies,® loved and revered the ancient homely earthenware of their tea service, and show little respect for the cold white glitter of porcelain. They produced none till that of the 16th century by Shonzui. The Japanese egg¬

shell china excels, some claim, even the Chinese, in thinness, transparency and brilliance; their drawing and color work are perfection. Pecu¬

liar to this nation are the painting in lacquer on porcelain, the cloisonne enamel china decora¬

tion. Greatly admired of European collectors is their ivory-glaze Satsuma faience.

Little wonder is it that India and Persia took to imitating the styles of Chinese decora¬

tion. For Europe, once seeing the ware, quickly acquired its (<Chinese taste® craze. From the 16th and into the 18th century immense quantities of Chinese and Japanese porcelain ware were brought into Europe by the Dutch and the East India trading companies' ships.

These wares at first had genuine Chinese art in their decoration as well as Chinese form ; but soon the traders had European ideas grafted on to made-to-order pieces and the truly Oriental style became obscured in a hybrid product.

Somewhere between the 9th and 12th cen¬

turies the Persians learned to make lustre dec¬

oration (mezza majolica) and we get here the so-called ((Rhodes-Persian faience,® Osmanli-Turkish. From Arabia came the knowledge of enameling clay vessels into continental Europe, an art known in the East from very early times, as is proved by her ancient polychrome hand-painted tiles for walls and ceilings in her mosques. We find these same tiles and enam¬

eled vases, etc., in opalescent metallic lustre in the true Arabian decoration, in Spain,, in the old Hispano-Moresque buildings. And it was, probably, from these same conquering Moors that Italy obtained (through the island of Majorca) this tin enamel polychrome decora¬

tion process (see Majolica), which from the 1 5th century became a greatly popular fictile art in Italy. In the 15th century, Faenza, Pesa.ro, Gubbio, Urbino, Castel Durante, had majolica ovens. In this early Renaissance period the Della Robbia sculptor family created their earthenware busts enveloped in tin-glaze (the so-called terra invetriata), Luca della Robbia claiming the discovery of using tin-glaze enamel to cover his statuary. In the 16th century we have Gubbio, with its genius, Maestro

Georgio, as centre of Italian majolica manu¬

facture, with its ruby lustre ; and the clever artist Orazio Fontana was working on this ware in Urbino. The madre-perla lustre

belongs to this time. The sgraffiti decoration belongs to this period with its engobe coat¬

ing scratched through to the body and finished in colored glaze.

In Germany glazed earthenware developed

with its oven tiles (Kachel) and Cologne (about 1530), then Nuremberg, produced its falsely termed ((Hirschvogel® jugs with their reliefs and colored glaze, to disappear in the 1 7th century. Next we find Germany produc¬

ing smooth painted surface enamelware and (end of 16th century) the noted Rhenish salt-glaze stoneware (Steinzeug) was made in Cologne, then Siegburg, Frechen, Raeren, Grenzburg, etc., with its quaint applied relief decoration, and odd forms, such as ((ring® vases, *etc.* This ware was long known as gres de Flandres. In France Bernhard Palissy, igno¬

rant of the chemistry and practice of the cera¬

mist, after many disastrous failures, produced an enamel decoration (see Palissy) of

brilliance and achieved fame through his nat¬

uralistic animal and plant representations in relief on plates, *etc.* In the middle of the 16th century arose the deservedly noted Henri Deux ware of Saint Porchaire with its intricate, yet artistic, strapwork inlays of brown clay on yellowish body, and its sprigged masacarons and. other reliefs. At the end of the 16th or beginning of the 17th century Nevers started making true French faience, soon arriving at an extended palette of glaze colors to cover the porous body with polychrome decoration.

Rouen soon followed, assisted by Nevers artisans. (See Rouen). Early in the 18th cen¬

tury Moustiers made such faience, and we find large faience factories at Bordeaux, Paris, Sinceny, Strassburg, Marseilles, Niderviller, Lille, *etc.* Talavera and Alcora in Spain pro¬

duced this ware; Germany in Nuremberg,

Hoechst, Frankenthal, *etc.* But already in 1680

Delft, Holland, had 30 potteries producing opaque enamel glazed tiles, and was soon shipping abroad large quantities of ware imi¬

tating the Chinese blue-and-white decorated ware that was becoming so popular. See Delft.

England in the 17th century was making no fictile wares worth comment. Her upper

classes were using imported Delft and German stoneware (termed by them Cologne ware).

The Staffordshire potteries had a considerable output of low-priced roughly modeled wares, termed these days <(peasant pottery.* Tygs, puzzle jugs, posset pots, ((cottage ornaments®, etc., were their art (?) or showpieces. Their decoration was done in raised slip poured from a spout or (<quill® (like confectioners' work).

By 1673, John Dwight had started a factory at Fulham, where he made a very fine stone¬

ware (termed <(Cologne ware®) and some truly artistic delicately executed statuary. About 1691, the two brothers Elers, from Holland, started making very fine salt-glazed stoneware in Staffordshire. It was of the finest texture body and perfect execution with sprigged (stamped) decoration. Following in the Elers path came Astbury, Thomas Wedgwood, Ralph Shaw (1733). A white Derbyshire clay pro¬

duced ((Crouch ware® till 1720. Bristol, Vauxhall and Lambeth also made salt-glaze stoneware, and Burslem (Staffordshire), by 1750, had 60 small factories, and exports to Holland and Germany were large. Enamel

polychrome decoration and gilding was done on some of this stoneware. By 1780 cream-colored earthenware had taken the place of

stoneware and came into use over the entire civilized world, the industry propagated by Warburtons, Wedgwoods, Turners, Mayer and other Staf¬

fordshire potters. Thomas Whieldon, between 1740 and 1780, produced clever vari-colored pastes (agate, tortoiseshell, ‘ etc.) and novel forms. Josiah Spode (Whieldon’s apprentice) and his son became noted for their ((black basalt,® cream color, transfer-print decoration, jasper and other wares. Josiah Wedgwood and his contemporaries, John Turner, Henry Palmer, Josiah Spode, Ralph Wood, in the mid¬

dle of the 18th century brought the earthen¬

ware product of the Staffordshire potteries to a stage of fine art. Wedgwood’s most famous ware was the beautiful jasper (of his own invention) in vases, plaques, medallions, etc., displaying the lovely reliefs of Flaxman and other artists. Other bodies were (<pearl® ware, Queen’s ware, basalts, ((encaustic® (imitating Greek terra cottas) emanating from Wedg¬

wood’s factory, ((Etruria.® Liverpool turned out its tin enameled (Delft) ware, and, by 1755, Sadler and Green had established the reputa¬

tion of their transfer-print decoration process, and the <(Herculaneum® factory made prolific quantities of artistic stoneware. Leeds was noted for its cream colored ware ; Swinton pro¬

duced ((brown china® with its ((Rockingham®

glaze. Other well-known earthenware potter¬

ies were at Newcastle, Sunderland, Bristol (see Bristol), Derby (see Derby), Swansea, Mort-lake, Caughley (Salopian ware) with its ((willow pattern,® Coalport, *etc.*

Chinese porcelain ware was still a costly luxury, and, while Delft proved a less expen¬

sive, clever substitute, the European ambition was to produce its own true porcelain. Lacking the requisite earths imitations they attained large proportions in faience (enamel) ware made in the factories of Strassburg, Franken¬

thal, Nuremberg, Hoechst, in Germany; Milan and Capo di Monte, in Italy; Roerstrand and Marieberg, in Sweden ; Lyons, Niderviller, Liineville, Lille, Saint Cloud, Sceaux, Marseilles, in France.

European Porcelain. — The ever increasing shipments of porcelain from China at ever de¬

clining cost in the 18th century brought failure to the European faienceries. The Oriental com¬

petition forced further researches for true-porcelain earths. Florence, in the 16th cen¬

tury, had for a few years produced soft (artifi¬

cial) porcelain. Saint Cloud, by the 17th cen¬

tury, was making an artificial porcelain, and rival factories started up at Mennecy, Chan¬

tilly and Vincennes, in France. The latter plant was moved, in 1756, to Sevres, where Louis XV took it over and subsidized it. It produced work of the highest style of the art in a lovely mellow body of artificial porcelain.

In 1768 kaolin earth was discovered in France and by 1772 was producing its noted delicate soft porcelain. See Sevres; Porcelain, *etc.*

But Boettger, in Germany (1708), discovered the true porcelain earth first, and a factory was established at Meissen (near Dresden), soon to be shipping its wares through Europe. (See Dresden). In spite of the Meissen workers being kept in military seclusion, the secret of hard porcelain manufacture leaked out, and we find porcelain factories opened in : Vienna (1718) ; Capo di Monte (1742) ; Saint Petersburg (1745) ; Hoechst (1746) ; Fuerstenberg (1746) ; Berlin (1750) ; Frankenthal (1755) ; Nymphen-berg (1758) ; Ludwigsburg (1758) ; Copen¬

hagen (1756) ; Madrid (1760), known as Buen Retiro. In England porcelain was first made, in 1730, at Bow; it was artificial body, largely glass and ground Chinese porcelain (some American clay). William Duesbury pur¬

chased the factory in 1776, when it wyas re¬

moved to Derby. (See Bow). Chelsea made soft porcelain from 1745, or earlier. William Duesbury purchased the works in 1770 and ran it till 1784, when it was removed to Derby.

(See Chelsea.) The Derby soft porcelain fac¬

tory ran from 1756 to 1849. (See Derby). At Worcester a factory was started in 1751. It made artificial porcelain till 1783, then hard porcelain. Robert Chamberlain started an op¬

position factory about 1789. The two factories combined in 1840. Thomas Grainger estab¬

lished a factory in Worcester soon after 1801.

Several partnership changes were made, after which Grainger ran the factory himself till his death in 1839. (See Worcester.) William Billingsley (a decorator from Worcester and Derby factories) started a factory in 1796 at Pinxton, but left in 1800 and started another factory at Nantgarw, in 1811, which was closed in 1814. These factories of Billingsley made ware from his wonderfully translucent but hopelessly costly, glassy paste formula. Swan¬

sea, besides earthenware, produced, from 1814, translucent (porcelain) ware under Billingsley's formula for several years. Lowestoft produced a soft paste porcelain in 1756 and continued, probably, till 1761. The pseudo-Lowestoft por¬

celain beloved of American collectors is pure Chinese hard porcelain.

England's first production of hard (true) porcelain was started through the discovery of kaolin (about 1758) by William Cookworthy of Plymouth. A factory was started there in 1764, to be purchased (1770) by Richard Champion, of Bristol, and soon moved to the latter city. (See Plymouth). Bristol porce¬

lain, likewise, was a financial failure and Cham¬

pion sold out the factory (1781) to a New Hall pottery.

Modern Ceramics.-— Bone porcelain (called also ˆstandard® porcelain) became a regulation factory paste composition, used by all English factories, when (1800) Josiah Spode's son started the use of the simple mixture

of bone-ash, china stone and china clay.

The ease gained and the low price of

production of bone porcelain ruined all competition against it, and it remains stand¬

ard to this day. Royal Worcester and

Crown Derby wares are still leaders in Great Britain in art products. The Wedgwood fac¬

tory (Etruria) continues its output of jasper and other fancy wares. Other leading pot¬

teries of this and last century are those of Mintons (see Mintons), and of Copelands and Doultons stoneware potteries. Italy produces many imitations of the old pieces. Sevres continued producing the finest art work in soft porcelain, until (under Brongniart), about 1800, she turned to making hard paste body.

In the last century Sevres worked out a cameo style of relief (pate sur pate) which Solon did master work on, till 1870, when he continued the delicate method at Mintons. In France Theodore Deck and Taxil Doat became re¬

nowned creative ceramic artists. Sevres revived (in 1850) faience making alongside of her superb porcelain ware. (See Sevres). French modern faience, in its perfect technique and beautiful painted decoration, takes a place in the plastic arts alongside the finest porcelain.

Limoges grew to become a leading porcelain centre in the last century; the great American factory of Havilands is there. Berlin enlarged her ceramic palette and has done rich relief work in colored plant life and

figures. The Berlin ˆtransparencies® in delicate porcelain re¬

lief became famous ; her dipped then fired lace produces clever effects. The pottery was re¬

moved to Charlottenburg in 1870. Seger's re¬

searches into Oriental processes produced a fiambe and a sang de bceuf glaze of great beauty. See Chinese Ceramics.

Bibliography. — Borrmann, (Moderne Kera—

mik> (Leipzig 1902) ; Brongniart, Al., and Salvetat, A., (Traite des arts ceramiques>

(Paris 1877) ; Birch, S., (History of Ancient Pottery* (London 1873) ; Gamier, E., (Dictionnaire de la Ceramique* (Tours 1882) ; Graesse and Jaennicke, (Guide de l'Amateur de Porcelain et Faience) (Dresden 1901) ; Jacquemart, A., (History of the Ceramic Art*

(London 1873) ; Jaennicke, F., (Die gesamte keramische Literatur) (Stuttgart 1882) ; Jervis, W. P., Encyclopedia of Ceramics) (New York 1902) ; Marryatt, Joseph, (A History of Pottery and Porcelain* (London 1868) ; Solon, M. L., (Ceramic Literature) (London 1910, an exhaustive bibliography) ; Burgess, F. W., (01d Pottery and Porcelain) (New York 1915) ; Litchfield, F., (Pottery and Porcelain) (London 1912).

Clement W. Coumbe.

CERARGYRXTE, native chloride of silver,

AgCl. It crystallizes in the isometric system, and is cubical in general habit. It has a specific gravity of 5.55, and is quite soft, with a grayish color and a resinous lustre. Upon ex¬

posure to light its color changes to a violet-brown. It occurs in Mexico, in western South America, in Norway and in the Ural Moun¬

tains. In the United States it is found in Idaho, Utah, Colorado, Nevada and Arizona. When found in quantity it is valuable as an ore of silver.

CERASTES, a genus of African vipers,

remarkable for their fatal venom, and for two little horns formed by the scales above the eyes. Hence they have received the name of horned vipers. The tail is very distinct from the body. C. cornutus is the horned viper or asp of northern Africa, a species known to the ancients. There are several other species.

CERASUS, a genus of trees, the cherries, of the order Rosacece, now always regarded as a section of the genus Prunus, distinguished from the other sections by the smooth, bloomless fruit conduplicate vernation and other char¬

acters. See Cherry.

CERATES, certain official preparations of the United States Pharmacopoeia. They are unctous substances, consisting of oil, lard or petrolatum mixed with wax, spermaceti or resin, to which various medicines may be added. In consistency they are harder than ointments and softer than plasters, and should be capable of being spread at ordinary tem¬

peratures on cloth, and should not melt at the temperature of the human body.

CERATODUS, se-rat'o-dus, an extinct

genus of fishes belonging to the Dipnoi (q.v.) or lung-fishes. Its nearest extant relative is Neo-ceratnlus, the barramunda or native salmon of the Australian rivers, measuring from three to six feet in length. This fish can breathe air, and can consequently live in water too foul for other fishes, but cannot live on land.

CERATOSA, certain sponges in which the

skeleton or solid support is horny. Another name is Ceratospongioe. The skeleton consists of spongin, which differs chemically from the

substance of true horn (keratin). The spongin is deposited in long fibres by peculiar cells (spongioblasts). The fibres interlace, branch and unite into the supporting framework of the sponge. Examples of the horny or fibrous sponges are the bath-sponges, such as Euspongia officinalis, varieties of which occur in the Medi¬

terranean and about the West Indies, Florida, *etc.* See Sponge.

CERATOSAURUS, se-ra-to-sor'us, a

carnivorous dinosaur (see Dinosauria) resem¬

bling Allosaurus (q.v.), but of smaller size and with small horns over the eyes and on the nasal bones. It is found in the Como formation of Wyoming (Upper Jurassic Period).

CERAUNIAN, se-ra'ni-an, MOUNTAINS,

in classical geography: (1) A mountain range in the southeastern part of the Caucasus Moun¬

tains, the exact position of which is not known ; (2) a chain of mountains in Epirus, northern Greece, extending to the Adriatic and forming the peninsula Acroceraunium (q.v.). The

mountains themselves are also called Acrocerau-nia, and are now known as Khimara.

CERAUNOGRAPH, from the Greek ker—

aunos, thunder and lightning, and grapliein, to write, an instrument

for the automatic recording of the number, time and intensity of lightning flashes during thunderstorms. The instrument is made in several forms, but all are modifica¬

tions of the recording apparatus of the wire¬

less telegraph, suggested by the fact that it was a wireless telegraph instrument which au¬

tomatically made the first thunderstorm record (in 1898). As with the wireless, the vibrations are transmitted by the Hertzian waves, caught by an antenna, and conveyed to a coherer and thence to the recording apparatus. The in¬

strument may be arranged for long distance observations, up to 600 miles. The cerauno-grapli has been combined with the barograph so that the records of both instruments appear on the same chart. The name of the instru¬

ment was given to it by Father Odenbach of the Saint Ignatius College Meteorological Obser¬

vatory, and his investigations appear in the annual reports of that institution for the years 1902, 1903, 1906 and 1907. Consult also the United States Weather Bureau's (Monthly Re¬

view } for 1906, p. 273.

CERBERUS, ser'be-rus, in Greek myths, a three-headed dog, with snakes for hair. Hesiod describes him as 50-headed, and states him to have been the offspring of Echidna by Typhon, the most terrible of the giants that attempted to storm heaven ; but later writers give him only three heads and a tail or mane of ser¬

pents. At his bark hell trembled, and when loosed from his hundred chains, even the Furies could not tame him. He watched the entrance of Tartarus, or the regions of the dead, and fawned on those who entered, but seized and devoured those who attempted to return. He was subdued by Heracles (Her¬

cules) .

CERCARIA, ser-ka'ri-a, the larva of the fluke-worm and other trematode parasites. The body is tadpole-like in shape, with an interior and posterior sucker, a mouth and pharynx, and a forked intestine. The Cercarice are de¬

veloped in the body of the parent-nurse (redia).

Escaping from the redia, the cercaria, swim¬

ming about in pools or ponds, forces its way into the body of some snail, which forms its first host. Then, losing the tail, it becomes encysted, attached to blades of grass or herb¬

age. The transference of the larval fluke to its final host, the sheep, is effected if the latter swallow the grass on which the cercaria has become encysted. The young fluke then escapes from the cyst, and forces its way up the bile-ducts to the liver, in which it rapidly grows, and developing reproductive organs, attains the adult conditions. See Trematoda.

CERCIS, ser'sis, a genus of plants of the order Legnminosce. C. canadensis , redbud, or Judas-tree, is a small ornamental tree, often cultivated, but growing wild from New York south to Florida and west to Minnesota, Kansas and Louisiana. C. siliquastrum, a native of the south of Europe, and of several countries in Asia, is a handsome, low tree with a spreading head. The leaves are remarkable for their un¬

usual shape; they are of a pale, bluish-green color on the upper side, and sea-green on the under. The flowers, which have an agreeable acid taste, are often mixed in salads, and the flower-buds are pickled. The genus re¬

ceived the name of the Judas-tree from the tradition that it was upon a specimen of it, near Jerusalem, that Judas hanged himself.

CERCOPITITECIDZE, ser-kd-pi-the'si-de,

a family of primates, including all the Old World monkeys, except the anthropoid apes.

The various groups and species may be found described under their names. See also Monkey.

CERCYON, a famous robber, killed by

Theseus.

CERDIC, ker'dik, founder of the West Saxon kingdom : d. 534. He was a Saxon earldorman who invaded England in 495, and after gradu¬

ally fighting his way and extending his con¬

quests, established the kingdom of Wessex about 519. He won a great battle at Charford in 519, but suffered a severe defeat from the Bri¬

tons in 520 at Mount Badon, or Badbury, in Dorsetshire. In 530 he conquered the Isle of Wight. At his death his kingdom extended over the present counties of Berkshire, Wilt¬

shire, Dorsetshire and Hampshire (including the Isle of Wight). All the sovereigns of England, except Canute, Hardicanute, the two Harolds and William the Conquerer are said to be descended from Cerdic. Consult Bede, (Historia ecclesiastics gentis) (bk. 5, ed. C.

Plummer, Oxford 1896) ; Gent, E., (Origines CelticaP (London 1883) ; Green, J. R., (The Making of England) (London 1897).

CERDONIANS, an ancient sect, whose be¬

lief, half philosophical, half religious, was a con¬

fused mixture of Christian dogmas with Orien¬

tal dualism and Gnostic ideas. Their founder, Cerdo, was a Syrian, who came to Rome about the year 139 under the pontificate of Hyginus.

He maintained the existence of the Zoroastrian two principles, one of absolute good and the other of absolute evil. The latter, according to him, was the creator of the world and the God and lawgiver of the Jews. The former was the creator of Jesus Christ, whose incar¬

nation, sufferings and death were only sensible appearances, and not vital facts. Because they believed the human body the work of the evil

Deity, the Cerdonians prohibited the eating of flesh, marriage and wine, and considered the ascetic life the highest spiritual life. His dis¬

ciples became confounded with those of Marcion, who some years later propagated similar opinions.

CER]£, sa-ra, Jean Nicolas, French bota¬

nist : b. Isle of France 1737 ; d. there, 2 May 1810. Under the direction of the French gov¬

ernment he greatly extended the culture of spices in the Isle of France (now Mauritius), when that island was a French dependency.

The Agricultural Society of Paris published his essay on the culture of rice and awarded him a medal ; and Napoleon confirmed him in his position as director of the botanical garden of the Isle of France, and conferred on him a pension of $120. A tree of the island has been called after him, Cerea.

CERE, ser, the naked skin or fleshy sheath that covers the base of the upper mandible in some birds, through which it is supposed that a tactile sense is exercised.

CEREALIA, se-re-a'li-a (from Ceres, the

goddess of the fields and of fruits), signified the productions of agriculture, also the festivals 224:

of Ceres, celebrated at Rome. The time at which they were celebrated is not known. Ac¬

cording to some it was the 12th of April ; ac¬

cording to others the 7th of the same month.

CEREALS, a term derived from Ceres, the goddess of corn. Though sometimes extended to leguminous plants, as beans, lentils, etc., and to buckwheat, it is more usually and properly confined to the Graminece, as wheat, barley, rye and oats, which are used as human food.

In agriculture they are usually considered as exhausting crops, partly on account of their trailing roots; their mode of nutrition, which is effected more by the roots than by the leaves; their slender stems, which allow weeds to grow up and rob the soil; and from the neces¬

sity of allowing them to attain full maturity before they are reaped. Accordingly it is con¬

sidered one of the rules of good husbandry not to take two cereal or white crops in succession, but to make them alternate with root crops, which, growing in rows at some distance apart from each other, have the additional advantage of allowing weeds to be destroyed by means of repeated hoeings. See Barley; Buckwheat; Grain ; Grain, Handling and Transportation of; Grasses in the United States; Corn, Indian; Millet; Oats; Rice; Rye; Sorghum; Wheat.

CEREBELLUM, ser-e-bel'um («the little

brain®), that portion of the brain situated be¬

hind and beneath the cerebrum. It is connected with the main brain mass by means of two feet or stems, the cerebellar peduncles, and is sepa¬

rated from the main brain mass in the cranial cavity by a thick layer of connective tissue, the tentorium cerebelli. It is also connected with the pons by a pair of middle peduncles, and with the medulla oblongata by the inferior peduncles. It thus forms a very integral por¬

tion of the brain mass. In general the form of the cerebellum in human beings is a flattened ovoid measuring from 8 to 10 centimeters from side to side, five to six centimeters from before backward, and five centimeters vertically. Its average weight is about 140 grams, which is one-eighth of the weight of the whole cerebro¬

spinal axis. It is larger and heavier in the male than in the female, and

is relatively larger in the adult than in the child. Like the brain, it is divided up into a number of lobes, of which three are most prominent, the middle portion or vermis, and the two lateral lobes.

The minute structure of the cerebellum is some¬

what similar to that of the cerebrum, but there are certainly very marked differences, particu¬

larly in the development of a layer of very characteristic cells, the Purkinje cells. The in¬

terior of the cerebellum contains masses of gray matter, or nuclei. These are the dentate nucleus, the nucleus emboliformis, nucleus globosus and the nucleus fastigii in the vermis.

Through the inferior, middle and superior peduncles fibres pass to and from the cerebrum, pons, medulla and spinal cord, thus bringing the cerebellum into organic union with the rest of the nervous system. The functions of the cerebellum are not yet completely worked out, but it is certain that the cerebellum has a num¬

ber of important functions, chief among which are those connected with locomotion and the act of balancing, i.e., the orientation of the body in space. It is termed by Sherrington the chief head ganglion for the proprioceptors, or those organs which give rise to the sense of position of the human body. The chief symptoms of cerebellar disease, either from maldevelopment or new growths, are : Cerebellar ‘ ataxia, a peculiar drunken-like gait; nystagmus (q.v.), adiadochokinesis, vertigo, hypotonus, asynergia, muscular asthenia, forced movements of the head and eyes, peculiar speech dysarthrias and occasionally cerebellar fits. Consult Jelliffe and White, (Diseases of the Nervous System) (2d ed., 1917). See Brain.

CEREBRAL HAEMORRHAGE. See

Brain, Diseases of.

CEREBRATION, an old term, much used

in the early physiologies, designating an auto¬

matic reflex series of brain actions taking place below the threshold of consciousness (q.v.).

CEREBRIN, CsoHieoNaOis, a name that has been applied, at different times and by different chemists, to various substances that are ob¬

tainable from the brain and other parts of the nervous system by extraction with alcohol. It is now usually applied to a white, crystalline, nitrogenous powder that is obtained by heating ox-brain with baryta, washing, drying and finally extracting with alcohol. The cholesterin that is also present in the product so obtained may be removed by the action of ether, in which cerebrin is insoluble. Cerebrin does not combine with acids or bases, but by prolonged boiling with dilute acids it is converted into a monosaccharide galactose and -the nitroge¬

nous substance known as sphingosin that can reduce Fehling's solution.

CEREBROSPINAL, pertaining to the

brain and spinal cord together, looked on as forming one nerve mass.

CEREBROSPINAL FLUID. See Brain.

CEREBROSPINAL MENINGITIS. See

Meningitis.

CEREBRUM. See Brain.

CEREMONIAL, Court. See Court Cere¬

monial.

CEREMONIALE, the book used in the

Catholic Church containing the ceremonies and rites for all general religious functions. The term is restricted to the Ceremoniale Episcoporum (of the bishops) and Ceremoniale

Romanum, special ceremonies and prayers be¬

ing found in other books, such as Breviary, the Missal, *etc.* (qq.v.).

CEREOPSIS, se-re-op'sis, the pigeon-goose, an Australian genus of the Anatidce or duck family, and the subfamily Anserine e, or geese.

It has a small and extensively membranous bill and notably long legs, bare above the suffrago.

They are so named from the remarkable size of their cere. There is but one species C. novee hollandice which has been made the type of a subfamily cereopsince.

CERES, se'rez, the name given by the

Romans to the Greek goddess of agriculture, Demeter, when her worship was introduced into Rome. The origin of the name cannot be explained with certainty. It is not Latin ; but some think it was Etruscan, among which people, according to Servius, Ceres was one of the Penates. Others think that Ceres may be the same with the Greek Cora, or Core (that is, CERES - CERIUM

ˆmaiden®), another name for Persephone, the daughter of Demeter, with whom Demeter her¬

self was often confounded. The worship of Demeter, or Ceres, was introduced into Rome from Sicily at the beginning of the 5th cen¬

tury b.c., and the first temple to her was vowed by the dictator, A. Postumius Albinus, 496 b.c.

Her worship soon acquired a considerable de¬

gree of political importance. She was the god¬

dess of the earth in its capacity of bringing forth fruits and grain. Her festival was the Cerealia. She is always represented as fully draped, with ears of corn and poppies in her hands and on her head a corn-measure. They sacrificed pigs and cows to her. As usual when the Romans introduced the worship of a foreign divinity into their own city, they adopted all the legends connected with that divinity, adapting them to their own mythology.

Thus she was made the daughter of Saturn and Ops, and sister of Juno, Pluto, Neptune, Jupi¬

ter and Vesta. Her daughter was Proserpine (q.v.). See Demeter.

CERES, the name of the first asteroid dis¬

covered between the orbits of Mars and Jupiter.

It was discovered by Piazzi, 1 Jan. 1801. Hav¬

ing observed it at Palermo, in Sicily, he called it Ceres, after the old tutelary divinity of that island. Under favorable circumstances it has been seen by the naked eye as a star of the seventh magnitude, but more generally it looks like one of the eighth magnitude ; some ob¬

servers call the light reddish and perceive a haze about the planet. Its diameter is about 500 miles.

CEREUS, se're-us, a genus of plants of the family Cactacece, remarkable for their singular¬

ity of form and the beauty of the flowers. C.

giganteus, the suwarrow or saguaro of the Mexicans, is perhaps the

largest and most strik¬

ing of the genus. It rises to the height of 50

or 60 feet, and looks more like a candelabrum than a tree of the normal type. It occurs in Arizona and northwestern Mexico. Other

notable species are C. senilis , the long gray bristles of which give it the appearance of the head of an old gray-haired man. C. grandi-florus is the night-flowering cereus, but there are others which also flower at night. C.

speciosus, an erect plant, commonly cultivated in greenhouses, is a native of Mexico. C.

flagelliformis, a creeper, is not unfrequently met with in gardens. The members of the genus are generally useful as cardiac agents and antipyretics. The fruits of many species are used for food.

CERIGNOLA, cha-ren-yo'la, Italy, town in the province of Foggia, and" 24 miles southeast from the city of Foggia. It has a college, sev-.

eral convents and a hospital. The inhabitants manufacture linen; and the district produces large quantities of almonds, oil and cotton. In 1503 the Spaniards under Gonzales, Duke of Cordova, here defeated the French, when the Due de Nemours, who commanded the latter, was slain. Pop. 38,180.

CERIGO, cha're-go- (ancient Cythera),

Greece, an island in the Mediterranean, separated from the southern coast of the Morea by a narrow strait. It formerly belonged to the Ionian Republic of the Seven Islands, but in 1864 became part of the province of Arcadia, Greece; area, about 106 square miles. It is vol. 6 — 15

rather rocky and mountainous. Grain, wine, olives and other fruits are raised. Sheep and goats constitute the chief live stock. The peo¬

ple are of Greek origin, and are all of the Greek Church. At an early period a Phoenician colony was founded here. Later it was suc¬

cessively under the control of Argos, Sparta and Athens, and finally fell into the hands of the Romans. After submitting to Venice and then to Turkey, in 1718, it was once more as¬

signed to Venice. It was annexed to France in 1807 ; two years later it was occupied by the English; after 1815 it shared the fate of the Ionian Islands. It was-anciently sacred to Aphrodite (Venus), who was also called

Cytherea. Pop. 13,100.

CERINTHUS, one of the first heresiarchs who, according to Saint Irenseus in his work, (Against Heresies, } was contemporary with the evangelist Saint John; but Tertullian and Epiphanius refer him to the time of Hadrian. In Irenaeus' work, as also in the ˆhilosophumena,*

attributed variously to Origen and Hippolytus, bishop of Ostia, Cerinthus is represented as an alumnus of the pagan philosophical schools of Alexandria ; but he broached his heretical doc¬

trines in Asia Minor, and there had a numer¬

ous following. The universe, he taught, is not the work of the First God, but was created by some angelic power far inferior to the supreme power. Jesus he held to be the son of Joseph and Mary, born as other men are born, but excelling all in righteousness, wisdom and understanding. Cerinthus taught also that upon Jesus, after his baptism of John, de¬

scended the Christos from the power which is supreme over all, in the form of a dove, and that then Jesus proclaimed the unknown

Father and wrought miracles ; but that at the end of the passion the Christos flew away out of Jesus, and Jesus suffered, but that the Christos remained impassible, being the spirit (or breath) of God. Angels play a con¬

spicuous part in the system of Cerinthus. Thus it was an angel, he says, that gave the law to Moses; and the Yahve of Israel was an angel.

Cerinthus and his followers entertained a special animosity against Saint Paul and Saint John, and the heresiarch is credited with writ¬

ing an apocalyptic book in rivalry with Saint John. He is said to have

been a believer in the millennial reign of the Christ upon the earth.

Modern critics consider Cerinthus a Gnostic who, in common with the Jewish Ebionites, held the belief that the Christ was a thing apart, which was with Jesus only during his life and left him at death.

CERITE, se'rit, a mineral occurring only at Riddarhyttan, in Sweden, and containing the rare element cerium, and others of the cerium group. Its formula is not certainly known, but the mineral may be described as a silicate of the metals of the cerium group, combined with small quantities of calcium and iron. It is mostly massive or granular, but crystals belonging to the orthorhombic system are sometimes found. Cerite has a hardness of about 5.5, and a specific gravity of about 4.9.

It has a peculiar and characteristic color, in¬

termediate between clove-brown and cherry red shading off to a gray.

CERIUM, se'ri-um, a metallic element the oxide of which was discovered and recognized 22(5

as a new substance in 1803 by Klaproth, and, independently, by Berzelius and Hisinger. It was named for the minor planet Ceres, which was also discovered at about the same time.

The principal source of cerium is the mineral monazite (q.v.), which is a silicate of cerium and certain other allied elements. Cerium forms a basic nitrate that is insoluble in water, and this fact affords a ready means of separat¬

ing the metal from the other elements with which it is almost invariably associated.

Metallic cerium may be obtained by electrolysis of the anhydrous chloride, or by melting the anhydrous chloride • with metallic sodium.

Thus prepared, cerium is a steel-gray metal, ductile and malleable, and melting at a tem¬

perature probably not far from the melting-point of silver. Its chemical symbol is Ce, and its atomic weight is 139.1 if H— 1. It has a specific gravity of from 6.6 to 6.75, and a specific heat of about 0.0448. It does not change in dry air, but in moist air it oxidizes superficially. It decomposes in cold water slowly, and in hot water quickly. Two oxides of the metal certainly exist, one having the formula Ce203 and the other the formula CeCh. Three other oxides have also been described, with the formulae Ce03, Ce205 and CeXb ; of these the first probably exists, but the other two still need confirmation. Oxide of cerium is also used in the manufacture of the better grades of incandescent gas-mantles. A fabric of cot¬

ton is woven of the desired form and this is impregnated by repeated dipping in a solution of the nitrates of cerium and thorium. On ignition the cotton burns away, and the nitrates are converted into oxides, which give the in¬

tense luminosity desired. A mixture of 99

per cent of thorium oxide to 1 of cerium oxide gives the best results.

In medicine the insoluble salts of cerium are used, cerium oxalate alone being officinal. It resembles the insoluble bismuth compounds in its action, being a sedative to mucous mem¬

branes, and it is much used as an antemetic, particularly in the nausea of pregnancy. The soluble salts of cerium are poison, their action being similar to the soluble salts of bismuth.

CERNUSCHI, Enrico, cher-noos'ke, Italian

economist : b. Milan, Italy, 1821 ; d. Mentone, 12 May 1896. He was graduated at Pavia in 1842, fought for liberty in the insurrection of 1848 and was obliged to flee from Italy, ow¬

ing to political proscription. He acquired a large fortune in Paris as a banker, but owing to the hostility of the communists left France in 1871 and traveled extensively in Egypt, China, Japan, England and the United States, visiting the last named in 1877. He brought back

valuable ethnological and art collections which he bequeathed to the city of Paris.

They now form the Musee Cernuschi, opened in 1898. He was an ardent bimetallist, and pub¬

lished (Mecanique de l'echangeˆ (1865);

illusions des societes co-operatives) (1886) ; (Discours) (1871); (Silver Vindicated* (1876); (Le bi-metallisme a quinze et demP (1881); {Anatomie de la monnaie* (1886), *etc.*

CERO, se'ro, a large, edible fish (Scombero -

morns regale) of the western Atlantic, and similar to the Spanish mackerel. Another species (S. caballa), also called ˆsierra® or ˆking-cero® is found in the southern Atlantic, and reaches double the weight of the lormeE

often attaining 100 pounds.

CERQUOZZI, char-kwot'ze, Michelangelo,

Roman painter: b. Rome 1602; d. 1660. He re¬

ceived the surname delle battaglie (battle-painter), and at a later period that of delle bambocciate, because, in imitation of Peter Laar, he painted ludicrous scenes taken from low life, such as that to be seen at fairs and markets, and among the lazzaroni. Among his best works are the (Insurrection of Masaniello in Naples) (Palazzo Spada, Rome) ; (St. John the Baptist Preaching* ; three Roman folk scenes (Galleria Nazionale, Rome) and two battle scenes (Dresden Gallery). Nearly all of the principal museums of Europe possess representative works by him.

CERRETTI, cher-ret'te, Luigi, Italian poet and rhetorician: b. Modena, 1 Nov. 1738; d.

Pavia, 5 March 1808. The purity and elegance of his diction made

him, at an early age, the most distinguished professor of rhetoric and oratory in Italy. His (Poems and Select Prose, * collected into a posthumous volume, were instantly successful, and have retained their rank ever since.

CERRO BLANCO, the highest mountain

in New Mexico; summit, 14,269 feet.

CERRO GORDO, ther'ro gor'do, or ser' ro gor'do ((<Big Hill®), a famous mountain pass in Mexico, the scene on 18 April 1847, of one of the sharpest battles of the Mexican War.

After the capture of Vera Cruz on the coast, General Scott moved northwest toward the city of Mexico, along the National road. Some 50 miles from Vera Cruz this leaves the steam¬

ing lowlands and climbs a steep rocky plateau, an eastern spur of the great mountain range, seamed with ravines and thick with chaparral, and pierced by the defile of the little Rio del Plan. To this defile the road after crossing it and leaving it by a loop to the north among the mountains, returns at a ravine separating a sharp rocky ridge called Atalaya from a coni¬

cal eminence termed Telegraph Hill. West of this again is the small hamlet called Cerro Gordo, which gives its name to the pass. On 9 April Santa Anna began fortifying Tele¬

graph Hill, and from the 12th pushed on the work with all his force ; accumulating about 12,000 men, the bulk at Cerro Gordo, but neglecting to occupy Atalaya. On the 11th, Scott's vanguard under Twiggs and Harney came up to Rio del Plan at the foot of the plateau, where the road crosses the river, drove away a few Mexican lancers, established a camp and began reconnoissances. Santa Anna, •in place of attacking the scattered detachments, confided in his strong position, and the lowland fevers which must force the Americans to fight him, and waited. By the 17th most of Scott's forces had come up; and he pushed Twiggs forward within easy striking distance.

The latter, finding Atalaya undefended, occupied it just as a Mexican detachment advanced to do so, routed them and chased them in headlong flight half way up Telegraph Hill. The whole American

army, about 8,500, being now at hand, Scott issued orders for a general advance next day. Santa Anna's line extended from Tele¬

graph Hill to a road at the ravine, and east¬

ward for a mile along the heights overlooking CERRO LARGO — CERULLI

the National road, which ends in a precipitous rocky bluff 100 feet high ; then back over three ridges terminating in rocky knolls, to the river defile. In front of the batteries and infantry, the chaparral had been cut down and piled into an abattis for several hundred feet. The Americans, on the other hand, planted power¬

ful batteries on Atalaya, and enfiladed the Mexican right with a howitzer across the river. Scott's plan was simple, but brilliantly effective, though the impassable ground made it fall short of the full intention. Since the Mexicans expected the chief attack on their right, he resolved to make only a feint there and assuming that they expected him to move forward along the road resolved not to do so.

In the meantime he ordered the roads cleared around the hills to the north in order that by making a circuit to the National road in the rear of the Mexicans he might cut off their re¬

treat. On the morning of the 18th Pillow as¬

sailed the right ; the artillery on Atalaya rained shot and shell with terrific effect on Telegraph Hill, the road batteries, Santa Anna's camp, and even his reserves, and the howitzer over the river added its discharge. Twiggs, Shields and Worth, with Riley, then moved along the circuit till on the north flank of Telegraph Hill, at first out of sight, then in full range of the Mexican fire. Santa Anna detached part of the forces on Telegraph Hill to drive them back; then Harney from Atalaya swept over the crest and down the side, up Telegraph Hill till within 200 feet of the batteries and below their range. There he reformed and in one final charge utterly routed the Mexicans, at the same time turning the forces on the hill against the main body of Mexicans at Cerro Gordo.

The entire right, its retreat cut off, threw down its arms and surrendered. The main body broke up in a panic, as the fugitives from Tele¬

graph Hill rushed among them and the guns from that quarter cut them down, and fled wildly down the craggy slopes and to the de¬

file, and westward along the road. The Mexi¬

cans lost 1,000 or 1,200 in killed and wounded; about 3,000 prisoners, including 5 generals, and 299 other officers; 43 guns and 3,500 small arms. The Americans lost 63 killed and 368

wounded. The victory laid open the road nearly to the Mexican capital. Consult Ban¬

croft, ‘History of Mexico) (Vol. V, San Francisco 1885) ; Wright, (General Scott) (New York 1894) ; and Wilcox, C. M., his¬

tory of the Mexican War* (Washington 1892).

CERRO LARGO, ser’ro lar’gd, a depart¬

ment in the northeast of Uruguay, well watered, with large savannahs and forests. Area, 5,729

square miles. Capital, Cerro Largo or Melo.

The inhabitants are chiefly engaged in cattle¬

raising. Pop. 36,000.

CERRO DE PASCO, ser’ro da pas’ko,

Peru, capital city of the department of Junin, at the northern extremity of the plateau of Bourbon, 14,275 feet above the level of the sea at the north end of Lake Chinchaycocha. The town came into existence in 1630, in conse¬

quence of the discovery of veins of silver there by an Indian. The streets are narrow and crooked, and the houses small and without windows or balconies. The inhabitants are a mixture of all races and nations, who make their living by the produce of the mines.

brom October to July hail-storms, mists and snowfalls make the place almost intolerable, and in summer with the exception of a few clear days the climate is little better. On ac¬

count of the extreme rarity of the air the dif¬

ference in temperature in the sun and in the shade is great. Cerro de Pasco still contains the most productive mines in all Peru, although they no longer yield the almost fabulous wealth that the Spaniards are said to have derived from them. Many of the shafts leading down to the veins of silver are in the town itself, and have their openings either in little huts or in the dwellings of the owners of the mines. Ac¬

cording to the greater or smaller depth of the diggings they are called minas or cortes. The silver is found partly pure, and partly in ores containing from 25 to 80 per cent of the precious metal. Pop. (very variable) about 14,000.

CERROS, or CEDROS, ISLAND, an

island belonging to Mexico, in the Pacific Ocean, off the west coast of Lower California where it forms a part of the western boundary of San Sebastian Viscaino Bay. It lies be¬

tween lat. 28° 5’ and 28° 35’ N. The climate is dry. It is for the most part mountainous and barren, but is thought to possess mineral wealth. Area, 12 square miles.

CERTALDO, Italy, town of Tuscany,

partly on a conical height, and partly on a flat along the right bank of the Elsa, 15 miles southwest from Florence. It is the birthplace, was long the home and now contains* the ashes of Boccaccio. His house is still shown, and in one of its rooms are collected numerous relics of the author of the ‘ Decameron, > and a large fresco painting of him by Benvenuti of Florence. Pop. 10,439.

CERTIFICATE OF INCORPORA¬

TION. See Corporations, Legal.

CERTIFICATION OF TEACHERS.

See School Supervision; also Teachers, Pro¬

fessional Training of. For foreign systems see the subheads Education , under the articles on the various countries.

CERTIORARI, ser-she-6-rar'I, in law, a

writ issuing from a superior court to call up the record of a proceeding in an inferior court, or before a body or officer exercising judicial power, that it may be trieˆ or reviewed in the superior court. This writ is usually obtained on complaint of a party that he has not re¬

ceived justice, or that he cannot have an im¬

partial trial in the inferior court or body. It is now to a great extent superseded by the appeal.

CERULEUM, a blue pigment, consisting of stannate of protoxide of cobalt mixed with stannic acid and sulphate of lime.

CERULLI, che-rool'li, Vincenzo, Italian

astronomer: b. Teramo, Italy, 20 April 1859.

He was educated at the Sapienza, Rome, and at the University of Berlin. For some time he was astronomer of the Gregorian University, Rome. In 1892 he founded the Collurania Ob¬

servatory at Teramo of which he has since re¬

mained director. He discovered the planet (704) Interamnia, and

rediscovered the Faye comet in 1910. He is corresponding member of the Lincei Academy, the Pontaniana Academy, Naples, the Turin Academy of Sciences and of 228

the Italian Astronomical Society. He is the author of two works on Mars ; three volumes of publications of the Collurania Observatory and is a contributor to Astronomische Nach-richten; (Memorie Spettroscopisti Italiani,*

and (Astronomia e scienza affiniˆ

CERUMINOUS GLANDS, the glands of

the ear which secrete the cerumen or wax which lubricates the passage to the tympanum and prevents the entrance of foreign matter.

CERUSITE, the native lead carbonate,

PbC03. It is common in orthorhombic crystals, very frequently stellately twinned. It also abounds in massive, earthy and stalactitic forms. It is very brittle, has a hardness of 3

to 3.5 and the high specific gravity of 6.5. It is usually translucent and of an adamantine or pearly lustre. Its color is white or gray, though green and yellow tints are not uncom¬

mon. It is one of the most abundant and valu¬

able ores of lead, and often carries silver. It is formed from galena by the action of solu¬

tions of calcium bicarbonate. Among its many important localities are Broken Hill in New South Wales, Ems in Germany and Phce-nixville, Pa.

CERUTTI, cha-roo'te, Giuseppe Antonio

Gioachimo, French Jesuit theologian: b. Turin, 13 June 1738; d. Paris, February 1792. He was one of the most eminent professors in the Jesuit College at Lyons and his (Apologie generale de l'institut et de la doctrine des JesuitesL attracted much attention. He had already published two discourses upon the means of preventing duels, and on the reasons why modern republics have not reached the splendor of the ancient. The last received the prize of the Academy of Dijon. He was at Paris when the Revolution broke out in 1789.

Abandoning his former principles he became one of the most zealous supporters of the new order of things. He was intimately connected with Mirabeau, and labored much for him. He also published with two others a paper called (La Feuille village oise'* for the purpose of keep¬

ing villagers informed of the news of the day, and several pamphlets, among which was a (Memoire sur la necessite des contributions patriotiquesP In 1791 he was a member of the legislative assembly. Some time after he delivered, in the church of Saint Eustache, a funeral discourse upon Mirabeau. The city of Paris called a street after his name. His col¬

lected works were published in 1793 (3 vols.).

Consult Aulard, F. A., (Un pamphlet de Cerutti, dans la Revolution frangaise, revue historique) (Vol. XV, p. 55).

CERVALCES, an extinct, moose-like deer,

complete skeletons of which have been found in Pleistocene marls in New Jersey, and which probably survived until the advent of human hunters. Its antlers are less broadly palmated than those of the existing moose, but have great trumpet-shaped plates on the lower prongs; the legs are very long, and the feet spread like those of a caribou, suggesting that it traveled in a snowy region, and indicating a much colder Quaternary climate in New Jer¬

sey than at present. The neck is too short to enable the animal to reach the ground without kneeling, and it is inferred that it was alto¬

gether a browser, although it has not the long prehensile muzzle of the elk or moose. It is, indeed, an intermediate form between stag and

moose. Consult Osborn, (Age of Mammals) (New York 1910).

CERVANTES, Philippines, capital of the

province of Lepanto, situated near the centre of the province in the northwestern part of the island of Luzon, three miles from Cayan, the former capital. It is on a road connecting it with Benguet, and is 78 miles from Dagupan, which is the nearest point on the railroad. Pop.

16,000.

CERVANTES SAAVEDRA, thar -van'tes

sa-a-va-dra, Miguel de, Spanish poet and novelist, one of the great writers of modern times: b. Alcala de Henares, 9 Oct. 1547; d.

Madrid, 23 April 1616. His parents removed to Madrid when he was about seven years old.

Their limited means made it desirable that he should fix on some professional study, but he followed his irresistible inclination to poetry, which his teacher, Juan Lopez, encouraged.

Elegies, ballads, sonnets and a pastoral, Milena,*

were the first productions of his poetical genius. Poverty compelled him to quit his country at the age of 22, to seek maintenance elsewhere ; he went to Italy, where he became page to the Cardinal Giulio Acquaviva, in Rome. In 1570 he served under the papal com¬

mander, Marco Antonio Colonna, in the war against the Turks and African corsairs, with distinguished courage. In the battle of Le¬

panto, in 1571, he lost his left hand. After this he joined the troops at Naples, in the service of the Spanish king. In 1575, while returning to his country, he was taken by the corsair Arnaut Mami, and sold in Algiers as a slave. He remained in slavery for seven years, but servitude, far from subduing his mind, served to strengthen his faculties. Vin¬

cente de los Rios and M. F. Navarrete, his chief biographers, relate the bold but unsuccess¬

ful plans which he formed to obtain his free¬

dom. In 1580 his friends and relations at length ransomed him. At the beginning of the following year he arrived in Spain, and from this time lived in seclusion, entirely devoted to the muses. It was natural to expect some¬

thing uncommon from a man who, with inex¬

haustible invention, great richness of imagina¬

tion, keen wit, and a happy humor, united a mature, penetrating and clear intellect, and great knowledge of real life and mankind in general. But it rarely happens that expecta¬

tion is so much surpassed as was the case with Cervantes. He began his new poetical career with the pastoral novel (Galatea* (1584), in which he celebrated his mistress. Soon after the publication of this he married. Being thus obliged to look out for more lucrative labor he employed his poetical genius for the stage ; and in the course of 10 years furnished about 30

dramas, among which his tragedy called

<Numancia> is particularly valued. He was not so successful in another kind of drama particularly favored by the Spaniards, a tangled mixture of intrigues and adventures ; and this was doubtless the cause of his being supplanted by Lope de Vega, who was particularly quali¬

fied for this kind of composition. He conse¬

quently gave up the theatre, but it seems not without regret From 1588 to 1599 he lived retired at Seville, where he held a small office.

He did not appear again as an author till 1605, when he produced the first portion of that work which has immortalized his name, — (Don Quixote. > Cervantes had in view by his work to reform the taste and

opinions of his country¬

men. He wished to ridicule that adventurous heroism with all its evil consequences, the source of which was the innumerable novels on knight-errantry. The beginning of the work was at first coldly received, but soon met with the greatest applause, in which at a later period the whole of Europe joined. Cervantes'

true poetical genius was nowhere so powerfully displayed as in his (Don Quixote, > which, not¬

withstanding its prosaic purpose and its satirical aim, is full of genuine poetry. While it strug¬

gles against the prevailing false romance of the time, it displays the most truly romantic spirit. The extraordinary good fortune of the work did not extend to the author. All his at¬

tempts to better his condition were unsuccess¬

ful, and he lived contented with his genius and his poverty, and a modest though proud esti¬

mation of his merits. After an interval of some years, he again appeared before the pub¬

lic in 1613, with (Twelve Novels) (which may be placed by the side of Boccaccio's), and in 1614 his (Journey to Parnassus) — an attempt to improve the taste of his nation. In 1615

he published eight new dramas, with intermez¬

zos, which, however, were indifferently re¬

ceived. Envy and ill-will, in the meantime, as¬

sailed him, and endeavored to deprive the neglected author of his literary fame; for which the delay of the continuation of (Don Quixote J afforded the pretext. An unknown writer published, under the name of Alonzo Fernandez de Avellaneda, a continuation of this work, full of abuse of Cervantes. He felt the malice of the act painfully, but revenged him¬

self in a noble manner by producing the con¬

tinuation of his (Don Quixote* (1615), the last of his works which appeared during his lifetime; for his novel (Persiles and Sigis-munda)

was published after his death. He found a faithful friend in the Count of Lemos, but poverty, his constant companion through life, remained true to him till his last moments.

Pie died on the same day as Shakespeare, in Madrid, where he had resided during the last years of his life, and the tercentenary anni¬

versary of his death was celebrated in many European and American literary centres, con¬

temporaneously with the Shakespearian tercen¬

tenary celebration in 1916. He was buried without any ceremony, and not even a com¬

mon tombstone marks the spot where he rests.

In addition to his celebrity as an author, he left the reputation of a man of a firm and noble character, clear-sighted to his own faults and those of others. (See Don Quixote; Exem¬

plary Novels). Among the best early editions of (Don Quixote) are the one published at Madrid by Joaquin Ibarra in 1780, considered a masterpiece of typography; that of Pellicer (Madrid 1798), and that of D. Diego Clemen-cin, with an excellent commentary (Madrid 1833-39). Many of his works are translated; (Don Quixote* into all the languages of Europe. Among early English translations may be mentioned those of Motteux (1719); Jarvis (1742) ; and Smollett (1755). A more recent notable translation is that of Ormsby, J.

(1885), containing life of the author, notes, bibliography, etc., republished with critical in¬

troduction by Fitzmaurice-‘Kelly, J. (Glasgow 1901).

CERVANTITE, or ANTIMONY

OCHER, is native antimony tetroxide, Sb20<.

It usually occurs in crusting stibnite and other antimony ores. It has a pale yellow color and greasy lustre.

CERVERA Y TOPETE, Pascual, thar—

ba/ra e to-pa'ta, Spanish naval officer : b. prov¬

ince of Jerez, 18 Feb. 1833; d. Puerto Real, Spain, 3 April 1909. He was of noble birth on his mother's side. He was graduated at the Naval Academy of San Fernando; entered on active service in 1851 ; served against Morocco and was made first lieutenant in 1859 ; captain in 1868; and admiral subsequently. He wras a prominent factor in the 10-years' war in Cuba, when he succeeded in blockading the ports and preventing the landing of filibusters; was sent to London as a representative of Spain to take part with other nations in a conference bearing on naval questions of international importance ; and commanded the fleet sent against the Amer¬

ican squadron operating in Cuban wraters after the declaration of war in 1898. He took refuge in the inner harbor of Santiago de Cuba, and when, on 3 July, he attempted to escape, under imperative orders from his superiors, his entire fleet was destroyed by the squadron under the official command of Rear-Admiral Sampson and the actual command (in the temporary absence of that officer) of Rear-Admiral Schley. Ad¬

miral Cervera and his surviving officers wrere sent to Annapolis, Md., as prisoners of wˆar, and soon afterward wˆere released and allowed to return to Spain. He wras a man of cultured and genial manners, of a kindly disposition and was a gallant officer and received many official courtesies at the hands of his captors. Consult (Spanish American War) (trans. from the Spanish, Washington 1899) and Cervera y Topete, (Views Regarding the Spanish Navy in the Late War* (Washington 1898); Alger, R.

A., (The Spanish American War.*

CERVID2E, ser'vi-de, the deer family, a group of ruminant ungulates, including, besides the typical deer, the reindeer, the musk-deer and others. The most noticeable characteris¬

tic of the entire group is tfip presence, in the males, or <(bucks,** of branched appendages to the skull, called antlers. These are, however, lacking in certain species, which, despite this fact, are very evidently closely related to the antlered deer. Only among the reindeer do the females have antlers. The antlered animals shed these ornaments annually and develop new ones. (For growth and reproduction of

these, see Antlers). Other peculiarities of the family are anatomical; the most noticeable is the ab¬

sence (except in Moschus) of a gall-bladder, and the presence in all of two lachrymal ducts, one visible outside the eye in the (<tear-bag**

(C rumen) . The subfamily Cervince, with sev¬

eral genera and about 60 species, embraces the typical deer; the subfamily Moschino? includes only the musk-deer (q.v.), separated because it is hornless, retains the gall-bladder and has no crumen. The musk-deer is confined to the Himalayan region. Otherwise deer occur in all parts of the w'orld except Australia and Africa.

Indications of kinship to his race occur in the 230

fossil Leptomeryx of the Oligocene, but the oldest certain types are of Miocene Age, and were small creatures somewhat akin to the modern muntjacs, but totally hornless. <(Not until the middle of the Miocene has a deer (Dicroccras) been found with horns, and they are bifid, and stand upon a long pedicel — also muntjac-like. Later came true deer with branching horns which culminated in a Euro¬

pean species with twelve points on each antler — the celebrated (giant stag) of the Irish peat bogs and similar places, whose palmated antlers spread 10 to 12 feet from tip to tip ; it was, in fact, a huge fallow deer." (See Deer). Con¬

sult Flower and Lydekker, (Mammals) (Lon¬

don 1891).

CERVIN, ser-van, Mont (German, Matter¬

horn; Italian, Monte Silvio), a mountain, Swit¬

zerland, Pennine Alps, on the southern frontiers of canton Valais, about six miles west-south¬

west of Zermatt, from which a road leads to the Col Saint Theodule, a pass over the mountain into Piedmont. It is one of the most magnifi¬

cent objects in nature, being an almost inac¬

cessible obelisk of rock starting up from an immense glacier, to a height scarcely 1,000 feet lower than that of Mont Blanc. The glacier, which differs from the lower glaciers in not being included between bold walls, but occupy¬

ing a vast and desolate table-land, is nearly 10,000 feet above sea-level. The height of the peak is 14,837 feet. It is composed of feldspar slate or gneiss. The peak was first ascended by a party of four English travelers and three guides in July 1865, but three of the party and a guide perished in the descent. (Consult Whymper's (Scrambles Among the Alps')- On the summit of the pass, 11,096 feet, are the re¬

mains of a rude fortification, supposed to have been erected two or three centuries ago, to prevent incursions from the Valais. The Little Matterhorn, or Petit Mont Cervin, reaches a height of 12,750 feet in the same group of mountains and is easily reached from the Theodule Pass.

CERVOLLE, ser-vol, or CERVOLE,

Armande de, French bandit chief, surnamed (<The High Priest." He was taken prisoner with King John at the battle of Poitiers in 1356, and after being ransomed, plundered the south of France with a band of troopers (routiers), and exacted tribute from Innocent VI at Avig¬

non. He served for a time under the Dauphin; pillaged Burgundy, Champagne, Alsace and Lorraine ; was made chamberlain to Charles V

in 1365 ; and was murdered in 1366.

CESALPINO, cha-zal-pe'no, or CiESAL—

PIN, Andrea, Italian botanist and physiolo¬

gist: b. Arezzo, Tuscany, 1519; d. Rome, 23

Feb. 1603. He studied and taught medicine and botany at the University of Pisa, and was physician to Pope Clement VIII. He was

the author of a valuable work (On Plants,' in which he classified plants by their parts of fructifica¬

tion. To this work Linnaeus, Jussieu and other subsequent botanists were greatly indebted for their ideas of botanical classification. In his Peripatetic Investigations' he propounded the theory of the circulation of the blood, after¬

ward adopted and demonstrated bv Harvey.

CESAR BIROTTEAU, bi-ro'to (1837), is

perhaps the most notable in a noteworthy group of scenes in Balzac's { Human Comedy'

dealing with business venture and the chicanery of unscrupulous finance, with the cumulative en¬

tanglements of debt and the legal snares of usurious oppression. In this novel these are viewed from the point of view of a prosperous tradesman, with chivalrous standards of com¬

mercial honor, whom success in his own field betrays into ventures in unfamiliar regions where he falls among thieves, men whom he thought he had special reason to trust. It is, Balzac says in his preface, (<the obverse of a medal whose reverse is La Maison Nucingen,"

which deals, somewhat less genially, with the same theme from the side of the exploiters of men of too credulous probity. Cesar, a brother of Balzac's memorably unfortunate Cure de Tours, had prospered as a manufacturing per¬

fumer during the consulate and the empire, though his relations to militant royalists had brought him a wound in connection with the conspiracy of Vendemiaire, 1795, which seemed to give him a title to the aid of royalist sympa¬

thizers after the Restoration. One of these was the very unscrupulous and successful Baron Nucingen. Du Tillet, once Birotteau's head-clerk and a betrayer of both his domestic and his mercantile confidence, but now a financial shark and confederate of Nucingen for his baser needs, interests Birotteau, at a moment when his ambition reaches full bloom

in a nomination as chevalier of the Legion of Honor, in a speculation and in imprudent ex¬

penditure by which his wealth becomes theirs and he a bankrupt debtor. By heroic exertion, four years' persistent labor and scrupulous economy, aided by Popinot, another type of industrial honor, who was later to marry Birotteau's worthy and charming daughter Cesarine, the debtor discharges his liabilities to the last farthing, dying from the relaxing of the strain immediately after his solemn re¬

habilitation and the restoration of his commer¬

cial honor and coveted decoration by the courts.

The story is less to be commended as a whole than for its portrayals of character, especially of the two druggists, the generous and loyal Popinot and the smug materialist Matifat, of the gentleman-scoundrel Du Tillet and the in¬

genuously gracious Cesarine, and most of all for its minute pictures, drawn it may well be from Balzac's own frequent memories, of the mental and moral tortures of Cesar in his cumulating commercial embarrassments. There are four English translations.

Benjamin W. Wells.

CESARESCO, Countess Martinengo. See

Martinengo-Cesaresco, Countess.

CESARI, cha -za-re, Giuseppi (sometimes

called II Cavaliere d'Arpino), Italian painter: b. Arpino about 1568; d. Rome, 3 July 1640. His first commission came from

Gregory XIII who appointed him one of the group who were employed in the decora¬

tion of the Vatican. Among them was

Roucalli, whose association profoundly in¬

fluenced the younger artist. Five popes honored him. In style, he was one of the later (Mannerists.' Among his best works are the frescoes of the Olgisti Chapel in Santa Prassede (1591) ; the huge (Ascension' at Saint John Lateran ; frescoes in the Borghese chapel and the capitol. A number of his smaller pictures may be found in the various European galleries.

Pope Clement VIII created him Cavaliere de Cristo. His works — in fresco and oil — display lively imagination, and great vigor in execution, although the broadness of his treatment has often been subjected to severe criticism by the more formal stylists of later periods.

CESAROTTI, cha-za-rot'te, Melchiore,

Italian poet and scholar: b. Padua, 15 May 1730; d. Solvaggiano, 3 Nov. 1808. He devoted himself to the belles-lettres, and was soon chosen professor of rhetoric in the seminary in which he was educated. He translated three tragedies of Voltaire, — ˆemiramisP (La Mort de Cesar } and (Mahomet.) In 1762 he went to Venice, where he translated Ossian into Italian, and was, in 1768, appointed professor of the Greek and Hebrew languages in the University of Padua. Here he published his translation of Demosthenes and of Homer, and his course of Greek literature. After the establishment of the republican government, in 1797, he was appointed by the existing authorities to write an (Essay on Studies.) In this he made sugges¬

tions for the improvement of education. In 1807 appeared his poem called <Pronea) (Provi¬

dence), in praise of his benefactor, Napoleon, who made him the same year knight of the Iron Crown. In spite of his advanced age he sub¬

sequently occupied himself with an edition of all his works;* but his death prevented the com¬

pletion of this enterprise. The edition of his works that had been begun during his life was completed by his friend Giuseppe Barbieri (1805-13). Consult Bersezio, Vittoria, (II regno di Vittorio Emanuele) (Turin 1878—81) ; and the memoir in the edition by Barbieri.

CESENA, cha-za'na, Italy, city in the prov¬

ince of Forli, central Italy, on the right bank of the Savio, 52 miles southeast of Bologna.

Among its buildings are a library founded in 1452 by Domenico Malatesta Novello, which possesses 4,000 precious manuscripts ; a Capu¬

chin church containing one of the best of Guercino's paintings, a lyceum, gymnasium, technical school, seminary and a noble cathedral.

Productive sulphur mines are in the neighbor¬

hood ; and the region has been noted ever since Roman times for the excellence of its wine.

Hemp, vegetables and silk form considerable items of trade. Cesena was the birthplace of Popes Pius VI and VII. There is a colossal statue of the former in the handsome city hall.

In 1357, under Maria Ordelaffi, it made a famous defense against Albornoz; but in 1377 it was barbarously pillaged by Robert of Genf. Later it was taken by Cesare Borgia and became part of the papal dominions. On 30 March 1815, Murat gained a victory at this place over the Austrians. Pop. (1911) 46,445.

CESIUM. See Cesium.

CESNOLA, ches-no'la, Luigi Palma di,

American archaeologist : b. Piedmont, Italy, 29

June 1832; d. New York, 22 Nov. 1904. He was educated at the Royal Military Academy and served in the Sardinian army during the war in 1849, and also in the Crimean War. He came to the United States in 1860, serving in the Civil War, and attaining the rank of briga¬

dier-general. He was United States consul at Cyprus (1865-77), where he made extensive archaeological discoveries. In 1878 he became a trustee and director of the Metropolitan Museum of Art, in New' York, a post he held till his death. In 1897 he was awarded a Con¬

gressional medal of honor for conspicuous military service. Columbia University con¬

ferred on him the degree of LL.D. in 1880. He published (Cyrus: Its Cities, Tombs and Temples,) and many monographs on art topics.

CESPEDES, thes'pa-des, Pablo de, Spanish painter, sculptor, architect and poet : b. Cor¬

dova 1538; d. there, 26 July 1608. In 1556 he entered the University of Alcala de Henares, where he distinguished himself by his pro¬

ficiency in the classics and Oriental languages.

He also assiduously cultivated his genius for the fine arts. Having at last made these his principal pursuit, he proceeded to Rome, studied under Zucchero and Michelangelo, and soon became renowned both for his frescoes and sculptures. In 1577 he obtained a prebend in the cathedral of Cordova, and from that time resided alternately in his native town and in Seville. His best pictures are in Cordova, Se¬

ville, Madrid and several towns of Andalusia ; and are admired particularly for elegance and loftiness of design, complete knowledge of anat¬

omy, the skilful employment of light and shade, warmth of coloring, accuracy of expression and spirituality of composition. One of his most celebrated pictures is a (Lord's Supper,) in Cordova Cathedral. He was the head of the Andalusian school of painting, and numbered among his pupils some painters of distinction.

The portrait by himself hangs in the old Spanish gallery at the Louvre.

Consult Pacheco, (Arte de la Pintura) (Seville 1649) ; Tubino, (Pablo de Cespedes* (Madrid 1860) ; Viardot, L., (Histoire des peinturesP

CESPEDES Y BORGES, bor' gas, Carlos

Manuel de, Cuban insurgent : b. Bayamo, 18

April 1819; d. 22 March 1874. He studied at the University of Havana, and later at Barce¬

lona, Spain. Implicated in Prim's conspiracy, he was banished from Spain (1843), and re¬

turned to Cuba to practise law. As leader of the revolt of 1868, he was chosen by the insur¬

gents president of the newly-proclaimed repub¬

lic. He was killed in a skirmish with the Spaniards.

CESSART, ces-sar, Louis Alexandre de,

French engineer: b. Paris 1719; d. 1806. He early entered the military service, and distin¬

guished himself in the campaigns of 1743-46, during which he was preseht at the battles of Fontenoy and Rocoux. Bad health having

obliged him to obtain his discharge, he entered the ficole des Ponts et Chaussees, where he displayed so much genius and industry that in 1751 he was appointed general engineer of Tours. In 1775 he was removed to Rouen, and in 1781 proposed his plans for the construction of the harbor and works of Cherbourg. These have immortalized his name. He died while engaged in preparing a description of his most important labors. The work was published under the title of description des Travaux Hydrauliques de L. A. CessarD (1806-09).

CESSIO BONORUM, sesh'i-o bo-no'rum

(<(surrender of goodsˆ), a process by which, ac¬

cording to the law of Scotland, a debtor against whom a warrant of imprisonment was issued, after being charged to pay his debt, was entitled to be free from imprisonment, if innocent of fraud, on surrendering his whole estate to his creditors. This procedure avoided infamy, and 232

the debtor could not be deprived of the bare necessities of life. Since the abolition of im¬

prisonment for debt a debtor may be compelled to make cessio bonorum at the instance of a creditor. Any property accumulated after this surrender is liable to attachment so long as the debt is not wholly paid off.

CESTIUS, the name of a plebeian gens at Rome, of which two memorials have been pre¬

served, one of them a bridge connecting the island of the Tiber with the right bank of that river, and the other a monumental pyramid standing at the gate San Paolo, partly within and partly without the walls of Aurelian. This pyramid stands upon a base of travertine. It is 125 feet high, and at the base 95 feet broad.

It is built of bricks, encased in blocks of mar¬

ble. In its interior there is a sepulchral vault 20 feet long, 13 feet broad and 14 feet high.

The walls of this vault were formerly decorated with paintings, but these are now faded, and only a few traces of them are still discernible.

They were copied in bronze by Falconieri 1661.

Two marble pillars which formerly supported the statue of the person whom the monument commemorates stand in front of the pyramid.

From the inscriptions still seen upon it, it has been inferred that the Cestius who caused this magnificent monument to be erected was a Roman knight of that name who lived in the time of Cicero, and who, having enriched him¬

self in Asia Minor, left part of his wealth for the purpose of perpetuating his memory in this way.

CESTODA, or tapeworms, a class of the

phylum Plathelminthes. Elongate ribbon¬

like usually jointed body with a scolex bearing suckers, hooks and other organs of attachment.

The segments or proglottids contain complete sets of reproductive organs and after separa¬

tion from the chain may lead an independent existence for some time. No trace of an ali¬

mentary system has been found and the nervous system is highly degenerate. The reproductive system is richly differentiated and produces large numbers of minute eggs which yield char¬

acteristic minute six-hooked embryos that de¬

velop in another host into bladderworms (cysticerci) . After transfer to the first (primary) host the cysticercus grows into a chain.

Cestodes are parasitic in the various types of vertebrates only, though some bladderworm stages occur in worms, Crustacea and insects of various sorts. In the rare monozoic cestodes (Cestodaria) the simple body contains only a single set of sex organs ; in the polyzoic cestodes there are many such sets corresponding usually to the numerous segments. The latter group contains five orders, Pseudophyllidce , Tetra-phyllidce, Diphyllidce, Trypanorhyncha and Cy-clophyllidce. The fish tapeworm of man falls in the first order and all others from the human host in the last.

CESTRACION, ses -tra’sT-on, a genus of

primitive sharks, also known as Heterodontus, of which the best known species is the Port Jackson shark of Australia (C . philippi). Four species are known, varying in length from four to five feet. They feed mainly on various kinds of mollusks. The family Cestraciontidce, though now represented by a single genus of four species, was very abundant in the earlier geo¬

logical periods.

CESTUI, ses'-twi, CESTUY, in law, that

person: common in the phrases cestui que trust, or person holding equitable title to an estate ; cestui que use, or person in whose behalf an¬

other holds the fee of lands or tenements; cestui que vie , or person whose death terminates an estate. A cestui que trust holds only the equitable, never the legal title to an estate.

The terms cestui que trust and cestui que use are almost identical in meaning, the former being more modern. As life estates are still common in Great Britain and the United States, the term cestui que vie is of considerable im¬

portance in the law of real property. An estate may be granted to one for his own life, for the life of another or for the lives of several others.

CESTUS (Lat. girdle), a band or zone said to have been worn by Aphrodite or Venus, and endowed with the power of exciting love toward the wearer. The following is Pope's transla¬

tion of Homer's description of it :

In it was every art and every charm

To win the wisest, and the coldest warm —Fond love, the gentle vow, the gay desire, The kind deceit, the still-reviving fire, Persuasive speech, and more persuasive sighs, Silence that spoke, and eloquence of eyes.

CESTUS, or CiESTUS, the boxing-glove

of the Grecian and Roman pugilists. It con¬

sisted of thongs or bands of raw hide or leather, fastened to the hand and reaching to the wrist. It was afterward enlarged so as to reach up to the elbow, and loaded with metal to in¬

crease the weight of the blow. The combat with the ordinary unloaded cestus was not more dangerous than a common modern bo~

ing-match. Theocritus (Idyll, xxii) and Virgil (Hineid, v. 362) describe one of these combats.

CETACEA, se-ta'se-a, an order of mam¬

mals whose structure is so modified as to render them fit for an aquatic life. The whalebone whales, the toothed whales, as the porpoise, narwhal, etc., and the extinct zeuglodon, rep¬

resent the leading divisions of the group. The body is fish-like in form, the head passing grad¬

ually into the trunk which tapers pos .eriorly and ends in a bilobate caudal fin which U placed horizontally, not as in the fishes, vertically. The posterior limbs are wanting, and the anterior are converted into broad paddles or flippers, consisting of a continuous sheath of the thick integument, within which are present repre¬

sentatives of all the bones usually found in the fore limb of mammals, but they are not movably articulated, so that the paddle moves like a solid oar. The fish-like aspect is further in¬

creased by the presence of a dorsal fin; but this is a simple fold of integument, and does not contain, as in fishes, any bony spines. The vertebrae of the neck, seven in number, are united more or less to each other, so that in some they form a single solid piece. The right whale and its allies have no teeth in the adult state, their place being taken by the triangular plates of baleen or whalebone which are de¬

veloped on transverse ridges of the palate. The frayed edges of these plates slope obliquely downward and outward from the middle of the

roof of the mouth, so that when the mouth is shut there is a triangular space in the middle, the floor of which is formed by the enormous CETACEA, EDENTATA, ETC,

Fig. 1 Skull of Camel

2 Llama

3 Giraffe

2 Skull of Greenland or Right Whale

Skull of Giraffe

13 Finner Whale

5 Manatee 6 Skull of Dugong 7 Dolphi” „ « Skull of Dolphin 14 Short-tailed Manis 15 Ant-eater 16 Skull of Ant-eater 1

9 Narwhal

17 Common Armadillo

10 Skull of Sperm Whale or Cachalot 11 Greenland or Right Whale 18 Skull of Common Armadillo 19 Skull of Sloth CETEWAYO — CEUTA

tongue. The water taken into the mouth is sifted by the frayed edges of the plates; it is driven out sideways between the plates and the tongue sweeps backward to the gullet any animals that have been caught in the fringes.

But the fetal whales possess minute teeth, which are very soon lost. The porpoises, etc., when they possess teeth in one or both jaws, have them numerous and conical in form ; they have no milk predecessors. The stomach is divided into several chambers, but these are not, as in rumi¬

nants, connected directly with the gullet; they are rather appendages of the pyloric portion of the organ.

The arrangement of the respiratory and cir¬

culatory systems, which enable the Cetacea to remain for some time under water, are inter¬

esting. The nostrils open directly upward on the top of the head, and are closed by valvular folds of integument which are under the control of the animal. When the animal comes to the surface to breathe it expels the air violently, and the vapor it contains becomes condensed into a cloud; if the expiration commences be¬

fore the mouth of the spiracle or blow-hole is above the surface, a little water may be blown up like spray but no water from the mouth is thus discharged, for the soft palate firmly em¬

braces during life the upper end of the larynx, so that the gullet is divided into two narrow passages, while the lungs have a continuous passage to the exterior. The blood vessels, especially those of the

thorax and spinaf canal, break up into extensive plexuses or networks, in which a large amount of oxygenated blood is delayed, and thus the animal is enabled to remain under water, the necessity for changing the air in the lungs being diminished.

Fossil Cetacea. — Bones of cetaceans, mostly allied to the living species, are found in the marine sediments of the Tertiary and Quater¬

nary ages, and are occasionally dredged up from deep-sea deposits. The hard and heavy ear-bones are especially apt to be preserved as fos¬

sils. The zeuglodons and squalodons of the Eocene epoch represent a peculiar primitive group of cetaceans with two-rooted teeth. Very little is known of the evolution of this order of mammals. The Tertiary deposits of Pata¬

gonia are supposed to be rich in material bear¬

ing on the evolution of the Cetacea.

Classification of Cetacea. — The sub-orders of cetacea are as follows :

1. Mystacoceti, baleen-bearing whales. Its families are: Balcenopterida, rorquals, and other great whalebone whales ; Balcenidce, right whales and kogias.

2. Odontoceti, of which the families are: Physeteridce, sperm-whales (Physeterince) , and beaked whales (Zipliiince) ; Delphinidce, dol¬

phins, porpoises, white whales, killers and the like ; Platanistidce , river dolphins ; and the ex¬

tinct S qual o don tide? .

3. Arcliceoceti, containing the extinct family Zeuglodontidcr. The most

recent and import¬

ant work on this order is Beddard's (Book of Whales > (London 1900). See Whale, and the names of the various groups and species of cetaceans.

CETEWAYO, set-i-wa'yo, Kaffir chief or

king, son of Panda, King of the Zulus. See Zululand.

CETHEGUS, Gaius Cornelius, Roman

statesman, one of the associates of Catiline, He was put to death in prison by order of the Senate, at the instigation of Cicero, 68 b.c.

CETHEGUS, Marcus Cornelius, Roman

official who flourished in the 3d century b.c. He became curule aedile, 213 b.c.; censor, 209; con¬

sul, 204. In 203, he was appointed proconsul of northern Italy, and was successful in driv¬

ing back the armies of Alago, brother of Hanni¬

bal. He was well known for his oratorical ability. Indeed, Cicero, quoting Ennius, refers to him as the ((suadae medulla,® (<the marrow of persuasiveness.®

CETINJE. See Cettigne.

CETIOSAURUS, set-i-6-sa'rus, a genus of

amphibious dinosaurs (see Dinosauria), of which fragmentary remains

have been found in the Lower Cretaceous (Wealden) of Europe.

From the fragments of the skeletons which have been discovered, a fair idea of the pro¬

portions of the animal may be conceived. It probably reached a length of 60 or 70 feet arid a height of 10 feet.

CETTE, set, France, seaport town in the department of Herault, built on a neck of land between the lagoon of Thau and the Mediter¬

ranean, 18 miles southwest of Alontpellier. The space enclosed by the piers and breakwater forming the harbor can accommodate about 400

vessels ; and the harbor is defended by forts Saint Pierre and Saint Louis. A broad, deep canal, lined with excellent quays, connects the port with the Lake of Thau, and so with the Canal du Midi and the Rhone, thus giving to Cette an extensive inland traffic; and it has an active foreign commerce. The principal trade is in wine, brandy, salt, dried fruits, fish, dye¬

stuffs, perfumery and verdigris. Cette has ship¬

yards, metallurgical works, salt-works, glass¬

works, factories for the manufacture of syrups and grape sugar, etc., and carries on extensive fisheries. After Marseilles, it is the principal trading port in the south of France; and it is much resorted to as a watering place. Pop.

33,049.

CETTIGNE, tset-thTye, or CETINJE,

chet-ten'ya, Alontenegro, the capital of the state ; situated in a lofty mountain val¬

ley, 19 miles east of Cattaro. It contains the palace of the ruler and the government build¬

ings, a convent founded in 1478, a girls' insti¬

tute and other schools, an arsenal and a theatre.

Turkish invaders sacked and burnt the town in 1683, 1714 and 1785. Many famous Montenegrin rulers lie buried here. Pop. about 4,500.

CETUS (Lat. whale), a large constellation lying on both sides of the equator, but mostly south of it, one of Ptolemy's original 48. It is surrounded by Pisces, Aries, Taurus, Eridanus, Fornax, Sculptor and Aquarius. It contains the remarkable variable star Omicron Ceti or Mira.

It was discovered by Fabricius in 1596. It be¬

comes visible to the naked eye once in 11

months, and after a few days passes out of sight, becoming a star of the ninth magnitude.

CETYL, se'til, in chemistry, a radical cor¬

responding in structure to the ethyl compounds.

It is formulated as CibHss and is derived from spermaceti.

CEUTA, tha'oo-ta, Morocco, a strongly for¬

tified place belonging to Spain, on the coast of Africa, opposite Gibraltar. The town occupies the site of the Roman colony of Ad Septem 234

Fratres, so called from the seven hills rising here in a group, of which the most prominent are Montes Almina and Hacho ; on the latter, the ancient Abyla (one of the Pillars of Her¬

cules), is a strong fort, and on the former, among beautiful gardens,

lies the New Town.

Ceuta contains a cathedral, a hospital and con¬

vents, but is chiefly of importance as a military and penal station. The place was a flourishing mart under the Arabs, and there the first paper manufactory in the Western world is said to have been established by an Arab who had brought the industry from China. In 1415 it was captured and annexed by the Portuguese, and fell to Spain in 1580. It has resisted sev¬

eral sieges by the Moors (1694—1720 and 1732), and is still the most important of the four Afri¬

can presidios. Pop. 23,907.

CEVA, cha' va, Tommaso, Italian mathe¬

matician and poet: b. Milan, 20 Dec. 1648; d. 3 Feb. 1736. He was admitted into the order of Jesuits in 1663, and spent his life as an instructor in various colleges. His more im¬

portant mathematical works had reference to angles, for the trisection of which he invented a mechanical instrument. He wrote several biographies in Italian, and many poems in Latin and Italian, two of which, entitled 'Philosophia nova antiqua) ; and (Puer Jesus, > are still ad¬

mired. His mathematical works are (De Natura GraviunP (1669) and (Opuscula Mathematica) (1669).

CEVALLOS, tha-val'los, Pedro, Spanish

diplomatist: b. Santander, Biscay, 1761; d.

Seville, 29 May 1838. He studied at Valla¬

dolid, and entered on a diplomatic career. Hav¬

ing been appointed secretary to the embassy at Lisbon, he there married a niece of Manuel Godoy, Duke of Alcudia, the Prince of Peace, and became afterward Minister of Foreign Af¬

fairs. In the disputes between Charles IV and his son Ferdinand he adhered to the latter.

Aware of the influence which Cevallos possessed over the Spanish people, Joseph Bonaparte was anxious to gain him over, and offered to take him into his service. Cevallos accepted with apparent willingness, but on arriving at Madrid united with the Spanish junta against Joseph, and was sent by them on a mission to London, where in 1808 he published his celebrated work on Spanish affairs, referring more especially to the proceedings at Bayonne, Exposition des fails et des trames qui ont prepare l'occupation de la couronne d'EspagneP After the Restora¬

tion he for some time maintained a great in¬

fluence over Ferdinand, but on his opposing the marriage of the latter with a princess of Portu¬

gal he lost favor, was deprived of his office of Secretary of State and sent as Ambassador to Naples and Vienna. On being recalled in 1820

he retired to private life.

cevennes, sa-ven, France, southern dis¬

trict, which at one time formed the northern part of the government of Languedoc. During the wars against the Albigenses and the Waldenses its mountains and valleys were the asylum of numerous persons who had re¬

nounced many of the beliefs of the Roman Catholic Church. It now forms part of the departments Haute-Loire, Loire, Ardeche, Gard and Avcyron. Consult Stevenson. R. L.,

'Travels with a Donkey* (London 1895) ; and Ribard, 'L'Histoire cevenale d'apres des docu¬

ments* (Cazillac 1898).

CICVENNES, sav-en' (ancient Cebenna),

the chief mountain range in the south of France between the Alps and the mountains of Au¬

vergne, and lying mainly west of the Rhone.

With its continuations and offsets, it forms the watershed between the river systems of the Rhone and the Loire and Garonne. Its general direction is from northeast to southwest, be¬

ginning at the southern extremity of the Lyon¬

nais Mountains, and extending under different local names as far as the Canal du Midi, which divides it from the northern slopes of the Pyrenees. They are divided into the South and North Cevennes. The Cevennes extend for over 150 miles, through or into nine depart¬

ments, the central mass lying in Lozere and Ardeche, where Mount Lozere attains 5,584 feet, and Mount Mezen (the culminating point of the chain) 5,754 feet. The average height is from 3,000 to 4,000 feet. The mountains consist chiefly of Primary rocks, covered with Tertiary formations, which in many places are inter¬

rupted by volcanic rocks. The Cevennes served as a retreat for numerous Protestant families after the revocation of the Edict of Nantes.

CEYLON (Sanskrit simhala, from simha,

lion; Latin Taprobane, and Hindu Sildn), an island possession and Crown colony

of Great Britain, in the Indian Ocean, about 60 miles southeast of the southern ex¬

tremity of Hindustan, from which it is sep¬

arated by the Gulf of Manar and Palk Strait.

It lies between lat. 5° 55’ and 9° 50’ N., and between long. 79° 41’ and 81° 54’ E., having the shape of a pear, with the broad end south.

Length, about 266 miles; average breadth, 100

miles ; area, 25,364 square miles. The northern and northwestern coasts are flat and monoto¬

nous, those on the south and east bold and rocky, presenting a highly picturesque appearance, which is further heightened by the exuberant

vegetation, the noble palm forests, the luxuriant corn fields and the verdant slopes of the moun¬

tains enameled with bright flowers, herbs and creeping plants, whose delicious perfume spreads far and wide. Many parts of the coast, at its southern and northern extremities, are studded with small, rocky and verdant islands, some of them overgrown with palms, and pre¬

senting a singularly beautiful appearance. At Trincomalee, on the northeastern coast, there is one of the finest natural harbors in the world; at Galle on the southern coast there is also a harbor; while the harbor at Colombo, the capital, is capable of admitting the largest ves¬

sels, and is now the regular calling-station for mail steamers to and from Calcutta, China and Australia. Between the island of Manar on the northwestern coast of Ceylon and the island of Ramiseram on the coast of India is a ridge of sandbanks called Adam's Bridge, which nearly connects Ceylon with the continent, being inter¬

sected only by three narrow shallow passages, the remainder being covered with two or three feet of water at full tide. These channels ad¬

mit only very small vessels, but ships of some size can get through between Ramiseram and the mainland.

Mountains. — The mountainous regions of

Ceylon are confined to the centre of the south¬

ern and broader part of the island. They grad-CEYLON

ually diminish to hills of moderate elevation as they recede from the central mass, and are suc¬

ceeded on the western side by a flat tract ex¬

tending to the coast. Their average elevation is somewhere about

2,000 feet, but there are several summits upward of 7,000 and 8,000 feet high. The highest summit is Pedrotallagalla (8,280 feet), but Adam's Peak, reaching 7,420

feet, is the most remarkable from its conical form, the distance from which it is visible from the sea and from the sacred associations with which it is connected, the summit being the point from which Buddha, according to his fol¬

lowers, ascended to heaven, a gigantic footprint bearing testimony to the fact. Other summits are Tolapella (7,720 feet) and Kirrigalpota (7,810 feet). The forms of the mountains of Ceylon are singularly varied. They most fre¬

quently occur connected in chains, and terminate in round or peaked summits. Their sides are always steep and occasionally precipitous and rocky. There is no proportional correspondence between the heights of the mountains and the depths of the adjoining valleys, and often the valleys are extremely narrow. The deepest are in the heart of the mountains. Some are be¬

tween 3,000 and 4,000 feet deep, and not over half a mile wide.

Rivers and Lakes. — The rivers of Ceylon, though numerous, especially on the southern and southwestern sides, are small, being merely mountain streams, navigable only by canoes, and that but for a short distance from their mouths.

The Mahavela-ganga, which rises near Adam's Peak, and falls into the sea by a number of branches near Trincomalee, is by far the most important. It has a course of 134 miles and drains upward of 4,000 square miles. The tim¬

ber growing on its banks in great abundance, consisting of halmalille, ebony, satinwood, etc., is floated down to the harbor during the freshets. Of the remaining rivers the Kalani-ganga, the Kala-ganga and the Maha Oya reach the sea on the western coast; and the Gintota-ganga at Galle. All the rivers are liable to be surcharged with rain during the monsoon, and to inundate the level country. Subsequently the heat of the sun drying the country produces malaria. There are numerous extensive lagoons or back-waters round the coast, but no lakes in the island worth noticing, the largest being only four miles broad. There are rills and stream¬

lets rushing along in every direction among the mountains, so overhung with superabundant vegetation as to be frequently invisible.

Geology and Mineralogy — Ceylon is

mostly formed of ancient stratified rocks, but owing to the obliteration of fossil remains it is doubtful whether they have been deposited on the beds of seas or lakes. The mountains are composed of Primary and metamorphic rocks, the prevailing rock on the island being gneiss, though laterite (or ˆcabook®) and a sort of dolomite also occur in considerable quantities.

In the Nuwara-Eliya district and elsewhere there are large alluvial tracts. Basalt is found near Galle and Trincomalee, and at Pettigalla-kanda an ancient lava occurs.. The soil is mostly formed from the disintegration of gneiss. The western coast of the island is believed to be rising. Plumbago is found in sufficient quantities to make it of commercial importance, and among the metals occurring in the island are iron in fair quantity, manganese, gold, platinum, molybdenum, nickel, cobalt, cop¬

per and tin. No coal has been found, but nitre and salt occur (the latter is also a somewhat important article of manufacture). Gems of many kinds are abundant, particularly near Rat-napura. They are found either embedded in the rock or washed down in the alluvium of river¬

beds, and include zircons, amethysts, cat's-eyes, topazes, moonstones, garnets, spinel, sapphires, rubies, cinnamon stones, *etc.* There are hot springs at Bintenna, Trincomalee and Puttalam.

Roads and Transportation. — Ceylon is now well provided with roads. A highway has been made from Colombo to Nuwara-Eliya, 6,000

feet above the level of the sea. A continuous line, 769 miles in length, makes the entire cir¬

cuit of the coast, and every town of importance is connected by roads with the two chief cities.

The roads in general are good, many of them being macadamized, and in the neighborhood of the chief towns are adapted for carriages.

During the monsoons, however, the roads in many parts are impassable from inundations.

The building and maintenance of roads, bridges, streets and canals forms one of the chief items of expenditure of the government. Railroad extension is also a government affair, and there are now about 604 miles in all, the main line being that between Colombo and Kandy (75

miles). In the early part of the 19th century there was not a single road in the country, merely a few pathways, the greater part of the island being then covered with impenetrable forests.

Climate. — Where the jungle has been cleared away and the land drained and cultivated, the country is healthy; where low, wooded tracts and flat, marshy lands abound, covered with a rank, luxuriant vegetation, the climate is emi¬

nently insalubrious, showing, what is now pretty well understood, that mere heat has little to do with the unhealthfulness of tropical climates.

The heat is not so great as on the neighboring coast of India, the sea-breezes moderating the temperature. At Colombo, on the western side of the island, near the 7th parallel of north latitude, the mean daily variation of the tem¬

perature does not exceed 3°, and the annual range is from 76° to 86° F. At Nuwara-Eliya (6,000 feet high) the' annual range is from 32°

to 80°. The eastern part of the island, being exposed to the northeastern monsoon, has a hot and dry climate, resembling that of the coast of Coromandel ; while the western division, being open to the southwestern monsoon, has a humid climate like that of the Malabar coast.

The quantity of rain that falls annually in Ceylon is estimated at three times the quantity that falls in England, the rains being less fre¬

quent, but much heavier. The interruption which the course of the monsoons meets with from the mountain ranges of the island causes deluges of rain to fall on one side, while the other is parched with drought. At Kandy,. in the interior, the average annual fall of rain is 85.3

inches; at Colombo, on the seacoast, 75 to 80

inches. The prevalent diseases are those of the liver and intestines, often accompanied by fever.

Elephantiasis and other cutaneous complaints are common. The very fatal disease called beriberi (Hydrops asthmaticus) occasionally occurs.

Animals. — Most of the animals found on the opposite continent are native to this island.

excepting the royal tiger, which does not exist here. Elephants are numerous, especially in the northern and eastern provinces, where they sometimes do great injury to the growing crops. The elephants of Ceylon are esteemed for their superior strength and docility. The eagerness with which they are hunted has greatly diminished their numbers. Since 1869

licenses for the capture and exportation of elephants must be obtained from the govern¬

ment. Bears, buffaloes, leopards, jackals, mon¬

keys and wild hogs are numerous. There are several species of deer, of which the elk and fallow deer (properly the great red Sambar and spotted axis) are most abundant. Porcu¬

pine, bandicoots, squirrels (flying and other), bats, mungooses, are to be found, as are also the pangolin or scaly ant-eater and the loris or Ceylon sloth. Flying foxes and rats are numerous. Pheasants, snipes, partridges,

pigeons, peacocks and a great variety of birds, of splendid plumage, are plentiful. Crocodiles, serpents and reptiles of all sorts abound. Of

the snake tribe, consisting of about 26 different species, six only are venomous. Among the insects are the leaf and stick insects, the antlion, the white ant, *etc.*

Vegetable Products. — In the luxuriance of its vegetable productions Ceylon rivals the islands of the Indian Archipelago, and in some respects bears a strong resemblance to them ; its most valuable products are tea, rice, coffee, cinnamon and the cocoanut. Coffee used to be the chief cultivated crop, but disease has within recent years much reduced the product.

Cinnamon grows in the southwest, to which it is almost exclusively confined, requiring a sandy soil with a moist atmosphere. The trade in this spice was reserved as a government monopoly by the Dutch when they had possession of the island ; all that was collected beyond the quan¬

tity which it was thought could be sold at a monopoly price being burned. This absurd sys¬

tem was followed by the English for some years after their conquest of Ceylon, but was aban¬

doned in October 1832, when the trade in cin¬

namon was declared free, subject to a duty on exportation. The cocoanut-trees grow along the entire western and southern coasts in countless numbers, each tree producing from 50 to 100

nuts in the year. Every part of this invaluable tree is capable of being turned to profitable account. The Palmyra palm, which grows prin¬

cipally in the northern part of the island, is of hardly less importance than the cocoanut, being productive in seasons of drought, when the crops fail. The jaggery palm, or kittul-tree, is cultivated for the sake of its sap, which yields a coarse sugar; its pith furnishes a kind of sago, and its fruit is also eaten. The taliput palm also abounds, as do the jack-and bread¬

fruit trees, the fruit of which is used by the natives for food, both raw and cooked ; the timber, also, of the jack-tree, not being subject to attack by the white ant, is much used by the natives for making furniture and in house¬

building. The Ceylon areca nut, celebrated for its superior qualities, is exported in large quan¬

tities. Tobacco is raised principally in the northern district and is of excellent quality.

Indigo grows wild, but is not sought after.

The cardamom plant is abundant, but inferior to that of Malabar; fruits and culinarv veg¬

etables are produced, the latter in the elevated districts, in great variety and profusion. The island abounds with timber of various descrip¬

tions, including calamander, satin, rose, sapan, iron, jack, halmalille and other beautiful woods adapted for cabinet work. Agriculture gen¬

erally, and the cultivation of the more valuable native products of the island in particular, are improving. As already stated, coffee once was the chief crop, but latterly the cultivation of tea, cinchona and cacao has been carried to such an extent that the island has become less dependent on a single article of produce. Not¬

withstanding the acknowledged fertility of Cey¬

lon, the capabilities of its soil where justice is done it and the efforts now in progress to develop these capabilities, by far the largest proportion of the island is still uncultivated.

There are a few natives who possess consider¬

able estates in land; but the law of inheritance has, for the most part, caused a minute sub¬

division of the soil, to a degree very unfavor¬

able to its improvement. The British govern¬

ment claims the proprietorship of all the waste lands, which are now disposed of by public sale.

Among works carried on by the government are irrigation works in suitable localities, in¬

cluding the cutting of channels, the construction of annicuts or dams and the formation and repair of tanks. Some of the ancient works of

this kind are of great magnitude. There is also a government forest department, part of the work of which is to provide fuel for the rail¬

roads and timber for government works.

Pearl-fishery, *etc.* — There has long been a pearl-fishery on the coast of Ceylon, carried on as a government monopoly. The fishery some¬

times fails for years, there having been none, for instance, between 1837 and 1854, or between 1863 and 1874. Although the government still continued a strict surveillance over the banks, and occasionally subjected them to a careful examination, scarcely any trace of the pearl oyster was to be found. No cause has yet been discovered for his disappearance. When the pearl-fishery is in existence it is confined to the Gulf of Manar, where the oyster banks ex¬

tend for 60 or 70 miles along the coast south of Manar, and perhaps 10,000 people, including 2,500 divers, will assemble in the fishing season.

The Ceylon pearls are whiter than those of Ormuz or the Arabian coast. The chank or conch fishery was at one time carried on to a great extent, employing about 600 divers, but has greatly declined owing to the little demand now made for them in Bengal, to which the greater part were sent. The chank is a sea-shell (Voluta pyrum), adapted for cutting into rings, these being formerly used in great num¬

bers by the native women of Hindustan for bracelets and anklets.

Manufactures and Trade. — The manufac¬

tures of Ceylon are very unimportant with ex¬

ception of arrack, which is distilled from the juice of the cocoanut-tree. The spinning and weaving of cotton goods, generally of the coarsest kind, was at one time a considerable industry, but is now dying out. There are numerous oil-mills for pressing the cocoanut kernels to express the oil. The Singhalese make good artisans, as is experienced at Colombo, where they are employed in making steam engines and other machinery. They are skilful in carpentry and woodwork, expert workers in gold and silver and excel in the CEYLON

manufacture of lacquered ware. Salt is a gov¬

ernment monopoly, being collected from shal¬

low lagoons which at certain seasons are over¬

flowed by the sea, or it is manufactured in pans, the property of the government. The exports are chiefly tea, coffee, copra, rubber, cinchona, cinnamon, cocoanut products, areca nuts, cacao, cardamoms, plumbago, tobacco.

Tea has only begun to be exported in recent years, and the export increased from 2,392,975

pounds in 1884, to more than 183,000,000 pounds in 1909, and by 1911 the value of the tea ex¬

ported was more than twice that of exports of rubber ; but the area devoted to the latter prod¬

uct increases rapidly. The trade of Ceylon is chiefly carried on with Great Britain and India. The principal articles of import from Great Britain are coal, cotton manufactures, apparel and haberdashery, iron and steel manufactures, machinery, *etc.* From other countries are imported rice, dried fish, wheat, sugar and various other commodities. In 1915

the imports totaled $53,089,540 in value, and the exports $83,692,283.

Government, *etc.* — The government of Cey¬

lon is conducted by a governor and two coun¬

cils, executive and legislative, of both of which the governor is president. The first is com¬

posed of seven members, including the gov¬

ernor; the other of 21 members, including the members of the Executive Council, other office¬

holders and unofficial members selected by the governor as representative of the different classes and interests in the community. The powers of the councils are limited, being sub¬

ordinated to those of the governor. All laws must be approved by the Secretary of State for the Colonies before they can take effect.

Any individual properly qualified may be ap¬

pointed to the most responsible situation, with¬

out reference to service, nation or religion, and native Singhalese have occupied some of the highest posts. The island is divided into nine provinces — the Eastern, Western, North¬

ern, Southern, Central, North Central, North¬

western, Sabaragamuwa and Uva, and subdi¬

vided into districts. In each province is sta¬

tioned a government agent. The criminal law has the Penal Code of India as its basis; the civil law is of Roman-Dutch derivation but is modified by colonial ordinances. For the ad¬

ministration of justice there are in the civil and criminal departments, a Supreme Court, estab¬

lished at Colombo ; also a Vice-Admiralty Court, provincial courts in various districts ; beside magistracies, local boards in the towns and the native village councils. The chief sources of revenue are the customs duties, railroad re¬

ceipts, land rents and salt farms. The chief articles of export are now free. The revenue for 1913 was $17,057,510; expenditures $15,-

890,310. The public debt amounts to about $23,000,000 ; but the finances are in a very healthy condition, as the public debt of the col¬

ony has been mostly incurred for the construc¬

tion of railroads.

Races. — The present population of Ceylon is composed of Singhalese or Ceylonese, de¬

scendants of immigrants from Hindustan who entered the country in the 5th century b.c., Malabars or Tamils, originally from southern India, Moors, Malays, Veddas and a small pro¬

portion of Europeans and their descendants.

The Singhalese inhabiting the coasts are a mild, timid race, obsequious to strangers, and hospitable and humane. Their stature is rather below the middle size; their limbs slender, but well shaped; eyes dark, finely cut features, hair long, smooth and black, turned up and fixed with a tortoiseshell comb on the top of the head; color varying from brown to black, or rather from the lightest to the darkest tints of bronze. The Singhalese of the interior, or Kandian Singhalese, are a superior race, being stouter, handsomer, and of more

manly and independent bearing, with a greater degree of intelligence. The Malabars of Cey¬

lon are similar in all respects to those of the continent. The Mohammedans or Moors are an energetic and industrious people, and en¬

gross a large proportion of the commerce and traffic of the island. The Veddas are supposed to be a portion of the aboriginal inhabitants of Ceylon. They inhabit the most secluded and inaccessible parts of the island, and subsist en¬

tirely on . wild fruits and animals. A cloth round the loins is their only clothing; and their habitations, generally of small dimensions, are formed for security among the branches %of large forest trees. They are a robust and hardy race, but extremely peaceable and inof¬

fensive. The other inhabitants of the coast con¬

sist of Dutch, Portuguese and English, some Malays or natives of the Eastern Archipelago, a few Chinese and Parsee traders and a varied population sprung from the intermixture

of these races with each other. The descend¬

ants of the Dutch and other Europeans are known as burghers. The population is rapidly increasing. In 1832 it scarcely amounted to 1,000,000; while in 1881 it was 2,750,000. In 1901 the total was 3,576,990, including 2,334,817

Singhalese, 952,237 Tamils, 224,719 Moors and in 1908, 4,038,456.

The census of 10 March 1911 showed the number of inhabitants to be 4,110,367. The number of laborers on the plantations was about 510,000 in 1912. This includes a large number of coolies who come from India for employment.

Religion, Language, Education. — More

than half the population are said to be Bud¬

dhists, and about 800,000 are of the Hindu reli¬

gion (sects of Brahmanism). Buddhism chiefly prevails in the interior and generally among the Singhalese of the seacoasts. It is main¬

tained and protected by the British government, agreeably to the treaty of 1815. On the west¬

ern and southwestern coasts numbers of the Singhalese profess the Roman Catholic religion.

There are a number of Episcopal clergymen in the island, subordinate to the bishop of Co¬

lombo ; various other Protestant bodies have places of worship, but the Protestants are less than half the number of the Roman Catholics.

The Singhalese have a colloquial language pe¬

culiar to themselves, but their classic and sacred writings are either in Pali or Sanskrit.

The Malabars use the Tamil. English is be¬

coming more and more common, and there is scarcely a roadside village in Ceylon now where the traveler could not find some persons to speak English, or interpret for him. The gov¬

ernment has a department of public instruction, and good progress is being made in education throughout the island. On 1 Jan. 1912 there were more than 325,000 children participating in public instruction, a number of the schools being maintained or aided by the government.

There are schools maintained also by the Church Missionary Society, by the Wesleyan, the American and the Baptist Missionary so¬

cieties, besides a number of private and some regimental schools.

Antiquities, History, *etc.* — The Singhalese annals contain a historical record of events for 24 centuries ; and their authenticity, as regards description of ancient towns and buildings, and other works of art, is established by existing ruins, proving that the island had been, at a remote period, inhabited by a powerful and nu¬

merous people. Long forgotten, and for ages hidden by dense jungle growths, the ancient capitals of Ceylon now afford a wonderland of interest for the archaeological investigator and the tourist alike. Scores of bell-shaped relic houses, ranging up to 400 feet in height and 1,500 feet in circumference, form the gigantic ruins that now make up the principal monu¬

ments to the magnificent civilization, the rival of Rome in luxury and architectural grandeur.'

The cities were two in number, Anuradhapura, the ancient Singhalese capital, from about 1000

b.c. to 500 a.d., and Polonarawa, the mediaeval capital, which flourished in the 12th century.

The grandeur of the mighty capital Anurad¬

hapura can be guessed from the fact that the king's pleasure garden in the centre of the city was 20 square miles in extent. After his conversion to Buddhism, King Tissa donated these gardens for religious uses. The ruins of the temples and dagabas erected here form the majority of the monuments that not only bear record to the vastness and splendor of that age, but are now — 2,000 years later — tak¬

ing their places among the wonders of the world.

Starting from the centre of the modern na¬

tive town, numbering scarce 50,000 souls, on a tour of the ruins, one comes at first to the for¬

est of monoliths remaining from the original 1,600 granite columns upon which rested the remarkable Brazen Palace. As this edifice, built by King Dutthagamini about 200 b.c. for his Buddhist monks, is typical of all the pal¬

aces of that day, the following description written about 500 a.d. by Buddhist monks is of interest : ((This palace was 100 cubits square — length, breadth and height all being the same. In it there were nine stories, each with 100 apartments. All these apartments were highly finished in silver; all the cornices thereof were embellished in gems. The flower ornaments thereof were also set with gems, and the tinkling festoons were of gold. In the centre of the great hall of the palace was an ivory throne, on one side of which was a sun in gold, on another the moon in silver, on a third the stars in pearls,® ending with <(the building was covered with brazen tiles, hence its name, the Brazen Palace.® Next in import¬

ance comes the Ruanweli Dagaba. A dagaba, or relic-house, was a bell-shaped mound of solid bricks built both as a monument for and to protect for all time a tiny sacred relic hid¬

den in the centre of its base. The Ruanweli is in a much ruined state, but enough remains to show its ancient structure. The Thuparama Dagaba, near by, is in good repair. It was built by King Tissa in 306 b.c., and antedates any ex¬

isting structure in Cejdon or India, and is still, though much smaller than the others, a re¬

markable monument to the skill of its builder.

Originally 176 ornamental pillars of graded heights surrounded the Thuparama ; of these but 31 now remain standing. The Abhayagi-riya Dagaba is 405 feet high, with a dome 360

feet in diameter and a base covering eight acres. Other monuments are the king’s palace with its beautiful “moonstone® entrance and

decorative guard stones by the side ; marble bath tanks equaling Rome's in luxury; elephant houses and great tanks where the state ele¬

phants ''ere wont to take their morning plunge, and where their wild descendants still come to bathe ; the curious Isurminia temple dug out of a mammoth boulder on the edge of an artificial lake, and finally the sacred Bo-tree itself, trans¬

planted here in 288 b.c. and said to be the old¬

est cultivated tree in the world. It was orig¬

inally a branch of the fig tree under which Buddha had been accustomed to sit and medi¬

tate. Polonarawa, the mediaeval capital, lay 40

miles southeast of Anuradhapura. A British archaeological commission is at work here, ex¬

cavating and restoring the grandest of ruins.

Temples, monasteries, dagabas rivaling the Pyramids in magnitude engage the attention of the visitor. The most interesting of all rel¬

ics discovered was the temple called the Gal Wikare, and the three giant figures at its en¬

trance — a sitting figure of the Buddha 15 feet high; a slatue of Ananda, Buddha's disciple, 23 feet high, and a recumbent statue of Buddha, 46 feet long. Other remarkable remains are the theatres, bathing halls, gardens, fountains, public buildings that shone with roofs, doors and windows of gold, and the group of ruined monuments at the rock of Sigiri. At Dambulla there is a celebrated cave temple, dating from the 1st century b.c.

Ceylon was known to the Greeks as Taprobane. In 543 b.c. it was conquered by Vijaya, a prince from the mainland of India, and for several centuries the island enjoyed great pros¬

perity under the generally beneficent rule of his dynasty. The Hindu immigrants brought with them the civilization of their own country, and a great part of Ceylon became covered with towns and villages.

Several of Vijaya's suc¬

cessors had to contend with invading Malabars, and these ultimately secured the sovereignty. A restoration of the line of Vijaya in the 11th and 12th centuries contributed to the return of something of the ancient grandeur of the is¬

land. Little was known regarding it in Europe until 1505, when the Portuguese established a regular intercourse with Ceylon, being en¬

couraged thereto by a native king. The Portu¬

guese were subsequently expelled by the Dutch in 1658, after a stubborn struggle of 20 years'

duration. The Dutch soon opened up an exten¬

sive and profitable trade with Holland, and they constructed several canals to serve as means of communication between their various posts on the island. Their policy, however, though beneficial on the whole to the Singhalese as well as themselves, was essentially a selfish and ex¬

clusive one. British intercourse with the island began in 1763, and in 1795, owing to the war with France and Holland, Great Britain was induced to attempt an effective occupation of it. In that year Trincomalee was captured, and in the following year Colombo; and by these victories all the Dutch forts were transferred CEZANNE — CHABANEAO

in Great Britain. By the Peace of Amiens (1802) the whole coast territory was formally ceded. The King of Kandy, who remained in possession of the central mountainous region, perpetrated such atrocities on hi.s own people that many of their chiefs in 1815 entreated Great Britain to depose him. A short cam¬

paign was ended by the capture of the tyrant and his deportation as a prisoner to India, and since then the whole island has been under direct British rule. A serious rebellion in 1817

and minor ones in 1843 and 1848 have been the only breaks in the generally tranquil subsequent history of the colony. British rule has con¬

tributed very largely to the material advance¬

ment o! the island by the construction of roads and railways, the extension of the Dutch canal system, the restoration of irrigation tanks, the bridging of rivers and the development of its great natural resources. Two important events in its modern history have been the rise and decline of coffee-planting (say from 1837 on¬

ward), and the substitution of tea-planting (about 1878) in its place. The decline of coffee¬

planting, as is well known, has been caused by a leaf-fungus. The planting of cinchona, cacao and rubber-trees has also helped to add to the resources of Ceylon in recent times. The rapid development of the rubber industry during the decade ending in 1916 has been mentioned above. In 1901 a considerable number of Boers, captured by the British in the South African War (q.v.), were sent to Ceylon.

The principal towns of the island are Co¬

lombo, Trincomalee, Kandy, Galle, Jaffna and Kornegalle. The urban population is 11.8 per cent of the total number of inhabitants which, on 1 Jan. 1914, was given as 4,262,097. See also above : Races.

Bibliography.— Baker, H. D., (British India, with notes on Ceylon, > *etc.* (Washington 1915) ; Barnard, A. S., (Glimpses of Ceylon) (in Man¬

chester Geographical Society Journal , London 1916) ; (Census of Ceylon, 10 March 1911 >

(Colombo 1911); Clark, A., (Ceylon > (London 1910) ; Crane, W., (India Impressions, with Some Notes of Ceylon) (London 1908) ; Hum¬

phreys, R., (Travels East of Suez} (London 1915) ; (Handbook for Travelers in India, Burma and Ceylon* (London 1913) ; (Khosla's Directory of India, Burma and Ceylon) (La¬

hore 1914); Pieris, P. E., (Ceylon: the Portu¬

guese Eraˆ (Colombo 1913-14).

CEZANNE, Paul, sa-zan', French painter:

b. Aix-en-Provence 1839; d. there 1906. He was the son of a banker and so, in spite of the failure of his pictures to find purchasers for the greater part of his lifetime, he did not, most happily, have to contend with poverty. Emile Zola was a schoolmate of Cezanne's and it was he who induced the latter to come to Paris in 1861. From this year on his time is divided between Aix and Paris, the years from 1861 to 1882 being spent principally at the capital, where he came into contact with the best men of his generation, the latter years of his life being passed mostly in the south where he could work out his ideas more quietly. Zola had introduced Cezanne to his friend Manet and the young painter was soon acquainted with the whole band, soon to be styled the Impres¬

sionists, Renoir and Pissarro being especially his friends. He exhibited with them in 1874

and again in 1877, when he sent in 17 oil paint¬

ings. Discouraged by the ridicule of critics ;md by his differences with the Impressionists, he retired in 1879 to Aix, where he spent the remainder of his life. In this seclusion he developed a style of amazing originality, which has exercised a profound influence upon the radical younger generation, who hail him as a prophet and a leader. After a fervent and profound study of the old masters and an ador¬

ing acceptance of the art of Delacroix and Courbet, Cezanne's next step was, logically, to make himself master of the principles of their successors. Ihis he did, especially during the two years that he lived with Pissarro at Auvers-sur-Oise. 1873-74. But while the modern ideas of light were his study at this period he never lost sight of the masters of the Louvre, and he made endless experiments in applying latter-day knowledge to classic principles of design.

"Imagine Poussin painted again according to our ideas of natureˆ was one of his character¬

istic remarks. With the early years of the ’80’s he is ready to begin a painting where personal inclination takes on more and more prominence as compared with inherited values. As a true Frenchman, and a true classicist in the best sense of the word, the qualities he adds to his art in later life are derived from those, observ¬

able in less emphasized form, in the art of the past. Cezanne observed the design and color of the old masters and found that with the best of them these qualities are present as a living organism throughout the entire picture. He saw that it was precisely in this regard that the painting of his time was falling short of the excellence of the past. Without dreaming for a moment of returning to the vision of nature or the formula of painting of the old masters, he applied their demand for a firm basis of design to the painting of the earlier 19th cen¬

tury. The picture at the Luxembourg, (L’Es-taqueR shows him on the road to his new style, the landscape at the Metropolitan Museum (1888) shows him firmly in possession of it and already obtaining his results with the as¬

sured stroke of a master. His later years, however, showed no inclination to rest on his achievement or to repeat himself. On the con¬

trary he goes untiringly ahead, making more and more clear to the younger generation (who began to follow him about 1885-90) that a profound idea of nature and an overwhelmingly sufficient statement of her aspects Cctn be made by the setting down of a few essentials. His treatment of form and color rose to always grander heights and he is to-day almost uni¬

versally considered one of the greatest of cre¬

ative artists. While the larger part of his works is still in private collections he is rep¬

resented, besides the museums noted above, in the Louvre ((The Card Players* and blowers*), at Berlin ((Still Life* and (The Bouquet*), at the Neue Pinakothek, Munich (<Self-Portrait) and bruits*), at the Museums of Mannheim, Christiania, in the Havemeyer collection, New York, *etc.* Consult Meyer and Graefe. (Paul Cezanne* (Berlin 1910), and Burger, (Cezanne and Hodler> (Munich 1913). The story of Cezanne’s struggles and career is depicted in Zola’s (L’CEuvre,* of which he is the hero.

CHABANEAU, sha-ba-n< >, Camille, French

philologist: b. Nontron, 4 March 1831; d. 1909.

From 1879 until his death he was professor of Romance languages at Montpellier. In 1895 he 240

was made a chevalier of the Legion of Honor, and later was the recipient of an honorary doc¬

torate from the University of Halle-Wittenberg.

He was not only a leading authority on Provengal philology, but made numerous valuable con¬

tributions to the history of Languedoc. He wrote (Histoire et theorie de la conjugaison frangaise) (1868); (Grammaire . limousine) (1876) ; (La langue et litterature provengales) (1879) ; (Biographies des troubadours* (1885) ; and contributed largely to the Revue des langues ro manes.

CHABANEL, Noel, Jesuit missionary

among the Huron Indians: b. France, 2 Feb.

1613 ; d. 8 Dec. 1649. In 1630 Chabanel entered the Jesuit novitiate at Toulouse and was pro¬

fessor of rhetoric in several colleges of the Jesuits in that province. He was sent to Can¬

ada in 1643, where, after studying the Algonquin language for a time, he was sent as missionary to the Hurons, among whom he labored until his death. He had as companion of his labors the Rev. Charles Gamier. Their deaths at the hands of a renegade Huron are told of in the (Jesuit Relations) of 1649-50. Consult Shea, (History of the Catholic Missions) (New York 1855).

CHABAS, sha-bii, Frangois, French Egyp¬

tologist: b. Briancourt, 2 Jan. 1817; d. Ver¬

sailles, 17 May 1882. Though at first engaged in commerce, he found time to become a learned linguist, but it was not till 1851 that he gave himself up to the study of hieroglyphics. The first results of his studies appeared in 1856, fol¬

lowed by a series of invaluable books and papers, elucidative chiefly of two important periods of ancient Egyptian history — the con¬

quest of the country by the Hyksos and the time of their expulsion. Among the more im¬

portant of his many books are (The Shepherds in Egypt *; (History of the 19th Dynasty and especially of the Period of the Exodus* ; and (Studies of Historical Antiquity from Egyptian Sources.) From 1873 to 1877 he edited L'Egyptologic.

CHABAZITE, a member of the zeolite

family of minerals of variable composition, but in general definable as a hydrated silicate of aluminum, calcium and sodium, with small amounts of potassium and occasionally of barium and strontium. It has a hardness of from 4 to 5 and a specific gravity of about 2.1.

It is transparent or translucent, and varies in color from white to pale red or yellow. It occurs in rhombohedral crystals that are some¬

times barely distinguishable from cubes, and also in amorphous forms. It is widely distrib¬

uted, and usually occurs in connection with basalt, syenite, gneiss, or mica, or hornblende schist.

CHABERT DE COGOLIN, sha-bar de

ko-go-lan, Joseph Bernard, Marquis, French geographer: b. Toulon, 28 Feb. 1724; d. 1 Dec.

1805, He entered the marines as a cadet in 1741. In 1750 he sailed to the North American coast, and on his return published the result of his

observations in an astronomical and hydrographical work, entitled (Voyage sur les Cotes de l'Amerique Septentrionale) (1753). In 1758

he was chosen a member of the Academy. In the American war Chabert distinguished himself so highly that in 1781 he was made commander of a squadron. In 1792 he was made vice-admiral.

During the same year the Revolution drove him to England. In 1800 he lost his sight in con¬

sequence of his intense application to study, and in 1802 returned to Paris, where Bonaparte assigned him a pension. In 1804 he was ap¬

pointed a member of the Bureau des Longi¬

tudes, and in 1805 presented to it a map of Greece and a description of the coasts of that country.

CHABLAIS, sha-bla', France, a district in Savoy, south of the Lake of Geneva. At one time it formed part of the kingdom of Bur¬

gundy, but in the 11th century came into the possession of the counts of Savoy. In 1860 it was ceded to France, along with the rest of Savoy, by Victor Emmanuel, King of Sardinia.

It now forms the arrondissement of Thonon (its ancient capital), in the department of Haute-Savoie.

CHABLIS, sha-ble', France, town in the

department of Yonne, on the left bank of the Serein, 11 miles east of Auxerre. It stands in the midst of vineyards which produce the cele¬

brated white wine known by its name, of which the most esteemed are Clos, Bouguerots, Mou-tonne, Grenouille, Montmaires, Lys and Vaux-Desirs. The annual product is about 4,400,000

gallons, but the quantity sold over the world as Chablis is much greater. There are manufac¬

tures of biscuits. Pop. 2,227.

CHABOT, sha-bo, Frangois, French revo¬

lutionist: b. Saint-Geniez, France, 1759; d.

Paris, 5 April 1794. In early life he entered the Capuchin order, which he abandoned in order to devote himself to the Revolution. The bishop of Blois nominated him his vicar-general, and succeeded in getting him chosen deputy to the national convention for the department of Loire-et-Cher. In this capacity he displayed the bitterest animosity against the King and his ministers and all deputies friendly to moderate courses, and labored incessantly to overturn the throne. His party, from occupying the higher seats of the national convention, was desig¬

nated by the name of <(La Montagne,** which it has since retained. The conversion of the cathedral of Notre Dame into the Temple of Reason is said to have originated with Chabot.

He at last became suspected by his party of bribery and falsification. When he saw' that he was lost he swallowed poison and three days afterward he was guillotined.

CHABOT, Jean-Baptiste, French hagiog—

rapher: b. Vouvray, Indre-et-Loire. He was educated at the Seminary of Tours and at Louvain University, also at the Sorbonne School of Higher Studies. He was ordained to the priesthood in 1885 and for some time had charge of the department of missions in the Ministry of Public Instruction. He was director of (Corpus Scriptorum Christianorum Orientalium* (Vols. I-LXXVI, 1903-14) and associate editor of (Corpus Scriptorum Semit-icarum,) of the Academy of Inscriptions and Belles-Lettres, which awarded him prizes in 1897 and 1900. In 1895 he was one of the nominees for the chair of Aramaic languages and literatures at the College de France. His published works include (Notes d'epigraphie et d'archeologie oriental (1897-1901); <Les

eveques Jacobites du VIIIe au XIIIe si£cle d'apres la chronique de Michel le Syrien*

(1901) ; (Narsai le Docteur et les origines de CHABOT — CHACO

1 Ecole de Nisibe* (1905); (Eclaircissements sur la litterature syriaque* (1906) ; (Les langues et les litteratures arameennes) (1910) ; ˆLes Saints Evangiles,* with Introduction and Notes (1911). He edited (De Sancti Isaaci Ninivitae Vita, Scriptis et Doctrina) (1892) ; ‘Histoire de Mar Jabalaha III et du moine Rab-ban Cauma) (1895-96) ; Jesus-Yahb Adiabenus, ‘History of Jesus Sabrau,* Syriac text and in¬

troduction (1897) ; (Synodicon Orientale) (1902); (Documenta ad Origines Monophy-sitarum illustrandas,* etc., *etc.* He collaborated in (Orientalische Studien) (1906); the Revue Semitique, Revue Biblique, *etc.*

CHABOT, Philippe de Brion, French ad¬

miral : b. about 1480; d. 1 June 1543. Having bravely defended Marseilles in 1524, he was made prisoner at Pavia in 1525. Appointed ad¬

miral immediately after his release, he was sent to Italy in 1529 to negotiate the ratification of the treaty of Cambrai by Charles V. Made commander-in-chief of the forces of Savoy in 1535, he effected the conquest of part of that country and of Piedmont, but was censured for not following up his victory. On his return to France he became involved in the intrigues of the court and charges of fraud upon the national treasury were brought against him.

Found guilty and imprisoned, he was soon afterward pardoned by the King at the urgent solicitation of the Duchess d’Etampes, and rein¬

stated in his position. He is said to have been the first to suggest the project of colonizing Canada. His letters in manuscript are at the National Library of France in two volumes.

CHABRIAS, ka’bri-as, Athenian general.

In 392 he succeeded Iphicrates in the command of the Athenian forces

before Corinth, was afterward sent to chastise the .TEginetes for depredations on the coast of Attica, and assisted Evagoras in Cyprus, and Acoris in Egypt, against the Persians. In 378 he com¬

manded the army which the Athenians sent to the aid of Thebes against the Lacedaemonians, under Agesilaus, on which occasion he saved his troops from impending defeat by a military manoeuvre renowned in antiquity, commanding them to await the attack of the enemy with pointed spear and shield resting on one knee.

In 376 he won an important victory over the Lacedaemonian fleet off Naxos. The Athenians having abandoned the alliance of Thebes, he defended Corinth against Epaminondas. He took part in the expedition against Thraee at the outbreak of the so-called social war. At the siege of Chios his vessel was the first to enter the harbor, but becoming isolated and dis¬

abled was soon abandoned; he alone refused to save his life, and fell fighting, 357 b.c. He was the last of the great Athenian generals.

Demosthenes said that he conquered 17 cities, took 70 vessels, made 3,000 prisoners and en¬

riched the treasury of Athens with 110 talents.

One of his apothegms, for which he was cele¬

brated, was that an army of stags led by a lion is superior to an army of lions led by a stag.

His life was written by Cornelius Nepos.

CHABRIER, sha'bre'a', Alexis Emmanuel,

French composer: b. Ambert, France, 18 Jan.

1841 ; d. Paris, 13 Sept. 1894. He at first studied law, but presently turned his attention to music. He composed the operas of (Gwendoline) (1886) and (Le Roi Malgre LuP

(1887). Other works by him are (Dix Pieces Pittoresques) and ˆEspanaC an orchestral rhapsody.

CHAC-MOOL, shak-mool', according to

tradition, a chief of the Maya Indians of Yuca¬

tan. In 1876 a statue was discovered in the ruins of Chichcn-Itza, Yucatan, to which Le Plongeon gave the name of Chac-Mool, because he supposed it to be a representation of the chief. The statue was taken by the Mexican government and placed in the National Museum of Mexico, but the correctness of Le Plongeon's identification is in question among archaeologists.

CHACABUCO, cha-ca-boo'ko, Chile, a

mountain and mountain pass, 28 miles north of Santiago, in the province of that name. It is celebrated as the scene of a decisive victory of the republicans over the royalist troops on 12

Feb. 1817.

CHACMA, chak'ma, the Hottentot name

for the baboon (cynocephalus porcarius) native to western Africa. It is grayish-black in color and has a well-marked crest of hair along the neck. It is larger than the allied species of its native region. See Baboon.

CHACO, cha'ko, South America, a govern¬

ment or territory in the north of the Argentine Republic bordering on the Paraguay River. Its chief town is Resistencia. See Chaco, El ; Chaco, El Gran.

CHACO, El, Argentina, a territory (terri¬

torial government®), bounded on the north by the territory of Formosa, on the east by Paraguay and the province of Corrientes, on the south by the province of Santa Fe and on the west by the provinces of Salta and San¬

tiago del Estero. Its area is 62,000 square miles, and its population about 14,000. The surface is even, but sparsely watered. The southern part is slightly higher and is covered with heavy forests of trees, the wood of which is of great economic value. Its capital is Resistencia, on the right bank of the Parana River, with a population of 3,500. The dis¬

tricts near the river are inhabited by civilized people, who cultivate the soil or exploit the forests, while Indians roam in the interior.

The national government has encouraged im¬

migration by selling land to settlers at the average price of 31 cents for an acre.

CHACO, El Gran, that great, lowlying,

alluvial plain situated in the interior of South America and bounded on the east by the rivers Parana and Paraguay, and on the south and west by the Argentine provinces and the re¬

public of Bolivia. It extends roughly over 10

degrees of latitude and 5 of longitude, com¬

prising an area of about 200,000 square miles.

The word Chaco or Chacu is supposed to have signified a drive of wild animals or a hunting ground; but in this instance it was employed figuratively. The region received its name (probably long before the Spanish conquest of Peru) on account of the Inca armies invading these lands. The savage inhabitants, being no match for Inca trained troops, would naturally fly in all directions, like game in a hunting-drive. Politicals the great Chaco is under the domination of the republics of Paraguay, Ar¬

gentina and Bolivia, but with the exception of a fringe of settlements near the boundaries, the 242

interior is entirely in the hands of Indians, the principal tribes being the Mataccos, Chiri-guanas, Tobas, Lenguas, Suhin, Kisapang, Cham-acocos and the Bororu. The total population is estimated at 135,000, but it is impossible to speak with accuracy owing to their nomadic habits and the difficulty of obtaining anything like a census. (See the article Paraguay).

Consult Grubb, W. B., (An Unknown People in an Unknown Land* (London 1911). The author of that book is recognized in South America as the greatest living authority on the Indians of the Chaco.

CHACORNAC, sha-kor-nak, Jean, French

astronomer: b. Lyons, 21 June 1823; d. near there, 20 Sept. 1873. He is principally known for his discoveries of asteroids, which came about in connection with his work on the for¬

mation of ecliptic charts of the stars. His asteroid discoveries were six in number, and most of his work was done at the Paris Ob¬

servatory under Leverrier. He published (At¬

las ecliptique) (1856), and (Atlas des annales de l'Observatoire imperial de Paris) (1860-63).

CHAD, chad. See Tchad.

CHADBAND, Rev. Mr., a personage in

Dickens' (Bleak House.) He is a hypocritical minister, who pretends to be humble and to despise the world, but is in reality extremely

selfish and self-indulgent.

CHADBOURNE, chad'bern, Paul Ansel,

American educator and writer: b. North Ber¬

wick, Me., 21 Oct. 1823; d. New York, 23 Feb.

1883. He was graduated from Williams Col¬

lege in 1848, and became professor of chem¬

istry and physics there in 1853. He taught the same subjects at Bowdoin and the Berkshire Medical College. He was president of the Massachusetts Agricultural College at Am¬

herst, 1867, and again in 1882; of the Univer¬

sity of Wisconsin (1867-70) ; of Williams Col¬

lege (1872-81). He became very active in politics, served twice in the Massachusetts senate and carried on manufacturing enterprises. He wrote (Natural Theology* (1867) ; (Instinct in Animals and Men* (1872); (Relation of the Natural Sciences to the Intellect * (1860) ; and edited Public Service of the State of Nezv York.

CHADD'S FORD. See Brandywine

Creek.

CHADRON, Neb., city and county-seat of

Dawes County, 350 miles north of Denver, Colo., on the Chicago and Northwestern Rail¬

road. It has a large trade in live stock and is the seat of a State normal school. It contains a Carnegie library, several churches and schools and a public park. The waterworks are the property of the city. Pop. (1920) 4,412.

CHADWICK, Sir Edwin, English social

and sanitary reformer: b. Longsight, near Manchester, 24 Jan. 1800; d. East Sheer, Sur¬

rey, 6 July 1890. England is indebted to him for its first sanitary commission, organized in 1838, and the office of registrar-general es¬

tablished through his persistent effort and advocacy. A lawyer by profession, he became private secretary to Jeremy Bentham, was ap¬

pointed assistant commissioner on the first English Poor Law Commission in 1832, and secretary of the Poor Law Board, an office he held for 20 years. From 1848 to 1854 he was also a commissioner of the Board of Health, when he retired into private life, but kept in close touch with former interests by his numer¬

ous contributions on sanitary and economical subjects to periodical literature. He was made K.C.B. in 1889.

CHADWICK, French Ensor, American

naval officer: b. Morgantown, W. Va., 29 Feb.

1844 ; d. New York, 27 Jan. 1919. He was graduated at the United States Naval Acad¬

emy in 1864; served later in the South At¬

lantic, Pacific, West Indies and on the Eu¬

ropean station ; was sent abroad in 1882 _ as naval attache with general orders covering Europe, though specially attached to the Lon¬

don legation until 1889; commanded Yorktown 1889-91 ; was chief intelligence officer 1892, and in same year was made chief of Bureau of Equipment in the Navy Department. Became a captain in 1897. During the war with Spain he commanded the armored cruiser New York, the flagship of the North Atlantic squadron, and was chief-of-staff to Admiral Sampson.

Was promoted five numbers for <(eminent and conspicuous service in battled Was president of Naval War College 1900-03; became rear-

admiral 1903 ; commander-in-chief, South At¬

lantic squadron 1904 : retired, by age limit, 1906.

He wrote and spoke much on public ques¬

tions; was member Newnort Representative Council; of National Institute of Arts and Letters; American and National Geographical societies ; corresponding member Massachu¬

setts Historical Society; author temperament, Disease and Health) (1892); (An Unsolved ProblenP (in Congressional procedure, 1896) ; (Causes of the Civil War* (Vol. XIX, Ameri¬

can National Series, 1906) ; 'Relations of the United States and Spain* ; (Diplomacy and War* (1909-11) ; 'The American Navy*

(1914).

CHADWICK, George Whitefield, Ameri¬

can composer: b. Lowell, Mass., 13 Nov. 1854.

He studied under Stephen Emery and Eugene Thayer in America and under Richter, Reinecke, Rheinberger and Jadassohn in Germany, where he went in 1877. On his return to America in 1880 he became organist of Saint John's Church and joined the staff of the New England Con¬

servatory of Music, of which he became di¬

rector in 1897. From this time his career has been one of ever increasing activity as com¬

poser, conductor, organist and teacher, and in the latter capacity he has numbered among his pupils such well-known musicians as Horatio Parker, Arthur Whiting, Wallace Goodrich, Frederick S. Converse and Henry Hadley. As a composer he is regarded by some foreign critics and by many of his countrymen as the leader of the American school. His leaning is toward the highest instrumental forms, which he handles with considerable skill. In 1897 he received the honorary degree of M.A. from Yale University and in 1905 that of LL.D. from Tufts College. His works are: for orchestra — Three symphonies in C minor, B flat and F; six overtures, 'Rip Van Winkle,* 'Thalia,* 'The

Miller's Daughter,* ' Melpomene,* 'Adonais*

(1899), 'Euterpe* (1904); serenade in F; suite in A; suite sinfonique; for chorus with orchestra — 'The Viking's Last Voyage) (1880) ; 'The Pilgrims' Hvmn) (1883); 'Lovely Rosa-bcllc* (1889); 'Phoenix Expirans) (1891); CHADWICK — CHAFFINCH

'The Lily Nymph* (1892); (Dedication Ode*

(1883) ; ˆColumbian Ode* (1892) ; <Aphrodite) ; (Tam O'Shanter.* His most ambitious work is a lyric drama, <Judith) (1900). Two other works for the stage are the comic operas (Tabasco* (1893), and (The Quiet Lodging*

(1892). He has also written many composi¬

tions for piano and organ.

CHADWICK, James Read, American phy¬

sician : b. Boston, Mass., 2 Nov. 1844; d. 1905.

He graduated B.A. at Harvard 1865 ; M.D.

1871 ; and pursued further studies abroad. In 1873 he began practice in Boston, and became distinguished as a gynecologist. He was a founder of the American Gynecological So¬

ciety, its secretary 1876-82, and president 1897.

A strong advocate of cremation, he was presi¬

dent of the Massachusetts Cremation Society from 1894 till his death. He contributed many articles on his specialty to the (Transactions) of the American Gynecological Association, the Boston Medical and Surgical Journal, the American Journal of Obstetrics, *etc.*

CHADWICK, John White, American

writer and Unitarian clergyman : b. Marble¬

head, Mass., 19 Oct. 1840; d. Brooklyn, N. Y., 11 Dec. 1904. His radical sermons attracted at¬

tention, and he was a liberal contributor to cur¬

rent literature. From 1864 till his death he was pastor of the Second Unitarian Church in Brooklyn, N. Y. Among his works are (A Book of Poems* (1875) ; (The Bible of To-day* (1878); (Origin and Destiny* (1883); (A Daring Faith* (1885); (The Man Jesus* ; (The Faith of Reason* ; (01d and New Uni¬

tarian Belief* ; (The Power of an Endless Life* ; (The Revolution of God* ; (Theodore Parker, Preacher and Reformer* (1900) ; (George William Curtis* ; <Later Poems*

(1905).

CHiERONEA, ker-6-ne'a, an ancient town

in Boeotia, near the Cephissus, on the borders of Phocis, at the head of the last defile where a stand could be made against an invader of central Greece, famous as the scene of several celebrated battles of antiquity. An important battle was fought near it in 447 b.c., by which the Athenians lost the supremacy in Boeotia.

A still more celebrated battle was fought 338

b.c., in which Philip of Macedonia defeated the united forces of the Athenians and Boeo¬

tians, and crushed the liberties of Greece. A mound of earth, about a mile from the modern village of Kapraena, which occupies the site of the old city, still marks the place where the Thebans who fell in the battle were buried; the grave was also marked by a magnificent colossal lion (quite recently restored). In a third battle, fought at Chaeronea, Sulla de¬

feated the generals of Mithridates, 86 b.c.

Plutarch was a native of this town.

CH.7ETODONTID.7E. See Butterfly—

fishes.

CHiETOPODA, ke-top‘6-da, a class be¬

longing to the phylum Annulata, characterized by segmentation and the almost invariable pos¬

session of bristles (chaetae), usually four bun¬

dles to a segment. They comprise the earth¬

worms (q.v.), the leeches, certain fresh-water and numerous marine annelids, such as Ser-pula arenicola, the lobworm and manv other genera; the most common and one of the larg¬

est American chaetopods is the ((clamworm**

(Nereis virens), which is associated with the clam of the New England coast, burrowing deeply in the mud. The marine forms undergo a metamorphosis, hatching as a top-shaped, free-swimming larva, called a trochosphere.

Some of the forms, as Nais, Syllis, Autolycus, etc., also multiply by a process of self-division called strobilation, and by alternation of gen¬

erations. Some of them, as Scrpula and Spi-rorbis, live in solid calcareous tubes or shells.

Certain forms are luminous. The tracks of chaetopod worms occur in Cambrian strata, which are so much like those made by existing forms as to show that the type has undergone little change since the Cambrian Period, which lies at the very base of the Palaeozoic Age.

Sometimes practically all the Annulata are known as chaelopoda. See Annulata.

CHAFARINAS, cha-fa-re'nas, or ZAF—

FARINES, Spain, an archipelago of three islands, off the coast of Morocco, opposite the mouth of the Muluya River, and near the Al¬

gerian frontier, three miles north of Capedet Agna. The Zafran of the Arabs and the Roman Tres Insulae, they were annexed by Spain in 1848, forestalling by a few days a French expedition sent out for the same pur¬

pose. A great landlocked harbor, sheltering the largest ships, has been created by a breakwater uniting the central island Isabella II with El Ray, the near-by islet. Del Con¬

gress, the largest of the islands, is rocky and hilly. Pop. 750.

CHAFER, the British name for a scarabeid or dung-beetle. The larger ones, called cock¬

chafers, are very destructive to vegetation, es¬

pecially in the larval state.

CHAFFEE, Adna Romanza, American

soldier : b. Orwell, Ohio, 14 April 1842 ; d. 1

Nov. 1914. In 1861 he entered the 6th United States Cavalry ; was promoted to be first lieu¬

tenant in 1865, and in the same year received the brevet of captain for gallant conduct at Dinwiddie Court House. In 1897 he was made lieutenant-colonel, and in 1898 saw service in Cuba during the Spanish-American War, dis¬

tinguishing himself at El Caney, and was brevetted major-general of volunteers. In 1900 he was sent to take command of the United States forces in China, being promoted to be major-general of volunteers, and took an important part in the expedition against Pekin. In 1901

he was made a major-general in the regular army and in 1902 was

placed in command of the division of the Philippines. He was made commander of the Army of the East in 1903, and was chief of staff of the United States Army in 1905, and was retired 1 Feb. 1906.

CHAFFINCH, Fringilla coelebs, a brilliant¬

ly colored and well-known European finch, one of the most popular and most valuable cage-birds (q.v.). It is found in large numbers throughout the Continent and England, and is migratory in the more northern parts, remain¬

ing, however, in England and around the Medi¬

terranean in winter, where it is shot in great numbers for market purposes. The top of the head and nape of the neck of the male are bluish-gray, the back is chestnut and the black wings are streaked with two conspicuous white bars. It is sought not only because of its loud, 244

clear and pliable voice, but because of its do¬

cility and beauty. Its voice is susceptible to training, and its value greatly increases by cul¬

tivation, the wild bird having an unpleasant and almost harsh cry. These birds sometimes have a repertoire of as many as six tunes, the words of which they sing with almost human articulation. Their training and rearing from the nest is an important industry throughout Europe, and particularly in Germany. For a full account of the powers of song of the chaf¬

finch see Bechstein's (Cage-Birds. >

CHAFIN, Eugene Wilder, American pro¬

hibitionist and Presidential, candidate: b. East Troy, Wis., 1 Nov. 1852; d. Long Branch, Cal., 30 Nov. 1920. He studied law and

practised at Waukesha from 1876 to 1900. He was superin¬

tendent of the Washingtonian Home, Chicago, from 1901 to 1904. He became known as an elo¬

quent speaker and an active organizer in the temperance and prohibition movements, and was the candidate on these questions selected for several public offices, notably for the governor¬

ship of Wisconsin in 1898, and the Presidency of the United States in 1908 and 1912. He was admitted to the bar of the Supreme Court of the United States in 1908. In 1909 he settled in Arizona. His published writings include (Voters' Handbook (1876) ; (Lives of the Presidents) (1896) ; (Lincoln, the Man of Sor¬

row } (1908) ; Washington as a Statesman >

(1909).

CHAGOS, cha'gos', ARCHIPELAGO, a

group of islands in the Indian Ocean, nearly on the same meridian as the Laccadives and Maldives, and probably a continuation of them.

It extends from lat. 7° 39' to 4° 44' S. and long. 70° 5CK to 72° 50' E. The largest, called Diego Garcia or Great Chagos, 100 miles south of the main group, is about 12ˆ2 miles long by 6 broad, is of a crescent shape and consists of a coral atoll covered with cocoa palms, and enclosing a lagoon which forms a harbor four miles broad. Fish abound, and excellent green turtle may be found on the shores. The islands belong to Great Britain, and form a depend¬

ency of Mauritius. Cocoanut oil is the chief product. Pigs and poultry are raised in abun¬

dance. Pop. 750.

CHAGRES, cha'gras, a river of Panama

rising in the Cordillera de San Bias, flowing southwest, west and northwest into the Carib¬

bean Sea. The mouth of the old river bed is about seven miles west of Colon. The river supplies the water required to operate the locks of the Panama Canal, which follows the bed of the stream from Mindi to Gamboa. The tremendous rise of this river during freshets, as much as 32 feet in 24 hours, presented one of the most formidable engineering problems in connection with the construction of the canal.

The building of the Gatun Dam, thereby form¬

ing Gatun Lake, successfully solved the prob¬

lem.

CHAGRES, Panama, a seaport on the north coast of the Isthmus of Panama, at the mouth of a river of the same name. It acquired some importance at one time as the station at which steamers landed the mails for the west coast of America. The terminus of the railroad across the isthmus was, however, in 1855 fixed at Aspinwall (now Colon), about eight miles northeast and Chagres then greatly declined.

CHAILL6, sha-ya, Stanford Emerson,

American physician: b. Natchez, Miss., 9 July 1830; d. New Orleans 1911. He was graduated at Harvard in 1851, and received his M.D at Tulane University in 1853, subsequently study¬

ing in Europe for three years. During 1862-63

he was medical inspector of the Confederate army in Tennessee, and later had charge of various military hospitals. He was a member of the National Board of Health, and in 1879

was president of the Havana yellow-fever com¬

mission. Since 1858 he held various professor¬

ships in Tulane University, Louisiana, and since 1886 was dean of the medical department, and professor of physiology, hygiene and pathologi¬

cal anatomy. He has published (Yellow Fever in Havana and Cuba) ; Origin and Progress of Medical Jurisprudence, 1776-1876) (1877) ; (Laws of Population and Voters > (1872) ; liv¬

ing, Dying, Registering and Voting Population of Louisiana, 1868, 1874, 1875) ; Untimidation of Voters in Louisiana) (1876). From 1857 to 1868 he was coeditor and proprietor of the New Orleans Medical and Surgical Journal.

CHAILLE-LONG, Charles, American

soldier, explorer and diplomat; b. Princess Anne, Somerset Co., Md., 2 July 1842; d. Vir¬

ginia Beach, Va., 24 March 1917. He was educated at Washington Academy, 1860, and was graduated from the Columbia Law School in 1880. He enlisted in the Union army in 1862 ; was promoted captain and mustered out in 1865 ; appointed lieutenant-colonel in the Egyptian army 1869 ; chief of staff to General Gordon 1874-77, during which time he concluded a treaty with King M'Tesa annexing Uganda to Egypt; 19 July 1874, discovered Lake Ibrahim and solved the problem of the Nile sources August 1874; was wounded at M'Rooli 17 Aug.

1874; promoted colonel and brigadier, took part in the conquest of the Niam-Niam country, and in the expedition to the east coast of Africa 1875-76, and in August 1877 returned to the United States. Returning to Egypt in 1882, he became acting consul of the United States at Alexandria from June to August 1882, after the massacre of 11 June. He was consul-gen¬

eral and secretary of legation to Korea 1887-89; secretary of the Universal Postal Congress, Washington, May 1897 ; and charge d'affairs (October 1897-September 1898) of the special commission to the Paris Exposition 1900. In 1910 he was awarded a gold medal by the American Geographical Society in recognition of his part in the final solution of the problem of the Nile sources. He has published Cen¬

tral Africa: Naked Truths of Naked People) (1876) ; (L'Afrique Centrale> (1877) ; (The Three Prophets> (1884); Les Sources du NiP

(1891) ; (L'Egypte et ses Provinces Perdues >

(1892); (La Coree ou Chosen La Terre du Calme MatinaP (1894) ; and compiled, trans¬

lated and edited (Les Combattants Franqais de la Guerre Americaine 1

778— 83 > ; (My Life in Four Continents > 0912) ; and contributions to French and American reviews and magazines on Egyptian and African subjects.

CHAILLU, cha-yoo, Paul du. See Du

Chaillu.

CHAIN ARMOR. Called also mail

armor, chain mail, or even mail. The term CHAIN ARMOR

co at-of -mail (taken from the French cottc de mailles) is often, by extension, used to cover the entire (panoply) chain armor — camail, hauberk, chausses, *etc.* The earliest body de¬

fenses started with the Eastern jazerans (jackets protected with bronze scales or plates), dating back to very early historic times. The regular chain armor was pre¬

ceded by body defenses of leather or quilted cloth having metal rings sewn or other¬

wise fastened to them, the better to pro¬

tect against blows or cuts. Doubtless chain armor was introduced to Europe from the East, where it was in use in very early times and where it is in use, in places, to this very day. Unfortunately, pieces of chain armor dating, authoritively, earlier than the 14th century are almost unknown. The thinness of the link necessitated by the weightiness of such armor and the very large metal surface exposed to the atmosphere caused rust to an¬

nihilate it rapidly unless steadily cared for. The Norsemen (Vikings) used chain armor, as fragments found in their graves testify.

Trajan's Column (a.d. 114) shows Roman

chain armor (lorica catenata) in use similar to that of the 13th century. The hastati (spear¬

men of the first line soldiers of the Roman Republic) appear to have worn armless chain armor reaching to the hips, the second line men {Principe s) also wore chain armor, while the third line (triarii) wore a breast plate.

The use of chain armor died out after the fall of the Roman Empire, to be revived by the 11th century, commencing with the hau¬

berk (body armor). By the 12th century the entire mail armor was in use, consisting of head-covering, body armor, leg and foot de¬

fense, all in mail. The so-called Bayeux Tap¬

estry depicts the Norman warriors of William the Conqueror (1066) wearing a hauberk in combination with a coif of mail (head defense) over which is worn a conical nasal helmet.

(See Helmets). The hauberk (coat of mail) of the 11th century had short, roomy sleeves, and below was split front and rear to allow easier motion and permit the knight to ride astride his horse. It reached, when standing, somewhat below the knees. The tunic (a short linen shirt worn beneath the mail) appears to have become lengthy by the end of the 12th century, reaching to the feet. The tunic dis¬

appeared early in the 13th century, being dis¬

placed by the gambeson (called, also, gambeis, wambais and hake ton), which was quilted.

This was worn sometimes by foot soldiers and knights as the sole body defense, or was worn beneath the hauberk to break the impact of blows on the chain armor. The gambeson was long enough to reach the knees and usually shows up (in old illustrations) for a few inches beyond the shorter hauberk. The com¬

plete hauberk (or great hauberk) was the privilege of the knight. The

cost of a full coat of mail in the early days of that armor was very great, as each ring had to be wrought.

Wire drawing was not invented till 1306, by Rudolf of Nuremberg; which discovery re¬

duced the expense of making mail enormously.

It brought the shortened hauberk, called hau-bergeon, into the general possession of the men of the line. Over the hauberk was worn the surcoat, or jupon, sometimes also termed gam¬

beson when it was gambiscd (quilted).

These surcoats were of rich, costly textile and soon became a background on which to depict the wearer's cognizance or device of recognition, so as to be known to other com¬

batants. Ihe surcoat was slit, usually, to per¬

mit riding astride the horse. It was sleeveless till the second half of the 13th century, when arm coverings were added. At this period the surcoat reached nearly to the heels. Knights of the 12th century wore mail leg armor (chausses) , haut de chausses covering the entire leg, or bas de chausses from the knee down. This leg armor became a kind of armored stocking reaching down over the entire foot by the end of the 13th century. But the common soldier, on account of the great cost of a full suit of mail, wore a swathed leather leg covering, and no coif of mail over the head. In the United States mail sleeves were added to the hauberk. Over the surcoat the sword was belted to the left side. Worn over the coif (or head mail) was either a bassinet or casque. (See Helmets). The nasal helmet had disappeared by 1140. The close fitting helm (bassinet) followed, and, for battle a heaume (pot-helm) placed over it became the popular method. First these heaumes, or great helms, were flat-topped, then some were slightly rounded on top. The conical <(sugar loaf® helmet followed (1300).

The shield worn in this period was convex and ((kite® or <(heater® shaped and was decorated often with the owner's heraldic bearings. See Shields.

A species of armor called ((banded mail®

seems to have been worn occasionally as early as the end of the 12th century, to become popular by the 13th century. Doubt still sur¬

rounds its composition, but illustrations of the period show defined bands (some say leather thongs) passing at intervals over the mail.

Banded mail appears in engravings as late as the 14th century.

Reinforced Mail Period (1250-1400).

Called also ˆTransition Period,® because it, by stages, developed into the Plate Armor Period.

Gradually the need for strengthening certain parts of mail seems to have arisen, and we find additions or reinforcements appearing.

<(Splint armor® appears also early in this period. It consisted of splints of metal cov¬

ered with and attached to some fabric — as velvet, silk, *etc.* This was soon evolved into the brigandine, which was a corselet of textile with overlapping small metal plates fastened (usually rivetted) to it. The textile was usu¬

ally worn on the outside, thus exposing the rivets to view.

By the end of the 13th century a cuir-bouilli (boiled leather) cuirass was worn over the hauberk. At this time came the poleynes or genouillieres, caps of metal or boiled leather, to protect the knees ; also began the practice of using ailettes or diminutive shields worn at the shoulders perpendicularly. Next came the leg front plate protection termed beinbergs.

Then appear disc-plates on the shoulders and elbows. A rerebrace plate protection for the upper-arm is strapped over the mail ; the coude , or coudiere, plate is fastened to the elbow.

The vambrace .reinforced the mail protecting the front of the lower arm from elbow to wrist. A quilted up per-p our point is worn over the

hauberk and over this again the surcoat.

The coif of mail had already become separate from the hauberk and then disappeared; and a camail (neck protector of chain mail) was attached by staples to a conical bassinet (see Helmets) and overlapped the surcoat. A strap with buckle in the rear held the camail from ® riding® up. The lower edge of the hauberk usually continues for about two inches in view lower than the jupon — the sleeveless surcoat.

Gauntlets with gadlings (knuckle points or knobs) arrive in this so-termed ((camail and jupon period.® (See Gauntlets). By the 14th century we find the solleret (foot armor) the first laminated plate armor worn by the knights. See Sollerets.

By the first half of the 15th century we have come to a time when the knight is found wearing a full harness (panoply) of plate armor with chain mail hauberk beneath and chain camail over neck and shoulders.

The arbalest (crossbow) was introduced in the 12th century to be used for sport as much as war. See Crossbow. See also Bards, Bows.

Cuirass, Daggers, Gauntlets, Helmets,

Maces, Shields, Spurs, Swords; also Japanese and Oriental Arms and Armor.

Bibliography. — Ashdown, Charles Henry,

(British and Foreign Arms and Armour>

(London 1909) ; Asselineau, L. A., (Armes et Armures du Moyen Age et de la Renaissance*

(Paris, n. d.) ; Belleval, Comte de, (La Pano-plie du XV au XVIII Siecle* (Paris 1873) ; Boeheim, (Handbuch des Waffenkundes*

(Leipzig 1890); Boutell, Charles, Arms and Armour) (from the French of Lacombe, New York 1876) ; Brett, E. J., (A pictorial and descriptive Record of the Original' Develop¬

ment of Arms and Armour,* *etc.* (London 1894) ; Busscher, Edmond de, (Les Armoiries des Comptes de Flandre) (Brussels 1872) ; Clephan, Robert C., (The Defensive Armour and the Weapons and Engines of War of Mediaeval Times and of the Renaissance) (Lon¬

don 1900) ; Demmin, Auguste, (An Illustrated History of Arms and Armour from the Earliest Period to the Present Time) (trans. from the French, London 1877) ; Ffoulkes, C. J., Ar¬

mour and Weapons) (Oxford 1909) ; Jaehns, (Entwickelungsgeschichte der alten Trutzwaf-fen* (Berlin 1899) ; Jubinal, M. L. A., (Notice sur les Armes defensives et specialement sur celles qui ont ete usitees en Espagne) (Paris 1840) ; also by same author, (La Armeria Real; ou Collection des principales pieces de la Galerie d'Armes anciennes in Madrid* (Paris 1838) ; Gardner, J. S., (Armour in England from the Earliest Times to the Reign of James P (Lon¬

don 1897) ; by same author, (Foreign Armour in England* (London 1898) ; Gaya, Louis de, (Traite des Armes) (ed. by Charles Ffoulkes, London 1911) ; Gimbel, K. G., (Tafeln zur Entwickelungsgeschichte der Schutz und Trutz-Waffen in Europa, mit Ausschluss der Feuer-waffen* (Baden-Baden 1894) ; Grose, Francis, <A Treatise on Ancient Armour and Weapons*

(London, n. d.) ; Haenel, Erich, (Alte Waffen*

(Berlin 1913) ; Hergsell, Gustav, (TallhofTers Fechbuch* (Prague (1889) ; Hewitt, John, < Ancient Armour and Weapons in Europe from the Iron Period of the Northern Nations to the End of the 1 7th Century) (3 vols., Oxford 1855-60) ; Kuppelmayr, Rudolph, (Ein Beitrag zur Waffenkunde* (Munich 1914) ; Labarte, C.

J., (Histoire des Arts industriels) (Vol. IV, Art de I'Armurier, Paris 1866) ; Maindron, Maurice, (Les Armes) (Paris 1891) ; Mey-rick, Sir Samuel Rush, (A Critical Enquiry into Ancient Armour *(London 1824) ;*

Specht, F. A. F. von, (Geschichte der Waffen (Leipzig 1869-77) ; Schultz, A., (Zur Waffenkunde des aeltern deutschen Mittelalters) . (Quedlinburg 1867) ; Viollet-le-Duc, <Dictionnaire raisonne du Mobilier frangais de l'fipoque carlovingienne a la Renaissance) (Vols. V and VI, (Armes, }

Paris 1872).

Clement W. Coumbe.

CHAIN-BRIDGE. See Bridge.

CHAIN-CABLE. See Cable.

CHAIN-SHOT, a projectile consisting of

two balls connected by a bar or chain, formerly used for cutting and destroying the spars and rigging of an enemy's ship. It was invented by Admiral De Witt in 1666, but has long been disused.

CHAIN-SNAKE, a harmless terrestrial

snake ranging from the Great Lakes to Mexico.

In length it is from four to five feet, the color varying with the species. In the East and South the typical form (Ophiobolus getulus) is glossy black, with a chainlike pattern of yel¬

low lines covering its back; the belly is dirty yellow, blotched with black, and the head-plates are black, spotted with yellow. A larger vari¬

ety, found west of the Mississippi, is ((cream-colored, sharply marked with rings of black.®

Chain-snakes feed upon small mammals, amphi¬

bians and reptiles, including venomous serpents.

CHAINE, shan, Marius, French Oriental

scholar: b. Tarascon-sur-Rhone, 10 Aug. 1873.

He was educated at the Sorbonne School of Higher Studies and at the School of the Louvre, Paris. In 1897 he was ordained to the priesthood and entered the Society of Jesus.

He was successively professor of Oriental lan¬

guages at Saint Joseph's University, Beirut, Syria, the Gregorian University, Rome, and the Pontifical Biblical Institute, Rome. He has written (L'Egypte et le Sudan1* (1902) ; Cram-maire ethiopienne* (1907) ; Compendium

Morphologiae Coptic3e> (1910) ; Unventaire sommaire des manuscrits ethiopiens de Berlin acquis depuis 1878) (1912) ; Catalogue des manuscrits ethiopiens provenant de la collec¬

tion Antoine d'Abbadie* (1912) ; Catalogue des manuscrits ethiopiens de la collection Mon-don-Vidailhet* (1913) ; (Etude sur le texte original des Apophtegmes des Peres d'apres le texte grec et le texte copte) (1912) ; (Rituel ethiopien* (1913). He contributed articles on Coptic and Ethiopian history and philology to L'Orient chretien , la Revue Semitique, Bes-sarione; the Arab review, Al Machriq of Beirut, (Nuovo Bolletino di archeologia cristiana* of Rome, and to Re cher ches de science re-ligieuse of Paris.

CHAINS AND CHAIN MAKING. A

chain consists of a series of similar links which either interlock or are joined to each other so that they form a continuous flexible metal line. The chain is one of the most familiar as well as one of the most useful of mechanical devices. Its origin is undoubtedly very ancient ; remnants of excellent Roman chains may be found in the museums of the world. The uses of chain are many. The CHAINS AND CHAIN

MAKING

three principal uses are for the hoisting of materials, for the transmission of power and for the conveying of materials. Chains are also used as surveyors' measures, as ornaments, as restraints, as elevator counterweights, for preventing the slipping of motor car wheel and in many other ways too numerous to mention.

All chains may be divided into two gen¬

eral classes which receive their names from the fundamental forms of the links. Coil chains consist of series of links, generally oval in shape, which interlock by passing through one another. Block chains consist, fundamentally, of flat bars which are joined together by cylin¬

drical pins so that the bars are free to articulate about the pins. Coil chains are sometimes loosely called crane chains from the fact that they are generally used in connection with cranes. Block chains are sometimes called link chains, pitch chains and sprocket chains. Coil chains may be subdivided into open link chains, studded link chains, twisted link chains, safety chains, laclder chains and jack chains, while block chains may be subdivided into simple block chains, multiple block (leaf) chains, silent chains, detachable chains and pintle chains. Open link chains are composed of series of interlocking oval links. The links of such chains are generally made from round bars, the size of the chain being taken as the diameter of the bar from which the links are made. The most common example of an open link chain is the ordinary crane hoisting chain.

The links of studded link chains are similar to those of open link chain, being provided, in ad¬

dition, with studs or braces across the centres of the links. These studs strengthen the links, enabling such chains to safely carry loads 20

to 25 per cent in excess of those which may be safely carried by open link chains of the same dimensions. Twisted link chains are made up of links similar to those of open link chains but which have been twisted through an angle of 90 degrees. Safety, ladder and jack chains are of minor importance. The first is made up of small flat links which are stamped from sheet metal ; the latter two consist of twisted interlocking wire links. Simple block chains consist of single series of

flat bars, each hav¬

ing round holes near its ends, which are joined together by means of pins, rivets or bolts which pass through these holes. The ordinary bicycle chain is, perhaps, the most common example of such a chain. Multiple block chains, or leaf chains, consist of series of flat bars, similar to those which compose simple block chains, which are placed side by side upon the same pins. A chain of this type has the gen¬

eral appearance of a number of bicycle chains joined side by side. Silent chains are of the multiple block type, being made up of series of flat bars which have profiles on one side much like gear teeth in appearance. Chains of this type operate over sprocket wheels which look very much like spur gears. Roller chains are essentially block cha.ns in which the flat bars have been separated to allow of the introduc¬

tion of a roller between them. Detachable chains are composed of rectangular links which interlock by sliding over one another. This interlocking of the links by sliding over one another eliminates the necessity of using pins for joining the links. Pintle chains are made up of U-shaped links which have barrels at one end and which are joined by means of pins in the form of either rivets or bolts. Chains are generally made of wrought iron, steel or malleable iron. When iron or steel may be subject to excessive corrosion, brass, bronze or some other corrosion-resisting material is used.

Chains as ornaments are generally made

of brass, bronze and the precious metals.

Chains used as ships' cables and for hoisting are almost exclusively made of wrought iron, for the ductility and toughness of wrought iron, together with its excellent welding prop¬

erties, make its use desirable despite its com¬

paratively low tensile strength. The iron used is a specially rolled grade, of high tensile strength and great ductility, the object being to secure a chain which, on the application of a sudden stress — as, for instance, when a ship is riding at anchor in a heavy seaway — will stretch and so resist the strain gradually, instead of snapping, as would be liable to happen with material of higher tensile strength but small ductility or power of elongation. The small sizes of coil chain

are sometimes made of steel but, in general, such chains are inferior to those made of wrought iron. Simple block chains, multiple block chains and silent chains are usually made of mild steel provided, gen¬

erally, with hardened steel bushings and pins.

One or two types of silent chains are equipped with rocker joints which obviate the necessity of using bushings. Roller chains are made of steel and of malleable iron. Roller chains made of steel are similar in construction to block chains. Those made of malleable iron are generally provided with cast iron rollers.

Detachable and pintle chains are made, almost exclusively, of malleable iron because of the peculiar form of the links which makes it economical to cast them, although of late many of the smaller sizes of detachable chain have been made from steel on automatic punching presses. The links of pintle chains are some¬

times provided with case hardened renewable bushings. The pins for joining the links of pintle chains are usually steel.

Coil chains of open, studded or twisted link type are usually hand-made. Many of the smaller sizes — up to 34-inch — are made on automatic machines, while chains above two inches are made with the aid of power presses and steam hammers. Whether made by handy* by auto¬

matic machinery or with the aid of power presses and steam hammers, the same opera¬

tions are involved. The bar from which the links are to be made is first cut up into pieces long enough to make single links; the ends of each of these pieces are next scarfed and bent so that when the link is formed the scarfed ends will come together; the scarfed piece is next * formed into the shape of the finished link ; the formed link is then drawn through the last link of the finished chain and its ends are welded. When making studded or twisted

link chain, the additional operation of placing the stud or twisting the link is necessary.

These operations are generally performed after the link has been welded. The weld is usually located at the end of the link.

In the smaller sizes the whole operation of chain-making by hand is done by a single smith without any helper. The length of completed chain is hung upon a hook or some convenient support near the anvil, and the operation of 248

forging the link proceeds as follows : In his fire the smith will have two or three short rods of the required diameter, and as one is heated to, say, a cherry red, he withdraws it, cuts off the desired length for one link, gives it a couple of blows to form the welding scarf, bends it through, say, about 130 degrees, hooks it into the end of the completed chain, and brings the ends together for welding. He then raises the link to a welding heat in his fire, places the abutting ends over what is known as the bick-iron, gives it a few taps to ensure a good weld, brings over a Molly® (which is hinged at the outer end of his anvil and when brought over registers above the bick-iron), and with half a dozen blows on the dolly, accompanied with a dexterous movement of the link, the weld is completed and the link smoothed up to a neat finish. The rapidity with which the smiths do this work is very remarkable. Thus, in the case of a 7/16-inch chain, with 30 links to the yard, an expert smith will cut off from the iron bar, scarf, bend up into shape, and weld the links, at the rate of 18 yards in a day of nine working hours, which is two yards per hour, or one link per minute.

In forging heavy chain two helpers are used, the iron is cut to about one-foot lengths, and several of these are being heated in the fire at the same time. The operation is as follows, the various steps succeeding each other with great rapidity: First, the helper to the right of the anvil withdraws the heated piece, drops one end into an eye at the end of the anvil, and bearing down upon the tongs, bends the piece over to an angle of about 45 degrees. The smith then takes it in his tongs, and with a few taps of the sledge it is bent around. It is heated again, passed through the end of the chain by the smith, laid flat on the anvil and the welding scarfs are put on with a few blows of the sledge. The link is now raised to a welding heat, welded by a few

blows by the helpers, laid over the bick-iron, the hinged dolly is brought over, and a few rapid blows on the dolly, while the smith turns the link to and fro, serve to bring the weld up to a smooth finish.

The link is now laid on edge ; a single blow from the sledge brings it into shape, and with a final tap or two of the smith's hammer the link is finished. At this forge as many as 35 links will be added to a 1ˆ4-inch chain in one hour, or about one every twro minutes.

One type of machine making coil chain winds the bar from which the chain is made upon a mandrel in the form of a spiral much similar to a spring. Each loop of the spiral is then cut apart at an angle of 60 degrees so as to form a scarf, and is welded in a set of dies under a drop hammer operated by a workman. Another type of machinery automatically performs all of the operations, including the welding, taking in a plain round bar and turning out a finished, assembly chain. Weldless chains up to one inch have recently been made with some success by passing a red hot cruciform bar through a series of machines. The first operation con¬

sists of impressing the outer form of the links on the bar. The second operation cuts away the webs which join the links, and the third breaks the links apart and finishes the chain.

Coil chain larger than 2-inch can be made en¬

tirely by hand only at a tremendous expense of severe labor and time and it is virtually im¬

practicable to attempt to make such chains without the use of power presses for forming the links and steam hammers for welding them. Chains smaller than 2-inch which are made by hand are generally superior to those made by machinery, while beyond 2-inch

machine-made chains, after proper annealing, are by far both stronger and more uniform.

Ladder, jack and similar type weldless

chains are made by machines which automatic¬

ally cut off the wire, form the links, interlock them and twist or bend

the ends of the links together. Chains of this type can only be made in small sizes and can be used for only unimportant work such as for horse halters, fences, dog chains and the transmission of hand power. Chains made of precious metal are generally made by machinery in a manner analogous to that used in making iron coil chains, with the exception that the links are either left open or arc closed by brazing instead of welding. Very often the links of such chains are stamped and brazed by hand. The operations involved in the manufacture of block chains are few and simple. The bars from which simple and multiple block chains, silent chains and steel roller chains are made are stamped from metal bars of the required width and thickness, the holes for the pins being gen¬

erally punched while the links are being stamped. In the case of extremely accurate chains, the holes are drilled and the links are finished and polished. The pins of chains of this type are either drop forged, cold rolled or machine turned. The rollers of roller chains intended for light duty are made of pipe or tubing cut to proper length. For severe duty it is necessary to use rollers which are made by boring out solid shafting. Chains of these types are assembled by hand, usually with the assistance of a small power hammer for forming the rivet heads. The links of malleable iron detachable and pintle chains are cast and annealed in the usual manner. After annealing, the links are thoroughly cleaned by tumbling and are then assembled to form the finished chain. Some of the smaller sizes of detachable chain are assembled by machines, all of the larger sizes being assembled by hand. All pintle chains are hand assembled with the aid, when the chain pins are riveted, of small power hammers for upsetting the heads of the rivets.

All chains which are to be used for important work are tested after manufacture in order to eliminate the defective links. This is done by subjecting them to test loads well above those under which they are to work and cutting out all links which exhibit defects. Chains which operate over sprocket wheels are also tested for accuracy of pitch and are well oiled and well limbered up before being shipped.

Chains used to hoist materials are generally of the coil type — open link chains being most commonly used. In unusual cases and under peculiar conditions block chains have been used for this work, one notable though disastrous instance being the attempted hoisting, in 1916, of the centre span of the Quebec bridge.

Chains used for ship's cables are of either the open link or the studded link type. Chains for this duty have been made from bars as large as four inches in diameter. Chains for CHAIR — CHALCEDON

the transmission of power are generally of the simple block, multiple block, roller, silent or pintle types. For low speeds, simple and multi¬

ple block and pintle chains are most satis¬

factory; for medium speeds, roller chains are used ; for high speeds, silent chains are usually employed. Small sized coil chains are fre¬

quently used for the transmission of hand power. Chains for the conveying of materials are generally of the simple block, roller, de¬

tachable or pintle type, although long pitch, open link coil chains were formerly quite exten¬

sively and are now sometimes used for this work. Chains which convey materials are gen¬

erally equipped with attachments which serve to carry buckets, flights, aprons, etc., which actually do the conveying. Block chains for the conveying of materials are made with pins up to three inches diameter and in pitches up to three feet.

Surveyor's chains are open link chains of peculiar construction. The links are relatively long and the ends, instead of being welded, are joined by means of small circular links. A "chain® consists of 100 links, which aggregate 100 feet in the United States and 66 feet in England.

Although each coir chain link consists of two thicknesses of bar, it must not be presumed that a chain possesses double the strength of a single bar; actually there is a reduction of three-tenths in the strength, due to the forma¬

tion into links, so that the chain has but about seven-tenths of the united strength of two bars of the same diameter of iron. Moreover, as the strength per square inch of a heavy bar is not so great as that of a smaller diameter iron, there is further reduction to be made on this account.

The chain industry is not confined to any one particular country or any one locality. The complete absence of statistics makes it impos¬

sible to even approximate its extent.

Technical data on chains may be found in various standard works on machine design and in the following works: Machinery's Hand¬

book (New York 1914) ; Kent, Mechanical Engineers' Pocket Book (ib. 1916) ; Marks, (Mechanical Engineers' Hand Book (ib. 1916) ; Year Book of the American Society for Testing Materials (New York).

CHAIR, an article of domestic furniture ; a movable seat having four legs, a back and sometimes arms ; usually for the accommoda¬

tion of one person. Chairs were much less common, both with the ancients and in the Middle Ages, than they are in modern times ; hence the reason why chair and cathedra have retained their appanage of state and dignity. We still speak of the chair of justice, and the chair¬

man of a meeting, and cathedra is now most widely known by its derivative cathedral, the name still given to a metropolitan church.

It was not until the 16th century that chairs became at all common. Our knowledge of chairs of antiquity is derived from monuments, sculpture and paintings, and a few examples in the museums. Ancient Egypt developed a splendid type of ebony and ivory, or of carved and gilded wood, covered with costly stuffs, with carved legs of animals or human figures as supports. A chair much of the same type comes from Nineveh. Greek chairs stood up straight; and from the frieze of Parthenon we get the chair of Zeus, a square seat, with a bar back and

thick turned legs, ornamented with sphinxes' heads and the claws of beasts. Char¬

acteristic Roman chairs were of the same type.

The curule chair was like our folding chair, but eventually received a great deal of ornament.

The most famous of all chairs is that of Saint Peter at Rome, which is exhibited only once in a century. It appears to be Byzantine work of the 6th century. It is of wood over¬

laid with carved ivory, representing the labors of Hercules. Another renowned seat is the (Chair of DagoberC in the Louvre. It is of cast bronze, partially gilt, supported on legs terminating in the heads and feet of animals.

For a long time the chair remained the sym¬

bol of honor and power. It appeared in all of the houses of the royalty and nobility. This chair soon acquired a high back and arms, and the lower part was usually filled in, with a panelled or elaborately carved front. The seat was hinged and sometimes closed with a key.

In the Renaissance, chairs became common and less architectural, and from this time on varied with the styles of dress and sizes of houses. They gradually became lighter, and took on a more strictly utilitarian character, becoming smaller and more numerous. After the middle of the 17th century, upholstery began to take the place of the leather seat. The heavy chair of the Tudor period gave way to the slender more elegant form improved by Chip¬

pendale and later by Adam. In France, the chair of the Louis XVI period had an oval back, ample seat, descending arms and round legs. Its seat was covered in tapestry. The Empire brought in low, squat, unattractive but very comfortable chairs.

Some well-known varieties of the present day chair are the Bath Chair,

an invalid's chair on wheels, to be pushed along by an at¬

tendant, so called from its common use in Bath, England; the Folding Chair, having seat, legs and back hinged and jointed so that it can be folded up when not in use; Rocking Chair, a seat mounted on rockers ; Morris Chair, a cushioned seat with a hinged cushioned back which can be inclined at various angles. See Sedan Chair.

CHAIR OF SAINT PETER, The, a relic

at Rome of which the first known mention was made by Ennodius in 500, and a feast in honor of which was instituted or restored by Paul IV

in 1558. It was exposed for public veneration by Pius IX in 1867. It is of wood overlaid with ivory and gold. The name is also used to de¬

note the See of Rome or the office of the papacy, from the tradition that Saint Peter was the first bishop of Rome.

CHAISE, shaz, (1) a two-wheeled carriage for two persons, with a calash top, and usually drawn by one horse. (2) A French gold coin issued by Louis IX in the 13th century. It was equal to about three gold dollars in the United States. It took its name from the rep¬

resentation of the seated king on the face of the coin. Chaises were also coined in England in the reign of Edward III.

CHALCEDON, kal-se'don, a city of an¬

cient Bithynia, opposite Byzantium, at the en¬

trance of the Euxine, about two miles south of 250

the present site of Scutari. Chalcedon is said to have been founded

before Byzantium, about 677 b.c. by a colony from Megara. It flourished in trade and finally joined the Athenian League when the Greek cities freed themselves from Persian rule. The Spartans won it during the Peloponnesian War. It was a flourishing town when it came into possession of the Romans, under the testament of Nicomedes 74 b.c., as included in the kingdom of Bithynia. In the war against Mithridates the Romans had fled to Chalcedon to escape Mithridates, who fol¬

lowed them, destroyed the protection of the port, burned four ships and captured the re¬

mainder. It was captured by Chosroes II of Persia in 616 a.d. after which it was finally destroyed by the Turks, by whom it was taken about 1075.

At Chalcedon in 451, Marcian, the Emperor of the East, held the fourth general council for the purpose of destroying the ascendancy of the Monophysite doctrines obtained in 449 by the influence of the Alexandrian patriarch Dioscuros at the (so-called) robber-synod at Ephe¬

sus ; and define the Christian faith so as to guard its orthodoxy against the Nestorian and Monophysite heresies. The council opened on 8

Nov. 451 under the guidance of Paschasinus, the bishop deputed by Leo I. About 600 bishops, mostly from the East, were present. It deposed Dioscuros, and after violent debates the articles of faith settled by them declared, in opposition to the Monophysites, the belief of two natures in Christ, existing without mixture or change, without division or separation, so that by the union of the two natures in one person and sub¬

stance their distinction is not destroyed, but the characteristics of each are retained. Besides this creed the council promulgated 30 canons against clerical abuses, of which canons the 28th conceded to the See of Constantinople second rights and privileges to the Roman, but Pope Leo I refused to confirm it. Rebellions in Palestine and Egypt were the immediate con¬

sequences of the decrees of the council of Chalcedon against Dioscuros and the Mono¬

physites; and not till after a long period of ecclesiastical contests did

the Chalcedon formula of faith obtain the undisputed authority which it now has in the Catholic, Greek and many Protestant churches.

CHALCEDONY (from Chalcedon, an

ancient Greek town in Asia Minor), a cryp¬

tocrystalline variety of quartz, transparent or translucent, with a waxy lustre, and white, gray, blue, brown or black in color, but commonly of a tint suggestive of diluted milk, marked with veins, circles or spots. It occurs in masses, also very frequently in mammillary, botryoidal and stalactitic forms. It is used for ornament and is often called <(white agate.® There are several varieties, as common chalcedony, chry-soprase, sard and sardonyx.

CHALCEDONYX, the name applied to

those agates in which opaque white chalcedony alternates with the translucent gray variety.

CHALC1S, kal'sis, Greece, town and capital of the island of Negropont or Euboea, at the junction of the Talanta and Egripos channels.

The latter is narrowed to 85 feet at Chalcis by a rock, surmounted by a castle, partly of Ve¬

netian, partly of Turkish, origin. A stone bridge crosses here. The main channel, 120

feet wide, was once crossed by a drawbridge, which has been removed in clearing and widen¬

ing the channel for larger vessels. The modern town is now one of the most attractive in Greece, and consists of an inner walled town and an outer or suburban portion, the walls being the work of the Venetians.

In the inner town the streets are narrow and the houses lofty. Several of the churches were formerly mosques. Ancient Chalcis was one of the greatest of the Ionic cities, carried on a large trade and planted numerous colonies. It had also colonies on the coast of Macedonia and Italy, in Sicily and in the islands of the 2Egean Sea. The Chalcians joined the Boeotians in a war with Athens, in which they were defeated 506 b.c. After the Persian wars Chalcis be¬

came tributary to Athens. The' Chalcians re¬

volted 445 b.c., along with the Eubceans, but were vanquished by Pericles. Another revolt occurred 411 b.c., and Chalcis for a short time became independent. A bridge was at this time built across the Euripus, and fortified, a pas¬

sage sufficient for a single ship being left in the middle. It was subsequently occupied by the Macedonians, and after various vicissitudes fell under the yoke of the Romans. It became a place of great military importance, was nearly nine miles in circumference, and contained several temples, theatres and public buildings.

Chalcis was the birthplace of the orator Isaeus and the poet Lycophron and Aristotle died there. Chalcis joined the Achaeans in their last war with Rome, when the city was taken and destroyed by Mummius. It was afterward

rebuilt, and about the beginning of the Christian era was the chief city of Euboea. It was held by the Venetians from 1210 to 1470, when it was taken by the Turks. Pop. about 10,000.

CHALCIS, kal'sis, FLIES, a family (Chalci -

didee) of parasitic Hymenoptera, allied to the ichneumon flies, and with similar habits. The fore wings are nearly veinless ; the posterior margin of the prothorax not reaching the tegulae; while the ovipositor issues from before the end of the abdomen. The chalcids are gen¬

erally minute, a few almost miscroscopic, most of them black, with metallic reflections. A goodly proportion of them are secondary para¬

sites, that is, are parasitic on other chalcids ; some deposit their eggs in galls. Typical genera are Pteromalus (P . puparum), Semiotellus

and Chalcis. Isosoma hordei is the wheat joint-worm, which is not carnivorous or parasitic in other insects. Our largest chalcid is Leucospis a finis. Aside from the immense benefit these chalcid flies confer on agriculture by destroy¬

ing noxious caterpillars, etc., the fig insect (Blastophaga grossorum) is the agent in en¬

hancing the value and flavor of figs. See Caprification.

CHALCOCITE, kal'ko-sit (XaAnds, <(copper®), a native sulphide of copper having the formula Cu2S. It crystallizes in the orthorhom¬

bic system, and also occurs in massive and granular forms. It has a hardness of from 2.5

to 3, and a specific gravity of from 5.5 to 5.8.

It is opaque and leaden in color, with a metallic lustre. In the United States it occurs in crys¬

tals at Bristol, Conn., massive as the principal copper ore at Butte, Mont., and similarly in many copper mines in Arizona; also in Mexico, Chile and Peru. Beautiful crystals come from CHALCONDYLAS — CHALEUR BAY

Cornwall, England, and one crystal, found in Tuscany, weighs half a pound. It contains 80

per cent of copper and is known also as <(copper-glance,® <(chalcosin® and <(redruthite.®

CHALCONDYLAS, kal-kon'dl-las, Deme¬

trius, Greek grammarian: b. Athens about 1424; d. Milan 1511. He was a pupil of Theodore Gaza, and on the taking of Constantinople by the Turks came to Italy, where he taught the Greek language, was

invited to Florence by Lorenzo di Medici about 1479, and proceeded afterward, on the invitation of Ludovico Sforza, to Milan. He spread the study of the Greek language and literature in the west of Europe, and sent out several celebrated scholars. Among the works edited by him are (Homer } (1488) ; <Isocrates) (1493) and cSuidas) (1499). He also compiled a Greek grammar, which was long in general use as a schoolbook. In his editions of the Greek authors he was somewhat arbi¬

trary in his emendations of the text. His brother Laonicus, after witnessing the fall of Constantinople, followed his brother to Italy.

He is the author of a history of the last years of the Byzantine empire, from 1297 to 1462.

CHALCONDYLAS, Laonicus, Greek his¬

torian : b. Athens ; d. about 1464. He was a brother of Demetrius Chalcondylas (q.v.). He was an ambassador of John VII during the siege of Constantinople, and wrote a (History of the Byzantine Empire 1297-1462. >

CHALCOPYRITE, kal-kd-pi'rit (Gt.Mk6S)

(<copper® pyrites), a native sulphide of copper and iron, having the formulas Cu2S.Fe2S3, and crystallizing in the tetragonal system, com¬

monly with a tetrahedral aspect. Chalcopyrite is brass-like in appearance, and is often tar¬

nished and iridescent. It has a specific gravity of about 4.2, and a hardness of from 3.5 to 4.

It is widely distributed, and in Cornwall, Eng¬

land, it constitutes the chief ore of copper. It occurs in many parts of the United States also.

Owing to the iridescence noted above, it is often called <(peacock ore.® It is softer and deeper in color than ordinary iron pyrites, with which it is sometimes confused.

CHALD7EA, kal-de'a, in ancient geography, the southerly part of Babylonia (q.v.), toward Arabia and the Persian Gulf, lying west of the mouth of the Tigris and Euphrates. The Chaldseans are supposed to have been at first a wandering and predatory race like the Arabs, who afterward became settled, and ultimately gave their name to Babylon and the Babylonian empire. The name Chaldaean was especially applied to a portion of the Babylonian Magi, who were devoted to the pursuit of astronomy and magical science.

CHALDAEAN, kal-de'an, CHRISTIANS,

a branch of the Nestorians, in communion with the Roman Catholic Church. The patriarch is directly subject to the Propaganda, is an arch¬

bishop, and the priests, who are very poor, number 108. In all essentials of doctrine and morals the Chaldaean Christians are in perfect conformity to the Catholic Church, but the clergy are permitted to marry before taking the higher orders, and not a few customs and rites of the Nestorians are found among them. About 40 monks in the monastery of Mar Jurgis follow the rule of Saint Anthony. In 1826 the Chal¬

daean Christians numbered 120,000, but in con¬

sequence of wars, famines and Kurdish cruelty, the present population is about 40,000.

CHALDEAN MS., The, a skit at the ex¬

pense of the publisher Constable, and of the Edinburgh notables specially interested in the Whig Edinburgh Review; prepared by the

editors for the seventh number of the new Tory Blackwood's Magazine, October 1817. In form it was a biblical narrative in four chapters, attacking Constable, and was perpetrated by James Hogg, the ((Ettrick Shepherd,® whose original paper was greatly enlarged and modi¬

fied by Wilson ((<Christopher North®) and Lockhart.

CHALDEE, kal'de, LANGUAGE, a form

or dialect of the Babylonian and also of the Aramean, one of the three principal varieties of the ancient Semitic. The region called in Scripture Aram may be described generally as occupying the northern and northeastern divi¬

sions of that corner of Asia which was the home of the Semitic languages. It was

bounded on the north by the Taurus Range and the river Tigris, which latter also formed its eastern boundary; on the west by the Mediter¬

ranean and Mount Lebanon ; and on the south by Palestine and the Arabian desert. The Ara¬

mean language was very extensively known, not only within the limits above mentioned, but beyond them. The princes of Judea and As¬

syria were familiar with it ; it was spoken in the palace of Nebuchadnezzar, and even formed the medium of communication between the Persian court and its subjects in Judea and Samaria. It may also lay claim to a high an¬

tiquity, being probably the language of Abraham previous to his migration into Palestine, and certainly of his grand-nephew Laban. Un¬

fortunately the older monuments of the lan¬

guage have perished, the Chaldee portions of Daniel and Ezra being the earliest specimens we possess of a language which had probably existed and flourished at least 2,000 years be¬

fore. There is another dialect of the Aramean besides the Chaldee, namely, the Syriac, and in this as well as in the Chaldee numerous writ¬

ings are still extant, but they are all of com¬

paratively recent date. The Chaldee literature is usually arranged in two divisions : the bibli¬

cal Chaldee, or those portions of the Old Tes¬

tament which are written in Chaldee, namely, Daniel from ii, 4 to vii, 28; Ezra iv, 8 to vi, 18

and vii, 12-26; and Jeremiah x, 11; and the Chaldee of the Targums and other later Jewish writings. The former is distinguished by a closer approach to the Hebrew idiom, and is therefore considered less pure than the Chaldee of the Targum of Onkelos, the oldest and most valuable of the Targums. Consult Brinton, (Protohistoric Ethnography of Western Asia) (Philadelphia 1895) ; Delattre, <(Les Chaldeens®

in (Revue des questions historiques) (Paris 1896) ; Meyer, Edward, (Geschichte des Alter-tums) (3d ed., Leipzig 1913); Winckler, (Untersuchungen zur altorientalischen Geschichte5

(Leipzig 1889).

CHALET, sha-la («a little castle®), the wooden hut of the Swiss mountain herdsman; a French-Swiss name, which is also extended to Swiss houses generally, as well as to ornate and picturesque villas built in similar style.

CHALEUR BAY, sha-ler, or BAY OF

CHALEURS, an inlet or arm of the sea in the 252

Gulf of Saint Lawrence, between Quebec and New Brunswick. It is about 85 miles in length from east to west and has a maximum width of over 20 miles. Its depth is 250 feet. The French fleet was here defeated by the British in 1760. There are a number of islands in this bay, notably Shippegan, near its mouth. The navigation is good and the mackerel fishery is important.

CHALICE. The ecclesiastical cup in which the consecrated wine is

administered at the ceremony of sacrament. The early Christians used plain glass chalices at first, tfien they be¬

came decorated with goldleaf. Wood is said by some to have been the very first material used. With the advance from severe poverty the Church made the vessel in successive stages from horn, then ivory, and, with wealth at dis¬

posal, the precious metals were utilized ; bone chalices were used in Germany, which material was forbidden in 787. Chalices were classified 1. 1st Century Chalice, Primitive Form, in Monastery of Kremensmunster. 2. Sepulchral Cup (1084). Munster Brass, Unornamented. 3. Ministerial Chalice with Handles.

4. Three Gothic Chalices, 14th Century, So. Ken. Museum.

5. Saint Remigius Cup. Late Romanesque. 6. Post Re¬

formation Chalice with Paten Covers (1) 1563-64; (2) Early 18th Century; (3) Recent.

by the clergy as ministeriales (used for dis¬

tributing the wine), offertorii (used by the deacons for offering the wine to the faithful), majores and minores (according to their re¬

spective sizes). The first of these usually had handles (calices ansati), as they were very large and heavy. The ecclesiastical chalice is made up of three parts: the cup or bowl; the stem with its middle swelled into a bulb or other kind of protuberance (termed a knop) to hinder its slipping when held ; and the foot.

In very early times the paten wras considered as an integral part in the term chalice.

The first form of chalice would appear to have been the Grecian cantharus shape, if we notice the altar depictions of the 6th to 9th century. Next appeared a similar form to that of the present day, but much larger. An ex¬

ample of the great size some of these ancient altarpieces attained is shown in the statement that Charlemagne (742-814) presented Saint Peter's at Rome with a pure gold chalice weigh¬

ing 53 pounds. They became smaller after the 12th century, losing their handles and the bowl becoming conical or semi-ovoid. The distri¬

bution of the wine from the large chalices was made through the medium of a small pipe (fistula or calamus) of gold, silver or ivory, and which was furnished with one or several handles. Examples of these are still extant.

Chalices may also be divided into the following classes : Pontifical handsome chalices for use on festive occasions ; those used at common mass ; traveling chalices for visiting distant places —usually small and frequently in parts that could be separated and packed in a small compass ; funeral chalices, generally of lead or other com¬

mon metal for burial with bishops. Cripps (noted authority) divides chalices into their respective periods thus:- (1) Norman type (circa 1170-1350), with circular feet. (2) Gothic type (circa 1350-1510), writh hexagonal feet; bowls conical at first, then less so. From 1490-1510, feet with toes. (3) Tudor type (circa 1 510—36), with six-lobed and flowing feet; bowls often less conical. From 1525 to 1536, bowls nearly hemispherical ; feet with flowing outline.

Octavius Morgan tells us the feet were made out of the round (usually hexagonal) to prevent the chalice from rolling when laid upon its side to drain. Fine enamel and chased work usually appear on the knop, stem and foot, frequently representing emblems of the Passion or other sacred subjects. The bowl is, generally, quite plain and highly polished, so as to be easily kept clean. A cross also appeared on one side, which the officiating priest kept facing him. A fair impression of the prevailing chalice forms in the different periods (includ¬

ing the heavy post-Reformation vessels) can be gained from the accompanying outlines.

Bibliography. — Buck, John Henry, (01d

Plate5 (The Gorham Co., New York 1903) ; Cripps, Wilfred Joseph,

(01d English Plate) (London 1901) ; Hope, W. H. St. John, and Fallow, T. M., (English Chalices and Patens5

(in Archceological Journal , 1887) ; Jackson, Charles James, (An Illustrated History of Eng¬

lish Plate, Ecclesiastical and Secular) (2 vols., London 1911) ; Jones, E. Alfred, (01d Silver of the American Churches5 (Letchworth, Eng., 1912) ; 'Illustrated Catalogue of the Collection of Old Plate of J. P. Morgan5 (London 1907), and JThe Old Silver Sacramental Vessels of Foreign Churches in England5.

Clement W. Coumbe.

CHALICOTHERE, a mammal of the ex¬

tinct, ancylopod family, Chalicotheriidce, fossil in various parts of the northern hemisphere from the Eocene Epoch onward; the type dis¬

appeared toward the close of the Miocene Epoch in America and in Europe, but persisted in southern Asia, at least, into Pleistocene. Among the better known genera are Pernatheruim, Moropus-, Macrotherium, Chalicotherium and Ancylotherium. They were small, deerlike, forest-dwelling animals, perhaps resembling ponies in form, and with teeth of a hoofed

animal but long-burrowing claws like those of a rodent. Scott ((Land Mammals in the Western Hemisphere, > New York 1913) says: ((Moropus, the lower Miocene genus (of North America) was as grotesque a creature as could well be imagined… . With rather a small and some¬

what horse-like head, long neck, long fore limbs and shorter hind limbs, three-toed feet, which were armed with enormous claws.® The prob¬

lem of their habits and mode of life is still un¬

solved, but it is inferred that they fed chiefly on leaves.

CHALIER, Joseph, French revolutionist:

b. Lyons 1747 ; d. there 1793. Educated for the Church, instead, he engaged in business, and as traveler for a Lyons firm visited Spain, Por¬

tugal and Italy. At the outbreak of the French Revolution in 1789, he was in Paris and associ¬

ated with Robespierre, Marat and Desmoulins.

Returning to Lyons he became the first member of the municipal bureau, and led in the civic reorganization that ensued, his administration being approved when assailed in the Legislative Assembly. Defeated by a royalist in an election for mayor of Lyons in 1792, Chalier became a leader of the local Jacobins, and in 1793 pre¬

cipitated a conflict which ended in his arrest and his execution, notwithstanding stay proceedings of the Convention, his memory as (<a martyr of liberty® surviving. Consult Wahl, N., (Les Pre¬

mieres Annees de la Revolution a Lyon) (Paris 1894).

CHALK. In geology chalk is a soft, friable, finely granular variety of limestone or car¬

bonate of lime, and may in color range from pure white to grayish or buff. It is a marine deposit, composed principally of the shells of ioraminifera. In the United States are some great beds of chalk of Upper Cretaceous Age.

One is exposed for 250 miles from Austin to Sherman, Tex., and is nowhere much less than 600 feet thick. Chalk beds of the same age, Colorado stage, are found in Arkansas, Kansas and in Montana, while the great chalk belt of Texas extends southwest from Austin into Mexico, being found in the states of Chihuahua, Coahuila and Tamaulipas. In Arkansas and Texas this chalk formation and its associated chalky marls is being developed as furnishing excellent material for making Portlant cement.

No statistics of the amount thus used at present are available. In England the Upper Cretaceous series is marked by great beds of chalk and chalky limestones, and includes the Cenomanian, Turomain and Senonian stages. Such strata extend across England from Flambo rough Head on the east coast to west of Dover on the south coast. The chalk-mining industry of England is of importance, the total amount of chalk pro¬

duced being about 4,500,000 tons annually. Part was used for cement-making and part for mak¬

ing refined chalk. When freed from grit by washing, it is called whiting, and is used for cleaning silver and making putty. When mixed with some binding substance it is used as a marking material. It is also used in farming to improve the texture of the soil. When puri¬

fied it is also used to allay acidity of the stomach. (See Cement; Cretaceous System; Lime.) Consult HJnited States Geological Sur¬

vey Report, 1900-01, > Part III; (The Chalk of Northwestern Arkansas. >

CHALK, Red, or REDDLE, a red,

amorphous variety of hematite or sesquioxide of iron, containing much clay. To this fact it owes its firm, compact texture. It has an ochre-red color and is used chiefly by carpenters for making marks on wood, and by tailors for marking on cloth; the finer, by painters. It occurs in thin beds in clay-slate and gray wacke-slate in parts of Germany.

CHALKLEY, chak'll, Thomas, American

Quaker itinerant preacher: b. London, 3 March 1675; d. Tortola, West Indies, 4 Sept. 1741. He spent his life preaching in New England and the Southern colonies ; toward its end he made his home near Philadelphia. His chief work was his (Life, Labors and Travels,) whose quaintness made it popular even outside the Society of Friends, and has caused it to be several times reprinted.

CHALLEMEL-LACOUR, shal-mel-la—

koor, Paul Armand, French statesman: b.

Avranches, 19 May 1827; d. Paris, 26 Oct. 1896.

He was graduated at the Lcole Normale in 1849, became a professor in the schools of Pan and Limoges, and soon fell under the ban of political proscription. He withdrew to Belgium and then to Switzerland, where he became a teacher of French literature at Zurich. He con¬

tributed largely to the Revues on his return to France in 1859, and after peace was reinstated gained the entire confidence of the Republic.

He was elected to the French Chambers, how¬

ever, and served the Republic as senator, Am¬

bassador to Switzerland from 1874 to 1879, Am¬

bassador to England from 1880 to 1882, Min¬

ister of Foreign Affairs and president of the Senate in 1888. He was elected to the French Academy in 1893.

CHALLENGE, originally, an accusation,

charge or claim. A challenge to jurors is an objection either to the whole panel or array, that is, the whole body of jurors returned, or to the polls, that is, to the jurors individually; and it is either peremptory, that is, without assigning any reason, or for cause assigned. A peremptory challenge is allowed to be made only by the party accused, and not by the gov¬

ernment or prosecuting officer, and only in cap¬

ital cases; and is said to be permitted on the ground that a man is liable to conceive a prej¬

udice against another from his mere looks and appearance, for which he can give no reason : and such may be the case of the accused; and it is conceded, in favor of life, that in stich case he may exclude the juror without assign¬

ing any reason ; and also on the ground that, by questioning a juror as to any objection to him, his prejudice may be excited thereby against the prisoner, who, to save himself from the effect of such prejudice, is permitted to have him rejected. The ground on which peremp¬

tory challenge is allowed supposes the prison¬

er's life to be in danger, and he is not entitled to it if he pleads in bar or abatement, for the trial of these pleas does not decide on his life.

He must, before making such challenge, plead (<not guilty,® or some plea the trial of which decides on his life. Having pleaded such a plea, the accused might, by the common law, peremptorily challenge 35 jurors; but the stat¬

ute 22 Hen. VIII c. 14 limited the number to 20 in felony. The regulating statute now in force in Great Britain is 6 Geo. IV c. 1. By the law of the United States a peremptory chal¬

lenge of 35 jurors is allowed in trials for trea,-

son, and 20 in those cases of felony mentioned in the statute. A challenge of the whole panel may he made because the jury is illegally drawn or summoned, whereby it is not a legal jury; and a challenge of this description may be made by the government as well as by the prisoner. Challenge to the polls may be made both in civil and criminal suits for cause, as that the juror is an alien, not from the proper district, not duly qualified as a freeholder, not of suitable age, etc., or is near of kin to one of the parties, is biased, has been guilty of felony, is interested, or is subject to any other exception, according to the common principles of proceeding or the provisions of any statute on the subject. In courts-martial a prisoner who objects to either of the judges must assign his reasons. In other words peremptory chal¬

lenges are not allowed in these courts. The privilege of challenging here belongs equally to the prisoner and the prosecutor. The right of

challenging the member of a court-martial prevails on the continent of Europe, as well as in England and America.

A challenge to fight a duel is punishable in England with fine and imprisonment. The tendency of modern statutes in the United States is to subject all persons connected with a challenge to serve criminal punishment, and to declare their ineligibility to any public office, either for life or for a limited term. See Duel.

CHALLENGER EXPEDITION, an ex¬

pedition conducted in 1872-76, under the auspices of the British government, for the purpose of exploring the open ocean. The Challenger was fitted with everything that could be carried in the way of appliances for scientific research, and placed in command of Captain Nares. Prof. Wyville Thomson and scientific staff conducted the investigations and determined the depth of waters, the configura¬

tion and conditions of sea-floor, the fauna, the currents, atmospheric conditions, *etc.* During the three and a half years they covered nearly 70,000 nautical miles. The route was south to Madeira, thence to the Canaries, the West Indies and north as far as Nova Scotia; south again to Cape Verde, then to Cape of Good Hope, Australia, the China Sea, Japan, the west coast of South America, through the Straits of Magellan and back to England. The narrative of the expedition is told in popular form in Moseley's (A Naturalist on the Chal¬

lenger. } A complete account of the scientific results was gradually published in 50 splendid volumes, by Wyville Thomson and Dr. John Murray.

CHALLIS, James, English astronomer : b.

Braintree, Essex, 12 Dec. 1803; d. Cambridge, 3 Dec. 1882. In 1836 he was elected Plumian professor of astronomy at Cambridge and director of the observatory. In 1861 he was succeeded in the latter position by Adams, but letained the professorship of astronomy till his death. He is best known for his work upon the theory of astronomical instruments, and for his observations in connection with the dis¬

covery of the planet Neptune. His inventions include the collimating eyepiece, the transit reducer and the meteoroscope. He contributed about 225. essays to publications and in addition several independent works on astronomy,

mathematic? and physics.

CHALLONER, Richard, English Roman

Catholic bishop: b. Lewes, England, 29 Sept.

1691; d. London, 12 Jan. 1781. His parents were Protestant dissenters from the established religion of England. After the death of his father young Challoner came under other in¬

fluences and was received into the Catholic Church. At the age of 13 years he entered the English college at Douai in France and there, after completing his studies, was ordained priest and appointed professor of divinity. He remained in this station till 1730, when he was sent on the English mission with London as his field. He wrote many controversial tractates and many devotional manuals. Among his

writings is (The Catholic Christian Instructed, ‘

a sort of advance catechism of the Roman Catholic faith, in the preface to which he made an ingenious and spirited reply to Dr. Mid¬

dleton’s famous Getter from Rome, Showing an Exact Conformity Between Popery and

Paganism.’ Middleton, smarting from the

keenness of Challoner’s controversial weapons, invoked against his adversary the penalties pre¬

scribed by the penal laws enacted for the ex¬

termination of the Roman Catholic religion.

In 1741 Challoner was consecrated bishop and made coadjutor to the bishop in charge of the (<London District,” for the assumption of a see-title in England by a Roman Catholic bishop was a penal offense. Besides the work already mentioned, Challoner wrote the de¬

votional work, Garden of the Soul,' which is still in general use among Roman Catholics as a prayer-book. He wrote also, in two volumes, (Memoirs of Missionary priests and Other Catholics of both Sexes Who Suffered Death or Imprisonment in England on Account of Their Religion, from the Year 1577 till the End of the Reign of Charles IP ; also (Britannia Sancta,' lives of English, Scotch and Irish saints. He revised the Douai-Rheims English version of the Old and New Testaments, im¬

proving and modernizing the style. For his Gife,' consult Barnard (1784) and Burton (London 1909).

CHALMERS, Alexander, Scottish journal¬

ist, editor and miscellaneous writer : b. Aber¬

deen, 29 March 1759; d. London, 10 Dec. 1834.

His father was the founder of the first Aber¬

deen newspaper. He received a good classical and medical education in his native city. About 1777 Chalmers went to London, and was em¬

ployed as a contributor to the Saint James '

Chronicle, the Morning Chronicle, the Morning Herald and various critical magazines and re¬

views. He edited numerous editions of the English classics, particularly the (British Es¬

sayist' (45 vols., 12mo, 1803), commencing with the (Tatler,' and ending with the (Observer,'

together with prefaces, histories and biog¬

raphies; the spectator' ; (Tatler' ; and Guard¬

ian' (12 vols., 8vo, 1822) ; an edition of Shakes¬

peare, with historical and explanatory notes, in 1809; (The English Poets from Chaucer to Cowper,'. with Johnson's Gives,' and addi¬

tional Gives' by Chalmers (21 vols., royal 8vo, 1810). The most important and valuable of Chalmers' extensive literary labors,

however, was the General Biographical Dictionary' (32

vols., 8vo, 1812-17), the fullest body of bio¬

graphical information published up to his time in England, and which has rendered invaluable service to subsequent compilers.

CHALMERS, George, Scottish antiquary :

b. Fochabers, Elginshire, 1742; d. 31 May 1825.

Having studied law at Edinburgh, he removed to America in 1763, where he practised that profession for upward of 10 years, till the colonies declared themselves independent.

Chalmers, being a keen Loyalist, returned to Great Britain, where he was in 1786 appointed to the office of clerk of the Board of Trade.

Previous to his appointment he had published 4 Political Annals of the United Colonies'

(1780) ; (Estimate of the Comparative Strength of Great Britain During the Present and Four Preceding Reigns' (1782) ; and (Opinions on Interesting Subjects of Public Law and Com¬

mercial Policy, Arising from American Independence) (1784). In 1790 he published a biography of Daniel Defoe; in 1794 a biog¬

raphy of Thomas Ruddiman ; in 1800 he

edited the works of Allan Ramsay, with an elaborate memoir of the poet ; in 1805 the works of Sir James Stewart of Coltness, also with a life prefixed; and in 1806 the writings of Sir David Lindsay of the Mount. The first volume of his <Caledonia) (1807), in quarto, displayed a vast extent of erudition and re¬

search. It professes to be an account, his¬

torical and topographical, of North Britain, from the most ancient to the present times; and the original intention of the author was, that it should be completed in four volumes 4to, each containing nearly 1,000 pages.

Chalmers left the remainder of his great work nearly ready for the press ; and it was subse¬

quently published complete, with numerous an¬

notations. He also wrote a (Chronological Account of Commerce and Coinage in Great Britain) (1810). Throughout he displays pro¬

found research into the history of Scotland and is still considered authoritative.

CHALMERS, George Paul, Scottish

painter: b. Montrose 1836; d. Edinburgh, 28

Feb. 1878. After serving in succession under a surgeon and a ship chandler, he went to Edinburgh in 1853 in order to become an artist.

He was elected an associate of the Royal Scot¬

tish Academy in 1867, and four years later was elected to full membership. His pictures, which are characterized by rich coloring, consist mainly of portraits and subjects, though dur¬

ing his later years he produced several land¬

scapes. The most important are the (Favorite Air> (1864); ‘End of the Harvest’ (1873); (Running Water’ (1875) ; ‘Threescore Years and Ten) (1875) ; ‘Prayer’ (1876) ; (Knitting) (1876) ; and ‘The Legend) (unfinished). Con¬

sult his biography by Pinnington (Glasgow 1897) ; and Caw, ‘Scottish Painting’ (Edin¬

burgh 1908).

CHALMERS, James, Scottish missionary:

b. Ardrishaig, Argyll, 1841 ; d. Goaribari Island, 8 April 1901. After early mission service in Glasgow, he was accepted by the London Missionary Society and was appointed in 1866 to Raraborya in the South Pacific where the natives named him “Tamate” the “well known.® After 10 years’ enthusiastic mis¬

sionary work he was transferred to New Guinea. In 1901, with a brother missionary, Rev. Oliver Tompkins, he was killed by canni¬

bals at Goaribari Island. His character and work were the source of cordial appreciation on the part of R. L. Stevenson. Consult Lovett, R., lamate: Autobiography and Letters of James Chalmers’ (1902).

CHALMERS, Thomas, Scottish theolo¬

gian : b. Anstruther Easter, Fifeshire, 17 March 1780; d. Edinburgh, 30 May 1847. At the age of 12 he was sent to the University of Saint Andrews, for the purpose of studying for the Church, and after passing through a curriculum there seven years, was licensed as a preacher in July 1799, the rule of the Scottish Church re¬

quiring that a licentiate shall have reached the age of 21 being dispensed with in his case, in virtue of the exceptional clause in favor of those possessing “rare and singular qualities.®

In May 1803 he was presented to the parish of Kilmany, in the northeast of Fifeshire, and opened classes of his own for teaching mathe¬

matics in the town of Saint Andrews. These were so successful that he commenced a class in chemistry also, his lectures on and demon¬

strations in which created quite a sensation.

About this time his views as to the obligations of a Christian pastor were very different from what he was subsequently led to entertain, and he deemed it a sufficient fulfilment of these to return to Kilmany on the Saturday evenings, and from thence back to Saint Andrews on the Monday mornings, devoting the bulk of his time to scientific pursuits. In 1808 he pub¬

lished an ‘Inquiry into the Extent and Stability of National Resources,’

the object of which was to show that the Berlin decree would not touch the real foundations of the prosperity of Great Britain. Illness and bereavement among other causes led in 1810 to a spiritual revitalizing of his own life, and from this time may be dated his extraordinary hold on the moral and religious life of Scotland.

In 1813 his article on Christianity appeared in the Edinburgh 'Encyclopaedia,' and shortly afterward his review of Cuvier's 'Essay on the Theory of the Earth,' in the Christian In¬

structor. In this last he propounded the inter¬

pretation of the first verses of Genesis, after¬

ward adopted by Dr. Buckland, with a view to make the truths of revelation and the discov¬

eries of geological science harmonize. His fame as a preacher had by this time extended itself throughout Scotland, and a vacancy hav¬

ing occurred in the Tron Church of Glasgow, he was elected to the charge by the town coun¬

cil, and inducted on 21 July 1815. In the month of November following he commenced his

series of astronomical discourses, in accord¬

ance with a custom observed in Glasgow, of the city ministers delivering in rotation a course of sermons in the Tron Church on Thursdays. These created a sensation such as no sermons had ever before produced in Glas¬

gow. It is related, that when the hour of de¬

livering them arrived, merchants and men of business would regularly leave their desks and proceed to the Tron Church, while the more liberal among them would, in addition, grant a similar indulgence to their clerks and assistants.

In the commencement of 1817 these discourses were published, and attained a sale of nearly 20,000 copies by the end of the year. They raised their author to the position of the first preacher of the day, and in a visit which he shortly afterward paid to London, the most

distinguished literati and statesmen crowded to listen to the wondrous oratory of the Scot¬

tish divine

The main .object which engaged Chalmers on his arrival in Glasgow was the reorganiza¬

tion of the parochial system, so as to provide a machinery by which the destitute and outcast might be visited and reclaimed, and the young instructed in the lessons and duties of religion.

Especial efforts were directed toward the es¬

tablishment of Sabbath-schools. Great exer¬

tions were also made by him to get new churches erected throughout Glasgow, the poor church accommodation providing for

scarcely a third of the inhabitants. In this he ultimately succeeded, and in addition, a new parish and church (Saint John's) were erected and endowed expressly for himself by the town council of Glasgow. To this he was in 1819 transferred from the Tron. In this charge he had as his assistant for two years Edward Irving (q.v.). The fatigues, however, which unremitting attention to parochial affairs in¬

volved were becoming too much for his health, and on the vacant chair of moral philosophy, in the University of Saint Andrews, being offered to him, he accepted it (1823).

In 1828 the divinity chair in the University of Edinburgh became vacant, and Chalmers was unanimously elected to it by the town council. This appointment he held till the dis¬

ruption of the Scottish Church in 1843. In 1832 he published his (

Political Economy,* and shortly afterward appeared his contribution to the celebrated Bridgewater Treatises, (On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man.* In 1834 he was elected a corresponding member of the Royal Institute of France. An important matter which now largely engaged his atten¬

tion was the subject of church extension, which he had zealously advocated from the days of his ministry in Glasgow. But Lord Mel¬

bourne's government was little disposed to aid the Church of Scotland on this occasion, and it was consequently obliged to carry out its scheme on the voluntary principle. Amid the various public movements with which Chal¬

mers' name stands connected, there is none in which it more prominently occurs than in re¬

lation to the great non-intrusion movement in the Scottish Church. Throughout the whole of this memorable controversy, from the pass¬

ing of the veto law by the General Assembly to the Disruption in 1843, he acted as the leader of the Evangelical party in their strug¬

gles with the civil power, and may be regarded as the founder of the Free Church, of the first assembly of which he was moderator. He was also the originator of the sustentation fund, out of which the ministers of that body are principally supported. Having vacated at the Disruption his professorial chair in the Edin¬

burgh University, he was appointed, on the establishment of a new college in connection with the Free Church, to the offices of principal and primarius professor of divinity in that institution. The energy which made Chalmers remarkable as an orator was infused into all his practical undertakings ; and the social and religious movements which he inaugurated left their mark far beyond the bounds of his own country. His published works are very numerous embracing sermons, tracts, essays, works on political economy, the parochial sys¬

tem, church establishments, *etc.* They exhibit the same energy of conviction, together with a breadth and profundity of view, which, though many of his theories have not been accepted by other thinkers, will always make them a rich mine of suggestion and instruction to inquirers into the complicated relations of human society.

Consult (Lives, } by Hanna (1849-52) ; Fraser (1881); Mrs. Oliphant (1893); Blaikie (1897).

See Free Church of Scotland.

CHAlONS-SUR-MARNE, sha-lon siir

marn, France, a city and capital of the depart¬

ment of Marne (Champagne), 107 miles east of Paris. It lies principally on the right bank of the Marne, here crossed by a stone bridge of three arches, built in 1787. Low walls now supply the place of the old ramparts, the en¬

trance being by six gates, which open to six main roads. The principal public buildings are the cathedral of Saint Etienne, destroyed by fire in the 13th century, and restored by Louis XIV; the church of Notre Dame, of the 12th and 13th centuries, and now restored; the Hotel de Ville, built in 1772; the Hotel de la Prefecture, built in 1764, one of the finest build¬

ings of the kind in France ; public library, mus¬

eum, hospital, *etc.* There is a promenade, occupy¬

ing about 18 acres, formerly planted with superb elm trees, which the Germans cut down for fuel during the Franco-Prussian War. Chalons is the seat of a bishopric, and of one of the schools of arts trades, where 300 pupils are maintained and instructed at the public ex¬

pense. There are manufactures of woolen and cotton goods ; cotton mills, tanneries, *etc.*

Chalons was fortified and embellished by the Romans. Christianity was preached here

about the year 250. On the plains between Chalons and Troyes Attila suffered defeat in 45L From the 10th century it formed a kind of independent state, governed by its bishops, till 1360, when it was united to the Crown. A celebrated camp was established by Napoleon III in 1856, at the distance of about 18 miles from Chalons, for the purpose of training the French troops. In 1870 the town was occupied by the Germans after MacMahon's withdrawal, Pop. of commune 31,367.

town of northeastern France, in the department of Saone-et-Loir, 81 miles north of Lyons. It is situated on the Saone, here crossed by a bridge of five arches, communicating with the suburb of Saint Laurent. It is irregularly built, and is surrounded by a wall and the re¬

mains of_ ancient fortifications. The public buildings include the church of Saint Vincent, built in 1386-1440; a bishop's palace of the 15th century; an extensive library, a gallery of painting, *etc.* Chalon is the seat of a tribunal of first resort and of commerce, and has a communal college. A branch of the celebrated Creusot ordnance and engineering works is here established, and it is the second industrial city of Burgundy. There are also dyeworks, manufactories of leather, cloth, glass, etc., and a considerable trade in grain, flour and wines.

The Saone becomes navigable for steamboats here, and there is steamer connection with Lyons. Caesar had grain magazines at Chalon, and it became the capital of Burgundy under Gontran. In 1273 Edward I of England, being invited to a tournament here on his return from Palestine, attended with 1,000 men-atarms; and some disputes having arisen, the

English attacked the French, killed a great number and left the tilting-ground strewed with the dead. This event is known as <(the little war of Chalon.® The town suffered con¬

siderably from the civil wars of the 15th and 16th centuries, and from the invasion of the allies in 1814. Pop. of commune 31,550.

CHALYBEATE, ka-llb'e-at, WATERS,

those which contain salts of iron in sufficient quantity to give them a special value in the treatment of cases of anaemia, *etc.* Iron or steel waters are not the only mineral waters in which some form of iron is found. Indeed in nearly all this ingredient exists, but in very many in

such small quantity, while other in¬

gredients are so conspicuous, that the character of the water can hardly be supposed to be af¬

fected by that metal. Those springs most suc¬

cessfully resorted to contain from one-third to nine-tenths of a grain of iron, in the form of carbonate, in 16 ounces. Some springs are classed as iron springs which contain barely one-fifth of a grain in 16 ounces of water. What are called pure iron springs are those which contain but a few grains of dissolved solids, a salt of iron existing to some appreciable amount ; compound iron springs contain mod¬

erate quantities of other salts, such as Epsom and Glauber's salts, common salt, sulphate of lime, besides being rich in carbonic acid gas.

The reason for the use of iron waters is that iron is a necessary ingredient of the blood, and in certain conditions promotes the formation of blood. Small doses only should be employed, as excess may irritate the stomach and bowels and produce constipation. It has been found that iron springs are most useful in cases of poverty of blood quickly produced, for ex¬

ample, by loss of blood by bleeding from the nose, or from wounds; by drain occurring from the blood, owing to diarrhoea, suppuration and other profuse discharges; in cases of chlorosis in young girls ; and in poverty of blood depend¬

ent on acute disease, in which cases they ma¬

terially promote convalescence. Iron springs are also used in disorders of menstruation, espe¬

cially in its suppression; in malarious conditions and poverty of blood due to residence in tropi¬

cal countries; and in neuralgia, sterility and impotency due to enfeebled conditions of gen¬

eral health. In such cases as these last the improvement is not so rapid, and is often best promoted by waters which, besides the iron, contain marked quantities of other ingredients, like common salt. It is chiefly in the form of carbonate that the iron exists, and this is the best form for administration. The presence of carbonic acid gas in the water keeps the car¬

bonate of iron in solution, and when the water stands a yellowish rust is deposited. Iron springs are used for bathing, but it is not now believed that the iron produces any effect on the skin or is absorbed from the bath. Among the chief chalybeate springs are those at Sara¬

toga, N. Y. ; two at Harrogate, England, called the Muspratt and the Tewitt, the latter pure; a pure one at Tunbridge Wells; several at Bath; one at Bocklet, near the salt spring of Kis-singen, containing much common salt and car¬

bonic acid gas; those of Antogast, Freiersbach, Griesbach, Petersthal and Rippoldsau,* in the Black Forest region, at altitudes of from 1,280

to 1,886 feet; one at Orrezza, in Corsica, with much carbon dioxide and traces of arsenic; vol. 6 — 17

many at Spa ; one at Saint Moritz, Switzerland, situated at an elevation of 5,710 feet; one at Santa Catarina, Italy, three miles from Bormio, at a height of 5,600 feet; several very popular pure ones at Schwalbach in Nassau; one at Pyrmont, Waldeck; and one at Cheltenham, with a very high proportion of iron carbonate.

CHALYBITE, kal'i-bit, or SIDERITE, a

common iron pre. It is iron protocarbonate, FeCCh, containing 48.2 per cent of metallic iron, It occurs in rhombohedral crystals, also betry-oidal, globular, compact or earthy, but most commonly cleavable-massive. Its hardness is 3.5 to 4, but in the siliceous variety, clay iron stone, found in many coal formations, it some¬

times runs up to 7. Its specific gravity is about 3.85, lustre vitreous to pearly, color usually brown or yellowish-gray. It is generally nearly opaque. It occurs in enormous quantities in Austria, also at Roxbury, Conn. It is a fre¬

quent associate of silver, lead and copper ores.

Clay iron-stone is considered the most import¬

ant iron ore of England.

CHAM, shan (pseudonym of Amedee de

Noe), French caricaturist: b. Paris, 26 Jan.

1819; d. 6 Sept. 1879. He adopted the name Cham (Ham) as one of the sons of Noah, his father being M. de Noe (Noah). The son of a peer of France, he attended the polytechnic school ; but following his artistic inclinations, became a pupil of Delaroche and Charlet, and acquired distinction as a caricaturist by his spirited and humorous contributions to the Paris Charivari and by the publication of several collections of caricatures, among the best of which are (Annees comiques) (1880) ; (Les folies parisiennes) (1883).

CHAMA, ka'ma, a genus of bivalve mollusks, the typical one of the family Chamidce.

The shell has foliaceous valves, the upper one the smaller, one valve attached to another body by the left umbo; the hinge tooth of the free valve is received between two teeth of the other.

The chamas are found less than 50 fathoms deep in tropical seas, especially among coral reefs. Fifty recent species are known, and 40

fossil, the latter from the Cretaceous onward.

The still existing Chama gigas sometimes weighs 300 pounds, and may measure four feet across. The byssus by which it adheres to the rock is so tough that a hatchet is required to cut it through. One valve is sometimes used in churches as a baptismal font.

CHAMˆEROPS, ka-me'rops, a genus of

palms established by Linnaeus, and remarkable as containing the species of the palm family found at the greatest distance from the equator.

It is characterized by its flabelliform leaves, polygamous and sometimes dioecious flowers, and its three-sided monospermous drupes. C.

humilis is the only palm native of Europe. It is confined, however, to

its hottest parts, and even there is generally only from four to five feet high. Its trunk, from five to six inches in diameter, is closely covered with triangular hard scales, the bases of the old leaves; the new leaves grow in a tuft at the top. Some¬

times the stem does not appear at all ; and the leaves, apparently issuing from the ground in the form of a large fan, have procured for the plant the name of the fan-palm. In hot¬

houses the stem attains the height of 15 feet or more. The leaves are used for thatch and 258

other purposes, and they furnish a large quan¬

tity of fibre, which forms an article of com¬

merce and yields a material that may be used instead of horsehair.

CHAMALARI, cha-ma-la’re, or CHAMAL—

HARI, a peak of the Himalaya Mountains, at the western extremity of the boundary line be¬

tween Bhutan and Tibet. Height 23,929 feet.

CHAMBA, British India, a state of the

Punjab district, north of the districts of Kangra and Gurdaspur and in the Lahore division of North India, area, 3,216 square miles. It is a mountainous tract, shut in on almost every side and traversed by two hill-ranges. The crops consist of all kinds of grain and the supply of iron and slate is plentiful. The sanitarium of Dalhousie is in this district. The annual revenue is about $170,000. Pop. 135,873.

CHAMBAL, chum’bul, a river in Rajputana, Central Provinces of

British India, flow¬

ing into the Jumna; length, 750 miles.

CHAMBER, a term having various techni¬

cal meanings. The chamber of a cannon is that part of the bore of a cannon which receives the powder with which it is charged. The chamber of a mine is the place where the charge of powder is lodged that is to be used for blow¬

ing up the works. In several languages cham¬

ber is used to designate a branch of govern¬

ment whose members assemble in a common apartment. A chamber of commerce is a board or association to promote the interests of the trade and merchandise. See Chambers of

Commerce.

CHAMBER MUSIC. The name given to

music particularly designed for performance in a room or small hall with few performers, as contrasted with music requiring many perform¬

ers and given on a stage in a larger hall, or in the opera-house. It is generally, though it was not formerly, applied to instrumental music only. Originally it meant music for the few, usually, of course, the wealthy, who cultivated it in the privacy of their homes and who, as in the case of the Esterhazy family, in whose serv¬

ice Haydn spent 30 years of devoted effort, made of it a formal function. As early as the time of Louis XIV, with his <(Maitre de la Musique de la Chambre de Roy,® chamber music was recog¬

nized as a separate branch of the art. Dance tunes were its earliest basis and in the form of suites were written or arranged for various combinations of instruments. (The lute figured prominently at first, but was gradually elbowed out by the members of the violin family). A little later, the more highly developed sonata form was utilized ; and while to-day this desig¬

nation is confined to pieces for piano or piano and one other instrument, the first sonatas were written for instruments in combination and especially for stringed instruments. Corelli, one of the greatest Italian composers (1653-1713), composed no less than 60 sonatas, among them 24 (Sonate da Camera) for several different instruments of the violin group.

The string quartet (written for two violins, viola and 'cello) is the typical chamber music of modern times and, beginning with Haydn, nearly all of the great composers have con¬

tributed generously to its literature. While not a pioneer in this field, Haydn is entitled to the credit of giving to the string quartet the stamp of perfection as an art form, which has belonged to it ever since; and to the Esterhazy family as his patrons, and to other noblemen who bore somewhat similar relations to Mozart and Beethoven may be attributed much of the impulse to this character of musical composi¬

tion. In the immense volume of Haydn's works, his chamber music bulks large. Directly in¬

spired by Haydn's efforts, Mozart began to write quartets and he dedicated six of the best to Haydn. The relations of Haydn and Mozart, and their remarkable reaction on each other, form a most interesting chapter in musi¬

cal history. Haydn, who outlived Mozart many years, composed his best chamber music after Mozart had died, and it bears the unmistakable impress of the younger man's influence.

Beethoven's activities in chamber music furnish clear evidence of the high seriousness with which composers have always approached this branch of their art. Comparatively early in his development, he wrote six quartets (Opus 18) ; and he made further essays as his career progressed. Finally, his sonatas and symphonic works and his great mass in D finished, he turned for his last expression in music, his peroration, to the quartet and wrote five, which rank with his finest works. Since Beethoven's day, chamber music has undergone little change or development. There have been beautiful accessions to its literature. Schubert, Schu¬

mann, Brahms, Franck and Tschaikowsky

have all poured rich new wine into the old bottle; but it remains as

Beethoven left it, the most chaste receptacle for musical thought yet fashioned. In addition to the string quartet, chamber music furnishes compositions for many other combinations of string instru¬

ments alone — trios, quintets, sextets and still larger groups — also, quite frequently, for piano and strings and, less often, for combinations including one or more wind instruments. Schu¬

bert's octet for two violins, viola, 'cello, bass, clarinet, horn and bassoon is one of the most important works in this field. But here, ob¬

viously, the approach is definitely toward the orchestra, with its variegated tonal tints, which are foreign to the true conception of chamber music. Next to the string quartet, the piano quartet and quintet are the favorites of the more modern composers. The piano quintets of Schumann, Brahms and Franck form a magnifi¬

cent triumvirate. To the musician universally, chamber music represents the purest form and the highest achievement in the art. Without the extraneous attractions of program, orchestral color or scenic effect, depending for its appeal on the most abstract presentation of creative thought, it has evoked-from composers the finest manifestations of their genius; and the contributions of Debussy, Ravel, Schonberg and others of the ultra-modern schools show that the appeal is as potent to-day as it was in the last century. Consult Kilburn, N., (The Story of Chamber Music> (London 1904) ; Krause, E., (Die Entwicklung der Kammermusik) (Ham¬

burg 1904) ; Schering, A., (Geschichte des Instrumentalkonzerts) (Leipzig 1905).

Lewis M. Isaacs.

CHAMBERLAIN, Alexander Francis,

American ethnologist and educator : b. Ken-ninghall, Norfolk, England, 12 Jan. 1865; d.

Worcester, Mass., 8 April 1914. He was graduated at Toronto University in 1886 and from 1886 to 1891 was examiner in modern

languages successively at Toronto University, 1 rinity University and in the educational de¬

partment of the province of Ontario. In 1892

he was appointed lecturer and afterward as¬

sistant professor of anthropology at Clark University. Under the auspices of the British Association he made a special investigation of the Kootenay and Chinook Indians in British Columbia. He was editor of the Journal of American FolkLore in 1901-08. He was

elected a fellow of the American Association for the Advancement of Science. He wrote ‘Report on the Kootenay Indians) (1892) ; ‘Language of the Mississaga Indians) (1892) ; ‘The Mythology of the Columbian Discovery5

(1893); ‘Child and Childhood in Folk—

Thought5 (1896) ; ‘The Child: A Study in the Evolution of Man5 (1900); <Poems) (1904), and contributions to various periodicals on South American and Asiatic tribes and people.

CHAMBERLAIN, Basil Hall, English

Japanese scholar: b. Southsea, 18 Oct. 1850.

He is a grandson of Basil Hall (q.v.). He is emeritus professor of Japanese and philology at the Imperial University of Tokio, and has pub¬

lished ‘The Classical Poetry of the Japanese) (1880) ; ‘Translation of the Kojik) (1883) ; ‘A Romanized Japanese Reader) (1886) ; ‘Lan¬

guage, Mythology and Geographical Nomen¬

clature of Japan in the Light of Aino Studies5

(1887) ; ‘Luchuan Grammar5 (1895) ; ‘Hand¬

book of Colloquial Japanese5 ; ‘Things Japa¬

nese5 (1890) ; ‘Japanese Poetry5 (1910).

CHAMBERLAIN, Charles Joseph, Amer¬

ican botanist : b. Sullivan, Ohio, 23 Feb. 1863.

He was graduated at Oberlin College in 1888, taught in Ohio and Minnesota 1888-93, when he entered the University of Chicago, from which he received the degree of Ph.D. in 1897.

In the last-named institution he was assistant in botany 1896-99, associate 1899-1901, instructor 1901-07, became assistant professor in 1907, as¬

sociate professor in 1911 and professor in 1915.

He spent 1901-02 at Bonn, Germany, in research work, was editor of “Current Botanical Litera¬

ture55 in Journal of Applied Microscopy 1899-1903 ; and since 1902 has edited the department of cytology of the Botanisches Centralblatt.

He is also a regular contributor to the Botanical Gazette, is a member of the Botanical Society of America, of the Association Internationale des Botanistes, of Die deutsche Botanische Gesellschaft and the Naturforscher Gesellschaft an der Konigliche Universitat zu Kiew.

He is also a fellow of the American Associa¬

tion for the Advancement of Science. He has published ‘Methods in Plant Histology5 (3d ed., 1915) ; ‘Morphology of Gymnosperms5 in collaboration with John M. Coulter (2d ed., 1910) ; ‘Morphology of Angiosperms,5 in col¬

laboration with J. M. Coulter (1903) ; and various articles especially on cycadaceae, in which connection he has made four exploring expeditions to the tropics of southern Mexico, besides expeditions to Cuba, New Zealand, Australia and Africa.

CHAMBERLAIN, Daniel Henry, Amer¬

ican politician: b. West Brookfield, Mass., 23

June 1835; d. 13 April 1907. He was gradu¬

ated at Yale in 1862 and at Harvard Law School in 1863. In 1864 he was commissioned lieutenant in the 5th Massachusetts colored cav¬

alry, served in Maryland, Louisiana and Texas and was promoted captain. In 1866 he settled as a cotton planter in South Carolina. Upon the call for a constitutional convention he was chosen a delegate, and was subsequently elected attorney-general, a position he held for four years. From 1872 to 1874 he practised law at Columbia, S. C. He was governor of the State 1874-77. Though renominated in 1876 and re¬

inaugurated in January 1877, his election was contested by Wade Hampton, the Democratic candidate for governor. After the inaugura¬

tion of President Hayes, both contestants were invited to a conference at Washington, which resulted in the United States troops (which had been sent to support Chamberlain) being withdrawn from South Carolina and Governor Chamberlain withdrawing his claim to election.

He resumed law practice in New York city until his retirement to West Brookfield, Mass.

He has published several addresses and pam¬

phlets, the latest of which is ‘Charles Sumner and the Treaty of Washington5 (1902). Con¬

sult Allen, ‘Governor Chamberlain’s Adminis¬

tration in South Carolina5 (1888).

CHAMBERLAIN, George Earle, Amer¬

ican legislator and State governor: b. Natchez, Miss., 1 Jan. 1854. He was graduated in 1876

from Washington and Lee University and be¬

gan practice as a lawyer in Oregon, where he became a member of the

State legislature, dis¬

trict attorney, State attorney-general and in 1902 and 1906 Democratic governor of Oregon.

In 1909 he was selected United States senator for the term ending 1915 and in this position was chairman of numerous important commit¬

tees, including the public lands committee. He was reelected for the term 1915-21.

CHAMBERLAIN, Houston Stewart, Eng¬

lish-German author: b. Southsea, England, son of a British admiral, 9 Sept. 1855. He was educated in France and England and in 1870

settled at Stettin, Germany, where he con¬

tinued his studies under Professor Kuntze and devoted himself to research in German civiliza¬

tion and culture, also studying music under Ruthard. He married one of Wagner's daugh¬

ters in 1878. From 1885 to 1889 he resided in Dresden when he settled permanently in

Vienna. Writing with equal ease in German, English and French, he was very active as a contributor to periodical literature, and besides his fine and comprehensive biography of Richard Wagner, his magnum opus, in Ger¬

man (1896), English (1897), French (1899), his published works include 'Die Grundlagen des 19 Jahrhunderts5 (2 pts., 1899-1901), re¬

printed in many editions ; translated into Eng¬

lish by Lord Redesdale (1910); 'Das Drama Richard Wagner's 5 (1892) ; and other Wagner books; 'Worte Christi5 (1901); 'Heinrich von Stein5 (1903); 'Immanuel Kant5 (1905);

'Goethe5 (1912).

CHAMBERLAIN, Jacob C., American

missionary: b. Sharon, Conn., 13 April 1835; d. 2 March 1908. He w&s graduated at West¬

ern Reserve University 1856; studied at the Dutch Reformed Church Theological Seminary 1859 and took a medical degree at the College of Physicians and Surgeons, New York. In 1859, he went as a medical missionary to south¬

ern India and till his death resided in the Mad¬

ras presidency. He established a hospital and dispensary at Madanapalli 1868 and another at 260

Palamanair 1872. He translated the Reformed Church liturgy into Telugu Madras (1873), and also (Hymns for Public and Social Wor¬

ship J (1884). He wrote (The Bible Tested ’

(1878; 7th ed., 1885); (Native Churches and Foreign Missionary Societies* (1879) ; (Wind¬

ing up a Horse; or Christian Giving* (1879) ; (Break Cocoanuts Over the Wheels: or All Pull for Christ* (1885); <The Kingdom in India: Whose?; (1907) ; /The Cobra’s Den and Other Stories of Missionary Work among the Telegus of India) (1900).

CHAMBERLAIN, John Loomis, Amer¬

ican army officer: b. New York, 20 Jan. 1858.

He was graduated at the United States Mili¬

tary Academy in 1880. For years he was an officer of the line. He was graduated from the Army Service School, the Artillery School at Fort Monroe and the Army War College, and for four years (1884-88) he

was an instructor at the Military Academy, West Point. In the winter of 1890-91, while a junior officer in the service, he took an active part in the campaign against the Sioux Indians. In 1891-93 he was chief ordnance officer of the Missouri depart¬

ment and in 1895-96 served as instructor in military science and tactics at the Peekskill Military Academy. In 1897-98 he was appoint¬

ed military attache at Vienna, but resigned this post on the outbreak of hostilities with Spain.

Throughout the war he served as a major of United States Volunteers with the Seventh Army Corps. In 1900 he became a major in the inspector-general's department through a competitive examination, open to all captains of the line. He investigated the Pacific transport service in 1901, the result being a complete re¬

organization of the personnel. He has seen nearly five years' service in the Philippines and in the course of his duties has also visited China and Japan. In 1913 his investigation of the aviation section of the Signal Corps re¬

sulted in changes of policy and a reorganiza¬

tion of the service. In February 1917 he was appointed inspector-general, with the rank of brigadier-general, and on 6 Oct. 1917 was ap¬

pointed major-general.

CHAMBERLAIN, Joseph, English states¬

man : b. London, 8 July 1836; d. Birmingham, 2 July 1914. He was for a time at University College School, London, and in 1854 he en¬

tered into partnership with his cousin, Joseph Nettlefold, as a screw manufacturer in Bir¬

mingham — a business in which his father was also interested. He retired from active busi¬

ness life in 1874 after having amassed a hand¬

some fortune. He was by this time coming to the front as the <(rising hope® of the advanced Radicals. As a member of the Birmingham

School Board, and its chairman from 1874 to 1876, he took up an attitude of uncompromising hostility to the denominational school system.

In 1869 he was elected a member of the Bir¬

mingham Town Council. His tenure of the may¬

oralty (1874-76) was' notable for sweeping re¬

forms ; new municipal buildings were built, the gas and water undertakings were municipalized and a great city improvement scheme was suc¬

cessfully carried out. After an unsuccessful parliamentary contest at Sheffield in 1874, he was in 1876 returned unopposed for Birming¬

ham. He rapidly made his mark in Parliament ; he infused new life into the Radical organiza¬

tion. and on the return of the Liberals to of¬

fice in 1880 entered the Cabinet as president of the Board of Trade. To Mr. Chamberlain's exertions was due the passing of an important bankruptcy act, and his attempt to amend the merchant shipping acts, though unsuccessful, formed the basis of later legislation. His in¬

fluence meantime was rising in the country ; he stood out as an opponent of "coercion® in Ireland and favored a large measure of self-government, and in the election of 1885 he preached the doctrine of "ransom® and the "restitution® of property with a frankness that alarmed moderate Liberals, and enunciated an "unauthorized program® which included free education, small holdings and a graduated system of taxation. After that election and the subsequent defeat of the Salisbury ministry and when the tenure of the Liberal government in office depended on the Irish vote and a Home Rule measure became imminent, he ac¬

cepted the presidency of the Local Govern¬

ment Board, but resigned on 15 March 1886

on account of hostility to Mr. Gladstone's Home Rule Bill of that year. With the other "dissentient Liberals® he voted against that measure

and assisted materially in the defeat of the Liberals at the polls at the ensuing general election. For a time it seemed as if the breach in the Liberal ranks might be healed, but after a “Round Table® conference in 1887 it grew wider and Mr. Chamberlain became the object of intense dislike on the part of the Home Rule party. He held no office in the Unionist administration from 1886 to 1892, but his in¬

fluence was felt in legislation, and he suc¬

ceeded in getting some radical measures passed, such as free education. As a member of the commission to settle the fisheries dis¬

pute with Canada, he visited Washington in 1887 and succeeded in negotiating the Cham¬

berlain-Bayard Treaty, which however was refused ratification by the American Senate.

Another result of his visit was that he mar¬

ried in 1888, as his third wife, Mary, daughter of William C. Endicott, Secretary of War in President Cleveland’s first administration.

On the elevation of Lord Hartington to the House of Lords as the Duke of Devonshire in 1891, Mr. Chamberlain succeeded to the leader¬

ship of the Liberal Unionists in the House. of Commons. During the passage of Mr. Glad¬

stone’s second Home Rule bill (1893) through the House of Commons, Mr. Chamberlain was the life and soul of the opposition, his discus¬

sion of the various amendments being marked by a masterly debating power and keen ana¬

lytical skill. On the return of the Unionists to power in 1895 he was appointed Secretary for the Colonies. His tenure of that office may be said to have been the turning point in the relations of the colonies with the mother country; his sympathetic understanding of colonial aspirations was soon apparent, and his talents as a business man and skill in admin¬

istration found a fruitful field. When the “Jameson Raid® occurred in the Transvaal, he at once repudiated all connection with it on the part

of the British authorities, and he sub¬

sequently denied in the most distinct manner having had any personal foreknowledge or suspicion of what was about to take place. The country was sharply divided on his conduct of the negotiations preceding the outbreak of the CHAMBERLAIN

war with the South African Republic in 1899, but his influence in the country was a main cause in the Unionist triumph in the ® Khaki®

election in 1900. On the conclusion of hostili¬

ties he visited South Africa and personally initiated the measures adopted to repair the ravages of war. His influence was manifest in the provisions of the Workmen's Compensa¬

tion Act of 1897, and he carried through the Australian Commonwealth Bill in 1900.

In 1903 Mr. Chamberlain launched another ˆunauthorized program,® which aimed at the reversal of the traditional free trade fiscal pol¬

icy of Great Britain and at the setting up of preferential tariffs within the Empire, and he resigned his place in the Cabinet the better to pursue this missionary enterprise. He found support from the majority of the Unionist party; but a powerful minority, including such distinguished men as Devonshire, Goschen and St. Aldwyn, stood for the old policy ; Mr. Bal¬

four, on whom devolved the duty of keeping his party together, gave to <(tariff reform® but a dubious and hesitating support; the Unionist party was rent in twain ; and at the general election of 1906 — at which Mr. Chamberlain's policy was only one among other issues — the Unionist government suffered a disastrous de¬

feat. Mr. Chamberlain from 1903 had been conducting a strenuous campaign on behalf of (<tariff reform® that had severely taxed his strength, and his last years were spent as an invalid; but from time to

time he continued to inspire his followers with messages in the press.

Mr. Chamberlain was the first purely busi¬

ness man, untaught in any of the universities, to rise to a commanding place in British public life, and he profoundly affected the style of debating in the House of Commons. His lithe spare figure, clean-cut, incisive features and single eyeglass were essential parts in the ˆmake-up® of a singularly forceful and dom¬

inating personality. In his talents as an ad¬

ministrator, in his capacity for getting through business, he was almost unrivaled. As a de¬

bater he was cool and resourceful, a hard but a clean hitter, and never so dangerous an an¬

tagonist as when he seemed to be fighting in a disadvantageous position. His utterances had a simplicity, directness and force which made him powerful no less in the country than on the floor of the House; but these characteristics proved an embarrassment when translated into the field of foreign relationships. He had, as Lord Morley has said, a <(genius for friend¬

ship,® both private and public; and this trait in his character, and the response it evoked, were happily illustrated in his relations with those whom he was proud to call (<his own people,®

the constituents of the city of Birmingham, who from first to last, for a period of nearly 40 years, through all his mutations of opinion, stood by him with an unshaken and almost unexampled fidelity. Consult biographies by Creswicke (4 vols., London 1900-05) ; Jeyes (ib. 1896) ; Mackintosh (ib. 1906) ; Morris (ib.

1909) ; and Viscount Morley's <Recollections) (2 vols., 1917).

CHAMBERLAIN, Joseph Austen, English

politician, son of Joseph Chamberlain (q.v.) : b. 1863. He was educated at Rugby and Trin¬

ity College, Cambridge. He was Civil Lord of the Admiralty

1895-1900, Financial Secretary to the Treasury 1900-02, Postmaster-General 1902-03, Chancellor of the Exchequer 1903-06; 1915-17 Secretary for India; member of War Cabinet 1918-19; and in 1919 Chancellor of the Exchequer. He represented East Worcester¬

shire in the House of Com'mons 1892-1914 and since the latter year has represented his father's old constituency, West Birmingham.

CHAMBERLAIN, Joshua Lawrence,

American soldier and educator: b. Brewer, Me., 8 Sept. 1828; d. 24 Feb. 1914; graduated Bowdoin College 1852 and Bangor Theological Sem¬

inary 1855 ; received the honorary degree of LL.D., Pennsylvania College, 1866, and from Bowdoin College 1869; professor of rhetoric and oratory, Bowdoin, 1856, and in 1861 pro¬

fessor of modern languages of Europe. On 8

Aug. 1862 he entered the army as lieutenant-colonel of volunteers and served through the Civil War in the Army of the Potomac in every campaign and nearly every great battle from Antietam to Appomattox, and was several times wounded, twice severely. He received the Congressional Medal of Honor for his re¬

markable conduct in the defense of Round Top, Gettysburg, 2 July 1863, and was advanced to the command of a brigade. On 18 June 1864

he was promoted brigadier-general on the field by General Grant for distinguished gallantry in leading a desperate charge, and early the fol¬

lowing spring he received a special promotion as brevet major-general, (<for conspicuous gal¬

lantry in action.® In the campaign of 1865 he commanded two brigades of the first division, fifth corps. In the order disbanding that army he was retained in the service and was offered a colonelcy in the regular army, but the condi¬

tion of his wounds induced him to decline the service, and in January 1866 he returned to Maine.

In the autumn of that year he was elected governor of Maine, and served in that office for four terms. In 1871 he was chosen presi¬

dent of Bowdoin College, and continued in that position for 12 years, his administration being marked by a broadening of the course and a large increase in the resources of the college.

During this time he was elected major-general of Maine, to command the militia of the State.

In 1880 when for a time there was no active or legal State government, he was called to the capital (<to preserve the peace and institutions of the State.® This he accomplished without the use or show of military force. In 1883 he retired from the presidency of Bowdoin and settled in New York to practise law. In 1885

he went to Florida and engaged in the work of railroad building and public improvements on the West Coast. He was much sought for as writer and orator. He published (Maine, Her Place in History > (1877) ; (Ethics and Politics of the Spanish War) (1898); (Property: Its Office and Sanction) (1900); (De Monts and Acadia) (1904) ; (Ruling Powers in History*

(1905). He also edited Universities and Their Sons> (1898).

CHAMBERLAIN, Mellen, American law¬

yer, librarian and historian : b. Pembroke, N.

H., 4 June 1821 ; d. Chelsea, Mass., 25 June 1900. He was graduated at Dartmouth College in 1844 and at the Harvard Law School in 1848.

In 1849 he was admitted to the bar, opened a law office in Boston and made his residence in 262

CHAMBERLAIN

Chelsea, where, during 51 years of citizenship, he served the town in many public capacities.

In 1858 and 1859 he was a member of the Massachusetts house of representatives and the senate in 1863-64. He was associate justice of the Municipal ‘Court of Boston 1866-70, and chief justice 1870-78. On 26 Aug. 1878

he was chosen librarian of the Boston Public Library, serving until ill health compelled his retirement in 1890. During his administration the new library building was begun and the cornerstone laid. Throughout his life he was a close student and investigator of Ameri¬

can history. Besides important chapters in Winsor’s (Memorial History of Boston)

(1881), and (Narrative and Critical History of America* (1888), he wrote (John Adams, the Statesman of the Revolution * (1884) ; The Authentication of the Declaration of Independ¬

ence } (1885); (John Adams, the Statesman, with Other Essays and Addresses* (1898) ; (The Journals of Captain Henry Dearborn, 1 775 —83 > (1886-87) ; (The Constitutional Rela¬

tions of the American Colonies to the English Government at the Commencement of the

American Revolution* (1887).

CHAMBERLAIN, Montague, American

naturalist: b. Saint John, New Brunswick, 5

April 1844. He was educated privately, both his parents being teachers. Though engaged in mercantile pursuits, he devoted much time to the study of natural history and came to be well known as an ornithological writer. In 1889 he became assistant secretary of the Lawrence Sci¬

entific School of Harvard University, and from 1893-1900, secretary. A member of several scientific bodies, his chief publications are (Canadian Birds) (1870) ; (Birds of New Brunswick) (1882) ; (Mammals of New Bruns¬

wick (1884) ; Systematic Table of Canadian Birds) (1887); (Birds of Greenland) (1892); Some Canadian Birds) (1895) ; (The Church Army* (1897) ; (Maliseet Vocabulary * (1899) ; (The Penobscot Indians) (1899), *etc.*

CHAMBERLAIN, Nathan Henry, Amer¬

ican clergyman: b. Bourne, Mass., 25 Dec. 1830; d. there, 1 April 1901. He graduated at Har¬

vard, 1853, and studied theology at the divinity school there, and at Heidelberg, Germany, eventually becoming a Unitarian minister. He was pastor at Canton, Mass., 1857-59, and at Baltimore, Md., 1860-63. He then took orders in the Episcopal Church, and became rector at Birmingham, Conn., 1864-67 ; Morrisania, N. Y., 1868-71; Milwaukee, Wis., 1871-73; Somerville, Mass., 1874— 79; East Boston, Mass., 1882-89.

He then retired to devote himself to literary pursuits. His books are (Autobiography of a New England Parish) (1864) ; (The Sphinx in Aubrey Parish* (1889) ; (What is the Matter with our Tariff and its Taxes) (1890) ; (Samuel Sewall and the World He Lived In*

(1897), an admirable study of colonial life in New England; (Life of Sir Charles Napier) ; (An Itinerary of Cape Cod.*

CHAMBERLAIN, Samuel Selwyn, Amer¬

ican journalist: b. Walworth, N. Y., 25 Sept.

1851 ; d. San Francisco, Cal., 25 Jan. 1916. He was graduated from New York University in 1875, and at once entered the journalistic field with the New York Herald; he went abroad with Mr. Bennett of the Herald, and was for a time editor of the Paris edition of that journal.

In 1879 he became editor of the World, but left to take charge of the Evening Telegram in 1881.

He founded Le Matin of Paris in 1884 and edited it for two years and

then returned to the United States. In 1889 Mr. Hearst engaged him as editor of the San Francisco Examiner, and he remained on the Pacific coast until 1895, when he came to New York as editor of the Morning Journal. In 1900 he became managing editor of the Philadelphia North American, which soon resumed its old place among the successful publications of that city. In a year or two Mr. Chamberlain returned to the Hearst service, and until his death acted as general staff officer. He went to the Chicago Examiner, was recalled to the New York American, and for several years, until the spring of 1915, had been the Hearst representative in London.

His last work was editor of the Boston Ameri¬

can. He was recognized as an exceptionally able newspaper man; his forte was a news touch of charming delicacy; he had unerring news perception and understood and carried out feature ideas that were distinct.

CHAMBERLAIN, S. D., city and county-seat of Brule County, on the Missouri River and on the Chicago, Milwaukee and Saint Paul Railroad, 85 miles southeast of Pierre. It is a thriving stock-raising centre, and has flour mills, bottling works and a cement factory. The public institutions include a free library, sani¬

tarium, Columbus College and the river island park of 1,000 acres, donated to the city by the Federal government. Chamberlain is governed by commissioners. Pop. (1920) 1,303.

CHAMBERLAIN (Germ. Kammerhcrr;

Ital. Camerlingo) , court officer, orieinally em¬

ployed, as the name indicates, to take charge either of the private apartments of a prince, or of a treasury, called in the 10th century camera (whence the word chamber). The gold¬

en key, which is worn by the chamberlains of the European courts on two small golden but¬

tons (as well as the buttons themselves, when the key is omitted), indicates also the origin of the office. At present the employment of cham¬

berlains (when their office is not merely nomi¬

nal) is to attend on the persons of the princes and their consorts. There is generally a chief or high chamberlain. This officer in England is called Lord Great Chamberlain of England.

His office is one of great antiquity and honor, being ranked as the sixth great office under the English Crown. It is entirely distinct from that of Lord Chamberlain of the Household (see below). To the Lord Great Chamberlain belong lodging and livery at the king's court ; and there are certain fees due to him from each archbishop and bishop when they perform their homage to the king; and from all peers at their creation, on doing their homage. At the coronation of the sovereign, he has an allowance of 40 ells of crimson velvet for his own robes. This officer, on the coronation day, is to bring the king his shirt, coif and wearing apparel, and after the king is dressed, he claims his bed and all the furniture of his chamber for his fees; he also carries at the coronation the coif, gloves and linen to be used by the king on that occasion ; also the sword and scabbard, the gold to be offered by the king, and the robes royal and crown ; he dresses and undresses the king on that day, waits on him before and after dinner, *etc.* This

officer has also the care of providing all things in the House of Lords during session ; the government of the palace of Westminster; and he disposes of the sword of state to be carried before the king, to anv lord he pleases. The office of Lord Great Chamberlain of England is hereditary, and has descended through the two sisters and coheiresses of the 4th Duke of Ancaster (d. 1779) to its present holders, the Earl of Ancaster, the Marquess of Cholmon-deley and the Marquess of Lincolnshire, who act in rotation. The last-named performs the duties during the present reign. The keys of Westminster Hall and the Court of Requests are delivered to the Lord Great Chamberlain on all solemn occasions. He goes on the right hand of the sword, next the king's person.

The Gentleman Usher to the Black Rod, Yeo¬

man Usher, etc., are under his authority.

The Lord Chamberlain of the Household is an officer who has the oversight and direction of all the officers belonging to the king's cham¬

bers, except the precinct of the king's bed¬

chamber. He has the oversight of the officers of the wardrobe at all His Majesty's houses, and of the removing of wardrobes or of beds, tents, revels, music, comedians, hunting, mes¬

sengers, etc., retained in the king's service. He moreover has the entire oversight and direction of the sergeants-at-arms, of all physicians, apothecaries, surgeons, barbers, the king's chaplains, etc., and administers the oath to, all officers above stairs. To his department belong the two dramatic censors, called Examiners of Plays.

The Chamberlain of London receives and

keeps the city money which is laid up in the chamber of London ; he also presides over the affairs of masters and apprentices, and admits duly qualified persons to the freedom of the city, *etc.* His tenure of office only lasts a year, but he is usually reelected.

At all monarchical courts there are almost as many different chamberlains as there are kinds of chambers ; the English chamberlains here cited, and their duties, may be taken as typical.

CHAMBERLIN, Joseph Edgar, Amer¬

ican journalist: b. Newbury, Vt., 6 Aug. 1851.

Until 1890 he was on the staffs of papers in Newport, R. I:, Fall River, Mass., Chicago and Boston. From 1890 to 1900 he was assistant editor of the Youth's Companion , an essayist and magazine writer. During the Spanish War he was war correspondent of the New York Evening Post in Cuba; was literary editor, editorial writer and art critic of the New York Evening Mail 1901-15; with the Boston Tran¬

script as editorial writer since 1915. He has published (The Listener in

the Town) (1896) ; (The Listener in the Country5 (1896); (Life of John Brown of Ossawatomie) (1899) ; and (The If's of History5 (1907).

CHAMBERLIN, Thomas Crowder,

American geologist: b. Mattoon, Ill., 25 Sept.

1843. He was educated at Beloit College and the University of Michigan ; was professor of natural sciences in Whitewater Normal School, Wis., 1869-73; professor of geology at Beloit College 1873-82; president of the University of Wisconsin 1887-92; and has been dean of the scientific faculty of the University of Chicago from 1892. He was assistant State geologist of Wisconsin 1873-76, and State geologist from 1876-82. He became United States geologist in charge of the glacial division 1882-1907, and was geologist of the Peary Relief Expedition 1894. He is a member of many scientific so¬

cieties, and in 1907 was president of the Illinois Academy of Science, and president of the Chi¬

cago Academy of Sciences 1898—1914. He is the author of (Geology of Wisconsin5 and of many important papers printed by the United States Geological Survey and is editor of the Journal of Geology.

CHAMBERS, Edward Thomas Davies,

Canadian journalist: b. Saffron Walden, Essex, England, 1852. He emigrated to Canada in 1870, and after teaching a short time entered journal¬

ism, becoming chief editor of the Quebec Daily Chronicle in 1897. He has published (Thc Port of Quebec5 (1890) ; (The Haunts of the Ouaniche5 (1891); (Quebec: Ancient and

Modern) (1892) ; (Quebec, Lake Saint John and the Saguenay5 (1893) ; Chambers' Guide to Quebec5 (1895) ; (The Book of the Ouaniche and its Canadian Environment5 (1896) ; (An¬

gler's Guide to Eastern Canada5 (1898); (Sportsman's Companion5

(1899) ; and the (Quebec Tercentenary History5 (1909).

CHAMBERS, Ephraim, English miscella¬

neous writer and encyclopedist: b. Kendal, Westmoreland, about 1680; d. 15 May 1740.

On leaving school he was apprenticed to a mathematical instrument and globe maker in London. Here he acquired such a taste for the study of science, and made so much pro¬

ficiency in it, that he not only formed the design of compiling his famous (Cyclopaedia, 5

or an Universal Dictionary of the Arts and Sciences, but actually wrote some of the articles for it behind his master's counter. The first edition of this work was published in 1728, and Chambers was soon after chosen F.R.S. Two subsequent editions, in 1738 and 1739, appeared previously to his death. A French translation of the (Cyclopedia5 was the basis of the (Encyclopedic5 of Diderot and D'Alembert.

A revised and enlarged edition was brought out first by Scott and Hill, and afterward, 1781-86, by Dr. Rees, who latterly built up on it the work known by his own name.

CHAMBERS, Ernest John, Canadian

litterateur : b. Penkridge, Staffordshire, Eng¬

land, 16 April 1862. He was educated at Montreal High School, engaged in journalism in that city for many years ; as newspaper cor¬

respondent he served with General Middleton's forces in the Northwest Rebellion (1885) ; and was editor of the Calgary Herald 1888-89. He was appointed gentleman usher of the Black Rod in the Canadian Parliament in 1904. From 1893-96 he was editor of the Canadian Military Gazette, and since 1908 has edited the Cana¬

dian Parliamentary Guide.5 Among other

works, he is the author of Canada's Fertile Northland5 (1908) and the ˆHistory of the Royal Northwest Mounted Police,5 and he has written many regimental histories of the Cana¬

dian militia. During the Great War he acted as chief press censor for Canada.

CHAMBERS, Robert, Scottish prose—

writer and publisher: b. Peebles, 10 July 1802; d. Saint Andrews, 17 March 1871. He and his brother William (q.v.) began in poverty as

small booksellers; issued penny leaflets of use¬

ful information for the people, written in a clear and simple though not infantile style, which became very popular, and at last took regular periodical form in Chambers' Journal, and the great publishing-house which bears the name of both developed gradually. The 'Chambers' Encyclopaedia for the People5 was the outgrowth of the Journal, and edited by the brothers. Robert wrote also 'Traditions of Edinburgh) ; (History of the British Empire) ; 'Domestic Annals of Scotland) ; 'The Book of Days5 ; (Cyclopaedia of English Litera¬

tureˆ ; (Ancient Sea Margins,5 etc., but his most noted book was the anonymous 'Vestiges of Creation.5

CHAMBERS, Robert William, American

artist and novelist: b. Brooklyn, N. Y., 26 May 1865. He began his career as an artist after studying at the Julian Academy, Paris, and be¬

came an illustrator for various New York weeklies ; but he soon abandoned this for the literary field in which he achieved considerable success through his popular novels. He wrote a drama, entitled 'The Witch of Ellengowan,5

for Ada Rehan, which was performed at Daly's Theatre, New York. He has written (In the Quarter) (1893) ; 'The King in Yellow) (1893); 'The Red Republic (1894); <A King and a Few Dukes) (1894) ; 'The Maker

of Moons5 (1895); (01iver Lock) ; ‘The Mystery of Choice) (1896) ; ‘Lorraine5 (1896) ; (Ashes of Empire) (1897) ; ‘The Haunts of Men) (1898) ; ‘The Cambric Mask) (1899) ; ‘Outsid¬

ers5 (1899) ; ‘The Conspirators5 (1900) ; Car¬

digan5 (1901) ; ‘The Maid at Arms5 (1902) ; ‘The Maids of Paradise5 (1903) ; ‘With the Band,5 a volume of ballads; Hole5 (1905) ; (The Reckoning5 (1905) ; ‘The Tracer of Lost Per¬

sons5 (1906) ; (The Fighting Chance5 (1906) ; ‘The Three of Heaven5 (1907) ; ‘The Younger Set5 (1907) ; Tome Ladies in Haste5 (1908) ; (Tbe Firing Line5 (1908) ; (The Danger Mark5

(1909) ; (Special Messenger5 (1909) ; (Ailsa Paige5 (1910) ; ‘The Green Mouse5 (1910) ; (The Adventures of a Modest Man5 (1911) ; ‘The Common Law5 (1911) ; ‘Blue-Bird

Weather5 (1912); ‘Japonette5 (1912); ‘The Streets of Ascalon5 (1912) ; ‘The Business of Life5 (1913) ; ‘The Gay Rebellion5 (1913) ; ‘Anne’s Bridge5 (1914); (Between Friends5

(1914);. (The Hidden Children5 (1914);

‘Quick Action5 (1914) ; ‘Athalie5 (1915) ; ‘Who Joes There!5 (1915) ; ‘The Better Man5 (1916) ; ‘Barbarians5 (1917); ‘In Secret5; ‘Moonlit Way5 (1919); ‘Crimson Tide5 (1919).

CHAMBERS, Talbot Wilson, American

clergyman: b. Carlisle, Pa., 25 Feb. 1819; d.

New York, 3 Feb. 1896. He was graduated at Rutgers, 1834; studied theology at the Re¬

formed Church Seminary there, and also at Princeton. He was pastor of the Reformed Dutch Church in Somerville, N. J., 1839—49. In 1849 he was installed a pastor of the Collegiate Dutch Church in New York, and remained in association with the Middle Dutch Church con¬

gregation until his death. He was a member of the American Bible Revision Committee, and for many years chairman of the committee on versions of the American Bible Society. He wrote ‘The Noon Prayer Meeting in Fulton Street5 (1857) ; ‘Memoir of Theodore Freling-

huysen5 (1863) ; ‘Exposition of the Book of Zechariah5 (1874), in ‘Lange’s Commentary5; ‘The Psalter a Witness to the Divine Origin of the Bible5 (1875); ‘Companion to the Re¬

vised Version of the Old Testament5 (1885).

CHAMBERS, Washington Irving, Amer¬

ican naval officer: b. Kingston, N. Y., 4 April 1856. He was graduated from the United States Naval Academy in 1876. He served on various vessels, and in 1883-84 was in the office of naval intelligence. In 1884 he was a member of the Greely relief expedition and was also engaged in a survey of the Nicaragua Canal route. He became captain in 1908, and was at the War College in 1892-94, and subse¬

quently served as commander of various ves¬

sels, was assistant chief of the Bureau of Ordnance in 1907-09, and member of the Gen¬

eral Board in 1911, when he became connected with the Bureau of Navigation and was put in charge of the development of aviation.

CHAMBERS, Sir William, English archi¬

tect: b. of Scottish parents, Stockholm, Sweden, 1726; d. London, 8 March 1796. He was edu¬

cated at Ripon, in Yorkshire, and while very young went as supercargo to the East Indies, resided for some time in China, and brought back many drawings of Chinese buildings and costume, which were afterward published. He.

then devoted himself to the study of architec¬

ture, and on returning from travels in France and Italy was appointed drawdng master to the Prince of Wales, afterward George III. He laid out the royal gardens at Kew in the Chinese style, and built the villa of the Earl of Besborough at Roehampton, in the Italian style, a mansion for Lord Abercorn, near Edin¬

burgh, and houses for Lord Melbourne and the Earl of Gower, at Whitehall and in Piccadilly.

His masterpiece was Somerset house in Lon¬

don, which he rebuilt in 1775. He published, in 1759—68, a ‘Treatise on Civil Architecture5 ; in 1772, a ‘Dissertation on Oriental Gardening.5

CHAMBERS, William, Scottish publisher

and miscellaneous writer: b. Peebles, 16 April 1800; d. Edinburgh, 20 May 1883. He was a brother of Robert Chambers (q.v.). He pub¬

lished ‘Things as They Are in America5

(1853) ; ‘American Slavery and Color5 (1857) ; ‘France: Its History and Revolutions5 (1871) ; ‘Stories of Old Families,5 *etc.* In 1859 he be¬

stowed on his birthplace the commodious suite of buildings known as the Chambers Institute, comprising a library, reading-room, lecture-room, art-gallery and museum. Of his native county he published a history in 1864. In 1865

he was elected lord provost of Edinburgh, in which capacity he organized and carried out many extensive and useful measures of sani¬

tary improvement. Between 1871 and 1883 he spent upward of $100,000 on the restoration of Saint Giles’ Cathedral, Edinburgh.

CHAMBERS OF COMMERCE, associa¬

tions formed by tradesmen and merchants for the purpose of protecting and furthering the commercial interests of the community to which the chamber belongs. In America and England the chambers of commerce are volun¬

tary associations with no recognized official functions. In continental Europe chambers of commerce are endowed with official char¬

acter, and are often vested with administrative functions concerning trade. In some countries it is made their duty to express their opinion

advance upon proposed legislation, and in the Hanse cities they must by law be consulted be¬

fore certain kinds of legislation can be con¬

sidered. Among the various methods employed to promote the ends of such associations are the following: The influence of legislative action for the benefit of commerce; not infrequently legislators engaged in drafting regulations affecting industry seek the views of the more important chamber ot commerce, the collection of trade statistics, the gaining of economical or other advantages, by combination, the settle¬

ment by arbitration of mercantile disagree¬

ments. The oldest body of the nature of a chamber of commerce was started in Marseilles at the close of the 17th century. The value of such bodies became apparent and they sprang up rapidly throughout the civilized world. In mediaeval Venice and in the Hanse towns they do not seem to have existed in the sense in which they are understood to-day. The first institution of the kind in the United States, the New York Chamber of Commerce, was organ¬

ized in 1768 and incorporated by royal charter from King George III in 1770. There are now similar bodies in every city and town of conse¬

quence in the United States officered by men of standing in the community, and rendering in¬

telligent and effective service. The oldest chamber of commerce in Great Britain, that of Glasgow, dates from 1783. Edinburgh fol¬

lowed two years later, and for long held a leading position, but the most important British chamber of commerce at the present time is that of London, founded so lately as 1881. It has instituted a series of examinations in com-merical subjects, and lectures are delivered under its auspices. Junior and senior com¬

mercial certificates are granted after examina¬

tion to those who display the amount of knowl¬

edge required. In 1860 there was formed an Association of Chambers of Commerce of the United Kingdom, which holds annual meetings in London. It includes nearly 100 chambers.

The extension of the functions of chambers of commerce in the United States has been con¬

siderable in the decade between 1890 and 1900.

The movement had its origin in Germany and grew out of the organized efforts of the last 20 years to foster the world commerce of the empire. The chambers of commerce in leading cities like Berlin and Hamburg undertook the commercial training of young men, with a view to their future advancement in mercantile life and the consular service. The result was the securing of a higher order of talent in such pursuits. The hint thus thrown out was promptly taken up in the United States. The New York Chamber of Commerce, in 1899, voted a fund for the endowment of a lecture course on commerce at Columbia University; in Chicago a chair of commerce was established by that city's chamber at the University of Chi¬

cago, and in August 1900 a School of Com¬

merce, Accounts and Finance was established by the University of New York. Students were assured in the event of a satisfactory course of study, that they would be given posts in leading commercial establishments or ap¬

pointed to consular offices so far as influence could attain that result. The movement is destined to mark a new era in the influence of chambers of commerce.

CHAMBERSBURG, Pa., borough and

county-seat of Franklin County, on the Cone-cocheague and Falling creeks and the Cum¬

berland Valley and Western Maryland and the Philadelphia and Reading railroads, 49 miles west-southwest of Harrisburg. In Early's raid in the Civil War General McCausland entered Chambersburg with

Confederate cavalry, 30

July 1864, and demanded a tribute of $100,000

gold; this not being paid the place was set on fire and two-thirds of it burned, causing a loss of $1,000,000. It was soon rebuilt, chiefly of brick or stone, and is now the seat of Wilson College for women, and has an academy, sev¬

eral churches and newspapers, public schools, two national banks and an assessed property valuation of $3,000,000. There are manufac¬

tures of hosiery, flour, furniture, wool, dresses, paper, iron, milling machinery, engines, boilers, soap, steam and hydraulic machinery, iron castings, silk, ice and condensed milk; and the shops of the Cumberland Valley Railroad are situated here. The United States census of manufactures for 1914 recorded 59 industrial establishments of factory grade, employing 1,920 persons, of whom 1,649 are wage earners, receiving annually $755,000 in wages. The capital invested aggregated $3,740,000, and the year's output was worth $3,075,000: of this, $1,528,000 was the value added by manufacture.

In the environs blue limestone, freestone and marble abound. Its government provides for a chief burgess, elected for three years, and a borough council. Chambersburg was first set¬

tled (in 1730) by Benjamin Chambers, an im¬

migrant from Ireland, and was for many years called ((Falling Spring.® It was incorporated in 1803. Pop. (1920) 13,171.

CHAMBERTIN, shaii'ber-tan, a superior

red Burgundy wine, named after the place where it is produced, in the department of Cote d'Or.

CHAMBERY, shan'ba're', France, capital

city of the department of Savoy, 45 miles south-southwest of Geneva, at the junction of two small rivers, near the Isere, between two moun¬

tains on the border of a fertile plain. It is an archbishop's see, and contains a cathedral, six hospitals, a castle, now the prefecture, the

palace of justice, barracks, a covered market, a college, a museum and a public library with 40,000 volumes. The old ramparts have been converted into public walks. In its vicinity are excellent baths, much frequented in summer.

Its suburbs are large with many fine villas. It has considerable manufactures and distilleries; trade in lace, silk, soap, paper, *etc.* Chambery was founded about the 10th century. It was under feudal lords till 1230, when it was ceded to Thomas, 1st Count of Savoy, who built the castle, where the princes of the house of Savoy resided till the government was removed to Turin. The town was surrendered to the French in 1792, and became the capital of the department of Mont Blanc. It was retroceded in 1815, and again ceded to France in 1860.

Pop. 22,958.

CHAMBEZI, cham-be'zi, a river of Africa, rising in the highlands south of Lake Tangan¬

yika, about lat. 9° 40' S. and long. 33° 15' E.

Its tributaries are large, and form a consider¬

able stream, which flows southwest to Lake Bangweolo.

CHAMBLISS, Charles Edward, American

entomologist: b. Petersburg, Va., 20 Aug.

1871. He was graduated at the University of Tennessee in 1892, and from 1894 to 1900 was instructor in zoology and entomology there,

and in the same period was entomologist of the Tennessee Agricultural Experiment Station.

He was State entomologist of Tennessee 1900-01, when he became associate professor of zool¬

ogy and entomology at Clemson College and entomologist of the South Carolina Experiment Station and State entomologist 1907-08. Since 1908 he has been agronomist in charge of rice investigations for the United States Department of Agriculture.

CHAMBLY

Canals.

CANAL.

See

Canadian

CHAMBLY

River.

RIVER.

See

CHAMBORD, shan-bor, Henri Charles

Ferdinand Marie Dieudonne, Comte de, Duke of Bordeaux, French noble: b. Paris, 29 Sept.

1820; d. Frohsdorf, Austria, 24 Aug. 1883. He was the last representative of the elder branch of the French Bourbon dynasty, and was called by his partisans Henry V of France. He was born after the assassination of his father, Prince Charles Ferdinand d'Artois, Due de Berry.

Charles X, after the revolutionary outbreak of 1830, abdicated in his favor; but the young count was compelled to leave the country with the royal title unrecognized by the nation. He lived successively in Scotland, Austria, Italy and London, keeping a sort of court, and oc¬

casionally issuing manifestos. In 1846 he mar¬

ried the Princess Maria Theresa, eldest daugh¬

ter of the Duke of Modena; and in 1851 in¬

herited the domain of Frohsdorf, near Vienna, where for the most part he subsequently re¬

sided. While abstaining from violent attempts to seize the crown, he let slip no opportu¬

nity of urging his claims, especially after Sedan; but his belief in divine right, and his failure to recognize accomplished facts and modern tendencies, destroyed all chance of his succession.

CHAMBORD, a castle, park and village in central France near Blois, department of Loiret-Cher. The splendid castle stands in the middle of a park, enclosed by walls extending seven leagues. It contains 440 rooms, 13 large staircases, and stalls for the reception of 1,200

horses. It was built in the Gothic style, by Primatice, for Francis I, and completed under Louis XIV. Here Francis I indulged his in¬

clination for gallantry; here the arts first sprang to life in France; and

here King Stanislaus Leczinsky resided for nine years. In 1745 it was given by Louis XV to Marshal Saxe, who died there in 1750. The Emperor Napoleon I gave the domain of Chambord to Marshal Berthier, and in 1821 a company of Legitimists bought it and gave it to the Duke of Bordeaux, son of the Duke de Berry and grandson of Charles X. It was bequeathed to the ducal family of Parma in 1883.

CHAMBRAY, shan-bra, Georges, Mar¬

quis de, French general: b. Paris 1783; d. 1848.

He served in the Napoleonic wars, fell into the power of the Russians, was banished to the Ukraine and not permitted to return to France until after the fall of Napoleon, From 1823 to 1829, he filled high military positions at Vin¬

cennes and Perpignan. He wrote various works on military subjects. A second edition of his (Philosophie de la guerre> appeared in 1835, and a (Life of Vauban,5 written by him, ap¬

peared in the (Plutarque Franqais.5 His most important production is his (Histoire de l'expedition de Russie,5 which appeared in 1837, and has since passed through several editions.

CHAMBRE ARDENTE, shanbr ar-dant

((<fiery chamber55), an apartment hung with black and lighted with tapers, in which the corpse of a person of distinction is deposited before the funeral ceremonies. The name was formerly given in France to an apartment, similarly draped and lighted, in which sentence of death, frequently by burning, was pronounced on heinous offenders. In a historical sense the term is more especially given to those extraor¬

dinary tribunals which, from the time of Francis I, directed the persecutions against heretics, and acted as a sort of inquisition. The members of the tribunal were named by the Pope. They ferreted out heretics, directed the proceedings against them, pronounced sentence, and also saw it carried into execution. A chambre ardente was established, by Louis XIV

to put a stop to the numerous cases of poison¬

ing which, after the proceedings against the Marchioness of Brinvilliers, were brought be¬

fore the public. Many persons of the highest rank, among others the Marshal of Luxemburg and Princess Louise of Savoy, were brought before this court, which, however, existed only for two years, and ceased in 1680. The last exercise of its powers was the condemnation of the celebrated sorceress, Voisin. Consult Weiss, (La chambre ardente5 (Paris 1889) and Ravaisson, < Archives de la Bastille5 (Paris 1866-84).

CHAMBRE INTROUVABLE, an-troo-

va-bl (<(the chamber whose like is not to be found55), the term applied to the French Chamber of Deputies which met after the second return of Louis XVIII (from October 1815 to April 1816), and which by its fanatic loyalty threat¬

ened to plunge France again into anarchy and commotion. Their dissolution met with uni¬

versal rejoicing. The electoral law of 5 Feb.

1817 prevented the return of a similar chamber.

CHAMECK, cha-mek', a species of spider-monkey. See Spider-mon key.

CHAMELEON, ka-mel'yun or ka-me'le-on,

lizard belonging to the family Chamcdeontidce.

The chameleons are generally considered as constituting a suborder or equivalent primary division of the Lacertilia (q.v.). All parts of their anatomy present striking peculiarities. The parietal and squamosal bones of the skull form a bony tripod which supports the conspicuous crest or casque on the posterior part of the head. In many species the strangeness of the physiognomy is enhanced by warts, serrated crests and prominent spines. Trifid teeth are situated on the ridge (acrodont) of the maxil¬

lary and dentary bones, but the premaxillary is toothless. The eyelids are almost completely united, leaving only a minute circular orifice through which the animal sees, and which moves with the eyeball in its almost constant rovings.

More remarkable still the two eyeballs move quite independently; one may be directed at an object behind while the other views one in

front. The tongue is club-shaped at the free end and slips into a sheath at the base, from which it can be projected to a distance of more than half the total length of the animal, and return, like a bit of rubber, with great rapidity to its former position. Unique among lizards is the prehensile tail, which rolls downward in a flat spiral and is utilized for clinging to twigs.

Serving the same purpose in the arboreal life of the animal are the almost equally peculiar feet, which have five toes arranged in two op¬

posed sets on both fore and hind feet. The lungs are produced into a series of long tubular di¬

verticula, which extend to all parts of the trunk, so that the chameleon is enabled to swell up its body in the fashion of a toad when angry or threatened. These animals subsist entirely on insects caught by the protrusile, somewhat sticky tongue; and are reproduced by eggs laid in the ground.

But the chamelepn is most famous for a faculty by no means confined to it, but common to many lizards and other animals — the well-known facility with which it changes its colors.

This is accomplished at the will of the animal, or results from the direct influence of external stimuli, by a relatively simple mechanism.

The outer portion of the skin or epidermis is trans¬

parent; beneath this is a layer of cells filled with granules and oil-drops that appear white or yellow ; among and beneath these are large irregular chromatophores, or cells filled with black and red pigment granules. These chro¬

matophores are under the control of the nervous system, and have the power, when appropriately stimulated, of sending out long branching proc¬

esses filled with pigment into the spaces be¬

tween and external to the light-colored cells.

When this occurs the latter cells are concealed by a pigment curtain and the animal appears dark-colored; when, on the other hand, the chromatophore processes are withdrawn, and the pigment is concentrated in the deeper layers of the skin, the animal appears pale. The rapid play of colors is due to the interchange of these two conditions in varying degrees.

More than 50 species of chameleons are known, belonging to the typical genus Cliama ?-

leon, and a few others. With the exception of a few species which inhabit Arabia and India, and one whose range extends across the Med¬

iterranean into southern Spain, all are con¬

fined to Africa, and a large number of the strangest forms to the island of Madagascar.

The common chameleon (C. vulgaris) inhabits the shores of the Mediterranean and Asia Minor, and through being so well known to Europeans, has made the peculiarities of these lizards almost proverbial.

In the United States the name chameleon is commonly applied to a lizard (Anolis carolinensis) and its allies, belonging to a quite different group, a genus of the family Iguanidce.

Like its African namesake it changes its colors with great facility. (Consult Proceedings Amer. Acad. Arts and Sciences, XL, 10, 1904).

It may be bright green, yellowish-gray, rich brown, or almost black, and the male is peculiar in having beneath the throat a pouch of elastic skin which can be inflated by means of a pair of delicate bony rods belonging to the skeleton of the tongue, when it appears of a flaming orange or vermilion color. They are dainty, smooth¬

bodied little animals, and are chiefly arboreal, jumping from twig to twig in pursuit of in¬

sects with an activity that contrasts strongly with the sluggishness of the European chame¬

leon, which depends upon its projectile tongue to secure its game. Anolis carolinensis is the only member of the genus which enters the United States, and is quite common in Florida and other southern States, from which many were shipped to the North a few years ago to supply the requirements of a silly fashion in vogue at that time of wearing one of these pretty lizards secured to the dress by a tiny golden chain about its neck. Owing to the ignorance of the wearers, many of the chame¬

leons quickly succumbed to thirst, as they, in common with most lizards, require a constant supply of water. Consult Gadow, < Amphibia and Reptiles* (New York 1911) ; Ditmars, (The Reptile Book) (New York 1907) ; Pycraft, (Story of Reptile Life) (London 1905).

CHAMELEON, a southern constellation

containing nine stars, lying within the Ant¬

arctic polar circle.

CHAMELEON MINERAL, manganate

of potassium, so called because a solution of it changes from green, through a succession of colors, to a rich purple.

CHAMFORT, shan’for’, Sebastien-Roch

Nicolas, French revolutionist: b. Auvergne 1741 ; d. 1794. He left school to become an abbe, but refused a benefice. For a time, his efforts to publish his works were unsuccessful.

He finally made his debut as a litterateur under the name of Chamfort, and obtained some suc¬

cess as a dramatist and as a critic, which pro¬

cured him a place in the French Academy, a pension and a place at court. An independent and somewhat misanthropic spirit made him, however, in spite of his interest, favor the Revo¬

lution, of which he became the epigrammatist.

He resigned his employment at court, and took the literary editorship of the Mecure de France.

He won several academic prizes, as on his essays on Moliere and La Fontaine. The King added 1,200 livres to his pension and the Prince de Conde made him his secretary, a post which he found uncongenial to his Bohemian tastes.

He withdrew to Auteuil, and thence to Hol¬

land, but returned and became a member of the Academy in 1781. An unfortunate love affair made him quit the court, but he gathered about him at the house of M. de Vaudreuil a con¬

genial circle which included Mirabeau. He fur¬

nished Sieyes with the idea and the title of his famous pamphlet (Qu’est-ce que ce Tiers-fitat?* and forged such popular watchwords as : Guerre aux chateaux, paix aux chaumieres (((War to the castles, peace to the cottages®).

He was employed by Roland in the National Library and published the first 26 (Tableaux Historiques de la revolution.* Threatened with imprisonment, he endeavored to blow out his brains. Though not immediately fatal, the wounds he inflicted on himself ultimately caused his death. His poetry has now little reputation. His best work, (Mustapha and Zeangir,* at which he labored for 15 years, exhibits him as a feeble follower of Racine and Voltaire. It is praised for purity of style and mildness of sentiment; but, as a French critic pungently

observes, he reserved all his mildness for his tragedies. A collection of 1,800 bon mots, under the title (Chamfortiana,*

is now considered the best memorial of him.

His (CEuvres completes5 is in five volumes (1824-25) ; a selection from his writings ap¬

peared as (CEuvres de Chamfort) (1852 with a critical preface by Houssaye). In 1879 ap¬

peared (CEuvres Choisis) (2 vols., with preface and notes by M. De Lescure). Consult Sainte-Beuve, (Causeries du Lundi) (Vol. IV, Paris 1857-62) ; Pelisson, <Chamfort) (Paris 1895).

CHAMIER, sha-mer', Frederick, English

novelist: b. London 1796; d. 1870. He entered the navy in 1809, took part in the last cam¬

paigns against the French and distinguished himself in the American War of 1812. He re¬

tired in 1833 with the rank of captain, and liv¬

ing at Waltham Hill, acted as a justice of the peace for the counties of Hertford and Essex.

He imitated Captain Marryat in making his experience of a sea life the basis of a series of romantic tales, but did not equal him in humor and imagination. He has, however, been credited with great fidelity to nature.

His principal works are (The Life of a Sailor5

(1834) ; (Ben Brace5 (1835) ; (The Arethusa5

(1836); (Jack Adams5 (1838); (Tom Bowl¬

ing's Log5 (1839). He also published a re¬

view of the scenes witnessed by him in the revolution of 1848, in which his prejudice against some of the leading participants ob¬

scures the veracity of his statements.

CHAMINADE, sha-me-nad, Cecile Louise

Stephanie, French composer: b. Paris, 8 Aug.

1861. She studied at Paris under Le Coupey, Savard, Marsick and Benejamin Godard; soon acquired a high reputation as a pianist, and played at concerts in Paris, Berlin, Vienna, London, Constantinople and other cities. She visited the United States in 1908 and made a successful tour, but has not maintained her hold on the public. She has resided in Eng¬

land for a number of years. Her composi¬

tions, which are widely known, include

(Callirhoe,5 a ballet symphony performed with great success at Marseilles (1888), Lyons (1889), and Bordeaux (1901) ; (Les Amazones5 ; ˆMenetriers5 ; (Au Matin5 ; and a number of songs, among which are (Madrigal 5 ; (Chanson Slave5 ; (Ritournelle5 ; (Fleur de Matin5 ; and (Sans Amour.5 She has also written a concertstuck for piano and orchestra, two trios and a large number of works for piano solo, piano and violin, *etc.*

CHAMISSO, sha-mes'sd, Adelbert de

(properly Louis Charles Adelaide de Chamisso de Boncourt), German poet and naturalist: b.

at the castle of Boncourt, Champagne, 27 Jan.

1781 ; d. Berlin, 21 Aug. 1838. When a boy his family were driven by the breaking out of the Revolution to seek an asylum in Berlin. On the Peace of Tilsit he returned with his family to France, and in 1810 was appointed professor in the Lyceum of Napoleonsville ; but shortly after returned to Prussia, and during three years devoted himself enthusiastically to the study of natural science at Berlin. Count Romanzoff having in 1815 fitted out a vessel, under the command of Otto von Kotzebue, for the discovery of the northwest passage, Chamisso accepted the appointment of natural¬

ist to the expedition, and added greatly to his store of scientific knowledge. He afterward took up his residence at Berlin, was appointed superintendent of the botanic garden and re¬

ceived the diploma of doctor from the univer¬

sity for the collections in natural history which he had presented to the museum. His abilities as a naturalist are displayed in his work (De Animalibus quibusdam e Classe Vermium Lin-naei5 (1819) ; and his (View of the Most Use¬

ful and the Most Noxious Plants of North Germany, with Remarks on Scientific Botany.5

In 1827, partly for the purpose of rebutting the charges brought against him by Kotzebue, he published (Views and Remarks on a Voyage of Discovery,5 and description of a Voyage Round the World.5 Both works display great accuracy and industry. His last scientific labor was a tract on the (Language of Owyhee. }

His reputation as a naturalist has been some¬

what eclipsed by that which he acquired as a poet. As early as 1804-06 he, in concert with Varnhagen von Ense, published a collection of poems, under the name of the (Muses' Almanac) ; and in 1813 appeared his celebrated and most original tale, (Peter Schlemihl,5

which has been translated, among other lan¬

guages, into English, and admirably illustrated by Cruikshank. His poetry is marked by vigor, correctness and a thorough command of the German language ; but is in general of a gloomy and terrific cast. He is the author, however, of several humorous pieces ; and his

political poems are distinguished by caustic, yet wholesome, raillery. Many of his ballads and songs are masterpieces of their kind. (See Peter Schlemihl's wundersame Geschichte).

Consult Geiger, (Aus Chamissos Friihlingzeit5

(Berlin 1905) ; Hitzig, (Leben und Briefe von A. von Chamisso5 (1839) ; Fulda, (Chamisso unde seine Zeit5 (Leipzig 1881) ; Kossmann, (Der deutsche Musenalmanach, 1833-395 (The Hague 1909) ; Raymond, (A von Chamisso als Naturfoscher5 (ib. 1889).

CHAMOIS, sham-wa or sham'i, a horned

animal (Rupicapra tragus) classed among the goat-antelopes, and native to the mountains of middle and southern Europe from the Pyrenees to the Caucasus and Georgian Mountains, and as far east as Persia. The chamois found in the Pyrenees and in the Caucasus differ in local peculiaries from the Tyrolese, which is the race-type. This is about the size of a goat ; but its neck is somewhat longer in proportion than that of the goat and is more graceful. The general color is brown ; the head pale, almost yellow, with a dark marking on each cheek ; the nails black. The short black horns rise straight from the forehead, and are recurved at the tip.

The chamois may be found in summer, in the highest Alpine altitudes, close to, and indeed beyond, the snow-line. In winter it seeks the forests, where it is somewhat protected. In the Alps, where they have been much hunted, the herds are small. The chamois is now rare in Switzerland. The breeding season is in May and June. The chamois is famous for its agility. The creature is timid; and when feed¬

ing in flocks, one is always on the watch to an¬

nounce danger by a peculiar whistling noise.

Chamois-hunting as a sport is almost impos¬

sible in the Alps, as the numbers have been so reduced by continuous hunting that the remain¬

ing ones are protected by law — only a few being annually at the disposal of the hunter; but in the Carpathians and eastward the sport is not restricted. Chamois leather is valuable CHAMOMILE — CHAMPS DE MARS

commercially for its softness and warmth. (See Leather). Ordinary (<chamois leather, ® how¬

ever, is prepared from sheep-skin or goatskin.

The flesh of the chamois is esteemed a table delicacy. The horns are used for ornamental purposes, especially in making souvenirs of Alpine tourist resorts.

CHAMOMILE, or CAMOMILE (An-

themis nobilis), a plant belonging to the family Asteracece. It is an herb with slender, trailing, hairy and branched stems. The leaves are doubly pinnate, with linear pointed pinnae. The head of flowers is white, with a yellow centre.

Both leaves and flowers of this plant have a strong though not unpleasant smell, and a very bitter nauseous taste ; but the flowers are more bitter and aromatic than the leaves.

Chamomile enjoys a wide, popular reputation as a diaphoretic and diuretic. The flowers are usually made into an infusion or tea and this is drunk while hot. A poultice is also made of the flowers and applied to painful swellings, such as rheumatic joints, or earache, boils, *etc.*

There is a large amount of fixed and volatile oil in chamomile to which its useful physiologi¬

cal and physical properties are due. Volatile oils act as vaso dilators and antispasmodics, diuretics and diaphoretics, the fixed oils per¬

mitting of long-continued heat. Chamomile flowers are sometimes used by brewers as a substitute for hops. Distilled with water, an essential oil in small quantities is obtained, of a greenish color and strong pungent taste. So fragrant is the chamomile plant that the places where it grows wild may easily be discovered by the somewhat strawberry-like perfume

emitted when it is trodden on. This quality has sometimes induced its cultivation for a green-walk in gardens. Chamomile in the United States is an importation from Europe. Two other closely related plants of the same genus, May-weed or dog-fennel (A. cotula) and corn chamomile (A. arvcnsis), both natives of Europe, are widely naturalized as weeds in North America.

CHAMOND, Saint. See Saint Chamond.

CHAMORE'RIL, a lake with apparently

no outlet, in Middle Tibet, on a plateau 15,000

feet above the sea, between the upper waters of the Sutlej and the Indus. It is surrounded by mountains some 5,000 feet in height, from which it receives much water. Its length of 15

miles and width of two and one-half are pretty constant. On account of its great depth it freezes only in winter.

CHAMOUNI, sha-moo-ne, or CHA¬

MONIX, sha-mo-ne, derived from champs

munis or Lat. campus munitus, fortified grounds, in allusion to the natural mountain fortifica¬

tions, a celebrated valley of southeastern France, in the department of Haute-Savoy, in the Pennine Alps, fully 3,000 feet above sea-level. It is about 12 miles long, and only about half a mile wide; lies southwest to northeast, its east side formed by Mont Blanc and other lofty mountains of the same range, and its west side by Mount Brevent and the Aiguilles Rouges. It is traversed in its whole extent by the Arve, which leaves the valley by a narrow gorge at the southwest end, through which also passes, high above the river, the highway to Sallanches and Geneva. At its north end the valley communicates with Canton Valais by two roads and a bridle-path, the latter crossing the Col de Balme ; and it may also be left by other passes, as the Col du Geant, but they are difficult and dangerous, and only suited for practised and daring pedestrians. The moun¬

tains on the west side of the valley, though at¬

taining a height of 8,500 feet, above sea-level, are not covered with snow in summer; but those on the east side, in the range of Mont Blanc, being from 10,000 to upward of 15,000

feet high, are always snow-clad, excepting where the peaks are too perpendicular for snow to lie. From the snowy range proceed the glaciers, some of which approach close to the cultiyated fields. They are very numerous, and of different sizes; but the two most important are the Glacier des Bossons and the Mer de Glace, the latter one of the largest glaciers in the Alps. From its lower extremity, called the Glacier des Bois, the meltings of the glacier flow off, in greater or less volume according to the season of the year, from under a naturally formed ice-arch, the source of the Arveyron, the name given to the stream thus formed, which is an affluent of the Arve. The lower slopes of the mountains are covered with tim¬

ber, through which is frequently to be seen the devastating course taken by the avalanche.

The soil is not fertile, but it is assiduously cultivated ; and the inhabitants, who are gathered together in numerous villages, of which Chamouni or Le Prieure is the chief, raise barley, oats, spelt, flax, potatoes, etc., raise cattle and keep bees. During the winter, yarns, cloths, hats and implements are made, and many articles of wood are carved. All the valley is famous for its scenery, which was first brought to public notice by Windham and Pococke, two Englishmen who visited it in 1741. It presents various points from which the whole mass of Mont Blanc may be seen at one view. The village of Chamouni (3,415

feet), 39 miles east-southeast of Geneva, originated in a Benedictine priory founded about 1090. It has several hotels, and is sup¬

ported mainly by visitors to the scenery of the valley. The ascent of Mont Blanc is most commonly made from this village. There is a monument to De Saussure, who did much to bring the valley before the notice of travelers.

Pop. 2,850.

CHAMP CLOS, shan klo (Fr. <(a closed-in field or area)}), formerly a place set apart for duels between those who wished to determine, in

that manner, either a lawsuit or dispute of honor. This name was also given to the place set apart for tournaments.

CHAMP DE MARS, shan-de-mars, Paris,

extensive area, on the left bank of the Seine, be¬

tween the Seine and ficole Militaire, which originally formed a place of exercise for the young men in the military school, and sub¬

sequently has been the scene of various public festivals and great gatherings of people. It is 1,093 yards long, 537 wide with four rows of trees on each side. Louis XVI and his family took part here, in 1790, in the great Fete de la Federation, in which the King swore to defend the new constitution; in June 1794, it was the scene of the Fete de l'Etre Supreme. In 1815

Napoleon selected the Champ de Mars for the scene of a general assembly of the French CHAMPS DE MARS — CHAMPAIGN

people, at which he placed before the repre¬

sentatives of the nation the articles of a sup¬

plementary constitution, called the Acte addi-tionnel, intended to establish the legality of his throne. It has also been the site of inter¬

national expositions of 1867, 1878, 1889 and 1900. See Paris.

CHAMP DE MARS, (Latin Campus

Martins'), and CHAMP DE MAI, shan-de-ma, the annual public assembly of the Franks. They were held originally in March and called from the place of meeting Champs de Mars; in the 8th century they were trans¬

ferred by Pepin, the father of Charlemagne, to the month of May, and

called the Champs de Mai. At the Champs de Mai, all questions re¬

lating to public affairs, such as war, peace, the enactment of laws, were decided by the ma¬

jority. These assemblies were held irregularly under the Merovingians, but became more fre¬

quent and systematic under the first Carlovingians. Pepin called together only the nobility and the clergy; but Charlemagne or¬

dered that every count should bring with him 13 men from his jurisdiction, to represent the people in the General Assembly. The first de¬

scendants of Capet departed from this usage; but Philip IV, who reigned from 1285 to 1314, restored the third estate by calling together delegates from the cities.

CHAMPAC. See Champak.

CHAMPAGNE, shan-pan-ye, or CHAM—

PAIGNE, Philippe de, Flemish painter: b.

Brussels, 26 May 1602 ; d. Paris, 12 Aug. 1674.

He went to Paris at the age of 19, and worked on the decorations of the Luxembourg under Duchesne; he was later appointed court painter by Marie de Medicis. He was also a member and finally rector of the Academy of Painting and Sculpture. His coloring is excellent and his portraits possess great merit. His best pic¬

tures are at Vincennes and at Paris ; among them are a portrait of himself, a portrait of Richelieu, (The Apostle Philip, } and (The Last Supper, } all in the Louvre.

CHAMPAGNE, cham-pan' (Fr. shan-pan-ye), France, an ancient province which before the Revolution formed one of the 12

great military governments of the kingdom.

The name Champagne, formerly Champaigne, is derived from the vast plains (Lat. campus, ((a plain®) which occupy the territory. Cham¬

pagne was bounded on the north by Hainaut and the bishopric of Liege ; on the east by the duchy of Luxembourg and Lorraine ; on the south by Franche-Comte and Burgundy; and on the west by L'Orleanais, L'Isle de France and Picardie. It forms at present the depart¬

ments of the Marne, Haute Marne, Aube, Ardennes and part of those of the Yonne, the Aisne, Seine-et-Marne and Meuse. The land is fertile, and produces the celebrated wine called after its name. In the Middle Ages it was a countship of which Troyes was the capital, and was united with France when Louis Hutin, Count of Champagne, succeeded to the throne of France under the title of Louis X in 1314.

CHAMPAGNE, a French wine made

chiefly in the department of the Marne, in the former province of Champagne. It is com¬

monly divided into river and mountain wines (vins de la riviere de Marne, and vins de la Montague de Rheims), the former being for the most part white, the latter red. Not all of these wines are sparkling or frothing, though by the name "champagne® is generally under¬

stood such wine as has been subjected to an imperfect fermentation, and contains a quantity of carbonic acid gas, generated during the in¬

sensible fermentation in the bottle, this gas being disengaged on removing the pressure by which it was detained in solution. The briskest wines are not always the best ; they are, of course, the most defective in true vinous quality, and the small portion of alcohol which they contain immediately escapes from the froth as it rises on the surface, carrying with it the aroma, and leaving the liquor that remains in the glass nearly vapid. Hence the still or the creaming or slightly sparkling Champagne wines (vins cremants or demi-

mousseux) are more highly valued by con¬

noisseurs and bring greater prices than the full-frothing wines (vins grand-mousseux) .

By icing these wines before they are used the tendency to effervesce is in some degree re¬

pressed ; but when they are kept cool this pre¬

caution is unnecessary. In general, it may be observed that the vineyards on the banks of the Marne supply the choicest wines, and that the quality degenerates in proportion as they recede from the river. Among the white wines of Champagne the first rank is generally as¬

signed to those of Sillery, the produce of the vineyards of Verzenay, Mailli, Raumont, *etc.*

Of the Rheims Mountain wines those of Verzi, Verzenay, Mailli, Bouzy and Saint Basle are most esteemed; but the Clos Saint Thierry fur¬

nishes perhaps the finest red champagne. The soil of the principal vineyards throughout Champagne is composed of a loose marl rest¬

ing on chalk and sometimes mixed with flints.

For the manufacture of the white Champagne wines black grapes are now generally used. In making the red wines the grapes are trodden before they are introduced into the vat. Cham¬

pagne, when well made, and placed in cool cellars, will retain its good qualities from 10

to 20 years. See Wine and Wine Making.

CHAMPAGNY, shan -pan-ye, Jean Bap¬

tiste Nompere (non-pa) de (Duke de

Cadore), French naval officer, diplomatist and politician: b. Roanne, 4 Aug. 1756; d. Paris, 3

July 1834. He entered the navy in 1780, and was a member of the States-General, National and Constituent Assemblies. Thrown into

prison in 1793, he was released after the 9th Thermidor (1794), and became councillor of state. He was employed by Napoleon as Am¬

bassador to Vienna, and as Minister of the Interior and of Foreign Affairs, and he ne¬

gotiated the marriage with Marie Louise.

After Napoleon's downfall he transferred his allegiance to the Bourbons, under whom he was restored to the Chamber of Peers.

CHAMPAIGN, sham-pan', Ill., a city in

Champaign County, on the Illinois Central, the Cleveland, Cincinnati, Chicago and Saint Louis and other railroads, 48 miles southeast of Bloomington. It is the trade centre of the richest agricultural county in the State. It has an ice and cold storage plant, railroad shops, extensive foundries and tool and textile factories. It is the twin town of Urbana3

which contains the University of Illinois, and it has a fine public library, several parks and a high school. Settled in 1855, it was incor¬

porated in 1860. Its government is admin¬

istered by a mayor, elected biennially, and a city council. The electric-light plant is owned by the city. Pop. (1920) 15,873.

CHAMPAK, chum'pak, an East Indian

tree (Michelia champaca) , of the natural order Magnoliacece. It has large axillary flowers of a deep yellow color, and very fragrant, which are much celebrated in Hindu poetry. The tree is sacred to Krishna,

and the women of India adorn their hair with its blossoms. The bark has tonic properties.

CHAMPE, champ, John, American sol¬

dier: b. Loudon County, Va., 1752; d. Ken¬

tucky about 1798. He was selected by request of Washington to go to New York as a deserter and spy, and if possible to seize and bring off Arnold in time to save the life of Andre. Champe undertook the enterprise with courage, passed the American lines with diffi¬

culty, was hotly pursued by his comrades as a deserter, reached New York, underwent an examination before Sir Henry Clinton, and by him was consigned to General Arnold, who gave him in the British army his former rank.

He discovered the custom of Arnold to walk in his garden at a late hour every night, formed a plan with a comrade to seize and gag him there, and to take him between them as a drunken companion to a boat on the Hudson, whence arrangements were made for his trans¬

portation to the American headquarters. On the appointed night Arnold failed to appear in the garden, and Champe, after waiting for him till near morning, returned with deep chagrin to his position in the British army. It proved that Arnold had the day before changed his quarters, preparatory to the embarkation of his troops for Virginia. There was nothing left for Champe but to embrace the first op¬

portunity to escape to the American army, which he did soon after landing in Virginia, and joined the troops under General Greene.

Washington discharged him from further serv¬

ice, lest, falling into the hands of the enemy, he should be immediately put to death. He died before Washington could reward him for his services.

CHAMPEAUX, shan-po, Guillaume de,

French philosopher: b. Champeaux, about

1050; d. 1121. He was so called from the place of his birth. He studied at Paris under Anselme, De Laon and Manegolde, and after¬

ward himself opened a school there, in which he had numerous pupils. The schools opened by De Laon and Champeaux are regarded by Pasquier as the origin of the University of Paris. Among the pupils of Champeaux were Robert de Bethune, one of the most distinguished prelates of the age, and still more famous, Abelard. Jealous of the younger man's acu¬

men he retired from his school and founded in 1113 the abbey of Saint Victor. A few months later he was made bishop of Chalons. He defended the doctrine of realism against the nominalism of Abelard ; but it is only in the works of Abelard that any record of their contention remains. Champeaux has left a treatise on the origin of the soul, (De Origine Animal in which he examines the question how children dying without baptism are justly damned, which he concludes by referring to the unfathomable judgments of God. The only other work of his which has been printed is 'Moraiia Abbreviata. 1 He is considered the first prominent dialectitian of the realist sect.

Consult Haureau, B., (De la philosophic scolastique) (2 vols., Paris 1850) ; Cousin, V., (Fragments de philosophic scolastique) (in 'Introduction aux ouvrages inedits d' Abelard, 1

Paris 1884) ; Michaud, E., (Guillaume de Champeaux et les ecoles de Paris au XIIe siecle) (after the unedited documents, Paris 1867, 2d ed., 1868).

CHAMPERTY, or CHAMPARTY (Lat.

campi partitio, ('a division of lands"), in law, a bargain with the plaintiff or defendant in any suit to have part of the land, debt or other thing sued for, if the party that undertakes the suit prevails therein, the champertor carrying on the party's suit at his own expense. It is a species of maintenance, and is generally held to be illegal both in courts of common law and equity; but in some of the States of this country such agreements are recognized by law, and the tendency is toward freedom of action in these as well as other contracts. See Maintenance.

CHAMPFLEURY, shan'fle're', pseu¬

donym of Jules Fleury-Hltsson, French novel¬

ist and miscellaneous writer: b. Laon, 10 Sept.

1821 ; d. Sevres, 5 Dec. 1889. His story of ˆChien-Caillou1 was in Victor Hugo's opinion a masterpiece of realistic description. He wrote an autobiographical novel of his youth¬

ful years in (Les confession de Sylvius1

(1849), continuing the story in (The Adven¬

tures of Mariette1 (1856). But his (Les bourgeois de Molinchart1 (1855), a satiric de¬

lineation of the provincial bourgeoisie, made him famous. He is a pronounced ˆrealist."

He compiled a (General History of Caricature1

(5 vols., 1865-85), with a supplementary volume, (Secret Museum of Caricature1

(1888) ; and a work on the arts of design and ceramics, (Bibliographic ceramique.1 Consult Troubat, (Souvenirs pur Champffeury et le Realisme1 (Paris 1905).

CHAMPIER, shaii-pe-a, Symphorien,

French historian: b. Saint Symphorien-le-Loise, Lyonnais; d. Lyons about 1540. Famed as a physician, with powerful friends at court and an ample fortune, he took delight in literature and the society of literary men, himself writ¬

ing a series of poems for (Virtuous Ladies1

(1503), in four divisions, entitled (The Flower of Dames,1 (The Rule of Love,1 (The

Prophecies of the Sibyls1 and (The Book of True Love,1 respectively. His best history is an account of (Princes and Battles1 (1502).

CHAMPIGNON, shan-pe-non, the French

name for the common mushroom (Agaricus campestris) . See Agaric.

CHAMPION, one who undertakes to de¬

fend, in combat or Dy argument, another per¬

son, a doctrine or a cause. In the rudest state of society men avenge their own wrongs with¬

out restraint. The first step commonly made toward a better state of things in the rude be¬

ginnings of political society is to confine this right within certain bounds, and allow it to be exercised only with certain formalities. This

was done by the feudal institutions of Europe, which recognized in many circumstances, undei*

the toleration of the Church itself, the right of private combat. In some countries, however, particularly in England, the legal recognition of the right of combat had this injurious effect, that the practice became so settled as to be al¬

lowed to continue even after more rational ideas had grown up on the subject of the ad¬

ministration of justice. The combat, after it had become a common means of settling dis¬

putes, was not always waged by the contending parties. This was the ease, indeed, in appeals of felony, and if the heir, either from sex or age, was incapable of (<waging his battle,® as it was called, the question was left to a more rational mode of settlement. But in the writ of right, the last and most solemn decision respecting real property, the tenant was re¬

quired to produce his champion, who threw down his glove as a challenge to the champion of the demandant, and the latter, by taking

it up, accepted the challenge. The laws authoriz¬

ing judicial combat, though fallen into disuse, continued to disgrace the English statute-book till 1819. Even the right to the English crown was in some degree put in issue by appeal to judicial combat; and the appearance of a cham¬

pion offering battle to any one who. gainsays the right of the king to the crown was till re¬

cently a part of the ceremonial of an English coronation. This office was for four centuries hereditary in the family of Dymoke, of Lincoln¬

shire. The champion's function was to ride into Westminster Hall in full knightly armor, throw down his gauntlet and proclaim his readiness to defend the title of the sovereign to the crown against any one disputing it. The last exercise of the office was at the coronation of George IV.

The term ˆchampion® is also used in the realm of athletics to designate one who is pre¬

eminent in a certain branch.

CHAMPION'S HILL, Battle of. On

30 April 1864, General Grant crossed to the east side of the Mississippi River at Bruinsburg, 32

miles in a direct line below Vicksburg. On 1

May he marched to Port Gibson, defeating a Confederate force under Gen. J. S. Bowen.

This turned the position at Grand Gulf, and on the 3d Grant reached Hankinson's Ferry; then, after bringing up supplies, marched north¬

east to interpose between the Confederates, under Gen. J. C. Pemberton, in and near Vicks¬

burg, and those at Jackson, the capital of Mississippi, 40 miles east of

Vicksburg. The battle of Raymond was fought and won on the 12th, and on the 14th Gen. Joseph E. Johnston was attacked, defeated and driven north from Jackson, Grant occupying the place. Learning from an intercepted dispatch, one of three sent by Johnston to Pemberton, on the 13th, that Pemberton had been advised to march with all his available force on Clinton, 10 miles west of Jackson, and attack Grant's rear, while John¬

ston operated on his front or flank, Grant, leaving Sherman with two divisions at Jackson to destroy all public property and manufactur¬

ing establishments, turned the rest of his army from Clinton, Raymond and Auburn, on Bolton and Edwards' Station, on the Vicksburg and Jackson Railroad, the nearest points where Johnston could unite forces with Pemberton, and at night of the 15th the various divisions were near their designated positions. Pem-bert6n, with the three divisions of C. L. Steven¬

son, J. S. Bowen and W. W. Loring, was near Big Black River on the 14th wdien he received one of the triplicate dispatches sent by John¬

ston on the 13th. Anxious to hold Vicksburg and the line of the Big Black, 13 miles east, he questioned the wisdom of acting" upon John¬

ston's suggestion and called a council of his leading officers, a majority of whom agreed with Johnston; but he adopted the suggestion of Loring and Stevenson, to move on Grant's rear in the direction of Raymond and ad¬

vanced on the 15th for that purpose, Loring's division halting at night on the Raymond road at Elliston's, eight miles east of Edwards' Sta¬

tion, the other divisions farther north on roads coming into the Raymond road. Early next morning the march was resumed, but the head of column had scarcely left camp when Pem¬

berton received a dispatch from Johnston that he had been driven north from Jackson, and advising that he move directly on Clinton, and inform him of the movement, that he also might move to that point with 6,000 men.

Pemberton concluded to make the movement.

He immediately turned back his trains to Ed¬

wards' Station to get the road leading to Brownsville on the north, and had scarcely done so, when Osterhaus' and Smith's divisions of Grant's army made their appearance on the Raymond road and attacked his skirmishers, upon which he suspended his movement to join Johnston. Continuing the reversal of his trains to the rear, he formed for battle on the general line of a cross-road, connecting the Raymond and Clinton roads, Loring on the Champion's Hill, about 60 to 70 feet above the general level of the country, covering the Clin¬

ton road and the intersection of the cross-road.

Stevenson formed line while heavy skirmishing was going on to his right. Pemberton had about 17,500 men. The position of Grant's army on the. night of the 15th was as follows: Hovey's division was at Bolton on the Clinton road; Logan's and Crocker's were on the same road a few miles in Hovey's rear; Osterhaus' was on a cross-road, half-way from Raymond to right, covering the Raymond road, Bowen in the centre and Stevenson on the left on the northern point of a narrow ridge, known as Bolton ; Carr's a short distance in his rear ; and the divisions of A. J. Smith and Blair were west of Raymond on the Edwards' Station road.

These seven divisions numbered about 32,000

men, on the three roads converging on Ed¬

wards' Station, and known as the Raymond road on the south, the middle road and the Clinton road on the north. Early on the morn-

ing of the 16th, Grant, who was at Clinton, heard that Pemberton was marching to attack him, upon which he sent orders for MacPher-son, with the divisions of Logan and Crocker, to close up rapidly on Hovey, and for the four divisions under McClernand on the Raymond and middle roads to move forward cautiously and establish communications with each other.

He then hastened by the Clinton road to the front. A. J. Smith, advancing on the Ray¬

mond road, attacked and drove in Loring's skirmishers about 8 o'clock, and Osterhaus on the middle road engaged those in his front, artillery was brought up and opened fire, but McClernand, who was in command of the four divisions, more than half the army on this part of the field, doubtful if Grant wanted him to bring on a general engagement, deferred at¬

tack until 2 p.m., when he received Grant's order to attack, upon which he ordered Smith and Osterhaus to attack vigorously and ((press for victory, w but the attack was not a vigorous one, and meanwhile the battle was being fought out and decided on the right, on Champion's Hill. Hovey, advancing on the Clinton road, began skirmishing with Stevenson about 10

o'clock and began to form line for a general attack, but was directed by Grant to wait until McClernand could be heard from. Logan

came up at 11 o'clock; nothing had been heard from McClernand and line was formed for a general attack, Hovey south of the Clinton road and Logan on his right. It was about noon when Hovey advanced with great spirit,

climbed Champion's Hill and attacked; finally, after a hard contest with varying success, driving back the right of Stevenson and cap¬

turing 11 guns, soon after which Logan, who had worked around on Stevenson's left, on the north side of the hill, attacked and drove back Stevenson's left and captured seven guns. The positions thus gained were held until 2 o'clock.

Meanwhile Stevenson, who had been compelled to take ground to the left to meet Logan's flank movement and cover the road to Baker's Creek and Edwards' Station, had induced Pem¬

berton to draw Bowen to the left and close the interval between the two divisions and Loring was ordered to close in on Bowen. It was after 2 o'clock when Bowen closed in on Ste¬

venson and his two leading brigades, F. M.

Cockrell's and Green's, attacked Hovey furi¬

ously and drove him back down the hill, Hovey contesting every foot, but forced to abandon nine of the captured guns. As Hovey fell back two brigades of Crocker's division came to his support, and the Confederates were checked. Artillery was now massed and poured

such an effective enfilading fire upon Steven¬

son's line that it was much shaken, and Hovey and Crocker again charged up the hill, driving Stevenson and Bowen, after a desperate resist¬

ance, before them ; and Pemberton, seeing his ' left entirely broken, at 3 o'clock gave the order for a general retreat, which he ordered Loring to cover. Before this, Loring, leaving Gen.

Lloyd Tilghman's brigade on the Raymond road to oppose Smith and Blair, had already with two brigades nearly closed up on Bowen, and when the retreat began was forming his men between the Clinton and Raymond roads, when he was attacked by Osterhaus, and soon gave way, falling back to the Raymond road.

Meanwhile A. J. Smith had advanced on the Raymond road, defeated and killed Tilghman.

Loring reunited his command and retreated on the Raymond road, but when he came to the ford of Baker's Creek he found it in Union possession, upon which, after vain effort to find a crossing lower down, and realizing that he had been cut off from Pemberton's army, he moved off to the south, abandoning his artil¬

lery, and on the 19th joined Johnston, who meanwhile had reoccupied Jackson. Steven¬

son's and Bowen's men retreated to the Big Black, Grant following as far as Edwards' Sta¬

tion, where darkness ended the pursuit. Grant says he fought the battle with about 15,000

men actually engaged in four hours of hard fighting, preceded by two or three hours of skirmishes, some of which rose almost to the dig¬

nity of battle. The Union loss was 410 killed, 1,844 wounded and 187 missing. The Confederate loss was 380 killed, 1,018 wounded, 2,441 miss¬

ing and 24 guns taken. Grant pursued next day, the 17th, defeated Pemberton at the Big Black and on the 19th invested Vicksburg.

Consult (Official Records* (Vol. XXIV) ; Green, (The Mississippi ; Grant, (Personal Memoirs) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. III).

E. A. Carman.

CHAMPLAIN, shan-plan or sham-plan',

Samuel de, French navigator, colonizer and soldier: b. Brouage, Saintonge, about 1570; d.

Quebec, 25 Dec. 1635. In early life he served in the army of Henri IV, as quartermaster of cavalry, but in January 1599 he sailed as captain of the Saint Julien to the West Indies, Mexico and Panama. On his return (1601) he prepared a record of this cruise, with charts, etc., which is preserved in manuscript form at Dieppe. An English translation was published in 1859, and it appeared in the original in 1870. In March 1603 he sailed for North America, and ex¬

plored, by boat, the Saint Lawrence River up to the Falls of Saint Louis, and down to Gaspe, and published a small book describing his voyage. In May 1604 he sailed with De Monts along the shores of Nova Scotia, wintered on the island of Saint Croix and founded a colony at Port Royal. From 1604 to 1606 he made careful surveys and charts of the coast as far as Cape Cod. He revisited France in 1607, but sailed again in 1608, and founded Quebec, which, owing to the development of its fur-trade, rapidly increased in size. In 1609 he accompanied an Algonquin and Huron expedi¬

tion against the Iroquois, and thereby discov¬

ered Lake Champlain, on the borders of which the Iroquois were defeated. From September 1609 to March 1610 he was engaged in bringing over French mechanics for his colony. In 1611

he established a trading-post at the present site of Montreal. He became lieutenant-governor of New France, 8 Oct. 1612 ; accompanied a band of Indians against the Iroquois, traversing a large part of the present State of New York; fortified Quebec in 1620, but

was compelled in 1629 to surrender to an English fleet, and was taken to England. Released in 1632, he sailed again for New France, with three well-equipped vessels, and spent his last years in the govern¬

ment and development of the French colonies.

A complete edition of his works was published in 1870, Laverdiere and Casgrain being the 274

editors. An English translation by Charles Otis, with a memoir by E. F. Slafter appeared in Boston (3 vols., 1878-82). Consult Voy¬

ages of Samuel de Champlain, 1604 — 18 5 (New York X907) ; Parkman, (Pioneers of France in the Ne% World* (Boston 1865) ; Sedgwick, in 'Riverside Biographical Series) (Boston 1902) ; Colby, (Canadian Types of the Old Regime*

(1908).

CHAMPLAIN, Lake, a body of water

chiefly in the United States, between the States of New York and Vermont, but having its northern end six miles within the Canadian boundary, in the province of Quebec. Its ex¬

treme length, north to south, is about 125 miles ; breadth, from half a mile to 15 miles; area, about 600 square miles. It is 90 feet above the level of the sea. It was discovered in 1609 by Samuel Champlain, governor of Canada, whence its name. It is navigated by steamboats and other vessels, and is deep enough for ships of the largest class. Its waters are carried north¬

ward to the Saint Lawrence by the river Riche¬

lieu or Sorel, which, in conjunction with the Chambly Canal, affords navigation for large vessels, and forms a well-frequented line of communication. The south end of the lake is connected by a canal with the Hudson River, Lake Champlain thus affording water com¬

munication between the Saint Lawrence a few miles below Montreal and the Atlantic at New York. Upwards of 50 islands are scattered over its surface; and it receives numerous streams, none of which are very important.

The scenery along its sides is picturesque. The Green Mountain Range lies about 20 miles east of the lake; on the west are the Adirondacks.

It abounds in salmon, shad, pike and other fish ; in winter it is usually frozen over. The chief port on its banks is Burlington, Vt. The other towns of importance are Rouses Point, Plattsburg, Port Henry, Crown Point and Whitehall in New York. During the wars between the United States and Great Britain, this body of water was the scene of numerous military op¬

erations.

The Champlain Society, whose headquarters are at Toronto, has published important his¬

torical writings dealing with the history of New France. In July 1909 a celebration was held in honor of the tercentenary of the dis¬

covery of Lake Champlain which was partici¬

pated in by many nations.

CHAMPLAIN, Lake, Battle of, in the

War of 1812. During 1812 and 1813 no im¬

portant naval operations had taken place on Lake Champlain. On 3 June 1813 the British cleared the lake of the few small American vessels, and captured the commander, where¬

upon Lieut. Thomas MacDonough (q.v.) was ordered to construct a new navy. During the following winter and spring both Americans and British pushed forward the building of sloops, brigs and gunboats. The British were first afloat but the summer passed in manoeu¬

vres as Sir George Prevost with 11,000 men was preparing to cross the

border. Brig.-Gen.

Alexander Macomb (q.v.) with 1,500 regulars and 700 militia under Gen. Benjamin Mooers had encamped at Plattsburg at the mouth of the Saranac and had thrown up works on the southern side of the town just across the bridge over the Saranac, but as the village was untenable when the British approached from the north, Macomb destroyed the bridge and retired to his breastworks. From 6-11 Sept.

1814 the two armies continuously skirmished and the British brought up heavy ordnance preparatory to assaulting the fort, but when Prevost beheld MacDonough's fleet in the bay he decided before attacking to await the arrival of the British fleet under Capt. George Downie. On the morning of 11 Sept. 1814

the fleet appeared, consisting of the Confiance, Linnet, Chubb and Finch, besides 12 smaller gunboats. The American fleet consisted of the Saratoga, Eagle, Ticonderoga and Preble, be¬

sides 10 gunboats. While the weight of metal thrown by the American fleet surpassed that of the British, the latter had 60 long range guns to MacDonough's 45 and thus if the battle were fought at long range the advantage lay with Downie. But MacDonough anchored his fleet so that Downie would be compelled to pass between him and the land and could not come to anchor on his broadside out of range of the American carronades. Downie anchored his flagship, the Confiance, 300 yards from MacDonough's flagship, the Saratoga, and at the first broadside nearly blew the American vessel out of the water, killing or wounding one-fifth of the crew. While these two ves¬

sels were engaged, the Eagle disabled the Chubb but was herself soon driven out of the fight; the Ticonderoga drove the Finch to Crab Island where she surrendered; but the British galleys forced the Preble to seek shelter. This left the Linnet free to aid the Confiance, which, having suffered severely, lacked the power to silence the Saratoga.

Thus exposed to the concentrated fire of both ships the starboard guns of the Saratoga were soon silenced but MacDonough let go his stern anchor, winded his ship and brought the un¬

used port battery to bear on the Confiance, with the result that in 15 minutes Downie struck his colors. The Saratoga next opened on the Linnet and compelled her to surrender, whereupon the remaining British galleys, with the aid of their sweeps, moved away and escaped with every ensign down. The Amer¬

ican loss was 52 killed and 58 wounded and the British loss 57 killed and 92 wounded. Mean¬

while Prevost was shelling Macomb's defenses and endeavoring to cross the Saranac in the hope of crushing the Americans by assault. As these efforts were fruitless and as control of the lake was in American hands Prevost, during the night of 12-13 September, sent away his baggage and artillery and retreated, leaving behind only his sick and wounded. The Americans pursued a short distance but

quickly returned. Consult Adams, Henry;

(United States) (Vol. VIII, pp. 91-113) ; 'American State Papers, Naval Affairs* (Vol.

I, pp. 310-311) ; Barnes, James, (Naval Actions of the War of 1812) (pp. 209-216) ; Bracken-bridge, H. M., 'History of the Late War*

(p. 274) ; Clark, G. R., 'Short History of the Navy* (pp. 189-198) ; Cooper, J. F., (Naval History* (Vol. II) ; Emmons, George F., ' Statistical History of the Navy) ; James, Wil¬

liam, 'Naval Actions) and 'Military Occurrences) (Vol. II) ; Lossing, B. J., 'War of 1812) (pp. 858-875) ; MacDonough, Rodney, 'Life of MacDonough* ; Maclay, E. S., 'History of the Navy* (Vol. II) ; Mahan, A. T., 'War of CHAMPLAIN STAGE — CHAMPNEYS

1812* (Vol. 11) ; Richard, G. H., 'Memoir of Alexander Macomb *; Roosevelt, 'Naval War of 1812 } (pp. 376-397); Spears, J. R., 'History of the Navy* (Vol. III,pp. 132-185) ; Wiley and Rines, (The United States) (Vol. V, pp. 434-440).

CHAMPLAIN STAGE, the name given

by American geologists to the subsidence that was a feature of the close of the Glacial Epoch in New York, New England, Ontario and

Quebec. At the beginning of the Glacial Epoch the elevation of this section of the con¬

tinent may have been greater than now, but when the ice-sheet finally retreated the sea ex¬

tended up the Saint Lawrence River nearly to Lake Ontario, and the lower Ottawa River and Lake Champlain were occupied by salt water. The stage is named from the lines of old sea beaches containing whale and walrus bones, thus showing the submergence, typically developed about Lake Champlain. The total amount of the depression varied, being greatest over the Saint Lawrence Valley. About New York harbor the coast was depressed fully 70

feet; at Albany 355 feet. Along the Maine shore the land was 150 to nearly 300 feet lower than now, and in the Saint Lawrence Valley the depression was over 500 feet, making al¬

lowance for the previous elevation the total depression in the Saint Lawrence Valley reached 1,500 feet. The climate of Champlain time was probably warmer and moister than that of the present. On the Pacific coast are evidences of depression in the region about Mount Saint Elias, shells of Champlain species being found at an altitude of 5,000 feet. (See Glacial Period; Quaternary Period). The

term Champlainic system has been proposed to replace Ordovician system, but the proposal has not met with general acceptance.

CHAMPLEVE, shan-le-va', ENAMELS.

See Art Enamels.

CHAMPLIN, champ'lin, James Tift,

American educator : b. Colchester, Conn., 9

June 1811; d. Portland, Me., 15 March 1882.

He was graduated as valedictorian at Brown University in 1834, and was tutor there 1835-38. He was a Baptist pastor at Portland, Me., 1838-41 ; professor of Greek and Latin, Waterville (now Colby) College 1841-58;

president of the college 1857-73 ; professor of intellectual and moral

philosophy 185&-73, when he removed to Portland to devote him¬

self entirely to literary work. He published a large number of school and college text¬

books, including English, Greek and Latin grammars, editions of ˆEschines' and Demos¬

thenes' orations, Tacitus, and Butler's 'Anal¬

ogy of Religion.) Others are 'Textbook of Intellectual Philosophy* (I860) ; 'First Prin¬

ciples of Ethics* (1862); 'Political Economy) (1868); 'Scripture Reading Lessons* (1876); 'Constitution of the United States; with Brief Comments on the Constitutions of England and France) (1880).

CHAMPLIN, John Denison, American

author: b. Stonington, Conn., 29 Jan. 1834; d. 8 Jan. 1915. He was graduated at Yale in 1856, and admitted to the bar in 1859. In 1864 he became associate editor of the Stand¬

ard at Bridgeport, Conn. He afterward pub¬

lished The Sentinel (1865-69) at Litchfield, Conn. He devoted himself entirely to litera¬

ture from 1869, and became associate editor of the 'American Encyclopaedia * (1875).

Author 'Young Folks' Cyclopaedia of Common Things) (1879) ; 'Young Folks' Catechism of Common Things) (1880, 1906) ; 'Young Folks'

Cyclopaedia of Poems and Places) (1880, 1899, 1911) ; 'Young Folks' Astronomy * (1881) ; 'Young Folks' History of War for the

Union> (1881) ; 'The Chronicle of the

Coach) (1886) ; 'Young Folks' Cyclopaedia of Games and Sports * (with Arthur E.

Bostwick, 1890) ; ‘Young Folks’ Cyclopaedia of Literature and Art) (1901) ; ‘Young Folks’ Cyclopaedia of Natural History) (1905) ; ‘The Tragedy of Anne Hutchinson * (1911).

Editor ‘Fox’s Mission to Russia* (1873) ; ‘Cyclopaedia of Painters and Paintings* (1886-88) ; ‘Cyclopaedia of Music and Musicians*

(1888-90) ; ‘Liber Scriptorum* (1893). Asso¬

ciate editor ‘The American Cyclopaedia* (1873—77) ; ‘The Standard Dictionary* (1892-94) ; ‘Orations, Addresses, and Speeches of Chauncey M. Depew* (1910).

CHAMPNEY, champ’m, Benjamin,

American artist : b. Ipswich, N. H., 29 Nov.

1817; d. Woburn, Mass., 14 Dec. 1907. He went to Boston in 1834, and for three years worked in a lithographic establishment. From 1841 to 1848 he studied painting in Paris and Italy, exhibiting several times in the Paris Salon. He worked chiefly in landscape and flower painting, and his White Mountain paintings, which are owned in and around Boston, are famous.

After 1853 he passed most of his summers in North Conway, N. H. He painted also a panorama of the Rhine and published ‘Sixty Years’ Memories of Art and Artists* (1900).

CHAMPNEY, Elizabeth Williams,

American author: b. Springfield, Ohio, 6 Feb.

1850. She was graduated at Vassar College 1869, has traveled extensively in Europe and written many papers for Harper’s and the Century. She is president of the board of managers of the Messiah Home for Children.

She has published ‘The Bubbling Teapot* ; ‘Howling Wolf and His Trick Pony* ; ‘All Around a Palette* ; ‘Bourbon Lilies* ; ‘Rose¬

mary and Rue* ; ‘In the Sky Garden* ; ‘Vassar Girls Abroad* ; ‘Witch

Winnie* series (7

vols.) ; ‘Dames and Daughters of Colonial Days* ; ‘Romance of the Feudal Chateaux >

(1900) ; ‘Romance of the Renaissance Cha¬

teaux* (1901) ; ‘Romance of the Bourbon Chateaux* (1903); ‘Romance of the French Abbeys* (1905) ; ‘Romance of Italian Villas*

(1906) ; ‘Romance of Roman Villas* (1908) ; ‘Romance of Imperial Rome* (1910) ; ‘Ro¬

mance of Old Belgium* (1915).

CHAMPNEYS, champ’niz, Basil, English

architect: b. 1842. He was educated at Trinity College, Cambridge, and after studying archi¬

tecture with the architect Prichard, of Llan-daff, began the practice of his profession in 1867. Important works of his are the divinity and literary schools of Newnham College and the Archaeological Museum at Cambridge; In¬

dian Institute, Robinson Tower at New College and Mansfield College at Oxford; Rylands Li¬

brary in Manchester; Butler Museum at Har¬

row; and Quincentenary buildings at Winches¬

ter College. He is cathedral architect at Manchester. He has published ‘A Quiet Cor¬

ner of England,* a delightful description of 276

Rye and Winchelsea (1875); (Henry Merritt: Art Criticism and Romance) (1879) ; (Coventry Patmore: Memoirs and Correspondence

>

(1900).

CHAMPOLLION, shan pol yon, Jean

Frangois, le Jeune, French Egyptologist: b.

Figeac, Lot, France, 23 Dec. 1790; d. Paris, 4 March 1832. At an early age he devoted himself to the study of Hebrew, Arabic, Coptic, *etc.* In 1807 he read a paper before the Acad¬

emy of Grenoble on the ancient Egyptian geo¬

graphical names, which he endeavored to ex¬

plain by the Coptic. He then went to Paris, where he continued his Oriental studies, paying particular attention to the Coptic, and endeavor¬

ing through it to find the key to the Egyptian hieroglyphics. In 1809 he became professor of history at Grenoble, but soon retired from this post and went to Paris, where he devoted him¬

self almost exclusively to the study of Egyptian antiquities. Assisted by the trilingual inscrip¬

tion of the Rosetta stone he at length discov¬

ered the key to the graphic system of the Egyptians, the three elements of which — fig¬

urative, ideographic and alphabetic — he ex¬

pounded before the Institute in a series of memoirs in 1823. These were published in 1824

at the expense of the state, under the title of (Precis du systeme hieroglyphique des anciens EgyptiensP In 1824 he went to Italy, and investigated the collections of papyri and other Egyptian antiquities in the principal cities there. In 1826 Charles X appointed him to superintend the new department of Egyptian antiquities in the museum of the Louvre. In 1828 M. Champollion went as director of a

scientific expedition to Egypt, at the expense of the King. He was admitted a member of the Academy of Inscriptions in 1830. In 1831 the chair of Egyptian archaeology was created for him in the College de France. His principal works are (Grammaire Lgyptienne5 and (Dictionnaire hieroglyphique^ both published after his death. His (Notice manuscrits) (1844 et seq.) gives an adequate description of the re¬

sults of his Egyptian journey. Of the numer¬

ous books and essays published during his life the most noteworthy are (Pantheon egyptien) (1824); (Sur l'ecriture hieratique) (1821); (Sur l'ecriture demotique) (1824). They are indispensable to the student of hieroglyphics.

Consult Champollion, Aime, (Les deux Cham¬

pollion, leur vie et lcurs ceuvres) (Grenoble 1888).

CHAMPOLLION FIGEAC, fe-zhak,

Jean Jacques, French archaeologist, elder brother of the preceding: b. Figeac, Lot, 5

Oct. 1778; d. 9 May 1867. He completed his studies at Grenoble' published his first archae¬

ological memoirs in 1803, and was named successively librarian of Grenoble, professor of Greek literature, secretary and dean of the faculty of letters of the same town. He took an active part in everything connected with science and letters in the department of the Isere. »He acted as secretary to Napoleon in drawing up under his instruction the account of his memorable passage from Elba to

Grenoble. In 1828 a place was made for him as keeper of the manuscripts in the Royal Library, and shortly afterward he was installed in the chair of palaeography in the Lcole des Charts. He was made an officer of the Legion of Honor in 1866. His principal works are (Antiquites deGrenoble) (1807); (Paleographie universelle) ; (Nouveaux eclaircissements sur la ville de Cularo, aujourd'hui Grenoble >

(1814) ; (Annales des Lagides) (1819) ; (Traite elementaire d'archeologie> (1843) ; (Lcriture demotique egyptienne) (1843);

(L'Lgypte ancienne et moderne) (1850) ; besides several other interesting works on Oriental history, and on the language and antiquities of the department of the Isere. He collaborated in editing the manuscripts left by his brother.

Consult the authority cited above.

CHAMPS ELYSEES, shanzWza' (Fr.

(Fr. (<Elysian Fields)}), an avenue in Paris, with its surrounding gardens. It extends from the Place de la Concorde to the Arc de Triomphe de l'Etoile, a distance of one and a quarter miles, and is a famous public resort and promenade. The lower end forms a park, on either side of which are placed the Palais de l'Elysee and the two Palais des Beaux Arts, occupying the site of the old Palais de l'lndustrie. It became the property of the Crown in 1616 and was ceded to the city in 1828.

CHANCA, chan'ka, Dr. (believed to have

been Diego Alvarez Chanca), Spanish physi¬

cian: b. Seville; who became a companion of Columbus on his second voyage in 1493. One of the principal authorities for this voyage is the letter which he wrote to the Catholic college at Seville, giving an account of his journey.

No record has been kept of his subsequent life.

CHANCE, in its original and strict mean¬

ing, is a description of events which cannot be subsumed under any law, causal or theological.

Strictly speaking, it is an idea which few men would now be disposed to admit as correspond¬

ing to anything which really exists; .the re¬

ligious mind excluding it as inconsistent with the belief in the divine government, and the philosophical mind rejecting it as inconsistent

with a recognition of universal laws of causa¬

tion. As a word, however, it has always been, and always will be, popularly accepted as a term denoting an unknown cause, or a cause so remote that it is overlooked when events are considered superficially and apart from their universal connection. For the mathe¬

matical theory of events which are chance in this derived sense, see Probability, Theory of.

CHANCE, Games of. See Gambling.

CHANCE ACQUAINTANCE, A, a

story by William Dean Howells, published in 1873. This agreeable and entertaining sketch contains many charming descriptions of the picturesque scenery and places about Quebec.

CHANCE-MEDLEY, homicide happen¬

ing either in self-defense, on a sudden quarrel or in the commission of an unlawful act, with¬

out any deliberate intention of doing mischief.

CHANCEL, that portion of a church oc¬

cupied by the clergy, and often separated from the nave and aisles by screens of carved stone or oak. The screen separating the chancel from the nave is called the rood screen, because anciently a rood or large crucifix was usually placed on it, accompanied with two figures rep¬

resenting Saint John and the Virgin Mary. In the chancel were situated the high altar, the sedilia, or seats for the officiating clergy, and the piscina, in which the water used for washing CHANCELLOR

the hands of the celebrant was poured. It usually contains carved seats or stalls, occupied by the clergy not engaged in the services.

These are enriched with carvings and have canopies of carved oak. The chancel occupies the same place with the apsis in the ancient basilicas, and was called so from the cancelli, or rails used in the early churches to separate the clergy from the laity. The chancel is al¬

ways at the east end of the church (churches being technically considered as having their major axes extending east and west) and is often constructionally a separate building open¬

ing from the nave with a lower roof elevation and raised several steps above the nave. In architecture the term is often employed as synonymous with choir (q.v.).

CHANCELLOR, Charles Williams,

American physician : b. Spottsylvania County, Va., 19 Feb. 1833 ; d. Washington, D. C., 3 Jan.

1915. He studied at Georgetown College and the University of Virginia, 1848-52, and was graduated at Jefferson Medical College, Phila¬

delphia, 1853. During the Civil War he was medical director of General Pickett's division in the Confederate army, 1863-65. He was professor of surgery in and dean of Washing¬

ton University, Baltimore, 1868-75 ; secretary of the Maryland State board of health, 1875; president of the Maryland State Insane Asy¬

lum, 1880; and United States consul at Havre, France, 1893-97. Among his numerous re¬

ports and articles on medical and sanitary top¬

ics are the following: (Report upon the Con¬

dition of the Prisons, Reformatories and Char¬

itable Institutions of Maryland* (1875) ; (Contagious and Infectious Diseases* (1878) ; (Mineral Waters and Seaside Resorts) (1883) ; (Drainage of the Marsh Lands of Maryland) (1884); (Heredity) (1886); (Sewerage of

Cities* (1886) ; (Climate of the Eastern Shore of Maryland.*

CHANCELLOR, Richard, English navi¬

gator: d. 10 Nov. 1556. He seems to have been brought up in the household of the father of Sir Philip Sidney and was chosen in 1553 as captain of the Bonaventure and pilot-general of Sir Hugh Willoughby's expedition in search of a northeast passage to India. The ships were parted in a storm off the Lofoden Islands and Chancellor, after waiting seven days at Vardo-hus, the rendezvous agreed upon, proceeded alone into the White Sea and traveled thence overland to the court at Moscow, where he was very hospitably treated and was able to conclude a treaty giving freedom of trade to English ships. His interesting account of Rus¬

sia was published in Hakluyt's (Navigations. *

Next spring Chancellor rejoined his ship and returned to England, where his hopeful reports led to the establishment soon after of the Mus¬

covy Company. In the summer of 1555 he made a second voyage in the Bonaventure to the White Sea, and was at Moscow once more in the succeeding winter. In July 1556, he set sail on his voyage homeward, but was lost in the wreck of his ship in Aberdour Bay off the Aberdeenshire coast.

CHANCELLOR, an officer supposed to

have been originally a notary or scribe, under the Roman emperors and named can cellar ins, because he sat behind a lattice — called in Latin cancelli — to avoid being crowded by the peo¬

ple. There are, however, other derivations of this title. Whatever may have been its origin, the office and name of chancellor were undoubt¬

edly known at the court of the Roman em¬

perors, where the title seems to have signified originally a chief scribe or secretary, who was afterward invested with several judicial pow¬

ers and with superintendence over the other officers of the empire. From the Roman em¬

pire the title and office passed to the Roman Catholic Church and hence every bishop has to this day his chancellor, the principal judge of his consistory. When the modern kingdoms of Europe were established upon the ruins of the empire, almost every state preserved its chancellor, with different jurisdictions and dig¬

nities according to their different constitutions.

In all he seems to have had the supervision of all charters, letters and such other public in¬

struments of the Crown as were authenticated in the most solemn manner, and therefore, when seals came into use, he had always the custody of the king's great seal. This officer has now great authority in all the countries of Europe.

The Lord High Chancellor of Great Britain (originally of England) is the first judicial of¬

ficer of the Crown and exercises an extensive jurisdiction as head of the judiciary. He ranks as first lay person of the state after the blood-royal. He is always one of the commissioners appointed to represent the sovereign in open¬

ing and closing Parliament or giving the royal assent to bills. He is created by the delivery of the great seal into his custody. In like manner the act of taking away the seal for¬

mally terminates his office. He is a Cabinet Minister and a privy councillor in virtue of his office, is speaker of the House of Lords by prescription and in that office has the right to address their lordships

as well as to vote.

He vacates office with the ministry which ap¬

points him. He has a salary of £10,000 and, no matter how brief his tenure of the office may be, is entitled to a pension of £5,000 a year on vacating it. When Sir Robert Finlay was in December 1916 nominated for the office in the Lloyd-George government, he is be¬

lieved to have created a precedent in stipulat¬

ing for waiving of the pension in his case. The Lord Chancellor presides over the Court of Ap¬

peal and the privy council in the exercise of judicial functions. He has the appointment of all justices of the peace in the kingdom, is visitor, in the king's right, of all royal founda¬

tions and patron of all Crown livings, the higher dignities in the Church of England being nominated by the Prime Minister. The office having in early times been always filled by ec¬

clesiastics (for no others were then capable of an employment requiring so much writing), he became keeper of the king's conscience ; and by special appointment he now exercises a general superintendence as guardian over all infants, idiots and lunatics, though these latter powers are not necessarily attendant on his office, as Blackstone seems to have imagined, but can be delegated by the Crown to any other judicial officer, as in fact they were delegated even as late as the reign of James I, when the seals were held by Dr. Williams, then dean of Westminster and afterward bishop of Lincoln.

The great seal has been not infrequently put in commission and was last so on the resigna¬

tion of Lord Thurlow in the year 1793. One 278

vice-chancellor was appointed to preside in the courts of equity by 53 George III, c. 24, and two by 5 Viet. c. 5, § 19. The two last-men¬

tioned were at first subordinate vice-chancel¬

lors, but they were afterward all made of equal rank. They sat in separate courts, and an appeal lay from their decisions to the Lord Chancellor. They latterly sat in the chancery division of the Supreme Court of Judicature.

See Chancery; Supreme Court of Judicature.

Chancellors of Ireland and Scotland. —

There is a Lord High Chancellor of Ireland, who is the head of the judicial bench, with a salary of £8,000. He is not a member of the British ministry. The chancellorship of Scot¬

land was abolished at the union. The Scottish Chancellor had no independent jurisdiction in equity, as there has never been a separate court of equity in Scotland; but he presided in Parliament, and was head of all the courts of judicature and of the Scottish office of chan¬

cery, in which all charters and other writs ap¬

pointed to pass the great seal were recorded.

The Chancellor of the Exchequer is the Finance Minister of the Cabinet and as all questions of supply originate in the House of Commons, a peer is ineligible for this office, which originated in the separation of the chancery from the exchequer in the reign of Henry III. The holder of this office in recent years is generally held as having the reversion to the premiership, with which it has occasion¬

ally been conjoined.

The Chancellor of the Duchy of Lancaster is the representative of the Crown in the man¬

agement of the lands of the duchy, which are the personal property of the sovereign. The office is a sinecure and is usually held by a minister of Cabinet rank, of high standing in the country, but who is unable to bear the physical strain incident to the management of a heavy department.

The Chancellor of a University is an official at the head of the university, generally a man of rank, whose duties are more or less nominal, but who is regarded as conferring the degrees.

At Oxford his duties are almost entirely dis¬

charged by the vice-chancellor; the chancellor's own acts being limited to the signing of diplo¬

mas, *etc.* Under the vice-chancellor are four pro-vice-chancellors, nominated by him from among the heads of colleges, to one of whom, in his absence from the university, he delegates his authority. The chancellor of Cambridge University, whose duties are very similar to those of the Oxford official, is elected bienni¬

ally by the senate ; but there is no instance, at least in modern times, where a re-election has not taken place.

Chancellor of the Order of the Garter and Other Military Orders , an officer who seals the commissions and the mandates of the chapter and assembly of the knights of the order, keeps the register of their proceedings and delivers their acts under the seal of their order. The title ˆchancellor® is given, in England, to sev¬

eral officers of other bodies.

Chancellors of Other European Countries.

— The Chancellor was one of the highest offi¬

cers in the German states and by the influence of his office was one of the most important. In Germany this dignity was from the remotest times vested in one of the higher clergy, until the head of the German clergy, the archbishop and Elector of Mainz, united it forever with his office as arch-chancellor of the empire. The two other spiritual electors held the same dig¬

nity, but it was merely titular; the archbishop of Cologne, as arch-chancellor of Italy; the archbishop of Treves, as arch-chancellor of Gaul and Arles, that is, the kingdom of Burgundy, once belonging to Germany. The arch-chan¬

cellorship of Mainz, on the contrary, had im¬

portant duties attached to it — the direction of the Diet and of the public business, as well as of all Imperial chanceries. The Elector appoint¬

ed a vice-chancellor, who was the actual min¬

ister of the empire at the Imperial court. In the German empire (1871-1918) the Chancellor (Reichskanzler) was the president of the Fed¬

eral Council (Bundesrath) , and had the general conduct of the imperial administration. All laws of the empire, after being sanctioned by the Emperor, had to be countersigned when promulgated by the Chancellor.

The Chancellor of France held a position analogous to that in England, was the highest officer of state and the only one who, when once appointed, could not be dismissed. In case, therefore, it was desired to remove him from participation in affairs, a keeper of the seals (garde des sceaux) was appointed. As the Chancellor was properly the Minister of Justice, he was chosen from the body of jurists.

A relic of his spiritual character was, that all his furniture, liveries and even his coach, were black.

CHANCELLORSVILLE, The Battle of.

The Chancellorsville campaign included the bat¬

tle of Chancellorsville, 1-3 May 1863, the action at Marye's Heights, 3 May 1863, and the en¬

gagement at Salem Church, 3 and 4 May 1863.

In the fore part of April 1863 the Army of the Potomac, under General Hooker, and the Army of Northern Virginia, General Lee, confronted each other on opposite sides of the Rappahan¬

nock at Fredericksburg. Lee was so strongly entrenched on the south

side of the river from Port Royal on the right to Banks' Ford on the left, a distance of 25 miles, that an attack on his front was not to be thought of, and Hooker concluded to march his cavalry far beyond and around Lee's left, destroy his communications with Richmond and compel him to leave Fred¬

ericksburg, when he proposed to fall on his flank and rear as he fell back. For this pur¬

pose General Stoneman with 10,000 cavalry was put in motion, 13 April, under orders to ascend the Rappahannock, cross it west of the Orange and Alexandria Railroad, attack Lee's cavalry wherever found, and plant himself firmly across his line of retreat. Stoneman found the Rap¬

pahannock and other streams so swollen by heavy rains that he was compelled to abandon the movement, and Hooker modified his plans.

He determined to flank Lee's position and com¬

pel him to come out and fight on open ground of Hooker's own choosing. Lee had, in and around Fredericksburg, exclusive of cavalry, about 60,000 men and 1 70 guns; the two divi¬

sions of McLaws and R. PI. Anderson of Longstreet's corps, and Jackson, with the divisions of A. P. Hill and D. H. Hill, commanded by R. E. Rodes ; Trimble, commanded by R. E.

Colston and J. A. Early. Hooker had," not in¬

cluding his 12,000 cavalry, about 118,000 men CHANCELLORSVILLE

and 380 guns, divided into seven corps: First, Gen. J. F. Reynolds; Second, D. N. Couch; Third, D. E. Sickles; Fifth, George G. Meade; Sixth, John Sedgwick; Eleventh, O. O. How¬

ard; Twelfth, H. W. Slocum. Both armies were in the best of condition. On the 27th the Elev¬

enth and Twelfth corps marched for Kelly's Ford, 25 miles up the Rappahannock, arriving on the 28th, and being joined by the Fifth

corps, all crossed the river next morning, the Eleventh and Twelfth corps marching for Germanna Ford on the Rapidan, the Fifth corps for Ely's Ford, lower down the same stream. Pleasan¬

ton's cavalry brigade accompanied the two columns. Some opposition was met at the fords, and at 2 p.m. of the 30th, after some sharp encounters with Stuart's cavalry, on the Germanna road, the three corps united at Chan¬

cellorsville, 11 miles west of Fredericksburg, and were joined the same day by two divisions of the Second corps, under Couch, which had crossed the Rappahannock at United States Ford, the Third corps also being near. The cavalry was thrown out on the roads toward Fredericksburg and Spottsylvania. Hooker had concentrated with great ability 71,000 men on Lee's left and joined them before night.

Mahone's and Posey's brigades of Anderson's Confederate division had been guarding United States Ford; the passage at Germanna Ford turned this position, and the two brigades on the 29th fell back to Chancellorsville, where Anderson had come up with Wright's brigade.

Next morning Anderson fell back with the three brigades to near Tabernacle Church, four miles, and began to throw up works covering the roads converging at that point. These movements on Lee's left were covered by dem¬

onstrations on his right and front below Fred¬

ericksburg. They began as early as the 21st, and on the 29th Sedgwick, with the First, Third and Sixth corps, moved to points two to four miles below town, threw pontoon bridges across the river and crossed troops to hold them. On the 30th he was ordered to demonstrate on Lee's right down the river, and the Third corps marched by the north bank of the river for Chancellorsville. Sedgwick's movements did not deceive Lee. On the afternoon of the 29th Stuart had informed him that heavy Union columns were marching for the Rapidan, and he ordered Anderson to march with Wright's brigade to Chancellorsville. When informed that Hooker had crossed the Rapidan he or¬

dered McLaws, leaving Barksdale's brigade on Marye's Heights, to march with three brigades, at midnight of the 30th, and take position on Anderson's right. Jackson was ordered with three divisions to Chancellorsville, leaving Early's division with Barksdale's brigade — in all, about 8,500 men and 30 guns — to hold the lines at

Fredericksburg against Sedgwick.

McLaws arrived on Anderson's right about daylight, and was joined by two of Ander¬

son's brigades from near Banks' Ford. Jackson marched at 3 o'clock on the morning of 1

May, and came up to Anderson at Tabernacle Church at 8, suspended work on the entrench¬

ments and, at 11 o'clock, ordered McLaws and Anderson forward on the two roads leading to Chancellorsville, his own three divisions follow¬

ing Anderson. Three roads lead from Chan¬

cellorsville to Fredericksburg, the most direct, the old turnpike, passing Salem Church. The second, the plank road, led south from Chan¬

cellorsville, then east, uniting with the turnpike beyond dabernacle Church. Both these roads were covered by Anderson's works. The third road led northeastward, passed Banks' Ford, about six miles distant, and continued to Fred¬

ericksburg. It was 11 o'clock, 1 May, when Meade pushed out two divisions on the Banks'

Ford road and one, Sykes', on the turnpike, under orders to be at or near Banks' Ford at 2

p m., and at the same hour, 11 a.m., Slocum advanced on the plank road, to be at Taber¬

nacle Church at noon. Hooker's intention being to get out of the Wilderness, uncover Banks'

Ford, and form for battle in open, elevated country, his right at Tabernacle Church, his left covering Banks' Ford. Meade's left division had come in sight of Banks' Ford; Sykes, sup¬

ported by Hancock's division, Second corps, had encountered McLaws and driven him back

nearly to Anderson's works ; Slocum, over two miles out, had met Jackson and was sharply skirmishing with him; and all was going

well, when Hooker, impressed by the unexpected advance of the enemy, and fearing his own inability to get entirely out of the tangled forest, onto open ground, before being beaten in detail, ordered the columns back to Chancel¬

lorsville, thereby giving up the advantage of position practically gained and losing the con¬

fidence of his corps commanders. Jackson and McLaws followed the retiring troops and felt the lines with skirmishers, and McLaws got guns in position and cannonaded the left of the line. Hooker's line, as completed on the morn¬

ing of the 2d, extended from the Rappahannock on the left to a point on the Germanna plank road full two and a half miles west of Chan¬

cellorsville. The Fifth corps and a division of the Second was on the left, facing east, the right in advance of the Chancellor House. The Twelfth corps was south of the plank road, its left less than one-fourth of a mile in front of the Chancellor House, its right near Hazel Grove, a little over a mile southwest of Chan¬

cellor's. Birney's division of the Third corps was on the right of the Twelfth, and the Eleventh corps continued the line from Dowdall's tavern westward beyond Talley's farm.

The works held by the Twelfth, Third and Eleventh corps faced south, those of the 280

Twelfth in form of a bow, the plank road being the string of the bow; those of the Eleventh ran in a straight line generally just south of the road. For nearly the entire distance the line ran through an almost impenetrable forest of scrub-oak and pine. There was a spacious clearing around the Chancellor House, where Hooker had his headquarters, and open ground around Dowdall's. A division of the Second corps and two of the Third were in reserve.

Pleasanton's cavalry was near Chancellor's House. On the evening of 1 May Lee had a conference with Jackson. To attack Hooker's 71,000 men, behind works, with 48,000, was cer¬

tain to entail a terrible loss of life, and it was determined that Jackson, with nearly 30,000

men, infantry, cavalry and artillery, should march across Hooker's front and assail his right flank and rear, Lee remaining with McLaws' and Anderson's 18,000 men to watch his left, demon¬

strate on it, and guard the roads to Fredericks¬

burg. Jackson moved on the morning of the 2d with his accustomed celerity, and about 4 :30 p.m.

his head of column was on Hooker's right and rear, and he began to form line a scant mile from the right flank of the Eleventh corps. His movement had been discovered and misunder¬

stood. As early as 9 o'clock he was seen marching a mile or so to the south; informa¬

tion of the fact was sent to Slocum and How¬

ard, and the instructions to both to strengthen their flanks. Hooker soon came to the con¬

clusion that Lee was retreating, and about 1

p.m. Sickles, at his own request, was ordered to take two divisions of the Third corps, move out and attack, which he did, falling on Jack¬

son's rear at Welford's Furnace, taking some prisoners. Barlow's brigade of the Eleventh corps was sent to Sickles and Pleasanton's cav¬

alry joined him, but the forest was too dense for cavalry operations, and Pleasanton with¬

drew two of his regiments and battery to Hazel Grove, where Sickles had left some of his artillery. Williams' division of the Twelfth corps was sent from its works to form on Sickles' left, attack Anderson's left and roll him back on Chancellorsville. Williams was about to attack when Jackson fell on the flank of the Eleventh corps and went back to his works.

The Eleventh corps was badly posted and, though repeatedly informed by brigade and regimental commanders and picket officers of the gathering enemy on the flank, the superior officers, with one

exception, lulled into security by the pleasing reports that Jackson was retreat¬

ing, made no adequate provision against a flank attack, and most of the men were preparing supper when the storm broke. Jackson had formed his 26,000 infantry in three lines across the plank road, a mile on either side of it, artil¬

lery in the road, and a little after 5 o'clock gave the order to advance. The lines advanced with a rush, startling the game in the forest. The Union skirmishers were quickly driven in, and with a wild yell the main Confederate line struck the right brigade of Devens' division, flanked it, and after two or three rounds had been fired it gave way, the enemy following, striking and flanking everything in the way.

No troops in the world, so placed, could stay such an attack. Some regiments made heroic stand and fought brilliantly, but in 30 minutes Devens' division of 4,000 men was routed and the Confederates advanced upon Schurz's di¬

vision, which had changed front. Schurz held ground about 20 minutes, and then fell back upon Buschbeck's brigade, east of Dowdall's.

Here Schurz rallied some of his men. Buschbeck stood three-quarters of an hour, and it was after 7 o'clock, when, attacked in front and flank, he fell back in good order to Fairview, where 40 guns of the Eleventh and Twelfth corps were being massed on high ground in his rear. Howard's corps had been driven two miles in less than two hours, losing nearly 1,500

killed and wounded and 1,000 prisoners. The force of Jackson's attack had spent itself; his two leading divisions — Rodes' and Colston's — had become inextricably mixed; the men were tired and hungry, and Jackson suspended their further advance and ordered A. P. Hill to re¬

lieve them. Meanwhile Hooker had sent

Berry's division of the Third corps and Hays'

brigade of the Second to the west edge of the open field north of the road ; on Berry's right were some of Schurz's regiments ; and Wil¬

liams, desisting from his attack on Anderson, regained part of his works and formed south of the road on Berry's left, Buschbeck in his rear. This covered the road at a distance of a little over a half mile

west of Chancellor's House. Sickles, when informed of Howard's disaster, fell back from Welford Furnace to Hazel Grove and formed on Pleasanton's left.

Barlow drew up in Pleasanton's rear, all close to Williams' left and front. The two Confed¬

erate lines fell back to the open ground around Dowdall's, to re-form, and A. P. Hill was brought up and his leading brigade pushed along the plank road beyond the intersection of a road leading left to White House, and United States Ford, the road to be taken by Hill to cut off Hooker's retreat. While Jackson was reconnoitering on this road, beyond his main line, skirmishing began between the opposing pickets in the woods, and as Jackson, with his staff and orderlies, was riding back, the mounted body was mistaken for Union cavalry and fired into, Jackson (about 9:20 p.m.) was wounded in three places, both arms being shat¬

tered. Nearly the entire escort were also killed or wounded. Jackson died 10 May. At the sound of the firing in the woods the Union guns on Fairview opened a furious fire down the plank road, causing some confusion to the Con¬

federate column on it. During this fire A. P.

Hill, next in command, was wounded; the intended advance was suspended, and Gen. J. E.

B. Stuart was sent for to take command.

During the night and early morning some changes were made in the Union line by which the approaches on the right to the United States

Ford were covered by Reynolds' corps and part o t Meade s, and the Eleventh corps took posi¬

tion on the extreme left vacated by Meade. At 9 p.m. Hooker, not knowing that Sedgwick's entire corps was at Fredericksburg, ordered him to cross from Falmouth and march up the south side of the river

to Chancellorsville and attack Lee's rear at daylight, 3 May, while he attacked in front. Pleasanton and Sickles were ordered to fall back from Hazel Grove at dawn. Pleas¬

anton marched back at 4 o'clock, and Sickles was following when his rear was caught by the oncoming Confederate line. Stuart, who had assumed command of Jackson's corps, advanced at 5 o'clock, 3 May, with great impetuosity, his right attacking Sickles as his rear brigade was about retiring from Hazel Grove. The brigade was soon driven, four guns were captured and Stuart swept on. Thirty Confederate guns were put in position at Hazel Grove which swept the open ground of Fairview and poured an enfilading fire on the right of Geary's di¬

vision of the Twelfth corps, which was fighting Anderson, and at the same time Geary's left was being pounded by McLaws' guns. The bat¬

tle now became fierce along the entire line of the Second, Third and Twelfth corps. On the right Stuart's men fought French's division of the Second corps and the three divisions of the Third taking the Union works, being driven from them and retaking them. Williams was fighting Stuart's right, Geaiy of the Twelfth corps was desperately engaging Anderson, and on his left, covering Fredericksburg road, Han¬

cock's division of the Second corps was resist¬

ing the fierce attacks of McLaws. Stuart grad¬

ually gained ground and united his right with Anderson's left near Hazel Grove. The Union ammunition began to fail, and finally, about 9 o'clock, French, of the Second corps, the Third corps and Williams' division of the Twelfth, after frightful losses, began to fall back, and the Confederates gained the west of the Chancellor plateau and swept it with ar¬

tillery. A cannon-shot struck a pillar of the Chancellor House against which Hooker was leaning. He was knocked down and stunned, and Couch, who was second in command, was instructed by Hooker to withdraw to a position, already selected, about three-fourths of a mile north of the Chancellor House, and covering United States Ford. The right and centre, closely pressed, fought their way back ; Geary, attacked in front, right flank and rear, fol¬

lowed; Hancock followed Geary; before noon the troops were in the new position, and here the battle of Chancellorsville proper ended, for, before Lee had completed preparations to re¬

new his attack, he heard of the capture of Fredericksburg and Marye's Heights and the advance of Sedgwick. Suspending further

operations against Hooker, he turned his atten¬

tion to Sedgwick, sending McLaws' division to oppose him.

When Sedgwick received Hooker's order of 9 p.m., 2 May, to cross the river at Fredericks¬

burg, he had already done so and was three miles below the town. It was 11 p.m. when he received the order; he had 14 miles to march before he could reach Chancellorsville, and an enemy barred the way. He had about 23,000

men. His three divisions were commanded by Gens. John Newton, W. T. H. Brooks and A.

P. Howe. Brooks was left below Fredericks¬

burg, and Newton led the advance on the town.

The night was dark; progress was slow; fre¬

quent halts being made while the skirmishers were feeling the way; it was the gray of the morning when Newton reached the rear and left of Fredericksburg; and as daylight came Marye's Heights were seen to be held by the enemy. Gibbon crossed the river from Fal¬

mouth and reported to Sedgwick with his divi¬

sion, and under cover of a demonstration by Newton, advanced on the right to turn the position, but was stopped by the canal and a concentrated fire of artillery. He found also that Hays' brigade of Early's division and Wil¬

cox's of Anderson's were in his front, and he was obliged to fall back. On the other flank Howe's division failed to make an impression.

Nothing remained but to assault the heights and storming columns were formed, Howe

forming three on the left and Newton two of two regiments each,

strongly supported. These were launched against the Confederate position and were bloodily repulsed by Barksdale's bri¬

gade. The assault was renewed and Marye's Heights carried about 11 o'clock, with a loss to Sedgwick of nearly 1,000 killed, wounded and missing in a very few minutes. He took 15

guns and nearly 1,000 prisoners. Here a delay occurred to get Brooks' division up, which was to take the advance, and it was 3 o'clock before Sedgwick marched for Chancellorsville, leaving Gibbon to hold the town and cover the bridges there. His march was impeded by Wilcox, who had regained the road in his front and made a stand half a mile in advance of Salem Church, where McLaws had now come up and formed across the road. Brooks' division advanced and Wilcox fell back to the church, Brooks closely following, and a desperate encounter raged around the church, in which at first Brooks, supported by Newton, was successful, but was finally compelled to fall back after losing 1,500

men. Dispositions were made to renew the struggle, but night came and both sides slept on their arms. Early, who had concentrated his command at Cox's, on the telegraph road, south of Fredericksburg, had Lee's permission to attack Marye's Heights and Sedgwick's rear at daylight. He was joined by Barksdale and, as Marye's Heights were held by a small Union force, his attack succeeded. Leaving Barksdale to hold the heights and prevent an advance of Gibbon, who was in the town, Early moved toward Salem Church and asked McLaws to co-operate with him. Meanwhile Lee, retain¬

ing only Jackson's three depleted divisions to confront Hooker at Chancellorsville, led An¬

derson to unite with McLaws and Early, and drive Sedgwick across the Rappahannock, the three divisions aggregating about 21,000 men.

Anderson arrived about noon of the 4th and took position between McLaws and Early.

Sedgwick was now hemmed in on three sides, his line in shape of a horseshoe, both flanks on the river covering Banks' Ford. The line was five or six miles in length, Newton, on the right, facing McLaws on the west ; Brooks, in the centre, facing south, confronting Anderson, and Howe, on the left, facing east, opposing Early. Skirmishing was kept up during the day, and at 6 o'clock, Lee, after reconnoitering the position, ordered an attack to break the centre. Newton was not

seriously attacked but Howe and Brooks were assailed with great 282

spirit, Early, falling upon the former and endeavoring to turn his left, in which he did not succeed, two of his brigades being repulsed and thrown into confusion by Howe's artillery.

An attack on Howe's right and Brooks' left was also repulsed. The Confederates continued the contest until darkness .put an end to it. Sedg¬

wick then withdrew irom the field to Banks'

Ford, where he was covered by 34 guns on the north side of the river, but he had lost so heavily and was hemmed in so closely that, with Hooker's approval, he crossed the river during the night, taking with him nine captured guns and about 1,400 .prisoners. His loss, since crossing the river on the 2d, had been 3,200

killed and wounded and 1,500 captured. During the night Gibbon recrossed the river to Fal¬

mouth, and on the morning of the 5th Lee was again in full .possession of the south side of the river below Chancellorsville. Early was left to hold Fredericksburg, and Lee marched back with McLaws and Anderson to renew the battle with Hooker. A heavy storm came up, converting dry ravines into torrents and the soil to deep mire, and the attack was deferred until next morning. When day came Hooker had recrossed the river at United States Ford, and the Army of the Potomac marched to its old camp, and Lee returned to his old position at Fredericksburg. The Union loss at Chan¬

cellorsville was 1,082 killed, 6,849 wounded and 4,214 missing. Including the losses at Fred¬

ericksburg, Marye's Heights and Salem Church, the Union loss in the entire campaign, 27 April to 5 May, was 1,606 killed, 9,762 wounded and 5,919 missing; an aggregate of 17,287. The Confederate loss during the campaign was 1,665

killed, 9,081 wounded and 2,018 captured; an aggregate of 12,764.

Consult (Official Rec¬

ords* (Vol. XXV) ; Hotchkiss and Allan, <Chancellorsville) ; Doubleday, Abner, Chan¬

cellorsville and Gettysburg) ; Bates, S. P., (The Battle of Chancellorsville) ; Dodge, T. A., (The Campaign of Chancellorsville) ; Hamlin, A. C., (The Battle of Chancellorsville * ; The Century Company's (Battles and Leaders of the Civil War> (Vol. III).

E. A. Carman.

CHANCERY, formerly the highest court

of justice in England, now consolidated with the other superior courts in the Supreme Court of Judicature.

The Court of Chancery obtained its name from being under the jurisdiction of the Lord Chancellor and its purpose was never more succinctly expressed than in Cowel and Jacob's Law Dictionary : (<A11 the other justices in the Kingdom are tied to the law, but the Chan¬

cellor hath the King's absolute power to mod¬

erate the written law, govern his judgment by the law of nature and conscience, and order¬

ing all things juxta cequum et bomim… .

He is not limited by the written law, but by conscience and equity, according to the cir¬

cumstances of the matter.® And in the words of King James I, ((When the rigour of the law in many cases will undo a man, then the Chan¬

cery tempers the law with equity, and so mixes mercy with justice, as it preserves a man from destruction.® The jurisdiction of the court was therefore wide; and between it and the common lawyers a long

struggle ensued. Its jurisdiction was inoperative in ordinary com¬

mon law cases, or in civil cases in which the common law courts could render adequate jus¬

tice. The great objection of the common law practitioners was that the very extensive pow¬

ers of the chancellor's court were exercised, not according to fixed rules of law, but at the discretion of the chancellor. In course of time, however, under a succession of able chancellors, the body of law administered by it became quite as fixed as the common law.

Thus there came into existence the curious anomaly of two co-ordinate sets of tribunals adjudicating on the same matters on conflicting principles. It was thus quite possible for a suitor to win in the Court of Chancery who had not the smallest chance of prevailing in the common law courts. In the caustic words of Lord Chancellor Westbury, one tribunal was set up to do injustice and another to stop it.

The distinctive functions of the Court of Chan¬

cery remained until the passing of the Judi¬

cature Acts of 1873 and 1875. (See below).

The Court of Chancery embraced six superior courts called high courts of chancery and nu¬

merous inferior courts. The superior courts were the Court of the Lord High Chancellor, the Court of the Master of the Rolls; the Court of Appeal in Chancery, constituted by the Lord Chancellor sitting alone with either of the two lords justices in appeal or by the two lords jus¬

tices sitting together apart from the Lord Chan¬

cellor; and the courts of the three vice-chan¬

cellors. The ordinary legal jurisdiction of chancery embraced the issuing of writs for a new Parliament ; of pleas of scire facias to re¬

peal letters patent, and of all original writs.

There was also a jurisdiction acquired by stat¬

ute or special delegation in issuing writs of habeas corpus and inquiring into charitable uses. There were numerous other powers con¬

ferred by act. of Parliament, and the Lord Chancellor, together with the lords justices of appeal, had exclusive authority over the per¬

sons and property of idiots and lunatics. Ap¬

peals in bankruptcy were heard by the Court of Appeal in Chancery. The sittings and busi¬

ness of this court of appeal were regulated by the Lord Chancellor.

The procedure of the Court of Chancery at one time, by reason of its traditions and forms (commonly known as ((red tape®) became so cumbersome as partially to defeat its own osten¬

sible aims and rendered reform imperative.

Charles Dickens made a determined attack upon the delays of chancery practice in his (Bleak Housed and subsequent changes have been commonly attributed to his influence.

The English Court of Chancery is now a di¬

vision of the High Court of Justice, which is it¬

self one of the two departments of the Supreme Court of Judicature in which are united all the higher courts of justice in England, exclusive of the appellate jurisdiction of the House of Lords and the privy council. The present judges of chancery as a division of the High Court of Justice are the Lord Chancellor, who presides over the division, and six justices.

According to the provisions of the act by which the Supreme Court of Judicature was es¬

tablished, the distribution of business, both as to its commencement and its transfer, was made subject to rules of court and orders of transfer.

By the operation of these provisions chancery, like the other divisions

it now belongs, was gradually to cease to be a separate department ; but in the meanwhile, subject to these rules and orders, certain causes and matters, were assigned to chancery until these provisions should take their full effect.

These are enumerated in the Supreme Court of Judicature Act (36 & 37 Viet. c. 66, § 34), and are (1) all causes and matters pending in the High Court of Chancery at the commencement of the act (finally fixed for 1 Nov. 1875) ; (2) all causes and matters to be commenced after the commencement of the act under any act of Parliament by which exclusive jurisdiction in respect to such causes or matters has been given to the Court of Chancery, or to any judges or judge thereof, except appeals from County Courts; (3) administration of the estates of deceased persons ; partnerships ; mortgages ; raising of portions or other charges on land; sale and distribution of the proceeds of prop¬

erty subject to any lien or charge; trusts, char¬

itable or private ; rectification or setting aside or cancellation of deeds or other written in¬

struments; performance of contracts between vendors and purchasers of real estates, includ¬

ing contracts for leases; partition and sale of real estate; wardship of infants and the care of infants' estates. Chancery, as a division of the High Court of Justice, has no exclusive right to the administration of equity, the act already mentioned making provision under certain rules for the concurrent administration of law and equity in all the divisions of the Supreme Court of Judicature. The Court of Appeal in Chan¬

cery no longer exists and its functions are transferred to the Court of Appeal, which in the new Supreme Court of Judicature is the complementary department of the High Court of Justice. The affairs of lunatics are still under the supervision of the Lord Chancellor. See also Equity.

In the United States the general tendency has been likewise to abolish courts of chancery as separate departments, and equity jurisdiction is generally conferred on the courts of law.

Delaware, New Jersey and Tennessee are

among the few States that still retain the for¬

mer practice.

In the Catholic Church the chancery denotes (1) the office in a diocese whence come those documents necessary for the exercise of episco¬

pal power; (2) the office in Rome which drafts and expedites the bills or briefs by which the mind of the Pope is made known to Christen¬

dom or to particular suitors.

CHANCRE. See Syphilis.

CHANCROID, a contagious venereal

disease characterized by the presence of one or more, often several, suppurative ulcers, chiefly located in the genital regions. These are clue to infection by the organisms of dirt and are not true syphilitic lesions. Very fre¬

quently both hard and soft chancres are com¬

municated at the same time, but they can be distinguished. Chancroid is definitely a dirt disease and is due to uncleanliness as well, per¬

haps, as to a specific micro-organism, the strep-tobacillus of Ducrey. Chancroid usually de¬

velops within 24 to 48 hours after infection as a minute macule or pin-point vesico-pustule surrounded by a reddish halo. This increases day by day until a pustule or ulcer about the size of a small coin is developed. This ulcer is usually a soft ulcer. There is not much in¬

duration in the connective tissue beneath it, which is one of the distinguishing features be¬

tween it and true syphilitic chancre. Chancroids are usually multiple, whereas chancres are usu¬

ally single. They persist usually from three to six weeks and are often very difficult to cure, and furthermore a patient with chancroid may reinfect himself and thus spread the lesion a't times very widely.

CHANDA, chun'da or chan'da, India, chief town of the district of Chanda in the Nagpur division of the Central Provinces and 90 miles south of the town of Nagpur. It is surround¬

ed by a stone wall five and a half miles in cir¬

cuit, from 15 to 20 feet high, 10 feet thick and flanked with rough towers large enough for the heaviest guns; inside which are cultivated fields and detached villages, while there are also suburban quarters outside. There is a citadel now enclosing the jail, tomb of the Gond kings, three interesting temples, massive mono¬

liths, *etc.* Outside the walls is a large water tank constructed under Gond rule and a col¬

lection of ancient statuary known as Rayap-pa's idols, the largest of which is 26x18x3 feet.

The town has a public park, civil station and military cantonments. Chanda is the commer¬

cial centre of the district with manufactures of silk, cotton, dyestuffs, slippers, bamboo work and gold and silver work. It has nu¬

merous schools and a mission station. The dis¬

trict contains considerable iron and coal de¬

posits. Pop. (1911) 19,866; the district has an area of 10,156 square miles and a population of 677,544.

CHANDELEUR, shan-de-ler, ISLANDS,

a group of about 15 small islands in the Gulf of Mexico about 25 miles off the east coast of Louisiana, from which they are separated by Chandeleur Sound. There is a lighthouse on the northern end of the northernmost island which is in lat. 30° 2’ N. and long. 88° 52’ W.

CHANDELIER. An apparatus suspended

from the ceiling or vault and supporting two or more lighting units. Usually, in modern Fig. i. — (i) Roman Christian Lucerna pensilis for four wicks (from the Catacombs). (2) Corona style Chan¬

delier (from an old MS.). (3) German church Chandelier of the Middle Ages.

times, the lights are supported on arms or branches radiating from a central shaft. The chandelier may be said to have originated in the ancient suspended oil lamp (lychnus) of several wicks (polymixos) used by the Romans.

(See Fig. 1). By the 4th century A.n. the Catholic Church began to use coroner, phari, 284

CHANDELIER

pharicanthari, circuli luminum, polycandelce, etc., carrying a multitude of candles (Pope Adrian presented Saint Peter’s, Rome, with one carrying 1,370 candles in the 8th century).

These were all terms for the corona lucis (see Corona), or crown light. Great and beautiful examples of these elaborate crown lights are still in existence in the <(heavenly Jerusalemˆ

design, with their small towers or ((tabernacles)) or Agates® for the Apostles. That presented by Frederick Barbarossa to the minster at Aix-la-Chapelle is 13 feet in diameter. (See Fig. 2).

Another is in the Hildesheim Cathedral (circa 1050), 20 feet in diameter with 72 candle hold¬

ers. Most of the elaborate crown lights were constructed in the 11th and 12th centuries, and while many carried candles, others were for oil lamps. Their construction was, for the most part, of metal (copper, iron, silver, even gold) and ornamented with enamels, *etc.* ; some were of wood. In the 13th century elaborate forged more general. Flanders produced lovely chan¬

deliers at this time which are yet much ad¬

mired. To this century belongs the famous historic ˆGalileo" chandelier in the cathedral of Piza, a magnificent work of bronze of the Italian Renaissance, whose swinging is said to have led to the pendulum in horology. In the 17th century a few wooden chandeliers were still produced, but with artistic carved decora¬

tion — most of them were constructed for tem¬

porary (festivals, etc.) use. Under Louis XIII Dutch copper chandeliers became popular. This style had a central shaft composed of a num¬

ber of balls relieved bv balustre forms. A com¬

mon device was to have the chandelier sur¬

mounted by a royal crown, ducal or other coro¬

net. Very elaborate chandeliers were produced in this century in wrought iron, bronze and copper (Flanders was doing very fine work in copper castings). Silver was used to some extent, also rock crystal was becoming quite Fig. 2. — The great 13th century Corona Chandelier at Aix-la-Chapelle Minster. Details: Left, section of railing; right, style of Tower decoration.

ironwork was in great vogue, therefore chan¬

deliers were fashioned in this manner. In the 14th century chandeliers began to take on a star or radiation form with six to eight branches supporting a number of candles or lamps. These were mostly of bronze. In this period a species of trophy device in chande¬

liers took form in Germany, made up of the horns of the animals of the chase (stag, elk, elephant, etc.). This fashion remained popular till the 18th century. In the 1 5th century wooden crosses acted as chandeliers frequently.

Oak was much favored, and, while many were quite plain, others, for church use, had elab¬

orately carved centrepieces from which radi¬

ated handsomely decorated curved arms of forged iron supporting candle sockets ; others were entirely of bronze or copper, a few of silver. The plain crown light still persisted.

The 16th century retained much of the radiate style of the preceding century but rock-crystal decoration (which had been practised in a modest way since the 13th century) appears (from documentary evidence) to have become the vogue ; but the former was alone used by royalty, nobility and the Church. The crystal ornament was becoming a part in the estab¬

lishments of the wealthy. In the 18th century the thorough combustion (sootless) of oil was becoming effective (Argand, Lange, Quinquet inventions), and we have suspended lamps largely replacing candles in chandeliers. Under Louis XV and Louis XVI were constructed for lay use more chandeliers of great import¬

ance than ever before, the Church having had the very large and elaborate pieces. The fur¬

nishing of civic homes with luxurious decora¬

tion was a new growth, and, by the second half of the 18th century, practically all chandeliers had crystal ornament. Every chandelier by this time had arms or branches ; the ˆconsole® or reclining go was the form prevalent. A com¬

mon style of crystal decoration consisted of interlacing strings of facetted crystal beads —often so elaborate as to be cumbersome. Ordi¬

nary glass sufficed usually, but rock crystal was favored by the wealthy. The chandelier, in some form, was now common property among CHANDERNAGORE-CHANDLER

all classes of city dwellers, except the very poorest. In chandeliers de luxe we find por¬

celain (Dresden and Sevres) flowers figuring as ornament, and soon the usage of these fictile Fig. 3. — Horizontal plan (birds ’-eye view) of Aix-la-Chapelle Corona Chandelier.

flowers became so common that porcelain flower-making became a distinct Paris industry.

Some chandeliers of the Louis XVI period Fig. 4. — Italian 18th Century Crystal (lustre) Chandelier.

In Metropolitan Museum of Art, New York.

had their facetted beads made of strass, some of polished steel.

During the early years of the 19th century but one style prevailed in the construction _ of chandeliers, bronze-gilt frames so swarming with crystal decoration as to make the chan¬

delier body a mere accessory hidden in garlands of crystal beads. Immense, gorgeous construc¬

tions were made for use in the theatres, etc., the most noted being that of the Grand Opera House, Paris, by Gamier. With the introduc¬

tion of hydrogen gas for lighting purpose no great transformations occurred in the forms used for chandelier (often termed gasolier) construction, pipes taking the place of bar metal and gas nipples displacing the old candle pricket or the later sockets. But, with the comparatively recent invention of illumination by electricity, a wider field has been given for the designer to work in. In America very artistic forms have evolved in the electrolier, some reverting to the classic Greco-Roman lychnus, others showing modern originality.

Bibliography. — Benesch, Ladislaus Elder

v., (Das Beleuchtungswesen von Mittelalter bis zum Mitte des XIX. Jahrhunderts,* *etc.* (Vi¬

enna 1905) ; d'Allemagne, Henri Rene, (Histoire du Luminaire) (Paris 1891) ; Gamier, J.

L. C., (Le nouvel Opera de Paris* (Paris 1875) ; Goertz, H., (Die verschiedenen Beleuchtungs-arten in Alterthum, Mittelalter und Neuzeit*

(in Metall. Jahrg., Berlin 1914) ; Hessling, Egon, (Le luminaire) (New York 1911) ; Houdayer, R., (L'Lclairage a travers les siecles* (in Science et Art de l'£clairage, Paris 1913, 1914) ; Lessing, Julius, (Candelaber, XVI.-

XVIII. Jahrhundert* (in Kunstgew. Mus. V orbilder-hefte, Berlin 1889) ; Liier, H., (Kron-lichter und Laternen) (in Kunstgew. Mus.

V orbilder-hefte, Berlin 1903) ; Rouveyre, Ed¬

ouard, (Le Luminaire Transformations progres¬

sives du premier au XIX. siecle* (in Com¬

ment discerner les styles, Paris n. d.).

Clement W. Coumbe.

CHANDERNAGORE, chunder-nu'gor or

chander-na'gor, or CHANDARNAGAR,

India, town on the right bank of the Hugh, 16

miles north-northwest of Calcutta. Its only manufacture is cotton cloth, and there is no trade but with Calcutta. The French estab¬

lished a factory there in 1676, and in 1688 ob¬

tained a formal cession of it, together with its territory of about three and a half square miles, from Aurungzebe. It was three times taken by the British, first in 1757, but finally restored to the French in 1816. Chandernagore is under a sub-governor, subordinate to the governor

of Pondicherry. Pop. of town and territory 26,000, including a small military detachment and a few Europeans and Eurasians, the great bulk being natives.

CHANDLER, Abiel, American merchant :

b. Concord, N. H., 1778; d. Walpole, N. H, 22

March 1851. He was graduated at Harvard College in 1806, and was for many years a merchant in Boston. He died a widower, with¬

out children, and devised $50,000 to Dartmouth College. The Chandler School of Science at Dartmouth was established in 1851 in pursuance of this bequest. For many years it was main¬

tained as a separate department, but has recently been formally incorporated into the college and it is now known as the Chandler scientific course leading to the degree of bachelor of science.

CHANDLER, Charles Frederick. Amer¬

ican chemist : b. Lancaster, Mass., 6 Dec. 1836.

He studied at the Lawrence Scientific School of Harvard College and at the universities of Ber-286

lin and Gottingen, receiving his doctor's degree at the latter in 1856. He was professor of chemistry in Union College, 1857-64, and pro¬

fessor of analytical and applied chemistry in the Columbia College School of Mines, 1864-1903. In 1858 he was elected to the chair of chemistry in the New York College of Phar¬

macy, and in 1876 to the chair of chemistry and medical jurisprudence in the College of Physicians and Surgeons. He became chemist to the metropolitan board of health in 1865, and its president in 1873, being instrumental in securing great reforms in connection

with the sanitary condition of the markets and the purity of the food supply, notably in the case of milk.

He is a member of the chemical societies of Berlin, London and Paris, and of the National Academy of Sciences. With his brother, Prof.

W. H. Chandler, he founded the American Chemist, a monthly journal devoted to chemical science. To this and to the annual reports of the New York health department he has con¬

tributed many papers on chemistry, water-sup¬

ply of cities, purification of coal gas, on petro¬

leum, milk, sorghum and glucose. Among the numerous reforms introduced during the ad¬

ministration of Professor Chandler were the segregation of slaughter-houses and the passage of the Tenement-House Act, providing that the plans of every tenement-house must first be submitted to the Board of Health.

CHANDLER, Francis Ward, American

architect : b. Boston, 30 Sept. 1844. He was graduated at the Lancaster Academy in 1861, served in the 53d Massachusetts Volunteers in 1861-63. He studied architecture and worked with Ware and Van Brunt, Boston, in 1864-67.

He spent 1867-69 in Paris and in 1869-70 was assistant in the architectural department of the Massachusetts Institute of Technology. In 1871-74 he was assistant architect in the Treas¬

ury Department, Washington. From 1874 to 1888 he was a partner of E. C. Cabot, Boston, and in 1888 became professor of architecture in the Massachusetts Institute of Technology, be¬

coming professor emeritus in 1911. He has published Construction Details) (1892) ; (Notes on Limes, Cements, Mortars and Concretes) (1892) ; and edited (Municipal Architecture in Boston) (1898) and many articles in the Tech¬

nology Quarterly.

CHANDLER, Frank Wadleigh, American

writer: b. Brooklyn, N. Y., 16 June 1873. He was graduated at the Polytechic Institute of Brooklyn, 1894; studied literature and philoso¬

phy at Columbia University, and at Oxford, London and Paris, 1895-99. In 1899 he was appointed professor of literature and history in the Polytechnic Institute, and in 1901 lecturer in comparative literature at Columbia. In 1910

he became professor of English and compara¬

tive literature in the University of Cincinnati, and in 1913 he became dean of the College of Liberal Arts of the same university. He has written (Romances of Roguery, an Episode in the History of the NoveP (1899) ; (Some Theories of the Novel's Evolution in East and West) (1900) ; (The Literature of Roguery) (1907); (Aspects of Modern Drama* (1914).

CHANDLER, Richard, English archaeol¬

ogist: b. Elson, Hampshire, 1738; d. Tilehurst, Berkshire, 9 Feb. 1810. He was educated at Winchester and at Queen's and Magdalen col¬

leges, Oxford. His first important work was (Marmora Oxoniensia) (1763), an elaborate description of the Oxford marbles. He after¬

ward traveled through Greece and Asia Minor, wdth Revett, architect, and Pars, a painter, at the expense of the Dilettanti Society, to ex¬

amine and describe the antiquities. The ma¬

terials collected were given to the world in the following publications: (Ionian Antiquities) (1769); (Ancient Inscriptions) (1774); (Travels in Asia Minor* (1775) ; and (Travels in Greece) (1776). He was an Anglican clergy¬

man and at his death was rector of Tilehurst, near Reading.

CHANDLER, Seth C., American astron¬

omer: b. Boston, Mass., 16 Sept. 1845; d. there, 31 Dec. 1913. He was long attached to the Harvard Observatory; w'as awarded the gold

medal of the Astronomical Society of London in 1896 for his determination of the laws of variations of latitude or movements of the earth's pole and his researches on variable stars.

In 1896 he became editor of the Astronomical Journal. He is well known for his investiga¬

tions and observations of the phenomena of variable stars, the computation of comet orbits, and, in connection with Ritchie, for devising a system of astronomical code-telegrams for the announcement of astronomical discoveries.

He also invented the Almacantar, and published a very complete treatise on the method of its use.

CHANDLER, William Eaton, American

politician : b. Concord, N. H., 28 Dec. 1835 ; d. 30 Nov. 1917. He was graduated at Har¬

vard Lawˆ School in 1855, entered the New Hampshire legislature in 1862, w'as speaker 1863-64, became judge-advocate-general of the Navy Department in 1865, and Secretary of the Navy in 1882, serving three years. In 1887—1901 he was a United States senator from New Hampshire. In 1901 he became president of the Spanish Treaty Claims Commission, and was a member of the New Hampshire Consti¬

tutional Convention in 1902.

CHANDLER, Zachariah, American mer¬

chant and statesman : b. Bedford, N. H., 10

Dec. 1813; d. 1 Nov. 1879. He received a com¬

mon school education, and early in life went to Detroit, and engaged in the dry goods business, in which his energy and ability soon brought success and put him in possession of a hand¬

some fortune. He was mayor of Detroit in 1851, the defeated Whig candidate for governor of Michigan in 1852, an active organizer of the Republican party in 1854, and in January 1857 was elected to the United States Senate to succeed Gen. Lewds Cass. The same energy

and ability which had made him successful in business he now’ applied to the organiza¬

tion of the Republican party and he was soon recognized as one of the most for¬

midable opponents of all plans in favor of slavery. He opposed the admission of Kan¬

sas under the Lecompton constitution 1858, and he was the author of the .famous (<blood letter, ** in which he said <(without a little blood-letting, this Union will not, in my esti¬

mation, be worth a rush.** Though a w’arm friend of Lincoln, he w’as more radical than the latter, and often differed from him in matters

ot public policy. In July 1861 he introduced a sweeping confiscation bill which failed to pass and in July 1862 violently assailed McClellan in a speech in the Senate. He was reelected to the Senate in 1863 and in 1869; served as Secretary of the Interior in the Cabinet of President Grant from 1875-77 ; was chairman of the Republican National Committee in 1876; was reelected to the Senate in 1879, where he led the attacks on Jefferson Davis. He was a man of imposing presence, great energy and perseverance. He was found dead in bed on the morning after delivering a political address in Chicago. Consult Curtis, W. E., (Life of Zachariah Chandler) (New York 1879).

CHANDOGYA, chun’do-jl’a, the name of

a Brahman of the Samaveda in Hindu litera¬

ture. It is in. 10 books, 8 of which are known in the Occident as Ehandogya UpanishadP It has been translated by Muller in his (Sacred Books of the East> (Vol. I).

CHANDOS, the name of a noted English

family, descended from a follower of William the Conqueror, the last representative in the direct male line being Sir John Chandos (d.

1428), whose niece married one Giles Brydges, the ancestor of the Brydges family, successively lords and dukes of Chandos. Their descend¬

ant, Sir John Brydges, was lieutenant of the Tower under Queen Mary, and was created Baron Chandos in 1554. James Brydges (1673-1744), 8th Lord Chandos, sat in Parliament for Hereford from 1698 to 1714, and was created duke of Chandos in 1719. The lucra¬

tive post of paymaster of the forces abroad supplied means for building a palace at Canons, near Edgeware, which cost $1,000,000, but was torn down at the Duke's death. Here Handel lived two years, wrote anthems for the chapel service and produced (Esther. } In 1796 the title passed by marriage to the family of Gren¬

ville, which retained the title of Duke of Buck¬

ingham and Chandos till 1889, when the 3d and last duke died. His widow, the dowager Countess Egerton, is still (1918) Duchess of Buckingham and Chandos from her first mar¬

riage. The title will die with her.

CHANDOS, Sir John, English soldier: d.

1370. He was descended from Robert de Chan¬

dos, who came from Normandy with the Con¬

queror in 1066. The earliest military records about John Chandos state that he was at the siege of Cambrai in 1337, at Crecy in 1346 and Poitiers in 1356, when he rescued his friend, the Black Prince, on the battlefield. He was soon afterward appointed (<regent and lieuten¬

ant® of the king of England in France, and vice-chamberlain of the royal household. In 1364 he commanded Montfort's and the English forces against Charles de Blois ; the latter was killed and the redoubtable Bertrand du Guesclin fell a prisoner to Chandos. In 1367 the Black Prince induced him to join a military expedi¬

tion across the Pyrenees into Spain against Henry de Trastamare, who was aided by Du Guesclin. In the ensuing battle at Navarette Chandos gained the victory and again captured Du Guesclin.' Retiring in 1368, Chandos was again called to arms against the French in 1369.

He was wounded and died the following day, 1 Jan. 1370. A gallant, chivalrous Warrior and one of the original Knights of the Garter, his death was regretted alike by friend and foe.

CHANDPUR, chund-or chand'poor, In¬

dia, a town in the Bijnaur district of the North¬

west Provinces, about 40 miles east-northeast of .Meerut. It. is thriving, well paved and drained ; there is a trade in sugar and grain, besides some manufactures of cotton cloth, pipes, *etc.* Pop. 13,000.

CHANDRA CHATTOPADHYAYA,

Bankim, Indian novelist. See Chattopadhyaya Bankim Chandra.

CHANEY, Lucian West, American biol¬

ogist: b. Heuvelton, N. Y., 26 June 1857. He was graduated at Carleton College in 1878. He spent three years as high school principal and superintendent of schools at Faribault and Glencoe, Minn., and in 1882 was appointed in¬

structor in biology at Carleton College and was professor there from 1883 to 1908. In 1907-09

he was special agent of the United States Bu¬

reau of Labor to investigate dangerous occupa¬

tions of women and children and in 1909 he was appointed expert in industrial hygiene in the same bureau. He has also explored the Rocky Mountain glaciers, one of which bears his name, and has published Employment of Women in the Metal Trades) ; (Cotton Mill Accidents) ; (Accidents and Accident Prevention ; Conditions of Employment in the Iron and Steel Industry* ; (Accidents and Accident Pre¬

vention in Machine Building. *

CHANG-CHAU, chang'-chow', China, city

in the province of Fu-kien, the capital of the department of Chang-Chow, 35 miles west-northwest of Amoy, which is its port. It is on the Kiu-lung estuary. It stands in a valley surrounded by hills and intersected by a river.

Its walls are about four and a half miles in circuit, and immediately within is a space planted with large trees. It has broad granite-paved streets with fine stores. The chief build¬

ing is a Buddhist temple dating from the 8th century. A wooden bridge nearly 800 feet long, resting on 25 stone piles, spans the river. The city has manufactures of silk, sugar, crystal and bricks, and carries on an extensive domestic and export trade in tea and sugar. It is the centre of the silk manufacture of the province.

Pop. about 900,000.

CHANG-SHA, chang'-sha, China, capital

of the province of Hu-Nan, on the Siang River, about 350 miles north of Canton. It is not a treaty port, but has an important native trade carried on in small boats. It is surrounded by a wall and has an important silk industry. Pop.

250,000.

CHANGA, a species of mole-cricket (Scap -

teriscus didactylus) indigenous in Porto Rico.

The changa is found throughout that island, living in galleries in the earth, and damaging the crown a'nd roots of the tobacco, sugar cane and small crops ; it is the most serious insect pest in the island. (See Mole-Cricket).. Con¬

sult Barrett, (The Changa, or Mole-Cricket* ; (Bulletin No. 2, Porto Rico Agricultural Ex¬

periment Station * (Washington 1902).

CHANGARNIER, shan-gar'ne-a, Nicolas

Anne Theodule, French general: b. Autun, 26

April 1793; d. Versailles, 14 Feb. 1877. He was educated at Saint-Cyr, and went in 1830 to Algeria, where for 18 years he saw much active service. On the proclamation of the republic in 1848 he acted as provisional governor-general 288

of Algeria, but returned to Paris to take com¬

mand of the garrisons of Paris and of the national guard. He did much to check the out¬

breaks of the Anarchist party during 1849. At the coup d'etat in December 1851, after being imprisoned in Ham, he went into exile till the Franco-Prussian War, when he offered his services to Napoleon II L He was in Metz with Bazaine, and, on its capitulation, retired to Brussels. He returned to France in 1871, en¬

tered the Assembly, and assisted M. Thiers in reorganizing the army.

CHANGE OF COLORS. See Camou¬

flage.

CHANGE OF FUNCTION. During the

metamorphosis of insects, Crustacea, and other animals, organs at first adapted for certain uses become, with change of conditions of life, media, and consequently of habits, adapted to quite dif¬

ferent uses or functions. Thus in the young larva (Nauplius) of many

of the lower Crus¬

tacea, the three pairs of head appendages are formed for swimming; the first two pairs after¬

ward change into the two pairs of antennae, the third pair becoming the jaws of the adult. In the tadpole, which lives on dead leaves or animal matter, the intestine is very long and coiled, but in after life, when the frog feeds on living insects, it is very much changed in form, being much shorter. These are examples of an ontogenetic change of function. There are many examples of change of function by sup¬

pression of the original or chief function, what was a minor use becoming the chief one.

Examples of a phylogenetic change of function are the transformation of the jaws of biting insects into the needle-like elements, aiding in the formation of the beak of bugs (q.v.) ; the transformation of the hypopharynx of caddis-flies into the piercing organ of fleas and flies; the modification of the maxillae of biting insects into the spiral tongue of the butterfly. The mouth-parts of bees and butterflies lost their primitive functions and adopted entirely new shapes and uses after flowers appeared. Among fishes the clearest example is the change of the swimming-bladder of the gar pike, where it also functions as a breathing organ, until in the lung-fishes, which have probably descended from some ganoid, it becomes a lung.

These changes of functions are due to

change of the surroundings, and consequently of habits, finally bringing about change of func¬

tion. Hertwig states that a muscle may from many causes become functionless, but finally becomes transformed into a ligamentous band.

What are the gill-supports of fishes may, as the results in certain of their descendants of the adoption of a terrestrial mode of life, be¬

come in part degenerate, while another part persists by assuming a new function, forming the jaws, the hyoid bone and the small bones of the ear, which are morphologically the same structures as the gill-arches. Consult Dohm, (Der Ursprung der Wirbelthiere und das Prinzip des Funktionwechsels5 ; Hertwig-Kingsley, (Manual of Zoology.*

CHANGE OF LIFE. See Menopause.

CHANGELING, a child left or taken in

the place of another. It was at one time a com¬

mon superstition that young children were liable to be stolen or changed by fairies before being baptized; and hence they were carefully watched till that ceremony was over. It was thought that the fairies were always anxious to change their own starveling elves for the more robust children of men. The children so left were called changelings, and were known by their greater backwardness in growth or learning; hence, stunted or idiotic children were regarded as changelings. The poets allude to this superstition occasionally, e.g., Shakespeare and Spenser.

CHANGO, an Indian tribe inhabiting the

rainless region of northern Chile, near the desert of Atacama. Their territory was for¬

merly much larger and their language, now extinct, appears to have been a distinct stock.

Consult Boman; (Antiquites de la Region Andine) (Vol. I, Paris 1910), and Chamberlain, in Journal de la Societe des Artier, de Paris (N. S., Vol. VII, p. 183, 1910).

CHANK-SHELL, the shell of a gastropod

mollusk (Turbinella pyrum). An extensive fishery of these shells, which live in water from 12 to 15 feet deep along the shore of Ceylon and India, has been established at Tuticorin. The shell is a sacred emblem of Vishnu, wTho is often represented as holding a ˆsinistral® one in his hand. They are used by the Hindu women as bangles and leg ornaments, or anklets. The chank appears as a symbol on the coins of some of the ancient Indian empires, and is still re¬

tained on the coinage of the Rajah of Franva-core.

CHANLER, Amelie Rives. See Trou-

BETSKOY.

CHANLER, William Astor, American

explorer: b. Newport, R. I., 11 June 1867. He studied at Harvard, but left the university to make explorations in Africa. With Chevalier Ludwig von Hohnel, he started from Zanzibar in September 1892 to explore the region east and west of Mount Kenia. They reached the coast on the return journey June 1893. He was elected to the New York legislature in 1897 and to Congress in 1898 as a Democrat.

He served in the War with Spain and was commended in General Shafter's reports. He has written (Through Jungle and Desert*

(1896) and <Travels in Eastern Africa,* *etc.*

CHANNEL-BILL, a gigantic Australasian

cuckoo (Scythrops N ovce-hollandice') , having the size, flight and general appearance of a hawk, brown and gray above and whitish be¬

low, with bare scarlet skin surrounding the eyes. It takes its name from two deep grooves in the side of the bill. It is probably parasitic, feeds on both fruit and insects, is migratory and utters a shrieking cry like the syllable ((krok.**

CHANNEL ISLANDS, a group of islands

in the English Channel belonging to Great Britain, off the west coast of the department La Manche, in France. The islands lie 10 to 30 miles distant from the Normandy coast and 50 to 120 miles south of the English coast.

They consist of Jersey, Guernsey, Alderney and Sark, with some dependent islets ; area, 75

square miles. They are picturesque and very fertile and are celebrated for a peculiar breed of cattle, the chief strains of which are the Jerseys, Guernseys and the Alderneys, which differ from each other in minor characteristics.

Boland, (Les lies de la Manche* (Paris 1904).

The islands are almost totally exempt from CHANNELS

taxation and the people enjoy besides all the privileges of British subjects. There are two lieutenant-governors, one for Jersey and the other for Guernsey, Alderney and Sark. The government is in the hands of two correspond¬

ing bodies called the “states,® some members of which are named by the Crown, while others are chosen by the people and others sit ex officio. These islands have been fortified at an immense expense. Ecclesiastically they be¬

long to the diocese of Winchester. The Chan¬

nel Islands form the only remains of the Nor¬

man provinces once subject to the English Crown. They now export large quantities of fruit, vegetables and flowers to the English markets, including grapes, tomatoes and pota¬

toes, partly grown under glass. The annual yield of potatoes in Jersey exceeds 60,000 tons, valued at $1,320,000. The chief fertilizer is “vraic,” or seaweed, the regular gathering of which, controlled by legislation, is one of the characteristic insular scenes. A large quantity of kelp is used in the manufacture of iodine, its value to Guernsey being estimated at $150,-

000 annually. There are important fisheries of turbot, conger eels, oysters, lobsters, monster crabs, *etc.* The quarries of Jersey and Guern¬

sey are extensively worked and export fine granite for building purposes. There is daily communication by steamer with various Eng¬

lish and French ports and an average of 3,000

vessels of 200,000 gross tonnage enter and clear the Channel Island ports annually. The chief town is Saint Helier, on the island of Jersey.

Among the farming population the ver¬

nacular is old Norman French, which differs in peculiarities of spelling and pronunciation in each island and even in parishes of the same island. English predominates in the town dis¬

tricts, which contain a large proportion of British and many French residents.

Military service at fixed periods is compul¬

sory on all male natives and residents. Cave dwellings and numerous megalithic cromlechs, tumuli and menhirs prove the habitation of a prehistoric race; a few old Norman chapels remain ; the oldest churches, Saint Brelade's, Jersey, and Saint Sampson's, Guernsey, date from 1111, and earthworks, fortifications and castles dating from Roman and subsequent pe¬

riods exist. The Romans occupied the islands during the 3d and 4th centuries; Caesarea (Jer¬

sey) and Sarnia (Guernsey) occur in the Htinerarium' of Antoninus. After the Con¬

quest the islands alternated between Norman and English rule until 1204, when with the loss of Normandy they remained faithful to Eng¬

land and steadfastly resisted many subsequent attempts on the part of France to capture them.

In the reign of Henry VI the French held part of Jersey for six years. During the civil war they were the scene of many notable events.

A French expedition landed in Jersey in 1781, but was defeated with great loss. During the French and American wars, the islanders fitted

out many privateers and captured many rich prizes. The islands are favorite asylums for political refugees. Their numbers have in¬

cluded Charles II, Earl Clarendon, Victor Hugo and General Boulanger. Lord Tennyson was a frequent visitor. Pop. (1911) 96,900.

Consult Ansted, (Channel Islands' _ (1893) ; Boland, (Les iles de la Manche> (Paris 904).

CHANNELS, or CHAIN-WALES, of a

ship, pieces of wood or iron projecting edge¬

wise like a ledge from the ship's outside, abreast of and extending somewhat behind the masts. They serve to extend the shrouds and to prevent them from touching the gunwale or being injured by rubbing against it.

CHANNING, Edward, American his¬

torian: b. Dorchester, Mass., 15 June 1856. Pie graduated at Harvard in 1878, and in 1883 was appointed instructor in history there, becom¬

ing successively assistant and full professor of history and is now McLean professor of an¬

cient and modern history. He has written (The Narragansett Planters) and (Town and County Government of the English Colonies in North America) (Johns Hopkins Studies,

1883-84) ; (Columbus and His Companions,) in Winsor's (Narrative and Critical History of the United States) (1888) ; (The United States, 1765-1865' ; in collaboration with A. B. Hart and F. J. Turner, (Guide to the Study of Amer¬

ican History' (1912) ; and with T. W. Hig-ginson, (English History for

Americans' ; (Students' History of the United States'

(1898) ; Ulistory of the United States,' Vol. I, (The Planting of a Nation in the New World, 1000-1660' (1905) ; Vol. II, (A Century of Co¬

lonial History, 1660-1760' (1908); Vol. Ill, (The American Revolution, 1761-1789' (1912) ; (The Jeffersonian System' (1906).

CHANNING, Edward Tyrrel, American

scholar: b. Newport, R. I., 12 Dec. 1790; d.

Cambridge, Mass., 8 Feb. 1856. He was a brother of William Ellery Channing, 1780-1842

(q.v.). He studied law with his elder brother, Francis Dana Channing, in Boston, and was admitted to the bar. He gave his attention chiefly to literature and carried forward a care¬

ful and critical study of the Greek and Roman classics, with that of the great writers of Eng¬

land. The North American Review, the earli¬

est permanent periodical in America, had its origin in a club of young men, who, in the win¬

ter of 1814-15, projected a bi-monthly maga¬

zine. Willard Phillips, afterward author of the celebrated works on the law of insurance and of patents, was to be its editor. The committee on politics was composed of George Cabot, James Lloyd, John Lowell, Josiah Quincy and others.

The chief managers were to be President Kirk¬

land, Jared Sparks, George Ticknor, Mr. Chan¬

ning, Richard H. Dana and John Gallison. At this time, William Tudor, author of the (Life of James Otis,' returned from Europe with a matured plan for a quarterly review ; and as the field was not large enough for two such works, the plan of the magazine was merged in that of Mr. Tudor, and the first number of the North American Review was issued in May 1815, as a bi-monthly, the quarterly publication

not being adopted until the commencement of the eighth volume. Tudor edited it for two years and in 1817 it passed under the control of a club. Jared Sparks was chief editor for one year when the duty was undertaken by Channing, aided by his cousin, Richard H.

Dana. In October 1819, Mr. Channing was succeeded in the editorship of the Review by Edward Everett, having been appointed Boylston professor of rhetoric and oratory in Har¬

vard University. _ This post he held for 32

years, resigning it in 1851. During all this 290

time, the department of rhetoric and oratory, including the charge of all the English compo¬

sitions of the students which had great in¬

fluence over their reading and taste, was filled by him with more than satisfaction to the pub¬

lic of reading and thinking men. A volume of his letters was published in 1856 with a me¬

moir by R. H. Dana.

CHANNING, William Ellery, American

Unitarian clergyman : b. Newport, R. I., 7 April 1780; d. Bennington, Vt., 2 Oct. 1842. Enter¬

ing Harvard College at 14 he took his degree in 1798 and though at first inclining to the study of medicine, presently decided upon the profes¬

sion of the ministry. After his graduation he spent two years in Virginia as a tutor, but in pursuance of his ascetic views regarding renun¬

ciation and the necessity of subduing the ani¬

mal nature, he endeavored to accustom himself to hardships during this period, even denying himself sufficiency of food and clothing. The result of this unwise course was to implant in him the tendency to disease that made him for the greater part of his career a semi-invalid.

Returning from Virginia he took up the study of theology, making at the start a careful study of the evidences of Christianity, wishing, as he said, to know what Christ taught and not what men made him teach. In 1801 he was made re¬

gent of Harvard, the duties of this office being light and the salary sufficient for his support while continuing his studies. In 1802 he preached his first sermon at Medford, Mass., from the text <(Silver and gold have I none; but such as I have, give I thee.® In 1803 he was ordained pastor of the Federal Street Church in Boston and continued in that relation for the rest of his life. In the earlier years of his min¬

istry the denominational spirit was not espe¬

cially strong in him and with the ministers of the Trinitarian churches in Boston, he was on most friendly terms. His opinions were ripen¬

ing during this period, however, and in 1819, at the ordination of Rev. Jared Sparks in Balti¬

more, he preached a sermon in which for the first time he gave free expression to the princi¬

ples of Unitarian Christianity, upholding the exercise of reason in religious matters ; declar¬

ing the Bible to be <(a book written for men in the language of men and its meaning to be sought in the same manner as that of other books.® He also objected to the doctrine of the Trinity, affirming his belief that Christ was distinct from and inferior to God, and sent to men as a great moral teacher, not as a medi¬

ator between erring man and offended deity.

This discourse gave rise to much controversy and fixed definitely the Unitarian position as distinguished from that of the Trinitarians. It made him, moreover, the recognized leader of American Unitarianism, and much as he dis¬

liked controversy he never hesitated from ut¬

tering what he believed to be true because of hostile criticism. His greatest dread was of becoming creed-bound and thus losing percep¬

tion of new truths, and he even spoke of him¬

self as ((little of a Unitarian,® and standing aloof <(from all but those who strive and pray for clear light, for a purer and more effectual manifestation of Christian truth.® After 1824

Rev. Ezra Stiles Gannett was associated with him in the ministry of the Federal Street par¬

ish and from this epoch his time was largely given to philanthropic and literary work, the asceticism of his youth having long since been supplanted by a more wholesome understand¬

ing of life and its requirements and duties.

He visited Europe in 1822 and became acquaint¬

ed with Coleridge and Wordsworth. He was one of the first to acknowledge the greatness of the latter, and save Shakespeare, he read no poet oftener. Channing was a fearless de¬

fender of freedom and upheld Garrison when that great abolitionist was the most generally detested person in Boston. In the pulpit his mission, as he saw it, was to free men's minds from servile conceptions of God, to disabuse religion of its benumbing terrors and to show forth to men the real significance of their moral natures. His writings on theological, social and philanthropic themes have received the widest circulation and been translated into French, Italian, German, Icelandic, Russian and Hungarian. The most notable of them in¬

clude (Evidences of Revealed Religion* ; (Es¬

say on National Literature) (1823) ; (Remarks on the Character and Writings of John Milton) (1826) ; (Character and Writings of Fenelon) (1829) ; (The Duty of the Free States>

(1835); (Negro Slavery) (1835); (Self Cul¬

ture* (1838). He had a lifelong abhorrence of slavery, but in his (Duty of the Free States) his feelings on the subject find fullest expres¬

sion. His name, moreover, was associated with the most of the social reforms of his day and besides bearing a part in the great anti¬

slavery agitation, he warmly sympathized in the temperance movement, was an ardent lover of peace and deeply interested in schemes for educational advance. He stood for intellectual and spiritual ideas and foresaw dangers both to nations and individuals in the spread of materialism, in the contented adoption of in¬

adequate aims, complacent satisfaction with perishable interests. In an age when com¬

paratively few religious leaders dared to think outside of narrow prescribed limits, Channing stood forth as the intellectual champion of freedom. Much of his influence may have been due, no doubt, to the singular sweetness of his disposition and his entire nobility of character, but more of it was due to the fact that he spoke with utter fearlessness and thus inspired other men to free themselves from the fetters of dogma or of intellectual timidity.

Although two generations have passed since his death, his name is still both familiar and beloved and his beneficent influence, far from lessening its hold upon men, has deepened and widened with the years. Channing's literary style, while not highly ornamental, was both clear and vigorous and his sentences were usu¬

ally short and direct, though it is said that his personal preferences in the writings of others were for long and involved sentences. On 1

June 1903, a bronze statue of Channing by Her¬

bert Adams was unveiled in the public garden in Boston, Mass., its site being opposite the Ar¬

lington Street Church, the successor of the Fed¬

eral Street Church, of which he was so long pastor. The statue and its monumental setting were the gift of John Foster to the city. Con¬

sult (Lives* by W. H. Channing and C. T.

Brooks (3 vols., London 1848, and reprinted Boston 1880) ; Correspondence of Channing and Lucy Aiken1* ; Peabody, (Reminiscences) ; Chadwick, (W. E. Channing) (Boston 1903) ;

and Eliot, (Four American Leaders } (Boston 1906).

CHANNING, William Ellery, American

poet, nephew of William Ellery Channing, the elder: b. Boston, Ma,ss., 10 June 1818; d. Con¬

cord, Mass., 23 Dec. 1901. After some years spent in newspaper work he retired to Con¬

cord, where he lived the life of a recluse. His writings include (Poems) (1843-47) ; (The Woodman* (1849); <Near Home* (1858);

cThe Wanderer) (1872) ; Conversations in Rome) (1847) ; and (Youth of the Poet and Painter) ; (Thoreau, the Poet-Naturalist*

(1873) ; (Eliot) ; (John Brown.*

CHANNING, William Henry, American

clergyman: b. Boston, 25 May 1810; d. London, 23 Dec. 1884. His father, Francis Dana Chan¬

ning, died when he was very young. He grad¬

uated at Harvard College in 1829, and entering the Unitarian ministry preached with much success in Meadville, Pa., New York, Cincin¬

nati, Nashua, Boston and Rochester. Settling in England, he succeeded James Martineau as pastor of the Hope Street Chapel in Liverpool, 1852-62. He was for two years chaplain of the Senate at Washington, but from the close of the Civil War lived entirely in England.

He published (Memoirs of Dr. William Ellery Channing) (1848) ; (Life and Writings of James H. Perkins*; (Memoirs of Madame

Ossoli (Margaret Fuller),* in connection with R. W. Emerson and J. E.

Clarke (1852). His addresses and discourses were often extempo¬

raneous and delivered in a style highly im¬

passioned and imaginative. During a consid¬

erable part of his career he was an earnest ad¬

vocate of social reform. He wrote for the North American Review, the Dial, the Christian Examiner and other magazines. See <Life, J

by Frothingham (Boston 1886).

CHANNUKAH, Han' na-ka. See Befana.

CHANSON DE ROLAND, the culmina¬

tion of a cycle of (Chansons de Geste* or (Songs of Valor,) celebrating the heroic achievements of Charlemagne. Its date is proved to be not later than 1095, possibly as early as 1066. They are inspired especially by the joy and pride of the triumph of Christian arms over the Mohammedan invasion, which, through the gate opened by the Moors of Spain, threatened to subdue all Europe. The subject of the poem is the avenging of the death of Roland at Roncesvalles by Charlemagne. The French text of the (Chanson) was first pub¬

lished in Paris by M. Francisque Michel in 1837, and afterward in 1850 by M. F. Genin.

Tyrwhitt, in his edition of Chaucer, was the first to call the attention of English readers to the 'Chanson* ; but English tradition has it that the song was sung by the Norman Taillefer just before the battle of Hastings. The best and oldest French manuscript, called the <Digby,) is preserved in the Bodleian library at Oxford.

The French poem contains 6,000 lines. A frag¬

ment of 1,049 lines, translated in Middle Eng¬

lish from what is known as the Lansdowne manuscript, is published by the Early English Text Society. The first modern edition is by Michel (Paris 1837). Consult editions by Mul¬

ler (Gottingen 1878) ; Gautier, Leon (Tours 1872 et seq.) ; Stengel (Heilbronn (1888); Seelmann, ‘Bibliographic des altfranzosischen Rolandliedes* (Heilbronn 1888) ; Paris, Gas¬

ton, (La poesie du moyen age1* (1885-1906) ; Grober, Gustav, (Grundriss der romanischen Philologie* (Strassburg 1904) • Gautier, Leon, (Les epopees frangaises* ; Becker, P. A., (Grundriss der altfransozischen Litteratur*

(1907) ; Hart, W. M., ‘Ballad and Epic) (1907) ; Wright, C. H. C., (History of French Literature* (London 1912) ; Stengel, Edmund, (Das altfranzosische Rolandslied* (1900).

CHANT, Laura Ormiston Dibbin, Eng¬

lish lecturer and reformer: b. Chepstow, Mon¬

mouthshire, 1848. In 1876 she was married to Thomas Chant. She has taught in schools as well as nursed in hospitals and has lectured widely both in England and the United States on literary and scientific subjects, being a prom¬

inent advocate of woman’s suffrage and temper¬

ance. In the crusade against the Empire Music Hall, London, she played an important role. In the Bulgarian wars she took relief to the Arme¬

nian refugees, and at the time of the Graeco-Turkish War she took nurses to the Greek frontier and Crete. She has published (Verona and Other Poems) ; ‘Short Stories,* and sev¬

eral collections of original songs.

CHANT, a short musical composition

adapted to the singing of the psalms and canti¬

cles. Chants are single when adapted to a single verse, and double when adapted to two verses, the former consisting of two strains of three and four bars respectively, and the latter being twice that length. More recently quad¬

ruple chants extending over four verses have been introduced. The complete chant consists of four parts, namely: (1) The intonation or initial phrase leading up to the reciting note; (2) the reciting note, which is the dominant of the mode employed; (3) the mediation, or main body of the chant; and (4) the termina¬

tion or concluding phrase. In modern Angli¬

can chants, however, there is no intonation.

The origin of the plain song of the Church is unknown, but the first attempt to reduce the traditional music to some definite system was made by Saint Ambrose, bishop of Milan (d.

397). More important, however, by far is the Antiphonarium of Gregory the Great, which appeared in the latter half of the 6th century and soon established itself as the chief and in fact only authority on Church music. The Gre¬

gorian tones were introduced into England by Saint Augustine, and in the course of their history in that country they underwent many modifications in the various local “uses.** Dur¬

ing the civil war and the Commonwealth they went out of use, but were revived at the Res¬

toration. Not long afterward, however, the Gregorian chants began to give place, to the modern double chants, and it is only in quite recent years that attempts have been made to revive them. A new impetus has been given to the use and popularization of plain chant in recent times by the first encyclical letter of Pius X, his amotu proprio ** and the introduction of Gregorian music in all the Catholic churches throughout the world. See Gregorian Chant.

CHANT DU DEPART, shan dii da-par

(Fr. (<Song of Departure8), a popular French military song of the period of the Revolution, written by the poet Marie Joseph Chenier, to the music of Mehul. The occasion for its com-202

position was the celebration of the fifth anni¬

versary of the taking of the Bastille.

CHANTABON, shan-ta-bun', or CHAN—

TIBAN, Siam, an important commercial port on the east side of the Gulf of Siam, near the mouth of the Chantiban River. It is occupied by the French as security for fulfilment of the treaty of 1893. It is a place of considerable trade. Pop. 30,000.

CHANTAL, shantal, Baroness de, Jane

Frances Fremyot (fram-yo), Saint, French devotee, foundress of the order of the Visita¬

tion B. V. M. : b. Dijon, France, 1572; d. Moulins, 13 Dec. 1841. She married C. de Rabutin, Baron de Chantal, who died 1600. After his death she devoted her life to charity. The in¬

stitution of the Visitation nuns was founded in 1610 at Annecy, and at her death it had 87

houses, and 60 years later 150 houses with 6,000

inmates — nuns and girls receiving a secular and religious education. She was canonized by Clement XIII in 1767 ; her day in the Roman Calendar is 21 August. Her life and letters wrere published at Paris (1874-79).

CHANTECLER, shan-t'-klar'. The most

original play of Edmond Rostand, although by no means his best, is Chantecler,* produced in 1910. The public, which had first been captivated by the dashing (Cyrano de Bergerac,* and then charmed by the more ambitious <L'Aiglon,) had for a decade yearned for another piece from the poet's pen. When it came, after judicious

heralding, it proved, to many, something of a disappointment. A tour de force, brilliant, witty and novel, it was nevertheless seen to stand apart from the main development of the modern drama. Rostand, as a romanticist, had sought to clothe with unconventional garb figures to be used in a satire. From his obser¬

vation of barnyard animals he caught the notion of presenting contemporary society in hide and feathers. Accordingly, he offered a dramatic fable, its central theme the faith of Chantecler, the cock, in his mission as the bringer of the dawn. Chantecler believes that his joyous song directly evokes the sunrise.

Great is his distress to find, when the envious Hen Pheasant has screened his eyes with her wing and made him forget his task, that the dawn has brightened without him, and that he and his work are of little moment in the scheme of creation. Yet he will leave the forest whither the Hen Pheasant has beguiled him, and return to his barnyard to proclaim, though he cannot produce, the day. His companion, freshly enthralled by this evidence of his cour¬

age in defeat, flies up to protect him by divert¬

ing to herself the attention of a hunter, but, caught in a snare, she dies. Incidentally, the play laughs at the social climbers who attend the Guinea-Fowl's five o'clock tea, at the cynical Blackbird, the fancy cocks who are fops and faddists, and the spiteful birds of night. More sympathetic are the hero, Patou the dog, a good old idealist, and the Hen Pheasant, who rep¬

resents woman the enchantress, piqued by man's devotion to his work, yet ready to lay down her life for him. The style of this fantasy is a marvelous mixture of poetry and slang, witty quips and smart local allusions jostling pas¬

sages of lyrical beautv. No translator could hope to render its rich and poetic quality, al¬

though the English versions of Gertrude Hall (1910) and J. S. Newberry (1911) are worthy attempts toward this end. M. F. Liberma has written a critical analysis of the play entitled (The Story of Chantecler* (1910).

Frank W. Chandler.

CHANTERELLE, an edible mushroom

(Cantharellus cibarius) of a bright orange color, with a pleasant fruity smell, growing in woods and on dry pastures. See Mushroom.

CHANTIBUN. See Chantabon.

CHANTILLY, shan-te-ye, France, town in

the department of Oise, 25 miles north-north¬

east of Paris, on the Nonnette, celebrated for its two splendid chateaux. The smaller of the two chateaux is of recent construction and is regarded as one of the finest specimens of French Renaissance. The older and larger chateau was made famous by the presence of the most brilliant men of the time, La Fontaine, Racine, Moliere, La Bruyere and Boileau. In 1632 it passed to the house of Conde, but the greater part was demolished at the Revolution.

The last Prince of Conde bequeathed the do¬

main to the Due d'Aumale in 1830. The present building and domain, including fine grounds and gardens, an extensive forest, etc., were presented by the Duke to the French Institute in 1886. The chateau contains a valuable li¬

brary and a precious collection of works of art.

The place was formerly celebrated for its manufacture of lace ((<Chantilly lace®), but the manufactures have fallen off. It is a great horse-racing and training centre with a fine course, and noted for the three annual race meetings held here. Pop. 5,556.

CHANTILLY, shan-tTTli, or OX HILL,

Battle of. On 31 Aug. 1862, the day after the second battle of Bull Run, General Lee marched his army by way of Sudley Ford around

Pope's right at Centreville, to seize Fairfax CourtHouse and interpose between Pope and Wash¬

ington ; and at night Jackson, who was in ad¬

vance, bivouacked six miles west of Chantilly, on the Little River turnpike, Longstreet some distance in rear. Next morning General Stuart informed Jackson that a part at least of the Union army was at Fairfax CourtHouse, and that Pope's trains were passing on the road from Centreville to that place. Jackson moved cautiously toward Fairfax CourtHouse, and on reaching Ox Hill, three miles east of Chan¬

tilly, was informed by Stuart that the Union force seemed very strong on the road in front.

Then Jackson formed line on Ox Hill ridge, his artillery massed on the left of the road, his infantry on the right, extending in the direc¬

tion of the Centreville road. He had not com¬

pleted his formation when he became aware of an approaching force from the Centreville road, upon which he strengthened his right and threw out skirmishers. About 1 p.m. Pope, who had heard of Jackson's advance toward his rear, sent Gen. I. I. Stevens with nine regiments, about 3,000 men, of Reno's corps to gain the road, two miles east of Chantilly and hold Jackson in check until the army could be brought into position at Fairfax CourtHouse. Stevens moved from near Centreville across the fields, unexpectedly struck Jackson's advancing

skirmish-line, thrown out from his right, and drove it back into a body of woods. Jackson then advanced a regiment from the woods,

which was immediately driven back by Ben¬

jamin's battery. Stevens now formed a column of assault, six regiments in three lines, two regiments in a line. At 4.30 p.m. he placed him¬

self in the centre of this column of 2,000 men, on open ground, and ordered it forward, Ben¬

jamin shelling the woods in front. Not a sight nor sound betrayed the presence of an enemy, until the advancing column, ascending a gentle slope, came to within 75 yards of the woods, when from a worm fence bordering them

came a terrible volley from Branch's brigade, smiting the column with great effect, men going down by the score. At first it began to waver, but quickly bracing up returned the fire; five color-bearers of the 79th New York, Stevens'

old regiment, went down in succession. The assault was checked, Stevens ran forward, seized the colors and, calling upon his men to follow him, all rushed forward, routed Branch, and gained the fence, Stevens falling dead on it, with a bullet through his brain and the colors upon his head and shoulders. The col¬

umn pushed on into the woods. At the moment of reaching the fence a sudden and terrific thunderstorm and fierce gale burst over the field, blowing the rain into the faces of the men on both sides, impeding their movements and wetting their ammunition. Jackson brought up fresh men, and after a contest of more than an hour the six regiments were driven out of the woods and fell back to the point where they had formed, and on the right of where Birney's brigade of Kearny's division had come up. Meanwhile three regiments of Reno's com¬

mand had been sent in on Stevens' right, one only of which, the 21st Massachusetts, became, seriously engaged and was repulsed with great loss. General Kearny now came up with a battery, which he put in position and went to the right for a regiment to fill an interval on Birney's right. He met the 21st Massachusetts as it came out of the woods, and was leading it to the left when his attention was called to the fact that the Confederates were advancing from the woods and through a cornfield on Birney. He spurred his horse into the corn¬

field to reconnoitre, ran upon a skirmish-line, saw his mistake and turned to ride back, when he was shot through the body and killed. A sharp encounter ensued between the 21st Massa¬

chusetts and the Confederates, which was ended by darkness ; the regiment withdrew, the Con¬

federates retired to the woods and the battle was ended, neither side having permanently gained a foot of ground. The other two bri¬

gades of Kearny came up, and the ground was held until 3 o'clock in the morning of the 2d, when Kearny's and Reno's men fell back to Fairfax CourtHouse after the last of Pope s army from Centreville had passed. Pope fell back to Washington, and Lee marched to cross the Potomac into Maryland. The Union loss at Chantilly was about 800; that of the Confed¬

erates about 700. In the death of Kearny and Stevens the Union army lost two of its best officers. Consult ˆOfficial Records) (Vol. XII) ; Stevens, Hazard, (Life of General I. I. Steveps) (Vol. II) ; Gordon, G. H., (Army of Virginia.ˆ

E. A. Carman.

CHANTREY, chan'tri, Sir Francis Legatt,

English sculptor: b. Tordanthorpe, Derbyshire, 7 April 1781; d. 25 Nov. 1841. The chief amusement of his boyhood was in modeling figures in clay and drawing likenesses and at his own request he was apprenticed in 1797 to a carver and gilder at Sheffield. Here he at¬

tracted the attention of J. Raphael Smith, a mezzotinto engraver and portrait-painter, who, perceiving his decided inclination for drawing and modeling, gave him instructions, which tended greatly to prepare him for his future career. He then set up as a portrait-painter.

By 1802 he was resident in London, studying at the Royal Academy. Having acquired much reputation as a sculptor, he became the success¬

ful candidate for the marble bust which the inhabitants of Sheffield had resolved to erect to the memory of the Rev. J. Wilkinson (1805-06).

This interesting work, which may be said to have finally decided his future course, is in Sheffield Parish Church. Having settled per¬

manently in London, he presented numerous busts at the exhibitions of the Royal Academy.

About the same time he was a successful candi¬

date for a statue of George III for the city of London, and soon was almost universally regarded as the first monumental sculptor of the day. In 1815 he was chosen an associate and in 1818 a member of the Royal Academy.

In 1819 he visited Italy, where he was elected member of the academies of Rome and

Florence. He was knighted in 1835. His most celebrated works are the (Sleeping Children,*

a monument erected to two children of the Rev. W. Robinson, in Lichfield Cathedral ; the statue of Lady Louisa Russell, daughter of the Duke of Bedford, in Woburn Abbey; Lady Frederica Stanhope with her infant child, in Chevering Church; Sir Joseph Banks, at the British Museum; Roscoe and Canning, at Liver¬

pool Town Hall; James Watt, at Glasgow; the bronze statue of William Pitt, in Hanover square, London ; and statues of Horner, Sir J.

Malcolm, etc., in Westminster Abbey, and a statue of Washington in the State House at Boston, Mass. His finest works are his busts, among the best of them being Sir Walter Scott, James Watt, Wordsworth and Porson.

His full-length figures are said to betray an insufficient acquaintance with anatomy, and sev¬

eral of his equestrian statues in bronze are still more defective. The postures are formal, and the horses, in their bodies and limbs are very inanimate. He made munificent bequests,

amounting to £150,000, for the advancement of art, the Royal Academy being endowed with a large fund known as the Chantrey Bequest for the purchase of works of sculpture and painting by artists residing in Great Britain.

See ‘Lives* by Jones (1849); and Raymond (1904).

CHANTRY (old French, Chanterie), an

ecclesiastical endowment to provide for the cele¬

bration of masses for the prosperity of the liv¬

ing or repose of the dead. Previous to the Refor¬

mation chantries were very numerous, almost every family of importance having founded one or more. Wealthy founders would endow a church or monastery, in which religious serv¬

ices should be celebrated continually. For less wealthy founders, an altar in the church of the locality was made to suffice. Sometimes small chapels, called chantry chapels, were appended to the main edifice and occasionally, as at Wakefield and Bradford-on-Avon, such chapels 294

were erected on bridges. The residences of priests engaged in the services were known as chantry-houses, chantries or colleges. The Chantry schools were widely spread over Eng¬

land prior to the Reformation. Chantries were finally dissolved in England by King Edward VI, and nearly all endowments were devoted to the purposes of the Crown. For the text consult Gee, Henry, (Documents Illustrative of the History of the English Church, > pp. 328-57

(London 1896).

CHANUTE, cha-noot', Kan., city in Neosho County, 125 miles southwest of Kansas City, Mo., on the Atchison, Topeka and Santa Fe and the Missouri, Kansas and Texas railroads.

The city was incorporated in 1873, and adopted the commission form of government in 1912.

Manufactories here include railroad shops, glassworks, brick and cement plants, smelters, drilling-tool works and flour mills. The

United States census of manufactures for 1914 recorded 27 industrial establishments of factory grade employing 190 persons, of whom 131 were wage earners, receiving $69,000 annually in wages.

The capital invested aggregated $430,000, and the year's output was valued at $496,000: of this $234,000 was the value added by manu¬

facture. Most of the industrial plants utilize the abundant natural gas of this locality, which is also used for lighting and various domestic purposes. The recent discovery of extensive oil-fields in the vicinity has led to a new and important industry, over 2,000 productive oil-wells having been opened. This industry promises rapid growth for the city, and also developments of great importance to the State.

Pop. 11,000.

CHANZY, shaii-ze', Antoine Eugene Al¬

fred, French general and politician: b. Nouart, Ardennes, 18 March 1823 ; d. Chalons-sur-Marne, 4 Jan. 1883. After a course at the military school of Saint-Cyr, he became sub¬

lieutenant of infantry in 1843, and was sent to Algeria and eventually became major. He sub¬

sequently served in Italy and Syria, but on becoming colonel he returned to Africa in 1868.

On the outbreak of the war with Germany, in 1870, he was created a general of division, and after gaining the battles of Coulmiers and Patay, was put in command of the second army of the Loire. Here he fought heroically against the much stronger and more disciplined Germans, but finally had to retreat. He was elected to the National Assembly for the de¬

partment of Ardennes, and during the Com¬

mune he narrowly escaped with his life. When peace was declared he was elected to the National Assembly and became in 1872 com¬

mander of the Seventh Army Corps. In 1873

he went to Algeria as governor-general, in 1875 was elected life senator and in 1879 he stood for the presidency. In that year also he

was sent to Russia as Ambassador, a post which he held till 1881, when he became com¬

mander of the Sixth Army Corps. He published (La deuxieme armee de la Loire0 (1871).

Consult biographies by Chuquet (Paris 1884) and Villefranche (Paris 1890).

CHAO-CHOW, chow'-chow', China, a city

in the province of Kwang-tung, on the river Ham, 195 miles northeast of Hongkong. It is the centre of an important maritime division of the province. The channel leading to it is very shallow, so that ships of large burden can sail up only at high water. This city was included in the Treaty of Tientsin (1858) as a port open to foreign trade, but the foreign trade is trans¬

acted at Swatow. Pop. estimated about 200,000.

CHAOS, according to the signification of the word, the void which embraces all things.

Hesiod mentions, as the original principles of all things, Chaos, Earth and Eros (Love) ; other ancient poets made Chaos alone the pri¬

maeval source from which everything is derived; others added to it Night, Erebus and Tartarus; and others still represented Chaos as the parent of the Earth and Heaven; after the production of which Eros (Love) completed the creation.

Modern writers commonly understand by chaos the uniform primaeval matter from which the universe was made.

CHAP-BOOKS, a species of cheap litera¬

ture, in the form of small pamphlets, which pre¬

ceded the popular periodicals of the present day and were so called because prepared expressly for sale by the chapmen, or pedlars, who hawked them from district to district. They were largely productions

of the provincial presses.

The writers are mostly unknown, but one of the author of Scottish chap-books was Dougal Graham (1724-79), bellman of Glasgow. Their matter was of the most varied character, in¬

cluding theological tracts, lives of heroes, martyrs, interpretation of dreams, fortune tell¬

ing, weather forecasts, stories of ghosts, giqnts and witches, and songs and ballads. After 1800

the chap-books declined in popularity, and were succeeded by the Penny Magazine and other cheap publications. Collections of chap-books • are now found only in the libraries of biblio¬

philes. Consult (Notices of Fugitive Tracts and Chap-Books) (Percy Society, Vol. XXIX, London 1851); (Popular English Histories) (Vol. XXIII, 1848) ; Ashton, (A History of the Chap-Books of the Eighteenth Century) (London 1882) ; Fraser, (Humorous Chap-Books of Scotland) (1873) ; Faxon, (Ephemeral Bibelots,* in (Bulletin of Bibliographical Pamphlets * (Boston 1903) ; ((Catalogue of American and English Chap-Books,® in

bibliographical Contributions,* No. 56 (Cam¬

bridge 1905). Consult also Nisard, (Histoire des livres populaires) (Paris 1854), and Simrock, (Deutsche Volksbiicher* (13 vols., Berlin 1839-67).

CHAPAIS, sha-pa', Joseph Amable

Thomas, Canadian journalist and statesman: b.

Saint Denis de la Bouteillerie, Quebec, 1858. He was graduated at Laval University in 1879 and was called to the bar in the same year. From 1879 to 1884 he was private secretary to the lieutenant-governor of Quebec and from 1884

to 1901 edited Le Courier dn Canada (Que¬

bec). He became a member of the legislative council in 1892 and was made speaker in 1895.

In 1893 he was a member of Taillon's Cabinet and in 1897 was

Minister of Colonization and Mines. In the latter year he retired from public life and was appointed professor of history in Laval University. He was made chevalier of the Legion of Honor in 1902. His published works include (Les congregations enseignantes et le brevet de capacity (1893) ; (Discours et conferences* (1898); (Le ser-men du roi) (1901) ; jjean Talon, intendant de la Nouvelle France0 .(1904) ; Melanges de

polemique et d'etudes religicuses, politiques ct litteraires) (1905) ; (Le Marquis de Mont¬

calm 1 7 12— 1 759 J (1911).

CHAPALA, cha-pa'la, Mexico, a lake on the high plateau of Jaliso, surrounded by steep, bare mountains. It has an estimated area of 1,300 square miles, and contains many islands.

The Rio Lerma is its chief tributary stream, entering from the east; its outlet is the Rio Grande de Santiago.

CHAPARRAL-COCK, cha' pa-ral'. See

Road-runner.

CHAPEAUX, sha-po (Fr. ((hats))V), a name applied to the partisans of France in Sweden in the 18th century, while those of Russia were called bonnets (caps). Having instigated war against Russia in 1741, and again in 1756, the calamities thus inflicted upon Sweden impaired the popularity of the chapeaux. Succeeding in 1769 in regaining their former position, the party was soon extinguished altogether by the advent of Gustavus III and his reforms. The same names were also formerly applied in the French Academy, the chapeaux constituting the party supported by the philosophers and the public, and the

bonnets that partly upheld by the clergy and the court.

CHAPEL (Fr. chapelle, Lat. capella), a name for religious edifices of various kinds, especially for such as hold a subordinate posi¬

tion. In England and Scotland there are sev¬

eral kinds of chapels — parochial chapels, sub¬

ordinate to, but distinct from, the mother church; chapels of ease, built for the accom¬

modation of the inhabitants, in large parishes; university chapels, and private chapels, whose names explain their uses. The term is also applied to small buildings attached to cathe¬

drals, and separately dedicated. In England Nonconformist places of worship are com¬

monly called chapels in distinction from those of the Established faith to which the term church is applied. In the early history of Massachusetts Bay Colony the Congregational body was the established church, and the first Episcopal church in Boston was consequently termed a chapel, retaining that name, <(King's Chapel,);> to the present time. (See King's Chapel). The word chapel is also applied to an association of union workmen in a printing-office for the purpose of promoting and enforcing order among themselves. Con¬

sult Bond, (Westminster Abbey) (London

1909) ; Martin, (Manual of Ecclesiastical Architecture) (Cincinnati 1897) ; and article ˆChapelleˆ in Viollet-le-Duc, (Dictionnaire raisonne de l'architecture frangaise).

CHAPEL HILL, N. C., town in Orange

County, on the Southern Railroad, 28 miles northwest of Raleigh. It is a lumbering centre and has cotton and knitting mills and a wood¬

working plant. It is the seat of the University of North Carolina and has a Carnegie library.

Chapel Hill was incorporated in 1851 and its government is vested in

a mayor and council.

Pop. (1920) 1,483.

CHAPEL ROYAL, in the Church of Eng¬

land, a body composed of two deans, 36 royal chaplains, 10 priests, a lay choir and an organist. The services are performed in an oratory in Saint James's Palace. In Scotland such appointments are purely honorary, carry¬

ing neither emolument nor any special duty.

CHAPELAIN, shap-laiT, Jean, French

poet, one of the earliest members of the French Academy; b. Paris, 4 Dec. 1595 ; d. there, 22 Feb.

1674. Having gained a high literary reputation, after writing a preface for Marine's 'Adone,*

translating Aleman's (Guzman de Alfarache) and composing four odes, he conceived the project of writing an epic on Joan of Arc, 'La Pucelle,) which proved a total failure, al¬

though he spent over 20 years on it. The first 12 cantos appeared in 1656; and to so high a pitch had public expectation been wrought, that notwithstanding the adverse criticism of Boileau and Voiture, six editions came forth within the following 18 months. Eight new parts appeared in 1757, and the concluding four parts, which never were printed, are in manu¬

script in the Imperial library of Paris. Riche¬

lieu, to whom he dedicated a poem and whom he assisted in concocting literary works, con¬

ferred a pension on him ; he presided over the organization of the French Academy, took a conspicuous part in the early labors of that body, sat as academical critic upon Corneille's (Cid> and possessed during nearly 40 years a literary prestige, which was broken by his 'PucelleP although he remained in favor with the court. Consult his (Lettres) (ed. in part by T. de Larroque, 2 vols., Paris 1880-82) ;

(Lettres inedites/ ed. by L. G. Pellissier (1894) ; Duchesne, Julien, (Les poemes epiques du XVIII6 siecle) (1780) ; Fabre, A., (Les en-nemis de Chapelain > (1888) ; Molenes, E. de, (La Pucelle par Jean Chapelain* (Paris 1891) ; Fabre, 'Chapelain et nos deux premieres Academies* (Paris 1890) ; Miihlan, A.,

(Jean Chapelain : Eine, biographisch-kritische Studie* (Leipzig 1893) ; Searles, (The Library"

of Jean Chapelain) (Chicago 1910) ; Saints-bury, George, 'History of Criticism) (Vol.

II, 1911).

CHAPELLE, sha-pel', Placide Louis,

American Roman Catholic prelate : b. in the diocese of Mende, France, 28 Aug. 1842; d.

New Orleans, La., 9 Aug. 1905. He studied at the College of Enghien, Belgium, but in 1858

came to the United States and after complet¬

ing his theological course at the Baltimore Seminary, was ordained priest by Archbishop Spalding in June, 1865, the missions of Mont¬

gomery County, Md., being the scene of his first ministerial duties. In 1871 he was made assistant at Saint John's Church and afterward rector of Saint Joseph's Church, Baltimore, whence he was appointed to the rectorship of Saint Matthew's Church, Wash¬

ington. He became vice-president of the Bureau of Catholic Indian Missions and

helped to found the Catholic University. On 21 Aug. 1891, he was made coadjutor to the bishop of Santa Fe; in 1893 was elevated to the titular archiepiscopal see of Sebaste and in less than a year succeeded Archbishop Sal-pointe in the see of Santa Fe. However, he was soon transferred to the diocese of New Orleans, assuming his new charge on 10 Feb.

1898. In September 1898 Pope Leo XIII ap¬

pointed him apostolic delegate to, Cuba and Porto Rico, in 1899 the Philippines being added to his care. Subsequently he spent three months 206

in the discharge of his official duties in his country's new possessions. Within eight

months he consecrated four bishops for

Cuba, and three more for sees in other places.

He died at New Orleans of yellow fever.

CHAPERON, shap'e-ron, a cap or hood.

Such a covering is worn by Knights of the Garter, and was at one time in general use, but was later appropriated to doctors and licentiates in colleges. A person who acts as a guide and protector to a lady at public places is called a chaperon, probably from this particu¬

lar piece of dress having been used on such occasions. The name was also applied to de¬

vices which were placed on the heads of horses at pompous funerals.

CHAPIN, Anna Alice, American author:

b. New York, 16 Dec. 1880; d. 26 Feb. 1920

Educated privately, she studied music under Harry Rowe Shelley. In 1906 she was married to Robert Peyton Carter. She early began to write, publishing her first work at 17. Her works include (The Story of the Rhinegold) (1897); (Wonder Tales from Wagner'

(1898) ; (Wotan, Siegfried and Briinnhilde) (1898) ; (Masters of Music) (1901) ; (Discords'

(1905) ; (Lady Calmore's Flirtations) (1903) ; (Babes in Toyland,' with Glen McDonough (1904) ; (Makers of Song) (1905) ; ˆThe Stronger CalP (1905) ; (The Heart of Music) (1906); (The Deserters,' with R. P. Carter (1910) ; (Konigskinder) (1911) ; (The Nowa¬

days Fairy Book) (1911) ; (The Street-Car Mystery) (1911) ; (The Spirit of the Sea) (1912) ; (The Eagle's Mate' (1914) ; (The Every Day Fairy Book) (1915) and contri¬

butions to magazines and to the Sunday editions of the New York Times and Herald.

CHAPIN, Edwin Hubbell, American cler¬

gyman: b. Union Village, N. Y., 29 Dec. 1814; d. New York, 27 Dec. 1880. In 1837 he was ordained to the Universalist ministry, was a pastor at Richmond, Va., Charlestown and Bos¬

ton, Mass., 1838-48, and then accepted a call to the Fourth Universalist Church in New York, a connection he retained until his death. He became editor of The Christian Leader in 1872, succeeding Dr. Emerson. His collected ser¬

mons and addresses are (Duties of Young Men' (1840, 9th ed., 1856) ; (Duties of Young Women' (8th ed., 1856) ; Characters in the Gospels' (1852) ; discourses on the Lord's Prayer' (1850) ; (The Crown of Thorns'

(1860) ; (True Manliness' (1854) ; (Moral Aspects of City Life' (1853) ; discourses on the Beatitudes' (1855) ; (Select Sermons'

(1860); diving Words' (1861); dessons of Faith and Life' (1876) ; (God's Requirements'

(1881) ; (The Church of the Living God, and Other Sermons' (1881). Consult Ellis, dife of E. H. Chapin' (1883).

CHAPIN, Henry Edgerton, American bi¬

ologist : b. Wilbraham, Mass., 9 May 1859. He was educated at the Massachusetts Agricultural College and at Boston University. In 1886-87

he took a post-graduate course in chemistry and biology at Johns Hopkins University. He taught in secondary schools and engaged in agricultural journalism in 1881-86, taught at the Pennsylvania State Normal School in 1888-90 and from 1891 to 1900 was professor of biology at Ohio University. Since 1900 he has been instructor in biology and physiography in a New York high school. He is joint author of Chapin's and Rettger's (Elementary

Zoology and Guide' (1896) and has written many scientific monographs.

CHAPLAIN, a clergyman not having a

parish or similar charge, but connected with a court, the household of a nobleman, an army, a prison, a ship or the like. Army chaplains in the United States are appointed by the Presi¬

dent and are assigned or transferred by the Secretary of War. They are usually attached to the various army posts. By acts of Con¬

gress, approved 1901, 1904, 1906 and 25 Jan.

1907, provision is made for 67 army chaplains, 15 of whom may be majors; those of less than seven years' service, first lieutenants ; and the remainder captains. They are required to make a monthly report to the adjutant-general of the duties performed, and to keep a record of all marriage, funeral or baptismal services per¬

formed by them. Another duty is the instruc¬

tion of the enlisted men in the common English branches of education. Chaplains are chosen from all religious denominations and must be under the age of 40 at time of appointment.

There are 24 chaplains in the United States navy; 4 with the rank of captain, 7 of com¬

mander, 5 of lieutenant-commander, 1 lieuten¬

ant and 7 lieutenants (junior grade). Their duties, responsibilities and remuneration in general correspond with the relative army rank.

CHAPLAIN OF THE FLEET, The, a

novel by Walter Besant and James Rice, pub¬

lished in 1881. It gives a detailed account of the famous Liberties or Rules of the old Fleet prison in London, and of the Fleet marriages of the 18th century. These <(Rules" were houses in certain streets near the Fleet Market, where prisoners for debt were allowed to live, outside the prison, on payment of fees. This novel is considered one of the best of those written under the firm-name of Besant & Rice.

CHAPLEAU, sha-plo, Sir Joseph Adolphe,

Canadian statesman : b. Sainte Therese de Blain-ville, Quebec, 9 Nov. 1840; d. Montreal, 13

June 1898. He was educated at the colleges of Terrebonne and Saint Hyacinthe, and in 1861

became a member of the bar. He represented Terrebonne in the Quebec legislature, served successively in the capacities of Solicitor-Gen¬

eral, Provincial Secretary, Provincial Premier, Minister of Agriculture and Public Works in the government of Quebec, and was finally ap¬

pointed Secretary of State for the Dominion in 1883. He was lieutenant-governor of Quebec in 1893-98, and for some years was professor of international law at Laval University.

CHAPLIN, Charles Spencer, moving pic¬

ture actor : b. London, England, 16 April 1889.

He was educated in the public schools of South London. Both of his parents were in the the¬

atrical profession, his father, Charles Chaplin, Sr., being a well-known London vaudeville actor. At an early age, Charles and his brother, Sydney, went into the vaudeville profession, Charlie becoming a member of a troupe of juvenile dancers, known as the ((Eight Lanca¬

shire Lads.” Afterward, he enacted the part of <(Billy,” the page boy, in (Sherlock Holmes.’

At the conclusion of the run of (Sherlock Holmes,’ he re-entered vaudeville as a member of the Karno Comedy Companies and was soon CHAPLIN

playing leading parts. In 1910 he came to America as leading comedian of this organiza¬

tion, playing the principal vaudeville theatres of the United States and Canada, until Novem¬

ber 1913, when he joined a prominent motion picture company at Los Angeles, Cal. After appearing in motion pictures for the Keystone, Essanay and Mutual companies, he built his own studios in Hollywood, Cal., and, in con¬

junction with his brother, Sydney, formed the Charlie Chaplin Film Company early in 1918.

His productions include (A Dog’s Life,5

(Shoulder Arms,5 (Sunnyside,5 (A Day’s Pleasure) and (The Kid,5 produced for the Associ¬

ated First National Pictures, Inc. He is a member, with Douglas Fairbanks, Mary Pick-ford and D. W. Griffith, of the United Artists Corporation, known as the (<Big Four.®

CHAPLIN, shap-lan, Charles Joshua,

French portrait painter: b. Les Andelys, 6 June 1825; d. Paris, 30 Jan.

1891. He was of English parentage, but was naturalized as a French citizen. Under Napoleon III he was engaged in decorating the Tuileries and the Elysee, and he also painted many ceilings and wall decora¬

tions in Parisian public and private buildings as well as various portraits.

CHAPMAN, Alvan Wentworth, American

botanist : b. Southampton, Mass., 28 Sept. 1809 ; d. 6 April 1899. He graduated at Amherst 1830, studied medicine in Georgia and Florida and in 1846 settled in Appalachicola, where he was collector of internal revenue 1865-66, and col¬

lector of customs 1866-69.

CHAPMAN, Carlton Theodore, American

artist: b. New London, Ohio, 18 Sept. 1860.

He was educated at Oberlin, Ohio, and re¬

ceived his artistic education at the National Academy of Design and the Art Students'

League, New York and at the Julien Acad¬

emy, Paris. He has made a specialty of marines and landscapes, and is famed for his representation of the naval battles of the United States. His latest works include (The Derelict5 ; (The U. S. S. Gloucester and the Spanish Torpedo Boats) ; (A Squally Day —North River) ; (Off Ellis Island) ; (The Argus and the Pelican) ; (The Bonhomme Richard and the Serapis) ; (The Lighthouse) ; (0'er the Dark Sea) ; (The Pacific Coast5 ; (The Mystic PooP ; (Battle of Cape St. Vincent.5 He is a member of the National Academy of De¬

sign and was awarded medals at all recent expositions.

CHAPMAN, Frank Michler, American

naturalist: b. Englewood, N. J., 12 June 1864.

Since 1887 he has been assistant curator in the department of vertebrate zoology in the Ameri¬

can Museum of Natural History, New York.

He made some excellent close-range photo¬

graphic studies of bird life. He is editor of Bird-Lore and associate editor of The Auk.

Besides many papers in scientific journals, etc., he has published (Handbook of Birds of East¬

ern North America5 (1895) ; (Bird-Life, a Guide to the Study of Our Common Birds5

(1897) ; (Bird Studies with a Camera5 (1900) ; <A Color Key to North American Birds5

(1903) ; (The Economic Value of Birds to the State5 (1903) ; (The Warblers of North America5 (1907); (Camps and Cruises of an Ornithologist5 (1908).

CHAPMAN, George, English poet, the

earliest and perhaps the best translator of Homer: b. about 1559; d. London, 12 May 1634.

He is supposed to have been educated at Ox¬

ford 1576, proceeded to London, where he made the friendship of Shakespeare, Spenser, Mar¬

lowe and other distinguished writers of the time. As to his personal history little is known, but he is supposed to have held some post in connection with the court. The first of his works, so far as known, was the (Shadow of Night,5 a poem published in 1594. His translation of the (Iliad, 5 in rhyming lines of 14 syllables each, was published in three sepa¬

rate portions, in 1598, 1600 and 1603. It has been highly commended by such poets as Pope, Keats and Coleridge, as also by Lamb. Keats'

sonnet (On First Looking Into Chapman's Homer5 (<(Then felt I like some watcher of the skies,55 etc.) is well known. In 1614 ap¬

peared his translation of the (Odyssey5 in the same metre as the (Iliad, 5 followed in the same year by that of the (Battle.of the Frogs and Mice5 and the Homeric hymns. He also translated Hesiod's (Works and Days5 and portions of various classic poets. He wrote numerous plays, almost all now forgotten, though containing some fine passages. The earliest of these was (The Blind Beggar of Alexandria,5 a comedy, 1598. He was asso¬

ciated with Jonson and Marston in writing the comedy of (Eastward Ho!5 which from its satirical reflections on the Scotch is said to have nearly brought severe punishment on the authors. Among his tragedies are (Bussy d'Ambois5 ; (Caesar and Pompey5 ; (Revenge for Honor5 ; and two dramas on the life of Marshal Biron, which Swinburne characterizes as ((a storehouse of lofty thought and splendid verse, with scarcely a flash or sparkle of dra¬

matic action.55 An edition of his works was published (1873-74). Consult Swinburne,

(George Chapman: a Critical Essay5 (1875); Arnold, Matthew, (On Translating Homer.5

CHAPMAN, J. Wilbur, American clergy¬

man: b. Richmond, Ind., 17 June 1859; d. 25

Dec. 1918. He studied for a time at Oberlin College and was graduated 1879 at Lake Forest University. He was educated in theology at Lane Seminary, Cincinnati, Ohio. The de¬

gree of D.D. was conferred upon him by the University of Wooster. The degree of LL.D.

was conferred upon him by Heidelberg Uni¬

versity, Otterbein, Ohio. He filled pastorates in Indiana, Ohio and New York. His special ministry was in the First Reformed Church in Albany, N. Y.; the Bethany Presbyterian Church, Philadelphia, and the Fourth Presby¬

terian Church, New York city. _ Much of has ministry was cast along evangelistic lines. He was an intimate associate of D. L. Moody, a noted evangelist. For 10 years he was the cor¬

responding secretary of the General Assembly s committee on evangelistic work in connection with the Presbyterian Church. He was the representative at larce of this committee until his death. After 1910 he gave his time to evan¬

gelistic work and in this field traveled ex¬

tensively. In addition to the larger cities in the United States, he labored in Canada, Hawaii, the Fiji Islands, Australia, Tasmania, New Zea¬

land, the Philippines, China Korea Japan, Cey¬

lon England, Ireland, Scotland and W ales. He 298

is the author of (Receive ye the Holy Ghost* ; (And Peter) ; (Kadesh Barnea* ; (The Lost Crown* ; (The Secret of a Happy Day* (1899) ; (The Surrendered Life* (1899) ; Spiritual Life in the Sunday School* ; (From Life to Life* ; (Present Day Parables* ; (Life of D. L.

Moody* (1900) ; (Present Day Evangelism*

(1903) ; (The Problem of the World* (1911) ; (Chapman's Pocket Sermons* (1911) ; (Re¬

vival Sermons* (1911) ; (Present Day Evan¬

gelization* (1912).

CHAPMAN, John Jay, American lawyer

and essayist: b. New York 1862. He was graduated from Harvard in 1884, was admitted to the New York bar and was in active practice there until 1898. His essays and speeches have attracted considerable attention on account of their striking individuality and original point of view. His published volumes include

<Emerson, and Other Essays* (1898) ; ‘Causes and Consequences* (1898) ; Practical Agita¬

tion* (1900) ; (Four Plays for Children*

(1908) ; ‘The Maid’s Forgiveness* (1908) ; ‘A Sausage from Bologna,* a comedy in verse (1909); (Benedict Arnold,* tragedy in verse (1911); ‘Learning and Other Essays* (1911); ‘Neptune’s Isle* (1912) ; (William Lloyd Gar¬

rison* (1913).

CHAPMAN, Maria Weston, American re¬

former : b. Weymouth, Mass., 1806 ; d. there 1885. She was a daughter of Warren Weston, and received her education in her native place and also in England. In 1829-30 she was principal of the Young Ladies’ High School, Boston. She married in 1830; became an active opponent of slavery in 1834; and after the death of her husband in 1842, went to Paris, France, and assisted the anti-slavery cause with her pen. She returned to America in 1856.

She edited the autobiography of her friend, Harriet Martineau (1877); wrote (Right and Wrong in Boston; Report of the Boston Fe¬

male Anti-Slavery Society* (1836) ; ‘Right and Wrong in Massachusetts* (1840). She compiled the anti-slavery hymnbook (The

Songs of the Free* (1836).

CHAPMAN, William, Canadian poet : b.

Saint Frangois de la Beauce, Quebec, 1850. He was educated at Levis College, studied law and for a time engaged in trade. Later he entered the civil service of his native province. He also did some journalistic work in Montreal and Quebec and in 1902 became a French translator for the Dominion Senate at Ottawa.

He has written (Les Quebecquois* (1876) ; ‘Le laureat* (1894) ; (Les deux Copains*

(1894) ; ‘Les aspirations* (1904), which received a prize from the French Academy; and ‘Les Royons du Nord* (1910), which gained the

highest prize from the French Academy.

CHAPMAN'S HOMER. George Chap¬

man (1559-1634), writer of plays and contem¬

porary of Spenser, Marlowe, Jonson and

Shakespeare, was a great translator in the great age of translations that brought forth the English Bible and so many versions and adaptations of the ancient classics. He pub¬

lished seven books of the 'Iliad* in 1598, and by 1616 had published together the (Iliad* and the 'Odyssey* complete in rhymed 14

syllable verse. The literature of his own time contains much complimentary allusion to him, and the esteem of later generations is manifest in many glowing tributes from eminent literary characters, probably the most familiar and the most stimulating being Keats's sonnet, (<Much have I travelled in the realms of gold:**

"Oft of one wide expanse had I been told That deep-browed Homer ruled as his demesne; Yet did I never breathe its pure serene Till I heard Chapman speak out loud and bold . "

The ((loud and bold** of Keats contains or suggests the qualities that have made Chap¬

man's translation live in spite of the lack of polish, of exactness, and sometimes of dignity, that are charged against it. Pope, his later rival, says ((he covers his defects by a daring fiery spirit that animates his translation.**

Even Matthew Arnold, the severe critic of all translations of Homer, who declares that (<in a verse translation no original work is any longer recognizable,** characterizes Chapman as "plain spoken, fresh, vigorous, and, to a certain degree, rapid.** Arnold, however, condemns him on the whole. ((Homer,** he says, ((is rapid in his movement, Homer is plain in his words and style, Homer is simple in his ideas, Homer is noble in his manner… . Chapman renders him ill

because he is fantastic in his ideas… . His conceits are un-Homeric, and his rhyme is un-Homeric; his manner and movement are un-Homeric; his diction …

often offends … by wanting Homeric noble¬

ness.** He condemns him most of all because ((he cannot forbear to interpose a play of thought between his object and its expression.

Chapman translates his object into Elizabethan, as Pope translates it into the Augustan of Queen Anne ; both convey it to us through a medium.** ((For the Elizabethan age,** write Butcher and Lang in the preface to their translation of the Odyssey, “Chapman supplied what was then necessary, and the mannerisms that were then deemed of the essence of poetry, namely, daring and luxurious conceits.

… Without Chapman’s conceits, Homer’s poems would hardly have been what the

Elizabethans took for poetry; without Pope’s smoothness, and Pope’s points, the Iliad and the Odyssey would have seemed tame, rude, and harsh in the age of Anne.** If, as Arnold reasonably insists, the real test of successful translation is the attempt to satisfy the scholar who has also poetical feeling, Chapman must be said to please most those not perfectly possessed of the means of really judging him as a translator, but who come to his work more or less as to an original poem in the Eliza¬

bethan manner. Such readers will find him admirable for what R. H. Horne calls <(his commanding energies, fulness of faith in his author’s genius, and in his own inspired sym¬

pathies, his primitive power, and rough truth¬

fulness of description** ; and will feel not only the inspiration of the Homeric narrative but the inspiration of the translator himself.

Grant Showerman.

CHAPPE, shap, Claude, French abbe and

inventor: b. Brulon (Sarthe) 1763; d. Brulon, 23 Jan. 1805. Having invented an ingenious system of signals to communicate at a distance with his friends, he presented it to the French Legislative Assembly in 1792. It was successfully tried between Paris and Lille, on a length of 48 leagues, and was adopted bv the government.

Chappe established several lines in France, and the one running north was first put in motion CHAPPE D'AUTEROCHE — CHAPTER

to announce the recapture of the town of Conde from the Prussians. The inventor was at once rewarded by the convention, which, by a decree, appointed him ingenieur telegraphe.

The lines were extended all over France, and the system was also adopted, with some altera¬

tions, through Germany and England. The attacks to which he was subjected, by persons jealous of his invention, preyed so much upon his mind that he committed suicide. His sem¬

aphore consisted of an upright post, with a transverse bar at top, and with two smaller arms movable on pivots. The position of the bars represented letters or words, and the posts were placed within visible distance one of another. Messages were conveyed a distance of 150 miles in 15 minutes by this method.

Consult (Histoire de la telegraphie* (1824) by Ignace Urbain Jean Chappe, brother of Claude Chappe.

CHAPPE D'AUTEROCHE, do-te-rosh',

Jean, French astronomer: b. Mauriac, Au¬

vergne, 2 March 1722; d. San Lucas, Cal., 1

Aug. 1769. He was a priest, but giving his whole attention to astronomy, became one of the assistants of Cassini in delineating the gen¬

eral map of France, and edited the astronom¬

ical tables of Halley. In 1760 he was desig¬

nated by the Academy to make an observation of the transit of Venus over the sun's disc, which Halley announced would happen 6 June 1761. He consequently set out for Tobolsk, in Siberia, which was pointed out as the most favorable point of observation. His mission was successfully accomplished; and returning to France at the end of two years, he published in 1768 his (Voyage en Siberie.* The follow¬

ing year he sailed for California to observe another transit of Venus, which was to take place 3 June. He was equally successful on this occasion, but died soon afterward. The results of his last expedition were published by Cassini, under the title of (Voyage de la Californie> (Paris 1772).

CHAPPED HANDS, a form of eczema

(eczema fissum), caused by exposure to ex¬

tremes of cold and heat. The skin swells and cracks and there is itching, pain and heat and in severe cases ulceration. The lesions are generally treated with oxide of zinc ointment, or a solution of borax in glycerin and rose water or with glycerin alone. The hands should be protected by warm gloves. Chapping may be avoided to a great extent by washing the hands with a bland soap in tepid water and thoroughly drying them afterward.

CHAPPELL, William, English musical

antiquary: b. 20 Nov. 1809; d. London, 20 Aug.

1888. For the most of his life he lived in Lon¬

don, where he was for some years a member of a great music publishing house. His first work of importance was (A Collection of National English Airs, Consisting of Ancient Song, Ballad and Dance Tunes1* (1838-40). He took a principal part in the foundation in 1840 of the Percy Society and the Musical Antiquarian Society and published the first volume of a (History of Music) in 1874.

CHAPPLE, Joe Mitchell, American jour¬

nalist: b. La Porte City, Iowa, 18 July 1867.

He studied at Cornell College, Iowa, and was engaged in journalism in Dakota, Ashland, Wis., and Chicago until 1897, when he became editor and publisher of The Bostonian, after¬

ward changed to The National Magazine, Bos¬

ton, Mass. Fie has written three novels (The Minor Chord* (1895; new ed., 1898); (Boss Bart, Politician > (1896); and <The Heart Chord) (1916); also <Mark Hanna* (1903); (Heart Throbs* (1906); (The Panama Canal*

(1907); cThe Happy Habit* (1908); (Hcart Songs* (1909) ; (Little Helps* (1910) ; (History Making* (1911) ; (Heart Letters* (1912). He has wide reputation as a speaker, having visited every State in the Union in his lecture tours, flashlights of Famous Men* is his most popular lecture.

CHAPTAL, shap -tal, Jean Antoine Claude, Comte de Chanteloup, French chemist and statesman: b. Nogaret, Lozere, 4 June 1756; d.

Paris, 30 July 1832. During his medical studies and practice he devoted much research to the science of chemistry, in which he soon became eminent, and was appointed professor at Mont¬

pellier, where he taught successfully the doc¬

trines of Black, Lavoisier and Cavendish. He established chemical works near Montpellier, the first attempted of the kind, by which he was soon enabled to produce various chemicals hitherto imported, such as the min¬

eral acids, alum, soda and salts of lead. The authorities of Languedoc heaped honors on him ; the Spanish government offered him a pension of 56,000 francs to go to Spain, and according to his biographer, Washington wrote three times to Chaptal, inviting him to America.

After the outbreak of the French Revolution he published a political

pamphlet, entitled (Dialogue Between a Montagnard and a

Girondist,* and was arrested, but through the intercession of friends was liberated. The Committee of Public Safety placed him in charge of the powder mills of Crenelle, now a part of Paris, which produced, under his management, 3,500 pounds of gunpowder daily.

Once more returning to Montpellier, he was elected member of the Institute, and devoted himself to science, until Bonaparte summoned him to the council of state, where he had the supervision of national education. When

Lucien Bonaparte resigned the portfolio of the interior, Chaptal took his place as minister, and for four years performed the duties of the department with much administrative ability.

He founded the conservatory, school of arts, chambers of commerce and society for en¬

couragement of industry, introduced the mod¬

ern French system of weights and measures, established a model farm and a system of dis¬

tribution of agricultural seeds, reorganized the prisons and hospitals, extended the network of highways over the face of the country and organized the carrying out of the plans of ex¬

tension of the Louvre and rues de Rivoli and Castiglione, since completed by Napoleon III.

On Napoleon's return from Elba, the Count was appointed director-general of commerce and manufactures and Minister of State. Louis XVIII struck him from the list of peers, but left him on the roll of the Academy. His works are all on chemical subjects, and may yet be consulted with advantage.

CHAPTER (Latin caput, head), one of

the chief divisions of a book. As the rules and statutes of ecclesiastical establishments were arranged in chapters, so also the assembly of 300

the members of a religious order, and of canons, was called a chapter, because some or all of the chapters containing the rules were read there ; and the place where they assem¬

bled, as well as the reproof administered to a delinquent member, by reading the rules of the chapter transgressed, had the same name.

The orders of knights, which originally had much of the ecclesiastical constitution, used this expression for the meetings of their mem¬

bers, and even some corporations of mechanics or tradesmen call their assemblies chapters. In England, as elsewhere, the deans and chapters had the right to choose the bishop, but Henry VIII assumed this right as a prerogative of the Crown.

CHAPTER-HOUSE, a building attached

to a cathedral, collegiate church or church belonging to a religious house in which the chapter meets for the transaction of business.

Chapter-houses are of different forms, being sometimes regular polygons of 4, 8 or 10 sides, and in other cases circles or parallelograms ; and their architecture is often noteworthy.

Sometimes they were the burying-places of clerical dignitaries. Among the most notable of English chapter-houses are those at Lincoln Cathedral (which is decagonal, with a central column), Salisbury, Wells, Southwell and York, the two last named excelling all others in Great Britain in the beauty and richness of their carved stonework. There is a chapter-house at Bristol,, of the Norman period, in shape a parallelogram, much enriched with arcading and various kinds of Norman orna¬

ment. The chapter-houses at Gloucester and Canterbury are likewise parallelograms, but of the Third Pointed or Perpendicular period.

CHAPULTEPEC, cha-pool'-te-pek ("Grass¬

hopper Hill®), Battle of. This, the last con¬

siderable engagement of the Mexican War, which was followed by the

immediate occupa¬

tion of the City of Mexico, was fought 12-13

Sept. 1847. Chapultepec is an isolated rocky mound 150 feet high, two miles southwest of the southwestern or Belen gate of the city, and guarding a main road into it ; sharply precipi¬

tous on the northern, eastern and part of the southern sides, but on the west and southwest sloping gradually to level marshy ground partly covered with a cypress grove. Here Montezuma and his predecessors had their pleasure grounds, and Chapultepec was their country-seat A fortified castle was started here by the viceroy Galvez in 1785, but left unfinished; from 1822 it was used as a military academy, in 1847 having some 40 students, who fought heroically in the battle. It was guarded by strong batteries, and its approaches were protected by walls (an aqueduct on the north) which shielded other batteries ; through the marshy fields in front of these were irrigating ditches, some large and deep, with high banks and sticky bottoms, very serious obstacles to troops and artillery. The one military defect of the castle for modern warfare was the limited force that could effectively use arms within it; the garrison of 800, commanded by Gen. D. Nicholas Bravo, was as large as could well operate there. Along its approaches were some 4,000 to 4,500 more troops, while Scott had 7,500; but Santa Anna dared not strip the other entrances to the city. By the battle of Molino del Rey (q.v.) on the 8th Scott had carried a set of long stone buildings southwest of Chapultepec and, though under its guns, forming some protection for hostile artillery.

On the 12th Captain Huger planted heavy bat¬

teries there and at three other places, to range the south and west of the hill, the only access¬

ible portions, on which an assault had been determined; and their fire gradually silenced that from Chapultepec, breached the defenses and caused much loss. About 8 a.m. on the 13th Scott launched two assaulting columns : Pillow on the west, from Molino del Rey through the cypress grove, supported by Worth; Quitman against the south, from the heights of Tacubaya, where Scott had his headquarters, supported by Persifor F. Smith's brigade.

Preceded by the pioneer companies with lad¬

ders, axes, picks and crowbars, and under a plunging fire, they surmounted all obstacles, cleared the approaches, broke through the

walls, climbed the heights, entered the castle gates and having cut off retreat by the northwestern road to Mexico, captured the entire garrison.

The approaches and castle had been mined, but the defenders waited too long before ex¬

ploding the mines, and failed. The next day the American army overcame all remaining re¬

sistance and entered the capital. Their loss in these three days was 863 killed and wounded, included Col. T. B. Ransom killed, Pillow and Shields wounded. The Mexican loss was un¬

known, but certainly as heavy, and included several gallant and brilliant officers ; and 823

prisoners were taken, including three generals, one the commandant of the academy. Among the American officers prominently engaged were a remarkable number afterward distin¬

guished in military and civil life: Robert E.

Lee, Joseph E. Johnston, James Longstreet, “Stonewall® Jackson, David E. Twiggs, Gideon J. Pillow, D. H. Hill, J. B Magruder, Barnard E. Bee, P. G. T. Beauregard, Geo. E. Pickett, Raphael Semmes; George B. McClellan, Silas Casey, E. V. Sumner, Jesse L. Reno, James Shields, I. I. Stevens, Z. B. Tower, William S.

Harney; Thomas H. Seymour, John W. Geary, Mayne Reid. Franklin Pierce had been severely wounded at Molino del Rey. Consult Wilcox, C. M., (History of the Mexican War} (Wash¬

ington 1892) ; Bancroft, H. H., (History of Mexico, Vol. V) (San Francisco 1885).

CHAR, char, a genus of fishes (Salvelinus alpinus) of the family Salmonidce. They were formerly classified in the same genus as the trout (Salmo), from which they are, however, differentiated by color, by smaller scales, by the structure of the vomer and bv its red, instead of black, spots during the breeding season.

There are several varieties of this fish, all hav¬

ing intense and beautiful colors; length from 10 to 15 inches; weight sometimes as high as two pounds, but generally ranging under one pound. All kinds are held in esteem for the table. They are found plentifully in the deeper lakes of England, Wales, Ireland and more rarely in Scotland, also in the Lake of Constance and Lake Geneva. The best known American variety is the brook-trout, N. fon-tinalis; there is also a variety found in Maine, known as the Rangeley Lake trout, which is very similar to the European char.

CHARA, ka'ra, in botany, a genus of plants, the typical one of the family Characece. The species are found in ponds. In palaeontology, the nucules, known under the name of Gyrog-onites, are found for the first time in the fresh¬

water beds of the Jurassic (Oolitic) forma¬

tions. They are the minute spiral fruiting bodies of sporocarps of these plants.

CHARACEiE, ka-ra'se-e, a family of cryptogamous plants, related to the Algce, composed of an axis consisting of parallel tubes, from which the branches are given off in whorls.

The axes are either transparent or incrusted with calcium carbonate. The plants inhabit stagnant water, both fresh and salt, beneath which they are always submerged. They are found in almost every part of the world, but are most common in the temperate zones.

Many species emit a disagreeable odor.

CHARACTER (from Gk. xaRaiiTVP& mark).

While it is doubtless true that the things which we primarily weigh

and evaluate in our discussion of moral worths are actions, the actions of an individual do not form a hap¬

hazard aggregate of unrelated deeds. There is a certain continuity in a man's acts, whereby one who knows him is able to predict pretty much what he will do under given circum¬

stances. This continuity is due to the fact that behind the shifting play of emotions that is to be found in the mental life of everyone, there is a background of permanent emotional associations and emotional processes which changes very slowly or not at all. This stable background of the moral life is the character.

Though a single deed may arise from the impulse of a mere fleeting emotion, and so falsify predictions made on the basis of a knowledge of a man's character, in the long run there will be found a very intimate cor¬

relation between a man's character and his deeds. As a result, our evaluation of a man's deeds can be and is vicariously transferred to his character. It is on account of this trans¬

ference that we are able to speak of a noble character, a base character, etc., meaning, the character of a man who is wont to perform noble deeds, or the character of a man who is wont to perform base deeds. All this permits us to assign a permanent moral worth to in¬

dividuals, and this assignment is of the utmost social value, inasmuch as it points out who is of lasting detriment to society and needs sup¬

pression, who is of lasting benefit and needs encouragement. Consult Jastrow, J., Char¬

acter and Temperament (New York 1915) ; Shand, A. F., (The Foundations of Character5

(London 1914) ; White, W. A., < Mechanisms of Character Formation (New York 1916).

CHARACTERISTIC (from Gk. Xapanrijp—

ictlkos). This term is used in many senses in mathematics. The characteristic of a com¬

mon logarithm (q.v.) is its integral part, which is so chosen that the fractional part is never negative. It depends only on the positive or negative power of 10 next smaller than the number whose logarithm is taken, and can consequently be found by inspection, so that it is not usually given in tables of logarithms.

The fractional part of a logarithm is called the mantissa, and is not altered if the number whose logarithm is to be found is multiplied or divided by a power of 10. Thus 35, 78

and 91 all have the characteristic 1. .002, .0018

and .00948 have the characteristic -3. On the other hand, 7,000,000, 7, and .000,007 all have the mantissa .845,098,0 _

The phrase, “characteristic of a family of surnames, 55 is used by Monge of a certain set of lines dependent on the family. Let us

have given a one-parameter set of surfaces, F (x, y, z, a) = 0, where a is the parameter.

Consider two surfaces of the family. In gen¬

eral, these will intersect in a line, whose value depends on the two values of a chosen. Con¬

sider the limiting position of this line as one value of a approaches the other. That is, con¬

sider a curve which satisfies the simultaneous 6F

equations F = 0 and = 0. This is called a characteristic of the family of surfaces. The locus of all the characteristics of a family of surfaces is its envelope.

In the phraseology of the 18th century, the characteristic triangle of a curve at a point is the triangle bounded by the tangent and abscissa at that point and a neighboring ordinate.

The word is also used to denote certain arithmetical invariants in the theory of alge¬

braic forms, the cross-ratio of the four tangents which can be drawn to a plane cubic from a point itself situated on the cubic, and many things besides. It is a custom among mathe¬

maticians who arrive at a new idea to call it by a name familiar in other branches of the science, and so there is scarcely a department of mathematics which does not involve some concept known by the name “characteristic.®

CHARACTERISTICS. Shaftesbury’s

Characteristics5 consisting of six treatises col¬

lected and published in 1711 : (A Letter Con¬

cerning Enthusiasm 5 ; (An Essay On The Free¬

dom Of Wit And Humor5 ; (Advice To An Author> ; (An Inquiry Concerning Virtue Or Merit5 ; (The Moralists5 ; and Miscellaneous Reflections.5 The book is the principal life work of a cultivated and high-minded

Whig nobleman who, debarred by ill health from a public career, dedicated himself to the study, practice and inculcation of moral philosophy. Writing for a sceptical and rationalizing age, Shaftesbury is pri¬

marily concerned to show that goodness

and beauty are not determined by revelation, authority, opinion or fashion, but by the essen¬

tially constant and inalterable nature of man and things. From his Philosophical Regimen,5

first published in 1900, it appears that he had reached his own convictions by a rigorous process of self-examination and self-discipline in imitation of his favorite classical masters, Epictetus and Marcus Aurelius. In common with the Stoics of antiquity and the Deists of his own time, he finds in the general harmony of the

universe objective evidence of a su¬

premely benevolent Mind, to whose purposes it is the part of every man's wisdom to conform.

In distinction from Hobbes, he holds that human society was not created by a contract but was inherent, from the first appearance of man in the world, in the natural and necessary relationships of male and female, parents and offspring. In distinction from Locke, the supervisor of his early education, he denies that all our ideas are derived from experience, in-302

sisting that our conceptions of right and wrong are, if not precisely innate, yet predetermined and appointed for us by our physical and mental constitutions and by our destiny as social beings. To study the ˆnatural® law of one's own being and of one's relationship to one's fellow beings and to the universe is es¬

sential, Shaftesbury persuades us, to the char¬

acter of a fine gentleman and a man of sense.

((To philosophize, in a just signification, is but to carry good-breeding a step higher. For the accomplishment of breeding is to learn what¬

ever is decent in company or beautiful in arts ; and the sum of philosophy is, to learn what is just in society and beautiful in Nature and the order of the world.® This passage suggests what is perhaps the most personal aspect of Shaftesbury as a moralist, namely, his aesthetic sensibility, his identification of the good with the beautiful, his insistence that conduct is a fine art with principles analogous to those of music and sculpture, and to be relished by every gentleman of taste. To a public begin¬

ning to take pride in its civility, in its tolerant and equable temper, in its devotion to common sense, Shaftesbury's studious ease and serenity appeared admirable, his urbanity worthy of emulation, his suave irony delicious and his benevolent and optimistic metaphysics an ac¬

ceptable antidote to the egoism of Hobbes and the pessimism of the theologians. He attained in the 18th century a wide reputation in Eng¬

land and abroad, influencing such men as Leibnitz, Herder, Franklin, Voltaire, Diderot, Montesquieu, Pope, Hutcheson, Hume and

Butler. In the reaction which followed the French Revolution his political and religious liberalism was disparaged as atheistical and revolutionary ; whereupon it was discovered that his style was artificial and pedantic.

Within recent years there have been some at¬

tempts at a critical restoration, notably in J. M.

Robertson's edition of the <Characteristics) (1900), and in Benjamin Rand's (The Life, Unpublished Letters And Philosophical Regimen) (1900), where Shaftesbury is ranked with Epictetus and Marcus Aurelius as one of ((the three great exponents of stoical philos¬

ophy.® Consult also Hatch, incomplete edition of (Characteristics } (1870) ; Gizycki, (Die Philosophic Shaftesburys) (1876) ; Stephen, (English .Thought in The Eighteenth Century) (1876) ; Fowler, (Shaftesbury and Hutcheson >

(1882) ; Martineau's (Types Of Ethical

Theory* (1885) ; Hatch, I. C., (Der Einfluss Shaftesburys auf Herder) (1901) ; Moore, C.

A., (Shaftesbury and the Ethical Poets in Eng¬

land* (in Pub. Mod. .Lang. Assoc., 1916) ; Wal-zel, (Shaftesbury und das deutsche Geitesleben des 18 Jahrhunderts* (1909).

Stuart P. Sherman.

CHARACTERS (Caracteres). The

<Characters) of Jean de la Bruyere are a col¬

lection of reflections on human nature and conduct and of ˆportraits®

of different types of character or varieties of moral development, studied with patient and penetrating observa¬

tion and drawn with extraordinary skill in a few precise, significant and revealing lines.

They are distributed over 16 chapters: Works of the mind, personal merit, women, the heart, society and conversation, material possessions, the city, the court, persons in high station, the sovereign or the state, man, judgments, fashion, certain usages, the pulpit, the strong-minded.

They derive in part from the Characters* of Theophrastus and appeared for the first time (1688) as an appendix to a translation that La Bruyere had made of that work, modestly hid¬

ing behind the Greek even in the title: (The Characters of Theophrastus, translated from the Greek, together with the Characters or the Manners of this Century.) They also continue the ˆportraits® that had long been popular in the novels of the time and in the literary recreations of certain salons. But these por¬

traits are no longer complimentary and flatter¬

ing, as those had been. Instead they insist pitilessly on the unlovely realities of motive that too often lie behind the smiling mask of manners. La Bruyere was a sharp-eyed ob¬

server of the brilliant society of court and salon. Indeed, there were many complaints from those who saw themselves in the satiric pictures he drew, though he disclaimed the intention of painting particular persons. His view of human nature is less embittered than that of his great contemporary La Rochefou¬

cauld, in the Maxims, but it is stern and hard, lacking in pity and tenderness. To the com¬

position of his (Characters) he brought a rare command of the French language, which he cultivated with infinite pains, and the judgment of M. Vallery Radot is often quoted with ap¬

proval: ((If you wish to take an inventory of the riches of our language, if you wish to know all its ins and outs, its movements, its figures, its resources, there is no need to have recourse to a hundred volumes ; read, reread La Bruyere.®

The Characters' by the progress they

mark in the art of psychological observation and moral characterization, also contributed substantially to the development of the novel, and their influence was clearly seen presently in England in Addison and Steele. Several translations were made, one by Nicholas Rowe (1709). None, however, is at present current.

The standard edition is that of M. G. Servois, in the series of the (Grands Lcrivains de la France1* (3 vols., Paris 1865-68).

Arthur G. Canfield.

CHARADE, sha-rad' (Fr.), a syllabic

enigma, that is, an enigma the subject of which is a name or a word that is proposed for dis¬

covery from an enigmatical description of its several syllables taken separately, as so many individual words. A charade may be called complete if the different enigmas which it contains are brought into a proper relation to each other, and, as a whole, unite in an epi¬

grammatic point. The French excel in this species of literary amusement, of which the following is a good example :

Quatre membres font tout mon bien

Mon dernier vaut mon tout,

Et mon tout ne vaut rien.

The answer is ((zero® : <(my last is worth my whole, and my whole

is worth nothing.® One from the German goes (<In front and behind, round; in the middle just a pound.® The an¬

swer is the name Otto, <ftt® being the equivalent of ((lb.® a pound.

Acting Charades, a kind of entertainment made up of pantomime and dialogue, and im-CHARADRIUS

provised by the members of an evening party.

The syllables and complete word are meant to be suggested by the various divisions of the piece. An example may suffice to convey the idea : Two of the parlor actors meet on the platform ; they shake hands, one says ((How do you do, Doctor ?w They both pass off at once and leave the audience to guess the word, which is “metaphysician.ˆ

CHARADRIUS, ka-rad’n-us, the genus to

which the plover belongs, forming the type of the family Charadriidce, which includes also the lapwings, dotterels, oyster-catchers, turnstones, sanderlings, *etc.*

CHARALES, ka-ra’lez (from Latin chara,

some unknown plant), a highly specialized or¬

der of the green algae or Chlorophycaceae. By some authorities it is considered as a group —the Characeae — of rank equal to that of the Chlorophycaceae (q.vD. Members of the group are found both in fresh and in salt water.

Formerly there were held to be only two genera of Charales, Chara and Nitella, but each of these has been subdivided by recent authorities. All the members of the group bear a strong superficial resemblance to the Archegoniate plants, for they appear to possess stem, leaves and roots. In fact, their general external aspect is that of a small Equisetum.

They grow to a height of from three inches to three feet, but the stalk is exceedingly slender, rarely exceeding a fifteenth of an inch in thickness.

Although asexual reproduction by spores is unknown in the Charales, they have several different types of structures which are able to survive after being separated and which de¬

velop into new plants the spring after they leave the mother plant. Sexual reproduction is carried on through extremely complicated or¬

gans whose closest analogues elsewhere are to be found among the brown algae. These or¬

gans, which are differentiated into male and female, are to be found at the points where the so-called leaves give off their leaflets. In cer¬

tain species they are to be found on different plants, but usually the same node bears both the curiously twisted oogonia and the anthe-ridia, as the female and male organs are re¬

spectively called. Of all male organs among plants, the antheridium of the Charales attains the highest degree of complexity.

The female cell or ovum is large and turbid with oil-drops and starch-grains, but the outer end is hyaline. The male cells or spermatozooids are of spiral form and taper, having two cilia at the smaller end. The product of the union of the spermatozooid and the ovum is the fertilized egg-cell or oospore. There is no alternation of generations with n chromosomes and 2n chromosomes to be found in any of the Charales. Nevertheless the oospore does not develop into the plant, but goes through the stage known as the proembryo. In Chara crinita, only the female of which is known, the ovum develops into an oospore parthenogeneti-cally, and no chromosome-reduction takes place.

The precise affinities of the Charales are not well known. Their sexual organs are un¬

like those of the other green algae, but closely resemble those of the brown algae, but Chara does not contain a trace of the brown pigment of the latter. The position that has been assigned to them as precursors of the mosses is at least doubtful, although they show a close analogy to the Archegoniates in their karyokinetic processes and in the form of the antherozooids. Consult Allen, ‘Characeae of North America) (New York 1888) ; Filarsky, ‘Die Characeen) (Budapest 1893).

CHARBON ROUGE, shar-bon roozh, or

RED COAL, a kind of charcoal obtained by subjecting wood to the action of heated air from furnaces, or of steam raised to a tem¬

perature of 572° F. Air-dried wood, by the ordinary process, yields at most 21 to 26 per cent of black charcoal, while by the steam process 36 to 42 per cent of red charcoal is obtained. It is of a dark-red color and con¬

tains 75 per cent pure carbon and 25 per cent hydrogen and oxygen. It is used in the manu¬

facture of gunpowder.

CHARCOAL, an impure variety of carbon,

prepared from vegetable substances or bones.

Wood charcoal consists of wood burned with but little access of air. Billets of wood are built into a heap, which is covered with earth or sand. The heap is fired at openings left near the bottom of the pile, and the gases escape at small openings above. For making fine charcoal, such as that of willow, used in the manufacture of gunpowder, the wood is burned in iron cylinders, or rather retorts, in which a process of destructive distillation removes the volatile hydrocarbons, pyroligneous acid, *etc.*

By this more perfect means the process is ac¬

curately regulated. Charcoal is used in the arts as a fuel; as a polishing powder; a table on which pieces of metal are secured in position to be soldered by the blowpipe ; a filter ; a defecator and decolorizer of solutions and water; an absorbent of gases and aqueous vapors ; a non-conducting packing in icehouses, safes and refrigerators: an ingredient in gun¬

powder and fireworks; and in the galvanic bat¬

tery and the electric light.

Animal charcoal, used largely in sugar¬

refining and as a disinfectant and filtering medium, is prepared by calcining bones in closed vessels. These are either retorts, similar to those in which coal is distilled for the pro¬

duction of illuminating-gas, or they are earth¬

enware pots, piled up in kilns and fired.

Charges of 50 pounds of bones to a pot will require 16 hours of firing. The bones are then ground between fluted rollers, the dust re¬

moved and the granulated material used for charging the filters of the sugar-refiner. The material is used for removing color, feculences and fermenting ingredients from the syrup.

In medicine charcoal is sparingly used, but is of service in gastric indigestion in which there is much evolution of gas. Charcoal takes up the gas and therefore prevents distention and pain. It has no curative qualities and is solely alleviative. See Lampblack.

CHARCOAL BLACK. See Blacks.

CHARCOAL DRAWING. See Art

Drawing.

CHARCOT, shar-co’, Jean Baptiste

Etienne Auguste, French explorer: b. Neuilly-sur-Seine 1867. He was an interne at the Hospital of Paris in 1890-94 and at the same 304

time an investigator at the Pasteur Institute.

In 1896-98 he headed the clinic of the faculty of medicine at the University of Paris. In 1903-05 and again in 1908-10 he was leader of Antarctic exploration expeditions and after¬

ward was made director of the Marine Labora¬

tory of Higher Studies. He has published (Arthropodes) (1907) ; Expedition antarctique frangaise, 1903—05 > (1908); (Deuxieme expedi¬

tion antarctique frangaise, 1908-10) (1911) ; ((<Pourquoi Pas?® dans 1’ Antarctique } (1911).

CHARCOT, Jean Martin, French physi¬

cian: b. Paris, 29 Nov. 1825; d. 16 Aug. 1893.

His specialty was in the treatment of nervous and mental diseases, and he performed many curious and successful experiments in hypno¬

tism and mental suggestion, in the Salpetriere, where he founded a clinic for the treatment of nervous diseases in 1880. He published several works treating of these subjects.

CHARD, the leaves of artichoke (Cynara scolymus) covered with straw in order to blanch them and make them less bitter. Beet chards

are the leaf-stalks and midribs of a variety of white beet (Beta cicla), in which these parts are greatly developed, dressed for the table.

CHARDIN, shar-dan, Jean Baptiste

Simeon, French painter, b. Paris 1699; d. 1779.

His father was a carpenter. The young Char¬

din received his first instruction from Pierre Jacques Cazes and had practical experience in executing minor portions of pictures of fash¬

ionable painters. His first independent work was a sign for the office of a surgeon. In 1728 on the occasion of a religious procession, he exhibited in the open air two pictures, one of which, (The RayR is now in the Louvre. He was already a master of still-life, the genre which wras to be his principal occupation throughout his life. He was extremely con¬

scientious, never beginning a new picture until the one preceding it was finished, and unceas¬

ingly consulting the object he was representing in order to be sure that his effect was true.

Chardin was twice married, and the fact is not without importance when we consider the char¬

acter of the man as reflected in his art. He was <(good and modest® and the delightful glimpses of family life that he has noted in his pictures are surely a result of the conditions in his own home. Of his two children the son, Pierre, gave promise of becoming a painter of merit, but died prematurely at 37 years of age.

Chardin was received as a member of the Academic de Peinture in 1728, and became its treasurer in 1755. In 1757 the King installed Chardin in an apartment in the Louvre where the painter spent the rest of his life. Diderot tells us that Chardin had a great understanding of art and could recognize it in others. The observation is certainly borne out by the fact that he was one of those who voted an en¬

couragement to the young Louis David, who was to bring in a style of painting so different from his own. He was a wise teacher,

Fragonard being a pupil of his before he went to study with Boucher, and it was to his first master that he owed the best of his instruction.

While Chardin's picture like the exquisite <Pourvoyeuse) or (Le Benedicite) at the Louvre and the innumerable still-life pieces might seem at first to suggest the Dutch school, he is in reality akin to the Hollanders only through the fortuitous similarity of his sub¬

jects. He is of the Latin tradition and his color and his idea of light — a matter to which he gave great attention — come from the earlier Frenchmen, with their Italian heritage. The composition of Chardin's work is also far re¬

moved from the Dutch — though one man of the latter nation must have appeared sympa¬

thetic to him, Vermeer of Delft. Even the lat¬

ter, however, if he is easily Chardin's peer in the matter of light, is not to be placed beside him as a colorist. From the gentle palette, so gay and so harmonious, the best influence has gone forth to the French colorists ever since, and not even Delacroix can make us forget the in¬

debtedness to Chardin of such painters as Cezanne, Renoir ani Matisse. He was very happy in the portrayal of children, as in (Boy Blowing Soap Bubbles > and (Girl with Cher¬

riesˆ (The Diligent MotheU and (The Amuse¬

ments of Private LifeR The best known of his portraits are a pastel of himself, now in the Louvre, and the excellent likeness of Rameau d'Alembert and Sedaine. From 1765 to 1767

he painted a series of decorative panels for the castles of Choisy and Bellevue, of which the Attributes of the Sciences, Arts and Music*

are now in the Louvre. Examples of his work are in the National Gallery, London ((La Fontaine) and (Still Life*), at the Metro¬

politan Museum, New York ((Still Life*), and at other museums. The great treasury of it remains in the Louvre. Consult Edmond

Pilou's <Chardin) (Paris 1909).

CHARDIN, Sir John, French Oriental

traveler: b. Paris, 26 Nov. 1643; d. London, 26 Jan. 1713. Before he had reached his 22 d year his father, a jeweler, sent him to the East Indies in order to buy diamonds. Chardin lived six years in Ispahan, where he was less engaged in mercantile business than in pro¬

found studies and scientific researches, making use of his connections at court for collecting the most authentic information of the political and military state of Persia. He collected the most valuable materials relating to antiquities and history. In 1670 he returned to France, but again left France for Persia, in 1671, tak¬

ing with him a considerable quantity of precious stones artistically set, exquisitely worked jew¬

elry, *etc.* He spent 10 years partly in Persia and partly in India. In 1681 he arrived in Lon¬

don, when he received the honor of knight¬

hood. He published the first volume of his (Travels into Persia and the East Indies,) in London, in 1686. The other volumes were about to follow, when he was appointed Min¬

ister Plenipotentiary of the King of England to the States-General of Holland and agent of the English East India Company to the same.

In 1711 two editions of his (Travels* appeared.

He soon after returned to England. The ex¬

actness and truth of his statements and the extent of his knowledge, have been confirmed by all succeeding travelers, and have been serviceable to Gibbon, Helvetius and Montes¬

quieu. The best edition of Chardin's trav¬

els* is that by Langles in 10 volumes (Paris 1811).

CHARDIN, Ohio, town and county-seat of

Geauga County, 30 miles northeast, of Cleve¬

land, on the Baltimore and Ohio and the CHARENTE— CHARGE D'AFFAIRES

Cleveland and Eastern Suburban railroads. It is an agricultural centre, has a large trade in dairy and maple products and contains a maca¬

roni factory. The electric-lighting plant is municipally owned. Pop. 1,542.

CHARENTE, sha-ront, France, an inland

department, formed chiefly out of the ancient province of Angoumois and deriving its name from the river Charente, by which it is trav¬

ersed; area, 1,487,447 acres; capital, Angouleme.

It is in general uneven, with hills covered with chestnut-trees, sandy plains, meadows, *etc.* The principal rivers are the Charente, joined by the canal of Poitou with the Vienne, the Dronne, Tardoire, Bandiat, Touvre and Ne. The wines of the department are of inferior quality and in little request for the table ; but they yield the best brandy in Europe. The celebrated cognac brandy is made in the districts of Champagne, Cognac, Jarnac, Rouillac and Aigre from a grape called the folic blanche , which yields a white wine. The red wines furnish an inferior brandy, without the bouquet that distinguishes the genuine cognac. The wine-growers them¬

selves carry on the distillation, each estate be¬

ing furnished with stills and the necessary ap¬

paratus. Excepting brandy and paper, the manufactures of the department are inconsid¬

erable, consisting of sacking, cloth, cordage, hats, corks, naval guns, leather, gunpowder, flour and earthenware. The paper made at Angouleme is said to be the best in France.

The department is divided into the five arrondissements of Angouleme, Barbezieux, Cognac, Confolens and Ruffec. Consult Coquand, de¬

scription, physique, geologique, etc., du departement de la Charente) (1859) ; and Lievre, (Exploration archeologique du departement de la Charente* (1881). Pop. 346,424.

CHARENTE, a river in France, rising in the department of the Upper Vienne ; flowing west and emptying into the Bay of Biscay, about 10 miles below Rochefort, opposite the Isle of Oleron ; length, 225 miles. It gives its name to two departments, Charente (q.v.) and Charente-Inferieure (q.v.).

CHARENTE-INFERIEURE, an-fa-re-er,

France, maritime department on the west coast, bounded on the north by the department of the Vendee, and on the south by Gironde; area, 2,792 square miles. It comprises parts of the former provinces of Angoumois, Saintonge and Poitou. The principal rivers that traverse or bound the department are the Charente, Gironde, Sendre, Boutonne and Sevre-Niortaise — all of which are navigable, as well as the canal of Brouage and that between Niort and Rochelle. The soil is fertile and well culti¬

vated; -and a considerable portion planted with vines. The soil produces hemp, flax, saffron, oats, wheat, rye, potatoes and fruit. The pas¬

tures are good and wrell stocked with cattle, horses and sheep. Along the coast are exten¬

sive salt marshes. The industries include the manufacture of salt, brandy, machinery, por¬

celain and faience ware and oyster and pil¬

chard fisheries. The chief harbors are those of Rochefort and La Rochelle ; the latter town is the capital of the department. Pop. 450,871.

CHARENTON-LE-PONT, sha-ron-toii—

le-pon, France, town situated about a mile to the southeast of Paris,

nected by rail and tramway, at the confluence of the Marne with the Seine. It has numerous mercantile and manufacturing establishments, including boat building, piano making and por¬

celain and rubber goods. The stone 10-arched bridge across the Marne used to be considered as the key to Paris on this side; hence the memorable attacks upon it both in the civil wars of France _ and in those with foreign enemies. At Petit-Charcnton is the celebrated asylum for the insane of both sexes. This establishment also contains a hospital for the care of accident victims in Paris, and a hospi¬

tal for workingmen. From its connection with the asylum the town has given several signifi¬

cant popular phrases to the French language, equivalent to the use of Bedlam in English. A person of marked eccentricity is called a ((Charenton boarder.** Pop. 19,499.

CHARES, ka'rez, the name of two well-known Greeks. The Athenian Chares was the general through whose incapacity the Thracian colony was lost to Athens during the Social War in 358-56 b.c., and who exposed his country to the designs of Persia, by entering for mercenary purposes the service of the revolted satrap, Artabazus. Although recalled in disgrace, Chares was sent in 349 to the aid of Olynthus, and again he returned without having achieved anything. In 340 he com¬

manded the army sent to Byzantium against Philip, again gave evidence of his incompc-tency, was replaced by Phocion, but once more invested with the supreme command. In 338

the fatal issue of the battle of Chaeronea seems to have been mainly due to his ignorance. He was noted for his athletic figure, his profligacy and his unscrupulous recklessness. Chares, the sculptor, a native of Lindus, Rhodes, flour¬

ished toward the close of the 3d century b.c.

He was a pupil of Lysippus and the sculptor of the Colossus of Rhodes, one of the (<seven wonders of the world,** a representation of the

Rhodian sun god erected in commemoration of the successful defense of Rhodes against Demetrius Poliorcetes in 303 b.c. See Col¬

ossus.

CHARGE, in heraldry, one of the bearings.

This may be one of the ordinaries, as they are called, the straight line bearings, as fess or chevron or a much more elaborate figure, as the representation of an animal or the head of one. Sometimes the charge is imposed upon another charge.

In gunnery, charge signifies the quantity of powder used at one discharge of a gun.

In military tactics , charge is the rapid ad¬

vance of infantry or cavalry against an enemy, with the object of breaking his lines by the momentum of the attack. Infantry generally advances to about 100 yards and fires, then gradually quickens the pace into the charge-step, and dashes at the enemy's lines. Cavalry charges in echelon or column against infantry, which is usually formed in squares to receive the charge.

CHARGE D'AFFAIRES, shar-zha daf-far',

a representative of a country at a less import¬

ant foreign court, inferior to an ambassador, a minister or resident minister, to whom is entrusted all matters of diplomacy. He is accredited not to the sovereign, but to the Min¬

ister for Foreign Affairs of a foreign power, 306

and holds his credentials only from the Min¬

ister for Foreign Affairs of his own country.

The title is also given to the officer to whom the charge of an embassy is entrusted during the temporary absence of the ambassador or minister plenipotentiary. When there exist strained relations between two governments to the extent that formal diplomatic relations can¬

not be maintained, charges d'affaires are often employed to exercise all the diplomatic func¬

tions of ministers.

CHARGE OF THE LIGHT BRIGADE,

The, a remarkable military movement made by nearly 700 British soldiers at Balaclava, 25 Oct.

1854. At the attack on Balaclava the Russians had been forced back by the 93d Highlanders.

Major-General Airy then sent down Captain Nolan, his aide-de-camp, with an order that the light brigade of cavalry, commanded by Lord Cardigan, was to charge along the southern line of heights and drive the Russians from the Turkish batteries. The order was not in itself difficult of interpretation; but Cardigan, to whom it was transmitted by Lord Lucan, his immediate superior, could see nothing from where he was stationed, and believed he was to advance down the valley in front of him.

Lucan must have perceived the proper line of advance ; but he did not inform Cardigan of his error, and Nolan was killed just as he per¬

ceived the wrong direction the brigade was tak¬

ing and was endeavoring to set it right. Car¬

digan headed straight for the Russian guns, (<into the jaws of death®; and the result was that the brigade of 673 mounted men was reduced in a few minutes to 195. <(Some one had blundered.® <(It was magnificent, but it was not war.® Lord Raglan, the British com¬

mander-in-chief, was wroth at this error and the grave losses sustained, and Lucan was re¬

called. On his return to England in January 1855 Cardigan was treated as a national hero and ever after he regarded himself as a man who had done great things. The poem under this title by Tennyson, written to the metre of >

Drayton's (Battle of Agincourt,® was published in quarto in 1855, and another edition in octavo was published in the following year under the title (In HonorenW It is worthy of note that the line ((Some one had blundered,® deleted in the first edition, was restored in the second and succeeding editions.

CHARING CROSS, a triangular piece of

roadway at Trafalgar square in the city of Westminster, forming the titular centre of London, so named from a cross which for¬

merly stood at the village of Charing in memory of Eleanor, wife of Edward I. When the Queen's remains were brought in 1290 from Grantham to Westminster Abbey, the King ac¬

companied the bier and erected at each stage where it rested a memorial cross. Of the 13

crosses raised, but two beside that in London remain. The original cross was demolished in 1647 by the Cromwellians as a symbol of Pop¬

ish idolatry. The modern cross, erected in 1863, stands in the courtyard of the Southeast¬

ern and Chatham Railway, close by the site of the older one, of which it is as nearly as pos¬

sible a reproduction, its style being the deco¬

rated Gothic of Edward's time.

CHARIOT, a vehicle used in ancient times either for pleasure or in war. According to the Greeks, it was invented by Miaerva; while Virgil ascribes the honor to Erichthonius, a mythical king of Athens, who is said to have appeared at the Panathenaic festival, founded by him, in a car drawn by four horses. The ancient chariot had only two wheels,

which re¬

volved upon the axle, as in modern carriages.

The pole was fixed at its lower extremity to the axle, and at the other end was attached to the yoke, either by a pin or by ropes. The Greeks and Romans seem never to have used more than one pole, but the Lydians had car¬

riages with two or three. In general the chariot was drawn by two horses. Such was the Roman big a, but we also read of a triga, or three-horse chariot, and a quadriga, or four-horse one. In ancient warfare chariots were of great importance ; thus we read of the 900

iron chariots of Sisera as giving him a great advantage against the Israelites. The Philis¬

tines in their war against Saul had 30,000 char¬

iots. The sculptures of ancient Egypt show that chariots formed the strength of the Egyp¬

tian army. We have also numbers of sculp¬

tures which give a clear idea of the Assyrian chariots. These resembled the Egyptian in all essential features. In modern times the name chariot has been given to a kind of light trav¬

eling carriage now out of vogue. An Etruscan chariot, in part reconstructed, may be seen in the Metropolitan Museum, New York. Con¬

sult Daremberg and Saglio, (Dictionnaire des antiquites) ; Ginzrot, (Die Wagen und Fahr-werke der Griechen und Romer) (1817) ; Hel-big, (Das Homerische Epos aus den Denk-malern erlauterD (1884); Leaf, (Journal of Hellenic Studies> (Vol. V) ; also article ((Currus® in Smith, W., dictionary of Greek and Roman Antiquities) (3d ed., London 1890).

CHARITABLE TRUSTS or CHAR¬

ITIES, any real or personal property gifted as a trust, which comes within an approved definition of a charity and which is for the benefit of an indefinite class of persons, suffi¬

ciently designated to indicate the intention of the donor, and constituting some portion or class ˆof the public. Thus, a charitable .trust or a charity is a donation in trust for promoting the welfare of mankind at large, or of a com¬

munity, or of some class forming a part of it, indefinite as to numbers and individuals — in short, a gift for general public use. Most defi¬

nitions attempt to carry the implication of public utility in its purpose as the following: A charitable trust is ((a gift, to be applied con¬

sistently with existing laws, for the benefit of an indefinite number of persons, either by bringing their minds or their hearts under the influence of education or religion, by relieving their bodies from disease, suffering or con¬

straint, by assisting them to establish them¬

selves in life, or by erecting and maintaining public buildings or works, or otherwise lessen¬

ing the burdens of government; a gift to a general public use, which extends to the poor as well as the rich.® In charitable trusts the object is generally uncertain, because if de¬

scribed with definiteness it would cease to be a charity and would be governed by the ordinary rules of trusts.

While, generally speaking, charities are either public or private, it is only with what are known as public charities that the courts

concern themselves in applying the peculiar law relating to charities. The line of distinc¬

tion which, determines where a private charity ends and a public one begins is at times diffi¬

cult to locate, and this difficulty has, caused much of the apparent

want of harmony which prevails among the decisions on this subject.

Charitable trusts are not within the rule against perpetuities. In fact a charitable trust contemplates perpetuity as explained farther on.

The general rule of law is that money or prop¬

erty devoted to a charitable use, where a trust is created, must, if the gift is accepted, be irrevocably devoted to such use.

Trusts for charitable uses are of ancient origin. In 1601 the English Parliament en¬

acted the statute of 43 Elizabeth, which is frequently referred to as <(The Statute of Charitable Uses,® and that act has had an important bearing on the subject of public charities from that date until the present time.

The statute was repealed in 1888, but the re¬

pealing act incorporated the preamble and it continues in force. Charitable trusts are rec¬

ognized in all of the States of the Union, but a number of the States have never adopted the statute at all, their courts differing as to whether this statute is in force as a part of the common law. The statute is important by reason of its enumeration in its preamble of purposes and objects which are considered charitable, as the courts of practically all juris¬

dictions give consideration and weight to this enumeration, regardless of the foundation of the law of charities in the particular jurisdic¬

tion. Uncertainty of the object is one of the characteristics of a charitable trust, and it has led to what is known as the cy pr£s doctrine, which is that the courts will interpret instru¬

ments creating charitable trusts so that if the exact object of the donor cannot be carried out the donation will be applied to something of a nature similar to that specified by the donor.

When a testator leaves property to his ex¬

ecutors in such a manner that they are to be the sole judges of its use, and the executors die before the testator, it is doubtful whether the trust will come into existence, as the execu¬

tors were the only persons who could desig¬

nate for what the donation was to be applied.

In some jurisdictions the rule is that if the property can be applied to other than charitable purposes it is too indefinite.

In cases in which the particular charitable purpose does not exhaust the whole fund, if from the instrument creating the fund, the in¬

tention appears that the entire amount is for charity, the surplus will be devoted to some other charity and will not form a resulting trust for the heir or next of kin. A gift may be made to a charity not in existence, and a gift to a specific charity will not fail for want of a trustee.

After the trustee has come into existence, if the purpose for which the trust was created fails for any reason, it will be applied to some other purpose of a similar character, so as to fulfil as nearly as possible the purpose for which it was intended. (See Rhodes Scholar¬

ships).

Charitable trusts are not subject to the rule against perpetuities, which is that property can¬

not be tied up for more than a life or lives in.

being and 21 years thereafter. If property left to a charitable trust is limited upon another estate not a charitable trust, and the first estate is in violation of the rule against perpetuities, the trust will not be sustained; but after the trust once comes into existence the rule against perpetuities is not applied to it.

By English law all bequests for charitable purposes, to be valid, must be strictly for the public benefit; that is to say, in favor of insti¬

tutions for the advancement of learning, science and art; for the support of the poor; or for other objects connected with the wel¬

fare of the public ; and such bequests include those in favor of the Church or of other re¬

ligious bodies sanctioned by the law. Be¬

quests for what are classed as superstitious uses are null and void. A body of commis¬

sioners (the charity commissioners), under whose superintendency such benevolent trusts are placed, was established under the Chari¬

table Trusts Acts of 1853, 1855, 1860, 1869 and 1888, and lastly upon the Mortmain and Char¬

itable Uses Act of 1891. They have the power of inquiring into the administration of all Eng¬

lish public charities. (See Mortmain; Pen¬

sions, Old Age; Penology; Entail;

Trust; Rockefeller Foundation; Russell

Sage Foundation). Consult Tudor, (Law of Charities and Mortmain) (London 1890) ; Perry, (Treatise on the Law of Trusts and Trustees > (5th ed., Boston 1899), and Pomeroy, (Treatise on Equity Jurisprudence) (3d ed., San Francisco 1905).

CHARITIES, Public, philanthropic asso¬

ciations and institutions of public and private initiative, for the relief of sufferers from dis¬

ease, poverty and misery. Following in the footsteps of civilization a development of char¬

ity has come, often slowly and haltingly, but ever persistently, until the treatment of de¬

pendent poor is now accepted as evidence of the civilization of a community. A glance through history discloses not merely neglect of the defective mentally and physically, by sav¬

age and barbarous peoples, but an aggres¬

sively cruel policy to rid the community of the burden of their care. Crippled children were left to die and helpless old persons were put out of the way.

Under the Hebrews, however, charity be¬

came recognized as a duty incumbent on per¬

sons of wealth to provide for those in need, the motives being obedience to Divine Law and practical pity for the unfortunate. In Greece and in Rome, the ((liberi» or free-born wealthy became patronizingly generous in liberal do¬

nations to the poorer classes. With the advent of the Christian Era charity in its broadest interpretation came to mean the exercise of humanity through the spiritual development of doing good, and the Church became a powerful organization in extending charity. Churches of all denominations have always looked after their poor and helpless; the Church is really the first organized charity. But the question arose as to whether, after all, it was not the duty of the community as a whole, rather than that of the Church, to care for the poor. It is well for the Church to do all that it can, but the fundamental responsibility for the care of the poor rests upon the community. What¬

ever the Church does lessens the burden upon 308

the state, but the conviction grew that the state is responsible and should be held respon¬

sible, and this may be said without in any de¬

gree lessening the responsibility that any church may feel for the care

of its own. Like Hebrew charity, which has always been, racial, churches are powerless to supply universal co¬

operation, because of their individual limita¬

tions, but they can assist and do assist in a general organization of charity. The proper sense of responsibility having at length devel¬

oped, the dawn of the 20th century found a settled conviction in all civilized communities that it is as much the duty of the state to care for its dependents as it is to conserve the educational interests of its children. This change was wrought only by self-sacrificing devotion of charitably inclined students of so¬

ciology through centuries of unremitting labor.

So slow, indeed, was the development of the practice of charity that it is well within the last hundred years that the care of the helpless was left to individuals or was treated by so¬

ciety at large as an unreasonable burden on the state. Even after the conviction became permanent that for its own protection, if for no higher reason, the state should assume the responsibility of caring for its helpless classes the conception of its duties were so vague and the method to be followed-was so undefined, that the results were eminently unsatisfactory.

Society regarded its dependents as being much on the same plane as its criminals and treated them much in the same way. Prisoners, de¬

pendent children, sick poor persons, the insane, the epileptics and the helpless aged were hud¬

dled together under one department of govern¬

ment and it was not infrequently the case that little or no discrimination was made in their care. General demoralization ensued and it be¬

came apparent that a remedy must be found if further progress was to be made in the devel¬

opment of the practice of charity. This remedy was found in segregation. It was clear that not only physical separation but governmental sep¬

aration of the various classes was necessary.

Custom and tradition were hard obstacles to overcome, but the adherents of segregation were not to be denied, and after a long and bitter and often disheartening struggle they won their first victory, in the segregation of criminals. A separate and independent depart¬

ment of government was established for their care, although society retained in a large de¬

gree its old habit of regarding its criminals and its dependents in much the same light. But an opening had been made for segregation and its adherents were quick to press their advan¬

tage. They next demanded and obtained the segregation of the insane and followed this up by the successful demand for the segregation of epileptics, idiots, dependent children, the sick poor, homeless men and women and the help¬

less aged. The aim was not merely to assure to each of these classes distinct physical sepa¬

ration from others, but to give to each a gov¬

ernment of its own so that it could receive the undivided attention and care of persons com¬

petent to do the work entrusted to them and held directly responsible for that work. So beneficial did the experiment of segregation prove to be that the practice of charity made strides for good after it was adopted far out of all proportion to progress in previous years.

Indeed the benefits from segregation are so marked and so convincing that the policy has been extended to different conditions in the same class. This is particularly noticeable in the modern treatment of consumptives, for whom special hospitals are constructed and spe¬

cial diet prepared. And yet the subject has not been exhausted. It is susceptible of further de¬

velopment and closer application. There is a crying need for it in the care of helpless old persons, in the treatment of whom the causes of destitution and the moral character of the individual should always be considered. The demonstrated advantages of segregation may be

summed up in the more intelligent attention that each class receives and in the choice of per¬

sons entrusted with the care of dependents, made with no other purpose in view than fitness for the position to be occupied. Poverty is not a crime, and the victims of poverty are no longer classed with criminals. As already mentioned the state has not always recognized this principle. On the contrary, its theory and its practice formerly forced the poverty-stricken individual into association with the criminal. In the last quarter of the 19th cen¬

tury convicted criminals wearing the uniform of the penitentiary were employed as nurses in public hospitals. When the force of union la¬

bor had driven prisoners as laborers out of the public streets, out of the public parks, off public works and from every other place where public moneys were expended for the improve¬

ment of the general community, prisoners wear¬

ing prison garb were retained as workmen in the public charitable institutions. At a time when it would have meant a race riot to have placed prisoners to care for the trees in the parks, to clean the cobblestones in the streets, or even to look after the sewers, the sick poor man, the helpless imbecile and the abandoned child were left in part to the care of convicts. This was done in the name of charity, but it was such a rank injustice to the individual, such a blot on the civilization of the community, that the long-growing and firmly founded convic¬

tion of earnest students of sociology rebelled against it and, by energetic insistence, won, step by step, a victory over such conditions.

The first great move toward the separation of the dependent poor from criminals was made in the introduction of the trained nurse into the public hospitals. It was potent in its in¬

fluence and appealed so strongly to the sense of justice of all communities that to-day every hospital, public or private, has its corps of trained nurses ; and the fact that once the place held by the trained nurse was held by a con¬

vict in prison garb is regarded as a barbaric horror. With the elimination of the convict as a nurse in the public hospitals, the cause

of progress and reform was encouraged to ex¬

tend its efforts to the elimination of prison la¬

bor in all public charitable institutions. The battle was not an easy one, but the adherents of reform never wavered. The divorce between the prisoner and the pauper to-day is complete in almost every civilized community.

Public sentiment has also gone deep into the study of the condition of children, looking always to the best chance to develop a depend¬

ent child, or a criminal child, into a good citi¬

zen. It recognized that environment is a pow¬

erful factor in the development of character,

and one of its chief endeavors has been to dis¬

associate the plastic mind of childhood from impressions that would tend to retard reform in a child already started on the downward path, as well as to protect a child not contam¬

inated by vicious surroundings from influences tending to contaminate it. The crowning work of this endeavor was the establishment of children's courts, wherein the cases of children charged with crime are tried, free from even the sight of adult criminals. See Charity Or¬

ganization Society ; Charities and Correc¬

tion, the National Conference of; Juvenile Courts; Delinquent Children; Pensions,

Old Age; Pauperism; Sociology.

Bibliography. — Brackett, J. R., Supervision and Education in Charity) (New York 1903) ; Conyngton, M., (How to help: a manual of practical charity } (New York 1909) ; Devine, E. T., (Efficiency and Relief > (New York 1906) ; Guild, F. H., State Supervision and

Administration of Charities) (Bloomington 1916) ; Richmond, M. E., Social Diagnosis) (New York 1917); Tallett, G. M., (Poverty: a Bibliography) (Madison 1909) ; Webb, S., (The Prevention of Destitution (New York 1911) ; Wright, H. C., (An Investigation of the Methods of Fiscal Control of State Insti¬

tutions in New York* (New York 1911).

CHARITIES AND CORRECTION,

The National Conference of. An annual con¬

vention of social workers which originated with an invitation extended by the American Social Science Association to different State boards of public charities, the delegates from which met in New York city 20 and 22 May 1874. It was found at that time that the members of the various States' boards which deal with public charity in the United States were desirous of a better acquaintance with each other and chat they could meet together and discuss the questions in which they had a common interest with mutual profit and en¬

couragement. It also appeared that a consid¬

erable number of persons not officially con¬

nected with the public charities were desirous of attending such a meeting and were both competent and willing to join in its debates or to contribute papers which should be the fruit of special research or long experience. An¬

nual meetings were established and in 1893

rules of procedure were published, giving a definition of membership requirements and a fee of $2. In 1897 the fee was raised to $2.50.

In 1903, a special class of sustaining members was created in addition In 1916 the regular membership fee was raised to $3. The mem¬

bership averages 3,000 and annual conferences are held in different cities throughout the na¬

tion. The permanent headquarters are at 315

Plymouth Court, Chicago, Ill. The history of organized social service and reform in the United States is revealed in the steady growth of

this dignified and powerful association, and its usefulness is shown in the manner in which every branch of scientific social effort in America may be turned to the solution of all its main practical problems ; practical applica¬

tion rivalling theory. Each year larger and extending issues have been attacked with con¬

fidence, a recent conference dealing with na¬

tional measures to prevent unemployment, the abolition of alcoholism, the promotion of social programs and State policies in the treatment of the insane, feeble-minded and defective criminals. The quarterly (Bulletins) and the annual Proceedings* constitute an encyclo¬

paedic storehouse on the social and charitable reform efforts of the United States. Consult Proceedings of the National Conference of Charities and Correction, 43d Annual Session *

(Chicago 1916 and previous volumes back to 1874).

CHARITON, kar'i -ton, Greek prose writer : supposed to have flourished in the 5th or 6th century a.d. He was the author of a romance which describes the loves and adventures of Chaereas and Callirrhoe. Critics generally think that the birthplace usually assigned to the author is fictitious, and that it is by no means certain that he was a native of Aphro-disias in Caria. The romance was first pub¬

lished with a learned commentary by D'Orville (3 vols., 4to, Amsterdam 1750), from a MS. in Florence, the only one yet known.

CHARITON, Iowa, city and county-seat

of Lucas County, situated on the Chariton River and on the Chicago, Burlington and Quincy and the Chicago, Rock Island and Pa¬

cific railroads. It is a fertile agricultural and stock-raising region, has coal mines and manu¬

factures carriages and wagons, ice, cement blocks, agricultural implements, flour, wind¬

mills, tanks, pumps, pipes, *etc.* The city con¬

tains a public library and owns its waterworks.

Pop. (1920) 5,175.

CHARITY (Fr. clicirite), one of the three great theological virtues, consisting of love to God and to men, or the disposition to love God with all our heart and our neighbor as ourselves. In a narrower sense, it signifies kindness and goodwill toward mankind in general, and in a still narrower sense, the giv¬

ing of alms and the alms itself, philanthropy in its general sense. Charity also has the sense of liberality in judging others and their actions; and in law it has the sense of a gift in trust for the good of a community or a part of it ; thus we have the term <(public charities.**

Organized charity is the system of poor relief carried out by bodies of a quasi-public charac¬

ter, such as the Charity Organization Society in New York. See Charities, Public.

CHARITY, Sisters of. See Orders, Re¬

ligious.

CHARITY ORGANIZATION SO¬

CIETY. The title given to numerous civic associations in the United States and Canada organized for the relief and cure of poverty, some designated under the alternative titles of associated charities, bureau of charities and united charities. As described under Chari¬

ties, Public (q.v.), out of the feeling of the necessity for general co-operation in charity, or¬

ganized charity has grown. To every student of sociology the conviction comes that, as in all departments of life, organization, law and or¬

der, efficiency is essential in the administra¬

tion of charity. The first modern step in this direction was the formation of relief societies, designed to replace indiscriminate alms-giving by individuals, and intended to increase the funds available for the help of classes that might have been neglected. Then followed the associations for improving the condition of the 310

poor, which were not to deal in relief, except in so far as relief might tend to the permanent elevation of those relieved. The relief societies increased in numbers, but these organizations for the improvement of the condition of the poor generally lost sight of the fundamental purpose of the organization and developed into mere relief societies. Neither filled the want, and so a third form of organized charity came into existence usually designated <(The Charity Or¬

ganization Society.® which developed what is generally known as the city plan. The city plan in a broad sense covers the whole program in which and by which a community attempts definitely and conscientiously to prepare and control its development. The object is to ad¬

vance civilization by making cities capable of maintaining and reproducing a high type of human life, an object absolutely essential both to city and national life. No considerable pro¬

portion of the expense of public charity can or will be borne out of any public treasury, except that of the city. Therefore it becomes almost exclusively a problem of municipal planning and finance to provide for the ac¬

tivities which a rising social conscience in a community demands. No great public policy has ever resulted from the uncontrolled con¬

flict of purely selfish and individual aims or the indifferent, easy-going laissez-faire attitude of the average taxpayer. To quote an histori¬

cal example, the awful excesses of the Parisian starvelings of the French Revolution can be traced to the callous indifference of the royal parasitic, tax-imposing authorities, and unless this important

problem is whole-heartedly looked after by the disinterested and generally unappreciated group of earnest social workers it is apt to be neglected. The cure for poverty lies not in the hands of the poor but in those of their more fortunate brethren. Since the first National Conference of Boards of Chari¬

ties and Corrections, held in New York city 20-22 May 1874, and annually afterward in different localities, charity organization soci¬

eties have multiplied in over 150 cities in the United States and interchange of ideas among affiliated relief societies is maintained and the working problems, ways and means and results of each year are discussed annually by means both of city and national conferences. On the general outline methods of a typical city asso¬

ciation the evidence of Edward T. Devine, Ph.D., general secretary of the Charity Organ¬

ization Society of the City of New York, founded in 1882, may be taken as authoritative.

The first thing done is to investigate, and he says in his book, (The Practice of Charity5 : In modern organized charity, investigation has come to mean something more than it had meant for those who had proclaimed the necessity for discriminating between the deserving and the undeserving. Investigation is not solely or even primarily for the purpose of thwarting the expectations of imposters. It is not even merely a device for preventing the waste of charity upon unworthy objects, in order that it may be used for those who are really in need.

Investigation is rather an instrument for the intelligent treatment of distress. It is analogous to the diagnosis of the f)hysician who does not attempt to treat a serious malady rom a glance at its superficial indications, but who carefully inquiries into the hidden and early manifestations of the disease, and seeks to know as much as possible of the com¬

plicating influences with which he must reckon in effecting a cure. Investigation, therefore, while it should never be inconsiderate or blundering, or heartless, must be painstaking, conscientious and honest. This kind of an investigation has been developed as one feature of organized charity and its possibilities have been onlv “’•”dually unfolded, and they are realized only gradually in the experience of individual workers. A bad investigation may be too full or too meagre, or it may be neither. The investigation is made not for

its own sake, but as a necessary step in the careful remedy of the defects or misfortunes that have brought the applicant to seek relief. In the majority of cases, if the investigation is wise and complete, it will reveal personal sources and facts which will enable the situation to be met without calling in outside aid, and in this way, in the large proportion of instances, investigation might be said to become a substitute for relief.

The Charity Organization Society not only insists on investigations, but on co-operation.

On this point Mr. Devine has this to say: By co-operation is meant not merely agreement among various societies and organized agencies, upon general plans of co-operation, but rather co-operation in dealing with individual cases of distress upon the basis of facts as ascer¬

tained by investigation. It involves, in other words, accept¬

ance of the plan of relief which is calculated to remedy the defects or to supply the deficiencies that have been discovered.

This may mean that each of the co-operating individuals or societies shall supplement the efforts of the others by con¬

tributing part of the money or work needed, or it may mean that they will agree to a division of the work, each leaving to the other the part for which its facilities are adapted; or it may mean a division of the cases to be dealt with, each agreeing to leave entirely to the other such classes of individ¬

uals or families whose needs are to be studied and adequately met by the agency to which they are assigned. One of the simplest forms of co-operation is that between the Church and the relief agency, secured by either directly from the other in the case of a given family, or secured by the agent of the Charity Organization Society from both. In this case the material needs should be supplied by the relief agency, and the Church should provide the necessary spiritual over¬

sight and the necessary formative influences for the children, and, if necessary, reformative influences for older members of the family. It sometimes happens that the family has no need of reformation; that it contains within itself all the necessary resources for education and training, while the financial income alone is lacking, or not sufficient. Even in such circumstances, another friend may not be unwelcome in

sickness or in trouble and in periods of unusual difficulty.

Enlargement of social opportunities may all be entirely appropriate.

In order to carry out a scheme .so compre¬

hensive as this a machine was necessary, and charity organization made a machine, not merely to investigate objects of charity and to promote co-operation among all charitable agencies, blit to keep a record of all work done in charity, and to employ individuals, com¬

petent and trained, to do that work. It even went further, and established schools for pro¬

fessional social workers in charity, who receive pay for charitable work. Organized charity, by its insistence upon co-operation and by its intelligent discussion of all matters pertaining to charity, exerts a powerful influence upon the State in its relation to charity. There can be no step backward by the State in its treatment of its dependents, which organized charity will not detect and seek to stop. The experience of its years of struggle to benefit the poor must be made known to officials having charge of charitable institutions and must be practically considered. The good done by organized charity is not confined to the relief that it gives indi¬

viduals, or to the fraud that it detects, or to the imposition that it prevents, but it extends to the making of public opinion about chari¬

table matters which forces good government in public charitable institutions.

State legislatures appoint State boards of charities whose duty it is to visit and inspect all institutions, whether State, county, munici¬

pal, incorporated or not incorporated, which are of a charitable, eleemosynary, correctional or reformatory character, the legislatures mak¬

ing provision for the education and support of the blind, the deaf and dumb and juvenile de-CHARLEMAGNE — CHARLES VII

linquents as seems proper, and recognizing and supporting the efforts of any county, city, town or village to provide for the care, support, maintenance and secular education of inmates of orphan asylums, homes for dependent chil¬

dren or correctional institutions, whether un¬

der public or private control. Representative of the numerous forms of public charity and of the co-operation and efficiency attained un¬

der a city plan is the list of societies and organizations represented by delegates at the annual New York city conferences, and also representative of the different complex prob¬

lems involved is the list of subjects discussed (see Charities and Corrections, The Na¬

tional Conference of). Consult Proceedings of the New York City Conference of Charities and Corrections1* (Albany 1910 et seq.).

CHARLEMAGNE, shar'le-man. See

Charles (Charlemagne).

CHARLEROI, sharl'rwa', Belgium, town,

20 miles southwest of Namur, containing ex¬

tensive ironworks and mines. It was here Napoleon crossed the Sambre on his march to Waterloo. At the outbreak of the European War the town had a population of over 29,000.

On 21 Aug. 1914 the 2d German army, under Von Buelow, had silenced the forts of Namur and on the 22d had pushed on to Charleroi, the headquarters of the 5th French army, under Lanrezac, holding the line of the Sambre, with the British on its left extending from Binche to Mons, thence westward to Conde. After a heavy bombardment the Germans entered

Charleroi and turned it into a street battle¬

field. The fight raged fiercely from house to house, from the roofs and through the factories.

The French colonials, Turcos and Zouaves furiously contested passages and alleys. Both Germans and French in turn were repeatedly driven out, and by night the town was in flames. The struggle continued all through the night, and in the morning the French were surprised by another German army, under Von Hausen, who attacked the right and compelled retreat. Simultaneously, the British were fight¬

ing on the left of Lanrezac in total ignorance of the latter's retreat.- It was not till late in the afternoon, that the British commander learned of the retreat and the fall of Namur.

On the following day, 24 Aug. 1914, began the historic retreat that ended on the Marne.

Numerous charges of atrocities alleged to have been committed in the Charleroi district were laid against the German troops. The Bryce Report (q.v.) states that in the village of Tamines a large number of civilians, includ¬

ing aged people, women and children, were (<deliberately killed, » and that the public square was Hittered with corpses.® At Mor-lanwelz the mayor and his man-servant were shot and the town-hall and 62 houses burned.

Several men were shot and houses burnt at Monceau-sur-Sambre, while at Montigny about 600 <(hostages® were collected, several shot and 130 houses set on fire in the main street.

See Mons; War, European: Invasion of Bel¬

gium.

CHARLEROI, shar-le-roi', Pa., city of

Washington County, on the Monongahela River and on the Pennsylvania Railroad, 40 miles south of Pittsburgh. Industries include mining and the manufacturing of various kinds of glass and shovels.

Charleroi was settled in 1890 and incorporated in the following year.

The government is administered by a burgess, elected for four years, and a borough council, chosen on a general ticket. Pop. (1920) 11.516.

CHARLES (Karl Ludwig Johann Joseph

Laurenz), Archduke of Austria, 3d son of the Emperor Leopold II : b. Florence, 5 Sept.

1771 ; d. Vienna, 30 April 1847. As soldier, statesman and military historian Charles was one of the most brilliant members of the Hapsburg family. At the time of his birth his father was Grand Duke of Tuscany and his uncle was Emperor (Joseph II). Charles spent his youth in Tuscany; his education was derived from General Spanocchi, Count Hohenwart and the Archduchess Christine Maria. A political party in Belgium desired to elect him ((hereditary sovereign and grand duke,® but The Hague Convention frustrated the plan. In his 20th year he distinguished himself at the battle of Jemappes; two years later he was made major-general and commanded the advance guard of Prince Josias of Saxony at Aldenhoven, Tirle-mont and Neerwinden, defeating the French republican armies. In 1793 he was appointed governor-general of the Netherlands. His victories had recovered Belgium for Austria.

He was appointed field-marshal of the empire and commander of the Austrian army on the Rhine in 1796; he opened the campaign by storming the heights of Altstetteh and turning his retreat at Wetzlar into a victory over Jourdan. He followed this up with the other suc¬

cesses at Teining and Amberg, which compelled Moreau to make his memorable retreat. In the winter of 1797 he captured Kehl, the only posi¬

tion the French occupied in Germany, and on 11

November was appointed governor and captain-general of Bohemia. After the fruitless con¬

gress at Rastadt he put himself at the head of the Rhine army and again defeated his old opponent Jourdan at Ostrach and Stockach.

Misunderstandings that arose between him and the Russian generals,

Suwarow and Korsakow, and his weak state of health, compelled him to throw up his command and retire to Bohemia.

In the protracted struggle in the heart of Ger¬

many Napoleon's genius was on every occasion triumphant; once only, at Aspern, did Charles snatch a victory from him, but the battle of Wagram laid Austria at the feet of the French Emperor. A particular interest attaches to the Archduke Charles from the fact that he was the uncle of Marie Louise and acted as proxy on behalf of Napoleon in the first marriage ceremony held in Vienna, 11 March 1810; thus half married, she proceeded to Paris and mar¬

ried the Emperor in person on 1 April.

CHARLES, 1st Duke of Lorraine: b. 953; d. Orleans 994. He earl}?-succeeded to his paternal inheritance. No sooner, however, was he invested with sovereign power, than he laid claim to the crown of France, on the death of Louis V, and immediately endeavored to sus¬

tain his claim by force of arms; but in the first battle fought between the two powers was made prisoner, his army entirely defeated and himself cast into a dungeon in the gloomy castle of Orleans, where he died a prisoner, 994.

CHARLES VII, ex-Emperor of Austria

and King of Hungary as Charles TV : b. Vienna, 17 Aug. 1887. He is a grandson of the late Karl 312

CHARLES I

CHARLES V

Ludwig, brother of the late Emperor-King, Francis Joseph, and Princess Annunciata, daughter of Ferdinand II of Naples, and son of the Archduke Otto Franz Joseph. On 21

Oct. 1911 he married Zita, Princess of Bourbon and Parma. He became heir apparent to the throne on the assassination of his uncle, the Archduke Francis Ferdinand, at Serajevo, Bos¬

nia, 28 June 1914. He succeeded to the throne on the death of his grand-uncle, Emperor Fran¬

cis Joseph, on 21 Nov. 1916. He abdicated 12

Nov. 1918. In April 1921 he entered Hungary in an attempt to regain the throne, but opposi¬

tion from the Entente spoiled his coup and he returned to exile in Switzerland.

CHARLES (sharl) I ((<le Chauve,® or

<(the Bald®), King of France, son of Louis le Debonnaire: b. Frankfort-on-the-Main, 13

June 823; d. 877. He was invested by his father with the kingdoms of Alemania, Bur¬

gundy, Provence and Septimania, and subse¬

quently with that of Aquitaine. On Louis'

death in 840 Charles found himself confronted with two enemies — his half-brother Lothaire, who, as eldest son, claimed the whole of the Frank empire of Charlemagne, and his nephew Pepin, who asserted, in right of his father, a preferable claim to the sovereignty of Aqui¬

taine. After considerable bloodshed, a treatv was entered into between Charles and Lothaire at Verdun (843), by which the former re¬

ceived, as his share of the dominions of Charle¬

magne, all those territories comprehended be¬

tween the North Sea on the one part, and the Meuse, the Scheldt, the Saone, the Rhone and the Mediterranean on the other. In 875, by the death of his nephew, the Emperor Louis II, he gained possession of the Imperial crown, and thereby provoked the hostility of his brother,

Louis the German, who ravaged the territory of Champagne and otherwise com¬

mitted great havoc in his dominions. In 877

he proceeded to Italy on a crusade against the Saracens, to which he had been summoned by the Pope, but died when crossing Mount Cenis.

CHARLES II («le Gros,® or «the Fat®),

King of France, also known as Charles III, Emperor of Germany: b. about 832; d. Neidin-gen, Suabia, 18 Jan. 888. He was the son of Louis the German and the grandson of Louis le Debonnaire, and was recognized as Emperor of Germany by the Pope. In 885 he ascended the French throne, to the prejudice of his cousin, Charles the Simple, whose youth pre¬

vented him from asserting his rights, but in 887 he was deposed, and the following year died miserably, strangled, as is asserted, by his servants.

CHARLES III («the Simple®), King of

France, the posthumous son of Louis the Stammerer: b. 17 Sept. 879; d. 929. On his father's death France was divided between Charles' two brothers, Louis III and Carloman, and an aristocratic oligarchv. On the death of his brothers he ought in right to have ascended the throne, but his extreme youth prevented his claims being recognized, and his cousin, Charles the Fat, was proclaimed king in 885.

On the deposition of the latter in 887 Count Eudes of Paris succeeded in obtaining the crown ; but his death in 898 left Charles undisputed king of the whole country. The reign of Charles is chiefly noted for the piratical incursions of the Northmen or Normans, who ravaged the coasts of France, sailed up the principal rivers and spread such dismay that, to conciliate them and put an end to their devastations, he agreed to cede to their chief, Rollo, the territory of Normandy, to be held as a fief of the French Crown. Latterly also Charles' tranquillity was much disturbed by the turbulence of some of his great vassals, who broke into open rebellion, declared the throne forfeited and proclaimed as king, Rob¬

ert, brother of Count Eudes. Through the treachery of Herbert, Count of Vermandois, Charles was inveigled into the town and im¬

prisoned in the fortress of Peronne. From this he was only liberated a short time before his death. Consult Eckel, A., (Charles le Simple) (Paris 1899).

CHARLES IV («the Fair®), King of

France, 3d son of Philippe le Bel: b. 1294; d. 1328. In virtue of the Salic law he ascended the throne in 1322, to the exclusion of the daughters of Philip the Long. He reigned six years, dying in 1328 without male issue, the last of the direct line descended from Hugh Capet.

Isabella, his sister, married Edward II of Eng¬

land, and was materially aided by Charles in fitting out, along with her paramour Mortimer, the expedition which resulted in the dethrone¬

ment of her husband.

CHARLES V («the Wise®), King of

France, son of John II: b. Vincennes, 21 Jan.

1337 ; d. there, 16 Sept. 1380. While duke of Normandy, and during the captivity of his father in England, after the battle of Poitiers, he took the title of lieutenant of the kingdom.

The vices and extravagances of the court were extreme, and the demands of the States-General for reform, headed by Stephen Marcel, provost of the merchants of Paris, were loudly and persistently urged. This assembly was sup¬

ported in its claims by Charles the Bad, King of Navarre, who, as grandson of Louis le Hutin, maintained a preferable right to the crown. By artfully temporizing Charles con¬

trived to detach the leading orders from the cause of the states, and having brought about indirectly the assassination of Marcel, succeeded in crushing their party. Meantime his father, John, still continued in

captivity in England till liberated by the Treaty of Bretigny in 1360.

Four years afterward he died, leaving Charles as successor to the French crown. The reign of the latter presents a series of combined hostilities and intrigues carried on with the view of establishing his power and extending his dominions. Great defensive skill was shown in his wars, and in these he was so far successful as to keep at bay the King of Navarre and de¬

prive the English of a great part of their possessions in France. The magnanimity and wisdom of Charles have been greatly com¬

mended by some writers, and if we make due allowance for the times in which he lived, the high character which these have assigned him may not appear overcharged. That in his pub¬

lic administration, however, he was guilty of various acts of perfidy and cruelty cannot be disputed. He possessed some literary tastes and was the founder of the Bibliotheque Royale. He erected the Bastile for the purpose of overawing the Parisians, whose outbreaks CHARLES VI — CHARLES VIII

he had found reason to dread. Consult De-lacheval, (Histoire de Charles V > (Paris 1908).

CHARLES VI («the Silly®), King of

France, and son of Charles V : b. Paris, 3

Dec. 1368; d. 21 Oct. 1422. When his father died he was not 12 years old, and the contend¬

ing pretensions of his uncles, the dukes of Anjou, Berry, Burgundy and Bourbon, ren¬

dered his minority one of unbounded turbulence and license. In 1385 he married at Amiens Isabella of Bavaria. In 1388 he declared him¬

self independent of guardians and took the reins of government into

his own hands. His mild and amiable though somewhat dissipated character had already secured for him a con¬

siderable share of popularity, when he was overtaken by the loss of his reason — a condi¬

tion in which, with a few lucid intervals, he remained to the end of his days. The origin of this was constitutional, aggravated by a fright and a severe accident. Perhaps at no period in her history was France the scene of greater disasters and miseries than during the reign of this unhappy prince. The rival fac¬

tions of the Burgundians and the Armagnacs kept up constantly throughout the countrv the horrors of a most rancorous civil war ; while brigandage and every kind of violence pre¬

vailed to the most fearful extent. Such a con¬

junction afforded the most favorable oppor¬

tunity for an invader; and accordingly, in 1415, Henry V of England crossed over to Normandy with a numerous army, took Harfleur by storm and signally defeated the French forces in the battle of Agincourt. Improving these ad¬

vantages he advanced into the country, gained possession of the capital and compelled the crazy King to sign the Treaty of Troyes (1420), by which his daughter Catharine was given in marriage to Henry, and Charles was also forced to disinherit his own son and to acknowledge Henry as his successor. Neither monarch long survived this celebrated paction, both dying within a few months of each other.

CHARLES VII, King of France, 5th son

of Charles VI: b. Paris, 22 Feb. 1403; d.

Mehun, 22 July 1461. He became, by the suc¬

cessive deaths of his elder brothers, Dauphin and heir-presumptive to the crown. On the King of England’s death in 1422 his son, Henry VI, was proclaimed King of France at Paris.

The war with the National party, represented by the Orleanist faction, with the Dauphin at their head, was maintained for several years by

the English, under the command of the Duke of Bedford. So successfully did the lat¬

ter conduct operations that Charles was brought to the verge of despair, and almost reduced to abandon the struggle as hopeless, when his fortunes were retrieved by the arrival in his camp of the Maid of Orleans, who by the enthusiasm which she inspired first turned the tide of success against the English. (See Joan of Arc). The fresh spirit thus infused into the French was heightened by mismanagement on the part of the English, whose military oper¬

ations were conducted with greatly diminished skill after the death of the Duke of Bedford, while discord and confusion prevailed in the home councils. Through the intervention of the Earl of Suffolk a marriage was concluded between the young King Henry VI and Mar¬

garet of Anjou, niece of Charles VIPs •queen.

In the treaty entered into on this occasion the territory of Maine was secretly surrendered to France, and subsequently, on hostilities being resumed between the two countries, the troops of Charles conquered the whole of Guienne and finally expelled the English from all their possessions in France except Calais. The last years of Charles' reign were embittered by domestic broils, in which his son and successor, Louis XI, took a prominent part against his father. So hemmed in at last was the latter by the emissaries of the Dauphin that he con¬

ceived the idea of Louis having formed a deliberate plan to poison him ; and so firmly was this notion rooted in his mind that he could only with the greatest difficulty be in¬

duced to take any food. A romantic interest has been thrown around Charles VII by his early reverses and the re-establishment of French nationality, which he effected mainly through the heroism inspired by the Maid of Orleans. His personal character, however, was weak and contemptible, without energy and without principle, and he surrendered himself continually to sensual and degrading pleasures.

His share in the treacherous murder of the Duke of Burgundy, and base abandonment to her fate of Joan of Arc, are stains on his memory which cannot be effaced. Consult (Lives) by Beau-court and Vireville.

CHARLES VIII, King of France, son of

Louis XI: b. Amboise, 30 June 1470; d. there, 8 April 1498. He succeeded his father in 1483, his sister, Anne de Beaujeu, acting as regent till he attained the age of 20. In 1491 he mar¬

ried Anne, the heiress of Brittany, and thereby annexed that important duchy to the French Crown. _ By so doing, however, he both broke faith with the daughter of Maximilian, king of the Romans, to whom he had been espoused, and also robbed Maximilian of his bride, a marriage by proxy having been already con¬

cluded between him and Anne. The leading incident of Charles VIII's reign is his Italian expedition and conquest of the kingdom of Naples, to which he was instigated by Ludovico Sforza, the usurping Duke of Milan. The pre¬

tension to Naples was asserted in virtue of the rights to that sovereignty transmitted by the house of Anjou to the royal family of France.

The whole of Charles' expedition reads like a page from one of the old chivalrous romances.

With an army of 30,000 men, unprovided either with money or stores, he suddenly crossed the Alps, advanced rapidlv southward, and meeting with scarcely any obstruction, arrived before the walls and gained possession of Naples.

This conquest, however, he did not retain for many months. Having left 5,000 men to guard his new acquisition he returned to France, and had scarcely reached it when the arms of Gonsalvo de Cordova effected the reannexation of Naples to Spain. The expedition of Charles VIII left thus hardly a trace upon the country, but is memorable as the commencement of that series of incursions into Italy by France and other northern nations which deluged that land with blood. He left no children, and was suc¬

ceeded by his relative, the Duke of Orleans, under the title of Louis XTI. Consult De Cherrier, (Histoire de Charles VHP (Paris 1888) ; Segur, <Histoire de Charles VHP

(Paris. 1884) ; Delaborde, <Charles VIII cn Italic) (Paris 1884) ; and translation of (Memoir > of Philip de Comines (London 1855).

CHARLES IX, King of France, son of

Henry II and Catharine de Medici : h. Saint Germain-en-Laye, 27 June 1550; d. 30 May 1574.

He ascended the throne at the age of 10, after the death of his brother, Francis II, and his mother assumed the regency. Parliament ac¬

quiesced in this resolution, to avoid exciting new contests between the Guises and the princes of the blood. The Duke of Guise, who obtained possession of the person of the young King, was shot by an assassin before Orleans, in February 1563. In his last moments he advised the King and the Queen mother to negotiate with the parties. This advice was followe.d; atreaty was signed 19 March, and Havre taken from the English 27 July. The King, who was the same year declared of age, visited the provinces in company with his mother. At Bayonne he had a meeting with his sister Isa¬

bella, the wife of Philip II of Spain. This ex¬

cited such suspicions in the Calvinists that they took up arms, and immediately formed the plan of attacking the King on his return to Paris.

Being warned in season he escaped the danger : but this plot could not fail to arouse the hatred of Charles. After the battle of Saint Denis, 1567, in which the Constable of Montmorenci lost his life, Catharine entered into negotiations for peace. But the Calvinists reserved certain of the places which they were to have surren¬

dered and continued to keep up a communica¬

tion with England and the German princes. A new civil war soon broke out. Notwithstand¬

ing the jealousy of Charles, Catharine placed the Duke of Anjou, his

brother, at the head of the royal army. The Prince of Conde was shot in the battle of Jarnac in 1569, and the Admiral Coligny defeated at Montcontour in the

same year, after which the King concluded peace (1570) on terms so favorable to the Calvinists that they seem even to have suspected treachery under them. The heads of that party did not therefore all appear at court when Charles celebrated his marriage with Elizabeth, the daughter of Maximilian II.

By degrees this distrust disappeared, and the marriage of the young King of Navarre (after¬

ward Henry IV) with Margaret, sister of Charles X, seemed to banish every suspicion.

This marriage took place 18 Aug. 1572. But under the sinister influence of his mother a diabolical plot was being framed. On the 22d the first attempt was made on the life of Co¬

ligny, and on the 24th began that massacre known under the name of the massacre of Saint Bartholomew, from having taken place on the night of the festival of that saint. Civil war broke out for the fourth time, and Catharine now became aware of the errors of her policy.

Charles could no longer conceal his aversion to her, and was on the point of assuming him¬

self the reins of government, when he died, childless, in 1574. Consult Merimee, (Chronique du regne de Charles IX y (Paris 1889).

CHARLES X, Comte d'Artois, King of

France: b. Versailles, 9 Oct. 1757 ; d. Goritz, Austria, 6 Nov. 1836; grandson of Louis XV.

He was the youngest son of the Dauphin and brother of Louis XVI. He spent a dissipated youth, and left France in 1789, after the first popular insurrection and destruction of the Bastile. After Louis XVI had accepted the con¬

stitution of 1791, he invited Charles to return to France, but he refused, and the Legislative Assembly, after stopping his allowance on the civil list, confiscated his property in 1792. He afterward assumed

the command of a body of emigres, and acted in concert with the Austrian and Prussian armies on the Rhine. At a later period he made a descent on the coast of Brittany, but despairing of success, withdrew to England, and for several years found an asylum in the palace of Holyrood at Edinburgh.

After the downfall of Napoleon he entered France with the title of lieutenant-general of the kingdom and issued a judicious proclama¬

tion, promising the reign of law and an entire oblivion of the past. In 1824 he succeeded his brother, Louis XVIII, under the title of Charles X, and gained a momentary popularity by the abolition of the censorship of the press, but reactionary measures soon followed, and the spirit of disaffection was so widely spread that a collision with the popular party became inevitable. Charles X endeavored to gain the start by a coup d'etat, and issued his celebrated ordonnances putting an end to the freedom of the press, decreeing a new method of election and setting aside a recent election to the Chamber. The revolutionary movement tri¬

umphed, and he was ignominiously driven from the throne in 1830. After formally abdicating in favor of his grandson, the Due de Bor¬

deaux, he revisited England, resumed his resi¬

dence for a short time at Holyrood and finally settled at Goritz in Styria. He was the last sovereign of the elder line of the house of Bourbon, a typical member of the family, in¬

capable of learning and incapable of forgetting.

See Loireux, (Histoire du regne de Charles X>

(1834).

CHARLES I, King of Germany. See

Charles (Charlemagne).

CHARLES II, King of Germany. See

Charles I of France.

CHARLES III, surnamed Le Gros, King

of Germany. See Charles II of France.

CHARLES I, King of Great Britain and

Ireland: b. Dunfermline, Scotland, 19 Nov.

1600; d. London, 30 Jan. 1649. He was the second son of James VI and Anne of Den¬

mark. James succeeded to the crown of Eng¬

land in 1603, and on the death of Prince Henry in 1612 Charles became heir-apparent. Little is recorded of him previous to his romantic journey into Spain in 1623 in company with Buckingham, in order to pay his court in per¬

son to the Spanish Infanta. Through the arro¬

gance of Buckingham this match was pre¬

vented, and the Prince was soon after com-tracted to Henrietta Maria, daughter of Henry IV of France. In 1625 he succeeded to the throne on the death of his father. The first Parliament which he summoned, being much more disposed to state grievances than grant supplies, was dissolved ; and by loans and other expedients an expedition was fitted out against Spain (1626) which terminated in disgrace and disappointment. In the next year a new Par¬

liament was summoned, and the distrust and jealousy prevailing between the King and this assembly laid the foundation of the misfor-

tunes of his reign. The House of Commons held fast the public purse, and he intimated a design of following new counsels should they continue to resist his will, and suddenly and angrily dissolved them,

after a short session, while they were preparing a remonstrance against the levying of tonnage and poundage without consent of Parliament. Charles then began to employ his threatened mode of raising funds by loans, benevolences and similar un¬

constitutional proceedings ; which, however partially sanctioned by precedent, were wholly opposed to the rising spirit of civil liberty and to the constitutional doctrine which renders the Commons the guardian and dispenser of the public treasure. His difficulties were further increased by a war with France, in¬

tended to gratify the private enmity of Buck¬

ingham, who added to the odium against him by an ill-fated expedition to assist the Hugue¬

nots of Rochelle (1627).

In 1628 the King was obliged to call a new Parliament, which showed itself as much op¬

posed to arbitrary measures as its predecessor, and after voting the supplies prepared a bill called ((A Petition of Right, Recognizing all the Legal Privileges of the Subject, M which, not¬

withstanding the employment of all manner of arts and expedients to avoid it, Charles was constrained to pass into a law.

The assassination of Buckingham in Au¬

gust 1628 removed one source of discord, but the Parliament which met in January 1629

manifested so determined a spirit against the King's claim of levying tonnage and poundage by his own authority, that it was suddenly dis¬

solved, and Charles was determined to try to reign without one. For this purpose, having judiciously terminated the pending wars be¬

tween France and Spain, he raised Sir Thomas Wentworth, after celebrated as Lord Strafford, to the principal place in his councils. This able statesman had begun his political career in op¬

position to the court, but having been gained over, was by his austerity, talent and firmness, a fit instrument to curb the spirit of resistance to prerogative, which had become so strong among the Commons. In ecclesiastical affairs Charles, unhappily for himself and the Church, was guided by the counsels of Laud, then bishop of London, a prelate whose learning and piety were accompanied by a zeal as indiscreet as intolerant.

Under these counsels about 11 years passed away in the execution of plans for raising money without the aid of Parliament, with other dangerous expedients. The arbitrary courts of high commission and star chamber, in the hands of Laud, also exercised in many instances the most grievous oppression. In 1634 ship money began to be levied, which being strictly applied to naval purposes, the nation at large acquiesced in it with less than usual repugnance; and some writers, who at¬

tacked the court in opposition to the prin¬

ciple, were treated with so much severity that others were deterred from following their example. So desperate did the cause of liberty at this time appear, that great numbers of the Puritans emigrated to New England. It was in 1635 that Hampden commenced his resist¬

ance to the payment of ship money, the right to levy which, without authority of Parliament, he was determined to bring before a court of law. His cause was argued in 1638 for 12

days in the Court of Exchequer; and although he lost it by the decision of eight of the judges out of 12, the discussion of the question pro¬

duced a very powerful impression on the public mind.

It was in Scotland, however, that formal warlike opposition was commenced. From the beginning of his reign Charles had endeavored to introduce into that country a liturgy copied from the English — an innovation which pro¬

duced the most violent tumults and ended in the formation of the famous ˆCovenant” in 1638, by which all classes of people mutually engaged to stand by each other and the aboli¬

tion of episcopacy. The covenanters levied an army, which the King, opposed by an ill-disciplined English force, so equivocally inclined, that, not able to trust it, Charles agreed to a pacification known as the Treaty of Berwick (1639).. His finances being ex¬

hausted, after an intermission of 11 years, he again assembled Parliament, which, as usual, began to state grievances previous to granting supplies. Losing all patience, the King once more hastily dissolved it, and prose¬

cuted several members who had distinguished themselves by their opposition. Raising money in the best manner he could devise, an English army was again made to proceed toward the north; but, being defeated by the Scots, it be¬

came obvious that affairs could no longer be managed without a Parliament, and in 1640

that dreaded assembly was again summoned, which proved to be the famous Long Parlia¬

ment, whose career forms so memorable a chapter in English history. Charles soon found himself obliged to be a comparatively passive spectator of the ascendency of the House of Commons and was obliged, both in Scotland and in England, to yield to the tor¬

rent which assailed him.

In the meantime a flame burst out in Ire¬

land, which had no small effect in kindling the ensuing conflagration at home. The oppressed Roman Catholic population of that country, during the confusion of the times, rose against the government for the purpose of regaining their rights. Very exaggerated accounts of the massacre of the Protestants are given by sev¬

eral historians. Later writers have established the fact that the number who perished in this insurrection was not great.

The Parliament being summoned, the King left the conduct of the war entirely to it; but it now became evident that the Commons in¬

tended systematically to pursue their advan¬

tages and to reduce the Crown to a state of complete dependence. They framed a remon¬

strance containing a recapitulation of all the errors of the reign; renewed an attempt for excluding bishops from the House of Lords; passed ordinances against superstitious prac¬

tices and so inflamed the popular odium against the Episcopal orders

as to intimidate, its mem¬

bers from attending to their duty in Parlia¬

ment.

At length, it being apparent that either zealous adherents of prerogative or those anx¬

ious to establish the government on a more democratic basis must give way, Charles caused his attorney-general to enter, in the House of Peers, an accusation against five leading members of the Commons, and sent a 316

sergeant-at-arms to the House to demand them.

Receiving an evasive answer, he, the next day (4 Jan. 1642), proceeded himself to the House, with an armed retinue, to seize their persons.

Aware of this intention, they had previously withdrawn ; but the King's appearance with a guard caused the House to break up in great disorder and indignation. The accused mem¬

bers retired into the city, where a committee of the House was appointed to sit, and the city militia was mustered under an officer appointed by Parliament, which also demanded control of the army. Here the King made his last stand, the matter having now arrived at a point which arms alone could decide. The Queen fled to Holland to procure ammunition, and Charles, with the Prince of Wales, proceeded north, and for a time fixed his residence at York. The King was received in his progress with great demonstrations of loyalty from the gentry; and many eminent and virtuous char¬

acters, the conscientious opposers of his arbi¬

trary measures in the first instance, now joined his party. On the other hand, all the Puritans, the inhabitants of the great trading towns and those who had adopted republican notions of government, sided with

the Parliament; and in no public contest was more private and pub¬

lic virtue ranged on both sides, however al¬

loyed, as in all such cases, with ambition, big¬

otry and the baser passions. The royal stand¬

ard was raised at Nottingham, 22 Aug. 1642.

The first action of consequence in the civil war was the battle of Edge Hill 23 Oct. 1642, which, although indecisive, enabled the King to approach London and produced consider¬

able alarm. Nothing decisive, however, hap¬

pened against the royal side till the battle of Marston Moor, which was gained chiefly by the skill and valor of Cromwell. Montrose's suc¬

cession in the Scottish highlands in 1641—45

created divisions in favor of the royalists. The succeeding year (2 July 1644), however, com¬

pleted the ruin of the King's affairs, by the loss of the battle of Naseby (14 June 1645).

Thenceforward a series of disasters at¬

tended his armies throughout the kingdom, and he took the resolution of throwing himself into the hands of the Scottish army, then lying before Newark, 5 May 1646. He was received with respect, although placed under guard as a prisoner; and, a series of abortive negotiations ensuing, an agreement was made with Parlia¬

ment to surrender him to their commissioners, on the payment of a large sum, claimed as arrears by the Scottish army. The King was accordingly surrendered to the commissioners appointed 30 Jan. 1647, and carried, in the first place, to Holmby House, in Northamptonshire; subsequently to the headquarters of the army at Reading; and soon after to Hampton Court.

In the meantime, however, the army and In¬

dependents becoming all powerful, he was led into some fears for his personal safety, and, making his escape with a few attendants, pro¬

ceeded to the south coast. Not meeting a ves¬

sel, as he expected, he crossed over to the Isle of Wight, and put himself into the hands of Hammond, the governor, by whom he was

lodged in Carisbrooke Castle.

While the King was in this situation, the Scots, regretting the manner in which they had delivered him up, and indignant at the pro¬

ceedings of the English, marched a consider¬

able army to his relief, under the Duke of Hamilton. This force, although strengthened by a large body of English royalists, was en¬

tirely routed and dispersed by Cromwell at Preston, as were the insurgents in Kent and Essex by Fairfax. During this employment of the army and its leaders a new negotiation was opened with the King in the Isle of Wight, who agreed to nearly everything demanded of him, except the abolition of Episcopacy; and so much had it now become the interest of the Parliament itself to comply with him, that a vote was at length carried that the King's con¬

cessions were a sufficient ground for a treaty.

The triumphant army, however, on its return, cleared the House by what is historically known as Pride's Purge (6 Dec.) of all the members opposed to its views ; and thereby procuring a reversal of this vote, the King's person was again seized, and, being brought from the Isle of Wight to Hurst Castle, prep¬

arations were made for trying him on the cap¬

ital charge of high treason against the people.

As the House of Lords refused to concur in a vote for this purpose, the Commons declared its concurrence unnecessary; and the King, be¬

ing conducted to London and stripped of all marks of royalty, was brought before the court of justice specially created for this unprece¬

dented trial, on 20 Jan. 1649.

The behavior of Charles had been calm and dignified throughout his adversities, and in no respect was it more so than during his trial.

Three times lie objected to the authority of the court when brought before it, and supported his refusal by clear and cogent arguments. At length, evidence being heard against him on the proof that he had appeared in arms against the Parliamentary forces, sentence of death was pronounced against him. He requested a conference with both Houses, which was re¬

jected, and only three days were allowed him to prepare for his fate. After passing the three days in religious exercises, and in tender interviews with his friends and family, he was led to the scaffold. His execution took place before the Banqueting House, Whitehall, on 30

Jan. 1649, where, after addressing the people around him with great firmness and composure, the ill-fated King submitted to the fatal stroke.

Thus died Charles I, in the 49th year of his age. He was, in an eminent degree, tem¬

perate, chaste and religious, and although some¬

what cold and reserved in demeanor, was really kind and affectionate. His talents were con¬

siderable; but he was deficient in decision and self-reliance necessary to superior executive ability, and constitutionally incapable of seeing any side of a question except his own. His mind was cultivated by letters and a taste for the polite arts, particularly painting, the pro¬

fessors of which he munificently encouraged; and his collections of work on art show judg¬

ment in the selection. To all these personal and private requirements he joined a graceful figure and pleasing countenance, and, under happier circumstances, would doubtless have been regarded as a very accomplished sov¬

ereign.

With respect to his political character, as exhibited in the great struggle between himself and the Parliament, it is impossible not to per¬

ceive that he strove to maintain a portion of prerogative that had become incompatible with CHARLES II

any theory of civil and religious liberty; but it is equally certain that he only sought to retain what his predecessors had possessed. There are periods in the history of every people in which old and new opinions conflict, and a con¬

cussion becomes unavoidable ; and it was the misfortune of Charles to occupy the throne at a time when the development of the representa¬

tive system necessarily brought it into conflict with the claims of prerogative. If the Parlia¬

ment had acquiesced in the kingly pretensions, as usually explained by Laud and the high churchmen of the day, it would have dwindled into a mere registry of royal edicts, like those of France. On the other hand, Charles acted a part which every monarch in his situation may be expected to act ; for a philosophical appreciation of the true nature of a political crisis is scarcely to be expected from one who sits upon a throne. The most forcible accusa¬

tion against Charles is on the score of insin¬

cerity. It is asserted that he never intended to fulfill the conditions imposed upon him, that all his compliances were feigned. This can scarcely be denied; but it is equally certain that some of the conditions might justly be deemed questionable, and may even have been imposed in order to produce that conduct in the King which so naturally followed.

Bibliography. — (Eikon Basilike : The Por¬

traiture of His Sacred Majesty in His Solitude and Sufferings,* purporting to be written by Charles I, but in reality the work of John Gauden of Worcester, was published at The Hague in 1648. Consult also Chancellor, E. B., (Life of Charles I, 1600-25) (1886) ; Clar¬

endon's (History of the Great Rebellion) ; Disraeli, I., Commentaries on the Life and Reign of Charles P (5 vols., London, 1828—31) ; Gardiner, S. R., (History of England, 1603-42* (10 vols., new ed., London 1883-84) ; his Civil War* (4 vols., London 1894-97) ; and Constitutional Documents* (Oxford 1889) ; (Ranke's History of England) (trans. by Boase and Kitchin, 6 vols., Oxford 1875) ; Whitelocke, (Memorials) (4 vols., Oxford 1853) ; and Calendar of State Papers) (ed. by Hamilton, London 1890-93).

CHARLES II, King of Great Britain and

Ireland, son of Charles I and Henrietta Maria of France : b. London, 29 May 1630; d. there, 6

Feb. 1685. He was a refugee at The Hague on the death of his father, on which he immedi¬

ately assumed the royal title. He listened to an invitation from the Scots, who had proclaimed him their king 5 Feb. 1649, and arrived in the Cromarty Firth 16 June 1650. Being obliged to throw himself into the hands of rigid Pres¬

byterians, they subjected him to many humilia¬

tions and mortifications, which caused him to regard them ever after with extreme aversion.

On 3 Sept. 1650 the Covenanting army was de¬

feated by Cromwell at Dunbar. In 1651

Charles was crowned at Scone ; but the ap¬

proach of Cromwell soon rendered his abode in Scotland unsafe. Hoping to be joined by the English royalists, he took the spirited reso¬

lution of passing Cromwell and entering Eng¬

land, Carlisle readily throwing open its gates to receive him. He was immediately pursued by that active commander, who, with a superior army, gained the battle of Worcester (3 Sept.

1651) and Charles, after a variety of imminent hazards, being on one occasion sheltered for 24 hours in the branches of the famous Boscobel oak, reached Shoreham, in Sussex, and from thence, France (16 October).

It is the province of history to state the circumstances that produced the Restoration, which General Monk so conducted that Charles, without a struggle, succeeded without hazard to all those dangerous prerogatives which had cost the nation so much blood and treasure, first to abridge and then to abolish. On 29

May 1660, Charles entered his capital amid uni¬

versal and almost frantic acclamations; and the different civil and religious parties vied with each other in loyalty and submission. His first measure's were prudent and conciliatory.

Hyde, Lord Clarendon, was made Chancellor; and an act of indemnity was passed, from which those alone were excepted who were im¬

mediately concerned in the late King's death.

A settled revenue was accepted in lieu of ward¬

ship and purveyance and the army was reduced.

In respect to religion, there was less indulgence ; for not only were prelacy and the parliament¬

ary rights of bishops restored, which was to be expected, but an act of uniformity (1662) was passed, by the conditions of which nearly all the Presbyterian clergy were driven to a resignation of their livings. In 1662 he mar¬

ried Catherine of Braganza, a prudent and vir¬

tuous princess, but in no way calculated to ac¬

quire the affection of a man like Charles. The indolence of his temper and the expenses of his licentious way of life soon involved him in pecuniary difficulties ; and the unpopular sale of Dunkirk in 1662 to

the French was one of his earliest expedients to relieve himself.

In 1666 a rupture took place with Holland.

It was attended, in the first instance, by various naval successes; but France and Denmark en¬

tering into the war, as allies of the Dutch, the English were overmatched, and a Dutch fleet entered the Thames, and, proceeding up the Medway, burned and destroyed ships as high as Chatham (13 June 1667). The domestic calamities of a dreadful plague in 1665, and of the great fire in London in 1666, were among the disasters of the period. Soon after, Clar¬

endon, who had become very unpopular and was personally distasteful to Charles, was dis¬

missed, and sought shelter from his enemies by a voluntary exile. A triple alliance between England, Holland and Sweden, for the pur¬

pose of checking the ambition of Louis XIV, followed (January 1668). It did honor to the political talents of Sir William Temple and was one of the few public measures of the reign which deserve approbation. In 1670

Charles threw himself into the hands of the five unprincipled ministers, collectively denomi¬

nated the cabal, who supported him in every attempt to make himself independent of Par¬

liament. The party troubles of this reign com¬

menced about this time by the open declaration of the Duke of York, heir presumptive to the crown, that he was a convert to the Roman Catholic religion. Soon after the ministry broke the triple alliance and planned a rupture with the Dutch. On 20 May 1670 was signed the secret Treaty of Dover, under wdiich the English King agreed to become a party to French aggression in the Netherlands and to favor the restoration of the Catholic religion 318

in England. As the price of this astounding betrayal, Charles, always in financial straits, received subsidies from France and thus be¬

came a pensioner of Louis XIV. As the King did not choose to apply to Parliament for money to carry on the projected war, he caused the exchequer to be shut up in January 1672.

The naval operations (1672) against the Dutch were by no means successful, and a new Par¬

liament being called, which strongly expressed the discontent of the nation, the cabal was dis¬

solved and a separate peace made with Hol¬

land in 1674. Divisions in the Cabinet, fluctu¬

ations in the King's measures and parliamentary contests followed and occupied the next three years, till, in 1677, Charles performed a popu¬

lar act, by marrying his niece, the Princess Mary, to the Prince of Orange. By taking some decided steps in favor of the Dutch he also forwarded the Peace of Nimeguen in 1678.

The same year was distinguished by the pre¬

tended discovery of the Popish plot for the as¬

sassination of the King and the introduction of the Roman Catholic faith. Notwithstanding the infamous characters of Oates and Bedloe, and the improbable nature of their disclosures, their tale, supported by the general suspicions of the secret influence of a Catholic faction, met with universal belief, Parliament exhibit¬

ing nearly as much credulity and heat as the masses. Many' Catholic lords were committed ; Coleman, the Duke of York's secretary, and several priests hanged ; and a venerable noble¬

man, the Earl of Stafford, beheaded. The Duke of York thought fit to retire to Brussels, and a bill for his exclusion from the throne passed the House of Commons. Such was the state of the country that Charles was obliged to give way to some popular measures, and the great palladium of civil liberty, the habeas corpus bill, passed during this

session. The temper of the Parliament was so much excited that the King first prorogued and then dis¬

solved it. The court now sought to establish a balance of parties ; to distinguish which the terms Whig and Tory were about this time brought into use.

In 1680 a new Parliament assembled, and the Commons again passed the exclusion bill, which was rejected by the Lords. This Parlia¬

ment was also dissolved in the next year and a new one called at Oxford, which proved so restive that a sudden dissolution ensued; and, like his father, Charles determined hencefor¬

ward to govern without one. By the aid of the Tory gentry and the clergy he obtained loyal addresses from all parts of the kingdom, and attachment to high monarchical principles came again into vogue. The charge of plots and conspiracies was now brought against the Presbyterians. The Nonconformists generally were also treated with much rigor; and a step of great moment, in the progress to arbitrary power, was the instituting of suits at law (quo warrant os) against most of the corporations in the kingdom, by which they were intimidated to a resignation of their charters, in order to receive them back so modeled as to render them much more dependent than before. These rapid strides toward the destruction of liberty at length produced the celebrated Rye House plot, the parties to which certainly intended re¬

sistance; but that the assassination of the King was ever formally projected seems very doubt¬

ful. It certainly formed no part of the inten¬

tion of Lord William Russell, whose execu¬

tion, with that of Algernon Sidney, on account of the plot, forms one of the striking events of this disgraceful reign.

Charles was at this time as absolute as any sovereign in Europe ; and had he been an active prince, the fetters of tyranny might have been completely riveted. Scotland, which at different periods of his reign had been driven into insur¬

rection by the arbitrary attempts to restore Episcopacy, was very nearly dragooned into submission ; and the relics of the Covenanters were suppressed with circumstances of great barbarity. On his death-bed Charles became reconciled to the Catholic Church and received the last sacraments.

The character of Charles II requires little analysis. He was a confirmed sensualist and voluptuary; and his reign was the era of the most dissolute manners that ever prevailed in England. A dependent and pensioner of

Louis XIV, in his need for money he betrayed the interests of the country. He was absolutely without moral sense. He cared more for his mistresses than for his kingdom ; the reigning one for the time being was the real centre of influence and authority. Charles was a man of wit; and he possessed an easy good nature, but united with it was a total indifference to anything but his own pleasure. Yet, with all his selfishness and demerits as a king, Charles always preserved a share of popularity with the multitude from the easiness of his manners.

Pepy's (Diary* and other private documents, however, clearly show the opinion of the more reflecting portion of his subjects; and it is now pretty generally admitted that, as he was him¬

self a most dishonorable and heartless monarch and man, so his reign exhibited the English character in a more disgraceful light than any other in English history. It need not be added that he left many illegitimate children, the de¬

scendants of some of whom are still among the leading nobility of the country. The fate of his son by Lucy Walters, the ill-fated Duke of Monmouth, is an affair of history.

Bibliography.— Airy, O., (Charles IP

(London 1904) ; Crawfurd, R., <Last Days of Charles IP (Oxford 1909); Gardiner, S. R.

(editor), (Letters and Papers Illustrating the Relations between Charles

II and Scotland in 1650 } (Scottish History Society's Publications, Vol. XVII, 1894) ; Ranke's (History of England) (trans. by Boase and Kitchin, 6 vols., Oxford 1875) ; and the invaluable diaries of Pepys and Evelyn.

CHARLES, or CHARLEMAGNE (Caro¬

lus Magnus), King of the Franks, and subse¬

quently Emperor of the West, Holy Roman em¬

peror : b. probably at Aix-la-Chapelle, 2 April 742; d. there 28 Jan. 814. His father was Pepin the Short, King of the Franks, son of Charles _ Martel. After the decease of his father, in 768, he was crowned king, and ac¬

cording to the wish of Pepin divided the Frankish dominions with his younger brother, Carloman ; but the conditions of this partition were several times altered, without being ever adjusted to the satisfaction of the parties.

Their mutual discontent was fostered princi¬

pally by the King of the Lombards, Desiderius CHARLES (CHARLEMAGNE)

(the father-in-law of both princes), because Charlemagne had repudiated his wife. Desiderius sought revenge for the rejection of his daughter by exciting and encouraging commo¬

tions in the realm, in which he was assisted by the circumstances that the nobles aspired to independence. The people of Aquitania were the first who attempted to become independent.

Charlemagne marched against them with rather a small army; but he relied on the assistance of his brother, Carloman, to whom a portion of Aquitania then belonged. Carloman appeared indeed on the field, but at the decisive moment deserted his brother, who was obliged to sus¬

tain alone an unequal conflict. His great cour¬

age and conduct, after a long and doubtful contest, procured him the victory and the in¬

surgents submitted (770). At Carloman's

death in 771, and after the flight of his wife and her two sons to her father in Italy, Charle¬

magne made himself master of the whole em¬

pire, the extent of which was already very great, as it embraced, besides France, a large part of Germany. He now formed the plan of conquering the Saxons, for which his zeal for the diffusion of Christianity served as a pre¬

text. The Saxons, in possession of Holstein and Westphalia, preferred pillaging to peaceful occupations, and a wandering to a settled mode of life. An irruption into the territory of the Franks was the alleged cause of the first war which Charlemagne began against them in 772.

The other wars were produced by the rebellions of this warlike nation, which was never re¬

duced to complete submission till the peace of Seitz, in 803, after it had embraced Christianity.

Charlemagne deported great numbers of the Saxons to Flanders and Switzerland and their seats were occupied by the Obotrites, a vandal tribe in Mecklenburg. During 32 years did the Saxons resist a conqueror who, striving with equal eagerness to convert and to subdue them, never became master of their country till he had transformed it almost into a desert. They might have made a more successful defense had they not been distracted by internal dis¬

sensions. The most celebrated of their lead¬

ers was Wittikind, and next to him Albio, who embraced Christianity in 783.

While he was combating the Saxons on the banks of the Weser, Pope Adrian implored his assistance against Desiderius who had torn from him the exarchate of Ravenna, which Pepin the Short had presented to

the Holy See, and who was urging the Pope to crown the nephews of Charlemagne, that Charlemagne himself might be considered a usurper. Charle¬

magne immediately left Germany and marched with his army to Italy. Desiderius fled to Pa¬

via, which was bravely defended by the Lom¬

bards. The city fell, and Desiderius, with the widow and sons of Carloman, were carried prisoners to France. Desiderius ended his life in a monastery. In 774 Charlemagne was crowned king of Lombardy with the iron crown.

In 778 he repaired to Spain to assist a Moorish prince, conquered Pamplona, made himself master of the county of Barcelona and spread the terror of his name everywhere. But on his return his troops were surprised in the valley of Roncesvalles by some Saracens, in conjunction with the mountaineers, the Basques, and the rear-guard defeated; remarkable from the circumstance that Roland, one of the most famous warriors of those times, fell in the battle. (See Roncesvalles). The disaffection of the tribes of Aquitania induced Charlemagne to give them a separate ruler : for this purpose he selected the youngest of his sons, Louis (called le Debonnaire). The Lombards were no less turbulent, and the Greeks made inces¬

sant efforts to conquer Italy; and the nobles to whom he had entrusted a part of the sovereign¬

ty of this country evinced little fidelity. He therefore gave them his second son, Pepin, for a monarch; his eldest son, Charles, remaining constantly with him, and assisting him in his manifold undertakings. In 781 he caused these two sons to be crowned by the Pope in Rome, hoping to render the royal dignity inviolable in the sight of their subjects. Charlemagne had another son, also called Pepin, who was the oldest of all his children, being the son of his divorced wife. This circumstance probably inspired the monarch with an aversion to the elder Pepin, and prevented him from admitting him to a share in the government.

After returning from Spain Charlemagne

was again obliged to take the field against the Saxons. The year 790, the 22d of his reign, was the only one which he passed without taking up arms. As his power increased, he meditated more seriously the accomplishment of the plan of his ancestor, Charles Martel, to restore the Western empire. On Christmas Day (800) he was proclaimed Caesar and Augustus by Pope Leo III ; he was invested with the ornaments of the ancient Roman emperors. The weak¬

ness of the situation was, that the empire could not subsist long in a family where the authority was, by law, divided among the children of the deceased monarch. Pepin, King of Italy, died in 810, and his death was followed the next year by that of Charles, the eldest. Thus of his legitimate sons only one remained, Louis, King of Aquitania, whom Charlemagne adopted as his colleague in 813.

Charles, who was five times married, was buried at Aix-la-Chapelle, his favorite and usual place of residence. He was deposited in a vault, where he was placed on a throne of gold, in full imperial costume.

Charlemagne was a friend of learning; he deserves the name of restorer of the sciences and teacher of his people. He attracted by his liberality the most distinguished scholars to his court ; Charlemagne established an academy in his palace at Aix-la-Chapelle, the sittings of which he attended with all the scientific and literary men of his court. All the members of this academy assumed names characteristic of their talents or inclinations. From Italy he invited teachers of the languages and mathe¬

matics, and established them in the principal cities of his empire. In the cathedrals and monasteries he founded schools of theology and the liberal sciences. He strove assiduously to cultivate his mind by intercourse with scholars ; and, to the time of his death, this intercourse remained his favorite recreation.

His mother-tongue was a form of the Teu¬

tonic, but he spoke several languages readily, especially the Latin. He was less successful in writing, because he had not applied himself to it till he was further advanced in years. In the winter he read much, and even caused a person to read to him while he took his meals, 320

He was a powerful ally of the Church, and promoted its interests to the fullest extent. He endeavored to improve the liturgy and church music. He was desirous of introducing the Roman liturgy into his states ; but the clergy, who clung to the ancient usages, offered some resistance. Several churches, however, com¬

plied with the wish of the monarch, and others mingled the Roman and Gallican liturgy. He attempted to introduce uniformity of measures and weights, but was unable to accomplish this design. Another abortive scheme of his, on which he employed his army, was to unite the Rhine with the Danube, and consequently the Atlantic with the Black Sea, by means of a canal. The arts, however, under his patron¬

age, produced other monuments of his fame.

The city of Aix-la-Chapelle received its name from a splendid chapel which he caused to be built of the most beautiful Italian marble.

Charlemagne also erected baths in which more than 100 persons could swim in warm

water. To Charlemagne France is indebted for its first advances in navigation. He en¬

couraged agriculture, and made himself im¬

mortal by the wisdom of his laws. His fame filled even the East. He received ambassadors from the patriarch of Jerusalem, from the em¬

perors Nicephorus and Michael, and was twice complimented with embassies from Harun-al-Rashid, the famous caliph of Bagdad. He was inclined to exalt the ecclesiastical authority over the secular, and to him may be attributed the establishment of the Western Church as a temporal absolutism under the popes. His empire comprehended France, most of Cata¬

lonia, Navarre and Aragon; the Netherlands, Germany as far as the Elbe, Saale and Eyder, Upper and Middle Italy, Istria and a part of Sclavonia. The great work he had accom¬

plished could only be maintained and con¬

solidated by a succession of able rulers ; but with his death, these not

being forthcoming, his empire fell to pieces.

In private life Charlemagne was exceedingly amiable: a good father and generous friend.

His domestic economy afforded a model of frugality; his person, a rare example of simplic¬

ity and greatness. He despised extravagance of dress in men, though, on solemn occasions, he appeared in all the splendor of majesty. His table was very plain. He was large of build and strong; his height, according to Einhard, equaled seven times the length of his foot. His head was round ; his eyes large and lively ; his nose of more than common size; his counte¬

nance had an agreeable expression of serenity.

His gait was firm ; his bearing manly. He en¬

joyed perfect health till the last four years of his life, when he was attacked by fevers and began to limp. In summer he was accustomed to repose for two hours after dinner, but at night he slept uneasily. He wore the dress of his country; on his body a linen shirt, over which was a coat with a silk border, and long breeches. For his outer dress he wore a cloak, and always his sword, the hilt and belt of which were of gold and silver. He possessed a natural impressive eloquence, and in his ex¬

pression of countenance there was something to excite respect, united with gentleness and kindness.

Bibliography. — Abel and Von Simson,

(Jahrbucher des frankischen Reiches unter Karl dem Grossen> (Leipzig 1888) ; Brosien, (Karl der Grosse) (1885) ; Burr, (Charlemagne }

(1888); (Cambridge Medieval History) (Vol.

II, New York 1913) ; Clemen, (Die Portrat-darstellungen Karls des Grossen) (Aachen 1890) ; Davis, (Charlemagne > (New York 1900) ; Dollinger, (Das Kaisertum Karls des Grossen und seiner NachfolgeU

(Munich

1864) ; Diimmler, (Poetse Latini Aeri CarolinP

(Leipzig 1884) ; Einhard, (Vita Caroli Magni,}

edited by Pertz, in the (Monumenta Ger¬

manise Historical and separately (Hanover 1863), also in English by Glaister (London 1877) ; Gaston, Paris, (Histoire poetique de Charlemagne) (Paris 1865) ; Guizot, Charle¬

magne and the Carlovingians) (1880) ; .

Haureau, (Charlemagne et son cour) (Paris 1888) ; Hodgkin, (Charles the Great > (London 1897) ; Mombert, (History of Charles the Great) (New York 1888) ; Prutz, (Age of Char¬

lemagne } (Philadelphia 1905) ; Vetault, (Charlemagne* (Tours 1876) ; Wattenbach, (Deutsch-lands Geschichtsquellen im MittelalteU (Vol.

I, Berlin 1904). Consult also the letters and poems of Alcuin, Paulus, Diaconus and

Angilbert.

CHARLES IV, Holy Roman Emperor, of

the house of Luxemburg: b. Prague, 14 May 1316; d. there, 29 Nov. 1378. He inherited the kingdom of Bohemia, and had been chosen emperor in 1346 by five electors, hoping to occupy the Imperial throne without opposition.

But the princes of the empire regarded him as a servant of the Pope. He however used every effort to appease his enemies, married the daughter of the Elector of the Palatinate, gave Tyrol as a fief to the Elector of Brandenburg and was unanimously elected emperor and con¬

secrated at Aix-la-Chapelle. But no sooner was he crowned than he took possession of the Imperial insignia and conveyed them to Bo¬

hemia. In 1354 the Emperor went to Italy to be crowned by the Pope ;

but this favor he pur¬

chased on terms which made him an object of ridicule and contempt. He engaged to appear without any armed force. Having been con¬

secrated king of Italy at Milan, he confirmed the Visconti in the possession of all the usurpa¬

tions of which he had pledged himself to de¬

prive them. He also annulled all the acts of his grandfather, Henry VII, against Florence, and by a treaty concluded at Padua resigned the latter city, with Verona and Vicenza, to Venice.

He refused the request of some Romans to claim the city, as belonging to him in the name of the empire, and in a treaty renounced all sovereignty over Rome, the states of the Church, Ferrara, Naples, Sicily, Sardinia and Corsica, and even took an oath not to return to Italy without the consent of the Pope.

Despised by the Guelphs, detested by the Ghibellines, Charles returned to Germany, where he issued the celebrated Golden Bull (1356), the rules of which applied in the elec¬

tions of the German confederation until 1806.

General indignation was excited by the proposal made by the papal nuncio, with his consent, to introduce a tax, equal to the tithe of all ec¬

clesiastical revenues, for the benefit of the Holy See. All the members of the Diet opposed it ; and Charles, in his anxiety to conciliate the princes of the empire, announced that he would propose to the assembly a reform of the Ger-CHARLES V

man clergy. The Pope, opposing this proposal of the Emperor, exhorted the electors to de¬

pose him. Charles immediately relapsed into his accustomed

submissiveness, and not only abandoned all his reforms, but even confirmed, in 1359, all the privileges of the clergy and made them independent of the secular power.

Such vacillating conduct subjected him to the contempt of both parties. Under such an em¬

peror Germany could not enjoy internal tran¬

quillity. The state of Italy was no less melan¬

choly. Tuscany was suffering the evils of anarchy; Lombardy was distracted by civil wars and the Visconti had made themselves masters of the Milanese. During his residence in Italy he sold states and cities to the highest bidder, or, if they themselves offered most, made them independent republics. He was crowned king of Burgundy at Arles, 4 June 1365. Gregory XI having given his consent that his son Wenceslaus should be elected king of the Ro¬

mans (1373), he employed his ill-gotten wealth to purchase the votes of the electors, who were irritated at the conduct of the Pope, and, more¬

over, distributed among them the domains of the empire on the Rhine and several free Im¬

perial cities. Thus he attained his object. To maintain their rights against the arbitrary meas¬

ures of the Emperor, the Imperial cities in Suabia formed the Suabian League, which Charles opposed in vain. His reign is notable for the improvement and prosperity of Bo¬

hemia ; for the founding of the University of Prague (1348) ; for a terrible persecution of the Jews; and as the period when the sale of letters of nobility commenced in Germany.

Consult Wernusky, (Geschichte Kaiser Karls IV und seiner Zeit) (Innsbruck 1880-92).

CHARLES V, Holy Roman Emperor, and

King of Spain (in the latter capacity he is called Charles I) : b. Ghent, 24 Feb. 1500; d.

Yuste, Spain, 21 Sept. 1558. He was educated in the Netherlands under the care of William of Croy, lord of Chievres, who taught him history, formed him for affairs of state and from whom he acquired that gravity of manner which he retained through life. After the death of Ferdinand of Spain, his grandfather, in 1516, Charles assumed the title of king of Spain. The management of this kingdom was entrusted to the celebrated Cardinal Ximenes.

In 1519 Charles, on the death of Maximilian, was elected emperor. He left Spain to take possession of his new dignity, for which he had to contend with Francis I, King of France.

His coronation took place at Aix-la-Chapelle with extraordinary splendor. The progress of the Reformation in Germany demanded the care of the new emperor, who held a Diet at Worms. Luther, who appeared at this Diet with a safe conduct from Charles, defended his cause with energy and boldness. The Em¬

peror kept silent ; but after Luther's departure a severe edict appeared against him in his name who thought it his interest to declare himself the defender of the Roman Catholic Church.

In a very few years the power of Charles became a source of uneasiness to most other princes of Europe. Pope Clement VII placed himself at the head of a league of the principal states of Italy against the emperor, but their ill-directed efforts were productive of new mis¬

fortunes. Rome was taken by storm by the VOL. 6 — 21

troops ol the Constable of Bourbon, sacked, and the Pope himself made prisoner. Charles publicly disavowed the proceedings of the Cons¬

table, went into mourning with his court and carried his hypocrisy so far as to order prayers for the deliverance of the Pope. Henry VIII of England now allied himself with the French monarch against Charles, who accused brands of having broken his word. The war was terminated in 1529 by the Treaty of Cambray, of which the conditions were favorable to the Emperor. Charles soon after left Spain, and was crowned in Bologna as king of Lombardy and Roman emperor. In 1530 he seemed desir¬

ous, at the Diet of Augsburg, to reconcile the various parties ; but not succeeding, issued a decree against the Protestants, which they met by the Schmalkaldic League. Notwithstanding his undertakings in favor of the Roman Cath¬

olic religion, Charles always practised modera¬

tion toward the Protestants whenever his inter¬

est left room for toleration. Nor did the Prot¬

estant princes hesitate to furnish their contin¬

gents when he was assembling an army against the Turks. Having compelled Solyman to re¬

treat, he undertook in 1535 an expedition against Tunis, reinstated the Dey, and released 20,000 Christian slaves. This success added to his character something of the chivalric, which gave him still more influence in Christ¬

endom, and promoted his political proiects.

The policy of Charles was to reconcile the two great religious parties, and with this end in view he alternately threatened and courted the Protestants. After some show of negotiation the Protestant princes raised the standard of war. The Emperor declared, in 1546, the heads of the league under the ban of the empire, excited divisions among the confederates, col¬

lected an army in haste, and obtained several advantages over his enemies. John Frederick, the Elector of Saxony, was taken prisoner in the battle of Miihlberg in 1547. Charles re¬

ceived him sternly, and gave him over to a court-martial consisting of Italians and Span¬

iards, under the presidency of Alva, which con¬

demned him to death. The Elector saved his life only by renouncing his electorate and his hereditary estates, but remained a prisoner.

Meanwhile the Emperor appeared somewhat

more moderately inclined toward the van¬

quished party. On coming to Wittenberg he expressed surprise that the exercise of the Lutheran worship had been discontinued. On visiting the grave of Luther he said, ((I do not war with the dead ; let him rest in peace ; he is already before his Judge.® The Land¬

grave of Hesse-Cassel, one of the leaders of the Protestants, was compelled to sue for mercy. Notwithstanding his promise Charles deprived him of his freedom. After having dissolved the League of Schmalkalden the Em¬

peror again occupied himself with the plan of uniting all religious parties, and for this pur¬

pose issued the Interim, which was as fruitless as the measures proposed by him at the Diet of Augsburg.

Neither was he successful in securing the Imperial crown for his son. Discord still agitated the public mind, and a new war broke out against him. Maurice of Saxony, whom he had invested with the electoral dignity, formed a league, which was joined by Henry II, King of France, the successor of Francis.

The preparations had been made with the greatest secrecy. Charles was at Innsbruck superintending the deliberations of the Council of Trent, and meditating great plans against France and Turkey. He was expecting' the aid of Maurice when this prince threw off the mask, appeared suddenly at the head of an army, and, in 1552, invaded the Tyrol while Henry II entered Lorraine. Charles was nearly surprised in Innsbruck. Maurice abandoned the Imperial castle to plunder, the Council of Trent was dissolved, and the Protestants dictated the conditions of the Treaty of Passau in 1552. Charles was not more successful in Lorraine. He was unable to recover Metz, which was defended by the Duke of Guise.

In Italy he lost Siena by a revolt. He with¬

drew to Brussels, where, hard pressed by his enemies, he became gloomy and dejected, and for several months concealed himself from the sight of every one, so that the report of his death was spread through Europe. His last exertions were directed against France, which constantly repelled his assaults. The Diet of Augsburg in 1555 confirmed the Treaty of Passau, and gave the Protestants equal rights with the Roman Catholics.

Charles, seeing all his plans frustrated and the number of his enemies increasing, resolved to transfer his hereditary states to his son Philip. Having convened the Estates of the Low Countries at Louvain, in 1555, he ex¬

plained to them the grounds of his resolution, asserted that he had sacrificed himself for the interests of religion and of his subjects, but that his strength was inadequate to further exertion, and that he should devote to God the remainder of his days. At that time Charles conferred on Philip the sovereignty of the Netherlands alone. On 15 Jan. 1556 he con¬

ferred upon him, in like manner, the Spanish kingdoms and Sicily, reserving for himself merely a pension of 100,000 ducats. He selected for his residence the monastery of Saint Justus, near Plasencia in Estremadura, and here he exchanged sovereignty, dominion and pomp for the quiet and solitude of a clois¬

ter. His amusements were confined to short rides, to the cultivation of a garden and to mechanical labors. He attended religious serv¬

ices twice every day, read books of devotion and by degrees fell into such dejection that his faculties seemed almost impaired. He re¬

nounced the most innocent pleasures, and ob¬

served the rules of the monastic life in all their rigor.

Charles had a noble air and refined manners.

He spoke little, and smiled seldom. Firm of purpose ; slow to decide ; prompt to execute ; equally rich in resources and sagacious in the

choice of them; gifted with a cool judgment, and always master of himself, circumstances developed his genius and made him great. Al¬

though he did not scruple to break his promises, he imposed, by the semblance of magnanimity and sincerity, even on those who had already experienced his perfidy. An acute judge of men, he knew how to use them for his purposes.

In misfortune he appears greater than in pros¬

perity. He protected and encouraged the arts and sciences, and is said to have picked up a brush which had fallen from the hand of Titian with the words, ((Titian is worthy of being served by an emperor.** By his wife Eleonora, daughter of Emanuel, King of Portugal, he had one son, afterward Philip II, and two daughters.

He had also several natural children. No min¬

ister ever exercised a decided influence over him. He was indefatigable in business, weigh¬

ing the reasons on both sides of every case with great minuteness. Wherever he was he imi¬

tated the customs of the country, and won the favor of all the peoples with whom he came into contact except the Germans. Consult Gachard, (Correspondance de Charles Quint y (1859); (Lives) by N. Robertson (Prescott's ed., 2 vols., London 1878) ; Armstrong (2

vols., London, with bibliographical introduction 1902) ; and Guntram (1865) ; Stirling, Maxwell, (Cloister Life of the Emperor Charles VJ

(1852); Guntram, (Kaiser Karl V) (1865).

CHARLES VI, Holy Roman Emperor, the

2d son of the Emperor Leopold I : b. 1 Oct.

1685; d. 20 Oct. 1740. His father destined him for the Spanish throne. The last prince of the house of Hapsburg, Charles II, disregard¬

ing the house of Austria, whose right to the Spanish throne was undoubted, according to the law of inheritance by descent, had by will made Philip, Duke of Anjou, second grandson of Louis XIV, heir to the Spanish monarchy. Ac¬

cordingly, on the death of Charles II, 1 Nov.

1700, Philip took possession of the vacant king¬

dom. England and Holland united against him, and this alliance was soon joined by Prus¬

sia, Portugal and Savoy. Charles was pro¬

claimed king of Spain at Vienna, in 1703, and proceeded by way of Holland to England, from whence, in January 1704, he set sail with 12,000 men for Spain, which was almost wholly occupied by the French, and landed in Cata¬

lonia. He succeeded in making himself master of Barcelona ; but was soon besieged there by his rival, Philip V. At the head of a garrison of hardly 2,000 men, he made the most obstinate resistance, till the long-expected English fleet appeared, which compelled the French speedily to raise the siege. This event was followed by alternate reverses and successes. Twice Charles reached Madrid, and twice was he driven from the city. The first time, in 1706, he caused him¬

self to be proclaimed king in the capital under the name of Charles III, He had been a second time compelled to flee to the walls of Barcelona, when he was informed of the death of his brother, Joseph I. According to the will of Leopold, this event placed the double crown of Charles V on his head ; to his claims on Spain it added the more certain possession of the Aus¬

trian dominions. But the allies did not like to see so much power united in the same hands.

Charles returned to Germany, and on his ar¬

rival learned that, at Eugene's suggestion, he had also been elected emperor. His coronation took place at Frankfort, in December 1711; and in the following year he received, at Presburg, the crown of Hungary. At the same time he still retained the empty title of King of Spain.

He now prosecuted, under the conduct of Eu¬

gene, the Spanish war of succession ; the allies concluded a peace with France at Utrecht in 1713, in spite of all the efforts of the Emperor to prevent it. He was obliged, in the following year, to sign the Treaty of Rastadt. This treaty secured him in the possession of Milan, Mantua,

Sardinia and the Netherlands. To secure his dominions to his daughter, Maria Theresa, in

default of male heirs, Charles strove to induce the powers to guarantee the Pragmatic Sanction, which settled the succession in her favor. He succeeded in gaining the concurrence of all the European powers. The reign of this prince was marked with perpetual agitations. The suc¬

cession to the Polish throne, after the death of Augustus II, in 1733, disturbed the peace of Europe. Charles, with Russia, supported the son of this prince; but France and Spain de¬

clared themselves for Stanislaus Leczinsky.

From this arose a war, which terminated, in 1735, in the loss of the Two Sicilies and a part of the duchy of Milan. Austria received Tus¬

cany in exchange for Lorraine, and obtained Parma. Hardly had Charles finished this war, when his alliance with Russia involved him anew in a war with the Turks. In 1737 his troops invaded Serbia without any declaration of war, and occupied Nissa. But the Turks renewed their attacks with a continually aug¬

mented force, and obliged the Emperor, after three unsuccessful campaigns, to cede to them by the Peace of Belgrade, in 1739, Wallachia and the Austrian part of Serbia, with Bel¬

grade. Consult Coxe, (History of the House of Austria) (Vol. Ill, 3d ed., London 1873).

CHARLES VII (properly Charles Al¬

bert). Holy Roman Emperor: b. Brussels, 6

Aug. 1697 ; d. Munich, 20 Jan. 1745. He was the son of Maximilian Emanuel, Elector of Bavaria, then governor of the Spanish Netherlands. His youth was spent at the Imperial court, and in the war against the Turks he commanded the army of auxiliaries sent by his father. In 1722

he married the daughter of Joseph I, having previously renounced with mental reservations all rights which this marriage might give him to the succession to the throne of Austria.

In 1726 he succeeded his father as Elector of Bavaria. He was one of the princes who pro¬

tested against the Pragmatic Sanction, guaran¬

teed in 1732 by the Diet of Ratisbon, and in consequence concluded a defensive alliance with Saxony. After the death of Charles VI, in 1740, he refused to acknowledge Maria

Theresa as his heiress, founding his own claims to the succession on a testament of Ferdinand I. He was supported by the king of France with a considerable force. In 1741 he was recognized at Lintz as Archduke of Austria.

The obstacles thrown in his way by Cardinal Fleury, who wished not to dismember the Aus¬

trian monarchy, as well as the want of artillery and ammunition, prevented him from getting possession of Vienna. On the other hand he took Prague, where he was crowned and pro¬

claimed king of Bohemia. In 1742 he was unanimously elected king of the Romans: he made a solemn entry into Frankfort, and was crowned by his brother, the Elector of Cologne.

But fortune soon deserted him. The armies of Maria Theresa reconquered all Upper Austria, and overwhelmed Bavaria. It was necessary to abandon Bohemia. Charles fled to Frankfort, and convoked a diet, when an attack of the king of Prussia on Maria Theresa allowed him to return to Munich in 1744. He was suc¬

ceeded in the electorate by his son Maximilian Joseph, and in the Imperial dignity by Francis I, husband of Maria Theresa.

CHARLES I, King of Portugal : b. 28

Sept. 1863 ; assassinated, Lisbon, 1 Feb. 1908. He was the son of Luiz I and of Maria, the daughter of Victor Emmanuel II of Italy, and came to the throne 19 Oct. 1889. After that event a powerful republican element made itself lelt in Portugal. The heir to the throne, the Duke

of Braganza, was assassinated along with his father, who was succeeded by his second son, Manoel.

CHARLES I (of Hohenzollern -SlGMARIN—

gen), King of Rumania; b. Sigmaringen, Ger¬

many, 20 April 1839; d. 10 Oct. 1914. The second son of Prince Karl of Hohenzollern, he entered the Prussian army early and held the rank of lieutenant of dragoons when, at the suggestion of the Prussian Ambassador, he was elected prince of Rumania 10 May 1866. He took the field with the Rumanian army as an ally of Russia in the Russo-Turkish War of 1877, and bore a distinguished part at the siege of Plevna. He subsequently proclaimed Ru¬

mania independent of Turkey and was crowned king 22 May 1881. He married in 1869 Princess Elizabeth von Neuwied, who as ((Carmen

Sylva® (q.v.) was well known as an author. On the death of their only child, the succession was settled in 1889 on Prince Ferdinand of Hohenzollern-Sigmaringen, a nephew of the King. King Charles during his reign did a great deal for the political and industrial interests of his people.

CHARLES I, King of Spain. See Charles

V, Holy Roman Emperor.

CHARLES II, King of Spain: b. 11 Nov.

1661 ; d. 1 Nov. 1700. He succeeded his father, Philip IV, in 1665. In this reign, Spain, which for nearly three centuries had held the fore¬

most rank in Europe as a great military nation, began rapidly to decline both in influence and glory, but such was the prestige attached to its name and past history, that it had long become powerless before it ceased to be respected.

The King was a degenerate, feeble-minded and inert, a puppet alternately in the hands of the French and Austrian factions at his courts.

Charles died in 1700, bequeathing his throne to the Duke d'Anjou, grandson of Louis XIV of France, an act which led to the long and calamitous <(War of the Spanish Succession.ˆ

CHARLES IV, King of Spain: b. Naples,

12 Nov. 1748; d. there, 20 Jan. 1819. He came to Madrid in 1759, when his father, Charles III, after the death of his brother, Ferdinand VI, ascended the Spanish throne, and succeeded him, 13 Dec. 1788. He married the Princess of Parma, Louisa Maria. Too imbecile in mind to govern, he was always ruled by his wife and his ministers, among whom Godoy, his wife's paramour, had unbounded influence over him. He had a due sense of his sanctity as an anointed king; and it is not known that .e ever permitted to be revealed to himself the absurd position in which he was placed by the infidelity and masterfulness of his consort.

The hatred which Godoy drew on himself from the grandees of the court brought on a revolu¬

tion in 1808, which enabled Napoleon to de¬

throne the Bourbons. Charles abdicated at Aranjuez, 19 March , in favor of his son Ferdinand, who in turn was forced to abdicate bv Napoleon. Charles, who had repudiated his own abdication, finally ceded, at Bayonne, his right to the throne to Napoleon, who settled on

him for life the palace of Compiegne and a pension of 6,000,000 francs. Charles after this lived at Compiegne with the Queen and her paramour, Godoy, but subsequently exchanged this residence for Rome.

CHARLES IX, King of Sweden: b. 5 Oct.

1550; d. Nykoping, 30 Oct. 1611. He was the fourth son of Gustavus Vasa and was chosen king in 1604. He fostered trade and mining, and established the University of Gothenburg, at the same time that he was subduing the tur¬

bulent nobles of the realm and forming alliances with the Protestant princes of Germany.

CHARLES X,, King of Sweden: b. Nykop¬

ing, 8 Nov. 1622; d. Gothenburg 13 Feb. 1660.

He succeeded his cousin, Christina, in 1654, and by his prudence and valor considerably ex¬

tended his dominions, wresting Livonia from the Poles, and several provinces from Den¬

mark. After a short reign of six years, in which he was constantly engaged in war, some¬

times meeting with severe reverses, but on the whole a considerable gainer, he was fatally at¬

tacked with an epidemic then raging among his troops, and was succeeded by his son Charles. Consult Bain, R. N., (Scandinavia >

(London 1905) ; Haumant, E., (La Guerre du nord et la paix d'01iva) (Paris 1893).

CHARLES XI, King of Sweden: b. 4 Nov.

1655 ; d. Stockholm, 15 April 1697. He suc¬

ceeded to the throne at five years of age, but the country was governed by a regency till 1672.

He then put in force a system of tyrannous ex¬

action and arbitrary oppression, by which he in a short time made himself absolute. Having once become independent of the states, he

studied to appease the people by ruling with justice and impartiality. In his wars — an evil legacy from the regency — he was unsuccess¬

ful, and lost much of his father's territorial acquisitions. He founded the University of Lund, reorganized the army and navy and strengthened the finances of the country.

CHARLES XII, King of Sweden: b.

Stockholm, 27 June 1682; d. Frederikshald, 11

Dec. 1718. On the death of his father, in 1697, he was declared of age by the Estates, Mean¬

while the young King showed but little inclina¬

tion for business : he loved violent bodily exer¬

cises, and especially bear hunting. To his jealous neighbors this seemed a favorable time to humble the pride of Sweden. Frederick IV

of Denmark, Augustus II of Poland and the Czar Peter I of Russia therefore concluded an alliance which resulted in the Great Northern War (1699). The Danish troops first invaded the territory of the Duke of Holstein-Gottorp.

Charles proposed in the council of state the most energetic measures against Denmark, the result of which was the discomfiture of the Danes ; thus ended the first enterprise of Charles XII, in which he exhibited as much in¬

telligence and courage as disinterestedness.

He adopted at this time that severe and tem¬

perate mode of life to which he ever remained true, avoiding relaxation and useless amuse¬

ments and living on the simplest fare.

After thus checking Denmark the attacks of Augustus and Peter remained to be repelled.

The former was besieging Riga, the latter menaced Narva and the country situated about the Gulf of Finland. Without returning to his capital — which in fact he never revisited —Charles caused 20,000 men to be transported to Livonia, and went to meet the Russians, whom he found 80,000 strong in a fortified camp under the walls of Narva. On 30 Nov.

1700, between 8,000 and 10,000 Swedes placed themselves in order of battle, under the fire of the Russians, and the engagement began. In less than a quarter of an hour the Russian camp was taken by storm. Thirty thousand Russians perished on the field or threw them¬

selves into the Narva; the rest were taken prisoners or dispersed. After this victory Charles crossed the Dwina, attacked the intrenchments of the Saxons and gained a de¬

cisive victory.

The war continued : the Swedes gained a brilliant victory at Clissau; in 1703 all Poland was in possession of the conquerors. At Al-transtadt Charles I dictated the conditions of peace in 1706.

In September 1707 the Swedes left Saxony on a Quixotic scheme of conquest. They were 43,000 strong, well clothed, well disciplined and enriched by the contributions imposed on the conquered. Six thousand men remained for the protection of the king of Poland; with the rest of the army Charles took the shortest route to Moscow. But having reached the region of Smolensk he altered his plan at the suggestion of the Cossack hetman, Mazeppa, and proceeded to the Ukraine, in the hope that the Cossacks would join him. But Peter laid waste their country, and the proscribed Mazeppa could not procure the promised aid.

The difficult marches, the want of provisions, the perpetual attacks of the enemy and the severe cold, weakened Charles' army in an un¬

common degree. Poltava, abundantly fur¬

nished with stores, was about to be invested when Peter appeared with 70,000 men. Charles in reconnoitering was dangerously wounded in the thigh; consequently, in the battle of 8 July 1709, which changed the fortunes of the Swed¬

ish hero and the fate of the North, he was obliged to issue his commands from a litter without being able to encourage his soldiers by his presence. They were obliged to yield to superior force and the enemy obtained a com¬

plete victory. He himself, together with Mazeppa, fled with a small guard, and finally found refuge and an honorable reception at Bender, in the Turkish territory. The regency in Stockholm took measures for the defense of the Swedish territory. Charles meanwhile negotiated at Bender with the Porte ; succeeded in removing the ministers who were opposed to him, and induced the Turks to declare war against Russia. The armies met on the banks of the river Pruth, 1 July 1711. Peter seemed nearly ruined when the courage and prudence of his wife produced a peace, in which the in¬

terests of Charles were entirely neglected. This monarch, however, projected new plans, and through his agents solicited of the Porte auxiliaries against his enemies. But the Rus¬

sian agents were no less active to prepossess the Porte against him, pretending that Charles designed to make himself, in the person of Stanislaus, the actual master of Poland, in or¬

der from thence, in conjunction with the Ger¬

man Emperor, to attack the Turks. The seras-kier of Bender was ordered to compel the King CHARLES XII — CHARLES

to depart, and in case he refused, to bring him, living or dead, to Adrianople. Little used to obey the will of another and apprehensive of being given up to his enemies, Charles resolved to defy the forces of the Porte with the 200 or 300 men of which his retinue consisted, and, sword in hand, to await his fate. When his residence at Varnitza, near Bender, was at¬

tacked by the Turks he defended it against a whole army, and yielded only step by step. The house took fire, and he was about to abandon it when, his spurs becoming entangled, he fell and was taken prisoner. The Turks now re¬

moved their prisoner from Bender to Demotica, near Adrianople. Escaping in disguise he reached Stralsund on the night of 22 Nov. 1714.

A combined army of Danes, Saxons, Russians and Prussians immediately invested Stralsund.

Charles, during the defense, performed miracles of bravery. But being obliged to surrender the fortress, on 23 Dec. 1715, he proceeded to Lund, in Schonen, and took measures to secure the coast. He then attacked Norway. The Baron of Gortz, whose bold but intelligent plans were adapted to the situation of the Swedish mon¬

archy, was at that time his confidential friend.

His advice was, that Charles should gain Peter the Great to the interest of Sweden by import¬

ant concessions, make himself master of Nor¬

way, and from thence land in Scotland, in order to dethrone George I, who had declared himself against Charles. Gortz discovered re¬

sources for prosecuting the war, and entered into negotiations at Aland with the plenipoten¬

tiaries of the Czar. Peter was already gained and a part of Norway conquered; the fortunes of Sweden seemed to assume a favorable aspect ; Charles was besieging Frederikshald, when, on 30 Nov. 1718, as he was in the trenches, leaning against the parapet and ex¬

amining the workmen, he was struck on the head by a cannon-ball.

At Charles' death Sweden sank from the rank of a leading power. If that King knew when to make war, he did not know when to make peace. The Great Northern War passed through three stages — a war of defense on the part of Sweden, then a war of aggression and finally a struggle for its existence as a nation.

In his last years Charles formed great plans for the improvement of its navy, trade and com¬

merce. Firmness, valor and love of justice were the grand features of Charles' character, but were disfigured by rashness and obstinacy.

These defects in his character earned him the nickname of the ((Madman of the North. »

Consult Bain, R. N., <Charles XII and the Col¬

lapse of the Swedish Empire) (London 1895).

CHARLES XII, The History of, a

famous work by Voltaire, published in 1731.

It is divided into eight books, and is considered its author's historical masterpiece.

CHARLES XIII, King of Sweden: b. 7

Oct. 1748; d. 5 Feb. 1818. He was the second son of King Adolphus Frederick. Appointed at his birth high-admiral of Sweden, his educa¬

tion was directed chiefly to the learning of naval tactics. In 1770 he commenced the tour of Europe. The death of Adolphus Frederick recalled him to Sweden, where he took an im¬

portant part in the revolution of 1772. His brother, Gtistavus III, appointed him governor-general of Stockholm and Duke of Sudermann-land. In the war with Russia, in 1788, he commanded the fleet, defeated the Russians in the Gulf of Finland, and, in the most danger¬

ous season of the year, brought back his fleet in safety to the harbor of Carlscrona, after which he was appointed governor-general of Finland. After the murder of Gustavus III, in 1792, he was placed at the head of the regency, and, happily for Sweden, preserved peace with other nations, while he united with Denmark for the protection of the navigation in the northern seas. In 17% he resigned the government to Gustavus Adolphus IV, who had become of age, and retired to his castle of Rosersberg. He did not again appear in public life till a revolution hurled Gustavus Adolphus IV, in 1809, from the throne, and placed Charles at the head of the state, as administrator of the realm, and some months afterward, 20 June 1809, as king of Sweden,

at a very critical period. The peace with Russia, at Frederik-sham, 17 Sept. 1809, gave the country the tran¬

quillity necessary for repairing its heavy losses and for completing the fabric of the constitu¬

tion. He had already adopted Prince Christian of Holstein-Sonderburg-Augustenburg as his successor, and after his death, Marshal Bernadotte, who was elected by the Estates, in Au¬

gust 1810, to take the place of the Prince. On him he bestowed his entire confidence. His prudent conduct in the war between France and Russia in 1812 procured Sweden an in¬

demnification for Finland by the acquisition of Norway, 4 Nov. 1814.

CHARLES XIV, King of Sweden. See

Bernadotte, Jean Baptiste Jules.

CHARLES XV (Louis Eugene), King

of Sweden and Norway: b. 3 May 1826; d. 18

Sept. 1872. He was the son of Oscar I, whom he succeeded 8 July 1859. He is well known for his liberal and popular rule, his reforms in the communal, ecclesiastical and criminal branches of the law. In his reign the Storth¬

ing, or Parliament, was reconstituted and given a more representative character. He was the author of a book of poems. Consult Booth-Holmberg, (Carl V, somenskild man, konung och Roustnar) (Stockholm 1891).

CHARLES, Elizabeth Rundle, English

writer of religious stories: b. Tavistock, 2 Jan.

1828; d. London, 28 March 1896. She was married to Andrew Charles in 1851. Her books have been widely popular in England and America, the most famous of them being (The Chronicles of the

(1863). Among her other works are (Martyrs of Spain) (1877); (Diary of Mrs. Kitty Trevelyan) (1865) ; (The Draytons and Davenants) (1867) ; (Winifred Bertram* (1866) ; (Against the Stream* (1873) ; (The Bertram Family) (1876) ; (Lapsed But Not Lost >

(1877).

CHARLES, Jacques Alexandre Cesar,

French scientist: b. Beaugency, France, 12 Nov.

1746; d. 7 April 1823. He lectured on physical science in Paris, made the first balloon using hydrogen gas and in 1783 made with M. Robert the first ascent ever made in a balloon. A height of 7,000 feet was reached on this oc¬

casion. Among his other inventions are the thermometric hydrometer and a number of optical instruments. In 1787, he anticipated Gay-Lussac's law of dilatation of gases.

CHARLES, Robert Henry, Irish theolo¬

gian and scholar : b. County Tyrone, 6 Aug.

1855. He was educated at Queen's College, Belfast, and Trinity College, Dublin, and was admitted to the Anglican priesthood in 1883.

He was curate of Saint Mark's, Whitechapel, 1883-85; of Saint Philip's, Kensington, 1885-86; and of Saint Mark's, Ivennington, 1886-89.

From 1898-1906 he was professor of biblical Greek at Trinity College,

Dublin; Grinfield lecturer on the Septuagint, Oxford, 1905-11; Speaker's Lecturer in Biblical studies, Oxford, 1910-14; and has been canon of Westminster since 1913. He has published <Forgiveness, and Other Sermons) (1886) ; (Book of Enoch Translated From the Ethiopia (1893) ; (Ethiopic Text of Book of Jubilees5 (1894) ; (Book of the Secrets of Enoch5 (1895) ; (The As¬

sumption of Moses5 (1897) ; (The Doctrine of a Future Life5 (2d ed., 1913) ; (Studies in the Apocalypse5 (1913) ; (Religious Develop¬

ment between the Old and the New Testament5

(1914) ; arid made numerous contributions to encyclopaedias and educational works.

CHARLES ALBERT, King of Sardinia;

b. 2 Oct. 1798; d. Oporto, Portugal, 28 July 1849. He was the son of Charles Emmanuel, Prince of Savoy-Carignan. He was educated in France, and in 1831 succeeded to the throne as the nearest heir on the death of Charles Felix. In the first years of his reign he showed himself favorable to the cause of progress by promoting a number of beneficial reforms.

Subsequently, indeed, he became more absolute in his views, but after the French Revolution of February 1848, he granted a constitution, and took the field against Austria on behalf of the revolted peoples of the Lombardo-Venetian kingdom and the duchies of central Italy. His arms were at first very successful, the Austrians were defeated in various encounters : but he was at last repulsed by Marshal Radetsky and obliged to sue for an armistice. On its expira¬

tion he resumed hostilities, but the battle of Novara, fought on 23 March 1849, proved fatal to the aspirations of Charles Albert and Sar¬

dinia. That very day he abdicated in favor of his son, Victor Emmanuel II, afterward King of Italy, and retired to a monastery at Oporto, in Portugal. Consult Capelletti, L., (Storia di Carlo Alberto5 (Rome 1899) ; Masi, E., (II Segreto del Re Carlo Alberto5 (Bologna 1891).

CHARLES OF ANJOU, King of Naples

and Sicily, the son of Louis VIII of France: b. about 1220; d. Foggia, 7 Jan. 1282. He waged war on King Manfred of Sicily, who was defeated and slain. He then seized on the Neapolitan crown (1266). His cruelty and exacting rule induced such a detestation of the French name, that the Sicilians, headed by John de Procida, rose in arms on the eve before Easter Day, 1282, and slaughtered all the French in the town and neighborhood of Palermo, the signal for the rising being the tolling of the vesper-bell ; this tragedy is hence recorded in history as the <(Sicilian Vespers”

(q.v.). By this act the French were entirely expelled from the island. Charles was unsuc¬

cessful in subsequent projects against the island.

CHARLES AUGUSTUS, Grand Duke of

Saxe-Weimar: b. 3 Sept. 1757; d. Graditz, Prussia, 14 June 1828. His mother, Amalia, reigned as regent for him until he succeeded to power in 1775. He was a* general in the army of Prussia 1772-93, and with the allies opposed Napoleon 1813-15. By the Congress of Vienna his principality was made a grand duchy. He liberally patronized science and art, and under him his capital of Weimar became the literary centre of Germany. He was a close friend of Goethe.

CHARLES THE BALD. See Charles

I of France.

CHARLES THE BOLD, Duke of Bur¬

gundy: b. Dijon, 10 Nov. 1433; d. Nancy, 5

Jan. 1477. He succeeded to the dukedom in 1467, and immediately engaged in a war with the citizens of Liege, whom he conquered and treated with extreme severity. Before this undertaking he had been obliged to restore to the citizens of Ghent the privileges which had been taken from them by Philip the Good. He now revoked his forced

concessions, caused the leaders of the insurrection to be executed and imposed a large fine on the city. In 1468 he married Margaret of York, sister of the king of England. Learning that the inhabitants of Liege, instigated by King Louis XI, had rebelled anew, and made themselves masters of Tongres, he compelled the King to sign a treaty the most disgraceful condition of which was that he should march with Charles against the city of Liege, which he had himself excited against the Duke. Charles encamped before Liege in company with the King; the city was taken by storm, and abandoned to the fury of the soldiers. Such success rendered the mind of the Duke utterly obdurate, and added the last traits of that inflexible, sanguinary char¬

acter which made him the scourge of his neighborhood, and led to his own destruction.

Edward IV conferred on him in 1470 the Order of the Garter. Shortly after he received in Flanders Edward himself, who came to seek an asylum with the Duke. Charles gave him money and ships to return to England.

About the end of the same year the war between the King of France and the Duke of Burgundy was renewed, and never did Charles show himself more deserving of the name of the ((Bold)5 or <(Rash,55 than in this war.

Having completed the conquest of Lorraine by the taking of Nancy in 1475, he turned his arms against the Swiss ; and notwithstanding the representations of these peaceful mountain¬

eers, who told him that all that he could find among them would not be worth so much as the spurs of his horsemen, he took the city of Granson, and put to the sword 800 men, by whom it was defended. But these cruelties were soon avenged by the signal victory which the Swiss obtained near the same city 3 March 1476.

With a new army he returned to Switzer¬

land, and lost the battle of Murten (Morat) 22

June. The Duke of Lorraine, who had fought in the army of the Swiss,

led the victors to the walls of Nancy, which surrendered 6 October.

At the first information of this siege Charles marched to Lorraine, to retake the city of Nancy from the Duke Rene. On 5 or 6 Jan.

1477 the two armies met: the wings of the Burgundian army were broken through and dispersed, and the centre, commanded by the Duke in person, was attacked in front and CHARLES CITY

flank. As Charles was putting on his helmet, the gilded lion which formed its crest fell to the ground, and he exclaimed with surprise, Ecce magnum signum Dei! Defeated, and car¬

ried along with the current of fugitives, he fell, with his horse, into a ditch, where he was killed by the thrust of a lance. His bodv, covered with blood and mire, and with the head em¬

bedded in the ice, was not found till two days after the battle, when it was so disfigured that for some time his own brothers did not recog¬

nize it. See Kirk, (History of Charles the Bold' (1863-68). In (Quentin Durward,' Sir Walter Scott has portrayed the character of Charles, and some of the quarrels between him and Louis of France.

CHARLES CITY, Iowa, city and county-seat of Floyd County, on Cedar River, 40 miles northwest of Cedar Falls, and on the Illinois Central and the Chicago, Milwaukee and Saint Paul railroads. It is supplied with good water power by the river and has a number of man¬

ufacturing interests, including stove fixtures, furniture, sashes and doors, harrows and gas¬

oline traction and stationary engines. Live stock, poultry, dairy products and nursery stock are the chief items of trade. It is the seat of Charles City College, a coeducational institu¬

tion, organized in 1891, under the auspices of the German Methodist Church, which had 246

students at the end of 1910. It contains an opera-house, public library, a home for the aged and several parks. It was settled in 1856, incorporated in 1869 and is governed by a mayor and council. The waterworks are the property of the municipality. Pop. (1920) 7,350.

CHARLES CITY CROSS-ROADS,

Battle of. See Glendale, Battle of.

CHARLES EDWARD STUART. See

Stuart, Charles Edward Louis.

CHARLES EMMANUEL I, Duke of

Savoy, surnamed (<the Great® : b. Rivoli, 12 Jan.

1562; d. Savigliano, 26 July 1630. He formed (1590) the plan of uniting Provence to his dominions. Philip II of Spain, his father-in-law, obliged the Parliament of Aix to acknowl¬

edge him as the protector of this province, in order by this example to induce France to acknowledge the king of Spain as protector of the whole realm. The Duke of Savoy, not less ambitious, likewise aimed at this crown, and after the death of Matthias desired also to be chosen emperor of Germany. He likewise intended to conquer the kingdom of Cyprus, and to take possession of Macedonia, the in¬

habitants of which, oppressed by the Turks, offered him the sovereignty over their country.

The citizens of Geneva were obliged to defend their city in 1602 against this ambitious prince, who fell upon them by night in time of peace.

Henry IV, who had reason to complain of the Duke, and whose

general, the Duke of Les-diguieres, had beaten Charles Emmanuel several times, entered at last into a treaty of peace with him, not disadvantageous to the Duke of Savoy. In 1628 he joined Spain in the war against France and his territory was left to him to support unaided by his ally. He died when this struggle had all but exhausted his army's strength.

CHARLES THE FAIR. See Charles

IV of France.

CHARLES THE FAT. See Charles II

of France.

CHARLES FRIEDRICH AUGUST

WILHELM, Duke of Brunswick: b. 30 Oct.

1804; d. 1873. He succeeded to the dukedom in 1823, but his rule was so arbitrary and op¬

pressive that the German Diet deposed him.

He subsequently lived in Paris and London, and at his death bequeathed his vast fortune to the city of Geneva.

CHARLES MARTEL, King of the

Franks: b. about 688; d. 22 Oct. 741. He was a natural son of Pepin Heristal, mayor of the palace under the last kings of the Merovingian dynasty. On the death of his father in 714, Charles was thrown into prison, but managed to escape, and gradually made himself master of a greater part of the country of the Franks.

By establishing unity in Gaul he saved it from the danger of conquest by the Arabs who had already taken possession of most of Spain. In 732 Charles gained a decided victory over Abd-ur-Rahman, the Arab leader, who had undertaken to conquer France. He extended his

influence over Frisia, the Germanic tribes, Saxony, Bavaria and neighboring races. He organized the nobility and the knights into great bodies, under effective discipline of a military character ; and the favors he extended to them to gain his ends had a strong effect on the creation and future growth of the feudal system. Charles Martel was a man of activity, courage and far-sightedness and, though his political schemes failed in the end, yet his work had a vast influence upon the future of southern and western Europe.

CHARLES D'ORLEANS, sharl'dor-la-an',

French nobleman and poet, son of Louis d'Orleans: b. 26 May 1391; d. 4 Jan. 1465. He was the grandson of Charles V of France, and the father of Louis XII. He was taken prisoner at Agincourt, and kept in captivity in England from 1415 to 1440, when he was ran¬

somed. He wrote a number of lyrics while in prison and after his return to France. At Blois, where he held his court, he gathered to¬

gether the chief French writers of his time, and took part with them in poetical tournaments, in one of which Fratigois Villon competed suc¬

cessfully. He has been termed the father of French lyric poetry, but has no claim to the title. His light and graceful lyrics are the last flowering of the courtly poetry of the Middle Ages; they show no trace of the modern spirit which appears so strongly in the works of his contemporary, Villon. His favorite themes are love and the springtime ; his favorite form is the rondel, with two rhymes, of which he is considered the chief master, as Villon is of the ballade and Voiture of the rondeau. His works were edited by D'Hericault (1874), with memoir. Consult Beaufils, (Etudes sur la vie et les poesies de Charles d'Orleans' (2 vols., Paris 1875) and Stevenson, R. L., (Familiar Studies of Men and Books' (1882).

CHARLES RIVER, a river in Massa¬

chusetts, which flows into Boston harbor, dividing Boston from Charlestown. The

source of the principal branch is a pond bor¬

dering on Hopkinton. It is navigable for 328

lighters and large boats to Watertown, seven miles west of Boston. The chief towns on its banks are the Newtons, Waltham, Watertown, Cambridge, Brookline and Boston.

CHARLES THE SIMPLE. See Charles

III of France.

CHARLES TOWN, W. Va., town and

county-seat of Jefferson County, situated on a branch of the Baltimore and Ohio Railroad, 10 miles southwest of Harper's Ferry. It is the centre of an agricultural region, has de¬

posits of limestone and iron ore in the vicinity, and manufactures brass fittings, harness, collars, fly nets, various wooden products and fertilizers. It was settled about 1750 and was first incorporated in 1873. It. was here that John Brown, after his raid at Harper's Ferry, was tried, condemned and hanged on 2 Dec. 1859.

On 18 Oct. 1863, a Confederate cavalry division, under General Imboden, captured the place and secured 424 prisoners and large quantities of military stores, but, on the approach of a superior Union force, almost immediately with¬

drew. Pop. 2,662.

CHARLES'S WAIN, a common name for

the constellation of the Great Bear or Ursa Major. Originally instead of Charles's Wain, the name was ˆcarl's® or ((churl's wain,® mean¬

ing the farmer's wagon. Since the time of Homer this constellation has been called a wagon; but since the 1 7th century the name has been associated with Charles I and Charles II.

Shakespeare calls it Charles's Wain.

CHARLES THE WISE. See Charles V

of France.

CHARLESTON, Ill., county-seat of Coles

County, situated at the junction of the Cleve¬

land, Cincinnati, Chicago and Saint Louis and the Toledo, Saint Louis and Western railroads.

It is the centre of a large oil, gas and coal region, and 49 miles southeast of Decatur. It has manufactories of woolen goods, carriages, stoves, plows, brooms and also flour mills, banks, good schools and several churches.

It is the seat of the Eastern Illinois Normal School, and contains a Carnegie library.

Charleston was settled in 1830, and incorporated in 1855. The government is vested in a mayor, chosen for two years, and a council. The waterworks are municipally owned. Pop. 6,600.

CHARLESTON, Mo., city and county-seat

of Mississippi, 15 miles southwest of Cairo, Ill., on the Saint Louis, Iron Mountain and Southern Railroad. It has a large trade in grain, flour, fruits, live stock and potatoes. It contains flour mills, saw mills, axe handle fac¬

tories and stave and barrel heading works. In¬

dian mounds are numerous in the vicinity. The city owns the waterworks. Pop. (1920) 3,410.

CHARLESTON, S. C, the chief city of

the State, and most important on the Atlantic seaboard south of Chesapeake Bay, seat of Charleston County: 130 miles southeast of Columbia, the capital, and 82 miles north of Savannah. Railroad service includes Atlantic Coast Line and connections (Charleston & W.

Carolina ; Georgia Railroad ; Cola., N. & L. ; Winston-Salem Southbound; N. C. & St. L. ; L. & N.) — Southern Railway and connections (Q. C. and Georgia Railroad)— and Seaboard Air Line and connections.

Charleston lies on a peninsula, 10 or 12

miles long and 8 or 10 feet above high water, between the navigable Ashley and Cooper rivers, 2,100 yards and 1,400 yards wide re¬

spectively at the mouth; the latter reinforced by the Wando at the city, and the estuary of the three forming a magnificent landlocked harbor, six miles long by three wide, with 40

feet of water at the city — one of the finest, safest and most spacious on the Atlantic Coast.

The harbor's channel, lying for some dis¬

tance between jetties, is 700 feet wide and has a mean depth at low water of 28 feet and at high water of 33 feet. There are about 17

miles of available waterfront, with develop¬

ment constantly in progress on both the Ashley and the Cooper rivers. During the years 1910

to January 1916, for example, wharfage and ter¬

minal improvements costing nearly $5,500,000

were made. Ocean traffic has been quick to take advantage of the several large induce¬

ments held out by Charleston and now its steamship service includes Clyde Steamship Company (Boston, New York, Jacksonville);

Baltimore & Carolina SS. Company (Balti¬

more, Georgetown) ; Philadelphia & New Or¬

leans SS. Company (Philadelphia, New Or¬

leans) ; Southern Transportation Company (barge line, Philadelphia, Baltimore, Norfolk, Wilmington, Georgetown) ; American-Hawaiian SS. Company (West Coast U. S.) ; Luckenbach SS. Company (contract service, West Coast, South America) ; Grace Line (contract serv¬

ice, West Coast, South America) ; Carolina Line (contract European service) ; United Fruit Company (port of call) ; Sea Island Steamboat Company (Charleston, Beaufort).

The resemblance of Charleston's position to that of New York in its rivers and harbors is striking. Freight here is moved directly from vessel to freight cars, or vice-versa, without lightering or trucking. Distances from the Central West to Charleston are not great and the city has just entered upon a period of re¬

lationship with the Central Western cities and manufacturing points that promises to make of Charleston the port of export and import for all these cities and manufacturing points.

From a military and naval viewpoint, Charles¬

ton's position is of supreme importance to all the Southeast. In 1,728 miles of coast line, from Cape Hatteras to the mouth of the Rio Grande, it has the only United States navy yard. Also, it is the only place on the South Atlantic and Gulf coasts with a dry dock large enough to repair a battleship. The city is only seven and one-half miles from the ocean and the channel is easily mined and is protected by forts Sumter and Moultrie. It is located directly north of the Panama Canal, from which its sailing distance is only 12 per cent greater than that from New Orleans. It has the only large coaling terminals on the coast and is the distributing point for the Carolinas of two of the greatest oil com¬

panies. Admirals of the navy have repeat¬

edly pointed out its wonderful strategic ad¬

vantages and its practical impregnability. The Charleston navy yard is

to-day in a high state of efficiency, employing more than 4,500

people and paying civilian wages of more than $5,000,000 annually. Charleston, at the time of America's entrance into the World War, be¬

came the headquarters of the Southeastern CHARLESTON, S. C.

1 Post Office, with St. Michael's, Charleston's Oldest Church, in the Distance 2 United States Customs House 3 Fort Sumter CHARLESTON, S. C.

Military Department and of the Sixth Naval District.

Trade and Commerce. — At the outbreak

of the Civil War, Charleston's export trade in cotton, rice and naval stores made up the largest part of a total of about $17,000,000 an¬

nually. The war reduced this to almost noth¬

ing. The work of repairs to docks, wharves and railroads was slow and it is only in recent years that Charleston has recovered from her tremendous losses and has begun to forge ahead rapidly. Recent years, however, have witnessed strides that are record-breaking, as seen in the statistics for 1903 and 1913 : Foreign imports, (1903) $1,768,000, (1913) $5, 361*, 000; coastwise imports, (1903) $10,315,000, (1913) $22,040,000; foreign exports, (1903) $3,468,000, (1913) $20,-

783,000; coastwise exports, (1903) $32,107,000, (1913) $31,040,000; total exports and imports, (1903) $47,659,000, (1913) $79,225,000. The rate of increase since then has been even greater, the total commerce for 1915 being $222,881,814, and that for 1916 being $320,048,883. The prin¬

cipal exports are cotton, cotton goods, lum¬

ber, fertilizers, cigars and tobacco, fruits and vegetables. Charleston is

the centre of the second most important trucking district of the country and is the shipping point for the prod¬

ucts of this district. In recent years, the com¬

pletion of the Panama Canal and freight rate adjustments have made the merchants of

Charleston begin to look to the Middle West for a large export trade in manufactured articles.

Charleston's wholesale business in 1915

amounted to $30,801,484. Coal terminals cost¬

ing $600,000 were constructed in 1915 and others to cost an equal amount are now under con¬

struction. These terminals and rate adjust¬

ments have made Charleston the most import¬

ant coaling port on the South Atlantic and the outlet for some of the largest coal fields. There have recently been installed two large fuel oil tanks, each of 700,000 gallons capacity, making this the most important oil supply and distribu¬

tion point between Baltimore and New

Orleans. The government is now constructing terminals to cost between twenty and thirty millions dollars at North Charleston for both war and peace uses.

Manufactures. — Charleston's principal enter¬

prises embrace fertilizers, lumber and timber, mineral waters and soda, bakeries, textiles, foun¬

dries and machinery, printing and publishing, tobacco and cigars and flour and grist. There are also important manufactories of carriages and wagons, ice, medicine and rugs, baskets, boxes and furniture. The most important man¬

ufacture is fertilizer, with lumber second and textiles third. Manufacturing statistics for 1917

are as follows: Plants, 190; capital, $29,268,513; annual products, $36,663,945 ; salaried persons, 801 ; wage earners, 14,437 ; paid in salaries and wages, $10,383,087.

As a distributing and wholesale point,

Charleston is pre-eminent in its section. Whole¬

sale establishments number 89, employing 1,528

wage earners. They pay wages and salaries of $1,135,602 and do an annual business of $30,-

801,484. Principal lines are groceries, cement, lime and plaster, drugs, dry goods and notions, flour, fruit and produce, machinery and mill supplies, provisions, rice and shoes.

Buildings, Streets, Suburbs, *etc.* — Charles¬

ton's long existence for an American city (founded 1670) and its position of leadership in all political movements as well as vital im¬

portance in war time give it rich historical interest; and this, with its fine climate and its old garden-set mansions and outlying garden spots of rare beauty, make it one of the choicest and most popular Southern tourist resorts. In summer it attracts large numbers of visitors by reason of its beach resort, the Isle of Palms, where the scenes of Poe's (Gold Bug* are said to have been laid.

Charleston is unique among American cities in that while keeping up with the most modern in commercial and industrial progress, it has preserved all its historic places and features.

Within its gates the student of history is pre¬

sented opportunities to study every period in American life from 1700 to the present time.

The city is laid out generally at right angles, but with some picturesque irregularities in the streets; four of these, King street, the principal retail thoroughfare, Meeting street, the prin¬

cipal wholesale and distributing thoroughfare, and Rutledge and Ashley avenues, run the en¬

tire length of the city, north and south. King street ends in White Point Garden, a handsome wooded park containing monuments to Sergeant Jasper and his comrades and to William Gilmore Simms; the old gun from the Keokuk, the Phosphate Monument and a drinking fountain to the heroes of the Hunley who lost their lives in Charleston Harbor on the first sub¬

marine boat ever built in America. White Point Gardens, with its adjacent esplanade, the Battery, 1,500 feet long, is Charleston's greatest pride and beauty. The Battery gives a mag¬

nificent view of the harbor and the forts. In the middle distance stands Fort Sumter; to the right the shores of Morris, James and John's islands, on which are located the lighthouse and United States quarantine station, and where formerly stood Fort Johnson, Battery Wagner and Cummings Point ; in the distance to the left, the houses of Mount Pleasant, Sullivan's Island and the Isle of Palms, suburbs and beach resorts ; nearer still, Castle Pinckney, on its little marsh island in the Cooper, and Fort Ripley. Adjoining the Battery is a development of recent years called the Boulevard. This is a section of land filled in from the river at a cost of about $400,000 and fronted by a beauti¬

ful walk and drive 4,000 feet long. This, with the Battery, gives a continuous waterfront es¬

planade of 5,500 feet or more than a mile.

Going north from the Battery, one finds at the juncture of Meeting and Broad streets several large public buildings. They are the county courthouse, a solid brick building; the city hall, an imposing structure entered by a double flight of steps and containing valuable paintings and relics ; the United States post-office, a four-story, $500,000, modern office building of Carolina granite, reputed to be the ((cleanest Federal building in the country,® and Saint Michael's Church, the central point of all Charleston's historical associations. The United States custom house, near Market wharf on the Cooper River, is a superb struc¬

ture of white marble costing some $3,400,000.

In front of the city hall is Washington Park or City Hall Park,

containing a statue of Wil¬

liam Pitt, erected before the Revolution — the British shot off one of the arms in 1780 — and monuments to the Confederate dead, to General 330

Beauregard, and a bust of Henry Timrod, the Charleston poet. Nearby is the old post-office building, where Washington and LaFayette were entertained, where Steve Bonnet and other pirates were imprisoned, where the forbidden tea imports were stored and whence the patriot Isaac Hayne was led to his execution by the British. The Charleston Chamber of Com¬

merce, which is nearby, was founded in 1773

and is the second oldest civic and commercial body in America and the oldest city Chamber of Commerce.

Going northward from the city hall one comes upon the Gibbes Memorial Art Gallery and, on the street west of it, the Charleston Library, both handsome buildings. Other in¬

teresting public buildings are South Carolina hall (1804), Charleston orphan house (1794), Hibernian hall (1799), the old Powder maga¬

zine (1705), the Slave market, the old Charles¬

ton market (1841) ; and such residences as the Pringle house, built in 1765; the old Heyward house, in which Washington was entertained for a week in 1791 ; the Huger residence, in which Lord William Campbell, last colonial governor of South Carolina, resided ; the Wil¬

liam Washington house and the Horry house.

In addition to the Battery and Washington Park, Charleston's parks include Marion Square, or <(Citadel Green,® containing a statue of John C. Calhoun and other interesting objects; Hampton Park, with sunken gardens and a wealth of Southern foliage ; Colonial Lake and Common ; Hampstead Mall and Cannon Park.

Charleston has one of the best electric street railways in the country, covering the city com¬

pletely and running to the navy yard, seven miles distant, and to North Charleston, a suburban development which is being built into a model city along scientific lines. A ferry line gives transportation across the river to Mount Pleasant, a suburb, and thence an electric railway runs through Sullivan's Island, where is to be found Fort Moultrie, and finally to the Isle of Palms, Charleston's beach resort, that boasts a beautiful white sand beach nine miles long, cottages, a large pavilion and other resort features. Magnolia Gardens, 12 miles west on the Ashley, are perhaps the principal attraction for beauty-lovers who visit Charles¬

ton. They are among the world's famous gardens, having been begun by one of the Dray¬

tons generations ago. Summerville, 22 miles north of Charleston, is a summer resort for Southern people and a fashionable winter re¬

sort for those of the North. Magnolia Ceme¬

tery is Charleston's largest and most beautiful burial place. A new cemetery of large propor¬

tions has been opened, however — the River-view. Charleston has a new and thorough sys¬

tem of drainage which further improves the fine sanitary condition for which the city has been noted.

Education. — The public-school system, es¬

tablished in 1810, had, in 1914, eight school buildings. For all primary and preparatory education, public and private, the statistics are : 20 institutions, 241 teachers, 7,818 pupils, build¬

ings valued at $463,500, annual expenditures of $291,324. For higher education the principal institutions are College of Charleston, chartered in 1785; the Military College of South Caro¬

lina, a .State institution, established in 1845, one of the foremost

military schools in the country and famed for the active part its students took in the Civil War; the Medical College of South Carolina, a State institution ranking in Class A of the American Medical Association ; Porter Military Academy, Charleston High School, Memminger High and Normal School, Academy of Our Lady of Mercy, Confederate College, Ashley Hall, Avery Normal Institute, Walling¬

ford Academy for Colored Youth and many private academies and schools. The Charles¬

ton Museum, the oldest museum on the Amer¬

ican continent, having been founded in 1773, is also one of the most complete and well-rounded collections outside the largest cities. In addi¬

tion to its collecting and exhibition work, it works with the public and private schools of the city.

Churches and Charitable Institutions. —

Charleston is truly a city of churches, there being 81 (42 white and 39 colored), divided among the Adventist, Baptist, Christian, Chris¬

tian Science, Congregational, Episcopalian, French Protestant, Greek Orthodox, He¬

brew, Lutheran, Methodist, Presbyterian,

Roman Catholic and Unitarian denominations among the white churches and Baptist, Con¬

gregational, Episcopal, Methodist, Presby¬

terian and Roman Catholic among the colored.

The leading denominations are Episcopalian, Lutheran and Roman Catholic. It is the home of the Episcopal bishop of South Carolina and also of the Roman Catholic bishop. It has a Roman Catholic cathedral, that of Saint John the Baptist. The oldest church building is Saint Michael's (Protestant Episcopal), dat¬

ing from 1761, with a fine chime, of

interesting history, and numerous associa¬

tions that make it the most famous church in South Carolina ; the oldest organization is that of Saint Philip's (Protestant Episcopal), whose building was burned in the great fire of 1835, after having been saved from two earlier fires, and whose present one is a classic struc¬

ture of great beauty and originality, with a steeple nearly 200 feet high, bearing at night a beacon, visible far out at sea ; and with a churchyard full of distinguished names, .in¬

cluding Calhoun, Gadsden, Rutledge and

Pinckney. The Circular (Congregational)

Church is noted, while the Old Huguenot Church is the only congregation of its kind in the United States. Other churches of interest are Grace (Protestant Episcopal), the Scotch, the Second and Westminster Presbyterian; Citadel Square (Baptist) and First (Baptist) ; Unitarian; Bethel and Trinity (Methodist); the Hasell Street Synagogue (Hebrew) ; Saint Matthew's (Lutheran) ; Saint Mary's (Catho¬

lic).

Of the charitable organizations and institu¬

tions, the most important are the Orphan House, founded 1792, the oldest of its kind in the United States; the Euston Home for the Aged; Home for Mothers, Widows and Daugh¬

ters of Confederate Soldiers; the Roper Hos¬

pital; the almshouse; the Old Folks' Home for Aged Colored People ; the Shirras Dispensary.

Among charitable societies are Associated Charities ; Ladies' Benevolent Society, organ¬

ized 1813; Ladies' Fuel Society; Saint An¬

drew's Society, founded by Scotchmen in 1720, the oldest society in the city; Hebrew Benev¬

olent Society, and the South Carolina So¬

from the Two-Bit Club, so called from the sum contributed by each member at each meet¬

ing for the relief of their own indigent.

Charleston's Young Men's Christian Asso¬

ciation will compare favorably with that in any city of its size. It occupies a building costing $157,000, contributed by the people of the city. There is also an active Young Women's Christian Association in the city, with a handsome new building under construction.

Banks. — In Charleston there are 19 national savings and State banks, with aggregate capi¬

tal and surplus of $5,077,899, resources of nearly $40,367,069, and deposits of $31,002,632.

The city's annual bank clearings are more than $175,000,000. Charleston also has in active operation building and loan associations with aggregate capital amounting to between $2,-

000,000 and $3,000,000.

Government and Finances. — The govern¬

ment is, by the charter of 1836: a four-years'

mayor and a council elected half by wards and half at large. The administrative boards and officials are partly appointive by the mayor and partly elective by the council. The city expenses are about $600,000 a year, of which $60,000 each goes for schools and charities, $75,000 for police and $50,000 for the fire de¬

partment. The net debt in 1910 was $4,086,500; the assessed valuation of all taxable property, $18,824,978, of which $12,400,000 is real estate; the city tax rate is $27.80 per $1,000, besides a school tax of $1 and a State and county tax of $10.62ˆ.

Population. — In 1790, the first census, 16,359; 1800, 18,924; 1810, 24,711; 1820, 24,780; 1830, 30,289; 1840, 29,261; 1850, 42,985; 1860, 40,522; 1870, 48,956; 1880, 49,984; 1890, 54,955; 1900, 55.807; 1910, 58,833; 1916, 72,000; 1918, 81,807; 1920, 67,957.

History. — The first settlement in South Carolina was made at Port Royal by the French, in 1562; it was not successful, but they never forgot the experiment or their favor for the region. In 1670 an English colony under Gov. William Sayle made for Port Royal also ; but on the advice of the cacique of Kiawah (the then name of the Ashley), settled instead at Albemarle Point, on the west bank of the Kiawah, three miles from the present site, —fortunately, as the colony Lord Cardross planted at Port Royal was exterminated by the Spaniards in 1686. The settlement was named Charles Town after Charles II. Within two years the settlers had discovered that Oyster Point, the end of the Charleston peninsula, was a better site, and within 10 years later had be¬

come the main settlement and the offices were removed there. The first village was on the Cooper entirely, as the main business still is.

The commerce even at this early date was lively, 16 vessels sometimes discharging at once.

In 1685-86 a colony of Huguenot refugees set¬

tled there and built a church : this strain has deeply molded Charleston and South Carolina, and its fiery zeal in heading every political movement is perhaps due to this quick French blood. In 1704 there were five churches: Saint Philip's, the Huguenot, the First Baptist, a Presbyterian and Congregational meeting¬

house and a Quaker one. In August 1706 an allied French and Spanish fleet attacked it, but were driven off by a small improvised fleet under Lieutenant-Governor Rhett ; shortly afterward, another French vessel, unaware of the others' defeat, came up and landed a party, which was routed with heavy loss, and the sur¬

vivors, • with the ship and the rest of the marines, captured. The city at this time was desolated with yellow fever, but this militia action counts among the brilliant feats of the War of the Succession. In 1755 a colony of 1,200 deported Acadians settled there, still further reinforcing the French element. In 1773, Josiah Quincy of Boston writes in his diary that the town was ((beautiful and in many respects magnificentˆ ; and Mar surpassed everything he ever saw or expected to see in America. w It was at this time the third seaport in size in America, and in 1774 established a chamber of commerce. It was not only the first Southern city to join the Revolutionary movement, but was the prime agent in bring¬

ing about the first provincial congress 10 years before ; it held the. first constitutional conven¬

tion in any colony in March 1776, and promul¬

gated an independent constitution. On 28 June the British fleet, under Sir Peter Parker, be¬

sieged the city, and was beaten off with ter¬

rible loss by the garrison of Fort Moultrie be¬

hind an improvised palmetto fortification. In 1779 a second attack under Gen. Augustine Prevost was defeated. But on 12 May 1780

Sir Henry Clinton captured it and its garrison under General Lincoln, after a six weeks' siege; it was not reoccupied by the Americans till 14-Dec. 1782. In 1783 it was incorporated as a city, and remained the capital of South Caro¬

lina till 1790. In 1784 it exported the first bale of cotton sent from the United States to Europe. In 1793 some 500 French refugees from the massacres of San Domingo settled there. It was the heart of the Nullification movement in 1832, as of all movements to op¬

pose Federal authority first and last ; and the Breckenridge convention of 1860 met here be¬

fore adjourning to Baltimore. The conven¬

tion which proclaimed the State's secession from the Union was held here 20 Dec. 1860.

Th-e Civil War was begun by its bombardment and capture of Fort

Sumter on 12-13 April 1861 ; and from 7 April 1863 on, for nearly two years, the fort was incessantly besieged and steadily bombarded by the Union fleet, for the last 18 months it being only a heap of ruins, but impregnable. On 17 Feb. 1865, on the sur¬

render of Columbia, Hardee evacuated the city and burned all public buildings, stores and ship¬

ping, and the next day Foster and the Union forces took possession. Despite its devasta¬

tion and wreckage, it grew 21 per cent from 1860 to 1870, while it had fallen off in the pre¬

vious decade, — a curious phenomenon. In 1886, on 31 August, the heaviest earthquake ever recorded in the United States destroyed several hundred buildings, and made three-fourths of the whole uninhabitable, killed scores of people and caused a property damage estimated at $8,000,000. On 2 Dec. 1901 the South Carolina Interstate and West Indian Ex¬

position was inaugurated in the city. The year 1906 saw Charleston beginning the era of modern business and commercial prosperity upon which she is now fully launched. In the 10 years that have passed since then, the city has grown faster than in 25 or 30

years before. It has now assumed its posi¬

tion as the leading seaport city of the South 332

Atlantic and the most important military point between the Chesapeake and the mouth of the Rio Grande. Her people have been filled with a great faith in her future and are leaving no stone unturned to make their city as great in the America of the future as she was in that of the past.

For a compact sketch of its history, consult Yates Snowden in Powell's (Historic Towns of the Southern States* and Mrs. Ravenell's, Charleston, the Place and the People* ; in connection with State history, McCrady's three volumes of South Carolina history, 1897-1901.

Sidney Rittenberg,

Charleston Chamber of Commerce.

CHARLESTON, S. C., Attacks on. In

May 1776 a British squadron under Peter Parker with troops under Sir Henry Clinton (q.v.) sailed to reduce South Carolina, on 1

June anchoring off Sullivan's Island (q.v.), near Charleston. The city had been put in a state of defense by Gens. John Armstrong, Charles Lee and Robert Howe (qq.v.) and Fort Moultrie (q.v.) on Sullivan's Island had been strengthened and garrisoned by 435

troops under Col. William Moultrie (q.v.). On 28 June the fleet opened fire and troops were sent to flank the fort but its defenders replied so vigorously that the fleet was compelled to retire and the troops were unable to reach the rear. A few days later the squadron set sail for New York. Consult Gordon, William,

(American Revolution (Vol. II) ; Drayton, W. H., (Memoirs of the Revolution* (Vol.

II) ; Moultrie, William, (Memoirs of the Revolution (Vol. I) ; McCrady, Edward,

(South Carolina in the Revolution (p. 137

et seq.) ; Ramsay, David, (History of the Revolution* (Vol. I) ; Sparks, Jared, Cor¬

respondence of the Revolution (Vol. II, pp.

494—505) ; Wiley and Rines, (The United States) (Vol. II, pp. 404-07). In December 1779 Sir Henry Clinton sailed from New York and on 11

Feb. 1780 landed about 30 miles south of Charleston. With reinforcements from New York and Savannah, he had about 13,000 troops, to oppose which Gen. Benjamin Lincoln (q.v.) had about 2,000 regulars and 1,000 militia, besides residents. On 9 April the fleet passed Fort Moultrie and Clinton es¬

tablished his batteries before the city, dispatch¬

ing small expeditions to cut off communication with the interior. On 21 April Lincoln offered to capitulate, but Clinton rejected his terms, on 7 May captured Fort Moultrie, then threatened to assault the city and finally compelled Lin¬

coln to capitulate, 12 May.

CHARLESTON, W. Va., city, capital of

the State and county-seat of Kanawha County, situated on the right band of the Kanawha at its junction with the Elk, and on the Chesa¬

peake and Ohio, the Kanawha and Michigan, the Kanawha and West^ Virginia, the Virgin¬

ian and the Coal and Coke railroads, 130 miles south by west of Wheeling and about 360 miles west by north of Richmond, Va. The valley yields coal, salt and hardwood timber, for which Charleston is the central and distribut¬

ing point. Charleston has several iron foun¬

dries, saw-mills, factories for the manufac¬

ture of chemicals, axes (Kelley's axe fac¬

tory, the largest in the world), boilers, furni¬

ture, woolens, carriages, fire-brick, boats, col¬

ors, veneer, glass, steel, mine cars, *etc.* The construction and repair shops of the Kanawha and Michigan Railroad are situated here.

(Charleston is the site of the government armor plate, gun-forging and projectile plants, which will cost when completed more than

$20,000,000

and will employ 5,000 men). In the neighbor¬

hood are extensive deposits of oil and natural gas. The principal buildings are the capitol, erected at a cost of $500,000, the capitol annex, a Federal court, custom-house and post office building (cost $123,000), a high school build¬

ing (cost $80,000) and county courthouse. In the capitol grounds there is a fine monument erected in memory of ((StonewalP* Jackson.

Charleston has derived great benefit from the improvement of locks and dams of the Great Kanawha River, undertaken by the Federal government at a great expense. The city is now connected by steamboat with the chief ports on the river. Coal, salt and timber are shipped in great quantities. The river at Charleston is 130 yards wide and is navigable to its confluence with the Ohio at Point Pleas¬

ant, 60 miles away to the northwest. In 1788

a fort was built where the city now stands.

The town was incorporated in 1794 and its city charter dates from 1870, when it was made the capital of West Virginia. The government was removed to Wheeling in 1875, where it re¬

mained for 10 years, when Charleston became the capital once more, The city is attractive and beautifully situated and has a water-sup-piy system, gas works and electric lights. It is governed by a mayor, a city manager and a council. Pop. (official United States census, 1920) 39,608.

CHARLESTOWN, Mass., since 1874 a part

of the municipality of Boston, previously a separate city and seaport. One of the chief navy yards in the United States, occupying an area of about 100 acres, is in the southeast part of Charlestown. It was settled as early as 1629, and in 1634 became a town, its original territory being considerably larger than at present, having been divided up to form the towns of Woburn, Malden, Stoneham, Burling¬

ton and Somerville, and parts of Medford, Cambridge, Arlington and Reading. It was the scene of stirring events in the Revolutionary War.

The battle of Bunker Hill was fought here 17 June 1775, when the British set fire to the town, destroying 320 buildings, valued at $525,000. The battle is commemorated by a monument. Charlestown was the home of John Harvard, the earliest benefactor of Harvard University, and the birthplace of Samuel F. B.

Morse, the inventor of the electric telegraph.

It had a population of 23,373 at the time of its annexation to Boston. Consult Sawyer, (01d Charlestown* (1902).

CHARLESTOWN, South Africa, a town

of the extreme north of Natal, on the railway from Durban to Johannesburg. It stands at a height of over 5,300 feet.

CHARLEVILLE, shar-le-vel, France, town

in the department of Ardennes, on the left bank of the Meuse, opposite Mezieres, with which it communicates by a suspension bridge. It is regularly built, has straight, wide and clean streets, and a public square and fountain, sur¬

rounded bv arcades, from which the four prin¬

cipal streets diverge. It manufactures hard-CHARLEVOIX — CHARLOTTENBURG

ware, leather, sugar, brushes and beer; and the Meuse affords facilities for considerable trade in metals, coal, iron, slate, wine and nails. It was the mediaeval Arcae Remorum and Carolop-olis, and an important military station until the destruction of its fortifications in 1687.

CHARLEVOIX, shar-le-vwa, Pierre

Frangois Xavier de, French Jesuit traveler: b.

Saint Quentin, 29 Oct. 1682 ; d. La Fleche, 1

Feb. 1761. He became a member of the Society of Jesus in 1698 and taught in Quebec from 1705 to 1709. After a brief return to France he was again sent to America by the Duke of Orleans. The object of this journey was the discovery of the “Western Sea® then supposed to be west of the Mississippi. He voyaged down the Mississippi to New Orleans. His chief title to fame rests on his (Histoire et description generale de la Nouvelle France avec.

le journal historique d’un voyage fait dans l’Amerique septentrionale) (1744; Eng. trans.

by J. G. Shea 1865-72). His other works include (Histoire et description generale du Japon) (1715) ; (Vie de la mere Marie de 1’IncarnatioiF (1724) ; (Histoire de File espag-nole, ou de Saint Dominque) (1730) ; and (Histoire du Paraguay, (1756; Eng. trans. 1769).

CHARLEVOIX, shar’lg-voc’, Mich, city

and county-seat of Charlevoix County, 210

miles northeast of Grand Rapids, on the Pine River and the Pere Marquette Railroad. It has manufactures, of cement, lime, lumber and stone, and a Carnegie library. It has extensive fishing and lumbering interests and is the seat of a branch station of the United States Fish Hatchery. The city is a favorite summer resort and owns the electric-lighting and water plants. It was chartered as a city in 1905. Pop.

2,420.

CHARLOCK. See Mustard.

CHARLOTTE, Mich, city and county-seat

of Eaton County, 15 miles southwest of Lans¬

ing, on the Michigan Central and the Grand Trunk railroads. It was

settled in 1835, was first incorporated in 1863 as a village, and as a city in 1871. It has a Carnegie library and manufactories of furniture, automobiles,

bridges and athletic equipment. It contains also grist mills and grain elevators. The water¬

works are municipal property. Pop. 5,126.

CHARLOTTE, sha'lot, N. C, city and

• county-seat of Mecklenburg County, on Sugar Creek, and on the Southern and Seaboard Air¬

line, the Piedmont and Northern and the Nor¬

folk Southern railroads, 267 miles northeast of Atlanta, Ga. Electric car lines connect the city with surrounding towns. The city covers an area of about 20 square miles, and its streets are macadamized and lighted with electricity.

The principal oublic buildings are the United States post-office and courthouse, the assay office, city hall, county courthouse, the Y. M.

C. A. and the Y. W. C. A. buildings, the Audi¬

torium, several fine business blocks and nu¬

merous hotels. Nearly all the leading religions are represented, and there are many handsome church edifices. The charitable institutions in¬

clude Saint Peter's Home and Hospital, a hos¬

pital for colored people, Thompson Orphanage, Presbyterian Home for Aged and Helpless Women, the Presbyterian Hospital, Alexander Rescue Home for Children, Negro Orphanage, Crittenton Home, Mercy Hospital (Catholic), and the Country Home. Beside several public and private schools there are Elizabeth College and Conservatory of Music for young women, Presbyterian College, Saint Mary's Seminary conducted by the Sisters of Mercy, North Car¬

olina Medical College and Biddle University for colored students. There is also a Carnegie library. Charlotte is in a fertile agricultural and an extensive cotton growing region ; it is the trade centre for

Mecklenburg and sur¬

rounding counties, and is also the centre of the Southern cotton mill industry, having 23 mills, operating 191,266 spindles and 4,326 looms.

Within a radius of 100 miles are over 400 mills operating 5,000,000 spindles, 125,000 looms and 3,000 knitting machines. The electric plants in the vicinity supply light and power for many surrounding cities and towns. There are sev¬

eral gold mines nearby. Manufactures include cotton-milling machinery, cottonseed oil and by-products, various kinds of machinery, agri¬

cultural implements, fertilizers, pipe, hardware, brick, saddlery and harness, belting, clothing, boots and shoes, drugs, flour, cement and build¬

ing materials, scales, caskets, show cases, *etc.*

The United States census of manufactures for 1914 recorded 106 industrial establishments of factory grade, employing 4,279 persons, of whom 3,800 were wage earners, receiving an¬

nually $1,477,000 in wages. The capital in¬

vested aggregated $11,808,000, and the year's output was valued at $10,893,000: of this, $3,-

367,000 was the value added by manufacture.

There are several daily, weekly and monthly publications. There are four national and one savings banks, two trust companies and three building and loan associations with combined capitalization of $4,632,590 and deposits of $5,263,279.20. The taxable valuation is about $12,000,000. The city is divided into 11 wards.

The government under the 1907 charter is vested in a mayor and a board of aldermen of 21 members (elected for two years) and minor city officials. The waterworks is owned and operated by the municipality and there is a paid fire department. Charlotte was settled about 1750, wras incorporated in 1768 and became the county-seat in 1774. It received its city charter in 1866 and its present charter in 1907. The Mecklenburg Declaration of Independence was signed in the city in May 1775. The signers are commemorated by a monument.

During the

Revolution several bloody battles were fought in and around Charlotte. In September 1780, Lord Cornwallis entered Charlotte, and oc¬

cupied it for several davs. He referred to it as a ((hornet's nest,® and this has since been adopted as the city's emblem. Later in the year General Gates made his headquarters here.

The city was the last meeting place of the full Confederate Cabinet. (See Mecklenburg

County). Pop. (1920) 46,318.

CHARLOTTENBURG, shar-lot'ten-boorg,

Prussia, residential suburb adjoining Berlin on the west, and now practically forming part of it, on the banks of the river Spree. It is con¬

nected with Berlin by street railway, by the Stadtbahn and the Hochbahn (an elevated road). It contains a palace built for Sophia Charlotte, the first queen of Prussia, which was begun at the end of the 1 7th century. In the garden is the handsome Doric mausoleum, erected in 1810 by Gentze, containing the tombs 334

of Frederick William III and Queen Louisa, and Emperor William 1 and Empress Augusta.

The town was founded soon after. The town contains various important educational and other institutions, including a school of artillery and engineering, and a technical high school, royal academy of music, royal academy of art, physical-technical institute and a military pre¬

paratory school. The technical academy is a spacious and noteworthy building, and contains a valuable architectural museum. A splendid municipal opera-house was opened in 1912. The manufacturing

interests are important; chief among them is a porcelain factory, founded in 1761. There are also iron foundries and man¬

ufactures of machinery, glass, pottery, electrical apparatus, dyes, wagons, asphalt, woodworking machinery, beer, paper, leather and chemicals.

Pop. 305,181.

CHARLOTTESVILLE, Va., county-seat

of Albemarle County, on the Rivanna River, and on the Chesapeake and Ohio and the South¬

ern railroads, 96 miles southwest of Washing¬

ton. It is the seat of the University of Vir¬

ginia, founded by Thomas Jefferson, and of Saint Anne's School for Girls, Jefferson School, Miller's Manual Training School and the Uni¬

versity Summer School. It contains also two hospitals and two sanatoriums. Monticello, Jefferson's home, is but three miles distant, to the southeast. The city has woolen, flour, silk and planing mills, tan-bark, locust-pin and cigar factories, wine presses, etc., and is in a rich agricultural and fruit-growing region. It is a popular summer resort; has electric lights and street railways, a national bank and several daily and weekly newspapers. Settled as early as 1744, Charlottesville was chartered as a city in 1888. The government is administered by a city manager elected by the city council.. The waterworks and gas plant are owned and operated by the municipality. Pop. (1920) 10,688.

CHARLOTTETOWN, Prince Edward

Island, Canada, capital city of the province; in Queen's County at the head of Hillsborough Bay, at the confluence of three large tidal rivers, on the Prince E. I. Railway. Its fine harbor accommodates vessels of the greatest draught, and it has a large export trade. The country in the neighborhood is very fertile and the horses of the district have a wide reputation. The fisheries are extensive and important; oysters and lobsters are plentiful, and are canned and shipped in large

quantities.

Charlottetown has iron foundries, woolen mills, railway workshops, packing houses, sash fac¬

tory, starch factory, *etc.* The streets are wide, and the town well built and lighted by gas and electricity. It has good water and sewerage systems. It has fine public buildings. It has excellent public and normal schools, a business college, and is the seat of Prince of Wales Col¬

lege, Saint Dunstan's College (Roman Cath¬

olic) and a Methodist college. It is the seat of a United States consulate and the see of a Roman Catholic bishopric. Charlottetown was founded about 1750, by the French, and was called Port la Joie. It came under English rule in 1763 with the cession of Canada. In 1775 it was raided by American privateers, but the prisoners were returned and the property of the people restored by order of General Washing¬

ton. The first conference toward a federation of the Canadian provinces was held in Char¬

lottetown in 1864. Pop. 11,198.

CHARLTON, John, Canadian statesman :

b. near Caledonia, N. Y., 1827 ; d. 1910. He was educated at the Springfield Academy, went to Ontario in 1849. He was for some years a farmer and merchant and acquired a fortune in the lumber business. In 1872 he was elected to the House of Commons as a Liberal. He attracted attention through his knowledge of trade and tariff questions and advocated gov¬

ernment intervention in private and public morality. He supported the Conservative

premier during the crisis of the Riel rebellion in 1885. He secured the passage of various laws for the protection of women and girls and was an advocate of reciprocity with the United States.

CHARM, anything believed to possess some occult or supernatural

power, such as an amu¬

let, spell, etc., but properly applied to spells couched in formulas of words or verse.

Among celebrated charms the Danish Dane-brog, or national banner, stands prominent.

This banner was said to have been woven in a day and a night by three daughters of a cele¬

brated Norse chieftain, of the race of Ynglings said to be descended from the god Odin.

These girls were deeply versed in the lore of the gods, giants, dwarfs and norns, and in the centre of the banner they placed a raven, the bird of Odin, wonderfully lifelike and real¬

istic. The superstition was that the result of a battle was foretold by this raven, which if vic¬

tory was to fall to the possessors of the ban¬

ner, held its head and bill in an upright posi¬

tion. By observing this banner the Danes in three years' time had won 27 important battles, going into action only when the raven looked skyward. If the bird looked droopy and held its head low, they remained in camp, or, if in action, and the attitude of the raven suddenly changed, they withdrew from the field. Alfred, the king of the English Saxons, noting the en¬

thusiasm which this banner inspired in the Danes, determined to capture it, and succeeded after a savage battle in which the Danes fought desperately for three hours. When, however, it fell into the hands of the Saxons, and the head and wings of the raven drooped, there was a general rout. The Danes were models of courage and bravery so long as superstition fanned the fire of faith in their hearts, but they were arrant cowards the minute they realized that their idol was powerless to protect them.

Another curious charm is to be seen in the National Museum at Washington. This is a necklace of human fingers which was captured from the Sioux Indians in 1876, the loss of which brought about the

subjection of the In¬

dians. Consult Grendon, (The Anglo-Saxon Charms } (in Journal of American FolkLore, Vol. XXII, Boston 1909).

CHARMES, sharm, Francis, French

editor: b. Aurillac 1848. He was educated at the College of Aurillac and at the lycees of Clermont-Ferrand and Poitiers. In 1872-80 and 1889-1907 he was editor of the Journal des De¬

bats and from 1893 to 1907 he also edited the Revue des Deux Mondcs. He also held various public offices, . principally in the Department of Foreign Affairs, was deputy for Contal in 1881—85 and 1889-98 and senator in 1900. He was CHARMIAN — CHARPENTIER

elected to the Academy in 1908. He published (Etudes historiques et diplomatiques1 (1892) and numerous literary and political articles in his editorial capacity.

CHARMIAN, kar'mi-an, or CHARMION,

an attendant on Cleopatra in Shakespeare's (Antony and Cleopatra.1 After Cleopatra's suicide, Charmian also made away with herself.

CHARNAY, shar-na, Claude Joseph

Desire, French traveler: b. Fleurieux, 2 May 1828. In 1857-61 he traveled in Mexico in be¬

half of the French Ministry of Education; from 1863 to 1878 he went

on a number of expeditions to North and South America, Australia and other countries. In 1880 he conducted an ex¬

pedition to the ruined cities of Mexico, the ex¬

pense of which was borne by Pierre Lorillard ; and in 1886 again visited Yucatan. He has writ¬

ten (Le Mexique, souvenirs et impressions de voyage 1 ; (Les anciennes villes du nouveau monde) (trans. into English 1888) ; (Cites et mines americaines1 (1863) ; (A travers les forets vierges) (1890) ; and (Histoire de l'origine des Indiens qui habitent la nouvelle Espagne selon leurs traditions) (1903).

CHARNEL-HOUSE, a chamber or build¬

ing under or near churches, where the bones of the dead are deposited. In England the crypts of some churches were formerly used as char¬

nel-houses.

CHARNWOOD FOREST, a forest in

Leicestershire, England. It is situated on a gradual rise, the highest point of which is Bardon Hill, 900 feet high.

CHARON, ka'ron, in mythology, the son of Erebus and Night. It was his office to ferry the dead in his crazy boat over the dark waters of Acheron, over Cocytus resounding with the doleful lamentations of the dead, and finally over the Styx, dreaded even by the immortals.

The shades were each obliged to pay him an obolus, which was put, at time of the burial, into the mouth of the deceased. Those who could not pay the fare, or had been so unfor¬

tunate as to find no grave in the upper world, were compelled to wander on the desolate banks of the Acheron for 100 years, after which Charon would carry them to their final resting-place without charge. The traditions relative to Charon are posterior to the Homeric age, and it is thought that the myth was imported into Greece from

Egypt. Charon is a familiar figure in literature after the 5th century b.c. His picture often appears on the Athenian white lecythi, or vases buried with the dead. These represent him as an old man with a long beard, wearing a seaman's garb, — the short tunic and pointed hat. He stands in a skiff which he propels with a single oar. The Etruscans, on the other hand, seem to have associated him with all the horrors of death and the place which was his boat's destination, and depicted him with bestial face, pointed ears, long tusks, carrying a large hammer or snakes. The modern Greeks preserve the tradition in the figure of Charos or Charontas, the black bird or winged horseman, who carries people to the after-world. Consult Waser, (Charon, Charun, Charos1 (Berlin 1898).

CHAROST, sha-ro, Armand Joseph de

Bethune, Duke of: b. Versailles 1728; d. 27

Oct, 1800. He was a descendant of Sully, and distinguished himself on many occasions in the military service of his country. He was particularly active in the promotion of agri¬

culture and public institutions. Long before the Revolution he abolished the feudal services on his estates, and wrote against feudal institu¬

tions. He established charitable institutions in sundry parishes, provided for the support and instruction of orphans, employed physicians and midwives, founded and liberally endowed a hospital. In a year of dearth he imported grain into Calais at his own expense. In the pro¬

vincial assemblies he spoke against the corvees.

In the assembly of the notables he declared him¬

self for an equal distribution of the public burdens. During the Reign of Terror he re¬

tired to Meillant, where he was arrested, and did not obtain his liberty until after the 9th Thermidor. In the testimonies given in his behalf by the revolutionary committees he was called the father and benefactor of suffering humanity. He returned to Meillant, where he established an agricultural society. No sacrifice was too great for him, and his vast fortune was scarcely sufficient for his enterprises.

CHARPENTIER, shar-pan-te-a, Frangois

Philippe, French engraver and mechanic: b.

Blois, 3 Oct. 1734; d. there, 22 July 1817. He studied copper engraving in Paris, and invented the aquatint or nitric acid process in engrav¬

ing, and sold his secret to Count Caylus. Among his engravings by this process are (Perseus and Andromeda1 ; (The Beheading of John the Baptist1 ; (A Shepherd1 ; (The Italian Concert1 ; and (The Children's Bacchanal1 after De Witt.

On account of his invention he was given the position of royal mechanic; in this capacity he perfected the lamps of light houses and devised a number of improvements in cannon and other firearms.

CHARPENTIER,, Gustave, French com¬

poser: b. Dieuze 1860. He was a pupil of Passard and Massenet at the Paris Conserva¬

tory ; and won the grand prix de Rome in 1887.

He has written a number of songs: Napoli,1

a symphony; (La vie du poete,1 a symphonic drama produced at the Grand Opera in 1892 ; and an opera, Louise,1 the most notable of his works, produced at the Opera Comique in 1898.

For the two latter he wrote both words and music; Louise1 was produced also in Germany, England and the United States with great suc¬

cess. Three other operas are ˆarie,1

ˆrphee,1 <Tete rouge.1 Charpentier was

elected to the First Academy of Fine Arts in 1912.

CHARPENTIER, Johann Friedrich Wil¬

helm Toussaint, German mining engineer: b.

Dresden, 24 June 1738; d. Freiberg, 27 July 1805. He studied law and mathematics at Leip¬

zig, then took a position as instructor in mathe¬

matics at the mining school of Freiberg, where he devoted himself to the study of mining methods. He investigated the improved process of amalgamation used in Hungary and intro¬

duced it in Germany, besides furthering a number of other improvements. He wrote

(Mineralogische Geographic des kursachsischen Landes1 (1778); (Beobachtungen fiber die Lagerstatten der Erze hauptsachlech aus den sachsischen Gebirgen1 (1799) ; (Beitrage zur geognostischen Kenntnis des Riesengebirges schlesischen Anteils1 (1804).

CHARPENTIER, Louis Eugene, French

painter: b. Paris, 1 June 1811; d. 7 Dec. 1890.

He was a pupil of Gerard and Cogniet, and was professor of design at the Lycee at Versailles for over 20 years. He was best known as a military painter. His first picture of importance was (Bivouac of the Cuirassiers } ; among other of his works are (Halt of the French Army on the Saint Bernard) ; (Battle of Tchernaia) ; Hmperial Guard of Magenta* ; (Retreat from Inkermann) ; (Wellington in Spain* ; (Charge of Cuirassiers at Waterloo.*

CHARPENTIER, Marc Antoine, French

composer: b. Paris 1634; d. there March 1704.

He went to Rome with the intention of study¬

ing painting, but turned his attention to music and became a pupil of Carissimi. Returning to Paris he held the position of chapelmaster at several places, finally at the Sainte Chapelle.

He was the most prominent rival of Lully. He wrote two operas, (Acis et Galathee* (1678) and <Medee* (1693). He wrote 18 oratorios. One of these <Le reniement de Saint Pierre,* was re¬

produced at Paris in 1903. His other works include 8 masses, 30 psalms, 60 cantatas, numerous smaller sacred compositions and some instrumental pieces.

CHARPIE, shar-pe. See Lint.

CHARQUI, char'ke, a term applied in Peru and adjoining countries to sun dried meat. In the pre-Columbian days the Incas of Peru held a grand hunt (Quichua chacu) once every four years in each royal district of the empire.

Often as many as 30,000 Indians were employed to surround the hunting grounds and to drive the guanacos and other wild animals in upon one another, when they were captured or killed.

The flesh of the slaughtered animals was sun dried and divided out among the Indians. The guanacos and other llamas were shorn of their wool which was also given to the Indians to be used for making garments, while the very fine wool of the vicunas was reserved for the use of the royal family and the temples. From the word Charqui comes the expression <(jerked beef.®

CHARRAS, shar-ra', Jean Baptiste

Adolphe, a French republican soldier and statesman: b. Pfalzburg, Lorraine, 7 June 1810; d. Basel, Switzerland, 23 Jan. 1865. He took part in the revolution of 1830, was promoted in 1833 to the rank of lieutenant, wrote a series of able articles in the National on military affairs, which gave umbrage to the government and caused him to be sent to Algeria; distin¬

guished himself there on the battlefield as well as in the training of native troops and the colonization of the country. After the revolu¬

tion of 1848 he became under-secretary of state and representative for the department of Puy de Dome. He was one of the victims of the coup d'etat of 2 Dec. 1851, and was transported to Belgium in 1852, but expelled from that country in November 1854, at the request of Louis Napoleon, whom Charras had denounced on many occasions, but most effectively in a letter of which 50,000 copies were printed in Belgium alone. A remarkable work from his pen, (Histoire de la campagne de 1815, > ap¬

peared in 1857; and then, (Waterloo* (1853), and an incomplete (Histoire de la guerre de 1813 J (1866).

CHARRAS, charTas or chur'ras, a resinous substance which exudes from the Indian hemp and is collected for use as a narcotic or intoxi¬

cant, forming a considerable article of trade in Asia. See Hemp.

CHARRIˆRE, shar-re-ar, Madame St.

Hyacinthe de, French authoress, well known under the assumed name of the Abbe de la Tour: b. Utrecht about 1740; d. 20 Dec. 1805.

In early life she became a maid of honor at the court of the Stadtholder. Her affection for her brother's tutor, M. de Charriere, a worthy but decayed Swiss nobleman, led her to forego her rank and family, and shortly after her marriage she retired with him to a small property at Neuchatel. Her lively tempera¬

ment was ill suited for the monotony of a rustic life, and accordingly seeking amusement in literary recreations she soon acquired a con¬

siderable reputation. Having lost the greater part of her fortune in the French Revolution, she reduced her expenditure to the lowest pos¬

sible amount, that she might be able to con¬

tinue her various acts of benevolence. Her works belong chiefly to the class of light litera¬

ture. Among others may be mentioned (Les trois femmes) ; and the

favorite dramas of (Le toi et le vous) ; <L'Emigre) ; (L'Enfant gate* ; and (Comment le nomme-t-onj (Lettres

neuchateloises* (1784) ; (Calliste, ou lettres ecrites de Lausanne) (1788), her masterpiece.

All these productions not only display much wit, truth and powerful description, but also breathe a spirit of philosophy, and have a strong moral tendency. Most of them were translated into German by her friend Herder.

Her friendship with Madame de Stael and Benjamin Constant brought her into promi¬

nence in the literary world.

CHARRON, sha-ron, Pierre, French

preacher and writer: b. Paris 1541; d. 16 Nov.

1603. He studied law at Orleans and Bourges, and had practised for six years as a parlia¬

mentary advocate when he turned his attention to theology, and gained so much fame by his sermons that he was presented in rapid succes¬

sion with several benefices in Gascogny and Languedoc, and appointed court chaplain to Queen Margaret. In 1588 he returned to Paris with the view of fulfilling a vow he had made to enter the Carthusian order, but owing to his age the prior of the order refused him ad¬

mission, and the Celestines also declining to receive him, he continued a secular priest. In 1589 he went to Bordeaux and became very intimate with Montaigne, whom he tried to imitate, though he failed to catch his ease of style, and original, piquant wit. His principal works are (Traite des trois verites,* and (Traite de la sagesse.* The Roman Catholic zeal of the former drew down upon him the rebuke of Duplessis-Mornay ; and the extreme liberalism of the latter exposed him to a charge of atheism, the treatise being condemned both by Parliament and the University. Consult Leibscher, (Charron und sein Werk: De la sagesse) (Leipzig 1890) ; and Vinet, (Moralistes des 16e et l7e siecles* (1904).

CHART, a representation of a portion of the earth's surface projected on a plane. The term is commonly restricted to those intended for navigators' use, on which merely the out¬

lines of coasts, islands, etc., are represented.

A globular chart is a chart constructed on globular projection. Mercator's chart is a chart on the projection of Mercator. A plane chart is. a representation of some part of the superficies of the earth, in which the spherical form is disregarded, the meridians are drawn parallel, the parallels of latitude at equal dis¬

tances and the degrees of latitude and longi¬

tude equal. A selenographical chart is a chart representing the surface of the moon ; and a topographical chart is a chart of a particular place, or of a small part of the earth.

Charts are designed to assist the navigator and to subserve the interests of commerce. For purposes of navigation they may embrace large areas, like one of the great oceans or seas, delineating the conformation of the shores and outlying dangers, and perhaps indicating the principal currents and winds that may be util¬

ized in determining the most advantageous routes between specified localities. Charts may also embrace much smaller areas, but on larger scales, permitting greater fullness of detail, and thus presenting graphically the channels that can be tollowed, with the depths of water, the position of lights, beacons, spindles, buoys and other objects provided to indicate the way to the stranger. Charts of these classes are usu¬

ally designated ((Navigation charts,® although they may also be

useful for other purposes.

Nearly all civilized nations have published charts of their coast lines in greater or less detail, and the principal maritime nations copy, those issued by other nations, and thus maintain for the use of their own seamen charts of all parts of the world to which their commerce may extend. Great Britain maintains the most extensive establishment for the purpose, and issues the most complete series of charts ; she has also made the most extensive surveys of unsettled coasts for cartographic purposes.

The United States Coast Survey, a vast un¬

dertaking, was begun in 1807, carried on inter¬

mittently till 1845, and since then more system¬

atically, save during the Civil War, under Professor Bache, Professor Pierce and their successors. The coasts of the United States are surveyed and the charts produced by the Coast and Geodetic Survey attached to the Treasury Department, which also makes re¬

searches to determine the origin and courses of the Gulf Stream (q.v.). Unsurveyed foreign coasts and the Great Lakes are surveyed by the Bureau of Navigation, the charts being pro¬

duced by the Hydrographic Office of the Navy Department. This bureau also duplicates charts and plans issued by other nations. The Coast and Geodetic charts are sold at from 10 cents to $1 each, being the cost of printing and paper. Naval vessels are supplied free. The charts are obtainable at Coast and Geodetic Survey agencies at all seaports of the United States. They exhibit accurate and minute topography as far inland as will supply land¬

marks for the navigator or serve for purposes of defense ; the shore line at high water, and sanding to mean low water; soundings, con¬

tours and material of bottom at different depths ; bars, channels, sailing ranges and di¬

rections ; true meridian and compass variation ; rocks, reefs, buoys, beacons,, lights; tide estab¬

lishment ; detailed explanation of lighthouses and signal stations. They are carefully cor¬

rected for every substantial change in any of VOL. 6 — 22

those features. They range in scale from gToff (30.401 inches to the nautical mile) to TTobowo (tt&o of an inch to the nautical mile). The Coast and Geodetic Survey issues four series of charts on the Atlantic and Gulf coasts of the United States, and three series on the Pacific Coast, designed to subserve the purposes the surveys were established to meet.

The first series includes “sailing charts,® which embrace long stretches of coast, as from the Bay of Fundy to Cape Hatteras, Chesapeake Bay to the Bahamas, etc., and are intended to serve for offshore navigation, or between the greater headlands, as Cape Cod, Cape Hatteras, etc., and between distant harbors, as Boston to Chesapeake Bay, Charleston, *etc.* They show only the outline of the continent, the seacoast lights and geographic information that will be useful for the purposes intended. The second series includes “general charts of the coast,®

also designed for purposes of navigation. They are on a scale three times as large as that of the first series, and embrace more limited areas, as the Gulf of Maine, Gay Head to Cape Henlo-pen, Galveston to the Rio Grande, *etc.* These charts serve the navigator in coasting along¬

shore between headlands, and in approaching harbors. Those of the third series, called “coast charts,® embrace the whole coast on a uniform scale five times as large as that of the second series. Such charts are necessarily con¬

fined to comparatively short stretches of coast, as Sandy Hook to Barnegat, the entrance to Chesapeake Bay, Mobile Bay, *etc.* One inch on the paper represents about one and *one-fourth statute miles, a scale sufficiently large to give the features of the topography and hydrog¬

raphy with great clearness, portraying the ap¬

pearance of the coast and the irregularities of the bottom with a detail quite close enough for the navigation of the principal harbors.

The fourth series consists of ((harbor charts®

on large scales, intended to meet the needs of local navigation. On the Pacific Coast the first series is similar to that on the Atlantic Coast, and extends from San Diego, Cal., to Point Barrow, Alaska. The second series is on a scale six times as large as the first, and is suit¬

able for alongshore navigation and inland pas¬

sages of southeast Alaska. The third series includes charts on scales like those of the fourth series on the Atlantic Coast.

All these series of charts are published from the same original surveys, the details of the original work being generalized or omitted to meet the requirements any particular series is intended to subserve. Various methods are available for producing charts of these classes, but experience has demonstrated that on coasts like large portions of those of the United States, which are subject to frequent changes from natural causes, necessitating ex¬

tensive corrections, engravings upon copper are the most expedient and economical. The engravings afford the additional advantage of being readily duplicated by the electrotyping process. All the standard charts issued by the bureau are therefore copperplate engravings.

Preliminary editions, however, are frequently issued by means of the photo-lithographic process, which affords a cheap and ready method for temporary purposes.

The Survey publishes about 500 charts, with an average annual issue of 70,000 copies.

CHARTA, Magna. See Magna Chart a.

CHARTE, shiirt, a term originally used to indicate the rights and privileges granted by the French kings to various towns and com¬

munities. One of the bureaus of archives of France is the Tresor des Chartes. The old charte setting forth the rights granted to the Normans by Louis X (1314-15) is still pre¬

served under the title Charte Normand aux Normands. The first such charter in France is known as the Grande Charte, or the Charter of King John (1355). At present by the Charte is meant the fundamental law of the French monarchy, as established on the res¬

toration of Louis XVIII in 1814. As is well known, it was the violation of an article of the Charte by the ministers of Charles X that led to the revolution of 1830, the expulsion of that monarch from the throne and the accession of Louis Philippe, who, on 29 Aug. 1830, swore to a new charter, sensibly modifying that of 1814 in a liberal sense. After 18 years' sway, Louis Philippe was himself expelled from France, 24 Feb. 1848, and therewith the Charte which he was called to support was canceled.

Consult Floquet, (Charte aux Normands, avec ses confirmations } (Caen 1788).

CHARTER, a document by which a su¬

perior power grants permanent or continuing rights and privileges to an inferior, either a person or persons, corporation or institution, colony, municipality, *etc.* Originally it had the broader sense, now obsolete, of a conveyance of land. -The mediaeval charters ranged from a grant of political rights by a sovereign to an entire people — like the Great Charter of Eng¬

land or the Golden Bull of Hungary, or colo¬

nial instruments of government conferring the broadest rights of

sovereignty — down to per¬

missive acts for abbeys and colleges or trading companies, or confirmations of rights already given (called confirmatory charters). The first-named class in modern usage is called a constitution. Thus, the agreements by which recent monarchs have deprived themselves or been deprived of absolute power and shared it with their people, as with Austria in 1866, Japan in 1868, etc., are essentially the same as Magna Charta. Charters in present usage are restricted to municipalities, corporations and institutions.

The charters for the American colonies

were usually distinguished from ((patents)) by granting specific privileges of jurisdiction and legislation, and in general the powers needed to establish and continue a self-regulating com¬

munity, instead of mere general grants of land and rights of settlement ; but the two were often loosely used as interchangeable. Thus, in the acknowledgment of receipt of their char¬

ter in 1662, the Connecticut officials acknowl¬

edge also the (<old charter, » meaning the War¬

wick Patent. Strictly, they were all patents, as granted by the king under letters patent; but in use, only the grants to individuals were commonly termed patents, the word charter being reserved for those to companies and col¬

onies already established. Of these three spe¬

cies, the first includes the patents to Lord Bal¬

timore for Maryland in 1632, to Gorges for Maine in 1639, to the Duke of York (after¬

ward James II) for New York in 1664 and to William Penn for Pennsylvania in 1681. The CHARTER

second comprises those to the Virginia Com¬

pany in 1606, 1609 and 1612, the Plymouth and London companies in

1606, the Council for New England in 1620, the Massachusetts Bay Company in 1629, the proprietors of Carolina (1663) and Georgia (1732). The third has the two exemplars of Rhode Island (1643, con¬

firmed 1663) and Connecticut (1662) : instru¬

ments of such complete self-government that those States made no change at the Revolution, the former living under its 17th-century char¬

ter till 1818 and the latter till it was forced to change it by the Dorr rebellion in 1842. The legal nature and implications of these docu¬

ments were keenly disputed in the age when their interpretation was vital, and have been argued with scarcely less heat for historical reasons since. According to the English view, they were concessions granted by the govern¬

ment for political reasons and revocable at its pleasure for the same reasons ; the title to the lands as well as to the political privileges lay with the government, and its right to vacate either was limited only by policy; and charter governments had only such powers as were specifically given them in the charters. James II put some of these theories in practice in the union of New England in 1685 and others were acted upon generally. On the other hand the colonial view was set forth by Jeremiah Dummer in his 'Defense of the Charters* (1728) ; at least it was widely adopted. It was, that the charters were compacts between the gov¬

ernment and the colonies, in consideration of the latter having cleared and taken possession of the territory and annexed it to the Crown ; and that the Crown possessed only political rights there, the land title being derived from purchase and occupation and their own cour¬

age and labor. As to the powers of the char¬

ter governments, Judge Story holds that they possessed full sovereignty and power of legis¬

lation and taxation, subject only to not con¬

tradicting the laws of the mother country. The truth is that neither side had any very definite views on the matter at the outset and both de¬

veloped antagonistic ones under the stress of interest.

In the United States, charters (special or general) are granted by acts of the several State legislatures or by the national govern¬

ment. Thus, the National Banking Act, and the general railroad acts of most States prescribe the conditions under which corporations of those classes may organize without special per¬

mission and their articles of association are their charter. The act by which a county . or township is set off as an administrative divi¬

sion of a State is not termed a charter. On the other hand, that by which a municipality is organized, as a city or borough, is always so termed; but it has the vital distinction from a private charter that it is not a contract ; the municipality has no vested rights, being a mere governmental agency and convenience ; and the charter can be altered or repealed at any time by the legislature. A private charter, on the other hand, is a contract which cannot be re¬

pealed or modified by the public power unless such liberty has been expressly reserved in the charter itself. (See Corporations, Legal; Dartmouth College Case). Consult Cooley, (General Principles of Constitutional Law in CHARTER OAK

the United States) ; Dicey, <Letters Introduc¬

tory to the Study of the Law of the English Constitution > (5th ed., London 1912) ; Mac¬

Donald, (Select Charters of American His¬

tory, 1606— 1 775 J (New York 1904).

CHARTER OAK, a tree nearly seven feet

in diameter, formerly in Hartford, Conn., it blew down in a storm, 21 Aug. 1856 when its age was computed to be nearly a thousand years. A section of its trunk was preserved in the rooms of the Connecticut

Historical So¬

ciety ; the remainder — currently believed to rival in miraculous powers of reproduction the loaves and fishes or the Mayflower furniture —was kept or sold for small souvenirs. It is thus venerated from a tradition, first accredited to it in 1789, that in a hollow of it was concealed the charter of Connecticut rescued from Andros in 1687 ; earlier ones specify an elm, others the houses of different persons. This is of little moment; but the adventures of the charter form a mystery which the latest investigations, instead of illuminating, render utterly insoluble.

The contradiction of unquestionable facts is absolute. The story without these is sufficiently peculiar. James II, wishing to make Connecti¬

cut a part of his consolidated New England under Andros (q.v.), found its charter in the way; and as the colony declined to surrender it he brought writs of quo warranto to vacate it, the last of which was returnable in February 1687. To delay or avoid voluntary surrender, yet escape forfeiture and entire outlawry of rights, they replied that they would much rather stay as they were, but if they could not, preferred a provincial union under Andros over annexation to any other province. The council chose to consider this a formal waiver of char¬

ter rights, and dropped proceedings under the writ; and on 31 Oct. 1687 Andros rode over from Norwich to Hartford, under orders to assume the government. Calling the governor and council together, he demanded surrender of the charter according to their dutiful assurances.

The meeting was secret ; what happened we learn only from tradition and the brief account of a later intimate of the actors. The colonial officials protested and debated till after dark; that this was prearranged is not only morally certain in itself, but Trumbull's account of a long speech by the governor, to no conceivable purpose otherwise, deepens the certainty. Can¬

dles were lighted; the charter was (or the char¬

ters were) at last brought in and laid on the table; suddenly some officious candle-snuffers put out all the lights, and when they were relighted no charter was to be seen. But if Andros had no longer a charter to suppress, equally the colony had no longer one to appeal to;

the old government was just as effectually extinguished as if they had let him have the paper ; they cannot have foreseen a revolution in England, and it is not evident what they intended to do with it. Most likely, from their previous actions, it was merely to save their Mace® from the humiliation of a formal sur¬

render. There was no outcry by Andros, no charge made against the officials, no appearance of ill-will to them, no report of the affair to England, seemingly no disclosure of it to the train of Massachusetts magnates who accom¬

panied him (and may or may not have attended the meeting), or to any one else; and (perhaps the most curious of all the circumstances of this curious affair) both our informant and tradition stop short at the relighted candles and the missing document, and give no hint what Andros said or if he said anything, or whether he seemed puzzled or offended, or any of the immediate sequelae of the business. The gov¬

ernor (Treat) had called a meeting of the General Court, which accepted the situation and the annexation ; the secretary inscribed it on the colonial records and wrote ((Finis® on them ; and the next day Andros publicly pro¬

claimed his commission. When James was

overthrown and Andros with him, the colony resumed its government, appealed to its charter brought from hiding, and the English authori¬

ties admitted without trial that it had never been vacated. But that was chance and not foresight. This, however, is only the beginning of mystery. The charter, obtained by Gov.

John Winthrop from Charles II's council in April 1662, was engrossed in duplicate, and the official fees are entered on the English records.

No other copies were made, nor could have been unless both the others were lost ; and neither was lost. The first copy was sent to the colonial government, which acknowledged re¬

ceipt of ((the charter, the duplicate and the old copy of the former charter® (that is, the War¬

wick Patent). Duplicate of what? It is usually assumed to mean of the charter; but the facts to be cited prove that it was of the patent.

Winthrop was to bring over the duplicate of the charter with him and

a legislative com¬

mittee was appointed to receive it from him.

That he did not is conclusively shown by a letter from the colony to its agent, William Whiting, in 1686, instructing him to obtain it from James Porter in London, with whom Winthrop had left it, and use it in defending the colony's rights before the council. That Winthrop may have taken it across once more on official business, and left it there, is barred out by the fact that he never visited England again. That Whiting sent it back within the next year is equally negatived by the fact that he continued to need it there and the colony did not need it at all, that he would not have sent it without orders and they gave him no such orders, and that in his correspondence there is no letter of transmittal. Furthermore, a legislative committee of 1715 voted a money acknowledgment to Joseph Wadsworth for

safely preserving the (<Duplicate Charter® when <(our constitution was struck at.® It is absurd to suppose they made him the grant for pre¬

serving a second copy when they had one safe already. Obviously, the one he preserved was the only one they had. On the other hand, Roger Wolcott, the first narrator (1759), dis¬

tinctly says that ((the charters were set on the table,® and that when the candles were relighted the charters were gone. Still more specifically, President Stiles of Yale writes in his (Itin¬

erary, > as from Wolcott, that Nathan Stanley took one copy and Governor Talcott's father the other. Wolcott was only eight at the time ; but by 1714 he was in the council, in 1715 was on the very committee which made the grant to Wadsworth, and was certainly intimate with many who were present at the scene and prob¬

ably helped arrange it. We have, then, the cer¬

tain fact that there was but one copy of the charter in America in 1687, set against the positive assertion of one who must have known,

that two were abstracted. Still a third mystery is, that Wadsworth was not present at the meet¬

ing and could not have taken the paper ; that Wolcott, who publicly honored Wadsworth as the savior of the charter, privately gives all the credit to others and does not even mention Wadsworth, and that the names he cites are really those of members present; and that if one of the actual abstracters passed it to Wads¬

worth waiting outside, he and not they should receive the public acknowledgment. The writer can guess at solutions to these problems, but all solutions are guesses alike.

Albert C. Bates,

Librarian Connecticut Historical Society.

CHARTER-PARTY, a contract executed

by the freighter and the master or owner of a ship, containing the terms upon which the ship is hired to freight. The masters and owners usually bind themselves, the ship, tackle and furniture, that the goods freighted shall be de¬

livered (dangers of the sea excepted) well-conditioned at the place of the discharge ; and they also covenant to equip the ship complete and adequate to the voyage. The charterer is bound to furnish the cargo at the place of lading and to take delivery at the port of dis¬

charge within specified periods called lay days ; and penalties are annexed to enforce the re¬

ciprocal covenants. Consult Scrutton, Con¬

tracts of Affreightment as Expressed ip Charter Parties and Bills of Lading1 (4th ed., London 1899).

CHARTERHOUSE, a celebrated school

and charitable foundation in London, England.

In 1370 Sir Walter Manny and Northbprgh, bishop of London, built and endowed it as a priory for Carthusian monks (hence the name, a corruption of Chartreuse , the celebrated Carthusian convent). After the dissolution of the monasteries it passed through several hands till it came into the possession of Thomas Sutton, who, in 1611, converted it into a hos¬

pital, richly endowed, consisting of a master, preacher, head schoolmaster, with 40 boys and 80 indigent gentlemen, together with a physician and other officers and servants of the house.

Each boy is educated at a certain expense and each pensioner receives food, clothing, lodging and an allowance of about $150 a year. The pensioners, <(poor brethren, 11 must be over 50

years of age and members of the Church of England. The Charterhouse School was re¬

moved to new buildings near Godaiming, in Surrey, in 1872, the premises sold to the Mer¬

chant Taylors' School, a fine range of build¬

ings being erected on the site. The non-academic department of the Charterhouse still remains in the old buildings. The special garb • of the scholars has been discarded, and Char¬

terhouse is one of the great public schools of England. Several of the famous men who have received their education at the Charterhouse are Isaac Barrow, Addison, Steele, John Wesley, Blackstone, Grote, Thirlwall, Havelock, John Leech and Thackeray. Charterhouse, and one of its <(poor brethren,11 Colonel Newcome, has been immortalized by Thackeray in (The Newcomes.1 Consult Brown, Haig, (The Char¬

terhouse, Past and Present1 (London 1879) ; Taylor, W. F., (The Charterhouse of London1

(London 1912).

CHARTERIS, Archibald Hamilton, Scot¬

tish clergyman and educator: b. Wamphray 1835 ; d. Edinburgh, 25 April 1908. He re¬

ceived his education at Edinburgh, Tubingen and Bonn, and in 1863 became pastor of the Park Parish, Glasgow. From 1868 to 1898 he was professor of Biblical criticism at Edinburgh, and in the latter year became professor emeritus.

In 1892 he was moderator of the General As¬

sembly of the Church of Scotland. He was appointed chaplain in ordinary to the king in 1901. He published (Life of James Robertson1

(1863) ; ˆanonicity1 (1881) , (New Testament Christian Scriptures1 : (A Faithful Churchman1

(1897) and (The Church of Christ1 (1905).

CHARTERS TOWERS, Australia, a min¬

ing township of Queensland, on the northern spurs of the Towers Mountain, 820 miles north¬

west of Brisbane. The place was first settled in 1871-72, when gold was discovered there. In 1877 it was incorporated as a town. Now it has railway connection with the coast by means of a railroad to Townsville. Pop. 15,037.

CHARTIER, shar-te-a, Alain, French poet

and moralist : b. Bayeux about 1392 ; d. about 1440. He was educated at the University of Paris, and was appointed by Charles VI clerk, notary and secretary of the royal household —posts which he held under Charles VII. His contemporaries considered him the father of French eloquence. Although far from hand¬

some it is said that he received one dav while asleep a kiss from Margaret of Scotland, wife of the Dauphin, who explained her conduct to the surprised bystanders by saying that it was not the man she kissed, but the mouth whence flowed so many golden words. His poems are often graceful and nervous, and his vigorous prose contains many fine thoughts and prudent maxims. The subjects of his poems

are mainly lovers' quarrels. However his (Livre des quatre dames1 and (Le quadrilogue invectif1

(1422) are filled with fine patriotic ardor. His works were edited by A. Duchesne (Paris 1617).

Consult Delaunay, (Etude sur Alain Chartier1

with extracts from his writings (Paris 1876), and Joret-Desclosieres, (Alain Chartier1 (1897).

CHARTISM, a working-class movement in

England, 1838ˆ18, the primary purpose of which was the attainment of certain political reforms.

The Reform Bill of 1832 had failed to bring the expected advantages to the working class ; the new poor law of 1835 wras unpopular ; and a period of general commercial depression and a succession of bad harvests had increased the sufferings of the neople. The discontent result¬

ing found definite expression in the ˆCharter11

or (<People's Charter11 prepared in 1838 by a committee of six members of Parliament and six workingmen. It comprised six heads; (1) Universal suffrage, or a right of voting conferred on every male of 21 years of age, of sound mind, unconvicted of crime, and a native of the United Kingdom, as well as to every for¬

eigner possessing the same qualifications, who had been resident in the United Kingdom for more than two years; (2) equal electoral dis¬

tricts; (3) vote by ballot; (4) annual Parlia¬

ments; (5) no other qualification to be neces¬

sary for members of Parliament than the choice of the electors ; (6) members of Parliament to be paid for their services. (Of the above six

demands, Nos. 3, 5 and 6 are now embodied by statute).

At first a portion of the middle class sup¬

ported the movement, but they became

estranged, and the Chartists became more and more a distinctively working-class party. The movement w~as not purely political; it was of a distinctively social nature — a ((knife-and-fork question® ■ — and aimed at the improvement of general social conditions. Stephens, one of the leaders, is quoted as saying: (<Chartism is no political movement where the main point is gaining the ballot… . The Charter means a good house, good food, prosperity, and shorter working hours.® Immense meetings were held throughout the country, numbering sometimes upward of 200,000, and popular ex¬

citement was great. Physical force was ad¬

vocated by some as the only effectual means for the masses to obtain their demands. An asso¬

ciation called the National Convention was em¬

bodied, and commenced its sittings in Birming¬

ham in May 1839. In June of the same year a monster petition in favor of the charter, pur¬

porting to be signed by 1,280,000 persons, was presented to the House of Commons, which refused to take it into consideration. The feel¬

ing of exasperation among the Chartists in¬

creased, and in November a riot took place at Newport, in which 10 persons were killed and great numbers wounded. The year 1842 was the time of the most excitement; great riots took place in the northern and midland districts of England, and these, though not directly caused by the Chartists, were more or less con¬

nected with the movement, and the party was blamed for them. In 1848 a great demonstra¬

tion was planned in London, but the precautions taken by the government in enrolling special constables and making other preparations for defense frightened the leaders and the demon¬

stration was shorn of its imposing nature.

From that year dates the decline of the move¬

ment; the repeal of the Corn Laws — which the Chartists opposed as likely to benefit only the middle classes — and the great expansion of trade following on that measure reacted favor¬

ably on the condition of the workers and stilled social tumult.

Bibliography. — McCarthy, (History of Our Own Times'; Carlyle, (Chartism } ; Gammage, (History of the Chartist Movement' ; Engels, (Condition of the Working Class in England in 1844) ; Hyndman, (Historical Basis of Social¬

ism in England'; Kingsley's (Alton Locke'; and the autobiography of Thomas Cooper, one of the leaders (London 1880).

CHARTRAN, shar-tran, Theobald, French

painter: b. Besangon, 21 Jan. 1849; d. 16 July 1907. He studied under Cabanel, and obtained the grand prix de Rome in 1877. He painted mostly historical pictures or portraits ; among his works are <The Body of Monseigneur Dar-boy lying in state in the Palace of the Arch¬

bishop of Paris' ; (Angelica and Roger' ; (Vision of Saint Francis of Assisi,' museum, Carcassonne; < Capture of Rome by the Gauls' ; and several portraits, of which the best are those of Mounet-Sullv as Hamlet, Sadi Carnot and Leo XIII. Later he spent a few months of each year in New York citv and numbered among his sitters President Roosevelt, Presi¬

dent McKinley, Admiral Dewey, Andrew Car¬

negie and Cardinal Gibbons. His (Signing of the Peace Protocol at Washington,' an episode of the Spanish-American War, was presented

to the United States government by Mr. H. C.

Frick of Pittsburgh. Consult Martin, Jules, (Nos peintres et sculpteurs' (Paris 1897).

CHARTRES, shartr, Robert Philippe

Louis Eugene Ferdinand D'Orleans, Due de, grandson of Louis Philippe: b. Paris, 9 Nov.

1840. When only two years old he lost his father and six years later the Revolution drove him along with his family into exile. The young duke was brought up in England and joined the Union army in the first campaign of the American Civil War in 1862. He married, 11 June 1863, Frangoise Marie Amelie d'Orleans, eldest daughter of the Prince de Joinville.

After the revolution of 4 Sept. 1870 in France, he served for two years in General Chanzy's army under the pseudonym of <(Robert le Fort,"

and before the close of the war had risen successively to the ranks of captain and chief of squadron. He became chief of squadron in the Chasseurs d'Afrique, under his own name, was appointed colonel in 1878, but in 1883 was suspended from the active service. In 1886 his name was stricken from the army list by a law excluding members of royal families from serv¬

ing in the army or navy. He published Souve¬

nirs de voyages' (1869).

CHARTRES, shartr (anciently Autricum,

Civitas Carnutum), France, capital of the de¬

partment Eure-et-Loire, 49 miles southwest of Paris, situated on the slope of a hill, at the foot of which flows the Eure, and partly enclosed by walls and ditches, surrounded by ramparts planted with trees, which form an agreeable promenade. Most of the houses are built of wood and plaster and have their gables toward the street. The streets of the lower town are narrow and crooked, and so steep in some parts as to be inaccessible to carriages. There are several public squares, one

of which is of great extent. The only public buildings of note are the cathedral, the church of Saint Pierre, contiguous to a huge barrack, once a Benedic¬

tine abbey, and the obelisk to the memory of General Marceau. The cathedral, one of the most magnificent in Europe, is rendered con¬

spicuous by its two spires, one of which is 413

feet high, surmounting the hill on which the city stands. It has 130 windows filled with painted glass of admirable workmanship; and in its chair Henry IV was crowned in 1594. It is also famous for its sculptures. Chartres is the seat of a bishopric, communal college, sem¬

inary and agricultural society, and has two hospitals, a cabinet of natural history, botanical garden and a public library of 127,409 printed volumes. Toward the end of the 11th century it was fortified, and in 1145 Saint Bernard preached, in its cathedral, the second crusade.

Chartres has manufactures of woolens, hosiery and leather and is the great cattle and grain market of the fertile plain of Beauce and the department. It has a chamber of commerce and a branch of the Bank of France. It was taken by the English in 1417 and recovered in 1432. In 1870 it was occupied by the Germans and formed their base of operations against the army of the Loire. Pop. (1911) 24,103. Con¬

sult Plerval, (Chartres, sa cathedrale, ses mon¬

uments' (1896); Adams, (Mont Saint Michel and Chartres' (Boston 1913).

CHARTREUSE, shar-trez, the French

term for a Carthusian monastery, correspond¬

ing to the Italian Certosa. The order of the Carthusians (q.v.) was most

rigorous in its rules, though each monk was allowed a decent cell and a garden of his own, so that the mon¬

asteries had often architectural character. The famous monastery called La Grande Chartreuse is the original and supreme monastery of the order, and exists in the mountains not far from Grenoble in eastern France. Of the monastic buildings still existing, none is architecturally noble, and nearly all are of date later than the middle of the 17th century. Therefore it does not rank with the great showplaces of monasticism for the grandeur and splendor of its buildings, but has ever attracted travelers, curi¬

ous or serious, as being the home of the most authentic exemplars of primitive monasticism in its rigor. At the Revolution the whole es¬

tablishment was confiscated, the monks driven out and secularized or banished. But in 1816

the order of Carthusians was permitted again to occupy the buildings, as tenants of the state, at a nominal rent. They were again expelled from their ancient home by the government of the French republic in 1903 under the laws for suppression of religious houses. When the monks were this time dispossessed the entire rural population of the vicinity, who had all their lives experienced the large, wise benefi¬

cence of the monks in supporting the local hos¬

pitals, schools, churches and the like, would have defended their benefactors against the power of the government had not the Carthu¬

sians counseled patience and forbearance. Till this second ejection from their home the monks used to derive a revenue from the sale of cer¬

tain medicinal agents prepared in their labora¬

tories which enjoyed a high reputation; in par¬

ticular the cordial liqueur Chartreuse. The other preparations were an elixir and a salve.

CHARTULARY, kar’tu-la-ri, a collection

of charters. When any body, ecclesiastical or secular, came to be

possessed of a considerable number of charters, it was customary for convenience and safety to have them classified and copied into a book or roll. Such book or roll has generally received the name of a Chartulary. Mabillon traces chartularies in France as far back as the 10th century, and some authorities say that chartularies were compiled even still earlier; but it was not till the 12th and 13th centuries that chartularies became common. They were kept by all kinds of re¬

ligious and civil corporations, but also by pri¬

vate families. Many of them have been printed and their contents generally are of the great¬

est value in historical, archaeological and gene¬

alogical inquiries. The name is in Scotland applied to the record of feu-charters kept by the superior's law-agent. Copies of valuable historical documents, whose originals have been lost, have been found in Chartularies. Some interesting English reprints are made in Grass, 'Sources and Literature of English History 5

(London 1900).

CHARYBDIS. See Scylla and Charyb-

DIS.

CHASE, Frederic Henry, English Biblical

scholar and prelate: b. 21 Feb. 1853. He was educated at Christ's College, Cambridge, and took orders in the English Church. He was lecturer in theology at Pembroke College 1881—90, and at Christ's College 1893-1901 ; principal of the Clergy Training School at Cambridge from 1887-91 ; Norrisian professor of divinity and president of Queen's College, 1901-05 ; and from the latter year bishop of Ely. He has published 'Chrysostom5 (1887) ; 'The Lord's Prayer in the Early Church) (1891); 'Old Syriac Element in Codex Bezse' (1895) ; 'Syro-Latin Text of the Gospel5 (1897) ; 'Credibility of the Book of the Acts) (1901) ; /Essays on the Gospels) (1905); Confirmation in the Apostolic Age5 (1909).

CHASE, Frederick Lincoln, American

astronomer: b. Boulder, Colo., 28 June 1865.

He was graduated at the University of Colo¬

rado in 1886 and at Yale in 1891. From 1891

to 1911 he was assistant astronomer and in 1910—13 acting director of the Yale Observa¬

tory. He wrote ‘Heliometer Triangulation of the Victoria Comparison Stars) in Annals of the Cape Observatory (1897) ; ‘Triangulation of the Principal Stars of the Cluster in Coma Berenices) (1896); ‘Parallax Investigations on 163 Stars mainly of large Properˆ Motion) (1906) ; ‘Parallax Investigations on 35 Selected Stars5 (1910) ; ‘Catalogue of Yale Parallax Results) (Vol. II, pt. 4, 1912), and miscellane¬

ous papers in the Astronomical Journal.

CHASE, George, American lawyer: b.

Portland, Me., 29 Dec. 1849. He was graduated valedictorian at Yale in 1870, and at Columbia Law School in 1873. He was assistant pro¬

fessor of municipal law at Columbia Univer¬

sity 1874-78; professor of criminal law, torts and procedure 1878-91 ; member of the univer¬

sity council 1890-91. In 1891 the New York Law School was chartered through his efforts, and he was chosen its dean, a position he still holds. Publications: ‘Chase’s American Stu¬

dent’s Blackstone) (4th ed., 1914) ; Chase’s ‘Stephen’s Digest of the Law of Evidence5 (2d ed., 1898) ; ‘N. Y. Code of Civil Procedure5

(12th ed., 1914) ; Chase’s ‘Cases on Torts5 (2d ed., 1904) ; ‘Chase’s Pocket Code5 (1911).

CHASE, Philander, American Protestant

Episcopal bishop: b. Cornish, N. H., 14 Dec.

1775; d. Jubilee College, Ill., 20 Sept. 1852. He was graduated at Dartmouth College in 1795, and was ordained priest by Bishop Provoost 10

Nov. 1799. After missionary work in New York State and rectorships at New Orleans, La., and Hartford, Conn., he set out as a mis¬

sionary in districts west of the Alleghanies. In Ohio he organized various parishes, and in 1819

was consecrated the first bishop of Ohio. Be¬

tween 1821 and 1831 he was for two years pres¬

ident of Cincinnati College, but chiefly engaged in perfecting plans for a theological seminary.

He visited England, and through the influence of Lord Gambier and Lord Kenyon raised a large sum of money, $30,000, with which he founded the Theological Seminary and Kenyon College at Gambier, Ohio. In 1831 he resigned his bishopric and the presidency of the college and seminary, removed to Michigan 1832, was chosen bishop of Illinois 1835 ; again visited England and raised $10,000 with which he founded Jubilee College, Peoria County, Ill.

Upon the death of Bishop Griswold in 1843, Bishop Chase became presiding bishop of the Church. He wrote ‘A Plea for the West5

(1826); ‘The Star in the West, or Kenyon CHASE

College) (1828) ; (Defense of Kenyon College) (1831); (A Plea for Jubilee) (1835); ˆReminiscences : An Autobiography) (1848).

CHASE, Pliny Earle, American scientist : b. Worcester, Mass., 18 Aug. 1820; d. Haverford, Pa., 17 Dec. 1886. He was graduated at Harvard, 1839 ; taught in Philadelphia and engaged in business for many years, but em¬

ployed his leisure in physical and philological studies. In 1864 the Magellanic gold medal of the American Philosophical Society was awarded him for his (Numerical Relations of Gravity and Magnetism.) The results of other mathe¬

matical and physical researches were published from time to time in the (Proceedings) of the American Philosophical Society, and brought him a wide reputation, both in the United States and abroad, as a man of unusual scientific powers and attainments. In 1871 he became a member of the faculty of Haverford College, Pa., and for a long time was professor of phi¬

losophy and logic. He published (Elements of Meteorology* (1884).

CHASE, Salmon Portland, American jurist

and statesman: b. Cornish, N. H., 13 Jan. 1808; d. New York, 7 May 1873. He was the son of Ithamar and Janet Ralston Chase, the former of English and the latter of Scotch descent.

After a preliminary education in schools at Keene, N. H., and Windsor, Vt., and under a tutor, he went to Ohio in 1820 under the care of his uncle, Philander Chase (q.v.), Episcopal bishop of Ohio, and attended the bishop's school at Worthington, near Columbus, doing farm work when not in the school room. He studied for a year at Cincinnati College but then returned to Keene, in 1824 entered Dart¬

mouth College as a junior, teaching in country schools during the winter vacations, and gradu¬

ated in 1826. He then went to Washington, D. C., for the next three years taught in a boys' school there, during which time he studied law, and in December 1829 was admitted to the bar. In March 1830 he went to Cincinnati, where he began the practice of law, soon be¬

coming known as one of the best lawyers in that city. He also made an impression as a lecturer, delivering several lectures before the Cincinnati Lyceum, which he was largely instru¬

mental in founding, two of his lectures being published in the North American Reviciv en¬

titled ((The Life and Character of Henry . Brougham® (July 1831) and "Effects of Machin¬

ery® (January 1832). In 1832 he formed the project of publishing a collection of the laws of Ohio with notes and references, and his work, even though it did not reward him financially, became the standard edition and gave him a solid reputation throughout the West. He also wrote a brief but excellent historical sketch of Ohio. In July 1834 Chase became solicitor of the Cincinnati branch of the Bank of the United States, and in the following November became solicitor of the Lafayette Bank, these trusts affording him so lucrative a practice that his literary pursuits were practi¬

cally abandoned. In l&H his connection with the Bank of the United States was severed because his fees were considered too high, but politics and the anti-slavery movement were beginning to absorb his attention and his loss failed to disturb him. Meanwhile on 4 March 1834 he had married Catherine Jane Garniss, who died 1 Dec. 1835 ; on 26 Sept. 1839 he mar¬

ried Eliza Ann Smith (d. 29 Sept. 1845), and on 6 Nov. 1846, Sarah Bella Dunlop Ludlow (d.

13 June 1852). Of his six children only two lived to maturity.

Early in his career Chase became identified with the anti-slavery movement. He was

aroused not by the wrongs of the slaves alto¬

gether but by the dangers to white men, and his earliest act as an anti-slavery man (1836) was to defend the rights of a fellow citizen (James G. Birney) to express his mind freely.

He indignantly disavowed any sympathy with the disunion sentiments of William Lloyd Garrison (q.v.), declaring that he was not one of those “abolitionists or anti-slavery men who regarded the Constitution as at war with moral obligations and the supreme law.® He states in his diary that he differed from Garrison and others ((as to the means by which the slave power could be best overthrown and slavery most safely and fitly abolished under our Amer¬

ican Constitution.® He was a frequent speaker at anti-slavery meetings and conventions throughout Ohio and the neighboring States and even in the East, but he was neither an orator nor a good stump speaker. His great forte was the preparation of formal addresses and platforms, since in these he had time and space more carefully and

comprehensively to marshal his facts and thoughts, and accordingly from 1841 to 1848 he was often called upon by the Liberty and Free Soil men to undertake such tasks. But while Chase's powers of state¬

ment made him a valuable ally of the Ohio anti¬

slavery men, he became their leader in the period from 1837 to 1849 chiefly through his pronouncements against slavery and his legal services in connection with fugitive slave cases.

He became known as the ((attorney-general of fugitive slaves,® but was defeated in every case in which he appeared for the defense. Some of his arguments were against indisputable his¬

torical facts — such as his absolute denial that Congress possessed power to establish slavery anywhere by any process, though he did admit that laws had been framed to support slavery in the District of Columbia, in the territories, and (as regards fugitive slaves) in free States, but he declared Congress had no constitutional power to enact such laws. He held the Fugitive Slave Act of 1793 to be contrary to the Ordi¬

nance of 1787, which provided for recovery of slaves only from the <(original States® and to be incompatible with the constitutional form of Federal government for, said he, <(when a slave passes beyond the jurisdiction of the State in which he is held as such, he ceases to be a slave, because he continues to be a man and leaves behind him the law of force which made him a slave.® The law was contrary to the letter and spirit of the Constitution, in denying "due proc¬

ess of law® and authorizing "unreasonable searches and seizures® ; the States and not Con¬

gress were responsible for the apprehension of fugitive slaves ; and finally, "the legislature cannot authorize injustice by law; … it cannot repeal the laws of nature, cannot create any obligation to do wrong, or neglect duty.

No court is bound to enforce unjust laws.®

These and other arguments were used in his various cases. In March 1837 he acted as coun¬

sel for an alleged fugitive slave, Matilda, and for Birney, who was accused of "harboring®

her. Chase based his argument on the fact that Matilda had been brought into Ohio by her master and had then escaped, wherefore she was a free person and could not be ((a person held to service or labor in one State, under the laws thereof, escaping into another.® The judge decided against Chase, and Matilda was re¬

manded into slavery, but Birney appealed and the State Supreme Court reversed the decision.

The most famous of the Ohio fugitive slave cases was that of John Van Zandt, who at¬

tempted to convey to safety some slaves who had escaped from their owner and were later recovered by force. One of the slaves escaped, however, and the owner sued Van Zandt to recover the slave's value and the expense of recapturing the others and also to recover the penalty of $500 allowed by the act of 1793

against anyone who (<after due notice harbored and concealed® a fugitive. Chase defended Van Zandt at the first trial in July 1842 and lost, but the award of $500 against Van Zandt was appealed to the Supreme Court, which in 1847 sustained the lower tribunal.

Anti-slavery had already begun to play a prominent part in Ohio politics and to Chase fell the task of organizing, politically, the Lib¬

erty and Free-Soil parties. Up to 1840 politics had only a mild interest for Chase, though he was a delegate to the National Republican Con¬

vention that nominated Clay in 1832. In 1836, though a Whig, he voted for General Harrison, as he did also in 1840, showing no sympathy for his friend Birney, who in 1840 was the can¬

didate of the new Liberty party. But in May 1841 Chase had deserted the Whig party for¬

ever and had cast in his lot with Birney.

Within a year he was practically the leader of the Liberty party in Ohio and for eight years organized conventions, prepared party addresses and bolstered up the anti-slavery press. He took part in the National Liberty Convention at Buffalo in 1843 and again in 1847, but through a shrewd move he practically dissolved the old Liberty party and secured a convention of the party members, now known as Free-Soilers, at Buffalo in August 1848. This con¬

vention, over which Chase presided, nominated Van Buren for the Presidency. On 22 Feb.

1849, through a curious combination of Demo¬

crats, Independent Democrats and Free-Soilers in the State legislature, he was elected to the United States Senate. There he continued his opposition to slavery during the stormy scenes of the period of compromise in 1850, and was particularly outspoken, especially in his speech of 26-27 March 1850, in condemning Clay's position and proposal. Chase usually acted with the Democrats, claiming to have been elected as a Democrat, and thereby losing a large share of the confidence of the Free-Soilers, but he gradually became estranged from the Demo¬

crats, too, and in 1851 to 1852 spent much of his time in a futile attempt to build up a <(Free Democracy® ; finally in 1852 the nomination of Pierce on a pro-slavery platform compelled him to withdraw entirely from the Democratic party and to rejoin his old Free-Soil allies. In 1853, however, the Democrats secured a ma¬

jority in the State legislature and therefore Chase failed of re-election to the Senate. In 1854, even with such men as Sumner and Seward in the Senate, he became the leader of the opposition to the Kansas-Nebraska bill and on 24 Jan. 1854, in collaboration with Sumner, Giddings and others, issued the historic (< Appeal of the Independent Democrats in Congress to the People of the United States,® but he could not prevent the passage of the bill. The politi¬

cal result of the struggle was the rending of the Whig party and the formation by the northern Whigs and independent Democrats of the Re¬

publican party, largely due to Chase's activities.

In July 1855, therefore, the <(Anti-Nebraska®

Republican Convention of Ohio nominated him for governor and after a close contest he was elected. He made an excellent executive, intro¬

duced many needed reforms and continuing his efforts in behalf of the negro, and in 1856

believed himself qualified for the Presidency, but he could not secure pledged votes sufficient for his nomination at the Republican conven¬

tion and withdrew his name. In 1857 he was reelected governor; thenceforth he was recog¬

nized as a Republican leader, and on 2 Feb.

1860 was again elected United States Senator for the term beginning 4 March 1861. Again in 1860 he endeavored to obtain the Presidential nomination but was unsuccessful and in Janu¬

ary 1861, at the solicitation of Lincoln (then President-elect), accepted the post of Secretary of the Treasury, taking the oath of office 7

March and thus relinquishing the senatorship.

Hardly had he assumed office when, in April 1861, the Civil War began. He rehabilitated the disorganized and almost bankrupt treasury ; suggested and secured the enactment of new taxes and ‘property confiscation acts ; borrowed money, maintained the national credit, regulated commerce; provided the legal tender paper cur¬

rency authorized by Congress ; insisted upon the establishment of a national banking system and finally saw it put into operation ; and admin¬

istered his department and the financial affairs of the country in so creditable a manner as to distinguish himself as one of the great incum¬

bents of that important Cabinet office. (See United States, Finances of the, 1861). De¬

spite his onerous duties he never lost sight of the slavery question, supported Butler’s con¬

tention that slaves escaping within the Union army lines were <(contraband of war® and advo¬

cated the arming of negroes. He opposed Lincoln's colonization scheme but warmly sup¬

ported the Emancipation Proclamation, though it did not exactly conform to his conception of the proper method of solving this problem. He differed with the President in many of his political views ; held a widely divergent idea of the functions of department heads and felt aggrieved when Lincoln disregarded his advice on military affairs ; he corresponded with army commanders and has even been accused of counseling disobedience to the President's orders, directly criticising him and expressing a distrust of him, that, considering its source, could only have created dissension among those for whose conduct Lincoln was directly re¬

sponsible to the people. Like Seward, Chase hoped to obtain ascendency over Lincoln, and when he learned that Lincoln, after his own fashion, completely dominated the situation and was determined to survive or perish according to the success or failure of his own policies, he resigned (as did Seward, too,) 20 Dec. 1862, petulantly stating that he expected his opinions and those of his colleagues to carry more weight with the President — ((there are certain heads

of departments, but no real Cabinet.® Lincoln refused to accept the resignations, but on 3

March 1863 Chase prepared another resignation because Lincoln refused to nominate a revenue collector selected by him. Again on 11 May 1863 Chase became disgruntled because Lin¬

coln removed an official whom he considered unfit for his post, but Lincoln again refused to accept the proffered resignation. The minor differences between Lincoln and Chase were accentuated by their rivalry for the Presidential nomination in 1864, but the issuance in Febru¬

ary 1864 of the so-called ((Pomeroy Circular,®

criticising Lincoln, rendered impossible Chase's nomination and placed him in a delicate rela¬

tionship with the President, wherefore on 22

February he again offered to resign and again was requested to remain. Finally in June 1864

another dispute arose over patronage in New York and though peacefully settled Chase, still disgruntled at Lincoln's renomination, decided once more to resign (29 June) and this time (30 June) Lincoln unexpectedly accepted it, appointing W. P. Fessenden (q.v.) as his suc¬

cessor.

Before his retirement from the Cabinet

Chase had signified a desire to be chief justice of the Supreme Court and in spite of many objections Lincoln nominated him 6 Dec. 1864

to fill the post recently made vacant by the death of Chief Justice Taney (q.v.). He con¬

tinued to advocate the universal enfranchise¬

ment of the negro, warmly sympathized with the work of the Freedmen's Bureau, and in 1866 became president of the (tAmerican Freed¬

man's Union Commission,® a benevolent society intended to advance the work of civilization.

He took little part in President Johnson's dis¬

pute with Congress regarding reconstruction, but privately opposed the readmission of any seceded State until it had granted suffrage to negroes; he drafted the Fourteenth Amend¬

ment, which, somewhat extended, was accepted and passed by Congress, and later used it in his dissent from the court's decision in the Slaughter House Cases (q.v.). Chase consid¬

ered the President's military governments ab¬

normal, and even after Johnson's proclamation declaring the war at an end (2 April 1866) he steadfastly refused to hold court in Virginia and North Carolina (which were included in his circuit) ((until all

possibility of claim that the judicial is subordinate to the military power is removed by express declaration from the President.® In June 1867, however, he assumed his functions at Raleigh. Chase dissented from the Court's decision in the Milligan (see Milli¬

gan Decision), Cummings and Garland cases and refused to sit in the trial of Jefferson Davis until late in 1868 when, however, the amnesty proclamation of 25 Dec. 1868 permitted Davis'

release and the case was not tried on its merits.

Though considering the trial impolitic and un¬

just, Chase presided with calmness and good judgment over the impeachment of President Johnson in 1868. Prior to this time he had allowed his friends again to bring his name before the Republicans as a candidate for the Presidential nomination, but soon became con¬

vinced that he could not secure the Republican nomination and entirely changed his attitude toward that party, within a few weeks endeav¬

oring to become the standard-bearer for the Democrats. However, he was not nominated and continued his work on the bench, writing numerous important decisions of the Court, such as that in the case of Texas vs. White, wherein he expounded the nature of the gov¬

ernment as <(an indestructible Union, composed of indestructible States,® reversing his previous theory of State suicide and as he did also in the case of White vs. Hart in 1872, approving the method of reconstruction that had been adopted. He wrote the Court's decision in the case of Hepburn vs. Griswold and thus in 1869 reviewed judicially and construed the stat¬

utes which as an administrative officer he himself had set in motion only a few years previously.

The Court decided that the Legal Tender Act was unconstitutional in so far as it compelled the acceptance of legal tender paper currency in payment of debts contracted before the statute.

By the subsequent decisions in the legal tender cases (q.v.), however, Chase was reversed, the Court holding the act constitutional. These contests were especially trying to Chase and the continual strain of the past few years began to affect him. In August 1870 he was stricken with paralysis but gradually improved, and though absent from the

Court during the term of 1870-71 he sat during the terms of 1871-72

and 1872-73, preparing numerous opinions. He was well enough also in 1872 again to desire the presidential nomination, but in 1873 he began to fail rapidly, on May 6 suffered a second stroke while in New York and passed away there the next day.

Bibliography. — (Diary and CorresponcTence of Salmon P. Chase* (in (Annual Report* of the American Historical Association for 1902, Vol. II, pp. 11-527, Washington 1903) ; Hart, A. B., (Salmon Portland Chase) (Boston 1899) ; Jones, F. R., (Salmon Portland Chase) (Boston 1902) ; Pike, J. S., (Chief Justice Chase) (New York 1873) ; Shuckers, J. W., (Life and Public Services of Salmon P. Chase* (New York 1874) ; Warden, R. B., (An Account of the Private Life and Public Services of Salmon Portland Chase) (Cincinnati 1874).

Irving E. Rines.

CHASE, Samuel, American jurist, one of

the signers of the Declaration of Independence: b. Somerset County, Md., 17 April 1741 ; d. 19

June 1811. His father, a learned clergyman, in¬

structed him in the classics; later he studied law at Annapolis, being admitted to the bar at the age of 20. Having become a member of the colonial legislature, he distinguished him¬

self by his bold opposition to the royal gov¬

ernor and the court party. He took the lead in denouncing and resisting the Stamp Act, and became a most active adversary of the British government in his State. The Maryland Con¬

vention of 22 June 1774 appointed him to attend the meeting of the General Congress at Phila¬

delphia in September of that year. He was also present and conspicuous in the subsequent Con¬

gresses during the most critical periods of the Revolutionary War. That of 1776 deputed him on a mission to Canada along with Dr. Frank¬

lin, Charles Carroll of Carrollton and the Rev.

John Carroll. He signed the Declaration of Independence without hesitation. In June 1783

the legislature of Maryland sent him to London as a commissioner to recover stock of the Bank of England and large sums of money which belonged to the State. In 1791 he accepted the appointment of chief justice of the General 346

Court of Maryland. Five years afterward Presi¬

dent Washington made him an associate judge of the Supreme Court of the United States.

Political cases of deep interest having been tried when he presided in the Circuit Courts, and his conduct having given much displeasure to the Democratic party, he was impeached by the national House of Representatives. The trial of the judge before the Senate is mem¬

orable on account of the excitement which it produced, the ability with which he was de¬

fended himself and the nature of his acquittal.

He continued to exercise his judicial functions with the highest reputation till 1811, in which year his health failed. Consult (The Impeach¬

ment Trial of Judge Samuel Chase' (in the American Law Review, Vol. XXXIII, Saint Louis 1899) ; Smith and Lloyd, (The Trial of Samuel Chase ' (Washington 1805) ; Adams, (History of the United States) (New York 1889).

CHASE, Thomas, American educator: b.

Worcester, Mass., 16 June 1827; d. Providence, R. I., 5 Oct. 1892. He was a brother of Pliny E. Chase (q.v.). In 1855 he became professor of philology and classical literature at Haverford College, near Philadelphia; from 1875 to 1886 its president. Among his publications are ‘Hellas: Her Monuments and Scenery) (1861); an address on (Liberal Education: Its Aims and Methods) ; a (Latin Grammar’ (1882) ; and editions of various Latin authors.

CHASE, William Henry, American mili¬

tary officer: b. Massachusetts 1798; d. Pensa¬

cola, Fla., 8 Feb. 1870. He was graduated at the United States Military Academy, became first lieutenant of engineers in 1819, captain in 1825 and major in 1838. He was engaged in repairing Fort Niagara in 1817-18; as super¬

intending engineer for many important works in 1819-28 ; and had charge of the defenses in Pensacola harbor, Florida, 1828-54. He super¬

intended the improvements of Mobile Bay; as senior engineer officer had charge of all the fortifications and river and harbor improve¬

ments at the mouth of the Mississippi, and took an influential part in all projects connected with the development of the region around Pensacola. At the outbreak of the Civil War he entered the Confederate army, and was prominent in the seizure of the Pensacola navy yard.

CHASE, William Merritt, American artist: b. Franklin, Ind., 1 Nov. 1849; d. New York city, 25 Oct. 1916. He studied painting in oil at the National Academy in New York and subsequently in Europe with Piloty, acquiring a thoroughly German method. On his return to New York in 1878 he began to change his style of painting, gradually clarifying his color and showing an appreciation for the .work of the French school. One of the most facile and brilliant technicians of the American school, Chase succeeds equally well with figure, por¬

trait and still life — particularly his fish, which are especially celebrated. Examples of his work are in the Metropolitan Museum, New York, the Pennsylvania Academy and Brooklyn Institute Museum.

He has made a specialty of portraits and figure pieces, winning celebrity with ‘Ready for the Ride,’ ‘The Apprentice’

and (The Court Jester,’ and portraits of Amer¬

ican ladies.. His more recent works include ‘American Fish’ (1905); ‘Flying Clouds’

(1906); and ‘Portrait of an Artist’ (1906); ‘Portrait of Mrs. J.’ (1910) ; ‘Studio Interior’

(1911); ‘The Orangeryˆ (1911); and ‘Portrait of Mrs. H.,’ awarded the Proctor prize in 1912. He was appointed instructor at the Brooklyn Art School in 1881 and elected a Na¬

tional Academician in 1890.

CHASIDIM, Ha-se’dim, the name of a

Jewish sect which appeared in the middle of the last century. See Jewish Sects.

CHASING, the art of indenting artistic or ornamental designs on metals. Figures on metal are often produced in relief by being punched out from behind, and sculptured or finished on the front with small chisels and gravers. It is this latter process that is prop¬

erly called chasing, and the same term is applied to designs produced by hand-tools on more or less flat surfaces. The process is a very old one and is frequently seen on ancient Greek works of art. Phidias used it effectively.

Benvenuto Cellini (q.v.) is the more modern master of chasing.

CHASKA, Minn., city and county-seat of

Carver County, 22 miles southwest of Minne¬

apolis, on the Chicago, Milwaukee and Saint Paul and the Minneapolis and Saint Louis railroads, and on the Minnesota River. There are ex¬

tensive brickyards here and the city contains also canning and pickle factories, foundry and machine shops and a flour mill. The electric lighting plant is municipally owned. Pop. 2,050.

CHASLES, shal, Michel, French engineer:

b. near Chartres, 15 Nov. 1793; d. Paris, 18

Dec. 1880. He entered the Lcole Polytechnique in 1812, and on leaving was classed among the engineers ; but with rare generosity he re¬

nounced his place as an officer in order to assure a career to one of his unsuccessful com¬

rades. In December 1829 he addressed to the Brussels Academy a memoir on two general principles of geometry, duality and homography.

The introduction to this memoir expanded into the well-known ‘Apergu historique sur l’origine et le developpement des methodes en geome¬

tric,’ the first edition of which was published in 1837. In 1841 he was appointed to the -chair of machines and geodesy at the Lcole Poly¬

technique, and in 1846 to that of higher geome¬

try, which had just been instituted at the Sorbonne. Some of his published works are ‘Treatise on Higher Geometry’ (1852) ; ‘The Three Books of Euclid’s Porisms Re-established for the First Time’ (1860) ; ‘Treatise on Conic Section’ (1865) ; ‘Reports on the Progress of Geometry’ (1870). These, his principal wrorks, are geometrical and historical. His contribu¬

tions to the ‘Comptes Rendus’ of the Academy of Sciences and to other scientific publications are extremely numerous, and though in the main geometrical, are not exclusively so. In particular he treated in several memoirs the question of attraction, and gave the first syn¬

thetic demonstration of a celebrated theorem of Maclaurin on the attraction of ellipsoids. Two of his memoirs on the properties of cones of the second degree, and on the spherical conics, were translated into English, and published, with additions, by Charles Graves in 1841. He

contributed much to projective geometry (see Geometry, Projective) and to the “method of CHASLES

characteristics” (q.v.). During his long life he was the recipient of many scientific distinc¬

tions, and he will always be cited as one of the great geometers of the present century.

CHASLES, Victor Euphemion Philarete,

French critic: b. Mainvilliers, near Chartres, 8 Oct. 1798; d. Venice, 18 July 1873. The son of a Jacobin, and educated according to Rous¬

seau, he acquired the point of view which, en¬

larged by life abroad, makes his essays so unique and instructive. In 1815 he assisted Valpy in an edition of Greek and Latin authors in England. In 1837 he became curator of the Mazarin Library and in 1841 professor of con¬

tinental languages and literatures at the Col¬

lege de France. He has written in every imag¬

inable prose form, from a romance to a riddle; but his enduring work is contained in (Tableau de la marche et du progres de la langue et de la litterature frangaises depuis le commence¬

ment du XVIe siecle jusqu’en 1610 > (8 vols., - 1828; <L’Antiquite) (1847) ; (Le seizieme siecle en France) (18 vols., 1847) ; (Les Voyages d’un critique a travers la vie et le livre) (1866-68, 2d series) ; and <Memoires) (1876-78). His principal service to French lit¬

erature lies in the fact that he was one of the first of the French critics to stimulate a lively interest in the literatures of England, Russia and Scandinavian countries.

CHASSAIGNAC, sha-san-yak, Charles

Louis, American physician: b. New Orleans, 25 Jan. 1862. He was graduated at the medical department of the University of Louisiana in 1883; was president and professor of genito¬

urinary diseases at the New Orleans Polyclinic from 1897 to 1906. He was editor of the New Orleans Medical and Surgical Journal; presi¬

dent of the Orleans Parish Medical Society; president of the Louisiana State Medical So¬

ciety; one of the founders and president of the New Orleans Sanitarium and Training School for Nurses. In 1906 was appointed dean of the Graduate School of Medicine of Tulane Uni¬

versity, continuing as professor of genito¬

urinary and rectal diseases. In 1914 he became managing editor of the American Journal of Tropical Diseases and in 1915 was elected con¬

sultant in genito-urinary diseases at the Charity Hospital of New Orleans. Has been a trustee of the Eye, Ear, Nose and Throat Hospital for many years.ˆ

CHASSE, sha-sa', David Hendrik, Baron,

Dutch soldier: b. Thiel in Guelders, 18 March 1765; d. Breda, 2 May 1849. He began his military career when but 10 years of age; be¬

came lieutenant in 1781 and captain in 1787.

After the failure of the revolutionary movement he took French service; was appointed lieuten¬

ant-colonel in 1793; and two years later found himself marching towad the Netherlands under the command of Pichegru. He afterward

fought with the French in Germany and Spain, gaining great

distinction, and from Napoleon himself, because of his fondness for bayonet charges, the name of “General Ba’ionette.” He was made a baron by Louis Bonaparte in 1809.

As lieutenant-general of the Dutch forces, in 1815, Chasse did good service at Waterloo against his old comrades, the French. . As gov¬

ernor of Antwerp he defended the citadel for three weeks with 5,000 men against 60,000 Bel¬

gians and French (1832), but he was forced to surrender. He was a French prisoner of war until May 1833, when he was released and retired.

CHASSEPOT, Antoine Alphonse, French

inventor: b. 4 March 1833; d. Gagny, in the Seine-et-Oise, 14 Feb. 1905. He v/as an em¬

ployee in the Paris arsenal of Saint Thomas, where he became an official in 1858, and in 1863

brought before the government the model of his breech-loading rifle, adopted three years afterward, and subsequently abandoned. It was about four pounds lighter than the needle-gun and about one pound lighter than the Mar¬

tini-Henry rifle.

CHASSEPOT, shas-po, RIFLE, a breech¬

loading rifle, named after its inventor, and adopted as the firearm of the French infantry in 1866, after the value of the Prussian needle-gun had been shown in the war between Prussia and Austria. It is not now in use, having been replaced in 1874 by a much modified form of small-arms. It was a bolt-action gun with a peculiar system of obturation and a paper cartridge. In the war of 1870 it proved a much better weapon than the German needle-gun (q.v.). It was considerably lighter than the needle-gun, the weight of the latter being 12 pounds, and that of the former less than nine pounds. In accuracy, penetrative power, length of range, lowness of trajectory and rapidity of fire, it was inferior to the Martini-Henry.

To the needle-gun it was superior in length of range and lowness of trajectory, as was shown in the war of 1870, in which the French could open fire at the distance of 1,500 paces, while the effective range of the needle-gun was only 400 to 500 paces. This superiority, however, was neutralized by the fact that its lightness and its large charge had the effect of producing great recoil and of heating the barrel. At the commencement of an action the men would open fire at long range, but before closing with the enemy the barrel of their piece was so heated that the weapon could hardly be handled. From the recoil and heating combined, the soldier was obliged to fire from the hip, so that his aim was not ac¬

curate; while after much firing the breech be¬

came clogged. The chassepot weighed 9 lb. 5 oz., was 6 feet 2 inches long with bayonet, had a calibre of .433 inches, and fired a 386 grain lead bullet with a charge of 86.4 grains of black powder at a muzzle velocity of 1,328 feet per second. It was sighted to 1,312 yards (1,200

metres).

CHASSEUR, sha-ser, a male attendant

upon persons of distinction, attired in a mili¬

tary dress, and wearing a sword. It is also the name given by the French to bodies of light infantry which act as skirmishers and sharp¬

shooters. The name was originally given to some troops raised in 1815, in imitation of the Jagers of the Austrian army, w*ho were chiefly Tyrolese chamois-hunters, and unerring marks¬

men. The French Chasseurs are of two kinds, light cavalry and infantry. Every battalion of infantry has a company of Chasseurs, but the term is more particularly applied to that body of men called the Chasseurs de Vincennes, who were enrolled and armed with rifles in 1833, and quartered at Vincennes. The Chassuers of the Italian army are called Bersaglieri. Garibaldi's Chasseurs, that took a prominent part in the 348

Italian war of 1859, and in the campaign against Francis II of Naples, in 1860, were known as Cacciatori dei Alpi, or Alpine hunters.

CHASSIS, shas'se, in automobiles, that part of the vehicle made by machinists, as distin¬

guished from the body made by the carriage or wagon builder. It includes the frame, wheels and machinery. The frame consists generally of two fore-and-aft members and three or four cross members of pressed steel riveted together with gusset plates at the joinings. This frame is the foundation on which is mounted the power plant with its controls and transmission gear, and it is set upon the axles of the running gear or slung below them, according to type.

See Automobile.

CHASTELARD, shat-lar, Pierre de Bos-cobel de, French poet: b. Dauphine 1540; d.

1563. He fell madly in love with Mary Stuart at the French court, and poured forth his ad¬

miration in innumerable poems. He figures as one of her escort on her return to Scotland after the death of her husband (1561). He had to return to France after this pleasing duty was performed, but on the first opportunity he was again in Scotland (1562). Mary gave him a very gracious welcome, answered, it is said, a poem dedicated to her, and allowed him to accompany her singing with his flute.

His indiscreet love led to a public trial at Saint Andrews and hanging. Consult Swinburne,

(Chastelard: a Tragedy* (London and New York 1906) ; Hewlitt, (The Queen's Quhair) (New York 1904).

CHASTELARD, a tragedy published in

1869, by Algernon Charles Swinburne, the scene of which is laid at Holyrood Castle, during the reign of Mary Queen of Scots. The tragedy

is conspicuously one to be read, not acted. It is too long, too much lacking in action and of too sustained an intensity, for the stage.

The style is essentially lyric, full of exquisite lines and phrases ; and as a whole, the play presents an intense passion in a form of ade¬

quate beauty. See Chastelard, Pierre de Bos-cobel.

CHASTELER, Jean Gabriel, Marquis of:

b. near Mons, Belgium, 1763; d. Venice, 7 May 1825. He received his first education at Metz in the College de Fort. In 1776 he entered the Austrian service. After having served against the Turks, by whom he was severely wounded, he displayed his zeal for the house of Austria in the disturbances in the Nether¬

lands. In 1796-97 he was employed in the negotiations of his court in Poland and Russia; was afterward with Suwarov in Italy, where he distinguished himself in several engagements with the French armies. In 1808, with Hor-mayr, he was the soul of the famous insur¬

rection in the Tyrol, and all the political as well as military events which were connected with it. He was finally defeated at Tyrol and his army was routed 13 May. After the close of the war he received several appointments, and in December 1814 was made governor of Venice.

CHASTELET, shat-la, Gabrielle Emilie

Breteuil, bre-te-yei, Marquise du : b. Picardy 1706; d. Luneville 1749. She was of an ancient family, was taught Latin by her father, Baron Breteuil, and was well acquainted with that language, but her favorite study was mathe¬

matics. She had a sound judgment and much taste, loved society ard the amusements of her age and sex, but after the publication of the Philosophical Letters) by Voltaire had roused the Jesuits' criticism against him, she abandoned all these pleasures, and in 1733 retired with him to the dilapidated castle of Cirey, situated in a dreary region on the borders of Champagne and Lorraine. She embellished this residence, formed a library, collected instruments, *etc.*

Cirey was often visited by the learned, — by Maupertius, John Bernoulli, *etc.* Here the Marchioness learned English of Voltaire in the space of three months, and read with him New¬

ton, Locke and Pope. She also wrote an analy¬

sis of the system of Leibnitz, and translated Newton's (Principia) with an algebraic com¬

mentary. Voltaire lived six years with her at Cirey, where they employed their time in the study of science, and in getting up lovers' quar¬

rels for the pleasure of patching them up again.

At the end of this time she went to Brussels to prosecute a lawsuit, which was terminated by an advantageous compromise, brought about by Voltaire. She also carried on a correspond¬

ence with the German philosopher, Wolf, until her death. Her (Traite de la nature du feu*

obtained the prize of the Parisian Academy of Sciences, and is published in their collections.

Her husband, the Marquis du Chastelet Lomont, was high-steward of King Stanislaus Lesczin-sky at Luneville.

CHASTELLUX, shat-liiks, Frangois Jean,

Marquis de, French historian: b. Paris 1734; d.

Paris, 28 Oct. 1788. He entered the army in 1749; distinguished himself as colonel in the Seven Years' War, and later served in the American Revolution as major-general under Rochambeau, and gained the friendship of Washington by his amiable character. He pub¬

lished numerous works relating to the United States, including (Voyages dans l'Amerique septentrionale dans les annees, 1780-1782; (Discours sur les avantages et les desavantages qui resultent pour l'Europe de la decouverte de l'Amerique* ; and translated into French David Humphry's (Address to the Army of the

United States.* Consult Chastellux, (Notice sur le Marquis de Chastellux) (Paris 1822) ; and Pascallet, (Notice historique sur la maison de Chastellux) (Paris 1844).

CHASUBLE, chas'u-bl, the outermost vest¬

ment worn by a priest in celebrating the mass : its name in Latin is casula, dim. of casa, house.

In its original form it was a garment of circular or elliptical form like the South American poncho, with an opening in its centre through which the head of the wearer passed. But the form of chasuble now employed almost univer¬

sally consists of a more or less oval front and back joined at the top, where is an opening to allow the head to pass through. The garment is usually of silk embroidered and decorated with gold or silver thread, and with a cross on the back. Chasubles of different colors, white (or cloth of gold), red, violet, green, black, are worn according to the occasion ; as white on all high festivals, violet in penitential times, red on the anniversaries of martyrs, black in masses for the dead, *etc.* In the present form of the chasuble the priest's arms are free, whereas in the ancient form, the garment covered the per-CHATARD — CHATEAUBRIAND

son like a cloak. See Costume, Ecclesias¬

tical.

CHATARD, Francis Silas Mareau, Amer¬

ican Roman Catholic prelate: b. Baltimore, Md., 13 Dec. 1834 ; d. 7 Sept. 1918. He was gradu¬

ated from Mount Saint Mary's College, Em-mitsburg, in 1853, and in 1856 took the degree of M.D. at the University of Maryland. After practising medicine a year, he entered the Ur¬

ban College of the Propaganda, Rome, studied for the priesthood and was ordained: 14 June 1863, obtaining the degree of D.D., August 1863. In November 1863 he was appointed vice-rector of the American College, Rome, and in 1868 was promoted to the rectorship, the in¬

stitution flourishing under his management.

Later he was made papal chamberlain to Pope Pius IX, who greatly esteemed him. On 26

March 1878 he was nominated bishop of Vin¬

cennes by Pope Leo XIII, and consecrated in Rome 12 May 1878. The title of the see was changed from Vincennes to Indianapolis 23

March 1898. Bishop Chatard translated works from the French, and was much interested in the cause of education. For some years prior to his death he was assisted in his diocese by a coadjutor bishop, the Rt. Rev. Joseph Chartrand.

CHATEAU-LAFITTE, la-fet, CHATEAU

LATOUR, and CHATEAU MARGAUX,

famous vineyards, all in the department of the Gironde, France, furnishing the best of the red wines of Bordeaux. See Bordeaux Wines.

CHATEAU-THIERRY, ta-re, France,

town in the department of Aisne, on the right bank of the Marne, 38 miles south-southwest of Laon, and 59 miles northeast of Paris. It occupies the side of a hill, whose rocky sum¬

mit is crowned by the ruins of the old castle of Thierry, said to have been built by Charles Martel, in 730. It is the birthplace of La Fon¬

taine (to whom a fine marble statue has been erected), and was the scene of several con¬

flicts during the campaign of 1814. On 9 Sept.

1870, it was occupied by the Germans, and became a few days later the temporary head¬

quarters of the Emperor. Its chief buildings are a commercial college, a public library and an old cathedral. It possesses a court of pri¬

mary resort and a communal college. The Champagne district begins here, and, besides its wine trade, it is famous for the manufacture of musical and scientific instruments and woolen yarn; stone is quarried near by. Pop. 7,771.

See War, European — Western Front.

CHATEAUBRIAND, sha-to-bre-an, Frangois Auguste Rene, Vicomte de, French au¬

thor and politician : b. Saint Malo, Brittany, 4

Sept. 1768; d. Paris, 4 July 1848. He received a commission in the army in 1788, and at the commencement of the Revolution he hurried into Paris to witness the great commotions then taking place there. In the spring of 1791 his ardent and enthusiastic spirit led him to join an expedition to America for the purpose of ex¬

ploring its Arctic regions, and discovering the northwest passage. He crossed the Atlantic, landed at Baltimore, and proceeded to Phila¬

delphia, where he had an interview with Wash¬

ington. Returning to France in 1792 he mar¬

ried Celeste Buisson de Lavigne, a girl of 17, who brought him a small fortune. Out of his American experience largely grew his (Les Natchez' (see Natchez, Les). Shortly after his return from America he quitted France and joined with other emigrants the Prussian army on the Rhine. At the siege of Thionville he was wounded in the thigh, and subsequently became an exile in England. Here his health gave way, arid friendless and penniless he continued for a time to wear out a miserable existence in Lon¬

don. He at last found means of earning a sub¬

sistence by giving lessons in French and execut¬

ing translations for the booksellers. In 1797 he published his (Essai

historique, politique et moral sur les revolutions anciennes et modernes, considerees dans leurs rapports avec la Revo¬

lution Frangaise.' It did not win very much success in England, and attracted no notice whatever in France. The essay is pervaded by a strong skeptical spirit in religious matters, but its author's views on this subject were soon to experience a sudden and important change. The death of his mother in prison, and the accounts of her last moments trans¬

mitted to hirn by his sister, who herself was no more by the time her letter reached her brother, made a lasting impression on the mind of Chateaubriand, and he became a firm believer in Christianity. In 1800 he ventured to return to France and take up his abode under an assumed name at Paris. Encouraged by the success of an essay on literature, contributed to the Mercure, he published in 1801 his (Atala,'

which was afterward introduced as an episode into his (Genie du Christianisme.' In the fol¬

lowing year appeared his celebrated work (Le Genie du Christianisme,' which may be said to have caused a religious reaction, and inaugu¬

rated a new period in the social history of France. The object of Chateaubriand was to demonstrate the superiority of Christianity over all other religions in a poetic and artistic, as well as moral and beneficial point of view.

Though a work more brilliant than profound, it is unsurpassed for beauty of language and description and the eloquence of its impassioned appeals. The main charm indeed of the book may be said to lie in its beautiful imagery, drawn from external nature, and more espe¬

cially from nature as exemplified in the glowing scenery of the New World. In this respect Chateaubriand may be said to have revived in French literature the description of natural scenery and objects which had long been al¬

most unknown. His work attracted the atten¬

tion and admiration of Bonaparte, and in 1803

he was appointed French minister for the re¬

public of the Valais. This office he resigned in 1804.

In order to give life and tangible form to the theories propounded in the (Genie du Christian¬

isme,' he commenced ˆLes Martyrs,' and to qualify himself for describing accurately the scenes amid which the poem is laid, made a pilgrimage to the East. In 1809 (Les Martyrs'

was published, and is considered by many the best of his works. Some of the descriptions, such as of the ancient forests of Gaul, the as¬

semblies of the Christians in the catacombs and the picture of Rome under the emperors, are given with marvelous beauty and effect. In 1811 appeared his (Itineraire de Paris a Jeru¬

salem.' The restoration of Louis XVIII was hailed by him with enthusiasm, and a pamphlet entitled (De Bonaparte et des Bourbons,' pub¬

lished by him in 1814, was said by the King to 350

have been worth to him an army of 100,000 men.

On the second restoration he preserved the title of minister of state, but refused to take office along with Fouche. On the accession of Villele to power Chateaubriand was appointed Ambas¬

sador to Berlin, then to London, and in Septem¬

ber 1822, crossed the Alps to represent France at the congress of Verona. In 1824 he was sum¬

marily dismissed from office at the instance of Villele, and the indignation which he felt at such treatment made him join the ranks of the op¬

position, where in the columns of the Journal des Debats he fulminated attacks against gov¬

ernment. On the accession of the Martignac ministry he again returned to office, and pro¬

ceeded as ambassador to Rome, but resigned this appointment on Polignac becoming Premier.

On the revolution of 1830 he refused to take the oath of allegiance to Louis Philippe, and con¬

sequently forfeited his seat in the House of Peers and a pension of 12,000 francs. In 1831 a new work appeared from his pen, entitled (De la Restauration, et de la monarchic elective, > in which occurs the following singular avowal : (<I am a Bourbonist by honor, a royalist by reason and conviction, and a Republican by inclination and character.ˆ In the same year he published his (£tudes ou discours historiques sur la chute de l'Empire Romain,* a work exhibiting more of the imagination of the poet than the critical acumen of the historian. Owing to sev¬

eral pamphlets of a legitimist tendency issued by him, he was arrested in 1832, but defended by M. Berryer, and acquitted. In the latter years of his life he published an (Essay on English Literatureˆ a literal prose translation of Hil¬

ton's Paradise Lost,) and other works. His memoirs appeared after his death, under the title of (Memoires d'outre tombed They pos¬

sess a great interest, and contain many charm¬

ing passages, but are at times disfigured by the ebullitions of personal vanity, which formed one of the principal weaknesses of Chateaubriand.

He was an intimate friend of the celebrated Madame Recamier, whose feeling toward him amounted almost to worship. He was the first in France to draw attention to the literary re¬

sources of the Middle Ages and Christian an¬

tiquity. He was a renovator in imagination and persuaded his generation to break with the imitation of imitation that had sapped the literary life of the 18th century. His style left its mark on poetry, history, fiction — on the very language. His effect on religion and morals was transitory, but in literary art he opened a new era. (See Genius of Christian¬

ity, The). Consult Lenormant, M., (Chateu-briand et ses memoires,) and also works upon his life and literary work by Vil-lemain and Saint Beauve; Phailhes, Chateau¬

briand, sa femme et ses amis) (Bordeaux 1896) ; Lemaitre, <Chateaubriand) (1912) ; (Correspondance general de Chateaubriand,) edited with introduction, etc., by L. Thomas (3

vols., Paris 1912-13).

CHATEAUDUN, sha-to-den, France, town

in the department of Eure-et-Loire, 26 miles south-southwest of Chartres, near the right bank of the Loire. Its streets are straight and ter¬

minate in a square, from which a complete view of the town may be obtained The hotel de ville, library and college buildings are deserv¬

ing of notice. The old castle of counts of Dunois overlooks the town. Chateaudun has manufactures of blankets and machinery, and large tanneries, and some trade in cattle, grain, wool and hemp. In the Franco-German War the town was captured by the Germans (18

Oct. 1870), who held it till 9 November, when they were driven out by the French; it was, however, recaptured some few days after. Pop.

7,296.

CHATEAUGUAY, shat-6-ga', RIVER,

Lower Canada: operations on in the War of 1812; and battle of 25 Oct. 1813. (For the pre¬

vious operations in the campaign against Mon¬

treal, see Chrystler's Farm). Gen. Wade Hampton had been for some months in com¬

mand at Burlington, Vt., when Wilkinson ordered him to advance on Montreal ; ostensibly to co-operate with himself, though he had not yet started down the Saint Lawrence. Hamp¬

ton moved to the Canada line ; then, finding that a drought had impaired the water supply on the straight road, marched westward to Chateauguay, N. Y., some 50 miles from the mouth of the Chateauguay River, an affluent of the Saint Lawrence. He remained there three weeks, menacing the British communications and opening up his own, building roads, getting up supplies and artillery, *etc.* On 16 October Armstrong ordered him to approach the river-mouth for convenient junction with Wilkinson; and on the 22d-24th he established himself at Spear's, about 15 miles from the mouth. He had some 4,000 raw troops and 200 dragoons.

Prevost had about 15,000 around Montreal, and the river lined with gunboats and batteries, while Hampton had not even transports, and was in the heart of a hostile country. Prevost could have captured his whole army without much trouble ; but he was really alarmed that Hampton was excellently posted to threaten the communications and supplies on the river.

When Hampton advanced to Spear's, the British militia there retired; but Lieutenant-Colonei de Salaberry with 800 regulars intrenched him¬

self in front on the road to the Saint Lawrence, and filled the road with abattis. Hampton felt it needful to restore his communication with the river, and on the night of the 25th sent a strong flanking party around, while he himself attacked Salaberry in front. The former lost his way, and on this account he did not press his own attack. He lost 50 men, the British 25. Just then he received a message to prepare winter quarters; and feeling sure the campaign was to be abandoned, fell slowly back to Chateauguay, unmolested by Prevost. A week later he re¬

ceived a request from Wilkinson to send sup¬

plies forward and march down the river: he replied that he had none to send, and as Wilk¬

inson evidently had not enough to sustain a forward movement, he should fall back to Plattsburg. Wilkinson received the message the day after his defeat at Chrystler's, and at once went into winter quarters.

CHATEAUNEUF DE RANDON, sha-

to-nef-de-ran-don, France, small town in the department of Lozere, 12 miles northeast of Mende, on a hill. It was formerly fortified, and is celebrated for the four years' siege sus¬

tained by the English garrison in 1380, against the troops of Charles V, commanded by the chivalrous Duguesclin. During this siege the English governor, who had bee'll hard pressed, CHATEAUROUX — CHATFIELD-TAYLOR

promised to surrender to Duguesclin at the ex¬

piration of 15 days, if no succor arrived. Be¬

fore the end of the time agreed upon Dugues¬

clin died, when his successor summoned the governor, who replied that he had given his word to Duguesclin, and would yield to no other. Informed of the hero's death, he said, (<Then I will carry the keys to his tomb.® Ac¬

cordingly the governor sallied forth with the garrison to Duguesclin's tent, and on his bended knees laid his sword and the keys of the town on the bier. In 1820 a simple com¬

memorative monument was erected at the ham¬

let of Bitarelle, on the spot where this event occurred. Pop. 3,541.

CHATEAUROUX, sha-to-roo, France,

capital of the department of Indre, 166 miles south-southwest of Paris, in an extensive plain, left bank of the Indre. It has straight, broad and tolerably well-paved streets, and spacious squares, with a public garden and some fine promenades. The cloth manufactures, in which the wools of Berry are almost exclusively used, are extensive, employing about 2,000 workmen.

Cotton hosiery, woolen yarn, tiles, paper, hard¬

ware, tobacco and parchment are also made ; and there are tanneries and dyeworks. There is likewise a considerable trade in grain, wine, iron, wool, poultry and cattle. The town owes its origin to a castle built in 950 by Raoul le Large, of Deols, still in a tolerable state of preservation. It was considerably extended in the reign of Louis XIII, who constituted it a duchy in favor of the descendants of Henry II of Bourbon, Prince of Conde. It was the prison of Richelieu's niece, the Princesse de Conde, for 23 years. Charles of Bourbon sold it to Louis XV, who conferred it on one of his mistresses, at whose death it returned to the Crown. During the revolution of 1793 it was called Indreville. Across the Indre lie its beautiful suburbs, Christophe and Deols. The church of Saint Andre, the hotel de ville with its Flemish paintings and souvenirs of Napo¬

leon I, and the statue of Gen. Henri Ber¬

trand, a native, are among the points of in¬

terest. Pop. 26,095.

CHATELAIN, shat-lan, Emile Louis

Marie, French philologist: b. Montrouge, 25

Nov. 1851. He is curator of the library of the University of Paris and secretary of the section of science, history and philology of the Prac¬

tical School of Higher Studies at the Sorbonne.

He is editor-in chief of the Revue des Bibliotheques and was in charge of the Dictionnaires Quicherat. He is one of the noted classical philologists of France.

CHATELAIN. See Castellan.

CHATELARD, sha-te-lar. See Chas-

TELARD.

CHATELET, Belgium, manufacturing town

in the province of Hainaut, on the Sambre, five miles east of Charleroi. It contains a number of smelting works and iron foundries. Its chief industries are coal mining and the manu¬

facture of cotton-stufifs, knives, nails and pot¬

tery. Chatelineau, opposite to it, has a pop. of about 11,500. Pop. 11,573.

CHATELET, shat-la', was anciently a

small chateau or fortress, and the officer who commanded it was called chatelain. The word is a diminutive of chateau , formed from castellum, a diminutive of cast rum ; or from castel-latum, a diminutive of caste Hum, castle. The term, in later times, has been applied ' to certain courts of justice, established in several cities in France. The Grand Chatelet, in Paris, was the place where the presidial or ordinary court of justice of the prevot of Paris was kept, consisting of a presidial, a civil cham¬

ber, a criminal chamber and a chamber of police.

The term signified the same at Montpellier, Orleans, *etc.* When Paris was confined to the limits of the old city (cite), it could be entered only by two bridges (Le Petit Pont and Le Pont au Change), each of which was fortified with two towers — a smaller one in the wall, facing the city, and a larger one before the bridge, toward the country. These two exterior turrets were the Grand and Petit Chatelet.

The tradition that the Grand Chatelet was built by Julius Caesar, though adopted by some, is not well supported ; but it is certain that the great tower was standing as early as the siege of the city by the Normans (885). The Grand Chatelet was the castle of the Counts of Paris, and therefore the seat of all the royal courts of justice within the city and county, and also of the feudal court. The city had no proper jurisdiction whatever; its bailiff or pro¬

vost (prevot) was appointed by the king, and was president of the court (though only nomi¬

nally, because he had no voice in the judgments), and, by virtue of his office, leader of the nobil¬

ity. The office of provost of the merchants (prevot des marchands; in other cities maire), established before the former, and afterward united with it for a time, was finally separated from it in 1388. The business of the Chatelet was transacted by the deputies of the bailiff (lieutenants) , of whom there were five, three for civil causes, one chief judge of criminal cases, and a lieutenant-general of police (lieutenant-general de la police). The latter, indeed, was Minister of Police for the whole kingdom, and the extent of his functions and power, particularly after the new arrangement made by the celebrated d'Argenson under Louis XIV, rendered him one of the most important officers of the state. In the Chatelet, however, he held only the fourth place. The whole court of justice was composed of 57 counsellors, with 13 state attorneys and a multitude of subal¬

terns, as 63 secretaries or greffiers, 113 notaries, 235 attorneys, *etc.* All these offices were sold.

The place of the first officer of the civil cham¬

ber was rated at 500,000 livres; that of a notary at 40,000 livres. The Chatelet was first in rank after the Supreme Courts (cours souveraines) .

CHATFIELD-TAYLOR, Hobart C.,

American author : b. Chicago, 24 March 1865.

He was graduated at Cornell University in 1886. In 1888-90 he was editor of America, was consul of Spain at Chicago in 1892-94, and became a member of several honorary societies of Spain, France, Italy and Portugal. He has written (With Edged Tools) (1891) ; (An American Peeress) (1893); (Two Women and a FooP (1895) ; (The Land of the Castanet'

(1896); (The Vice of Fools) (1898); (The Idle Born' (1900); (The Crimson Wing)

(1902); (Moliere ; a Biography' (1906);

(Fame's Pathway' (1909); (Goldoni; a Biog¬

raphy' (1913) and contributions to various magazines and periodicals.

CHATHAM, William Pitt, 1st Earl of

((<The Great Commoner'1), British statesman: b. Westminster, 15 Nov. 1708; d. Hayes, Kent, ll May 1778. He was the younger son of Robert Pitt, M.P. for the family borough of Old Sarum, and afterward of Boconnoc, Corn¬

wall. He was educated at Eton and Trinity College, Oxford. From boyhood he was a martyr to gout — indeed throughout his career he was persistently dogged by ill health ; and he was compelled for health reasons to leave col¬

lege without taking his degree, and was advised to travel. At the age of 23 he ob¬

tained a cornetcy in the Blues, and was re¬

turned M.P. for Old Sarum in 1735. He joined the opposition to Sir Robert Walpole, and in his maiden speech so incensed that minister that he declared ((we must muzzle that terrible cornet of horse,® and Pitt was at once cashiered and his commission canceled. His speeches in the House, however, steadily advanced his reputation in Parliament and the country. He was appointed groom of the chamber to Fred¬

erick, Prince of Wales, who was at enmity with his father, and to whom the members of the Parliamentary opposition looked for promotion or place on his succession on the death of the old king, George II. Pitt soon became the most prominent member of the House of Commons.

His denunciation of Walpole's convention with Spain in 1739 was followed a few months later by that statesman reluctantly embarking in a war with that country, which he conducted with lethargy. Pitt

was the head and front of the opposition to Walpole, and succeeded in driving him from office in 1742. But though driven from office, he was still the power behind the throne. Pitt incensed the King by the freedom with which he denounced the policy of the British Cabinet as conceived in the interest of the King's foreign dominion — (<this absurd, un¬

grateful and perfidious partiality to the German interest. If ministers prefer the interests of Hanover, Parliament regards only the interests of Great Britain.® He also opposed the policy of buttressing Maria Theresa by means of Brit¬

ish money and troops. Pitt afterward modified his views ; but the King was difficult to placate.

In 1744 he received, as a mark of appreciation of his patriotism, a legacy of £10,000 from the Duchess of Marlborough — a welcome wind¬

fall to a man whose private income was only £100 a year. In 1746 Pitt, who had cut himself adrift from the Prince of Wales, received the subordinate post of joint vice-treasurer of Ireland in the Broad Bottom administration, and later in the same year was made paymaster-general of the army. His refusal in the latter office to accept a commission on subsidies to foreign powers and other <(perquisites® of the office — amounting to many thousands of pounds per annum, — which his predecessors and suc¬

cessors accepted, greatly increased his hold on the country. On the death of Pelham he pushed his claims to cabinet rank; but the hostility of the court stood in his way, and Sir Thomas Robinson, a creature of Newcastle's, was ap¬

pointed to lead the Commons. Pitt took his revenge by flouting both Newcastle and Robin¬

son, and in November 1755 he was dismissed from office. He never at any time commanded any number of votes in the Commons — he placated no magnates and he gave no bribes ; his strength lay with the people. He married on 15 Nov. 1754, Hester Grenville, the only sister of Earl Temple, and the marriage was one of unclouded happiness.

Pitt at this period might well have despaired.

The personal hostility of the King appeared unappeasable, and without his consent he could not reach the position at which he aimed and to which the country was insistently calling him.

A series of grave reverses to British arms brought about the fall of Newcastle; the Duke of Devonshire was called upon to form an ad¬

ministration, in which Pitt became secretary of state for the southern department and leader of the House of Commons (4 Dec. 1756). He had the country with him ; but the King and the magnates succeeded in compassing his fall, and in April 1757 he was again dismissed from office. But 11 weeks later he was recalled to office, and then began his great administration which lasted to 5 Oct. 1761. Newcastle was his co-ordinate in the ministry, and in his accom¬

plished hands the patronage and jobbery, were retained; but almost absolute power was in the hands of Pitt. The Seven Years' War had broken out: Frederick of Prussia was

threatened by a confederacy of five powers ; France asserted her claim to the whole of the North American continent from the sources of the Mississippi to Hudson Bay and was bent on hemming in the English colonists to the sea¬

board east of the Alleghanies. Pitt had a true appreciation of the value of sea power and he determined on the destruction of French influ¬

ence in America. He began by expeditions against Rochefort, Saint Malo and Cherbourg, which while they did not achieve any decided success, were of assistance to Frederick in his conflict against the continental alliance. He spared no labor; the plans of campaign, the choice of commanders — in which he discarded seniority — the preparation of the armaments, were all in his hands. (<The ardor of his soul set the whole kingdom on fire,® and he culti¬

vated the loyal co-operation of the colonists in American campaigns. Louisburg was taken ; the valley of the Ohio secured; the conquest of Can¬

ada was completed; the dominating influence in North America passed from France to Great Britain. <(With the triumph of Wolfe, the his¬

tory of the United States began,® says J. R.

Green, the historian ; ((Pitt laid the foundation of the great republic of the West.® Guadeloupe was taken from the French; Boscawen won a

victory off Cape Lagos, and Hawke off

Quiberon Bay. Pitt's reign of power also synchronized with French defeats in India and with the foundation of the British empire in the peninsula. ((The position which Pitt occupied at the end of the reign of George the Second was the most enviable ever occupied by any public man in English history. He had conciliated the King; he domineered over the House of Commons ; he was adored by the people; he was admired by all Europe. He was the first Englishman of his time ; and he had made England the first country in the world.®

George Ill's accession to the throne was followed by the undermining of Pitt's influence: the young monarch was desirous of keeping the affairs of state pretty much in his own hands, and was under the influence of his mother and the Earl of Bute, his groom of the stole. Pitt became aware of the family com-CHATHAM

pact between France and Spain in September 1761, and wanted to declare war on Spain while she was unprepared, and failing to secure his policy, resigned office. He was offered the governorship of Canada or the chancellorship of the duchy of Lancaster; but accepted a pension of £3,000 a year for his own and two lives. In the following year, when Pitt's pre¬

diction became fulfilled and Spain declared war, he urged the vigorous continuance of the war, hy which both France and Spain would per¬

haps have been totally exhausted ; but peace was concluded in 1763. In 1765, Pitt fell heir to the estate of Burton Pynsent in Somersetshire, with a rent roll of £3,000 a year, which was be¬

queathed him by Sir William Pynsent, a man he had never seen, in acknowledgment of his public services.

Foreseeing the separation of the American colonies from the mother

country if the arbi¬

trary measures then adopted should be con¬

tinued, he advocated a conciliatory policy, and in 1766 lent all the weight of his influence in securing the repeal of the Stamp Act. In the same year he was again called upon to form a ministry, in which he took the office of Lord Privy Seal, and was raised to the peerage as Earl of Chatham. His acceptance of this honor was very unpopular ; and in the Upper House he never became the dominating force he had been in the Commons. In the following year sup¬

pressed gout disordered his whole nervous sys¬

tem and drove him into intense mental depres¬

sion ; his intellect became clouded ; he went into retirement and was inaccessible even to his colleagues in the Cabinet ; and so continued until his resignation in 1768. In January 1770heagain denounced the coercive measures employed against the American colonies; from that time till 1774 he was again in retirement; in that and the following year he again pleaded for conciliation, and in 1776 the colonies declared themselves independent. In May 1777 he un¬

successfully moved an address to the Crown praying for a stoppage of hostilities, but he was not willing to recognize American independence.

On 7 April 1778, though laboring under severe illness, he appeared at the House on crutches, with his legs swathed in flannel, and made his way to his place ; and though plainly not him¬

self, spoke movingly on his old theme, the rela¬

tions with the American colonies. At the close of the Duke of Richmond’s reply he stood up again, pressed his hand on his breast and fell down in an apoplectic fit ; and was conveyed to his country seat at Hayes, Kent, where he died a month later. Parliament made provision for his family, his debts were paid and he was honored with a public funeral and a magnificent monument in Westminster Abbey. Another was erected in 1782 at the Guildhall. His popularity in America was very great, and several local¬

ities were named in his honor, as well as Pitts¬

burgh, Pa., and Pittsfield, Mass.

Bibliography. — Many biographies of Chat¬

ham have been written, but an intimate (Life >

it is impossible to write, as the materials do not exist. He had no intimates, and as Lord Rose¬

bery says, <(cut off all vestiges of his real self as completely as a successful fugitive from justice. We know what was around him, the scene on which he played, the other actors in the great drama, and we recognize him on the stage; but away from the footlights he reVOL. 6 — 23

mains in darkness. M Consult <Lives) by Thack¬

eray (2 vols., London 1827) ; von Ruvelle (Eng¬

lishmans, by H. G. Chayter, 3 vols., New York 1907) ; Williams (2 vols., New York 1913) ; and Frederic Harrison (New York 1905) ; his Cor¬

respondence,) edited by Taylor and Pringle (4 vols., London 1838-40) ; his Correspondence with Colonial Governors and Military and Naval Commanders in America, > edited by Kimball (2 vols., New York 1906) ; Winstanley's Cord Chatham and the Whig Opposition >

(Cambridge 1912); Lord Rosebery, Chatham: His Early Life and Connections) (New York 1910) ; and Macaulay's two essays, the most brilliant and the most satisfying brief account of his life and work that has ever been pub¬

lished, and which is never likely to be super¬

seded.

D. S. Douglas,

Editorial Staff of The Americana.

CHATHAM, Canada, city and county-seat

of Kent County, Ontario, on the Thames River, the Grand Trunk and the Lake Erie and De¬

troit River railways, 45 miles northeast of Detroit and 67 miles southwest of London. The Thames is navigable for steamboats from Lakes Erie and Huron. Chatham is trade centre for a rich agricultural, fruit and stock-raising dis¬

trict, and exports large quantities of grain, lum¬

ber, railroad ties, cordwood, potash, tobacco, soap and pork. It is the seat of a United States consulate. It has large saw, flour and woolen mills ; foundries and machine shops ; manufactories of wagons and carriages, soap, candles, potash and tobacco ; and breweries and distilleries. Pop. 10,770.

CHATHAM, Canada, county-seat and port

of entry of Northumberland County, on the right bank of the Miramichi River, 12 miles from its mouth and one mile from Chatham station on the Chatham branch of the Inter¬

colonial Railway, 98 miles northeast of Fredericton. It is the largest town on the north shore of the province. The harbor ac¬

commodates ships of large draught. Chatham has a large export trade in fish, tanning bark, deals, lath and finished lumber. Its manu¬

factories include saw and pulp mills, foundries, shipyard, sash and door factories. The town has many handsome buildings, including two large hospitals, a very fine Central High School and the Ursuline Academy. Its natural attrac¬

tions include Tecumseh Park, set amid beauti¬

ful scenery. It is called the ((Maple City,ˆ and was incorporated in 1855. Pop. 4,666.

CHATHAM, England, now a parliamentary

and municipal borough, naval arsenal and sea¬

port, in County Kent, on the Medway, about 33

miles by rail from London, practically forming one town with Rochester. As a parliamentary borough it includes Gillingham and New

Brompton, and returns one member. The great features of Chatham are the naval and military establishments here and in the vicinity. The dockyard was founded by Queen Elizabeth in 1588, and during this reign Upnor Castle, on the left bank of the Medway, was erected to pro¬

tect the dock and shipping. Despite the fire from the castle, however, in 1667 Van Ghent, a vice-admiral of De Ruyter succeeded in breaking the chain stretched across the river, burned and sank several ships, and retired bear¬

ing off the warship, the Royal Charles, as a /

prize. The former lines of fortifications have been replaced by modern forts. With its recent extensions the royal dockyard now extends for about three miles along the Medway, and is thoroughly equipped with building slips and lloating docks, making it one of the most im¬

portant naval bases in the kingdom. One huge basin has a frontage of 6,000 feet with a width of 800 feet. Up to 8,000 workmen may be at one time employed in and around the dockyard.

The military establishments include extensive infantry barracks, and barracks for the royal marines ; the headquarters of the royal engi¬

neers, arsenal and park of artillery, hospitals, *etc.* The old convict prison has been partly pulled down and replaced by naval barracks.

The fortifications are intended as a defense for London, a protection

against an invasion from the south coast. Chatham is one of the chief shipbuilding towns of England. Charles

Dickens lived some time in Ordnance place, Chatham. The remains of a Roman cemetery have been discovered at Chatham. Pop. of municipal borough 42,250; of the parliamentary borough 92,686.

CHATHAM, N. J., borough in Morris

County, 15 miles west of Newark, on the Passaic River and the Lackawanna Railroad. It is mainly a residential suburb of New York, Jersey City and Newark, but has important interests in the rose-growing industry of the district. In 1892 it was incorporated as a vil¬

lage and as a city five years later. The electric¬

lighting plant and the waterworks are municipal property. The government is vested in a mayor and council, elected every year. Pop. (1920) 2,421.

CHATHAM ISLAND, the most important

of the Galapagos Archipelago (q.v.), 600 miles from Ecuador, which owns the group, and uses Chatham, Charles and Albemarle as penal set¬

tlements for political offenders. Chatham Is¬

land came into international prominence when unsuccessful negotiations were opened with Ecuador in March 1900, to buy it for a Pacific coaling station.

CHATHAM ISLANDS, in south Pacific

Ocean, belong to and are 536 miles east of New Zealand. The group, three in number, area, 375

square miles, are in lat. 44° 7’ S. ; long, about 176° 49’ E. The group is of volcanic origin.

Chatham, the largest island, is about 38 miles long and 25 broad. The other islands are Pitt Island, 12 miles long by 8 broad; and Ranga Tira, a mere rock. The harbor of Waitangi, on the west side of Chatham Island, is fre¬

quented by whaling vessels, which there supply themselves with fuel, provisions and water.

There are few hills in the island, and the highest does not exceed 800 feet. In the interior of the largest island is a brackish lake. The soil is in many places fertile, and crops of potatoes and wheat have been successfully and extensively cultivated and exported. Turnips, cabbages, pumpkins and tobacco are also successfully cul¬

tivated. The creeks and shores abound in fish, many of them excellent ; sharks of formidable size are numerous. Stock raising and seal fish¬

ing are prominent industries. The original in¬

habitants, now nearly extinct, are a cheerful and good-natured race. About the year 1830

they amounted to some 1,200. In 1911 the popu¬

lation was 453 (234 Europeans and 219 Maoris and Morioris) ; in 1915 the population was 267 ; of these 171 were males and 96 females. The Chatham Islands were discovered by Lieut.

William Robert Broughton, of H.M. brig Chat¬

ham, and taken possession of by that officer in name of his Britannic majesty, 29 Nov. 1791.

CHATI, cha’te, a wildcat (Felis mitis), ranging from Mexico to Paraguay, in warm lowlands and woods. The body, including the head, is from 24 to 27 inches long, the tail about 14 to 18 inches. The fur is soft and tawny, spotted with black. This cat is by some natural¬

ists considered a variety of the margay (q.v.).

CHATILLON-SUR-SEINE, sha -te-yon-

sur-san, France, a town, and capital of an arrondissement in the department of Cote d'Or, 45 miles northwest of Dijon, on the Seine.

There are interesting mediaeval churches and a castle built by Marmont, which is surrounded by a large park. Napoleon held a congress here with the Allies in 1814. Pop. about 5,000.

CHATMOSS, an extensive morass, area

about 6,000 to 7,000 acres, situated chiefly in the parish of Eccles, Lancashire, England. It is remarkable as being the scene of operations for reclaiming bog-land, first successfully carried out on a large scale in the end of the 18th and beginning of the 19th century; also for offering one more field of triumph to George Stephen¬

son, who carried the Liverpool and Manchester Railway over it after all other engineers had declared the feat impossible. Stephenson spread branches of trees and hurdles inter¬

woven with heather on the surface of the bog, and placed a thin layer of gravel over all ; upon this sleepers and rails were laid in the ordinary way.

CHATRIAN, sha-tre-an, Alexandre. See

Erckmann — Chatrian.

CHATSWORTH, England, the celebrated

estate of the Dukes of Devonshire, situated in the parish of Edensor, in Derbyshire. It was among the domains given by the Conqueror to his natural son, William Peveril. It was pur¬

chased in the reign of Elizabeth by William Cavendish, who commenced to build a mansion on it, which was completed by his widow, the Countess of Shrewsbury. Mary, Queen of Scots was imprisoned here for 13 years. The present building was nearly completed by the 1st Duke of Devonshire, and a new wing was added by the 6th duke.

CHATTAHOOCHEE, a river in the

northern part of Georgia, rising in the Appala¬

chian Mountains, and flowing first west and then south, forming, for a considerable dis¬

tance, the boundary between the above State and Alabama. In its lower course, after the junction of the Flint River from the east, it is named the Appalachicola, and is navigable to Columbus for steamboats. Total course, about 550 miles.

CHATTAHOOCHEE STAGE, in Amer¬

ican geology, rocks laid down in older Miocene, or according to more recent authorities, in Oligocene time along the Atlantic coast of what was then the continent of North America.

Strata of this stage probably extend, except for a break in Maryland and Virginia, from Cape Cod to Texas, and in the north are clays

and uncompacted sand, changing to limestones in the south. See Oligocene Series; Tertiary System.

CHATTANOOGA, Tenn., city and county-seat of Hamilton County, an important rail¬

road, trade and manufacturing centre, on the south bank of the Tennessee River, and on the Southern, Central of G., Nashville, C. & Saint L., Cincinnati, N. O. & T. P., Alabama G. S.

and other railroads. It is situated near the Georgia and Alabama boundaries, at the base of the Cumberland Plateau, 698 feet above the level of the sea. It is the centre of, and the largest place in, the

quadrangle formed by Nashville and Knoxville, Tenn., Birmingham, Aia., and Atlanta, Ga., distant respectively 151, 112, 143 and 137 miles. The lines radiating from Chattanooga terminate in 43 important cities of nine States, and communicate with an area containing one-third of the population of the United States. The district around Chat¬

tanooga, as the gateway of the Cumberland Range between the three States, was one of the greatest strategic points during the Civil War, and is historic for many bloody and famous battlefields. To the southwest is Lookout Mountain, commanding a superb view of six or seven States ; on the east is Missionary Ridge; and south by east, a few miles away in Georgia, is the field of Chickamauga, now turned by the government into a national mili¬

tary park of 6,000 acres. Adjoining the park is Fort Oglethorpe, a regimental cavalry post in connection with which, for purposes of the World War, there are a regular army camp, medical corps training camp, base hospital, prison for dangerous aliens ; also a training camp for line officers, the third group of whom finished the course in April 1918. The medical camp is being enlarged and seems destined to be the chief medical corps training camp of the United States. At the southwest corner of the old city line is a national cemetery, one of the largest in the country, containing 13,362 graves.

The whole region is a noted tourist resort, for historic and scenic reasons, served by 98 miles of street railroads, including the celebrated 4,750 feet incline up Lookout Mountain.

Public Buildings. — The city has many fine buildings, among which may be mentioned the Municipal building, costing $200,000; the Hamil¬

ton County courthouse, costing $500,000, of Tennessee marble, a beautiful and imposing structure; the Federal building; the James building; the Hamilton building; the Times and the News buildings; Hotel Patten, costing $1,-

000,000; Read Hotel; Signal Mountain Inn, which is 2,200 feet above sea-level, although only 40 minutes distant from the business dis¬

trict, with golf, fishing, boating and bathing as amusements ; Grand Hotel ; Y. M. C. A., cost¬

ing $150,000; Y. W. C. A., costing $100,000; City High School and

Central High School ; Carnegie Library; Terminal Station, cost¬

ing $1,000,000; Volunteer State Life Insur¬

ance Company building, costing $500,000; and many beautiful churches. The Baroness Erlanger Hospital, Pine Breeze Tuberculosis Sanitarium, Old Ladies' Home, Vine Street Orphans' Home, Frances Willard Working

Girls' Home and Kosmos Cottage are the prin¬

cipal charitable institutions. For higher educa¬

tion the city contains the University of Chat¬

tanooga, which has now new and modern

buildings made possible by a $500,000 endow¬

ment ; several preparatory schools, including one for girls; and the Chattanooga College of Law.

Trade and Manufactures. — The river here is navigable eight months in the year, and the Mussel Shoals Canal gives unbroken passage to its mouth by the Chattanooga Packet Com¬

pany, which operates boats and barges regu¬

larly to Ohio River points at a considerable saving in freight over the railroad rates; while northeastward, steamers run to Kingston, and at high water to Knoxville, 200 miles, by water.

But the great and growing importance of Chat¬

tanooga is in manufacturing, which it owes to its hydro-electric power derived from the Ten¬

nessee and Ocoee rivers (cost of plants $15,-

000,000), and the adjacent deposits of coal, iron (20,000 tons of coal and 8,100 tons of iron ore are mined daily), clays and many other minerals, and the forests. Articles made from wood, iron, steel and cotton can be manufac¬

tured more cheaply in Chattanooga than any other place in the South.

The United States Department of Com¬

merce summary for manufactures shows a con¬

sistent increase at the census of 1914, as com¬

pared with that for 1909. This census covers only the factories in the corporate city; those in the immediate suburbs are large and increase the real totals very materially. In 1914 the value added by manufacture was $9,503,000, and in 1909, $7,602,000, the increase being $1,901,-

000, or 25 per cent. The value added by manu¬

facture in 1914 formed 48.4 per cent of the total value of products, and in 1909, 47.4 per cent. The salaries and wages in 1914 amounted to $5,461,000, and in 1909 to $3,995,000, the in¬

crease being $1,466,000, or 36.7 per cent. In 1914 the number of salaried employees was 1,173 as compared with 972 in 1909, making an increase of 201, or 20.7 per cent. The average number of wage earners in 1914 was 7,085, and in 1909, 6,410, the increase being 675, or 10.5

per cent. The capital invested, as reported in 1914, was $20,615,000, a gain of $4,490,000, or 27.8 per cent, over $16,125,000 in 1909. The cost of materials used in 1914 was $10,149,000

as against $8,434,000 in 1909, an increase of $1,715,000, or 20.3 per cent. The average cost of materials per establishment in 1914 was approximately $36,000, and in 1909 $45,000.

The value of products in 1914 was $19,652,000, and in 1909, $16,036,000, the increase being $3,-

616,000, or 22.5 per cent. These figures cover only the factories in the corporate city. As very many large plants are in the immediate suburbs the industrial statistics of metropolitan Chattanooga are much increased. Chattanooga has a very active Chamber of Commerce with several hundred members ; the Chattanooga Manufacturers' Association, embracing 130 of the most important of the city's 300 industries, and housing a permanent exhibit of Chattanooga made

goods, showing a majority of the 1,200

varieties made there; the Chattanooga Whole¬

sale Dealers' and Jobbers' Association, Retail Merchants' Association, Builders' Exchange, Business Men's Club, Society of Architects, Rotary Club and other organizations.

Banks. — Chattanooga has 11 banks, includ¬

ing three national banks, representing a total capital and suriius of $5,126,000. During the 356

year 1909, the bank clearings amounted to $76,-

882,444.93, while those in 1915 were $120,140,500, or a gain of more than $43,250,000, and in 1917

the total was $205,456,856.

Government and Finances. — Chattanooga

has the commission form of government — a board, mayor and four commissioners. The annual expenditures are about $700,000, the heaviest annual item being $100,000 for schools.

In 1915 the assessed valuation was $32,000,000, the debt about $3,000,000 and the municipal tax rate 16.50 on a thousand.

Schools, Churches, *etc.* — Chattanooga's

school system has developed with the growth of the city. The pupils number more than 8,300

and the teachers and principals number about 200. Warner Park is the

municipal play¬

ground. There are 120 churches in the city.

Population and History. — Chattanooga,

originally called Ross Landing, first appears in the census in 1860 with 2,545 people. In the Civil War, being a storm centre, it was nearly destroyed; but as in the case of some other Southern cities, the war was its making. It was an important military post, and the iron industry started in a rolling-mill opened in order that the ruined railroads might be re¬

built. The attention of capital had also been called to its great advantages of situation. In 1870 it had a population of 6,093 ; in 1880, 12,892; and in 1890, 29,100. The growth of the city was retarded by the general business de¬

pression which followed the financial reverses of 1893 ; but a revival came with the concentra¬

tion of some 70,000 soldiers there in 1898, and the consequent immense disbursements. Since then it has been rapidly moving forward. The 1910 Federal census credits the city with 44,604

people in the corporate limits, and the 1920

official count of the census bureau, with 57,895 in the same area. The directory census, multiple two and two-fifths, gives the city and immediate suburbs over 105,000. The incor¬

porated area is less than seven square miles.

The increase in school attendance, post-office receipts, bank clearings, deposits, manufactur¬

ing, etc., has been very large in recent years. A number of good industries have been added, some, even, during the business depression. One of the greatest elements of success in expand¬

ing Chattanooga's industrial life, since the Chamber of Commerce organized a specialized industrial bureau, has been through analyzing the community's needs and encouraging plants to manufacture commodities which have a home market for their products. Some of

the im¬

portant new lines added to the list since the bureau's inception are aluminum salt, stamped enameled ware, box-board paper, glass caskets, roofing, excelsior, handles, shovels, ferro-alloys, skirts, hames and singletrees and breakfast foods. Chattanooga now has more than 300

factories producing over 1,200 different articles.

The textile industry is developing in a large way at Chattanooga, the city enjoying its full share of the benefits resulting from the policy of manufacturing cotton near the cotton fields.

Hal F. Wiltse,

Secretary of Chamber of Commerce.

CHATTANOOGA, Battle of. At the close

of the battle of Chickamauga, Ga., 20 Septem¬

ber, the Union army, in withdrawing from the field, having interposed at Rossville, Ga., be¬

tween Bragg and Chattanooga, advanced into that city the night of the 21st and morning of the 22d, and immediately began to fortify it.

Bragg followed on the 22d, and his lines were soon established in front of the place, his left resting on the Tennessee River and Lookout Mountain, below the city, his centre extending across the plain to the foot of Missionary Ridge, his right being established at the foot of the ridge and reaching toward the Tennessee River above. The north point of the Lookout Moun¬

tain range is three miles southwest of Chat¬

tanooga, and Missionary Ridge the same

distance east of it, the mountain and the ridge being parallel, running nearly north and south and about four miles apart. The Tennessee River touches the base of Lookout. The city lies to the northeast in a great bend of the river.

The advance line of the Confederates was half way between the ridge and the city, upon a low intermediate ridge, at the right of which was Orchard Knob, an isolated knoll rising some 60 feet above the plain.

Lookout Mountain commanded the river line to Bridgeport and Stevenson, the main depots of supply. This necessitated a wagon-haul of 60 miles over the Cumberlands and the adja¬

cent range of Walden's Ridge, all precipitous and barren mountains. The Union army was soon running short of supplies, the fall rains rendering the roads almost impassable. On 19 October, the day that Rosecrans had per¬

fected the general features of a plan for re¬

gaining the river line of supplies, he was re¬

lieved from command and Gen. Geo. H.

Thomas assigned, who at once ordered the prep¬

arations inaugurated by Rosecrans to go forward.

Immediately after the battle of Chickamauga General Hooker with the 11th and 12th

corps was sent from the Army of the Po¬

tomac and arrived at Bridgeport, Tenn., 30

September. Sherman, in camp east of Vicks¬

burg, had been ordered up with four divisions.

Grant was sent to take general command. Upon arriving, 23 October, he approved the plans for opening the river, and directed their execution.

General Hooker was to advance into Lookout Valley, and a co-operating force from Chatta¬

nooga under Gen. W. F. Smith was to seize Brown's Ferry below Lookout Mountain, throw a bridge there and form a junction with Hooker. These movements were successfully executed during 27 and 28 October. The 11th corps (two divisions) and Geary's division of the 12th corps entered Lookout Valley the afternoon of 28 October, the 11th corps pro¬

ceeding to Brown's Ferry and formed a junc¬

tion with General Smith's troops from Chatta¬

nooga. Geary, with six regiments of his divi¬

sion, halted near Wauhatchie Station. At mid¬

night of the 28th Geary was attacked by Jenkins' (Hood's) division, six regiments, of Longstreet's corps, supported by Law's division.

Schurz's division coming to Geary's support, Longstreet's troops after three hours' fighting withdrew to the east side of Lookout, and the Wauhatchie or Lookout Valley remained there¬

after in Union control. Abundant supplies by the river then reached Chattanooga by a short wagon-haul from Brown's Ferry. On 4 No¬

vember, shortly after the battle of Wauhatchie, Longstreet's corps was detached by Bragg and sent to Knoxville

CHATTANOOGA, TENN.

*»w»w

"MW*

pni

ifflitfgi

Mss#

■■■

mm*

mw*

!**w»

■WHS

U«W5*

mm

isrm

1 View from Cameron Hill, Chattanooga, showing River Front 2 Portion of Business District and Missionary Ridge in Background 3 View of Downtown Chattanooga from the Courthouse V

CHATTANOOGA, BATTLE OF.

The battle of Chattanooga, which occurred three weeks later, embraced three days' opera¬

tions, 23, 24 and 25 November. At the opening Bragg's lines were as already described.

Hooker, with Geary's division and Cruft's from the 4th corps of the Army of the Cumberland, occupied Lookout Valley, the Army of the Cum¬

berland and the 11th corps were on the lines about Chattanooga, and Sherman with three divisions had crossed at Brown's Ferry and was concealed behind the hills above Chattanooga and on the opposite side of the river from the city.

General Grant's force for his firing lines was sweeping south they were to clear the ridge and the valley. As the engagement progressed, every feature of this plan was changed by unex¬

pected developments.

At noon, 23 November, General Thomas,

being directed by Grant to ascertain if the Con¬

federates still occupied their lines and camps between the city and Missionary Ridge, paraded five divisions in full view of the Confederate positions, which, as was afterward ascertained, was at first supposed to be a review. Wood's division was in the centre advanced, Schurz's and Steinwehr's divisions of the 11th corps were reformed on the left, and Sheridan's and SCALE Of M1LE3

SHEMriAN'S

cnos«iN<

brown-

orcharctt.

ROSSViut/

Chattanooga, Tenn., and vicinity.

A ˆ

WAUHATCm*

about 60,000, and the Confederates' a little less than 40,000. The formidable natural positions of the latter were held to give them superior advantages.

Grant's plan of battle was for Hooker to hold Lookout Valley against Bragg's left. Sher¬

man was to cross the Tennessee opposite the north end of Missionary Ridge, which was un¬

occupied, and carry it to the railroad tunnel about half a mile south of its northern end.

Sherman, then, astride of the ridge, was to move south ; while Thomas, with the Army of the Cumberland before the city, was to con¬

nect its left with Sherman's right, and together Baird's on the right. At a bugle signal at 1 :30

p.m. the centre advanced rapidly, and, after a sharp contest, captured

Orchard Knob, and forced the abandonment of the entire line of the Confederates through the centre of the plain, reversed the works at and near the Knob and held them. This was the first day's battle.

The night of the 23d Sherman with three of his four divisions which had reached his con¬

cealed camps opposite the city and north of-it, marched to the North Chickamauga, where 116

pontoon boats awaited him. These were filled with soldiers, floated down the creek to the river and thence to the opposite shore, and by 358

daylight of the 24th 8,000 of Sherman's troops were in line fronting Missionary Ridge, two miles from it, and opposite its northern extrem¬

ity, which point was not occupied by the Con¬

federates until 2 :30 in the afternoon. At 1

o'clock the three divisions, and one from the Army of the Cumberland which had covered the movement having crossed, the lines were advanced, and at 4 o'clock a range of unoccu¬

pied hills north of and overlooking the north end of Missionary Ridge was occupied without resistance, and strongly entrenched under the supposition that these formed the north end of the ridge contemplated in the order of battle.

The mistake was due mainly to the misty weather, and the omission of any recon¬

naissance.

At 2.30 p.m. Cleburne's division arrived at the north point of the ridge

and entrenched.

General Thomas, having obtained Grant's

permission to make a demonstration against the Confederate position on Lookout, Hooker made ready to move at an early hour on the 24th.

The Confederates held the top of the moun¬

tain, which was a narrow plateau 1,700 feet above the valley, protected by perpendicular palisades varying from 75 to 250 feet high.

From the foot of these walls of rock the moun¬

tain sloped westward to Hooker's position in Lookout Valley eastward to the plain south of Chattanooga, while its north slope descended to the Tennessee River opposite Moccasin Point.

It was approximately a mile and a half from the foot of the palisades to the valley. The bat¬

tle took place on these slopes. No Union troops reached the top of the mountain during the engagement. The morning of the 24th, Brown's and Pettus' brigades of Stevenson's Confeder¬

ate division, with a battery of four Napoleons, occupied the summit, and Walthall's and Moore's brigades of Cheatham's division the slopes of the mountain, Walthall's holding the western slope and Moore's the northern.

Hooker's forces consisted of three brigades of Geary's division of the 12th corps, two brigades of Cruft's division of the 4th corps, and two brigades of Osterhaus' division of Sherman's army. This latter division had been prevented from following Sherman over the river by the breaking of the pontoon bridge at Brown's Ferry. Hooker's aggregate strength was something over 9,000. Walthall's brigade, which sustained almost the entire attack until the western and northern slopes had been car¬

ried, did not number over 1,700. There were 250 men of Moore's brigade on picket, which were mostly captured early in the

engagement.

The head of Hooker's column crossed Look¬

out Creek at Light's Mill near Wauhatchie, at 8 o'clock in the morning, and, concealed by the fog which hung over the mountain, marched directly up the western slope until the head of the line reached the base of the palisades. His line then faced toward the north point of the mountain, distant about two miles.

After an advance of a mile and a half with Geary's brigades, Cobham's, Ireland's and Candy's, in advance, and Whitaker's of Cruft's division in reserve, the troops struck the left flank of Walthall's line protected by slashed timber. This was carried, and in the face of stout resistance the Confederates were driven around the north point of the mountain, and across its northern slope. As Geary's attack opened, first Grose of Cruft's division and next Wood and Williamson of Osterhaus', succes¬

sively joined the left of the lines, and advanced with the swinging movement on the slopes of the mountain. Until the northern slope had been carried to the Craven House, Walthall had no assistance. Moore advanced as he was being pushed back from the Craven House, but was immediately repulsed. Pettus arrived at 1

o'clock and relieved Walthall after he had with¬

drawn some 400 yards from the Craven House.

This enabled Walthall to procure ammunition, reform and take his place on the line again.

This position was held until 3 o'clock in the morning, when, the troops and supplies from the top having been withdrawn and safely started across the plain for the Missionary Ridge line, this final line was also withdrawn, and the mountain abandoned. The troops on the summit, on account of the fog, could do little damage to the Union lines. Hooker was materially assisted by batteries on the elevated points in Lookout Valley, and those across the river on Moccasin Point, which swept the north¬

ern slope. The next morning the Union forces occupied the summit.

The capturing of Lookout Mountain decided General Bragg to withdraw his whole army from the plain to the crest of Missionary Ridge, except as heavy picket forces were left in the entrenchments at the base of the ridge.

Hooker's losses at Lookout, and the next day at Missionary Ridge, which were small but not definitely reported, were : killed, 81 ; wounded, 390. The Confederate loss was: killed, 21 ; wounded, 177. Walthall lost 845

captured, mostly from his long picket line at the base of the mountain. Moore's missing were 199, and Pettus' 9.

During the night of the 24th and the early morning of the 25th, Bragg concentrated his army on Missionary Ridge, and in the earth¬

works at its base. This was his first occupation of the crest of the ridge in force. His new line extended from Rossville, a distance of eight miles to the north end of the ridge, his divisions from Rossville northward being Stewart's, Breckinridge's (Bate's), Hindman's (Patton Anderson's), Cheatham's, Walker's, Stevenson's and Cleburne's.

The battle of the 25th opened soon after 7

o'clock by an assault of Sherman upon the north end of the ridge, defended by Cleburne. Sher¬

man's force consisted of his own divisions of Morgan L. Smith, Hugh Ewing and John E.

Smith, with the divisions of Jeff. C. Davis from the Army of the Cumberland, and Schurz and Steinwehr of the 11th corps. While the four brigades of Corse, Mathies, Raum and Giles A. Smith reached the crest at different periods, none was able to maintain position there, though Corse and Smith held on stub¬

bornly under the crest until toward evening, when all were driven from the slopes. The fighting of the troops sent in was persistent and

most courageous, but Cleburne, at first alone, and later supported by Stevenson's division and a part of Walker's repulsed all assaults. The last one, about 3:30 p.m., was especially serious.

Grant, on Orchard Knob, observing this re¬

pulse, ordered General Thomas to advance his four divisions at the centre against the earth¬

works at the foot of the ridge as a diversion in favor of Sherman, hoping thereby to cause the CHATTEL — CHATTEL MORTGAGE

withdrawal of Confederate forces from his lront. Fhe four divisions which were ranged along the Orchard Knob line were, from left to right: Baird, Wood, Sheridan and Johnson.

The line was two and a half miles long, and faced the ridge at distances from three-quar¬

ters of a mile to a mile from it. There were 11

brigades and 89 regiments in the lines as pre¬

pared for the assault. The formation was such as to present the appearance of being four lines deep. At a signal of six. cannon shots from Orchard Knob the four divisions rushed for the earthworks at the foot of the ridge.

On the summit opposed to this advance were 13

brigades and 16 batteries. The cannonading of nearly 100 guns from the crest was terrific, and the line was soon under rifle-fire from the works at the base, but the entire line of earthworks was captured as soon as the troops by running could reach them. Reforming their lines in the earthworks, Baird's division on the left and Johnson's on the right began the storming of the ridge without further orders. In Baird's division the horses of field officers had been left behind at the start, because as he announced he had intimations that the intention was to go to the summit, and it was easy to see that the slopes were too steep

for mounted men to ascend.

In the same way Johnson's men were informed at the start that the movement was to be an attack on the ridge. At the centre in Wood's and Sheridan's divisions the orders as under¬

stood by most were to stop at the rifle-pits, but the men ignored these and started forward, and soon orders were received to go to the top.

The whole line of brigades gained the crest so nearly together that it has always been difficult to determine which, if any one, was the first.

The long lines of the storming party moved up the slopes with few checks, and in an hour had carried three miles of the crest and cap¬

tured 37 guns and about 2,000 prisoners.

Just as the orders were given Thomas for this assault at the centre, Hooker, who had de¬

scended Lookout at 1 o'clock and started to attack the south end of the ridge in Rossville Gap, reached that position. He had been de¬

tained by the necessity of rebuilding a bridge over Chattanooga Creek. He at once sent Osterhaus's division through the gap and turned it north along the east side of Missionary Ridge.

Cruft's division assaulted and carried the south end of the ridge in the gap while Geary moved along the western base of the ridge and finally ascended to the crest, reaching it soon after the right of Thomas' assault had occupied it.

As Baird's division reached the crest, it turned northward and became hotly engaged with Walthall's brigade, assisted by Jackson's and Moore's, of Cheatham's division. Dark¬

ness coming on, the fighting ceased. Walthall's stand across the ridge had made it possible for Cleburne's, Stevenson's, Walker's and Cheat¬

ham's divisions to withdraw in order and un¬

molested. The centre and left retreated in gen¬

eral confusion, Bate's division, however, soon rallying for a stout resistance as rear guard.

Two myths of the battle have gained gen¬

eral currency. The movements of the Confed¬

erate troops which retired from Lookout Moun¬

tain and were early sent to confront Sherman gave rise to the report that Bragg was weaken¬

ing his centre to concentrate against Sherman.

But not a single soldier or gun was sent from the centre against Sherman during the day. On the contrary, three brigades, John C. Brown's, George Maney's and Alfred Cummings', were hurried from Sherman's front to resist the assault of General Thomas at the centre.

The second long perpetuated error is that when General Sherman advanced to the unoccu¬

pied hills beyond the north end of Missionary Ridge he had carried the ridge to the tunnel as was contemplated in the order of battle. He did not secure any portion of the ridge during the battle, although those troops which were put in fought desperately. Eleven brigades of his force were held as reserves and were not engaged, General Sherman thinking it necessary to guard against an attack upon his left. Bragg was promptly pursued. His rear guard made a stubborn stand at Ringgold Gap, but his army was first rallied at Dalton, where it remained until the opening of the Atlanta campaign in the spring of 1864.

The losses at Chattanooga, including the three days' battles and the affairs in pursuit to Ringgold, were for Grant : Killed, 753 ; wounded, 4,722; missing, 349; total, 5,824; for Bragg: Killed 361; wounded, 2,180; missing, 4,146; total 6,687. Consult (War of the Re¬

bellion Records) (Vols. XXX and XXXI, Parts 1 and 2).

H. V. Boynton.

CHATTEL (O.F. chatel, property), prop¬

erty movable and immovable, not being free¬

hold. The word chattels is originally the same word with cattle, all property being reckoned in early periods by the number of heads of cat¬

tle possessed, or their equivalent. The word ˆcapital® also has the same origin. From the fact that cattle were reckoned by the head, it appears probable that they were called capitalia (from the Latin caput, the head), which be¬

came contracted by syncope into captalia, and then catalia, whence the legal term catalla, and our ˆchattels® and (<cattle.® Hence the word chattels signified originally only movable prop¬

erty, but in course of time came to be applied to all property not held in feudal tenure. Chat¬

tels are divided into real and personal. Chat¬

tels real are such as belong not to the person immediately, but dependency upon something.

Any interest in land or tenements, for example, is a real chattel ; so also is a lease, a rent for a term of years, an interest in advowsons, *etc.*

Chattels personal arc goods which belong im¬

mediately to the person of the owner, and in¬

clude all movable property. Chattels usually pass to the executor, except such, for instance, as trees, which may not be severed from the freehold, and therefore pass to the heir. But objects forming part of the real estate may be¬

come chattels upon being separated from it, as for example, ore, oil, timber, *etc.* Chattels per¬

sonal, at common law, are transferable by agreement, when the

transfer is made for a consideration; but if the transfer is made through a gift, the delivery of the chattel is necessary to confer title on the guarantee.

CHATTEL MORTGAGE, a transfer of

personal property as security for a debt in such manner that upon default the chattel becomes the property of the mortgagee. In the absence of statute no special form is necessary, the terms depending to a great extent on the inten¬

tion of the parties. Between the parties to a 360

mortgage, a delivery is not necessary, but to be binding on creditors, delivery to the mortgagee or notice to the creditors is necessary. In mortgage, title and possession pass ; in pledge, possession passes, but title remains in the pledgor. At common law it was necessary for the chattel to be in possession of the mort¬

gagor at the time the mortgage was given, so as to be binding against creditors; but if the mortgagor acquired title after the mortgage had been given, it was good as between the parties, but not as to creditors. In equity a chattel mortgage is considered in the nature of an executory agreement. See Mortgage.

CHATTERERS, formerly the popular

name of certain insessorial birds of the family Ampelidce , genus Ampelis, as the Bohemian chatterer or waxwing (A. garrula) and the chatterer of Carolina (A. ccdrorum) . Now the Cotingidce. See Waxwing.

CHATTERTON, Edward Keble, English

journalist and author: b. Sheffield 1878. He was educated at Oxford,

went to London and entered journalism, wrote on art and the drama for several journals; became sub-editor of the Art Record in 1902; sub-edited John Ruskin's manuscripts for the Library edition of Ruskin 1902-03 ; was London correspondent of the Sheffield Weekly Independent 1902; sub-editor of the Daily Mail and editor of the Lady's Realm 1904-06, and its dramatic critic in 1904—08. In September 1914 he received a tem¬

porary commission as lieutenant in the Royal Naval Volunteer Reserve and was appointed to the command of a patrol yacht. His published works include 'T. Sidney Cooper, R. A.: His Life and Art) (1903); 'Sailing Ships: The Story of their Development from the Earliest Times to the Present Day* (1900) ; 'The Mar¬

riages of Mayfair* (1909); 'Modern Journalism) (1909); 'Steamships and their Story*

(1910) ; Town Channel in the Vivette* (1910) ; 'The Romance of the Ship* (1910) ; 'The Boy's Book* (1910) ; 'Story of the British Navy* (1911); 'Fore and Aft* (1911); 'Ships and Ways of Other Days* (1913) ; 'The Romance of Piracy* (1914) ; 'Daring Deeds of Famous Pirates* (1916).

CHATTERTON, Thomas, English poet:

b. Bristol, 20 Nov. 1752; d. there, 25 Aug. 1770.

At about 10 years of age he acquired a taste for reading, which became a ruling passion.

Melancholy gave way to vivacity and vanity, and dreams of immortality. His father had accidentally obtained possession of a num¬

ber of old parchments of the 15th century.

Many of these were put to domestic uses in the family or served in the making of dolls, but several fell into the hands of Chatterton, who after a few days declared that he had dis¬

covered a treasure. He then procured glos¬

saries of the old dialects of the country, and in 1768, when the new bridge at Bristol was com¬

pleted, he inserted a paper in the Bristol Jour¬

nal, entitled ‘A Description of the Friar’s First Passing Over the Old Bridge, Taken from an Ancient Manuscript.* He was then but 16 years old. Upon being questioned as to the manner in which he had obtained it, he finally asserted that he was in the possession of several valuable old manuscripts, taken from an old chest in Redcliffe Church. He had been engaged for a year in the composition of several poems, which he attributed to different ancient writers, particularly to one Rowley.

In 1769 he ventured to write to Horace Wal¬

pole, who was then engaged upon his ‘Anec¬

dotes of Painters,* giving him an account of a number of painters who had flourished in Bris¬

tol, which Chatterton pretended to have dis¬

covered along with several ancient poems in that city, and received a polite answer. Dis¬

contented with his situation, he went to Lon¬

don. The favorable reception which he there met with from the booksellers inspired him with new hopes. He wrote for several jour¬

nals on the side of the opposition and in¬

dulged the hope of effecting a revolution, boast¬

ing that he was destined to restore the rights of the nation. Failing to procure the rewards which he had expected, his situation daily be¬

came worse. Although extremely temperate, and often voluntarily confining himself to bread and water, he was frequently destitute even of these necessaries. At last, after hav¬

ing been several days without food, he poisoned himself in 1770, when not yet 18 years old.

His works were extensively read as the public became acquainted with the history of his mis¬

fortunes. The most remarkable are the poems published under the name of Rowley, which he composed at the age of 15 years. They

display a vigorous and brilliant imagination, fertility of invention and often a deep sensibility.

Among the poems which he published under his own name his satires deserve the preference.

His prose writings are spirited. Professer Skeat's edition of his poems is one of the best.

His collected works were published in' 1803.

See biographies by Dix (1837), Wilson (1869) and Masson (1875).

CHATTOPADHYAYA, shat-to pad-hya'-

ya, Bankim Chandra, Indian novelist: b. 27

June 1838 at Katalpara in the District of Twenty-four Pargannas, Bengal, India. Jadav Chandra Chattopadhyaya, Bankim's father, was an official in the service of the government.

Bankim Chandra was educated both at Hugh College and at the Calcutta Presidency College.

He was the first to receive the B.A. degree from the Calcutta University in 1858. In recognition of his services as a magistrate, the British authorities conferred on him the titles of Rani Bahadur and C.I.E. He was fond of literature even as a boy. At the age of 15, he published a book of poems entitled 'Latit O Manash.* His first novel, 'Durgesh Nandini,* was published in 1864. This book created a literary sensation in Bengal and the author was hailed as a great literary genius.

Tagore has won an international fame, but Bankim is called in Bengal, "The Emperor of Bengali Literature.** His principal novels are 'Durgesh Nandini,* 'Kapal Kundala,* 'Mrina-li ,* 'Bish-Briksha,* 'Chandra Shekhar,*

'Krishna Kanter Will,* 'Debi Chowdharani,*

'Ananda Math,*. 'Sita Ram,* 'Raj Singha,*

'Rajani,* 'Indria.* Two of his most im¬

portant religious books are 'Krishnacharit*

and ‘Dharmatatwa.* Ever since the advent of the Nationalist movement in India, Bankim Chandra’s ‘Ananda Math* has become exceed¬

ingly popular. This novel deals with the Sannyasi rebellion of 1772. The famous

national song of India, “Bande-Matarani,** ap¬

pears in this book. This was used, as it is to-CHAUCER

day, as a rallying cry against the English.

The song, in part, reads thus translated: Mother, hail!

Thou with sweet springs flowing,

Thou fair fruits bestowing.

Cool with zephyrs blowing,

Green with corn-crops growing,

Mother, hail.

Though now seventy million voices through thy mouth sonor¬

ous shout.

Though twice seventy million hands hold thy trenchant sword-blades out,

Yet with all this power now,

Mother, wherefore powerless thou?

This song is a source of inspiration to the Nationalists of India. In his literary life, Bankim Chandra was influenced by Iswar

Chandra Vidyasagar. And Bankim influenced Rabindranath Tagore. In elegance of lan¬

guage and in loftiness of thought, Bankim's novels can be counted among the very best in any literature.

CHAUCER, cha'ser, Geoffrey, English poet, ((the father of English poetry® : b. London about 1340, probably rather after than before; d. 1400. The traditional date for his birth, 1328, is disproved by known facts in his life.

His father, John Chaucer, a wine-merchant, was known to the court, and therefore was able to obtain for his son a position as page in the household of the Countess of Ulster, daughter-in-law of Edward III ; here we first learn of Geoffrey, in 1357, and here he may have ac¬

quired much of his rather extensive though not very methodical education, besides accom¬

plishments and experience. In 1359 he served in the war in France; he was taken prisoner, but was ransomed in 1360 for a sum which indicates powerful and appreciative friends.

Throughout his life he frequently received pensions and gifts from the Crown and from John of Gaunt. During the next decade, while he was in the twenties, we know little of him, except that during part of the time at least he was at court as Yeoman of the king's cham¬

ber, an office which doubtless required more dignified social as well

as humble domestic duties. In or before 1366, probably, he mar¬

ried; his wife, Philippa, was a damsel of the queen's chamber, and was almost certainly a sister of Katherine de Swynford, who lived in various capacities, finally as wife, in the house¬

hold of John of Gaunt. This marriage doubt¬

less strengthened the tie which we know ex¬

isted between the poet and the Prince, though there are indications that Chaucer's wedded life was not altogether comfortable. During this time Chaucer must have written more or less poetry on French models; little of it has sur¬

vived, however. Chaucer was not a precocious poet. From 1370 to 1380 he went on numerous diplomatic missions to the Continent, which he seems to have discharged with tact and judg¬

ment. Of these journeys those to Italy are of particular interest. On the first he was absent for six months in 1372 and 1373, with three or four months in Genoa and Florence and perhaps elsewhere ; his main business was to arrange for an English port to receive Genoese trade.

The numerous attempts which have been made to prove that he may have met Petrarch in Padua are opposed by a great weight of prob¬

ability and evidence. He certainly learned the Italian language, and must have brought home Italian manuscripts. In 1378 he was in Lom¬

bardy for a month or two conducting negotia¬

tions with the noted condotticre Sir John Hawkwood and with the Lord of Milan. In 1374, between the two journeys, he received the office of comptroller of the custom and sub¬

sidy of wools, hides and wool-fells in the port of London, which kept him closely applied to its duties for nearly 11 years, except when he was away, so much so that at this time he rented a house built on the city-wall over Aid-gate, 10 minutes' walk from the custom-house.

In 1382 he received an additional customs office and in 1385 permission to discharge his duties through a deputy. It was probably in conse¬

quence of this that he moved into the quiet country, down the river at

Greenwich whence he would come up to town, when occasion re¬

quired it, by boat with the tide or on horseback.

By nature vivid in energy and interest, he lost no time in devoting part of his new leisure to public duties. In 1385 he became justice of the peace for Kent and in 1386 was elected to represent the county in Parliament. Chaucer's intimate attachment to the court party is illus¬

trated by the fact that during the years 1386-89, when Richard II was deprived of absolute power, Chaucer was in misfortune ; in 1386 he lost his custom-house positions, and for a time was clearly in straitened circumstances. In 1387 his wife seems to have died. With the return of the royal party to power in 1389

Chaucer's fortunes revived, and he received the office of clerk of the king's works at Westminster and elsewhere. This he held only two years, and from then till his death little is known of his occupations. At times, in spite of pensions and the like, he seems to have been again in hard circumstances, was several times sued for debt, and wrote more than one poetic appeal for aid. In 1399 he rented a house in the garden of Westminster Abbey for a term (oddly) of 53 years or until his death. On 5 June 1400, the records of the payment of his pensions cease, and there is no reason to doubt that he died late in that year, as has always been understood. It was his burial in the south transept of Westminster Abbey, followed two centuries later by that of Spenser, which has made that the ((Poets'

Corner.® To judge from a more or less au¬

thentic portrait of him produced under the direction of his disciple Hoccleve, and from his description of himself in the (Canterbury Tales, > he was short of stature, fair, and late in life rather stout. Everything testifies to his charm of personality and character.

The most convenient and essential thread by which to trace Chaucer's literary develop¬

ment is the growth of his originality. The usual division of his works into French, Italian and English periods is misleading and con¬

tradicts the facts. We may fitly begin with his translation of the 13th century French amorous and satirical allegory (Le Roman de la Rose,*

which he mentions in the (Legend of Good Women, * and which we know he produced earlier than 1386, probably bv many years. The extant incomplete Middle English translation was never attributed to Chaucer until 1532. but there is good reason to believe that of its three fragments the first, consisting of 1,705 lines, may be by him ; whether his version originally was longer we do not know. It is certain that 362 CHAUCER

the French poem influenced him strongly for many years, by its vision-form, its allegory and its park-like scenery ; and longer yet by its tales, its satire and its pithy sayings. His first important original and first datable poem is the (Book of the Duchess,* written in 1369 to com¬

miserate John of Gaunt on the death of Blanche, his first wife. It is undeniably pretty and fanciful, but it is strongly under the in¬

fluence of (Le Roman de la Rose* and other artificial French poetry, is ill-proportioned and is far from the directness and naturalness of Chaucer's later literary manner. Had he died in 1370 he would be obscure and probably un¬

known as a poet. Other poems which may date from much the same period, since they show no Italian influence and little originality, are the (Complaint to Pity,* which shows him as a poetic lover in the artificial French mode, and the (A. B. C.,* translated from Deguille-ville, which shows piety toward the Virgin Mary. His prose translation of the (De Con-solatione Philosophise* of the late Roman philosopher Boethius, though usually deemed much later, may date from 1370-72.

Chaucer's three or four months in Italy in 1373 gave him literary breadth, independence and ideals. Before this, the only literatures with which he shows familiarity are the ancient Latin and the French. But the conditions, traditions and manners of poetry among the Romans were so different from those of Chaucer's own day and land, and his own temperament was so unlike that of the ancient Latin poetry which he had read, that he could respond to it far less readily than, for example, Dante did. The literary tradition which it was inevitable that he should begin by following was the French. But mediaeval French poetry was in general either undignified and extem¬

poraneous in manner, like the romances, or artificial, like the allegory. In Italy, in the works of the three great (Trecentisti,* especially Dante and Boccaccio, he found literary work which was contemporaneous in its interest but which had assimilated what the Romans had to teach, — Christian and romantic poetry written in a modern language which was more like poetic English than French was, and of a more dignified yet natural character than was usual in French. It was inevitable that for a time he should be greatly under its influence ; even though certain French modes and influences abode with him until the end, and though the differences between his two masters tended finally to free him from the domination of both and to leave him independent.

The most important of Chaucer's poems

based directly on the Italian is his longest single poem, the (Troilus and Criseyde.* There seems to be strong reason to deem it also the first, written 1373-77, though it is usually regarded as dating from about 1380-83. This story, of Criseyde's slow acceptance of Troilus' love, and quick transference of hers to Diomed, is a very free translation and expansion of Boccaccio's psychological epic (I1 Filostrato,* to which it must be admitted that much of the merit of Chaucer's poem is due. The traditional story is a mediaeval outgrowth on the Troy-saga; Criseyde is ultimately the same person as Homer's Briseis, but her love-story first ap¬

pears in Benoit de Saint Maur's 12th-century French poem (Le Roman de Troie.* Less than a third of Chaucer's lines are translated from the Italian, and he has made important changes in the characterization and some in the plot.

The poem is too long and its analysis of emo¬

tion frequently fine-drawn and stagnant, but it shows humor, much sympathetic penetration and skill in dialogue and in situation, and has been called one of the most beautiful long poems in the language.

Chaucer's next important poem was proba¬

bly the (House of Fame.* It shows markedly in detail and sometimes in plan the influence of Dante's (Divina Commedia,* though it should hardly be called an imitation or parody of it.

The poet in an allegorical vision is carried by an eagle through interstellar regions to the dwell¬

ing of Fame, where he learns of the capricious¬

ness of that goddess. The poem is ill-propor¬

tioned, rambling and sometimes confused and pointless, but in a high degree is free, fanciful and humorous. Of special interest are the glimpses it allows us of Chaucer's own circum¬

stances and way of life. It is usually assigned to about 1384, but may have been written as early as 1379.

Much the same merits, without some of these faults, make the Parliament of Fowls) one of the most attractive of Chaucer's lesser poems.

It is almost certainly a complimentary celebra¬

tion of the betrothal of Richard II to Anne of Bohemia, and would therefore date from 1381.

The noble female eagle represents the future queen; of the three male suitors, the noble tercelet of course is the King, and the other two are two German princelings, lor her marriage to whom during her early childhood there had been negotiations, which for literary reasons Chaucer makes contemporaneous. The poem is rich in its imagery, fanciful though not wholly original, in its plan, realistic in its humor and melodious in its verse (especially the roundel at the end).

Two other early poems Chaucer later in¬

cluded in the Canterbury Tales,* in each case without obliterating traces of their earlier his¬

tory. The first is the (Life of Saint Cecelia, *

now the (Second Nun's Tale.* This sweet and sympathetic but rather crude and unnatural legend of martyrdom was derived from the 13th century Latin prose (Legenda Aureal The far more important (Palamon and Arcite,*

which took the first place among the Canter¬

bury Tales) as that of the Knight, is a con¬

densed adaptation of Boccaccio's epic (I1

Teseide.) It may probably have been written about 1384-86; assuredly not very much earlier.

The idea, long current, that it was written early in the form of seven-line stanzas, and was recast in the couplet-form for the Canterbury Tales,* is disproved by both probability and evidence. An outgrowth on the Greek story of Thebes, the poem narrates the rivalry of the imprisoned Theban princes for the love of Emily, the sister-in-law of Theseus. It is less intensive and psychological than the (Troilus,*

but is a brilliant romance of picturesque inci¬

dent, now gay, now pathetic, and (for all its Athenian location) one chief source whence modern romantic writers drew their ideas of mediaeval pageantry.

Among Chaucer's minor works, written at various times, mention should be made of several. (The Complaint of Mars* is probably an allegory on a certain court-scandal. The GEOFFREY CHAUCER

fragmentary (Anelida and Arcite/ noteworthy for the great metrical skill shown in the (Com¬

plaint near the end, represents Chaucer's earlier use of Boccaccio's <Teseide,) whence the first part is drawn, and may have been written about 1383-84. The little poem called (Chaucer's Words unto Adam) upbraids his careless copyist with amiable raillery. The charming (Former Age* is based on a passage in Boethius. The prose treatise on the (Astrolabe/ written in 1391, and based on a Latin version of a

treatise by the Arabian Messahala, instructs the writer's little son Lewis in the use of that astronomical instrument. Of ethical and gnomic balades the best are (Truth * and <Gentilesse.) The two balades addressed to (Scogan) and (Bukton) are vivacious and satirical ; both men were courtier-friends of Chaucer's, and it is curious to learn that the latter of them lost no time in flouting the poet's advice not to marry, and wedded within two or three months of the writ¬

ing of the poem. The triple rounded (Merciless Beauty/ which we can hardly doubt is by Chaucer, is no less musical and clever in metri¬

cal form than animated and jolly in substance.

The 'Complaint to His Purse/ addressed to Henry IV and therefore dating from 1399-1400, may be the last poem which Chaucer wrote, but certainly shows no failing of spirits or powers.

Of other abalades, roundels, virelays® we have Chaucer's own word for it that he wrote many, most of which unhappily have perished. It should be remarked that several works attrib¬

uted to Chaucer in old editions, such as (The Flower and the Leaf/ and the ˆMother of God/ are not by him.

(The Legend of Good Women/ the poet's

first attempt at the kind of composite poem at which he made his great success in the Canterbury Tales/ marks the culmination and transcending of his conventional and French style. It dates probably from 1386-87; there is no reason to connect it with any incidents of 1385, as was formerly done. It consists of a prologue and the Hegends® of 10 classical heroines. In the former the poet, after express¬

ing his passionate devotion to the daisy, is up¬

braided by the God of Love for having written such anti-feminine works as the (Troilus) and the (Romance of the Rose/ and is instructed by Alcestis, the mythical Greek heroine, who ac¬

companies the god, to make amends by celebrat¬

ing ladies who have been faithful to false men.

The prologue is now known to be based largely on the poems of three 14th-century French writers, but with amazing vigor Chaucer vivifies the conventions which he borrows, and pro¬

duces a poem full of fresh love of nature, biographical interest and quaintly pretty page¬

antry, which has charmed other poets from the 14th century to Keats and Tennyson. The “legends of” Cupid’s saints® which follow are largely drawn from Ovid; Chaucer wrote them with less sympathv than the prologue and ap¬

pears to have wearied of their gloom and monotony. It is most probable that Queen Anne is “celebrated in. the prologue under the double guise of the daisy and of Alcestis. It is extant in two very different versions, of which «B,» usually printed second, is now known to be the earlier-written; «A® was probably pro¬

duced in 1394 or 1395, after the Queen’s death, and its cooler tone is due to the excision of the probable references to her.

From his sense of confinement in the

(Legend* Chaucer emerged directly, in 1387, into the multifarious freedom of the Canter¬

bury Tales/ the greatest collection of narrative poems in the world’s literature. The “frame-story,® as it is often called, many subordinate tales fitted into a main narrative, is of Oriental origin, but was familiar in mediaeval Europe ; Boccaccio’s (Decamerone/ often wrongly as¬

sumed to have been Chaucer’s model, is only one of several such collections, and it is most unlikely that Chaucer was familiar with it.

Nor is there any good reason to suppose that the poem originated in any actual pilgrimage made by the poet. His design is no less original than it is simple. At the Tabard Inn, South¬

wark, on 16 April, about 30 pilgrims assemble, drawn from every class of middling English society, and the day after set forth on their 60-mile ride, lasting four or (more likely) three days, to the tomb of Saint Thomas a Becket in Canterbury Cathedral, one of the most popular shrines in mediaeval Europe. The host of the inn proposes that by way

of pastime they shall tell tales on the ride, and that on their return the teller of the best shall be given a supper, —at his own inn, he is careful to stipulate. These pilgrims are described with immortal charm in a (General Prologue/ which probably dates from 1387 and is Chaucer's greatest work; its combination of sparkling realism, pungent satire, rich and delicate humor, penetrating knowledge of human nature and of the world, catholic and democratic sympathy, graphic and pithy style and abundant and essential poetry has never been equaled. Of the pilgrims about a third are connected with the Church, and of them Chaucer has little good to say, except for the Clerk and the humble but upright Parson, the perfection of whose character atones for all of Chaucer's satire on the Church. Among the others, the poet writes with a particular fondness of the military class, represented by the Knight and his young son ; and with tolerant satire and an unerring eye for typical features, of the professional and mercantile classes.

Chaucer's original plan called for two tales from each pilgrim on the journey to Canterbury and as many on the return, together with an account of their experiences during and after the pilgrimage. Of this prodigious design he completed only about a fifth, 24 tales in all, several being incomplete, scattered over the whole journey to Canterbury. Most of the tales are connected with each other by passages, usually called prologues and ((links,® in which the narrative of the pilgrimage is carried on, and which contain some of the best and liveliest writing in the poem. Several of the characters, such as the Pardoner and the Wife of Bath, reveal their own views and characters with ex¬

traordinary frankness; between others there are lively quarrels ; tiresome tales are twice broken off by weary auditors ; as the party is nearing Canterbury they are joined by a rascally canon who makes a dishonest living by feigning to practise alchemy, and whose servant, after frightening his master away by his indiscreet loquacity, entertains the company with a tale of another such impostor; throughout, com¬

menting and keeping things harmonious and lively, moves the burly, canny figure of Harry Bailey, Host of the Tabard Inn, the self-ap¬

pointed "personal conductor® of the party.

Of the tales each is in general admirably adapted to the person who tells it ; the pious tell of religion, the soldiers of chivalry, the vulgar of licentiousness. Most of them fall into well-recognized classes of mediaeval narrative poetry. The tales of the Knight, Scpiire, Wife of Bath and Franklin are romantic; Chaucer himself, as a character on the pilgrimage, tells the burlesque romance of 'Sir Thopas,* tact¬

fully unwilling to compete seriously among his own creations; the tales of the Miller, Reeve, Cook, Shipman, Sumner, Merchant, Canon's Yeoman and Manciple are (or are of the nature of) fabliaux, more or less drastically realistic and often very coarse comic tales; those of the Man of Law, Monk, Pardoner, Friar and Clerk are moral tales of various kinds; the tale of the Nun's Priest is a mar¬

velously witty beast-fable; the Physician's is the Latin story of Virginia, ultimately from Livy; the Prioress', of the Christian child killed by the Jews, and the Second Nun's, of Saint Cecelia, are saints' legends ; Chaucer's second tale, of Melibeus and his moralizing wife, Prudence, is a didactic prose-work; as is the Parson's, on the sacrament of penance and the seven deadly sins, introduced at the end because it seemed fitting to approach the holy city ((in some vertuous sentence.® Hardly any of the tales are original in their groundwork; originality in plotting was even less regarded as desirable in the Middle Ages than by Shakespeare ; and they are of various and remote origins. The tales of the Squire, Merchant and Pardoner are ultimately Oriental ; those of the Manciple (Ovid's tale of the talking crow) and Physician are from the classics; the Clerk's ideal and pathetic story of patient Griselda is from Petrarch's Latin version of the last novel in Boccaccio's ˆecameronep just as the Knight's is from the latter's (Teseide) ; the Wife of Bath's, Man of Law's, Clerk's and perhaps Franklin's are more or less rationalized fairy-stories, perhaps originally Celtic ; the Monk's patterned after Boccaccio's (De Casibus Vir-orum IllustriumP is drawn from the Bible, Roman writers, Boccaccio and others ; most of the fabliaux are probably developed from short humorous French poems; for the Canon's Yeo¬

man's no parallel has been found, and it may be based on fact; the

Nun's Priest's is based on some branch of the Old French 12th-century animal-epic (Le Roman de RenarC ; the story of Melibeus comes, through the French, from the Latin of the Italian Judge Albertano of Brescia; and the Parson's is from some rifaci-mcnto of works by two theological writers, Ray¬

mond of Pennaforte and Peraldus.

Chaucer probably worked on the Canter¬

bury Tales) to near the time of his death. The order and dates of the writing of most of them have not been determined, but there is little reason to believe that any except the Knight's and Second Nun's antedated the beginning of the poem as a whole. It is clear that the order in which they are now printed is far from being the order in which they were written ; that the work was extended and filled in at various times and in divers manners, and that it was by a con¬

tinuation of this process of inserting tales and joining them by links that Chaucer intended to complete the poem and make it continuous. In gradually building up the work Chaucer did not cover his tracks, and in several cases a change of plan is evident, for he was not always a careful polisher and reviser. A study of the 60

or more manuscripts of the poems shows a probability that by supplying the connecting links he had drawn the work together, at the time of his death, into eight volumes or con¬

tinuous fragments unconnected with each other (not wholly the same as the nine ˆgroups® in modern editions, which do not seem quite to fit the facts), but that even they were by no means put in their final form. Chaucer's intentions as to arrangement can be pretty well discovered by references to times, tales already told and such places along the road as Rochester, Sitting-bourne and the Bleau Forest, but for every group of tales he may not have decided on the position, and the arrangement of modern edi¬

tions may represent rather what he would have done than what he did. Some parts of the work were certainly known to the world before the author's death, and others may have been ; but it seems very unlikely that the poem as a whole, as we have it, was put forth otherwise than by Chaucer's literary executors. The arrangement of none of the manuscripts can agree with his intention, and there are many other evidences that his death determined, as it were, a

fortuitous cross-section of the growing work. The Canterbury Tales> therefore re¬

main the most unfinished and fragmentary of great poems.

Chaucer might well be characterized as an intellectual man of the world. Interested, but not absorbed, in things purely of the reason and the soul, he drew his inspiration chiefly from literature and human life. With science and pseudo-science he was rather well ac¬

quainted, especially with alchemy and as¬

trology, although naturally skeptical, he seems to have believed in neither. In philosophy and theology he shows no great interest, except in the question as to the relation between chance, free-will and foreordination. There are indi¬

cations that he sympathized with some of Wyclif's teachings; but they no more show that he was a thorough Lollard than his occasional flippancy shows that he held <(agnostic® views.

There are signs that before his death he became even narrowly devout, and throughout he was probably faithful enough to the Church. It was for poetry that he cared rather than for specula¬

tion, and in it he was well and widely read.

English poetry was too unoriginal and meant for too rude an audience to appeal to him ; he probably read it little, and never mentions it except for ridicule. He, like other educated people, almost confined his reading to Latin and French, with the weighty addition, in his case, of Italian. Ignorant of Greek, like all his con¬

temporaries, he derived most of his knowledge of the ancient world from Boethius, Virgil, Ovid, Statius and a dozen or so of other Roman writers. Among later Latin writers, he was somewhat familiar with Saint Jerome, Saint Augustine and other Fathers, and with many ecclesiastical, didactic, satirical and historical writers of the Middle Ages, most of whom habitually wrote in Latin. Among these works are several by Boccaccio, with whose Italian poems we have noted already Chaucer's inti¬

macy, as with Dante's (Divina Commediap with Petrarch he was less familiar, though he knew his sonnets. With French literature he was

lyric ; the romances he knew, but their thin extravagance did not greatly appeal to him. In his best days, what he derived from literature was chiefly an ideal of style, his plots and oc¬

casional ornament. What makes his poetry vital and individual, — characterization, vivid episode and situation, descriptive touches of people and things, vivacious and penetrating side-thrusts or obiter dicta, humorous and satirical lights and flashes, — he derived from his intense interest in life, and his vast endow¬

ments of humor and observation. His most characteristic humor consists in odd juxta¬

positions of ideas and in the bold, spontaneous minuteness of his naturalness. The pleasurable effect of all is doubled bv his spirit of bonhomie , tolerance and charity. The licentious character of some of his tales is due in part to the frank¬

ness of the time, in part to his dramatic in¬

stinct for the sort of tale which certain charac¬

ters would be likely to tell, in part to his hearty appreciation of humor wherever found. He was not naturally romantic, but naturalistic, and investigation shows more and more that the faithful and brilliant reflection of contemporary conditions in his works, especially the dro-logue) of the Canterbury Talcs,) is quite equal to his nice observation of characteristic acts and habits. The thoroughly romantic and idealistic character of most of the literature and art of the Middle Ages throws Chaucer's individuality into high relief, and gives the modern a peculiar sense of kinship with him.

Chaucer's style carries on the tradition in¬

herited by the later Middle Ages of a poetry orally sung or recited, yet modified by the more dignified manner which he learnt from the

Italians. Hence his combination of informality with amenity, which gives him a magically gracious ease. It is this, with his perfect free¬

dom from artifice, with his complete frankness, his instinct for a situation, his readiness to vary his mood, and his knowledge of what to select and (usually) what to omit, that makes him a consummate narrative-poet. Of all English versifiers he is one of the most melodious, pro¬

vided a reader understands the chief differences between Middle and Modern English, — that the vowels have their Continental sounds, that in general all letters are pronounced (including especially the final e) and that many French words are still accented on the last syllable.

His chief verse-forms, in order of date and increasing excellence, are the 8-syllable couplet, the 7-line stanza and the 10-syllable couplet ; the two latter he was the first to use in English, having adopted and perfected them from the French.

Chaucer is frequently called ((The Father of English Poetry,® and the title is perhaps better deserved than such epithets usually are. While he stands at the end of a long evolution in a more real sense than at the beginning of another, the former line was not a native one.

His was the dominant literary influence in Eng¬

land and Scotland during the barren century and more after his death, and he, his contem¬

porary and friend John Gower, and his disciple John Lydgate, were repeatedly named as the three glories of English letters. At the end of the 15th century, the Canterbury Tales) were twice printed by Caxton and twice by others ; in 1532, William Thynne brought out the first fairly complete edition of Chaucer's works. In the 16th centi:riy, as well because, owing to rapid changes in the language, his vocabulary seemed archaic and his verse unmelodious, as because the direct influence of Italian and an¬

cient literature came in, his influence decayed.

Nevertheless, especially in regard to style, it was strong upon Spenser, who calls him, in celebrated phrase,

“ Dan Chaucer, well of English undefyled, On fames eternall beadroll worthie to be fyled.”

In the 17th and early 18th century there was a tendency not to take him very seriously, but he delighted and sometimes influenced Shakespeare, Milton, Dryden and Pope. Late in the 18th century, with the development of an interest in the past, in part romantic and in part historical, reviving appreciation of Chaucer was indicated and stimulated by the treatment of him in War-ton’s (History of English Poetry) (1774) and by the admirable edition of the Canterbury Tales) by Thomas Tyrwhitt (1775-78; several times reprinted). His influence is more or less traceable on Wordsworth, Scott, Keats, Long¬

fellow, Morris and Tennyson, to mention no others. Within the last 40 years knowledge of Chaucer has been added to and interest in him enlivened by the work of very numerous editors, investigators and critics, not only in England, America and Germany, but even France and Italy; notably Child, Furnivall, Skeat and Ten .Brink. See Canterbury Tales; Troilus and Criseyde.

Bibliography. — ‘The ensuing bibliography, in which might also be mentioned numberless articles in many special periodicals, is arranged in the order of the following subjects: Edi¬

tions, handbooks, biography, chronology, sources, criticism, philology, bibliography. W. W.

Skeat, Complete Works of Geoffrey Chaucer) (6 vols., Oxford 1894; spurious works, Vol.

VII, 1897) ; A. W. Pollard and others, Clobe Chaucer) (London 1904) ; Skeat, (Student’s Chaucer) (New York 1895) ; doetical Works) (3 vols., Grant Richards, London 1903) ; MacKaye, Complete Poetical Works of Chaucer, first put into Modern English* (New York 1912) ; A. W. Pollard, Canterbury Tales) (2

vols., London 1894) ; Percy MacKaye, (The Canterbury Tales : A Modern Rendering into Prose) (Duffield, New York 1904) ; J. Koch, detailed Comparison of the Eight Manuscripts of Chaucer’s Canterbury Tales) (Heidelberg 1913) ; Skeat, (The Prologue, etc.* (Oxford), also F.

J. Mather (Boston 1899) ; Skeat, (Man of Law's Tale, etc.,* (Prioress' Tale, etc.* (2

vols., Oxford) ; various reprints of manuscripts of Chaucer's several works by Chaucer Society, London; R. K. Root, die Poetry of Chaucer*

(Boston 1906) ; Pollard, Chaucer Primer) (London 1903) ; W. Tuckwell, Chaucer,* a popular primer (London 1904) ; B. Ten Brink, distory of English Literature* (Vol. II, Lon¬

don 1896); (Life Records of Chaucer* (Chaucer Society, London 1875-1900) ; A. W. Ward, dife of Chaucer* (in (English Men of Letters Series,* London 1875) ; J. W. Hales, Chaucer*

(in dictionary of National Biography,* X, 154-67) ; Ten Brink, Chaucer Studien* (Munster 1870) ; J. Koch, Chronology of Chaucer's Writings* (Chaucer Society. London 1890) ; J. S. P. Tatlock, development and Chronology of Chaucer's Works* (Chaucer Society 1907) ; J. L. Lowes, (The Prologue to the Legend of 366

Good Women, } in Publications Modern Lan¬

guage Association (XIX, 593-683; XX, 749-864) ; (Originals and Analogues of Some of Chaucer's Canterbury Tales) (ed. by Furnivall, Brock and Clouston, Chaucer Society) ; T. R.

Lounsbury, (Studies in Chaucer) (3 vols., New York 1892) ; (Essays on Chaucer* (parts 1-6, Chaucer Society) ; <Chaucer> (in J. R. Lowell, Prose Works,* III, 291-366, Boston 1890) ; (Chaucer *(in W. P. Ker, (Essays on Mediaeval Literature,* pp. 76-100, London 1905) ; Ten Brink, (Chaucers Sprache und Verskunst* (2d ed., Leipzig 1899; trans. by M. B. Smith, London 1901) ; G. Hempl, (Chaucer's Pronun¬

ciation (Boston 1893) ; G. L. Kittredge, (The Language of Chaucer's Troilus) (Chaucer So¬

ciety 1891) ; Pyme-Indices) (serving as a par¬

tial concordance to Chaucer's several works, Chaucer Society 1875, 1889, 1892) ; Skeat, (The Chaucer Canon (Oxford 1900) ; Hammond,

(Chaucer: a Bibliographical Manual* (London 1909). John S. P. Tatlock,

Professor of English Philology, Leland Stan¬

ford Junior University.

CHAUDIERE, sho'de'yar', LAKE (Fr.

caldron or place of boiling water), an expan¬

sion of the Ottawa River just above the city of Ottawa. It is noted in Indian legend and tra¬

dition, and the name Chaudiere is, in this case, said to be a literal translation of the original Indian designation of this lake.

CHAUDIERE RIVER, a river of Canada,

which has its rise in Maine, near the source of the Kennebec, and flows north for 120 miles and joins the Saint Lawrence about six miles above Quebec. Between two and three miles above its mouth it forms the Chaudiere Falls.

CHAUFFEUR, sho-fer' (Fr. a «stoker)

This term has recently come into use in the English language to designate at first the engi¬

neer or motorman of a steam-driven road car¬

riage ; but by extension it is now applied to any professional machinist who operates an auto¬

mobile, electrically or otherwise propelled. Dur¬

ing the Reign of Terror in France the word was applied to members of a band of outlaws who infested-the northeastern portion of the king¬

dom. They were led by John the Skinner. They garroted men and women and tortured others in efforts to make them disclose hidden treasure.

The band was not suppressed until 1803.

CHAULMOOGRA, chal-mug'ra (Tarak -

tagenos Kurzii), a tree of the order Flacourti-acece, which grows in eastern countries, and from the seeds of which an oil is obtained that has been long known and highly valued in India and China as a remedy in skin diseases. The oil has been introduced into Great Britain, and is said to be useful in rheumatism, sprains, *etc.*

It has been used as a specific for elephantiasis and leprosy. Recent experiments seem to bear out its value in the treatment of the latter disease. Chaulmoogra oil was formerly sup¬

posed to come from Gynocardia odorata.

CHAUMETTE, Pierre Gaspard, French

revolutionist: b. Nevers, 1763; d. 13 April 1794. In early life he wandered over France and became interested in botanical studies and was studying medicine at Paris at the outbreak of the Revolution and for a year following.

He contributed anonymously to the Revolution dc Paris. He became a member of the insur¬

rectionary Commune, by which in 1792 he was made delegate to visit the prisons with power to arrest suspected persons. He acquired great influence in Paris and was made president of the Commune. In 1793 he was one of the leaders in the attacks against the Girondists, whom he treated with great harshness. Oppos¬

ing Robespierre in an effort to save the Hebert-ists he was overthrown by the latter, who had him arrested. He was tried by the Revolution¬

ary Tribunal and executed. He left some speeches and memoirs which were published in the (Amateur d'autographes.*

CHAUMONOT, Pierre Marie Joseph,

French missionary: b. 1611; d. 1693. His father was a vine dresser who committed the care of his son to his brother, who was cure at Chatillon. Pierre ran away at the age of 10 in order to prosecute the study of music at Beaune, Burgundy. In the course of a pilgrimage to Rome he came under the notice of the Jesuits, who induced him to become a member of their order and sent him as missionary to the Indians of Canada in 1639. He was first assigned to the Huron missions at Ossossane, where he col¬

lected material for a Huron dictionary. In 1640

he accompanied Breboeuf to a tribe living be¬

tween Lake Erie and Lake Ontario and to the west of the dreaded Iroquois; the mission re¬

sulting in failure Chaumonot went to Saint Michael where he remained for eight years until the settlement was destroyed by the Iroquois.

Chaumonot took the surviving Hurons to an island in Lake Huron and later to the Isle of Orleans. In 1655-58 he was stationed at Onon¬

daga in the Iroquois country, and in the latter year removed to Montreal. He returned after¬

ward to spend his last days with the Hurons.

Consult his autobiography (1688; New York 1858) ; Thwaite's (Jesuit Reiations) (72 vols., Cleveland 1901).

CHAUMONT-EN-BASSIGNY, sho-mon,

France, the capital of the department of Haute Marne, on a height between the Marne and the Suize, 145 miles southeast of Paris by rail.

It is well built, has a fine town-hall, courthouse, communal college, public library, church dating from the 13th century, the ruins of a castle be¬

longing to the counts of Champagne, and an iron bridge 1,960 feet long with 50 arches on which the railway crosses the Suize. There are manufactures of gloves, wax candles, hosiery, cotton, cutlery, leather, woolens, sugar, *etc.* ; and a trade in grain, coal and in the iron and iron goods of the department. Here was signed, March 1814, a treaty between Great Britain, Russia, Austria and Prussia, in which these powers pledged themselves to accomplish the overthrow of Napoleon and restore peace to Europe. Philip Le Bon, the first who advocated the use of gas for illumination, in France, was a native, and his memory is honored by a bronze statue. Consult Tolibois, rHistoire de la ville de Chaumont* (Chaumont 1856). Pop. 14,870.

CHAUNCEY, Isaac, American commo¬

dore: b. Black Rock, Conn., 20 Feb. 1772; d.

Washington, 27 Jan. 1840. He commenced his career in the merchant service, in which he be¬

came distinguished for seamanship, enterprise and energy. He entered the navy as lieutenant in 1799, and early in 1802 was appointed acting captain of the frigate Chesapeake , the flagship of a squadron ordered to the Mediterranean to CHAUNCY — CHAUTAUQUA

operate against Tripoli. In the brilliant opera¬

tions before Tripoli in 1804 lie bore a distin¬

guished part. In April 1806 he was promoted to the rank of captain. In the War of 1812 the naval superiority on the lakes became an object of high importance, and Commodore Chauncey, then in command of the navy yard at Brooklyn, was appointed to command on all the lakes ex¬

cept Champlain. He commanded the Mediter¬

ranean squadron 1816-18 and negotiated the treaty of peace with Algiers.

CHAUNCY, Charles, American clergyman

and educator and second president of Harvard College: b. Yardleyburg, England, 1592; d.

Cambridge, Mass., 19 Feb. 1672. He was edu¬

cated at Trinity College, Cambridge, where he became professor of Greek and of which he was afterward a fellow. From 1627 to 1633

he was vicar of Ware, and of Marston Saint Lawrence from 1633 to 1637. In both these re¬

lations he was in frequent conflict with his ecclesiastical superiors, first for substituting catechetical exercises for the prohibited after¬

noon sermon, and in 1629 for asserting that ˆidolatry was admitted into the Church,® and ((there is much atheism, popery and heresy in the Church.® In 1635 he was again before the Court of High Commission for objecting to the act of kneeling at the communion service. After the trial he publicly recanted. He came to America in 1638 and preached in Plymouth for three years. From 1641 to 1653 he was pastor at Scituate. In 1654 he was arranging to return to his former charge at Ware when he was chosen by the overseers of Harvard to suc¬

ceed President Dunster. From this time until his death he was president of Harvard. In addition to volumes of sermons he published (The Doctrine of the Sacrament, with the Right Use Thereof* (1642) ; (The Plain Doctrine of the Justification of a Sinner in the Sight of God) (1659) ; (Antisynodalia Scripta Americana) (1662). Consult Fowler, (Memorials of the Chauncys* (Boston 1858) and Cotton

Mather, <Magnalia) (London 1702).

CHAUS, ka'us, the common short-tailed

jungle cat of southwestern Asia (Felis chans), so called in India,

where it wanders from the forests into sugarcane plantations and marshy fields, in search of game birds, mice, *etc.* It varies from yellowish to dark brown in color, and when adult is unspotted. This wildcat has contributed to the mixed ancestry of eastern domestic cats (q.v.).

CHAUTAUQUA, sha-tak'wa, a popular

educational centre on Chautauqua Lake in the southwestern part of New York State. The controlling organization is a corporation <(not for profit,® conducted for educational purposes by a board of trustees. The property com¬

prises about 200 acres on the upland terraces above the lake, at a high elevation, although lying in a lowland corner of the State. Chau¬

tauqua is 70 miles south of Buffalo, 200 miles north of Pittsburgh and 450 miles west from New York. It is reached by the Pennsylvania and Erie railways. Chautauqua has numerous large and commodious school buildings on a hilltop with a beautiful lake environment ; sev¬

eral thousand cottages in the woods ; an hotel called ((The Athenaeum® ; about 40 smaller houses for the boarding accommodation of the public ; a few shops or <(stores® ; a so-called "Hall of Philosophy,® which is a Greek temple with supporting pillars of masonry, open to the summer breeze, and seating 3,000 people ; and a vast amphitheatre dug out of a hillside, but well roofed, well lighted by electricity and capable of seating 5,000 or 6,000. There are only about 500 permanent residents in Chautauqua. For nine months of the year it is a town of 1,000, but during the summer, while the classes are being held, has a population ranging from 20,000 to 50,000.

As an educational institution Chautauqua has become a centre of great importance. It may be considered primarily as an educational adaptation of the open-air public assembly such as the American mass-meeting or town-meeting, or the religious camp-meeting. The Chautau¬

qua assembly was established by Bishop Vin¬

cent and Lewis Miller in 1874 at Fairport for Bible study and the

training of Sunday school teachers. But the ideal and purpose of the assembly were gradually broadened ; and to the specifically religious study a great variety of subjects were added. The religious spirit, how¬

ever, still holds an important place in the work of. the assembly. The best exponent of the spirit of the institution was its chancellor, Dr.

John H. Vincent. He infused into it the idea that all sound learning is sacred, and that the secular life may be pervaded by religion. The work done at Chautauqua has been thus sum¬

marized in one of the New York State bulle¬

tins : ((For the many there are popular lectures, concerts, entertainments ; for a somewhat less number there are philosophical, scientific and literary lectures in progressive courses; for the comparatively few are provided means for careful study under able and well-known in¬

structors.® The work may be further classified as follows: (1) School of English Languages and Literature; (2) School of Modern Lan¬

guages; (3) School of Classical Languages; (4) School of Mathematics; (5) School of Sciences; (6) School of Education; (7) School of Social Science and History; (8) School of Library Training; (9) School of Home Eco¬

nomics; (10) School of Music; (11) School of Arts and Crafts; (12) School of Expression; (13) School of Physical Education; (14) School of Practical Arts. An important part of Chautauqua's influence is made effective through classes and courses for home study offered by the Chautauqua Literary and Scien¬

tific Circle (C.L.S.C.), founded in 1878. The C.L.S.C. is a well-directed system of home reading in literature and science, carried on in connection with local reading circles, and prac¬

tically aided by many good suggestions in a monthly bulletin, the Round Table. The course of reading occupies four years. Each year is devoted to one particular nation, the four being known as the (<Modern European Year,® the ˆClassical Year,® the ((English Year® and the ((American Year.® No attempt is made to teach languages or any of the exact sciences.

The textbooks on England and the United States, Greece and Rome,

and other subjects, social and economical, are prepared by good writers representing American colleges and universities. With the regular courses in his¬

tory are combined literary courses and studies in art, sociology and natural science. In the American year the subjects are American his¬

tory, literature, government, diplomacy, social 368

institutions and the like. The course of reading is carried on by Chautauquans at home, but once a week they meet in social circles in neighbor¬

hoods and villages all over the country and, under the best local guidance they can find, devote an evening to the discussion of topics suggested and to other private reading. The total enrolment of Chautauqua readers has been about 400,000. By far the larger number fail to complete the four years' course, but it is estimated that about half have done consecu¬

tive reading for two years. A <(saving rem¬

nant® of about 75,000 continued to the end and have won a simple certificate. The graduates are also encouraged to form local educational clubs and continue special study.

The <(Chautauqua idea,® of which much has been said and written, is best expressed by Bishop Vincent, who said : ((Chautauqua pleads for universal education ; for plans of reading and study; for all legitimate enticements and incitements to ambition; for all necessary adaptations as to .time and topics; for ideal associations, which shall at once excite the imagination and set the heart aglow. … A college is possible in everyday life if one choose to use it ; a college in house, shop, street, farm, market, for rich and poor, the curriculum of which runs through all of life, a college which trains men and women everywhere to read and think and talk and do … this is the (Chautauqua ideaP ®

CHAUTAUQUA, Jewish, an institution

founded in 1893 by Rev. Dr. Henry Berkowitz of Philadelphia, and incorporated in 1899, with a body of officers representing the chief cities in the United States for ((the dissemination of a knowledge of the Jewish religion by fostering the study of its history, literature, etc.® The departments for study and entertainment are modeled on those of other Chautauqua. This society has about 3,000 members, divided into various sections. Its courses include pre¬

paratory, two years, with readings in Jewish history and literature ; Bible, four years ; and special courses in post-Biblical history and literature, (Jewish Characters in English Fic¬

tion, > (Beginners' and Advanced Hebrew.) Its chief work of late years has been embodied in its summer assembly, at Atlantic City, N. J., which is held annually in July and lasts three weeks. It includes a summer school, popular lectures and conferences, literary and social en¬

tertainments, in which many prominent speakers-participate. During the annual session the con¬

dition of religious schools, dependent and delin¬

quent children, how to relieve congestion in large cities, the status of the Jews of Russia, the attitude of Jewish university students toward Jewish problems, are the topics dis¬

cussed. The average attendance at the morning sessions is from 150 to 350 persons and at the evening from 300 to 800 persons. During the summer of 1903 an English organization on the plan of the Jewish Chautauqua was formed at Ramsgate and is now known as the London Jewish Society. Until 1907 its official organ was the Menorah Magazine (New York) and there is also the Assembly Record (Philadel¬

phia) and special series of various publications.

Consult the Menorah Magazine (New York

1897-1907) ; (Annual Reports) of the United States Commissioner of Education; and

‘Special Series No. T* of the Jewish Publica¬

tion Society (Philadelphia 1902).

CHAUTAUQUA LAKE, a beautiful lake

situated in Chautauqua County, N. Y. It is 18

miles long and from one to three miles wide, the highest navigable water on the continent, 730 feet higher than Lake Erie and 1,400 feet above the sea-level. Chautauqua was the In¬

dian name for this lake, the shores of which are a natural “divide® between waters which flow northeastward with the Saint Lawrence from the Great Lakes district and waters which flow southwestward to the Mississippi River and the Gulf of Mexico. On its banks is the village and summer resort of Chautauqua, the centre of a religious and educational move¬

ment of large and growing interest. See Chautauqua.

CHAUVEAU, shoW, Pierre Joseph

Olivier, Canadian statesman, orator and educa¬

tionalist : b. Quebec 1820 ; d. 1890. He became a journalist at 17, was called to the bar, en¬

tered Parliament in 1844 and held portfolios in the government. In 1855 he was appointed chief superintendent of education for Lower Canada, and in 1857 founded the ‘Journal de l’lnstruction publiqueP He was first premier of the province of Quebec under Confedera¬

tion, 1867-73, and was speaker of the senate, 1873-74. .

CHAUVEAU-LAGARDE, la gard, Claude

Francois, French advocate: b. Chartres 1756; d. 1841. He studied law in his native town and began to practise in Paris shortly be¬

fore the outbreak of the Revolution. He be¬

came celebrated for his eloquent defense of those on trial in the Reign of Terror. He was the advocate of Marie Antoinette at her trial and also of Charlotte Corday. Others of his clients were Brissot and Madame Elizabeth of France. His defense of Mirandola saved the latter from the scaffold. In 1814 he was en¬

nobled by the government of the Restoration and two years later he published an account of the trial of Marie Antoinette and Princess Elizabeth.

CHAUVENET, sho'-ve-na', William,

American astronomer and mathematician : b.

Milford, Pa., 24 May 1819; d. Saint Paul, Minn., 13 Dec. 1870. He was graduated at Yale in 1839, and became professor of mathematics and astronomy at the United States Naval Academy in 1845, and was the first director of the ob¬

servatory there. He was made professor of astronomy at Washington University, Saint Louis, in 1859. In 1862 he became chancellor of the last institution. He wrote (Spherical and Practical Astronomy,* (Elementary Geom¬

etry } and similar works. Consult (Memoir of William ChauveneU (in the (Biographical Memoirs of the National Academy of Sciences, *

Washington 1877).

CHAUVINISM, sho'vin-izm, a French

word derived from Nicolas Chauvin, a soldier of the French Republic and of the First Em¬

pire. His name became a synonym for a pas¬

sionate admirer of Napoleon, and the word Chauvinism was formed to signify the almost idolatrous respect entertained by many for the first Emperor, and generally any feeling of exaggerated devotion, especially of patriotism.

which there was a character named Chauvin, with a song that became immensely popular, fixed the word in the French language. The word is now used to express exaggerated patriotism of an aggressive type, jingoism.

CHAUX-DE-FONDS, sho’-de-fon’, LA,

Switzerland, town in the canton of Neuchatel, and nine miles northwest of the town of Neuchatel, in a deep valley of the Jura, at an elevation of 3,070 feet above sea-level, and is regularly built, with broad, straight streets, and stone houses. The most notable structures are the aqueduct, 13 miles long; the Protestant church with a fine, vaulted roof ; the hospital ; the college, which contains the municipal pic¬

ture gallery ; the historical museum ; and the library. Among the educational institutions is a watch-making and art-engraving school.

Chaux-de-Fonds and the neighboring village of Locle are the chief centres of watch-making in Switzerland ; and also manufacture articles in gold, silver, bronze and enamels, lenses and scientific instruments. Watch and clock mak¬

ing was begun here in 1705 by Jean Richard.

Pop. 39,597.

CHAVES, sha’vesh, Portugal, the ancient

Aquˆe Flavin, town of the province of Tras-os-Montes. The fortifications which once de¬

fended it are now in ruins. It is situated on the Tamega River, here crossed by a Roman bridge, 12 arches of which remain out of the

original 18, and has hot saline springs and baths. It has an interesting church, the burial place of Alfonso I, Duke of Braganza. Linen and silk manufactures are carried on in the town. In 1811, after a violent conflict, Soult obtained possession of the place; and after the defeat of the Cartistas, 18 Sept. 1837, the famous Convention of Chaves was signed here.

Pop. 6,463.

CHAY-ROOT, cha-, or CHOY-ROOT,

choi-, the roots of a small Rubiaceous plant of Hindustan, Oldenlandia mnbellata, extensively cultivated on the Coromandel coast. The roots yield a dye which is used as madder.

CHAYOTE, chi-6'ta, a climbing vine

(Sechium edule), belonging to the Cucurbi-tacea:, or gourd family. The leaves are strongly three-angled or lobed, with the broadly cordate base also showing two or four sharp corners. They are deeply concave, have a rough surface with whitish veins and in color are of a deep fresh green. The pistillate flowers are solitary; the much more numerous staminate flowers are borne on special branches. Pollina¬

tion takes place through the agency of insects.

The ovary is always one-celled, with a single ovule. It is mealy-pubescent when young, be¬

coming spiny with maturity in some varieties.

The mature fruits are always more or less compressed, as though built over the large flat seed. In general they are pear-shaped, but vary in their proportions. They weigh from eight ounces to a pound each and fruits weighing three pounds have been reported. In flavor they resemble summer squash or vegetable marrow. The chayote is produced in large quantities in Porto Rico for domestic con¬

sumption and it has recently attained popular¬

ity in Australia and Algeria, from which lat¬

ter country many hundreds of tons are shipped annually to Paris and London. It bears ship-vol. 6 — 24

ment well, an 8-or 10-day journey not affecL

ing its condition. It is in common use as a vegetable in Madeira, Mexico, Central Amer¬

ica, the West Indies, California and Louisiana.

It was first reported in Europe by Francisco Hernandez, who found the plant in Mexico about 1560 and described the fruit as suggest¬

ing the flavor of roasted oysters, sweet po¬

tatoes or chestnuts. It produces tuberous roots which resemble the yam or cassava. In Mexico the young shoots are sometimes boiled and eaten like asparagus. Both the fruit and the vine are used as fodder for cattle and hogs, and the vines are sometimes used for fancy basket-work and the manufacture of women's hats. The flowers yield an abundance of nec¬

tar and are said to be of value to bees. As an ornamental vine the chayote takes high rank, a single vine being reported as covering a fence 6 feet high and 50 feet long in a few months.

The fruit is eaten in a variety of ways —boiled and seasoned with pepper, and salt ; par¬

boiled and fried; stuffed and baked; in pud¬

dings, tarts or fritters, *etc.*

The name appears to be a form of the Aztec word cliayotl, meaning <(a head bristling with spines® or a ((squash covered with thorns.®

The popular names are in many cases corrup¬

tions of the Aztec term, as the Porto Rican tayote ; but in the West Indies and Australia it is known as chocho ; in Louisiana as mirli-ton; and as ((vegetable pear® in some parts of the British West Indies.

CHAZARS, cha'zarz, or KHAZARS, a

people of the Finnic stock known in the 7th century on the shores of the Caspian ; in the 9th century their kingdom occupied the southeast part of Russia from the Caspian and the Volga to the Dnieper. Their capital was long at As¬

trakhan, called by them Balandshar. They were singularly tolerant of all religions, Jew¬

ish, Christian and Moslem ; and a large part of the nation formally adopted the Jewish faith from Jews who fled from the prosecu¬

tions of the Emperor Leo. It is not improb¬

able that the modern Jews of Russia have at least an admixture of Chazar blood. Cyril converted many to Christianity in the 9th cen¬

tury. The power of the Chazars was broken in 965 by Sviatoslav. In the early part of the next century the destruction was completed by the Byzantine emperors and the Russians.

CHAZY, sha-ze, STAGE, in American geol¬

ogy, the limestone beds, 725 feet thick, typically developed at Chazy, N. Y. The name was first applied by the New York geological survey.

The Chazy limestone was laid down around the border of the old Pre-Cambrian land in Canada and New York in older Ordovician time. It succeeds the-Calciferous or Beekman-town and is succeeded by the Lowville.

Though a well-marked division in New York and Canada, it is not determined farther west, but the Saint Peter sandstone, which under¬

lies the so-called Trenton limestone in Iowa, Michigan and Wisconsin, may be of Chazy age. See Ordovician.

CHE-KIANG, che-ke-ang', or CHE-CHI—

ANG, China, a maritime province lying north of Fu-kien and south of

Kiang-su and includ¬

ing the Chusan Archipelago; area, 39,150 square miles. The province is of great commercial 370

importance, containing three treaty ports, Ning-Po, Wan-Chau (Wen-Chow) and Hang-Chau (Hang-Chow) all of which are connected with Shanghai by a railway under British con¬

trol. The surface is mountainous and trav¬

ersed by rivers, no.tably the Tsien-Tang and Ta-Kia, which run down to the Eastern Sea.

The Grand Canal, which has its gateway in Che-Kiang, affords the only means of internal communication apart from an extensive system of narrow foot roads. Trade in silk and tea is well developed, this province being, with Chiang-Su and Fu-Shien, the first to contain a treaty port, that of Ning-Po, opened in 1844.

Beside tea and silk the province produces cotton and sedge for hats and mats, rice, ground-nuts, wheat, indigo, tallow and beans in abundance.

It imports opium, cotton and woolen goods, tin and iron, kerosene oil, indigo and sugar.

Coal is found in the north and iron ore in the south, and there are traces of copper, but none of these minerals exists in sufficiently large deposits to make mining remunerative. Che-Kiang is famed for its native system of educa¬

tion. It contains the great religious and liter¬

ary centre of China, Hang-Chow (not to be confused with Hang-Ivow or Han-Kow), where thousands of candidates yearly resort for the public examinations. Hang-Chow is also the capital of the province, which is ruled by a viceroy. Marco Polo visited Che-Kiang in the 14th century, when it contained beautiful tem¬

ples, now in ruins. The most magnificent architectural feature of the

province is the temple of the Queen of Heaven, dating from 1680. Che-Kiang suffered severely during the Taiping rebellion in 1861. The Italians in 1900 laid claim to part of Che-Kiang as a sphere of influence and demanded the privilege of establishing a port on the coast to be called San Mun. There are thousands of native Christians. The population is estimated at 18,800,000. The foreign population is esti¬

mated at about 2,750.

CHEAT. See Brome Grass.

CHEAT RIVER, a river rising in the Alleghanies in West Virginia, and after the union of its four forks, flowing north and then north¬

west to empty into the Monongahela a few miles beyond the boundary line of Pennsyl¬

vania. Its length is about 150 miles.

CHEATHAM, Benjamin Franklin, Amer¬

ican Confederate soldier: b. Nashville, Tenn., 20 Oct. 1820; d. there, 4 Sept. 1886. He served as captain of volunteers in the Mexican War, distinguished himself at Monterey, Medelin and Cerro Gordo, and, after the expiration of his 12 months' term of service, was again mustered in as colonel of the Third Tennessee Regiment and served till the end of the war.

He was major-general of Tennessee militia after his return, and was a farmer until 1861, when he entered the Confederate army, being one of the first Tennesseeans to enlist in that service, and was earlv appointed a brigadier-general. He commanded at Ma3rfield, Ky., in September 1861, and at the battles of Belmont and Shiloh, served subsequently at Columbus, Ky. ; was a division commander in Bragg's army when it entered Kentucky in September 1862, was soon after promoted major-general and was engaged at Perryville and Stone River, being wounded in the second battle, and at Chickamauga and Chattanooga, Nashville and other places. President Grant, who was his personal friend, offered him an appointment in the civil service, but

he declined. He devoted himself chiefly to agriculture after the war, but served four years as State superintendent of prisons, and in October 1885 became postmaster of Nashville.

CHEBOYGAN, she-boi'gan, Mich., city and

county-seat of Cheboygan County, on Lake Huron and on the Michigan Central and the Detroit and Mackinac railroads, at the east¬

ern end of the Straits of Mackinaw. It be¬

came a city in 1886 and is governed by a board of 10 aldermen. It has a good harbor, connected with lake ports by regular steamship lines. It is an agricultural centre, a popular summer resort and manufactures lumber, paper, leather and furniture and there are large tan¬

neries, canning factories and shipyards. It has nine churches and an excellent public school system. Pop. 6,859.

CHECK or CHEQUE, a draft or bill on

a bank, payable on presentation. A check may be drawn payable to the bearer, or to the order of someone named; the first form is transfer¬

able without endorsement and payable to any¬

one who presents it ; the second must be en¬

dorsed, that is, the person in whose favor it is drawn must write his name on the back of it.

A person who obtains money on a check which he knows is drawn by one not entitled to draw for the amount specified therein is guilty of fraud and liable to criminal punishment.

Prompt payment is demanded of a check ; it is not for use as a continuing security. In case of delay, the drawer is not relieved of his ob¬

ligation to the holder unless he suffers actual damage through the delay; as for instance, through the failure of the bank on which the check was drawn. Certified checks may also be obtained from banks in

the United States.

This has effect on the drawer's liability, depending on whether it is procured by the holder or by the drawer. When procured by the former, the drawer and endorsers are freed from liability ; when procured by the drawer he remains liable on the check.

In England the custom of crossing checks is common. This is accomplished in two ways, (1) by a general crossing, (2) by a special crossing. A general crossing makes it payable only when presented through a bank, but any bank will do. A special crossing names the bank by which the check must be presented.

A check may be crossed either by the drawer or by the holder, who may convert a general into a special crossing. Only bankers have the privilege of crossing a check which has al¬

ready been twice crossed. A check which is crossed either generally or specially may fur¬

ther be crossed by the words <(not negotiable,®

which means that the person who takes it with these words on it does not obtain and is not capable of giving any better title to the check than that which the person from whom he took it had. A check so crossed is on very much the same footing as an overdue bill of ex¬

change.

CHECKERBERRY. See Gaultheria.

CHECKERED BEETLE, a beetle of the

serricorn family Clcridce, so named because of CHECKERS

its markings. Some are ant-like in form and coloration. The adults are found on tree trunks and in flowers, where they subsist on sweet sap and nectar. The larvae live under bark and feed on wood-boring larvae. Some invade hives of the honey-bee and devour the young bees. For a synopsis of the North American species consult Annals of the Lyceum of Natural History of New York (Vol. V, New York 1849).

CHECKERS, chequers or draughts; Fr.,

jeu de dames; Germ., Damenspiel ; Ital., giuoco di dama ; Sp., juego de damas ; Arab., la'ab ed-dama : a game of skill played by two persons on the familiar board — divided into 64

squares. The pieces or "men® used are 24

wooden (bone or ivory) discs, 12 black and white (or red). For purposes of recording games and moves the squares are numbered as shown in the diagram :

BLACK.

As the game is usually played on the dark squares, it must be noted that in printed dia¬

grams the white squares are invariably used to indicate the position of pieces — as in prob-blems — and for numbering. Only 32 of the squares (the half) are used in checkers; but whether the dark or the light squares are used in play, each player must have the double corner of that color at his right. The black pieces are arranged on the squares 1 to 12 : this is called "the black side® ; the white pieces on those numbered 21 to 32, which is called "the white side.® The vacant squares 13 to 20 form the preliminary battleground. The general rules are simple. Black always has the first move, and at the beginning of each suc¬

cessive game the players change colors, taking alternately the black and the white pieces. The pieces are moved forward diagonally one square at a time except in jumping, when a piece may cover as many as six squares in one move. Each piece as it reaches the extreme opposite side of the board becomes a "king®

and is “crowned® by having another piece of the same color placed on top of it. The king can move forwards or backwards — always di¬

agonally — one square at a time, except, as be¬

fore, in jumping. By arranging the board it is possible for a king to jump nine pieces. A man can never jump more than three. The capturing piece jumps over the man “en prise®

to a vacant square beyond, and may continue to jump as many pieces in its path so long as there is a vacant square behind each. When a “man,® i.e., not a king, jumps a piece or sev¬

eral pieces and lands in the opposite king-row, the move is ended; he cannot move or jump out again until the other side has made a move.

A king, however, can jump into a king-row and right out again so long as there is any piece in position to be taken. The theory of the jump is simple: Place the 24 men ready for play; black moves 11 to 15; white responds by moving 22 to 18, and black must jump over that piece from 15 on to square 22, taking the man on 18 off the board. The black piece now *

on 22 is liable to capture by the white pieces on 25 and 26: either 25-18, or 26-17. The former is the correct jump, 25-18, and the black piece is captured and removed from the board.

This is a “level exchange,® i.e., one for one.

These moves form the “single-corner® open¬

ing, than which no other offers so great a scope for attack or defense. For many years, indeed, it was the only opening checker players knew of. When a piece is touched it should be moved if possible. Keeping a finger on a piece that has just been moved does not con¬

fer the right to move that piece back again at will ; no move once made can be withdrawn except by consent of the opponent. When a player has a “jump® in which two or more pieces can be captured, and the hand is with¬

drawn from the capturing piece before all the men possible have been taken, the move is completed; in other words, the player cannot retrieve the omission. When a player has a “jump® before him and

fails to take it by making some other move instead, the opponent has the choice of one of three methods: (1) he can “huff® the piece that should have made the jump, i.e., take it off the board as a pen¬

alty; (2) he can compel the player to take his wrong move back and make the jump, or (3) if it suits his game, he can let the error stand as if it had not occurred. A “huff® is no move ; the player entitled to do so must “huff® first and then make his move; if he makes his move first (overlooking the “huff®) he cannot take the “huff® afterward. The “huff® is a pe¬

culiar movement. As there should be no talk whatever during a checker game, a player “huffing® picks the offending piece off the board, passes it near his mouth and blows upon it — just like blowing out a match — and places it on his side of the table. The “huff® is not generally employed except in match play, where the rules are very strict and every move is timed by special clocks.

Contrary to general — and superficial —opinion, checkers is as profound and scientific a game as human ingenuity ever devised.

“Everybody plays checkers, but there are few checker players.® Some of the greatest ex¬

perts, men who had spent 50 years and more in studying the mathematical intricacies of the game, have finally confessed that they had “only begun to touch the fringe of the sub¬

ject.® Yet checkers is a game well worth cul¬

tivating on account of the mental faculties it calls into play; it imparts a fascination all its own, for its main principle is to arrive at an object by the most direct and decisive methods.

Neither in regard to antiquity nor as an exer¬

cise in mental gymnastics need the game of checkers yield the palm to its more ornamental sister game, chess. In Butcher’s translation of the (Odyssey J we read that when the goddess Athene descended from the heights of Olym¬

pus and reached the gate of Odysseus, “she found the lordly wooers …

taking their 372

pleasure at draughts in front of the doors.®

Checkers and chess are (<both unfathomable and beyond the comprehension of the human mind®

(Henry Spayth). Edgar Allan Poe goes a step further and boldly asserts that ((the higher powers of the reflective intellect are more de¬

cidedly and more usefully taxed by the unos¬

tentatious game of draughts than by all the elab¬

orate frivolity of chess® (Murders in the Rue Morgue). The average chess problem declares a white win or mate in two or three moves, and not infrequently contains 10 white pieces as against three or four black ones. On the other hand, the famous ((second position® in checkers by Andrew Anderson contains three pieces a side — a king and two men each —equal forces, with an apparent <(safe draw.®

Black, men on 3, 6; king on 1; white, men on 12, 13; king on 8. Black to move and win. If at the sixth move white goes 15-19, the short¬

est way by which black can win requires 79

moves all told; if white instead goes 15-11, it takes no fewer than 83 moves (counting both sides) for black to force a win. If black makes one mistake in 42 moves, the result is a draw. In a problem by Mr. H. D. Lyman, with a king and three pieces a side, altogether 63 moves are necessary for black to win, and every white move is forced: black men on 1, 3, 28; king on 21; white men on 5, 12, 20; king on 29; black to move and win (No. 948

in Gould's). Again, Strickland's position (3

pieces to 4) and Bowen's <(Twin® (4 to 4) re¬

quire 55 moves each to win. Without pre¬

vious study of these positions, it would be quite beyond the

intellectual range of any checkerist to discover the correct moves under playing conditions. There are 49 classified two-move openings in checkers ; the variations of many of them run into hundreds (E. T.

Baker's book on the (<Alma® opening alone gives upward of 500 variations ; and P. Ketchum's (<Flora Temple® branches of the <(single-corner® opening gives over 280 variations). The principal openings are: the Dundee, formed by the first move, 12-16; Bristol, 11-16; Kelso, 10-15; Denny, 10-14; Double Corner 9-14; Edinburgh, 9-13; Switcher, 11-15, 21-17; Sin¬

gle Corner, 11-15, 22-18; Cross, 11-15, 23-18; Second Double Corner, 11-15, 24—19; Ayrshire Lassie, 11-15, 24-20; Dyke, 11-15, 22-17, 15-19; Will o' the Wisp, 11-15, 23-19, 9-13; De¬

fiance, 11-15, 23-19, 9-14, 27-23; Centre, 11-15, 23-19, 8-11, 22-17, 15-18; Fife, 11-15, 23-19, 9-14, 22-17, 5-9;- Glasgow, 11-15, 23-19, 8-11, 22-17, 11-16; Laird and Lady, 11-15, 23-19, 8-11, 22-17, 9-13; Maid of the Mill, 11-15, 22-17, 8-11, 17-13, 15-18; Old Fourteenth, 11-15, 23-19, 8-11, 22-17, 4-8; Souter, 11-15, 23-19, 9-14, 22-17, 6-9; Whilter, 11-15, 23-19, 9-14, 22-17, 7-11. As the openings develop after the sec¬

ond move they receive auxiliary titles, e.g., Kelso-Switcher, Kelso-Choice, Kelso-Exchange, Kelso-Cross, Kelso-Regular, Kelso-Double,

Kelso-Side, *etc.* Other developments are the Boston Cross or Waterloo, Tillicoultry, Wagram, Paisley, Pioneer, Drummond, Nailor, *etc.* A gambit is a form of strategy in the early stages of a game in which a piece is sac¬

rificed for position.

Within the limits of this article it is only possible to indicate briefly the beginner's road to checkers. Let him number a board as in diagram, marking each square at bottom left-hand corner, so that the numbers will be visible when the squares are occupied. With a guide¬

book on the game — wherein every move is numbered — it will be easy to follow the direc¬

tions. In this practice the white squares would be used; in playing with an opponent, how¬

ever, the board must be half-turned to bring the dark double corner to each player's right.

The black squares may then be used. The best opening to begin learning is the ((single-corner.®

To play a good end-game the 1st, 2d, 3d and 4th positions should be mastered, with a few of the simpler problems and early traps, such as the <(goosewalk,® *etc.* The ˆcalculation of the move® requires some study and a good memory; it is useful only in end-games when there are five pieces a side or less. A knowl¬

edge of this theory is often a winning advan¬

tage. The (<tricks® of the board are innumer¬

able ; beginning with the easy ones of over¬

coming one king in a double corner with two kings, or of defeating two kings — one in each double corner — with three kings in the middle of the board (a problem frequently given up as a ((draw® by the uninitiated), the student may travel by graduated stages into ((bridge®

positions, <(gambits,® long or short <(shots® ; to draw with inferior forces, make (<slip® moves, etc., *etc.* As in music, there are certain <(themes® in checkers, such as throwing a piece to retard the opponent's advance or to draw him off a given line. The finest example of this type is by Hugh Byars (1889) : B., 10, 11, 21 ; W., 18, 19 ; king on 22 : W. to play and win — 22-17; 21-25; 17-21 ; 10-14; 18-9; 25-30; 21-25; 30-21; 9-6; 21-17; 6-2 ; 17-14 ; 2-7 ; W. wins. If white does not sacrifice the king at the 7th move, the black king would capture the piece on 19 and draw. A simpler theme, arrived at from three settings is: (a) B. 19; king 28 ; W. 32 ; king 26 ; W. to play and win —32-27; 28-32; 27-24; 19-28; 26-23; W. wins, (b) B. 12, 24; king 27; W. 20; kings 11, 26; W. to play — 26-31; 27-23; 20-16; 12-19; 11-16; 24-28; 31-27; 23-32; 16-23; W. wins. (c) B. 21, 28; kings 2, 25; W. 30, 32; kings 5, 10; W. to play — 5-9; 25-22; 9-13; 22-18; 30-26; 21-25; 13-9; 25-30; 9-5; 30-23; 32-27; 23-32; 10-6; 2-9; 5-23; W. wins. A draw can often be secured with a piece down : B. kings 29, 30 ; W. king on either 17 or 18; by one move (to 22) white draws. Again, B. 13; king on 17; W. king on either 15 or 23; by moving to 18

and keeping control of that square and 22, white holds the two blacks in perpetual check.

Three B. kings on 13, 14, 15 ; and two W. kings on 22 and 23, with black to play, makes a tricky win for black; now remove the <(crown® from the king on 13, black to play, and white draws.

The (<slip® theme may be illustrated thus : B. men 5, 9, 11, 20; W. men 18, 24, 27, 32; W. to play — 27-23; 20-27; 18-15; 11-18; 23-14; 9—18 ; 32-14; W. wins. The ((in-and-out® or <(waiting jump® is a simple trick rarely prac¬

tised by novices, although the possibility arises in perhaps 50 ner cent of their games : B. men on 7, 16, 21, 24; W. men on 6, 25, 30; W. to play — 30-26; 21-30; 6-2; 30-23; 2-18; thus in 3 moves and with one piece down, white clears the board. Perhaps the greatest fascina¬

tion of checkers is the immense variety of (<shots® or ((strokes® that frequently crop up in play and are only too often overlooked. On a crowded board it is possible, by a series of CHEDDAR — CHEESE AND CHEESE-MAKING

forced moves, utterly to annihilate the whole forces of the opponent and compel immediate surrender, j. T. Denvir's (Traps and Shots'

(Chicago 1905) gives hundreds of brilliant ex¬

amples occurring in actual play, and is the most instructive, entertaining book on the game. Many of the traps are provided with names, either after their discoverers or their home towns. Thus we have the Jaques Shot, the Steel Stroke, the Bailey Shot, the ('Brooklyn," the <(Chicago Trap," *etc.* None of these is an impossible position, and the player who has committed them to memory and can lead up to them ((across board" will achieve a dash¬

ing triumph over an adversary who has neg¬

lected or not yet reached the higher altitudes.

It may surprise many to learn that checker enthusiasts — and their name is legion — even possess a tutelary deity of their own, yclept

((Dama” — in Great Britain, ((Dameh.” It is also a testimonial to the game that its most ardent devotees are Scotsmen, doctors, lawyers and practical business men, besides a host of others — even ladies — scattered throughout the English-speaking world. Almost every town, county, State, colony or country has its clubs and its champions. The greatest master of the game was the late James Wyllie, of Scot¬

land; next come his compatriots Andrew An¬

derson and Robert Martins. These modern pioneers were followed by a brilliant school of experts, the Barker brothers of Boston, the late Robert Yates of Brooklyn, J. T. Denvir of Chicago, H. Pillsbury, Henry Spayth of Buffalo, Richard and Alfred Jordan, both champions of England, as also were J. Smith, W. Gardner, A. Hynd and H. Morral. The champion problemists include Drs. Brown, Clute, Purcell, Dean, Schaefer, Lucas and Dr.

Stayman of Kansas; the Hon. J. D. Danvier of Delaware; M. Priest, ex-champion of the United States; Mr. Melvin Brown (lawyer) of New York; the late W. W. Avery of New York, and the greatest living inventor of <(brain-puzzlers” on the checker board, Mr. H.

D. Lyman, secretary of the American Surety Company of New York. The British Isles have produced a large number of experts, Richard Atwell, Fred Allen, W. Buchanan, F.

W. Drinkwater, J. Drummond, F. Dunne, D.

Gourlay, J. A. Kear, R. M’Culloch, J. Robert¬

son, W. Strickland, J. Tonar, J. Strudwick.

On the literary side of American checkers ‘spe¬

cial credit is due to Messrs. Denvir, P. Ketchum, Spayth, Stearns, Whitehill and Yeomans. The roll here given could be multiplied many times without approaching the aggregate of promi¬

nent checkerists, past and present.

Bibliography. — The literature of checkers is copious; books were printed on the game in Spain in 1547, 1590, 1597, 1610 and 1650; in Paris, 1668; in London, 1694; and the first in America (New York) in 1846. Several of the older works still survive in periodical new

editions, among the chief being Anderson, A., (Game of Draughts Simplified' (Philadelphia) ; Atwell, R., Scientific Draughts' (London 1905) ; Call, W. T., (The Literature of Checkers'

(New York 1908); Cousins, S. E., (Draughts: 1000 Best Games' (Northampton, Eng., 1913) ; Drummond, I., draughts' (London and New York) ; Dunne, F., (Draughts Praxis: A prac¬

tical guide to scientific play' (London 1912) ; Gould's (Problem Book' (London) ; Kear and Atwell's Encyclopaedia of Draughts' (Bristol 1902) ; Lee's 'C iuide to the Game of Draughts'

(new cd.) ; Lyman's (Problem Book' (New York) ; Spayth, H., 'Checker Player' (Buf¬

falo 1895 et seq.) ; Stearns, L. M„ (The Draughts Marvel and Twentieth Century

Checker Compendium' (Manchester, N. H.,

1909) ; Sturges, J., 'Guide to the Game of Draughts' (London 1808-1904). There are

hundreds of other publications, to most of which the reader will be directed in the works shown above.

Henri F. Klein,

Editorial Staff of The Americana.

CHEDDAR, ched'der, England, a parish in Somerset County, at the foot of the Mendip Hills, 18 miles southwest of Bristol. The dairies in the neighborhood have from the 17th century been famous for the excellence of their cheese, which is made from the whole milk, and the whey skimmed off, heated and added to the curd. Pop. 1,974.

CHEDORLAOMER, ked-or-la-6'mer, a

king of Elam, mentioned in the 16th chapter of Genesis. He made

numerous conquests, penetrating as far west as Canaan, and ruled oyer its southeastern part. After remaining tributary to him for 12 years the local princes rebelled and were reduced by Chedorlaomer with the assistance of Amraphel, king of Shinar, Arioch, king of Ellasar, and Tidal, king of Goyim.

CHEDUBA, che-doo'ba or ched'oo-ba, or

MAN-AUNG, Burma, an island in the Bay of Bengal, about 25 miles off the coast of Aracan, forming a township of Kyauk-pyu district ; area, 250 square miles. On the island is a town of the same name. Cheduba is well wooded and fertile, but unhealthy. On the northwest coast inflammable gases are discharged in some quan¬

tity. The principal product is an excellent tobacco. Rice, indigo, pepper are also pro¬

duced, and petroleum is found. Pop. 24,000.

CHEECHA, che'cha. See Geckos.

CHEERYBLE BROTHERS, two mer¬

chants introduced in Charles Dickens' novel (Nicholas Nickleby.' They are twin brothers of a very genial and liberal disposition and become staunch friends of the hero. It is said that the novelist reproduced in these char¬

acters two cotton-spinners of Manchester named Grant.

CHEESE AND CHEESE-MAKING.

Cheese is the curd of milk, including princi¬

pally the casein and fat, coagulated, cooked, drained and pressed into solid form. Nearly all cheese, is made from cows' milk, and origi¬

nally it was a product of the farm. Now by far the greater portion is made in factories especially fitted for the purpose. The standard factory-made American cheese is practically identical with the English cheddar cheese, and is often so called.

In the manufacture of cheese a milk rich in fat is preferred, the cheese being nearly all fat and casein. By artificial souring of the milk coagulation is produced, so that the whey or watery part may be separated from the curd.

The curd is the raw material operated on; the casein is a proteid substance that may be com¬

pared to lean meat, and is coagulated bv acid.

It is that part of the curd that remains when 374

the fat, sugar and ash are extracted. The first process of manufacture is to heat the milk (preferably sweet milk) to about 84° F. It is then tested with rennet for ripeness. A gradu¬

ated cup provided with a fine hole in the bot¬

tom is filled with milk and a little rennet added.

Rennet, in its commercial form, is a preserved extract from the fourth stomach of a calf.

Being of a peptic character it tends to coagulate the milk, and if the milk in the cup coagulates in from 17 to 20 seconds it is sufficiently ripe for treatment. Enough rennet is then added to the supply of milk to coagulate the whole in 25 or 30 minutes. The proportions vary with conditions, but about four ounces of rennet extract to 100 gallons of milk is perhaps an average quantity. When the milk is coagulated the solid portion or curd in the vat is separated from the watery portion, by allowing the latter to drain off. This waste usually becomes food for pigs. Gang knives are then brought into use to cut the curd into cubes of a third of an inch or more, the knives being set a little less

than half an inch apart and passed through the curd horizontally and perpendicularly. Af¬

ter cutting, the curd is gently agitated to pre¬

vent settling. This allows the curd to shrink and tends to expel a portion of the whey. The stirring may be done with a curd-rake, but factories more commonly employ what is

termed an automatic curd-agitator, which is attached to the vat and driven by steam power.

The mass of curd is next heated very slowly to about 92° F. This cooking process may con¬

tinue several hours, lasting until the operator finds that the curd will string about a quarter to a third of an inch on a hot iron. The whey is then drawn off. The curd is next turned and piled, to rid it of the excess of moisture.

When deemed sufficiently solid it is ground and salted. The grinding may be done in one of several kinds of mills, a common form having two cylinders with teeth rotating toward each other, which operation picks the curd to pieces.

After grinding, the curd — or cheese, as it may now be called — is dipped and put into hoops to give it form for pressing. Common sizes of hoops are 14ˆ2 X 10 and 13ˆ4 X 6

inches. An iron bandage or rim is placed about the hoop to give it solidity, and a cloth wrapped about it to keep the cheese together and secure cleanliness. Pressure is then ap¬

plied, at first lightly, and then increased, the cheese being usually turned over during the operation. The pressure is maintained for 16

to 18 hours, after which the cheese is ready to be cured.

Curing-rooms are built both above and be¬

low ground, the latter being preferred as being easier to maintain at a

cool temperature. High temperature is very deleterious to cheese, di¬

minishing its value by melting and leaking of fat, while the texture and flavor are also impaired. A temperature below 65° F. should always be maintained in the curing-room, and 40° is better. Ventilation must be provided, and the usual arrangement is an upright draft-pipe, run high enough to catch the wind, and with a vane at the top to turn the mouth of the funnel to the wind. The process called ripening takes place in the curing-room, deter¬

mining the particular flavor of the cheese. The ripening is caused by bacteria, as is proven by making cheese from sterilized milk, in which case it retains the flavor of new-made cheese for a very long period. Dairy bacteriologists are endeavoring to isolate the different species of cheese bacteria, that they may be cultured and incorporated with the milk in starting the cheese-making. In this way the maker would be certain of securing a particular flavor for his cheese, whereas now it is a matter largely of chance as to what bacteria predominate.

The method described above is that followed in practically all the factories of the United States and Canada. About 90 per cent of the cheese manufactured is of this character. The remainder is farm-made, or made in urban dairies, or else is manufactured by some other process in imitation of some foreign cheese, as the Swiss Gruyere or Emmenthal, Limburger, Neuchatel, Brie, *etc.*

The constituents of milk which determine its value for cheese-making are the fat and casein.

Milk may contain from 3 to 8 per cent of fat and from 2 to 5 per cent of casein, the average proportion being about a pound of fat to two-thirds of a pound of casein. Since the cheese yield increases with the fat in the milk, managers of cheese factories have encouraged the production of milk rich in fat, and perhaps this knowledge is largely responsible for the fact that in 1900, in the factories of the United States, 100 pounds of milk made almost 17 per cent more cheese than it did in 1890.

The analysis of cheese is largely a matter of securing a correct average, as a cheese varies in properties at the centre or at the

circumference. A wedge is generally taken as a sample, cut from the centre to the rind, or sometimes a plug, taken at one-third the dis¬

tance from the rind to the centre. The usual test of cheese is to find the proportion of fat.

For this purpose the Association of Official Agricultural Chemists of the United States De¬

partment of Agriculture have adopted the fol¬

lowing method :

For the estimation of fat in cheese about 5 grams should be carefully weighed, and transferred as completely as pos¬

sible to a test bottle. From 12 to 15 c.c. of hot water are then added and the bottle shaken at intervals, keeping it warm until the cheese has become softened and converted into a creamy emulsion. This may be greatly facilitated by the addition of a few drops of strong ammonia to the con¬

tents of the bottle. After the contents of the bottle have become cold the usual amount of acid should be added and the bottle shaken until the lumps of cheese have entirely dissolved. The bottles are then placed in the machine and whirled, the test being completed in the same manner as with milk. To obtain the percentage of fat the reading should be multiplied by 18 and divided by the weight in grams of cheese taken.

Some cheese is colored by the makers,

though the best requires no coloring. Saffron and arnotto are used for this purpose. Various herbs are also incorporated with the milk at the time of making the curd, to alter the appear¬

ance or flavor of the cheese. Common among these arc sage leaves, marigold and parsley.

A small proportion of the cheese used in the United States is imported. From 5,000,000 to 7,000,000 pounds a year of Swiss cheese are

brought in, also some from France, Germany and England. In 1910 40,817,524 pounds of cheese were imported, while the exports were but 2,846,709 pounds. The value of the imports was $7,053,570; the exports about $442,000.

Such cheese is usually named from the locality whence it comes, though sometimes the name becomes distinctive of a special make, as the Roquefort, which is made from the milk of CHEESE-FLY — CHEEVER

sheep, mainly the Larzac breed ; the Kachkaval (Bulgarian), a white cheese made of sheep's milk; the Parmesan (Italian), which is kept three or four years and polished with linseed oil and charcoal till it shines like ebony ; the Lijnburger (German), characterized by its strong odor; and the Brie (French), which is also odoriferous.

Previous to 1850 practically all the cheese made in this country was a farm product. Jesse Williams started the first cheese factory in the United States in Oneida County, N. Y., in 1851 ; between then and 1860 factories were established in New York State at the rate of three or four a year, and from the latter date the growth of the industry in New York was rapid, as follows: 1860, 17 new factories; 1861, 18 more; 1862, 25; 1863, 111; 1864, 210; 1865, 52 ; 1866, 46. Since that date the growth has been a normal one.

The United States census classes butter, cheese and condensed milk factories together, and gives the total establishments in 1914 as 7,982. These concerns manufactured in 1914

products worth $370,818,729, but most of this value is milk and butter, cheese representing only about one-sixth of the industry. The fac¬

tory production of cheese in 1914 was 377,506,-

109 pounds, in value $50,931,925, or about 1 3R>

cents a pound. Nine-tenths of this production was full cream cheese.

Wisconsin, where the industry began in

1864, has been the leading State in cheese-mak¬

ing for some years, with an annual production valued at about $9,000,000 ; other States aver¬

age: New York $6,600,000, Minnesota $4,300,-

000, Illinois $2,000,000. Considerably higher figures have been given by some authorities, but this is due to other nroducts of the dairy, as condensed milk, being figured in with the cheese.

For further information regarding cheese see Decker's (Cheese Making) (1905), the United States census reports and reports of the New York State Agricultural Experiment Sta¬

tion and the Wisconsin Agricultural Experiment Station; also the yearbooks and bulletins of the Department of Agriculture.

Charles H. Cochrane.

CHEESE-FLY, a small, black, dipterous

insect (Piophila casei) bred in cheese, belong¬

ing to the Miiscidcu, the same family to which the house-fly, blow-fly, etc., belong. It has a very extensible ovipositor, which it can sink to a great depth in the cracks of cheese and lay eggs there. The maggot, well known as the cheese-hopper, is furnished with two horny claw-shaped mandibles, which it uses both for digging into the cheese and for moving itself, having no feet. Its leaps are performed by a jerk, first bringing itself into a semi-circu¬

lar attitude, when it can project itself 20 to 30

times its own length. It infests not only cheese, but also smoked meats,

doing much damage in packing-houses.

CHEESE-HOPPER. See Cheese-Fly.

CHEESE-RENNET. See Bedstraw.

CHEETA, CHETA, CHEETAH, or

HUNTING-LEOPARD, a large tropical cat

(Cyricelurus jubatd) forming an offshoot of the Felida ?. Its length and slenderness of limb give it a fleetness in running short distances, such as is probably attained by no other large mam¬

mal. Its claws are short, blunt and practically non-retractile. It pursues its prey by chase rather than by stealth; and ordinarily exhibits more dog-like than cat-like qualities, among these being great docility. It can, however, stealthily come upon its prey if occasion de¬

mands. It is about the length of a leopard, but stands much higher, is rufous or tawny in color, spotted with black, except on the throat.

It is commonest in the African jungles, and thence is more sparsely distributed to India. In India it is tamed and trained by the natives as a hunter. It is treated like a falcon, leashed, hooded and kept blindfolded until the game is in sight, when it is loosed and darts upon the quarry, which it drags down and holds until the huntsman comes. The ancient monuments

show that this leopard was employed by the Assyrian and Egyptian sportsmen to remote antiquity; and it is known that in the 14th century the returning Crusaders introduced the cheeta into Europe where it was used for some centuries.

CHEETHAM, Samuel, English theologian:

b. Hambleton 1827 ; d. 1908. He was educated at Christ's College,

Cambridge, was fellow there in 1850 and assistant tutor 1853-58. From 1863 to 1882 he held the chair of pastoral the¬

ology at King's College and in 1879-82 was archdeacon of Southwark. From 1875 to 1880

he edited the dictionary of Christian Antiqui¬

ties.) He published (A History of the Christian Church during the First Six Centuries) (1894) ; (The Mysteries, Pagan and Christian) (1897) ; (Mediaeval Church History) (1899) ; (History of the Christian Church Since the Reformation }

(London 1908).

CHEEVER, Ezekiel, American school

teacher: b. London, England, 25 Jan. 1614; d.

Poston, Mass., 21 Aug. 1680. He received a good classical education and emigrated to America in June 1637, in order to enjoy religious free¬

dom. With Davenport and Eaton he was one of the founders of New Haven, Conn., -where he married and taught school in his own house, Michael Wigglesworth being one of his pupils.

About 1650 he removed to Ipswich, Mass., where he was the first master of its Free, or Grammar, School ; in 1661 he went to Charles¬

town in a similar capacity, and in 1670 was called to Boston as headmaster of its free school and remained there the rest of his life.

His (Latin Accidence: an Elementary Gram¬

mar of the Latin Language, > was for a century the most popular introductory Latin textbook used in New England, 18 editions having been printed before the Revolution (10th ed., 1767 ; 20th ed., Salem 1785). He also wrote (Scripture Prophecies Explained, in Three Short Essays,) an edition of which was printed in Boston 1757.

His funeral sermon was preached by his pupil and friend, Cotton Mather. Consult Gould, (Ezekiel Cheever, Schoolmaster > (Boston 1905).

CHEEVER, George Barrell, American

clergyman: b. Hallowell, Me., 17 April 1807; d.

Englewood, N. J., 1 Oct. 1890. He was gradu¬

ated at BowMoin College in 1825 and at the Andover Theological Seminary in 1830. In 1839 he became pastor of the Allen Street Pres¬

byterian Church in New York, and from 1846-67 was pastor of the church of the Puritans, New York. He distinguished himself as an 376

anti-slavery advocate in the pre-Civil War period. He was editor of the New York Evangelist from 1845 to 1846, and at different times connected with the New York Observer and Independent. He was an able and vigor¬

ous writer and speaker, and the author of a large number of works in prose and verse.

Among his publications are (Studies in Poetry0

(1830) ; (God's Hand in America) (1841) ; (Poets of America) (1847) ; (Windings of the River of the Water of Life) (1849) ; (The Voice of Nature and Her Foster-Child, the Soul of Man> (1852) ; (Lectures on the Life, Genius and Insanity of Cowper) (1856), argu¬

ing that Cowper's religious terrors proved him sane instead of insane; and (God Against Slav¬

ery and the Freedom and Duty of the Pulpit to Rebuke ID (1857). One of his most effective works was (Deacon Giles' Distillery.)

CHEFOO, chi-foo, or che'foo', China, a

treaty port in the province of Shantung, the most easterly of Chinese provinces. Its popula¬

tion includes about 400 foreigners and 80,000

Chinese ; its currency is the Chefoo tael and the Mexican dollar; its exported products are ver¬

micelli, peanuts, bean cake, bean oil, silk, silk waste, silk pongee, straw braid, thread lace and hair-nets. In 1863 the port was opened to foreign trade. Although it is not a foreign settlement it has a recognized foreign quarter which is well kept and has clean roads. The entire city, Chinese as well as foreign, is well lighted by electricity. An international commit¬

tee, consisting of six foreigners and an equal number of Chinese, Hooks after the interests of the foreign quarter,® as the consul of the United States at Chefoo wrote on 17 June 1916; and voluntary contributions of residents enable that committee to meet necessary expenses.

The trade of the district with the United States and Europe passes mainly through Shanghai, Tientsin and Japanese ports. The net value of Chefoo trade during 1915 was $22,312,696. The number of steamers entering the port in 1915

was less than in any year since 1900 — it was 1,693, of 1,434,569 tonnage; and the principal nationalities represented were British, with 527

vessels; Chinese, 588 vessels; Japanese, 494

vessels ; Russian, 47 vessels ; American, 26

vessels.

CHEHALIS, che-ha'lis, RIVER, Washing¬

ton, in the southwestern part of the State. It has its rise in Lewis County, flows north-north¬

west and through Chehalis County, into Gray's Harbor. Its length is 125 miles, and is navi¬

gable for light steamers some distance from the mouth.

CHEILOGNATHA, or CHILOGNA—

THA, ki-ldg’na-tha, also known as Diplopoda, one of the two orders of Myriapoda, including the millipedes (q.v.) and other forms. See Myriapoda.

CHEILOPODA, or CHILOPODA, ki-

lop‘6-da, one of the two orders of Myriapoda , represented by the centipedes (q.v.). See Myriapoda.

CHEIROMANCY, or CHIROMANCY,

ki’ro-man-si. See Palmistry.

CHEIROMYS, ki-ro’mis, a generic name

sometimes given to the Aye-aye. See Aye-aye.

CHEIROPTERA, ki-rop’te-ra, an order

of mammals, the bats, closely related to the insectivores and characterized by the immense extension of the forelimbs so as to form wings, and by other adaptations of the skeleton for an aerial life. The order is divided into two groups: Megacheiroptera and Microcheirop¬

tera. The former consists wholly of the great fruit-eating bats of the Old World tropics; the latter contains all the remaining families. They are separated principally by dental features.

See also Bats.

CHEIROTHERIUM, kl-ro-the’n-um. See

Labyrinthodonta.

CHEKE, chek, Sir John, English scholar: b. Cambridge, 16 June 1514; d. London, 13 Sept.

1557. He was educated at Saint John's College, Cambridge, and made Regius professor of Greek. In 1544 he was appointed tutor to the future Edward VI, and appears likewise to have assisted in the education of the Princess Elizabeth. On the accession of Edward he was knighted, became Secretary of State in 1553 and was also a privy-councillor. On the King s death he became Secretary of State for Lady Jane Grey, for which he was committed to the Tower by Mary. After a few months, how¬

ever, he was set at liberty and settled in Strassburg; but his connection with the English Protestant Church there gave offense to the Roman Catholics in England, and his estates were confiscated. He supported himself by teaching Greek, but in 1556, having been in¬

duced to visit Brussels, he was arrested by or¬

der of Philip II and sent prisoner to England.

Under threat of the stake he recanted and re¬

ceived the equivalent of his forfeited estates.

His chief distinction was the impulse given by him to the study of Greek. His best work is his translation of the (Gospel of Saint Matthew,) edited by Goodwin (1843).

CHEKHOFF, or TCHEKHOV, Anton

Pavlovitch, Russian author: b. Taganrog 1860; d. 1904. Of humble parentage, he yet received a good education, studied medicine at the Uni¬

versity of Moscow, and practised only about a year in a small cholera hospital. At the age of 19 he began writing short stories under the pen-name of ((Chekhonte.® The favorable

reception accorded his first volume of stories encouraged him to desert medicine for litera¬

ture, where his scientific training was to prove of inestimable value. His mental trend was from the first inclined to the banal aspects of Russian life. With grim satire he seized on all that was petty, mean and sordid in human character, and with Gorky, became one of the most prominent exponents of the Russian school of sordid realists. Chekhoff's writings reveal a crowded stage of humble characters — aristocrats are excluded — photographed from life, merchants, students, priests, schoolmasters, saloon-keepers, magistrates, neurotics, lunatics, officials, etc., with all their mean sordidness and narrow-minded simplicity. Where he intro¬

duces doctors — which is frequently — he rev¬

els in describing physical and mental diseases, of which latter (The Black Monk) is the best example. An atmosphere of sadness and hope¬

lessness pervades his characters and impresses itself upon the reader; his vivid portrayal of poverty and squalor, dishonesty and vice, frivolity, drunkenness, misery and coarseness, is certainly depressing even if true to life. Yet Chekhoff is withal a great master; brilliant, of CHEIROPTERA, INSECTIVORA, ETC

ˆ A it?

Fig. 1 Slender Lori 2 Foot of Slender Lori 3 Skull of Slender Lori 4 Black-fronted Lemur 11 The same flying. 12 Common Bat crawling 13 Skull of Horseshoe Bat 20 Skull of Water Shrew

5 Skull of Flying Lemur

14 Skull of Common Bat

21 Elephant Shrew 22

1 ua u® 7 Flyin£ Fo* 8 Skeleton of a Bi Skull Sek0L 16 Sku11 of Hedgehog 17 Mole SKull of Alpine Shrew 23 Canadian Mole 9 Head of Vampire Bat 10 Long-eared Bat Hanging 18 Skull of Mole 19 Common Shrew ranging CHEL-AB-KU-KIL — CHELMSFORD

penetrating psychology, with a remarkable flow of language, and a weird faculty of suddenly turning a humorous situation into a painful tragedy. His attempts at dramatic writing are less successful, being, at first, feeble dramatiza¬

tions of some of his stories. One of his best plays is described elsewhere (see Cherry Orchard) ; others are HvanofU ; (The Sea-gulP ; ˆncle Vanya, or Country Life) ; (A Marriage of Calculation ; and (The Three Sisters. > Most of his works are translated into French and German, some into English. Among his numerous stories are (The Sorceress,*

(Agatha, > (The Enemies, > (The Nightmare,) ‘The Twilight,* (The Stepped <A Melancholy Tale,* (A Stranger’s Story, *‘Room No. 6,*

‘The Gabled Housed (The Kiss,* (Philosophy at Home,* ‘Sorrow,* (The Biter Bit, > (In Exile, *‘Sleepy-Eye,* ‘Street Scene in Russia,*

‘From a Doctor’s Practiced He left 10 volumes of works.

CHEL-AB-KU-KIL, or AB-KU-KIL—

CHEL, an Indian priest of Yucatan who

flourished in the 15th. century. His name is mentioned in almost every Yucatanic legend, and fragments of history composed by him are found in documents of the missions of Yuca¬

tan and Central America.

CHELAN, che'lan, LAKE, Washington, in

the mountains of Okanogan County, 70 miles long, about 3 miles wide and the largest lake in the Northwest. Its chief inlet is Stehekin or Pierce River, on which, about three miles dis¬

tant from the lakes, are the famous Rainbow Falls, 300 feet high. The outlet is Columbia River. Chelean, Moore, Stehekin and Johns, towns on its banks, are summer resorts.

CHELARD, she-lar, Hippolyte Andre

Jean Baptiste, French musician and composer: b. Paris, 1 Feb. 1789; d. Weimar, Germany, 12

Feb. 1861. After studying in the various musi¬

cal centres of Europe, he brought out his first comic opera, (Casa da Vendere,* in Naples in 1815. In 1816 he settled in Paris as a teacher of music and violinist. In 1827 his lyrical opera, (Macbeth) (with words by Rouget de Lisle), was very successful and procured for him the place of chapel master to the king of Bavaria. He went to London in 1832, where he conducted German opera. In 1836 he was made chapel master to the Grand Duke of Weimar.

He produced other operas and cantatas, the most successful of the former being (Der Stu¬

dent* (1831); 'Mitternacht* (1831); 'Die Her-mannsschlacht* (1835).

CHELLEEN, che-la-aii, this name is given by French archaeologists to certain leaf-shaped flint implements found near Chelles in the de¬

partment of Seine-et-Marne, and supposed to be the oldest relics of prehistoric man in Europe. The name is also given to the epoch, early Pleistocene, in which the makers, who were on the Neanderthal, lived. The climate then was warmer and moister than now, so much so that the hippopotamus and rhinoceros inhabited Europe. It is impossible to say what was the equivalent of the Chelleen Epoch in the United

States, though, perhaps, it was equiva¬

lent to one of the earlier retreats of the con-tinetal ice sheet in the glacial period, if not altogether pre-glacial. See Glacial Period; Anthropology ; Pleistocene.

CHELLES, shel, Jean de, French archi¬

tect and sculptor of the 13th century. He is best known for his work on the southern portal of Notre Dame in Paris. This beautiful en¬

trance remains as it was constructed in 1257.

CHELMINSKI, chel-min'ske, Jan, Polish

painter: b. Brzostov, Russian Poland, 1851.

He studied in Warsaw under Kossaks and under Wagner, Brandt and Franz Adam at the Academy, Munich. In 1884-87 he was in the United States and resided afterward in London and Paris. In his early career he portrayed mostly hunting and military subjects, and attained a great success. The principal works of this period are (Stag Hunt in the Time of Louis XV) (1876); 'Morning in the Ukraine) ; (Empress of Russia on a Fox Hunt.*

His principal later works are a series of battle pictures portraying the deeds of the Polish legion in the Napoleonic wars. Other recent canvases are (Outskirts of Soissons 1814 >

(1907) ; 'Pursuit of a Courier, 1812* (1910).

CHELMSFORD, chemz'ferd, Frederic

Augustus Thesiger, 2d Baron, English gen¬

eral: b. 31 May 1827; d. London, 9 April 1905.

Entering the army in 1844, he served in the Crimea and through the Indian mutiny. As deputy adjutant-general he served in the Abys¬

sinian campaign, was made aide-de-camp to Her Majesty, and

adjutant-general to the forces in India (1868-76), and in 1877 was appointed commander of the forces and lieutenant-gov¬

ernor of Cape Colony. He restored Kaffraria to tranquillity, and was given the chief com¬

mand in the Zulu war of 1879. After great difficulties with the transport, and some dis¬

asters, such as those of Isandhlwana and In-tombi, he gained the decisive victory of Ulundi on 4 July, before the arrival of Sir Garnet Wolseley, who had been sent to supersede him.

On his return to England he became lieutenant of the Tower, a post which he held till 1889.

He wras appointed lieutenant-general in 1882, in 1888 general and in 1893 was retired.

CHELMSFORD, Frederic John Napier

Thesiger, 3d Baron : b. 12 Aug. 1868. He was educated at Winchester College, graduated at Magdalen College, Oxford, 1892, and was a fellow of All Souls' College, Oxford, 1892-99.

He has served on the London school board and the London county council ; was governor of Queensland, 1905-09, governor of New South Wales, 1909-13, and in 1916 was appointed vice¬

roy of India.

CHELMSFORD, England, a municipal

borough and capital of the county of Essex, 30 miles northeast of London by rail, situated near the confluence of the Chelmer and Cann.

There is a good municipal water supply and the streets are lighted by electricity. The church of Saint Mary is a fine old building of the 14th or 15th century. Among the public build¬

ings are the corn-exchange and the shire-hall containing the Court of Assize. There are manufactories of agricultural implements, electrical apparatus and motor cars, and a considerable trade in corn and malt is

car¬

ried on. On the banks of the Chelmer are several large flour-mills. The town gives name to a parliamentary division of the county. The Romans had a station on the site of Chelmsford and Roman remains have been found in the neighborhood. Pop. 18,008.

CHELMSFORD, Mass., town in Middlesex

County, five miles southwest of Lowell, on the Boston and Maine and the New York, New Haven and Hartford railroads and on the Merrimac River. The town contains several old residences of historic interest, the Adams Li¬

brary and Silver Lake. The Middlesex County Training School is situated here. The town has large agricultural interests and manufac¬

tures woolens, worsteds, hardware, and has cotton-scouring establishments. The govern¬

ment is vested in a board of three selectmen.

Pop. (1920) 5,682.

CHELONIA, ke-loma, or TESTUDI—

NATA, tes-du-di-na'ta, an order or sub-class of Reptilia (q.v.) containing the turtles and tortoises, and one of the most sharply defined groups of vertebrates. The body is enclosed in a more or less well-developed bony box, from which the head, neck, tail and two pairs of limbs protrude, and into which they may be completely retracted in some tortoises and terrapins. This box is a unique feature among reptiles and is divided into a dorsal shield or carapace composed of numerous der¬

mal bones usually arranged regularly and sup¬

ported on the ribs and vertebral spines, and a ventral shield or plastron likewise composed of dermal bones, among which are incorporated the clavicles and interclavicle. Both carapace and plastron are usually encased in horny plates, which do not correspond to the bony pieces. Except for the head, neck and tail, which are flexible, the vertebrae are immovably ankylosed with the carapace. The skull is very compact, with a small brain cavity, and ex¬

hibits many structural peculiarities, of which two of the most apparent are the complete fixation of the quadrate bone and the substitu¬

tion of horny cutting plates for teeth on the margins of the jaws. Both shoulder and pelvic girdles are permanently enclosed within the shell, and the latter may be firmly united to both carapace and plastron. The limbs may be flattened paddles in the sea turtles, or true walking legs with free toes in the other groups.

All chelonians have well-developed lungs; but some aquatic forms have additional respiratory organs in the form of vascular areas and papil¬

lae in the pharynx and oesophagus, or respira¬

tory sacs in connection with the rectum. Pul¬

monary respiration is maintained partly by the movements of the neck and limbs in and out of the shell and partly by the hyoid apparatus.

Without any known exceptions, chelonians are oviparous, and, after burying the eggs in the earth, allow them to be hatched by the warmth of the sun. Except in the colder regions tur¬

tles are found throughout the world, and are mostly inhabitants of fresh water, though a considerable number are terrestrial and a few marine. Between 200 and 300 living, and a great many extinct, species are known, many of the latter belonging to families not represented in the recent fauna. The chelonia are divided into four sub-orders :

1. Athecce, in which the carapace is of leathery consistency and is supported by nu¬

merous small, irregular, separate bones free from the ribs. There is one familv (Derma-tochelydidc?) , containing the leather-turtle (q.v.).

2. Trionychoidca. with a true carapace com¬

posed of dermal bones united to the ribs, but covered by a leathery skin, and lacking the marginal bones; the pelvis is free from the plastron. There is one family (7 rionychida?) , the soft-shelled turtles. See Turtles.

3. Cryptodira, in which the carapace is cov¬

ered with horny plates and provided with marginal bones, and the pelvis is free from the plastron. It embraces the following families : ChclonidcB, including marine turtles, as the green, loggerhead and tortoiseshell turtles ; Tesiudinidce, land-tortoises and gopher tortoise; Chelydridce, snapping-turtles and alligator-turtles; Cinosternidce, terrapins and mud-turtles ; and several others confined to the tropics of both hemispheres.

4. Pleurodira, in which the carapace is simi¬

lar to that of the Cryptodira, but the pelvis is ankylosed to the plastron, and the neck folds in a horizontal instead of a vertical plane. They are all inhabitants of fresh waters in the tropical parts of both the Old and New Worlds.

Representative families are the PelomedusidcF, tartaruga (q.v.) and Chclydidce, matamata (q.v.). .

Consult Gadow, (Amphibia and Reptiles*

((Cambridge Natural History,* London 1901), and Baur, in a bulletin of the United States National Museum.

CHELSEA, chel’se, England, a metropoli¬

tan and parliamentary borough in Middlesex and western suburb of London (area, 659

acres), on the north side of the Thames, chiefly distinguished for containing a royal military hospital. A building was originally commenced here by James I as a theological college, but was never finished. In the reign of Charles II the erection of the present hospital for sick, maimed and superannuated soldiers was begun.

It was carried on during the reign of King James II and finished in that of William and Mary by Sir Christopher Wren, in 1692. The whole expense of this structure amounted to £150,000, and the extent of the grounds is now about 66 acres. The pensioners maintained here number about 550, and consist of soldiers maimed or disabled in the military service or who have served for 21 years. All pensions are granted by the commissioners of Chelsea Hos¬

pital, but most of the recipients are known as out-pensioners. Their number amounts to

about 85,000. It is from them that the in-pensioners are selected. The Duke of York’s school for the children of soldiers, formerly situated near the hospital, has been removed to Dover. There are great military barracks, but these are not within the boundaries of the borough. Chelsea is replete writh literary associations — Swift, Steele, Smollett, Turner the painter, Leigh Hunt, Rossetti, Whistler and Carlyle all having resided here. Carlyle is known as <(the Sage of Chelsea.® The borough returns one member to Parliament. Pop. (1911) 66,385. Consult Beaver, (Memorials of Old Chelsea) (1892) ; Blunt, (A Historical Handbook to Chelsea) (1900) ; Davies, (Chelsea Old Church* (1904) ; L’Estrange, (The Village of Palaces: Chron¬

icles of Chelsea* (1880) ; Martin, (01d Chelsea) (1889).

CHELSEA, Mass., city of Suffolk County, separated from East Boston by Chelsea Creek, and from Charlestown by the Mystic River. It is a suburb of Boston, and is connected with it bv ferries, electric and steam railroads ; and the Mystic River is crossed here by a bridge 3,000

CHELSEA PORCELAIN

JA

r’BlIi Jm’

gggˆ

|P

…

llif# A

Bril:-

CHELSEA PORCELAIN

Courtesy of Metropolitan Museum of Art, New York 1 Vase with Heart Medallion decoration. Ooen-work Neck (between 1757 and 1770) 2 Vase with “ Escotic ” Bird Motif, Rococo Handles (late 18th Century) 3 and 4 Pair of Candlesticks. “ Rustic ” Figures on Rococo Scroll Bases (late 18th Century) CHELSEA PORCELAIN

CHELSEA HOSPITAL — CHELSEA WARE

feet long. Chelsea has a United States Marine Hospital, United States naval powder maga¬

zine, Soldiers' Home, Fitz Public Library and Odd Fellows' and Masonic halls. It has exten¬

sive manufactories of rubber goods, foundry and machine-shop products, leather, cordage, brass goods, pottery, iron and steel, *etc.* In 1909 there were 110 manufacturing establish¬

ments, with $11,021,000 capital and 5,954 hands and an annual output valued at $17,002,000. It has numerous churches, high and graded public schools, weekly newspapers and two national banks. Chelsea was settled at Winnisimmet in 1630; was a part of Boston until it was organ¬

ized as a town in 1738, and was incorporated as a city in 1857. In 1914 a destructive fire swept over the manufacturing section of the city, causing a loss of over $17,000,000. The burned-out section, however, has been almost entirely rebuilt. Pop. (1920) 43,184.

CHELSEA HOSPITAL. See Chelsea.

CHELSEA VILLAGE, now a part of New

York. The name is still preserved in Chelsea square between Ninth and Tenth avenues and Twentieth and Seventy-first streets. Clement C. Moore, the author of ('Twas the Night Be¬

fore Christmas, } owned here a farm in the early part of the last century. He sold it off in lots, and the place was called Chelsea Vil¬

lage.

CHELSEA WARE (soft porcelain).

There is doubt as to the date when the Chelsea (London) factory was

started. Both 1730 and 1744 are claimed. The earliest dated Chelsea pieces (two extant ((goat and bee® decoration milk jugs) have incised triangle and <(Chelsea, 1745® as marks. They are of such expert work¬

manship as to create a supposition that the fac¬

tory had been already operating for some years.

Chelsea ware appears to have had a high repu¬

tation and large sale in France as early as 1745.

Charles Gouyn was manager of the factory in 1747. In 1750 Nicholas Sprimont held that post, to become proprietor by 1759. . The Duke of Cumberland and Sir Edward Fawkener

financed the works to their loss, but Sprimont became wealthy. Sprimont sold the factory to Charles Cox in 1769. The latter sold out the next year to William Duesbury, owner of the Derby porcelain factory. Duesbury ran the works till 1784, then transferred the entire plant to Derby. See Derby.

Characteristics. — Early pieces (to 1749) were thick and badly potted, the frit (artifi¬

cial) paste being difficult to manipulate. Nu¬

merous pieces were white; no gilding was in use then. Decoration simple, with tend¬

ency to Meissen (Dresden), Sevres and

Chinese styles. Forms were often after

silversmiths' ware. From 1750 to 1753 we find Japanese patterns. Chelsea figures are said to show better finish than Bow ware and to be rather thinner in the face than Derby figures. The <(spur® marks, bare of glaze, are a characteristic of this ware. The rococo scroll more often decorates the foot of the Derby and Chelsea figures, whereas the scroll itself forms the foot of Bow figures. In general there is so much likeness in Bow, Chel¬

sea and Derby ware as to cause much discussion as to provenance of pieces. Differences in paste and glaze are the points connoisseurs de¬

pend on largely.

Product. — Rococo vases, figures of Chinese, harlequins, animals, Cupids, groups, dinner, tea, coffee and dessert services, epergnes, beakers, candlesticks, cups with stands, small seals rep¬

resenting animals, hafts for table and dessert knives and forks, scent bottles, caudle cups, *etc.* Figures vary from one inch to over two feet. Finest pieces are said to have been pro¬

duced in Chelsea's last period.

Decoration. — Plain white and simple deco¬

ration came first, with Oriental and Continental, especially Dresden patterns. Underglaze blue (cobalt) and enamel overglaze colors followed.

Sprimont colors were very brillant compared with the Derby ware. Chelsea figures are very fine (some have the noted ((bocage® raised flower and foliage decoration) and came from the hands of such sculptors as Nollekins Senior, Roubilliac and Bacon. Kandler's and Acier's Meissen (see Dresden) figures were frequently closely copied. Beautiful decoration also was done by such painters as Zachariah Bowman, Sir Thomas Thornhill, Willinson (((exotic®

birds), and by John Hall, later noted as en¬

graver. Other artists were Boyer, Askew, Barton, Gauron, Dyer and Mills. Chelsea's beautiful ground colors consist of the unique (<Chelsea claret,® <(mazarine® blue, pea-green, turquoise, termed ((celeste,® *etc.* Her elaborate gilding is sometimes chased or even raised.

Glaze. — The large proportion of lead

caused great brilliancy; it made the underglaze blue spread with its soft absorbent qualities, so as to form a lovely blue tinge over the entire surface. This plumbiferous glaze had a soft¬

ness and richness that experts termed ((luscious,® ((sensuous,® *etc.* ;

its softness often causes the surface to show wear. Late pieces often show cracks from defective firing.

Paste. — First paste was soft and of un¬

even density, rendering it opaque in the denser portions and translucent in the remainder of the body. This created the appearance of the so-called <(grease spots® or ((moons® when held up to light. Later (1757-69) the body becomes whiter and more evenly translucent (a phos-phatic paste).

Marks. — • First ((Chelsea, 1745® and incised triangle. Then anchor impressed in relief on oval medallion or painted (red), sometimes in gold. W. M. Binns says the gold belongs to last period. Next came two anchors (last re¬

versed) touching, in red used to about 1758, then red or gilt till 1768. Oriental style pieces often have <(Chinese seal® mark. The mark of trident and crown is on some pieces.

Chelsea-Derby Period (1770-84). — Dues¬

bury substituted Derby features (see Derby) in body, glaze, style (severely classic) and decoration. The wonderful Chelsea ((claret®

color disappeared. Gold stripes were favored.

Products were services, vases, etc., as before.

Decoration ran to festoons and other floral motifs, figures, landscapes, biscuit flowers, medallions, masks, *etc.* The mark is an anchor with the script ((D.®

Bibliography. — Bemrose, William, (Bow,

Chelsea and Derby Porcelain) (London 1898) ; Burton, William, (A History and Description of English Porcelain) (London 1902) ; Church, Sir Arthur Herbert, (Handbook to the China made in England during the 18th Centurv) (London 1902) ; Franks, A. W., (Notes on the

don 1863) ; Hobson, R. L. (Porcelain, Oriental, Continental, and British1 (London 1808) ; Jewitt, Llewellyn, (The Ceramic Art of Great Britain1 (London 1883) ; Mew, Egan, (Chelsea and Derby-Chelsea1 (London 1910) ; Nightin¬

gale, James Edward, Contribution towards the History of Early English Porcelain1 (Salisbury 1881) ; Solon, M. L., (Brief History of Old English Porcelain1 (London 1903) ; Tiffin, Wal¬

ter F., Chronograph of the Bow, Chelsea and Derby Porcelain Manufactories1 (Salisbury 1875).

Clement W. Coumbe.

CHELTENHAM, chel’ten-am, England, a

municipal and parliamentary borough and popu¬

lar watering-place in the county of Gloucester, seven miles northeast of the city of Gloucester, on the river Chelt, a short tributary of the Sev¬

ern, 120 miles from London by rail. It is a city of gardens, protected by hills and sur¬

rounded by beautiful scenery. Cheltenham spas first occasioned the rapid growth of the town, but the baths and springs are less fre¬

quented than formerly. The springs were dis¬

covered in 1716 by accident, but became famous in 1788 through a visit paid to them by George III. The parish church is a fine old Gothic structure, and the Roman Catholic and Con¬

gregational churches are two of the finest in England. The town is also

noted as an educa¬

tional centre. There is a college for boys (founded in 1843), with an attendance of 700

scholars ; and the ladies' college, with 500

pupils. There are also two training colleges for teachers. Among other public institutions may be mentioned its libraries, assembly-rooms, the college museum, pumprooms and numer¬

ous places of fashionable resort. There are hospitals, orphanages, *etc.* Cheltenham returns one member to Parliament. The town has a large brewery and ironworks. Pop. 48,942.

CHELYUSKIN, chel-yoos'kin, Cape (for¬

merly Northeast Cape, and sometimes called Cape Severo), the extreme northern point of Asia, on a peninsula of the same name, which forms the western arm of the eastern half of the Taimyr Peninsula. It is named after a Russian officer who led an expedition thus far in 1742, and here succumbed, with his wife, to the fatigues of the journey; it was not revisited till 1878, when Nordenskjold, in the Vega , spent 19 and 20 August here. Lat. of the west is 77° 36′ 37″ N, that of the east 77° 41' N.

CHEMICAL AFFINITY, the force or

tendency which causes two or more dissimilar substances to combine in definite proportions to form a new substance, whose properties are distinct from those of any of the constituents.

The word "affinity11 was originally employed in this sense because it was believed that a kind of relationship exists between substances that are capable of combining with one another. No such idea as this is entertained in modern times, and it might even be said that the tend¬

ency toward combination is (in general) stronger, in proportion to the dissimilarity, or lack of obvious relationship, between the sub¬

stances combining. In the time of Aristotle the constituent particles of bodies were con¬

ceived to be endowed with qualities somewhat akin to love and hate. After the advent of Galileo, these notions were exchanged for equally erroneous but more mechanical ones, and the ultimate particles were represented, in thought, as provided with hooks and other similar devices, by means of which their com¬

binations were conceived to be effected. Later, when the law of universal gravitation was pro¬

pounded by Newton, the force impelling the atoms toward one another, and holding them in their combinations, was naturally enough pic¬

tured as a special form, or manifestation, of gravitative action. This latter view may pos¬

sibly be true, but if so we must modify our present views with regard to gravitation some¬

what, and assume that it follows different laws, when acting at molecular distances, from what it does when acting at distances that are appre¬

ciable to the senses. The modern tendency ap¬

pears to be rather in favor of viewing chemical affinity as an electrical manifestation, though this conception . has not yet been developed in a wholly definite and satisfying form. (See Electron).

It was formerly thought possible to arrange the elements in the order of their chemical affinity, so that each element in the array would expel all those that preceded it from their com¬

binations, and tables of this sort were published two centuries ago (in 1718) by Geoffroy.

Later, it was found that no such definite law exists; and Claude Louis Berthollet, in his fa¬

mous (Essai de Statique Chimique1 (Paris 1803), pointed out that the combination of sub¬

stances depends not only upon the affinity that such substances have for each other, but also upon the relative quantities in which they are

present. For example, if barium sulphate and potassium carbonate are melted together, the former is always partially converted into car¬

bonate; but in order to effect its total conversion into carbonate, it is necessary that the quan¬

tity of carbonate of potassium present shall be at least six or seven times as great as the equation BaSCh + BaCOa + K2SO«

would appear to require. In recent times the necessity of taking account of the relative masses of the combining substances has been fully recognized, and a good idea of the im¬

portant results that have followed may be had from Nernst's (Theoretical Chemistry from the Standpoint of Avogadro's Rule and Thermo¬

dynamics1 (translated into English by Prof.

C. S. Palmer). Numerical estimates of the "affinity11 of various substances have been ob¬

tained by many methods, but the results are not always in as good accord with one another as could be wished, and a discussion of the differences would require a volume. For a brief but excellent review of the different methods consult W. C. D. Whetham, (Solution and Elec¬

trolysis.1 See Dissociation; Electron; Equi¬

librium (Chemical) ; and Solutions.

CHEMICAL ANALYSIS is the art of

determining the constituents of which a given substance is composed. The analysis is "qualita¬

tive11 if it is made solely for the purpose of discovering what those constituents are. It is "quantitative" if the object is to ascertain the quantity of each that is present. It is hardly necessary to say that in the examination of an unknown substance a qualitative analysis must be made before a quantitative examination is attempted, because the methods that must be employed in quantitative work depend alto¬

gether upon the nature of the constituents that are to be determined. An analysis is said to CHEMICAL ANALYSIS

be aultimate)) when its object is merely to dis¬

cover what elements are present, and in what quantity each occurs. It is said to be proxi¬

mate® when it is made for the purpose of learn¬

ing how these elements are combined with each other, and what radical or other proximate constituents are present. General methods are known, which suffice for the ultimate analysis of any compound that may be proposed ; but chemical science has not yet been developed sufficiently to formulate equally general methods for proximate analyses. Methods are indeed known for the recognition of certain of the organic radicals, but most of the problems that arise in proximate analyses are of such a nature that special means must be devised to fit each special case.

Qualitative Analysis of Inorganic

Substances.

In the qualitative analysis of inorganic sub¬

stances, the color that a given compound com¬

municates to the flame of a Bunsen burner often affords useful information as to the na¬

ture of the compound, and a systematic exam¬

ination of the substance in the flame of the blowpipe may afford much additional informa¬

tion. (See Blowpipe Analysis). When the substance is partially

volatilized in the flame of the Bunsen burner, or by the electric spark from an induction coil, and the light of the flame (or the spark) is examined through the spectroscope, many of the elements can be rec¬

ognized, even when present in exceedingly small quantities, by the occurrence, in the spectrum, of certain characteristic bright lines, or groups of such lines. (See Spectroscopy). The usual method employed, however, for the detection of the commoner bases and acids, is known as the <(wet process,® and consists in bringing the substance into solution, and noting the behavior of this solution when certain reagents are added to it. Even in the analysis of inorganic sub¬

stances (which are alone considered in the pres¬

ent section) troublesome combinations some¬

times occur, and in such cases the reaction that might naturally be expected at a certain stage in the examination may be modified to a consid¬

erable extent, or even be suppressed altogether.

An adequate account of conditions of this sort cannot be given in the present article, and they are not stated with any degree of completeness in the more elementary manuals on inorganic analysis. Good accounts of the various diffi¬

culties of this sort will be found, however, in Douglas and Prescott's Qualitative Chemical Analysis,* to which the reader is referred. The existence of difficulties and limitations being recognized, a general scheme for the detection of the commoner metallic elements may be given, which will be found to work satisfactorily in the majority of cases.

The first step in making an analysis in the wet way is to ensure the absence of organic matter, which might seriously interfere with the subsequent reactions. If organic matter be present, it may usually be detected by heating a part of the compound in a closed tube. If it blackens, or gives off a characteristic empyreu-matic odor, organic matter is probably present, and it must be destroyed either by the continued application of heat, or (if there appears to be danger of losing any essential part of the inorganic substance by volatilization) by warm¬

ing it with strong sulphuric acid. The organic matter being destroyed by either of these meth¬

ods, the next step is to bring the substances int©

a state of solution. Water, either cold or hot, should first be tried as a solvent. If this does not suffice, hydrochloric acid, nitric acid or alkaline solvents may be tried. If these reagents fail to effect solution, one part by weight of the substance may be mixed with five parts of sodium carbonate and five of potassium car¬

bonate, and the whole heated in a porcelain crucible until quiet fusion is attained. (This may take 30 minutes). The crucible and its contents are then allowed to cool, and are im¬

mersed in dilute hydrochloric acid, or (if silver is suspected to be present) in dilute nitric acid.

In this way most of the commoner insoluble substances may be brought into a state of solu¬

tion. For methods that are applicable to sub¬

stances that resist this mode of treatment, the more advanced treatises on analysis must be consulted. In case a part of the substances to be analyzed dissolves in water or in one of the other solvents, a separate examination of the solution so obtained should be made, the insol¬

uble part being reserved for subsequent treat¬

ment, by the method indicated above.

The commoner metals (which are the only ones that can be considered in the present article) may be divided into seven general groups, according to their behavior when treated with certain reagents that are known as “group reagents.® These classes or groups are as follows :

1. Metals forming chlorides that are insol¬

uble in water, and which are precipitated as chlorides upon adding

hydrochloric acid to their solutions. (Silver, lead and mercurous mer¬

cury).

2. Metals that are precipitated from their acid solutions, by sulphuretted hydrogen, in the form of sulphides that are insoluble in ammo¬

nium sulphide, (NHˆaS. (Mercury, lead, bis¬

muth, cadmium, copper and silver).

3. Metals that are precipitated from their acid solutions, by sulphuretted hydrogen, in the form of sulphides that are soluble in am¬

monium sulphide. (Arsenic, antimony and tin).

4. Metals whose sulphides are insoluble in water, and which are precipitated from neu¬

tral solutions, by ammonium sulphide, either as sulphides or as hydrates. (Iron, manganese, co¬

balt, nickel and zinc are precipitated as sul¬

phides; aluminum and chromium as hydrates).

5. Metals which, upon addition of ammo¬

nium carbonate, are thrown down in the form of carbonates that are insoluble in ammonium chloride, (Barium, strontium and calcium).

6. Metals which, upon addition of ammo¬

nium carbonate, are thrown down in the form of carbonates that are soluble in ammonium chloride. (This group contains the single metal

magnesium).

7. Metals which remain in solution when treated by any or all of the foregoing reagents, and all of whose important compounds are sol¬

uble. (Potassium, sodium, lithium and am¬

monium).

The separation of the groups that are de¬

fined above may be effected as follows : Hydro¬

chloric acid is added to the solution under examination, drop by drop, until no further precipitation takes place. The white precipi¬

tate which may occur at this stage consists 382

of the chlorides of the metals of Group 1, and is to be preserved for further examination. The solution is filtered, and a drop or two of hydro¬

chloric acid is added to the clear filtrate, to make sure that this reagent is incapable of inducing further precipitation. Sulphuretted hydrogen gas is then passed through the filtrate until the liquid smells strongly of the gas. If a precipitate is formed, it will consist of the sulphides of the metals of the second and third groups. Silver, however, will not (in general) be present, because it is ordinarily completely precipitated in the first group, and has there¬

fore been already removed by filtration. Lead may not be completely precipitated in the first group, and hence its sulphide may occur in the present precipitate. The mercury in the present precipitate represents mercuric mercury in the original solution The mixed sulphides of Groups 2 and 3 are removed by filtration and are washed until the wash water is no longer acid.

They are then boiled with ammonium sulphide.

This reagent leaves the sulphides of Group 2

undissolved, but dissolves those of Group 3.

Filtration then leaves the sulphides of Group 2

on the filter paper; and when the filtrate is acidified by the addition of hydrochloric acid, the sulphides of Group 3 are thrown down again.

The clear filtrate from which Groups 2 and 3 were removed by sulphuretted hydrogen gas is next made slightly alkaline by the addition of ammonia and heated almost to boiling. Ammo¬

nium sulphide is then added, and the whole is kept warm for some time. The sulphides (or hydrates) of Group 4 are thus precipitated, and may be isolated by filtration. The filtrate from this operation is next boiled to expel all the sulphuretted hydrogen and ammonia and ammonium chloride are added. The solution is then heated to the boiling point and treated with a solution of ammonium carbonate

(NH.O2CO3. This causes the precipitation of the carbonates of Group 5, which are removed by filtration. The filtrate is boiled, and then treated with a solution of sodium phosphate, NasHPCh, to which one-sixth of its volume of ammonia has been added. Magnesium, the

metal of the sixth group, is thrown down (if present) in the form of a white crystalline pre¬

cipitate having the formula MgofNLLˆPsOs.

This is again removed by filtration, and the filtrate will contain, in solution, the metals of Group 7.

The several groups being thus separated, it remains to examine each group by itself, to see how its components may be isolated or other¬

wise recognized.

Group 1. The chlorides of this group, as ob¬

tained in pursuing the general scheme outlined above, may be separated very readily. Thus if the precipitate of mixed chlorides be treated with boiling water, the chlorides of silver and mer¬

cury will be unaffected ; but the chloride of lead will dissolve, and may therefore be isolated by filtration. The mixed chlorides of silver and mercury may be separated by treatment with hot ammonia. This reagent dissolves silver chloride, which is again precipitated in the form of chloride upon neutralizing its solution with nitric acid. The hot ammonia does not dissolve mercurous chloride but transforms it into a black substance that contains mercury, chlorine, nitrogen and hydrogen, and remains behind upon the filter paper.

Group 2. All the silver present being as¬

sumed to be removed in the first group, the mixed sulphides of Group 2 are washed until the wash water ceases to redden blue litmus paper, and are then boiled with a small quantity of nitric acid. Lead, bismuth, calmium and copper pass into solution in the form of nitrates, while mercury sulphide remains unchanged, and may be isolated by filtration. The filtrate, con¬

taining the mixed nitrates, is evaporated to a small volume, and sulphuric acid is added. This precipitates lead sulphate, which appears as a whitish precipitate, removable by filtration. The filtrate from this last operation may contain the nitrates of bismuth, cadmium and copper.

If it is made alkaline by the addition of am¬

monia water, any bismuth that it contains will be thrown down in the form of the hydrate.

The cadmium and copper nitrates are simul¬

taneously reduced to the form of hydrates, which, however, remain in solution. Upon pass¬

ing sulphuretted hydrogen through the solution containing them, a precipitate consisting of cad¬

mium sulphide and copper sulphide is thrown down. If this is boiled with dilute sulphuric acid the copper sulphide remains unaffected, while the cadmium sulphide passes into solution.

From the solution, sulphide of cadmium may be again thrown down by adding ammonia till the reaction is alkaline, and then passing sulphuret¬

ted hydrogen through the solution. If cadmium is present, its sulphide is thrown down as a bright yellow precipitate.

Group 3. When the sulphides of Group 3 have been isolated, some information may be had at once from the color of the precipitate. Thus arsenic sulphide is yellow, antimony sulphide is red and tin sulphide is black. If only one of these elements is present, it may therefore be detected by the color of its sulphide. If more than one are present, the mixed sulphides are treated with a solution of ammonium carbonate (NFLLCCL.

The sulphides of antimony and tin are unaffected, but the sulphide of arsenic passes into solution, and after filtration it may be again thrown down by the addition of hydrochloric acid. The mixed sulphides of antimony and tin are trans¬

ferred to a porcelain dish, and heated with a small quantity of hydrochloric acid, to which a few crystals of chlorate of potash have been added. By this treatment they are reduced to the form of chlorides. The solution containing the mixed chlorides of antimony and tin should then be somewhat diluted, and a piece of plati¬

num foil wrapped in zinc should be added. By the electrolytic action so set up, antimony and tin are thrown down, in the metallic state, upon the platinum foil ; and the foil will be blackened in spots, if antimony be present. In any case the foil should be washed and boiled with hydrochloric acid diluted with its own bulk of water. In this way any tin that may be present is brought into the form of the chloride, which dissolves; the antimony remaining unaffected.

The presence of tin chloride in solution may be readily demonstrated by the addition of a solu¬

tion of corrosive sublimate. The tin is thereby reduced to the form of a higher chloride, and a precipitate of HgaCL (calomel) is thrown down.

If no tin is present, this precipitate is not formed.

Group 4. The metals of Group 4 are ob¬

tained, in the general scheme of separation out-CHEMICAL ANALYSIS

lined above, in the form of sulphides and hy¬

drates. The precipitate containing them is to be treated in a porcelain dish with cold dilute nitro-hj'drochloric acid. The sulphides of nickel and cobalt remain unaffected, and may be re¬

moved by filtration, since the other metals pass into solution. The precipitate that is undis¬

solved should be tested in a borax bead before the blowpipe. (See Blowpipe Analysis).

Cobalt gives a blue bead, while nickel gives a reddish-brown one. If both metals are present, the color is intermediate between these two.

In the reducing flame the reddish-brown color due to nickel changes to a gray, while the blue of the cobalt remains unaltered; hence the reducing flame should be tried, if no decided indication of cobalt is obtained in the oxidizing flame. For other and more exact tests for dis¬

tinguishing cobalt from nickel, special treatises on qualitative analysis should be consulted.

(For example, Scott's (Standard Methods of Chemical Analysis*)-Nickel and cobalt being removed from the metals of Group 4 by the means indicated above, the filtrate contain¬

ing the remaining members of the group is boiled until all the sulphuretted hydrogen is ex¬

pelled. A little nitric acid is then added, and the solution is again boiled until the greater part of the acid is driven off, when the remain¬

ing solution is diluted with water. The small amount of free acid that is still present is neutralized with sodium carbonate, care being taken

that no permanent precipitate is formed.

The solution is allowed to cool, barium car¬

bonate is added in the cold and the whole is allowed to stand for 15 minutes. The precipitate contains the aluminum, chromium and iron in the form of hydrates, and also the excess of barium carbonate. The filtrate contains manganese and zinc. The precipitate is removed by filtration, dissolved in dilute hydrochloric acid, gently warmed and made alkaline by ammonia. By this process the hy¬

drates of aluminum, chromium and iron are thrown down, free from barium. This precipi¬

tate of the hydrates is collected on a filter, dried, transferred to a porcelain dish and dis¬

solved in concentrated nitric acid. A few crys¬

tals of potassium chlorate are then added, and the solution is boiled for several minutes. Upon adding sodium hydrate in excess, the iron is thrown down in the form of hydrate, the alu¬

minum and chromium remaining in solution.

The iron being removed by filtration, the filtrate is divided into two portions. One of these por¬

tions is made acid with nitric acid, and am¬

monia is added in excess. Aluminum hydrate is thrown down, if aluminum is present. The other portion of the filtrate is made acid with acetic acid, and lead acetate is added. If chro¬

mium is present, a yellow precipitate of chro¬

mate of lead, PbCrCh, is thrown down. The filtrate from the treatment with barium car¬

bonate, which may contain zinc and magnesium, is heated to boiling, and the barium that it con¬

tains is completely precipitated with dilute sul¬

phuric acid. The precipitate of barium sulphate is removed by filtration, and the filtrate is boiled, after addition of sodium hydrate in ex¬

cess. If manganese is present, it is precipitated in the form of the hvdrate, and may be removed b}' filtration. The filtrate from this operation is acidified with acetic acid, and treated with sul¬

phuretted hydrogen gas. If zinc is present, it is thrown down in the form of a white precipi¬

tate of zinc sulphide, ZnS.

Group 5. The metals of this group (barium, strontium and calcium) are isolated, in the general scheme, in the form of carbonates. To separate them from one another, the mixed carbonates are dissolved in dilute acetic acid, and a portion of the solution is tested for barium by the addition of potassium chromate, K2Cr04

(not the bichromate, K2Cr20s). If barium is present, a straw-yellow precipitate of barium chromate, BaCrCh, is thrown down. If barium is not present, we may proceed at once to the tests for calcium and strontium; but if it is pres¬

ent, it must first be removed from the solution by cautiously adding potassium chromate until no further precipitate is formed, and then filter¬

ing. In this case it is necessary to remove the excess of chromate of potassium before testing for calcium and strontium, because these two metals cannot be separated in the presence of that reagent. For this purpose the filtrate con¬

taining the strontium and calcium (which must be perfectly free from barium chromate, even though several successive filtrations may be necessary in order to make it so,) is made alka¬

line by ammonia, and ammonium carbonate is then added until the carbonates of strontium and calcium are all precipitated, the potassium chro¬

mate remaining in solution. After filtration and thorough washing, the mixed carbonates of strontium and calcium are dissolved in hot acetic acid, and the solution is boiled. Dilute sulphuric acid is then added; and if the acid is sufficiently dilute, a white precipitate of sul¬

phate of strontium is thrown down, while the sulphate of calcium (which is formed at the same time) remains in solution. After stand¬

ing for 15 minutes or more, in order that the precipitation of strontium sulphate may be complete, the solution is filtered, and the clear filtrate is tested for calcium by first adding ammonia until an alkaline reaction is obtained, and then adding a solution of oxalate of am¬

monia. If calcium is present, a white precipi¬

tate of calcium oxalate is obtained.

Group 6. This <(group® contains magnesium only. Hence the presence of magnesium

will be made apparent at once in the course of the preliminary separation into groups.

Group 7. Potassium, sodium, lithium and ammonium belong to this class. These metals are characterized by the high solubility of all their important salts. Ammonia, being used in the separation of the groups as a reagent, is sure to be present in the final solution that has been designated as containing the metals of C(Group 7.® Hence if it is desired to test for that substance, the test should be made upon a specimen of the original solution, before any ammoniacal reagent has been added. The test is very simple, and consists merely in heating some of the proposed solution with milk of lime (calcium hydrate in suspension). All salts of ammonia are decomposed in this way, with the liberation of ammonia gas, which may be recog¬

nized by its smell or by its turning moist red litmus paper blue. The general nature of the re¬

action involved in the liberation of ammonia gas may be illustrated by the case of ammonium sulphate. We have (NH4)2S04 + Ca(0H)2— CaS04 + 2NH3 + 2H2O. Sodium, potassium and

lithium may be sought for in the final fil¬

trate obtained in the separation of the funda-384

menial groups, since no compounds of those metals have been used as (<group reagents.®

They are best identified by means of the colors that they communicate to the flame of a Bunsen burner. For performing a test of this sort, the filtrate containing these metals should be evapo¬

rated to dryness in a porcelain dish, and the residue ignited until any ammoniacal salts present are eliminated by volatilization. The dish is then allowed to cool, and its contents are moistened with a few drops of distilled water.

A piece of platinum wire is next thoroughly cleaned, moistened with hydrochloric acid and held in the Bunsen flame until it ceases to com¬

municate any color. The wire is then dipped into the solution in the dish, and again held in the flame. Potassium salts give a fine blue color, lithium salts a red and sodium salts an orange yellow. If sodium is present in any con¬

siderable amount, its strong, brilliant flame-color is almost certain to obscure the colors due to any other elements present. Chemists there¬

fore make use of colored glasses that are prac¬

tically opaque to sodium light, using them as screens through which to view the Bunsen flame. The commonest glass of this kind is the "cobalt-blue® glass, which is used for the de¬

tection of potassium, since it is quite trans¬

parent to the flame-color of that metal.

For methods of examination adapted to the detection of gold, platinum and others of the less common metals, reference must be made to books on chemical analysis.

The metals that exist in a proposed substance being known, it remains to discover in what chemical combinations they are present. It is usually impossible to learn, by mere qualitative analysis, which of the acid radicals that may be present is combined with any given one of

the metals ; but it is possible to ascertain that certain kinds of compounds (such as sulphates, chlorides and the like), are present and a chem¬

ist of experience, who is familiar with the kind of work in hand, can often infer, with con¬

siderable probability, how the bases and acids are associated with one another. In the present article it is not possible to discuss this difficult phase of analysis, but a few of the more com¬

mon tests for the presence of acid radicals may be given.

There is no general scheme for the detection of these radicals, by which they are separated into groups like the metals, and eventually iso¬

lated singly. In examining a substance for them, all that can be done is to apply certain tests, largely independent of one another, and best carried out by dividing the original solu¬

tion into a number of parts, each of which is to be examined for a single class of acid radi¬

cals, and then thrown away.

When a solution of barium chloride is added to a neutral or slightly alkaline solution, a pre¬

cipitate of the corresponding barium compounds is thrown down if the solution tested contains sulphates, phosphates, borates, oxalates, fluor¬

ides, carbonates, silicates, tartrates, sulphites, hy¬

posulphites, arseniates, arsenites or chromates.

(If the original solution contains lead, silver or mercury, nitrate of barium is used as a reagent in the place of the chloride, because other¬

wise a precipitate of the chlorides of those metals would also be obtained). The mixed pre¬

cipitate just obtained is isolated by filtration, washed and treated with dilute hydrochloric acid. All of the compounds named pass into solution, with the single exception of the sul¬

phate; and if a white, insoluble precipitate re¬

mains after treatment with dilute hydrochloric acid, the presence of sulphates in the original solution is demonstrated. The hydrochloric acid solution is next made alkaline by ammonia, when a precipitate will again be thrown down, if the original solution contained oxalates 01; phosphates. Certain other salts also may be thrown down at this point ; and, therefore, if any precipitate is obtained, confirmatory tests for oxalic and phosphoric acids should be ap¬

plied to the original solution before the pres¬

ence of those substances can be regarded as really proved.

If the original solution contains a carbon¬

ate, it will effervesce upon the addition of hy¬

drochloric acid, owing to the liberation of car¬

bon dioxide. If it contains a sulphite, the ad¬

dition of hydrochloric acid will liberate sulphur dioxide, which is readily recognized by smell.

If it contains a hyposulphite, sulphur dioxide will also be liberated, but the solution will at the same time become turbid from the liberation of free sulphur. If it contains an alkaline silicate (other silicates are not soluble in water) in considerable quantity, the addition of hydro¬

chloric acid will cause the silicic acid to sep¬

arate in the form of a gelatinous precipitate, which, when dried and ignited, is gritty. The presence of the arsenic acids may be estab¬

lished by Marsh's test for arsenic. (See Ar¬

senic). If a tartrate is present, the original compound, when obtained in the solid state by evaporation or otherwise, is blackened by heat, with a characteristic odor suggestive of burnt sugar. The presence of a

fluoride in the origi¬

nal substance is established by the liberation of hydrofluoric acid (see Fluorine) when that sub¬

stance is heated gently with concentrated sul¬

phuric acid. The presence of a chromate is indicated by the precipitate from the addition of barium chloride exhibiting a yellow color.

As a confirmatory test a solution of lead ace¬

tate may be added to a neutralized sample of the liquid under examination. If a chromate is present, a yellow precipitate of chromate of lead is thrown down, which is soluble in caustic soda, but insoluble in acetic acid. To test for the presence of borates, a sample of the original liquid is acidified with hydrochloric acid, and a piece of turmeric paper is wetted with it, thor¬

oughly dried before a flame and finally moist¬

ened with a solution of sodium carbonate. If a borate is present, the color of the paper, where wetted with the sodium carbonate, changes to a greenish black.

To test the chlorides and certain other salts, a fresh specimen of the original solution should be chosen, and if it is not already acid, it should be made so with nitric acid. A solution of nitrate of silver is then added, whereupon a precipitate will be thrown down if chlorides, bromides, iodides, cyanides or sulphides are pres¬

ent. (Cyanide of mercury, however, gives no precipitate at this point). The precipitate should be removed by filtration, thoroughly washed and then treated with hot ammonia. The chloride, bromide and cyanide of silver dissolve, while the sulphide and iodide remain behind, un¬

changed. The sulphide is black, while the iodide is yellowish. For methods of distinguishing be-CHEMICAL ANALYSIS

tween the chloride, bromide and cyanide precipi¬

tates reference must be made to the works on chemical analysis. It may be said, however, that the cyanide, when heated, is reduced to me¬

tallic silver, with the liberation of cyanogen gas.

The presence of an iodide, when this is made doubtful by the black precipitate due to a sul¬

phide may be further investigated by the iodide of starch test. See Iodine.

Nearly all of the nitrates and acetates are soluble, and hence precipitation tests are not commonly used for the detection of nitric and acetic acids. Color tests are usually employed instead. To test for acetic acid, the original solution may be made neutral, and a few drops of ferric chloride addeu. If acetates are present, the solution takes on a dark red color, owing to the formation of ferric acetate. To test for nitrates, a portion of the original solution is mixed with a solution of ferrous sulphate in a test tube, and strong sulphuric acid is poured down the side of the inclined tube, in such a manner as not to mix with the contents, but to form a layer at the bottom of the tube. If nitrates are present, a purplish or reddish ring, changing to a dark brown, will be observed at the surface of separation of the two liquids.

Quantitative Analysis of Inorganic

Substances.

Quantitative analysis is far more difficult than mere qualitative analysis, and cannot be treated adequately in a general encyclopaedia.

As has been said, unless the nature of the sub¬

stance is known in some other manner a pre¬

liminary qualitative analysis must be made.

Several usual methods of making quantitative analyses will be

described below.

Electrolytic Method. — When the substance to be analyzed is an alloy, or a simple mixture of metallic salts, its metallic components may often be readily separated by the electrolysis of its solution, the separation of the metals being based upon the known fact that in electrolysis the nature of the deposit depends largely upon the nature and degree of concentration of the solution, the sizes of the electrodes and the strength of the electric current that is employed.

By systematic study of the effect of these con¬

ditions in the electrolysis of mixtures of metal¬

lic salts, it is found to be possible to deposit one metal upon the cathode, while the others remain in solution. The electrolytic method has been developed to a considerable extent, and promised to be of great value. Thus far, how¬

ever, it is not in extensive general use. For details concerning it, consult Classen, Quanti¬

tative Analysis by Electrolysis,' and various papers published by Prof. Edgar F. Smith, a few years ago, in the Journal of the Franklin Institute. Scott's Standard Methods of

Chemical Analysis' contains the latest details concerning approved electrolytic methods. See also the article Electrolysis.

Gravimetric Methods. — Strictly, any method of analysis in which the quantity of each con¬

stituent is determined by weighing is a gravi¬

metric method; but the term is usually under¬

stood to exclude the electrolytic method just mentioned. In gravimetric work the components that are to be weighed may be separated by fire-methods, or by selective precipitation from solution, as in 'the scheme of qualitative analy-vol. 6 — 25

sis outlined above. The fire-methods are com¬

monly used in the estimation of gold and silver and are described in the article Assaying. The wet methods do not differ in general theory from the method given above for qualitative an¬

alysis ; for it is evident that any precipitate which contains only one base may be isolated and weighed, and that the quantity of the base present may be calculated from the observed weight of the precipitate, and its known chemi¬

cal formula. But the practical case is by no means as simple as this statement would indi¬

cate, because certain matters of detail, that are not of the slightest importance in qualitative work, must be attended to with great care in quantitative analysis. For example the sub¬

stance that is to be determined must be isolated by a method that will ensure its perfect separa¬

tion from every other substance that may be present; that precipitate that is to be weighed must be granular enough to be filtered easily and without loss ; the precipitate must not be liable to oxidation nor to other change upon exposure to air for such time as its manipula¬

tion may demand; it must be of such nature tha't it can be thoroughly dried; and it must not be hygroscopic enough to absorb sensible quantities of water from the air, from the time it is dried until the weighing has been com¬

pleted. Thus in qualitative analysis aluminum may be recognized by the precipitation of the hydrate ; but in quantitative analysis it is neces¬

sary to reduce the metal to the form of the oxide. The hydrate is usually gelatinous when freshly precipitated, and it retains traces of the acid with which the metal was previously com¬

bined, and also traces of the alkali that was used in the precipitation of the hydrate. These facts are of no consequence in qualitative work, but their importance in quantitative investiga¬

tion is evident.

Volumetric Methods. — In volumetric analy¬

sis the quantities that are to be measured are determined by the measurement of volumes, and weighings are resorted to only in the prepara¬

tion of the standard reagents that are to be used. The reagents are made up in certain standard strengths, according to the purposes for which they are wanted ; but the usual strengths are those designated as .ˆnormal” and Mecinormal” solutions. A ˆnormal” solution is one having such a strength that one litre of the solution contains as many grams of the reagent as there are units in the reagent’s chemical equivalent. Thus the chemical equivalent of sodium hydrate, NaOH, is (in round numbers) 23 + 16 + 1 = 40; and hence a ˆnormal” solu¬

tion of sodium hydrate is one which contains 40 grams of that substance to the litre. A Mecinormal” solution of this reagent contains 4 grams of it per litre, and a ‘ ˆcentinormal”

solution contains 0.4 gram per litre. If the reagent is a bivalent acid, or a salt of a bivalent base, the number of grams of it present in each litre of solution must be equal to half the molecular weight. Thus sulphuric acid, H-SCh, contains two atoms of replaceable hydrogen, and its molecular weight is 2 + 32 + 64 = 98.

Hence a normal solution of sulphuric acid con¬

tains 49 grams of the anhydrous acid, per litre of solution. The general idea is to have all of the reagents of such strength that if one cubic centimeter of any ˆnormal” acid solution be added to one cubic centimeter of any ˆnormal”

alkaline solution, the mixture will be precisely neutral. As an illustration of the method that is followed, let it be assumed that a manufac¬

turer buys a carboy of oil of vitriol, and wishes to know what proportion of pure sulphuric acid it contains. If the acid were quite free from water, 49 grams of it would be exactly neu¬

tralized by 1,000 cubic centimeters (that is, one litre) of any normal alkali solution. It is more convenient to work with one-tenth of this quantity of acid and reagent ; so that the ex¬

periment will consist in weighing out 4.9 grams of the oil of vitriol, diluting it with water, adding a piece of litmus paper, and letting a normal alkali solution pass into it (pref¬

erably from a graduated burette) until the acid is precisely neutralized. If 100 cubic centi¬

meters of the alkali were required to effect the neutralization, the given sample of oil of vitriol would be known to contain 100 per cent of its weight of sulphuric acid, — or to be en¬

tirely free from water. On the other hand, if only 53.9 cubic centimeters of the normal alkali solution were required to effect neutraliza¬

tion, the sample would be known to contain 53.9 per cent of its own weight of sulphuric acid. As a further example, suppose it is de¬

sired to ascertain the percentage of sodium oxide present in a given sample of crude soda ash, without raising the question as to whether the sodium actually occurs as oxide, hydrate or carbonate. The formula of sodium oxide is NasO, and its molecular weight is 46 + 16 — 62.

As it contains two atoms of sodium to the molecule, we weigh out 3.1 grams (not 6.2

grams) of it, dissolve in water and dilute and add litmus paper as before. Then into the solution we pass a normal acid solution until neutralization is effected. If 46.7 cubic centi¬

meters of the normal acid solution are re¬

quired, the alkali present in the sample, when computed as sodium oxide, constitutes 46.7 per cent of the weight of the whole. This process is called “acidimetry” when it is used for esti¬

mating the strength of acids, and “alkalimetry”

when it is used in estimating the strengths of alkalis. As a further illustration of volumetric methods the estimation of chlorine (known as “chlorimetry”) may be considered. If the sub¬

stance to be examined for chlorine is bleaching powder, 10 grams of the powder are dissolved by rubbing with water in a mortar, and the solution is diluted till it occupies a litre. It is then well shaken, and 100 cubic centimeters are drawn off into a beaker, by means of a pipette, and treated with a decinormal solution of arsenious acid (As203) until a drop of the mixture, when withdrawn by a glass rod, gives no blue stain .upon filter paper that has been soaked in starch liquor and iodide of potassium.

The number of cubic centimeters of decinormal arsenious acid solution required is to be multi¬

plied by the constant multiplier 0.00355, and the product is the weight of available chlorine in grams, contained in each gram of the original powder. (For explanation of the multiplier 0 00355, and for full details of this process and of volumetric analysis generally, consult Fran¬

cis Sutton, Systematic Handbook of Volumet¬

ric Analysis*).

The analysis of gases is of so special a character that it is treated under a separate heading. See Gasometric Analysis.

Organic Analysis.

In the analysis of organic compounds, no general scheme can be given, corresponding to that which is used in the systematic examina¬

tion of inorganic substances. The number of possible organic compounds is so great, that practically nothing can be done in the way of effecting a “proximate” analysis of a compound concerning whose general nature we have no preliminary information. For the more or less general methods that have been developed for the examination of special classes of organic substances, advanced books on organic

analysis must be consulted. The ultimate analysis of an organic substance consisting of oxygen, hy¬

drogen and carbon may be effected by burning the substance in a glass tube in a current of oxygen gas. The carbon is converted into car¬

bon dioxide, which is absorbed by potash and estimated quantitatively by observing the gain in weight of the potash; and the hydrogen is converted into water, wtiich is similarly esti¬

mated by absorption of calcium chloride. The oxygen of the original compound is then esti¬

mated by difference. When nitrogen is also present, the process is somewhat more com¬

plicated. In this case the gases of combustion may be passed over red-hot metallic copper to absorb the oxygen, and the nitrogen may be measured in the free state, the oxygen being finally concluded by difference, as before.

Consult (in addition to the works mentioned above), Fresenius, (Manual of Qualitative Chemical Analysis* and (System of Instruction in Quantitative Chemical Analysis *; Lunge, (Technical Methods of Chemical Analysis) ; Thorpe, Quantitative Chemical Analysis* ; Prescott, (Outlines of Proximate Organic Analysis. *

Allan D. Risteen.

CHEMICAL CRYSTALLOGRAPHY.

Chemical Crystallography is concerned with the relations between the chemical constitution of crystallized substances and the structure of their crystals as revealed by their form and physical characters.

In 1800 Abbe Rene Just Haiiy announced that to every specific

substance of definite chemical composition capable of existing in the solid condition there appertains a crystalline form peculiar to and characteristic of that sub¬

stance. Despite the many controversies involv¬

ing polymorphism, and isomorphism, this law needs little modifying and it is still the belief that each chemically definite body crystallizes only in one symmetry class and has for any definite temperature and pressure constant angles and constant volume just as it has a definite molecular weight and a definite chemical structure. Furthermore, all the in¬

vestigations prove that substances in any way chemically different possess different shape and volume.

The observation by Mitscherlich in 1819 that the phosphates of ammonium and potassium and the arsenates of ammonium and potassium occur in very similar crystalline shapes led to the announcement in 1821 of the principle of isomorphism which was in effect that analogous elements can replace each other in their crys¬

tallized compounds without any apparent change in crystalline form.

For many years criteria were sought by which substances (<truly isomorphous® could be recognized; for instance, similarity in their chemical molecules and reactions, close rela¬

tions in symmetry and angles and above all capacity to crystallize together in homogeneous mixed crystals <(m which the physical characters are continued functions of their chemical com¬

position l®

It is now established that except in the iso¬

metric substances, the replacement of one ele¬

ment by another inevitably produces some change in the angles and sometimes even in the symmetry, and while the change increases in general with increasing chemical dissimilarity there are no sharp lines which can be drawn and series exist with striking resemblances in angles and physical characters and little or no chemical resemblance.

Von Groth in 1870 broadened and systema¬

tized the field of chemical mineralogy by direct¬

ing attention to the definiteness of the changes produced by the replacement of one atom or group by another. For instance, he showed that the derivatives of benzene, CeHo, underwent definite changes of structure by the substitution of new atoms or groups, and that even while the crystal system might change there remained a striking similarity in angle in certain zones, and the alteration consisted chiefly in an elonga¬

tion or shortening of this zone axis, usually a crystal axis. The axial ratios given below show that the change is principally with refer¬

ence to the c axis.

a : b : c

C6H6 . .

CeH4(OH)2 .

C6H3(OH) (NOs)2 .

C6H2(OH)(NO)2 .

C6H4(N02)2 .

CeH3(N02)3 .

0.891:1:0.799

0.910:1:0.540

0.933:1:0.753

0.937:1:0.974

0.943:1:0.538

0.954:1:0.733

The study of the changes which result in the crystal structures of different substances when certain atoms or atomic groups are re¬

placed by others necessitates extremely accu¬

rate physical and chemical determinations. A deeper insight into the results has been obtained by use of the so-called (<topical ratios® or (<molecular distance® ratios of Muthmann, which may be explained as follows :

In any space lattice the crystal elements o, (3, y, and a, b, c are theoretically the angles and relative lengths of the sides of the elementary parallelopipedon of the crystal structure, but the parameters a : b : c cannot be used directly for comparison between volumes of elementary •

parallelopipedons because in each such propor¬

tion one term is unity and the ratio between the unities is not known.

The assumption, however, is that the volumes of the elementary parallelopipeda are directly as their molecular weights and inversely - as their specific gravities and the quotient of the first by the second is called the molecular vol¬

ume. By appropriate formulae the relative molecular volumes of different substances may be combined with their respective crystal ele¬

ments and the topical parameters X-V': ° ob¬

tained and the relaffve dimensions of the ele¬

mentary parallelopipeda of different substances with the same type of space lattice compared term by term, thus making clear the changes which will be produced in any structure by the substitution of one element for another.

For instance, the rhombic series of isomor¬

phous sulphates and selenates of potassium, rubidium and ctesium exhibit the same forms and their corresponding angles vary less than one degree. The calculated topical ratios arc : X w

K2SO4 . 3.8810 3.8754 4.9964

Rb2S04 . 4.0340 4.0039 5.2366

CS2SO4 . 4.2187 4.1849 5.2366

K2Se04 . 4.0291 4.0068 5.1171

Rb2Se04 . 4.1672 4.1315 5.3461

Cs2Se04 . 4.3457 4.3040 5.6058

From these Tutton concludes that one atom of sulphur or selenium lies between two of the alkali metal and all three extended in the direc¬

tion of w because in passing from the sulphate of one metal to that of the next in the periodic classification or from selenate to selenate the principal change is the vertical direction w whereas in passing from sulphate to selenate of the same metal the horizontal directions X and 1 P are more changed.

Such a series as that mentioned, Tutton calls a Eutropic series, the interchangeable ele¬

ments _ belonging to the same group in the periodic system, and in such a series the angles and the physical properties of the crystals are functions of the atomic weights of the inter¬

changeable elements. He uses the term Iso¬

morphous in a broad sense to include sub¬

stances which bear some definite chemical anal¬

ogy, crystallize in the same symmetry class, develop the same forms and differ in angles only by a few degrees, rarely over three.

Possibly the most important general result of the study of morphotropic changes is the proof that the atom has a definite place and exerts a definite influence on the structure, for this must be so if the substitution of one par¬

ticular element for another produces a quanti¬

tative and definitely oriented change in struc¬

ture in whatever salt the substitution is made.

Polymorphism or Physical Isomerism. —

That an element or compound may occur in two or more distinct crystalline forms was first observed by Mitscherlich in 1821, who found that by slowly cooling fused sulphur, mono¬

clinic crystals were developed and that these on standing passed spontaneously, without again being fused, into the usual orthorhombic ciystals.

This property, now known as polymorphism, was formerly attributed to a difference in the number of the chemical molecules in the so-called physical molecules, but is now regarded as due to the existence of different positions of equilibrium in the homogeneous arrangement of the atoms, each position being most stable at a particular temperature.

Many substances have been shown to

present two or more solid ˆphases,® each char¬

acterized by specific form, optical properties, melting point, specific gravity, etc., and, while in general each ((phase® has certain tempera¬

ture limits beyond which it cannot exist it is possible for two modifications to exist under the same conditions when once formed, though one is the less stable and sometimes passes gradually or suddenly to the more stable modi¬

fication.

Polymorphism must not be confounded with <(chemical isomerism® in which the differences between two substances with the same per¬

centage composition are due either to the dif¬

ferent number of atoms or the different linking of the atoms in the chemical molecule.

The distinction between polymorphism and chemical isomerism can sometimes be made by melting or dissolving the substance. In the resultant amorphous condition all differences due strictly to crystal structure disappear.

In chemical isomeres on the contrary,

fusion or solution does not destroy the differ¬

ences. Lehmann states that in such fusions or solutions of polymorphic substances crystals of either modifications grow further on being placed in contact with the amorphous liquid mass, but such a solution or fusion will in con¬

tact with a chemical isomere usually grow only its own kind of crystal.

Adding one chemical isomere to the other raises or lowers the melting or freezing points, whereas adding one polymorphous form to the other does not, there results always the melting point of the more stable form.

Polymorphism must also be distinguished

from <(polysymmetry)) or the tendency of crys¬

tals of a sufjstance of a certain grade of sym¬

metry to unite to apparently simple forms of higher symmetry. For instance, substances which are orthorhombic, monoclinic or triclinic often unite to apparently hexagonal forms, and although twin lamellae usually reveal the com¬

posite structure, at times repeated twinning may yield a structure in no way distinguishable from that of a hexagonal crystal.

In such a case, however, the physical prop¬

erties are those of the original less symmetrical material and intermediate states usually can be found, whereas in the polymorphous substance the ˆphases® differ in their physical characters.

When a fused compound capable of assum¬

ing different (<phases® is cooled, the tempera¬

ture falls steadily until the transformation temperature is reached when the rate suddenly changes and coincidently the physical prop¬

erties and crystalline form change. For in¬

stance, according to Lehmann, the ordinary orthorhombic crystals of ammonium nitrate melt at about 168 degrees. If such a melted mass is gradually cooled there form eight-rayed skeleton crystals, isotropic in polarized light, which at 127 degrees suddenly become doubly refracting, increase in size and become rhombohedra. At 87 degrees acicular orthorhombic crystals develop regularly about the rhombohedral crystals. These phenomena are ob¬

tained in reverse order if the cooled mass is reheated gradually.

Morphotropic Relations between Poly¬

morphs. — An interesting empirical relation ex¬

ists between polymorphic modifications which may be expressed as follows: If comparable <(set-ups® have been chosen then the products of each crystal volume by the corresponding specific gravity are in simple mathematical ratio.

By crystal volume is meant the volume of the unit pyramid. For example :

Crystal Vol.

Sp. Gr.

Product

Ratio

Marcasite .

. 2.094

4.86

10. 18

2

Pyrite: .

. 1

5.10

5.10

1

Senarmontite … .

. 1

5.25

5.25

1

Valentinite .

. 9.179

5.72

52 . 50

10

Calcite .

. 0.7399

2.713

2.0072

3

Aragonite .

. 0.4489

2.95

1.324

2

Octahedrite .

. 0.71084

3.84

2.7296

1

Brookite .

. 0.6667

4 065

2.7101

1

Rutile .

. 0.6440

4.239

2.730

1

Enantiomorphism. — Pasteur in 1848 showed that racemic acid decomposed by solution into two varieties of tartaric acid and that while the solution of one possessed the power to rotate the plane of polarization to the right the solu¬

tion of the other rotated this plane a corre¬

sponding amount to the left, and that the crys¬

tals of these two varieties were enantiomorphic mirror images of each other (like right and left hand). Further study led to the discovery that the same relations existed in other so-called optically active compounds.

Such a result is attributed to enantiomorphous chemical molecules and resultant enantiomorphous crystal structures, the structure of the racemic acid corresponding to an inter¬

penetration of the two enantiomorphous struc¬

tures.

Structure Indicated by Formula. — An inter¬

esting relation between chemical composition and crystalline form was shown by Tschermak in 1903. If the repetition of equivalent direc¬

tions in the crystal corresponds to repetition of corresponding atoms or groups this is likely to show even in the simpler formulae. Thus many rhombohedral minerals show a threefold arrangement in the formula which may be written as A3B whereas in tetragonal minerals there is a tendency to the four-fold A4B in isometric to either threefold or four-fold, and in hexagonal the six-fold, AeB may be as¬

sumed, A corresponding sometimes to one member as O, Cl, HaO, and sometimes to a pair. Examples are :

Rhombohedral . . Proustite . . 3 Ag S. As … . Hematite 03Fe2

Tetragonal … Zircon… . 04Zr2 . Cassiterite 04Sn2

Isometric . Eulytite… Bi43Si04 . Senarmontite Hexagonal…. Beryl . 6(Si03) Be3Al2. O3 Sbs See Crystallography; Crystal; Crystallo-Chemical Analysis; Physical Crystallog¬

raphy; Mineralogy.

Bibliography. — Groth-Marshall, introduc¬

tion to Chemical Crystallography > (New York 1906) ; Groth, P.,

(Chemische Krystallog-raphie) (3 vols., Leipzig 1910) ; Pope, W. J., (Annual Report Chemical Society* (London 1908) ; Tutton, A. E. R., (Crystalline Structure and Chemical Constitution* (London 1910).

Alfred J. Moses,

Professor of Mineralogy, Columbia University.

CHEMICAL EXTINGUISHERS. See

Fire Protection.

CHEMICAL INDUSTRY, The. Accord¬

ing to the statistics published (1916) in the report of the United States Census Bureau covering the special census of manufactures taken for the year 1914, the American chemical industry ranks among the largest manufactur¬

ing interests in the country. Outranked only by such industries as those of iron and steel, woolen goods and cotton manufactures — for it must be remembered that cattle killing, the making of boots and shoes and of clothing, as well as several other ˆassembling® industries, are not accounted as manufactures proper by the census statisticians — it also represents a wider diversity of interests than any other of the great industries which combine to represent the source of revenue that has made the United States the most prosperous of nations.

At the same time, it is somewhat remarkable to recall what a brief period of existence this industry has had in the United States. Great

as the proportions are to which it has attained to-day, not one of its products are known to have been made in America prior to about 100

years ago : to-day, scarcely a State in the Union that cannot boast of prosperous chemical estab¬

lishments, and less than a century ago, not one such factory anywhere in the country.

According to the best reports that are ob¬

tainable, the first attempt to manufacture chem¬

icals in any considerable quantity was made in 1810, when 8,000 pounds of copperas were pro¬

duced in Vermont, and a lesser amount in Maryland. Three years later an equally suc¬

cessful attempt was made to manufacture alum in Maryland, and, in 1816, a Baltimore house began to make chemicals, paints and medicines for the general trade. It is true that some oil of vitriol had been made in Philadelphia as early as 1793, but the quantity was so small as to be scarcely worthy of notice except as a his¬

torical incident. According to the census re¬

ports of 1820, there were but two chemical manufactories in the entire State of New York.

In spite of this small beginning the chemical industry spread so rapidly that, by 1830, it had become a trade of considerable importance to the country. Prior to about 1815 everything needed in this line had been imported from Europe and as this necessitated the addition of transportation and other charges to the orig¬

inal cost, the American manufacturers who had need of such products in their factories and shops were very glad to learn that such ma¬

terials might be produced in their own land.

For economy's sake, if for no other reason, therefore, they were ready to patronize any local firm that would undertake to make the chemicals they required, so, in 1830, the census reports told a different story.

Whereas, in 1820, the chemical industry had been worthy of slight notice, 10 years later it had been extended to such a degree that the 30 firms then engaged in the business repre¬

sented an invested capital of $1,158,000, and an annual product of fully $1,000,000. Alum, cop¬

peras and several other articles were then so largely manufactured in America that the foreign product had been almost entirely ex¬

cluded from this market. And in addition, the list of American productions then included calomel and a number of other mercurial prepa¬

rations, Rochelle and Glauber's salts, ammonia, oil of vitriol, sulphate of quinine, tartar emetic, Prussian blue, chrome yellow, chrome green, refined saltpetre, borax and camphor, acetate and nitrate of lead, prussiate and bichromate of potash and tartaric, nitric, muriatic, oxalic and acetic acids.

Great as this advancement was, however, those who compare this first report of a prac¬

tically infant industry with the census figures that were gathered in 1914 will have a striking illustration of the manner in which these great manufacturing interests have extended their operations.

A summary of the chemical industry in 1909

showed 2,140 establishments in operation, with a combined capital of $483,729,410. There were engaged in conducting the business, as officers, firm members and clerks, 17.671 persons, whose salaries amounted to $86,743.333 ; and 70.426 em¬

ployees, whose wages amounted to $38,658,201.

The cost of materials was $258,115,971, and the value oi the products was $425,084,540 — the value added by manufacture being, therefore, $166,968,565.

I he rapid growth of the industry may be noted by comparing with the above figures those of the special census of 1914, as follows: In that year there were 2,461 establishments em¬

ploying $722,988,871 capital. Officers, firm members and clerks numbered 24,670, whose salaries aggregated $36,631,960. Employees numbered 86,788, whose wages amounted to $53,- .

021,371. The cost of raw materials used amounted to $340,216,702 and the value of the product was $547,801,957 — the value added by manufacture being $207,585,235.

Among all the strictly chemical products the most important is and has long been sulphuric acid, owing to the supremacy which it main¬

tains over all other known chemicals in the promotion of the great manufacturing interests.

A comparison of the quantities produced dur¬

ing the several census years, therefore, as well as a comparison showing the reduction of prices that has obtained, will give the reader a very good general idea of the marvelous ad¬

vancement that has been made in the manufac¬

ture of chemicals in the United States.

Among the allied industries the refining of petroleum takes first rank in value of output, reaching nearly $400,000,000; with the fertilizer industry second, with products valued at over $168,000,000. The latter figures are particularly interesting because, if for no other reason, they indicate quite clearly the growth and develop¬

ment of the agricultural interests of the coun¬

try.

Of course, the history of the farming indus¬

try in the past has been a record of gross igno¬

rance and prodigal wastefulness, especially in the matter of fertilization. Through carelessness, or, perhaps more often, through want of thorough knowledge of his trade, the American farmer has permitted vast quantities of valu¬

able manurial materials to soak into ground where they could be no use, or to find their way to the sea. In the old days, instead of devising some method of preventing such waste in the future, the agriculturist continued his primitive methods, until, at last, the manufac¬

turer of artificial fertilizers came to his assist¬

ance, and, by the aid of chemicals and mechanical devices, converted worthless matter into valuable merchandise.

To obtain a general idea of the use to which this product of the chemical arts is put by the farmers of the United States it is only necessary to make a brief computation. Thus, for ex¬

ample, we may say that 300 pounds of ferti¬

lizers are used to an acre of land; and, as the total output of the country aggregated 33,654,-

000,000 pounds, it is easy to see that it would require no less than 112,200,000 acres to ex¬

haust such a product. As the figures of the Agricultural Department now show that large areas of this country are already becoming un¬

profitable as farming lands unless artificial fer¬

tilizing is to be used to enrich them, it is not surprising that great manufactories for the making of such materials should have been established in so many sections of the country, and that the output of fertilizers in 1914 should be five times that of 1900.

As classified by the census bureau, the chemi¬

cal industry has two grand divisions: The gen-390

eral chemical industry, and the allied industries — those in which the processes of manufacture are essentially chemical. The latter group in¬

cludes (1) manufacture of dyestuffs and tan¬

ning extracts; (2) manufacture of essential oils; (3) manufacture of explosives; (4) the fertilizer industry; (5) paint and varnish in¬

dustry; (6) petroleum refining; (7) manufac¬

ture of soaps ; (8) wood distillation. The gen¬

eral chemical industry covers the manufacture of strictly chemical substances, and is subdi¬

vided according to products, as follows : Acids, comprising chiefly sulphuric, nitric and mixed acids, and other acids used largely in commercial quantities for manufacturing purposes. In 1914 there were 194 establish¬

ments making sulphuric acid. Their combined output of acids for sale reached a value of $15,395,133. At least as much more was made and used in the plants making it, and did not pass directly into commerce. The output of 50-degree (Baume) acid was 1,677,649 tons (of 2,000 pounds), of which 451,121 tons were sold for $2,709,350; of 60-degree acid, 795,489 tons, of which 545,562 tons were sold for $3,754,866; of 66-degree acid, 828,466 tons, of which 732,-

186 tons were sold for $8,042,4 22 ; and of oleum or fuming acid 77,758 tons, of which 62,354

tons were sold for $888,495. The production of 50-degree acid exceeded in quantity that of 1909 by only 2.1 per cent, but the output of 60-degree acid was 320 per cent, and of the 66-dcigree acid 49.9

per cent greater than that of 1909.

Nitric acid was made in 52 establishments, whose combined output was 78,589 tons, of which 14,685 tons sold for $1,591,625 — an in¬

crease of 17.3 per cent since 1909.

Mixed acids (sulphuric and nitric) were made by 37 establishments, with an output of 112,124 tons, of which 42,725 tons were sold for $2,204,480 — an increase over 1909 of 49.4 per cent in the quantity made though but 18.5 per cent in the price received.

Citric acid was made in three establishments whose production was 2,657,840 pounds, valued at $1,516,336 — an increase of 95.1 per cent in value, and 26.4 per cent in quantity.

Muriatic or hydrochloric acid was made in 31 establishments whose output was 337,167,882

pounds, of which 170,876,878 pounds were sold for $1,348,805 — a decrease of 15.9 per cent in quantity and 23.3 per cent in value as compared with the figures for 1909.

Oleic acid was manufactured in seven estab¬

lishments, the output aggregating 23,187,570

pounds, of which 21,932,736 pounds were sold for $1,301,353 — an advance of 34 per cent in quantity and 54 per cent in value over 1909.

Acetic acid was made in 13 establishments, the output aggregating 75,303,375 pounds, of which 70,617,637 pounds were sold for $1,272,294

— showing an increase of 24.1 per cent in quantity made, and a decrease of 4.8 per cent in the price received.

Stearic acid was made in 10 establishments whose combined output was 14,351,404 pounds, valued at $1,242,492 — an increase of 8.7 per cent.

No other acids reached a production valued at $1,000,000.

Alums engaged 19 establishments with a total output of 313,712,000 pounds, valued at $3,467,-

969 — an increase of 13.5 per cent in quantity and 14.7 per cent in value.

Bleaching Materials were made in 51 estab¬

lishments, and their output was valued at $4,-

964,403, an increase of 54.4 per cent since 1909.

These products include chloride of lime or bleaching powder, chloride of soda and other hypochlorites, hydrogen peroxide (or dioxide), sodium (and other) peroxide (or dioxide), bi¬

sulphites of soda, lime, etc., chlorine, sulphur dioxide, lime-sulphur solutions, *etc.* Hypo¬

chlorites constitute the most important class, aggregating 222,152,000 pounds, valued at $2,-

578,269, an increase over 1909 of 90.2 per cent in quantity and 44.3 per cent in value. Of the total value, $1,714,837 was gained by electro¬

chemical processes. Hydrogen peroxide en¬

gaged 20 establishments whose combined output was 32,594,807 pounds, valued at $1,303,596 —an increase of 49.7 per cent since 1909.

Cyanides were made in six establishments, the production amounting to 16,450,225 pounds, valued at $2,398,674 — an increase of 23.5 per cent over the figures of 1909.

Plastics, including pyroxylin (under vari-our trade names — celluloid, fiberloid, viscoloid, xylonite, etc.), viscose, artificial silk, bakelite, rubber substitutes, and all plastic materials based on rubber, gutta percha, fibrin, casein, gluten, gums, glue, etc., as cementing agents, engaged 24 establishments which produced ma¬

terials valued at $13,895,784 — an increase over 1909 of 86 per cent.

Sodas and Sodium products were made in 68 establishments. The output was 1,371,105

tons of soda, valued at $22, 616,696, and 169,049

tons of sodium salts valued at $8,280,572. The increase since 1909 was 41.7 per cent in quantity and 12.7 per cent in value.

Gases, compressed and liquefied, were made in 127 establishments whose output was valued at $8,097,720 — an increase of 56.2 per cent over 1909.

Electric Chemicals — those made by the aid of-electricity — included aluminum ; phosphorus ; silicon ; sodium ; carbon in its allotropic form of graphite or plumbago ; chlorine ; oxygen ; hydrogen; ferro-alloys; copper, titanium, and vanadium compositions and other alloys ; car¬

borundum ; alundum; caustic soda; caustic potash ; sodium peroxide ; chloride of lime and other hypochlorites; bisulphide of carbon; and muriatic acid. The electrical production in the iron and steel industries

is not included. These substances were manufactured in 36 establish¬

ments, and the output was valued at $29,661,649

— an increase of 60 per cent over the 1909 value.

The products of largest value were ferro¬

alloys. $2,859,482 ; caustic soda and potash and lye, $2,309,511; hypochlorites, $1,714,387; and chlorates, $1,131,316.

Potash and potassium products engaged

39 establishments whose total output was valued at $4,094,927.

Coal-tar Products were made in 40 estab¬

lishments whose output was valued at $8,839,506.

These figures do not include the by-products of coking plants. Of the total value, the manu¬

facturers of synthetic dyes produced $4,652,947, and the manufacturers of coal-tar medicines, $774,350.

Fine Chemicals. — This division includes the high grade chemicals rated KC.P.,® or chemically CHEMICAL INDUSTRY

pure, as well as many laboratory products.

Their combined value was $10,316,519.

The Allied Industries.

Dyestuffs and Extracts. — The manufacture of natural dyestuffs and tanning extracts en¬

gaged 112 establishments, whose total product was valued at $20,576,769 — an increase of 29

per cent since 1909.

Essential Oils were made in 108 establish¬

ments (of wffiich 53 were in Michigan and 29

in Indiana) whose total output was valued at $2,565,361 — an increase of 44.7 per cent since 1909.

Explosives were made in 111 establishments, the combined output aggregating in value $41,-

453,339 — an increase of 3.5 per cent since 1909.

Fertilizers engaged 1,124 establishments

whose combined output was 16,827,000 tons, valued at $168,388,405 — an increase of 50.5 per cent since 1909.

Paints and Varnishes were made in 855

establishments, of which 618 were devoted to paints and 237 to varnishes. The paint produc¬

tion was valued at $113,953,084, and the varnish production at $35,096,736, a combined value for this section of $149,049,820 — an increase over the 1909 figures of 16.9 per cent. A subsection is ’made of the 46 additional establishments which manufacture boneblack, carbon black and lampblack, to the value of $2,949,797 — an increase of 38.1 per cent since 1909.

Petroleum Refining engaged 176 establish¬

ments whose combined products were valued at $396,361,405 — an increase of 67.2 per cent since 1909. These establishments consumed as raw material 191,262,724 barrels of crude oil, and produced naptha and gasoline, illuminating oils, fuel oils, lubricating oils, greases, paraffin wax, *etc.*

Soap manufacture engaged 513 establish¬

ments, whose combined production was, in value, $135,340,499 — a decrease of 2.5 per cent from the 1909 figures. The output comprised 2,064,288,000 pounds of hard soaps, 57,000,000

pounds of soft and liquid soaps and 45,419,827

pounds of glycerine, the last named valued at $7, 562,423 above the value of the soap produc¬

tion.

Wood Distillation was conducted in 101

establishments, the output being valued at $10,-

236,332 — a very slight increase over 1909. The figures include the output of 14 establishments engaged in making turpentine. Other products were 7,196,975 gallons of wood alcohol, as well as acetate of lime, acetone, formaldehyde, acetic acid, wood creosote, *etc.*

Chemical production comprises such an

infinite variety of combinations of raw materials that it is almost impossible to give anything like a detailed view of the subject without go¬

ing far beyond the restrictions which space fixes upon such an article as this, and yet it is to this variety of raw materials, as well as to its almost numberless combinations, that the chemical industry owes its

unique position in the com¬

mercial world. Although it is impossible to give all the raw materials and their combinations, it may be said in brief that scarcely any sub¬

stance on the face of the earth, from the purest water to the blackest tar, fails to find a new utility in the chemist's hands. And thousands of industries exist not only in the United States, but in foreign lands as well, solely to supply the raw materials needed in the chemical industry.

Some little idea as to the enormous quantities of raw materials thus consumed may be gained by figures for some of the principal substances as given in the 1914 census. The amount of petroleum so used was 28,689,400 tons; of iron pyrites, 1,581,600 tons; of nitrate of soda, 412,-

748 tons (all from Chile) ; of sulphur, 82,248

tons.

In the United States the manufacturers of chemicals have such a wide range of territory from w-hich to select their location that they have not infrequently constructed their plant in some position of convenience to their natural products. The markets for such chemical pro¬

ductions, however, are far apart, but they may¬

be classified in a list of such attractive points as the great centres of the textile manu¬

facture, of the dyeing and bleaching works, the great oil refineries, the artificial manure w-orks, *etc.*

The processes that are used in the making of chemicals are almost as varied as its products, and yet there are certain mechanical steps that are utilized by all of them. Such, for example, are the grinding, furnacing, dissolving, separat¬

ing, evaporating, filtration and crystallization processes. In each of these the laws governing chemical constitution are closely followed,

while, from time to time, processes are improved by inventions, as the competition of the age increases the demand for quicker, surer and more economical methods. Some of the

present-day chemical operations are still the result of a long and complicated treatment.

There are instances in which crystallization and decomposition take place very slowly, for both are hastened or retarded by many physical con¬

ditions ; both heat and cold, like extreme agita¬

tion and absolute quietude, are often required by-the chemist. Moreover, when we remember that some of these long and complicated proc¬

esses include, perhaps, a continued series of dissolvings alternating with as many crystalliza¬

tions, it is not difficult to imagine wffiy it should be necessary for manufacturers to have such an abnormally large capital before they-can estab¬

lish themselves successfully in the industry of producing chemicals.

Moreover, it is not money alone that is needed for one to be able to successfully con¬

duct a manufacturing chemical establishment.

A quarter of a century ago money and a little knowledge was all that was required of the ordinary manufacturer. To-day, however* all this has changed. During the past 30 years scientific Germany has devoted much time and attention to chemical researches, and w-ith such results that the rest of the world's manufac¬

turers have had all they could do to keep abreast of the times. To-day it is the chemical lab¬

oratory that is the pulse of the entire factory.

It must be well equipped with the most modern apparatus, operated by workers of rare skill, for each step in the process is watched and regulated by a continuous series of tests by the laboratory force.

Chemical engineering is another branch of the industry to which much attention has been devoted during the past 30 years, and its im¬

portance as a factor in the adjustment of plants to the exigencies of the many difficult and com¬

plicated operations to which the works must be adapted has led to the establishment of courses 392

in chemical engineering by several of the lead¬

ing institutions of technical education.

The effect of the European War upon the chemical industry of the United States has been remarkable. Previous to the outbreak of that great conflict, the world trade in many chem¬

icals was supplied principally by Germany, Austria and England. But since the war closed the ports of Germany and Austria, and the English plants turned to the manufacture of munitions, the chemical trade of the United States has faced an unprecedented demand not only in its own country, but from abroad.

While figures for the home trade are not avail¬

able, the records of the Bureau of Foreign and Domestic Commerce as to the exports from yean to year show the response of the chemical manufacturers to the foreign demand. The open figures following are those of the exports of leading chemicals for the year ended 30 June 1916 : the figures in parentheses are for the fiscal year ended 30 June 1914 — the year im¬

mediately preceding the war.

Acids : sulphuric, 82,020,246 pounds, valued at $1,990,532 (in 1914,

12,131,750 pounds, valued at $125,892). Other acids, a value of $22,-

717,335 (in 1914, $357,035).

Copper sulphate, 17,978,242 pounds, valued at $2,469,437 (in 1914, 7,375,775 pounds, valued at $330,007).

Dyes and Dyestuffs, a value of $5,102,002 (in 1914, $356,919).

Extracts for tanning, a value of $5,902,709

(in 1914, $639,941).

Sodium compounds, a value of $12,649,854

(in 1914, none at all).

All other chemicals exported, $62,765,752 (in 1914, $16,201,563). The total value of chem¬

icals exported was $113,597,711 (in 1914, $18,-

011,358).

Among the ((Allied Industries,® the only notable increase in exports was in explosives, which reached a value of $467,082,000 (in 1914, $6,272,000).

As to the geographical distribution of the increased export trade in chemicals, it is inter¬

esting to note that France and Great Britain took nearly all of the sulphuric acid, and a large part of (<all other acids® ; Greece, Canada, Mexico and Japan being the other principal buyers. The

increased exports of copper sul¬

phate were taken by Greece, Italy, Canada, Mexico, Argentina, Brazil, Dutch Guiana and Uruguay. The dyestuffs (chiefly natural dyes) went to Great Britain, France, Italy, Spain, Japan and Canada. The sodium compounds

were bought by France, Great Britain, Holland, Norway, Canada, Mexico, Cuba and Latin

America, with smaller quantities to Japan and Russia. The tanning extracts went to nearly every part of the world, many countries being purchasers for the first time.

It is worthy of note that in 1906 (the latest complete figures available) the total trade of the world in chemicals, drugs, dyes and fertili¬

zers, amounted to $592,467,000, and that the contribution of the United States to this market was but $41,000,000, or about 7 per cent.

Germany's export chemical trade at that time was $111,000,000, or 17 per cent, and that of the United Kingdom, $63,019,000, or 11 per cent of the whole. While the figures for these latter countries have not changed considerablv, the advance of the chemical exports of the United States to $113,600,000 establishes a new world's record for the United States.

Richard Ferris,

Editorial Staff of The Americana.

CHEMICAL MINERALOGY. See Min¬

eralogy.

CHEMICAL SENSE IN ANIMALS.

See Animals, Chemical Sense in.

CHEMISTRY, the science which deals with the composition and transformations of matter, had its origin in remote antiquity. In its earliest form it was purely empirical, a mass of disconnected facts which were brought to light in the natural course of development of various industries. In the extraction of metals from their ores, in the preparation of drugs and medi¬

cines, in the processes of dyeing and the like, many chemical data were discovered; and of such facts a large number were known to the ancient Egyptians. Indeed, one plausible deriva¬

tion of the word <(chemistry® is from Khem, an early name for Egypt, which has reference to the blackness of its soil. With this name the Arabic word chema, to hide, seems to have some relation ; and when we remember that much ancient learning was preserved for us by Arabian scholars, the descriptions of chemistry as the Egyptian science, or as the hidden or occult art, become intelligible. Secrecy was a characteristic of its early practitioners.

The one fundamental fact of chemistry is, that matter can undergo apparent transforma¬

tions of kind, one substance being converted into another. For instance, wood becomes charcoal, and iron is changed to rust ; and facts like these were evident even to the most primitive observers. As philosophy developed, these data were necessarily considered, the nature of matter was discussed and attempts were made to correlate and explain the phe¬

nomena. Much of the early speculation was vague and mystical, and has little significance to-day; but a part of it was intensely practical, and gave a definite purpose to investigation. If matter can be transformed from one substance to another, why should not the possibility of change be universal? All metals, it was seen, had certain properties in common, and so trans¬

mutability between them was almost taken for granted. Thus alchemy arose, with its search for the philosopher's stone and its attempts to convert base metals into gold; and from alchemy the chemistry of to-day is lineally descended. The discoveries, even the failures, of the

alchemists laid the foundations of our modern science, and pointed out the best paths for investigation to follow.

The Greek philosophers, and especially Aris¬

totle, in their attempts to interpret matter, as¬

sumed the existence of four elements, namely, earth, water, air and fire. These names, how¬

ever, denoted properties rather than things, and implied the attributes of coldness, wetness, dry¬

ness and heat. The properties of matter were determined by these conditions, and could be expressed by the varying degrees under which the latter were displayed. Of chemical com¬

bination, as we understand it, the ancients seem to have had no clear conception ; they sought to solve the problems of the universe by reasoning alone; the experimental method as a test of truth had not become a court of last appeal.

To the alchemists, on the other hand, and to CHEMISTRY

their successors, the iatrochemists, who applied chemistry to medical uses, experiment was the essential thing ; and in their hands true knowl¬

edge rapidly increased. The alchemical ele¬

ments, salt, sulphur and mercury, were still names of properties ; but they represented con¬

ceptions which stood closer to reality than the earlier ideas, since they were based upon more exact observations. Speculation had not been dethroned, but it was no longer an absolute ruler.

To trace the history of chemistry during its formative period would be impracticable in an article of the present scope. It is enough to say that the modern distinction between ele¬

ments and compounds was first clearly stated by Robert Boyle in 1661. An element is a sub¬

stance that cannot be further decomposed, but which is obtainable from a compound body, and from which the latter can again be pre¬

pared. He also held that chemical combination consisted in an approximation of the smallest particles of matter, thus adopting the atomic hypothesis which had been current in philosophy from the very earliest times. With these teach¬

ings of Boyle modern chemical theory practi¬

cally began.

The chemical researches of the 18th cen¬

tury were many and varied, but most of them, at least during the earlier decades, were essen¬

tially qualitative in character. The fundamental importance of exact weight and measure came into recognition with extreme slowness.

Throughout the greater part of the century one theory dominated chemical thought, the theory of phlogiston, proposed by Becher, but de¬

veloped and completed by Stahl. The phe¬

nomena of combustion had always attracted the attention of chemists, and the new theory wras devised to explain them. Every combustible body was supposed to contain a peculiar non-isolable substance, phlogiston ; and when com¬

bustion took place this substance was thought to be expelled. Thus lead, when heated in the air, undergoes a change analogous to that pro¬

duced by combustion, and yields a calx, or, as we call it now, an oxide. This calx, combined with phlogiston, was thought to exist in the original metal, and to be freed from phlogiston when calcination

occurred. In this speculation no account was taken of the weight of the several bodies, and the fact that the calx was heavier than the metal, that a gain, not a loss, was observed, seemed to offer no difficulty to the believers in the phlogistic doctrine. To phlogiston a negative weight wras ascribed, and by this device the real difficulties of the prob¬

lem were comfortably laid aside.

In 1774 Joseph Priestly, himself a believer in phlogiston, discovered oxygen ; and so made, though unwittingly, the true interpretation of combustion possible. In 1766 Cavendish had discovered hydrogen; and in 1781 he proved that water was produced by the union of the two new' gases. Cavendish also determined the composition of the atmosphere, and in these re¬

searches the foundations of a new chemistry were laid. The two chief architects to build upon the foundation were a Frenchman, La¬

voisier, and an Englishman, Dalton.

Lavoisier, by careful use of the balance as an instrument of research, proved that matter wras constant in weight, and could neither be created nor destroyed. In any chemical change the weight of the substances engaged in the reaction remained unaltered. Studying combus¬

tion he showed that it was merely combination with oxygen ; and he pointed out that respira¬

tion was a phenomenon of the*same character.

He also gave greater precision to the idea of an element, and announced the elementary na¬

ture of the metals; and, in conjunction with other chemists, did much toward the estab¬

lishment of a rational system of chemical nomenclature. Hitherto the names of com¬

pounds had been arbitrary and often meaning¬

less ; now they were made to express with more or less accuracy the composition of the substances described.

Lavoisier died in 1794, a victim of the French Revolution; and it was not until 1803 that the next really great forward step in chemistry was taken by Dalton, who then first announced his famous atomic theory. To support this doc¬

trine, which, being quantitative in form, had little in common with the atomistic speculations of the philosophers, Dalton established two laws, the laws of definite and multiple propor¬

tions. That every chemical compound has a fixed and definite composition wras recognized by Lavoisier and by other writers before him, but the fact was disputed by Berthollet, and it remained for Dalton to give its statement a pre¬

cise form. Dalton then went further, and found that to every element a definite combin¬

ing number could be assigned, and that when two elements united in more than one propor¬

tion, even multiples of that number appeared.

Thus, taking the hydrogen weight as unity, the standard of comparison, oxygen always com¬

bines with other elements in the proportion of eight parts or some simple multiple thereof, and so on through the entire list of elementary bodies. Each one has its own distinct com¬

bining weight, and this was a condition which Dalton sought to explain. Fractions of the weights did not occur, fractional atoms could not exist, and the two thoughts were connected by Dalton. Chemical union, to his mind, be¬

came a juxtaposition of atoms, whose relative weights were indicated by their combining num¬

bers; and so the atomic conception was for the first time given a clear, quantitative expression.

First, every element is composed of similar atoms which have constant

weight. Secondly, chemical compounds are formed by the union of these atoms in simple numerical relations. Upon these fundamental statements the entire system of chemical philosophy rests, so that for a hun¬

dred years the history of chemistry has been the history of the atomic theory. All chemical calculations are based upon the atomic weights of the elements, and in all chemical formulae they are implied.

Since Dalton's time great labor has been expended upon the exact determination of atomic weights, and in the discovery and de¬

scription of new elements and compounds. The general conclusions which have been established by this class of researches may be summarized as follows : Every chemical substance is either an element or a compound. The elements, which are not artificially separable into any simpler bodies, at least by no means yet dis¬

covered, are comparatively few in number ; the compounds are innumerable. More than a hun¬

dred thousand compounds are already known.

A compound may he separated into its elements

or built up from them; and its composition is absolutely invariable. In this respect com¬

pounds differ from mechanical mixtures, in which any proportion may occur. Flour and sugar may be mixed together, but they still remain flour and sugar, each with its prop¬

erties unchanged ; no combination here takes place. In combination, as when gaseous

hydrogen and gaseous oxygen unite to form liquid water, they do so only in one fixed pro¬

portion and the characteristics of the original substances disappear.

This fact of combination, the union of two or more bodies to form others which are widely different from them, is clear; but its mechanism is not yet understood. The elementary atoms of the compound are drawn and held together by some form of attraction, but its precise nature is unknown. The object of chemistry is to discover the laws which gov¬

ern the union or the decomposition of sub¬

stances, and to determine the limits within which such changes are possible. For the study of compounds, at least for the purpose of ascer¬

taining their composition, two methods are em¬

ployed. First, analysis , in which the com¬

ponent parts of the compound are separated, and individually identified. Secondly, synthesis, in which the parts are forced to unite, and to form the compound which happens to be under investigation. Furthermore, analysis may be either qualitative or quantitative. In one case we merely ascertain what substances are pres¬

ent, in the other we determine their exact quan¬

tity. The elements now known, about 80 in number, are given in the following table, to¬

gether with their atomic or combining weights and their symbols. The latter are abbrevia¬

tions whose use will be explained presently.

International Atomic Weights, 1916

Aluminum ….

Symbol

. A1

Atomic

weight

27.1

Antimony .

. Sb

120.2

Argon .

. A

39.88

Arsenic .

. As

74.96

Barium .

. Ba

137.37

Bismuth .

. Bi

208.0

Boron .

. B

11.0

Bromine .

. Br

79.92

Cadmium .

. Cd

112.40

Caesium .

. Cs

132.81

Calcium .

. Ca

40.07

Carbon .

. C

12.005

Cerium .

. Ce

140.25

Chlorine .

. Cl

35 46

Chromium ….

. Cr

52.0

Cobalt .

. Co

58.97

Columbium …

. Cb

93.5

Copper .

. Cu

63.57

Dysprosium…

. Dy

162.5

Erbium .

. Er

167.7

Europium .

. Eu

152.0

Fluorine .

. F

19.0

Gadolinium …

. Gd

157.3

Gallium .

. Ga

69.9

Germanium …

. Ge

72.5

Glucinum .

. G1

9.1

Gold .

197.2

Helium .

. He

4.00

Holmium .

. Ho

163.5

Hydrogen .

. H

1.008

Indium .

. In

114.8

Iodine .

. I

126.92

Iridium .

. Ir

193.1

Iron .

. Fe

55 . 84

Krypton .

. Kr

82.92

Lanthanum … .

. La

139.0

Lead .

. Pb

207 . 20

Lithium .

. Li

6 94

Lutecium .

175.0

Magnesium … .

. Mg

24.32

Manganese .

. Mn

54.93

Mercury .

. Hg

200 6

Molybdenum …

. Mo

96 0

Neon.

Tin.

Zinc.

Symbol

Atomic

weight

…Nd

144.3

. .Ne

20.2

…Ni

58.68

, . .Nt

222.4

…N

14.01

. . Os

190.9

. . O

16.0

… Pd

106.7

…P

31.04

, . .Pt

195.2

…K

39.10

. . Pr

140.9

. Ra

226.0

. Rh

102.9

. Rb

85.45

. .Ru

101.7

. .Sa

150.4

. .Sc

44.1

. .Se

79.2

. .Si

28.3

107.88

…Na

23.00

…Sr

87.63

…S

32.06

. .Ta

181.5

. .Te

127.5

. .Tb

159.2

. ,T1

204.0

. .Th

232.4

. Tm

168.5

118.7

. .Ti

48.1

. ,W

184.0

. .U

238.2

. .V

51.0

. .Xe

130.2

. .Yb

173.5

. .Yt

88.7

. .Zn

65.37

. . Zr

:s there

are sev-

eral others which are as yet incompletely known. Among them, polonium, actinium and ionium may be named. New elements are not infrequently discovered, and argon, helium, neon, xenon, krypton and radium have all been brought to light within recent years.

With the help of the elementary symbols, chemical formulae can be constructed, and these are of great help in chemical calculations and reasoning. Some of the symbols are initial let¬

ters only, as H, O, N, C, for hydrogen, oxygen, nitrogen and carbon; others are formed of two letters, like Ca for calcium and Zn for zinc.

Still others are derived from the Latin names of the metals, such as Ag from argentum, sil¬

ver, Fe from ferrum, iron, *etc.* The formula of a compound is made by writing the proper symbols in juxtaposition, so that NO means a compound of nitrogen and oxygen, HI a com¬

pound of hydrogen and iodine, and so on.

When two elements form more than one com¬

pound, these are distinguished by subscript numerals, as in the examples PC13 and PCls.

In these substances one atom of phosphorus unites with three and five atoms of chlorine respectively. In every case the symbol of an element means one atom of the element, and therefore that relative quantity of it which is indicated by its atomic weight. In water, H20, two atoms of hydrogen weighing two units combine with one atom of oxygen weighing 16 units ; and thus the formula tells us in shorthand that the compound contains two parts of one element to 16 of the other. No

matter how complex a formula may be, this simple rule invariably applies, and by its means the composition of the substance represented can be calculated. The symbols, moreover, can be combined into equations, from which we may compute the outcome of a given chemical CHEMISTRY

process. Phis subject, however, is much too abstruse for discussion here. Its details are developed logically from the atomic theory.

To the philosophers who preceded Dalton an atom was the smallest particle of any sub¬

stance which could possibly exist. Thus water might be subdivided and subdivided until, in theory, a limit was attained, and an atom of water was the result. By chemical means a new order of divisibility had now to be recog¬

nized, and the supposed ˆatom® of water was itself found to be complex and separable into still smaller particles of oxygen and hydrogen.

The latter are the atoms of the chemist; the former clusters of atoms are known as mole¬

cules. This distinction was not developed im¬

mediately; its full recognition came slowly; and it derived its importance from certain laws relative to gases which were discovered, partly by Boyle, partly by Gay Lussac and generalized in 1811 by Avogadro. Avogadro’s law may be concisely stated as follows : Equal volumes of gases under like conditions of temperature and pressure contain equal numbers of molecules.

A molecule is now defined as the smallest particle of any substance which can separately exist ; an atom as the smallest particle which can take part in chemical change. Another law, discovered by Dulong and Petit in 1819, was also highly important, for it was shown that the specific heat of an element was in¬

versely proportional to its atomic weight. In other words, the elementary atoms have all the same capacity for heat, and this rule gave us an important check in ascertaining the true weights of the atoms. The law of Avogadro and the law of Dulong and Petit were brought together by Cannizzaro in 1858, and the system of atomic weights and chemical formulae now in use, which differ in certain essential particu¬

lars from those that were first adopted, was the result of the combination.

In the early days of scientific chemistry the science was divided into two great sections, organic and inorganic, the one dealing with animal and vegetable products, the products of life, and the latter with substances derived from the mineral kingdom. Inorganic chemis¬

try, the chemistry of the metals, the earths, the commoner oxides, bases and salts, was for the time being the simpler, and during the first half of the 19th century it received the lion's share of attention. At first it was supposed that the two fields of research were absolutely distinct, and that no organic compound could be derived by artificial means from inorganic sources. This belief was overthrown by Wo-ehler, in 1827, who showed that urea, an organic body, was easily prepared from inorganic am¬

monium cyanate, and since then a vast number of organic syntheses have been effected. Curi¬

ously enough, urea and ammonium cyanate, al¬

though very different substances, have the same percentage composition, containing the same elements in exactly the same proportions. Later it was found that isomerism , as this semi¬

identity is called, was exceedingly common, and here was a noteworthy phenomenon which

called for explanation. Different molecules could be constructed from the same set of atoms, and the simplest interpretation of the fact was that the latter were differently ar¬

ranged. Out of the same bricks different houses may be erected. The conception of clietmcal structure , therefore, came into being.

What is the arrangement or grouping of the atoms within any given molecule?

The earlier attempts at the solution of this problem have now only historical interest, and their consideration is of value to professional students of chemistry alone. If we were to trace the successive stages we should find evi¬

dence of a systematic growth in chemical the¬

ory; but definiteness was hardly possible until after Cannizzaro had established the true sys¬

tem of atomic weights, and formulae had been adjusted in accordance with them. Between 1850 and 1860, however, a new property of the atoms began to be recognized, and this, taken in connection with the formulae based on Avoga¬

dro's law, was the key to the problem. The theory of valence, which is the expression of the newly-discovered property, is as follows : Every atom, as regards its union with other atoms, has a certain atom-fixing power, which is known as its valency, or valence.

Let us take hydrogen as our standard of reference and consider some of its simplest compounds. In HC1, hydrochloric acid, one atom of hydrogen is united to one of chlorine.

So also we have HBr, and HI, KC1 and NaCl, AgBr, *etc.* These elementary atoms, which combine only in the ratio of one to one, at least to form permanent compounds, are univalent, that is, their power of fixing or uniting with other atoms is unity. In water, on the other hand, H-O, a single oxygen atom holds two of hydrogen in combination, and so oxygen is called a bivalent element. In H2S, CaCb, Znl2, we have illustrations of still other compounds in which a bivalent atom is united with two of the univalent type. Nitrogen, phosphorus, ar¬

senic, aluminum and some other elements go still farther, and are trivalent, so that the com¬

pounds formed by them have such formulae as NH3, PH3, AsH3, A1CL and so on. Carbon, a quadrivalent substance, forms normally com¬

pounds of still more complex type, such as CH*, CCh, or, when it unites with two dyad or biv¬

alent atoms, CCb and CS3. For brevity the valency of the various elementary atoms may be indicated by speaking of them as monads, dyads{ triads, tetrads, *etc.* The rare metal vanadium is a pentad, having a valency of five, and sexivalent tungsten is a hexad. In many cases valency seems to be a variable property of the atom, as, for example, when we consider the two chlorides of phosphorus, PC13 and PCL

In cases like these the higher figure may be taken as showing the maximum atom-fix¬

ing power of the element, a power which is only partially exercised in the lower com¬

pounds.

In the theory as thus stated there is no mere speculation ; it is a statement of definitely observed facts. It tells us that the atoms unite, not arbitrarily, but in accordance with certain rules ; and these help us in our comprehension of known compounds and the discovery of new ones. Indeed, an enormous advance in chemi¬

cal discovery followed the application of these principles : an advance not only of scientific importance, but of economic and commercial value also. It was in the domain of organic chemistry that the growth became most imme¬

diately evident, and to this branch of the sci¬

ence we may now turn our attention. It is here that we find the best illustrations of what is 396

meant by chemical constitution or structure, and the best examples of isomerism.

It has already been pointed out that organic chemistry in its beginnings dealt with animal and vegetable substances, the products of liv¬

ing organisms. Other artificial bodies, derived from these, were also included in its territory.

All organic compounds were characterized by the presence in them of carbon, this element being ordinarily combined with hydrogen, oxy¬

gen, nitrogen, or all three, and sometimes with other elements also. Organic chemistry, as its domain was enlarged, in time received a new definition, and to-day the term broadly signifies the i chemistry of carbon compounds. It is true that some compounds, such as the metallic carbonates, are more conveniently described as inorganic in character ; but these minor excep¬

tions affect the definition but slightly.

At first sight the almost innumerable or¬

ganic substances appear to be hopelessly . com¬

plex, and some, indeed, such as albumen, are so ; but a closer inspection reveals order among them, and, in general, an ultimate simplicity.

Their great number is due to the fundamental properties of the carbon atom, which, being quadrivalent, can unite with four other atoms simultaneously; and which, moreover, may combine with other atoms of its own kind to form rings or chains that serve as nuclei for the development of long series of substances.

Most of the latter are derived from hydrocar¬

bons, compounds of carbon and hydrogen, and these are exceedingly numerous. Marsh gas or methane, CIE, contains the largest propor¬

tion of hydrogen, and is the type upon which the quadrivalency of carbon is predicated ; it is, furthermore, the first member of a series of hydrocarbons, CFL, GHo, GHs, and so on up to C35H72, and perhaps even farther. In this series each compound contains one atom of carbon and two of hydrogen more than the hydro¬

carbon preceding it, and this regular difference establishes what is known as an homologous series. Nearly all organic substances can be arranged in series of this kind, so that the chemist is able to master a great number of de¬

tails by a single effort of the memory. More¬

over, the members of each homologous series vary regularly, step by step, in their physical properties. Thus CH4 is a gas, GH6 a heavier gas, GH12 a volatile liquid, the following terms are liquids which grow less and less volatile, while above GsH38 the hydrocarbons are waxy solids. Ordinary paraffin is a mixture of these higher hydrocarbons, and the whole group, therefore, is known as the paraffin series. Com¬

mon petroleum consists chiefly of its liquid members. From these hydrocarbons, with oxy¬

gen, a parallel series of alcohols is derived: such as CH4O, methyl or wood alcohol, GH80, ethyl or ordinary alcohol, GH12O, amyl alcohol or fusel oil, *etc.* By further oxidation the alcohols yield a set of acids, among which acetic acid, the acid of vinegar, is the one most familiarly known. This single family of hydro¬

carbons is the key to thousands of other sub¬

stances which are directly producible from them. Some of these products illustrate very simply a mode of derivation which is known as substitution, as when, from CH4, hydrogen atoms may be successively withdrawn and re¬

placed by univalent atoms of chlorine. Thus we get the following compounds ; CH4, CH3C1, CH2CI2, CHCh, and finally CCh; the fourth one being the familiar body chloroform. So also acetic acid, GH1O2, by substitution with chlorine, gives GH3CIO2, GH2CI2O2, and

C2HCI3O2; but here the process stops and can¬

not be carried further. The one remaining atom of hydrogen in acetic acid is differently combined from the others, and here we begin to see the sort of evidence by which differences of chemical structure may be determined.

When we study great numbers of organic com¬

pounds, especially with regard to their pos¬

sibilities of chemical change, we find that cer¬

tain combined atoms behave differently from other combined atoms of like kind. We also discover groups of atoms which can be shifted collectively from compound to compound;

clusters which act almost like elements and are perfectly definite in their nature. The group NH4 is so much like a metal in its compounds that it is given a distinct name, ammonium, and is conventionally treated as if it were really a metallic body. CN, cyanogen, resembles chlorine in some of its relations, and such groups as CH3, methyl, and GH5, ethyl, are en¬

countered at every turn. They do not exist separately, but only in combination, and are known as compound radicles. Every such

radicle has valency, and this is essentially re¬

sidual in its nature. Thus in methyl, CH3 three of the four units of affinity belonging to the carbon atom are satisfied by hydrogen, leaving one unit unemployed. Methyl, therefore, is a univalent radicle, and acts almost as if it were an independent element.

The chemical formulae which we have so far considered belong to the class known as em¬

pirical formulce; they give the number and kind of atoms in a molecule, but tell nothing as to their arrangement or mode of union. With the conception of valency and a knowledge of radi¬

cles we are now prepared to construct rational or constitutional formulae, and from these it is possible to infer what sort of changes a given molecule can undergo, and to understand where¬

in isomeric bodies differ. For example, there are two bodies having the empirical formulae GHoO ; one, methyl ether, is a gas ; the other, common alcohol, is liquid; the great difference between them is evident at a glance. Their ra¬

tional or structural formulae exhibit the cause of difference as follows :

H H

I I

H— C— O— C— H

I I

H H

Methyl ether.

H H

I I

H— C— C— O— H

I I

H H

Ethyl alcohol.

In the first, two methyl groups appear united by an atom of oxygen ; in the other, the carbon atoms are directly combined, and the bivalent oxygen connects carbon and hydrogen. The lines which connect the symbols represent units of valency, and the groups CH3 in one case and GH5 in the other stand for well-known radi¬

cles. For further illustration we may recur to the case of acetic acid, in which, as we have seen, three hydrogen atoms behave differently

trom the fourth. This condition is shown in the following structural expression :

H

I

H— C— C— O— H

Here we see the three replaceable atoms directly connected with carbon, while the fourth is linked to oxygen ; the latter element also being combined in two ways. The known facts are clearly and simply presented to the eye by a convenient symbolism, a method of formulation which has been of immense value as a guide to practical research. In order to succeed, an ex¬

periment upon any of these compounds must be in accord with the facts of molecular struc¬

ture, for the latter indicate limitations which cannot be disregarded.

In two of the foregoing formulae the link¬

ing of carbon with carbon is clearly indicated, but only by single units of valency, or bonds as they are sometimes called. In other cases, however, more complex unions occur, and double or triple linkages are common. The formulae for two hydrocarbons may be cited to illustrate this principle, thus :

H— C— H C - H

• I ! Ml

H— C— H, C - H,

Ethylene Acetylene

The second of these bodies is now widely known as an illuminating gas. Each com¬

pound is the starting point of an homologous series, exactly as with the paraffins ; but the ethylene series exhibits a striking peculiarity.

If we add to ethylene successive CH2 groups, which characterize chemical homology, we get a sequence represented by such formulae as C2H1, C3HG, QHs, and so on indefinitely. In all of these compounds the ratio between car¬

bon and hydrogen is the same, and their per¬

centage composition is identical ; such a series is called polymeric. The different members of the series, hoAvever, yield different derivatives, and they are further distinguished from one an¬

other by their molecular zveights, the weight of the molecule being the sum of the weights of the atoms contained in it. These molecular weights can be directly' measured by ascertain¬

ing the actual weight of definite bulks of the several substances in the condition of gas or vapor. According to Avogadro's law, equal volumes of gases contain equal numbers of molecules; if, therefore, a litre of one gas is twice as heavy as a litre of another, the weight of its molecule must be double that of the lat¬

ter. By experiment, then, we can determine the relative weights of molecules, and so discover whether a compound is formed from a larger or smaller group of atoms.

One other class of organic substances de¬

mands attention here, the so-called aromatic bodies, which start from the hydrocarbon GjH6, benzene. In the compounds previously consid¬

ered the carbon atoms are united in a chain¬

like manner, but in benzene there is good rea¬

son to assume that they form something like a ring. Around this ring of carbon atoms the hydrogen atoms are grouped, and by succes¬

sively replacing them with other atoms or radi¬

cles, a mvriad of substances may be generated.

The details of this theory, which was put forth by Kekule in 1866, are too abstruse for full de¬

velopment here, but its influence upon chemical research and chemical industry has been over¬

whelming. From benzene, which is a product of coal-tar, aniline is produced; and the deriva¬

tives of aniline give us a perfect rainbow of artificial dyes. To benzene, other hydrocarbons are closely related, and their derivatives are often curiously interesting. Among them we have artificial indigo and artificial alizarin, the latter being the coloring principle of madder.

Both compounds are identical with the natural substances, and both are important commercial products. Medicines, like saccharin, antipyrin, acetaniiid and phenacetin; perfumes, like musk and violet;

and flavoring substances, such as vanillin, are now prepared by synthesis from the hydrocabons of coal-tar, and thousands of workmen find employment in the new industries which are based upon these processes. The in¬

vestigations which created these new sources of wealth have been in great part guided by theo¬

retical considerations, and at the very founda¬

tion of all this work we find the conception of chemical structure, and Kekule's interpretation of the constitution of benzene. The atomic groupings represented by the structural or ra¬

tional formulae are not visionary and their study has led to the greater material well-being of mankind.

It must not be supposed that the rational formulae represent the arrangement of the atoms in space, for that is not their purpose. It is not likely that the atoms of a molecule all lie in one plane, and yet these formulae suggest no other mode of grouping. The tridimensional structure of molecules is, generally speaking, almost entirely unknown ; and yet, in certain cases, there are clues to a partial solution of the problem. Various organic substances have optical properties which are easiest explained by assuming that the atom of carbon is essen¬

tially a tetrahedron in form, and that its four valencies are forces exerted from the centre toward the four solid angles of the body. By means of this hypothesis many curious facts are interpreted and many new discoveries have been made. Formulae based upon the tetrahedral carbon atom are called stereochemical formulae, and the study of their space relations is named stereochemistry. This subject is quite modern and does not admit of detailed discussion here.

That the elements are connected with one another by various relationships is a fact which was early recognized; they were therefore soon classified into groups according to their like¬

nesses. Thus chlorine, bromine and iodine are closely allied and form strikingly similar com¬

pounds ; lithium, sodium and potassium resem¬

ble one another very clearly, and so too do the metals, calcium, strontium and barium. Such a grouping was of great service in classifying many chemical facts, and in due time it was seen to be related to the property of valency.

A general law connecting all the elements was, however, not discovered until the decade, ending in 1870, during which time three investigators, Newlands, Mendeleef .and Lothar Meyer, work¬

ing independently, developed the periodic sys¬

tem. Upon arranging the elements in the order of their atomic weights, a regular periodic vari¬

ation in their properties appeared, and the full¬

est interpretation of it was due to Mendeleef.

The nature of his work may be partly shown as follows:

Beginning with lithium and arranging the elements in the order above indicated, a table of the following form can be constructed, al¬

though only three lines of it are given here : I.

II.

III.

IV.

V.

VI.

VII.

VIII.

Li.

Gl.

B.

c.

N.

0.

F.

Ne.

7.

9.

11.

12.

14.

16.

19.

20.

Na.

Mg.

Al.

Si.

P.

S.

Cl.

A.

23.

24.

27.

28.

31.

32.

35.5

39.9

K.

Ca.

—

Ti.

V.

Cr.

Mn.

etc.

39.1

40.

—

48.

51. .

52.

55.

Under the symbol of each element its atomic weight is written, rounded-off, in some cases, for convenience. Let us now consider the first line. Lithium, which begins the scheme, is univalent, glucinum bivalent and carbon quad¬

rivalent, a regular increase in valency. Nitro¬

gen is in its stablest compounds trivalent, oxy¬

gen bivalent and fluorine univalent ; thus show¬

ing a steady decrease. Neon, which was not known in Mendeleef's time, and argon, which falls just below it, are elements of no valency, and these form no compounds. These elements, with their regular rise in valency to carbon and fall to neon, form a single period. In the next line, beginning with sodium (Na), the process is repeated; and this happens again in the third line; so that all of the elements in the same vertical column are alike in valency and intimately related in their properties and their compounds. Regular step-by-step varia¬

tion horizontally, and likewise vertically, char¬

acterizes the table, which may, with certain qualifications, be extended so as to include all the elements known.

At the third place in the third line of the table, as given above, a blank appears. This place, when Mendeleef developed his periodic law, was occupied by no known element ; and in the fourth period of the completed scheme two similar gaps occurred. These indicated un¬

known elements, and Mendeleef, from the prop¬

erties of the adjacent elements, predicted what their properties should

be. Since then the pre¬

diction has been verified; and three new metals, having all the properties which Mendeleef fore¬

saw, fill the vacant places. They are scandium, gallium and germanium. The connection be¬

tween the elements was more intimate than any¬

one had supposed, so much so that the unknown could be accurately prophesied. All physical properties appear to rise and fall from element to element in this regular periodic way; and we can now see what sort of elements are likely to be discovered in the future, and where they will stand in the tabular arrange¬

ment. The properties of . an atom, thermal, electrical, optical, etc., seem to be in great measure dependent upon its weight. The dis¬

tinctly chemical property of the atom, its val¬

ency, may be related to its form, as stereo¬

chemical evidence would seem to indicate ; but here we have few facts to go upon and specu¬

lation would be premature.

The wonderful regularities of the periodic law, with its verified predictions, lead us at once to reiterate the old question as to the ulti¬

mate nature of matter. Is it really various in kind, or is it at bottom only one? Are the elements, in the last analysis, elementary? To such questions no final answer can yet be given, but they cannot be silenced ; and one of the most marvelous discoveries of science has some bearing upon the problem.

When a beam of white light passes through a glass prism, it is broken up into a bundle of rays which give to the eye the so-called seven primary colors. If this phenomenon be ob¬

served through the form of instrument called a spectroscope, a continuous band of color is seen ranging from red at one end to violet

at the other. Suppose, now, that instead of ex¬

amining white light, we repeat the experiment with a colored flame and see what will happen.

Sodium compounds, for instance, when intro¬

duced into a non-luminous gas flame, give out an intense yellow light ; and this, viewed through a spectroscope of low power, yields a spectrum consisting of a single, narrow, yellow line. Lithium, under similar conditions, ex¬

hibits a red line; barium, a group of several green and yellow lines ; and, in short, every substance which is capable of coloring a flame gives a spectrum which is not continuous. Each spectrum is made up of bright, colored lines, with dark spaces between ; and every line is absolutely characteristic of its source. Every element, provided it be first heated hot enough to be converted into vapor, yields its own definite spectrum of one or many lines, which can be recognized in a spectroscope. The vapor of iron, as obtained in an electric spark be¬

tween iron terminals, gives a spectrum con¬

taining a multitude of bright lines, and every one of them belongs only to iron. The process by which substances are thus identified is known as spectrum analysis ; and it was discovered by Bunsen and Kirchhoff more than 50 years ago.

Bunsen applied the method to the analysis of the salts contained in a mineral water,' and saw lines which belonged to no known element.

He was thus led to find two new metals, ru¬

bidium and caesium, and soon afterward, by similar means, other chemists discovered thal¬

lium and indium.

Shortly after its invention the spectroscope was turned toward the heavenly bodies, in or¬

der to see what tales their light had to tell. It was at once found that they are all composed of matter like that with which we are fa¬

miliar on the earth, although varying in com¬

plexity. The sun wasr proved to be an intensely heated body, containing a large number of our chemical elements in gaseous form, and the fixed stars were similar in character. The whiter and hotter stars contain comparatively few substances, the colored and cooler stars contain more. The nebulce, those bodies which represent the first step in the formation of planets and systems, were found to be vast clouds of incandescent gaseous matter, in which hydrogen and helium predominated ; chemi¬

cally, therefore, they were extremely simple.

From the simplest nebula to the complexity of our earth there was regular chemical gradation, suggesting that the evolution of the one from the other had been accompanied by an evolu¬

tion of the so-called elements also. A strong argument in favor of the unity of matter was thus brought to light, even though absolute proof was wanting. The general opinion now is that our elements are really complex, al¬

though our present resources are not adequate to decompose them.

Very recently this opinion has been strength¬

ened by a group of remarkable discoveries con-CHEMISTRY

nccted with the rare metals, thorium and ura¬

nium. These elements and their compounds were found to emit invisible radiations, or ema¬

nations, which affect the photographic plate, and also possess certain measurable electric proper¬

ties. This trait of radioactivity, as it is called, led to the discovery of two or three new metals, which are associated in the mineral kingdom \yith uranium, and one of these, radium, has the new power to an extraordinary degree. The radiations are of several kinds ; and are still the subject of active investigation; but one or two of the conclusions

so far reached are per¬

tinent to the present discussion. In the case of radium, the emanation consists of chemically inert gaseous particles which are continually being generated and given off from the parent material. The elements thorium and uranium behave in a similar manner. In short, radium, a metal like barium, is an unstable element, and it spontaneously, but very slowly, decomposes, yielding helium as its final product. J. J.

Thomson, studying electrified gases, is led to the conclusion that the negative charge resides upon certain corpuscles, as he terms them, which are not more than the thousandth part of an atom of hydrogen in magnitude, and which are the same for all substances. Particles smaller than the chemical atom are thus being identified, and so the belief in the actual complexity of the ele¬

ments is receiving close attention.

Although the principles of valency and the conception of chemical structure are best de¬

veloped and exemplified in the study of organic compounds, the inorganic side of chemistry is by no means to be neglected. Here we find the simplest illustrations of chemical nomenclature, and some of the greatest fields of industrial activity. Sulphuric acid, soda, bleaching pow¬

der and many other inorganic substances are of immense commercial importance; and the processes by which metals are extracted from their ores all fall within this department of chemistry. Information upon these practical subjects will be found elsewhere, under the proper headings, such as Iron; Phosphorus; Salt ; Soda ; *etc.* ; but a few general notions belong here.

The nomenclature of inorganic chemistry is quite simple. Compounds of two elements are described by giving their names and adding the termination ide to part of the second title.

For example, copper unites with oxygen to form copper oxide; zinc and chlorine give zinc chloride, and so on, the names thus expressing the composition of the substances. When mul¬

tiple proportions appear a numeral prefix is added to the class name, so that we have such combinations as iodine mono chloride, I Cl, iodine /n'chloride, ICh, and the like. In some cases this mode of nomenclature is varied, as when certain well-defined classes of compounds are to be described. Thus we have the iron compounds FeCk and FeCk (the symbol Fe from ferrum), which are commonly called ferrous and ferric chloride respectively. The terminations ous and ic denote lower and higher stages of union and are used for convenience or euphony when the regular nomenclature might be awkward. Such compounds as PCk and

PCI5 may be named either phosphorow.? and phosphoric chloride, or phosphorus trichloride and pentachloride, according to preference; but the latter form is the more precise and clear.

Any compound of a metal with oxygen, then, is an oxide; with chlorine, a chloride; with sul¬

phur, a sulphide, *etc.*

Three of the largest and most important classes of compounds are acids, bases and salts.

In order to define these rigorously, some pre¬

vious knowledge of chemistry is required; but an indication of their character is easily given.

The acids, as their name implies, are usually sour in taste, but not invariably so, and the stronger members of the class are violently corrosive and able to dissolve metajs. They are most commonly derived from the non-metallic elements, and several acids may be formed from one of the latter. Here again we have the ous and ic nomenclature, as in sul¬

phurous acid, H2SO3, and sulphuric acid, H2SO4 ; the latter containing the higher pro¬

portion of oxygen. From nitrogen we get nitrons and nitric acids, HNO2 and HN03, and so on with simple descriptive names through¬

out the long list of these compounds.

The bases are the direct opposite of the acids in their properties, and have, when soluble in water, an alkaline or soapy taste. The taste of ordinary kitchen soda is a good example of this peculiarity. Certain vegetable coloring matters are changed in hue by acids and alkalis, the latter name being applied to the stronger soluble bases. Blue litmus, for instance, be¬

comes red in contact with an acid, but an alkab restores its original tint. When acid and base are mingled in proper proportions, they neu¬

tralize each other, and a salt is produced which no longer affects litmus. To illustrate further: Soda is a base, and when it is mixed with sul¬

phuric acid it generates sodium sulphate. With sulphurous acid it yields sodium sulphite; and the two terminations ate and ite correspond to the other terminations ous and ic. Nitric acid, with bases, forms nitrates ; acetic acid, acetates, etc., the nomenclature being simple and easy.

Many of the salts are important commercial articles.

From one point of view an acid is a sub¬

stance which contains hydrogen replaceable by a metal, and a salt is the compound so pro¬

duced. Zinc, for instance, dissolves in sul¬

phuric acid to form zinc sulphate, and free, gaseous hydrogen is liberated. An acid, then, contains hydrogen plus something else, and the latter is a distinct radicle in each case which exhibits a definite valency. The subjoined formulae may help to make this point clear: Nitric

acid.

HNOa.

Potassium

nitrate.

KNOa.

Sulphuric

acid.

H2SO4.

Potassium

sulphate.

K2SO4.

Phosphoric

acid.

H3PO4.

Potassium

phosphate.

K_3PO_4.

That is, potassium (symbol K from kalium) re¬

places hydrogen atom for atom ; and the radi¬

cles, NO_3, SO_4 and PO_4 are univalent, bivalent and trivalent respectively. A knowledge of these simple principles enables the chemist to classify the facts in his mind, and to write numberless formulae without overloading his memory with details. Learning these principles is like learn¬

ing a language, only the grammar is easy of acquisition. Fluency in its use can only be gained by practice.

Between allied departments of science no sharp dividing line can be drawn, and this is 400

CHEMISTRY

peculiarly true with respect to chemistry and physics. The two sciences merge one into the other by imperceptible gradations, and neither can be fully understood separately. Physics treats primarily of the different forms of energy, light, heat, electricity, mechanical force, etc., and all of these appear in the phenomena of chemical change. Furthermore, chemical substances are described in physical terms, and are identified by physical properties such as weight, color, specific heat, melting point, boil¬

ing pointy electrical conductivity and the like.

Considerations of this kind have received much attention during recent years, more than ever before ; and so a great department of knowl¬

edge has been developed, known as physical chemistry. Avogadro's law, the periodic law and the revelations of the spectroscope all fall partly within this field, but other important portions of it deserve seme notice here.

Between chemical change and heat the re¬

lation is exceedingly intimate. No chemical change takes place without either the libera¬

tion or the absorption of heat, and every one is in some measure dependent upon temperature.

At very low temperatures, like the temperature of liquid air, all chemical action ceases, and the most oppositelv energetic substances, lie side by side indifferent to one another. At very high temperatures all unions are broken up, and here again the chemical forces cease to be oper¬

ative. Most of the changes which we observe are effected at ordinary temperatures, and a slight warming may arouse an apparently inert mixture to chemical activity. The application of heat, then, may either instigate or prevent chemical union, according to circumstances.

As a general rule, with some apparent ex¬

ceptions, every chemical union develops heat and every decomposition absorbs it ; and the study of these relations has received the special name of thermochemistry. Furthermore, every chemical change is attended by its own special, definite quantity of heat, and these quantities vary from substance to substance. Hydrogen, burning, that is, combining with oxygen, gives out the largest amount of heat of any substance known ; carbon yields much less, phosphorus or sulphur less still, weight for weight being con¬

sumed. For such reasons the heat value of any fuel depends upon its

chemical composition, and hence careful analyses of coal, which is a vari¬

able mixture containing chiefly carbon and hydrocarbons, have great practical importance.

From the composition of a coal its calorific value may be calculated, although a direct ex¬

perimental measurement of it is to be preferred.

In general laws, however, thermochemistry is still rather deficient, and its larger meanings are yet to be discovered.

Like heat, radiant energy, the energy of light, may cause either chemical union or chem¬

ical decomposition. Hydrogen and chlorine, mingled in cold and darkness, do not readily unite, but upon sudden exposure to strong sun¬

light they combine with explosive violence. On the other hand, silver salts, under suitable con¬

ditions, are broken up by light, and upon this fact the art of photography is founded. The photographic film is a laboratory in which light is the chemist. We have already seen, in con¬

sidering spectrum analysis, that every substance, when intensely heated in the form of gas or vapor, emits light which is peculiar to itself ; but there are still other relations between mat¬

ter and light that have chemical importance.

Color is merely the capacity for selecting or ab¬

sorbing certain rays, and rejecting or transmit¬

ting others; and this is often a characteristic distinction between various classes of com¬

pounds. For example, salts of cobalt are com¬

monly red, of nickel green, of copper blue or green, and so on. Many of the optical proper¬

ties of substances seem to depend upon theif chemical composition, and in one set of phe¬

nomena this fact has economic importance.

Certain bodies have the power of twisting or rotating a ray of polarized light, and among carbon compounds this property is directly connected with stereochemical structure. Sugar is one of these optically active compounds, and by measuring the amount of rotation which a sample can produce its degree of purity may be determined. This process is practically applied in all sugar refineries for estimating the value of raw sugars or syrups, and also in assessing customs duties. The polariscope used for such purposes is often called a saccharimeter.

Of late years chemistry has been greatly de¬

veloped upon its electrical side, both theoreti¬

cally and practically. Electricity may be gen¬

erated by chemical change, and this happens in all forms of the galvanic battery. For many years, previous to the perfecting of the dynamo, batteries of that class supplied all the electrical power that had any industrial significance.

Electricity may also produce chemical change, and it is especially effective in bringing about decompositions. Indeed, many thinkers have sought to identify chemical attraction qr affinity with electricity, and even the . property of val¬

ency is commonly ascribed to electrical charges carried by the atoms.

From a purely chemical point of view, prob¬

ably the most important electrical phenomena are those of electrolysis. When a current of electricity passes through a compound solution, the latter undergoes decomposition, and the dis¬

solved substance, acid, base, or salt, is separated into two parts which move with unequal veloci¬

ties in opposite directions. The conducting liquid is called an

electrolyte, and the separated parts, or rather particles, of the compound in solution are termed its ions. One ion is posi¬

tively, the other negatively, electrified, and hence they tend to accumulate around the opposite poles. Under suitable conditions the separa¬

tion can be made permanent, and this fact is the basis of all our processes in electrometal¬

lurgy. From solutions of gold, silver, copper, nickel, etc., the metal is electrically set free, to be deposited upon properly arranged surfaces.

Electroplating and electrotyping are operations of this kind. In the electric furnace, however, the electricity acts as a. source of heat, and the latter is the effective decomposing agent. In manufacturing chemical preparations many elec¬

trolytic processes are now employed. In liquids which do not conduct a current electrolysis does not take place.

Suppose, now, we employ several precisely similar currents to effect a variety of elec¬

trolytic changes. Let one current liberate hy¬

drogen from water, • another deposit silver, another copper, and so on. Then, upon meas¬

uring the quantities of the different sub¬

stances which have been set free, we shall find them to be exactly proportional to their CHEMISTRY

chemical equivalents , an equivalent being the ratio between the atomic weight of an element and its valency. For univalent elements the atomic weights and equivalents are identical, for bivalent elements the equivalent is half the atomic weight, and so on through the list. If, then, one gram of hydrogen is liberated, the same current in the same

time will deposit 107.1

grams of univalent silver, or one-half of 63.1

grams of bivalent copper, *etc.* This funda¬

mental proposition of electrolysis is known as Faraday's law. Furthermore, the separated ions all carry equal electrical charges per unit of valency, 96,500 coulombs for a univalent ion, and twice that for a bivalent ion. The relation between electrical and chemical phenomena is of the very closest kind, and Faraday's law is absolutely general.

When two or more substances act upon one another chemically, the entire process is termed a reaction. Very many of the reactions which are observed in the laboratory take place be¬

tween bodies in solution, and hence the study of solutions has received and is still receiving a great deal of attention. No complete theory of solutions has so far been developed; why one substance should dissolve easily in water, an¬

other slightly, and a third not at all, remains unexplained; but some generalizations have been reached, and these are cf the most sug¬

gestive character. Some of the phenomena are electrolytic in their nature, and others go to prove a remarkable parallelism between bodies in solution and bodies in the gaseous condition.

In Avogadro's law the volume of a gas is defined by conditions of temperature and pres¬

sure, and equal numbers of molecules occupy equal spaces. The power of exerting pressure is one of the distinct properties possessed by all gases, and this is a consequence of the fact that the molecules are in rapid and continuous mo¬

tion. Substances in solution are also found to exert pressure, and the latter can be measured by various means. The pressure is proportional to the strength of the solution, and although it is not easily detected, it is often very great.

The movement of the sap in a plant is due to the osmotic pressure of the dissolved substances that it contains. In 1887 Van t'Hoff, studying these phenomena, deduced from them the sim¬

ple law that equal volumes of solutions, at equal osmotic pressures, contain equal numbers of molecules, and Avogadro's law was directly paralleled. A body in solution and a gas obey precisely similar laws. We have already seen that from the actual weight of a gas its molec¬

ular weight can be determined. Now, from the behavior of substances in solution their molec¬

ular weights can also be ascertained. A saline solution does not freeze so easily as pure water, and its boiling point is higher ; the depression in one case and the elevation in the other be¬

ing proportional to the molecular weight of the dissolved substance. These facts are directly connected with Van t'Hoff's generalization, and they are now of almost daily application in scientific research. The actual measurement of molecular weights has been enormously ex¬

tended by means of the new laws.

Both gases and solutions, however, some¬

times exhibit apparent anomalies. Certain com¬

pounds, when vaporized, seem not to agree with Avogadro's law, and such facts require ex¬

planation. The seemingly anomalous substances, vol. 6 — 26

as such, do not exist in the state of vapor, but are split up, or dissociated, into other things.

For example, ammonium chloride, NH4C1, above a certain temperature, is decomposed into a mix¬

ture of two gases, hydrochloric acid and am¬

monia, NH3 + HCI, which, on cooling, reunite and reproduce the original compound. Twice as much vapor as is required by theory, and

specifically half as heavy, is produced by this transformation, which is but one of a large class, all well understood.

In the case of solutions it was found that many compounds, especially the acids, bases and metallic salts, caused a lowering of the freezing point that was twice as great as should be expected. Here again a splitting up of molecules, a true dissociation, exactly like that observed in gases, had occurred. Further¬

more, the anomalous compounds were all elec¬

trolytes ; that is, their solutions conducted elec¬

tricity and were electrolytically decomposed ; while normal substances, like sugar, were not.

Solutions, then, were to be divided into two classes, differing electrically, and also dissimilar in their relations to Van t'Hoff's law. The ex¬

planation of these differences is given by Arrhenius in his theory of electrolytic dis¬

sociation.

As interpreted by this theory, an electrolyte, when dissolved, is dissociated into its ions, partially in a strong solution, and entirely in one which is infinitely dilute ; a statement which leads to some remarkable conclusions. For in¬

stance, the ions of common salt, sodium chloride, are atoms of sodium and chlorine. In a dilute solution the salt itself ceases to exist as such, while atoms of sodium and of chlorine wander about, chemically separated, but still in equi¬

librium with each other. Sodium sulphate may be regarded as made up of two parts, sodium ions and ions of an acid radicle, S04, and these are severed apart during solution to move about independently. According to this view elec¬

trolysis is not primarily a decomposition of the salt : it is rather a sorting out of the already uncombined ions, which receive different

elec¬

trical charges and concentrate separately at the two electrical poles. Some ions are single atoms, others are more or less complicated groups such as CO3, S04, N03, P04, etc., which cannot be, or at least have not been, independ¬

ently isolated.

In the study of chemical reactions the ionic theory of Arrhenius has been fruitfully applied.

By means of it we are now able to better dis¬

criminate between acids and bases, and to in¬

terpret more rationally the phenomena of neu¬

tralization. Acids are all characterized by the presence in their solutions of hydrogen ions, single atoms with a univalent radicle, two atoms for each bivalent radicle, *etc.* Thus in hydro¬

chloric acid the ions are H and Cl ; in sulphuric acid 2H and S04, and in phosphoric acid 3H

and PO4. In bases, on the other hand, ions of hydroxyl exist, and this is a radicle of the for¬

mula HO, in which the bivalent oxygen is only half combined. Caustic soda, NaOH, for ex¬

ample, dissociates in solution into the ions Na and HO ; caustic lime, Ca02H2, into Ca and 2HO, and so on. When a dissolved base and a dissolved acid are brought together, the H

ions of the latter and fhe HO ions of the for¬

mer combine to form water, H20, and vanish from the reaction. The salt which is produced 402

is represented by the remaining ions, and as the.

characteristic features of acid and base are gone, the result is neutral. Nearly all reactions in so¬

lution, but not quite all, are reactions between ions rather than between the actual compounds with which we originally began.

In the time of Lavoisier chemistry was hardly more than a minor subdivision of nat¬

ural philosophy. It was just coming into recog¬

nition as a true science, and its votaries were few. Its great development has taken place in little more than a century, and now it touches many other branches of knowledge, affects all departments of industry and gives employment to tens of thousands of men. In every part of it there is intense activity, and discovery follows discovery faster than they can be assimilated.

Mineralogy is to all intents and purposes a branch of chemistry, for minerals are classified upon the basis of their chemical composition, and the first step toward the establishment of a new species is its chemical analysis. Physi¬

ology is in great part a chemical science ; respiration, assimilation and excretion are chemical processes ; within the living organism, plant or animal, substances are undergoing transformations which only the chemist can follow or identify. The chemistry of vital processes, biochemistry , is almost a science by itself, so large is its field and so varied are the problems with which it has to deal. Medi¬

cine is indebted to chemistry for almost a new pharmacopoeia, for not only have new remedies been created, but in place of old drugs, crude and bulky, the compact and more elegant active principles are now employed. Anaesthetics, such as ether, chloroform and nitrous oxide; hyp¬

notics like chloral ; the remedies derived from coal-tar; and alkaloids like quinine, morphine and cocaine are a few of the contributions with which chemistry has enriched medical practice.

Even antiseptic surgery depends upon chemical preparations for its success.

The chemistry of agriculture is separately treated elsewhere, but a word may fairly be said upon the relations between chemical sci¬

ence and the arts. Every manufacturing indus¬

try is directly and profoundly affected by the results of chemical research. A century ago probably no manufacturing establishment in the world even thought of maintaining a chemical laboratory; to-day hundreds are in operation for the benefit of the intelligent manufacturer.

Coal gas is a chemical product ; its bv-products are ammonia and coal-tar; and from the latter, as we have already seen, hundreds of useful substances, discovered within the last half century, are prepared. Better and cheaper soap and glass owe their existence to chemical im¬

provements in the making of alkalis ; chemical bleaching has replaced the slow action of sun¬

light and dew ; chemical dyestuffs give our mod¬

ern fabrics nearly all their hues. In metallurgy every metal is extracted from its ores by meth¬

ods which rest on chemical foundations, and analyses of fuel, flux and product go side by side with the smelting. The cyanide and chlor¬

ination processes for gold, the Bessemer process for steel, are good examples of the advance in chemical metallurgy; but before they can be applied the dynamite of the miner, another chemical invention, must have done its work underground. Waste products are made use¬

ful, and new applications of old materials are discovered by the chemist ; even curiosities like the rare mineral monazite are brought into play.

Monazite furnishes the oxides of thorium and cerium, from which the mantles of the Wejs-bach burners are made. Every year brings its improvements, and chemical patents by the hun¬

dred are annually issued to inventors.

The facilities for chemical training have in¬

creased side by side with the demand for chem¬

ical services, and in every university or tech¬

nical school chemistry has become a leading study. Even the preparatory schools are now equipped with chemical laboratories, and the science has come to be recognized as an im¬

portant part of a liberal education. Apart from its practical bearings its disciplinary value is very great, and this consideration is now given due weight by teachers.

One more phase of chemical activity re¬

mains to be noticed, the organization of chem¬

ical societies. Of the larger national organiza¬

tions the English society is the oldest, the French next, then comes the German and then the American. The American Chemical Society now numbers over 7,000 members and has nearly 50 local sections in continuous opera¬

tion. In its three journals it publishes over 7,000 pages each year. There are also many smaller organizations devoted to chemistry, and some to special subdivisions of it, such as electro-chemistry. Applied science is repre¬

sented by the Society for Chemical Industry, an Anglo-American association of great

strength.

Bibliography. — Clarke and Dennis, Ele¬

mentary Chemistry) (1902) ; Classen, Quanti¬

tative Analysis) (1902) ; Crookes, (Select Meth¬

ods in Chemical Analysis > ; Jones, Elements of Physical Chemistry) (1902); Lupke, (The Ele¬

ments of Electro-Chemistry) ; Martin, indus¬

trial and Manufacturing Chemistry) ; Mendeleef, (The Principles of Chemistry) ; Muir, (The Elements of Thermal Chemistry) ; Von Meyer, (History of Chemistry) ; Remsen, (Organic Chemistry > and inorganic Chemistry, Ad¬

vanced Course) ; Roscoe and Schorlemmer, (Treatise on Chemistry) ; Thorpe, (Dictionary of Applied Chemistry) (3 vols.) ; Tilden, < Short History of Scientific Chemistry) ; Walker, in¬

troduction to Physical Chemistry) ; Watts, (Dictionary of Chemistry) (4 vols.) ; Peters, (Key to Modern Chemistry) (1910).

F. W. Clarke,

Chemist for United States Geological Survey.

CHEMISTRY, Progress of. The progress

of chemistry has been so disturbed by the European War that it is doubtful if the inven¬

tions which necessity has compelled have made up for the deficiency in discoveries for the general welfare and in pure science. In the midst of strife there is but little interchange of communication, so that the work of to-day, done in secret in response to the needs of war¬

ring nations, is not yet generally known.

In pure science the tendency has been to re¬

move the dividing line between physics and chemistry and to bring the latter over to a mathematical basis. The problems of physical chemistry, which cover the middle ground be¬

tween the two sciences, have to do rather with how things happen than with what happens, and it is fair to say that for the past 15 years chem¬

ists have set themselves to this task far more CHEMISTRY, PROGRESS

assiduously than heretofore. In considering a reaction, the modern chemist endeavors to com¬

pute, as far as possible, the free energy' avail¬

able in order to determine not only what takes place, but also the reason why.

Another subject which has had the attention of man}' workers of late is colloid chemistry.

This has to do with uncrystalline bodies which divide themselves into very minute particles, much larger than molecules, and yet small enough to be kept in constant motion by the bombardment of surrounding molecules. The more finely divided a substance is the greater is the proportion of the surface of its particles to their volume, and, as every surface has its own peculiar qualities, in regard to what may be spread out upon it, many phenomena are met with that do not take place in a non-colloidal condition. Inasmuch as all body juices are col¬

loidal in their nature, this study has thrown a great deal of light upon problems of physiology.

Electrochemistry (q.v.) has shown marked advances. The high temperature of the elec¬

tric arc has provided the means, not only for the fixation of nitrogen in the first instance, but for the combination of elements otherwise inert toward each other. It has made possible the reduction of many rare metals from their ores, thus bringing them into use. The elec¬

trolytic refining of copper and the electric steel furnace are products of electrochemical re¬

search, as is the aluminum industry.

In applied chemistry we find research active but industry still unwilling, in many cases, to (<let in the theorist.ˆ On the other hand, chemi¬

cal control of works and processes of manu¬

facture is growing apace. This and the results of research are the most evident indications of the progress of the science to those unfamiliar with chemical .processes. Much has been said of the “scientific managementˆ of men in de¬

vising economies of work in manufacturing processes, but much has also been done in the scientific management of materials in relation to their chemical reactions during the processes of industry. We shall address ourselves prin¬

cipally to applied chemistry and note some of the industries in which the hand of the chemist may be traced and make comment upon what he has done as well as upon the outlook for the future.

Power. — This is the first great requirement in nearly all manufacture and is of vast im¬

portance in electrochemical industry (q.v.).

Water power is not used to its full extent. In the United States the conservation statutes which withhold it under fear of private control or monopoly have had an important bearing on this. A promising method of converting water into steam is by burning coal in the form of a very fine powder. This ensures complete com¬

bustion, avoids smoke and promises marked economy. The burning of coal powder is in general use in the Portland cement industry to obtain the high temperatures needed in _ the operation. It is necessary that the coal be milled as it is fed into the fire, as in a powdered con¬

dition it is easily exploded. A problem yet to be solved is a way to avoid the damage done to boiler plates by the high temperatures obtained in combustion. As soon as this is overcome, the steaming power of coal will be materially increased.

Gas-engines are competing with those steam driven, but they are still more expensive to in¬

stall and more difficult to operate. On the other hand, coal gas, by which these engines are pro¬

pelled, is increasing in use for power. The development of by-product ovens for making coke for the manufacture of pig iron, in the place of the wasteful beehive coke ovens, has provided a new source of coal gas in large quantity. Another prospective cheapening of gas to the consumer is that municipalities may learn the expensiveness of demanding candle power in the place of heat units as the standard of gas furnished by public service corporations.

The increased light obtained by the use of mantles of the Welsbach type from gas low in illuminating power and much cheaper to pro¬

duce should bring this about.

Motor Fuels. — These are all chemical prod¬

ucts, and while the needs have not been fully met, the outlook is encouraging. The use of automobiles is increasing faster than is the pro¬

duction of gasoline, so there is a problem to be solved. One way to meet it is by “cracking®

petroleum, whereby the more complex, heavier bodies are in effect chemically split down into lighter bodies by means of heat and pressure.

There is, however, a limit to the number of times heavy petroleums may be cracked, owing to their tendency to revert to their elemental carbon and hydrogen if the process is carried too far. Heavy trucks are now beginning to use the cheaper kerosene, starting the motors with gasoline or alcohol. What is needed is either a successful kerosene carburetor or an oxidizing agent to prevent the fuel from car¬

bonizing in the cylinders.

The art of making ethyl (grain) alcohol from sawdust and other wood waste, and from the sugar in the waste liquors of sulphite pulp mills has been developed to a qualified com¬

mercial success. The leading raw material for this purpose is molasses, which is a waste prod¬

uct of the sugar industry of the United States and the West Indies. Vast quantities are pro¬

duced from this source for industrial use to¬

day. Frost-damaged corn, of which nearly every year there is considerable, is also used.

If the raw material is starch as in corn or potatoes, or if cellulose as in sawdust, these products are first reduced to sugars and then fermented to alcohol and carbonic acid gas.

The alcohol is then distilled off. Alcohol more or less mixed with petroleum bids fair to be¬

come important as motor fuel in the United States.

With the growth of the by-product coke in¬

dustry there will be a larger production of benzole from coal-tar than the color, ex¬

plosives, and other industries evidently need, and the excess will be available as motor fuel.

Size of Apparatus. — This has grown,

especially in the smelting industry, iron blast furnaces in the United States reaching a ca¬

pacity of 500 tons daily. On the other hand, chemists have become more than ever alive to the fact that increase in size of apparatus may only be availed of after careful study, because questions of temperature, pressure and, in gen¬

eral, the ways of stuff in the mass, are not to be guessed at. This has

taught manufacturers the principle that every new process should be tried out in a small factory before a large plant is built. Many problems of physical chemistry are still unsolved, and the phenomena of chemical 404

action in the mass differ in surprising measure from laboratory experiments made under dif¬

ferent physical conditions.

Iron and Steel. — The greatest contribution to iron manufacture within the past 25 years was made by James Gay ley, by bringing air to a stable, low temperature before it enters the blast furnace. A given temperature within the furnace is provided for, but if the water con¬

tent of the air varies, the operation of the furnace becomes irregular. Now the warmer the air is the more humid it may be. For in¬

stance, if one cubic mile of air at maximum humidity at 95 degrees Fahrenheit were cooled to 32 degrees, there would be given off 140,000

tons of water, or 35,000,000,000 gallons. It had always been noticed that blast furnaces worked better in winter than in summer, but the reason was not known. By the Gayley process the air is refrigerated and thus a great part of the water is extracted. The saving amounts to a dollar or more in the cost per ton of pig iron.

The Siemens open-hearth process for mak¬

ing steel has supplanted the Bessemer method in part, because, although the open-hearth proc¬

ess is much slower, it is under far better con¬

trol and the product is more even and generally better. In many of the largest steel works the conversion from iron to steel is first done in

part in Bessemer converters and continued in open-hearth furnaces. This saves a great deal of time. In some of the most modern works steel is made in two steps; first in Bessemer converters, and from these into electric fur¬

naces. The economy of beginning with molten iron from a blast furnace and finishing it as electric steel without once allowing the metal to cool may readily be seen, while the quality compares with that of crucible steel.

For making steels of the best quality and greatest purity the old method of refining in crucibles is still in use although the electric furnace is supplanting it in part. Owing to the amount of electric current required and the short life and heavy expense of carbon elec¬

trodes, the process is costly, although less so than it is to produce steel in crucibles.

Steel Alloys. — Very interesting and valuable strides have been made in the production of alloys of other metals with steel. Some have been known for a long time while others are of recent discovery. Nickel, for instance, gives to steel tenacity and ductility; nickel and chro¬

mium, hardness ; manganese increases tenacity and improves the working qualities ; tungsten is added to make self-hardening and other special steels ; titanium produces great stiffness, especially in rails; and the presence of no more than one-quarter of 1 per cent of copper in steel sheets is remarkably effective in prevent¬

ing rust. Certain proportions of tungsten, chromium and molybdenum, in conjunction with special tempering, make the Taylor & White <(iiigh speed” tool steels. Vanadium gives great hardness. Silicon makes steel and iron brittle but hard, and a steel low in carbon but high in silicon content has a resistance to electricity four or five times greater than ordinary iron and loses less current when installed in electri¬

cal machinery. A very high silicon content makes iron resistant to acids and alkalis.

Sulphuric Acid. — This is the most widely used of all chemical products and touches, at one point or another, a vast number of manu¬

factured articles in daily use. When sulphur is burned out of metallic ores or as elemental sulphur, the compound S02 or sulphur dioxide is formed. These choking fumes, familiar to all of us, constitute the anhydride of sulphurous acid, but to produce the anhydride, or body which with water produces sulphuric acid, an¬

other atom of oxygen is needed in the mole¬

cule. In other words, it is required to change S02 to S03. The formula for sulphuric acid is H2SO4, while that of water is H20. The rela¬

tion, then, of SO3 to sulphuric acid may be seen in the following equation :

SO3 + H20 = HaSO*

Sulphur Water. Sulphuric

Trioxide. Acid.

The standard method has been to bring the sulphurous fumes into great leaden chambers and there to effect a union with oxygen by means of oxides of nitrogen, which are ulti¬

mately recovered. This must be done in the presence of water so that the resultant acid or (<chamber acid" as it is called is weak, and the excess water must be boiled off.

A later method of producing the anhydride of sulphuric acid (SO3) is accomplished by what is known as catalysis, whereby a foreign body causes a chemical action to take place between others without apparent change in itself. For instance, if the fumes of burn¬

ing sulphur or sulphur dioxide are brought to¬

gether with air, which contains one-fifth oxy¬

gen, in the presence of platinum sponge, under the proper conditions, then great clouds of sulphuric anhydride or SO3 (the trioxide) will fall to the floor of the apparatus. This is the principle of the contact process and it is in wide use wherever the anhydride is especially needed.

The old chamber process, however, has also been improved, so that it is not clear which process is cheaper to make an acid of 93-95 per cent concentration. Chamber acid is more cheaply produced in the old way than ,by making S03 and then adding dilute acid to it. (No one would think of adding water to SOs in practice because the reaction would be too hot and lively for convenience).

A notable change in the industry in the United States within the last few years has been the enforced manufacture of sulphuric acid by copper and zinc smelters in order to get rid of the sulphurous fumes from the roasting of their ores, which vitiated the air for miles around the smelters, ruined vegetation, killed farm crops and are conceeded to be inimical to health. It was made possible by the invention of Dr. Frederick G. Cottrell. He found that by the conduction of high tension electric cur¬

rents through vapors under proper conditions, suspended bodies were precipitated from the a\r as the currents pass through them, along with anv excess of moisture contained in the air. This saved the day for many cop¬

per smelting corporations that were in im¬

mediate danger of being compelled by law to shut down, owing to the fumes which they pro¬

duced. A considerable part of the sulphuric acid produced in the United States is now made from smelter fumes. The Cottrell process has been partiallv worked out with reference to other problems, such as the smoke nuisance in cities, and with reference to fog at sea. The

method proposed for overcoming fog is to sail an electrically operated small aeroplane, merely large enough to carry the necessary apparatus, attached to the bow of a ship. Then with one pole on the aeroplane and the other at the bow of the ship, the high tension currents would pass between them and the intervening fog should be precipitated. It is interesting to record that Dr. Cottrell turned over all the proceeds from his patents on electrolytic pre¬

cipitation to be expended for research in the advancement of science.

Nitrogen Compounds. — This has been one of the fields of greatest achievement of late years. Nitrogen, of which four-fifths of the air is composed, is needed in combination for fertilizer, for food, for the manufacture of dyestuffs, ex¬

plosives, medicines, — in short, nitrogen in com¬

bination is needed constantly for a vast number of purposes. Formerly the only source of supply was the great beds of nitrate of soda found in Chile, but not only will these be ex¬

hausted within 100 to 150 years at the present rate, but in the event of war, a blockade of the Chilian ports makes the production of explo¬

sives impossible. For despite the inexhaustible volume of it all around us, it will not enter into chemical combination except at the temperature of the electric arc or, until lately, under condi¬

tions unknown to man. Leguminous plants, such as clover, cowpeas, alfalfa, etc., take up nitrogen from the air and not only use it but enrich the soil with it when they are ploughed under. Other plants do not accomplish this and neither do laboratories or factories to this day, save in a roundabout way. The industry started at Niagara Falls under the invention of an American chemist, Charles S. Bradley. The product proved too expensive to persuade the investors in the enterprise that it was worth while, and the work was discontinued. Then two Norwegians, Birkeland and Eyde, took it up and have developed an enormous industry.

With the great water powers of Norway, avail¬

able to industry, they develop electric currents'

and produce nitric oxides from the nitrogen and oxygen of the air. These oxides, brought into combination with lime, produce a fertilizer which is sold all over the world. The process calls for vast quantities of power, and in Ger¬

many, with the war on and the supplies of nitrate of soda approaching an end, and the ports all closed, and no great water power de¬

velopment available in the country, something had to be done if the war was to continue.*

Without fixed nitrogen, no explosives may be made. At this point the process of two chem¬

ists, Haber, a German, and Le Rossignol, a Frenchman, was used whereby ammonia was produced by causing nitrogen of the air to unite with hydrogen. They knew, as

chemists have long known, that if three volumes of hydrogen gas and one vol¬

ume of nitrogen are enclosed in a vessel and an electric spark is passed through the mixed gases, a little ammonia will be formed. Am¬

monia is a combination of three atoms ot hydrogen with one of nitrogen. Not much am¬

monia is formed, though, because at that tem¬

perature it is not a stable compound and it dissociates into its components, nitrogen and hydrogen. They sent the gases, instead, through tubes under varying conditions of heat and pressure, bringing them into contact with various metals with a view to getting them to act as catalysts. In other words, they were after a contact process. They succeeded with the metals osmium and uranium, and by 1913

there was erected in connection with one of the industrial establishments a $10,000,000 plant which operated successfully. But ammonia gives with water an alkaline reaction, and while incalculably useful in the arts of peace, it will not do to make munitions. So a late discovery of Professor Ostwald was availed of, whereby ammonia, brought together with oxygen, under catalysis, produces nitric acid and water. This solved the problem. Another process to pro¬

duce ammonia by contact was developed in the research laboratory of the General Chemical Company of New York and turned over to the United States government for war purposes. It is an improvement over the German method.

Still another in wide use consists in treating calcium carbide at a high temperature with nitrogen gas, which combines with it and pro¬

duces what is called calcium cyanamide, CaCN2, a favorite nitrogen fertilizer. Then calcium cyanamide treated with super-heated steam pro¬

duces calcium carbonate, which is the composi¬

tion of limestone and ammonia. Prof. John E.

Bucher of Providence, R. I., has patented a method whereby steam and powdered coal and soda are brought together in the presence of iron; and as air, which is four-fifths nitrogen, is passed through at a moderately high tem¬

perature, sodium cyanide is formed. But this poisonous substance, when treated with steam, goes over into bicarbonate of soda and am¬

monia.

Soda. — The old standard method of produc¬

ing soda (sodium carbonate) from salt (sodium chloride) was by the process of Nicholas Le¬

blanc, who in 1789 developed his invention and presented the discovery to his patron the Duke of Orleans, whose domestic physician he was.

The Duke provided capital for the start of the industry, but the French Revolution came along and the industry, as is the way with such things in times of disorder, moved over to England where the process is still in operation in some works. It consisted in treating salt with sul¬

phuric acid, producing salt cake (sulphate of sodium) and muriatic (hydrochloric) acid.

The salt cake was heated with coal and lime¬

stone (calcium carbonate) until the mass had fluxed, when the reaction took place ; that is, there was an exchange of acids and bases, the sulphate of sodium becoming the carbonate and the lime becoming the sulphate. We need con¬

cern ourselves no further with the details of the process because it is practically obsolete.

In 1861 Ernest Solvay of Brussels patented the so-called Ammonia process, which is that by which the major portion of the soda used to-day is made, although we shall soon note another process that is crowding.it wherever there is abundant power for electricity. In the Solvay process, salt (sodium chloride) is treated with ammonium bicarbonate, or suc¬

cessively with ammonia and carbon dioxide, at a low temperature. Sodium bicarbonate and ammonium chloride are formed and the former being nearly insoluble in a solution of the latter, it precipitates out. The mother liquor (of ammonium chloride) is drawn off, treated with caustic lime, which frees the ammonia which is recovered and produces calcium chloride.

By using magnesia instead of lime the chlorine may be saved and the magnesia used continu¬

ously. The bicarbonate of soda is changed to the carbonate by heating. Caustic soda is made by treating the carbonate with quicklime.

The still newer method, resulting in caustic soda as the first product, and a very successful one, is the electrolytic process, which is by no means as simple as it looks. Methods differ in detail, but in principle the salt brine is led into an electrolytic cell, through which a current

of electricity is passed which splits the sodium from the chlorine, each element approaching its opposite pole. The sodium combines with the water to form caustic soda and the chlorine is collected. A very lively industry is developed at Niagara Falls, N. Y., and elsewhere, under several modifications of this process. See Electrochemical Industries.

Chlorine. — -The electrolytic production of soda and improved methods of transporting gases in iron containers has facilitated the use of chlorine in bleaching, in chemical manufac¬

ture and in the destruction of noxious bacilli in supplies of drinking water. A surprisingly small amount of the gas dissolved in water seems effectively to destroy them. Since the water supply of New York City has been chlo¬

rinated, no single case of typhoid fever has been traced to this source. The gas, condensed to a liquid, is shipped in cylinders under pressure and it has replaced the use of bleaching powder in many instances. It was the first German <(poison gasˆ of European warfare.

Flotation. — An improved method of con¬

centrating ores has been found to consist in grinding the rock to a very fine powder and then feeding it into a tank containing water and a slight amount of oil. As bubbles are caused to rise in the water, the metal-bearing particles attach themselves to the bubbles and float to the top, while the lighter gangue of limestone or other rock falls to the bottom. The phenome¬

non is regarded as due to the fact that the oil wets at once the metallic surfaces and the sur¬

faces of the bubbles, which carry the oil and the metal to the top. The particles of rock, on the contrary, not being wetted by the oil, do not so attach themselves, and so fall to the bottom.

By this means a 20 per cent concentrate may be obtained from a 2 or 3 per cent ore. The process has come into very widespread use.

Artificial Precious Stones. — Very small diamonds are produced by

heating a piece of iron, as pure as possible, with sugar charcoal in a carbon crucible in an electric arc furnace, according to the discovery of Moissan. Under these conditions the iron melts and dissolves a great deal of carbon. At about 4,000 degrees Centrigrade, when the iron volatilizes in clouds, the crucible is plunged in cold water. The sud¬

den cooling solidifies the outer layer so that the inner core becomes solid at enormous pressure.

This separates some of the carbon from the iron and when the latter is dissolved away by means of an acid, a few microscopic diamonds are found, with graphite, in the residue. No large diamond has been produced synthetically.

Greater success has been attained in the pro¬

duction of other precious stones. Rubies and white, yellow and blue sapphires are among the principal stones made. They are syntheti¬

cally correct, consisting of alumina fused with additions of chromium and iron oxides, titanic acid and other materials, according to the con¬

tent of the stones as found in nature. They cannot be distinguished from natural gems.

Coal-Tar Industry. — At the present time, this industry is in a state of high fever. Tar is the generic name for all that part of coal which does not remain behind as coke, on dis¬

tillation, and which does not go through the gas pipes into the gasometer. It consists of a large series of bodies, from benzole, which is lighter than water, to pitch. The pitch is used for roofing and very lately an American proc¬

ess has been developed for coking it. The lighter bodies are used for preserving woods, and, with the still lighter ones, as the starting point for a vast variety of chemical products.

These include the long list of coal-tar colors, explosives, photographic and pharmaceutical preparations, synthetic perfumery and innumer¬

able other products.

Despite the great use of coal in the United States, the country has not been as large a producer of tar as might be expected, because petroleum water gas has been greatly used in cities, and this produces practically no tar. The coke for the iron industry (to our shame be it said) has been made chiefly in ovens of the so-called beehive type in which everything, all the precious content of the coal except the coke, is wasted. This condition is in process of correction ; by-product ovens are rapidly supplanting the beehive type and the amount of available tar is increasing. At pres¬

ent it is estimated that nearly one-half of the coke produced in the United States is still made in beehive ovens. Until the outbreak of the war, the principal use for tar in the United States was for some of the pitch, the other bodies being exported or used to enrich city gas or wasted. In fact, the light oils from nearly all coal tars found their way to Germany, if they were saved at all, for there was the great coal-tar color and product industry of the world. Then came the war, the closing of German ports and general anarchy of trade. Within an area the size of the State of New York a great part of the dyestuffs, all of a certain kind of medicines, many pho¬

tographic materials — in fact, the bulk of the coal-tar product industry, was located. But the very same things needed to make dyes, etc., are needed to make munitions. The same raw materials are needed for both. What the color maker wanted the explosives works needed, and the latter were willing to pay any price.

This is what gave the by-product coke-oven industry, which was slowly developing in America, its rapid development. The coal-tar industry has since .then grown in the United States by leaps and bounds. At the outbreak of the war, there . were six factories making dyestuffs from intermediate products im¬

ported from Germany. Now, after less than four years, there are nearly 100 concerns mak¬

ing finished products with the old ones greatly enlarged, and over 40 factories making inter¬

mediates. What the future of the industry will be when the demand for the lighter oils of tar for munitions ceases, it is hard to tell. Benzole, it may be recalled, is an excellent fuel for ex¬

plosion engines and it will probably become a rival to. gasoline.

Medicines. — The advances made in physi¬

ology in connection with physical chemistry CHEMISTRY, PROGRESS OF

have enabled intelligent physicians to compre¬

hend the reactions which take place with many medicines, and thus to proceed with greater understanding and — 1-ess doses. When the chemical structure and reactions of a body are known it is desirable that it be dispensed in a pure state, and this need has brought about marked improvements in pharmaceutical chem¬

istry. Many synthetic bodies, built up under careful supervision and with knowledge of their structure, have supplanted indefinite decoctions made by extracting all the soluble juices of plants and letting them go as the concentrated extract of something chemically unknown.

Rubber. — Synthetic rubber has been pro¬

duced by causing certain hydrocarbons to polymerize, which is, in effect, to cause their molecules to join in large groups. But very little has been produced and in view of the im¬

proved culture of gum-producing trees and plants, and the better harvesting of the latter, the question is still debatable whether the syn¬

thetic product will replace the natural one, eco¬

nomically, as was the case with indigo before the war.

Perfumes. — A growing knowledge of the

structure of the molecules of organic com¬

pounds has enabled chemists to provide ethers and esters of great olfactory power and by mixing these to obtain odors desired. Musk and other standard perfumes are now produced synthetically in factories. The sense of smell, what olfactory phenomena are, and what their relation to life is, remains unstudied. The mediaeval Saracens were far ahead of us in the understanding of this sense.

Sewage. — It has been found that sewage, if aerated or (<activatedw as it is called, by letting air bubble through tanks containing it, will separate by oxidation into two types of bodies ; the sludge, which precipitates and is available as a nitrogen fertilizer, and the efflu¬

ent, which is a clear solution. By treating the effluent with chlorine, its danger as a carrier of disease is removed and it ceases to pollute the streams into which it flows. The economic treatment of city sewage, so that the recovery and sale of inoffensive sludge as fertilizer pays the cost while the pollution of rivers and har¬

bors is brought to an end, has not yet been generally attained. Of considerable promise is the Miles process whereby sulphur dioxide is mixed with the sewage which reduces all the soaps and fats. With the fats removed by means of a recoverable organic solvent, the sludge is good nitrogen fertilizer. The outlook for its early achievement is favorable.

Paper. — There are certain combinations of carbon and hydrogen that are known as sugars.

There are many of them, but they are all alike in that they are made up of carbon atoms strung together as in a chain, with hydrogen and oxygen atoms stuck on along the side of the chain. Now suppose you take a number of these sugar molecules, as the smallest particles imaginable are called, and bunch them together, so that a lot of these units are combined into one big complex one. Then you have a series of resins or gums and starch. This is what chemists call polymerization. Now let us take these resins and by chemical chicanery and tricks cause them to bunch their molecules again, to polymerize, and, if we carry it far enough, we get cellulose. That is, we should if we could. But trees and plants do this with ease ; they start with water and carbonic acid gas, from the air, and this they

manufacture into sugar, the sugar into starches, gums and other things, and finally into cellulose, of which their cells are made. Cellulose is the frame¬

work of cells, and all organic life is made up of it, with juices and sap and solutions of one sort or another wandering around within them.

Cotton is nearly pure cellulose. Paper is cellu¬

lose ; little filaments of it, matted or felted to¬

gether.

Now the varieties of cellulose and the dif¬

ferences in their structure, both physical and chemical, are beyond the knowledge of to-day.

Cotton, as we have already said, is nearly pure cellulose and yet there are 60 different varie¬

ties of it listed, and they all differ from each other in the structure of their fibres. So we may say that the art of making paper, which has already entered the list of chemical manu¬

facture, is one that presents innumerable un¬

solved problems.

The main source of available supply is wood.

Mechanical pulp, which is the cheapest, con¬

sists in the fibres of soft wood, torn asunder by grinding diagonally the edges of the natural wood with a stone, in the presence of water.

Their particles contain a large part of the gums and other substances of the tree which are less stable than cellulose. So the)” oxidize on long exposure and the process of oxidation, whether it be slow as in this instance or rapid as with fire, is likely to be contagious, and the cellulose is in time changed to oxy-cellulose, which is an amorphous powder with no mechan¬

ical qualities whatever. That is why news¬

paper lacks durability. It also explains why old-fashioned hand-made paper, made of linen rags, is more durable than modern paper, even though it be made of linen, too. The chemical treatment is more severe and drastic in the modern machines than in the old hand beaters, whereby the chemical structure of the cellulose seems to be attacked and thus rendered more susceptible to oxidation.

A better quality of pulp is made by the sul¬

phite process, discovered by a Philadelphia chemist named Tilghman. It consists in treat¬

ing chips of wood with a solution of calcium bisulphite, with a view to dissolving out by the sulphurous acid which is set free all organic substances except the cellulose. It takes place under heat and pressure. The cellulose fibres of the chips are then bleached and treated with water and strained until they are thoroughly separated from each other. It requires about 20 per cent of sulphite pulp mixed with the mechanical product to make a good quality of newspaper.

A stronger quality of sulphite pulp is pro¬

vided by the Mitscherlich process in which a weaker acid is used. This points the way to improvements in the art such as the lately de¬

veloped, so-called Kraft paper, a very strong wrapping paper made of undercooked sulphite pulp. This has developed into what is known as the <(sulphate process,® which, by its milder chemical treatment of the wood, is finding in¬

creased application.

The tendency of research in the preparation of pulp is to conserve the chemical structure of the cellulose and to find new sources of sup¬

ply, owing to the using up of spruce and other 408

soft-wood forests for this purpose. The United States consumes from four to five million cords of pulp wood per year, involving the cutting over of several million acres to furnish it. An im¬

mense source of supply is available from the lumber industry, which wastes more than half of the cut of timber. Much of this is available for paper under more enlightened methods.

Many raw materials for the manufacture of paper have been proposed and in other coun¬

tries other materials are availed of. Esparto, a grass growing in southern Spain and northern Africa, is used in England and on the Conti¬

nent. The Japanese use mulberry fibre. Bam¬

boo is also used, although the knots give trou¬

ble. Corn stalks, rice and flax straw, cotton stalks and wild bananas have been tested with varying degrees of success. It is also pro¬

posed by the dehydration of sugar cane at the plantation to extract the raw sugar in temper¬

ate climates and use the cane for making paper, for which it is well adapted. This is now used for fuel in the tropical sugar centres. On the other hand, nothing so economical and con¬

venient as spruce wood has thus far been found for making paper pulp, provided always there is enough of it at hand.

Since all plants that grow are made up of cells, and the walls of ‘cells are cellulose and paper is but matted or felted cellulose fibres, it is impossible to outline the future of the paper industry under chemical control and with abundant research. The waste liquors of sul¬

phite pulp mills, in which one-half the cellulose has been lost, still pollute streams and cause waste. The sugar in the waste liquor may be converted into alcohol and uses are gradually being found for the gummy products that now cause trouble. As soon as it can be made to

pay, then waste liquors will be evaporated tp dryness and the nuisance avoided.

Drying, mixing, grinding, filtering, heating, refrigeration and distillation aad work under pressure as well as in vacuo are problems to which the chemical engineer has addressed himself ; and the making of apparatus for these special purposes has become a series of special industries. Just as, considering pure science, we found the line between chemistry and phys¬

ics fading away, so in industry we find that there is no more a clear dividing line that sep¬

arates chemistry from engineering.

In conclusion it is fair to say that there has been great advance in the knowledge of how closely chemical processes touch us on every hand. It is needed in the preparation of our food and clothing, in the materials of our houses, in the care of the water we use and in cleaning streets.' It is needed in the control of the production of metals and it prepares for us paints, varnishes, paper, ink; indeed nearly everything we use or handle has needed chemical control in the making. Its language is ugly and seems difficult, although it is not so hard to learn as many of us are disposed to think. We need a better understanding of it because through it we may learn to avoid the flagrant waste of the riches of the earth, of which our generation has been guilty. And with a sense of chemistry in our minds all the processes of nature take on a new and added interest.

Ellwood Hendrick.

CHEMISTS AND DRUGGISTS, Laws

Relating to. In the United States the terms “apothecaries,® “druggists® and “pharmacists®

are used more or less indiscriminately to desig¬

nate those licensed to compound and sell drugs and poisons. In England there is a legal dis¬

tinction applied to these ; apothecaries being constituted the lowest type of the profession with rights of practising, limited to a few classes of cases; chemists and druggists are compelled to pass an examination at the college of phar¬

macy and receive a license to compound and sell drugs and medicines; pharmacists are obliged to pass a second examination. In the United States the statutes generally require of those wishing to adopt this profession to pass an examination before a State board, or to pro¬

duce a diploma from a recognized college of pharmacy. There are in addition State and municipal ordinances which state the conditions under which certain drugs or poisons may be sold, prescribing also regulations as to labels on containers of poison, and the entry of such sales in a special book open to public inspection.

The certificate or prescription of a physician is required for certain drugs or liquors. Care¬

lessness in compounding a prescription, if it lead to death or serious injury, is considered gross and is a penal offense. In case it result in death, the offense is usually manslaughter.

CHEMITYPE, a term used in engraving to include various relief processes by which a drawing or impression from an engraved plate may be produced in relief to fit it for printing on an ordinary printing press. One of these, devised by C. Pul of Copenhagen in 1843, de¬

pends on filling up the lines of the engraved zinc plate with some metal or alloy, and etching away the zinc.

CHEMNITZ, or KEMNITZ, Martin,

German Protestant theologian: b. Treuenbriet-zen, Brandenburg, 9 Nov. 1522; d. Brunswick, 8

April 1586. He was the son of poor parents; received his education at

Magdeburg and Frankfort on the Oder, and in 1544, to obtain the means of continuing his studies at Witten¬

berg, became a schoolmaster in Wriezen. In 1550 he became librarian to Duke Albert of Prussia. He then wrote his (Loci Theologici/

a valuable commentary on Melanchthon's sys¬

tem of dogmatics. Being invited to Brunswick, as minister, he attacked the Jesuits in his (The-ologiae Jesuitarum Praecipua Capita > (1562), and, when the Council of Trent thought itself assailed in this work, he wrote his (Examen Concilii Tridentini,* a work of great historical value. With Joachim Morlin he wrote (Corpus Doctrinae PrutenicunP (1567). He gradually became attached to the Lutheran doctrines as distinguished from those of Melanchthon, and did much to spread the Lutheran doctrines among the Saxon and Swabian churches. Con¬

sult his <Life) by Lentz, C. G. H. (Gotha 1866) ; Mumm, R., (Die Polemik des M. Chem¬

nitz gegen das Konzil von Trent) (Leipzig 1905).

CHEMNITZ, Saxony, town at the base of

the Ezrgebirge and at the confluence of the Chemnitz River with three other streams, 51

miles south-southeast of Leipzig. The city con¬

sists, of an older inner town, almost circu¬

lar in form, intersected by narrow streets, completely surrounded by modern suburbs.

Among its numerous squares and public places are the Hauptmarkt,

which contains the old Rathaus, the Neumarkt; the Konigs-Platz ; with the church of Saint Peter and the Techni¬

cal Schools. The city owns its water, gas and electric works, maintains a municipal pawn¬

shop. Its educational institutions include a gymnasium, schools of agriculture, commerce, engineering and the various crafts. There is also a municipal library of over 35,000 volumes.

It is the principal manufacturing town of the kingdom— the ((Saxon Manchester® its towns¬

folk call it — its industry consisting in weaving cottons, woolens and silks and in printing cal¬

icoes, chiefly forˆ German consumption. It also has large manufactories of carpets, dyestuffs, chemicals, leather, vehicles and beer. It sup¬

plies the world with cheap hosiery, and makes mixed fabrics of wool, cotton and jute for the markets of Europe and the United States. It has several extensive machine-factories, produc¬

ing locomotives and other steam-engines, with machinery for flax and wool-spinning, weaving, and mining industry. Created a free imperial city as early as 1125, Chemnitz suffered much during the Thirty Years' War; but later in the century the introduction of cotton manufactur¬

ing revived its prosperity. Its growth during the last 20 years has been phenomenal. Pop.

287,340.

CHEMOSH, ke'mosh, the national god of

the Moabites, who were on that account called (<the people of Chemosh® (Num. xxi, 29; Jer.

xlviii, 46). In Judge xi, 24, Chemosh is men¬

tioned as the god of the Ammonites, but the whole narrative here applies to Moab, and not to Ammon. Milcom was the national deity of the Ammonites. The Moabite Stone was

erected to commemorate victories achieved by the aid of Chemosh. In the inscription upon it Ashtar-Chemosh is mentioned, apparently a goddess associated with Chemosh. Human sac¬

rifices seem to have been occasionally offered up to Chemosh (2 Kings iii, 26, 27). The wor¬

ship of Chemosh was introduced among the Hebrews by Solomon, who <(built an high place for Chemosh, the abomination of Moab, in the hill that is before Jerusalem® (1 Kings xi, 7).

Some have identified Chemosh with the sun, others with Saturn, while still others have re¬

garded him as a war-god. These identifica¬

tions are valueless. Chemosh doubtless bore the same relation to the Moabites as did Yahwe to the Hebrews.

CHEMOTROPISM, ke-mot'ro-pism, orien¬

tation (q.v.) by diffusing molecules, as where animals are mechanically attracted to their food by the sense of smell. This is positive chemotropism. Negative chemotropism con¬

sists in movements away from some reagent.

Odoriferous particles are diffused or radiate from a centre; chemotropism is thus analogous to heliotropism (q.v.). The chemical effects of the diffusing molecules on certain elements of the skin, says Loeb, influence the tension of the muscles, just as the rays of light influence the tension of the muscles on heliotropic animals.

Thus maggots of flies are positively chemo-tropic toward certain chemical substances which are formed, for instance, in decaying meat and cheese. The blow-fly (q.v.) has the same posi¬

tive chemotropism for these substances as its larva and is accordingly led to the meat. This explains the instinct of the blow-fly and similar insects, which compels them to lay their eggs on the food appropriate for their young, neither experience nor will playing any part in their processes. Chemotropic phenomena also occur in plants, and depend on alterations of growth produced by the exciting substances. Consult Loeb, Comparative Physiology of the Brain and Comparative

Psychology) (New York

1900).

CHEMULPO, che-mul'po, Korea, town on

the western coast at the mouth of the Han River, 25 miles by road west-southwest of the capital, Seoul. It is one of the three treaty ports opened in 1883 to foreign commerce, the volume of which has since steadily advanced, in spite of the drawbacks resulting from the great difference between high and low water here (33 feet), and the want of wharves. The imports attain a value of $7,227,000 in some years; the exports, $1,950,000. The chief im¬

ports are cotton and woolen goods, railway ma¬

chinery, metals, oils, textiles, silk, petroleum and timber; the chief exports are rice, beans, millet, ginseng, wheat, paper and cowhides. The majority of foreigners are Japanese. In 1900

a railroad connection was established with Seoul.

Improvements by the Japanese have made the river navigable. Small steamers owned by Japanese run to Seoul in summer, and Che¬

mulpo is connected by telegraph both with China and Japan. At the outbreak of the Russo-Japanese War a Japanese force landed in Chemulpo, 8 Feb. 1904. On the following; day a Japanese squadron under Admiral Urin destroyed a Russian cruiser and gunboat out¬

side, the harbor. Pop. about 26,000, of which 14,000 are Japanese.

CHEMUNG, she-mung', Battle of the, in

the Revolution, 29 Aug. 1779, the decisive en¬

gagement of John Sullivan's campaign, to harry the Iroquois country. The Indians and their Tory allies made a stand in force at the Chemung River, about a mile southeast of New¬

town (Elmira), N. Y. They had five com¬

panies of British troops and rangers, number¬

ing about 250; and the entire fighting strength of the Six Nations. These Indians the Tory authorities state as 550; but this seems impos¬

sibly small, and Sullivan and his officers, from a careful estimate of various factors, place it at 1,200 or 1,300. Sullivan had about 5,000.

The Indians were led by their Napoleon, Brant (Thayendanegea) ; the Tories by Col. John Butler, with Sir John Johnson, and perhaps Guy Johnson, Maj. Walter N. Butler and Cap¬

tain MacDonald. Their line was in advance of the river, resting on a bend at the right.

From the bend ran a breastwork half a mile long, flanked by bastions and having a dwelling in front turned into a blockhouse ; it was con¬

cealed by a mass of pines and scrub-oaks, some of them cut from other places and stuck down to make a seemingly thick virgin forest. From their left a thin line was continued about a mile and a half to a steep ridge parallel to the river, where a strong detachment was posted ; and a mile further east was another ridge parallel to the first, with a breastwork and another company, the two advance detachments designed to take the Americans in flank and rear. Along the front of the main breastwork ran the road to Newtown, exposing the whole American flank 410

to a raking fire. The entire works formed a magnificent ambuscade ; but Sullivan, who was no Braddock, guessed the utility of the ridges and knew what scouting parties were for.

About 11 a.m. of the 29th Major Poor beat up the position, and General Hand formed his infantry in a wood 400 yards from the works and waited for the rest of the army. Sullivan ordered Poor to carry the hill at his right and take the British in rear, while the main body with artillery attacked the front. Steadied by Brant, a warrior of great force and sagacity, the Indians not only made a stubborn resistance for two hours, yielding inch by inch, but even stood up against the bayonet, something almost unknown in Indian history. At first thrown into a

panic by the artillery, Brant rallied them to a fresh and tenacious fight; and noting Poor's turning movement, threw a strong de¬

tachment with a battalion of rangers to the hill to oppose it. But at length Poor, having cleared the crest, burst on the rear with a bayonet charge; and both Indians and whites fled across the river in rout, the Indians leaving their packs and weapons behind, and 11

dead, though they usually carry all these away with them. Fourteen other dead Indians were in fact found under the leaves, two canoes were found covered with blood and the Indians told their western villages that they had many killed and vast numbers wounded. The Americans had 6 killed and 40 or 50 wounded.

CHEMUNG SERIES, in American geol¬

ogy, the great series of shoal-water sediments, mostly light gray shales and ripple-marked sandstones, that were laid down in Upper De¬

vonian time in the great northeastern bay of the interior sea that covered much of what is now the Mississippi Valley. This northeastern bay stretched across lower Michigan, Ontario and central New York, reaching nearly to the Hudson River. The Chemung Series includes the Catskill Group and is divided into the Chemung and Portage Stages. It is typically developed on the Chemung River in New York.

It reaches its maximum thickness of 8,000 feet in eastern Pennsylvania, but thins out and dis¬

appears to the south and west. The ((oil sands®

of Pennsylvania, from which have been taken many millions of barrels of petroleum, are in part of Chemung Age.

The Chemung corresponds to part of the series of shales and limestones laid down in the Northwest Territory and Manitoba, Canada, probably to part of the Devonian strata that extend along the main range of the Rocky Mountains in Canada and to an unknown frac¬

tion of the great thickness of Devonian strata in Nevada. In Europe the Old Red Sandstone, a series of sandstones and shales estimated as

possibly 10,000 feet thick, is in many respects like the Catskill Group of the Chemung, and contains similar fossils. This great sandstone formation is found in South Wales, England and Scotland, near the Baltic Sea in Russia, in Spitzbergen and in Greenland. See Cats¬

kill Group ; Devonian System ; Old Red Sandstone.

CHENAB, che-nob', in Hindustan, one of

the five rivers of the Punjab. Its affluents are the jhelum and the Ravi. It rises in the Hima¬

layan ranges of Cashmere, and entering the Punjab near Sialkot flows in a southwestern direction till it unites with the Sutlej ; length about 600 miles. Its greatest depth is 14 feet; its greatest width 1ˆ4 miles. At Wazirabad it is crossed by a great iron railway bridge more than a mile long.

CHENAVARD, cha-na-var', Paul Joseph,

French historical painter: b. Lyons, 9 Dec.

1808; d. 12 April 1895. He studied at Paris and spent some years in Italy, and acquired a reputation by his picture of (Mirabeau Replying to the Marquis de Dreux-BrezeP After the revolution of 1848 he received a commission to paint large compositions for the decoration of the Pantheon. Among these are (The

Deluge) and (The Passage of the Rubicon.) The Pantheon having been restored to the Ro¬

man Catholic worship, he was not permitted to finish the task. Consult Germain, *Les artistes Lyonnais) (Lyons 1910).

CHENERY, Thomas, English journalist

and Orientalist: b. Barbadoes 1826; d. 11 Feb.

1884. He was educated at Eton and Cambridge.

He was called to the bar, but was soon after sent out as Times correspondent to Constanti¬

nople and was chiefly located there during the Crimean War. Afterward he was constantly employed on the Times staff until 1877, when he became its editor, a post which he filled till within 10 days of his death. As a singularly thorough Hebrew and Arabic scholar he had few equals among his contemporaries, and his translation of the Arabic classic, the Assem¬

blies of A1 Hariri* (1867), led to his appoint¬

ment to a chair of Arabic at Oxford in 1868.

He was one of the company of Old Testament revisers, and besides other works published an edition of the (Machberoth IthieP (1872), a Hebrew version of the Assemblies.*

CHENEY, Charles Edward, American

clergyman: b. Canandaigua, N. Y., 12 Feb.

1836. He was graduated from Hobart College, A.B., 1857, following which he took the course at the Protestant Episcopal Theological Semi¬

nary at Alexandria, Va., and he received the degree of D.D. from Iowa College in 1871.

He was ordained in the ministry of the Prot¬

estant Episcopal Church 1858, and after two brief pastorates in New York State became rector of Christ Church, Chicago, in which re¬

lation he has continued ever since. During the years from 1869 to 1873 he became involved in ecclesiastical difficulties growing out of doc¬

trinal views concerning baptism, and, in 1873, he joined Bishop George David Cummins, D.D., in the organization of the Reformed Episcopal Church, and 14 Dec. 1873 was consecrated bishop of the Reformed Episcopal Church, with jurisdiction over the churches of the North¬

west, subsequently becoming bishop of the Synod of Chicago, in

which position he con¬

tinues, retaining also the rectorate of Christ Church. In 1908 he received the degree of S.T.D. from Hobart College. He is a member of the American Historical Association, Ameri¬

can Geographical Society, Chicago University Club, Chicago Historical Society, Chicago Lit¬

erary Club, the Illinois Society of the Sons of the Revolution and the Illinois Society of May¬

flower Descendants. Besides a volume of (Ser¬

mons, *published 1880, is author of (What Do Reformed Episcopalians Believe?* (1888) ; (The Enlistment of the Christian Soldier*

(1892) ; A King of France Unnamed in His-CHENEY — CHENOPODIUM

tory5 (1902) ; (The Second Norman Conquest of England5 (1907); (A Neglected Power) (1915).

CHENEY, John Vance, American poet and

essayist : b. Groveland, N. Y., 29 Dec. 1848.

He was librarian of the public library at San Francisco, 1887-94, and of the Newberry Li¬

brary, Chicago, from 1894-1909. He has pub¬

lished (The 014 Doctor> (1885); ‘Thistle-Drift5 (poems, 1887) ; ‘Wood Blooms5 (1888) ; ‘The Golden Guess5 (a volume of essays, 1893) ; (That Dome in Air5 (essays, 1895) ; (Queen Helen5 (1895) ; (Out of the Silence’ (1897) ; ‘Lyrics5 (1902) ; ‘Poems5 (1905) ; (The Time of Roses5 (1908) ; ‘At the Silver Gate5 (1911).

Editor of ‘Wood Notes Wild, 5 by Simeon Pease Cheney, with

appendix and notes (1892) ; Caxton Club's edition of Derby's 'Phcenixiana5

(1897) ; 'The Caxton Club Scrap-Book5

(1904). Member of the Authors' Club and of the National Institute of Letters.

CHENEY, Seth Wells, American en¬

graver: b. South Manchester, Conn., 26 Nov.

1810; d. there, 10 Sept. 1856. Upon the death of his father in 1829 he joined his brother John in Boston, where he entered the latter's profes¬

sion, that of an engraver. A position in the Athenaeum enabled him to study and work from casts and drawings, and he copied and engraved in 1832 Washington Allston's picture, 'Mother and Child, 5 which was afterward burned. In 1833 he studied in Paris in the atelier of Delaroche. His great power was in the expression of character in individual heads. He never attempted historical or genre subjects, and only rarely would he group two or more heads.

James Russell Lowell, Theodore Parker and William Cullen Bryant are among the best known of his studies. Consult (Memoir of Seth W. Cheney, by E. D. Cheney5 (Boston 1881) and Koehler, S. R., Catalogue of the Works of John and S. W. Cheney.5 His wife, Ednah Dow Cheney (b. 1824; d. 1904), was an author of note. She was active in the Freedmen's Aid societies and was a pioneer of the woman suffrage.

CHENIER, sha-nya', Andre Marie de,

French poet: b. Constantinople, 30 Oct. 1762; d. Paris, 25 July 1794. He went to France when very young and entered the army, but left six months after to devote himself to literary pur¬

suits. He was for about three years secretary to the French embassy at London, but in 1790

returned to Paris. Advocating the doctrine of a limited monarchy, he

made himself equally offensive to the Royalist and the Jacobinical parties. In consequence of his attacks on the Jacobins he was condemned by the revolution¬

ary tribunal, and executed. Although but little known in his own day, Chenier has long been regarded as one of the finest French poets of his century, his chief characteristics being purity of form combined with vigor of thought and diction. He wrote idyls, elegies, odes (includ¬

ing one to Charlotte Corday), dithyrambs, philo¬

sophic pieces, *etc.* The maturity, breadth and soundness of his judgment in poetical composi¬

tion are demonstrated by his poem on (Inven¬

tion. 5 Similar in spirit to this, and of perfect Pindaric form, is the ‘Dithyrambic on the Ten¬

nis Play5 (1791). In his prison of Saint Lazare he composed a beautiful elegy, ‘The Girl Cap¬

tive,5 and the ‘Iambes5 which owing to their spiritual affinities, are often likened to the poems of John Keats. Consult Becq de Fouquieres, (Lettres critiques sur Chenier5 (Paris 1881) ; Faguet, ‘Andre Chenier5 (Paris 1902) ; Heller, ‘Andre Chenier5 (New York 1895) ; Valee, ‘Chenier et les Jacobins5 (Paris 1881).

CHENIER, Marie Joseph de, a French

dramatist, younger brother of Andre M. Che¬

nier (q.v.) : b. 11 Feb. 1764; d. 10 Jan. 1811.

He was a Jacobin, and a member of the Legis¬

lative Assembly during the Revolution. His tragedies— (Charles IX5 (1789) ; ‘Henry VIII5

and ‘Calas5 (both 1791) ; ‘Caius Gracchus5

(1793); and others — brought him fame and success by the accordance of their republican and revolutionary sentiments with the public opinion of the time, rather than by their merits as compositions. His national songs were ap¬

proved by the best test of such productions, —popularity; one of them, ‘The Parting Song5

(Partant pour la Syrie), is hardly less famous than the (Marseillaise.5 His satires are full of spirit, point and wit, but often rancorous and unjust. His translations from ancient and modern poets were excellently rendered. Con¬

sult ‘Marie-Joseph Chenier als Kritiker und satirischer Dichter’ (Leipzig 1911).

CHENILLE, she-nel’, a round fabric or

trimming, made by uniting with two or more sets of warps, either by weaving or twisting, a fine filling or weft, which is allowed to project beyond the warps. This filling is cut at its outer edges and the fabric is then twisted, assuming a cylindrical shape with weft project¬

ing radially from the central line of warps.

The name is applied, also, to lace, carpets and cloth made wholly or in part from silk threads twisted or woven to resemble the tufted trim¬

ming of the same name.

CHENOMORPHiE, ke-no-mor’fe, an

order of desmognathous birds, first proposed by Huxley and nearly equivalent to the Lamelli-rostres and Anseres (q.v.) of other authors.

The palate is closed anteriorly by a thick bony bridge, but the vomer is well developed; the margins of the beak are more or less toothed; the tongue is thick and fleshy; and the down is uniformly distributed over the skin. All of the species are more or less aquatic ; most of them are web-footed ; and the young are precocial, or able to run from birth. Three very distinct families are recognized: the Anatidce, or ducks, geese and swans (qq.v.) ; the Palamedeidcu, or screamers (q.v.) ; and the Phocnicoptcrida , or flamingoes (q.v.).

CHENONCEAUX, she-non-so. See

Blere.

CHENOPODIACEiE, ke-no-po-di-a’se-e,

a family of apetalous dicotyledons, consisting of more or less succulent herbs or shrubs, be¬

longing to about 80 genera and 600 species.

They are mostly innocent weeds, but several, as spinach and beet, are employed as pot-herbs; others for the manufacture of soda. See Chenopodium.

CHENOPODIUM, ke-no-po’dl-um, or

GOOSEFOOT, a genus of plants belonging to the family Chenopodiacece ■ (q.v.), of which it is the type, and distinguished by its usually perfect flowers, having mostly five small green scales for the calyx, about five stamens, no co¬

rolla and a fruit consisting of a membranous 412

coat enclosing one black, flat and shining seed.

A number of the species have received the name of goosefoots, from a fancied resemblance to the webbed foot of the goose. The best-known or more remarkable species are :

1. C. album (lamb’s quarters, pigweed), a common annual, found in cultivated and also waste ground. It has a leafy angular stem, which, as well as the whole plant, is white-mealy. The young plants are much used in North America as “greens.®

2. C. bonus-henricus (Good King Henry, or wild spinach), a perennial, in Europe not un¬

common in country churchyards and places sel¬

dom disturbed, sparingly naturalised in North America. It has bright green, broad, succulent leaves, which were in common use as spinach before the introduction of the present culti¬

vated plant. The early shoots are sometimes used as a substitute for asparagus.

3. C. quinoa, the quinoa of Peru, a perennial inhabiting the high table-land of the Cordilleras, where, at the conquest of the Spaniards, it was one of the important farinaceous grains used as food. It is still largely cultivated for its nutritious seeds, which are made into soup and bread, and, when fermented with millet, make a kind of beer. The plant is from four to six feet high and has many angular branches, dull glaucous leaves of a jagged triangular outline, on long narrow stalks, and flowers forming large compact branched heads and succeeded by minute strong flat seeds of a black, white or red color.

In medicine, Chenopodimn, ambrosioides, is used very extensively as a remedy for the round worm as well as the tapeworm. The oil is the officinal part used, in doses of 5 to 15 drops, and it is a very efficient anthelmintic, particu¬

larly for the round worm, Ascaris lumbricoides.

CHENOWETH, Alexander Crawford,

American engineer: b. Baltimore, Md., 5 June 1849. He was graduated at Dickinson College in 1868 and studied engineering at the Rens¬

selaer Polytechnic Institute. In 1870 he was engaged on the engineering force of Prospect Park, Brooklyn, was assistant engineer of the Middletown-New Haven Railway 1871, assistant under General

Green of the public works of Washington, D. C., contractor for dock and railway work of the West Shore Railroad in 1882 and consulting engineer to President Prado of Peru. He prepared the foundation for the Bartholdi Statue of Liberty in New York har¬

bor 1884, was assistant engineer of the Croton aqueduct commission 1885 and resident engi¬

neer 1889-95. In the latter year he resigned to undertake construction work for the United States government at Sandy Hook. He spe¬

cialized in foundation work and was awarded many medals and prizes. He invented a steel-concrete pile for pier and foundation work ; the Chenoweth reinforced concrete revetment for maintaining the banks of the Mississippi, Missouri and Colorado rivers. He discovered at Inwood, Manhattan Island, a village site of prehistoric Indians from which he excavated a collection of implements now in the American Museum of Natural History, New York.

CHENOWITH, Caroline van Dusen,

American writer: b. Louisville, Ky., 29 Dec.

1846. She has lectured on English literature and history and is the author of ‘Stories of the Saints) (1880); * Child Life in China >

(1882); ‘School History of Worcester, MassP

(1899); (An Undistinguished Citizen) (1900); ‘History of the Second Church in Leicester, MassP (1908) ; ‘Stories of Stonewall Farm*

(1913) ; and contributions to various magazines and reviews.

CHENSTOCHOW, chen’sto-kov’, Poland,

town in the Russian government of Piotrkow, on the Warthe, 135 miles sohthwest of War¬

saw, on the Warsaw-Vienna Railway. It con¬

sists of the old and new towns and contains several cotton-mills,

foundries, paper-mills, flour-mills and breweries. There is consider¬

able trade in the products of these plants and also in lithographs, printing and religious em¬

blems. Near the town is the famous monas¬

tery of the Order of Saint Paul the Hermit, which is visited annually by about half a million pilgrims. A great object of veneration is the picture of the Virgin, made of dark wood, and known to Polish Catholics as the “Black Virgin.® It is attributed to Saint Luke the Evangelist and is said to have been brought to the monastery in the 16th century by Dr. Wal¬

ter Lynch, bishop of Cloufert, Ireland, then exiled from his see. The monastery was at one time strongly fortified and in 1655 was unsuc¬

cessfully besieged for 38 days • by Swedish troops. Pop. 69,500.

CHEOPS, ke’ops, the name given by

Herodotus to the Egyptian despot whom the Egyptians themselves called Khufu. He be¬

longed to the rulers who had for their capital Memphis ; lived about 2800-2700 b.c., and built the largest of the pyramids. According to Herodotus he employed 100,000 men on this work constantly for 20 years. Several monu¬

ments bearing his name have survived.

CHEPHREN, kef ‘re, or CEPHREN,

king of Egypt, the successor of Cheops and the builder of the second pyramid. The former is the form of his name as it is found in Herodotus, the latter is the name given to him by Diodorus. Herodotus informs us that his reign was in all respects as tyrannical as that of his predecessor, and that the Egyptians, ani¬

mated by a feeling of hatred against these two kings, under whom they had suffered all kinds of oppression and during whose reigns the

temples had never been opened, avoided even the mention of their names; and hence, instead of naming the pyramids after their builders, named them after a shepherd called Philition, who used the land in the neighborhood of the pyramids for pasturage. Diodorus adds that the pyramids were intended to serve as tombs for their builders, but as the people threatened to break them open and remove the bodies, both the kings desired their friends to bury them in some spot where their bodies might remain undisturbed. Herodotus makes Chephren the brother of Cheops ; but Diodorus says that Chembes, who is the Cheops of Herodotus, was succeeded by his son, Chabryis, who may per¬

haps be the same with the Chephren of Herod¬

otus. His reign lasted 56 years.

CHEPSTOW, chep-sto, England, town and

port in county of Monmouth, on the Wye River, two miles, from its junction with the Severn and 14 miles north by west of Bristol.

It is pleasantly situated on a slope descending gradually to the river and has spacious, well-CHEQUE

payed and well-lighted streets. The principal edifices are the church, a fine specimen of Nor¬

man architecture, and the old castle, the ruins of which crown a lofty cliff overhanging the Wye. The ruins of Tintern Abbey are in the vicinity. There is a river and coastal trade.

The beauty of the environs is an attraction to visitors. Both the town and the castle are re¬

ferred to in (Domesday Book.) Pop. 2,953.

CHEQUE. See Check.

CHEQUEN, chek-wen', the leaves of Eu¬

genia chequcn, of the family Myrtacece. A shrub of Chile and Bolivia, whose leaves are rich in volatile oil and are used as a tonic ex¬

pectorant in much the same manner as Euca¬

lyptus.

CHEQUERS ESTATE, an official coun¬

try residence for British prime ministers, pre¬

sented for that purpose by Sir Arthur Lee, K.C.B., M.P., in 1917. The actual transfer of the property to the nation may not take place during the lifetime of the present owners; after their death it will be maintained in per¬

petuity as the official country residence of the Prime Minister for the time being, or, failing him, the full privileges of residence to be of¬

fered in turn to the Chancellor of the Ex¬

chequer, the Foreign Secretary, the American Ambassador, the speaker and four other Cabi¬

net ministers. Chequers stands in a sheltered hollow of the Chiltern Hills, about 36 miles from London. The history of the mansion goes back to the 12th century; it contains a number of Cromwell relics, a fine library and a valuable collection of manuscripts and auto¬

graphs, letters of Napoleon, Washington, Charles I, Pitt, Franklin, *etc.* The area of the estate is about 1,500 acres, consisting of gar¬

dens, grounds, farms, woods and Coombe Hill.

The hill, 852 feet high, was presented to the nation in 1913.

CHER, shar, France, inland department

having on the north Loiret, east Nievre, south Allier, west Indre and Loiret-Cher, between lat.

46° 26’ and 47° 38’ N. and long. 1° 50’ and 3° 3’ E., and formed of parts of Berry and Bourbonnais. It is named from the river Cher, which traverses it southeast to northwest.

Area, 7,199.34 square kilometers, or 2,779 square miles ; capital, Bourges. This department is included in the basin of the Loire, which forms the greater part of its eastern boundary. The climate is mild and pleasant. The surface is in general flat, but is diversified in the north by chains of inconsiderable hills. The soil varies but is fertile in the neighborhood of the Loire and Allier. Heath and sand prevail in the northern districts. The forests occupy above a sixth of the area and furnish large quantities of fuel for the ironworks and timber for ship¬

building. Pastures are extensive and sheep very numerous. Grains, chestnuts, hemp, vegetables, fruit and wines are among the important prod¬

ucts. The best wines are those of Chanignol and Sancerre. Beets, buckwheat and flax are also grown. The minerals consist of iron, litho¬

graphic stones, good building-and grind-stones, flint, marble, ochre and potter’s earth. The preparation and manufacture of iron, called Berry-iron, is the principal branch of industry.

The manufactured articles are metal goods, fine and common cloth, woolen goods, faience, porcelain and earthenware, sacking, beet-sugar, nut oil, paper and glass. The department is divided into three arrondissements, 29 cantons and 290 communes. Bourges is the capital.

Consult Fremont, (Le departement du Cher) (Bourges 1862). Pop. 337,810.

CHER, a river of central France, rising in Auvergne in the department of Creuse and joining the Loire from the left near Tours; length, 220 miles. It is navigable to Vierzon.

This river gives name to the department of Cher.

CHERASCO, ka-ras'ko (ancient Claras—

cum), Italy, a town in Piedmont, in the prov¬

ince of Cuneo, near the confluence of the Stura and Tanaro, 36 miles south of Turin and 22

miles northeast of Coni. Its fortifications, once of great strength, were demolished by the French in 1801. It was repeatedly the object of contest between the French and Aus¬

trians in the wars of Italy, terminated in 1631

by a peace concluded here; and in 1796 Napo¬

leon, by what is called the Armistice of Che-rasco, obtained a free passage for his troops through the Sardinian states. The town is well built, and has several silk-mills. It has a domed church, two triumphal arches, a gymna¬

sium and a technical school. It markets grain, wine and truffles, and manufactures silk. Pop.

9,312.

CHERAW, che-ra, S. C., town in Chester¬

field County, 88 miles northwest of Columbia, on the Atlantic Coast Line, the Seaboard Air Line and other railroads, and on the Pee Dee River. It contains lumber plants, cottonseed-oil mills, box factories, planing mills and sash and door factories. For a time during the Civil War the Confederates maintained a supply depot here. The town was taken by Sherman 3 March 1865, when a vast amount of stores, including 3,600 barrels of gunpowder, was de¬

stroyed. The waterworks are municipally

owned. Pop. 2,873.

CHERBOURG, shar-boor, France, a sea¬

port in the department of La Manche (The Channel), 196 miles west-northwest of Paris, on the north coast of the peninsula of Coten-tin, and nearly due south of Southampton. It has a strongly fortified arsenal, and consists of the old or civil town and the new or military (Port Militaire), the latter quite distinct from the former, and separated from it by the forti¬

fications with which it is surrounded. Apart from its consideration as a naval station, Cher¬

bourg is unimportant ; it is the works by which it has been converted into a great naval for¬

tress and place of arms that give it its special importance. These altogether have cost £8,000,-

000 and were chiefly carried out under Napo¬

leon I, Louis Philippe and Napoleon III.

Foremost among them must be mentioned the digue, or breakwater, stretching across the en¬

trance to the roadstead, which was formerly open to heavy seas from the north. It is more than two miles in length, of very massive con¬

struction, covers an area of 3,700 acres and consists of a western or longer and an eastern or shorter portion, forming at their junction a very obtuse angle pointing toward the north.

There are a fort and lighthouse there, and, also, at either end. The breakwater alone cost about £2,700,000. The eastern entrance to the har¬

bor, between the breakwater and the island of Pelee, is about 500 yards wide ; the western en-414

trance, between the breakwater and Fort Chavagnac (on a rocky islet), is about 1,000

yards. It is the latter that large ships of war make use of.

The Port Militaire has three great basins for war vessels — an outer accessible at all states of the tide for vessels of the largest class; a float¬

ing basin communicating with this by gates; and a third communicating with both by similar gates. The aggregate water area of the three basins is about 56 acres, the depth of water being from about 30 to 50 feet. They have been excavated from the solid slate rock which forms the foundation of the entire dockyard, much of the excavated material being used in the con¬

struction of the breakwater. There are also slips for vessels of the largest dimensions, dry docks, building sheds, masthouses, boiler-works, and in short everything necessary for the build¬

ing and fitting out of ships of war. The nu¬

merous forts and other works with which Cher¬

bourg is defended render it, if not impregnable from the sea, at least very difficult of attack.

The commercial town has quite a modern aspect, the streets being generally wide, regular, well paved and clean, but it is rather dull and unin¬

teresting. There is an outer harbor, entered from the sea by a passage between two jetties, and an inner harbor or floating dock. The prin¬

cipal industries of Cherbourg are centred in the works of the dockyard, the commercial trade and manufactures being otherwise compara¬

tively small. The Hotel de Ville possesses a notable collection of paintings. The celebrated artist, J. F. Millet, was born near by.

Cherbourg is supposed to occupy the site of a Roman station, which is said to have borne the name of Caesaris Burgurn. Aigrold, king of Denmark, we are told, resided here about 945

a.d. William the Conqueror founded a hospital in it, and built the castle church. The Eng¬

lish held possession of the place till about 1200.

The castle, in which Henry II frequently re¬

sided, was one of the strongholds of Normandy, and escaped the fate of the town, which, about 1295, was pillaged by an English fleet from Yar¬

mouth ; but it sustained afterward three memor¬

able sieges, in 1378, 1418 and 1450. In 1758

the town was taken by the English without op¬

position, notwithstanding that the garrison was large. They kept possession of it eight days, destroyed the fortifications, carried off the ar¬

tillery and the bells, and only retired after having exacted a heavy ransom from the inhabit¬

ants. The completion of the fortifications was celebrated by Napoleon III in 1858, the festivi¬

ties being graced by the presence of Queen Vic¬

toria. A statue of Napoleon I was unveiled on the occasion. It was after leaving Cherbourg that an end was put to the career of the Confederate cruiser Alabama, when it was sunk by the Federal cruiser Kearsarge, 19 June 1864.

Pop. of commune (1911) 43,731.

CHERBULIEZ, shar-bii-le-a, Charles Vic¬

tor, French writer: b. Geneva, 19 July 1829; d. Melun, 1 July 1899. He belonged to a family noted for literary attainments. Having studied in the universities of Geneva, Paris, Bonn and Berlin, he was for a time an edu¬

cator at Geneva ; but in 1864 became one of the editors of Revue des Deux Mondes. He first gained distinction as art critic and observer of public affairs, as also by his writings, under the pseudonym G. Valbert. He wrote a vol¬

ume of art travels in. Greece; (A Horse by Phidias' ; (Political Spain* ; (Foreign Profiles' ; (Art and Nature,' *etc.* His works are char¬

acterized by clever treatment of the problems of domestic and social life and a fine psychologi¬

cal analysis, with a marked bias for description of odd characters. Among his most successful novels — and their success has hardly been less abroad than at home — are (Romance of a Re¬

spectable Woman' (1866) ; (L'Aventure de Ladislas Bolski (1869) ; (Samuel Brohl et Cie'

(1877). The last two were dramatized, but won .

little popular favor on the stage. He was made a member of the French Academy in December 1881.

CHERET, she-ra', Jules, French lithog¬

rapher and artist: b. Paris 1836. He was ap¬

prenticed to a lithographer and was self-taught as a draughtsman. His posters in color be¬

came famous because of their opening up a new field by making designs of this kind into a real art. He is also noted as a mural painter, the best known of his works in this field being the dance scenes (Life's Joys' in the Hotel de Ville, Paris. His best posters are (Bal de Valentino' ; (Le petit Faust' ; (Pan' ; (Scaramouche' ; (Loie Fuller,' and (Jardin de Paris.' Consult Alexandre, (Jules Cheret, catalogue de ses ceuvres' (Paris) and Kahn in Art et Decoration (ib. 1902).

CHERIBON, sher'i-bon, Java, province or

residency on the coast toward the northwest of the island, between Krawang and Tegal. It was formerly an independent kingdom. It has a population of about 1,500,000. The produc¬

tions are coffee, timber, cotton, areca-nuts, in¬

digo, sugar and also a little pepper. The rhi¬

noceros is native here. The capital of the province of the same name is on the north coast, at the mouth of the river Cheribon. The houses are mostly of bamboo. The finest tomb in Java, that of Mulano, who introduced Mo¬

hammedanism into the island, 1406 a.d., is near here. It has a good harbor, and although it has lost to a great extent its commercial im¬

portance, it still has a considerable trade in coffee, indigo and teak-wood. Population of the city, about 20,792.

CHERIMOYA, che-re-mo'-ya, the fruit of

Annona cherimola , a plant of the family Annonacece, native of South America, allied to the custard-apple. It is a heart-shaped fruit with a scaly exterior, and numerous seeds buried in a delicious pulp. Both flowers and fruit emit a pleasant fragrance. This fruit is now cultivated in various tropical regions.

CHERITH, ke'rith, the name of a brook to which Elijah was sent during a portion of the years of famine (1 Kings xvii, 3-7), but the locality of which is no further designated than that it was before or on the face of Jordan. The most probable opinion is that it is to be sought for on the east side of the Jordan.

CHERKASK, cher'kask, or TCHERKASK,

two towns of Russia, in the government of the Don Cossacks, called Old and New Cherkask, or Staro-Cherkask and Novo-Cherkask. The former is on the right bank of the Don; the latter is 11 miles farther north, on a hill above the Aksai. Old Cherkask, a very ancient place, the foundation of which is attributed to a CHERMSIDE — CHEROKEE

(jreek colony, is situated on an island formed by the Don, the Aksai and one of its branches, and is built on piles, as a protection from the inundations which continue from the begin¬

ning of April till the end of June. New Cherkask, founded in 1805, has a large cathedral and carries on a considerable trade. It is the seat of government of the Don Cossacks. Pop.

about 40.000.

CHERMSIDE, Sir Herbert Charles, Eng¬

lish general: b. Wilton, Wiltshire, 31 July 1850.

He was educated at Eton and entered the army in 1868, and after successive promotions at¬

tained the rank of major-general in 1898. He was with the Egyptian armv, 1883-88 ; consul for Kurdistan, 1888ˆ89; military attache at Con¬

stantinople, 1889-96; and governor of Queens¬

land from 1901-05. He was created G.C.M.G.

in 1899.

CHERNOZEM, cher’no-zem (Russian

wblack earth®), Russian name for a fertile dark-colored soil which covers nearly all the southern half of European Russia and extends into Asiatic Russia. Similar soils are found in Galicia, Rumania, Bulgaria and around Magdeburg and Hildesheim in Germany and in the prairie regions of the United States and in the pampas of Argentina. Chernozem con¬

tains from 6 to 20 per c-ent of humus with about 5 per cent of nitrogen. There is also about one-fouth of 1 per cent of phosphoric acid and from one-third to 1 per cent of potash. Such soil is rich in plant food, is of great depth and continues to bear the same crops year after year without deterioration.

Under certain weather conditions, however, it becomes hard and

compact so that crops fail.

Consult Kossowitsch, P., (Die Schwarzerde*

(Vienna and London 1912).

CHEROKEE (((uplanders,® their own

name; also, rendered Tsaraki, Tsalaki and Tsanaghi), the largest and most important In¬

dian tribe originally east of the Alleghanies, perhaps the highest in culture and intellectual receptivity north of Mexico. They are of Iroquoian stock, though remotely, and are believed to be identical with the Tallagewi of Delaware tradition, a large tribe once occupying the Ohio and Alleghany valleys, till driven south by the Delawares and Iroquois. Their own tradition, that they came from the west and exterminated a certain (<moon-eyed people,® does not con¬

tradict this. The first white men who en¬

countered them were those of De Soto's ex¬

pedition in 1540. Our first definite information finds them located along the south — Allegheny and Appalachian ranges and the Piedmont region adjoining, from Virginia to Georgia and Alabama, a range about 120 miles square — and divided into two main branches speaking different dialects: the Otari Tsaraki or Atali Tsalaki (Upper Cherokees), whose main settle¬

ments were around the headwaters of the Tennessee and Cumberland ; and the Erati Tsaraki or Elati Tsalaki (Lower Cherokee), centred in northern Georgia and southern North Carolina, around the headwaters of the Savannah and Chattahoochee. These location names, however, had become fixed tribal names, and persisted after the Upper Cherokee had been forced south into the region of the others.

They were further divided into seven clans, forbidden to intermarry. Lying close to the stream ot immigration in the southern colonies, they fill the most conspicuous place in the In¬

dian wars, trade and treaties of that section in the 17th and 18th centuries; and their chief southernmost town, Etowah, gave a name to the famous frontier fortress Ninety-Six (96

miles from it). At the beginning of the 17th century they are said to have had 64 towns and 6,000 warriors, the flatter declining to 3,000 by 1769 and 1,500 by 1793; but the figures are very dubious. At any rate, they had many villages of well-built log houses, and the Upper Cher¬

okee were agriculturists, raising large crops of corn, beans and pumpkins ; the Lower were chiefly huntsmen. They sided with the English in the early colonial struggles, and in 1730

formally recognized the supremacy of the English king (though it may be doubted if they attached that interpretation to their marks). In 1755 they ceded a large tract of land to South Carolina under Governor Glenn, and Fort Loudoun was built in their territory, it is said by their own request. But after the reduction of Fort Duquesne in 1758, the slaughter of some Cherokees for horse-stealing set the whole tribe aflame, and they requited the massacre tenfold. The folly of the then governor of South Carolina (Littleton) pre¬

vented an arrangement from being made, and a fearful Indian war desolated the borders till 1761, when the harrying of their lands for a month and the burning of 14 villages caused them to sue for peace. Their principal chiefs at this time were Attakullakulla or Little Carpen¬

ter, and Oconostota. In 1773 they made a large cession to Georgia.

In the Revolution, like most other Indians, they joined the English, their natural interests being against the Americans ; and also like the others, their alliance won no victories for Eng¬

land, but helped her to lose the country from the immeasurable odium it excited. General

Pickens at last subjugated them; and by a treaty at Hopewell, 28 Nov. 1785, they acknowl¬

edged the sovereignty of the United States.

This was confirmed by that of Holston, in 1791, with a cession of territory ; and other treaties and cessions followed in 1 793, 1804, 1816, etc., ending 27 Feb. 1819. The United States on its part solemnly guaranteed to the Cherokees the possession of all lands not ceded by them, recognized their autonomy, and on 30 March 1802,

authorized the President to expel tres¬

passers, especially surveyors, by force. In 1790

a portion of the tribe emigrated to Louisiana; and others, mainly Lower huntsmen, later re¬

moved from time to time beyond the Missis¬

sippi, till in 1817 there were some 3,000 north of the Arkansas in the present Indian Terri¬

tory. But the remainder showed an adapta¬

bility not equaled by any other Indians, and began a vigorous civilized career, which how¬

ever only postponed their evil day for a few years. Two influences conduced to this be¬

sides their character, — the missionaries and the half-breeds: for almost alone among Indians, the mixture of white blood has prospered with the Cherokees. This blood, however, was singularly fine — that of the best Scotch fami¬

lies, in some cases noble: the Rosses, Adairs, McLeods, McDonalds, *etc.* After the rising of 1745 a number of these, irreconcilable or ˆwanted,® emigrated to the Carolinas ; in the Revolution, not unnaturally, they became Loyal-416

ists; when it ended and a fresh outlawry men¬

aced them, some of them and their sons pushed on into the Cherokee country, settled there and intermarried with the native women. The Mo¬

ravian missionaries had been working among the Cherokees from 1740, and had baptized a considerable number before the Revolution. In 1799 some of the tribe earnestly requested teachers and clergy. A great council was held at Tellico on the Tennessee, at which the Upper chiefs agreed to the plan, but the Lower dis¬

sented. In 1804, however, schools and missions were opened, a large part of the tribe was soon christianized, and the sons of the chiefs attended the schools. The American Board worked successfully among them later.

The Cherokees were now perfectly peace¬

able, industrious and rapidly growing civilized in the genuine sense; and they did good service to the United States in the War of 1812. In 1810 they abolished the clan system and blood-feuds. In 1820 they organized a regular civil¬

ized government, including a legislature with paid members, and adopted a code of laws. In 1827 they took the name of The Cherokee Nation, and framed a constitution. In 1825 the Cherokee Sequoyah (q.v.) invented an alphabet of 85 letters, one for each sound in Cherokee, and it was officially adopted by the Cherokee government. In 1827 the first Indian press north of Mexico was established, and on 21

Feb. 1828 the first number of the Cherokee Phoenix was issued at New Echota, one-half printed in the new alphabet. But the nation's time had come, hastened by the discovery of gold, which they worked successfully. Georgia, on 24 April 1802, as consideration for ceding western lands to the United States, had stipu¬

lated that the Indian titles to lands within the State should be extinguished (<as soon as it could be done peaceably and on reasonable terms.® The government did its best, but found that it had promised the impossible. In 1808

both the Lower (hunters) and the Upper (farmers) sent deputations to Washington.

The former expressed a desire to remove to the virgin hunting-grounds of the West, the latter to retain their own. The former, there¬

fore, on 8 July 1817, were granted an exchange of lands to the West. This left about 5,000,000

acres of Georgia in the hands of the Cherokees, and 4,000,000 in those of the Creeks, or about 14,000 square miles in all, nearly a quarter the present area of the State, — the whole north¬

western triangle above the line of Atlanta (which was Cherokee land) and Gainesville.

In 1819 Georgia began to grow impatient, and memorialized the President to carry out the agreement of 1802. But the remaining Cher¬

okees loved their beautiful and salubrious country, which they had covered with improve¬

ments ; they had not much more in that moun¬

tain country than they needed ; and the reports from Indian Territory were that their brethren were being badly harassed by the wild tribes of the plains. They refused to sell as a nation ; by all Indian law, confirmed by the United States, no individual could sell, as the land belonged to the tribe ; and to prevent sales they dared not disallow, the Cherokees in 1820 passed a law making such sale a capital offense in any mem¬

ber of. the tribe. The Creeks duplicated this action in 1824. There was therefore no way for Georgia to rid herself of these two huge Indian states within her borders except by naked vio¬

lence in defiance of United States treaties. She aid so first with the Creeks, 1826-32, openly defying the United States, and proclaiming the separate sovereigntv of Georgia (see Creeks; Nullification) ; then in 1828-30 (see title below) passed laws extinguishing the govern¬

ment of the Cherokees and parceling out their land. The President (Jackson) would give no help, the Supreme Court said it could not ; but the Cherokees clung desperately to their land even under the new legislation. Finally, on 29

Dec. 1835, a small fraction of the tribe, headed by a few influential men, were induced by an emissary of the United States to sign a cession of all tribal lands, in exchange for others in Indian Territory and the sum of $5,700,000, and agree to entire removal within three years.

This was of course perfectly invalid; the leaders were immediately assassinated, and were execrated as bribed traitors. There is, however, no reason to doubt their good faith to the nation. One of them was the still remem¬

bered Elias Boudinot, editor of the Cherokee Phoenix, who was

educated at Cornwall, Conn., and married a Connecticut wife. They proba¬

bly thought the nation could make better terms by yielding than by holding out. The bulk of the tribe, however, repudiated the treaty, and, refusing to go in 1838, were deported by an armed United States force, after a strong re¬

sistance and some bloodshed. Many hundreds, however, escaped on the march, lingered about in the woods, and finally concentrated near the Great Smoky Mountains in western North

Carolina, where about 1,400, called the Eastern Band, still live, mainly in Swain, Graham, and Jackson counties. Of those who went, thou¬

sands are said to have died on the march or from resultant hardships. The number de¬

ported is unknown : probably between 10.000

and 20,000.

The chief of the tribe for nearly 40 years (1828-66) was the able John Ross (q.v.). or Kooweskoowee, a Scotch half-breed; and after fighting the removal to the last, when the crisis came he superintended it. . When the tribe had gathered in Indian Territory it resumed its form of government and made Tahlequah the capital ; and in 1845 resumed publication of a national paper, the Cherokee Advocate — which, however, was suspended in 1854, the present paper of the name dating only from 1870. The nation was doing well till the Civil War came as a blight. The Cherokees were almost equally divided in sentiment ; their treatment by Georgia had been capped by that of the national government, and after ail they were Southerners by birth and industrial sympathies, and slave¬

holders. Each section furnished a large body of troops to its chosen side, and in consequence each side in turn ravaged the country as a hostile land, and with the consideration usually shown by whites to Indian property; and the land was ‘ almost swept bare. After the war they made a new treatv with the United States, freeing their slaves and admitting them to full citizenship in the tribe; and in 1866 they ab¬

sorbed the remnant of the Delawares. Since then their land has been

opened up by railroads, despite their protests. The case of Cherokee Nation v. Southern Kansas Railway, 1889, de¬

cided that the United States had right to grant eminent domain through their territory, and in CHEROKEE — CHEROKEE NATION v. GEORGIA

fact four trunk lines traverse it. In 1892 they sold their great western extension, known as the Cherokee Outlet, and it forms the larger part of northern Oklahoma. Their region is the whole of Indian Territory north of the Arkansas.

Their government was by an elected principal chief, and a legislature with two chambers.

The open policy of the United States govern¬

ment to substitute allotment in severalty for tribal ownership as fast as possible, and put an end to the anomaly of independent tribes with a figment of sovereignty which only makes hardship to government, tribe and innocent outsiders alike went into effect, 30 June 1914, when the tribal government was abolished. No tribe was better fitted for the change than the Cherokee; generations of good living and civil¬

ization having not only tamed and elevated the Indian character in them, but greatly modified even the Indian physiognomy; there are scores of full-blooded Indian ladies in Tahlequah scarcely distinguished from whites save for duskiness of skin. A thorough system of public schools among them has been one of the chief instrumentalities in refining both face and char¬

acter at once.

The 1915 annual report of the superintendent for the five civilized tribes stated there was contained in the Cherokee nation a total of 4,420,068 acres, of which 22,880 acres were re¬

served for town sites, railroad rights of way and other purposes ; 4,346,203 acres were allotted to 40,193 citizens and freemen; and the re¬

mainder, consisting of 50,905v acres, was sold except an 80-acre tract which was involved in litigation, and a 226-acre tract included in what is known as Big Lake, the title to which had not yet been definitely determined. The tribal affairs of the Cherokee nation were completed with the exception of the disposition of the 306

acres above mentioned, by the delivery of ap¬

proximately 750 deeds; the completion of the per capita and equalization payments to citizens and freedmen of the nation; and payment of the amounts due to citizens and freedmen enrolled under the act of 1 Aug. 1914.

CHEROKEE, Iowa, city and county-seat

of Cherokee County, 60 miles northeast of Sioux City, on the Illinois Central Railroad and on the Little Sioux River. The State hos¬

pital for the insane is located here and there is a Carnegie library. There are also here rail¬

road repair shops, butter factories, mill machin¬

ery and novelty works. The city was settled in 1850 and was incorporated in 1872. The government is vested in a mayor and a uni¬

cameral council. The waterworks are munic¬

ipally owned. Pop. (1920) 5,824.

CHEROKEE NATION v. GEORGIA,

the historic case (1831) on the relations of the Indian tribes toward the United States govern¬

ment. (For the preliminary history, see Chero¬

kee). The means taken by Georgia to oust the Cherokees were as follows : By six succes¬

sive acts, from 20 Dec. 1828 to 22 Dec. 1830, Georgia laws and jurisdiction were extended over all inhabitants of the Cherokee territory, and resistance to her writs made indictable; Cherokee laws, usages, legislative assemblies and courts were abolished, and execution of their writs prohibited ; Cherokees were declared incapable of testifying against or making con¬

tracts with white men, but the execution of VOL. 6 — 27

the Cherokee laws against selling land to white men was punished as murder; their lands were ordered surveyed and distributed by lottery among the citizens of Georgia; their improve¬

ments and gold mines were confiscated ; and white men were forbidden under penalty to enter their country, without a license from the governor and taking the oath of allegiance to Georgia. The Cherokees appealed at once (early in 1829) to President J. Q. Adams, to make good the government's treaty guaran¬

tees ; but he, as his term was about to expire, left it to Jackson, who, as an old Indian fighter, sympathized with Georgia, refused to interfere and advised the Cherokees to submit or re¬

move. Their next resort was to the Supreme Court, but the Georgians took care not to let suits in the State courts come to a decision, and so give opportunity for appeal. At length, however, a case was found. When the Geor¬

gia authority over the Cherokee country be¬

came operative in 1830 a Cherokee named Corntassel or George Tassels killed an officer serving a writ of ouster, and was sentenced to be hanged; a writ of error was obtained from the Supreme Court 12 Dec. 1830, citing the State to appear ; the legislature instructed the State officials to ignore it, and the sentence was carried out. The Cherokees' council then applied to the Supreme Court for an injunction to prevent Georgia from exercising her laws within the Cherokee country; the State put in no appearance, and the case was decided from the arguments on the other side : These were : That the Supreme Court had jurisdiction over cases between States of the Union and foreign countries; and that the Cherokee Nation, by repeated

acknowledgement of the United States in solemn treaties, was such a foreign country, sovereign and independent. Chief Justice John Marshall for the court — Story and Thompson dissenting — ‘decided that they were not a for¬

eign nation in the meaning of the Constitu¬

tion, — since, for example, an attempt by any other foreign nation to form a connection with them, or to trespass on their land, would be held an invasion of the rights or territory of the United States; that they wrere a domestic or dependent nation, in a state of pupilage, their relation to the United States being like that of a ward to its guardian, that their title to their land was only that of occupancy, the United States succeeding to it whenever their own possession lapsed ; that their appeal lay to the President ; that the Supreme Court could not call out force to resist the extension of Geor¬

gia laws over territory claimed as its own ; that it could pass on the title to land, upon suit properly brought, but this question was a po¬

litical one.

A second case, though not cited under this head, properly belongs with this. Under the law restricting white men’s entry into the Cher¬

okee country, 10 missionaries and others were arrested and sentenced to four years’ imprison¬

ment, in September 1831. Eight were released on making submission ; two refused ; and one, Rev. Dr. Worcester, brought suit for a habeas corpus in the Supreme Court, which gave de¬

cision in March 1832, and to the lay mind ap¬

pears to have reversed its former one. It held that all the acts of the Georgia legislature with respect to the Cherokees were unconsti¬

tutional and in violation of the treaties and 418

laws of the United States, and ordered the prisoner released as condemned on a void stat¬

ute. The State refused to comply ; but in place of waiting till the next term of the Su¬

preme Court, to see if it would call on the United States authorities to enforce the decree, the prisoners made submission and were re¬

leased. It is probable that Jackson's famous ((John Marshall has made his decision — now let him enforce it,® would have prevented them from regaining freedom till their term was up.

Consult Cherokee Indians, (Protest against land belonging to their nation being treated by the State of Georgia as its own) (Washington 1830) ; (The relations existing between the nation and the State of Georgia > (Washington 1831) ; Ross, J., (The Cherokees ; their loyalty and suffering during the Civil War* (Philadel¬

phia 1864).

CHERRY, the name of various species of trees and shrubs of the genus Primus, family Amygdalacece, closely related to the almond, peach, apricot and plum, thus comprising one of the most important groups of fruits — the drupaceous or stone fruits. Cherries are char¬

acterized by white flowers, usually in umbel¬

like fascicles, or in racemes, and subglobular, mostly red, yellow or black fruits, without bloom, and containing nearly globular, smooth stones. Few of the native species have attracted horticultural attention except for ornamental purposes, but some, especially the wild black cherry (P. serotina), are highly prized as cabi¬

net woods and for interior house-finishing.

The cultivated cherries have been derived almost wholly from two European species, P.

avium and P. cerasus. The varieties of P.

avium belong to three groups ; hearts, heart-shaped, soft, light or dark, sweet fruits; bigarreaux; heart-shaped, firm, light or dark, sweet

fruits; and dukes, light, somewhat acid fruits.

Of these four groups the bigarreaux are the most important ; they are largely grown in Cali¬

fornia and shipped to the Eastern markets. The hearts are somewhat grown for home on both the Atlantic and Pacific coasts, in Europe and in Australia. The varieties of P. cerasus are divided into amarelle (light-colored) and morello (dark-colored) groups. The morellos are the leading acid cherries and most pop¬

ular in the eastern United States, especially in western New York, where they are largely canned for market, as well as shipped in the fresh state.

Besides these important species and their varieties, a few others have horticultural value, notably, P. mahaleb, a hardy, rather small European species, which is used as a propagat¬

ing stock ; P. pennsylvanica, the pin, wild red, or bird cherry; P. besseyi and P. pumiia, the sand or dwarf cherries, which seem to grade into one another, the former producing sweet fruit, the latter acid, and which, being natives of the plains region, seem worthy of the atten¬

tion of the hybridizer.

Cherries are propagated by budding upon either mazzard or mahaleb seedlings, the latter being in more general favor, especially in the West, because they are hardier, easier to grow, easier to bud and are freer from blight in the nursery. Sweet cherries succeed best upon well-drained light loams where the moisture is abundant but not excessive; sour kinds will stand heavier but not wet land; neither prove profitable upon very rich soils. The ground should be thoroughly and deeply plowed and harrowed ; the sweet kinds, which are large spreading trees, set 25 to 30 feet apart, and the sour kinds 15 to 20 feet. The land should be kept clean by frequent cultivation until mid¬

summer, when a clover crop should be sown.

This must be turned under the following spring, and the land treated

as before. Each year liberal applications of potash and phosphoric acid should be given and the trees protected from the attacks of insects and fungi by sys¬

tematic spraying.

Two insects are most dreaded. One is the cherry aphis, which attacks the foliage in May.

It is particularly troublesome upon the sweet kinds. Kerosene emulsion and fish-oil soap are each useful in controlling the pest. The other is the cherry slug, a shiny, dark-green “worm,®

the larva of a four-winged black fly. This eats the soft tissue of the leaves between the veins. It may be controlled with air-slaked lime or arsenites. See Fungicide.

The most important diseases of the cherry are brown rot, leaf-blight and black knot, which are treated under Plum. Consult Bailey, ‘ Cy¬

clopedia of American Horticulture) (1914).

CHERRY, Wild, the bark of Primus sero¬

tina collected in autumn. This is very exten¬

sively used in medicine as a vehicle basis, the syrup of the bark being used very extensively in cough remedies. It contains a small amount of hydrocyanic acid.

CHERRY-LAUREL (Primus laurocera—

sus), a shrub closely allied to the common cherry, but having evergreen leaves. It was introduced into Great Britain in the 16th cen¬

tury, and is well known as an ornamental shrub.

It yields the celebrated laurel-water. This is a powerful poison, the strength of which (like that of peach-kernels, bitter almonds, cherry-

leaves, etc.) depends upon the presence of prus¬

sic acid. Laurel-water is obtained from the leaves and flowers, or the leaves only, by distil¬

lation. This shrub is often called the common laurel, another evergreen species being distin¬

guished as the Portugal laurel ; both are dis¬

tinct from the true laurel.

CHERRY ORCHARD, The. Chekhov's

realistic drama of Russian life, (The Cherry Orchard, > was first performed, with enormous success, at the Moscow Art Theatre in 1903, only a few months before the death of the author. Chekhov's literary activity was coinci¬

dent with the deep depression that in the eigh¬

ties of the last century spread over the <(Intelli-gentsiaw of Russia, owing to the disappointing reaction following the war with Turkey. As a trained physician, Chekhov understands the diagnosis of this almost universal distemper and depicts it in his stories and plays. The title of (The Cherry Orchard) has a double meaning: It refers both to the actual orchard on the destruction of which hinges the plot of the play, and to Russia itself. The people of the play represent various types of Russian character. Madame Ranevskaya through weak¬

ness and mental inertia sacrifices her great estate and its chief glory, the famous cherry orchard; her daughter Vavara is alike inactive; Lopakhin is the prosperous grandson of a former serf, into whose hands the estate passes; CHERRY VALLEY — CHERTSEY

the uncle Gayey is a type of the Russian who talks but who does nothing. The student Tro¬

fimov is a dreamer and idealist who sees what is the matter with

Russia, and asserts that ((in order to live in the present we must first re¬

deem the past, and that can only be done by suffering, by strenuous, uninterrupted labor.®

With the faithful, unselfish old serf Fiers is contrasted the selfish young footman, Yasha.

Though the play ends with the prospect of a gloomy future for Madame Ranevskaya and her daughter, Trofimov sees the vision of a regenerated Russia ; <(Mankind goes on to the highest truth, and to the biggest happiness possible on earth, and I go in the very van.®

But the poor old serf Fiers is left behind for¬

gotten and soon to die, and the sound of axes is heard in the cherry orchard. In its sincerity, its truth, its subtle characterization, and its idealism, (The Cherry Orchard) is representa¬

tive of the best in modern Russian drama. It was first translated into English by George Calderon in 1912 and by Julius West in 1916.

Nathan Haskell Dole.

CHERRY VALLEY, N. Y, village in

Otsego County, 68 miles west of Albany, on the Delaware and Hudson Railroad. During the Revolutionary War the village was the scene of a massacre. On 11 Nov. 1778 Joseph Brant with 600 Indians and Walter Butler with 200

Tories and English attacked the little garrison here, killing 16 of the latter and 32 of the non-combatants, including women and children.

Nearly all the buildings were burned and 71

prisoners were carried off and treated with great severity. Consult Halsey, (The Old New York Frontier) (New York 1901).

led by Lieut. Walter N. Butler, a Mohawk Valley Tory leader, son of the more

famous Col. John Butler. He had been

captured at German Flats in the summer of 1777, and sentenced to death as a spy, but, spared on the intercession of friends, he es¬

caped. Lafayette, seeing the exposed situation of Cherry Valley, had fortified it with a block¬

house the preceding spring; and Col. Peter Gansevoort, an experienced officer of high reputation, solicited the command. For some reason, however, it was given to Col. Ichabod Alden, a Massachusetts officer, not used to In¬

dian warfare. During the summer the in¬

habitants lived in the fort and went warily; but by November they had returned to their dwellings. On the 8th, Colonel Alden received a message through a friendly Indian that at a great meeting of Tories and Indians at Tioga it was resolved to attack the place; and the people begged to be permitted to take refuge in the fort again. Alden pooh-poohed the report as an idle Indian rumor, assured them that he would guard against a surprise and sent out scouting parties. The party that should have beaten up Butler's went to sleep by a camp¬

fire on the night of the 9th, and awoke as prisoners of the enemy. Butler obtaining a company of his father's rangers, induced Brant, the great Mohawk chief, to join him with a few hundred of his Indians, picked up a band of Senecas and other straggling Indians and Tories as he went on, and with about 800 men approached Cherry Valley. Securing from the prisoners, under threat of torture, all informa¬

tion as to the conditions there — as that the officers of the garrison lodged with families near the fort, instead of in it — the expedition camped about a mile southwest of the village on the night of the 10th. It snowed in the night, turning to rain in the morning. As the enemy approached under cover of the thick mist, an Indian fired on a stray settler and wounded him, but he escaped and warned the colonel, who

thought the assailant only a straggling Indian, and paid no attention to the matter. The rangers stopped near the village to examine their guns, and the Indians sprang forward, the ferocious Senecas in advance, under their chief, Sayenqueraghta. In the massacre that ensued, 32 settlers, mostly women and children, the colonel and 15 soldiers, were slain ; 30 to 40 prisoners were taken, also nearly all women and children ; and the village was reduced to ashes. Most of the prisoners were released the next day, and sent back to effect an exchange for Butler's mother and younger brothers and sisters, in the power of the Americans.

CHERRYVALE, Kan., city in Montgomery

County, 160 miles southwest of Kansas City, on the Atchison, Topeka and Santa Fe and the Saint Louis and San Francisco railroads. Brickmak¬

ing, oil refining, zinc smelting, glassmak¬

ing and iron founding are the principal indus¬

tries. There are deposits of oil and gas nearby.

The city has a Carnegie library. It was set¬

tled in 1870 and incorporated nine years later.

It is under the commission form of govern¬

ment and owns its waterworks. Pop. 4,698.

CHERSO, ker'so, a long, narrow island in the northern Adriatic, belonging to Jugoslavia, yielding wine, olives and other fruits. It is situated on the Gulf of Quarnero, between Veglia and the mainland, and forms part of Istria. It is about 35 miles long, and the area is 105 square miles. The town of the same name stands on the west coast, and has a population of about 4,725. Pop. of island about 10,180.

CHERSONESUS, ker-so-ne'sus (Greek, a

peninsula). This name has been given to sev¬

eral peninsulas, as (1) the Cimbrian Chersonesus, now Jutland; (2) the Taurian

Chersonesus, the peninsula formed by the Black Sea and the Sea of Azov — the Crimea; (3) the Thracian Chersonesus, the great peninsula in Thrace, now the peninsula of the Dardanelles; (4) the Golden Chersonesus, in India beyond the Ganges, supposed to be the Malay Peninsula.

CHERT, a cryptocrystalline (not visibly crystalline) variety of quartz closely related to flint, but less translucent and having a more splintery fracture. In geology the term is ap¬

plied to a considerable range of siliceous rocks, from the impure flints largely formed from the siliceous remains of organisms, sponges and diatoms, found in limestones and other strati¬

fied rocks, to the j asperated quartz formed by the alteration of limestones or limy sandstones.

Cherts of this last type grade into jasper. See Flint; Jasper; Quartz.

CHERTSEY, ches'si or chert's!, England,

town in the county of Surrey, 22ˆ2 miles south¬

west of London, on the London and South¬

western Railway, is pleasantly situated on the right bank of the Thames, over which there is 430

a handsome bridge, connecting with the north or Middlesex side of the river. The houses arc mostly of brick, and in general well built. The church of Saint Peter has a square embattled tower, and contains a tablet to the memory of Charles James Fox. There was here formerly a great monastery of the Benedictine order, founded in 666, of which the ground plan only is now traceable. The chief industries are

manufacturing iron, engineering, boat-and steam-launch building and carriage building, and there is a large trade in flour, malt and agricultural produce for the London market.

Pop. 13.816.

CHERUB (plural, cherubim), a celestial

spirit, which, in the angelic hierarchy, is placed next in order to the seraphim. All the several descriptions which the Scripture gives us of cherubim differ from one another, as they are described in the shapes of men, eagles, oxen, lions and in a composition of all these figures put together. The hieroglyphical representa¬

tions in the embroidery upon the curtains of the tabernacle were called by Moses (Ex. xxvi, 1) cherubim of cunning work.

CHERUB, The. See Essex, Phcebe and

Cherub.

CHERUBINI, ka-roo-be'ne, Maria Luigi

Carlo Zenobi Salvatore, Italian composer : b.

Florence, 14 Sept. 1760; d. Paris, 15 March 1842. In 1773 he produced a mass, which, with other of his compositions, attracted the atten¬

tion of the Grand Duke Leopold, who enabled him to become a pupil of Sarti of Bologna, under whom he studied from 1778 to 1782. As early as 1780 he produced his first opera, (Quinto Fabio,* at Alessandria, and in 1784 he had already produced eight operas in the theatres of Italy. In 1785 he composed for the London Italian opera (La finta Principessa) and (Giulio Sabino) (1786) ; in 1788 at Turin his (Ifigenia in Aulide1* ; and in the winter of the same year he brought out his <Demophon) ; and in 1791 his ˆodo'iskaP at Paris. The latter opera established his fame, and was fol¬

lowed by (£lisa) (1794) ; <Medee) (1797) ; ˆ'hotellerie Portugaise) (1798) ; (Les deux journees) (1800) ; (Anacreon) (1803) ; and his

ballet of (Achilles at Scyros) (1804). In 1806

he produced (Faniska) at Vienna; in 1809, <Pimmalione) at Paris; in 1813, (Les Aben-cerrages) ; in 1814, (Bayard a Mezieres) ; in 1821 (Blanche de Provence) ; and in 1833, (Ali BabaP He excelled in sacred music. His cele¬

brated Mass in F for three voices, his grand (Requiem, > his (Messi SacrieR are the noblest monuments of his genius. Haydn and

Beethoven pronounced him the greatest sacred composer of the age. In 1822 he became direc¬

tor of the Conservatoire of Paris, with which he had been connected from the date of its foundation in 1795, and which is greatly in¬

debted to him for its prosperity. The most important of Cherubini's literary wTorks is one on counterpoint — which is a standard publica¬

tion. He was enthusiastically devoted to his profession, and his independence as an artist frequently manifested itself. Napoleon for a long time could not forgive him, because on one occasion, when he rudely contradicted him on some point of music, the artist replied : ((Citizen Bonaparte, in the art of war you are pre-eminent, but you should leave music to those who understand it." Consult Bcllasis, E., (Cherubini; Memorials, Illustrative of his Life) (London 1874) ; Berlioz, (Memoires) (Paris 1878) ; Wittmann, M. E., (Cherubini > (Leipzig 1895).

CHERUSCI, ke-rus'se, the most celebrated of all the German tribes. It is difficult to deter¬

mine their exact position, owing to the fact that ancient writers sometimes confound the national league formed by the Cherusci with the tribe, properly so called. It seems prob¬

able, however, that the tribe was situated in that part of Germany lying between the Weser and the Elbe, and having the Harz Mountains on the north and the Sudetic Range on the south. This tribe was known to the Romans before 50 b.c. and it is mentioned by Caesar as a people of equal importance with the Suevi.

Their territory was first entered by the Romans under Drusus, the stepson of Augustus ; and a year or two later they entered into an alli¬

ance with the Romans, and served in their armies. But when Varus attempted to make them tributary to Rome, and subject them to the Roman laws, they formed a confederation with many smaller tribes, and having decoyed Varus into the forest of Teutoburg, destroyed his whole army in a battle which lasted three days, and in which he himself was slain (9

a.d.). Upon this the Cherusci became the chief object of the attacks of the Romans. Germanicus, victorious over the Marsi and Chatti, marched against the Cherusci, whose leaders, Segestus and Arminius (the latter of whom had carried off the daughter of the former), were at war with each other. Segestus, pressed by Arminius, called Germanicus to his aid, who delivered him, indeed, from his danger, but was obliged to return after several campaigns without having obtained any permanent advan¬

tages. In the end the Cherusci were overcome by the Chatti in the second half of the 1st century of our era ; but this seems to have been owing more to internal dissensions among themselves than to any natural supe¬

riority in their opponents. Before the end of the 4th century they appear as members of the great confederation of the Franks, and after that they are lost sight of.

CHERVIL, a popular name for several

plants of the family Apiacece. Leaf chervil or salad chervil (Anthriscus cere folium) is an annual herb native to southern Europe, and has long been cultivated in Europe, but very little in America, for its sweet-scented com¬

pound leaves, which are used like parsley for garnishing, flavoring soups, stews, etc., and as a pot-herb. It is of easy cultivation and yields its leaves in about eight weeks from sowing the seed. In some localities it has escaped from the gardens and has become a weed. Tur¬

nip-rooted or tuberous chervil (Chcerophyllum bulbosum) is a biennial or annual herb native to southern Europe and has long been culti¬

vated for its small, grayish or blackish, carrot¬

like roots, which are eaten either like beets or as a flavoring in soups, stews, *etc.* Since its seeds lose their vitality very quickly, they should be sown in the autumn, or else stratified until spring. If sown in the fall they need not be expected to appear before spring. Except as just mentioned, the cultivation of tuberous-rooted chervil resembles that of carrots.

CHESAPEAKE BAY, in Maryland and

\ irginia, and dividing the former State into two parts, is the largest inlet on the American coast of the United States, being 200 miles long and from 4 to 40 broad. Its entrance, 12 miles wide, has on the north Cape Charles, and on the south Cape Henry, both promontories being in Virginia. The bay has numerous arms, which receive many navigable rivers such as the Susquehanna on the north, the Potomac, Rappahannock and York on the west, and the James on the southwest. Unlike the shallow sounds toward the south, this network of gulfs and estuaries, with its noble feeders, affords depth of water for ships of any burden, virtu¬

ally carrying the ocean up to the wharves of Baltimore and Norfolk and the arsenal of Washington. Extensive oyster beds are to be found in this bay.

CHESAPEAKE BAY DOG. See Doc.

CHESAPEAKE AND DELAWARE

CANAL, connecting Chesapeake and Delaware bays. It is 14 miles long, 9 feet deep. The cost of construction was $4,000,000. See Canals.

of the, 22 June 1807. The Chesapeake was a 40 gun frigate destined to relieve the Constitut-tion in the Mediterranean; Capt. James Barron was to go out in her as commander of the Medi¬

terranean squadron. She had been refitted at the Washington navy-yard, and made final prep¬

arations at Norfolk, reporting ready for service on 19 June. On the 22d she got under way, but expecting no attack from powers at peace with this country, was in no shape for im¬

mediate action, and being four months behind time, could not wait. The gun deck was ob¬

structed with various lumber, sick seamen were lying on the upper deck, the cables were not stowed away, the powder-horns were not filled and the crew was raw and not exercised at the guns. At this time, in the heart of the Napoleonic wars, the high wages and relatively safe »employ of the American merchant and even naval service, with the rights of American citizenship immediately obtained, raised the normal rate of desertion from the British navy so much that its officers were much embarrassed and greatly incensed; and Great Britain claimed, as for many years afterward, the right of searching neutrals for deserters and contra¬

band. At the same time, her press-gangs crimped for service any strays who could be caught, of any nationality, and rarely gave any redress. Early in 1807 a British fleet lay off Norfolk watching to intercept some

French frigates in the Chesapeake; and a boat's crew deserted bodily and escaped to Norfolk.

The captain was told that they had enlisted on the Chesapeake, — which was true of only one, and he under an assumed name; and meet¬

ing the latter and another deserter in the streets of Norfolk, was defied. Another vessel, the Melampus, reported three deserters gone to the Chesapeake, but it was proved that they were native Americans illegally pressed. Admiral Berkeley, at Halifax, on complaint of his offi¬

cers, ordered any of his vessels to overhaul and search the Chesapeake on meeting her out¬

side the United States iurisdiction. The order was carried out by the 52-gun flagship, Leopard, Captain Humphreys, after consulting with the local commandant at Lynnhaven, followed the Chesapeake out beyond Cape Henry, hailed her, and sent a boat with a copy of Berkeley's order. Barron, who believed that he had no deserters aboard except the Melampus', which were not really such, honestly denied having any, but refused the right to search; the mes¬

senger lieutenant at once left and within five minutes the Leopard came closer, and Humph¬

reys announced that he should carry out his orders. Barron at once called his men to quar¬

ters, and did everything that skill, coolness and courage could do to prepare for action, but the Leopard almost at once poured one whole broadside into the Chesapeake, and then two more in rapid succession, without the pos¬

sibility of her opponent replying. Three of the latter's men were killed, Barron and 17

others wounded, and it was certain that the vessel would be sunk in a short time if the fire kept up, and Barron, to stop a useless massacre, struck his flag. The one English deserter was hunted out and hanged, the three Americans taken and imprisoned. The mass of the country was on fire with indignation ; the extreme Fed¬

eralists at first justified the English course, but were compelled by public feeling to exhibit some patriotism. Even Jefferson, whose unwise course had brought on the catastrophe, inter¬

dicted British cruisers from American ports, and demanded disavowal and reparation from Great Britain, which were not given ; but he did nothing to prevent the recurrence of such out¬

rages. The unfortunate Barron, who had be¬

haved like a brave man and good officer, and whose instructions had bound him to do noth¬

ing to bring on collisions, was made the scape¬

goat of the popular fury. His own captain screened himself, by accusing him, and a court-martial on board his own vessel from 4-8 Jan.

1808, Capt. John Rodgers president, after ac¬

quitting him of all blame in every respect but one, found him guilty in not preparing for action as soon as he read Admiral Berkeley's order, and sentenced him to five years' suspen¬

sion without pay or emoluments. The gross injustice of this is now admitted. One of the judges was Stephen Decatur (q.v.), who never ceased reflecting on Barron till the latter chal¬

lenged and killed him.

CHESAPEAKE & OHIO RAILWAY,

The. The road had its origin in the charter of a company by the legislature of Virginia on 18

Feb. 1836, to build a branch from the Rich¬

mond, Fredericksburg & Potomac Railroad, through the county of Louisa, Va., and was styled The Louisa Railroad. The road was built under this charter from Hanover Junction (now Doswell), on the Richmond, Fredericks¬

burg & Potomac Railroad, 26 miles from Rich¬

mond, to Louisa Court House, 34.7 miles, and was operated by the Richmond, Fredericksburg & Potomac Railroad Company. Subsequently it was extended in short sections at various times under several acts of the legislature to Jackson River, 10 miles east of Covington, Va., on the west, and to the city of Richmond on the east, between which points it was being operated in the spring of 1861. Prior to this time, however, in 1850, its name was changed to "Virginia Central Railroad Company.®

In 1853, the State authorized the construe-422

CHESAPEAKE AND SHANNON

tion of the Covington & Ohio Railroad, from Covington, Va., to the Ohio River; work was stopped by the Civil War after about $3,000,000

had been expended by the State. When the war was over, the State having been dismem¬

bered, Virginia and West Virginia united in efforts which resulted in combining the Vir¬

ginia Central and the Covington & Ohio rail¬

road companies, in 1868, under the name of Chesapeake & Ohio Railroad Company and the cqmpletion of the road westward to Huntington, on the Ohio River, in West Virginia, in the year 1873.

In 1878 the road was sold under foreclosure and reorganized as The Chesapeake & Ohio Railway Company.

Under legislative authority the road was ex¬

tended from Richmond to Newport News, in 1880, and to the government reservation at Fort Monroe, in 1882. In the meantime it had been extended westward from Huntington to the Big Sandy River, the western boundary of West Virginia, and established connection wdth the Elizabethtown, Lexington & Big Sandy Railroad Company, in October 1880, opening up through service to Lexington, Cincinnati and the West and South. In 1888 the road was again reorganized and secured control, through stock ownership of the Maysville & Big Sandy Rail¬

road Company and the new railway bridge at Cincinnati, giving it a direct through line from tidewater to Cincinnati, Ohio.

In 1892, the Elizabethtown, Lexington & Big Sandy Railroad Company, extending to Lexing¬

ton, Ky., was acquired, and in 1895 through service to Louisville, Ky., was established by an agreement with the Louisville & Nashville for the joint use of its line from Lexington to Louisville. In the same year The Chesapeake & Ohio Railway Company became owner jointly with

the Cleveland, Cincinnati, Chicago & Saint Louis Railway Company of the Louisville &

Jeffersonville Bridge Company, giving entrance into Jeffersonville, Ind., and connection with the Big Four Railway northward.

The Richmond & Allegheny Railroad located in the James River Valley, 231 miles long, be¬

tween Richmond and Clifton Forge, Va., was acquired in January, 1890, affording a low grade route from the Ohio River to Newport News.

Entrance into Washington, D. C., was secured in 1891, under agreements for the joint use of tracks of the Richmond & Danville Railroad Company (now the Southern Railway Com¬

pany) and the Washington Southern Railway Company.

A number of subsidiary lines and branches have been built penetrating mineral and timber regions; among them are the Big Sandy Rail¬

way, Kentucky, the Guyandot Valley Branch, Coal River Railway, Cabin Creek Branch, Point Creek Branch, Gauley Branch, Loup Creek Branch, Piney Creek Branch, the Greenbrier Railway, in West Virginia, and the Warm Springs Valley Branch, Craig Valley Branch and Buckingham Branch, in Virginia.

The eastern termini of this railway are Washington, D. C., Newport News, Fort Mon¬

roe and (by ferry transfer) Norfolk, Va.

From these places it extends westward, passing through the agricultural, tidewater and Pied¬

mont regions, crossing the Blue Ridge Moun¬

tains and the Shenandoah Valley of Virginia, thence through the iron ore regions, across the Allegheny Mountains to and through the coal and limber fields of West Virginia, to the Ohio River, at Huntington.

One of its lines con¬

tinues on along the Ohio River within the north boundary line of Kentucky to Cincinnati, Ohio, and another extends from Ashland, Ky.,

through the Blue Grass region to Lexington and Louisville, Ky., and Jefferson, Ind.

As of 30 June 1916, the company's lines and sidings comprised 3,992.7 miles of track; the mileage operated, exclusive of second track and sidings, was 2,385.6, of which 2,123.5 miles are owned, 37.9 miles are leased and 224.2 miles used jointly with other railway companies.

Steel rails 125 and 100 pounds to the yard are the standard in use. Facilities for handling traffic are excellent in every respect. It is essentially a low grade line from Cincinnati to the coast. Crossing the mountains the maxi¬

mum grade ascending eastward in the direction of heavy traffic is only 30 feet to the mile.

In the fiscal year 1916 the number of reve¬

nue tons of freight carried one mile was 10,296,523,340 ; the tonnage of coal handled was 26,979,519; and passenger miles run were 281,-

348,788. In the same year the equipment of the road consisted of the following: Loco¬

motives, 827; freight cars, all classes, 44,770; passenger, baggage and express cars, 370. In 1894-95 the equipment was as follows : Locomo¬

tives, 355; freight cars, all classes, 13,808; pas¬

senger, baggage and express cars, 212. The increase in freight car and locomotive capacity is greater than appears from their number, as the average capacity of freight cars increased from 25.1 tons each to 49.7 tons, and the loco¬

motives are of much greater power.

The capital stock outstanding (1916) was $62,792,600, and the total bonded indebtedness was $181,535,169.54. The gross earnings for year ending 30 June 1916 were: $48,239,012.10, operating expenses, $31,789,179.22 ; net earnings, $16,449,832.88; taxes, $1,587,407.08 ; other in¬

come, $191,989.10; fixed charges, $8,175,199.15; net income, $6,879,215.84.

CHESAPEAKE AND SHANNON, Battle

of, 1 June 1813. In the War of 1812, the former vessel (See Chesapeake and Leopard, Affair of the), cruised to no purpose from December 1812 till April 1813, and arrived at Boston 9 April. Her captain, Evans, left her on account of ill health, and about the middle of May was replaced by Capt. James Lawrence, famous for the brilliant victory of the Hornet over the Peacock. He accepted against his will ; nearly all the officers and crew were new, and the latter second-rate, totally untrained and sulky over questions of prize money. On 25 May Captain Broke of the Shannon, lying outside, sent away Ins consort, the Tenedos, to have a fair chance to fight the Chesapeake alone, and repeatedly urged Lawrence to ar¬

range a duel between the ships. In theory they were evenly matched; they were of almost exactly the same length; the Chesapeake now carried 50 guns, the Shannon 52; the Chesa¬

peake had 379 officers and crew against the Shannon's 330, but the latter had been trained for seven years under Broke himself, kept in constant artillery and other practice, and was a thoroughly disciplined fighting machine, men used to each other and the officers. On 1 Tune, however, Lawrence, whose experience had made CHESAPEAKE STAGE — CHESNEY

423

him despise British skill and courage alike, sailed out to meet his enemy, and at 5.30 p.m.

they engaged. After a couple of broadsides, the Shannon's shot cut the Chesapeake's stays, and the latter drifted helplessly stern foremost toward her adversary. There was no salvation but to make sail forward or to board, and both were impossible. The Shannon's broadsides and the musketry fire from her tops swept the Chesapeake diagonally from stem to stern, with¬

out the latter being able to fire a shot in reply, beating in the stern ports and killing or wound¬

ing every man on the quarter-deck and the af¬

ter part, including the men at the wheel. Just before the vessels struck, Lawrence ordered up his boarding party ; but almost at the same in¬

stant he fell mortally wounded by a musket ball, and was carried below. Not a living per¬

son was on the quarter-deck, and Broke, with 50 boarders, rushed on board unresisted just as the vessels parted. He was in deadly peril from his own guns, which killed his first lieutenant as the latter pulled down the American flag, and so fierce was the resistance from that 30

or so of the American crew who had rallied at the forecastle, that 37 of the boarding party were killed or wounded, including Broke him¬

self. Had the rest of the crew shown even decent pluck, not one of the British would have escaped ; but the upper party, heavily over¬

matched, were killed or driven below, and though the dying Lawrence called out from the cockpit, (<Don't give up the ship ! Blow her up ! 5) the remainder refused to go above, and surrendered. The Chesapeake lost 61 killed and 85 wounded; the Shannon 33 killed and 50

wounded. The former was towed into Hali¬

fax as a prize, turned into a British war ves¬

sel and in 1820 was broken up. Lawrence died four days after the battle.

CHESAPEAKE STAGE. The rocks of

the Chesapeake Stage, a younger Miocene of the Atlantic coast, are

clays and marls in the-north, and marls and limestones in the1 south.

They differ chiefly from the older Miocene, or Chattahoochee and Chipiola Stages, now called Oligocene, in the character of the fossils, par¬

ticularly in the north; these fossils indicating that the climate was much colder in the newer than in the old Miocene. This change of climate is believed to have been due to a change in the direction of the Gulf Stream, which flowed farther from the coast than before. The stage is well developed at Duplin County, N. C., at Yorktown, Va., and along rivers in Mary¬

land. Strata of this age are found at Martha's Vineyard, Mass., and in Texas. See Miocene Series; Tertiary System.

CHESELDEN, ches el-den, William, Eng—

glish surgeon and anatomist : b. Somerby, Lei¬

cestershire, 1688; d. Bath, 10 April 1752. At the age of 22 he began to give lectures on anatomy, and in 1711 he was chosen F.R.S. In 1713 he published a treatise on the < Anatomy of the Human Body,* long a favorite manual of the science. He continued to read his lec¬

tures for more than 20 years, during which he gradually rose to the head of his profession.

In 1723 he published a (Treatise on the High Operation for the Stone. * In 1733 was pub¬

lished his 'Osteographia,. or Anatomy of the Bones. 5 Cheselden obtained in 1737 the ap¬

pointment of chief surgeon to Chelsea Hospital, a post he held till his death.

CHESHIRE, chesh'her, Joseph Blount,

American Protestant Episcopal bishop: b. Tar-boro, N. C., 27 March 1850. He was graduated at Trinity College in 1869, and practised law

from 1872 to 1878. He was ordained to the priesthood in 1880, and, after holding various rectorships, became bishop of North Carolina in 1893. He received the degree of D.D. from the University of North Carolina in 1890 and from the University of the South in 1894. He is the author of a number of monographs on local, State, and Church history, and of (History of the Protestant Episcopal Church in the Confederate States5 (1911).

CHESHIRE, or CHESTER, England, a

maritime county, bounded by seven other coun¬

ties in England and Wales, by the estuaries of the Dee and Mersey and by the Irish Sea.

Its area is 1,026 square miles, of which the greater part is under cultivation. The sur¬

face is generally level, the soil mostly a rich reddish loam variously clayey or sandy. There is some of the finest pasture land in England; and cheese, the main product of the Cheshire farmer, is made in great quantities. Extensive tracts of land are cultivated as market-gardens, the produce being sent to Liverpool, Manches¬

ter and other cities. Minerals abound, espe¬

cially rock-salt and coal, which are extensively worked. Cotton manufacture is carried on at Stockport, Stalybridge and in the northeast¬

ern district, shipbuilding at Birkenhead and other places. There are numerous railroad lines and a splendid system of canals, among them the famous Manchester Ship Canal. The principal towns are Chester, the county town, Macclesfield, Stockport, Birkenhead and Staly¬

bridge. The various divisions of the county return eight members to the House of Com¬

mons. Pop. 954,779.

CHESHUNT, ches’ent, England, town in

Hertfordshire, seven miles south of Hertford, and 14 miles north of

London, on the Lea. From 1792 to 1905 it was the seat of Cheshunt Theo¬

logical College. Consult (Cheshunt College5

(London 1868). Pop. 12,954.

CHESLEY, Mary Russell, Canadian social

reformer: b. Dartmouth, Nova Scotia, 1847.

She was educated in her native place and early became interested in social problems, notably in the suppression of the liquor traffic. She became president of the Women's Christian Temperance Union. In 1891 the Society peti¬

tioned the Nova Scotia legislature for the polit¬

ical enfranchisement of women and when the petition was denied Miss Chesley became very prominent in the movement, making a note¬

worthy reply to an attack on woman suffrage by Attorney-General Longley of Nova Scotia.

She has written (The Mission of Women5

(1895) ; (The Delusion of Militarism5 (1909) and many articles on woman suffrage and pro¬

hibition.

CHESNEY, ches'nl, Charles Cornwallis,

English soldier and author: b. 29 Sept. 1826; d. 19 March 1876. He was a well-known mili¬

tary engineer, but was still better known as a writer on military themes, publishing (Cam¬

paigns in Virginia5 (1863) ; (Waterloo Lec¬

tures5 (1868); (Military Biographies5 (1870).

The last-named volume contained essays on Generals Grant and Lee. He was a nephew of F. R. Chcsney (q.v.).

CHESNEY, Francis Rawdon, English ex¬

plorer: b. Annalong, County Down, Ireland, 1789; d. Mourne, 30 Jan. 1872. He was gazet¬

ted to the Royal Artillery in 1805. In 1830

he inspected the route for a Suez canal which he proved to be practicable. His first explora¬

tion of the route to India, by way of Syria and the Euphrates, was made in 1831, and he made three other voyages with the same object.

The idea was taken up by the government, who made a grant of £20,000 after his first expedition, but owing to the opposition of Russia it was never brought to a practical issue. He commanded the artillery at Hong¬

kong from 1843 to 1847. In 1850 he published his 'Expedition for the Survey of the Rivers Euphrates and Tigris,' and in 1868 a 'Narra¬

tive of the Euphrates Expedition.' Consult <Life,) edited by Lane-Poole (1885).

CHESNEY, Sir George Tomkyns, Eng¬

lish writer : b. 1830 ; d. 1895. He was a colonel in the army, and later a general and K.C.B.

and sat in the House of Commons for Oxford from 1892-95. But he

will be longest remem¬

bered for his remarkable realistic ‘Battle of Dorking) (q.v.) (1871) ; and his brilliant novel, ‘The Private Secretary’ (1881).

CHESNUT, Victor King, American bota¬

nist: b. Nevada City, Cal., 28 June 1867. He was graduated at the University of California in 1890 and pursued post-graduate work at the University of Chicago and at Columbia Uni¬

versity. In 1894 he became assistant botanist in charge of poisonous plant investigation, car¬

ried on by the United States Department of Agriculture. From 1904 to 1907 he was chemist of the Montana Experiment Station. In 1907

he became assistant chemist in the division of drugs, bureau of chemistry, United States De¬

partment of Agriculture. He has written ‘Principal Poisonous Plants in the United States’ (1898); ‘Thirty Poisonous Plants of the United States’; and ‘Preliminary Cata¬

logue of Plants Poisonous to Stock’ (1898) ; ‘Plants used by the Indians of Mendocino County, California’ (1902) ; ‘The National Museum in Drug Research’ (1908) ; ‘Deter¬

mination of Pepsin in Liquids’ (1913).

CHESNUTT, Charles Waddell, American

author: b. Cleveland, Ohio, 20 June 1858. While still a child he was taken to North Carolina, where he was educated, becoming subsequently principal of the State Normal School at Fay¬

etteville. He removed to New York and en¬

tered journalism temporarily, returning later to Cleveland, where he was admitted to the bar in 1887. He has written ‘The Conjure Woman’ (1899) ; ‘The Wife of His Youth and Other Stories’ (1899); ‘Life of Frederick Douglass’ (in ‘Beacon Biographies’) (1899); ‘The House Behind the Cedars’ (1900) ; and ‘The Marrow of Tradition’ (1901) ;

and ‘The Colonel’s Dream’ (1905).

CHESS. Chess is a game of strategy con¬

sisting of regularly developed attack and de¬

fense with a definite objective toward which all operations are directed and to which they are subordinated. It may aspire to the dignity of both an art and a science. It cultivates both memory and reason and what may be called “geometrical sense” and at the same time is one of the most fascinating recreations, Sieinitz, Zuckcrtort and Blackburne, noted masters of the game, have developed such intellectual powers, in play, that they have not infrequently engaged successfully in as many as 14 games simulta¬

neously, without looking at the board. With 32

men on each board at the opening, and 64

squares on each board to cover, this is surely remarkable.

Chess is a very ancient game, probably long antedating any extant records. Although the first authentic literature on chess came from the Arabs and Hebrews, in Granada, about the 11th century, it is quite clear that it was already widespread among Mohammedan nations. It is probable that it originated in China, and passed into India, where it was known as “Char-tarunga” and was played by four persons, and that from India it spread to Persia about the beginning of the 7th century of our era. It was then adopted by the Arab conquerors of that country and introduced into Europe.

The accompanying engraving shows the

pieces, which are manufactured in variously modified forms, in position at the opening of play, and the board upon which the game is played.

CHESS BOARD

Knight Queen Bishop Rook

Rook Bishop King Knight

The board is divided into 64 squares, and the opposing forces occupy the limits of these squares.

The four squares counting from the king's square to the right are called the king's side, and the four squares from the queen to the left, the queen's side of board. The squares counting from the white to the black are called files, and in a direction perpendicular to the files, rows. For purposes of description, each square on the board is designated in two ways, in accordance with its relation to the position of the black or white rear men, as originally set in the preceding diagram. Each file is named after the rear row piece standing thereon. The rows are numbered consecutivelv across the. board. If white plays, the position of the white piece is designated by naming the file on which it stands, while the row is i. um¬

bered from the white side; similarly, if black plays, the row is numbered from the black side,

The rear men are named as indicated in the diagram and are known as pieces. The front row men are called pawns. Where there are two pieces of the same name, they are dis¬

tinguished as king's or queen's pieces, through¬

out the game, in accordance with their greater nearness to the king or

queen, as originally set.

In notation the abbreviations are as follows : King . K. Queen . Q.

King's bishop . K. B. Queen's bishop . Q. B.

King's knight . K. Kt. Queen's knight . Q. Kt.

King's rook . K. R. Queen's rook . Q. R.

and Pawns . P.

The movements of the pawns and pieces are as follows : Each pawn moves straight for¬

ward one square at a time. On its first move, however, it may, at the option of the player, advance two squares, if there is no piece in the way. It cannot take an opposing piece directly in front. It captures an opposing piece only when it is one square diagonally to the right or the left. The captured piece is then removed from the board, and the capturing pawn placed on the square. All other chess men capture an opposing piece by stopping on the square it occupies, as they move. Should a pawn, in moving two squares, pass the diagonal of an opponent's pawn, the opponent may ((take it in passing® by moving on to the square it crossed.

Should a pawn succeed in reaching the eighth row, the player may replace it by any piece he desires.

The rook may move in a straight line up or down the file, or row, any number of squares at the option of the player unless obstructed by his own or an opposing man. If the obstruc¬

tion is by an opposing man it may be captured or not, as the player wills.

The bishop moves diagonally in any one direction and any distance over the board, un¬

less similarly limited, when it has a similar right of capture.

The knight has a peculiar move over two squares, one diagonally and the other straight, leaping over the intermediate square whether occupied or not. Thus, in the diagram the knight on K.Kt. square is at liberty to move to KR3 or KB3 — leaping over the pawns and if he chooses, may return to Kt. square at the next move. He cannot leap into a square which is occupied by one of his own men, but if occupied by an opposing man, he may cap¬

ture him.

The queen combines the rook and bishop moves in the sense that she may either traverse the board in a straight or a diagonal line, any distance at the option of the player so far as the same is unobstructed, with the right to cap¬

ture any enemy's pawn or piece in her way, as above indicated.

The king moves in any direction one square.

Once during the game, he has, however, a right, termed Castling. This is effected by placing the king's or queen's rook — as the case may be — next to the king and causing the king to leap over the rook to the square on the other side. This can only be done if there are no pawns or pieces intervening between the king and the rook and only in the event of the king and the rook used in castling not having theretofore been moved, and also that the king does not traverse a square which an opposing piece or pawn can reach in one move.

When either king in the course of the game is brought into a position

where he could be captured by an opposing piece, his player must be notified by the word “check.® He must then either be moved out of the “check® position, the hostile piece taken or some piece interposed to annul the “check.® Should none of these re¬

sources be available, he is ((checkmate® and the game is lost. He is not permitted to move into “check,® and if no other piece on his side can be moved, and a move into “check® is the only possible move, the situation is one of ((stale mate® and the game is a (<draw.® To put the opposing king into a position of “checkmate® is the sole object of chess strategy. Rapid “check¬

mate® is often illustrated by the following game :

White Black

1. P— K4 1. P— K4

2. K. B. — B4 2. K. B.— B4

3. Q— R5 3. K, Kt.— B3

4. Q takes B. P. (checkmate)

and while easily frustrated, may be studied by the beginner to see how variously “checkmate®

may be avoided.

As in warfare, chess strategy consists in rapid mobilization against the vital points of your enemy’s defense and the opening moves are directed toward securing open lines of communication in the rear, with a well-supported attack. A few simple points in this con¬

nection should be noted by the beginner. Seek as early as possible to form some definite plan of attack. In developing your plan make the advantageous capture of enemy pieces subsidiary to that end and not a principal object. This will be almost impossible at first but always keep it before you as an end to be attained.

Never study your own move until you have first sought to divine the purpose of your op¬

ponent's move. On the other hand "camou¬

flage® your own purpose by the avoidance of a too obvious scrutiny of the part of the board that particularly interests you. Remember that a purposeless move, or move into a position from which your adversary may easily drive you, is a step toward loss of the game. In this connection, note that it is usually unwise to bring out your major pieces early in the game.

Beginners are usually too fond of early and frequent play with the queen. It is only against inferior players that such tactics are fruitful.

The pawns should support one another and not become isolated. Two or three are usually re¬

tained in a position to protect the king, after castling, which is often done rather early in the game in order to bring out the rook and protect the king. Use your knights and king's bishop in developing an earl}'- attack. A knight in an advanced position from which it cannot easily be driven is very hampering to your op¬

ponent and gives the . opportunity > for diverse strategy. Avoid placing your knight on the rook's file as it loses half its power thereby.

The bishop is often more valuable than a knight on an open board. In considering the exchange of a knight for a bishop, this detail may deter¬

mine, in the absence of other reasons. Do not develop simple "fondness® for a piece, as be¬

ginners often do, refusing an exchange to the loss of position. The "openings® in chess have been so carefully studied and each move, with its possible answers, has been so carefully 426

analyzed, that the beginner cannot do better than study some of the more prominent ones, in order to obtain an early acquaintance with its tactics and strategy. He should also care¬

fully play over games by the great masters.

Many of these have been annotated by promi¬

nent players, and their comments, while at first hard to follow, will gradually become more and more illuminating, as the student's <(chess sense®

develops. Chess problems will also develop the player's ability.

There are two classes of chess openings, the gambit, in which one or more pieces are sacri¬

ficed in order to obtain a strong attack, and those without any sacrifice. While theoretically the gambit is a lost game, writh perfect play on your opponent's part, it is practically very safe and usually develops a more fascinating situa¬

tion. Lately chess masters have rather avoided the gambit in matches, but with it the game is full of varying interest and the policy has been a loss to chess. The gambit may be either on the king's or queen's side. The former offers a more exciting game.

The following game between Anderssen

(white) and Kieseritzki (black) illustrates the king's bishop's gambit.

White

Black

Anderssen

Kieseritzki

1.

P— K4

1.

P— K4

2.

P — KB4

2.

P takes P

3.

B— B4

3.

Q— R5 (ch)

4.

K — Bsq

4.

P — QKt4

5.

B takes KtP

5.

Kt— KB3

6.

Kt— KB3

6.

Q— R3

7.

P— Q3

7.

Kt— R4

8.

Kt— R4

8.

Q— Kt4

9.

Kt— B5

9.

P — QB3

10.

P— K Kt4

10.

Kt— B3

11.

R — Kt sq.

11.

P takes B

12.

P— K R4

12.

Q — Kt3

13.

P— R5

13.

Q — Kt4

14. Q— B3

14.

Kt — Kt sq.

15.

B takes P

15.

Q— B3

16.

Kt— B3

16.

B— B4

17.

Kt— Q5

17.

Q takes KtP

18.

B— Q6

18.

Q takes R (ch)

19.

K— K2

19.

B takes R

20.

P— K5

20.

Kt— QR3

White mates in three moves. The Muzio gambit with its double sacrifices affords an in¬ tensely instructive opening. It develops as follows :

White

1. P— K4

2. P — KB 4

3. Kt— B3

4. B— B4

5. Castles

6. Q takes P

Black

1. P— K4

2. P takes P.

3. P — KKt4

4. P— K Kt5

5. P takes Kt

6. Q— B3

An old Scotch gambit known as the Evan's gambit not often played now, on account of a defense revived by Steinitz, but not given here, is also very instructive for the beginner.

White

1. P— K4

2. KKt — B3

3. B— B4

4. P— Q Kt4

5. P— B3

6. P— Q4

7. Castles

8. P takes P

Black

1. P— K4

2. QKt.— B3

3. B— B4

4. B takes Kt.P.

5. B— B4

6. P takes P

7. P—03

8. B — Kt3

If on the fourth move above the game should proceed 4. P — Q3. 4. P — Q3 it then develops into-the conservative Giuoco Piano opening, illustrative of the theoretically safe game. An¬

other type of the conservative game, known as the Ruy Lopez and developing a more lively attack is as follows:

White Black

1. P— K4 1. P— K4

2. KKt— B3 2. Kt— QB3

3. B — Kt5

The following simple problem will serve as an introduction to problem solution. Place the men as follows: Black — K. on Q.R1, R. on Q.Ktl, R. on Q.R 2, P. on Q.Kt2; White — R.

on Q.R1, R. on K.R8, K. on K.Kt6, Q. on K4.

White to play and mate in two moves. The only difficulty for the beginner in this problem is to determine the opening move, which

should be Q. — K.R.sq.

Bibliography. — Consult Morgan, Moardecai (The Chess Digest) (Philadelphia 1902) ; William, Cook, (The Chess Players' Compendium) (London 1902) ; Staunton, (Chess

Praxis) (London 1893); Stanton, (Chess: Theory and Practice* (London 1883) ; Steinitz, (The Modern Chess Instructor Part I (New York 1889).

Frederick C. Grant.

CHEST, in man and the higher vertebrates, the cavity formed by the breast bone in front and the ribs and backbone at the sides and behind, shut off from the abdomen below by the diaphragm or midriff. It contains the heart, lungs, the great arteries and veins, the trachea or windpipe, the bronchi or branches of the trachea, leading to the lungs, several important nerve-trunks, the thoracic duct, by means of which the lymph and chyle are discharged into the blood, while the oesophagus or gullet passes through it. The diseases of the chest are gen¬

erally known by the organ affected. The lungs and air-tubes are subject to pleurisy, pneumo¬

nia, bronchitis, tuberculosis (consumption) (qq.v.) ; the heart to pericarditis, endocarditis, enlargement, degeneration, etc., and the arter¬

ies to aneurism and degeneration of the walls.

See Anatomy; Heart; Lungs; Nose and

Throat; Thorax; Rib; Breathing and

Health; Influenza; Nervous System; Res¬

piration ; Skeleton, *etc.*

CHEST, Naval, the name given in Eng¬

land to certain funds collected for the benefit of seamen of the British navy. In 1590 a sum of from two to six shillings was stopped from the monthly pay of all sailors to support a fund for the relief of disabled or superannu¬

ated seamen. The money was kept in a chest, and was known as the ((Chest at Chatham.®

The fund was better organized later and was transferred to Greenwich in 1803, the name chest being still retained. It is managed ex officio, and an annual report is made to Parlia¬

ment. Disabled sailors, if their injuries are not permanent, receive a sum of money. If permanently disabled, a pension is paid them for one year, for several years or for life.

CHEST DEFORMITIES. These are

congenital or secondary to disease either of the bony skeleton of the chest or to a disease within the chest. The congenital deformities usually are a result of failure of development of some one or more of the ribs.. They are extremely rare. Funnel chest is a rare but characteristic anomaly. The acquired deformities result mostly from tuberculosis of the spinal verte¬

brae (Potts Disease), from poliomyelitis, wThere the defect usually follows muscle unbalance, or CHESTER

from syringomyelia, a chronic disease of the spinal cord. See Pott's Disease.

CHESTER, Colby Mitchell, American

naval officer: b. New London, Conn., 29 Feb.

1844. He was graduated at the United States Naval Academy in 1863; fought under Farragut in the famous battle of Mobile Bay; became captain 12 June 1896: was commandant of cadets at Annapolis 1890-94 ; commanded the Galena, Richmond, Newark, Minneapolis 1895—97 ; the Cincinnati during the war with Spain, and the Kentucky 1900-1901. From 1897-98 he was commander-in-chief of the South Atlantic squadron; from 1901-02 was at the Naval War College ; in 1903 became rear-admiral ; and from 1 Nov. 1902 to 28 Feb. 1906 was superin¬

tendent of the United States Naval Observa¬

tory. He was engaged upon special duty under the Navy Department until May 1908, when he was assigned by the Secretary of State to represent the United States at the Ninth Inter¬

national Congress of Geographers at Geneva, Switzerland, in July of that year. Also repre¬

sented the National Rivers and Harbors Asso¬

ciation of America at the Sixth International Congress of Navigation at Petrograd, Russia, and the American and Washington Aviation Societies at the Second International Congress of Aeronautics held at London, England, in June 1908. Later he was engaged upon a special mission, under the supervision of the State Department, to investigate commercial affairs in Russia and the Near East, holding, at the same time, commissions from the New York Chamber of Commerce and the New York

Board of Trade and Transportation Associa¬

tions. After retiring from active duty in the navy, 1 July 1909, he occupied himself with writing and lecturing, in Europe and the United States, upon the subjects of international law, geography, aeronautics, commerce, *etc.*

CHESTER, George Randolph, American

author : b. Ohio 1869. He left home at an early age and engaged in various occupations ; began newspaper work as a reporter on the Detroit News; later on the Cincinnati Enquirer, becoming Sunday editor of the latter. He be¬

gan writing for newspaper syndicates and later for magazines. Many of his stories have been dramatized and produced with great success.

His works include (Get-Rich-Quick-Wallingford} (1908) ; (Cash Intrigue) (1909) ; tak¬

ing of Bobby Burnit) (1909) ; (Art of Short Story Writing) (1910) ; (Young Wallingford, Early Bird* (1910); (Wallingford and Blackie Daw* (1913) ; (Wallingford in his Prime) (1913) ; also in collaboration with his wife, Lillian Chester, (The Ball of Fire) (1914) ; (Cordelia Blossom) (1914) ; (Runaway June) (1915) ; (The Enemy) (1915) ; (Pay* (1915).

CHESTER, Joseph Lemuel, American

genealogist: b. Norwich, Conn., 30 April 1821; d. London, England, 26 May 1882. His earlier life was taken up chiefly with mercantile pur¬

suits. His literary tastes found expression in contributions to the (Knickerbocker? From 1845 to 1850 he was musical editor of Godey's (Lady's Book ,* and in 1852 became one of the editors of the Philadelphia Inquirer and of the Daily Sun. In 1858 he went to England to sell some patent rights, but not succeeding in the undertaking, settled in London, and devoted himself to genealogical investigation. For more than 20 years he collected materials illustrating the ancestry of American families, made special researches for clients, and investigated the Eng¬

lish descent of noted Americans, especially that of George Washington. His greatest work was the editing and annotating of (The Marriage, Baptismal and Burial Registers of the Colle¬

giate Church or Abbey of Saint Peter, West¬

minsterˆ dedicated to the queen (1876), a work that cost him 10 years' labor, and which he generously allowed the Harleian Society to issue as one of its publications. He was a founder of this Society in 1869, and edited five of its volumes. He was also a member of the Royal Historical Society, and of many other learned societies in England and America. His non-genealogical writings were (Greenwood Cemetery, and Other Poems) (1843); treat¬

ise on the Law of Repulsion) (1853) ; Educa¬

tional Laws of Virginia: the Personal Narra¬

tives of Mrs. Margaret Douglas) (1854) ; (Jofm Rogers, the Compiler of the First Authorized English Bible, the Pioneer of the English Reformation, and its First Martyr* (1861), a work of great industry and research.

CHESTER, England, an ancient and episco¬

pal city, the capital of the county of Cheshire, 16 miles southeast of Liverpool. The two main streets cross each other at right angles and were cut out of the rock by the Romans, 4 to 10 feet below the level of the houses. The houses in these streets were curiously arranged ; the front parts of their second stories, as far back as 16 feet, from a continuous paved prom¬

enade or covered gallery, open in front, where there are pillars and steps up from the street below, with private houses above, inferior shops and warehouses below, and the chief shops of the town within. These arcades, called the “Rows,® together with the walls and the half-timbered construction of many of the houses, with ornamental gables of the 16th century, render Chester perhaps the most picturesque city in England. Saint John’s Church, now par¬

tially in ruins, is supposed to have been founded by Ethelred in 698. Chester still preserves its old walls, two miles in extent, and the gate¬

ways have been rebuilt during the last cen¬

tury. Many modern improvements have been made in the city, but with due regard to the quaint architectural features. Electric lighting has been installed ; a modern sewage system, including precipitation works, has been intro¬

duced; public baths, markets, a free library, a museum, and a hospital are maintained by the municipality. Chester has manufactures of lead; iron foundries, chemical works and a shipbuilding yard. It manufactures boots and shoes for export. Its principal trade, however, is in cheese, for which it is a famous market.

The improvement of the Dee is bringing back to Chester some of its former importance as a port; there is an increasing importation of ores and timber and an export of manufactured iron. Chester is the terminus of several rail¬

way lines. Pop. 39,028.

CHESTER, Ill., city and county-seat of

Randolph County, on the Mississippi, 70 miles south of Saint Louis, on the Saint Louis, Iron Mountain and Southern, the Cape Girardeau and Northern, and other railroads. It is the seat of the Southern Illinois Penitentiary and the Illinois Asylum for the Criminal Insane 428

and contains a public library. The city has manufactories of flour, furniture, hose, shoes, foundry products, wagons and knit goods. Pop.

(1920) 2,904.

CHESTER, Pa., a city and port of entry of Delaware County, on the Delaware River, and the Philadelphia, Wilmington and Baltimore, the Baltimore and Ohio, and the Phila¬

delphia and Reading railroads, IS miles south of Philadelphia. The favorable lo¬

cation and excellent shipping facilities of the city have given it a diversity of industries. Chester is the local trade centre of a very prosperous agricultural and manufac¬

turing district. It is the site of the Roach ship yards, where several vessels of the United States navy have been built. According to the Federal census of 1910, Chester has over 128 factories, employing $24,000,000 capital and 8,000 hands, and having annual products to the value of $19,400,000. The principal indus¬

tries were shipbuilding, foundry and machine-shop work, and the manufacture of cotton, woolen and worsted goods. The United States census of manufactures for 1914 recorded 153

industrial establishments of factory grade, em¬

ploying 7,127 persons, of whom 6,295 were wage earners, receiving annually $3,506,000 in wages.

The capital invested aggregated $25,148,000, and the year's product wras valued at $21,021,000; of this, $7,920,000 was the value added by manu¬

facture. There are national banks having ap¬

proximately $700,000 capital and a surplus of $575,000, several private banking houses, several daily and weekly newspapers. Chester is con¬

nected with Media, Darby and other surround¬

ing towns by electric railways. It is the seat of the Pennsylvania Military College and Crozier Theological Seminary and Swarthmore College is nearby. The notable buildings are the United States government building, including the post-office ; the city hall, erected in 1724, of great historic interest ; Chester and Homoeo¬

pathic hospitals and the public library. Besides the educational institutions mentioned, there are public schools, with about 6,000 pupils, and public school property valued at $500,000; a public high school and Chester Academy.

Chester was settled by the Swedes in 1643, un¬

der the name of Upland, and is the oldest town in the State. It was incorporated in 1866. In 1913 it adopted the commission fonn of govern¬

ment. Pop. (1920) 58,030.

CHESTER, S. C., capital of Chester

County, on the Cheraw and Chester, the Chester and Lenoir and the Seaboard Air Line railroads, 65 miles north-northwest of Columbia. It is a trade centre, cotton is the chief shipping prod¬

uct. It has four banks, a city hall and a court house. The valuation of its property is $5,000,-

000. Pop. (1920) 5,557.

CHESTER STAGE, the youngest o.f the

limestones laid down in the interior sea that covered, in Lower Carboniferous or Mississippian time, much of what is now the Mississippi Valley. Limestones of this stage are found in Texas, Arkansas, Kentucky, Tennessee and Alabama, and in places reach a thickness of 600 feet. Some of the Lower Carboniferous limestones of West Virginia correspond in age to the Chester. The characteristic fossils in¬

clude several genera of lamellibranchs and brachiopods. See Carboniferous.

CHESTERFIELD, Philip Dormer Stan¬

hope, 4th Earl of, English statesman and orator : b. London, 22 Sept. 1694 ; d. 24 March 1773. On the accession of George I, General Stanhope, his great-uncle, procured him the place of gentleman of the bed-chamber to the Prince of Wales; and the borough of Saint German, in Cornwall, elected him to Parliament, though he had not yet attained the legal age.

He soon acquired distinction as a speaker, which he maintained also in the Upper House after his father's death in 1726. In 1728 he was appointed Ambassador to Holland, and succeeded in delivering Hanover from the calamities of the war by which it was threatened. He was afterward, in 1744, ap¬

pointed lord-lieutenant of Ireland, and on his return in 1746 received the place of Secretary of State; but in 1748 retired from public affairs, and devoted the remainder of his life almost entirely to study and the society of his friends.

His talents as an author were displayed in several moral, critical and human essays, in his parliamentary speeches, which were printed at a later period, and particularlv in a collec¬

tion of (Letters to His Son5 (1774), which have become famous. To the charms of wit and grace he united good sense, a thorough knowl¬

edge of the manners, customs and the political condition of Europe, and a polished style. He recommends to his son grace of manners as

the most essential quality for a man of the world, and even instigates him to licentious irregular¬

ities. Another series of letters addressed to his godson, and published in 1890, show Chester-held in a more favorable light. (See Chester¬

field's Letters to His Son). Consult Brown¬

ing, (Wit and Wisdom of Lord Chesterfield) (New York 1891) ; Birrell, (Lord Chesterfield) (New York 1905) ; and biographies by Ernst (London 1893) ; Craig (London 1907). A col¬

lection of hitherto unpublished letters appeared in Nineteenth Century and After5 (ed. by R.

Louden, London 1912).

CHESTERFIELD, England, town in Der¬

byshire, on the Midland Railway, 24 miles north of Derby. It has a large market-place and five principal streets, and is irregularly but substan¬

tially built. Among its public buildings are a large parish church, noteworthy for its crooked wooden spire 250 feet high, a commodious townhouse, guild-hall, grammar-school, the Stephenson Memorial Hall and the Chesterfield Institute. The principal manufactures are ginghams, lace, earthenware, leather, etc., but a majority of the working people are employed in connection with the collieries, iron-mines, quar¬

ries and blast furnaces of the vicinity. There are also iron-foundries, corn-mills, and engine-works. Mrs. RadcliflA the celebrated romance-writer, was born at Chesterfield, and a branch of the Stanhope familv takes its title of earl from the town. Pop. 37,406.

CHESTERFIELD INLET, Dominion of

Canada, an inlet of Hudson Bay, near its north¬

west extremity 250 miles long and 25 miles across at its widest part. It receives the waters of several rivers, contains numerous small islands and connects with interior lakes.

SON. The letters of Philip, 4th Earl of Ches¬

terfield, a leading statesman of his age, to his (illegitimate) son, Philip Stanhope, are to be CHESTERTON

distinguished from the letters to his godson and successor of the same name. Neither set was meant for publication. The 'Letters to His Son) were written between July 1761, when the boy was five and one-half years old, and June 1770. Composed in English, French and Latin, they were designed to convey instruc¬

tion — both by repeated precept and varied example — in language, history, literature, good manners, morality, and a general knowledge of mankind. At the age of six the boy receives Dryden's (<fine lines" :

When I consider life 'tis all a cheat; Yet, fooled with hope, men favor the deceit.

For a knowledge of men, advises Chester¬

field, read La Rochefoucauld and La Bruyere.

Study the French character-sketches, compar¬

ing them with persons you know. Better read one man than 10 books. Human nature, ever the same in essence, is varied in its operations.

Discover the ruling passion deep in the heart of the individual ; do not trust him where that is concerned. Avoid vulgar liaisons —cultivate

polite arrangements. Choose and cultivate the best in all domains of life, but do not necessarily enter the lists as champion of anything. Let people enjoy quietly their errors both in taste and religion. Do not tell every¬

thing; acquire the art of dissimulation, and distinguish between this and simulation — never lie. The greatest fools are the greatest liars.

Lecky's estimate of Chesterfield is severe : <(His delicate but fastidious taste, his low moral principle, his hard, keen, and worldly wisdom."

But the father loved his son, and knew how to be a friend. His letters are full of real, not feigned, interest, and have something for every reader. And he did well to insist upon culti¬

vating <(the graces" in an age marked by coarse¬

ness of language and conduct in both men and women, when bull-baiting and cock-fighting were deemed genteel. Neither the son nor the godson became a pattern of wit and good breed¬

ing; but it is unfair to say that the solicitude of their mentor was lavished on them in vain.

A complete edition of Chesterfield's 'Letters to His Godson* did not appear until 1890 (Lord Carnarvon's). Consult also the essay by Sainte-Beuve ; and (Cambridge History of English Literature) (Vol. X).

Lane Cooper.

CHESTERTON, Gilbert Keith, English

author and journalist: b. London 1874. He was educated at Saint Paul's School, London.

He early began reviewing art books, and his fresh and piquant style soon attracted attention.

He has essayed criticism, biography, poetry and fiction, and has specially excelled in the first named, the agreeably pungent flavor of his obiter dicta and the heterodoxy of his liter¬

ary judgments drawing large circles of readers.

Among his works are ‘Wild Knight5 ; ‘The Defendant5 ; ‘Carlyle5 (1903); ‘Browning5

(1903) ; ‘The Napoleon of Notting Hill5

(1904); ‘Dickens5 (1906); ‘Tremendous Tri¬

fles5 (1909); ‘George Bernard Shaw5 (1909); ‘What’s Wrong with the World5 (1910) ; ‘Alarms and Discursions5 (1911); ‘The Vic¬

torian Age in Literature5 (1913); ‘The Flying Inn5 (1914); ‘A Short History of England5

(1917).

CHESTERTOWN, Md., town and county-seat of Kent County, 30 miles east of Balti¬

more, on the Pennsylvania Railroad and on the Chester River. There are basket factories, phosphate manufactories and planing and

strawboard mills. It is the seat of Washington College, organized in 1773. Pop. 2,735.

CHESTNUT, James, American soldier

and statesman: b. near Camden, S. C., 1815; d.

1 Feb. 1885. He was graduated at Princeton in 1835. From 1842 to 1852 he served in the South Carolina legislature and from 1854 to 1858 was a member of the State senate. A vacancy occurring in the United States Senate, he was appointed to fill the unexpired .term, and was formally elected senator in January 1859. He resigned on 10 Nov. 1860, in antici¬

pation of the secession of South Carolina, but his resignation was not accepted, and he was formally expelled, 11 July 1861. In the mean¬

time he had been appointed delegate to the Confederate Provisional Congress. He was commissioned colonel in the Confederate army and detailed as aide-de-camp on the staff of Jefferson Davis. In 1864 he was promoted brigadier-general and assigned to a command on the coast of South Carolina. In 1868 he was a member of the National Democratic Convention that nominated Horatio Seymour for the presidency.

CHESTNUT, ches'nut, a genus of trees,

and shrubs (Costarica) of the family Fagacece.

The species are characterized by long male catkins and bristly ovaries (burs) which con¬

tain rounded nuts. Three species are of wide economic use, their wood being used for many purposes, their bark for tanning and their nuts for food. In America the most important species is the common chestnut (C. dent at a), which is a tall spreading tree often attaining a height of 100 feet and a girth of 10 or more feet in the forests, which are usually upon high gravelly or sandy land or mountain sides where clay and limestone are absent or in but slight evidence. Its range is from New Eng¬

land to the high lands of Alabama and west¬

ward to southern Michigan. During the clos¬

ing half of the 19th century this species at¬

tracted the attention of horticulturists, who have produced about a score of improved varie¬

ties worthy of being cultivated for their nuts.

The Japanese chestnut (C. crenata) has long been cultivated for its large nuts, which are produced by very young trees and are highly prized for food. The trees are rather dwarf, compact and symmetrical, and free from the attacks of blights, qualities which, together with their ease of propagation, have com¬

mended them to orchardists throughout the world. During the closing years of the 19th century it came into prominence in America.

The European chestnut (C. sativa), a native of southern Europe, northern Africa and western Asia, is a large tree which forms great forests throughout its range. Its nuts are probably more widely used as food than those of either of the other species, being a principal article of diet in the western countries bordering the Mediterranean Sea. In America it has become popular with orchardists on account of its large nuts. Of the three species the American pro¬

duces the finest flavored nuts, but they are gen¬

erally much smaller than those of the other two species.

Another American species is valued for its 430

nuts. The chinquapin (C. pumila), which is usually less than 10 feet tall, but occasionally attains a height of 30 feet or even more, is found from Pennsylvania to Florida and west¬

ward to Indiana and Texas. It bears small ovoid pointed nuts about half the size of ordi¬

nary American chestnuts. They are as yet little cultivated and have produced few varie¬

ties.

The various species and their varieties are readily propagated from seed. The seedlings are, however, generally grafted with choice varieties, and when the grafted plants are one or tAo years old they are set in orchards and cultivated like other fruits or are allowed to care for themselves. In places where chestnuts grow naturally, the sprouts which arise from the stumps of felled trees are often grafted with European or Japanese varieties, and the land pastured with sheep. The principal enemy of the chestnut in North America is the chest¬

nut bark disease, produced by a parasitic fun¬

gus. This has caused the death of large forests of the trees in the northern portion of their range and threatens the destruction of all the native chestnut trees. So far, no wholly satisfactory method of fighting it has been dis¬

covered.

CHESUNCOOK, che-sun'kuk, LAKE is

in Piscataquis County, Maine. It is really an expansion of the Penobscot River, is 20 miles long and 2,500 feet above sea-level.

CHETTIK, chet'ik, a tree of Java, the

Strychnos tieute, yielding a very virulent poison called by the same name, more powerful than that obtained from the upas-tree. It causes violent convulsions. There is no known

antidote.

CHETTLE, Henry, English dramatist and

pamphleteer : d. about 1607. He wras editor of Greene's (Groatsworth of Wit) (1592), wrote 13 plays of considerable merit, and was part author of 35 others, including (Robin Hood) in two parts; (Patient GriseP ; (The Blind Beggar of Bethnal Green5 ; and (Jane Shore. 5

In Meres' (Palladis Tamia) (1598) he is men¬

tioned as one of the ((best for comedy amongst us.® Of his other works, his (Kind-Hart's Dreame> (1593?) and (Englande's Mourning Garment5 (1603), are of interest, the former as containing an apology undoubtedly intended for Shakespeare as one of those whom Greene had attacked ; the latter having a stanza sup¬

posed to be addressed to Shakespeare as ((silver-tongued Melicert.55

CHEVAL, she-val, A (Fr. Cheval, horse), on horseback, astride any object. In a military sense, a body of troops is said to be a cheval of a

river, if one wing is stationed on the right and the other on the left bank.

CHEVALIER (Lat. cahallus, horse, Fr.

Chevalier) , an honorary title given especially in the 18th century, to younger sons of French noble families. Brought up in comparative luxury, and left at the death of their fathers almost entirely unprovided for, these men gen¬

erally lived at the expense of others, as a sort of aristocratic parasite, even when they did not prefer recourse to such less honorable means of livelihood as gave occasion to the synonym for swindler, chevalier d'industrie.

In the plays of the 18th century the chevalier is a constant figure. Both the Old and Young Pretender were each called the Chevalier by their partisans. The word is at present often used with its old meaning, and a chevalier may mean a man of honor. The chevalier was originally so called because he rode a horse ; but as only the nobles and those connected with the life of the upper classes could afford horses, the term chevalier came to have the sense we attach to it to-day.

CHEVALIER, she-vaMya, Albert, English

comedian: b. 21 March 1861. He is of Italian, French and Welsh blood. His first appear¬

ance was at the age of eight. For many years he was associated on the stage with the Kendals, Johp Flare, *etc.* For four years he ap¬

peared in music halls, then he came into vogue as a drawing-room entertainer with his coster ballads. He has made tours in England and America and has given 1,000 recitals at Queen's Hall, London. Besides 100 sketches, mon¬

ologues and plays, he has written a volume of reminiscences, (Before I Forget) (1901).

CHEVALIER, Michel, French economist:

b. Limoges, 13 Jan. 1806; d. Montpellier, 28

Nov. 1879. He was educated as an engineer in the School of Mines, joined the Saint Simo-nians and suffered six months' imprisonment for promulgating the free doctrines of Pere Enfantin's party. On his liberation he re¬

nounced his extreme doctrines, and was sent to the United States and to England on special missions. He spent two years in America, traveling, investigating and making his report to the French government and writing frequent letters to the Journal des Debats. He visited the United States, Mexico and Cuba. He negotiated with Richard Cobden a commercial treaty between England and France in 1860.

He became a councillor of state (1838), pro¬

fessor of political economy in the College de France (1840), member of the Chamber of Deputies (1845), and member of the Institute (1851), senator in 1860, and grand officer of the Legion of Honor the following year. He pub¬

lished (Letters on North America) (1836) ; (On the Materials of Interest in France5 ; As¬

says on Industrial Politics) ; (Course in Politi¬

cal Economy 5 ; (History and Description of the Ways of Communication in the United States5 (1840-42); (Mexico: Ancient and

Modern5 (1863). He was a strong advocate of free trade, and a specialist on questions of cur¬

rency.

CHEVAUX-DE-FRISE, she-vo-de-frez

(Friesland horses, so called because first used at the siege of Groningen, in that province, in 1658), armed beams of square timber or iron used to defend the fronts of camps, breaches, etc., by closing them up. They are usually from 15 to 18 feet long, and connected by

chains, each being perforated with small holes to receive rods of wood or iron, pointed at their extremities, and when moved in any di¬

rection making a sort of hedge of spears. In their original form they were made of spears, sword-blades and other steel instruments such as were readily found at hand in the army equipment.

CHEVERUS, she-vrus, Jean Louis Anne

Magdeleine Lefebvre de, French bishop and cardinal of the Roman Catholic Church : b.

Photograph by J. Horace McFarland Co.

CHINQUAPIN

.

S

Mayenne, France, 28 Jan. 1768; d. Bordeaux, 19 July 1836. He was ordained priest in 1790.

Refusing to take the constitutional oath re¬

garding the clergy, he was imprisoned at Paris as contumacious in 1792, but escaped to Eng¬

land. There he engaged in missionary work, but in 1796 he came to Boston, Mass., where he was noted for his graceful and winning pulpit eloquence. In an epidemic of yellow fever in the city he ministered bodily and spiritually to the stricken. He studied the language of the Abenaki Indians on the Penobscot and the Passamaquoddy in Maine, visited their settle¬

ments and remained among them at his first visit three months; and every year thereafter he repeated his visit to them, built them a church and procured for them a missionary priest, who thereafter till his death, 20 years later, devoted himself to their spiritual care.

On the occasion of a visit of President John Adams to Boston, the two seats of honor at a public banquet were reserved for the chief magistrate and the priest. Mr. Adams' name headed the list of names of subscribers to a fund to erect a church for Cheverus' congrega¬

tion. In 1810 Cheverus was consecrated

bishop of Boston and entered on the duties of the episcopate with a zeal and industry that taxed his strength to the utmost, and his phy¬

sicians in 1823 counseled his return to his native land. There the French king, Charles X, named him bishop of Montauban, and, in 1826, bishop of Bordeaux and a peer of France.

Here in a visitation of cholera he placarded his episcopal palace as a maison de secours or dis¬

pensary. At the instance of King Louis Philippe the Pope, Pius VII, in 1836 created him a cardinal. The position that Boston now holds in the Catholic Church is due to the earnestness, zeal and skilful administration of Cheverus during his years of labor there. Con¬

sult (Life, > by Huen-Dubourg (1837).

CHEVES, chevz, Langdon, American

statesman: b. Rocky River, S. C., 17 Sept. 1776; d. Columbia, S. C., 25 June 1857. He began to study law at the age of 18, entered upon his profession with superior natural qualifications and after severe discipline he rapidly attained eminence and wealth in its practice. He was a representative in the national Congress be¬

fore and during the War of 1812, and was a zealous supporter of the party which carried the declaration of war. He was chairman of the Naval Committee in 1812, and of the Com¬

mittee on Ways and Means in 1813, and con¬

stantly opposed the restrictive system. When Henry Clay was sent as commissioner to Ghent, Cheves succeeded him as speaker of the House. He retained this office till 1815. The National Bank under injudicious management had become hard pressed and was on the verge of stoppage in 1819, when Cheves was elected president of its board of directors. By a rigor¬

ous system of retrenchment, and by making credits only upon sufficient securities, the bank was saved, and specie payments maintained, at the principal centres of commerce. Resigning office after three years, he became chief com¬

missioner under the treaty of Ghent for settling some of its provisions.

CHEVET, che-va, a variety of the apse, almost exclusively confined to French Gothic churches. The extreme end of the chancel or choir is called the chevet. The apses or chapels are made to radiate around the choir aisle. There are generally five apses, but, es¬

pecially in early architecture (from the 11th century), constructions with four apses are met with. Henry III introduced the chevet into England, in a part of the edifice of West¬

minster Abbey. In some French churches there are only three; but in others there are seven, and in still others, nine apses, the second one of which was generally dedicated to the Virgin Mary.

CHEVILLARD, she'-ve'yar', Camille,

French composer: b. Paris, 14 Oct. 1859. His father was the lamous 'cellist, Pierre Chevillard.

He was self-taught in composition and studied the piano under G. Mathias. For many years he was assistant conductor to his father-in-law, Lamoureux, whom he succeeded in 1899. He continued the Concerts Lamoureux and main¬

tained the high standard established by his pred¬

ecessor. He received the Chartier prize for chamber music in 1903, and in 1913 became president of the French Society for Chamber Music. His compositions include a symphonic ballad, a symphonic fantasy, a string quartet, a piano trio, a sonata for violin and piano, and a sonata for piano and ’cello.

CHEVIOT, she’-vi-ut, HILLS, a range on

the borders of England and Scotland, stretching southwest to northeast for above 35 miles, the larger part of the range being in Northumber¬

land, England, and the lesser part in Roxburgh¬

shire, Scotland. Their culminating point, known specially as the Cheviot, has a height of 2,676

feet; Carter Fell, the next in height, is a little more than 2,000 feet high. They are clothed for the most part with a close green sward, and are pastured by a celebrated breed of sheep ad¬

mirably adapted for hilly districts, and known in many of the more elevated districts of Great Britain. They form the headwaters of the Tyne, Tweed and other rivers of the border country.

CHEVIOT SHEEP, a breed of sheep of

large carcass and valuable fleece, which has been pastured from time immemorial on the Cheviot Hills, on the borders of England and Scotland, and which from its powers of en¬

durance is justly regarded as the most valuable mountain sheep of Great Britain. The peculiar features of the Cheviots are the absence of horns in both sexes; white or mottled-gray face and legs, an erect, long and clean head, destitute of wool, while both the throat and neck are well covered, long open ears well covered with hair, and altogether a fine, open, sprightly coun¬

tenance, with every indication of hardiness. The fleece weighs from three to four pounds, and the weight of the carcass varies in ewes from 12 to 16, and in wethers from 16 to 20 pounds per quarter. The

Cheviots, though originally confined to a small area, are now spread over all parts of the kingdom, and, except on the most barren and stony grazings, are far more profitable than the heath breed.

CHEVREUL, she-vrel, Michel-Eugene,

French chemist: b. Angers, 31 Aug. 1786; d.

Paris, 9 April 1889. He was educated in his native town, and when a youth went to Paris, and was employed in the chemical factory of Vauquelin. In 1813 he became professor of 432

physical science in the Charlemagne Lyceum ; in 1824 he was made director of dyeing in the carpet manufactory of the Gobelins, and in 1830 succeeded Vauquelin in the chair of chem¬

istry at the Museum of Natural History. He was the author of (Lectures on Chemistry Ap¬

plied to the Art of Dyeing5 (1831) and other treatises on chemistry and dyeing, and an im¬

portant work on the (Principles of Harmony and Contrast of Colors5 (1839), which has been translated into English. He was a commander of the Legion of Honor, and the centenary of his birth was celebrated in Paris with much enthusiasm. Chevreul's studies and discoveries had a deep and far-reaching effect upon the scientific development of organic chemistry.

He led the way to the use of proper methods of analyses and the establishment of scientific rules of procedure with the use of fixed nomen¬

clature in all chemical investigation, which, he insisted, should be, above all things, exact. He is one of the most original figures of his age and he has left a very definite impression on the page of chemistry.

CHEVREUSE, chev -rex, Marie de Rohan

Montbazon, mon-ba-zoh, Duchess of, daugh¬

ter of the Duke of Montbazon, French political adventuress : b. December 1600 ; d. Gagny, near Paris, 12 Aug. 1679. When scarcely 17 years old, she married the Duke of Luynes who died four months afterward. She next became the wife of Claude de Lorraine, Duke of Chevreuse.

A great friend of Anne of Austria, by whom she was made superintendent of the royal house¬

hold, she incurred the hatred of Richelieu, and succeeded so well in making herself obnoxious to him, that he determined to have her arrested ; but, made aware of his project, she assumed man's attire, crossed the Somme by swimming and fled to England (1637). For years she was an exile from France, and King Louis XIII had been inspired by his minister with such fear of her uncontrollable spirit and cunning, that in his will he forbade her return to France. In spite of this, Anne allowed her to return, with¬

out, however, showing her the same degree of confidence as before; though she made her a present of f250,000. Afterward she engaged in new plots against Mazarin, mostly acting in concert with Cardinal de Retz, and was once more compelled to leave France, fleeing to Flanders. She soon returned to France and made her peace with Mazarin, and became his helper in several political intrigues. Through¬

out all these adventures and audacious intrigues the Queen had a soft place in her heart for the pretty, clever and charming Duchess, whom she learned, however, not to trust altogether.

CHEVRON (Fr. c-hevre, a goat), chev'run, a bent bar or shield, rafter-shaped, in heraldry.

A chevron is, according to some, a third, and, according to others, a fifth of the field. A chevronel is half a chevron, and the couple close the fourth of the shield. A chevron couped is that which does not reach the sides of the escutcheon. A chevron in chief is one which rises to the top of the shield. In architecture a chevron is a zigzag molding, characteristic of romanesque architecture in France, England and Sicily. It is a common decoration of the Norman arch. It is also used as a badge of rank by officers of armies, navies, police and other uniformed bodies.

CHEVROTAIN, shev'ro-tan (Fr. C hey rot, Lat. caper , goat) a family (Tragulidce) of un¬

gulates, which though ruminant, in the general sense, differ in many respects from true deer; they resemble the true Cervidcc in certain minor peculiarities, and the musk-deer in others ; but anatomically they are, in the main, distinct, es¬

pecially in such of the more important char¬

acteristics as make naturalists class them by themselves. The chevrotains are divided into two genera, one African, and the'other Asiatic, the latter genus (Tragulus) being that of the true chevrotains. These form a group of dimin¬

utive, hornless, deerlike animals, standing only about 12 inches high, found in southern India, Ceylon and the Malayan Peninsula. They are usually reddish, tawny or mouse-gray in color, except the Indian mouse-deer (Tragulus mem-inn a) , which is flecked with white. The ((water-deer55 of western Africa is a kindred species, as is also the species found in the Philippines.

These animals are shy little creatures, with a peculiarly stiff manner of walking, and given to hiding in thickets and inaccessible crags.

They may, however, be readily tamed. They are considered as a survival of the Miocene form to which is also attributed the ancestry of the deer.

CHEVY CHASE, chev'i chas, the name of

a celebrated border ballad probably founded on some actual

encounter occurring between Percy and Douglas, although the incidents mentioned in it are not historical. It is this ballad that Sir Philip Sydney speaks of when he says, in his (Defense of Poetry,5 (<I never heard the old song of Percie and Douglas that I found not my heart moved more than with a trum¬

pet55 ; and which is made the subject of a critique by Addison in Nos. 70 and 74 of the Spectator. On account of the similarity of the incidents in this ballad to those of (The Battle of Otterbourne,5 the two ballads have often been confounded; but the probability is that if any historical event is celebrated at all in the ballad of Chevy Chase, it is different from that celebrated in (Thc Battle of Otterbourne, 5 and that the similarity is to be ex¬

plained by supposing that the incidents were borrowed.

There are two versions of the ballad bearing the name of Chevy Chase, an older one and a more modern one. The older version is some¬

times called the (Hunting of the Cheviot,5 which is its original title. It begins thus : “ The Persj owt of Northombarlande,

And a vowe to God mayd he,

That he wolde hunte in the mountayns

Off Chyviat within dayes thre,

In the mauger of doughte Dogles,

And all that ever with him be.”

Neither the exact age nor the name of the author of this version is known. From the fact that it is mentioned in the (Complaynt of Scot¬

land,5 written in 1548, where it is called the (Huntis of the Chevot,5 it is clear that it was known in Scotland before that time, and since James of Scotland is mentioned in the ballad, it may be inferred that it was not written before the reign of Henry VI, for James I did not ascend the throne of Scotland till two years after Henry VI had become king of England.

As for the author, it is true that a manuscript of the ballad contained in the Ashmolean col¬

lection at Oxford is subscribed by one Rychard CHEW — CHEYENNE

Sheale, but it is likely that this Rychard Shealc was merely one who had frequently recited the ballad, and perhaps the person who committed this old version to paper. This is probably the version with which Sir Philip Sydney was ac¬

quainted, since he speaks of it as <(evil apparelled in the dust and cobweb of an uncivil age.®

The age of the more modern version is no better known than that of the older one, but it is said by Dr. Rimbault to be no later than the reign of Charles II. This is the version which forms the subject of the critique by Addison in the above-mentioned numbers of the Spec¬

tator. The following is the opening stanza as given in Percy's Uˆeliques* :

“ God prosper long our noble king,

Our lives and safetyes all;

A woefull hunting once there did

In Chevy-Chace befall.”

CHEW, Benjamin, American jurist: b.

West River, Md., 1722; d. 1810. He studied law in Philadelphia in the office of Andrew Hamil¬

ton and later in London. He returned to Phila¬

delphia in 1754 and held successively the offices of register of wills, attorney-general and chief justice of Pennsylvania. He joined the ranks of the Loyalists on the outbreak of the Revolu¬

tionary War, resigned the office of chief justice and retired to private life. His stubbornness in refusing to sign a parole led to his imprison¬

ment at Fredericksburg, Va., in 1777. During the battle of Germantown his mansion there was badly damaged in the bombardment. From 1790

to 1806 Chew was president of the High Court of Errors and Appeals, which was abolished in the latter year.

CHEW, Ng Poon, Chinese-American

editor: b. Sun Ning, China, 1866. He was edu¬

cated at the Occident School, San Francisco, and at the Theological Seminary there. He wras destined for the Taoist ministry by his parent, but becoming a convert to Christianity he , ntered the Christian ministry. In 1899 he re¬

signed and established the first illustrated Chinese weekly and also the Chung Sai Y at Po, the first Chinese daily newspaper in the United States. In 1906 he was made adviser to the Chinese consulate general. He is a recognized authority on matters pertaining to Asiatic ex¬

clusion and Chinese-American relations. His published works include (Non-Exclusion) (1905) and (Treatment of Exempt Classes of Chinese in America) (1908).

CHEWING-GUM, a resinous gum used as

a masticatory. The habit of chewing gum is perhaps peculiar to the United States. At first the resinous exudations of the spruce, cherry, etc., were employed in their native state; but with the increase of the habit the spruce supply nearly failed, and recourse was had to other ingredients. The gum resins of sweet gum, tamarack and certain other forest trees are also used. Balsam of tolu is a constituent of certain kinds of gum, while paraffin has also been employed. Paraffin is also very largely used as an adulterant in the cheaper grades of gum, which in consequence crumble when chewed. Of late years a gum known as chicle, an elastic gum from the naseberry, a tree of tropical South America, somewhat similar to the India-rubber tree (q.v.), has come to the front as the foundation of most of the chewing-gum. The chicle gum is chopped into fine par-VOL. 6 — 28

tides, dried and then cooked in steam-jacketed kettles. At this stage sweetening and flavoring ingredients are added to the mass, which is mixed mechanically. The resulting (<dough® is then kneaded on a table and rolled between rollers having knives set into their faces. These knives cut the sheets into suitable sizes for the market, and, after drying, the sticks are wrapped, packed and shipped. The practice of chewing gum is probably harmless, and in mild cases of indigestion it may even be somewhat beneficial, by mechanically stimulating the flow of saliva. Pepsin, mint and similar substances are often mixed in with the gum; thymol being added in the so-called antiseptic gums, but it is safe to say that the success of any particular brand depends more upon its sweetness and flavor than upon any beneficial properties. In 1914, 2,689 persons were engaged in the manu¬

facture of chewing-gum in the United States, in 74 establishments with a capital of $10,-

625,000; the salaries and wages amounted to $1,648,000. Raw materials to the value of $7,-

322,000 were turned into a finished product valued at $17,159,000.

CHEWINK. See Towhee Bunting.

CHEYENNE, shi-en' (Sioux, 'Ted,® *i.e.*

foreigners = enemies : their own name =

(ffiurs®) an important Indian tribe of the great Algonquin stock, and its westernmost member except the Blackfeet. In the 18th century they lived on the Cheyenne River in eastern North Dakota, but were gradually driven southwest by the Sioux to the forks of the Big Cheyenne near the Black Hills, where Lewis and Clark found them in 1803. Originally settled agricul¬

turists, their acquisition of horses turned them, like the other plains Indians, into nomad raid¬

ers and led to their foraying even to Mexico, and claiming lands as far apart as the upper Missouri in northern Montana, and the forks of the Platte, though they numbered but little over 3,000. The first United States treaty with them was made in 1825 in the former locality.

They had already fraternized with the Sioux; and when their location at the Black Hills grew unsatisfactory, one section (the (<Northern Cheyenne®) joined the Ogallalla Sioux in driv¬

ing the Crows from the Powder and Tongue river valleys in southeast Montana, while the remainder (the <(Southern Cheyenne®) moved south and formed a confederacy with their Algonquin kinsmen, the Arapaho, on the Arkan¬

sas. In 1851 a treaty was made with the North¬

ern band at Fort Laramie, on the North Platte, to cut roads through their lands. A number of treaties were made with the Southern, but it is alleged that the commissioners neither made them intelligible nor executed them fairly ; the Cheyenne, with their Indian allies, committed the usual atrocities which were their one method of retaliation ; the settlers clamored for their extermination ; the military desired to cow them by heavy punishment ; the Indian Depart¬

ment blamed both and wished peace. The Indian commissioner in 1864 sent some 400

Cheyenne and Arapaho to a camp at Sand Creek, Colo. ; Colonel

Chivington fell upon them 29 November (see Sand Creek Massacre),

and butchered 131 men, women and children.

A bloody and costly war followed ; the next year the tribe consented to go upon a reserva¬

tion, except a band called the (<Dog Soldiers,®

who held out. In 1867 Hancock burned their village at Pawnee Fork, and another war with them began. On 27 Nov. 1868, Custer inflicted a crushing defeat upon them at the Washita in Indian Territory, killing Black Kettle, their chief, and compelling them to return to their reservation. The Northern band all this time remained peaceful, despite urgent solicitations from their brethren and the Sioux. Fresh treaties were made in 1866 and 1868. The Northern Cheyenne are on a reservation in the Tongue River Valley, Custer County, Mont.; the Southern Cheyenne are united with the Arapaho, in Oklahoma ; their reservation was on the Canadian River,' near Elreno, but was opened up in 1892. The tribe numbers about 3,055, and is governed by a council of five chiefs. The Cheyenne are a tall, finely built race, the best physically of all the plains In¬

dians except the Osages; but rather dull intel¬

lectually. Their language is one of the most difficult even of Indian tongues. They live in tepee, observe the Sun Dance, and maintain a complex social organization. Consult Dorsey, (Field Columbian Museum Publications* (Chi¬

cago 1905).

CHEYENNE, locally shi'-an', Wyoming,

city, capital of the State, and county-seat of Laramie County, on the

Union Pacific, the Colorado and Southern, and the Burling¬

ton Route railroads, 110 miles north of Denver. Cheyenne, named after the local Indian tribe, is situated in the southeastern part of the State on a plateau near the Laramie Range, 6,075 feet above sea-level.

A boulevard three miles in length ex¬

tends northwest to Fort D. A. Russell, an im¬

portant United States military post, with build¬

ings and equipment valued at $7,000,000, com¬

memorating the Union officer, Maj.-Gen. David Allen Russell, who was killed at Opequan, Va., in 1864. Cheyenne was founded and the

fort built in 1867, by Union Pacific Railroad engineers and United States army officers, when the railroad reached this point, and here the Union Pacific Railroad established its main work and repair shops which have contributed largely to the industrial prosperity of the city.

Coal, iron, oil and other valuable mineral de¬

posits are worked in the vicinity, and besides numerous manufactures of commodities for local consumption and export, dry-farming, cat¬

tle and sheep-grazing are large and important industries. Cheyenne is the centre of an ex¬

tensive meat-growing region, shipping beef-cattle and sheep to eastern markets, and is also the supply depot for a large amount of the game hunting trade and sport of the Rocky Mountains. Cheyenne is attractively laid out with broad streets and boulevards, and enjoys the distinction of having been the first city in the United States to be lighted by electricity.

It has modern gas plant, electric street car sys¬

tem, an up-to-date fire department, and a municipal system of waterworks, including five storage reservoirs and a filtration plant which cost $80,000; its parks and ornamental lakes cover 800 acres. <(Frontier Days," an annual celebration providing the largest Wild West show of its kind in the world, is a feature of civic life which attracts thousands of visitors.

Cheyenne was selected capital of Wyoming Ter¬

ritory in 1869, and was almost destroyed by fire in the same year. The city is administered by three commissioners under the commission form of government. Its chief buildings are the State capitol, the Federal building and post-office, the State governor's mansion, city hall and county courthouse, soldiers and sailors'

home, Carnegie library, banks and trust build¬

ings, schools and high school, the Industrial and other clubs, Masonic, Elks, Eagles buildings, hospital, opera-house, Union Pacific station, good hotels and handsome churches of the lead¬

ing religious denominations, including the Con¬

vent of the Holy Child Jesus and Saint Mary's Catholic Cathedral. Pop. (1920) 13,829.

CHEYNE, chan, George, Scottish physi¬

cian: b. Methlick, Aberdeenshire, 1671; d. Bath, England, 13 April 1743. He started a London practice in 1702, in which year he was elected a fellow of the Royal Society. Full living made him enormously fat, as well as asthmatic, but from a strict adherence to a milk and vegetable diet he derived so much benefit that he recom¬

mended it in all the later of his dozen medical treatises, which included (A New Theory of Fevers* (1701); Philosophical Principles of Natural Religion* (1705) ; (Essay of Health and Long Life) (1725) ; and the (English Malady, a Treatise on Nervous Disorders) (1733).

CHEYNE, Thomas Kelly, English biblical

scholar: b. London, 18 Sept. 1841; d. 16 Feb.

1915. He was educated at Merchant Taylors'

School, Worcester College, Oxford and Got¬

tingen. In 1868 he was elected fellow of Bal-liol College and from 1885 to 1908 he was Oriel professor of the interpretation of Scripture at Oxford. He edited the Old Testament por¬

tion of the Variorum Bible for Messrs. Eyre and Spottiswoode, and in

1884 became a mem¬

ber of the Old Testament Revision Company.

His numerous works deal exclusively with the exposition and criticism of the Old Testament books, and reveal a scholarly and able attempt to reconcile the views of the advanced critics of the Bible with those of the evangelical school.

CHEYNE, Sir William Watson, English

surgeon. He was b. Edinburgh, 14 Dec. 1852, educated at Edinburgh University, and was Hunterian professor of the Royal College of Surgeons of England, 1888-90. He has pub¬

lished (Antiseptic Surgery* (1882) ; (Manual of the Antiseptic Treatment of Wounds) (1885) ; and other important professional works. He was created a baronet in 1908.

CHEYNE-STOKES RESPIRATipN, a

breathing common in severe cases of diseases of the heart, kidneys or other severe affections.

The respirations occur in a cycle ; becoming gradually deeper and more frequent up to a point when they grow weaker until to all ap¬

pearances breathing ceases. After a pause the cycle begins all over again. Such a state usually presages death.

CHEYNEY, cha'-ne, Edward Potts,

American educator and sociological writer: b.

Wallingford, Pa., 17 Jan. 1861. After graduat¬

ing from the University of Pennsylvania in 1883, he took a post-graduate course there, and later traveled abroad, studying in German universities and in the British Museum. Upon ch£zy

his return he was appointed professor of Euro¬

pean history in the University of Pennsylvania.

He has written (Social Changes in England in the 16th Century > (1896) ; (Social and Indus¬

trial History of England* (1901) ; (A Short History of England* (1904) ; background cf American History) (1905) ; headings in Eng¬

lish History* (1908) ; (A History of England, from the Defeat of the Armada to the Death of Elizabeth) (2 vols., Vol. I, 1914) ; also monographs and review articles on history and economic subjects.

ch£zy, sha-ze, Antoine Leonard de,

French Orientalist: b. Neuilly, France, 15 Jan.

1773; d. there, 31 Aug. 1832. He began his studies in the ficole Polytechnique, and after¬

ward attended the lectures of Audran, Caussin and Silvestre de Sacy, on Oriental literature.

Unassisted, he taught himself Sanskrit, and became so proficient in it that, in 1815, a chair of Sanskrit was formed expressly for him in the College of France. Among his productions is a free French translation of the Persian poem, (Medjouin and Leila.) He also published Kalidasa's drama of cSakuntala,* in the original, with a translation

accompanied with notes. Consult Klenck, (Chezy, Wilhelmine Christine von* (Paris 1830).

CH&ZY, Wilhelm von, German novelist

and historical essayist: b. Paris, 21 March 1800; d. Vienna, 13 March 1865. He was the son of A. L. Chezy (q.v.). He acquitted himself cred¬

itably as a journalist, and wrote many popular tales: (The Wandering PupiP (1835); (The Six Noble Passions) (1842) ; and (The Last Janissary) (1853), among them; as well as (Chivalry in Picture and Word* (1848).

CHHATISGARH, chut-tes-gar', India, the

southeast division of the ˆCentral Provinces, comprising formerly the districts of Raipur, Bilaspur and Sambalpur, and several small feudatory states. In 1906 Sambalpur was given to Bengal, and the district of Drug constituted out of parts of Raipur and Bilaspur. Its area is 21,240 square miles. It is mainly a vast fertile plateau, and has of late become a great centre of the Indian grain trade. Dongargaon is the capital. Pop. 3,246,767.

CHIABRERA, Gabriello, ke-ab-ra'ra, Ital¬

ian lyric poet: b. Savona, 8 June 1552; d.

Savona, 14 Oct. 1637. Impatient of de¬

pendence on the great, he again and again abandoned the courts of noble patrons.

He visited Rome and resided a consid¬

erable time at Florence and Genoa, settling finally in his native place. Wherever he went he was loaded with presents and honors. Pin¬

dar and Anacreon were his models among the poets, and his countrymen named him ((the Italian Pindar,® but his Pindaric odes have little grace and force, being labored rather than spontaneous. Some of his little songs after Anacreon are models of elegance and

grace.

He wrote epic and dramatic poems also. He showed himself a master of complex rhythms ambitious and new in form, and a master of the Italian language such as had never before ap¬

peared. He was the last of the great Italian writers until the appearance of Manzoni in modern times. He left a charming autobio¬

graphical sketch. His collected poems were published under the title of (Rime. } Chiabrera showed little originality in anything except a few of his lyrics; but his strict adherence to Latin form had a strong influence upon succeed¬

ing Italian literature.

CHIAJA,, kya' -ya, a fashionable driveway in modern Naples, commencing at the Largo Vittoria and extending for a mile along the coast. On one side is the public park, the Villa Nazionale and on the other side are many hand¬

some and imposing buildings and hotels.

CHIAN, ki'an, or CYPRUS TURPEN¬

TINE, a greenish-yellow, non-acrid turpentine or resin obtained mainly from the island of Chios (Scio), yielded by Pistachio, terebinthus, of the order Anacardiacece, a large tree, native to the Mediterranean islands and shores. The turpentine, now used only in medicine, exudes from the tree in small quantities during the warmer months, but it is obtained at other sea¬

sons by making incisions in the bark.

CHI ANA, ke-a'na (the ancient Clanis), a river of central Italy, originally a tributary of the Tiber, watering a perfectly level valley, which its overflow rendered once the most pes¬

tilential district of Italy. The bed was deepened in 1789-1816, and in 1823 extensive hydraulic works were undertaken for further improving the river course, and for leading a north branch, through

canals, to the river Arno, a few miles below Arezzo, the south stream reaching the Tiber through the Paglia at Orvieto. The double stream is 60 miles long, and one-half to one mile broad; and the district has since be¬

come one of the most fruitful in all Italy.

CHIANTI, ke-an'ti, a district in Tuscany, province of Siena, Italy, where what is now the best-known red wine of Italy is produced.

Chianti wine is full flavored and astringent, with an alcoholic strength of about 20 per cent.

CHIAPANECS, che-a'pa'neks, or CHA—

PANECS, a tribe of Indians inhabiting

the state of Chiapas in the southern part of Mexico. They were at one time very powerful and evidently were well advanced in agriculture and picture writing. They also had made some progress in mechanical art and lived in well-made houses. They were never conquered by the Aztecs but the Spaniards easily overcame them. A few remaining members of the tribe still exist in central Chiapas. They are sup¬

posed to have entered Mexico at a time much anterior to the arrival of the Aztecs, from whom they borrowed a part of their religious ideas and some of their culture. They also borrowed from the Mayas of Yucatan and northern Guatemala. So long as they have been known to history and tradition, the Chi-apanecs have been a cultured race. See Mexico — Ethnology.

CHIAPAS, che-a'pas, Mexico, a state of

this republic on the Pacific slope, bordering on Guatemala, having an area of 27,111 square miles. The capital is Tuxtla-Gutierrez. The state is in many parts mountainous, and is also in many parts traversed by fine streams, includ¬

ing the Rio Chiapas. At Palenque are the ruins of an ancient Aztec city of great beauty and magnitude. The valleys have a rich soil and

produce maize, sugar, cotton, *etc.* Some of the largest rubber plantations in the world are now being laid out here. There is a considerable export of logwood. Trade is, however, in a 436

backward .state for lack of roads. Education is free and compulsory, but the law is not strictly enforced. The state forms part of the Central American table-land, and has a fine cli¬

mate although the whole region is largely clothed in primaeval forests. Pop. 438,843.

CHIARI, ke-a’re, Pietro, Italian novelist and comedian: b. Brescia 1700; d. Brescia 1788.

After completing his studies he entered the order of Jesuits, but soon changed the monas¬

tic for the secular life and devoted himself solely to letters. He resided at Venice, with the title of poet to the Duke of Modena, and in the space of 10 or 12 years brought more than 60

comedies on the stage. Chiari and Goldoni were rivals, but the public adjudged the palm to the latter. Chiari’s dramas in verse fill 10

volumes; those in prose, four.

CHIARI (known to the Romans as

Clarium), Italy, town in Lombardy, in the province of Brescia, 14 miles west of Brescia and 36 miles east of Milan. It is well built, has several churches, two convents, an elemen¬

tary school, a hospital and a public library. It was formerly fortified,

and some of its ancient defenses still exist. It has manufactories of silk, linen and cotton, and some tanneries.

Prince Eugene here defeated the French and Spanish troops, 1 Sept. 1701. Pop. 12,489.

CHIARINI, ke-a-re'ne, Giuseppe, Italian

poet and critic: b. Arezzo, 17 Aug. 1833; d. 1908.

He began life as an official in the department of education, was in 1866 president of the Liceo of Livorno ; in 1882 of the Liceo Umberto I, Rome, and in 1892 general superintendent of secondary education. He was a student of for¬

eign literatures, especially English and German, and was editor of literary journals. His verse is mostly lyrical and has been collected under the titles (Poems> (1874); (In MemorianP

(1875); (Lacrymae) (1879), *etc.* It gives proof of deep poetic sensibility. He translated some of Heine's poems and published critical essays on English and German poets.

CHIAROSCURO, ke-ar-os-ku ro, or CHI—

AROOSCURO, ke-a-ro- (It. chiaro, clear;

oscuro, dark), in painting the art of judiciously distributing the lights and shadows in a picture.

A composition, however perfect in other re¬

spects, becomes a picture only by means of the chiaroscuro, which gives faithfulness to the rep¬

resentation, and therefore is of the highest im¬

portance to the painter; at the same time it is one of the most difficult branches of an artist's study, because of the want of precise rules for its execution. Every art has a point where rules fail, and genius only can direct. This point in the art of painting is the chiaroscuro.

The drawing of a piece may be perfectly cor¬

rect, the coloring may be brilliant and true, and yet the whole picture remains cold and hard. This we find often the case with the ancient painters before Raphael ; and it is one of the great merits of this sublime artist that he left his masters far behind him in chiaros¬

curo, though he is considered not so perfect in this branch as Correggio and Titian, who were inferior to him in many other respects. The mode in which the light and shade are distrib¬

uted on any single object is easily shown by lines supposed to be drawn from the source of the light which is shed over the figure; but chiaroscuro comprehends, besides this, aerial perspective and the proportional force of colors, by which objects are made to advance or recede from the eye, produce a mutual effect and form a united and beautiful whole. Chiaroscuro re¬

quires great delicacy in conception and skill in execution ; and excellence in this branch of art is to be attained only by the study of nature and of the best masters. Chiaroscuro is also understood in another sense, paintings in chiar¬

oscuro being such as are painted in light and shade and reflexes only, without any other color than the local one of the object, as representa¬

tions of sculpture in stone or marble. There are some fine pieces of this sort in the Vatican, at Rome, by Polidoro da Caravaggio, and on the ceiling of the Paris Bourse by Meynier and Abel de Pujol.

CHIASTOLITE, ki-as’to-lit, a variety of

the mineral andalusite, occurring in stout crys¬

tals of prismatic aspect, and distinguished by containing carbonaceous impurities that are dis¬

tributed through the interior according to a geometric scheme, so that a cross section of the crystal presents a tesselated appearance or shows a distinct colored cross. In the United States it is found at Lancaster and Sterling, Mass., and in Canada at Lake Saint Francis.

Also called “made.® The name ((chiastolite® is derived from a Greek word signifying <(arranged diagonally.®

CHIAVARI, kya-va’re, Italy, a seaport in the province of Genoa, on the Gulf of Rapallo, 23 miles southeast of Genoa. It has narrow streets lined with substantial houses and open arcades ; statues of Garibaldi and Mazzini, at¬

tractive public gardens, a technical and nautical school and a gymnasium. Silks, lace and fur¬

niture are manufactured, and fishing and trad¬

ing are carried on. Pop. 13,700.

CHIAVENNA, kya-ven’na, Italy, a town

on the Mera 38 miles north-northwest of Ber¬

gamo, in the province of Sondrio, Lombardy.

It stands in a valley in the midst of magnificent scenery on the road to the Spliigen, and at the junction of two passes through the Alps, and has an important transit trade. Pop. 4,788.

CHIBCHAS, cheb’-chas, or MUSICAS, a

tribe of Indians who, at the time of the con¬

quest of Colombia, occupied the upland country in and around Bogota. When the expedition under Gonzalo Timenez de Quesada came into contact with the Chibchas in 1536, after a toil¬

some, unpleasant and dangerous journey up the Magdalena River, through jungle and forest and over rugged mountains, they were a fairlv civilized people living in well-built towns and villages, cultivating the land and carrying on extensive trade and commerce. An organized government, a highly developed religion, a com¬

plicated mythology and a powerful and much venerated priesthood and ruling class bound the Chibchas into a compact nation which was fully aware of its superiority over the other races by which it was

surrounded and with which it did business. The Chibchas were skilful artisans, and their work in gold, silver and precious stones was almost the equal of the best of the kind done by the native races of America. In their size, construction and architecture their temples only fell short of the excellence of the sacred edifices of the Peruvians, Aztecs, Mayas and more advanced CHIBOUQUE — CHICAGO

races of Guatemala. Though they fought val¬

iantly in defense of their homes and their ruler and priests, the Chibchas were defeated oy Quesada and their country renamed by him New Granada (Nuevo Reino de Granada) ; and their capital city was baptized Santa Fe de Bogota and dedicated to the service of the king of Spain (1538). At the time of the con¬

quest the Chibchas had amassed vast quanti¬

ties of gold, which the Spaniards seized. They had considerable scientific knowledge and pos¬

sessed a hieroglyphic system of writing much like that in use among the neighboring cultured native races. They traded the products of their cold upland country, for those of the temperate and hot lands ; and they mined em¬

eralds and salt, for which they had a constant and ready market. These are to-day still two of the most important industries of Colombia.

The salt and the emeralds from the Chibcha mines were carried down the Magdalena River and distributed all along the neighboring seacoast, and from there carried far into Central America and some of them are believed to have reached the capital of the Aztecs before the discovery of America. The Chibchas also ex¬

cel in weaving, the tanning of skins and the making of pottery. Their complicated religious system, which was based on nature worship, had much affinity with the various creeds of Cen¬

tral America and Mexico.

CHIBOUQUE, chi-book', CHIBOUK,

CHIBUK (Turk. Chibuq, pipe), a long Turk¬

ish pipe having generally a wooden stem, an amber mouthpiece and a clay bowl. The stem, which is usually from four to five feet long, is generally wound with silk, cotton or other thread. This is frequently kept wet to cool the smoke of the pipe by evaporation.

CHICA, or CHICHA, che'cha, a South

American word having several meanings.

(1) A species of Sterculia, the seeds of which are eaten in Brazil. They are about the size of a pigeon's egg and have an agreeable taste.

(2) A red coloring matter prepared by the Indians on the upper parts of the Orinoco and the Rio Negro from the leaves of a plant na¬

tive to that region called Bignonia chica, and with which they paint their skin, in order to be better able to resist the rays of the sun. It is of a beautiful vermilion color, and, although of a resinous nature, is not liable to become liquid under the influence of heat. It is soluble in alcohol, and stains cotton orange-yellow. It is extracted by boiling the leaves in water, de¬

canting the decoction and allowing it to settle and cool when a red matter falls down, which is formed into cakes and dried. It is also called carajuru. (3) A dance popular among Spanish South Americans. It is said to have been intro¬

duced into Spain by the Moors, and to have been the origin of the fandango, the chaconne, the cachucha and the bolero and other similar dances known by distinct names in different parts of Spain, which some writers declare to be the chica under a more decent form. It is similar in character to the dance of the Angris-mene performed at the festivals of Venus, and still popular among the modern Greeks.

CHICA, che'ka, PITO, pe'to, or POSO,

a kind of beer made from maize, in general use in Chile, Peru and other mountainous regions of South America. It was the national drink of the natives long before the appearance of the Spaniards. The most ordinary method of pre¬

paring it is to steep the grains of maize until they begin to sprout, when they are exposed to the sun. The malt thus prepared is then ground, mixed with warm water and left to lerment. The beer, when ready, has a dark-yellow color and a pleasant and somewhat bitter and sour taste. It is consumed by the Indians in great quantities. When Chica has been buried for some time in the earth in pitchers it has a violently intoxicating effect.

CHICACOLE, chik-a-kol', or CICACOLE, India, a town in the Gan jam district, Madras Presidency, near the coast, about 567

miles northeast of Madras, at one time famous for its fine muslin manufactures. On two occa¬

sions, namely in 1791 and 1866, it suffered much from famine, and in 1876 a flood did consider¬

able damage to the town. Pop. 20,000.

CHICAGO, Ill., the second city in the

Union, is in Cook County, and lies on the south¬

western shore of Lake Michigan. The dome of the courthouse is in north latitude 41° 53′ 2″

and longitude 87° 36′ 47″ W. The city has a shore line on the lake of 24.5 miles and ex¬

tends 10 miles inland. The city area, 198.997

square miles, covers a great part of the alluvial plain formed by the Chicago and Calumet rivers. The Chicago River is formed by the junction of two small rivers, the north and south branches, thus dividing the city into three portions commonly known as the North, South and West sides, respectively. Calumet River is the outlet by

which the shallow sheet of water known as Calumet Lake empties into Lake Michigan. The land on which the city is built is level and lies quite low, the elevation above Lake Michigan being only 25 feet. The two rivers form natural harbors, which have been improved by dredging. The shore of Lake Michigan is broken by few bays or inlets, and harbors are infrequent, and, as a rule, not commodious. Wherever, therefore, a river is found, navigators eagerly use it, so far as its depth permits, as a refuge from the storms of the great lake. Still, rivers so small as these afford inadequate facilities for the commerce of such a city as Chicago has grown to be, and one of the needs of the early future is provision for a commodious harbor, with sufficient depth of water, proper dockage and protection from storms.

Early History. — In the earlv days of French exploration it was found that the Indians used the Chicago River as one line of travel by which the Mississippi could be reached. Passing up the river and its south branch, a portage of only four or five miles brought the traveler to the Desplaines River, down which his canoe passed to the Illinois River, and so to the Mis¬

sissippi. This route seems to have been used bv white men for the first time in 1673, when Joliet and Marquette, returning from the Illi¬

nois River, were shown by the Indians the Chicago portage. It may be that thev descended to Lake Michigan by the Calumet. Pere Mar¬

quette spent the winter of 1674— 75 in a cabin on the south branch of the Chicago River, being unable on account of physical weakness to pros¬

ecute his journey to the Illinois villages. It was in the following springtime that the devoted missionary died, while endeavoring to make his 438

way to Mackinac by the east shore of Lake Michigan.

The French seem later to have had a fort at the Chicago portage, although it was prob¬

ably a mere stockade, and no regular garrison was kept in it. This fort is mentioned by Tames Logan in his report to the governor of Pennsylvania in 1718, and also in the Treaty of Greenville, 1795. However, the Chicago portage was not much used by the French, as they found other routes of travel safer and more convenient.

About the time of the Revolutionary War a colored man from San Domingo, Jean Bap¬

tiste Point de Saible (or an Sable), made his way to the Chicago River and established him¬

self there as an Indian trader. Here, about 1777, he built a house of squared logs which may be regarded as the beginning of continuous settlement at Chicago. This house he sold in 1796 to a French trader, who in turn sold it in 1803 to John Kinzie, the first American set¬

tler. The house, known as the old Kinzie mansion, stood on the north bank of the river opposite the site on which Fort Dearborn was later built, and was in existence until 1837.

Kinzie was an Indian trader, and no doubt thought the Chicago a convenient centre for his business. He brought his family to his new home in 1804, the same year in which the fort was built, and thereafter continued his residence there until his death (1828).

Fort Dearborn was a mere stockade, with two blockhouses. The quarters for the garri¬

son were enclosed in the stockade. It was sit¬

uated on the south bank of the river, not far from the lake. At that time the river took a sharp turn to the south just east of the fort, and made its way into the lake over a heavy sandbar not far from what is now the eastern end of Madison street. The bar was not capable of being crossed by anything larger than a small boat, and the schooner which, in 1804, brought the stores for the garrison had to anchor and

land passengers and cargo in boats. The first garrison consisted of one company of infantry (of the First regiment). The site of the fort was on a reservation of six square miles, ceded to the United States by the Indians in Wayne's treaty made at Greenville in 1795.

The settlement at Fort Dearborn made little growth until after the War of 1812. It was far in the wilderness, being reached from Detroit by a trail through the woods, and from Mack¬

inac by lake schooners of which usually two came each year, in spring and fall.

The Massacre of 1812. — In 1812 the second war with Great Britain broke out, and at the outset in the Northwest all the advantage lay with the British and their Indian allies. Mack¬

inac was captured, thus securing to the British the control of the upper lakes, and General Hull, in command at Detroit, sent orders that Fort Dearborn should be evacuated, and that the surplus stores should be divided among the Indians. These orders were executed, and on 15 August the garrison, escorting a number of women and children, set out for Detroit by the road which wound along the lake shore.

At a point among the sand hills near the eastern end of the present Eighteenth street the savages attacked in force, and the whole body of whites were captured or destroyed. Two of the women and 12 children were butchered during the fight and a number of the wounded men were killed afterward. The Indians then burned the fort and divided the plunder.

In 1816, after peace was fully restored, Fort Dearborn was reconstructed on a somewhat lar¬

ger scale than before, and under protection of its garrison a small village slowly grew up.

Political Jurisdictions. — In the old days of French and British occupation the territory, in¬

cluding the valleys of the Wabash and Illinois rivers, west to the Mississippi and north to Lake Michigan, was commonly known as the ˆIllinois Country.® The main French settlements were at Vincennes, on the Wabash, at Kaskaskia on the river of that name, and at Cahokia and Fort Chartres, on the Mississippi. In 1763, by the Treaty of Paris, the French government yielded to Great Britain all claim to land east of the Mississippi, and thus the Illinois country be¬

came British. By the (<Quebec Act® of 1774 —one of the legislative acts of the British govern¬

ment which led to the Revolutionary War —all of the newly-acquired land between the Ohio and the Great Lakes was included in the prov¬

ince of Quebec, thus placing it under the arbitrary military government at that time pre¬

vailing over Canada.

In 1778 a small army of Virginia troops sent out by Gov. Patrick Henry, under com¬

mand of Col. George Rogers Clark, seized Kas¬

kaskia and Vincennes, and thus replaced British authority by American throughout the Illinois country. The treaty of peace of 1783 drew the northern line of the new republic through the Great Lakes, instead of through the Ohio River, as doubtless would have been done had it not been for Clark's victorious expedition, and thus the site of Chicago became finally American and not British. Virginia organized the Illinois country as a county — the county of Illinois —and under that government it continued from 1778 until the cession of all the Northwest by Virginia to the United States, in 1783.

While Clark's expedition determined the

exclusion of British authority from the Illinois country, there remained a dispute as to jurisdic¬

tion over it among several of the States. Vir¬

ginia claimed all the territory between the Ohio, the Mississippi and

the lakes, on the ground mainly of conquest. New York claimed the same territory, on the ground of a treaty with the Iroquois, who were asserted to have ex¬

tended their conquests as far as the Mississippi.

Massachusetts and Connecticut claimed, under their original charters, to own all the land between their northern and southern boundary lines of latitude west of New York as far as the Mississippi. Under these various claims Chicago is in territory claimed respectively by Virginia, New York and Connecticut. The con¬

flicts were settled by acts of cession on the part of the various States to the United States.

After the Virginia act of cession of 1783

the authority of that State was withdrawn from the Illinois country and for several years the French villagers were a law unto themselves.

In 1787, however, the ordinance for the govern¬

ment of the Northwest Territory was enacted by Congress, and thus the Chicago area came legally into that Territory. In 1790 Governor St. Clair visited Kaskaskia and formed Saint Clair County from the southwestern portion of the Illinois country. The wilderness north of that had practically no white population, and CHICAGO

hence no local government was needed. In 1796, however, the county of Wayne was or¬

ganized, which included Detroit and the Chi¬

cago area. It was in this year that the British finally withdrew their garrisons from Detroit, and the new county was named from the victor over the Indians in the campaign of 1794, who also made the Treaty of Greenville in 1795.

In 1800 the Indiana Territory was organized, in which all the Illinois

country was included, and in 1809 the Illinois Territory was created, including all west of the Wabash River and north to British America. When the boundaries of Wayne County were changed, in 1803, the Chicago area was left out, and it was not in¬

cluded within any county until 1812, when the county of Madison was formed. Under the laws of the Territory of Illinois, Chicago was included in Edwards County in 1814, and in Crawford County in 1816. In 1818 Illinois was admitted to the Union as a State. Under the laws of the State Chicago was successively in¬

cluded in Clark County, organized in 1819 ; in Pike County, 1821; in Fulton County, 1823; in Peoria County, 1825 ; and finally in Cook County, organized 15 Jan. 1831. •

The ordinance of 1787 seemed to indicate that a State in the northern part of the North¬

west Territory west of Lake Michigan should have as its southern boundary a line drawn east and west through the southern extremity of that lake, and the bill for the admission of Illinois was originally drawn accordingly. Mr.

Nathaniel Pope, delegate in Congress from the Territory, however, succeeded in having the bill amended so as to secure the present north¬

ern boundary for Illinois. Had this not been done Chicago would be in the State of Wisconsin.

Origin of the City. — In 1830 Chicago was a hamlet of log houses inhabited by something less than a hundred people. These log houses were nearly all on the North and West sides.

The beginning of the city as a prosperous town was due to the Illinois and Michigan Canal, authorized by act of Congress in 1827. By this act the State was granted alternate sections of land on both sides of the canal route, and the canal commissioners proceeded to lay out towns and sell lots in order to secure funds. One of these towns was Chicago, at the eastern ter¬

minus of the canal, and the lands platted therein were sold in 1830.

The town was bounded on the east by State street, on the north by Kinzie street, on the west by Desplaines street and on the south by Madison street. Buildings began to be erected and slowlv immigration began to come. The early settlement of Illinois had been in its southern counties and was derived mostly from southern States. The new migra¬

tion, beginning with 1830, came in the main by way of the lakes and was largely from the east, New York and New England being espe¬

cially represented. In 1833 Congress made an appropriation for a harbor at Chicago. Piers were built out into the lake, a channel was cut through the old sandbar and the spring freshets sufficed to scour it out. It was in 1834 that, for the first time, a schooner sailed up the river.

By 1837 the town had grown to have a popula¬

tion of 4,170, and in that year it was incor¬

porated as a city.

Early Railroads. — The canal, from which so much was expected, did not prove the won¬

derful success that was hoped. It was not finished till 1848. Meanwhile, however, rail¬

road construction began and opened up the prairie interior of the State, while the applica¬

tion of steam to navigation made it compara¬

tively easy to transport passengers and freight between Chicago and Buffalo. In 1849 the Galena and Chicago Union Railroad (the begin¬

ning of the present Chicago and Northwestern) was put in operation and in 1852 the Michigan Southern and the Michigan Central railways from the east reached Chicago, and others speedily followed in all directions.

Population and Area.— The growth of the new city in population, slow at first, finally be¬

came very great. Chicago is now the second city in the United States in population. The area was extended also by successive annexa¬

tions of contiguous territory. Between 1837

and 1915 the city's area increased from 2.55 to 198.997 square miles. The 4,170 people of 1837

became 4,479 in 1840, 28,269 in 1850, 109,206 in 1860, 298,977 in 1870, 503,298 in 1880, 1.099,850

in 1890, 1,698,575 in 1900, 2,185,283 in 1910 and the United States census bureau of 1915 esti¬

mated the population of the city at 2,447,045.

Chicago has a very large foreign population.

In 1910 there were 781,217 (35.7 per cent of the total population) foreign born persons in the city.

Among this number were 182,281 persons born in Germany, 121,786 in Russia, 132,059 in Aus¬

tria-Hungary, 65,463 in Ireland and 63,035 in Sweden. There were also 705,109 persons of native birth with foreign parentage. Only 20.4

per cent of the population, 445,139 persons, were native born of native parentage. The negro population in 1910 was 44,103, about 2 per cent of the total. Pop. (1920) 2,701,705.

The Great Fire of 1871.— The year 1871

was memorable for the great fire which swept a large part of Chicago from the earth. Begin¬

ning at a little before 9 o'clock on Sunday evening, 8 October, in a small barn on the West side, the flames spread through all the three sections of the city, and were not finally extinguished until Monday night, 9 October, at 10 o'clock, when a welcome rain fell. The main business and residence portion of the city was devastated. The total area of the burnt district was 2,024 acres, nearly three and a third

square miles, and the value of the prop¬

erty destroyed was estimated at $187,000,000.

The loss of life can only be conjectured — per¬

haps it amounted to 300 persons. The destitu¬

tion which for a time fell upon the city was relieved with lavish generosity from all parts of this country and of Europe.

This appalling disaster did not daunt the people of Chicago. They began at once to re¬

build the city and to reconstruct business. While many insurance companies were obliged to sus¬

pend, still some $46,000,000 were realized from this source, and fortunately the bank vaults in every instance but one were found to have preserved their contents intact. Within two years the burnt area was again covered with buildings, and of a more solid type than before the fire.

The Columbian Exposition. — In 1892-93

a World's Fair was held in Chicago, to com¬

memorate the discovery of America four cen¬

turies before. An act of Congress, passed in the spring of 1890, authorized an international exposition in Chicago as an illustration of the 440

development of the new world which Columbus found, made appropriations for the share of the United States government, and provided for a national commission to supervise the work. In Chicago a corporation was formed under the laws of Illinois, to undertake the

practical de¬

tails. Funds were provided from private sub¬

scriptions to the stock of the exposition com¬

pany, from a loan of $5,000,000 made by the city, the proceeds of which were devoted to the exposition, from a special appropriation by Congress, from gate receipts and from various concessions. The site was Jackson Park and the Midway Plaisance, an area of 666 acres being included, with a frontage of two miles on Lake Michigan. Buildings were erected on an elab¬

orate scale, and with taste which met wide approval. J. L. Olmstead planned the land¬

scape work and the architectural work was done by Daniel Burnham and other leading architects. The great building devoted to manufactures had a ground area of nearly 31

acres and a floor and gallery space of 44 acres.

In the central hall 75,000 people could be seated, while the entire building would seat 300,000.

The standing army of Russia might have been drawn up under its roof. The entire cost of the fair was estimated at upward of $43,000,000.

The number of paid admissions throughout the six months from May to November was

21,500,000, the whole number of admissions be¬

ing 27, 529,401.

Chicago and the Federal Government. —

In Chicago are held United States courts as follows : The Circuit Court of Appeals and the Circuit Court of the seventh judicial circuit, and the District Court of the northern district of Illinois.

The Chicago post office includes the central office, 47 carrier stations, 4 stations without carriers and 302 substations. There are 3,898

employees in the main office and stations and 2,051 carriers and collectors. The receipts for the year 1915 were $23,495,730.76. During the same period the pieces of mail handled num¬

bered 981,037,196 first-class and several million of second-class matter.

By the apportionment under the census of 1910 Illinois has 27 members in the House of Representatives. Six of the Illinois Congres¬

sional districts lie wholly in Chicago and four more are partly in Chicago. Two representa¬

tives in Congress are elected in the State at large, as the legislature has not redistricted the State on the basis of the last census.

The port of Chicago showed vessels entered for the year 1915 to be 5,055, of a registered tonnage of 7,739,174, while the number

cleared for the same period was 5,097 vessels of a tonnage of 7,834,152.

Of the lake commerce of Chicago in 1915, 8,409,573 tons were received or shipped from the Chicago River, and 7,163,753 tons at the Calumet River. Practically all of the com¬

merce of the Calumet River consisted of iron ore amounting to 4,414,964 tons, as compared to 2,403,916 tons received at Gary during the same period, and 1,133,193 tons of both hard and soft coal. The lake commerce of Chicago has slightly declined during the past decade, even though there has been a large increase of tonnage received and shipped from the Calu¬

met harbor, at the south end of the city. This is largely due to the obstructions in the Chi¬

cago River by bridges and to the crookedness of the river. The city has recently completed a $5,000,000 pier extending 3,000 feet into the lake for the use of passenger boats and pack¬

age freight. In 1915 the amount of package freight received at the Chicago River amounted to 824,754 tons and the shipments were 432,678

tons. The receipts of the Chicago custom¬

house for 1914 were $9,147,600. The internal revenue receipts for the same year were $15,-

947,189.89, or a total of $25,094,789.89.

Chicago and the Government of Illinois.

— The general assembly of the State of Illinois numbers 51 senators and 153 representatives, one senator and three representatives being elected from each district. Of these districts 14 are wholly and 4 partly in the city of Chicago.

The Supreme Court of Illinois consists of seven judges elected one in each of seven dis¬

tricts for a term of nine years. Chicago is in the seventh judicial district. The five counties composing that district had in 1910 a total population of 2,618,847, of which Chicago had 2,185,283.

Cook County forms a judicial circuit of the State of Illinois, and has a Superior Court of 18 members and a Circuit Court of 20 mem¬

bers. These courts have concurrent jurisdic¬

tion in law and equity. The members are elected for a term of six years by the voters of the county. The population of Cook County, outside of Chicago, in 1910 was 219,050.

Three judges of the above courts are desig¬

nated by the Supreme Court of the State to sit as an appellate court, with appellate jurisdiction over the Circuit, Superior and County Courts.

In like manner six other judges are designated * by the same authority to form two branch appellate courts.

The Criminal Court of Cook County is

formed by the judges of the Circuit and Su¬

perior Courts, who alternate in the dutv of hold¬

ing such court. One judge of the Circuit Court is also assigned to hold the Juvenile Court, which has jurisdiction under the act to regu¬

late the treatment of dependent, neglected and delinquent children. Cook County also has a County Court and a Probate Court, each con¬

sisting of one judge, elected by the people of the county, for a term of four years. All these courts sit in the city of Chicago. The Munici¬

pal Court, consisting of a chief justice and 30

associate justices, takes the place of the old system of justices of the peace, and is in a very real sense the people's court, having civil and criminal jurisdiction of a primary nature.

The administration of the court provides for specialized courts, such as the boys' court, dealing with offenders between the ages of 17

and 21, the morals court, the court of domestic relations and the automobile speeders' court.

A psychopathic laboratory is also maintained in connection with the criminal branch of the court.

As has been noted, Chicago contains

2,701,212 of the 3,053,01 7 people of Cook County — almost the total. The taxable value of property in Cook County, which, bv State

law, is one-third of the assessed full real value, is $1,078,824,261 (1914). The taxable value of property (1914) in Chicago was $1,000,797,060, or over 90 per cent of that of the county.

Moreover, many of the people residing in Cook - w

®CT

□ □ ddod

RSON ’ E.C

□ q tp ciizlz

E. *_ CHICAGO

tQSOsff&jC

Lake Shore \

□ □ niHOa □!□ & □ □ pit:

w. I HURON I . _ I, ST. E T_r< _

Plav Ground AVA

] r

ˆ\CI TY “LIMITS

SUPERIOR

ST

_ □ □ □ □ D!ac

|-erie-£ | I ST.

JafatzD □ □ □

W. j ONTARIO | I _ ST.

HURON

TT

ERIE

tin q

□hˆDD

- r — -v-aveˆi _ , .

□gaping

SQ&JHpir-

_J □ □ □

W. I OH id _ I I _ ST

□ O □ □

ˆ ziipsaTnˆpi

! odi cnritaj[nsi~i£

i — »X - ■

I way man

;□ Pcd’

; _ -st.

W. ˆeAUSTH*— ij _ 7J _ o

n?aOafag

- K I M2 ie -

□

— ■ GTJ”

Q

dy

□I

rd_QLd

r AVE.

■AVE-

i?E＝D|i|a|ajLzi

iV*

tzD £3

-RANDOLPHˆ

AHZˆCZ %

wrnl

ZJI’IZD’CZD ZD

- Llˆrr.

ItZDˆD’ZD

-JjIZjlZD’CZI

- aN - \ - 1 - HST;

c” J”

- &t-

,9 uiMˆr

oM - - -

CZlid] CZh

□ □ r~H i

□ □ ZZ

E OHIO

□ □ CMZUZDˆ

□“pznzjrx-

tgzeo-

= AUSTIN AVE

ST

ONTARIO

IT

RAND— ST.

hNOIS

ST.

6urt| r I

•IZD _

-4＝＝- -ST-

oso

□

s

,** c°～«xnrjP: I

^3

oj-a

ate

qraDDQ

X % MONROE ˆ - 1- - ST,

anpOJ

— < - I - ” — t-

vOflSDj

CONGRteS ST

■ ZCZI

| [tOWAKˆft.

“KTATHtA

□

Sfa

Trˆ

OJLPIN

FORQUEH

ˆ□JIZDgZtfLZˆj

co, _ £ - Z _P L. i

SOCKCD8C3

□ icnlczillˆll

8

DC KOVEN

] □ CZDiCZI IZZJ

igarrrrs3 = wii

[

ST.

□!□ □ □

BUNKER *I* I - *8Tr*

i!|cˆaajcˆQ|

in

2a

＝a s

3! CD □

i

Vfadwel -

_ ru.

g;

ST.

u’»iniv

□ I c

DIE

55p5Tst

LJESBHLC

jZFtTQ

rU

■W 18 V -

POLK

BON— | -

Subway

BOULl

□□

TAYLOR

2-1

8T.

□

irn

SL,

Efl.7™ ST

EH8TH ST. y

•CM.

106.*, 4

STAT!. E

Jc

:-t iny *l

I

0

D

6t ST

i w \$’

\

! CITY LIMITS

I HUMBOLDT |

Pi as L.

i r lijLjlc

! <

1

| CITY LfMITS

OUTLINE MU’

OF

CHICAGO

City Limits, Parks

and Boulevards.

3’ortlon Shown oo Maia

‘Map In Solid Color.

r

%

h._.

CITˆIMITSJ

ms

J I IV.* 8T.

91 H

wo

iflOy

id ml

□□

CENTRAL PORTION

OF

CHICAGO

SHOWING RAILROADS, DEPOTS

AND

STREET TRANSPORTATION LINES.

SCALE

3 % Inches =1 Mile

R&nd-McXal! j ’e 11x14 Map of the Central Portion of Cblctgo.

Copyright by Rand -McNally a Co.

EXPLANATION

Railroads __

Elevated R. R.

Electric Lines

RAILROADS.

01 WOT NO.

1. Illinois Central (Suburban).

2. Chicago & North Western,

5! Chicago <£ Alton.

J Chicago. Burlington & Quincy.

• 1 Chicago. Milwaukee & St. Paul.

* Pennsylvania Lines West of Pittsburgh.

) Chicago. Rock Island & Pacific.

1. •< New York Central.

(New York. Chicago & St. Louis.

5. Illinois Central (Suburban).

Atchison. Topeka & Santa Fe.

Chesapeake & Ohio of Indiana.

Chicago & Eastern Illinois.

Chicago & Western Indiana.

Chicago, Indianapolis £ Louisville.

Erie.

Grand Trunk Railway System.

- Wabash.

f Baltimore & Ohio.

| Baltimore* Ohio Chicago Terminal.

Chicago Groat Western.

Minneapolis, St. Paul * Sault Sainto Marie.

LPere Marquette.

| Illinois Central (Central Station).

Cleveiand. Cincinnati, Chicago * St. Louis, Michigan Central.

8

Yield Columbian

museum

II

.

.

.

-

■

.

.

.

‘

P1.

■ •

.

‘ ‘

‘

CHICAGO

441

County outside the limits of Chicago have their business in the city. From these facts it is plain that Cook County is largely identical with

Chicago.

The affairs of the county are administered by a county board of 15 members, elected for a term of three years. Ten are elected in the city and five from that part of the county out¬

side the city. The president of the board is designated by the people at the election for commissioners.

The City Government. — The city is incor¬

porated under the general laws of the State for municipal corporations. The constitution of Illinois forbids special charters for corpora¬

tions, and the statutes provide in detail a scheme of government for cities.

Local legislation and general administra¬

tive oversight are vested in the city council.

This body consists of 70 aldermen and the mayor. Each of the 35 wards elects two mem¬

bers for a term of two years. One-half of the members of the council are chosen each spring.

The mayor presides over the council.

The mayor is the administrative head of the city. He is chosen by popular election for a term of four years. He has the veto power over all ordinances passed by the council and may veto separate items in the budget. The city council may, however, by a two-thirds vote, override the mayor's disapproval. The mayor has directive control over the adminis¬

trative departments. He appoints the heads of departments, subject to the approval of the council. All other employees of the city gov¬

ernment, except about 400 employed principally in the law department, are under the merit sys¬

tem.

The city treasurer and the city clerk are elected by the people. The main administrative departments are those of finance, law, public works, police, fire, health, public service, build¬

ings, local improvements, municipal courts and public welfare. The board of education, the public library and the municipal tuberculosis sanatarium have special taxes levied for their support, but are, strictly speaking, departments of the city government. Each of the administra¬

tive departments has a single head, except the library, educational system, house of correction, board of local improvements for the construc¬

tion of street improvements by special assess¬

ment and the municipal tuberculosis sanato¬

rium, which are administered by boards ap¬

pointed by the mayor. The city budget is made annually by the city council and the same body levies a tax to meet the greater part of the expenses. Water rates provide the cost of water supply. A very large proportion of the city's revenue, practically one-half, is derived from licenses.

The board of education forms a branch of the city government. The 21 members are ap¬

pointed by the mayor, subject to the approval of the city council. Seven are appointed each year for a term of three years. The city coun¬

cil at the request of the board of education levies an annual tax on city property for the maintenance of the school system. The tax for the operation of the schools may not ex¬

ceed 1.2 per cent on the assessed value of prop¬

erty. An additional tax, usually one-half of 1

per cent, is levied for the purchase of sites and the construction of new buildings. In 1015 the school board received in taxes $14,536,608.63, of which $10,043,883.73 were levied for the op¬

eration of schools and $4,492,724.90 for new buildings and sites. Besides revenue from taxes, the board of education received on leases of school property and from other sources, in 1915, $1,760,893.44. The total in¬

come of the school board annually amounts to over $16,000,000. The public schools offer free education through all grades up to and includ¬

ing the high schools, and the law makes ele¬

mentary education required. The board of education also maintains the Chicago Normal School for the training of teachers. There are 23 high schools with an enrolment of more than 23,000 pupils, and 284 elementary schools.

Students finishing the high school course are prepared to enter college. The total enrol¬

ment of pupils in the public schools in 1915

was 317,004, with 7,865 teachers.

The Park System. — The parks of Chicago are in the main under control of three boards, one for each of the three sections of the city.

These boards are municipal corporations, cre¬

ated under State law and are independent of the city government. The members of the Lin¬

coln Park board on the northside and those of the West Park board are appointed by the governor of the State. The members of the South Park board are appointed by the judges of the Circuit Court of Cook County. There are also a number of smaller park boards in the outlying sections of the city and the city (corporate) itself also has under its control many playgrounds and bathing beaches. The park system forms a girdle around the central portion of the city from

Lincoln Park on the north shore to Jackson Park on the lake shore at the south. The various parks are connected by a series of boulevards. The total area of parks was 3,915.4 acres in 1915. There were also 74.25 miles of parkways and boulevards.

Funds for the parks are obtained by taxes levied by the boards on the property within their respective districts and by the sale of a limited amount of bonds.

Chicago has been greatly interested in the development of small parks varying in size from less than 10 acres to 75 acres, scattered through the congested portions of the city and equipped with gymnasiums, swimming pools and assembly halls. The equipment is in con¬

stant use throughout the year and the parks serve as neighborhood community centres.

There are 24 such parks and many other smaller playgrounds.

A metropolitan park district was created in 1913 by an act of the State legislature pro¬

viding for the acquisition of forest areas in and near the city. Several large tracts aggre¬

gating 5,000 acres have already been purchased.

The proposed forest preserve area forms a ring around the city and lies just outside of the present city limits.

The Chicago Sanitary District.— The Chi¬

cago sanitary district was authorized by act of the State legislature in 1889, ratified by vote of the people in the same year and organized in 1890. The water supply of the city is taken from the lake, being pumped into the mains from a series of stations at varying distances from the shore. The city drainage also was of ne¬

cessity carried into the lake, either directly or by way of the river. Contamination of the 442

water supply it was hoped to avoid by carrying the pumping stations farther into the lake than it was supposed the sewage outflow would go without purification by air and sun. As the city grew, however, it became manifest that the lake water was dangerous to health, and in the end the plan was devised of cutting a canal between the south branch of the Chicago River and the Desplaines River, with a pumping plant capable of turning the water of the south branch into the canal. Then, by connecting all the sewers with the river, it was intended to convert the city drainage into the Desplaines.

As all parts of the city could not be included in the new drainage area, and also as a great part of that area must be outside the city limits, a drainage district was created known as the Chicago sanitary district. The construction and management of the canal within that dis¬

trict was entrusted to a board of nine trustees, elected by the people. Funds were provided by bonds of the district and by taxation. The total cost of the work has been over $66,000,000.

Earth was broken 3 Sept. 1892, and the water of the lake was turned into the canal 2 Jan. 1900.

Since that date it may be noted that the Chi¬

cago River no longer flows into Lake Michi¬

gan. Its waters now reach the Mississippi.

The sanitary district as originally created com¬

prised all of Chicago north of 87th street and some 43 square miles north of. Cook County outside of Chicago. The assessed value of tax¬

able property in the district is $1,098,037,554, of which $1,000,797,060 belong to that portion within the city — a percentage of 90.2. By law the board was authorized to effect loans to the amount of 5 per cent of the value of the tax¬

able property in the district, provided that the total should not exceed $15,000,000. The tax levy of the district must not exceed one-half of 1

per cent of the assessed value of taxable property in the district.

By the statute of 1903 large additions of territory were made to the sanitary district so as to protect the lake water both north and south of the original area and the district now has an area of 386 square miles, of which 198,997 miles are in the city of Chicago. Sub¬

ordinate canals have been cut in each of these territories, connecting ultimately with the main canal. The north shore channel is about eight miles long and the Sag Channel still incom¬

plete, to drain the Calumet region, will be 16

miles long.

The main channel of the canal from river to river is 28.05 miles long. The width on the bottom varies from 110 to 202 feet. The min¬

imum depth of the water is 22 feet. A project for a navigable waterway from Lake Michigan to the Mississippi River was started by the appropriation of $5,000,000 by the Illinois State legislature in 1915. The State waterway will connect with the sanitary canal at Joliet and provide for an 8-foot channel to Utica. It is proposed later to complete this work to the Mis¬

sissippi River.

The sanitary district has established at Lockport an electric generating plant at which elec¬

tric power is created by the water passing through the sanitary canal. The city street lights are supplied with current from this water power plant. In 1915, 28,123 lights were thus supplied. The sanitary district also sells elec¬

tricity to commercial users to a limited extent.

The hydro-electric plant is the largest publicly owned electric light plant in the country, and on the whole has been quite successful. Prior

to the building of the sanitary canal the death rate from typhoid in Chicago was very high, but now it is one of the lowest in the country.

Public Works. — -The city department of

public works has charge of the paving, repair and cleaning of streets and alleys, of the con¬

struction and maintenance of sewers and of the city waterworks. There are in the city ap¬

proximately 3,094.44 miles of streets, of which 2,059.34 miles are paved, and 1,592.07 miles of alleys. This is exclusive of the many miles of parkways and boulevards under the care of the various park boards. The city sewers empty into the drainage canal which diverts the city's refuse from the lake.

The waterworks system, which has cost up to 1915 $61,697,000, is owned by the city. The plant has largely been built out of the annual revenue which in 1915 amounted to over $6,500,-

000, an amount sufficient to cover the cost of the supply and to make extensions to the plant.

The pumping stations provided the city during the year with about 213,000,000,000 gallons of water. The per capita use is 236 gallons per day — more it is said than in any other city of the country. The number of miles of pipe was 2,641 in 1915.

The City Library. — The Chicago Public

Library contains 627,619 volumes. The main library building on Michigan avenue between Randolph and Washington streets, cost $2,000,-

000. The income of the library board (the members of which are appointed by the mayor) is about $425,000, mainly derived from taxation.

The library maintainˆ 33 branch reading-rooms and 109 delivery stations in different parts of the city. The T. B. Blackstone Memorial

Branch Library is an Ionic building of gran¬

ite and marble, with shelving capacity for 25,000 books.

The City Corporate. — The city corporate, that is, the city exclusive of the board of edu¬

cation, public library, park boards and the Municipal Tuberculosis Sanitarium, has a total ordinary revenue of about $30,000,000 per year.

This is also exclusive of the amount received for waterworks, for the payment of local im¬

provements by special assessment, and other special trust funds, such as the amount received by the city from the operation of street rail¬

ways which amounts to almost $3,000,000 per year. The gross public debt of the city of Chicago in 1915 was $31,924,600.

Institutions of Private Endowment. — The public spirit of Chicago citizens is manifest in many institutions endowed by private munifi¬

cence for the public good.

The Chicago Art Institute is devoted to maintaining an art gallery and to conducting education in art. The museum contains ex¬

cellent examples of the old masters and of modern painters, besides sculptures, etchings, engravings and many other appropriate art-objects. The enrollment in the school is over 2,900 in all branches. The Ryerson Library of Art, a beautiful wing of the main building, con¬

tains about 8,000 volumes. It also contains extensive and valuable collections of photo¬

graphs and slides.

The Newberry Library has an endowment

of $2,500,000 and occupies a building valued at CHICAGO, ILL

‘Sf

Ivllititt, . <•••*« »«4 -• •••

… ? . m

!, V~ˆV *35? ‘v

,-* V:rr

r- "‘f**L* = >? “V

v . * ; • K

a ˆ .

-

r~‘

m\

js&a*.

-4- ■ *” ’•

. < > ^ * ?*

«, *

- i ‘

•»«

/*W.

>f

^4 i * :

w “~

:;W*

„_ ’*(*,*”< ****”+

&>■»*£* « *’ - .>’

*r -:~, ■■ * •> • m

~ -r

^ ‘Hi,‘ ,. Ji

v«r. “’C’rsr-

i» • 5 «t* ‘■ 5*

.. *t , « .»*

‘ **

4*

“‘K‘ **

ISC;-.

«ivV

4§p 4sr ***,/^.

“T

A

1 Municipal Pier

2 Field Museum of Natural History

3 Chicago Union Passenger Station

CHICAGO, ILL

iiror

1 Newberry Library

2 Auditorium and Annex

$500,000. The library, used wholly for consul¬

tation, has 356,033 books and pamphlets.

The John Crerar Library has an endowment of $3,400,000. The books, which are confined to branches of science, number 348,500, besides 115,000 pamphlets, all used for consultation only.

The library of the Chicago Law Institute, which has quarters in the county courthouse, numbers 55,000 volumes.

The Chicago Historical Society has a collec¬

tion of 40,000 books and 75,000 pamphlets, be¬

sides other material relating to the history of the Central West.

Higher education is represented by the Uni¬

versity of Chicago, by the professional schools of Northwestern University, by the Medical School of the University of Illinois, by the Loyola University, by the Armour Institute and the Lewis Institute and by various independent schools of law and medicine.

The University of Chicago (q.v.) opened its doors for instruction in 1892. The buildings are situated on the South Side, fronting on the Midway Plaisance, one of the south parkways.

Its assets amount to about $50,000,000. The en¬

rolment of students in 1915-16 numbered 8,510.

The university consists of graduate schools and colleges of arts, literature and science, a divin¬

ity school, a law school, a medical school, a professional school for teachers, and of vari¬

ous other activities, including a press depart¬

ment, which publishes both books and period¬

icals.

Northwestern University maintains in the city its schools of medicine, law, pharmacy, den¬

tistry and commerce. The College of Liberal Arts and Graduate School, the College of En¬

gineering and the School of Music are in Evanston. The total assets of the university, including grounds and buildings, amount to $10,500,000. The total number of students in all departments (1915-16) was 5,293, and the members of the faculties numbered 452.

Loyola University was organized in 1909.

It had in 1915-16 127 instructors and 1,542

students. The Bennett Medical College is affili¬

ated with this institution.

The Lewis Institute is a polytechnic school on the West Side. It was opened for instruc¬

tion in 1895, the; endowment at that time amounting to $1,600,000. The enrolment for 1915-16 included 3,280 students.

The Armour Institute, on the South Side, is also a polytechnic school. The endowment amounts to $4,500,000, and the enrolment of students, 1915-16, was 1,424.

The Field Columbian Museum (q.v.) is an outcome of the Exposition of 1893. The mu¬

seum was incorporated in that year, and was at the outset encircled by many of the most val¬

uable exhibits which had been made at the Ex¬

position. The original endowment of $1,250,000

was the gift in large part of one citizen. Large acquisitions have been made, especially in the fields of American ethnology. The collections are at present housed in one of the remaining Exposition buildings, in Jackson Park. By the will of the founder, the late Marshall Field, $8,000,000 was left to the museum for a suit¬

able building, which is now under construction as part of the project for the beautification of the Lake Front.

Churches. — Religious organizations number some 1,150 churches and missions.

Business.— Manufactures and commerce

form the basis of Chicago's prosperity. With the development of the West and the extension of railroads the industries of the city have grown to enormous magnitude. The manu¬

factures of iron and steel, the agricultural imple¬

ment works and the beef and pork packing are among the largest. The recepits of live cattle at the Union Stock Yards for the year 1915

were 3,262,752, of sheep 3,510,015, and of hogs 7,652,071. The total value of all live stock received at the Union Stock Yards in the year 1915 was $370,938,156. The Chicago elevator warehouses have a capacity of 50,426,000

bushels of grain.

The census of 1910 records (for 1909) 9,656

manufacturing establishments for Chicago, with a capital of $971,841,000, an average number of 293,977 wage earners, salaries and wages amounting to $240,037,000, and a product valued at $1,281,313,000. The value of manufactured products in 1904, amounted to $955,036,000 — an increase of $326,277,000, or 34 per cent in this five year period. This product actually turned out has no necessary relation to the amount of sales for that year.

Chicago is an important railway centre, be¬

sides being favorably situated on Lake Michi¬

gan for marine commerce through the Great Lakes. Twenty-three through lines of railroad have terminals in the city. There are no roads passing through Chicago. It is necessary, .there¬

fore, for transfers both of freight and passen¬

gers to be made from one line to another. This greatly complicates the transportation system of the city, and among the vital improvements of the near future should be a complete reor¬

ganization of these matters, in aid of saving time and labor and cost both for freight and passengers. The old Illinois and Michigan Canal connecting Chicago with the Mississippi River of course is obsolete, but the Drainage Canal may be made the means of connection under modern conditions, providing an ade¬

quate amount of work is done on the Illinois River, so that freight may pass directly from the Great Lakes system to the Mississippi system of water transportation.

The Plan for a More Beautiful and Con¬

venient City. — Chicago, like most other cities, has grown to an extent entirely unforseen at the outset, and on lines resulting from circum¬

stances and conditions of the locality. The original reason for the settlement was the lo¬

cation in the vicinity of a harbor of Lake Mich¬

igan and near the carrying place between the waters of that lake and the affluents of the Mississippi. The ground was flat and marshy, being therefore in many ways entirely incon¬

venient for city building. As population in¬

creased streets extended toward the north and south along the shores of the lake, and westward over the prairie. It was very difficult to provide suitable pavements for the streets and at the same time suitable foundations for large build¬

ings. Such buildings have had to be erected on piles, which originally did not go down deeper than a clay substratum. In later years concrete piles have been carried down to the bedrock. There was a time when it became necessary to grade the streets up, and this in¬

volved the correlative necessity of. lifting the 444

buildings along these street lines. In the main, streets have been made at right angles, with an occasional diagonal following the line of some old highway leading out into the State. On the south side the Illinois Central Railroad oc¬

cupies the lake shore for several miles, thus preventing ready access to the beach and largely cutting off the city from the use of the lake.

After the World's Fair of 1893 serious study was given to the question of a possible re-crea¬

tion of city lines in such a way as to secure fur¬

ther development in accordance with funda¬

mental principles of beauty and advantage.

The Commercial Club of the city appointed a Commission of 28 of its members, and the Mayor of the city also appointed a very large committee of citizens, to consider the same question. This was in 1909. After careful study a systematic plan was evolved looking toward the recreation of the lines of city growth in a very important way. It was sug¬

gested that the heart of the city should be con¬

nected in a systematic manner with the sur¬

rounding districts by two great arterial systems, rectangular and diagonal. Certain existing streets should be widened and made the main arteries of commerce. It was further pro¬

posed to extend the park system by completing the existing park belt, by securing another sys¬

tem of parks more remote from the present settled area and by adding a considerable num¬

ber of small parks. In order to complete the existing park system the plan contemplates filling. in shallows on the South Side between the centre of the city and Jackson Park, thus creating a system of islands which are to be im¬

proved and connected by bridges, leaving a waterway of lagoons between this new park¬

way and the mainland. The lake front on the North Side is now being improved by an exten¬

sion of Lincoln Park on made land. When this extension is completed the lake frontage on the north side of the river for eight miles will be parked or boulevarded. The plan also contemplates reconstructing the location of the railway passenger stations and freight-yards in such way as to facilitate as much as pos¬

sible the removal of freight-yards from the centre of the city, and at the same time making communication convenient and rapid for rail¬

way passengers. This last of course involves a complete subway traction system. The plan also involves the creation of a civic centre for the main administrative buildings, so situated as to be easy of access from all parts of the city.

This plan is a very extensive one, and of course will require many years to carry to completion. At the same time, when completed it will make the city far more beautiful, and far more convenient, and will provide for its future development in a way that is systematic rather than haphazard. The City Beautiful will become also the City Comfortable.

Bibliography. — Moses, (Illinoisy Historical and Statistical) ; Andreas, (History of Chicago} ; Blanchard, (History of Illinois and Chicago > ; Moses and Kirtland, (History of Chicago) ; Annual Report of Trade and Com¬

merce; Board of Trade City of Chicago

Quarterly Statistics; Comptroller's Annual Re¬

port; Report of the South Park Commission¬

ers; Report of the Lincoln Park Commission¬

ers; Report of the West Park Commissioners'

Chicago Daily News Almanac; annual reports of various institutions.

Harry Pratt Judson,

President of the University of Chicago.

CHICAGO, University of, located at Chi¬

cago, Ill. A Baptist institution known as the University of Chicago was founded in 1857, and was compelled to close its work in 1886.

Shortly after the closing of that institution, a movement for the founding of a large univer¬

sity was begun by the American Baptist Educa¬

tion Society at the suggestion of John D.

Rockefeller (q.v.). The present university was chartered in 1890, and opened to students in 1892; Mr. Rockefeller contributed the larger part of the original endowment fund to which he has since added gifts amounting to about $40,000,000. The university was organized under the leadership of William R. Harper (q.v.), who was its president until his death, and largely directed and controlled its admin¬

istrative and educational policy. In accord¬

ance with the charter, the president and two-thirds of the trustees must be members of a Baptist church, but there is no denominational control.

Seal of the University of Chicago.

The university includes the following de¬

partments: (1) the Schools, Colleges and Academies; (2) the University Extension Divi¬

sion ; (3) the University Libraries, Lab¬

oratories and Museums; (4) the University Press; (5) the University Affiliated Schools.

The Schools, Colleges and Academies include : (1) the Schools, which are the Divinity School, the Ogden (Graduate) School of Science, the School of Education, the Law School and the Medical School (partly organized) ; the School of Technology, the School of Fine Arts and the School of Music are yet to be established ; (2) the Colleges, the College of Arts, the Col¬

lege of Literature, the College of Science, the College of Commerce and Administration and the University College and College of Educa¬

tion ; (3) the Academies, the University High School, directly under University con¬

trol and numerous other secondary schools affiliated with the University. Each Col¬

lege is divided into a Junior College and a CHICAGO UNIVERSITY

Senior College, the former including the first half of the curriculum, corresponding to the work of the usual college Freshmen and Soph¬

omore years, the latter the work of the Junior and Senior years. The academic year for all departments is divided into four quarters of 12 weeks, and each quarter into two terms of six weeks each; the courses are arranged with the work of 12 weeks or six weeks as a unit, and students may enter upon their work at the beginning of any quarter, and may be absent from the university during any quarter they desire. The summer quarter has a large attendance of teachers, and others outside the regular student body, but an increasing number of regular students continue their work in the summer. Instructors from other universities are added to the staff for this quarter. The courses are classified as majors and minors, a major course requiring four to five hours of classroom work for 12 weeks, a minor

four, to five hours classroom work for six weeks ; the regular work of a student during each term of a quarter is three minors or the equivalent. The Colleges of Arts, Literature and Science confer the degree of A.B., Ph.B.

and S.B. for the completion of the full work of the Junior and Senior Colleges; the College of Commerce confers the degree of Ph.B. The

work of the Junior Colleges is largely pre¬

scribed for each degree ; the work of the Senior Colleges of Arts, Literature and Science is elective, with the limitation that the student may not elect more than half his work from any one department ; the electives are further limited by the degree to be received. The work of the Senior College of the College of Com¬

merce and Administration is divided into four divisions: (1) Business; (2) Business Teach¬

ing; (3) Secretarial; (4) Philanthropic Serv¬

ice. The University College is conducted by the university in the centre of the city, and is designed chiefly for the bene¬

fit of teachers. It confers the degrees of A.B., Ph.B. and S.B., on the fulfilment of the requirements for the degrees in the other col¬

leges. The Divinity School includes: (1) the Graduate Divinity School, for college grad¬

uates; (2) the English Theological Seminary ; (3) the Dano-Norwegian Theological Semi¬

nary; (4) the Swedish Theological Seminary.

The Graduate Divinity School offers courses leading to the degrees of B.D., A.M. and Ph.D. ; certain studies are prescribed for all courses; the others are elective, depending upon the degree to be obtained. The English Theological Seminary offers resident courses in the summer quarter, and non-resident courses during the other quarters; the course covers four years' work. The Graduate School of Arts and Literature and the Ogden School of Science confer the degrees of A.M., M.S., Ph.M. and Ph.D. The Law School was or¬

ganized in 1902; it requires for admission the equivalent of three years of college work, and confers the bachelor's degree (A.B., Ph.B. or S.B.) after one year's work in the Law School, the degree of Doctor of Laws (J.D.) is con¬

ferred on the completion of the full course (three years) ; special students who maintain a high standing are granted the degree of LL.B. The Medical School offers the courses of the first two years of the medical curric¬

ulum only; Rush Medical College (q.v.) is affiliated with the university and provides a full medical course. In 1917, however, a basis for a great new medical school was laid through the provision of a fund of $5,461,500. The Rush Medical School will be an integral part of the new medical school and will be used for graduate instruction. The Presbyterian Hospi¬

tal, the McCormick Memorial Institute and the Sprague Institute are also parts of the new plan. Within the university quadrangles will be built the A. M. Billing's Memorial Hospital, the Max Epstein Dispensary and a completely equipped medical college conferring the degree of Doctor of Medicine. The School of Educa¬

tion offers courses for the training of teachers which lead to the degrees of A.B., Ph.B., S.B.

The University Extension Division offers cor¬

responding courses, which entitle the student completing them to university credit; for fuller description of these courses see the article on University Extension. The University Library comprises the general library, departmental libraries, the branch libraries and the traveling libraries of the University Extension Division.

The Yerkes Observatory, founded in 1892, is located on Lake Geneva, Wis., near the town of Williams Bay; it offers special facilities for advanced work in astronomy. The university press publishes books, pamphlets and depart¬

mental journals. The journals are The Jour¬

nal of Political Economy, The American Jour¬

nal of Sociology, American Journal of Sem¬

itic Languages and Literatures, Biblical World, The Astrophysical Journal, Journal of Geology, School Review, Botanical Gazette, American Journal of Theology, The Elementary School Teacher, Modern Philology , The University Record, Weekly Calendar and Classical

Philology.

Women are admitted to all departments of the university, but those

who enter the Divinity School are not expected or encouraged to take up the work of public preaching. The students maintain a Men's Club, Greek let¬

ter fraternities, a Dramatic Club, a Glee Club, an Athletic Association, and numerous smaller societies and clubs. Some of the students, nearly one-third, live in the univer¬

sity dormitories on the campus; a few live in their fraternity houses; but the greater part live in the city and its suburbs. All students are required to wear the academic cap and gown on formal occasions. The university campus lies between Washington and Jackson Parks, facing the Midway Plaisance on the south. The buildings, of which there are 40, are built of Indiana limestone, all in the same general style of architecture, an English Gothic; they are grouped in accordance with a fixed plan, which is not yet worked out to completion, but allows for numerous additions. The library contains 545,000 volumes, bound and catalogued, 100,000

volumes uncatalogued and about 250,000 pam¬

phlets. The students (on the basis of nine months' attendance) number about 10,000

and the faculty 400. The general assets of the university amount to about $41,400,000

about half of which represents buildings, grounds and equipment, the remainder repre¬

senting investments. The current expenses now reach about $2,100,000 annually.

Though the University of Chicago is the youngest of the large universities of the United States, it has taken a leading position. Its

standards of scholarship are the highest, and it carries out the true

university ideal, offering the best of opportunities for graduate and re¬

search work, and emphasizing that part of its work. Its policy is in many ways unique, no¬

tably in the establishment of the summer term. Two other characteristics of the univer¬

sity are the quarter system, which permits a student to take his work when it is most con¬

venient for him and saves him from losing a year because of some enforced absence for a few weeks, and the maintenance of a large enough force of instructors to keep the classes small, thus ensuring students individual atten¬

tion. Through these affiliations it has exerted a wide influence on the educational institutions of the Middle West, particularly; and through its University Extension Department it has come into close touch with the general public and the work of ((popular education.®

CHICAGO AND ALTON RAILROAD,

a system operated in Illinois and Missouri by a company of the same name, a consolidation of the Chicago and Alton Railroad Company

(old) and the Chicago and Alton Railway Com¬

pany, effective 14 March 1906. The company purchased the property of the Saint Louis, Peoria and Northern Railway Company and also acquired over 98 per cent of the capital stock of the Chicago and Alton Railroad Com¬

pany, whence its title. The Chicago and Alton Railroad Company, operating under a charter of the State of Illinois, dated 18 Feb. 1861, was originally the Alton and Sangamon Railroad Company, afterward known as the Chicago and Mississippi Railroad Company. The new com¬

pany on 3 April 1900 leased for a term of 99

years the Chicago and Alton Railroad with its leased lines and agreed

to pay as rental the in¬

terest on the bonds of the Chicago and Alton Railroad Company, the rentals payable by the Chicago and Alton Railroad Company under the leases of the Joliet and Chicago Railroad, Kansas City, Saint Louis and Chicago Railroad, and Louisiana and Missouri River Railroad, taxes and the surplus net earnings of the leased properties. It owns one-third of the stock of the Joliet Union Depot Company and one-twelfth that of the Kansas City Terminal Railway Company. On 16 Dec. 1902 the com¬

pany was admitted as a member of the Ter¬

minal Railroad Association of Saint Louis, and became the owner of one-fourteenth of the cap¬

ital stock of the terminal company. For the fiscal year ending 30 June 1915, the company operated 1,052.49 miles of track; of this it owned 687.68 miles and operated 327.79 miles of leased lines, and in addition operated jointly with the Cleveland, Cincinnati, Chicago and Saint Louis Railway Company the line be¬

tween Wann and East Saint Louis, 17.85 miles.

The system also comprised 253.08 miles of second track, 1.72 of third track and 1.63 miles of fourth track, 449.07 miles of sidings, giving a total length of all tracks, 1,757.99 miles. The operating divisions of the system exclusive of trackage rights are : Sherman, Ill., to Grove, Ill., 50.66 miles; Chicago, Ill., to East Saint Louis, Ill., 279.95 miles; Coal City Line, Joliet, Ill., to Mazonia, Ill., 26.92 miles; Dwight, Ill., to Washington and Lacon, Ill., 80.77 miles ; Roodhouse, Ill., to Kansas City, Mo., 251.17

miles; Bloomington, Ill., to Godfrey, Ill., 15083

Mexico, Mo., to Cedar City Mo., 50.10 miles.

miles; Godfrey, Ill., to Wann, 111., 7.36 miles; The numl)er of passengers carried in 1915 was 3,677,113, an increase of 5.94 per cent over 1914; 7,864,283 tons of revenue freight were carried, a decrease of 7.31 per cent; but, on account of an increase in the average rate obtained, there was a gain of 3.47 per cent, the total freight revenue amounting to $9,200,546.54. The total earnings for year to 30 June 1915 were $14,-

245,623.76; operating expenses, $11,072,706.81, yielding net earnings, $2,660,583.78. Other in¬

come of $97,236.96 gave a total of $2,757,820.75.

CHICAGO, BURLINGTON AND

QUINCY RAILROAD, popularly known as

the ((Burlington Route,® a system operating in Illinois, Wisconsin, Minnesota, Iowa, Missouri, Nebraska, Kansas, Colorado, Wyoming, South Dakota and Montana. The nucleus of the sys¬

tem originated in the Aurora Branch Railroad Company, chartered 12 Feb. 1849, a name changed to Chicago and Aurora Railroad Com¬

pany, 22 June 1852, and to the present corpo¬

rate title 14 Feb. 1855. The earliest construct¬

ed portions of the system were the section of the main line from Chicago to Mendota and the branch from Aurora to West Chicago. By construction, consolidation and purchase, the system has enlarged to its present size. The system was leased 1 Oct. 1901 to the Chicago, Burlington and Quincy Railway Company for 99 years and operated by the railway com¬

pany until 1 July 1907, when the lease was canceled and the railroad resumed control and operation.

Mileage. — The length of road operated and controlled 30 June 1915 was 9,365.94 miles; of this mileage 9,008.41 miles were owned abso¬

lutely by the company. The mileage is lo¬

cated as follows: 1,671.58 miles in Illinois; 222.49 miles in Wisconsin; 23.61 miles in Min¬

nesota; 1,365.12 miles in Iowa; 1,122,30 miles in Missouri ; 2,850.34 miles in Nebraska; 259.32

miles in Kansas ; 394.36 miles in Colorado ; 134.38 miles in Montana ; 279.95 miles in South Dakota ; and 684.96 miles in Wyoming. The

roads east of the Missouri River total 4,387.94

miles, the roads west of the Missouri River 4,620.47 miles. The principal sections are : Main line, Chicago, Ill., to Denver, Colo., 1,077.01 miles; Aurora, Ill., to Minneapolis, Minn., 385.35 miles ; Galesburg, Ill., and Saint Louis, Mo., to Kansas City and Saint Joseph, Mo., 486.14 miles; Lincoln, Neb., to Billings, Mont., 836.03 miles and other divisions and branches 6,223.88 miles, all operated as the Chi¬

cago, Burlington and Quincy Railroad. The Company also controls, through ownership of securities, the Quincy, Omaha and Kansas City Railroad 261.62 miles and the Colorado and Southern Railway 1,968.05 miles, and has a total of# 357.53 miles of leased trackage rights.

Equipment. — The equipment of the com¬

pany, 30 June 1915 comprised 1,773 locomotives, 1,285 passenger cars, 65,843 freight cars, 5,649

miscellaneous cars and 41 units of floating equipment; total of cars, locomotives, etc., 74,-

591. For year ended 30 June 1915 : total operat¬

ing revenue, $91,125,060.67; operating expenses, $60,441,367.04 ; net operating revenue, $30,683,-

693.63 ; deductions from net operating revenues, $4,105,665.23; operating income, $26,578,028.40; other income, $1,224,069.41 ; gross corporate in¬

come, $27,802,097.81 ; deductions from gross cor¬

porate income, $22,720,982.46; surplus for the CHICAGO GREAT WESTERN — CHICAGO, IND. AND LOUISVILLE

year, $5,081,115.35; 22,708,392 passengers and 31,758,791 tons of freight carried; the capital stock of the Company was $110,839,100;

the funded debt $181,690,000.

CHICAGO GREAT WESTERN RAIL¬

ROAD COMPANY, popularly known as the

((Corn Belt Route, a system operating in Illinois, Iowa, Minnesota, Missouri, Kansas and Nebraska. The company was organized 11 Aug.

1909, under the laws of the State of Illinois, for the purpose of purchasing the properties for¬

merly owned by the Chicago Great Western Railway Company, and sold under judicial de¬

cree.

Mileage, — For the fiscal year ending 30

June 1915, the company operated 1,427.10 miles of railway, of which 1,410.13 (less 68.96 miles in Minnesota, between Mankato and Randolph, leased to the M. St. P. R. & D. E. T. Co.) are owned and 85.93 are operated under trackage rights. The line extends from Chicago, Ill., via Oelwein, Iowa, to Minneapolis, Minn., 471.27

miles; from Oelwein to Kansas City, Mo., 364.01 miles; from Oelwein to Omaha, Neb., 283.64. miles ; Hayfield, Minn., to Clarion Iowa, 99.71 miles; Randolph, Minn., to Winona, Minn., and Osage Iowa, 208.47 miles; total, 1,427.10

miles. The Company also owns all the stock of the Wisconsin, Minnesota and Pacific and Mason City and Fort Dodge railroad com¬

panies, operating in 1915, 208.47 miles and 383.35 miles, respectively, which are included above. The earnings and expenses of each line are kept separate.

Equipment. — The rolling stock consisted of 292 locomotives, with a total traction power of 9,769,000 pounds; 11,110 freight cars; 179

pas¬

senger cars and 472 miscellaneous cars. The total operating revenues for year ending 30

June 1915 were $13,920,684; the operating ex¬

penses, $10,450,727 ; taxes, $580,026, leaving a total net revenue of $2,889,931. Compared with the year 1914 both the gross revenues and operating expenses for the year 1915 decreased, the latter in a lesser ratio, so that the net revenues showed a decrease of $37,409.

Business and Funded Debt. — In 1915 there were 2,825,496 passengers and 157,642,318 pas¬

sengers carried one mile compared with

2,398,685 and 138,735,465, respectively, in 1910, the year of reorganization. The average rate per passenger per mile was 1.950 cents in 1915

as against 1.905 cents in 1910. The compara¬

tive revenue tonnage was 5,642,764 and 4,623,-

102, and tons hauled one mile 1,378,504,602 and 1,189,185,332. The rate per ton mile was 7

mills in 1915 and 7.18 mills in 1910. The per¬

manent capital of the company authorized at $96,000,000 is represented by two classes of stock divided into shares of $100 each ; of this amount $89,076,915 were outstanding 30 June 1915, leaving $6,923,085 still issuable. The state¬

ment of the funded debt of proprietary lines on 30 June 1915 was as follows: Mason City and Fort Dodge Railroad Company; issued and outstanding, $12,000,000; funded debt per mile, $31,980.39. The funded debt of the Chicago Great Western Company, 30 June 1915, was: issued and outstanding, $25,881,000; funded debt per mile, $25,008.21. The mortgages are secured by valuable leaseholds of long tenure.

The proprietary lines, being new, have not yet developed their full earning capacity.

CHICAGO HEIGHTS, Ill., city in Cook

County, 28 miles south of Chicago, on the Michigan Central and other railroads. The city manufactures iron and steel goods, car¬

riages, chemicals, glass, lumber, cars, linseed oil, pianos, brick and fireproofing materials. It has a hospital and a Carnegie library. Chicago Heights was settled in 1835 and received its city charter in 1900. The waterworks are mu¬

nicipally owned. Pop. 14,525.

CHICAGO, INDIANAPOLIS AND

LOUISVILLE RAILWAY. The company

which built the first portion of the Chicago, Indianapolis & Louisville Railway was the New Albany & Salem Railroad Company, chartered 8 July 1847, to build a railway between the points named in its title, a distance of 35 miles.

Work was begun in 1849 and the road was completed and opened to traffic in January 1850.

Amendments to its charter empowered the Com¬

pany to extend the road to any place within the State, and work was begun on an extension to Michigan City in 1850, and was completed and opened to the public in 1854. The section from Crawfordsville to Lafayette was built by the Crawfordsville & Wabash Railroad Com¬

pany, completed in 1852, and was purchased by the New Albany & Salem Railroad Company.

The company did not prosper and in 1857 it defaulted interest on its bonds, and in 1858 was turned over to D. D. Williamson, of New York, as trustee, and operated by him until October 1868, when a suit for foreclosure was brought and the road went into the hands of a receiver, passing the next year, under foreclosure sale, to the first and second mortgage bondholders, who organized a new company under the name of the Louisville, New Albany & Chicago Rail¬

way Company. Various law suits kept the road in the courts for

several years from this date, but in May 1881 a consolidation was effected with the Chicago & Indianapolis Air Line Rail¬

way.

In January 1882 the northern extension of the line was completed to a point near Ham¬

mond, where a junction was made with the Chicago & Atlantic Railroad, thus giving a line into Chicago. Work was completed on the southern extension to a point four miles north of Indianapolis in October 1882 and, using the tracks of the Lake Erie & Western for these four miles, in May 1883 trains were run through from Chicago to Indianapolis. Subsequently the unfinished portions of the road were completed and the company used its own tracks for the entire distance. In 1889 the company took a 30 years' lease from the Louisville Southern Railroad for its line from Louisville to Burgin, Ky., and another for its Lexington extension.

In March 1890, during disputes growing out of the action of newly-elected directors of the lessee road, the Louisville Southern Com¬

pany took possession of both of the leased branches of its road by force, and a very stormy period of litigation followed.

On 1 March 1886 the Company bought, the Orleans, West Baden & French Lick Springs Railway and completed the construction of its lines within one year. On 1 April 1886, the Company bought all of the stock of the Bedford & Bloomfield Railroad Company, amounting to $600,000. Both of these lines are now merged in the present company.

CHICAGO JUNCTION — CHICAGO, MILWAUKEE AND ST. PAUL

In June 1879 the Chicago & Western Indiana Railroad Company was organized for the pur¬

pose of affording a Chicago terminal to several different companies desirous of entering the city, and the Louisville, New Albany & Chicago became a fifth owner in the concern. In No¬

vember 1882 the Belt Railway Company of Chi¬

cago was formed for the purpose of connecting the various railroad terminals, warehouses and other facilities in the city. The five companies that formed the Chicago & Western Indiana Railway Company became the stockholders in this new corporation.

In August 1896 a receiver for the Louisville, New Albany & Chicago Railroad was appointed at the instance of its creditors. In October of that year the consolidated mortgage interest was defaulted, and a reorganization plan was proposed. On 1 July 1897 the purchasing com¬

mittee under the plan of reorganization deliv¬

ered the road to a company organized under the name of the Chicago, Indianapolis & Louis¬

ville Railway Company. On 15 March 1899 the capital account showed a stock issue of $5,000,000 preferred and $10,500,000 common stock, and a bonded debt of $13,177,000.

In September 1899 the company began the operation of the Indian Stone Railway, extend¬

ing from Clear Creek to Harrodsburg, a dis¬

tance of 10 miles, which was constructed under contract with the company in 1898-99.

In May 1902 control of the Chicago, Indian¬

apolis & Louisville Railroad passed to the Louis¬

ville & Nashville Railroad Company and the Southern Railway Company, these two com¬

panies having acquired 51 per cent of the cap¬

ital shares of the first named company. In September 1902 a contract was entered into with the Illinois Central Railroad Company for the joint use of 10 miles of their road west from Switz City, for a period of 25 years, thus giving the Chicago, Indianapolis & Louisville Railway an entrance into valuable coal fields.

A similar contract was made in May 1903 with the Pennsylvania Company for the joint use of that part of its track between Switz City and Gosport Junction.

Equipment and Earnings. — On 30 June

1915 the company owned 508.79 miles of main track, 275.62 miles of siding and used under contract 113.62 miles of track, making a total of line operated 622.41 miles. The equipment comprises 147 engines, 6,743 freight cars, 120

passenger cars and 155 company service cars.

For the fiscal year ended 30 June 1915 the total earnings were $6,559,664.95 and the operating expenses were $4,678,021.14, leaving a net rev¬

enue from railway operations of $1,881,643.81.

The gross income was $1,794,814.45 ; the total deductions from gross income were $1,555,040.99, leaving a net income of $239,773.46.

CHICAGO JUNCTION, Ohio, village in

Huron County, on the Baltimore and Ohio Rail¬

road, 60 miles southwest of Cleveland. It has fine sulphur springs, owns the waterworks and lighting plant. The repair shops of the Balti¬

more and Ohio are the principal source of em¬

ployment. Pop. 2,950.

CHICAGO, MILWAUKEE AND SAINT

PAUL RAILWAY, a system operated by the company of the same name in Illinois, Wiscon¬

sin, Michigan, Minnesota, Iowa, Missouri, South Dakota, North Dakota, Montana, Idaho and Washington.

History. — The organization was chartered as the Milwaukee and Saint Paul Railway Com¬

pany, 5 May 1863, the projectors being the pur¬

chasers of the foreclosure of the Western Division of the La Crosse and Milwaukee Rail¬

road. The Milwaukee and Western, the Mil¬

waukee and Horicon, The Ripon and Wolf River railroads, and the Eastern Division of the La Crosse and Milwaukee Railroad were subsequently acquired by purchase, and under authority of an act of the legislature of the State of Wisconsin, the present name was adopted 14 Feb. 1874, when the total length of completed roads owned equalled 1,399 miles.

Equipment, Earnings and Funded Debt.

— During the fiscal year ending 30 June 1915 the company operated 10,075.61 miles of main track, of which 1,823.59 miles were located in Wiscon¬

sin ; 475.95 miles in Illinois; 1,936.54 miles in Iowa; 1,250.73 miles in Minnesota; 379.93 miles in North Dakota; 1,794.89 miles in South Da¬

kota ; 147.68 miles in Missouri ; 245.41 miles in Michigan; 6.30 miles in Nebraska; .77 mile in Kansas; 1,057.21 miles in Montana; 199.41

miles in Idaho and 757.20 miles in Washington.

The main track owned solely by the company amounted to 9,617.22 miles which with 1,023.50

miles of second track, 21.72 miles of third track, 13.11 miles of fourth track, 46.98 miles of connection tracks and 3,104.48 miles of yard tracks, sidings and spur tracks, gives a total of 13,827.01 miles owned solely by the Company.

Jointly with other companies it owned 103.45

miles of main track, 6.14 miles of second track, 1.94 miles of third track, 1.93 miles of fourth track, 5.92 miles of connection tracks, 175.34

miles of yard tracks, sidings and spur tracks; total 294.72 miles, and also leased 354.94 miles of main track, 76.47 miles of second track, 1.14

miles of third track, total 432.55 miles, giving a trackage for the entire system of 14,554.28

miles. Extensions from the end of track south¬

east of Gleason, Wis., 1.55 miles, and from Ladd to Cherry, Ill., 3.41 miles were completed at a cost of $40,495.51, and an extension of the Armour line, 21 miles in a northwesterly direc¬

tion, and a line 75 miles long extending west from Chamberlain on the Missouri River were under construction. The main line of the system from Chicago, Ill., to Minneapolis, Minn., is 417.40 miles in length. The divisions of the system are as follows: Chicago; Evans¬

ton; Racine and Southwest Division in Wiscon¬

sin and Illinois ; Chicago and Council Bluffs Division in Illinois; Chicago and Council Bluffs Division in Iowa ; Kansas City Division ; Du¬

buque Division; Northern Division; River Di¬

vision; Wabash Division; Chippewa Valley Division; Iowa and Minnesota Division;

Prairie du Chien Division; Mineral Point Division ; La Crosse Division ; Wisconsin Val¬

ley Railroad ; Iowa and Dakota Division ; Sioux City and Dakota Division ; Southern Minnesota Division; Hastings and Dakota Division;

Des Moines Division ; Rochelle and Southern Division; Superior Division; Black Hills Di¬

vision; Trans-Missouri Division; Rocky Moun¬

tain Division; Northern Montana Division; Musselshell Division; Missoula Division; Idaho Division ; Columbia Division ; and Coast Di¬

vision. The total equipment 30 June 1915 com-CHICAGO AND NORTH WESTERN RAILWAY

prised 1,983 locomotives and 68,776 cars of all kinds.

The number of passengers carried during the year amounted to 16,065,456 ; 858,452,321 pas¬

sengers were carried one mile at an average rate per passenger per mile of 2.091 cents. The num¬

ber of tons of revenue freight carried were 32,-

959,392; 8,185,988,375 tons of revenue freight were carried one mile at an average rate per ton per mile of .7813 cent. The earnings from passenger traffic during the year were 19.63 per cent of the total earnings, a decrease of $1,008,796, or 5.32 per cent, compared with the previous year. There was a decrease of 47,885

tons, or .14 per cent, compared with the preced¬

ing year in the amount of freight carried, the earnings from freight traffic were $63,953,798.62, being 69.95 per cent of total earnings, a de¬

crease compared with the preceeding year of $1,-

361,956.17, or 2.09 per cent. The number of tons of all agricultural products carried during the year was 7,742,673 tons — an increase com¬

pared with the previous year of 8.10 per cent.

Agricultural products comprised 23.49 per cent of the total tonnage carried, as compared with 21.70 per cent of the total tonnage of 1914.

The number of tons of commodities other than agricultural products carried during the year was 25,216,719 tons — a decrease compared with the previous year of 628,308 tons, or 2.43 per cent — the per cent of the total being 76.51 per cent against 78.30 per cent in 1914. The gross earnings for the year ending 30 June 1915 were $91,435,374, the operating expenses $61,971,700, yielding net earnings of $29,463,673 ; income from other sources $3,649,713 gave a total net income of $33,113,386. The total payments were $21,145,104, leaving a surplus of $11,968,-

282. During 1915 two dividends, aggregating 7

per cent, were paid on the preferred stock, and two dividends, aggregating 5 per cent, were paid on the common stock. The total amount of the capital stock of the Company at the end of the fiscal year 1915 was $233,636,300, during the year 1915 it was increased by $506,000 of common stock issued and sold. The sum of $434,400 is held in the treasury. The amount of capital stock per main line mile of road owned was $24,163.91 The funded debt at the close of the fiscal year was $482,133,154 — a decrease in the year of $4,748,000; the sum of $123,893,800

is held in the treasury. The amount of the funded debt per main line mile of road owned was $49,864.79. The total capitalization of the company per mile of road was $24,164.

CHICAGO AND NORTH WESTERN

RAILWAY, popularly known as <(The North Western Line,ˆ a system operated by a company of the same name in Michigan, Illinois, Iowa, Wisconsin, Nebraska, Minnesota, North Da¬

kota, South Dakota and Wyoming.

History. — The Company was organized 6

June 1859 to take over the property of the Chi¬

cago, Saint Paul and Fond du Lac Railroad Company, sold under a foreclosure of 2 June 1859. The Chicago, Saint Paul and Fond du Lac Railroad Company had been organized 31

March 1855, to consolidate the Rock River Val¬

ley Union Railroad Company with the Illinois and Wisconsin Railroad Company, the latter chartered 12 Feb. 1857 to build a railroad north to the Illinois State line, and to consolidate with any railroad in Wisconsin. The Rock River vol. 6 — 29

Valley Union Railroad Company, so named 9

Feb. 1850, was previously the Madison and Beloit Railroad, chartered by the legislature of Wisconsin 19 Aug. 1848; it was leased in 1854

by the Galena and Chicago Union Railroad Company which had been incorporated by the State of Illinois, 16 Jan. 1836, to construct a railroad from Chicago to Galena, and lateral lines as they might deem advisable to unite with those of any other railroad company. The Galena and Chicago Union Railroad Company began to build their road in 1847, and their Chicago to Freeport section is the earliest built portion of what now constitutes the great Chi¬

cago and North Western System. The Chi¬

cago, Saint Paul and Fond du Lac Railroad Company, involved in the great financial panic of 1857, became bankrupt in 1859, and its re¬

organization as the Chicago and Northwestern ; Railway Company was authorized by the legis¬

latures of Illinois and Wisconsin.

Operation, Equipment, *etc.* — By extensions and by the acquisition of other railroads, chief of these undertakings being the grand consolida¬

tion with the Galena and Chicago Union Rail¬

road Company (1864), the Madison Extension (1871), the Menomonee Extension (1882), the Elroy Route (1875), the Fort Pierre Extension (1882), the acquisition of the Iowa lines (1884), the Fremont, Elkhorn and Missouri Valley Railroad Company (1903), of the Manitowoc,

Green Bay and Northwestern Railway (1909), the Milwaukee, Sparta and Northwestern Rail¬

way (1912), and the Saint Louis, Peoria and Northwestern Railway (1913), the Chicago and North Western Railway Company was operating, 30 June 1915, 8,107.82 miles of railroad. Of this it owned 7,946.12 miles, leased 82.93 miles and had 76.78 miles of trackage rights on branches of the Union Pacific Railroad, the Chicago, Saint Paul, Minneapolis and Omaha and other railroads. Of the total mileage 2,170.03 are located in Wisconsin, 1,633.14 in Iowa, 1,102.05 in Nebraska, 1,063.15 in South Dakota, 824.53 in Illinois, 519.88 in Michigan, 650.30 in Minnesota, 130.46 in Wyoming and 14.28 in North Dakota. In addition to the above the company had in operation 1,106.32

miles of second, third and fourth main tracks, and 3,406.53 miles of sidings and yard tracks, making a total mileage of all tracks both owned and operated of 12,620.77. The operating divi¬

sions of the system are : Wisconsin Division, 348.46 miles ; Northern Wisconsin Division, 332.72 miles; Galena Division, 414.81 miles; Southern Illinois Division 202.17 miles; East Iowa Division, 346.66 miles; West Iowa Divi¬

sion, 222.80 miles; Iowa and Minnesota Divi¬

sion, 335.99 miles; Northern Iowa Division, 383.57 miles ; Sioux City Division, 456.70 miles ; Madison Division, 696.01 miles ; Lake Shore Division, 381.35 miles; Ashland Division, ■673.73 miles; Peninsula Division, 464.44 miles; Minnesota Division, 499.88 miles; Dakota Divi¬

sion, 841.85 miles; Eastern Division, 897.41

miles ; Black Hills Division, 609.27 miles. In addition the Chicago and North Western Rail¬

way Company owns a majority of the capital stock of the Chicago, Saint Paul, Minneapolis and Omaha Railway Company, and has con¬

tracts and agreements with other railroad com¬

panies as follows: With the Chicago, Bur¬

lington and Quincy, securing to that company the joint use of the bridge over the Mississippi 450

CHICAGO, ROCK ISLAND AND PACIFIC - CHICHEN-ITZA River at Clinton, Iowa, at an annual rental of $20,000; with the same company and the Chi¬

cago, Rock Island and Pacific, giving them joint use with this company of certain sidings in Council Bluffs, Iowa; with the Chicago, Saint Paul, Minneapolis and Omaha, providing for joint running arrangements between Chicago and Saint Paul, and divisions of earnings upon a pro rata per mile, with the Chicago Great Western Railroad; granting that company the joint use of certain tracks and buildings in Zumbrota, Minn., with the Union Pacific Rail¬

road Company, the Southern Pacific Railroad Company, the Oregon Short Line Railroad Com¬

pany and the Oregon Railroad and Navigation Company, providing for the establishment of a through route between Chicago and the Pacific Coast, and with the Chicago, Saint Paul, Minne¬

apolis and Omaha Railroad, and Northern Pacific Railroad companies, providing for the establishment of a through route between Chi¬

cago and Northwest Pacific Coast points in Oregon and Washington.

The rolling stock on 30 June 1915 com¬

prised 1,840 locomotives, 1,959 passenger cars, 68,242 freight cars, and 3,626 work cars, including 4 rotary snow plows. The total operating revenues for the year were $80,779,-

675, comprising freight, $51,923,860; passenger, $20,528,443; other transportation, $6,694,249; incidental, $1,633,121. The operating expenses amounted to 69.78 per cent of the operating revenues or $56,371,573, leaving a net revenue from railway operations of $24,408,102. This, less railway tax accruals, 5.59 per cent of operating revenue amounting to $4,516,943, and uncollectable railway revenues, $7,254, left a railway operating income of $19,883,904. A non-operating income from rentals, dividends, funded and unfunded securities, etc., of $2,799,-

999, made a gross income of $22,683,904. With deductions from gross income, rental payments, interest on funded debt, etc., $10,769,855,

and the disposition of net income in sinking funds $204,053, and dividends 8 per cent on preferred stock and 7 per cent on common stock — total appropriations, $11,103,668 — the balance income for the year was $810,380. Of the operating expenses for the current fiscal year, $32, 920,365

or 58.40 per cent was paid employees for labor.

The outstanding funded debt which had been decreased during the year by $4,298,000 was, on 30 June 1915, $210,581,000. The Company's authorized capital stock is $200,000,000, of which the following had been issued to 30 June 1915 : Common stock and scrip held by the public, $130,117,028; common stock and scrip owned by the company, $2,338,502; preferred stock and scrip held by the public, $22,395,120; preferred stock and scrip owned by the company, $3,834; total capital stock and scrip, $154,854,485.

CHICAGO, ROCK ISLAND AND

PACIFIC RAILWAY COMPANY, an

Illinois corporation operating besides the main parent line of the same name the Chicago, Rock Island and Gulf Railway, the Morris Ter¬

minal Railway, and under lease, the Choctaw, Oklahoma and Gulf Railway, the Rock Island, Arkansas and Louisiana Railway, the Saint Paul and Kansas City Short Line Railway, the Rock Island, Stuttgart and Southern Railway, the Rock Island and Dardanelle Railway, the Peoria and Bureau Valley Railway, the Keokuk and Des Moines Railway and the White and Black River Valley Railway, a total mileage of 8,330.17. The parent company owns the entire capital stock of all these companies with the exception of the three last on the list.

The parent company, The Chicago, Rock

Island and Pacific Railway, was incorporated by act of the Illinois legislature, approved 27 Feb.

1847, under the name of the Rock Island and LaSalle Railroad

Company, the intention being, as defined in the charter, to construct a line of railroad <(from the termination of the Illinois and Michigan Canal® at LaSalle, Ill., to Rock Island, on the Mississippi River, and the capital stock was fixed at $300,000.

The charter amended by the legislature

changing the name of the corporation to the Chicago and Rock Island Railroad Company, au¬

thorizing it to continue its projected railroad by way of Ottawa and Joliet to Chicago and to increase its capital stock to $3,000,000, was ap¬

proved on 7 Feb. 1851.

Construction was begun in April 1852, and the first passenger train was run from Chicago to Joliet, a distance of 40 miles, in October of the same year. The full line authorized by the charter, from Chicago to Rock Island, was com¬

pleted and placed in operation in -1854.

The lines of the affiliated proprietary com¬

panies were built subsequently up to 1906, and were leased or acquired for traffic operation by the Chicago, Rock Island and Pacific Railway Company. In 1915, on the application of the American Steel Foundries, a corporation, receivers were appointed to take charge of and operate all the railroads, lands, properties, assets, rights and franchises of the company.

The results of the operations for the fiscal year ending 30 June 1915 were as follows: Total operating revenue (increase, $2,272,047.83, or 3.3 per cent), $70,947,889.88 ; operating ex¬

penses (increase, $1,885,794.78, or 3.7 per cent), $53,521,615.06; net operating revenue (increase, $386,253.05, or 2.3 per cent), $17,426,274.82; taxes and uncollectable railway revenue (increase, $50,110.43, or 1.5 per cent), $3,386,379.84; operat¬

ing income, $14,039,894.98 ; miscellaneous income, $1,367,916.26; total income, $15,407,811.24; in¬

terest and rentals, $16,142,487.76 ; balance of income carried to profit and loss — deficit, $1,734,676.52. The authorized capital stock of the company is $75,000,000. The amount of capital stock outstanding 30 June 1915 was $74,877,200; of this amount $517,477.50 was owned by the company and held in its treasuary.

The total investment in road and equipment up to 30 June 1915 had been $319,565,234.80. The equipment on the same date comprised 1,674

locomotives of all classes, 1,163 cars in passen¬

ger service, 45,674 cars in freight service, 4,469

cars in company's service, and 1 steamer.

CHICAGO SUMMER SCHOOL. See

Summer Schools.

CHICHEN-ITZA, che-chan'e-tza' (at the

mouth of the well of the Itza), an ancient city of Yucatan whose ruins are fairly well pre¬

served. According to the traditional history of the Itza they came from the west at an early period in their tribal life, settled at the mouth of an overflowing well, built a great city known as Chichen Itza, and prospered. It is probable that the Itza derived their name from that of

their great culture god Itzamna, or Zamna.

Chichen Itza retained great prominence among the pre-Columbian cities of Yucatan for a long time during which it became a centre of learning and of a very extended commerce which

stretched out its arms into Central America and Southern Mexico. As the holiest shrine of the Itza it exercised a strong religious influence over the peninsula of Yucatan, Campeche, Chiapas and Guatemala, into all of which dis¬

tricts four great paved roads led from the heart of the capital. The remains of the capi¬

tal of the Itza to-day consists of a number of fairly well-preserved buildings to which fanci¬

ful names have been given, and the ruins of many others which have been completely de¬

stroyed. The <(Nunnery® is a two-story build¬

ing on a terrace 32 feet high. The edifice itself, which is reached by a flight of stone steps 56

feet wide, is richly sculptured on the outside.

The ˆChurch® is a one-room building of very imposing appearance. The <(Akab-tzib® (the place of writing in the dark) is a building built on the level ground. It is 48 feet wide by 149

feet long; and the roof is reached by an out¬

side stairway 45 feet wride. The (<Castle® which is built on a very steep pyramid, about 200 feet square at the base and 75 feet high, is reached by a grand stairway 37 feet wide on the west; and by another 44 feet wide on the north.

The latter has solid stone balustrades terminat¬

ing at the bottom in immense serpents' heads each 10 feet long and with open mouths and protruding tongues. The building is rich in carved wood and stone and the main doorway is 20 feet wide. The (<Gymnasium® consists of what is supposed to have been the circus of the city. Two immense parallel stone walls 274

feet long and 120 feet apart enclose the court which is open at both ends. A short distance from each end is a terraced building both sup¬

posed to have been temples. The (<House of the Tigers,® at the end of the gymnasium, has massive sculptured pillars and door posts, and carved zapote lintels, while the walls and ceil¬

ings are adorned with very elaborate paintings in bright colors, depicting different scenes. The <(Red House® (Chin-chan-chob) contains tablets of stone with carved hieroglyphics like those to be found in Guatemala. The <(Caracol® consists of two rectangular terraces one above the other, the first 150 by 223 feet, the. second 58 by 80

feet, on the latter of which is a round tower with dome-shaped top. The tower is 22 feet in diameter and 24 feet high and through the centre of it there runs, from top to bottom, an immense column of stone round which passes a circular corridor, and between this and the outside wall a second corridor. These corri¬

dors probably contained stairways. Great stair¬

ways 45 feet wide of huge, intertwining stone serpents lead up the sides of the terraces to the tower. In one part of the city there is a great number of square stone columns from three to six feet high standing in rows from three to five feet apart around an open space some 400 feet square and also irregularly in other directions around various mounds. Sev¬

eral hundred of them have been counted while others lie buried. Heaps of ruined mounds, fallen walls, sculptured blocks scattered over the plain in the vicinity of the buildings already described show that the completely ruined part of the city is vastly larger than the part that is still standing to command the wonder and admiration of the present generation.

CHICHESTER, England, a municipal bor¬

ough and episcopal city, near the southwest cor¬

ner of the county of Sussex, 28 miles west of Brighton. It is well built and has wide streets.

Its old wall, still in good preservation and lined with lofty elms, gives it a very picturesque appearance. Its principal edifice is the cathe¬

dral, an ancient Gothic structure, founded in 1078, with one of the

most graceful spires in England, and containing among many monu¬

ments one of the poet Collins, who was born and died here. It has a fine old octagonal market-cross. The site of the city was known as Regnum during the Roman occupation, and was the headquarters of Vespasian. During the great Civil War the city changed hands three times in the course of 13 months (1642-43). It is now the headquarters of the Sussex County counsel. Pop. 12,591.

CHICK-A-DEE (an onomatopoeic word,

imitating the note of the bird), a local name for the black-cap titmouse. See Titmouse.

CHICK-PEA, the popular name of Cicer—

arietinum and other plants of the same genus, growing wild along the shores of the Mediter¬

ranean and in many parts of the East, and producing a short puffy pod with one or gener¬

ally two small wrinkled seeds. It is an im¬

portant article of French and Spanish cookery, and the plant is cultivated in Europe, Egypt, Syria, India, Mexico, *etc.* When roasted it is the common parched pulse of the East. It is sometimes used as a substitute for, or as an adulterant of, coffee. In Mexico it is an im¬

portant food, known under the name garbanzo.

The herbage serves as fodder for cattle. The chick-peas are leguminous plants of the vetch tribe, differing from the vetches mainly in the fruit. A dozen species are known, having the flowers solitary or in small axillary groups.

CHICKAHOMINY (the river of the

coarse-pounded corn, an Algonquin word), a river in Virginia, about 75 miles in length. It is an affluent of the James and runs parallel to it for many miles from its source northwest of Richmond. As its course

was between the Union armies and Richmond, on and near it occurred many of the most important events of McClellan's Peninsula campaign in 1862, in¬

cluding the battles of Williamsburg, Hanover CourtHouse, Fair Oaks, Mechanicsville, Cold Harbor, Savage's Station, Frazier's Farm and Malvern Hill (qq.v.). The second battle of Cold Harbor under Grant occurred 3 June 1864.

CHICKAMAUGA, chTk-a-ma'ga, Battle of,

fought near Chickamauga Creek, and on Geor¬

gia soil, 19-20 Sept. 1863. General Rosecrans (q.v.) having forced Bragg (q.v.) out of his fortified position in Middle Tennessee by a campaign of strategy, prepared to gain pos¬

session of Chattanooga, the gateway through the mountains to the Gulf States, and a most important railroad centre for the Confederacy.

Bragg held the city. Rosecrans' army lay along the western base of the Cumberlands, with headquarters at Winchester, Tenn. His army was composed of three corps of infantry, the Fourteenth, Gen. George H. Thomas ; the Twentieth, Gen. Alex. McD. McCook; and the Twenty-first, Gen. Thomas L. Crittenden. Gen.

D. S. Stanley commanded the one corps of cavalry. McCook's corps was the right wing, Thomas' the centre and Crittenden's the left.

Stanley's cavalry guarded the right flank and Minty's brigade of cavalry the left.

The plan of campaign involved the repair of the railroad to the Tennessee River, the collection of supplies for _ a month's absence from any base, and ammunition for two battles and the throwing of Rosecrans' army to the rear of Chattanooga and advancing to it from the south. His centre and right were ascend¬

ing Lookout before Bragg became aware of the character of the movement. He then evacuated Chattanooga and moved to La Fay¬

ette, 26 miles south and behind Pigeon Moun¬

tain, the next range east of Lookout, leaving his rear-guard just below Lee and Gordon's Mill at the crossing of the Chickamauga. Crittenden having accomplished his purpose north of the Tennessee withdrew through Sequatchee Val¬

ley to the river, crossed both that and the Sand Mountains and entered Lookout Valley near the north point of Lookout Mountain. A reconnoitering party, 9 September, discovered the evacuation of the city. Passing around the point of the mountain, Crittenden, leaving one brigade in the city, proceeded at once, by way of Rossville Gap, to operate to the left of Thomas, who had descended Lookout at Ste¬

vens' Gap. McCook was further to the right, having crossed Lookout at Winston's. The grand strategy of the campaign had been en¬

tirely successful. . The army had been thrown over three formidable mountain ranges and a wide river, all within the immediate territory of General Bragg, without opposition, almost without discovery and entirely without loss.

To possess Chattanooga it remained necessary to concentrate the widely separated corps in it, or between it and Bragg.

Erroneous dispatches led Rosecrans to be¬

lieve that Bragg was retreating on Rome. He ordered pursuit, and found Bragg occupying the gaps in Pigeon Mountain in force and pre¬

paring movements against each separate corps.

These failed, and Bragg, having notice of the arrival of Longstreet, with two divisions from the Army of Northern Virginia, issued, 18

September, orders of battle designed for inter¬

posing between the Union army and the city.

At this time the main bodies of the two armies confronted each other across the upper Chicka¬

mauga, and Longstreet was arriving at Ringgold. Crittenden's corps was concentrated at Lee and Gordon's Mill.

During the afternoon of the 18fh Gen. Bushrod Johnson from Ringgold, in command of five brigades, including Hood's division of Longstreet's corps, forced a crossing at Reed's Bridge, after a sharp defense by Minty's cavalry. Walker's corps, after failing at Alex¬

ander's Bridge, which was defended by

Wilder's brigade of mounted infantry, crossed at a ford below. During the night about two-thirds of Bragg's army crossed the Chicka¬

mauga, and early in the morning of the 19th, he formed line of battle directly on Crittenden's left flank and in contact with it. Bragg's plan was to drive Crittenden's corps back on Thomas in the centre, and both on McCook at the right, and force the whole into the mountain. His plan of battle was interfered with and finally destroyed by an undiscovered night advance of Rosecrans' centre and right, by which he passed several miles beyond Bragg's position and thrust his lines across the La Fayette road and eastward to the Chickamauga, and so gained position between Bragg and Chattanooga. The head of Thomas' corps, which struck Forrest's cavalry at Jay's Mill, was Brannan's division.

The fighting, desperate and at close quarters, continued until 1 o'clock, when Forrest and his supports were repulsed. Soon both armies were rapidly advancing toward this vortex of fierce fighting. It was of desperate character on both sides, continuing from noon until sun¬

set, with alternate success and repulse for each side, the field finally remaining in possession of the Union forces. The fighting throughout the day had been largely in forests thick with un¬

derbrush, and so all within the limits of point-blank range. At nightfall Cleburne's division burst with great force upon the lines of John¬

son's and Baird's divisions, which were well in advance at the centre. They gradually with¬

drew from under the fire which continued for an hour after dark. At the close of the fighting for the day Rosecrans' army held La Fayette road between Bragg and Chattanooga, and Bragg's plan of battle for the day had been effectually defeated.

On the Union side the entire force except five brigades had been engaged. Of Bragg's army three divisions and one brigade present had not been engaged, and two brigades did not arrive until the second day. At the close of the first day's battle the Confederate line ex¬

tended from Hall's Ford to Jay's Mill. The Union line was brought back nearer to La Fayette road, which was the axis and the ob¬

jective of the battle. The Confederate line ex-CHICKAMAUGA

tended far beyond the Union left. Counting by brigades, the Union line was overlapped on its left by four brigades of cavalry, two fighting dismounted, and two brigades of infantry, and on its right by two_ brigades of infantry. The Confederates had 15 brigades in their reserves, counting Longstreet's second and third lines, Law's and Kershaw's divisions, at the centre.

The Union army had five, an overlapping force for the Confederates of four brigades, and an excess of 10 in the reserves. The Union line had strengthened its front by logs, stumps, stones and fence rails. Counting by divisions from left to right, it was formed as follows: Baird, Johnson, Palmer and Reynolds east of the La Fayette road; Brannan, Negley, Davis, Sheridan and Wilder's Mounted Brigade west of it, with Wood and Van Cleve in reserve.

The Confederate line, from right to left, was thus composed: Pegram and Armstrong of

Forrest's cavalry, Breckenridge, Cleburne, Stewart, Bushrod Johnson, Hindman, Preston, with Walker, Liddell, Cheatham, Law and Ker¬

shaw in reserve.

The Confederates attacked about 9 o'clock.

Breckinridge moved against Baird; the left brigade, striking Baird's rude works, was broken on them and its commander mor¬

tally wounded. The other two brigades swung around full in the Union rear, but were driven back after sharp fighting. Cleburne and Stew¬

art assaulted in succession and were both re¬

pulsed. At 11 o'clock Negley, in rear of the Brotherton house, had been replaced by Wood from the reserve, and sent to the left. Brannan, on the left of Wood, had also been ordered to the left, but the Confederate attack developing on his front, he did not move. Upon the sup¬

position that he had gone, Wood was ordered to close on Reynolds, the next division to the left of Brannan. Wood moved promptly to find Reynolds. This left a gap, just as Longstreet, with a column of three divisions, Bushrod Johnson in the front line, Law in the -second and Kershaw in the third, was moving to attack Wood's position. This broke the Union centre.

Davis' and Sheridan's divisions to the right of the break were rushed toward the gap, but failed to restore the line, and being attacked in front and on both flanks by Johnson's and Hindman's troops were forced off the field in confusion. Rosecrans, Crittenden and McCook, being with the right wing, were driven off the field with that portion of the army which left it. Brannan's division, the first on the left of the break, swung back nearly at right angles, and took position on Snodgrass Hill, a quarter of a mile in the rear, on which also rallied other portions of the Union army that had been scattered or broken. At noon Forrest's cavalry, opposite Cloud's, had crossed La Fayette road and captured the field hospitals of the Union left wing.

The four divisions of Baird, Johnson, Pal¬

mer and Reynolds maintained their lines around Kelly field. At 1 o'clock General Thomas had formed parts of Brannan's, Wood's and Negley's divisions, with various fragments, on Snodgrass Hill. Negley

had left at noon with two regiments of infantry and 40 guns. General Thomas then found himself with only one bat¬

tery. About 1 :30 the hill was assaulted by five brigades, that of Fulton overlapping Bran¬

nan's right and gaining the valley in his rear.

At this juncture Gordon Granger arrived from McAfee's Church with Whitaker and Mitchell's brigades of Steedman's division, and promptly attacking, drove the Confederate force, which had crossed the ridge, over it again, and ex¬

tended General Thomas' line for a half mile along the crest. About the same time Van Derveer's strong brigade arrived from its suc¬

cessful charge on Breckinridge in the Kelly field and strengthened Brannan's line. Longstreet's assault continued with little intermission until sundown. Finally 11 Confederate brig¬

ades were participating in the attack on Snod¬

grass. For its defense Thomas at the last had five brigades and about one-half of two others.

There was little fighting on the Kelly field line after 1 o'clock, though Bragg ordered a gen¬

eral attack for 3. It was not delivered until about sundown. At 3 Longstreet, from Snod¬

grass Hill, asked Bragg for re-enforcements, but was informed that the right wing had been so beaten back that it could be of no service to him. Longstreet's last assault was with troops that had not been engaged. Their attack began at 4 :30 and lasted until 6. They gained a salient of the Union line and held it for an hour, with a loss of 36 per cent, but were finally dislodged by Gen. Charles H. Grosvenor's regi¬

ment.

At 5 :30 General Thomas began withdraw¬

ing his army. The four divisions on Kelly field retired in succession

from right to left.

Reynolds and Palmer were not attacked. The Confederate attack ordered for 3 o'clock was delivered just as Johnson and Baird were leav¬

ing their lines, and some captures were made, though both reached the forest west of the La Fayette road without disorganization and followed the rest of the left wing through Mc¬

Farland's Gap to Rossville. At 7 o'clock the Snodgrass Hill line began to retire from left to right. Steedman's withdrew at 6, sundown.

Fighting in his front had ceased. An hour later Trigg and Kelly, passing over the ground which Steedman had occupied, captured the greater part of three Union regiments which were temporarily attached to the left of his line, and by mistake had not received notice of the withdrawal. The last volley of the battle was fired by troops of Van Derveer's brigade at Kelly's and Trigg's lines, which, after captur¬

ing the isolated troops, attempted to move on Van Derveer's position. Davis' division, which had been cut off at noon, reached a point on its return near General Thomas' right at sun¬

down. General Sheridan, who had continued to Rossville, marched toward the field from that point, reaching Cloud's an hour after sun¬

down. Both of these divisions acted as sup¬

ports for the flanks, while the troops w-ere being withdrawn. General Thomas withdrew the

army without molestation through McFarland's Gap to Rossville, and during the night placed it in strong position in the gap at Rossville, along the adjacent crests of Missionary Ridge and across the valley to Lookout Mountain. It was thus firmly established between Bragg and Chattanooga. Holding his lines through the next day, at night he withdrew toward Chatta¬

nooga.

General Rosecrans crossed the Tennessee

with an effective force of a little above 60 000.

Two brigades and an additional regiment were detached. A maximum figure for his force at 454

the opening of the battle would be 55,000. It is difficult to approximate Bragg's force. A week after the battle he reported 38,846 effec¬

tives, and his losses to have been 18,000, which would make his force in action 56,846. Gen. R.

E. Lee, writing to President Davis of Bragg's strength, five days before the battle, said: <(His total effective force will therefore be 76,219, as large a number as I suppose he can operate with." This did not count Longstreet's re-en¬

forcement, according to General Lee's figures, but a large part of Longstreet's forces never reached Bragg. In view of General Lee's state¬

ments, and the known overlapping of the Union lines, and the preponderance of his reserves, it would seem that Bragg's force can be fairlv fixed at 70,000.

Few, if any, of the great battles of the war show an equal percentage of casualties, con¬

sidering the numbers engaged and the time of fighting. The losses in killed, wounded and missing for Rosecrans were 16,179, and for Bragg 18,000. For the troops actually engaged these figures give a percentage of 33 for each side. On the Confederate side, Longstreet's wing lost 44 per cent, nearly all on the second day. Bushrod Johnson's division lost 44 per cent and Preston's 33 per cent in the attack of an hour and a half on Snodgrass Hill ; and Gracie's brigade of the latter division lost 36

per cent during the same time. The brigade losses in Cheatham's division ranged from 35

to 50 per cent. The loss in Breckinridge's division was 33 per cent and in Cleburne's 43

per cent. Bates' brigade of Stewart's division lost 52 per cent. The Confederates assaulted throughout the second day.

On the Union side Steedman's division lost 49 per cent in four hours, and all of these but one were killed or wounded. Brannan's division lost slightly over 36 per cent; Van Derveer's brigade of that division only two less than 50

per cent ; Davis' division a little over 50 per cent ; Van Cleve's division 23.5 per cent. Among the Union brigades Buell's loss was 45 per cent, Carlin's 53 per cent, Hazen's 34 per cent, Dick's 25 per cent, Connell's 37 per cent and Croxton's 39 per cent. Consult (War of the Rebellion Records, > Vol. 23, parts 1 and 2; Vol. 30, parts 1, 2, 3 and 4. Any good history of the United States.

H. V. Boynton.

CHICKAMAUGA NATIONAL MILI¬

TARY PARK. Park in Georgia, on the site of the battle of Chickamauga, a few miles southeast of Chattanooga, Tenn., near the Ten¬

nessee and Georgia line. Congress, in 1890, passed an act authorizing the establishment of a park on the site of the battle of Chickamauga.

In carrying out the project the States of Geor¬

gia and Tennessee gave $400,000 and Congress appropriated $725,000. To the United States Federal government the citizens of each State sold and the States ceded jurisdiction over lands and roads included in or leading to the battlefield of Chickamauga, as well as the sites of those actions which took place about Chatta¬

nooga, and which the park also commemorates.

The actual area of the park is 15 square miles, but to all intents and purposes it embraces a much larger tract. It is the object, so far as

possible, to preserve the conditions as they ex¬

isted at the time of the battle, and in order to make clear the positions and movements of the troops engaged, monuments, historical tab¬

lets and other guide marks have been set up at the proper points. Several lofty observation towers have been erected, which command a view of the battlefield. A large part of the park is forest land, but a considerable portion has been cleared of underbrush and small tim¬

ber, in order to permit free access and unob¬

structed views. It was dedicated with elabo¬

rate ceremonies 19-21 Sept. 1895. It is the first time that a battlefield has been so com¬

pletely marked and set aside as a monument of the event which happened within its boundary.

See Boynton, Henry V.

CHICKAREE, the American red squirrel;

a popular name, imitative of its cry. It is a small animal, about seven inches in length of body, with a tail about the same length. See Squirrel.

CHICKASAW, chik'a -sa, the most active

and warlike tribe of the great Muskhogean (q.v.) Indian stock; a branch of the Choctaw (q.v.), and according to their own tradition, not separated till after the united tribe crossed the Mississippi eastward. They occupied north¬

eastern Mississippi, and the adjacent part of western Tennessee to the Ohio. Their chief settlements were on the headwaters of the Tombigbee and Yazoo, about the present Ponto¬

toc and Chickasaw counties, and trail led to them from the site of Memphis, 160 miles off, their principal Mississippi landing. They were first found by De Soto, who reached the village of "Chicaga" with 200 houses, on the west bank of the Yazoo, 17 Dec. 1540, and remained

there till March; but when he undertook to impress some of the Indians as porters, he was repeat¬

edly assailed, the village fired, his path barred by a stockade and he lost many men before he beat them off. English traders penetrated thither in the 17th century. After the French settlement at Mobile, the rivalry of the two nations-first set them against the French, and for a time cut off the Mississippi trade from both; but with the French, as the only real colonists in that region, they were in constant and envenomed hostility for many years, and Bienville and D'Artaguette led expeditions against them again and again, not even a nom¬

inal peace in 1740 putting an end to their war¬

fare. With Oglethorpe of Georgia they had friendly relations. At this time they had four large contiguous settlements, with the houses in each scattered over a space 1 to 2 miles wide and 4 to 10 long; the chief was called Chookka Pharaah, or Long House. Their sachem was called the mico. In 1765 Governor Johnstone of West Florida induced them and the Choctaws to hold a council with him at Mobile, where a trade tariff was framed; but the white traders among them soon precipitated fresh troubles.

After the Revolution, at the great general treaty of Hopewell, 28 Nov. 1785, their mico Pio anil others made a treaty delimiting their lands from the Ohio River to the Mississippi State line.

Their number was then estimated at 800 to 1,200. The reliability of these estimates may be judged from the fact that they are said to have had 10,000 warriors when they crossed the Mississippi, 450 in 1755, 750 in 1764 and 500

in 1768. In 1793 they joined the whites against the Creeks, and continued friendly to the set¬

tlers. In 1805, 1816 and 1818, they gradually CHICKASAW BAYOU

ceded all lands north of the Mississippi line.

About 1800, as the hunting grounds narrowed, the tribe began to

migrate west of the Missis¬

sippi, as did the Cherokees and others. In 1822 there were in Mississippi 3,625 on a reli¬

able count, with eight towns, and a progressive civilization : they were industrious farmers and cattlemen, marketing live stock among the whites. By the treaty of Pontotoc Creek, 20

Oct. 1822, they made another large cession of lands ; and by that of Washington, 24 May 1834, they gave up all the remainder, the two cessions comprising 6,442,400 acres, or over 10,000 square miles, for which they received $3,646,000. On 17 Jan. 1837 they bought of the Choctaws for $530,000 a district on the Red River west and south of the Washita (the extreme western part of the subsequent Indian Territory, now incorporated in Oklahoma), to be inalienable except with the consent of the Choctaws ; relinquished their governmental organization and became a part of that nation, with proportionate representation in its govern¬

ment. A considerable number, instead of re¬

maining with the tribe, scattered through the Choctaws, buying and taking up lands at pleasure. They lagged behind the Choctaws in progress, however; a smallpox epidemic carried off several hundred; the government annuity made them lazy; and they opened no schools till 1851. Aggrieved at being repre¬

sented in the Choctaw government only accord¬

ing to numbers, instead of equally as a tribe, they appealed to the President, and on 27 June 1855 were given separate title to their district as the Chickasaw Nation. They organized a government with a council and two-chambered legislature, and advanced rapidly. In the Civil War, as slaveholders, and having Southern agents, they joined the Confederate side; lost aDout one-fourth of their people, and were liable to the penalties of treason. By the treaty of Fort Smith, September 1865, they were conditionally restored to their rights. On 28

April 1866 all the old treaties were renewed; but they were forced to sell to the government 7,000,000 acres of land, nearly 11,000 square miles, for $315,000, the money to go to their former slaves unless they admitted them to full tribal citizenship. They held off for some years, but finally acceded on 10 Jan. 1873. The ˆnation®

in 1915 numbered 10,966, of whom 5,659 were blood Indians, 645 of intermarriage descent and 4,662 freedmen. Under treaties with the United States government, the lands in the Choctaw and Chickasaw nations were held in common by members of both tribes, the Choc¬

taw lands comprising 6,953,848 acres and the Chickasaw lands 4,707,903 acres. Owing to their allied interests citizens of both nations had the right to select their allotments of land in either or both nations at their options. In view of this common interest, matters pertaining to these two nations are treated under one head.

There have been allotted to citizens and freed¬

men of these two nations a total of 8,091,386

acres, leaving 3,569,565 acres, of which 98,474

acres have been reserved for various purposes, not including 431,080 acres segregated for coal and asphalt, but including reservations made therefrom for coal leases. Tracts comprising 2,431,361 acres were sold for $14,053,760. Over one-half of the sales price, together with in¬

terest thereon, was collected and deposited in the United States Treasury to the credit of these nations. See also Choctaw; Indian Affairs.

CHICKASAW BAYOU or BLUFFS.

Battle of, fought 29 Dec. 1862. On 8 Dec. 1862

General Grant ordered Gen. W. T. Sherman to organize at Memphis, Tenn., an expedition which in co-operation with Adm. D. D. Porter's gunboat fleet should reduce Vicksburg. On the 22d the expedition rendezvoused at Friar's Point on the Mississippi, ready to move up the Yazoo River in rear of Vicksburg. Sherman had the four divisions of Gens. F. Steele, Geo. W.

Morgan, M. L. Smith and A. J. Smith, aggre¬

gating about 30,000 men. The transports, pre¬

ceded by the gunboats, entered Yazoo River on the 25th, and on the 26th and 27th the troops were landed on its south bank, confronting the •bluffs overlooking the swamps through which ran Chickasaw

Bayou. Gen. J. C. Pemberton, commanding the Confederate forces in Missis¬

sippi, was at Grenada opposing Grant, who was moving south from Grand Junction and Cor¬

inth on the line of the railroads. On the 21st Pemberton heard that the fleet and transports were moving down the Mississippi for the sup¬

posed purpose of attacking Vicksburg, which at the time was held by Gen. Martin L. Smith with the brigade of Gen. S. D. Lee. Vaughn's brigade was immediately ordered to Vicksburg, and was soon followed by the brigades of Gregg and Barton. Pemberton arrived at Vicksburg on the 26th and the last of the three brigades during the night of the 27th. Pemberton dis¬

posed his forces, under Vaughn, Gregg, Bar¬

ton and Lee, on a line from Vicksburg on the left to Haynes' Bluff on the right, a distance of 13 miles, on high ground overlooking Chick¬

asaw Bayou and the Yazoo River, S. D. Lee holding Walnut Hills from Vicksburg to Sny¬

der's Mill on the right, a distance of 10 miles.

Lee, a good engineer and a fine officer, strength¬

ened his position by works for his batteries and rifle pits on the slope of the bluff, which rose about 200 feet above the Bayou. Between this position and where Sherman had landed was bottom land, almost wholly densely wooded, intersected with bayous and low, swampy ground. There were but three roads through this area, and these were obstructed by earth¬

works and felled timber. By these Sherman advanced on the morning of the 27th, Steele on the left, Morgan on the right of Steele and M. L. Smith and A. J. Smith on the right of Morgan. There was heavy skirmishing on the 27th and 28th, the Confederate outposts were driven in, and on the night of the 28th the Union troops lay parallel to Chickasaw or Walnut Hills bluff and about 600 yards from its foot. The main assault on the bluff was to be made by Morgan, supported by Steele; while, to make a diversion in favor of Morgan, A. J. Smith, with M. L. Smith's division and one brigade of his own, was to cross a lake, a mile below Morgan, by a narrow sandbar, and attack. On the extreme right the rest of A. J. Smith's division was to demonstrate on

the road to Vicksburg. On the morning of the 29th Morgan represented to Sherman that an attack from his position was impracticable ; but Sherman, after an examination, rode off to his headquarters, whence he sent his adjutant-gen¬

eral to Morgan with this message: <(Tell Mor-456

gan to give the signal for assault ; that we will lose 5,000 men before we take Vicksburg, and may as well lose them here as anywhere else.®

Morgan replied that Sherman's entire army could not carry the position in his front, but that he would order the assault. De Courcy's brigade of Morgan's division, and the two brig¬

ades of Blair and Thayer of Steele's, were formed for the assault. The signal was given by a heavy artillery fire upon the Confederate lines, and at 12 o'clock the three brigades went forward. By some misunderstanding Thayer's brigade, with the exception of the 4th Iowa, diverged too far to the right, but De Courcy, Blair and Thayer (with the 4th Iowa), about 6,000 men, after clearing the obstruction in front and floundering through deep mire and tangled marsh, under a terrific fire of artillery, finally made a lodgment on the hard table¬

land at the foot of the bluff, where an aban¬

doned line of works gave shelter, and where some of the men stopped. All formation was broken up, brigades and regiments mixed, but on went the main body, pushed up the bluff, and reached different points of Lee's works, where they were met on both flanks by such a withering fire from the rifle-pits that ran diag¬

onally up the slope of the hill, and so severe a cross-fire of shell and canister from the bat¬

teries, that the men faltered and, no support being in sight, fell back to the point of starting, leaving about 1,500 killed, wounded and cap¬

tured. Lee lost 115. More to the right, where A. J. Smith was to demonstrate, the 6th Mis¬

souri gained the levee at the foot of the bluff, but not able to go farther under the hot fire poured upon them from above, the men sought shelter by digging with hands and bayonets into the bank of the levee, where they remained un¬

til night covered their withdrawal, after a loss of 57 killed and wounded. Sherman thought of renewing the assault in the morning, but after a personal examination, he came to the conclusion that the enemy's centre could not be broken without crippling his army beyond the power to act with any vigor afterward, and proposed to attack Haynes' Bluff, higher up the Yazoo. Preparations were made to assault at 4 o'clock on the morning of 1 Jan. 1863.

Admiral Porter, who was to co-operate in this attack, found the fog so dense on the river that he could not move his boats. The attack was deferred and then abandoned, and by sunrise, 2 January, the troops were all embarked on transports and sailed for Milliken's Bend. The Union loss in the assault on Chickasaw Bluffs and in the skirmishing preceding it was 1,213

killed and wounded, and 563 missing. The Confederate loss was 177 killed and wounded, and 10 missing. Consult (Official Records) (Vol. XVII) ; The Century Company's (Battles and Leaders of the Civil War) (Vol. Ill) ; Greene, F. V., (The Mississippi* ; Sherman's <Memoirs) (New York 1888).

E. A. Carman.

CHICKASHA, chik'-a-sha, Okla., city and

county-seat of Grady County, on the Rock Is¬

land, The Frisco, Oklahoma Central and Santa Fe railroads. The city has an altitude of 1,100

feet above sea-level, has a delightful climate and an abundance of good water. Grady County is ideal for the raising of wheat, corn, cotton, alfalfa, fruits and stock, and the rapid growth of the city is due to the extent and value of the agricultural crops. The commercial busi¬

ness interests of Chickasha are large and grow¬

ing rapidly. The city has three large cotton gins, two of the largest cottonseed-oil mills in Oklahoma, the plants being among the largest in the world, one of the largest cotton com¬

presses in the South, the only cotton-oil refin¬

ery in the State, large flour-mills and elevators, 33 wholesale manufacturing and commission houses. The United States census of manu¬

factures for 1914 reported 29 industrial estab¬

lishments, employing 430 persons, of whom 337

were wage earners, receiving annually $235,000

in wages. The capital invested aggregated $1,315,000, and the year's output was valued at $1,720,000; of this, $443,000 was added by .

manufacture. The large railroad machine

shops located here employ nearly 1,000 persons.

Chickasha is the largest stock feeding and cot¬

ton concentration point in the State. There are five banks with a combined capital and surplus of $670,000. Chickasha has an admirable school system, many fine churches, a Carnegie library, a Federal building costing $150,000 and is the home of the Oklahoma College for Women. The city owns and operates its own water system. Pop. (1910) 10,320; (1920), 10,179.

CHICKEN. See Fowl.

CHICKEN-FLEA, the common name of

Sarcopsylla gallinacea, a pest of young chickens in tropical and subtropical regions, and destruc¬

tive from Florida to Texas. It is smaller and shorter than the cat-flea, with the eyes and antennae in the higher part of the head, and it does

not hop. It abounds mostly in shady places, under old houses, and in earthen floors.

It is first observed to infest young chickens and turkeys, and by its number and pertinacity kills young chickens, while being more or less per¬

manently parasites on hens. See Jigger; Sarco¬

psylla.

CHICKEN-LICE, several species of bird-lice (Mallophaga) , or louse-like wingless in¬

sects, afflicting chickens and hens. Unlike the louse (Pediculus), which obtains its nourish¬

ment by suction, the bird-lice, have free jaws adapted for cutting feathers, though they also draw blood from the skin of their host. The large chicken-louse (Goniocotes abdominalis) is less common than the lesser chicken-louse (G .

hologaster) ; it is only one millimeter long, while the first-named kind is three millimeters long. Quite a different kind is the common hen-louse (Menopon pallidum), which is the most abundant and annoying of all. It differs from the others in its light color and greater activity, running among the feathers and from them upon the hands of persons handling fowls.

It is from one to one and a half millimetres long, rather slender and of a pale straw-yellow color. Fowls should be allowed plenty of ashes and road dust in which to roll. An infested hennery should be well fumigated and white¬

washed, and insect-powder should be dusted upon the birds themselves.

CHICKEN-MITE, or POULTRY-TICK,

a small mite (Dermanyssus gallincc) which gathers on fowls at night and sucks their blood.

It is about one millimetre high, light gray, with dark patches, but red when gorged with blood.

It swarms in cracks and corners of the hen¬

house and should not be confounded with the bird-tick (D . avium),

CHICKEN-POX, varicella, an acute, spe¬

cific, infectious disease, characterized by a definite incubation period, an eruption of suc¬

cessive crops of vesicles which persist for a certain length of time and a well-marked clin¬

ical course of short duration. It is one of the mildest of the eruptive fevers. The disease is usually epidemic, but sporadic cases do occur.

It very frequently accompanies smallpox, and great care must be exercised not to confound mild cases of smallpox with severe cases of chicken-pox. The stage of incubation is usually about eight days, although it may vary from 8 to 18 days. The child may be feverish in some cases, have a slight chill, pain in the back and legs, nausea and vomiting. The eruption usually develops within 24 hours after the first onset. There are first raised red papules which in a few hours are transferred into raised hemispherical vessels filled with clear serum.

At the end of 36 to 48 hours, this clear serum may become purulent, and the vesicles then be¬

gin to shrivel, and in from three to four days are changed to dark-brown crusts which fall off and rarely leave a scar. Fresh groups occur

during the first two or three days of the illness; as a rule they are not very many in number.

In delicate children the number may be large, and gangrene may set in unless great care is taken in the treatment of the vesicles. Chicken-pox is very contagious, but is not dangerous, and the first treatment should be the complete isolation of the patient.

CHICKEN-SNAKE, a name given in the

Southern States to several different, but allied snakes that occasionally eat birds and small poultry, although their principal fare is rats and mice. Search for these brings them about farm buildings, but they do little harm as com¬

pared with their beneficial service. The blotched chicken-snake is a variety (con finis) of the pilot blacksnake (Coluber obsoletus) , and is gray with dark brown blotches, which become H-shaped on its neck. The yellow chicken-snake is another variety (quadnvit tatua) of the same species, yellow or olive, with four blackish stripes and a strong black line from the eye to the nostril. Both are common throughout the Southern States, where they reach a length of six or seven feet. (See Blacksnake). The red chicken-snake is a local name of the cornsnake (q.v.).

CHICKEN-TICK, an arachnid of the

family Argasidce, and related to the mites, but very much larger. Originally an inhabitant of tropical America, this tick (Argas miniatus) has been found to annoy poultry in Texas and Florida. It is about a quarter of an inch long, usually very flat, unless gorged with blood. The surface of the body differs from that of other ticks in having scattered pits with a raised edge ; it also differs from ordinary ticks in the head being covered by the body, in the spiracles be¬

ing placed between the third and fourth pairs of legs and in having no pulvillum between the claws. It was originally found in Texas among ordinary ticks taken from cattle. The young is six-footed. Of 10 other species of Argas , A.

reflexus of the Old World lives on pigeons and occasionally attacks man; the Persian Argas (A. persicus) in Persia attacks man and

poultry.

CHICKERING, Jonas, American piano

maker: b. New Ipswich, N. H., 5 April 1797 ; d. Boston, Mass., 8 Dec. 1853. The instruments made by Chickering were works of art. Before his death his Boston factory was turning out 2,000 pianos a year. The firm has been carried on continuously by his sons, and their pianos have a high reputation among musicians everywhere.

Some of the most important developments in pianoforte construction have first been intro¬

duced in the Chickering piano.

CHICKWEED (Alsin media), an annual

plant, of the family Alsinacece , abounding throughout temperate regions of the world in ill cultivated or neglected places. It grows in waste places throughout North America, and may be used when young as a substitute for spinach and other greens.

CHICLANA, che-kla'na Spain, town in

Andalusia, 12 miles southeast of Cadiz. It stands in a plain on both sides of the Lirio, and about a mile northeast of Barrosa, famous for the defeat of the French, under Marshal. Victor, by the British under General Graham, in 1811.

It consists of well-built houses of hewn stone, white as snow, and generally enclosed by gar¬

dens. The principal buildings are a magnificent hospital, two parish churches and a large and well-decorated theatre. The manufactures con¬

sist of linen, starch, earthenware and other articles, and there is a considerable trade in corn, wine and fruit. The baths of Chiclana, which have a temperature of 60°, and are said to be very efficacious in cutaneous affections, are much frequented. Pop. 11,496.

CHICLAYO, che-kla'yo, Peru, city in the northwest in the department of Lambayeque, on the coast, is near a valuable sugar district, and the shipping of the sugar is its chief occu¬

pation. It is the residence of a United States consular agent. Pop. 13,000.

CHICLE-GUM, chekl-or che'kla-, an elas¬

tic-gum produced by the bully-tree, naseberry or sapodilla (Achras sapota), a native of South America. It is largely imported into the United States for the purpose of being manufactured into chewing-gum.

CHICO, che'ko, city in Butte County, 95

miles north of Sacramento, on Chico Creek, and on the Butte County and the Southern Pacific railroads. It has a natural park of 2,000 acres, a Carnegie library and a State normal school. Its industrial establishments include match factories, flour-mills, machine shops and foundries, electric-car shops, *etc.*

Dairying, fruit-growing, lumbering and mining are also important. Pop. (1920) 9,339.

CHICOPEE, Mass., city in Hampden

County, on the Connecticut River, at the mouth of the Chicopee, four miles north of Springfield, and on the Boston and Albany and Boston and Maine railroads. It is connected with Holyoke and Springfield by electric street rail¬

way lines. The former villages of Chicopee Falls , Williamamsett and Fairview are now included in Chicopee city, which has manu¬

factures of cotton, artillery, bronze, bicycles, rifles, swords, paper, rubber tires, automobiles, *etc.* The United States census of manufactures 458

for 1914 recorded 62 industrial establishments of factory grade, employing 9,119 persons, of whom 8,425 were wage earners, receiving annually $5,131,000 in wages. The capital in¬

vested aggregated $23,501,000, and the year's production was valued at $28,869,000; of this, $11,751,000 was the value added by manu¬

facture. Manufacturing power is furnished bv the Chicopee River. It contains numerous cnurch, public and parish schools, national and savings banks. Pop. (1920) 36,214.

CHICOPEE RIVER, rises in Worcester

County, Mass., flows south-southwest into Con¬

necticut River. It has an abundance of water power which is utilized for manufacturing by the numerous towns on its banks. It is 20 miles long from the mouth to Three Rivers. It drains an area of 700 square miles. It has a rapid fall and supplies extensive water power.

CHICORY, or SUCCORY, a perennial

herb (Cichorium intybus) of the family Cichoriacece. It is a native of Europe which has become naturalized in many parts of the world, having escaped from gardens in which it is often grown as a pot herb and salad, or for its roots, which, while young, are used like carrots. In many places it has become trouble¬

some as a weed. The plant may be cultivated like other root crops upon rich, deep, well-drained soil. It resembles dandelion in its leaves, but the perennial roots send up a branched flower-stem which bears leaves of various shapes and flowers of various colors, blue predominating, but pink and white not being uncommon. The dried roots have been widely used as a substitute for or adulterant of coffee.

CHICOUTIME, she-koo-te'me, Canada,

county of the Quebec province, formed from Saguenay in 1853. Several smaller sheets of water are scattered over its surface, and the Saguenay intersects it, receiving in its course several small tributaries. The surface is rocky, rough and broken, but near the streams are fertile and cultivated strips. A great deal of lumber is cut and sawed on the small streams emptying into the Saguenay. The Hudson Bay Company have several stations in the county.

The capital is Chicoutimi, with a population of 5,580. It is the seat of a Roman Catholic bishopric and of a classical college founded in 1873.

CHIEF JUSTICE, the title of the presid¬

ing justice of the Supreme Court of the United States, and of the presiding justice of the sev¬

eral State Supreme Courts. Various other courts in the United States are also presided over by a chief justice. The chief justice of the United States is the highest judicial officer of the republic. Among his functions are those of administering the oath of office to the President and Vice-President at their inaugura¬

tion, and of presiding over the Senate when that body is resolved into a high court for the trial of impeachments. In official dignity he ranks next after ;he President. In England the superior judges of the King's (or Queen's) bench and of the Court of Common Pleas are called chief justices, the former being known as Lord Chief Justice of England, and ranking all other judicial officers except the Chancellor.

(See Chief' Justice or Lord Chief Justice.) The following is a list of the persons appointed as chief justice of the Supreme Court of the United States from its establishment, some of whom, however, never served :

John Jay, of New York, appointed by Wash¬

ington, 26 Sept. 1789; resigned 1791.

John Rutledge, of South Carolina, appointed by Washington, 1 July 1795; rejected by the Senate, 15 Dec. 1795.

William Cushing, of Massachusetts, ap¬

pointed by Washington, 26 Jan. 1796; declined promotion from his associate justiceship.

Oliver Ellsworth, of Connecticut, appointed by Washington, 4 March 1796; resigned 1800.

John Jay, of New York, appointed by John Adams, 19 Dec. 1800 ; declined.

John Marshall, of Virginia, appointed by John Adams, 31 Jan. 1801; died, 6 July 1835.

Roger Brooke Taney, of Maryland, ap¬

pointed by Jackson, 15 March 1836; died, 12

Oct. 1864.

Salmon Portland Chase, of Ohio, appointed by Lincoln, 6 Dec. 1864; died, 7 May 1873.

George H. Williams, of Oregon, and Caleb Cushing, of Massachusetts, appointed by Grant 1873 ; rejected.

Morrison R. Waite, of Ohio, appointed by Grant, 21 Jan. 1874; died, 23 March 1888.

Melville W. Fuller, of Illinois, appointed by Cleveland, 20 July 1888' died, 4 July 1910.

Edward Douglass White, of Louisiana, ap¬

pointed by Taft, December 1910.

CHIEF JUSTICE, or LORD CHIEF

JUSTICE, in England; the presiding judge in the king's or queen's bench division of the High Court of Justice, and, in the absence of the Lord Chancellor, president of the High Court, and also, ex officio, one of the judges of the Court of Appeal. The chief justice of the Court of Common Pleas, previous to 1881, was the presiding judge in the common pleas division of the High Court of Justice, but the office is now merged in that of the chief justice of England.

The title chief justice is also generally given in the various British colonies to the heads of the different judicial establishments, as in Canada, Australia, *etc.* In Canada there is not only a chief justice at the head of the Supreme Court of the Dominion, but also chief justices in the separate provinces.

CHIEF MOUNTAIN OVERTHRUST.

See Lewis Overthrust.

CHIEF OF STAFF. See General Staff

of the Army.

CHIEMSEE, kem'za, the largest lake in

Bavaria, circle (also known as Bayrisches Meer), Isar, district Trostberg, 48 miles south¬

east of Munich; greatest length, 9 miles; greatest breadth, 6 miles ; area, 33 square miles ; depth, about 480 feet. It is of an irregular shape, very much indented and contains three pretty islands — Krautinsel, Herrenworth and Frauenworth.

CHIERI, kya're, Italy, city in the province, of Turin, eight miles east-southeast of the town of Turin. It is walled and well built, contains the largest Gothic church in Piedmont, with a very ancient baptistery, and at a very early period became celebrated for its manufactures of fustian, which are still flourishing. It has a CHIETI — CHIHUAHUA

gymnasium, a technical school, a theatre and linen, cotton and silk factories. In the 11th century it was an independent republic. Pop.

15,454.

CHIETI, kya'te, Italy, capital of province of same name, on a hill near the right bank of the Pescara. It was anciently one of the lar¬

gest and most important towns in this part of Italy, and was for some centuries in possession of the Greeks, from whom it passed succes¬

sively to the Romans, Lombards, Franks and Normans. In 1802 it was taken by the French troops. The modern town, which is well built and adorned with several handsome edifices, is the see of an archbishop and the seat of a superior civil and criminal court, and has manu¬

factures of woolens, and a trade in silk, wine, wheat and oil. Pop. 26,897.

CHIFF-CHAFF, a small European bird

(Sylvia hippolais or Phylloscopus collybita) , of the warbler family (Sylviidce) , so named from its cry. Its head, back and upper wings are ashy brown, and its under parts are brownish green dashed with yellow. In length it is be¬

tween four and five inches, and it frequents woods, hedges and thickets. Its food consists of the larvae of various insects and some of the smaller moths.

CHIGI, ke'je, a noble Italian family,

founded by Agostino Chigi (d. 1520) of Siena.

He became a patron of the fine arts and banker for the Pope. Peruzzi built for him the well-known Villa Farnese. Raphael painted there the (Triumph of Galatea *and (The Legend of Psyche.* Sodoma ornamented it with his

fresco (The History of Alexander and Rox-anna.* Consult Cugnino's (Agostino Chigi il Magnifico.* The family was further dis¬

tinguished by five cardinals and one Pope, Fabio Chigi (1652), afterward Alexander VII (q.v.).

Flavio Chigi: b. 1810; d. 15 Feb. 1885, was one of the papal guard until 1848, when he was made bishop of Mira in partibus, nuncio at Munich, but was sent to Paris (1873) and later in the same year was made cardinal.

CHIGNECTO, shig-nek'td, BAY, Canada,

an inlet at the head of the Bay of Fundy, separating Nova Scotia from New Brunswick.

It is 30 miles long and 8 broad, and has an isthmus of only 14 miles in width between it and Northumberland Strait, in the Gulf of Saint Lawrence.

In October 1888 work was begun on the con¬

struction of a ship railway across the neck of land connecting Nova Scotia with the main land of Canada, under the encouragement of an annual subsidy from the Canadian government.

The promoters had spent nearly $4,000,000 on the work, when in 1890 a financial depression in London prevented them from obtaining further capital. In March 1901 the undertak¬

ing was revived. The railway, 18 miles long, by uniting the Gulf of Saint Lawrence with the Bay of Fundy and the waters of the Atlan¬

tic Ocean, saves a run of several hundred miles around the province. See Ship-railway.

CHIGNON, shen-yon, (Fr. chignon, the

nape of the neck), a peculiar arrangement of the hair, worn by women, a knot or mass, natural or artificial, arranged low on the back of the head, at the nape of the neck. This style of hair-dressing was common in the 18th cen¬

tury, but fell into disuse and was revived in the last half of the 19th century, but is not now in vogue.

CHIGO, che'gd. See Jigger; Sarcopsylla.

CHIHUAHUA, che-wa'wa, Mexico, state

bounded on the north by the United States, on the east of Coahuila, on the south by Durango and on the west by Sinaloa and Sonora. It is the largest of the Mexican states, having an area of 89,998 square miles, or about double that of the State of New York. The Sierra Madre Range traverses the state, and the Sierra de Tarahumares lifts its peaks (Bufa de Cerro Prieto, Jesus y Maria, Mesa de Tabascotes, etc.) to a considerable height; otherwise the surface is an undulating table-land, the eleva¬

tion of which varies from 3,500 to 7,000 feet above sea-level. The largest of the elevated plains lying between the mountain ranges are the Chilicote, Gigantes, Bolson de Mapimi, *etc.*

The Rio Grande forms the northern boundary, separating the state from the United States; but this river, which rises in Colorado and flows through New Mexico, is almost dry by the time it reaches Mexico territory, the greater portion of its waters having been utilized for the irrigation of lands in the country of its origin. The climate is temperate and healthful and the soil fertile wherever watered. Agri¬

cultural products consist of corn, wheat, several kinds of vegetables and fruit, including grapes.

Cotton is also grown successfully in the Torreon district. The forests are found mostly in the mountainous districts of the west.

Chihuahua has considerable mineral de¬

posits, its silver mines being among the richest in the republic. Some of them were worked by the Indians at the time of the Spanish Conquest. The state's production of lead is also noteworthy and zinc is also abun¬

dant. Over 5,250 mining properties are recorded for its entire area. The state is traversed from north to south by the Mexican Central Rail¬

way. A considerable portion of the population is creole or white ; the rest consists of Indians partly civilized. There are some Apaches in the mountains. In recent years large numbers of foreigners, chiefly Americans, have secured control of the industries and have already raised the state to a leading place in the republic. A flourishing Mormon agricultural colony was founded in 1886 west of Ciudad Juarez. The state suffered severely in the many revolutions which followed the fall of the Diaz regime, being overrun with bandits, who despoiled the residents, both native and foreign, and prac¬

tically brought the various industries to a stand¬

still. The state was invaded by United States troops under General Pershing in March 1916, who were dispatched to capture the bandit, Francisco Villa, who had made a murderous raid on Columbus, N. M., a few weeks pre¬

viously. Pop. (1910) 405,265. The capital is Chihauhua.

CHIHUAHUA, Mexico, capital of the

state of the same name, the. northern border of which forms the dividing line between Mexico and the United States, and one-third of the width of the first named country. Altitude, 4,973 feet above sea-level. Distance from the United States border at El Paso, Tex., 225 miles and 460

from Mexico city, 999 miles. It is well provided with transportation facilities, being on the lines of the Mexican Central and Kansas City, Mexico and Orient railways, and the initial terminal of the Chihuahua and Pacific Railway.

Is the centre of one of the most important stock raising and mineral producing districts south of the Rio Grande. It is the first point of im¬

portance reached in the journey from the north¬

ern boundary of the country to the City of Mexico. It is an important supply point for miners whose properties are situated in the mountain regions to the west and southwest.

Among the manufacturing establishments of the city are extensive rolling mills and iron works, a brewery, a soap factory, a manufactory of clothing, broom factory, mineral water factory, manufactory of agricultural implements and various smaller industries. Since the outbreak of the revolutionary movements within the past few years, of which it has been the starting point, its industries and social life have come practically to a standstill.

A few miles distant from and connected with the city by railway, are the Santa Eulalia Mineral Springs and health resort, for which great merit is claimed. The principal buildings of a public character are the new penitentiary; the old cathedral, completed over 200 years ago by the contributions of a rich miner, at an outlay of almost $1,000,000, the recently built opera-house, one of the largest and finest in the re¬

public; the Government Palace, the palatial home of ex-Governor Ahumada ; the new

municipal palace and the Mineral Bank. It was here that the patriot Hidalgo suffered imprison¬

ment and was executed in 1811. The tower or dungeon in which he was confined is sacredly preserved and will ever be reverently visited by tourists. In the plaza adjoining the Govern¬

ment Palace a splendid monument has been erected in his honor. The Alameda, situated in the business centre, is utilized on Sunday evening of every week by all classes as a prom¬

enade, the occasion being always enlivened by excellent music provided by the state govern¬

ment. An aqueduct built over 200 years ago conveys water into the city, and a modern built street railway provides means of local trans¬

portation. A museum of minerals recently established by the state has already become one of the city's chief places of interest. Advanced methods of primary education are receiving much attention, both from the state and munici¬

pal governments, and higher education is pro¬

vided by a normal school for young women, a college for young men and a number of clerical and other institutions of advanced instruction.

A library connected with the Preparatory School contains 6,000 volumes. The principal scientific organization is devoted to the study of medicine and is known as the ((Medica Mutualista.®

Financially, Chihuahua is one of the best equipped cities in the republic. It has four local banks, — the Mineral Bank, with a capital¬

ization of $5,000,000, the Chihuahua Exchange Company, the Chihuahua Investment Comnany and the Commercial Bank; besides which there are branches of the National Bank and the bank of Sonora, and an agency of the bank of London and Mexico.

CHILAN BALAM, che-lan', ba-lam\ the

Books of, a series of Maya writings dating back to the end of the first century of the Christian era. They were transcribed by a priest or

chilan by the name of Balam, in the Maya language with Latin characters, which had al¬

ready replaced the ancient Maya system of writing throughout Yucatan. The books of Chilan Balam seem to have been a collection of Maya stories and records which had been, at the time of the conquest, and probably long previous to it, written in the ancient Maya script. Balam either copied these manuscripts or retold the Maya stories as he knew them from his connection with the Maya people, for he is supposed to have been a full-blooded Maya Indian. These books, we are told, recite all the old traditions which still lingered in the memory of the natives of Yucatan with whom the writer came into contact. They lay long in manuscript, and were copied in whole and in part several times. Brinton, the American scholar, had a copy of them made and published under the title of ((Maya Chronicles,® in the first volume of his (Library of Aboriginal American Literature. > The name given to them by Brinton admirably defines their scope, for they are, in reality, short chronicles dealing with divisions of time, for the most part, with legends, stories and events that are collected around the ((Katuns,® or dates. These books are very valuable for the light they throw on Maya customs and habits previous to the com¬

ing of the Spaniards to Yucatan. They also serve as a starting point from which to reckon back the Maya time as given in the few ex¬

isting manuscripts written in the old Maya script.

CHILBLAIN, or FROSTBITE, a mild or

severe inflammatory reaction from the effects of severe cold on the toes, fingers, nose, chin, ears, *etc.* In mild cases there is swelling only, with an inflammation of the skin. This disappears and the part is apt to be tender. In severe frostbite there is ulceration and sloughing of the part. The treatment of mild chilblain is by slow raising of the temperature of the chilled part to that of the body. Too rapid heating results disastrously.

CHILCOTT, Ellery Channing, American

agriculturist: b. East Hamburg, N. Y., 8 April 1859. He was educated

in the common schools and at the Friends' Institute of East Hamburg.

From 1882 to 1892 he was owner and manager of a stock ranch in Campbell County, S. D., and at the same time acted as United

States deputy surveyor. He was elected to the State senate in 1892, was professor of agricul¬

ture 1892-97, professor of geology and agron¬

omy and vice-director 1897-1905 of the South Dakota Agricultural College. From 1893 to 1905 he was agriculturist of the United States Experiment Station, South Dakota, and in the last named year was placed in charge of dry¬

land agricultural investigations of the bureau of plant industry. He wrote (A Study of Cul¬

tivation Methods and Crop Rotations for the Great Plains Area) (1910), bulletin issued by the Department of Agriculture.

CHILD, Francis James, American scholar

and educator: b. Boston, Mass., 1 Feb. 1825; d. Cambridge, 11 Sept. 1896. He was Boylston professor of rhetoric and oratory at Harvard from 1851 till 1876, when he exchanged for the CHILD — CHILD LABOR

chair of English literature which he held until his death. His principal work, (English and Scottish Ballads > (10 large volumes), a sub¬

ject on which he was the highest authority in this country, he improved and enlarged for pub¬

lication 1882-98. Among his other works are (Four Old Plays> (1848); a collection of (Poems of Sorrow, Comfort, Counsel and As¬

piration (edited 1865) ; and (War Songs for Freemen } (edited 1862). He also published, in 1855, the (Poetical Works of Edmund Spen¬

ser, } five volumes, with notes, introduction and explanations, the best edition of Spenser to date.

CHILD, Frank Samuel, American Congre¬

gational clergyman : b. 20 March 1854. He was educationed at Hamilton College, N. Y., and after graduating from Union Theological Sem¬

inary in 1878 was ordained to the ministry.

Since 1888 he has been pastor of the First Church of Fairfield, Conn. He received the degree of D.D. from Hamilton College and Litt.D. from Alfred University; is president of the Fairfield Historical Society and lecturer on literary and historical subjects, corresponding secretary of the Francis A. Palmer Fund for Education, trustee of several colleges and other educa¬

tional and benevolent institutions and a con¬

tributor to the press. He has published <An Old New England Town> (1895); <The Co¬

lonial Parson of New England) (1896); (A Colonial Witch) (1897) ; (A Puritan Wooing) (1897); (The House with 60 Closets) (1899); (An Unknown Patriot* (1899) ; (The Little Dreamer's Adventure) (1900) ; (Friend or Foe) (1900); (Fairfield, Ancient and Modern,* a history (1909) ; <An Old New England Church,*

a history (1911) and numerous historical pamphlets upon Colonial New England.

CHILD, Sir Josiah, English merchant : b.

London 1630; d. there 1699. The work by which he is known is entitled (Brief Observations Concerning Trade and the Interest of Money, by J. CP (London 1668). An enlarged edition was published in 1690, under the name of (A New Discourse on Trade.* The work has been several times reprinted. It was written in de¬

fense of the reduction, by legal enactment, of the rate of interest on money from 8 to 6 per cent, and recommends a further diminution to

4 per cent. He was for some time chairman and governor of the East India Company, and wrote several papers, without signature, in defense of the traffic with the East, arguing, in opposition to those who complained of the drain of coin, that the India trade percolated through other countries with which Britain traded and thus returned indirectly a surplus in cash. In his essay on trade he advocated the compulsory emigration of paupers to the colonies, and sug¬

gested the appointment of corporate officers called <(fathers of the poor® to superintend those who were left. He became very wealthy, and his children, by three marriages, allied them¬

selves with the highest nobility. Charles II made him a baronet (1678). His son became Earl Tylney, but the title is now extinct.

CHILD, Lydia Maria Frances, American

prose writer: b. Medford, Mass., 11 Feb. 1802; d. Wayland, Mass., 20 Oct. 1880. She was mar¬

ried to David Child, a Boston lawyer, educa¬

tionalist, diplomat and soldier in 1828. Her first novel, 'Hobomok,* was written and published in 1821. From this time until her death she continued her literary activity. She was an ardent abolitionist, and published one of the first anti-slavery books, entitled (Appeal for that Class of Americans Called African.* one immediate result of which was the loss of her former literary popularity in the Southern States From 1843 to 1844 she and her husband edited the (Anti-Slavery Standard. * She began the publication, in 1826, of the Juvenile Miscellany, which she continued for eight years. This was the first monthly periodical for children pub¬

lished in the United States. Among her numerous works, some of which had a very large circulation for their day, are (The First Settlers of New England) (1829); (Philothea, a romance of Greece in the days of Pericles*

(1835); (Fact and Fiction) (1846); (Isaac T.

Hopper: A True Life) (1853); (Progress of Religious Ideas) (1855) ; (Looking Toward Sunset* (1864); (Miria: A Romance of the Republic (1867) ; and (Aspirations of the World) (1878). A collection of her letters, with an introduction by John G. Whittier, and an appendix by

Wendell Phillips, was published in 1882.

CHILD LABOR. The term <(child labor®

is difficult to define because what is regarded as labor in one community or under certain con¬

ditions is often not so regarded in other com¬

munities or under other conditions; neither is there agreement as to the length of childhood.

The definition of the term depends upon the state of public opinion and upon the crystalliza¬

tion of that opinion in the form of restrictive and constructive measures for the benefit of children. In the early days of the movement in England to protect children from economic exploitation, the term was understood to apply only to the employment of very young children in mills and mines. Gradually its application was broadened to include the work of children in many other establishments and occupations and the minimum age limit for employment was raised. To-day in the United States, not only the employment of children by merchants, man¬

ufacturers and mine operators is considered as child labor, but also the independent activity of boys and girls for gain, as in the so-called street trades of newspaper selling, bootblacking and peddling, in which the child is virtually in business on his own account. There is also a growing conviction that the labor of children in agricultural pursuits and domestic service, which are not now regulated by law and here¬

tofore have been commonly looked upon as wholly beneficial occupations, also may be ob¬

jectionable under certain conditions. The possibility of exploitation in any line of work is now generally recognized and this more enlightened public opinion has caused a steady expansion in the application of child welfare principles, until now every use that is made of children industrially is subject to careful scrutiny. The United States bureau of the census in its report of the 13th census uses the term ((gainful workers® as applied to children, to include all workers except those working at home merely on general household tasks, on

chores, or, at odd times, on other work. There is no definite period fixed as the result of scientific inquiry to mark the limit of childhood

in respect of ability to labor, but for purposes of regulation in this field the age of 16 years is generally accepted as marking the transition from childhood to youth.

Extent. — According to the United States census for 1910, there were engaged in gainful occupations in this country 1,990,225 children from 10 to 15 years of age inclusive, or 18.4

per cent of all the children belonging to this age group. Nearly half of these were under 14

years, the number of such children exceeding by more than 100,000 the corresponding num¬

ber in the census report for 1900; this increase, however, was confined to those in agricultural pursuits, and the number of children under 14

years of age engaged in other occupations was reduced almost half (from 186,358 to 95,839).

The bureau of the census attributes the in¬

crease in the number of child agricultural workers to the more exacting nature of the instructions given to the census enumerators in 1910 as compared with those given

in 1900, rather than to any marked change in the actual extent of child labor on the farms.

Public opinion against the employment of older children (those 14 and 15 years of age) has been steadily growing, and even before 1910 several States had forbidden the employ¬

ment of children under 16 in certain dangerous occupations, but not until after this census was taken did any State, with the single ex¬

ception of Montana, attempt to establish an age limit higher than 14 for employment in the common kinds of work other than agriculture and domestic service. Therefore we find a far smaller decrease in the number of older child workers, 461,806 children 14 and 15 years old being reported in non-agricultural occupations in 1910, as against 501,849 10 years earlier. The distribution of child workers in the United States, among industries, by age groups, accord¬

ing to the census of 1910, is as follows: Children reported

Industry

Salt, oil and gas wells .

Public service (not elsewhere

classified) .

Quarries .

Liquor and beverage in¬

dustries … …

Chemical and allied indus¬

tries . .

Paper and pulp industries …

Professional service . .

Metal industries (except iron

and steel) . .

Clay, glass and stone in¬

dustries .

Cigar and tobacco factories. .

Pood and kindred industries.

Leather industries .

Printing and bookbinding…

Mines . .

Iron and steel industries. … .

Lumber and furniture in¬

dustries .

Clothing industries .

Transportation .

Miscellaneous industries ….

Building and hand trades …

Textile industries .

Trade .

Domestic and personal serv¬

ice .

Agriculture, forestry and

animal husbandry .

Totals

10-13

14-15

Total

28

205

233

84

707

791

224

1,120

1,344

115

1,327

1,442

187

3,132

3,319

154

4,652

4,806

805

5,628

6,433

252

6,971

7,223

1,234

9,161

10,395

1,843

8,723

10,566

972

10,245

11,217

406

11,592

11,998

622

11,482

12,104

2,241

14,877

17,118

951

19,518

20,469

4,367

17,418

21,785

1,113

22,158

23,271

3,041

21,777

24,818

2,064

28,093

30,157

5,008

27,657

32,665

14,642

65 , 888

80,530

22,441

88,965

111,406

33,045

80,510

113,555

800,137

632,443

1,432,580

895,976

1,094,249

1,990,225

The occupations which, according to the census for 1910, show the highest percentage of children engaged as based upon the total number of workers of all ages in each, are given in order in the following table : Number

Per cent

Total, 10-15

Total workers

Total,

10-15

10-13

14-15

Workers in all occupations .

1,990,225

38,167,336

5.2

2.3

2.9

Newsboys and newsgirls .

20,450

29,708

68.8

40.6

28.2

Telegraph messengers .

4,612

9,152

50.4

6.3

44.1

Messenger, bundle and office boys and girls .

52,187

108,035

48.3

6.4

41.9

Farm* and dairy farm laborers .

1,419,098

5,982,514

23.7

13.3

10.4

Bakery employees (semi-skilled) .

1,267

8,938

14.2

1.3

12.9

Bootblacks .

1,831

14,020

13.1

5.4

7.7

Cotton mill employees (semi-skilled) .

35,651

278,625

12.8

3.6

9.2

Knitting mill employees (semi-skilled) .

9,129

2,089

*72,750

17,887

12.5

1.6

10 9

Paper box factory employees (semi-skilled) .

11.7

0.4

11.3

Silk mill employees (semi-skilled) .

8,264

78,773

10.5

0.5

10.0

Candy factory employees (semi-skilled) .

2,900

30,943

9.4

0.4

9.0

Tinware and enamelware employees (semi-skilled) .

912

10,611

8.6

0.6

8.0

Glass factory employees (semi-skilled) .

2,886

41,877

6.9

0.6

6.3

Woolen and worsted mill employees (semi-skilled) .

6,670

98,970

6.7

0.2

6.5

Stock herders, drovers and feeders .

3,422

59,250

5.8

2.8

3.0

Servants .

89,508

1 ,572,225

5.7

1.8

3.9

Cigar and tobacco factory employees (semi-skilled) .

Printing and publishing establishment employees (semi-8,422

151,519

5.6

0.9

4.7

skilled) .

3,491

67 , 469

5.2

0.2

5.0

Turpentine farm laborers .

1,389

27,557

5.0

2.3

2.7

All clothing factory employees (all semi-skilled) f .

16,955

350,541

4.8

0.2

4.6

Electrical supply factory employees (semi-skilled) .

1,190

24,677

4.8

0.1

4.7

Textile dyeing and finishing mill employees (semi-skilled).

721

*15,764

4.6

0.2

4.4

Clerks in stores .

15,692

387,183

4.1

0.1

4.0

Shoe factory employees (semi-skilled) .

7,453

181,010

4.1

0.1

4.0

Carpet mill employees (semi-skilled) .

1,208

....

*29,854

4.0

0.1

3.9

* Home farm and working out.

t Hat factory employees not included.

t Total workers are not given in the volume and had to be computed; may include a few not semi-skilled who were with the unclassified.

CHILD LABOR

463

Census figures are necessarily inadequate for the purpose of revealing the actual extent of child labor, inasmuch as they are gathered at a certain time of the year and therefore cannot show conditions existing in seasonal oc¬

cupations at other periods. The data for 1910

were collected in the month of April, when, for example, very few fruit and vegetable canneries were in operation, and consequently only 49

children 10 to 13 years of age were reported as employed in such establishments over the entire country ; later in the year when the fruit and vegetable seasons occur, great numbers of canneries are running and children of these ages are quite generally found at work in them, especially in those States which have granted specific authorization to this industry for their employment. Furthermore the number of

children engaged in street trading is evidently understated in the census report, probably be¬

cause many parents, in replying to the questions of enumerators concerning the occupations of their children, did not regard newspaper selling, bootblacking or peddling as within the meaning of that term and hence a large number of boys and girls so engaged were probably returned as having no occupation. This is indicated by the return of only three newsboys, including adults, for Chattanooga, a city of 45,000 inhabitants ; and of only 243 newsboys 10 to 15 years of age for the great city of New York, while 240 of the same ages were reported for Toledo whose population is only one-thirtieth of New York city's. In neither of these two cities were children of these ages forbidden in 1910 to sell newspapers. For eight cities with more than 25,000 inhabitants no bootblacks whatever, either adults or children, were reported. In view of these facts and the lack of any report as to workers under 10 years of age (about whom no statistics have as yet been published by the bureau of census), the number of children under 16 years of age engaged in gainful occupations in 1910 must have been somewhat in excess of 2,000,000.

Effects. — As to the physical effects of child labor very little is known, aside from the find¬

ings of a few isolated studies and the opinions of individual observers not based on prolonged investigation. Professor Teleky of the Univer¬

sity of Vienna has shown that child laborers are especially susceptible to tuberculosis and that for the period of years covered by his study there was a steady increase in the gen¬

eral sickness rate and industrial strain among children who left school to go to work. He urges that the employment of children under 16

years be prohibited, and that the hours of labor for those between 16 and 18 years be rigidly curtailed to afford opportunity for con¬

tinued education and recreation.

The lists of accidents to workers reported by State departments of factory inspection show that employees under 16 years of age suffer more mishaps than do those who are older, in proportion to the total number of such em¬

ployees. This is to be expected because of the immaturity and natural spirit of playfulness in children which make them more liable to acci¬

dent than adults, especially when employed about dangerous machinery or in other places where the risk is great; and so, among the working classes, one not infrequently finds crippled children whose condition is due to misfortune met with in the course of work.

The effects of labor upon the schooling of children are manifest wherever the system of child employment is found. The States of Mississippi, Alabama, South Carolina, North Carolina, Arkansas, Georgia, Texas, Tennessee, Florida and Louisiana, in the order given, had the largest percentages of children under 14

years of age at work in 1910, and were also among those having the highest percentages of illiteracy in their total population. These same States have been the last to enact compulsory school attendance laws — in several of them the application of the requirements adopted is sub¬

ject (1918) to local or county option. In any community the presence of child labor and the absence of compulsory education produce illit¬

eracy, for the child cannot be both at work and in school at the same time, and, as practically the only opportunity for elementary education comes in childhood, the child who neglects it or is denied it almost certainly becomes the illit¬

erate adult.

If the child attends school irregularly or attends regularly but works at other hours, the effect is evident in his standing or scholarship.

He fails to keep up with his class and is obliged to repeat the work of grades that is intended to require only one year for comple¬

tion. In other words, he becomes retarded.

This effect of retardation among working children is brought out by several studies made by the National Child Labor Committee. In the city of Toledo it was found that 55 per cent of the children who were attending four public schools and devoting their time outside of school hours to trading in the streets were enrolled in grades below those in which they naturally belonged according to their ages, while of the entire number of pupils only 36

per cent were retarded. In the State of Colorado 5,000 boys and girls under 16 years of age were found at work in the sugar-beet fields in 1915 ; they were kept out of school to assist in the cultivation and harvesting of the crop and as a result 54 per cent of them were backward, as against only 20 per cent of the non-beet-working children, and yet their teachers declared that they would have been just as far advanced as the others if they had attended as regularly. Child labor in any form must not be allowed to interfere with attendance at school, if the benefits of education are to be realized.

Remedies. — The remedies for child labor conditions may be divided into two groups, one embracing restrictive measures and the other constructive ones. The restrictive measures are found in legislation adopted by the nation, the State and the municipality for the control of child employment and in the machinery pro¬

vided for the enforcement of such legislation.

A State child labor law of general application, in order to be effective, must prohibit employ¬

ment below a certain age limit in ordinary occupations, fix a higher age limit for danger¬

ous work, regulate the hours of labor of children above the minimum age limit and re¬

quire of them the completion of a certain amount of schooling, proof of age and physical fitness as qualifications for official work-permits, make certain officers responsible for the enforcement of the law and fix the pen¬

alties for its violation.

The age limits commonly adopted by the States of this country are 14 years for ordinary occupations in factories, workshops, stores, offices, restaurants, *etc.* ; 16 years for dangerous work such as mining, quarrying, the operation of dangerous machinery and employment in the dusty trades or where paints, acids, dyes, gases, etc., are made or used; and 18 years for extra-hazardous occupations about railroads, blast furnaces, hoisting machines or where phos¬

phorus, explosives or liquors are made or handled.

A majority of the States limit the workday of children between 14 and 16 years to 8 hours.

In some States this regulation does not apply to all kinds of establishments, but factories are affected wherever it has been adopted.

Other States prescribe a nine-hour workday for such children, some allow 10 hours and a few place no limit whatever upon hours of labor. Work at night by children under 16

years of age is prohibited by almost all the States.

The range in the requirements for the issu¬

ance of work-permits to children between 14

and 16 years is very great. A few States make practically no requirements while others de¬

mand completion of the elementary school course of eight years, physical fitness for work as determined by authorized physicians, as well as documentary proof of age and written promise of legal employment. The permit is issued in most States by the local public school authorities, in a few others by the State factory inspectors or board of health. It is kept on file by the employer of the child for examina¬

tion by inspectors and therefore serves as the basis for the enforcement of the child labor law. Its careful issuance under strict require¬

ments is therefore a very important part of any program of child protection.

The machinery provided for enforcement of the law varies with the nature and stage of development of the industries carried on in each State, and also depends upon the extent to which the law applies to these industries.

For example, in Mississippi, where at the present writing the child labor law affects only mills, factories and canneries, and where the number of such establishments is comparatively small, one factory inspector is charged with the duty of seeing that it is obeyed; in New York the law applies to factories, stores, offices, restaurants, hotels, tenements, bowling alleys, barber shops, places of amusement, bootblack stands, mines, quarries, distilleries, breweries, to delivery and messenger service and to news¬

paper selling, and there is required to ensure its observance an elaborate organization which includes divisions of factory, mercantile and home-work inspection employing 150 inspectors.

Most of the States have a department of labor or an industrial commission which is responsible for the enforcement of all State laws concern¬

ing the employment of children as well as of all other labor acts.

The adoption by the States of such a variety of standards led to a movement having as its object the bringing about of some degree of uniformity in the legislation on this subject, and a so-called Uniform Child Labor Law was drafted by the National Child Labor Commit¬

tee and recommended to the States for adoption by the United States Commissioners on Uni¬

form Laws of the American Bar Association.

This effort had some effect, but the desired degree of uniformity was not attained. A few of the States neglected to pass laws embodying even the essential minimum standards. At¬

tention was then turned to the possibility of control by the Federal government and as the Federal constitution grants to Congress the power to regulate interstate commerce, agita¬

tion was begun for the passage of a bill for¬

bidding the shipment in interstate commerce of goods produced (1) in mines or quarries where children under 16 years of age were employed; (2) in factories where children under 14 years were employed; (3) in factories where children between 14 and 16 years were employed more than eight hours a day ; and (4) in factories where such children worked at night. This bill was enacted into law by Congress in 1916 and on taking effect (in 1917) established a uniform minimum standard throughout the country so far as child labor in mines, quarries and fac¬

tories is concerned, because the products of practically every such industry throughout the country are shipped in interstate commerce.

The States are, of course, free to. adopt standards higher than those fixed by the Federal law, and all forms of child labor not affected by its provisions are still subject only to State regulation.

The constructive measures in the program of child labor reform embrace compulsory at¬

tendance at school, the development of indus¬

trial education and the providing of oppor¬

tunity for further instruction and recreation through the establishment of special schools, libraries, clubs, playgrounds, baths, *etc.* These form what is generally referred to as the con¬

structive side of the movement, while restric¬

tive legislation is known as the prohibitory part. These two elements are necessary in any well-balanced program for social welfare and especially so in child labor reform, because when the child is denied employment in industry a substitute that is better both for him and for society must be offered in its place.

Bibliography. — Adams, T. S., and Sumner, H. L., (Labor Problems* (Ch. I, XI, XII, New York 1905) ; Addams, J., (The Spirit of Youth and the City Streets) (Ch. V, New York 1909) ; Breckenridge, S. P., (Child in the City* (Part V, Chicago 1912) ; Clopper, E. N., (Child Labor in City Streets) (New York 1912) ; Davis, P., <Street-Land> (Ch. VI, VII, VIII, Boston 1915) ; Freeman, A., <Boy Life and Labour) (Ch. VIII, IX, London 1914) ; Hutchins, B. L., and Harrison, A., (A History of Factory Legis¬

lation (London 1911) ; Jackson, C., (Report on Boy Labour* (Royal Commission on the Poor Laws, Appendix Vol. XX, 1909) ; Keeling, F., (Child Labour in the United Kingdom) (London 1914) ; Kelley, F., (Some Ethical Gains Through Legislation* (Ch. I, II, New York 1905) ; Mangold, G. B., (Child Problems) (Ch. I, XI, XII, New York 1905) ; Markham, E., Lindsey, B., and Creel, G., (Children in Bondage* (New York 1914) ; Nearing, S., Solution of the Child Labor Problem* (New York 1911); Spargo, J., <The Bitter Cry of the Children (Ch. Ill, New York 1906) ; Veditz, C. W. A., (Child Labor Legislation in Europe) (United States Bureau of Labor, Bul¬

letin No. 89, 1910) ; (Child Labor in the United States* (Bureau of the Census, Bulletin 69,

1907); ‘Occupation Statistics of Thirteenth Census y (Bureau of the

Census 1914) ; ‘Report of Condition of Woman and Child Wage-earners in the United States > (Senate Docu¬

ment No. 645, 61st Congress 191(>— 12) ; Publica¬

tions of the National Child Labor Committee (New York 1904-16).

Edward N. Clopper,

Secretary for Northern States, National Child Labor Committee.

CHILD PSYCHOLOGY. Child psychol¬

ogy is the study of the growth or development of mind during the first few years of life and of the mental characteristics during the early stages of development. It may be contrasted with the psychology of infancy, of adolescence, of maturity and of senility. See Child Study ; Genetic Psychology ; Psychology.

CHILD STUDY. A branch of study con¬

cerned with the physical, mental and moral life of the child from birth through infancy and adolescence to adult age. It thus includes child psychology, dealing with the mental life of children, overlaps into genetic psychology (q.v.), and may just as properly be further subdivided into child physiology, child pathol¬

ogy, child sociology, *etc.* Lately every phase of the Child-Wei fare Movement has come to be grouped under the general name of child study. The field as a whole covers every phase of child-life, individual and collective, and involves everything known or knowable about the growth and development of human beings from birth to maturity. To treat of so comprehensive a subject in a single encyclopaedia article is obviously impossible. The reader will find some of its more important subdivisions treated elsewhere under their appropriate head¬

ings, while this article will be confined to the narrower field of the physical and mental life of the child. Even of these two phases of the subject space permits but a mere outline of its aims and methods and

a general statement of some of its principles and results.

History. — As scientific interest in children arose first in the classroom, it is but natural that the earliest students of child-life should have been educators. It is indeed with such educational reformers as Rousseau, Basedow, Comenius, Froebel and Pestalozzi that child study may be said to have originated. The in¬

terest aroused by them in the child as a sepa-

. rate entity proved so strong that the 19th cen¬

tury saw the birth of a well-nigh universal child study movement. In Germany Preyer's, 'The Mind of the Child) was the first import¬

ant manifestation of this interest, while Dar¬

win's published extended observations of early childhood gave considerable impetus to child study in England. But it remained for Stanley Hall, the famous American educator, to make child study the popular subject that it is to-day both here and abroad. The field which had formerly been pre-empted almost exclusively by educators, for child study was long considered as only a handmaiden of pedagogy, has rightly been entered by parents and others interested in the numerous phases of the subject — from child labor to juvenile delinquency and chil¬

dren's courts (q.v.). Naturally a vast litera¬

ture has already grown up on this subject, while the number of child study federations runs into hundreds.

Aims and Methods. — The necessity for a special study of childhood, especially for a child psychology, arises from a few essential structural and functional differences existing between the adult and the child. These differ¬

ences are not only physical, but physiological and psychological ; and they include differ¬

ences of kind as well as of degree. Besides the obvious anatomical differences in the child — such as shorter legs and a relatively longer trunk and larger head — and the less obvious physiological differences — such as a higher pulse rate, a relatively greater heart action and a correspondingly faster respiration —there is a most marked difference in psycho¬

logical processes. Some of these the human child seems to exercise even in infancy, while others come in weak form in later childhood; but a few are entirely wanting before maturity.

For all these reasons, the old notion that the child is a miniature copy of man has long been eradicated by psychologists. But despite these reasons for making child study a separate branch of investigation, it cannot be considered as entirely unrelated to the other sciences deal¬

ing with the life of man. If it is fallacious to study the child as if he were a little man; it is equally unscientific to do so without regard to his potential manhood.

Just as the child's mental processes differ in kind from those of the adult, so the methods of studying them must be modified or even changed altogether. For instance, the method of introspection (q.v.), the principal method of general psychology, is unavailable in child psychology, since the power of introspection does not appear much before adolescence. For want of direct introspection, the methods of observation and experimentation must be relied upon. The first, known as the "diary method,®

consists in carefully recording a child's pro¬

gressive development as actually noted by the observer, usually a parent. The great Pesta¬

lozzi kept a diary of this kind in which the do¬

ings and sayings of his son were minutely re¬

corded. Another famous instance is Darwin's 'Biographical Sketch of an Infant* (1877), dealing also with his own son. There are numerous published records of this sort —notably Perez' 'The First Three Years of Childhood) and Preyer's 'Mental Development in the Child) — and much important informa¬

tion bearing on the sensory and motor develop¬

ment of the infant has already been obtained from them. For the study of infancy no better method has yet been devised, and in the hands of trained observers it yields excellent results.

The experimental method, known also as

the method of Mental Tests (q.v.), is usually applied to children of school age. Devised by educators and used by them for purposes of experimental pedagogy, these tests seek to de¬

termine the child's mental ability as shown by his reaction-time, visual and auditory sense-perception, power of concentration, the curve of fatigue, *etc.* The advantages of this method over the other are that it deals with children collectively rather than as individuals, thus fur¬

nishing data of greater scientific value, and that the personal equation of the parental or other doting observer of an individual child is here entirely eliminated. Thus, while the diary method is far more comprehensive, extending as it usually does over years, the experimental 466

method is generally more scientific. Notable specimens of collective studies of children are Sully's (Studies of Childhood* and Baldwin's (Mental Development in the Child and in the Race.* But a sufficiently large number of indi¬

vidual studies, properly analyzed and inter¬

preted, may 'yield results that are equally re¬

liable. As both methods have their obvious limitations, neither of them is self-sufficient for scientific child study and each should be used to supplement the other.

Another method, which really partakes

somewhat of the nature of the two methods already mentioned, is known as the <(ques-tionnaire method.® This involves reports on the child's behavior made by parents, teachers and others in response to special lists of ques¬

tions prepared for them. In so far as this method depends upon partial and untrained observers, it is open to the same objections as the diary method. The accuracy of the final conclusions reached by this means is often still further impaired by arbitrary classification and interpretation on the part of the question-framer, who cannot be aware of the conditions under which the information solicited was ob¬

tained. For these reasons this method, save under exceptionally favorable circumstances, has proved of little scientific value. Few psychologists have ever used it, and fewer still use it at present.

Finally, mention might here be made also of another means — it is in no sense a method — of getting indirect light on the intricate problems of child study. This is a sort of ((reminiscent introspection® by which adults, usually authors, attempt to resurrect for us their childhood experiences. The famous

autobiographies of Tolstoy, Loti and John Stuart Mill afford such reminiscences. The danger of reading into such recollections ele¬

ments belonging to a later period of develop¬

ment is indeed very great. Even in cases of unquestioned sincerity such reminiscences of childhood are apt to assume the nature of romantic autobiography.

Such other methods as are used in child study are not peculiar to this subject, but are borrowed from the other sciences — physiology, anthropometry, *etc.* — dealing with the physical nature of man. These, therefore, need not be described in the present article.

Principles and Results. — The fundamental principle of child study, that the child is not to be considered an adult in miniature, has al¬

ready been referred to. Another essential con¬

sideration which must ever be borne in mind in this connection is that, both physiologically and psychologically, the child is a more dynamic being than the adult. The latter need but live, whereas the former must live and grow. The adult's physiological existence is better co-ordinated and regulated ; hence there is greater equilibrium in his case. The child, on the other hand, owing to continuous growth and consequent readjustment, is in a constant state of flux. Hence his restlessness and lack of concentration, which unenlightened teachers and ignorant parents vainly deplore. A third guiding principle in child study is that children vary less among themselves than adults, pre¬

senting a uniformity which increases inversely as their ages. Still another controlling truth is the most significant recognition that play is the child's chief business in life. The old notions that play in the child serves no pur¬

pose other than that of mere recreation, or that it is but an outlet for surplus energy, have long been abandoned. In their stead— -and there were many variations of these fallacies —the view that play in childhood has a very im¬

portant ulterior end has won universal accept¬

ance. The recognition of the educational and biological significance of play, a direct corol¬

lary of the general theory as to the meaning of infancy, has revolutionized modern child-train¬

ing and education.

The most concrete results of child study have, naturally, been physical or physiological.

In these respects the division of the period of childhood into different stages, according to marked lines of development, may be con¬

sidered the most important step. While there is still no complete agreement among writers on child study as to the exact years marking the boundaries, these three periods may be ac¬

cepted as approximately correct: (1) Infancy, the first six years —

about a year less for girls; (2) Childhood, the 7th to the 12th year — about two years less for girls; and (3) Adolescence, from the close of childhood to about the 25th year — about the 21st for girls. The impossi¬

bility of establishing very exact boundaries here is due to numerous variations from the normal stages of physical development. Such individual differences may result from various causes — prenatal tendencies and environ¬

mental influences — and must always be reckoned with in making general deductions from child study. In spite of these difficulties, however, it has been determined that all nor¬

mal children grow very rapidly during the first five years, at a slower rate from 5 to 12, faster again till about the 14 — 15th year, and at a rapidly decreasing rate thereafter till the age of maturity. But even these generalizations must be qualified by the statement that the rates of growth here indicated do not neces¬

sarily imply parallel or uniform development in height and weight or for all parts of the body. For a child of seven may happen to have the weight of an eight-year-old and the height of one who is but six. Nor should the essential differences between the growth of boys and girls ever be lost sight of. For in¬

stance, the rate of growth before the close of the prepubertal period is faster for girls than for boys, making the former heavier than the .

latter. Again, giris attain the normal height of adulthood at the age of 18, while boys are not full-grown men before the 20th or 21st year.

Sexually, too, girls mature considerably earlier than boys, passing through the period of adolescence (q.v.) about four years sooner, as already indicated.

While on the psychological phase of child study the results so far obtained are naturally more vague, their importance must not be un¬

derestimated. Apart from such lessons of gen¬

eral psychology as have a bearing on the men¬

tal development of the child, perhaps the most practical result in this

new field of study is the formulation of a graduated scale of child development by which the normal growth of mentality can be readily ascertained. This standard table, . known as (<Binet's Metrical Scale of Intelligence,® has been found so nearly correct for the average child that, with CHILD WELFARE

some modifications and extensions (see Men¬

tal Tests), it has been adopted by students of child psychology and teachers everywhere.

Still, it cannot be said that experimental psy¬

chology has done as much for child study as have the other biological sciences. Even the typical child mind has not yet been satisfac¬

torily determined, a task performed for the adult mind long ago. Yet until this is accom¬

plished by child psychology, it can hardly be considered a science. But even so the psychol¬

ogy of childhood has, to quote Professor Thorndike, (<acquired facts concerning instinc¬

tive tendencies, the gradual maturing of capaci¬

ties, the tendencies useful or harmful in chil¬

dren's habits of observing, associating and reasoning, the actual kinds and amounts of knowledge which they may be expected to pos¬

sess at different ages and under different con¬

ditions, their likes and dislikes, the relation of their mental to their physical well being, and the like.®

Specifically, and according to the periods of childhood already outlined, the following facts have been fully established in regard to

the child’s mental development.

The human infant is at first essentially a sensory and motor animal whose mental life, apart from the emotions of anger and fear, is confined almost exclusively to sense-perception.

With the acquisition of language comes the earliest indication of conscious meaning. Then the mental life of the child really begins.

Imagination develops rapidly and tends to obliterate for the child the dividing line be¬

tween fact and fancy, which is so exasperating to the adult, whose imagery is never so vivid as that of the child. In general, spatial per¬

ception precedes temporal, and both come much before color discrimination. Ideas of time-in¬

tervals dawn rather late upon the child’s mind, and the sense of rhythm is often a very slow acquisition. The modes of learning for in¬

fancy seem to consist of the /trial and success method® and unconscious imitation.

With the advent of childhood come con¬

scious imitation, a rapid extension of purposive activity, an enlargement of the field of sense-perception, and a corresponding enrichment of mental life generally. Actual experiments have shown that an average child doubles or trebles its power of sense discrimination be¬

tween the years of 6 and 16. There is probably a corresponding rise in the child’s entire mental life at this stage of development. It is certain, at any rate, that the power of immediate mem¬

ory keeps on increasing till about the 15th year, after which it remains stationary. The power of logical memory, however, continues to increase. In emotional life childhood differs but little from adulthood. Every emotion known to the latter, with the single exception of the sexual, are experienced in the former, though naturally in a cruder and simpler form…

The most striking characteristics of the adolescent period, which is decidedly a period of transition, are the rapid growth of # the emotions, the higher sentiments, and of indi¬

vidualism, which are either effects or correla¬

tives of the sexual awakening that comes in this period and largely dominates many of its manifestations. Altogether, it is a very critical period in the life of the young man or woman — as critical psychologically as infancy is phy¬

sically — a period calling for more patience, tact and sympathy in parents and teachers than any other. It is then that intellectual, aesthetic, moral or religious life really begins.

Among the general results of child study mention should be made at least of the conclu¬

sion reached by psychologists that childhood, though necessarily a preparation for adulthood, is to be passed through by the child entirely for its own sake. Nor should its various stages be hurried or compressed, save under very unusual circumstances. For it is believed that the best possible preparation for adulthood is to absorb fully the various influences and ex¬

periences characteristic of each preceding age; that, in other words, the person who displays the characteristics peculiar to each age in the fullest degree will ultimately attain a higher type of manhood or womanhood than one upon whom adult characteristics are forced prema¬

turely. In this connection passing mention must be made, too, of the quickening of the parental conscience as one of the far-reaching results of child study, thanks to which the serious responsibilities of parenthood are com¬

ing to be better realized. The vogue of (<eugenic marriages® and the cry for ((better babies® are but superficial manifestations of the deeper tendency making for an enlightened parenthood. See Adolescence.

Bibliography. — Besides the works men¬

tioned incidentally in the body of this article, consult Binet, A., (Les idees modernes sur les enfants) (Flammarion 1910) ; Chamberlain, A..

(The Child: A Study in the Evolution of Man* (New York 1900) ; Claparede, E., Psy¬

chologic de l'enfant* (Geneva 19091 ; Com-payre, G., intellectual and Moral Develop¬

ment of the Child) (New York 1902) ; Dear¬

born, <Moto-Sensory Development* (Balti¬

more 1910) ; Drummond, W. B., (An Introduc¬

tion to Child Study* (London 1907) ; Fiske, J., (The Meaning of Infancy) (Boston 1909) ; Forbush, (Guide Book to Childhood* (Phila¬

delphia 1915) ; Groos, K., (The Play of Man*

(New York 1901); Hall, S., (Adolescence*

(ib. 1905) ; Harrison, E., (A Study of Child Nature-* (Chicago 1900) ; Haskell, E. M., (Child Observations) (Boston 1896) ; Jacoby, (Child Training as a Science) (New York 1914) ; Kirpatrick, E. A., < Fundamentals of Child Study* (New York 1908) ; McKeever, (Outlines of Child Study* (ib. 1915) ; Neu¬

mann, Worlesungcn zur Einfiihrung in die ex-perimentelle Padagogik* (Leipzig 1907) ; Op-penheim, (The Development of the Child*

(New York, 1898) ; Rowe, S. H,, (The Physical Nature of the Child* (New York 1899) ; Tay¬

lor, (The Child* (ib. 1900) ; Thorndike, E. E., (Notes on Child Study* (ib. 1901) ; Tracy, F., (The Psychology of Childhood* (Boston

1897); Warner/ F., (The Study of Children*

(ib. 1898) ; Washburne, M. F., (Study of the Child* (Chicago 1907) ; and Whipple, (Manual of Mental Tests* (Baltimore 1910). Very suggestive reading may be found in the numer¬

ous autobiographical and literary accounts of children.

David A. Modell.

CHILD WELFARE. See Child Labor;

Federal Children's Bureau ; Labor Legisla¬

tion; Mother's Pensions.

CHILDBIRTH, Painless. That women in

travail have always suffered more or less pain seems probable, since the writer of Genesis quotes God as saying in the primaeval curse : <(In sorrow thou shalt bring forth children.®

Yet there are many reasons for believing that labor for the primitive woman was more purely a physiological process and therefore less pain¬

ful than it is to-day. Normal physiological processes are painless. The sensation of pain is caused by the abnormal and is usually sug¬

gestive of pathology. Childbirth being a natural function of woman should be physiological and therefore relatively painless.

Very easy and practically painless labors are still observed but they are now the exception since most women suffer more or less intense pain during the second or expulsive stage of labor. The more difficult labors of to-day re¬

sult from several factors, the more important being the intermarriage of races, the develop¬

ment of the brain, the survival of the physically unfit, and the abnormal methods of dressing and living. Civilization, at the same time, has de¬

veloped in woman a more sensitive nervous system which is less able to endure the shock of pain.

The belief that pain is an inevitable accom¬

paniment of labor has reconciled most mothers to endure it, while the joys of successful motherhood have caused them to forget it.

There is, however, no logical reason why women should suffer during labor. Suffering, physical or mental, produces surgical shock; it increases the dangers of puerperal complications, and delays the convalescence. When labor be¬

comes pathological and therefore painful, the physician should endeavor to minimize and re¬

lieve this pain with the same skill he shows in the care of other painful conditions.

The conduct of labor among all primitive peoples was purely intuitive and very little or no assistance was given. In difficult cases the older women of the tribe would assist with pressure, massage and nauseating drinks. In the earlier stages of civilization some of the older women assisted during labor and the priests gave spiritual assistance (mental sug¬

gestion) or mechanical assistance in difficult cases.

The ancient Greeks appreciated the increased susceptibility of the nervous system of women during pregnancy. <(The law in Carthage and Athens forbade the pursuit and punishment of a criminal or murderer who sought refuge in the house of a woman who was pregnant or had recently given birth to a child.® (Englemann).

There is also considerable evidence in the Greek literature that an attempt was made to relieve the suffering of labor by anaesthetizing

agents and other means.

To mention the various drugs which have been used in the attempt to relieve the pain of labor would necessitate the listing of every drug thought to have hypnotic, sedative, anal¬

gesic or anaesthetic properties. Hypnotism and mesmerism have been used successfully and the value of mental suggestion has long been ap¬

preciated.

The drugs most used by the ancients were probably cannabis indica (Indian hemp; hash¬

ish), mandragora and opium. Of these opium is still employed, although its limitations have been recognized for at least a century. W. P.

Dewees wrote in 1819, (<I have in a number of instances seen opium exhibited with a view to mitigate the severity of the pain, when labor advanced slowly, and have never failed to ob¬

serve that the force of the contraction was diminished at the time it was required to be the strongest.®

James Y. Simpson in January 1847 used ether to produce analgesia in midwifery and inaugu¬

rated the first consistent effort to relieve the severe pain of labor. Flourens in March of the same year announced the anaesthetic prop¬

erties of chloroform, and Simpson in November read his paper entitled, (<Notice of a New Anesthetizing Agent as a Substitute for Sul¬

phuric Ether in Surgery and Midwifery.® Be¬

cause of superstition and religious prejudice these anaesthetizing

agents at first were opposed by both the profession and the laity. However, following its use by Queen Victoria in 1854, chloroform d la reine became the fashion and analgesia was maintained for many hours in large numbers of cases. Protheroe Smith in a letter to Simpson stated that he had used chloro¬

form analgesia for 28ˆ hours. Simpson him¬

self used it for over 13 hours.

Chloroform being more pleasant and more efficient quickly replaced ether. While the fact that it is more dangerous than ether was soon discovered, from the greater number of fatalities in surgical cases, the delusion was long main¬

tained that the pregnant woman had a special tolerance for chloroform. Within recent years most authorities have shown a preference for ether because of its greater safety, and, with the newer methods of administration, its effi¬

ciency has been increased to some degree. Both have proved of great value in many thousands of cases. Some deaths undoubtedly have re¬

sulted from their use but they have been the means of saving hundreds of lives.

Both ether and chloroform have the fault of opium in that they weaken the uterine con¬

tractions and anaesthetize the fetus in utero.

Because of their limitations and slightly greater dangers these anaesthetics are gradually being supplanted by nitrous oxid-oxygen analgesia.

Klikowitsch of Petrograd applied nitrous oxid-oxygen analgesia to 25 obstetrical cases in 1880. He found that three or four inhalations of this mixture rendered the uterine contrac¬

tions painless without clouding the conscious¬

ness. He observed that its action was different from that of opiates, ether and chloroform, in that the uterine contractions were often stimu¬

lated and that in no case was there any diminu¬

tion in their frequency or strength. The fol¬

lowing year Winckel of Dresden used the nitrous oxid-oxygen analgesia in 50 cases with satisfactory results. ((The apparatus, which con¬

sists of a rubber bag like a pillow, is incon¬

venient, it must be confessed, but this is en¬

tirely subordinate; in abnormally painful labor it is at any rate an extremely important remedy.®

(Winckel). But owing to its cost, the impurity of the gases used, the crudeness of the appa¬

ratus, and the fact that it was often given to the stage of asphyxia, nitrous oxide did not become popular at that time.

Dr. J. Clarence Webster of the Presbyterian Hospital, Chicago, was one of the first in Amer¬

ica to use nitrous oxide in obstetrical practice.

In 1904 he began to use this anaesthetic in opera¬

tive obstetrics when ether and chloroform were CHILDE HAROLD'S PILGRIMAGE

contraindicated. Gradually its use was ex¬

tended to normal cases as a substitute for ether during the delivery of the child. The use of the nitrous oxid-oxygen analgesia during the

entire painful stage of labor has been developed during the past few years largely as a result of the constantly increasing demand for painless childbirth.

Von Steinbuchel of Gratz in 1902 suggested the use of scopolamin-morphine analgesia in ob¬

stetrics. Gauss of Freiberg in 1906 made the first report of these drugs given in small gradu¬

ated doses based on a memory test. Because of the semi-sleeping condition of the patient he called this treatment the <(Dammerschlaf®

(Twilight Sleep). This method has been tried by many physicians with varying degrees of success and failure. Given under the most favorable condition to selected cases the results have been satisfactory in from 70 to 90 per cent of the cases. Most users of scopolamin and morphine are now advocating these drugs only for the first or dilating stage of labor.

Some anaesthetic is usually needed for the de¬

livery of the child.

In March 1915, Dr. Webster announced the very satisfactory results which were being ob¬

tained by the obstetrical staff of the Presby¬

terian Hospital, Chicago, from the use of the nitrous oxid-oxygen analgesia during the pain¬

ful stage of labor. This announcement was made only after various members of our staff had tested the method thoroughly on all types of patients and it had been found efficient, easily administered and not too expensive for general adoption. Influenced by the papers of this staff, together with papers from obstet¬

ricians in other cities, this analgesia has been used successfully in several thousand cases dur¬

ing the past two years. It is of considerable significance that of the

obstetricians who have used the nitrous oxid-oxygen analgesia long enough to develop a technic not one has ques¬

tioned its value in the management of labor.

While the use of any drug may not be en¬

tirely free from the element of danger, the writer believes that the proper use of any of these drugs or anaesthetizing agents is less danger¬

ous than is the shock of severe pain. With proper care during pregnancy, with the labor skilfully conducted, and with proper facilities for the adaptation of the various anaesthetizing agents to her individual needs, it is possible for the mother of to-day to have a relatively pain¬

less childbirth.

C. Henry Davis, M.D.

Author (Painless Childbirth , Entocia and A Ji-trous Oxid-Oxygen Analgesia.

CHILDE HAROLD'S PILGRIMAGE.

Byron's (Childe Harold, > despite diversity of critical opinion and the fact that it has become hackneyed through use in guidebooks and school ((readers,® still remains the most famous descriptive poem in English. It was written, says Byron, <(as a mark of respect for what is venerable and of feeling for what is glorious.®

The poem is divided into four parts, or ˆcantos,®

aggregating 4,500 lines ; its metre is the nine-line stanza of Spenser's (Fairy Queen.) Though usually termed a ˆdescriptive® poem, (Childe Harold) is really a series of descriptive, re¬

flective and lyrical stanzas strung on a slender thread of narrative formed by the wanderings of its eponymous hero through the countries described. But Harold figures only slightly even in the first canto, still less in the second, is scarcely mentioned in the third, and disappears entirely in the fourth. He was, in spite of Byron s too strenuous denial, never other than the poet himself.

Byron's travels through Spain, Portugal, Albania and Greece, in 1809 and 1810, furnish the subject-matter for cantos I and II, which upon their publication in 1812, caused their author to exclaim, (<I awoke one morning and found myself famous.® Their popularity, such as few poems have ever attained, was due largely to their posing, their showy rhetoric, and their satire, which exactly suited the taste of the age. Except for the fine stanzas on Greece (II, 73-90), however, they contain little of value. But the third and fourth cantos, pub¬

lished in 1816 and 1818, respectively, belong to a higher order. Within the intervening years Byron had written copiously, had grown famous, had become for a time the darling of English society, had met the great people of his day, had married — unhappily; and, finally, under a storm of unmerited abuse, had quitted England forever. His earlier poses and affectations are now laid aside, and his style is direct and ma¬

ture. Canto III is devoted to Waterloo, the Rhine and Switzerland ; canto IV, to Italy ; with their landscapes, historical associations, great men and great events, cities, buildings and works of art. But not one half of the matter is de¬

scriptive; for the poet usually passes from description into reflection, and from this into the purely lyrical. In Italy his wanderings are easily traced, from Venice, through Ferrara and Florence, southward to Rome; but (Childe Harold* is far from being a guidebook. Byron selects only what arouses his emotions, and presents objects only as colored and interpreted by his own personality. Yet so essentially just and adequate are many of his descriptions, such as those of Venice, Rome, the Pantheon, the gladiator, that they have become identified with the objects they describe. The contemporary popularity of (Childe Harold,* however, was not due solely to the splendor and energy of these descriptive passages. The spirit of the age spoke in its pleas for justice and liberty, and for social, political and religious reform; and contemporary interest was quickened by the reflections on the French Revolution and Na¬

poleon, and by political allusions and prophecies.

Added to all this was the daring revelation of the poet's own complex and brilliant person¬

ality.

Despite the diversity of critical opinion, it may safely be said that (Childe Harold) con¬

tains much poetry of a high order. Byron's passion for the grander aspects of nature finds expression in verse that fairly rises to the sub¬

limity of his themes (on the Rhine, III, 50-56; on Night and Storm on Lake Geneva, III, 85-97 ; on the Marble Cascade, IV, 69-72 ; on the Ocean, IV, 178-84). Again, as no other poet, Byron possesses the historic imagination, can summon (fthe glory that was Greece, the grand¬

eur that was Rome,® and make the reader feel the desolation of once great and now fallen states (on Athens, II, 73-90; on Venice, -IV, 1-19; on Rome, IV, 78-82). With all its lapses into empty rhetoric, its moral platitudes, its too ostentatious parade of the poet's ((bleeding heart,® (Childe Harold) still possesses, as Swin-470

burne has said, <(the splendid and imperishable excellence of sincerity and strength.®

Marion Tucker.

CHILDE ROLAND TO THE DARK

TOWER CAME. < Childe Roland,* one of

the most powerful and impressive, and perhaps the most widely

discussed, of Browning's shorter poems, is a narrative monologue in which (<Childe® (or (<young lord®) Roland, a mediaeval knight, tells the story of his quest of the ((dark tower® ; though to whom he speaks, and when, and where, we never know.

The poem, which is in 34 six-line stanzas, was written in one day, 3 Jan. 1852, in Paris, and was first published in the volume entitled (Men and Women* in 1855. Its title was suggested by a single disconnected line spoken by Edgar in (King Lear* (<(Childe Roland to the dark tower came® ; III, iv, 1. 187) ; and its grotesque imagery is perhaps to be understood only in the light of the unreal and fantastic world of Edgar's fancy. The strangely impressive setting presents a series of pictures as by Albrecht Diirer, in turn terrific and grotesque, fantastic in the general impression but sharply realistic in detail. In spite of Browning's assurance that the poem is <(only a fantasy,® commentators have offered various interpretations of its sup¬

posed allegory, not one of which is without in¬

consistencies that render it invalid. Probably the poem is best taken, as the poet evidently intended it should be, simply as an effort of the imagination from which each reader may gain what he will. Possibly a broad and safe inter¬

pretation, if the reader insist upon one, is that Childe Roland's quest is the journey of life, with its dangers, failures and successes, its pursuit of an ideal through perils both real and imaginary, and its final triumph through sheer power of will. The climax of the poem is superb in the crashing finality of its long-drawn trumpet blast, defying fate and all unseen malignant forces, and claiming victory even in the midst of apparent defeat. Among the many comments and interpretations may be men¬

tioned that by John Esten Cooke in The Critic (5:201, 24 April 1886) ; by Arlo Bates, in The Critic (5:231, 8 May 1886); by Mrs. Orr in her (Handbook to Browning* ; by J. Kirkman and others in (The Browning Society Papers*

(1:21); and by William Lyon Phelps in his (Browning: How to Know Him* (pp. 231-244).

Marion Tucker.

CHILDEBERT, shel'-de-bar or chil'debert, three kings of the Merovingian dynasty, France. (1) Childebert I. : b. about 495 a.d. ; d. 558. On his father's death in 511 he succeeded to the kingdom of Paris; his brother, Clodomir, king of Orleans, having been killed in battle, Childebert and his brother, Clotaire, king of Soissons, determined to seize and divide his dominions, and murdered his two eldest sons and their followers. Childebert afterward quarreled with Clotaire and laid waste his ter¬

ritory. (2) Childebert II.: b. about 570; d.

596. On the death of his father in 575, he was proclaimed king of Austrasia, and subsequently, by the death of his uncle, Gontran, succeeded to the -kingdoms of Burgundy, Orleans and part of that of Paris. (3) Childebert III, surnamed the Just: b. about 683; d. 711. He was proclaimed king in 695, on the death of his brother, Clovis III. His kingship, however, was merely nominal, the true sovereign being Pepin le Gros or d'Heristal, who, under the title of mayor of the palace, exercised the real author¬

ity.

CHILDERMAS (chil'der-mas) DAY

(Feast of the <(Holy Innocents®), a festival celebrated by the Roman Catholic Church, 28

December, in commemoration of the massacre of the male children in and near Bethlehem by Herod soon after the birth of Christ. Consult Matthew ii, 16-18.

CHILDREN, Defective. Under the term

ˆdefective children® are included deaf, blind, feeble-minded, epileptic, crippled and incurable children. The treatment of the deaf and blind is generally recognized as an educational prob¬

lem, and will therefore be discussed under Blind, Education of the; Deaf, Education of THE.

The Problem. — The problem of the feeble¬

minded has come to be recognized as one of the most difficult and acute social questions.

It has long been known that a considerable number of the inmates of reformatories and prisons were mental defectives but until recently there was no means of determining what pro¬

portion of them belonged to this class. Within the past few years there have been devised the Binet-Simon tests, and other tests for ascer¬

taining the mentality of children. These tests have been applied to inmates of reformatories in large numbers, and it has been discovered that from 5 per cent to 25 per cent of the boys, and from 20 per cent to 50 per cent of the girls in such institutions are distinctly feeble-minded. It is more difficult to ascertain the mentality of adults, but it is generally agreed that a considerable proportion, ranging from 10

to 40 per cent of the adult inmates of jails, prisons and reformatories are feeble-minded.

Dr. Henry H. Goddard, director of the

department of research of the Training School fox Feeble-minded Children, at Vineland, New Jersey, who has made extensive studies along this line, says that every feeble-minded child is a potential criminal. The feeble-minded child becomes a criminal, not because of deliberate viciousness, but because he has not the mental capability or the will power to withstand the ordinary temptations of life, and because he is readily susceptible to the influence of vicious associates who make use of him to promote their own ends, and initiate him into criminal ways. Many crimes of violence are committed by persons of defective mentality, especially by the high-grade feeble-minded who have come to be known as ((morons® who are easily excited or frightened, and who are not restrained by motives of conscience or prudence.

The studies of Goddard and other investi¬

gators have shown that the feeble-minded woman is twice as prolific as the normal woman, and that the large majority of feeble-minded children are the offspring of feeble-minded mothers. This arises partly from the fact that she is an object of pursuit and becomes the mother of illegitimate children and partly be¬

cause she is not restrained by the ordinary con¬

sideration of prudence. If the feeble-minded woman consorts with the normal man there is more than an equal chance that the offspring will be defective; if she consorts with an inebriate or a syphilitic the probability of de-CHILDREN, DEFECTIVE

fective offspring is greatly increased; if she consorts with a feeble-minded man her off¬

spring is sure to be defective.

Under former social conditions a large part of the feeble-minded children died in infancy or early childhood ; but with the gradual im¬

provement in housing conditions, milk supply, and the general care of mothers and children among the poorer classes, together with the establishment of institutions for feeble-minded children, the lives of such children are pre¬

served, and apparently their numbers are in¬

creasing more rapidly than the normal class.

The number of feeble-minded children in the community is unknown. Indeed an exact defi¬

nition of feeble-mindedness has not yet been established; but the estimates of the best quali¬

fied experts indicate not less than one feeble¬

minded person out of every 300 of the popula¬

tion, which would indicate a total of not less than 300,000 for the United States. Some ex¬

perts estimate a much larger number.

Remedies. — Much attention is being given to the question as to how the multiplication of the feeble-minded can be checked. The most important propositions to this end are instruc¬

tion of the public as to the danger of the marriage of the feeble-minded, marriage re¬

striction laws, sterilization and segregation of the feeble-minded, especially young women of child-bearing age. Instruction is only a partial remedy because those who need it most are incapable of profiting by it. Marriage laws are a valuable but partial remedy for the reason that the feeble-minded multiply their kind re¬

gardless of marriage.

Sterilization has been decreed by the laws of 12 States but it is practically operative only in the State of California. The first State to adopt a sterilization law was Indiana, but the law has been inoperative there since 1911. A few operations have been performed in North Dakota, but the law is a dead letter in the remaining nine States which have adopted it.

Sterilization is a legitimate measure for the prevention of feeble-mindedness, but its efficacy is impaired in two ways: first, by the fact that all of the laws thus far enacted pro¬

vide that the operation shall be performed only in cases where there is no reasonable prospect that the condition of the individual will improve. That provision protects the high grade feeble-minded, who are now recognized as the most prolific source of hereditary feeble¬

mindedness ; second, by the fact that while public sentiment has quite readily sustained the enactment of sterilization laws, it has not sustained their execution. The indications are that only after a long time, if ever, will this difficulty be overcome by the education of the

public.

Special Institutions. — Under these circum¬

stances, segregation is being advocated, even by those who favor sterilization, as the most practical and available method of prevention.

It is urged that special institutions be pro¬

vided for all feeble-minded children who can¬

not be properly cared for in their own homes.

Heretofore most of the institutions established have been ˆschools® for the care and instruc¬

tion of young feeble-minded children. As the children have grown up, they have remained in the institutions, because there was no other place for them, but the care of adults was a secondary proposition, and the admission of adults was exceptional. Feeble-minded adults were cared for, if at all, by sending them to insane hospitals, reformatories or almshouses, where they do not belong.

A few States, recognizing the importance of caring for adults, have established ˆcolonieˆ

for the care of the adult feeble-minded: for ex¬

ample, Massachusetts, New York, New Jersey and Minnesota. Other States, like Pennsyl¬

vania and Illinois are moving for similar instiutions.

With the recognition of the facts of the heredity of feeble-mindedness, the rapid multi¬

plication of this class of defectives, and the significance of feeble-mindedness as a factor in crime, there has come about an active move¬

ment in Massachusetts, New York, Michigan, Pennsylvania and other

States for adequate custodial provision for the adults — at least for the young women of child-bearing age. The plan proposed is the establishment of colonies such as have already been established in New York, Massachusetts, New Jersey, Indiana, Min¬

nesota and other States. The colony consists of a collection of buildings of a simple char¬

acter, located upon a large farm. The colony is organized with a view to utilizing the labor of the inmates in such a way that they shall contribute as much as possible to their own support by the use of simple industries such as gardening, poultry, rug-weaving, basket-making and so forth for girls, and farming, redeeming waste land, care of stock, simple carpentry and so forth for boys.

In Massachusetts and New Jersey, wooden buildings are being erected of a very simple character, and the more intelligent inmates are used as caretakers for the low grade inmates, under careful supervision. The children re¬

ceive such education as their natural endow¬

ments will warrant, but it is deemed useless to carty on expensive educational processes in the effort to develop that which is not in them.

By this system, the expense of maintenance is largely reduced without sacrificing either the happiness or the comfort of the inmates. These <(children of a larger growthˆ find happiness in the performance of simple tasks together with simple forms of recreation such as folk-dancing, outdoor games, calisthenics, moving pictures and so forth.

A large number of the adult feeble-minded are already under care in institutions which are not designed for them and are unsuitable for them : prisons, workhouses, reformatories, jails, almshouses and insane hospitals. In most of these institutions, the cost of their mainte¬

nance is much higher than in a colony for feeble-minded. This is especially true of girls in reformatories, where the cost of maintenance

is nearly double what it would be in a properly organized colony. It would be for the ad¬

vantage of all concerned if, instead of enlarg¬

ing their reformatories, the different States would build separate institutions for the feeble¬

minded contingent in the reformatories.

It is generally recognized that provision for feeble-minded young women is more urgent than for feeble-minded young men for the reason that the feeble-minded woman is more prolific than the normal woman, and the feeble¬

minded man is much less likely to contribute to the increase of the defective population. The.

number of feeble-minded persons in the United States is not known, but it is very large, prob¬

ably there are not less than 250,000 of whom perhaps 75,000 are women of the child-bearing age, of whom less than 10,000 are as yet pro¬

vided for in suitable institutions, leaving 65,000.

Provision for this number is by no means im¬

practicable. We are already caring for about 75,000 insane ones.

Epileptic Children. — Epilepsy is one of the most dreadful afflictions to which the human race is subject. The disease is obscure and to this

day it is very imperfectly understood. The disease may begin at any age, and the early paroxysm is progressive and its progress is usually accompanied by a gradual decay of the mental faculties, taking the form of feeble¬

mindedness or insanity. There is no specific cure. All that can be done is to provide proper food, under medical advice, to provide con¬

genial employment, suitable outdoor exercise and recreation. Only a fraction of those afflicted recover- — probably not more than 10

per cent.

The epileptic is peculiarly unfortunate be¬

cause he is debarred from many of the ordinary pursuits of life. He cannot be employed on any vehicle. He cannot be a house painter, or a salesman, nor can he work safely about machinery. The disease often makes its victim morose or even dangerous. It is cruelty to both classes to incarcerate them in a hospital for the insane as is often done, or to keep them in an almshouse.

Ohio was the first State to establish a separate institution for epileptics. Several States have followed the example of Ohio. It should be generally adopted, both as a measure of humanity to a most unfortunate and most wretched class, and as a measure of protection to the rest of the community.

Crippled Children. — The first institution for crippled children was the New York Hospi¬

tal for Ruptured and Crippled Children. It was established in 1863. In the 28 years from 1863 to 1890, only 5 institutions were estab¬

lished: 2 in New York city, and 3 in Philadel¬

phia. In 1913, the Russell Sage Foundation found 35 institutions devoted to crippled children, including 9 orthopedic hospitals, 14

convalescent hospitals or homes and 12 asylum houses. Many general hospitals have or¬

thopedic departments, and many other institu¬

tions receive and care for convalescent or chronic cripples. Many of these are designed especially for them. The cripples housed in institutions are remarkable for their courage, cheerfulness and optimism. They expect to get well and they endure their sufferings with a fine spirit of philosophy and hopefulness. This spirit is largely due to the influence of the orthopedic surgeons who have built up the beneficent institutions.

State hospital schools for crippled children have been established in Massachusetts, New York, Minnesota and Nebraska. These insti¬

tutions are most important because they reach crippled children in rural districts who other¬

wise would never hear of an orthopedic sur¬

geon. The care of crippled children is very expensive, but is highly economical because it makes productive children of many who otherwise would lead a miserable life of de¬

pendence. See Children, Neglected; Chil¬

dren, Delinquent.

Bibliography. — Proceedings* of the Con¬

ferences of the National Association for the Study and Education of Exceptional Children (Plainfield, N. J., annually) ; Anderson, M. L., (Education of Defectives in the Public Schools) (Yonkers 1917) ; Bronner, A. F., (The Psy¬

chology of Special Abilities and Disabilities) (Boston 1917) ; Groszmann, M. P. E., (The Exceptional Child* (New York 1917) ; Hol¬

lander, B., (Abnormal Children) (London

1916) ; Shuttleworth, G. E., (Mentally Deficient Children* (ib. 1916) ; Young, Meredith, (The Mentally Defective Child) (ib. 1916) ; Holmes, A., (Backward Children* (Indianapolis 1915) ; Kelynack, T. N., (

Defective Children* (London 1915) ; Huey, E. B., (Backward and Feeble¬

minded Children) (Baltimore 1912) ; Mac¬

Donald, A., (… Bibliography of Exceptional Children and their Education* (Government Printing Office, Washington, D. C., 1913).

Hastings H. Hart,

Director Department of Child-Helping, Russell Sage Foundation.

CHILDREN, Delinquent. A delinquent

child is one who commits an act which would be counted a crime, if performed by an adult.

In most States of the United States, children who are declared incorrigible, knowingly asso¬

ciate with vicious persons or frequent vicious places, are classed as delinquents.

Up to the year 1823, juvenile criminals were tried in the criminal courts, associated with adult criminals, and received like punishment with them; but in that year, the New York House of Retuge was established. Children sentenced for crime were sent to the house of refuge, where they became the wards of the board of trustees, who were given authority to release them on parole when they gave evi¬

dence of reformation.

From this beginning grew up the juvenile reformatory system of the United States.

Gradually the idea of punishment retreated into the background and the idea of guardian¬

ship, training and reformation came to the front. _ Sentences for fixed terms gave way to commitments for an indefinite period, to be de¬

termined in accordance with the child's prog¬

ress in character and self-control.

In 1855 the Ohio State Reform School was built at Lancaster, on the cottage plan, without prison bolts, bars or walls. "Elder brothers"

took the place of guards. The boys were treated as pupils rather than prisoners. From that time the. cottage system gradually found favor until it is now in general use. The early cottages were built for 50 to 60 children each.

The size of cottages has gradually decreased until cottages for 25 to 30 children are com¬

mon. The Children's Village at Dobbs Ferry, N. Y., the State Agricultural School at Indus¬

try, N. Y., and the Thorn Hill school near Pittsburgh, Pa., have cottages for 20 children each, and the cottages recently built for the New York Training School at Yorktown

Heights are designed for only 16 boys each.

In the most modern institutions for delin¬

quent girls, each cottage is a complete domes¬

tic unit, with its own dining-room, kitchen and laundry. In some institutions, every girl has a separate room, while in others a part of the CHILDREN, DEPENDENT

girls sleep in dormitories, and the rest in single rooms. It is generally recognized that separate rooms should be provided for at least a part

of the girls.

There has been a steady advance in the quality of employees in juvenile reformatories.

Men and women of the highest character and attainments are now sought for superintend¬

ents because it is recognized that the task calls for a high degree of talent and training. In many reformatories, there has been a corre¬

sponding advance in the quality of subordi¬

nates, particularly cottage managers, and teachers of industries, and in the school of let¬

ters. In schools for delinquent boys, it is common to have a man and wife in each cot¬

tage, the wife serving as house-mother, and the husband being employed in the school or in the shop or on the farm and acting also as house¬

father. In schools for delinquent girls, each cottage has a house-mother and in some schools there is also a housekeeper or assistant. These house-mothers are now chosen with great care, with reference to their intelligence, refinement, devotion, patience and tact.

The school for girls at Sleighton Farm, Darling, Pa., employs for the most part, as caretakers, teachers and cottage mothers, young women who are college graduates. The Home School for Girls at Sauk Centre, Minn., prefers as cottage mothers mature women of intelligence and motherly spirit.

All managers of juvenile reformatories at¬

tach great importance to vocational education.

Many reformatories have endeavored to pro¬

vide instruction in tailoring, shoemaking, farm¬

ing, sewing, dressmaking, cooking and other branches of housekeeping through the ordinary domestic tasks of the institution under instruc¬

tion of ordinary employees. Experience has demonstrated that this method of instruction is ineffective, -especially in large congregate in¬

stitutions. In cottage institutions, with small groups, domestic science can be taught in the regular work of the cottages, but even under those conditions, special, trained teachers are needed to supplement such teaching. In boys'

schools, special teachers must be employed for carpentry, blacksmithing, farming and so forth, in order to attain any practical success in voca¬

tional training.

Nearly all of the reformatories for boys are located on large farms; one acre for each boy is considered a suitable amount. The farm is used partly as a means of vocational training, partly for the wholesome effect of life on the land, even for boys who will go back to city life, and partly to supply an abundance of good milk and fruit and vegetables. It is doubtful whether these farms are profitable from a commercial point of view, but the other considerations undoubtedly justify the location of such institutions upon farms.

It is indispensable to success in the work of the juvenile reformatory that the children shall be trained for life, first by normal living, as much like that of a good family as possible, with the best possible instruction in mind, manners, morals and religion ; second, by a well devised and rational plan of vocational instruction.

The work of the juvenile reformatory, al¬

ways difficult, has been made doubly hard in recent years by two circumstances : First by the beneficent work of the juvenile court, with the probation system. Formerly the juvenile reformatory was the instrument of first aid, and many of its inmates were children guilty of minor offenses, who were readily impressed by the good influences of

the industrial school.

To-day the hopeful cases are placed on proba¬

tion by the juvenile court. If they do not suc¬

ceed, they may be placed on probation a second or a third time; and it is only after the proba¬

tion system has proved ineffectual, that they are sent to a juvenile reformatory. The re¬

sult is that children are committed from one to two years older than formerly, and are more familiar with evil and hardened by resistance to the restraining influences of home and Sunday school, day school and the juvenile court.

The second circumstance is the increasing proportion of defective children in the reforma¬

tories. The probation plan fails with many of them and while normal children are paroled and make good, these poor children, lacking the intelligence and the will power to with¬

stand evil, fail on parole, and are sent back.

These ((defective delinquent" children need an entirely different discipline and training. They clog up the schools and hinder their proper work. They should be sent to separate institu¬

tions where they can be properly trained and cared for at a cost not more than two-thirds of that in a good reformatory.

Bibliography. — Annual reports of State

Agricultural and Industrial School, Industry, N. Y. ; Children's Village of the New York Juvenile Asylum, Chauncey, N. Y. ; Glen Mills School, Glen Mills, Pa. ; Saint Charles School for Boys, Saint Charles, Ill. ; Sleighton Farm, Darling, Pa. ; Home School for Girls, Sauk Centre, Minn.; New York State Probation Commission, Albany; Folks, Homer, (Care of Destitute, Neglected and Delinquent Children^

(New York 1902) ; George, William R., (The Junior Republic (New

York 1909) ; Hart, Hastings H., (Cottage and Congregate Institutions) (New York 1910) ; Hart, Hastings H., Preventive Treatment of Neglected Chil¬

dren J (New York 1910) ; Rural Court Study, New York School of Philanthropy; Study of Connecticut Courts, Wm. B. Bailey, Yale Uni¬

versity.

Hastings H. Hart,

Director of Department of Child-Helping, Russell Sage Foundation.

CHILDREN, Dependent. A dependent

child is one who is orphaned, homeless, or has no fit and responsible guardian to provide for his needs or, in general terms, one who ((is dependent upon the public for support."

Strictly speaking, this definition would in¬

clude the major part of the children who are commonly classed as ˆdelinquent" or ((defective"; but in practice delinquent and defective children, who are cared for as such, are omit¬

ted from the category of dependent children.

The children recognized and recorded as de¬

pendent include children declared dependent by the juvenile court and other courts, children in orphanages and children's homes, normal children in almshouses, children placed in. fam¬

ily homes by public authorities, and children placed in families by private orphan asylums, infant asylums and lying-in hospitals,

CHILDREN, DEPENDENT

The question of the proper care of depend¬

ent children is one of the utmost importance, calling for the exercise of the highest wisdom, because it involves the permanent fate of the children who are in no manner responsible for their unfortunate condition and who are abso¬

lutely dependent for their welfare and pros¬

perity upon the fidelity and wisdom of those assuming the responsibility of providing for them.

In former years it was a common thing for dependent children to be committed to the pub¬

lic almshouse, especially when the mother of the children was sent there ; but it has long been understood that the almshouse was an absolutely unsuitable place for the care of any child, and in many States of the Union com¬

mitment of children beyond the age of one or two years is forbidden by law.

For a great many years, the favorite plan of caring for dependent children in the United States was the orphan asylum plan. By the orphan asylum plan is meant the bringing up children to young manhood and womanhood in orphan asylums. The argument was as follows : This child having been left homeless, a substi¬

tute should be provided for the home; and it was believed that a substitute could be provided which might be better than the original article.

It was recognized and admitted that in many cases the child could not have a fair oppor¬

tunity in his own home because his parents were vicious, incompetent

or diseased, or for other reasons the child's own home was unfit.

In the institution, however, it was believed that all of these difficulties could be overcome. In the institution it is possible to control absolutely the environment and conditions under which the child shall live. His food can be prescribed by a physician, and weighed out if necessary, and proper ventilation and cleanliness can be ensured. The institution can select the people who are to care for the child, direct his educa¬

tion in letters and in morals, his industrial and religious training. The child will never be tardy or absent from school, will never be on the street at night, will never miss his study hours. Under these favorable circumstances it would appear as if the institution might do far better for the child than even a reasonably good family home. Notwithstanding this plaus¬

ible argument it has long been recognized, both by those who have had charge of institutions and those who have not, that institutional life is not the most desirable condition for a child, especially when continued for long periods.

The reason for this view is institutionalism.

Institutional life, even under the most favorable circumstances, is contrary to the nature of the child. The cooking is done by steam, the washing is done by steam, the house is heated by steam, the food is different in kind and quality, is cooked in larger quantities and by different methods than those which prevail in ordinary homes. The dining-room is arranged and ordered under a different plan. The entire arrangements are different from ordinary homes. The bell rings for the child to get up in the morning, to go to his meals, to play and return from play, to go to school and return from school ; all day long the bell ! That means that someone else is planning his life for him ; someone else is doing his thinking for him; the child does not acquire initiative, independ¬

ence or courage. He does not learn to spend money or to make a bargain for his services He does not learn to fend for himself in hb dealings with his fellowmen.

In the best institutions for children efforts are made to overcome these

difficulties by adopting the cottage system, with the children in small groups, providing a kitchen and dining¬

room for each cottage, creating as close as possible a relationship between the children and the superintendent ; sending the children to other schools to mingle with other children ; giving the children small wages to be expended under advice of older people, and so forth.

Nevertheless, in the great majority of the insti¬

tutions, these difficulties still exist.

In 1853 Mr. Charles Loring Brace, of New York city, organized the New York Children's Aid Society. He declared that for the greater part of the dependent children of the com-munitv institutional care is entirely unnecessary.

He took children by the thousands from the streets and alleys of New York and sent them to farm and village homes to grow up in the normal life of the community. He maintained that the child placed in a good family home had better chances of success in life than a child brought up in an institution, even a good insti¬

tution.

There arose a vigorous controversy between the advocates of the orphan asylum plan and the advocates of the child-placing system. This controversy was carried on in the National Con¬

ference of Charities and Correction for more than a quarter of a century, but it was finally closed in the brief, but admirable-, report of the Hon. Thomas M. Mulry, a leading

Catholic layman, chairman of the Committee on Neglected and Dependent Children. He said: ((A11 workers agree that the home is the natural place to properly develop the child… . There is a growing tendency on the part of many of the poor to shirk the responsibility of the parents, and to transfer to others the duty which is strictly their own, to hand their chil¬

dren to the public care.®

He said, referring to the report of Mrs.

Elizabeth E. Williamson, chairman of the com¬

mittee of 1898, ((The good work accomplished by the institutions in the past was fully recog¬

nized, as well as the fact that the institution has an important place to fill in the future on the disciplinary and educational lines and the care of those children who are prevented by circumstances from being placed in homes. It was said that many children are kept longer than necessary in the institution, because, hav¬

ing no relatives, there were no persons to claim them ; and such children it was thought might well be placed in good homes, provided the families were of the same religious faith as the child. The earlier they are placed in such families, the better it is for the child.

<(The placing-out system needs the most careful supervision ; and those interested in the work realize how prone to selfishness people are, and that many wish the children only for the work they can obtain from them… . This does not, however, mean that any effort should be spared to place as many children as possible in good homes ; and this committee is strongly in favor of renewed activity in this direc¬

tion… .

<(Your committee is emphatically of the CHILDREN, DEPENDENT

opinion that the (onnce of prevention is better than the pound of cure,* and it strongly urges upon all charitable people the absolute neces¬

sity of preserving the home wherever possible.

… There are homes in abundance throughout our cities, our towns and our farming sections for every orphan child, if the people will but open their hearts and brighten their homes by studying in what way they may best show their love for their less fortunate fellow-beings.®

This practically closed the debate as to the relative merits of the orphan asylum plan and the placing-out system. It recognized the legiti¬

mate work to be done by institutions, but urged the use of the family home plan to the utmost.

In January 1899 there was held in Washing¬

ton, D. C., the celebrated White House Confer¬

ence, which was called by President Theodore Roosevelt. The President invited about 200

delegates, representing every State in the Union, public officials and philanthropists, workers for children and the different religious organiza¬

tions. This conference, after a full discussion, adopted a platform which contained the fol¬

lowing statements : (<Home life is the highest and finest product of civilization… . Chil¬

dren should not be deprived of it except for urgent and compelling reasons. Children of parents of worthy character suffering from temporary misfortune, and children of reason¬

ably efficient and deserving mothers who are without the support of the normal breadwinner, should, as a rule, be kept with their parents, such aid being given as may be necessary to maintain suitable homes for the rearing of the children… .

<(As to the children who for sufficient reasons must be removed from

their own homes, or who have no homes, it is desirable that, if normal in mind and body and not requiring special training, they should be cared for in families whenever practicable. The carefully selected foster home is for the normal child the best substitute for the natural home. Such homes should be selected by a most careful process of investigation, carried on by skilled agents through personal investigation, and with due regard to the religious faith of the child.

After children are placed in homes, adequate visitation, with careful consideration of the physical, mental, moral, and spiritual training and development of each child on the part of the responsible home-finding agency is essen¬

tial.®

This platform was adopted by a conference composed of representative philanthropists, in¬

cluding trustees and officials of charity organ¬

izations, juvenile reformatories, orphanages, children's homes, children's aid societies, chil¬

dren's home societies, societies for the preven¬

tion of cruelty to children and so forth. It was adopted unanimously without a single dis¬

senting vote.

There is still a difference of opinion as to the question how far and in what cases institu¬

tional treatment of dependent children may be necessary; but there is practical unanimity of opinion that the family home is the best place for dependent children, and the placing-out method is increasing in favor, and in . some States there is even a marked decrease in the relative number of inmates of orphanages and children's homes, as is indicated by the returns of the census.

Take, for instance, the States of Massachu¬

setts and Indiana. In the State of Massa¬

chusetts the census of 1904 showed 129 in or¬

phanages and children's homes out of each 100,000, but in 1910 it showed only 121. In 1904

the State of Indiana showed 110 inmates of orphanages and asylums for each 100,000, but in 1910 it showed only 96. In the State of Mas¬

sachusetts at least 15 institutions for dependent children have been closed and have gone out of business. In both of these cases there has been a corresponding advance in the number of children placed in family homes. The different organizations in the State of Massachusetts have under their supervision at least 10,000

children placed out in family homes.

There is a gradual advance in the standards of institutions for dependent children : First, as to the quality of the superintendent and other employees. A higher degree of education, training and general fitness is demanded than formerly. Second, as to the education and training of the children. Many institutions, especially those in cities, send their children to the public schools, where their progress usually compares well with the children of the rest of the population. The best of the institutions which maintain their own schools, demand of their teachers equal qualifications with those in the public schools, and seem to give their children equal advantages. In small institutions it is of course necessary to have two or more grades in charge of a single teacher. Third, in the personal care and training of the chil¬

dren. Orphan asylum children are better clad and better fed than formerly, which means that attention is given to their medical treatment, and the care of their teeth, eyes, skin and so forth.

In the best institutions, dietitians are employed, and the effort is made to secure an adequate and balanced ration, carefully prepared.

The Placing-out System. — Placing-out is defined by the law of the State of New York as <(The placing of a destitute child in a fam¬

ily, other than that of a relative within the second degree, for the

purpose of providing a home for such a child.® Placing-out implies that a parent, guardian or a court which has legal control of the child selects a home, places the child in it by virtue of that author¬

ity and continues to be responsible for the su¬

pervision of the child in order to insure his proper treatment by the foster parents.

While the orphan asylum plan is the pre¬

vailing one in a few important States, includ¬

ing New York, Pennsylvania, California,

Maryland and Connecticut, the placing-out method is the prevailing one in many States, including Massachusetts, Illinois, Michigan, Iowa and Minnesota. It is estimated that not less than 10,000 Massachusetts children are under supervision in family homes where they have been placed-out.

Children may be placed-out in ((free homes,®

without paying their board and with or with¬

out legal adoption ; or they may be placed in ((boarding homes,® where board is paid, either from the public treasury, or from the treasury of some benevolent institution or society or, in whole or in part, by the parents of the child.

When board is paid the amount is usually be¬

low the ordinary rates of board, ranging from $2.50 to $3.50 per week for a healthy child, to $5

or $6 per week for a sick child. Or a child may 476

be placed-out at wages agreed upon between the placing-out agency and the employer; usu¬

ally with the proviso that a portion of the wages shall be placed at interest for the sub¬

sequent use of the child.

Formerly the practice prevailed widely of placing-out children on an indenture contract, under which the foster parent assumed cer¬

tain obligations as to food, clothing, medical care, schooling and religious privileges, agree¬

ing further to pay a stipulated sum to the child on the expiration of the contract, provided the child had stayed out his time. It is now quite generally agreed that the indenture plan is un¬

desirable and that the placing-out agency should reserve the right to remove the child whenever in their judgment it may be for its interest. Where the indenture plan is continued the indenture usually contains a provision un¬

der which the child may be removed at the dis¬

cretion of the placing-out agency. In Indiana and some other States, the law requires that indenture contracts shall reserve this right.

Placing-out is an exceedingly technical, dif¬

ficult and responsible undertaking. It requires agents of training, experience and conscience.

The placing-out method has been justly dis¬

credited in many communities for lack of these qualities. It has been undertaken by many ir¬

responsible people : keepers of baby farms, matrons of lying-in hospitals, poormasters and other people whose chief object has been to dispose of the child with the greatest speed and the least possible trouble and expense.

There is an active demand for the older boys and girls by people who wish to save the expense of hiring servants. Even well-mean¬

ing people often err thoughtlessly by expect¬

ing and exacting too much from such a child.

Only the unceasing vigilance of a faithful and tactful agent can protect the child against the comparative danger of overwork, deprivation of school privileges and financial injustice.

The following is an outline of the essential standards required in order to carry out prop¬

erly the placing-out system :

1. A careful case study of the family his¬

tory, home conditions, character and capabil¬

ity of parents, responsible relatives, physical condition, mental condition of the child and also, in the case of older children, their capa¬

bilities and aspirations.

2. A determination of the question whether the child is a proper subject for placing-out, taking into account his mentality, his physical condition, the probability of the rehabilitation of his home and the question of the responsi¬

bility of grandparents, older brothers and sis¬

ters and other relatives. If it is proposed to sever the parental relations permanently, and especially if it is proposed to place the child for adoption, this question should be deter¬

mined by a court of record. If the child is to be boarded out, or placed under such condi¬

tions that he may be readily recalled at any time, the question may be determined by a responsible public officer, a competent superin¬

tendent of an institution, or a competent agent of a philanthropic society.

3. The preparation of the child for his fos¬

ter home by medical treatment, surgical treat¬

ment, physical care, training in manners and so forth. Under skilful direction, these prepa¬

rations can usually be accomplished in a few weeks. It often makes a great difference as to the quality of the home secured and the whole future prospects of the child. Most agencies undertake to do this work in a prop¬

erly equipped ((receiving home® ; but some agencies, for example, the children's aid so¬

cieties in Boston and Baltimore, prefer to use private families, even for this work. The New England Home for Little Wanderers has re¬

cently established in Boston a complete and thoroughly equipped laboratory for the phys¬

ical, medical and psychological examination of children and for securing whatever treatment may be necessary to put them in the best pos¬

sible condition.

4. The inspection and study of foster

homes offered for dependent children in order to determine, first, whether the home is a de¬

sirable one, and second, what kind of child should be selected for this particular home.

The study of prospective homes requires ex¬

perience and good judgment. The amateur will often approve a home which would be in¬

stantly rejected by an experienced agent. This study involves the intelligence, character, spirit, disposition and financial ability of the inmates ; the comfort, refinement and atmosphere of the home, the character of the neighborhood and the community, the opportunities of school, church and social life and many other import¬

ant elements. The foster homes which prove to be the most satisfactory are usually those of people of moderate means, good character, cheerful dispositions and genuine purpose to help a needy child.

5. The fitting of the child to the home. This is the most critical point in child-placing. You may have a good child and a good horns but they may not be adapted to each other. The proposed foster parents often make a mistake in their selection • from lack of experience.

They need the guidance and help of a trained adviser.

6. The supervision of the placed-out child.

When an organization has taken the responsi¬

bility of selecting a home and placing the child in it, when the child is incapable of exercising any choice, it thereby incurs a sacred obligation to see to it that the child does not suffer for lack of friendly watch care, and it must employ responsible agents who can be depended upon to exercise both judgment and courage. The obligation is too sacred and the responsibility is too great to depend upon volunteers, no matter how willing or faithful they may be. The vol¬

unteer is liable to be influenced insensibly by local or personal consideration, and the volun¬

teer cannot be held to the same accountability as a trained and paid agent.

7. Supervision by the State. It is now recog¬

nized that the great mother State is under obli¬

gation to exercise fostering care over all de¬

pendent and neglected children, whether in or out of institutions for children. It has long been the practice, in case an orphan child is heir to any property, to appoint a guardian, who shall conserve the sacred property rights of the child; but if the orphan child had no property and only his body and soul needed looking after, it was not deemed necessary to appoint a guar¬

dian, because there did not seem to be any sacred rights to be conserved. It is beginning to be recognized that the child who has no prop¬

erty is all the more in need of a responsible CHILDREN, DISEASES OF

guardian, and gradually the State is beginning to assume the responsibility for all dependent children. New Jersey has a State board of children's guardians which is responsible for all children who arc public wards. The District of Columbia has a similar board of guardians.

In Massachusetts, Ohio, Indiana and California the State boards of charities are made respon¬

sible for the supervision of placed-out children.

In Iowa the State board of control and in Illinois the State board of administration per¬

forms this duty.

The powers and duties of the State agencies vary in different States in their powers and duties, but in general they inspect and report upon the work of public and private institu¬

tions and societies which receive public money or receive children through the courts ; they receive reports as to children placed out by

public and private agencies and have authority to visit such children and to require their re¬

moval from foster homes, if necessary.

In New York, Kentucky and Idaho certain private societies have a degree of supervision over children who are cared for by other chari¬

table institutions. In many States the juvenile court has authority to inspect and supervise institutions to which it commits children and to refuse to commit to institutions which do not maintain satisfactory standards.

Bibliography. — Proceedings of the White House Conference on the Care of Dependent Children (Washington, D. C., U. S. Printing Office 1909) ; Reeder, Rudolph, R., (How Two Hundred Children Live and Learn) (Charities Publication Committee, New York 1911) ; Folks, Homer, (Care of Destitute, Neglected and Delinquent Children* (New York 1902) ; Hart, Hastings H., (Cottage and Congregate Institutions) (New York 1910), and Preven¬

tive Treatment of Neglected Children* (New York 1910).

Hastings H. Hart.

Director Department of Child-Helping, Russell Sage Foundation.

CHILDREN, Diseases of. Children’s dis¬

eases may be, at the outset, roughly divided into three groups: (1) Diseases which are com¬

mon to both adults and infants; (2) weaknesses and diseases inherited directly from the par¬

ents; (3) diseases peculiar to the various epochs of life from infancy to adolescence.

Antenatal Disease. — To begin with, disease or deformity may attack the child before it is born, i.e., the fetus in utero. A pregnant woman who is suffering from any one of a great number of infectious diseases, such as smallpox, scarlet fever, measles, erysipelas, typhoid fever, cholera, malaria, syphilis, or tu¬

berculosis may directly infect the child in the womb. For instance, typhoid during pregnancy nearly always affects the fetus so that it either dies in utero and is expelled prematurely, or else it is born at full term suffering from the disease. In the latter case, the disease . mani¬

festation is usually a general typhoid septicemia, i.e., the blood is swarming with active typhoid bacilli, though as a rule the intestinal ulcers commonly present in adults and older children are absent.

Diseases of the bone or errors of bone de¬

velopment may manifest themselves during the life of the fetus. The effects of such diseases are seen in babies who are born with congen¬

ital rickets, or with a defect or absence of a portion of the spinal column; a condition known as spina bifida, in which the spinal cord and its coverings are exposed to the naked eye. A baby may be born with a very large head, due to the accumulation of excessive fluid in the ventricles of the brain. This condition is known as hydrocephalus. Indeed the head of the fetus may attain such a large size that in some instances it has to be punctured in order to render birth possible.

Nearly every organ of the body is subject to malformation or error of development before birth. Defective closure of the normal bony structures leads to certain malformations, such as harelip, clept palate and hernia of the brain and its coverings. Defects in the abdominal wall sometimes lead to a hernia in which the liver and intestines may be exposed to view.

An incomplete development of the bladder may result in a condition known as ectopia vesicae, characterized by a deficiency in the abdominal wall as well as the anterior wall of the bladder, whereby the mucous membrane of the bladder becomes exposed.

Malformation of the heart is common in these antenatal diseases. In some instances, however, where there is inflammation of valves or muscles, the disease may possibly be ac¬

quired as a direct infection from the mother, in¬

stead of constituting an error of development.

There are malformations of the extremities, such as webbed fingers or webbed toes and club feet. There are deformities about the genitalia, such as undescended testicles, imperforate hy¬

men and hermaphroditism. There are con¬

genital dislocations of the joints, curvature of the spine, imperforate anus, hypertrophic steno¬

sis of the pyloris and occlusion of the assopha-gus. Indeed, one can hardly think of any organ of the body without considering some congen¬

ital malformation or some arrest in development which may be found in any museum of anatomy or pathology.

Accidents and Injuries Resulting from the Act of Birth. — The life and health of the human individual is not only in jeopardy before birth, but is menaced in certain ways during the act of birth itself. A long, difficult labor, in¬

strumental delivery, a rigid birth canal which delays the expulsion of the baby's head and subjects it to great pressure may in some in¬

stances result in such injury to the skull or its contents as fracture, hemorrhage into the cover¬

ings of the brain, or meningeal hemorrhage, which may in turn ultimately bring about par¬

alysis, idiocy or convulsions.

The extremities may also be injured during birth. Fractures of the long bones may occur as an unavoidable accident in difficult labors.

Diseases of the First Days of Life. — A newly born baby presents certain phenomena, which occurring in later life would be consid¬

ered pathological, but which in the infant we speak of as physiological. The most striking example of these is the jaundice which appears from the first to the sixth day of life and disappears ordinarily in a week or two without causing any disturbance of health. Of course, in this connection we do not include those cases of congenital obstruction of the bile duct, inflammatory disease of the liver, and septic infections, where jaundice may indicate a 478

severe, if not a fatal disease. Another physio¬

logical phenomenon of the early days of life is the desquamation of the outer layers of skin which happens to nearly every new born baby.

Ordinarily, this occurrence is of no serious con¬

sequence, but when the desquamation is ex¬

cessive, it partakes of the nature of disease.

Albumin is frequently present in the urine of newly born children, but disappears soon, and as a rule, has no pathological significance.

Newly born babies become easily infected.

The infection may occur through the open um¬

bilical wound, through the broken external in¬

tegument, or through any mucous surface. Al¬

most any of the known micro-organisms, such as the pus organisms,

the pneumococcus, or the tetanus bacillus may cause infection. In the newly born baby these infections rapidly tend to become generalized. For instance, the infection which enters the body through the navel shows a striking tendency to gain access to the circulating blood and produces symptoms of general septicemia, with abscess formations in remote parts of the body, high fever and great prostration. In the majority of such cases, death ensues. It is obvious that the same antiseptic and aseptic precautions wrhich are employed with reference to the mother should also be employed in the care of the baby.

Another disease manifestation, probably due to pus organisms, which is spoken of as pem¬

phigus of the new born, is characterized by the formation of multiple bullse or blisters oc¬

curring on the trunk and the extremities. This variety of pemphigus must be differentiated from the syphilitic variety, which is localized usually on the palms and the soles and is asso¬

ciated with other syphilitic manifestations.

The eyes of newly born babies are particu¬

larly susceptible to infection. This usually in¬

volves the mucous membrane which lines the lid and covers the eyeball. The milder cases are caused by a simple pus infection, the or¬

ganism being contained in the vaginal secre¬

tions of the mother. The severer infections are usually due to the organism of gonorrhea and results in gonorrheal ophthalmia, a very dreaded disease of the newly born. Though the infection may be caused by filth contamina¬

tion from without, it usually results from the presence of the disease in the mother. In the child it runs a severe course, resulting fre¬

quently in the permanent loss of vision. It has been estimated that from 25 per cent to 30

per cent of blindness in adults is caused by gonorrheal ophthalmia.

The disease, however, can be prevented in the new born baby by the use of the Crede method of prophylaxis, which consists of dropping one or two drops of 1 per cent nitrate of silver solution into the baby's eyes immediately after birth.

Resistance to Disease in Infancy. — The healthy baby, as soon as he becomes a bona-fide member of society, is, a happy mor¬

tal. During the early part of his life, he sleeps almost continuously, awakening only to get his food. He gains steadily in weight and has a normal temperature. He has a fresh pink skin that is full and elastic to the touch. Such a baby is uncomplaining. He has a keen appe¬

tite, normal evacuations from the bowels and kidneys, and is not irritable, cross or whining.

Being, however, a delicate and undeveloped organism, he must be carefully protected against disease, particularly against septic infections, to which the newly born or young infant is easily predisposed. This is due in part to the fact that his skin and mucous membrane are delicate in texture and can easily be broken, and in part to the fact that, compared with older children and adults, he has a diminished power to develop antibodies which will re¬

sist invading microbes or their products. His predisposition to disease, moreover, is influ¬

enced by another factor, i.e., food. The normal food of the young infant is breast milk. Breast fed children not only thrive better than arti¬

ficially fed children, but they also show a greater resistance to infection, have an increased immu¬

nity to disease, and develop higher bacteri¬

olytic power in the blood. Clinical observation has repeatedly shown that breast fed children not only have a greater relative immunity against such acute contagious diseases as scar¬

let fever, measles and diphtheria, but that when they are stricken by these diseases, the course is less severe and less likely to be fatal than in artificially fed babies.

Digestive Disturbances. — Nevertheless,

breast fed as well as artificially fed babies may suffer from alimentary disturbances. In the former, the principal causes of disorder are two : underfeeding and overfeeding. Under¬

feeding is due usually to the inability of the mother to secrete a sufficient amount of breast milk, though at times it occurs where weak babies have insufficient strength to suck the milk from the mother's breast. The result is that the baby loses in weight, tends to become emaciated, frequently has a subnormal tempera¬

ture, and if the inanition be long continued, he becomes drowsy and apathetic. He may be constipated, though at times he has diarrhoea.

In every case where underfeeding is sus¬

pected, one should weigh the baby before and after feeding, in order to discover the amount of milk ingested. If this amount is inadequate, the breast feeding should be supplemented by a suitably prepared artificial food, or if the baby is very weak and suffering from poor di¬

gestion, he should be supplied with the milk of a wet nurse. The various remedies for in¬

creasing the quantity of a mother's milk, such as food, medicine or alcoholic drinks, are usu¬

ally ineffectual. The best stimulant for the flow of breast milk is the sucking of the in¬

fant. Every mother, therefore, should perse¬

vere by putting the baby to the breast at regu¬

lar intervals and encouraging him to suck.

Overfeeding at the breast also leads to di¬

gestive disturbances. . Although a baby will tolerate overfeeding with breast milk for a long time, he eventually suffers. He becomes rest¬

less, cries at night, and vomits occasionally.

He not only fails to gain in weight, but may actually lose. His abdomen becomes distended.

He has symptoms of flatulence and colic, and frequent loose and green stools. The treat¬

ment for this condition is simple, particularly when it is recognized early. If the milk is flowing too freely, the baby should be fed not oftener than at four-hour intervals and be allowed to remain at the maternal breast no longer than twenty minutes at a time. In the more severe cases, breast feeding should be discontinued for 12 to 24 hours, and a bland, non-irritating diet substituted, such as water or weak tea sweetened with saccharine.

Constipation occurs in both breast-fed and artificially-fed babies.ˆ It is sometimes due to excess of fat in the diet and sometimes to a deficiency of sugar. Such disproportion should, therefore, be immediately corrected. On the other hand, it may be due to a congenital dilata¬

tion of the rectum and colon or, not infre¬

quently, to an inactivity of the sphincter mus¬

cles of the bowel. In the latter case, slight as¬

sistance with a suppository or an enema of sterile water, given with a small hand syringe is all that is required. Emphasis should be laid on the fact that the frequent administra¬

tion of cathartic drugs is not only unnecessary but is actually harmful. The diseases caused by artificial feeding may produce a variety of symptoms : viz., local disorders of the gastro¬

intestinal tract, such as vomiting and diarrhoea ; and marked

constitutional disturbances, such as failure to gain in weight, restlessness on the one hand, or drowsiness approaching coma on the other, with disturbances of breathing, heart action, blood content, and urinary elimination.

We were formerly taught that alimentary diseases in artificially-fed babies were caused by infected milk conveying certain bacteria into the intestinal tract. While contaminated milk undoubtedly causes considerable disease, the majority of alimentary disorders is caused by the ingestion of foods for which the baby has no tolerance. These foods, failing to assim¬

ilate properly, produce toxic products in the intestines, in the circulating fluids of the body, or possibly in tissues and organs. As a conse¬

quence, babies fail to gain in weight and show, not only alimentary, but also constitutional dis¬

orders. The basic problem in artificial feeding, then, is to ascertain which of the elemental food stuffs produces toxic disturbances. This sub¬

ject has been investigated thoroughly in recent years. We now believe that fat and sugar may produce certain well known alimentary disturb¬

ances and should not be given in excess. The prevailing view as to the cause of these food disorders is that they are due to bacterial de¬

composition of the food, either inside or out¬

side of the intestinal tract, creating poisonous products which produce the disease manifesta¬

tions. The foods which are thus acted upon and decomposed are the carbohydrates and the fat contained in the milk. Through the action of the bacteria, these undergo a process of fer¬

mentation which results in the production of fatty acids. The acids produced by the fer¬

mentation of an excessive, quantity of sugar cause increased peristalsis, diarrhoea, and other symptoms of disease; while those

pro¬

duced by an excessive quantity of fat may com¬

bine with the alkalis to form soaps. In the lat¬

ter instance, the body becomes deprived of the mineral substances required to neutralize the normal acids of the body, so that very soon there is an excess of acids in the intestines and fluids of the body and we have the condition known as acidosis. It is not to be understood from this theory, which relates to the disturb¬

ances produced by food, that infections, as such, cannot take place in the intestine. In fact, it is commonly recognized that infectious diarrhoeas may occur as the result of action of specific or non-specific bacteria on the intes¬

tinal mucosa.

Alimentary disturbances may also occur as the result of infections in parts of the body outside of the intestinal tract. Thus, a baby with pneumonia or grippe has a diminished tolerance for food, and vomiting, diarrhoea, loss in weight, and high fever may occur. These cases differ from the purely alimentary type in that the fever and other symptoms continue even when the food is withdrawn or modified in such a way as to prevent intestinal fermen¬

tation.

To summarize and to supplement very briefly treatment of the alimentary disturbances in infancy, the following points should be empha¬

sized : (1) Every newly born and young infant is entitled to receive its natural food, breast milk. (2) Overfeeding is to be avoided. It is as disastrous as underfeeding or starvation.

(3) An excess of fat or sugar is capable of producing general toxic symptoms. (4) Simple milk mixtures, i.e., milk, diluted with plain water or with cereal water, with the addition of 3 to 5 per cent of sugar will in most cases give satisfactory results. Normal infants re¬

quire daily a quantity of milk equal to one-tenth of the body weight. After the fifth month of the baby's life, he should receive one and one-half ounces of milk for every pound of his weight exclusive of the sugar and starch added. (5) The technique of suc¬

cessful feeding consists in the careful prepara¬

tion and proper administration of the food.

This precaution is also an important disease preventive. (6) In feeding sick infants it is frequently possible upon careful and intelli¬

gent inquiry, to ascertain which food element in the milk mixture is producing harm. Thus the proper modification may be made. (7) In some children, cow's milk produces toxic symp¬

toms. Attempt should therefore be made in such cases to administer breast milk, skim milk, or some adaptation of cow's milk which is low in fats and sugars. Every baby, espe¬

cially if he is sick, is a law unto himself, and should be studied as an individual. No one's dictum or rule of thumb or recent discovery is ever as important in solving the feeding prob¬

lem as a knowledge of the general principles of food and digestion. (8) Prolonged starva¬

tion lowers resistance and predisposes to dis¬

ease and death. (9) Prolonged and excessive use of laxative drugs is harmful, since it irri¬

tates the delicate mucous membrane of stomach and bowel. The indiscriminate practice of giv¬

ing laxatives is based on tradition, not upon a knowledge of facts. Their use does not, as a rule, improve or cure the alimentary disease or assist in digestion or assimilation of food. (10) Scalded or boiled milk may be used when raw milk causes indigestion and diarrhoea. (11) Sometimes an infant's feeding difficulties or his alimentary disturbance may be due to an inherited or infectious disease, an anatomical malformation, or a constitutional vice.

The Respiratory Diseases. — Second in fre¬

quency to the diseases of the alimentary tract are the respiratory disturbances. Their most frequent manifestations in infancy and young childhood is the common cold, or as it is sometimes called, la grippe. This disease may occur either epidemically or endemically. It is frequently carried by nurses, parents or any¬

one suffering from a cold. The babies whom it affects suffer from catarrhal inflammation of the throat, nasal mucous membranes, larynx, trachea and bronchial tubes. At times, they 480

are restless and at other times, somnolent.

They frequently present gastro-intestinal symp¬

toms, such as vomiting, diminished tolerance for food and loss in weight. These symptoms, however, are present without any intestinal lesions. La grippe is frequently complicated by more severe respiratory diseases, such as bronchopneumonia, middle ear infection, kid¬

ney infection, meningitis, valvular heart dis¬

ease, peritonitis and sometimes pyelitis, i. e., a disease in the pelvis of the kidney which is manifested by a large quantity of pus in the nrine.

The most important factor in the treatment of grippal disorders consists in their preven¬

tion. The baby should be protected from other children and adults who are suffering with catarrhal symptoms. He should be fed and cared for in such a way that his resistance to disease shall be maximal. He should be prop¬

erly clothed and kept in well ventilated apart¬

ments or out of doors, when the weather per¬

mits. If he falls ill, he should be loosely clad and kept in a well ventilated moderately warm room. Physical and mental overstimulation of every kind should be avoided. Nourishment should

be continued if the patient is able to take it. The baby should not be depleted by the excessive use of laxatives. Drugs should be administered only when they are indicated or advised by the medical attendant.

Bronchitis, which is of frequent occurrence in young infants and children, develops usually in association with many of the acute infec¬

tious diseases, notably with measles and whoop¬

ing cough. It gives rise to very definite signs and symptoms, the most prominent of these being cough, fever, and the so-called rales, which, on examination, are heard diffusely dis¬

tributed over the lungs. When bronchitis con¬

fines itself to the larger bronchi, it is rarely ever severe. When, however, the pathological process extends into the smaller bronchi, pro¬

ducing inflammation in the bronchioles, it de¬

velops into capillary bronchitis, one of the forms of bronchopneumonia.

Although bronchopneumonia may occur as

a primary disease, it is, as a rule, either secondary to grippal infections or to bronchitis, or it occurs concomitantly with the acute in¬

fectious diseases which have already been men¬

tioned. It is a disease peculiar to the extremes of life, occurring most frequently in infants and the aged. In infancy it may occur in feeble children, in those who are prostrated, either by malnutrition or by a previous disease.

It is characterized by a gradual onset, usually of fever, which in very delicate or feeble children may be moderate or absent, followed by high fever, rapid breathing, cyanosis or blueness of the skin and visible mucous mem¬

branes, rapid pulse, short hacking cough, and usually great prostration. In some of the severe cases there occurs a retraction of the soft parts of the thorax, such as the intercostal spaces and the muscular attachments at the lower end of the sternum. Bronchopneumonia produces the highest mortality in those children who have been debilitated by previous disease.

There is not, as yet, any specific remedy for bronchopneumonia. The present treatment is symptomatic. The best hygienic condition should be provided for the sick infant. The sick room should be ventilated; pure fresh air should be provided for. The nutrition

should be maintained. Stimulants should be employed when needed. Depleting medication of every kind should be avoided. Unnecessary manipulation of the child, including excessive bathing and handling, should not be permitted.

Lobar pneumonia, which is the most fre¬

quent type in adults, may occur at any age and affect previously healthy children. The onset is usually sudden. The disease begins with vomiting, sometimes with rigor or con¬

vulsions. The face is flushed, feyer is high, and respirations are rapid. The patient is pros¬

trated almost at once. He complains of head¬

ache and general weakness, and refuses food.

The pulse is usually rapid. Very often the patients show marked nervous symptoms.

Sometimes convulsions occur early in the dis¬

ease. Delirium is not uncommon. While the base of the left lung is the most frequent loca¬

tion of the disease, any portion of the organ may be involved. In some instances, both lungs may be attacked. There are four suc¬

cessive stages : Congestion, red hepatization, gray hepatization, and resolution. In red hepatization, the air cells are filled with fibrin and

red and white blood cells, the red predomi¬

nating. In the gray stage, the white predomi¬

nate. In favorable cases, resolution begins in about a week or 10 days. Occasionally a reso¬

lution is delayed, so that the temperature falls gradually instead of critically.

Pleurisy is the most frequent complication.

This disease sometimes takes the purulent form, which is also called empyema. This com¬

plication protracts the fever and causes embar¬

rassment of respiration. The patient suffers profuse perspiration, irregular temperature, circulatory embarrassment, and emaciation.

Pericarditis, endocarditis, meningitis, and middle ear diseases are occasional complica¬

tions. It is a noteworthy fact that notwith¬

standing the severity of lobar pneumonia, the mortality is not high, usually 3 to 4 per cent.

The treatment of lobar pneumonia, like

bronchopneumonia, should be conducted along the lines of hygiene. The patient should lie comfortably in a well ventilated room. Cool or tepid sponging may be employed for the temperature. Pain should be relieved by seda¬

tives. Excessive medication should be avoided, and stimulants should be employed only when cardiac failure is threatened.

The Nervous Diseases of Children. — The nervous system is

incompletely developed at birth, so that its functions are easily disturbed during the first years of life. Thus young children are more easily predisposed to ner¬

vous disorders than adults. There are certain nervous diseases that are peculiar to infancy and childhood, due either to abnormal develop¬

ment at birth or to hereditary influences. As an example of abnormality, may be cited the baby born with a congenitally small head and brain, constituting a condition known as microcephalus, and the baby born with a large head and a large brain, hydrocephalus. And as an example of inherited nervous disease developing shortly after birth, we have the cerebellar ataxia.

Those children who are born with a de¬

ficient thyroid gland, and those in whom it degenerates shortly after birth, suffer from myxedema, a condition of idiocy also known as cretinism. Such children are usually dwarf-CHILDREN, DISEASES OF

ish, with thick lips, thick tongue, depressed nose, coarse hair, and coarse skin. They usually present a protuberant abdomen and um¬

bilical hernia. They develop slowly, both physically and mentally, and suffer from more or less permanent mental impairment. The majority of them are benefited by the internal use of thyroid gland extract in appropriate doses.

Mongolism is a condition akin to cretinism, except that it does not depend upon alteration in the function of the thyroid gland and does not yield to thyroid treatment. The mongols are undersized, have a peculiar obliquity of the eyelids, and small, somewhat flattened skulls.

Like the cretins, they are slow in mental and physical development. While they are usually kind and affectionate and in most instances learn to talk about the fourth or fifth year, they nevertheless remain

always subnormal and can be educated only to a limited degree.

Infants frequently sustain injury to the head during the act of birth, as the result of which they are apt to have meningeal hemorrhage and destruction of meninges and brain tissues.

Important brain cells are separated from their nerve connections following such tissue de¬

struction, so that the nerve fibres which have their origin in these cells undergo degeneration.

This condition explains the numerous cases of paralysis, convulsions and idiocy which result from head injuries at birth.

Infants are predisposed to convulsions,

which occur under a variety of conditions and have their origin in various ways. They may be primarily central, i. e., their source lies in affections of the brain itself, such as inflamma¬

tion of the brain (encephalitis), inflammation of the brain coverings (meningitis), abscess of the brain, hemorrhage into the brain, and brain tumors. Another class of convulsions is due to toxic conditions, resulting, for example, from the use of such drugs as strychnia, etc., from bacterial poisons, such as are produced by tetanus and hydrophobia ; or from toxic processes produced by perverted chemical products in the body, such as uremia, which occurs in diseases of the kidneys, or the poison produced by diabetes. Eclamptic at¬

tacks sometimes occur as the result of toxic products in the gastro-intestinal tract arising from severe alimentary disturbances. Simi¬

larly when the body is overpowered by the toxic products of an acute infectious disease, such as pneumonia or scarlet fever, convulsions not infrequently occur at the onset. Burns of the external integument, if very severe, fre¬

quently cause convulsions. The explanation in this case is also to be sought in the. production of poisonous products by the action of the burn on the injured tissues.

Tetany or spasmophilia may assert itself in the form of active convulsions. The disease condition depends upon an excessive irrita¬

bility of the nervous system and is usually due to faulty nutrition. In addition to convulsive attacks, spasm of the larynx may be present or spasms of the hands and feet, the so-called carpo-pedal spasm. Many of the convulsions of the first years of life arise in this. way.

Spasmophilia is usually associated with rickets.

Epilepsy, a diseased state characterized . by convulsions, may occur at any period of child¬

hood. As a rule, it depends upon fine struc-VOL. 6 — 31

tural changes in the nerve cells of the central nervous system. In early infancy it is some¬

times difficult to differentiate recurrent con¬

vulsions from true epilepsy.

Although most of the nervous diseases of adult life occur among children, there are a number which are peculiar to infancy. Among these may be mentioned amaurotic family idiocy, an inherited disease characterized by blindness, progressive mental deficiency, and paralytic symptoms; myatonia congenita, in¬

fantile cerebral palsies, the muscular atrophies, and nodding spasm. Infantile spinal paralysis may be included in this list, for although it may occur at any age, it is much more fre¬

quent in infancy and young childhood than in later life.

Diseases of Nutrition — The most frequent disease manifestation occurring as a result of improper nutrition is rickets or rachitis, a dis¬

ease affecting the bones which occurs most commonly in artificially fed children. The early symptoms are characterized by restless¬

ness, possibly pain, sweating, and pallor of the skin and mucous membranes. The bones, be¬

ing deficient in mineral matter, are soft. The skull bones are parchment-like, and when pressed upon, instead of being firm, they crackle and are easily depressed. When the earlier florid stage disappears, it is noted that the head is large, that the bones of the skull are thickened, and that the junction of the bony with the cartilaginous portion of the ribs is marked by bead-like nodes, which constitute the so-called rachitic rosary. The chest is fre¬

quently deformed; the abdomen is enlarged and protuberant. In these children, normal de¬

velopment, such as learning to walk and denti¬

tion, is delayed.

In many of the rachitic children, every vestige of the disease disappears in later child¬

hood. In a certain number, however, where the deformities have been severe, they may remain permanent unless relieved by surgical treatment. The treatment of rickets is essen¬

tially one of proper hygiene and food. Some¬

what older children may be given fresh fruit, vegetables, animal broth, and, if advised by a physician, minute doses of phosphorus, 1 /200th of a grain, given internally two or three times a day.

Infantile scurvy, another nutritional dis¬

order, is due to errors of diet, such as, for example, absence of fresh food. The disease as it occurs in young infancy, is characterized by hemorrhage under the periosteum of the bone and sometimes by hemorrhages from the mucous membrane into the muscular structures and under the skin. Scurvy manifests itself by fretfulness, swelling of affected arms or legs, so that they are painful when moved, and

swollen and spongy gums which bleed readily.

The disease is sometimes mistaken for rheuma¬

tism. If it is detected early, it yields readily to treatment. In fact there is no more striking phenomenon in treatment of disease than the rapidity with which these cases recover when given daily doses of orange juice.

The Fevers of Infancy and Childhood. —

Fever forms as important and prominent a symptom in the diseases of infancy as it does at any later stage of life. The new-born baby frequently shows a febrile. reaction during the first hours or days of life. This, in some 482

cases, is due to the retention of urinary prod¬

ucts which have failed to be eliminated. In other cases it may be due to infections to which new born babies are prone and which may result in a more or less generalized sepsis.

It is a matter of common knowledge that in¬

fants and young children show a relatively higher temperatures than adults. In pneumonia, for ex¬

ample, it is common for a child to have a tem¬

perature ranging from 105 to 106 or 107 degrees, and yet recover. Most of the acute infectious diseases, active tuberculosis and the eruptive diseases, such as scarlatina and measles, are accompanied by high temperature reaction; though in uncomplicated diphtheria or whooping cough it may be moderate or low. Fever fre¬

quently occurs in intestinal disorders as the result either of food disturbances or infection.

It occurs often in infections of the nose and throat. In some children,

the temperature elevations are always higher than in others of the same age or weight. This difference is a matter of individuality and is dependent upon the nervous constitution and in some instances upon the strength and general resistance of the child to infection.

The cause of fever in infancy and child¬

hood is often obscure. Sometimes it may be protracted for weeks without offering any indication of its origin. If, after a careful examination of visible mucous membranes, the heart, lungs, abdomen and skin, no adequate explanation is found, the examination should be continued further. Not infrequently, high fever is caused by disease of the middle ear, which may result eventually in abscess. Con¬

sequently, in every instance of obscure fever, the ear should be examined by an expert. Occa¬

sionally in female children (rarely in males), fever is caused by urinary infection. This con¬

dition, which is spoken of as pyelitis, is caused by a disease process in the pelvis of the kidneys and may last with a high temperature for days or weeks. One of its most prominent symp¬

toms is the presence of a large quantity of pus in an acid urine. In the vast majority of such cases, the infection is due to the colon bacillus, which has taken on a pathological activity.

The normal habitat of this organism is the bowel, where it is, as a rule, harmless, and plays, probably, a physiological role in normal digestion.

Naso-pharyngeal disease and chronic in¬

flammation of the tonsils with enlarged cervi¬

cal glands is not an infrequent cause of protracted fever, and its persistence is an in¬

dication for the removal of the tonsils and adenoids. Occasionally a considerable collec¬

tion of pus is located at the base of the tonsil, in which case radical

cure can be effected only by operative procedure.

It should be stated again that tuberculous processes in the lymph nodes, particularly in the bronchial glands, may give rise to febrile reaction whose origin it is difficult to explain.

The X-ray examination of the thorax or the occurrence of a positive tuberculin reaction on the skin sometimes gives a clew to the diag¬

nosis in this latter group of cases.

In a general survey of this kind, only the most salient points have been touched. For greater detail covering the various diseases, the reader is referred to the appropriate articles.

Bibliography. — Batten and Thursfield,

‘Diseases of Children) (London 1913) ; Den¬

nett, R. H., ‘The Healthy Baby1* (New York 1912) ; Grulee, ‘Infant Feeding* (1912) ; Holt, ‘Diseases of Infancy and Childhood* (1911); Pfaundler and Schlossman, ‘Diseases of Chil¬

dren *(Eng. trans. by Shaw and La Fetra, 1912); Sachs, ‘Nervous Diseases of Children*

(1905) ; Ramsey, ‘Infancy and Childhood*

(1916).

Isaac A. Abt, M.D.,

Editor of (A System of Pediatrics’* .

CHILDREN, Legal Codes Relating to.

Legislation in behalf of dependent, neglected, delinquent and defective children has been ac¬

cidental and unsystematic until within the past few years. A progressive governor recom¬

mends the creation of a juvenile reformatory, a State home for dependent children, a school for feeble-minded children or a State board of children's guardians ; or a philanthropic legis¬

lator introduces a bill for such an institution, and straightway it is created, without any in¬

telligent study as to whether it is needed or whether something else is needed more.

In 1908 the British Parliament enacted an elaborate Children's Act, which was character¬

ized by the Hon. Herbert Gladstone as "the Children's Charter.**

In 1911 a bill, prepared by Judge George S.

Addams, of the Cleveland juvenile court, was passed by the Ohio State legislature, provid¬

ing for a children's code commission. This commission consisted of two eminent lawyers, Judge Daniel Babst and Arthur D. Baldwin, Esq. After a careful study of the children's laws of Ohio and other States, they produced a comprehensive children's code, covering the care, training, protection and supervision of dependent, neglected, delinquent and defective children, including juvenile courts. The code authorized the board of State charities to supervise and certify all public or private insti¬

tutions and associations which receive and care for children. The board was also authorized to become guardian of such children and place them in family homes.

The Ohio children's code marked a new era in children's legislation in that it aimed to cover all of the obligation of the mother State toward

children who lack proper care ahd training.

The governor of Missouri, in June 1915, ap¬

pointed a children's code commission of 23

men and women "to revise the existing laws relating to children, to prepare such new legis¬

lation as might seem desirable, and to bring together in one code all the laws relating to children.** No funds were provided by the State, but the commission raised $1,500 b}ˆ sub¬

scription for expenses.

The commission organized seven sub-com¬

mittees on general laws for the protection of children ; public administration ; delinquent and neglected children; defective children; desti¬

tute children; child' labor and education; and health and recreation.

The commission submitted a code consisting of 42 bills to the legislature of 1917, covering the entire field of child welfare; but, owing to the large membership of the committee and the difference in point of view of the different sub¬

committees, the commission was not unanimous CHILDREN, NEGLECTED

in its recommendations. The legislature en¬

acted 11 out of the 42 bills submitted and the remainder went over to the next legislature.

Much of the legislation adopted was distinctly progressive.

The governor of Minnesota, in August 1916, appointed a commission of 12 members to <(revise and codify the laws of the state relating to children.® Although the time available was only six months, the commission worked with extraordinary industry, unanimity and wisdom.

In February 1917, they submitted to the legislature a code consisting of 41 bills, of which 35 were enacted into law. It is un¬

questionably the most advanced and coherent body of law relating to children in the United Siates. Chapter I is <(An act to give the State board of control general duties for the pro¬

tection of defective, illegitimate, dependent, neglected and delinquent children ; with author-

'ty to act as guardian of children and to pro¬

vide for child welfare boards in the several counties of the State to aid in the performance of such duties.® Chapter II defines the duties of the district, juvenile and probate courts re¬

specting children. Chapter III relates to crimes by and against children. Chapter IV regulates child labor and provides a minimum wage com¬

mission to establish proper wages for women and children. Chapter V, on education, deals with compulsory school attendance and the education of defectives. Chapter VI, on rec¬

reation and health, regulates parks and play¬

grounds and midwifery. Chapter VII relates to the support of children by relatives and counties. Chapter VIII provides for the reg¬

ulation of private institutions and societies for the care of children and the supervision of placed-out children by the State board of con¬

trol. (The supervision and certification of private agencies and institutions for children is authorized in Chapter I). Chapter IX

relates to illegitimate children. It provides for an examination, on request of a mother, to determine the paternity of an illegitimate child and that when the paternity is judicially estab¬

lished the father ((shall be subject to all the obligations for the care, maintenance and ed¬

ucation of such child, and to all the penalties for failure to perform the same, which are or shall be imposed by law upon the father of a.

legitimate child of like age and capacity.®

A National Committee for Standardizing

Children's Laws was created in 1915 to promote the enactment of children's codes, and the National Child Labor Committee is working in the same direction. Movements are in progress for children's codes in several States. Michi¬

gan has a permanent commission created by the legislature of 1917.

Bibliography. — (A Community Plan in

Children's Work,) 12 pp., by C. C. Carstens, Russell Sage Foundation, New York, Juvenile Court Laws Summarized, Russell Sage Founda¬

tion, New York; Report of the Commission. to Codify and Revise the Laws of Ohio Relative to Children, State of Ohio, Columbus, Ohio; Ohio Bulletin of Charities and Correction, No¬

vember 1913 (containing the Ohio Children's Code, Columbus, Ohio) ; Report of the Mis¬

souri Code Commission, 1916, Saint Louis, Mo. ; Report of the Minnesota Child Welfare Com¬

mission, 1917, Saint Paul, Minn.; Compilation of the Laws of Minnesota Relating to Children ; The Law of Children and Young Persons

(London 1909).

Hastings H. Hart,

Director Department of Child-Helping, Russell Sage Foundation.

CHILDREN, Neglected. — The term ((neglected children® is often confused in the minds of people and even in the laws of the State with the terms <(dependent® and (<delinquent,®

but while these conditions shade into each other so that the same child may even be in all three conditions, neglected, dependent and delinquent, nevertheless, it is important to distinguish these three classes, , as clearly as possible, both in language and in law.

A delinquent child is one who has trans¬

gressed the law or is incorrigible, or who knowingly associates with criminals or vicious persons. A dependent child is one who is orphaned or homeless, or has no responsible relative or guardian to care for him. A neg¬

lected child is one whose relatives or guardians fail to perform their duty, do not provide a proper home, do not care properly for him or treat him with cruelty. Examples of neglect would be a father who spends his earnings in dissipation, leaving his family to suffer; a well-to-do widower who brings to his home a woman of bad character and puts his daughters under her charge ; a mother who is slatternly, lazy and dirty, and who allows her children to run the street without restraint ; a mother who leads an immoral life in her own home; parents who do not send their children to school or who send them out to beg or to steal, or who beat them cruelly; quarrelsome and divorced parents whose conduct deprives their children of home life and alienates them from their natural protectors.

In many communities there have been or¬

ganized societies for the prevention of cruelty to children, which are designed for the pro¬

tection of neglected children and whose serv¬

ices are invaluable. About 150 such societies are registered in the United States. Some of the societies for the prevention of cruelty are militant. Their policy is to deal promptly and sternly with recreant parents and to make them realize that neglected children have a power¬

ful and active friend acting swiftly and aggres¬

sively against those who do them wrong. Other societies are constructive in their policy. When they find a child who is neglected or ill-treated by his parents or employers, they first seek to discover the cause of such conduct. Is it be¬

cause the parents are ignorant or because they are following the practices which prevail in their native country or because they have not been able to adjust themselves to the novel conditions which they find in this country?

Can the home conditions be. remedied by ad¬

monition, advice or supervision? If so the effort is made to rehabilitate the home before resorting to extreme measures, and arrest, trial and punishment are used only after milder measures have failed. This method has been used successfully in Boston and Philadelphia.

In the smaller communities, it is difficult to maintain, separately, aid societies for the care of dependent children and societies for the pre¬

vention of cruelty, to care for neglected chil¬

dren. It is very desirable that the two func¬

tions should be united in one societv and the constructive method lends itself readily to this 484

consolidation. Most of the societies for the prevention of cruelty to children co-operate ciosely with the juvenile courts. In New York city

the society furnishes investigating officers for the children's court, maintains a detention home for children awaiting trial, and has offi¬

cers in attendance upon all sessions of the court to attend to the interests of children. See Children, Defective; Children, Delinquent; Children's Courts.

Hasting H. Hart,

Director Department of Child-Helping, Russell Sage Foundation.

CHILDREN, Spirit of Modern Legisla¬

tion Affecting. Prior to the year 1899 chil¬

dren who committed offenses against the law were dealt with by the courts as criminals.

They were arrested by the police, detained with adult criminals in police stations and jails, ar¬

raigned in police courts, where they listened at the trial of older criminals. They were in¬

dicted by the grand jury, tried in the criminal court, convicted of crime, and sentenced like older criminals. This process was demoralizing and hardening. Efforts were made in some communities to avoid these evils. In some parts of Canada and in Boston, children were tried separately from adults, but they were still regarded as <(juvenile criminals.® In 1899

the legislature of Illinois enacted the first <(juvenile court law,® which revolutionized the treatment of juvenile offenders throughout the United States, and has affected it also in for¬

eign courts. The juvenile court law of Illinois rejected the title <(criminal® for children under 16 years of age, and classified them as <(juvenile delinquents.® It took children from the juris¬

diction of the police court and other criminal courts and placed them under the circuit court, which is a civil court, and a court of chancery.

They were no longer tried under the criminal laws but under the chancery laws. This meant that they were no longer regarded as enemies of the State, to be hunted down by the police and punished according to the enormity of their offense, but that they were regarded as wards of the State, to be reformed, trained and guided into wholesome and decent lives. This law has resulted in a complete change of prac¬

tice in dealing with delinquent children. In¬

stead of a warrant for arrest, a summons is issued to the parents or custodian, to bring the child to court. Instead of confinement in jail, pending trial, the child remains at home, or is kept in a “detention home® apart from any prison. Instead of a policeman or a deputy sheriff, his father or mother brings him into court. Instead of an indictment for crime, there is a petition alleging that the child is delinquent. Instead of a prosecutor employed to make a case against the child, there is a probation officer appointed by the court ((to represent the interests of the child.® In short, the case is not “The State of Illinois versus Harry Jones,® but “The State of Illinois pro Harry Jones.® The court seeks to ascertain the facts not as a basis for inflicting a penalty, but as a basis for doing whatever may appear to be for the best interests of the child. Pro¬

ceeding on this basis, a preliminary investiga¬

tion is made by a probation officer for the in¬

formation of the court. The ordinary rules of evidence are modified and the probation officer is allowed to give hearsay evidence, or the child is encouraged to tell his own story of the case. A jury may be called, but the jury cannot find the child guilty of any offense, it can only find that he is in the condition of delinquency. When the - testimony is concluded, the judge does not pronounce a sentence. He may make an order returning the child to his own home, with an admonition to his parents ; or he may make an order placing the child on probation, under the care of a probation officer, either in his own home or a foster home; or he may make an order, committing the child to a juvenile reformatory — not for punish¬

ment but for training and education. The juvenile court idea commended itself to the practical judgment of jurists and legislators, and juvenile court laws have been enacted in most of the States of the Union. In many States the chancery principle has been adopted; in others the jurisdiction of the criminal courts continues, but, in

general, the effort is made to free the child from the stigma of crime, to separate him from the adult criminal, to sur¬

round him with good influences and to give him the opportunity for development into a nor¬

mal, wholesome and happy life. Most of the juvenile court laws provide that, whenever possible, the child shall be brought into court not on a warrant but on a petition ; and that the child shall not be confined in any jail or prison where adult prisoners are kept. The success of the juvenile court depends largely upon the spirit and temper of the judge. In some cities as in New York and Philadelphia, the juvenile judges were frequently changed, but experience proved that this plan is unde¬

sirable, and now, as a rule, the juvenile judges serve for several years in succession. It is generally recognized that the essential feature of the juvenile court is the probation system.

Under this system the boy or girl is placed under the watch-care of a selected probation officer, a man or a woman chosen with special reference to their wisdom, tact and patience.

The probation officer makes a preliminary in¬

vestigation of the case before the trial is held, visits the child from time to time in his home, advises the parents, admonishes the child, and acts as the representative of the court. If the child's home is unfit he may be placed in a foster home under the watch-care of the pro¬

bation officer and then the probation officer stands as his next friend and adviser. There is increasing effort to select probation officers of high character, intelligence and wisdom. In the large cities they are selected by civil service examinations which are generally conducted in such a way as to bring out the special fitness of the candidate. In connection with the pro¬

bation system a plan has been evolved known as the Big Brother and Big Sister Movement, originated by Ernest K. Coulter, Esq., formerly chief probation officer of the Children's Court of the Borough of Manhattan in the city of New York. This plan enlists young men and women who co-operate with the probation offi¬

cers and become responsible for the personal oversight and guidance of one or two individual children. The relation between the big brother and the little brother is made as humane and close as possible.

The big brother, in his own way, undertakes to establish a relation of friendship and confidence with the boy and to CHILDREN OF THE ABBEY — CHILDREN OF THE WORLD

assist in building upright character. In Massa¬

chusetts, New York and Illinois State pro¬

bation commissions have been organized to direct the work of probation officers, both for adults and juveniles.

Hastings H. Hart,

Director Department of Child-Helping , Russell Sage Foundation.

CHILDREN OF THE ABBEY, The, a

once famous romance, by Regina Maria Roche (q.v.), published in 1798. The Earl of Dun-reath, marrying a second time, is induced by the machinations of his wife to cast aside her stepdaughter, for a luckless marriage. It is with the children of this marriage that the story deals. The motherless Amanda is the heroine ; and she encounters all the vicissitudes befitting the heroine of the three-volume novel. These include the necessity of living under an assumed name, of becoming the innocent victim of slan¬

der, of losing a will, refusing the hands of dukes and earls, and finally with her brother, of overcoming her enemies, and living happily in the highest society forever after.

CHILDREN OF EARTH. In 1913 Mr.

Winthrop Ames, of the Little Theatre, New York, offered a prize of $10,000 for the best play by an American author. The manuscripts were to be submitted anonymously. In June 1914 the judges, after having gone through 17 manuscripts, awarded the prize to Miss Alice Brown, of Boston, for her play of New England life, (Children of Earths This piece was given its first production at the Booth Theatre, New York, on 12 Jan. 1915. It was hailed in the press as an effort showing high literary and poetic quality, but it failed of popu¬

lar appeal because it was a middle-age romance and lacked true, red-blooded passion.

The heroine, worn out with self-sacrifice, and grown old in the service of her conscience, experiences a last mad flame of youth in a wild, unexplainable adventure with one Peter Hale.

This flame finally dies down in the last act, and our New England heroine is finally crushed by circumstance.

Though the play has literary quality, it is defective dramatically. It is too intent on ex¬

ternalizing New England types. But none of the New England characteristics are deeply in¬

grained in the characters ; they are super¬

imposed upon them in order to furnish a genre picture.

There is the passion of great souls in Mary Ellen and Peter Hale ; they are too detached in their poetic love, too lukewarm in their deter¬

mination to take from life what it has to give them. The consequence is that when the New England conscience drives them back into con¬

ventionality, both the theatre audience and the reader are unconvinced of the logical reasons for their mad adventure. The other characters in (Children of Earth) are types, not human beings definitely interwoven into the plot. That is why the play failed on the stage. In its printed form, while it leaves one unsatisfied, it at least

convinces one that here is an Ameri¬

can drama with literary quality which dominates over its dramatic effectiveness. The play was reviewed by Clayton Hamilton in The Book¬

man (41 .62).

Montrose J. Moses.

CHILDREN OF THE GHETTO, a

noted book by I. Zangwill (q.v.), published in 1892. It is, as the author says, <(intended as a study, through typical figures, of a race whose persistence is the most remarkable fact in the history of the world." The book raises prob¬

lems that it does not solve ; but the masterly and sympathetic exposition of the Jewish tem¬

perament invites a better comprehension of that wonderful race.

CHILDREN OF GIBEON, a popular

novel by Walter Besant (q.v.), published in 1886. Like his (A11 Sorts and Conditions of Men,* it deals with society in both the west and east ends of London, and their relations to each other. The plot is so ingeniously man¬

aged that it seems entirely plausible ; the studies of London wage-earners and London slums are faithful, without being too repulsive; and the tone of the book is cheerful, while many social problems are touched in the course of an entertaining story.

CHILDREN OF THE SOIL, a novel of

modern Polish life, by Henryk Sienkiewicz, published in 1894. There

are interesting side issues to the story, involving questions of prop¬

erty, of the social order, of marriage. The work as a whole is realistic, sane in spirit, genial and broad in its conception of life and character.

CHILDREN IN THE WOOD, The, or

THE BABES IN THE WOOD, an old Eng—

glish ballad, telling the story of two children whom their uncle wished to murder and who were left to die in the woods, by the man who was ordered to kill them. The authorship is unknown, and the date uncertain ; it appears in the Stationers' Register of 1595, and was probably written about that time. An old play, published in 1601, has a similar plot, and the source of the two is supposed by some critics to be the same.

CHILDREN OF THE WORLD (Kinder

der W elt) . This novel (1873), by Paul Heyse, is the literary echo of the discontent and rebel¬

lion against the existing order — political, reli¬

gious, social and economic — which, beginning in the universities of Germany, spread through the land in the period between the Revolution of 1848 and the Franco-Prussian *War. It is a perfect example of the ˆTendenz-Roman"

which such eras of unsettled thought and altered human values engender. Except in its treatment of women which, although erotic, is romantic in the extreme, the book is the philosophy of Schopenhauer and David Strauss reduced to novel type. Every problem of the age is set forth in the person of one of the characters.

There is the ascetic-erotic-intellectual hero, without honor in the university because of his freedom of thought ; the unawakened but erotic heroine, natural daughter of a landed aristo¬

crat without morals ; the ugly _ but talented feminist musician ; the highly spiritual, ill-nour¬

ished carpenter brother of the hero ; the hounded young socialist-

atheist ; the kindly old artist with no vision beyond the nearest fence; the overfed, material, unspiritual, vengeful teacher of the gospel; and a dozen more of their fellows. (Children of the World* has been called the “romance of pessimism” and ((the apotheosis of atheism.” The very name, in which (Children of the World) is contrasted 486

with (Children of God,* i.e., the clergy, is argu¬

mentative. The wonder is that in spite of its faults, its lack of spontaneity, its persistent preaching, and its iconoclastic tendency, the book remains good fiction. The characters all say too much and do too little, but so they would in real life ; they are. all exaggerated types, but the exaggeration is not that of un¬

reality but of that violation of the norm which accompanies social rebellion.

Edith J. R. Isaacs.

CHILDREN’S AID SOCIETY, an asso¬

ciation for the rescue of neglected, dependent or wayward children. The first society so-called was founded in 1853 at New York by Charles L. Brace. It trains the children and seeks to find situations and homes for them preferably in country districts. Similar socie¬

ties have been founded in all cities and are accomplishing marvels in rescue work. See Children, Dependent.

CHILDREN’S BUREAU, a bureau in the

Department of Labor (in the Department of Commerce and Labor in 1912-13), established by law of 9 April 1912. It is authorized to investigate and report to the department all matters pertaining to child life or welfare. The birthrate, infant mortality, accidents and

dis¬

eases of children, child labor, juvenile courts, State labor laws in relation to children all come within the province of the bureau. The chief of the bureau is nominated by the Presi¬

dent and confirmed by the Senate. Miss Julia C. Lathrop was the first chief.

CHILDREN'S COURTS. Special judi¬

ciary institutions for dealing with cases of juvenile waywardness or parental remissness in a reformative rather than a retributive spirit.

The general theory of these courts is that, for obvious reasons, children should not be judged in ways and by means designed for their elders; that, in other words, the delinquent child is not to be regarded and treated as a criminal, but merely as an unfortunate needing the special supervision or protection of the State. The most advanced view of the matter is that such children, being themselves the victims of un¬

favorable environment over which they have no control, must be dealt with sympathetically and educationally. From this standpoint, the children's courts may well be considered a sociological and educational agency rather than a legal institution. Their inception and develop¬

ment, at any rate, were more in line with the former than the latter, as we shall see pres¬

ently. They received both their impetus and their general character from the enlightened modern view of juvenile delinquency, and were made imperative by the scientific results at¬

tained in the general field of Child Study (q.v.).

History. — Although the juvenile court is a comparatively new institution — less than 20

years old, in fact — there is no unanimity among writers on this subject as to where and when the very first real children's court was

established. Claims of priority are made for the States of Massachusetts, Rhode Island, Colorado and Illinois — which leaves the honor safely to the United States. The uncertainty on this point is due partly to failure to dis¬

criminate between the actual establishment of children's courts and the sundry legislative en¬

actments that preceded them. Thus Massa¬

chusetts, which passed the first statutory law on the subject of probation and granted children separate trials as early as 1869, has the best claim to priority in children's court legislation — legislation which practically started the children's court movement in America ; while Illinois, with her official juvenile court estab¬

lished at Chicago in 1899, seems to have an equally valid claim to priority in the matter of actual children's courts. The Illinois innova¬

tion gave such impetus to the juvenile courts'

movement that children's court laws were soon passed in New York, Rhode Island, Kansas, Wisconsin, Pennsylvania, Colorado and else¬

where. The second children's court was estab¬

lished at Philadelphia in 1901. New York city and Baltimore followed suit in 1902, and Saint Louis a year later. It is neither possible nor desirable to enumerate all the others, since there is hardly a city worthy of the name that has not established some kind of juvenile court.

An idea of the rapid growth of the movement may be had from the fact that in four years (1903-07) no fewer than 18 States either es¬

tablished children's courts or adopted legisla¬

tion to that end.

Of course, the children's court movement has not been confined to the United States, where it originated and is best developed. Among its foreign promoters, Canada may be ranked first, since her juvenile court legislation ante¬

dates even the famous Juvenile Court Act of Illinois. Indeed, the Chicago court itself seems to have been forestalled in South Aus¬

tralia, which created a State children's depart¬

ment in 1895 and a juvenile court three years later that served as a model for the very effi¬

cient children's court of Toronto. Since then every important country in Europe and at least one in Asia has been studying and adopting the American juvenile court system in one form or another. Several international congresses for the study of juvenile court problems have already been held, and the world-wide interest in this new movement is most encouraging. Both Eng¬

land and Germany have very comprehensive laws on the subject, though the former has made greater progress in juvenile court legislation than any other country in Europe, as may be judged by her unique Children's Charter.

Scope and Procedure.— As children's courts are still in a formative stage, neither their scope nor their methods of procedure are uniform or well-defined. Both vary in different cities and States, depending upon local conditions. In general, their scope has broadened steadily throughout the country and their methods have been more advanced in the Western States than in those of the East. Beginning as institutions for dealing with juvenile offenders, their scope has gradually been extended to include every phase of juvenile delinquency, parental neglect, and maltreatment of children, however caused or legally defined — every conceivable offense, in short, committed by or against children. The broadest view of the functions of children's courts, therefore, seems to make of them official child-welfare agencies; and much of the opposi¬

tion to these institutions has been aroused by such liberal interpretations of their scope. But neither in theory nor in practice do all children's courts claim such seemingly unlimited jurisdic¬

tion. The juvenile court of Saint Louis, for in-CHILDREN'S COURTS

stance, confines itself to delinquent and depend¬

ent children ; that of Chicago, to delinquent, dependent and neglected children ; while that of Philadelphia deals with all these and incor¬

rigible children besides. Parental neglect and other contributory causes of juvenile delin¬

quency were recognized and dealt with as early as 1907 by the laws of Colorado, which estab¬

lished the first complete children's court in the wrorld. This type of juvenile court is em¬

powered even to proceed criminally against parents, guardians and all other persons charge¬

able with serious offenses involving children.

Other children's courts — notablv that of Indian¬

apolis, perhaps the most complete and efficient children's court in the world — have found themselves drawn into the affairs of the home, encroaching, that is, upon the field of the domestic relations court. This process went so far in the city of Indianapolis that its juvenile court and the domestic relations court were actually combined in 1911. Adult con¬

tributory delinquency laws are now quite com¬

mon, many States having followed the example set by Colorado — Virginia, Rhode Island, New York and Kentucky in 1910, and others since.

Thus does the growing realization that the erring or wayward child is but a product of home, school and society continually enlarge the scope of children's courts. In line with this general tendency juvenile court laws, which originally applied to children under 16, have recently raised the age limit to 18 years. In¬

deed, a few children's courts — those of Denver and Buffalo, for instance — have jurisdiction even of adolescents (<(adult delinquents®) be¬

tween the ages of 16 and 21.

Under such varying circumstances, uniform¬

ity in children's courts' procedure can hardly be expected. This depends very largely upon the particular judge in charge, the nature of the community concerned, and the laws under which proceedings ar& conducted at any given place. The general attitude of these courts being corrective rather than punitive, their hear¬

ings are usually very simple and informal —even private at times. No juries are called, and no charges or criminal accusations can be. made against juveniles, no matter what the offense may be, since a child cannot be considered a criminal under juvenile court laws. The rules of evidence are partly or wholly disregarded.

Such information as may be needed is usually obtained before the hearing by a probation officer, who conducts all preliminary investiga¬

tions and reports the facts to the judge. The latter may supplement these data by such ad¬

ditional information as parents and others can furnish upon the child's character, environ¬

ment and antecedents before disposing of a particular case. Invariably, too, the child is privately interviewed by the judge and en¬

couraged to tell his own story in confidence.

Once a child is found delinquent — verdicts of (<guilty® and (<not guilty® are, of course, out of the question in strictly juvenile cases — many courses are open to the judge. The child may , be (1) returned to his home on probation, that is, in charge of a probation officer; (2) placed out in some foster home until ready to return to his own; (3) committed to the care of some children's society available for the purpose; or (4) sent to a reformatory insti¬

tution. The order of enumeration is, obviously, the order of preference. The child's natural home, if not positively forbidding, is by all means to be preferred. Next comes the tem¬

porary home for such children as must, for whatever reason, be put beyond parental con¬

trol. Only when neither of these courses are deemed expedient should society care be in¬

voked, and, as a very last resort, the reforma¬

tory is to be used. The best juvenile court judges — and this is one test of their fitness' —resort to institutional care with increasing re¬

luctance. In any case the delinquent child passes automatically into the custody of the court and becomes a ward of the State. The spirit of the most progressive and efficient children's courts is indicated by certain delin¬

quency laws, which expressly stipulate that the treatment of the child under them ((shall be as nearly as possible like that of parents.® Un¬

fortunately, far too many children's courts are not yet conducted in this enlightened spirit.

Some of them (a-gradually decreasing number) still cling to the traditional manner of court procedure — 'even to the rules of evidence, criminal charges and the pronouncement of guilt or innocence.

Results. — The success of any particular children's court depends very largely upon its judge and probation officer, both of whom should be broad-minded and large-hearted per¬

sons, fully in sympathy with the problems of child-life and conversant with the essential teachings of child psychology. Special insight into local conditions and resourcefulness in the disposition of cases are, of course, other neces¬

sary qualifications in the juvenile court judge; just as maturity, a high moral purpose, and tact are among the indispensable qualifications in a good probation officer.

The general results of the establishment of children's courts have been manifold and far-reaching. The juvenile courts have accom¬

plished at least four distinct and important results. They have (1) separated the child offender from the adult criminal, thereby res¬

cuing him from crime-breeding association and criminal court procedure; (2) made the former victims of retributive justice objects of sincere solicitude to an official child-welfare agency; (3) helped to lead parents to a better realization of their responsibility for the child's waywardness; and (4) obviated the necessity of jailing the juvenile offender, thus making the lifelong sting of <(convict children® for¬

ever impossible.

Bibliography. — Besides general works on the juvenile delinquency and the special reports on particular children's courts, consult Barrows, S.

J., Children's Courts in the United States, Their Origin, Development and Results y (Washington 1904) ; Eliot, Th. D., (The Juvenile Court and the Community) (New York 1914) ; Flexner, B., and Baldwin, R. N., (Juvenile Courts and Pro¬

bation (New York 1914) ; Hart, H. H., i Ju¬

venile Court Laws in the United States> (ib.

1910) ; Henderson, C. R., (Theory and Practice of Tuvenile Courts) (in Proceedings of the National Conference of Charities and Correc¬

tion, 1904, p. 358 et seq.) ; Hornbeck, S. K., (Juvenile Courts* (Madison, Wis., 1908) ; Lind¬

sey, B. B., (Recent Progress of the Juvenile Court Movement* (in Proceedings of the Na¬

tional Conference of Charities and Correction, 1905, p. 150 et seq.); Mack, J. W., (The Ju-488

venile Court, The Judge and the Probation Officer* (ib. 1906, p. 123 et seq.) ; Mangold, G.

B., (The Juvenile Court) (in his (Problems of Child Welfare,* New

York 1914) ; Schoff, H.

K., (The Place and Work of the Juvenile Court) (in her (The Wayward Child, J Indian¬

apolis 1915) ; Stubbs, G. B., (The Mission of the Juvenile Court*. (in Proceedings of the Na¬

tional Conference of Charities and Correction/

1904, p. 350 et seq.) and Wade, F. E., <The Prosecution of Parents for the Delinquencies of their Children* (ib. 1909, p. 297 et seq.).

David A. Modell.

CHILDREN'S CRUSADE, The, a singu¬

lar movement in 1212, preached in France by Stephen, a peasant boy, and in Germany the same year by Nicholas, also a peasant boy.

Some 90,000 children left their mothers and schoolmasters in the spring <(to rescue the Holy Land from the infidels,® and ships were placed at their disposal. The French contingent em¬

barked at Marseilles in August ; part perished the same month by shipwreck on the island of San Pietro, and the rest were sold into slavery to Mohammedans. The German con¬

tingent reached Genoa in August, and was utterly dispersed by various disasters before the next spring. See Crusades.

CHILDREN'S LIBRARIES. In a con¬

crete sense, special collections of books in¬

tended for juvenile readers and usually kept in separate rooms of general public libraries.

From a broader point of view, however, children's libraries may be defined as an edu¬

cational agency seeking to acquaint the young with the world's best literature and to culti¬

vate an abiding love for good reading. Their work, therefore, supplements and transcends that of the public schools which exercise but a limited influence on the child's outside reading.

History and Development. — Active library work with children is a comparatively recent development — not more than 35 years old, at the utmost. Owing, however, to the laxity with which the term children's library has been used, there is considerable uncertainty as to just where and when the institution originated.

Sporadic and usually abortive efforts in this direction appear to have been made as early as 1885, when a children's library was opened in New York by a public school principal (Emily S. Hanaway). A more successful experiment was made, also in New York, the following year, when a separate library for children was opened as a branch of the Aguilar Free Li¬

brary. But these forerunners of the children's library movement do not appear to have been generally imitated before 1890, when a chil¬

dren's reading room was opened at the Brook¬

line (Mass.) Public Library. Soon thereafter special provisions for children in public libra¬

ries were made at Buffalo, Cleveland, Pitts¬

burgh, Philadelphia, New York, Lowell,

Medford, Brooklyn, Pawtucket, New Haven

and elsewhere. By 1896 Milwaukee, Denver, Detroit, Omaha, Seattle and San Francisco —the movement spreading more rapidly in the West — all had their children's departments.

To the Minneapolis Public Library, however, seems to belong the honor of first recognizing the full importance of the children's library movement by making adequate provisions for library work with children in 1893. By 1897 the movement had assumed such proportions that the American Library Association made the sub¬

ject of children's libraries a special topic for discussion at its annual conference at PhiladeL

phia that year. This gave so much additional impetus to the movement that children's depart¬

ments or children's rooms soon became a component part of every progressive public library in the United States. The best of these carry on systematic work with children and have all the delightful adjuncts of children's rooms. In some instances even — in such cities as Brooklyn (N. Y.), Cleveland and Griffin (Ga.) — children's libraries are housed in entire¬

ly separate buildings, which naturally afford many exceptional opportunities. This indicates how juvenile readers have come to their own in our public libraries since the day of ((children's corners,® designed quite as much to keep chil¬

dren out of the way of adult readers as for their own good. In most of the larger cities of the United States children's libraries are now completely organized and fully supervised.

In such cities the central library serves as a model for the various branches, all of which are administered and conducted in accordance with the general principles formulated by the supervisor.

Some idea of the general growth and popu¬

larity of children's libraries may be had by a glance at a few actual figures. In 1914 there were over 1,500,000 volumes intended specially for juvenile readers in but 51 of the larger libraries in the country, which shelved some 300,000 new volumes in 1913 alone. By a very conservative estimate half a million children held library cards the same year, drawing more than eleven million books for home use in the few libraries above mentioned. Of course such large library centres as those of Pittsburgh (Pa.) and New York, where children's libra¬

ries constitute an entirely separate system, pre¬

sent figures even more impressive. In 1915 the various children's library branches of Pitts¬

burgh had 119,678 volumes and a circulation of 702,139. During the same year the combined circulation of all the children's branches of

Greater New York exceeded seven and a-half million volumes (7,6.9,462, to be exact), while the number of children using the 44 branches of three of its boroughs (the boroughs of Manhattan, the Bronx and Richmond) was

1,608,753. The great popularity of children's story hours, an important and seemingly in¬

dispensable phase of library work with chil¬

dren, may be judged from the fact that 119,678

children attended them in 1915 in Pittsburgh alone. In New York, exclusive of the bor¬

oughs of Brooklyn and Queens, 2,489 story-hour groups gathered during the same period in the various branch libraries and the Central Children's Room. At the latter, on one special occasion, the number of auditors was 270.

The children's library movement abroad has not, on the whole, kept pace with its rapid development in the United States. Not even England and Germany have caught the full, educational significance of this movement. In England the limited funds available under the Public Library Acts has greatly hindered prog¬

ress in this direction. In Germany, likewise, the juvenile library movement has lagged be¬

hind considerably, despite a very extensive and CHILDREN'S LITERATURE

well organized library system. Both joined the movement very recently. Germany, for in¬

stance, opened her first children's library only in 1909 and even five years later had children's rooms in but 30 cities — a showing easily sur¬

passed by Denmark, where by 1916 more than 400 children's libraries had been opened, 62 in Copenhagen alone. Russia, on the other hand, has more separate libraries for children than many a more progressive country. In 1915

there were at least 10 such libraries in Moscow alone. But the American example is gradually making itself felt to the ends of the civilized world — in Sweden, New Zealand, Japan, *etc.*

and there is probably no large book-reading C2ˆUn,ky .anywhere that has not some kind of children's library or reading room.

Aims and Means. — Besides the chief aim of children's libraries — the general aim al¬

ready mentioned, which may be called inspira¬

tional — there is another and perhaps a secondary aim, which may be called informa¬

tional. T his consists in teaching library chil¬

dren, directly or indirectly, the intelligent use of libraries and their accessories, including such indispensable library tools as books of reference and card-indexes. Speaking relatively, the second aim is really a means to the more general end for which libraries are maintained; for, obviously, the better children learn how to use the resources of their own libraries the more they necessarily contribute to the efficient use of the adult department.

The attainment of these general aims in¬

volves various more or less distinct lines of work with children, which naturally varies both in kind and degree with local conditions. In general, according to an eminent librarian (Arthur E. Bostwick), ((a typical children's de¬

partment of an American public library carries on some or all of the following kinds of work : (1) Controlled and guided circulation of books for home use; (2) use of books and periodi¬

cals as in an ordinary reading room; (3) refer¬

ence use of books, largely in connection with school work; (4) work with very young chil¬

dren, chiefly by means of picture books; (5) exhibitions, the display of illustrated bulletins, etc., always in connection with courses of read¬

ing; (6) story-telling to selected groups.® The three great factors in carrying on these mani¬

fold activities are, of course, the children, the books and the librarians; and although the suc¬

cess of any particular library centre depends upon all three, only the second and third ele¬

ments can properly be considered in this article.

The selection of books for a children's library is at once the most difficult and most important task of the children's librarian.

Great diversity of opinion prevails on this sub¬

ject among librarians themselves, and while the problem of children's reading is a new and very serious one (see Children's Literature), the conscientious librarians are trying hard to solve it. Since the establishment of children's libraries, policies as to the choice of books have varied all the way from puritanical ex¬

clusion of everything not positively didactic to latitudinarian inclusion of everything the child will read. Such extreme views of the function of children's libraries have naturally put their supervisors on their guard, with the result that, although the golden mean has not yet been generally attained, far higher standards of book selection prevail in children's rooms than in the average adult department. The best children's libraries follow neither moral nor literary criteria to the utter disregard of chil¬

dren's tastes, but provide enough books in suf¬

ficient variety to supply the normal needs of boys and girls of all tastes and of all ages.

Special attention, too, is given in children's rooms to the mechanical

features of the books selected. — such as editions, type, binding, and illustration — since it is realized that attractive¬

ness in children's volumes has more than the obvious aesthetic end to recommend it. Indeed, the ideal children's book shelf, already the most attractive in the whole public library, is gradually being made a thing of beauty as well as a joy forever.

Next in importance to the quality and

quantity of the books in a children's library are the personality and qualifications of the chil¬

dren's librarian, upon whom the success of the children's room largely depends. Consequently, the most experienced assistants — experienced in dealing with children as well as in library routine — are coming to be employed in the best children's rooms. Such librarians should know intimately the entire range of juvenile litera¬

ture and be in thorough sympathy with the rising generation of book readers, whose read¬

ing they must guide and direct, if they would make the most of their vocation. Besides ex¬

pert knowledge of children's books and special library experience, aptitude for work with children is an indispensable requisite in the children's librarian. Indeed, so important and responsible is her position that special prepara¬

tory courses are now given for such work in nearly all library training schools, at least one of which (The Carnegie Library of Pitts¬

burgh) devotes itself exclusively to the pro¬

fessional training of children's librarians — a training that may well be made as broad and as cultural as is required for the profession of teaching.

David A. Modell.

written for or suited to the young. From a stricter point of view, children’s literature com¬

prises books specially written for children. In either case, books about childhood intended for adult readers are excluded and will not be considered in this survey. But it is really im¬

possible to define children’s books without instancing titles of children’s favorites. Such a list would show, for one thing, that quite as many works not written for children have found favor with them as those that were.

Thus, parts of (The Bible, > Homer’s (Odvs-seyP (The Pilgrim’s Progress, > (The Arabian Nights,) (Gulliver’s Travels, > and (Baron Munchausen) — none of them intended for

children — are just as much children’s books as (Alice in Wonderland, } Andersen’s (Fairy Tales, > (The Water Babies,* and (Peter Pan) — which were expressly written for juvenile readers. That the former should be much relished by children and the latter also by adults, proves conclusively the impossibility of drawing a hard-and-fast line between juvenile literature and other kinds of books. Any book that interests or comes within the comprehen¬

sion of children generally may therefore be considered as belonging to the large and mis¬

cellaneous class of children’s books.

History. — The difficulty of formulating a satisfactory definition of children’s books adds to the perplexities of the historian of juvenile literature and helps to account for the woeful want of chronological definiteness in many histories of children’s literature. Thus, while some of these date the beginning of children’s books from 1715 —

that is, from the appearance of Isaac Watts's (Divine and Moral Songs y ■ —others go back as far as the 7th century —to a Latin work by one Aldhelm, Abbot of Malmesbury, and to the school texts of the Venerable Bede. For our purposes this sketch need not extend beyond the 15th century, be¬

fore which children's books can hardly be said to have existed. What are now considered such by some imaginative historians were mainly lesson texts, written in Latin and in¬

tended generally for pupils in monastic schools.

Such works belong rather to the history of education than to the history of children's literature. Passing by therefore the pseudo¬

juveniles of Aldhelm, Bede, Alcuin and even Aelfric, whose { Colloquy > was one of the most interesting beginnings of books for the young, we come to the peculiar 1 5th and 16th cen¬

tury productions whose nature and purpose we shall now consider.

The Early Period.— During the 1 5th cen¬

tury real attempts at the writing of children's books were made by various authors, whose chief purpose was moral or other instruction.

This appears in their very titles : (The Babees Boke; or, A lytyl Reporte of how Young Peo¬

ple should behave* (circ. 1475) ; (The Boke of Curtesye) (1460); Simon's (Lesson of Wyse-dom for all Manner Chyldryn) ; and

the like. All these were written in Latin —one of them, (Stans Puer ad Mensam* ((The Page Standing at the Tabled 1430) still pre¬

serves its Latin title — and most of them in rhyme. Not only was their general tone moral or didactic, being intended to inculcate lessons in manners and conduct, but their appeal was very limited, being addressed mostly to boys of noble families destined to serve as pages, esquires, etc., on to the rank of knighthood.

There was not even the sugar-coating of nar¬

rative to render such wholesale didacticism palatable. In no sense of the word, therefore, can these 15th century rhymed treatises be con¬

sidered as children’s books.

The next stage in the development of chil¬

dren’s reading was reached toward the end of the 16th century, with the invention of The Hornbook (q.v.), which for the first time put reading matter into the hands of children.

Such instruction as this crude device con¬

tained was decidedly religious. A variation of the Hornbook, however, which appeared a cen¬

tury later and was known as the (Battledoreˆ

<(contained easy reading lessons and little woodcuts, besides the alphabets, numerals and so forth, but never any religious teaching. Now and then a short fable or didactic story ap¬

pears.® These battledores, crude makeshifts for modern primers, were long very popular, surviving into the second half of the 19th cen¬

tury.

Much more interesting to the unsophisti¬

cated boys and girls of this period must have been the numerous ballads, which, circulating freely among the common people, could not fail to attract the attention of the young.

Among the better known of these old ballads were Adam Bell, Guy of Warwick, Friar

Bacon and Friar Bungay, and the prolific Robin Hood series. It was these and other mediaeval ballads that have yielded such nur¬

sery favorites as jack the Giant Killer, The Babes in the Wood and Tom Thumb and that in the 17th and 18th centuries became so popu¬

lar in the form of chap books, of which more presently. It is interesting to note in passing that those ballads have survived the longest which appeal most strongly to juvenile readers.

The Middle Period. — Having learned their letters from the (Battledore) 17th century chil¬

dren had no means of satisfying their craving for reading save the above-mentioned Chap-Books (q.v.). These cheap and uninviting leaflets, printed in type calculated to ruin chil¬

dren's eyes and illustrated in woodcuts that violated the proprieties and shocked one's taste, must have been very sorry things indeed.

Yet, forbidding as they were, these pamphlets represented the first embodiment of popular literature, intended as they were for every age and taste, and costing but a penny each.

Though not written for children, these little tracts, whose popularity was phenomenal and whose vogue lasted far into the 19th century, put within the reach of the young tales of action, stories of heroism and adventure, nar¬

ratives of peace and war, etc., which must have enchanted the juvenile reader of those early days. It was an unfortunate boy indeed that could not own such things as jack and the Giants; Guy of Warwick, Hector of Troy or Hercules of Greece in the centuries of chap-books. Indeed, it was in this crude form that such fairy stories as Blue Beard, Cinderella and other of the Mother Goose Tales collected by Perrault, French fountain-head of fairy tales, first appeared. Possibly even such classics as the Canterbury Tales) were also peddled about by hawkers on streets and high¬

ways, with all the lustiness of a town crier.

To this period, too, belong the stern and gloomy New England Primers, which long

embodied the religious features of the horn¬

books aforementioned. The general tone of the so-called children's books written in Puri¬

tan times may be judged from such titles as James Janeway's (Token for Children; an Exact Account of the Conversion, Holy and Exemplary Lives and Joyful Deaths of Several Young Children,* and Francis Cokain's (Di¬

vine Blossoms; Prospect or Looking Glass for Youth.* Small wonder therefore that, in view of such unimaginative vehicles for religious instruction as these — and their number was appalling — such a gem as Bunyan's <The Pil¬

grim's Progress* was eagerly seized upon by juvenile readers, written though it was for their elders.

But, dull and forbidding as were these early attempts at children's books — the hornbooks, chap-books, tokens, primers, *etc.* — which reached their culmination in such works as franklin's (Poor Richard,* they were the un¬

doubted forerunners of real children's litera¬

ture, whose rise . we must now consider. As such, their historical importance should not be underestimated.

The Period of Transition. — The rise of real children's books — that ishhooks specially written for children — dates from the second

half of the 18th century. It was then that such educational reformers as Rousseau, Froebel and Pestalozzi aroused that new interest in child¬

hood which culminated in modern Child Study (q.v.). Obviously, before this general awaken¬

ing to the special needs and problems of the child as a child, his reading appeared to in¬

volve no special difficulties. One of the first manifestations' of this new realization — the real¬

ization that the child is not merely a diminutive adult, but a being with tastes and interests pecu¬

liar to himself — was the founding of a chil¬

dren's magazine (Weisze's Kinderfreund) .

But the turning point in the development of children's literature seems to have been reached by 1760, when John Newbery (q.v.), the first publisher of books for children, issued a small collection of nursery rhymes under the title of { Mother Goose's Melody. 5 It was five years later that Goldsmith, who probably edited the little volume just mentioned, published his (History of Margery Two-Shoes,5 which is generally considered the first real children's story written — and it is still a favorite with younger children. But the enterprising pub¬

lisher, assisted by Goldsmith, Dr. Johnson and lesser celebrities driven to hack-work, published hundreds of little volumes for juvenile readers, whose appetites he both stimulated and sought to satisfy. This prolific and ambitious publisher ran the gamut of children's reading,

from young folk's magazines to grammar-texts and a (Circle of Sciences,5 a sort of compendium of universal knowledge. The tone of most of the Newbery publications, however, was still didac¬

tic. Such titles as (The Renowned History of Giles Gingerbread, a little boy who lived upon learning5 ; (The Whitsuntide Gift, or the Way to be Happy5 ; and (The Valentine Gift, or how to behave with honor, integrity and humanity 5

— and they are not by any means exceptional —sufficiently indicate the type of thing produced by ((the philanthropic publisher of Saint Paul's Churchyard, 55 as Goldsmith once called John Newbery.

A somewhat similar service to children's books was rendered in America by Isaiah Thomas, the long-lived Massachusetts printer and bookseller, the pioneer publisher of juvenile literature in the western world. Drawing freely upon Newbery's list, he needed but to alter a bit the English terminology and give the stories a New England setting to make his reprints interesting to children of Colonial and Revolutionary times. In such stories as (The Juvenile Biographer) (containing accounts of Mistresses Allgoo, Careful and Lovebook, together with the narratives of Mr. Badenough and other heroes) the English text is easily recognizable. They represented no very great advance, it must be admitted, over the least cheerless New England primers. Nor were such of the Thomas publications as were writ¬

ten in America tinged by less sombre sternness.

(Godly Children the Parents' Joy5 ; (A Dying Father's Legacy to an Only Child5 ; and Janeway's (Token for the Children of New England > — were the self-explanatory titles of some of these. The echo of Puritan England and Colonial America was far too. distinct in such children's books — they were in no sense real literature — to make them delightful reading for healthy boys and girls. For that they had still to wait.

In Germany the educator Basedow and

others originated a type of literature which, intended for children and undeveloped adults, combines instruction and narrative in an enter¬

taining manner. Although the art of such tales was still crude, they

form another interesting link in the evolution of children's literature.

It was as a result of this movement inaugurated by The Philanthr opium (see Philanthropy) that Defoe produced his children's classic, (Robinson Crusoe, 5 so many times translated and imitated — only half successfully, it should be noted, in (The Swiss Family Robinson.5

The Modern Period. — At least four dis¬

tinct streams of influence are distinguishable in this great period of children's literature, which was well under way by the beginning of the 19th century. These may be characterized as (1) The Rousseau Influence; (2) The Sunday School Influence; (3) The Poetic Influence; and (4) The Classical Influence. We shall briefly consider each of them.

(1) The first of these influences has already been referred to. The enthusiastic disciples of Rousseau who wrote books for children — notably the two Edgeworths, Thomas Day and Mrs. Barbauld — accepted without question the narrowly utilitarian principles propounded in the <Emile). The result, so far as children's reading was concerned, was not altogether a happy one. The writers of this school con¬

ceived the function of children's books to be informational and reformative. They, in effect, substituted educational and moral didacticism for. the religious didacticism of preceding periods. Thus, parents are urged by the Edgeworths in their Practical Education5 (1796) to banish dolls from the nursery, while the epoch-making < Parent's Assistant5 (1796) and (Moral Tales5 (1801) — perhaps the best known and most meritorious children's books credited to Maria Edgeworth — are equally laden with moral <(objects55 and information.

Day's (Sanford and Merton5 (1783), one of the most famous juveniles of this school and long a children's favorite, would be quite as dull as the Edgeworth books save for its inclusion of some classic tales that constitute its sole redeeming feature. Perhaps even more insipid were the children's books of Mrs. Barbauld, best known for her (Evenings at Home5

(1795), whose every chapter seeks to impart some definite lesson; her

(Early Lessons for Children5 (1774), written for the special edi¬

fication of Charles Aiken, himself a writer of children's books; and her (Hymns in Prose for Children5 (1774), in which, like in all her works, instruction and narrative walk side by side. Among the descendants of these moral and educational writers was Jacob Abbott, author of the once popular Rollo, Jonas and Lucy books.

(2) The writers of juveniles identified with the Sunday School movement, started by Rob¬

ert Raikes (q.v.), were still too didactic in tone, though their didacticism took on a somewhat social hue. The one direct effect of this move¬

ment upon juvenile literature was to create an unusual demand for tracts, a demand which Hannah More was the first to endeavor to satisfy. Her numerous tracts, from (The Shepherd of Salisbury Plain,5 her most famous one, to the least meritorious piety pamphlets, are redolent with a fundamental moral ideal 492

and abound in real pictures of humble folks worthy of a Charles Dickens. But throughout these and all her longer works, the acquisition of knowledge is considered as but a means to a better understanding of the catechism. The imaginative child's fancy must still content itself with very low flights, if it can rise at all.

Pretty much the same may be said of the juveniles of Sarah Kirby Trimmer, a more famous writer of the Sunday School group, who has been called the parent of the didactic age in England. Most of her books — such as (Easy Lessons for Children) (1780), <Easy Introduction to the Knowledge of Nature '

(1782) and (Sacred History for Young Persons) (1785) — were intended for use in the Sunday Schools, which Mrs. Trimmer had

helped to open. But it is not for her religious writing as much as for her (History of the Robins) (1789), which represents the earliest attempt to teach children kindness toward the animal world, that Mrs. Trimmer is best re¬

membered.

Among the many other writers of this

school, mention must be made of Mrs. Sher¬

wood, for her (Fairchild Family) (1818-47), including (Little Henry and His Beaver,' (The Child's Pilgrim's Progress,' *etc.* A distant fol¬

lower in America was Elizabeth Wetherell, author of (Queechy' and (The Wide Wide World, > works far above the average religious or Sunday School story written in America during the last century — such as are exempli¬

fied by the Elsie and the Pansy books. In the better stories of this class, though there is an unmistakable religious background, the picture of life is generally vivid and the narrative of considerable interest. The stories of Charlotte Yonge are among the very best religious tales extant.

(3) With the gradual advance made in the literary qualities of children's books, special attention to juvenile poetry came as a matter of course. One of the first writers to pen a volume of verses specially for children was Isaac Watts (q.v.), a man belonging to an earlier age than we are now considering. His name must be mentioned here as a worthy predecessor of the better known children's poets to be spoken of presently. The verses of Dr. Watts — and such a charming hymn as (Holy Angels Guard Thy Bed) is among the best in the language — show the truest under¬

standing of childhood, childhood seen in retro¬

spect and with an adult's sadness over the lost joys of innocence.

Much more didactic were the Taylor sisters, Jane and Ann, whose

poetry makes a far greater appeal to juvenile readers than any¬

thing Watts ever penned. Their (Original Poems for Infant Minds' (1804), containing verses of real merit, seek to emphasize such social virtues as generosity, honesty and truth¬

fulness — an emphasis no longer religious, it will be noticed, but distinctly ethical. Their aim was to interpret the world through the eyes of childhood, an ambitious undertaking in which they hardly succeeded.

Far more successful in this respect were the children's verses of William Blake, whose (Songs of Innocence' (1787), though chrono¬

logically belonging to the 18th century, is of the 19th century in form and spirit. So happily are the modern regard for childhood and the latter's responsiveness to adult sympathy blended in Blake's verses that they suggest the best children's lyrics of Wordsworth and Chris¬

tina Rossetti. Indeed, nothing finer than his (Songs of Innocence,' with its remarkable imagery and grace, was added to children's verse before Robert Louis Stevenson's delight¬

fully reminiscent (Child's Garden of Verses '

(1885), which has been the forerunner and inspiration of a great many volumes of poetry for children.

(4) The literary heights reached in chil¬

dren's verse during the 19th century marked but one of the important phases of the rapid development of modern children's literature.

Another — perhaps an outgrowth of the first —was the new and increasing zeal for putting the classics within the reach of the young.

By the middle of the last century four most noteworthy and very successful manifestations of this salutary tendency appeared. Kingsley's (Greek Heroes) (1856), Lamb's (Adventures of Ulysses) (1808) and Hawthorne's < Wonder Book' (1852) and (Tanglewood Tales> (1853) practically unlocked for children the rich granaries of Greek mythology, to the infinite delight of generations of eager

readers. This gave such impetus to imaginative writing for children that the wonderful flowering of chil¬

dren's literature in the latter half of the cen¬

tury may well be attributed very largely to the classic influence we are here considering. Then it was that the reading child first came into full possession of his literary heritage, the accumu¬

lated treasures of imaginative Man.

Classification. — From the early times when children's books were yet non-existent — when children and adults heard the same tales with a common naivete — to the present fine spe¬

cialization in books intended for the young, millions of volumes have been published under the general head of Juvenile Literature. With this multiplicity has come also great diversity, so that it is no mean task merely to classify satisfactorily this wealth of material. The task becomes the more difficult in that there are no definite types of children's literature more than of any other, and this, naturally, makes for greater variety. For these and other reasons no adequate classification of children's books will here be attempted. Only a few of the more common types can be considered, and under these general headings: (1) Fairy Tales, Myths and Fables; (2) Historical, Biographical and Other Narratives; (3) Children's Poetry; and (4) Juvenile Fiction. Nor can the treat¬

ment even of these be more than summary in the present article. For a fuller study of the subject, the reader is referred to the bibliog¬

raphy appended to this article.

Fairy Tales, Myths and Fables. — Despite the great variety of other books for children that have grown, like mushrooms, since Perrault's pioneer collection of (Mother Goose Tales) ((Contes de ma Mere L'Oye,' 1697), nothing has displaced the fairy tale in favor with younger children. After Perrault, the greatest contributions to fairy tale literature were made by the Grimm Brothers with their (Household Tales' ((Kinder-und Hausmarchen,' 1812-15) and by their most distinguished successor, Hans Christian Andersen, with his (Fairy Tales'

(1835), best translated into English by Mary Howitt. Among other literary fairy tale col-CHILDREN'S LITERATURE

lections, to the making of which there is no end, mention should be made of Kennedy's (New World Fairy Book*; Rhys's <Fairy

Gold* ; Scudder's ˆChildren's Book* ; Jacobs'

(English Fairy Tales* and its companion vol¬

ume, (More English Fairy Tales* ; and Lang's long Rainbow Series. More in the nature of wonder stories are the Alice books of Lewis Carroll, Ruskin's (King of the Golden River,*

Kingsley's (Water Babies,* and (The Arabian Nights.* The charming fairy tales of George Macdonald have such a unique spiritual quality and a distinctive tone of mystery that they may be considered among the best modern specimens of their kind. As a general rule, however, the modern fairy story, cultivated by many medi¬

ocre writers, is apt to be lacking in imagination, art and taste.

Mythological tales, which are based upon primitive man's interpretation of nature, run back naturally to the beginning of time. The best myths have come down to us from ancient Greece, and we have already mentioned the three great writers — Kingsley, Lamb and Haw¬

thorne — who first familiarized English-reading children with these most delightful narratives, so full of beautiful imagery and true poetic force. Of the many other versions of the classic myths of Greece, Bulfinch's (Age of Fable* and Moncrieff's (Classic Myth and Legend* are per¬

haps th£ fullest and best. Next to the Greek myths, the Old Norse myths are particularly interesting to children. They have been ad¬

mirably retold by Brown (Un the Days of Giants*) and Mabie ((Norse Stories Retold from the Eddas*). The mythology of the American

Indian, equally full of color, mystery and elemental nature, has been strangely neg¬

lected by modern writers of children's books.

Longfellow's (Hiawatha* is still the most beautiful presentation of Red Indian myths.

There are, of course, many other kinds of mythical tales, but the three here mentioned possess the best characteristics for juvenile readers.

The fable (q.v.), which is probably of Indian origin and was one of the earliest forms of story-telling everywhere,. has been made familiar to children only in modern times. The classic fable of HIsop has never yet been surpassed, if it ever shall be equalled. This form of imaginative literature makes its peculiar appeal to younger children and performs a special mission in their ethical education. Some of the best of Uisop's fables — edited times without number — are (The Dog in the Manger,* (The Lion and the Mouse,* (Belling the Cat,* (The Shepherd Boy and the Wolf* and (The Town Mouse and the Country Mouse.* The other two great fabulists were La Fontaine in France and Krylov in Russia, but neither has enjoyed such universal popularity abroad. (Select Fables from La Fontaine,* translated by Elizier Wright, and <Kriloff's Original Fables,* trans¬

lated by Harrison, are perhaps the best two selections from these fabulists available in Eng¬

lish. A general collection from yEsop, La Fon¬

taine and others is found in Wiggin's and Smith's (The Talking Beasts; A Book of Fable Wisdom.* Excellent recent specimens of ani¬

mal stories that may be classed either as fables or as fairy tales are Kipling's Jungle books and (Just So Stories.* In a class by itself stands that highly literary and charmingly imaginative modern fairy tale, Lagerlof's (Wonderful Ad¬

ventures of Nils.*

Historical, Biographical and Other Narra¬

tives. — For children who have outgrown the world of make-believe these classes of books afford most welcome substitutes. The best kind of historical narrative for children is that which emphasizes the romantic and biographical ele¬

ments. Such narratives have been written by Scott QTales of a Grandfather*), Greenwood ((Merry England*), Lodge and Roosevelt

((Hero Tales from American History*), Eg¬

gleston ((Stories of Great Americans for Little Americans*), Baldwin ((Fifty Famous Stories Retold*) and many others.

From history stories to historical biography is a natural transition. This type of biography has been written for children since the middle of the 19th century, when the Abbotts, authors of hundreds of juveniles, popularized it. More recent examples — and naturally better ones —are Tappan's lives of Alfred the Great, William the Conqueror, Queen Elizabeth and Queen Vic¬

toria. Two excellent and very comprehensive sets of historical biographies (one in 36 vol¬

umes) are (Lil'e Stories for Young People*

and the Children's Heroes Series,* the former translated from the German by G. P. Upton.

Mention should here be made, too, of Mar¬

shall's Child's English Literature* for the abundant biographical material this well-written work contains.

Besides such special biographies, there are scores of others that are not necessarily his¬

torical or romantic. Good examples of such biographies suited to young readers are the (Life, Letters, and Journals of Louisa Alcott*

and Richard's ˆFlorence Nightingale.* Two excellent collected biographies are Mrs. Lang's (Red Book of Heroes* and Mrs. Wade's

AVonder Workers,* the latter dealing with emi¬

nent contemporaries.

Other kinds of instructive narratives that children like to read include every conceivable subject' — from books of travel and geograph¬

ical descriptions to animal stories and nature study excursions. Naturally, these cannot be enumerated here. A few good specimens of the types mentioned must suffice. Thus, (Peeps at Many Lands,* (Little People Everywhere,*

(Peeps at Great Cities* and (The Little Cousin Series* — the last consisting of 40 volumes by various authors — are admirable travel books; such works as Burroughs' (Birds and Bees*

and (Squirrels and Other Fur-Bearers,* Rob¬

erts' (Kindred of the Wild* and (Haunters of the Silences* — rather than the more romantic Seton stories ((Lives of the Hunted,* (Wild Animals I Have Known, *etc.) — represent the best type of animal story; while Ball's ˆtar-land,* Morley's Unsect Stories,* Thompson's (Water Wonders Every Child Should Know,*

Andrews' (Stories Mother Nature Told Her Children* and Buckley's (Fairyland of Science*

— eveiy one combining science and narrative in happy proportions — will serve to indicate the diversity of nature-studv narratives, the best of which are as fascinating as fairy tales.

Children's Poetry. — It is common knowl¬

edge that a child's first appreciation of verse depends largely on rhythmic quality — hence his great fondness for the old Mother Goose rhymes, those matchless specimens of perfect rhythm. For the same reason children of fairy

tale age readily catch the swing of ballads, which they greatly enjoy

even when the mean¬

ing of these vigorous poems happens to tran¬

scend their understanding. Among the best old ballads are (Adam Bel,* (Chevy Chased (Sir Andrew Barton,* (The Battle of Otter-burn,* (Fair Rosamond,* (Sir Cauline,* (The Heir of Linne,* (The Blind Beggar's Daugh¬

ter,* (Clym of the Clough and Wyllyam of Cloudeslee,* and the cycle of Robin Hood poems. Good collections of such ballads are available in Bates' (Ballad Book,* Mabie's (Book of Old English Ballads* and Lanier's (The Boy's Percy.* A special collection of the Robin Hood series has been made by Perkins ((Robin Hood*). The great popularity of these old ballads does not suffer even when their tales are retold in prose, which has been done repeatedly — best perhaps by Pyle ((Merry Adventures of Robin Hood*) and Tappan

((01d Ballads in Prose*). For older children there are, in addition, the more modern ballads of Scott, Coleridge, Wordsworth, Browning, Tennyson and others, which are well repre¬

sented in Palgrave's (Golden Treasury,* (The Oxford Book of English Verse* and almost any comprehensive collection of children's poetry.

Didactic narrative poetry for children has been well written by the Taylor sisters, whose (Original Poems for Infant Minds* has already been characterized; the Lambs, authors of those charming (Tales from Shakespeare* and other excellent Juveniles; the Carys, authors of the delightful (Ballads for Little Folk* ; Dr. Hoffmann, author of the ever popular (Slovenly Peter*; and many others. Lyric verse for young readers is equally abundant.

William Blake, already mentioned for his beautiful (Songs of Innocence,* and William Allingham, author of many natural and grace¬

ful lyrics, seem to have perfected this type of poem. Other children's poets of the earlier period are Christina Rosetti, referred to else¬

where, Mary Howitt, Celia Thaxter and Lucy Larcom (most of them represented in Whit¬

tier's excellent anthology, (Child Life*). The children's verses of

Robert Louis Stevenson, whose (Child's Garden of Verses* has never yet been excelled, of Eugene Field and of James Whitcomb Riley — not to mention their nu¬

merous imitators1 — are distinctly reminiscent of childhood at play; their appeal is therefore quite as much to adults as to children. Ro¬

mantic poetry, which appeals to children in adolescent years, has been written by Scott, Longfellow, Tennyson and all the other great poets. Much of it can be appreciated in later childhood. When the child's taste for poetry has grown to the appreciation of the best ro¬

mantic poets, he no longer needs any special children's poetry. For anthologies of children's verse, the reader must be referred to the works cited in the bibliography.

Juvenile Fiction. — From Goldsmith's Mar¬

gery Two-Shoes,* Day's (Sandford and Mer¬

ton,* and (The Moral Tales* of Mrs. Edgeworth to such modern children's . stories as (Heidi,* (Peggyˆ and (Nancy Rutledge*— is a far cry indeed. Yet, everything in narrative form that marked this long evolution comes somewhere under the general head of juvenile fiction. Naturally there are many different types of children's stories — some writers enu¬

merate no fewer than a dozen. For our pres¬

ent purpose, however, two broad classes will suffice: (1) Stories of Adventure, and (2) Stories of Character. But even so, it cannot always be determined accurately to which class a children's story really belongs, the two gen¬

eral types not being mutually exclusive — a good story of adventure may abound in de¬

lineation of character, and effective character stories are not necessarily devoid of thrilling narrative. The determining consideration will be simply the predominance of either of these elements in stories possessing both.

That the child's earliest interest is in the adventure story, the story concerned with events rather than with character, is shown by the undying popularity of the fairy*tale and wonder story as nursery literature. This in¬

terest naturally carries over into animal stories of the non-fable type, stories of travel and romantic tales of every kind. Perhaps the best romantic story for children who have just emerged from the cycles of Arthurian, Caro-lingian and other legend — those fascinating adventure stories that no reading boy or girl should miss — is the historical novel, in which the heroic side receives special emphasis.

Famous novels of this kind suitable for young people include Scott's Hvanhoe* and (The Talis¬

man,* Dickens's (Tale of Two Cities,* Kings¬

ley's (Westward Ho!* and Bulwer-Lytton's (The Last Days of Pompeii.*

A very different kind of romantic story, one that may be styled unhistorical, originated in this country with Cooper's tales of Indian life and adventures on the sea. In his leather-stocking Tales* to (The Last of the Mohicans*

and (The Two Admirals* there is not a narra¬

tive that any normal boy — and Cooper is de¬

cidedly a boy's author — willingly .skips, any more than he can abstain from devouring the tales of mystery by Jules Verne. The genre of romance originated by Cooper has been done by Captain Marryat, Mayne Reid, Ballantyne and many others, whose thrilling tales of ad¬

venture on land and sea continue to enchant boys to this day.

Differing more in degree perhaps than in kind are such children's classics of adventure as (Treasure Island,* (The Three Musketeers,*

(Mysterious Island,* <The Slowcoach,* (The Adventures of Tom Sawyer,* (Kidnapped,*

(Captains Courageous* and (Adventures of Billy Topsail.*

The juvenile character story may deal with school-life, the home and many other things.

The forerunners of the modern school story, a very prolific brand of juvenile fiction, were Harriet Martineau's (Crofton Boys* and (Tom Brown at Rugby.* Unfortunately these mas¬

terpieces have not been often duplicated in recent times, when the average school story is apt to be devoid of characterization and in¬

terest. Among the best modern school stories are Vachell's <The Hill,* Coolidge's (What Katy Did at School,* Brown's (The Four Gor¬

dons,* Richards' (Peggy,* and, especially, the works of Arthur Stanwood Pier, who has written some of the best books of this kind.

The home story, a type as ill-defined as any other kind of children's story, includes such excellent things as Alcott's c Little Women,*

c Little Men* and (Under the Lilacs* ; Richards'

(Hildegarde Series*; Pyle's (Nancy Rutledge*; CHILDREN'S PLAYGROUNDS

Ewing's (Jackanapes,* (Lob Lie-by-the-Fire>

and (Six to Sixteen) ; Yonge's (The Lances of Lynwood*; Martin's (Emmy Lou*; and

Howell's (A Boy's Town* — to cite but a few of the thousand-and-one stories coming under the present classification.

Finally, there are numerous other varieties of juvenile fiction which are represented by such diverse genuine classics as (Rebecca of Sunnybrook Farm,* (The Prince and the

Pauper,* (The Story of a Bad Boy,* (Mrs.

Wiggs of the Cabbage Patch,* (Jim Davis* and (Betty Leicester.* These few titles of modern children's books indicate the great advance made in juvenile literature since the days of the Edgeworths, Thomas Day and the other early writers of so-called children's stories.

With all that, however, and despite the fact that streams of juveniles are continually pour¬

ing from publishers' presses, there is still a woeful dearth of unexceptionable juvenile fic¬

tion, especially of realistic stories.

Bibliography.— Most of the literature on children's books has appeared in the form of magazine articles, many of them in library journals. Moses, in Children's Books and Reading* (pp. 269-72) gives a fairly compre¬

hensive list of such periodical literature up to 1907. Later references will be found in Fay and Eaton's work cited below. The more im¬

portant books on the subject in English include Ashton, J., Chap-Books of the Eighteenth Cen¬

tury* (London 1882) ; Fay and Eaton, (In¬

struction in the Use of Books and Libraries*

(Boston 1915, chaps. XIII-XXI) ; Field. E. M., Che Child and his Book* (London 1891) ; Field, W. T., c Fingerprints to Children's Read¬

ing* (Chicago 1907) ; Ford, P. L., (History of the New England Primer* (New York 1897) ; Lee, G. S., Che Child and the Book* (ib.

1907) ; Lowe, O., (Literature for Children*

(ib. 1914) ; Lucas, E. V., (01d-fashioned Tales and Forgotten Tales of Long Ago* (London 1905) ; Moses, M. J., Children's Books and Reading* (ib. 1907) ; Olcott, F. J., Che Chil¬

dren's Reading* (Boston and New York 1912) ; Pearson, E., (Banbury Chap-books and Toy Book Literature in the Eighteenth and Nine¬

teenth Centuries* (London 1890) ; Repplier, A., Che Children's Poets** (in her c Essays in Idle¬

ness,* Boston 1893) ; Grahame, Kenneth, Che Cambridge Book of Poetry for Children* (New York 1916). Two excellent works in German are Koster's Ceschichte der deutschen Jugendlitteratur* (Hamburg 1906) and Wolgast's (Das Elend unserer Jugendlitteratur* (Leipzig 1905).

Judicious lists of children's books are published by most public libraries. A very helpful and comprehensive one has been compiled by G. W.

Arnold, (A Mother's List of Books for Chil¬

dren* (Chicago 1909).

David A. Modell.

CHILDREN'S PLAYGROUNDS. Spe¬

cial provisions made by progressive modern communities, through public or private agencies affording children better opportunities for free or directed play. Socially and educationally, the children's playground movement is but a phase of the general Child Welfare Movement (q.v.) which began with the great awakening to the special needs and interests of childhood in the closing decades of the last century.

History. — Like many other great move¬

ments, the playground movement in America began very simply and unpretentiously. Boston was its first home, and (<three piles of yellow sand** placed in the yards of the Children's Mission in 1886, its first concrete manifestation.

This Boston idea, borrowed from Berlin, had little to do, however, with the subsequent de¬

velopment of the playground movement in the United States, which did not really begin before 1898. The earliest playgrounds were opened mostly under private auspices — charitable or philanthropic societies, especially social settle¬

ments — and to Brookline (Mass.) belongs the honor of taking the first municipal action on the purchase of playground sites (1872). In 1887

both Pennsylvania and New York enacted

State legislation on the subject of playgrounds.

Chicago established her first summer play¬

ground in 1892; Boston officially joined the movement in 1898, and the first municipal play¬

ground in New York was opened a year later.

This last proved so successful that in 1903, in response to popular demand, similar play¬

grounds were established in other congested parts of New York city. The movement re¬

ceived much additional stimulus from the action of the New York Department of Education, which in 1898 took over a number of private summer playgrounds and placed them in charge of a special committee. Since then the play¬

ground movement in America has grown enor¬

mously. Numerous special societies devoted to playground interests now exist all over the country, and several national conventions, called by the Playground Association of America, have aroused world-wide interest. According to (The Year Book for 1915,* published by the above-mentioned national association, no fewer than 460 cities maintained playgrounds in 1915 at a total cost exceeding $4,066,377 and with the help of more than 7,500 salaried directors or play leaders. The actual number of playgrounds in the United States the same year was 3,294, with 28 cities maintaining playgrounds unrecorded.

In 1914 and 1915, 116 cities opened their first playgrounds. The rapid growth of the move¬

ment in intent has been equally significant, for at least 70 cities maintain special classes for the professional training of playground attendants and directors. Even normal schools and teach¬

ers' colleges now offer regular courses in play¬

ground supervision. The work is attracting great numbers of young men and women with talent for leadership and knowledge of child activities.

Management and Equipment. — In propor¬

tion as the educational and social importance of playgrounds becomes better understood their ownership tends more and more to pass from private associations to municipal agencies. But so great is the demand for additional play¬

ground facilities, especially in the larger centres of population, that both private and public own¬

ership are apt to continue side by side for some time, as even together they cannot supply the ever-increasing demand — a demand so dispropor¬

tionate to the supply that many cities have had to rope off streets at certain seasons for want of playground space. An idea of the number and relative proportions of private and munic¬

ipal playgrounds may be formed on the basis of the figures given in the above-mentioned (Year Book, which shows that in 1915, 182 cities supported their playgrounds by municipal funds, 112 by private means and 130 by both.

The tendency toward the municipalization of children's playgrounds, though unmistakable, cannot therefore be said to be very strong.

Wherever such playgrounds are municipally owned, their actual management is placed in the hands of either the park department, the school board or some separate department specially created for the purpose.

The equipment of children's playgrounds, like their size and number, varies, naturally, with local conditions. The average school yard play¬

ground has a sand pit, a frame swing, a number of other swings and teeters, a spring-board, basketball standards, a standard for high jump¬

ing, a tether ball equipment, a net for volley ball and a supply of playground balls, besides special provisions for sewing, basket-making and raffia work. But many playgrounds have far more meagre facilities, which may consist of only jumping standards, horizontal bars and sand piles. The roof playgrounds, if for boys, make provisions for baseball, basketball and tennis ; those intended for girls, however, will have little or no apparatus, as dancing and sing¬

ing are their chief diversions on such play¬

grounds. The largest and best equipped play¬

grounds, such as are maintained by Chicago, include large fields for baseball, field houses, libraries, clubrooms, assembly-rooms, gymnasia, swimming and wading pools, *etc.* The broadest scope is given in such playground centres to play and social activities, which include sing¬

ing, folk-dancing, story-telling, pageants and amateur theatricals.

The general tendency as to hours and sea¬

sons is to make children's playgrounds available during as large a part of the day and as many days in the year as seems possible. Some play¬

grounds, especially those located in parks pro¬

vided with field houses, are open throughout the year. In 1915 there were at least 573 play¬

ground centres in 97 cities open all year round.

Some, by electric lighting, are made available also in the evenings. The open hours of school playgrounds are naturally limited to non-in¬

struction periods. The recent tendency, too, has been toward greater supervision and more trained leadership, experience having proved the unsupervised playground educationally unde¬

sirable.

Objects and Results. — The object sought by the promoters of the earliest playgrounds was very simple. It was merely to keep chil¬

dren off the streets and away from their physi¬

cal and moral dangers. But as the playground movement developed its objects were interpreted more broadly. The importance of play as an educational factor coming to be more clearly understood, the formative influence of play¬

grounds on character and social ideals could not be overlooked. The connection existing be¬

tween unapplied juvenile energy and wayward¬

ness suggests another very important gain from the playground movement, which has helped to make children not only busier but happier.

Finally — to mention only the more significant benefits of playgrounds — children's play¬

grounds, by bringing together the various racial elements under the most favorable circum¬

stances, exert a most salutary socializing in¬

fluence upon America's cosmopolitan population — an influence making for greater comity and tolerance among peoples with natural or ac¬

quired animosities.

Bibliography. — Addams, J., 'The Spirit of Youth and the City Streets)

(New York 1909) ; Curtis, H. S., Education Through Play) (ib.

1915) ; Greene, M. L., ‘Among School Gardens) (ib. 1910) ; Johnson, G. E., (Education by Plays and Games> (Boston 1907) ; Perry, C. A., (Wider Use of the School Plant* (New York 1910) ; Mero, E. B. (ed.), ‘American Playgrounds) (ib. 1910) ; Wade, E. J., ‘Social Centres) (ib. 1913) ; and The Playground, the offi¬

cial organ of The Playground Association of America (ib. 1907 et seq.).

David A. Modell.

CHILDREN’S THEATRES. The early

educational plays, or, strictly, dialogues for children, under the severe pedagogics of the 18th and 19th centuries, were as near to the character of real plays as the shorter catechism is to roaring comedy. For certainly they con¬

tained no elements of play, the healthy demand of educationists of the present time. It is, of course, necessary to observe a distinction be¬

tween the children’s play written and played entirely “for fun® and the play written to meet some more or less diadactic purpose. In the bibliography below, the one will be found classed under “Home Plays® and the other under “School Plays and Pageants,® though the two may occasionally have a tendency to overlap.

In the mediaeval ecclesiastical plays boys*and young girls frequently took very important parts (consult Mantzius’s ‘History of Theatrical Art,* Vol. II, p. 88, for some curious facts) ; and ‘Hamlet) has made everyone familiar with the boys of the chapel of the Elizabethan Court (consult ‘The Children of the Chapel Royal and Their Masters) by John M. Manly, Cam¬

bridge History of English Literature, Vol. VI).

The first children’s educational theatre on record, apart from ‘School

Drama * (see Col¬

lege Dramatics), was, appropriately enough, in France. This theatre was built on her estate for the education of her children, by Comtesse de Genlis, who had been influenced by the nature theories of Rousseau. History, language and simple moral lessons were the subjects. The method was not far removed from the kinder¬

garten system which also is, in principle, dra¬

matic. For the rest, private theatricals at Christmas, and on other special occasions, carry us forward to our own times.

In 1903 in the Educational Alliance Building on the east side of New York, “The Children’s Theatre® was founded by Miss Alice Minnie Herts, with Mrs. Sheridan Fry as director of plays. Miss Herts’ book, ‘The Children’s Edu¬

cational Theatre,* written after seven years’

close experience, explains the reason of its origin, the enthusiasm with which the under¬

taking was supported, and the wide influence it has exerted. It also prescribes exactly how similar theatres can be organized all over the country. “The dramatic instinct,® says the author, “is a primitive impulse, not to be con¬

fused with dramatic talent, which is a special¬

ized form of it. This instinct cuts a new and safe channel for a hitherto undirected stream of human energy. The demand of children for interesting entertainments is often met by nothing better than cheap vaudeville or moving picture shows.® Miss Jane Addams, in ‘The Spirit of Youth,) also expresses the same; in¬

terweaving the delightful little character studies CHILDREN’S THEATRES

of a close warm-hearted observer. Short stimu¬

lating essays on the subject, by Dr. Eliot of Harvard, Mr. Percival Chubb and Dr. G. Stan¬

ley Hall, are incorporated in Miss Herts' vol¬

ume. This theatre, after many haphazards, is still in existence. In 1911 the Educational Players, a body of young amateurs, an offshoot from the Children's Educational Theatre, gave performances (generally free) in the public schools; and a few of their plays were written with these special school audiences in view. A (Handbook of the Educational Player Method,*

by Mrs. Sheridan Fry, is worthy of a classic place in the literature of pedagogy for the skill with which the author relates herself to the psychology of the child. The model rehearsal illustrated in the book is a work of fine art in its own way.

In 1913 the Educational Dramatic League was founded with Mrs. August Belmont as president and Mrs. Sheridan Fry as colleague.

This powerful organization (a national, not a local body) is doing excellent work among the schools, and in the social, civic and recreation centres throughout the country. The League works co-operatively with the schools and cen¬

tres ; lending books of plays, costume plates, costumes and even sets of screens for back¬

grounds, for merely nominal sums to its mem¬

bers. It serves in some sort as a clearing house, introducing teachers or leaders, and holding classes to instruct school teachers and others how to direct their own plays.

The aims of the Educational Dramatic

League are exactly those forwarded by Miss Herts and Mrs. Sheridan Fry when founding the Children's Educational Theatre, with the advantage of extended scope. The League does not encourage the making of actors, but seeks to guide the existing dramatic instinct of

the child, for the profit of all concerned, both intellectually and emotionally. The visiting side of the work is being developed, and various charitable and other institutions gladly welcome the merriment that these youngsters are able to carry with them from outside. When cast for a part in a play a child refers to the history, geography and customs of the country or locality in which the play has been set, builds up the particular costume, studies the lit¬

erary and elocutionary values of his or her part, to fit into the ensemble, and directly and indi¬

rectly absorbs many a lesson in an entertaining way, the work not being without its difficulties at every step. So that, far from the child lying in danger of finding itself drawn into the net of that fell disease, “stage-struckness® it has been very properly urged that our little hero or heroine receives such a foretaste of the difficul¬

ties of the actor’s lot, robbing it of all glamour, that the experience proves an almost unfailing antidote — except in the case of either the elect or the incurable — not to be prevented or gain¬

said under any system.

Nothing is more popular or more fruitful of good results in the settlement and neighbor¬

hood and recreation centres of the large cities than this dramatic activity of the children. In the Little Theatre of Hull House special pro¬

ductions of children’s plays are given every year. The Boston Women’s Educational and Industrial Union has established an association, “The Children’s Players,® organized from among college and private dramatic clubs. At

the House of Play, a little theatre in Washing¬

ton, D. C., the best plays for young people are regularly given by children for children, under the auspices of the Drama League. In such ways (and volumes of instances might be quoted) highest art appreciations are formed and the taste educated against inferior work.

Aside from the foregoing types of plays and playing, the readiest means found by children throughout all history for the expression of the dramatic instinct has been by dances, action songs and games. In the natural sequence these have, as times and occasions permitted, de¬

veloped into the festival and the pageant. In the olden pastoral life of civilized, and even uncivilized peoples, it was usual for the young to join with the adults in the sports and pas¬

times of the festal days. The only concern the schools of organized communities had with these till lately was in the granting of holidays to the children. Then came the rise of machin¬

ery and factories, the spread of large cities and the consequent depopulation of the rural dis¬

tricts (particularly in Anglo-Saxon countries).

With the introduction of these conditions the old-fashioned revels were gradually forgotten, and the natural instinct of the people for shows and showing was kept aflame only through spectatorship, fatuous and empty enough, for the most part. It could hardly be a matter of surprise that the sober-sided Puritans resisted these stupid entertainments, not realizing causes. But since it has been clearly demon¬

strated that there is no more refining influence than where the people of all ages are freely encouraged to play in common, especially where that play has a picturesque and emotional and intellectual tendency, our Puritan friends have been among the staunchest supporters of this community art. Meanwhile, it became the cus¬

tom for the schools to initiate more or less formal celebrations on state occasions, on fes¬

tal and commemoration days, and at the com¬

mencement or close of the school year. These, however, were only a little less severely dis¬

ciplined than the regular lessons. John Ruskin, himself of Puritan Scotch descent, is said to have been the first to instigate a change from these methods in his suggestions for the revival of the ancient spirit of

May Day. Since then the growth of the genuine festival cheer, both in and out of schools, has been in the ascend¬

ant. Commencement exercises and other such functions have partaken of the freer spirit of olden time revelry; and a wide appeal for the use of dramatics, even during lesson-hours, for the sake of a fuller and richer education, has met with pronounced success in Europe, the United States and the English colonies. Decla¬

mation, dramatization, singing, dancing, histori¬

cal and fancy costume-making are now being treated as integral parts of the curriculum of the finer sort of school, where formerly these subjects were accounted mere “fads and frills,®

appropriate only for the overtime of worn-out teachers and pupils. Educationists of distinc¬

tion are now generally of the opinion that the various branches of children’s dramatics co¬

ordinate all other subjects (language, literature, history, geography, etc.), that they considerably augment young people’s power of understanding all other lessons by visible and tangible aids and supply the fundamental test of all literature —the oral. Then, again, not only does the pupil

gain a lively impetus in his general work by study and rehearsal on his own account, but also by the spontaneous and often stimulating co-operation with other performers. At every point do the enthusiastic teachers descry some gain resulting from these methods, not the least gain being the world-wide demand for a more intellectual theatre, with which the chil¬

dren’s dramatic movement has been con¬

current.

Since the Ethical Culture School of New York, under the leadership of

Mr. Percival Chubb, began experiments in communal dra¬

matic forms some years ago, the practice has had great extension on all sides. The schools themselves have developed new types of festi¬

vals and pageants. The various training centres for teachers, the Boston Normal School, the Brooklyn Training School and the Teachers'

Training College of New York have all made interesting experiments. These have had much direct and indirect influence on the children's performances and promoted many productions.

The procession of the seasons, the anniversaries of the births and deaths of famous men and women in every field, the circumstance (and sometimes the pomp) of world events and innu¬

merable other topics, as well as the time-honored festal days (Christmas, New Year's, Twelfth Night, Easter, Arbor Day, Fourth of July, Michaelmas, Harvest Thanksgiving) are being celebrated in most creditable performances in many schools and settlements; the tenor of these productions being likely to live long and happily in the memories of the young partici¬

pants.

In 1910 eleven settlements in Brooklyn united in presenting the (Pageant of Patriots,5 show¬

ing the youth of various American heroes be¬

fore an enthusiastic audience of 10,000 people.

On 7 June 1914, under the auspices of the People's Institute and of Social Centre P. S. 63, the (Festival and Pageant of Nations) was given in New York city. The folk costumes and much of the character and customs of the nations, of foreign peoples living in New York, were represented. Before a cheering crowd of 20,000 people 2,000 children and 1,000 adults gave this most successful performance.

For all manner of information toward mak¬

ing and shaping, spreading and showing every sort of play for young

people, consult Miss Constance Mackay's invaluable guide, (How to Produce Plays for Children,5 written from the standpoint of the new stage art; also the works below.

Bibliography. — Play Lists: Whereas it was formerly necessary for thousands of amateur producers distant from the big cities to depend almost entirely upon textbooks, they have now the advantage of being able to consult two well-informed spirited institutions, the Drama League of America and the before mentioned Educational Dramatic League, New York,

which is constantly making additions to a col¬

lection of printed and manuscript plays not to be found in the ordinary current lists of plays.

Inquirers are also invited to address Miss Kate Oglebay, chairman of the junior department of The Drama League of America, at the New York and Chicago centres. The special pamph¬

let, (Plays for Children, 5 contains many useful suggestions, a catalogue of useful books on costumes, reference books, etc., as well as classi¬

fied lists of selected plays in English, French and German. Consult this pamphlet also for a list of (Dramatic Readers5 and dramatizations of school classics for all grades. Dramatiza¬

tions by the children's classes of the Francis W. Parker School, Chicago, published at nom¬

inal sums, are interesting to teachers as exer¬

cises in story-dramatizing.

Home Plays: Arkwright, Ruth, 'Browni—

kins and Other Fancies) (New York 1911) ; Bell, F. E. E., (Fairy Tale Plays and How to Act Thein) (New York 1908) ; Bullivant, Hˆ

(Home Plays,5 a miscellaneous collection of 27

plays for boys and girls by various writers (New York 1911) ; Burrows,

Edith M.,

(Cheery Comedies for Christmas5 (Boston 1915) ; Carter, Mrs. Elsie H., ‘Christmas Can¬

dies5 (New York 1915) ; Chapman, J. J., ‘Four Plays) and (Neptune’s Isle and Other Plays5

(New York 1911) ; Dalkeith, Lena, <Little Plays Told to the Children5 (New York 1907) ; De Mille, W. C., ‘Christmas Spirit and Votes for Fairies5 (New York) ; Dugan, Caro, ‘The King’s Jester and Other Short Plays5

(New York 1899) ; Goodlander, M. R., (A Book of Fairy Plays: Nine Short Plays5 (New York 1915) ; ‘Harper’s Book of Little Plays, 5 by Margaret S. Brisco, J. Kendrick Bangs, Caro¬

line A. Creevey, Margaret E. Sangster and others (New York 1910) ; Harris, F. H., ‘Plays for Young People5 (New York 1911) ; Keat¬

ing, ‘Home Plays for Boys5 (New York

1909) ; Mackay, Constance D., (The Silver Thread and other Folk Plays5 (New York 1910) ; Nesbit, Frank, ‘The Magic Whistle and Other Fairy Plays5 (New York 1912) ; Nixon, Lillian E., ‘Fairy Tales a Child Can Read and Act5 (New York) ; Pertwee, Guy, ‘Scenes from Dickens5 (London) ; ‘Saint Nicholas Book of Plays and Operettas5 (New York) ; Sowerby, Githa, ‘Little Plays for Little People5

(London) ; Syrett, Netta, ‘Six Fairy Plays for Children5 (New York 1904) ; Warner, Ellen E. K., ‘Nonsense Dialogues for the Youngest Readers5 (New York 1912).

School Plays and Pageants: Bird, G. E., and Starling, Maud, ‘Historical Plays, Based on the Voyage of Discovery to America5 (New York 1912) ; Black, Clementina, ‘Kindergarten Plays5 (2 vols., London) ; Bunner, H. C., ‘Three Operettas5 (New York) ; Cole, Edna G., ‘The Good Samaritan and Other Bible Stories Dramatized5 (Boston 1915) ; Comstock, Fanny, ‘A Dramatic Version of Greek Myths and Hero Tales5 (New York) ; Corbin,

Alice, ‘Adam’s Dream and Other Miracle

Plays5 (New. York 1909) ; Craig, A. A. T., ‘The Dramatic Festival … with Plays and Bibliographies5 (New York 1912) ; Gould, E. L., ‘Little Men and Little Women5 (New York 1900) ; Gunnison, Binney, ‘New Dialogues and Plays5 adapted from popular authors for all grades (3 vols., New York 1911) ; Hand, Gertrude, ‘Historical Studies in Dramatic Form, about Famous Men of American His¬

tory5 (16 vols., Boston 1914) ; Kraft, Irma, ‘The Power of Purim and Other One-act Plays for Jewish Religious Schools5 (Philadelphia 1915) ; Lincoln, Jennette E. C., ‘The Festival Book; May-Day Pastimes5 (New York 1915); Liitkenhaus, Anna M. (Irwin), ‘Plays for School Children 5 _ (New York 1915); MacDon-nell, Amice, ‘Historical Plays for Children5

(three series, New York 1914) ; Mackay, Con¬

stance D., ‘Patriotic Plays and Pageants’: ‘Indoors and Outdoors’ (New York 1912); ‘Plays of the Pioneers) (New York 1915) ; Merington, Marguerite/ Festival Plays: One-act Pieces for New Year’s Day, ‘ *etc.* (New York 1913); ‘ Holiday Plays; Five One-Act Pieces) (New York 1910) ; (Picture Plays, Seven Short Plays About Famous Pictures) (New York) Newell, W. W., ‘Games and Songs of Amer¬

ican Children’ (New York 1903); Sandys, W., (Christmas Carols, Ancient and Modern’

(New York); Sansing, M. F., (Dramatic

Readings for Schools’ (New York) ; Shoe¬

maker, C. C., ‘Holiday Entertainments, Adapted to All Holidays > (Philadelphia 1915) ; Wagstaff, Blanche (Shoemaker), (Colonial Plays, for the Sixth Grade’ (New York 1912) ; Walker, A. V., (Little Plays from American History’ (New York 1914).

General: Addams, Jane, (The Spirit of

Youth and the City Streets) (New York 1909) ; Appleton, E., (A Comprehensive Study of the Play Activities of Adult Savages and Civilized Children > (Chicago 1910) ; Chubb, Percival, festivals and Plays; in Schools and Elsewhere) (New York 1912) ; Curtis, E. N., 'The Dra¬

matic Instinct in Education) (Boston 1914) ; Davis, Dr. M. M., (The Exploitation of Pleasure) (in Russell Sage Foundation pamph¬

lets, New York) ; Finlay-Johnson, Harriet, 'The Dramatic Method of Teaching) (London 1911); Fry, E. Sheridan, Educational Dra¬

matics: A Handbook of the Educational Player Method) (New York 1913) ; Haywood, F. H., (The School and the Drama' (London 1910) ; Herts, A. M., 'The Children's Educational Theatre' (New York 1911) ; Manly, J. M., (The Children of the Chapel Royal and Their Masters' (in the Cambridge History of English Literature,' Vol. VI, London 1910) ; Needham, M. M., (Folk Festivals, Their Growth and How to Give Them' (New York 1912) ; Sandys, W., 'Christmastide, Its History, Festivals and Carols' (New York 1852).

Periodical Literature: Emmons, Myra,

(Pageantry for Children' (in Outlook , 22 July 1911) ; Gale, L., (Robin Hood in Jones Street'

(in the Outlook , 26 June 1909) ; Jones, G. L., (How Magic Piper of Hamelin Town Was

Given as an Outdoor Play' (in Woman's Home Companion, 15 April 1905) ; King, Helen M., 'Staging the Egyptian Princess' (in School Arts Magazine, March 1916) ; Parker, Louis N., 'Historical Pageants' (in Journal of Social Arts, Vol. LIV, p. 142) ; Peixotto, S. S., 'The Ideal Dramatics for a Boys' Club' (in Charities and Commissions, 3 Oct. 1908) ; Pierce, L. F., 'Children's Theatres' (in Green Book Album, Vol. IV) ; Spender, C. M., 'The Educational Aspects of Pageants and Pageantry' (in Jour¬

nal of Education, London, February 1911) ; Thompson, A. E., 'Staging The Lady of the Lake' (in School Arts Magazine, April 1916) ; Wade,

H. D., ‘What the Pageant Does for Local History’ (in American Revieiv of Re¬

views, September 1913) ; White, E. W., ‘Panto¬

mime in a Park’ (in Survey, 6 Aug. 1910) ; ‘Children’s Plays and How to Stage Them’ (in Year Book 1812, Francis W. Parker School, Chicago) ; ‘The Dramatic Instinct in the Edu¬

cation of the Young’ (in Year Book 1914, Francis W. Parker School, Chicago).

Duncan Macdougall.

CHILDRESS, Tex., town and county-seat

of Childress County, 200 miles northwest of Fort Worth, on the Fort Worth and Denver Railroad. There are railroad repair shops located here. The waterworks are municipally owned. Pop. (1920) 5,003.

CHILDS, George William, American phi¬

lanthropist and publisher : b. Baltimore, Md., 22

May 1829; d. Philadelphia, 3 Feb, 1894. He pub¬

lished the Philadelphia Public Ledger, 1864—94, which he made one of the first cheap newspapers in the United States. Under his management the Ledger attained a large circulation and wide influence. He educated over 800 children. He gave a Shakespeare memorial fountain to Strat¬

ford-on-Avon, a memorial window in Westmin¬

ster Abbey to Cowper and Herbert and assisted in establishing a home for printers at Colorado Springs. He published ‘Recollections of Gen¬

eral Grant’ (1885), and ‘Personal Recollec¬

tions’ (1889).

CHILDS, Thomas Spencer, American cler¬

gyman : b. Springfield, Mass., 19 Jan. 1825; d.

21 March 1914. He was educated at New York University and at Princeton Theological Sem¬

inary. He entered the Presbyterian ministry and held pastorates at Hartford, Conn., 1851-66; Norwalk, Conn., 1866-70; Washington, D.

C., 1882-90. In 1870-79 he was professor of biblical and ecclesiastical history at Hartford Theological Seminary and in 1880-82 was pro¬

fessor of mental and moral science at the University of Wooster. In 1890 he joined the Protestant Episcopal ministry and from 1894

to 1901 was archdeacon of Washington. In the latter year he became rector at Chevy Chase.

He published ‘Justification’ (1861) ; ‘Hints to Christians’ (1862) ; ‘The Heritage of Peace’

(1868) ; ‘Christ His Own Witness’ (1880) ; ‘The Voice of God to the Nation’ (1901) ; ‘Christian Unity and Church Unity’ (1902) ; ‘Mormonism and the Labor Question’ (1904).

CHILE, chel’a, or CHILI, chin (the

republic of), situated on the western coast of South America, between the Andes Mountains and the Pacific Ocean, is bounded on the east by Argentina and Bolivia and on the north. by Peru. In length it surpasses even Argentina (q.v.), for it extends from lat. 55° 59’ S. to 17° 57’ S. in a curving line, the total length of which is nearly 2,700 miles, but its greatest width is only 248 miles, and in the narrowest part the measurement from west to east is less than 70 miles. The total area is 292,419 square miles. Besides the Andean Cordillera on the east, there is a parallel western coast ridge or cor¬

dillera with moderate elevations, and in the val¬

ley between the two, from Santiago, the capital, to the south, are found the best agricultural districts and many towns. Compared with the other South American countries, Chile ranks as the seventh in size.

The northern part of Chile is a hot desert ; the southern a cold region of almost incessant rains ; but between these ex¬

tremes lies a great extent of territory blessed with a temperate and healthful climate. Divid¬

ing the republic, for convenience of characteriza¬

tion, into five zones, in the northernmost zone, despite its nearly absolute lack of vegetation, are the chief resources of the national wealth —the deposits of nitrate of soda, mines, *etc.* The second zone, continuing toward the south, is less torrid. Rain falls several times in the year; 500

and though mining is the chief industry, small areas are also devoted to agriculture. The third zone, in the centre of the country, has a tem¬

perate climate and fairly abundant rains. Cat¬

tle-raising, mining and the cultivation of cereals, vines and fruits are the leading industries. In the fourth zone, where rains are more abun¬

dant and the climate cooler, the chief products are wheat, cattle and lumber. The fifth and most southerly zone, extending to Cape Horn, is cold and rainy. From 43° 30’ southward, about 1,150 miles is a district of islands and uplands, rich in forests, fisheries and lands suitable for stock-raising.

Physiography. — The country is a valley enclosed between two lines of mountains. On the east is the Cordillera of the Andes, dimin¬

ishing in height to the south, where its line is crossed by various rivers and lakes. On the west a parallel, lower range, the coast Cordil¬

lera, is interrupted from about 42° S. lat. by many arms of the sea. It contains the line of islands that fringe the mainland,. Chilean geographical contrasts and extremes are here illustrated. The Longitudinal Valley, admir¬

ably fertile between 30° and 42° S. lat., is pro¬

longed in the arid desert of the north, but in the south is submerged beneath the ocean, becom¬

ing a drowned valley. The Cordillera of the coast is, geologically, older than that of the Andes. It is lower and less continuous, but so far resembles it that it presents, generally speaking, an abrupt slope to the west, while sinking much more gradually to the east. In Tarapaca it rises, almost from the sea, to heights varying from 1,000 to 7,000 feet. In Atacama it averages 3,000 feet, culminating in Penarave (7,300 feet). Farther south it re¬

cedes from the sea and sinks in height till it disappears below Tres Puntas. It rises again to some 7,000 feet in the central provinces, notably in Roble and Campana, near Valparaiso.

South of the river Ropel the range becomes lower and more complicated. Further south it splits into two parallel low spurs. South of the Bio-bio it is known as the Cordillera of Nahu-elfuta. Still further toward the south it shares with the valley, its companion throughout, that plunge already mentioned ; but its peaks and high plains form the line of islands clinging to the curved shore-line, though only at one point, the peninsula of Taitao or Taytao, is it visibly united to the continent.

Rivers that rise on the western side of the coast Cordillera form the smaller hydrographic system of the country; and the larger hydrographic system, the available source of un¬

limited power for industrial uses, includes rivers which have their source in the Andes and flow to the Pacific Ocean. North of lat. 28° S. all the rivers, except the Azufre of Tacna and the Loa, carry their waters to the sea only during a portion of the year. In the region just below this, to lat. 35° S., — and particularly in the Valparaiso-Santiago section — are rivers swollen by the melting snow on the mountains in No¬

vember, December, January and February and by rains that fall on their watersheds at an¬

other period. The more important of these annual floods is the former, which brings down into the agricultural valleys alluvial silt to re¬

new their fertility. But below lat. 35° S. the rivers are subject to floods, especially in June and July, rather then than in the season from November to February, because the melting of snow on the mountains affects the total volume of water much less in these latitudes. Navi¬

gable rivers are comparatively few, and in any event they would be called upon to play a less important role here than that assigned to the great inland waterways of Argentina and Brazil, since the ocean itself facilitates communication with, or between, the different parts of this nar¬

row country. The Andean rivers of the coun¬

try rise at great altitudes and accomplish their descent to the coast by a series of cascades and great waterfalls, not at a single point or two, but in many widely separated regions.

Above the southern limits of the arid zones are saline depressions in lieu of lakes, although in remote ages, before radical changes of cli¬

matic conditions had occurred, the lake region embraced these northern districts. Lakes are still numerous in the south and are often found at imposing elevations. There are almost start¬

ling variations of temperature between the hours of sunlight and those of darkness, both at high places among the mountains and in the northern zones generally. The severity of winter's cold is confined to the Far South and the high Andes, snow never falling on valley or foothill north of lat. 36° S. The difference occasioned in climatic conditions by the cold current from the south that flows northward along the west coast is noteworthy. The mean annual tem¬

perature on the west coast, wherever the influ¬

ence of this current (the so-called Humboldt current) is-felt, is 6° to 7° F. lower than that of places in the same latitude on the east coast.

The Humboldt current reaches Chiloe Island and thence flows northward to the equator.

South of Chiloe, therefore, or, more exactly, from Taytao Peninsula southward, we find other climatic influences and conditions ; and this statement applies to the entire territory of Magellan (Territorio de Magallanes) which, embracing nearly one-fourth of the total area of

the Republic, extends along the Pacific Coast from lat 47° S. to the southern extremity of South America. On the southeast it is, indeed, separated from the Atlantic Ocean by outlying portions of Argentina ; nevertheless the most important eastern outlet is secured to it by Chilean control of both sides of the Straits of Magellan. It has thus practically an outlook upon both oceans. The main divisions of the territory are the islands and channels north of the Straits of Magellan, up to the Peninsula of Taytao; north continental section, central con¬

tinental section — region of Ultima Esperanza ; south continental section — < Chilean Patagonia — peninsula of Brunswick; western islands and channels of Patagonia; islands and channels south of the Straits of Magellan; Tierra del Fuego (Chilean portion) ; and the islands and channels south and west of Tierra del Fuego.

The total area of the Territorio de Magallanes (66,861 square miles, almost equally divided between the continental part and the islands) is much greater than that of Rumania and only a little less than that of Uruguay. The (Censo Jeneral del Territorio de Magallanes, > written by Lautaro Navarro Avaria, shows that the territory has received more immigration during the last few years than has been available for the development of other portions of Chile. A great majority of the immigrants were men who came to take part in sheep-CHILE

raising and various industries, or who were at¬

tracted by not wholly trustworthy reports to the discovery of gold. The population at the date of the last census was only 23,650, 80 per cent of which was in the city of Punta Arenas and the town of Porvenir, and 20 per cent in the rural districts devoted to stock-farming. The climatic conditions are unfavorable to agricul¬

ture in the widest sense of the term, but sheep thrive uncommonly well on the immense pas¬

tures. The maritime traffic of Punta Arenas, despite its geographical remoteness, is very little inferior to that of Valparaiso, because its posi¬

tion on the. Straits of Magellan makes it the port at which a thousand

vessels — warships, merchant steamers, sailing vessels — call each year, to renew provisions or effect repairs of engines, or to spend a few hours waiting a favorable moment for passing the more or less dangerous points. See Juan Fernandez

Islands.

Flora and Fauna. — The essential characteris¬

tics of the Chilean flora were impressed upon it during the long ages of complete isolation, before the Argentine Pampas were lifted out of the waters that covered them. Even now the country is, on that eastern side, shut in by the Andean Cordillera, and on the north it is cut off from the rest of the continent by the deserts ; formerly its separateness was like that of a Pacific island; and so naturally it is dis¬

tinguished botanically by the large number of indigenous species peculiarly its own. Among these are two genera and five species of Francoacece, the skylanthus, and several species of cactacece. The potato is said to have come originally from Chile. It is still found wild in Chiloe and the adjacent islands and mainland.

The bean and peppers are also indigenous, and maize and quinoa were grown in the country before the Spanish conquest. The forests of the Juan Fernandez Islands, in so far as they have maintained their primitive character, may be classified with subtropical evergreens, be¬

cause all their trees and shrubs, with the single exception of the michai (Bcrberis corymbosa) which shed its leaves in July and August, re¬

main green throughout the year, thus showing adaptation to a temperate and uniform climate.

Even a tree by nature deciduous, namely, the peach-tree (Amygdalitis persica), retains its leaves all winter long when naturalized in Masatierra. Decidedly less noticeable in the fauna than in the flora are the insular or separate characteristics just referred to, al¬

though the fauna also differs from that of other South American countries to the extent of excluding jaguars (so common in regions just beyond the Andes), venomous snakes, monkeys, lizards (save in the northern zones) and river turtles. There are 12 genera and 25

species of rodents. In this order are included the beaver-like coypu and the chinchilla.

Among carnivora we find the wildcat, puma and fox. Characteristic ruminants are the huemul deer and the small pudu (the latter peculiar to Chile), and those wild members of the llama family, the vicuna and guanaco or huanaco. Birds, great and small, are the con¬

dor, the white and the black albatross, pelican, giant petrel, penguin, rhea (South American ostrich), cormorant, the barking guid-guid, turco, tapacollo, gull, swan, duck, parrot and three species of humming-birds (one peculiar to Chile). Fish, comparatively rare in the rivers, abound in the ocean near the coast and in the channels of Magallanes Territory, and are taken in great numbers in the northern har¬

bors. Chilean waters are also visited by whales and at. least six species of seals.

Political Divisions and Cities. — The re¬

public of Chile is divided into 23 provinces and the territory of Magallanes. In alphabetical order, with their areas and populations, capitals and populations, they are as follows :

Provinces

Aconcagua .

Antofagasta ….

Arauco .

Atacama .

Biobio .

Cautin .

Chilo6 .

Colchagua .

Concepci6n .

Coquimbo .

Curic6 .

Linares .

Llanquihu6 ….

Malleco .

Maule .

Nuble .

O’Higgins .

Santiago .

Tacna .

Talca .

Tarapaca .

Valdivia…

Valparaiso .

Magallanes Ter¬

ritory .

Total (1914).

Area

Popula¬

tion

Capital

Popu¬

lation

5,406

138,446

San Felipe… .

10,426

46 , 408

126,101

Antofagasta . .

36,114

2,189

63 , 209

Lebu .

3,500

30,711

66,641

Copiapo .

11,617

5,353

103,873

Los Angeles . .

11,691

6,381

172,006

T emuco .

16,000

6,979

95,756

Ancud .

3,979

3,851

159,930

San Fernando .

9,150

3,313

235,959

Concepcion …

69,776

14,098

183,787

La Serena ….

24 , 000

3,045

109,466

Curicd .

19,529

3,969

114,980

Linares .

11,122

34,778

124,947

Puerto Montt .

6,000

3,303

117,375

Angol .

7,896

2,812

122,754

Cauquenes ….

9,683

3,498

174,663

Chilian .

39,173

2,168

96,808

Rancagua ….

10,380

5,893

587,721

Santiago .

378,103

12,590

45,593

Tacna .

15,000

3,864

133,742

Talca .

39,526

16,689

123,843

Iquique .

45,012

8,991

151,537

Valdivia .

19,388

1,775

324,660

Valparaiso… .

187,240

65,355

22,744

Punta Arenas .

11,000

289,829

3,596,541

Population.— In 1907, the date of the last census, the population numbered 3,249,279, and in 1917 it was estimated as nearly 4,000,000. The great majority of the population is of European origin. The indigenous inhabitants are of three branches, the Fuegians, mostly nomads, living in the extreme south, the Araucanians (101,000), the ancient rulers of the country, who so long bravely resisted the white invaders, live in the valleys or on the western slopes of the Andes; the Changos, who inhabit the northern coast regions and perform most of the manual labor there. Immigration is small, but is encouraged by the government. The total number of immi¬

grants between 1905 and 1914 was 25,544. Colo¬

nies (agricultural settlements) are encouraged and their number and importance are increasing.

History. — The dominion of the Incas of Peru included the northern and central por¬

tions of Chile — at least to lat. 37° S. In 1535

the Spanish conquerors of the Inca empire sent their first expedition southward along the Pacific Coast; but the task of adding this terri¬

tory to the Spanish possessions in Peru and Upper Peru (Bolivia) was not undertaken in earnest until 1541 ; nor was it brought to a successful conclusion without desperate fight¬

ing in the second half of the 16th century.

Pedro de Valdivia suffered defeat and death in 1553 at the hands of Lautaro, the young Indian leader, and not of the famous Caupolican as many writers have asserted. Both Barros Arana and Errazuriz deprive Caupolican of the glory that Ercilla first bestowed upon him. The Araucanians offered a stubborn resistance, and even as late as the 18th century they made 502

good their prior claim to a large part of the country below lat. 37° S.

In September 1810 was formed the first national government, to rule the country dur¬

ing the captivity of the king of Spain, whom the French held as a prisoner. From that time forward the design to achieve independence was never relinquished, though the events of the years immediately following were of a character to discourage patriotic aspirations.

Chileans were defeated and compelled to return to a nominal subjection; the final success was won with the help of Argentine troops under General San Martin (see Argentina), and the independence of the country was proclaimed in 1818. A constitution, adopted in 1824, and re¬

modeled in 1828, was given in 1833 its final shaping, substantially the form which it still retains, though modifications demanded by the progress of the country have been made. Inde¬

pendence was recognized by a formal arrange¬

ment with Spain, and embodied in the treaty of 1844. In 1865,

however, a war broke out between the mother country and Chile and Peru, hostilities continuing until 1869. After an interval of peace, the War on the Pacific began. For many years the rights of Bolivia and Chile, respectively, in certain mining lands bordering on the Pacific Ocean remained with¬

out definition ; but in 1874 an agreement was entered into between the two countries which apparently disposed of the question at issue.

The exploitation of these lands by Chileans increasing, Bolivia reopened the dispute by im¬

posing an export tax on the nitrate, obtained in Bolivian territory. A Chilean company re¬

fused to pay the tax, alleging that it contra¬

vened the treaty of 1874.. The Bolivian govern¬

ment's reply was an order for the sale by auc¬

tion of the property of the offending company, on 13 Feb. 1879. Thereupon the Chilean gov¬

ernment sent a man-of-war to seize the port of Antofagasta. It soon became apparent that Chile would be obliged to deal with Peru against whom a secret offensive and defensive alliance had been formed bv Bolivia and Peru in 1873. On 5 April 1879 Chile declared war against the latter republic. Tacna and the neighboring port of Arica were occupied by the presidents of Peru and Bolivia with their troops ; the defense of Iquique was entrusted to a sufficient force, and at Lima a reserve of about 10,000 men was held in readiness to meet the Chileans at any point that might be at¬

tacked. The plans of the allies seemed to have been well laid, and some initial successes fell to them. Two Chilean warships, the Esmer¬

alda and the Covodonga, blockading Iquique, were attacked by the Peruvian frigate Inde-pendencia and the monitor Hudscar. The Es¬

meralda was sunk by the Hudscar, but the latter on 18 October fell in with the Cochrane and Blanco of the Chilean navy north of Point Mejillones. A fight of great severity ensued.

Only 86 men were left alive on board the Hnds-car, out of the complement of 216, when she was obliged to surrender. This vessel

was re¬

paired and added to the Chilean navy. Pisagua was captured from the Bolivians by Chilean warships. On 18 Nov. 1879, the allies were defeated in the battle of San Francisco, but before the close of the same month they scored a dearly bought success against the Chilean forces in the battle of Tarapaca. Chilean divi¬

sions commanded by General Baquedano in¬

vested the town of Moqucgua, and on 23 March 1880 entered Torata. Two months later the city of Tacna (now the capital of the Chilean province of that name) was taken (26 May).

The troops of the allies, including 5,120 Peru¬

vians and 3,200 Bolivians, commanded by Ad¬

miral Montero, and the Bolivian President, General Campero, sustained a crushing defeat.

Arica, the port of this district, was attacked by the land and sea forces of Chile in June, and fell after making a desperate resistance. In order to emphasize the defeat and to cripple the more important members of the alliance, the Peruvian coast was laid waste, Mollendo was destroyed, Callao and other ports block¬

aded and an expedition under Baquedano's command made ready to proceed to Lima. See Peru.

As the fruits of her victory, Chile took from Bolivia the districts of Cobija and Ata¬

cama; from Peru the coast line north of, the Bolivian possessions to, and including, condi¬

tionally, the province of Tacna. Thus Chile's territory on the Pacific was extended north¬

ward from the old boundary, at lat. 24° S.

One of the allies was cut off from communi¬

cation with the outside world by way of the Pacific Ocean; and a strategic frontier was established against the other ally. A truce, instead of a treaty, was concluded between Bolivia and Chile after the war, the sentiment of the Bolivians being utterly averse to any per¬

manent arrangement which did not give them access to the sea. Renewal of negotiations for a definite treaty, which should include the con¬

cession of a seaport, was repeatedly urged by Bolivia, but without effect. Peru, by the terms of the treaty of Ancon (1883), surrendered to Chile absolutely the valuable nitrate district of Tarapaca, but with respect to the Tacna-Arica region a peculiar convention was made.

It was agreed that Tacna-Arica should be gov¬

erned by Chile for a period of 10 years, and that, at the end of the decade, the vote of the inhabitants should decide whether it would be better for the province to revert to Peru or to be administered by Chile in the future —the country thus rejected by popular vote re¬

ceiving from the other country $10,000,000 silver by way of compensation. Over 32 years have passed, and the Peruvian government has re¬

peatedly urged fulfilment of the treaty, but the plebiscite has not yet been held. The regions that then changed hands now form the north¬

ernmost zone of Chile. The Bolivian frontier was settled by the treaty of October 1904.

Some of the amendments to the constitution referred to above were adopted before the out¬

break of the war with Peru and Bolivia. They embodied the liberal ideas which, in 1874, tri¬

umphed over the conservation of the proprie¬

tors of large estates, a class practically dominat¬

ing the government's policy up to that time.

The most . forceful of the liberal leaders who effected this important political change was Balmaceda, a member of Congress in 1868,

Minister to the Argentine Republic at the time of the war with Bolivia and Peru, and, in 1885, elected to the presidency of the republic. Balmaceda's advocacy of measures relating to internal im¬

provements, a system of popular education and the separation of Church and State, created bitter antagonism. United in opposition to him CHILE

Copyright, Brown & Dawson, N. Y.

1 Nitrate deposit and Refining Plant, Northern Chile 2 Port of Valparaiso, Chile CHILE

were all those who disapproved of his vigorous liberalism on principle, and all who were jeal¬

ous of his power as an individual. In 1888

the country was plunged into civil war. The operations of the forces of the revolutionists were directed by a junta representing Congress.

The President assumed the powers of a dictator for the defense of his position; but he was de¬

feated, and died by his own hand on 19 Dec.

1891. The opinion prevailed in Chile, when this conflict was at its heigh*, that the United States government, through Minister Patrick Egan, was showing favor to the cause of Balmaceda, and discriminating against the Con¬

gressional party. The fierce resentment felt by the latter expressed itself in an attack upon sailors of the United States cruiser Baltimore, who became involved, while on shore, in a brawl with Chilean sailors. There was a riot of the populace in the streets, and several of the Baltimore's men were seriously or mortally wounded. When a report of this indignity reached Washington, suitable representations were

made by the authorities there, but un¬

fortunately it was necessary to address such representations to a merely provisional govern¬

ment at Santiago. The latter not only refused the demand for satisfaction, but insisted that the men who had been assaulted should be handed over to Chile for trial as criminals.

The management of Chilean affairs was en¬

trusted to President Montt, and the demand of the United States was emphasized by the send¬

ing of two additional warships to Chile. The new President tendered apologies for the dis¬

courtesy of the provisional government, as well as for the attack upon men wearing the uni¬

form of the United States; and compensation was made to the wounded sailors, or to the families of those who had died.

Chile and Argentina had agreed that their common boundary should be a line running along the crest of the Andes, which was errone¬

ously supposed to be the watershed throughout.

Discovery of this error occasioned disputes at first, and finally a resort to arbitration. By mediation of the Ambassador of the United States, an agreement was reached as to the northern districts. The more intricate southern portion was surveyed bv a boundary commis¬

sion under Sir T. W. Holdich ; and King Ed¬

ward of England, as arbitrator, issued the award in 1902. On 28 May 1902, the plenipo¬

tentiaries of Chile and the Argentine Republic concluded two important agreements, the first of which provides for the arbitration of all questions not affecting constitutional precepts, or that cannot be settled by direct negotiations.

It is entitled a ((General Treaty of Arbitration,®

and the desire is expressed in its introductory clause ((to settle by friendly methods whatever questions may arise between the two countries. ®

The second agreement is entitled a “Convention on Naval Armaments,® which has (<the object of removing all causes of anxiety and sus¬

picion. The two governments “renounce the acquisition of the war vessels they have in con¬

struction and the making for the present of any new acquisitions ;* agreeing, moreover, to re¬

duce their respective fleets until they arrive at “a prudent equilibrium.®

On 25 May 1905 Sefior Alejandro Lira

signed the A. B. C. peace treaty at Buenos Aires. Diplomatic relations with Peru were severed in 1909 but no serious results ensued.

On 10 July 1911 King George of England ren¬

dered his award in the long-standing Alsop claim, assigning $935,000 to the Alsop firm. The original amount of the claim was $3,000,000 with interest. Chile paid the amount 13 November through the government of the United States.

In 1913 the railway from x\rica on the coast of Chile to the Bolivian plateau was completed.

The control of this railway is to be retained by Chile for 15 years, that is, until 1928. In 1915

Chile felt very keenly the effects of the Great War; the suspension of her credit in Europe, the loss of her export market and the obliga¬

tion to secure her imports from new sources.

Readjustment soon took place, however, and in some cases on a healthier basis. Bad credit practices have been destroyed ; desirable re¬

trenchment in public expenditures was in some cases enforced. Trade

losses in one direction were made up in many instances by gains in other directions, and, in some cases, more nat¬

ural routes and relations were established.

Chile protested to Great Britain in 1916, against the destruction of the German cruiser Dresden by a British fleet in the territorial waters of the Juan Fernandez Islands, and received an apology from the latter stating that the Dresden had not accepted internment and that it was destroyed to protect shipping. This apology was accepted by Chile. Germany protested to Chile, denying the allegations of the British note and demanding satisfaction. This protest was returned by Chile. (See Latin America and the War). President Juan Luis San-fuentes, representing the Liberal Democrats or new Balmacedists took office 23 Dec. 1915.

Government. — The constitution of 25 May 1833 is still in force, though repeatedly amended. That fundamental law established for Chile a form of government, with legisla¬

tive, executive and judicial branches, which at first sight appears to be genuinely republican; but the oligarchical tendencies are much stronger than in any other South American country. The legislative power is vested in the national Congress, composed of the chamber of senators, with members elected for a term of six years by direct vote and by provinces, in the proportion of one senator to each three depu¬

ties ; and the chamber of deputies, with mem¬

bers elected for a term of three years. To represent Congress in the period of its recess, there is a permanent committee of 14 members, one-half chosen by each chamber. The Presi¬

dent of the republic? holds office for five years, and cannot be reelected for the next consecu¬

tive period. A Council of State, composed of 11 members, some of whom are appointed by the President, and others by the chambers, has the power to intervene in certain appointments, and its consent is necessary for the promulga¬

tion of laws, the granting of pardons and some other matters. This council is not to be con¬

fused with the Cabinet, in which there are but six ministers or secretaries : the Minister of the Interior; of Foreign Affairs; of Justice and Public Instruction ; of War and the Navy; of the Treasury; of Industries and Public Works. The judicial branch of the government comprises: the Supreme Court of Justice located at Santi¬

ago, and composed of seven members, with authority over all other tribunals of the re¬

public; the Court of Appeals, for the districts 504

of Tacna, Serena, Valparaiso, Santiago, Talca and Concepcion; one or more justices of the peace in each department of the republic ; and sub-delegation of minor district judges. Juries exist only for suits involving the question of abuse of the freedom of the press. Senators must not be less than 36 years of age, and must have a fixed income of $2,000 a year. Deputies also must be not less than 36 years of age; and, they must be possessed of a fixed income of $500 per annum and, also like senators, serve without salary. Every married male Chilean of 21, or unmarried man of 25, not civilly dis¬

qualified by judicial act, is an elector. It is provided, however, that he must be able to read and write and must have a certain amount of property. The literacy test disfranchises con¬

siderably more than one-half of the possible electorate. This makes the members of the Congress the choice of a few electors. The President, who must be a native Chilean of not less than 30 years of age, is chief of the ex¬

ecutive branch. He is elected by representa¬

tives who are themselves, by direct vote of the whole electorate, sent to a special congress for the purpose. The President is forbidden to leave the country either during his term of office or in the following year without sanction of Congress. His salary is $15,000 per annum.

He is assisted in his duties by a Council of State of 11 members, five of whom he appoints, while six are appointed by the Senate. With the sanction of the Council of State, the President may convene

extraordinary sessions. In the event of the President's death or abdication, the Minister of the Interior becomes Vice-President and chief of the executive branch.

The President is, ex officio, chief of the army.

The executive is represented in each depart¬

ment by a public prosecutor, who initiates civil and criminal prosecutions and is an officer de¬

pendent on the ministries of justice and of the interior. Limitations of the presidential in¬

fluence and its subordination to the legislative power appear very clearly in the circumstance that the Cabinet must resign if it encounters an adverse vote in Congress.

Education. — In many parts of Chile educa¬

tion scarcely touches the common people ; but, so far as the upper and middle classes are con¬

cerned, the educational system is fairly well developed. Elementary education is free, but not compulsory ; and although there are schools of some kind in all towns, 75 or 80 per cent of the population as a whole must be called illit¬

erate. The University of Chile in its various departments (including law, engineering, medi¬

cine, philosophy and the fine arts) has an attendance of 1,300. Other public educational institutions are the National Institute, with 1,200 pupils; Institute of Pedagogy; about 30

lyceums of secondary instruction for men ; and 15 lyceums for girls; 6 normal schools; a con¬

servatory of music ; a commercial institute ; also schools of fine arts, agriculture, arts and trades, for the blind and for deaf-mutes, pro¬

fessional schools for girls and industrial schools.

Private educational establishments are numer¬

ous and receive pupils from other Latin American countries. The Roman Catholic Uni¬

versity has courses of engineering and law.

There are several museums of natural history and fine arts; an astronomical observatory and meteorological .observatories; botanical gar¬

dens and, in various parts of the country, 41

public libraries, with 240,000 volumes. At Copiapo, La Serena and Santiago there are mining schools; and agricultural schools at Chilian, Concepcion, Ancud and other cities.

In 1916 the Chilean legislature voted to es¬

tablish a school of mining at Antofagasta ow¬

ing to the importance which that province has assumed in the exploitation of the mineral wealth of the nation ; and with a view to train¬

ing native engineers and to encourage the ex¬

tensive study of the mineral resources of Antofagasta and promoting their exploitation.

Exceedingly interesting are the statistics relat¬

ing to instruction in Magallanes Territory, for it is shown that 77.77 per cent of all inhabitants of that territory, above the age of six years, can read and write; 1.89 per cent can read but cannot write ; and only 20.33 per cent are en¬

tirely unlettered. But the percentage of illiteracy in Chile as a whole is, as we have just said, nearly four times greater. Comparing the Chilean population of Magallanes Territory with the foreign element, the former shows 25.51 per cent of illiteracy as against 13.23 per cent for the latter. A still more favorable result is obtained if we scrutinize the reports of primary and secondary schools in that ter¬

ritory. It appears that more than 83 per cent of all children of school age there can read and write, while less than 17 per cent must be classed provisionally among illiterates. The Report of the

Commissioner of Education for the year ended 30 June 1915 (Washington 1915) contains the statement : ((Thc budget passed by the Chilean Congress (for the year 1915-16), carries $122,450 (United States currency) for public instruction. This is less than 1 per cent of the entire budget and represents a mere fraction of the public expenditure for educa¬

tion, which is supplied mainly by the provincial governments.® According to the latest annual of the Chilean bureau of statistics there were 3,131 public and 506 private primary schools in Chile at the close of the year 1913, with 318,000

and 61,000 pupils respectively ; 16 public and 2

private normal schools with 2,650 and 225 pupils respectively; 86 public and 120 private second¬

ary schools with 25,500 and 17,400 pupils re¬

spectively; 11 public and 10 private commercial schools, 3,660 and 1,690 pupils respectively; special schools of the army numbered 6 and there were 7 special schools of the navy. The cost of maintaining the public primary schools in 1915 was $2,945,310.

It is proper to note under this heading that the Spanish language, as written and spoken in Chile, differs from the standard Castilian in many respects. For example, the initial g in such words as general is changed to j. Com¬

pare in the bibliography the titles (Historia JeneralB (Censo JeneraU

Agricultural and Pastoral Industries.—

The extent of lands capable of being utilized for agriculture is estimated at somewhat more than 146,000 square miles; but one-half of this is covered by forests and woods, a little more than one-eighth is properly pasture-land, and one-tenth irrigated areas or can readily enough be made productive by irrigation. About one-eighth. of the total area of Chile may be classed as plains not requiring, irrigation, and the soil has been built up by silt brought down in the flooding mountain streams, Tfie main crops are CHILE

wheat, maize, barley, potatoes, rye, oats and forage plants. In the irrigated valleys of the north — in Tacna, Tarapaca, Atacama and Coquimbo — maize gives two crops annually.

Other products are grapes, many of the sub¬

tropical fruits, tobacco, sugar-beets, honey and hemp. Vineyards exist from the northern ex¬

tremity to Llanquihue. In the north, from Tacna to Aconcagua, the slopes of the irrigated valleys are clothed with the luxuriant green of the vines. And in these irrigated valleys, from Atacama to Chile's northern boundary, there are generous crops of figs, pomegranates and olives. Some of the Chilean tropical fruits are exceptionally fine. There is an immense grazing area in Magallanes Territory, near the Straits of Magellan; and sheep and cattle thrive in that part of the country. The horses bred in the central zones are short-bodied but powerful animals. Many conditions favoring agricultural development are present; but other conditions are very unfavorable. Nearly all the agricultural land of the Central or Longitu¬

dinal Valley, especially from Cautin up to Aconcagua, in the provinces of Valdivia and Llanquihue on the south and Coquimbo on the , north, is in the hands of wealthy families of Spanish descent or others who have been <(absorbed into the local oligarchy.® ((Although the law provides that land shall be divided up into equal shares among all children, a kind of patriarchal system prevails ; and although a mansion or hacienda may shelter a group of families, the agricultural estates themselves are not split up. Consequently in these central provinces large estates are the rule.® There is little modern enterprise ; antiquated agricultural methods are still favored; leisurely and waste¬

ful ways persist. Life on the haciendas is often very pleasant. Many of the houses are large, well built, delightfully equipped and money is plentiful. In the irrigated valleys of the north also much of the land is held by the ruling classes. There remain districts not yet absorbed for development, but the chief draw¬

backs of these are isolation, lack of transporta¬

tion facilities and labor.

In 1913-14 the principal crops, with their acreage and production, were as follows : Wheat 1,018,382 acres, 8,787,852 cwts. ; barley, 152,625

acres, 2,386,157 cwts.; oats, 121,615 acres, 1,267,-

815 cwts.; maize, 58,609 acres, 752,791 cwts.; beans, 76,188 acres, 737,626 cwts.; potatoes, 81,-

299 acres, 197,338 tons; vines, 162,902 acres, 45,981,056 gallons of wine. On 31 Dec. 1913

the live stock of Chile comprised 457,845 horses, 38,193 mules, 1,968,620 oxen, 4,602,317 sheep and 221,384 pigs. Dairy farms and the pro¬

duction of butter and cheese are on the in¬

crease. In Patagonia and Tierra del Fuego large tracts of country are devoted to sheep¬

farming.

The total wool production of Chile in 1916

was 20,000,000 pounds, more than twice that of Peru, the other great wool growing country of South America on the Pacific coast. As Chile does not export agricultural products to any great extent, the European War did not have a marked effect on the agricultural situation. In the latter part of 1914 the closing of the nitrate fields deprived the farmers in the south tempo¬

rarily of a good market for their products, but a full and complete recovery was soon effected.

Labor. — A system of management which is a direct outgrowth of the conditions described in the foregoing section prevails on the large estates. A landed proprietor allows any farm laborer to take up as much land as he can till with the assistance of his family. He pays, no

rent, and the produce of the land is his own ; but he has to sell his services to the landlord, whenever need for them arises, at less than one-half of the prevail¬

ing local rate. Thus a permanent supply of labor is secured by the landlord, and occa¬

sional employment by the laborer, or inquilino, as he is called (Lat. inquilinus , Sp. inquilino , tenant; compare peon, day-laborer). The in¬

quilino s are obliged to work for the landlords at the time their own little farms need attention.

The evils of the system are felt by both land¬

lord and tenant, since the inquilino s, whose own farms are perforce under-cultivated by women and children, naturally render apathetic and inefficient service on the big estates. Con¬

tributory to the maintenance of such economic¬

ally unsound arrangements is the character of the peasantry. There is a strong element of Indian blood (Araucanian, etc.) in the Chilean laboring classes generally; and although hardy and fairly hard-working, when well directed, they cannot easily be transferred from one place or occupation to another. They lack en¬

terprise but have patience, when sober, and uncommon powers of endurance at all times.

Professor Ross makes the assertion that the dominant class of landed proprietors in Chile was, as a whole, not averse to the per¬

petuation of the regime of paper money, under which the peso fell far below its former value; because when the peso depreciated farm wages did not rise in equal or corresponding degree, so the cost of labor to the hacendado or land¬

lord was reduced by a substantial amount.

Chilean laboring men are beginning, however, to have clearer ideas in regard to abuse of privi¬

lege. A general strike occurred in 1913, and a labor deputation visited the President of the Republic. The demands of the strikers included

the redemption at par of the paper currency, the legal tender currency being worth only 20f4

cents at the time; recognition of employers'

liability for accidents and establishment of an eight-hour working day. The Chilean govern¬

ment has recently adopted measures of con¬

sideration for mothers working in factories. A special room is provided in factories where mothers may keep their children under one year of age, and may spend one hour of the work¬

ing day in caring for them without any loss in wage.

The shutting down of the nitrate plants in the latter half of 1914 seriously affected over 50,000 laborers in the nitrate industries. The government was obliged to transport large num¬

bers with their families to the agricultural dis¬

tricts where their presence served to depress the wage of the agricultural laborers. Early in 1915, the nitrate market greatly improved and the nitrate laborers were all returned to their own field of high wages. The employees of the manufacturing establishments of the central provinces also suffered severely in the first year of the war because the mills curtailed produc¬

tion. The miners were little affected by un¬

employment although employers complained of their inability to secure adequate currency for the payment of their men, The agricultural 506

laborers suffered least of all as agriculture was little affected and the war tended to raise the price of agricultural products.

Mining. — The deposits of nitrate of soda, or Chilean saltpetre (salitre), are in Tacna, Tarapaca, Antofagasta and Atacama, and their preservation is due to the rainlessness of those northern provinces. Measured from north to south, the deposits extend about 300 miles.

Less than one-fourth of the total area of the salitreras has as yet been thoroughly investi¬

gated ; but surveys of 2,242 square miles in that region, which was once the bed of an inland sea, were followed by the publication of the statement that 244,000,000 tons remained as a supply for the future. The annual expor¬

tation of salitre previous to 1915 exceeded 2,000,000 tons, valued at five-sixths of the entire export trade. But the exports of nitrate in 1915 were worth $77,981,158, as compared with $111,454,397 in 1913. The development was be¬

low normal for reasons stated under Banking and Finance. (See also Commerce — conclud¬

ing paragraphs). In 1914 the exports of salitre fell to 40,147,463 quintals (of 101.4 pounds) ; but in 1916 it had risen to 64,781,125 quintals, or more than 3,000,000 tons, the largest in the history of the nitrate business in Chile. The revenue from the export tax on nitrates and iodine (a by-product of the extraction of nitrate from the raw ore) is more than two-fifths of the entire public revenue. The exports of nitrate in 1917 were less than in 1916 owing to lack of shipping facilities to transport the stock on hand. The Chilean government, on 16 April 1917, sold at auction large tracts of nitrate lands and purchases were made by 11

companies, three of whose bids amounted to more than $1,000,000 each. Only two of the tracts offered were not sold.

Next in importance are copper ores, which abound in the ancient cordillera of the coast and the lower slopes of the Andes in the central and northern zones. The copper output of Chile is increasing, owing to the development of large copper properties in which North Ameri¬

can capital is invested. Copper exports ad¬

vanced from $10,337,35 1 in 1913 to $15,143,802

in 1915. During 1916 Chile exported the largest amount of copper in her history, 120,756 tons as against 113,913 tons in 1915. This increase was due to the large output of the Churquicamate and Teniente mines. In 1917 the copper mines of Chile were being increased, enlarged and improved. Iron mines in the Coquimbo dis¬

trict are also being developed by American capitalists. Large quantities of gold were ob¬

tained during the first century of the Spanish conquest by the use of unpaid native labor. In the 18th century the output of silver was large enough to be, perhaps, misleading; for Chile is much less a land of precious metals or pre¬

cious stones than the equatorial lands of South America; but, in addition to copper and iron, Chile has coal in various sections of the country. The principal mining centre is the coastal region south of the river Bio-bio, as far as the port of Lebu. Deposits have been found still farther south. The coal fields of the province of Arauco, it is estimated, con¬

tain over 1,800,000,000 tons. The coal mining companies have invested in this industry over $7,500,000 qnd now produce over 1,000,000 tons \f coal per year. The product of these mines is from 10 to 20 per cent below the standard in the United States and Great Britain. Native coal is used in the factories at Lota and Coronel ; on Chilean steamers and railways.

The most interesting development of coal min¬

ing in South America is at Lota and adjoining regions in the province of Concepcion. The territory of Magellan has no mineral resources that can be compared with those of the provinces of the north and centre of the re¬

public. Veins of coal (lignite), not of the besl quality, have for a number of years been mined at the Loreto, near Punta Arenas, and copper ores are obtained at Cutter Cove on the penin¬

sula of Brunswick. There are washings of auriferous soils at some points in Tierra del Fuego and the Minas River; and calcareous and other salts exist. Mining is still in the initial stage in Chile. The number of work-people employed in mining in 1914 was 71,106, of whom 43,979 were engaged in nitrate of soda workings, 8,105 at coal mines and 11,142 at cop¬

per mines. Chile possesses rich iron mines, but the absence of good coking coal has been a great handicap to the iron industry. Plans were being made, in 1917, to use charcoal in the smelters, and Swedish and Belgian experts, familiar with the iron industry, were experi¬

menting in Chile where good charcoal is abundant.

Antofagasta is one of the departments of Chile richest in mineral wealth. Alum, salt, sulphur, nitrates, aluminum, borax, carbonate of lime, chloride of sodium, cobalt, carbonate of soda, nickel and potassium are found in various parts of the district. One of the largest known deposits of low-grade copper is at Chuquicamata and is being worked by the Chile Exploration Company. Other extensive deposits exist at Caspana, Cerro Gordo, Conchi, Chacaya, Chug-Chug, Desesperado, El Cobre, Huacazul, Huanta-Jayita, Lagarto, Lomas

Bayas, Mantos Blancos, Moctezuma, Naguayan, Nuevo Tamayo, San Lorenzo and a score of other places, some of which yield high-grade ores. There were copper smelters at Colama, Chuquicamata, Gatico, Antofagasta and sev¬

eral other places ; and additional smelters were being projected in 1917. Iron, in various com¬

binations, exists through the province ; and mercury, blue vitro], gypsum, tripoli and zinc among its unexploited wealth. The gypsum covers the desert plains over large areas.

Manufactures. — The more important indus¬

tries of Chile, after the chemical and metallur¬

gical, are those concerned with the manufac¬

ture or preparation of food substances, bever¬

ages, textiles, clothing, leather, woodworking (including furniture and carriage building) and pottery. In 1917 there were over 6,200 fac¬

tories, employing 80,697 operatives, of whom 27,138 were women and 6,443 children.

Six Chilean concerns make china and glass¬

ware and the ((Fabrica de Vidrios^ (Window-glass Factory) and the ((Sociedad Nacional de Vidrios® (National Window-glass Company), both in Santiago, employ over 2,000 workmen.

The latter has a capacity of over 25,000 pounds of glass a day. The manufacture of plate glass was begun in 1917. Beer and wine bottles, demijohns and other heavy utility glassware are made by the ((Sociedad Fabrica Nacional de Vidrios," which has a capacity of 36,000,000

bottles, which was (1917) sufficient to supply CHILE

the entire demand of the country. Several packing-houses had begun to carry on a profit¬

able business in Chile in 1916, and in 1917

<(La Compania Frigorifica de Puerto Natales,®

with a capital of £100,000, and a capacity of 500,000 sheep a year, was under construction at Ultima Esperanza, in Magallanes Territory.

All the refrigerator plants were paying divi¬

dends of about 100 per cent a year, so great was the rush of business caused by the European War. The annual consumption of paper and paper products in Chile was, in 1917, a little less than $4,000,000, of which over $3,000,000

was imported. The local product consisted principally of colored poster, cover paper, wrap¬

ping paper and cardboard.

There are more than 100 factories in Chile manufacturing ready-made clothing, underwear, shirts and waterproofs. A very large part of the output of these factories is sold in the local market as imported goods.

The knitting indus¬

try developed greatly between 1900 and 1917.

On the latter date there were 17 factories in Santiago alone. One cordage factory, (<La Sociedad Industrial de las Andes®, employed 350

hands in 1917 and was unable to supply the local demand. It was making an extensive propaganda to encourage the growth of hemp in Chile. The Santiago Lumber and Ship Company manufactures half the packing boxes in Chile and has a large output of shingles (1917). The European War called into being several furniture factories in Chile, and numer¬

ous establishments for the manufacture of food stuffs. Forty of these were represented at the Chilean Industrial Exposition opened at Santiago in September 1916; yet these were ((only a small part of the food producing fac¬

tories of the country.® More than 150 factories are engaged in the making of alcohol, liquors, beers and other drinks ; and about 40 in the manufacture of mineral waters. In 1915 there were 139 establishments in Chile turning out paper and paper products. Of these 99 also did a general printing and binding business and 12 conducted lithographing establishments.

The cost of the maintenance of these factories was, in 1916, over $6,000,000. More than 90

per cent of the machinery used in the paper business in Chile is European.

The total number of factory employees is distributed as follows: Breweries, 4,225; glass and pottery, 1,053; food products, 12,068; gas and electricity, 1,208; shipyards, 1,034; cloth¬

ing, 14,016; furniture and wood products, 12,-

393; building supplies, 1,365; textiles, 2,568; metal products, 6,880; paper and printing 4,731 ; leather and furs, 12,279; drugs and chemicals, 2,871; tobacco products, 1,735 ; carriages and other vehicles, 1,530; miscella¬

neous, 731 ; total, 80,697.

Tariffs. — Imports, being subject to specific duty or charges by weight (instead of ad valo¬

rem duty, as in the United States), may be dutiable on net weight, gross weight, weight including packing or weight including con¬

tainers. No brief statement can summarize the various regulations prescribing the imposts on all classes of goods except those which, from motives of public policy, are admitted duty-free; but it is important to note that the application of a specific tariff results in the payment of identical duties on articles having the same name and general description, even though there may be a wide range of quality.

To make this quite clear and to emphasize the difference between the Chilean practice in this respect and the practice in the United States, a concrete instance may be cited, as follows : Suppose two different articles, one worth $1,000

and the other $2,000, were imported into the United States. The duty, if calculated on an ad valorem basis of 40 per cent, would be re¬

spectively $400 for the first and $800 for the second. But if these articles should be im¬

ported into Chile, the duty would be assessed regardless of the difference in quality. The effect is to encourage the importation of costly articles. Consult Filsinger, E. B., Export¬

ing to Latin America,* New York and London 1916.

Commerce. — In 1915 the value of Chile's imports from the United States was $17,800,-

611; in 1914, $13,627,618; and in 1913, $16,616,-

618. In 1913 the last normal year before the war in Europe, the figures for Chile's foreign commerce were: Imports, $120,274,001, exports, $144,653,31 2; Great Britain leading in both ex¬

ports and imports, followed by Germany, the United States and

France. Chile's principal exports were : Nitrate of soda, 2,666,000 tons (metric tons of 2,204.6 lbs. in this item and each of the following) ; copper concentrates, 69,106 tons; oats, 53,515 tons; wheat, 52,291

tons; borate of lime, 42,011 tons; copper, 37,712

tons; bran, 14,855 tons; iron ore, 14,100 tons; wool, 12,786 tons; beans, 10,840 tons; hides, 5,881 tons; wheat flour, 5,612 tons; whale oil, 3,109 tons; iodine, 437 tons. The 12 leading Chilean ports, whose rating is based upon the value of their imports, are, in the order of such rating: Valparaiso, Talcahuano, Antofagasta, Iquique, Resguardos, Valdivia, Punta Arenas, Taltal, Coronel, Tocopilla, Coquimbo and Cor-reos. On the other hand, the 12 leading in exports take rank as follows : Iquique, Anto¬

fagasta, Mejillones, Tocopilla, Taltal, Caleta Buena, Valparaiso, Coloso, Punta Arenas, Pisagua, Junin and Talcahuano. The imports during 1914, as classified by the Central Statis¬

tical Office of Chile, were, with values in United States gold : Oils, varnishes, paints and coal, $18,478,181; textiles, $17,838,117; mineral prod¬

ucts, $15,972,919; vegetable products, $14,161,-

999 ; machinery, instruments, tools and appa¬

ratus, $11,192,688; arms, ammunition and explo¬

sives, $8,639,150; animal products, $5,755,723; perfumery, pharmaceutical and chemical arti¬

cles, $2,555,533; paper and cardboard and manu¬

factures thereof, $2,467,004; beverages, $1,497,-

261 ; miscellaneous, $1,269,609. The effect of the European War upon Chilean commerce is described in the following paragraphs :

((The United States in 1915, for the first time, ranked first both in exports from and imports into Chile, receiving more than 42 per cent of Chilean exports and selling to Chile more than 33 per cent of the goods imported.

Before the European War, the order of im¬

portance of countries in trade with Chile, both export and import, was Great Britain, Germany and the United States. But while the exports from Chile to the United States were $lb,765,-

000 greater, the imports from the United States were $1,510,121 less in 1915 than in 1914. In other words, the increase in exports to the United States was greater than the total amount of imports from this source.® (Supplement to 508

Commerce Reports, Annual Scries, No. 41b, 10 Nov. 1916). In fact, the total imports from all countries showed a decrease of $42,538,977, while the total value of exports to all countries showed an increase of $10,179,052 in 1915 over 1914.

Currency. — Although Chile is nominally on a gold basis, the currency is inconvertible paper.

Hitherto there has been no limit to the fluctua¬

tions in the exchange quotations, because there has been no fixed unit of value as a basis for rates. A theoretical unit does indeed exist, namely, the gold peso, representing 0.599103

grammes of gold .91666 fine, or, say, 0.54918

grammes pure gold, of which the par value in terms of currency of the United States is $0,365, and its equivalent in British currency, 18d.

But this law is not in operation, and the actual circulation is composed of government notes which are quoted on the market at rates fluct¬

uating between 18 and 25 cents per peso. In 1915 the rates fluctuated in the neighborhood of 7y2d., thus showing a depreciation in the paper currency of about 25 per cent. The ac¬

tion of the government in authorizing its con¬

version office to issue notes against gold at a fixed rate of 12 pence per peso in 1916 indi¬

cates the possibility of the adoption of the gold exchange standard, in a manner analogous to that of Argentina (q.v.), Brazil, Mexico (in time of peace) and Panama. The basis of exchange in Chile is the 90:day London bill, which is quoted in terms of pence per one paper peso (consult (Latin American Monetary Sys¬

tems and Exchange Conditions,* by Joseph T.

Cosby, New York 1915, N and (Modern Foreign Exchange,) by V. Gonzales, 1914). Rates of exchange prevailing in Chile before the Euro¬

pean War contrast with those prevailing in 1915, as follows: New York — sight — cur¬

rency of United States — $1.00 = 5.06 Peso paper, on 7 Feb. 1913, but 6.64 Peso paper on 23 May 1915; London — 90 days — 10 l/32d. =

1.00 Peso paper on 7 Feb. 1913, but 7ˆ4d. = 1.00

Peso paper on 23 May 1915.

Banking and Finance. — Banks with offices in Santiago or Valparaiso or both are Banco de Chile, Banco de Santiago, Banco Aleman Transatlantico, Banco Nacional, Banco Comercial de Chile, Banco Espanol, Banco de Chile y Alemania, The Anglo-South American Bank, Ltd., Edwards y Compania, Banco Ger-manico de la America del Sur, London and River Plate Bank, Deutsche Sud-Amerikanische Bank Akt. ‘Ges., Banco de la Republica, Banco Italiano, Banco Frances de Chile. Many have established branches. The Anglo-South Amer¬

ican, with headquarters in London, has branches not only at Santiago and Valparaiso, but also at Punta Arenas, Chilian, Coquimbo, Copiapo, Serena, Iquique and Antofagasta. In the provinces we find, besides branches of the fore¬

going, The Banco de Concepcion, Banco de Talco, Banco de Curico and Banco Comercial de Curica and Banco de Punta Arenas. The Banco de Chile is regarded as the official bank¬

ing house of the government, though not strictly a government bank. There is, in fact, no government bank in Chile. Banking is carried out on rather more conservative lines than in most Latin countries.

Interest is al¬

lowed on current and deposit accounts, and advances are made rather more freely than is the habit with English joint stock banks, With the German, Italian and Spanish banks there is a certain amount of co-operation of the home banks supporting the Chilean houses, which adds greatly to their strength and influence, especially in financing big commercial under¬

takings. During the first half of 1917 the depositors in the National Savings Bank in¬

creased 12 per cent over those of the cor¬

responding period of 1916 and the deposits in¬

creased 17 per cent. The annual deficit in the national finances, which had become traditional, was changed in 1916 into a surplus. A gov¬

ernment institution known as the Caja de Credito Hipotecario lends, on lands and buildings, 50 per cent of their market value. A private concern called the Banco Hipotecario de Chile carries on a similar business ; and, organized under the same law (that of 1857) are the private institutions Banco Garantizador de Valores and Banco Hipotecario de Valparaiso.

The function of all four is, primarily, to assist agriculture by making loans on real estate for long terms. Savings banks in Chile are of relatively modern origin. In the course of 20 years deposits have increased more than 20-fold in their <(cajas de ahorros,**

as they are called. Foreign banks, duly incorporated, may open branches in Chile.

There is, however, at present a project of law requiring them to invest or maintain in Chile the capital they declare for use in that country, and limiting the deposits they can receive in proportion to such capital. There were, in 1917, six foreign banks doing business in Chile, each having many branches. A. comparison of the financial movement during the year ending 31 Dec. 1914 with that for the previous year ((shows that the European War caused** — such is the statement in a memorandum by Chile —(<no impairment of the integrity of the banking situation, notwithstanding the fact that the foreign banks were constrained to remit to their home establishments the greater part of the funds that they had in the country.** But it is necessary to place beside that statement another entitled <(The Finances of

Chile** in The Americas (Vol. I, No. 3), to the effect that the nitrate industry of Chile suffered perhaps more severely than any other industry of a neutral state, because approximately two-thirds of the nitrate exports before 1914 were taken by Ger¬

many and Austria-Hungary, and these, of course, were cut off ; that the effect upon the general business situation was serious, and the government was a direct and heavy loser in its revenues. Fortunately the government had large gold credits in Europe. These credits are understood to have been accumulated for the purpose of establishing the currency system on a gold basis ; but, inasmuch as they are available for discharging other government obligations, it seems probable that the gold standard will be postponed.

The total funded public debt, as shown bv recent figures, amounts to $215,280,035, of which $173,644,000 is on account of external, and $41,640,035 internal, loans. The first public loan was for $5,000,000, raised in London in 1822.

Others followed, and all were paid off. Then, from 1885 to the present time, Chile placed a series of loans, sometimes (as in 1889) on very favorable terms ; and the acquisition of the nitrate fields, after the successful war with Peru and Bolivia (see above: History), placed

a vast source of wealth at Chile's disposal, en¬

abling her to meet all requirements of the government, including the large increase in ex¬

penditures by the War and Navy departments; but this, unfortunately, did not prevent an excessive issue of paper. The annual expendi¬

ture approximated $70,000,000 gold in 1917

($7,460,000 for the Department of Interior; $1,-

470,000 Foreign Affairs; $2,160,000 Justice; $6,-

800,000 Navy; $7,400,000 War Department; $5,280,000 Public Works; $15,400,000 govern¬

ment railways ; $9,000,000 public debt service, etc.). The budget for 1918 is as follows: Departments Paper pesos

Interior . 44,155,000

Foreign Affairs . 2,210, 000

Justice . 10,980,000

Education . . 35 , 450 , 000

Treasury . 18,804,600

War..: . 42,590,000

Navy . 20,816,500

Industry and Public Works . 13,404,000

Railways . 3,175,000

Gold pesos

446,250

1,309, 000

246,000

39,560,000

251,500

4,216,000

41,216

1,834

Total

191,585,100 46,071,800

With the gold at 36ˆ2 cents American money and the silver peso at 23 cents, this amounts to a total of $61,880,780, almost $8,000,000 less than the budget for the preceding year. In February 1917 the Chilean Congress authorized a loan of 20,000,000 pesos, $7,600,000, for the extension of railway lines and the improvement of the condition of those now in existence.

The profits of the fiscal year 1916-17 were ordered to be applied to certain railway con¬

struction. Congress also appropriated 380,000

pesos ($130,870) to enlarge the Alameda sta¬

tion; and 400,000 pesos for construction of the Lingue — Pichilemu line. The budget provides annually for the development of water and drainage-systems in the chief cities and for the construction of port works, which will represent an outlay, when completed, of more than $26,000,000. The revenues and expenses of the country have increased in 20 years as follows : In 1894, income $25,945,000 and ex¬

penses $20,739,000; in 1913, the last normal year before the war, the fiscal revenue amounted to $77,575,000 and expenses amounted to $80,-

800,000; the budget for 1914 attained the sum of $95,520,000; in 1915 the fiscal budget was re¬

duced to $63,362,000, approximately.

Transportation and Communication. — The

Longitudinal Railway, with a total length of 1,957 miles, extends from Iquique to Puerto Montt, through the Longitudinal or Central Valley (see above: Topography) and with branches to the chief ports. Thus a double sys¬

tem of intercommunication, by both land and water, is maintained. Besides this central line there are three transandine railways and the independent lines of the nitrate fields — in all 4,521 miles. Other lines under construction increase the total to 5,684 miles (3,541 owned by the Chilean government and 2,143 miles pri¬

vately owned). The Trans-Andean line, via Juncal, was completed in 1910. It connects Santiago, from Llai-Llai, with Mendoza, on the Argentine side of the Cordillera of the Amdes.

Another mountain-climbing line is the inter¬

national railway from Antofagasta to Oruro and La Paz in Bolivia, a distance of 719 miles.

A railway built by the Chilean government with the co-operation of

Bolivia connects the port of Arica with La Paz. This road — a short line between the Bolivian plateau and the Pacific Coast, was opened to traffic in 1913.

Steamship routes are, at present, still those which were followed in colonial days, al¬

though a single Japanese line crosses the Paci¬

fic. Between Panama and Valparaiso, with calls at all the larger ports, and occasionally at the smaller ones also, English, Chilean, and other lines maintain regular service at highly remunerative rates; and by the southern route through the Straits of Magellan come and go vessels of all maritime nations. Coastwise shipping gives employment to many Chileans.

In the aggregate, the shipping of Chilean ports exceeds — and relatively to populations very greatly exceeds — that of other Latin American countries. There are, moreover, 21,000 miles of public road, 528 miles of navigable rivers and 660 miles of navigable lakes. The length of telephone line in operation is 44,000 miles, with 55,000 miles of wire. There are 17,497 sub¬

scribers. A chain of wireless telegraph sta¬

tions was nearing completion in 1917. These are located at Arica, Antofagasta, Coquimbo, Valparaiso, Talcahuano, Valdivia, Puerto

Montt, Punta Arenas, and one on the Juan Fernandez Islands.

The telegraph service is chiefly performed by the State, which owns about 18,000 miles, with 367 offices out of the total of 22,500 miles.

In the interest of public education, the govern¬

ment has made a practice of circulating news¬

papers, reviews and other periodical publications free of postal charges. The number of post-offices is given as 1,114, handling over 65,000,-

000 pieces of mail matter annually.

Army and Navy. — All males born in Chile, whether of native or foreign parentage, are, under the law of 1910, subject to compulsory service from the ages of 18 to 45; and the nominal strength of the permanent army is 23,216, of which number 17,132 are in the land forces. A system of military instruction and drill is enforced which practically renders a much larger number available in an emergency ; the National Guard comprising all other men between the ages of 20 and 45. Plans for the army include three regiments of field artillery, two of mountain artillery, one section of ma¬

chine guns, four companies of sappers and miners, six regiments of cavalry, 16 of infantry, and one battalion of railway troops, besides the administrative units. The war strength of the first line is estimated at 150,000 men. The ar¬

tillery units are armed with Krupp guns (7

and 7.2 centimetre) ; the infantry with 7 milli¬

metre Mausers. The police (about 500 officers, 1,000 non-commissioned officers and 6,000 men, organized on. a military basis) are in charge of Santiago, the provincial and departmental capi¬

tals, *etc.* Establishments for military instruc¬

tion are the Military Academy and school, cavalry school, artillery school, school for non-commissioned officers, and staff college, where higher studies can be pursued. The Chilean navy includes nearly 50 vessels of various classes : the armor-clads Capitan Prat , O'Higgins and Esmeralda ; 4 protected or armored cruisers, 3 torpedo gunboats, 13

destroyers, 6 modern torpedo boats, 1 mine ship and 1 hospital ship. Two Chilean dread¬

noughts being built in England were purchased for the British navy; and two submarines were 510

taken over by Canada. There is a naval academy at Talcahuano and a government naval school at Valparaiso.

Bibliography. — Avaria, L. Navarro, (Censo Jeneral del Territorio de Magallanes' (Punta Arenas, Vol. I, 1907, Vol. II, 1908); Barros, Arana D., (Historia Jeneral de Chile' (Santiago 1884-1902) ; Bulnes, G., (Guerra del Pacifico'

(Valparaiso 1912-14) ; Cochrane, T. (Earl of Dundonald), (Narrative of Services in the Liberation of Chile> (London 1859) ; Darwin, C., (Journal and Remarks' (Vol. Ill in the (Narrative of the Voyages of H. M.'s Ships Adventure and Beagle' (London 1839) ; Ereilla y Zuniga, A. de, (La Araucana' (Santiago de Chile 1910) ; Errazuriz, C., (Historia de Chile' : (Pedro Valdivia' (Santiago de Chile 1911-12) ; Filsinger, E. B.. (Exporting to Latin America'

(New York 1916) ; Harrison, B., 'Message of the President… . Inquiry into the Attack on the Seamen of the U. S. S. Baltimore '

(Washington 1892) ; Holley, A. B., 'Historia de la Paz entre Chile y el Peru' (Santiago de Chile 1910) ; International Bureau of the Ameri¬

can Republics, c Chile : a Handbook' (Washing¬

ton 1909) ; Johow, F., (Estudios sobre la Flora de les Islas de Juan Fernandez, con Noticias Preliminares por R. Pohlmann' (Santiago

1896); Koebel, W. H, 'Modern Chile' (Lon¬

don 1913) ; Malsch, A., 'Le Dernier Recoin du Monde' (Geneva 1907) ; Markham, C. R., (The War between Peru and Chile, 1879-1882' (New York 1883) ; Medina, J. T., 'Los Aborijenes de Chile' (Santiago de Chile 1882) ; Mills, G. J., 'Chile: Physical Features, Natural Resources, etc.' (London 1914) ; Poirier, E., 'Chile en 1910' (Santiago de Chile 1910) ; Quesada, E., (La Politica Argentina respecto de Chile'

(Buenos Aires 1898) ; 'Revista de Bibliografia Chilena y extranjera' (Santiago de Chile 1913) ; Ross, E. A., 'South of Panama'

(New York 1915) ; Rowe, L. S., 'The Early Effects of the European War upon the Finance, Commerce, and Industry of Chile' (Preliminary Economic Studies of the War, Carnegie Endow¬

ment for International Peace, New York 1918) ; Stange, P., 'Landeskunde von Chile' (Berlin 1914) ; Torrente, M., (Historia de la Revolucion de Chile, 1810-1828: Capitulos de la Hist. Rev.

Hispano-Amer., Santiago de Chile 1900' ; Velasco, F., (La Revolucion de 1891' (Santiago de Chile 1914) ; Vicuna MacKenna, B., 'Historia de la Campaha de Lima' (Santiago de Chile 1881) ; Villarino, J., 'Jose Manuel Balmaceda' (Barcelona 1893).

Marrion Wilcox.

CHILE SALTPETRE, or CUBIC NITRE,

is nitrate of sodium, NaNCh, which, however, is not really cubic, but crystallizes in very obtuse-angled rhombohedra. It is found in beds in the rainless district of Tarapaca, in Chile, where it occurs sometimes of great purity, but is gen¬

erally mixed with other salts (one of which is iodate of sodium), and with sand and clay.

These deposits cover more or less completely an area of more than 600 square miles. From the mines it is brought down by rail to the coast, and it is there transferred to ships, origi¬

nally by means of rafts formed of inflated skins.

The name of Chile saltpetre is a blunder. When the first cargo was taken to Liverpool, about 1830, its character was not known, and as it could not find a purchaser it was finally thrown overboard. The next cargo went to France, where its value was recognized, and ultimately quantities were brought to England. The de¬

mand for it has gone on steadily increasing.

It is used either in mixed artificial manures, or alone as a dressing for grass, the bulk of which it is said to increase. It was anticipated that it might be used for making gunpowder, but the deliquescence of thd salt has been found an insurmountable difficulty. It is, however, transformed into nitre by double decomposition with chloride of potassium, and large quantities are imported into Strassfurt, in Germany, for this purpose. It is, besides, substituted, when¬

ever practicable, for nitrate of potassium as a source of nitric acid. The

sole drawback to its general use for this purpose is the presence of chlorides, which, giving off hydrochloric acid, render the nitric acid impure. Of late the in¬

dustry at Tarapaca has been greatly developed.

The crude salt or ((caliche," as it is called locally, is broken up and the nitrate concentrated by lixiviation with steam and boiling water. The liquor flows continuously from one tank to another gathering more and more of the salt till it has gained the desired strength, and it is then allowed to cool, and the nitrate crystallizes out. From the mother liquor, the world's sup¬

ply of iodine is obtained.

CHILI MILLS, machines for pulverizing

ore as a preliminary to securing the values. In these machines vertical rollers run in a circular enclosure or die. The rollers and dies are now usually of steel although stone is sometimes used.

CHILIASM, kll'i-azm, the belief that

Christ will come to earth and rule the world from Jerusalem for 1,000 years. The Latin word millennium means the same thing. The Revelation of John is the chief authority of the Chiliasts. Papias, Justin Martyr, Irenseus, Tertullian and Lactantius were Chiliasts, but Origen was opposed to the notion. Papias, bishop of Hierapolis, says, in the millennium every vine will bear 10,000 branches, every branch 10,000

shoots, every shoot 10,000 sprigs, every sprig 10,000 bunches, every bunch 10,000 berries, and every berry 36 times 25 gallons of wine; and if a saint comes to pluck a berry it will cry out, (<Pluck me, O saint; I am better for being plucked, praise the' Lord." The Fifth Monarchy Men were, of course, Chiliasts, only they main¬

tained that the Golden Age had begun, and that they were of it.

CHILKAT, chil'kat, INLET, the western

arm of the terminal part of the Lynn Canal, an inlet in Alaska, in about lat. 50° 10’ N. It is in the territory in dispute for a considerable time between the United States and Canada.

CHILKOOT, chil’koot, INLET, the east¬

ern arm of Lynn Canal, an inlet in Alaska. It is again subdivided, its principal arm being called Taig, an inlet which stretches for 15 miles north and south in about long. 135° 20’ W.

CHILKOOT PASS, a pass over the moun¬

tains in the northern part of Alaska, traversed by thousands of gold-seekers in the Klondike gold fields’ excitement in 1896-98. By way of the Chilkoot Pass is the most direct route to Dawson City, the principal starting point to the Klondike region. The trail starts from Dyea, along the river of that name, and crosses the CHILLAN — CHILLICOTHE

Pass at an elevation of 3,500 feet, to the head of Lake Lindeman, a total distance of 28p2

miles. From the latter place to Dawson City is 548 miles. The Chilkoot Pass route is the old trail used for generations by the Indians, and for many years was the only one taken by miners and prospectors to reach the interior.

It is by far the shortest route to the Yukon.

The difficulties and dangers attending this route are many, and the steepness and roughness of the ascent have proved fatal in numerous in¬

stances, to those unaccustomed to endure hard¬

ships. The summit of the Pass is 13 miles from Dyea, the first six miles being traversed by a good wagon road. Owing to the winding of the

Dyea River that stream had to be crossed sev¬

eral times by ford or ferry. The trail then enters a narrow, canon with steep, rocky sides, which it follows to Sheep Camp, four and a half miles farther on, which point is the timber line. From Sheep Camp to the summit the rise is from 1,800 feet in three and a half miles, to 1,000 feet in half a mile, and here masses of broken rock make the ascent, which is in some places almost perpendicular, difficult and hazardous. As a general route to the Klondike and to the country over the mountains Chil¬

koot Pass has been superseded by the railway through White Pass.

CHILLAN, chel-yan', Chile, capital of the province Nuble, about 56 miles northeast of Concepcion. It consists of an ancient and a modem portion, the former built by the Span¬

ish conquerors, who made it a place of some strength, in which the early settlers often found an asylum when hard pressed by the Araucanians. The old town was founded in 1579, and destroyed by an earthquake in 1835.

The new town was built shortly after the latter date. It is regularly built and has a Franciscan missionary church and a normal school. To the southeast are sulphur baths, which were dis¬

covered in 1795, and to the east is the volcano of Nevado de Chilian, 9,528 feet high. Pop.

34,269.

CHILLED IRON, iron cast in metal molds called chills, where, on account of the rapid conducting of the heat, the iron cools more quickly on the surface than it would do if cast in sand. The effect of this chilling is to leave the interior of the casting soft and tough while the surface is hardened. This property of iron is taken advantage of by iron founders to harden specified parts of castings, those parts of the molds being of iron while the rest is of sand.

It is used in making axle-boxes, hubs, plow¬

shares and some hammers and anvils. The iron selected for making

chilled castings should be entirely free from silicon which interferes with the hardening, and it should have a compara¬

tively small content of carbon. Minute per¬

centages of sulphur and manganese, on the other hand, contribute to the desired result.

CHILLI AN WALLA, Battle of, an en¬

gagement in India between the Sikh forces in considerable strength, and the British com¬

manded by Lord (afterward Viscount) Gough, fought 13 Jan. 1849. The Sikhs were com¬

pletely routed, but the loss of the British was very severe : 26 officers were killed and 66

wounded, and 731 rank and file killed, and 1,446

wounded. The Sikh loss was 3,000 killed and 4,000 wounded. On 21 February, Lord Gough attacked the Sikh army, under Shere Singh, in #

its position at Goojerat, with complete success; and the whole of the enemy's camp fell into the hands of the British.

CHILLICOTHE, chil-li-koth'e, Mo., city

and county-seat of Livingston County, on the Wabash, the Chicago, Milwaukee and Saint Paul and the Hannibal and Saint Joseph railroads, 70

miles east of Saint Joseph. It is a farming trade centre and has several manufacturing in¬

dustries. It is the seat of the Chillicothe Nor¬

mal School, State Hospital, State Industrial School for Girls and Saint Mary's Hospital, and is near the noted health resort, Laurel Mineral Springs. It has several daily and weekly newspapers, electric lights and street railroads, and five banks. Pop. (1920) 6,525.

CHILLICOTHE, Ohio, city, county-seat

of Ross County, on the Scioto River, Paint Creek, the Ohio and Erie Canal, the Baltimore and Ohio Southwestern, the Norfolk and West¬

ern and the Cincinnati, Hamilton and Dayton railroads, 50 miles south of Columbus, the State capital, to which the Scioto Valley third-rail traction system gives trolley service. The city is the centre of an agricultural and coal¬

mining region ; and it has flour, pulp and paper mills, foundries, the machine and repair shops of the Baltimore and Ohio Southwestern Rail¬

road and numerous other local industries, banks, national and savings, trust, building and loan companies, and an active chamber of commerce.

The United States census of manufactures for 1914 recorded 46 industrial establishments of factory grade, employing 1,758 persons, of whom 1,557 were wage earners, receiving annually $852,000 in wages. The capital invested aggre¬

gated $2,905,000, and the year's output was valued at $4,083,000; of this, $1,512,000 was the value added by manufacture. Public safety and public service, police and fire departments, both with motor equipment, parks, city hospital and Enderlin welfare home, are all adminis¬

tered under a mayor and city council. The pub¬

lic library, school buildings, churches, Masonic Temple, Elks Hall, auditorium, the Agricultural and Industrial Building, the well-kept homes and lawns, the broad and tree-lined paved streets are all characteristic of the (<01d Town Beauti¬

ful,® as it is called, and its residents. Chilli¬

cothe has an interesting history. In its neigh¬

borhood are several ancient mounds of pre¬

historic aborigines, and the sites of villages of the Chillicothe Indians, one of the four Shawnee tribal divisions, the latest of which was

destroyed by Kentucky rangers in 1787.

Chillicothe was settled in 1796 and here 1800-03 Gen. Arthur St. Clair set up his Territorial government, as governor of the Northwest Ter¬

ritory. It was incorporated in 1802 and follow¬

ing the agitation for statehood led by a quartet of the residents — Thomas Worthington, Na¬

thanael Massie, Edward Tiffin and Duncan Mc¬

Arthur, it was here, on 29 Nov. 1802, that a con¬

stitution for the State was adopted, in compliance with the requirements of the Federal constitution, resulting in the young State's crea¬

tion in the spring of the succeeding year, Edward Tiffin being elected first governor.

From 1803-10 and 1812-16 Chillicothe was the capital of Ohio. When Ohio celebrated her 100th birthday as a State May 1903, it was peculiarly fitting that Chillicothe should have 512

. been chosen as the place for the celebration, for all the historic memories of the early years of the State's existence cluster about this city.

Again, 9 May 1912, the fourth Constitutional Convention of the State met here for one ses¬

sion as guests of the Chamber of Commerce.

Pop. (1910) 14,508; (1920) 15,831.

CHILLIES, the fruits of the capsicum,

used to make cayenne pepper, pickles and chilli vinegar. See Cayenne

Pepper.

CHILLINGHAM WHITE CATTLE.

See White Cattle.

CHILLINGWORTH, William, English

Anglican divine and controversialist : b. Oxford, October 1602; d. Chichester, Sussex, 30 Jan.

1644. He was matriculated at Trinity College, Oxford, in 1618, and in 1628 was made a fellow of the same college. Having been won to the Roman Catholic Church through the arguments of the Jesuit Father Fisher, Chillingworth entered the English college at Douai, where Laud, then bishop of London, by correspond¬

ence implanted in his mind doubts regarding the foundation of the Roman Catholic system; and, resolved to make a thorough investigation, Chillingworth returned to England after a few months abroad. The result was that he de¬

clared for Protestantism and in 1634 set forth, in a treatise that was not published and is now lost, the grounds of his conclusion. Laud procured his nomination to a church benefice in 1635, but Chillingworth's scruples about sub¬

scription to the 39 articles and acceptance of the Athanasian creed was an obstacle that could not then be overcome. In 1637 was published his great work, (The Religion of Protestants: a Safe Way to Salvation. } In the preface he explained away his former scruple about the 39

articles, and the next year was named preb¬

endary and chancellor of Sarum. When Gib¬

bon in his autobiography explains his own religious experiences, which closely resemble those of Chillingworth, he insinuates that the reconverted convert afterward repudiated pri¬

vately the cardinal doctrines of the Church of England.

CHILLON, she-yon' or shil'on, Switzer¬

land, a castle on the Lake of Geneva, six and one-half miles southeast of Vevey, once an im¬

portant stronghold of the counts and dukes of Savoy, and the prison-house of Francis Bonnivard, prior of Saint Victor, Geneva, from 1530

to 1536. It stands on a rock rising 22 yards from the shore of the lake, and is reached by a bridge. It probably dates from the 9th century.

Bonnivard was confined in it by the Duke of Savoy because he had assisted the republic of Geneva, with which the Duke was at enmity.

Byron's poem: (The Prisoner of ChillonP

founded on this incident, has made it well known.

chilo£;, che-16-a', Chile, province of, con¬

sists of the island of that name on the west coast, which is separated from the mainland by the narrow Strait of Chacao. on the north and by the Gulf of Corcovado 30 miles wide on the east, and has a length of 115 miles, and an extreme breadth o? 43 miles, and of a number of neighboring islets, mostly uninhabited; total area, 6,979 square miles ; almost all Indians living on the principal island. Chiloe proper is hilly in the interior, and everywhere covered, except immediately along the shores, with nearly impassable forest. The climate is mild and not unhealthy, although inordinately wet.

The Indians belong to a subdivision of the Araucanian family ; they are a gentle and hon¬

est race, mostly engaged in fishing and in lum¬

bering, timber being at present the chief export from the island, though immense deposits of coal have been reported. In the eastern part the soil is fertile and well cultivated. Corn, wheat, barley and hemp are produced extensive¬

ly and domestic animals are plentiful. Oysters, which are very scarce

elsewhere in South America, are found in large quantities in the Chiloe Archipelago. The potato here, as in other parts of South America, grows wild. The Spaniards discovered the archipelago as early as 1558. Chiloe was the last part of Spanish America under Spanish rule, which it was not rid of until 1826. The capital and chief sea¬

port, Ancud, on th-north coast, has a good harbor, is the seat of a bishop and has a popu¬

lation of about 3,979. Pop. of province 95,756.

CHILON, kl'lon, son of Damagetus and

one of the so-cailed seven wise men of Greece.

Fie flourished about the beginning of the 6th century b.c., and was a native of Sparta, and one of the Ephori, a body of magistrates which he is said to have originally introduced. A col¬

lection of his sayings may be seen in Orelli's (Opuscula Graecorum sententiosa) (1819).

Chilon claimed that the great virtue of man was prudence or a proper judgment as to coming events.

CHILOPODA, kl-lop'o-da, a group of

myriapods represented by the centipede (q.v.).

In these animals the body is composed of from a few to between 100 and 200 segments; the body is flattened, and there is but a single pair of legs to each segment. There are three pairs of mouth-appendages, that is, a pair of jaws succeeded by two pairs of accessory jaws; while the first pair of legs are modified to form the poison fangs, which contain at their base a poison sac, the ducts from which open by a minute pore, out of which the blood oozes when the creature bites. The Chilopoda are divided into four families, — Lithobiidce , S colop end ridee, Geophilidce and Scntigeridee.

CHILPERIC, chfl'pe-nc, two Merovingian

kings: 1. Chilperic I, king of Soissons from 561 to 584. He never was acknowledged king of all the Frankish land, but divided the king¬

dom with his three half-brothers ; he had, how¬

ever, great power throughout their dominions by reason of his influence with the nobles. The murder of his wife, Galswintha, involved him in a war with her brother-in-law, Siegbert of Austrasia. 2. Chilperic II, King of Neustria from 715 to 720. He was several times at war with Charles Martel (q.v.), but was forced to submit to him, and was in 719 made king of the Franks. Consult Sergeant, (The Franks }

(New York 1898).

CHILTERN HILLS, a range of flint and

chalk hills in England, extending through Ox¬

ford, Hertford and Buckingham shires; loftiest summit, 905 feet. These hills were anciently covered with forests, and were infested by numerous bands of robbers. The steward of the Chiltern Hundreds is an officer of the CHILTERN HUNDREDS — CHIMES

Crown, appointed to protect the people of Bucks from the robbers of the Chiltern ‘Hills. This office is now a sinecure, but as a member of Parliament can only resign his seat by accept¬

ing office, he accepts this sinecure, which he immediately vacates for the benefit of others.

CHILTERN HUNDREDS. See Chil¬

tern Hills.

CHILTON, Robert Hall, American

soldier: b. Loudoun County, Va., 1817; d. Colum¬

bus, Ga., 18 Feb. 1879. He was graduated at West Point 1837 ; became captain of the First Dra¬

goons, 6 Oct. 1846, and was brevetted major for gallant and meritorious conduct at Buena Vista, Mexico, 23 Feb. 1847. In this battle Jefferson Davis, afterward President of the Southern Confederacy, but then colonel of the First Mis¬

sissippi Rifles, was severely wounded, and Chil¬

ton bore him from the field, a lifelong friend¬

ship resulting from the event. He became a brigadier-general in the Confederate service, 20

Oct. 1862, was chief of staff to General Lee, and inspector-general of the Army of Northern Virginia. After the war he was engaged in business in Columbus, Ga.

CHILTON, William Edwin, American

legislator: b. Saint Albans, W. Va., 17 March 1858. He was educated in public and private schools, by private tutors and at Shelton Col¬

lege. He has been engaged in law practice at Charleston, W. Va., since 1880; was admitted to the Supreme Court of the United States in 1891. He was appointed prosecuting attorney of Kanawha County in 1883, was chairman of the Democratic State Executive Committee in 1892, was secretary of State for West Virginia 1893-97 and United States senator for West Virginia 1911-17.

CHILTON, Wis., city and county-seat of

Calumet County, 75 miles north of Milwaukee, on the Manitowoc River and on the Chicago, Milwaukee and Saint Paul Railroad. It has a large trade in the agricultural products of the surrounding districts. It has cheese manufac¬

tories, grain elevators, condensed milk factories, canning factories, machine shops, boiler works, flour mills, sash, door and blind factories. Pop.

(1920) 1,833.

CHIMˆERA, ki-me’-ra, a fire-breathing

female monster reported to be of divine origin, brought up by / \misodarus, king of Caria.

According to the description of her given in the Homeric poems, the fore part of her body was like that of a lion, the middle like that of a goat and the hind that of a dragon. She laid waste the fields of Lycia and all the coun¬

try round. Hesiod says she had three heads, one for each of the three animal parts com¬

posing her body. She was destroyed by Bel-lerophon with the help of Pegasus. This mythical monster is supposed to have had its origin in the volcano of the same name, near Phaselis, in Lycia, round the top of which, ac¬

cording to popular belief, dwelt lions, round the middle goats and at the foot poisonous serpents.

The word Chimaera early came to be used for a nondescript, unnatural production of fancy, a wild dream, owing to the strange, unnatural form of the being described by the poets.

In ichthyology, one of a family of oceanic, elasmobranch fishes. Chimarida, of primitive VOL. 6 — 33

structures, a few species of which survive from Cretaceous and Lower Eocene time ; noted for their extraordinary appearance. They are small, no living species exceeding three feet, have a shark-like body, heads furnished with strange fleshy projections, especially in the male, where they serve as ((claspers ;® or the snout may be extended into a sharp beak. The tail is con¬

tinued into a sort of whip, often nearly as long as the body. One species is frequently caught in the North Atlantic, and others exist in the North Pacific and in the Japanese and South seas. Most of them inhabit deep water, where the young are born from eggs laid in leathery cases, like those of rays, on deep bottoms. Con¬

sult Boulenger, (Fishes) (London 1910).

CHIM./EROIDEA, one of the primary

divisions of fishes, the equivalent of Holocephali (q.v.).

CHIMANGO, she-man'go, a carrion hawk

of South America (Ibyctcr chi many o) , closely related to the Caracara (q.v.). The plumage is black, with whitish streaks on neck and breast in the adult, which are lacking in the young.

Chimangos are particularly numerous in the Falkland Islands. Darwin describes them as without fear of man, frequenting inhabited re¬

gions and feeding on all kinds of refuse.

CHIMAY, she'ma', Jeanne Marie Ignace

Therese de Cabarrus, Princesse de, Hispano-French adventuress: b. 1773; d. 1835. She was the daughter of the Comte de Cabarrus, Minis¬

ter of Finance in Spain. In 1789 she was mar¬

ried to the Marquis de Fontenoy, but was divorced from him in 1793, when she married the revolutionist Tallien. She induced the lat¬

ter to join a plot for the overthrow of Robes¬

pierre, and was one of the chief promoters of the revolution of July 1794. Her husband be¬

came displeased with her social activity and freedom of manners and left her to join Napoleon's Egyptian expedition. They were divorced in

1802 and three years later Jeanne married the Comte de Camaran, later Prince de Chimav. She now settled down to a peaceful life. She was never admitted to court circles, although the first beauty of her time. Con¬

sult Houssaye, (Notre Dame de ThermidoD

(Paris 1866).

CHIMBORAZO, chem-bd-ra'so or chim—

bo-ra'zo, Ecuador, a peak of the Andes, in the province of Quito, lat. 1° 20' S. and long. 79c W. Though not the loftiest summit of the Andes, it rises 20,700 feet above the sea-level, and its top is covered with perpetual snow.

The mountain has no crater, though it is built of volcanic rock. This mountain was ascended in 1802 by Humboldt and Bonpland, who, though they failed to reach the summit, yet mounted to the great height of 19,390 feet, a greater elevation than ever was before attained by man. Their further ascent was prevented by a chasm 500 feet wide. In 1880 the sum¬

mit was reached for the first time by Mr. E.

Whymper.

CHIMES. A set of bells from 3 to 12

in number, generally of considerable weight, tuned to the notes of the diatonic scale with sometimes one or two additional half tones. In England these are most often hung "free,® i.e., so as to swing, and then are called also a "ring®

or “peal.” A set of bells tuned to the chromatic scale, with a compass of three or more octaves and hung “fixed” or “dead,” i.e., so as not to swing, is called a carillon. Tunes arc played automatically on chimes where the bells are hung fixed and on carillons by a revolving drum and hammer mechanism like that of a music box. A chime hung fixed is also played by a chimer, who with his hands operates the levers of a chiming-stand, one lever for each bell. A carillon is also played by a carillonneur who uses both hands and feet on key¬

boards similar to those of an organ, connected with the clappers. In England a method of playing upon bells hung free, called “change¬

ringing,” has long been in vogue. In this method each bell is separately swung by means of a rope by an individual ringer. The bells are thus made to sound one after another in mathematically defined changing sequences un¬

til they come back to the order in which they started. This in complicated changes often in¬

volves several hours of ringing. Great ex¬

pertness is shown by companies of men in this art but the product of their skill is a regularly developed mosaic of sounds rather than music.

On chimes only a few simple tunes can be ac¬

curately played. On a carillon, however, the chromatic characteristic combined as it is with the extended compass and range in the size of the bells — from several tons to a few pounds — enables the master of its keyboard to play not only the notes of a great variety of music but to interpret sentiment, and produce effects beyond the power of any other musical instru¬

ment. While England, because of its many bells, has been poetically called “the ringing isle,” bell music has been still more a character¬

istic of Belgium and Holland and French Flanders through centuries. There carillons, and the great church and town hall towers which contain them, are maintained entirely at the public expense, and the bell music of folk songs, patriotic airs and national hymns, heard day and night and on market and feast days, is a considerable feature in the life of the people.

Summer evening concerts in the Low Countries when the city carillonneur plays on the carillon clavier always have brought

hundreds together to listen. Such concerts by Josef Danyn, the unrivalled master of the art, on the finest carillon in the world at Mechlin, Belgium, 45

bells, attracted thousands before the Great War.

Antwerp's carillon then numbered 47 bells, Ghent's 52, Bruges' 47, Courtrai's 49, Mons' 47.

In all there were recently about 70 carillons in Belgium and northern France. In Holland there are also about 70; among the finest are Middleburg, 41 bells; Delft, 40; Amsterdam (Palace), 37; Utrecht, 42; Arnhem, 47; The Hague, 37 and Appingedam, 25. Carillon de¬

struction by Germany has undoubtedly been great. The bells of Ypres, 44; of Termonde, 40 and of Saint Peter's at Louvain, and of Arras are destroyed, and probably many or possibly all others in the occupied regions. The oldest chimes in the United States are those of Christ Church. Philadelphia ; Christ Church, Boston ; and Trinity Church, New York. California University, Berkeley, has 12 fine bells. Among English Carillons are Cattistook, 35 and Eaton Hall, 28 bells. In Ireland, Queenstown Cathe¬

dral has a carillon of 42 bells — the finest bells in the United Kingdom. Where chimes and carillons originated is not known. Tradition takes us back to the 12th century and the abbey of Egmond in Holland. But it is not until early in the 16th century that authentic records, principally in certain Low Country towns, ap¬

pear. Louvain had 8 bells in 1525; Hoorn, 10, in 1528; Oudenburg 10, in 1539; Alkmaar 11, in 1541 ; Ghent 16, in 1543. Thereafter the de¬

velopment of this musical instrument was rapid.

D. G. Rossetti, Thackeray, Stevenson, George Macdonald, Thomas Hardy, Victor Hugo,

Georges Rodenbach, DeAmicis and others have written of carillon music. Longfellow's (Belfry of Bruges) is especially well known. Consult Rice, William Gorham, (Carillons of Belgium and HollancP (New York and London 1914, 1915) ; (The Carillon in Literature) (New York and London 1916) ; Robinson, F. E., (Among the Bells> (London 1909) ; Starmer, W. W., (Royal Academy of Music Lectures* (London 1916) ; Van der Ven, D. J., (De Torens Zingen>

(Amsterdam 1917) ; Loosjes, A., (De Toren-muziek) (Amsterdam

1917).

William Gorham Rice.

CHIMES OF NORMANDY, The (Les

Cloches de Corneville), opera comique in three acts by Robert Planquette, libretto by Clairville and Gabet, first produced at Paris, 19 April 1877. While called an opera comique, (The Chimes of Normandy) is rather in the operetta class, the most typical of which are Offenbach's famous series of operas bonffes. The story is simple and romantic, if not vital. The music is unaffected and spontaneous and its first suc¬

cess, which was conspicuous even for those days and for audiences which saw many a popular hit, has been repeated wherever the opera has been given. The legend of the chimes is the best known number, but there is scarcely a dull moment in the entire work and half a dozen of the songs are household favor¬

ites the world over. The lilting barcarolle, "On billow rocking," the cider song, the waltz song in the last act "That night I'll ne'er forget"

and the spritely finales of the first and second act come readily to mind.

Lewis M. Isaacs.

CHIMNEY (Fr. cheminee, related to Latin caminus, oven), an upright structure of stone, brick, etc., enclosing one or mere flues or pas¬

sages through which smoke and gas from the fire in a stove, furnace or fireplace may escape into the open air. Originally the term chimney included both the fireplace and the shaft. How far the Greek and Roman archi¬

tects were acquainted with the construction of chimneys such as we have is a matter of dis¬

pute, That kitchens and baths were provided with chimneys appears certain, but how far other apartments were so provided is doubtful.

An ancient mosaic found in Algeria, and repre¬

senting a Roman country mansion, shows chim¬

ney stacks projecting above the roof. Of course in southern Europe fires are less neces¬

sary than in northern Europe. Chimneys re¬

quire much attention to make them secure and prevent their smoking, so great an annoyance to domestic comfort. It seems at present to be acknowledged that it is much better to exclude the cold, damp air from the flues, by narrow¬

ing the aperture at the top, than to give larger CHIMPANZEE (Anlhropopithecus niger)

vent to the smoke at the risk of admitting a quantity of air to rush down the flue. For this reason chimney pots are of great use. The longer a chimney the more perfect is its draft, because the tendency of the smoke to draw up¬

wards is in proportion to the difference of weight between the column of air included in a chimney, and an equal column of external air; and the heated air in the chimney being lighter than the external air, the longer the chimney is the greater is this difference. Short chimneys are liable to smoke, and fireplaces in upper stories are therefore more apt to smoke than those in the lower ones. Two flues in the same chimney should not communicate with each other short of the top. In manufactories tall chimneys are built for the purpose of carrying away the great quantities of smoke, which would otherwise be highly deleterious to the health of those living in the neighborhood. In chemical works, especially, these chimneys are sometimes built to an

immense height. Such chimneys are constructed from the inside, by which the expense of the scaffolding is saved.

The shafts of most early chimneys were round and the chimneys contained but one shaft each, from the side of which the smoke generally issued, the top being crowned. In France and Italy chimneys came to form a decorative part of the national architecture.

CHIMNEY SWALLOW, the common

swallow of Europe (Hirundo rustica), so-called in Britain, where it makes its nests about buildings, and in niches of the outside of old chimneys, walls, *etc.* (See Swallows). In the United States the name given erroneously to a very different bird, the chimney swift. See Swifts.

CHIMOIO, Africa, town in the Portuguese possessions, near the border of Mashonaland, 118 miles from Beira on the coast. A railway connects it with Fontesvilla, 28 miles northwest of Beira, and is being continued inland to Salis¬

bury.

CHIMPANZEE, chimpan'ze or chimpanze', an anthropoid ape (Anthropopithecus niger), native to the equatorial region of Africa, from the Atlantic Ocean to the Nile, within a belt about 20 degrees wide. In this extensive territory it exhibits much diversity and has many local names, but whether these indicate more than one species is still to be de¬

termined.

This ape would measure in an average

specimen about feet tall, but the spread of its arms and hands would be nearly 6 feet, and the girth of the chest about 35 inches. Old males often exceed these measurements, but there is not such a disparity in size between the sexes as in the gorilla. The massive struc¬

ture of the bones and muscles implies great strength, but it certainly is not so prodigious as that reputed of the bigger gorilla. The fore¬

arm and hand are longer than in the other anthropoid apes (q.v.) except the gibbons, in conformity with the more arboreal habits; the skull is brachycephalic, the ears are propor¬

tionately large and stand out from the head, and the nostrils are wide. The skin on the face is naked and yellowish, surrounded by long black hair that hangs over the head and shoulders and depends from the elbows. The body is covered with shorter hair, typically shining black, but brown on ihe back in some specimens, especially those taken along the Ituri River in the Kongo region. In disposi¬

tion the chimpanzee is milder and more timid than the always ferocious gorilla, and in captiv¬

ity it is far more tamable than that irreclaim¬

able beast, which is more primitive in every way.

Chimpanzees are forest-dwellers, and are not easy to find and observe, and still less to catch. They go about in family parties, prob¬

ably mated for life and frequently gather into bands of two or three families. During the day their time is spent mainly in some big tree, dozing, nibbling at young shoots and “loafing® quietly. In the early morning and again late in the afternoon they descend to the ground and grab for roots and tubers, or search for fruit and the leaves of certain succulent plants of which they are fond. An intelligent traveler-naturalist, Major Cuthbert Christy, writing recently of his observation of these apes in the Kongo forests, says that where a large troop has been feeding one might believe a herd of real pigs had been at work. Much food is also gathered in the tree-tops, including fruit, insects and birds’ eggs. The appetite for fruits makes the chimpanzee a menace to the plantations, especially when bananas are in edible condition. The natives guard the plan¬

tations, and as the animal is timid toward man this usually saves the crop ; but when he can¬

not run away, the chimpanzee at bay is a for¬

midable foe, using his long, sinewy arms and sharp teeth with deadly

effect. He is even said to be a match for the leopard. The stories of his capturing and carrying off negro women or children are not substantiated.

The presence of chimpanzees in a neighbor¬

hood is quickly known to the people, “for at intervals during the day, either singly or in chorus, they indulge in bouts of far-echoing, half-human, half-maniacal shouts and hoots, rising crescendo to what seems like fiendish laug’hter … till the forest rings with the sound.® Just at daybreak this forms a kind of concerted uproar that lasts for several minutes.

At night each adult climbs a tree, usually of small size, and by bending down branches and heaping leaves and twigs on them, con¬

structs a platform big enough for a bed, on which he or she lies down and spends the night.

These little platforms are believed to be used only once, and old ones are common sights in the forest; when the female is about to bring forth the one or sometimes two young, borne by her annually, she builds a similar platform-bed, and there the little ones are born and rest until able to travel or be carried away. The chimpanzees are so heavy that the big ones are clumsy in climbing about, as compared with smaller monkeys, and when in haste to make their escape from men, whom they will avoid and flee from whenever possible, they take to the ground. “At the first sign of danger,® says Major Christy, “the wary old male forsakes his family, comes down from the tree-top with a few acrobatic swings and a drop, and makes off along the ground, not exactly on all fours, though something like it, using his great arms to help himself along, … to push swinging branches and creepers out of die way rather 516

than for running with. When on all fours his fingers are doubled on the palms of his hands so that he walks on his knuckles. w The arms

are not so much needed or actually used for progression as has hitherto been believed.

Chimpanzees have been seen in menageries and zoological gardens in Europe since the middle of the 1 7th century; and many accounts have been given of their docility and submis¬

sion to training, in which they exhibit an ability to learn to do things, and handle implements in a way that is most interesting and amusing.

They also when young show much affection for kind trainers. They are very susceptible to diseases, especially of the lungs, and rarely survive long in captivity; and as they grow to adulthood they are likely to grow fretful, morose and even dangerous. Consult Hartmann, (Aiw thropoid Apes} (New York 1886) ; Elliot, <A Review of Primates) (New York 1912), and general works on natural history. See Ape; Gibbon; Gorilla; Orang-utan.

Ernest Ingersoll.

CHIN-FLY, a horse bot-fly (Gastrophilus nasalis) which has been confused with the horse-bot (G . equi). This species is smaller than the bot, densely hairy, with the thorax rust-colored. The abdomen is whitish at base and the wings are not spotted. It deposits its white eggs on the hairs about the lips or in the nostrils of equine animals, within easy reach of the tongue, and it is probable that the mag¬

gots hatch out more promptly than in other species. It has been found common and

troublesome in Kentucky. Also, in Europe it is a parasite of the ass, mule and goat. See Bot-fly; Horse Bot-fly.

CHIN-KIANG, chen-kyang', or CHIN-KIANG-FOO, China, city in the province of Kiang-Su, on the right bank of the Yangtse-Kiang, near the junction of the Grand Canal, 150 miles from Shanghai. In 1861 it was made a treaty port. It is advantageously situated for trade, as the river is navigable for large vessels, and the canal connects it with the

country north and south of the great river, but with the con¬

struction of railroads the canal is about to lose its former importance. Extensive suburbs stretch along the river and the canal. Chin-Kiang forms the key of the empire, as the block¬

ade of the river and canal at this spot would in a great measure prevent all communication be¬

tween the north and south. The city was for¬

merly fortified, but has been dismantled. It has a bund or river-fronting esplanade, club¬

house and churches. In 1842 it was taken by the British after a determined resistance on the part of the Manchu garrison. It was also taken by the Taiping rebels in 1853. They defeated the Imperialists here on 1 Jan. 1856, and finally abandoned the city in 1858. In 1889 a native mob destroyed half the foreign houses. Goat¬

skins, silk, rice, hides, wool and fancy products are exported, and opium, cotton goods and sugar are imported. The foreign trade amounts to about $16,000,000 annually, the traffic having gradually declined within the last few years, partly owing to railway freights having entered into competition with river steamers. Pop.

about 160,000.

CHINA (Chung-Hua Min-Kuo), an im¬

mense territory, stretching from the centre to the eastern extremities of Asia, and occupying nearly a third of the surface oi that continent; between lat. 18° 20’ and 56° N., and long. 73°

and 135° E. ; bounded north by Siberia; west by Russian Turkestan, the Russian Pamir, Cashmere, etc.; south by India, Burma, Anam and the China Sea ; east by Siberia, Korea and por¬

tions of the North Pacific Ocean (Eastern Sea, and Yellow Sea) ; greatest length, west to east, about 3,000 miles ; greatest breadth, 2,400 miles ; area, about 4,300,000 square miles. This vast territory is usually divided into China Proper, which forms its nucleus, and the following dependencies :

Manchuria (Chinese, Tunn-san-Sheng) com¬

prises the extreme northeast portion of the Chinese Republic. It is bounded on the north by the river Amur and Russian territory, east by the Russian maritime province, west by Mongo¬

lia, and south by the Gulf of Liao-Tung and Korea. It is divided into the three provinces Mukden, Hei-lung-Kiang and Kirin, the re¬

spective capitals of which are Mukden, Tsitsi-har and Kirin. The total area is 280,000 square miles. Mongolia is the name given to the vast levels of desert land which, interspersed with infrequent oases, stretches across the greater part of the north of China along the Siberian frontier. A large part of its area of 1,288,000

square miles is taken up by the Gobi desert.

The population is almost entirely nomadic. The chief town is Urga. Eastern or Chinese Tur¬

kestan is a mountainous region lying between the western tract of the Gobi desert and the Pamirs, and enclosed north and south by the ranges of the Tian-Shan and the highlands of Cashmere and Tibet. It possesses an area of 431,000 square miles. The principal towns are Kashgar and Yarkand. Sung aria or Dzun¬

garia, the smallest of the tributary states of China, lies to the northwest of Turkestan, on the banks of the Ili River, at the junction of Mongolia, Turkestan and the Russian province of Semipalatinsk. Its area covers 147,900 square miles, and its population is said to amount to half a million. Tibet comprises the mountain¬

ous region lying between Turkestan and Nepal and Assam. On the east it adjoins China Proper, and on the west Cashmere. It covers an area of 651,500 square miles. Its capital is Lhasa. The authority exercised by the Chinese over their dependencies is by no means uniform.

Some of the dependencies are closely connected with the empire, while others are merely tribu¬

tary; and Tibet is so independent as to do little more than profess a nominal allegiance to the Republic of China.

China Proper (anciently Cathay; Chinese, Chung Kuo, (<Middle Kingdom^) forms the southeastern portion of the republic, and occu¬

pies less than a third of its whole extent. Not including the island of Hainan, it lies between lat. 20° 20’ and 41° N., and long. 98° and 123°

E. China is bounded, north by one of the most remarkable of human structures, the Great Wall, which proceeds directly over mountain and valley, and for a length of 1,250 miles forms the barrier between China and Mongolia ; on the west it is bounded by Tibet ; on the south by Burma, Tonkin and the China Sea ; and on the east by the North Pacific Ocean. There are N

Greenwich

Longitude East from

Zagan-tuguruk

CHINA, SIAM,

INDO-CHINA and

CHOSEN

Toirym

f*..

Numutl-bao

*.o fllnsuta

L,k‘

‘■jSjiN

vuK

Ban c him (

Sugurin-chuduk

Gaschun

, TaclMchan

SCALES

Statute 9flles, 215 ＝1 Inch,

Salutu

Dabeati

Khonichi

SharX

Kilometres, 34G = 1 lucli,

Tear a

The hau-ha Lake

-/Kh«u-yu

\5Thie-ung

feb

MoiiMe»W*fiW si i'w"Ssv3s*mBuT .Vr>

\ "*pCi L*Kime-Pl 'oKi|>i*T"

- \ k>, t, Aw!l*',?Cbai.e-j'B_^

;in no DO U

.T^-oMn—^O PGk^An*J9,J Vi.nSV r_.a,

ZAS/tmx «->'

KOREA <- ££sS&* n bjWS’V~X

”A-N.OˆC

Lake Zijau

Sudschi

Raud, McNally 4i C<l’b New 11 X’ 14 Map uf China. Slum, lndo-Cbina and Chosen.

Copyright by Rand McNally it Co. /

uStfan-tU’ f \ 1

1 c y~ \ <r—

DoloirNorvL

Chara-obo

Chantai

Ta-lun-tung ,

<-> o4‘3™

Burchonbulyk

Tsagan-tschulutai

Myang-al l*

ItvuVweib’watiiiV

Fe»g-oheno

Sopine-fu.

•tnoto

Asclian

,g- \Kalganl

J ending 1

i^autu

.1x0

Ohara-manona i

« £.

Chara-

8ndioi

Chara L.

Schu-tsM-ho

TienUh

-sch’ing (®~]

Cbimnu

Paoti^‘gfo/ Nf

lupslafn

Ckengtii

Chaochou,

0 I 1

Nei-W *

Shun-toit

T AfyUENFliˆ—ˆ0’

,. 5-J /D < Cphm*

Yung-mng /-.-°Su-kou

, Zipeno/’ˆT St , Liaocbowfu

Vtche L‘.

Ngantlng

-jonrpu

!r si-tung

J

ˆ Song-in ,

COfi&pi11

XV eilisiel

Hwan y/ ˆTenantn

wfu \ Ja

x

Chu-‘obeng

.umhiim’

Sio-san

Chant®

] iaoehow Bay

Hr.

“Jiia-ho-Bo

Jer Point

5KT®l£nci

[Yencbou

d c0Ka /o 4 1; >1

va Pin gvingfuS CO

‘SˆSHfsjhrlions

)jj 0V> anhC-. ‘V _ ■

’Changte

‘ S /ˆU

Pingliaogo

?oliangYu .

lingning \?

-Tnngdiwi

. . o Yau 14]

[chow]

oThuns

Cbenc-

•HIT ”‘Tochao-la

SianrjL

,8lang-tcbeng

Vtt ” ‘ C I M _ ’i*. ‘bWlltn i’ii

oKivanZyutnV ‘O

QUELfART

•toheng

luUfn ˆ °Ssu\j3

s. Mengtchcng

Ymgehovrfu

°. \ Fungˆng° ˆS.

bwfiEigXˆ/jShau o Nva

Ku-o)u~r a Ting-yli»n\

w“H) /.NANKiNi

‘ J chow hu < ’ r

Tcrtfg-ching o XV uwei/ ˆ

V’qjYu O

Bl-pbingl

8hre-ki-cbin

0 Tbang /

p Shan-yaiig° _5ˆX

V Kingtack’vaq ˆ Nap ya

Jhe-aluˆ. Vunj/ > •« gˆT-W-chowˆ

ˆyˆlˆg-ngau-ˆKiimˆ,ˆ

m-ping ■’§/ Lobo-kou

fjuninf

i.tb-*b* L

Mouths of the

■ kianj

FanehebgH

ˆMangˆASau-jantrJ

yangfn U-c

Nan-°l > V: Ingsl

chSDg hJ [% O

Nganlo-fuo rT<

■King-meno Eayanj

Vlchang V-A*

1 *®Hfoab« o\

_ ° \ ,

ChamJo’i .

■ Yanjtse ■

ˆTchung-wso L l

ˆIlC! Saddle Q»o«r 1

ˆunghianbian

‘3rs.C hcsa＞ L - —

Blnyang

Xlhaugohc

\ j Tung-klang Tanlng

＜r X/) * Kweicliowfn oˆ‘1ˆ

rˆ° Wanhsien1

ingngan-cbou

Chung-chou

■E.\ i%c r

“V»Yj fj l

f jˆ_Kwan\

5 | Tjongjkin-chow I

1 ‘TacSiˆluyiˆS-cbou 0

■A — » 1 ; Yachon-f u

TuiSSSˆ*1

? vˆ?lian-choik

*? ©CrjENGTU

Hwangngan

K’., Chfm‘1 > A-i)ra > kˆoN

lankow

ey: Ning-l

‘Chicbou-lu |

,Tong-liu ˆ o;

ANKINGc

■chowˆ

Ho-cbc

Ui’,. -uartok

NˆHvW”v NJ

i-enc/ j Fung-hwaˆˆ Ximro* •

* < Sbeipu

f ‘Samnun Bn

Xaichou Bay

Sblnaa Cˆang-lob.oˆ Sliasljty Mlwyaag.PˆC’j) Cr _/Olbu-ki-kou‘

ocliOtY

‘■uny ting Tung ;Vy

Lakey chung -y

ˆPˆHsiang-yinˆj ˆ

Sj,ao-fr»

Tua£ichoH_K3

-shan.

Plnkoj ＞ Hiuning

[abkaugfW ˆVip-Tuea.

ˆKingtcfhin’ ‘V :c h«

. Jktjau-chow ˆ Ki

C4Slvˆta

luting^

Fulii

Tautati1ˆ

‘Fowrboˆ Lˆi-fui

＞-v oTung-y«

A nQ

Tal-chou v

Tai-plng

jDoragunˆ

Nanchwan bslen"

klang

‘v — > — - Cbengan-V

bwla ˆ _ chou j

Sui-yang /

) Teuu-i ° Sinaii)

V# Sui-.u

- Luku/ˆ Lciputiug (fˆc

J-chcw [%J . _ |(a-j’ - lj4 /

[Ppngtsela

‘taiiUum6

Changsi-T/

81angtano 1

Fucaou Jn

Klen-ch&ng’

Kwang-cbac

S’tjai\ˆho’

nW„ E l/C H OW

; _ f ˆNjV/buo sKwEIYANG

■CˆD’Dg-cbouo 0 ,

ˆ (Tushan-ohou.

\ U-po,

San

°Kuti«

vLien-k/ˆ

inatu

YnnrrhowfnL ln?<| uljjj |

cCben-«.bou Ka

Jchangj>/, Nauhiungˆhou,

Sadon

-chbu Wuting-cl

ruano 0 i

a eTBln-tien)(Yut

lˆhoiio

Jvjv.eilid

>llYAK0

fco 1.

Hwnl-ch*ng!

‘Hwelngan]

Talnap-chou

Shau-cboi

^*1 A 111 Q J^Av

langohoitlu0

H oping o

CANCER

Koboa\Kwei.tch c^JSow^/p^^TyS^^b

SVug-kangV

TROPtC

Chaochou

XJantoj

«»«

\ . XX liaaipiˆ

YˆKaipine

Kwang-tA

Sama»*»a

?Cj TaW’ ＞w\

A 1’ong-kant

Rˆobanh

lanning’

BotolTobaoo

’ll Ank ‘ran* (

i ;°l Langr-ne

Li＜*ocbou-fu,

Nguyen

p«klu,

is: ‘KebaoL.

■ VI f jˆBoto Ib.

. Eao-Lan Ig.

I.

Dorothea Reef

Pkatas

— ps-jˆosaaa-Mrt gulf of

fe NcStiˆ PL oh“shYV’

4ti«v«Pa-cbuni (T flktlnh 8- ” • Capo U ˆ

xJxamjKheut \ °

. . \K*?mL„ •/-O H; Mul Do°E \ V.it-ctcˆl ■DDburlt Xi/Minli’kˆt0-‘ Bun«k”lu* 0. ***

LnkboX §Lftit,u, \K»an»:bml,

.Hainan Head

CaLAYAN

r’ /TONGEON MT.

ˆ ˆVLobwel

Yank False Point

• ,,, Y / nˆJˆx-‘W

• j *Kaotau* » r/yi’

» o .C,A-b len .-S ‘

tai adil , ˆ Kan

Pecbal / Lul 0 ˆˆng-banˆ

ˆPitsanuioke P u.r-Uta ‘S’a* S-i

Yˆˆ Capc Engano

Tugucgarao

y°kT»

Paracel Islands *

aNd Reefs

uran Crescent Gkoup ‘

Money I.

Discovery Reef*

Triton 1v

C. Bantam

T \T TN tChieu Linh

rao*lM U U “ K Tl

V M.Pbong Kwragtri4 VThuanan

- ^^tM.Nongˆ HCE c

‘ /V’-Xl. Suvanna-kill* KwaDg-ngi

• Amphitrite Group

Woopy I. ˆLincoln I.

• Pyramid I.

Vularpore Reef

. ♦ •*■ Boubay Reef

Passu Keah

f \ life . / Pu-kiu

p“0 \ |7 “” pech«bu,|

on •snira nl/v

- - T Khnn

sfin, * }ly whorjT-^^

X oupan

apburil 5Yfl-ljutbia ˆ

CH _ I),§ P/rat mntanl

:nam N X

pang Pli-SoJ

pang-Praf

Pt. Tuinango

Baj’ouliorg

XLingayen

Tarlao

PHILIPPINE

Scarborough

lulacan

-ˆttopeu Lai

Balangu/y

Bay of Manila Cav

,CatandCAI < es

< CHINA

\Kwi

fnlˆpnmok of ˆ

I ‘< Konj-Vio

dZbo-ho-huen

lonkan

ISLANDS

feclinburl

Siemnp

h*CHANO

itnngas

atuiig-treiig

jSiem-bod2

lOmpong-Tom

idvqVe AU—

Pascualˆ sV ‘u—

BURIAˆ

it itbangˆ T,

leatabuQ

Mamburao

(t. S.)

[DORO

X’arela

iumbor

Xxr*1 Rk‘

onnsscriu, J -f

ivnas

Cdano I Cs’Ap A |\ˆ H /

p ‘’X*. ˆ Kouipcing-sbeunng

Kut it\ ˆYd td’>‘ls,

K.«lkb4£NOMˆ

n ./ Kr»ng-rcvak

tt C. SoniUCnˆ. a /

Company Sant B. <ˆc> >>oSr«-4‘nbel

y)/

Southern Section

OF SIAM.

SCALE SAME AS

MAIN MAE.

Solinglong-bayu

ˆJfKrox hmar

y Pnom-bakhey

Krai Romiˆt’>_y—

Calamianes Is.

P. LahtaJ

Pan don I

SwalˆTh An Oaw-rnnA Bay

LTItuimJ, Cape Padaran

. Jtb uan-dang

‘Cape Kega

• P. Secir de Mbr

Great Catwycx

■Sengora

Po TERurAtr

Po Bdtonc

Po Lanc.kavv

‘. Patani^

i#‘yb 1

UScbviri

„ U .

.Kedah lo -/l

ueorgeto^ rH «j. _ .

Po PiNANGjI.c/V J Kata-Tampain

,Sibalon‘° Hoi

Kota-Sbaru

Red a nr fa>

Valladolulj

it kˆˆrr

• Samuib L

mjen

Dama Arch..;:.

T'– coc

.Cambodia Pointˆl

Oni I. ;

Sapatu

ayakes Is.

ˆTvVPuorto

jˆ'ˆPrincesa

Tolon

CHINA

Bak-lieu

0f Lakon

DINDINGS(

bum’ll

mo

Tub Bataha

■01 Pclo Condor 1.

P. LANTAlf! > *’

, , T»ta <

■V-

Bodune

~Lakt

18 provinces with area and population as follows :

Provinces

Area; Eng¬
lish square
miles

Population

Population
per square
mile

Chi-Li (Pe-chi-Li).. .

115,800

20,937,000

281

Shan-Tung .

55,970

38,247,900

528

Shan-Si .

81,830

12,200,456

149

Honan .

67,940

35,316,800

376

Kiang-Su .

38,600

13,980,235

448

Ngan-Hui .

54,810

23,670,314

315

Kiang-Si .

69,480

26,532,125

382

Che-Kiang .

36,670

11,580,692

463

Fu-Kien (Fokien) …

46,320

22,876,540

282

Hupeh .

71,410

35,280,685

348

Hunan .

83 , 380

22,169,673

282

Shen-Si .

75,270

8,450,182

111

Kan-Su .

125,450

10,385,376

82

Sze-Chuen .

218,480

68,724,890

314

Kwang-Tung with

Hainan .

99,970

31,865,251

277

Kwang-Si .

77,200

5,142,330

67

Kwei-Chau .

67,160

7,650,282

114

Y iinnan .

146,680

12,324,574

84

Total .

1,532,420

407,253,029

av. 266

The official ˆcensus® so-called of 1910, with enumerations, only approximate to actuality re¬

duces the number of souls in the Chinese Em¬

pire to about 325,000,000. The number of foreigners in the empire in 1915, the Japanese far outnumbering all others, was not far from 200,000. #

Physical Features. — The coastline, form¬

ing an irregular curve of about 2,500 miles, gives about one mile of coast for every 500 miles of area. It is not deeply penetrated by gulfs, the only one of great extent being that of Pe-chi-Li in the northeast, but numerous indentations form safe and capacious roadsteads. With ex¬

ception of a bold and rocky peninsula in the province of Shan-Tung, the shore from the Gulf of Pe-chi-Li south to the island of Chusan is flat, and in many places so little raised above the sea-level as to be extensively inundated dur¬

ing a continuance of strong winds. From Chu¬

san to the mouth of Canton River it is usually rocky; from this point southwest, flats chiefly prevail. A peninsula of some size juts out in the extreme south from Kwang-Tung province, separated from which by a narrow strait is the large island of Hainan. Chusan Island and archipelago are also of importance, but most of the innumerable islands dotted round the Chinese coast are very small. The large island of Formosa, off the east coast, now belongs to Japan. Many lighthouses have been planted along the coast. Owing to the exclusive policy of the Chinese and their dislike of foreigners, a great part of the interior of the country must be regarded as still almost a terra

incognita.

The surface is mostly mountainous. The gen¬

eral slope is from west to east, and the moun¬

tains are a continuation of those of Tibet and central Asia. Branches of the Kuenlun trav¬

erse almost the whole breadth of China. In western Sze-Chuen, there are peaks reaching the height of 25,000 feet. In the north the Nan-shan branch of the Kuenlun Range runs under various names along the northeast of China till it reaches the frontier of Manchuria, north of Peking. A third great mountainous re¬

gion of China is in the southeast, where exten¬

sive chains stretch on the south of the Yang-tsc-Kiang all the way from the highlands of Yunnan to the eastern seaboard. Between the main mountain system, and following courses which may be roughly described as parallel, run the two great rivers of China, the Hoang-Ho and the Yangtse-Kiang. Here lie the central and richest Chinese provinces. (On both sides of the lower Hoang-Ho is an immense delta plain, consisting generally of a deep alluvial soil of unparalleled fertility.) This great plain has a length of not less than 700 miles, and a width varying from 150 to 500 miles, and probably maintains a denser population than any other portion of the earth's surface of similar extent.

Rivers and Lakes. — No country of the

world is better watered than China. The Yangtse-Kiang, which traverses the country centrally from west to east, has a course of some 3,000

miles, and forms a splendid inland waterway up which ocean steamers can sail for 1,100 miles to Ichang, a port opened to foreign trade. The Hoang-Ho, farther north, and next in size, has a course of over 2,600 miles, but is of much less value for commerce, being comparatively shallow, subject to tremendous and disastrous floods and apt to shift its course. The Grand Canal connects the lower course of the Yangtse with that of the Hoang-Ho, starting from Hang-Chau Bay in the south, and being con¬

tinued to Tien-Tsin in the north, thus com¬

pleting what is said to be the most magnificent system of water communication in existence.

This great waterway has, however, been greatly neglected, and threatens to become unnavigable, unless the necessary repairs are taken in hand.

Besides these rivers and their numerous tribu¬

taries, the most deserving of notice are the Si-Kiang in the south, of considerable size but still more commercial importance, having at or near its mouth Canton, Hongkong and Macao ; and the Pei-Ho, which, though much smaller, forms a waterway between Peking and the Gulf of Pe-chi-Li. The lakes of China, though rather numerous, are not individually of great extent. Perhaps the largest is Tung-Ting, in the province of Hunan, which furnishes an affluent to the Yangtse-Kiang, and has a cir¬

cuit of 270 miles. Po-yang, in the province of Kiang-Si, is 90 miles long by 20 broad, abounds in fish and is remarkable both for the pictur¬

esque scenery around it and the numerous beau¬

tiful and populous islands which it encloses.

Climate. — -The greater part of China

belongs to the temperate zone, only a small por¬

tion of the south lying within the tropics. It has what is called an excessive climate, and has a far greater range of temperature than is usual within the same parallels of latitude. Peking, the capital, is nearly a degree south of Naples, and yet while the mean temperature of the latter is 63°, that of the former is only 54°. In sum¬

mer, however, the heat reaches from 90° to 100°

in the shade, while the winter is so cold the rivers usually continue frozen from Decem¬

ber to March. At Hongkong, notwithstand¬

ing the influence of the sea in checking ex¬

tremes, the thermometer in June and July, the hottest months, frequently stands at 90°, and in winter, from December to March, sinks nearly to the freezing-point. At Canton, snow, though rarely, has sometimes fallen. At Shanghai, lat.

31° 20’, the range of temperature is still greater, the maximum reaching 100°, and the minimum falling at least 20° below freezing, or 12° F.

In the south the climate is of tropical character, the summer heat rising to 120°. Here the southwest and northeast monsoons blow with great regularity, and nearly divide the year.

In the north they are more variable. The vio¬

lent hurricanes known as ˆtyphoons® are not uncommon in the Chinese seas.

Geology. — The geology of China is very imperfectly known, but there is no doubt that all the leading geological formations are found in it. Primary formations are most largely de¬

veloped in the mountainous regions of the west, where granite, gneiss and primitive schists pre¬

vail. The same formations exist to a more limited extent in the southeast, where bleak mountains of granite give that district a dis¬

tinguishing feature. The secondary formation, including the carboniferous and cretaceous sys¬

tem, occupies a considerable area, and the coal fields of China are perhaps the most extensive in the world. The Tertiary formation has

its largest development in the northeast, and prob¬

ably underlies the greater part of the alluvium which covers the surface of the Great Plain.

A surface feature of a great part of northern China is the earthy deposit known as ((loess,w which covers an immense area both of mountain and valley, forming a yellowish-brown soil of the utmost fertility.

Mineralogy. — China is well supplied with useful minerals. Gold, though not thought to be very abundant, is obtained by washing the sand of several of the rivers, particularly those of the upper branch of the Yangtse, and in the mountainous and almost inaccessible regions of Yunnan. Silver is also found in the same re¬

gions. The quantity suffices for a large annual export, chiefly in payment of various foreign goods. Copper, besides forming the ordinary currency in limited mercantile transactions, is worked to a great extent for economical pur¬

poses. Mercury or quicksilver, in the form of cinnabar, is of frequent occurrence, and is much used both for coloring and medicine. Its poi¬

sonous fumes are even said to be inhaled like opium or tobacco. There is no want of iron either in the form of rich hematite, or in that of the carbonate of the coal-measures, but smelting is not carried on to any considerable extent. Lead, tin and zinc exist, but owing either to a deficiency in quantity, or ignorance of the method of extracting them economically from the ores, the native products fall short of the consumption. Some authorities reckon the coal-fields of China as equal in value to all the other coal-fields of the world together, and some time they must certainly become of immense economic importance to the country. The area of the coal deposits in the southeastern part of the province of Hunan is about 21,700 square miles. The coal occurs as both bituminous and anthracite, but as most of it is raised without machinery, by the rudest forms of manual labor, the price is necessarily high, and the quantity mined is trifling. Defective means of communi¬

cation partly, account for the backward state of coal-mining. Coarse mixtures of culm and earth are used as fuel to some extent, while other still more inefficient and less attractive com¬

pounds are employed. Among other mineral substances may be mentioned nitre, alum, gyp¬

sum, and more important than all, inexhaustible beds of kaolin or porcelain earth, the early pos¬

session of which by the Chinese, and their great skill in working it, has given the name of China to the beautiful ware which so long monopolized the market of Europe. Jade ap¬

pears to be found in China in its most perfect form, and is there held in the highest estima¬

tion, being wrought into trinkets and into orna¬

mental articles of various kinds. Various pre¬

cious stones also are found, and agates especially are admirably wrought.

Zoology. — China is said to possess about 200 indigenous mammals and over 760 birds, most of which are found in adjacent parts of Asia, and some are also European. Among the mammalia are several species of the monkey tribe, one of them being the so-called Cochin-China monkey, marked by a striking variety of stripes and colors. Another is the proboscis monkey. Tigers and leopards were at one time so numerous as to have been regularly hunted in state by the emperors, but these animals have been extirpated except in certain localities, es¬

pecially in Yunnan and Manchuria. A small species of wild cat is sought for as game, and served at table as a delicacy. Bears are fre¬

quently mentioned, and their paws are said to be in high request among Chinese gourmands.

Other carnivora include the lynx, badger, civet, marten and weasel. The elephant, rhinoceros and tapir occur in some localities of the south¬

west. Both camels and elephants are-employed as domestic animals, the former only in the north. Bats are numerous, and one large spe¬

cies is extensively used as food. To the indige¬

nous animals already mentioned may be added the wild hog,

porcupine, raccoon-faced dog or Chinese fox, and several species of rats, more especially one of a yellow color, larger than those of Europe, and much prized for its skin.

Several species of deer ar.e met with, one being the musk deer. In birds, as above indicated, China is extremely rich. Pheasants in par¬

ticular are famous, both for variety and for beauty. Among others are the well-known gold and silver pheasants, the former one of the most gorgeous of the feathered tribe. The pea¬

cock is also indigenous, and fowls akin to our common domestic variety. Birds of prey in¬

clude eagles, falcons, owls, *etc.* Song birds, such as the nightingale and thrush, are well known and much appreciated. Water-birds of almost every kind abound, such as ducks, geese, swans, pelicans, *etc.* The mandarin-duck is a Chinese species famed for beauty of plumage.

But perhaps the most remarkable water-bird is the fishing cormorant, the training of which forms an important employment, and is so com¬

plete, that when a bird has secured a fish which from its size he cannot manage singly, his neighbor darts down and assists him to com¬

plete the capture. The reptiles of China include several large serpents not regarded as danger¬

ous, and one species at least which is very venomous. Tortoises are common and are often kept in gardens and pleasure-grounds. No country is said to possess a greater number and variety of indigenous fishes than China. All its waters — its rivers, lakes, pools, canals and even ditches — are full of fish. This is partly owing to the artificial means by which the natural supply is vastly increased. Boat-loads of water containing spawn are carried to distant parts and deposited in ponds, where the fry are fed with various species of lentils or with yolks of eggs.

Botany.- — The flora is naturally extensive and varied. In the south it is tropical in char¬

acter, farther north subtropical, and still far¬

ther there are many plants and trees identical or nearly so with those of middle Europe.

Among trees commonly found in China the bamboo (if this gigantic grass should be called a tree), as in India, is perhaps the most valu¬

able of all on account of the almost endless uses to which it is applied. Oaks of different species are common, and the economical uses of the various parts — the wood, bark and galls — are perfectly understood. Even the acorns of some kinds are ground into flour and con¬

verted into a farinaceous paste. Coniferous trees are represented by numerous forms of pine, yew and cypress, some of them of great economic importance. The tallow and camphor trees abound, as also the mulberry and paper-mulberry. Palms are not abundant, but the cocoanut flourishes in Hainan and on the ad¬

jacent coast. The Pandanus or screw-pine is abundant in the south, but the date-palm is not known. The chestnut, walnut, willow and hazel are all indigenous. The fruit-trees include the fig, mango, guava, lichi, loquat, orange, peach, pomegranate, quince, nectarine plum, ap¬

ricot, *etc.* Plants producing lacquer or varnish and medicinal herbs of various kinds (including ginseng), are also well known. Among shrubby plants, the first place is unquestionably due to the tea-plant, of which further mention is made below. The next in importance is the mulberry, on the leaves of which the silkworm is nourished. Among flowering shrubs or trees are the rose, with its numerous varieties, the hydrangea, the passion-flower, the lagerstreemia, Indian pride, the Chinese tamarisk, various species of cactus and the camellia. The Chinese flora is particularly rich in varieties of the azalea. Altogether the abundance of flowering-plants, shrubs and trees is a feature of the Chinese flora. Dwarfing is a favorite occupa¬

tion and the Chinese horticulturists force plants to assume the most fantastic forms.

Agriculture. — This first of arts has always been held in the highest veneration in China.

During the period of the Empire the

emperor himself, to do it honor, repaired annually to an appointed spot with a large retinue, and, taking the plow in his hand, drew a furrow and sowed some seed. A similar festival is held in the capital of each province.

The agriculture of the Chinese has been lauded in high terms by almost all who have had op¬

portunities of witnessing it. In the important processes of stirring the soil, eradicating weeds, economizing manures, and applying them in the form best fitted to nourish the crop and bring it to maturity, they display unwearied industry and no small degree of skill. On account of the dense population, every square foot of land that can be made to raise food is kept in con¬

stant service and at the highest point of fertil¬

ity. Even mountain slopes are terraced and tilled, sometimes to the height of 8,000 feet, wheat or other grains being the. usual crop in these places. The farmers slavishly follow a routine which has been handed down without change from untold generations, and not only display no inventive powers themselves, but obstinately refuse to profit by the inventions of other countries. Their implements generally are of the rudest description and though im¬

proved European and American (flows have been sent out and urged on their acceptance, they reject them with disdain, preferring a rude shapeless thing drawn by oxen or buffaloes.

They appear to have no idea of raising im¬

proved breeds of horses and cattle by the arts so well known and practised in other countries.

The only animal of which the Chinese can be said to have furnished 11s with an improved breed is the pig. Their asses and mules are also of good quality. Rice, as the principal food of the people, is the staple crop. The rich alluvial plains which cover a great part of the surface are admirably adapted for its culture, and, by careful management,

yield amazing ’

crops — not one merely, but in the south lati¬

tudes two crops of rice in the hot season, be¬

sides a winter green crop usually plowed in for manure. In the neighborhood of Ningpo, lat.

30°, where the summer is too short to mature two crops in succession, they are still obtained by an ingenious device. The rice is sown in seed-beds and afterward planted out in drills.

A first planting is made about the middle of May, and in two or three weeks after, a second planting is made in the intervals between the previous drills. When the first crop is reaped in August the other is still green, but being stirred and manured, and having plenty of light and air, comes rapidly forward, and is reaped in November. All the steps of the process are conducted with the greatest care ; and the water¬

wheel, worked by the hand, or by an ox or buffalo, is kept in daily operation from the first planting of the crop till it is nearly ripe. The reaping instrument is not unlike our sickle ; and the crop, when not thrashed on the field, as is generally the case, is carried home and built up into stacks, resembling those of Europe.

The rice is not always grown on alluvial flats, and there is a variety, known as dry-soil rice, that is cultivated like any ordinary cereal. The sides of the hills are often laid out in a suc¬

cession of gently sloping terraces, and planted with rice in drills running across the declivity, thus admitting of being irrigated by streams which, retarded at every step, move slowly for¬

ward without acquiring any impetus. The same mode of culture is also practised with other crops. In the north the crops principally con¬

sist of our ordinary cereals and legumes —wheat, barley, pease and beans. Vegetables of various kinds are generally grown for house¬

hold use. Varieties of the cabbage tribe are extensively cultivated for the sake of the oil extracted from the seeds. The raising of green crops to be plowed in as manure is generally common where rice is cultivated. Two kinds of plants are chiefly employed; one of them, a trefoil, grown on ridges similar to those which form the intervals in

our celery beds.

Among other crops regularly and extensively grown may be mentioned sugarcane, used chiefly in a green state ; indigo ; the castor-o.il plant ; and numerous plants grown for their roots.

The opium poppy was once so extensively cultivated that the demand for the. imported article fell off very greatly. Maize, buck¬

wheat and tobacco may also be mentioned as cultivated crops. Three other plants of the greatest economical importance, and so exten¬

sively grown as to form important branches of Chinese. agriculture, deserve a separate notice.

The first is the mulberry. Judging from the 520

quantity of raw silk annually exported, and the general use of silk for dress, especially by the wealthier classes of the country, it is evident that a large area must be appropriated to the cultivation of this tree, and millions of persons employed in the different processes connected with it. The plants are not allowed to exceed from four to six feet high, and are planted in rows, often along the banks of canals. The mulberry farms are small, and are generally worked by the farmer and his family. The Chi¬

nese silk is much heavier than the Italian, and preferred in fabrics requiring lustre and firmness. Whether it owes its quality to a particular variety of mulberry, or to the climate or soil, has not yet been definitely ascertained.

The second plant more particularly deserving of notice is the cotton-plant. That cultivated in China is of the same species as the ordinary American, namely, Gossypium herbaceum. The plant producing the yellow cotton used in the manufacture of nankeen appears to be of a more stunted habit than the ordinary cotton. It is chiefly cultivated in a level tract around Shang¬

hai, forming part of the Great Plain, and is the staple summer crop. The culture differs little from that of other cotton countries, more

especially the cotton districts of India. The third plant, the tea-plant, is cultivated in two varieties — The a bohea and Thea viridis ; and though it was long supposed that the former only yielded black and the latter green tea, it is now known that both kinds of tea are obtained from each. The great tea provinces are Kwang-Tung, Fu-Ivien and Che-Kiang. In the first the Thea bohea is grown, and the tea is of inferior quality; in the other two the Thea viridis, which yields all the finer qualities and furnishes the greater part of all that is exported to Europe.

In these two provinces, where the culture is most extensive and carried to its highest perfec¬

tion, the tea plantations are usually formed in a deep rich loam, never on the low lands, but on the low hilly slopes. The tea farms, as common throughout China in all kinds of cul¬

ture, are small, and their management, includ¬

ing not merely all the steps of the culture of the plant, but the preparation of the leaves for market, is almost invariably confined to the farmer and his family. The leaves are gathered thrice — about the middle of April, when the leaf-buds are beginning to unfold ; about a fortnight after, in the beginning of May, when the leaves are fully grown ; and when the leaves again are newly formed. The first gath¬

ering yields the finest and most delicate tea, but with considerable injury to the plants.

Manufactures. — In all the arts necessary to the comfort of life, and in not a few of those conducive to luxury, the Chinese have made considerable progress. One peculiar feature in their processes is the general absence of ma¬

chinery. Except in a few industries the great moving power is manual labor. The silk stuffs of China have long borne a high name, and in several qualities are still unsurpassed. The loom in common use is worked by two persons, one of whom sits on the top of the frame, ■where he pulls the treadles and assists in making the various changes which must be made on the machine while in operation. By means of it the workman can imitate almost any pattern. The crapes and flowered satins, and damasks for official dresses, manufactured by the Chinese are particularly excellent. Everybody wears silks. It was formerly the prescribed attire of high officers, and soldiers were not

considered in full uniform without it. The finer kinds form the ordinary dresses of the opulent, while the poorest manage to deck themselves in a coarser quality, at least on gala days. The embroidery of silk is carried on to an amazing extent, the perfection to which it has been brought cre¬

ating an almost unlimited demand, both domes¬

tic and foreign, and employing myriads of the inhabitants. Steam-power has latterly been utilized in the reeling and spinning of silk.

In cotton goods the Chinese make good and substantial fabrics, but the cheapness and good appearance of the foreign goods have given rise to a large importation. Nankeen, once so common in Europe, is still produced as before, and continues to form an important branch of domestic manufacture. Cotton mills and fac¬

tories of the European type have recently been established. Linen seems not to be made in China. Flax is not grown, but a good substi¬

tute for it is found in the fibres of two or three plants, especially ramee, from which the beautiful grass-cloth, similar in appearance to linen, is extensively woven. Woolen fabrics are made only to a very limited extent. The con¬

sumption of leather in China is not great, and the manufacture of it is very imperfect. The porcelain of China has been famous from the earliest periods. The manufacture of the finest forms of it being long known to the Chinese alone, gave them the monopoly of the world, and though in elegance of shape and de¬

sign they must now yield the palm to Europe, for quality of material and rich gorgeous color¬

ing they still hold perhaps the foremost place.

Paper is an article that has been made in China from an early period and with great suc¬

cess. The manufacture of glass is not carried on to a great extent, and this is one of the few arts which, at least in regard to its finer processes, the Chinese have condescended to learn from Europeans. In beautiful lacquered ware the Chinese continue unsurpassed. Much of its excellence appears to be owing to the fine varnishes which they have learned to ex¬

tract from native plants. Except in some few articles the Chinese are backward in the manu¬

facture of metal goods; but recently, and under European leading, machinery, small arms and ordnance, warships, etc., are being produced in the country, as well as soap, matches and other articles. Many small articles made by hand display much finish and delicacy of workman¬

ship. See Chinese Architecture and Art.

Trade and Commerce. — The inland trade

of China, aided by the unusual facilities which it derives from a system of water communica¬

tion, ramifying like network over all its prov¬

inces, is of incalculable magnitude. Its rivers and canals are so covered with junks and barges and swarms of smaller boats that there does not seem much exaggeration in the estimate which makes . the tonnage belonging to the Chinese little short of the combined tonnage of all other nations. The inland commerce, how¬

ever, is much hampered by the rarity of good roads.

By the opening of the principal ports the foreign commerce has been immensely in¬

creased. Till 1842 the trade with foreigners, exclusive of that carried on by the mainland CHINA

»’ ■. if t *isj

r* jvi-t $^’$9

,-st’ »,i n »>i <* >■

.! < ».*•(> ■»

a < s7)r -

1 A Street in Tungchow

2 Reception Hall of Temple

CHINA

1 The Custom House, Shanghai

2 Hu-Sing Ting — Chinese Tea-House, Shanghai I

iT»

*

«

1

>|t

i

<

w i

_ •

H ‘M . :

■k i

.

L I

CHINA

521

through the town of Kiachta, with the Rus¬

sians, was jealously restricted to the mouth of Canton River. By the Treaty of Nankin, in the above year, Hongkong was ceded to Great Britain, and Canton and four other ports were th rown open, namely, Amoy, Fu-Chau, Ningpo and Shanghai. At subsequent dates other ports have been added to the list of treaty-ports for foreign commerce, and about 30 ports are now open, the. most northern being Niu-Chwang, in Manchuria, and the farthest inland being Chung-King, on the upper Yangtse, some 1,500

miles from the river’s mouth. Steamers do not go higher at present than Ichang (1,100 miles), the trade above this being carried on by junks or other craft. Several other of the ports are on the Yangtse. Of all the Chinese ports, Shanghai, at the mouth of the estuary of the Yangtse, carries on much the largest trade.

Regardless of the war, the trade here in 1916

was greater than ever before. The direct foreign commerce exceeded the returns in the year 1913 by $50,000,000; and the increase over 1915 was $100,000,000. Forty-two per cent of the total foreign trade of China was transacted here. In 1902 China agreed to open five new

treaty ports, Chang-Sha, Ngan-Iving, Wan-Hsien, Wai-Chau and Kong-Mun.

Among the countries which maintain com¬

mercial relations with the Chinese the prin¬

cipal are Great Britain and her dependencies, Hongkong and India, Japan, the United States and Russia. The latest trustworthy statistics relating to the foreign commerce of China are set forth in (The Americas > (New York, July 1916, Vol II, No. 10), from which we quote as follows: (<Official returns of the trade of China in 1915 have reached this country from Shanghai. The net commerce, not including the trade of Hongkong, and exclusive of a con¬

siderable total of goods carried by Chinese ves¬

sels not within control of the Maritime customs and plying between coast towns and treaty ports, has been (stated in Haikwan taels, equaling 62 cents, U. S.) : 1915, imports 454,-

475,719; exports 418,861,164; as compared with 1914, imports 569,241,382, and exports 356,226,-

629, w *etc.* It is shown by the complete statistics for the decade 1906-15 that 1915 was ((China's record year for exports, in spite of interference with shipping. Demand for silk, tea, natural dyes, antimony and other Chinese products, also higher prices, raised the total of exports. A drop in imports was accounted for by a. boycott of Japanese goods and by the fact that, owing to shortage of dyestuffs, colored cottons were not obtainable in usual quantities and at reason¬

able prices, and as white is the mourning color in China, the undyed materials could not be marketed. » The total trade of China^ through the entrepot of Hongkong was 252,606,127

Haikwan taels. Excluding the trade of Hong¬

kong, China's total trade with the United States in 1915 amounted to 97,622,706 Haikwan taels; with Great Britain 103,493,356; and with Japan 197,926,331 Haikwan taels (1 Haikwan tael =

62 cents currency of the United States).

The Chinese, in carrying on their extensive dealings, domestic and foreign, have in all 24

weights and measures, but of these only 6 are in common use, namely, the liang or tael —ounces avoirdupois; kin or catty —V/z

pounds avoirdupois; and picul = 13 3T/3 pounds used in weighing bulky articles; and decimals of a tael, called mace or tsien, candareen or fan, and cash or le, used in reckoning bullion, gems, drugs, etc., 19 cash making 1 candareen, 10 candareens 1 mace. The only native coin now current is the cash, a small piece of thin circular copper about three-quarters of an inch diameter, with a square hole in the middle for convenience of stringing. Native silver bullion, called sycee, and gold bullion of similar shape, and usually stamped with the names of the banker and workmen, and the year and dis¬

trict in which it is cast, are used in larger transactions. All taxes are paid in sycee of 98

per cent fineness. Private bankers are found in all large towns, and some of them pay interest on deposits. They issue paper money, which passes current in the particular districts where they are known. The Mexican dollar has been made a current coin all over the empire. In Shanghai, Tien-Tsin, Han-Ivow and the north¬

ern ports, the tael is commonly used.

Railroads. — Railway history began in 1876

when the Wu-Sung line was built. The lines in working order are as follows : Shanghai to Wu-Sung (opened 1898) ; Kai-Ping to Pe-Tang; from Tien-Tsin to within a short distance of the Great Wall, by way of Chan-Hai-Ouan, and with connection to Peking (built by Li Hung-Chang s advice; length 298 miles).

Of lines conceded and projected in 1897, the list is as follows: (a) The Russian line through Manchuria, with branch to Port Arthur and Niu-Chwang (began in 1897, and com¬

pleted in 1904; length of main line 1,200 miles, branch line 600 miles). (b) The German Kiao-Chau line (total length, 621 miles). (c) The Franco-Belgian line from Peking to Han-Kow (the first line to be

constructed by Imperial decree). The line will connect with Tai-Yuan-Fu and Singan-Fu. (d) The Anglo—

German line from Tien-Tsin to Chin-Kiang with connections to Tsi-Nan; total is about 620

miles. (e) The English line from Tai-Yuan to Fu-Chau (298 miles) ; and two lines from Shanghai, one in the direction of Su-Chau, Chin-Kiang and Nankin, the other to Hang-Chau and Ningpo. (/) The Belgian line from Canton to Han-Kow, with a junction at Hong¬

kong. (g) The French lines from Lavi-Kai to Yunnan-Fu from Lang-Son to Long-Chau and from Nanning-Fu to Peking. An edict in 1911 commanded that all railway trunk lines should revert to government and that provin¬

cial control should cease. The concessions granted for railroads in 1913 include one to a British firm, from the city of Sha-Shi in Hupeh through Honan and Kweichan, a distance with branches of 800 miles, the contract being signed 18 October. On 23 October two railways in Shantung were contracted for by German

parties, one to join the Hankow main line. On 24 June 1914 an agreement was made extending the German line to Su-Chau, one of the richest cities in China, and through populous regions especially rich in canals. Another line west¬

ward was provided for, both to form ultimately a part of the state system, after repayment of the loan. To French parties was granted through the Banque Industrielle de Chine, a concession to build a railroad through the south¬

ern provinces, 1,000 miles long from Yam-Chau near Pakhoi on the Gulf of Ton-Kin, through Nan-Kin, to Yunnan-Fu and to Chung-Kin in Szechuen. The same bank secured in March 522

an agreement to loan $30,000,000 for harbor im¬

provements at Pu-Hau and trolley lines and public conveniences in .Peking. On 31 March 1914 the British and Chinese Corporation

agreed to a loan of $40,000,000, at 5 per cent for 45 years, for further extensions of the Shang-Hai-Nan-Kin line. Active work in all these enterprises, however, has been for the most part suspended because of the European situation. Inclusive of 1,800 miles in Man¬

churia, the total mileage of Chinese railways in operation in 1915 was 5,960, with 2,273 miles under construction. Railway receipts in 1915

amounted to 50,933,059 taels (approximately $33,106,488) ; expenditures, 36,566,916 taels ($23,768,495).

People. — The Chinese belong to that variety of the human race which has been called Mon¬

golian, but in them its harsher features, as rep¬

resented in the genuine Tartars, are consider¬

ably softened. The southerners are of low stature, have small hands and feet (the last often artificially made so small in the females as to become a deformity), an olive or yellowish complexion, much modified by the degree of its exposure to the open air, prominent cheek¬

bones, depressed nose, eyes obliquely turned up¬

ward at the outer extremities, black hair, scanty beard. In bodily strength they are far inferior to Europeans, but superior to most Asiatics, their great assiduity and patient endurance of fatigue making them highly prized as laborers throughout the Indian Archipelago. Some of the finest physical specimens of the race are to be seen among the coolies or porters of Canton.

The Chinese are deficient in courage, yet often display great contempt for death. In their moral qualities there is much that is amiable.

They are strongly attached to their homes, hold age in respect, toil hard for the support of their families, and in the interior, where the worst kind of foreign intercourse has not debased them, exhibit an unsophisticated and pleasing simplicity of manners. In the great mass these qualities are counterbalanced, or. rather sup¬

planted, by numerous vices — treachery, lying, gambling, opium-smoking, *etc.*

Population. — The Imperial treasury depart¬

ment of China in 1910 published an official census of China in connection with a readjust¬

ment of the imposts that are destined to pay its war indemnities. It appears from this census that the empire contains 426,000,000 inhabitants, and that China Proper — with its 18 provinces — contains 407,000,000. In the provinces, the number of inhabitants per square mile is great¬

est in Ho-Nan and least in Kan-Su. In the dependencies the density of population is far less than in China Proper, especially in Mon¬

golia and Turkestan, which are very sparsely populated. The density is 22 times greater in Ho-Nan than in Manchuria. The population of the United States as a whole is about 20 per¬

sons per square mile. The population of China Proper is about 300 per square mile. If the whole population of the United States and 40,000,000 more were crowded into the State of Texas the density of population would be about equal to that of the Yangtse Valley and of the plain extending north and south between the lower courses of the Yangtse and the Hoang rivers. Ngan-Hui but a little larger than New York State has more than three times the pop¬

ulation. Che-Kiang province, slightly less in area than Kentucky, has more than 10 times the number of inhabitants, and between Kwan-Tung and Kansas the ratio is 21 to 1.

No census figures based upon official returns are obtainable for the dependencies, and the nature of the population in these regions makes even a close estimate difficult. The data for 1910 may be given approximately as follows: China . 407,330,000

Manchuria . 8,500,000

Mongolia . 2 , 580 , 000

Tibet . 6,430,000

Sungaria . 600 , 000

East Turkestan . 600,000

426,040,000

Religion. — Judging by the multitude of tem¬

ples and joss-houses seen in every quarter, and the endless number of ritual acts performed on high festivals and in the ordinary intercourse of life, the Chinese are a most religious people.

The religion of the state was for ages Con¬

fucianism, founded by Kung-Fu-Tse or Con¬

fucius, about 550 b.c. Another religion is Taoism, introduced about the same time by Lao-tsze, and numbering a good many adherents.

(See Confucius; Lao-tsze). Among the great mass of the people a form of Buddhism pre¬

vails, or a curious mixture of religious ideas and forms. In the conduct of daily life they are under the dominion of innumerable super¬

stitions, living in dread of demons whom they constantly endeavor to ward off or appease.

Their belief in feng-shui, or the influence of ˆaspects,® works against the introduction of rail¬

roads and other modern improvements. At¬

tempts to introduce Christianity were made by the Nestorians as early as the 6th century, but the celebrity of the Jesuit missions has thrown

all others into shade. The Roman Cath¬

olics now claim to have about 1,000,000 ad¬

herents among the Chinese. Various Protestant bodies carry on missionary operations in China.

There are now probably over 50,000 native Protestants. During the Boxer massacres many native Christians were martyred.

Education and Philosophy. — The im¬

mediate object of Chinese education has been twofold: (1) To prepare students for the con¬

duct of life; and (2) to fit them for office under the government. Both in the elementary schools and in those of the highest grade the purpose was ever kept in view of giving the scholar a command of those branches of knowl¬

edge which formed the old Chinese curriculum of studies. These were almost wholly literary — the classics, some knowledge of history and poetry and skill in working the abacus. On this numeral frame, employed in a much simpler form in Europe long ago, but of greater scope and with a more elaborate system, still in use from Petrograd to Tokio, the skilled accountant can add, subtract, multiply, divide, extract the square and cube roots, work decimals and frac¬

tions. The expert can usually complete the cal¬

culation more rapidly than by our mental or mechanical methods. Iu the higher grades, the schools, private instructors and writing masters prepared lads and young men for the civil serv¬

ice examinations which, for over 1,000 years, have been one of the institutions of China.

These teachers, usually men who had been un¬

successful applicants at the civil service exam¬

inations, were to be found in most villages, as well as in large towns and cities. Tn old China CHINA

this olficial system, of purely literary competi¬

tion for appointment to office, had become in effect little more than a method of training the memory and for producing experts in penman¬

ship, while educating the literary tastes. Such a discipline, however, bore slight relation to the exercising of the judgment, to the provocation of original thought, or to informing the student concerning the world outside of China, while but slightly fitting him for the practical duties of statesmanship or administration. The reason assigned for this official system of education was that all the people, individually and in mass, were presumed to be so well versed in the maxims of Confucius and so thoroughly indoctrinated in ancestral ethics, that both pri¬

vate and public virtue was supposed to be auto¬

matic. The clash with Occidental civilization exposed the weakness of this antiquated sys¬

tem, and it came to an end during the revolu¬

tion, out of which arose the Chinese Republic.

For some years previous to this the schedule of examinations had greatly changed, the reformed curriculum including such subjects as the history of Western nations, political economy, civic administration, finance, taxation and the physical sciences. The ancient brick ex¬

amination halls, with their hundreds and thousands of stalls, in which students spent days, and in which some might be found dead or exhausted, are now no more, for schools and colleges on Western models have taken their places. Though in one sense the Chinese, who almost worship letters, are the most literary of peoples, probably not 10 per cent can read books; though a much larger percentage of the males know the characters needful in their crafts or trades. Until very recently, female education, so far as it existed, was mainly a private or a family affair. Of late years, largely through missionary influence and example, the education of women has made surprising prog¬

ress and the tendency is now strongly toward more equality in

intellectual training without regard to sex. The second great purpose of education was personal culture, looking to the right conduct of life. China, like all old nations with unique or advanced civilization, has a long and interesting literary history. Af¬

ter the dateless evolution of writing, Confucius — -the Ezra of China — in the 6th century b.c.

collected the literary inheritances of the past and reduced the ancient traditions to sys¬

tematic and easily communicated form. The literary bequests of the sage, preserved by his pupils, became the textbook, of the nation, the basis of family and school training and the social bond of a then comparatively small com¬

munity. Nevertheless the people thus equipped with a weapon of culture more potent than the sword, even a deathless literature, was to enter upon a career of expansion and to erect a polit¬

ical structure that should ultimately as an em¬

pire include not only China proper but also most of eastern Asia within China's own bound¬

aries. In time this culture influenced also many distant, neighbor, vassal or pupil nations, to whom Great China was suzerain, teacher or model. Mencius (b.c. 372-289) made pop¬

ular the ethics of the sage, applying them especially as practical principles of government.

He gave his work so democratic a tone and flavor that when, 2,000 years later, Chinese and especially Japanese scholars perused the Amer¬

ican Declaration of Independence and the Con¬

stitution of the United States, they thought that surely ((the barbarians must have studied Mencius® ! It is no wonder, therefore, that the first universal Emperor, Shi Wang Ti (209

b.c.) , who abolished feudalism, built the Great Wall and unified China in imperialism, and in what he perhaps meant to be benevolent

despo¬

tism, ordered, as tradition loves to state, the destruction of literature and the decapitation or exile of hundreds of the literati. Students of scientific mind remembering that Shi Wang Ti was a centralizer and unionist of strenuous proclivities, use freely the salt of critical opinion here. The reputed tyrant acted less from hatred of literature as such than fear of the democratic sentiments of Mencius and of the ultra-conservatives, who, though men of let¬

ters, were rather too bigoted adherents of feudalism and their feudal patrons and hope¬

lessly wedded to old-time notions. Under an¬

other dynasty, early in the Christian era, the ancient texts were recovered, ink and paper replaced the iron stylus and the bamboo slats and civil service examinations were established.

Then in succession followed Buddhism, the study of Sanskrit and the train of ideas from India — to issue later in the blending of Mongol and Hindoo ideals — the foundation of the Han Lin or Imperial Academy (Forest of Pencils), printing by means of cut blocks and later by ® living® or movable types (made not indeed of zinc and antimony but of various materials) the compilation of dictionaries and cyclopedias and the creation of the drama and the novel. The era of the Sung dynasty (960-1126) was the Augustan or Golden Age of literary splendor.

Whole libraries of books, on a multifarious variety of subjects, attest the mental fertility of the age. To a large degree, this epoch has been prolonged to our day. It was not, how¬

ever, until the 11th century that the various systems of Confucianism, Taoism, Buddhism clashed in a contest that for a generation threatened anarchy to the whole empire. Dur¬

ing a time of apparently boundless national prosperity a school of politicians arose (a.d.

1021-1086) with socialistic or populistic notions which they first sought to found on the classic literature and then proceeded to put into prac¬

tice. Their theories and methods show a start¬

ling resemblance to modern discussions and ex¬

periments. At their acme of temporary success they demanded the overthrow of existing insti¬

tutions. Against these innovators, a school of writers and party agitators arose (1009-1086) in opposition, who contended for the ancient principles of the sages. At first the radicals won, but after some years the people demanded the return of the old order and the conserva¬

tives gained power. This bloodless struggle compelled deep thinking on vital themes.

After a generation of thought, a restate¬

ment of the old faith, or neo-Confucianism, issued (1130-1200) in which it seemed as though all systems had entered and passed through the crucible and taken the form of a creed. No longer a mere ritual, or phase of philosophy, the new system of belief, which has since influenced half of Asia, showed itself to be a fusion of Taoist and Buddhist elements with Confucianism, or Universism, as the chief element; for in this neo-Confucianism, the ethics of the sage are paramount. Yet this 524

(<mcdley of pantheism® is a true creed, which, in both China and neighboring nations, has been often enforced with a cruelty quite equaling that of the southern European. To-day, against this creed Mohammedanism and Christianity concentrate their forces. The compromise made by the State through Yuan Shi Ivai and his sup¬

porters, seems to be much like that of those persons in the State churches of Europe and among ourselves, who, while subordinating dogma and the peculiarities of sects, conform politely to mild ritual and the forms supposed to be needed for upholding society and keeping control of the masses. Modern science, while seriously disturbing some of the elements in the <(pantheistic medley® of the modern Chinese gentleman's creed, seems on the whole to har¬

monize finely with the ancient ethics, which seem also to the average Chinese man to be so pleasantly modern, while capable of being merged into the rising tide of Christianity.

Customs, Manners,, Dress, *etc.* — Among

the Chinese, politeness is carried to an extreme.

They scrupulously avoid all contradiction in conversation, and are careful not to use any offensive or irritating expressions. From the same source arises the tedious, frivolous and often absurd etiquette and extravagant compli¬

ment for which the}' are remarkable. But even here a wish to please and gratify is sufficiently evident. An invitation to dinner is written on a slip of red paper, and is sent some days be¬

fore ; it is usually in this style : <(On the -

day a trifling entertainment will await the light of your countenance; Tsau Sanwei's compli¬

ments.® This is followed by another card nam¬

ing the hour. The dinner itself is sumptuous, wine and spirits are drunk freely, and the whole affair goes off with a great deal of boisterous merriment. Fresh pork, fish and fowl form the staple articles of food, with vegetables of various kinds. Beef and mutton are rare.

Opium and tobacco are in common use. The usual beverage among all . classes is tea, of which the Chinese consume enormous quanti¬

ties.

In ordinary cases, strict separation prevails between the male and female branches of a household. Betrothment is entirely in the hands of the parents, and is conducted through the medium of a class of persons called mei-jin, or go-betweens, whose office of matchmaking is considered honorable. The marriage itself is conducted with much ceremony, gay processions and other convivialities. Besides one wife,

strictly so-called, a man who can afford it may have several subordinate wives. A wife may be divorced on several grounds that we should deem frivolous. Infanticide is common among the very poor, the female children being almost the only victims.

The return of the new year is an occasion of unbounded festivity and hilarity in China, and New Year's Day is a universal holiday for rich and poor. At this season all accounts are expected to be adjusted, and if this is delayed or neglected the creditor has sometimes recourse to the expedient of carrying off his debtor's door. On New Year's morning all shops are shut, and this usually continues for several days.

There are also various festivals throughout the year, but no weekly day of rest. Gambling is universal in China. Porters play by the way-side while waiting for employment; and hardly has the retinue of a great official seen the latter enter the house when they pull out their cards or dice and squat down to a game. Dress, like other things, undergoes its changes in China, and fashions alter there as well as elsewhere; but they are not as rapid or as striking as among European nations. Regarding dress, there are certain restrictive laws in operation.

The mandarins or officials have some special pe¬

culiarities of dress, and their respective ranks are indicated by the nature of the knob or but¬

ton they have on the top of their hats. The wearing of the queue or pig-tail, perhaps the most noticeable external peculiarity of the Chi¬

nese as regards costume, was a sign of loyalty to the Manchu dynasty, but with their deposi¬

tion and proclamation of the republic, is now a thing of the past. The headdress of married females is becoming, and even elegant. The copious black hair is bound upon the head in an oval-formed knot. No caps, bonnets, hoods, or veils are worn abroad; a light bamboo hat, or an umbrella, protects from the sun. The extraordinary practice, peculiar to China, x of compressing the feet of females (especially those of the better class) into unnatural form and dimensions is now rapidly, passing away under the new order of things, since the repub¬

lic was ushered in.

Dwelling-houses are generally of one story.

The common building materials are bricks sifted earth, matting or thatch for the walls, stone for the foundation, brick tiling for the roof and wood for the inner work. The fronts present no opening but the door. The walls are often stuccoed, but not painted, and the bricks are occasionally rubbed smooth with stones and the interstices pointed with fine cement. The general internal arrangement of a Chinese dwelling of the better sort is that of a series of rooms of different dimensions, sepa¬

rated and lighted by intervening courts, and accessible along a covered corridor, communi¬

cating with each, or by side passages leading through the courts. Streets are generally so narrow as to be mere lanes. The most charac¬

teristic Chinese structures are the pagodas, built generally with a number of stories, each marked off from the rest by a peculiar projecting por¬

tion.

Government, Laws, Army and Navy, *etc.*

— In our supplementary remarks we have glanced at the abolition of the Manchu system of government, which was a modification of the older Chinese system and at the reforms made under the republic, but it is more than prob¬

able that much of the old routine in adminis¬

tration will remain. The provinces, either singly or by twos, are under a governor and sub¬

governor, and each province has also a chief criminal judge and a treasurer. Particular magistrates preside over particular districts and cities, and instead of being permanent are changed about once in three years. The great object aimed at is to maintain a strict surveil¬

lance and mutual responsibility among all classes ; in other words, to

imbue them with fear of the government and infuse a universal distrust. The chief protection of the people is in a body of laws, called TaTsing-Liuh-Li, that is, <(statutes and rescripts of the great pure dynasty® which are held in high regard, and agreeably to which, with occasional violations, all public functions arc discharged. The new

CHINESE COUCH AND FURNITURE

.

r>

J

I

■

• ˆ irt

code of laws that is being drawn up for the Chinese republic is to be the work of a Japanese professor of law. The old distinctions of Manchu and Chinese have, however, been abolished and the reorganized national army, equipped with modern weapons and appliances, has shown its effectiveness in recent years quite satisfactorily. Numbers of Krupp guns are mounted on the fortifications ; and there are arsenals superintended by Europeans. The

navy contains several cruisers and other war vessels of the modern type, but the Chinese lost their most powerful ships in the war with the Japanese, and their navy is now of comparatively little strength. Three protected cruisers were built in 1897 in Germany for the Chinese fleet, and several sea-going torpedo boats, ordered be¬

fore the war, have been also added. The reve¬

nue of the republic is derived from customs, ex¬

cise and the land and salt taxes. Calculating on the basis of statistics for 1901, if the cus¬

toms duties, including the sum payable in lieu of the lik in or in land-transit dues, be computed at about 10 per cent, the revenue, if payable in gold, would be about $20,000,000.

China had a national debt before the war of 1894— 9c, and at the close of that contest she assumed a new indebtedness of $187,500,000.

The aggregate amount which the foreign

powers were to receive by way of indemnity for the Boxer outrages in 1900 was $337,500,000, payable in 39 annual instalments. The whole of the Chinese customs revenue, if payable in gold, would be equivalent to about 6 per cent of the indemnity.

History. — The early history of the Chinese is shrouded in fable, but it is certain that civili¬

zation had advanced much among them when it was only beginning to dawn on the nations of Europe. The names of numerous dynasties be¬

longing to a period two or three thousand years before Christ are still preserved, but how much, if any, of their early history is authentic, can¬

not be determined. The Chow dynasty, which was founded by \Yu Wang, and lasted from about 1100 b.c. to 255 b.c., is perhaps the earliest that can be regarded as historic, and even of it not much more

is historic than the name. W'u W ang is said to have divided the kingdom into 22 feudal states, and the continual internal ri¬

valries which resulted from this policy encour¬

aged Tartar raids and invasions. Under LingW'ang, one of the sovereigns of this dynasty, Confucius is said to have been born in 551 b.c.

During the latter half of the period in which this line of sovereigns held control there appear to have been a number of rival kings in China, who lived in strife with one another. Chow-siang-W ang, who v as the founder of the Tsin dynasty, attempted to bring all China under his rule, but he was unsuccessful. His great-grandson. however, a national hero of the Chi¬

nese, who was the first to assume the title of •Whang* (emperor), and henceforth called himself Tsin-Shi Whang Ti, succeeded in ac¬

complishing this. He ascended the throne at the age of 13 and fixed his capital at what is now Segan-Fu. Besides building a great palace there, he constructed numerous roads, canals and buildings throughout the country. He com¬

pletely defeated several Tartar and other neigh¬

boring tribes and suppressed a revolt in his own country. The Great Wall of China was begun by his command, and it was he who ordered all books treating of the past history °f China to be destroyed. The present name of China is derived from the name of this dvnasty. The Tsin dynasty ended with W hang-Ti s grandson, who gave way in 206 b.c. to Lew Pang or Kaou-Te, the founder of the Han dynasty*. Toward the end oi the 2d century, or soon after the beginning of the 3d century, of the Christian era, the empire was divided into three states, which were again united under one ruler before the end of the 3d century. Dur¬

ing the 10th century the right to the throne was disputed, and civil war raged till an adjustment took pˆace by the establishment of the Tsung dynasty under Tae-Tsu 960 a.d. Under this dynasty great progress was made in literature and art. Inroads of Tartar hordes now pressed the Chinese so hard that they called in the aid of the Mongols or western Tartars, who freed them from their oppressors, but gave them a new master in the celebrated Kublai Khan who founded the Mongol dynasty, and removed the capital from Nankin to Peking. His ninth de¬

scendant was driven from the throne ar.d a native dynasty called Ming again succeeded in 1368 in the person of Hungwu. A Long period of peace ensued, but was broken about 1618, when the Manchus gained the ascendancy, and after a war of 27 years established the Tartar dynasty in the person of Tung-Tchi, which came to an end in 1911. According to the Chi¬

nese, their dynasties, 26 in number, embrace a period of afx>ut 5,090 years, during which be¬

tween 200 and 300 sovereigns have held the throne. The earliest authentic accounts of China published in Europe are those of Marco Polo, who visited the country in the 13th cen¬

tury. The first British intercourse was at¬

tempted under Queen Elizabeth in 1596, but the vessel sent did not reach its destination. A trade was subsequently established at Canton by the East India Company, but no direct in¬

tercourse between the governments took place till the embassyˆ of Lord Macartney in 1793, which was well received by the Emperor Keen Lung. A second embassy in 1816 of Lord Am¬

herst was treated with insolence, and returned with a letter from the emperor to the prince regent, bearing among other things, I have sent thine ambassadors back to their own country without punishing them for the high crime they have committed. The arrogance thus manifested could not fail, sooner or iater, to bring on a collision; and accordingly, in 1841, the British, on being refused redress for injuries, partly real and partly alleged, proceed¬

ed to hostilities, and after scattering almost without a struggle every force which was op¬

posed to them, were preparing to lay siege to Nankin, when the Chinese found it necessary to sue for peace. A treaty was then concluded, by which the five ports of Canton, Amoy. Fu-Chau, Ningpo and Shanghai were opened to British merchants, the island of Hongkong ceded to the British in perpetuity and the pay¬

ment of $21,000,009 agreed to be made by the Chinese. In 1850 an insurrection headed by Hung-seu-Tseuan or Tier.-Te, who gave him¬

self out as a descendant of the Ming dynasty, broke out in the provinces adjoining Canton, with the object of expelling the Chinese

tar dynasty from the throne, as well as of re¬

storing the ancient national religion of ShanTi, and of making Tien-Te the founder of a 526

new dynasty, which lie called that of Tae-Ping, or Universal Peace. After the capture and execution of Tien-Te his place was taken by Hong-Sin, who identified Shan-Ti with the God of Christianity, and regarded himself as called of God to make the old true religion of China again predominant. For a long period the insurgents succeeded in maintaining their ground against the imperial forces, and it was not till after the lapse of several years that the latter were enabled in some degree to quell the rebellion. Notwdthstanding the cruel retali¬

ation by the victorious party, and the wholesale massacres perpetrated on the insurgents, they were unable to stifle the spirit of revolt. In October 1856 the crew of a vessel belonging to Hongkong were seized by the Chinese on the allegation that they had been concerned in a piratical attack on a Chinese vessel. The men, on the remonstrance of the British authorities, were afterward brought back, but all reparation or apology was refused. The attitude taken by the Chinese in this matter led to a declara¬

tion of war, and in 1857 the Chinese fleet was almost totally destroyed, and Canton was taken by the French and English troops. A treaty was at length concluded with Lord Elgin on behalf of the British, by which important privi¬

leges were secured; but an attack on the French and English ambassadors wTho were on their way to Peking to have the treaty ratified by the Emperor led to the renewal of the war. The allied forces marched toward Peking, and after twice defeating the Chinese troops entered the city. This brought the Chinese to their senses, and the treaty was ratified. Meantime the Tai-Ping rebellion had been gaining strength, and the trade of Shanghai and Canton was materi¬

ally interfered with. The British thereupon de¬

cided to assist the Chinese in quelling the in¬

surrection, and the services of a young engi¬

neer officer, Capt. Charles Gordon (<(Chinese Gordon,® afterward so well known in connec¬

tion with the Sudan), were lent to the govern¬

ment for that purpose. The rebels were gradu¬

ally driven from their posts and in July 1864

Nanking, their last stronghold, was taken. But the empire was still disturbed by rebellion in other parts. The Mohammedans in Chinese Turkestan, wishing to take advantage of the weakness to which the Chinese government had been reduced by the Tai-Ping rebellion, revolted almost simultaneously, but apparently inde¬

pendently, with those in the province of Yun¬

nan in the southwest. In both cases the rebel¬

lion resulted in the temporary separation of the provinces from the empire. In 1883 hostilities broke out between China and France in conse¬

quence of the warlike operations of the latter in Tonkin and her claim to the protectorate of the country; but the matter was arranged early in 1885. In 1894 war broke out with Japan in connection with Chinese misgovern-ment in Korea, and in this struggle Japan had almost an uninterrupted success both by land and sea, driving the Chinese out of Korea and in¬

vading China at several points. Peace was concluded in 1895, China agreeing to give up Formosa and pay a large indemnity to Japan, to open additional ports to foreign commerce and to recognize the independence of Korea.

In the autumn of 1897 two German mission¬

aries were murdered in the province of Shan-Tung, and the admiral commanding the Ger¬

man squadron on the China station immediately effected a landing in

the bay of Kiao-Chau, which, after much discussion, was finally leased to Germany early in January 1898. This acquisition of Chinese territory by Germany attracted much attention among other powers whose interests were likely to be affected, and was followed at brief intervals by the leasing of the town and harbor of Port Arthur in the Liao-Tung Peninsula to Russia, and the leas¬

ing of the bay of Wei-hai-Wei to Great Britain.

On 22 September a coup d'etat was effected by the dowager-empress of China, who had acted as guardian to the Emperor Kwang-Su during his minority, by which the emperor was again placed under her dominion. The prompt remonstrances of the representatives of the powers at Peking served to prevent any extreme procedure on the part of the Empress and her advisers, and the Emperor afterward nominally regained power, but early in 1900 was reported to have abdicated.

In September 1899 Secretary Hay instructed the United States representatives in England, France, Germany, Russia, Italy and Japan to invite from those governments a presentment of their intentions in regard to the treatment of the commerce of foreign powers in the newly acquired spheres of influence, with special ref¬

erence to the treaties existing between China and the United States, advising that China be regarded as heretofore as an open market for the world's commerce, and that all possible steps be taken to establish much-needed admin¬

istrative reforms and to preserve and strengthen the imperial government in its integrity. On 20

March 1900 Secretary Hay announced that all the powers concerned had accepted the pro¬

posals of the United States, and that he would consider their consent final and irrevocable. In May 1900 a secret society, colloquially known as the ((Boxers,® rose in the provinces of Shan-Tung and Pe-chi-Li and massacred native Christians and European missionaries. The Boxers were encouraged by the empress-dowager and the palace-party at Peking, who placed themselves at the head of a movement directed against foreigners. The ministers at the European legations in Peking — Sir Claude Macdonald being at the head of the British legation — determined to requisition guards for their protection, and these arrived on 31 May.

On 4 June the Boxers destroyed the Peking-Tien-Tsin Railway, and by cutting communica¬

tions isolated the Europeans in Peking. Soon after the chancellor of the Japanese legation and Baron von Ketteler, the German Minister, were murdered in the streets. In hope of relieving the legations, Admiral Seymour put himself at the head of 2,000 European troops and blue¬

jackets and set out from Tien-Tsin for Peking, but had to retire. Meanwhile the Chinese had been manning the Taku forts at the mouth of the Pei-Ho, and making preparations for clos¬

ing the entrance to the river. The commanders of the allied fleets — British, French, Russian and German — in the Gulf of Pe-chi-Li sum¬

moned the Chinese commander to surrender.

He refusing, they opened fire on the 17 June, bombarded and destroyed the forts. The allied forces entered the foreign city of Tien-Tsin on 23 June, and the native portion of the citv was taken on 14 July. All this time the lega¬

tions at Peking were closely besieged and con-CHINA

slant ly bombarded. The smaller legations having been destroyed or rendered untenable, their occupants, together with a number of native Christians, took refuge in the British legation, which, from its extent and strength, offered a better prospect of protection. The legation was ill supplied with provisions, and the defenders were reduced to extremities, when the relief force of 12,000 men, comprising Brit¬

ish, American, French, German, Russian and Japanese troops, captured Peking on 15 August.

Before the arrival of this force the empress-dowager and her court, with the Emperor Kwang-Su, had fled from the capital, and it was impossible, with the troops and transport available, to overtake them.

Troops of various nationalities had been dispatched from Europe to North China with all possible haste, and Count von Waldersee, the German commander, had been accepted by all the allies as commander-in-chief, but interna¬

tional jealousies soon made themselves appar¬

ent, and complications seemed likely to ensue.

In October 1900 it was announced that Lord Salisbury had concluded an agreement with Germany by which the two powers bound them¬

selves to the principle of the (<open door® in China, to abstain from seeking to obtain for themselves any territorial advantage, and to take such steps as might be agreed on for the protection of their interests, as against any other power seeking territorial aggrandize¬

ment. Subsequent military operations consisted chiefly of punitive expeditions to the south and west. Negotiations for peace were at once en¬

tered upon. On 4 December the powers sent a joint note to the Chinese peace commissioners, demanding among other acts, the execution of the leaders in the massacre of foreigners and the payment of an indemnity, which in October 1901 was fixed at $735,000,000. On the ratifi¬

cation of the indemnity agreement, the foreign troops were withdrawn from Peking. Later, through the good offices of the United States, the indemnity was reduced, being fixed at $337,500,000.

After the Boxer episode the Imperial Court returned to Peking and again assumed govern¬

mental powers. Yet, while the dynasty was showing a disposition to reform abuses and conform to the world's general customs and laws, two currents of influence were flowing away from the Manchus. The idea among

diplomatists and writers from 1902 to 1908

seemed to be that of the imminent (<breakup of China,® while the determined purpose of the newer generation of enlightened natives was to have a new China with a new form of government. Meanwhile

Russia and Japan

were moving to their clash in Korea and Man¬

churia. The vital question to the Chinese mil¬

lions, however, was this — dismemberment by foreigners, or (<the five countries® maintained in unity — whether under empire, constitutional monarchy or republic. Which?

All question of the ftbreak-up of China,® its dismemberment and division as spoil among aliens, passed out of sight when the govern¬

ment of the United States of America, through the logic of events, entered the field of Far Eastern politics as a power to be henceforward reckoned with. This was especially manifest in the negotiations resulting from the Boxer riots.

The action of Admiral Lewis Kempff, U. S. N., following the precedents set by President Wash¬

ington, in his refusal to join with the allies in making war on China, by bombarding the Taku forts, when as yet no hostile shot from a soldier or sailor employed by the Chinese gov¬

ernment had been fired, gave the Americans the “inside track,® making China ready and glad to listen first and accede to whatever the United States proposed, in diplomacy or finance. The Americans set the precedent to all the powers, of prompt evacuation and retirement of their military forces, thus teaching that China must work out her own salvation. The old policy of European predatory aggression was further dis¬

approved and the unbroken precedent settled since the foundation of the American govern¬

ment, of considering the Asiatic nations, not as material for conquest and spoil, but for humane treatment and fair dealing, was fol¬

lowed. Not only was the outrageously heavy indemnity demanded by the Powers reduced one-half, but, after satisfying all possible de¬

mands for loss by the Boxer rioters — the mis¬

sionary societies for the most part waiving or declining to make any

claim — the sum of $13,000,000 was set aside, to be paid back to China. Under this arrangement, at the sugges¬

tion of the Washington government, nearly a thousand young men and women, appointed af¬

ter competitive examinations, have been sent to the United States to be educated. Distrib¬

uted in our schools, colleges and universities, these young people have cut off their queues and adopted the coiffure and clothes1 which are now becoming uniform throughout the world.

Through the Cosmopolitan Clubs now so nu¬

merous and other means of culture they have gained knowledge of the world at large.

Greater in influence on China, even than the United States, has been Japan, especially since that military clash, in 1904-05, between organ¬

ized intelligence and the ignorance of despotism, manifest in the Russo-Japanese War. In the one case, an army and navy, in which prac¬

tically every man could read and write, made proof, in the field and at sea, under scientific leaders, of what Japanese soldiers and sailors are capable. The struggle was not one of reli¬

gions, or races, or civilizations, but of equally brave men under varying capacity of leader¬

ship, and was virtually the victory of education over illiteracy, of public schools over repression and ignorance. While the battle of Mukden was pending, the writer made prediction that if the Japanese, victorious as they were sure to be, guarded from loot or dishonor the tombs of the Manchu dynasty at Mukden — in Chinese ideas, blessing or cursing of ancestry or spirits, whether of Mikado, Son of Heaven, or common folks being vastly more significant than in the case of contemporaries — ((they would have the heart of China in their hands® ; in a word, that the Chinese would look at once to the Japanese as their models and teachers. As matter of fact, before they had fully attended to their own wounded, the Japanese set a guard

around the Manchu tombs, which were kept inviolate. Thereupon, victory being assured and known throughout China, not only did the Peking government assent cordiallv to the pro¬

visions of the Portsmouth, treaty Jq.v.) in which it had no part, promising Count Komura faithful co-operation, but from all over China students at once crossed the sea to Japan, until 528

the schools in Tokio were embarrassed by the largeness of the invasion. No fewer than 20,000 Chinese young men and hundreds of girls, from 1904 to 1910, studied in Japan from a few months to six years. The overwhelming majority of them were found to be, in the eyes of the Peking government, seditious, and many were openly plotting to destroy the Manchu dynasty. Returning home, ihey began direct agitation for a change of government, this time in co-operation, financially and morally, with their countrymen in America, Hawaii and in other lands. From the first the note of their public harangues and secret meetings was this —((Let us gain the world's sympathy. Refrain from injury to the life and property of the foreigners. If we do not, our cause is lost.

Let us strike at the Manchus for a new China and make clear our object to the world, accept¬

ance of modern conditions ; friendship, not isolation.® The last of the 35 or more (general or local) dynasties that ruled China was the Great Bright (Ta Tsing) or Manchu, whose Tartar chieftains began to be powerful about a.d. 1500. Summoned early in the 1 7th century by a faction of the Ming emperors, to help in a civil struggle, these men of the horse and tent rode into China like a whirlwind. Once in and securing victory for their patrons, and seeing at once the wealth and weakness of the land, they refused to return. In 1644 the Ming dynasty ended. Beginning the conquest of the empire, the Manchus compelled all subjects to shave the fore-skull and adopt the queue, as the symbol of loyalty. The Manchus camped in China as the Turk in Europe, virtually mo¬

nopolizing the military and most of the civil offices and revenues, keeping apart from the Chinese, but in time yielding to luxury, weak¬

ening in their primitive race-fibre, losing their language and customs, and virtually being con¬

quered by the superior brain and ability of the people they ruled. At first the Manchus seemed to be (<the most improvable race in Asia,® but in the end, while the Chinese yielded notably to the spirit of the age, the Manchus appeared for the most part incapable of responding to the necessities of the modern world. Reformers and thinking men saw that their continuance in office boded disaster and meant the ultimate partition of China by foreigners. Young men educated abroad, on coming home, found the situation intolerable. Already two generations of reading people (probably 8 or 10 per cent of the whole population of the empire) had been enlightened ; first, by the teachings of Christian missionaries ; second, by the floods of printed matter, in Chinese, sent out by the Society for the Diffusion of General and Chris¬

tian Knowledge, in which books on science, true history and biography of famous men and women of the West were numerous ; and third by those tens of thousands of Chinese who had lived abroad. The death of the Emperor and Empress Dowager, in November 1908, and the appointment of Prince Chun as regent of the infant named to fill the throne hastened the •inevitable. The Peking government, compelled to read the signs of the times and yielding to pressure, promised a modern constitution and a national legislature, sent commissions abroad to study systems of government , but postponed the date of that assembling of the Diet, which would mean in effect the transfer of power from the Manchus to the people. This postponement, with the dismissal of Yuan Shi Kai from all his offices, as the result of a Manchu reaction, served only to irritate the revolutionists and to precipitate their action. Now appeared a leader, a Christian and a man of science, the physician, Dr. Sun Yat Sen, converted in an American Congregational church in Hawaii and long a resident in America and in London, in which city he had been kidnapped by minions of the legation, but released on the instant demand of the British government. With extraordinary powers of reticence, organization and influence, he spoke and acted at the right moment. In the main he represented southern China. Prob¬

ably seven-tenths of the new men, working for the reform of China, were educated in the United States. In the north, the man of des¬

tiny was Yun Shi Kai, a worthy pupil and successor to Li Hung Chang. Meanwhile the elections to and formation of provincial assem¬

blies proceeded, following the Japanese prece¬

dent for the development of constitutional gov¬

ernment. After riots at Chang-sha, in 1910, and troubles in various places, the revolutionary movement became general and Wuchang was captured by the insurgents. So serious was the situation that Yuan Shi Kai was recalled to power, but the Imperial troops made little way and many of them as well as the Imperial navy went over to the other side, the educated classes sympathizing with the reformers and the men of the new army being well armed and skil¬

fully led. The ability of the Chinese to fight under competent leaders had been first demon¬

strated by an American adventurer, Frederick G. Ward, of Salem, Mass., who drilled, organ¬

ized and led to battle the force which, after Ward's death in 1862, under ((Chinese Gordon®

became the Ever Victorious Army and nucleus of China's modern military power. In late days, the < grateful Peking government erected a memorial temple in his honor. There were some battles, in 1911, and much destruction of property, but on the whole the revolution in China was comparatively bloodless. One notable innovation was the presence on the field of battle of doctors and trained nurses. Strenu¬

ous efforts were made to remove foreigners to places of safety and even during battles the rival forces ceased firing to allow missionaries to cross the lines. By edict of 30 Oct. 1910 the Manchus, in the name of the child-emperor, granted a constitution, with a cabinet from which nobles (the only permanent nobility in China, in addition to the honorary, non-political one of the descendants of Confucius, being Manchus) were to be excluded, with pardon to all rebels and political offenders. Even this was not satisfactory and the result was the proclamation of the Chinese Republic, with a flag of five colors, the bands or stripes repre¬

senting China, Manchuria, Mongolia, Tibet and Turkestan. In February 1911 the Ta Tsing dynasty came to an end, the republic and the dynasty, through Yuan, making terms of

amicable agreement. Dr. Sun abdicated his leadership in favor of Yuan, who became first President of the Chinese Republic, the

presiden¬

tial seal being ceremoniously delivered to the Premier 29 March. Millions of Chinese have cut off their queues and have adopted, in whole or part, the common dress of the world, but probably seven-tenths of the people of the China

empire are conservative and opposed to innova¬

tions. The first troubles of the new state came from mutiny, riots and looting by the unpaid troops. At least $300,000,000 are needed to support the government, pay the soldiers and begin public works and national development on a large scale. Months of trouble and anxiety followed, because the six powers, Great Britain, France, Germany, the United States, Italy and Japan, though wishing to loan the necessary money to China, imposed hateful conditions — viz., the right and power to dictate how the money should be spent and to have foreigners on the board of audit. This, to the Chinese mind, means not only loss of national sovereignty, but, sooner or later, for¬

eign intervention. Stiffened by the precedent of Japan in 1865 and 1868, when money was borrowed in London by free men, at 10 per cent, rather than at 4 or 6 per cent, with political dictation, in order to maintain her sovereignty inviolate, China waits before accepting <(the gifts of the Greeks.® Sun handed over the seal of the Republic to Yuan Shi Kai, who had been elected President of the Chinese Republic.

largely centred in the personality of Yuan Shi Kai. The man of power and poise was a thoroughly typical Chinese, having never been outside of China except in Korea in 1882-85, where, beginning at the age of 23, he showed exceptional ability and vigor, especially in as¬

serting Chinese claims and in resisting the Japanese, both in reforms and in aggressions.

Born in Hunan province, in 1859, he became the pupil and favorite of Li Hung Chang, learn¬

ing the methods of his master to perfection, especially in those arts of statecraft which balance one set of forces alien to China against another, thus dividing the counsels of the for¬

eign ministers. He made the undertow of reaction break the force of opposing waves and often neutralized the schemes of aliens, whether these were planned from purely sordid motives or in the name of humane civilization. The idealist Sun Yat Sen resigned and transferred office and power to Yuan, the newly chosen provisional President of the United Republic, which, in theory at least, under the reorganiza¬

tion of the government in transition from a monarchy to a republic <(retained the territorial heritage of the Chinese empire intact.® The provisional president, once in office, was con¬

fronted with the inherent difficulties arising from a vast complexity of problems in a hastily created republic, which had behind it in either the people or their leaders little or none of the experience necessary for stable federal govern¬

ment. The fundamental fact underlying all Chinese history is the radical difference in in¬

fluences of climate, temperament and training between the Northern and Southern man. The differences racially, historically and psychologi¬

cally, between these types are much greater than between the ante-bellum Americans above and below Mason and Dixon's line, but less eradi¬

cate than those drawn by surveyors are the lines that divide the men of China in inher¬

itances, feelings and aims. The alien thinks rather of Russians and Italians, or more ana¬

logically, of the Germanic and the Latin races in Europe, where in the south are the peoples older in history, differing in stature, complexion and mental traits together with the unsocial

attitudes, to other neighbors or aliens, which self-conceit, race pride and mutual jealousies naturally breed. The southern Chinese, shorter in stature and swarthier in complexion, older in history and more subtle in mental processes, look upon the Northerners much as in every land the cultured look upon the crude. Con¬

trasting the men in the Nanking and Canton regions, the Northerners, more mixed in an¬

cestry, taller and more robust in body and lighter in complexion, are much younger in historic development, while simpler and more direct in mental action. Race pride is common to all Chinese, as the inheritors of the primitive culture, ancient ideals and ethics and philosophy of Confucius, but patriotism, in our sense of the word, has been nearly unknown in China except among a comparatively few.

Yuan Shi Kai and the Northerners had from the very first believed in and stood for a con¬

stitutional monarchy, while the men of the south, led by Sun Yat Sen, were for a republic.

On this rock of sectionalism the Chinese ship of state was almost sure to suffer wreck. On accepting office Yuan Shi Kai agreed to the provisions of the Southern or Nankin constitu¬

tion, under which a national council was to be called and a permanent president chosen by a two-thirds majority in a session at which three-fourths of the members were present.

The term of the provisional government was fixed at six months, at the end of which time Yuan Shi Kai, as he declared in beginning his administration, would either retire or seek re-election. The names of the chief departments were changed and great reforms were pro¬

claimed. These to some extent were put in force. The new premier and cabinet officers were chosen on the theory of a coalition of sec¬

tions, parties and interests. Until the new Par¬

liament should be elected, the functions of such a body were performed by a National Council, composed of five members from

each province chosen by the provincial assemblies. This Par¬

liament was to consist of a House of Represen¬

tatives of 596 members, chosen by those male citizens over 21 years of age who were eligible to vote at the polls ; a Senate, which was to have 274 members, elected by the provincial assemblies or electoral bodies in Tibet, Mon¬

golia and Turkestan. The army, navy and departments of justice and education were to be reorganized.

The Nanking Constitution, accepted by Yuan Shi Kai, while it defined the provisional presi¬

dent's powers, did not fix his term of office or settle the method of the election of future presidents. On 10 March Yuan formally took the oath of office and the seat of government was transferred from the Southern capital to the Northern capital, that is frrom Nanking to Peking. On 29 April the new Parliament, or National Assembly, of the Chinese Republic was formally opened; 177 senators and 500

representatives being present. Most of the dele¬

gates from the provinces of China proper were dressed in black coats of the European style.

The other divisions, Mongolia and Tibet, were well represented. Dissensions in the Cabinet soon developed, rising to a crisis in June, in which the President and the Southerners, or Cantonese, were in opposition to each other on the question of Cabinet formation. The South¬

rons insisted that there should be government 530

by party, the Cabinet to be either wholly neutral or formed from one of the three parties then existing, and that the ministers of one of them, the Tungmenhui, should resign their portfolios.

To this Yuan Shi Kai was opposed and he gained the victory. The retiring ministers then allied themselves to another party in opposition to the government. During the ensuing sum¬

mer numerous local outbreaks occurred in southern China. In August, when a plot against the Republic was unearthed, two of the leaders in Peking were arrested and summarily shot.

The Parliament made severe criticism of this act of the chief executive, but when Yuan made public the full facts, a majority of the members justified him, and on 6 October Yuan Shi Kai was elected by the National Assembly per¬

manent President of the Republic, no limit be¬

ing set to his term of office. On this same day, Russia and Japan formally acknowledged the Chinese republic, the United States and some other countries making no move in this direc¬

tion.

It was hoped at home and abroad that by the co-ordination in harmony of the legislative and executive branches, a true republican gov¬

ernment in China would be the result. Yet here China's initial experiences . tallied with those of Japan's, showing how much alike are human experiences in the application of politi¬

cal science. In Kioto in 1868, in the re¬

bound from despotic one-man power of the Shogun and in compliance with the oath of the Mikado, put into his mouth by liberal revolu¬

tionists, a deliberative assembly was called and twice, in 1869 and in 1870, met in Tokio. Its members being utterly without experience and ignorant of the problems pressing upon the nation for quick solution, the gathering became first a mere debating society and then an obstruc¬

tive force, hindering good government. It was dissolved and no national assembly was called again, until after violent agitation, in 1889, or 21 years later. Moreover, many of the men who led in the revolution of 1868, which placed the Mikado in supreme power, had

hoped for a limited monarchy after the English fashion, with the sovereign responsible to the Parlia¬

ment. Instead of this, arbitrary government by a bureaucracy, or committee of a few ministers held its own and ruled the empire until 1889.

Even when the constitution was proclaimed, the Liberals, after a generation of agitation, felt themselves betrayed by the men who had so long and exclusively held the power, in that the Prussian instead of the English model had been followed and that all the legislative powers of the Imperial Diet comprised a mere fraction of what had been hoped for. China, in 1912, not only lacked the experience of the other nations, in which a republican form of govern¬

ment has been successful, but even that pre¬

liminary intellectual preparation, through phi¬

losophy and the critical study of history, that had lent such power and so admirably fitted the Japanese leaders to change the system in vogue for over 600 years. From the start, without attending to the pressing and intricate problems facing the nation, the one purpose of the Chinese Parliament of 1914, especially among the Southern members, seemed to be to hamper the President in every possible way, preventing his obtaining the necessary money for national reconstruction, to reduce him to a mere figure¬

head and to place all power in the hands of the Cabinet. The action of the President in sign¬

ing the Five Power Loan contract on 26 April, without consent of the National Assembly, was repudiated by a large majority in the votes taken 29 April and 5 May. The truce between the two parties now ended and threats were made of a second revolution in the South.

Yuan answered by announcing coercion as the policy forced upon him to preserve the re¬

public. A deadlock lasting two months fol¬

lowed. In July, a cashiered officer started a re¬

bellion which soon spread through the Yangtse provinces and the

Nanking army joined the in¬

surgents. By prompt action and good finance, backed by the loyalty of the well-paid navy and the provinces north, east and west, after some fighting near Shanghai, the revolt was suppressed and the leaders, with Sup Yat Sen, fled to Japan. In a word, before even the foundations had been laid for a parliament, here were men utterly inexperienced, trying to found a republic. After eight months of un¬

productive wrangling, the Cromwellian single precedent of England in 1653, and the double one of the Mikado of Japan in 1869 and in 1870, were followed. Yuan expelled from the Parliament the Kuo Ming Tang, or body of obstructives, by mandate of 4 Nov. 1913, on the plea of their complicity in the southern revolt.

No quorum being left for business, Yuan nominated 71 members of the Assembly to form an Administrative Council. This body, legislative and advisory, wras to take the place of or represent the Premier, the Cabinet, the nine ministers and the provinces. With this body Yuan exercised full government powers and, with the approval of its members, issued on 11 Jan. 1914 a proclamation dissolving the National Assembly and, later, the district councils in the provinces, as being seditious in character and as hindrances to national adminis¬

tration. In a new draft of the constitution, amended by a convention of his own nominees and published 1 May 1914, the power of the President is increased by his virtual domina¬

tion of the single-chambered legislature, which has no more control over the (<fixed expendi¬

tures® prepared by the government, than has the Imperial Diet of Japan. An advisory council assists the President but there is no Cabinet and all authority over the provinces and the army and navy is centralized in the executive. It was this concentration of power that enabled the government to suppress with comparative ease the uprising in the south, organized and led by Sun Yat Sen.

In the industrial and financial spheres, mat¬

ters improved through the more efficient system of taxation in the provinces, returns from the salt tax, the extinguishment of loans. Con¬

cessions for further railway building were granted to foreigners, French and British, and the British and Chinese corporation and for the exploitation of the oil wells in Chi-li and Shen-si by a Chino-American company. The Sufferers by the floods in ’Kiang-su and Anhui were provided for in arrangement with the American Red Cross organization, the idea being prevention as well as cure. During May and June 1915 a commercial delegation of 18

honorary commissioners from the Chinese

cities visited the United States and was well CHINA

received, while preparations on a large scale were made for the development, especially of the soil and agricultural resources of Manchuria with American capital.

China has always been a church nation and religion an affair of state, duly graded, pro¬

vided for and safeguarded, the Emperor in the great temple of Heaven in Peking, worshipping with imposing sacrifices the supreme imper¬

sonal principle, heaven ; while the provincial governors paid homage to the spirits of Heaven and Earth ; and the common people rendered honor to their ancestors. Apart from ritual and social ethics, Chinese religion may be defined as Universism, through which man is expected to be in obedience to and in harmony with the universe and the laws which govern it, to make recognition of its order, to observe the seasons and in all human relations to be in mutual obli¬

gation and dependence upon each other. In a word — the word which Confucius consecrated — ‘reciprocity is the keynote of the harmony of China’s social system, which means each individual consecration to human brotherhood.

The sudden change from monarchy to a re¬

public dislocated this social system and loosened the ethical bonds

holding the nation together.

In accordance with Chinese habits of thought the necessity of official sanction and encourage¬

ment to law and order was quickly and keenly felt, though nothing had been said about re¬

ligion in the provisional constitution. Yielding to this demand, President Yuan proposed in 1913 the establishment of the ancient Confucian system, but this was stoutly opposed by the men of other religions, Buddhist, Mohamme¬

dan and Christian. A certain amount of com¬

promise seems to have been made by Yuan as representing the nation, when, solemnly en¬

tering the great temple in Peking, he paid homage and offered sacrifice to Heaven, and proclaimed anew the old system, in so far at least as duties to the State are concerned. At present among leaders of thought, Chinese ideas as to religion are in solution or process of transition. In judging of this, as of all measures affecting the mass of Chinese, the alien must remember that the overwhelming majority of people are governed by the force of tradition and habit, only a small fraction being interested in any reform or radical change that disturbs the daily routine of life, which for them finds its best comfort in Universism.

The outbreak of the World War in 1914

made Chinese territory again the scene of con¬

flict. Under pressure from her ally, Great Britain, Japan sprang joyfully to the double task of settling several old scores with Ger¬

many and of eliminating German occupation and influence not only from China but from the eastern hemisphere. In short, Japan proved her¬

self an apt pupil in all the European methods so long employed in the Far East. She was quite ready to enforce, at a sacrifice of blood and

treasure, her new version of the Monroe Doctrine; withal, more than willing to practise on the Chinese those arts of diplomacy backed by armed force, which European nations for over a century made use of on China and old Japan.

With her fleet and army equipped with the latest modern resources of offense in the high air and the deep sea and on land and water, the plan was to capture Tsingtau, on which the Germans had expended $60,000,000 and to control the lines of traffic in Shantung which radiate from this seaport. Against the protest of China, the Japan¬

ese troops under General Kamio were landed and marched inland 150 miles north of the pro¬

fessed objective, thus violating the neutrality of China. The activities of blockade, march and siege, lasted from 11 September until 11 Novem¬

ber, when the army under the sun banner marched into Tsingtau. The Japanese victors found a model city, with fine architecture, hospi¬

tals, pavements, sewers, perfect sanitation, which in 1913 had a population of 60,484 souls, 55,672

being Chinese. From 1903 to the outbreak of hostilities commerce had increased tenfold. It was now to be seen what disposition would be made of the prize of war, which, as the Japan¬

ese government had acknowledged before the world, belonged to China. Against the spirit, method and details revealed in the unfolding of the policy of the new trespassers on her soil, China made protest, declaring that her sovereign rights had been ruthlessly violated. In prac¬

tising political morality these fresh aggressors, despite professions loudly made from Tokio, showed no more conscience or mercy in diplo¬

macy or actions than European powers

during the previous century, or in any of China's numerous humiliations. Being virtually without a navy or army — all the available Chinese troops having been utilized to prevent threatened revolutionary uprisings in the south¬

ern provinces — China had to submit to the vio¬

lations of her sovereignty as ordered from Tokio. The custom houses and conquered area were put under the control of Japanese officers.

These aggressions were followed on 18 Jan.

1915 by the presentation of 21 peremptory de¬

mands from Tokio, the Japanese Minister, Mr.

Hioki, presenting them personally at night and directly to the President of the Chinese Repub¬

lic. Under the plea of Maintaining the peace of Eastern Asia and of further strengthening the friendly relations existing between the two neighboring nations, w it was demanded that China should agree1 to what Japan might ar¬

range with Germany, to cede no land in Shan¬

tung to any foreign powrer, to open new ports, to extend the leases of Port Arthur, Dalny, and of the railroads to a period of 99 years, to allow an equal voice to Japan in all matters relating to South Manchuria and Inner Mon¬

golia and her people equal privilege with the natives, to employ Japanese instructors and advisers, to buy 50 per cent of war munitions in Japan, to have arsenals and technical schools worked jointly by the two governments, to allow Japanese to build railways and work mines in specified places and have full freedom for the Japanese to propagate religious doc¬

trines. In explaining to foreign governments, at their request, the meaning of her negotia¬

tions with China, Japan replied that of the 21

articles under negotiation, 10 were demands and 11 were requests. After 25 meetings between the plenipotentiaries of China and Japan, the matter was not yet settled in April. Meanwhile the British and Russian ambassadors in Tokio had made protests and the representatives of the two billions of dollars of British money in¬

vested in China, especially in the Yangtse region, sent complaints to London, warning of the impending danger not only to China but 532

to Europe. After much had been conceded by the Chinese commissioners, negotiations were at deadlock, while every day the real nature and true details of Japan's "requests® were be¬

coming public. One of the points of struggle re¬

lated to the mines of the Han Yeh Ping region, where are coal, iron and limestone in close proximity. Japan, poor in metals, having sunk millions in establishing steel foundries and compelled to import 75 per cent of her iron and steel, wished control of these mines in China for her military equipment. Moreover the Japanese, having seen in China and in other lands the potent results secured by the employ¬

ment of foreign experts and advisers, and hav¬

ing herself, in a generation or two, been raised to the position of a world power, largely through the aid of the peaceful army of 5,000

yatoi, or salaried foreigners in her employ and in every line of human achievement, from 1870

to 1900, may be said, in this special measure to have introduced into diplomacy the principle we may designate as yatoism. In a word, she would imitate her European teachers, the trad¬

ing nations, who have always had "a solid sub¬

stratum of force® in dealing with the Orientals and forcing their goods and employees upon them. Finding the Chinese resistant to her demands and warned by her ally, Great Britain, the government in Tokio modified its demands both in tone and amount, and on 26 April made presentation of these, but this time requiring immediate compliance. In answer, given 1 May, China granted the rights of residence, lease and business to the Japanese, refused the long leases, demanded that the Japanese, like other aliens, submit to the laws of China, that Kiaochau be unconditionally retroceded, and the right of participation in negotiations with Ger¬

many after the war be given her, intimating also that this was the final word. In answer, Japan withdrew the most objectionable group of

demands, but left open for “future discus¬

sion® the negotiations begun but not yet settled, adding, on 6 May, that an answer was desired at once, and the Tokio Government mobilized its military forces for the invasion and coercion of China.

Apart from any question of political ethics, or any attempt at condemnation or justification of Japan, let it not be forgotten that her actions toward China, in 1915, are no more severe than those against herself, or rather against the in¬

surgents, either of 1868-69, or in the years from 1870, or in the great southwestern re¬

bellion of 1877. Then and now, her fierce, un¬

wavering determination to modernize herself and to compel China to be modern also, has been shown, as well as her equal zeal in humane efforts after victory. In this, also, she has equaled Great Britain after the Boer War; in a word, Japan imitates the Anglo-Saxon

nations.

In China the opinion of the executive coun¬

cil was still divided when, on Friday, 7 May, the ultimatum was received from Tokio, giving 48 hours for decision. Having no military to withstand the aggressor, the Chinese govern¬

ment on Sunday, 9 May, at 1 :30 a. m., yielded and signed away her sovereign rights. In re¬

turn for Japan’s sacrifice of life and treasure, Kiaochau, which had been under German con¬

trol since 1907, was to be handed over to China on conditions that virtually ignored China’s sovereignty in the matter. The new peace ar¬

rangement gives Japan control of a railway of great strategic importance, with valuable rights and privileges for the Japanese, but probably no greater than for other foreigners. New treaty ports are to be opened, the leases of Port Arthur and Dalny are extended to 1997, that of the South Manchurian Railway to 2002

and that of the Antung-Mukden Railway to 2007. What may be the full meaning of the other concessions made to Japan, only time will show.

But this time Japan, while probably succeed¬

ing in her supreme and underlying purpose of forcing China to change from mediaeval to modern conditions and thus furnish, for Japan's advantage, in a better and more speedy way than any other, a market and field of enter¬

prise for her people, also preserved the unity of China and thus forestalled her "breakup®

and division by European powers.

A boycott of Japanese goods began which ruined thousands of traders from Nippon, in¬

volving a loss of millions, while from 7 May began a new spirit of resistance in the Chinese people making for national uni¬

fication and increase of power to with¬

stand all foreign aggression. All these events weakened in China the prestige of the

republican government and the personal influ¬

ence of Yuan Shi Kai. An agitation in favor of the restoration of the monarchy began and soon assumed dangerous proportions. After consultation with natives and foreigners, Yuan Shi Kai decided that the best form of govern¬

ment for China would be found in a return to monarchy. Expert legal advisers, one of them an eminent American, gave the same opinion — that a republic for China was premature and that a monarchy was best suited to her conditions. Advice was received from Japan on 28 October to Yuan Shi Kai to arrest this movement, the gist of the words from Tokio being that in the present uncertainty of the status of the Powers, owing to the war, any change of government was inadvisable. After officially and with promptness recognizing the Chinese Republic,

Japan felt that she was trifled with when a monarchy was proposed.

So insistent was this “advice® that, when a Complimentary Mission to Tokio from Peking, designed to arrange for recognition of the monarchy, arrived in Tokio, 16 Jan. 1916, it was virtually refused an official interview.

Nevertheless, an “election was ordered by Pe¬

king and carried out, the apparent results being overwhelmingly in favor of Yuan Shi Kai be¬

coming emperor. Preparations were made for induction into office on New Year’s Day, but this date found the strong man of the empire still engaged in a diplomatic duel with Japan and at the same time confronted by a possible rebellion which promised to involve all southern China, and the formal ceremonies of induction into office were postponed. The opening of the spring of 1916 found the opposition of Japan so strong and the indication of widespread revolt so menacing that Yuan, on 24 March, issued a mandate renouncing his title of Em¬

peror of China and proclaiming the return to .

republican government. With the confes¬

sion of sin common to the rulers of eastern Asia, Yuan took upon himself “all the faults of the country,® and especially the blame of CHINA

not opposing the monarchical movement with proper vigor, and officially canceled his official acceptance of the throne on 11 Dec. 1915.

To the judicially minded student, surveying the long perspective of history and seeing that China has attempted or passed through almost every form of government known to man, while still preserving the body social intact, two or three things seem plain: (1) that China is an

anvil that will wear out, by passive resistance, every hammer that beats it (and Japanese know this far better than Occidentals) ; (2) that it makes far less difference to her millions what the frame of government may be, while the social bond is so strong and local freedom, as heretofore, is maintained; and (3) that so long as China's classic literature endures, pure despotism cannot exist and the spirit of liberty will survive all native dictators or foreign con¬

querors.

In local matters, the Chinese are as well fitted for republican government as are any other people, but how to generate sufficient power at the centre is still a problem. One may summarize the needs of China as (1) a strong central government; (2) a separate and honest judiciary; (3) a uniform currency; (4) development of her natural resources; (5) elementary education; (6) public works; (7) absolute freedom in religion; (8) philanthropic reform.

Bibliography. — Boulger, (History of

China) ; Doolittle, (Social Life of the Chinese' ; Douglas, (Society in China) ; Holcombe, (The Real Chinaman' ; Hosie, (Three Years in Western China) ; Abbe Hue, Christianity in China, Tartary, and Tibet,' (Travels in Tar¬

tary, Tibet and China' and (The Chinese Em¬

pire' ; Johnston, China and Formosa' ; Legge, (Religions in China' ; Martin, Che Chinese, Their Education, Philosophy, and Letters,'

(A Cycle of Cathay,' Chinese Legends,' and Che Siege in Peking' ; Moule, (New China and Old' ; Mounier, (Le Drame Chinois' ; Navarra, China und die Chinesen' ; Nichols, Chrough Hidden Shensi' ; Smith, Chinese Character¬

istics,' (Village Life in China' ; Meadows Tay¬

lor, Chinese and their Rebellions' ; S. W. Wil¬

liams, Che Middle Kingdom' and (History of China' ; Williamson, (Journeys in North China' ; Wilson, Cravels and Investigations in the Middle Kingdom' ; Wu-Ting-Fang, for¬

eigners in China’ ; Yule, (Book of Sir Marco Polo’ ; Little, Cleanings from Fifty Years in China’; Conger, fetters from China’; John¬

ston, (Lion and Dragon in Northern China’ ; Ball, Chings Chinese’; Cecil, Changing

China’ ; Ross, Che Changing Chinese’ Griffis, China’s Story’ ; McCormick, Che Flowery Republic’ (1913) ; Jones, Che Fall of Tsing-Tau’ (1915); Bashford, T. W., China: An Interpretation.’

William Elliot Griffis,

Author of cThe Mikado’s Empire* ; c China’s Story* cThe Mikado: Institution and Per¬

son* *etc.*

CHINA, Diplomatic Relations with.

American intercourse with China began in 1784

with the arrival of the Empress of China near Canton, which for a century had been the only port open to foreign oversea commerce. The supercargo of this vessel was Samuel Shaw, who was appointed first American consul at Canton by John Jay in 1786, and was later reappointed by Washington in 1790. For over half a century, American commerce (largely via the Northwest coast and Hawaii) continued with no official supervision beyond that of an American trader acting as consul without salary, and without recognition as an accredited repre¬

sentative by China. The opening of American diplomatic relations with China, necessitated by the steady increase of American enterprise and interests in the Pacific and the Far East —which finally attracted the protective and en¬

couraging attention of the American govern¬

ment to lavor new enterprises, as illustrated by the famous Wilkes expedition of 1838-42, — was more directly the result of the British attack on Canton in 1840 in a demand for trade as a right, and of the

subsequent treaty of Nanking which accorded to the British privileges of residence at five ports and ceded the island of Hong¬

kong. Caleb Cushing, appointed commissioner and envoy extraordinary to China by President Tyler in 1843, arrived at Macao in an American steamer, in February 1844, en route to Peking; but, yielding to the arguments of the Chinese governor against the propriety of the trip, he awaited the arrival of Tsiyeng, the Emperor's commissioner. In July 1844, he negotiated the treaty of Wanghia granting privileges of trade and residence at five ports, of extraterritorial¬

ity, of most favored nation, of reception of consuls by Chinese officials on equal terms, and of direct diplomatic correspondence with Pe¬

king. It also established port regulations. For over a decade after the ratification of the treaty, successive American commissioners or ministers — Alexander H. Everett, John W. Davis,

Humphrey Marshall, Robert W. McLane, Peter Parker — maintained legations, without per¬

sonal interviews with the tranquil, elusive Chinese commissioner, who directed foreign af¬

fairs by literary conventionalities and masterly inactivity. Attempts to communicate directly with the Imperial government at Peking were without success. Meantime, Americans shared in the series of irritations and annoyances from the failure of treaty stipulations which cul¬

minated in the Arrow affair of 1856, causing England to declare war — in which France joined, but to which the American government refused to become a party. Marshall who arrived in 1852 at the culmination of the Taiping revolt found Yeh, the Imperial official, too busy to talk or to do more than to trifle through literary excuses and evasions. McLane (1853-54), was as unsuccessful, and found the insu**-

gent chiefs even more elusive ; and, after a fruitless conference with the Imperial commis¬

sioner, recommended co-operative coercion by a united Anglo-Franco-American fleet. Par¬

ker (1855-57), also failing to bring Yeh to a personal interview,

promptly recommended the “contemplated plan of concurrent action” with Great Britain and France, and later suggested the American occupation of Formosa as a means of securing satisfaction ; but the Ameri¬

can government remained neutral, hesitating to become involved in hostile demonstrations.

In 1857, experience having shown the neces¬

sity of a revision of the treaty and a more rigid enforcement of its provisions and the British and French having invited the United States to aid their demands on China by armed co-operation, the American government ap-534

pointed William B. Reed with instructions to co-operate with the allies only by moral sup¬

port and peaceful means, but to demand suitable guarantees for trade protection and diplomatic residence with direct diplomatic intercourse at Peking. Mr. Reed was unable to in¬

duce the tranquil, arrogant Yeh to meet him, or to recognize the need of a change in the treaty. Overcome by Yeh’s literary skill which seemed to elude any form of literary retaliation known to the western mind, he con¬

cluded that vigorous coercive action was neces¬

sary to secure redress. Finally, accompanying the British and French fleets to Taku, and thence to Tientsin, after the Anglo-French hostilities which he had tried to prevent, and aided by Dr. W. A. Martin (a missionary), he negotiated a treaty (signed 18 June 1858), granting the opening of new ports, the right of direct correspondence with the privy council at Peking and the annual visit of the minister under certain restrictions, and recognizing somewhat apathetically the right of Christians to practice and quietly teach their religion.

Later, at Shanghai, he negotiated a supple¬

mentary convention for regulation of trade and revision of tariff. He also secured by convention an indemnity of $735,000 in satis¬

faction of claims of American citizens for dam¬

ages by the recent war between China and Great Britain. Less than half this sum was subse¬

quently awarded to claimants by the American commission ; and in 1885, Congress rather tardily voted the return of the unexpended balance — an unusual event in international re¬

lations.

In 1859, ratifications of the Reed treaty were exchanged by J. E. Ward at Pehtang on the coast, after a fruitless attempt to have the ratifications exchanged at Peking as pro¬

vided in the treaty. Although Ward reached the capital, and was entertained there with imperial munificence, he could obtain no audi¬

ence with the Emperor without the humiliating kotow before the throne, and he refused to grovel, prostrate himself or kneel. He was criticized for retiring from Peking, but was sustained by his government.

The Lmited States had no share in the Anglo-French expedition of 1860, which ob¬

tained the establishment of permanent lega¬

tions at Peking and resulted in the creation of a new Chinese board, the Tsung-li-yamen, or foreign office.

In turning the tide of war for the suppres¬

sion of the Taiping insurrection which for ten years desolated the country, China recog¬

nized the valuable services of an American, Frederick T. Ward (predecessor of Charles Gordon), who fell at the head of his men in 1862 and was awarded posthumous honors by the Emperor. Anson Burlingame, appointed minister in 1862, was the first American repre¬

sentative to reside in Peking. He was success¬

ful in a policy of peaceful forbearance and co¬

operation in diplomatic action. By securing the co-operation of other diplomatic represen¬

tatives, he aided in preserving the integrity of China in the final crisis of the Taiping revolt.

He also aided China in the suppression of the coolie trade and negotiated with the Tsung-li-yamen for a treaty requiring freedom of immi¬

gration. After he left the American diplo¬

matic service, in 1867, he was chosen by China as a representative to all the great foreign powers with which China had treaty relations, and especially to inaugurate diplomatic rela¬

tions with the western world. In 1868, when California and other parts of the Pacific Coast still welcomed Chinese labor for the develop¬

ment of resources, he negotiated with Secretary Seward at Washington the Burlingame treaty, which recognized the right of citizens to change their home and allegiance, and the mutual ad¬

vantages of free migration and immigration, and guaranteed every privilege and complete protection to Americans in China and equal rights to Chinamen in the United States. In 1872, two years after a furious anti-foreign riot at Tientsin, China began a new policy by sending a number of young men to be educated in the United States, a policy which she later abandoned because of the danger of estrange¬

ment from Chinese institutions. In 1876 China sent her first resident ministers to the United States and other powers.

To meet objections to the immigration

clauses of the Burlingame treaty — objections resulting from a reversal of feeling on the Pacific Coast after the completion (in 1869) of the first overland railroad (which brought laborers from the eastern States) and culminat¬

ing in California during the disorder attend¬

ing the railroad strike of 1877 — the American government appointed the special Angell com¬

mission of 1880 which negotiated the Peking treaty of November 1880, modifying the Bur¬

lingame treaty by a clause providing for regu¬

lation of the admission of Chinese laborers.

This treaty began a policy of restriction and exclusion, to which Congress quickly responded by an act of 1882, suspending the admission of Chinese laborers for ten years and requiring certificates from other Chinese. The act of 1882 was amended in 1884 by more stringent provisions, and again in 1888 by the Scott act which was criticized as an abrogation of the Chinese immigration treaty of 1880 by indirect legislation, and also as a legislative intervention while a newly negotiated treaty to adjust the matter was. pending ratification at Peking, The Chinese minister criticized the Scott act as a disregard of treaty obligations and later made a strong protest against the new act of 1892

(the Geary law) which continued previous acts in force for ten years. By these acts American trade interests and opportunities were jeopard¬

ized.

The American government later made

amends for the Scott act by payment of long-pending claims of Chinese laborers, and by the negotiation of the treaty of 1894 which accepted the main provisions of the abortive treaty of 1888 and reconciled the differences between the two governments. In 1904 China terminated the treaty of 1894, and soon there¬

after Congress re-enacted without term all ex¬

isting laws. Meantime relations improved.

There were new sources and evidences of bet¬

ter. feeling. In 1895, at the close of the Chinese-Japanese war, ex-Secretary J. W. Fos¬

ter of Washington was appointed by China as counsel in the peace negotiations at Shimonoseki. In 1899, following the American acqui¬

sition of the Philippines, Secretary Hay, re¬

fusing to participate with other powers in the “sphere of influence® or partition policy in China, proposed the policy of the open door.

equality of opportunity, maintenance of terri¬

torial integrity and autonomy.

In 1901 the United States co-operated with other foreign powers represented at Peking in compelling China to make amends for aggres¬

sions attending the Boxer outbreak of 1900.

American influence with other powers reduced the money indemnities first proposed. The amount finally imposed, largely through Ger¬

man influence, and against the advice of the American representative, was still excessive, greatly exaggerating private claims. In 1909

the United States remitted to China $16,000,000, the unclaimed portion of the American share of the indemnity — which the Chinese

govern¬

ment arranged to use for educational expenses of Chinese students in the United States.

The Chinese republic of 1911, the culmina¬

tion of a revolution precipitated by the creation of railway systems built on foreign loans, was recognized by the American government in May 1913, after the disappearance of the Im¬

perial government of the Manchus (1912). The diplomatic representatives of the United States and the five great nowers backed a combination of bankers of the six powers formed to ad¬

vance money to the new republic ; but, in March 1913, after considerable negotiation to secure an agreement from China for satisfactory se¬

curity and supervision of expenditures as a condition of the loan, the American government announced its withdrawal from the group.

In 1915, China took an important step in the development of trade relations by the ap¬

pointment of a trade commission to the United States. In June 1915 she took an important political step in the appointment, by President Yuan, of Pres. F. J. Goodnow of Johns Hop¬

kins University, an American expert in prob¬

lems of government, to act as constitutional adviser of the Chinese government. In 1916, the Chinese government selected as Dr. Goodnow's successor Prof. W. F. Willoughby of Princeton University who was later succeeded by Prof. W. W. Willoughby of Johns Hopkins.

American leadership is disclosed in a long list of interlocking obligations in regard to China, expressed since 1900. The American government has shown no inclination to aban¬

don political interests in China or to shirk responsibility in the continuance of the prin¬

ciples of the Hay doctrine, the logical sequence to all earlier diplomatic relations. Following the Japanese demands on China, which were granted in large part by the China-Japanese treaty of 25 May 1915, it announced that it could not agree to any action which might im¬

pair American-Chinese treaty obligations, or the open door, or Chinese integrity. In 1917

it reached an agreement with Japan on ques¬

tions relating to Japanese policy in China.

Late in August a special Japanese mission armed with full power, headed by Viscount Kikujiro Ishii arrived at San Francisco to secure a better understanding between the two countries.

By an agreement of 2 November between

Secretary Lansing and Viscount Ishii, the United States government consistent with the principle of the American Monroe doctrine, recognized that Japan by territorial propinquity had special interests in China, and obtained from Japan a recognition of the principle of the open door and a denial of any purpose to infringe in any way on the independence or territorial integrity of China. Although the recognition of special Japanese interests con¬

ceded no right or authority over the destinies of the Chinese people, and was joined with the guarantee of China's independence and in¬

tegrity, and although the pact was justified by China's feeble condition as a sovereign state, the Chinese government made a formal protest stating that it <(will not allow' itself to be bound by any agreement entered into by other nations® in which she has no part.

Bibliography.— Callahan, J. M., 'America

in the Pacific and Far East* (1901) ; Coolidge, M. R., (Chinese Immigration) (1909) ; for¬

eign Relations of the United States* (vols.

since 1861) ; Foster, J. W., (American Diplo¬

macy in the Orient® (1903); Johnson, W. F., (America's Foreign Relations) (1916) ; Latane, J. H., 'America as a World Power) (1907) ; Malloy, F. M., (Treaties … between United States and other Powers* (1910); Millard, T. F., (America and the Far Eastern Question*

(1908); Moore, J. B., (Digest of International Law* (1906) ; Smith, A. H., 'China and Amer¬

ica To-day ' (1907) ; Williams, S. W., 'Sketch of the Relations between the United States and China* (1910).

James M. Callahan.

Professor of History and Political Science, West Virginia University.

CHINA, Educational Progress in. It was

admirable wisdom, indicating no little courage, for China to reform its venerable system of education. Less than a year after the Treaty of 1860, Dr. Martin writes in his 'Lore of Cathay, * "large bodies of Chinese troops might have been seen learning foreign tactics under foreign drill masters, on the very battle grounds where they had been defeated. But happily China did not confine itself to a reform of war methods. It took steps to modernize its entire educational system, not in one bound, which would have been too radical, but in a series of measures extending over a few decades, that were safer and more effective for a nation of such antiquity, whose scholars, in charge of its government, were chosen for more than 12

centuries by competitive examinations.®

The first step was establishing in 1862 a school for training official interpreters, as the necessity of studying foreign languages and

literatures — English, first, then French, Rus¬

sian, German, and in 1899 Japanese — became keenly felt. The school grewr into a college in 1866, with the number of students increas¬

ing in 1910 to 120, departments in law and science being added. Dr. W. A. P. Martin was president for 25 years. Two auxiliary schools were opened-later at Shanghai and Canton.

Naval schools rapidly followed, with a Naval College at Nanking in 1896, a government min¬

ing and agricultural college at Wu Chang in 1892, a telegraph college at Tientsin in 1879.

Despite some opposition on the score of dis¬

loyalty to Chinese tradition, an education com¬

mission was appointed in 1871 to send 120

students to the United States for training in four-year instalments of 35 students each for 15 years — though all were recalled in 1881.

Most of them, according to the educational number of the East of Asia, later served in various government positions, medical, tele¬

graph, torpedo, and otherwise. As early as 536

1871, Li Hung Chang advocated the Tientsin University, which was organized in 1896. Be¬

sides preparatory classes in English, etc., a four years' course was arranged in the schools of civil and mechanical engineering, mining and law, the Boxer outbreak, with the German occupancy of the buildings, abruptly closing the institution.

The Nan Yang College came next in 1897

at Shanghai, whose students, with the elements of Chinese education, were to receive a thorough course in English and Western

Sciences, preparing also for the government competitive examinations. In April 1907 it be¬

came an imperial polytechnic college. Through¬

out the nation more and more enthusiasm for further reforms was aroused. Before the close of the century all schools where western science and language were taught were over¬

crowded with students. Reform clubs arose in increasing numbers. The young Emperor was a zealous student of foreign writers and thousands of scholars followed his example.

The edicts in 1898 and sweeping reforms under his sanction made China definitely progressive despite the wave of reaction that imprisoned the Emperor and put an end to many reforms and reformers for a time. The Peking Imperial University alone remained. After the Boxer outbreak, however, and on the return to power of the Empress, she adopted a more liberal course and resumed the work of reform. Not only did she abolish old methods for examina¬

tions, regulate the education of students abroad, and provide more thorough instruction in his¬

tory, politics and western learning, but she opened new colleges in 1901-02 in 10 prov¬

inces, instituted normal colleges and had com¬

missioners sent to various countries to study their systems of education, commerce, agricul¬

ture, manufactories, armies, marine, *etc.*

Boards of education were appointed in various provinces ; lecture halls opened, middle schools established, the University at Tientsin begun anew in 1903, and night schools were started for officials to study English. In Chihli province alone in 1906 were 35 lecture halls 3 techni¬

cal and special schools, 21 normal, 24 middle, and 166 boys' higher primary schools.

The controlling authority of the Chinese system of education is vested in the minister of education at Peking, created by imperial de¬

cree in 1905. There are five subordinate depart¬

ments : general supervision, professional, general and technical education, and finance. Boards of education exist in every province with educa¬

tional clubs. No effort is spared to train the people along the lines of modern education.

The course of study in the lower primary is five years, with kindergarten for children from two to six, taught by specially trained women.

Apart from the middle, high schools and pro¬

vincial colleges and universities there are normal schools and colleges, and numerous miscellane¬

ous schools, technical, industrial, law, military and a few medical. A police training school was organized in Tientsin in 1902 and was fol¬

lowed by others elsewhere. -Great changes for the better have been instituted in prison life.

There are now (model prisons) with schools, and reformatory schools in several provinces.

The facilities for the education of girls, for whom-formerly no provision was made, are extending rapidly. In 1908 Peking opened its first women's normal college and the girls'

schools are revolutionizing the people's home and social life. The custom of binding the girls' feet cannot continue, as the government will not admit into the schools any girls so bound.

China is most liberal to its students studying abroad. Those sent to the United States receive $960 yearly. In gratitude for the return in 1908

of over ten millions of the Boxer indemnity, China pledged itself to send to the United States 100 studenrs each year for four years and 30

thereafter for 28 years, all to be chosen without regard to province, race or religion.

The Tsing Hua College, near Peking, was opened in 1911 and after a brief interruption, a year later instruction was resumed. Here students are trained before being sent to America — a direct outcome of our govern¬

ment's generosity. In 1913-14 Tong Kaison, a Yale graduate, was president, and Tsur Yet-sung, with degrees from Yale and Wisconsin, dean. It has a high and middle school course, a Chinese and an English department. Pro¬

vision is made for physical exercise and ath¬

letics. Its team represented China and the college in the Far Eastern Olympic Games at Manila only two or three years ago. China's half century struggles for reform in education have succeeded despite almost insurmountable obstacles. Perfection has by no means been reached, but the outlook is hopeful from the popular enthusiasm for the new system. All de¬

pends on the character and calibre of the men who have returned or who are to return from abroad, to solve the problems which remain.

Bibliography. — (The Educational System

of China as Recently Reconstructed) by Harry Edwin King (U. S. Bureau of Education, Bulletin No. 15, 1910) which contains an admir¬

able bibliographical index. The Tsing Hua College Bulletin of Information (1913-14).

CHINA AND JAPAN. When in 1823 in

response to the Russian ukase claiming exclusive possession of the Pacific coast of North Amer¬

ica to the 51st parallel, John Adams told the tsar's minister, Baron de Tuyl, that <(we should contest the right of Russia to any territorial establishment on this continent, and that we should assume, .

distinctly, the principle that the American continents are no longer subjects for any new European colonial establishments,® he not only gave the first clear expression in action to the Monroe Doctrine (q.v.), but he uncon¬

sciously perhaps dictated the future history of the Pacific Ocean and in large measure the peaceful progress of China and Japan through American influences. Thus ushered into the world's politics, the United States, after resist¬

ing the tsar's demand and by diplomacy alone forcing it back to parallel No. 55, prevented the Russian advance southward in America, and later gained California, Alaska and the Aleu¬

tians with a vast front on the Pacific, then whitened by whaling and trading ships. Once California and Oregon were ours, the incentive was quickly given to tap the markets of Asia and awaken the hermit nations to commerce.

After Monroe came Fillmore. The latter, on the day that Mutsuhito (q.v.), the late emperor of Japan, was born, 3 Nov. 1852, ordered Com¬

modore M. C. Perry (q.v.) to proceed, by the shortest route — around the Cape of Good Hope — to Yedo Bay to negotiate a treaty.

Perry's triumph was a <(brain victory, won by tact, patience and consummate knowledge of human nature and especially of the Japanese va¬

riety of it. He opened a new era in the treat¬

ment of Oriental nations, showing how, apart from force, the door of international brother¬

hood might be opened. On the spot at Kuri-hama, where, in 1853, stood the pavilion for the reception of the President's letter, rises to-

day in Perry Park the memorial monolith inscribed in gold by Marquis Ito (q.v.), to the erection of which the Mikado, leading his people, sub¬

scribed. At Yokohama, where the conferences of Commodore Perry and Professor Hayashi were held to discuss ethics, humanity, and treaty business, and the first industrial exhibi¬

tion in Japan of American tools, inventions and products was held, the United States consulate and the Union Church have been upreared.

Thus led forward, the hermit Japan entered the school of experience, whence she was to emerge as the pupil of the Anglo-Saxon nations and the champion of their principles in Asia, the teacher of China and the middle term between the civilizations of the Orient and the Occident. After her own political commotions, consequent upon the clash of old and new ideas, Japan from 1870 engaged the service of hun¬

dreds, yes even thousands, of Yatoi (hired spe¬

cialists) from America and Europe, to rebuild the foundations of the empire, and for 30 years, besides sending thousands of her sons abroad, put herself under the tuition of an army of teachers from western countries, who were active in every department. Yet what has been phenomenally true of Japan has been, in the working of leaven, true of China also, only her larger mass hindering the visibility of real prog¬

ress. Perry's success with Japan really opened a new era in the whole Chinese world of east¬

ern Asia. The spirit of America's commerce, education, diplomacy, missions and the political policy of the United States have been the great¬

est factors not only in the awakening of China, but in influencing ana regulating the policies of the aggressive European nations in their dealings with China and the neighbor nations of the Far East. Japan, contrary to popular notion, is a very young nation, being, accord¬

ing to the unanimous verdict of critical scholar¬

ship and all the evidence in hand, no older than the Germanic nations, coming to national self-consciousness in the 5th century of the Chris¬

tian era. Naturally then she has taken quickly to western culture in the 20th, as in the 5th and 15th century. The Chinese, being an old race, with all the limitations of senility are more slow in their mental movements than the Japanese, who show all the peculiarities of a young race.

Yet in both empires progress, through the com¬

bination of old and new forces, has been real.

Surveying the past 50 years and especially what has been done within the 20th century, it is well to show still further wherein the Chinese and Japanese are alike or different from each other, and also wherein they have human traits in common and systems in harmony with or in contrast to the nations of the West. We may appraise changes actually wrought and see how far these movements or evolutions are to be attributed to agencies within or without these countries. There are those who consider Japan almost wholly a self-reformed nation, while others think that all transforming agen¬

cies have come from without. The truth lies in the golden mean between these extremes* of opinion. China's vastness of area and density of population prevent even keen western ob¬

servers and students and certainly the average Occidental, from any clear perception of leav¬

ening principles and transmuting elements within so large and venerable a body politic.

They may note what is phenomenal, while they are usually blind to the psychic changes in the Far East. Hence, for example, the real energies of the native secret societies and sects within the Chinese empire cannot be definitely gauged, yet that they have been for centuries a real force, frequently showing themselves in both blood¬

less and bloody manifestations, the Boxer insurrection of 1900 and the Republican revo¬

lution of 1912, demonstrate. That these sects yet exist in great potency is certain. Until western diplomatists discern that China, equally with Turkey or Russia, and what survives of old Japan, is a church nation,

with a fixed creed upheld by the government and main¬

tained by force, and that China always has been, and is still, a persecuting nation, there can be no sound diplomacy. Failure to see this adds mystery to the Chinese problem and ac¬

counts largely for the discreditable surprise at the Boxer outbreak in 1900, foreseen by the missionaries, but to the approach of which so many diplomatists in Peking were blind. This politico-ecclesiasticism, based on the Confucian writings and philosophy, is the foundation of a social system that has survived the fall of over 30 imperial dynasties, and is still the most potent check upon and the choicest weapon of government, whether by pure Chinese or alien rulers like the Manchus were. Hence to attack that dogmatic system is treason in a native, a horrible offense in a foreign mission¬

ary, and only tolerable in the Mohammedans be¬

cause they are so numerous and powerful.

The maintenance of this dogma by the sword of the normal magistrate, himself ex officio an orthodox Confucian, has been the cause of persecutions during the ages with bloodshed abundant. This is the real reason of so many reactions and of repeated disappointments.

China has again and again raised hopes among Occidental people that she was about to mod¬

ernize her laws and people, only to dash the expectation of optimists to the ground. Even in this 20th century she has, after founding schools and universities, apparently on modern lines, even appointing American and European officers and teachers, cast these persons aside, and neutralized their methods, ostensibly be¬

cause natives or Japanese were preferred, but in reality to maintain her dogma of Confucian orthodoxy, because the degrees from Peking demand adherence to Confucianism. Whatever modifications China has made in her system are as yet simply external, nor will there be any real progress in the western sense of the word until Chinese bigotry and persecution are aban¬

doned and the union of. church and state given up. The plea of China is that innovators under the pretext of progress are seditious and that reforms by natives mean revolt, anarchy, and de¬

struction of established government. But this is only another phase of that Chinese indirection of mind, which Dr. Arthur Smith in his book on (Chinese Characteristics > has exposed with such masterly skill. The certainty of the Chi-538

nese union of church and state, the instances of bigotry and bloody persecution, and the great slaughter of Chinese in the name of orthodoxy during past ages, making the Chinese govern¬

ment a shedder of blood for opinion's sake, quite equal to Russia or the mediaeval states of Christendom, are shown by that lifelong scholar of Chinese, J. J. M. DeGroot of Leyden, in his monograph, Sectarianism and Religious Persecution in China. > In weight of scholar¬

ship based on original research this work out¬

weighs all that has thus far been written on the subject of China's politico-religious status. In the future these sects will doubtless play a very important part, and probably with more effect on China's internal structure, than either the Tai Ping rebels or the (<Boxers® (q.v.). Such possibilities must -exist as long as China re¬

presses thought and opinion for conscience'

sake by her absolutism in religious matters.

Nor is it likely that she will find any better solvent for her problems than the complete separation of church and state and the granting, not only of academic freedom, but of perfect liberty of conscience to her people. So long as she refuses to grant such liberty, both in the school and to the masses, there will be no end to internal disorders and to foreign complica¬

tions. In this matter of self-reformation, as the past has already proved, the elements tending to reconstruction and the evolution of the Chi¬

nese along more modern lines are most likely to arise from among the natives who have been educated or helped by the teachers from for¬

eign countries. The overwhelming majority of such men of modern mind are Christian, though others are far from lacking. Almost all the knowledge of China by the western world comes from aliens, who have studied, surveyed, and described the country, and who in addition to propagating their dogmas have given the Chinese pretty nearly all the exact science they possess. One cannot ignore the services of those physicians, engineers, advisers, financiers, customs officers, who, with or without Chinese pay, have for a century or more served China's people. It was an American, Ward, who

showed the possibilities of the Chinaman as a soldier. What other Americans have done in China is set forth in the book (America in the EastP It was an American, S. R. Brown, <(A Maker of the New Orient,® for example, who established the first (Protestant) Christian school in China, brought the first Chinese stu¬

dents to America, and demonstrated the ability of the Chinese youth to absorb western learn¬

ing and methods. Among his pupils was Yung Wing, who, after graduating with honors from Yale College, brought to the United States under government patronage, six score Chinese lads as students, one of whom, Sir Liang Chang, has since been Chinese envoy at Washing¬

ton. In a word the efforts of the lay and cler¬

ical teachers, helpers and healers of the Chi¬

nese, especially since the opening of the ports, and within the last 60 years, reveal a force that has in the peaceful American, rather than the conquering European, way helped to give cred¬

ibility to the prophecy of one of the greatest of China's foreign teachers, S. Wells Williams: l<The regeneration of China will be accom¬

plished like the operation of leaven in meal, without shivering the vessel.®

The Japanese are not compacted wholly of Oriental stuff. They differ from the Chinese physically and psychically. Though they form a race having in it many elements, Tartar, Korean, Malay, Nigrito, etc., their basic aborig¬

inal stock, the Ainu, is very probably a branch of the Aryan family of humanity, and the Japanese are thus allied in some measure with the ((white® races. In mind and temperament they differ from the Chinese, not only as insu¬

lar people dwelling on volcanic soil constantly shaken by earthquakes may be supposed to differ from continentals inhabiting stable lands in river valleys, but also in culture and aims.

So long as that half of Asia dominated by Confucian and Buddhist culture was virtually iso¬

lated from Christendom and the West, the na¬

tions of China, Korea and Japan were hermits, who had little to do with each other. The activities that mark Occidental diplomacy were unknown. It was Japan's frank facing modern requirements and her determination to. shirk no responsibilities that compelled China to awake from her sleep and aloofness. Her release of the Chinese coolies, in Yokohama harbor, from the Peruvian ship Maria Luz, in 1873; her descent on Formosa to chastise the murderous savages in 1874; her treaty with Korea in 1876 and recognition as a sovereign state, stirred China to look after her own peo¬

ple abroad, to recognize international obliga¬

tions by establishing legations and consulates.

Finally, China even yielded to General Grant's suggestion in 1879, to settle the irritating mat¬

ter of the Riu Kiu Islands by a joint high com¬

mission. Unfortunately, however, race pride, colossal conceit and a chronic tendency to re¬

action prompted China in August 1880 to cancel the treaty commission, a proceeding which so outraged Japan that Japanese statesmen fore¬

saw war with China and began to prepare for it.

When in 1894, this war broke out, it was evident that both nations had made vast prog¬

ress in both material civilization and in those gains which are associated with the triumph of mind in law and morals, revealing clearly by startling contrast both the homogeneousness and thoroughness of the progress of the smaller and the looseness of organization in the larger country. Japan, quickly responsive to a central will, seemed like an athlete in possession of all his powers, while on the other hand there was with <(the boneless giant® progress only in lines and spots, the work of partially modernizing China having been chiefly that of a few reso¬

lute men, while the great body politic seemed to be insensitive and vigorous for offense and defense only in portions. Strictly speaking, there never was any war between Japan and China, but only a war between all Japan and' a few of the maritime provinces of China. The American, Ward, and the Englishman, Gordon, had shown what the average Chinaman could make of himself as a soldier, when properly drilled, commande'd and influenced by example.

Under these men, Li Hung Chang (q.v.) was converted to the value of the material forces in western civilization. Adopting these, and being viceroy of provinces nearest to the capital, he organized an army drilled by German offi¬

cers and had the promontories of Wei-hai-wei and Port Arthur, guarding the sea gates of the capital, fortified and the Taku forts com¬

manding the Pei-ho River rebuilt according to CHINA AND JAPAN

modern principles of defense and engineering.

Gradually an efficient fleet of battleships, cruis¬

ers and gunboats was organized. A beginning had also been made in China of railways and steamship lines. One part of China's vast sys¬

tem of revenues, <(the imperial customs® of the empire, elaborated since 1863 under the British Sir Robert Hart and honestly administered, has given China her surest source of cash in¬

come for general purposes and the purchase of foreign equipment of

every sort. For an indi¬

vidual or government service to be free from bribery and routine corruption seems to the normal Chinaman something unearthly, and the imperial customs under Sir Robert Hart have won unbounded admiration from the Chinese.

In 1894, when the war broke out which did so much to prick the bubble of Chinese prestige of greatness and mass, and which, paradoxical as it may seem, evoked mutual respect and drew the Chinese and Japanese more closely to¬

gether in reciprocal understanding, China had, in addition to her military mobs in the various provinces, the beginnings of scientific military system. This in time might have become national. Even then as seen to undiscerning for¬

eigners China appeared from a military point of view invincible. On the humane side of provision for sick and wounded soldiers and in the nobler features of civilization, China was woefully deficient. As soon as hostilities broke out the vast difference between the two nations was manifest. China went to war without sur¬

geons, hospitals, nurses or the manifold appa¬

ratus of civilization for protecting non-com¬

batants, saving life and mitigating the horrors of war. China had not yet become a signatory to any of those conventions of nations in the interests of mercy, nor was there a Red Cross organization within her borders. Her recog¬

nition of the international code of war was slow and her acceptance of it slight. On the contrary Japan, having her object lessons given by Christian missionaries, had provided hos¬

pitals, surgeons, Red Cross Society and equip¬

ments for surgery, healing and hygiene, and these were in splendid condition, while 1,400

trained nurses were ready for work. Japan had in 1887 signed the Geneva and other conven¬

tions and had diligently educated her army offi¬

cers in the commentaries and usages of the signatory nations, while her naval commanders were well versed in the laws of search and cap¬

ture. When in 1894 her fleets and armies went forth into Korea, Manchuria and China proper, there was with each field-marshal, besides a hospital corps ready to minister to friend or foe, an expert lawyer, versed in international law, who went as adviser to see that nothing was done by the Japanese which should infringe the laws of nations. Two notable books, (In¬

ternational Law During the Chino-Japanese War,> by S. Takahashi, and (La Guerre Sino-Japonaise au Point du Vue du Droit Interna¬

tionale, > by Professor N. Ariga, the one from the military and the other from the naval col¬

lege in Tokio, r.re the literary monuments of this habit of the Japanese, which, in 1904, has developed into a college of five international law experts. These, after being consulted at all points during the progress of the negotia¬

tions of 1903-04, have gone upon deck and field with the military and naval men ;n*o Man¬

churia to insure, in every detail, harmony with the laws of nations.

The war of 1894-95, which wrought such great results for the world at large, is worth reviewing in its main outlines, since it blew to pieces and forever China's doctrine of Whang-ti, or world-sovereignty, the tenacious adher¬

ence to which over Korea had brought on the war. After being again served by China as they had been in the Riu Kiu matter, the Japan¬

ese determined to take no further chances with her rulers. In Korea, after the bloody struggle in Seoul between the native Liberals and Re¬

actionaries in 1884, followed by the armed con¬

flict between the Japanese and Chinese troops, a convention was made dated 7 May 1885 be¬

tween Li Hung Chang and the Marquis Ito, that both governments withdrawing their

troops would not again land soldiers in Korea without mutual agreement. For awhile there was peace in the Land of Morning Calm, but when the Tong Hak uprising took place, the soldiers from Seoul were overcome and the whole kingdom seemed to be in danger of anarchy, the pro-Chinese faction at court asked for aid from Peking to put down the rebels.

Then to the amazement of the world the Chi¬

nese government violated the treaty of 1885 by first forwarding troops and then notifying the Japanese minister in Peking, using the words <(our tributary state® concerning Korea. China thus reasserted her ancient claim of suzerainty over Korea as a vassal state, notwithstanding that Korea had been recognized as sovereign and independent by Japan and other nations.

The government in Tokio interpreting this as a direct insult, on 12 June 1894 announced the despatch of a body of troops under strict disci¬

pline to Seoul and five days later invited China to undertake with Japan financial and adminis¬

trative reforms in Korea in order to preserve the peace of the Far East. The Peking government curtly refused and demanded the recall of the Japanese troops. The reply from Tokio was that pending an amicable settlement of questions in dispute, any further despatch of Chinese forces into Korea would mean war. China had already ordered her soldiers in Manchuria to cross the Yalu River and having chartered the British ship Kow-Shing despatched 1,100 sol¬

diers to reinforce the Chinese camp at Asan in Korea.

What follows the world knows. With as¬

tonishing secrecy and celerity, the armies of Japan occupied Korea and after the decisive battle of Ping Yang drove the Chinese out of the peninsular, crossed the Yalu and in Man¬

churia conquered an area larger than their own empire, while her navies wiped the Chinese fleet off the ocean and captured the great

fortresses of Port Arthur and Wei-hai-wei. After an¬

nihilating nearly all the drilled troops of China at Ping Yang, the Japanese fought military mobs, making war chiefly with the forces of only a portion of the empire. During the war the majority of the Chinese people scarcely knew that there were any real hostilities adverse to their empire, nor did they learn for years afterward just what had happened, but the military success of Japan opened the eyes of Europe and enlightened some of the Chinese mandarins and scholars. To-day we find China with a new army, formed on modern principles and drilled chiefly by Japanese officers, while in 540

June 1904, having become a signatory to the Geneva and other conventions made to mitigate the horrors of war, she has entered still the pale of civilization, which means the world in brotherhood.

The Japanese stung to the quick, because neither China nor western nations had recog¬

nized them as highly civilized people, were con¬

firmed in their pride and resolve to make the so-called white race understand and appreciate them, when Russia, France and Germany join¬

ing to deprive them of the lawful fruits of con¬

quest, forcibly compelled them to be satisfied with the cession of Formosa and indemnity in money. Had the Japanese been possessed of four battleships, they would in 1895 have de¬

clared war against Russia. As it was, they who never forgive an insult, resolved to nurse their wrath, keep it hot by buying battleships, and in cool science and unwearied persever¬

ance began to invent explosive powders, perfect munitions and equipments and enlarge an army and a fleet that should some day wipe out the insult and show that the Japanese count none on earth as

their superiors. Meanwhile, China, profiting by her fresh experience in humiliation, began to inquire more earnestly into the secrets of western power. A tremendous impetus

was given to the reading of all kinds of in¬

formation about Japan and the western nations, to the building of railroads and to the renova¬

tion of educational methods. The ferment of ideas caused something like a great reform movement in 1897, which, led by progressive literati and apparently sanctioned and even con¬

trolled by the young emperor, seemed apparently about to sweep over the whole empire. New schools and universities were planned and a newspaper called Chinese Progress was pub¬

lished. The purchase and sale of official rank was to be abolished. The stirring and patriotic brochure ((China's Only Hope,® recommended by the emperor, fed the flaming zeal of the reformers who were led by Kang Yu Wei.

Even the abolition of the queue, the changing of the Chinese national dress, the adoption of the Christian religion, the calling of a national parliament and a journey of the emperor and empress dowager to Japan to see for them¬

selves the pitiful condition of China were advocated in memorials. Reform seemed to be ready to spread like a prairie fire, when suddenly in September, Li Hung Chang was dismissed from office and the Emperor virtually dethroned by the Empress Dowager. This act ((carried within itself the fruitful seeds of the Boxer outbreak.® Yet although the missionaries felt what was in the air, the diplomatists looked on the episode as a <(Manchu family quarrel,®

and ignored the warning of those living close to the masses of the people.

Meanwhile the disturbing influence of Amer¬

ican prosperity and expansion were felt in both Europe and Asia. Within a year after Pitts¬

burgh achieved the supremacy of the world in the making of cheap

steel, Russia, Germany and Great Britain <(precipitated themselves upon the shore of the Yellow Sea, grasping at the posi¬

tions which had been conquered by Japan and for the same reason,® — to obtain possession of the rich coal and iron deposits in Shansi, said to be <(worth ten Pennsylvanias.® Germany seized Kiao Chau, Russia Port Arthur, and Great Britain Wei-hai-wei, in readiness for the supposed impending (<Breakup of China® and its expected partition. The torpedo that sunk the Maine in Havana harbor interrupted the European program, postponed the partition of China and united the British, Americans and Japanese in the determination to keep China intact and the door of commerce open.

In 1900 the United States, now a world power, was in Asia with force and had a policy — the policy of freedom and uplift — which for a century or more, the Americans in Asia, as traders, teachers, healers and apostles of democracy and fair play had been steadily de¬

veloping. Meanwhile in China the old terri¬

torial integrity could not be so ruthlessly vio¬

lated nor the ancient social systems invaded without protest. The introduction of railways had thrown thousands of men out of old meth¬

ods of employment. The tremendous commer¬

cial intrusions, which disarranged old customs and made the problem of livelihood to millions so very serious, brought on a fierce reaction both of the scholars and the people and es¬

pecially of the Buddhist priests, creating an atmosphere and environment most favorable for the outbreak of another of those sectarian re¬

volts against the official orthodoxy of China, to put down which the Chinese have shed more blood perhaps than all the religious wars and inquisitions of Europe. This time the heresy was joined with and the cry raised in the name of patriotism. The heretics became the people called <(Boxers® or the Fists of United Har¬

mony. The triple pressure of hunger, super¬

stition and patriotic revolt at the territorial in¬

cursions of the foreigner at last burst out into a storm, which in blind wrath against everything alien, smote first the railways and foreign work¬

men and then the teachers of the foreign re¬

ligion and their converts. The mob reached Peking and surrounded the legations, which were hastily isolated, fortified and for months successfully defended. The foreign powers hastily made preparation to defend and then succor their nationals, but the United States seemed to be the only one that beside its prompt despatch of a military force had a definite policy, which was in recognition of the sov¬

ereignty of China to relieve its own citizens and then withdraw its military from Chinese soil. It is absurd to suppose any real harmony or co-operation between the orthodox Chinese government and the heretical Boxers. What¬

ever may be one's opinions on the subject or the form of the encouragement alleged to have been given directly by the Empress Dowager, it is a fact that no hostile shot was fired by a Chinese regular soldier or sailor, until the seven allied nations, in which the Americans were not in¬

cluded, had made war on China by firing on the Taku forts, 17 June 1900. Against this unwarranted proceedings and overt act of war the American Admiral Lewis Kempff protested and in the crime of attacking peaceful Chinese he refused to participate, his conduct becoming the basis of the triumphal diplomatic policy of the United States government. Briefly stated, the situation was this : A riot of fanatical sectarians, moved by economic and patriotic motives, rose in rebellion against the govern¬

ment already impoverished and weakened by foreign aggression. When unable to put down the uprising in Shan-si, the Pei-ho valley and the vice-royalty from which Li Hung Chang had CHINA AND JAPAN

been removed — though the whole Boxer move¬

ment was wisely handled and thoroughly sup¬

pressed by able viceroys in the central and southern parts of China — the seven allied na¬

tions made war on China in the bombardment of the Chinese forts. When also the Chinese, of course, attacked their enemies in Siberia, the Russians perpetrated the massacre at Blag-ovestchenk and then marched their soldiers to Peking. The combined relieving force fought the opposing Chinese. The Japanese, having the largest and best furnished of the contingents, led the van. The Russians as very slow march¬

ers came next, so that the Americans and Brit¬

ish contingents had to march during the hottest hours of the day. It is certain that the celerity, character and discipline of the Japanese sol¬

diery on this expedition excited the surprise and admiration of military critics of every na¬

tion represented, while on the other hand the familiarity of the men of Nippon with those of Muscovy bred contempt of Russian slowness, heaviness and low grade of intelligence in the mujik or common soldier of the tsar.

After the capture of Tien-Tsin 14 July, the Japanese or Americans alone could then have pressed on and relieved Peking within a fort¬

night, but jealousies and unnecessary delays kept the relieving column idle until 4 August.

The unspeakable robberies, violation of women, brutalities and generally barbarous conduct of the most of the European troops, by the way and in the capital, demonstrated the hypocrisy of the claim to be called Christian and in con¬

trast to the conduct of the Japanese proved that the terms “Oriental® and “Occidental,® as ap¬

plied to morals, are purely traditional and des¬

tined soon to pass away. The Imperial city was captured on 15 August, the Chinese court es¬

caping to the westward remained wholly away from Peking until January 1902. On 28 Au¬

gust bodies of soldiers, representative of the eight allied nations, marched through the For¬

bidden City as a token of China's humiliation.

Li Hung Chang was recalled to office and with Prince Chang commissioned to treat with the Powers, only one of whom, the United States, seemed to have a definite policy. During the "peace® negotiations, the German army kept up a series of attacks and massacres of Chinese called "punitive expeditions® which in general character were a disgrace to civilization. An indemnity equal to $330,-

000,000 was imposed on the Chinese gov¬

ernment in expiation of the Boxer outrages, and for her self-defense in the war fol¬

lowing the attack on the Taku forts. Various safeguards for the legations were arranged and agreed to, the importation of arms and ammunition prohibited, and the Tsung-li-Yamen was transformed into the Ministry of Foreign Affairs which was to take precedence of the other ministries. Except legation guards, the foreign troops were to be withdrawn in September 1901. The Imperial edict of Febru¬

ary 1901 accepted the terms imposed. On 9

April 1902, the Manchurian convention between China and Russia received the imperial seal.

The Russians were to evacuate Manchuria within eighteen months, but to retain control over the railroads.

It was after this Boxer uprising that what we have called the Russian and the American foreign policies and systems of diplomacy had by contrast their most signal illustration. As soon as order was restored and the preliminary diplomatic arrangements made, the United States recalled all its military force, except a small legation guard, asked no favors in return for what had been done, and not only em¬

phasized her recognition of China as a sover¬

eign Power, but set a commendable example to the other governments by dealing justly with the Chinese in the matter and method of pay¬

ment of the indemnity, thus illustrating again the fixed American policy of helping rather than taking advantage of Asiatic nations. Rus¬

sia, on the contrary, demanding the right to occupy Manchuria with her troops and to make Port Arthur the terminal of her Siberian rail¬

way, began thenceforth the military possession of Manchuria, the building of the city of Dalny (q.v.), and the making of Port Arthur (q.v.) both a city and an impregnable fortress, and ini¬

tiated various other enterprises on a vast scale, costing hundreds of millions of roubles, all of which suggested a prospective ownership in fee simple, rather than temporary occupation, not¬

withstanding that she solemnly covenanted to evacuate on 8 Oct. 1903. The United States believing in the good faith of the Mus¬

covite government and in accordance with her policy of recognizing China's sovereignty, ap¬

pointed consuls for the three cities in Manchuria which by treaty agreement were to be thrown open to the trade of the United States. When the appointed time drew near, there was no indication of any purpose on the part of Russia to keep her agreement. As early as 28 July 1903 the Japanese government expressed to Russia its alarm at the Manchurian situation.

When Russia formulated new demands at Pe¬

king and seemed to consolidate rather than re¬

lax her hold on Manchuria, showing also in¬

creased activity along the Korean frontier, doubts were raised in Tokio as to the limits of Russia's ambition. Through his minister in Tokio, Baron Komura and his envoy, Mr. Kuri-no in Saint Petersburg, the mikado notified the tsar through Count Lamsdorff that wishing to remove every cause of future misunderstanding he desired to enter "upon examination of the condition of affairs in the Extreme East, where their interests meet, with a view to a definition of their respective special interests in those regions.® Negotiations were opened and after long delay on the part of Russia the tsar an¬

nounced that while willing to respect the in¬

dependence and territorial integrity of Korea, Russia declined to extend the same engagement to China and requested Japan to acknowledge Manchuria and its littoral as entirely outside her sphere of interest. The tsar furthermore requested the limitation of Japanese control in Korea, even proposing a mutual zone covering all Korean territory north of the 39th parallel.

Other negotiations, followed by exasperating delays in Saint Petersburg, took place, Russia meanwhile heavily reinforcing both her army in Manchuria and her fleet in eastern seas, pur¬

chasing and transporting also large stores of ammunition and coal to Port Arthur. On 5 February, Japan telegraphed the termina¬

tion of her negotiations, severing diplomatic relations with Russia and withdrawing her lega¬

tion. Then followed hostilities, begun simul¬

taneously, both parties claiming that the other had fired the first hostile shot.. In the war that 54 2

followed, the Japanese surprised Europe with the rapidity and brilliancy of their victories on land and sea, China remaining neutral except to take precautions against the violation of her frontiers. At the request of the German em¬

peror, the American secretary of state urged upon three of the nations most interested, the limitation of the area of hostilities, to which they promptly responded. From the side of the Japanese it must be remembered that they were smarting under the sense of long-continued Russian aggression in Saghalien and Kuriles, begun very early in the 19th century. In 1861

a Russian man-of-war proceeded to the island of Tsushima, on which the Russian flag was hoisted and a settlement was made (though not until Japanese blood had been shed in resist¬

ance), which would have constituted a title of ownership had not Great Britain interfered.

The Russians were finally compelled through British intervention to abandon their claim and leave. By the usual plan of (<joint occupation,®

which in the Ussuri province of the Chinese empire had ended in China's loss of a territory as large as France and its incorporation into the Russian empire, the Russians gained complete possession of Saghalien. After the restoration of the empire in 1868 it was foreseen by the Japanese statesmen that Russia would be their chief danger, for already signs of her movement in Korea were menacing. This fact was the strongest determining element in the creation in 1871, in place of the old clan contingents, of a powerful army and navy for national defense.

It is more than probable, as history has clearly shown in the past and as the racial con¬

stitutions intimate, that progress in Japan and China will proceed from varying levels and in different channels. In the island empire the centre of national life is in the one unchanging dynasty and national amelioration has issued from the government downward. Any sure

advance for Japan in the future will be from the same source and in a similar direction. On the contrary among the Chinese people, to whom the existence of this or that dynasty makes no vital difference, reform will arise in and pro¬

ceed through their social system and not from throne or court. In China real and permanent progress has been less through anything done in Peking than directly traceable to the work of men who rose from the people and who had been instructed by foreign diplomatists, teach¬

ers or missionaries. These men have trained the people through the schools, the press, the churches and the hospitals, reaching all parts of the empire by means of the printed word, book, tract, newspaper or by personal influence upon China's leading men, whether in or out of office. In Japan before Perry's advent there were hundreds of men already enlightened, keeping eye on European aggression in Asia, and moving for the unification and reform of the nation. The great motive supplying the force of their lives came from no foreigner but from

their own inborn patriotism and self-sacrifice. Nevertheless, when fullest credit is given to the propulsive power of her Bushido, or the Knightly Code, it must be remembered that Japan, after her first contact with Europe, never was truly a hermit nation. For 200

years or more the Dutch at Nagasaki fer¬

tilized the Japanese mind, keeping open not only the door of-outlook on and information from Europe, but nourishing the Japanese in¬

tellect with exact science, varied knowledge and the applications of Occidental methods especially in medicine and the mechanical arts. In 1853

it was strenuously charged by the Conservatives who wished the country kept shut that only the native (<Dutch scholars® wanted the empire opened to commerce and western influences.

In 1868 when the men rich in Dutch culture and the (<Mikado-reverencers® gained possession of the imperial person in Kioto, they began to relay the foundations of the empire by seek¬

ing for knowledge in every part of the world.

Teachers, advisers, engineers and experts of all sorts were imported by the hundreds, who dur¬

ing 35 years have literally taken off their coats and, by example and teaching, rede¬

craft and handicraft have shown the Japanese how to do those very things which they are now doing so well. The configuration of the Jap¬

anese Islands has fitted them to profit to an ex¬

traordinary degree by the adoption of the forces of steam and electric communication at a time most needed, that is, immediately after the abo¬

lition of feudalism and in the transit to indus¬

trialism helping to unify them politically and consolidate them into a marvously compact nation. In China, railways will re-distribute into wholesome evenness of proportions of table¬

land and littoral the population now congested in the river valleys and

alluvial plains, will de¬

velop and distribute the wealth of the mines, will abolish the almost periodical famines, and by adding healthy movement and contact of the inhabitants of distant provinces develop in the Chinese that patriotism (as distinct from race pride which is already so intense), the lack of which has been the cause of China's many woes, and will give that middle term of a large in¬

telligent and practical body of men of affairs between the throne and the masses, so notable in Japan and which China so sadly needs. The progress in both Japan and China has neces¬

sarily been thus far mostly of the material, edu¬

cational and economic sort, for neither the Chinese nor the Japanese take kindly to the abstract thought or science of the West. It is an exceptional thing to get a Japanese or Chinese to listen patiently to the presentation of even the outlines of a metaphysical or ab¬

stract argument or proposition. Hence, there¬

fore, in its doctrinal form, Christianity has made but slight progress, and the chief experience noted by foreigners in the reception of an Occidental creed of any historic name by Chinese or Japanese has been its simplification.

It seems quite certain that Christianity as known and practised by the countries of the Extreme Orient is to a very hopeful degree ex¬

pressed in practical forms or in reform. Nor is it at all likely that in accepting what Jesus taught these peoples will ever receive or as¬

similate also that Greek philosophy, Roman tradition and doctrinal achievement, and the ethnic peculiarities which form so large a part of popular Christianity in America and Europe.

The chief role which the Japanese are to play in the future — with probably the de¬

velopment of reserves of power greater than the average Occidental suspects in them — will be as the teachers of the Chinese, who number one-fourth of the population of the world, by interpreting to the sons of Ham the civilization and systems of the West, themselves

the middle term between Occident and Orient.

The Japanese have learned how vain it is to trust in material progress alone. The old sanc¬

tions and motives being now corroded or dis¬

solved, they are seeking new guarantees for decency and progress. In answer to the im¬

potent fears of many Japanese that their na¬

tional solidarity, centred in the throne and imperial line, existing from <(ages eternal,® will be imperiled, and the similar terror of the Chinese conservatives, lest the whole edifice of society and morals fall to ruins, history has but one reply. Inexorable fact and reasonable probability, shows that dogmatic theology, as a political engine, must certainly give way be¬

fore the advance of education and science ; while if anything is certain from the record of the past it is that the first secret of Occidental progress lies in the fact that Greece, Rome and the northern nations of Europe, early in their careers, dropped ancestor worship and put the moral responsibility of the individual in the fore, making mental initiative a duty and not a crime. The Chinese and Japanese must find other grounds and sanctions for national life and perpetuity than in ancestral worship and their traditional, communal civilization. Hap¬

pily the events of the last few years in the Far East show steady progress in the direction which history assures us is the only right one.

The real line of advance had been in the direc¬

tion of an increasing sense of both personality and individuality.

Having in our survey of China given the Chinese and average Occidental view of the situation in 1916, we shall in this article pre¬

sent what may approximate the view of the Japanese and of the scientific student of inter¬

national affairs.

The logic of events and the general move¬

ments of civilization, within the last 50 years and especially from about the year 1880, have not only forced China and Japan, once hermit nations, into a new alignment with the western Powers, but into unexpected relations with each other. Of old, Spain, Portugal, Holland, Eng¬

land and France were the countries most indus¬

trious at the task of seizing and occupying the land of ((the heathen,®' when whole continents were confiscated as prizes, or given away in the name of God, but in our days Great Britain has led all others. The new dogma of imperial¬

ism dominating European Powers in the 20th century means first the exploitation of the weaker nations, through capitalism and then the use of the governments in support of these advance agents of civilization, leading sooner or later to trade wars, to military occupation and to annexation. Great Britain, having led the way and set the example, rules 22 per cent of the earth's surface and 25 per cent of its population. Russia, France and the United States have followed. These four countries are, with China and Brazil, the six greatest landowners of the world controlling 62 per cent of the earth's area. All of these, except China and Brazil, whose boundaries were long ago fixed, have in very recent times seized the possessions of other peoples to enlarge their domain. The white man, imagining himself the favorite of Heaven, has appropriated nearly all of Africa, much of Asia, both continental and insular, and Polynesia. Only the Monroe Doctrine has prevented European Powers from reappropriating much of republican America.

It is this lust for land, pelf and power, shown by the white man, that has conditioned the mod¬

ern history of the Far East.

In. the reawakening of national conscious¬

ness in the three nations, China, Korea and Japan, the Central Empire suffered first, hav¬

ing her frontiers violated and her soil invaded, while indemnities, more or less extortionate, have been forced from her. This nibbling and dismembering process, begun with the loss, in 1841, of Hongkong to Great Britain, has con¬

tinued to this day. From her old-time area, Upper Mongolia and much of Manchuria has become the possession of Russia; Annam or Cochin China of France; and Formosa of Japan. Korea, \yeak and helpless, desolated her borders in order to make her territory forbidding to the covetous. In Japan, far-see¬

ing spirits, over a centuiy ago, discerning her eastern trend on the continent and the descents of Russia southward on Japanese soil, sounded the. alarm by voice and writings ; but only to be imprisoned or hounded to death as alarmists and to have their books confiscated or destroyed by the Yedo authorities. Only at a late hour did the Shogun's government awake to reality and begin the defense of the north and, in 1860, the expulsion, with British aid, of the Russians from the islands of Tsushima, near which, in 1905, Admiral Togo destroyed the Muscovite's naval power in the Far East.

While in her hermit isolation, tortoise-like Japan, governed from Yedo, sought to defend herself by closing her shell, reckoning all aliens alike. To the three peaceful missions, sent by Presidents Jackson, Polk and Fillmore, to the unofficial calls of Glyn and Cooper, and to the private enterprise of Mr. King, in 1839, she gave firm refusal, to all but Perry. He re¬

fused to be refused, and his visible power, firm¬

ness and tact won. As soon as the intellectual movement in critical scholarship and historical investigation and the study of Dutch, begun two centuries previously, ripened to the coup d'etat in Kioto in January 1868, the new, cent¬

ralized, Imperial government came into power and instantly made bold assertion of the na¬

tional consciousness. This was done by at once signing treaties in the name of the mikado, raising the first real, national army ever known in Japan, building a modern navy, sweeping away feudalism and

inaugurating a definite foreign policy. This latter was manifested by the abolition of the long existing dual sov¬

ereignty of the Riu Kiu archipelago (Loo Choo Islands) long tributary to both China and Japan, the assertion of ownership of these and other outlying islands (such as the Bonin and other groups), the protection of her citizens in for¬

eign lands, the establishment of consulates and legations abroad, the sending of hundreds of students to America and Europe and the im¬

portation of an equal number of salaried ex¬

pert teachers and advisers (yatoi) from the Occident, ((to relay the foundations of the empire.® In a word, the Japanese, confessing their defects and the folly of long isolation, faced the situation. Instead of playing off one nation against another, they determined to find out the secrets of power in each and to apply these to their own needs. When some Riu Kiuans had been wrecked on Formosa and killed by the native head-hunters, the govern-

ment in Tokio, in 1874 lived up to its duties by sending a force to Formosa to chastise the savages. When a Peruvian vessel entered Yokohama harbor, loaded with Chinese coolies kept against their will, Japan freed them and then communicated in friendly terms with China and Peru on the basis of international law. In her further dealings with Korea and China, she refused to negotiate except accord¬

ing to the laws of nations. China, thus stim¬

ulated and compelled by a rival deemed inferior, began to see the necessity of providing what she had never possessed before, a standing army and a navy.

Meanwhile the three Powers of Chinese

Asia — almost the only ones that still preserved their sovereignty —

forced into new and em¬

barrassing relations by the military and political activities of the Occidentals in or near their borders, found themselves at odds with each other. The old dogmas of statecraft, that had ruled the world of Confucian ideas in eastern Asia, were being challenged and jostled.

Especially was China's attitude of superiority and her claim to universal dominion and hom¬

age, so long tacitly or openly expressed to the neighbor and pupil nations around her, of¬

fensive to the mikado's empire, as being an¬

archistic and anomalous. A war party formed in Japan for the invasion of Korea, that had taunted her island neighbor with being a traitor to Oriental culture. Happily, instead of hostil¬

ities, the government in Tokio offered the olive branch and a treaty was made in 1876.

This action was followed by the United States and by China, in 1882, by which little Korea, though having few of the necessary features of a modern state, was dragged out, in all her poverty and weakness, into costly and perilous international relations. Only for two or three decades did she attempt to keep up the forms, or farce, of a state in the modern world of in¬

terrelations, while still her people had the mind of hermits. How hard old ideas and mental habits die is seen in China's attempt to hold both Riu Kiu (over which a long contro¬

versy arose, which it was hoped would be set¬

tled by the suggestion of Gen. U. S. Grant of a joint high commission) and Korea as vassals, despite the fact of her own recognition of Korea as a sovereign state. In 1894, these differences of view clashed and rose to the climax of war.

Then, not for the first time on the bloody field, but initially as to modern armaments with steam and electricity, the two powers met — China fractional and divided and Japan united. The result of war's arbitrament was to clear the ground for the future history of Asia by abol¬

ishing forever the effete dogmas of universal and of dual sovereignty.

Now Japan illustrated the axiom that pre¬

cept whispers while example thunders. Not the professions of amity and benevolence but the policy and action of Europe bade Japan fol¬

low up her advantage by aggression. As the pupil of the Anglo-Saxon nations, Japan- — her sons having already read and mastered Eng¬

lish and American history — proceeded to follow their compelling example. Dwelling on a chain of volcanic islands, with little arable soil and a fast growing population, Japan, like insular Britain, must needs have a larger food area and room for industrial expansion. Imitating Eng¬

land even to flattery, she sought fresh territory in other lands on the near continent, demand¬

ing, as “indemnity,® or the price of successful war, what had long been a thinly populated country very near the condition of waste land; which was, however, on the westward route to Europe and further toward those nations and parts of the world whose ideas she had adopted and with which she was joined in brotherhood, having turned her back on Chinese culture.

England, by waging nearly 50 trade wars in almost within as many years, had shown her what to do by seizing coaling stations, islands and vast territories, from the size of India to those of the dimensions of coral reefs, thus ex¬

panding her possessions in every direction, so as to have a never ceasing drum beat and a midnight as well as a noonday sun, and one shinning on her possessions during 24 hours of each day. Even the history of the United States, thanks to American missionaries and teachers, was a familiar object lesson urging to action and embrace of opportunity. Once but a narrow strip between the Alleghenies and the Atlantic Ocean, though already possessed of more land than could be worked intensively, the American people had extended their domains beyond the Mississippi and the desert, and out from the Pacific, even possessing Alaska, Hawaii and the Philippines. The Americans taught and enforced the Monroe Doctrine. Why should not the Japanese have one also? Hers, too, seemed “manifest destiny.® Hindered in 1905

by the combined force of Russia, Germany and France, that were angry at the idea of Japan becoming so apt a pupil and doing what they had done, even making the European nations her models, Japan yielded to their mandate.

She accepted, in lieu of Manchuria, Formosa, with a money indemnity sufficient to buy the battleships that in due time should enable her to win back what she had lost. The experience, in 1900, of marching with the Russians to Peking, did not tend to raise respect for the Russian military. Unable to see that the Muscovites had any more right to Chinese ter¬

ritory than they had, the Japanese, after the failure of polite diplomacy, faced their rival, now become enemy, in arms in 1904—05. They won a foothold on the continent, with control of the routes to Europe and then proceeded to follow the example immediately before their eyes, of the United States in appropriating the Philippines. This they did by absorbing Korea.

Still following out the principles of the Monroe Doctrine, they determined that eastern Asia should no longer be the seat of exploitation, colonization and conquest by European or other foreign powers. In 1915 Japan settled her old scores and eliminated Germany from China and the islands of the Pacific. Still carrying out her purpose, of cementing the friendship and consolidating the power of the nations under similar conditions of culture, she resolved to rouse China into a fufler national con¬

sciousness in order to prevent that “break up®

so heartlessly planned by European powers.

Japan’s underlying idea was to change China from a mediaeval to a modern power, make sure of a market and hinder China’s further dismem¬

berment by the nations that had already seized most of the lands and continents not their own.

That the Japanese motive was ethically as well founded as that of the Europeans’ policy toward Asiatics cannot, when studied in the light of

history, be denied. In carrying out her policy of 1915 toward China, Japan simply employed the methods taught her and the weapons which had already been used upon herself and upon China for a century or more and approved by most Christian governments. Drastic they were, but if we take facts, instead of fears and prejudices for our guide, we see that Japan sought no conquest of China's territory, but aimed rather to influence her colossal neighbor by means of education, employment of her experts, the right of control of the resources needed, and propa¬

gation of religion, with freedom of conscience and unhindered modern civilization — all of which methods other foreigners had repeatedly used before her. Terrible as these demands seemed and ruthless as were the methods, real or apparent, as set forth in the hysterical ex¬

aggerations of the journalists in Peking and writers in American magazines, they were no more than Christians had made — often at the point of the bayonet and at the mouth of cannon, when forcing tariffs, collecting indem¬

nities, or laying extortionate mulcts on both Japan and China. So far as history has re¬

corded, the United States is the only country in which the national conscience, as in the case of the Shimonoseki affair in 1865 and in that of the Boxer outbreak in 1900, revolted against injustice and demanded and made re¬

turn or reparation to the wronged. In 1915

Japan resolved to forestall European aggres¬

sion — which might yet have another recrudes¬

cence after the war, when Europe should awake from her international insanity.

What President Monroe's ultimatum in 1823

meant to the Holy Alliance and Fillmore's mes¬

sage through Webster to Austria in 1850, and Cleveland's word in

1895 to Great Britain in the Venezuela matter — all of them republishing the Monroe Doctrine — Japan's actions have meant to all conquering nations who talk about such monopolies as (<the control of the Pacific,®

<(British Supremacy,® or ˆinterests® of any sort, which are opposed to international law. Seeing that it was highly probable that, after the waste of the Great War, European nations would expect to do what Holland did with Java, Britain with India, and France with Africa — pay their national debts by grinding the faces of the Asiatics — Japan took opportunity by the forelock. Her motives in the China affair of 1916 were at least as honorable and even as altruistic — so far as intelligent self-interest would allow — as were the motives of the European powers that once seized America, Africa, Asia and Polynesia. The actual result, for the benefit of mankind, was to awaken China from her almost soulless slumber and to give her a new soul, uniting the nation as never before and replacing race pride with patriotism.

That this idea of defense against the land-hungry nations of Europe was not a new or even recent one, born of the ambitions of an upstart people who had borrowed modern artil¬

lery and diplomacy, is clear to all familiar with that notable body of historical literature, pro¬

duced in Japan since the Russian descents on Saghalien, in 1807. How thoroughly the

Japanese fear of European conquest — with the example of subjugated India and Java and the humbled China of 1860 before them is seen in the answer given to Dr. J. M. Ferris in New vol. 6 — 35

York, in 1866, when questioning the first two students arriving from Japan, as to what brought them so far, even to America. ((We came to learn how to make big cannon, so that we shall not be conquered® was their instant and ingenuous reply.

In contrasting the relative action and pro¬

longed policy of Japan and China, in their first meeting with the nations of the West, we note a startling difference. Building another Great Wall of conceit, trusting to her traditions and choosing intrigue as her chief weapon of de¬

fense, by playing off one selfish power or sordid interest against another, China made, during the decades of her humiliation, no serious effort, as did Japan, to win and hold a place of honor among the nations, by interior reformation and appropriate outward respect. Never, until late in the 19th century, did China make decent recognition of either foreign governments or international law, ignoring even the existence of her people abroad, and so ultimately had to yield in impotent fear to all threats. On the other hand, Japan acknowledged the age-long folly of her isolation, broke the crust of in¬

herited conceit, confessed her defects, sought for alien talent and industry over all the world according to the mikado's oath of 1868, abol¬

ished feudalism, recreated her industries and kept most scrupulously all her engagements, whether of treaties, ((gentlemen's agreements®

or Open Door arrangements, as those who deal with facts not fears agree. Had China awak¬

ened, 70 years ago, from sloth, ease and age-crusted conceit, as she did awake after 7 May 1915, there would have been, for neither Japan or China, any Anglo-Japanese Alliance, or Russo-Japanese War, and no German-Japanese War. It has been the supreme purpose of Japan to have China realize these truths. The very fact that the Japanese have felt the wounds and retain the scars at which others jest, ex¬

plains her terrible sincerity in teaching China the lesson of 7 May 1915. That China should employ Japanese political, financial and mili¬

tary advisers (Japan having already employed and benefited by over 5,000 of them, chosen from at least 20 nations) is in no way strange.

Of the 3,938 foreign employees in China there were, in 1914, 1,105 British, 1,003 French, 533

German, 463 Russian, 174 Americans and others, but only 245 Japanese. As for partial control of China's armed forces, why should not China profit from the Japanese, as well as from Occi¬

dentals, to gain what she has never had — uni¬

formity and the best results — in place of the waste, inefficiency and the confusion arising from the variety of arms and ammunition, in¬

cluding infantry rifles of 10 or a dozen calibres?

As for the right to propagate religion, only the decadent and bigoted nations still in mediaeval darkness would think of opposing the proposi¬

tion. Japan, since $he opened her ports, and especially since 1873, has far surpassed some European nations in freedom of conscience. The hostile critics of Japan, who argue from fore¬

bodings rather than realities, seem to forget the history of European, British or American aggressions from Monroe to McKinley, or else they imagine that one code of morals rules the West and another the East.

One may perhaps sum up the newspaper re¬

ports, magazine articles and those recent books 346

which are journalism but not literature, ex¬

aggerating the diplomatic demands of Japan and giving a sinister interpretation to all her acts and motives, in the proverb, (<a guilty con¬

science needs no accuser,® since the only new element in the case of 1915 was that it was Japan, and not an Occidental power, that by provocation roused China to new life. It is reasonably certain that those who fatten on Chinese love of conservatism and who Hand®

big contracts, or enrich themselves or debauch the Chinese with opium, liquor and drugs, want to keep things as they are and misrepresent Japan, whose first purpose is to change things for the better. So far from China having been nationally ((awakened® before

7 May 1915, the mass of her people are still like those Amer¬

icans who, while their feet are wet with the slush of Inauguration Day, want the date changed, but forget all about the matter when their feet are dried. Yuan Shi Kai is reported to have said in 1916, ((As soon as the trouble is over, we indulge in all kinds of pleasure for¬

getting all the former humiliations.® Notwith¬

standing all that has been said, China's terri¬

torial integrity has not been disturbed by Japan, even though other powers have not only threatened but have also seriously injured and even mutilated it.

If China — that is, the 400,000,000 of her people — has really <(awakened® this time, then the shame of the Chinese may change the destiny of the Far East. With the self-refor¬

mation that has come from the Japanese goad, this unwieldy mass of humanity has shaken off much that in this 20th century world is a hindrance to growth in true nationality.

A new spirit of independence and patriotism has entered into the Chinese, so that it does not severely tax our credence to suppose that 7 May will hereafter be celebrated like our own 4 July, as Independence Day, in a holiday truly national and from which point in time the nation, oldest in the world, started on a new career of uni¬

versal education and of industrial, commercial and political prosperity.

To the thoughtful student of humanity's progress, or one who has freed his mind, even in part, from ethnic, racial, credal and com¬

mercial prejudice, it would seem that the chap¬

ters of history opened in the Far East since Washington's time, who commissioned Major Grey as the first American agent in eastern Asia, are of the highest interest and happiest augury. It seems to be demonstrated that the general American policy that has left on Asia the mark of the school, college, church, hospital, missionary healer,

honorable merchant and truthful and just diplomatist is not only the best in morals, but reveals the one method, as yet unexcelled, for the promotion of commerce, mutual prosperity and the peace of the world.

The Monroe Doctrine, as established in 1823

and enforced by James Monroe, Millard Fill¬

more, Abraham Lincoln and John Hay, can be in accord with justice and righteousness, only as it is applied not only to America but to the whole world. It means that nations have the right, each to its own soul and soil and to live in such peace as they are able to maintain. <(If America support Japan's contention and Japan America's, Europe will be forced to acquiesce, and peace in the Pacific will be secured® is the general verdict of the latest and ablest writers on this theme.

William Elliot Griffis,

Author of (The Mikado's Empire f (America in the East f (China's Story, > ˆThe Japanese Nation in Evolution f *etc.*

CHINA DECORATION. The decoration

of china, and, indeed, of all kinds of clay wares, falls into two groups: (1) Controlled by method, and (2) controlled by producer. The former group deals with the fact that a decora¬

tion can be introduced at any stage of the man¬

ufacture; the latter concerns itself with the various handicrafts employed.

Decorations may be used under the glaze, either on the unburned or burned clay; in the glaze, as a natural coloring; on the glaze, after the hard-glaze fire.

Decorations on the clay usually take the form of sgraffito (incising) ; inlaying, or pate-sur-pate ; or painting with diluted clay. In the two

latter it is important that the inlaid or over¬

laid clay should be similar in composition to the main body, or the fire will cause them to sep¬

arate. The body piece,, formed either in a mold or upon the wheel (see Pottery Manu¬

facture), is kept quite damp, and the

design, lightly sketched in India ink, is carefully followed. In inlaid work a channel is tooled out of the body, and filled in with clay of a different color. In pate-sur-pate no cutting out is necessary, but usually the background is stained a dark color and the design is laid on in white. The beautiful works of M. Solon are of this class.

On the burned ware underglaze decoration may be either painted or printed. Most of the modern hotel and restaurant ware is printed under the glaze.

For some classes of work a coloring added to the glaze itself is very effective. By this means are produced the flowing and flashed effects much followed by the Japanese and by many French ceramists. In America the Ded¬

ham Pottery has worked in this direction.

For work over the glaze a lower fire is em¬

ployed, many more colors are available, and the processes of decoration include painting, gilding, printing, and ground-laying.

Ceramic colors are made from certain me¬

tallic oxides with which are blended a fusible flux, so that the mixture may melt and attach itself to the glaze. Various fluxes are in use.

They are composed of red lead, borax and quartz sand in varying proportions. These in¬

gredients are melted together, and the resulting glass is finely ground. For blues the oxide of cobalt is used; for greens, those of copper and chromium ; for yellows, antimony and lead ; for reds and browns, iron ; for dark brown, manga¬

nese ; and for grays, nickel and iridium. Gold produces rose color and purple, and a pink is also made from tin oxide and chromic acid. In some cases the colorant and the flux are melted together ; sometimes they are united only in the grinding-mill. For underglaze work, as well as for the coloring of clays and glazes, the list is not so full. Some of the oxides fail under the higher temperature, and must there¬

fore be confined to overglaze use.

In the second group, decoration is considered as a handicraft. Division of labor is the rule in a manufactory, and thus a piece of china may pass successively through the hands of the CHINA — CHINA INLAND MISSION

ground-layer, the painter, the printer and the gilder, together with those of many minor opera¬

tors. To the ground-layer falls the task of dis¬

tributing an even tint over the whole piece or upon some part of the design. Using a stiff oil, — linseed boiled with litharge or lead acetate, —he dilutes it with turpentine, and brushes a thin coating over the china. This coating he dabs with a soft linen pad, and then spreads the color, a fine dry powder. A certain quantity adheres to the oil, and a smooth tint is the result. If only part of a design is to be covered, the free portions are painted with a water-color mixed with molasses.. The work is oiled and dusted as before, and is then immersed in water, when the water-color is washed up, taking with it any of the ground color which may have settled upon it.

The painting of china scarcely needs a de¬

scription. The colors are as already explained, and the painting depends upon the personal skill put forth. The colors are mixed in turpentine and fat oil just as the painter pleases, for each artist mixes his own palette. The colors change somewhat in the fire, but not as much as is often supposed. The main difference is a great gain of brilliance.

The gilder is mainly employed to embellish the work of others. He uses pure gold, as pure as it can be purchased. This is received in the form known as ((coffee gold,** a brown granular mass. Mercury is added of about the same weight as the gold and the whole is ground perfectly fine. When mixed with the proper oil this can be used freely as a paint and the oil and mercury are driven off in the fire. Gold thus prepared needs to be burnished after firing; but there is another form of gold, known as bright or liquid gold, which is much cheaper, and therefore largely used on com¬

mon wares. In this case the gold is dissolved and the solution is mixed with certain oils.

The fire removes everything but the metal, which is left as a brilliant film on the china.

Printing from copper plates has been in use ever since 1756, but for many years has taken an inferior position. At first it was employed for fine engravings and decorative subjects, but lately only for borders and outlines. The pat¬

tern is engraved upon a plate of planished cop¬

per, and the printer makes this plate quite hot upon his stove. The color, mixed in a very stiff oil, is also kept hot, and with this the en¬

graving is charged. An impression is taken upon thin paper, and this print is handed to a woman who cuts away the superfluous paper and presses the print on to the china. A bath of cold water removes the paper, and the color, rendered hard by the low temperature, remains firmly fixed. The fire completes the process.

Lithographic printing is now very popular in china decoration. The

process was introduced from France some years ago, and the prints were made abroad; out recently the more suc¬

cessful manufacturers have established their own lithographic departments. The prints are made in the usual way from stone, except that no color is applied to the stone itself. The im¬

pression is taken in varnish, and the color is dusted on the printed paper. On account of the transfer the order of impression is re¬

versed, the print which is first on the paper becoming uppermost when the impression is transferred to the china. The paper used is double, consisting of a sheet of tissue paper cemented on to a stiff backing. The stiffness is necessary to withstand the pressure of the ma¬

chine, and when printed the tissue is stripped from the sheet and proves flexible enough to accommodate itself to the surface of the ware.

The printing is done in verifiable colors, of course, and the finished china is fired in the usual way.

CHINA, Great Wall of, the White Wall,

the Wall of 10,000 Li, the largest artificial de¬

fense structure on the face of the earth, a bar¬

rier extending for about 1,500 miles in the north of China proper, of which it partly forms the boundary. Its western end is in the deserts of central Asia, its eastern reaches the sea to the northeast of Peking, and it has an exten¬

sion to the Sungari River to the northeast. It was erected as a barrier against the inroads of the barbarous tribes, and part of it dates from about 214 b.c. The greater part, however, was constructed during the latter half of the 14th century. It is carried over height and hollow, and avoids no inequality of the ground, reach¬

ing in one place the height of over 5,000 feet above the level of the sea. Earth, gravel, brick and stone were used in its construction, and in some places it is much more substantial than in others. Its greatest height, including the para¬

pet on its top, is about 50 feet, and it is strengthened by towers at regular distances.

The average height of the wall is about 22 feet and the width 20 feet. The towers are about 40 feet high. Consult Geil, (The Great Wall of China) (London 1909).

CHINA INK, or INDIAN INK, a black

solid substance, which, when rubbed down with water, forms a very pure black indelible ink.

It has been used in China from time immemo¬

rial, and both there and in japan is employed for writing, small brushes being the implements made use of. In Europe it is used by drafts¬

men, artists, *etc.* It is manufactured in various ways and from various materials, but consists essentially of fine lampblack incorporated with a gluey substance, the whole being dried and consolidated into cakes and sticks. Some kinds are made with animal or ivory black, others with lampblack got from camphor or oil of sesame. There is generally added some per¬

fume — a little musk or camphor. Many at¬

tempts have been made to imitate Chinese ink, some of which have been tolerably successful.

Almost all the imitations consist of carbon ground up with gum, gelatine or fish-glue, but the quality and tint may vary according to the special carbon employed and the process of manufacture. Good Chinese ink should have a velvety black appearance, with a gloss which becomes very conspicuous on rubbing. The color it gives on paper should be pure black and homogeneous, and if water be passed over it it should not run or become streaky. See Ink.

CHINA INLAND MISSION founded

1865 by the Rev. J. Hudson Taylor, has had a remarkable history, and many denominational societies have learned from it valuable lessons

in faith, economy and the pre-eminence of spiritual methods. It has been carried on with¬

out the backing of any distinct constituency and without direct appeals for financial aid.

The Reverend Taylor first went to China in 1853, in connection with the Chinese Evangelization 548

CHINA ROOT

CHINCHILLA

Society. From Shanghai he made numerous inland journeys and four years later resigned from the Evangelization Society and began in¬

dependent work in Chekiany province. After a visit to England in 1865 there followed, as the result of a remarkable spiritual experience at Brighton, the formation of the China Inland Mission, and on 26 May 1866 Mr. Taylor re¬

turned to Shanghai with a party of 15 mis¬

sionaries. The work was organized under a directorate, the districts mapped out and the 11 great inland provinces, whose 250,000,000

people had never heard the Gospel of Christ, were opened up. Believing in medical work, the mission now maintains 9 hospitals, 68 dis¬

pensaries, 27 physicians and a great number of trained nurses. Over 35,000 persons are now in fellowship with the churches, and over 50,000

have been baptized since the commencement of the work. The annual income raised ranges from $200,000 to $291,000.

CHINA ROOT, the root or rhizome of

Smilax china, a climbing shrubby plant closely allied to sarsaparilla, for which it is sometimes used. Vitis sicyoides, a species of vine, is known by this name in Jamaica. It is a native of Eastern India, Japan and China. In the United States the roots of smilax have been used as substitutes of China roots, and similar smilax roots have been used in Latin America.

CHINA ROSE, the name given to a num¬

ber of varieties of garden rose chiefly derived from Rosa indica and R. semperflorens, both natives of China. The name is also given to Hibiscus rosa-sinensis, one of the mallow tribe, common in China and the East Indies, and an ornament in greenhouses.

CHINA SEA, that part of the North

Pacific Ocean bounded on the north by

Formosa, on the northwest by China, on the west by Anam and the Malay Peninsula, on the southeast by Borneo, and on the east by the Philippines. It contains numerous islands, re¬

ceives several considerable rivers, and forms the important gulfs of Siam and Tongking.

The currents in this sea are very mutable, de¬

pending much upon local circumstances.

CHINA-TREE, Wild, a common name for

the soapberry-tree (Sapindus mar g hiatus) . It is a handsome tree, sometimes growing as high as 60 feet. The flowers are white and the oval berries are very saponaceous. It grows from Florida westward to Arizona and northern Mexico, and in southern Kansas. The wood is very hard, and heavy, weighing nearly 60

pounds to the cubic foot. It is also a name given to a native tree of India, M clia Azedarach, the pride-of-India. It is extensively cultivated in warm countries as a shade tree.

CHINA WAX. See Wax.

CHINANDEGA, che-nan-da'ga, Nicara¬

gua, a town, capital of the department of the same name, 26 miles northwest of Leon, and 10

miles from the port of Corinto on the Pacific, with which and with Managua it is connected bv rail. It is a place of considerable trade.

Pop. about 15,000. In 1849 an agreement was formed in Chinandega to confederate the Cen¬

tral American republics into a political unity under the name of Central American States ; but this scheme fell through.

CHINAWARE, the name given to porce¬

lain made in the Chinese empire and imported as ˆChinaware,® now chiefly confined to the soft porcelain made in England, of which bone-ash is the characteristic ingredient. This class of ware is called <(bone chinaw by the potters and dealers of America. Bone-ash was used at Bow and at Chelsea, near London, as early as-1750 and has been extensively employed ever since. Bone china consists of kaolin, pigmatite, or Cornwall stone, and bone-ash. The clay and rock are found in Cornwall, England; the bone is largely imported from America and the Argentine. The proportions in a dry mix are about as follows: Kaolin, 40; stone, 20; bone-ash, 40. The heat at which the kilns arc burned ranges from 2,300° to 2,400° F. Bone china is not made to any great extent in America, though some few manufacturers have put it forth as a side line. The particular merits of this ware lie in its snowy whiteness, and in the soft glaze which makes it possible to produce very beautiful decorations over the glaze. For rich services this class of china is unrivaled.

See Porcelain.

CHINCH, the popular name of certain

fetid American insects of the family Lygceidcz, genus Rhyparochromus, resembling the bed-bug, very destructive to wheat, maize, etc., in the Southern and Western States. The name is also applied to the common bed-bug (Cimex lectularius) .

CHINCHA, chen'cha, ISLANDS, a group

of small islands off the coast of Peru; lat. 13°

38' S. ; long.. 76° 28' W. They are granitic, arid and destitute of vegetation, and the coasts bold and difficult of access. Immense deposits of guano used to exist here, but after being ex¬

ported for 34 years the supply became exhausted in 1874.

CHINCHAYCOCHA, chen-chl-ko'cha, a

lake of Peru, in the department of Junin, 13,330

feet above the level of the sea, 36 miles long and 7 broad, with an area of about 300 square miles. It is the source of the river Jauga, and abounds in fish and wild fowl.

CHINCHILLA, chm-chil'la, orERIOMYS,

a genus of South American herbivorous rodents allied to the cavies, which they resemble in the general shape of the body, in the limbs being longer behind than beiore, in the conformation of the rootless molars, and by the nature of the fur, which is more woolly than silky. C.

lanigera is about 15 inches long from the muz¬

zle to the tip of the tail, and is covered with a beautiful pearly-gray fur, which is highly esteemed as stuff tor muffs, pelisses, linings, *etc.* The chinchilla lives gregariously in the mountains of western and southern South America, principally in Peru, Chile, Bolivia and Argentina, and makes numerous and very

deep burrows. It is gentle and sportive, loses none of its gaiety in captivity and is very cleanly. This genus gives its name to the family Chinchillidcc, which contains two other genera, one (Lagidium) , including a large chin¬

chilla-like rodent of the Andes ; and the other (Lagostomus) , containing that large numerous burrower of the pampas called vizcacha.

The chinchilla derives its name from the Span¬

ish Chinche, bed-bug, on account of a certain odor which it gives off. This derivation must not be confounded with that of the town Chin-

chilla. The latter name is a corruption of the Roman Saltici (Saltigi) on the site of which Chincilla stands. Ruins of the old city still exist in the neighborhood.

CHINCHILLA DE MONTE-ARAGON,

chjn-chel'ya, Spain, city in Murcia, in the province of Albacete, 10 miles southeast of the city of that name ; situated on a rocky eminence.

It is surrounded by a wall and commanded by a castle. Its handsome parish church has three naves, and a lofty tower containing six bells ; the interior is richly decorated and contains pictures and other works of art. Quarries of granite, alabaster, gypsum and limestone are wrought in the vicinity. It has manufactures of cloth, linen, leather, earthenware and glass, and a trade in the agricultural produce of the district. Pop. 6,795.

CHINCHOLLE, shan-shol, Charles Henri

Hippolyte, ip-pd-let, French journalist and novelist: b. Chauny, France, 16 July 1845; d.

Paris, 21 Aug. 1902. In the earlier portion of his career he was secretary to the elder Dumas, with whom he occasionally collaborated, and from 1872 was a member of the staff of Figaro , where he gained a reputation on mat¬

ters of passing interest. He was an extremely versatile writer, but his style is wanting in finish. Beside his one-act farce, (Oncle Margotin,* which ran 300 nights in 1870, and (Le Mari de Jeanne) (a drama in three acts) and other plays, his romances and other works include (La Plume au Vent) (1865) ; Alex¬

andre Dumas Aujourdhui* (1867); (Les

Pensees de tout le Monde* (1868) ; (Dans l,Ombre) (1871); (Le Lendemain de l'Amour) (1880); <Le Catalogue de l,Amour> (1881); (Paula, Histoire d'une Neurosee* (1888) ; (La Ceinture de Clotilde* (1884) ; (Les Sur¬

vivals de la Commune* (1884) ; (Les Jours d'absinthe) (1885) ; (Le Vieux General *

(1886) ; (Femmes et Pois) (1886) ; (La Grande Pretress* (1887); (Biographe du General

Boulanger* (1889).

CHINCHON, chen-chon', Spain, a town 25

miles southeast of Madrid. Peruvian bark was named <(chinchona,** now habitually misspelled ((cinchona,** after a Countess of Chinchon, wife of the governor of Peru in 1638.

CHINDE, Africa, a town on the only navi¬

gable mouth of the Zambezi. Here the inland steamers meet the ocean steamers of various European companies; and here, too, Great Brit¬

ain has obtained from Portugal a small piece of land called the ((British Concession,** for com¬

mercial purposes, and a residential district called the ((Extra Concession.** It is the entre¬

pot for Nyasaland and northeastern Rhodesia.

CHINDWARA, chind-wa'ra, India, a dis¬

trict in the central province of Nerbudda, situ¬

ated on the southern slopes of the Salpura Mountains. Its area is 3,915 square miles.

Large forests cover the greater portion of the country and a great supply of coal has recently been found there. In the upper part of the dis¬

trict over 2,000 feet above sea-level the climate is very mild, and it sometimes is cool enough to form ice. The annual rainfall averages about 36 inches. Pop. 517,000, of whom more than one-half are Hindus.

CHINESE ARROWROOT. See Nelum-

BIUM.

CHINESE ARCHITECTURE AND

ART. The fine arts in China are as varied in character and as rich and tasteful in design as those of the peoples most successful in art; but they are known to Europeans in a very unequal fashion. Thus the architecture of the vast country, contained in the old provinces of China, as large as the United States west of the 100th parallel, and as diversified in soil and climate, is so little known that the essays on the art written even by former residents in China deal obviously with certain very limited places only — the neighborhood of a certain city, the borders of a certain river and the like — and are, moreover, the studies of men not conversant with the construction or with the decorative buildings of any part of the world.

The history of this architecture is yet to be written. The photographs now obtainable, hav¬

ing been made during the years since 1890, open up a new world of architectural art. It is enough to say here that there exist two systems of building; the one being a framed construc¬

tion, usually of wood and capable of great elaboration, the other a solid masonry con¬

struction carried out in brick or stone accord¬

ing to the resources of the neighborhood and the cost of the building. The framed system of building is closely akin to that used in Japan; and it is there that we can best study the wooden temple-tower and the wood-framed hall of reception. As for the masonry buildings, they are often large and massive, as is well known to all who have observed the walls and gateways of the great fortified cities and the famous ((Great Wall** which protected Pekin and its neighborhood from northern invasion.

In the way of more decorative buildings less is known of the system of design, but several peculiarities may be mentioned. Thus there is a marked preference for the octagonal form in towers, and everywhere throughout the central provinces these buildings, called by the Euro¬

peans pagodas, rise above the hills and show over the groups of houses. The often cited use of the polygonal arch, that is, one with the in-trados at least many-sided instead of curved, is to be noted as indicating how much that is attractive we have still to discover. The decorative gateways (pailoo) corresponding nearly to the torii of Japan and to those edifices called toran in the peninsula of India, are often admirable designs in the way of purely decora¬

tive architecture, monumental architecture hav¬

ing no direct utility. The dwellings of the Chinese, even the palaces of the princes, do not seem to include many-storied and ponderous structures, but cover immense tracts of ground with gardens, among which stand buildings of no great height, but of a singular beauty of construction, especially in the roofs, and very richly decorated within. The dwelling-houses of the people are generally walled with brick and are not striking in their external appear¬

ance. The roof is an especial feature in Chinese art. It is commonlv built with a hollow upward curve, the result of a very interesting system of construction, with light woodwork.

This slightly concave surface covered with glazed ridge-and-furrow

tiles richly colored is an important feature in Chinese architectural composition. Painting in strong pure colors is a recognized element of external design ; and it has been truly said that the special and dis-550

tinguishing feature of Chinese exteriors is gaiety. Even the slightly-built one-story shops of the great towns are bright with vermillion and green ; and the signs, painted with the very ornamental Chinese ideographs, help in this effect.

Chinese painting reached a great develop¬

ment as early as the 8th century a.d. ; and there is every probability that it had then been a great school for several centuries. Landscape was one of its especially favored branches. While in Europe no one dreamed of landscape art for its own sake, the Chinese impressionist de¬

signers were producing admirable studies, both in color and in monochrome. Some few of these are in European museums, their authors and dates having been fixed by careful com¬

parison, but the much more modern Japanese landscapes, in painting, monochrome and woodcut, are the best material from which to gain a general idea of that ancient landscape art. A highly religious art was developed in the 12th century a.d. At that time Buddhist religious feeling was strongly expressed in the art of some painters, while others affected rather a kind of decorative realism, that is to say, a close observation of natural objects used to inspire and to influence a highly decorative system of design. These paintings have been little known to Europe, because they are preserved in tem¬

ples and almost inaccessible palaces ; and again it is Japan which has opened to us, through her own art, a knowledge of the older arts of China. A few ancient paintings known to Europeans are of surprising interest; and they open up to us a whole system of design in form and color on the flat surface, which the West is now studying, much to its own advan¬

tage. The paintings best known to us are of some purely decorative character, those on por¬

celain having attracted the attention of Europe ever since the 16th century. These paintings are closely connected with the system of inlay which in the form of cloisonne enamel (see Enamel) is another of the great art industries of China. The porcelains affect a more close and careful study of the natural forms in flow¬

ers, trees, costume of figures and the like, whereas the enamels are more severe and are confined more closely to the making of ad¬

mirable patterns ; but the two systems differ only as one and the same artist might change his style according to the material and demands upon him. A similar method of decoration by the free use of natural forms, conventionalized but still retaining much of their character, is seen in the splendid embroideries which have been little known to the West until within a few years. The textile fabrics of China — silks, brocades and velvets — have been known to collectors for many years, but very few national museums have provided themselves with any number of them : they present an inexhaustible treasure of beautiful design in strong and posi¬

tive colors. It may be stated here that brilliant color is a specialty of the Chinese artist.

Where, as in a fine cloisonne enamel, a Jap¬

anese artist works in dark and sombre colors, the. Chinese will use a sky-blue ground, upon which an elaborate pattern is carried out in deep ultra-marine blue, violet, reddish-gray, dark green, apple green, vermillion, bright yel¬

low and white, with dividing lines of gilded metal, and many passages of gradation from one color to another. No people have equaled the Chinese in the decorative use of bright, pure colors.

Sculpture in the sense of a grand and per¬

manent art of form is less the business of the Asiatic artist than painting, or than decoration properly so-called. Sculpture in the form of carving in ivory and wood and bronze figures of small size has alwrays attracted great atten¬

tion in China and has reached an extraordinary state of excellence in spirit, movement and skil¬

ful composition. Thus, a bronze figure will express perfectly the character and the senti¬

ment of the occasion, while yet losing nothing of its sculpturesque value ; and a group of ((The Seven Wise Men55 seated around the trunk of a bamboo will be rendered in cheap glazed pottery or in minutely carved ivory with equal skill and at a price proportionate to the labor expenses and the prime cost of the material.

The ivory group may have cost, when new, a hundred times as much as the piece molded in clay, fired and then glazed and painted, but it is not on that account a finer design, the characters are not more perfectly expressed nor the attitudes of the figures more forcible or more harmonious with each other. This is a great evidence of an old traditional skill of sculpture excelling in the larger as well as in the smaller scale of work. Relief sculptures, especially those in wood, in soft stone and in the surface of lacquer, which has generally a wooden background prepared to receive the impressed and sculptured coat of the viscous material, are as effective for their decorative purpose as are the sculptures in the round.

Finally there must be mentioned the lapidary's art, in which the Chinese have always excelled, for the most marvelous carvings in agate, jade and rock crystal, that is to say, in the hardest materials known, are unmatched in the world, and they are as artistically perfect as the carv¬

ings in the softer stones ; their essential charac¬

teristics perfectly understood and always ob¬

served. The conventional way of rendering in hard material the most delicate leafage and sprays of twig and blossom is perfectly main¬

tained ; and the brilliant polish which is one of the beauties of these carvings is carried through beneath those delicate undercut sprays.

Bibliography. — There exists an extensive literature on Chinese art, much of it contem¬

poraneous with the great art epochs, by Chinese writers and inaccessible to Western readers.

The following works are of recent date and deal with some phase of Chinese art: Binyon, (The Flight of the Dragon5 (London 1911) ; id., dainting in the Far East5 (ib. 1913) ; Boersch-man, die Baukunst der Chinesen5 (Berlin 1911) ; Bushell, (Chinese Art5 (2 vols., Lon¬

don 1904—06) ; Chuta Ito in (The Kokka,5 Nos.

197, 198; Chavannes, (La sculpture sur pierre en Chine au temps des deux dynasties Han5

(Paris 1893) ; Cram, <(Chinese Architecture55 in dictionary of Architecture and Building5

(New York 1902) ; Fenollosa, (Epochs of Chinese and Japanese Art5 (ib. 1912) ; Fisher, ((Chinese Art55 in (Repertitorium fur Kunstwis-senschaft5 (Vol. XXXV, Berlin 1912) ; Giles, (An Introduction to the History of Chinese Art5 (Shanghai 1905) ; Glaser, die Kunst Ostasiens5. (Leipzig 1913) ; Hirth, dremde Einfliisse in der chinesischen Kunst5 (Munich 1896) ; id., (Scraps from a Collector's Note-CHINESE ART

UQfr*r&JV'

- !k v -P,TA

ig|-§i#s

J i¥4

1» 1 1 .,

r ˆ

m

L -rjg

7 -

j •% j\

As ■

T » ‘ **

FW

*•

1

1. Enameled copper plate. 2. Porcelain Vase (Siwen-te, 1426-1436). 3. Painted Screen. 4. Porcelain vase (Ming, 1368-1644). 5. Snuff-jar of green paste. 6. The WarvOqd. .Kwan-ti, in porcelain. 7. Tea-pot of terra¬

cotta.’ 8. Embroidered altar-cloth. 9. Silk embroidery. 10. Hair-pin.

✓

book: Notes on Some Chinese Painters) (New York 1906) ; Miinsterberg, (Chinesische Kunstgeschichte) (2 vols., Esslingen 1912) ; Sei-ichi Taki, (Three Essays on Oriental Painting) (London 1911) ;

Stein, (Ruins of Desert Cathay* (ib. 1912).

Russell Sturgis,

Author of (Dictionary of Architecture .*

CHINESE CERAMICS. Until a little

over a generation ago the foreigner in China found it both difficult and dangerous to person¬

ally investigate the inside conditions pre¬

vailing in that country's ceramic industry. The technique and history of China's wares, there¬

fore, remained a mystery to Westerners, and written evidence was largely erroneous if not supposititious. The pottery and porcelain pieces themselves, in museums and private collections of Europe and America, were the main source from which to gather information. Pere d'En-trecolles (a Jesuit priest) sent some letters home (1712-22) containing remarks concerning some technical processes used in preparing the different clays, glazes and colors. Julien's trans¬

lation (published 1856) of the Chinese work en¬

titled (Ching-te Chen t'ao lu* was scholarly, but, failing to have expert knowledge of the technique of ceramics, he misinterpreted terms and led future writers astray. Franks (1876) aided much with his classification and intelli¬

gent system; Dr. S. W. Bushell's (Oriental Ceramic Art) (1899) revolutionized the field of knowledge on the subject. Cosmo Monkhouse's (History and Description of Chinese Porcelain) (1901) assisted the work. Then came a translation of the 16th century (Album of Hsiang Yiian-p'ienP The result of the life residence of Captain Brinkley contained in his voluminous work <China) (1906) afforded further insight into the facts. But, greatest factor of all in deciphering the mysteries of Chinese ceramics was the founding of the Chinese republic. Access to the many sources of reliable information

have lately become com¬

paratively easy; internecine warfare induced many wealthy natives to part with treas¬

ures which in times of peace none could purchase. The opening up of railroads has laid bare large numbers of buried pieces of fictile art through excavation of graves cen¬

turies old. With our present knowledge we can not only decipher the characteristics and his¬

tory of wares back to the Sung Dynasty (960-1280), so long hoped for, but we have an in¬

sight and productions of the T'ang Dynasty (618-906) wares in undreamed of splendor.

The following meanings of several Chinese terms used in ceramic lore will aid to a better understanding of the subject: The body or paste of Chinese porcelain (hard paste), termed tz'u, is composed of kaolin, a native weathered pegmatite (silicate of alumina), which is very refractory, and petuntse (or pe-tun tz'u), a fusible, finely comminuted clay, derived from the same felspathic rock as the kaolin. Both are products of decomposed granite. The glaze (termed yu) which covers the porcelain body is also composed of petuntse, but all Chinese glazes contain some proportion of lime to in¬

crease the fusibility of the petuntse; it is the lime which gives the tinge of green or blue characteristic of Chinese porcelain, besides con¬

ducing to the brilliancy of the glaze. The Chinese term for earthenware, as differentiated from the fused porcelain and stoneware body, is wa. The finished product of the kiln is known as yao (similar to our term ware). Thus Kuan yao is ˆImperial ware® (Kuan meaning Imperial), and Sung Kuan yao is the Imperial ware of the Sung Dynasty. Ting yao is the ware produced by the kilns at Ting-chou, or wares of the Ting type.

Early Chinese Pottery. — The earliest

pieces of Chinese fictile ware come to our knowl¬

edge are an imperfectly baked earthenware with a green or thin yellow glaze (sometimes un¬

glazed). They belong to the Han Dynasty (206

b.c.-220 a.d.) . By the time of the T'ang (618—906 a.d.) the potter's and all other arts were flourishing, and most beautiful forms had come into being. In Shosoin, the noted storehouse at Nara (Japan), are hard pottery vessels with beautiful blue, yellow and green glazed orna¬

ment on a bare body, others have green and o'range glaze. They belonged to the Japanese Emperor Shomu, whose belongings were stored there on his death (749 a.d.). These pieces have enabled connoisseurs to identify confidently such pieces in their possession as examples of the T'ang Dynasty and, therefore, made before the middle of the 9th century a.d., yet perfect as to form, potting and glaze. Life-size figures and statuettes in this early pottery also are ex¬

tant, beautifully sculptured. Berthold Laufer's researches into examples taken from tombs of the Han period (206 B.C.-220 a.d.) in this century show an earthenware usually having green glaze.

Recent excavations on the Pien-Loh Railway have, practically, crowded the Peking market with pieces, probably dating back as far as the Han period — Han wa. Altogether we are now fairly assured of the following facts.

Ching-te Chen pottery kilns became famous early in the 7th century, under the name of Ch'ang-nan, with the Imperial Court patronage ; the ware was termed (<Ceramic Jade® (T'ao Yu). But, during the Wei Dynasty (220-265) the Tung-ou kilns produced refined ware. In the T'ang Dynasty (618-906) Shou yao (yel¬

lowish ware) was made in Anhui province; Yueh yao (greenish ware), Shu yao (white ware of Sau-chuan), Pi-se yao, or <(secret color®

ware (for Imperial use only), belong to these T'ang pieces. The process of ((marbling® was also used in T'ang yao. But the finest ware prior to the Sung Dynasty was the noted Ch'ai yao, made middle of the 10th century. It was (<sky color, mirror clear, paper thin, reso¬

nant, glossy,® *etc.* T'ang ware was of (<plaster-like® body and ran from faience to stoneware, even to true porcelain. Soft lead glazes were used colored with metallic oxides, to green, purplish brown,

blue, amber. Some ware has felspathic glazes in white, brownish green, chocolate brown, purplish black, ((tea-dust®

green; some have ((frothy® patches, same as Sung ware, in gray or bluish gray. Ornament is mostly incised with a point, or stamped or carved low relief. Colored glaze fills in the cavities.

Sung Dynasty Wares (960-1280). — This

period is called the Golden Age by the Chinese.

Court patronage brought successful potters into the artist class. Sung wares were as follows : Ting yao, made at Ting-chou (in the North) first, then moved to Ch'ang-nan (South), the present Ching-te Chen. Yu yao , made at Yu-chou; Kuan yao, made at K'ai-feng Fu; Lung-552

ch'uan yao, Chun yao, Chien yao. There were also a number of minor kilns. Ting yao was a ((semi-porcelain® ,and has been called Mather of our white porcelain.® It was covered with a glaze thicker and less transparent than later porcelains, and its soft appearance has caused it to be erroneously termed by Westerners <(soft® porcelain. Dillon calls it ((kaolinic stone¬

ware.® Forms, at first, were copied from bronze vessels. Product was: Plates, saucers, wide¬

mouthed bowls, etc., Often, being baked in¬

verted, foot is glazed but rim bare. Rarely crackled. Some pieces plain, others have molded relief peonies, phoenix, day lilies, scroll¬

work, ((key® pattern, *etc.* The Yuan Dynasty, following the Sung, contained the same wares, evolving little new. Forms of these dynasties are bold. Some pieces show ornament painted in red, blue and green enamels, but carving, molding and incised work are most frequent, depending on beautiful opalescent felspathic glazes. In a study of these early Chinese wares it must be borne in mind that the main inspira¬

tion of the potter was to make from clay the closest possible imitation of jade — the most precious stone of the Celestial. Hence we get these glazes of opalescent (((tallow-fat®) depths of faint greenish yellows, yellowish blues, *etc.* ; they are the celadons. They are the ultima Thule of present-day collectors.

Chinese Porcelain Period. — In discussing Chinese porcelain we must always have the clear understanding that there are three oven heats entering into the <(firing.® First there is the grand-feu (1,350° Centigrade) heat needed to create a vitrification of kaolin and petuntse, producing the porcelain body and glaze, and fusing the underglaze colors. Next comes the demi-grand feu obtained by placing pieces in those parts of the oven which have the least heat. Lastly there is the muffle oven heat (from 830° to over 1,000°) which fuses the enamel colors to the surface of the already baked ware.

Ming Dynasty (1368-1644). — Kaolinic

(felspathic) wares had been made (7th cen¬

tury) long prior to actual porcelain. These, usually opaque, are at times slightly translucent and resonant, but are classed as stoneware. A true porcelain, of mediocre quality, was made by the 10th century (Sung Dynasty), and blue-under-glaze decorated pieces were produced in the 14th century (Yuan Dynasty). But it is to the Ming Dynasty we must look for the first real supplies of true porcelain. The Ching-te Cheng kilns had become now so numerous and important as to leave all others forgotten.

These potters favored blue-and-white and poly¬

chrome decoration. The ((classic® types fall into the 15th century. From Yung Lo's reign (1403—24) we get white bowls extremely thin and translucent; the decoration is incised or trace*!

with fine slip (liquid paste). The finer ex¬

amples extant are the noted so-called <(egg-shell,® the t'o fai ((<bodiless®) of the Chinese connoisseur. The decoration is unnoticeable unless held up to the light, and it is almost paper thin. Few of the many similar pieces extant can date so far back. In the Hsiian Te period (1426-35) we find the Hsien hung (ftbright red® or

((rouge vif®) transmutation glaze. Few examples of this exist, even in China. It is similar to the later Lang yao, the Western collector's sang de bceuf. The Pao-shi-hung (((precious stone red®), is also trans¬

mutation glaze and likewise derived from sili¬

cate of copper. The next important period is the reign of Wan Li (1573-1619). More speci¬

mens of this period are extant than probably any other of the Ming reigns ; mostly blue-and-white. The wonderful ((Mohammedan® blue of former periods was no longer procurable and we notice the blue has acquired a purplish tinge.

Extant are some boxes for holding cakes, sweetmeats, *etc.* ; they are oblong, square, round and have mostly dragon designs in dark blue. Shipments are now being made abroad and pieces show frequently hurried workman¬

ship of export ware already. The body is white and termed ((unctuous® ; glaze is lustrous but bluish. The kilns of Yi-hsing were turning out a reddish yellow or brown earthenware; it is the ware known in Europe at that time as <(boccaro,® and has relief decoration, like other wares of this period. Relief and pierced work in combination are found. Large polychrome jars show raised outline designs, carved and filled in with demi-grand feu glazes (turquoise, violet, purple, yellow, green). Flat wash dec¬

oration appears in san ts'ai (three-color) —green, yellow, aubergine. Red underglaze in various tones is used now. Enamel overglaze decoration is done largely; a characteristic of this reign being enamel decoration in combina¬

tion with underglaze blue. Marked mono¬

chrome Wan Li pieces are rare. The last three emperors of the Ming Dynasty are not men¬

tioned in Chinese ceramic works, and what wares we know of are inferior; of coarse body, crude design, impure colors. China had serious internal troubles and potters were not patron¬

ized by the wealthy.

Ming glazes were thick and usually applied before baking. Foot rims are plain, without grooves or beading as later on K'ang Hsi wares.

Body is close grained, white and fine texture; the edge of the foot is bare of glaze and the baking has given it a brown color. Ming vases have thick, massive body; forms favor ((double gourd,® square body and gourd-shaped neck, bottles of globular body and tapering neck, melon-shaped pots with lobed sides, ovoid jars.

Other pieces are barrel-shaped garden seats, porcelain plaques for furniture inlays, screens.

Dishes have saucer-shape usually.

The noted Fukien or Te-liua white porcelain ware was made at Te-hua Hsien. It is the blanc de Chine of the collector. Body is clear white, very translucent, and has satin-like glaze of a cream or ivory whiteness. Many of the old examples exist, including statues of Kuan-yin (goddess of Mercy), Kuan-yu (god' of War) ; Bodhidharma (Apostle of the Bud¬

dhists), Manjusri (Buddhist Trinity), *etc.*

Some pieces have nothing but their plain charm of delicate body and glaze to show; others have incised designs ; others again have high relief decoration, such as plum, dragons, phoenixes.

The latter variety are the least valuable. This ware was made till late into the 18th century and is recently being again reproduced.*

Ch'ing Dynasty (1644-1912).— Little of in¬

terest occurred until the reign of K'ang Hsi (1662-1722). This is the greatest period in Chinese ceramics; it is also the most prolific.

Three-fourths of the Western collections belong to this period. The wonderful Lang yao ware was produced at this time. The red is the

1 and 2 Flower Pots

Phiin Ware 3 Tomb Vase. T’ang Period (618-906) 4 Celadon Vase (crackled), Ming Dynasty (1368-1644) CHINESE CERAMICS

sang de bceuf so greatly prized by Western collectors. Derived from copper oxide, the secret of production of this marvelous brilliant red glaze has been lost. In spite of the wonder¬

ful control these potters had over the oven’s heat, no two pieces of this ware are alike. The green tinged glaze is most desired by native connoisseurs. Other noted glaze colors were : She p’i Hi (snake-skin green), shan yu huang (eel yellow), chi ts’ui (turquoise), huang pan ticn (spotted yellow). Their monochrome yel¬

low (chiao), brown or purple (ten), green, souffle red (ch’ui), and souffle blue were beauti¬

ful. Most honored, generally, by the Western world were the blue-and-whites. The Kai-pien-yao or so-called soft paste blue decorated ware has been called a ˆmasterpiece.® Another marvel of art and technique is the hard-paste porcelain ˆegg-shell® ware, thin as paper, nearly as translucid as glass and of wax-like body.

Another greatly admired blue-and-white is the ˆhawthorn pattern® (plum blossom), the Mei-hwa-yao. The blue is perfect in lustre, depth and purity. The Dutch and the West India companies carried immense quantities to Europe, mostly a second ((export® made-to-order quality of considerable beauty, but the highest class pieces are also found. It was the time of specialization, when one man painted trees only, another animals alone, another ruins, and speed was demanded of the ((export® qualities. The pictorial designs used were innumerable, from court scenes to mythological subjects and flowers. The <(hawthorn pattern® was favored for ((ginger jar® shapes. Reserve panels were used for romantic scenes and domestic figure subjects, *etc.* All this blue-and-white is under¬

glaze (cobalt) blue.

China's steatite (soapstone) porcelain has great repute in this period. It is the so-called ((soft® porcelain of Western collectors. The substitution of soapstone for kaolin produced a wonderfully light body with a (<vellum® sur¬

face just adapted for the delicate, miniature¬

like, brush work paintings done on this ware.

Some K'ang Hsi polychromes consist of under¬

glaze blue, red and clay slips and glazes (such as ((Nanking® yellow, baked in the grand-feu in one process. An underglaze red, from cop¬

per oxide, was revived from early wares, and assumes irregular effects in the firing: ma¬

roon, sang de bceuf, even (<peach-bloom® variega¬

tions. An underglaze red style of painting was done now. Another style of polychrome

decoration was done in washes of different glaze colors. The "three-color group® (under¬

glaze transparent green, yellow and aubergine) was continued from the Ming style. This same san t'sai (three-color) combination was also done in muffle (enamel) colors.

Certain similarity in color combinations of Chinese wares led the French connoisseur, Jacquemart, last century to group them into ((families® ; thus we get the famille noire, famille verte and famille rose wares. The first is done by overlaying a dull black pigment with transparent green enamel washes, producing a greenish black. The lead of the green flux creates some iridescence on the surface. In this ware we have statues of Buddhist and Taoist deities, demigods, sages and Chinese native figures. In the famille verte group we have combinations of underglaze blue with the onglaze san t'sai (three-color) and the coral red (iron oxide). The tracing of the design in brown black, all covered with green, forms one type of this <(family.® In another an over¬

glaze blue takes the place of the underglaze.

Famille verte is costly and highly prized — even those pieces which are second rate. The motifs are traced in with red or brown black outline and the spaces filled in with washes. The beautiful apple green used is a characteristic of K'ang Hsi pieces. Sometimes the red and blue are absent. Touches of gilt occur.

K'ang Hsi monochromes are numerous. We

find the pale yellow (<(husked chestnut®) on white glaze. The American's "peach bloom,®

the Chinese pin-kwo-ts'ing, is a pale red be¬

coming pink in some parts, mottled in others, with russet spots displayed on a background of celadon tint. It is a grand-feu transmutation effect in underglaze, and is a "sport® or freak demonstration. Blue monochromes are in¬

numerable in this period, such as the "bleu souffle,® applied by insufflation ; most noted, however, is the <(mazarine® (dark) blue; the turquoise or ((kingfisher® blue (fei ts'ui) is another. The green monochromes about equal the blues in number : ((Apple,® <(leaf ,® "cucumber® (Kua p'i lii) greens are famous.

Yung Cheng Period (1723-35). — The

product of this reign is highly refined. In it we find the well-known "armorial china,® certain sets of ware decorated with the coat of arms of the European and American owners. They have caused much trouble and discussion among collectors through the writer Chaffers errone¬

ously attributing the ware to the English town of Lowestoft. Even to this day, after full proof of its being of Chinese manufacture it is often termed "Sino-Lowestoft.® Snuff bottles of this and the next reign are scarcely equaled and are highly prized. The paste of this reign is whiter, less blue than former periods. Under¬

glaze red .(yu li hung) painting is much used, some combined with the underglaze blue.

Greatest of monochromes now is the wonderful famille rose ware, in (<egg-sheli® saucers, dishes, plates, coffee and tea services of lovely finish.

The ((rouge red® and ((ju-jube red® (derived from gold) and pinks are admired the world over and pieces are costly. The delicate color is imposed on the back of the ware, and im¬

parts an incomparable effect with the white upper surface of these “rose backs® and ((ruby backs.®

Chien Lung Period (1736-95). — Mono¬

chromes follow former periods, including blue-and-white (often running to archaic bronze forms). To this reign belong lavenders, clair de lunes (celadon), violets, souffle and plain blues and a deep lapis lazuli. The common blue has a poor dull indigo tinge. The potters of this time showed their wonderfully expert powers in “reticulated® and other open wTork on perfume boxes, lanterns, insect cages, spill vases, *etc.*

“Rice grain® (grains de riz) pattern was done on the body by small perforations filled in with transparent glaze. By covering tjhe surface with black lacquer and inlaying patterns with mother-of-pearl the potters produced their lac burgaute ware. The powerful European in¬

fluence exerted during the last two reigns created a bastard ware of degraded European design in Chinese paste. The later porcelains are not of art interest. A peculiar ware is that known as ((clobber.® It is decorated porcelain

ware made in China on which the Western painter has “improved8 the underglaze designs with overglaze decoration and some gilding.

Bibliography. — Brinkley, Captain, (China) (Vol. IX, London 1906) ; Burton, W., ‘Porcelain) (London 1912) ; Bushell, S. W., (Chinese

Porcelain, Sixteenth Century > (a translation from a Chinese MS., Oxford 1908) ; Bushell, S. W., (Chinese Porcelain before the Present Dynasty* (Peking, 1886) ; Bushell, S. W., description of Chinese Pottery and Porcelain) (a translation of the T'ao shuo, Oxford 1910) ; Bushell, S. W., (Oriental Ce¬

ramic Art* (Walters Collection, New York 1891) ; Bushell, S., W., 'Chinese Art* (London 1909) ; Dillon, E., <Porcelain) (New York) ; Franks, A. W., Catalogue of a Collection of Oriental Porcelain and Pottery) (London

1879) ; Grandidier, E., (La Ceramique Chinoise) (Paris 1894) ; Gulland, W. G., (Chinese Porcelain) (London 1902) ; Hirth, F., 'Ancient Porcelain) (Leipzig 1888) ; Hobson, R. L., 'Chinese Pottery and Porcelain) (New York 1915) ; Hobson,- R. L., 'The New Chaffers*

(London 1913) ; Jacquemart, A., and E. Le-Blanc, 'Histoire de la porcelaine* (Paris 1862) ; Laufer, Berthold, 'Chinese Pottery of the Han Dynasty* (Leyden 1909) ; Monkhouse, Cosmo, 'A History and Description of Chinese Porcelain) (London 1901) ; Muensterberg, O., 'Chinesische Kunstgeschichte) (Esslingen a/N

1910-12).

Clement W. Coumbe.

CHINESE EMPIRE. See China.

CHINESE-FIRE, a pyrotechnic composi¬

tion, consisting of gunpowder, 16; nitre, 8; charcoal, 3 ; sulphur, 3 ; cast-iron borings (small), 10.

CHINESE GLUE, a superior glue and

varnish, obtained from a species of Algce which abounds on the shores of China. When once dried it resists the action of water, and is used by the Chinese to fill up the lozenge-shaped interstices in the network of bamboos, of which their windows are frequently constructed, as well

as to strengthen and varnish the paper of their lanterns.

CHINESE GORDON. See Gordon,

Charles George.

CHINESE GRASS, CHINA GRASS,

RHEA or RAMIE FIBRE. See Ramie.

CHINESE HEMP. See Corchorus.

CHINESE IMMIGRATION. Until the

California gold discoveries of 1848 there were literally no Chinese laborers in the United States. From 1840 to 1850, according to the records of immigration, only 35 came over, and those all in the year from June 1849 to June 1850. During the next decade 41,397

Chinese came to the port of San Francisco, of whom about 6,500 returned to China, leaving the net Chinese population in 1860 34,933, nearly all in California. For some years the general feeling continued to be favorable, as labor was dear and domestic service almost impossible to obtain ; and the Chinese laborer, and above all, the Chinese house servant, seemed to make in¬

dustrial progress and lives of refined leisure possible. In 1858 the Reed Treaty was nego¬

tiated, and no restriction was placed on immi¬

gration. In 1862 the California legislature ap¬

pointed an investigating committee on the subject; but it was still felt to be only a local nuisance, not calling for any hasty or severe measures. Even as late as 1868 the Burlingame Treaty with China, though reprobating enforced immigration (coolies under contract), asserted the right of migration to be inherent in the human race; and on 27 July 1868 a special resolution of Congress, in response to anti¬

immigration measures in the East, repeated this assertion as to the right of human beings to expatriate themselves, and declared that its restriction was contrary to the fundamental principles of the republic. This meant Euro¬

pean immigration ; but it proves that even then the Chinese question had not become acute enough locally to force California politicians into making it a national issue. Within a few years after this, however, it was not only the burning issue of the Pacific Slope, but had emerged into the national arena. Those who saw the excessive strain placed on democratic institutions by ignorant European immigrants, ultimately assimilable, were appalled at the prospect of operating them among a huge un-assimilable and purchasable brute-vote on the Pacific Slope. If they were made voters, they would force a permanent political division on the lines of race; and if not, would form a dangerous anomaly and nuisance in the republic.

Thus, white industry, order, sanitation, public morals and statesman-like forecast united in the conviction that this class of immigration must be prohibited or severely restrained. These valid objections and fears were reinforced by others, unsound or exaggerated. The numbers arriving were vastly swollen in popular imagi¬

nation, and the departures suppressed. The actual number of Chinese in the United States in 1870 was 62,376, an increase of some 27,000

in 10 years; 69,298 had come over within 10

years, and 34,850, or over one-half, had gone back.

After attempts at restriction by local legisla¬

tion, which were invalidated by the Federal courts as in violation of United States treaties, California appealed to Congress for a national law ; but that body evaded the question till 1876.

Then the exigencies of the Hayes-Tilden cam¬

paign compelled both parties to bid for Cali¬

fornia's electoral vote by anti-Chinese planks in their platforms; and Congress (the House, 6

July, the Senate 17 July) appointed a joint special committee to

investigate the subject. It met at San Francisco 18 October, heard a mass of testimony and made a very voluminous re¬

port, taking the strongest ground in favor of a restrictive law (Senate report 689, 44th Con¬

gress, second session, 27 Feb. 1877). At this time the Chinese population was about 100,000.

Nevertheless, . the party pledges were not re¬

deemed in Congress till 1879, when on 20 March such a bill was passed; but it was vetoed by President Hayes as being in conflict with the Burlingame Treaty. In 1880 a commission was sent to Peking to negotiate a new treaty per¬

mitting the restriction. This treaty, signed 17

Nov. 1880, ratified by the Senate in ’March 1881, gave the United States the power to “regulate, limit, or suspend8 the immigration of new Chi¬

nese laborers, but not to prohibit it altogether; permitted laborers already in the country to remain and travel to and from it at will; and allowed Chinese merchants, students, teachers or travelers to exercise their functions without CHINESE LACQUERWORK — CHINESE LANGUAGE

molestation, each class to have all the privileges and advantages of the most favored nation.

(The Chinese population here in 1880 was 105,465). Under guise of giving effect to this treaty, Congress, in March 1882, passed an act suspending Chinese immigration altogether for 20 years. This was vetoed by President Arthur on the ground that so long a suspension was virtually absolute prohibition, and not in accord with the spirit of the treaty. On 6 May another bill was passed to meet this objection, suspend¬

ing fresh immigration for 10 years, both of skilled and unskilled

laborers, permitting those already here to remain, but forbidding their naturalization. The provisions of this act were minutely severe. The exempted Chinese must have certificates of identity issued by the Chi¬

nese government, and the only Chinese laborers who could be permitted to return after once departing were those who had a living wife, parent or child in the United States, or $1,000

worth of property, which was made answerable for their default.

This was <(amended® on 1 Oct. 1888 by the Scott Act, striking out all permission to return for any purpose, forbidding the issue of return certificates and declaring all that wete issued void, — in a word, absolutely barring America to any Chinese workman once outside it. A treaty was at this time pending between the United States and China by which the Chinese govern¬

ment was to prohibit the emigration of laborers and the United States was to protect those in the country from violence, which it had shame¬

fully failed to do, but the Scott Act enraged the former government, and it refused to ratify the treaty. On the expiration of the 1882 act in 1892, the <(Geary law® of 5 May extended it for another 10 years, with further severities, not called for by any dangers at hand. On 7

Dec. 1894 a convention with China restored the conditions of return to the status of 1882. On 3 March 1901 it was enacted that a Chinaman can only be arrested under these acts on sworn complaint of certain specified United States officers. In 1902 the exclusion was re-enacted for another decade. With the general intent of these acts there is little difficulty in concur¬

ring; but some of the provisions, and the petty acridity of their execution, exhibit a spirit of panic which is neither dignified nor sensible. The volume of the immigration is the very essence of the danger; if it is insignificant it is harm¬

less. The Chinese population in 1890 was 107,488; in 1900, 89,863; and 71,531 in 1910. In 1915 the District Court of Montana (223 Fed.

Rep. 801) and the Circuit Court of Appeals of New York rendered decisions which in effect assure to Chinese students in the United States (in accordance with existing treaty rights) con¬

tinuance of privileges accorded the subjects of the most favored nations.

CHINESE LACQUERWORK. See Lac¬

quers AND LACQUERWORK.

CHINESE LANGUAGE, The. Among

the oldest of human scripts, the Chinese system of writing has -had an astonishing effect upon the life and structure of the language itself.

It has conditioned largely the development of both the native speech and the written form of the vernacular, making the acquisition of Chi¬

nese one of the most easy, and yet the most difficult, in the linguistic field. There is, apart from syntax, virtually no grammar. From one point of view Chinese is the unaltered baby -talk of mankind, fixed, too early in its history, by writing. This, while allowing for endless de¬

velopment in forms visible to the eye, has robbed the soil and closed the avenues of growth to what meets the ear. The whole language, spoken and written, consists of rudimentary monosyllables, each intended to represent a word or thing. It is true that these are often com¬

bined to make compound words. Various other devices have been elaborated, which enlarge the powers of conception and expression, while ex¬

panding the field of description. These verbal combinations, and especially the compound writ¬

ten forms, appeal powerfully to the mind through the eye. The striking characteristic in the Chinese and Turanian languages is the unchangeability of the root, the reverse of the case in Semitic and Aryan languages. The meaning of a word is determined, not by giving it a name as a ((part of speech,® nor by inflec¬

tion, or terminology; but wholly by its place in the sentence. The same character may serve in manifold forms as noun, verb, adjective, ad¬

verb or other part of speech. To the native, or expert scholar, this is not so difficult, for the notable device of using auxiliary words is constant and universal. There are hundreds of these words, which, having long served as more or less correct conceptions of things, according to their shape, size, use, nature or relation, act as so many ready-made agents of classification.

The categories which they suggest or furnish enable the Chinese to extend the powers of both thought and language, and on perception of a new idea or object, at once to catalogue or classify the novelty, whether native or for¬

eign, when first presented to the mind. Where we say 50 (<head® of cattle, a ((flock® of sheep, a (<brace® of partridges, or a <(span® of horses, a few tens of times, the Chinese employ these aids to memory and classification in hundreds of instances. It seems clear that, as concerning the luxuriance of the written characters and the comparative poverty of the sounds of the spoken vernacular, nature's law of compensation has been strikingly illustrated. Not a few sounds in vogue in ancient times — as for example, those in the classic poems and old rhyming dic¬

tionaries show — have been lost; while of the written characters or logograms, at least 25,000

words are still in use, and the Great Dictionary of Kang Hi in the 18th century contains 44,449.

It is quite possible, counting obsolete words and remembering the great demands made by the modern age, that 80,000 characters may be legiti¬

mately considered as in the Chinese repertoire.

Since the recent revolutions and the establish¬

ment of a republic, Chinese editors, writers and government departments have found in the word-coinages and character-combinations of the Japanese a rich addition to the resources of both speaker and penman in China. Beginning as early as 1870, the literary men of 'Japan, who used the script of China, and not a few of whom were at home in the Chinese classics, began, from the storehouse of the past, to mint new expressions for Occidental and modern ideas and things. These, after trial and long use, have been accepted in China. Thus a rich infusion of terms has come to reinforce the oldest of languages, with the newest of needed additions in a mighty nation,

face to face with a new world of thought. In neither case has any modification of the syntax or structure of the two languages been sought or wrought. There are many written forms, or styles, of writing, six at least of these being long and widely recognized. While this shows the copiousness of the language, as it issues from the pen, it does but reveal also the poverty of vocables in the native speech. There is no common language of the lips in the Chinese republic, nor is there the verbal unity, such as exists even in Russia. A linguistic map of China would suggest a crazy quilt, lacking all unity. The <(mandarin dialect,® so-called, comes nearest to being a standard spoken language, and possibly offers a ground plan, on which the hoped-for future linguistic unity of the Chinese republic may become a possibility. This speech of educated men, especially of officials and those who travel, has even been under lit¬

erary cultivation and is an excellent medium of thought. Hardest of all for foreigners is the mastery of the Honest By means of the device of uttering the same sound in various vocal forms, depending chiefly on pitch, the same word or sentence is made to bear widely differ¬

ent meanings and to effect varied purposes. Yet this is one of the devices tending to pauperize the spoken language, even wrhile eking out the popular resources of sound, and to expand the written language. With a stick on the sand or earth, or with pencil or paper, educated natives of various lands, under the Chinese world of culture, can converse all day; even when the opening of their lips means instant confusion, the. eye, in this case, having supreme advantage over the ear. The writer has often been amused, while among his Oriental friends, at the discussions consequent upon his interro¬

gations put to them. Controversy might run high owing to the paucity of sounds and the very large number of homophones (from five to a thousand, or more, characters, to express one sound). When no pen, pencil, blackboard and chalk, stick and earth were at hand, under¬

standing and final settlement were reached by using the forefinger of one hand as the chalk, and the palm of the other as the blackboard, so to speak, in order to give something like graphic visibility to the

argument or answer. One can quickly tell what a spoken word means, when he sees the characters with which it is written, but otherwise has more or less difficulty. Some amusing blunders in foreign books, especially those of tourists, have arisen from lack of knowledge of the ideograph. To reduce the mass of written words into categories of thought, the ancient tables of 514 radicals, or root-ideas, have been grouped under 214 heads.

Knowing these — and every mature pupil is expected to have them by heart — a bright learner quickly discerns in a new character the basic idea. Then, according to his education, culture, imagination and experience, he can recognize'a meaning new or old, or dissect a sen¬

tence. Such knowledge serves very much, as with us, as a classical education does helping one to dissect new or unfamiliar words. Un¬

doubtedly, in its origins, the Chinese language was hieroglyphic, each character being meant for a picture of the object represented — as in the still recognizable forms for moon, sun, field, *etc.* Ages ago, however, all such vestiges passed from sight. The invention of the hair pencil, in place of the stiff stylus, and the necessity of holding the pen and paper in the manner now common, revolutionized the old form of script. The ((grass character® or running hand, completed the separation of idea and form. There is thus no alphabet in China, though in modern days 26 or more characters have been selected and arc used arbitrarily for their phonetic value only and chiefly to trans¬

literate foreign names. In modern days, also, some progress has been made, chiefly by mis¬

sionaries, in Romanizing the colloquial in vari¬

ous provinces. Among prominent educators, chiefly American, plans are under way for a reform of the diversified scripts of China, Korea and Japan. While all three have a common basis of inheritance and culture, yet they differ in their written forms. The three ways of expressing thought, in writing, are thus found in adjoining countries, — the ideograph, or logogram (China) ; the syllable (Japan) ; and the true phonetic sign, or alphabet (Korea). There seems no insurmountable obstacle — while leav¬

ing the vernaculars of the three countries un¬

touched — toward the creation of one standard system of writing, as in most of Europe, for all the lands which value the Chinese inherit¬

ance.

Bibliography. — Hirth, <Notes on the Chi¬

nese Documentary Style) (2d ed., 1909) ; Marsh-man, (Clavis Sinica) (Serampore 1814) ; Pre¬

mare, (Notitia Linguae Sinicae) (Malacca 1831; Eng. trans., by Bridgman, Canton 1847) ; the grammars of Martin (Shanghai 1863), Julien (Paris 1870) and Schott (Berlin 1857) ; the dic¬

tionaries of Giles (Shanghai 1892; 2d ed., 1912), Eitel-Genahr (Hongkong 1910), and Watters, (Essays on the Chinese Language* (Shanghai 1889).

William Elliot Griffis,

Author of (China's Story in Myth, Legend, etc?

CHINESE LANTERN, a lantern made of

thin paper, usually variously colored and much used in illuminations.

CHINESE LITERATURE. In this article

we propose to sketch the history and treat of the influence of the literature of China in molding not only the thought and character of the Chinese people, but also those of the neighbor and vassal nations included in the circle of Chinese culture, rather than to cata¬

logue the books or to comment upon them.

Only the great landmarks in the literary field of the centuries, and what in the present are rooted in antiquity and are true outgrowths of the same, will come under our view. The mental attitude of the Chinese author is ever upon the past, as the sure dwelling-place of perfected ideals. The typical man of China looks not upon athe judgment of posterity,®

but hopes ever for the approval of the ancients.

(<How can I face my ancestors®? is his ques¬

tion. Hence the two great systems of phi¬

losophy, the first founded upon the authority of the fathers of Chinese order, and the second upon that in which knowledge is discoverable by intuition, and resting upon reason and science. The first has had vastly greater vogue in China proper, the second in Japan. A history of the literature of China to date still awaits the pen of a native author, but the Chinese classify their literarv production under four heads: (1) The Classics of Confucius and CHINESE LITERATURE

Mencius, with the general cultural apparatus of education, such as commentaries, diction¬

aries and works that treat of language, and its contents, as the vehicles of thought ; (2) his¬

tory, including biography; (3) ethics and phi¬

losophy; (4) poetry. Other literary matter, such as fiction, romance, drama, modern news¬

papers, works of science and books of infor¬

mation are hardly recognized as literature, in the true sense of che term, or as worthy of no¬

tice by the literary critic as such. The charac¬

teristics of Chinese literature are terseness and absence of anything like obscenity or low forms of language ; while in poetry the general themes relate to the sadness of things, as shown in the abounding sorrows of life, the brevity of human existence and the beauty of nature. There is little personification, nor is there much that is infused with the idea of the personality of Deity, or the individuality of man. The Unseen Power is rather conceived of as Abstract Right, or a bundle of laws and forces ; while toward man the outlook is that of brotherhood and mutual duties. The whole literature is instinct with

the spirit of freedom and the necessity of the individual's obedience to the laws of the great impersonality and the folly of disobeying or flying in the face of heaven's decrees. China's history has repeat¬

edly verified the thesis that so long as her deathless literature animates her people, des¬

potism cannot permanently exist. The litera¬

ture of China is the key to her history. Her social system is based on her literary inherit¬

ances, and has remained intact during the 25

centuries of her recorded history, during which time over 30 dynasties have risen, ruled and been overthrown. When the scholars of China and Japan first heard of American democracy and the revolt from the tyranny of Great Brit¬

ain, then ruled by a German king, they as¬

cribed their thought and action to the knowl¬

edge which the ˆbarbarians® had, in some way, gained from the writings of Mencius ! By the native orators, in 1911, who preached and agitated for a republic, justification was sought and impassioned appeals were made to the writings of this famous commentator, Men¬

cius, who expounded the writings of the sage and gave to the text of Confucius that political significance which they have never lost. So vast and powerful in its influence is this classic literature, that it has had the threefold effect of furnishing the norm and philosophy of gov¬

ernment, besides serving as the basis of train¬

ing for office, through a series of competitive ex¬

aminations over 1,000 years old and only recently in form abolished. This exaggerated veneration and devotion to the ancient classics have checked the development of intellect, of thought and literary expression ; putting all originality more or less under ban, while act¬

ing as an invincible force in creating models of style. A modern essay, state paper or ar¬

gument is effective, in so far as it is a mosaic of quotations, references

or allusions to the classics, or to the ancient or mediaeval standard literature; nor is any written language or col¬

loquial speech richer in literary memorabilia, than that of China. So widely disseminated is this feeling of veneration and appreciation, that any missionary, or other alien, can always gather a crowd, upon the streets, in a Chinese city by quoting from the classics and asking attention to their exposition. Hence, therefore, the two great streams of thought, or rather the river and the rill ; the one, which is wholly Confucian and based on authority of the an¬

cients ; the other, that which is intuitional, or based on science ; though each is like the other in literary method and form. Both history and literature were shaped and unfolded in the feudal period, when China was a state of small area. The legendary and semi-historical ages had passed and a relatively high state of civil¬

ization had been reached. Letters and writingˆ

songs and annals, wise maxims and a consid¬

erable mass of products of the pen were al¬

ready in existence, when Confucius was born (551 b.c.). His work was almost wholly that of an editor. He invented or taught nothing new, but rather made the teachings handed down from the ancients the norm of his own thought and expression, while setting in order the rich inheritances of the past. From the first utter¬

ances of the Chinese soul, which were in poetry, he selected, from over 3,000 odes, rhymed and in four-word lines, 311 pieces, testing their merits also with the lute. Poetry has ever been the delight and occupation of Chinese lit¬

erary men, though in later ages when the pro¬

nunciation changed, the rhyming assonance has suffered, and in many of the odes the primitive sound-forms cannot be recovered. The seven-word stanza, with the ((surprise line® in the last verse, has also been in use. Modern collections abound, but the standard thesaurus, issued in 1707, is in 900 chapters or books, containing 48,900 pieces. The eras of the Tang (618-905) and Sung (960-1278) dynasties were especially rich in poetry. Some attempts have been made in recent times, but so far without striking suc¬

cess, to frame poetical thought on Occidental models. Love of nature,

the spirit of fraternity and sympathy with humanity mark the Chinese poet. In his lines there is little about roman¬

tic love, but much in praise of wine, and of the glories and beauties of the external world; yet with frequent touches of tender sentiment and with bursts of sublime admiration and awe, in view of creation's wonders. Briefly stated, the five classics, or king, of Confucius, and the.

basis of every Chinese gentleman's education, are: (1) History; (2) the Book of Changes; (3) The Odes; (4) Rites and (5) His own An¬

nals. History begins with the canon, which Confucius found to his hand and he added, as his own work, the annals of spring and au¬

tumn. The result of his labors, however, has been that the sage shines more brilliantly as a moralist than a historian ; and, except for the style, the annals are not highly valued. In¬

deed, it cannot be said that history, in its mod¬

ern sense, existed, until there arose the father of Chinese history, Szu Ma Chien, who was born 145 b.c. He compiled and reduced into books containing nearly half a million char¬

acters, the story of the nation's life ; though neither he, nor his predecessors, attempt to ex¬

plain the origin of the Chinese people. It is only fabulists, or myth makers, later than Con¬

fucius, who attempt to bridge the gulf of ig¬

norance on this point. Often edited and reis¬

sued, the standard edition of Szu Ma Chien's work was published in 1747. Outstanding, among all other historical works of a later date, is the colossal (Mirror of History > of Szu Ma Kwang (1019-86). China's most orig-558

inal thinker, Lao Tsze, taught a philosophy re¬

sembling in its main features that of India, though without leaving behind him authentic writings. Nor can he be held responsible for the system of ˆTaoism® that is associated with his name. The (Tao Te King,} traditionally from his pen, has been translated into English. Men¬

cius (372-289 b.c.) expounded Confucius, and made his writings popular and the accepted criteria of China's thought. After his era, the chief literary events are, the burning of the books by Shi Wang Ti, who had abolished feudalism, built the Great Wall, put many lit¬

erary men to death and destroyed much litera¬

ture, in order to prevent, as he pretended, reac¬

tion to the old order of things; the coming of the Buddhists and the diffusion of Chinese cul¬

ture through their efforts, not only in conti¬

nental countries of Asia, but by their mission¬

aries in neighbor lands and islands, from Japan to Java. Without disturbing or intermingling with the purely national product of letters, the stream of Buddhist literature, both original and in translation, has flowed on, instructing the masses of the people, whose thoughts, hopes and fears are saturated or colored by Buddhist conceptions. On the other hand, the Chinese scholars have held generally to the Confucian ethics, doctrines and philosophy, finding in the classics the basis of both erudition and culture and also of statecraft, ethics, sociology and re¬

ligion. Nevertheless Buddhism has powerfully modified the thought and methods of Chinese thinkers. In the 12th century, after a prolonged outbreak of populism, the two systems, Con¬

fucianism and Buddhism, came to their final clash. A century of intellectual activity and profound thinking followed, during which China's foundations of ethical and intellectual concepts were re-examined, along with the claims of the rival religious systems. The re¬

sult was a restatement of philosophy, which became the creed of educated men in all the countries of Chinese Asia. While claiming to be orthdox Confucianism, this representation of the old faith and traditions showed that the Chinese and Hindu cultures had combined.

The two views of the universe were harmonized in the system of Chu-Hi, which, until recent years, in China and Japan, remained the accepted standard of intellectual orthodoxy.

Another renaissance of philosophy in a more original form took place in the 15th century, when Wang Yang-Ming (Japanese Oyomei)

promulgated a system of idealistic intuitional¬

ism. In this, the seat of authority was declared to be, not in the dicta of the ancients, nor in the sacred texts or inspired utterances of Con¬

fucius, but in the vision of truth, as dissolved through reason and tested by science and ex¬

periment. Man, by looking within, must find reality. Then, seeing the truth, he must act upon it. Discernment prompts duty. A clear vision of righteousness is a revelation from heaven. Thus, what begins in intuition be¬

comes pragmatism in its noblest form. Though his system was at first branded as heresy and the author sent into exile among savages, Wang's doctrines became a cult, enthusiastically propagated by his followers, and, under later emperors, Wang Yang-Ming was canonized.

About 1600 a.d. this philosophy, introduced into Japan and there developed and applied, was the efficient cause and instrument, excelling all others, in making modern Japan possible.

Thence, reacting to China and kindling anew the older mass of thought, it has been power¬

ful in making the Chinese Republic. A new in¬

fusion of thought and a fresh direction of the imagination were given, by the advent of the Mongols (1200-1368), who brought in the drama and the novel, which before had existed only in rudimentary forms. From this time, the theatre, whether permanent or itinerant, has existed in nearly every village, or is utilized for private amusement. The people go to see the actors more than the plays, each of which is usually less than an hour in length ; though in public theatres many of these comedies and dramas — tragedy being non-existent — are linked together so as to make a day's perform¬

ance. The manuscripts of the popular plays are in the possession of the families of the actors. The novel, coming through Mongol conquests

from the homeland of stories, Central Asia, was in China gradually developed ; until, from the 16th century, the people of China have been fed with fiction almost as generously as in Western lands. The Chinese romancer usually treats his themes under four or more heads: (1) Plots and Court Politics; (2) Love and Intrigue; (3) Popular Beliefs and Superstitions ; (4) Violent Actions and Law¬

less Characters — the latter in great variety.

In all the repertoire of Chinese fiction, the most popular one, in both China and the sur¬

rounding pupil nations, because of its easy fas¬

cinating style and multitude of constantly thrilling actions, is that of (The Three King¬

doms, J describing their wars in the 3d century b.c. Other novels, which quite equal our most sensational and blood-stirring stories, rich in incident and action, are based on historical events, journeys to strange lands, real or im¬

aginary, or legends illustrating or exaggerating wonders in nature and human history. Among the greatest literary events, of far-reaching im¬

portance to China, have been the journeys of passionate pilgrims to India, from which coun¬

try after many years' stay and bibliographical collection, they brought back, from this Treas¬

ure Land in the West, books that mightily in¬

fluenced the popular life of the Chinese. As in the similar case, of the Aryan and Semitic languages, in which, for example, are the drama of (Sakoontala) and the (Arabian Nights,* the Occidental scholars, naturally content with the classical literature, or products of erudition, have overlooked or ignored the humbler men¬

tal pabulum of the people. In modern and recent times, translations from standard Occi¬

dental literature, especially in philosophy, science, history, travels, biography and the monographs by native authors, on a vast vari¬

ety of subjects of modern interest, have been numerous and widely circulated by Chinese pub¬

lishers, and especially through the Society for the Diffusion of Useful Knowledge. Wall and fence literature, on every theme, practical, eth¬

ical and theoretical, still holds its own. Jour¬

nalism, which has never been popular with men in office, who fear publicity, flourishes, and is notably on the increase. The native fictionists now borrow plots, themes and coloring from Western literature and often employ ideas, mo¬

tives and moral coloring derived from Chris¬

tianity. . A new figure in the literature of the world is the native Chinese, educated abroad, CHINESE OLIVE — CHINIQUY

who writes not only on science and politics, using his own tongue and script, but wields a powerful pen in European languages, thus opening for us large windows into the mind of the Chinese, while enabling foreigners to understand their methods of thought and liter¬

ary presentation, thus hastening the day of the union and reconciliation of the Occident and the Orient.

Bibliography. — Henry Cordier's mon¬

umental work, (Bibliotheca Sinica) (2d ed., 1904-08) ; Legge, James, 'The Chinese Class¬

icˆ (8 vols., Oxford 1895) ; Giles, H. A., (A History of Chinese Literature-* ; Wylie, A., (Notes on Chinese Literature > (Shanghai 1867) ; and Griffis, W. E., 'China's Story. >

William Elliot Griffis,

Author of (China's Story in Myth, Legend, etc?

CHINESE OLIVE, the fruit of Canarium

commune, order Amyridaccce, a tree of the Asi¬

atic Archipelago yielding an oil which is used as a condiment and for lamps.

CHINESE PAVILION, a semi-musical

instrument composed of a pole with several transverse brass plates of some crescent or fan¬

tastic form, generally terminating at top with a conical pavilion or hat. On all these parts are hung small bells, which the performer causes to jingle by shaking the instrument held ver¬

tically up and down. It is employed only in military bands, and is more for show than use.

CHINESE SWALLOWS' NESTS, cu¬

rious productions, which sell at a high price in China, though they have no special points of recommendation beyond many other gelatinous ingredients in soups. They were formerly sup¬

posed to be made of some species of the rose-spored Algce, as S pliocrococcus lichenoides ; but this is now ascertained to be a mistake, and it is known that they are formed of dried saliva from the mouth of the bird itself. The nests are the production of certain species of swifts (not swallows) of the genus Callocalia which breed in caves on islands of the tropical Pacific and Indian oceans. All species of swifts secrete an abundant mucous saliva which is utilized along with other materials in con¬

structing the nests; but species of Callocalia only form their nests of saliva exclusively.

CHINESE TARTARY, an old name of

Eastern or Chinese Turkestan.

CHINESE WHITE, a pigment prepared

from the white oxide of zinc (ZnO), introduced into the arts in the latter part of the 18th cen¬

tury as a substitute for the preparations of white lead. Its color is not changed by exposure to air. It is used also as a water-color paint and in this form is known as body-color paint.

Though it is not as heavy in body as white lead yet, when mixed with water colors, it renders them less transparent.

CHINESE WINDLASS, a differential

windlass, in which the cord winds off one part of the barrel and on to the other, the amount of absolute lift being governed by the difference in the diameters of the respective portions. It is a good contrivance in the respect that great power may be attained without making the axle so small as to be too weak for its work.

CHING-HAI, ching'-hi', or CHIN-HAI,

China, seaport in the province of Che-Kiang, about 18 miles from Ningpo. Ching-Hai has no foreign commerce of its own, not being a treaty port; but it is a resort for native traders from the Chusan Archipelago, and from here Chi¬

nese merchandise is sent to Ningpo. There is a missionary station and a native academy for students who compete in the civil service exam¬

inations at Ningpo. Pop. (1910) estimated 140,000, mostly Chinese. It was taken by the British in 1841.

CHING-TU, ching-too', China, city, capital of the province of Sze-Chuen, situated on the Min River, 150 miles from its junction with the Yangtse-Kiang and 175 miles from the treaty port Chung-King. Ching-Tu is in one of the largest fertile plains of China, and is sur¬

rounded by mountains rich in the minerals of commerce. By way of the Min River and canals nearby, trade is carried on with the places in the valley of the Yangtse-Kiang. The walls around the city are 12 miles in extent. Famous in Marco Polo's time, it is still one of the richest cities in China, with clean streets and canals. It has telegraphic and postal connec¬

tion with many other places in the province, and railways to K'ui-chou-fu and farther east have just been completed. Good roads connect the city with Ichang and the Yangtse ports. It has an arsenal with modern equipment, and goods of European manufacture are found in some shops. Pop. about 1,000,000.

CHINGLEPUT, chin-gul-put', or CHENGALPAT, or THE JAGHIRE, India, a coast district in the province of Madras, area, 3,079

square miles, surface rocky, water scarce, crops scanty. In the fertile localities grain and fruits are raised which are shipped to the Madras markets. Some manufacturing of cloth is car¬

ried on. The chief towns are Conjeveram, Saint Thomas' Mount, Saidapet, Tiruvotiyur and Chingleput. This tract of country was obtained in 1760 and 1763 by the East India Company from the Nabob of Arcot. It w*as invaded by Hyder Ali in 1769 and again in 1780, when it was nearly depopulated by famine and emigration. Pop. 1,312,122.

CHINGLEPUT, or CHENGALPAT,

India, town in the district of the same name, 15 miles west from the Bay of Bengal, 36 miles southwest of Madras, situated in a valley sur¬

rounded by hills. In 1751 it was taken by the French, retaken the following year by the Brit¬

ish under Clive. A railroad enters the town.

It has Roman Catholic and Protestant missions, hospital, the reformatory school of the Madras presidency, civil and criminal courts and a dilapidated fortress which at one time was of considerable extent and well fortified. Pop.

about 11,000.

CHINIOT, India, town in the Jhang dis¬

trict of the Punjab, 80 miles west of Lahore.

It is famed for woodcarving, and has manu¬

factures of coarse cloth. Its trade, principally in wheat, cotton and other agricultural prod¬

ucts, is of considerable importance. Pop.

15,685.

CHINIQUY, she'-ne-ke', Charles Pascal

Telesphore, Canadian clergyman : b. Kamour-aska, Quebec, 30 July 1809; d. Montreal, 16 Jan.

1899. He was a Roman Catholic priest from 1833 to 1858, when he joined the Canadian Pres¬

byterian Church. He lectured in England in 560

1860, 1874 and 1882 and in Australia 1878-80.

He wrote (The Priest, the Woman and the Confessional > (1874), a work that has had an enormous circulation in English-speaking coun¬

tries, and has been translated into French, Ital¬

ian, Spanish and Dutch; c Fifty Years in the Church of Rome) (1886); (Papal Idolatry >

(1887) ; (Forty Years in the Church of Christ) (1899).

CHINKARA, chin-ka'ra, the common

gazelle of India. (See Gazelle). Also the four¬

horned antelope, T etraceros quadricornis. This animal is found in the hilly parts of India. It has the additional pair of horns above the hinder angle of the eyes. The female is horn¬

less.

CHINOLINE, km'6-lin. See Quinoline.

CHINON, she-noh', France, antique town

in the department of Indre-et-Loire, beautifully situated on the Vienne, 31 miles southwest of Tours. Crowning a lofty rock are the ruins of its vast old castle, the French Windsor of the Plantagenets, the death-place of Henry II, and later the residence of several French sovereigns, where, in 1429, Joan of Arc revealed her mis¬

sion to the Dauphin. A farmhouse across the Vienne is pointed out as Rabelais' birthplace.

Chinon has manufactures of druggets, serges, earthenware, baskets, wines, rope, *etc.* Pop.

5,943. Consult De Cougny, (Chinon et ses monuments > (Chinon 1874).

CHINOOK, chi-nook' (Tsinuk, the Chehalis name of this tribe), the best known di¬

vision of the Chinookan family. They held territory on the north side of the Columbia River, in Washington, from the mouth of the river to

Grays Bay. They have become very much mixed with the Chehalis, a cognate tribe, and the language of the southern division of the Chinookan family has become practically extinct. The Chinook, owing to their proxim¬

ity to the early settlement of Astoria, became well known to the whites ; more especially so as the Chinookan tongue had already become the basis of a trade jargon which served as a medium of .communication all along the Pacific Coast from California to Alaska. This jargon the white settlers, traders, merchants and trappers found it convenient to accept, as it enabled them to communicate not only with the Chinook but with all the other tribes who frequented the country about the mouth of the Columbia River for purposes of trade. The principal village of the Chinook was situated on Baker Bay, on the Pacific Coast, near the mouth of the Columbia River, a very advan¬

tageous position, as the Chinook were great traders and fishermen. Though they lived in villages of a more or less permanent character, they were, owing to the nature of their tribal occupation, given to considerable moving about ; and their voyages were generally made by water — in dugouts, canoes of huge size and graceful form. The Chinook differ in size and appearance from the other tribes of the region lying about the mouth of the Columbia, being taller and having broader and higher foreheads and more arched noses. In all these respects they resemble the Kwakiutl of Vancouver Island. There are at least three distinct di¬

visions of the Chinook Indians: the Chinook proper, the Upper Chinook and the Clatsop.

The Upper Chinook and a part of the Clatsop still retain their Indian tongue, the former in a more or less pure state and the latter pretty well mixed with English and Chehalis. The Chinook seems to have been a numerous people.

Lewis and Clark, who visited their country in 1805, state that they numbered 16,000. This estimate undoubtedly referred only to the Lower Chinook and did not include either the Clatsop or the Upper Chinook. The greater part of the Chinookan race was carried off by an epidemic, the nature of which is unknown (1829). This plague swept away whole vil¬

lages and even sub-tribes are said to have disappeared before its ravages. (See Chinook Jargon). Consult Bancroft, (Native Races of the Pacific States} (New York 1875).

CHINOOK JARGON, an Indian trade

language probably of considerable antiquity, which is known to have been in use along the Pacific Coast of North America from Califor¬

nia into Alaska for more than a century. It has had incorporated into it during that time numerous foreign words, but the body of the language is still essentially Indian. This jar¬

gon was named after the Chinook tribe at the mouth of the Columbia River, who first intro¬

duced it to the traders and settlers at Astoria.

The white hunters, who entered the Columbia River region, accepted it as the easiest means of communication with the natives. This so-called Chinook jargon is made up of Chinook, Nootka, Salish and half a dozen other tribal tongues, and undoubtedly it had its origin in the extensive trading carried on all along the Pacific Coast, long before the first white man visited the mouth of the Columbia. It consisted of commonly recognized words and phrases, which have been variously estimated as num¬

bering from 500 to 1,000. Among these there existed, at the close of the last century, a few French, English and Russian words and phrases ; but the great body of the vocabulary was Indian, in which Chinook predominated.

This Chinook lingua franca is rapidly dis¬

appearing from along the Pacific Coast, but it is spreading and growing in importance in the interior of Alaska, where it promises to be as useful in the development of trade and com¬

munication with the natives as it has been in the past in the regions from which it is now being crowded out. Apparently the Chinook jargon was never a steady quantity, for obso¬

lete words form a part of the collection of almost all vocabularies made of it. Moreover, the jargon differed in different parts of the territory in which it was spoken. Consult Hale, Horatio, (Manual of Oregon Trade Language*

(1890).

CHINOOK WIND, a warm, dry wind

from the Rocky Mountains over the plains that stretch from their eastern base. The moisture-laden winds from the Pacific Ocean striking the lofty barriers of the Cascade and Rocky Mountains are forced to precipitate their moisture as rain and snow. When the ranges are crossed the winds are cold and dry. De¬

scending the eastern slopes of the mountains they become warmer, because in descending the air is condensed, the atmospheric pressure at the base of the mountains being much greater than at the summit. The winds are, however, still dry, all their moisture having been precipitated in crossing the mountains. In the descent of 10,000 feet or so to the plains of Montana and CHINQUAPIN — CHIOS

the prairie province of Canada, the winds be¬

come so warmed by the increased pressure that they give a mild climate to regions far north.

It is on account of these winds that cattle on the prairies of Alberta can graze in the fields all winter, a snowfall of a foot or more dis¬

appearing in a few hours before the warm, dry breath of the Chinook. Not all the warm winds of Montana and the regions north and south have their origin west of the Rockies. Various causes contribute to the formation of descend¬

ing air, and when the descent is a number of thousands of feet, the winds resulting are always warm. Such winds blow over prairie regions west of the Missouri, but not always adjacent to the Rockies. Similar warm winds are known in other parts of the world, as in Switzerland, where they are called Fohn winds.

CHINQUAPIN. See Chestnut.

CHINS, or KUKIS, a tribe living in the mountainous region between Lower Bengal and Upper Burma. They form a collection of tribes belonging to the Tibeto-Burman group of the Indo-Chinese race, and consist of three di¬

visions: Northern Chins, who inhabit the Chin Hills and a small part of the country to the north of them; the Central Chins (known as Kamis, Kwemis, Mros, Chinboks and Chin-bons) live in the Pakokku Chin Hills and the northern Arakan district ; and the Southern Chins of the Arakan Yoma. The Chins are, for the most part, a warlike race, divided strictly into clans over which their leaders and upper classes have almost despotic power and influence. They are uncleanly in habits, treacherous and given to intemperance.

CHINSURA, chm-soo'ra, British India,

town beautifully situated on the Hugli, and now included in the town of Hugli, 20 miles north of Calcutta. It is a military station, was formerly a Dutch settlement and contains many neat houses in the Dutch style. The Armenian church, erected in 1695, is a building of great antiquarian interest. Chinsura is noted for the manufacture of cheroots, and has several schools, among them some belonging to the United Free Church of Scotland.

CHINTREUIL, shan-tre'y, Antoine,

French landscape painter: b. Pont-de-Vaux, France, 15 May 1816; d. Septeuil, 13 Aug. 1873.

He was a pupil of Corot, obtained a medal at the Paris Exhibition, 1867, and that of the Legion of Honor in 1870. His sunlight effects have been greatly admired. The Louvre con¬

tains his (Thicket With Deer) (1873) ; and his (Rain and Sunshine > (1873), his best work.

CHINTZ (Hindu, chint, spotted, varie¬

gated), a cotton cloth gaily printed with de¬

signs of flowers, etc., in five or six different colors. The name was originally applied to a stained or painted cloth made in India. It was a favorite in the time of Queen Anne, long before cotton prints became cheap. The name, being highly respectable, has since been applied to goods lacking the graceful and artistic char¬

acter of the genuine article. The Chintzes of the Coromandel coast were celebrated in the time of Marco Polo, 13th century. They are mentioned also by Barbosa, a Portuguese, who visited India soon after the passage of the Cape of Good Hope by Vasco de Gama : ((Great quantities of cotton cloths admirably painted, VOL. 6 — 36

also some white and some striped, are held in the highest estimation.®

CHIO, ke'o. See Chios.

CHIOCOCCA, ki-6-kok'a, a genus of trop¬

ical plants of the family Rubiaccce, consisting of small, often climbing,, shrubs, with opposite stipulate leaves and bell-shaped or funnel-shaped, yellowish flowers in axillary clusters.

Ihe fruit is a white berry with two seeds. The bark of the root of C. brachiata is a violent emetic and purgative. It is also considered a remedy for snake bites by the people of Brazil.

CHIOGGIA, kyod'-ja, or CHIOZZA, Italy,

important seaport town, 18 miles southwest of Venice, on an island at the southern1 end of the Venetian Lagoon, connected with the mainland by a stone bridge of 43 arches. It is founded on piles, has a beautiful cathedral; its harbor, the deepest in the lagoon, is guarded by forts and batteries. It is one of the strongest places in the Venetian lagoons. The cathedral dates from 1633, the Board of Trade building

from 1322. The inhabitants have always been dis¬

tinguished by quaint customs, costumes and dialect, and the fisheries have long been im¬

portant. The other principal industries are flax-spinning, shipbuilding and the manufac¬

ture of sails, bricks, candles and lace. The rivalry of Genoa and Venice was decided here, 23 Dec. 1379, by the victory of the Venetian fleet. Pop. (1911) 35,052.

CHIOS, ki'os (now called by the natives Chio, Italianized into Scio), one of the most beautiful and fertile islands in the 2Egean Sea and archipelago, seven miles off the coast of Asia Minor, at the entrance to the Gulf of Smyrna; about 30 miles long from north to south, by 8 to 15 miles broad, with a coast¬

line of about 110 miles, an area of 320 square miles and a population of about 74,000, almost all Greeks. The northern part is more moun¬

tainous than the southern part. The climate is delightful. Earthquakes are common, and one in 1881 caused the death of 3,558 persons, and the destruction of property to the value of over $15,000,000. The wine produced on the north¬

west coast, the Vinum Arvisium of ancient times, is still esteemed. Other products are figs, also noted in classical days ; mastic, silk, lemons, oranges and olives. Goats' skins are also exported. The capital, Chios, about the middle of the east coast, contains about 13,000

inhabitants, and has a harbor touched by vari¬

ous services of steamers and doing a good trade. On the west coast is a rich monastery, Nea-Moni, founded in the 11th century. In ancient times excellent marble and potter's clay were quarried in the mountains, and recently pits of antimony and ochre have been worked.

Chios is one of the places which contended for the honor of giving birth to Homer. It formed in early times one of the most flour¬

ishing of the Ionian states and contributed 100

ships to the Greek force defeated by the Per¬

sians in the sea-fight off Miletus (494 b.c).

After the Persian victory the town and tem¬

ples of Chios were burnt and many of the people enslaved. In more recent times the island was taken by the Genoese (1346), and by the Turks (1566), in whose hands it re¬

mained up to 1913, except for a short interval.

Revolting against Turkish rule in 1821-22, dur-562

ing the Greek war for independence, the Chiotes were ruthlessly massacred and sold as slaves.

During the Balkan War 1912-13, a Greek ex¬

pedition wrested the island from the Turks, which by the treaties of London (May 1913) and Athens (Nov. 1913) was awarded to

Greece. From 1914 during the great European War, Chios was the scene of considerable mil¬

itary and naval activity. See War, European.

CHIPMAN, Nathaniel, American jurist:

b. Salisbury, Conn., 15 Nov. 1752; d. Middlebury, Vt., 15 Feb. 1843. He was an officer in the American army for a part of the Revolu¬

tionary War, and was admitted to the bar in 1779. He served as State's attorney for four years. In' 1786 he was elected assistant judge of the Supreme Court; in 1789 chief justice and one of the commissioners to adjust the differ¬

ences between Vermont and New York. In 1791 he was a member of the convention called to decide the question whether Vermont should accede to the Union, and a joint commissioner with Lewis R. Morris to attend Congress and negotiate for the admission of Vermont into the Union. In 1793 he published (Sketches of the Principles of Government and (Reports and Dissertations.) In 1796 he was again elected chief justice of the Supreme Court and ap¬

pointed one of a committee to revise a code of statute laws for Vermont. The revised laws of 1797 were written by him. He was a United States senator (1798-1803). In 1813 he was again elected chief justice of the Supreme Court. From 1816 to 1843 he was professor of law in Middlebury College. In 1833 he pub¬

lished Principles of Government: a Treatise on Free Institutions, Including the Constitution of the United States, > which contained portions of his former treatise.

CHIPMAN, Ward, Canadian jurist: b.

Saint John, New Brunswick, 10 July 1787; d.

there, 26 Dec. 1851. He was the son of Ward Chipman (1754-1824), a Massachusetts Loyalist who went to New Brunswick after the Ameri¬

can Revolution. He graduated at Harvard in 1805, and succeeded his father as agent for the Crown in the Maine boundary dispute. After holding minor legal offices he became puisne judge of the Supreme Court (1825), and was chief justice of New Brunswick (1834-51). He was the last judge to sit in the provincial legis¬

lative council.

CHIPMUNK, an American ground-squir¬

rel, a small animal of the genus Tamias, about six inches long, with a slender furred tail, nearly as long as its body, and a coat of red¬

dish-brown fur, striped with white on the back; from the marking it is called Tamias striatus.

The eastern species has two white stripes, and the western chipmunk,

Tamias quadrivittatus , which is exceedingly common all over the Rocky Mountain region, bears four stripes. The ground color also is extremely variable ac¬

cording to habitat. This little creature is often found frisking along stone walls, stopping now and again to sit erect and dart sharp glances at moving objects. It is generally shy in the presence of man, and escapes with great ra¬

pidity, when need arises, into some hiding-place.

Its home is a burrow in some woodland place, tunnel-like in structure, sometimes fully 20

feet long, and always deep enough to be below the frost-line. It is enlarged into chambers at intervals. One of these, supplied with dried leaves, grass and like material for bedding, is the sleeping apartment; the others are store¬

houses. In them the chipmunk stores his win¬

ter supplies of small nuts and acorns, espe¬

cially the sweet beech-nuts. These he carries home, often several at a time, in his disten¬

sible cheek pouches. They are his chief food; but he will eat, also, buds, mushrooms and in¬

sects. The breeding season is in May; and the young are usually from four to six in num¬

ber. The chief enemies of the chipmunk are the fox and the weasel. The former is dan¬

gerous only in the open, as he is too large to disturb the chipmunk at home. But the weasel can attack him in his burrow ; and to escape him the chipmunk makes an opening for pos¬

sible escape, at the far end of his burrow.

For consideration of the various species of Tamias , consult Allen, J. A., (Bulletin of the American Museum of Natural History) (Vol.

Ill, New York 1890). Consult also Thompson, Seton, (Life Histories of Northern Animals^

New York 1909).

CHIPPAWA, chip'a-wa, Canada, village in

the province of Ontario. It is situated at the confluence of the Chippawa and Niagara rivers, two miles above the falls, is the terminus of the electric railway from Queenston and contains an extensive steam-engine manufactory, and one of the largest factories of stoves in the province. On 5 July 1814 the battle of Chip¬

pawa (q.v.) was fought here between the Americans and the British, when General Brown defeated the English under Riall. Pop.

700.

CHIPPAWA, Battle of, 5 July 1814, an

action of the War of 1812, remarkable for the defeat of a force of British regulars by an in¬

ferior number of Americans, in pitched battle on an open plain, without advantage of position and with weaker artillery. Major-General Riall, commanding the British forces, had about 1,500

line infantry — the King's regiment, the 100th, and the Royal Scots, with dragoons and artil¬

lerymen, and 600 skirmishers — north of the Chippawa River, which enters Niagara on the Canada side just above the rapids; the bridge from Chippawa village crossed it near its mouth. Joseph Brown's American force lay to the south beyond Streeter's Creek, and Brown started on the morning of the 5th to build another bridge across the Chippawa, to out¬

flank Riall, whose skirmishers crossed the river and harassed the work of the camp from the woods on the west, and Peter B.

Porter's militia brigade was sent to drive them out. As it approached the river Riall's army crossed the bridge on its right flank, and it fled in panic about 5 p.m. Riall thereupon deployed his force and advanced on the plain toward Brown. Scott's brigade of 1,300 was

about to cross the creek bridge for a Fourth of July parade and, the creek being lined with woods, only learned of the danger at the last moment. Scott's troops crossed the bridge under fire and deployed beyond ; while Scott threw his wings forward to avoid being out¬

flanked, the left wing reaching into the woods.

Both sides advanced, with pauses to load and fire, till the flanks touched and the centres were 200 feet off ; when the British, unable to en¬

dure the deadly musket-fire in front and the CHIPPENDALE — CHIPPENDALE FURNITURE

artillery now sweeping diagonally through the ranks, broke and ran for the Chippawa. The battle lasted less than an hour ; and when Rip¬

ley's brigade came to Scott's aid the plain was deserted by the enemy. Riall lost 137

killed and 305 wounded of the regulars, nearly a third of his entire force, besides 73 skirmish¬

ers ; Scott, 48 killed and 227 wounded ; and Porter, 22 more. The victory was won by superior musketry and artillery. Consult Henry Adams, (History of the United States) (Vol.

VIII, Chap. 2).

CHIPPENDALE, Thomas, English cab¬

inetmaker; d. London, November 1779. He is supposed to have gone to London from

Worcestershire before 1750. The style of fur¬

niture named from him was less heavy and severe than that of his successors, and was elaborate, delicate and baroque, with classical tendencies. He wrote a (Cabinet Maker's Director > (1752).

CHIPPENDALE FURNITURE. Thomas

Chippendale was the son of a woodcarver of Worcester, England. The era in which this great cabinetmaker did his best work was from 1735 to 1760; then his production shows decline. His furniture shops and showrooms were in Saint Martin's Lane, the Strand, Lon¬

don. These furniture galleries were the ren¬

dezvous for the London Court's belles and beaux during the reigns of George II and George III ; even royalty patronized his work.

Being a woodcarver and son of a woodcarver his leaning was to that form of decoration.

Fame gave him the term of <(the great upholder® (upholsterers of that day were called upholders) . Neither inlay or painting entered into his decoration, and the "serpentine®

fronted sideboards ascribed to him (many ex¬

perts declare) were the work of Heppelwhite or Shearer ; in fact some even doubt whether Chippendale ever made sideboards. Mahogany was the popular furniture wood at this time, so that most of his pieces are in the American fine-grained "Spanish® mahogany ; but some pieces are in walnut and rosewood. Chippen¬

dale brought out a book of patterns or ex¬

amples of designs entitled "The Gentleman and CabinetMaker's Director,® displaying engrav¬

ings of styles he termed "Gothic,. French and Chinese taste.® They represent, in their hid¬

eous repulsiveness, nothing we know of as ex¬

tant Chippendale pieces. Chippendale "Gothic,®

called also "Cathedral-Gothic,® furniture arose (about 1760) when Gothic architecture was becoming fashionable; Chinese motifs soon became the fad; hence we find some pieces in composite Gothic and "chinoiserie.® From the latter Chippendale used pagodas, mandarin hats, lattice, fret and other motifs. French style copied Louis Quinze, using the "opposed C's,® *etc.* The bombe , or swelled front, is in this

style.

Characteristic Productions. — If Chippen¬

dale did not make sideboards, he produced massive carving tables with marble or mahog¬

any tops with “wine coolers® beneath or on the sides. Bureaus followed former oak and wal¬

nut varieties, but were of veneered or solid mahogany. A bookcase often figures on top with paneled or glazed fronts; the latter had beautiful lattice, or tracery panes. Bookcases rarely had carving, but they were handsomely decorated with fretwork friezes, some had serpentine fronts (highly prized). A “broken®

pediment is favored. Chippendale’s tables were various: writing tables, tripod “tip-up® (tilting) or “let-down® with plain and “galleried® tops, molded rims, *etc.* His writing tables (called “pedestal®) were generally very commodious.

For card-playing “Chinese taste® or “lattice®

tables were favorites. Chippendale period ma¬

hogany dining tables sell at moderate prices but his carved ones are costly these days ; plain pieces, therefore, have often recent carv¬

ing to enhance the price. His tilting tripod often shows very fine, carved decoration. Chip¬

pendale wardrobes were true masterpieces, nearly always having plain cornices even when elaborate carving adorns the rest of the piece.

In the latter case Louis Quinze (see Furniture, European), feet are usual but in simpler pieces we find the plain French ogee feet. His chests of drawers have, generally, serpentine (waved) fronts and are equipped with handsome brass keyhole escutcheons and brass handles. The “high-boy,® that came into being in the 17th century is still made. A much admired Chip¬

pendale piece is the settee. It is often of the “two-chair-back® and “three-chair-back® varie¬

ties fashionable in the Queen Anne period; being in such favor, and

rare, there are many fakes on the market, usually made up from the backs of two or three singles, or perhaps from arm-chairs, for the originals were made spe¬

cially and are wider even than the arm-chair backs. Imitations were made in Holland and Portugal but of inferior workmanship and much “rococo® elaboration that was foreign to Chippendale. In chairs Chippendale made two distinct varieties — the plain and the fine; the plain were for everyday use in the living rooms, the latter for display in the drawing¬

room. These chairs are in the following styles: Dutch (with pierced splats) ; “ladder-back®; “French manner®; Gothic or “Cathedral-Gothic® ; “Chinese taste.® A Chippendale chair innovation was the making of wider fronts (to allow for hoop-skirts) in combination with reduction of the breadth in the back. It is often erroneously claimed that Chippendale originated the pierced splats, which created such an appearance of lightness. There are however extant Queen Anne chairs which show perforation of the splat in an elementary form.

As before, the arms of arm-chairs frequently reach only part of the way from the back to accommodate the ladies’ skirts. The “claw-and-ball® foot of the Queen Anne period early in this era alternated with the ogee and the club-shaped feet with a ball beneath. The four-poster bedsteads of Chippendale are often very elaborate with their pierced-work cornices and Louis XV carved motifs, the foot-post re¬

ceiving especial carefully carved decoration and massive claw-and-ball feet, but the charac¬

teristic Chippendale bed-post shows only slight enrichment and somewhat slender proportions.

Those in Gothic and Chinese taste have square feet after 1750. Besides mahogany, these bed¬

steads are found in cherry, maple and birch.

A popular piece of furniture of this period was the fire-screen. Chippendale made them in three styles — the tripod, “horse® and folding screen. The tripod (“pole-screen®) had screens either banner or shield -shape sliding up and down the poles ; “horse® screens had two sup-564

ports, each on four legs. Chippendale clock-cases are noted ; these cases for ˆgrandfatherˆ

or long-case clocks are mostly in the French style, rococo at first, then Gothic, followed by Chinese taste. Their decoration runs to fret¬

work more than carving, except those in the French style. His tea-caddies are in demand and show careful work from this master hand.

Most are in Louis XV style with cabriole legs, ogee or claw-and-ball feet in chased brass.

Their brass handles and key escutcheons were of exquisite design. Among other pieces of this master cabinetmaker we find consoles, window-seats (now very rare), dumb-waiters, *etc.* The Chippendale typical support is the cabriole (<(bandy®) leg surmounted by a scallop shell or acanthus drop ; and his unique furniture leg is the <(pierced square, M the term describing the idea very graphically. His favorite motifs in decoration were: Scallop-shell, fret, endive, acanthus, dolphin, wyvern, ram's head holding swags, squirrel, crow, a bird with long tail and long bill, lion, masque, quatrefoil, ribbons, flowers, bells, pagoda, Chinese umbrella, canopy with bells at each corner, opposed C's of rococo style, eagle, *etc.*

ˆIrish® Chippendale. — Certain pieces of furniture consisting of side-tables (with ma¬

hogany or marble tops), china cabinets and clothes-presses, are met with in Ireland of con¬

struction, design and decoration similar to the work of Chippendale. Their source of creation has never been determined, even after much research. They show good workmanship, but these pieces when compared with true pieces of Chippendale the poverty of the carving as contrasted with the rich depths and sharp edges of the master's work stamps the piece as Mrish® Chippendale: all the carving is flatter. Other characteristics are found. Half way down the leg is a circlet or garter in relief.

The scallop shell is on the top of the leg in true Chippendale style, but

it is larger, more like that of the Oueen Anne style. Grimacing masks appear on some pieces, some are slightly tilted out of the perpendicular. The reason for supposing these pieces of furniture are Irish creations is supported not only by the fact that they appear to have been all first dis¬

covered on that island, but also by the knowl¬

edge that the same dark grade of mahogany was imported to Ireland from San Domingo in West Indian trade.

Bibliography. — Benn, H. P., and Baldock, W. C., Characteristics of Old Furniture Styles in England, 1600 to 1800) (London 1908) ; Blake, J. P., and Reveirs-Hopkins, A. E., (Little Books about Old Furniture J (Vol. IV, New York 1911-12) ; Cescinsky, H., (English Fur¬

niture of the 18th Century > (London 1912) ; Chippendale, T., (The Gentleman and CabinetMaker's Director) (London 1762) ; Clouston, K. W., (The Chippendale Period in English Furniture) (London 1897) ; Clouston, R. S., (English Furniture of Furniture Makers of the 18th Century) (London 1906) ; Wheeler, G. O., (01d English Furniture of the 17th and 18th Centuries* (London 1907). See also Fur¬

niture, European.

Clement W. Coumbe.

CHIPPENHAM, England, municipal bor¬

ough of Wiltshire, 13 miles northeast of Bath, on the left bank of the Avon, here crossed by an ancient stone bridge of 22 arches. It con¬

sists of one principal street, with others diverg¬

ing from it. It contains two large parish churches with lofty spires, an old and a new town-hall, *etc.* The town was once the seat of important cloth manufactures, is an important mart for cheese and has malting and tanning industries, with stone quarries in the neighbor¬

hood. Bowood, the scat of the Marquis of Lansdowne, is three and one-half miles distant.

Pop. 5,332.

CHIPPEWA, chip’pe-wa. (1) Michigan,

an eastern county of the Upper Peninsula, bor¬

dering on lakes Superior and Huron, and bounded east by the river Saint Mary, and west by Luce and Mackinac counties. The surface is hilly and partly covered with forests of. pine.

Capital, Sault Sainte Marie. (2) Wisconsin, a county in the northwestern section, about 50

miles from the Mississippi River, traversed by the Chippewa and several affluents ; area, about 4,300 square miles. Sandstone is abundant, and much of the surface is well wooded. Capital, Chippewa Falls.

CHIPPEWA, a river of Wisconsin, which

has its rise in the north of the State, and after receiving several tributaries flows southwest into Lake Pepin, an expansion of the Missis¬

sippi.

CHIPPEWA (puckered up from roasting,

a term said to have been derived from the peculiar puckered shape of their moccasins, which were gathered in front), a shortened form of Ojibway fojib, to pucker, and ubray, to roast) ; one of the largest North American Indian tribes. They covered, at one time, over 1,000 miles of territory, from east to west. They were stretched along the shores of lakes Huron and Superior and spread westward across the intervening country into North Dakota. It is hard to define accurately the Chippewa country as the Chippewas blended readily, in the course of long years, with other members of the Algonquin race to which they belonged.

Moreover they frequently changed their habitat in places. The Chippewa was one of the native races with which the French came

early into contact; and so we have had frequent, though somewhat uncertain, accounts of them from French sources. They are known to have oc¬

cupied considerable territory in Wisconsin, some of it as far back as the time of the discovery of America by Columbus. According to native tradition some of the Chippewa have lived in the territory in and around lakes Huron and Superior ever since the beginning of the race.

At the time of their discovery they were a semi-civilized people, cultivating corn, beans and certain medicinal plants and collecting wild rice. They were forest dwellers and, even when they surged westward, they preferred to keep to the wooded country, though they emerged from it in places. They were a hardy race, good hunters, brave warriors and pos¬

sessed of considerable intelligence. Their medi¬

cine men were famed throughout all the lake region and the eloquence of their tribal orators, the skill of their story tellers and the wisdom and cunning of their great tribal leaders still form the subject of the stories of the old men on the Canadian reservations.

The Chippewas drove the Foxes from

northern Wisconsin about the beginning of CHIPPEWA FALLS — CHIQUITOS

the 18th century and forced the Sioux across the Mississippi River. They continued their conquest until they reached Turtle Mountains in North Dakota and established their western headquarters near the headwaters of the Red River. In the meantime other Chippewa bands had entered western Ontario overrunning the peninsula between lakes Huron and Erie and forced the Iroquois to retire eastward. They were constantly at war with the white settlers as they attempted to move westward until 1815

when they made a treaty of peace with the United States government, which has been fairly well kept by them ever since. The Chip¬

pewas now in the United States are on reserva¬

tions or on private lands in Minnesota, Michi¬

gan, Wisconsin, North Dakota and Kansas.

The Chippewas were always friendly with the French who gave them the reputation of being honorable and very faithful in the keep¬

ing of all their treaties and other obligations into which they had once entered. They were expert canoemen and made long voyages by water, often coasting for hundreds of miles along the shores of the Great Lakes, where, in the later days of their prosperity, they met friends everywhere. They were separated into more than a score of tribal divisions and were a fairly numerous people ; though, on account of the extent of territory they covered, no accurate estimate of their numbers when they were a power in the land can be made.

There are now about 33,000 Chippewas, one-half of which is in Canada and the other in the United States.

John Hubert Cornyn.

CHIPPEWA FALLS, Wis., town and

county-seat of Chippewa County. It is on the Chippewa River, and the Chicago, Milwaukee, and Saint Paul and the Minneapolis, Saint Paul and Sault Sainte Marie railroads, 12 miles northeast of Eau Claire. It contains the County Insane Asylum, the State Home for the Feeble-Minded and a fine county courthouse. Tone Rock battleground, near the city, is of interest as the scene of a Sioux-Ojibway conflict. The city has fine water power, carries on a con¬

siderable trade in lumber, and manufactures beet sugar, chairs, sashes and doors, flour, shoes, gloves, beer, woolen goods, foundry prod¬

ucts, *etc.* It is especially noted, however, for the pure spring water which is obtained from the Chippewa Springs and which is shipped to

all parts of the United States and to the Orient.

It has daily and weekly newspapers, two na¬

tional banks and an assessed property valuation of $2,000,000. Settled in 1838, it was chartered as a city in 1870. The government is ad¬

ministered under a general State law by a mayor and a council. Pop. (1920) 9,130.

CHIPPING SPARROW, one of the most

widely spread and familiar of North American sparrows (Spizella socialis), seen in summer by every roadside and in every garden of the United States east of the high plains and north¬

ward to Labrador and Great Slave Lake. The ˆchippy" is of small size, has the streaked brown and gray plumage of the sparrow and is to be distinguished at a glance by its chestnut cap and plain white breast. It comes from the south in early spring and makes its home fearlessly near the house, forming a neat nest in some bush or vine, where its pretty, trilling song is heard until late summer. The nest, made of grasses and fine twigs is always lined with horsehairs ; and this sparrow is often called "hair-bird." The five eggs are greenish blue, sparsely speckled with brown. It feeds its young, of which two broods are frequently raised, on aphids, small caterpillars and other (usually injurious) insects; and at other times is a diligent eater of weed-seeds. Both these services contribute to the beneficial effect of its otherwise delightful presence, and its home, should be shielded from harm.

CHIPS FROM A GERMAN WORK¬

SHOP, by F. Max Miiller (5 vols.). A col¬

lection of special studies incidental to the au¬

thor's editing of a library of the (Sacred Books of the EastP The several volumes cover vari¬

ous fields, as follows: (1) (The Science of Religion* ; (2) (Mythology, Traditions and Cus¬

toms* ; (3) literature, Biography and Antiqui¬

ties J ; (4) (Chiefly the Science of Language *; (5) 'Miscellaneous* and later topics. Al¬

though they are the result of <(occasional work,"

their wealth of material and thoroughness of treatment, and the importance of the views presented, give them not only interest but per¬

manent value. On many of the points treated, discussion is still open and some of the views advanced by Professor Muller may come into doubt ; but his contributions to a great study will not soon lose their value.

CHIQUICHIQUI PALM, che'ke-che'ke

(Leopoldinia piassaba), a native of Brazil, where it is called piassaba. It grows in swamps and along river banks. Its thin-stalked, pin¬

nate leaves are used for thatching, and it is the source of a fibre which is used for making brushes.

CHIQUIMULA, che-ke-moo'la, Guatemala,

Central American town in the department of the same name in the east of Guatemala, 55 miles northeast of the city of New Guatemala. It is in a mountainous region, has valuable mineral deposits and a delightful climate. Pop. 6,500.

CHIQUINQUIRA, che-ken-ke-ra', Colom¬

bia, South America, the largest town in the department of Boyaca, near the Suarez, 42 miles west of Tunja; was an Indian place of pil¬

grimage before the conquest. In the Dominican Conventual Chapel is a miraculous picture of the Virgin, and the place is visited annually by some 60,000 pilgrims. Its educational facilities are good, there being one state college, one private college of philosophy and letters, three colleges for women and one higher school for men. The permanent popula¬

tion is about 13,000.

CHIQUITOS, che-ke’toz, a race or stem

of Indians inhabiting western Bolivia. The chief occupation of the people when first dis¬

covered by the whites was agriculture. They rejected Spanish rule and European customs until 1691, when the Jesuits established a mis¬

sion among them. The soil here is rich, grow¬

ing vanilla, indigo, cotton, sugar, *etc.* ; but for want of markets there is little cultivation. The policy of the Jesuit missionaries has made the Chiquito language the predominant one among the natives. It is copious, and is said to have a separate vocabulary for female use. The size and decorations of the churches and the perfec¬

tion of the church music in which the natives 566

take a part, are a curious monument of the perseverance of the Jesuit missionaries, which has succeded in implanting in the midst of these solitudes a fragment of European civilization.

In the year 1767 the Jesuits were expelled from the place, by Spanish authority. Since then the Chiquitos have not prospered, and their numbers have decreased. They still cultivate the soil, which is fertile, growing vanilla, indigo, cotton, sugar, *etc.* ; but for want of markets there is little ambition to raise large crops. The native population is about 22,000, distributed among 10 missions.

CHIRIMOYA, che-re-mo’-ya, The Anona

Humboltiana, is considered by many to be the best of the indigenous fruits of America. The word is Aztec in origin and is said to mean <(The fruit of the gods.® So highly esteemed was it in the days of the Aztec empire that the districts of Mexico, famed for growing the best varieties of chirimoyas, were required to pay their full contributions to the Federal govern¬

ment in this fruit. The interior resembles un¬

colored ice cream in appearance and consist¬

ency, and for this reason English and Ameri¬

can residents in the districts where the chirimoya is sold not unfrequently call it natural ice cream. The chirimoya grows in the hot-lands of its habitat and in the medium-tem¬

perate and the colder-temperate altitudes. It varies in size from that of a large apple to an ordinary pumpkin. It contains numerous large, dark, hard seeds.

CHIRIQUI, che-re-ke', Panama, formerly

one of the administrative divisions of Colombia, adjoining Costa Rica; area, 6,500 square miles.

It is well wooded, and has rich pasturage, espe¬

cially on the Atlantic Coast, where the climate is very moist. The Cordilleras that occupy the interior reach their highest point in the volcano of Chiriqui (11,265 feet). Chief town, David.

On the north coast is a spacious lagoon about 35 miles long and extending inland from 12 to 15 miles, with a depth of water for the largest ships. Pop. 45,000.

CHIROGALE, ki'ro-gal, or Mouse-lemur,

a small lemur of the genus Chirogale, native ex¬

clusively to Madagascar, especially C. Coquer-eli. It lives in trees and at the approach of the dry season curls up in a hollow place in a tree and sleeps until the rainless time is over.

Like hibernating animals of cold regions, it accumulates a large deposit of fat before be¬

coming torpid; and when it wakes it has re¬

gained its normal condition. It feeds on fruits and insects and builds a nest somewhat like a bird's. Four other species are known whose habits are similar, generally, to those of the lemurs (q.v.), especially the galagos, to which they are closely allied.

CHIROMANCY, ki'ro-man-si, the prac¬

tice of attempting to foretell the future of a person by inspecting the lines of his hand, in the markings of which chiromancy professes to see a line of life and a line of fortune. In the gen¬

eral acceptation of the term, chiromancy, among students of the so-called art of palmistry, is restricted to the sense of foretelling the future by means of an examination of the palm of the hand, while chirosophy is applied to the inter¬

pretive science of the hand. It will be thus readily seen that the two terms have a ten¬

dency to overlap one another. As a science chiromancy or palmistry deals with the ((seven mounts® of the hand, their lines and the inter¬

lacings of the latter. The names given to these mounts, Jupiter, Saturn, Apollo, Mercury, Venus, Mars and the Moon at once connect the practice of chiromancy with the art of divination as carried on by means of a study of the stars. The mount of Jupiter is situated at the base of the first finger; that of Saturn, the middle finger; that of Apollo, the ring finger; that of Mercury, the little finger; that of the Moon, the wrist; that of Venus, the thumb; while that of Mars is beneath that of Mercury. The system lays down four great lines : life, head, heart and fortune, the first three of which are termed <(the trinity of hu¬

man existence,® that is to say, sensation, intel¬

ligence and action. Length of life, possibility of disease, ill health and other misfortunes are determined by the line of life which, following the mount of Venus, meets the line of the head ; intellectual quality by the line of the head crossing the palm obliquely from Jupiter to Mars ;

estimation of character by the line of the heart crossing the hand horizontally from Jupiter to Mercury. While chiromancy as studied in the Middle Ages was, in some re¬

spects, almost as complicated as astrology, yet it was governed by the one general principle that strong, long lines indicated strength of character and were generally favorable, while short, obscure or ill-defined lines bore the opposite import. So it was with the mounts.

All clearly-defined mounts denoted a certain quality in the individual, while the dimness or total absence of the mount indicated weakness or absence of the quality. In general the mount indicated the qualities connected in mythology with the character whose name it bore. Thus Jupiter denoted joviality, love, honor ; Saturn, wisdom, prudence, success ; Apollo, noble aspirations and love of the beautiful; Mars (the god of war), courage and resolution; Mercury (the culture god), love of science, industry, trade, commerce and the ac¬

tivities of life; the Moon (the goddess of dreams), a dreamy disposition and strong moral character; Venus (the goddess of love) amor¬

ous temperament and love for physical beauty.

All these mounts were modified in an almost infinite variety of ways, by intersection of lines, shape of fingers formed by these intersections and their relation to one another, to the lines and to the mounts, as well as to the shape and formation of the palm, the fingers, the nails and other physical attributes.

Chiromancy is a very ancient practice and seems to have been at one time in pretty general use among most of the peoples of Europe, of India and of Egypt. It very probably had its origin in the ceremonies by the medicine men, diviners and priests of very primitive times, to determine good and bad omens. The Assyrians, Hebrews, Chaldaeans, Greeks and Romans paid particular attention to the study of chiromancy.

From a purely priestly institution it degraded until it became a tool in the hands of unscrupu¬

lous fortune tellers who were often as ignorant and credulous as their dupes. But before it arrived at this latter stage, it had reached a position where it was looked upon as being as exact a science and as worthy of careful study as any of the sciences of the age. Men of the

highest rank, position, intelligence and educa-CHIRON — CHIROPRACTIC

tion gave their time to its study. Already, in the early Middle Ages, it had begun to claim the attention of the studious and, a little later, the art was being practised by a professional class, who took the place of the ejected pagan priests, and exploited the rich and poor alike.

But all who practised palmistry were not of this class ; for there were many who un¬

doubtedly believed in the art, which was taught in schools and colleges. However, in an age of extreme ignorance, the temptation to exploit a willing public became gradually greater; and chiromancy degenerated into palmistry and the latter into ((fortune telling®.

CHIRON, ki'ron, in Greek mythology, the son of Kronos (Saturn) and Philyra. Kronos assumed the shape of a horse, in this amour, to deceive his wife Rhea. The shape of Chiron, therefore, was half that of a man, half that of a horse. In point of fact, Chiron was one of the Centaurs. He was celebrated through all Greece for his wisdom and acquirements; and the greatest princes and heroes of the time were represented as his pupils. He was par¬

ticularly skilled in surgery. When Hercules drove the Centaurs from Mount Pelion, they took refuge with Chiron in Malea ; but their enemy pursued them even into this retreat and unfortunately the old teacher was wounded with a misdirected arrow. The speedy opera¬

tion of the poison in which the arrow had been dipped rendered remedies useless ; and Chiron suffered the severest torments. The gods, at his prayer, put an end to his life, though his nature was immortal by reason of his descent from Kronos. After his death he was placed among the stars and became the constellation Sagittarius.

CHIROPODY, the treatment by experts,

male and female, of hand and human foot dis¬

eases and malformations, first becoming defi¬

nitely known to science in the latter part of the 18th century. In 1785 a publication appeared in London under the title Ghiropodologia,* treat¬

ing in a scientific manner the causes of corns, warts, bunions, etc., with a detail of the most successful methods of removing all deformities of the nails and of preserving or restoring to the feet and hands their natural soundness and beauty.

When this and subsequent announcements of a similar nature first became known, the name was made the subject of much jesting and ad¬

verse criticism. In a magazine then current the name was condemned as “new-fangled.® This evidently did not discourage the cultivators or patrons of the science, for during the same year, or early in 1786, a “chiropodist® opened his establishment in the English capital and did a thriving business.

By degrees the idea of having special care taken of the hands and feet spread throughout Great Britain. One hundred years after the establishment of a <(Chiropodical Establishment®

in London, a novelist in a magazine story re¬

ferred to a lady who had ((finished her chiropo-distry,® and in the same year a popular London weekly, by referring to the operations of chirop¬

odists as ((chiropody,® gave the stamp of author¬

ity to that name as expressive of the craft specialty.

During the past 10 years chiropody has made vast strides in popular estimation as a useful if not essential factor in the acquisition of perfect personal comfort and cleanliness. In all large cities the list of operators in this line includes many men and women highly skilled in

the proper treatment of diseased and malformed hands and feet. This is particularly true of the United States, notably New York city, where all barber shops of any pretensions now have a woman in attendance who undertakes to cleanse and purify the hands of customers while they are under the soothing influence of razor and lather brush.

Latterly there has been a clear distinction drawn between the specialists who, like the women who have their headquarters in the pal¬

aces of tonsorial artists, attend only to the hands, and others, mostly men, who give their attention principally to the feet. The former announce themselves to be ((manicures,® the latter “chiropodists.® The chiropodist, as a rule, is fully qualified in both divisions of the work.

The service of chiropodists and manicures has become so essential and elaborate that it now embraces an extended vocabulary of its own. Surgical instrument makers have a special department for implements used by chiropodical operators. The skill with which these imple¬

ments, many of them of razor-like keenness, are manipulated by competent operators is little short of marvelous. Holding the hand or foot of the subject gently, yet with a vise-like grip, they deftly turn their wrists to bring the instru¬

ments exactly to the required position around or beneath each nail, and, although the slightest error in movement may mean the crippling of the person under treatment, accidents of any kind are very rare indeed. See Bunion; Corn; Nail; Wart.

CHIROPRACTIC. Defined. — Chiroprac¬

tic is a name given to the study and application of a universal philosophy of biology, theology, theosophy, health, disease, death, the science of the cause of disease and art of permitting the restoration of the triune relationships be¬

tween all ittributes necessary to normal com¬

posite forms; to harmonious quantities and equalities by placing in juxtaposition the ab¬

normal concrete positions of definite mechanical portions with each other, by hand ; thus cor¬

recting all subluxations of the spine, atlas to coccyx inclusive, for the purpose of permit¬

ting the recreation of all normal cyclic cur¬

rents, through nerves, that were formerly not permitted to be transmitted, through impinge¬

ment, but have now assumed their normal size and capacity for conduction as they emanate through intervertebral foramina — the expres¬

sions of which were formerly excessive or partially lacking — named disease.

Historical. — The first Chiropractic adjust¬

ment of a vertebra w \s given in September 1895, by Dr. D. D. Palmer. Neither the art nor science was formed at this time. Its growth remained practically dormant till 1903, since which time his son, B. J. Palmer, D.C., Ph.C., has developed it into a well-defined non-therapeutical philosophy, science and art that has no resemblance to any therapeutical method.

Health (equality) is restored by completing the mental and physical circuits ; restoring the cur¬

rents of cycles of mental impulses acting through the material agency; to replace the full quota of positive with an equivalent negative; permitting the reconveyance of the intelligent immateriality into the mechanical corporeal ; to 568

reconstruct the normal psychophysical unit ; to make as one the

triunity of creation, transmis¬

sion and expression ; to re-establish equilibrium between the abstract and concrete, all of which is induced by replacing specific disordered con¬

crete mechanical anatomy which permits adjust¬

ment between that one law of two principles —cause and effect — the rules and manner of declaration of which are unique and unlike any theories of stimulative or inhibitive movements or applications used by any other school.

Premise. — <(And in the beginning, Godp as true to science as philosophy. Decapitate a man — he's^ dead, showing that life centres in brain and is there known as mind; passes to spinal cord and is there known as nerve force ; thence to spinal nerves, there known as mental impulses.

To section spinal cord induces degeneration, pressure upon spinal cord induces paralysis ; constriction upon a spinal nerve causes disease to all tissues beneath. Section, pressure and constriction are relative terms, each producing its degree of effect.

The steamfitter closes a valve to shut off steam ; plumber shuts a faucet to diminish flow of water; electrician turns off the button to stop the flow of electricity; the same is also true of man, as above outlined, any section, pressure or constriction reduces the flow of life from brain (where originated) to tissue cell (where expressed) as function.

Section is impossible except with surgery or murderous intents ; pressure impossible except by traumatic fractures or dislocations; con¬

strictions though are frequent occurring with everybody, no vertebrate excepted.

The brain is encased within a solid bone, the skull ; the spinal cord passed through the spinal foramen where fractures or dislocations are rare but subluxations of vertebrae are frequent and therein enters constriction.

These vertebrae are 24 in number, separate from each other, they become subluxated by jars, twists, wrenches, strains, etc., thereby de¬

creasing the lumen from which issue spinal nerves on each side on their way to every tissue of a body. This orifice is formed by notches of two vertebrae in juxtaposition.

Nerves, passing through (being soft and en¬

tirely surrounded by two movable hard sub¬

stances) should one of its halves become dis¬

torted it decreases the lumen and, the nerves having no avenue to escape, become constricted.

Constriction does to nerves what a foot upon a hose would do — decreases the diameter and circumference, thereby diminishing the carrying capacity, the distant manifestation being notably observed by the physician in pathology and felt by the patient in symptomatology.

The subluxation could be at 3d lumbar —the effect noticeable at ankle, three feet away.

The Chiropractor palpates for this vertebral sub¬

luxation, finds it, adjusts it, opening the fora¬

men, releasing the pressure upon the nerve, per¬

mitting carrying capacity to reach normal, nerve force flows to affected part — health is restored.

This would take place in exact inverse ratio as the steamfitter opens a

valve to let steam flow to produce heat ; or the plumber opens a faucet to permit a full stream of water to flow to water flowers ; or the electrician turns on the button to permit electricity to return to the globe for light.

Ease resides in origination, disease in periphery. That cause which makes ease dis¬

ease is on the path between. As electricity exists in only three degrees, viz., enough, not enough or too much, so life exists in three de¬

grees ; balanced, in minus or excess. Endless complications, that seem to exist, represent not enough life (e.g., constipation) or too much (e.g., diarrhoea).

Chiropractic finds the cause of every dis¬

order — ’adjusts it. That which confuses and has bewildered the masses for ages is now a simple process. Physicians have studied ‘ ex¬

pressions. Chiropractic investigates source and transmission.

Chiropractic is an art, science and philosophy of locating and adjusting causes rather than treating effects; a process of restoration of life rather than stimulating and inhibiting effects present in an organ. Chiropractic is based upon the clinical hypothesis that man is a triune being; spiritual, mechanical and chemi¬

cal ; rather than the laboratorical deduction that he is but chemistry and physics. That which cures or heals is Innate Intellectuality which resides within the body of the patient ; not any thing that may be taken from outside inward.

The chiropractor opens the channels, intellectual life flows in quantity and speed intuitively —health is the inevitable result.

Statistics. — At the present time there are between 8,000 and 9,000 chiropractors in the United States. One or more are located in 19

foreign countries. The attendance in the various competent schools is over 1,300 an¬

nually. Chiropractors have now received

licenses in several States and a number of States have chiropractic bills and examining boards. Among the latter are Connecticut, Nebraska, Kansas, North Dakota, Oregon, Ar¬

kansas and New York. The chiropractors in their legislative policy are opposed to any one method being placed in dominance over any other method. They hold that each method best knows its problems, therefore can best regulate them if given control of the same by State legislative enactment. Chiropractors through their national organization have been successful in 85 per cent ot actions in showing that chiropractic was not the practice of osteopathy or medicine. There are several scientific journals published devoted to the development and advancement of Chiropractic. Conventions are held. Each State and many cities have thoroughly established societies.

Educational. — There are several competent schools. The Palmer school of Chiropractic at Davenport, Iowa, is the oldest and one of the. largest. The course of study in these insti¬

tutions in point of hours equals 4,037, which is slightly in excess of the average four years medical school excluding the hours used in medical schools for materia medica, major surgery, *etc.* Studies taught are anatomy, physiology, symptomatology, pathology, minor surgery, obstetrics, microscopy, chemistry, bac¬

teriology, gynecology, biology (in addition to which are those original to Chiropractic, viz., cycles, . equations, metric system, serous circula¬

tion, intellectual adoption, adjustment, palpa¬

tion, nerve tracing, analysis, chiropractic orthopedy, anomology, restoration, spinography, *etc.* Among the other modern good schools is

the Universal Chiropractic College, also located at Davenport, Iowa; The Pittsburgh College of Chiropractic; The Carver Chiropractic Col¬

lege ; Oregon Chiropractic College ; Rutledge Chiropractic College. These institutions main¬

tain a residual course of sufficient length in which 100 per cent of attendance is required.

Bibliography. — Firth, J. N., (Chiropractic Symtomatology) ; Palmer, B. T., (The Science of Chiropractic > (Vols. I, II, III, IV, V, VI) ; Vedder, H. E., (Physiology) ; Loban, Joy M., (Technique and Practice of Chiropractic ; Johnson, Clare P., (A Treatise on the Science of ChiropractiC ; McNamara, R. E., Chi¬

ropractic and Drugless Methods. >

B. J. Palmer, D.C., Ph.C.,

President of the Palmer School of Chiropractic, Davenport, Iowa.

CHIROSOPHY, the interpretive science

of the hand. See Chiromancy.

CHIROTES, in zoology, a genus of Sau—

rians, resembling the Chalcides in their verticillated scales and the Amphisboena in the obtuse form of their head; but distinguished from the former by the want of posterior feet, and from the latter by their possession of anterior limbs.

There is only one known species, a native of Mexico, Chirotes canaliculatus (Cuvier). It is about the thickness of a man's little finger, and from 8 to 10 inches long. Body flesh-colored, and covered with demi-rings on back and belly, alternating on the sides ; eye very minute.

CHIRU, che’roo, a large antelope (Pantho -

lops hodgsoni) native to the plateau of Tibet, found at an elevation of from 13,000 to 18,000 feet. It is about 32 inches tall, and pale in color. The buck has a black face, and long horns like those of the gazelle; the doe is hornless. It is wary to a degree that makes the autumnal hunts of the native a matter of patience as well as of skill. It has a thick covering of woolly hair of fawn-gray color. This fine antelope is related to the saiga of eastern Russia.

CHISEL, an edged tool for cutting wood, iron or stone, operated by striking its upper end with a hammer or mallet, or by pressure. The form of chisel used in carpentry is the most familiar; one used in turnery has the cutting edge in the middle of the thickness, one used in metallurgy has the upper part flat for re¬

ceiving the blow of the hammer, and the lower part in the form of a wedge for penetrating iron plates or bars. Some of the ˆcelts® found in Europe in prehistoric times are believed to have been used as chisels, and these tools were known also to the ancient Egyptians. In ancient times chisels were made of stone and later of various kinds of metals. The more civilized of the native tribes of America were acquainted with the chisel. The Aztecs, Zapole-cas, Mixtecas and races of Yucatan, Guate¬

mala and other parts of Mexico made chisels of copper and stone.

CHISELMOUTH. See Chub.

CHISHOLM, Jesse, pioneer, guide, scout,

interpreter and trader: b. Tennessee about 1806; d. March 1868. His father was a Scotchman and his mother a Cherokee Indian. He mi¬

grated to the West while the Cherokees oc¬

cupied lands in Arkansas, being mentioned as one of the members of the tribe which accom¬

panied Captain Dutch on his punitive expedition against the Towakony Indians in Texas, about 1827. _ He was one of the interpreters in the council held with the Wichita, Kiowa and Comanche tribes in the Red River country by Col. Henry Dodge and Gov. Montfort

Stokes, in 1834, and was prominent as a media¬

tor in most of the councils, negotiations and treaties made between the government and the wild tribes of the Southern Plains from that time on. He became a trader among the Comanche, Kiowa and other tribes of the plains, and during the course of his trading expeditions he rescued by ransom nine cap¬

tive children and youths (mostly Mexican) all of whom were adopted and reared in the family with his own children. His home was at Camp Holmes, on the Canadian River. He also established and maintained trading posts near the present towns of Lexington and Oklahoma City. At the outbreak of the Civil War he was for a time prevailed upon to aid the Confederate authorities in negotiating treaties of alliance with various tribes in the In¬

dian Territory but, in the latter part of 1861, was found among the refugee Indians who fol¬

lowed Opothleyahola northward to an asylum in Kansas. Tiring of life in the refugee camps, he soon drifted westward to the mouth of the Little Arkansas, where the Wichita and affil¬

iated tribes of Indians had settled temporarily and where he engaged in trade. In the spring of 1865, he went south from the Arkansas to the valley of the upper Washita on a trading trip, the road over which he traveled being ever afterward known as the Chisholm Trail, des¬

tined to become famous during the days of the overland cattle traffic. In the autumn of that year he was active in persuading the hostile Comanche and Kiowa leaders to attend the peace council at the mouth of the Little Arkan¬

sas. He was reputed to have a speaking knowledge of 14 Indian languages, hence the frequent demand for his services as an inter¬

preter by army officers, explorers and sur¬

veyors. Consult Lieutenant Whipple's narrative in the (Pacific Railway Reports, } also (Kansas Historical Society Collection (Vol. V, pp. 90,

93; Vol. VII, p. 486; Vol. VIII, p. 177); also Andreas's (History of Kansas) (p. 1385).

CHISHOLM, William Wallace, American

official : b. Morgan County, Ga., 6 Dec. 1830 ; d. De Kalb, Miss., 13 May 1877. After the Civil War a fusion of white Unionists and negroes elected him sheriff. In 1877 a long standing personal and political feud between Chisholm and an opposing faction, led by John W. Gully, came to a head. On 26 April Gully was waylaid and murdered. His friends ac¬

cused Chisholm and his party of the crime.

Chisholm and four others were arrested on the morning of 29 April, and his wife, daughter and son accompanied him to jail which was shortly after attacked by the mob; Chisholm and ffiis daughter receiving wounds that later proved fatal, while the son was killed in his father's arms by a shot from one of the lead¬

ers of the assailants. In December 1877, Walter Riley, a negro, confessed that he had murdered Gully, and denied any knowledge or complicity on the part of Chisholm or the lat¬

ter's associates. Consult Wells, (Chisholm Massacre* (1878). < Kemper County Vindi¬

cated gives the Democratic side of the affair.

CHISHOLM v. GEORGIA, in the United

States Supreme Court, the case which led the several States to protect themselves from legal responsibility to individuals, while retaining

legal powers of aggression. The constitution provides (Art. iii, sec. 2) : ((The judicial power shall extend to all cases — between a State and citizens of another State.® Under this pro¬

vision Maryland was sued soon after the adop¬

tion of the constitution, and acknowledged process by her attorney-general ; but the case was compromised, and the question of jurisdic¬

tion did not come up. On 11 July 1792, Alex¬

ander Chisholm of South Carolina, as legatee in an inheritance case, served a process on the governor and attorney-general of Georgia to appear before the August term of the Su¬

preme Court. Georgia instructed its attorney-general not to appear, and its counsel to enter a denial that States could be sued by individuals, or that the Supreme Court had jurisdiction in such cases, but not to argue the case. Chief Justice Jay and all the court, except Iredell of North Carolina, found that the court had such jurisdiction; and a writ of inquiry was issued, but not served be¬

cause Georgia passed an act making service of it a capital offense. Virginia was as angry as Georgia ; and the Eleventh Amendment to the constitution was introduced into Congress, passed by two-thirds of both Houses 5 March 1794, ratified by the States and declared in force 8 Jan. 1798. It reads: ((The judicial power of the United States shall not be con¬

strued to extend to any suit in law or equity, commenced or prosecuted against one of the United States by citizens of another State, or by citizens or subjects of any foreign state.®

Efforts were made to get around this Federal law by having a citizen assign his claim to the State of his domicile and having the suit then brought in the name of this State. But it was held that this could not be done (New York v.

Louisiana).

CHISLEHURST, England, town in Kent,

11 miles southeast of London. It was long the residence of Camden, the antiquary, and was the residence of Napoleon III from his

dethrone¬

ment till his death in 1873. His body and that of the Prince Imperial (killed in Zululand in 1879) reposed here until their removal to Farnborough in 1888. Pop. 8,666.

CHISLEU, CHISLEV or KISLEV, in

the Jewish calendar the third month of the civil and the ninth of the ecclesiastical year. The name was not adopted till after the captivity, and does not occur in the canonical Scriptures.

Chisleu begins with the new moon of December.

The feast of the Dedication of the Temple began on the 25th of Chisleu, and continued for eight days.

CHISWICK, England, town of Middlesex,

on the Thames River, seven and one-half miles west-southwest of Saint Paul's, London; con¬

tains a church said to date in part from the 12th or 13th century, charity schools established in 1707, gardens of the Horticultural Society and the grave of Hogarth. Fox and Canning both died at Chiswick House, the seat of the Duke of Devonshire. It has a considerable brewing and extensive trade in market gardening. Large open air baths were here erected in 1910. Pop.

38,772.

CHITALDRUG, a town in Mysore, Brit¬

ish India, capital of a district of the same name, 128 miles north-northwest of Seringapatam ; noted for its great fortress, which was unsuc¬

cessfully attacked by Hyder Ali in 1776, cap¬

tured by him in 1779, and made the place of imprisonment of General Matthews by Tippoo Sahib in 1783.

CHITIN (Gr. xiTiJV, tunic), or CHITINE, ki'tin (C15H26N2O10), the horny substance which gives firmness to the tegumentary system and other parts of the Crustacea , Arachnida and in¬

sects; probably also the carapace of the Rota¬

toria consists of it. It is left when the above structures are exhausted successively with alcohol, ether, water, acetic acid and alkalis.

It is colorless and amorphous, and is usually classed a proteid. It is dissolved by concen¬

trated mineral acids without the production of color. It is not dissolved by solution of potash, even when boiling; neither does it give the characteristic reactions with Milton's or Schultze's tests.

CHITON, ki'ton (Gr. xlTUV, tunic), a

genus of Mollusca and the common name of the same, the shells of which are boat-shaped, and consist of a median series of symmetrical plates, folding over each other, and implanted in the mantle, the marginal zone of which is studded with spicules. It is the typical genus of the family Chitonidce of the class Amphi-neura. The chitons cling firmly to rocks, etc., by means of the powerful foot, many of them resisting the heaviest beat of the surf.

Only very small species (Chcetapleura , etc.) are found on the eastern Atlantic Coast, but larger species occur in Florida and the Gulf of Mexico, while California has the giants of 8 or 10 inches of the genus Cryptochiton. Consult Cooke, (Mollusca) (New York 1895).

CHITON, ki'ton, the undergarment of the ancient Greeks. In the earliest times it was worn by the men only; in later times there were two forms, and the chiton was worn by both sexes. The Dorian chiton was sleeveless, reach¬

ing about to the knees, and usually left more or less open on the right

side. The Ionian was a long tunic reaching to the feet, closed on the sides, sometimes sleeveless, but often with short or long sleeves. Both forms were usually worn belted in at the waist.

CHITOR , or CHITTORE, India, a town

and fort of Hindustan, in the native state of Oodeypore, Rajputana, on the Gamneri River, about 70 miles northeast of the town of Oodey¬

pore. The town was for several centuries capital of Oodeypore, and was far more pros¬

perous and wealthy than it is at present. It still contains many temples. The fort, formerly considered one of the strongest in India, stands upon a high rock overlooking the town. Pop.

15,108.

CHITRAL, chit-ral', British India, a native state, having Yasin and Gilgit on the east, Swat, Dir and Bajaur on the south, Kafiristan on the southwest and the Hindu Kush Mountains on the north and northwest. Through it flows in a southwest direction the Chitral or Kunar or Kashkar River, a tributary of the Kabul, and on Jt, in about lat. 36° N., stands the town of Chitral at a height of more than 5,000 feet above sea-level. The people are Moslems, but CHITTAGONG — CHITTY

mostly speak a language closely akin to that of their neighbors in Kafiristan. Upper Chitral, with its capital, Mastnj, is closely connected with Gilgit. Lower Chitral enjoyed till recent times undisturbed independence; but in 1894

an English resident and small body of troops were surrounded and besieged in Chitral, the consequence of which was that in March 1895

an expedition was sent (the main body by the Swrat Valley, the other from Gilgit), which after some sharp fighting advanced triumph¬

antly through extremely difficult country, re¬

lieved the besieged and annihilated all oppo¬

sition.

CHITTAGONG, India, district in the

presidency of Bengal, Hindustan. The district has Tipperah on the north, the Chittagong Hill Tracts on the east, Arracan on the south and the Bay of Bengal on the west. Its area is 2,492

square miles, and it has a population of 1,508,433. The Blue Mountains, on the north¬

east, attain a height of 5,600 feet. The prin¬

cipal river is the Karnaphuli, or Chittagong.

The level lands, chiefly on the coast, and the valleys are very fertile. The principal exports are timber, canvas, coarse cloths and elephants.

A considerable majority of the inhabitants are Mohammedans. The city of Chittagong, the capital of the district, is situated on the right bank of the Karnaphuli, 12 miles from its mouth and 220 miles east of Calcutta, and is the second port of Bengal. It consists of a series of detached houses on little hills. Although its climate is unhealthful, it is an important in¬

dustrial and trade centre, among its exports being rice, jute, jute manufactures and tea.

Pop. about 25,000.

CHITTAGONG WOOD, the wood of

several Indian trees, especially of Chickrassia tabularis, of the family Meliacece. It is a light colored beautifully grained wood used by cabinetmakers. It is light in weight but does not wear well in changeable climates, as it warps in dry weather. The wood of Cedrela Toona receives the same name.

CHITTAM-WOOD, or AMERICAN

SMOKE-TREE (Cotinus cotinoides), belongs

to the sumac family. It is a small tree with widespreading branches growing to the height of about 40 feet. It grows in Tennessee and Alabama and westward to Missouri and Okla¬

homa. A rich dye for commercial use is ex¬

tracted from the orange-yellow wood, which weighs about 40 pounds to the cubic foot.

CHITTENDEN, Frank Hurlbut, Amer¬

ican entomologist : b. Cleveland, Ohio, 1858. He was educated at Cornell University, was editor of Entomologica Americana in 1890, and in the following year was appointed assistant ento¬

mologist in the United States Department of Agriculture. He has written several depart¬

ment bulletins on insect pests, including (The Colorado Potato Beetle-* (1907) ; (The Harle¬

quin Squash Bug) (1908); (The Common Red Spider* (1909) ; (The Asparagus Miner*

(1911); (The Broad-Bean Weevil* (1912);

(The Potato Tuber Moth* (1912) ; (The

Spotted Beet Webworm* (1913).

CHITTENDEN, Hiram Martin, Amer¬

ican military engineer: b. New York, 25 Oct.

1858. After graduation from the United States Military Academy (1884), he rose through various grades to be lieutenant-colonel of volun¬

teers and chief engineer of the 4th army corps in the Spanish-

American War in 1898-99. He retired, as brigadier-general in 1910. He has supervised engineering government works in the Yellowstone National Park and elsewhere, and has published (The Yellowstone National Park: Historical and Descriptive* (1893); (Reservoirs in the Arid Regions* (1897) ; (Reservoir System of the Great Lakes* (1898) ; (The American Fur Trade of the Far West*

(1901); (War or Peace* (1911); (Water Sup¬

ply System of the Spring Valley Company*

(1912) ; (Letters to an Ultra-Pacifist* (1916).

CHITTENDEN, Russell Henry, Amer¬

ican university professor and director: b. New Haven, Conn., 18 Feb. 1856. He was graduated with the degree of Ph.B., at Sheffield Scientific School (Yale), 1875, Ph.D., 1880; Heidelberg University 1878-79 ; (LL.D., University of Toronto, 1903; Sc.D., University of Pennsyl¬

vania, 1904; LL.D., University of Birmingham, 1911 ; Washington University, 1915) . He became assistant 1875-77, instructor 1877-78, 1879-82, and professor of physiological chemistry in 1882, and director of the Sheffield Scientific School, Yale, in 1898. He was lecturer on physiological chemistry at Columbia 1898-1903, and is member of referee board of consulting scientific experts to the Secretary of Agricul¬

ture, member of the National Academy of Sciences, American Philosophical Society; president of the American Society of Nat¬

uralists, 1893, American Philosophical Society, 1895-1904, American Society of Biological Chemists, 1907. He is author of (Digestive Proteolysis* (1895); (Studies in Physiological Chemistry* (4 vols., 1884-1901) ; (Physiological Economy in Nutrition* (1905) ; ‘Hhe Nutrition of Man* (1907), and also many papers on physiological subjects in American and foreign journals.

CHITTENDEN, Thomas, American colo¬

nial and State governor : b. East Guilford, Conn., 6 Jan. 1730; d.

Williston, Vt., 24 Aug.

1797. He was one of the pioneers of Vermont, settling upon the New Hampshire grants in 1774, and acquiring a fortune from his lands.

In 1778 he became governor of Vermont, be¬

fore its formal separation from New York was recognized. During the Revolutionary War the English and the Continental Congress re¬

ceived overtures from him, his terms being recognition of Vermont's statehood. He retired from public life in 1796.

CHITTIM. See Kittim.

CHITTOOR, chit -toor', or CHITTUR,

India, a town 100 miles west of Madras. It contains courts and public offices, an English church and a Roman Catholic chapel. Until 1908 it was the capital of the North Arcot district. Pop. 15,108. There is a town of the same name in the state of Cochin, Madras, with about the same population.

CHITTY, Joseph, English lawyer and legal writer: b. 1776; d. London, 17 Feb. 1841. He acquired great reputation by his legal text¬

books. These comprise a (Treatise on Bills of Exchange* (1799) ; (Treatise on the Parties to Actions and to Pleadings* (1808) ; (Treatise on the Law of Nations* (1812) ; (A Treatise on the Criminal Law* (1816) ; (Treatise on Com-572

mercial Law) (1818); Collection of the

Statutes of Practical Utility J (1829-37) ; (Treatise on Medical Jurisprudence) (1834).

CHIUSI, kyoo'se, Italy, town in the prov¬

ince of Siena, 102 miles north-northwest of Rome, on an olive-clad eminence in the Val di Chiana, not far from the small Lago di Chiusi. In ancient times, under the name of Clusium, it was one of the 12 republics of Etruria, and the residence of Lars Porsena. When Italy was overrun by the barbarians, it fell into decay, the whole valley was depopulated, and became the pestilential pool described by Dante.

Since the improvement of the course of the Chiana, Chiusi has begun to flourish again along with the whole district. It is in con¬

nection with the discovery of Etruscan an¬

tiquities, however, that the place is chiefly heard of. During the 19th century immense quantities of these remains were found in the neighbor¬

hood in the grottoes that served the ancient Etruscans as tombs. They consist chiefly of sun-dried, black earthenware vases, ornaments, relievos and carved stonework, and are pre¬

served in the museums at Chiusi and Florence.

These objects represent Etruscan products and imports from Greece. The earliest graves show no Greek wares and must reach well back into the 8th century b.c. Succeeding graves con¬

tain Greek vases of the 7th century and from the beginning of the 6th century are found the chamber tombs, often richly decorated. Three thousand Etruscan and 500 Latin inscriptions have been found in Clusium. Beneath the town is a series of underground passages which seem to belong to the old Etruscan system of drain¬

age. Pop. 6,000. Consult Dennis, (Cities and Cemeteries of Etruria) (London 1907) ; and Giometti, L., (Guida di ChiusP (Poggibonsi 1904).

CHIVALRY (Fr. chevalerie, from cheval,

Lat. caballus, <(a horse®), a term which indicates strictly the organization of knighthood as it existed in the Middle Ages, and in a general sense the spirit and aims which distinguished the knights of those times. The chief char¬

acteristics of the chivalric ages were a warlike spirit, a lofty devotion to the female sex, a love of adventure and a thirst for glory.

To explain the nature and origin of chivalry we must consider the character of the ancient German tribes. The warlike spirit was com¬

mon to them with other barbarous nations ; but there were certain traits in their character pe¬

culiarly their own. Among these was their es¬

teem for women. This is dwelt upon by Tacitus, and is sufficiently apparent from the early native German historians. This regard for the female sex was diffused by them through every country into which they spread, though with considerable difference in the forms in which it developed itself. In France it became that refined gallantry for which the nation has been so long conspicuous ; in Spain it assumed a more romantic and glowing character, dis¬

playing much of the fire of Oriental feeling; in Germany itself it became faithful and tender attachment to the wedded wife. Engrafted upon this primitive regard for woman amongst the Germanic tribes, the moral and aesthetic principles of the Christian religion, its ideals of chastity, marriage and loyalty, and in particular the widespread veneration paid to the Virgin Mother of Christ, powerfully contributed to the development of the institutions of chivalry. We may be told, in answer to our claim of the peculiar regard for the female as a characteris¬

tic of the Teutonic tribes, that women were held in high esteem by the Romans. It is true that wives and mothers were treated with great regard by the Romans, and the history of no nation affords more numerous instances of female nobleness; this esteem was rendered to them, not as females, however, but as the faithful companions and patriotic mothers of citizens. It had somewhat of a political cast.

But this was not the case with the Germans.

There is another trait of the German character which deserves to be

considered in this con¬

nection, which is very apparent in their lit¬

erature, and the lives of many individuals; we mean that indefinite thirst for something su¬

perior to the realities of life, that sehnen, to use their own word, which hardly admits of trans¬

lation, which has produced among them at the same time so much excellence and so much extravagance. These three traits of the Teutonic race, their warlike spirit, their esteem for women and their indefinable thirst for superhuman greatness, together with the in¬

fluence of the feudal system and of the Roman Catholic religion, afford an explanation of the spirit of chivalry — an institution which, to many observers, appears like an isolated phe¬

nomenon in history, and leaves them in doubt whether to depise it as foolish or admire it as sublime. The feudal system divided the

Christian Teutonic tribes into masses, the mem¬

bers of which were united, indeed, by some political ties, but had little of that intimate con¬

nection which bound men together in the com¬

munities of antiquity, and which has produced like effects in our own and a few preceding ages. They still preserved, in a great measure, the independence of barbarians. There was, however, one strong bond of union which gave consistency to the whole aggregate ; we mean the Roman Catholic religion. The influence of a common religion was of great service to man¬

kind, during the ages of turbulence and violence, in giving coherency to the links of the social chain, which were continually in danger of parting. To this cause is to be ascribed the great uniformity of character which • prevailed during the ages of chivalry.

The feudal system enabled the gentry to live on the labors of the peasants without the necessity of providing for their own support, and to indulge the love of adventure incident to their warlike and ambitious character. If we now combine the characteristics which we have been considering — a warlike spirit, a lofty devotion to the

female sex, an undefinable thirst for glory, connected with feudal inde¬

pendence, elevation above the drudgery of daily toil, and a uniformity of character and purpose, inspired by the influence of a common religion — we obtain a tolerable view of the chivalric character. This character had not yet quite developed itself in the age of Charlemagne.

The courage exhibited by the warriors of his age was rather the courage of individuals in bodies. The independence, the individuality of character, which distinguished the errant knight who sought far and wide for adventures to be achieved by his single arm, was the growth of a later period. The use of the war-horse, which CHIVASSO — CHIVE

formed so essential an instrument of the son of chivalry, was not common among the Ger¬

mans until the time of their wars with the Huns. They were, indeed, acquainted with it before, and Tacitus mentions it in his account of Germany; but it was not in common use among them till the period mentioned. After it was introduced, cavalry was considered among them, as among all nations in the early stages of their progress, much superior to infantry, which was, in fact, despised, until the successes of the Swiss demonstrated its supe¬

riority. In the 11th century knighthood had be¬

come an established and well-defined institu¬

tion ; but it was not till the 14th that its honors were confined exclusively to the nobility. The Crusades gave a more religious turn to the spirit of chivalry, and made the knights of all Christian nations known to each other, so that a great uniformity is thenceforward to be per¬

ceived among them throughout Europe. Then arose the religious orders of knights, the Knights of Saint John, the Templars, the Teu¬

tonic knights, *etc.* The whole establishment of knighthood assumed continually a more formal character, and, degenerating, like every human institution, sank at last into quixotic extrav¬

agances, or frittered away its spirit amid the forms and punctilios springing from the pride and the distinctions of the privileged orders of society.

The education of a knight was briefly as follows : The young and noble stripling, gen¬

erally about his 12th year, was sent to the court of some baron or noble knight, where he spent his time chiefly in attending on the ladies and acquiring skill in the use of arms, in riding, *etc.* This duty of waiting about the persons of the ladies became, in the sequel, as injurious to the morals of the page as it may have been salutary in the beginning. When advancing age and experience in the use of arms had qualified the page for war, he became an escuyer (esquire or squire). This word is gen¬

erally supposed to be derived from escn or scudo (shield, scutum), because among other offices it was the squire's business to carry the shield of the knight whom he served. The third and highest rank of chivalry was that of knighthood, which was not conferred before the 21st year, except in the case of distinguished birth or great achievements. The individual prepared himself by confessing, fasting, etc.; religious rites were performed; and then, after promising to be faithful, to protect ladies and orphans, never to lie or utter slander, to live in harmony with his equals, *etc.* (in France there were 20 vows of knighthood), he received the accolade, a slight blow on the neck with the flat of the sword from the person who dubbed him knight, who at the same time pronounced a formula to this effect: ((I dub thee knight, in the name of God and St. Michael (or in the name of the Father, Son, and Holy Ghost).

Be faithful, bold, and fortunate.ˆ This was often done on the eve of battle, to stimulate the new knight to deeds of valor, or after the com¬

bat, to reward signal bravery.

Chivalry exercised, in many respects, a salu¬

tary influence at a time when governments were unsettled and laws # little regarded. Though it often carried the fe*elings of love and honor to a fanatical excess, yet the reverence paid to them contributed to prevent mankind, at this period of lawless violence, from relapsing into barbarism ; and as the feudal system was un¬

avoidable, it is well that its evils were somewhat alleviated by the spirit of chivalry. The in¬

fluence which chivalry had on poetry was very great. The troubadours in the south of France, the trouveres in the north of the same county the ˆminstrels® in Great Britain, the minnesin¬

gers in Germany, sang the achievements of the knights who received them hospitably. In Provence arose the (<Courts of Love,** which de¬

cided the poetical contests of the knights. At these, amorous songs (chansons), duets (ten-sons), pastoral songs (pastourelles) and poeti¬

cal colloquies (sirventes) , were performed. In Germany the chivalric spirit produced one of the most noble epics, the (Nibelungenlied) (q.v.). It was the spirit of chivalry which led to the Crusades, and from the intercourse with the East which grew up during this period the wonders of Oriental enchantment were intro¬

duced into the romantic or chivalric poetry, and European literature received a great stimulus.

Chivalric poetry, however, existed apart from any influence of this kind, and really begins with the mythological cyclus of King Arthur's round table and the feats of his knights, which furnished materials that found poetic treatment in various European countries. A second cyclus is that of Charlemagne and his paladins, his 12 peers, which remained a poetical founda¬

tion of chivalric poetry for many centuries.

Alexander the Great also became a great hero of chivalric poetry. The cyclus of Amadis, which belongs, perhaps, exclusively to Spain, does not rest on any historical ground. For further information consult the essay on chiv¬

alry written by Sir Walter Scott; Heeren's (Essay on the Influence of the Crusades) ; (Memoires sur l'ancienne chevalerie, par Lacurne de Sainte-Palaye) (2 vols., with engravings) ; Gautier's (La Chevalerie) ;

Henne am Rhyn's (Geschichte des Rittertums) ; Gautier, (La Chevalerie* ; and (Don Quixote. } See also Duel; Tournament.

CHIVASSO, ke -vas'so, Italy, town on the Po, in the province of Turin, 14 miles northeast of the city of Turin. It was formerly strongly fortified, and contained the residence of the dukes of Montferrat. The fortifications were destroyed by the French in 1804. It markets grain and cattle. There are sulphur baths at San Genesio, two miles south. Pop. 10,084.

CHIVE, chiv, or CIVE, a perennial herb (Allium schcenoprasum) , of the family Liliacece.

It is a native of Europe, Asia and the northern parts of North America, but has been intro¬

duced in temperate climates as a vegetable. It has small, flat, clustered bulbs which multiply laterally to form clumps. The leaves, which grow in dense profusion, are tubular, five to eight inches long; and the flowers, which are borne in umbels, are purplish, pinkish or violet.

Aside from the use of the leaves as a flavoring for soups, stews, salads, etc., the plants are frequently used for ornamental purposes, since they make excellent edgings for flower-beds.

They are readily propagated by division, a proc¬

ess that should be performed as soon as the clumps become very dense. The plants do well in any good garden soil with no attention ex¬

cept weeding, and they may be clipped for use frequently during the growing season. Their flavor resembles that of onions.

CHLADNI, ulad'ne, Ernst Florens Fried¬

rich, German physicist, one of the founders of the science of acoustics: b. Wittenberg, 30 Nov.

1756; d. Breslau, 4 April 1827. He adopted the profession of jurisprudence, which he practised first in his native town, and afterward at Leip¬

zig, but his natural taste led him to study music, and to devote his leisure to physical science.

The backward state of the theory of music compared with the other physical sciences early opened up to him a neglected mine of scientific discovery; and at the age of 19 he set himself resolutely to investigate it. By covering plates of glass with fine sand, and causing them to vibrate, he discovered the fundamental fact in the science of acoustics, that the communication of vibrations in material bodies is subject to constant mathematical laws. (See Sound). His scientific investigations led him to travel through the principal countries of Europe and visit its principal capitals. He invented the euphone about 1789 and clayicylinder 1800, instruments more curious than useful, in which musical sounds are produced by friction, and by the revolution of a glass cylinder causing the vibra¬

tion of chords. His scientific works are of dif¬

ferent value. The first of them, (Entdeckungen *fiber die Theorie des Klanges,* appeared in 1787 ; (Acoustics) (1802); (Neue Beitrage zur Akustik* (1817) ; (Ueber Feuermeteore) (1820).

CHLADNI FIGURES are figures made by

sand on vibrating plates with free edges and indicating the position of the nodes. They depend in shape on the shape of the plate and the node in which it is made to vibrate. They were studied experimentally by Chladni in 1787.

Consult Lord Rayleigh, (The Theory of Sound) (London 1894-96).

CHLAMYDOPHORUS, a genus of ar¬

madillos, containing the pichiciago or truncated armadillo. It is found principally in the Argen¬

tine and Bolivia. See Armadillo.

CHLAMYS, kla'mis. (1) In ancient Greek

costume, a light and freely flowing scarf or plaid, worn as an outer garment. It was oblong in shape, generally twice as long as its width, and was worn, according to taste or circumstances, in different ways. The chlamys of the youth was probably of a yellow color, while that of the soldier was scarlet. It was also carried by hunters and travelers, and some Romans are recorded as having adopted it.

(2) In zoology, the name of a genus of coleop¬

terous insects, belonging to the sub-tribe Cyclica, and the family Chrysomelidce. There are but few North American species, none of large size.

CHLOASMA (Gr. ˆAoaˆa, greenish), a

peculiar pigmentation of the skin, of a yellow¬

ish, brownish to blackish shade, and due to a number of causes: (1) mechanical; (2) chem¬

ical; (3) thermal; (4) parasitic. Scratching is one of the most frequent mechanical causes.

The irritants of mustard plasters, capsicum, cantharides, — all may cause an abnormal skin pigmentation. Sunburn is a frequent cause, a bringing out of the spots with greater vividness.

Parasitic fungi have been known to cause it.

In addition there are a large number of mis¬

cellaneous conditions associated with these liver spots. Pregnancy, menstruation, constipation, —one or all may emphasize their characters. Cer¬

tain diseases, such as syphilis, Addison's disease (q.v.) in particular,

and forms of anaemia are associated with excessive pigmentation. In only a small proportion of the cases has the liver anything to do with the condition.

CHLOPICKI, Hlo-pit'ske, Joseph, Polish

general: b. Galicia, 24 March 1772; d. Cracow, 30 Sept. 1854. Lie served under Kosciuszko, during the first revolt of the Poles (1794), and then engaged in Napoleon's service, under whom he took part in the battles of Eylau, Friedland, Smolensk and Moskowa. After the fall of Paris in 1814, he conducted back to Poland the debris of the Polish-French contingent, and was created general of division by the tsar.

On the outbreak of the Polish revolution of 1830, he was elected dictator, but soon resigned that office, fought at Grochow and Wavre, and later retired into private life.

CHLORAL. The trichlor substitution—

product of acetic aldehyde, obtainable from aldehyde by the action of chlorine gas. In its practical manufacture, however, it is formed by passing chlorine through cold absolute alco¬

hol ; a crystalline alcoholate of chloral is thereby formed, from which the chloral itself is after¬

ward set free by the action of sulphuric acid.

Chloral is a colorless liquid at ordinary tem¬

peratures, having the formula CCh.CHO. It freezes at about — 100° F. and boils at 208° F.

It combines directly with water, forming chloral hydrate (q.v.), CC13.CH(0H)2, the substance commonly but incorrectly called ˆchloral.®

CHLORAL HYDRATE, CCL.CHO +

H20, a crystalline solid composed of trichloral aldehyde with one molecule of water. The crystals are single, colorless and transparent

rhomboids melting at 135° F., and with an aromatic penetrating and smarting taste and slightly acrid odor. They are freely soluble in water, alcohol, turpentine, chloroform and ether. Chloral hydrate is a powerful germicide but is rarely used as such save to preserve ana¬

tomical preparations. It is a vesicant and a local analgesic. In small doses it causes burn¬

ing sensations of the stomach, but little general action. Full medicinal doses, 5 to 15 grains, cause a slowing of the pulse, dilatation of the arterioles, lowering of blood pressure and slow¬

ing of the respiration. On the nervous system it acts as a depressant, causing sleep by direct action on the brain cells. Large doses cause poisoning with symptoms of collapse, coma with a feeble, thready pulse, lowering of temperature, cyanosis or lividity, cold perspiration, dilated pupils, and loss of reflexes. Death results from respiratory and cardiac paralysis. Treatment of poisoning is by rousing patient to maintain res¬

piratory centre, artificial heat, artificial respira¬

tion, hot coffee by mouth or rectum and cardiac stimulants. Chloral is particularly valuable in insomnia from overwork and in many of the convulsive disorders, tetany, myoclonus, status epilepticus and delirium tremens. Its action is possibly due to the formation of chloroform in the general circulation, by the action of the alkalis contained in the blood, in accordance with the equation $CCl_3.CH(OH)_2 + KOH =$

$CHCl_3 + H_2O + CHO.OK$, the last formula in this equation being that of potassium formate.

It is also useful in states .associated with high arterial tension, if the heart is not weakened.

Within recent years a large number of allied drugs have been introduced. They have similar CHLORALAMIDE — CHLORINE

actions but are more palatable or are thought to cause less heart

depression. Among these may be mentioned chloralamide, chloretone, chloralose and urethane.

CHLORALAMIDE, kld-ral'a-mld, or

CHLORAL FORMAMIDE, for'ma-mid, a

substance formed by gently heating together formamide and chloral. It is usually obtained in lustrous, colorless crystals with a slightly bitter taste. It has the chemical formula CCls.CH < melts at 240° F., and is

soluble in 9 parts of water and in 1ˆ4 parts of alcohol. It is not decomposed by dilute acids, but is decomposed by alkalis, and also by water at temperatures above 140° F. See also Chloral.

CHLORALIMIDE, a substance occurring

in long, colorless, needle-like crystals, with the formula CCh.CH :NH. It is prepared by heat¬

ing chloral and ammonium chloride until chloro¬

form ceases to be given off. It is insoluble in water, but dissolves readily in alcohol, ether and chloroform. It is used in medicine as an antipyretic and analgesic, and must not be con¬

founded with chloralamide (q.v.). By some physicians it is recommended as more effective than either chloral hydrate or urethane.

CHLORASTROLITE, klo-ras'tro-lit, a

mineral found in the form of rounded pebbles of radiated structure on the shores of Isle Royale, Lake Superior, and derived from the trap rock in the vicinity. It is bluish-green in color, with a hardness of 5.5 and a specific gravity of 3.18. It is susceptible of a high polish. According to Hawes it is an impure variety of prehnite, but for optical

reasons Lacroix classes it under thomsonite. Its name is from the Greek and signifies ((green star,®

in allusion to its color and its stellated cross-section.

CHLORATES, the metallic salts of chloric acid. They are all more or less soluble in water, potassium chlorate being least soluble.

They are all decomposed by heat, with the evolution of oxygen. See Chloric Acid.

CHLORIC ACID, a colorless, strongly

acid liquid, having the formula HC103 and a specific gravity of 1.28. It combines with bases to produce the salts known as chlorates. Potas¬

sium chlorate is formed directly when chlorine gas is passed through a warm, concentrated solution of caustic potash. By treating this salt with sulphate of ammonia and adding barium hydrate, barium chlorate, Ba(C103)2, is formed, from which chloric acid is set free by the action of dilute sulphuric acid. The clear solution is decanted from the precipitated barium sulphate and evaporated over strong sulphuric acid in a vacuum, until the residue contains 40 per cent of pure chloric acid. A further concen¬

tration leads to decomposition. This aqueous acid is colorless and has a pungent odor and a sour taste. When exposed for a time to the light it changes to perchloric acid. Chloric acid has powerful bleaching properties, owing to the facility with which it parts with its oxygen.

Paper that is dipped into a strong solution of the acid takes fire spontaneously upon drying owing to the great rapidity of its oxidation.

The most important salt of chloric acid is pot¬

assium chlorate, which is largely used in the preparation of oxygen gas, in the manufacture 0! matches, and in medicine. It crystallizes in monoclinic plates having a specific gravity of CHLORIC ETHER, a name given (1) to

spirits of chloroform, a liquid consisting of one part of chloroform to

nine of alcohol, and (2) to chloride of ethyl, C2H5CI, which is obtained by passing dry hydrochloric acid gas through alcohol. 1 he latter is a colorless, mobile liquid, having a sweet taste and a pungent ether-like smell. It has anaesthetic properties similar to those of ether. When mixed with an equal volume of alcohol it is known as <(alcoholized muriatic ether.®

CHLORIDES. See Hydrochloric Acid.

CHLORIMETRY, the art of estimating

the quantity of chlorine present in bleaching-powder or any other hypochlorite. Several methods are employed, depending for their success upon the affinity of chlorine for hydro¬

gen. See Chemical Analysis.

CPILORINE, klo'rin, a gaseous element,

discovered in 1774 by Scheele, who named it <(dephlogisticated marine acid air.® The term Mephlogisticated® had exactly the same import as (<oxygenated,® which was soon afterward in¬

troduced by Lavoisier. Davy showed that the substance is not a compound of oxygen, but a simple body or element, and from its peculiar yellowish-green color the name <(chlorine® was given to it. Chlorine gas is obtained by heating a mixture of hydrochloric acid and finely pow¬

dered peroxide of manganese, and may be col¬

lected either in bottles over warm water in the pneumatic trough, or by simply leading the de¬

livery-tube to the bottom of the collecting-bot¬

tle, and allowing the chlorine to displace the air.

The reaction is

MnOa + 4HC1 = 2H20 + MnCb + 2C1.

Deacon's process for the commercial manufac¬

ture of chlorine consists in passing a mixture of hydrochloric acid gas and oxygen over tiles that are soaked in a copper salt preferably oxychloride of copper, and then dried and heated to a temperature of about 700° to 750°

F. At this temperature the hydrochloric acid gas is decomposed with the formation of water and liberation of chlorine; the copper salt exer¬

cising an obscure influence, and being in its original form at the close of the operation.

Chlorine is now largely (and perhaps chiefly) manufactured by the electrolysis of a solution of chloride of sodium (common salt).

Under ordinary atmospheric conditions chlo¬

rine is gaseous, but it condenses into a mobile yellow liquid at a pressure of about six atmos¬

pheres. It also liquefies at the ordinary atmos¬

pheric pressure at about 28° F. below zero.

It has the chemical symbol Cl, and its atomic weight is usually given as approximately 35.4

for H — 1. It is two and a half times heavier than atmospheric air, and has an insupportable, suffocating odor. When pure it occasions im¬

mediate death to an animal immersed in it ; but even when largely diluted with common air it cannot be respired with safety. It occasions a severe sense of stricture at the breast, which renders it impossible to make a full inspiration.

Chlorine is somewhat soluble in water, the solu¬

tion having the color and odor of the gas. If 576

the solution be cooled, long yellow crystalline needles deposit, consisting of a hydrate of chlo¬

rine. When exposed to sunlight the solution gradually loses its color, oxygen is liberated, and the water contains hydrochloric acid in solution.

The great affinity of chlorine for hydrogen is one of its most characteristic properties, and is exhibited in a number of reactions. If equal volumes of hydrogen and chlorine gas be mixed in the dark and then exposed to diffused day¬

light, gradual combination takes place ; and if the mixture be exposed to direct sunlight the gases combine at once with an explosion and produce hydrochloric acid. This is the only compound these substances form with each other, and it is one of the most important of the acids. When a lighted taper is immersed in a jar of chlorine, it burns with a smoky flame ; this is due to the combination of the chlorine with the hydrogen only, and the libera¬

tion of the carbon. Similarly, when hydro¬

carbons like turpentine and olefiant gas are mixed with chlorine and a light applied, a ruddy flame with a copious deposition of carbon shows that the hydrogen and chlorine are alone combining. Chlorine gas is inflammable if burned in an atmosphere of hydrogen. Several of the elements catch fire when immersed in chlorine, for instance, phosphorus, arsenic, anti¬

mony, and copper; while others combine with it at a higher temperature, sometimes with vivid combustion as in the case of potassium. The binary compounds* of chlorine with the other elements are termed chlorides, and next to the oxides they are the most abundant and widely distributed substances in the earth, many of them being also of great importance for manu¬

factures. Common salt, the chloride of sodium, is the most plentiful of all, and forms large rock masses in various parts of Europe, and occurs dissolved in the waters of the ocean and of many salt lakes. In the United States rock salt is mined in Michigan, New York, Ohio, Kansas, Louisiana, Utah and California. It is the ultimate source of all the hydrochloric acid and chlorine of commerce. Other chlorides, as of

potassium, calcium, etc., are met with, but in no case nearly so abundantly as common salt. As a class, the metallic chlorides are crystallizable salts, readily soluble in water, some being even deliquescent. The chloride of silver, the subchloride of mercury, and one or two others are, however, insoluble in water, while a few are decomposed by water. From its wide affinities and great activity in the free state, chlorine is one of the most useful and powerful instruments with which the chemist deals. By it such metals as platinum and gold are attached and made soluble in water, while its power over organic substances is very great, and has resulted in the formation not only of a number of compounds by simple union with it, but of a great number into which the chlo¬

rine has entered more intimately and produced what are called substitution compounds.

Chlorine is largely consumed in the arts.

Thus it is used in the manufacture of potassic chlorate, in the conversion of the yellow to the red prussiate of potash, in the preparation of chloride of sulphur for vulcanizing, and above all as a bleaching and disinfecting agent. This last property is exercised by chlorine by virtue of its power of decomposing water by combin¬

ing with the hydrogen and liberating oxygen, which latter substance is the true agent in the operation, and which converts the coloring mat¬

ter into colorless compounds. Berthollet was the first to apply chlorine to the process of bleaching. The method of using it has been successively improved. It consisted at first in subjecting the thread or cloth to be bleached to the action of the gas itself ; but the effect in this way was unequally produced, and the tex¬

ture was sometimes injured. It was then ap¬

plied in a dilute aqueous solution. The thread or cloth was prepared as in the old method of bleaching, by boiling first in water and then in alkaline lye ; it was then immersed in the diluted chlorine, and this alternate application of alkali and chlorine was continued until the color was discharged. The offensive suffocating odor of the gas rendered this mode of using it, however, scarcely practicable ; but the odor was found to be removed by a weak solution of potash; lime immersed in water, being more economical, was afterward substituted. Later a compound of chlorine and lime was employed,

prepared by exposing slaked lye to chlorine gas ; the gas is quickly absorbed by the lime, forming a com¬

pound of the hypochlorite and the chloride of lime, or bleaching-powder, as it is called, and this, being dissolved in water, forms the bleaching-liquor now generally employed. (See

Bleaching Materials). In using it the cloth is first commonly steeped in warm water to clean it, and is then repeatedly washed with an alka¬

line solution so diluted that it cannot injure the texture of the cloth; the cloth is then washed and steeped in a very weak solution of the bleaching-powder, again washed, acted on by a boiling lye as before, and again steeped in the solution; and these operations are performed alternately several times. The cloth is lastly immersed in very dilute acid, which reacts on the bleaching-powder and liberates chlo¬

rine ; this then attacks the coloring matter, and the cloth soon acquires a pure white color.

It is next repeatedly washed with water to remove the last traces of the lime salts, and then it is exposed to the action of a hyposul¬

phite in order to render inoperative any chlorine that may remain. (See Antichlor). The

cloth is finally washed, dried, and dressed.

When sulphuric acid is used to liberate the chlorine it is found more difficult, in the sub¬

sequent washing, to remove the calcic sulphate formed, on account of its sparing solubility in water. To avoid this, chloride of magnesia has been substituted for the chloride of lime. It is easily prepared bv adding sulphate of magne¬

sium to a solution of chloride of lime and straining off the clear fluid. It has the same bleaching power, is easily removed by washing, and is said to leave the cloth in a more supple state than when ordinary bleaching-solution has been employed. Another important application of chlorine gas and of bleaching-powder is to the destruction of disease germs. Acid vapors, sulphurous acid in particular, under the form of the fumes of burning sulphur, are often em¬

ployed for that purpose; but chlorine is superior to any other agent, and is now widely employed for the purposes of fumigation and

disinfection.

In medicine, chlorine gas dissolved in water is used extensively for bactericidal purposes. It is employed as a mouth-wash and for bathing purposes, being both a deodorant and a bacteri¬

cide; and internally has been used for its CHLORIS — CHLOROFORM

germicidal properties, particularly in typhoid fever. See Chemistry, Progress of.

CHLORIS, klo'ris (Gr. xˆupo~, pale green as seen in flowers). (1) The Greek goddess of flowers and the wife of Zcphyrus, identical with the Flora of the Romans. (2) The daugh¬

ter of the Orchomenian Amphion, the wife of Neleus and the mother of Nestor. (3) The daughter of the Theban Amphion and of Niobe.

When the children of Niobe were killed she alone escaped along with Amyclas, and became so pale from terror that her former name of Melibcea was exchanged for that of Chloris.

CHLORIS, a greenish-yellow bird, about

the size of a lark, mentioned by Aristotle. It is said to have been yellow underneath and, by some, has been identified with the yellow wag¬

tail. The name was applied generically and specifically to the European greenfinch, which is now generally called Ligurinus chloris. The word is also used to designate a genus of war¬

blers.

CHLORIS, or PRAIRIE CHLORIS

(Chloris verticillatd) , a genus of grasses, of which there are some 60 or more species, mostly natives of warm, dry countries. About 10 of these species are found on the prairies, from Kansas to Texas. Chloris radiata is a pretty annual grass frequently cultivated in green¬

houses for the sake of its ornamental and curious appearance.

CHLORITE (L. chloritis, stone) GROUP,

in mineralogy, a group of minerals crystallizing in the monoclinic system, exhibiting a green color from the presence of ferrous iron and chemically definable as hydrous silicates of aluminum, ferrous iron and magnesium. They are usually secondary minerals, derived from pyroxene, amphibole and other forms. They exhibit a marked basal cleavage suggestive of mica; but they differ from mica and its allies by not containing any considerable amounts of calcium or of the alkalis.

CHLORITE SCHIST, shist. As chlorite

is a general name for green, secondary, hydrated silicates, containing alumina and iron, derived particularly from augite, hornblende and biotite, so chlorite is used as a prefix to various names of rocks that contain such silicates, for ex¬

ample, chlorite schist. In the wide belt of Algonkian and Archaean rocks stretching from Labrador to the west end of Lake Superior are great areas of chlorite schists resulting from the alteration of sedimentary as well as igneous rocks.

CHLORODYNE, klo’ro-din or -den, a

proprietary mixture of uncertain composition and best represented by the National Formulary formula, which is a mixture of chloroform, cannabis indica, morphine and tincture of cap¬

sicum. Practically all of the chlorodynes on the market contain morphine, and hence are dangerous poisons. Their sale should not be permitted save on a physician’s prescription.

CHLOROFORM (CHCl«f> trichlorometh—

ane, methenyl chloride, terchloride of formyl), a heavy, clear, colorless, mobile and diffusible liquid of a sweet burning taste and characteris¬

tic etheral odor formed by the action of the sun’s rays on a mixture of chlorine and marsh gas ; also by the action of caustic potash on

chloral or chloracetic acid, or by the action of vol. 6 — 37

nascent hydrogen on tetrachloride of carbon. It is prepared on a large scale by distilling water and alcohol with bleaching-powder (chloride of lime). Slaked lime is sometimes added. Its vapor density is four times that of air. Its specific gravity should not be below 1.49, and it should be soluble in 200 volumes of cold water, and in all proportions in alcohol, ether, benzol, benzine and fixed and volatile oils. It is vola¬

tile, even at low temperature, boils at 140° F.

and freezes at —115° F. It should not be ex¬

posed to the light, as it is liable to decomposi¬

tion with the liberation of hydrochloric acid and chlorine.

As used in medicine it is a liquid consisting of 99 to 99.4 per cent by weight of absolute chloroform and 1 to 0.6 per cent of alcohol. It is not inflammable, but its vapor burns with a greenish smoky flame. It is an excellent solv¬

ent for a variety of substances, as caoutchouc, resins, fats, sulphur and phosphorus, many alka¬

loids and other organic substances. It is anti¬

septic and prevents the growth of deleterious micro-organisms, but has no effect upon yeast.

Medicinally it is used as an aqua, emulsion, lin¬

iment, spiritus and pure U. S. P. chloroform.

Its physiological action is allied to the alcohols, but it is much more energetic. Externally chlo¬

roform is an irritant, and if confined on the skin it can cause blistering. It is irritant to mucous membranes, and, taken into the stomach, causes a sense of warmth and burning with increased production of gastric secretions. In large doses it causes violent gastro-enteritis.

Its chief use in medicine is as a general anaesthetic, for which purpose it was first used by Simpson, of Edinburgh, in 1848. As an anaes¬

thetic its vapor is inhaled; it thus enters the circulation through the blood circulating in the lungs. When so administered the stages of anaesthesia closely resemble those induced by others of the alcohol series, but in chloroform the anaesthesia is very rapid. There is first a stage of excitement, with heightened cerebral activities. This is soon followed by a gradual dissolution of the mental faculties, usually in an order the reverse of their complexity.

Thus the highest faculties of judgment, mem¬

ory, etc., are attacked first, then unconscious¬

ness gradually sets in. The spinal cord centres are then affected; there may be some temporary irritation, which is followed by paralysis, and then by loss of sensation and of the reflexes.

The automatic centres of breathing and the heartbeat are only slightly affected. There may be some lessening of the heart action, following an initial stimulation, and similar respiratory changes. The patient thus in complete anaes¬

thesia is motionless and senseless, unable to feel or move, his automatic functions of most vital importance to life-maintenance alone function¬

ating. It is in this stage that operations are performed, although minor operations may be performed in the early stages of primary anaesthesia.

When the administration of chloroform is pushed too far, or there is a peculiar suscepti¬

bility to its effects, as in some individuals, poi¬

soning results. It is usually rapid in onset, is attended with cyanosis, weak, trembling pulse and reduction of blood pressure. The vaso¬

motor system seems to be paralyzed and death is due perhaps to this alone, although other fac¬

tors seem to be involved at times. Following 578

chloroform anaesthesia, nausea and vomiting are apt to occur. Chloroform is a safe anaes¬

thetic, deaths to the proportion of 1 :3000 or 1:4000 are said to occur; but ether, which has a proportion of 1 : 16,000 is preferred by many. This is so particularly in America, whereas in Europe chloroform is preferred.

See Anesthetics ; Ether.

CHLOROPHANE, in mineralogy, a vari¬

ety of fluorspar, or fluorite, which when warmed, shines with a green phosphorescent light. Fine specimens are found at Trumbull, Conn., and in the mica mines of Amelia County, Va.

CHLOROPHY'CEiE (Gr. ˆpdr, light

green, and (f>vn6crf seaweed). A group of Algae which is characterized by the fact that the green chlorophyll (q.v.) of its members is not masked by other pigments. Certain Algae of a yellowish green color which were formerly considered to belong to this group have been assigned by Luther and many other systematists who follow him to a new class, the Heterokon-tae. These are not only characterized by the possession of great quantities of the yellow pig¬

ment xanthophyll, but also by the fact that they store up part of the products of their meta¬

bolism in the form of oil, whereas it is all trans¬

formed to starch in the true Chlorophyceae.

The Chlorophyceae show a remarkable di¬

versity in form and structure. They range all the way from the unicellular Chlamydomonas and the other cilate free-swimming Volvocacee?, which exhibit close affinities to the lowest forms of animal life, the Flagellate Protozoa, to the fixed many-celled filaments of S pirogyra, or the enormous complicated multinucleate cell of the Siphonea. This latter structure is unique in the vegetable world ; in Caulerpa, for example, we have what is apparently a plant fully en¬

dowed with roots, stem and leaves and several inches in length, while all that really is there is a mass of protoplasm containing many nuclei and surrounded by a single cell-wall. This structure, of course, represents not a single true cell but a mass of cells whose inner walls are undeveloped, as is evidenced by the occur¬

rence among the Chlorophyceae of forms in which the disappearance of these cell-walls or septa is only partial.

Asexual reproduction by motile spores or zoogonidia is found in most Chlorophyceae, although the Conjugate? never propagate them¬

selves in this manner. Non-motile asexual spores are often found. In many of the unicel¬

lular forms, the normal mode of reproduction is by cell division.

Sexual reproduction is found in the most varied forms. The cells which unite may be equal or unequal in size, and either motile or non-motile. In the case of Spirogyra, sexual union takes place between two ordinary vegeta¬

tive cells in place in their filaments. In a few instances, traces are found of an alternation between sexual and asexual generations.

The cells of the Chlorophycean are all nucleate, and in almost all cases contain chloroplasts (q.v.) with pyrenoids, or masses of reserve protein. The cell-wall, though usually made up of cellulose, often exhibits the mucilag¬

inous pectose, to which much of the slimy character of the algae in pond-scum is due.

The habitat of most Chlorophyceae is

fresh water, and most fresh-water algae belong to the class. The majority of the Siphoneae, however, and several other species of the green algae are marine. Consult Lemmerman, E., ˆlagellatae, Chlorophyceae, Coccosphaerales and Silicoflagellatae) (Kiel 1908) ; West, G. S., (A Treatise on the British Fresh-Water Algae) (Cambridge, Eng. 1904).

CHLOROPHYLL (Gk. xfapfc, light

green, and <pv'AAovt leaf). The green coloring-matter possessed by almost all plants that are not of a parasitic or saprophytic habit. It is soluble in ether, alcohol, chloroform, carbon disulfid, olive oil, benzine and other organic solvents, and when dissolved exhibits a red fluorescence and a very characteristic absorption-spectrum. Willstatter has pointed out that there are four pigments in green leaves, all of which used to go under the name of chlorophyll.

These are chlorophyll a, blue-black in the solid state and green-blue in solution, of the formula GsFlˆOsˆMg; chlorophyll b, CssHwOoNiMg,

green-black in the solid state and pure green in solution; the orangered carotin, GtoHso; and the yellow xanthophyll, CwHoeCb. All of these he has isolated in a pure state. There is good evi¬

dence that these substances are not mere arte¬

facts of the isolation-process, but exist as such in the living cell. In the first place, the trans¬

mission spectra of these substances exhibit the lines shown by that of the living leaf. In the second place, that curious phenomenon of the chlorophyll in the leaf, that it cannot be ex¬

tracted by solvents free from water, has also been exhibited by Willstatter in colloidal solu¬

tions of the extracted chlorophyll, and is conse¬

quently no evidence of the hydrolysis of chloro¬

phyll during its extraction.

The chlorophyll obtained from different

plants has been shown to be always made up of the same constituents in much the same pro¬

portions. Other pigments besides the chloro¬

phyll-constituents, however, are to be found in the cells of many plants, in very close associa¬

tion with the chlorophyll-constituents proper.

These are especially to be found in the brown, the red and the blue-green algae.

The function of chlorophyll in the plant is to take part in the photosynthesis of carbohy¬

drates from carbon dioxide and water, but no experiment as yet undertaken has exhibited this action on the part of chlorophyll in vitro. The action of chlorophyll is bound up with the entire structure of the chloroplasts (q.v.), or chloro¬

phyll bearing bodies in the cells of the plant. It has been found that the photosynthetic activity of plants is not simply proportional to their chlorophyll-content, and for this and other rea¬

sons Willstatter has been led to postulate an enzyme in the plant cell, which acts together with chlorophyll in the production of carbohy¬

drates, so that the rate of carbohydrate genera¬

tion is a function of two independent variables, if not of more.

The systematization of the chemistry of chlorophyll is due to

Willstatter, although in many important points his work was anticipated by the British physicist G. G. Stokes in the six¬

ties of the last century. Both Stokes and Will¬

statter made use of the method of separating two substances that depends on their unequal solubilities in different solvents. With the pure materials that he has obtained in this way, Will¬

statter has made a number of highly interesting CHLOROPHYLLITE — CHLOROSIS

experiments. For example, he has produced a number of substances in which the magnesium of chlorophyll is replaced by other metals. Con¬

sult Jorgensen, I., and Stiles, W., ‘Carbon Assimilation) (in Nezv Phytologist, 1915).

CHLOROPHYLLITE, klo-ro-fil’it, an

alteration product of the mineral iolite. The only difference in composition is a larger per¬

centage of water, but there is a marked decrease in hardness, from 7 to from 1.5 to 3, and also in transparency. The characteristic blue color of iolite is changed to a dull green, while a basal cleavage is highly developed. Its specific grav¬

ity is 2.7. It is found at Unity, N. H.

CHLOROPLAST (Gk. xˆuPˆ~» light

green, and Faeroe, formed). The chlorophyll (q.v.) or green coloring-matter of plant-cells is not diffused throughout their mass, but is col¬

lected in certain special bodies known as chloro¬

plasts. These chloroplasts may be of the most varied shapes ; they may be granular, as is the case in most flowering plants, or spiral bands, as in Spirogyra, or flat plates, as in Mesocarpus.

They contain particles of nutritive material in the form of starch-grains, oil-drops, and highly-refractive masses of proteid known as pyrenoids.

Bodies of the same general character as chloroplasts, but differing from them in the ab¬

sence of chlorophyll, are known as leucoplasts or chromoplasts according as they are colorless or pigmented. Chloroplasts, leucoplasts and chromoplasts are all known as chromatophores.

In all embryonal cells, all the chromatophores have the appearance of leucoplasts, being small, transparent, highly-refractive bodies of granu¬

lar, spindle-like, or thread-like form. It is because of this common origin that the chro¬

matophores, or as they are also called, plastids, are classed together under a single heading.

In those phanerogams that lack a green color, the chloroplasts are replaced by other chromato¬

phores. In the fungi, however, which likewise lack chlorophyll, there are no chromatophores of any sort. The chromatophores of the blue-greed, red and brown algae contain chlorophyll, but in addition other pigments, known as phy-cocyan in the blue-green algae, phycoerythrin in the red algae, and fucoxanthin in the brown algae.

The chloroplast, as the chlorophyll-bearing organ, is undoubtedly that part of the cell which is most directly concerned in the assimilation of carbon dioxide. This process is very imper¬

fectly understood, but is believed to involve the action of an enzyme. (See Chlorophyll).

Ponomarew claims that the chloroplast is liquid, and of a colloidal nature. He explains its relative permanency of shape by supposing that it is in equilibrium with the surrounding cell-contents as to surface-tension. He accounts for the contraction of the chloroplast into a spherical shape when the cell is treated with dilute alcohol as due to a disturbance of this equilibrium.

In most plants the chloroplasts are sensitive to light, and place themselves in the cell in such a manner as to offer the greatest surface possi¬

ble to a slight illumination, but the least surface possible to an intense illumination.

Thus the plate-like chloroplast of Mesocarpus presents its face to a weak light, its edge to a strong one. The chloroplasts of

Lenina trisulca group themselves in planes parallel to the surface of the leaf when moderately illuminated, but perpendicular thereto if the illumination be intense. In all cases the position in the dark is less definitely determined. On account of these light-reactions of the chloroplasts, the suggestion has been made that they act in a manner analogous to sense-organs, but this idea of a specific sensi¬

tivity on their part has been opposed by Pfeffer.

CHLOROSIS (Gr. xlupo-f green), is a

diseased condition which first manifests itself almost exclusively in females at the time of puberty or in the early years after its establish¬

ment. If it occurs later it is probably the re¬

currence of an earlier attack. The manifest symptoms are a characteristic pallor which often shows a greenish-yellow tint and gives the disease its name, chlorosis or ((green-sickness^ ; lassitude, tendency to fatigue, to head¬

ache and vertigo; loss of appetite and anoma¬

lies of appetite, digestive disturbance; some¬

times dilatation of the heart and ana?mic heart murmurs; dyspncea ; slight rise in temperature; disturbance of the menstrual function and other hysterical manifestations. The red cor¬

puscles of the blood are but slightly reduced but there is insufficiency of haemoglobin. There is evidence to show that the haemoglobin is not reduced but diluted by the marked increase in blood plasma.

The disease has come to be recognized as due to a disturbance of the secretory function of the sexual glands. As such it is variously explained. It has been thought that there is a deficiency of the hormone substances secreted by the ovary into the general circulation and therefore an interference with blood formation and likewise with the formation of the bone marrow. But the alteration of the blood is not always present in chlorosis nor is there evi¬

dence of insufficiency of the bone marrow.

These features separate chlorosis from anaemia as does also its different response to iron. An¬

other theory is that of intoxication produced in the blood through disturbance of the ova¬

rian activity. When ovulation first takes place at puberty and at each subsequent menstruation there is a new formation of interstitial cells in the ovarian (Graafian) follicles and an ac¬

cumulation of lipoids produced by these cells, upon which sexual characteristics depend.

Anything which disturbs the normal relativity between the number of lipoids produced and the number utilized in the process of matura¬

tion produces an increase of these in the ovary and in the blood, with resulting intoxication of the organism. This produces the symptoms of chlorosis, the insufficiency of haemoglobin, car¬

diac, vasomotor, respiratory and other disturb¬

ances already noted. The follicular disturbance affects directly the menstrual function, causing amennorhea, and the uterine issue. The action of iron has been found to be inhibitory to the ovarian lipoid secretion, hence its value, accord¬

ing to this theory of chlorosis, in this disease.

The presence frequently of hysterical symp¬

toms as well as response to certain environ¬

mental elements in treatment point to a psychi¬

cal etiology also for chlorosis. That portion of the nervous system which controls the activity of the endocrinous glands (glands of inner secretion) is no less than the voluntary nervous centres at the service of the psychical 560

attempt to adapt to environment the attitude of the patient toward the world. The disease occurs at the period when psychical and physi¬

cal activity are stimulated to new adjustments which are made often with much difficulty.

Stimulation and inhibition of psychical im¬

pulses are not well adjusted. The chlorosis, therefore, is one mode of expression of in¬

ability to adapt individual wishes to the de¬

mands of development in the social environ¬

ment, which at this period of stress comes to definite expression and may manifest itself again at further strenuous periods. Psy¬

chotherapy should therefore also be con¬

sidered in treatment. Consult Falta, (The Ductless Glandular Diseases } ; Pende, (Endo-crinologiaˆ ; Jelliffe and White, (Diseases of the Nervous System* (2 vols., ed. 1917).

Smith Ely Jelliffe.

CHLOROXYLON (Greek, Ulwpor , green,

and ijvXov, wood), a genus of plants of the order Meliacece, distinguished by the fact that the fruit has only three cells and is split into three parts. The satinwood tree of India, Chloroxylon swie tenia , sometimes grows to a height of 50 or 60 feet and is a native of Ceylon and the Coromandel coast. The wood is hard and light-colored, having a satin-like lustre and is sometimes mottled or curled, somewhat re¬

sembling boxwood but deeper in color. It is mainly used for articles of turnery, for the backs of brushes and often as veneering for cabinet-work. The tree also produces a gum, a wood oil and an ethereal oil from the leaves.

CHMELNIZKIJ, kmel-nit'ske, Nikaloi

Ivanovich, Russian writer: b. 1789; d. 1846.

He contributed largely to the reformation and elevation of the Russian stage. Among his comedies are (The Babblers) ; (Air Castles) ; (The WavererP

CHMIELNICKI, kmy-el-mt'ske, Bogdan,

Cossack chief: b. 1593; d. 25 Aug. 1657. He was the son of a Polish nobleman, who settled among the Cossacks of the Ukraine. This peo¬

ple, who had long defended the eastern bound¬

aries of Poland against the Tartars and Rus¬

sians, were at that time subjected to grievous oppression. Their religion was persecuted, their freedom circumscribed and the castle of Kudak, called the curb of the Cossacks, was built to restrain them. Thus exasperated, they seized Kudak and massacred the garrison, but were soon subdued. After their defeat at Kumejki, Bogdan was sent to the Polish court, where he was favorably received, but suspicion soon drove him forth and finally made him a scourge of Poland. Availing himself of the hatred and prejudices of the Cossacks, he entered upon

a conspiracy against the Poles, and sought the alliance of the khan of the Tartars. Chmielnicki became master of the Ukraine and carried terror, devastation and death as far as Lem¬

berg and Zamosc. Under the new king, John Casimir, the war was continued with equal ferocity on both sides until Chmielnicki was checked. He sought the protection of Turkey, of Russia (1654), and again that of Poland (1656), and finally lived in retirement under the suzerainty of the Tsar of Russia. An eques¬

trian statue commemorating Chmielnicki was erected at Kiev in 1873.

CHOATE, Joseph Hodges, American

lawyer and diplomat: b. Salem, Mass., 24 Jan.

1832; d. New York, 14 May 1917. He was graduated at Harvard .University in 1852 and at the Harvard Law School two years later.

After practising law in Boston for a year he went to New York city, where he achieved remarkable success as a lawyer. In 1856 he became active as a republican in supporting John C. Fremont. In 1884 he became a mem¬

ber of the famous legal firm of Evarts, Choate and Beaman. He won great distinction as a trial lawyer, conducting many celebrated cases in State and Federal courts and International tribunals. He successfully defended Gen. Fitz John Porter, prosecuted * the infamous Tweed Ring, appeared in the Tilden will contest, the Chinese Exclusion cases, the Income Tax cases of 1894, *etc.* In 1894 he was president of the New York State Constitutional

Convention. In 1897 he was a candidate for the Lffiited States Senate, but was defeated by T. C. Platt. President McKinley appointed him in 1899 to succeed John Hay as ambassador to the court of Saint James, in which capacity he served with distinction till 1905. He was elected Hon. Bencher of the Middle Temple of England on 10 April 1905.

In 1907 he served as ambassador and leading delegate of the United States to the Inter¬

national Peace Conference at The Hague, and his activity as a public-

spirited citizen was mani¬

fested as a trustee of the Metropolitan Museum of Art and of the American Museum of Nat¬

ural History, a governor of the New York Hospital (1877-1917) and in many other ways.

Among his published writings are (Addresses on Abraham Lincoln, Admiral Farragut, Rufus Choaje, The Supreme Court of the United States,* etc., and (The Two Hague Con¬

ferences.*

CHOATE, Rufus, American lawyer: b.

Ipswich, Mass., 1 Oct. 1799; d. Halifax, N. S., 13 July 1859. He as a child showed remark¬

able precocity ; was graduated at Dartmouth College in 1819; was admitted to the bar and began practice in Danvers in 1823 ; removed to Salem in 1828; and was a member of Congress in 1830-34, resigning in the latter year. Remov¬

ing to Boston in 1834, he rapidly acquired a large practice. He was successor of Daniel Webster in the United States Senate in 1841-45; resuming his legal practice in Boston at the expiration of his senatorial term. He traveled in Europe in 1850 and was a delegate to the Whig National Convention in Baltimore in 1852. After Webster's death Mr. Choate was acknowledged the leader of the Massachusetts bar. He made many political speeches, the most brilliant, while a United States senator, includ¬

ing those on the Oregon Boundary, the Tariff, the Fiscal Bank Bill, the Smithsonian Institu¬

tion and the Annexation of Texas. His style is peculiar and characteristic, but hardly to be commended as a model for imitation ; it is rich, vivid and glowing, instinct with passion and colored with all the hues of fancy, but some¬

times, it must be admitted, a little extravagant and exaggerated. The most remarkable feature, however, in his written compositions, is the structure of his periods. These are not the short and compact

statements, involving but a single proposition, in which most writers of our times express their thoughts ; but they recall and renew the continuous sweep and long-resounding march of the prose writers of the JOSEPH HODGES CHOATE

■ .

K

16th century. They are often of breathless length, containing clause after clause, modify¬

ing, enlarging or limiting the leading idea. His (Addresses and Orations J appeared in a sixth edition in 1891. Consult Brown, (Life of Rufus Choate* (1870); Neilson, (Memories of Rufus Choate) (1884); Whipple, (Recollections of Eminent Men' (1886).

CHOBI, cho'be, a Bantu people in south¬

eastern Africa, extending from the Limpopo to the sea. On the coast they are called Mindon-gas. They scarify their faces.

CHOCK, a piece of wood employed on

shipboard as a wedge to support various articles liable to be displaced by the motion of the ves¬

sel. It receives different names according to the purpose for which it is used, as Anchor-chocks® to support the anchor; "rudder—

chocks® to keep the rudder immovable in the event of accident rendering it unmanageable.

Chocks are also used to support casks, boats and other curved objects. It is probably analogous to shock in derivation.

CHOCOLATE. See Cocoa.

CHOCTAW (properly CHAHTA, the

chief “Chactas® in Chateaubriand’s (Atala) is an eponym of the tribe), one of the largest tribes of the great Muskhogean (q.v.) stock and be¬

fore its deportation the most advanced in hus¬

bandry’ and general culture of any except the Creeks. They were called “Flatheads® bv the French (not to be confused with the northwest¬

ern tribe of that name), from a habit of flat¬

tening their children’s skulls with bags of sand ; and they had a burial custom of disinterring the corpses after a few days, cleaning the bones and preserving them. They are rather short, stout and slow, compared to the taller and more active Chickasaw (q.v.) ; and were nicknamed “tubbies,® though not on that ground, but from the customary final word of their war-chiefs’

names, meaning “killer.® The Chickasaw was one of their subdivisions, or perhaps merely the more warlike and adventurous portion, till after the whole had crossed the Mississippi ; and while using a dialectic language of their own for com¬

mon service, still employed Choctaw for oratory.

The Choctaw occupied central and southern Mississippi and western Alabama in three divi¬

sions, west of the Muskhogee; and in the 18th century their chief towns lay in two groups, one some 200 miles north of New Orleans (about the present Choctaw County, Miss.) and the other about half

way from the Chickasaw to Mobile. These villages a century earlier had been numerous and widely distributed ; they are stated at 40, and the tribe as having 2,500 war¬

riors. It was first found by De Soto in his ex¬

pedition of 1540. At their town of Mavila (Mobile probably, Choctaw Bluff, Clarke

County, Ala., on the north bank of the Ala¬

bama), was fought perhaps the bloodiest and most destructive single battle ever known be¬

tween red and white men on the continent. The village was burned, 20 of De Soto's men killed and 150 wounded and many hundreds of In¬

dians slain — the Spanish chroniclers .sav 2,500

to 3,000, which may be discounted. Tristan de Luna met them again in 1560. The French, in settling this region about 1700, came immediately in contact with them, and established friendly relations with them, contrasting strongly with the permanent hostility of the Chickasaw, against whom and the Natchez the Choctaw aided the French. The latter planted forts in their country and sent missionaries among them.

In the final struggle between France and Eng¬

land, however, the English won over a part of them, including the chief Red Shoes. After the Revolution the Choctaw shared with the other Indiansˆin the general treaty of Hopewell, 28

Lov. 1785, by which the sovereignty of the United States was recognized, a portion of the Choctaw lands ceded and they were "guaran¬

teed® the possession of the rest. By 1800 some 500 of them had migrated to the Arkansas (Indian Territory') and it is said that the rest were much less unwilling to go than the Cherokees and Creeks. They did good service to the Americans in the Creek War 1813-14. In 1820, by the Treaty of Doak's Stand, they ceded part of their lands for an equivalent amount on the Arkansas ; and in 1830, by that of Dancing Rab¬

bit Creek, they gave up the rest — 19,000,000

acres, or nearly 30,000 square miles, in the two cessions, for 20,000,000 acres in Indian Terri¬

tory and $2,225,000 in money and goods. In 1837 they removed with the Chickasaw to their new lands, between the Arkansas and Canadian rivers on the north and the Red River on the south. How the Chickasaw first amalgamated with and then separated from them is told under Chickasaw. They made good progress, re¬

ceived the missionaries of the American board and several Church denominations, were given a well-devised school system and established a government consisting of a head chief, a coun¬

cil of 40 chiefs, a two-chambered legislature and a regular judiciary system, with trial by jury. Like all the southern tribes, the}' were slaveholders and in 1860 had some 5,000 negro slaves. Their superintendent and agents were Southerners, and they joined the Confederate side in the Civil War. Though their land was not overrun, their progress was brought to a standstill and their population reduced by a third ; and after the war, they were for a time deprived of their rights. On being restored, they had to part with a section of their lands to the government, which settled other tribes there. For a time, a territorial government was formed, with the superintendent as governor ; and they had to make heavy allowances to their emancipated slaves. A grammar of their diffi¬

cult language was published in 1870. In 1915

there were 25,168 Choctaws proper in the Ter¬

ritory, besides those who had taken up lands in severalty; and 1,660 still remaining in Mississippi.

The lands located in the Choctaw Nation comprise 6,953,048 acres, which under trea¬

ties with the United States government, owing to their close affiliation with the Chicka¬

saw Nation owning an additional 4,707,903

acres, total 11,660,951 acres, are held in com¬

mon by the members of both of these tribes of Indians. See Chickasaw; Indian Affairs.

CHOCZIM, Ho'tsim (properly KHOTIN),

Rumania, fortified town, on the right bank of the Dniester, opposite to Kaminiec, in Bessarabia, a few miles from the new Polish fron¬

tier. In 1718 the Turks caused it to be regu¬

larly fortified by French engineers; but it was taken by the Russians in 1730, 1769 and 1788.

As it is completely commanded by the hills which surround it. its value as a fortress is now small. Its chief importance is as a mill-582

tary station. The inhabitants are engaged chiefly in agriculture. Here John Sobieski de¬

feated the Turks in 1673. Pop. 19,561.

CHODAT, sho-dii. Robert, Swiss botanist: b. Moutier-Grandval, Jura-Bernois, 6 April 1865. In 1889 he became a professor of botany in Geneva University and was doyen of the Faculte des Sciences there, from 1898 to 1906, and rector of the university from 1908 to 1910.

He has contributed numerous professional papers to botanical journals, and has published many important monographs, including (Principes de botanique> (1906) ; (Sur le polymor-phisme des Algues) (1908) ; (Les Pteridopsides des temps paleozo'iques.*

CHODKIEWICZ, Hod-ke-a'vich, Jan

Karol, Polish general: b. Lithuania 1560; d.

Chocim, 27 Sept. 1621. He served in the Span¬

ish army under the duke of Alva and also under Maurice of Nassau. Later he returned to Poland and took part in crushing the Cossack revolt and the campaigns against Wallachia. In 1602 he went to Livonia as commander of the Polish army and three years later he inflicted a crushing defeat on Charles IX of Sweden at the battle of Kirchholm. He made an unsuc¬

cessful campaign against Russia, and he drove back the Turks who had an army of nearly 200,000 trained men (1620-21).

CHODOWIECKI, iid-do-vy-ets'ke, Daniel

Nicolaus, German designer and engraver : b.

Danzig, 16 Oct. 1726; d. Berlin, 7 Feb. 1801.

He was instructed in miniature painting by his father, and subsequently painted snuff boxes.

He was encouraged to study enameling, and soon attracted attention by the beauty and finish of his productions, some of which came under the notice of the academy of Berlin, and pro¬

cured him a commission to make a set of de¬

signs for their almanac. The manner in which he executed these established his reputation.

He thenceforth devoted himself almost ex¬

clusively to designing and engraving; he pro¬

duced the plates for Klopstock's (Messiah,) (Don Quixote,* Lavater's (Physiognomy, *

editions of Shakespeare, Voltaire, La Fontaine and many other works.

CHODZKO, kodz'ko, Jacob Leonard,

Polish scholar: b. Oborek, 6 Nov. 1800; d. 1871.

Having traveled as secretary of Prince Oginski through nearly all Europe, he established him¬

self in 1826 at Paris, where he published a memoir of the prince, with an introduction en¬

titled Observations sur la Pologne et les Polonais) (Paris 1827), and commenced collect¬

ing materials for a history of his country from the death of Augustus III. Afterward he pub¬

lished the (History of the Polish Legions in Italy, Under the Command of General Dom-browski* (1829). During the revolution of July 1830, Lafayette appointed him his aide-de-camp; and after the outbreak of 29 November of the same year in Warsaw, he acted as agent of the revolutionary government in France.

He was an active member of the French-Polish and American-Polish committees, and after the failure of the revolution, as member of the national Polish committee of France.

CHCENIX, ke'niks, a measure of capacity among the ancient Greeks. Its size is variously given, and it is probable that it actually differed in the different states of Greece. Some ac¬

counts represent it as containing three cotylse, or about 1.487 pints English; others make it equal to 1.982 pints; and still others give it as equal to 3.964 pints. This variety is due to the fact that it was originally the daily ration of a man. Recent discoveries would seem to indicate that the chcenix was about 1.5 liters.

CHCERILUS, ke'ri-lus, the name of several Greek poets, among whom Choerilus of Samos is the best known. He lived in the 5th century b.c., was the contemporary and friend of Herodotus, and composed an epic poem, enti¬

tled (Perseis,* celebrating the victory of the Greeks over Xerxes. The

fragments of the poem still extant have been collected and ex¬

plained by Nake (Leipzig 1817). Another Choerilus, of Iasus, in Caria, is mentioned by Horace as an example of an extremely bad poet. He formed part of the train of literary men who were selected to accompany Alex¬

ander the Great on his expedition to the East.

CHOIR. In religions worship, an organ¬

ized body of singers. In ceremonial Christian religions, the choir officials and choristers, or other singers taken collectively, are spoken of as the choir. Typical choral organizations, such as those of Catholic and Episcopal cathe¬

drals and churches are usually divided into two sets of voices, the one sitting on the north and the other on the south side of the chancel, and are known by the respective titles of Cantoris and Decani from their nearness to the Cantor (or Precentor) and to the Decanus (or Dean).

In most cathedrals and collegiate chapels, the Decani side is held to be the side of honor, the best voices are placed there, and all the verses or soli parts, if not otherwise directed, are sung by that side, which is also considered the (<first choir" (coro primo) in eighth-part music.

In architecture, the eastern limb of a cruci¬

form church or the eastern portion of any church. In the latter case it is more commonly styled the chancel (q.v.), and is frequently con¬

structionally lower and narrower than the main part of the building. The ordinary daily serv¬

ices in a cathedral or collegiate church are held in the choir. While architecturally the term choir is applied to the entire portion of the church east of the crossing, the eastern limb is itself divided into three portions: (a) the ((ritual choir," containing the stalls for the singers and comprising the western portion of the architectural choir; (b) the presbytery, next east of this, containing seats for the laity (a term sometimes applied to all of the choir east of the (<ritual choir") ; (c) the sanctuary, containing the altar and sedilia, and divided from the

remainder by a low railing. In cer¬

tain cases there is even a fourth division called the rectro-choir, comprising one or more bays east of the sanctuary. It should be noted that the ˆritual choir," or place for the singers, does not invariably, correspond with the architectural choir. Sometimes it includes the crossing and one or more bays of the nave, or again, as at Westminster Abbey, London, and in Spanish cathedrals generally, it is entirely in the nave, from the remaining portion of which it is separated by a massive wall or screen. In buildings where the ritual choir is entirely east of the crossing, the choir screen is placed be¬

tween the eastern piers of the crossing. In many cathedrals, the organ is placed upon the

choir screen. In several cathedrals the choir is quite as long as the nave, and in some parish churches even longer, but the usual proportion of choir to nave is as one to three. In many French churches the choir terminates polygonally with encircling chapels and this termination is known as a chevet. The choir of the cathe¬

dral of Saint John the Divine in New York city is built after this plan. In England the square east end is the most common in Gothic churches, although in Norman ones the semi¬

circular apse is not infrequent. In the Middle Ages, the choir, as the most indispensable por¬

tion of the church, was erected first, the nave, regarded practically as a stately approach to the choir, was built later, a century or more some¬

times intervening between the completion of the choir and that of the nave. The cathedral of Saint John the Divine in New York is being erected after the mediaeval custom. The choir was completed for consecration and service in April 1911, and the construction of the nave was begun in 1916.

CHOIR INVISIBLE, The, a novel by

James Lane Allen, published in 1897. It is one of his most popular and pleasing stories, and was enlarged from an earlier story called 'John Gray.* Its scene is the Kentucky of 100

years ago and the fresh picturesque descrip¬

tions of pioneer life in Kentucky give the tale historical value.

CHOISEUL-AMBOISE, shwa-zel-anbwaz,

Etienne Frangais, Due de, French states¬

man: b. 28 June 1719; d. Paris, 7 May 1785; he entered the army in early life and after distin¬

guishing himself on various occasions in the Austrian War of Succession, returned to Paris, where his marriage with the daughter of the financier, Crozat, gave him the command of great wealth, and his intimacy with Madame de Pompadour furnished the means of gratify¬

ing his ambition; as he gratified hers by the expulsion of the Jesuits, whom he had come to hate as much as she did. After having been ambassador at Rome, where he obtained from the Pope, Benedict XIV, the celebrated encycli¬

cal letter intended to appease the disputes which had arisen on the bull Unigenitus and at Vienna, where he concluded with Maria

Theresa the treaty of alliance against Prussia, he became in 1758 Minister of Foreign Affairs.

At the same time he was made a duke. He succeeded the marshal of Belle-Isle as Minister of War in 1761, and the same year he became also Minister of Marine. His administration was distinguished by many useful reforms. He reorganized the army and navy which the dis¬

asters of previous wars and the neglect of previ¬

ous administrations had suffered to fall into decay; negotiated the famous Family Compact which reunited the various members of the Bourbon family, and restored Corsica to France.

His fall was brought about in 1770 by a court intrigue, supported by

Madame du Barry, the new favorite of the king. He was recalled to court on the accession of Louis XVI in 1774, but not again intrusted with power.

CHOISEUL-GOUFFIER, goo-fe'a, Marie

Gabriel Auguste Florent de, Count of,

French antiquarian and diplomat: b. Paris 28

Sept. 1752; d. Aix-la-Chapelle, 20 June 1817

He was colonel in the Queen's regiment, lived at the court of Marie Antoinette, and was the friend and co-worker with Talleyrand. He early displayed a particular interest in every¬

thing relating to Greece. His wish to visit that country was gratified in 1776, and in 1782 ap¬

peared the first volume of 'Voyage pittoresque de la Grece,* which attracted much attention and procured him a seat in the French Acad¬

emy in 1784. The other volume appeared in 1824. The first was entirely revised by him before his death. The same year he was ap¬

pointed ambassador to Constantinople, where he remained till 1791. The appointment of am¬

bassador to London was then offered to him, but he remained at Constantinople and sent his official correspondence to the exiled French princes. This correspondence having fallen into the hands of the republicans the conven¬

tion gave orders for his arrest, but he escaped, taking refuge in Saint Petersburg, where Paul I made him a privy-councilor, director of the Academy of Arts, and superintendent of the imperial libraries. He returned to France in 1802 when his friend Talleyrand again took office and resumed his seat in the Academy.

He was made a peer of the realm immediately after the restoration. He also became a mem¬

ber of the privy council, with the rank of Minister of State and Lieutenant-General. His antiquarian researches were chiefly inserted in the memoirs of the National Institute, and his very valuable

collection of antiquities is now in the museum of the Louvre.

CHOISEUL-PRASLIN, pra-lan, Eugene

Antoine Horace, Comte de, French states¬

man : b. 23 Feb. 1837. He served in the navy from 1853 to 1865, held some minor offices, and in 1869 was elected to the Corps Legislatif. He was first elected to the National Assembly in 1871, and has been several times a member of the chamber of deputies. He is considered one of the leaders of the Republi¬

cans. In 1871 he was Minister Plenipotentiary to Italy; in 1880 he became Secretary of State in the ministry of foreign affairs ; and in 1887

was sent on a botanical expedition to Ceylon and the United States. He was regarded as very influential in the Republican majority.

CHOISY-LE-ROI, shwa-ze-le-rwa, or •

CHOISY-SUR-SEINE, F ranee, town in the

department of Seine, seven miles south of Paris, on the left bank of the Seine. Its broad, straight streets, elegant houses, and fine avenues, with the proximity of the Seine, contribute to render it one of the most agreeable towns in the vicinity of Paris. It owes its importance to the pleasure chateau built here by Mile, de Montpensier in 1682, which was acquired later by Louis XV as a residence. It was destroyed during the Revolution. The church and the town hall were built in the reign of Louis XV. Among its monuments is a bronze statue of Rouget de ITsle, author of the 'Marseillaise,* who died here in 1836. In its cemetery is his tomb. It has manufactures of wax cloth, soap, hats, chemical stuffs, glass, morocco leather, earthen¬

ware, porcelain, and vinegar, and some trade in wine, vinegar, coal, *etc.* Pop. 15,908.

CHOKE-CHERRY (Primus virginiana),

so called from the astringent nature of the fruit, a shrub from 2 to 10

feet high, rarely a small tree, belonging to the family Amygdalacece. For commercial uses the wild black 584

cherry (Primus serotina), which is closely allied to P. virginiana, is valuable. Its wood is one of the best American woods for cabinet¬

making. The bark has medicinal properties as a pectoral tonic and febrifuge. The range of choke-cherry is wide, flourishing along river banks and in rocky situations, from Canada to Florida, and west to Colorado and Texas.

CHOKE-DAMP, or AFTER-DAMP, the

carbon dioxide gas found in mines as a result of the combustion of methane (q.v.), otherwise known as marsh-gas, or fire-damp (q.v.) after explosions. It extinguishes the flame of a candle by depriving it of its oxygen, and asphyxiates any one who ventures into it with¬

out special breathing apparatus. The formula in accordance with which it is formed is CH-t + 40O =

(fire damp) (oxygen from the air)

2H20 + C02.

(water) (choke-damp)

CHOKING, a stoppage caused by a morsel of food, a drop of liquid, etc., passing into the larynx or upper opening of the windpipe, in¬

stead of the gullet, or an obstruction of the oesophagus itself. It is usually followed by a violent fit of coughing which lasts, in slight cases, till the offending substance is ex¬

pelled. Sometimes, however, a larger mass —for example, a half-chewed piece of meat — is drawn into the opening of the windpipe, com¬

pletely blocking it, and arresting respiration al¬

together. This condition is one of extreme danger; the sufferer becomes purple in the face, and if not at once relieved will die of suffocation. The obstructing substance is usually within reach, and may often be dislodged if a bystander promptly pushes his forefinger to the back of the throat and attempts to draw the obstruction forward.

A child may sometimes be saved by holding it up by the heels and shaking it, or slapping its back. If these measures fail relief may be obtained by means of a sharp-pointed knife promptly pushed into the windpipe to admit air to it below the obstruction. In the case of an animal, remove the obstruction with the . hand when possible. Cause the animal to swallow the obstructing substance, if possible, by giving it water, oil or belladonna solution.

Carefully push the obstruction down by a pro¬

bang, if it is possible to effect this, and if with¬

drawal by the mouth is impracticable. In some cases the gullet has to be cut into by a surgeon.

CHOLAGOGUE, kol'a-gog. See Ca¬

thartics.

CHOLERA, kol'er-a, Asiatic, an acute,

infectious disease, endemic in some localities and epidemic in others, characterized by vomit¬

ing and purging of a peculiar rice-water-like fluid, and a stage of collapse.

It is usually ushered in by vomiting, purg¬

ing and griping pains in the stomach, and death may follow in from 1 to 24 hours. If life is retained longer than this time the patient may possibly recover. The mortality is 30 to 80 per cent.

It originated in the East Indies and was not known to migrate for 1,000 years. The oldest Sanskrit writings show that it was known many hundred years before the birth of Christ.

There are abundant proofs of epidemics in the 17th and 18th centuries, but it did not spread into Europe until 1830. The Russians took it from India through couriers and stage-coaches.

Another peculiarity of this disease is that when it was in Marseilles it broke out in Paris, jump¬

ing Lyons, the second largest city in France, notwithstanding the fact that quarantines were in full force.

It was first observed in the United States in 1832, having been brought by immigrants from Great Britain to Quebec whence it found its way across the border to New York. It was also epidemic in the United States in 1835 and 1836. In 1848 it was brought into the country by way of New Orleans, traveled up the Mis¬

sissippi Valley and thence across the continent to California. Other years in which it pre¬

vailed with greater or less severity were 1849, 1854, 1866, 1867, 1873, 1884, 1892, 1893.

Since 1873 it has had no positive foothold in the United Stages or Great Britain, but in the Philippine Islands it has prevailed since 1901 though it is now under control. It has prevailed in the Orient since 1901 and it was severe in Russia from 1907 to 1911. In 1911

it was prevalent in Italy, North Africa, Ma¬

deira, Asia Minor, Arabia and Turkey. It still prevails in India where it is always endemic.

Several cases were brought to the United States on shipboard in 1911, and a number of so-called cholera-carriers were detained until the evi¬

dences of the disease disappeared. There was no extension of the disease from the port of entrance (New York).

Etiology.— The undoubted cause of the dis¬

ease is the comma bacillus which was dis¬

covered by Koch in 1884. It is about half as large as the tubercle bacillus, but is some¬

what thicker. Under high magnification it re¬

sembles a bent rod, or a short spiral. It is about toittto of an inch in length. It will grow in water at ordinary temperatures, and was isolated from the water tanks at Hamburg during the epidemic of cholera which visited that city in 1892. It is said to live at temperatures ranging from — 15° to 104° F.

The bacteria are located chiefly in the intes¬

tines, as, according to Dr. Koch, none have been found to exist in the blood or in any of the other organs. In the lower section of the lower in¬

testines they are found in greatest abundance, also in the dejecta, but not often in the vomit.

It is said that the bacilli cannot live in the stomach.

In post mortem the organisms were found by Koch in the intestines but not in other in¬

ternal organs. They have often been found in the faeces of persons who are apparently healthy, during an epidemic, such persons being the so-called cholera-carriers.

The symptoms of the disease are apparently due to the absorption from the intestine of toxic material generated by the bacilli.

It is asserted that these comma bacilli de¬

stroy the blood corpuscles within a pretty wide range, and it is fair to conclude that they also destroy more or less of the surrounding tissues.

Transmission. — The disease is contagious but not highly so. Those who wash the cloth¬

ing and bedding of cholera patients often con¬

tract the disease, and so do those who come in direct contact with the body, as undertakers, orderlies, etc., but such attacks are probably due to imperfect hygienic precautions on the part of the victims. Physicians and nurses

suffer with comparative infrequency from cholera. Animals may be readily immunized to the disease by first injecting a suitable cul¬

ture of the dead organisms and following it with the injection of a culture of living or¬

ganisms. Many human beings have a natural immunity to it. It is demonstrable that it may be conveyed by vegetables, especially by raw ones, by milk and by other forms of food.

The two agencies by which it is most fre¬

quently conveyed are house flies, which carry the bacilli directly from the dejecta of cholera patients to milk and other food, and water

which is constantly polluted in the countries in which cholera is present. Military camps and barracks are notorious breeding places for cholera. In certain parts of India the water for bathing is also used for drinking purposes and it seems impossible to prevent the natives from thus using it and from suffering the inevitable consequences.

Melville ((Military Hygiene and Sanita¬

tion, > 1912) states that cholera has disap¬

peared from the British army in India since the water supply has been improved and regu¬

lated. The disease is seldom conveyed by the air; its development is favored at the sea-level, by a moist soil, and by a high temperature. It is common to all ages and usually attacks the debilitated in preference to the robust.

Pathological Anatomy of Cholera.— After

death the stomach contains more or less of the whey-like albuminous fluid and is full of cast¬

off epithelium. The small intestines usually contain a large quantity of the whey-like fluid and epithelium. The glands of Brunner, the solitary and agminated patches, are thickened and very prominent. The solitary glands of the large intestines are also infiltrated and swollen.

The liver is more or less advanced in fatty de¬

generation. The kidneys have a pale, white appearance, due to the epithelium blocking the tubes. The bladder is empty and contracted.

The lungs are congested. The right cavities of the heart are distended with blood, while the left cavities are empty and contracted. .

Clinical History. — When the disease runs its typical course it has three stages: (1) The preliminary or stage of invasion. (2) The stage of collapse. (3) The stage of reaction.

It is preceded by a period of incubation which ordinarily lasts from two to five days.

It would seem probable, however, that dur¬

ing a virulent epidemic when people are over¬

come by fear, fatigue, anxiety, etc., the period of incubation may in some cases be hardly appreciable.

1. In the preliminary stage there is more or less profuse diarrhcea which may be ushered in abruptly and with or without fever, or it may be attended with pain, vomiting, headache, great depression of spirits, *etc.*

2. In the stage of collapse there is still profuse diarrhoea with pain and straining.

There is also great exhaustion and great evi¬

dence of shock; the countenance is ghastly, there is subnormal temperature, and a scarcely perceptible pulse. This condition is frequently followed by unconsciousness and death. The stools are at first yellow from the biliary color¬

ing matter, then whitish, resembling rice water, and thev contain blood, mucus, etc., and have an alkaline reaction. The glandular secretions are arrested with the exception of those of the sweat glands; the (<cold sweat" is characteristic of this stage. In nursing women the secretion of milk is sometimes maintained.

3. If the patient survives until the stage of reaction the warmth and color will gradually return to the surface, the pulse will again be¬

come perceptible, urine will again be secreted, the stomach will become less irritable, and the stools less frequent. Relapses are not uncom¬

mon and a patient may apparently be con¬

valescent when suddenly his bad symptoms re¬

turn with uraemia, unconsciousness and death.

Complications are always possible. Those which occur most frequently are the typhoid condition, nephritis, pneumonia, pleurisy, ab¬

scesses in various portions of the body, and the formation of diphtheritic membrane upon the mucous surfaces. The diagnosis of the dis¬

ease is seldom difficult, and can almost always be readily made during an epidemic. The prognosis is uncertain, varying greatly with the type of the epidemic and the resisting power of the individual.

The Prevention and Treatment of Cholera.

— While the treatment of this disease must vary in accordance with local conditions, there are certain methods and regulations which may be regarded as generally applicable.

No specific treatment has as yet been dis¬

covered for it, and living writers with extensive experience in India, where it has been more prevalent during the past ten years than in all the rest of the world, declare that a symptom¬

atic and expectant plan of treatment is as good as any. Latham and English, like others who have worked among Asiatics, admit great diffi¬

culty in carrying out preventive measures for a germ disease which is conveyed by polluted water. Natives in India simply will not take the precautions which are indispensable, in regard to drinking water, to prevent the spread of cholera, precautions which are always neces¬

sary when the water supply comes from storage tanks, wells, polluted rivers, *etc.*

The adequate protection of such people is a hopeless task, but there are always more or fewer white people in such countries who must also be protected and with whom an appeal to reason is not apt to be disregarded.

In countries in which cholera is epidemic or endemic, therefore, the areas in which water is collected, that is to say water sheds, must be protected, religious pilgrimages by which cholera is constantly carried from one country to another must be discouraged by government, and the milk supply, which is so easily con¬

taminated by polluted water, by flies, and by other food, must undergo rigid public super¬

vision.

Preventive measures on the part of local and general governments will also consist in keeping the public streets absolutely clean, in efficient drainage, in careful collection and dis¬

posal of garbage and sewage, in fumigation and disinfection of public and private buildings and private property wherever such attention may be called for. Preventive measures on the part of individuals may consist in (1) Pre¬

ventive inoculation. (2) Personal hygiene.

(3) The treatment of all forms of diarrhcea and of bowel disorders in general.

1. Haffkine's method of preventive inocula¬

tion is as efficient as any which has yet been tried. It consists in the subcutaneous injection

of a culture of living and virulent cholera microbes. An injection of nine minims has been found sufficient as an average dose for an adult. The germs die shortly after their injection, and yield an antitoxin which gives protective immunity from cholera for a few weeks or months though it was not found that it had materially lessened the mortality from cholera in India.

2. As to personal hygiene those who are new arrivals in a cholera infested district are usually more susceptible to the disease than those who are acclimated.

As far as possible, in the presence of cholera, fatigue, worry, the use of unripe fruits and uncooked vegetables must be

avoided. Decomposed food, especially fish, must be avoided with religious care, also stale milk, unboiled or dirty water and alcohol in all forms. Food should be carefully screened from flies; flies should be kept out of the house and should not be allowed to breed in yards and stables. Milk and water should be boiled, the hands and vessels of all kinds should be kept scrupulously clean and if a water filter is required only one of some standard variety should be used.

3. In the preventive treatment of bowel disturbances salines and purgatives should be avoided and a choice may be made from the following astringents : chlorodyne, laudanum, catechu, kino, asafoetida, black pepper and opium, lead and opium, and chalk and opium.

If a person has diarrhoea, when cholera is epidemic it will be wise for him to go to bed and remain there until his diarrhoea is relieved.

Treating during the disease varies accord¬

ing as the stage is that *of (1) invasion, (2) collapse or (3) reaction.

1. In this stage it is essential that the patient be in bed, in the

recumbent position and that the bed be warm and the body dry. The room should be darkened and kept at a tem¬

perature not exceeding 70° F. The patient must be kept quiet, he must have little or no company and be given plenty of iced water, but not enough to provoke vomiting. For the relief of the cramps in the bowel he may in¬

hale chloroform, or be rubbed with a suitable anodyne liniment, or applications of turpen¬

tine or mustard may be applied to the abdomen. Morphine may be given hypoder¬

mically if necessary. The antitoxic sera have been used in various countries in the treatment during this stage but without very satisfactory results. The Japanese are the only ones who speak with confidence of this method of treat¬

ment.

2. In the stage of collapse it is necessary to stimulate the patient as vigorously as his strength will allow. Alcohol in the form of brandy, whisky, or champagne may be given by mouth, also nitrite of amyl, nitro-glycerine, and hypodermics of ether. A very efficient form of treatment consists in the intravenous injection of a normal saline solution. A pint may be injected in the course of ten minutes and this may be given as many as three times if the conditions warrant it.

3. In the stage of reaction the bladder and kidneys must be carefully attended to for there is sometimes suppression of the urinary secretion or retention of urine within the blad¬

der. In such cases heat may be applied over the kidneys, or wet or dry cupping be practised.

The retained urine must be withdrawn with a catheter. If the diarrhoea continues hot injec¬

tions of a suitable astringent may be slowly ad¬

ministered, and bismuth may be given by mouth.

In all cases the food must be simple and easily digested, the stools disinfected, the clothing sterilized, and the hands of nurses and attendants sterilized.

Bibliography. — Latham and English, (A

System of Treatment (1912); Osier, Princi¬

ples and Practice of Medicine) (1912) ; Mel¬

ville, (Military Hygiene and Sanitation >

(1912) ; Burnet, (Microbes and Toxins) (1912) ; Burgey, Principles of Hygiene) (1912).

Andrew F. Currier, M.D.

CHOLERA INFANTUM, an acute infec¬

tious disease of infants, due in large part to a definite micro-organism, the Bacillus shiga, or allied species, characterized by acute gastro¬

enteric inflammation, with nausea, vomiting, diarrhoea, high temperature, wasting and pros¬

tration. Death may result in a very short time.

The child may be attacked suddenly, but it is more liable to occur in children who have been somewhat run down from a mild diarrhoea of indigestion. The child is then taken with the cholera-like diarrhoea, passing thin serous-or rice-water discharges, 10 to 20 a day. The temperature rises abruptly to from 103° to 105°

F. and there is constant vomiting. There is rapid emaciation and prostration, the child having strength only to moan or cry with a sharp irritable sound. Dullness, stupor, and at times convulsions precede death. Treatment should be prompt and requires skilled medical attendance. Acute summer diarrhoea of infants is not necessarily cholera infantum. In fact cholera infantum is not a

common disease, whereas the acute diarrhoeas of children, re¬

sulting from tainted foodstuffs, are very com¬

mon. Every case of summer diarrhoea, how¬

ever, should receive vigorous treatment, because it offers an opportunity for the Bacillus shiga to develop cholera infantum.

CHOLESTERIN, ko-les'ter-in (Gk. xoM,

bile, and a repedg t solid). An unsaturated monatomic secondary alcohol which is found in small amounts in most animal fluids, and is abundant in the nervous system in wool-fat, in the yolk of eggs, and more particularly in gall¬

stones, where it usually is the chief ingredient.

Its empirical formula is still a matter of dis¬

pute. Obermiiller considers that it is C2i H« O

while Mauthner and Suida regard it rather as C21 H + * O. Windaus considers that its structural formula is

ch,3) CH.CH2.CH2.C*H2f,CH = CH2.

ch3 ch3

CH.OH.

At any rate, it is more or less closely related to the terpenes.

Cholesterin that has been crystallized from a heated aqueous solution contains one molecule of water of crystallization. Its melting-point is 148.5°C. It consists of thin plates of a nacreous lustre, and is greasy to

the touch.

Cholesterin, together with certain other CHOLET — CHONDROSTEI

lipoids or fat-like bodies, is to be found in the cell-walls of the red blood corpuscles. This is perhaps to be connected with the fact that cholesterin prevents the haemolytic action of certain poisons, for example saponin.

Substances closely related to cholesterin are found in faeces, in wool-fat, in the tissues of sponges and of the silkworm, and in all vege¬

table fats, being found in the largest quantities in the fats of the pea and of the Calabar bean.

These various substances, called ˆcholesterinsˆ

in a loose sense, may be distinguished from cholesterin proper by various color reactions or by the determination of their melting-points.

The commonest vegetable analogue of choles¬

terin is known as phytoserin , and vegetable fats may be distinguished from animal fats on ac¬

count of the fact that whereas animal fats in general contain traces of cholesterin, vegetable fats contain traces of phytosterin. Consult Windaus, A., article on ˆSterine® (in Bioche-misches Handlexikon, Vol. Ill, 1911) ; Bang, J., (Chemie und Biochemie der Lipoide) (1911) ; v. Fiirth, O., (Probleme der physischen und pathologischen Chemie) (1912).

CHOLET, shd-la’, France, town in the de¬

partment of Maine-et-Loire, on the right bank of the Maine, 32 miles southwest of Angers.

It has a tribunal of commerce, consulting cham¬

ber of manufactures and communal college.

Its manufactures include handkerchiefs and cotton goods, called cholettes, flannels, and woolen stuffs, which industries in this and sur¬

rounding territory employ between 50,000 and 60,000 operatives. There are also wool and cot¬

ton spinning-mills, bleachfields, dyeworks and tanneries. There is a great trade in cattle, lumber and grain, the markets for which are attended by a large concourse of buyers from other parts. Granite is quarried near by. The first considerable growth of the town was when a colony of weavers settled here under Edouard Colbert, Count of Malevrier. Here during the Vendean War, two actions were fought in 1793, in both of which the Royalists were decisively defeated. Pop. 21,058.

CHO LI AMBUS, ko-li-anTbus (Greek,

ˆo3«j/u/?o5, the lame iambus ; also called skazon, from skazo, to halt ; or z'crsus Hipponacticus, because the satirist Hipponax of Ephesus made use of it, or perhaps invented it), an iambic trimeter, the last foot of which, instead of being an iambus, is a trochee or spondee, which gives it a lame motion, as, for instance, Martial, 1. i.

pray. v. 3.

Cur in theatrum, Cato severe, venisti?

An ideo tantum veneras, ut exires ?

We perceive, from the construction of the choliambus, that it may be applied with advan¬

tage to produce a comic effect. The Germans have happily imitated this verse, as well as all other ancient metres. An instance of a German choliambus is —Der Choliambe scheint ein Vers fur Kunstrichter.

CHOLIC (Gk .xolfi, bile) ACID

a non-nitrogenous acid produced by decompos¬

ing the true biliary acids with an alkali. It does not exist in bile ready formed; but is found in the contents of the intestines and in the excre¬

ment. It is crystalline, sparingly soluble in water, but readily soluble in alcohol and ether.

The cholates are rather obscurely crystalline; they are not very soluble in water, but rather more so in spirit. Both the acid and salts have a bitter taste.

CHOLINE, kol'in fGr. x°M, bile), a basic body (C5H15NO2) found in both plants and animals. In animals it is apparently one of the reduction compounds of proteids, being a tri¬

methyl oxyethyl ammonium hydroxide. It is of interest in medicine chiefly because of its close affinities to two very poisonous compounds, into either of which it may be converted. By oxidation it builds neurine, a highly poisonous body; and by hydration it becomes an alkaloid¬

like body closely resembling the plant alkaloid muscarine, from the poisonous mushroom

Amanita muscaria. Thus choline may be one of the auto-intoxicating sub»tances that may be developed in the human body if its normal metabolism is disturbed. It may also be a factor in the so-called ptomaine poisoning.

CHOLMONDELEY, churn'll, Mary, Eng¬

lish novelist. Her fictions have been extremely popular and include (The Danvers Jewels* ; (Sir Charles Danvers> ; (Diana Tempest* ; (A Devotee) ; (Red Pottage*; (Moth and Rust-* ; (The Lowest Rung) ;

Notwithstanding.*

CHOLOCHROME, kbl'd-kroni (Gr. X0A77,

bile, Xpwˆa, color), or CHOLOPH.7EIN, the brown coloring matter contained in bile and in the intestines, and the substance coloring the faeces and the skin in jaundice. It is also a general term for bile pigments of every kind.

CHOLOPH2EIN, kol-6-fe'In, also known

as biliphaein (from L. bilis , bile, and Gr. $ai6<r, dusky) ; an impure bilirubin.

CHOLOS, sho'l o-z, in Peru, the name for those who are partly of white, partly of Indian parentage, the most numerous class of the community.

CHOLULA, cho-loo'la, Mexico, city in the state of Puebla. It is 12 miles west of La Puebla, with which it is connected by rail, and 60 miles southeast of the city of Mexico. The streets are regular and spacious, the houses mostly of one story, and flat-roofed. It is well built and contains a pyramid of clay and brick supposed to have been built by the aborigines in honor of one of their deities and surmounted by a half-ruined chapel, probably erected by Cortes. Cholula, at the time of Cortes, was a flourishing city of 20,000 houses and a large number of temples. It was the chief city of a semi-independent state settled by a tribe of the Nahuatl race. The inhabitants carried on a considerable trade and had a more or less democratic form of government. It was visited by Cortes in 1519, and in spite of his friendly reception by the inhabitants, he massacred a number of them, suspecting them of plotting against the Spaniards. Pop. about 9,000.

CHONDROMA. See Tumor.

CHONDRO-SARCO'MA. See Tumor.

CHONDROSTEI, kon-dros’te-i, an order

of acanthopterygious fishes of lowly organiza¬

tion, the sturgeon, paddle-fishes and their fossil predecessors. The internal skeleton is but little ossified, the vertebrae and most of the skull re¬

maining in a stage of pure cartilage; but the skull is enclosed by close-fitting dermal bony plates. There are no true scales, but a small number of longitudinal rows of large bony 588

plates, with granules on the intervening skin.

The elongated snout, stout body, large fins and strongly hcterocercal tail complete the aspect of these survivors of a once dominant race that flourished from the Lower Devonian through the Mesozoic, except the Cretaceous period, from after the Eocene steadily diminished, until of seven great families only two remain, represented by a few species that exhibit de¬

generacy from the ancient type. Consult Wood¬

ward, (Vertebrate Paleontology > (Cambridge 1898).

CHONDRUS (Gr. XovSpo?, grjstle, car¬

tilage) kon’drus, the genus of seaweeds to which carrageen or Irish moss (chondrus crispus) belongs.

CHONOS, cho-‘nos, ARCHIPELAGO, or

GUAYTECAS ISLANDS, a group of islands

belonging to the Chilean province of Chiloe, lying off the west coast of

Patagonia, mostly be¬

tween lat. 44° and 46° S., and long. 74° and 75° W. Two are large, but they are nearly all semi-barren and scantily inhabited by Chonos Indians. Magdalena is the largest island, and the only settlement of any importance is Melinka.

CHOP-STICKS (Chinese, kwai-tsz, <(nim—

ble or diligent lads®), two smooth sticks, about the thickness of a quill, of bamboo, wood, or ivory, which are used by the Chinese for con¬

veying meat or vegetables, particularly rice, to the mouth. The chop-sticks are used in various manners, serving partially the purposes of a fork and a spoon. The most curious mode of using the chop-sticks is when a bowl of rice is brought close to the lips, the mouth held wide open, and the grain dexterously dashed into it, with the chop-sticks, held one on each side of the forefinger, and plied with a rapid motion quite suggestive of the Chinese title.

CHOPIN, sho-pan' (Frangois), Frederic,

Polish pianist and composer: b. Zelazowa Wola (near Warsaw), 1 March 1809; d. Paris, 17 Oct.

1849. Chopin, in the words of Saint-Saens, ˆrevolutionized the divine art and paved the way for all modern music® — certainly for all piano¬

forte music. His father, Nicholas Chopin, was born in 1770, at Nancy, Lorraine, and emigrated to Warsaw, in 1787, where he was at first a bookkeeper, and subsequently a professor of French in the Lyceum. He was reputed to have Polish blood in his veins, and, in 1806, he mar¬

ried a Polish girl, Justina Krzyzanowska, the daughter of ((poor but noble parents,® who bore him three girls beside Frederic, who inherited from her the intense love of his native country and its art, which is one of his most striking characteristics. He got his first lessons on the pianoforte from a Bohemian composer named Zywyny,

and made such rapid progress that he was able to play a concerto in public before he was nine years old. Three years later he en¬

tered the Lyceum and also took lessons in coun¬

terpoint and harmony from the head of the Warsaw Conservatory, Joseph Eisner, who, while teaching him the value of hard work, had sense enough to recognize his genius and to al¬

low his striking individuality free play. While a student at the Lyceum, he wrote a one-act comedy with his sister, and otherwise showed such an interest in the stage that it seems strange he did not, in subsequent years, write an opera.

The earliest compositions of Chopin were national dances (mazurkas, polonaises, waltzes, a krakowiak, etc.). Some of these were played at the public concerts he gave at Vienna, in Au¬

gust 1829 and again the following year, on which occasion the critics put their fingers on some of the most marked peculiarities of his style — the unconventional accents in his phras¬

ing, and the ((melancholy tints in the style of his shading.® In March 1830, having made up his mind to visit Paris and London, he gave a farewell concert at Warsaw, which was so suc¬

cessful that two more had to be given. In No¬

vember he became traveling virtuoso, visiting Breslau, Dresden, Prague, Vienna, Munich and Stuttgart. This trip was financially a failure, and he had to write home for money to pay his fare to Paris. He was 22 years old when he reached that city, which was thenceforth to be his home. At Stuttgart he had heard of the capture of Warsaw by the Russians. There was much sympathy for unfortunate Poland in Paris, and Chopin profited by it socially. He soon became a favorite of the aristocracy, and a friend of the men and women of genius who at that time made Paris their permanent or temporary abode ; Meyerbeer, Liszt, Berlioz, Mendelssohn, Heine, George Sand, the Countess L'Agoult, Cherubini, Bellini, Balzac and others.

Among these his genius found sympathetic appreciation, but the musical world in general never suspected that he was an epoch-making composer, even after he had lived in the French capital for 18 years. ftHe is underestimated,®

wrote George Sand, and Liszt said : <(Whoever could read in his face could see how often he felt convinced that among all these handsome, well-dressed gentlemen, among all the perfumed, elegant ladies, not one understood him.® Had his contemporaries even suspected his real greatness he might have lived in luxury from the sales of his compositions (which have since his death enriched many publishers), or from a few public concerts. As it was, his concerts grew fewer and fewer, and he had to support himself by giving lessons. As a teacher he was much in demand.

Worshipped by women, Chopin had a mind most susceptible to feminine charms. One of the young ladies he fell in love with, Constan¬

ts Gladkowska, assisted him at his farewell concert at Warsaw. She wore his engagement ring, but married another man. The adagio of the F minor concerto is an echo of his tran¬

sient infatuation. In 1836 he proposed to Maria, the daughter of Count Wodzinski, but she refused him. In the following year, Liszt introduced him to the brilliant novelist, *Mme.*

Dudevant, known to the world as George Sand.

At first, Chopin did not feel attracted to her, but she knew how to overcome his coyness and ensnare his affections. A French writer says of her that (<when she was writing she would often ask Chopin to sit down by the piano and improvise, and inspired by his playing, she wrote some of her finest novels.® For a time, no doubt, her vivid imagination and her sym¬

pathy and appreciation of his music stimulated his genius, too. A romantic episode in his life is the four months he spent with George Sand and her son and daughter on the island of Majorca in quest of health. It was during this sojourn (1838) that he wrote the most marvelously inspired of his works, the (Pre-CHOPIN

hides,) as is proved by his letters and George Sand's (Histoire de ma

vie9 The natives,- on discovering that he was suffering from con¬

sumption, shunned him as if he had the plague, and he found it difficult to secure satisfactory lodgings. This, combined with the rainy weather, aggravated his illness. George Sand found him ua detestable invalid,® whereas his pupils declared, after his death (his friendship with the novelist terminated nine years after the return from Majorca) that she had killed him by her fickleness and cruelty. He visited England in 1848, but was already so weak that he usually had to be carried upstairs. His last days were made comfortable through a gift of $5,000 from a noble Scotchwoman and pupil of his, Miss Jane Stirling. Mozart's Requiem was sung at his funeral, and he was interred near the graves of Bellini and Cherubini in the cemetery of Pere-la-Chaise.

Music is, as Rubinstein remarked, the most aristocratic of the arts, and Chopin was the most aristocratic of musicians. No other com¬

poser equals him in the elegance and polish of style, which resembles that of the best Parisian literature. This is the French side of his genius. Equally fascinating, and much more vital, is its Polish side. Chopin contributed a new national element to the world language of music (as did the Hungarian Liszt in his day, the Bohemian Dvorak and the Norwegian

Grieg afterward). This Polish element char¬

acterizes all his works more or less, but par¬

ticularly the songs, mazurkas and polonaises.

Of the songs there are 17 ; they are simple in structure, but delightfully melodious, and several of them are as realistic reflections in music of the moods of the poems as are the best songs of Germany. The mazurkas, of which there are 56, are like as many orchids ; no two are alike, yet all resemble one another.

They are in three-four time, graceful, melan¬

choly, tender. To most pianists they are music of the future ; only those can properly interpret them who have mastered the Polish ((zal® and the Polish ((rubato.® The zal is a ((compound of pain, sadness, secrecy, rancor, revolt,® such as naturally characterizes a nation with a tragic history like that of Poland. The tempo rubato is

misrepresented in the biographies of Chopin, the writers of which have attached too much importance to Chopin's alleged injunction to his pupils that the left hand must keep strict time, while the right hand melody fluctuates freely. Berlioz attested, on the contrary, that Chopin ((could not play strictly in time.® There can be no doubt that in his playing, as in Liszt's, Rubinstein's, and Paderewski's, both hands frequently retarded and accelerated, scorning the metronomic regularity of the dance hall. The mazurkas have the varium et mutabile, the coquettish quality, of woman; they represent the feminine side of Chopin's genius, as do the dainty, graceful, lively valses (13 in number) which have been called <(dances of the soul and not of the body;® and the 19

nocturnes, with their sweet melodies and dreamy, languorous harmonies. It is no longer permissible, however, to exaggerate this feminine side of Chopin's genius. The refine¬

ment of his style and the exaggerated accounts of his ill-health and feebleness (before his last illness) have distorted his image. He really had the "soul of a lion;® many of his works betray a strength, a virility, not surpassed by any other master.

To this class of his works belong his 15

polonaises, his four scherzos, four ballades, three impromptus, four fantasias, three sonatas and most of the 27 etudes and 25 preludes.

The polonaises represent the chivalrous, mar¬

tial side of Chopin's and Poland's genius. The scherzos are of marvelous originality, with a strong undercurrent of sadness — hallmark of Poland. The ballades are a creation of Cho¬

pin's genius, in form as well as in content ; they are legends without words. The im¬

promptus, also, apart from their contents, give evidence, like the ballades, the scherzos and the fantasias, of Chopin's skill in creating new patterns of musical form. The sonatas contain some of his best inspirations; they have been criticized for lack of coherence, but, as a matter of fact, there is quite as much co¬

herence between the movements as in the so¬

natas of Beethoven. The etudes are infinitely more than technical studies ; they include some of Chopin's most poetic pieces. The preludes Rubinstein considered the pearls of Chopin's work, and it may be asserted safely that, page for page, they contain more of the essence of musical genius than the same number of pages by any other master. Like many of the other works, they reveal Chopin as one of the three or four greatest creators of new melodies, harmonies, modulations and rhythmic varia¬

tions and combinations in the whole realm of music. He started out with what he called the <(perhaps bold but noble determination to create a new epoch in art,® and he succeeded.

Schumann pronounced him "the boldest and proudest poetic spirit of the time® and called the G minor nocturne ((a terrible declaration of war against a whole musical past.® Cho¬

pin revolutionized the art of writing piano¬

forte pieces as thoroughly as Wagner did the method of writing operas. Liszt and all other subsequent pianists followed in his footsteps.

By the use of the sustaining pedal to unite the tones of scattered chords he marvelously en¬

riched the harmonic capacities of the piano¬

forte, and at the same time added countless new tints and shades to its color scheme. He was ((the soul of the pianoforte,® as Rubin¬

stein called him, the most idiomatic of all writers for that instrument.

All of his works are for or with pianoforte.

Beside those named, mention must be made of two concertos ; a trio with violin and 'cello ; a 'cello sonata; an introduction and polonaise for the same instrument; several fantasias and sets of variations ; three ecossaises ; a ber¬

ceuse ; a bolero ; a barcarole ; a tarantella ; three rondos. Of the books on Chopin the best is Huneker's, which also contains analyses of all the pieces and a complete bibliography. Niecke's work in two volumes is more elaborate, • but less commendable in its judgments. Liszt's

book on Chopin is not always reliable, but con¬

tains valuable hints. Other books and essays are by Karasowski, Kleczynski, Tanotha, Wille-by, Bennett, Schucht, Niggli, Hadow, Ehlert, Lenz, Johnson, Finck. The different editions of Chopin's works are excellently discussed by Huneker; consult also the essay on the (Greater Chopin* in his { Mezzotints in Music.*

Henry T. Finck,

Musical Editor of cNew York Evening Post. *

CHOPIN, chop'in, a Scotch liquid measure containing two imperial pints. The chopin, in name at least, was derived from the French, with whom a similar measure was in use till the introduction of the metric system. The French chopine was not a uniform measure, but varied according to localities. That of Paris was a little over four-fifths of an im¬

perial pint.

CHOPIN, chd-pen', an elevated shoe or

clog, introduced into England from Venice in the reign of Queen Elizabeth, and which be¬

came the fashionable wear of court ladies dur¬

ing that reign. The V enetian chopines were made of wood covered with leather of sundry colors, white, red, yellow and sometimes gilt.

Some were of great height, the height of the chopine being regarded as a mark of the rank of the wearer. To such a degree of extrava¬

gance was this carried that women of rank could not walk without being supported. This silly fashion does not seem to have been car¬

ried to the same excess in England. Hamlet (act ii, scene 2) addresses one of the players, ftYour ladyship is nearer to heaven than when I saw you last by the altitude of a chopine.®

CHOPTANK RIVER rises in Kent

County, Del., flows southwest into Maryland, and near the south extremity of Talbot County spreads into an estuary several miles wide and nearly 20 miles long, through which it emp¬

ties into Chesapeake Bay; total course, 100

miles. It is navigable for sloops to the mouth of Tuckahoe River, a distance of about 50

miles.

CHOPUNNISH, cho-pun'ish, or NEZ

PERCE, a tribe of North American Indians, also known as Nimapu, or Sahaptian, the prin¬

cipal tribe of the Sahaptian confederation, who now live on the Nez Perce Reservation, in Idaho, and numbered 1,534 in 1906. At the same time there were 83 on the Colville Res¬

ervation in Washington. The name Nez

Perce originated from the custom formerly followed of piercing the nose. In the Nez Perce War of 1877 the tribe was under the control of Chief Joseph, who forbade his men to interfere with any white non-combatants.

See Sahaptian Indians.

CHORAGIC, ko-raj'ik, MONUMENT, in

ancient Greece, a monument erected in honor of one who had gained a prize as "choragus,®

or organizer of the play and chorus. The remains of two very fine monuments of this sort are still to be seen at Athens, namely, those of Thrasyllus and of Lysicrates, the last popularly called the Lantern of Demosthenes.

CHORAGUS, ko-ra'gus, or, CHOREGUS,

among the ancient Greeks, the musician who directed each of the choruses furnished by the 10 Attic tribes for the public festivals; also the citizens who defrayed the expense of each chorus. (Such an office was established in Oxford University in 1626, but did not last long). The person of the Greek choragus was inviolable, as well as those of the members of the chorus. The choragus who was adjudged to have performed his duty best received an ornamental tripod, engraved by a skilful artist, and bearing the name of the tribe which had gained the victory, of the citizen who had paid the expense, and of the master who had trained the choir. These tripods were set up as public monuments on pillars or other structures. A street in Athens which contained a great num¬

ber of such monuments was called the Street of the Tripods. The most remarkable of these monuments yet remaining is the choragic monument of Lysicrates. (See Choragic Mon¬

ument; Chorus). Consult Gardner, E. A., 'Ancient Athens) (New York 1902) ; Weller, C. H., 'Athens and its Monuments) (New York 1913).

CHORAL, or CHORALE (Ger. choral and

corale). This form of melody, to which sacred songs or hymns are sung by the congregation in unison, may almost be said to belong ex¬

clusively to the German Protestant Church, this style of music having

been introduced by Luther in the early part of the 16th century.

These hymns were written by Luther in the vernacular, founded on the simpler tunes, and arranged to music which was more rhythmic than that in general use. This change appealed to the people and brought out the wonderful power of music to kindle religious passion.

This change also had a great effect upon church music throughout Germany, and within a short time after its introduction a literature of remarkable dignity, simplicity and earnest¬

ness was produced. During the 16th and 17th centuries many excellent examples of chorales were brought forth, probably the most import¬

ant, though not the first, of the early collections being the ‘ Enchiridion,) or handbook, pub¬

lished by Luther and his friend Walther, at Erfurt, in 1524. This book contained a preface by Luther himself, and was undoubtedly the foundation for the extensive number of collec¬

tions which continued to appear till the latter part of the 1 7th century, but which, for many reasons, religious as well as political, shortlv after that time ceased to be popular. Chorales were generally accompanied on the organ, and this custom, together with that of playing and writing so-called figured chorales, soon led to a greater development of harmonv and counter¬

point, so that the art of playing became of first importance to the successful singing of the chorale.

Many of the chorales were original, many were revisions of old church tunes, and some were adapted from altogether secular sources.

Of these latter, the most famous collection was that of Claude Goudimel, published in Paris in 1565, the majority of which were soon incor¬

porated into the German collections, and one of which, ‘Old Hundred, > became very popu¬

lar in England. Others taken from secular sources are ‘Herr Christ der einig’ Gott’s Sohn,* taken from ‘Ich hort’ ein Fraulein klagen,* and

‘Herzlich thut mich verlangen,*

which appears several times in Bach’s ‘Matthaus-Passion,* taken from ‘Mein Gemuth ist mir verwirretP On the other hand, there are many based upon church tunes, such as ‘Der Du bist dreip taken from ‘O beata lux Trini-tatis,* and Mendelssohn’s ‘Allein Gott in der Hoh’, sei Ehr’P

The authorship of many chorales is, how¬

ever, obscure and uncertain, such as the ‘Es ist gewisslich,* generally attributed in England to Luther. But of his authorship of the famous ‘Ein’ feste Burg is unser Gott) there is but little doubt, and it has been incorporated into the compositions of Meyerbeer in ‘The Huguf-

nots, *of Mendelssohn in his (Reformation Symphony,’ of Wagner in his (Kaiser Marsch,*

and of Bach in one of his cantatas. One of Johann Criiger’s chorales, (Nun danket alle pottB became well known in England from its incorporation in Mendelssohn’s ˆobgesangP

See Gregorian Chant.

CHORAL SERVICE, a service with in¬

toned responses, and the use of music through¬

out wherever it is authorized. The service is said to be partly choral when only canticles, *

hymns, etc., are sung ; wholly choral, when, in addition to these, the versicles, responses, etc., are sung.

CHORAL SOCIETIES. A choral society

is a body of amateur singers formed for the purpose of studying and performing large choral works. Formerly all chorus singers were professional musicians, and the chorus that took part in the production of an oratorio did not usually number over 40, while the orchestra was frequently larger than this.

To-day all choral societies consist of ama¬

teurs and are much larger than their profes¬

sional predecessors, while the orchestra is only slightly increased in size. An average chorus numbers 150 to 200 voices, while the orchestra varies from 35 to 60 men. It is possible that the magnificent effect of the chorus formed to celebrate the centenary of Handel's birth by performances given in Westminster Abbey and the Pantheon in London in 1784 may have been a great factor in the formation of choral so¬

cieties in England. This chorus was the largest that had ever been formed up to that time. It numbered 274 and the orchestra 251. At a subsequent festival in 1791 the chorus and orchestra were said to have numbered over 1,000, while for the Handel Festival held in the Crystal Palace in London in 1874 the chorus numbered 3,200 and the orchestra over 500.

It is very doubtful, however, whether such a large body of singers and players is very materially more effective than a smaller one.

The impression on first hearing an enormous chorus is nearly always one of disappointment at the volume of sound. The explanation is made that the large hall necessary for such a large chorus and audience causes a loss of quantity of tone, but this is disproved by com¬

parisons made at a Saengerfest held in Phila¬

delphia, Pa. Here the effect of the entire mass chorus of 5,000 male voices was not much greater than that of a single society of 250

voices. There was a difference, of course, but the volume was not 20

times greater, not even twice as great.

A well-balanced chorus of from 200 to 500

voices is now generally acknowledged to be more effective and much easier to command than the overgrown chorus assembled for a festival. Choruses of this size are very numerous in the United States, Germany and England, where choral work, both religious and secular, is highly appreciated and supported.

It is remarkable that France and Italy, both musical countries and more devoted to vocal than to instrumental music, do not cultivate choral music more generally. Even Berlioz in writing out his list of an ideal musical force to have at command makes his orchestra almost equal in number with his chorus, showing that he had a professional chorus in mind, and that therefore in his time (died 1869) a choral society of amateurs was perhaps unknown.

The Berlin Singakademie, still in existence and world renowned, was the first permanent choral society. Founded in 1791 with 27 mem¬

bers it now numbers 600. Mendelssohn was at one time its conductor.

In the United States the first choral society was the Stoughton (Mass.) Musical Society (1786), the outgrowth of a (<sacred singing school" founded in 1724. The Handel and Haydn of Boston (1815) was of much greater importance, however, and is to-day one of the most important choral societies in the New World. Until 1847 the president of the society was. its conductor, but with the increase of musical ability and criticism it was felt that the time-honored custom wohld have to be given up. Under Bergman (1852) and Zerrahn (1854) it increased in numbers and ability.

Within the last few years under Mollenhauer a thorough reorganization took place and the society rapidly recovered the position which it had to some extent lost.

The Cecelia Society, founded in 1900, under the direction of B. J.

Lang, has done good work in the field of choral music.

In New York a number of choral societies, the Handel and Haydn, the New York Choral Society and the New York Sacred Music So¬

ciety, dating from 1819 to 1849, fostered the taste for choral music. After this for more than 20 years no long-continued effort was made to carry on the work, until in 1873

Dr. Leopold Damrosch founded the .Oratorio Society which, beginning with about 50 mem¬

bers, now numbers nearly 300. Walter Dam¬

rosch, son of Dr. Leopold Damrosch, succeeded him as conductor, and Frank Damrosch, an¬

other son, was conductor from 1898 to 1912, when Louis Koemmenich assumed control.

Frank Damrosch is also conductor of the Mu¬

sical Art Society, devoted to the performance of older church music, and the People's Choral Union of 2,000 voices drawn from the laboring classes. The organization has three classes of members — those constituting the elementary class, the advanced class and the choral union proper. Any self-supporting man or woman may join the elementary class, where thorough instruction as to the proper use of the voice and the rudiments of music is given.

From this class the pupils are promoted to the advanced class, whence upon graduation they pass to the choral union. The attendance at the various classes numbers about 2,500, 450

and 1,200 respectively. Meetings are held every Sunday, and once, in May, a public con¬

cert is given. Another important New York society, the Arion, was founded in 1854. Its membership is about 1,200.

Philadelphia has had several notable choral societies, the Handel and Haydn, the Bee¬

thoven, the Cecilian and the Philadelphia Chorus, conducted by Henry G. Thunder,

Michael H. Cross, Chas. M. Schmitz and W. W. Gilchrist. These have all passed away, but in their stead is a new and vigorous chorus of 300 voices, founded in 1897 and conducted by Henry Gordon Thunder, son of Henry G.

Thunder.

In Baltimore the Oratorio Society under Pache, and in Washington the Choral Society 592

under Kaspar, are presenting standard works in an adequate manner.

In the West the German element of the population forms male choruses. But there is no lack of mixed choruses, which meet yearly for a great singing festival. In making these festivals a means for the spreading of musical culture and intelligence, Theodore Thomas and Frank van der Stucken were indefatigable.

In Chicago the Apollo Club (1872) under Harrison M. Wild, and in Saint Louis the Choral Symphony Society (1870) under Ernst, are bending public taste toward the great choral works.

While the giving of music festivals involves the forming of a large chorus in conjunction with orchestra and soloists, it does not appear that such bodies of voices are appropriately styled choral societies in the strict sense ; hence only passing mention is here made of the Springfield, Worcester and Cincinnati festivals, all of which have large and efficient choruses conducted by Chadwick, Goodrich and Theo¬

dore Thomas.

A difference, however, must be made be¬

tween these choruses and the Bach Choir of Bethlehem, Pa. This unique organization of about 100 voices under the direction of J.

Fred Wolle has devoted itself to the presenta¬

tion of the works of John Sebastian Bach, and in the remarkable series of festivals held since 1900 it has succeeded in achieving a national reputation for itself. It produced the great Mass in B minor for the first time in America, besides giving the Matthew Passion, the Christmas Oratorio and other works in a most impressive manner. To some extent this was no doubt due to the unusual and reveren¬

tial surroundings, the old Moravian town, the venerable church in which the performances were held, the announcement of the perform¬

ance by a choir of trombones in the belfry.

All these details no doubt helped greatly to create an atmosphere of simplicity and sin¬

cerity that affected the audiences that gathered from far and wide, but the real effect was the chorus work, which was done with an earnest¬

ness and devotion that were most impressive and caused the often inadequate solo and or¬

chestra work to be forgotten.

CHORALE. See Choral; Choral So¬

cieties; Music; Gregorian Chant.

CHORAZIN, koˆra’zm, Palestine, one of

the cities in which Christ’s mighty works were done, but named only in his denunciation (Matt, xi, 21; Luke x, 13). It was known to Saint Jerome, who describes it as on the shore of the lake, two miles from Capernaum. Robinson locates it at the modern Tell Hum, three miles

northeast of Capernaum, but this location is doubtful. Though the town was evidently of some importance, judging from the extensive ruins to be seen there, it has received little or no ‘attention in ancient writings, the only men¬

tion of it being in the New Testament. It has been identified with the modern Kerazeh.

CHORD (from the Greek word chorde, a

string of gut). 1. In music , the simultaneous and harmonious union of different sounds, at first intuitively recognized by the ear, and after¬

ward reduced to a science by the invention of the laws or rules of harmony. Chords may consist of from two to five parts. Absolute chords of two parts are produced only by thirds or sevenths. Chords of more than two parts are either fundamental chords or inversions of them and are divided into concords and dis¬

cords. The union of sounds in all chords will be found, on analyzing their component parts, to be an admixture of major and minor thirds.

The common chord of Trais harmonica perfecta is the basis of all harmony and consists of a base note or prime, with its third and fifth .above. These three sounds are the distance of a third from each other. When the lowest third is the greater third, as above, the chord is a major chord; but when the lowest third is the lesser, the chord is called a minor chord.

A chord of two minor thirds combined is called diminished, as the interval from the lowest note to the highest is less than a perfect fifth; the common chord admits of two inversions, ac¬

cording as one or other of its notes is made the base, or lowest note of the chord.

By adding another third above the common chord, a chord of four parts is produced, which is called the chord of the seventh, because the highest note is a seventh above the base. When the chord of the seventh is produced on the fifth of the scale it is then called the

dominant seventh, which is the most perfect species of the chord. It then consists of a major third, perfect fifth and seventh, the minor, which is the next harmonic produced by nature above the fifth. The chord of the seventh may be formed also on any of the notes of the major or minor scale taken as a bass note, which produces the varieties of major, minor and diminished seventh. The chord of the seventh admits of three inversions, according as the notes above the fundamental note are used as bass notes.

From its nature it requires a resolution and is therefore always followed by a common chord, whose fundamental bass is a fifth below that of the seventh.

2. In geometry , a chord is the straight line which joins the two extremities of the arc of a curve; so called from the resemblance which the arc and chord together have to a bow and its string, the chord representing the string.

The chord of a circular arc is obtained by multiplying the radius by twice the sine of half the angle which the arc subtends at the centre.

CHORDATA, kor-da'ta, the most advanced

in development of the phyla, or branches, of the animal kingdom, the phylum which is character¬

ized by the presence of a notochord (q.v.) and in its higher classes by the presence of a back¬

bone and spinal cord. It includes all the ver¬

tebrates (mammals, birds, amphibians, reptiles and fishes), and also Amphioxus, the ascidians, and Balanoglossus. Compare Adelochorda.

CHOREA, or SAINT VITUS' DANCE,

is a disease of the central nervous system characterized by disturbances of spontaneous and co-ordinating movements. It occurs usually .

in the later years of childhood or less frequently the earlier years of adolescence and is more common in girls than in boys. The motor symptoms vary from slight unrest and irritabil¬

ity to marked disturbances. In mild cases the choreic movements, are limited to the face and to single muscles, in more severe ones the en¬

tire body musculature may be involved. The movements in the incipient stage are often scarcely noticed. There are at first slight,

irregular, jerky movements with a tendency to drop articles, due to a relaxation of grasp oc¬

curring simultaneously with the muscular jerk.

I here are also premonitory symptoms of list¬

lessness, depression, nervous irritability, loss of appetite and sometimes anaemia. Psychic mani¬

festations may accompany the development of the chorea in the form of night terrors, transi¬

tory hallucinations, all of which are only tem¬

porary and belong to the less severe forms.

Distinct delirium, stupor and acute dementia belong only to the severer form for which the prognosis is unfavorable. The usual course of chorea is from 6 to 10 weeks, but not in¬

frequently it extends over three or four months, or the movements may persist for many months due to the nervous condition of the child.

Recurrent attacks are also frequent. All of this points to a broader view of the causation than is usually accepted. There is funda¬

mentally present, probably, an inferior or slowly developing psychomotor-cerebellar integration, which is inadequate to the grade

of motor adaptation demanded by the rapidly growing body. Chorea is therefore a fatigue symptom arising from a slight degree of infection or even from mere excess of motor activity.

Rheumatic and other infections aid in reducing the physiological efficiency, but probably have not the specific etiological value that has been as¬

signed to them. Ancestral syphilis, by inter¬

fering with the normal development of the ner¬

vous system, is a causative factor in certain choreas.

The best treatment for chorea is rest in bed during course of the active symptoms. Excite¬

ment of all kinds, play or intellectual effort should be avoided. There should be a full nourishing diet and during convalescence gentle exercise in the open air. Arsenic is of distinct value, but its administration should be very carefully supervised. Neosalvarsan may be used intravenously in some cases with advan¬

tage. In chronic chorea much can be done in overcoming the persistent motor disturbance by judicious training through passive and vol¬

untary movements under guidance. The vol¬

untary movements are very simple at first and gradually become more complex, thereby assist¬

ing in establishing once more freedom and pre¬

cision of movement through co-ordination.

There are also habit choreas which may be hysterical imitation or may be milder forms of convulsive tics, from which, however, true chorea can be differentiated. There are also choreas appearing in adults. The most serious of these is the chorea of pregnancy. It usually occurs with the first pregnancy and may recur with succeeding pregnancies. It soon ceases after the termination of the pregnancy. (For hereditary chorea see Huntington’s Disease).

The name Saint Vitus' Dance was acquired from a dancing mania common at one time in Germany and which was said to be cured by pilgrimages to the shrine of Saint Vitus. The name has been retained although chorea is an entirely different affection from those out¬

breaks of mental and physical excitement. Con¬

sult Jelliffe and White, (Diseases of the Ner¬

vous System) (2d ed., 1917).

Smith Ely Jelliffe.

CHORION, ko'ri-on, the outermost of the membranes that surround the embryo. It is . vol. 6 — 38

a most important structure in its developmental history as it comes into close contact with the decidua and is incorporated into the placenta, constituting the foetal part.

CHORLEY, chor'li, Henry Fothergill,

English critic and miscellaneous writer: b.

Blackley Hurst, Lancashire, 15 Dec. 1808; d.

London, 16 Feb. 1872. His criticisms appeared mostly in the Athenceum of London, display¬

ing fine perception and exquisite taste in mat¬

ters connected with literature and music. His novels, however, (Conti* ; (The Lion,* and (The Prodigy) are failures from the popular point of view, although finely written ; and his plays, with the exception of (01d Love and New Fortune,) are weak.

CHORLEY, England, municipal borough

and market town, in Lancashire, on the Chor, 22 miles northwest of Manchester. It consists of wide and well-built streets, and contains an ancient parish church, various other churches and chapels of modern date, together with a spacious town-hall, several large schools, club¬

houses, theatres, *etc.* The principal manufac¬

ture is that of cotton goods, but there are also bleaching, calico-printing and dye-wood works, floor-cloth works and iron foundries. In the vicinity are coal, lead and iron mines and mill¬

stone quarries. One of the reservoirs of the Liverpool corporation waterworks is here situ¬

ated, with a capacity of 48,300,000 gallons. Pop.

30,315.

CHOROID. See Eye.

CHORON, sh6*-roii, Alexandre Etienne,

French musician: b. Caen, 21 Oct. 1772; d.

Paris, 29 June 1834. Besides being a talented musician he was an excellent scholar, linguist and mathematician. He labored assiduously to promote musical education in France, founding his famous “conservatoire® in 1818. He had be¬

come a music publisher in 1805, and for some years he published the works of the best mas¬

ters. He composed a song entitled (<La Sen-tinelle,® which is still popular in France. His most ambitious work was his “Introduction a l’etude generale et raisonee de la musique,®

which, however, he did not complete. Choron wrote several instructive works on music and composed a number of church pieces. He trained many composers and singers who after¬

ward became famous.

CHORUS, originally a special feature in the Greek drama. During the most flourishing period of Attic tragedy the chorus was a troop of male performers, wearing masks and repre¬

senting male or female characters, who, during the whole representation, were spectators of the action. In the intervals of the action the chorus chanted songs relating to the subject of the performance and which were intended either to augment the impression or to express the feeling of the audience on the course of the action. Sometimes it even took a direct part in the action by observations on the conduct of . the dramatic characters, by advice, consola¬

tion, exhortation or dissuasion. It usually rep¬

resented a part, generally the oldest portion of the people, where the action happened, some¬

times the counsellors of the king, *etc.* The chorus was an indispensable part of the repre¬

sentation. In the beginning it consisted of a great number of persons, sometimes as many 594

as 50; but the number of the tragic chorus was afterward limited to 15; while the chorus in comedy numbered 24. The exhibition of a chorus was in Athens an honorable civil charge, and was called choragy. (See Choragus).

The leader or chief of a chorus was called coryphaeus, who spoke in the name of the rest when the chorus participated in the action.

‘The chorus was often divided into two parts, who sung alternately. The divisions of the chorus were not stationary, but moved from one side of the stage to the other; from which cir¬

cumstance the names of the portions of verse which they recited,

strophe , anti-strophe and epode, are derived. But it cannot be determined in what manner the chorus sung. It is probable that it was in a sort of solemn recitative, and that their melodies, if we may call them so, con¬

sisted in unisons and octaves, and were very simple. They were accompanied by flutes.

With the decline of ancient tragedy the chorus was omitted. Some modern tragedians, as Ra¬

cine in France and Schiller in Germany, have attempted, with more or less success, to imitate or revive the Greek chorus. Shakespeare has employed devices founded on it.

Chorus, in modern music, is that part of a composite vocal performance which is executed by the whole body of the singers, in contradis¬

tinction to the solo airs and concerted pieces for selected voices. The singers themselves are also called the chorus.

CHOSE, shoz, a thing, a chattel, a piece of property; the subject-matter of an action.

Chose is used in divers senses, of which the four following are the most important: Chose local, a thing annexed to a place, as a mill ; chose transitory, that which is movable, and may be taken away or carried from place to place; chose in action, otherwise called chose in suspense, a thing of which a man has not the possession or actual enjoyment, but has a right to demand by action or other proceed¬

ing; chose in possession, a thing which a person has not only the right to enjoy, but also its actual enjoyment.

CHOSEN. See Korea.

CHOSI, cho'she, Japan, a prefectural town, on the east coast of Nippon, 72 miles by rail from Tokio, on the Tonegawa. Fish oil manu¬

facture is the chief industry. The city contains a fine temple situated on an eminence in its centre. Pop. about 19,000.

CHOSROES, kos'ro-ez, or KHOSRU,

properly KAI KHOSRU, (a) a legendary

Persian king, referred to by Omar Khayyam, (b) Chosroes I, king of Persia: d. 579.

He succeeded to the throne in 531, and his memory is still venerated in the East, where his virtues obtained him the titles of the Magnanimous and the Just. At his accession Persia was involved in a war with Justinian, which Chosroes terminated success¬

fully, obliging Justinian to purchase peace by the payment of a large sum of money. In 540, however, jealous of the victories of Belisarius, the great general of the empire, Chosroes vio¬

lated the peace, invaded Syria, laid Antioch in ashes and returned home laden with spoils.

The war continued till 562, when the emperor again purchased peace, by an annual tribute of 30,000 pieces of gold. The peace continued for 10 years, when the war was renewed with Justin, the successor of Justinian, when Chosroes was again successful. His zeal for the administra¬

tion of justice sometimes led him to acts of cruelty; but he encouraged the arts, founded academies and attained considerable proficiency in philosophy himself. His reputation obtained him a visit from seven sages of Greece, who still adhered to the Pagan religion ; and in a treaty with Justinian he required that they should be exempt from the penalties enacted against those who continued to favor Paganism.

It was in the reign of Chosroes that the Turks first became known to Europeans, first as friends, afterward as enemies, of the Persian king.

CHOSROES II, king of Persia, grandson

of the preceding: d. 628. He ascended the throne in 591, on the

deposition of his father.

He was assisted by the Emperor Mauricius, and on the assassination of the latter by Phocas (602) he took up arms against the empire, and refused to make peace at the solicitation of Heraclius, the succeeding emperor. By a long series of successes he raised the Persian power to the highest point, and reduced the empire to extremity. Heraclius, however, taking courage from despair, succeeded in a series of brilliant campaigns in recovering his lost prov¬

inces, 622-27. Chosroes, repeatedly defeated, was completely overthrown in the great battle of Nineveh. He fled with his favorite wife, Sira, but after witnessing the massacre of his numerous sons he was thrown into a dungeon and assassinated by command of his son Siroes.

CHOTA NAGPUR, choTa nag-poor'. See

Bihar and Orissa.

CHOUANS, shoo-ari', a name given to the royalist peasantry of Brittany and Lower Maine, who carried on a petty warfare against the Republican government from an early period of the French Revolution. The name Chouan was finally extended to all the Vendeans. The name was derived from the first chief of the Chouans, Jean Cottereau, who with his three brothers organized these bands in 1792, under the inspiration of the Marquis de la Rouarie, an ardent leader of the Royalists. Cottereau was the son and grandson of persons engaged in the manufacture of wooden shoes. He had joined a band of dealers in contraband salt, and ac¬

quired the surname Chouan from the cry of the screech-owl (chat-huant) , which he used as a signal with his companions. He was killed in an engagement with the Republican troops, 28 July 1794. After the death of Jean Cotte¬

reau, the Chouans become quite lawless, engag¬

ing in guerrilla warfare and highway robbery.

About 1800 they ceased to rob and terrorize, and although an effort was made in 1815 to revive the insurrection, they were suppressed by

General La Marque.

CHOUANS, The, a romance by Balzac, the novelist's first important work. The title, when it appeared in 1829, was (The Last Chouan; or, Bretagne in 1800.) In 1846 it was rearranged in its present form. The author made a profound study of the scenery of Bretagne and the man¬

ners of its people before he wrote his romance, and his pictures of both scenery and people have the stamp of reality and truth.

CHOUSINGA, chow'sTn-ga, a gazelle-like

Indian antelope, remarkable for the fact that CHOUTEAU — CHOWDER

the buck has four horns. See Four-horned Antelope.

CHOUTEAU, shoo -to, Auguste, pioneer,

trader and government peace commissioner: b.

New Orleans 1749; d. 24 Feb. 1829. In com¬

mand of a boat, and accompanied by his young brother Pierre (afterward known as Pierre Chouteau the Elder), in August 1763, they joined the Laclede expedition to open up the fur-trade in the region west of the Mississippi.

In the winter they selected a position on the western bank of the Mississippi, 61 miles above Saint Genevieve, for their principal trading post, and named this Saint Louis. Auguste had command of the party which commenced opera¬

tions there, 15 Feb. 1764. Both brothers, in time, became heads of

large families; acquir¬

ing wealth and a reputation which for over a century was a passport that commanded safety and hospitality among the Indians of the North¬

west.

CHOUTEAU, Auguste Pierre, American

fur trader and pioneer: b. Saint Louis, Mo. > 9

May 1786; d. Fort Gibson, 25 Dec. 1838. He entered the United States Military Academy in 1804 and was appointed an ensign in the 2d United States Infantry, in June 1806. He served on the Southwestern frontier as an aide-de-camp on the staff of Gen. James Wilkinson for a brief term, resigning from the service in January 1807. During the following season he commanded a trading expedition up the Mis¬

souri River, which was accompanied by a mili¬

tary detachment, under the command of En¬

sign Nathaniel Pryor, which had been detailed to escort the Mandan chief, Shehaka, back to his people in Dakota. The expedition was at¬

tacked by the Arikara Indians and driven back down the river with the loss of a number of men killed and wounded. In 1809 he ascended the Missouri River to the Rocky Mountains with a trading expedition, returning the follow¬

ing year. During the War of 1812, when a general Indian uprising throughout the Mis¬

sissippi Valley seemed imminent, he served as captain of militia. In 1815, he formed a part¬

nership with Jules de Mun for the purpose of engaging in the Indian trade in the upper valleys of the Arkansas and Platte rivers. The expe¬

dition met with disaster, first having to fight the Comanche Indians, at a place always after¬

ward known as Chouteau's Island in the Ar¬

kansas River, and subsequently being imprisoned by the Spanish authorities at Santa Fe, where their goods were confiscated, and whence they were expelled. About 1819 or 1820, Auguste P.

Chouteau took charge of the Chouteau trading post on the Grand, or Neosho, River, where he made his home during the rest of his life, and where he entertained Irving and Latrobe en route to their <(tour on the prairies, » in 1832.

At that time he also had another trading post near the lower falls of the Verdigris River, to which Irving referred as the Osage Agency.

In 1834, he accompanied the Leavenworth-Dodge expedition to the Red River country to visit the Wichita, Kiowa and Comanche tribes of Indians. In 1835 he established another trading post at Camp Holmes, on the Canadian River. Two years later he transferred the busi¬

ness of this post to a new one which was built near the present town of Lexington, Okla. He served as a commissioner in negotiating a treaty with the Wichita and other tribes of Indians in council at Camp Holmes that same year. Con¬

sult Latrobe, Charles J., (The Rambler in North America in 1832 and 1833 ˆ ; James, (Three Years among the Indians and Mexicans*

(Missouri Historical Society, edited by Walter B. Douglas 1916) ; Mooney, James, (Calendar History of the Kiowa* (17th Annual Report, Bureau of American Ethnology, part 2, pp.

170-72) ; Catlin, George, (Letters and Notes on the Manners, Customs and Condition of the American Indians* ; Gregg, Josiah, (Commerce of the Prairies.-*

CHOUTEAU, Pierre, the Elder, pioneer,

trader and one of the founders of the city of Saint Louis: b. New Orleans 1759; d. 9 July 1849. He was a brother of Auguste Chouteau (q.v.) whose business travels and enterprises he shared. He was father of Auguste Pierre Chouteau (q.v.) and of Chouteau, Pierre, 2d; b. Saint Louis, 19 Jan. 1789; d. 8 Sept. 1865.

Early engaged in business with his father and uncle he became a leading merchant in the fur-trade in Saint Louis ; and a principal or head of most of the companies successively formed for conducting this

business. In 1834, with Messrs.

Pratte and Cabanne, he purchased the interest of John Jacob Astor in the American Fur Com¬

pany, and in 1839 formed the house of P.

Chouteau, Jr. & Co., which almost monopolized the fur trade of the West and Northwest.

CHOUTEAU, Pierre, Jr., American fur

trader, son of the preceding: b. Saint Louis, 19

Jan. 1789; d. Saint Louis, 8 Sept. 1865. He worked for his father and began trading in fur early in life. After establishing posts for the sale of skins throughout the trans-Mississippi region he purchased the fur-trading interests of John Jacob Astor.

CHOWCHOW, a Chinese or pidgin Eng¬

lish word meaning chopped up or broken and mixed. It is applied to a confection of mixed fruits made in China; to a mustard pickle of assorted ingredients made in India; and in the United States and Great Britain to a similar pickle usually compounded of chopped cabbage, green tomatoes, green or red peppers, spices, vinegar, mustard-seed, cucumbers, *etc.*

CHOWCHOW, a diminutive breed of

Siberian sledge-dogs, improved and developed in China, whence they began to be imported into Europe and America at the beginning of the 20th century. These dogs have the form and coat of their more useful progenitors, and are very compact and sturdy of frame, and lively in disposition. The tail is carried tightly curled over the back. In color they are either all black, even to the tongue and inside of the mouth, or all white, blue, red or yellow. This breed was not recognized in American bench-shows until 1902.

CHOWDER (French chaudiere, <(a kettle**), a dish of French origin, composed chiefly of vegetables, pork and fish or shell-fish, boiled together. Perhaps the most common form of chowder is that made from clams, either from the soft-shelled variety or the hard-shelled round clam or quahog. Chowder is a favorite dish on the New England coast and among the Newfoundland fishermen. A fish chowder is made as follows : Salt pork cut into small strips or dice is cooked for a few minutes in a deep 596

iron kettle. Sliced or chopped onions are slightly browned in the pork fat, and onions and pork are then removed. A layer of sliced potatoes is laid in the kettle, then a layer of fish (small ones entire or large fish in slices), a layer of salt pork, one of onions, and so on alternately to the requisite amount. The fried salt pork and onions are also distributed through the mass, which should be seasoned throughout with salt, pepper, thyme and savory. A very common ingredient is ship-bread or other hard crackers laid in between the other layers. A small quantity of water or of milk, or of both, is poured into the kettle, and the whole is boiled, without stirring, until cooked through.

In-adding the water or milk it must be remem¬

bered that chowder is a stew, — not a soup. For¬

eign cooks make a soup of clams, potatoes, onions and tomatoes, which passes under the name of clam chowder. Genuine chowder is never disturbed until it is served, and in camps is portioned out in layers, direct from the kettle.

CHOWN, Samuel Dwight, Canadian

clergyman: b. 11 April 1853. He was educated at King's Grammar School and Victoria Uni¬

versity; ordained to the Wesleyan Ministry in 1879; was secretary of the social reform com¬

mittee of the Methodist Church in Canada, 1902—10; associate general superintendent, 1910—14, when he was elected general superintendent.

CHRESTIEN DE TROYES, kra-te-en de

trwa, French trouvere (troubadour) : b. Troyes about 1150; d. about the end of the 12th or be¬

ginning of the 13th century. He translated Ovid's (Ars Amandi5 into French, and probably wrote some works based on the classics, but his fame rests upon the still extant romances of Arthur and the Knights of the Round Table, the materials for which were obtained from Geoffrey of Monmouth's rather credulous

(History of Britain.5 They are entitled Uric et Guide) ; (Percival le Gallois) ; (Le Chevalier au lion) ; (Cliget) ; (Chevalier de la table ronde5 ; (Lancelot du Lac5 ; and (Guillaume d'Angleterre5 ; but the authorship of the last named is doubtful. Two others of his works, (Tristan, ou le roi Marc et la reine Yseult5

and (Le Chevalier a l'epee,5 have been ap¬

parently lost. His language and versification were models for troubadours and romancers for a long time; and from him the Arthurian poets to the end of the 13th century borrowed episodes, themes, situations, characters and all manner of poet's devices. Chrestien was a master of invention, fashioned for himself a competent literary vehicle and made most ef¬

fective use of his large knowledge of men and manners. Consult Forster, (Christian von Troyes sammtliche erhaltene Werke5 (1884).

CHRIEMHILD, krem-hilt. See Nibelun-

GENLIED.

CHRISM, a mixture of olive oil with balm (opobalsamum), which, being blessed by the bishop, is used in the Roman Catholic Church in the administration of the sacraments of baptism, confirmation, holy orders and ex¬

treme unction, and in certain rites ; as in con¬

secrating the instruments of the divine service, such as sacred vessels, church edifices, altar stones. The chrism of the Greek Church is compounded of olive oil and a great variety of spices. In the Roman Catholic Church the holy oils are blessed by the bishop on the Thursday of Holy Week.

CHRISOM, kriz'om, the name of the white linen cloth laid by the priest on the child in Roman Catholic baptism, to signify its inno¬

cence. By olden usage it was generally pre¬

sented by the mother as an offering to the Church, but if the child died before the mother was churched, it was used as a shroud. By a common abuse of words, Chrisom came to mean the child itself, being first applied in the old bills of mortality to denote such children as died within the month of birth. .

CHRIST, krist, Wilhelm von, German

philologist: b. Geisenheim 1831; d. 1906. After 1861 he was professor at the University of Munich. He published numerous works in¬

cluding (Die metrische Ueberlieferung der Pindarischen Oden5 (1868) ; (Metrik der Griechen und Romer5 (Leipzig 1879) ; (Atti-kusausgabe des Demosthenes5 (1882) ; (Griech-ische Litteraturgeschichte5 (latest ed., 1904) ; editions of the Uliad5 (1884) ; Pindar (1887) and the (Poetics5 and (Metaphysics5 of Aris¬

totle (1895).

CHRIST (Greek Christos , the anointed;

Messiah, from the Hebrew, has the same sig¬

nification). See Christianity; Tesus.

CHRIST, or CRISS-CROSS ROW. See

Hornbook.

CHRIST, Disciples of, a denomination of Christians in the United States commonly known as the Christian Church, or Church of Christ, and sometimes called Campbellites.

Among the Protestant bodies of America they rank fifth in number. Their strength is great¬

est in the Ohio and Mississippi Valley States.

In September 1809, Thomas Campbell, a Scotch minister of the seceders' branch of the Presby¬

terian Church, then living in western Pennsyl¬

vania, issued a ˆDeclaration and Address,55 de¬

ploring the divided state of the Church, and urging as the only remedy a complete restora¬

tion of apostolic Christianity and the rejection of all human creeds and confessions of faith.

The Christian Association of Washington, Pa., was formed for the purpose of promoting the principles set forth in this declaration. Mr.

Campbell's son, Alexander, just, from Glasgow University, Scotland, at once gave his splendid ability and learning to this new movement. It was not the intention of the Campbells to form a distinct religious body, but to effect the pro¬

posed reforms in the churches. Their plea was so opposed that they were compelled to act independently, and the first church in the new movement was organized at Brush Run on 4

May 1811. The Disciples maintained that hav¬

ing accepted the Bible as their only rule of faith and practice, and the only divine basis for the union of all Christians, they were led to reject infant baptism and adopt believers'

immersion only. They observe the Lord's Supper each first day of the week, and heartily and practically accept and exalt the doctrine of the divinity of Christ. Their church policy is congregational, and they have no distinction of clergy and laity and recognize the local church with its elders and deacons as the highest ecclesiastical authority though they frequently hold conventions in the interest of world-wide missions and benevolent work, but not for legis¬

lative purposes. In recent years the Disciples

of Christ have made great advance in numbers and along all lines of religious activity, until their statistics for 1916 show 14,184 ministers, 17,236 churches and 2,283,003 communicants.

They report about 10,000 Bible schools, with an enrolment of about 900,000 children. They raised $1,503,716 for missions, home and foreign, in 1915, and about $150,000 for other purposes. Among the several universities and colleges of high rank controlled by the Church are Drake University, Des Moines, Ruth Col¬

lege, Indianapolis, Hiram College, Ohio, and Valparaiso University, Indiana.

Bibliography. — Doctrinal: Campbell, Chris¬

tian System* (Cincinnati 1853) ; Errett, Cur Position* (ib. 1885) ; Edwards, 'Or¬

thodoxy in the Civil Courts *(ib. 1887) ; Lamar, (First Principles and Perfection (New York 1895) ; Tyler, Peculiarities of Disciples* (Cin¬

cinnati 1897) ; Garrison, (01d Faith Restated) (Saint Louis 1890) ;

Power, (Bible Doctrine for Young People* (ib. 1899). Historical: Richardson, (Life of Alexander Campbell *

(Philadelphia 1868) ; Tyler, (History of Disciples* (New York 1894) ; Power, (Sketches of Our Pioneers) (Cleveland 1898) ; Gates, ‘Disciples of Christ* (New York 1905) ; and Carroll, (Religious Forces in the United States) (ib. 1912).

CHRIST, Order of the Knights of, an

order instituted in 1317 by King Diniz of Portugal <(for the defense of the faith, the con¬

fusion of the Moors, and the extension of the Portuguese monarchy.® It was modeled on the Spanish orders of the Alcantara and Calatrava and adopted the regulations of the Cistercians. The property from the suppressed Templars was given it as endowment. Papal approbation was secured with difficulty. The knights joined in several Crusades and received great additions to their own possessions and in time the order became so rich and powerful as to excite the jealousy of the Portuguese monarehs. Subsequently their possessions were transferred to the Crown as were the offices of administrator and grand master. The head¬

quarters of the order was the castle of Thomar, 70 miles northeast of Lisbon. John III, in 1523, made the order a monastic one. It was secular¬

ized in 1797 and afterward became a mere honorary order. In 1823 it was extended to Brazil, but was dissolved there after the fall of the empire in 1889.

CHRIST, Papal Order of, a branch of the Portuguese order instituted for Italians by Pope John XXII (1316-34). It later became merely an honorary order.

CHRIST IN ART. The representations

of the person of the Saviour which for a suc¬

cession of ages have constituted one of the most important subjects of Christian art, and have occupied the highest genius of Christen¬

dom, are all ideal. The attempt to represent the personal appearance of the Saviour can hardly be traced back further than the age of Constantine. The origin of Christian art, in¬

deed, has been traced to the catacombs < of Rome, and is not to be considered as springing directly from Pagan art, although the great Italian masters of the Middle Ages may have derived much instruction from classical models; but the painting and sculpture of the early Christians were chiefly allegorical, representing the moral of the gospel parables or similar symbolic representations of Christian doctrine, without regard to historical accuracy of por¬

traiture. At a later period legends arose of various likenesses of the Saviour having been preserved by miraculous means. For example, King Abgarus of Edessa had a napkin sent him by the Saviour himself, in which he had caused his likeness to be miraculously impressed by placing his face in it. A portrait is said to have been similarly impressed on a handker¬

chief of Saint Veronica, and Saint Luke is said to have taken one himself. An apocryphal letter of Lentulus, the predecessor of Pilate, ad¬

dressed to the Roman Senate, contains a descrip¬

tion of the person of Jesus. One of the earliest professed portraits of the Saviour is in the Calixtine Catacomb near Rome. He is repre¬

sented with the hair parted on the forehead, and falling over the shoulders in long waving locks. In regard to this common representation it may be observed that when Saint Paul wrote his first epistle to the Corinthians there were probably many Christians scattered over the w'orld who remembered the personal appearance of the Saviour, and if this representation of it had been correct he would hardly have written to a Christian church that it was contrary to nature and a shame for a man to have long hair. The great painters of the Middle Ages, to whom we owe the ideal representation of Christ, probably founded somewhat upon these early notions. A Christ of the 4th century with an oval face, Oriental features, parted hair and a short straight beard is said to have been the model for the Byzantine and Italian painters till the time of Michelangelo and Raphael.

Consult Jameson, Mrs., (History of Our Lord, as Exemplified in Works of Art* (2 vols., Lon¬

don 1883) ; Kraus, (History of Christian Art*

(Freiburg 1903).

CHRIST CHURCH, College of, a notable

institution in Oxford, England. In 1526 Wolsey obtained from Clement VII a bull for the suppression of 22 monasteries, the site of one of which he chose for a new college, to be called Cardinal College, and which he intended to en¬

dow beyond that of any other in Oxford. On the fall of Wolsey, in 1529, the establishment came into the hands of King Henry VIII. In 1532 that prince founded it under the name of King Henry VIII's College, and in 1546 he once more re-established the college under the name of "Christ Church Cathedral in Oxford, or the Foundation of King Henry VIII, with a dean and eight canons, 100 students, 40 school¬

boys, clerks, choristers,® *etc.* The foundation is now subsisting, though it has undergone con¬

siderable modifications. According to the present statutes, which came into force in 1882, the students, who are equivalent to fellows, are divided into two classes, and are in number about 30, besides honorary students. There is also a body of scholars, about 60 in number, some of whom are elected annually from West¬

minster School, while others are chosen by open competition for proficiency in mathematics, phys¬

ical science or history. The students are ap¬

pointed in the first instance for two years, but this term may be prolonged. There are also 29

exhibitioners, besides six chaplains, the whole forming the largest collegiate establishment in Oxford. The modern spirit of reform was in¬

troduced by one of the most famous deans of 598

the college, Dean Liddell (1855-91), who was also responsible for the restoration of and ad¬

ditions to the college buildings. In 1913 it had 326 undergraduates. The buildings about the great quadrangle include the cathedral, and the Hall, with the exception of the Hall of William Rufus at Westminster, the most splendid ex¬

ample of its kind in England. Christ Church is one of the foremost colleges in Oxford and has always been famous for its distinguished mem¬

bers. Among these may be mentioned five Prime Ministers of England in the 19th century — Canning, Peel, Gladstone, Salisbury and Rosebery. Through it have passed Lyttleton, Mansfield, John Locke, William Penn, Ben Jonson, Camden, Sir Philip Sidney, John and Charles Wesley, Dr. Pusey and John Ruskin.

Consult Thompson, H. L., (Christ Church *

(Loudon 1900).

CHRISTABEL. Coleridge's <Christabel,>

though a fragment, is among all his works sec¬

ond in fame only to the (Ancient Mariner) (q.v.). The first part was written in 1797, the second in 1800; and between them and the date of its publication in 1816 — a delay due largely to Coleridge's uncertain ways — Sir Walter Scott, Charles Lamb, Wordsworth, Southey and many other people of taste and authority had become familiar admirers of the poem.

Except for a certain disappointing harshness in the reviews of the day, this success was re¬

peated in a wider public for the printed form, and may be said still to hold.

ˆhristabeP for us, then, remains a frag¬

ment of a long narrative poem. The second canto leaves off with the baron's anger at his daughter's jealousy and his dispatching Tracy, the bard, to Lord Roland's castle at Tryer-maine. It is a common opinion that Coleridge never told how the poem was to end. But in Gillman's <Life) (p. 301) is supplied an ac¬

count of Coleridge's plans for its completion in a third and fourth canto, by making the supernatural being change from Geraldine to Christabel's absent lover. (ChristabeP is re¬

volted without knowing why — by the suit paid her ; but finally yields to her father's entreaties and is led to the altar. The real lover returns just in time with the ring token. The super¬

natural being disappears, the bell tolls and the mother's voice is heard, and with joy the mar¬

riage and the reconciliations take place.

The metrical beauty of (ChristabeP is one of its greatest claims. It is based on the prin¬

ciple of accent, rather than syllable counting.

There are four accents to the line, with a variation in syllables as the poetic necessity and passion itself may vary. With so delicate an instrument as this, Coleridge shows himself easily to be one of the great masters of Eng¬

lish verse.

The main idea of (ChristabeP is that the virtuous people of this world may save the wicked ; may have a power deeper far than the power of evil. Around this idea Coleridge weaves the story; with the framework of popu¬

lar romance and legend ; the pure maiden, the mother's love ; the natural — supernatural effect, to use his own phrase ; the innumerable lovely cadences; the half-magical imagery; the enchantments ; the poignant and lyrical beauty everywhere evident.

Stark Young,

Professor of English, Amherst College.

CHRISTADELPHIANS, "brothers of

Christ, w a small body of Christians, owning John Thomas, M.D., an Englishman, as their founder. He came to this country in 1832, and was for a time connected with the Disciples of Christ; in 1834 he declared opposition to the doctrines of that body concerning baptism, and other subjects. He announced his belief that the existing churches were apostate and began to form societies which held with him to the Bible as the only rule of faith and practice and to the idea of restoration of primitive Chris¬

tianity. Several years later, the distinctive name of Christadelphians was adopted. This was in the early years of the 6th decade of the 19th century. Christadelphians do not hold to the ordinary view of the Trinity, believing that the Holy Spirit is not a person but an effluence of divine power. They are premillennialists, believing that Christ will come and set up his kingdom in Palestine, and that at the end of the thousand years the righteous will receive the reward of eternal life and the wicked will be sentenced to eternal death. They baptize by immersion and govern their churches by the congregational system. They have no confer¬

ences or associations but hold "fraternal gather-ingsA There is no ordained ministry. They have 70 societies, or churches, and 1,500 mem¬

bers, an increase of less than 90 in the past 10

years. They are scattered over 24 States.

The Christadelphian Advocate, Waterloo, Iowa, is their organ. Consult (Dr. Thomas, His Life and Work* (Birmingham 1880), and (Who

are the Christadelphians (1869).

CHRISTCHURCH, England, a parlia¬

mentary and municipal borough in Hampshire, situated at the confluence of the Avon and Stour, about one mile from the sea. It is famous for its great priory church, dating in part from the early part of the 12th century.

The church is over 300 feet long and contains a magnificent altar-screen. The famous south coast health resort, Bournemouth, is included in the borough. Pop. 5,104.

CHRISTCHURCH, New Zealand, town,

capital of the province of Canterbury, and the see of the primate of New Zealand, situated on the Avon River, seven miles from the sea, and is the terminus of the Great Northern and Southern Railway. A railway tunneled through the Lyttleton Hills connects it with Lyttleton, the nearest port. It was founded by the Canterbur)' Association, a colonizing body of Anglican churchmen formed in 1850, and its streets were given the names of English dioceses. It is one of the two chief centres of the Middle Island.

Socially it is one of the principal towns of New Zealand. Its seaside resort, New Brighton, is famous throughout the island. It contains a number of handsome buildings, including a fine cathedral, the government offices, Saint Michael's Church, the Supreme Court, museum, library and college, and has a flourishing trade and manufactures. Pop. 80,193.

CHRISTEN, kre'sten, Ada. See Breden,

Christine.

CHRISTIAN I, king of Denmark and

Norway: b. 1426; d. Copenhagen, 21 May 1481.

He reigned from 1448 to 1481, and in 1479

founded the University of Denmark.

CHRISTIAN II, king of Denmark, Nor¬

way and Sweden: b. Nyborg, Fiinen, 2 July CHRISTIAN III — CHRISTIAN VII

1481 ; d. Kallundborg, Zealand, 25 Jan. 1559. He was grandson of Christian I. In 1501 he was named successor to the crown and took part in the government of Norway, which he conducted with great severity. On his accession to the throne in 1513 he signed a capitulation in favor of the privileges of the lay and clerical aristoc¬

racy in his dominions, including the independent administration of justice; but all his efforts were bent toward strengthening the royal power, particularly in Sweden, which refused to acknowledge him. To strengthen himself against Steen Sture, the administrator of Swe¬

den, who had set himself in opposition to the union of Calmar formed in 1397 between Nor¬

way, Sweden and Denmark, he married Isa¬

bella, sister of Charles V of Germany, in 1515.

He had already a mistress called Dyveke, the daughter of a Dutch woman who kept an inn in Bergen, Norway. She exercised a great in¬

fluence over the King, and by her liberal spirit and knowledge of the

institutions of Holland tended greatly to improve the administration of his government. She became a sort of prime minister and had great influence in originating those wise laws which gained for this king the love of his subjects. But she incurred the hatred of the nobility, and in 1517 died of poi¬

son. Soon after war broke out with Sweden, and making all the preparations and alliances in his power, Christian sent an army into Swe¬

den commanded by Otto Krumpen, who de¬

feated the Swedes in the decisive battle of Bogesund (Ulrikehamn), 19 Jan. 1520, in which Steen Sture, the administrator, was killed. Stockholm, under the command of the widow of Sture, stood a siege of four months, and on 4 November, Christian was crowned king of Sweden.

Subsequently Sweden revolted under Gustavus Vasa, who had expelled the Danish garri¬

sons and been proclaimed administrator. To find the means of defense Christian convoked the Diet toward the close of 1522. Instead of attending it the nobles and prelates assembled at Viborg in Jutland, proclaimed the deposition of Christian, and called his uncle, Frederick, to the throne. Christian fled to the Netherlands to claim the succor of his brother-in-law, Charles V. Gustavus,' already master of Swe¬

den, put an end to the union of Calmar in 1523, and was proclaimed king. Christian remained nine years in exile without obtaining aid from Charles, and then visited England and Ger¬

many and adopted the Reformed faith. At length, with the assistance of Charles, he equipped a fleet in Holland, landed in Norway in 1531 and was proclaimed king by the Norwe¬

gian Diet, which had refused to recognize Frederick. The commander of the Danish

fleet, a bishop, having offered him a safe con¬

duct, he repaired to Copenhagen to negotiate with Frederick, who disavowed the admiral and retained him prisoner. He was confined for 12 years in the Castle of Sonderborg, island of Alsen, in a dungeon of

which the door was walled up, the only access being by the win¬

dow, and his only attendant a Norwegian dwarf. In 1544 Christian III somewhat re¬

laxed the rigor of his confinement, and in 1549, on renouncing his right to the crown, he was permitted to reside in the Castle of Kallund¬

borg in Zealand, where he was subjected to a less severe surveillance, until his death in 1559.

His misfortunes were chiefly due to the enmity excited by his reforms and his violation of the capitulation entered into at his coronation.

Consult Behrmann, (Kong Christiern II, Historic) (1815).

CHRISTIAN III, king of Denmark and

Norway: b. 1502; d. Kolding, Denmark, 1 Jan.

1559. He succeeded his father, Frederick I, and introduced the Reformed faith into Norway and Denmark. In his reign Norway was re¬

duced to the status of a province.

CHRISTIAN IV, king of Denmark: b.

Frederiksborg, Zealand, 12 April 1577; d.

Copenhagen, 28 Feb. 1648. He was the son of Frederick II and succeeded to the throne as a minor in 1588. He early gave numerous proofs of a sincere love of religion and justice and a high esteem for science and art. He made his celebrated voyage to the North Cape to learn the boundaries of his kingdom and protect the rights of his subjects in that remote region from any foreign interference with their coast¬

ing trade. He was afterward, in consequence of the claims advanced by Sweden to Lapland, engaged in what is called the Calmar War with

Charles IX and his successor, Adolphus, and terminated it by an advantageous peace, in which he stipulated for the free navigation of the Baltic. In the Thirty Years' War he was beaten by Tilly at Lutteram-Barenberge in 1626, but afterward, in conjunction with Gustavus Adolphus, obtained the Treaty of Liibeck 1629.

He has the merit of having laid the foundation of the Danish navy, extended the trade of his subjects to the East Indies, introduced a judi¬

cious system of finance and fitted out several expeditions for the discovery of a northwest passage. He founded Christiania, the capital of Norway, which was named after him. He was succeeded by his son, Frederick III.

CHRISTIAN V, king of Denmark and

Norway: b. 15 April 1646; d. Copenhagen, 25

Aug. 1699. He succeeded his father, Frederick III, in 1670, and carried on a long and fruitless war against Sweden.

CHRISTIAN VI, king of Denmark and

Norway: b. 30 Nov. 1699; d. 6 Aug. 1746. He succeeded his father, Frederick IV, in 1730.

CHRISTIAN VII, king of Denmark and

Norway: b. Copenhagen, 29 Jan. 1749; d.

Rendsburg, Holstein, 13 March 1808. He was the son of Frederick V, whom he succeeded in 1766. In the same year he married Caroline Matilda, sister of the British monarch, George III. He afterward traveled for three years in England, Germany, Holland and France and became a member of several learned academies.

Youthful indulgences, however, had weakened his intellect and obliged him to confide the charge of public business to his ministers, and more especially, it is said, to his favorite phy¬

sician, Struensee, who, though he had gained the affections of Christian and his young bride, was very unpopular as a statesman, and made innovations which provoked the hostility both of the nobility and the army. Notwithstanding the unfortunate circumstances of Christian's reign, several important improvements took place under it. Serfdom was abolished in the duchies, trade and commerce promoted, the Schleswig-Holstein Canal constructed and ex¬

cellent roads formed throughout the kingdom.

Christian was succeeded by his son, Fred¬

erick VI.

CHRISTIAN VIII, king of Denmark, and

Duke of Schleswig-Holstein and Lauenburg: b.

Copenhagen, 18 Sept. 1786; d. there, 20 Jan.

1848. He was chosen king of Norway in 1814, but, unable to hold it against Bernadotte, he abdicated in October of the same year. His reign was comparatively unimportant, the most notable event being the King's proclamation in 1846 that Schleswig and Holstein were insep¬

arably united to Denmark. He was succeeded by his son, Frederick VII.

CHRISTIAN IX, king of Denmark: b.

18 April 1818; d. Copenhagen, 29 Jan. 1906. He was the fourth son of the Duke of Schleswig-Holstein-Sonderburg-Gliicksburg and succeeded Frederick VII on 15 Nov. 1863. On his acces¬

sion he quickly encountered difficulties. The son of the Duke of Augustenburg laid claim to the duchies of Schleswig and Holstein, although his father's rights had been bought out in 1852.

The intervention of Prussia and Austria (1864) wrested the duchies from Denmark after a short war and Christian was compelled to re¬

nounce all his rights over them. Two years later Prussia and Austria quarreled over the spoil; after a short struggle Austria and Hanover were defeated and the latter annexed by Prus¬

sia. The remaining 40 years of Christian's reign were uneventful except for the continual turmoil of domestic politics. But if the country over which he ruled was small and compara¬

tively unimportant, the members of his family certainly filled exalted positions. He married, in 1842, Princess Louise (1817-98), daughter of the Landgrave William of Hesse-Cassel. Of the six children of the union one son became king of Denmark (Frederick VIII) ; another king of Greece (George I) ; one daughter was empress of Russia and is the mother of the deposed Tsar, Nicholas II, while the other daughter is the dowager Queen Alexandra, mother of King George V of Great Britain.

His grandson is the king of Norway, Haakon VII. Christian IX was a true constitutional ruler, democratic and modest to a degree rarely found among royalty.

CHRISTIAN X, Carl Frederick Albert

Alexander Vilhelm, king of Denmark: b.

Charlottenlund, 26 Sept. 1870. He is the son of King Frederick VIII and Queen Louisa. He was married 26 April 1898 to Princess Alexan¬

drine of Mecklenburg and succeeded to the throne on the death of his father, 14 May 1912.

CHRISTIAN I, German prelate, Imperial

chancellor, diplomat and soldier, one of the most picturesque figures of the Middle Ages: d. Tusculum, Italy, 25 Aug. 1183. He was made

archbishop of Mainz in 1165. He was chiefly celebrated for his military exploits under Fred¬

erick Barbarossa, for whom he opened the way to Italy. He died of fever after scaring a hostile Roman army away from the walls of Tusculum, whither he had gone in response to an appeal for help from Pope Lucius III. A contemporary described Christian as a mighty, powerful man, mounted on a heavy horse.

Over his shirt of mail he wore a hyacinth-col¬

ored tunic ; a gilt steel helmet on his head, and was armed with a ponderous battle mace. In this guise he once fought and laid out nine armed opponents single-handed.

CHRISTIAN, Prince, of Schleswig-Hol¬

stein, uncle of King George V : b. Augusten¬

burg, Isle of Alsen, 22 Jan. 1831 ; d. London, 29

Oct. 1917. He was the son of Duke Christian August, who in 1848 placed himself at the head of his adherents to resist by force the claims of Denmark upon the duchies. Father and son narrowly escaped capture by the Danes at the time. The Duke hurried to Berlin to beg the intervention of Prussia. Prince Christian, then 17, joined the newly-constituted Schleswig-Hol¬

stein army with his elder brother, Frederick.

They were defeated at the battle of Idstedt and he finally had to seek a new home. The death of the Danish King Frederick VII in 1863 reopened the Schleswig-Holstein question. But Bismarck had long kept the annexation of the duchies in mind, a policy he carried out by war in 1864.

Prince Christian came to England in 1865 and in the following year he married Princess Helena, third daughter of Queen Victoria. He was created (<Royal Highness** by order of the Queen, and with his wife settled down as an English country gentleman. His eldest son died in the South African War (1900); the surviv¬

ing son, Prince Albert, is an officer in the Brit¬

ish army. Of his two daughters, one is mar¬

ried to a German, Prince Aribert of Anhalt.

See Schleswig-Holstein.

CHRISTIAN, Edward, English jurist: b.

London 1774; d. Cambridge 1823. He was chief justice of the Isle of Ely and Downing pro¬

fessor of law, Cambridge (1800-23). He was the author of various works, among which are treatises on the bankruptcy laws and on the game laws. He also edited an edition of Blackstone, to which he added numerous notes.

CHRISTIAN, The, a novel by Hall Caine, published in 1897. For the most part the scene is laid in the London of to-day. The details of London life are spectacular, and the object of the book seems to be to show the inadequacy of London churches to save the city. A novel by Miss Marie Corelli is entitled (The Master Christian.*

CHRISTIAN ARCHAEOLOGY, that de¬

partment of archaeological science which, through the study of inscriptions, monuments, frescoes, household and ecclesiastical utensils, seeks to throw light upon the ideas, customs and events of the early Christian communities. It may be said to have a beginning in the days of peace following the Diocletian persecutions.

The Acts of the Martyrs were collected and critically examined, but in the 5th century the reading of some of these Acts was forbidden in the Roman Church by Pope Gelasius because of the mixture of legend and fact they con¬

tained. The Acts written between the 8th and 10th centuries have very little critical value, although they contain an element of truth, as the name of the martyr, the date of his death, the name of the judge of the trial, above all his. place of burial, for the Catacombs were still visited. Le Blant, in his < Supplement to the Acta Sincera Martyrum

of Ruinart,* has

shown how it is possible to separate the facts in these Acts from their setting of rhetoric and legend.

From very early times it was the custom to mark in the local calendar the Church feasts celebrated each year. Each church had its own calendar. The most ancient that have CHRISTIAN ARCHITECTURE

come down to us are those of Rome, Tours and Carthage. Later, calendars of the principal churches were united and called martyrologies.

The (Martyrology of Jerome, } made in Italy about the middle of the 5th century and revised at Auxerre, in France, toward the end of the 6th century, is the source from which are de¬

rived existing manuscripts. Other martyrol¬

ogies are those of Saint Bede, in the 8th cen¬

tury, of Rabanus Maurus, of Adon, bishop of Vienne, in the 9th century, and of Usuard, com¬

piled about the year 875. The Roman Martyrology was revised by Cardinal Baronius in 1598.

In addition to the martyrologies there is also the (Liberian Calendar, } so called from Pope Liberius, in whose pontificate it was compiled.

It contains a list of the Roman consuls and the Roman prefects from 254 to 354, the epoch of Pope Liberius, the date of the death of the bishops of Rome during the same period and also the date of the death of many martyrs, to¬

gether with the names of the places where they suffered martyrdom and where they were buried.

It also mentions the principal feasts of the Ro¬

man Church : Christmas, Easter, the Chair of Peter and some of the more solemn feasts of the martyrs.

The (Book of the Popes> ((Liber Pontifi¬

calˆ) is a collection of biographies of the Popes from Saint Peter to Stephen VI (891).

Until recent years its authorship was assigned to Anastasius, the librarian, who lived in the 9th century.

Duchesne and Mommsen both agree that the collection as we have it is a second edition and that it is an expansion of certain primitive cat¬

alogues of the Popes, some of which date as far back as the 2d century.

In the opinion of Duchesne, the biographies of the Popes from the 6th to the 9th centuries were written by contemporaries. The (Book of Popes* has been edited in the 17th century by Fabrotti (Paris 1647), by Bianchini (Rome 1718), by Muratori and by Migne in the 19th.

The text may now be said to be fixed by the edition of the Abbe L. Duchesne (Paris 1886-92).

Of great importance in determining the to¬

pography of the Catacombs and the churches and shrines of the early Church are the guide¬

books written by the pilgrims of the Middle Ages. The earliest of these is the Utinera-rium) of John the Priest, which belongs to the end of the 6th century. John was sent by Theodelinda, queen of the Lombards, to Greg¬

ory the Great to obtain relics of the martyrs.

These he did not obtain, but he brought back with him oil from the lamps that burned be¬

fore their tombs. On each phial he inscribed the name of the martyr and the place of his burial. The original catalogue written by John is still preserved in the treasury in Monza.

The best known guidebook is that of Wil¬

liam of Malmesbury, compiled in the 12th cen¬

tury, perhaps for the use of the Crusaders.

Other guidebooks are those preserved in the monasteries at Einsiedeln and Salzburg. They throw much light on the topography of the Catacombs. To these same pilgrims and to the monks of the 8th century we owe many collec¬

tions of inscriptions, that have since perished.

The (Codex Palatinus) of Heidelberg contains more than a hundred, some of them in metre taken from the papal tombs of the 4th, 5th and 6th centuries. Other collections of inscriptions from Rome, Ravenna, Milan, France and

Switzerland are preserved in Saint Gall, in Switzerland, in Verdun and Wurzburg.

During the Middle Ages the study of an¬

cient Christian monuments was neglected, the Catacombs were well nigh forgotten, but inter¬

est in them was revived at the time of the Re¬

naissance and rediscoveries in the 16th century made possible scientific examination. Anthony Bosio, charge d'affaires of the Order of Malta, spent 30 years in the Roman Catacombs, re¬

producing mural paintings, deciphering and copying inscriptions. He has been called the (< Founder of Christian Archaeology,)) but this title belongs by better right to John Baptist de Rossi, who by his explorations and writings has given to the study the character of an

exact science. He was a Roman, who, at the age of 24, began the study in 1842 under the direction of Padre Marchi, and his 50 years' labor ac¬

complished much in reconstructing the artistic, doctrinal and family life of the Christian com¬

munity of early Rome. He died in 1899, leaving his work to be carried on by Armellini, Marucchi, Wilpert and Stevenson. His classic Toma Sotterranea* has been translated in part into English by Northcote and Brownlow.

Bibliography. — Armellini, (Archeologia

Christiana) and (Le Chiese di Roma) ; de Rossi, (Inscriptions Christianae Urbis Romae* (2 vols., Rome 1857-88) ; Marucchi, (Elements d'Archeologie chretienne) ; id., (Le catacombe romane) (Rome 1903) ; id., (Manuale di epigrafia cristiana) (Milan 1904) ; Lanciani, (Pagan and Christian Rome) ; Martigny, cDictionnaire des antiquites chretiennes* (Paris 1877) ; Kraus, (Real-Encyklopadie der christlichen AlterthumeD (Freiburg 1880-86) ; Smith, (A Dic¬

tionary of Christian Antiquities* (London 1875-80) ; Duchesne, (Christian Worship, Its Origin and Evolution) ; Wilpert, (Principien-fragen der Christlichen Archaologie* (Frei¬

burg 1892) ; Mommsen, (Romische Geschichte.*

William J. White, D.D.

CHRISTIAN ARCHITECTURE, that of

the schools which have grown up among the peoples generally Christian in belief ; but more especially the architecture of churches and their dependencies. The term is used commonly in both senses. Thus, at the time of the Gothic revival in England (most active between 1850

and 1870) the term ˆChristian architecture**

was used especially to denote Gothic art and Gothic and Romanesque

art taken together; and this because it was assumed that those styles were peculiarly the creation of the Chris¬

tian organization, as distinguished from the neo-classical styles of the Renaissance and later epochs, which had obviously been developed from the study of ancient Greco-Roman archi¬

tecture.

Styles which are in a strict sense Christian are (1) the Latin style, identified with the basil¬

icas of the Western Church built from the 4th to the 9th century, and most numerous in Italy, especially in Rome and Ravenna. The Christian basilicas are extremely simple in structure and design. The entrance is generally from a square peristyle, like a cloister; though the narthex or vestibule often replaces it. A nave from 30 to 50 feet wide is divided from two U-Jes by rows of columns often taken from

classical buildings. These columns carry the clerestory wall which rises above the aisle roofs and between the windows of the clere¬

story, and above and below the windows there are large flat surfaces commonly filled with pictures and decorative scroll-work in mosaic.

There are sometimes two additional aisles. The aisles and the nave all stop against the tran¬

sept, which is often higher and generally wider than the nave and is the most striking part of the buildings, but in many of the smaller ba¬

silicas no transept exists. Beyond the tran¬

sept, that is, farther from the entrance doors, an apse projects, and this originally contained the seats of the bishop and his clergy. The high altar had different places at different pe¬

riods, but the middle of the transept, on the axis of the great nave,

was the more usual place and a baldacchino or permanent canopy was built over it — a feature which was pre¬

served in later Italian churches; (2) the By¬

zantine style, finding its great central monu¬

ment in the church of Saint Sophia, Constanti¬

nople, and spread over the Balkan Peninsula, parts of Asia Minor and Syria, with offshoots in Egypt and Persia, and with more recent de¬

velopments among the churches of Russia ; (3) the Romanesque style of western Europe, developed from the attempt of the church builders to roof their naves and aisles, choirs and apses, with vaulting, copied at first from the Imperial Roman examples, which were nu¬

merous throughout western Europe, but al¬

ways with inferior materials and skill; then de¬

veloping into a more florid style, taking differ¬

ent characteristic forms according as it was in¬

fluenced more or less by Eastern intercourse, and spreading over Europe from Hungary to Scotland and Spain; (4) the Gothic style, which is the Romanesque style carried to its legitimate sequence in the way of vaulting, but greatly changed by the very perfection of that constructive process, the buildings growing larger and lighter, more open and with a con¬

stant tendency of the walls to disappear until the building becomes a stone roof supported on light uprights, with no wall surface except under the great wdndows ; the windows them¬

selves very rich in colored glass and filling large parts of the upright screen or enclosure of the buildings. These are the four great di¬

visions of Christian architecture in the strict¬

est sense ; all these styles are treated in the general article Architecture.

There are exceptional forms, less important but very interesting,

hardly to be classified un¬

der the above general divisions. Thus, there exists in Syria a style of building which was entirely unknown until the explorations of the Comte de Vogiie (about 1860-65) and which has been studied since by an American expedi¬

tion. This is a Romanesque of singular sim¬

plicity and consistency of design, the buildings being entirely of stone, roofed and fitted in every part with solid stone, and the whole style growing out of Imperial Roman construction as adapted to a country where stone was the material most easily procured. The resulting style was, however, generally unrestrained by Greco-Roman traditions. The general design and the sculptured detail alike were singularly free, original, logical, inevitable, in their con¬

ception. It has been pointed out bv French critics that the quality of clearness and original thought in design is present in all the earlier and finer buildings. The Christian symbolism, which, in its more elaborate forms, is shown most perfectly in the mosaics of central Italy (see the Latin style above), is seen in its sim¬

plest form carved on the lintels and wall-pan¬

els of these churches. The cross in its many forms, the sacred monograms and ciphers, the vine and other plants identified with the Chris¬

tian teaching of the East, are used with marked success in these carvings both as symbolism and as decoration. The churches of Syria are of singular simplicity and charm. Again, al¬

though the Gothic architecture of Europe reached its culmination at the close of the 13th century, and was less energetic, less fruitful of new thought during the 14th century, this was followed by an independent and most attrac¬

tive style in the 15th century, which on the Con¬

tinent we call generally the Florid Gothic or Flamboyant style, whereas in England it took the shape of the formal and rigid Perpendicular and passed into the Tudor style with its far vaulting. (See Vault). Yet again, as the Italians never understood Gothic architecture nor sympathized with it, there are only a few monuments which are strictly Gothic, but the great cathedrals of Orvieto, Siena

and Flor¬

ence and churches throughout the peninsula and in Sicily, are Gothic in detail, and are adorned by a magnificent system of sculptured and colored decoration. It is to be noted that from the beginning of the 15th century onward the artistic design is less and less dependent on church buildings ; the important dwellings of the nobles in the country, and of citizens in the towns, modifying greatly the style of the day and sometimes taking the lead away from eccle¬

siastical structures. It is entirely a matter of private judgment how far this change tends to remove those later styles from the field of Christian architecture.

Bibliography. — Browne, (Early Christian and Byzantine Architecture* (New York 1912) ; Butler, Architecture and Other Arts in North¬

ern Central Syria > (New York 1903) ; Dehio and Von Bezold, (Die kirchliche Baukunst des Abendlandes) (Stuttgart 1887-1901) ; Esenwein, (Der christliche KirchenbaiP (Frankfort-on-the-Main 1886) ; id., Ausgange der klassischen Baukunst* (Stuttgart 1889) ; Hill, Architec¬

tural History of the Christian Church* (Lon¬

don 1908) ; Holtzinger, <Die altchristliche Architektur) (Stuttgart 1889) ; Hiibsch, (Die altchristlichen Kirchen) (Karlsruhe 1863) ; Kraus, (Geschichte der christlichen Kunst*

(Freiburg 1896); Vogiie, De, (Syrie Centrale; Les eghses de Terre-Sainte) (Paris 1865) ; Von Quast, (Die altchristlichen Bauwerke zu Ravenna.*

CHRISTIAN BROTHERS. See Breth¬

ren of the Christian Schools.

CHRISTIAN BROTHERS COLLEGE,

Roman Catholic institution situated in Saint Louis, Mo., conducted by the Brothers of the Christian Schools. In 1855 it was established and incorporated with power to confer degrees.

The modern language department is given spe¬

cial attention, the pupils being required to con¬

verse and write in French, German and Spanish.

Practical engineering, mechanical and scientific draughting and designing are emphasized in the scientific department. There are also com-CHRISTIAN CHURCH

mercial and preparatory departments. Literary and musical courses are aided by the various organizations which contribute to the develop¬

ment of good taste. The graduates of this col¬

lege are among the distinguished men of the country. The value of the college buildings and grounds is about $650,000, and the total annual income $40,000. The library contains about 22,400 volumes. The student enrolment in all departments in 1916 was 340, and there were 40 instructors.

CHRISTIAN CHURCH, The, a body of

believers who adopt this simple Biblical name and accept the Bible as their rule of faith and practice, in devotion to the principle of unity and as a testimony against sectarianism. An¬

other body, commonly known as the Disciples of Christ, are also called Christians in some sections, and in consequence the two denomina¬

tions, which are in no way ecclesiastically con¬

nected, are confused in the popular mind, and one is taken for the other. The Christians, for the sake of distinction, have been called the Christian Connection, but the denomination itself objects to it. In

rejecting sectarian names it does not arrogate to itself the idea of exclusive right to the use of the name, nor deny that those using distinctive denominational titles are Christian. They recognize all be¬

lievers in Christ as God's children, and as such welcome them to their fellowship, holding, how¬

ever, that those who assume the name Chris¬

tian, a family name, should also welcome all followers of Christ into their fellowship. They believe that other names are divisive, but that this name is unifying.

The Christian Church dates back in its earliest beginning to 1794. Three separate di¬

visions united to constitute it. One of these arose in Virginia, led by Rev. James O'Kelly, who left the Methodist Church, with a number of followers, on account of dissatisfaction with the discipline and methods of that Church.

They chose for the new organization, formed in 1794, the name Christian. The second branch was formed in Vermont in 1801 by Elias Smith and Abner Jones, Baptists who dissented from the Calvinistic doctrines and the polity of the Baptist churches. Other Baptists came to their standard, which affirmed the Bible as their creed and the name Christian as their sufficient desig¬

nation. Many churches were organized in con¬

nection with this movement. The third strand was Presbyterian in origin. In Kentucky dif¬

ferences arose in 1800-01, among Presbyterians in the Crane Ridge revival, and Barton W.

Stone led those who withdrew and formed a new organization with the same name and similar principles as the Virginia and Vermont bodies. Each of these movements was un¬

known to the others until later on when they came together, agreed to principles and polity and united in the organization known as the Christian Church. In 1832 a joint meeting be¬

tween Barton W. Stone, representing, with others, the Christians, and Messrs. Smith and Johnson, the Disciples of Christ, took place, the outcome of which was an agreement to unite under the name Christian. The agree¬

ment was not fully carried out, but^ many Christians followed Stone in uniting with the Disciples of Christ, whose name in that section was afterward Christian. The Christian Church holds to the following principles :

1. The Lord Jesus Christ is the only head of the Church.

. 2. The name Christian is the only appella¬

tion needed by the Church.

3. The Holy Bible, or the Scriptures of the Old and New Testaments, are a sufficient, and should be the only, rule of faith and practice.

. 4. Christian character, or vital piety, is a just, and should be the only, test of member¬

ship, or fellowship in the Church of Christ.

5. The right of private judgment and the liberty of conscience are a right and a privilege that should be accorded to and exercised by all.

Under these principles the Christian Church contends for the oneness of the people of God and the blessings of truth in a wholesome evangelical toleration, in all matters which rest for solution on mere human opinions. Thus athe Presbyterians went into the water without-becoming Baptists; the Baptists continued bap¬

tism without exclusiveness, and the Methodists fellowshipped both without becoming Calvin¬

ists, w conflicting elements were harmonized in the spirit of brotherly

love, the body was one in Christ and each one held to the truth as he saw it.

Deprecating the divisive character and the evils of human creeds and party shibboleths, they determined to take the Bible as their only confession of faith, with Christian character under the new birth (John iii, 1-7) as the only test of church membership and Christian fel¬

lowship, leaving each individual in full posses¬

sion of the right of individual interpretation in all matters of opinon on theological ques¬

tions.

In the United States and Canada the Chris¬

tian Church now has 71 annual conferences, with 1,500 ministers and 113,000 members. They work under a congregational form of govern¬

ment. Their national body is The American Christian Convention, with headquarters at Dayton, Ohio, Rev. J. F. Burnett, D.D., secre¬

tary. To this people belong the distinction of having published the first religious newspaper ever published in the world — The Herald of Gospel Liberty, now published at Dayton, Ohio.

The Christian Church also publishes The Chris¬

tian Sun, Elon College, N. C., The Christian Vanguard, Toronto, Canada, The Christian Missionary, Dayton, Ohio, The Messenger, Sendai, Japan, besides a number of smaller periodicals and many books of permanent value.

To this body also belongs the honor of having first opened the college to both sexes with equal privileges establishing the practice of co¬

education. They now own colleges in Indiana, Ohio, North Carolina, New York, Missouri and Wyoming. Their theological seminary is The Christian Divinity School, a department of Defiance College, Defiance, Ohio.

The Christian Church was among the first denominations to split over the issues of the Civil War, the separation taking place in the National Convention held at Cincinnati, Ohio, in October 1854. Some years after the issues of the Civil War had been settled, there was a reunion at a National Convention at Marion, Ind., in October 1890. After 36 years of sep¬

aration they came together without a jar, under the motto : <(In essentials, unity ; in non-essen¬

tials, liberty ; in all things, charity.® The gen¬

eral trend of the Christian Church in the fundamental doctrines of Christianity is Ar-604

minian. They hold to the divinity of Christ, to the vicarious atonement, to the lost condi¬

tion of the unregenerate, to salvation through Christ. They use either mode of baptism com¬

mon in evangelical churches and practise open communion at the Lord's table. As is common in all denominations to-day, there are a few among them who do not adhere to some of these teachings.

As a whole the Christian Church stands for an evangelical Christianity, for the divine in¬

spiration of the Scriptures, recognizing their authority as final in all matters of faith, practice, and doctrine. They steadfastly main¬

tain, not that they have no creed, as some ignorantly or wilfully affirm, but that they have no creed but the Bible, allowing nothing in the way of any human expression of doctrine to displace them in this position. Consult Bur¬

nett's (Origin and Principles of the Christians) (Dayton, Ohio, 1903).

J. Pressley Barrett,

Editor of (The Herald of Gospel Liberty. y CHRISTIAN CHURCH, Divisions and

Statistics of the. The term Christian Church is here used in a comprehensive sense. Some religious bodies adopt it as a denominational title; a few claim the exclusive right each to be considered as the one and only Christian Church. The broad use of the name here in¬

cludes all religious bodies which worship Christ as divine, or revere Him as a great religious teacher and example, and wish to be called by His name.

Divisions of the Christian Church. — There are three main divisions of the Christian Church: (I) The Roman Catholic; (II) the Eastern Orthodox; (III) the Protestant. A separation took place between the Eastern and Western sections of the Christian Church in the 11th century, the Western section adhering to the primacy of the bishop of Rome, the Eastern section adhering to the primacy of the patriarch of Constantinople. Thus was created the first and second divisions ; the third division, the Protestant, arose from a schism in the Western section, begun in 1517 by Martin Luther, in what is known as the Reformation and resulting in a division of the Church in the West into the two great bodies of Catholics and Protestants.

I. Western Division — The Roman Cath¬

olic Church. — The <(Holy Catholic Apostolic Roman Church® claims to be the oldest, the original, Christian Church, tracing its begin¬

ning to the appointment of the disciple Peter by Christ himself as the chief Apostle, and delivery to him of the <(keys.® Peter resided at Antioch and then at Rome, according to tradition, where he was martyred in a.d. 67.

He heads the list of bishops of Rome, in which office he has had 259 successors. While two other bodies claim an origin quite as early and

equally apostolic (see Armenian and Syrian Orthodox), the Church which had its capital at Rome from the beginning was the chief, if not the only, Christian Church in primitive times, including the Eastern capital at. Con¬

stantinople. The first great separation in the Christian Church occurred in the 11th century, over the filioque controversy and other differ¬

ences, the Church at Rome adhering to the doctrine that the Holy Ghost proceeds from the Father and the Son, and the Church at Con¬

stantinople maintaining the view that He pro¬

ceeds from the Father alone. The Roman Church, including western and southern Europe and Africa, excepting Egypt, recognized the primacy of the bishop of Rome, whose other ecclesiastical titles, as now stated, are, <(Vicar of Jesus Christ, Supreme Pontiff of the Uni¬

versal Church, Patriarch of the West, Primate of Italy, Archbishop and Metropolitan of the Roman Province, and Sovereign of the Tem¬

poral Dominions of the Holy Roman Church.®

Connected with the Roman Catholic Church are bodies in Europe, Asia and America, called Uniates, who represent secessions from the Eastern Churches, at various times. The great body of the Church uses the Latin ritual, which obtained from the beginning, but the Uniates, in consideration of acknowledging allegiance to the Pope and accepting the dogmas and sacra¬

ments of the Roman Church, are allowed to use their own rites, which are chiefly in the Greek, the Armenian, the Syrian and the Cop¬

tic, and certain other privileges to which they had been accustomed. The Roman Catholic Church is world-wide in its territorial range, having churches and members in all continents, countries and populations.

2. To the Western division also belong small bodies which are not in communion with the Roman Catholic Church, having separated from it chiefly because they reject papal claims and dominion. Among these dissidents are the Old Catholics of Germany, Austria, Switzerland and other countries of Europe, including the Jansenists of Holland; also

the Polish National Church of the United States and the American Old Catholic Church, no one of which has ob¬

tained a large following.

II. Eastern Division — Eastern Orthodox Churches, specifically called the <(Holy Or¬

thodox Catholic Apostolic Eastern Church.®

This division includes properly the Hellenic, Russian, Syrian, Rumanian, Serbian and other Orthodox Churches, which, though independent of one another, are in general agreement in matters of doctrine, worship and practice, ac¬

cepting the seven ecumenical creeds (those adopted before the division of the 11th cen¬

tury), and having rituals of the same general type, though differing in language.

1. The Greek Orthodox Church. — In the separation between the Western and Eastern sections of the Christian Church, Constantinople, which had been the eastern capital of the Roman Empire, became the capital city of the Eastern Church. Constantine the Great had issued an edict of toleration for Christianity in the 4th century, and a patriarch had been at the head of the Church in the East long before the separation. The patriarch of Constanti¬

nople is still at the head of the Greek Chris¬

tians of Turkey.

2. The Hellenic Orthodox Church is the na¬

tional church of Greece. It is independent of the Greek Church of Turkey, and is gov¬

erned by a synod of bishops.

3. The Orthodox Church of Russia, em¬

bracing the empire, was for some time under the control of the patriarch at Constantinople, but became independent in the process of time and had its own patriarch until the patriarchate was abolished by Peter the Great, to be restored in 1917 after the dethronement of the Tsar.

Archbishop Tikhon, of Moscow, is the new patriarch.

4. The Serbian Orthodox Church embraces Serbia, with a patriarch resident at Belgrade.

5. The Orthodox Church of Austria-Hun¬

gary consists of Serbs, Rumanians and Ruthenians resident in the empire, under distinct heads.

6. The Orthodox Church of Montenegro is under the rule of bishops.

7. The Orthodox Church of Bulgaria , em¬

bracing Bulgaria and Macedonia, is under the care of an exarch.

8. The Syrian Orthodox Church is com¬

posed of Syrians by birth and descent who speak only the Arabic language, and has two patriarchates, one at Antioch and the other at

Jerusalem. There are several thousand of these Christians in America, where they are under the care of the Russian Orthodox Church.

9. The Orthodox Church of Rumania is

under the supervision of the metropolitan of Bucharest.

10. There are still in existence the ancient patriarchates of Alexandria and Mount Sinai, with a reduced number of sees and followers; also the Orthodox Church of Cyprus.

11. The Armenian Church. — Although not in the Orthodox Eastern Communion it is an ancient Church of the East, which traces its origin through shadowy tradition to the Apos¬

tles Bartholomew and Thaddeus, and claims a vigorous renewal and organization under Gregory the Illuminator in Armenia, before the close of the 3d century, resulting in the accept¬

ance of Christianity by the king, making Ar¬

menia the first Christian country. The patri¬

arch, or catholicos, has his seat at the foot of Mount Ararat in Transcaucasia. Persecutions have widely scattered the Armenians, a con¬

siderable number of whom are in America.

12. There are a number of Churches, the Coptic or Jacobite Church of Egypt and Syria, the Church of Abyssinia, the Nestorians and Chaldeans, which are not orthodox; but for want of a more suitable classification they are included with the Eastern Churches, together with numerous dissenting sects in Russia, the Raskolniks, or schismatics ; also similar bodies in other countries where the Eastern Orthodox Church is found in strength.

III. Protestant Division. — This division embraces practically all the Christian bodies not included in the first two divisions, and they are great in number and in diversity of belief, government and practice. The multiplicity of small bodies with their differences manifests the diversity of Protestantism ; on the other hand, the fact that the overwhelming mass of Protestants are found in the great evangelical communions, like the Anglican, the Baptist, the Lutheran, the Methodist, the Presbyterian and the Reformed, manifests the orthodox unity of Protestantism.

Protestantism historically began with the Reformation of Luther; but there were re¬

formers before Luther, and divergences from Roman Catholic belief and discipline before his day, as witness Peter Waldo, of the 12th cen¬

tury, and John Huss, burned at the stake as a heretic in 1416, and the Waldenses (q.v.) and the Bohemian Brethren (q.v.). Out of the Reformation led by Luther in Germany, begin¬

ning in 1517, and by Zwingli, Knox and others in other countries, have grown through the mutations of the centuries and by division and subdivision the ecclesiastical organizations known collectively as Protestantism (q.v.).

1. Evangelical Lutherans. — The direct out¬

come of the Reformation, this communion, called ˆLutherans® by Catholic contestants, a name opposed by Luther as ˆsectarian,® embraces in its numerous branches most of the countries of the world. These bodies are practically one in belief, holding either to the Augsburg Confes¬

sion or to the Book of Concord, or to both ; but using the episcopal form of government in Scandinavia and other parts of Europe and the congregational or presbyterial systems in the LTnited States and elsewhere. In Germany, (a) United Evangelical State Church is reckoned as about seven-eighths Lutheran and one-eighth Reformed; (b) Old Lutherans and other

Lutheran organizations which are without state connection; (c) Evangelical Lutheran Church of Sweden; (d) of Norway; (e) of

Denmark and Iceland; (f) in Russia, including Poland and Finland; (g) in Hungary; (h) in Hol¬

land; (i) in Switzerland; (j) in France; (k) in the British Isles; (1) also in various other European countries; (m) also in Asia, Africa and South America; in the Llnited States; (n) General Synod; (o) General Council; (p) United Synod South; (q) Synodical Confer¬

ence; (r) Norwegian Church; (s) Synod of Ohio; (t) Synod of Iowa; (u) eight other smaller bodies. Other bodies of Lutheran origin are (v) German Evangelical Protestant Church and (w) German Evangelical Synod, both of which were originally from the Evan¬

gelical State Church of Germany. Also, Swed¬

ish Evangelical bodies, outcome of the Walden-stromian movement in Sweden; (x) Swedish Evangelical Mission Covenant, and (y) Swedish Evangelical Free Mission.

2. Reformed and Presbyterian Churches. —In Continental Europe, the Reformation pro¬

ceeded along two distinct lines, the Lutheran and the Reformed, the latter being more em¬

phatically Augustinian, or Calvinistic, in doc¬

trine. Led by Zwingli, Calvin and others, it also differed from the Lutheran in its views of the eucharist. Churches were organized as follows: Reformed Church in (a) Germany; (b) in Switzerland; (c) in Austria; (d) in Hungary; (e) in Bohemia; (f) in Holland; (g) in France. In Prussia and other German states the Reformed and Lutheran Churches were united in 1817 in the Evangelical State Church. Holland continues to be a stronghold of the Reformed Church, whence it was early planted in the East Indies, Africa and America.

(h) Reformed Church in America and (i) Christian Reformed Church came here from Holland; (j) Reformed Church in the United States and (k) Hungarian Reformed Church came from Germany and Hungary respectively.

(1) Waldensian Church of Italy, antedating all the Reformed Churches,

properly belongs to this group, or to the Presbyterian. The Pres¬

byterian Churches proceeded from the Ref¬

ormation in the British Isles, led by Hamil¬

ton, Wishart and Knox, and established in 1560. In doctrine and polity the Presbyterian Churches are in general harmony with the Re¬

formed Churches of the Continent. Existing bodies of the Presbyterian name, omitting small organizations, are: In Scotland, (a) Church 606

of Scotland; (b) United Free Church; (c) Free Church; (d) Reformed Presbyterian

Church; (e) United Original Secession Church; in England and Wales, (f) Presbyterian Church of England; (g) Calvinistic Methodist Church of Wales; in Ireland, (h) Presbyterian Church of Ireland; (i) Reformed Presbyterian Church ; (j) Secession Church; in the British Colonies, (k) Presbyterian Church in South Africa; (l) Presbyterian Churches in Australasia; (m) Presbyterian Church in Canada; in the United States; (n) Presbyterian Church, North¬

ern; (o) Cumberland Presbyterian Church; (p) United Presbyterian Church; (q) Re¬

formed Presbyterian Church, Synod; (r) Re¬

formed Presbyterian Church, General Synod; (s) Associate Reformed Synod of the South; (t) Welsh Calvinistic Methodist Church. Other small bodies in the United States and elsewhere are omitted. The Reformed and Presbyterian Churches of the world are united in an <(Alliance of the Reformed Churches throughout the World holding the Presbyterian System.ˆ

3. The Church of England and its branches in various parts of the world constitute the Anglican Communion. The Church of Eng¬

land definitely ceased to be a part of the Ro¬

man Church in the reign of King Henry VIII, about a century after Luther's break with that body. Christianity was carried to the ancient Britons from the adjacent continental countries, as is supposed, and it is claimed that the Church of England, which holds that it has unbroken apostolic succession for its prelates and clergy, was always a national Church, and was not con¬

tinuously subject to the see of Rome. The branches are (a) Church of England; (b) Church of Ireland; (c) Episcopal Church of Scotland; (d) Protestant Episcopal Church in the United States; (e) Church of England in Canada; (f) in the West Indies; (g) in India and Ceylon; (h) Holy Catholic Church in Japan (missionary) ; (i) Holy Catholic Church in China (missionary) ; (j) Church of England in Africa; (k) in Australia and Tasmania; (1) in New Zealand and Melanesia. There are independent sees in Newfoundland, South

America, Asia, Africa and other countries, which hold relations direct with the archbishop of Canterbury, the primate of England. The various branches meet in Conference at Lam¬

beth at long intervals. (m) The Reformed Episcopal Church of the United States, Canada and England historically belongs to the Angli¬

can group, though it is not in union with it.

4. The Baptist Churches.— These date back through the Anabaptists to within a few years of the time of Luther. Anabaptist churches, which refused to recognize infant baptism as valid, were formed in Switzerland as early as 1523, and sprang up later in Holland, Germany, England, whence the modern type came to the United States. Baptist churches use almost without exception the congregational or inde¬

pendent form of government, and hold to the principle of baptism of believers only by im¬

mersion. They are divided by national bound¬

aries, and in the United States by differences in doctrine, practice, *etc.* The chief bodies are in the United States and England: (a) Baptist Union of England and Wales (omitting some small bodies) ; (b) Baptist churches in Scot¬

land; (c) in Ireland; in the United States, where the great majority of Baptists are found —(d) Northern Baptist Convention; (e) South¬

ern Baptist Convention; (f) National Baptist Convention (two colored bodies claiming the same name) ; (g) Primitive Baptists, very con¬

servative ; (h) Freewill Baptists; (i) 10

smaller bodies; (j) Baptist churches of Canada; (k) Baptist churches of Australia.

Considerable numbers of Baptists are found in Germany, Russia, Sweden and other European countries, and in the mission fields of Asia, Africa and South America. Similar in doctrine and practice are the (1) German Baptist Breth¬

ren, or Dunkards (four bodies); and the Churches of God (Winebrenner).

5. C ongregationalists. — The first churches of this order — full autonomy or independence of the local church — were formed in England in the last quarter of the 16th century, one of which emigrated to Holland and thence to the United States in 1620. (a) Congregational Union of England and Wales; (b) Congregational Union of Scotland; (c) Congregational Union of Ireland; (d) Congregational Conference of the United States; (e) Congregational Churches of Canada; (f) in Africa; (g) in Australasia; (h) in Holland; (i) in Germany, Sweden and other parts of Europe ; also in mission fields of Turkey, India, China and Japan.

6. Friends or Quakers (George Fox, Drayton, England, founder), date from the middle of the 17th century. They regard the sacraments as spiritual, and do not observe them by outward rites, and they are non-resistant. Persecution drove English Friends to the United States, Canada and elsewhere. In England, (a) Yearly Meeting of Friends; in the United States, (b) General Conference of Friends, Orthodox; (c) Society of Friends, ˆHicksite® ; (d) Society of Friends, “Wilburite^ ; (e) Society of Friends, Primitive.

7. Mennonites. — A group of 12 or more small bodies in the United States and Canada, and other bodies in Europe, who regard Menno Simon, a Waldensian preacher of the 16th cen¬

tury, as their founder. They came to the United States from Germany, Holland, Switzerland, Russia, in our colonial days. They reject infant baptism, baptize generally by pouring and hold to the principle of non-resistance.

8. Moravians. — A body rising out of the Huss movement in Bohemia and Moravia, whose offi¬

cial name is Unitas Fratrum. Their headquar¬

ters are at Herrnhut, Germany, there being three branches, (a) German, (b) British, (c) American. They hold close relations with the Union of Bohemians and Moravians, which has a small representation in the United States.

9. Methodist Churches. — ‘Originating in 1739

in England, through the preaching of John and Charles Wesley, George Whitefield and other clergymen of the Church of England, carried to the United States in 1760-66 by immigrants and spread over the world, Methodism embraces : in the British Isles, (a) the Wesleyan Methodist Church; (b) the Primitive Methodist Church; (c) the Wesleyan Reform Union; (d) the United Methodist Church; (e) the Independent Methodist Churches; in the United States; (f) Methodist Episcopal Church; (g) Methodist Episcopal Church, South; (h) Methodist Prot¬

estant Church; (i) African Methodist Episcopal Church; (j) African Methodist Episcopal Zion Church; (k) Colored Methodist Episcopal

Church; (1) Free Methodist Church; (m)

American Wesleyan Methodist Church; (n)

Primitive Methodist Church; (o) five other small bodies; (p) Methodist Church of Canada; (q) Australian Methodist Church; (r) New Zealand Methodist Church; (s) Methodist

Church of Japan. The latter is the product of missions of three Methodist bodies; there are also large numbers of members in the mission fields of Asia, Africa, Europe, South America and elsewhere. Four other bodies in the United States of kindred belief and practice, which have been represented in the Ecumenical Metho¬

dist Conference, decennial, are (t) Evangeli¬

cal Association; (u) United Evangelical

Church; (v) United Brethren in Christ; (w) United Brethren in Christ (Old Constitution).

10. Disciples of Christ. — A considerable body in the United States and other countries, with non-sectarian name and principles, with which may be classified the Christians, an organization of similar purposes and principles.

Neither has any creed but the Bible. The former are often called by the name of the latter. Both originated in the early part of the 19th century. Another small body known as the Christian Union may be included in this group. • • i ,

11. Unitarians. — A liberal body, in the United States, England and Hungary, who do not ac¬

cept the doctrines of the Trinity or the divinity of Christ. They arose in the United States early in the 18th century, and in Hungary about a century earlier.

12. Universalist Church. — This body arose in the United States at the close of the 18th century. It holds to the final salvation of all persons.

13. New Jerusalem Churches. — Two small bodies descended from the movement begun by Emanuel Swedenborg, in England, near the close of the 18th century.

14. Adventists. — A group of half a dozen bodies of premillennialists, baptizing by im¬

mersion, and congregational in polity, arising in 1840-50, the chief of which are, (a) Advent Christians and (b) Seventh Day Adventists.

The latter is represented in most of the coun¬

tries of the world.

15. Plymouth Brethren. — A group of four or more bodies, calling themselves simply Brethren. They hold premillennial views, have unpaid, unordained preachers and baptize gen¬

erally by immersion. Found in England,

Canada, the United States and other countries.

16. Church of Jesus Christ of Latter-Day Saints, commonly called Mormons, from the Book of Mormon which they accept as inspired revelation. There are two bodies, (a) the Utah branch, which taught polygamy as a divine revelation, and practised it, but promised to discontinue it when Utah was admitted as a State. It is a large body and has missionaries and followers in many countries besides the United States. The (b) Reorganized branch protests against polygamy.

17. Salvation Army, an organization of

workers, with -a mission to those not reached by the churches. It originated in England in 1876, and is found in many parts of the world.

18. Church of Christ, Scientist, founded by Mrs. Mary Baker Eddy, in the last quarter of the 19th century, on the doctrine that spirit is immortal and dominant, and that through it evil and disease are to be overcome. It has churches, or temples, in other countries besides the United States.

19. There are many other small bodies of Christians in the United States and the rest of the world, which cannot be classified.

IV. Statistics of the Christian Church. —Three things must be said as to the world sta¬

tistics of the Christian Church: First, it is impossible to array them in detail by countries, for the reason that some of the large com¬

munions, to say nothing of many small bodies, do not present the necessary data; for example, the Church of England makes no returns, even for England and Wales, either of communicants or church population. Second, though most of the Churches of the United States and a num¬

ber in other countries* make official reports of communicants, and a number in other countries give official reports of population, and decennial censuses give more or less accurate returns of communicants or population, estimates, more or less uncertain and vague, have to be used for the rest of the world. Third, some of the re¬

turns, or estimates, are not even recent, but 10

years or more old and some nearly twice that.

It should be understood that the totals, except for the various communions, are to be taken as approximate, not as exact.

Of the population of the world, estimated at 1,691 ,751,000 by the National Geographic So¬

ciety, of Washington, D. C., 609,414,000 is Chris¬

tian. This number includes members, or com¬

municants, and adherents, making together what is called <(church population? Distributed among the three great divisions oi Christianity — Roman Catholic, including Uniates, i.e., those of the Eastern Orthodox division who have acknowledged the supremacy of the Pope, Old Catholics, etc.; Eastern Orthodox, including Armenians, Jacobites, Copts, Abyssinians and Russian Schismatics; Protestants, including evangelical and non-evangelical, orthodox and heretical, bodies — we have these results: Ro¬

man Catholic, 294,583,000; Eastern Orthodox, 120,729,000; Protestant, 194,102,000. These figures show an increase over these heretofore given by (Whitaker's Almanac, ˆ London, and other authorities, of 21,723,000 in the Roman Catholic division, of 729,000 in the Eastern Orthodox, and of 22,452,000 in the Protestant.

Later and more accurate statistics, from many of the countries of Europe especially, -would probably make important changes in these totals. The following table gives a distribution of the three divisions by continents:

CHRISTIAN POPULATION BY CONTINENTS

Roman

Catholic

Eastern

Orthodox

Protestant

Total

Europe …

183,760,000

112,281,000

100,000,000

396,841,000

Asia .

5,500,000

3,800,000

6,500,000

15,800,000

Africa ….

2,500,000

3,648,000

2,750,000

8,898,000

North

America.

50,000,000

1,000,000

79,352,000

130,352,000

South

America.

44,623,000

1,000,000

45,623,000

Oceania…

8,200,000

4,500,000

12,700,000

totals… 294,583,000 120,729,000 194,102,000 609,414,000

The Christian faith greatly outnumbers any of the other faiths of the world and is the most aggressive, active and prosperous. If Confu¬

cianism be regarded as a religion, and the dis¬

ciples of the ancient sage be classified with Taoists, as is commonly done, this ethical cult 608

CHRISTIAN CHURCH

stands second, with 300,830,000, according to accepted estimates, Islam coming third, with about 222,000,000, and Hinduism fourth with 210,000,000. The combined strength of Con¬

fucianism and Moslemism falls more than 86,-

000,000 short of the total of Christians.

The Christian following in the world, though unquestionably gaining on the total population, has not yet reached the half-way mark, which is 845,875,000. It has passed the one-third stage, having over 36 per cent. It is not possible to say with much certainty what the gain of the Christian Church has been in the last quarter of a century, but it is probably from 50,000,000

to 60,000,000. The Eastern Orthodox Churches are gaining little, if any, outside of Russia; but the Roman Catholic Church and the Protestant bodies are making advances, both divisions being active and successful in missionary work in all parts of the globe.

As Christianity is a development of Judaism, the Jewish Bible being also the Christian Bible, with the Christian Gospels and Epistles added, the two faiths may be classified together for comparison with the other faiths of the world, the two having more in* common, despite some radical differences, than either has with any other religion. Adding to the Christian popula¬

tion of the world 609,414,000, the Jewish 13,980,-

715, we have a grand total of 623,394,715. Of the Jews, 9,986,447 are irf Europe, and the next largest number, 2,144,061, in North America.

Of the three divisions of the Christian Church, the Roman Catholic has a little more than 48 per cent of the entire Christian popula¬

tion of the world; the Protestant a little less than 32 per cent, and the Eastern Orthodox the remaining 20 per cent.

The Roman Catholic division is first in Europe, in South America and in Oceania.

The Eastern Orthodox division is first in Africa.

The Protestant division is first in North America and in Asia.

In Europe the Roman Catholic Church pre¬

dominates in numbers in the countries of Aus¬

tria, Hungary, Belgium, France, Spain, Portugal and Italy; the Protestant churches are first in Great Britain, Germany, Scandinavia, Holland and Switzerland. The Eastern Orthodox

Churches are first in Russia, the Balkan States, Greece and Turkey.

The Christians embrace nearly six-sevenths of the population of Europe, thirteen-four¬

teenths of that of North America and four-fifths of that of South America. It is a minor¬

ity faith in Asia and Africa, having about one-sixteenth of the population of the latter and one fifty-sixth of the population of the former.

Putting it in another way, of every 100 inhabit¬

ants of the world, 36 are Christians ; of Europe, 85; of North America, 93; of South America, 82; of Asia, 2, and of Africa, 6.

Protestant communions and bodies, as de¬

scribed under the head of ˆDivisions® : ANGLICAN COMMUNION

Communicants

Great Britain and Ireland . -.

British Colonies, Canada, Aus¬

tralia, *etc.* … . .

United States and missions in¬

cluding Reformed Episcopal… 1 , 102,020

Population

17,500,000

6,000,000

3,306,060

BAPTIST COMMUNION

Communicants

United States, Canada, South

America, West Indies . . 7,020,525

Europe . 617,607

Asia . 213,647

Africa . 18,924

Australasia . 30,168

Dunkards, Church of God in

United States . . 156, 938

Total . 8,057,809

Population

21,061,575

1,852,821

640,941

56,772

90,504

470,814

24,173,427

CONGREGATIONAL COMMUNION

Communicants Population

United States, Canada and mis¬

sions .

Great Britain, Ireland and mis-

905,290 2,715,870

sions ....

Australasia .

Total. .

541,251

21,760

1,623,753

65,280

1,468,301 4,404,903

DISCIPLES OF CHRIST

Communicants

Population

United States and missions .

Christians, Christian Union,

1,469,345

4,408,035

United States, missions .

122,984

368,952

Total .

1,592,329

4,776,987

EVANGELICAL LUTHERAN

Communicants

Population

United States .

Germany .

2,460,937

7,382,811

32,546,852

10,463,000

Scandinavia .

Russia, including Poland and Fin-

land .

6,115,242

1,310,000

Hungary .

Austria, Holland, France, Brit-

ish Isles .

1,042,000

412,000

431,000

244,000

770,000

424,396

Asia .

Africa .

Oceania .

South America .

British America .

Scandinavian bodies in United

States .

188,700

German Evangelical Protestant

in United States .

104,112

German Evangelical Synod in

United States .

845,973

Total .

62,280,086

METHODIST COMMUNION

Communicants

Population

United States, Canada and mis¬

sions .

Great Britain, Ireland and mis-

8,607,631

25,822,893

sions .

Australasia .

United Brethren in Christ (two

1,259,307

174,608

6,296,525

873,040

bodies) .

Evangelical Association (two

370,839

1,112,487

bodies) .

220,900

662 , 700

Total .

10,633,285

34,767,645

PRESBYTERIAN AND REFORMED COMMUNION

Communicants Population

United States . 2,778,624 8,335,872

Canada . 346,822 1,117,200

England and Wales . 293 , 166 893 , 166

Scotland and Ireland . 1 , 366 , 972 4 , 066 ,972

Germany . 5,000,000

Holland . 2,500,000

Hungary . 3 , 000 , 000

Switzerland . . : … . 1 , 700 , 000

France and other countries of

Europe . 1,750,000

Africa . 1,000,000

Asia . 600,000

Australasia … 900 , 000

South America . . 100 , 000

Total

26,806,060 Total

30,963,210

CHRISTIAN DOCTRINE

609

OTHER BODIES

, , . Communicants Population

Mennomtes, United States, Can¬

ada, Europe . 250,000

Moravians, American, British,

German branches . 221,601

Friends, United States, Great

Britain, missions . 146,000

Adventists, United States, other

countries . 773,671

Unitarians, United States, Eng¬

land, Hungary, etc . 200,000

Latter-Day Saints (Mormons, two

bodies). United States, Europe . 500,000

Church of Christ Scientist, United

States, England, etc . 150,000

Unclassified bodies . 1,388,210

Total . 3,629,482

RECAPITULATION

Population

Anglican Communion . 28,806,060

Baptist Communion . 24,173,427

Congregational Communion . 4,404,903

Disciples of Christ . 4,776,987

Lutheran Communion . 62,280,086

Methodist Communion . 34,767,645

Presbyterian and Reformed Communion . 30,963,210

Other bodies . 3 , 929 , 482

Grand total . 194,101 , 800

Henry K. Carroll,

Author (Religious Forces in the United States *etc.*

CHRISTIAN DOCTRINE, Development

of. The evolution of Church doctrine, and with their slighter shades of meaning, of dogma, creed, precept and tenet, since the Apostolic Age. Church doctrine is based on truths contained in the Scriptures of the Old and New Testaments, Christian theologians recognizing in these

Scriptures the depository of all knowledge necessary for the teaching of salvation.

Presented by a recognized authority, — a teacher, a school or a sect, — doctrine, as a principle or exact rule of conduct, which is to be considered true and obeyed on its own merits, differs slightly from dogma which is formulated as essential and to -be accepted as authoritative.

In pre-Christian times, the precepts of Moses, Pythagoras and other teachers were considered authoritative by their followers. In (Academic Questions,* Cicero records ˆdecrees® or ((doctrines® which the philosophers and teachers called ((dogmata,® and which it was criminal to doubt. The Mosaic ordinances are thus classed as Hebraic (<decrees,® or doctrines, in Ephesians ii, 15; Colossians ii, 14. The first Christian doctrinal and moral instruction given by the apostles was delivered by Peter, on the Sunday of Pentecost 30 a.d., a few weeks after the crucifixion of Jesus Christ, and the nucleus of the Apostolic Church was formed. Four years later, in face of persecution, through the martyrdom of Stephen and the conversion of Paul at Damascus, Christianity began to spread outside of Jerusalem, and from 34 to 44 made rapid progress through Palestine, Phoenicia and Syria as far as Antioch. Paul made his first missionary journey in 47-48, and at Pentecost in 49, disciplinary decrees and doctrines were formulated for future guidance bv the Apostolic Council in Jerusalem. Between 49 and 64, Paul made missionary journeys to different parts of the Levant, including Spain, preaching the Christian gospel, twice undergoing terms of imprisonment at Rome, and writing the Epistles

to the different churches and congregations, from which subsequent Christian doctrine was formulated. As generally accepted Paul and Peter were martyred at Rome by Nero in 67, and three years later, with the siege and destruc¬

tion of Jerusalem in 70, Hebrew nationality ended.. During the 2d century, however, Hebraic Christianity continued to spread, al¬

though diversity of opinion arose over points of doctrine among Ebionites, Docetae, Essenians, Gnostics, Manichasans, and in Dynamic,

Patri-passian, Monarchian and Sabellian Unitarian circles. . At Alexandria, Egypt, with its great universities, libraries, learned professors and throngs of eagerly inquiring and active-minded students, — where the Hebrew philosophy of Philo and the Greek teaching of Plato had blended with the doctrine of Moses and the prophets for a modified teaching of contem¬

porary thought,— - the first serious attempt was made by Christians to adjust the facts and truths of the . gospel and the relations of Christian doctrine to reason and philosophy.

Tertullian, 200 a.d., the first to apply the word (<Trinity® to the conception or revelation (from human life) of the Triune Godhead, and Origen the Adamantine 185-254, spiritual as well as speculative in his outlook, are the commanding figures of the period. According to Justin Martyr, — the first of the great teachers to de¬

velop the doctrine of the Logos or the Divine Word which is God, incarnated in Jesus Christ, — the Gospels included in the New Testament Canon were being read in Christian assemblies on Sundays in 150 a.d. The circulation of apocryphal apostolic writings and the formula¬

tion of apocryphal canons to uphold their teach¬

ings had to be combated, and great weight came to be laid upon tradition as a source of evidence respecting the teaching of Jesus and the apostles. . The principal churches were honored as the witnesses and trusted guardians of these traditions, and the authority of the acknowl¬

edged Scriptures was considered final and con¬

clusive. Unity, holiness and catholicity became fixed doctrines of the ever-growing church communities over which the bishops presided, and the bishop of Rome as the acknowledged successor of Peter, the leader of the apostles and vicar of Jesus Christ, was head of the united Church. During the 3d century, the doctrines of Christianity had become such a power, that shortly after the opening of the 4th century, Constantine the Roman emperor-convert, by the Edict of Milan in 313, decreed the toleration of Christian worship throughout the empire and gave ‘ Imperial sanction to Church doctrine. Five years later, in 318, Arius of Alexandria, denving the doctrine of the Incarnation of Jesus as the Word which is God, was opposed by Athanasius ((the father of orthodoxy,® and the first ecumenical

council of bishops convoked by Imperial decree from all the churches assembled at Nicea in Bithynia, 325. It culminated in the formulation of the Nicene Creed. In 381 the first ecumenical council of Constantinople reaffirmed the Nicene Creed in opposition to Apollinarianism (q.v.), a modified form of Arianism. In 431 the Council of Ephesus defined the doctrine that Mary was the Mother of God, which was op¬

posed by Nestorius, bishop of Constantinople.

In 451, the celebrated Council of Chalcedon, disciplining Eutyches, formulated the orthodox 610

doctrine of the Trinity which has ever since been regarded as the limit of human wisdom on this subject. In 589 the Council of Toledo, Spain, inserted filioque — and the Son — in the Creed, to affirm the procession of the Spirit from the Father and the Son. In 831 the doctrine of Transubstantiation (q.v.) was ad¬

vocated by Paschasius Radbertus. In 870, the Greek Church under Photius, archbishop of Constantinople, separated from the Roman Church over the insertion, two and a half centuries before, of filioque in the Creed.

Abelard (1079-1142), the greatest of scholastic philosophers, in concept and conceptualism ap¬

plied psychology and logic to the Ephesian doctrine of 431. In 1409 the Council of Pisa attempted to heal the great schism which had existed since 1309 over the rival popes of Rome and Avignon; the abuses it entailed creating popular demands throughout all Europe for reform. In 1439, the Council of Florence formally sanctioned the seven sacraments of baptism, confirmation, unction of the sick, the Lord's Supper, penance, marriage and ordina¬

tion. In 1517 the need for reform of abuses which had crept into Church practice culminated in Luther's protest, and Protestantism created that revival of religious feeling throughout Christendom which, by a reactionary influence, resulted in a reawakening of religious zeal within the Catholic body. (See Reformation and

Counter-Reformation). With this dual Reformation came the division of Christian doctrine into Protestant and Catholic fields of thought. After 1530 appeared the Protestant confessions of faith, Lutheran, Anglican, Calvinistic, *etc.* Justification by faith, individual responsibility, the right to believe and worship according to one's conscience became the car¬

dinal points of Protestantism. The Bible is the one rule of faith and practice; the decrees of any spiritual representative, of any body or convention, are not considered infallible or obligatory. Since then Protestant Christian doctrine has had innumerable expositors, dis¬

cussing every possible shade of opinion. (See Christianity ; Christology ; Creeds and Con¬

fessions ; Incarnation; etc.).

The Council of Trent 1545-63, with the greatest deliberation and care, confirmed the Catholic position on doctrine. Since then the only additions considered necessary by the Catholic Church to give greater force to exist¬

ing doctrine have been the formulation of the Ephesian definition of 431, conceptualised as the elevation of womanhood by Abelard 1079-1142, finally promulgated as the doctrine of the Immaculate Conception (q.v.) in 1854, and the Papal infallibility (q.v.) of doctrinal teaching, promulgated in 1870. Consult Newman, Car¬

dinal J., development of Christian Doctrine) (London 1878) ; Fisher, G. P., (History of the Christian Church) (New York 1887). See

also Canon Law ; Decretals.

Charles Leonard-Stuart,

Editorial Staff of The Americana.

CHRISTIAN ENDEAVOR, Young Peo¬

ple's Society of, a society distinctly religious in all its features; organized 2 Feb. 1881, in Williston Congregational Church, Portland,

Me., by the Rev. Francis E. Clark. From one small association it has expanded into more than 77,500 societies in all parts of the world, with an aggregate membership (1917) of

3,875,000. In addition to the main organiza¬

tions in the United States it has been found necessary to form branches, among which are the Junior, organized 29 March 1883, by the Rev. Charles A. Savage, pastor of the First Congregational Church, Berkeley, Cal. ; the Intermediate, organized 1891 by the Rev. A. Z.

Conrad, pastor of the South Congregational Church, Worcester, Mass., and the Mothers', suggested by Mrs. Amanda B. Fellows, of Chicago, and organized in April 1893 at Topeka.

Kan., by Mr. F. C. Barton. Among other special branches are the Floating societies for work in the United States navy and among seamen generally; and various other organiza¬

tions whose fields of labor lie among the Chi¬

nese, the Indians, convicts in prison, *etc.* The first Christian Endeavor society in England was organized in 1887, and was followed by similar ones in other countries, and the constitution has been printed in more than 60 different lan¬

guages. The movement is interdenominational and international, with societies in more than 80 denominations and 60 nations. Any society belonging to an evangelical church which adopts the leading principles as set forth in the consti¬

tution, including the prayer-meeting pledge, and which guarantees these principles by the name (<Christian Endeavor,ˆ either alone or in connec¬

tion with a denominational name, is admitted to all the privileges of the organization. In the United States the Presbyterian Church has the largest number of societies; in Canada and Australia the Methodists are in advance of all others. In some of the American States the Disciples of Christ, and in others the Congregationalists claim the largest number.

The distinctive features in the Christian Endeavor movement are its work among the young people, leading them to consecrate their lives

to the active service of God; the weekly prayer-meetings, which each member takes a pledge to attend regularly (unless unavoidably detained), and to take a part in; the consecra¬

tion meetings held once a month, at which special efforts are made to see whether each member has been faithful to his pledges ; the committee work training the members in practi¬

cal service ; and the unions, city, county, dis¬

trict, State, national and international, which emphasize and illustrate the fellowship of the movement. The amount of good accomplished in training the young people in the practical work of Christianity and fitting them to take up the work of those dropping out of active service can never be fully estimated. The increase and efficiency standards set before the societies the most practical and helpful plans for definite religious training ever, presented by any organization. As a result of this train¬

ing it has enrolled (1917) more than 100,000

comrades of the Quiet Hour, who practise daily communion with God; more than 36,000

members of the Tenth Legion, who give at least one-tenth of their income to the service of God; more than 8,000 Christian Endeavor experts who have passed an examination on the history, principles and methods of the movement; more than 3,000 lifework recruits who have devoted their lives to the ministry, missions or some other form of Christian service, and more than 50,000 members of the International Peace

Union, pledged to promote the principles of brotherhood and fellowship among all nations.

Christian Endeavor Week, the week in which the 2d of February occurs, was adopted in 1913

and is observed with appropriate exercises by the societies in all parts

of the world. Through it a great impetus is given to all departments of the work.

The World's Union of Christian Endeavor has held conventions at Washington, D. C., in 1896; in London, England, in 1900; Geneva, Switzerland, in 1904; Agra, India, in 1909, and Chicago, Ill., in 1915, which were attended by representatives from all over the world. The United Society of Christian Endeavor is a bureau of information, which simply seeks to spread the idea of the movement throughout the world. Its headquarters are in Boston. The Christian Endeavor World is the international publication of the movement.

William Shaw,

General Secretary.

CHRISTIAN ERA, the era or epoch intro¬

duced by the birth of Christ. It was calculated back about the year 532 by a monk, Dionysius Exiguus, a resident of Syria. It is thought that he fixed the advent too late by four years, and that consequently Jesus was born, if the con¬

tradiction in terms can be permitted, in 4 b.c., which is, however, the generally accepted date among Biblical scholars. They give the (<probable dates® as follows : Circa 4 b.c. — Birth of Jesus; circa 28-29 a.d. — Beginning of public work; 30 a.d. — Death of Jesus. There are no historical data for determining the day of His birth; the Church after much vacillation finally settled on 25 December. The Christian Era is sometimes called the Dionysian Era.

CHRISTIAN KNOWLEDGE, Society

for the Promotion of. The oldest and greatest of the religious associations connected with the Church of England. It is popularly referred to as the (<S. P. C. K.® It was founded in 1698, although it

did not receive its present name till 1701, and had for its objects:

«1. To promote and encourage the erection of charity schools in all parts of England and Wales. 2. To disperse, both at home and abroad, Bibles and tracts of religion; and, in general, to advance the honor of God, and the good of mankind, by promoting Christian knowledge both at home and in other parts of the world by the best methods that should offer.® These objects it has never ceased to pursue, directing its efforts chiefly to Great Britain and the colonies. It partakes at the same time of the nature of an educational asso¬

ciation, a missionary society, a Bible society, a religious tract society and an emigrants' spir¬

itual aid society. The publishing and book¬

selling business shows in some years total sales of $450,000; the works published being in very various departments of literature, and including several admirable series on Early Britain, Dio¬

cesan Histories, Ancient History from the Mon¬

uments, Early Chroniclers, *etc.*

The Protestant missionaries who labored

in the south of India in the 18th century were supported chiefly by this society, and it is now chiefly engaged in supplying to the mission-field throughout the world needful religious litera¬

ture in the vernacular. Besides translations of the Bible and Prayer-book, it provides for pio¬

neer missionaries, grammars, dictionaries, read¬

ing-books and general literature to instruct them in the languages which they will have to use. In Scotland a similar society was organ¬

ized in 1709.

CHRISTIAN AND MISSIONARY AL¬

LIANCE. Christian Missionary Alliance was the title adopted when the Christian Alliance, which had been founded in 1887 and the International Missionary Alliance combined in 1897. All who have made open profession of belief in Christ may become members by sub¬

scribing to the principles of the order and en¬

rolling their names. The objects of the Alli¬

ance are (<Wide diffusion of the Gospel in its fullness, the promotion of a deeper and higher Christian life and the work of evangelization, especially among the neglected classes in dis¬

tant heathen countries.® Connected with the Alliance are the Missionary Training Institute, Institute for the Training of Home Workers, Berachah Home and Berachah Orphanage.

CHRISTIAN REFORMED CHURCH

IN NORTH AMERICA, The. This Church

is largely the result of three secession move¬

ments out of the Reformed (Dutch) Church (q.v.). The first of these movements took place in 1822 in the States of New Jersey and New York. Its leader was Rev. Solomon

Froeligh, D.D., assistant professor of theology in the Dutch Church. The reasons advanced for seceding from the old denomination were its laxness in disciplining offending members, indiscriminate administration of sealing ordi¬

nances and toleration of Hopkinsian teachings.

In 1827 the seceders, calling themselves the ((True Reformed Dutch Church,® numbered 25

congregations and 12 ministers. Their number dwindled slowly but surely until 1890, when they formed a union with the main part of the present Christian Reformed Church.

This main part was composed largely of Hol¬

landers who, in 1847 and the decade following, had settled in Michigan, Wisconsin, Iowa and other northwestern States. In 1849 these peo¬

ple — all stanch Calvinists — had united them¬

selves with the (Dutch) Reformed Church.

From the very beginning, however, some were dissatisfied with the union on account of dif¬

ference in language, neglect of catechetical preaching and teaching, too much fraternizing with un-Calvinistic denominations, the singing of hymns and laxity of doctrine. Objections were also made against allowing freemasons to be church members. In 1857 this dissatisfaction led to an open disruption. Under the leader¬

ship of the Rev. K. Vanden Bosch, about half a dozen churches in Michigan withdrew and styled themselves the ((True Dutch Reformed Church.® In 1876 they opened a theological school in Grand Rapids, Mich., the denomina¬

tional stronghold.

This True Dutch Reformed Church was

much strengthened, numerically and morally, by a third movement of secession which took place in the early ’80’s. This movement was the result of anti-Masonic agitation, the General Synod of the Reformed Church refusing to take such decided action as the complainants desired. In 1882 the seceding congregations, about half a dozen, led by Rev. L. J. Hulst, united formally with the Church which had withdrawn in 1857.

After this union the numerical increase of the denomination, which was slow at first, be¬

came quite rapid. The statistics for 1918 give 250 congregations, 175 ministers, 40,000 com¬

municants, a total of 90,000 souls; about 25,-

000 catechism scholars and some 20,000 pupils in the sabbath schools. These congregations are scattered through the Northern States of the Union, several along the Atlantic Coast, from Massachusetts to New Jersey. In recent years a few have been organized in Washington and California. About half a dozen congregations are found in the Saskatchewan and Manitoba provinces of Canada, while four affiliated churches, supported by the denomination, are found in the Argentine Republic. The different local churches are joined in 13 “classes® or pres¬

byteries. Six delegates of each of the latter, three ministers and three elders, constitute the Synod, the highest Church court of the denomi¬

nation, meeting biennially (in even years), the third Wednesday in June. The Theological School and Calvin College, located in Grand Rapids, Mich., have about 350 students en¬

rolled. The faculty is composed of 17 pro¬

fessors. The Christian Reformed Church is very zealous in home mission efforts. This is one of the main causes of its rapid growth ; continual immigration from the Netherlands and the formation of new settlements supplying the material for the increase.

The denomination also carries on mission work among the Navaho and Zuni Indians in New Mexico. Near Gallup, N. M., ((Rehoboth Missions,® a flourishing boarding-school for Navaho children gives a Christian education to some 100 Indians boys and girls, while in Zuni a day school has 24 children enrolled. Five other stations, with Rehoboth as centre, are manned by ordained missionaries who labor in connection with governmental boarding-schools for Navahoes in New Mexico. Both in Pater¬

son and in Chicago Rescue Missions are main¬

tained; in the first named city a Jewish Mission Home of the

denomination was opened in 1915, while in Hoboken, N. J. a Seaman's Home has been established. In Ogden, Utah, work is done among the Mormons. The free Christian primary schools found in all the principal Dutch settlements are supported largely by the Chris¬

tian Reformed people, something which ap¬

plies also to the Bethesda Sanatorium for tuberculosis sufferers in Denver, Colo., and the Psychopathic Hospital near Grand Rapids, Mich. The denomination has three official church periodicals, one in Dutch (weekly), one in German (monthly) and The Banner, an

English weekly, dating from 1866 and

published in Grand Rapids, Mich. This

indicates that the Christian Reformed Church is a trilingual body. About half a dozen of its churches are German, the great majority use the Dutch tongue and about two dozen of churches employ the English language in their worship. This latter element is growing rapidly as a result of the natural process of Americanization constantly going on. Fra¬

ternal relations are established with the stricter Calvinistic Churches of the United States and South Africa, and especially with the Reformed Churches of Holland. In creed and govern¬

ment the Christian Reformed Church is like all reformed denominations of Holland origin throughout the world, its creed consisting of the Heidelberg Catechism, the Belgic Confession and the Five Articles against the Remonstrants, usually called the ((Canons of Dordrecht.® The Church is marked for its conservative spirit and contends earnestly for Calvinistic tenets.

It lays much stress on catechetical training of its young people. The Psalms are used almost exclusively in public worship. The name "Holland Christian Reformed® was adopted in 1880

and 10 years later the official name became (<Christian Reformed Church.®

Rev. Henry Beets.

CHRISTIAN SCIENCE. The religion,

or interpretation of the Christian religion, dis¬

covered and founded by Mary Baker Eddy (q.v.). Christian Scientists regard it as the restoration and divinely promised fulfilment of the religion taught and practised by Christ Jesus. It is defined by Mrs. Eddy as “the law of God, the law of good, interpreting and dem¬

onstrating the divine Principle and rule of uni¬

versal harmony® (‘Rudimental Divine Science, }

p. 1).

To the question, What did Mrs. Eddy dis¬

cover? Christian Scientists answer that she dis¬

covered the law of God, the law of Life, Truth and Love, as well as the rule, the systematic method or practice, for demonstrating the Prin¬

ciple of harmonious being. Besides this she added immeasurably to the world’s knowledge of spiritual reality as distinguished from ma¬

terial belief. Anyone who would understand Christian Science (<must begin,® says Mrs. Eddy, (<by reckoning God as the divine Principle of all that really is® ((Science and Health with Key to the Scriptures, > p. 275). Whatever is the object or subject of thought, unless God made it, unless it expresses His being, it is illusive, destructible and unreal. This is the basis of Christian Science practice. On this basis the Christian Scientist works to purify human thought and to realize the truth of being.

The Christian Science definition of God is “incorporeal, divine, supreme, infinite Mind, Spirit, Soul, Principle, Life, Truth, Love®

((Science and Health, } p. 465). The word <(Person® (spelled with a capital letter), is also used as a term for God, but Christian Science does not hold that God is like a human being.

Of God it is said that “He is all-inclusive®

(‘Science and Health, > p. 331); which state¬

ment is to be regarded as consistent with the idea of imparted identity and individuality.

Indeed, one of the leading points of Christian Science is that God is the Life, Mind and Soul of man, yet that man, as the reflection of God, possesses perfect identity and individuality.

As understood in Christian Science, therefore, God creates man and the universe ; He governs the individuality and continuity of each crea¬

ture ; and He maintains this infinite creation as the expression of His being.

Since Christian Science is based on the teaching and example of Jesus, it has a definite and emphatic view of him and his mission. To begin with, it distinguishes between Jesus and the Christ as between what is human and what is divine. In the authorized literature of Chris¬

tian Science the word “Jesus® usually refers to the person whom Christian Scientists regard as Teacher and Way-shower. The word

“Christ® may refer to him, to his spiritual self¬

hood, or to his office as the Messiah, Saviour or Christ. Usually, however, Christian Scien-CHRISTIAN SCIENCE

tists use the word <(Christ® .n an entirely im¬

personal manner, as Saint Paul sometimes used it-d hus Mrs. Eddy defines ((Christ® as <(the divine manifestation of God, which comes to the flesh to destroy incarnate error® ((Science and Health,) p. 583). As for the mission of Jesus, Christian Science finds the index to it in his description of himself as the Teacher and the Way. His teaching and example

showed the way of salvation for all men and made him the Way-

shower as well as the Teacher or Master. Accordingly, the system which he taught was called the Way by the early Christians. This fact appears frequently in the historical Book of Acts (ix, 2; xviii, 25-26; xix, 9, 23; xxii, 4; xxiv, 14, 22) and in some of the Epistles (Heb. x, 20; 2 Peter ii, 2). Originally, therefore, Christianity was, to quote modern translations of Hebrews and Second Peter, (<the way which he (Jesus) dedi¬

cated for us, a new and living way,® ((the way of the truth.® Christian Science, then, utterly rejects the doctrine that Jesus, by his death, paid a ransom to the devil and thus wrought the deliverance of those who believed on him.

Christian Science likewise rejects the doctrine that the righteousness of Jesus was accepted by the Father as a substitute for the righteousness of mankind lost through the fall, and that the death of Jesus was accepted by the Father as an equivalent of the punishment justly incurred by mankind ; men being consequently released from punishment, on condition of their accept¬

ance through faith of his sacrifice. And of course Christian Science rejects the various re¬

finements of these doctrines which have con¬

tinued to the present day. Christian Science finds the supremely efficacious service of Jesus in his life, including his overcoming of death, as he himself said, (<Because I live, ye shall live also.® The way which he showed or dedi¬

cated was new, as distinguished from the sub¬

stitutional sacrifices of the Old Testament. It was also living, for he overcame death with the full proof of life and immortality. Further¬

more, he dedicated it for us ; hence it is avail¬

able to us, even as it was to him. So the per¬

tinent tenet of Christian Science reads, (<We acknowledge Jesus' atonement as the evidence of divine, efficacious Love, unfolding man's unity with God through Christ Jesus the Way-shower ; and we acknowledge that man is saved through Christ, through Truth, Life and Love as demonstrated by the Galilean Prophet in healing the sick and overcoming sin and death® ((Science and Health,) p. 497).

Christian Science defines man as the image, likeness or reflection of God. Of course this is not an uncommon description of man; but Christian Science, defining God as heretofore stated, reasons consistently from cause to ef¬

fect as Jesus did when he said, ((That which is born of the Spirit is spirit.® Christian Science does this in spite of all material evidence to the contrary, and declares with Saint John that ((As he (God) is, so are we in this world.®

Such a conclusion must mean either that God is like a human being, or that the human con¬

cept of man is erroneous. Christian Science declares that the human concept of man is erroneous ; that the human need is spiritual con¬

sciousness; and that human life becomes more divine as the true conception of God and man is realized.

Christian Science, therefore, distinguishes completely between the real, ideal man and the human or mortal sense of man. For this purpose and for every purpose, it distin¬

guishes between ultimate or absolute real¬

ity and mere appearance, semblance or il¬

lusion. Acknowledging God as the origin of all that really is, Christian Science does not find an origin for aught else, but con¬

sistently denies that anything which is not of God can have an origin or real existence. Says Mrs. Eddy, <(The mirage, which makes trees and cities seem to be where they are not, illus¬

trates the illusion of material man, who cannot be the image of God® ((Science and Health,) p. 300). In this connection, Christian Science declares that Christianity was originally based on the truth or reality of being. Its basic re¬

quirement was the knowledge of the truth con¬

cerning God and man, ((the truth® denoting ab¬

solute reality as opposed to which is merely apparent, seeming or false. Attention is drawn to sayings of the Master, such as the following: (<For this cause came I into the world, that I should bear witness unto the truth.® ((I came that they may have life, and may have it abundantly.® ((This is life eternal, that they might know thee, the only true God and Jesus Christ, whom thou has sent.® (<Ye shall know the truth, and the truth shall make you free.®

Such sayings imply that the human or mortal sense of life is false, and they imply that abun¬

dant and eternal life is to be gained by finding and realizing the truth of being. The human situation was stated by Saint John in these words : (<Beloved, now are we the sons of God, and it doth not yet appear what we shall be.®

He did not mean that we shall ever be different from what we really are. He meant that we are the sons of God, though the reality of being doth not yet appear. He did not foresee a loss of identity; he discerned the realization of true identity. Mrs. Eddy has consistently said : (<The real, ideal man appears in propor¬

tion as the false and material disappears.®

((Mortals will disappear, and immortals, or the children of God, will appear as the only and eternal verities of man® ((Science and Health, >

pp. 69, 476).

According to Christian Science, then, no form of evil possesses the nature of substance, but every phase of evil is only an aspect of error; truth or the understanding of reality being the universal remedy. For instance, take its teaching in regard to sin. Sin is primarily wrong thinking; it is always punished by the loss of harmony or the suffering which it en¬

tails ; it is forgiven as it ceases, for goodness always receives its reward. The impulse to sin is always ignorant or deceitful ; at worst it is a false sense of pleasure in sin. So Christian Science is spiritually educational ; it makes much use of the truths that sin cannot confer genuine pleasure; that the consequences of con¬

scious indulgence are cumulative ; and that hap¬

piness must be sought and can be found in active goodness. This religion also emphasized the power of goodness — the ability which goodness carries to detect sinful motives, to unmask sinful inducements and to dispel sinful persuasions. In this manner the reformative work of Christian Science has been conspicu¬

ously successful.

The prevention and cure of disease is within 614

the mission of Christian Science for the same reasons that it was within the mission of original Christianity. What are disease and health? In the last analysis not only disease and health but mortality and immortality are opposite mental states, resulting from contrary modes of thought. On one hand is material sense, which has no principle — no cause or substance — and is simply an illusion, a dream of pain and pleasure in matter that includes sin, disease and death. On the other hand is spiritual sense, which is created and sustained by God, the divine Principle of all true being.

What Saint Paul wrote to the Romans on this subject was both Christian and scientific: (<To be carnally minded is death, but to be spiritually minded is life and peace.® In these words he declared that life is a condition of mind or thought; he analyzed causation as wholly meta¬

physical. The mentality which sickens and dies is carnal ; that is to say, material ; while the thought which lives and enjoys the perfect at¬

tributes of life is spiritual ; that is to say, ema¬

nating from Spirit or God. In other words, it is Spirit, God, the divine Mind, that gives life and health to man, and gives it through men¬

tality or thought. Health, therefore, is pri¬

marily a mental and spiritual quality, and it is to be gained and

preserved as such ; that is, through the understanding of and obedience to the spiritual law which emanates from the divine Mind. Disease, on the other hand, even the most physical disorder is a palpable evidence of false belief. It is a condition incident to the supposition that man is a material selfhood and governed by a law of suffering, disability and death — governed by laws which divine Life, Truth and Love could never make. Every lack of health, from beginning to end, is only a subjective condition of mortal thought; it is a particular result of the general supposition that life inhabits matter and is mortal. Chris¬

tian and scientific treatment of disease, then, depends on the distinction between absolute or real being and the human or mortal concept of man. Freedom from disease follows the abso¬

lute knowing of the truth concerning God and man. To cope successfully with disease it must be resolved into false belief and dealt with on a mental plane, in accordance with the divine law by which Truth destroys error. Healing comes to pass when the supposed law of disease and death is broken by the actual law of Life, and the unitv of being is such that one indi¬

vidual can help another to obtain this victory.

In so far as hygiene and sanitation denote cleanliness and purity, Christian Science is in full accord; and it commends not only a clean body and clean surroundings, but a clean men¬

tality; not only pure food, but pure thoughts.

Jesus intimated to the Pharisees that for out¬

ward cleanness to be more than , superficial it must be the result of inward cleanliness.

Christian Scientists usually conduct their own charities, and they contribute funds with an ease that is remarkable to observers. During the Great War, for instance, Christian Scientists have contributed and expended relatively large sums for the relief of sufferers from the war, both before and since the United States entered it ; and they have carried on a varied and systematic work for the welfare and comfort of soldiers and sailors in this and other countries.

The Church of Christ, Scientist, or Christian Science Church, was organized at Boston in 1879. It consists of The Mother Church, The First Church of Christ, Scientist, in Boston, and branches thereof throughout the world.

The number of regularly organized congrega¬

tions in April 1918 is 1,766, of which 1,582 are in the United States. The governing body of the denomination is the Christian Science Board of Directors ; but each congregation has its own self-government.

The Christian Science Publishing Society publishes Mrs. Eddy's writings (see bibliog¬

raphy at end of article under Eddy, Mary Baker) and issues the following periodicals: The Christian Science Quarterly Bible Lessons , a quarterly containing the ˆlesson-sermons®

which are read in the Sunday services of this denomination; The Christian Science Journal, a monthly accompanied by directories of churches and practitioners ; Der Herold der Christian Science, a monthly published with alternate pages in English and German ; Le Heraut de Christian Science, a monthly pub¬

lished in English and French; The Christian Science Sentinel, a weekly; and The Christian Science Monitor, an international daily news¬

paper. This paper, founded in 1908 by Mrs.

Eddy <(to injure no man, but to bless all man¬

kind,® has now become well known wherever the English language is spoken.

Clifford P. Smith,

Committee on Publications, Boston.

CHRISTIAN UNION CHURCHES, a

small body of Christians, organized in 1861, partly in protest against the preaching of poli¬

tics. Rev. James F. Given, who left the Metho¬

dist Church in 1860 because the Civil War was advocated from its pulpits, drew together those who were of his way of thinking and they organized the Christian Union, at Columbia, Ohio, in 1861. Their principles are: (1) Christ the only head of the church; (2) the Holy Bible the only rule of faith and practice; (3) good fruits the only test of fellowship; (4) each local church to be self -governed ; (5) the union of all Christians as an ideal; (6) political preaching discountenanced. Its doctrines are Evangelical. Its representative is The Christian Witness, Excelsior Springs, Mo. The denomi¬

nation is strongest in Ohio and Missouri. In 1916 it reported 16,825 members, with 365 minis¬

ters and 330 churches. Consult Carroll's Re¬

ligious Forces of the United States > (1912).

CHRISTIAN UNIVERSITY, a coedu¬

cational institution in Canton, Mo. ; organized in 1853, under the auspices of the Disciples of Christ; reported at the end of 1915: Profes¬

sors and instructors, 16 ; students, 72 ; volumes in the library, 10,000; grounds and buildings valued at $40,000; productive funds, $20,000: benefactions, $3,000; income, $5,000; number of graduates, 287.

CHRISTIAN VIEWPOINT OF THE

ORIGIN AND DESCENT OF MAN. See

Man, Christian Viewpoint of the Origin

and Descent of.

CHRISTIAN WOMAN, A, a novel by

Emilia Pardo-Bazan. In this interesting tale the author presents a very realistic picture of modern Spanish life, into which are introduced many current social and political questions.

CHRISTIAN YEAR, The. (The Chris¬

tian Year,* by the Rev. John Keble is a series of poetical compositions or thoughts in verse for the Sundays and holy days throughout the year.® In other words it represents an attempt to make poetry an instrument of religion ; in consequence, the writer is interested more in the religion than in the poetry. The work was intended to be an aid to the reader of the Book of Prayer of the Established Church of England; its object, in the words of the author, ((will be attained if anv person find assistance from.it in bringing his own thoughts and feel¬

ings into more entire unison with those recom¬

mended and exemplified in the Prayer Book.®

It has, also, an historical significance, inasmuch as it “still remains the most satisfactory expres¬

sion in poetry of the spirit which inspired the Oxford Movement.® Although it does not con¬

tain the best of Keble's poetry, it is the work by which he is most widely known, and by which, in all likelihood, he will be chiefly re¬

membered. When published in 1827, its success was immediate. It was, and doubtless remains, the most successful series of religious poems ever published. Before Keble's death in 1866, 95 editions were called for; before the end of 1867, the work had run into 109 editions — the editions in each case varying from 3,000 to 5,000

copies. It is still popular.

It is not difficult to account for the success of (The Christian Year.* The different poems expand, elaborate, and illuminate some of the most familiar and most cherished Scriptural scenes, events and texts. It is doubtless true that most people are not "athletic readers® ; that most do not think strenuously, or use their imagination effectively, while they are reading.

A substitute, or aid, such as Keble supplies, does not ordinarily fail to attract attention and gain wide currency. There is, also, in (The Christian Year) enough of true poetic quality to sustain the whole ; in general, Keble's taste is "on the side of the angels.® (The Christian Year) is a kind of poetical analogue of the Rev.

Samuel Rutherford's (Religious Letters. * Cer¬

tain devout souls are pleased with such raptur¬

ous expression; other souls, just as devout, but more reserved, are displeased. It has been said that "the poet of (The Christian Year* sinks not infrequently to the commonplace… . He lacks the art to conceal art, or, better, the glow of feeling which effects the concealment uncon¬

sciously. A little coldness is the defect of his verse, just as it is the defect of a most amiable and virtuous life.® The interested student will find John Campbell Shairp's criticism in the North British Review well worth reading.

Waldo H. Dunn.

CHRISTIANA CASE. On 11 Sept. 1851,

Edward Gorsuch of Maryland, his son, a party of friends and a United States deputy marshal, having secured a warrant from a Philadelphia commissioner for the arrest of a fugitive slave (alleged to have been Gorsuch's own son), came to Christiana, Lancaster County, Pa., ap¬

proached the house where the fugitive had taken refuge and demanded possession of him, firing two shots at the house. The neighbor¬

hood was aroused, and several armed colored men appeared on the scene, as also did Castner Hanway and Elijah Lewis, Quakers, who tried to persuade both parties to disperse. The deputy marshal ordered them to join his posse; they urged him to withdraw for his own sake ; Gor¬

such and two of his party fired on the colored men, who returned the fire, killed Gorsuch and his son, and forced the rest to fly. The fugi¬

tive slave escaped. The two Quakers were indicted for treason; the grand jury found bills against them; and they were tried 24 Novem¬

ber before Justice Grier of the Supreme Court.

Among the counsel for their defense were Thaddeus Stevens and T. L. Cuyler; the chief argument was by J. M. Read. The absurdity of the accusation was so great that the Demo¬

cratic judge charged emphatically for the prisoners, and the jury acquitted them without leaving the box.

CHRISTIANCY, Isaac Peckham, Ameri¬

can editor and diplomatist: b. Johnstown (now Bleeker), N. Y., 12 March 1812; d. Lansing, Mich., 8 Sept. 1890. He was one of the founders of the Republican party and espoused its cause as editor of the Monroe Commercial. In 1875

he was chosen United States senator from Michigan and in 1879 became Minister to Peru.

CHRISTIANIA, kres-te-a'ne-a, Norway,

capital, city and port, province of Aggershuus or Christiania, at the head of the long narrow inlet called Christiania Fjord, about 60 miles from the open sea or Skager Rack. High hills rise around it on both sides, excepting toward the bay, but at considerable distances, particularly on the north. The most interesting building in the town is the fine old castle of Akershus (built about 1300), with its church and planted ramparts crowning a point jutting out into the fjord and commanding a fine view, but of no military value. It now serves as an arsenal and prison. On a gentle elevation and in the midst of a beautiful park stands the royal palace — a massive square building, without any architectural ornament, but commanding delight¬

ful views of the fjord and its beautifully wind¬

ing shores. The hall in which the Storthing holds its sittings is a very plain building. The other public edifices are the military academy, cathedral, university, *etc.* Attached to the uni¬

versity is a museum, containing a fine collection of antiquities. The climate of Christiania is de¬

lightful. It is screened from violent winds; and even in winter, though the cold is severe, the weather is seldom variable, but bright and settled and free from damp and fog. In summer it is warm but not sultry, with a light and buoyant atmosphere. The few manufactures of the city consist of woolen cloth, furniture, liquors, iron-ware, tobacco, paper, leather, soap, spirits, glass, *etc.* There are also some extensive breweries. The ex¬

ports are principally timber, deal planks and iron. The environs of the city are exceedingly beautiful, the approach to it by the magnificent fjord, at the head of which it is situated, ex¬

citing the admiration of all visitors. The fjord is frozen for upward of two months in the year, for about 20 miles from Christiania to the sea; and the harbor is kept open by means of ice breakers. Christiania forms a separate offi¬

cial district and is administered by a magistracy composed of the burgomaster and two council-men. It has good waterworks and several elec¬

tric-car lines. The educational institutions in¬

clude, besides the university, two higher military schools, a gymnasium, a technical school and a number of Latin schools and

Museum of Art contains many meritorious paintings by Scandinavian and foreign artists, but no great masterpieces. The Industrial Art Museum has fine ancient and modern specimens of Norwegian handicraft. There are three theatres and a municipal library of 55,000

volumes. The city was founded in 1624 by Christian IV, on the site of the town of Oslo, which dated from 1048 and was burned in 1624.

Pop. 247,588. Consult Anneus, (La ville de Kristiania, son commerce, sa navigation et son industrie : Resume historique) (Christiania 1900).

CHRISTIANIA, University of, the state

university of Norway, founded under Frederick VI, in 1811-12. Previous to that time during the union of Denmark and Norway, Norwegian students went to Copenhagen for their uni¬

versity training. The awakening of the

national spirit demanded that an institution of higher learning be established at home. It was started by voluntary subscriptions and during the 19th century both the state and individuals contributed to the erection of many buildings.

The institution is controlled by the Ministry of Religion and Education. The library contains about 500,000 volumes ; there are a botanical garden and an observatory. The student en¬

rolment is about 1,600.

CHRISTIANITY. Christianity is a name

for the religion which was founded by Jesus Christ. At first it was regarded as an hereti¬

cal sect of Judaism, and, in appearance, it was little more. Its Founder was a Jew who always spoke with respect of his ancestral religion, attended upon its worship and reverenced its sacred books. Its earliest adherents were Jews who were devotedly attached to the traditions and customs of their people, and who were far from supposing that in becoming disciples of Christ they were taking a step which would, at length, separate them from the religion of their fathers.

It is, indeed, a matter of dispute whether Jesus himself contemplated such a result. Some believe that he hoped to do the work of a re¬

former and to induce the Jewish people to adopt his religious ideals without separating himself or his disciples from the congregation of Israel.

In view of all the circumstances this supposition seems improbable. The ritualism and traditional¬

ism of late Judaism and the radical ethicism of Jesus were too diverse to admit of reconcilia¬

tion. As he himself expressed it, his country¬

men who were accustomed to the old wine of Jewish thought and custom would not straight¬

way desire new, and his teaching was new wine which would not be confined in the old wine¬

skins of Judaism (Luke v, 37-39). Accordingly, the separation which Jesus' experience at the hands of his countrymen had betokened became more and more complete as time went on. The teaching of men who discerned and emphasized the contrast between Judaism and Christianity — especially that of the apostle Paul — 'the in¬

tense missionary spirit of the early Christians and the downfall of the Jewish state in 70 a.d., were among the circumstances which completed the separation of the two forms of faith and started Christianity on its career as one of the great world religions.

In speaking of the religion of Christ, we must refer primarily to his own teaching and that of his early disciples. This we may the more

properly do since all Christians agree that for obtaining a knowledge of the principles of their religion recourse must be had to the writ¬

ings of the New Testament as being, in some sense, primary and formative. Despite the dif¬

ferences of opinion which have obtained in the Christian world, there are certain great, general convictions which Christians share in common and which may be said to underlie or constitute the claims of the Christian religion on its own behalf.

Chief among these claims is this, that the; unique personality, teaching and influence of Jesus Christ give to him a supreme place among the religious teachers of the world. All Chris¬

tians would assert the incomparable elevation and excellence of the morality which he taught and illustrated, and would maintain that the in¬

fluence of his example upon the life of the world has been most salutary. They would agree that a revelation of God is to be seen in the person and lifework of Jesus, however widely they might differ as to the method, nature and scope of that revelation. It is a general Christian conviction that the moral effects of Christianity in the world have been such, on the whole, as to constitute an evidence of its divine origin and character. These intro¬

ductory considerations must now be further elaborated.

Christianity and Christ. — How did Christ become the Founder of a new religion? We must answer: By the personal influence and inspiration which he exercised upon those who associated themselves with him. He did not adopt the methods of the political organizer.

He created no party; led no uprising; elaborated no formal program. Other founders of re¬

ligions have generally been the authors of elaborate books of rules and doctrines; Jesus wrote nothing. He was not an organizer or an aggressive leader of men. He advocated no revolution, except the moral revolution of the inner life. He moved quietly about along the highways and among the villages of Galilee and Judea, speaking to

men about God and life and duty, and thus initiating a movement which has transformed the world.

The secret of this movement doubtless is that in his teachings and life Jesus touched the deep¬

est chords in human nature. He sounded the profoundest depths of man's moral and spiritual being. The conception of God which he por¬

trayed, the ideals of life which he illustrated, were the highest and truest of which men can conceive. Such has been the conviction which he has inspired. However far men might fall below the morality of Christ, however much they might deny his principles in practice, they have still been haunted by the feeling that his words were true; In the depths of their hearts men, despite their cruel selfishness, have recog¬

nized in the voice of Jesus the tone of absolute truth.

Our most primitive sources of information assure us that Jesus taught something regarding himself, as well as something regarding God and man. The Gospels assume that this latter aspect of his teaching is inseparable from the former. He assumed to speak to men about the fatherhood of God out of a sense of his own unique sonship to him. He told men what God was and required because he claimed to possess

an incomparable knowledge of God's nature and will- . we can trust the earliest reports of his teaching, we must say that he never separated his message from his personal claims as the bearer of it. However unwarranted the historic theories of Christ's person may have been, they sprang from a legitimate impulse. The Christian religion implies and necessitates some theoretic estimate of Christ.

Christianity and Scripture. — Christianity has sometimes been described as the religion of a book. It would be more correct to say that it is a religion with a book. It is certainly not a book-religion in the sense in which Moham¬

medanism or Confucianism is. It does not appear, as it were, ready-made in the writings of any single sage or prophet. Its sacred books are its products, not its cause. Its program was not first elaborated in a book and then carried out in life and action. Christianity did not begin with a body of rules or laws. It is, or, at any rate, originally was, a religion in which motives and principles are primary and whose nature it is to create its own externals.

Nevertheless, the conception that the re¬

ligion of Christ had its chief source and war¬

rant in a book has often been maintained, and still has a wide popular acceptance. A similar view prevailed in Judaism concerning the re¬

ligion of Israel. The Mosaic law was believed to have had its origin in heaven and to have prescribed, by divine authority, the complete re¬

ligious duty of man. This law was the antece¬

dent warrant for all that was to be believed and practised. This conception of an authoritative book in which the laws and principles of the system were incorporated in advance was transferred to the earliest Christian writings and became the popular working theory of the subject.

Nothing is plainer, however, than that such a view, alike of the Hebrew and of the Chris¬

tian Scriptures, is quite unhistorical. The Mo¬

saic law was a comparatively late codification of rules and maxims which were developed and collated through a long period of time. In its present form it was later than the preaching of the great prophets whose teaching represents the high-water mark in Israel's religion. In like manner the writings which compose our New Testament were produced after Chris¬

tianity had been, for a considerable period, a vigorous force in the thought and life of the world. Its oldest books, the earlier letters of Paul, were incidental products of his missionary activity. They were addressed to individuals, particular congregations or groups of congrega¬

tions, and deal largely with local conditions.

They could not have been written with the re¬

motest thought, on the part of the apostle, that he was contributing to an authoritative canon of Scripture. They were doubtless highly prized and carefully preserved by their recipi¬

ents, yet not carefully enough to prevent several of them from being lost. At first they were not thought of as sacred Scripture — they were not placed on a level with the Old Testament, for example ; that character they acquired only afterward when they became available in various controversies for the refutation of heresy.

We have reason to believe that the words of Jesus were carefully treasured from the first and the various early efforts to preserve them in writing were the germs of the New Testa¬

ment canon. They were probably preserved for a generation or more in oral tradition only and after various redactions and compilations took form in our present Gospels toward the end of the 1st century. Speaking broadly, then, we may say that the New Testament is the earliest available literary product and record of primi¬

tive Christianity and possesses unequaled his¬

torical and practical value because it acquaints us most closely with Christ and with the first effects of his work in the world. The New Testament contains the original documents of the Christian religion.

Its Theological Basis. — Christianity is one of the great monotheistic religions. In general, its theistic presuppositions were derived from Judaism, on whose soil it took its rise. By its monotheism it is differentiated at once from polytheistic religions, such as those of

ancient Greece and Rome, and from pantheistic systems, such as Brahmanism and Buddhism. In com¬

mon with Judaism Christianity rests upon the conviction of the personality of God. All those vague and infra-personal descriptions, of the source and ground of all things which have been advanced as essentially equivalent to the Jewish and Christian ideas of God, such as ((a power not ourselves* and a ((stream of tendency,* fall utterly short of the idea of God portrayed in the Old and New Testaments. Such philosophical terms as ((ultimate reality* and <(ground of the world* are useful, but non-committal on the point of prime importance. Christians believe that the fundamental reality is Spirit; that the ground of the world is personal.

So far all Christians would theoretically agree. When, however, we proceed to inquire as to the moral character of God, Christian speculation illustrates wide diversities of view.

Men necessarily represent God to themselves by means of analogies drawn -from their own life and experience. Hence in different ages, with their differing ideals and standards of life, vari¬

ous human .analogies have been used to picture forth the nature and attributes of Deity. The Christian idea of the one personal God, at once gracious and holy, has, accordingly, varied in its form from age to age or within the same age among people of differing inheritance and cul¬

ture. Now one aspect or attribute of his nature has been magnified, now another. But amidst all such divergences of emphasis, there has been a continuous and constant effort to conceive the character of God according to the highest eth¬

ical standards, and to represent him as embody¬

ing in himself all possible moral perfections.

Many modern Christian divines hold that the truest and most satisfying analogy with which to describe God is that which Jesus chiefly employed, namely, that of fatherhood.

His favorite name for God was the Father.

The descriptions which he gave of the nature and action of the Father show that for him fatherhood meant original, self-imparting, all-embracing love. Hence the apostolic summary of the Christian doctrine of God: ((God is love,* is true to the thought of Jesus. The kindred formulae : ((God is spirit,* that is, of a spiritual nature, as opposed to what is material and local, and: <(God is light,* that is, perfect purity and beneficence, emphasize special aspects of God as fatherly love. The specifically Chris¬

tian idea of God is best expressed by saying: God is Father; God is love.

CHRISTIANITY

Christianity and Judaism. — Historically

speaking, Christianity arose out of Judaism.

Jesus declared that he had not come to destroy, but to fulfil, the law and the prophets. Accord¬

ing to the Fourth Gospel he summarized the relations of his work and teaching to the re¬

ligion of Israel by saying: ((The (Messianic) salvation is from the Jews.® There is no funda¬

mental doctrine of Christianity the germs of which are not found in Judaism. Christianity presupposes the ethical monotheism, the views of the world and man and the ideals of right¬

eousness which underlie the preaching of Is¬

rael's greatest religious teachers, the prophets.

The New Testament uniformly regards the gos¬

pel as an unfolding, a development from the Jewish religion, and this view is amply justi¬

fied by a critical study of both religions.

But are they, then, two different religions?

Are they not merely two branches growing on the same stem? The differences appear by con¬

sidering how much in Judaism Christianity dis¬

cards. In Israel Church and State were one.

The state had no existence except in and through its religious constitution. Israel's great peculiarity was that it conceived itself to be a theocracy, a people whose real king was Jeho¬

vah. Now Christ, in his teaching, entirely dis¬

regarded this civic organization of the forces of religion. His teaching was wholly ethical and spiritual. He framed no constitution, enacted no laws; he did not even formally provide for an outward organization. Many Christians, indeed, hold that the creation of a closely com¬

pacted organization, a new kind of theocracy, was implicit in the principles of Jesus and was the legitimate and necessary outgrowth of his work; but however that may be, it cannot be shown that, in any direct way, he concerned himself with matters of outward organization and policy.

To the ritualistic system which was so prom¬

inent a feature of Judaism, Jesus only incident¬

ally referred. As we have seen, he made no violent break with this system ; it is a fair inference that he continued to attend upon the temple worship. But he laid no stress upon a ritual which had acquired increasing importance in the later history of Judaism, and even de¬

preciated it. Like the Old Testament prophets, he does not commend sacrifices, but teaches that the most commonplace moral duty is more im¬

portant. The most sacred rite of all, the badge of Israel's separation from the rest of the world, circumcision, he never even mentions. From such considerations it is evident that the gospel of Jesus is no mere reproduction of Judaism.

There are many other differences kindred to those which have been mentioned or growing out of them. Christianity is not, in the view of its Founder, a legal religion. It is a dispensa¬

tion of inner, not of outer, law. In this re¬

spect its closest analogue in Hebraism is the teaching of the prophets. The New Testament writers see in the gospel the fulfilment of the prophecy that the new covenant should not be like the old; that the chief mark of the Mes¬

sianic era should be that God would write his law on the heart. Hence Christianity finds its norm not in statutes, but in a personal life in which it beholds all its motives operative and all its principles illustrated.

The Relation of Christianity to Other Re¬

ligions. — The principle which the Founder of Christianity announced when he said that he had not come to destroy but to fulfil was not applicable solely to Judaism. Jesus recognized goodness and truth under whatever form of religious belief or practice it might be found.

While it is true that he saw in Israel's life and history a unique revelation of God and recog¬

nized in the Jewish Scriptures the product and record of that revelation, it is also true that he found a revealing and saving activity of God outside Judaism. He could see in the nobility and generosity of a heathen soldier a faith not matched in all Israel. He had other sheep who were not of the Jewish fold whom he would bring into the one flock. In the opinion of many interpreters the judgment parable in Mat¬

thew xxv is intended to describe the testing of the heathen, many of whom are accepted because they have shown the spirit of love and service ; having done kindness to Jesus' fellowmen, they are regarded

as having done it unto him.

The primitive Church more or less fully ap¬

prehended this conception of the relation of the gospel to other forms of religion. Paul de¬

clared that God had not left himself without a witness among any people ; that he had made of one blood all nations of men; that the Greeks had been seeking after God and that there was a law of God written in the hearts of all men.

The apostle recognized elements of truth in the crude beliefs and worship of the heathen.

Despite their ignorance, he saw in their more than ordinary religiousness an evidence of a sin¬

cere aspiration after God and in their devotions and moral judgments a proof of their native kinship to him.

These views obviously rest upon the concep¬

tion that, in some real sense, revelation is uni¬

versal. God's eternal power and divinity are known to mankind, says Paul, because God has made these truths known to them. Other New Testament writers teach the same in other terms. In the Fourth Gospel Christ is iden¬

tified with the Logos of Greek speculation.

Accordingly in his preincarnate activity he is conceived as the medium of a universal revela¬

tion. Like an eternal sun he has been shining down into the world's darkness and sin, enlight¬

ening the mind of every man. He was operative in the life of Israel of old, however blind this favored people may have been to his presence.

Paul expresses allegorically the same thought when he says that the spiritual rock of which the Israelites drank in the wilderness was

Christ. But this action of the pre-existent Christ was. not exceptional. He was the light of men universally. ((His writing is upon the wall, whether of the Indian fane, or of the porticos <pf Greece.® (J. H. Newman). From these, various forms of thought and of expres¬

sion it is seen that Christ and the early Chris¬

tian teachers recognized truth in other religions than Judaism and Christianity and regarded the teaching and work of the Founder of the Chris¬

tian religion as a clarification and completion of such truth.. Christianity builds on the constitu¬

tional religiousness of man, upon his native and persistent sense of God, which it aims to en¬

lighten and to quicken into a rational, moral faith.

The Doctrinal Contents of Christianity. —What has been said concerning the early his¬

tory of Christianity, its monotheism and its esti¬

mate of Christ, may serve as a point of begin-CHRISTIANITY

ning lor a somewhat fuller illustrative statement °1 its doctrinal contents. As we have seen, Christianity inherited the monotheism of Israel, but gradually developed it by the elaboration of the doctrine of the Trinity. The motives to this development were chiefly two: (1) The primitive Christian estimate of the person of Christ, and (2) the Biblical teaching regard¬

ing the Spirit of God. Instead of conceiving of God as a simple, distinctionless essence, speculative thought began to analyze the divine nature until in the 4th century an elaborate theory of a threefoldness in God appears.

In this Nicene or Athanasian form of thought God is said to consist of

three persons, Father, Son and Holy Spirit, all equally eternal, power¬

ful and glorious. It was held that this tri¬

personality of God is not inconsistent with monotheism, since the Father is the fons et origo oj Deity from whom the Son and Spirit are derived by an eternal process of generation, and because the divine Essence is one. The doctrine thus included these three elements: (1) The coequal eternity of the three persons; (2) the subordination and derivation of the second and third from the first; and (3) the conse¬

quent oneness of the divine Nature in which all three persons alike partake.

It would carry us beyond the purpose of this article to dwell upon the various arguments and analogies by which it was sought to illus¬

trate the nature of this triunity in God, or to describe the varying types of theory which were elaborated in subsequent theological discussion.

Those who desire to pursue the subject further can do so by the aid of such standard treatises as Neander's or Milman's (History of the Church, } or Fisher's (History of Christian Doc¬

trine. > The various forms of Trinitarian belief are sketched and discussed in Prof. L. L. Paine's (Evolution of TrinitarianismP

The orthodox doctrine of incarnation was that the Son, the second person of the Trinity, united himself with (<human nature® — some¬

times defined as impersonal, sometimes as per¬

sonal. <(Two whole, complete natures in one person,® was the formula. In modern times these definitions have been modified or rejected by those who have adopted a different philos¬

ophy of the Trinity from that on which the definitions proceed.

Amidst the many diversities of opinion and theory the great common

conviction of all Chris¬

tians is that Jesus Christ is the supreme Revealer of God and the Saviour of men. The manner in which he effects their salvation has been variously explained and illustrated accord¬

ing to the conceptions entertained at different times of the ethical character of God. But whether Christ was believed to have paid a debt of honor to God or to have experienced a vicari¬

ous punishment for us, or to have safeguarded the divine government, or to have furnished a supreme example and incentive to goodness — in all these and other theories of atonement he is recognized as the Way to the Father.

These few statements respecting three great doctrinal topics may serve as illustrations of the historic theories which have been, in some cases, sanctioned by ecclesiastical authority, and, in others, rendered almost equally binding by tradition, and of their modification by the ap¬

plication to them of modern historical and phil¬

osophical methods of investigation and thought Its Ethical Character and Requirements.

— W hile, officially considered, Christianity has had the character of a doctrinal system, with its authorized theories and binding beliefs, prac¬

tically its chief value and power have lain in its ethical teachings and influence. Theologians have placed great stress upon the various formu¬

las and definitions which have been elaborated from time to time, but of these the vast mass of Christians have never had more than the vaguest knowledge. Dogmaticians have often held that Christianity was primarily a body of officially defined doctrines, but for most be¬

lievers it has certainly not been such but rather a series of moral duties and requirements — a certain line of action or kind of life.

This view of Christianity is more germane to the teaching of Jesus than the dogmatic view.

He promulgated no creed, elaborated no system, championed no set of formulas. His teaching was doctrinal in the sense that there underlav it certain conceptions of the moral nature of God and man and a certain view of their rela¬

tions. But Jesus advanced no such technical theories on these subjects as were developed in later Christian thought. Metaphysics, in gen¬

eral, was foreign to the Jewish mind. Hence the teaching of Jesus naturally moved wholly in the ethical sphere. His teaching about God concerned itself almost wholly with the moral character and disposition of God. This char¬

acter he illustrated by practical, human anal¬

ogies.

Jesus' favorite name for God, as we have seen, was ftFather® ; that is, original, creative and sustaining Jove. In that conception of God the whole ethical character of his religion is rooted. The Father delights to give, to serve, to bless. He bestows his benefits upon all, even the evil and unthankful. He freely forgives, upon repentance, not only «until seventy times,®

but ((until seventy times seven.® Now, the pri¬

mary requirement of Christianity is that men should be like God; or, as Jesus expressed it, that they should be sons of their Father; that is, morally kindred to him in spirit and action.

Jesus represented himself as having come into the world to reveal God in this character and perfectly to illustrate in himself the Godlike type of life. He would be servant of all ; he came to minister and to give his life for others.

His followers must do the same. They must take up his cross of sacrifice and self-renuncia¬

tion and follow after him. As he laid down his life for men, so must they lay down their lives for one another.

With all its faults and failures, despite its divisions and bitter enmities, Christianity has done much to leaven the world with the spirit which its Founder thus described and en¬

joined. It has cared for the sick and the poor, instructed the ignorant and sheltered the help¬

less. To education, to literature and to art the Christian religion has imparted a powerful im¬

pulse. No impartial student of history can question the great contribution which Chris¬

tianity has made to human progress in culture and philanthropy.

Its Various Forms. — The theological con¬

troversies of the early Christian centuries, to¬

gether with the political rivalries of Rome and Constantinople, finally rent the Church into two divisions, the Western or Latin, with the bishop of Rome as its head, and the Eastern, in which 620

the patriarch of Constantinople was the chief dignitary. Out of the same controversies also grew a number of sects and national churches which still survive, such as the Coptic, Ethiopic and Armenian. Down to the Protestant Ref¬

ormation in the 16th century the two chief forms of Christianity were the Oriental, now represented by the Greek and Russian Churches, and the Roman Catholic. In the West the claims of the papacy were gradually increased until the Pope rivaled in political power the greatest European emperors. There was no corresponding development in the East, where the Church became more and more dependent upon and subservient to the states with which it was allied. The Eastern Church was dif¬

ferenced from the Western by a more specula¬

tive and less practical tendency, the favorite themes in the theology of the former centring in the doctrine of the Trinity, those of the latter having more largely to do with sin and salvation. Both developed an elaborate cere¬

monial of which the mass is the central feature.

At the Reformation, or in consequence of its influence, the various divisions of Protestant¬

ism arose. Some of these, for example, the English Church, continued in alliance with the state ; others repudiated any such connection.

The Church of England retained the Episcopal system and laid increasing stress upon its con¬

tinuity in organization with the Church of apostolic days. Most Protestant communions rejected this order along with other features of the Roman organization, and attached no im¬

portance to the question of so-called tactual succession. Among these the greatest variety of belief and practice prevails.

It is quite impossible adequately to charac¬

terize in a brief statement the various forms of belief and life which the Churches and creeds of Christendom illustrate. In general, it may be said that the Roman type represents a highly elaborated, authoritative system. The decrees of popes and councils are binding, and, indeed, within certain limits, infallible. There is a highly developed and minutely defined system of dogma and an elaborate ritual. Great stress is laid upon the prescribed rites of the Church and upon priestly mediation. Salvation is mediated through the sacraments, which are seven in number. In the English Church we see an intermediate form. Its head is not the Pope, but the king. In general, it highly esteems the decrees of the early councils and lays great stress upon the (two) sacraments, but, in practice, does not compel the unquestioning ac¬

ceptance of the former, nor regard the latter as essential to salvation.

Most other Protestant bodies, such as Baptists, Congregationalists, Methodists and Presbyterians, permit and ex¬

ercise a larger liberty regarding traditional be¬

liefs and rites, some of them, as the two former, having no general authoritative creed, others, as the two latter, allowing considerable liberty in the interpretation of their official articles of belief. In general, it may be said that in Protestantism the prevailing tendency of thought is to regard Christianity as not being a system which can be embodied in rules and enforced by laws, but as a religion whose nature it is to attest itself to reason and con¬

science by its moral appeal to the human mind and heart.

The Essential and the Transient in Chris¬

tianity. — What facts and truths constitute the essence, the permanent substance of Christian¬

ity? That is a difficult question and one which Christian thinkers would answer in the most various ways. Certain it is that in its long history Christianity has undergone many trans¬

formations, been influenced by a great variety of foreign forces and taken up into itself many incongruous elements. In its Roman Catholic form it blended with the Roman Imperial idea.

In its most elaborate developments of dogma it wrought in close alliance with Greek philosophy.

Some of its doctrines have been examples of a christianized Platonism. Are these features of historical Christianity essential to it?

The same question meets us if we go back to the Church of the first age. The common view has been that every idea which is found in the New Testament is of the essence of Chris¬

tianity; but this supposition is not without its difficulties, and was probably never consistently carried out in practice. Were the apocalyptic expectations of the first Christian century valid and

essential — the universal belief in Christ's speedy personal return to earth to judge the world, the confident anticipation of Rome's early destruction and the like? A close study of early Christian history reveals the fact that the admixture of foreign elements with primitive Christian teaching was not limited to the later ages of the Church. Christian doctrine had al¬

ready undergone a considerable development within the New Testament period. Greek ideas and, especially, late Jewish theories and specula¬

tions, must be taken into account in interpreting and estimating apostolic and post-apostolic teaching and tradition.

If Christianity be regarded as a certain kind of life — if it be conceived as sonship to God, membership in the kingdom of the Godlike —then we cannot sav that any one particular form of church organization is essential to it. True Christianity is formed within all these forms of organization. Except in some purely human, arbitrary definition of it, it cannot be truly said that divine grace is the special prerogative of any one of them. Nor can any theory or prac¬

tice concerning the sacraments, or other rites, be essential. A vast range of speculative dogma, though often insisted upon as essential to salvation, can hardly be a constituent part of Christianity, since the vastly greater part of the Christian world knows nothing of it.

Christ never emphasized organization or

ceremonies or dogmas. His great words were love, righteousness, sonship to God and the like. He said that all ritual observances were trifling in comparison with judgment, mercy and the love of God; that he who had wronged a brothel* might better leave his sacrifice unof¬

fered and go and right the wrong; that love to God and man was the substance of all laws and commandments; and his life was the perfect commentary on these sayings. It was that of an obedient, trustful son of God. His one chief concern was to found and foster the kingdom of God; that is, the reign of love among men.

For this end he labored, suffered and died, and taught that his followers must follow him on this path of service and sacrifice. To live

the kind of life he lived is the essence of Chris¬

tianity. See Christian Church.

Bibliography. — Bender, (Das Wesen der

Religion) (4th ed., Bonn 1888) ; Dreyer, (Un-CHRISTIANS OF SAINT THOMAS - - CHRISTIE

dogmatisches Christentum) (4th ed., Brunswick 1890) ; Bisher, (The Grounds of Theistic and Christian Belief* ; (The Christian Religion* ; Foster, (Finality of the Christian Religion*

(Chicago 1906) ; Hatch, (The Influence of Greek Ideas and Usages upon the Christian Church* (5th ed., London 1895) ; Lipsius, (Die Hauptpunkte der christlichen Glaubenslehre*

(Brunswick 1891) ; Orr, (The Christian View of God and the World) ; Fairbairn, (The Philosophy of the Christian Religion * ; Renan, (Histoire des origines du christianisme) (Paris 1862-83) ; Sabatier, (Religions of Authority and the Religion of the Spirit) ; Piinjer, (The History of the Christian Philosophy of Re¬

ligion* ; Toy, (Judaism and Christianity *; Weiss, (The Religion of the New Testament* ; Kaftan, (The Truth of the Christian Religion* ; Harnack, (What is Christianity?* (Eng. trans., London 1901) ; id., (Expansion of Christianity in the First Three Centuries (trans., 2 vols., New York 1904—05) ; Bruce, (Apologetics, or, Christianity Defensively Stated* ; Brown, (The Essence of Christianity* (New York 1902) ; Gordon, (Ultimate Conceptions of Faith* ; Clarke, (An Outline of Christian The¬

ology* ; Brace, (Gesta Christi* ; Storrs, (The Divine Origin of Christianity Indicated by Its Historical Effects.*

The following works are by Roman Catholic authors: Chateaubriand, (Le genie du christianisme* (5 vols., Paris 1802) ; Shahan, (The

Beginnings of Christianity* (1903) ; Devivier, (Christian Apologetics* ; lyieagher, (Christ's Kingdom on Earth* (New York 1900) ; Car¬

dinal James Gibbons, (The Faith of Our Fathers* (Baltimore 1880 et seq.).

George Barker Stevens,

Late Professor of Systematic Theology, Yale U niversity.

CHRISTIANS OF SAINT THOMAS,

the name of a sect of Christians on the coast of Malabar, in southern India, to which region the apostle Saint Thomas

is said (by a tradition that has lit¬

tle to justify it) to have carried the gospel.

The facts of their history are not well made out.

They originally belonged probably to a body of Christians who, in the year 499, united to form a Syrian and Chaldaic Church in eastern Asia, and who were adherents of the doctrines taught by the heretic Nestorius. At an early date (7th century) the Persian Church had adopted the name of Christians of Saint Thomas, and the Christians of Malabar received bishops from Persia. Latterly the Christians of Saint Thomas gained the position of a military caste which locally had considerable power. When the Portuguese gained a position in Malabar these Christians were forced to join the Roman Catholic Church (1599). But in 1653 many of them renounced this union, and having in 1665

received a bishop sent by the patriarch of An¬

tioch, they have since belonged to the Jacobite body of Eastern Christians. The Church is now under seven bishops with a patriarch at the head ; and the adherents number about 300,000.

They give communion in both kinds, and in some other matters differ from the Roman Catholic Church. They allow the consecration of a

married layman or deacon to the office of priest. Their churches contain no symbols or pictures except the cross. Their liturgy is sim¬

ilar to the Syrian, and the Syrian language is used in it. At present they are, under the British government, free from any ecclesiastical restraint, and form among themselves a kind of spiritual republic, in which the priests and elders administer justice, using excommunication as a means of punishment. Consult (The Indian Empire,* by Sir W. W. Blunter.

CHRISTIANS AND, kns ‘te-an-sand, Nor¬

way, city in the southern part of the country, situated on a sandy plain at the mouth of the Torrisdals Elv, in the Bay of Christiansand.

It was built by Christian IV in 1641 ; and has been the capital of its province or stift since 1684. It has several dockyards, a good harbor, much used for refuge, and a considerable trade in timber, pitch, stockfish (salted cod), fish-oil for curriers, salmon, mackerel and lobsters, the latter chiefly for the London market. Hides, copper and iron are also exported. Shipbuild¬

ing is a considerable industry. Christiansand has a cathedral and grammar-school, and is the residence of a bishop. The streets are wide, straight, and regular; the houses are built of wood and detached, presenting altogether a remarkable colonial appearance. It has twice, once in 1880 and once, in 1892, been devastated by fires. Its fortifications have become useless because of the fortress built at Flekkero, five miles distant. Pop. 15,154.

CHRISTIANSTED, kris’ti-an-stet, capital

of the Virgin Islands, and chief town in the island of Santa Cruz, situated on the north¬

east shore. The harbor is difficult of access, being encumbered with many shoals, one of which stretches out nearly two miles sea¬

ward in a northeasterly direction. Pop. 6,000.

CHRISTIANSUND, Norway, seaport on

the northwestern coast, capital of the bailiwick of Romsdal, 82 miles southwest of Trondhjem, on three islands, which enclose its beautiful landlocked harbor. Fresh water is scarce and must be brought to the islands in long aque¬

ducts. The trade of the place is considerable, and the principal export is dried cod, chiefly for the Spanish and Italian markets. The town was founded in 1734 by Christian VI of Den¬

mark, who gave it its privileges.

CHRISTIE, Anne, Canadian poet and

novelist : b. London, England, 1837. She went to Canada in early life and settled on Amherst Island, near Kingston, Ontario. Later she re¬

moved to Ottawa. She wrote several short stories and poems for American, British and Canadian periodicals. She also wTrote for the Magazine of Poetry and received high praise from distinguished critics for her verses deal¬

ing with the Riel rebellion. Her novels in¬

clude (Alice Grey* (1873); (Edged Tools*

(1880); (Requited* (1886); (Loved I not Honour More* (1889).

CHRISTIE, Richard Copley, English

scholar: b. Lenton, Nottinghamshire, 22 July 1830; d. Ribsden, 9 Jan. 1901. He was educated at Oxford, studied law and practised his pro¬

fession 1857-77. He was professor of political economy at Owens College, Manchester, 1854 —66, and was chancellor of the diocese of Man¬

chester 1872-94. After retiring from the pro¬

fession he gave much time to bibliographical re¬

search, and besides contributing to the (Dic-622

tionary of National Biography' he published Etienne Dolet, the Martyr of the Renais¬

sance' (1880) ; (01d Church and School Li¬

braries of Lancashire' (1885) ; (Letters of Sir Thomas Copley.' He gave to Owens College the 'Christie Library, opened in 1898, and at his death bequeathed his library of 75,000 volumes to the same institution. . Consult The Athenceum, 19 Jan. 1901.

CHRISTIE, Sir William Henry Mahoney,

English astronomer: b. Woolwich 1845. He was educated at King's College School, London, and at Trinity College, Cambridge. He became fellow of the latter in 1869 and in the follow¬

ing year was made chief assistant at* the Green¬

wich Observatory. In 1880 he was secretary of the Royal Astronomical Society and in 1881 be¬

came Astronomer Royal, remaining in this rela¬

tion until 1910. He has published numerous technical papers in scientific periodicals and the volume (Manual of Elementary Astronomy'

(1875). He was created K.C.B. in 1904.

CHRISTIE JOHNSTONE, a story by

Charles Reade, published in 1855. The story, by turns pathetic and humorous, abounds in vivid and dramatic scenes of Scottish life by the

sea.

CHRISTINA, kri-te'na, queen of Sweden :

b. Stockholm, 9 Dec. 1626; d. Rome, 19 April 1689. She was a daughter of Gustavus Adol¬

phus, and her education was conducted in a masculine manner. After the death of Gustavus in 1632 the States-General appointed guardians to the Queen Christina, then but six years old.

These were the five highest officers of the Crown, who were entrusted at the same time with the administration of the kingdom. The education of Christina was continued according to the plan of Gustavus Adolphus. She learned the ancient languages, history, geography, politics, and renounced the pleasures of her age in order to devote herself entirely to study. In 1644 in her 18th year she took upon herself the government. A great talent for business, and great firmness of purpose, distinguished her first steps. She terminated the war with Den¬

mark, and obtained several provinces by the treaty concluded at Bromsebro in 1645. She then, contrary to the advice of Oxenstiern, who hoped to gain, by the continuance of the war, still greater advantages for Sweden, labored to re-establish peace in Germany, in order to be able to devote herself uninterruptedly to the sciences and the arts of peace. France, Spain, Holland and England sought her friendship.

She promoted commerce by wise legislation, and patronized the learned and literary institutions.

She declined to marry her cousin, Charles Gus¬

tavus, but induced the States-General in 1649 to designate him for her successor. In 1650 she caused herself to be crowned with great pomp, and with the title of king. From that time she neglected her ancient ministers, and listened to the advice of ambitious favorites. The public treasure was squandered with extravagant pro¬

fusion. Distinctions were conferred upon the undeserving, and produced jealous murmurs, complaints and factions. In this state of con¬

fusion the Queen declared her intention of ab¬

dicating the crown. The old ministers remon¬

strated with so much energy that the Queen de¬

sisted from her resolution. She now grasped with more firmness the reins of government, and occupied herself again with study, bought paintings, medals, manuscript, books, maintained a correspondence with many learned men and invited several to her court. Descartes, Grotius, Salmasius, Bochart, Huet, Chevreau, Naude, Vossius, Conring, Meibom, appeared in Stock¬

holm, and the Queen conversed familiarly with them on literary and philosophical subjects. But new troubles occurred; and Christina, who loved whatever was uncommon, resumed her deter¬

mination to resign the crown.

In 1654 she assembled the States-General at Upsala, and in their presence laid aside the in¬

signia of royalty to surrender them into the hands of Prince Charles Gustavus. She reserved to herself a certain income, entire independence and full power over her suite and household.

A few days after she left Sweden, and went to Brussels, where she made a secret profession of the Roman Catholic religion, which she after¬

ward publicly confirmed in Innsbruck. From here she went to Rome, which she entered on horseback in the costume of an Amazon, with great pomp. When the Pope Alexander VII confirmed her she adopted the surname of Ales-sandra. In 1656 she visited France, where her dress and manners produced an unfavorable im¬

pression, but her talents and knowledge were generally admired. She offered to mediate be¬

tween France and Spain; but Mazarin declined the offer. While at Fontainebleau during this visit, abusing the right of extraterritoriality, she had Monaldeschi, her grand equerry and lover, executed before her eyes, as a faithless traitor. Mazarin succeeded in accelerating her departure from France under various pretexts.

After the death of Charles Gustavus in 1660, the Queen made a visit to Sweden, under pre¬

tense of wishing to arrange her private affairs ; but it was soon perceived that she had other views. As the Crown Prince was very young, she declared that in case of his death she should lay claim to the throne. This project was unfavorably received and she was com¬

pelled to sign a formal act of abdication. About this time she aspired to the Polish Crown, but the Poles took no notice of her wishes. Finally she returned to Rome, where she passed the re¬

mainder of her life in the cultivation of the arts and sciences, giving way at times to fits of sen¬

sual indulgence. She was interred in the church of Saint Peter, and the Pope erected a monument to her with a long inscription. She had asked only for these few words: Vixit Christina annos LXIII. Consult Archenholtz, (Vie de Christine par elle-meme' (Stockholm 1751) ; Bain, 'Christina, Queen of Sweden'

(London 1890) ; Geyer, 'Geschichte Schwedens,' Vol. Ill (Hamburg 1836).

CHRISTINA, Maria, queen of Spain,

daughter of Francis I, king of the Two Sicilies, and mother of Isabella II, the dethroned queen of Spain: b. Naples, 27 April 1806; d. Havre, 22 Aug. 1878. She was married to Ferdinand VII in 1829, and took an active part in the affairs of Spain from 1830 to 1854. As queen-regent she governed arbitrarily, and in 1854 she abdicated.

CHRISTISON, Sir Robert, Scottish phy¬

sician and toxicologist: b. Edinburgh, 18 July 1797; d. 23 Jan. 1882. He graduated in medi¬

cine at Edinburgh University in 1819, and sub¬

sequently _ studied in London and Paris. He was appointed to the chair of medical juris-CHRISTLIEB — CHRISTOLOGY

prudence in Edinburgh in 1822, shortly after his return to Scotland, and in 1832 was pro¬

moted to those of materia medica and clinical medicine, but resigned them in 1877 and 1855, respectively. He was twice president of the Royal College of Physicians, president of the Royal Society of Scotland and ordinary phy¬

sician to the queen in Scotland. He was created a baronet in 1871. The most important of his published works is his (Treatise on Poisons) (1829) ; he also wrote (Granular De¬

generation of the Kidneys) (1839) ; and a com¬

mentary on the (Pharmacopoeias of Great Britain) (1842).

CHRISTLIEB, krist'leb, Theodor, Ger¬

man theologian : b. Bukenfeld, Wurtemberg, 7

March 1833 ; d. Bonn, 15 Aug. 1889. He studied at Tubingen, after which he taught for some time in France. In 1858 he began preaching in London, where his famous lectures on (Modern Doubt and Christian Belief > were later pub¬

lished. After a stay of seven years in London, in 1865 he returned to Germany, and subse¬

quently, in 1868, became professor of theology at Bonn. In 1873 he was sent to the United States as a delegate to the Evangelical Christian Alliance, then convened in New York, and de¬

livered a lecture before that body on rational¬

ism. Prominent among his publications are ˆLeben und Lehre des Johannes Scotus

Erigena) (1860) ; (A!odern Doubt and Chris¬

tian Belief } (1874) ; (Protestant Foreign Mis¬

sions, Their Present State) (1880), *etc.*

CHRISTMAS, derived from the mediaeval

Christes Masse, the Mass of Christ; the feast commemorating the birth of Jesus, observed by the Christian Church annually on the 25th of December. It was, according to many authori¬

ties, not celebrated in the first centuries of the Christian Church, as the Christian usage in general was to celebrate the death of remark¬

able persons rather than their birth. The death of the martyr Stephen, and the massacre of the innocents at Bethlehem, had been already long celebrated, when, perhaps in opposition to the doctrine of the Manichaeans respecting the birth of the Saviour, a feast was established in memory of this event in the 4th century. In the 5th century the Western Church ordered it to be celebrated forever on the day of the old Roman feast of the birth of Sol, as no cer¬

tain knowledge of the day of Christ's birth ex¬

isted. Among the German and Celtic tribes the winter solstice was considered an important point of the vear, and they held their chief fes¬

tival of Yule to commemorate the return of the burning-wheel. The holly, the mistletoe, the Yule log and the wassail bowl are relics of pre-Christian times. In the East Christmas was celebrated on 6 January. As told in the Gospel of Saint Luke, Christ was born during the night, and therefore divine service was per¬

formed in the night of 24-25 December, from which circumstance Christmas is called in Ger¬

man Weihnachten, a contraction of the old German ze wih nahten, on the holy or conse¬

crated nights. The feasts of the martyr Stephen and the evangelist Saint John were united with it, and a feast of three days' con¬

tinuance was thus formed. In the ecclesiastical year this festival gives name to a period ex¬

tending from the first Sunday of Advent to the feast of Epiphany, 6

January. In the Roman Catholic Church priests are allowed to cele¬

brate three masses against the rule which pre¬

vails every other day in the year. In the Greek and Roman Catholic churches the manger, the holy family, etc., are sometimes represented at large and before them are sung the carols and manger songs which are musical features of Christmastide. Most Christian, churches celebrate this great festival in some way, and practically the entire community in Christian countries, including Jews and non-churchgoing people nominally classed with Christian popula¬

tions, join in its social observance. In the United States, England and other countries business is commonly suspended, although in Scotland this is only partially the case. The custom of making presents at Christmas is derived from ancient usage; but it has become consecrated by ages, and contributes greatly to make this festival an interesting event to families. (See Befana). The sending of Christ¬

mas cards by way of friendly greeting and re¬

membrance has grown up since about 1860.

The Christmas-tree has been traced back to the Romans. It went from Germany to Great Britain, and is almost universal in the United States, where the customs of so many national¬

ities meet and gradually blend into common usage.

CHRISTMAS-BOX. See Boxing-Day.

CHRISTMAS CAROL, a song in cele¬

bration of Christ's birth, sung especially at Christmas time. Such carols, as well as many of a more secular but always joyous nature, have been long popular among the people of many nations. In France they are known as noels, and various good collections of them have been published from time to time. Con¬

sult Sandys, (Christmas Carols, Ancient and Modern.-'

CHRISTMAS GIFTS, Origins of. See

Befana.

CHRISTMAS ISLAND, the name given

to three oceanic islands, of which the most im¬

portant is situated 200 miles southwest of Java.

This island, which is supposed to have been originally a coral atoll, and to have been raised by volcanic forces, rises to the height of nearly 1,600 feet and is in shape an irregular quadri¬

lateral nine miles long and about nine miles wide. It was annexed by Great Britain in 1888, and a settlement has been formed on it for the purpose of developing beds of phos¬

phate. The population in December 1914 was about 1,670, all employed in the phosphate in¬

dustry.

CHRISTOLOGY, in the widest sense, in¬

cludes whatsoever of theology bears upon the Christ; in a limited and technical sense, it is that branch of theology which treats of the nature, personality and activities of the Christ.

In this technical sense, Christology may be con¬

veniently treated according to the historical evolution of ideas Christological in : I. The Old Testament; II. The New Testament; III.

The Early Church; IV. Modern Schools of Christology.

The viewpoint of this article is that alike of Catholics and of

Protestants, who have the traditional belief in the divinity of Christ. The names Catholic and Protestant have of set. pur¬

pose been omitted, since the matter of belief is common. The essentials of the Christology of the Reformers have not been given; they are 624

the traditional and conservative ideas that run through the article. Anything distinctive of each form of Christian belief is left to the articles on the various religious denominations.

I. Christology of the Old Testament. —

They who accept the Bible as the Word of God, and consequently derive religion from God's revelations to the human race, trace the idea of a Christ throughout many prophecies contained in the Old Testament.

Early Prophecies. — Immediately after the fall of the human race in Adam, God promised a victory of that race over the enemy that caused its fall (Gen. iii, 14-15). In the di¬

vine promises made to Abraham, Isaac and Jacob, this victory was spoken of as salvation by their seed (Gen. xiii, 16; xv, 5; xviii, 17-19; xxii, 17-18; xxvi, 4; xxviii, 14).

The saving seed of Jacob was designated as a Ruler in the patriarch's blessing of Judah: " The sceptre shall not pass from Judah, Nor the ruler's staff from between his feet, Till that he come whose it is,

And his be the obedience of the folk." (Gen. xlix, 10) From Mosaic days, Israel looked forward to a salvation that should come through a King of the line of Jacob and of Judah (Num. xxiv, 17-19). To David (b.c. 1017-977), it was re¬

vealed through Nathan that out of the line of Judah the Davidic family was chosen as the source of the royal Saviour of Israel (2 Sam.

vii, 1-16; 1 Chron. xvii, 11-14). Such is the interpretation of this revelation that is given in Hebrews i, 5.

The Christ of the Psalter. — In its present inspired content, the Psalter is the result of a ‘ gradual evolution. The Psalters of David, the Director, Asaph, etc., were finally collated and arranged in a lyric anthology that records Israel’s religious thought from the time of David to that of Esdras. Three lyrics will sufficiently indicate the Christological ideas, whereof these inspired psalms afford abundant evidence. In Psalm 2, probably written in the time of David, is the first mention of the Christ, <(the Anointed,® the Messiah (verse 2), whom previous Old Testament writings speak of as the saving King. Acts iv, 25-28 inter¬

prets the first two verses of this psalm as fore¬

boding the united efforts of Jew and Gentile to overthrow the Christ. The Christ of the Psalmist is the Son of God, begotten in eter¬

nity: <(Jahweh said to me: My Son art thou: I to-day begat thee® (verse 7). The divine name Jahweh, wrongly written Jehovah, means ((He is® ; and denotes the ever being of the Deity. Hebrews, in proving the divinity of Jesus, interprets this verse of natural divine sonship of the Christ (Heb. i, 5). In like manner, the Jews of the time of Jesus looked forward to the Christ, the King of Israel, as the Son of God. Witness the act of faith of Nathaniel: ((Rabbi, thou art the Son of God; thou art the King of Israel® (John i, 49).

Witness the authoritative and judicial query of Caiaphas : ((I adjure thee by the living God to tell us if thou be the Christ, the Son of God®

(Matt, xxvi, 63). This expectation of the Jews infiltrated even into Samaritan reli¬

gious life. The Samaritan woman said to Jesus: <fI know that the Messiah who is called the Christ, is coming® (John iv, 25).

In Psalm 45 (44) :7-8, we find ((Thv throne, 0 God, is forever and ever… . Thy God, O God, hath anointed thee.® Hebrews i. 8-9

refers these words to the Christ as the natural Son of God, the first born of the Father and the object of adoration to the angels (Heb.

i, 6). Hence, the Christ is here twice called God; and his throne, or reign, is said to be from eternity.

In Psalm 109 (110); 1. ((Jahweh said to Adonai : Sit thou at my right hand.® This pas¬

sage is cited by the Christ to prove that he is Adonai, seated at the right hand of Jahweh (Matt, xxii, 44). But Adonai, ((my Mas¬

ter,® as a proper name, is used exclusively of the Deity, either alone or in such a phrase as Jahweh Adonai; indeed, in the stead of the in¬

effable name, Jahweh, the pious Jew read Adonai. It is clear, then, that in this lyric, Jahweh addresses the Christ as a different Per¬

son and yet identical in Godhead. Moreover, farther on Jahweh says to the Christ: <(Before the day-star I begat thee® (verse 3). Hence the Christ of this psalm is the begotten of God, sharing the nature of his Father, different in personality; he is before the world comes into being; he sits at the right hand of the Father from all eternity.

The Sophia-Logos of the Sapiential Books.

— In Proverbs, Wisdom, and Ecclesiasticus, the Christ appears as the uncreated Sophia and Logos, the personified divine Wisdom and Word, a divine Person distinct from the first Person.

The Christ of the Early Prophets. — Isaiah who prophesied before the fall of Samaria (b.c. 722), will serve as a witness to the Chris¬

tological ideas of the Prophets of the Assyrian period. All his invective and foreboding in re¬

gard to the degeneracy and downfall of Israel are tempered by a Messianic hope that ever and anon looms large over against a stormy horizon. What though Samaria be on the point of falling? Fear not the Assyrian hordes.

“ Say to the fluttering of heart:

Be brave! Fear not!

Lo, with vengeance your God will come in quittance: Your God, he will come and save you! ” (Is. xxxv, 4) Manifold and multiform is the clear

prophecy of Isaiah that the nature of the Christ will be divine. (<Make ready the way of Jahweh® (xl, 3). ((Lo, Adonai Jahweh will come with might® (xl, 10). Saint Mark, witnessing to the Messianic expectation of his time, identifies Jahweh of this prophecy with the Christ (Mark i, 3). Not only Jahweh, but a new divine name is given by Isaiah to the Messiah : <(His name will be called Immanuel®

(Is. vii, 14). This prophecy is said by Saint Matthew to be fulfilled in the divinity of Jesus the Christ : <(They shall call his name Em¬

manuel, which, being interpreted, is God with us® (Matt, i, 23). Equally clear is the prophecy of the divinity of the Christ, when Isaiah says : <(A child is born to us …

his name shall be called Wonderful, Counsellor, God the Strong One, the Father of the world to come, the Prince of Peace® (Is. ix, 6).

The very same child, whose coming is to be the salvation of Israel, is called Immanuel (vii, 14). and God the Strong One (ix, 6).

The former name explains the latter. The Christ will be with Israel more intimately than Jahweh Shechinah, (< Jahweh, He who tents with us.® By this more intimate presence and CHRISTOLOGY

greater efficiency of Immanuel, is the Christ to be God the Strong One.

1 hough more efficacious than Jahweh of the old Law, by his exercise of might in Israel, the Christ will be ((the Sprout of Jahweh® (Is.

iv, 2), the same in nature as the Father. <(The Saviour sent by our God® (Is. lii, 10) will be (cGod our King® (Is. lii, 7), — yea, very God of very God, “Jahweh the God of Israel® (Is. lii, 12), “He that hath made thee, Jahweh of the hosts his name® (Is. liv, 5).

The Christ of the later Prophets. — Among the prophets of the Babylonian period, Jere¬

miah stands out as a beacon of Messianic hope.

While thundering against sin, before b.c. 586, he foretells the peace that is to be through the Christ, “Jahweh our Just One® (xxiii, 6; xxxiii, 16). Malachi (b.c. 459-445) says: “Behold I send my angel, and he shall prepare the way before my face, and presently the Lord, whom ye seek, and the angel of the testament, whom ye desire, shall come to his temple® (iii, 1).

The Christ himself interprets “my angel® as his precursor, John the Baptist, who prepared the way before his public life (Matt, xi, 10).

The Christ was, therefore, the spokesman of the words of Malachi. But the words of Malachi are uttered by Jahweh the great God of Israel.

Hence, in this prophecy of Malachi, as else¬

where in the prophets, the type merges into the antitype, the God of the Old Testament be¬

comes the God of the New, Jahweh and the Christ are one and the same divine person.

Bibliography. — Hengstenberg, (Christology of the Old Testament (1836) ; Meignan, Rro-pheties messianiques) (1878); Schiirer, his¬

tory of the Jewish People) (1885) ; Edersheim, ‘Prophecy and History’ (1885) ; Briggs, Mes¬

sianic Prophecy) (1886) ; Schindler, Messianic Expectations) (1886) ;

Elliott, (01d Testament Prophecy' (1889); Stanley, (History of the Jewish Church) (1891); Riehm, Messianic

Prophecy) (1891) ; Maas, (Christ in Type and Prophecy' (1893); (Judaism at the World's Parliament of Religions' (1894) ; Robertson, 'Early Religion of Israel' (1895) ; Goodspeed, (Israel's Messianic Hope) (1900) ; Addis, (Hebrew Religion' (1906) ; Marti, Religion of the Old Testament' (1907); Kittel, 'History of the Hebrews) (1908), and Scientific Study of the Old Testament (1910) ; Lagrange, Messianisme chez les Juifs' (1909); Welch, Re¬

ligion of IsraeP (1912) ; Robinson, Religious Ideas of the Old Testament' (1913) ; Drum in American Ecclesiastical Review (Nov., Dec.

1915 and Jan., Feb. 1916).

II. Christology of the New Testament. —Three fundamental facts are taught by the Christology of the New Testament: (1) The Divine Nature of Jesus Christ; (2) The Human Nature of Jesus Christ; (3) The Hypostatic Union of the Human with the Divine Nature in the Divine Person of Jesus Christ.

The Divine Nature of Jesus Christ. — By the Christology of the Gospels and of Saint Paul, the divinity of Christ stands out in clear relief. The underlying, and at times overlap¬

ping, purpose of Matthew, Mark, Luke, John and Paul, is to establish the divine nature of Jesus. For the sake of brevity, the evidence will be limited to two forms of this doctrine.

First Jesus is the natural Son of God; secondly, he is very God. These two forms of the doctrine of the divinity of the Christ are deduced from VOL. 6 — 40

documents, which are assumed to be authentic, historical and inspired. The origin of Mark from <(Q® and another early document, the de¬

pendence of Luke upon Mark' and the Logia, the sources of Matthew,

the authenticity of the Pauline epistles,— all these questions are waived in this statement of conservative Christology of the New Testament.

A. First, Jesus Christ is the Son of God.

At Caesarea Philippi, during the third year of his ministry, Jesus asked the disciples: ((Who do men say that the Son of Man is?® (Matt, xvi, 13). This name, Son of Man, was one of predilection to Jesus; it connoted his oneness with men. The disciples made answer that others said he was one of the prophets. Christ pressed them : ((But who do ye say that I am ?®

(ibid. 16). Peter, as spokesman, replied : <(Thou art the Christ, the son of the living God®

(ibid. 16). Peter meant more than they who said that Jesus was one of the prophets. They meant that he was the adopted son of God.

All the prophets were the adopted sons of God both by grace and by descent from Abraham.

Without special divine revelation, Peter might have known that Jesus was such an adopted son of God. The divine sonship that he as¬

signed to Jesus was known to him by special revelation, and not by acquired knowledge.

Peter meant that Jesus was the natural Son of God. The Christ approved of both the avowal and the source of information : ((Blessed art thou, Simon son of John; for flesh and blood hath not revealed this to thee, but my Father who is in heaven® (ibid. 17). Jesus here ad¬

mits that he is the natural Son of God ; that God is his Father by a title greater than that whereby the prophets and other saintly leaders in Israel were adopted sons of God. That title is identity of divine nature. Friend and foe alike were allowed by Jesus to address him as the Son of God, and to show by adoration that they meant real and natural sonship, not a figurative and adoptive divine sonship conse¬

quent upon personal and racial sanctity. Men possessed by unclean spirits prostrated them¬

selves in adoration before him, and the spirits of evil were forced to

cry out: ((Thou art the Son of God® (Mark iii, 12). His disciples, after the stilling of the storm at sea, adored him and said : (<Indeed thou art the Son of God® (Matt, xiv, 33). The man born blind, whom Christ had cured at Jerusalem, was asked to make an act of faith in the divinity of the Wonderworker: “Dost thou believe in the Son of God?® And after a brief instruction, (<he said: (I believe, Lord’; and he adored him®

(John ix, 36-37). The centurion on Calvary (Matt, xxvii, 54; Mark xv, 39), the evangelist Saint Mark (i, 1), the hypothetical witness of Satan (Matt, iv, 3) and of the enemies of Christ (Matt, xxvii, 40), all go to show that Jesus was called and esteemed the true Son of God. Never once did Jesus suggest that men should not give him the adoration due to God alone; never did he hint that men erred in making him more than the adopted son of God.

He could not have suggested such error.

Adoration was his due. He claimed to be that which adoration implied, — the real and natural Son of God. It was just before the end. Jesus had journeyed to Judea for the last time. He would continue his ministry thereabout for three months until the last Passover. Open and

frank then were the teachings that had at times been given under the esoteric form of the par¬

able. One day, during the celebration of the Feast of the Dedication of the Temple, Jesus was walking neath the portico of Solomon on the temple plot. His foes were on the watch.

They wished to catch him in speech. So they gathered round about and said : ((How long dost thou hold our souls in suspense? If thou be the Christ, tell us plainly.® The answer of the Christ was typical. He put them off for a while; chided them for unbelief, for the rejec¬

tion of the abundant testimony that his works bore of the truth of the Messianic claim. And then followed the clear and tremendous teach¬

ing: ((I and the Father are one.® The Jews understood at once. They took up stones to kill him. He asked why. He made them ad¬

mit that they understood him aright. They replied : ((We stone thee not for a good work, but for blasphemy; yea, for that thou, being a man, makest thyself God.® Had they misun¬

derstood, Jesus would have cleared himself of the charge ; would have at once denied all claim to true divine sonship, to identity of nature with God the Father. He made no such denial. He pressed the claim more fully home : <(Do ye say of him whom the Father hath sanctified and sent into the world, (Thou blasphemest,* be¬

cause I said, I am the Son of God? …

The Father is in Me and I am in the Father®

(John x, 22-38). A last incident worth special note is the judicial procedure before Caiaphas, who was de jure High Priest of the time. Jesus had hitherto held his peace, and made no reply to any false charges. But when Caiaphas sol¬

emnly queried in regard to the very fundamen¬

tal issue of the Messianic mission, silence was broken. Caiaphas demanded: ((I adjure thee by the living God, that thou tell us if thou be the Christ, the Son of God® (Matt, xxvi, 63).

Simple and to the point is the answer : (<I am®

(Mark xiv, 62). Caiaphas understood. He rent his garments and accused Jesus of blasphemy.

All joined in condemning him to death for the supposed blasphemy of claiming to be the natural Son of God. Jesus allowed them to understand his claim, and to put him to death therefor. Had he not made claim to be the natural Son of God, he would have been obliged in all truth and fairness to correct the wrong impression.

B. Secondly, Jesus Christ is very God.

Again and again New Testament Christology bears witness to this second form of the doc¬

trine of the divine nature of the Christ, —namely, to the fact that Jesus Christ is very God.

In the tradition of John, Jesus identifies him¬

self absolutely with God: ((He that seeth me, seeth the Father® (John xiv, 9). The very purpose of the Gospel of John is ((that ye may believe that Jesus is the Christ, the Son of God®

(John xx, 31). The opening of the prologue is a grand summary of the fundamental facts of Christology: <(In the beginning was the Logos, and the Logos was in relation to God the Father, and the Logos was God® (John i, 1).

From all eternity was the Logos, the Word.

And the Logos of John is Jesus the Christ.

For the Logos is he of whom the Baptist bears witness : ftThis is he of whom I said, — He who'

is come after me, is before me® (John i, 15)..

But he of whom the Baptist bears this witness is Jesus the Christ (John i, 30). Therefore the Logos is Jesus the Christ. Hence the Christ was from all eternity.

Moreover, ((the Logos was in relation to God the Father.® This translation is correct. The words odedg (with the article) mean, in Johannine Hellenistic, ((God the Father.® The preposition n p6g is the Platonic, as well as Aristotelian, way of expressing relation. Neo-Platonic ideas and forms had got a vogue in Alexandria. Alexandrian philosophy had been brought over the sea to Ephesus. It was the influence of this Alexandrian philosophy in Ephesus and elsewhere that John set himself to combat. Quite naturally, then, he adopted some of the expressions of the hostile school, and adapted them to his Christology. To stem the inrushing tide of Gnosticism, he clearly set it

down that Jesus the Christ, the Logos of his Gospel, was from eternity, was in nature God, was in relation to God the Father from all eternity, and therefore a distinct divine Person.

And to drive home by irresistible clearness of statement, the teaching of the divine nature of Jesus, John immediately added: <(A11 things by him came into being, and apart from him came into being not one thing that is® (John i, 3).

Jesus is the very God, who <(in the beginning created heavens and earth® (Genesis i, 1).

Similarly in his Epistles, John gives certain witness to the very Godhead of Jesus: (<We know that the Son of God is come. And he hath given us understanding that we may know the true God, and may be in his Son. This is the true God and life eternal® (1 John v, 20).

The Patristic interpretation down the centuries refers this to the Christ: ((Jesus is the true God, and life eternal.®

Saint Paul is as absolute in his witness of the Deity of Jesus as are the evangelists. To the great Apostle, Jesus is the Christ, <(who is over all things, God blessed for ever® (Romans ix, 5). The Christ is Jahweh of the Exodus: (<And all drank the same spiritual drink ; yea, they drank of the spiritual Rock that followed them, and the Rock was the Christ® (1 Corin¬

thians x, 4). It was Jesus whom some of the Israelites tempted; and they perished by ser¬

pents (ibid, x, 19). It was he, against whom (<some of them murmured; and they were de¬

stroyed by the destroyer® (ibid, x, 10). ((In him dwelleth the fulness of the Godhead cor¬

poreally® (Colossians ii, 9). Men should not go so low as to give to angels, that they see not, the adoration due only to the Christ (ibid, ii, 18). (<For in him all things were created … . all things were created by' him and for him® (ibid, i, 16). <(Although he was in the nature of God, yet did he not look upon equality with God as above all things to be clung to; but he emptied himself by taking the nature of a slave

and by becoming like men.

And having appeared among us in outward bearing as mere .man, he still further humbled himself by submitting even to death, — even to death on a cross. And that is why God the Father raised him to the very highest place, and freely gave him the name which stands above all other names; so that in the name of Jesus (at the Jahwistic power of Jesus) every knee should bend in heavens, on earth and under the earth, and every tongue should confess that Jesus Christ is Jahweh in the glory of God the Father® (Philippians ii, 6-11).

The Human N attire of Jesus Christ. — The CHRISTOLOGY

Gospel story of the birth, upbringing, public hie, private life, suffering and death of Jesus would all be a lie, were he not a Man with human nature such as ours. ((For there is one God, and one Mediator between God and men, the Man Christ Jesus55 (1 Timothy ii, 5). He is the “seed of Abraham” (Galatians iii, 16), the son of David (Matt, i, 1), the fruit of the loins of David (Acts ii, 30), made of the seed of David according to the flesh (Romans i, 3).

To prove the human nature of the post-Resurrection Christ, Jesus even takes pains to enu¬

merate the parts of his body: (<See my hands and feet, that it is I myself ; handle and see ; for a spirit hath not flesh and bones as ye see me to have” (Luke xxiv, 39).

The Hypostatic Union of the Divine Na¬

ture with the Human in the Divine Person Jesus Christ. — New Testament Christology teaches not only that the Christ is true God and true Man, — i.e., has divine and human nature, —but that the two natures are physicaljy united in one hypostasis or person, and that Person is divine. The very, same Person, the Logos, the Christ, was God in the beginning (John i, 1), was in Personal relation with God

the Father from eternity (ibid, i, 2), created all things (ibid, i, 3), and was made flesh, — i.e., became Man in time (ibid, i, 14). The same divine Person, the Christ, “although he was in the nature of God, yet … emptied himself by taking the nature of a slave and becoming like men. And having appeared among us in out¬

ward bearing as mere man” (Philippians ii, 6-7), he was “in every, way tempted, exactly as we have been, yet without sinning” (Hebrews iv, 15). During the beginnings of the Church in Jerusalem, Saint Peter told the people, at the Gate of Solomon: ((The Author of life ye have put to death, but God raised him from the dead” (Acts iii, 15). It is always one and the same Person, Jesus Christ, who is said to be God and Man, or is given predicates that de¬

note divine and human nature.

Bibliography. — The literature of New

Testament Christology is enormous. A few of the works most worthy of note are : Fathers of the Church: Saint Irenseus, (Adversus Haereses5 ; Saint Athanasius, (De Incarnatione Verbi5 ; id., (Contra Arianos) ; Saint Ambrose, (De Incarnatione } ; Saint Gregory of Nyssa, (Antirrheticus contra Apollinarium5 ; id., (Trac-tatus ad Theophilum5 ; Saint Gregory of Nazi-anzen, Saint Cyril of Alexandria, who wrote explicitly against the Arians, Nestorians, Monophysites and Monothelites. Scholastics: Saint Thomas, <Summa) (III. qq. 1-59) ; Saint Bonaventure, (Brevil.5 (IV); id., (In iii Sent.5; Bellarmine, (De. Christo Capite totius Ec-clesiae Controversy ; Suarez, De Lugo, Petau, Franzelin, Hurter, Stentrup, Billot, Pesch, Bil-luart, in the treatise (De Verbo.5 Lives of Christ; Saint Bonaventure, Ludolph of Sax¬

ony, Veuillot, Coleridge, Grimm, Farrar, Fou-ard, Didon, Maas, Plumptre, Geilcie, .Edersheim.

Dogmatic Works: Liddon, (Divinity of our Lord and Saviour Jesus Christ5 (1866); Roh, (Who and What is Christ?5 (1890) ; Gore, (Incarnation of the Son of God) (1891) ; Mathews, (Messianic Hope in the New Testament5

(1905) ; Prat, (Theologie de St. PauP (1909) ; Briggs, (Messiah of the Gospels) (1894); (Messiah of the Apostles5 (1895) ; (New Light on the Life of Jesus5 (1909); Hncarnation of the Lord5 (1902); Drum, (Divinity of Christ5

(1918).

III. Christology of the Early Church. —Of little import are the early heresies of Basili-des, Marcion, Valentinus, the Manichaeans and Apollinaris. They were combated by the

Fathers of the time. First to attack effectively the conservative Christology of the early Church was Arius. He set the heresy agog that the Christ was not of one essence, nature or substance with God, — not a divine Person, —was at most a half-way between the human and the divine. This heresy was condemned by the declaration of the Church in the Coun¬

cil of Nicaea, a.d. 325, which defined the divinity of the single Person, Jesus Christ, and his twofold nature, — human and divine. Later Nestorius started a new form of heresy. He taught that, in Jesus, there were the human na¬

ture, and therefore a human person; and also a divine Person with a divine nature. This heresy was condemned by the Church, which in the Council of Ephesus, a.d. 431, defined the oneness and divinity of the single Perspn, the Christ; and the physical unity in this divine Person, of the double nature, human and di¬

vine, of the Word made Flesh. Later another heresy took rise. By the anathema ‘ of Nicaea, the Church had made it impossible to teach, in the sense of Arius, that, in Jesus, there is no divine Person and no divine nature. In the Council of Ephesus the Church had condemned the opinion of Nestorius that, in Jesus, there were two persons and two natures. Was there room for more heresy? Yes, Eutyches saw a loophole. He taught that, in Jesus, there was only one Person, the divine, and only one na¬

ture. The followers of Eutyches, Monophysites, taught either an intermingling of the two natures of Christ into one; or some sort of a conversion of the human nature into the divine.

The Council of Chalcedon, a.d. 451, launched an anathema against all Monophysites ; and defined still more clearly that, in Jesus, there were two distinct natures, the divine and the human, physically united in one divine Person, and yet not merged into one nature.

What more? Since the two natures of Jesus were physically united in one divine Person, what handle for heresy remained? One handle more! Three of the Oriental patriarchs, —Sergius of Constantinople, Cyrus of Alexandria and Athanasius of Antioch, — joined their patriarchal power in one last effort to destroy the great mystery of the Christian faith. They had to admit with Nicaea, Ephesus and Chal¬

cedon that one divine Person, Jesus the Christ, had two natures, the divine and the human, physically united in one hypostasis or Person.

But they resented the mystery of a perfect Man, who was not a human person. They withdrew from the perfection of the human nature of Jesus. They taught that, in Jesus, there was no human activity; that the activity of the human nature was merged into the activity of the divine; that, in Jesus, there was only the activity of the divine nature; that, in Jesus, there was only one activity, and one will, and that one activity and one will were divine.

Against this heresy, the Council of Constanti¬

nople, a.d. 680, defined the perfection of the human nature of the Christ, his perfect human will distinct from the divine, his perfect human activity distinct from the divine.

One more effort was made by the Orient to detract from the perfection of the two natures in Christ. Photius, in the 9th century, admitted with the Council of Constantinople, the per¬

fection of the human nature of Jesus; he de¬

tracted from the divine, and denied to the Son equality with the Father in the procession of the Holy Spirit. He was condemned. The Church taught the equality of Father and Son, the procession of the Holy Spirit from Father and Son as from one principle. A schism re¬

sulted. The tear was mended for a century and a half. Then, in the

middle of the 11th century, under the Emperor Michael Caerularius, the party of Photius again gained power. Con¬

stantinople was wrenched from Rome. The Eastern Church was separated from the West¬

ern in its Christology. ,

Bibliography. — Stanley, (Eastern Church5

(1864) ; Thatcher, (The Apostolic Church) (1893) ; Rainy, (The Ancient Catholic Church5

(1902) ; Duchesne, < Christian Worship5 (1904), (The Churches Separated from Rome5 (1907), (The , Early History of the Church5 (1910); Batiffol, (Primitive Catholicism5 (1911) ; Barnes, (The Early Church5 (1913) ; Fortescue, (The Lesser Eastern Churches5 (1913), (The Ortho¬

dox Eastern Church5 (1911) ; Scott, (The Be¬

ginnings of the Church5 (1914) ; Fisher, (The Beginnings of Christianity5 (1916).

IV. Modern Schools of Christology. —

Unitarians. — After the break between the Eastern and Western churches, there were no widespread, epoch-making Christological con¬

troversies for many centuries. The Reformers took over the three fundamental facts of tradi¬

tional Christology ; they taught the divinity and the humanity of the one divine Person, Jesus Christ. An exception was Laelius Socinus, who in a.d. 1544 was obliged to leave Italy for denying the divinity of Christ. From Socinianism came Unitarianism, which was first organized in Poland about a.d. 1563.

Unitarians teach that Jesus is the highest of men ; but profess a deism which excludes the doctrines of the Trinity and the divinity of Christ.

Modern theories of Christology are the out¬

come of two tendencies, which to-day divide German liberal Christologists. The first ten¬

dency is of the Religionspsychologischerklarungschule, — the school that claims to interpret religion according to the findings of psychol¬

ogy; its chief resultant theories are the Ideal Christ, and the Christ of Experience. The sec¬

ond tendency is of the Religionsgeschichtlich-erklarungschule, — the school that claims to in¬

terpret religion in terms of history; its chief resultant theories are the Christ of History and the Mythic Christ. Modern Christological theories at times show both tendencies, — for instance, the Christ of History now and then dovetails into the Christ of Experience ; but it will make for clear exposition, if, according to . his dominant tendency, the modern Ghristolo-gist be classed under one of these four main headings. All of these modern theories either explicitly deny the divinity of Christ or defend a Godhead that departs from the definitions of the early councils of the Church.

The Ideal Christ. — During the 17th century, the Lutheran theologians strove by scholasticism to defend Lutheran Christology, and to ex¬

plain the union of the two natures of Christ in one divine Person. Their attempts were an intellectualistic departure from Luther's voluntaristic theology.

The revolt against this array of scholastic¬

ism on the side of Luther took place in the 18th century. The pioneer rebel was Kant (1724-1804). He was an anti-intellectualist.

According to him, pure reason can reach, not the noumenon, the thing in itself, but the phainomenon, the thing in the content of con¬

sciousness ; and hence pure reason cannot at¬

tain to the knowledge either of the human or the divine nature in Jesus. Hence faith is not an act of pure reason on the authority of God

revealing. Faith is an act of the practical rea¬

son. Practical reason postulates, by a Kantian Ought, the acceptance of the Man-God; and this acceptance by the will is the Kantian act of faith in Christ (Consult Kant, (Religion innerhalb der Grenzen der blossen Vernunft,5

Chapter 4). Kant had set at naught things in themselves. They are, but we cannot get at them. Fichte (1762-1814) put aside even the Kantian things in themselves. What is the use of them, since we cannot get at them?

The only thing we know about them is that we know nothing about them. It is the I, the Self, that makes the world. The world is whatsoever self-consciousness makes it ; and self-consciousness is the Moral Will, the will to act nobly, dutifully, steadfastly, di¬

vinely. The human nature of Jesus, being part of the world, in Fichte's Christol¬

ogy, is a limitation of the Absolute, the pro¬

jection of Moral Will, the I, the Self, into time and space. The incarnation is the union of God and man by self-consciousness. The Deity of Christ is impersonal.

' The Romantic School. — Fichte's explanation of the world of subject and object as the ob¬

jectifying of Moral Will led to the Romantic School. This school was started by a group of young men, all born between 1765 and 1775, the two Schlegels, Tieck, Novalis, the philoso¬

pher Schelling, and the theologian Schopen¬

hauer. The Romanticists substituted Emotion for the Moral Will of Fichte, as their imper¬

sonal Deity. The world of objects is what emotion makes it. Dream out your world ; it is a dream of the inner life, — a projection of Emotion into time and space. In Christ, the Absolute first becomes truly objective; his Godhead is not that of a Person. Josiah Royce, late Alford professor of natural re¬

ligion, moral philosophy and civil polity, at Harvard, always retained the voluntarism of Schopenhauer.

Hugo Miinsterberg late professor of Psy¬

chology in Harvard, was likewise voluntaristic in his philosophy. In seeking a substitute for Kant's noumenon — the useless thing-in-itself —he set down, as the ultimate category of objec¬

tivity, not Sein, not the being of the thing-in-itself ; nor Miissen, not the must-be of a thing — a universal necessity consequent upon

scientific consciousness; nor Sollen, of the Freiburg school of critical transcendentalists, not the ought-to-be — a necessity consequent upon Moral Will ; but Wollen, an over-indi¬

vidual Will, reminiscent of the Welt Wille of Schopenhauer. Nietzsche's Absolute, Will

Power, is also of the Romantic school. He deems Pontius Pilate to have been the nearest approach to Superman in the Gospel story.

CHRISTOLOGY

Hegel (1770-1831), in his Absolute Idealism, is a monist. He identifies subject and object in a unity of all things; and consequently his Deity is not a Person, his Christ is an Idea.

To explain the world, that seems to be out¬

side the thinking subject, Schelling starts from the Absolute; Hegel starts from the Idea.

The Absolute is the pure Idea in itself; Na¬

ture is the Idea manifested: Spirit is the Idea turning back on Itself — the Idea as Soul, So¬

ciety, God. The Christ is the supreme mani¬

festation of the Idea. Among recent Neo-Hegelians are Bradley, the Cairds, Bishop D'Arcy of Down and Canon Inge.

The Christ of Experience. — While the sub¬

jectivism of Kant led up to the various forms of the impersonal Ideal Christ, which the foregoing pantheists substituted for a real, personal Christ, a rival school of Christology founded its views on the existing fact of the Christ and the Christian consciousness thereof.

Schleiermacher (1768-1834) started by denying that religion is a philosophy or any science at all : it is not knowing, but feeling. Every new religion is determined by a newr feeling or in¬

tuition of the world outside the self. Christ had such a new intuition. His divinity lies in a consciousness of mediatorship and Godhead.

He had not eternal existence, did not rise from the dead; he is divine in the complete satisfac¬

tion he gives to the Christian conscience.

Rothe (1799-1867) followed Schleiermacher in denying the identity of Christ with God the Father, and affirming a divinity that is found¬

ed on the consciousness that Jesus had of his mission, and upon the Christian consciousness of the worth of the Christ. Ritschl (1822-89) followed in the wake of Schleiermacher and Rothe ; and steered by the beacon of Kant. At first a disciple of Bauer, in the search and research for a Christ of History, he in time wearied of the unconscionable ar¬

bitrariness with which his master carved out parts of the New Testament and recast the Gospels. So Ritschl harked back to the Kantian Ought. Since pure reason is inca¬

pable of attaining to the thin g-in-its elf , the Christ in himself does not matter. What mat¬

ters the categoric imperative of practical reason in the realm of Christology? Religious knowledge finds expression in independent and direct value-judgments — in judgments, for in¬

stance, about the Christ, that are independent of scientific knowledge,

and the direct dictate of practical reason. By the Kantian Ought, we are conscious that immortal joy is assured to us, and that the Christ is of value in bringing us to that end. No motives intervene to lead pure reason. The appropriation of the Christ-values is a direct and independent act of faith, or trust, of the will. Ritschlians are numerous among Christological writers of to-day; such are Weinel, Widgery, Fairbairn, Roberts, Bur¬

ton, Mathews, Macmillan, Armitage.

Somewhat akin to the Christology of

Ritschl is that of the Pragmatists. James, Dewey, Schiller and others unite in making satisfactoriness their variable criterion of truth and goodness. James proposes a Deity that is impersonal, and an immortality of the soul that is not personal. That is good, in matters religious, which works; and, in so far forth as it is satisfactory, it is true. Logic¬

ally the variable Christology of pragmatism is whatsoever works, gives satisfaction, in one's attitude toward the Christ.

The Christ of History. — While the Christ of psychology has appeared in many a Jcsus-form, the school of historical criticism in Christology has been at work. This school starts with the elimination of all elements of supernaturalism — miracles, prophecies, etc..

The Virgin Birth and physical resurrection of Jesus are assumed to be impossible and unhistorical. A Christ of History is sought, who is not God, and yet satisfies, to explain the fact of Christianity. Strauss (1808-74) was the first to break up the Gospels into historical and mythical elements. The birth of the Bap¬

tist and of Jesus; the baptism, temptation and miracles of the Christ; the Last Supper and Resurrection — all these facts are relegated to the realm of mythology. They are myths in¬

vented to give a supernatural air to Christian¬

ity. Bauer. (1792-1860) taught that Christian¬

ity was built upon faith in the Christ rather than upon the Person of

Christ. Saint Paul, not Jesus, was the real founder of the Church.

At first there were two parties, the Pauline and the Petrine. The Petrine party believed that Jesus was the Messiah, but clung to Juda¬

ism; from this party came the elements of the New Testament that give us a Christ of His¬

tory. The Pauline party divorced Judaism, aimed at a universal faith, superadded the su¬

pernatural elements, was victorious over its Petrine rivals and founded Christianity with all the supernaturalism contained in Romans, 1 and 2 Corinthians and Galatians. Renan (1823-92) was free from the dogmatic vio¬

lence of Strauss against supernatural religion, made no attempt to explain Christianity as the work of Paul, and presented to his readers a simple, loving, lovable, God-fearing, deluded saint and fanatic, as the Christ of History.

Drawing upon the ideas of Daniel and other Messianic writers of the Old Testament, Jesus became fascinated and inspired with the delu¬

sion that he was the Messiah. On this account he practised pious frauds to sate the desire folk had of the miraculous ; and was so misled by fanaticism as even to desire death. Among re¬

cent writers, Dr. Adolf Harnack, of Berlin University, while taking great pains to prove the genuineness of the Apostolic writings, deems them to be records of the evolution of the Christian conscience from the death of Christ to the close of the New Testament canon. His Christ of History is so stripped, not only of supernatural power, but even of natural ability, as not to measure up to the stat¬

ure of Socrates and Aristotle. Wellhausen, of Gottingen, strips the Christ of History of even the noble sentiment which inculcates forgive¬

ness of injuries. This fundamental element of Christianity, together with the parables where¬

in it is taught, are all said to belong to a time later than that of the Wellhausen Christ of History. Schmiedel, of Zurich, sifts the* Gos¬

pel narrative down to nine passages, the fa¬

mous pillar-passages, upon which he builds up his Christ of History. The historical worth of these nine passages is admitted as a start, because Schmiedel thinks that they rather de¬

grade than exalt Jesus.

The Eschatological Christ. — The eschato¬

logical sayings of Jesus — i.e., the prophecies that have to do with the end of the world —630

have led some to look upon the Christ of His¬

tory as a fanatic, a dupe to his expectation that, before his death, the world would end in a cataclysmic upheaval and the establishment of the Messianic kingdom. He died a failure.

The expectation was not fulfilled. His follow¬

ers were up against the alternative of admit¬

ting that failure or of making him out to have been God. Either duped or duping, they pre¬

ferred the latter alternative. Thus began the evolution of the Christian conscience which gave us Christianity in its present form. Such is the Christology of Johann Weiss, Schweit¬

zer, Loisy, Tyrrell, Burkitt and Lake.

The Mythic Christ. — The radical and de¬

structive reconstruction of the life of Jesus —inaugurated by Strauss, and maintained by Bossuet, Neumann and the above-mentioned critics — has left so little of fact to the critical Christ of History, that it is not surprising to find radicals throwing over the very existence of an historical Jesus. Jensen, of Marburg, sees in the Gospels a mere

carrying on of Babylonian mythology. Other members of the Pan-Babylonian school, who class the Christ as a Babylonian Jesus-myth, are Jeremias, Drews, Gunkel and Kalthof. W. B. Smith, of Tulane University, New Orleans, holds that the Jesus-cult took its rise from a Judaeo-pagan source that is indicated by the two titles Jesus Christ. (<Neither of these titles originally meant an earthly man : both certainly desig¬

nated a deity. The latter seems to be chiefly Jewish; whereas the former is at least half foreign.® Cf. Der vorchristliche Jesus. (1911) p. xv.

Bibliography. — Lichtenberger, (History of German Theology in the Nineteenth Century5

(1889); Brown, (Essence of Christianity) (1908), (Christian Theology in Outline5

(1914); Pfleiderer, (Paulinism> (1877), de¬

velopment of Theology5 (1890), Evolution and Theology5 (1900), (Religion and Historic Faiths5 (1907) ; Sanday, (Life of Christ in Re¬

cent Research5 (1908), (Christologies Ancient and Modern5 (1910), Outlines of the Life of Christ5 (1911) ; Haering, (The Christian Faith5 (1913) ; Schweitzer, (Leben-Jesu For-schung5 (1913) ; Loofs, (What is the Truth about Jesus Christ?5 (1913) ; Weinel, (Jesus in the Nineteenth Century and After5 (1914) ; Briggs, (History of the Study of Theology5

(1916) ; Drum, in American Ecclesiastical Re-viezv (December 1914 to January 1918, a series of 27 articles on Christological theories).

Walter Drum, S.J.,

Professor of Scripture , Woodstock College, Maryland.

CHRISTOPHE, kres-tof, Henri, king of

Haiti : b. Grenada, West Indies, 1767 ; d. 8 Oct.

1820. He was an African slave who received his freedom as a reward of faithful service.

On the outbreak of the negro insurrection in San Domingo, 1801, he became one of its leaders, and attracted by his energy and ability the attention of Toussaint l'Ouverture, who conferred upon him a divisional military com¬

mand. After the deposition of Toussaint Christophe served under his successor, Des-salines, and waged a war of increasing ferocity against the French, who in 1803 were compelled to evacuate the island. In 1811 Christoohe ob¬

tained undisputed possession of a portion of the island, and was proclaimed Henri I, king of Haiti. His reign was despotic and sanguinary.

CHRISTOPHER, Saint, a saint whose

name and feast are celebrated, but whose his¬

tory is little known. He is reported to have been a native of Syria or Cilicia, who was baptized by Saint Babylas, bishop of Antioch, and received the crown of martyrdom in Asia Minor about the middle of the 3d century.

Relics of him are found in several places, prin¬

cipally in Spain. The Eastern Church cele¬

brates his festival on 9 May; the Western on 25 July. His intercession was particularly sought in the time of the plague. Christopher literally means ((bearer of Christ.55 He is rep¬

resented as a giant, bearing the child Jesu >

upon his shoulders over a stream, which refers to a legend of this saint.

CHRISTOPHER NORTH, pseudonym of

John Wilson, the Scotch author (q.v.).

CHRISTOPHER'S, Saint (commonly

called Saint Kitt's), West Indies, an island of the Lesser Antilles or Leeward Islands, 100

miles northwest of Guadeloupe, discovered by Columbus in 1493 ; 23 miles in length, averaging about 5 miles in breadth and having an area of 65 square miles. It produces sugar, potatoes, tomatoes, yams, onions and other vegetables, as well as pineapples, bananas, custard-apples, cocoanuts and various other fruits. Mount Misery, the highest elevation, rises 4,100 feet.

The flora and fauna are similar to those of the West Indies generally, among, the latter being a species of small monkey. The climate is considered to be very healthful. This island is divided into nine parishes, Basseterre being the capital, with a population of 8,160. It was colonized by the English in 1623. Pop. of the island 26,283.

CHRISTOPULOS ATHANASIOS,

Greek lyric poet: b. Kastoria, Macedonia, 1772; d. Wallachia, 29 Jan. 1847. He studied medicine and the sciences at Budapest, and finally settled at Hermannstadt in Transylvania. An epi¬

curean in every sense of the word, and un¬

concerned for the fate of his country, he lived only for the gratification of his appetites and celebrated sensual indulgences in his (Erotika and Bacchika,5 or (Love and Drinking Songs,5

which have been several times collected and printed under the title of (Lyrika.5 Though partly modeled upon Anacreon and the songs of Piron, Desaugiers and other French authors, they display so much ease and simplicity, ten¬

derness and grace, as to give their author a high place among the poets of his nation and entitle him to the name of the modern

Anacreon.

CHRIST'S HOSPITAL (generally called

the Blue-coat School, from the costume of the pupils), a school in London, founded by Ed¬

ward VI, for supporting poor orphans. There used to be from 1,000 to 1,200 boys and girls at this establishment receiving instruction, board and clothing, the girls being comparatively few in number. The ages varied from 8 or 10 to 15

or 16, five of the best scholars being sent each year to Oxford and Cambridge. An entirely new scheme of management came into opera¬

tion in 1891, according to which the preparatory school (established in 1683 at Hertford) has 120 pupils, the boarding-school for boys 700

and the girls' school 350; a day-school for 600

CHRIST'S THORN

boys and another for 400 girls being also pro¬

vided for. No Blue-coat boy ever wears a hat or cap winter and summer. They wear knee-breeches, yellow stockings and long blue coats with a leather belt. Entrance to the Hospital Schools is partly by nomination or presenta¬

tion, partly by competition ; and in regard to two-thirds of the scholars, fees ranging from £10 to £20 may be charged if the parents or relatives are judged to be able to contribute to the child's education and maintenance. Numer¬

ous exhibitions and prizes still remain, includ¬

ing exhibitions to the universities. Situated in Newgate street, London, since the 16th cen¬

tury, Christ's Hospital was pulled down a few years ago and the institution removed to Horsham. The new general post-office now

stands upon the old site. Camden, Stillingfleet, Coleridge, Charles Lamb and other distin¬

guished men received their education at Christ's Hospital.

CHRIST'S THORN, a small thorny shrub

of the order Rliamnacecc , or buckthorn family.

It is common in the southeast of Europe and Asia Minor, especially in Palestine. The fruit has a singular appearance, resembling a head with a broad-rimmed hat. The spines are long and sharp, growing on slender vine-like branches which are easily plaited, the flowers rose-shaped.

The plant derives its name from its being be¬

lieved by many to be the plant from which the crown of thorns was made which was placed on the head of our Saviour. The fruit is called jujube.

CHRISTY, kris'ti, Charles, American min¬

strel : b. New York 1828; d. Kansas City, Mo., 13 Feb. 1897. He was an actor from boyhood, supporting Forrest and Macready as well as singing on the minstrel stage.

CHRISTY, Howard Chandler, American

illustrator: b. Morgan County, Ohio, 10 Jan.

1873. He was educated in the public schools of Duncan's Falls, Ohio; went to New York in 1893, studied at the National Academy and the Art Students' League under Chase. He first attracted attention with his illustrations of the Spanish-American War, published in Scribner's and Harper s magazines and in Collier's Weekly, gaining especial prominence with his (Men of the Army and Navy> series and a portrait of Colonel Roosevelt. He is, however, best known for his charming illustrations of the works of such authors as the late Richard Harding Davis and has created a picturesque and romantic type of society women peculiarly his own. He pre¬

fers black and white, but has also worked with success in color.

CHRODEGANG, or GODEGRAND,

Saint, bishop of Metz: b. about 700; d. Metz, 6 March 766. He was a native of Hosbania (Belgian Limburg) and a descendant of a dis¬

tinguished family among the Ripuarian Franks.

Pepin the Short, in 742, appointed him bishop of Metz; in 753 he conducted the Pope on a journey from Rome to Gaul; and in 764

brought from Rome the relics presented by the Pope to the churches and monasteries of Gaul.

He was the author of the rule <Vita Canonical CHROMATES. See Chromium.

CHROMATIC, in music, a succession of

semitones, ascending or descending. The

chromatic semitone is the interval between any -CHROMATROPE 631

given note and that same note raised by a sharp or lowered by a flat. The chromatic scale con¬

sists of 13 tones, the 8 scale tone and the 5

intermediate. It is believed by some that the term chromatic was adopted because the

Greeks were in the habit's of designating the intermediate tones by characters of various colors.

CHROMATIN, kro'ma-tin, a substance in

the nucleus of a cell which is readily stained by certain reagents, such as carmine, hsematoxylin and suffranin, so as to be distinguished from

the other substance called achromatin or linin.

This chromatin is made up of minute spherical or rod-like particles called ˆchromosomes.®

The latter bodies in the course of cell-division are of equal size in the same cell and their number is the same in all the cells of all the tissues of the same species. The chromatin par¬

ticles are of especial interest because they are supposed to be the bearers of heredity and are thus thought to form the physical basis of this unknown property of organic life. See Hered¬

ity.

CHROMATOPHORE, a pigment cell. The

possibility of change of color in the chameleon, frogs, the squid, etc., is due to certain cells in the cutis which are filled with pigment. These pigment-cells are called chromatophores, and under the stimulus of light may expand or con¬

tract. When expanded they are highly ramified and when contracted are roundish. The pig¬

ment differs in different individuals and in dif¬

ferent parts of the body, being yellow, brown, black and at times even red or green. In the goby (a fish), the chromatophores, which are yellow or greenish-yellow when distended, be¬

come orange when contracted; while the orange or red ones, when shrunk, become brown or even black. In the same fish a still different kind of chromatophores are filled with irides¬

cent crystals of marvelous delicacy, which in expansion become visible as spots of metallic sheen. It Is on the distribution and different depth in the skin of the chromatophores that the pattern of markings of the skin of change¬

able animals depend. The common squid is very beautifully tinted, and under the micro¬

scope the chromatophores can be seen dilating and contracting, giving off a remarkable play of all the colors of the rainbow. The value of

this power, which is under control, is that it gives the animal means of concealment by adapting its color to that of its surroundings.

CHROMATOPSIA, in pathology, signi—

nifies colored vision, or an abnormal state of the vision in which colors present themselves independently of the color sensations usually experienced. These sensations are unnatural and generally they are only temporary. They may be caused by drugs, medicines or some temporarily abnormal condition of the organ of sense or that of vision. Frequently objects appear tinted with certain colors, through which the original color may even appear dimly. See Color-Blindness.

CHROMATROPE, kro'ma-trop, or

CHROMOTROPE, -mo-, a toy consisting of

a disc painted with arcs of circles in brilliant colors in such a manner that when the disc is revolved centrifugal or centripetal streams of color seem to flow through it. The term is also applied to an attachment for a magic lan-632

tern, by. which, on the revolution of two painted discs of glass, kaleidoscopic effects are pro¬

jected on the screen.

CHROMATYPE, a photographic picture

in which the paper employed has been sensitized by some of the salts of chromium.

CHROME GREEN, the green oxide or

sesquioxide of chromium, forming a green pig¬

ment used by enamelers. It is also employed by dyers and calico-printers as a mordant. A hydrated variety, Cr203.2H20, used for the same purposes, is known as ((Guignet's green®

or <(emerald green.® (<Arnaudon's green® con¬

tains some phosphoric acid in addition. These are now used instead of the poisonous greens prepared from arsenic as a base. See Chro¬

mium.

CHROME IRON ORE. See Chromite;

Mineral Production of the United States.

CHROMIC ACID. See Chromium.

CHROMITE, or CHROMIC IRON, the

only important ore of the metal chromium and the source of all of the chromium salts.

Chemically considered it is a chromate of ferrous iron FeCˆCh, but it is usually classified by mineralogists among the oxides of the spinel group as a compound of iron protoxide, with chromium sesquioxide, having the formula Fe0.Cr203. The metals are often in part re¬

placed by magnesium, aluminum and ferric iron, as in the varieties magnochromite from Silesia and mitchellite from Webster, N. C.

The composition of the mineral thus approaches the chromiferous variety of spinel, picotite.

Chromite has a hardness of 5.5 and a specific gravity of 4.32 to 4.57. It is usually a granular-massive, black, opaque, metallic mineral, much resembling magnetite. It has, however, a dark-brown streak and is readily distinguished from all black minerals by fusing it with borax

and salt of phosphorus, the bead thus obtained as¬

suming an emerald-green color on pooling. It is further identified by its invariable occurrence in serpentine or olivine rocks. It is often disseminated in grains, or rarely in small octa¬

hedral crystals, and thus upon the disintegration of the rock the grains are washed into the streams and adjoining bottom-lands. Prior to 1884 it was extensively mined near Baltimore, also at Texas, Pa., and in California, North Carolina and Wyoming.

The production of chromite in the United States experienced a notable expansion in 1916, in the output of 47,035 long tons — more than 15 times the previous record output of 3,280

tons, mined in 1915. This was due primarily to the unprecedented demand for chrome steel for war purposes, but also in large measure to the scarcity of ocean tonnage from Africa and Oceania, which countries had heretofore been depended on as the chief sources of sup¬

ply. However, in spite of this difficulty in trans¬

portation, the importation was 115,945 tons, a gain of 39,490 tons, or nearly 52 per cent.

The United States' production came prin¬

cipally from California, which yielded 92 per cent of the country's total, the remaining 8 per cent being nearly all from Oregon, with small additions from Maryland and Wyoming. Chro¬

mite is found iq deposits of serpentine, where the latter has been disintegrated by weather and erosion. The black grains and boulders of the chromite accumulate in the surface son, and in concentrated masses, in connection with magnetite, in the black sands of the streams and beaches. In quality the California chro¬

mite ranges up to 48 per cent of chromic oxide, and the Oregon mineral up to 56 per cent.

The importations of chromic iron ore into the United States in 1916 were as follows: From Rhodesia, 61,850 tons; from New Cale¬

donia (French Oceania), 33,936 tons; from Canada, 12,220 tons; and from Greece, 7,000

tons. Asia Minor formerly supplied the

United States with about 10,000 tons of chro¬

mite annually, but since Turkey entered the European war that source has been cut off.

Under the stimulus of the war demand

Canada's output of chromite has been very largely increased, and her exports of the ore to the United States in 1916 exceeded those of 1914 by more than 2,300 per cent. Consult California State Mining Bureau (Bulletin 38}

(Sacramento 1906) ; Dolbear, S. H., (The Na¬

ture of Chromic Iron Deposits } (Mining and Scientific Press , 21 April 1917) ; United States Geological Survey, (Mineral Resources of the United States, 1916 J (Pt. I).

CHROMIUM (Gr. xpuf™ /color,® in al¬

lusion to the colors exhibited by its compounds), a metallic element discovered in 1797 by Vauquelin, in the native chromate of lead of Si¬

beria, and afterward found combined with iron.

The metal itself has never been prepared in large quantities, but it can be obtained by the reduction of the oxide by carbon in the electric furnace. It is also obtained by heating the anhydrous sesquichloride of chromium with zinc, potassium or sodium. In nature it occurs most abundantly as the mineral chromite (FeO.Cr203), which is often found as a segre¬

gation in ultrabasic rocks such as peridotite.

Most of the world's supply has come from New Caledonia, Rhodesia, Turkey and Greece.

In the United States California leads, though there has been a small output from Wyoming and from Maryland. Chromium is extremely hard, of a grayish-white color and less fusible than platinum. Its chemical symbol is Cr, and its atomic weight is 52.1 if 0 = 16, and 51.7 if H = l. Its specific gravity is from 6.5 to 6.8

and its specific heat is about 0.1, though the latter constant has not been determined with precision. Once separated from oxygen, it does not readily combine with it again. It oxidizes superficially, however, upon being heated in air, and it decomposes steam at a red heat.

Chromium forms four different oxides,

whose formulae are respectively CrO (chro¬

mium monoxide) ; Cr203 (chromium sesqui¬

oxide) ; Cr0.Cr203 (chromo-chromic oxide) ; and Cr03 (chromium trioxide). Of these the first two act as bases, each yielding a series of salts with various acids. Those salts that are derived from the monoxide, CrO, are called ((chromous® compounds; while those that are derived from the sesquioxide, Cr203, are called <(chromic® compounds. Chromium sulphate,

Cr2(SOi)3, forms a series of alums with the sulphates of potassium and ammonium, the ele¬

ment behaving in this respect like aluminum.

(See Alum). . Chromo-chromic oxide is not chemically active. Chromium trioxide, Cr03, dissolves in water with the formation of an acid, H2Cr04, which is called ((chromic acid,®

and is of great interest to the chemist. Chromic acid forms a series of definite salts that are known as ˆchromates.® One of the best known of these is chromate of lead, PbCr04, which is used as a pigment under the name of (<chrome yellow,® and is formed by precipitating chro¬

mate of potassium by a soluble salt of lead.

Potassium bichromate, K2Cr207, or IGCrChCrOs, is another extremely important salt of chro¬

mic acid; it is used as a depolarizer in electric batteries, as a bleaching and oxidizing agent and as a convenient starting-point in the manu¬

facture of many of the chromium compounds.

It possesses the peculiar property of rendering gelatine insoluble upon exposure to light, and for this reason it is used in various photo¬

graphic processes.

Chromium is used to some extent in the manufacture of steel, as it is found that the addition of less than 1 per cent of chromium materially increases the strength, hardness and elasticity of the product.

In medicine chromic acid and potassium

bichromate are used. The acid is employed as a caustic ; the bichromate is now rarely em¬

ployed because of its irritant properties.

Poisoning by chromium compounds is simi¬

lar to that caused by other metallic poisons.

The drinking of battery fluid is the usual mode.

There is severe gastro-enteritis, nausea, vomit¬

ing of yellowish bloody matter, diarrhoea, pain, colic, tenesmus, great prostration, muscular cramps, rapid and feeble pulse, bloody urine (perhaps suppression of this secretion), feeble and irregular breathing, with coma or convul¬

sions preceding death. A fatal ending may occur in from 4 to 15 hours. At times this result may be delayed and symptoms referable to degenerative processes in the liver and kid¬

neys appear. Treatment is by prompt and con¬

tinued washing of the stomach. Bismuth sub¬

nitrate is indicated in the after treatment, which is symptomatic.

CHROMIUM, or CHROME STEEL.

See Chromite; and Chromium.

CHROMO-LITHOGRAPHY, a method

of producing a colored or tinted lithographic picture by using various stones having different portions of the picture drawn upon them with inks of various colors and so arranged as to blend into a complete picture. Sometimes as many as 20 different colors are employed. It was invented by Alois Senefelder, of Prague, between 1796 and 1800. An outline drawing is first traced, and then transferred to the various stones, one for each color. The artist puts in the colors, with soap, of the tints re¬

quired. Next the slab is put upon a press and carefully damped with a sponge, after which the oil color is applied with a leather roller.

The parts of the slab which contain no drawing, being wet, resist the ink, while the drawing itself, being oily, repels the water while retain¬

ing the color. In printing, the lighter shades are printed off first and the darkest last. See Lithography.

CHROMOSOME. The entire body of an

animal or plant is built up of cells; each cell consists of protoplasm and a nucleus and is usually surrounded by a cell wall ; the nucleus consists of chromatin and its derivatives. Dur¬

ing nuclear division the chromatin appears in the form of definite pieces called chromosomes.

This name, meaning color bodies, was given because the pieces stain intensely with certain dyes. The general appearance of chromatin in the resting nucleus is shown in Fig. 1A; Fig. IB shows the chromatin after it has as¬

sumed the form of definite chromosomes during the division of the nucleus.

Fig. 1. — Two cells from the root tip of an onion. A, resting condition. B, early stage of division, p, protoplasm; n, nucleus; c, chromosome.

Since 1880 investigations dealing with chro¬

matin in the resting condition, but more par¬

ticularly with nuclear division when the chromatin is obviously in the form of chromo¬

somes, have increased in number and in the extreme minuteness of their details. For a diagrammatic outline of nuclear division and the behavior of the chromosomes during this process, see the article on Cell. In regard to the details of nuclear division, there have been two strongly defended theories, one of which may be called the linin-chromomere theory and the other the vacuolization theory. The first assumes that the chromatin is in the form of granules rather regularly arranged upon or embedded in a substratum called linin. The granules, or chromomeres, divide and their division splits the linin thread, so that each chromosome produces two new chromosomes

(Fig. 2).

ABC

Fig. 2 — Diagrammatic representation of a single chromosome according to the linin-chromomere theory. A, single chromosome consisting of a linin band, /, and chromo¬

meres, c. B, the chromomeres have divided. C, the linin has split between the two pairs of chromomeres, so that two new chromosomes have been formed.

All the chromosomes of the nucleus divide simultaneously and are distributed so that each of the two new nuclei not only receives half-of the chromatin of the preceding nucleus, but half of each chromosome. This theory is satisfying to the philosophical mind, but prac¬

tically all botanists have come to the conclusion that it is not supported bv the facts. Most botanists accept the vacuolization theory. Ac¬

cording to this theory vacuoles appear in each chromosome and increase both in number and extent until the group of vacuolated chromo¬

somes constitutes the familiar network of the resting nucleus. Thus, there is only one sub-634

stance, the chromatin. The substance which in the other theory is called linin is only the more attenuated portion of the chromatin. As division begins the attenuated portions are withdrawn and the chromatin condenses until the solid chromatin thread appears. This thread splits longitudinally, by some mechanism not yet known ; then the thread, already split, breaks up into pairs of chromosomes and one member of each pair goes to each of the new nuclei.

There are many reasons for believing that the chromosome maintains

its identity from one cell generation to another throughout the whole life of the plant or animal. The number of chromosomes is practically constant for a given species ; e.g., in vegetative tissues, the lily has 24, trillium 12, canna 6, the mole cricket 12 and man has 24. If the nucleus of an egg be re¬

moved and a single sperm introduced the nuclei of the resulting embryo have only half the normal number of chromosomes. If a normal egg be fertilized by two sperms, the resulting embryo shows one-third more chromosomes

than the normal. If the two species with dif¬

ferent chromosome numbers be crossed, the resulting embryo shows a number equal to the sum of the numbers found in the sperm and the egg. Some very competent investigators claim they can see the chromosomes outlined in the network of the resting nucleus. Still further evidence might be cited to prove that the chromosome is a permanent organ of the cell.

The number of chromosomes is doubled by the union of the sperm and the egg during fer¬

tilization. At some subsequent point in the life history, before sperms and eggs are formed Fig. 3 — Diagram of the reduction divisions. A and B, two stages in the first division; C, a stage in the second division. A represents a pair of fused chromosomes, one member of the pair consisting of a and b, the other of c and d. B, the two members of the pair are being separated. C, the next division, the two parts of each member of the pair are being separated.

again, there is a reduction in the number of chromosomes. The most generally accepted view is that the reduction is due to the fusion of chromosomes in pairs. The number becomes reduced during two peculiar, successive divi¬

sions, called the reduction divisions (Fig. 3).

Most botanists and many zoologists believe that the chromosome is the sole bearer of hereditary characters. The male and female at

fertilization contribute not only equal amounts of chromatin but, in most cases, the same number of chromosomes ; and this is the only equal contribution. In some cases, as in the lily, the male contributes nothing but a nucleus, which consists, essentially, of chromosomes. If the nucleus of an egg be removed and the sperm of another species be introduced the resulting embryo has only the characters of the sperm parent. Other evidence might be added. It has been established that the chromo¬

somes are not all alike and that different chro¬

mosomes may have different functions. In insects, and in some other forms, it has been shown that one chromosome, differing in ap¬

pearance from the rest, is concerned in the determination of sex (See Plants, Sex in).

In mutation (q.v.) it has been proved that the chromosome content of the nuclei of the mu¬

tating form differs from that of the parent plant and it seems probable that the change in the chromatin was the cause of the mutation.

Bibliography. — Wilson, E. B., (The Cell in Development and Inheritance > ; Hertwig, O., (The Cell. } Also many articles since 1895 in various journals, especially The Botanical Ga¬

zette, Annals of Botany, La Cellule, J ahrbiiclier fiir zvissenschaftliche Botanik, Journal of Mor¬

phology and Archiv fiir Zellf or s chung.

Charles J. Chamberlain,

Professor of Morphology and Cytology, Uni¬

versity of Chicago.

CHROMOSPHERE, the gaseous envelope

which exists round the body of the sun, through which the light of the

photosphere, an inner envelope of incandescent matter, passes. Dur¬

ing total eclipses it is observed that a red-col¬

ored envelope surrounds the sun and shoots up to great distances from the surface. It seems to have been first recognized by Secchi ; and the projecting portions of it are commonly de¬

scribed as (<red-colored protuberances® and <(red flames.® To this red envelope the name <(chromosphere® was given by Lockyer. The light from it is much fainter than that from the photosphere; and till 1868, when M. Jans¬

sen and Mr. Lockyer almost simultaneously pointed out a method of viewing it, it was never seen except during eclipses. See Sun.

The spectrum of the chromosphere was

first observed in 1868 during the Indian total eclipse, and it was found to consist of a num¬

ber of bright lines, and conspicuous among them those of hydrogen. The light of the chromosphere was thus proved to be due to masses of incandescent vapor or gas, hydro¬

gen forming a large part of the whole.

Since the invention of the Janssen-Lockyer method of observing, as it is called, very re¬

markable advances have been made in our knowledge of solar physics, discoveries quite unthought-of having followed. The observa¬

tions are made by means of a combined tele¬

scope and spectroscope. A spectroscope is sub¬

stituted for the eyepiece of the telescope, the slit of the spectroscope being placed at the principal focus of the object-glass of the tele¬

scope. The slit is capable of being moved in such a way that any particular band of the image formed in the object-glass of the tele¬

scope may be examined by the spectroscope.

The spectroscope employed for the purpose of examining the chromosphere must have the greatest possible dispersive power, and requires for this purpose a very long train of prisms.

As was mentioned above, the spectrum of the chromosphere consists of a series of bright lines. The breadth of a bright line of the spec¬

trum is not sensibly increased by increasing the dispersive power of the spectroscope, but the contrary is the case with a continuous spec¬

trum, which is extended by dispersion. Thus the latter becomes weakened, while the former maintain their brightness and become more easily visible in comparison with it. The slit of the spectroscope being arranged so as to take in a band, either tangential or radial, close to the edge of the image of the sun formed by the object-glass of the telescope, it is found that the bright lines of the chromo¬

sphere are perfectly visible, in spite of the light of the continuous spectrum proceeding from the inner portion of the disc. Further it has been found possible, by using a spectro¬

scope of the very highest dispersive power, and by opening the slit sufficiently wide, to see the whole of one of the protuberances at once, and by this means to watch its motions and its changes. To understand this the reader must consult the article Spectroscope. He must rec¬

ollect that a continuous spectrum consists of an enormous number of images of the slit, placed side by side, and in ordinary cases slightly over¬

lapping each other. If we could employ an in¬

finitely narrow slit we should have an infinite number of infinitely

narrow images, and no overlapping whatever. But suppose a light to consist of only two or three colors, say light from a source capable only of giving the two bright lines C and F, that is, one in the red and another in the blue part of the spectrum.

It is easy, even with a slit of sensible width, to keep the two from overlapping, and we shall see without any confusion the two bright lines or bands at different parts of the spectrum, darkness intervening. Now imagine a bright prominence starting up from the sun's surface, and let the spectroscope be directed on its im¬

age in the telescope; there will be only portions of the slit illuminated by it, portions corre¬

sponding to the shape of the flame, and if the flame contain only light of the bright line C

and F, there will be seen two images of the prominence at the points of the spectrum be¬

longing to these colors.

It will readily be seen from the explanation just given that if the general background of the field has been made faint enough (by a high dispersion), it may be possible to open the slit so widely that the entire prominence may be seen in its true form, in either of the re¬

gions, C or F, of the spectrum. The images seen in this way are, however, formed only by light of one particular wave length : if the point of the spectrum selected is that upon which there falls a line due to hydrogen, then the image seen will be that arising only from the hydrogen in the prominence ; whatever other elements there may be will have no effect, and we shall, in fact, see the exact form and distri¬

bution of that portion of the cloud which is composed of hydrogen alone.

A remarkable application of this principle is made in the so-called spectro-heliograph, an instrument invented by the American astron¬

omer, G. E. Hale, and first successfully em¬

ployed by him in the year 1891. Here all light is screened from the field except that coming through the very narrow slit of the spectro¬

scope, this slit being sufficiently long to include the whole object observed, or even the entire sun's disc. By letting the sun's image sweep over the slit, every part is successively seen by the light of a single wave length, and thus we may view the distribution of the hydrogen solely, or of the calcium, or of the other ele¬

ments upon or about the sun. Finally, by al¬

lowing the very narrow, moving image of the slit to fall upon a photographic plate, we may obtain a photograph of the sun from a single selected element which it contains, provided only that there emanate from this element a line of sufficient brightness for this purpose.

The glowing prominences sometimes extend to great heights above the sun's surface: though the usual depth of the chromosphere is but from 5,000 to 10,000 miles, material has been observed at times of great eruptive dis¬

turbance to extend to a distance of no less than 400,000 miles — a distance nearly equal to the radius of the sun itself. While, gener¬

ally speaking, all the elements of the sun are found in the lower regions of the chromo¬

sphere, it is only the lighter ones which attain these enormous altitudes in the eruptive prom¬

inences, and the opposite is true of the constitu¬

tion of the great, comparatively quiescent chromospheric clouds which lie above the pho¬

tosphere. Thus Jewell has found that in the high levels of the envelope there are hydrogen, helium, parhelium, magnesium, sodium and ytter¬

bium, while at the low levels are chromium, iron, cobalt, nickel, manganese, yttrium, cad¬

mium, zinc, carbon and vanadium. Several substances, notably calcium, give contradictory results, the average level being sometimes high and sometimes low ; as only very minute quantities of some substances are required to produce spectral lines, however, the apparent discordance is not surprising.

From minute displacements of well-known

lines in the spectrum (see Spectrum Analy¬

sis) motions are inferred of the incandescent bodies from which these lines are proceeding.

On this principle motions of the fixed stars have been determined. Thus Sirius is ap¬

proaching us at the rate of 10 miles per second, and Arcturus is approaching us at the rate of five miles per second. The principle applied to the results of the spectroscopic examination of the prominences of the chromosphere, as well as a direct observation of their apparent movement across the line of sight, shows that they are due to enormous outbursts of gases and vapors from the sun. These gases are sometimes projected outward or even tangen¬

tially with extraordinary velocities, rates of mo¬

tion so high as 300 miles a second having been reported. In some cases the apparent motion of a single cloud may be a perspective effect due to the successive formation of many clouds over an extended area, yet it is quite certain that in many of the cases the enormous veloci¬

ties observed are real, and it is probable that they may be in part, at least, due to electrical action. But much is still to be learned, not only as to the true cause and movements of the eruptive prominences, but also in explanation of the clouds which are nearly quiescent for a 636

considerable length of time, though so near the enormously

distributed region of the sun's photosphere.

Bibliography. — The most recent, semi—

popular, but authoritative, work is (The Sun,*

by C. G. Abbot (1911) ; this contains many references to more detailed or extended publi¬

cations. A larger and very important recent work is (Physilc der Sonnet by E. Pringsheim (Leipzig 1910). Numerous papers will be found in the (Proceedings } of the Royal So¬

ciety (London), the Astrophysical Journal (Chi¬

cago), and in practically all journals devoted to general astronomy and to astronomical spectroscopy.

CHROMOTYPE. See Chromatype.

CHRONIC (Gr. Xpovos, «time))), a term

applied to diseases which are of long duration, and mostly without fever. It is used in oppo¬

sition to the term ˆacute,® which is applied both to a poignant pain and to a disease which is attended with violent symptoms, terminates in a few days and is attended with danger.

On the other hand, a ((chronic)) disease is slow in its progress and not so generally dangerous.

CHRONICLE, a history recounting in

order of time all details which observation or tradition has furnished the author. It may be a universal history, or may deal with a single epoch, nation, city or individual. Some chron¬

icles have been preserved from early ages; the Old Testament

Chronicles (q.v.) are a type of such. An important ancient chronicle, discovered on the island of Paros in 1627, and known as the (Chronicle of Paros, J is an out¬

line of Greek history, originally covering the period from the reign of the legendary Cecrops, king of Athens (1582 b.c.) to 264 b.c.

The last part, from 355 b.c., is now lost. It omits many important political and military events, and deals more fully with the art and festivities of the people. In the early Christian ages, ecclesiastics were generally the authors of the chronicles ; for example, Eusebius, bishop of Caesarea, collected from other his¬

torical works his (Chronicle of Ancient His¬

tory.) Hieronymus of Stridon translated it into Latin in the 4th century, and others con¬

tinued it. Many historical works of the Byzan¬

tine historians are also chronicles. Most of the mediaeval chronicles were by monks, especially by the Benedictines, who usually began their story with the creation of the world, and gave an abridged history of the events from the first chapter of Genesis to the immediate sub¬

ject of their narrative. In their statement of facts they in general knew little distinction be¬

tween fabulous and true history, were not in¬

clined to question much either visions or mira¬

cles, and were accustomed to dwell as long on unimportant as on momentous events. Chroni¬

cles are valuable for determining historical facts when, like that of Eusebius, they con¬

tain materials from older works which are now lost, or when they relate events contemporary with a writer, and of which he was a witness ; and they are always valuable as an illustration of the spirit of an age and the sentiments of a people. It is through them that nearly all the history of the Middle Ages has been preserved.

Every European people has numerous mediae¬

val chronicles.

Among the German chronicles may be men¬

tioned that of Regino, abbot of a monastery in the forest of Ardennes, whose work extends from the Christian era to 907 ; that of Hermannus Contractus, entitled (A Chronicle of the Six Ages of the World,* to the year 1054; that of Lambert von Aschaffenburg, which re¬

counts the period from the beginning of the world to 1050 in brief, and from 1050 to 1077

in detail; that of Godfrey of Viterbo, giving a universal history to the year 1186, written partly in prose and partly in verse, and enti¬

tled (Pantheon } ; and a chronicle found in the collection of Pistorius, composed by an Augustinian monk, which extends from the Christian era to 1474. These were written in Latin and, with many other Latin chronicles, were col¬

lected and published at Hanover in a scries of volumes entitled <Monumenta Germanise His¬

torical The oldest historical book in the Ger¬

man language is a rhyming chronicle, consist¬

ing of 83,000 verses, written by Ottokar von Horneck, in the 13th century, and of nearly the same antiquity are the chronicles of Rudolf von Ems and Jansen Enekel, both having the form of poems and furnished with notes by their authors. France is rich in chronicles, universal and particular, written in Latin, French and various provincial dialects. It was the fancy of the earliest chroniclers to give to France a Trojan origin. Eginhard, the son-in-law of Charlemagne, chronicled the deeds and talents of that emperor in his (History of Charlemagne.* The first of the chroniclers who wrote in the popular language of France was Geoffroi de Ville-Hardouin, who lived in the 12th century, and was an actor in the events which he describes. The (Chronicles* of Froissart (q.v.) embrace the events occurring from 1325 to 1400 in England, Scotland, France, Spain, Brittany and the Low Countries, set¬

ting forth in detail the feasts, spectacles and all the pageantry of feudal times, and enlivened throughout by Froissart's shrewd comments and observations. Of the strictly English chronicles, the earliest is that by Geoffrey of Monmouth, a monk of the 12th century, trac¬

ing the history of Britain through a series of imaginary kings, from Brutus, a son of the Trojan 2Eneas, who founded the British state many centuries before the Christian era, to Cadwallader, who was said to have lived 689

a.d. There is also the (Anglo-Saxon Chroni¬

cle,ˆ extending from the beginning of the Christian era to the death of King Stephen (see Anglo-Saxon Literature). The collec¬

tion of chronicles edited by Holinshed in 1577

embraces a history of England to that year, a history and description of Ireland by Stani-hurst, and a history of Scotland translated by Hector Boethius. (The Chronicle of the Kings of England,* by Sir Richard Baker, published in 1643, is a history of England from Roman times to the death of King James I. It was a very popular work and was afterward con¬

tinued to the death of George I, but is not now considered accurate history.

CHRONICLE OF THE KINGS OF

ENGLAND. See Chronicle.

CHRONICLE OF PAROS. See Chron¬

icle.

CHRONICLES, Books of. The books of

Chronicles were originally one book in the Hebrew, which is also true of Ezra and Nehe-CHRONICLES OF THE CANON-GATE — CHRONOGRAM

miah. further, it is now a generally accepted conclusion that these two books, Chronicles, and Ezra and Nehemiah, were written by the same author and were, when composed, a sin¬

gle work. The reasons for this conclusion are the following:

Ezra is the direct historical continuation of Chronicles. Further, two verses at the end of Chronicles are repeated at the beginning of Ezra, a duplication which is supposed to have occurred when the division was made. Also, the characteristics of both works are the same.

These are particularly a fondness for genealo¬

gies and also for the treatment of religious matters, especially those things which pertain to the temple and the work of the priests and Levites. Again, both are marked by the same unusual late linguistic peculiarities.

In Chronicles the passage which apparently indicates the latest date is 1 Chron. iii, 19-24, where the sixth generation after Zerubbabel in the line of David is mentioned, which would be about 350 b.c. The text of the passage is, however, somewhat doubtful; the Septuagint reading indicates the 11th generation. Nehe¬

miah contains clearer evidence of a late date.

The high priest Jaddua, of the time of Alex¬

ander the Great, is mentioned, Nehemiah xii, lOf, 22f. Further, the description of Darius as the Persian, Nehemiah xii, 22, would be unnecessary and unnatural while the Persian empire was in existence, and implies that at the time of the writer that empire belonged to the past. Hence the writer lived probably about 300 b.c., but possibly later than that.

1 Chronicles i-ix contains the history

of the Hebrews from Adam to Saul; x2 Chron. ix, the history from the death of Saul to the death of Solomon ; 2 Chron. x-xxxvi, the history of Judah only, without Israel, to the end of the Babylonian captivity in 537.

When this history is compared with the paral¬

lel accounts in the books of Samuel and Kings it shows many omissions and also many addi¬

tions. The omission of the entire history of the northern kingdom, Israel, is specially no¬

table. The whole of the material of 2 Sam.

ix-xx, except the account of the wars with the Ammonites, is omitted. This is particularly significant because the omitted portion gives an account of the failings of David and the un¬

favorable side of his court and family life.

The additions arc concerned chiefly with the activity of the Levites and the prominence of the temple and ritual matters. An example of a long addition is 1 Chron. xxii, 2-xxxix, 30, of which only xxix. 23a, 27, is from a known source, i.e., from 1 Kings. The additions show an idealized view of the history, representing the P code as in force in the time of David.

It is evident that the sources used by the writer included some of the canonical books, principally the books of Samuel and Kings, with the Pentateuch and Joshua employed less extensively. The material from these canon¬

ical books is largely in the form of verbatim extracts, with omissions and additions, but not rewritten. The author also refers to other sources under at least 15 titles, such as: The Book of the Kings of Judah and Israel, 2

Chron. xvi, 11; The Book of the Kings of Israel and Judah, 2 Chron. xxvii, 7; The Mid¬

rash of the Book of the Kings, 2 Chron. xxiv, 27, *etc.* It is obvious that several of the titles refer to the same work, and that is possibly the case with all. The principal source used by the writer, then, aside from the canonical books, is a work covering the history of Israel and Judah; whether any other sources are referred to is uncertain. It is probable that the material from the extra-canonical source or sources is rewritten. At any rate, the portions not drawn from the canonical books all have the same peculiar late style.

The historical value of the portions of Chronicles not derived from the canonical books is uncertain. Much of the material is distinctly improbable, some being quite out of harmony with the earlier material from the canonical books. On the other hand, it cannot be asserted that there is no historical element in this added material. The evidence is not sufficient to afford a positive judgment in every case. The religious standpoint of the book is that of the time of the writer, and he puts that standpoint into the earlier time. The historical value of the book is largely that of showing the religious standpoint of about 300 b.c.

Bibliography. — Barnes, W. E., (The Book of Chronicles } ((Cambridge Bible, > Cambridge 1900) ; Bennett, W. H., (The Books of Chronicles) (Expositor's Bible, > New York 1894); Curtis, E. L., and Madsen, A. A., (The Books of Chronicles) ((International Critical Com¬

mentary,) New York 1910) ; Harvey-Jellie, W.

R., (Chronicles) ((Century Bible, J Edinburgh 1906) ; Torrey, C. C., Ezra Studies* (Chicago 1910).

George R. Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

CHRONICLES OF THE CANON-GATE, a collection of Sir Walter Scott's stories published in two series. The first series (1827) contains (The Highland Widow,) (Two Drovers,) and (The Surgeon's Daughter) ; the second series (1828) contains (The Fair Maid of Perth.*

CHRONICLES OF CLOVERNOOK, a

story by Douglas Jerrold, published in 1846.

Clovernook is a ((hamlet wherein fancy has loitered away a truant hour® ; and under the guidance of the ((Hermit of Bellyfulle® the author explores Clovernook, and discourses of it. The book charms by its quiet humor, the grace of its fancy and the benevolence which characterizes even its satire.

CHRONICLES OF FROISSART. See

Chronicle.

CHRONICLES OF THE SCHON—

BERG-COTTA, shen'berg kot'ta, FAMILY,

a novel by Mrs. Elizabeth Charles, published in 1863. It is the story of a family during the period of the Reformation in Germany, as told chiefly by Friedrich and Else, the oldest children. The book is written with an effort after the archaic style, and has much of the simplicity and directness of the old chronicles.

It is interesting and has proved a great favorite, though accurate scholarship finds fault with its history.

CHRONOGRAM, a device by which a

date is given in Roman numerals by printing certain letters of an

inscription larger than the others ; as in a motto of a medal struck by Gustavus Adolphus in 1632: ChrlstVs DVX; 638

ergo trIVMphVs. The value of C and the other capitals equals 1632, MDCXVVVII.

CHRONOGRAPH. See Chronoscope.

CHRONOLOGY, the science of dates, or

of arranging events in order of time. Two steps in human progress were requisite for its exist¬

ence : the invention of material records, since memory would not transmit exact sequences of events on any considerable scale ; and the adop¬

tion of some recurrent astronomical period, neither too short nor too long, as a measure of time. The pictograph, developed into a system of writing, and the Peruvian quipu, or knotted cord, are the chief of the former. The fixing of the year by the Babylonian astronomers was the only feasible specimen of the latter; the month being too short for a measure of long periods and even the year becoming too formi¬

dable in numbers for the limited counting power of the ancients. Between the creation of these raw materials, however, and the construction of a simple and universally applicable system for even one country, thousands of years elapsed in which the chaos of unsystematic systems is still the difficulty and often the despair of antiquarians.

For a satisfactory chronology there is a third requisite, — a fixed epoch to count from, no matter what : as in Babylonia the accession of Nabonassar; in Greece the hypothetical institu¬

tion of the Olympian' games ; in Rome the imagi¬

nary foundation of the city; in Christendom the arbitrarily fixed birth of Christ; with the Mo¬

hammedans the Hegira of the Prophet, *etc.* But, obvious as this seems, it is in fact a very late device of civilization. Herodotus and Thucy¬

dides, in the most splendid intellectual age of Greece, wrote history without a date, or any apparent recognition that one was needed. The sequence of events was preserved; but that these need be related to an arbitrary point in the past is an artificial conception, created by the ac¬

cumulation of practical inconveniences. These would seem to have differed in each country which independently invented it : the scientific and business ones in Assyria, historical in Greece, administrative in Rome. Others bor¬

rowed the system when its utility was manifest ; but older societies were satisfied with a ruder scheme. Their science and business was alike undeveloped; their historical sense was satis¬

fied with a few dramatic episodes, and even the order of events was heroically confounded; and when it became necessary to keep public rec¬

ords, their unit was a reign, or they dispensed with units altogether and dated by some notori¬

ous event. Thus the Babylonians dated their business and official tablets (<the year he brought Nannar of Nippur into a house,® (<the year he overran Karkhar,® ((the year he overran Karkhar a second time,® (<the year divine Bur Sin became king,® *etc.* ; on exactly the same princi¬

ple as a modern mother dates events in the year the second child had the measles. Dating by the year of a certain king's reign is a natural system, still preserved in English statutes : they are not the laws of 1663 or 1860, but ((4th Car.

II,® <(24th Victoria,® *etc.*

In Assyria, as early as the 14th century b.c., a system was begun of

dating by <(eponyms,® or the names of the chief officers of state, in an¬

nual succession, with the chief events in the year; each new king's name being entered on his accession. Thus: (<Edsur-sarabe governor of Gozan. Revolt in city of Ashur. In month Sivan sun was eclipsed.® (Three intervening entries). ((Pan-ashur-lamur governor of Arbela. Revolt in city of Gozan. Pestilence.®

In Rome, it was (<in the consulate of® certain persons ; in Athens, ((in the archonship of® ; and so on. Obviously, if the regular succession of functionaries is preserved for a long time, as in Assyria it was for centuries, it will furnish a perfect chronology provided one date can be fixed in the series. This has been done in sev¬

eral cases, and the chronology of some sections of ancient history has been accurately recon¬

structed over long periods. The most certain authentication is by some astronomical phe¬

nomenon whose date can be fixed by calcula¬

tion ; and several of these priceless data are casually mentioned by old records or historians.

Thus, the mention by an Egyptian papyrus of a rising of Sirius, in connection with the over¬

flow of the Nile, fixes the accession of Userte-sen III, fifth king of the 12th dynasty, between 1876 and 1873 b.c. ; the oldest certain year-date or approximate date in history yet discovered, and by a happy chance, in a country the most empty of chronological data. (The Babylonian Naram-Sin's date as near 3750 b.c. is now quite discredited). The most usual of these phe¬

nomena recorded are eclipses of the sun, from the terror inspired by the darkening of the sky; fortunately for history, as the mention of them has furnished several invaluable dates. The Assyrian eponym canon for several centuries has been fitted with accurate dates by the eclipse recorded in the first entry above, 763

b.c. ; the same one is mentioned in the Bible (Amos viii, 9) as occurring in the reign of Jeroboam II. Even when we cannot be certain by itself which eclipse was meant, it is rare that other synchronisms do not fix the limit.

Thus, an important date in the kingdom of Lydia is determined by an eclipse which was either 610 or 585 b.c., and other circumstances make the latter date probable.

When positive evidences fail, the only

method of research is by synchronism, or fixing the date of an event by its connection with some other event or person of known date. Fortu¬

nately the records afford considerable help in this, if less than could be wished ; they mention international battles, captures, treaties, appeals, threats, correspondence, etc., where one date must apply to both. Noted examples of this are the biblical records as to relations of Palestine with Assyria, Egypt, Tyre, *etc.* : sometimes con¬

fusing events and dates, occasionally confound¬

ing persons, and needing correction from other sources, but still of extreme value. Another specimen is the Assyrian ˆsynchronous history®

of the relations between Assyria and Babylonia, a tablet of about 800 b.c. When we come down to classic times, these synchronisms are the very basis of historical work on those periods. There is also a synchronism of arts, products ex¬

changed between countries, systems of writing, etc., and even to some extent of institutions ; which, though demanding expert knowledge and careful judgment, is often of the first value. On this basis much of the Homeric and pre-Homeric history of Greece is taking shape, and even the origins of China can perhaps be related to Babylonia.

The chronological sense of different races CHRONOLOGY

presents extreme diversities ; but it is fairly ac¬

curate to say that none of the older ones had any appreciable amount except the Babylonians, and that in them and their pupils, the Assyrians, it was early and remarkably developed. Their dated records (in the primitive fashion above) go back to the third millennium b.c. at least; the Assyrians' eponym canon antedates by many centuries any similar attempt elsewhere ; and the Babylonians were much the first to adopt an epoch. On the other hand, their cofounders of the earliest civilization, the Egyptians, were utterly destitute of it ; and the dates in their history back of the time of close contact with Babylonia, where synchronism can be utilized, are almost pure guesswork. Beyond 2000 b.c.

the divergences of estimated Egyptian dates among the most authoritative scholars vary from 500 to 1,500 years, and even down to 1500

b.c. there is often 100 or 200 years' difference; and only the vaguest inferential proof is avail¬

able. The Hindus, the Chinese, the Jews, the Greeks, were nearly as devoid of chronological instinct. The case of the great Greek historians has been mentioned; and the vague Jewish ((forty years,® for a generation or an indefinite long time is familiar and not conducive to accurate chronology.

The obscurity due to lack of dates in general was of course enhanced by the fact that each state counted from its own events or persons, so that in place of one problem, the historical antiquary has scores. The chief method — for many ages the only one — by which this Babel of chronologies was finally reduced to uni¬

formity over large areas was political absorption and the disuse of provincial systems. Even when fixed epochs came to be adopted, though the continuity of history was assured, the inter¬

national confusion was not lessened nor com¬

parative chronology made easier, as each selected a different epoch ; and the same remedy only was operative here. Nor, indeed, for some time did even the individual system become the accurate instrument of research it is now; for the succession was not at first of years, but of annual magistrates, as with the. Assyrians, Athenians and Romans sometimes more

vaguely of kings and priests. Moreover, with one dubious exception the date of the epoch was not that of its adoption, but centuries back; and the dates affixed by the new systems to former events were often wildly fanciful, as was that of the very event which furnished the starting point. The first epoch ever used, so far as known, was the accession of Nabonassar of Babylonia 747 b.c.; it is generally believed to have been used from the beginning, but this is less probable now than formerly. The Roman era was the founda¬

tion of Rome, somewhere about 750 b.c. accord¬

ing to Roman writers ; it is not known when it was first adopted, but probably not before the 2d century b.c. The Greek reckoning was from the alleged foundation of the Olympic games in 776 b.c., quite as apocryphal as the other ; it was first used as a basis of calculation by Timseus of Sicily in the 3d century b.c. It furnishes a scientific one when the year of the Olympiad is mentioned, which is not always, so that a mar¬

gin of three years is left. Note the curious fact that all three epochs begin within a quarter cen¬

tury or so of each other, though the last two are merely guesswork. It seems incredible that the year, apparently the most simple and obvious of natural units, was first suggested and used in 194 b.c. by Eratosthenes, the great Greek ed¬

itor, mathematician, geographer and chronographer. Of course it had been employed for thousands of years as a unit within other units, such as reigns, but not alone in sequence from a fixed epoch. The Olympiad, however, for rea¬

sons given below, held its own till the middle of the 5th century. Even after the official adop¬

tion of the Christian era, — which, like its prede¬

cessors, antedated its use by centuries, — cen¬

turies elapsed still before it was employed to the exclusion of other systems. Many other methods of dating, local or ecclesiastical, flour¬

ished besides it, and made nearly as much labor necessary in modern as in ancient times to synchronize dates. An acquaintance with these is indispensable to the study of the chronicles, charters and other legal and Church documents of the Middle Ages.

Still another cause of the imperfection of early chronological methods was the difficulty found by the masses in grasping large numbers.

Hence, it became the practice to divide the time into cycles of a small number of years, and number by the years in a cycle. The Olympiad was a refined form of this. Our own system of reckoning by centuries is another, only by its decimal form it expresses both ideas at once.

Instead of saying (<the 3d year of the 20th cen¬

tury,® as ((the 3d year of the 40th Olympiad,®

we use a term of addition, and say ((nineteen hundred (s) and three.® The Chaldseans had their saros of 6,585E3 days, or 18 years; the Romans, their indiction of 15; and the Chinese and other Asiatic nations still use a cycle of 60.

The European cycles, however, as the metonic of 19 years still used for computing Easter, were mostly used to regulate the calendar rather than to compute dates ; but they are often extremely useful as an additional method of verifying these.

Babylonian: Era of Nabonassar. — This

prince seems for a very brief time to have thrown off the Assyrian yoke and restored Babylonian independence. It was almost imme¬

diately lost ; but he succeeded in imposing a new dating system which convenience main¬

tained, or else later gratitude looked back to him, under the glories of Nabopolassar and Nebuchadnezzar, as the pioneer of Neo-Baby¬

lonian greatness. At any rate, the era is fixed at 26 Feb. 747, from astronomical data collected in Chaldaea by Callisthenes, a general of Alex¬

ander the Great. It is the basis of the once famous Canon of Kings, or Mathematical

Canon, preserved in Ptolemy's works, and pre¬

vious to the era of archaeologv our one source of Mesopotamian

history. The Alexandrian Greeks also used this era till their adoption of Julius Caesar's reformed calendar, 25 b.c. The Babylonian year was different in length from the Julian of 365 days, and the conversion of Nabonassar years into years b.c. is a matter of delicacy, necessitating a knowledge of the month and day for certainty. Tables have been drawn up Jor this purpose.

Olympiads. — It is now pretty generally ad¬

mitted that the early lists of victors in the Olym¬

pic games are fictitious, and that the foundation of the games cannot be assigned a date, our first authentic knowledge beginning with the 6th century b.c. ; but this is indifferent to the method 640

of calculation which assumes a beginning in 776

b.c. They were celebrated every fourth year in the summer solstice ; and as the Olympic year began sometimes with the full moon before and sometimes with the one after the solstice, to save trouble and perpetual recomputation it was reck¬

oned as beginning the 1st of July. Hence, the Olympic years cannot be synchronized with ours year by year; the second half of the one corre¬

sponds with the first half of the other, and the month must be known for accurate conver¬

sion. Therefore, in years before Christ, when the event happened between January and June, inclusive, subtract the number of the Olympic year from 776. Thus: the oligarchy of the Four Hundred was desposed in June Ol. xcii, 1 : 4 X 91 + 1 = 365 ; 776 — 365 = 41 1 b.c. Socra¬

tes was executed in May 01. xcv, 1 : 4 X 94

+ 1 = 377 ; 776 — 377 = 379 b.c. . If it took place in the latter part

of the year (as did the immense majority of the familiar incidents in Greek his¬

tory — all the great battles, for physical reasons, the deaths of Pericles and Cleon, etc.), subtract the sum as aforesaid from 777. Thus, the bat¬

tle of Plataea was fought in September 01. lxxv, 2; 4 X 74 + 2 = 298; 777 — 298 = 479 b.c. If the year is after Christ, subtract the number of the Olympic year from 776 in the first case, from 777 in the second. The Olympiad was only used by historians ; it is never found on coins or inscriptions. A new Olympiad was instituted by the Roman emperors, beginning with 131 a.d., and is used on some coins and inscriptions, but struck no deep root.

Macedonian Era, or Era of the Selucidae: also called by the Jews Era of Contracts, be¬

cause their Syrian governors compelled them to use it in civil business, and styled by the writers of the books of Maccabees the Era of Kings. — This epoch dates from the foundation of the Syro-Mesopotamian monarchy by Seleu-cus Nicator, Alexander's general; assumed to begin with his occupation of Babylon 311 b.c., 12 years after Alexander's death. It was used not only in the Seleucid empire, but by the Greek states on the east coast of the Mediter¬

ranean generally; w'as followed by the Jews till the 15th century, and is said to be in use by some Arabians even yet. It was the great Eastern date for many centuries, but it is one of the most difficult to convert into terms of Christian years, from the astonishing variety in the beginnings of the year (which in different countries and among different sects varied from the vernal equinox to 28 October), and from the variation in length of year, some using the Egyptian year of 365 days, some the Julian of 365J+ The usual computation is to place the beginning of 312 Seleucid on 1 September in the Julian year preceding the first of our era.

Therefore, to reduce a Seleucid date to ours, subtract 311 years 11 months.

Era of Alexander. — This is used by some Greek historians, dating from his death 325 b.c.

Era of Tyre. — This begins 19 Oct. 126 b.c.

To reduce it to our era, subtract it from 126

if b.c., subtract 125 from it if a.d. This date is used only on medals and in the acts of some councils.

Era of Rome. — The date of the foundation of Rome, as related to the Olympian-epoch, is differently assigned by different authors: by Fabius Pictor at Ol. viii, 1, autumn (747 b.c.) ; by Polybius at 01. vii, 2 (750) ; by M. Porcius Cato at 01. vii, 1 (751) ; by Verrius Flaccus at 01. vi, 4 (752) ; by Terentius Varro at 01. vi, (753). As all the dates were figments, each Roman writer followed which he chose, and sometimes varied from one to another. Livy generally follows Cato, sometimes Fabius Pictor ; Cicero follows Varro, as does Pliny, in general ; Dionysius of Halicarnassus follows Cato. The modern writers usually follow Varro, supported by Censorinus, who specifically says the festival of the Palilia in April was the anniversary of the foundation. The Romans had two kinds of year: one for business, public or private; and the consular year, which their annalists follow.

The former began with the calends of January.

The latter had no fixed time of beginning, but commenced with the installation of the consuls, which happened as chance and politics dictated ; it is the one generally used by the Latin and Greek historians down to the 6th century a.d., however. But in the computations of the Roman era the year begins with 21 April.

After Caesar's regulation of the calendar, the year began with January, much to the disgust of the Roman poets, who thought the spring was the real beginning, as, of course, it is.

Caesarean Eras. — Several attempts were

made to establish time eras from actions of Caesar and Augustus, one of them very success¬

ful. The Ccesarean Era of Antioch commem¬

orated Caesar's victory at Pharsalia 48 b.c. ; it was used by Evagrius in his (Ecclesiastical History. > The Syrians and Greeks, however, placed its beginning 11 months apart. The Julian era began 1 Jan. 45 b.c., and commemo¬

rated the reformation of the calendar by Caesar.

The Era of Spain or of the Ccesars commemo¬

rated the completion of the conquest of Spain by Augustus, and began 1 Jan. 40 b.c.; for many centuries it was the one era of Spain and Portu¬

gal, and generally of the Roman provinces sub¬

dued by the Visigoths, not only in the Iberian Peninsula, but in southern France and in Africa.

Several of the councils of Carthage, and that of Arles, also dated from this, though after the 9th century the year of the Incarnation wras usually joined writh it. It wˆas not disused in Castile till 1382, and in Portugal not altogether till 1422 or later. The calendar being Julian, all its dates are reduced to ours by merely sub¬

tracting 38. There was an Era of Actium, com¬

memorating that battle, fought 3 Sept. 31 b.c.

The Romans began it 1 Jan. 16 Julian (30 b.c.) ; the Egyptians, 29 August; the Eastern Greeks (who used it till the 9th century), 2 September.

The latter called it the Era of Antioch (not the one mentioned later), and that city struck medals with it. There wˆas also an Augustan Era, beginning 27 b.c., the year in which Augus¬

tus received that title.

Jewish Eras. — The Jews came under for¬

eign rule before they had invented an epoch, or even developed periodic magistrates ; and their annals, except for synchronisms, are nearly as baffling as the Egyptian. Their first internal chronology is after the Macedonian era was forced on them by the Seleucid officials ; their religious matters, however, were regulated by their own

calendar, in which the civil and sab¬

batical year began (as now) about the autumnal equinox, the ecclesiastical and legal year about the spring equinox. They also made computa¬

tions of the time from the Creation (see para¬

graph below), but their dates do not depend on CHRONOLOGY

it till modern times. After the Dispersion they were obliged to conform to the periods of other nations, in order to have their festivals cele¬

brated uniformly; and they adopted a cycle of 84 years (a transformed Greek cycle). The time of its beginning is not certain, one author placing it at 162, and another at 291 b.c. In 46

b.c. the Christians adopted it, and used it par¬

tially till the Council of Nice ; they then, and the Jews in 360 a.d., substituted the metonic cycle of 19 years, which the latter still employ.

Till the 15th century they continued to date from the Macedonian era; since then they have adopted a Creation era, which they date 3,760

years 3 months b.c. Their dates cannot be re¬

duced. to ours without expert knowledge of their involved calendar.

Creation Eras. — To emphasize their separa¬

tion from paganism, and avoid participation in pagan observances connected with the calendar, the Christians early began to reckon time from the supposed date of the creation of Adam ac¬

cording to the Jewish Scriptures. Aside from its resting only on the adding up of impossible and inconsistent genealogies, the problem was further confused by there being three texts of equal authority to

work from, — Hebrew, Sa¬

maritan and Septuagint, — all irreconcilably variant. One author collects 120 different com¬

putations of the true date ; another says he has collected over 200 ; and 300 have been reckoned ; and the estimates vary over 3,500 years, from 3,483 to 6,984 years before the Christian era.

None of them have any scientific standing, but for two centuries the Christian world generally accepted as a working hypothesis Archbishop Usher's (1650) figure of 4004 b.c., which is still used in some Bible appendices and similar works. Several earlier ones, however, obtained considerable footing, and two of them are not yet disused. It is. of course as useful as any other arbitrary point, like the Olympic Games or the foundation of Rome ; and has the ad¬

vantage of requiring only one continuous figure, in place of a break in the centre like the Chris¬

tian era. But its controversial character, and the satisfaction of marking off the time after Christ's coming as the beginning of a new era, have caused the latter system to supplant it. Of the others, the chief are: (1) Era of Constanti¬

nople, still employed in the Greek Church, and used by the Russians till the time of Peter the Great. This begins 5,508 years 4 months before the Christian era. The civil year begins 1

September; the Church year on the spring equinox or 1 April. To find the current year corresponding to a Constantinople year, if the event took place before 1 September, subtract 5,508 from the date; if later in the year, sub¬

tract 5,509. (2) Era of Alexandria. This was adopted by the Christians of Alexandria on the computation of Julius Africanus, who reckoned 5,500 years from the creation of Adam to the birth of Christ, but placed the latter three years earlier than the current reckoning, so that our era would begin 5503 Alexandrian. After the accession of Diocletian in 284, however, they, dropped 10 years, both from the year since the Creation and since the Incarnation, making in fact two eras instead of one. To convert this era into our own, in the first eight months of the year subtract 5,502 up to and including 5786 Alexandrian, after that date, 5,492; in the last four months, 5,503 and 5,493 respectively.

This era was used by the Coptic Church till the 15th century, and is still retained in the Abys¬

sinian. (3) Era of Antioch. The Syrian Christians, early in the 4th century, adopted Julius Africanus' reckoning as above, but dropped 10 years from it as the Alexandrians had already done ; placing the Incarnation, how¬

ever, as in our own era, three years later than the Alexandrian. As regards the Creation, therefore, the two eras are seven years apart up to Diocletian's time, and then coincide ; as regards the Incarnation, the Antioch is three years less before that time and seven years later after it. Dates in this system are reduced to ours, as in the reformed Alexandrian calen¬

dar above.

Era of Diocletian, Subsequently Named

Era of Martyrs. — At the same time that the Alexandrians changed their Creation era as above, they established a new and shorter one from the accession of Diocletian, 29 August (first of the Egyptian year) 284. The second name given implies that an attempt was made to start it from 303, the date of Diocletian's edict of persecution, but if so it was unsuc¬

cessful, as indeed a mere perpetuation of a strife was likely to be. The era is still used by the Copts of Egypt and the Abyssinians.

The change from the Egyptian to the Julian calendar, and the peculiar complications it has introduced into the conversion from that era to ours, are too intricate to detail here. To make the change, add to their date 283 years 240

days in common years; if the date is between 30 August and the end of the year in the one before leap year, add 283 years 241 days. But the Ethiopians do not reckon the years con¬

tinuously from the beginning: at the end of each 532 years (that is, 28 X 19, or the solar and lunar cycles multiplied together) they be¬

gin again with. 1.

The Christian Era. — It is not generally re¬

alized how modern this epoch is in general use.

It was introduced into Italy 533 a.d. by Diony¬

sius Exiguus (((the lean®), a Roman abbot; was not introduced into Gaul (France) till the 8th, and not in current use there till the 9th; and came into use in England only in the latter part of the 8th. In Latin countries the current scheme before that was the cycle of indiction (below). Any uniform date is so useful that its defects may be overlooked. That of having a double set of numbers, forward and back, is not serious. Perhaps the chief inconvenience in calculating backward is that of calling the year preceding the era 1 b.c. instead of 0; thereby making the leap years on the backward series fall on the odd years, 1, 5, etc., or else making 7

years between the first one previous and the first one after. Astronomers rectify this by calling the first year previous 0. (For the dif¬

ferent dates on which the beginning of the year has been placed, see Calendar). Dionysius fixed the birth of Christ in 754 of the Roman era, but he began the year 1 with the Annun¬

ciation, 25 March of the year preceding. In ecclesiastical and common usage it has begun at Christmas, Easter, 1 March, and other dates.

In England from the 7th to the 13th century it was on Christmas ; in the 12th the Annunciation began to be used as well, and from the 13th till 1752 remained paramount. The different be¬

ginnings of the year must be carefully taken into account in studying mediaeval history.

Cycle of Indiction. — This was a period of 15 years, whose object has been already ex¬

plained. It was generally used in the Western or Latin empire for several centuries before the Christion era became general. It began in the year 313, or was referred to that year as a start. There were three, differing only as to the beginning of the year: (1) The Constantinopolitan, beginning in September, like the Greek year; generally used in the Eastern or Greek empire and sometimes in France. (2) The Imperial or Constantinian, attributed to Constantine the Great, called also the Caesarean.

It began 24 September, and was used by old French and English chroniclers. (3) The Roman or Pontifical, beginning on Christmas or 1 January as custom varied; often used in papal bulls, and sometimes in old French writers. To find the number of any year in the Indiction, add 3 to the date (our era), divide by 15, and the remainder is the number. If the remainder is 0, the year is the fifteenth or last of the cycle.

Armenian Era. — This starts from the Coun¬

cil of Tiben, 9 July 552, when the Armenian schism began by condemnation of the acts of the Council of Chalcedon. The Armenian civil year is the Egyptian year of 365 days, out of all measure with others; their ecclesiastical year begins 11 August, and has the Julian cal¬

endar. They also use the Creation era of Constantinople along with their own, dating documents with both on occasion. In busi¬

ness with Europeans they employ our era and our year. To convert their civil dates to our era, multiply the number of Armenian years by 365; add the number of days from 1 January to the given date; subtract 176; the remainder will be the number of days from l Jan. 553 to the given date ; reduce this to Julian years, add 552, and this gives the date in the Julian year, olci style. Add the requisite number in the Gregorian calendar if desired. In ecclesiastical reckonings, add 551 years 223 days. In leap years, if the date is between 1 March and 10

August, subtract one day from the above.

Mohammedan Era. — This commemorates

the Hijra or Hegira (flight) of the Prophet from Mecca to Medina, 622 a.d. It does not, however, date from the flight, but from 68 days previous, 16 July, or as some have it, 15 July.

The methods of computation are too compli¬

cated and uncertain to be given here : Moham¬

medan chronology rs one of the most treacher¬

ous of subjects, and even experts disagree and go astray.

Persian or Gelalaean Era. — This begins with the accession of Yezdegird III to the throne of Persia, 16 June 632. Till 1079 the Persian had the random Egyptian year, 365

days without intercalation ; it was then re¬

formed by Omar Khayyam, the great poet and astronomer, under Malek Shah, to a degree al¬

most as accurate as the Gregorian. There were seven successive leap years once in four years, but the eighth was deferred till the fifth year. This method was once universal in Persia, and is still followed by the Parsees of India. Owing to the days of error accumulated by the old year, the day of beginning is thrown back, so that the Persian year can be con¬

verted into ours by adding 631.

Hindu Eras. — The philosophers divided the duration of the world into four yugs or ages, of which three are past, and the present cor¬

rupt one, the kali-yug, is alone historical. It begins 3101 b.c. and includes several others in use. The Era of Vikramaditya, from a Hindu Augustus who may or may not be historical, is reckoned from 57 b.c. This monarch is gen¬

erally attributed to the 5th or 6th century if real, and the epoch is thought a sidereal one.

The Era of Salivahana is 78 a.d. This is used in southern India, and commemorates an

equally dubious ruler. The Fusli era, used in revenue transactions all over India, is not uni¬

form, but the most usual begins 590 a.d. ; it seems to be a Mohammedan one, and to corre¬

spond roughly to the Hegira. The Bengali era is another of the sort, and is set at 631. There are also others which are used in different provinces. The 60-year cycle is employed, its date being variously set.

Chinese Chronology. — 'This rests on cycles of 60 years, the mathematical tribunal fixing their start at 2277 b.c. But since 163 b.c. the Chinese writers have used periods called Nien-hao, each beginning with the accession of some emperor, and named after him, as with English laws, and ending when he or some successor chooses to begin a new period. Tables of Nien-hao are therefore needed to identify the years.

Forrest Morgan,

Connecticut Historical Society.

CHRONOMETER (Gr. xpˆor, «time»+

fxtTpov , ˆmeasure®— 1 ((time-measurer))), an instru¬

ment designed to measure time with great ac¬

curacy, and much used in scientific work, for the determination of longitude at sea, and in the regulation of clocks and watches by makers and repairers. The marine chronometer bears a strong superficial resemblance to a watch, ex¬

cept that it is larger and is mounted upon gim¬

bals, so that the motion of the ship may affect it as little as possible. In its mechanism it dif¬

fers from a watch chiefly in the design of its escapement and balance-wheel. The usual

form of escapement, as invented by Le Roy about 1765 and greatly improved by Earnshaw and Arnold some 15 years later, is shown in Fig. 1. It is known as the ˆdetached® or ®detent® escapement. In the figure a spring de¬

tent is shown, the spring being at F. This type is the usual one for marine chronometers.

For pocket chronometers the spring is omitted and the detent blade G is pivoted.

In the ordinary watch the balance-wheel is in connection with the train of wheels leading from the mainspring continuously, or nearly so; but in the chronometer it is free from these during the greater part of the time, so that its natural period of vibration is more nearly real¬

ized. A is the escape-wheel, which is in gear CHRONOMETER

with tlie other wheels of the instrument and is prevented from free rotation by means of the locking-pallet, D. B is a disc (technically known as the ˆimpulse-rollerˆ) secured to the same staff, or axis, as the balance-wheel. F is the <(detent spring,® which serves to return the light frame, G, and the locking-pallet, D, to the position they have in the illustration, after the detent has been tripped by the balance-wheel.

A set screw is provided for preventing the locking-pallet, D, from being drawn too far into the escape-wheel, but this has been omitted in the illustration for the sake of greater clear¬

ness.

When the mechanism is in the state shown, the balance-spring should be free from strain; but the balance-wheel is moving with its maxi¬

mum velocity in the direction (let it be sup¬

posed) of the arrow, so that in another instant the discharging-pallet, H, will trip the detent by momentarily withdrawing the locking-pallet, D.

The escape-wheel, A, is then free to rotate until again arrested by the locking-pallet, D ; but as it does so it engages the impulse-pallet, C, and accelerates the balance-wheel. After the escape-wheel has been arrested by the lock¬

ing-pallet, the balance-wheel continues its ex¬

cursion until the energy of its motion has all been expended in winding up the balance¬

spring. The balance-spring then preponderates, and the wheel returns to the opposite extreme of its swing without disturbing the locking-pallet, D ; the discharging-pallet, H, merely raising the light gold spring, E, as it passes the detent. In most chronometers the balance¬

spring is made in the form of a helix instead of a flat spiral.

The balance-wheel is also compensated for change of temperature, though this feature can hardly be said to constitute a point of differ¬

ence between a chronometer and a watch, since practically all of the better grades of watches are similarly compensated. The effect of an increase of temperature upon the rate of a chronometer (or watch) is of a dual nature.

If the instrument keeps correct time at one temperature, then, unless some mode of com¬

pensation is provided, it will lose time at all higher temperatures, because (1) the strength of the balance-spring is less at higher tempera¬

tures, and (2) the wheel itself is greater in diameter on account of its natural expansion, so that it has a greater moment of inertia, and hence responds more sluggishly to the action of the balance-spring. To

counteract these effects as far as possible, certain weights are provided along the rim of the wheel and the wheel is so designed that as the temperature rises these weights are automatically thrown nearer to the axis of rotation. The moment of inertia of the wheel is thereby reduced, and the wheel is caused to respond to the weakened spring with precisely the same readiness as before. The essential parts of the balance-wheel of a marine chronometer are shown in Fig. 2. The rim is divided by transverse cuts into two equal, semi-circular segments, each of which is supported near one end; and it is built up of two concentric metal strips, of which the inner is steel, while the outer (which is twice as thick) is of brass. As the temperature rises the brass expands piore than the steel, so that the rim-segments are deflected inward, and the weights, AA, are caused to approach the axis (or ((staff®) of the wheel. The two masses AA must always be opposite each other, in order that the balance may not be thrown out of poise; but they are slotted so that they may be slid along the rim. If a chronometer keeps correct time at one temperature, but loses at a higher temperature, the compensation is not sufficient, and the masses AA must be shifted toward the free ends of the rim-segments. If it gains at the higher temperature it is over¬

compensated, and the masses AA must be shifted toward the fixed ends of the rim-segments. In practice it is found to be impossible to adjust the masses so that the instrument shall be perfectly compensated at all tempera¬

tures. In fact, the theory of the balance shows that there are only two temperatures at which the chronometer can be expected to keep cor¬

rect time, though these two may be selected arbitrarily, and the instrument adjusted accord¬

ingly. In marine chronometers the tempera¬

tures so selected are usually 45° and 90° F., and at intermediate temperatures the instru-Pig. 2. — Balance Wheel of Marine Chronometer.

ments will gain. Hartnup, the director of the Liverpool Observatory, concluded, as the result of experiments upon 1,000 chronometers, that the error in rate from imperfect compensation may amount to 1.5 seconds per 24 hours at temperatures 15° F. above or below either of the points at which the balance is standardized, when the balance-

spring is of steel. With pal¬

ladium springs the error is smaller. A more delicate adjustment has been devised, in the form of short arcs of steel attached to the shaft of the wheel at its ends. They are set parallel to the rim and a short distance from it, and at their free extremities carry an ad¬

justable screw. Two are placed on the outside of the long ends of the cut rim, and these check the outward thrust of the rim under the in¬

fluence of cold, thus automatically shortening the expanding arm. The two placed inside of the rim act in a similar way when the tempera¬

ture is high, shortening the contracting arms.

The practical effort is to bring the extremes of temperature for which the chronometer is regu-644

lated much closer together and nearer the centre of the scale to be covered, the tempera¬

tures above and below these points being taken care of automatically. When the balance has been compensated for temperature as accurately as possible, the moment of inertia of the wheel is adjusted so that the chronometer will keep correct time at the standard temperatures, by means of the slotted nuts BB. These turn upon screw-threads that are secured to the rim near the central arm, where their positions will not be sensibly affected by changes of tempera¬

ture. If they are caused to approach the rim, the moment of inertia of the wheel is lessened, and the chronometer runs faster; and vice-versa. The slots in BB are provided so that the nuts may grasp their screws spring-tight, and so avoid backlash. Consult Britten, F. J., (Watch and Clockmakers' Handbook (New

York 1899) ; Fritts, C. E., (The Watch Ad¬

justers' Manual* (Philadelphia 1912).

CHRONOSCOPE, or CHRONOGRAPH,

an instrument contrived to measure the .dura¬

tion of certain short-lived luminous phenomena, such as the electric spark, of which the eye itself can be no judge, owing to the persistence of impressions of light on the eye after the cause of sensation has ceased. The phenomenon is observed by reflection in a mirror, in such rapid motion that the image of the luminous object would appear to describe a circle sup¬

posing the luminosity to endure long enough.

Should the phenomenon be instantaneous, the image will appear as a mere point; should it last for an appreciable time, the image will form an arc, greater or less, of the circle. The nature and operation of chronoscopes will be best understood by a few descriptions.

Navez-Leurs Chronoscope. — This is one

of the most successful of all the pendulum in¬

struments, where the value of the time is ex¬

pressed in arc. It may be said to consist of two separate instruments, the pendulum instrument and the dis junctor. The pendulum instrument is an upright plate of vulcanite with a gradu¬

ated arc, mounted on a stand, and supporting two pendulums, two electro-magnets, a pair of springs and the pivot upon which the escape¬

ment system works. One of the pendulums is termed the chronometer pendulum and the other the register pendulum ; and the mag¬

nets are so adjusted one behind each

pendulum, that when magnetized by a cur¬

rent of electricity they will just sustain the bobs of their respective pendulums, into both of which a piece of soft iron is inserted. The disjunctor consists of a small stand on which are two pieces of brass, each provided with a pressure-screw, a brass spring, fastened by

another pressure-screw, and a cam to work the spring; the brass pieces have platinum points, separated from each other by a short interval, and the spring has also a platinum point below it, which when pressed down by the action of the cam connects the two other points ; thus connecting, when requisite, the circuits through the apparatus. The electric currents are ob¬

tained by means of voltaic batteries, there being two circuits for an ordinary experiment, one passing through the magnet of the chronometer pendulum on the first screw, the other through the magnet of the register pendulum and the second screw ; as both pass through the dis¬

junctor, the simultaneous disjunction of both circuits can be effected by turning the releas¬

ing spring, and so disconnecting the platinum points.

Noble Chronoscope. — The principle of

action of this instrument consists in registering by means of electric currents upon a recording surface traveling at a uniform and very high speed, the precise instant at which a pro¬

jectile passes certain defined points in the bore of a firearm. It consists of two portions: First, the mechanical arrangement for obtain¬

ing the necessary speed, and keeping that speed uniform ; secondly, the electrical recording ar¬

rangement. The first part of the instrument consists of a series of thin metal discs, each 36 inches in circumference, fixed at intervals upon a horizontal shaft, which is driven at a high speed by a heavy descending weight through a train of gearing multiplying 625

times. If the requisite speed of rotation were got up by the action of the falling weight alone, a considerable waste of time would ensue; to obviate this inconvenience the required velocity can be obtained with great rapidity by means of the handle. The speed usually attained in working this instrument is about 1,000 inches per second, linear velocity, at the circumference of the revolving disc, so that each inch traveled at that speed represents the one one-thousandth part of a second; and as the inch is subdivided by the vernier into a thousand parts, a linear representation at the circumference is thus ob¬

tained of intervals of time as minute as the one one-millionth part of a second. As a small variation in speed would affect the relation be¬

tween the several records obtained, the uni¬

formity of rotation is ascertained on each occasion of experiment by three observations, one immediately before, one during and one immediately after the experiment, the mean of three observations being taken for the average speed. Some idea may be conveyed of the minute intervals of time which can be meas¬

ured, from the fact that the distances between the parts of a 10-inch gun at which the time records have been obtained are in some in¬

stances only two and four-tenths inches, while the total time the projectile takes to reach the muzzle of the gun — a distance of 100 inches —when fired with a full charge, is about the one-hundredth part of a second. By this means the time may be recorded which the projectile occupies, from the commencement of motion, in reaching different parts of the bore, and from these time records may be deduced the velocity with which the projectile is passing through the different parts of the bore, and the pressures in the gun which corresponds to these velocities.

Schultz Chronoscope. — By means of this instrument, designed for the measurements of very short intervals of time, periods varying from 30 seconds to the one five-thousandth part of a second have been measured with very great approximation, and with great ease and accuracy. It was introduced into the United States for the purpose of determining the initial velocity of projectiles in the proof of gunpowder. A tuning fork, caused to vibrate by electro-magnets, makes an ascertained number of vibrations per second;' it traces on the surface of a revolving cylinder a sinuous line showing the beginning and end of each vibration. This sinuous trace is an actual scale of time. The instant at which a projec-CHRONOSCOPE

tile reaches any point in its trajectory is by the application of electricity marked upon the cylinder beside the scale of time. The

number of vibrations comprehended between any two consecutive marks .is an exact measure¬

ment of the time elapsing between the instants at which the projectile occupied the corre¬

sponding positions in its trajectory. The meas¬

urement of time depends on the equality of duration of the vibrations made by the fork; the number of these vibrations in the unit of time is fixed by the construction of the fork.

The principal parts of the machine are the cylinder vibrating fork, electro-magnets, the wheel-work, the electric interrupter, Rhumkorff coil, pendulum and micrometer, and, while ex¬

perimenting the galvanic batteries and targets.

I he cylinder has a double motion of rotation against the tuning fork on the inner side of the prong, making the fork its own interrupter when the electrical current is passed through it.

Hipp Chronoscope. — In this instrument a falling weight sets in motion a clock-work which is regulated by a rapidly vibrating spring. Electro-magnets make this clock-work 9n§aSe and disengage a registering dial. The instrument reads in thousandths of a second.

Benson's chronograph is, in principle, a lever watch with double seconds hands, the one superimposed on the other. The outer end of the lowermost hand has a small cup filled with a black viscid fluid, with a minute hole at the bottom, while the corresponding end of the uppermost is bent down so as just to reach the hole. When in operation a string is pulled, and translation, given by means of a weight acting on a system of clock-work. The silvered face of the cylinder is covered with a thin coating of lampblack, which is removed by the trace and spark, exposing the surface in strong contrast to the blackened parts. The vibrating fork stands immediately in front of the cylinder; on each side of it is an electro¬

magnet to originate, sustain and equalize the amplitude of the vibrations. The left branch of the fork is armed with a flexible quill-point, which, by an eccentric roller, can be made to touch the cylinder

at pleasure and thus make the traces upon it. The interrupter is the mechanism by which the current for the fork's electro-magnets is made and broken. In the Schultz Chronoscope at West Point the de¬

tached mercury interrupter has been replaced by a light metallic spring, which is pressed whereupon the bent end of the upper hand passes through the hole and makes a black mark on the dial, instantly rebounding. This chrono¬

graph, which is sometimes called a stop-watch or a split-second fly-back watch, registers to one-tenth of a second.

Very ingenious devices are employed for special kinds of work. Thus for registering the exact times of the ˆtransit® of a moving star across several wires in the field of the telescope, a moving wire is sometimes kept ac¬

curately upon the star's image (either wholly by hand or partly driven by a small motor) and at the instant when the moving wire reaches the position of one of the fixed wires the current is automatically closed and the record made. In another device for the same purpose the clock each second uncovers a delicate photo¬

graphic plate placed at the focus of. the tele-646

scope ; the plate when developed thus shows a series of dots which are the positions of the star at successive seconds. The wires of the instrument are also photographed upon the same plate directly. In this form the plate itself becomes the astronomical chronograph.

It should also be mentioned that in a very ingenious form of chronograph invented by this time the insect eats no food, living upon the fat stored up by the larva. (See Pupa).

The chrysalides of butterflies differ from the pupae of moths in being often ornamented with brilliant golden spots which have given origin to the name ˆchrysalis® or ˆaurelia.® Also the body is often strengthened or protected by tubercles situated on the head, back and

sides.

Schultz Chronoscope — Disjunctor.

G. W. Hough the closure of the key by the observer records upon a moving tape the exact time to one-hundredth of a second when the closure was made, the figures expressing the hours, minutes and seconds being directly printed upon the paper. This does away with the necessity for a later measurement of the chronographic record, for the figures can be readily read from it.

CHROSPERMA, kro-sper'ma, a monotypic

genus of plants of the Melanthacecu ; the bunch-flower family. The single species

(Muscat oxiciim) is commonly known as fly-poison, so called from its deadly effect on flies and similar insects. It has a longish bulbous root, grass-like foliage and six-petaled white flowers borne in a terminal raceme, of which the lower flowers open first. It abounds in dry sheltered soil from Arkansas and Tennes¬

see eastward along the seaboard of the United States, in some sections reaching high altitudes.

CHRUDIM, Hroo'dem, Czechoslavia, town

and capital of a circle of the same name of Bohemia, situated 74 miles by rail southeast of Prague on the river Chrudinka. It is a walled town and contains an old church and a Capuchin convent. Its principal industries are the making of sugar, liquors, meal, leather, shoes, cloth and agricultural machinery; and the horse markets held here are the most im¬

portant in the country. Pop. 13,017.

CHRYSAL OR THE ADVENTURES

OF A GUINEA, a satirical novel by Charles Johnstone, published in 1760. Chrysal, the spirit inhabiting a guinea, passes through many hands, from the prince's to the beggar's, and tells its own story, which is chiefly the ad¬

ventures of those in whose possession it is for the time being.

CHRYSALIS, krfs'a-lis, the pupa stage in butterflies, succeeding the caterpillar. During They are either suspended head downward by the tail, or rest horizontally, with a thread pass¬

ing around them to hold them securely. Many, if not most, chrysalides are protected from ob¬

servation by their colors, which harmonize with the color of the object to which they are at¬

tached. Thus, the chrysalis of the milkweed butterfly (Anosia archippus) which is suspended among the pale-green leaves of the milkweed and does not hibernate, is of a pale-green tint; while those of Papilio turnus, or of Pieris, are gray, and so spotted with light and dark marks as to harmonize with the neutral tints of the boards or fence to which they are attached.

These colors and markings are apparently due to the effects of light and shade. These tints are determined at the period when the caterpil¬

lar is about to pupate, or become a chrysalis, when the integument is soft and moist. Poul-ton found, by subjecting the partly formed chrysalis to artificial surroundings of different colors, that the breeding boxes, when lined with black paper, produced dark chrysalides ; when lined with white, light-colored, or green ones, or when lined with gilt, they produced chrysalides of a distinctly golden color, more completely so than occurs in nature.

Certain chrysalides have been found to ex¬

hibit negative phototropism (q.v.) ; that is, are directly sensitive to light. They will, while sus¬

pended by the tail, change their position if sun¬

light strikes them, and move so as to keep in the shade, from a pendant to a horizontal posi¬

tion, through an angle varying in different spe¬

cies of from 45 degrees to 70 degrees or even 90 degrees. Too much light, especially direct sunlight, seems to be injurious to them, and the movement is one of protection.

CHRYSANDER, kre'san-der, Friedrich,

German music editor : b. Lubtheen, Mecklenburg-Schwerin, 1826; d. 1901. He studied philosophy at Rostock, but later devoted him-

self exclusively to music. He is best known as the editor of Handel's works, his edition be¬

ing the first prepared from the autograph scores.

He undertook this edition as a private enter¬

prise and with one printer and an engraver and a small hand press completed 97 of the 100

volumes. He was engaged on the work from 1859 to 1894, and introduced various improve¬

ments, principal of which were a new German translation of the English text, and the res-storation of the original orchestration. Chrysander also prepared a biography of Handel, but of this only two volumes were completed.

CHRYSANTHEMUM, a genus of herbs

of the family Asteracece. The very numerous species are natives most of the cooler parts of the northern hemisphere, but some have become introduced and established in the southern hemisphere as weeds, having escaped from gardens. They are generally hardy, white or yellow-flowered, annual or perennial and of easy cultivation. Except C. cinerarias folium and C. coccineum, the flowers of which are used to make insect powder (q.v.), the species have small economic use, though some, notably C.

leucanthemum, the ox-eye daisy, is a trouble¬

some weed upon badly managed land in the United States. C. segetum, the corn-marigold, and C. frutescens, the marguerite, are cultivated for ornament, especially in Europe, where they are native.

But the most important species are C. indi-cum and C. morifolium. These are the parents of the popular autumn flowers known as ((mums)) and chrysanthemums, the varieties of which in Europe and America are numbered by thousands, and vary greatly in size, form and color. So great is the diversity that fanciers speak of the varieties as belonging to certain types, of which there are recognized : Single, double, large, small, few-flowered, many-flowered, anemone-flowered and various forms of the ray flowers, such as incurved, reflexed, *etc.* The size ranges from the ˆpompon,ˆ which may be less than an inch in diameter, to the (<show,):> which may exceed eight inches in diameter. But with all this range of form and color the varieties are almost scentless, or have a somewhat disagreeable odor. These varieties are mainly cultivated under glass, since they do not reach perfection in the open air. They are propagated almost wholly from cuttings, which are taken from the parent plant after it has flowered. The cuttings are grown in a cool greenhouse until spring, when the young plants, then in pots, are placed in partial shade for the summer and kept as stocky as possible. In autumn they are forwarded until they blossom, after which they are destroyed, new cuttings having been taken.

For exhibition purposes the plants are

watched and tended with the most minute atten¬

tion, the superfluous buds and stems being re¬

moved while still tiny. Sandy or clayey soil is found useful by various growers, but whatever its character it must be rich and rather porous.

Attention to fertilization, watering and cultiva¬

tion is essential. For outdoor culture the large-flowered varieties are unsuited, but the hardy pompons, which are usually free-flower¬

ing, are more satisfactory. Though the season of the indoor chrysanthemum is. only about six weeks long, this flower ranks fourth in import¬

ance in the United States as a commercial flower, about $500,000 worth being used annually.

The literature dealing with this flower is voluminous, probably ranking next in extent to that dealing with the rose. Eighty-three books are listed by C. Harman Payne in the (Cata¬

logue) of the National Chrysanthemum So¬

ciety (1896), and many more have been pub¬

lished in recent vears. Other references to literature are given under the title Chrysanthe¬

mum in Bailey's (Cyclopedia of American Horticulture,* which should be consulted for descriptions of various species, types, etc., and for methods of propagation, cultivation and management. Consult also Scott, (The Show Chrysanthemum and Its Cultivation. *

CHRYSAROBIN, kri-sa-ro'bin, a neutral

principle extracted from goa-powder, a sub¬

stance found deposited in the heart wood of V ouacapoua araroba. It is an extremely irritat¬

ing substance and is not used internally. Ex¬

ternally, combined with an ointment base, it is useful in a number of chronic skin affections.

CHRYSEIS, kri-se-is, the daughter of

Chryses, a priest of Apollo. She was captured by the Greeks in the Trojan War, and became the portion of Agamemnon. When he refused to restore the daughter at the request of her father, Apollo listened to the pra}rer of his priest, and sent by his arrows pestilence and death into the Greek camp. Agamemnon found himself obliged to yield up the maiden, but then robbed Achilles of the fair Briseis. Hence arose the dissension between these heroes which so long delayed the conquest of Troy, and with which the story of the (Iliad* opens.

CHRYSELEPHANTINE, kris'el-e-fan'-

tin, in Greek art, statues which were overlaid in ivory and gold. The frame or body of the statue upon which the ivory plates were fastened was usually of wood, and the gold was used for the garments and hair. The most celebrated of these statues were the colossal works of Phidias, of which the largest was the Pallas of the Parthenon, 26 cubits high, repre¬

senting the goddess in armor covered with a long robe.

CHRYSES, krl'sez, a name appearing

several times in Grecian legend: (1) A priest of Apollo, who, according to Homer, came to the Grecian camp to ransom his daughter Chryseis, who had become the prize of Agamemnon. (2) The son of Neptune and Chrysogeneia, and the father of Minyas. (3) The son of Minos and the nymph Pareia. He lived on the island of Paros with his brothers Eurymedon, Na-phaleon and Philolaus, and was put to death by Hercules because he had, in concert with them, murdered two of his companions. (4) A son borne by Chryseis to Agamemnon after her return to her father, but alleged by her to be the son of Apollo. He assisted his stepbrother and stepsister, Orestes and Iphigenia, in mur¬

dering King Thoas.

CHRYSIPPUS, kri-sip'pus, Greek Stoic

philosopher of Cilicia: d. about 206 b.c. He was distinguished for his skill in debate. He was the principal opponent of the Epicureans, and is said to have written 700 different works, mostly of a dialectical character; but of these no complete work is extant. He died at a great age.

CHRYSIS, a priestess of Juno, who by

falling asleep suffered the sacred fire to destroy the temple of her goddess, and was at last burned herself.

CHRYSOBALAN2E, krls-o-bal'a-ne, a

plant family closely allied to the Rosacea', of which it is sometimes considered a suborder, comprising 12 genera, with 180 species, all trees or shrubs. Many of them, as the cocoa-plum, produce edible fruits. So do several species of West Africa, the seeds of which are sometimes substituted for or used to adulterate sweet al¬

monds, which they resemble in taste and ap¬

pearance. From the seeds of a member of the family growing in the Himalayas an oil is ex¬

tracted.

CHRYSOBERYL, krls'o-ber'Il (Gr.

XpvaopT/pvXTiog, «golden beryl®), a native aluminate of glucinum (or beryllium), having the formula G10.A1203, and crystallizing in the orthorhombic system. It is transparent or trans¬

lucent, with a vitreous lustre and a green or yellow color. The variety alexandrite (q.v.) is green by daylight and columbine-red by ar¬

tificial light. The finer varieties are used as gems. It has a hardness of 8.5 and a specific gravity of from 3.5 to 3.84. Chrysoberyl occurs in Brazil, in Ceylon, in the Urals and in Ire¬

land ; and in the United States it has been found in Maine, Connecticut and New York.

See also Cat's-eye.

CHRYSOCOLLA, kns-5-kol'la, a hydrated

silicate of copper, having the formula CuSi03 +

2H20. It is cryptocrystalline and usually occurs in opal-like or earthy masses, or as incrusta¬

tions, or not infrequently with botryoidal sur¬

face. When pure it is translucent and of sky-blue color, but when impure it is often opaque and dull green, brown or black. Its hardness varies with its composition, from 2 to 4, and its specific gravity from 2 to 2.2. Its lustre varies from vitreous and shining in the pure mineral to dull and earthy. It is found in copper mines in all parts of the world, especially in Cornwall, England, Australia and Arizona.

The chrysocolla of the ancients, meaning (<gold glue,® was apparently a body used to facilitate soldering. The name is still applied to borax which is thus used. Malachite, the green car¬

bonate of copper, was doubtless confused with chrysocolla.

CHRYSOGONUM, kns-6-go'num, a monotypic genus of the natural order Composite u.

It is found throughout the eastern seaboard of the United States, in dry soil, from southern Pennsylvania to Florida, blossoming in April

and July. It is a perennial herb with large heads of tubular and radiate flowers.

CHRYSOLITE, kris‘6-lit (Gr . xpvc6?a0oq , <(bright yellow stone®), a native silicate magne¬

sium and iron, sometimes also containing tita¬

nium, nickel or tin. It occurs massive and granular, and also in orthorhombic crystals. It is transparent or translucent, and usually green or yellow in color, with a vitreous lustre. It has a specific gravity of from 3.27 to 3.57 (ac¬

cording to its composition), and a hardness of from 6.5 to 7. Chrysolite occurs in volcanic rocks, as in basalt and basaltic lavas, and it is also found in dolomite and in certain varieties of limestone. The finest crystals of the mineral come from Brazil and Egypt, and are known as “precious chrysolite.® They are used to a cer¬

tain extent as gems, and are sometimes confused with the emerald. Chrysolite readily passes by alteration into serpentine, and numerous large beds of the latter mineral are known to have originated in this manner. It is abundant in crystalline grains in some meteoric irons and stones. Peridot and olivine (qq.v.) are names frequently used for varieties of chrysolite.

CHRYSOLORAS, kns-o-lo’ras, Manuel,

Greek scholar : b. about 1355 ; d. Constance, Germany, 15 April 1415. He was the first, who, in modern times, transplanted Greek literature into Italy. The Emperor John Palaeologus sent him in 1391 to Italy and England to ask for assistance against the Turks. Having thus be¬

come known in Italy he returned there about the year 1395, and was appointed professor of Greek literature at Florence, where he collected around him a great number of scholars of all ages and ranks, and excited universal enthu¬

siasm as much by his dignity and the grace of his elocution as by the extent of his learning.

From his school proceeded -Leonardo Bruno, Poggius, Francis

Philephus and other distin¬

guished revivers of classical studies. He after¬

ward taught with equal success at Milan, Pavia and Venice, and lastly at Rome. Pope Gregory XII employed him in public affairs, and sent him with others to the Council of Constance, where he died in 1415. He should not be con¬

founded with his nephew and companion in Italy, John Chrysoloras.

CHRYSOMELIDˆE, kns-6-mel'i-de, an

extensive family of small beetles which have a hemispherical or ovate form, small, sunken head, and antennae widely separated. All, and especially the typical genus Chrysomela, are very gaily colored, — blue, green, golden or a mixture of brilliant tints. The most elegant American species (C . scalaris) has the head, thorax and under side dark green, while the wing-covers are silvery white, ornamented with small green spots on the sides and a broad irregular stripe down the middle of the back; the legs and antennae are rustred, and the wings rose-colored. These beetles inhabit trees, bushes and plants, feeding, in their larval state, on the leaves. They include many species, as the potato-bug and the elm-leaf beetle, which do vast damage. Their eggs are laid on the leaves, and the grubs, which as a rule are protected by disagreeable odors and exudations, go into -the ground to transform, and there spend their pupal life. The family is a very large one and is spread all over the world. See Leaf-beetles.

CHRYSOPHANIC, kns-6-fan'Ik, ACID,

the yellow coloring matter of rhubarb. It can be obtained direct from rhubarb by exhausting with benzol and purifying the crude product.

It crystallizes in fine yellow tables. It is hardly soluble in water, but dissolves in ether, benzol, *etc.* With potash it gives a fine purple solution, and thus affords a delicate test for the presence of alkalis. It is also soluble, without decom¬

position, in strong sulphuric acid. Its acid properties are rather obscure.

CHRYSOPHYLLUM, kns-6-fil'um, a

genus of the sapodilla family (Sapotacea) , consisting of trees with milky juice, alternate leaves with numerous transverse closely aggre¬

gated ribs, and golden hairs on the under sur¬

face. In the West Indies the fruit of C. cainito CHRYSOPSIS — CHRYSOSTOM

is esteemed a delicacy under the name of star-apple. If is fleshy, with several one-sided cells, or, by abortion, with one. Seeds nut-like.

CHRYSOPSIS, kri-sop'sis (from the Greek, signifying «of a golden aspect®), a genus of about 20 species of the natural order Compos¬

ite, comprising nearly 30 species, natives of North America and Mexico. Commonly known as the golden aster.

CHRYSOPRASE, kris'o -praz, a variety of chalcedony, colored apple-green by nickel oxide and prized as a semi-precious stone. Silesia and Siberia long furnished a small supply, but later discoveries in California have made it abundant and cheap. It also occurs in Oregon and North Carolina.

CHRYSOSTOM, kris'os-tom, Dion (surnamed Cocceianus), Greek orator: b. Prusa in Bithynia about 99 a.d. He was first a Sophist, then a Stoic, and rose into high repute as an orator under Domitian. That tyrant, however, took offense at his freedom of speech, and he was obliged to save himself by flight. He was afterward highly esteemed by Nerva and Tra¬

jan. About 80 of his orations are still extant.

They are written in an affected style, but not¬

withstanding form a valuable contribution to our knowledge of ancient philosophy. They appeared first in a collected form at Milan in 1476.

CHRYSOSTOM, John, Saint, archbishop

of Constantinople, greatest of the Greek Fathers of the Church : b. Antioch, the capital of Syria, about 347 ; d. near Comana, in Pontus, 14 Sept.

407. His cognomen, the golden-mouthed

(chrysostomos) , which was given to him after his death, he owes to his extraordinarily rich, fervid and persuasive eloquence. In his youth he attended the school of Libanius, a celebrated Pagan sophist, was his favorite disciple and would have been his successor had he not been won for the service of the Church by his pious mother Anthusa. In accordance with the general usage of that time, he did not receive baptism till he had attained maturity, and then he lived devoted in religious contemplation and studious seclusion in a desert place for six years. There the austerities he practised undermined his strength, and being called back to Antioch by the bishop, he was ordained deacon in 381 and presbyter in 386. By his zeal, his urbanity and his eloquence, he won to the Church heretics, pagans and Jews in great numbers ; and his fame spreading to the capital city of the Eastern empire, he was, with the approval of the Emperor Arcadius, chosen to be archbishop of Constantinople in 397. Here he led in the episcopal palace the life of an ascetic, eschewing the pomp and lux¬

ury of his predecessors, and out of the reve¬

nues of the see maintained numerous charities.

Meanwhile his homilies or pulpit discourses, which are still extant, were even a stronger attraction for the masses than the shows of the amphitheatre. But he had many ˆrivals, who left no means untried to blacken his character, his reputation for piety, zeal, disinterestedness and for orthodoxy, and his life was accord¬

ingly full of trials and vicissitudes. His en¬

forcement of the Church’s laws regarding the relations between

ecclesiastics and the female inmates of their households; his deposition of bishops for simony and licentiousness ; the re¬

straints he put upon the vagrant habits of the monks, called forth a host of enemies, who brought against him the charge of sympathiz¬

ing with heretical monks of the Nubian desert who had been excommunicated by their eccle¬

siastical superior, Theophilus, patriarch of Alexandria. Theophilus now added himself to the malcontents of Constantinople, and he called a_ synod oi bishops to be held in the im¬

perial city to judge Chrysostom. But because of the menacing attitude of the common peo¬

ple, who were to a man loyal to their arch¬

bishop, the synod had to be held in the neigh¬

boring city of Chalcedon. To this synod Chrysostom was four times summoned, to re¬

ply to the charges that were to be made against him, but he ignored the summons, and was declared guilty of favoring the heresies of Origen. By order of the Emperor Arcadius he was exiled to Nicaea in Bithynia; but so great was the commotion of the common peo¬

ple in Constantinople when the degree of ban¬

ishment was published, that the emperor, alarmed, ordered his recall. The re-entry of Chrysostom to the city was attended with all the pomp of a Roman triumphal procession, and he abated no jot of his zeal for the repression of the evils of Church and state. His lan¬

guage was, as it had ever been, sufficiently emphatic, sufficiently plain-spoken, but his ene¬

mies put in circulation a spurious version of the opening passage of his first discourse after his return : he was reported by them to have commenced his address with these words in denunciation of the Empress Eudoxia : (<Herodias is again furious ; Herodias again dances ; she once more demands the head of John.®

The report was false, but the fate of Chrysos¬

tom was sealed. Barbarian troops were

brought into the city to overawe the commons while another synod was in session in the city: it confirmed'the decree of the synod of Chalce¬

don. By decree of the emperor, Chrysostom was banished to Cucusus, a place in Mount Taurus. The people of Constantinople, not to be restrained by the garrison of Gothic mer¬

cenaries in the city, set fire to the cathedral and the senate house on the day the decree was published; and Chrysostom, though absent, was a more formidable power than ever: his correspondence with bishops, both in the East and West, arrayed the whole Catholic Church against Theophilus and the court of Arcadius.

Indignant at the contumacy of the exiled arch¬

bishop, Arcadius ordered his transfer to a more inhospitable region still, the desert of Pityos.

He died on the way thither in his 60th year.

His day in the calendar of the Greek Church is 13 November; in that of the Latin Church, 27 January. His last words are reported to have been ((God be in all things praised.® His works consist of homilies or discourses sug¬

gested by or illustrating passages of Scripture ; commentaries on the sacred books ; epistles, and treatises on the truths of religion, virtues and vices, *etc.* Consult Martin, (Saint Jean Chry-sostome, ses oeuvres et son siecle) ; Perthes, (Life of Saint John Chrysostom and His Biographers) ; Tauscher, (Life) ; both in Ger¬

man ; and a biography by Aime Puech, in English.

George Edwin Rines.

CHRYSOTILE, kris-6-til, a variety of the mineral serpentine, occurring in silky fibres that are flexible and easily separated. It is com¬

monly greenish in color. Its specific gravity is about 2.22, which is sensibly less than that of ordinary serpentine. It occurs abundantly in Canada, where it is known as ((bostonite® and ((asbestos.® See Asbestos.

CHRYSTLER'S FARM, Battle of, the

most discreditable American defeat, as Chip¬

pewa was the most brilliant victory, of the War of 1812, was fought 11 Nov. 1813. The expedi¬

tion prepared in the summer and fall of 1813

at Sackett's Harbor, on Lake Ontario, to de¬

scend the Saint Lawrence and capture Mon¬

treal, started 17 October under bad auspices.

Aside from insufficient resources and the late¬

ness of the season, the personnel was hopeless.

The commander-in-chief alone would have

ruined it. This was Maj.-Gen. James Wilkin¬

son, termed by Scott (<an unprincipled imbecile,®

a mere cunning jobber, of neither military talent, firmness nor even character to be re¬

spected, and despised by all the other officers.

He had been appointed for the curious reason that New Orleans was not thought safe in his hands. Furthermore, he was prostrated with lake fever, as was his second in command, Morgan Lewis. Boyd, the third, was so in¬

competent that Jacob Brown, the one able fighting general, had threatened to leave the army rather than serve under him. Men can¬

not fight without leaders. The flotilla, battered by contrary winds, began the descent of the river 5 November. From this on, the British made progress slow and dangerous. Captain Mulcaster, an able and daring naval officer, with several gunboats, harassed the rear, and 800

regular infantry co-operated with him, pouring musketry and artillery fire on the expedition from the opposite bank whenever possible, be¬

sides the batteries at Prescott. Brown's and Macomb's brigades were landed on. that side to clear the road; and by 10 November the flotilla had reached the Long Sault, and anchored for the night at Chrystler's Farm on the Canadian side. The next morning Brown marched down beside the rapids with his brigade, and Boyd was ordered to take the rest of the troops, some 2,000, with six field pieces, and guard the rear.

Brown reported all clear, and the fleet was about to run the rapids when Boyd reported that the enemy was advancing in order of battle. Wil¬

kinson was sick in bed and could give no or¬

ders ; so was Lewis ; and Boyd was left to fight his own battle. He did it as a weak commander usually does, by detachments, which the British crushed in detail, though they had but 800

against 2,000. The battle lasted from about 2 :30

to 4:30, when General Covington was killed and his brigade driven back in disorder. Then the whole American line gave way and retreated in haste. Wilkinson reported 102 killed and 2 o7

wounded, and the British claim to 100 Amer¬

ican prisoners is more likely to be true than Wilkinson's report of none. The British re¬

ported 22 killed, 148 wounded and 12 missing.

The American troops hurriedly re-embarked ; the next morning the flotilla ran the rapids to Cornwall. There Wilkinson learned that his colleague, Wade Hampton, had ended opera¬

tions for the season (see Chateaugay), and at once went into wfinter quarters. Consult Henry Adams, ‘History of the United States,* Vol.

VII, Chap. 8.

CHU-HI, choo-he’, Chinese scholar and

philosopher: b. 1130; d. 1200. As a student of the Chinese classics, he became widely known through his interpretation of the doctrines of Confucius, and became one of the founders of the Chinese school of speculative philosophy.

He had a large number of disciples among the scholars, and they, under his direction, com¬

piled a history of China in 59 books, which is still a standard work.

CHU-KIANG, choo-ky-ang’, or CANTON,

RIVER, the ((Pearl River® of the Chinese, is the lower part of the Pe-Kiang, and has a navi¬

gable channel of about 300 miles. Opposite Can¬

ton it is about one-fourth mile wide, and is crowded with shipping up to 1,000 tons burden ; larger vessels must tie up at a point 15 miles below. About 40 miles below Canton it is called “Boca Tigris,® or “The Bogue.®

CHUAR. Piute Indian name given by Wal¬

cott to a thick group of strata of Algonkian Age in the Grand Canyon of Arizona. The rocks are shales with interbedded sandstone and limestone, about 5,000 feet in all. They overlie the Unkar group and are unconform-ably overlain by sandstone at base of Tonto group.

CHUB, a name given to various species of fishes of the family Cyprinidce (q.v.), of which the river chub (Hybopsis kentuckiensis) and the creek chub (Semotilus atromaculatus) are the most

important in the United States. The name is also sometimes applied to the roach (q.v.), and more rarely to certain marine fishes, as the rudder-fish. The river chub is abundant in rivers and creeks throughout the eastern United States, and may be known by its orange-colored fins and the tuberculate head of the males in spring. It reaches a length of 10 to 12 inches, and is a favorite with the less ambi¬

tious anglers in certain regions. The creek chub, or horned dace, is even more widely dis¬

tributed, and inhabits brooks rather1 than rivers.

It resembles the roach, but has a black spot in front of the dorsal fin and does not exceed a foot in length. The large black chub (Aero -

cheilus alutaceus), of the Pacific Coast rivers, is known locally as chiselmouth, squaremouth and hardmouth. The English chub (Squalius ccphalus) is a much larger fish, attaining a length of two feet and a weight of eight pounds, and lives in mountain brooks as well as in rivers. It is a game fish of considerable im¬

portance.

CHUB-MACKEREL, a fish (Scomber

colias), found in immense numbers in the Mediterranean Sea. It is the ((Spanish mack¬

erel® of England.

CHUBB, Percival, American educator: b.

Devonport, England, 17 June 1860. He was educated at. Stationers' School, London, and received training for the English Civil Service where he was employed for 10 years on the local government board. He has delivered lectures on literature at the Brooklyn Institute of Arts and Sciences ; instructed in pedagogy at Pratt Institute; served as head of the Eng¬

lish department of the Manual Training High School, Brooklyn, and as principal of the high school department of the Ethical Culture School

of New York, where he also directed the Eng¬

lish courses and produced pageants, festivals, *etc.* After acting in the capacity of associated leader of the Society for Ethical Culture at New York for a few years and as lecturer on English at the School of Pedagogy of New York University, he went to Saint Louis, where in 1911 he became leader of the Ethical So¬

ciety. He edited Emerson's (Selected Writ¬

ings 5 (1888) ; Montaigne's (Essays 5 (1891) ; Pope's 'Homer's Iliad J (with William Max¬

well, 1898) ; Dryden's (Palamon and Arcite) (1899); Browning's <Poems) ; (Boy Life5 ; (Readings from Howells5 (1909) ; (Select Writ¬

ings of Lincoln5 (1909) ; (Travels at Home5

and (Readings from Mark Twain5 (1910). He is also the author of (The Teaching of Eng¬

lish5 (1902); (Festivals and Plays in Schools and Elsewhere5 (1912). In 1915-16 and 1918-20

he was president of the Drama League.

CHUBB, Thomas, English controversialist:

b : East Harnham, near Salisbury, 29 Sept. 1679 ; d. Salisbury, 8 Feb. 1747. He was a mechanic who employed his leisure in the acquisition of knowledge from the best English books which he could procure. In 1715 he published (The Supremacy of the Father Asserted,5 the per¬

spicuity and argumentative skill of which ob¬

tained for it much notice. Of course a produc¬

tion assailing the orthodox faith did not pass without reply, and a controversial warfare commenced which lasted as long as his life.

Between 1725 and 1732 he offered to the world his thoughts on a variety of topics, moral and theological, in 34 tracts, collected in a 4to volume, of which book Pope in a letter to Gay speaks with great respect. Various publications followed: (A Discourse Concern¬

ing Reason5 ; (The True Gospel of Jesus Christ Asserted5 ; (Inquiry into the Ground and Foun¬

dation of Religion,5 *etc.* His publications were a good deal read in America.

CHUBB LOCK (so-called from the name

of the inventor), one of the most intricate of the many-tumbler locks which were first made in England by Barron in 1774. The locks of Chubb have obtained their celebrity partly from their superior workmanship, having more tumblers than usual, with the addition of a lever called the ((detector,55 which is so fixed that, while it does not act under the ordinary application of the key, it cannot fail to move if any one of the tumblers be lifted a little too high, as must be the case in any attempt at picking. The bolt becomes immovably fixed, and thus, while rendering all further attempts at picking use¬

less, gives notice that such an attempt has been made on the next application of the proper key.

To draw the bolt after it has been tampered with, it is necessary only to turn the key a little farther forward, as in the process of overlook¬

ing; this pushes up a tooth at the end of the detector, restoring the lock to its original posi¬

tion, and the key is then free to turn in the ordinary way. These locks, which were pat¬

ented as far back as 1818, maintained the repu¬

tation of being invincible until the celebrated locksmith Hobbs, of the United States, in 1851

succeeded in picking the most intricate locks of English workmanship,

such as Chubbs, Bra¬

mahs and Cotterills.

CHUBUT, choo-boot', Argentina, a terri¬

tory in the northern part of Patagonia, so named from a river which drains a large part of the surface. Its area is about 90,000 square miles. Its principal interest lies in its Welsh settlement, which has remained almost wholly Welsh-speaking. The first settlers, 151, arrived in July 1865. Epochs in its history have been the abandonment of the colony in 1867 ; the subsequent return from New Bay; a 20 months'

nearly complete isolation from the outer world, terminated in 1871. The principal towm, Raw-son, is situated about five miles from the At¬

lantic Ocean, and has a population of a few hundreds. English grain and roots are pro¬

duced, and salt of good quality is found.

CHUCK-WILL'S-WIDOW, a large, noc¬

turnal bird (Antrostomus carolinensis) related to the whippoorwill, common in the Southern States of the Union. The name is an attempt to reproduce the note of the bird. It is fully 12 inches in length, and is one of the largest of American song-birds, and when uttering its call, opens its mouth enormously. The eggs are laid upon the ground, little or no attempt being made to form a nest. The bird is a voracious eater of insects, its large bristled mouth fitting it for catching flying objects.

CHUCKWALLA. See Lizard.

CHUFA. See Cyperus.

CHUGWATER CREEK, Wyo., a railroad

station in Platte County; it is also the name of the Red Beds, an extensive geological formation in Wyoming carrying valuable gypsum deposits.

CHUKOR, or CHICORE, a partridge

(Caccabis cliukor), the favorite game-bird of the foothills of the Himalayas.

CHUMBUL, a large river of Hindustan.

It rises in Malwa, in the Vindhya Mountains, about 50 miles south of Oojein, flows north, enters Rajpootana, through which it runs north¬

east, and falls into the Jumna about 90 miles southeast of Agra, after a course of over 650

miles.

CHUNAM, in India, a name given to a

very fine kind of quicklime made from calcined shells or from very pure limestone, and used for chewing with betel (q.v.). It is also used for plaster, being mixed with fine sand by wretting, and sometimes with various other ma¬

terials added. It makes a plaster of great durability, capable of being highly polished, and suitable for decorative wrork. Both fresh and fossil shells are used for making chunam. Ex¬

tensive beds of fossil shells employed for this purpose occur in the south of India, particularly in low, marshy places near the seacoast. The chunam from Madras is among the best made.

The shells used are first very carefully cleaned; they are then calcined in kilns, with wood charcoal. When chunam is to be used for plas¬

ter, it is mixed with fine river sand and thor¬

oughly beaten up with water. The name is applied also to a weight for gold used in northern India.

CHUNAR-GHUR, chun-ar'ger, India,

town, fortress and invalid station in Hindustan, 17 miles southwest of Benares, on the Ganges.

The fortress stands on a lofty rock rising abruptly from the river. Chunar was stormed bv the British in 1764, and formally ceded to the East India Company in 1768. Pop. about 12,000.

CHUNG-KING, choong-keng', China, city

in Szechwan, on the Yang-tze-Kiang, at its junction with the Kialing. It was declared open in 1890, and has become one of the most important commercial centres of western China.

It is surrounded by a strong stone wall, about five miles in circumference and pierced with nine gates. The climate is neither pleasant nor healthful. The vice-consul of the United States writes that the trade of Chung-King in 1915, although less than in 1914, was more than in other years. The value of the trade of the port was as follows: Net foreign imports, $5,-

322,888; net native imports, $5,980,186; exports, $10,120,803; total, $21,423,877. The number of vessels entered and cleared at Chung-King dur¬

ing 1915 was given as follows : Chinese vessels of foreign type 120, tonnage 31,627; Chinese junks 1,905, tonnage 85,793. There was a re¬

bellion of the natives here in 1896-98, which checked progress. A railroad to centre at Chung-King is projected, and the exploitation of

valuable products awaits the realization of this plan, since in size and potential wealth Szechwan surpasses all other provinces. Pop.

about 702,300.

CHUPRAH, chup-ra', or CHAPRAH,

India, a town in Bengal, on the Gogra, near its junction with the Ganges, 32 miles west-north¬

west of Patna. It is narrow, but extends along the river for four miles. It has government courts and offices, government English schools, and is the station of a German Lutheran Mis¬

sion ; a Roman Catholic Mission was also started within recent years. In 1901 the population was 45,901, or nearly 12,000 less than in 1891, the decrease being mainly due to a plague outbreak and the attendant exodus shortly before the census. The plague has visited the town several times since; between November 1902 and Feb¬

ruary 1903 there were 2,138 deaths from the epidemic.

CHUQUISACA, choo-ke-sa'ka, Bolivia, de¬

partment in the southeastern part of the coun¬

try, bounded on the north by the department of Santa Cruz, on the east by Brazil, on the south by Paraguay and the department of Tarija and on the west by the departments of Oruro and Potosi. Its area is 26,417 square miles. The eastern portion is mostly level, the mountainous parts being in the west. There are large for¬

ests and grazing lands, and the soil, where cul¬

tivated, is found good for agriculture. Mineral deposits exist, the most valuable being silver, of which some is mined. Among the other pro¬

ductions are wheat, coffee, sugarcane and cacao.

The capital of the department is Sucre (q.v.) which was formerly the capital of the republic also. The population is estimated at 230,000,

embracing about 85,000 civilized and 8,000 un¬

civilized Indians.

CHURCH, Albert E., American mathemati¬

cian and military officer : b. Salisbury, Conn., 1807 ; d. West Point, N. Y., 30 March 1878.

He was educated at West Point and was pro¬

fessor of mathematics there 1834-78. His mathematical works include (Elements of

Differential and Integral Calculus) (1842) ; (Elements of Analytical Geometry) (1851) ; Analytical Trigonometry5 (1857); (Elements of Descriptive Geometry5 (1865)-.

CHURCH, Alfred John, English translator

and author: b. London, 29 Jan. 1829; d. 1912.

He was educated at Lincoln College, Oxford; was ordained in the English Church in 1853 ; professor of Latin in University College, Lon¬

don, 1880-88; and rector of Ashley, Gloucester¬

shire, 1892-97. He published translations of Tacitus and Livy. His tales retold from the classics and reconstructions of the histories of the ancient empires of Greece and Rome won him wide popularity on both sides of the At¬

lantic. (His Memories of Men and Books5 was issued in 1908.

CHURCH, Sir Arthur Herbert, English

chemist: b. London, 2 June 1834; d. 31 May 1915. He was educated at King’s College, Lon¬

don, the Royal College of Chemistry and Lin¬

coln College, Oxford. He was professor of chemistry in the Royal Agricultural College, Cirencester, 1863-79; and filled the same po¬

sition in the Royal Academy of Arts from 1879 to 1911. He was the discoverer of the animal pigment known as turacin, and of churchite, a native cerium phosphate. He published (Precious Stones5 (1883) ; (English Earthenware5 (1884) ; (The Laboratory Guide5

(7th ed., 1894) ; (Food5 (16th thousand, 1901) ; (Josiah Wedgwood5 (1894) ; (Color5 (1887) ; (Guide to Corinium Museum5 (1910); Chemis¬

try of Paints and Painting5 (1901).

CHURCH, Benjamin, American soldier: b.

Duxbury, Mass., March 1639; d. Little Comp¬

ton, R. I., 17 Jan. 1718. He commanded forces with distinction in King Philip's war and in the famous battle of 1675 with the Narragansetts won renown. He captured and executed King Philip in 1676. (Entertaining Passages Relating to King Philip's War5 were compiled from his notes by his son Thomas.

CHURCH, Benjamin, American physician :

b. Massachusetts about 1710; d. 1776. He grad¬

uated at Harvard ; became noted for his patri¬

otic writings during the decade preceding the Revolutionary War, and was a leader in the ˆBoston tea-party.55 He secretly corresponded in cipher with the British, and, being detected, failed to exculpate himself. He was lost at sea while on a voyage to the West Indies.

CHURCH, Francis Pharcellus, American

editor: b. Rochester, N. Y., 22 Feb. 1839; d.

New York city, 11 April 1906. He was the first publisher and editor of the Army and Navy Journal ; afterward, with his brother, he established and edited the Galaxy Magazine.

He was a leading editorial writer on the New \oik Sun, and till his death was a proprietor of the Army and Navy Journal.

CHURCH, Frederick Edwin, American

landscape painter: b. Hartford, Conn., 4 May 1826; d. New York, 7 April 1900. His earliest productions were views of the Catskill Moun¬

tains, among which he resided, and a view of East Rock, near New Haven, which attracted very favorable notice.. In 1855 he visited South America, and found in the magnificent scenery of that country materials for several of his most admired pictures. After his return he executed his (View of Niagara Falls from the Canadian Shore,5 regarded by many as the most successful representation of the great cataract. Among his other works are (The Heart of the Andes5 ; (Cotopaxi5 ; 'Morning on the Cordilleras5 ; 'Under Niagara5 ; (The Ice¬

bergs5 ; and 'Sunrise on Mount Desert Island.5

After a visit to the Holy Land in 1868 he CHURCH

painted <Damascus) (1869) ; (Jerusalem)

(1870) ; (The Parthenon' (1871).

CHURCH, Frederick Stuart, American

artist : b. Grand Rapids, Mich., 1 Dec. 1842.

He studied at the National Academy of Design, of which in 1885 he

was elected a member.

He has achieved note as a realist and is well known as a painter of figures and animals. He has a sentitive and delicate feeling for color which he realizes more fully through his use of water color than in the medium of oil.

Among his pictures are <Weirdness) ; cMad as March Hares' ; and (The Sea Princess, ' in oil; (Hard Times) ; and 'The Phantoms,' in water colors. He exhibited (St. Cecilia) in 1896 and in the National Academy of Design 1901, (The Sea Serpent' ; Companions'

(1909); (The Were Wolf' (1910); 'Summer'

(1911) ; (The Stowaway' and 'Refuge'

(1912) ; 'Conquered' (1913).

CHURCH, George Earl, American soldier,

engineer and explorer: b. New Bedford, Mass., 7 Dec. 1835. He was a member of the Scientific Exploring Expedition in South America in 1858; served in the Army of the Potomac 1862-65 ; and was war correspondent in Mexico for the New York Herald 1866-67. He made explorations in South America 1868-72 ; was United States commissioner to visit and report on Ecuador 1880; represented American So¬

ciety of Civil Engineers at London Congress of Hygiene and Demography in 1891, and was president of the Geographical Society of the British Association in 1898. He is now resi¬

dent in London where he is vice-president of the Royal Geographical Society.

CHURCH, Irving Porter, American civil

engineer and educator : b. Ansonia, Conn., 22

July 1851. He was educated at Cornell Uni¬

versity and has been professor of applied me¬

chanics and hydraulics in the College of Civil Engineering there, from 1892. He has pub¬

lished ‘Statics and Dynamics for Engineering Students’ (1886) ; (Mechanics of Materials’

(1887); (Hydraulics and Pneumatics’ (1890), these three being combined into his (Mechanics of Engineering’ in 1890; (Notes and Examples in Mechanics’ (1892) ; (Diagrams of Flow of Water in Open Channels’ (1902); (Hydraulic Motors’ (1905); (Mechanics of Internal

Work’ (1910).

CHURCH, John Adams, American mining

engineer : b. Rochester, N. Y., 5 April 1843 ; d.

New York, 19 Feb. 1917. He was educated in New York city, completing his course in the School of Mines, Columbia University, in 1867.

The two years immediately following his grad¬

uation were passed in European travel. From 1872 to 1873 he was acting professor of metal¬

lurgy and mineralogy at Columbia, at the same time editing the Engineering and Mining Jour¬

nal. Several years later he was appointed a member of the United States Geographical and Geological Survey. Much of his work for the government was done in Nevada. He was as¬

signed to make a detailed study of the Com¬

stock lode, and at the completion of the work startled the scientific world by evolving the theory that the presence of heat at the bottoms of deep mine shafts is due to a chemical action in the rock and not to the approach to the earth’s fires. His report received recognition by Columbia University and the degree of doctor of philosophy was conferred on him.

From Nevada Mr. Church went to Ohio State University as professor of mining and metallurgy. He entered the employ of the Chinese government in 1886, and for four years under Viceroy Li Hung Chang

he supervised the re¬

opening of several famous silver mines in Mon¬

golia. Mr. Church served on the Assav Com¬

mission under President Cleveland. He was the author of (Mining Schools in the United States' ; (Notes on a Metallurgical Journey in Europe' (1875) ; (The Comstock Lode'

(1880) ; 'Report on Artesian Wells in Arizona,'

and other volumes of a technical character. He was a member of the American Institute of Mining Engineers and of the Century Club.

CHURCH, Richard William, English

clergyman: b. Lisbon, 25 April 1815; d. Dover, 9 Dec. 1890. Lie took a first-class at Oxford in 1836, and soon after was elected to a fellow¬

ship at Oriel. From 1852 to 1871 he held the rectory of Whatley, near Frome. In 1871 he became dean of Saint Paul's Cathedral, Lon¬

don. In 1854 he published 'Essays and Re¬

views,' and thereby took rank almost at once as _ one of the most graceful and scholarly writers of the day. His university sermons 'Human Life and its Conditions' (1878) ; 'The Gifts of Civilization' (1880) ; and 'The Disci¬

pline of the Christian Character' (1885), are profound contributions to religious thought.

Other works by him are 'Life of Anselm'

(1843); 'Dante: an Essay' (1850); 'Spenser'

(1879) ; 'Bacon' (1880) ; 'The Oxford Move¬

ment' (1891); 'Miscellaneous Essays'; 'Oc¬

casional Essays.' Consult his 'Life and Let¬

ters' (1895).

CHURCH, Samuel Harden, American

writer: b. Caldwell County, Mo., 24 Jan. 1858-He is a railway official in Pittsburgh, Pa., and has written ‘Oliver Cromwell: a History’

(1874) ; ‘John Marmaduke’ (1897) ; ‘Cor¬

porate History of the Pennsylvania Lines West of Pittsburg’ (1898-1900) ; ‘Penruddock of the White Lambs’ (1907); ‘Short History of

Pittsburgh,’ ‘The American Verdict on the.

Great War’ (1915).

CHURCH, William Conant, American

editor and author: b. Rochester, N. Y., 11 Aug.

1836; d. New York city, 23 May 1917. He was educated in the Boston Latin School. While still a youth he engaged with his father in editing and publishing the New York Chronicle.

In 1860 he became publisher of the New York Sun and in 1861-62 was Washington corre¬

spondent of the New York Times. He re¬

signed this position on his appointment as captain in the United States Volunteers in 1862.

He served for one year, receiving brevets of major and lieutenant-colonel. In 1863, with his brother, F. P. Church, he established the Army and Navy Journal, and in 1866 founded the Galaxy Magazine, and conducted it until 1878 when it was merged in the Atlantic Monthly. In 1882 President Arthur appointed him government inspector of the Northern Pacific Railroad. With George W. Wingate he established the National Rifle Association and was its first president. He took a very active part in public affairs in New York city; was one of the founders of the Metropolitan Museum of Art, and a life member and director of the New York Zoological Society. He pub-654

lished (Li f e of John Ericsson) (1890); (Life of Ulysses S. Grant* (1899).

CHURCH, a word derived from the Greek

kyriakos, dedicated to the Lord, the Scottish kirk and German kirche being forms of the same word. In its widest sense the Church denotes the whole community of Christians, and was thus used by the New Testament writers. In more restricted significations it denotes a particular section of the Christian community differing in doctrinal matters from the remainder, as the Catholic Church, the Protestant Church, etc.; or to designate the recognized leading church of a nation or com¬

munity as the Greek, Lutheran, Gallican, An¬

glican, Presbyterian, etc., Church. In another sense it signifies the building in which Chris¬

tians assemble for the worship of God, and, re¬

ferring the reader to the separate articles on the sects into which the community is divided, this article is confined to a few remarks, his¬

torical and descriptive, on church as denoting the edifice appropriated to Christian worship.

When in the time of Constantine the persecuted Christians emerged from their meeting-places in upper rooms and in the Roman catacombs by favor of the Imperial edict, no buildings could be found fitter for their purposes than the basilicas or royal public halls of Rome.

The basilica (q.v.) was generally in the form of a parallelogram, with a semi-circular apse at one end, which was raised, being approached by a semi-circular range of steps. In the centre of this apse was the raised seat of the quaestor or other presiding magistrate; on each side, upon the steps, were places for the assessors, or those engaged on the

business being trans¬

acted. In front of the apse was placed an altar, where sacrifice was performed before un¬

dertaking public business of any importance.

The area of the building was divided by two rows of columns, the central division or nave being by far the broadest; over the two smaller divisions or aisles a gallery was often raised.

In the small dark and Pagan temple there was neither room nor light enough to conduct Chris¬

tian worship, but in such a building as above described, the whole congregation of the faith¬

ful could meet and take part in the act of worship. The bishop naturally took the place of the quaestor, the priests that of the assessors.

The altar (q.v.) on which the pious Pagan poured his libations at the commencement of important business served equally well for the celebration of Christian rites. (See Altars).

When in course of time the separation be¬

tween laity and clergy became complete, the apse was railed off and appropriated to the use of the clergy, then the raised part on which the altar stood was separated by pillars called calcelli, and not allowed to be profaned by the multitude. Another change was the introduc¬

tion of a choir, or enclosed space in the centre of the nave, round three sides of which the faithful congregated to hear the gospel read from two pulpits built into its inclosure on either side, or to hear the services read or sung by the minor clergy, who occupied its precincts. As time went on other modifica¬

tions were introduced ; on the erection of new buildings, the symbolic form of the cross was generally adopted as the most suitable for a Christian building; the arms of the cross (the transept) were railed off by rows of columns as the main building had been; at the point of intersection of the transept with the nave a tower was raised, which was at times sur¬

mounted by a small spire; frequently two towers were placed at the

angles of the en¬

trance end of the edifice. Over the greater part of Europe the style which came to be usually adopted for ecclesiastical buildings was the pointed Gothic, as lending itself more readily to a more majestic and ornamental treatment than the graceful Greek with its columned portico and rounded tower. Circu¬

lar churches, which were popular at an early date, have found little imitation. The struc¬

tures which are among the most notable in point of size or historic interest are alluded to in the article on Cathedrals. The ordinary churches are generally long rectangular build¬

ings, without transepts, and the tower is placed so as to form the principal entrance, or at one of the angles of that end of the church. Dur¬

ing the latter half of the 19th century a taste for a superior style of building to that hitherto prevalent arose among all Christian bodies and resulted in the erection of many fine church edifices throughout the world. (See Archi¬

tecture). Consult Brandon, (Parish Churches) (London 1848) ; Braudot, (Eglises de bourgs et villages) (Paris 1867) ; Everett, (Historic Churches of America* (Boston 1884) ; Norton, (Church Building in the Middle Ages* (New York 1880).

CHURCH, an Organization of Christians.

As understood to-day there are two widely dif¬

ferent opinions regarding the meaning of a church, and both claim the New Testament as authority, (1) that Jesus Christ established a definite Church with a code of laws pertaining to belief and government; (2) that he gave us only moral instruction and no definite laws of belief or discipline. Under (1) may be classed those who claim that Jesus Christ established only one Church, and that the churches men¬

tioned by Paul and others of the early mission¬

aries, as recorded in the New Testament, were all parts of the one Church. Still others hold that the Christian Churches of the New Testa¬

ment were each separate and distinct in govern¬

ment, but one faith. The Roman Catholic, Greek, Church of England and all Christian organizations with any generally recognized form of government, whether by presbyters or by the congregation, may be classed under (1).

Under (2) will come all who hold that to ob¬

serve the moral code as taught by Jesus Christ is all sufficient, hence this division need not be treated under the head Church.

The Roman Catholic definition of Church is : <(The congregation of all the faithful, who being baptized, profess the same doctrines, par¬

take of the same sacraments, and are governed by their lawful pastors under one visible head on earth, the Bishop of Rome.® This implies unity of faith, morals and government. The Greek definition is the same except they do not recognize as the visible head the bishop of Rome. The Church of England definition is : ((A congregation of faithful men, in which the pure word of God is preached, and the sacra¬

ments be duly administered in all those things that are of necessity requisite to the same.®

In the further authorized explanation of this definition it is shown that the government is given to the bishops without any authoritative

head. The same definition is in general use by all other Christian churches, but in some the government is vested in presbyters, elders or officers acting as elders ; in others the govern¬

ment rests in the congregation or members of the church. See Church

Government.

Under the names of the various Christian denominations may be found further informa¬

tion Regarding particular doctrines and forms of government. See Christian Church ;

Christianity; Church and State.

CHURCH-ALE, formerly a church festival

in England at which ale was drunk liberally; also the ale brewed for such a festival. The name is obviously compounded like bridal — bride-ale, scot-ale, clerk-ale, bid-ale, *etc.* The church-ales were usually held upon Whitsun¬

tide, and two persons were chosen beforehand to preside over the feast, and divide out the victuals and drink voluntarily contributed by the parishioners. Sometimes the drink which had been brewed from malt given by the par¬

ishioners was sold about Whitsunday at the church for the support of orphans and poor, the repair of the church and similar objects.

The practice of holding church-ales with the corresponding games was denounced by the Puritans, and is not overlooked in Stubbs'

(Anatomie of Abuses. >

CHURCH CALENDAR. A systematic

method of arrangement of the feasts of the Christian Church has long been in use, and the record of the time of these feasts is called the Church Calendar. Many of the feasts of the Church occur on a fixed day of the month, as Christmas, 25 December; All Saints', 1 Novem¬

ber; Assumption, 15 August, and the feasts of the saints. The ˆmovable® feasts are regulated from the feast of Easter Sunday. (For Easter see Calendar). The fiftieth day after Easter Sunday is ˆPentecost® ; the eighth day after ((Pen'tecost® (<Trinity Sunday,®

etc. The fasts, except those of Lent, are regulated by the feasts, the records of which are found in the calendar.

CHURCH DISCIPLINE, the practice of

the Christian Church in dealing with such of its office-bearers and members as have by public scandal caused hindrance to its common spirit¬

ual life. Its Scripture authority, resting on such passages as Matt, xvi, 19; xviii, 15 (et seq.), is further enforced in Paul's epistles and in the gospel and epistles of John. Discipline, in the' ecclesiastical sense, means the laws which are intended to govern the subjects of the Church in their conduct, as distinct from dog¬

mas or articles of faith, which affect their belief. These laws may be based upon the Scripture and tradition or they may be the outgrowth of the condition of the times.

CHURCH OF ENGLAND. See Great

Britain — The Church of England.

CHURCH FATHERS (patres ecclesice),

teachers and writers of the ancient Church, who flourished after the time of the apostles and apostolic fathers (the immediate dis¬

ciples of the apostles), from the 2d to the 6th century. This name is also sometimes given to the teachers and writers of the following centuries, down to the schoolmen, who begin with the 12th century. A large number of their writings have been preserved, and have been published by modern scholars. The

fathers of the Church are divided into two chief classes — Latin and Greek. The most celebrated among the Greek fathers are Clement of Alex¬

andria, Origen, Eusebius, Athanasius and Chrysostom. The most distinguished among the Latin fathers are Tertullian, Augustine, Ambrose and Jerome.

CHURCH GOVERNMENT. The system

by which the affairs of the local church, or congregation, and of the denomination are di¬

rected. The main principles of church govern¬

ment are derived by various bodies of Chris¬

tians from the New Testament. Roman Cath¬

olics and Episcopalians, Presbyterians and Re¬

formed, Baptists and Congregationalists, whose polities are as different as possible, all be¬

lieve that their respective systems of church government are derived from the Scriptures, particularly from the Gospels, the Acts of the Apostles and the Epistles. Apostolic succes¬

sion is of fundamental importance to the Roman Catholic, the Greek Catholic and the Anglican communion, and the teaching and practice of the Apostolic Church are, therefore, regarded by them as of binding force. Each traces its succession of bishops, and hence of ordained ministers, back through the ages to one or another of the apostles, and holds that since the time of Peter and Paul it has had an un¬

broken succession of the episcopal order.

Churches using the presbyterian or congrega¬

tional order hold that their respective systems are in harmony with the Scriptures and insist that they have a valid ministry. They do not accept the idea of apostolic succession, and do not believe that any particular system is of divine authority, but that churches of Christ are free to adapt their polities to circumstances and conditions, provided that the procedure be orderly.

There are three more or less distinct systems of polity, or church government, generally recognized, known as the congregational, the presbyterial and the episcopal. There are, how¬

ever, many modifications or variations of these systems. It is not

always possible to determine what particular system a particular denomina¬

tion employs. The Lutherans in the United States generally classify themselves as con¬

gregational ; some of them, however, contend that their system is presbyterial, while a few insist that it is really more nearly episcopal.

In the Scandinavian countries the Lutheran is the state church and has bishops.

1. The congregational method regards the local church, or congregation, as having full control of its own affairs, and as not subject to legislative or executive direction by any denominational organization or even by the whole denomination itself. That is, each local church is a complete body in itself with in¬

herent authority to conduct all the business ap¬

pertaining to itself. The principles of fellow¬

ship and co-operation, however, come in to modify any tendency toward strict independ¬

ency of the local church, which feels that it ought to be related to other churches of like faith and order, and recognizes that fellowship is concerned to know, when a new church is organized and seeks the recognition of other neighboring churches of the same name and order, what are its doctrines, principles and practices, and whe^> it calls a pastor, to be 656

assured of his standing and qualifications.

Hence, associations, or conferences, of contigu¬

ous churches, and councils for recognition, or¬

dination and installation, and hence, also, co¬

operation in the support of denominational missionary, educational and other boards, or societies. Congregationalists and Unitarians and the various Baptist bodies, with other de¬

nominations, accept the congregational system.

Baptists and Congregationalists in the last half century have developed denominational conven¬

tions and councils for the supervision of gen¬

eral denominational activities.

2. The presbyterial system is government by presbyters, which is another word for elders.

Presbyters (Milton said, ((New presbyter is but old priest writ large®) are elder ministers, or teaching elders, bishops or pastors, and there are also in each local church ˆruling® elders, who are laymen, and with the pastor constitute the session or consistory. Control in each church is exercised through the session or con¬

sistory; then comes the presbytery or classis, composed of pastors and elders of the churches of a district; then the synod, consisting of rep¬

resentatives from presbyteries or classes, and then the General Synod or the General Assem¬

bly, the chief legislative and judicial authority of the denomination. All Presbyterian and Re¬

formed churches use the presbyterial form of government, and, strictly speaking, that of the Methodists is more akin to the presbyterial than to the episcopal polity, although they have bishops. The Methodist bishop is a general overseer or superintendent, but has no legisla¬

tive power and is subject, under a few constitu¬

tional restrictions, to the legislative, executive and judicial authority of the General Confer¬

ence, the supreme governing body.

3. The episcopal system centres in the bishop.

The Roman Catholic Church is governed by the Pope as bishop of Rome, which it calls the primal Christian see. He creates cardinals, archbishops and bishops, calls ecumenical councils, at long intervals, to advise him, but he is always the su¬

preme head of the Church, ((the vice-regent of Christ on earth.® The Anglican Communion and the Eastern Orthodox Churches are also episcopally governed, though the state comes in to modify the system somewhat. The Protestant Episcopal Church of the United States has a triennial General Convention, composed of two houses, the house of bishops and the house of clerical and lay deputies, the latter elected by the diocesan conventions. This is the supreme legis¬

lative body of the Church. Concurrence of both ‘houses is necessary to the enactment of legislation. The Methodist Episcopal Church, a type of a number of bodies similarly, organ¬

ized, lodges supreme legislative and judicial power in the General Conference, a body com¬

posed of ministerial and lay delegates elected by the annual conferences and lay electoral conferences. The bishops preside over its ses¬

sions, but are not members of it, and have no part in its proceedings, except as presiding offi¬

cers. Prior to 1872 this body consisted solely of ministers; since that date laymen have par¬

ticipated in the government of the Church.

The patronage of the Church, the ‘appointment of pastors, is vested by the constitution in the bishops.

The denominations provide judicial courts to determine the validity of ecclesiastical legis¬

lation and to try ministers and laymen accused of offenses against doctrine, discipline, and morality, according to the polity in use,

recog¬

nizing the principle generally that ministers should not be condemned except by tribunals constituted of ministers, or of ministers and laymen.

Briefly, the following distinctions are char¬

acteristic of the different ecclesiastical polities: In the congregational form, no convention or council has power to legislate for the local churches or to make and enforce rules for their government. The local church is the fountain of ecclesiastical power. In the pres¬

byterial form, the presbytery is the ecclesiastical unit, but with no power of legislation, which rests with the denomination in a representa¬

tive general synod, or general assembly, con¬

sisting of representatives of the presbyteries.

In the episcopal system, as represented by the Protestant Episcopal Church, supreme power belongs to the denomination, as in the presby¬

terial form, but bishops have a co-ordinate power in legislation with clerical and lay dep¬

uties of the dioceses, while in the Roman Catholic Church, the bishop holds, in the person of the Pope, all power in his hands.

Henry K. Carroll,

Author of < Religious Forces in the United States P

CHURCH HISTORY, the history of any

church, but especially of the Christian Church.

Church history naturally divides itself into four periods: From the advent of Christ to the time of Constantine; from Constantine to Mo¬

hammed, or by the arrangement of Mosheim and others, to Charlemagne; from Mohammed, or alternately from Charlemagne to the Ref¬

ormation; from the Reformation to the pres¬

ent time. This division of the subject is not always followed ; some authors regard the great periods in Church history as: Foundation; Persecution ; Extension ; Reformation. See Christian Church, The.

CHURCH OF THE NEW JERU¬

SALEM, a body of Christians founded on the writings of Emanuel Swedenborg (q.v.), and often called <(Swedenborgians.® Swedenborg was a public officer of Sweden who became in¬

tensely interested in religious matters and, re¬

tiring from office in 1747, devoted himself thereafter till his death in 1772, in London, to receiving and writing his revelations, as they are called. From his voluminous works are drawn the system of religion held by the New Church, his followers believing that he was a <(divinely illuminated seer and revelator.® He never preached a sermon and no societies were formed until after his death. Public services were first held in 1788, in London, and the first church of the order in America was organized in Baltimore, in 1792. The name is taken from the Revelation of John, who beheld the <(New Jerusalem coming down from God out of

heaven.® The doctrines are set forth in Swe¬

denborg's books and briefly formulated in a creed in the (New Book of Worship. > A dis¬

tinctive idea is that material things have cor¬

respondences in the spiritual world, and that the word of God has an outward and also an inward or spiritual meaning. His views of the Trinity do not contemplate three persons, but distinctions in essence and existence, in love, CHURCH-RATE — CHURCH AND STATE

wisdom, power. Jesus is directly worshipped as God, in whom is the Father, the Son and the Holy Ghost. Christ is creator and redeemer, the word and the revelation. The Father is the divine inmost, the divine love ; the Holy Ghost is the divine proceeding in and for man. Thus the New Church reverses the usual trinitarian view of approach to God through Christ. As to Christ's second coming, Swredenborg held that it occurred when the interior meaning of the Scriptures was revealed to himself in 1757, and that universal judgment accompanied this advent in which the religious beliefs of man¬

kind were overturned and recast. In other words, the New Church means a new dispensa¬

tion following the apostolic as the apostolic fol¬

lowed the Jewish, and embraces all who ac¬

knowledge these three essentials: (1) The di¬

vinity of our Lord; (2) the holiness* of the Word; (3) the life of love; and unite with the New Church. The ritual is similar to that of the Anglican Church, except that it is all ad¬

dressed to Christ as God, and not through Christ to another of the Trinity. Two sacra¬

ments are observed, baptism, through which angelic association is formed, and the Lord's Supper, in which the Lord is not present ma¬

terially but really in the divine good and truth, which are his body an.d blood.

Societies of the New Church exist in Eng¬

land and many other foreign countries. There are two divisions of the body in the United States, one known as the General Convention, the other as the General Church.

1. The General Convention of the New

Jerusalem in the United States was organized in 1817 and is composed of delegates from State and Territorial associations. The conven¬

tion meets annually. There are general pastors who preside at the meetings, and ordained pas¬

tors and ministers. Local churches, and asso¬

ciations have power to conduct their own af¬

fairs ; the polity is a modified episcopacy.

2. The General Church of the New Jerusa¬

lem originated in the Academy of the New Church which was formed in 1876 for a stricter adherence to Swedenborg's revelations and for the development of the religious and social life of the Church. Twelve principles were enun¬

ciated, among which was the declaration that the government of the Church belongs to the priesthood of three degrees, the highest of which is bishop. The General Association of Pennsylvania supported the Academy and, find¬

ing itself out of harmony with the General Con¬

vention, organized anew in 1897 as the General Church of the New Jerusalem and elected a bishop. The General Church had in 1916 1,272

members, 22 churches and 38 ministers. Its publishing house is at Bryn Athyn, Pa. The General Convention had in the same year 8,500

members, 128 churches and 102 ministers. Its publishing house is at 3 West 39th street, New York. Consult Swedenborg's works; Dole's (New Church — What? How? Why?) (New

York 1906). „ ˆ

Henry K. Carroll,

Author of (Religious Forces in the United States P

CHURCH-RATE, in England, a rate

raised for the purpose of repairing and sus¬

taining the established parish churches, church¬

yards and other ecclesiastical objects. It was made by the church-wardens with consent of vol. 6 — 42

the parishioners, who fixed the amount, but could not refuse it altogether, as in that event the church-wardens were empowered to levy a rate for necessary purposes. Church-rates orig¬

inated in the quadruple charges laid on the an¬

cient tithes (q.v.), one for the edifices of the Church, and the other three for the support of the bishop, the clergy and the distribution of charity to the poor. The rate, though appli¬

cable to the requirements of parish churches only, was imposed upon parishioners of all re¬

ligious denominations. This gave rise to fre¬

quent complaints, and these led to repeated pro¬

posals for its commutation or entire abolition.

The compulsory imposition of the rate was abolished in 1868.

CHURCH AND STATE. Between these

two institutions, in modern times, there has rarely, if ever, existed perfect harmony. This struggle, so long protracted, bids fair, unless some astonishing upheaval occurs, to last for all time. It has been a

bitter one. It has in¬

volved large interests and brought to the fore¬

front momentous discussions. It has fomented uprisings of all kinds and originated a literature of vituperation without parallel outside of political strife. It has been, not seldom, mere political contention. There has been much con¬

fusion of issues, yet the lines of division are visible throughout. The question has its his¬

torical side and its doctrinal features. In con¬

temporaneous events it is reduced, practically, to a battle between one important Church and not a few of the civil powers. In Italy the recognition of that Church has reached the irre¬

ducible minimum. France has at last snapped the only link which, since the days of the Directory, constituted after all but a semblance of union. Everywhere at present we find our¬

selves confronted with a state using its power against a Church, or a state Church, or Church and state going their own ways, very little mindful of each other. Summarized, the his¬

tory of the contest is that before the coming of Christ there was no Church in the sense in which it has been presented by Christianity in its many forms. The religions of antiquity, with the exception of that of the Jews, were for the most part unsystematized beliefs and a ceremonial which was either identified with the state or was a mere function thereof, dependent in a large measure on civil rulers. This is found to be the case in the great religions of the ancient world; the religions of the Egyp¬

tians, of the Assyrians and Babylonians, of the Iranians, of the early Sanscritic Indians, of the Phoenicians and Carthaginians, of the Etruscans, and of the ancient Greeks and Romans (Raw-linson). The religion of the Jews, as is suffi¬

ciently well known to all educated persons, was the essential element in their theocratic form of government. While this lasted friction was hardly possible. In captivity the Jews, as re¬

ligionists, were more or less hampered by their conquerors. They were sometimes persecuted, sometimes unmolested. In general, a goodly

amount of religious liberty was accorded them.

The historic struggle for Church supremacy and independence began with Christianity. It met with opposition from the start. The antagonism germinated the day when Herod, his court and all Jerusalem were troubled, because wise men came from the East and asked where is He that is born King of the Jews. It became more 658

accentuated when Christ began to leach in public and more intensified when His disciples set out upon their missionary journeys. In the commencement of the 2d century the Roman Empire, which was the whole known world, was agitated, and for 200 years thereafter the Im¬

perial state used all its powerful machinery to crush the Church out of existence. It is to be noted that whenever the state pressed heavily against the Church, the reason put forward was the weal of the state. This has always been the war cry. Under Constantine the Church entered the arena of universal activity as a collaborator in the task of civilizing the peoples. Acknowledged as the spiritual ruler, it gradually acquired a local habitation and a name as a temporal potentate. It became a world power. This success was the beginning of all the many disasters of the Church. Some say this external grandeur was the cause, oth¬

ers that it was merely the occasion, of every calamity by which the Church has been visited.

Emperors granted her immunities and promul¬

gated laws in her favor. The wealth and posi¬

tion which she acquired (legitimately or not, according to the spirit of her founder or not, is still a problem for many) was a. basis for her of independent action. From the preaching of Christianity at Rome, to the conversion of Constantine, the state persecuted the Church and refused to recognize the divine authority it claimed to possess. From Constantine to Charlemagne the civil power, while giving legal recognition to the Church, interfered in its gov¬

ernment. From Charlemagne to a period ap¬

proaching that of the Reformation, Church and state were closely united and there was a gen¬

erally acknowledged subordination of the civil to the spiritual authority. During this last divi¬

sion of history the Church was in possession to a very marked degree of the prize which she has lost, though still fights for; that is, she was admitted to have an independent sphere of ac¬

tion, a supremacy in all spiritual matters and an undisputed title to the territory which in one or other way she had acquired and enlarged.

She has been accused of greed and tyranny in her management of her temporal rights. In every age many foreswore their allegiance to her. Deserters from her camp counted peasants and princes. These either used or invoked the secular arm against her. The Arians and other dissenters did this. Modern nations were formed and the idea of individual independ¬

ence became stronger and more general. The Eastern schism was open rebellion against the parent Church. The Orient went its own way through many vicissitudes and much bickering, until it was finally absorbed by the state. In that large portion of Europe there was no long¬

er conflict, for ecclesiastical rule was swallowed up in that state Church which Peter the Great established and which he denominated the Orthodox. Constantinople had drawn Russia into the schism. From 1700 a.d. onward, Peter no longer appointed any one to the office of patriarch, but decreed a directing synod at Saint Petersburg and placed himself at its head (1721). The secession of Martin Luther and his adherents revolutionized the condition of things. His doctrines and his alliances with princes brought about rupture after rupture with the old Church (1530). The followers of Luther discarded all Roman authority whether in temporal or spiritual matters. The Roman Empire gradually split into fragments. Princes introduced the new creed into their respective states. The opposition to Rome grew apace. It ran like a tidal wave over Europe. The Brit¬

ish Isles were drawn into the vortex. Henry VIII declared himself head of the English Church. In France Gallicanism propagated a spirit hostile to the Church. Voltaire and the Revolution abolished every

vestige of papal authority. A reaction began with Napoleon, who aimed at subordinating the supreme ruler at Rome to himself and to his power. There was a protest on the part of the pontiff. He was thrown into prison. At last a concordat was agreed upon between the consul and him¬

self. Barring the revolutionary changes, the attitude of France has remained the same. The concordat was more or less religiously adhered to until these later times, when the French government violated nearly all its agreements and recently annulled it, thus completely sep¬

arating state from Church. The Chamber of Deputies passed the bill effecting the separation of Church and state in France. The principles involved in the measure are destructive of all union between the two powers. The state neither recognizes nor salaries any form of worship. The exercise of worship is free un¬

der certain restrictions. French citizens, eccle¬

siastical as well as lay, are not all at one in their views regarding the nullification of the concordat. Some see in it a beginning of bet¬

ter days for religion just as not a few Catholics, the world over, are against any kind of a union anywhere between Church and state and think that the Roman pontiff is much better circum¬

stanced now that he has no temporal rule, for the welfare of the Church and its mission.

They hold that the Church won spiritually dur¬

ing the three first centuries — a period when the popes never dreamed of becoming civil sov¬

ereigns. Whether or not this view can be con¬

sidered an orthodox Catholic view may be de¬

cided by a reference to recent papal utterances on the matter. It would appear that since the Reformation the only Church which maintains what it considers its prerogative in relation to the state is that of Rome. Practically every other Church is a state one, or claims no rights as against civil government, and as a conse¬

quence is ignored by secular constitutions, or is an instrument more or

less passive, of the king¬

doms or principalities or republics of which it is a territorial part, or is so limited numerically and has so small a voice in general affairs that its demands challenge neither notice, nor cen¬

sure, nor opposition, on the part of the state.

Thus the struggle which for so many centuries shook the world is narrowed down to an .an¬

tagonism between governments and Rome. The old Roman Church power has dwindled down to a very small area, without kingdom or weap¬

ons of defense. _ Its isolation is complete and absolute. As this Church holds views on the status of Church and state, as she still main¬

tains the principles which for no short period directed national movements, her position de¬

mands investigation. What does this Church claim? What is the basis of that claim? To these two questions the Catholic Church has given an answer which goes back very far.

The answer is found in all the papal documents in which the popes have touched on this sub-CHURCH AND STATE

jcct. The reply has been very diligently elabo¬

rated by the great doctors and theologians and has introduced into what may be termed, with¬

out any implied reproach, Catholic Casuistry, a series of discussions which contain minutiae of argumentation exceeding the possibilities of this notice to compass. The following con¬

densation will bring forward the very large out¬

lines only. Civil power as well as ecclesiastical authority are of divine origin. Both aim at the welfare of humanity, the one in a higher, the

other in an inferior, degree. As both agencies are necessary for the betterment of the race, there must be union and not separation. Not only is union demanded by the nature of the common purpose, but subordination also, and in that subordination the place of supremacy must be ceded to the Church. Each power is distinct, yet each is to help the other. The duty of the state is to protect all the rights of every man, to provide for all a quiet and regulated ex¬

istence, and, where necessary, to co-operate with the Church, whose divine character it is bound to recognize in the leading of all men to salva¬

tion. The Church has the right to require from the secular ruler, as from the individual Catho¬

lic, that he should receive from her hands the divine law and act in conformity with her in¬

terpretation of its precepts. The Church strengthens civil authority by imposing upon all her subjects that stu.te power is of divine right, that secular governors are the anointed of the Lord. According to this view', in many ages the Pope was looked upon as the head of the im¬

mense Christian family scattered throughout the earth. He cited before his tribunal both sover¬

eigns and subjects, composed quarrels, inflicted spiritual penalties upon scandalous princes and deprived of their dignities and rights those who refused obstinately to change their line of con¬

duct. The Pope was then regarded as the nat¬

ural head and father of Christendom. Kings stood in need of the Church for things religious and the Church was protected by the laws of the state. If the warning voice of the Church failed to deter the evil-doer, the sword of the civil power was drawn in her behalf. The Church asserts her right, in virtue of her divine commission, to require of every one submission to her doctrine. ((Each power remains sover¬

eign in its own sphere, each is confined within limits perfectly defined and traced in conformity with its nature and special purpose. There is therefore a circumscribed sphere within which each of them exercises its own action, jure proprio, through its own right. Yet, as their authority is wielded over the same subject, it may happen that one and the same thing, though from a different cause, may be under the judg¬

ment and jurisdiction of both powers.® This position the Church bases on the fact that to Saint Peter, according to her view of Scripture and tradition, and to his successors, Jesus Christ confided the government of His Church;

secondly, on the more exalted nature of her ap¬

pointed end ; thirdly, on the conduct of Christ and the apostles who never asked leave from civil rulers to evangelize and whose principle (Acts v) was: ((We ought to obey God rather than man.® The Church declares that she pro¬

claims the independence of secular power and she herself cannot interfere so long as state ac¬

tion does not infringe upon the laws of God and the rights of the Church and the spiritual in¬

terests and chief end of man are not endangered by legislation. In case of conflict, that is to say, when in mixed questions the two authorities impose upon their subjects who are the same persons contradictory obligations, the state should yield to the Church. The foregoing are the principles affirmed by the Church and are the Catholic view of the relations which should exist between both. This doctrine is her doc¬

trine to-day. A stand so peremptory and so unmistakable has not met with universal ap¬

proval. Within the last 300 years it has been denied in toto. The opponents say the founda¬

tion on Scripture and tradition is insecure, that such a relation as Rome calls for is inadmissi¬

ble, because the history of the past proves that it was always controverted in theory and prac¬

tice, that it led to the denationalizing of peo¬

ples, that it incited to the worst of crimes, that it extinguished every spark of patriotism, that it called for the universal empire of the Church, that it spoke for greed and tyranny and self-aggrandizement merely, that it crushed intelli¬

gence and battered down all the props of indi¬

vidual and collective freedom, that it fettered thought and clipped the wings of science, that it deflected nations on their march toward prog¬

ress and that it was a benighted doctrine and to be fought and execrated wherever it showed its head. Statesmen have scoffed at it and ex¬

pelled its votaries as they would drive out an¬

archists and criminals. Laws in the most en¬

lightened countries have been made to prevent, if not its existence, at least its logical effects.

The widespread theory held by the powers to-day is either : no Church or absorption of Church by state or the subserviency of the Church to the state. It has assuredly gone hard with the Church in many ages and under many governments. No one upholding Chris¬

tian doctrines could be a citizen has been the ex¬

pressed opinion of multitudes of people in many countries. The Catholic teaching on this point has angered governments because of two special questions, that of education and that of divorce. In recent times the Church has not been silent regarding the family and her protests have irritated many, while it has also been confirmed by the approval of men outside her pale. As the Pope is now an isolated indi¬

vidual, stripped of all temporal power, the ques¬

tion of Church and state has become purely academic. It must not be lost sight of that, though no civil ruler, his spiritual legislation ex¬

tends over some 250,000,000 subjects, who are more or less obedient to his commands, and that therefore the states not only now but as long as the papacy lasts will have to reckon with his influence and cannot afford to consider him as at any time a negligible quantity, and hence the question of Church and state is one which, concerning essential features, is not yet to be considered beyond discussion or likely to be closed. See France.

Bibliography. — Hooker, Ecclesiastical Polity) ; Balmes, European Civilization* ; Hallam, (Middle Ages) ; Gladstone, Essays* ; Macau¬

lay, (History of England) ; Taparelli, (Diritto Naturale* ; Philipps, JKirchenrecht* ; papal en¬

cyclicals. This question is treated in nearly all dogmatic theologies of any note, and they are many, as well as in ecclesiastical histories.

Patrick A. Halpin,

Late Professor of Ethics, New Rochelle College.

CHURCH AND STATE IN THE

UNITED STATES. That an indispensable

function of any government is the conservation of public morals, and that an indispensable method of achieving it is to enforce the public exercise of some religious forms, seemed axiomatic to most people in the 1 7th century.

The tenet that religion is best promoted by leaving it to individual discretion was first evolved, naturally, by groups whose best hope was immunity, not establishment. These differ¬

ing circumstances in the English colonies, with change of views from experience and change of policy from gain or loss of power, resulted in four chief attitudes of the colonial govern¬

ments toward religion: (1) The establishment of a specific Church, and the taxation of the entire community to support it; (2) restriction of suffrage to church members, without speci¬

fying the church — ((theocracy® ; (3) require¬

ment of some church form and steady parish service in communities, without establishment of a specific Church or disfranchising individ¬

uals ; (4) entire religious liberty.

The first type is found in the chief Southern colonies and New England. Virginia came first, then Carolina before its division, the (<Fundamental Constitutions® (see Carolina, Original Constitution of) merely shaping in this re¬

spect the provisions of Charles II's charter; lastly Maryland in 1691, after overthrowing the tolerant proprietary government. Each, from the nature of the case, established the Church of England. In New England the form of establishment was peculiar and quasi-casual ; it wˆas not statutory nor specific, but rested on local taxation to support a Church which, owing to circumstances, was at first always the Calvinistic Congregational Church. When other church bodies began to grow, this taxation was remitted to all who supported a church of their own ; those who were not thus bona-fide con¬

tributing members to another Church paid their cess to the Congregational as before. The sec¬

ond type is represented exclusively by the early Massachusetts Bay and New Haven colonies.

The former, 18 May 1631, when as yet there was no popular representation in the colony, enacted (<that no man should be admitted to this body politic but such as are members of some of the churches within the limits of the same.®

This restricted suffrage to one-fourth the adult males and was repealed 3 Aug. 1664. The latter, 4 June 1639, agreed (<that church members only shall be free burgesses, and they only shall choose among themselves magistrates and offi¬

cers® for public business. This, of course, per¬

ished with the absorption of the New Haven into the Connecticut colony, in 1662. The third type has but one representative, New York, including the Jerseys. This was <(the Duke's*

(afterward James II) constitution, and is not the only ground for a less harsh judgment on him than prevails. The fourth type includes Rhode Island, the product of a quarrel with Massachusetts theology and politics, in which the founder's views developed by force of cir¬

cumstances as he went on ; Maryland, founded by a Roman Catholic who would not have been allowed to establish his own religion ; Pennsyl¬

vania, equally limited to seeking immunity from persecution ; and Georgia, founded late by an enlightened philanthropist.

The Revolution swept away all vestiges oi establishment. The Constitution of 1787 pro¬

vided against a danger not likely to recur. Arti¬

cle VI enacts: <(No religious test shall ever be required as a qualification to any office or pub¬

lic trust under the United States.® This, how¬

ever, did not touch the real likelihood if bigoted sectarians should control the government ; the State conventions held to ratify the Constitu¬

tion, urged a clause to guarantee full religious liberty; therefore the First Amendment begins: ((Congress shall make no law respecting an es¬

tablishment of religion, or prohibiting the free exercise thereof.® Even this does not in the least debar individual States from doing it; but most of their constitutions decisively prevent that, not only by direct prohibition, but by enact¬

ing that no appropriation of public money shall be made to sectarian institutions. The stability of this provision, the impossibility of evading it, and its incalculable public value, have been proved many times over in the past half cen¬

tury. In the early years of the Union, efforts were occasionally made to have the legis¬

latures enact some test to confine the govern¬

ment to Christians, for fear of atheistic or of Jewish control ; or to Protestants, in fear of Catholic supremacy ; but the improbability of its need has prevented any approach to success.

The only serious problem that has arisen on this point is due to Mormonism, where the claim to free exercise of their religion and its dictates is complicated by one of its ostensible revelations enjoining polygamy. In 1882 Con¬

gress prohibited polygamy under severe penal¬

ties ; and the Supreme Court held this r»ot in conflict with the constitutional provision above cited.

CHURCH STATES. The former do¬

minions of the Popes or Roman Pontiffs in Italy. Prior to 1859, the Papal states covered a territory stretching across Mid-Italy from sea to sea and comprised an area of 17,218 square miles, with a population of 3,124,668. The states originated with the grant of Pepin, king of the Franks, in 754, who bestowed on Pope Stephen II some districts which the Lombards, against whom Stephen II solicited Pepin's as¬

sistance, had taken from the Exarchate of Ra¬

venna. Charlemagne confirmed this grant in 774, and in return received the title of Roman Emperor from Leo III in 800. The wise policy of the Popes in conferring favors on the Nor¬

mans in Lower Italy secured to them in these vassals staunch protectors of the holy see. The structure of the papal power was fully com¬

pleted in 1075 under Gregory VII. The domin¬

ions of Matilda of Tuscany were added to the states of the Church by her request, and the Popes maintained possession of them against all the claims of the German emperors. The papacy removed a dangerous neighbor belong¬

ing to the house of Hohenstaufen by raising the house of Anjou to the throne of Naples in the year 1265. The frequent revolutions of the Romans and the influence of the French led the Popes of the 14th century to transfer their residence, from 1305 till 1376, to Avignon,

which Clement VI bought of Joanna, queen of Naples and Countess of Provence, in 1348. As this change of residence was made, it was charged under the influence of the king of France, it never obtained the full assent of the CHURCH TEMPERANCE SOCIETY — CHURCH-WARDEN

Romans and Germans, and anti:popes were sometimes elected bv the opposing factions, and the welfare of the Church as well as of the state suffered by their mutual hostilities. After 20 years of exile the Popes returned to Rome.

Julius II added Bologna to the papal domin¬

ions in 1513 and Ancona in 1532. The Vene¬

tians were obliged to restore Ravenna. Fer¬

rara was also recovered from Modena in 1598, and Urbino was bequeathed to the papal chair in 1626 by its last duke, Francis Maria, of the house of Rovera. The wise administration of Sextus V restored internal order toward the end of the 16th century ; but the extravagance and family partialities of some of his success¬

ors created fresh disorder. Subsequently Naples renounced her feudal obligations to the papal chair. After the successes of the French in Italy the Pope was forced at the Peace of Tolentino, 13 Feb. 1797, to cede Avignon to France, and Romagna, Bologna and Ferrara to the Cisalpine republic. An insurrection in Rome against the French, 28 Dec. 1797, caused the annexation of the states of the Church to the Roman republic. Pius VI died in France.

The victories of the Russians and Austrians in Italy favored the election of Pope Pius VII, 14 March 1800, who, under the protection of Austrian troops, took possession of Rome. By the concordat concluded in 1801 with the F/rst Consul of the French republic the Pope again lost a great part of his temporal dominions. In 1807 France again declared war, and the prov¬

inces of Ancona, Urbino, Macerata and Cam-erino were added to the kingdom of Italy. The possessions of the Church beyond the Apen¬

nines were all that remained to the Pope. On 2

Feb. 1808, a French corps of 8,000 men entered Rome ; the remainder of the papal states were added to France, and a pension of 2,000,000

francs settled on the Pope, whose ecclesiastical power was guaranteed by Napoleon. The de¬

cree of 17 May 1809 put an end for the time being to the ecclesiastical state. The Pope was held a prisoner in France until the events of 1814 again permitted him to take possession of his states. Pius VII was succeeded by Leo XII, who reigned from 1823 till 1829. He was succeeded by Pius VIII, who, in his turn, was succeeded by Pius IX in 1846. The first acts of this Pope were characterized by such a lib¬

eral spirit that diplomatic Europe was surprised.

The events of 1848 caused the Pope to pause in his advanced policy, which so dissatisfied the extreme liberal party that they drove Pius IX

from Rome, and the reins of government fell into the hands of Garibaldi, Mazzini and Avez-zano (1849). Some few months afterward the French government, resolving to restore the papal authority, sent General Oudinot with an army against Rome. Defeated in their first at¬

tack on the city, the French began a siege in regular form, and in a month's time were mas¬

ters of it. Pope Pius did not return to Rome, however, until the following year.

After the Austro-Italian War of 1859 the papal see was stripped of the greatest part of its territorial possessions. Embracing before that date an area of 17,218 square miles, with 3,124,668 inhabitants, the Roman territory was then reduced to 4,891 square miles, and 692,106

inhabitants. Of the former legations and dele¬

gations into which it was subdivided only five remained, namely — Rome and the Comarca, Viterbo, Civita Vecchia, Velletri and Frosinone. From 1860 to 1866 the papal government was sustained by the presence of a French army, which was withdrawn in 1866 upon the king of Italy binding himself by treaty to respect the integrity of the

Roman states. In 1867, however, revolutionists numbering 15,000, be¬

longing to the Italian party of action, entered the papal territory, headed by Menotti Gari¬

baldi. They made but little progress until the elder Garibaldi placed himself at their head.

Napoleon III, at the earnest prayer of the Pope, sent an army to protect the city against the vio¬

lence. of the revolutionists, who had now sur¬

rounded it. On 28 October the French entered Rome, and Garibaldi, beginning to perceive that he would be hemmed in by the regular Italian forces under Cialdini, thought of retreating.

An advanced section of the papal troops came in contact with the Garibaldians (3 November), and were likely to have suffered severely had not two French battalions, armed with the Chassepot rifle, come speedily to their aid.

Garibaldi, with 4,000 men, retreated into the Italian territory, where they were disarmed. A strong force of French troops were left in oc¬

cupation of Civita Vecchia after peace was restored and the Pope seemed as secure as ever.

But the outbreak of the Franco-German War changed the aspect of affairs. The French army of occupation left Rome on 30 July 1870, and the Pope was at the mercy of his powerful neighbor, Victor Emmanuel, king of Italy, who, seizing the opportunity, marched upon Rome and took it by force of arms. In September the Italian troops occupied Rome. In October the states of the Church were incorporated with the kingdom of Italy, a plebiscite was held under bayonet-rule, the count of which resulted in 133,681 in favor of the Sardinian occupation and 1,807 against it. In the beginning of July 1871, Rome became the seat of the Italian gov¬

ernment and the residence of the court. An Italian law of 13 May 1871 guaranteed, be¬

sides possession of the Vatican and Lateran palaces and the villa of Castel Gandolfo, an annual income to His Holiness the Pope and his successors forever of $645,000. This allow¬

ance whose arrears without interest in 1918

amounted to $30,960,000 remains unclaimed and unpaid.

CHURCH TEMPERANCE SOCIETY,

a national organization of the Anglican Church in the United States. It was founded in New York in the year 1881, and its object is to promote temperance by means of high license.

It seeks to influence state legislators and mu¬

nicipal authorities, and it has done most effect¬

ive work in providing substitutes for the saloon.

The organization in the United States follows, in a measure, the methods used by the Church of England Temperance Society.

CHURCH-WARDEN, one of two Episco¬

palian parochial officers chosen annually at the Easter vestries. In Anglican churches in the United States the wardens are usually elected by the parishes; in England the custom pre¬

vails of the rector appointing one warden and the parish the other. Their duties are to pro¬

tect the building of the church and its appur¬

tenances, to superintend the ceremonies of divine worship and the proper distribution of 662

alms, *etc.* ; to form and execute parochial regu¬

lations and generally to act as the legal repre¬

sentatives of the parish. They usually attend to the secular affairs of the parish. The term <(church-warden® is also given to a long¬

stemmed clay tobacco-pipe formerly much used in Great Britain. A famous ((make® of this class of pipes is located in the town of Broseley, in Shropshire.

CHURCHES OF GOD, a denomination

of Baptist principles and Methodist organiza¬

tion, founded by Elder John Winebrenner in Pennsylvania, in 1830. Winebrenner was a minister of the German Reformed Church and was active in revival movements and changed his views so as to be out of harmony with his Church, with which his relations were severed in 1828. Continuing his revival work, he or¬

ganized the fruits in societies, called simply Church of God, which in 1830 were formed into a denomination at Harrisburg, with the same name. The Church of God has annual con¬

ferences, called elderships, and a general con¬

ference, called general eldership. Since 1860

the denominational name has been Churches of God in North America. The doctrinal position of the denomination is evangelical, with a leaning toward Arminianism, rather than Cal¬

vinism. There is no written creed, the Bible being accepted as the only rule of faith and practice ; biblical designations are used wherever possible, as in the denominational title. Three ordinances are recognized — baptism by im¬

mersion, the Lord's Supper and foot-washing.

In each local church there are deacons and elders, who, with the pastor, constitute the church council. Annual elderships, or confer¬

ences, are composed of pastors and laymen, and the general eldership of ministers and laymen elected by the annual elderships. It meets once in four years. The Churches of God, includ¬

ing many of German origin or descent, are active in Sunday-school, missionary, educational and young peoples' work. According to de¬

nominational statistics for 1916 there are up¬

ward of 28,000 members, with 434 ministers and 484 churches. Since 1906 there has been a fall¬

ing off in the number of churches and ministers and an increase of about 4,000 members. The Church is strongest in the States of Pennsyl¬

vania, Ohio, Illinois and Indiana. It has a publishing house at Harrisburg, Pa., where its weekly organ, The Church Advocate, is issued.

Consult Winebrenner's (Brief Views of the Church of God) (1840).

CHURCHES OF THE LIVING GOD,

the general name applied to three small bodies of colored Christians. The first, called also Christian Workers for Friendship, was begun in 1899, by Rev. William Christian, in Arkansas.

It combines with the Baptist faith the Method¬

ist form of organization. Believers are baptized by immersion, the ceremony of feet-washing is observed and the Lord's Supper is celebrated with water and unleavened bread. The churches are generally called temples. The polity is presbyterial, legislative power being lodged in a general assembly, the presiding officer of which is called (<chief® or ((bishop.® The second branch, the Apostolic Church, differs only in calling its chief officer president, instead of chief or bishop. The third branch, the Church of Christ in God, separated from the older body partly for personal reasons and partly to lay more stress on education. The three bodies have together 68 churches, or temples, with 4,276 members, of whom 2,676 are in the first branch, 732 in the second and 848 in the third.

There are 81 ministers in all.

CHURCHILL, Charles, English satirical

poet: b. Westminster, February 1731 ; d. Bou¬

logne, France, 4 Nov. 1764. He took orders in the Established Church, but reflected very little credit upon his clerical profession. He won his fame with (The RosciadP a satire upon the actors of the time, in which only Garrick and some few popular actresses are praised. His capacity for ridicule was so great that (The Ghost, > (The Farewell,* (The Conference,*

(The Author* and (The Prophecy of Famine) proved exceedingly popular.

CHURCHILL, Randolph Henry Spencer,

Lord, English statesman, 3d son of the 7th Duke of Marlborough: b. 13 Feb. 1849; d. Lon¬

don, 24 Jan. 1895. He was educated at Merton College, Oxford, and entered Parliament in 1874 as member for Woodstock. After the Conservative debacle in 1880, he formed what was half satirically known as the Fourth party, consisting usually of four members, who took up an attitude of uncompromising and even obstructive opposition to the measures of government, and one also of frank and brutal criticism of the <(old gang,® as Lord Randolph called the official opposition leaders. So well did he employ his powers of ready and exten¬

sive criticism, both in the House and in the country, that on the accession of the Conserva¬

tives to office in 1885 he became Secretary for India. His tenure of this office was rendered notable by the annexation of Upper Burma. On the defeat of Gladstone's Home Rule bill in 1886 and the return of the Unionist party to power Churchill became leader of the House of Commons and Chancellor of the Exchequer.

In his leadership of the House he showed tact, judgment and resource; but on 23 December of the same year, owing to demands made by the ministers responsible for the army and navy for increased outlays, to which he was opposed, he caused a sensation by unexpectedly resigning office. Subsequent, events showed this to be an act of political suicide, for he never regained his old place in the party councils. A man of great natural abilities, and of boundless ambi¬

tion, with marvelous political insight and de¬

bating and oratorical talent of a high order, he had at the same time the defects inseparable from an unstable nervous system. He married in 1874 Jennie Jerome, a daughter of Leonard Jerome, of New York. In July 1900 Lady Ran¬

dolph Churchill married George Cornwallis West. His elder son, Winston Leonard Spen¬

cer Churchill (q.v.), has inherited his father's political abilities.

CHURCHILL, William, American philol¬

ogist; b. Brooklyn, 5 Oct. 1859; d. Washington, D. C., 9 June 1920. Graduated at Yale in 1882; in 1896 he became consul-general to Samoa, also judge of the Consular Court and receiver and custodian of the revenues of Samoa. In 1897 he was also made consul-general to Tonga. In 1902-15 he was a member of the editorial staff of the New York Sun. He edited the Malayo-Poly-CHURCHILL

nesian department of the (Standard Dictionary 5

in 1912.* He was a fellow of the Royal Anthro¬

pological Institute and of the American Philo¬

logical Association. He has written (A Princess of Fiji5 (1892) ; Polynesian Wanderings 5

(1910) ; <Beach-la-Mar) (1911) ; Paster Is¬

land, Rapanui Speech and the Peopling of Southeast Polynesia) (1912) ; (The Subanu5

with John Park Finley (1913) and many

monographs on ethnological and philological topics.

CHURCHILL, Winston, American novel¬

ist: b. Saint Louis, Mo., 10 Sept. 1871. He was educated in the public schools of Saint Louis and at the United States Naval Academy, Annapolis.

He was graduated from the latter institution in 1894. He received the honorary degree of A.M. from the academy in 1903. He was a member of the New Hampshire legislature, 1903-05, and was a candidate on the Progressive ticket for governor of New Hampshire in 1912, but failed of election. He has written several successful novels and many articles of interest for the magazines. His novels are (The Celeb¬

rity } (1898) : (Richard CarveP (1899) ; (The Crisis) (1901) ; (The Crossing) (1904) ; (Conis-ton) (1906) ; (Mr. Crewe's Career) (1908) ; (A Modern Chronicle5 (1910) ; (The Inside of the Cup5 (1913) ; (A Far Country5 (1915) ; and (The Dwelling Place of Light5 (1917). As an historical novelist and as a novelist of con¬

temporary life he has done substantial work.

He writes carefully and the structure of his novels are evidence of this commendable characteristic, which distinguishes him from many gifted popular writers whose methods are more perfunctory.

CHURCHILL, Winston Leonard Spen¬

cer, English statesman, soldier and author : b.

30 Nov. 1874, the elder son of the late Lord Randolph Churchill (3d son of the 7th Duke of Marlborough) and Jennie, daughter of Leonard Jerome, banker, of New York. He was educated at Harrow and Sandhurst Mili¬

tary College, joined the 4th Hussars in 1895, and in the same year (while on leave) he saw his first active service — with the Spaniards in Cuba. With the 31st Punjab Infantry he ac¬

companied the Malakand Field Force on the.

Northwest Frontier of India in 1897, and in 1898 served with the Tirah Expeditionary Force under General Lockhart. When Kitchener

started on the reconquest of the Egyptian Sudan in 1898, Churchill immediately joined the 21st Lancers and took part in the battle of Omdurman (Khartum). By the time he was 24 he had already been ((mentioned in dis¬

patches55 and earned four military decorations.

In 1899 he turned to politics and contested the Oldham division as a conservative. He failed, however, and when the Boer War (1899-1902) broke out he was appointed lieutenant in the South African Light Horse, at the same time acting as war correspondent for the London Morning Post. On 15 Nov. 1899, during the Natal campaign, he was riding in an armored train with some Dublin Fusiliers and Durban Light Infantry, when they ran into an ambush and part of the train was derailed. Churchill led a little party of volunteers to clear the line in front of the engine, which they succeeded in disentangling from the wreckage. Being still on the rails, it was sent on with its cab full of wounded, shells and bullets playing furiously around them. Churchill got away with the engine, but returned to share the fate of his comrades. All the survivors were captured by the Boers and taken to Pretoria, whence Churchill and Captain Haldane escaped a month later, the former afterward taking part in some 20 battles and engagements. He returned to England in 1900, again contested Oldham in the general election, and this time successfully. He held the seat till the resignation of the Balfour Ministry in December 1905, when he turned over to the Liberal party, which then came into power with an overwhelming majority.

The main ground for Churchill's defection was his uncompromising opposition to the Tariff Reform movement inaugurated by Chamberlain in 1903. Elected for Northwest Manchester, Churchill entered the Campbell-Bannerman

ministry as Under-Secretary of State for the Colonies. During his first six years in Parlia¬

ment he had frequently distinguished himself as a skilful debater and a brilliant — if some¬

what reckless and impetuous — orator. In 1908

he was raised to Cabinet rank as President of the Board of Trade, a change which necessi¬

tated an appeal to his constituency. To the general surprise he was defeated, and had to seek election elsewhere. He was then elected for

Dundee, which he still represents (1918).

In 1910 he became Home Secretary, the most powerful official in England. During his 21

months' tenure at the Home Office Mr. Church¬

ill frequently encountered adverse criticism levelled against his rather novel procedure in criminal affairs. He not only freely exercised the prerogative of his office in reducing sen¬

tences and issuing pardons, but endeavored to ameliorate the rigor of prison life by permit¬

ting occasional concerts and lectures to be held in penal establishments. The notorious ((battle of Sidney Street,55 where some foreign criminals were besieged in a London slum on 3 Jan. 1911 by artillery and police under the personal supervision of the Home Secretary, led to a series of attacks in the press and Parliament upon Mr. Churchill for alleged in¬

terference. He proved, however, that he had not sent for the troops nor exceeded his authority. In October 1911 Mr. Churchill suc¬

ceeded Mr. McKenna as First Lord of the Admiralty, in which capacity he was destined to play an important part in the Great War.

He kept the fleet in a high stage of efficiency notwithstanding the repeated offers to Germany for a <(naval holiday,55 and was able to assemble, in July 1914, a formidable armada of 200 fight¬

ing ships, drawn up in eight lines, extending over 22 miles, and manned by 70,000 men. The occasion of this gathering was the annual royal review off Spithead, which in that year proved of unforeseen value, due to the wise foresight of Mr. Churchill and the then First Sea Lord, Prince Louis of Battenberg. The review ended on 20 July, three days before the Austrian ulti¬

matum was launched. In normal times the vessels would have been dispersed to their respective stations and the reserves called out for the occasion would have been sent home.

It has since become known that Mr. Churchill, entirely on his own responsibility, kept the , fighting units together and at the critical mo¬

ment Great Britain's naval strength stood con¬

centrated in the North Sea, ready for action.

After four years' absence from the Admiralty, Lord Fisher, the creator of the dreadnaught, returned as First Sea Lord early in the war.

When the Belgians were thrown back on Ant¬

werp and the fall of the city seemed imminent, Mr. Churchill arrived on the scene (4 Oct.

1914) with 2,000 Royal Marines, followed next day by 6,000 more, in a desperate effort to save the city. Antwerp fell on the 10th, and Mr.

Churchill did not escape criticism in conse¬

quence, though his justifiable attempt delayed the fall of the city for a few days. In May 1915 a Cabinet crisis arose through a quarrel between Mr. Churchill and Lord Fisher over the Dardanelles campaign. The first phase of the operations in that theatre had ended in disaster on 18 March. Lord Fisher resigned ; Mr. Asquith reconstructed his Cabinet and Mr.

Balfour succeeded Mr. Churchill as First Lord, the latter accepting the undistinguished office of chancellor of the duchy of Lancaster. Lord Fisher refused to reconsider his resignation unless Mr. Churchill were eliminated, and as that condition was not fulfilled, he disappeared.

On 11 Nov. 1915 Mr. Churchill resigned his office and on the 15th he reviewed in Parlia¬

ment the share he had taken in the matter of Coronel, Antwerp and the Dardanelles, assert¬

ing that Lord Fisher had never expressed dis¬

approval at the War Council. Two days later Mr. Churchill left for the front with the rank of major in the Grenadier Guards. In Decem¬

ber 1916, on the accession of Mr. Lloyd George to the premiership, Mr. Churchill succeeded him as Minister of Munitions. In January 1919

he became Secretary of State for War and Air in the reorganized Coalition Cabinet. In 1921 he was active in the Irish Peace discussions. Among his numerous literary activities the chief are (Lord Randolph ChurchilP (2 vols., 1905) ; (The River War* (the Sudan campaign, 1899) ; (The Story of the Malakand Field Force*

(1898) ; (London to Ladysmith via Pretoria*

(1900) ; Man Hamilton's MarclP (1900) ; <Savrola) (a novel, 1900). See War, Euro¬

pean.

Henri F. Klein,

Editorial Staff of The Americana.

CHURCHILL RIVER, a river of the

Northwestern Territories of Canada, which arises in La Grosse Lake, forms or passes through various lakes or lake-like expansions, the largest being Big or Indian Lake, and enters Hudson Bay near Fort Churchill, after a northeasterly course of about 800 miles. It is called also Missinnippi, English and Beaver.

Except by means of frequent portage, it is not navigable.

CHURCHING OF WOMEN, a rite

founded on the Mosaic injunction found in Levit. xii, 6-8, and as practised in some de¬

nominations, is now a giving of thanks for the birth of a child. The first mention of the subject as a usage in the Christian Church is found in the pseudo-Nicene Arabic Canon, but no prescribed form is given.

CHURL (Saxon ceorl) in modern usage,

a rude, boorish person, but in Saxon Eng¬

land, the term denoted a common freeman.

The rank of the churl, or ceorl, steadily de¬

clined until finally the only important dis¬

tinction between churl and serf was that the former might choose his own master. The better class of churls sometimes found their way into the class of theyns, or thanes, cor¬

responding to the knights of post-Conquest times, while the others became the villeins of the Norman feudal organization. 'Domes¬

day Book) makes no mention of the word ceorl.

CHURN, a vessel in which cream is agi¬

tated to separate its buttery globules in a solid mass from the fluid portions. The length of time usually occupied by this process, and the fatigue consequent upon working those ma¬

chines by hand, have caused the ingenious to produce numerous modifications in form and size. Some may be worked by dogs in the way a squirrel-wheel is driven ; others may be worked by horse power; and in some cases steam is the motive power. The ordinary plunge-churn, with its cylindrical box, its straight rod projecting downward through the cover and attached below to the dasher, has been greatly improved by an arrangement by which the air is introduced into the cylinder at every stroke by a tube run right along the handle, with a valve at its end which opens as the dasher rises and closes as it sinks.

The air is thus dashed through the cream, separating it into innumerable small particles, and throwing it into a state of foam. A box form of churn, with dashers attached to a rod passing horizontally through the box, and driven by a winch, is frequently used. Less common kinds are those in which the whole body of the machine is set in motion, such as the rocking-churn and the barrel-churn. A churn on the centrifugal principle has been introduced into Sweden. Though the rapid completion of the process of butter-making is the principal end in . view, it is a well-known fact that butter suffers seriously by too rapid a process. When butter forms in about 45 minutes it is sure to be good ; when it appears sooner it is soft; when later, strong-tasted. See Butter ; Dairy.

CHURRIGUERESQUE, chur'ri-ga-resk',

the term used to describe that distinctively Spanish post-Renaissance style in architecture which corresponds to the combined Barocco and Rococo. It takes its name from Jose Churriguera who was ((royal architect® in the reign of Carlos II and through his two sons and his pupils, the Quinones, dominated Spanish architecture in the first half of the 18th century. Its most striking and unre¬

strained development was in Mexico. See Mexico — Architecture.

CHURRUS, chur'rus, the resinous exuda¬

tion of the leaves and flowers of Indian hemp, Cannabis indica. It is used by the natives of India as an intoxicating drug. According to JafTur Shurreeff, a man covers himself with a blanket and runs through a field of hemp early in the morning; the dew and gum of the plant naturally adhering to it are first scraped off and the blanket afterward washed and wrung.

Both products are boiled together and an electuary formed. The smoking of five grains of it will produce intoxication.

CHURUBUSCO, choo-roo-boos'ko, Bat¬

tle of, one of the principal engagements of the Mexican War, took

place 20 Aug. 1847. Con¬

treras (q.v.) was won in the early morning, Churubusco in the forenoon and early after-CHUSAN — CHYME

noon, of that day, but they are quite distinct battles. The main road north to the City of Mexico, via San Augustin and San Antonio, an elevated paved causeway, converges with that on the west from Contreras and Coyoacan at Churubusco, a village six miles south of the capital and a mile northeast of Coyoacan.

Just north of it runs east and west the little stream called Rio Churubusco, crossed by the main road at a bridge fortified with a bridge-head ; there was a strong bastion 75 to 100 yards on a side, with embrasures sweeping the San Antonio road. Along

the sides were cornfields, maguey plantations, hedges and thickets, and irrigating ditches full of water. In the western part of the village, southwest of the bridge-head, on the Coyoacan road, was the Convent of San Pablo, a massive building with walls so thick that field-pieces could make no impression on them, defended on two sides by strongly built bastions with six or eight heavy guns, and the building it¬

self an impregnable cover for musket-fire.

Around it was a flooded moat, in front were cornfields and thickets. The two points to be carried were the convent and the bridge-head; and since, after the rout at Contreras, this was the last place where the Mexicans could make a stand short of the City of Mexico, the resist¬

ance was likely to be desperate. The wreckage of Contreras was being pursued by Pillow and Twiggs along the Coyoacan road; and Worth, having turned the works at San Antonio on the main road, had captured a considerable body of the enemy, and was advancing along the causeway. Santa Anna threw a battalion into the convent, placed five guns and a heavy body of troops at the bridge-head, and posted several regiments along the north bank of the stream. The first assault was made on the convent. Bennet Riley's and Persifor F.

Smith's brigades, Dimick's and Taylor's bat¬

teries, attacking it from the west and south, were received with a storm of shot and shell from the guns in embrasures and barbette; and as they struggled out of the cover they were swept by the musket-fire from the build¬

ing itself, with heavy loss. Seizing a line of adobe buildings 60 yards from the convent, they opened fire under that protection and held it till the time for advance. Meantime Worth's division, with Pillow, Cadwalader, Garland, Clarke and others, had charged down the causeway, blocked for several hun¬

dred yards with loaded wagons, and through the fields to the bridge-head. Broken into irregular fragments by the hedges and ditches, they were twice repulsed with tremendous loss by the plunging fire of the Mexican guns; but Shields had moved north from Coyoacan and, after a fierce combat, which nearly overwhelmed him, he was reinforced by Lee and Sumner, carried the river line, and moved east against the rear of the bridge. In danger of having their retreat from the capital cut off, the Mexicans lost nerve, and a third charge from the Americans carried the head with a rush.

Thence they turned southwest against the con¬

vent; the American artillery was still batter¬

ing it on the other side; a sally from the garrison was driven back and, as the fire slackened, both divisions of the Americans entered it from opposite sides at the same time. The American forces in this battle numbered a little over 7,300; the Mexican numbers are uncertain, but probably about 2.1,000. The American losses at Contreras and Churubusco together were 1,053, not over 100

at Contreras. The Mexican loss was 2,637

prisoners at both, and probably 2,000 at least killed and wounded at Churubusco. Consult Bancroft, H. H., (History of Mexic.o) (1885) ; Scott, General, (Autobiography > (New York 1864) ; Wilcox, (History of the Mexican War> (1892).

CHUSAN, choo'san, ARCHIPELAGO, a

group of islands off the east coast of China, the largest being the

island of the same name, which is about 21 miles long, and from 6 to 11 broad, with a population of about 200,000. Its surface is finely diversified by hill and dale. The rocks are evidently volcanic ; and the soil, often very fertile, is under good cultivation, for the most part by spade husbandry. On the same slope may be seen, in different stages of their growth, wheat, tea, sweet potatoes, cotton and tobacco.

There are several towns on the island ; the capi¬

tal is Ting-hae, a walled town of about two miles in circumference. From its situation near the mouths of the Yangtse-kiang, which forms the great channel of communication with the heart of the empire, Chusan is considered as the key of southern China, and was accordingly taken possession of by the British on two oc¬

casions during the first Chinese War. Notwith¬

standing the great mortality among the British troops during their occupation of the island, the climate is still considered healthful.

CHUTIA NAGPUR, choo'te-a nag-poor'.

See Chota Nagpur.

CHUTNEY, chut'ni, a condiment com¬

pounded of sweets and acids, much used in the East Indies and thence introduced into England and the United States. Ripe fruit, especially mango and tamarinds, raisins, spices, herbs, chillies or cayenne, lemon-juice, vinegar, etc., are the ordinary components, which are

pounded, well boiled together and then bottled for use. It is much eaten in India with curries, stews, *etc.*

CHUZZLEWIT, Martin, the principal

character in Charles Dickens' novel of that name, published 1843-44.

CHYLE, kil, the liquid mixture of food¬

stuffs taken up by the lacteals from the in¬

testine in the course of digestion. It is not a definite substance, its composition varying very widely according to the character of the in¬

gested food. See Digestion ; Lacteals ; Chyme.

CHYME, kim, a pulpy mass into which

food in the stomach is resolved by the action of the gastric juice and by the contraction of the stomach. This mass is grayish in color and the previous texture or nature of the aliment can be no longer distinguished. It passes by the pylorus into the intestinal canal, where it is mixed with the pancreatic juice and the bile.

The thinner parts of it are absorbed by the slender tubes termed ˆlacteals.® The liquor thus absorbed, which is called ˆchyle® (q.v.), is of a white color; it passes through the glands of the mesentery, then enters the thoracic duct and is conveyed by it into the blood at the junc¬

tion of the left jugular with the left subclavian vein. Chyle is an opaque milky fluid, mild to 666

the taste. By standing for some time one part of it coagulates ; another portion is coagulated by heat. The chyle, after mixing with the lymph conveyed by the absorbent vessels, is received into the blood, which has returned from the extreme vessels before this passes to the heart. All traces of it are very soon lost in the blood, as it mixes perfectly with that fluid.

It is probable, however, that its nature is not immediately completely altered. The blood passing from the heart is conveyed to the lungs, where it circulates over a very extensive sur¬

face presented to the atmospheric air, with the intervention of a very thin membrane, which does not prevent their mutual action. During this circulation the blood loses a considerable quantity of carbon, part

of which, it is probable, is derived from the imperfectly assimilated chyle, as this, originating in part from vege¬

table matter, must contain carbon in larger proportion than even the blood itself. See Digestion; Lymph; Nutrition.

CIALDINI, chal-de'ne, Enrico, Italian

soldier, statesman and diplomat; b. Castelvetro, Modena, 10 Aug. 1811 ; d. Leghorn, 8 Sept. 1892.

For his share in the insurrection of 1831 he was forced to escape to France and in 1835 passing over to the Spanish service, he fought against the Carlists and1 was made colonel. When Charles Albert headed the Italian rising in 1848, he was employed by the Sardinian government to reduce the volunteers to discipline and fought at the head of his new regiment in the brief campaign of 1849. In the Crimea he com¬

manded a division of the Sardinian contingent; and on his return was appointed aide-de-camp to the king. He was intrusted by Cavour with the formation of the famous Cacciatori delle Alpi. In the war of 1859 the victory at Palestro was his chief exploit. In 1860 he defeated the papal army at Castelfidardo ; in 1861 Gaeta and Messina yielded to him. Created Duke of Caeta, and for a few months governor of Naples, he had to act against Garibaldi in the second Sicil¬

ian expedition (1862). In 1864 he became a senator; and in the war of 1866 occupied Venice almost without a blow. In 1876 he was sent as Ambassador to Paris, but he retired in 1881

and received the post of one of the two generals of the army.

CIAMICIAN, cha-mish'yan, Giacomo,

Italian chemist: b. Trieste (then in Austria), 1857. He was educated at the University of Vienna. He became assistant at the Chemical Institute of Rome in 1880 and in 1887 was ap¬

pointed professor of general chemistry at Padua. After 1889 he was professor of general chemistry at Bologna and in 1910 became a member of the Italian Senate. He published (I problemi chimici del

nuovo secolo) (1905); ˆrganico e fisiologico chimica) (1908) ; (Co-operazione delle scienze) (1911) ; Fotochimica nell' avenire) (1912).

CIAMPI, cham'pe, Ignazio, Italian poet

and historian: b. Rome 1824; d. 21 Jan. 1880.

From 1874 till his death he was professor of modern history in the University of Rome.

Among his poetical wrorks are some imitations of the Russian poet Pushkin; an epic, (Stella) ; and two volumes of (Various Poems. } He wrote several works on the history of literature, also biographies and histories of special periods.

His principal work appeared posthumousl)ˆ : (Modern History, } from 1492 to. the Peace of Westphalia.

CIAMPI, Sebastiano, Italian scholar: b.

Pistoia, 30 Oct. 1769; d. Florence, 14 Dec. 1847.

Ordained as a priest in 1793, he was appointed professor at the University of Pisa in 1803; owing to some misunderstanding with his col¬

leagues, he accepted in 1818 a professorship at Warsaw and returned to Italy in 1822, a pre¬

bend having been conferred on him in Poland, which enabled him to devote himself to literary studies at Florence. His principal works treat of Italian literature and art, of ancient litera¬

ture, of the Latin literature of the Middle Ages and of the history of Poland.

CIAMPOLI, cham-po'le, Domenico, Ital¬

ian novelist : b. Atessa in Abruzzi, 25 Aug. 1855.

He became professor of the history of literature at the Lyceum of

Ancona and later librarian of the Victor Emmanuel Institution at Rome. His stories and romances are to a great extent pictures of life among the peasantry and moun¬

tain folk of southern Italy, of which may be mentioned (Fiabe abruzzesP (1877) ; and (Cicuta) (1884). He has also written romances of a less local character; (Diana? ; (The Un¬

known. (He has devoted special study to Slavic literature and published several volumes on that subject. He published also (Nuovi studi letterarii e bibliografici) (1899).

CIBAO, se-ba'o, a mountain range in the central part of Santo Domingo; length about 20

miles. When Columbus discovered the island, he was told by the natives that there was gold in the Cibao and he thought it to be a part of Japan. Gold was found there in 1494, by Ojeda.

CIBBER, sib'ber, Caius Gabriel, Danish

sculptor : b. Flensborg, Holstein, 1630 ; d. Lon¬

don 1700. He visited England during the pro¬

tectorate of Cromwell and met with such en¬

couragement as to induce him to settle there.

Lie was employed to execute the bas-reliefs on the pedestal of the London Monument. The work, however, by which he is principally known are his figures of Raving and Melancholy Mad¬

ness, formerly erected above the gate of the old Bethlehem Hospital and now in the new hos¬

pital, Saint George's Fields. He was the father of Colley Cibber (q.v.).

CIBBER, Colley, English dramatist and

actor: b. London, 6 Nov. 1671; d. there, 12 Dec.

1757. He was a son of C. G. Cibber (q.v.) and the sculptor's second wife, Jane Colley. He made his appearance at Drury Lane Theatre in 1689. In 1695 appeared his first comedy, (Love's Last Shift,* which met with great success. In this piece he played the part of Novelty, a fash¬

ionable fop. This character is found in most of his pieces and in the representation of it he was likewise distinguished. His dramatic celeb¬

rity is founded chiefly on the (Careless Hus¬

bandˆ which even obtained the approbation of his declared enemy, Pope. This piece, though without novelty in the characters and without invention in the plot, is a good picture of the manners and follies of the time. His comedy, the (Non-juror,* an imitation of Moliere's <Tartufe,) adapted to English manners, ap¬

peared in 1717 and was directed against the Jacobites. It was very successful, but drew upon him many enemies, whose number he in-

creased by his conduct as director of Drury Lane Theatre, from 1711. His appointment as poet-laureate in 1730 gave full play to the rail¬

lery of his enemies. Cibber had the good sense to join in the laugh against his own verses.

P ope, however, did not cease to ridicule him on every opportunity. Besides writing original works for the stage, he adapted a number of others, Shakespeare's Richard III being one of those that have passed through his hands.

In 1750 he quitted the theatre and published the (Apology for the Life of Colley Cibber,5 writ¬

ten with spirit and candor and containing many entertaining ancedotes and judicious remarks.

CIBBER, Susannah Maria (Arne), Eng¬

lish actress: b. London, February 1714; d. there, 30 Jan. 1766. She was the sister of the cele¬

brated Thomas Arne (composer of the music of (Rule Britannia5), who taught her music and introduced her in one of his operas at the Haymarket Theatre. She was so much of a favorite with Handel, that he composed pieces expressly adapted to her voice and also in¬

structed her in singing them. In 1734 she mar¬

ried Theophilus Cibber (q.v.), but was soon after separated from him. She subsequently made her appearance in tragedy. Her beauty and her talents gained her universal admiration. Gar¬

rick is said to have exclaimed when informed that she was dead, (<Then tragedy has expired with her.® She is buried in Westminster Abbey.

CIBBER, Theophilus, English actor and

dramatist: b. 26 Nov. 1703; d. October 1758. He was the son of Colley Cibber (q.v.). Among his plays are (The Lover5 (1730); (Patie and Peggy5 (1730) ; (The Auction.5 The biogra¬

phy of English and Irish Poets,5 which appeared under his name, was from the pen of Robert Shiels, a Scotsman, who purchased for 10

guineas the right of prefixing to the work the name of Cibber, then in prison for debt.

CIBOL, sib'ol, a perennial plant (Allium fistulosum) of the onion genus, a native of Siberia, with hollow stems larger than those of the chive. It was formerly cultivated in Great Britain for culinary use, but it has been superseded by more palatable species. See Onion.

CIBORIUM, si-bo'ri-um, the sacred ves¬

sel of silver or gold or silver-gilt and often incrusted with precious stones, in which the sacred host is reserved. Its liturgical name is pyx. In the language of architecture, ciborium is the name of the canopy which overhangs the high altar of a church.

CIBOTIUM, a genus of ferns of the

family Cyathecicece, natives of Mexico, Poly¬

nesia and China. C. barometz, a Chinese species, gave rise to the wonderful stories con¬

cerning the Barometz or Scythian lamb, which, according to the famous botanist Bauhin (1650), had wool, flesh and blood and a root, attached to the navel and bore a perfect resemblance to a lamb, but grew on a stalk about a yard high and turning about from side to side consumed all the herbage within reach, until from lack of food it died. Not until 1725 was it ex¬

plained authoritatively that the Barometz was merely the large root of a fern, covered with yellow down, which had been placed in a museum in an inverted position in such a man¬

ner that it resembled in a vague way some quadruped.

CIBRARIO, che-bra' ryo, Luigi, Italian

historian and politician: b. Turin, 23 Feb. 1802; d. Salo, 1 Oct. 1870. He studied law, entered the service of the state and soon distinguished himself by his historical investigations. In 1848, when Italy rose against the Austrians, Charles Albert appointed him commissioner at Venice and a senator of Sardinia. In 1852 he was made Minister of Public Instruction and ultimately, in 1855, Minister of Foreign Affairs.

In 1839 he published his (Della Economia Politica del Medio Evo5 ; in 1840, his (Storia della Monarchist di Savoia5 ; and in 1847, his 'Storia di Torino.5 He published numerous other works on history, numismatics and mis¬

cellaneous subjects.

CICACOLE, sik-a-kol'. See Chicacole.

CICADA, si-ka'da, a large insect of the order Hemiptera , suborder Homoptera and family Cicadidce , known by its broad head, pro¬

tuberant eyes, sucking beak and well-developed ovipositor. The male cicada makes a shrill noise by means of a special apparatus at the base of the abdomen or hind-body. The males only possess this sound-organ. (<Happy,55 said Xenarchus, ftare the cicadas' lives, for they all have voiceless wives.55 The loud, piercing notes issue from a pair of structures or cavities on the under side of the body, which act some¬

what as two kettle-drums or (<timbals,55 each cav¬

ity being covered by a tense membrane which is rapidly vibrated by means of two special mus¬

cles within. The sound is variously modified by adjacent smaller disc-like sounding-boards, which increase and transmit the sound vibra¬

tions caused by the movement of the membrane.

The sound is modified by the semi-circular discs, one on each side projecting from the metathorax over the (<mirrors,5) cover-plates or sounding-boards, one on each side and which, when closed, deaden the sound, or, if open, allow it to escape in greater volume. This apparatus appears to be homologous with the <(ears55 of the locusts or common grasshoppers. Cicadae have an incomplete metamorphosis, the young (nymphs) being like the parents, but without wings ; they live attached by their beaks to the roots of trees, *etc.* The female deposits her long, slender, cylindrical eggs in gashes in twigs made by her saw-like ovipositor. From 400 to 600 eggs are laid, the process requiring about 45

minutes. The two commonest forms in the United States are the dogday harvest fly (C.

tibicen) and the periodical cicada (C. septen-decem). The former is the black-and-green harvest fly which appears in midsummer and gives out its shrill notes during the heat of the day from the tree tops. It matures in two years, but there being two broods, one appears every year. The 17-year cicada (wrongly called 17-year locust) is the longest-lived qf any known insect, as the grub or nymph lives for over 16 years sucking the roots of forest trees, often several feet below the surface; in the late spring it finishes its transformations and usually at the last of May or the beginning of June issues in enormous numbers from the ground. This appearance of a 17-year brood in a given area

has been recorded as far back as 1633. At the present time each year has its brood or broods, each limited, as a rule, to a 668

well-defined district. Of such broods there are 30, occurring over a large area in the Atlantic and Central States. In southern New England a brood periodically appears near Fall River and on Martha's Vineyard, as well as in Connecticut, while in Rhode Island its first appearance known in history was in the first week in June 1903, in the town of Coventry, near Tiogue reservoir. The southern limits are northern Georgia and the western limits are eastern Nebraska and Kansas. Besides this 17-year brood is a 13-year brood, which is more southern, the dividing line being about latitude 38° ; this appears to be a temperate variety.

The male is very short-lived and takes no food.

The females live for several weeks and de¬

posit their eggs about the middle of June in New York and West Virginia. The young

hatch, dropping to the ground about six weeks after the eggs are laid ; they then burrow into the soil and begin to pierce the rootlets of trees.

The nymph molts about once a year or oftener and Riley estimates the number of molts at from 25 to 30, while there are six stages of growth before the imago or winged state is assumed. Consult Riley, (The Periodical Cicada) ((Bulletin 8 United States Department of Agri¬

culture^; Marlatt, C. L., (The Periodical Cicada) (ib. 14, Washington 1898), and Wood-worth, (Synopsis North American CicadidaP

(in Psyche , Vol. V, Cambridge, Mass., 1888).

CICATRIZATION, the process of heal¬

ing in the skin of an ulcer or a wound. Where a solution of continuity of the skin is made the blood is thrown out into the gap, the edges of the wound are gummed together by serum, and, springing from both

sides of the wound, new connective tissue is formed. This new connective tissue gradually fills the wound with a white glistening mass, the cicatrix. This con¬

tracts and all that may be left of the wound is a white shiny strip of new connective tissue.

CICELY, Sweet, a plant of the United

States belonging to the natural order Umbellifer, a perennial herb growing from fleshy, clustered, thickish roots. There are about 15

species in North America, western South America and eastern Asia, grouped into the genus W ashingtonia, so named in honor of George Washington. Eleven of the 15 are na¬

tives of the western United States. They are related to chevril (q.v.) on one side and to Scandix on the other. The smoother sweet cicely (IV. longistylus) grows in the woods of southern Canada, through Dakota, eastward to North Carolina, southward to Tennessee and Alabama and westward to Kansas, and on elevations to the height of 4,200 feet. The roots have a rich spicy taste and odor, resembling anise. The sweet cicely of England (Myrrhis odorata), although common about buildings, is an imported plant, probably from central Asia.

It is fragrant and its odor is supposed to be particularly agreeable to bees, therefore hives are rubbed with the herb to attract them.

CICER, si’ser, a genus of the natural

order Leguminosce, of the tribe Vicice, of which the chick-pea (q.v.) is a representative.

CICERO, Marcus Tullius, Roman orator

and public man and the greatest master of Latin prose style: b. 106 b.c. ; killed at Formiae 43 b.c.

Cicero was a native of Arpinum, the birth¬

place also of Marius. His father was a knight of good social position and the son was well educated in preparation for the bar and for public life. While still a young man he served a campaign under the elder Pompey.

He first appeared as a lawyer in 81 and again in 80, and in the latter case was brought into direct collision with a favorite of Sulla, at that time perpetual dictator. It was perhaps in conse¬

quence of this that he withdrew for a time from Rome and spent the years 79-77 in Greece and Asia Minor, occupying himself with the further study of oratory. In 75 he began his political career by serving as quaestor in Sicily, and in 70 he gave evidence of the closeness of his relation to that province by prosecuting Verres for maladministration as governor there.

In 69 he was curule aedile and in 66 praetor urbanus, following the usual course of offices; in the latter year he made his first distinctively political speech in support of a proposal by the tribune Manilius to give to Pompey the com¬

mand of the war against Mithridates. Though the distinction between parties was then less sharp than it is now, he had thus far been con¬

nected with the democratic party, but in the canvass for the consulship for 63 that party had already two candidates in the field, Catiline and Antonius, while the Optimates had no candidate of special promise. As Catiline belonged to the radical wing of the democrats, the sena¬

torial party, desiring his defeat, threw its influ¬

ence in Cicero's favor. He was thus elected as a representative of the Optimates and con¬

tinued to act with that party during the rest of his life. His constitutional instincts were fur¬

ther strengthened by the outbreak during his consulship (63) of the so-called conspiracy of Catiline, an attempt by the radicals under the leadership of this reckless noble to seize the government by violent means. This attempt Cicero put down with considerable vigor ; Cati¬

line was killed in battle and several of his asso¬

ciates were condemned to death by a vote of the Senate and executed

under Cicero's orders. The execution, however, was of questionable legality, since it set aside the right of the accused to an appeal to the popular assembly, and Cicero was at once attacked by members of the democratic party for his responsibility in the transaction.

Upon the formation, in 60, of the coalition be¬

tween Caesar, Pompey and Crassus called the First Triumvirate, by which the democrats came into control of the government, Cicero was banished from Rome and left Italy (April 58).

The years preceding his exile had been years of great professional activity and some of the best of his speeches belong to this period, but he had not yet acquired the habit of literary production and the year of his absence was unfruitful ex¬

cept in letters. His return to Italy in 57 was made the occasion of a great party demonstra¬

tion and was to some degree a personal triumph, and he engaged himself at once in suits for the recovery of his property and in the party strug¬

gles with the Triumvirate. During this period he also took up again his early studies in rhet¬

oric and wrote the *De OratoreC one of his most finished and authoritative works. He had not up to this time followed the usual custom of taking the proconsular governorship of a prov¬

ince, but in 51, in comnliance with a new law, though much against bis will, he went as gov¬

ernor to Cilicia. He spent here exactly the year CICERO

required of him, from 31 July 51 to 30 July 50, but impatient as he was of the enforced absence from Rome his governorship was highly credit¬

able to him ; he showed, in particular, the most honorable scrupulousness in abstaining from even the customary exactions from

the provin¬

cials. When he returned to Rome, he found all parties absorbed in the agitations which pre¬

ceded the civil war. Early in 49 Caesar marched upon Rome and Pompey withdrew to Dyrrachium. During these months Cicero re¬

mained away from the city in great uncertainty as to his duty and his interests. Caesar asked of him only that he should remain neutral, and his own forebodings as to the outcome of the struggle inclined him toward this course, but his party connections, his constitutional preju¬

dices and opinions and his lifelong respect for Pompey took him finally to the camp at Dyr¬

rachium. After the victory gf Caesar at Phar-salus in August 48, he returned to Italy and spent a year in Brundisium, awaiting Caesar's permission to go to Rome. From the summer of 47 to March 44 the domination of Caesar put an end to free discussion and action in the state and Cicero made only a few speeches, addressed to Caesar, with whom he had always been on terms of friendship, on behalf of persons desir¬

ing amnesty. But the enforced political inactiv¬

ity he put to use in literature, and to this period belong almost all his greatest writings, the ripe fruits of a life of intellectual interests. In March 44 the assassination of Caesar aroused in Cicero, though he was not cognizant of the plot, a renewed hope that the Senate might re¬

cover control of the state. But for the first few months events turned against his party ; popular feeling did not approve the death of Caesar, An¬

tony was unexpectedly active and successful, and Cicero for a time thought of joining Brutus and Cassius in the East. As the confusion be¬

gan to clear, however, and the old issue between constitutional government and the rule of a dictator took form, Cicero's indecision came to an end and he threw himself unreservedly into the contest of the Senate with Antony. The 14

Philippics, delivered between September 44 and March 43, are unmatched among his speeches.

When Antony and Octavianus (the later Au¬

gustus) were reconciled and formed with Lepidus the Second Triumvirate, Cicero's name was placed upon the list of the proscribed, and he was killed at his villa near Formise, 7

Dec. 43.

The literary work of Cicero is in amount much greater than the extant work of any other Latin writer and in value is second only to the poems of Virgil. It consists of orations, rhe¬

torical works, philosophical essays and collec¬

tions of letters, and will be taken up in that order.

Of the orations we possess 57 in nearly com¬

plete form and the titles of some 50 more are known. The extant orations are about equally divided between speeches to the Senate or the people on public questions and legal pleas.

Cicero spoke by preference on the side of the defense in both civil and criminal trials, some¬

times making a close legal argument, but not infrequently using also political and even liter¬

ary discussions to relieve the formal argument.

The public orations are to a considerable extent invectives, especially the four orations against Catiline and the 14 Philippics against Antony, and these are at times bitter to a degree that modern taste would condemn, even in the most excited political struggles. But the wit, the fire, the humor and breadth, the easy handling of complex argument and the perfection of stylistic form are such that no critic, either an¬

cient or modern, has seriously questioned Cicero's supremacy in Roman oratory.

The rhetorical works deal chiefly with ora¬

tory ; several are textbooks on the theory and practice of public speaking, one is a history of Roman oratory and one is a discussion of the ideal in oratory. While Cicero did not attempt a wholly novel treatment of these subjects, there is in the works much of the ripe judg¬

ment of the practised speaker who was inter¬

ested also in the theory of his life work, and they contain some of his most finished and de¬

lightful writing.

The philosophical works are constitutional and ethical essays in dialogue form. Cicero himself regarded them as useful means of mak¬

ing educated Romans better acquainted with Greek philosophy, especially of the Academic and Stoic schools, and made for them no claim to originality of thought.

We possess also a collection of nearly 800

letters by Cicero, with nearly 100 more from his correspondents. They begin with the year 68 and with some breaks continue down to the year of his death. About half of them are addressed to his intimate friend T. Pomponius Atticus, the rest to various persons, including almost all the eminent men of his time. Som.e few of them are formal and guarded in expres¬

sion, but the majority, especially those ad¬

dressed to Atticus, are extremely intimate and confidential, written without thought of publica¬

tion. They give a most interesting picture of the progress of events and changes of opinion during a critical period of Roman history, and they also reveal some of the weaknesses of Cicero’s character and have furnished the ma¬

terial upon which the harsher judgments of his conduct have been founded.

The uncertainty of the judgment of poster¬

ity — to which appeal is often made as if it were always precise and infallible — was never better illustrated than in the history of opinion in regard to Cicero. During the earlier cen¬

turies after the Revival of Learning, when at¬

tention was fixed upon correct and elegant Latinity, the judgment which scholars formed in regard to Cicero's public career was really determined by their just admiration for his Latin style. And most scholars up to the be¬

ginning of the 19th century continued to oc¬

cupy the uncritical position. But with the rise of historical science a revision of opinion was inevitable. This found expression in Drumann's history <pf Rome and later in Mommsen's history; in both of these writers, however, the extravagant and passionate dis¬

crediting of Cicero was as marked as the earlier unquestioning worship had been. The influence of Mommsen's authority is still to be seen in popular and school histories, though scholars have long understood its inaccuracy. But though opinion varies within narrower limits, it still varies somewhat, for reasons which are to be found partly in the character of Cicero and partly in the nature of the constitutional and political questions that are connected with his career. Cicero was, as most orators are, a

man in whose temperament emotion and sensi¬

bility were more controlling than intellect or will. Such a man is always liable to the charge of inconsistency and his conduct is certain to show extremes of weakness and of strength.

On three occasions, in the trial of Roscius, in the affair with Catiline and in the struggle with Antony, he showed the hot courage of attack, but in the trial of Milo he failed to ex¬

hibit the cool and steady courage required to face mob violence. At the outbreak of the civil war he hesitated long — not wholly with¬

out reason — and after the death of Caesar his vacillation amounted to weakness, but taken as a whole his public life was a consistent expres¬

sion of his patriotic feeling. His' depression during his exile was great but not greater than his cheerfulness during the unhappy years pre¬

ceding 44. His vanity — of which Mommsen makes much — is indeed repellant to our taste, but it was a foible of his race; Caesar, not in general a vain man, wrote the extraordinary dispatch, V eni, vidi, vici, and Horace, certainly a modest man, wrote the Exegi monumentum.

A character in which an instinctive artistic per¬

ception and a trained intelligence are directed by the emotional temperament of the orator is not to be summarized in a formula.

The political situation, also, when an old constitution was giving way to personal rule, is of a kind about which men will always differ ; half the discussion in regard to the character of Cicero is fundamentally an expression of opin¬

ion or feeling about such constitutional crises.

The severest critics of Cicero have been Ger¬

man scholars, eminent indeed, but accustomed to feudal traditions and inexperienced in the workings of a free constitution. The judgment of English scholars, though not unanimous, has been more liberal.

Literature. — The best edition is C. F. W

Muller's (Teubner) (Leipzig, 9 vols.) , text with¬

out commentary. Halm's editions of the ora¬

tions have excellent German introductions and notes; the (Letters> are well edited by Tyrrell (London). There are <Lives) by Middleton (1741), Forsyth and Anthony Trollope; also (Ciceron et ses AmisP by

Boissier and (Cicero of Arpinum, a Political and Literary Biography) (Yale 1915).

Edward Parmelee Morris,

Professor of Latin Language and Literature, Yale University.

CICERO, Quintus Tullius, Roman gen¬

eral and brother of Marcus Tullius Cicero (q.v.) : b. about 102 b.c. ; put to death by the messengers of Antonius 43 b.c. He was praetor in 62 b.c. and governor of Asia 61-58 b.c. In 55 b.c. he was legate to Caesar, accompanied him to Britain, and in 54 commanded a legion in Gaul. In 51 he was a legate to his brother, Marcus Tullius, in Cilicia and in the civil war fought with Pompeius against Caesar, but in 57

made peace with him. He was proscribed by the triumvirs and killed.

CICERONE, chich-e-ro'ne, one who, in

Italy and particularly in Rome, shows and ex¬

plains to strangers curiosities and antiquities; hence, in general, a guide. The talkativeness of such attendants procured them the name

ciceroni, in jocular allusion to Cicero. This term is falling into disuse, the official designa¬

tion, servitore di piazza, or simply guida (guide), being used instead'.

CICERO'S LETTERS. The letters,

'EpistulaeP of Cicero cover a period of 25

years, from 68 to 43 b.c., the year of the orator's death, and are embraced in four groups : (1) <Epistulae ad FamiliaresP consisting of 16 books of letters to various friends, including an entire book of those addressed to his wife and children, and another book of those to his faithful freedman Tiro.

(2) (Epistulse ad AtticumP likewise consist¬

ing of 16 books, a witness to the lifelong friendship and intimate relations subsisting be¬

tween Cicero and Titus Pomponius Atticus.

(3) (Epistulse ad Quintum FratremP three books of letters to Cicero's brother Quintus.

(4) (Epistulse ad Marcum Brutum, two

books of letters to the Brutus who headed the conspiracy against Julius Caesar.

The contents of the letters are so various that it is difficult in brief compass to give any adequate conception of their range and quality.

Many of them deal directly with the stirring political issues of Cicero's own time, the strife of parties, the competition for office, the am¬

bitious aspirations of Caesar, Pompey and Crassus in the First Triumvirate, the struggle between Caesar and Pompey and the chaotic conditions subsequent to Caesar's assassination.

Others have to do with the purely personal af¬

fairs of the writer, the publication of his works, the construction and furnishing of his villas or the gossip of the day. Several touch upon the domestic infelicities of Quintus Cicero and his wife, Pomponia, the sister of Atticus, in which Atticus naturally blamed Quintus, while Cicero blamed Pomponia.

Most of the letters are written in the more intimate style of the Roman sermo familiaris, contrasting strongly with the studied elegance of the formal style characteristic of Cicero's other works. Equally marked is the unreserved frankness with which Cicero discusses the men and

measures of his day. In the letters to Atticus in particular he practises as little re¬

serve as if he were writing a diary for his own private edification. As a result, some of the less attractive features of Cicero's personality are brought out in strong relief. Thus in 65

b.c. we find him writing to Atticus that he con¬

templates the defense of the unsavory Catiline.

((I am thinking, » he says, <(of defending Cati¬

line. We can have any jury we wish with the full consent of the prosecutor. If Catiline is acquitted, I hope it will make us better friends.ˆ

Thus he writes of the man whose true character he knew well, and whom only two years later he was branding in his speeches with all the vituperation at his command. On his way into exile and later when in banishment he breaks out into the most disconsolate lamentations as to his hard lot, bewailing the sad fate of his wife and children and expressing regret that he had not committed suicide. Fifteen months later the exultation to which he gives utterance on his return to Italy and the capital is no less extravagant. In 52 b.c. he went to Cilicia in Asia Minor as provincial governor. He cannot dwell sufficiently upon the enthusiasm mani¬

fested at his arrival in the different towns through which he passed on his outward journey. A trivial military success over some wild mountain tribes within his jurisdiction impels him to write home in loud praises of his achievement.

The four collections above enumerated con¬

tain 774 letters written by Cicero. As many more are believed on good grounds to have ex¬

isted in antiquity and to have been lost. In¬

corporated in the (Epistul3e ad Familiares} and the (Epistulae ad Atticum) are some 90 letters written by Cicero's correspondents. Thus we have one entire book of letters from Caelius.

Others from whom letters are preserved are Plancus, Cato, Pompey, Cassius, Lepidus and Asinius Pollio. One of the most notable letters is from Julius Caesar, written in reply to one of Cicero. Cicero had praised the dictator for his magnanimity in sparing the lives of his opponents who had surrendered at Corfinium.

Caesar's reply breathes the same generous spirit which had prompted his act of clemency.

In their range, their sincerity, their connec¬

tion with the events of the time and their in¬

tensely human quality, the (Letters } are not only of commanding interest, but they are of the greatest value in helping us to understand the complex character of the orator and the tangled events of his day. In modern times the first manuscript of the <Letters) was dis¬

covered by Petrarch in the 14th century. The great humanist was shocked at the new light thrown by them on Cicero's character, and com¬

posed his famous letter to Cicero. There is an ex¬

cellent translation of all the letters by E. Shuck-burgh in the Bohn Library; also of the <Letters) to Atticus in the Loeb Library by E. O.

Winstedt.

Charles E. Bennett,

Late Professor of Latin, Cornell University.

CICISBEO, che-ches-ba'o*, or Cavaliere

Servente, a name given since the 17th

century in Italy to the professed gallant of a married lady. It was the fashion among the higher ranks in Italy for the husband, from the day of marriage, to associate with his wife in his own house only. In society or places of public amusement she was accom-pained by the cicisbeo, who even attended at her toilet, to receive her commands for the day.

The custom is the more extraordinary, from the natural jealously of the Italian, who seemed to change his character completely after mar¬

riage.

CICOGNARA, Leopoldo, Count da,

Italian antiquarian, diplomatist and writer on art subjects: b. Ferrera, 17 Nov. 1767 ; d.

Venice, 5 March 1834. He studied at Modena and the Academy of San Luca, and was later appointed Ambassador to Turin, and councillor of state. In 1808 he became president of the Academy of Fine Arts in Venice. His most important work was a 'History of Sculpture from the Renaissance of that Art to the Present Century > (3 vols., 1813-18). He also wrote a (Life of Canova) (1823).

CICONIA, si-ko-'m-a, the genus of birds to which belongs the common stork, the type genus of the family Ciconiidce.

CICONIFORMES, an order of Aves

(birds), composed of the sub-orders Stegano-podes (tropic birds, gannets, cormorants, frig¬

ate-birds and pelicans) ; Ardece (herons and bitterns) ; Ciconii (storks, ibises and spoon¬

bills) ; and Phoenicopteri (flamingoes). All are aquatic or mainly so. See Ornithology.

CICUTA, si -ku’ta, a genus of poisonous unbelliferous plants commonly known as water-hemlock or cowbane, the species natives of North America. The plants are a dangerous poison, said to be fatal to cattle that eat them.

Persons are known to have died from eating the roots-which are white and fleshy. The com¬

mon hemlock, Conium maculatnm, a poisonous umbellifer, has a stem from two to four feet high, hollow, striated and spotted with purple ; leaves large, much divided and fetid when bruised ; and with unilateral partial involucres, marks by which the common hemlock is readily distinguished from the water-hemlock, and from other plants of the Apriaccce. It is indig¬

enous in Europe, and is extensively used in medicine, being given internally as a sedative, and applied externally to sores, ulcers, etc., in the form of a poultice or ointment. It may be the koneion (hemlock) of the Greeks, which Socrates and others condemned to death were required to drink. The Latin cicnta was the true hemlock. See Hemlock.

CID, El, al thud, or el sid, the popular name of a Spanish national hero, Rodrigo (or Ruy) Diaz: b. Bivar about 1040; d. 1099.

Legend and tradition have somewhat obscured the character of the historical Cid, but the main facts of his life are well established by Spanish and Arabic records. He first appears in national history when Sancho, the eldest son of Ferdinand I, and king of Castile, was at war with his brother, Alfonso; at this time he was already known as the Campeador (the cham¬

pion), a name which he won probably by van¬

quishing in single combat the champion of San¬

cho of Navarre. In the war with Alfonso, Sancho was victorious, and this success was owing to the Cid, to whom he had given the command of his forces. Alfonso was taken prisoner, and it remained only to overcome the obstinate resistance of Zamora, where Sancho’s sister, Urraca, ruled. Before the walls of this city Sancho was assassinated, and Alfonso was called to the throne. It is asserted — but

the historical evidence here is not complete — that before recognizing Alfonso's authority the Cas¬

tilian nobles required of him an oath that he had no part in his brother's murder, and that it was the Cid who administered this oath, in 1073. Whatever the facts, Alfonso must have thought it wise to conciliate the goodwill of the Castilian grandees until at least his own position became secure, as he gave his cousin Jimena (or Ximena), daughter of the Count of Ovideo, to the Cid in marriage. The marriage contract, dated 1074, is preserved at Burgos.

Later the king, taking advantage of a pretext that the Cid had attacked the Moors without obtaining the royal consent, banished him (1081). Old wrongs which the king still re¬

membered probably furnished the real motive.

Then begun that career of "soldier of fortune, »

which, idealized by tradition, has made the Cid the perfect cavalier of Spain. He first offered his services to the Christian Count of Barce¬

lona, and, when refused by him, to the Moorish king of Saragossa, who accepted the offer. The Cid remained in Saragossa till 1088, fighting against Moors and Christians alike, and rising to unusual distinction and power. In 1088 the attention of Mostain, the king of Saragossa, was drawn to the city of Valencia, then under the protection of King Alfonso. The Almoravi-672

des, a new Moslem sect from northern Africa, defeated Alfonso in battle, and caused him to withdraw his protection from Valencia, and the governor of the city appealed to Saragossa for help. The Cid was sent to the aid of the city in command of an expedition which proved suc¬

cessful, and he established himself in Valencian territory. As the recognized protector of the lawful king, in reality, the suzerain of Valencia, he received a generous tribute ; but it is clear that he had already resolved, when opportunity offered, to secure the city for himself. Mean¬

while he skilfully held off, now by force, now by ruse, all other competitors, Christian and Moslem alike; including among these King Alfonso, whose territories he once wasted with fire and sword. As head of an independent army, he made successful forays in all direc¬

tions ; despoiling, levying tribute, garrisoning strongholds and strengthening his position in every way, and in 1094 finally became master of Valencia itself. He successfully held the city till 1099, when the troops he had sent against the Almoravides were utterly routed, few escap¬

ing, and he already enfeebled in health, died, it is said, of grief and shame. His widow held Valencia for two years longer. He left two daughters, one of whom married the Count of Barcelona, and the other the Infante of Navarre.

The Cid very soon became the favorite hero of popular songs. It is probable that these songs were at first short stories in rude metri¬

cal form ; and that they were the sources of the epic poems. The earliest of the epic poems is (Poema del Cid) or (Cantar de Mio Cid,} (The Poem of Aly CidC based upon history, but with a large amount of legendary matter. Its date is probably about 1200. It is one of the best of mediaeval folk epics, its characters being drawn with clearness and simplicity. Another poem of about the same date, (The Legend or Chronicle of the Youth of Rodrigo, > is of in¬

ferior merit, though not without fine passages.

Two centuries and more after these poems we meet with the tRomances) or (Ballads of the Cid. } The earliest of these do not in their present form far antedate 1500. These ballads are derived from all sources, but chiefly from the Cid legend, which is here treated in a lyric and popular tone.

These ballads make Jimena (or Ximena)

Gomez the wife of the Cid and tell the legend¬

ary story of her father (Don Gomez), insult¬

ing the Cid’s father, of the Cid’s revenge by killing Don Gomez, of

Jimena's pursuit of the Cid demanding justice of King Ferdinand and the final reconciliation through marriage. De Castro, in his drama, (The Youth of the Cid,}

drew his material from the ballads, but added love and the conflict between affection and the claims of honor in the mind of both Jimena and the Cid. Corneille based his drama, (The Cid} (see Cid, The) upon that of Castro, using the same plot and the same struggle between love and duty on the part of the hero and heroine. Corneille condensed De Castro's (The Cidp gave it dramatic unity, and added greater dignity and nobility to the verse. His drama, when first put on the stage in France (1636), met with immediate success. Of the very first poem on El Cid, there are translations tjy A.

M. Huntington (1901); T. H. Frere (1874); J.

Ormsby (1879). Consult Huber, (Geschichte des Cid} (Bremen 1829) ; Southey, (Chronicle of the Cid) (London 1808) ; Menendez Pidal, (Cantar de Mio Cid: texto, grammatica y vocabulario) (3 vols., Madrid 1908-11) ; ib., (E1 Romancero espanoP (1910).

CID, The (Le Cid) (1636), the play

through which Corneille first gained distinction as a dramatist, marks a turning point in the development of the French stage. The scene is Seville, at the court of Ferdinand, king of Castile; the time about 1075; the theme a struggle on the hero's part between love and honor, between duty and love on the heroine's.

The kernel of the story belongs to historic tradition. In telling the deeds of Ruy Diaz de Bivar, the Cid Campeador, in the struggle of Christian and Moslem in Spain the chronicler Mariana records a duel between the Cid and the Count of Gormaz, a mainstay of the realm.

In this encounter the Count was killed. His daughter and heir Ximena then ((demanded of the king that he should give him to her as hus¬

band, for she was much attracted by his merits, or punish him according to the laws.® They were married, continues Mariana, ((with the approval of all.® This theme had been already dramatized by the Spaniard Guillem de Castro and was the subject of several Spanish ballads.

From all these sources Corneille borrowed freely whatever was to his

purpose, but his treatment of the materials was independent and original. In his opening scene Chimene

(Ximena) discovers to the inevitable confidante her love for Rodrique, the Cid. Then the king's daughter, L'Infante, tells her confidante that finding her own passion for Rodrigue hopeless she is resigned to see it extinguished by the marriage of its object to Chimene. But now arises an apparently insurmountable barrier in a quarrel over court preferment between Don Diego, the father of Rodrigue, and the father of Chimene. He insults Diego, whose age com¬

pels him to commit his honor to his son, who puts it magnanimously above his love. He kills Chimene's father, inopportunely for na¬

tional defense, since an invasion of Moors im¬

pends. Chimene demands the death of her lover. She will C(pursue him, destroy him and follow him in death.® Yet she hides her love neither from herself nor from him. She will (<do all in her power to avenge her father, but her sole hope is that she may avail nothing.®

While the king hesitates Rodrigue overcomes the Aloors. Chimene finds a champion in Rod¬

rigue's rival, Don Sanche, for she will marry her avenger. Yet, in desperate conflict with herself, she urges Rodrigue to do his utmost to save her from Sanche. Rodrigue ((puts honor above Chimene, Chimene above life.®

She will yield herself to the victor. Rodrigue leaves her invincible. But presently Sanche appears to offer her a bleeding sword. He is scorned unheard. For her it shall be a convent, since she cannot wed Rodrigue. But it now ap¬

pears that Rodrigue has sent the disarmed Sanche unharmed, for he (<would destroy no life that had been ventured for Chimene,® to give his own sword to her and tell of Rodrigue's victory. The king, her heart revealed, joins the lovers, betrothed at last.

The Cid broke radically with the traditions of the French stage, hitherto bound by largely misunderstood Aristotelian canons. Scudery,

a critic of repute, thought its subject ill-chosen, its irregularity unpardonable, its action clumsy, its prosody bad. Cardinal Richelieu was jealous for he had literary foibles; the Academicians professed alarm. Corneille found it prudent to withdraw for three years from Paris to Rouen. But the play was popular from the first. Boileau found that ((all Paris has for Rodrigue the eyes of Chimene® and, though this tragi-comedy lacks ethical depth and tragic force, it is still most acted of Corneille's dramas.

(Le Cid) is best edited with English notes by C. Searles (Boston 1912) ; translated by Mongan (New York 1896). Consult Gaste, (La Querelle du Cid) (Paris 1878) and Searles, C., (Les Sentiments de l'Academie Franˆaise sur Le Cid> (Minneapolis 1916).

Benjamin W. Wells.

CIDER, the pressed fermented juice of

apples ; a beverage, the quality of which de¬

pends principally on the following particulars : kind of fruit, condition of the fruit when ground, manner of grinding and pressing, method of producing fermentation, and precau¬

tions to be taken against its excess.

The Kind of Fruit. — The characteristics of a good cider apple are a red skin, yellow and often tough and fibrous pulp, astringency, dry¬

ness, and ripeness at the cider-making season.

The only artificial criterion for ascertaining the quality of an apple for cider is the specific gravity of its must, or unfermented juice; or the weight compared with that of water. This indicates with very considerable accuracy the strength of the future cider. Its weight and consequent value are supposed to be increased in the ratio of the increase of saccharine mat¬

ter. The strongest and most highly flavored cider which has been obtained from the apple was produced from fruit growing on a shallow loam, on a limestone basis. All the writers on the subject seem to agree that calcareous earth should form a component part of the soil of a cider orchard. A dry and somewhat loose soil is preferred.

Condition of the Fruit. — Fruit should be used when it has attained full maturity, and before it begins to decay. Each kind of apple should be manufactured separately, or at least those kinds only should be mixed which ripen about the same time. The longer the fruit remains on the tree without decay or being in¬

jured by frost the better, for not only is the perfect maturity of the juice an important con¬

sideration, but the colder the weather, short of actual frost, the more quiet and equable will be the fermentation. When gathered the apples should be carefully stored in some shady, cool room, and placed in heaps to undergo a further ripening, and acquire more saccharine matter while losing a considerable quantity of watery juice.

Grinding, *etc.* — This operation should be deferred till December, if possible. It is abso¬

lutely essential that the weather should be cold, even slightly frosty, to counteract the tendency to rapid fermentation. The apples should be re¬

duced by the mill as nearly as possible to a uni¬

form mass, in which the rind and seeds are scarcely discoverable, and the pomace should be exposed to the air. It has been ascertained that, by exposing the reduced pulp to the opera¬

tion of the atmosphere for a few hours, the vol. 6 — 43

specific gravity of the juice increases from 1.064 to 1.078. For fine cider the fruit should be ground and pressed imperfectly, and the pulp then exposed 24 hours to the air, being spread and once or twice turned, to facilitate the ab¬

sorption of oxygen ; it should be then ground again, and the expressed juice added to it before it is aga.n pressed. The best method of grind¬

ing the apples is to employ cylindrical rollers placed so near each other as to crush them.

They are fed from a hopper above them, from which the apples pass between a pair of fluted or toothed cylinders, by which they are torn and partially crushed before reaching the more per¬

fectly crushing apparatus below. The mass is then powerfully pressed, and the cider is run into casks.

Fermentation. — .The vinous fermentation

commences and terminates at different periods, according to the condition and quality of the fruit and the state of the weather. The best thing whereby to judge of the proper moment to draw the liquor from the scum and sediment is the brightness of the liquid which appears after the discharge of fixed air has ceased and a thick crust has collected on the surface. The clear liquor should then be drawn off into another cask. If it remains bright and quiet, nothing more need be done to it till the succeed¬

ing spring; but if a scum collects on the sur¬

face it must immediately be racked off again, as this would produce bad effects if suffered to sink. Among the precautions used to prevent excessive fermentation is stumming, which is fuming the cask with burning sulphur. This is done by burning a rag impregnated with sulphur in the cask in which the liquid is to be decanted, after it has been partly filled, and rolling it so as to incorporate the liquid with the gas. By distillation, a strongly fermented cider called cider brandy or applejack is produced, con¬

taining a larger percentage of alcohol. A species of vinegar is also made from cider.

See Vinegar.

CIENFUEGOS, the-en'foo-a'gos, Nicasio

Alvarez de, Spanish poet : b. Madrid, 14

Dec. 1764; d. Orthez, France, July 1809. He studied at Salamanca at the time when the modern school of Spanish poetry was founded there by Cadalso and Melendez. He attached himself to this school, and in 1798 laid the foundation of his literary fame by the publica¬

tion of a collection of poems. Shortly after he became editor of the government newspapers, La Gaceta and El Mercurio, and was appointed to the Department of Foreign Affairs. He was in possession of this office when the war of independence broke out. Madrid was occupied by the French and Cienfuegos, having both offended Murat by an article in La Gaceta and taken part in the insurrection of May 1808, was brought to trial and condemned to death. At the intercession of some influential friends the sentence was commuted to banishment to

France. His tragedy, 'Pitaco,* had procured his admission to the Spanish Academy. He also wrote the tragedy of Udomeneo,* and the comedy of the (Magnanimous Sisters. } His tragedies are considered his best works. His dramas were collected and published at

Barcelona 1836. Consult <Poesias) (in (Biblioteca de Autores Espanoles,* Vol. LXVII) ; Pineyro, (Cienfuegos > (in Bulletin Hispanique t Vol. XI, Bordeaux 1909).

CIENFUEGOS, Cuba, city in the prov¬

ince of Santa Clara, on the south side of the island. Its harbor, which is one of the finest in the West Indies, was visited by Co¬

lumbus on his first voyage, and was surveyed by Ocampo in 1508. The town was settled by refugees from Santo Domingo in 1819. Here the revolutionist Narciso Lopez planned to make his first demonstration

on 4 J uly 1847. (See also Cuba). In recent years its commercial progress has been rapid, and it is now the second seaport of Cuba. Some of the sugar estates in the neighborhood are very large, and conducted on the most approved modern plan ; in fact, Cien¬

fuegos is the centre of the sugar trade on the Caribbean coast. It is a city of attractive, well-shaded streets, and substantially built houses.

One of its plazas is the largest in Cuba. Among the principal buildings are the governor's house, market, railroad station and military and gov¬

ernment hospitals. Water from the aqueduct is supplied to 42 per cent of the dwellings; from wells, to 47 per cent; from cisterns, to 7 per cent. There are social clubs, a theatre, *etc.*

The city is lighted by gas and electricity. The climate from May to November cannot be highly commended, the air having an excess of mois¬

ture, and the temperature ranging from 75° to 98° F. The winter months, however, are very agreeable, winds from the north prevailing, and the temperature ranging from 60° to 78° F.

during the day, with cooler nights. Cienfuegos is connected by rail with Sagua la Grande, on the opposite coast ; with Santa Clara, the west¬

ern terminus of the Cuba Company's main line to Santiago ; with Havana, *etc.* By steamer it is in regular communication with New York, as well as with ports of the southern coast of Cuba from Santiago to Batabano. The census taken during the first American intervention showed : number of inhabitants engaged in trade and transportation, 3,065 ; in agriculture, fisheries and mining, 901 ; in personal service, 4,004; in manufactures and mechanical in¬

dustries, 3,221; in professional service, 294; without gainful occupation, 18,553; total school attendance 3,832 ; number of persons able to read, 18,052, or 60 per cent — a higher percentage in this respect being found among Cuban cities only in Havana (66 per cent) and Puerto Principe (62 per cent). Foreign-born, 11.6

per cent of the city's population. The white people numbered 19,220; negroes, 3,068; mixed, 7,401; and Chinese, 349. Population, 30,100 in 1907; (est.) 31,000 for the city proper in 1916.

CIESZKOWSKI, tse'asb-kov'ske, Au¬

gust, Count, Polish philosopher and econ¬

omist: b. Sucha, Podlachia, 1814; d. 1894. He was educated at the University of Berlin, was one of the founders of the Biblioteka W arszawska, and in 1848 settled in Posen. For many years he served as deputy in the Prussian Chamber of Deputies. He tried but in vain to establish a university in Posen and in 1872 was made a member of the Cracow Academy. He combated the pantheism of Hegel and developed his own concepts of God, the immortality of the soul and the divinity of Christ. His best known works are (Prolegomena zur Historiosophie) (1838); (Gott und Palingenesie) (1842); (De la pairie et de l'aristocratie moderne) (1844); (Du credit et de la circulation (1847) ; (Ojcze-Nasz> (1848) and (0 drogach ducha> (1869).

CIEZA, the-a'tha, Spain, town in the prov¬

ince of Murcia, and 26 miles northwest of the city of Murcia, on an eminence near the right bank of the Segura. It has spacious streets, a large church and ancient tower, manufactures of linen and hempen fabrics, and a trade in corn, wine, oil and silk. Pop. 14,393.

CIGAR (of uncertain etymology; it can¬

not be connected with any West Indian speech, and the customary derivation from Sp. cigarra, cicada, in allusion to a similarity of outline is generally denied by scholars ; Sp. cigarro.

Also incorrectly spelled segar), a short compact roll of tobacco leaf for smoking. This form was borrowed by the Spanish invaders from the Indians of Cuba. When the Spaniards found that tobacco would grow elsewhere, they trans¬

planted it to their possessions in the Philippines and to other localities. The Manila cheroot is the common form in which tobacco is smoked in the Far East. This cheroot is a roll cut off squarely at both ends and is shorter than Ameri¬

can cigars. Rolling tobacco into cigars was not generally practised in

Virginia and the Carolinas for a long time after the settlement of those sections by the English, for there the Indians invariably smoked their tobacco in pipes, but finally the convenience and superior flavor these rolls possessed made their use quite common some years before the Declaration of Inde¬

pendence of the Afnerican colonies. In Cuba, Mexico and Central America and, in fact, in all Spanish-speaking countries, the use of a pipe to this day is a rarity, the inevitable cigarro or cigarette ((<little cigar®) being found constantly in use. ‘

The moist climate, the character of the soil and the peculiar preservative -qualities of the air make Cuba the true home of the perfect cigar. There are but half a dozen valleys, mostly in the western end of the island, in-the province of Pinar del Rio, where the finest cigar tobacco is grown and cured, the most important being the Vuelta Abajo district. In this section the soil is of volcanic origin. It is the color of chocolate, and of great depth. The fields are carefully and scientifically fertilized from year to year to preserve the proper pro¬

portion of chemical ingredients necessary to produce the finest tobacco. It has been truly said that the making of a-cigar begins with the cultivation of the tobacco leaf. The flavor of the cigar depends essentially upon the harvesting of the leaf at exactly the proper moment. The finest quality of tobacco may be reduced to an inferior grade by gathering it while the juices are too green. Having been gathered, the Cuban tobacco leaves are hung in curing-houses, where they remain for seven weeks, during which time the color changes from the rich green of the growing plant to the peculiar shade of brown assumed by the specific variety under consideration. Having safely passed this stage, the tobacco is ˆsweated® in piles for a day or two, and is then baled and placed in a storage warehouse where it under¬

goes a fermentation process. It remains in this storage for from one to two years, accord¬

ing to the grade of cigars in which it is to be used — the longer the storage, the finer the smoking qualities. Havana tobacco thus pre¬

pared is of an even dark brown color, without spots or stains. The finest quality brings as CIGAR

high as $20 a pound. The excellence of the Havana cigar does not depend wholly on the quality of the tobacco, but is due in part to the skill of the Cuban cigar-maker who knows what blending of leaf will yield the choicest flavor. Perhaps the next best grade of cigar tobacco comes from Porto Rico. The removal of the duty on manufactured cigars from that island in 1903 flooded the United States with cigars from there, many of them very inferior.

In order to avoid paying the high duties on Cuban-made cigars, the device was early tried of bringing the tobacco over to the small island of Key West, a part of the State of Florida, separated from Cuba by only an 80-mile-wide strait. It was thought that the climatic con¬

ditions there would be so similar to those of Cuba that an equally fine cigar could be made there, while the importation of the tobacco in bulk cut down the duties very materially. The ((Key WesU cigar is much cheaper than the one made in Cuba, but the flavor, for some reason, is inferior. The manufacturers even brought cigar-makers from Cuba to Key West, so that so far as possible the product might be the same as the original, but in vain. It has been discovered by experts of the Department of Agriculture that in Ohio and Texas are certain areas which possess a soil so similar to that of the cele¬

brated Vuelta Aba jo district of Cuba that it is possible to raise tobacco there that will equal the Cuban. Samples of the leaf grown there and submitted to dealers in New York and Philadelphia, who were not told where it came from, proved to be so similar to that of Cuba that it was pronounced pure Havana leaf of the best quality. The pioneer in the manufac¬

ture of Key West cigars was Gen. J. H.

Gregory, who gained his military title in the first war for Cuban independence, and was familiar with the internal resources of Cuba.

The cigar is made up usually of two parts : the filler and the wrapper. In some makes there is also an intermediate strip placed around the filler, known as the binder. In the cigars made in Cuba (so-called Havana cigars), the filler and wrapper are of the same tobacco. In the cigars made in the United States, the filler is generally of one kind of

tobacco, and the wrapper of another. About one-sixth of the tobacco used in cigar making in the United States is imported. The imported filler tobacco comes chiefly from Cuba, Porto Rico, Mexico, Brazil and the Philippines, and the wrapper tobacco from the Dutch East Indies and Cuba.

The best tobacco for wrappers is grown in Sumatra. Connecticut wrappers are also much used, being supple and tough. The best cigars made within the limits of the United States are undoubtedly those manufactured in Key West, of Cuban tobacco with a Connecticut wrapper.

Those with Virginia, Carolina, Pennsylvania and other tobaccos as the filler, with the Con¬

necticut wrapper, are of inferior quality, but sell in large quantities, because of their cheap¬

ness. Tobacco for the ((little cigars, » cheroots and all cheaper brands is grown in Wisconsin, Connecticut, New York, Pennsylvania, Ohio and Florida.

Tobacco comes to the cigar manufactory in bundles, or bales, that suitable for wrappers being in separate packages. When the leaf is received the bales are opened, and the leaf spread out and sprayed with water. It is then piled for some hours until it has become moist throughout and pliant. It is then graded, and placed in bins for further curing of from one to six weeks. Tobacco leaf is highly absorbent and readily takes up odors from the air. If these are foul, the effect on the tobacco will utterly ruin the cigars made from it. The best temperature in which to keep the tobacco leaf is 65° F., and the moisture content of the air should be about 70 per cent. As it becomes ˆripe® it is taken to the cigar-makers. The operative spreads the filler leaf on his bench, with a small quantity of the wrapper beside him. He rolls the filler into the proper shape and firmness, then deftly cuts a portion of leaf to form a wrapper, winds the wrapper about the filler and secures the ends with paste.

This is the standard method. Some popular grades are made by machinery, but hand¬

made cigars are generally considered the best.

The cigars are passed upon critically by a fore¬

man who rejects those not up to the standard of the factory. The passed cigars are placed in large cedar bins for seasoning. Finally they are sorted according to color, and packed into boxes. In general there are five distinct color grades: (1) Claro or Clara, a very light brown; (2) Colorado Clara, light brown; (3) Colorado, medium brown ; (4) Colorado

Maduro, dark brown; and (5) Maduro, very dark, almost black. As a fact, however, in large factories up to 32 shades of brown are recognized. The color, while usually considered an indication of the strength of the cigar, has in reality nothing to do with it, the wrapper giving no perceptible flavor to the cigar, consti¬

tuting but about two per cent of it. And actually the flavor depends mostly upon the age at which the leaf was cut, and the time and skill bestowed upon its curing. The dark tobacco is the more likely to be ripe, and therefore superior in quality, and likely to be much milder than the very light cigars. In 1914 there were 16,754

manufacturers of cigars and 381 manufacturers of cigarettes operating in the United States.

The total output for that year was 16,869,520,463

— an increase in the year of 1,298,722,016. In 1917 the output was 8,266,770,593 cigars, an increase of 876,587,423 over the previous year and the largest output on record.

In the same year 35,377,751 pounds of snuff were manufactured and 445,763,206 pounds of smoking and chewing tobacco. The average quantity of unstemmed tobacco required to make 1,000 of the cigars weighing more than three pounds was 21.45 pounds.

The average quantity used to make 1,000

little cigars was 6.46 pounds; the aver¬

age for cigarettes was 3.68 pounds. The total quantity of leaf tobacco used in mak¬

ing the 1914 output was 157,967,457 pounds for cigars, and 62,209,366 pounds for cigarettes —a total of 220,176,823 pounds. In that year the United States imported 7,863,130 pounds of wrapper tobacco (valued at $9,992,276) and 49,-

543,392 pounds of other leaf tobacco (valued at $24,779,771). Of the latter, a considerable amount was used by cigarette-makers — the figures for cigar tobacco are not kept separate by the Department of Commerce. Of the

wrapper tobacco, 7,688,514 pounds was ((Sumatra® leaf, from the Dutch East Indies, and 117,315 pounds Cuban leaf. Of the other leaf tobacco, Cuba supplied 25,601,021 pounds 676

(valued at $14,504,856), Turkey, 21,141,40 2

pounds (valued at $9,014,612), and Porto Rico, 6,353,528 pounds (valued at $2,805,532). The influence of the European War upon the tobacco imports of the United States may be seen by comparing the following figures for the fiscal year ended 30 June 1916 with those of the calendar year 1914 given above. Of wrapper tobacco there was imported in the year ended 30 June 1916, 5,070,308 pounds, valued at $7,-

246,933. Of this, 4,963,961 pounds came from the Dutch East Indies. Of other leaf tobacco there were imported 42,943,027 pounds, valued at $17,372,126. Of this, 23,920,859 pounds came from Cuba, and 6,705,823 pounds from Porto Rico. The usual importation of Turkish to¬

bacco was entirely lacking.

The importation of cigars was: from the Philippines, 1,081,840 pounds, valued at $1,-

369,836 (in 1914, 798,744 pounds, valued at $1,238,306) ; all others, 564,116 pounds, valued at $3,373,042 (in 1914, 552,251 pounds, valued at $3,232,390). In addition Porto Rico sup¬

plied 156,996,000 cigars and cheroots, valued at $5,528,406. Of cigarettes, there were imported 52,780 pounds, valued at $72,325 (in 1914, 40,777

pounds, valued at $63,219). Of cigars exported, there were 1,394 pounds, valued at $24,439; of cigarettes, 2,612,389 pounds, valued at $4,325,513.

For further details, including the culture and preparation of tobacco-leaf, see Tobacco. Con¬

sult also Brennan, W. A., (Tobacco Leaves) (Menasha, Wis., 1915).

CIGARETTE. See Cigar.

CIGNANI, chen-ya'ne, Carlo, Italian

painter: b. Bologna, 15 May 1628; d. Forli, 6

Sept. 1719. He was a pupil of Albano. He knew how to compose, like the Carracci, and to distribute his figures in such a way that his paintings appear larger than they really are.

His finest fresco paintings are at Saint Michael in Bosco, at Bologna, in ovals supported by angels, and in the salon of the Farnese Palace, where he represented Francis I of France touching for the king's evil. In his painting of the Assumption, at Forli, he has imitated the beautiful Michael of Guido in the cupola at Ravenna, and other fine conceptions of this painter ; but in other pieces he made Correggio his model. He does not so often introduce foreshortenings as the Lombards; and in his outlines and drapery he possesses a finish pe¬

culiar to himself. His pencil is powerful, and his coloring lively. Clement XI conferred on him several marks of distinction. His paintings have been engraved by various artists.

CIGNAROLI, chen-ya-rd'le, Giovanni

Bettino, Italian painter: b. Salo, near Verona, 1706; d. Verona, 1 Dec. 1770. His best works are in the cathedrals of Pisa, Bergamo, Mantua and in the churches of his native city and of Ferrara. He educated a numerous school at Verona, and received several invitations to visit foreign courts, which he invariably declined.

In style he resembled Carlo Maratti, but formed himself on the works of Guido and Correggio.

He was a man of literary culture, and wrote with discrimination and taste on various sub¬

jects.

CILIA, sfl'i-a (Latin, ˆeyelashes®), small, generally microscopic, hair-like organs or ap¬

pendages, averaging inch in length, found on the surface of the tissues of most animals, and in some vegetable organisms (as algte), chiefly on tissues which are in contact with water, or which produce fluid secretions. They are constantly in a state of active movement, and communicate to the fluid with which they are in contact a corresponding motion. This is called vibratile or ciliary motion. In most of the lower aquatic animals the respiratory function is aided by means of the vibratile cilia; many animalculae move by a similar mechanism ; and in the highest classes of animals cilia have a share in the performance of some important functions.

CILIATA, sil-i-a'ta, a group of Protozoa, and to which belong most of the Infusoria (q.v.). The body is covered with cilia, and it is either free or stalked and attached to sub¬

merged plants, *etc.* The group comprises the most specialized Protozoa, including the trum¬

pet-animalcule (Stentor), the bell-animalcules (Vorticella and Epistylis) . In these one-celled animals there is for the first time in the animal kingdom, as we ascend from the simplest organisms, a permanent aperture (cytosome) corresponding to the mouth of the higher animals, and an oesophagus (cytopharynx), and the undigested or waste portions of the food are cast out at a fixed point or opening (cytopyge), usually not detected when not used.

There is also in the stentor, etc., a definite spiral muscle, while nettling bodies (trichocyst), like minute rods, in rare cases occur, and are sup¬

posed to be defensive in their nature. The ciliate infusoria reproduce

by fission, budding and also by conjugation, molting in the origin of spores or embryos. Certain forms are para¬

sitic ; thus the skin disease called eczema has been attributed to the presence of parasitic yorticellce, and a flattened oval free form occurs in the large intestines of men ill with diarrhoea.

CILICIA, sl-lish'i-a, in ancient geography the maritime country between Pamphylia on the west and Syria on the east, lying south of the Taurus Mountain range along the extreme northeastern area of the Mediterranean Sea.

The inhabitants of the coasts were formidable as pirates, and even disturbed the 2Egean and Ionian seas. The inhabitants of the northern portion lived in part a nomadic life; those in the east were devoted to agriculture. Its capital city was Tarsus. Alexander made Cilicia a Macedonian province after which many Greeks settled there. Later Cilicia passed to the Syrians. Pompey subdued its piratical inhab¬

itants. The mountainous parts were left in the hands of the native princes; the rest, in 67-66 b.c., was constituted a Roman province, of which Cicero was proconsul in 51-50 b.c. It is now a part of the Turkish vilayet of Adana.

CIMABUE, che-ma-boo'a, Giovanni, Ital¬

ian artist: b. Florence 1240; d. there about 1302.

Two Greek artists, who were invited to Florence by the Senate to paint a chapel in the church of Santa Maria Novella, were his first masters. Although these artists handled the pencil awkwardly, they however taught him, according to ancient tradition, the proportions which the Greek artists had observed in their imitations of the human figure. Attentive to their instructions, Cimabue studied principally the fine antique statues. He was the first to point out to succeeding painters the elements CIMAROSA

CIMICIFUGA

ol the bean ideal, the memory of which had been extinguished during several centuries of disorder. It is true the paintings of Cimabue do not exhibit that harmonious distribution of light and shade which forms the chiaroscuro.

His coloring is dry, flat and cold ; the outlines of his figures intersect each other on a blue, green or yellow ground, according to the effect which he had in view. He had no idea of linear and aerial perspective. His paintings are, properly speaking, only monochromes. But these faults, which are to be attributed to the infancy of the art, are compensated for by beauties of a high order — a grand style, ac¬

curate drawing, natural expression, noble grouping and a fine disposition of his drapery.

His best paintings are in the church of Santa Maria Novella at Florence, and in the Sacro Convento at Assisi. He may be considered the link between the ancient and modern schools of painting. Cimabue evinced a generous appre¬

ciation of Giotto, whom tradition says he dis¬

covered drawing figures on the smooth surface of a rock while tending his sheep, and whom he took with him to Florence, and instructed with such success that the pupil soon excelled his master. It should be added that there is very little corroborating testimony regarding the works attributed to him by Vasari, and a de¬

structive critic wrote in the Nineteenth Cen¬

tury for March 1903. ((A11, then, that we know about this Cenni di Pepi is that he was a dis¬

tinguished Florentine artist ; that he was nick¬

named Cimabue ; that he flourished in the closing years of the 13th century and the early years of the 14th, and that he executed a mosaic and an altarpiece at Pisa, of which the latter has . disappeared and the former has been en¬

tirely renewed.®

CIMAROSA, chema-ro’-za, Domenico,

Italian composer: b. Aversa, near Naples, 17

Dec. 1749; d. Venice, 11 Jan. 1801. He received his first musical instruction from Sacchini, en¬

tered the conservatory of Loretto, where he imbibed the principles of the school of Durante, and studied with great assiduity. He soon dis¬

played his superiority in the (Sacrificio di Ab-ramoj the <01impiade) and other composi¬

tions. At the age of 25 he had already gained the applause of the principal theatres of Italy.

He was invited to Saint Petersburg (where he remained four years) and to several German courts to compose heroic and comic operas. In the latter he particularly distinguished himself by the novelty, warmth, humor and liveliness of his ideas, and by a thorough acquaintance with stage effects. Among his 120 operas the most celebrated are (Penelope) ; (Gli Orazj e Curiazj) ; and ˆrtaserse,* among the opere serie; and among the opere buffe, (L’Italiano in Londra) ; (L’Amor Costante) ; (I1 Pittore Cari-gino) ; and many others. His comic opera, HI Matrimonio Segreto,* excited general enthu¬

siasm, and received the signal honor of being performed twice on the same evening, at the desire of the Emperor Leopold. From Vienna he went to Naples, and became involved there in the revolutionary commotions. He died from the effects of the ill treatment which he had been subjected to in prison. His bust, by Canova, was placed in the Pantheon at Rome in 1816 by the side of those of Sacchini and Paesiello,

CIMBRI, kim’bre, a tribe which inhabited Jutland (the Chersonesus Cimbrica), whence they sallied, together with the Teutones, and became among the most formidable of the ene¬

mies of Rome. In the year 114 b.c., when the Romans were already masters of a part of the eastern Alps, in the present Carniola, Istria, etc., and had established themselves in Dal¬

matia and Illyria, along the coast, immense bodies of barbarians suddenly made their ap¬

pearance, who overcame the consul Papirius Carbo in the country now called Styria ; but instead of entering Italy they proceeded to the north, and soon after, jointly with the Tigurians, entered the territory of the Allobroges.

The Romans sent two armies, commanded by the consuls L. Cassius and M. Aurelius Scaurus, to oppose them, but both were defeated — the former by the Tigurians, the latter by the Cimbri. Even after this success the victors did not enter Italy, but overran Gaul with three bodies, consisting of Teutones, Cimbri and Ambrones. Two new armies, with which the con¬

sul C. Manlius and the proconsul Q. Servilius Ciepio hastened to oppose them, were likewise defeated beyond the Rhodanus. The Romans lost, according to Aetius, 80,000 men. While Rome placed her last hope in Marius, the bar¬

barians overran the other western countries of Europe. Gaul suffered severely, but the Iber¬

ians and Belgians repulsed the invaders. Upon this they resolved to descend into Italy. The Teutones and Ambrones were to enter on the western side of the Alps, the Cimbri and Tigur¬

ians on the east. After Marius had waited the approach of the first during three entire years, and had accustomed his troops to their ap¬

pearance, he routed them completely (102 b.c.) in two days — ‘on the first day the Ambrones, on the second the Teutones — at Aix in Prov¬

ence. The Cimbri, on the other hand, who had driven back the consul Catulus on the Adige, and had spread themselves along the Po, de¬

manded land of the Romans, but were totally routed by Marius at Vercelli 101 b.c. About a century after this the Cimbri sent (from the Cimbrian Chersonesus) an embassy to the Roman emperor Augustus, to offer him presents and to ask pardon for what they had previously done against the Romans. The nationality of the Cimbri is a disputed point. Similarity of name led the ancients to identify them with the Cimmerians, but this view is no longer held.

Some authorities believe them to have been of Germanic, others of Celtic race. Their name certainly has a great resemblance to that of

the Celtic Ivymri; and their armor and customs, according to Plutarch and Strabo, were very different from those of the Germans. <(A11

these circumstances,® says Schmitz, in Smith's dictionary of Greek and Roman Geography, >

"render it in the highest degree probable that the Cimbri were a Celtic or Gallic and not a Germanic nation.®

CIMBRIAN PANIC, The, a Roman

panic after the annihilation of five armies by the Cimbrians 105 b.c. This panic rose to its climax after the terrible defeat of Caepio, the consul, in Gallia Narbonensis.

CIMEX LECTULARIUS, si'meks lectu-laFe-us. See Bedbug.

CIMICIFUGA, si-mT-sif'u-ga, from the

Latin Ho drive away,® so named because cer-678

tain species are used to drive away bugs and other insects. The plant is a genus of the crow-foot family, comprising about 20 species, natives of North America, Asia and Europe.

The best known American species, because of their medicinal properties, are the bugbane (Cimicifuga americana) (q.v.) and the black snakeroot or black cohosh (C. racemosa) , sup¬

posed to be an antidote for the venom of ser¬

pents.

In medicine cimicifuga is used largely by the eclectics as a digestant, cardiac tonic and uterine stimulant. Its active principles have never been thoroughly determined and little is known of its physiological action as determined by exact pharmacological experiment.

CIMMERIAN, si-me-ri'an, BtDSPORUS,

an ancient name for the Strait of Kaffa.

CIMMERIANS, a tribe half-mythical,

half-historical, described first in the Odyssey as dwelling beyond the ocean-stream, in thickest gloom, unvisited by Helios. Hence the term, (<Cimmerian gloom.® From Herodotus we

learn that they originally inhabited the country between the Borysthenes and the Tanais, but expelled by the Scythians, they traveled along the shores of the Euxine, passed through Col¬

chis and over the Halys, and entered Asia to the west of that river. Against this it is urged that the route by the Euxine would be impass¬

able for a nomadic people, the Caucasus run¬

ning down to the very shores of that sea. The sum of our certain knowledge respecting this people is, that they seem to have been the chief occupants of the Tauric Chersonesus (the Cri¬

mea), where they had a large city, near which were fortifications enclosing the isthmus by an earthen wall.

CIMOLIAN, si-moli-an, EARTH, or

C l M O LITE, sim'6-lit or kim'6-lit (from Kimolos, one of the Cyclades, in the 2Egean Sea, where it is still to be found), a hydrated silicate of aluminum, apparently formed by the decomposition of augite. It is of a light color, compact and somewhat slaty. Water soon splits it up; when ground with water it forms a thick cream. In classical times it was used as a soap for cleaning delicate fabrics, and by the bath-

keepers. It is mentioned by Aristophanes in this connection. It is used in the island as a detergent.

CIMON, ki-mon, Athenian general and

statesman : b. about 502 b.c. ; d. Citium, Cyprus, 449 b.c. He was a son of the great Miltiades.

He fought against the Persians in the battle of Salamis 480 b.c., and shared with Aristides the chief command of the fleet sent to Asia to deliver the Greek colonies from the Persian yoke. The return of Aristides to Athens soon after left Cimon at the head of the whole naval force of Greece. He conquered the pirate-island of Scyros, subdued all the cities on the coast of Asia Minor, pursued the Persian fleet up the Eurymedon, destroyed more than 200

of their ships, and then, having landed, on the same day entirely defeated their army 469 b.c.

He employed the spoil which he had taken in the embellishment of Athens, and in 463 re¬

duced the revolted Thasians ; but the popular leaders, beginning to fear his power, charged him on his return with having been corrupted by the king of Macedon. The charge was dropped, but when Cimon's policy of friendship to the Lacedaemonians ended in the latter in¬

sulting the troops sent by Athens to their aid, his opponents secured his banishment. He re¬

tired into Boeotia, and his request to be allowed to fight with the Athenians against the Lace¬

daemonians in 457 at Tanagra was refused Eventually Cimon was recalled at the instance of Pericles to conclude a peace with Lace¬

daemon. He died while besieging Citium in Cyprus. His (Life) was written by Cornelius Nepos.

CINAPUSEN, se-na-poo'san, or CINA—

PURAN ISLANDS, a cluster of 10 islands of the Tawi group, Sulu Archipelago, lying south¬

west of the island of Sulu ; area, 13 square miles.

The islands are covered with tropical vegeta¬

tion, and are mostly resorted to for fishing by natives of neighboring islands. Tabawan, the largest of the cluster, is, however, thickly popu¬

lated; the inhabitants carry on a considerable pearl fishery. They were at one time notorious pirates, but since the destruction of their settle¬

ments by a Spanish fleet, have been harmless and inoffensive. The islands now belong to the United States and are a part of the military department of Mindanao.

CINCHONA, sm-koma, BARK, the bark

of several species of Cinchona, a genus of trees and shrubs of the family Rubiacea.

The following are the most important: Cin¬

chona flava cortex, yellow cinchona bark, which occurs as quills covered with a brown epi¬

dermis, mottled with whitish yellow lichens, and also in flat cinnamon-colored pieces. They break with a fibrous fracture and the escape of a powder. Yellow bark is rich in quinine, and 100 grains should yield not less than two grains of alkaloid. It is derived from C. calisaya, which grows in the peculiar cloudy regions of the Andes. C. pallida cortex, pale cinchona bark, from C. officinalis. It occurs always in quills covered with crustaceous lichens. Its fracture is short and not fibrous. It contains chiefly cinchonine. Two hundred grains of the bark yield about one grain of alkaloid. C. suc-ciruhra, a native of Peru, appears to thrive in India. The bark occurs in flattened rough-fibrous, dark-brown red pieces, which are cov¬

ered with a brown-red epidermis. It breaks with a red fibrous fracture. It contains about equal quantities of cinchonine and quinine, and 100 grains of the powdered bark should yield not less than one and one-half grains of alkaloid.

The yellow bark is used in the form of decoc¬

tion, extract, infusion and tincture. The pale bark is contained in tincture cinchona composita and in mixtura ferri aromatica. The cinchona barks contain, besides the alkaloids, certain acids having astringent properties, and are valuable as tonics in cases of great debility.

Cinchona barks rich in quinine generally con¬

tain much lime, and their solutions are pre¬

cipitated by sodium sulphate. See Quinine.

CINCINNATI, Ohio, city and county-seat

of Hamilton County, in the extreme southwest of the State, one of the great commercial and manufacturing centres of the Union, 16th in rank according to the latest census. It is situated on the north bank of the Ohio River, almost exactly half way from its origin at Pittsburgh to its mouth at Cairo, Ill., about 465 miles by water from each, and 315 miles by rail from the former and 369 miles from the CINCINNATI

latter; and is a terminal of every trunk line of railroad in the Middle West, being the main terminal of the Cincinnati Southern, Cincinnati, Hamilton and Dayton, Chesapeake and Ohio and a number of others. It is 138 miles by water from Louisville and 1,631 miles from New Orleans against 114 miles and 1,210 miles respectively by rail; 764 miles by rail from New York and 270 miles from Chicago.

Topography. — -Cincinnati occupies the

northern half of a circular amphitheatre of hills about two and a half miles in diameter bisected east and west by the Ohio River —which here makes a great southward sweep.

The southern half is bisected north and south by the Licking River with its Kentucky sub¬

urbs, respectable cities themselves. The north¬

ern semi-circle rises from the river in two great terraces sloping northward to a third level at the summit, originally quite distinct, now much confused by grading. The lower platform is a bluff about 65 feet above low water, the second 50 to 100 feet higher. The crest hills, 15 to 300 feet higher yet, are about 475 feet at the summits — Mount Adams, Price Hill, Mount Lookout, Mount Auburn, Fairview Heights, *etc.* — giving a noble prospect of river and country. Three of these hills can be reached by inclined plane cable railways, used in the main for lifting of electrical cars.

These hills are cut by ravines, the heavy original woods having been replaced bv miles of the finest residence streets in America, parked with shrubbery, lawns and flower gar¬

dens. On the western side of the city from north to south runs Mill Creek, the remains of a once huge glacial stream whose gently slop¬

ing valley, one-half mile or more wide, forms an easy path into the heart of the city and was an indispensable factor in determining its posi¬

tion. Highways, canals and railroads come through it and the city's growth has pushed much farther up this valley than in other direc¬

tions. The railroad stockyards are on its east¬

ern slope. Cincinnati extends for about 30

miles along the river front to a width of about 15 miles in an irregular block north from it.

The total area thus far in the city limits is 72

square miles, much more being legitimately a part of it. Cincinnati owns a strip of land 100

feet wide and 335 miles long directly south to Chattanooga, Tenn., upon which is built the city-owned Cincinnati Southern Railroad.

Municipal Conditions. — The site of the city is a glacial moraine of gravel and boulders cut through by the Ohio River. There is there¬

fore little bottom land and there has been from the first none of the

malaria which was long such a scourge and reproach to Western settle¬

ments ; and this with the moderate climate averaging about >75 degrees in summer and 30

or 40 degrees in winter and the easy sewerage down the slopes into the Ohio and away from the city has given it excellent sanitary con¬

ditions. Its death rate fell from 21 per 1,000 in 1890, to 15.6 per 1,000 in 1915. The city owns its waterworks and 712 miles of mains. In re¬

cent years it has completed a municipal water¬

works at a cost of $12,000,000, including a com¬

plete magnificent filtration plant which fur¬

nishes the city with 128,000,000 gallons of pure water daily. This water is so pure that it is used for all hospital purposes except where distilled water is distinctly specified. Cincin¬

nati has 960 miles of streets and alleys (608

miles improved) ; and 463.6 miles of sewers.

It owns property worth $126,000,000 and has an assessed property valuation of $706,613,000.

Interior, Suburbs, *etc.* — The bottom level below the bluffs, along the river seat, is the site of the river shipping business, and has the usual fringe of low quarters. It is paved and there is a broad public landing fronted by floating docks, wharf boats, *etc.* Above are the wholesale and then the retail business streets with great extent and variety of fine business architecture and girt around with electric roads of which there are some 227 miles within the city limits. The principal lines converge at or near Fountain Square and connect with a ring of suburbs within and without the city limits, unsurpassed in America. To the north are Clifton, Avondale, Mount Auburn, Vernonville, College Hill, Winton Place, Linwood, Elmwood, Hartwell, Lockland, Glendale, Norwood, Oak¬

ley, Walnut Hills, Mount Lookout, *etc.* Across the river, over which on three bridges the electric lines run, are numerous cities and towns, including Covington, Ludlow and Mill-dale to the west of the Licking, and Newport, Bellevue, Dayton and Fort Thomas to the east.

These are in the State of Kentucky, but are included in Cincinnati's metropolitan district.

The river is crossed by five bridges, each more than half a mile long, one exclusively for rail¬

way traffic, two for highway and two for both.

The trnss-bridge of the Cincinnati Southern to Ludlow — costing $3,348,675, is one of the long¬

est spans in the world; there are also the cantilever designed by John A. Roebling and completed at a cost of $1,800,000; and two wrought iron bridges to Newport, one of them used by the Louisville and Nashville Railroad.

The original town was laid out as a checker¬

board, with streets four rods wide, the con¬

ventional form of the artificial American town; but the irregular surface and individual tastes have given them greater variety since, and no city has a finer field for picturesque architec¬

ture. A local freestone and blue limestone are much used in building as well as brick with steel framing. The most notable public build¬

ings besides churches noted below are the gov¬

ernment building (post-office, custom-house, etc.), of brick and iron with freestone facing, 180 feet by 50 feet, costing $5,200,000 ; the new county courthouse, costing $2,500,000, erected in 1916; the Cincinnati General Hospital, a group of 29 buildings, costing $4,000,000; the magnifi¬

cent Music Hall, the gift of Reuben R. Springer and others ; the Romanesque public library, costing $675,000; the Masonic Temple (Byzan¬

tine) ; the Odd Fellows' Temple; the Y. M.

C. A. building, the Art Museum, the Queen'

City Club, Bell Telephone building, the Union Central Life building, the tallest office building outside of New York city, and a number of sky¬

scrapers of from 15 to 20 stories, one of which, the Ingalls building, was the first tall concrete structure in the world. Of public monuments, the most artistic is the Tyler Davidson Fountain, with a surrounding esplanade on Fifth street between Vine and Walnut on Fountain square, the centre of most of the street car lines. It was presented to the city by Henry Probasco in 1871, having been cast at the Royal Foundry at Munich at a cost of $200,000. The equestrian statue of President William Henry Harrison

(first governor of Ohio), the statues of Gar¬

field, Lincoln, Ecker and McCook, and the Fort Washington monument also adorn the city.

Parks, Cemeteries, *etc.* — The park system comprises 2,550 acres in three large bodies on the hills and many smaller ones. The largest is the superb Mount Airy Forest, containing 943 acres. The second is Eden Park, formerly called the Garden of Eden. It is situated on Mount Adams, in the northeast centre, contain¬

ing the two main city reservoirs made to look like lovely natural lakes; there is also a water tower with steps to the top commanding a matchless prospect. The Art Museum and Art School, two beautiful buildings costing $450,000, are within the grounds, which are entered by a mediaeval gateway, Elsinore, much admired.

The . next largest and an equally picturesque park is Burnet Woods, containing 160 acres.

It contains the grounds of the University of Cin¬

cinnati. The Cincinnati Zoological Gardens (q.v.), northeast of Burnet

Woods, comprise 60

acres of wild natural beauty, and contain a varied collection of wild animals and birds.

McFarland Woods, Owl's Nest Park, Mount Echo Park and Ault Park, together with Lin¬

coln, Washington and Hopkins, are the finest of the smaller parks. Most of the 20 cemeteries are in the northeast, although one or two are in the extreme southwest, but the one superb burial ground, one of the largest and most charming in the country, is Spring Grove Ceme¬

tery, about six miles north on the western slope of Millcreek Valley, with 600 acres of fine land¬

scape gardening and native beauty, and reached by an avenue 100 feet wide. It has a bronze statue as a soldiers' monument, and many magnificent and costly mausoleums.

Amusements, Clubs, *etc.* — Music is culti¬

vated in a number of well-patronized institu¬

tions, including the Conservatory, the College of Music and various smaller conservatories.

The biennial May festivals are an indispen¬

sable part of the city's higher life and are known throughout the world. Other important features of the musical life are the permanent Symphony Orchestra, which was endowed in 1915 for $1,000,000 by the late Cora M. Dow ; the Orpheus Club and a large number of Ger¬

man singing societies. The grand Music Hall is a monument of the munificence of Reuben Springer, who founded it and gave it part of its endowment. It is 500 feet by 300 feet, has a seating capacity of 3,600, and its organ is one of the largest in the country. There are also the Grand, Lyric, Walnut, Keith's, Peoples' and Olympic theatres, over 100 motion picture houses, the Emery Auditorium and many halls where people congregate for entertainments of * various sorts. The chief clubs are the Queen City, Business Men's Club, Phoenix, Cincinnati, Cuview Press, Country, Literary, Woman's Women's City Club, Business Woman's, the City Club, Rotary Club, Advertiser's Club, Ben

Franklin Club, and the Trade Expan¬

sion Club. The Cincinnati Gymnasium has extensive suburban athletic grounds and owns a fine city building. There are two favorite summer resorts on the Ohio River, one on the Kentucky shore called the Lagoon, and Coney Island some miles up the river.

Chester Park, near Spring Grove Cemetery, is one of the best equipped amusement resorts in the Middle West,

Business Interests. — The position of Cin¬

cinnati as a midway port on the great central channel of one of the most fertile districts of the world, added to its location on a platform above the floods which washed away its rivals, was the origin of 'ts greatness; but that river traffic has greatly declined since the advent of railroads. Even yet, however, it is invaluable for the transportation of bulky freight — coal, ore, iron, lumber, salt, *etc.* — to manufactories and the distribution of its products to the Ohio and Mississippi ports as far as New Orleans, up the Ohio to Pittsburgh, to the Big Sandy, Cumberland, Tennessee and Green, Red, White, Arkansas, Yazoo, etc., covering 1,200 miles of the Ohio, 850 of the Mississippi, and 2,000 of tributaries. About 100 vessels a year register for this inland commerce, with a tonnage of some 8,000; but there is a much greater com¬

merce than this indicates, as one towboat will push many barges in front of it, a method peculiar to Western rivers. The government improvements, dredging and lighting the chan¬

nel, have greatly aided to keep this navigation alive. The immense railroad business has already been referred to. Seventeen roads enter Cincinnati ; the passengers of most of them come into the Central Union Depot at Central avenue and Third street ; but a few, of which the Pennsylvania is chief, have separate stations.

The Cincinnati Southern road, 338 miles long, was built and is still owned by the city, and is operated by the Southern Railway Company, under lease. The business interests of the com¬

munity revolve around the Cincinnati Chamber of Commerce, an organization of business and professional men, totaling 4,000, which conducts by means of a large income a thoroughly de¬

partmentalized organization, the principal de¬

partments of which are devoted to conventions and publicity, weighing and inspection, statis¬

tics, grain and hay, exchange, produce exchange, civic and industrial work, traffic, merchandis¬

ing and foreign trade.

The trade and manufacturing interests of the city are large and important. It has many national banks, clearings aggregating $2,030,-

181,819 in 1917. It has also a large number of State and private banks, building and loan as¬

sociations, many strong trust companies and savings banks. Slaughtering and packing of meats, especially pork, has been long and is still one of the leading branches of commerce, the city packing more than one-half of the produce of the State. Cincinnati holds the first position in the country in the manufacture and sale, both domestic and foreign, of machine tools and machinery. The number of industrial estab¬

lishments is about 4,000, with a capital of about $212,500,000, and 100,000 workmen, and occupy¬

ing real estate valued at $100,000,000, with an annual factory output of nearly $300,000,000.

According to the last census the greatest single branch is iron work, including pig, castings, foundry and machine shop products and archi¬

tectural iron work; men's clothing, slaughter¬

ing and packing of meats, distilled liquors, fac¬

tory made boots and shoes, carriages and their material, tobacco products and malt liquors. Other great products are leather and leather goods, furniture, lumber, timber and woodworking products; coffee and spices, roasted and ground; saddlery and harness; pickles and preserves; undertakers' goods; CINCINNATI, OHIO

i Fountain Square: Tyler-Davidson Fountain 2 University of Cincinnati

musical instruments ; soap and candles ; electri¬

cal supplies ; flour and grist ; plumbers' sup¬

plies; patent medicines; and society regalia, costumes, banners, etc., in which Cincinnati heads the United States. Other products num¬

ber hundreds, many curious and interesting, notably those of the Rookwood Pottery.

Educational Institutions, Libraries, News¬

papers, *etc.* — Cincinnati has a thorough system of public schools with 59 day elementary, 10

special, 2 night high, 6 night elementary, 6 pub¬

lic high schools and about 1,725 teachers; be¬

sides private academies and secondary schools including 51 Catholic parochial schools. For higher education the chief is the University of Cincinnati, the only municipal university in the United States, operated as part of the public school system, expanded from the old McMicken University, the capstone of the system of public instruction, with affiliated medical, and dental and law de¬

partments, and in connection the famous observatory now located on Mount Lookout —one of the earliest in the United States, with a 16-inch refractor and a new meridian circle, and with a notable record in the investigation of double stars. The university buildings are in a 30-acre space set off by the city in Burnet Woods Park. The Ohio Mechanics' Institute, one of the most important educational forces in the city, has a large, thoroughly equipped build¬

ing and library, and maintains both daily, and night schools, attended by hundreds, in which regular classical, literary and scientific instruc¬

tion and courses of lectures arc given. There are also medical and surgical schools, besides training schools for nurses in the hospitals; two other dental colleges ; a night law school ; sev¬

eral business colleges and schools of expres¬

sion; Lane Theological Seminary at Walnut Hills (1832) famous for Lyman Beecher and Calvin E. Stowe, and for its slavery dissensions, two Roman Catholic colleges, Saint Francis Xavier (1840) and Saint Joseph's (1873) ; five Catholic seminaries for the education of priests and six Catholic female academies and semi¬

naries, leading to others, the Hebrew Union College (Reformed Jewish) for educating

rabbis, the chief one in the United States; the Art Museum and Art School founded by Cin¬

cinnati ladies on the model of South Kensing¬

ton, London, with two large buildings and sev¬

eral hundred students, and a valuable collection of works of art. The Cincinnati Society of Natural History has a museum of valuable and interesting relics open to the public. Of the libraries, "the chief is the free Public Library, handsomely housed on Vine street (with over 490,000 volumes and pamphlets) and 23 branches and 26 stations. There are 16 others, subscrip¬

tion and institutional, of which the chief are the Young Men's Mercantile, the Law Library, that of the Mechanics' Institute, the library of Saint Xavier's College, Lloyd Library and Museum, the University Library, and the His¬

torical and Philosophical Society has the finest collection in existence of original manuscripts, pamphlets 'and bound volumes pertaining to the history of Cincinnati and the State of Ohio, and ranks among the first institutions of the kind in the country. The city supports some 20 daily newspapers English, German and

Italian ; over 80 weeklies, English and German ; over 100 monthlies and quarterlies, besides a number of special publications.

Churches and Charities. — Cincinnati has about 270 church bodies, 56 Roman Catholic (besides 5 convents), 219 Protestant of various denominations, 12 Jewish synagogues and 38

unclassified, including Christian Science, Spirit¬

ualist, *etc.* The city is the seat of a Roman Catholic archbishop and a Protestant Episcopal bishop, with cathedrals of both. The finest church building in Cincinnati is the cathedral of Saint Peter in pure Grecian style, 180 feet by 60 and 90, with a spire 224 feet high, and its priceless altarpiece Murillo's original ((St.

Peter Delivered.® Other prominent churches are the First Presbyterian, with a tower and spire 285 feet high, the loftiest in the West; the Second Presbyterian; Saint Francis Xavier and the Saint Francis de Sales (Roman Catho¬

lic), Christ's and Saint Paul's Protestant Epis¬

copal and Saint Paul's Methodist Episcopal, the Ninth Street Baptist, Unitarian, New Thought Temple and the church of the New Jerusalem (Swedenborgian). There are 61 benevolent associations in the city covering every class and grade of alleviable human misfortune, and an infirmary, a workhouse, with workshops and workgrounds. Prominent among 17 hospitals, public and private, are the Cincinnati General, Jewish, Good Samaritan, Longview Insane Asy¬

lum, Bethesda, Ohio Hospital for Women and Children, the Presbyterian, Elizabeth Gamble, Deaconess Home, Christ, and the Branch Hos¬

pital (the first tuberculosis hospital established in America for the scientific treatment of tuber¬

cular subjects). There are also numerous homes for the aged and infirm, for orphans, for incurables and the friendless, non-sectarian and denominational, all splendidly equipped, and a fresh air fund and farm.

Government, Finances, *etc.* — The govern¬

ment is a modified federal form, there is a four-year mayor, who

appoints directors of public service and safety, a legislative council of one from each ward with four elected at large and a board of education elected by the people. The city debt is about $55,000,000, but $27,000,000 of this is for the Cincinnati Southern Railroad which returns $1,000,000 per year rental. The tax rate is $15.46 per thousand dollars. The yearly disbursements are about $14,457,725, of which over $2,500,000 is for schools.

Population. — In 1800, 750; (1810) 2,540; (1820) 9,642; (1830) 24,831; (1840) 42,338; (1850) 115,435; (1860) 161,044; (1870) 216,239; (1880) 255,139; (1890) 296,908; (1900) 325,902; (1910) 363,591; (1920) 401,247, exclusive of the numerous suburbs. This is misleading, how¬

ever, without supplemental figures based on the population of the city with nearly one-third of its business population resid¬

ing across the river in another State, as well as several populous suburbs in other town¬

ships to the north, Newport, Bellevue and Dayton, Ky., east of the Licking, Covington and Ludlow, west of it, Millcreek, Columbia and Delhi and Norwood on the north adding about 200,000 to the population above stated. About 79 per cent of Cincinnati people are native white Americans, a greater proportion than any other large city in the United States. The foreign-born population is 15.6 per cent of the total. Male aliens over 21 years of age form only 2.6 per cent of the population. Negro 082

population is but 5.4 per cent of the total ; 78 per cent of the foreign-born population is made up of English, Irish and Germans; 10.3

per cent of the foreign-born population is made up of Russians, Italians and Hungarians.

History. — The site of Cincinnati at the time it first came under the

eye of the white man was covered with <(ancient works,® monuments of a prehistoric race. Traces of many of these <(works® still abound in the neighborhood, which is a centre of the so-called <(Mound Builders®

remains. Here, too, ran the old Indian trail leading from the British trading post at Detroit to the Licking River, and into the section south of the Ohio. Numerous bands of savages swept through the valley of the Miamis, subse¬

quently called the (<Miami Slaughter House,®

on their marauding expeditions against the Ken¬

tucky pioneers. It was in pursuing one of these bands of (<Horse Thieves® that Benjamin Stites first noticed the fertility of the section and its desirability for settlement. As a result of his efforts came the (<Miami Purchase.®

John Cleves Symmes, with other members

of Congress who had been interested by Stites, in 1787 began negotiations with the govern¬

ment for the land lying between the Miamis, which resulted in a conditional purchase that on survey proved to be some 600,000 acres, of which he ultimately received about half. Early in 1788 he sold 740 acres opposite the mouth of the Licking to Matthias Benman and others, with whom he visited the spot later and selected it as the site for a city, to be called Losanti-ville — a combination of Latin and French, meaning (<Town opposite the mouth of the Lick¬

ing.® After some shiftings of ownership a firm consisting of Israel Ludlow, a surveyor, and two others took possession 28 Dec. 1788, and Ludlow laid out a village with the present Central ave¬

nue and Broadway, about three-quarters of a mile apart, for east and west boundaries, and Seventh street, about as far from the river, for northern, blazing the street lines on the trees.

Three or four log cabins were built, and the flooding out of several Ohio River town sites about this time left Cincinnati the chief sur¬

vivor. The building of Fort Washington by the government in the

summer of 1789, just east of Broadway, still further confirmed its primacy, for the Indians were a terrible menace until long after. In January 1790 Gen. Arthur St.

Clair, newly-appointed governor of Northwest Territory, arrived, laid out Hamilton County (named after Alexander Hamilton), and made its seat the new town, whose name he changed to Cincinnati (Symmes who professes to have suggested the change, was tenacious for Cincinnata), after the famous society of Revolu¬

tionary officers, of which he was a member.

By the end of 1790, it had some 40 log houses.

The defeats of Harmar (1790) and St. Clair (1791) nearly caused its abandonment in a panic, but the importance of the fort kept the settlement alive. In 1792 as man}'- as 354 lots had been taken for building; and so important a centre of commerce had it become even then that 34 of its buildings were warehouses well stocked with goods. It had some 900 inhabit¬

ants, but many of them were floaters. A visit¬

ing missionary reported that the people re¬

sembled those of Sodom, and the town, like others on the north bank of the Ohio, was thronged with frontier idlers and lawless ruffians, who took refuge in Kentucky when brought to book; but as the first church (Pres¬

byterian) was built this year, and the first school (pay) opened with 30 scholars, perhaps some of this language was ((common form.®

Also as settlers were compelled by law to take their loaded guns to church for protection against Indians, it was no place for the tamer sort. In 1793, the Sentinel of the Northwest Territory, the first newspaper published north of the Ohio, appeared, and a year later the first through mail to Pittsburgh was started in a canoe, and a packet line of keel boats to Pitts¬

burgh was organized. Wayne's crushing defeat of the savages at Fallen Timbers, bringing peace to the frontier, was in one sense disastrous to Fort Washington, as settlers swarmed all over Ohio, and it ceased to be the one centre. This defeat, however, assured the permanency of Cin¬

cinnati, which increased slowly but surely until in 1800 its population was 750, a growth of 50

per cent since 1795. In December 1801 the seat of territorial government was removed to Chillicothe. But its 12 years' primacy, the army post making it a depot for supplies, and its frontier position, had given it a safe start. In 1802 Cincinnati was incorporated as a town. A well-known picture of the town also dates from this year, in which, too, a (< Young Ladies'

School® was started, indicating a superior grade of population, and from February to May 1802

over 4,400 barrels of flour were exported, show¬

ing its development as a distributing port. The first bank, that of the Miami Exporting Com¬

pany, was started in 1803. In 1805 the town had 960 people and 172 buildings. But immigration set in much more strongly a year later, and the names show an extraordinary intellectual cali¬

bre, in the settlers it was attracting. In 1810 it had 2,300 inhabitants, and was the largest town in the State, the centre of immigration to Ohio, and with a great commerce along the river, and was contemplating a university. The first book descriptive of the place appeared this year writ¬

ten by the celebrated Dr. Drake. In October 1811 the steamboat New Orleans passed the town on her first trip from Pittsburgh to Louis¬

ville. A stone steam mill 110 feet high of nine stories and with foundation walls 10 feet thick dates from 1812. In 1814 Lancaster Academy, afterward Cincinnati College, was founded. In 1819 the town received a city charter, having ac¬

cording to the first directory, published this year, 9,873 inhabitants, mostly from the Northern and Middle States, but also many foreigners, so that it was <(not uncommon to hear three or four languages spoken in the streets.® Another little book descriptive of the city published in 1826 was republished in England and translated into German, circulated on the Continent and attracted a large number of immigrants, es¬

pecially Germans, who by 1840 numbered one-fourth of the population. But its great develop¬

ment came with the opening of the Miami Canal, the most important single influence in the history of the city, for which ground was broken in 1825 at Middletown, and which was completed to Cincinnati in 1827. This not only developed commerce but furnished great water power for manufacturing. The first railroad, the Little Miami, was chartered in 1836, but was not opened until 1846, the first section not until 1843. Even before this the growth was very rapid, population nearly trebling 1820-30, CINCINNATI

and doubling 1830-40, but the next decade showed the tremendous leap from 46,000 to 115,000. From 1840 the immense immigration of Germans increased so rapidly as to make it for years the typical German city. The Germans took great interest in grape culture and the city for some years was a great wine market. It was the great German

population that caused the first Saengerfest of the North American Saengerbund to be held here in 1849, a great stimulus to the musical activity of the city since so famed in the musical world. Several times the city was fearfully ravaged by the cholera, beginning with 1832-34; in 1849 and 1850 over 9,000 souls, nearly 8 per cent of the entire population, per¬

ished of it. Yellow fever came in 1878. Floods have also risen over its platform several times and laid the lower section under water; those of 1832 (the year of flood, fire, pestilence and famine), of 1883, 1884, having been especially high and destructive. In 1838 the new and beautiful steamer Moselle exploded in front of the landing with a loss of almost 140 lives, one of the most terrible river disasters of the cen¬

tury. Two years later the city was the centre of the (<log cabin® campaign, which sent a favorite son, William Henry Harrison, to the White House. At a later time Hayes, whose pre¬

vious active life had been spent in this city, occupied the presidential position, and Salmon P. Chase, another famous Cincinnatian, was chief justice of the United States. A continu¬

ous excitement of the city was its fury over the race question and later the abolition movement.

The vast Northern interest in Southern trade was everywhere a powerful restraining influ¬

ence on this ; but Cincinnati, on the border, and with its daily bread dependent on this trade, be¬

sides having a considerable percentage of its people of Southern birth and detesting the movement on general principles, felt menaced with entire industrial ruin, if the agitation were not put down by force. Lane Seminary was threatened with fire, and its faculty with lynch¬

ing, if the students were not prohibited from discussing slavery; and in 1836 and 1841 James G. Birney's philanthropist press was wrecked by the mob. In fact anti-negro riots were fre¬

quent and arose upon the slightest provocation.

The trouble was later aggravated by the fact that Cincinnati, being a border city, was a chief station on the "underground railroad® ; one Quaker citizen boasted of aiding 3,000 fugitive slaves to escape, and in all several' times that number must have been smuggled across. Here, too, were tried the celebrated "fugitive slave cases,® the Rosetta and Margaret Garner cases.

In 1856 Buchanan was nominated for the presi¬

dency ; later nominees of Cincinnati conventions were Greeley, in 1872, Hayes, in 1876, and Han¬

cock, in 1880. When the war broke out, however, it became a strong Union city, and its record is noble. In 1862 the fear of an assault by the Confederate, Kirby Smith, caused the city to be put under martial law for a while; a some¬

what similar experience came in 1863, at the time of the John Morgan raid. Another war incident was the Vallandingham case. Cincin¬

nati sent its citizen, George B. McClellan, to command the armies of the North. The dec¬

ade prior to the war had not been one of great progress, but in spite of the decay of trade with the South, the city leaped forward with the resumption of peace. The desire to renew the relations with its old business asso¬

ciates induced it to enter upon the construction of the Cincinnati

Southern Railway to Chatta¬

nooga, which was built by the city itself, an ex¬

treme instance of municipal ownership. The celebrated “Bible® case in 1869 resulted in the abolition of religious instruction from the pub¬

lic schools and gave national fame to the bar that included such lawyers as those who argued the case. In 1869 began a series of annexations, which in a few years increased the city’s area from 7 square miles (3 miles when incorporated in 1819) to 24 square miles. Annexations in 1895 and 1903-04, 1912-13-14 and -15 brought the area to 72 square miles. The most noto¬

rious event in its later history is the “Cin¬

cinnati Riot® of 28-31 March 1884. As usual in modern times, the law had protected the criminal against the community till the crim¬

inal law was felt to be a farce ; some murderers had received absurdly light sentences, and the patience of the lower orders gave way; they attempted to break into the jail and lynch the prisoners ; foiled in this, they assaulted the courthouse, and burned it, as well as its rec¬

ords and other buildings adjoining; the State militia had to be called in, and in the fray that ensued 45 persons were killed and 145 wounded.

In 1888 the centenary of the settlement of the State and city was celebrated by a Centennial Exposition of the Ohio Valley, the culmination of a series of industrial expositions that had attracted the attention of the country and given a director-general to the Centennial at Philadelphia in 1876.

Bibliography. — Burnet, J., (Notes on

Northwest Territory5 (1845) ; Cist, C., Cin¬

cinnati in 1841, 5 Cincinnati in 1851, 5 Cincin¬

nati in 1859) ; Cincinnati Miscellany5 (1844-45) ; directories of 1819, 1825 and 1829 5 ; Drake, D., (Picture of Cincinnati5 (1815) ; Drake, B., and Mansfield, E. D., Cincinnati in 18265 ; Ford, H. A., (History of Cincinnati and Hamilton County5 (Cleveland 1880) ; Greve, C. T.,

Centennial History of Cincinnati5 (Chi¬

cago 1904) ; Mansfield, E. D., (Personal Mem¬

ories5 (1803ˆ4-3) ; Miller, F. W., Cincinnati's Beginnings5 (1880) ; Stevens, G. E., Cincin¬

nati5 (1869); Trollope, Mrs. F., domestic Manners of the Americans5 (London 1831).

Thomas Quinlan,

Cincinnati Chamber of Commerce.

CINCINNATI, Society of the (as having

left the plow, like Cincinnatus, for their country's service, and returning to it when the need was over), a memorial society organized by the officers of the American Revolutionary army, 13 May 1783, just before their final dis¬

persion, from the camp on the Hudson near Fishkill. The first meeting was in the Ver-planck House, Steuben's headquarters. A so¬

ciety was organized for each State, besides the general society of which Washington was elected president. Membership was confined to officers of the Continental army who had served with honor three years, or been honorably dis¬

charged for disability, whether native or foreign, and to their direct male descendants in order of birth, through females in default of males, and then to collaterals if judged accept¬

able to the Society. Partly as including several European nobles (Lafayette, Steuben, etc.), this was considered the beginning of an aristo-684

cratic order on European models, obnoxious to popular liberties. Of course it could only be¬

come such by government recognition, but the principle of heredity is per se un-American.

With more show of reason, it was regarded as a military conspiracy to appropriate all the offices under the new government ; a sign that the officers did not intend to be Cincinnatuses if they could help it. It was regarded by high and low as a grave public danger; and all the Revolutionary chiefs who had not been in the army, and were ineligible, — Franklin, Adams, Jefferson, *etc.* — distrusted its possibilities if not its motives. The legislatures of Massachusetts, Rhode Island and Pennsylvania adopted resolu¬

tions censuring it as dangerous to the liberty and safety of the country; the governor of South Carolina denounced it in his message to the legislature; and the Irish chief justice of the same State, 2Edanus Burke, wrote a pam¬

phlet signed ((Cassius,® proving that it would subvert everything gained by the Revolution.

This pamphlet was translated into French, and used by Mirabeau some years later. At the first general meeting, 7 May 1784, Washington per¬

suaded them, in view of this public excitement, to abolish this hereditary feature. This, how¬

ever, did not wholly conciliate popular feeling; and in 1789 the Tammany Society was founded in New York in avowed opposition, as a body where true equality should govern, and private advantage should not prevail over disinterested public spirit.

In 1787 Washington was elected president-general, and reelected till his death ; Alexander Hamilton succeeded him. Most of the State societies soon died, and the general society lan¬

guished. When Lafayette visited this country in 1824 he was the only surviving major-general. The old hero's reappearance gal¬

vanized it into new life for a short time, but it sank out of sight again, and for many years was virtually dead, its chief function being an

annual dinner in New York. Even a nominal organ¬

ization was retained only in three or four States.

The last survivor of the original association was Robert Burnet of New York, who died in 1854. In 1893 the general society began a suc¬

cessful effort to induce the States to revive or re-form their branches, and Connecticut first (1893) and Georgia last (1902) fill up the roll of the 13. Some of them issue publications.

The president-generals of the Society have been George Washington, Alexander Hamil¬

ton, Charles Cotesworth Pinckney, Thomas Pinckney, Aaron Ogden, Morgan Lewis, Wil¬

liam Popham, H. A. S. Dearborn, Hamilton Fish, William Wayne and Winslow Warren.

The emblem of the Society, adopted at the outset, was a bald eagle suspended by a dark-blue ribbon with white borders, symbolizing the union of France and America. On the eagle's breast is Cincinnatus receiving a sword and other military insignia from the Senate; in the background, his wife stands at the door of their cottage, with the plow and other agricultural implements near; round the whole are the words, Omnia reliqnit servare rent publicam ((<He left all to serve the commonwealth®).

On the reverse, Fame is crowning Cincinnatus with a wreath, inscribed Virtutis Prcemium ; in the background is a seaport city with gates opened and vessels entering; below are joined hands supporting a heart inscribed Esto Per -

petua (((Be thou perpetual®). The living hered¬

itary members number about 980.

CINCINNATI, University of. The Uni¬

versity of Cincinnati owes its existence primarily to a bequest of Charles McMicken, who, in 1858, left $1,000,000 worth of property to the city of Cincinnati to found and maintain a college.

One-half of this property consisting of real estate in the State of Louisiana was lost in 1860 by a decree of the Supreme Court of the United States, annulling that section of McMicken's will giving this property to the uni¬

versity on the ground that the testator could not bequeath real estate in Louisiana to a for¬

eign corporation. The university receives sup¬

port from the city to the extent of three-tenths of a mill on the total city tax. Other gifts have been utilized to contract buildings and to in¬

crease the endowment fund. The total value of the property and endowment was $3,200,000

in 1918. From 1858 to 1874 the income from McMicken's estate not being sufficient to sup¬

port a college or university, the trustees decided to wait until a fund should accumulate or until additional support could be gained. Thus the present University of Cincinnati was not founded until 1874, although three departments of the university are much older, namely, the astronomical department, founded in 1842 ; the medical department, founded in 1819 ; the law department, founded in 1819 (Cincinnati Col¬

lege). Until 1899 the university was composed of the three departments above named, and also the academic which was founded in 1874. Since 1899 the following depart¬

ments have been added: the College of

Engineering, offering courses in civil, electrical, chemical, architectural and hydraulic engineer¬

ing; the University Summer School; the Uni¬

versity Library; the Teachers' College; the University Press; and the Technical School, which furnishes the shops to the engineering department and is an integral part of the Teachers' College, as also the College of Com¬

merce. The dental department and the Clinical and Pathological School are only affiliated with the University of Cincinnati, having no finan¬

cial or other connection with the University.

No tuition is charged to residents of the city of Cincinnati who enter the university as students. The University of Cincinnati pos¬

sesses a beautiful location in Burnet Woods Park, away from the noise and bustle of the city. Its government is by a board of directors appointed for six years by the mayor of Cin¬

cinnati. The intellectual life of the university finds expression in the publication of many memoirs, and monographs on literary and scien¬

tific subjects through the very important de¬

partment of the university that has been recently established, namely, the University Press.

These contributions to knowledge in the form of an annual volume of university bulletins are distributed by exchange all over the world. The total value of the scientific apparatus is about $190,000; the total number of volumes in the University Library, in addition to 80,000 pam¬

phlets, is 88,100. The teaching corps numbers 271 and the students 2,922.

CINCINNATI ANTICLINE. In the

period of disturbance which marked the close of Ordovician time in North America, the lime¬

stones deposited during the Trenton Epoch in CINCINNATI ZOOLOGICAL GARDENS — CINEMATOGRAPH

the interior sea that covered most of what is now the Mississippi Valley were forced lip, on a line running through southern Ohio, Kentucky and Tennessee, in a low, broad arch. This arch is called the Cincinnati Anticline. It has been of much economic importance from its having contained great reservoirs of petroleum and natural gas, the latter now approaching exhaus¬

tion. See Ordovician System ; Trenton Stage.

CINCINNATI ZOOLOGICAL GAR¬

DENS, founded in Cincinnati, Ohio, by Mr.

Andrew Erkenbrecher, were opened to the public 18 Sept. 1875. There existed in the city a society of acclimatization, and it was at a meeting of this body, 30 June 1873, that the matter of instituting a zoological park was first agitated, followed by the formation of an in¬

fluential stock company. The gardens embrace 60 acres of ground diversified with valleys and undulating plains, covered with verdure and tree growth, about three miles from Fountain Square, the city centre, in a group of pic¬

turesque hills in a charming suburb. The col¬

lection of animals averages over 500 mammals, 1,200 birds and 125 reptiles, including fine specie-mens of lion, buffalo, polar bear, giraffe, zebu, elephant, python and alligator. The condition of the collection, the attractive buildings, fine structures of pleasing designs erected in iron and stone, the exceptional beauty and taste of the landscape gardening, the general arrange¬

ment of the grounds, the care displayed and success achieved with the animals and birds, rank this institution as second to none. Under good management it has become a self-sustain¬

ing as well as an excellent paying proposition without any detriment to its valuable educa¬

tional advantages.

CINCINNATUS, Lucius Quinctius, a

patrician belonging to the earliest period of the Roman republic: b. about 519 b.c. The legend which makes him the beau-ideal of the virtuous Roman is as follows : The Romans of his day were weakened by dissensions between the patricians and plebeians; the warlike 2Equians, after making harassing incursions into their territory, succeeded at last in surrounding the Roman army under the consul Minucius in the wooded grounds of Mount Algidus. In despair the Roman senators went to Cincinnatus, offer¬

ing him the dictatorship. The messengers found him at the plow. Reluctantly he accepted the office. He succeeded in rescuing the army from its perilous position, and marched to Rome laden with the spoils of victory. He then re¬

turned to his farm, whence he was again called, at the age of 80, to resume the dictatorship, to oppose the machinations of Spurius Mselius, and prevent a civil war between the upper and lower classes, which he succeeded in doing.

CINEMATOGRAPH, km-e-mat‘6-graf

(Gr. idvT/fj,af ˆmovement,® from mveiv} ((to move0), an ingenious instrument introduced about 1895 by two brothers Lumiere of Lyons, and founded on the same principle as Edison’s kinetoscope — the persistence of vision. The characteristic part of the instrument is a sensi¬

tive photographic film or band about an inch and a quarter broad and from 50 feet long upwards, and which is exposed in a cinemato¬

graph camera. In this instrument the band passes from the drum on which it is wound around a series of compensating drums into position behind the camera lens. This lens is equipped with a shutter which opens 16 times in one second, remaining open usually about one one-hundredth of a second, although this time must be much reduced for quick move¬

ments like those of a trotting horse. During the time when the shutter is closed the film is pulled forward three-fourths of an inch, pre¬

senting a new surface for the succeeding ex¬

posure. The entire mechanism is worked by turning a crank-handle at the uniform rate of two turns per second. After exposure the film is developed by the tank method and wound for drying upon a large drum. In order to produce positives from these nega¬

tives a second sensitive film is exposed be¬

neath it in a suitable apparatus and duly de¬

veloped. If desired the positive may be con¬

ventionally colored by hand ; the pictures are too small to be colored in detail. The cine¬

matograph proper is a projecting lantern ar¬

ranged to show the film pictures in rapid suc¬

cession enlarged upon a screen. Besides the customary combination of the brilliant light and lenses which constitute a projecting lan¬

tern, the cinematograph is characterized by a delicately adjusted apparatus for advancing the film picture by picture in jerky fashion past the aperture behind the lenses at the rate of 16 per second, and a shutter which opens when the film is stationary and closes while it is moved onward. The periods while the shutter is. closed are so brief that the eye fails to note it, the previous picture persisting upon the retina of the eye until the next picture appears on the screen. Upon the skill with which this delicate mechanism is regulated depends the steadiness, or freedom from flicker, of the view on the screen. Unfortunately the lenses which con¬

dense or concentrate the light used for project¬

ing also condense the heat rays, and the film being of celluloid is quickly ignited if the wind¬

ing reels pause when the shutter is open. Four or five seconds exposure to the concentrated rays is enough to start a conflagration, often with the most serious consequences. Recently several effective automatic fire prevention de¬

vices have been introduced and the newer cine¬

matographs have this very necessary protection.

The moving mechanism for the film is oper¬

ated generally by hand, as with the cinemato¬

graph camera, but in some machines a small electric motor is attached. However, the hand mechanism is much to be preferred if an expert operator is to be had, as he can gauge the speed by the actual effect on the screen and thus compensate for any deviations in the speed with which the original film was made.

The average length of the commercial ex¬

hibition cinematograph film is from 600 to 1,000

feet, requiring from 10 to 16 minutes for its presentation on the screen. Some extended subjects occupy three reels, or 3,000 feet, and require 50 minutes for a presentation. It is necessary to the smooth production of the mo¬

tion picture on the screen that the individual pictures appear at the rate of 16 per second.

It is not necessary, however, that the negative should have been exposed at the same rate.

For instance, very interesting pictures showing the growth and blossoming of a plant have been produced by making the exposures at in¬

tervals' longer or shorter — an hour, or even a day between. The film thus obtained in a 686

period stretching over months is shown in a few minutes on the screen, and the actual mo¬

tion of the plant as it grows is witnessed by the audience. This latitude in the time within which a film may be exposed affords oppor¬

tunity for the production of marvel or trick pictures, the camera being

stopped while changes are made and started again to make such record as is desired. The continuous exhibi¬

tion of the film presents the illusion that the picture presented was also a continuous event.

Consult Bennett, C. N., (The Handbook of Kinematography) (London 1911) ; Hopwood, H. V., (Hopwood's Living Pictures) (London 1915) ; Hulfish, D. S., (Motion Picture Work) (Chicago 1913) ; Jones, B. E., (How to Make and Operate Moving Pictures) (New York

1916) ; Talbot, F. A., Practical Cine—

matography) (London 1913).

CINERARIA, a genus of plants of the

family Asteracece, composed of about 25 spe¬

cies, natives of South Africa. The plants com¬

monly in cultivation under this name were for¬

merly placed in the genus Cineraria but are now generally referred to the vast genus Senecio. The cultivated forms have been de¬

rived from Senecio cruentus, native of the Canary Islands. They have large hairy leaves and dense clusters of heads of white, blue, pink and reddish flowers. They are exten¬

sively grown by florists as pot-plants, and by careful breeding a large number of varieties have been obtained.

CINERARY URNS, urns in which the

ashes of the dead were deposited after the body was burned. Many Greek and Roman urns are in a high style of art, and are formed of bronze, marble, glass or pottery ware. See Burial.

CINGALESE. See Singhalese.

CINNA, sin'a, Lucius Cornelius, Roman

patrician, associate of Marius and leader of the popular party, during the absence of Sulla in the East. In 86 b.c. he was elected consul along with Octavius, and in violation of his oath to Sulla he attempted to overpower the Senate and to procure the recall of Marius and his party from banishment. In the contest which ensued he was defeated by his colleague and driven from the city. His office thus be¬

came vacant, and the Senate appointed another consul in his stead. He soon returned, how¬

ever, along with Marius, and laid siege to Rome. The Senate was forced to capitulate; but while the votes of the people were being taken for the repeal of the sentence against Marius he broke into the city, massacred the friends of Sulla and allowed his partisans to commit frightful excesses. He was consul for the next three years; but Sulla, having brought the Mithridatic War to a close, resolved (84

B.c.) to return to Italy to inflict condign punish¬

ment on his enemies. Cinna prepared to resist him by force of arms, but was prematurely slain by a mutiny among his own troops.

CINNABAR, sm'na-bar, red sulphide of

mercury, HgS. The native cinnabar occuis in earthy, granular and massive forms, and also in crystals belonging to the rhombohedral sys¬

tem. It is red, not infrequently with a brown¬

ish or leaden cast. Its hardness is from 2 to 2.5 and its specific gravity from 8 to 8.2.

Artificial cinnabar, formed by subliming a mix¬

ture of sulphur and mercury, is brighter in color than the native mineral, probably on ac¬

count of its greater purity, and is known in commerce as ˆvermilion.® Cinnabar is the prin¬

cipal ore of mercury, and large deposits of it occur at Almaden, Spain, at Idria in Carniola, at New Almaden, Cal., and in certain parts ot China and Japan. When it is roasted the sul¬

phur burns away and metallic mercury distils off and is condensed in earthenware vessels.

For a discussion of various ancient references to cinnabar, consult Engineering and Mining Journal, 16 May 1903, p. 747.

CINNAMIC, sin'a-m!k, ACID, an acid

which exists in the free state in the balsams of Tolu and Peru, in liquid storax and in gum benzoin. It occurs in two forms, slender needle-like crystals, and large transparent prisms, melting at 270° F. When oil of cinna¬

mon is exposed to the air it absorbs oxygen and deposits crystals of cinnamic acid, which are colorless and readily soluble in alcohol, ether and boiling water, but sparingly soluble in cold water. It is not of any importance in the arts and is chiefly interesting as being the acid corresponding to oil of cinnamon. This oil is the aldehyde of cinnamic acid and is repre¬

sented by the formula CsHsCh. Though isomeric with oil of cassia it has a slightly different flavor, and is much more expensive. Both of these oils are employed in medicine as aromatic stimulants, but chiefly as pleasant adjuncts to disguise the taste of nauseous drugs. From a chemical point of view, the cinnamic acid and oil of cinnamon are related to benzoic acid and oil of bitter almonds. Oxidizing agents con¬

vert it first into benzaldehyde and then into benzoic acid. It unites with hydrogen to form hydrocinnamic acid.

Cinnamic acid is one of the active prin¬

ciples in many of the balsams and enjoys an excellent reputation in the treatment of tuber¬

culosis and chronic ulcerative processes. It is a marked stimulant to the skin and mucous membranes and has been very widely used in the form of an emulsion for the treatment of tuberculosis of the joints. It is prepared in quantity by keeping one part of benzaldehyde, one part of acetyl chloride and three parts of sodium acetate at a temperature of 320° F. for 24 hours.

CINNAMOMUM, a tropical genus of

plants of the laurel family, natives of Asia and the Pacific islands. The genus numbers up¬

ward of 50 species, all possessing aromatic volatile oils that make them valuable articles of commerce. Cinnamon proper is the prepared bark of C. zeylanicum ; culiwan bark comes from the C. culiwan, and cassia bark from C.

cassia. The best known American relative, al¬

though not of the same genus, is sassafras.

See Cassia; Cinnamon; Laurel.

CINNAMON, the bark of the under

branches of a species of laurel (Cinnamomum zeylanicum) , which is chiefly found in Ceylon, but grows also in Malabar and other parts of the East Indies. The tree attains a height of 20

or 30 feet. Its leaves are oval, the flowers are of a pale yellow color and the fruit is shaped somewhat like an acorn. There are two prin¬

cipal seasons of the year in which the Ceylonese bark the cinnamon-trees. The first of these commences in April, and the last in November;

the former being that in which the great crop is obtained. In this

operation the branches of three years' growth are cut down, and the out¬

side pellicle of the bark is scraped away. The twigs are then ripped up lengthwise with a knife and the bark is gradually loosened till it can be entirely taken off. It is then cut into slices and on being exposed to the sun curls up in drying. The smaller pieces, or Squills,® as they are called, are inserted into the larger ones, and these are afterward tied into bundles. Cin¬

namon is examined and arranged according to its quality by persons who, for this purpose, are obliged to taste and chew it. This is a very troublesome and disagreeable office, few per¬

sons being able to hold out more than two or th ree days successively. After this examina¬

tion, the bundles are made up to a length of about four feet and a weight of about 88 pounds each. From the roots of the trees numerous offsets shoot up. These, when they have at¬

tained the height of about 10 feet, are cut down and barked, being then about the thickness of a common walking-stick. The cinnamon which they yield is much finer than any other. In Ceylon the cinnamon-trees are said to be so common as to be used for fuel and other do¬

mestic purposes. The smell of cinnamon, par¬

ticularly of the thinnest pieces, is delightfully fragrant, and its taste pungent and aromatic, with considerable sweetness and astringency. If infused in boiling water in a covered vessel it gives out much of its grateful flavor and forms an agreeable liquid. An oil is extracted from cinnamon, which is heavier than water. This is prepared in Ceylon, and almost wholly from the small and broken pieces. It is made, how¬

ever, in such small quantities that the oil of cassia is generally substituted for it ; indeed, the cassia bark is often substituted for cinnamon, to which it has some resemblance, although in its qualities it is much weaker. The leaves, the fruit and the root of the cinnamon plant all yield oil of considerable value. That from the fruit is highly fragrant, of thick consistency, and in Ceylon was formerly made into candles for the sole use of the king.

The oil of cinnamon consists mainly of cin¬

namic aldehyde, C&HsO, which, when pure, is colorless. By exposure to the air it absorbs oxygen and is converted into cinnamic acid (q.v.).

Various forms of cinnamon have been used for many years in medicine as flavoring agents and as carminatives. As cinnamon is rich in volatile oils, the action of the drug resembles the action of the oil of cinnamon, which is closely allied to other volatile oils (q.v.). The active principle in the oil is an aldehyde of cin¬

namic acid, and its antiseptic and antispasmodic action is due in large part to the cinnamic alde¬

hyde.

CINNAMON FERN, a fern, Osmunda

cinnamomea, so called from the cinnamon color of the sporangia. The plant has been known to reach the height of 11*4 feet. It is frequent in boggy places from Florida and Mexico north to Minnesota and Newfoundland, and occurs also in Asia and Brazil. See Osmunda.

CINNAMON OIL, an essential oil dis¬

tilled from the bark of the Cinnamomum Zeylanicum, the Ceylon cinnamon tree. The yield is from one-half to 1 per cent. It is of a bright yellow color, which gradually darkens. It con¬

sists chiefly of cinnamic aldehyde, normally from 70 to 77 per cent, with from 4 to 8 per cent of eugenol. When pure it has a specific gravity of 1.020 to 1.035. It is often adulter¬

ated, however, by an oil obtained by distilling the leaves with bark from the root. The chief constituent of this oil is eugenol, which gives its specific flavor to the oil of cloves. When ex¬

posed to the air cinnamon oil gradually absorbs oxygen and forms a resin and cinnamic acid.

CINNAMON-STONE, or ESSONITE, a

variety of grossularite garnet, usually of a beautiful cinnamon-brown, yellowish or brown¬

ish-red color. It is a silicate of aluminum and calcium. Its name essonite is derived from the Greek esson , inferior, and refers to its hardness, 7, which is inferior to that of the true hyacinth, which it often resembles. It occurs in isometric crystals, usually in rhombic dodecahedrons.

Cinnamon-stone from Ceylon is the finest known, and has long been cut into gems. Amber colored specimens are found at Piedmont, Italy, Phippsburg, Me., and in Quebec, Canada.

CINO DA PISTOIA, che'no da pes-to'ya,

Italian jurisconsult and poet: b. Pistoia 1270; d. there, 24 Dec. 1336. He ranks among the best of the early Italian poets, and resembles Petrarch more than any of the other predeces¬

sors of this poet. His poems were first pub¬

lished at Rome in 1558 by Pilli. They after¬

ward appeared at Venice increased by a second volume, which, however, was not considered genuine. The most complete edition is that of Ciampi (1812). He published a commentary on the first nine books of the (Codex Justinianus >

in 1314.

CINQ-MARS, san-mar, Henri Coiffier de

Ruze, Marquis de, French courtier: b. 1620; d. Lyons, 12 Sept. 1642. At the age of 18 he was presented at court by Cardinal de Richelieu and soon obtained the favor of Louis XIII, to whom he became master of the horse. Chafing at the restraint under which Richelieu held him and ambitious of political power, he framed a conspiracy to overthrow the cardinal, of which the king himself and his brother, Gaston, Due d'Orleans, were members. But Louis was

weak and fickle, Gaston perfidious and Riche¬

lieu not the man to be put down by a youth just turned 20. Cinq-Mars was delivered up to the cardinal and beheaded at Lyons with his friend, the councillor De Thou. Consult Bas-serie, (La conjuration de Cinq-Mars) (Paris 1896) ; Bazin, A. de R., (Histoire de France sous Louis XIIP (Paris 1846).

CINQ-MARS. ˆinq-Mars,* by Alfred de

Vigny, is one of the most popular French his¬

toric novels. Published in 1826, it showed unmis¬

takable traces of the influence of Sir Walter Scott and was an immediate success. The novel deals with that important and interesting period of French history which culminated in the sway of Cardinal Richelieu, the minister of Louis XIII. It is Richelieu, more than the favorite of the king, Cinq-Mars, who is the central figure of the story. The author does not keep very strictly to the historic facts and misrep¬

resents to a great extent the characters which he portrays. For de Vigny, Richelieu is a symbol of ambition, while de Thou, the de¬

voted follower of Cinq-Mars, is the type of the friend. Even the minor characters of the book 688

are treated according to the preconceived idea of the author. The novel is thus a curious mixture of history and fiction. But in spite of the falseness of the historic treatment there is much in the novel which explains and in a way justifies its wide popularity. There was a great revival of interest in the past at the time the book was written, and no other period, perhaps, was so full of dramatic incidents and gave such opportunities for character study as that of the administration of Richelieu. Again, the lyric note of the novel is admirable. The picture in the opening chapter of beautiful and peaceful Touraine, where the author him¬

self was born and which he knew well and loved, together with passages of similar charm and beauty, such as the description of the chateau of Chambord, are veritable poetic gems — and, after all, was not Alfred de Vigny primarily a poet? The reader will gladly over¬

look the historical inaccuracies, which were intentional, and will forgive the rather poor psychology of the characters for the sake of the spirited and entertaining story and the passages of exquisite description.

Raymond Weeks,

Professor of Romance Languages and Litera¬

tures, Columbia University.

CINQUE PACE, sink pas, a kind of grave, stately dance, in which the steps were regulated by the number 5.

CINQUE PORTS, seven ports of England,

on the coasts of Kent and Sussex — Dover, Sandwich, Hastings, Hythe, Romney, Winchelsea and Rye. They were originally only five, the two latter having been declared ports sub¬

sequent to the first institution; hence the name cinque, five. The precise designation of these seven localities is <(The Cinque Ports and the Two Ancient Towns,® the last named being Winchelsea and Rye. They were granted spe¬

cial privileges by the later Saxon and earlier Norman kings, on condition of providing a cer¬

tain number of ships during war, there being no permanent English navy previous to the reign of Henry VII. The ports are, collec¬

tively, in the jurisdiction of a lord warden, whose office, though the salary is £3,000 a year, is little more than a sinecure. Consult Burrows, (The Cinque Ports > (in (Historic Towns Series)) .

CINQUECENTO, ching-kwe-chen’to1, in

Italian, 500, an abbreviation for mille cinque-cento, or 1,500. The term is used to designate the art styles of the 16th century, or such as were developed about, or after, 1500. In like manner the terms trecento and quatrocento de¬

note art of the 14th and 15th centuries. The Cinquecento is the period of the highest perfec¬

tion of the arts of the Revival or Renaissance.

CINQUEFOIL, sink’foil. (1) In botany,

a species of the genus Potentilla of the Rose family, closely allied to the strawberry. There are about 300 species, chiefly natives of the tem¬

perate regions of the northern hemisphere, 175

of them occurring in North America, scattered throughout the continent. In northern New England the shrubbery cinquefoil (Dasiphora fruticosa) is a troublesome weed. The name of the genus is from Latin potens (powerful), from the supposed powerful medicinal virtues of some of the species.

(2) In architecture, an ornament in the Gothic style, consisting of five foliated divi¬

sions, often seen in circular windows. In her¬

aldry, it means a five-petalled corolla borne without a stalk and full-faced.

CINTRA, sen’tra, Portugal, a town in the province Estremadura, 15 miles northwest of Lisbon, on the slope of the Sierra de Cintra.

The country around is extremely beautiful, and the climate mild and agreeable. On these ac¬

counts it is much resorted to by the wealthier inhabitants of Lisbon, who have here their quintas or country houses. Cintra is celebrated for the convention entered into there in 1808, by which the French, after their defeat at Vi-meira, were not only permitted to leave Portu¬

gal, but were conveyed to France with their arms, artillery and property. Pop. 4,846.

CIOTAT, sy-6-ta, La, France, a seaport, department of Bouches-du-Rhone on the Medi¬

terranean, 15 miles southeast of Marseilles. It has a safe and commodious harbor and carries on a considerable trade in the productions of the district. The yards and workshops of the Messageries Maritimes Company employ about 3,000 hands. The town, surrounded by its old ramparts, consists of well-built houses and spacious, well-paved streets. The surrounding district yields wine, oil, oranges, *etc.* Pop.

9,975.

CIPHER, a kind of monogram, in which

the initials of a person or persons are inter¬

twined with each other.

CIPHER DISPATCHES. See Cipher

Writing.

CIPHER WRITING, a method of sending

important intelligence in a manner so effectually disguised that only those for whom the com¬

munication . is intended can understand the meaning of what is written. Till comparatively recent years diplomats, statesmen and military or naval commanders were the principal per¬

sons compelled by circumstances to keep their affairs or their intended movements shrouded in secrecy. So long as there was not regular postal service important letters were sent by courier, and thus the weightiest secrets were often at the mercy of any one inclined to be dishonest. Before the spread of education, and at a time when few possessed a knowledge of any other language than their own, to indite a letter or dispatch in a foreign tongue was usually ample protection against a surreptitious prying into its contents. But this safeguard has broken down, and it became necessary for all who did not want their correspondence known to interested parties to contrive some means of communicating with the pen that would defy scrutiny.

Hence there came into extensive use the art of writing in cipher, called also cryptography, from the Greek words Kpvnrdc t ((secret,® and / pa<f>eiv , «to write.® Under this term are in¬

cluded all private alphabets or systems of characters for the safe transmission of secrets.

A popular cipher for ordinary purposes is found by using the alphabet in an inverted order, taking Z for A, Y for B, X for C and so on.

When it is only desired to write a cryptogram, and not print it, such other characters may be used as are mutually agreed upon by corre¬

spondents, or the alphabet may be transposed in CIPHER WRITING

blher ways. A figured cipher is one in which the letters of the alphabet are numbered and these numbers compose the cryptogram. To ensure secrecy it is, of course, necessary that the particular series of numbers chosen shall be known only to those who use the cipher.

Another plan consists in choosing a certain book — a dictionary appears to have been the favorite — and by a simple citation of the

num¬

ber of the page, of the column and of the line, sentences were constructed, the key to which was extremely difficult of discovery by one not in the secret.

As the number of different dictionaries was necessarily limited, however, the mystery could usually be solved by any one willing to devote time and patience to hunting up the particular one adopted. Various other books have been similarly used, such as spelling books, and even the Bible ; but these systems are cumbersome, and wTere all more or less open to detection.

From a few rules, as for instance, that in Eng¬

lish e is the letter which most frequently occurs, and the the most common word, the whole might generally be deduced. The task of de¬

tecting cipher methods is rendered much more difficult when false characters, which are not to be counted, have been interspersed through¬

out the cipher. A curious explanation of the process of unraveling a cipher is given in Poe's story of the (Gold-Bug.) Still, with devices such as these, more or less ingenious, the world was fain to be content until the advent of telegraphy. Immediately a new want made itself felt. If the mail was slow, it afforded privacy, but the contents of a telegraphic mes¬

sage are of necessity known to others besides the sender and the receiver. So the minister, the banker and the merchant soon began to send cipher despatches. It was quickly discov¬

ered, however, that existing methods of cipher writing were unadapted to telegraphy ; the costliness of the new invention necessitated brevity; and thus it was not long before there went whirling over the wire messages of 10

words that, properly deciphered, included from 30 to 50. Cryptography became a recognized calling, requiring thought, labor and inventive skill. A great proportion of commercial mes¬

sages — orders to buy and sell and the like * —are similar in their terms, and hence it is that a single word representing three or four

words in frequent use is the plan on which our present cable cipherˆ are based, whereby there is annu¬

ally a large saving in expense, Then, too, as trade increased and competition became fierce, every firm wanted or needed its own cipher sys¬

tem, distinct from any other. Hence there is a vast number of ciphers in use in every great commercial centre such as New York or Lon¬

don. There are firms which specialize in the preparation of ciphers or <(cable codes® contain¬

ing from 50 to many thousands of words. The International Office of the Telegraph Adminis¬

trations in Bern, Switzerland, published an (<Official Vocabulary for Telegrams in Precon¬

certed Language® (1899-1901). _ In 1903, how¬

ever, it was internationally decided that, after July 1904, all combinations of letters that do not exceed 10 will pass as one cipher word, <(provided that it is pronounceable, or that it is taken from the following languages: English, French, German, Dutch, Spanish, Portuguese or Latin.® This concession widened enor~

voj*, 6 — 44

mously the scope of admissible words and huge, complicated codes sprang into existence.

From the volume issued by the Lieber Code, for instance, it is claimed that 100,000,000 combina¬

tion ciphers can be devised. The ((Simplex Cryptograph® (Providence, R. I., 1902) is a small book, giving over 50,000 numbered cipher words with a (<key® to each one. In this, e.g., the number 33,458 can be expressed by the word (<post,® and 50,551 by the word (<vary.®

The cipher codes of the State Department at Washington and those of other governments are frequently changed. The special code is

entrusted to the personal custody of diplomatic officials embarking on a mission, who retain possession of it and destroy it if their lives are endangered. The imprisonment of the United States Minister Conger, in Peking, in 1900, caused the cipher to figure conspicuously in in¬

ternational relations. China objected to the transmission of cipher dispatches, but subse¬

quently withdrew her objection. She was ac¬

cused of having obtained surreptitious posses¬

sion of a copy of the United States cipher code.

For private individuals desiring to commu¬

nicate in cipher by letters through the post it is easier to devise a code of 26 letters or signs representing the alphabet. To avoid unauthor¬

ized deciphering of the message, it is advisable not to separate the words into their natural groups of letters ; thus instead of arranging the signs or letters representing, say, ((Come and see me,® place them in this fashion : com eandse erne.® Instead of having a certain sign or letter invariably represent the same letter, it is safer to adopt an arbitrary sentence of 26

letters and place them under the 26 letters of the alphabet. Such a code can easily be carried in the memory. The following example of such a cipher, taken from a book published in London, will explain : (<Hush Money, by Charles H. Ross, Esq.® By placing these letters under the alphabet we get H=A ; U=B ; S=C ; H=D ; M= =E, and so on. Hence,

Ohs ya h sych, oayarsa it loucys syms, Qsrh srore rrhmu h smsmsmah emshyr snms, could only be deciphered by the receiver as Far in a wild, unknown to public view, From youth to age a reverend hermit grew.

Another method, absolutely undecipherable by any ((outsider,® is to adopt a method of number¬

ing somewhat as follows : Ignore all vowels, h, y and w, or invent separate signs for them, using these only where absolutely necessary ; then replace the consonants with figures like this : L = T ; N = 2 ; M = 3; R = 4; F and V = 5 ; P and B = 6; T, TH and D = 7; SH and CH = 8; K and C (hard) = 9; S, Z and C (soft) = 0. From this can be made 93275837344 = KMNDFCHM

TM RR : (< Come and fetch me to-morrow.®

This system is specially adapted for writing numbers by words : Ignoring vowels, h, y and w, Kansas = 9200; Smith = 037 ; London = 1272;

Calif ornia = 91 542 ; 127 = r::(< land® ; 894 = ((sugar.®

The same code can also be used to commit a number of figures to memory: If it is desirable to remember the number 746,527,682; this gives, in code, the letters DRPFNDPSHN. By in¬

serting vowels between these consonants, the sentence can be made, ((Drop off and push on.®

By mentally repeating the sentence each con¬

sonantal sound suggests a figure, hence 746,-

527,682. By using figures for letters and vice-versa, the telephone number ((Central 3277®

would read: ((02741 Mandate.® The conso¬

nants must be used phonetically, as in stenog¬

raphy, regarding the C(c® in central as ((s.® The introduction of an occasional <(dummy word,®

i.e., one not to be reckoned, will serve further to baffle attempts at elucidation. An interesting account of how the cipher dispatches in the Tilden electoral canvass of 1876 were deciph¬

ered by New York journalists is given in The Tribune, 21 Nov. 1878 (Extra No. 44).

CIPHERS, signs for numbers (see Nota¬

tion). They are either borrowed signs, as let¬

ters, with which the Greeks and several tribes of the north of Europe designate their num¬

bers; or peculiar characters, as the modern or so-called Arabic ones, though the Arabs do not use them, and never did. The ciphers, such as they are at present, 1, 2, 3, 4, 5, 6, 7 8, 9 and 0, did not attain their present character till a pretty late period. We received them through the Arabians from Hindustan. It seems prob¬

able that the Egyptians were acquainted with the present system of ciphers, at least in its principles. As early as the 9th century ciphers were used, though seldom, in France. Not until the 11th century did their use become common in Europe.

CIPPUS, sip'us, a low column generally

rectangular and sculptured, and often bearing an inscription, used by the Romans for various purposes. Cippi served as sepulchral monu¬

ments, as milestones and boundaries, and in some cases to receive the inscribed decrees of the Senate. They were frequently or usually adorned with rams' heads supporting festoons of flowers, figures of sphinxes and various mythological subjects. Those serving as tomb¬

stones bore the epitaph of the deceased, includ¬

ing his name, the date of his birth, death, *etc.*

CIPRIANI, che-pre-a'ne, Giambattista,

Italian painter and engraver: b. Pistoia 1732; d.

London 1785. He was one of the first fellows of the Royal Academy. His drawing is correct, his heads have grace and loveliness, his coloring is harmonious and the general impression of his composition good. Many fine engravings of Bartolozzi are from the designs of Cipriani.

CIRCARS, ser-karz', The Five Northern,

an ancient division of the Madras presidency, on the east coast of Hindustan. The northern Circars were formerly Chicacole, Rajahmundry, Ellore, Kondapilly and Guntur, with Masulipa-tam as the chief town, but the districts that now correspond most nearly with them are those of Ganjam, Vizagapatam, Godavari,

Kistna and Guntur. They were among the earliest of the territorial possessions of the East India Company, which acquired four of them in 1765 from Mogul Shah Allum, who bestowed them on the company as a free gift. The fifth, Guntur, came into possession of Great Britain in 1788. Consult history in (The Imperial Gazeteer of India* (Vol. X, Oxford 1908).

CIRCASSIA, str-kash'i-a, a region in the southeast of European Russia, lying chiefly on the north slope of the Caucasus, partly also on the south, and bounded on the west by the Black Sea. It forms part of the government of the Caucasus, including a great portion of the terri¬

tory of the Kuban and the districts of Sukhum and Tichcrnomore, but is not itself an official division ; and, indeed, the name is now much less seldom heard than formerly, since the coun¬

try has been entirely incorporated with the rest of the Russian possessions in this quarter, and has no longer a separate political existence.

The whole region is mountainous, and is com¬

posed of the northern masses or western off¬

shoots of the great chain of the Caucasus, the culminating heights of which are those of Mount Elbruz. The mountains are intersected everywhere with precipitous ravines, in the deepest hollows of which flow rock-impeded streams that occasionally become raging tor¬

rents. The chief rivers are tributaries of the Kuban and the Terek, the first of which bounds the territory on the northeast and east sides, while the Terek skirts the Circassian limits on the southeast side. Circassia is a beautiful though rugged country. The sides of the moun¬

tains are often clothed with thick forests. Its climate is temperate, its inhabitants are healthy and long-lived. There are few manufactures and little trade ; but the valuable oil deposits are now being worked.

When Russia took possession of this region the exodus of the inhabitants left compara¬

tively few Circassians proper, and those who remained have now to a large extent lost their national peculiarities. The people call them¬

selves Adighe; the Tartar word Tchertkess be¬

ing a slanderous name applied to them as <(robbers.® The Circassians were divided into sev¬

eral tribes, having three distinct languages or more. Each tribe included five ranks of men, namely, princes or chiefs (pshat) ; nobles (vork) ; middle class (thlofokl or tokavs) ; serfs or retainers of the nobles, and slaves —the latter being prisoners taken in war or the descendants of such. All classes except the slaves were united into fraternities for mutual support ; and this union formed the real ground¬

work of the government of the country, which was altogether peculiar, being patriarchal in nature, with a great amount of freedom. He¬

reditary feud, once prevalent, was latterly al¬

most extirpated, and pecuniary compensation, including a mulct upon manslayers for the benefit of the deceased's fraternity, was sub¬

stituted. Crimes of all degrees, and civil causes, were judged either in general or local councils; and petty offenses by district judges and as¬

sessors.

The religion of the country was chiefly Mos¬

lem; but in many cases it formed a jumble of Christian, Jewish and heathen traditions and ceremonies. In no case was it very strict ; al¬

though most of the chief Mohammedan feasts and fasts were pretty well observed. The morals of the people were good. Great crimes were rare ; and such as have their sources in poverty with one class and avarice in the other were not common, for property was little cov¬

eted, and money was scarcely known. The commerce of presents was universal ; few or none were very rich, and there were no miser¬

ably poor at all. There was no tenure of land in Circassia except what immediate possession, for the purpose of cultivation, gives.

Agriculture is still in a rude state, but the produce of the tilled lands is considerable and exceeds local wants. The forests yield great quantities of fine wood, including oak and all our own best species of timber trees, CIRCE — CIRCLE

with (in the southern regions) boxwood, *etc.*

The chief grain is millet ; but barley, oats and a little wheat are also raised. There are great numbers of goats, sheep and oxen.

The Circassians, male and female, are a well-formed and handsome race. The males are highly prized as warriors by the Russians, and the females as mistresses by the Turks, a posi¬

tion generally envied by the women themselves.

The men are among the finest equestrians in the world, and their horses, though small, are of good stock, hardy and intelligent.

The early history of the Circassians is ob¬

scure. They have no annals; but their min¬

strels, in their martial and genealogical strains, preserve traditional accounts of the deeds and lineage of their dead heroes and existing tribes.

Between the 10th and 13th centuries this coun¬

try formed a portion of the empire of Georgia, and it is said the Georgian queen Tamar sub¬

jugated and for a time Christianized them.

During the Middle Ages the Genoese had sev¬

eral trading stations on the coast, of which some memorials yet exist. In 1424 the Circas¬

sians were an independent people and at war with the Tartars of the Crimea, etc., to whose khans, however, it is understood some were occasionally tributary. In 1555 the Muscovite tsar, Ivan Vasilievitch, came to their aid against the Tartars and married a Circassian princess. But the stay of the Russian forces was short, and after their withdrawal the bellig¬

erents kept up a struggle with varying results till 1705, when the Tartars were finally defeated in a decisive battle. Shortly after the terri¬

torial encroachments of Russia on the Cau¬

casian regions began. From that time she advanced by steps slow and stealthy and in 1781

obtained a frontier line on the right bank of the Kuban, the left bank of which formed the national limit of Circassia. In 1784 the Turks founded Anapa, near the northeast corner of the Black Sea, as a place of trade for their com¬

merce and that of the Circassians; this was the only territorial settlement they as yet had in or near the country and the place was a mere fac¬

tory. In 1807 the Russians took Anapa from the Turks; but in terms of the Treaty of Bucharest, in 1812, it was restored. In 1829 it was once more taken by the Russians and finally ceded to them by the Treaty of Adrianople, along with the whole of Circassia — as they inter¬

preted the words of that cunningly ambiguous document; the fact being that not an inch of the territory of Circassia proper had ever been in the possession of either Turks or Russians.

Many of the Circassians were indeed Mussul¬

mans and all such recognized the padisha (sul¬

tan) as their spiritual head, but nothing more.

As the ((hated Muscovites® (fana Moscov) im¬

mediately proceeded to act upon the pretended cession, a struggle commenced which was con¬

tinued over a long series of years. The spirit of resistance to Russia became stronger than ever; and a bold leader, Schamyl, who united in his person the imputed sanctity of the hie¬

rarch with the daring courage and prudent con¬

duct of a great warrior, with his heroic band beat off or baffled the whole disciplined forces that Russia was able to send against him. But at length the protracted resistance of the people, extending for a period of 35 years, terminated in the triumph of the more powerful of the foes and the Circassians with their leader sur¬

rendered. Large numbers of them, as many it is said as 500,000, were deported into the Turkish provinces in 1864 and were settled in Asia Minor and in Bulgaria and Serbia.

A considerable portion of their former country was thus ruthlessly almost denuded of in¬

habitants.

CIRCE, ser’se, in classical mythology, a sorceress on the island of JExa. Ulysses in his wanderings landed on her island, and sent out Eurylochus with a party to explore the country. They arrived at the palace of Circe, who. gave them food and wine, and with her magic wand changed them into swine. Eury¬

lochus only, by cautiously abstaining from the magical potion, escaped the transformation, and informed Ulysses of the event. He immedi¬

ately proceeded into the country to free his companions. On the way Hermes (Mer¬

cury) met and advised him. Following the advice of Hermes he then ran upon her with his drawn sword, threatening her with death, and compelled her to bind herself by an oath to do him no injury and deliver his companions.

Ulysses then remained with her a whole year.

Before his departure she told him that in order to secure a safe return to his country he must visit the infernal regions and ask advice of Tiresias. This he did, and again visited Circe on his way back. The story is told in the Odyssey.

CIRCINUS, ser’sT-nus (((the Pair of Com¬

passes®), one of the 14 southern constellations added to the heavens by Lacaille in connection with his work at the Cape of Good Hope in 1751-52. It is surrounded by Apus, Musca, Centaurus, Lupus, Norma and Triangulum

Australe.

CIRCLE, in geometry, a plane figure con¬

tained by one line, which is called the ((circumference® and is such that all straight lines drawn from a certain point (the ((centre®) within the figure to the circumference are equal to one another. According to this definition of Euclid, which is remarkable for its

perspicuity and precision, the circle is the space enclosed, while the circumference is the line that bounds it. The circumference is, however, frequently called the circle. Still no confusion ever arises from this usage.

The properties of the circle are investigated in books on geometry and trigonometry. Prop¬

erly the curve belongs to the class of conic sec¬

tions and is a curve of the second order.

The Cartesian equation of a circle with centre at the origin and radius R is X2JrY2=R2.

Its polar equation is P —R. The general Cartesian equation of a circle is x2+y2-\~ax--by + c=o; the general polar equation is P sin ($-|-a)=a-f-6P2. From the standpoint of pro¬

jective geometry, a circle is any conic passing through a certain pair of imaginary points at infinity, known as the circular points.

The celebrated problem of (<squaring the circle® has given rise to extraordinary geo¬

metrical labors, and even now there are to be found, as in the case of the problem of per¬

petual motion, those who profess to have solved it.

The question is to construct by rules and compass a square whose area shall be equal to the area of a circle. It is not possible to do so.

This was only shown within the last 36 years 692

by Lindemami. All that can be done is to ex¬

press approximately the ratio of the length of the circumference of the circle to the diameter, and to deduce the area of the figure from this approximation. This ratio, which is known as 7r , has, however, been determined to a degree of exactness more than sufficient for all prac¬

tical purposes. If the diameter be called unity, the length of the circumference of the circle is 3.1415926535…; and the area of the circle is found by multiplying this number by the square of the radius. Thus the area of a circle of 2 feet radius is 3.14159 X 4, or 12.56636 square feet, approximately.

7T can be approximated by series or con¬

tinued fractions or products, as follows: oo n — 1

7T = 4: 2 (1) (Leibnitz)

n = i 2n — 1

00

= 2 7r 4 w2

(Wallis)

w— 1 (2 w + 1)2

4

1 +i_L

1 9

¥ +

1 25

(Brouncker)

1 2 + • •

For trigonometrical calculations the whole circumference of the circle is divided into 360

equal parts or arcs, called degrees ; each degree is divided into 60 minutes, and each minute into 60 seconds. The angles subtended at the centre by these arcs are called respectively degrees, minutes and seconds of angle. A centesimal system of circular division is sometimes used.

For purposes of pure mathematics the unit is the radian, i.e., the angle subtending an arc equal to the radius, or 360°. Since every circle 2ˆ

has an equation of the form P = x2Jry2Jrax--by + c = 0, it follows that if two circles have the equation P = 0 and Q—O (of the same form), if they intersect, the line P — Q~ 0 will pass through all their finite points of intersection.

Even if these points are imaginar}ˆ P — (> = 0 wall be real. P — Q— 0 will be in this case the locus of the points from which the tangents to the two circles are of equal length. In either case, it is known as the radical axis of the two circles.

Let us consider the equation of a circle in polar co-ordinates; it is psin (# -ff a) = a -f-bp2.

If we substitute — for p, we get

= a + or p' sin ($ + «) — b + af > '2.

p ˆ

-∼i sin (tf + a)

This is also

the equation of a circle. It follows that if we take any circle, such as the unit circle about the origin, and exchange every point for one which is on the same radius vector from the origin, but at a distance from the origin which, when multiplied by the distance from the origin of the first point, gives the square of the radius of the circle, we shall retain all circles un¬

changed in form. This transformation is called an inversion. The study of all properties of figures which remain invariant under all in¬

versions is the important branch of mathe¬

matics known as inversion geometry. The polar of a point is the line connecting the real or imaginary points of tangency of the tangents to the circle of reference from the point. A point is said to be the pole of its polar.

In practical astronomy, metallic circles ac¬

curately divided are used to measure angles.

The general principle is to have a telescope moving in a given plane, while a divided circle, situated in a parallel plane, measures the angle through which the telescope moves. Verniers or microscopes are used to read the graduated circle with great precision.

The term (<meridian circle® is applied to an instrument in which the telescope revolves in the plane of the meridian, and a divided circle measures angles in this plane.

In logic, a circle is the fault of an argument that assumes the principle it should prove, and afterward proves the principle by the thing which it seemed to have proved. The same fault takes place in definitions when an idea is defined by others which suppose the knowl¬

edge of the first. Arguing in a circle is a fault into which men are very liable to fall, particu¬

larly in theological discussions.

In astronomy, the heavens being considered as a spherical surface drawn round the earth as centre, an imaginary line drawn round the heavens so as to lie in one plane is a circle of the sphere. It is a <(great circle® if the plane of it passes through the centre ; thus the celes¬

tial equator and the ecliptic are great circles; if the plane of the circle does not pass through the centre it is called a <(small circle® ; all paral¬

lels of declination are small circles.

See also Geometry, various subheadings.

Consult McClelland, (Geometry of the Circle*

(London 1891) ; Smith, D. E., (The History and Transcendance of tt > (in Young, (Monographs on Topics in Modern Mathematics *

New York 1911).

CIRCLE, Magic, a space in which sor¬

cerers were wont to protect themselves from the fury of the evil spirits they had raised. This circle was usually formed on a piece of ground about nine feet square (in the East seven feet appears to have been considered sufficient), in the midst of some dark forest, churchyard, vault or other lonely and dismal spot. It was described at midnight in certain conditions of the moon and weather. Inside the outer circle was another somewhat less, in the centre of which the sorcerer had his seat. The spaces between the circles, as well as between the paral¬

lel lines which enclosed the larger one, wrere filled with all the holy names of God, and a variety of other characters supposed to be potent against the powers of evil. Without the pro¬

tection of this circle, the magician, it was be¬

lieved, would have been carried off by spirits.

Another figure which, described upon the ground, could bar the passage of a demon, was the pentagram.

CIRCLE OF CURVATURE. When a

point in motion is tracing out any curved path, the direction of motion changes from point to point of the curve, and the path is said to be more or less curved according as the di¬

rection of the motion of the point changes more or less rapidly. The curvature at any point is measured by the rate of this change at the point per unit length of the curve.

In the case of the circle the curvature is the same at every point ; and it is easy to show that CIRCLEVILLE — CIRCULAR POLARIZATION OF LIGHT

the curvature measured as above is equal to the reciprocal of the radius of the circle.

If we consider any small portion of any curve whatever, it may be approximately taken as an arc of a circle, the approximation being closer and closer to the truth as the portion considered is smaller and smaller, and by taking it small enough we may make the approxima¬

tion as close as we please. The curvature is then the reciprocal of the radius of this circle.

The circle which coincides more nearly than any other with the arc at any point of any given curve is generally found by means of the methods of the differential calculus. Such a circle is called the circle of curvature, and sometimes the osculating circle. The radius of it is called the radius of curvature of the curve at the point considered; and the centre of this circle is called the centre of curvature. See Calculus, the Infinitesimal.

CIRCLEVILLE, Ohio, city and county-seat of Pickaway Count)-, on the Scioto River, the Ohio Canal and the Cincinnati and Muskin¬

gum Valley and the Norfolk and Western rail¬

roads, 28 miles south of Columbus. It derives its name from a circular earthwork built by some ancient people, and which is the site of the present city. Circleville contains a county infirmary, a children's home, a home and hospital for old ladies, numerous churches, three banks and several daily and weekly newspapers.

The surrounding country is very fertile and the city has extensive strawboard works, canneries and flour and corn-meal mills. It also has manufactures of agricultural implements and furniture. Settled in 1806, it was incorporated as a village in 1814, and as a city in 1853. It is now governed under the Ohio Municipal Code of 1902 by a mayor, elected for two years, and a council. One of the city's historic places is the Logan Elm, where John Logan, the Indian chief, made his celebrated speech. A park has been laid out here. Pop. (1920) 7,049.

CIRCUIT COURT. See Courts.

CIRCULAR NOTES, in commerce, notes

or letters of credit furnished by bankers to persons about to travel abroad. Along with the notes the traveler receives a <(letter of indica¬

tion® bearing the names of certain foreign bankers who will cash such notes on presenta¬

tion, in which letter the traveler must write his name. On presentation

the foreign banker can demand to see the letter of indication, and by causing the presenter to write his name, can compare the signature thus made with that in the letter, and so far satisfy himself as to the identity of the person presenting the note.

CIRCULAR NUMBERS, numbers whose

powers end on the same figure as they do themselves: such are numbers ending in 0, 1, 5, 6.

CIRCULAR PARTS, Napier's Rules for.

Rules invented by Baron Napier of Merchiston, near Edinburgh, for the solution of all cases of right-angled spherical triangles, eminent for comprehensiveness and utility in extensive sur¬

veys, navigation and practical astronomy. They were first published by him in the (Descrip-, tio,* in 1614. See Trigonometry.

CIRCULAR POLARIZATION OF

LTGHT. Plane-polarized light is altered into circularly polarized light by passing in a par¬

ticular direction through a Fresnel's rhomb.

This is a parallelopiped of glass with its faces set at certain angles depending on the refrac¬

tive power of the glass. The usual experi¬

mental rhomb is a bar of thick plate glass, the ends of which are ground to an angle of 54°

and then polished. The light entering one base of the rhomb is twice internally reflected be¬

fore it emerges at the opposite base; and while common unpolarized light passes through the rhomb without suffering alteration, plane-polar¬

ized light has its properties in general complete¬

ly altered. The final result depends on the in¬

clination of the plane of polarization of the in¬

cident light to the plane of the internal reflec¬

tions. In two cases, namely, when this angle is 0° or 90°, the emerging light is still plane polar¬

ized; when the angle is 45° the light is circularly polarized; in every other case it is elliptically polarized. In the first case, as will be under¬

stood from consulting the article on Polariza¬

tion of Light, the analyzer, on being applied to test the beam, shows in one position bright light, and on being turned round the principal axis through 90°, total darkness. In the last case — that of elliptic polarization — the ana¬

lyzer shows, on being turned round, a beam of varying intensity, but never complete ex¬

tinction. In the case of circularly polarized light the analyzer, on being turned round, shows a beam of the same intensity in every position of the analyzer, and, in fact, does not at first sight differ from ordinary unpolarized light. When, however, it is examined — not with a Nicol's prism direct, but after a second Fresnel's rhomb has been interposed — it is found to differ very materially from unpolar¬

ized light. The latter is, as we have remarked, unaffected by the rhomb; the circularly polar¬

ized light emerges from the second rhomb plane polarized. It is thus shown how to pro¬

duce and how to recognize circularly polarized light. We now give a few of its most notable properties.

The light, as we have said, that emerges from the second Fresnel's rhomb is again plane polarized, but it does not emerge precisely as it entered. For, except in one particular position of the two Fresnel's rhombs, the light that emerges from the second rhomb has its plane of polarization changed ; the plane is turned round, in fact, through an angle depending on the positions of the two rhombs with regard to the original plane ot polarization ; and it may be turned round either in a right-handed direc¬

tion, that is, as the hands move_ on a clock, or in a left-handed direction, that is, a movement opposite to clockwise. We might arrange a set of pairs of Fresnel's rhombs, it is evident, in such positions that each pair should give the plane of polarization of the ray passing through it a farther twist in the same direction, and we might turn it thus through any angle whatever Such a power as we have imagined in a set of Fresnel's rhombs is _ possessed naturally by quartz and by a considerable number of solu¬

tions of organic substances and it is known as the power of rotating the plane of polarization.

When a beam of homogeneous light has passed through the polarizer, and the analyzer is placed in the position of total extinction of the ray (see Polarization of Light), on introduc¬

ing a plate of quartz the light reappears ; but on turning the analyzer round, either in a right-694

handed direction or in a left-handed direction (whence the names), extinction is again ob¬

tained. Quartz is named right-handed quartz or left-handed quartz according to the direc¬

tion in which the analyzer must be turned. The difference between right-handed and left-handed quartz is due to the fact that the right-handed circular component travels faster in the for¬

mer and slower in the latter. The amount of the angle through which it must be turned de¬

pends on the thickness of the plate of quartz.

If, instead of using homogeneous light, as we have been supposing, plane-polarized white light is employed, it is found that the different rays are differently deviated. The effect on the more refrangible rays is greater than on the less refrangible, and the plane of polariza¬

tion of the blue rays will thus be turned through a greater angle than that of the red rays. It will be perceived from this that having arranged the polarizer and analyzer, and inserted a plate of quartz, as described above, on rotating the analyzer in the direction, right-handed or left-handed, that corresponds to the nature of the plate of quartz, we shall not arrive at a position of total extinction, but we shall see a most beautiful play of colors changing in order from red to yellow, then to orange, green and blue.

These phenomena are among the most beautiful and most striking of all the marvelous phe¬

nomena of light.

It has been remarked above that certain or¬

ganic liquids and solutions have this rotatory power. Among these may be mentioned tur¬

pentine and the essential oil of anise as in¬

stances of left-handed rotatory substances, oil of lemon and oil of caraway and solutions of sugar, as right-handed rotatory substances, and solutions of tartaric acid as showing both ro¬

tations, as explained below. This fact is taken advantage of in Soleil's saccharometer, an in¬

strument for determining the value of cane-sugar in a liquid.

We have spoken above of the right-handed and left-handed properties of quartz; a dis¬

covery of Hairy leads us here to the very threshold of the molecular

structure of crystals.

We may yet hope for discoveries in this direc¬

tion. On comparing crystals of quartz that give us right-handed and left-handed polarization, it is found that a very remarkable property con¬

nects their forms. The crystals that give right-handed and left-handed polarization are of an unsymmetrical construction, such that either viewed in a looking-glass gives an image of the same form as the other. Pasteur, examining the crystals of the twyo varieties of tartaric acid whose solutions have opposite rotational powers, but whose chemical properties are very nearly the same, showed that the same law holds for them ; and, having crystallized what is known as neutral tartaric acid, was able, by picking out the crystals by hand, to separate it into equal portions of laevo tartaric acid and dextro tartaric acid. But we must refer the reader to the special articles on the chemistry of this substance.

One of Faraday's most brilliant discoveries was the rotatory power of glass under the action of a powerful magnet. The reader is referred for an account of it to the article Polarization of Light.

CIRCULATING LIBRARY. See Li¬

braries.

CIRCULATING MEDIUM. See Money.

CIRCULATION. See Blood, Circula¬

tion of.

CIRCULATION IN PLANTS. See Sap.

CIRCULATORY SYSTEM, general name

for the group of organs which convey fluids and solids from one part of a body to another, the matter carried being usually of an alimentary nature. Such a system develops when an organism becomes specialized in struc¬

ture, so that the organs requiring alimentation are more or less removed from the regions where it is supplied to the organism. For the circulatory systems of the unicellular and other animals see Blood, Circulation of, and the articles on Crustacea, Arthropoda, Mollusca, Protozoa, *etc.* For a description of the cir¬

culatory systems of plants see Sap.

CIRCUMCELLIONS, ser-kum-sel'i-onz,

CIRCUMCELLIONES, or CIRCELLIO—

NES, members of bands, probably of fanatic monks, partisans of Donatus (q.v.) and the Donatists in Numidia and Mauretania who, avenging the condemnation of Donatus by the Synod of Arles (314) and the Council of Nicaea (325) and the condemnation of Donatus and his followers by Constantine and Con-stantius, roamed throughout those provinces pillaging and wrecking the churches and other religious establishments of the Roman Catholics and proclaiming the downfall of the empire itself. Their name probably is formed from circmn, round about, and cella, cell, a monk's cell : if the derivation is correct these Circum-cellions are of the same class of vagabond monks complained of by the father of western monachism, Saint Benedict, as gyrovagi, circu¬

lating vagabonds.

CIRCUMCISION, an amputation of the

foreskin, or labia minora of the human organs of generation; principally performed on males, but sometimes on females. It has been practised in all ages and by both civilized and savage races, as Arabs, certain African tribes, Chris¬

tian Abyssinians, Australian “blacks,® Malays, some North American Indians, Aztecs, Mayas, Caribs, South American Indians, Jews, Moham¬

medans, Fijians and Samoans.

In the male, the operation consists in re¬

moving a section of the prepuce. The original object was religious and symbolic and its an¬

tiquity is lost in the shade of mythology. The institution of the rite among the Jews is re¬

corded in Gen. xvii. Here it is stated that Abraham, then 99 years old, was himself cir¬

cumcised, with his son Ishmael, 13 years old, ((and all that were born in his house and all that were bought with his money, every male among the men of Abraham’s house.® But by the terms of the covenant every man-child among the Hebrews was to be circumcised on the eighth day after birth, and this rule, peculiar to the race, is adhered to with such rigor that even the Sabbath observances are not allowed to interfere with the ceremony. Other Eastern nations have practised circumcision on various days — the Arabs 7, 14, 21 or 28 days after birth, though Josephus states that in his day the Arabs circumcised after the age of 13

on account of the circumcision of Ishmael, their progenitor, taking place at that age; the Moham¬

medans of Persia circumcise in the third or fourth year; Fijians and Samoans in the CIRCULATORY SYSTEM.

[The red lines show arteries; the blue, veins.]

1. General Circulation in the Human Body. 2 The Heart, showing Interior.

3. Cross-Section of the Heart, seen from above. 4. Circulation of Blood in the Lungs 5. Circulation of Blood in Digestive Tract.

seventh year ; the Christian Abyssinians in the sixth, seventh or eighth year ; while some of the African tribes that practise the rite follow the Jewish rule; others, again, performing the ceremony between 30 and 60 days after birth.

Circumcision is universally practised by Mohammedans, not on the authority of the Koran, which does not enjoin it, but as follow¬

ing the example of Mohammed. It seems to be doubtful whether Mohammed's omission to

prescribe the cite was due to his deeming such a rule valueless where custom already decreed it, or because he attached only a physiological and not a religious importance to the ceremony. It is, however, now recognized as a religious obli¬

gation just as strongly as if it had been ordained by the founder of Islam. Circum¬

cision among Mohammedans may be practised seven days after birth, but it is customary to postpone the ceremony to some time between the 7th and 12th year.

Christianity recognizes no religious signifi¬

cance in the rite, substituting for it, according to Saint Paul (Rom. ii, 25-29) ((circumcision of the heart. w The Church, however, celebrates as a festival the first of January, as being the day of the circumcision of its founder.

Circumcision of proselytes to the Jewish or Mohammedan faith is insisted on by the ortho¬

dox, and previous circumcision for surgical reasons is not accepted as sufficient compliance with the requirements of religion. Among some ˆreformed** Jews, however, the circumcision of adults has lately been abandoned. Among many savage tribes the rite is undergone at the age of puberty and is perhaps in such instances more of a sociological than a religious cere¬

mony, being akin to other mystic rites which mark the entrance of the young into full tribal fellowship.

The circumcision of women is effected by the removal of a portion or the whole of the clitoris. It is perhaps practised more in Arabia than elsewhere, but has never prevailed among Jews. The inner significance of circum¬

cision is psychological. It is a purely symbolic rite, the origin of which is lost for the con¬

scious life of the individual. It has no intrinsic medical value whatever, save where some maldevelopment is present. The motive of cleanli¬

ness is solely a rationalization to endeavor to explain its deeper psychological significance as a type of racial identification and an index of the father pixation fantasy in the uncon¬

scious. The operation is sometimes attended with grave consequences, hence should be done by surgeons only.

CIRCUMFERENCE, or PERIPHERY,

the curve which encloses a circular, elliptic or other plane area. In figures bounded by straight lines, as the triangle, square and poly¬

gon, the term perimeter is employed to desig¬

nate the sum of all the bounding lines taken together. The length of the circumference de¬

pends partly on the nature of the curve; thus, that of the circle of radius r and diameter d =2Trr=7rd, where tt=3.141592 … and that of the ellipse=

(/l-V*1 /l3Ye*

Tlj T'tJT'U T'_-

where a is the semi-axis major, and e the eccentricity. See Circle, etc,

CIRCUMFLEX, in grammar, one of the

three accents, formed by the union of the other two, thus, r\~. It originally denoted a rising and falling of the tone in the pronunciation of the syllable. In Greek it is used in certain cases to indicate the long vowel of the last syllable or of the penult. In Latin the mark is A . It is not used in English, and in French is usually a sign of the elision of a letter, often the letter s , and therefore indicates a pro¬

longed sound.

CIRCUM NUTATION, the continuous

motion of every growing part of a plant, in which it describes irregular elliptical or oval figures. The apex of the stem, for instance, after pointing in one direction, moves round till it points in the opposite direction and so on continuously. The term circumnutation was first used by Darwin.

CIRCUMPOLAR STARS, stars near the

Pole that appear to move around it, and per¬

form their circles without setting. A star whose polar distance is less than the latitude of a place in the same hemisphere will never set at that place. If the place is in the other hemisphere it will never rise. They are cqii-stantly used by astronomers in connection with meridian work for determining latitude of a place or the azimuth of a line. The pole-star Polaris or Alpha Ursae Minoris, usually known as the North Star, is the most used for that purpose.

CIRCUMSTANTIAL EVIDENCE, evi¬

dence which tends to prove a particular fact by the proof of other facts, from which it is concluded that the particular fact must 1 ave happened. It is the natural and reasonable in¬

ference resulting from facts which have been established.

If A is on trial for the murder of B, and a witness testifies that he saw A shoot B, and a few minutes later B died, that would be direct evidence; whereas if the witness testified that B had been shot and the bullet found in the body of B was of a particular make only used by A and that A was in the neigh¬

borhood at the time of the shooting, the jury might infer that A was guilty; but if A could prove that his pistol had been stolen from him shortly before the shooting and he had not recovered it at the time of the shooting, it would be a complete defense and the verdict would depend on the credibility of the wit¬

nesses.

Circumstantial evidence is of two kinds : that from which a certain conclusion neces¬

sarily follows and that from which a certain conclusion is only probable or likely. If the body of a man is found with a bloody right hand impression on a part of his body where it is impossible for him to put his right hand, the presumption is that some one was present at or since the time the person was hurt ; but if that is all of the evidence, it is impossible to tell whether the bloody impression was made by the person at the time of the assault, or by some one after the

assault had been committed.

In civil cases the jury may decide according to the weight of the evidence; but to convict a person of a crime the evidence must be such as to leave no reasonable doubt as to. hj§ guilt, See Criminal Law. . , … . .

CIRCUMVALLATION, a fortification

consisting of a parapet of earth and a trench, constructed by a besieging army around its camp, to guard against attempts to relieve the place besieged.

CIRCUS, a word which has come down to us from the Latin without change, meaning <(circle® and used by the Romans to indicate the place in each city where chariot races, gladiatorial contests and feats of skill were held. The circus building in Roman times was without a roof, rectangular in shape, except that one short side formed a half-circle; on both sides and on the semi-circular ends were the seats of the spectators, rising gradually one above another, like steps. The largest of these buildings in Rome was the Circus Maximus, 1,875 feet long and 625 feet wide and capable, according to Pliny, of containing 260,000 spec¬

tators. At present but few vestiges remain, but the circus of Maxentius is in a better state of preservation. Grown great through conquest of other peoples, the Romans of 2,500

years ago (and for 10 centuries later) encour¬

aged all forms of pleasure which would de¬

velop to its highest pitch the fighing instinct in their soldiery. Among the circus games were chariot races, a favorite sport of the Romans; athletic contests; the Trojan games, contests on horseback; and

combats with wild beasts in which beasts fought beasts, or beasts with men (either criminals or volunteer).

The prizes given to the victors were often valuable and the honors great. In the deca¬

dence of Rome came a decline of the circus and it was frequently debased by revolting spectacles, in which Christians or others tem¬

porarily hated by the government were given over to wild beasts or crucified. Julius Caesar dug ditches around the circus and filled them with water. This served the double purpose of protecting the spectators from the sudden swerving of a chariot or spring of a tiger and of making possible the novelty of feats of skill on the water. Most of the vessels then were propelled entirely by banks of oars and Caesar held rowing-races, swimming-races, *etc.*

Most of our grotesque picnic-games, like swim¬

ming in a barrel or running in a sack; are relics of his fertile inventions to please his restless, turbulent people. There was no charge to see these entertainments, as a rule, the circus being used as a pacifier by the emperor.

America has taken the lead in the reproduc¬

tion of the Circus Maximus. This is probably because the American people are of a similar strenuous, contest-loving, restless disposition.

It was his acute perception of this disposition in his countrymen that led Phineas Taylor Barnum (q.v.), a Connecticut Yankee, to de¬

vote his life to entertaining his countrymen bv giving them a real circus. The magnitude of the Barnum & Bailey circus and menagerie can scarcely be described. It is usually formed by making three immense rings, three different performances being given simultaneously. The capital invested in this and other circuses in America is enormous, being estimated at over $100,000,000.

Since about 1890 there has developed a pe¬

culiar American form of circus which is worthy of mention. This is a

reproduction in the ring of the habits and customs of the ˆcowboy® and pioneer of our own western plains. The exhibi¬

tion is termed a <(Wild West® show. It was originated, practically, by William F. Cody (q.v.), known on the plains as (<Buffalo BillP*

He was a former government scout, and thus became familiar with many Indian tribes. With the aid of the late Nathan Salsbury he organ¬

ized an exhibition of frontier and Indian life which rivals Barnum & Bailey's in point of in¬

terest and profit. He had a hundred western cattle-herders, who gave marvelous illustrations of the perfect horsemanship of the plains; he also had many American Indians. from a score of tribes, who gave their war-dances and weird chants; also Mexican lariat-throwers, perform¬

ing wonderful feats with a swirling rope, and <(rough riders® from many lands. Altogether, this made a ((show" which appealed powerfully to both the young and the old American. Sev¬

eral less important <(Wild Wests® have also been organized.

Some American college youths have in re¬

cent years endeavored to revive interest in the ancient Grecian Olympic games. Delegations went to Athens in 1896 and 1906 to compete with the modern Greeks and other national champions. Similar athletic contests were held in Paris 1900; London 1908, and Stockholm in 1912.

CIRENCESTER, siz'e-ter, England, town

in the county of Gloucester, on the river Churn, 17 miles, southeast of the city of Gloucester.

The chief industries are malting, brewing and cutlery manufacture ; it also has a large wool trade. The town contains the remains of the gateway of an abbey founded in 1117 and several churches of interest.

In the environs is the well-known Royal Agricultural College, with a large number of students coming from all parts of the world. It is an important live stock and wool market. Cirencester was

founded by the ancient Britons, and later, under the name of Corinium, became a Roman sta¬

tion. Various Roman remains, including those of an amphitheatre, have been discovered in it, and numerous relics belonging to this period of its history have from time to time been discovered. Cirencester was twice stormed by Prince Rupert in the great civil war. Pop. 7,631.

CIRILLO, che-nTlo, Domenico, Italian

republican and naturalist: b. Grugno, Naples, 1734; d. Naples, 29 Oct. 1799. He officiated in early life as professor of botany, after¬

ward accompanied Lady Walpole to France and England, became a fellow of the Royal So¬

ciety of London, a friend of Buffon, D' Alem¬

bert and Diderot, and on his return to Naples was appointed physician of the court. After the proclamation of the republic by the French, he was chosen representative of the Neapolitan people, and member of the legislative commis¬

sion (1799) ; and on the re-establishment of roy¬

alty suffered death on the scaffold, rather than take the oath of allegiance or ask a pardon from King Ferdinand. His principal writings are (Fundamenta Botanica) (1787) ; and (Ento-mologias Neapolitanae Specimenˆ* (1787). Con¬

sult Giglioli, (Naples in 1799) (London' 1903).

CIRL-BUNTING, serl'bun'tmg, a small

and very handsome European bunting (£m—

beriza cirlus), rare and local in England, often kept as a cage-bird, though its song is slight.

CIRPAN, cher'pan, a town of eastern Ru-melia, Bulgaria, on the tributary of the Maritza, CIRQUE — CISALPINE REPUBLIC

30 miles east oi Philippopolis. It is situated in a fertile, fruit-producing region and is noted for its mineral springs. Pop. about 12,000.

CIRQUE, serk, a broad amphitheatre-like

valley head, also sometimes called a glacial bowl. It is usually the gathering ground for the snow and neve that form the glacier.

Cirques usually have steep rock walls and are often occupied by small lakes. They constitute a striking feature of mountain landscapes in glaciated regions. As the bergsehrund crevasse is formed at the head of the glacier, where the ice pulls away from the rocky walls, these walls are exposed to frost work, which loosens large blocks of rock. Each winter, with the accumu¬

lation of new snows, these loosened blocks freeze into the glacier and are dragged away down the valley. Thus the valley head grows larger and larger, until a typical cirque is formed. See Bergschrund.

CIRRHOSIS, ki -ro'sis, a process of chronic, inflammatory reaction in an organ, due to some form of constant irritation. It is characterized by the excessive production of connective tissue in the part, which increase of connective tissue gradually invades the blood-vessels of the organ and slowly encroaches upon its essential glandu¬

lar tissues. This connective tissue proliferation is probably a result of a lack of balance of autonomic and sympathetic nerve stimuli. Cir¬

rhosis may occur in almost any portion of the body, but it is

characteristically present in only those organs which are rich in functionating parenchyma, such as the kidney, liver, spleen, pancreas and brain. In each of these organs it produces very definite forms of change with clearly defined clinical course and history, ac¬

cording to the functioning organ. Thus, in the kidneys, cirrhosis constitutes one of the forms of Bright's disease or chronic nephritis (q.v.).

Cirrhosis of the liver results in a well-defined form of liver-disease, or chronic cirrhotic hepatitis (q.v.). Cirrhosis of the spleen and cirrhosis of the pancreas also occur, and there is a well-known form of cirrhosis of the brain associated with degeneration. (See Senile Dementia). These different forms of cirrhosis will be discussed under their separate headings.

CIRRIPEDIA, an order of entomostrac—

ous Crustacea (barnacles), sometimes ranked as a sub-class, always fixed in the adult stage, but with free-swimming larvae having three pairs of appendages (nauplius) like other Crustacea.

The typical barnacles have the body enclosed in a reduplication of the skin which secretes a calcareous shell, on which account they were classed with the Mollusca until the discovery of their free-swimming larvae led to a closer in¬

vestigation of their structure. Owing to adapta¬

tion to a sedentarv life segmentation of the body has become obscure, and the six pairs of jointed biramous appendages are mere fringed scoops for creating currents in the water. The eyes and other sense organs have likewise de¬

generated, and most species are hermaphroditic.

The barnacles are exclusively marine, and a great many are parasitic.

Four sub-orders are distinguished : (1) Tho-racica, including the typical, free-living, shelled barnacles of which the sessile forms (Bala -

nidee, Coronulidce, etc.) are well known as rock and ship barnacles in which the animal is pro¬

tected by a conical shell formed of several pieces, with a multivalve conical movable lid, having an opening through which several pairs of long, many-jointed, hairy appendages are thrust, thus creating a current which sets in toward the mouth. The young have oval bod¬

ies, with a single eye, a pair of antennae, with three pairs of legs. After swimming about for some time it attaches itself by its antennae to some object, and now a strange backward meta¬

morphosis begins. The body becomes enclosed by two valves, the stalk by which it is anchored grows larger, the feet become more numerous and eventually the barnacle shape is attained.

The goose-barnacle (Lepas) is not sessile, but is flat and triangular, and attached to floating bits of wood or seaweed by a long, large, soft stalk.

(2) Abdominalia, parasitic barnacles, in which the sexes are separate and very unequal in size.

In this group is presented the remarkable phe¬

nomenon of dwarfed complemental males dis¬

covered by Darwin. The females live in bur¬

rows in the shells of mollusks and other bar¬

nacles, while the males are minute, lack mouth, digestive canal and appendages, and live, often several together, permanently attached to the female. (3) The Apoda, whose body is maggot¬

shaped, are hermaphrodite and parasitic in other barnacles. (4) Rhizocephala: This group pre¬

sents perhaps the most extreme cases of degen¬

eration, through parasitism, known among ani¬

mals. Sacculina, which attaches itself to the abdomen of the crab, is little more than a bag of genital organs which draws its nourishment from the tissues of its host by means of branch¬

ing root-like processes which penetrate to every part of its body.

Consult Darwin, (Mono¬

graph of CirripediaP

CIRRUS. See Cloud.

CIRRUS, in botany, the tendril by means of which certain plants climb, usually a modified leaf or the prolongation of a midrib.

CIRSIUM, a genus of plants belonging to the family Asteracece, generally known as thistles, common in most temperate regions.

Many of them are troublesome weeds, though said to possess medical properties which make them useful in fevers. Among the more com¬

mon of them are C. arvense (corn-thistle, way-thistle or creeping-thistle), which has strong fleshy roots extending underground, and is diffi¬

cult of extirpation; and C. lanceolatum (spear-thistle), which, both from its size and rough feeding, is a great robber of the soil, but being only a biennial is more easily managed.

CIRTA, sir'ta, a city of northern Africa, the capital of the Numidian prince Syphax, and an important fortress of Masinissa and his succes¬

sors. Later it became a flourishing Roman col¬

ony. It was much injured by the troops of Masentius in 310 a.d., but was restored by Con¬

stantine and named Constantina. The modern Constantine occupies its site.

CISALPINE REPUBLIC, Italy, a

former state in the northern part. After the battle of Lodi, May 1796,

General Bonaparte proceeded to organize two states — one on the south of the Po, the Cispadane Republic, and one on the north, the Transpadane. These two were on 9 July 1797 united into one under the title of the Cisalpine Republic, which embraced Lombardy, Mantua, Bergamo, Brescia, Cremona, Verona and Rovigo, the duchy of Modena, the 698

principalities of Massa and Carrara, and the three legations of Bologna, Ferrara and the Romagna. The republic had an area of more than 16,000 square miles, and a population of 3,500,000. The seat of the government or Di¬

rectory was Milan. The army consisted of 20,000 French troops, paid by the republic. The republic was dissolved for a time in 1799 by the victories of the Russians and Austrians, but was restored by Bonaparte after the vic¬

tory of Marengo, and some modifications of constitution were made and the area was in¬

creased. In 1802 it took the name of the Italian Republic, and chose Bonaparte for its president. In 1805 the republic sent a depu¬

tation to Napoleon with authority to give him the title of king of Italy. The territory was known as the kingdom of Italy until 1814. In 1815 it became a part of Austria. It is now a part of the Italian kingdom.

CISCO, sis'ko, a local name, probably from the Indian language, applied to several species of fresh-water fishes of the family Salmonidce (q.v.) and closely allied to the whitefishes (q.v.), with which they are sometimes placed in the genus Coregonus, or separated under the name Argyrosomus. They are distinguished from the true whitefishes by having the lower margin of the premaxillary bone horizontal in¬

stead of vertical, and by the larger mouth.

Nine or 10 species have been described from North America, most of

them belonging to the w'aters of particular lakes or lake systems. The most important is A. artedi, which is found in the Great Lakes and adjoining regions, being represented in the small lakes of Indiana and Wisconsin by a slightly modified race. Under the name of lake herring it is the object of an extensive fishery on the lakes, second in value only to that of the true whitefish. It is a voracious fish, swimming in large schools, frequenting deep waters during most of the year, but spawning in the shallows during the winter. The other species inhabit various lakes and the river systems of Alaska, *etc.* Similar species also occur in Europe and Asia.

CISLEITHANIA, sis-li-tha'm-a, a river on the boundary line between Austria and Hungary.

CISNEROS-BETANCOURT, thes-na'ros

be-ton-koor', Salvador, Cuban patriot : b. Puerto Principe 1832. He was a descendant of one of the best families of Spanish nobility and possessed the hereditary title of Marquis of Santa Lucia. During the revolution of 1868-78

he was president of the Cuban House of Repre¬

sentatives and during a part of the time Presi¬

dent of the Cuban Republic. In 1895 he was reelected President of the new Cuban Republic.

His niece, Evangelina Cosio Cisneros, was im¬

prisoned by the Spaniards for aiding the in¬

surgents during the insurrection in 1896-97, and made a sensational escape, coming to the United States, where she became a protege of Mrs. Gen.

John A. Logan. His daughter tendered her services to the United States as an army nurse during the war with Spain in 1898.

CISPADANE, sis-pa'dan, REPUBLIC,

Italy, a republican state established by Napoleon in 1796 after the battle of Lodi. It comprised Bologna, Modena, Ferrara and Reggio. In 1797 it was united with the Cisalpine Republic (q.v.).

CISPLATINE, sis pla'tin, REPUBLIC

(Lat. cis, on this side, and Sp. Plata, name of the river on the boundary between Uruguay and Argentina). The republic of Uruguay was called by this name from 1828 to 1831. Previous to becoming an independent state it had be¬

longed to Brazil and was called Cisplatine province.

CISRHENISH REPUBLIC, or CIS—

RHENAM REPUBLIC, several towns on the

Rhine, particularly Cologne, Aix-la-Chapelle and Bonn, at the time when so many republics were created, declared themselves independent, under French protection and took the title of Cisrhenish Republic in September 1797. But at the peace of Campo-Formio (17 Oct. 1797), the left bank of the Rhine, including the Cisrhenish Republic, was ceded to France by a secret article and the confederation bearing this name is in consequence hardly known.

CISSAMPELOS, a tropical genus of climb¬

ing shrubs of the natural order Menispermacece, whose growth is similar to that of an ivy vine.

The plant is of great commercial value because of its medicinal qualities, especially the velvet-leaf of Brazil (Cissampelos pareira), the root of which supplies the spurious pareira brava, abuta root, used in medicine as a tonic. Other species growing in nearly all tropical countries are used for emetics and cathartics and an East Indian species (C. obtecta) yields an intoxicat¬

ing spirit.

CISSEY, se'sa, Ernest Louis Octave Courtet, French general: b. Paris 1811; d. there 1882. He was educated at the military school of Saint Cyr and having served with distinction in Algeria and the Crimea, he was promoted general of a division in 1863. He fought in the Franco-Prussian War and against the Com¬

mune of 1871. He was elected to the National Assembly in February 1871 and was Minister of War from 1871 to 1873 and in 1874— 76. He was elected life senator in 1875.

CISSOID, a curve in geometry, the locus of the vertex of a parabola rolling upon an equal parabola. If pairs of equal ordinates be drawn to the diameter of a circle, and through one extremity of this diameter and the point in the circumference through which one of the ordinates is let fall a line be drawn, the locus of the intersection of this line and the equal ordinate is known as the cissoid. This curve was discovered by Diodes while he was seek¬

ing the solution of the celebrated problem of the duplication of the cube.

CIST, Henry Martyn, American soldier : b.

Cincinnati, Ohio, 20 Feb. 1839; d. Rome, Italy, 17 Dec. 1902. He graduated at Belmont College 1858 and began the study of law, but enlisted as a private in the Sixth Ohio Regiment in 1861, attaining, before his resignation in 1864, the brevet rank of brigadier-general. He was post-adjutant of Camp Chase during the im¬

prisonment of the Confederates captured at Fort Donelson, assistant adjutant-general of the Army of the Cumberland and later on the staff of Generals Rosecrans and Thomas. After the war he practised law in Cincinnati, was twice mayor of College Hill, originated the project that resulted in the conversion of the Chickamauga battlefield into a national park and was a contributor of military articles to the maga-

zincs. He wrote (The Army of the Cumber¬

land* (1882) ; and collaborated with Donn Piatt in a (Life of General George H. Thomas.*

CIST, a place of interment of an early or prehistoric period, consisting of a rectangular stone chest or enclosure formed of rows of stones set upright and covered by similar flat stones. Such cists are found in barrows or mounds, enclosing bones. In rocky districts cists were sometimes hewn in the rock itself.

See Burial; Burying Places.

CISTACEiE, sis-ta'se-e. See Cistus.

CISTERCIANS, sis-ter'she-ans, a monas¬

tery founded in 1698 by Saint Robert of Molesme, a Benedictine monk of Cluny (q.v.) at Cistercium, near Dijon in France. After a year Robert of Molesme was succeeded as abbot by the monk Alberic and he in turn by Saint Stephen Harding, an Englishman who ruled the order during 25 years with great wisdom and who is regarded as its second founder and lawgiver : his day in the Church calendar is 17 April. The Cistercian order in his time grew to be the most considerable monastic order in the Church and to him in great part is due the founding of the four greatest Cistercian monasteries of France, next after Citeaux, namely, La Ferte, Pontigny, Clairvaux and Morimond. By the middle of the 12th century Citeaux had affiliated with it 500

abbeys and priories, and early in the 13th their number was 1,500, of which very many were convents or priories of Cistercian nuns. For 200 years the austere rule of Saint Benedict as reinforced by Saint Stephen Harding was main¬

tained throughout the order : there was the chanting of matins and lauds at midnight throughout the year in the abbey or priory church; there was a strict fast on one slender meal from 14 September to Easter; there was abstinence at all times (cases of sickness ex¬

cepted) from all animal food, save that very rarely milk was allowed. The austerity of the Cistercian rule extended even to the churches of the order: simplicity was sought in every¬

thing; there was no display of ornamentation, either of the edifice or of the vestments, or of the sacred vessels ; the copes and chasubles em¬

ployed in the church services were of white linen instead of silk or cloth of gold; the chalices and the pyxes, instead of being of gold incrusted with precious stones, were of plain silver. But the Church schisms and the wars and civil commotions of the 14th century led to the plundering of the abbeys and priories, and the monastic discipline was greatly relaxed, so that on the one hand it became necessary for the see of Rome to sanction in some respects this relaxation, while on the other hand there arose zealous upholders of the ancient rules who brought back the primitive observance in all its rigor. Among the most notable of these revivers of the ancient rule was the abbot De Ranee of the monastery of La Trappe (q.v.) in the 17th century. At the dissolution of the English monasteries by Henry VIII there were in England and Wales 115 Cistercian houses, of which 25 were for nuns. In the period of the French Revolution most of the Cistercian Cenobia, not only in France, but throughout the continent of Europe, were suppressed. In the United States there are three Cistercian abbeys, La Trappe at Gethsemane, Ky. ;

New Mellarey, near Dubuque, Iowa, and Our Lady of the Valley, Cumberland, R. I. The most noted English Cistercians' houses were the abbeys of Furness, Fountains, Rievaulx, Tintern, Kirkstall and Woburn. A modern English Cistercian abbey is situated at Mount Saint Ber¬

nard, not far from Leicester. Consult Janaus-chek, (Origines Cistercienses) (1877); Guig-nard, (Monuments primitifs de la regie Cister-cienne* (1877) ; Sharpe, Architecture of the Cistercians* (1874) ; Lefroy, (Ruined Abbeys of Yorkshire* (1889) ; Eulart, (Origines de l'architecture Gothique en Italie* (1893).

CISTERN, a tank for holding water. Cis¬

terns differ from wells in that they do not get their water from natural sources, such as springs, but through channels made by the hand of man. In hot countries, where the supply of water is not regular, or where rain water is used, cisterns are necessary for storing up water

for future use. They are also largely used for the supply of locomotive boilers at railroad stations. Cistern water used for drinking is usually filtered.

CISTUS, the typical genus of the rock rose family (Cistacece) , a family having four genera, and about 160 species, of which two at most are found outside the northern hemisphere. The American representatives of the family belong to the genera Helianthemum, Hudsonia and Lechea, most of the species being pestiferous plants, such as the frost-weed or Canadian rock rose (H . canadense) , poverty-grass (Hud -

sonia ericoides) and the pin-weeds {Lechea).

Cistus does not grow wild in America, but some species are cultivated in greenhouses and the warmer regions for the beauty of their large, wild, roselike flowers, which are often of two colors. This genus, which is a native of Europe, is generally a beautiful evergreen flowering shrub, ornamental in gardens or shrubberies.

Gum ladanum is obtained from C. creticus and C. ladaniferus. This gum was formerly used as an external stimulant in plasters, but is now almost obsolete in medical practice.

CITADEL (from the Italian cittadella, a diminutive of cittd, city; signifying little city), in fortification, a kind of fort, consisting of four, five or six sides, with bastions, commonly joined to towns, and sometimes erected on com¬

manding eminences within them. It is distin¬

guished from a castle by having bastions.

CITATION, a summons or official notice

given to a person to appear in a court as a party to a cause. A writ issued out of a court of competent jurisdiction, commanding a per¬

son therein named to appear on a day named and do something therein mentioned, or show cause why he should not. In cases in which a citation issues it is generally the writ commenc¬

ing the action, the same as a summons in tres¬

pass, or a bill in equity. The citation is used by courts having control over the estates of the dead. In law, the naming of an authority, as a legal textbook, or a State or Federal report.

CITHiERON, sl-the'ron, or ELATEA, a

range of mountains in Greece, which stretches northwest, separating Bceotia from Megaris and Attica. The loftiest summit rises 4,620 feet above the sea, and is the subject of numerous fables and classical allusions. On its northern slope stood the city of Plataea, the circuit of whose walls may still be traced. Its modern name, Elatea, from elate, a fir, is derived from 700

the pine forests which are abundant on its sides and summit.

CITHARA, sith'a-ra, a guitar-like musical instrument, said to have been invented by Apollo. The strings, usually five or six in num¬

ber, were struck with a plectrum, or picked with the fingers. It was the forerunner of the banjo, guitar, zither and similar instruments. See Lyre.

CITIES, American, Government of.

Earlier Development. — In its earlier stages the American municipal system was based upon that of England, the charters of the colonial boroughs, among them New York, Albany,

Philadelphia, Richmond and Trenton, following closely the English model. After the Revolu¬

tion great changes were made, involving the in¬

troduction of the double-chambered council and the increase of the mayor's powers. .In due course the choice of the mayor was taken from the council and given to the voters, thus mak¬

ing this office a separate and independent branch of the municipal government. This step wTas followed by vesting in the mayor's hands im¬

portant powers of appointment, by the establish¬

ment of administrative boards to assist the mayor in the exercise of his functions and by greatly increased interference with city affairs on the part of the State legislature.

Relation of City and State. — The basis of American government is the municipal charter, over which the State legislature, in the absence of constitutional provisions to the contrary, has complete control. This has been completely established by judicial decisions. In many States, however, the constitution prescribes the conditions under which city charters shall be granted or amended by the legislature. In 12

States these established a system of municipal home rule under which each city acquired the right to draft its own charter and to adopt it by a majority vote of its own citizens. (See Home Rule, Municipal). In some other States the legislature is forbidden to charter any city by special laws, being required to deal with all cities, or with all cities within designated classes, by means of a general enactment or municipal code. In a few States, notably in New York and Massachusetts, the legislature has enacted "optional charter® laws, allowing each city, with certain exceptions, to decide for itself by popu¬

lar vote which of several types of charter it will adopt.

In any case the charter outlines the political organization of the city, defines the way in which the various officials shall be chosen, their relations to each other and the powers which they may exercise. American city charters are sometimes elaborate documents, setting forth in great detail the functions and responsibilities of many officials.

Administrative Officials. — (a) The Mayor.

— In most cities of the United States the cfiief administrative official is the mayor, who is elected by popular vote for a term of from one to four years. Very few cities retain the one-year term. As a rule any qualified voter is eligible, but in some cities there are additional qualifications as to age and length of residence in the city. The nomination of candidates is usually by party convention or by a primary election ; tfye election is by secret ballot, and the suffrage is that prescribed by State law for State elections. Mayors are paid salaries which vary according to the size of the city, and in the large municipalities their work de¬

mands almost the whole of the incumbent's time. As a rule a mayor who has served a term is eligible for re-election, but to this there are a few exceptions. The powers of the mayor may be grouped broadly under four heads, (1) the power to initiate municipal legislation; (2) the veto power; (3) the appointing power; and (4) powers in relation tp local finance.

The power to initiate legislation arises from the mayor's right to send messages or com¬

munications to the city council upon any official matter. Except in a few cities the mayor is not the presiding officer and indeed does not usually appear before the council in person.

But he may at any time address the councillors as a body by sending a written communication to be read by the clerk. These communications, after being read to the council, are referred to one of its committees and the matter to which the communication relates is in due course brought back to the council with the commit¬

tee's recommendation thereon. In this way the mayor may and often does exert an important influence upon the council's legislative work.

In the second place the mayor possesses in most cities (except those which have adopted the commission plan or some similar form of government) the right to veto any ordinance or resolution of the council which does not meet with his approval. All such ordinances

and resolutions must be sent to the mayor for his signature. If he approve an ordinance or reso¬

lution, he signs it ; if not, he may return it to the council without his signature, accompanied by his reasons, within a designated period of ‘

time, usually five days. If within this period he neither signs nor returns the ordinance or resolution it becomes effective without any further action on his part.

But the mayor’s veto of the council’s action is not necessarily final. After hearing the mayor’s reasons the council takes a vote of its members upon the question of sustaining or overriding the mayor’s decision. If the pre¬

scribed majority of the councillors vote to over¬

ride the mayor, the measure goes into effect notwithstanding the mayor’s veto. This pre¬

scribed requirement is usually two-thirds of the members of the council; but in a few cities it is fixed at three-fourths or three-fifths.

Mayors have used their veto powers freely, much more so than the chief executives of the nation and the States. The passing of measures over the mayoral veto is also quite common.

Much difference of opinion exists as to whether the executive veto, in municipal government, has justified its existence.

Then there is the mayor’s appointing power, which is perhaps the most important among his various prerogatives. With the exception of the few administrative officials who are elected by the people, or chosen by the council, the chief positions in the city’s service are filled by the appointees of the mayor. In cities under the commission form of government this power is exercised by the commission as a body, but in most of those which retain the mayor-and-council system the executive appointing power is of great importance. Not that the mayor has an unfettered hand in making appoint-CITIES

merits ; in many cases his selections do not be¬

come effective until confirmed by the city coun¬

cil, or by the upper branch of it where there are two branches. In those cities wrhich have es¬

tablished civil service rules for appointments the mayor's selections, except for headships of the administrative departments, must be made from the lists of eligibles submitted by the civil service authorities. But in any case (save in cities under the commission or the city-manager plan of local government) the mayor's appointing powers are of great importance and place large amounts of patronage in his hands.

Thirdly, the mayor has important powers of initiative in financial matters. In some cities he is responsible for the preparation of the munic¬

ipal budget. In many he awards all the im¬

portant contracts for public work. He also takes the first step in any exercise of the city's borrowing powder. These, moreover, do not exhaust the list. He has many functions of a miscellaneous character. In fine, the office of mayor in the larger American cities carries a greater amount of power and responsibility than any municipal office in other countries.

(b) Officials and Boards. — But not all the executive functions are committed to the mayor.

Many administrative powers are exercised by various officials and boards, some of whom are directly elected by the people, others appointed bv the mayor or by the city council, and still others in a few cases selected by the State au¬

thorities. Chief among such officials are the city clerk, the city treasurer or city chamberlain, the comptroller or the auditor, and the

com¬

missioners in charee of various departments, for example, police, streets, fire-protection, water-supply, sanitation, parks, and so forth.

Some departments, however, are controlled not by single commissioners but by boards of three, five or a larger quota of members. Such bodies are the board of education, the board of health, the overseers of the poor, the board of assessments and the like. In no two cities is there the same number of departments nor are the methods of departmental organization alike.

What is done by a commissioner in one city is given to a board in another. One city, for example, may have a commissioner of police, while in a neighboring municipality police affairs are in the hands of a police board.

This lack of any approach to uniformity in the number, methods of selection, terms, salaries and duties of the administrative offi¬

cials is one of the outstanding characteristics of city government in the United States.

For many years, however, the drift has been in the direction of a more centralized administration. The mayor has been nearly everywhere given greater powers in the way of appointing and of controlling the heads of departments. The board system, formerly so much in vogue, has been giving way, especially in the larger communities. The tendency has been to put all the city departments, except those having charge of the schools, public health and charities, under single heads. In some cities even the last two of the three de¬

partments named have been included. The board system, it is believed, does not make for that prompt and effective action which is so often needed in administrative work. More¬

over, the disposition is to place those single heads of departments directly under the mayor's control, making him solely responsible for their selection and giving him power to remove them at will. Executive centralization has gone forward steadily although in many cities it is yet far from being complete.

Administrative Functions. — The powers

and functions of municipal administrators are designated from three sources. Some are as¬

signed by the general State laws. This is particularly true of such departments as educa¬

tion, public health and finance. So far as these fields of administration are concerned the municipal officials are to a varying extent merely the local agents of the State in carrying out its general policy. Some powers and functions, in the second place, are set forth in the provisions of the city charter. Almost in¬

variably the charter prescribes the authority and duties of the mayor, his relations with the city council and to the various administra¬

tive officials and boards. As for the latter, the charter may, and in most cases does, define their general duties or it may leave these things to be determined by ordinance. That is the third method of assigning functions. The city coun¬

cil by a series of ordinances may outline the way in which the various administrative de¬

partments shall be organized, the work which each shall perform and the powers which each shall exercise. With the growth of adminis¬

trative problems in extent and difficulty, this has become the preferable method. The

ordinances have greater flexibility than the charter; they can be more quickly and more easily amended. Reorganizations of depart¬

ments, changes in the powers and functions of officials, many details of duty have to be changed from time to time as new administra¬

tive problems arise or as old problems assume a different form. All this can be most satis¬

factorily handled by the ordinance-making power, that is, by the city council with the assent of the mayor.

As for the actual duties of the chief ad¬

ministrative officials and boards, these are broadly connoted by the titles which they bear. The city clerk has charge of the munic¬

ipal records ; in a word, he is the secretary of the municipal corporation. The city treasurer has the custody of the public funds, receives the income and pays the warrants which are presented to him for payment in proper form.

The comptroller authorizes the payment of bills against the city after he has satisfied him¬

self that appropriations are available to cover them, and that the expenditures which they represent have been legally incurred. The auditor checks up all items of revenue and dis¬

bursement. The corporation counsel, or city attorney, or city solicitor, as he is variously named in different cities, is the chief law officer of the municipality. He gives advice and opinions on legal matters when so requested by the mayor or by the city council, and repre¬

sents the city in all cases to which the munic¬

ipal corporation is a party before the courts.

The police commissioner, fire commissioner, superintendent of streets and water commis¬

sioner have duties which, in a general way, their titles imply. And the same is true of the various other administrative posts, for example, the inspector of weights and measures, the commissioner of gas and electricity, the superintendent of parks and cemeteries, the

assessors, overseers of the poor, and so on.

From city to city the exact powers of these and many other officials differ somewhat in extent but in a general way they follow much the same lines.

The Subordinate Service. — Below the of¬

ficials at the head of departments come the rank and file of the municipal employees, rang¬

ing from the deputy-heads, through the chiefs of divisions and bureaus, the inspectors and foremen down to the ordinary laborers.

Ordinarily the heads of departments, either of their own authority or with the approval of the mayor, appoint all of these. But in some cities, though not in the majority, these selec¬

tions are governed by the civil service regula¬

tions and by the same rules the employees are protected against capricious removal. The gradations and pay of the different ranks are fixed by ordinance (usually by the budget or appropriation ordinance) or in some cases by the provisions of the State laws.

State Legislation. — In most parts of the Union the intervention of the State in city affairs is frequent and of far-reaching import¬

ance. A dozen or more States have by consti¬

tutional provisions forbidden this interference in matters of local concern and have guaranteed to the cities the right to determine all such matters freely for themselves. Even here, however, the line between matters of general interest affecting the whole State and those of purely local concern are hard to draw. As a result there is still, even in these home rule States, a considerable amount of interference with affairs which primarily concern individual cities alone. In the States which have not as yet recognized the principle of municipal home rule, the hand of the central authority is ex¬

tremely active in local matters. Scarcely a legislative session passes but many new statutes regulating even the minutiae of munic¬

ipal administration are enacted. And* these statutory provisions often relate to such purely local matters as the pay of city laborers, their hours of work, their holidays, the paving of specific streets, the rates to be charged for water, and the way in which city officials shall keep their records. By this practice the legis¬

latures have in many cases virtually taken away from the citizens their power to control and regulate their own purely local affairs. This authority has been in large degree usurped by the State and is

exercised through channels of legislation. Herein the situation differs widely from that which exists in the various European countries. In them there is state supervision of municipal government and in some respects it is a stricter supervision than that exerted anywhere in the United States. But it is ex¬

ercised through administrative and not through legislative channels. The provincial president in Germany, the prefect in France and the local government board in England are all administrative agents of the central govern¬

ment ; they deal with all cities alike and deal with each local problem on its individual merits. That is obviously a different and far more satisfactory policy than one which deals with cities by acts of legislatures enacted by men who know little about the local problems in hand. So far as central control of munic¬

ipal affairs is concerned that is the chief dif¬

ference between American and European prac¬

tice. See City Manager; Executive; Com¬

mission Government; Cabinet and Cabinet

Government; Boards, Municipal; Appoint¬

ments to Office; Budget System, American.

Bibliography. — Beard, C. A., (American City Government (New York 1912) ; Goodnow, Frank J., (City Government in the United States) (New York 1904) ; Matthews, Nathan, (Municipal Charters) (1914) ; Munro, W. B., (The Government of American Cities } (New York 1912) ; Zueblin, Charles, (American Municipal Progress } (1916).

William Bennett Munro,

Professor of Municipal Government, Harvard University.

chief features of city government in the various countries of Europe are (1) a uniform system of charter powers and organization applying to all the cities in each State; (2) a plan of close supervision of city affairs and particularly of city finances, by the central authorities; (3) the continual supremacy of the city council in the direction of municipal policy; (4) the election of the municipal executive by the city council, not by the people; and (5) the placing of ex¬

perts in charge of all important branches of the city's administrative work.

1. England. — The English city, or borough as it is usually called, is governed under the gen¬

eral provisions of the Municipal Corporations Consolidation Act of 1882 (45-46 Victoria, c.

50), and amending acts. All English cities, with the exception of London, have substantially the same general powers. Their chief organ of government is the borough council, a body which varies in size and is composed of two classes of members. First, there are councillors who are elected by the wards of the city, one or more from each ward, for a three-year term.

The suffrage in council elections extends to all owners and occupants of ratepaying property.

Women are permitted, in certain cases, to vote at these elections though not in parliamentary elections. In the second place, there are the aldermen, who are chosen by the councillors either from among themselves or from outside, and who serve for a six-year term. The two classes, councillors and aldermen, sit together in the same chamber and form a single body, the councillors forming three-quarters of the entire membership and the aldermen one-quarter. Be¬

tween the voting powers and the other privi¬

leges of councillors and aldermen there is vir¬

tually no difference, except that by custom the aldermen are usually

made chairmen of the council's various standing committees.

The mayor of the English city, who serves for a one-year term only but is customarily re¬

elected, is chosen by the council. He may be selected from among the councillors and aider-men themselves or from outside. His functions are for the most part of an honorary nature.

He presides at council meetings but has no special administrative powers. In certain cities which have acquired the right this office bears the title of lord mayor.

The council is the chief organ of borough government, both legislative and administrative.

It appoints all the municipal officers except one auditor, and may dismiss any of them at its pleasure. There is no system of competitive civil service appointment in English cities, yet men of good qualifications are usually appointed to municipal posts and they are not removed without proper cause. The council also enacts the municipal by-laws, determines the rate of local taxes and makes all the appropriations.

Its action is also necessary for borrowing upon the city's credit. In some of these matters, however, its action is subject to the approval of a central authority known as the local govern¬

ment board.

Through its standing committees the council also manages the various city departments, such as police, fire, water supply, sanitation, highways and public health. It does not have charge of poor relief, which is entrusted to a special authority, the board of poor law guard¬

ians. The routine work of departmental ad¬

ministration is given to the permanent offices, but the standing committee for each department is the intermediate, and the council is

the ulti¬

mate authority in all matters of administrative policy.

London is in a class apart. The “City® of London, which is only a small area in the heart of the metropolis, retains its ancient and intri¬

cate system of government by a lord mayor, a court of aldermen, a court of common council, a court of common hall, sheriffs and chamberlain. The real area of London govern¬

ment is the administrative county of London, created in 1888, and since governed by the Lon¬

don county council of 137 members. This body has charge of main thoroughfares, fire protec¬

tion, main drainage and other matters of gen¬

eral importance. Within the administrative county there are 28 subsidiary borough govern¬

ments exercising limited jurisdiction. The police administration of metropolitan London, which includes a much larger area than the county, is under the direct control of a metro¬

politan police commissioner appointed by the Crown and who is, in turn, under the super¬

vision of the Home Secretary.

2. The German Republic. — Each of the

states of the German Republic has its own municipal system although they do not differ widely one from another. That of Prussia, which is larger than all the other states put together, has its basis in the Prussian City Government Act of 1853, and amending statutes of which there have been a great many. In Prussia the dominant local authority is the city council (Stadtversammlung), the members of which are elected for six-year terms by the voters of electoral districts in each city. The suffrage is arranged on what is known as the “three-class system,® by which all the voters are grouped into three classes according to the amount of their annual tax payments. Each class of

voters in each district elects one councillor, although the number of voters in each class differs widely.

The city council, in turn, chooses the mem¬

bers of the city's administrative board (Stadt-rat or Magistrat), each for a 12-year term, arid these officials have charge of the various city departments. As a body the administrative board prepares all business for consideration by the council at its meetings and is entrusted with the duty of carrying the council's resolutions into effect. The subordinate officials are ap¬

pointed by this board, but under strict regula¬

tions laid down by the general laws.

The biirgermeister, who is titular head of the city government, is chosen by the council subject to federal approval. Invariably an official of long administrative experience is selected for the post. The biirgermeister has the gen¬

eral oversight of administration, but he has no veto or appointing power, no patronage and no such administrative discretion as is vested in the American mayor.

In the exercise of their respective powers the German city authorities are subject to rigid supervision at the hands of the higher au¬

thorities, particularly those of the province in which the municipality is situated.

3. France. — Except as regards Paris the system of local government is uniform through¬

out the French republic. All municipalities, large and small, with the single exception of the capital, are ranked as communes and governed under the terms of the Municipal Code of 1884.

In each commune there is a local council, the members of which are

elected by manhood suf¬

frage for fourˆyear terms. This council chooses from among its own members a mayor and one or more assistant-mayors or adjoints, also for four-year terms. These officials, however, retain their membership in the council and con¬

tinue to sit there, the mayor as presiding officer.

The general direction of municipal policy rests with the council which maintains various standing committees. But the supervision exer¬

cised by the national government through the prefects is very strict. The municipal budget, for example, must have this official's approval.

The mayor and his assistants have numerous important powers both as agents of the central government and as chief administrative officers of the municipality. The mayor has important powers of appointment ; he is in control of the local police and he frames the annual budget, presenting it to the council for adoption. As agent of the central government he is respon¬

sible for the local enforcement of the national laws and decrees, for the administration of the system of universal military service as regards his commune, for the enrolment of voters, the reportation of births, marriages and deaths, and for the proper working of the educational and poor-relief systems. Many of these functions are devolved upon the adjoints or upon the secretary of the commune.

Paris, which virtually forms the department of the Seine, is governed by two prefects, the prefect of the Seine and the prefect of police, both appointed by the President of the re¬

public, and by a municipal council of 80 mem¬

bers elected by popular vote, one from each of the 80 electoral districts into which the city is divided. The term is four years. The council's powers, apart from matters of finance, are not extensive. The city, however, is divided into 20 wards or arrondissements, each with a mayor who is appointed by the national government and who acts as a deputy-prefect. The whole system is one of rigid centralization.

4. Italy. — The Italian municipal system is based upon the Municipal Law of 1889 and its amendments. Each city has a municipal coun¬

cil of from 15 to 80 members, elected for five-year terms, one-fifth retiring annually. The right to vote is given only to those who pass an educational test and who pay a small amount in taxes. The administrative work is de¬

puted by the council to a small standing com¬

mittee or Junta which it selects from within ?04

its own membership. It also selects from among its own members a Syndic, or mayor, who is the chief administrative official of the city and head of the Junta. As in France the provincial authorities exercise close supervision over municipal affairs.

5. Austria. — The Austrian system of city government resembles that of Prussia, but with some important differences. The city council is elected by the citizens under a system by which the voters are grouped according

to their annual tax payments into four classes. The administrative magistrates are selected by the council from among its own members and so is the biirgermeister. The latter holds office for six years only but is sometimes reelected. His selection is not valid until confirmed by the central government, but this confirmation is rarely refused.

6. Other European -Countries. — Of the

other countries of continental Europe, Spain and Belgium have systems of local government which in their general outlines resemble that of France. In Spain each city ranks as a com¬

mune ; its organs of government are a city council (ayuntamiento) ,

the members of which are selected for a four-year term by the voters, and all male Spaniards above the age of 24 have the right to vote at local elections. The council elects one of its own members to serve as mayor (alcalde) ; but in the largest cities the right to appoint the mayor belongs to the national gov¬

ernment. In Belgium the French system of city government has been almost literally fol¬

lowed, except that the mayor or burgomaster is chosen for a 10-year term. Plural voting and proportional representation have also been adopted. French influence is also apparent in the municipal system of Holland. There is an elective council, a board of adjoints (wethouders) elected by the council from among its own members, and a mayor or burgomaster ap¬

pointed by the Crown for a six-year term.

Bibliography. — Howe, F. C, (European

Cities at Work) (1914) ; Munro, W. B., Gov¬

ernment of European Cities5 (1909) ; Ogg, F.

A., (The Governments of Europe5 (1913).

William Bennett Munro,

Professor of Municipal Government , Harvard U niversity.

CITIES, Water Supply of. See Water

Supply.

CITIES OF THE PLAIN, Sodom and

Gomorrah, chief of the five cities which were destroyed by fire from

heaven, and their sites overwhelmed by the waters of the Dead Sea.

CITIES OF REFUGE, according to the

law of Moses six out of the 48 cities which the Israelites were directed to give to the tribe of Levi, in the division of the land of Canaan among their tribes, were to be set apart as cities of refuge for the manslayer or accidental homi¬

cide. The right of avenging murder belonged to the next-of-kin of the murdered man; but the slayer fleeing to one of these cities, three of which were to be on either side of Jordan, the avenger of blood was forbidden to touch him till he stood before the congregation in judg¬

ment, when, if he were found to have acted without premeditation or malice, he had a resi¬

dence appointed him in the city of refuge until the death of the high priest, and was then per¬

mitted to return to his inheritance. If the slayer violateˆ this regulation by leaving the city of refuge before the death of the high priest, the avenger of blood might kill him with impunity. The six cities of refuge appointed in accordance with this law were Kedesh, Shechem and Hebron on the west side of Jordan; and Bezer, Ramoth-Gilead and Golan on the east.

This law of refuge seems to have been favored by the Levites, to whom it gave a measure of political influence, much in the same way as the privilege of sanctuary did to the monks, abbots and Other dignitaries of the Roman Catholic Church ; it was consequently interpreted by them in the most liberal way. Maimonides says that all the 48 cities of the Levites had the right of refuge, although only the six were obliged to receive and lodge the slayer gratuitously.

CITIZEN, originally, a member of the body of freemen entitled to share in the government of a civitas, or city-state of the ancient type; as the Roman state gradually broadened into the entire ancient world, the citizenship was ex¬

tended piecemeal for political reasons, till Justin¬

ian made it coextensive with personal freedom, and the attribute of all residents of the empire except slaves. With the rise of the miscel¬

laneous modern community, where flux of popu¬

lation, permanent and temporary, is going on, and the mass of people share in the government to a varying extent, the question of its limita¬

tions and the privileges it confers have become acute, and that of its legal definition has fur¬

nished one of the grounds of a civil war. The definition varies in different countries. In monarchies it is commonly used only of a resi¬

dent's relation to his municipality, the term <(subject55 expressing the relation to the state; in republics generally it means a regular mem¬

ber of the community, subject to its ordinances, obligated to its support and defense, and en¬

titled to its protection. In the United States, a complication is introduced by the Federal struc¬

ture of the government, there being a citizenship of each distinguished from that of the other.

The questions arising in this country are there¬

fore: (1) What constitutes citizenship; (2) What rights it confers; (3) How it is acquired; (4) How it can be lost; (5) What are the re¬

spective obligations to State and nation.

1. A citizen has been legally defined as (<one who owes to the government allegiance, service, and money by way of taxation, to whom the government in turn grants and guar¬

antees liberty of person and of conscience, right of acquiring and possessing property, …

suit and defense, security in person, estate, and reputation.55 In a

word, the citizen is one whose lot is cast in with his society, for all social pur¬

poses according to his status and means, to fight or pay unless he is a dependent member of a group which fights, pays, *etc.* This includes women, children, defectives and criminals; and excludes alien residents (see, however, section 3), and Indians living in tribal relations, who are <(dependent subjects.55 It should be added, however, that for jurisdictional purposes resi¬

dent aliens are regarded as citizens, and in com¬

mercial and business legislation ((citizen55 is equivalent to ˆresident.55

2. Citizenship implies civil but not neces¬

sarily political rights. The former are alike for all, and are the primary obligation of a govern¬

ment to secure to its citizens ; political rights CITIZEN — CITIZENS' INDUSTRIAL ASSOCIATION OF AMERICA 705

are endlessly varied and within the discretion of the government. The right of direct share in government is everywhere withheld from minors, convicts and the insane or idiotic, nearly always from paupers, and most generally from women ; but these do not cease to be citi¬

zens. On the other hand, voting has occa¬

sionally been permitted in this as in foreign countries to persons not citizens of a State or municipality, for holdings of property, and could be so again. It was on this distinction that the minority in the Dred Scott case based their dissenting opinion that a slave's lack of political rights did not prevent his being a citizen with a right to sue in the courts ; and the government by the Fourteenth Amendment ratified this view, and definitely dissociated civil from politi¬

cal rights.

3. Citizenship may be acquired by birth, every child born on the soil or within the juris¬

diction of the United States, — even of resident aliens, except of foreign official representatives, whose residences are assumed to be part of their country's territory, — or of citizen parents trav¬

eling abroad, or of its officials resident abroad, being a citizen ; or by naturalization ; or by succession to a parent's or husband's rights, — the wife of an alien becomes a citizen by his naturalization, or after his death before natu¬

ralization if he had previously declared his in¬

tention of becoming so ; and the children inherit similar rights.

4. It may be lost by formal renunciation, but the abandonment will not be presumed without it, even from a lifetime of residence abroad; but the government, with most civil¬

ized governments at present, recognizes full right to change allegiance at will. This was one of the issues in the War of 1812, Great Britain firmly refusing to recognize it ; and it was not till 1870 that that country formally ad¬

mitted that right.

5. Dual allegiance. The nature of the obli¬

gations is different : any one may be a citizen of the United States, yet not of any particular State, but not vice-versa ; and as the citizenship of the nation is the more universal, so it is the higher sanction. The two could not in fact come into conflict except through an act of secession, which must be fought out, so that the question is academic, as short of that the whole matter would involve a case in the Su¬

preme Court, pending which the question would be in abeyance ; but in case of forcible resistance of a State to a decree of the nation, the citizen's first allegiance is to the latter. Further than this, however, the national government cannot go beyond the scope of its reserved powers; and a State can go very far in the direction of abolishing even the civil rights of its citizens under the shelter of this flexible

permission. It should be noted that the right of citizenship is totally unconnected in essence with the right of suffrage or the elective franchise. The former is an elemental right of all born among, or who have cast in their lot with, a civil society; the right to the protection of its laws and its strength, to a share in its benefits and its chari¬

ties. The latter, a right to share in the gov¬

ernmental management of a society, is a mere question of the best machinery of management, and dependent on the fitness or power of indi¬

viduals or classes to help guide that machinery.

The unfit or weak are just as much citizens as vol. 6 — 45

the fit or the strong, by natural right ; women and minors, defectives and criminals, have the fullest right to claim the protection of the laws, by themselves or their natural or appointed guardians. The suffrage is only a substitute for a battle, assuming that the larger body could outfight the smaller; and admission to it lies in the discretion of the fighting body.

(See Alien; Citizenship in the United

States; Naturalization). Consult Sheldon, W. L., (Citizenship* (Chicago 1905) ; Van Dyne, F., (Citizenship of the United States*

(Rochester 1904) ; Wise, J. S., (A Treatise on Citizenship* (Northport 1906).

CITIZEN, The. A comedy by Arthur

Murphy, performed 2 July 1761, at the Drury Lane Theatre, and printed in 1763. It is founded in part on Destouche's (Fausse Agnesi CITIZEN KING, The. A title applied to

Louis Philippe, king of the French, 1830-48.

CITIZEN OF THE WORLD, the signa¬

ture of Oliver Goldsmith's (Letters from a Chinese Philosopher residing in London, to his friends in the East.*, The work was published in 1762.

CITIZENS' INDUSTRIAL ASSOCIA¬

TION OF AMERICA, The. A national fed¬

eration of local employers' associations, citizens'

alliances and State and national organizations representative of business interests, organized as the culminating step in the movement for the organization of employers in 1903. Nearly all the large cities, and scores of the smaller ones, during the months following the anthracite strike of 1902, became the centres of consider¬

able agitation on the labor question, and from 400 to 500 local associations sprung into exist¬

ence for the purpose of combating what was termed the lawless aggressions of organized labor. The membership of some of these asso¬

ciations was confined to employers, while others, which adopted the general name of alliances, admitted professional men, and even employees, into their ranks. In cities like Chicago, Saint Paul, Omaha, Kansas City, Saint Louis, Detroit, Cincinnati, Louisville and New York, employers associations were formed, while in Denver and all over Colorado and many other parts of the West, as well, also, in the smaller towns of the Central States, the alliance was the most popular form of organization. In response to a call issued by a number of the prominent leaders in the employers' movement, a convention was held in Chicago, 29-30 Oct. 1903, which was attended by nearly 300 delegates, who came from all parts of the United States and Canada, cities as far apart as San Francisco, New Orleans, Montreal and Minneapolis being represented. The name of the Citizens' Industrial Association was con¬

sidered as being inclusive in meaning of both employers' associations and citizens' alliances, and was selected by the convention for the new organization. The purposes, as set forth in the constitution adopted, were those of law enforce¬

ment, the maintenance of individual liberty, the securing of industrial

peace and the perpetuation of free competitive conditions in industry. The organization stood for the open shop and no restriction of output. Its work was largely con¬

fined to that of educational propaganda, and it maintained a publication bureau! for this purpose.

It did not interfere in any respect with the in¬

ternal government of its constituent associa-706

tions, and the action of its convention or execu¬

tive committee was advisory and not obligatory upon its members. The Association formed a central source of information for its members and a directing agency in matters of national legislation in which the associations generally were interested. In the contest in Congress over the eight-hour, the anti-injunction and similar bills, which were fathered by organized labor, the Citizens' Industrial Association took a most active part. The National Association of Manufacturers was a member and one of the principal elements of support in the newer or¬

ganization. The Association has over 500 local societies throughout the United States and is represented by The Square Deal, a periodical devoted altogether to its interests.

CITIZENSHIP AND EDUCATION.

The idea that schools and colleges should train for citizenship is one that in a measure depends upon a theory of the state. If the individual exists for the state, then there is no doubt but that any system of education must train the individual in all ways that serve the best inter¬

ests of that state, and that the individual must be forced to followr it. On the other hand, if the state exists for the benefit of the individual,

then it is less clear to the average mind that the individual should be forced to receive an education that he does not wish to take, or that his own freedom of action mentally or

physically should be interfered with. Between these two extremes there exists a third theory that as the state came into existence to serve the best interests of those in it, the individuals who form it should be willing to do everything in their power to conform to those rules and regulations which will make the state their most effective agent for the purposes for which it grew up. If the state is to be more effective by virtue of having the individual intelligent, then he must get an education; if the state is to be more efficient because the individuals are healthy and strong, then the citizen must take care of his health and train his body. In a democracy the majority of the people deter¬

mine what is best along these lines and the minority has to abide by the decision. In an autocracy it is those in power who so determine and the individuals must conform as long as the few have the force necessary to compel obe¬

dience.

The idea that the individual should be trained or educated along certain lines because of the best interest of the state is not new, though its strength has varied much throughout history, and among peoples even at the same period of history. The Spartans among the Greeks represented the extreme view of the theory that the individual existed for the state, and their educational system was devised along those lines. On the other hand the Athenians represented the via media, or the third theory as presented above, and their educational sys¬

tem was worked out accordingly. The Romans tended strongly to the Spartan ideals and re¬

garded the Athenians as unpractical and vision¬

ary. After the barbarians had overrun the Roman Empire and the idea of the participation of the citizen in the active work of the state had died out during the Middle Ages, when feudal¬

ism held sway, education, except for the pur¬

poses of the Church, was generally non-existent.

In a way the Church took the place of the state, and the theory that the individual clergyman existed for the good of the Church was per¬

petuated.

It was only during the philosophical theoriz¬

ing of the 18th century that the idea of giving the individual an education because of his inter¬

est to the state began to be revived. The democrats of the French Revolution soon realized that people enfranchised, but without an education, were a dangerous element and would soon lead the ship of state on the rocks of anarchy and thus back into the control of a despot. It was for this reason that Danton in one of the best of his speeches declared: (<After bread, education is the first need of the people.® It was thus that democracy • was fundamentally responsible during the whole course of the 19th century for the demand that the people be educated for the sake of the safety of the state. An ignorant electorate meant eventually the destruction of a democratic state.

It was from a different point of view that the educational reformers Pestalozzi, Herbart and Froebel approached the question. They were, quite naturally, because of the nature of their civil and economic environments, more impressed with the idea of the importance of education as a means for the economic and social betterment of the individual rather than as a means for preserving the state. It is now to be observed, however, that the two go hand in hand, for the well-to-do citizen is a good citizen. The education which has brought him economic prosperity and social recognition also tends to make him interested in the preservation of the state.

It remained particularly for Jhe fathers of the American republic like Washington, Jeffer¬

son and Madison to lay stress on the idea that the safety of the

republic lay in the education of the people. In 1786 Jefferson wrote to Washington : <(It is an axiom in my mind that our liberty can never be safe but in the hands of the people themselves, and that, too, of the people with a certain degree of instruction.

This is the business of the state to effect and on a general plan.® Washington in his message to Congress in 1790 wrote : <(Knowledge is in every country the surest basis of public happi¬

ness. In one in which the measures of the government receive their impression so im¬

mediately as in ours, from the sense of the community, it is proportionally essential.®

<(Whether this will be best promoted by afford¬

ing aid to seminaries of learning already estab¬

lished, by the institution of a national university, or by any other expedients, will be well worthy a place in the deliberations of the Legislature.®

Madison wrote : GA popular government

without popular information or the means of acquiring it, is but a prologue to a farce or a tragedy, or perhaps both.® ((The best service that can be rendered to a country, next to giving it liberty, is in diffusing the mental im¬

provement equally essential to the preservation and enjoyment of that blessing.®

These three men set by their words the standards which not only the United States but all democracies had to follow for the sake of self-preservation. Though progress along such lines was slow in the first half of the 19th century, in the latter half, the state has entered

into fields ol instruction little dreamt of by the fathers of the constitution and which would probably have been condemned by them as tend¬

ing to go altogether too far in interfering with the liberty of the individual.

Once grant, however, that the state for its best good has the right to take steps along educational lines which serve for its preserva¬

tion and there is no limit to the extent to which it may go. In a democracy perhaps little harm will come from such a doctrine, for the people are in the end the determining factors of the length to which interference with the individual is to go. In an autocratic government, however, the dangers of such a doctrine have become only too obvious. Under the leadership of an un¬

scrupulous sovereign and military clique the educational system of the state is devised to make good soldiers who are to do the will of the rulers. Under such a system, unlike con¬

ditions existing in a democracy, the people can exercise no restraining hand and the citizens are debauched morally and mentally so that they conduct themselves like obedient slaves. Trained under such a system they do not have any minds of their own, but are shaped to do the bidding of a tyrant.

The first attempt to give to the people an absolutely uniform education over a vast area was connected with religion. The Church and state combined in the Middle Ages to compel every citizen to receive uniform religious doc¬

trine not only in one state, but all over Europe.

The salvation of the state was thought to de¬

pend on religious uniformity. As James I of England said: <(No bishop, no king." The secu¬

rity of the state was deemed to rest on a religious instruction which all

must receive. He who refused it put himself outside the pale and was to be regarded both as a heretic and an an¬

archist — -a fit candidate for the stake or the block.

The states of the world have gradually dropped the idea that the safety of the state is bound up with religious education, but in its place the theory of the safety of the state has dictated the institution of a system for the instruction of youth, not only mentally, as was originally intended by Washington, Jefferson and Madison, but physically, morally, vocation¬

ally and in an infinite variety of subordinate ways. The justification for such instruction in a democracy is not hard to find. If it is to the best interest of the state that its people should be trained mentally, it is also necessary that they be trained physically. Citizens that are weak physically are a menace to the state. The state has the right to step in and say that its citizens shall not be permitted to become physi¬

cal weaklings. For this purpose it can interfere with the individual to see that he gets the proper physical culture, that he lives hygienically, that he is vaccinated, that he conforms to good physical health laws and subjects himself to food regulations. The same also holds true for moral education. Morally debased people are a danger to the state and therefore the state may step in to give moral instruction. Citizens who are poorly prepared to earn their own living are also a menace to the state and on the same ground, here as elsewhere, it may for its own safety's sake see to it that the citizens are properly trained to follow vocations that will prevent them from becoming dependents.

For all of these purposes the cuiricula, not only of public schools but of private schools, must answer. In them must appear the neces¬

sary courses and the properly trained teachers.

Such, briefly stated, is the somewhat common theory of citizenship and its relation to educa¬

tion. How far the state will go along these lines only the future can

reveal. It will go in a democracy as far as the people wish it to, subject to constitutional limitations, but even the latter may be broadened, if the people see fit.

In an autocratic state there are no limits except those found in a revolutionary overturn of the state by the people who feel that the state is going too far.

At the present time (1918) the most progres¬

sive states are insisting that their minor citizens must learn reading, writing and arithmetic and are compelling them to attend school to do so.

From that minimum of the literary and mathe¬

matical, various states have added other subjects which the pupils must study : hygiene and physiology, history and civics, geography and natural'science, music and drawing, trades and vocations, physical culture, military drill and religion and morals. In order that the minor may not escape such education he is forced to attend school up to a certain age and no one is allowed to give employment to him before that time. Even if he then goes to work, he is, by the law of certain states, forced to attend for a time certain continuation or evening schools to make himself better prepared for citizenship — political, social and industrial.

The present tendency of states is to increase the age limits for compulsory education, to add more subjects that must be taken for the sake of good citizenship and even to force adults to make up their deficiencies. In the United States trades and vocations have, been recent additions, and physical culture and military drill are making great strides. Subjects present in European schools for generations, but still gen¬

erally absent in the schools of the United States, are those of religion and morals. A campaign to introduce the latter without the former as essential to good citizenship and the safety of the state is being carried on.

Bibliography. — ’Brewer, J. M., Vocational Guidance’ (New York 1917) ; Gignilliat, L. R., ‘Arms and the Boy) (Indianapolis 1916) ; Haines, C. G., and others, cThe Teaching of GovernmenU (New York 1916); Howe, L.,

(Universal Military Education and Service) (New York and London 1916) ; Jenks, J. W., (Citizenship and the Schools’ (New 'ork 1909) ; Martin, F. G., (Moral Training of the School Child’ (New York 1913) ; Monroe, Paul, (History of Education’ (New York 1911) ; Robbins, C. L., ‘The School as a Social Institution’ (New York 1918) ; Sargent, D. A., ‘Physical Education’ (Boston 1906); Terman, L. M., ‘The Hygiene of the School Child’

(Boston and New York 1914).

James Sullivan,

New York State Historian.

CITIZENSHIP IN THE UNITED

STATES. All persons who are within the territorial jurisdiction of a state owe an alle¬

giance to it according to the maxim protectio trahit subjectionem et subjectio protectionem, and the existence of this fealty thus imposed is shown in the fact that, according to the public 708

law of all modern constitutionally developed states, even aliens may be held guilty of trea¬

son, if, within its territory, they plot or com¬

mit acts against the welfare and existence of the local sovereign. In a narrower sense of the word, however, only those persons are termed citizens or subjects* of a state who owe to it a primary allegiance and one that con¬

tinues wherever the person may be and may be cast off only with the consent of the state concerned.

Viewed from the standpoint of international law, the citizen body of a state consists of all those persons from whom the state claims this primary and permanent allegiance. These per¬

sons, sometimes termed nationals, constitute, so far as other ‘states are concerned, one homo¬

geneous body. They are all equally entitled to the protection of their own government

wherever they may be.

When, however, we regard the civitas or body-politic of the state from the domestic or constitutional point of view, it is found that its members may be divided into as many different classes, with as many different public and pri¬

vate rights, as may be deemed just and expedi¬

ent by those who fix the public policy of the particular state in question.

All civilized states make a distinction be¬

tween natural or native born, and naturalized citizens. The native-born citizen is one who has this status imposed upon him by reason of the nationality of his parents or parent, or the locality in which he is born ; the naturalized citizen is one who, originally in allegiance to one state, is granted citizenship in another state.

Every sovereign state determines for itself the circumstances which shall be recognized as creating natural or native-born citizenship, as well as the conditions under which an alien may be admitted to membership in its citizen body. Many states adopt as their general prin¬

ciple the jus sanguinis, according to which the children take the citizenship of the father or, if illegitimate, of the mother. • Other states accept the rule of jus soli, according to which a person becomes a citizen of the state within whose territorial limits he is born. This lat¬

ter rule is constitutionally obligatory upon the United States, the Fourteenth Amendment to the Federal Constitution providing that (<all persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside.® This rule, though thus explicitly stated only in 1868, was declara¬

tory of the rule which had been previously ap¬

plied. The qualifying clause ((and subject to the jurisdiction thereof® was inserted to cover the cases of children of foreign representatives or other persons entitled to extraterritorial rights while in the United States. So abso¬

lute, otherwise, has this rule of jus soli been declared to be, that children born in the United States of Chinese or Japanese parents are American citizens even though their fathers and mothers are aliens who, under statute law, cannot obtain naturalization.

The rule of jus sanguinis, however, also * Citizens and subjects are, juristically speaking, inter¬

changeable terms, although it is more usual to designate as subjects those who owe allegiance to a state with a mo¬

narchical form of government.

finds some application in the United States for the constitutional mandate does not operate negatively to the effect that only those persons shall be deemed natural citizens who are born within the jurisdiction of the United States.

Thus children born to American parents while abroad are deemed natural citizens if, during minority, they return to the United States with the intention of residing there permanently.

The conditions under which aliens may be¬

come naturalized American citizens are fixed by acts of Congress and have varied from time to time. They are now mainly determined by the laws approved 25 June 1910 and 30 June 1914. These statutes extend the rights of naturalization only to white persons or to those of African nativity or descent. Thus, among others, the Chinese and Japanese do not come within their provisions. The naturalization of Chinese is, indeed, expressly prohibited by a law enacted in 1882.

In order to be naturalized, the alien, being 18 years of age or over, must first file a declaration of bona-fide intention to seek American citizenship and to renounce forever all allegiance and fidelity to any foreign prince or state ; and then, not less than two years after, file his petition, signed in his own hand¬

writing, verified by two credible witnesses, who are themselves citizens of the United States, that he has resided in the United States con¬

tinuously for at least five years immediately preceding the date of his petition, and at least one year in the State or Territory in which he seeks naturalization. Besides various facts of date and place of birth, date and place of arrival in the United States, name and country of nativity of his wife, names and dates of birth of his children, if any, the petitioner must show that he is not a disbeliever in or opposed to organized government, that he does not practise or believe in polygamy and that he can speak the English language.

Aliens of 21 years of age or more who have been honorably discharged from the armies of the United States, whether regular or volun¬

teer, or who have served five consecutive years in the United States navy or one enlistment in the marine corps, may be admitted to citizen¬

ship without having previously made a declara¬

tion of intention.

Naturalization is a judicial act and may be granted by the Federal District Courts, or by any court of record in any State or Territory which has a seal and clerk and a jurisdiction in law and equity without limit as to the amount in controversy.

Naturalization is granted to aliens without reference to any permission to expatriate them¬

selves which they may or may not have re¬

ceived from the state of their original alle¬

giance. Thus when the right of expatriation is not recognized by the original state, a double citizenship is created. Dual citizenship also arises when the same person is claimed by two states, the one bv reason of the citizenship of his parents, the other by reason of birth within the territorial jurisdiction.

It has been declared by the United States courts that the naturalization of a father operates as a naturalization of his minor chil¬

dren if they are dwelling within the United States. In the same case (Boyd v. Nebraska) it was held that the declaration by a father of

an intention to seek citizenship gives to his minor children, who reach their majority be¬

fore his naturalization is completed, an in¬

choate citizenship which, however, they may, upon coming of age, repudiate.

In the constitution it is provided that only native-born citizens are eligible for elec¬

tion as President or Vice-President of the United States. By statute it is declared that, except for this disqualification, naturalized citizens shall have all the rights, privileges and protection that are enjoyed by native-born citizens. In fact, however, in those states which do not recognize a full right upon the part of their citizens to expatriate themselves, the United States is not able to extend to the citizens of those states who have become naturalized American citizens that full degree of protection which it is able to assert and effect with regard to its own native-born citizens.

Citizenship may be lost as it may be ac¬

quired, in various ways. Everywhere women lose their citizenship by marriage to aliens.

By a recent act of Congress women may, how¬

ever, resume their American citizenship upon termination of the marital relation through the death of the husband, divorce or otherwise, by returning to the United States and residing therein or, if continuing to reside abroad, by making a declaration before an American diplomatic or consular representative of their intention to resume their American nationality.

In some countries citizenship is lost by the ac¬

ceptance of office or service under a foreign government but according to the law of the United States this results only in case the ac¬

ceptance of office involves the taking of an oath of allegiance to the foreign government.

By Act, 5 Oct. 1917, however, it was declared that American citizens who, since 1 Aug. 1914, had sworn allegiance to a foreign State which was at war with a State with which the United States is at war, in order to enlist in the armed forces of that foreign State, and was honorably discharged there¬

from, may reassume American citizenship.

In others, it is lost by the acceptance of a decoration from a foreign government, by desertion from the military or naval service or by judicial condemnation for certain crimes; but American law does not

provide for the loss of citizenship through any of these acts.

Again, according to the law of various Euro¬

pean states, citizenship may be lost by long residence abroad even if not followed by naturalization in a foreign state, but according to American law and practice long and con¬

tinued residence abroad has no other result than to create a presumption of intention to abandon American nationality, — a presumption which may be overcome by the presentation of evidence to the contrary. Thus Secretary of State Evarts in 1879 stated that <(a citizen of the United States may be. absent from this country for an indefinite period for purposes of business, education or pleasure and so long as he does no act, or assumes no obligation in¬

consistent with his native or acquired citizen¬

ship in this country, he is not held under our laws to have forfeited any of his rights as a citizen of the United States.® It was in ac¬

cordance with this principle that the United States government in 1904 assumed the protec¬

tion of an American citizen named Perdicaris, who had been kidnapped by a Moroccan bandit, this notwithstanding the fact that Perdicaris had lived abroad for 34 years. Likewise ac¬

cording to American law and practice loss of citizenship in the case of native-born citizens results ordinarily not from long residence abroad but from naturalization by a foreign government. In the case of naturalized citi¬

zens, however, the presumption from residence abroad of intention to abandon American nationality is much greater. Thus by the Act of Congress of 2 March 1907, it is declared that ((when any naturalized citizen shall have resided for two years in the state of his origin, or five years in any other foreign state, it shall be presumed that he has ceased to be an American citizen — provided, however, that such presumption may be overcome on the presentation of satisfactory evidence to a diplomatic or consular officer of the United States.®

. Leaving now the distinction between native-born and naturalized citizens we come to con¬

sider a fundamental constitutional distinction which, in the United States, is made between Federal and State citizenship. This is a dis¬

tinction arising out of the Federal form of the American government. All persons, not aliens, who reside within one of the States of the Union have a double citizenship ; they are citi¬

zens of the State in which they reside and are also citizens of the United States.

There was for many years an uncertainty whether, as a constitutional proposition, State citizenship was primary and the basis upon which Federal citizenship rested, or vice-versa.

The result of the Civil War fixed in fact, and the adoption of the 14th Amendment estab¬

lished in law, the priority and supremacy of Federal citizenship. However, the distinction between the rights and obligations attaching to these two citizenships has been in no wise destroyed. This was made plain by the Supreme Court in the famous Slaughter House cases, in which it was held that the provision of the 14th Amendment that ((no State shall make or enforce any law which shall abridge the privi¬

leges and immunities of citizens of the United States,® has reference only to those privileges and immunities which-are peculiar to national citizenship, as, for example, the right to use the mails, to resort to the Federal courts, to go to the seat of Federal government, to receive protection while abroad, *etc.*

Another constitutional classification of citi¬

zens of the United States which has become especially important since the Spanish-American War is that between the citizens of the States of the Union and of the territories which are regarded as having been ˆincorporated in the United States,® and those persons who are natives of those annexed territorial posses¬

sions, such as the Philippine Islands,* who, while citizens of the United States in the international and broader sense of the term, are nevertheless not deemed to be citizens of the United States in a

narrower constitutional sense, and therefore are not entitled to certain special rights which are regarded as flowing from the more special and privileged status.

*The Hawaiian Islands have the status of an “incorpor¬

ated territoiy of the United States.” By the art of 2 March 1017 the inhabitants of Porto Rico were declared by Congress to be citizens of the United States.

Another constitutional class of citizens which deserves mention embraces the Indians. Al¬

though under its sovereignty and jurisdiction, the United States for many years saw fit to regard the Indians, or at least those who main¬

tained tribal relations, as constituting bodies-politic independent, of the States of the Union, and separate from, though dependent upon, the United States; yet with these tribes the United States entered into treaties with respect to Phe rights which their members should enjoy and the control to which they should submit. For some time now, however, this quasi-interna¬

tional attitude has been abandoned, and the principle put into full operation that the Indians in all their private and public rights are abso¬

lutely subject to such statutory control as Con¬

gress may see fit to provide. The Indians have never been treated, however, in any full consti¬

tutional sense as citizens although they owe full allegiance to the United States. As nationals they are, when abroad, entitled to the protec¬

tion of the United States, and when desiring to leave the limits of the United States they can obtain from the Department of State a paper which partakes of the nature of, even if formally it is not designated as, a passport.

In all cases, whether living within those re¬

stricted areas known as reservations or not, whether maintaining tribal relations or not, Indians remain subject to the direct control of the Federal government. And it has been held that the Indian does not and cannot become a citizen of the United States simply by leaving his tribe, abandoning his reservation and tak¬

ing up his residence and leading a civilized life within a State. On the other hand, it is within the power of Congress at will to impose citizen¬

ship upon such Indians as it pleases. This refusal to permit an Indian by his own will to obtain citizenship, and the imposition upon him of such a character without his consent, are illustrations of the principle that citizenship is not a right which inheres in the individual, but a status created by the sovereign will of the State.

The rights which aliens may enjoy within the United States are dependent upon the gen¬

eral principles of international law and comity and upon the provision of such treaties as the United States may have entered into with the native states of the aliens concerned. It is thus possible that aliens within a State of the Union may be entitled to rights and privileges which that State itself may be unwilling to recognize, and this too with reference to matters which, so far as American citizens are concerned, lie wholly within the legislative discretion of the States. Just how far a Federal treaty may con¬

stitutionally go in fixing the rights of aliens within the States has been a matter of con¬

siderable controversy; and thus, both as a mat¬

ter of law and as a matter of policy, there have arisen such problems as those connected with the right of Japanese, resident in California, to take title to and hold real estate, and to at¬

tend the public schools of the State.

With reference generally to citizens and non¬

citizens, that is, citizens and resident aliens, it is to be observed that throughout the civilized world there is an increasing tendency to make the distinction of little significance within the field of private rights, and within several of the States of the American Union even the right of suffrage has been extended to those aliens who have become domiciled and have declared their intention of becoming citizens, that is, as it is called, have taken out their (<first papers.®

See Aliens; Allegiance; Nationality; Nat¬

uralization; Naturalization Laws; Suffrage.

W. W. Willoughby,

Professor of Political Science, Johns Hopkins University.

CITRANGE, a hybrid between the com¬

mon orange and the hardy trifoliate orange, Poncirus trifoliata. This hybrid was first pro¬

duced in 1905, and several varieties are now grown in the southern United States. The trees are very resistant to cold, being able to with¬

stand temperatures as low as 15° or 10° F.

without injury. The fruits are similar to those of the common orange, 1 to 4 inches in diam¬

eter. They are not grown commercially, but are planted for home use in regions of the South too cold for growing the common

orange.

CITRIC ACID (C6H807,H?0), a very

widely distributed acid, present in most com¬

mon fruits, such as gooseberries, currants, lemons, citrons, cherries and many others. It is also a constituent of the sap of many plants.

It was first separated and distinguished by Scheele in 1784. It is generally prepared from the dark treacle-like concentrated lemon juice imported from Sicily, Bergamot juice from Calabria or lime juice from Montserrat

and Dominica. The process consists of

filtering and neutralizing with chalk and quicklime, by which citrate of calcium is precipitated. This, by decomposition with a slight excess of sulphuric acid, gives the acid, which is then purified by repeated crystalliza¬

tion. The theoretical yield is from 51 to 64

ounces of commercial citric acid per gallon of juice, but this is seldom reached in practice.

Several improvements have of late been intro¬

duced, both in preparing the crude lemon juice for exportation and in the subsequent purifica¬

tion and crystallization of the acid. As found in commerce citric acid is sometimes adulterated with tartaric acid which is readily detected by the brown coloration in the presence of potas¬

sium dichromate. Citric acid is white when pure; it crystallizes in two forms, one belong¬

ing to the trimetric system is the common form, and in it the acid contains one molecule of water, as indicated in the formula given above.

The other form contains half the quantity of water. The ordinary crystals effloresce in the air in a warm room. Citric acid has a pleasant sour taste. It dissolves very readily in water and is soluble in alcohol, but insoluble in ether.

When heated it undergoes decomposition and yields aconitic, itaconic and citraconic acids, along with other products. It is acted on by nitric

and sulphuric acids and by other re¬

agents, yielding a variety of decompositions and derivatives.

Citric acid combines with the metals, form¬

ing citrates. They are crystalline salts and many of them are soluble in water. Crude citric acid is largely employed by the calico-printer as a resist and as a discharge.

Citric acid and the citrates are used in medi¬

cine as cooling drinks, as antidotes to alkalis and for the purpose of rendering the urine alka¬

line, thus overcoming abnormal acidity. Cit-CITRON — CITY

rates of magnesium are used as laxatives and cathartics.

CITRON, a tree (Citrus tncdica) related to the lemon, with a large lemon-like fruit having a thick peel and a small amount of very acid pulp. It is grown chiefly in the Mediter¬

ranean regions and large amounts of the fruit are preserved in brine and shipped to the United States, where the peel is candied and used for confectionery and culinary purposes. The trees are grown to a small extent in southern Cali¬

fornia. The name citron is also applied to a small variety of the watermelon which is used for preserving.

CITRON-MELON. See Watermelon.

CITRONELLA OIL, an oil obtained from

a kind of grass (Andropogon nardus), culti¬

vated at Singapore and in Ceylon. It is used for scenting soaps. Other species of the same genus and some other allied genera also yield essential oils.

CITRONELLE, sit-ro-nel', Ala., a village in Mobile County, where on 4 May 1865 the last Confederate army east of the Mississippi sur¬

rendered to the Federal troops under General Canby.

CITRONWOOD, or CITRUS-WOOD,

the most costly furniture wood of Roman an¬

tiquity, usually regarded as derived from Biota (Thuja) orientalis, or possibly from Callitris quadrivalvis , allied coniferous trees, both popularly known as Arbor vitcz (Oriental and African). Cicero is said to have paid an enormous sum for a table of this wood.

CITTA VECCHIA, chet-ta vek'kya, a

fortified city of Malta, formerly the capital, near the centre and almost on the highest point of the island, seven miles southwest of Valetta, which became the capital in 1570. Pop. 7,500.

CITTADELLA, che-ta-del'la, Italy, city in province of Padua, compartimento of Venetia, 30 miles northwest of Venice. It contains beautiful churches and botanical gardens. Its modern industries are the manufacture of paper, cotton, woolen goods and linen. It was founded in 1220, as a protection against Treviso, and has still retained its walls, tower and moat.

Pop. 11,332.

CITY (Latin civil as). The Greeks and

Romans distinguished a city from a town, or mere assemblage of people living together under municipal laws, as an independent community or state possessing sovereign authority, and including any portion of the surrounding ter¬

ritory the inhabitants of which possessed the rights of citizenship, but excluding conquered or dependent territories. Thus, Athens, Rome, and Carthage were all both towns and cities in different senses. In Europe the word city came to have two meanings, the one civil, the other ecclesiastical. The civil meaning corresponded with the Roman sense, in which the great Ital¬

ian republics and the German free cities during the period of their independence corresponded with it. The fluctuations in the fate of such cities must necessarily have caused the word to lose the sense of territorial independence, and this change would be promoted by the rise of rivals to them in other respects having no such claim, so that in modern times a city has come to signify merely a town holding from extent of population, favorable situation or other causes, a leading place in the community in which it is situated. The ecclesiastical sense of the term city is a town which is the see of a bishop. This seems to be the historical use of the term in England, and still possesses some authority there, but in general use it has been superseded by the wider one. In our historical retrospect we take the term in its least restricted sense.

The origin of cities belongs to the earliest period of history. According to Moses, Cain was the first founder of a city, and Nimrod built three, among which Babylon was the most important. The Jewish tradition is that Shem erected the first city after the deluge.

At the commencement of society the form of government was patriarchal. The ruler was the head of the family or clan. Relationship, the innate wish of men to live in society, and more perhaps than both these causes, the necessity of providing means of defense against more powerful clans, brought together separate fam¬

ilies to one spot. The fertility of the East also afforded facilities for

men to give np the rambling life of nomads and to form perma¬

nent settlements. These settlers began to bar¬

ter with those tribes who continued to wander with their herds from place to place. Thus cities sprung up. These were then surrounded with walls to prevent the inroads of the wan¬

dering tribes. The bond of connection be¬

tween their inhabitants thus became closer, and their organization more complete. As by de¬

grees the chiefs of these family-states died away, the citizens began to elect the most able or most popular men for magistrates, without respect to birth or descent. Thus political in¬

stitutions began to assume a systematic character.

The earliest form of government succeeding the patriarchal state was probably monarchical.

In this the religious, paternal and political authority remained rudely mingled. When con¬

quest extended the limits of these early king¬

doms the authority of the king was weakened, his connection with the different parts of his dominions became imperfect and the prog¬

ress of civilization was promoted almost solely by the growth of the cities. These gave rise to the division of labor, the refinements of social intercourse, the development of laws caused by the conflicting interests of many people living close together, the idea of equality of rights, the diminution of awe for a distant monarch, the growth of patriotism springing from the sense of advantages enjoyed and the exertion necessary to maintain them. These were the salutary consequences of the estab¬

lishment of cities.

Under the mild sky of Asia, Africa, Greece and Italy cities were built first, and in the greatest number. The Phoenicians and Egyp¬

tians particularly distinguished themselves by the erection of cities, which soon attained a high degree of wealth, and consequently of civilization. The Egyptians considered their city of Thebes older than any of the Greek cities ; and Pliny says that Cecropia, said to have been erected in Attica by Cecrops, 1582

b.c., and afterward called ˆAthens,® was the oldest city of Greece. Heeren justly remarks that the rise of cities was the most important source of the republicanism of antiquity. This is particularly true of Greece. In fact cities 712

are, by their very nature, of a democratic tendency. Several confederations of cities ex¬

isted in the ancient world; for instance, the Phoenician, consisting of the cities of Tyre, Sidon, etc., and the Achaean league, formed by the most important cities of Greece, in order to strengthen themselves against the power of Macedon. Under Augustus and his successors the Romans began to establish colonial cities in Germany, having done the same long before in Gaul, Spain, Africa, *etc.* In Switzerland they first erected cities about 70 a.d., which, how¬

ever, were mostly laid waste by the Alemanni, and subsequently rebuilt under the government of the Franks (496 a.d.). The Germans, accus¬

tomed to a wild, rambling life, did not show any disposition to live in cities until Charlemague labored to collect them together in settled abodes from his desire to civilize them. Henry I dis¬

tinguished himself particularly in this way, and on this account has been called by some (<Henry the City-builderˆ (der Stadtbauer) .

He gave the cities great privileges, in order to induce his subjects to live in them, and thus laid the foundation of that power which at a future period contributed most to break down the feudal system. In many cities Imperial castles were erected to protect the inhabitants, and the insupportable oppressions and even cruelties exercised by the feudal lords upon their peasants, or by the wandering knights and robbers, drove many people into the cities.

The attacks of the neighboring lords gave firm¬

ness to their union, and compelled them to cultivate their resources. Commerce and the various arts and trades were soon cultivated within their walls, and their wealth and re¬

spectability increased. They soon became sen¬

sible of the want of a better system of laws and political administration than prevailed around them, and the principle of equal rights and laws was quickly developed.

One of the most important remnants, if not the most important, of the great fabric of an¬

cient civilization, was the cities of Italy. In spite of their bloody contests with each other, and the vices of an oligarchical government, Europe is mainly indebted to them for the cul¬

tivation of the commercial spirit, together with the toleration and love of liberty, which, under the most unfavorable circumstances, it tends to foster, and for that ardor in the cultivation of arts, science and literature, which has always distinguished the best periods of Italian his¬

tory, and from which the general revival of learning in Europe, called the Renaissance, took its rise. Under the reign of Conrad III (1138-52) the cities of Lombardy, and partic¬

ularly Milan, which stood at their head, had ac¬

quired a high degree of wealth and power, and had formed themselves into a confederation.

The struggles between the emperors and these cities form one of the most important portions of the history of the German empire and of Italy. Frederick I in vain demolished the pow¬

erful city of Milan. It was soon rebuilt, and the cities of Lombardy, in alliance with the Pope, obliged the emperor to conclude with them a very disadvantageous peace at Constance. Two other confederations of cities, highly import¬

ant, were formed during the interregnum of the German empire,

between 1256 and 1272.

One of them was the powerful Hansa, or Han¬

seatic League (q.v.), the other the confeder¬

acy of the High German and Rhenish cities, from the foot of the Alps to the mouth of the Main, established by Walpode of Mentz in 1255. A similar confederacy, and a very im¬

portant one, was that of the Suabian cities, instituted in 1488 to repel the outrages of the feudal lords and knights. The cities of the Netherlands, from their central position be¬

tween France and Germany, exercised a power¬

ful influence on the growth of civilization and political liberty in Europe. Their favorable sit¬

uation and the enterprise of their inhabitants early gave them great wealth and power. The democratic spirit, ultimately carried to the greatest height in Holland, was earliest mani¬

fested in the towns of Belgium, which began in the 12th century to show a turbulent dis¬

position, and by frequently leaguing themselves with the enemies of their feudal superiors ex¬

tended their political privileges, and acquired at times a premature independence, which, though ultimately extinguished in the spirit of na¬

tionality, contributed not a little to the breaking up of the feudal system (q.v.). In Spain munic¬

ipalities were established at an early date.

Leon received a charter in 1020, Sepulveda, Lograno, Sahagun and Salamanca followed soon after. The constitution of the Spanish towns approached more nearly to the ancient idea of a city than was common in other large states of Europe, in this resembling the Italian cities.

Their constitution was extremely democratic, and they ruled over a

large extent of surround¬

ing territory, which they were bound to defend.

Deputies from the towns were admitted to the Cortes in the 12th century (1167 and 1188).

The love of liberty rose high in these ancient Spanish cities, but from the isolation of the Iberian Peninsula they exercised little influence in Europe, and they soon lost their power and importance, most of them by the end of the 15th century having ceased to send their representa¬

tives to the Cortes. By degrees the cities ac¬

quired in the different countries of Europe the right of representation in the legislative bodies; and wealth, industry, knowledge and equal laws spread from them through Europe. But the cities of Lombardy, though still flourishing and wealthy, had fallen, for the most part, under the rule of single families ; their republican gov¬

ernments vanished, and their confederation was dissolved. The association of German cities experienced a similar fate. By the Peace of Westphalia the princes of the German empire were declared sovereign powers, and the more their authority increased the more did the rela¬

tive weight of the cities diminish. These had formerly suffered from the oppressions of the feudal lords. They were now the victims of the policy of the neighboring princes, whom envy often led to adopt the most unwarrantable meas¬

ures against the cities, many of which had lost their independence before Napoleon dis¬

solved the German empire. He took away the privileges of those which remained free; and the Congress of Vienna restored freedom to Lubeck, Hamburg, Bremen and Frankfort, only because the different powers could not agree to whom they should be assigned. At the same time Cracow was declared an independent city, with a republican form of government.

Cities, as we have seen, naturally develop the democratic principle, and on this and several other accounts are to be considered among the

firmest supports of liberty. Well-organized mu¬

nicipal institutions, in which the government is in the hands of the citizens, afford continual nourishment to the spirit of freedom throughout a country.

In the United States a city is an incorporated municipality, usually governed by a mayor, aider-men and common council. In many of the States, especially the Eastern, the number of in¬

habitants required for legal municipal incorpora¬

tion is 10,000. In several of the Western States a much smaller number is required. A village or town of 10,000 or more inhabitants is not obliged to become a city, and in several cases places of 20,000 and 30,000 have preferred for local reasons to remain under village govern¬

ment. In the United States cities are generally the outgrowth of villages; one village expands into a town with a population sufficient to as¬

sume the duties of a city; but in several instances, villages near each other have united to form a city, and sometimes cities nearby have united in one municipality,

The 10 largest cities in the world are Lon¬

don, New York, Paris, Tokio, Chicago, Berlin, Vienna, Petrograd, Philadelphia and Moscow.

The cityward movement is common to all civil¬

ized countries. Not only the great industrial nations — the United States, Great Britain and Germany — but new countries holding vast

un¬

occupied territories, such as Canada, Australia and New Zealand, have all felt the influence of the tidal movement that has set in toward urban centres. The explanation is plain and simple.

The improvement in transportation facilities, ((the inclusion of one farm task after another —weaving, toolmaking, soapmaking, slaughtering — in the scope of the urban factory ; the im¬

provement of farm methods and farm ma¬

chinery, making it possible to do the work still left to the farm with fewer hands; the en¬

couragement given to the city as contrasted with the country, with tariff favors; the increasing array of financial and commercial middlemen required as communities become less self-suf¬

ficient and more dependent on world-wide ex¬

changes, rendered the shifting inevitable.® This migration to the cities has been accompanied by great congestion at the centre : in the East Side of New York 600,000 persons are huddled to¬

gether on 1,230 acres; but within recent years there has been a movement in many large cities of factories and residences to the suburbs, when the problem becomes one of transportation from the business centre to the outlying residential districts. The most striking example of a city centre entirely given up to business interests is seen in the historic city of London, which dur¬

ing the day throbs with busy life, and in the night time becomes a city of caretakers.

In 1790 but 3.14 per cent of the inhabitants of the United States lived in cities; New York now contains a larger population than the States of the Union held at the beginning of the 19th century. In 1800 4 per cent were town dwellers ; the proportions in 1830 and 1860 were 6.7 and 16.1 respectively. In 1890 the population living in urban places of 2,500 or over was 36.1 of the whole ; in 1900, 40.5, in 1910, 46.3. In New York, New Jersey, Pennsylvania, Maryland, Illinois, Ohio, ‘ Colorado, California, Washington, and in all New England States with the exception of Vermont, the urban population predominates ; New

York, Chicago and Philadelphia contain about an eighth of the entire population of the United States.

The census of 1910 showed that 96.7 per cent of the inhabitants of Rhode Island lived in com¬

munities of 2,500 and over, 92.8 in Massachu¬

setts, 78.8 in New York and 69.7 in Connecticut.

The percentages for the South Atlantic States were 25.4 (19.5 in 1900), for the West Central States 22.3 (15.1 in 1900), and for the East South Central 18.7 (12.7 in 1900). The ratio of increase for the last decade was highest in cities of from 50,000 to 250,000, being 42 per cent.

The rate of increase for the entire urban popu¬

lation was 38.5 per cent, as against 11.1 for the rural. A disquieting feature in the last returns is the fall of the birthrate in rural districts.

In England and Wales in 1851, 50.08 per cent of the population lived in towns; in 1911 the percentage was 78 per cent. In 1816 but 2 per cent of the population in Germany resided in cities of over 100,000 inhabitants. In 1910, 54.3

per cent were living in communities of 2,000 or over; the number living in cities of over 100,000

increased by 50 per cent in the last decade. In 1870, 68 per cent of the people were engaged in agriculture; in 1907 only 28 per cent. In France, Belgium and Holland the proportion of town dwellers is about 40 per cent. In Australia about one-third of the population is urban. In the decade from 1900-11 the rural population of Canada fell from 63 to 55 per cent of the whole.

Even in the Western provinces, where millions of acres of virgin soil were opened for cultiva¬

tion, the urban population showed a much greater relative increase than did the rural, and came near to the rural in absolute numbers, while in every one of the Eastern provinces with the exception of

Quebec, the country popu¬

lation showed a decline.

Much has been said and written upon the immorality of large cities, and it cannot be de¬

nied that they have vices peculiar to themselves; but it must be considered, on the other hand, that they are free from many of those of petty towns, and even of rural districts. The asso¬

ciation of men in masses, when due surveillance is exercised, has an influence distinctly favorable to the maintenance of social order, the impartial administration of justice, and, above all, the sup¬

pression of all petty and local tyrannies, and the maintenance of individual liberties. It is by the influence of cities alone that a sufficient or¬

ganization for the support of education and the means of enlightenment is obtained, even though that organization often fails to penetrate the entire mass of the cities themselves. It is to them that many of the facilities for progress in art and science are due. It is in them that pub¬

lic opinion is formed, and so organized as to act upon the administration, and, even independ¬

ently of direct representation, upon the legisla¬

tion of a country; and although the individual freedom enjoyed in great cities may often tend to license, its general influence in an otherwise healthy community is highly beneficial to the moral tone of the whole. It must, however, be admitted that the democratic spirit in cities is liable to be carried too far, that an excessive growth of large towns might thus prove danger¬

ous to the state. See Appropriations, Amer¬

ican System of ; Budgets ; City Councils ; City Manager Plan of Government; City

Planning; Cities, American, Government of; Cities, European, Government of; Municipal

Government; Commission Form of Govern¬

ment.

Bibliography. — Consult Fustel de Cou—

langes, (La cite antique) (English trans., Bos¬

ton 1877) ; Goodnow, (City Government in the United States} (New York 1905) ; Howe, (The City: the Hope of Democracy } (new ed., New York 1916) ; and (European Cities at Work*

(New York 1913) ; James, (The Growth of Great Cities in Area and Population* (Annals Am. Acad. Pol. and Soc. Sc., Vol. XIII, Phila¬

delphia 1899) ; Weber, (The Growth of Cities in the 19th Century) (New York 1901) ; Wil¬

cox, (The American City) (New York 1904) ; and the annual volumes of the (The American Year Book.*

CITY APPROPRIATIONS. See Ap¬

propriations, American System of; Budgets, American.

CITY OF BROTHERLY LOVE (Gr.

(jiiXaSeTjpla, Philadelphia, tyiXog, philos, dear, and <2<kA0<fc, adelphos, brother). William Penn gave the English rendering of the two words as the name, Philadelphia, to a city in Pennsylvania.

The common rendering into English of the name of the city is (<City of Brotherly Love.®

CITY BUDGETS. See Budgets, Ameri¬

can ; Appropriations, American System of.

CITY OF CHURQHES, a name given to

Brooklyn, N. Y., because of the large number of churches (556 in 1917) in proportion to the population, estimated 1 July 1916 at 1,928,43 2.

The name was also given to Mexico City by Humboldt, where there were at the time 360

churches to 400,000 inhabitants.

CITY COUNCILS, American. Organ¬

ization. — • City councils in the United States are usually of the single-chamber type although many cities, including a few of the larger ones, have councils with the bicameral or double¬

chamber organization. In colonial times the single chamber prevailed in all the chartered boroughs, but after the Revolution the double¬

chamber was introduced, largely through the application to city government of the so-termed Federal analogy. Congress was bicameral, so were the State legislatures. Following their example the cities provided themselves with two local legislative bodies, commonly known as the board of aldermen and the common council, respectively. But in the course of time there came a reaction against the cumbrousness of this system and it was in many communities abandoned. Eventually it will disappear alto¬

gether. No American city which has changed from the double to the single-chamber plan has ever retraced its steps in this regard.

The Councillors. — The number of mem¬

bers in American city councils varies greatly.

Some small communities have only seven or nine councillors ; more commonly the number is 15 or 21 ; in a few of the largest cities it rises much higher. In Chicago it is 70 ; in New York the city's single legislative chamber (known as the board of aldermen) has 79 members; in Philadelphia the total membership of the two chambers is 132. But the drift has been every¬

where in the direction of reduced membership.

By charter amendments in recent years the number of councillors has been reduced in Bos¬

ton to 9, in Saint Louis to 13 and Cleveland to 26.

Councillors are elected by popular vote; their term of service varies from one to four years in different cities ; they are usually paid a stated salary per annum. As a general rule any voter is eligible to be a candidate for election; but in a few cities there are additional qualifica¬

tions as to age or length of residence in the city.

There are three methods of electing mem¬

bers of city councils, namely, election by wards, election by the city at large and election by a combination of these two plans. In the smaller cities election at large is the usual method. In the larger cities the ward system of

election is common. Both plans have their defects; the ward system too often re¬

sults in the election of mediocre men, while under the scheme of election at large the entire slate of the dominant political party is frequently chosen and the minority party is left without representation entirely.

The effort has been made to lessen these objections by a combination of the two plans, providing for the choice of some councillors by wards and others by the voters of the city as a whole.

The council elections are almost everywhere contested upon a partisan -basis. From time to time non-partisan organizations put for¬

ward their candidates but rarely with con¬

tinued success. Nominations are made by party conventions, or more

commonly, by some form of primary, closed or open (see Primary). The election is everywhere bysecret ballot and ordi¬

narily a plurality of the votes actually cast is sufficient to elect. In a few cities, however, the preferential form of ballot is used (see Preferential Voting). In most cities there are strict regulations for the prevention of fraud and corrupt practices at council elections and in some of them the maximum amount that may be spent by candidates, even for legitimate campaign expenses, is rigidly fixed by law.

City Council Procedure. — Each city

council adopts its own rules of procedure, but these rules do not differ widely throughout the cities of the United States. Regular meetings of the council are provided for, these meetings being held once a week in the larger municipali¬

ties, once a fortnight or even once a month in the smaller. In a few cities the mayor pre¬

sides at these meetings, but for the most part the council chooses from its own membership a chairman or president to serve for one year.

Meetings are almost invariably open to the public; the council records are kept by the city clerk or by a clerk of the council, and in the larger cities these are usually issued in printed form. Each city council has its own order of business and its own standing rules as to how business shall be disposed of ; but these rules may usually be suspended by a two-thirds vote.

Council Committees. — As city councils

have a considerable variety of matters to deal with it is customary td maintain several stand¬

ing committees. In large cities there may be 20 or more of these committees. Their selec¬

tion is one of the first things to be done after a new council has been elected. In most cities the work of arranging the membership of these various committees is in the hands of the preCITY COUNCILS

siding officer who makes his ˆslate® after con¬

sulting with the councillors and announces it when completed. In a few cases, however, the work is clone by the council itself through the medium of a (<committee on committees. ˆ Some one member of each committee is designated as chairman and presides at the committee's meet¬

ings.

In the usual course of events all business coming to the city council for consideration is first of all referred to the appropriate com¬

mittee. The standing committees on such fields of local administration as streets, public health,'

water supply, police, fire protection, parks, finance and so forth, each receive the matters which seem to come within their respective ju¬

risdictions. At meetings of the committees these things are considered; public hearings are held if the importance of the matters in hand so warrant and in due course the committee reports to the council its recommendation upon each item that has been referred to it. The council may or may not adopt these recommendations but the committee's reports usually carry con¬

siderable weight. On the other hand the recom¬

mendations of committees are set aside fre¬

quently and this practice has greatly impaired the efficiency of the work done by the councils.

So much business comes before the council that the members as a whole cannot study every question thoroughly. This work, if it is to be done at all, must be performed by committees.

But the frequency with which the results of a committee's investigation are cast aside by the whole council has led to many

abuses and forms one of the chief reasons for the growing de¬

mand that councils be reduced in size so that committees may be abolished altogether.

Powers of the Council. — (a) Legislative.

City councils are primarily legislative bodies; they frame and enact the local ordinances sub¬

ject to the mayor's veto power where that power exists as it does in most cities. Through this ordinance-making power they exercise en¬

tire or partial jurisdiction over a great variety of matters of which only the most important can be described here. First of all come powers in the domain of local finance. The city council determines the local tax rate although it does not, as a rule, have any discretion as to the forms of property that may be taxed nor the type of tax that may be imposed. These things are regulated by State law. But the rate of annual taxes depends upon the amounts of money appropriated for municipal expendi¬

tures, and these appropriations must in all cases be passed by the council before they become available. The-estimates of necessary appro¬

priations for each year may be transmitted to the council by the mayor, as in Boston ; in a few cities, notably in New York, they are pre¬

pared under the supervision of an administra¬

tive body known as the board of estimate and apportionment ; in some cities, as for example, in Chicago, they are arranged by a committee of the city council itself. But, however pre¬

pared, the estimates must be submitted to the council to be finally acted upon. If the esti¬

mates are segregated, the council acts upon them item by item, appropriating a designated amount of money for each specific requirement. This is known as the segregated budget system of making municipal appropriations. If, on the other hand, the estimates are submitted in terms of total requirements for each municipal depart¬

ment, the system is known as lump-sum budget plan. See Budgets, American.

In dealing with appropriations, however, the city council does not, in most cases, possess en¬

tire discretion. The State laws require some appropriations to be made. The provisions of city charters sometimes provide, as in New York and Boston, that no changes by way of increase may be made by the council in the esti¬

mates for appropriations submitted to it.

Borrowing on the city's credit is another matter over which the council has a measure of control. The initiative does not usually rest with the council but its assent is in all cases necessary before bonds can be issued. Here again, however, State constitutions and statutes have by the imposition of municipal debt limits restricted the liberty of the local authorities.

A second branch of the city council's legis¬

lative jurisdiction lies in what is commonly known as the domain of the police power.

Speaking broadly the council has the right, within the generous limits permitted by State laws, to enact ordinances designed to protect the lives, property, health and morals of the citizens. Within this category come ordinances regulating traffic in the streets, establishing rules for the prevention of fires, setting stand¬

ards for building construction, providing sani¬

tary regulations, rules governing the inspection of milk, the conduct of theatres and open places of amusement, the erection and maintenance of billboards and a great variety of other matters.

It is true that in some cities the right to regu¬

late some of these things has been taken from the council and given to the board of health or the police commission or to some other

adminis¬

trative board, but taking the cities of the country as a whole the' council still possesses a wide range of jurisdiction.

In the third place the city council usually has powers with respect to the granting of franchises to public service corporations which seek to acquire rights in the public streets. But in this field great inroads upon the council's freedom of action have been made by the State in recent years. Most of the States have es¬

tablished public service commissions or public utilities boards and to these bodies much au¬

thority with reference to the terms of franchises has been entrusted. The power of city councils to grant and determine franchises at will is a thing of the past. The assent of some State authority or the approval of its action by a referendum to the voters is now a requirement in most cities. Nevertheless the council retains some powers in this field and they are of not inconsiderable importance.

And where a city itself owns and operates any public service such as the water supply or the lighting plant, the council has ordinarily the power to regulate by ordinance the terms and incidents of the service. The immediate man¬

agement is not commonly in the council's hands, but the direction of general policy is controlled by it in most cases.

All these things and many others are deter¬

mined by the provisions of ordinances which the council has power to enact. In addition to the specific limitations imposed by State law, however, there are certain general restrictions which apply to all ordinances. Ordinances to be valid must be reasonable; they must not

make unfair discriminations, and they must not be unwarrantably in restraint of trade. What¬

ever the council's powers they must be exercised within the limits set by their general rules.

(b) Administrative powers. City councils are not administrative bodies, and strictly speak¬

ing they should possess no administrative func¬

tions. Nevertheless they do in most cities possess powers of this sort and in some of them powers of importance. Some administrative ap¬

pointments are still made by city councils ; the city clerk, for example, is frequently so selected.

In various cities the council's concurrence is necessary before appointments made by the mayor become valid. Its consent, moreover, is sometimes required for the award of contracts, for the acquisition of land when needed for parks or public buildings, and for changes in the organization of city departments or in the salaries of municipal officials. Usually it may investigate any branch of the city administra¬

tion. And even in the absence of actual juris¬

diction over administrative matters the council's control of the city's purse-strings necessarily gives it at least a substantial influence in this field.

Conclusion. — American city councils have been shorn of many powers but they still retain others of high importance. The tendency dur¬

ing the last half century has been to strengthen the executive branch of municipal government at the expense of the city legislature. In dif¬

ferent cities this tendency has had varying degrees of strength ; accordingly in no two cities of the land have city councils exactly the same jurisdiction. In some they retain much more than in others. See

Cities, American, Govern¬

ment of; Commission Form of Government; Municipal Government.

Bibliography. — Fairlie, J. A., (Municipal Administration (Chap. XVII, 1906) ; Goodnow, F. J., Municipal Government } (Chap. X, .

1909) ; Munro, W. B., (The Government of American Cities) (Chap. VIII, 1912) ; National Municipal League, (A Model City Charter*

(1918).

William Bennett Munro,

Professor of Municipal Government, Harvard University.

CITY OF DAVID, Bethlehem (modern

Beit-Lahm, house of bread), supposed to be the birthplace of David, the place where his de¬

scendants had to go for the enrolment, when the census was taken by order of the Roman emperor. Jerusalem is sometimes called the ((City of David® because he captured it from the Jebusites and made it the capital of his kingdom.

CITY OF DESTRUCTION, The. In

Bunyan's (Pilgrim's Progress) Christian begins his journey at this city and journeys to the Celestial city. The place of beginning repre¬

sents the world with its temptations, and the place of ending, Heaven with its joys.

CITY DISTRICTS. See District.

CITY OF DREADFUL NIGHT, The.

This well-known poem by James Thomson was first published in The National Reformer in 1874, under the initials <(B. V.® for Bysshe Vanolis, Thomson's nom-de-plume. The work is the most remarkable example in English literature of the unrestrained expression of intense and overpowering gloom. It has ap¬

propriately been called a (<litany of pessimism.®

The author writes

"Because a cold rage seizes one at whiles To show the bitter, old and wrinkled truth, Stripped naked of all vesture that beguiles, False dreams, false hopes, false masks and modes of youth."

His words are addressed not to the happy, not to ((those pious spirits with a God above them,®

not to optimists who look for a heaven upon earth, but to desolate and Fate-smitten sufferers like himself who see no ray of hope. 'The City) is life, — sombre, desolate, a hell on earth.

It is empty, save for wretches who move to and fro in the gloom like spectres, speaking as with one voice the message of despondency and woe. In a succession of vague incidents, which give forward movement to the meditation, the poet encounters one after another of these shadowy figures. He hears a sort of atheistical sermon preached from the dark pulpit of a cathedral to a vast congregation of <(spectral wanderers of unholy night,® counseling despair and suicide. The poem closes with a mem¬

orable description of Diirer's Melancholia,*

whom Thomson makes the presiding goddess of his doleful city.

False as the note of unrelieved pessimism may sound to healthy ears, there is in Thom¬

son's poem an unescapable appeal, due partly to the author's compelling power of imagina¬

tion, partly to his mastery of the cadences of verse and partly to the very intensity of his mood. The atmosphere of gloomy mystery and the deep intonations of language in (The City) are said to owe something to the poetry of Poe; its melancholy is <(compounded of many simples.® Yet Thomson's poem remains not only highly original but unique. Thomson's poems were published in collected form by Reeves and Turner in 1880; for comment con¬

sult Walker, (The Literature of the Victorian Era,* and Stedman, (Victorian Poets.*

James H. Hanford.

CITY OF GOD, The, a noted work by

Saint Augustine. This, the most important of all the saint's writings, was begun in 413, three years after the capture and pillage of Rome by the Visigoths under Alaric. The pagans had endeavored to show that this calamity was the natural consequence of the spread of the Chris¬

tian religion, and the main purpose of Augus¬

tine is to refute them. The work was finished about 426. See De Civitate Dei.

CITY OF A HUNDRED TOWERS, a

name given to Pavia, Italy, from the many towers and steeples which first greet the traveler.

CITY OF MAGNIFICENT DIS¬

TANCES, The, a name given to Washington, D. C. When the city was planned, the last of the 18th century, the long and broad streets, with here and there small parks, almost all of which were out long distances in broad fields, caused this name to be given to it in derision.

Now its citizens are proud of the title.

CITY MANAGER PLAN OF GOVERN¬

MENT. As outlined in the charter of Dayton, Ohio, the commission or city manager plan of municipal government <(shall consist of a com¬

mission of five citizens, who shall be elected at large, … shall constitute the governing body with power as hereinafter provided to pass ordi¬

nances, adopt regulations, and appoint a chief CITY MANAGER PLAN OF GOVERNMENT

administrative officer to be known as the (City Manager y … who shall be administrative head of the municipal government and shall be responsible for the efficient administration of all departments. He shall be appointed without regard to his political beliefs and may or may not be a resident of the city of Dayton when appointed. He shall hold office at the will of the commission and shall be subject to recall as herein provided. The powers and duties of the city manager shall be: (a) To see that the laws and-ordinances are enforced; (b) to appoint and, except as herein provided, remove all di¬

rectors of departments and all subordinate officers and employees in the departments in both the classified and unclassified service; all appointments to be upon merit and fitness alone, and in the classified service all appointments and removals to be subject to the civil service provisions of this charter; (c) to exercise con¬

trol over all departments and divisions created … by the commission; (d) to attend all meet¬

ings of the commission with the right to take part in the discussion but having no vote; (e) to recommend to the commission for adoption such measures as he may deem necessary or ex¬

pedient; (f) to keep the commission fully ad¬

vised as to the financial condition and needs of the city; and (g) to perform such other duties as may be prescribed by this charter or be required of him by ordinance or resolution of the commission… . The city manager may without notice cause the affairs of any department or the conduct of any officer or em¬

ployee to be examined. Any person or per¬

sons appointed by the city manager [for this purpose] shall have the same power to compel the attendance of witnesses and the production of books and papers and other evidence, and to cause witnesses to be punished for contempt, as is conferred upon the commission by this charter.®

Such in brief are the powers and duties of the city manager, the minor details differing only slightly in the various cities operating under such government. Under commission

government one responsible body supersedes the two formerly in vogue; the number of elective officers is reduced; the responsibility for the administration of the various city services is fixed; and certain checks in the way of public control are provided. But in two respects the original plan of commission government fails to meet all requirements. In the first place the elective officers are called upon to execute what only the professionally experienced are com¬

petent to perform ; and in the second place com¬

mission government fails to co-ordinate the work of administration by subordinating it to one central responsible authority. These de¬

fects are remedied by the city manager plan, since the manager is chosen because of expert qualifications and in turn appoints his subordi¬

nates on the basis of the same qualifications.

Being appointed and subject to removal by him, under proper limitations, the department heads are responsible to him in every particular and hence he can use that compulsion which is fre¬

quently necessary to secure successful co-opera¬

tion. On the other hand, none of the legal and political characteristics of commission govern¬

ment are interfered with or altered by the city manager — the commission retains its legis¬

lative function, its advisory capacity and its power to formulate broad-minded policies and wise plans, the execution being left to the ex¬

pert. Toulmin says: <(The unspoken qualifica¬

tions, undoubtedly the chiefest in the make-up of a man in such a position are, first, absolute, unswerving adherence to his own view that ef¬

ficiency, and hence results for the city, is the paramount thing; second, administrative ex¬

perience in business involving the maintenance of engineering works and the necessary-techni¬

cal education ; and third, the ability to lead through tact as well as knowledge.® When the commission selects the city manager, it has power to fix his salary and to secure the best man the city finances will justify. Sometimes the salary of a city manager seems large but it is justified if the recipient save the city the excess and more by his economy of administra¬

tion without impairment of results.

The advantages claimed for the city manager plan are: (1) It creates a single-headed ad¬

ministrative establishment instead of several separate administrative establishments; (2) it permits expertness in administration at the head, where it is most needed; (3) it permits comparative permanence in office of the chief executive, whereas the terms of elective execu¬

tives are rarely long, this permanence tending to eliminate amateur and transient executives and enabling the consummation of far-sighted policies extending over many years ; (4) it per¬

mits the city manager to migrate from city to city, and thus as he need not be a resident of the city at the time of his appointment, an ex¬

perienced man may be summoned at increased salary from a similar post in another city; (5) while giving a single-headed administration, it abolishes the one-man power of the old mayor-and-council plan, and, as the manager is subject to instant correction or even discharge by the commission, the city need not suffer from his personal whims or prejudices, whereas, on the other hand, the combined judgment of the whole commission safely submerges and averages the individual whims or prejudices of the various members of the commission, *etc.*

In 1908 the city of Staunton, Va., initiated the city manager plan in the United States by adopting an ordinance providing for a ((general manager® who should assume all executive duties save those reserved to the finance, ordi¬

nance, school and auditing committees and be responsible to the elected governing body of the city ; the mayor and council were retained be¬

cause under the Virginia constitution the city could not change its government to the com¬

mission form. Hence the innovation created no widespread interest, but in 1912 the city of Sumter, S. C., directed attention to the plan by adopting a commission form of government and advertising widely throughout the country for applicants for the position of city manager. In 1911 the Board of Trade of Lockport, N. Y., secured the introduction in the New York legis¬

lature of a bill authorizing commission gov¬

ernment with a city manager for cities of the third class in that State, but the bill failed to pass. Nevertheless the interest manifested in the city manager plan has resulted in its adop¬

tion in many cities in the United States and also the passage of general State-wide laws by Massachusetts, New York, Virginia, Ohio and Iowa, permitting all or certain classes of cities to adopt the plan. A list

follows of a 718

number of cities operating wholly or in part under the city manager plan, and of some of the more important of these cities with the year in which the plan became effective.

Arkansas, 2. — Bentonville, 1915; Hot Springs, 1917.

Arizona, 3. — Phoenix, 1914; Tucson, 1915.

California, 10. — Bakersfield, 1915; San Diego, 1915; San Jos6, 1916; Santa Barbara, 1918.

Colorado, 2. — Durango, 1915.

Connecticut, 1. — Farmington.

Florida, 3. — St. Augustine, 1915; St. Petersburg, 1916.

Georgia, 1. — Griffin, 1918.

Illinois, 2. — Winnetka, 1915.

Indiana, 1. — Cambridge City.

Iowa, 11. — Grinnell, 1916; Webster City, 1915.

Kansas, 4. — Eldorado, 1917; Wichita, 1917.

Kentucky, 1. — Cynthiana, 1915.

Maine, 1. — Auburn.

Massachusetts, 2. — Waltham, 1917.

Michigan, 15. — Alpena, 1916; Grand Rapids, 1917; Sault Sainte Marie, 1917; Jackson, 1915.

Minnesota, 3. — Morris, 1914.

Montana, 1. — Glasgow, 1916.

New Mexico, 2. — Albuquerque, 1917.

New York, 5. — Newburgh, 1916; Niagara Falls, 1916; Watertown, 1918.

North Carolina. — Durham; High Point, 1915; Morgan¬

town, 1913.

North Dakota, 1. — Carrington.

Ohio, 10. — Dayton, 1914; Sandusky, 1916; Zanesville, 1918.

Oklahoma, 3. — Mongum.

Oregon, 1. — La Grande, 1913.

Pennsylvania, 5. — Altoona, 1918; Titusville, 1913.

South Carolina, 3. — Sumter, 1912.

South Dakota, 2. — Clark, 1912.

Tennessee, 3. — Jackson.

Texas, 13. — Brownsville, 1916; San Angelo, 1916; Sherman, 1915; Tyler, 1915.

Virginia, 10. — Norfolk, 1917; Portsmouth, 1916.

Washington, 1. — Snohomish, 1915.

West Virginia, 4. — Charleston, 1915; Wheeling, 1917.

Wisconsin, 1. — Horicon, 1914.

Bibliography. — (The City Manager Plan)

(in transactions of the Commonwealth Club of California,' Vol. X, pp.

507-46, San Fran¬

cisco, December 1915) ; the City Manager Plan: Both Sides) (in The Independent, Vol.

LXXXVI, p. 40, 3 April 1916) ; Dykstra, C. A., the Commission Manager Plan of City Gov¬

ernment (Lawrence, Kan., 1915) ; Fitzgerald, R. L., the City Manager' (in Journal of the Western Society of Engineers, Vol. XXI, pp.

418-25, Chicago 1916) ; James, H. G., the City Manager Plan, the Latest in American City Government' (in American Political Science Review, Vol. VIII, pp. 602-13, Baltimore 1914) ; tome Reflections on the City Manager Plan of Government (in ib., Vol. IX, pp. 504—06, 1915) ; the Origin and Theory of the City Manager Plan' (in Pacific Municipalities, Vol.

XXIX, pp. 215-17, San Francisco 1915) ; Mandel, A. M., (Budgetary Procedure under the Manager Form of City Government (in An¬

nals of the American Academy of Political and Social Science,' Vol. LXII, pp. 163-75, Philadelphia 1915) ; National Municipal League, the Commission Plan and Commission

Manager Plan of Municipal Government

(Philadelphia 1914) ; National Short Ballot Organization, Commission Government with a City Manager' (New York 1915) ; Patton, J.

S. , (Municipal Business Manager' (in National Municipal Review, Vol. IV, pp. 50—54, Concord, N. FT., 1915) ; Ryan, Oswald, (Municipal Free¬

dom : a Study of the Commission Government'

(Garden City, N. Y., 1915, contains bibliog¬

raphy) ; Toulmin, H. A., the City Manager'

(New York 1915, contains bibliography) ; Up¬

son, L. D., City Manager Plan in Ohio' (in American Political Science Review, Vol. IX, pp. 496-503, Baltimore 1915) ; Waite, H. M., the Commission Manager Plan' (in Na¬

tional Municipal Review, Vol. IV, pp. 40-49, Concord, N. H., 1915) ; and the Commission Manager Plan in Actual Operation' (Philadel¬

phia 1915).

CITY OF OAKS, a name given to Rale:gh, N. C., from the size and beauty of some of the oak trees which adorn its streets.

CITY OF PALACES, a name applied to

Calcutta, India, from the numerous palace-like edifices.

CITY OF THE PLAGUE, The, the name

of a poem written by John Wilson (Christopher North), published in 1816. It is said to have been founded on the 'Journal of the Plague in London,' by Defoe.

CITY PLANNING. Due to the conges¬

tion of certain portions of cities, and their piecemeal development, without regard to order, with slums and inaccessible suburbs, greater attention is now being paid to the development of the science of city planning, for the purpose of balancing the different elements which con¬

stitute a municipality, and to give a greater de¬

gree of comfort and pleasure to its inhabitants.

City planning is not alone a matter of engineer¬

ing and architecture, but vitally concerned with the social, ethical and physical condition of the citizens. It means more light, purer air and more healthful and less expensive living quarters. City planning provides safer and more direct means of transportation, prevents traffic accidents and saves time. Conveniently located parks, places for recreation, public baths and gymnasiums, with access to wood¬

lands and athletic fields, gives greater oppor¬

tunity for physical development. The proper location of municipal markets affords cheap and wholesome supplies of food. These factors, together with the convenient location of schools, libraries, churches and other structures of a public nature, all unite to elevate the life of the citizens. A greater sense of civic responsi¬

bility is instilled in the citizens, their comfort and means of enjoyment are increased and the morale of the entire community is raised. While the movement, as we know it, is recent, the art of city planning is of the greatest antiquity.

The remains of the earliest communal abodes of man, however primitive, show a certain definite arrangement. With the development of races, villages became towns, and towns, cities, continually on a larger scale and it is un¬

doubtedly true that the higher the degree of civilization of a people, the greater will be the size of its cities. The civilization of the Romans was largely expressed in the grandeur of the city of Rome, and the glories of ancient peoples were generally shown in their cities.

In the art of city planning, genius has oc¬

casionally arisen — among the early masters being Merian and Canaletto, the former de¬

veloping the general plan of the city, while the latter excelled in the planning of its internal arrangements. Sir Christopher Wren, in 1666, after the great fire of London had the genius to present a plan for the reconstruction of the city that would have made it the most beautiful in the world, but he was ahead of his time, and London was permitted to grow up into the dis¬

ordered mass of streets and lanes that makes it such a puzzle to the stranger. L'Enfant, CITY PLANNING

however, who planned the city of Washington, P-C., admittedly the most beautiful city in America and one of the most beautiful in the world, enjoyed the double good fortune of having the support of the founders of the republic and an unencumbered site upon which to build. Most city planners hˆve had to re¬

organize existing cities. Equally fortunate was Baron Haussmann, who rebuilt Paris. He

was given a free hand, and a plan was developed in which conceptions of order, convenience, variety and grandeur were not subjected to in¬

terference by questions of expense. Great avenues were cut through labyrinths of streets, and foul and congested districts were replaced by parks and spacious squares. The plan of the city of Buffalo is notable among American cities. Joseph Ellicott, an agent of the Holland Land Company, laid out the city in 1801-02.

He is known as the “ Father of Buffalo,’ w and the city owes him a debt of gratitude for a well-conceived and well-executed plan, the fruit of his genius and foresight. Joseph Ellicott was a younger brother of Andrew Ellicott, the first surveyor-general of the United States, who completed the city of Washington on the designs of the great French planner, L’Enfant.

After him the art of city planning in America seems. to have died, for, with the exception of Washington and Buffalo, American cities have been almost wholly built at haphazard.

The early masters, however, did not impart their theory, leaving instead only their accom¬

plished work as examples. Modern or practical city planning is, therefore, a new art, of German origin, based upon principles, theories and prac¬

tice reduced to a scientific basis. The origi¬

nators and modern masters are Reinhard Baumeister, the originator of the science of city planning, and Camille Sitte, the creator of the aesthetic principles governing the same, while, of practical city builders, Joseph Stiibben is the greatest.

The results obtained by German city planners in applying scientific methods in the develop¬

ment of their cities have been studied by officials of other countries, with the consequence that within the past decade numerous cities in France, England, United States, Canada and Australia have organized city planning commis¬

sions, whose plan is to co-operate with the city authorities. In many States of the Union laws are in force to this effect; for instance, all third class cities (above 50,000 population) in the State of Pennsylvania must have city plan¬

ning commissions, must retain a city planning expert and provide ways and means for the betterment and enlargement of their cities. The jurisdiction of these commissions covers also the territory within three miles of the city limit. Already more than 200 cities of the United States have adopted more or less com¬

prehensive systems of city planning, and the number is constantly increasing.

Principles of City Planning. — The German city building movement produced great, prac¬

tical city planners, who have left no municipal factor out of their calculations, and as a result the United Society of German Architects and Engineers in 1874 formulated a set of funda¬

mental principles governing their activities.

Some of the basic principles of enlarging a city, considered from the technical, the. economic and the administrative points of view, are : <((1) The scope of city planning consists prin¬

cipally in fixing the base lines of all traffic movements and transit facilities, *viz.* : Streets, street cars, railroads arid canals, which must be treated liberally and systematically. (2) The street net should contain the main streets, with the existing streets taken duly into considera¬

tion ; the auxiliary streets which are fixed by local conditions; and in addition other sub¬

ordinate streets, treated in accordance with the necessities of the

immediate future, or having their development placed in the hands of inter¬

ested property owners. (3) The grouping of the parts of the city should be effected in ac¬

cordance with their location and individual characteristics, subject to such modification as may be demanded by sanitary considerations and the exigencies of commerce and industry.

(4) The duty of the building department is to determine the rights and privileges of tenant and neighbor and house owner. Such rights and privileges are related to fire protection, freedom from interference, health, and safety of buildings; and all aesthetic considerations must be secondary thereto. (5) It is desirable that expropriation and impropriation be facili¬

tated by legal measures, and of still more im¬

portance is the creation of a law providing for the regulation of new or reconstructed blocks to be built upon. (6) The city should be reim¬

bursed by property holders directly benefited by improvements by funds advanced by the city for such purposes, and it is advisable to have the amount stipulated before the work is begun , and a normal cost per front foot fixed. (7) The activities of interested property owners'

associations, in regard to the improvement of certain sections, should be subject to munici¬

pal supervision. (8) Land upon which it is imperative to make improvements should only be built upon under reservations for its sub¬

sequent use by the city. The property owner whose land has been marked out for street im¬

provements should be entitled to demand expro¬

priation with compensation, in the event of de¬

lay in making the improvements. The installa¬

tion of sewer connections to new buildings must be at the expense of the property holder, but the city should be obligated to install a

complete system upon the guarantee of a suffi¬

cient number of property owners of abutting property.®

In his work (Stadterweiterungen in tech-nischer, baupolizeilicher und wirtschaftlicher Bezichung) (1876), Baumeister says: ((In the city of the future, there will be three principal divisions : a business section as a core, an in¬

dustrial district, including possibly a wholesale and a residential district. It is, therefore, im¬

portant that all large cities of the future, from the outset, should keep these principles in view.

It must be recognized that the development of a city is confined to these three divisions and that they are interdependent in their develop¬

ment, though for the necessities of an im¬

mediate future, piecemeal progress may be made with subordinate projects. To each basic divi¬

sion belong main streets, railroads and drain¬

age canals, together with the . grouping of in¬

dustrial districts and the selection of places for public buildings and promenades. The immedi¬

ate object is not to complete the planning at once, but to gain control of the ground that will be needed. In a good street net, dis-720

tinction must be made between the main streets and the auxiliary streets. There must not only be variety in the city as a whole, but also in its various districts. Symmetry in grouping of buildings, picturesque perspective of streets and plazas, well chosen points of observation, and attractive successions of buildings constitute the individual

elements of a satisfactory archi¬

tectural impression. The straight stretches of the arterial highways of the city should be gradually transformed, as the suburbs are reached, into forms more characteristic of rural life, with curves and deflections. While ad¬

ditional time will be consumed in traversing such streets, the life of the city has been left behind, and the enjoyments of the country have been reached. The further such avenues extend the more rural in character should they become.®

The Civic Centre.— The heart of the city's design is the civic centre. It gives to the city its vital individuality, and imparts a sense of unity and cohesion that cannot be secured in any other manner. A city with a suitable civic centre no longer gives the impression of being an accidental conglomeration of buildings; it becomes an organized whole and gains a new dignity and a new meaning. These centres, as a rule, are located in the heart of the city and have ready access from all parts of the city and surrounding suburban districts. Several main arteries of traffic radiate from the civic centre, making it also the centre of the city's • street plan, the keystone in the arch of its design. Such a centre can hardly be too great in area, and, however expensive this may prove as an initial outlay, it will be of the greatest ultimate benefit. To make it easily accessible to all parts of the city, new avenues and streets have been cut through to afford the proper approach.

The buildings to be included within the civic centre are the city hall, courthouse, hall of records, post-office and Federal court, custom¬

house, administrative buildings for the various departments, and certain buildings of a com¬

mercial character, either in the civic centre or adjacent thereto and contributing to its general effect, such as a chamber of commerce, banks and life insurance buildings. The leading prin¬

ciple of the design is that one of the buildings dominates the rest. This one is usually the city hall or courthouse. The other buildings are in character and style related to the dominant building, but not of such size or outline as to detract from its importance, as it should be, in an

artistic sense, protective of the others.

Another important principle of the civic centre is balance, the buildings being so proportioned and placed with reference to each other that their masses and outlines produce a pleasing effect. The design of a civic centre is an artis¬

tic problem of great magnitude. It is a paint¬

ing, with the city and the sky as a background, a sculpture in masses, and it should have strength, feeling, completeness, balance and splendor. The art of the civic architect is one in which the greatest talent may find opportu¬

nity for expression not attainable in any other art. Probably the best example in the world of a civic centre is to be found in Washington.

Originally built after the plans of L'Enfant, improvements have been continually added, in particular, in accordance with the report of the Senate (1902) regarding the construction of public buildings. Philadelphia, Seattle and Chicago, as well as many other progressive American cities, have planned and built civic centres on the most approved plan.

Main Streets. — The proper expansion of a city depends *upon the arrangements of the main streets conforming to the topography, what is known as the great ground plan. Most American cities have rectangular block systems, with long straight streets. Few have diagonal and circumferential streets, often found in European cities. Very excellent examples of great ground plans are those of the cities, Karlsruhe and Mannheim, Germany. The

principles given in this system of streets have been adopted in many European and American cities. For instance, the horseshoe effect, ac¬

cording to the plan of Mannheim, has been adopted in the remodeling of Chicago and Saint Louis, while the radiating street system of Karlsruhe is being followed in the new capi¬

tal city of India, New Delhi. This radiating street plan is also to be found in Washington, D. C., and Buffalo, N. Y.

The area occupied by streets varies, ordi¬

narily from 30 to 40 per cent of the total area of the city. The streets of Washington, which are unusually wide and imposing, occupy 54

per cent of the city's total area. By the Prus¬

sian law of 1875, enacted to regulate the streets of Berlin, it was prescribed that the main streets should be 95 feet or more in width; secondary thoroughfares from 65 to 95 feet; and local streets from 40 to 65 feet. Another standard, for secondary German cities, such as Diisseldorf, Cologne, Frankfort, etc., is: Main thoroughfares, 85 to 120 feet; secondary thoroughfares, 50 to 80 feet; and local streets, 35 to 48 feet.

In London, the Royal Commission on Lon¬

don Traffic, in its report of 1905, stated: (<The chief difficulty that stands in the way of im¬

proving the means of locomotion in London is the narrowness of the streets, and the fact that they were not originally laid out on any gen¬

eral plan.® In accordance therewith it was recommended that the following be observed : Main avenues, 140 feet; first class arterial streets, 100 feet; second class arterial streets, 80 feet; third class 60 feet, and fourth class 40

to 50 feet, the width in each case to include the footways on either side, and no street to be less than 40 feet.

The widthsˆ of the more prominent avenues in European cities are as follows : Avenue des Champs-Elysees, Paris, 250 feet; Reeperbahn, Hamburg, 210; Unter den Linden, Berlin, 190; Ring-Strasse, Vienna, 185; Belle-Alliance Strasse, Berlin, 160; Andrassy, Budapest, 145; Avenue Henri Martin, Paris, 130; Whitehall, London, 120-145 ; Victoria Embankment, Lon¬

don, 120; Potsdamer and Friedrich Wilhelm Strasse, Berlin, 110; Princess and George Streets, Edinburgh, 100; Avenue de l'Opera and Paris Boulevards, Paris, 98; Holborn Via¬

duct, London, 90; Regent Street Quadrant, London, 85 ; Picadilly, London, 75 ; and Queen Victoria Street, London, 70.

One of the main objects in modern city planning is to secure streets of definite length, properly terminated, or curved or otherwise changed as to direction, avoiding the principle of having them of the same width throughout.

CITY PLANNING

1 Proposed approach to Manhattan Bridge, New York City 2 Civic Centre Project for the City of Seattle CITY PLANNING

The eye should rest at easy distances upon columns, arches, statues, fountains, fagades or other suitable objectives, and the quality of unity will thus be gained. Without a terminal, a vista is meaningless. What, for example, would the Avenue de l'Opera be without the closure of the Grand Opera House; Rue

Royale, without the Madeleine; Avenue Vic¬

toria, without the Hotel de Ville; the Vienna Burgring, without the Parliament building; Keichsratstrasse, without the Votiv Kirche ; and Unter den Linden, without the Branden¬

burg Tor?

In undertakings of breaking new streets, foreign cities have not hesitated at expense.

Paris it is estimated has spent $265,000,000 on its reconstruction. London in new streets has spent $100,000,000, and the new commission has under way expenditures that will increase this by

$125,000,000. That expenditures for the betterment of traffic conditions are justified is shown by a calculation made with reference to the improvement in a portion of Saint Louis, the cutting through of Gravois avenue to 13th street, a short stretch of three blocks. It is estimated that the saving in time to those using the ut-off would amount to $500,000 in a year.

The calculation is on the following basis : The saving would amount to 10 minutes per day for every person traveling over the road. In a year this would amount to 100 hours per per¬

son, which at 20 cents per hour means a sav¬

ing of $20 per year, or for a traffic of 25,000

persons, daily — one-twenty-eighth of the city's population — the aggregate of $500,000 per annum.

Civic Embellishment. — Unless the streets of a city are properly embellished, kept free from nuisances, and given proper attention in every detail, the city will fail of realizing its full advantages, however well it may be planned. Such embellishments comprise,

among other features, boulevards, esplanades, bridge and park approaches, water gates, quays, plazas, squares, bay fronts, terraces, monuments, statuary, fountains, trees, grass plots, artistically designed electroliers, trolley poles and other like structures and details.

The combination of such features makes up the impression produced by the streets, and just at this point carelessness, neglect or inadequacy in the treatment of small structures or other objects is likely to destroy the whole effect and spoil what has been accomplished at the cost of much time, skill, labor and expense.

Of the more important features of civil em¬

bellishment are the boulevards, esplanades and plazas, with the liberal provision of grass plots, shrubbery and trees on the streets. Among the trees that are useful for city purposes are the following: Norway Maple, Sugar Maple,

Scotch and American Elms, Cottonwood,

Horse Chestnut, Red, White and Pine Oaks, Ash, Catalpa, Linden, Kentucky Coffee Tree, Thornless Honey Locust, Lombardy Poplar, Evergreen Pines and Cedar.

Trolley poles in cities using the overhead system, lighting poles, as well as the lighting system itself, if properly designed, may be made highly ornamental features of street equipment.

The appearance of a city and the impression that visitors, as well as residents, receive, is dependent far more than is generally supposed 6 — 46

upon the appearance of the sidewalks, con¬

sidered apart from their adjacent buildings.

Sidewalk regulations have been in force abroad for many years, and within the past five years various American cities have adopted similar plans. As an example, the city of New York has recently added to its sidewalk regu¬

lations by prescribing that the widening of the roadway shall be at the expense of the side¬

walks, and the latter to regain their width by the removal of building encroachments, such as stoops, areaways, pillars, porticos and the like. Although bitterly opposed for a number of years, and though the removal of such en¬

croachments has marred the lower sections of some of the buildings that had for years tres¬

passed on the street, the plans of the city have been carried out, and the process is constantly being extended on all streets where traffic is congested.

. A matter of the most pressing importance is that of the municipal public comfort station, a subject that has been greatly neglected.

Without an adequate system, the health of the public is seriously affected, and numberless are the instances cited by physicians where their absence has been the cause of numerous dis¬

eases and ailments. Two methods are followed in the architectural treatment of the comfort station, one being to place them underground, with entrances as inconspicuous as possible, and the other is to make of them small monu¬

mental structures. English cities are well pro¬

vided, Liverpool maintaining about 40 and Glasgow an equal number. Berlin maintains 450 such stations, or about one to every 10,000

of population, which for a large city is a suf¬

ficient number. Most of the English stations are underground, and in the United States the same system is largely followed, with the mis¬

take, however, of too often having the en¬

trances for men and women in too close proximity.

When the city has fulfilled its whole duty in the embellishment of its streets, avenues, promenades, boulevards and parks, it is still necessary for the individual citizen to complete the work by the erection of suitable and artis¬

tic buildings and residences. The work of the city is, at best, only a small share of what goes to make up the effect of the street which de¬

pends finally upon the character of the struc¬

tures that fill it. For the encouragement of private owners, foreign cities often offer re¬

wards for the most artistic fagades. When a new street is opened, the prizes are announced, and when the street is built up, the awards are made. The prizes are usually large, for ex¬

ample, in Brussels $4,000, $2,500 and $1,500

have been awarded as prizes for the first, sec¬

ond and third best fagades In Paris, they have been awarded by way

of remission of one-half of the street tax, and medals, and the re¬

sult has been that there is keen and lively com¬

petition among house, owners and architects.

Building Regulation. — In German cities the height of buildings is subject to very strict regulations. In Berlin, the height permitted is from 18 to 24 metres, or from 59 to 79 feet.

The minimum height to which buildings are limited varies in different cities. In Wies¬

baden, Bremen and Barmen it is 15 metres (49

feet) ; in Munich 12 metres (39 Rj feet) ; and in Kiel and Cologne, 11 metres (36 feet), this 722

being the minimum on the narrowest streets.

It is greater, however, in the wider streets.

Not only is the height of buildings regulated in German cities, but also the maximum and minimum number of stories, which depends on the zone in which the building is situated.

In Berlin and Hamburg, the greater number of buildings must be cither four or five stories in height. Throughout the grand duchy of

Baden, the number of stories runs from three to five, in the suburbs and outlying districts, three being the maximum, and in the business districts the maximum being five. In Munich, Cologne, Uiisseldorf, Halle and Breslau, all buildings must be at least two stories in height, but in Bremen, one-story buildings may be erected. In Baden, houses in the country are not permitted to be over two stories in height.

Many American cities have taken up the question of the regulation of

the maximum height of buildings, and the following are ex¬

cerpts from several of their regulations: Bal¬

timore, Md. : No building more than 175 feet, except that towers, spires or belfries in fire¬

proof buildings may extend to a greater height.

Boston, Mass.: No ordinance, but building regulations provide the following : City divided into districts. District A, buildings of fire¬

proof construction may be erected to a height of 125 feet; in another district, to a height of 100 feet; in a third, to 80 feet; but the build¬

ings in these latter districts are not of the same construction as in District A. Buffalo, N. Y. : ((Outside the fire limits of the city of Buffalo, it shall be lawful to erect frame build¬

ings not exceeding 50 feet in height from the sidewalk to the highest point of roof.® Cleve¬

land, Ohio: (<No building or other structure hereafter erected except a church spire, shot tower, water tower or smokestack, shall be of a height exceeding times the width of the wid¬

est street upon which the building faces, but no building shall be over 200 feet high.® Denver, Colo.: <(No building or structure to exceed 12

stories except spires, towers, smokestacks, *etc.*

All buildings or structures more than 125 feet high to be absolutely fireproof.® Los Angeles, Cal. : Fire district, one story only, and not over 16 feet high. Class A. All buildings up¬

held by masonry or reinforced concrete or framework of steel or iron. Fireproof or skeleton construction. No building over 150

feet high, allowing 30 feet for mansard roof — not more than seven stories. Class B. Ma¬

sonry or masonry and steel, and iron and steel buildings, supporting iron or steel masonry.

No over 100 feet high, nor more than eight stories. Class C. Masonry or reinforced con¬

crete walls, floors not wholly carried by steel columns and girders or reinforced concrete and masonry — 85 feet high, not more than six stories, exclusive of basements. Class D. All buildings not included in A, B and C, not more than 50 feet high, nor more than four stories.®

Louisville, Ky. : ((No nonfireproof building or structure outside the fire limits shall exceed 70

feet in height, but this shall not apply to spires of churches or similar buildings outside of the fire limits which may be constructed of wood to a height of 125 above the curb level.® Portland, Ore.: ((Class I (Absolutely fireproof), 12 stories, or 160 feet. Class II (Fireproof, short span), 12 stories, or 160 feet.

Class III (Fireproof, long span), 10 stories, or 140 feet. Class IV (Semi-fireproof), 6

stories, or 85 feet. Class V (Mill construc¬

tion), 6 stories, or 85 feet. Class VI (Ordi¬

nary construction), 4 stories, or 60 feet. Class VII (Frame construction), 3 stories, or 42

feet.® Providence, R. I. : No ordinance.

Building regulations provide: (<No nonfire¬

proof building or structure hereafter should exceed 65 feet in height. No fireproof build¬

ing (ordinary) or structure hereafter erected shall exceed 120 feet in height, except that structures or appendages may be built upon roofs of said buildings not exceeding 20 feet in height, provided that said structure or ap¬

pendage shall be built of incombustible ma¬

terial throughout. Every building hereafter erected or altered to be used as a theatre or public station which exceeds 3 stories or more than 40 feet in height, shall be built fireproof (absolute) except as hereinafter specified.®

Rochester, N. Y. : No ordinance. Height reg¬

ulated to conform to size and strength of foundations and construction of walls. San Francisco, Cal.: Fireproof buildings, 102 feet; semi-

fireproof buildings, from 55 to 86 feet.

The regulation of the height of buildings is only one of the numerous rules made and en¬

forced abroad. Among the important ones are those affecting the ratio of the area of the building to that of the lot, the separation of buildings, classes of buildings, classes of areas between buildings, minimum number of rooms in an apartment, window area, height of ceilings and cubic air content of sleeping-rooms. Repre¬

sentative figures are selected, which, though in many cases not applicable to American cities, will give a good idea of the regulations. The area of the lot which may be built over in cities in the state of Baden, the regula¬

tions of which are regarded as being well worked out, varies according to the zone, from three-quarters to four-fifths of the total area. In the outlying districts, these figures are reversed, it being permissible to build only over one-quarter to one-fifth of the total area of the lot.

In other cities the regulations vary, but are about on the same basis, a difference being made according to the zone.

The regulations abroad as regards the

classes of buildings that may be used as work¬

ingmen's homes require the apartment used by the family to consist of not less than three rooms — a living-room, a sleeping-room and a kitchen. The living-room is required to be of a certain size. In Wiesbaden, this is 75 square feet; throughout Baden, 107 square feet; in Karlsruhe, 130 square feet; in Mannheim, 160

square feet, at the minimum. In the last named city, the kitchen must not be less than 130

square feet in area. There are in addition re¬

quirements as to the total area of the rooms, which in Diisseldorf, Magdeburg and through¬

out Saxon}* must not be less than 320 square feet. The height of the rooms is generally placed at not less than two and a Hal f metres, or 8.2 feet, while the window area must be from one-twelfth to one-sixth of the area of the floor, an average being one-tenth. The minimum cubic air content of the rooms is also fixed by regulation at from 250 to 700 cubic feet, being in Baden 350 cubic feet.

Block and Zone Systems. — The regula¬

tions as to space not built upon are sometimes based on the number of families occupying a CITY PLANNING

building. In Altona, 160 square feet per family must be left open in the main portions of the city, while in the suburbs, 1,100 square feet per family are prescribed. Among other rules are those in reference to light, there being pro¬

visions to the effect that certain windows of buildings shall receive light at angles of from 30 to 60 degrees over the walls of others, but these regulations are of a somewhat compli¬

cated nature and are not easily applied. In London, the right to <(ancient light^ has had the effect of causing theatres to be built prac¬

tically underground, so that the highest priced seats are in the gallery near the street level, and the pit is far below.

In buildings in Germany in which the upper floor is 36 feet above the street, two stairways are usually required, though in exceptional in¬

stances one is permitted. Every portion of the floor must be within 98 feet of a stairwray.

All stairways must extend to the roof, or, if the main stairway does not go to the roof dilation ol air in blocks is to leave openings at the ends of the blocks. The houses face all four sides of the block, but there are

four openings at the rear of the houses on the ends of the block. Blocks of this kind are to be found in cities in -England, Holland and in some German cities, notably Bremen. In some blocks the houses only face the sides of the block. 1 he breeze is free to sweep the entire length, there being no houses at the ends. Such blocks are required by ordinance in the cities of Mannheim and Posen in Germany.

A large number of American cities have alleys bordered by dwellings, such, for example, as the city of Allentown, Pa. There the alleys have the form of a capital the two vertical bars pf the <(Hrt joining the main thorough¬

fares. A new block plan was adopted in 1916

(see the illustration). The plan to eliminate all interior buildings and, instead of the middle bar of the in the alley system, to have two narrow alleys, spaced 40 to 50 feet apart, was lli

*

o

\\\\\\

New Block System, with Children's Playground, Allentown, Pa.

itself, an auxiliary stairway at least two and one-half feet wide must be provided to go to the roof. In many buildings the stairs are in a stainvay house, that is to say, alcoves or lean-tos at the side of the building, of a fire¬

proof construction. The shape of the stairhalls is regulated and under some circumstances no corner is allowed. The regulations in differ¬

ent cities vary to some extent. In some build¬

ings of more than two floors above the street, the floor must have two staircases, irrespective of their floor area. The main stairways must not be less than three and three-fourths feet in width, while the stairs

to the roof and base¬

ment must be three feet wide.

One of the difficult problems in connection with the design of buildings in congested or closely built up blocks is to provide light and air for the rear rooms. To obtain a suit¬

able circulation of air is even more trouble¬

some than to secure light. A method adopted with great success for securing the direct cir-adopted, thus making an interior plot of this width and about 100 feet in length, the interior being enclosed and used as a playground for the children residing in the block and provided with simple playground equipment.

Following the practice in Europe, American cities, such as New York, Washington, Balti¬

more, Los Angeles, Seattle and Boston have adopted zone or districting systems for dividing the city according to the purposes for which the different sections are best adapted or are already used. This establishment of the zone system is of as much importance in the older cities as in those under development. The num¬

ber of zones depends largely on the activities of the city and on the extent to which the citizens are willing to submit. Those of European cities are much more numerous than would be practicable in America. For example, Karlsruhe, a city of 150,000 inhabitants, has as many as 16 different zones, while American cities have ordinarily, adopted from four to six 724

zones for their purposes. The following is a workable basis for the extension of the system in the ordinary American city: (1) Residential district, (a) light traffic, no stores; (b) medium traffic, stores; (2) Business district, (a) me¬

dium traffic; (b) heavy traffic; (3) Industrial district, (a) 25 to 100 employees per establish¬

ment; (b) over 100 employees per establish¬

ment; (4) Tenement district, stores and heavy traffic; (5) Warehousing district, heavy traffic.

Other articles on city planning will be found under Garden Cities, Recreation Centres.

Bibliography. — General: (Select List of Works Relating to City Planning and Allied Subjects } (New York Public Library, New York 1913) ; Maltbie, M. R., ‘Civic Art in Northern Europe* (New York 1903) ; Weber, A. F., ‘The Growth of Cities in the Nineteenth Century *(New York 1899). United States: Burnham, D. H., and Bennett, E. H., (Plan of Chicago* (Chicago 1909) ; Efficiency in City Planning) (New York 1913) ; Engineering In¬

terest in City Planning) (in Engineering Rec¬

ord, New York 1913) ; Ford, F. L., ‘The Group¬

ing of Public Buildings) (Hartford 1904) ; Ford, G. B., (Digging Deeper into City Planning) (New York 1912), and (The City Scientific*

(New York 1913) ; Koester, F., ‘American City Planning* (in American Architect, New York 1912-13) ; Lamb, C. R., (The Possibilities of the Esthetic Development of Our City* (New York 1909) ; Marsh, B. C., (An Introduction to City Planning; Democracy’s Challenge to the American City* (New York 1909) ; Nolan, J., Comprehensive Planning for Small Towns and Villages) (Boston 1912) ; Olmsted, F. L., City Planning) (Washington 1910) ; Pray, j.

S., and Kimball, T., ‘A City-Planning Classifi¬

cation (Harvard University Press 1913) ; Rob¬

inson, C. M., Che Improvement of Towns and Cities; or, The Practical Basis of Civic Esthetics* (New York 1901), and (Modern Civic Art; or, The City Made Beautiful* (New York 1903); Wacker, C. H., Chicago; A City Set in a Garden* (in Municipal Engineering, Indianapolis 1913), and ‘Manual of the Plan of Chicago* (Chicago 1912) ; Zueblin, C., ‘American Municipal Progress; Chapters in Municipal Sociology *

(New York 1912). Aus¬

tralia: Cites for the Seat of Government (Report of Royal Commission, Melbourne

1903). Austria: Roessler, A., Won Wien und seinen Garten (Vienna 1909). Canada: Mawson, T. H., and Vivian, H., ‘Town Planning and Housing) (Calgary 1913). England:

Adshead, S. D., Civic Design * (Liverpool 1909) ; Bentley, E. G., and Taylor, S. P., hous¬

ing, Town Planning, etc., Act, 1909) (London 1911) ; Casson W. A., (The Housing, Town Planning, etc., Act, 1909 * (London 1912) ; Culpin, E. G., Carden Cities and Town Planning Association (London 1910) ; Garden City As¬

sociation, ‘Town Planning in Theory and Practice> (London 1907) ; Geddes, P., ‘City Devel¬

opment ; A Study of Parks, Gardens and Culture Institutes) (Edinburgh 1904) ; Glen, R. A., and Dean, A. D., ‘The Law and Practice of Town Planning* (London 1913) ; Mawson, T. H., Civic Art; Studies in Town Planning, Parks, Boulevards and Open Spaces* (London 1911); Royal Institute of British Architects, ‘Town Planning Conference) (London 1910) ; Triggs, H. I., ‘Town Planning; Past, Present and Possible) (London 1909) ; Unwin, R., ‘Town Plan¬

ning in Practice; An Introduction to the Art of Designing Cities and Suburbs> (London 1911). France: Gaudet, J., ‘Elements et theorie de l’architecture) (in Lihrairie de la con¬

struction moderne, 4 vols., Paris 1909) ; Smith, E. R., ‘Baron Haussmann and the Topographi¬

cal Transformation of Paris under Napoleon IIP (in Architectural Record, New York

1907-08). Germany: Eberstadt, R., ‘Neue

Studien fiber Stadtebau und Wohnungswesen*

(Jena 1912) ; Jones, P., ‘Town Development in Germany and Austria *(Birmingham 1911) ; Howe, F. C., City Building in Germany* (Bos¬

ton 1912) ; Rehorst, K., ‘Alte Stadtebilder und moderner VerkehP (Mannheim 1907) ; Wolf, G., ‘Die schone deutsche StadP (Munich

1911) ; (Brix, J., and others, ‘Grundplan ffir die Bebauung von Gross-Berlin > (Berlin 1911) ; Keller, K., and Nitze, P., ‘Gross-Berlins bail-liche Zukunft, Vorschlage zur Reform der Bebauungsbestimmungen) (Berlin 1910) ; Was-muth, E., ‘Wettwerb Gross-Berlin 1910; Die preisgekronten Entwfirfe mit Erlauterungs-Berichten* (Berlin 1910) ; ‘Wettbewerb zur Erlangung eines Bebauungsplanes der Stadt DfisseldorP (Dfisseldorf 1911). India: ‘Re¬

port of Delhi Town Planning Committee, East India* (3 vols., London 1913).

Frank Koester,

Author of ‘ Modern City Planning and Main¬

tenance A

CITY OF THE PROPHET, a name given

to Medina, in Hedjaz, Arabia, the second holy city of the Mohammedans, the place where Mo¬

hammed took refuge, in 622, when he fled from Mecca, and the city where he died.

CITY OF THE STRAITS, often applied

to Detroit, Mich., from its position. It is sit¬

uated on that part of Detroit River between Lake Saint Clair and Lake Erie.

CITY OF THE SUN, a name given to

Baalbec, an ancient city of Syria, built on the ruins of the Greek city, Heliopolis, “The Sun City.®

CITY OF VICTORY, a translation of the

Arabic name for Cairo, the capital of Egypt.

CITY OF THE VIOLET CROWN, The,

a name applied to Athens.

CITY WATER SUPPLY. See Water

Supply.

CIUDAD, the-oo-dad, BOLIVAR, Vene¬

zuela, city, the capital of the state of Bolivar, on the Orinoco, about 240 miles from the sea, with governor’s residence, a college, a cathedral and a considerable trade, steamers and sailing-ves¬

sels ascending to the town. Exports: coffee, gold, cotton, indigo, tobacco, cattle, rubber, hides, sugar, asphalt, *etc.* Imports: manufac¬

tured goods, wines, flour, *etc.* Ciudad Bolivar was founded in 1764. It was first called San Tomas de la Nueva Guayana, but was long known as Angostura (“the narrow®) because of its situation at a narrow part of the river.

In 1819 the Congress met here, which, under Simon Bolivar, formed the republic of Colom¬

bia out of the Spanish states of New Granada and Venezuela. Since then the city has been known as Ciudad Bolivar (“Bolivar’s city®).

Pop. 11,686.

CIUDAD DE CURA, da koo'ra, or CURA,

V enezuela, in the state of Guzman Blanco, 55

miles southwest of the city of Caracas, about CIUDAD PORFIRIO DIAZ — CIVIC CROWN

20 miles east of Lake Valencia. It is an 18th century city, but many of its new buildings are modern in style and beautiful in architecture.

The streets are broad, many small parks adorn the city and the inhabitants are justly proud of their library. Pop. 12,600.

CIUDAD PORFIRIO DIAZ, por-fe're-o

de'ath, Mexico, town in the state of Coahuila, on the Rio Grande, opposite Eagle Pass, Tex., on the Mexican International Railroad, and the Mexican terminal of the international bridge across the Rio Grande. It has a custom-house, army post, large cattle markets and but poor buildings for the storage of fruits or grains.

It is situated in an agricultural region, and its trade with the United States consists chiefly in exporting grains, fruit and cattle and in importing manufactured articles. Coal beds near are of value and may cause the establish¬

ing of manufactories. It was founded in 1849.

Pop. 5,200.

CIUDAD REAL, the name of a province

of Spain, occupying the south extremity of New Castile, and of its

capital. The area of the province is 7,620 square miles. The surface in general is bare looking, immense plains stretching from the mountains of Toledo to the Sierra Morena. The mountains of Ciudad Real abound in minerals : iron, silver, copper, lead, antimony, cinnabar and coal ; also in quarries of marble, jasper, quartzite, granite, *etc.* Medici¬

nal and mineral springs, both hot and cold, are abundant. The climate is dry, and in the heat ot summer very oppressive. The plains and valleys are productive in the vicinity of the rivers; in favorable seasons good crops of cereals are obtained. Cattle, sheep and mules are reared. Woolen, linen and other fabrics, hardware, earthenware, esparto, etc., are manu¬

factured; brandy, wine and oil of good quality are made. Metals, manufactured goods,

brandy, wine and oil, horses, mules and cattle are exported. The city of Ciudad Real is situated on a low plain near the Gua-diana, 100 miles south of Madrid. The walls are in many parts in ruins. The principal edi¬

fices are the church of Santa Maria del Prado, consisting only of a single nave, but so grand and loftv that no other in Spain, except the cathedral of Coria, equals it ; the hospital ; the institute, with a good laboratory and botanic garden. The manufactures and the trade are of little importance — the former of woolen and linen cloths, the latter of grain, wheat, wine, *etc.* Pop. about 15,000. Pop. of the province about 321,580.

CIUDAD RODRIGO, rod-re'go, Spain,

fortified town in Leon, on the river Agueda, eight miles east of the Portuguese frontier.

There is a castle dating from the 13th century.

The cathedral was begun in 1190 and contains many interesting features. Ciudad Rodrigo was a place of considerable importance in early Spanish history as a frontier fortress. It was taken by the English in 1706, during the war of the Spanish Succession, and recovered by the Spaniards in 1707. The fort was surrendered to the French under Ney, 10 July 1810, having been bombarded 25 days; and i9 Tan. 1812 it was taken by storm by the British under Welling¬

ton, after a siege of 11 days. The Cortes be¬

stowed upon Wellington the title of Duke of Ciudad Rodrigo. Pop. about 9,000.

CIUDAD VICTORIA, vik-to’re-a, Mexico,

capital of the state of Tamaulipas, on the main line of the railroad which runs from Tampico to Monterey, about 100 miles from the Gulf coast. It is in a sugar and fruit-growing region, but the sugar only is exported. It is an episco¬

pal see and the residence of a consular agent of the United States. The city was founded about 1750 under the name of Santa Maria del Refugio de Aguayo, and not until 1825 was its present name adopted. Pop. about 11,000.

CIVETS, a family of small carnivorous

mammals, the Vivcrridce, related to both the hyenas and the cats. Their alliance to the former appears when the fossil history of the family is traced back to the early Tertiary, where the ancestry of both converges. The comparatively coarse hair and erectile mane possessed by some species, and dentition, are still hyena-like ; while the slender, elongated form, long tail and especially the fact that the claws are semi-retractile, exhibit the inborn likeness to the cats. The civets vary from two to three feet in length, and most of the species are strongly marked in black and white stripes and spots, sometimes prettily disposed. They are distributed throughout the warmer parts of the Old World, abounding in Africa and the Malayan Islands, but are absent from the Australian region. The family is divisible into two groups, one of which includes the typical civets ; the African genets, one species of which also inhabits Spain and Italy; the linsangs and other Oriental spotted forms and the para-doxures. The second group includes the mungoos and other ichneumons, suricates and the like. These various forms will be found de¬

scribed elsewhere under their separate names.

Civets feed upon smaller mammals, birds’

eggs, lizards and snakes, and are considered beneficial because of their appetite for crocodile eggs, which they devour in great quantities along the Nile. They are characterized by, and chiefly valued for, an odorous, fatty sub¬

stance, contained in a pouch connected with the sexual organs, in both sexes. This sub¬

stance is used for compounding perfumes, and is ready for use after it has been drained, washed and dried. It is called <(civet.® Shakes¬

peare refers to it as ((of a baser birth than tar, the very uncleanly flux of a cat.® A dram is obtained at a time from each animal, from which it is taken at intervals of a few days.

Many thousand ounces are annually imported into London. Pure civet is valued at about $10

an ounce. The American ˆcivet-cat® is the cacomistle (q.v.), which is not a true civet, but nearly related to the raccoons.

CIVIC CROWN, among the Romans, the

highest military reward assigned to him who had preserved the life of a citizen in battle. It bore the inscription Ob civem servatum, that is, (<for saving a citizen,® and was made of oak leaves. He who was rescued offered it, at the command of his leader, to his preserver, whom he was bound to honor afterward as a father.

Under the emperors it was bestowed only by them. The person who received the crown wore it in the theatre, and sat next the sen¬

ators. When he came in all the assemblv rose up as a mark of respect. The Senate granted to Augustus, as a particular mark of honor, that a civic crown should be placed on the pediment 726

CIVICS AND CIVICS TEACHING

of his house, between two wreaths of laurel, as a sign that he was the constant preserver of his fellow-citizens and the conqueror of his enemies. Similar honors were also granted to the Emperor Claudius.

CIVICS AND CIVICS TEACHING.

Civics is now a term broadly applied to the activities of the citizen in his relationship to the state and society. When it first came into use it was generally interpreted to mean the rela¬

tionship of the citizen to the state and sup¬

planted the earlier expression <(civil govern¬

ment.®

Along its broader definition it now includes a wide variety of forms. Thus we have its use as :

(1) Civics, sometimes modified by the word, political, and interpreted to mean a study of governmental machinery.

(2) Civics, including the first definition and adding thereto the idea of the duties of the in¬

dividual to the state.

(3) Community civics, emphasizing strongly the idea of the relation of the citizen to the im¬

mediate environment in which he is living, and ultimately the state and the nation, with the many obligations which they entail — political, social, industrial, and moral or ethical.

(4) Social civics, stressing the duties of the citizen to society and social betterment, with emphasis on social agencies, but little attention to governmental machinery.

(5) Industrial civics, emphasizing the rela¬

tion of the citizen to industries.

(6) Moral or ethical civics, pertaining to citizens' activities with relation to the moral or ethical standards of himself and his fellows.

Each one of these many conceptions or sub¬

divisions of civics has grown out of the original conception of civics as civil government. It was not until after the middle of the 19th cen¬

tury that the idea of teaching civil government in the schools or colleges took any root at all.

Previous to that time it was felt that the ordi¬

nary citizen would derive his knowledge of government by actual participation in it when he reached the voting age. This was always an ineffective method of instruction, but its defects were only forcibly made clear when immigrants began to swarm into the United States in the middle and latter half of the cen¬

tury. Teachers' organizations and judicial offi¬

cers soon detected the danger of allowing such people and their children to remain in igno¬

rance and began a campaign for the introduc¬

tion of the study into the schools.

The colleges gave them no encouragement or assistance, for it was at a time when literary education had strongest hold on those higher institutions and the utilitarian was rigidly ex¬

cluded. The agitation, therefore, met with but little success. Schoolmen in general evinced little interest in it, and it was only in the early eighties that the Constitution of the Uni¬

ted States began to be put into the backs of his¬

tory textbooks of the elementary schools and the pupils were given some instruction in gov¬

ernment.

Progress in the subject, however, was slow until an impetus was given from above. The colleges had shown themselves singularly ob¬

tuse to the study of political science within their own walls, and it was only in the middle of the late eighties that the subject began to make headway there. Once that men and women connected with higher institutions began to take an interest in the subject, the way for the introduction of the study of government in the lower schools was made easy.

The whole curriculum of secondary educa¬

tion was made the subject of a study by a Committee of 10 of the National Education Association from 1890 to 1893. A sub-commit¬

tee was given the subjects of history, civil gov¬

ernment and political economy to deal with.

This met at Madison, Wis., in December 1892, and was known as the Madison Conference. It made the following remarks and recommenda¬

tions :

“Civil government is pursued at present in vepˆ few grammar schools, — certainly in not more than one-sixth of those which have come under our observation. It is, how¬

ever, rather a frequent subject in high schools, about one-third offering some sort of instruction in it. In actual teaching it seems little associated with history; it is usually simply a textbook study during a part of one year; and very few of the teachers seem to be familiar with the subject.”

“ Resolved, that to American history be added the ele¬

ments of civil government.”

“ That American history and civil government be taught in the last year of the elementary school and in the last year of the high school.”

In 1895 the Committee of 15 of the

same Association, which considered the subject of elementary education, recommended : ((The study of the outlines of the Constitution, for 10 or 15 weeks in the final year of the element¬

ary school.® In 1897 the Committee on Rural Schools recommended that ((some work in civics should be taken up® with children between the ages of 9 and 13 years, and that for those be¬

tween 11 and 13 ((duties to the native land, treating under this title the organization and principles of our form of government (civics)®

should be taught. ((As a preparation the teacher should carefully read some systematic treatises on ethics and civics.®

In 1899 a Committee of Seven of the Ameri¬

can Historical Association recommended the ‘Study of civics along with or separate from the course in American history in the last year of the high school course. In 1910 a Committee of Eight of the same Association, especially appointed to consider history in the elementary schools, made a statement (<that elementary civics should permeate the entire life of the school® and recommended a course of study for it through grades five, six, seven and eight, to be taught in connection with history.

The subject had by this time become thor¬

oughly established in the colleges and secondary schools. In the colleges the courses in govern¬

ment had been introduced gradually through the eighties and nineties, hsually, however, under the control of the professors of history, and sometimes even denominated as history courses. The separation of courses into dis¬

tinctly history and distinctly government courses took place rapidly in the colleges, but in the secondary schools the combination lingered.

In 1908 a Committee of Five of the Ameri¬

can Political Science Association and a Com¬

mittee on Civics of the New England History Teachers' Association strongly recommended a course in civics for high schools which should be separated from the history course, and in 1911 a Committee of Five of the American Historical Association made recommendations to the same effect.

Organizations outside of academic circles began campaigns for the more effective teaching of civics in school and college. The most prom¬

inent of these was the National Municipal League, which in 1901 began a series of reports on college work in government and in 1905

published a syllabus for elementary and sec¬

ondary schools.

Following the activities of this organization the Bureau of Education at Washington ap¬

pointed an agent in civic education and a special committee issued a

report in 1915, urging the teaching of civics in elementary and secondary schools along somewhat new lines. This re¬

port urged that emphasis be placed on “Com¬

munity Civics.® “The aim of community civics is to help the child to know his community … what it does for him and how it does it; what the community has a right to expect from him, and how he may fulfil his obligation ; meanwhile cultivating in him the essential quali¬

ties and habits of good citizenship.®

Meantime the American Political Science

Association had a new Committee of Seven at work, and in 1916 it published the most complete survey to date covering instruction in civics or government in elementary schools, junior high schools, high schools, colleges and universities.

It summarizes all activities up to the present and makes constructive recommendations.

In spite of the commendable activities of these various bodies progress in the matter of getting thorough courses in civics introduced into the rural schools, elementary schools and high schools has been slow and yet the progress when considered over half a century has been very great.

The entrance of the United States into the war in 1917 awakened the public to the fact that there has been great neglect in putting into operation the recommendations so urgently pushed by the associations mentioned above, . and now (1918) there is evident in many parts of the country a desire to do that which has been so long neglected.

The greatest difficulty encountered has been the lack of teachers properly prepared to teach the subject. Women, who form the overwhelm¬

ing proportion of the teaching force, have, prob¬

ably from the fact of their exclusion from participation in the active life of government, failed to evince any active interest in the sub¬

ject. Such teaching as has been given has been of a purely formal kind from a textbook. At the time of the earliest introduction of the sub¬

ject, instruction usually consisted of reading or studying the Federal Constitution and some¬

times even committing it to memory. The very nature of its introduction in the form of an appendix to a history of the United States scarcely permitted of any other kind of method and even the proponents of its introduction seemingly had no conception that it could be taught in any other fashion.

Gradually separate textbooks were published, but these at first consisted of commentaries on the clauses of the Federal Constitution. The State and local governments were almost en¬

tirely neglected. Even when these subjects were added, as they gradually came to be, in¬

struction was of the most formal and unin¬

teresting kind.

Any other kind of teaching demanded of the teachers was impossible to have for the reason that they did not know the subject except from a text. The better prepared teachers began to teach the subject of government as it was actu¬

ally carried on and the demand for that kind of instruction kept growing. This was difficult to get because civics, of all subjects, was one which demanded for its successful teaching a thorough preparation and the habit on the part of the teacher of keeping abreast with the news of the day.

The confusion of counsels in the ranks of its protagonists kept even the best prepared teachers from doing effective work. Those who had recommended that civics be taught as a part of history played into the

hands of school officials who were only too glad to tack it on to another subject, so as to avoid taking away time from other subjects in the school curricula.

In such a position the teaching of the sub¬

ject usually became nothing more than a study of constitutional history and such knowledge of actual government as was obtained by the pupil could only be had by cramming the subject just before an examination. Even with the best of prepared teachers the subject under such cir¬

cumstances inevitably became one of the study of machinery rather than of the functions of government.

It was largely to remedy such a condition of affairs that the study of community civics was introduced. Through this medium the pupil was to look about him, find out for him¬

self what the government was doing for him and through that means approach the study of the agency of machinery of governmental activ¬

ity. This method of study led to the considera¬

tion of municipal activities first and then quite naturally to the work of the State and Federal governments.

This brought to the subject an interest on the part of pupils that they had never before had. They visited local governmental agencies, executive, legislative, judicial; witnessed the numerous industrial, charitable, educational and social activities of their local government ; kept note and scrap books ; took a keen interest in current events on which they were quizzed ; had debates on political issues ; subscribed and read the daily newspapers and weekly or monthly periodicals ; listened to talks by public officials ; took part in mock conventions and so on.

Actual experience showed that many of

these methods could not be carried out in all centres and in others they were pushed to extremes. The sordid nature of a police court in a large city was not the best introduction to judicial institutions, and moreover political officers soon got tired of having a veritable mob of school children of all ages swarming over their buildings and offices. While only a few teachers were doing it, it was well enough, but when it became a daily or weekly, or even monthly, practice, for many it became distasteful.

There has been, therefore, a reaction from the extremes of this system even by its advo¬

cates, but as a method of instruction it has aroused interest. The time consumed and its interference with the work of other teachers were not the least objections.

The time given in class to the subject in elementary schools where it is best taught is 728

combined with language study, geography and history, in the first four grades, while in the fifth and sixth grades 20 minutes a week are given to a separate study of it; in the seventh grade 40 minutes and in the eighth grade 60.

In the best high schools five periods a week of 45 minutes for 20 weeks or three periods a week for 40 weeks are given to the subject.

Sometimes it is taught parallel with the United States history and at others it follows.

The methods of instruction in colleges and schools have been undergoing great improve¬

ment in recent years though civics is far from being generally well taught in the schools.

The improvement has generally come in those schools where the object of the teacher has been to get away from the dry resume of offi¬

cers and official duties to a study of functions.

These have been studied by the use of current newspapers and periodicals, public documents and official notices, visits to legislative assem¬

blies and courts, and in the employment of a great variety of means to interest the pupil in the living organization of governmental functions.

In many schools the classes and whole school have been organized into ((School Cities® or <(School States® and the pupils given a share in the government of the school. All of these methods along with many others have served to vitalize the study of the subject and to make for a good training in citizenship.

Bibliography. — (The Teaching of Govern¬

ment } (report to the American Political Science.

Association by the Committee on Instruction ; see lists of books, pp. 11 Iff) ; Barnard, J. L.,.

Carrier, F. W., Dunn, A. W., Kingsley, C. D.,,

(The Teaching of Community Civics) (in Bul¬

letin No. 23, United States Bureau of Education,, Washington 1915) ; Bourne, H. E., (The Teach¬

ing of History and Civics) (New York 1907) ; Hill, Mabel, (The Teaching of Civics) (New York and Boston 1914) ; Munro, W. B., (Status of Instruction in Municipal Government in Col¬

leges and Universities) (Proceedings of the National Municipal League,* 1908).

James Sullivan.

New York State Historian.

CIVIDALE, che-ve-da'la, Italy (the ancient Forum Julii), town of Venetia, in a basin of the Julian Alps, eight miles east-northeast of Udine near the Austrian border. It consists of the town proper, surrounded by walls and ditches, and of fine suburbs ; and has among its edifices a large cathedral of the 15th century,, with three Gothic portals, a curious baptismal font and several fine paintings; a museum of antiquities, and a record office with some very ancient characters. The neighborhood abounds in interesting antiquities. The Natisone, which flows through the city, is crossed by a 1 5th century bridge. The modernized city has a military training college, and silk, cotton and linen factories. Pop. 10,031.

CIVIL ACTION, an action brought in the civil courts for the recovery or protection of private or civil rights, or damages for their breach. The two great classes into which ac¬

tions are divided are civil and criminal. In civil actions either a government or a private individual may be plaintiff or defendant; while criminal actions are always brought in the name of the government,

CIVIL CORPORATIONS. See Cor¬

porations.

CIVIL DAMAGE ACTS, legislative acts

passed in several of the States, giving to hus¬

bands, wives, children, parents, guardians, em¬

ployers and others who have sustained injury in person or property or means of support, by an intoxicated person in consequence of such intoxication, the right of action against the person who sold or gave away the liquor which caused such intoxication. Such acts have been held to be constitutional. In some cases the right of action has been extended to the Ovvner of the premises where such intoxicating liquor has been obtained.

CIVIL DEATH, a legal term applied to

a person who on account of some crime, has been convicted and sentenced to life imprison¬

ment, thereby losing all his civil rights, and is considered in law, dead. In some jurisdictions a person convicted of murder and sentenced to life imprisonment is considered in law as dead.

CIVIL ENGINEERING. In order to

understand clearly what constitutes civil engi¬

neering, it will be desirable to consider briefly the steps by which the different branches of the engineering profession have developed and have become differentiated from one another.

The profession of engineering in some form is as old as the human race, for some form of building, some utilization of the materials and forces of nature, has always been necessary in order that man might protect himself against the elements and sustain himself in the con¬

flict with nature. Up to about the middle of the 18th century there were but two recognized branches of the profession, the civil and the military.. (See Engineering, Military). The former included all those branches of the con¬

structive art not directly connected with mili¬

tary operations and the construction of forti¬

fications ; while military engineering concerned itself with the applications of science and the *

utilization of materials in the art of war. But during the last third of

the 18th century, there came a remarkable series of mechanical in¬

ventions, such as the spinning jenny by Har¬

greaves, the spinning frame by Arkwright, the mule by Crompton, the power loom by Cart¬

wright, the modern steam engine by Watt, the puddling process for making wrought iron by Cort and others. These were followed in the first third of the 19th century by the develop¬

ment of the steam locomotive by Stephenson and of the steamboat by Robert Fulton. These discoveries led to the inauguration of the age of steam transportation by rail and by sea.

The era of railroads began, for all practical purposes, with the victory of the ((Rocket® in the competition at Rainhill in 1829. Improve¬

ments rapidly followed in the various fields of manufacturing and in methods of producing iron and steel.

The Field of Civil Engineering. — The In¬

stitution of Civil Engineers of Great Britain was established in 1818, and its first president, Thomas Telford, described civil engineering at a meeting of the Council 4 Jan. 1828, as <(the art of directing the great sources of power in nature for the use and convenience of man, as the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, CIVIL ENGINEERING

canals, river navigation and docks, for internal intercourse and exchange ; in the construction of ports, harbors, moles, breakwaters and light¬

houses ; and in the art of navigation by arti¬

ficial power for purposes of commerce, and in the construction and adaptation of machinery, and in the drainage of cities and towns.®

But the improvements and inventions above re¬

ferred to soon led to the differentiation of sev¬

eral branches from the parent stem of civil en¬

gineering, which up to that time had included all branches of the constructive art, excepting those for military purposes. The “construction and adaptation of machinery,® referred to by Telford, soon became a field by itself, which is known as mechanical engineering (q.v.) and which is distinguished from civil engineering by the essential characteristic that it deals with machinery. The rapid development ‘in the man¬

ufacture of iron and in the production of the various metals from their ores soon led to the differentiation of metallurgical and mining en¬

gineering (q.v.). Architecture, which up to the 18th century had been considered a branch of engineering, had already become a profes¬

sion by itself. Thus, until about the middle of the 19th century, the branches of the engineer¬

ing profession were civil engineering, mechan¬

ical engineering and metallurgical and mining engineering. The last half of the 19th cen¬

tury, however, has probably witnessed a greater advance in the utilization and application of the “sources of power in nature for the use and convenience of man® than had occurred in all previous history, and various other branches of the engineering profession have become specialties. For instance, within the last quar¬

ter of a century the perfecting of the electric motor and the other great discoveries in elec¬

trical science first led to the development of electrical engineering (q.v.) as a distinct pro¬

fession, while later the increasing importance of the applications of chemistry in manufactur¬

ing has produced the chemical engineer, a com¬

bination of chemist and mechanical engineer, and the advance in sanitary science and the dis¬

coveries with reference to the nature, causes and prevention of disease have resulted in the development of sanitary engineering (q.v.) as a branch quite extensive enough to constitute a profession by itself, though it is still consid¬

ered a branch of civil engineering.

The term civil engineering has, therefore, two distinct meanings. In the widest and old¬

est sense it includes all non-military branches of the engineering profession as it did a hun¬

dred years ago ; but in its narrower, and at the present day more correct, sense, it includes those branches of the profession which are left after the separation from the main stem of mechanical engineering, electrical engineering and metallurgical and mining engineering. But even in this restricted sense, what is properly included under the title of civil engineering re¬

mains undoubtedly the widest in scope of the four great branches of the engineering pro¬

fession, and in practising it a man must be¬

come a specialist in some one or in several narrower fields. These fields may be enumer¬

ated as follows :

1. The construction of railroads, now one of the largest fields both in number of men en¬

gaged and in capital invested. The work of the civil engineer comprises the location and construction of the railroad, with all its vari¬

ous structures, such as bridges and buildings, and also the maintenance of the railroad. The motive power is the field of the locomotive en¬

gineer and is a branch of mechanical engi¬

neering.

2. The construction of street and interurban railways, a branch of civil engineering which touches on the field of electrical engi¬

neering and may even be properly considered to belong to that field rather than to civil engi¬

neering, inasmuch as all street and interurban railways are at the present time operated by electricity. The construction of the track and structures, however, aside from the motive power and its applications, is properly a branch of civil engineering.

3. The construction of highways and of city streets and pavements. This has always been an important field of engineering, for the high¬

ways of a country, as Macaulay remarked, are a good index of its civilization ; but with the advent of the modern automobile, the construc¬

tion and maintenance of highways and of city streets have become of even greater import¬

ance. . In the application of various materials and bituminous products for the road surface, this branch of engineering touches on the field of chemistry.

4. The improvement of rivers and harbors, the construction of canals, of lighthouses and other works necessary for carrying on mari¬

time trade and commerce.

These four fields constitute the field of transportation engineering.

5. Structural engineering, which comprises the construction of bridges, aqueducts, steel frames for buildings, retaining walls, and in¬

deed all fixed structures with their foundations.

This great field of engineering finds its applica¬

tion in all of the other fields, for structures are requisite in all of them.

6. Hydraulic engineering, which includes the development of water powers and the con¬

struction of dams and power plants up to the point at which the mechanical engineer is called upon to supply the motors.

7. Irrigation engineering which concerns it¬

self with utilization of waters in agriculture, the diversion of water from streams and its ap¬

plication to the land, with the various struc¬

tures and appliances necessary for the purpose.

8. Surveying which is necessary in the lay¬

ing out of works of all kinds in the field, but which constitutes a branch by itself known as land surveying when applied to the object of measuring and subdividing land, and which is known as topographical surveying when the object is to represent upon a map the surface configuration of the land, and which, further, when extended to the survey of very large areas in which the curvature of the earth must be taken into account, leads to the intricate and interesting problems of geodesy, or the measurement of the earth, and touches upon the field of terrestrial physics.

9. A great variety of problems due essen¬

tially to the congregating together of. people in cities and the necessity for conserving and protecting the public health. This includes works of water supply, sewerage, the disposal of wastes, the drainage of lands and of build¬

ings and the heating and ventilating of build¬

ings. The latter field has recently become the 730

specialty of the heating and ventilating engi¬

neer. The last group of subjects, involving the preservation of the health of communities, has within recent years become the special field of the new profession of sanitary engi¬

neering (q.v.).

The above enumeration will make clear the vast extent of the field of what is still properly termed civil engineering, and will make it evi¬

dent that this field touches at many points the other engineering professions and that the vari¬

ous specialties themselves are in some cases closely related and yet divergent. In the con¬

struction and operation of steam railroads and electric railways, the work of the civil engi¬

neer comes in many ways into relation with that of the mechanical and with that of the electrical engineer. The same is true in the development of water powers, the construction of pumping stations for waterworks and the design of canal and harbor works and docks with the necessary operating machinery. In problems involving the construction of the foundations and steel frames for high build¬

ings, the civil engineer comes into intimate re¬

lations with the architect, with whom he must collaborate. The work of the sanitary engineer also comes in many ways into relation with economic, sociological and legal problems of great importance and difficulty.

Training and Education. — We may next

inquire as to the qualities which fit a man for success in this profession. In the first place, it is evident that the ideal civil engineer must be a scientific man and at the same time a busi¬

ness man. He must have a thorough knowl¬

edge of the laws of nature, the fundamental principles of mathematics and mechanics and the materials of construction, for his work consists in applying those laws, principles and materials so as to make them of use in the world's business. He must be essentially a man of action. The engineer takes the discoveries of the scientist in his laboratQry or the book¬

worm in his study, and makes them available for the use and convenience of man. His dom¬

inant quality must be practical common sense, combined with habits of care and accuracy, and with the courage and training which will enable him to solve new problems and to meet emer¬

gencies with success. His mistakes may be very costly and his opportunities for effecting economies by skilful design and construction are very great.

It is often assumed that in order to be a successful engineer a man must be a fine mathematician. As a matter of fact, while the engineer should be thoroughly familiar with the fundamental principles of mathematics up to and including the calculus, he seldom uses any but the simplest applications. In geom¬

etry, and especially in trigonometry, he must be thoroughly at home ; but the essential charac¬

teristic of his knowledge of these subjects is his ability to use them and his perception of their value as tools, rather than his power to indulge in elaborate mathematical refinements.

The engineer must know how to use mathemat¬

ics, but he must possess in addition other men¬

tal qualifications which are of far greater con¬

sequence ; for mathematics is in its essential conceptions and methods an abstract science and the great mathematician is apt to lack the qualities of action, the quick decision, the ac¬

curate judgment, the ingenuity in meeting and overcoming obstacles and the natural grasp and insight leading him to see the physical possibili¬

ties of a situation, which must distinguish the successful engineer. On the other hand, the engineer should have a liking for mathematics, and a quick and instinctive grasp of its prin¬

ciples and methods, together with the insight which will enable him to see how they are to be made of use and to use them properly when the time comes.

The training of the engineer must be mainly a training in science, and such a training tends to develop the quality of honesty. The only aim of the true scientific investigator is to ar¬

rive at the truth concerning the phenomena he is studying. Such a training, if combined with business ability, makes the very best adminis¬

trators, and, whether for this reason or not, engineers are being more and more sought after to fill administrative positions, especially in connection with corporations in which en¬

gineering is concerned. On the other hand, the early practice and associations of the en¬

gineer are often of a character which fails to produce polished manners or a good address and appearance, the lack of which is sometimes a great handicap.

There have been, and are, two ways of pre¬

paring for the practice of this profession. The first is to begin by getting a thorough tech¬

nical training in a good engineering school, in the principles

underlying the profession. The second is to begin as an apprentice or student in an engineering office, gaining experience and studying at the same time. A man may become a good civil engineer by either method.

Which method is the better will depend upon the man. If he can take a college course and not become demoralized by the opportunities for slack work, the lack of responsibility and the rather low standards; if he can maintain his sense of perspective and avoid intellectual arrogance ; if he can really master thoroughly the things which he studies and not simply learn to repeat by rote, he will find a college education to be the best and quickest prepara¬

tion for the engineering profession. He will find there offered the opportunity to learn many things which many men never learn in practice, the opportunity to become acquainted with engineering literature, to gain habits of study and breadth of view, and the adaptabil¬

ity of mind to enable him to select the best way of solving a new problem. But many young men have not the opportunity to go to college, and many also learn better when, from day to day in their actual work, they see the necessity for learning; others would become in¬

different or lazy in a college atmosphere. For such men the second method may be adopted, and if they take advantage of the many oppor¬

tunities now offered for self-culture, such as evening courses, correspondence schools, in¬

dustrial and manual training schools, etc., it is possible for them ultimately to become just as good engineers as by the first method. The Franklin Institute in Boston, for instance, of¬

fers evening courses in most branches of en¬

gineering, including not only civil engineering but mechanical engineering and electrical engi¬

neering, in some of which courses the students are carried as far into the subject as in some of the large engineering schools. Similar op-

portunities are offered in the Wentworth Insti¬

tute of Boston, the Mechanics Institute and the Cooper Union in New York, the Pratt Insti¬

tute, Brooklyn, and other schools where in¬

struction of high quality is offered and taken advantage of by many young men who are working and earning their living during the day time.

The young man, however, who aims to be¬

come a civil engineer should endeavor to se¬

cure a broad training and a wide outlook, not directed entirely to technical subjects, but cov¬

ering also those subjects of a general nature which are necessary for every thoroughly trained man. The engineer of the past has too generally been considered a mere builder, and he has not, as a rule, been given the position to which his responsibilities and his achievements legitimately entitle him ; but the engineer of the future should aim to take a position in society and business as a cultivated and highly trained man, on a level with men in any of the other professions.

A broad and thorough education can now be obtained at many schools in this country.

Many educators w ould advise a young man to take first a college course and to supplement it by a course in a professional school. An¬

other plan which has its advantages is to lay out a course longer than the usual college course, in one institution, directed from the beginning toward the end in view, some gen¬

eral subjects and some professional subjects being studied in each year, with an increasing proportion of the latter toward the end of the

course. The latter plan has the advantage that the student is working always toward a defi¬

nite end, provided he is able to decide at the beginning what general line of work he de¬

sires to pursue. Some of the technical schools of the United States have provided courses of five years or more, in which the student may gain a technical training and a liberal training at the same time. If a young man is unable to decide upon a profession at the beginning of his course, whether he goes to college first or not, he should at least decide within broad limits, in order that he may arrange his stud¬

ies so as to avoid unnecessary waste of time when he finds himself able to make a definite choice.

The University of Cincinnati, with the co¬

operation of a number of establishments or firms which employ young engineers, has adopt¬

ed the novel system of having its students al¬

ternate between the school and some practical employment, spending a certain period exclu¬

sively in each place. In this way the student is made to see the use of what he is learning and to realize that the entire value of what is learned depends upon the ability to use it, which is frequently lost sight of or not per¬

ceived at all in the usual college or technical school. This experiment is a most interesting one as a method of training engineers.

It is not, at the present time, necessary to go abroad in order to obtain a technical training in civil engineering. Our Amer¬

ican schools* now offer better preparation for the practice, of the profession in America than can be obtained elsewhere, being wˆell equip¬

ped and teaching American methods. Twenty years ago this could not be said, but at present our technical schools are as good as any in the

w'orld. Fortunately, also, many of them offer scholarships or other aids to needy but capable young men, so that the lack of money need not prevent a persevering man from gain¬

ing a technical education.

The Civil Engineer. — The opportunities

presented to a young man graduating from one of our engineering schools, or prepared by self¬

training or at one of the evening schools re¬

ferred to, will be many and varied. All pro¬

fessions are overcrowded in the sense that there are men in them who cannot find employ¬

ment, and this is true in civil engineering. Yet there are few professions which offer so many opportunities to properly qualified men, so that, properly speaking, it is very far from over¬

crowded. The young civil engineer will, more¬

over, find open to him many purely business positions for which his training has fitted him. The range of the engineering professions is continually widening, one direction in which they are rapidly extending being that of ad¬

ministration. Within the past 60 years nearly the entire railway system of this country has been built, most of our factories started and our works of sewerage and water supply con¬

structed. The construction of these works has required the services of most of our engineers, while the opportunities of profitable employ¬

ment here have attracted many members of the profession from foreign shores. The civil en¬

gineer of the past has thus been mainly a con¬

structor; but the civil engineer of the future will be more and more of an administrator as well. And while the construction of railroads will not proceed as rapidly in the future as it has in the past there are certain directions in which construction will still proceed with great

activity. For instance, although the great era of railroad construction may be said to be sub¬

stantially ended, there is still much work to be done in building branch lines, in double track¬

ing existing lines, in reducing grades and curves, eliminating grade crossings and making other local improvements, often on a large scale.

Moreover, the construction of urban and interurban electric lines, the building of subways and tunnels for rapid transit in cities and the im¬

provement of steam railroad terminals, is pro¬

ceeding at a rapid rate and will require the expenditure of many millions of dollars; while the rapid growth of urban population and the advances in sanitary science have recently given a great impetus to the construction of works for supplying pure water and for disposing of the sewage and other wastes without injury to the public health. Enormous projects requiring the services of hundreds of engineers, for 5

or 10 years are sometimes necessary for sup¬

plying one of our great cities with water which has sometimes to be brought hundreds of miles.

But in addition to works of construction, which in the past have utilized the greater part of the energy of the profession, it is becoming more and more recognized that the man with a good technical training, if he have also a talent for organization and executive ability, and if he be possessed of that greatest _of all gifts for the engineer, common sense, is the best type of man to direct the work of our great industrial corporations, many of which are dependent for their success upon sound en¬

gineering judgment. Some of our large rail¬

road corporations have within comparatively 732

few years instituted the practice of choosing their higher officers from their engineering corps, instead of from other branches of the service. Not a few railroad presidents began their careers as civil engineers, and the number of such men will increase in the future.

With respect to financial remuneration, the civil engineer stands at an advantage compared with the members of some professions, in the fact that his services are in demand at the out¬

set at a fair salary, while the young doctor or lawyer is not able to meet his expenses for some years. The ultimate financial possibili¬

ties presented to the engineer may not be as great as in the professions referred to, but the rewards are still sufficient to tempt even the most ambitious men, while there are few impe¬

cunious engineers. The engineer will be appre¬

ciated more and more as time goes on. The profession is a growing one, with great possi¬

bilities, and few careers offer greater induce¬

ments or a surer or truer success to the ener¬

getic and capable young man, for we live in a mechanical age, and the work of the man who can <(direct the great sources of power in nature to the use and convenience of man®

must continually increase in importance.

George F. Swain,

Harvard University and the Massachusetts In¬

stitute of Technology.

CIVIL LAW, The. 1. Introduction. —

The term Civil Law (Jus Civile) is commonly and popularly used in several distinct senses.

Thus we distinguish it on the one hand from the Jus Gentium and on the other hand from the Jus Naturale. Again our municipal law is called the civil law, and further we distinguish between civil and criminal law on the one hand and civil and canon law on the other.

But it is here used as referring to the whole body of Roman law (the Corpus Juris Civilis), having its proper origin contemporaneously with the genesis of the Roman state and com¬

ing down in ordinary generation, from century to century, through the regal period, the repub¬

lic and the empire to the codification of Jus¬

tinian and Napoleon.

When we speak thus of the Civil Law we mean the whole system of usages and rules of private law adopted by the Roman people ; their jus privatum as opposed to their jus publicum (including criminal and sacred law). The Corpus Juris Civilis as left by Justinian was the result of a gradual modification and enlarge¬

ment of the code of the XII Tables under three great influences — the Jurisconsults, the Praetors and Legislation. The institutional definition of the jus civile as the peculiar law of Rome, in contrast with the jus naturale and the jus gentium is a mere philosophical flourish; by late writers jus civile was confined to the responsa prudentium alone; what the Roman jurists had chiefly before their mind when they used the expression was the old law of the XII Tables, as contrasted generally with the newer development of the jus honorarium (Hunter, (Roman Law,* 24).

Thus the Roman law presents two aspects, each perhaps equally deserving the attention of the student of jurisprudence. From one point of view it furnishes the sound and scientific basis of the greater part of the modern law of all civilized mankind, and has long proved an inexhaustible storehouse of legal principles. On the other hand, it

forms a connecting link be¬

tween the institutions of our Aryan ancestors and the complex organizations of modern so¬

ciety. In its ancient records it takes us back to the very inception of civil jurisdiction, and tracing it down for more than 2,500 years from the Rome of Romulus and Servius Tullius, we see it constitute a legal development not matched in the history of the law of any other people. The oldest fragments of the Roman law that have come down to us are ascribed to the period of the kings, but these are essentially traditional and practically insignificant, and we take the XII Tables as the first solid ground in the history of the Civil Law.

2. The Law of the XII Tables. — About the year 450 b.c. a commission from Rome vis¬

ited Greece for the purpose of collecting infor¬

mation necessary to draw up a written code of laws. This fact suggests a foreign or Greek extraction for at least a part of the oldest body of Roman law, although it must of course be conceded that the XII Tables undoubtedly con¬

tained much law of indigenous growth. Three centuries had intervened between the founding of the city and the promulgation of the law of the XII Tables. During this period a certain body of local, customary law had inevitably de¬

veloped, some part of which must have been incorporated into this first written code. Until the time of Diocletian (245-313 a.d.) profes¬

sional lawyers, strictly so called, were not known in Rome. The business of practising law, so to speak, had been up to that time re¬

garded as a public office, which each citizen might be called upon to undertake ; but about that time there began to grow up in Rome a class of men among the patricians who made it their business to know the law. Pomponius in his history of the Roman law, written about the middle of the 2d century a.d., informs us that the custody of the XII Tables, the exclu¬

sive knowledge of the forms of procedure and the right of interpreting the law belonged orig¬

inally to the College of Pontiffs, a patrician order, at the head of which was an officer known as the Pontifex Maximus, from which office, it may be remarked in passing, indirectly and by a strange and circuitous devolution has come down to our day the office of the Pope in the Roman Catholic Church. Only a small part of the language of the substantive law of the XII Tables has been transmitted to our time.

Some learned attempts have been made to patch out the substance of each table, but it is by no means certain that the exact fragments of any part of the XII Tables have come down to us in their precise original form and expression.

The language has probably been essentially modified by the subsequent Latin usage and by repeated transcription; and the fragments have had to be picked out and pieced together from numerous references in the later literature, as for example from Cicero, Dionysius and Gaius; so that, as matter of fact, what passes for the substance of the XII Tables is probably largely a speculative patchwork, and in its content and significance certainly more or less misleading.

3. The Jurisconsults and the Praetors. —The jurisconsults, a professional class of ju¬

rists or legal writers dating from the century before Christ, were given by Augustus an au¬

thority and standing which they had not there-CIVIL LAW

tofore possessed, and from his time much weight is to be attached to the opinions and writings of the more eminent of them. In 426

a.d. Valentinian enacted a law, commonly called wthe Law of Citation,® providing that the writ¬

ings of only five jurists, — Papinian, Paul, Gaius, Ulpian and Modestinus, should be quoted as authorities. If a majority of these held one opinion, that was to bind the judge; if they were equally

divided, the opinion of Papinian was to be adopted. The great bulk of Roman law as it has come down to us, and all that is most valuable in it, is due to the jurisconsults.

The praetor stood in Roman law midway be¬

tween the jurisconsults and the legislature. At first there was but a single praetor, but later a praetor-urbanus and a praetor-peregrinus (when the empire extended beyond Italy, the number being increased to 18), dividing the jurisdiction among them generally either along the line sug¬

gested by their names or territorially. The praetor exercised a qualified or limited legisla¬

tive power. His right to alter the law was conceded, but it was not unlimited. He was in some sort the chancellor, the keeper of the conscience of the Roman people, or the person who was to determine in what cases the strict law was to give way to natural justice (natu -

rails ce quit as) .

4. Legislation. — To give an adequate ac¬

count of Roman legislation would be to write the constitutional history of Rome, something quite beside the purpose of this article. It is important, however, to state that during the republic the popular assembly was the founda¬

tion of legislation. During the earlier part of the empire the function of the popular assembly was gradually usurped by the Senate, acting more and more as the mere mouthpiece of the emperor. Finally even this form was dropped, and all enactments were made directly by the emperor. During the republic three assemblies of the Roman people existed. — the Comitia Curiata, a patrician body, the Comitia Centuriata, composed both of plebeians and patricians — the franchise being on the basis of a property qualification — and the Comitia Tributa , which was based on a local division of the people of the city — the vote being given territorially, as if by arrondissements, cantons or wards. The sovereign power was exercised by the emperors in three ways, — (1) by direct legislation (edicta , constitutiones) ; (2) by judgments in their capacity as* supreme judge (decreta) ; and (3) by

epistole or rescripta, giving instruction on questions of law in answer to applications from the judges.

5. Codification. — The earliest collection of law in Rome was the Jus Papirianum of the regal period (temp. Tarquinius Superbus), and it was not until 304 b.c. that the full knowledge of the law was wrested from the patricians.

The constitutions of the emperors were col¬

lected at different times and constituted the first codes. The oldest collection in the form of a code is the Codex Gregorianus et Hermo-genianus, which covers a period of 200 years from Hadrian to Constantine. Only fragments of it remain. Next we have the Codex Theo-dosianus, made about the year 435 a.d. The Theodosian Code has small pretensions to scien¬

tific classification, but it runs to 16 books and has come down to us almost complete. The reign of Justinian (527— 65 a.d.) marks the culminating period of Roman law. In collab¬

oration with Tribonian, he prepared, or caused to be prepared, a complete codification of the whole body of the law, first appointing a com¬

mission of 10 members to draw up a code along the general lines of the Theodosian Code. This is called the Codex Vetus, which was speedily superseded by a later edition and has been en¬

tirely lost. Next, about the year 530 a.d., Jus¬

tinian created a commission of 16 members to collaborate with Tribonian in a codification of the vast accumulation of law that had grown up under the hands of the jurisconsults and the praetors. The commission had to deal with the works of 39 jurists, consisting of 2,000 books and 3,000,000 verses. This matter was finally sifted and reduqed to 50 divisions or books, and constitutes what we know as the Digest and the Pandects. For the purpose of providing an ele¬

mentary or preparatory textbook of the law, a commission was further constituted by Justinian which prepared the Institutes of Justinian, which are in some sort a little more than a re¬

vision or a new edition of the Institutes of Gaius. After publishing the

Pandects and the Institutes in 534 a.d., a commission was ap¬

pointed to revise the old code and to incorporate the new constitutions and decisions. This re¬

vision was completed in the same year, and promulgated on 16 Nov. 534 a.d. Laws of a permanent character, subsequent to Justinian's codification, were collected from time to time and called Novels.

6. The Justinian Law in the West. — Upon the fall of the Western Empire and the sub¬

sequent local disorder and social disintegration throughout western Europe, the civil law fell into disuse in the West, and during the Middle Ages was largely lost sight of ; but in the 12th century the study of the civil law was revived at Bologna and spread thence throughout Italy and into France. In 1453, about nine centuries after Justinian, Constantinople was taken by the Turks and the Eastern Empire was over¬

thrown. During some five centuries, or more than half of the existence of the Eastern Em¬

pire after Justinian, the law nominally remained as settled by Justinian's legislation, modified indeed by subsequent novels of the emperors; but about the end of the 11th century the Jus¬

tinian Code fell into abeyance without special abrogation. The great causes of its decay were the change of language from Latin to Greek, the accumulation of fresh law and of commentaries, the authorized readjusting of the whole by several of the later emperors and the overpowering influence of the ecclesiastical or the canon law. The revival of the study of Roman law and the rise of the Bologna school were formerly erroneously attributed to the alleged discovery of a manuscript of the Pan¬

dects at the sack of Amalfi by the Pisans in 1137; but it has recently transpired that the study of the Roman law had begun to be pur¬

sued with ardor at Bologna and elsewhere in Italy long before that time. However, the man¬

uscript in question, now called the Pandecte Florentine, taken to Florence on the. conquest of Pisa in 1406, is well known; it is a very

ancient and valuable copy of the entire Pan¬

dects, being also the only one in existence that dates before the age of the Glossators. The fame of the school, at Bologna spread through¬

out Europe, attracting crowds of students from 734

all quarters and reviving a vivid interest in the civil law.

About 1135, or a little earlier, the code of Justinian was translated into French, and by the 13th century many French translations had been made of the Digest, the Institutes and the Code. By the 12th century ecclesiastical coun¬

cils had begun to forbid ecclesiastics to study the secular law (Rheims 1131; the Lateran 1139; Tours 1162). This ecclesiastical inhibi¬

tion served somewhat to check the study of the civil law at Paris — then as now the chief uni¬

versity town of Europe — and was favorable to the continued predominance of Bologna as the seat and centre of civil law study, to the growth of the Montpellier School and to the establish¬

ment of new schools, the chief of which were at Toulouse and at Orleans. ‘All these great schools in France — except Paris — and the numerous schools that sprung up in the suc¬

ceeding centuries, taught the civil law on the basis of the Justinian text. After the spread of the scientific study of Justinian’s works from Bologna to Montpellier and other parts of France, the Justinian law in the 12th and 13th centuries gradually replaced the ante-Justinian, as being the more perfect form of the Roman law. In 1250 France was still divided under two laws ; in the south (pays de droit ecrit) the Roman law obtained, modified by local cus¬

toms; in the north (pays de continue) local cus¬

toms prevailed, slightly modified by Roman law, which, however, was

taught in the northern schools and left numerous traces in the legal works of the period. A Dutch school of jurists arose toward the end of the 16th century at the University of Leyden. So, too, in Germany some progress was made in the study of the Justinian law. Like the jurists of other coun¬

tries, those of Germany were impressed bv the superiority of the Roman law to their native law, both in form and substance, and their admiration induced them by degrees to put it forward in practice. The influence of the Bologna revival extended into Spain, w'here a crude codification was effected as early as 1263, called Siete Partidas, but not generally adopted throughout the kingdom until about the reign of Alonzo XI in 1348. The Roman law worked its way into Scotland by way of France.

From the close alliance that so long subsisted with France, Scotland, besides borrowing many of its institutions from that country, also "imported a large portion of Roman jurisprudence to make up the deficiencies of a municipal law, long crude and imperfect, and which had made little progress as a national system till some time after the establishment of the Court of Session in 1532 by James V, after the model of the Parliament of Paris… . Properly speaking, the teaching of the civil law com¬

menced in Scotland at the Reformation in 1560®; after which date, as well as before it, the more ambitious students of the civil law also availed themselves of the best professional teaching of the continental universities. "In Scotland a knowledge of the Roman law has always been regarded as the best introduction to the study of the municipal law… . All the best writers on the law of Scotland, such as Stair, Bank-ton, Erskine and Bell, were able civilians ; and though they have not produced separate trea¬

tises on the subject, their works abound with admirable illustrations of the Roman law, evincing great learning and research, and a familiar acquaintance with the writings of the continental jurists.® (Mackenzie, 'Studies in Roman Law,* 40-41).

The influence of Roman law on the English common law has been very differently esti¬

mated by different writers. Mr. Stubbs stands at one pole of the controversy with his eyes shut, saying, "England has inherited no

portion of the Roman legislation except in the form of scientific or professional axioms, introduced at a late period, and through the ecclesiastical or scholastic or international university studies.

Her common law is, to a far greater extent than is commonly recognized, based on usages anterior to the influx of feudality, — that is on strictly primitive custom.® (Stubbs, ‘Const.

Hist, of England, } I, 10, § 8). This is perfectly insular and manifestly untrue. The other and sounder view as here taken is presented in Reeves’ ‘History of the English Law,} follow¬

ing Guizot and Mackintosh, and more recently an equally enlightened view has been taken by Pollock & Maitland in their ‘History of Eng¬

lish LawP The definite traces of Roman law surviving the Roman domination of the island are exceedingly slight. Selden states that the Roman law wholly disappeared in England until it was reintroduced from Bologna in the 12th century. A little before the middle of the 12th century, Vacarius, a Lombard, went over to England with Archbishop Theobald and lec¬

tured on the civil law at Oxford with suc¬

cess. Even Stubbs admits that before the end of the reign of Henry II the procedure of the Roman civil law had become well known by the English Canonists. Henry of Bracton was the first really scientific commentator on the law of England, and the greater and more important part of his work is little more than a transcript of the Roman law. He show’s everywhere close familiarity with the Corpus Juris. The Novels are not quoted, but the Institutes are referred to, and there are many quotations from the Digest and the Code, w’hile a very large number of passages are incor¬

porated bodily into the text itself and into the tissue of the author’s commentary without any statement as to their source. From Bracton and Glanvill to Pollock & Maitland, the pre¬

dominating influence of the Roman law in Eng¬

lish jurisprudence is everywhere traceable and evident. “The English system of equity and the ecclesiastical law have been formed more or less extensively on the Roman law or on the Roman through the Canon law.® (Mackenzie, ‘Studies in Roman LawP 40).

Both in England and in Germany the influ¬

ence of the Roman law was resisted and its predominance looked upon with disfavor, but it nevertheless made its way pari passu with advancing civilization in each country', becom¬

ing in fact and effect the substantial corpus juris of the one country directly and of the other indirectly. Many causes combined to open the way both in Germany and in England for the practical application of Roman law. Among them, especially in England, were the impulse given by the universities and the Oxford School of Civil Law, the recognition of the Roman law in the clerical courts, whose jurisdiction ex¬

tended over a class of civil matters, and the personal influence of the higher judges, who mostly belonged to the clergy, and were there-

fore versed in the Roman law. Above all, how¬

ever, was the necessity of supplying the de¬

fects of the common law, which had become manifest from the growth of trade, the increase of intercourse and the greater importance of movable property; for the common law had expended its best energies in the completion of the legal constitution of the feudal system, and had showed no tendency toward creating an original commercial law. To these causes must also be added the scientific superiority of the foreign law, with its completeness, over the domestic law, with its want of theoretical de¬

velopment. Even at an earlier period it is not improbable that the Roman law had been used as an assistant and complementary authority in the Curia Regis, upon which court it was incumbent to instruct the inferior judges in regard to the law in doubtful and omitted cases.

A legal principle enunciated by that court had authority beyond the particular case in which it was laid down, and became, by means of its actual use, part of the jus non scriptum , con-suetudinarium. As

Roman legal matter obtained reception, although the written sources of the Roman law were not at all received as having a legislative authority, Bracton properly included the former among the leges et consuetudines Anglice. (Prof. Dr. Giiterbock, (Henricus de Bracton, J etc., translated bv Brinton Coxe, 60-62).

7. Code Napoleon. — Some steps were taken during the reign of Louis XIV looking to a codification of the French law. Little, however, was accomplished, and the French people owe to the constructive genius of Napoleon the pres¬

ent scheme of codification, which was under¬

taken during the consulate at his dictation, and finally completed, one code at a time, shortly after the end of his reign. The Civil Code, which was the first, was enacted and became the law of the land 21 March 1804. It was pre¬

pared by a council of jurists assigned by the First Consul to the work; but he himself took great personal interest in it, attending many of the sessions of the Commission and contributing much by his acute suggestions to the form and content of the law. With some fitness he is reported to have said, ((I shall go down to pos¬

terity with the Code in my hand.® This code, called at first the Code Napoleon, but now the Code Civil, has to do with the law of obliga¬

tions, of persons, of personal status and of property. It contains 2,281 sections, many of them of only a line or two in length, and is comprised in a volume of less than 350 pages.

The whole body of law in France at present, substantive and adjective, civil and criminal, is comprised in eight codes, as follows: Le Code Civil; Le Code de Procedure Civile; Le Code de Commerce , Le Code Penal; Le Code d' In¬

struction Criminelle ; Le Code F orestier ; Les Codes de Justice M Hit air e. The scope and pur¬

pose of each of these codes is generally and sufficiently disclosed by its title. This codifica¬

tion is supplemented by the Lois Usuclles. The sources of the codified law of France are: (a) the ancient laws of the realm theretofore in

force, consisting of local customs (custom of Normandy, custom of Paris, custom of Brit¬

tany, etc.); (b) the written or Roman law: (c) such legislative enactments of the National Assembly, the Legislative Assembly and the Convention, and such of the Decrees of the Consuls and of the Directory, between 17 June 1789 and 15 March 1803, as were thought by the codifiers to be .of permanent value; and (d) such general laws as have been enacted since 21 March 1804. The Roman law constitutes the foundation and groundwork of the struc¬

ture, the other constituent elements indicated being merely subordinate or ancillary.

8. The Extent of the Civil Law Through¬

out the World. — The civil law in its modern¬

ized form and substantially as enacted in the Code Napoleon has, within a century past, be¬

come the law of more than three-quarters of civilized mankind. To be more exact, it is thus the law not only of France and of all her colo¬

nies, but also of Italy, Greece, Switzerland and all the minor countries of southeastern Europe, of Spain and Portugal, Belgium, Holland and her colonies, of Austria-Hungary, Germany, Norway and Sweden, Denmark, Russia, Mexico, together with all the countries of Central and South America — all of the western hemi¬

sphere from the Texas border to Cape Horn —of Scotland and the Philippine Islands, the West Indies and Louisiana, of Egypt, of all the other civilized parts of Africa and of a majority of the more important British colonies, to-wit: Quebec, Ceylon, British Guinea and other English possessions in Africa, and Aus¬

tralasia. It is also working its way into Turkey and her dependencies. The German Empire in 1900 adopted for the empire the Prussian Code, which is a Germanized version of the Code Napoleon; and Japan, as part and parcel of her scheme of civilization, has within recent years enacted a code of law on French lines, follow¬

ing closely even its minor details, thus writing the law of Rome — the Codes of Justinian and of Napoleon — into the jurisprudence of the

remote islands of the sea.

9. Resemblance Between the Civil Law

and American Law. — Aside from matters of procedure and minor detail, the actual differ¬

ences between the living Civil Law as it exists throughout the world and the English common law, as refined and modified in this country and now administered here, are not great, certainly not greater than we should reasonably expect, having regard to the controlling influence,—conscious and unconscious — of the Civil Law, upon the growth and development of the com¬

mon law in England, and having in mind the fact that many English judges, notably Mans¬

field and Holt, and several of the chancellors for the past 200 years at least, have professedly drawn copiously from the great reservoir of Roman jurisprudence, whenever occasions have arisen for modifying or extending common-law principles or for applying them to new condi¬

tions of fact and circumstance. The so-called common law of England, certainly from the 11th century, is, in reality, largely the Custom of Normandy and the Custom of Paris, as imported at the Conquest in 1066 a.d. Its scientific terminology and its exact legal lan¬

guage even in its present form are essentially French. Chief Justice Plolt nearly 200 years ago said : ˆInasmuch as the laws of all nations are doubtless raised out of the ruins of the civil law, as all governments are sprung out of the Roman empire, it must be owned that the principles of our law are borrowed from the civil law, and, therefore, grounded upon the same reason in many things.® (12 Mod.

Rep. 482). Sir William Jones, writing during the Revolutionary War,

said: <(With all of its imperfections, the Digest is a most valuable mine of judicial knowledge; it gives law at this hour to the greatest part of Europe, and though few English lawyers dare make such an acknowledgment, it is the source of nearly all our English laws that are not of feudal origin.® And Mr. Hornblower, addressing the New York State Bar Association (1902), has said: ((It is also well for us votaries of the common law to remember that there is another jurisprudence founded upon the Roman or the Civil Law, and prevailing throughout the greater part of continental Europe, from which we have ourselves borrowed many of the most important legal principles.® If we eliminate from the law of England, as it obtains in this country, our technical rules of evidence, which have grown up about our system of trial by jury, our pleading and the peculiarities con¬

nected with the tenure, transmission and devo¬

lution of real estate (which are each of them, for the most part, little more than an antiquated mass of ignorance and rubbish, of which it is the modern tendency of our American juris¬

prudence to relieve us), the rest of our system is not very different, at least in its elements, from modern Civil Law. The following subjects in American law may be mentioned, which have been largely influenced by the Civil Law, and re¬

semble that system in many important elemen¬

tary principles, namely, the subject of probate, of succession to personal property and testa¬

mentary capacity; the law of admiralty; the law merchant, largely of continental origin; the law of equity and trusts ; the law of corpora¬

tions as juridical persons distinct from cor¬

porators; the law of res judicata, fully ex¬

pounded in the Digest of Justinian; the theory and practice of habeas corpus, the leading prin¬

ciples of which are found in the same compila¬

tion; the law of alluvion, of accession and of wild animals; and finally the great subject of obligations in general as arising from contract, quasi contract, tort, neglect and the operation of law, the logical

arrangement of which by the civilians becomes more and more useful in legal analysis and discussion. To these we may add the general doctrines of public and private inter¬

national law which are mainly of continental origin. (Howe, (Roman and Civil Law in America,5 16 Harv. Law Rev. 342).

10. The Importance of the Civil Law in America. — The present practical importance of the Civil Law to us consists in the fact that about one-seventh part of the present popula¬

tion of the United States and its dependencies — or, to put it in figures, more than 13,000,000

of our population — live under the Civil Law, and are governed in their personal and prop¬

erty rights by some form of it. Thus Louisi¬

ana, with a population of 1,700,000, Porto Rico, with a population of 1,150,000, the Hawaiian Islands, with a population of 190,000, the Phil¬

ippine Islands, with a population of 8,000,000, and Cuba (if indeed it may be included), with a population of 2,050,000, are governed by the Civil Law. Not only, therefore, must our judges and lawyers acquire familiarity with it and fa¬

cility in working in it, but our commercial and trading classes are finding it constantly of more and more consequence to them in their busi¬

ness. Not only is much of our law derived from it, but many millions of our people live and must continue to live under it. It is a curi¬

ous fact that the Custom of Paris was in force in Michigan and Wisconsin down to the year 1810, when it was formally abolished, in Michi¬

gan at least, by the legislature of that State.

(18 Wis. 158; 8 Mich. 25). All the French colonies established in the 17th and early part of the 18th century in North America were governed by the Custom of Paris, which still remains in Quebec the

basis of the codified law of that province. By a royal ordinance the laws, edicts and ordinances of France and the Custom of Paris were extended to Louisiana, and that system of law thus introduced prevailed there until 1763, when France ceded the coun¬

try to Spain. That introduced the Spanish law into Louisiana, which was, however, only another form of the Civil Law. In 1808 a Civil Code was adopted by the Territory of Orleans based to a considerable extent on the Code Napoleon, and, as revised in 1825 and subsequently, constitutes the present Louisiana Code. We probably owe to the study of Blackstone's Commentaries much of the unreason¬

ing prejudice which has hitherto existed to some extent in this country against the study of the Civil Law. Blackstone began to be read by law students in America about 140 years ago, and from then to now has been for the most part the initial textbook for all lawyers and law schools. He writes bitterly in his first lecture about the Civil Law. But it is mani¬

fest that he wrote without knowledge and un¬

der the influence of a set of political preju¬

dices and with a bias and prepossession with which we in the United States may well have little sympathy. Abstractly, there is no more reason why Americans should entertain a prej¬

udice against the Civil Law than against the law of gravitation, and there are cogent rea¬

sons, practical as well as scientific, why we should — now at least when it has become a matter of real personal concern to so consider¬

able a part of our people — give serious at¬

tention to modern Civil Law.

Bibliography. — Ferriere, 'Coutume de

Paris5 ; Ferriere, 'History of the Roman Law5 ; Flach, (Etudes critiques sur l'histoire du droit romain au moyen age5 ; Bentham, Complete Works, Vol. I, Principles of the Civil Code5 ; Mackenzie, (Roman Law5; Hunter, (Roman Law, in the Order of a Code5 ; Hunter, 'In¬

troduction to Roman Law5; Hadley, ‘Roman Law5 ; Baudry-Lacantinerie, ‘De droit civil5 ; Viollet, ‘Histoire du droit civil frangais5 ; Esmein, ‘Cours elementaire d’histoire du droit frangais5 ; Muirhead, ‘Historical Intro¬

duction to the Private Law of Rome5 ; Bryce, ‘Studies in History and Jurisprudence5 ; Howe, ‘Roman and Civil Law in America,5 16 Har¬

vard Law Review, 342, also 1 Southern Law Review, 96; Hornblower, ‘Address New York State Bar Association 1902 5 ; Beach, ‘French Law and the French Judicial System,5 15 Green Bag, 33; Carpentier et Frerejouan du Saint, ‘Du droit frangais5 ; Riviere, ‘Codes frangais et lois usuelles5 ; Weiss, ‘Pandectes fran-gaises5 ; Ruben de Couder, ‘Pandectes chron-ologiques.5

Charles F. Beach,

American Lawyer in Paris; Author of ‘ Equity Jurisprudence ,5 *etc.*

#

■

. .

Vol. 7, CIVIL LIST TO CORONIUM

Americana

- .rtv

y’ •

>V- < \ e' 1

ffp. VJ

m A \ \

Tip*

1 1 mt\

^JTBgEA

1 1\

%

s

‘

i

i

d

i

1

I

I

I

1

1

I

I

I

1

THE

ENCYCLOPEDIA

AMERICANA

jr

la^r

UjifVEHSAL

JtffOWLEDGE,

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK. CHICAGO

s

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

’S

>

COMPOSITION, ELECTROTYPINQ, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

©CI.A654317

‘”’-‘VO i

ri

4

ri

PARTIAL LIST OF CONTRIBUTORS TO VOLUME VII

AUSTIN, OSCAR P., M.A.

Statistician, National City Bank of New York

■COMMERCE, HISTORY OP

COMMERCE, INTERNAL, OF THE UNITED STATES

COMMERCE OF THE WORLD, INTER¬ NATIONAL

COMMERCIAL GEOGRAPHY

BAIN, CHARLES W., M.A.*

Professor of Ancient Languages and Literatures, University of South Carolina.

CLASSICAL LITERATURE

BOOCHEEVER, ROSE, A.B.

Editorial Staff of the Americana

CONSTANT DE REBEQUE

BOYNTON, HENRY VAN NESS*

Brigadier-General, U. S. A.

CIVIL WAR IN AMERICA

(Revised by Irving E. Rines)

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

COLERIDGE, SAMUEL TAYLOR

BROOKE, C. F. TUCKER, M.A., Litt.B.

Assistant Professor of English, Yale University

COMEDY OF ERRORS, THE CORIOLANUS

BROPHY, TRUMAN W., M.D., D.D.S.

Chicago, Ill.

CLEFT PALATE

BUELL, MARCUS D., S.T.B., D.D,

Professor of New Testament Greek and Exegesis, School of Theology, Boston University

COLOSSIANS, EPISTLE TO THE

CAIRNS, WILLIAM B., Ph.D.

Associate Professor of American Literature, Uni¬ versity of Wisconsin

COMMEMORATION ODE

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

CONFEDERATE STATES OF AMERICA, RECOGNITION OF THE

CONSERVATION OF NATURAL RE¬ SOURCES

CANFIELD, ARTHUR G., Ph.D.

Professor of Romance Languages, University of Michigan

CONTES BLEUS

CARNEY, SIDNEY H., Jr., M.D.

Historian, Society of Colonial Wars, New York

COLONIAL WARS, SOCIETY OF

CARLTON, WILLIAM N. C., M.A., L.H.D.

Librarian, Newberry Library, Chicago

CLEVELAND, GROVER

CARMAN, EZRA A.*

Brigadier- General, U. S. A. n

CLOYD'S MOUNTAIN, BATTLE OF COLD HARBOR, BATTLE OF

CORINTH, ADVANCE ON AND BATTLE OF

CARVER, THOMAS N., Ph.D., LL.D.

Professor of Political Economy, Harvard University

CONSUMPTION (ECONOMIC)

COCHRANE, CHARLES H.

Founder of New York Master Printers' Association, Author of " Modern Industrial Progress'"

COLOR PHOTOGRAPHY COLOR PRINTING COMPOSING-MACHINES CONVEYER

COCKRELL, F. M.*

Late United States Senator from Missouri

CONGRESS OF THE UNITED STATES

(Revised by members of the staff)

CORNYN, JOHN HUBERT, LL.B.

Editorial Staff of The Americana

COLOMBIA

CONFUCIUS

COUMBE, CLEMENT W.

Technical Art Expert, New York

COLORS IN ART AND SYMBOLISM CORONA

COWLES, ALFRED A.*

Vice-President of The American Brass .Company

COPPER AND BRASS INDUSTRY, THE

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell Uni¬ versity

CONCEPT

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

CLARISSA HARLOWE CLOISTER AND THE HEARTH, THE COLLINS, MORTIMER COLLINS, WILLIAM WILKIE

DEIMEL, R. F., B.S., M.A.

Assistant Professor of Mechanics, .Stevens Institute of Technology, Hoboken, N. J.

COLOR

COMBINATIONS AND PERMUTATIONS

- Deceased

Contributors to Volume VII — Continued

DITTMER, C. E.

Editor “ City Bulletin,” Columbus, Ohio

COLUMBUS, OHIO

DODD, WILLIAM E., Ph.D.

Professor of American History, University of Chicago

CLAY, HENRY

FARROW, EDWARD S., C.E.

Consulting Civil and Military Engineer

COMPRESSED AIR

y . r * . ’ ; i : [i

FERRIS, RICHARD, C.E.

Editorial Staff of The Americana

COAL

COAL MINING COAL-TAR COLORS COAL-TAR PRODUCTS COPPER

GARNER, JAMES W., Ph.D.

Professor of Political Science, University of Illinois

CONTINUOUS VOYAGE CONTRABAND

GRAHAM, W. B.

Chancellor of the Consulate-General of Paraguay, New York

COCOA

GRAVES, REV. CHARLES

Chaplain New York State Assembly

CIVILIZATION

HATT, W. K., B.A., Ph.D., C.E.

Professor of Civil Engineering, Purdue University

CONCRETE BRIDGES CONCRETE CONSTRUCTION

HENRY, ALFRED J.

Professor of Meteorology, United States Weather Bureau

CLOUDS

HERRICK, MYRON T., LL.D.

President Society for Savings, Cleveland; Am¬ bassador to France 1912-14; 1921-

CLEVELAND, OHIO CO-OPERATIVE BANKING

HOLCOMBE, RAWLEY W.

Secretary of Columbia Chamber of Commerce

COLUMBIA, S. C.

INGERSOLL, ERNEST

Zoologist, Editor and Author

CLIFF-DWELLERS COLOR IN PLANTS

JELLIFFE, SMITH ELY, M.D., Ph.D.

Formerly Professor of Pharmacognosy, Columbia University

CLIMATE IN THE TREATMENT OF DISEASE

COITUS

JELLIFFE, SMITH ELY, M.D., Ph.D.

CONSCIOUSNESS, BIOLOGICAL ASPECTS OF

CONSCIOUSNESS, DISORDERS OF CONTAGION

JOHNSON, TITIAN W.

Of the Washington Bar

COPYRIGHT

JONES, EDWARD D., B.S., Ph.D.

Professor of Commerce and Industry, University of Michigan

COMMERCIAL ASSOCIATIONS

KLEIN, HENRI F.

Editorial Staff of The Americana

CONSTANTINOPLE

LE GALLIENNE, RICHARD

Author, Critic and Reviewer

COMPLEAT ANGLER, THE

LIGHTHALL, WILLIAM DOUW

Fellow Royal Society, Canada

COPYRIGHT, CANADIAN

LINCOLN, MARY J.

Author of “ The School Kitchen Text Book ”

COOKERY

LOISEAUX, LOUIS A., B.S.

Associate Professor of Romance Languages and Literatures, Columbia University

CONTES DE FEES

MACDOUGALL, DUNCAN

Formerly Lecturer on Public Speaking at Saint Andrew’s College, University of Sidney, Aus¬ tralia, and Lecturer for the Department of Education, New York

COLLEGE DRAMATICS COMMUNITY DRAMA COMMUNITY MUSIC

MOORE, WILLIS L., LL.D., D.Sc.

Professor of Meteorology, George Washington University

CLIMATE

MUNRO, WILLIAM BENNETT, Ph.D., LL.D.

Professor of Municipal Government, Harvard University

COMMISSION FORM OF GOVERN¬ MENT

NOTT, HON. CHARLES C.*

Chief Justice Court of Claims

CONSTITUTION, IMMUTABILITY OF THE

NOURSE, EDWARD E., D.D.

Professor of Biblical Theology, Hartford Theologi¬ cal Seminary

CORINTHIANS, EPISTLES OF PAUL TO THE

- Decease 1

Contributors to Volume VII — Concluded

OSGOOD, WILLIAM F., Ph.D., LL.D.

Professor of Mathematics, Harvard University

COMPLEX VARIABLE

PALMER, WALTER B.

Formerly Special Agent, Bureau of Foreign and Domestic Commerce

CLOTHING INDUSTRY IN AMERICA

PFEIL, STEPHEN*

Formerly of the Philadelphia “ Press ”

COMMERCE, INTERSTATE COMMERCIAL LAW COMMON LAW CONTRACT

PICKERING, WILLIAM H.

Astronomical Observatory, Harvard

COMET

CONSTELLATION

RICHARDS, ROBERT H.

Massachusetts Institute of Technology; Author of “ Ore Dressing ”

COAL WASHING

RINES, IRVING E.

Author of “ History of the United States ”

COLONIAL GOVERNMENT

CONGRESS OF THE UNITED STATES, SESSIONS OF AND POLITICAL PAR¬ TIES IN

CONVENTIONS, CONSTITUTIONAL, IN THE UNITED STATES

ROBERTS, FRANK H. H., Ph.D., LL.D.

President of New Mexico Normal University; for¬ merly professor of History, University of Denver

COLORADO

SEE, THOMAS J. J., Ph.D.

Professor of Mathematics, Naval Observatory, Mare Island, Cal.

COMETS

SHARER, C. B.

The American Clay Machinery Company

CLAY-WORKING MACHINERY

SHERMAN, L. A., Ph.D., LL.D.

Professor of Literature, University of Nebraska

COOPER, JAMES FENIMORE

TAYLOR, WILLIAM J., Ph.D.

Head of Department of Psychology and Principle? of Education, The Brooklyn Training School for Teachers

CONSCIOUSNESS

THOMAS, M. CAREY, Ph.D., LL.D

President of Bryn Mawr College

COEDUCATION

THWING, CHARLES F., S.T.D., LL.D., Litt.D.

President of Western Reserve University, Cleveland

COLLEGES FOR WOMEN

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Univer¬ sity

COMUS

TRUMBULL, JONATHAN

Librarian of Otis Library, Norwich

CONNECTICUT

TURNER, JOHN F., D.D.

Saint Joseph's Seminary, Dunwoodie, N. Y.

CONGREGATIONS, SACRED

i

WALKER, WILLISTON, Ph.D., D.D.

Professor of Church History, Yale University

CONGREGATIONALISM

WALSH, JAMES J., M.D., Sc.D., Litt.D.

Author of " The Popes and Science," etc.

COLLOQUIES OF ERASMUS

CONFESSIONS OF SAINT AUGUSTINE, THE

WELD, HARRY P., Ph.D.

Assistant Professor of Psychology, Cornell Univer¬ sity

CONTRAST

WELLS, BENJAMIN W., Ph.D.

Author of " Modern French Literature," etc.

cl£lie

CORINNE

WIELAND, G. R.

Lecturer in Paleobotany, Yale University

CORDAITALES

WINCHESTER, CALEB T., L.H.D.

Professor of English Literature, Wesleyan Univer¬ sity

CONFESSIONS OF AN ENGLISH OPIUM EATER

WRIGHT, CHARLES H. C., B.A., M.A.

Professor of French Language and Literature, Harvard University

CONSUELO

YERKES, ROBERT M., Ph.D.

Professor of Psychology, University of Minnesota

COMPARATIVE PSYCHOLOGY

- Deceased.

KEY TO PRONUNCIATION.

a

far, father

n

Span, h, as in canon (can’ydn)

pin on (pen’yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

A

a

all, fall

o or 6

not, on

ch i

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. e, as in de ; cu, as in naif ; and ocn, as in

oi

oil, soil ; also Ger. eu, as in bentel

boeuf, coeitr; Ger. d (or oe), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin •

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or H

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

ii

between u and e, as in Fr. sur,

Ger. Muller

• V

i or 1

him, it

i

between e and i, mostly in

V

of, very

Oriental final syllables, as, Ferid-ud-din

y

(consonantal) yes, young

•

J

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents, to indicate

point, Jean, temps

syllabic stress

CIVIL LIST, a term signifying in the United States, (1) a list of the entire expenses of the civil government, (2) the revenue appropriated to support civil government, (3) the officers of the civil government who are paid from the public treasury.

In England the meaning of the term for¬ merly represented the whole expenses of the government with the exception of those of the army, navy and other military departments. It is now limited to expenses proper to the main¬ tenance of the household of the sovereign. It was once a principle in England, as also among Teutonic nations, that the monarch was to pay all the expenses of government, even includ¬ ing those of the army, from the possessions of the Crown, the domains, and that the subjects were not obliged to contribute anything more than they voluntarily engaged to. From this principle, which is proved by the history of the origin of the domains, it appears that the Crown lands in general cannot be considered the private property of the ruling family. On the contrary, they are, in general, the property of the state and have been given to the prince to defray the expenses of government. Until the Restoration the whole expenses of the gov¬ ernment continued to be defrayed out of the royal revenue. The first Parliament of Charles II fixed on £1,200,000 as the ordinary revenue of the Crown in time of peace. For this they provided by taxation, which ultimately pro¬ duced more than the amount of the grant. The same taxes were continued during the reign of James, and produced on an average £1,500,000, in addition to which he received extraordinary grants. At the commencement of the reign of William, the Commons made still further re¬ striction on the royal control of the revenue. They voted £1,200,000 as the revenue of the

Crown in time of peace, one-half of which was appropriated to the maintenance of the king's government and the royal family, the other to public and contingent expenditure. The outbreak of war prevented this arrange¬ ment from being strictly carried out, but the Commons maintained the principle of separat¬ ing the regular and domestic expenses of the king from the public expenditure, and estab¬ lishing a systematic and periodical control over the latter. The amount actually voted to the king for life in 1597 was £700,000 and the same vote was made at the commencement of the reigns of Queen Anne and George I. On the accession of George II £830,000 was voted. Be¬

sides the regular vote, grants had been fre¬ quently made to defray debts incurred in the expenditure of the sovereign. On the acces¬ sion of George III the civil list was fixed at £800,000, but instead of being paid out of the appropriated revenues in which the Crown lands were included, these were surrendered, and it was charged on the ordinary taxation. Large extra grants had to be made during this reign. At the commencement of the reign of Victoria a civil list of £385,000 per annum was settled on her majesty for life for the sup¬ port of the royal household, and the main¬ tenance of the dignity of the Crown, £60,000 being allotted to the privy purse. In 1901 the civil list of the king of England was raised to £470,000; £110,000 of this being for the privy purse.

CIVIL PROCEDURE. See Court.

CIVIL RIGHTS BILLS. 1. An act to

carry out the intention of the 13th Amend¬ ment, prohibiting slavery — which it was al¬ leged the Southern States were attempting to nullify by public and private action — and se¬ cure the political equality of the ex-slaves with the whites. It provided that all persons born in the United States and not subject to any foreign power, excluding Indians not taxed, were citizens of the United States and entitled to the same immunities, irrespective of race or color, or previous condition of servitude, except as punishment for crime ; punished as a misdemeanor any deprival of such right under color of State law; transferred cognizance of such cases from the State to the Federal courts ; entrusted the execution of the act to national officers only, and fined them for re¬ fusal ; punished resistance to the officers ; pro¬ vided for fees; empowered the President to send officers to any district where the act was likely to be violated, and to call out the na¬ tional forces to execute it; but permitted an appeal to the Supreme Court. Significantly, it employed somewhat the same means to emancipate the negro which the Fugitive Slave Law did to re-enslave him, especially in over¬ riding or supplanting State officers ; and for the same reason — they could not be trusted in the sections where it was to be enforced. The bill was passed in the Senate 2 Feb. 1866, 33 to 12; in the House 13 March, 111 to 38. Andrew Johnson vetoed it 27 March, and it was passed by the requisite two-thirds over his veto, in the Senate 6 April and in the House 9 April. Even so, the debate had brought out

two grave doubts of its constitutionality; that the protection of civil rights under the Consti¬ tution belonged not to Congress but to the States, and that under the Dred Scott decision (which stood as a precedent for the Supreme Court until reversed), negroes could not be¬ come citizens even by emancipation. This led to the proposal of the 14th Amendment (see Constitution, Amendments) , which passed both Houses in June.

2. An act extending the foregoing to the exclusion of negroes from juries and from equal privileges in schools, public conveyances, hotels, theatres, etc. This had been persistent¬ ly urged by Charles Sumner, for some years before his death ; was offered as an amend¬ ment to the Amnesty Bill of 1872, and lost by only one vote; again introduced into the House in December, and referred to a committee; on 30 April 1874, a few weeks after Sumner's death, it passed the Senate, but the House re¬ jected it; it finally passed both Houses in Feb¬ ruary 1875 and was signed 1 March. For an account of its partial invalidation, see next article.

CIVIL RIGHTS CASES. These were five test cases in the United States Supreme Court of the

constitutionality of sections 1 and 2 of the second Civil Rights Bill, described above; decided in one group, October term, 1893, and reported and cited under the title above. All came up from Circuit Courts; three on certifi¬ cates of division of opinion, two on appeal for error; and while the decision on the act was adverse to all, and the first three were found for defendant, the error was admitted and the decision given for plaintiff in the last two. Two of them were for hotel discrimination, two for theatre discrimination, one for rail¬ road discrimination ; the first four submitted 7 Nov. 1882, the last one 29 March 1883. The cases were: U. S. v. Murray Stanley, from the Kansas district : hotel case. U. S. v. Michael Ryan, California district : refusing a negro a scat in the dress circle of Maguire's Theatre, San Francisco. U. S. v. Samuel Nichols, West¬ ern Missouri district : hotel case. U. S. v. Samuel D. Singleton, southern New York dis¬ trict; refusing a negro a seat in the Grand Opera House, New York. Richard A. Robin¬ son and Sallie A. Robinson, his wife, against the Memphis and Charleston Railroad Company: refusal to allow the wife a seat in the ladies' car from Grand Junction, Tenn., to Lynch¬ burg, Va. The decision of the court was given by Justice Bradley, Harlan dissenting. The terms of the first section of the act are that <(All persons within the jurisdiction of the United States shall be entitled to the full and equal enjoyment of the accommodations, etc., of inns, public conveyances by land or water, theatres and other places of public amusement,® and that laws must be (

made under State laws. Congressional legisla¬ tion for enforcing the latter amendment is not direct legislation, but corrective, counteracting or redressing State legislation of a sort for¬ bidden by the amendment. For private injury from discriminations, the remedy must be sought in State laws — to withdraw it from which was the precise object of the act.

CIVIL SERVICE, that branch of the pub¬ lic service which includes all executive offices not connected with the army or navy. The term is not applied to the direct representatives of the people, as the President of the United States or the governor of a State. Owing to the complexity of modern government and the variety of its functions, the civil service has become very complex, and the problem of its effective administration a difficult one.

In Great Britain the service comprises vari¬ ous departments, such as the home office, the foreign office, the war office, admiralty, post of¬ fice, customs, excise, etc. Formerly, appointments to the civil service in Great Britain were the gift of the executive government, and were ob¬ tained by influence, while the bestowal of them was used as a means of gaining parliamentary support on behalf of the government. Those appointed were not generally called upon to show whether they were competent or not. In 1855 examinations were instituted to test the efficiency of all candidates for subordinate posts ; but for some time candidates were spe¬ cially nominated for those posts. As more than one might be nominated for a post, com¬ petition was gradually introduced, and in 1870, it was directed that appointments in the civil service should (with certain exceptions) be filled by open competition, as was already the case with appointments in the Indian civil serv¬ ice. The appointments to what are known as clerkships in the civil service are divided into two classes or divisions, with different age lim¬ its and salaries. In the higher division, while the examinations are more severe, the salaries are much better; the two divisions are kept quite distinct; and it is rare for a person to be promoted from the lower to the higher. For a number of appointments open to com¬ petition special qualifications, scientific oi tech¬ nical, are necessary, while there is also a spe¬ cial limit of age. A large number of subordi¬ nate appointments in the postal and telegraph service, the excise, etc., are on a different foot¬ ing from the clerkships just mentioned and are not so well paid. All persons who have served in an established capacity in the permanent civil service are given a pension, varying with the length of service, at the time of retirement. The total expenditure of the civil service of Great Britain is about $90,000,000.

In the United States the Constitution pro¬ vides that the President, ((with the advice and consent of the Senate,® shall appoint all officers of the United States whose appointments are not otherwise provided for by the Constitution. This gives the chief executive power to choose the heads of departments, as well as their sub¬ ordinates. In the separate States the appoint¬ ive power of the chief executive is much more limited. The heads of the State depart¬ ments such as the attorney-general and comp¬ troller, etc., are elected by the people, and usu¬ ally have the constitutional right to select most of their own subordinates. The governor

therefore appoints only his own secretaries, etc., members of commissions, heads of bu¬ reaus and the like. With the development of party government in the United States, the pat¬ ronage placed in the hands of elected officers through their power of appointment has led to the giving of offices as a reward for party serv¬ ice (the spoils system) and to considerable inefficiency and unnecessary expense in public administration. A reform is being brought about by the appointment of officials according to merit in public examinations. (See Civil Service Reform). On 30 June 1915 the civil service positions under the Federal govern¬ ment numbered 454,116, of which 9,692 were appointed by the President. To these may be added 28,605 positions under the civil govern¬ ment of the Panama Canal Zone, making a total of 482,721 positions in the government service.

CIVIL SERVICE REFORM, the im¬ provement of the civil service in methods of appointment, rules of conduct, etc. ; in the United States, the movement for the appoint¬ ment of public servants according to their fit¬ ness for their work, rather than their services to the party in power.

In the year 1835 a debate took place in the Senate of the United States on the condition of the civil service, and especially on the abuse of the power of appointment and removal to serve party ends instead of public ends. Among the senators who took part in the debate were the three whom history has judged the strongest in that famous body, Daniel Webster of Massa¬ chusetts, Henry Clay of Kentucky and John C. Calhoun of South Carolina. Differing wide¬ ly in their views of party policy and rivals in ambition, they were of one mind as to the true nature of the public service and as to the er¬ rors and evils that had crept into it. Mr. Web¬ ster, then in the prime of his young manhood, had already won the title of the “Great Ex¬ pounder of the Constitution.® He thus stated the idea in which the others heartily joined: ((The theory of our institutions is plain ; it is that government is an agency created for the good of the people, and that every person in office is the agent and servant of the people. Offices are created, not for the benefit of those who are to fill them, but for the public con¬ venience. w

There is no doubt that this is indeed the true theory of our institutions. It is to be found in all the early writings of the men who formed the government. It is the basis of the Declaration of Independence, that “governments are instituted .among men9 to secure the rights of “the governed® from whose consent “they derive their just powers.® When our national government was founded it was the only one in which offices were not a privilege, but a trust, imposed by the choice of the people and for their sole interest. Neither birth nor rank nor wealth gave any title to them. Each of the men who held them was intended to be, in the words of Webster, “the agent and the servant of the people.®

This theory had grown out of the needs of the American people, and fitted them closely. As colonists they had had to work and fight hard for the right to live and the means to live as free men in a wild land, far from the homes of their fathers, amid many perils and

hardships. There was no ruling class among them. To attend to the common business of each little settlement, they were led to choose among their own number the agents best fitted for the task. These in the early days were, as in the towns of New England they still are, “select-men,® “trustees.® The name shows what was expected of them, and what was their title to employment. As the towns were grouped in counties and the counties in States, the public business grew, became more com¬ plex and required a larger number of agents with different duties and powers, but the idea held. They were still agents, selected men, trustees. From the most modest unpaid village or town officer to the President of the United States, the commander-in-chief of the army and navy of the nation and its representative in the eyes of the world, no man in the public service in this country is anything but the agent, the trustee of the people.

One result of the growth of the public busi¬ ness has been that only a small part of the agents

for doing this business are chosen di¬ rectly by the people. Those thus chosen are entrusted with the employment or appointment of a very large number of others. The chief difference between the two classes is that those elected are expected to carry on the public business in a way that the majority of the vot¬ ers are in general agreed upon. They are the choice of the majority party and, so far as the rights of all permit, they are the agents of that party. When the views and wishes of the ma¬ jority change, these agents are usually changed also. But the far greater number of agents for doing the public business are appointed or employed. The duties of nearly all these are the same no matter what may be the policy of the majority party. In the national govern¬ ment, for instance, the main work for those in office, except the highest, is the collection and expenditure of the taxes. The taxes are col¬ lected on goods brought into this country for sale or on goods made here for sale; in other words, customs, duties and internal revenue taxes. Parties differ widely as to which class of taxes should be the higher, and as to how high the custom duties should be. But all par¬ ties agree that the taxes of all sorts should be collected according to law honestly and fair¬ ly, that the money should be carefully account¬ ed for and none of it stolen or wasted. Agents for this purpose need to be good business men of character and ability; they do not need to be of one party or another. Again, the Post- Office Department does a great part of the busi¬ ness of the government. It collects mail mat¬ ter of all kinds, transports it, delivers it at home or abroad, makes large payments on money or¬ ders and sells the stamps by which the cost of its work is paid. As to this work, there is no difference at all between parties and there has never been. The agents engaged in it need only to be honest and efficient. They do not need to be of one party or another. In all offices where the duties are of this sort, it is plain that those engaged in them should be selected for merit only, promoted as the service requires and re¬ moved only for failure or incapacity to do their work in the best manner.

Such a policy would answer to Webster's statement of the theory of our institutions and to the practice of the early Presidents, Wash-

ington declared : <(In every nomination to office I have endeavored, so far as my own knowledge extended or information could be obtained, to make fitness of character my primary object." In the first 39 years of the history of the govern¬ ment the six Presidents made only 112 removals. A few years later, when Webster had to define anew the true theory of the public service, a very different practice had grown up. It was frankly described in that same debate by Mr. Marcy, a senator from New York. He said: ((The poli¬ ticians of the United States are not so fastidious as some gentlemen are as to disclosing the prin¬ ciples on which they act. They see nothing wrong in the rule that to the victor belongs the spoils of the enemy." This theory is plainly the opposite of the true one. Under it elections do not merely settle the policy of the country, as to which parties may unselfishly differ. They become contests for spoils as well and tend to become more and more contests for spoils and less disputes as to principle. The spoils are the offices, the places of trust and these tend to be given not to those best fitted to perform their duties, but to those who have claims on the party. The service is hurt by putting out tried men and putting in untried men and since the untried men are chosen for other reasons than fitness, they are apt to be poorer officers. Since they owe their employment to party favor and do not get it on their merits, they are likely to be less faithful and less honest. They are liable to be turned out at the next election and they are tempted to make all they can from their places. The offices tend to be regarded as created not <(for the public convenience" but (

The Spoils System. — The spoils system pre¬ vailed in the service of the United States gov¬ ernment for about a half-century after 1830. It also prevailed in greater or less degree in the service of the several States and of the larger cities. It was not confined to any one party. All were more or less corrupted by it. The effect on the politics of the country was very bad. The pressure for public employment, al¬ ways strong, became extreme. Probably the election of 1860 was as largely decided by moral conviction as any in the history of the country. Yet, one month after he took office, President Lincoln groaned under the burden of this pres¬ sure. (

light on the waste of time, of money and of strength imposed by the spoils system. The degradation and pollution of politics were even worse effects. The office-holders, living on the spoils of the place and greedy for more, seized the organization of their party, whichever it happened to be, and made the free exercise of honest preference among the voters difficult and often impossible. The scramble between fac¬ tions in the party in possession became as in¬ tense as between opposing parties. In the cus¬ tom house in New York, five collectors of the same party made 1,878 removals in a period of 1,565 business days and the service grew steadily worse. In 1881, Guiteau, an office-seeker from. New York, where a bitter factional fight had long been raging, half-crazed with disappointed greed, assassinated President Garfield, to whom he charged his failure.

The Merit System. — This proved the turn¬ ing point. At the next session of Congress bills were introduced for the establishment of the merit system and a law was passed in January 1883. It was entitled <(An Act to Regu¬ late and Improve the Civil Service of the United States." The object of the law was to secure appointment and promotion in the service for fitness. For this purpose appointments were to be made from those graded highest as the results of open competitive examinations, the appointments being made final only after a period of probation or trial. This system was to be extended throughout the service as fast and as far as the President should direct. When any part of the service was to be brought under the system, it was to be arranged in classes by order of the President; hence the term <(classi- fied service" means, under the law, the part of the service in which the merit system is applied. Within the classified service, the ex¬ aminations for appointment and for promotion are chiefly competitive ; that is to say a list, called an (

actual excellence in the performance of work counts in promotion. For places requiring special knowledge, trained examiners are em¬ ployed. For instance, the examiners who set the questions and rated the answers in the case of the supervising architect were prominent architects from various parts of the country. They were able, from the records of the candi¬ dates, to test not only professional knowledge, but business capacity. In all cases the ex¬ aminers are selected from those who are well informed as to the work to be done. The ap¬ plication of this law is to be carried out and watched by a commission, known as the United States Civil Service Commission, made up of three members, appointed by the President with the advice and consent of the Senate. This commission aids the President in the formation of the rules under the law, and, with the aid of examiners, sets and conducts the examinations. All appointing officers are required to report to it all changes in the classified service, of which the commission keeps a full record, as well as of its own examinations and other proceedings. All officers of the service are required to aid in the performance of the duties of the com¬ mission.

One of the worst evils of the spoils system was the fact that public employees were made to pay a large fraction of their salaries to party funds, and another was that these employees were forced to work for the party in power in order to keep their places. Both these practices are now forbidden by law in the service of the United States. No one in the service is allowed to use his official authority or influence to coerce the political action of others. All persons in the service are forbidden to ask or receive polit¬ ical contributions from others in the service. Such contributions cannot be solicited in any place or building used by the government. By the rules, which have the force of law, no ques¬ tion can be asked of candidates for appointment as to their political or religious opinions; no disclosures of such opinions can be considered ; no change of rank or pay can be made because of such opinions. Under the spoils system, the office-holder got his place from his party and was taxed heavily by his party managers. The law' intends to put a stop to that ; it holds the officer bound only to earn his pay by honest work, and free to spend it as he chooses. The law further holds him without fear of harm or hope of aid from outside, to do his duty to his employers, the whole people of the United States. It aims to put the people and those who work for them on the same footing that is maintained in honorable private business be¬ tween employers and employed.

The merit system has been greatly extended since the passage of the law. Under President Arthur, who signed the law in 1883, some 16,000 places were brought within its provisions. The number is now over 120,000. While this ad¬ vance has been made there have been more frequent changes of

party in the government of the country than in any like period in our history. Each succeeding President, until the present, has, in the discretion which the law confides to the President only, added to the number of places removed from the spoils svstem. President McKinley withdrew a con¬ siderable number of places from the merit system for reasons urged upon him by the

heads of some departments. The effect has been unfortunate. President Taft, near the close of his administration, transferred all the fourth class postmasterships to the classified service. President Roosevelt increased the number by including the deputy collectors of customs and internal revenue. The merit sys¬ tem has been extended to the service in the Philippine Islands in a way that promises to make the wrork of governing there clean, effi¬ cient and fair to a degree that could hardly have been looked for. In this region the bond of trusteeship rests upon our government with a peculiar and solemn obligation. The United States have taken control of the affairs of the people of these islands as the result of a war with Spain, without the assent of the peo¬ ple in the first instance, and against resistance by a portion of them which was overcome by arms. It would be a sore disgrace if their affairs were not managed honestly and purely and for the interest of the governed. The merit system on the lines of the Civil Service Law has been established there, under the general guidance of an experienced and skilled exam¬ iner from Washington. As many natives as practicable are being employed. It is still too early to judge of the final outcome, but the beginning is promising.

The chief aim of the merit system is, on the one hand, to get the best service for the govern¬ ment — that is, for the people — and, on the other hand, to remove from the party contests of the country the corrupting influence of the vast number of business places offered as spoils to the victors. The methods of competition and probation are not perfect, and, like all other human methods, are liable to mismanagement. But they are the best that have ever been tried, and they are very effective. The test of com¬ petitive examination is shown to be thorough and practical by the fact that only a very small number of those who pass that test are dropped after probation or trial. Another proof is the much larger amount of work done by persons so> selected. During 10 years before the adoption of the merit system in the departments at Wash¬ ington the number of clerks increased from 3,300 to 5,523, or more than two-thirds. In the 13 years after the system was adopted the num¬ ber actually fell off 211, or 3 per cent, while the work of the departments had largely in¬ creased. Another proof of the efficiency of the system is the small number of changes that take place in it compared with those that take place in the branches of the service where the system is not yet applied.

The entrance examinations are held in all parts of the land, and men and women are selected for the departments at Washington with no regard whatever for their party views or the influence of politicians. This has been of great effect in laying to rest the passions bred by the Civil War, and giving to the dwellers in the South a sense of their common rights and duties as citizens of the nation. It is a great and lasting gain.

In 1884, laws for the introduction of the merit system were enacted in New York and Massachusetts, and later law's authorize the system in the service of cities in Wisconsin and Illinois. In Massachusetts and in New York the system has made much progress and the results have been good in proportion as the

system has been extended and honestly and faithfully applied. But the evils of the spoils system still prevail almost without check in the service of the cities and the States through¬ out the country. The enormous number of places involved are still almost wholly the prizes of party contests. The place-holders, many times more numerous than the present army of the United States, are in greater part enlisted for party rather than for public service. Effi¬ ciency, industry and economy in the public work are hard to secure. The suppression of vice and the decent administration of the affairs of cities and States are made more difficult.

Clearly it is best that the merit system should be applied to all that portion of the civil service in which the duties are of a business nature and in which the office-holders are not called on to fix the policy of the government. There is no Democratic or Republican or Populist way of being honest and industrious and intelligent which all Americans may not use. To these qualities in their service the

people have a right, and no party can claim a monopoly of them. Much remains to be done to complete the work so well begun. The men in all parties who look on public employment, not as a trust, but as the spoils of party victory, resist all advance and seek to undo what has been done. They cannot succeed if the true nature of the merit system is understood, its honesty and fairness, its high utility and its fidelity to the funda¬ mental principle of the free institutions of the American republic. From 1915 on the Civil Service Reform League conducted a vigorous agitation to bring all classes of postmasters into the classified service, all diplomatic secretaries and consular officers to be transferred to the classified service. The League also co-operated by request to ensure efficiency in war serv¬ ice. Consult Roosevelt, Theodore, Amer¬ ican Ideals) (New York 1900) ; Fish, C. R., (The Civil Service and the Patronage (New York 1905). See Executive.*

CIVIL WAR IN AMERICA. The num¬ ber of engagements entered in the government's Chronological List of Battles exceeds 2,200. An alphabetical list of battles compiled at the bureau of pensions, including such minor ac¬ tions and skirmishes as seemed worthy of in¬ corporation, contains over 6,800 separate affairs. It is therefore clear that, even in a compre¬ hensive narrative of the War, a large number of the lesser engagements must be ignored. Merely to state strength and losses for the bat¬ tles mentioned would form a lengthy statistical article. For these figures the student is re¬ ferred to the separate accounts in this work of the various battles herein treated.*

The Civil War of 1861-65 was inaugurated by the determination of seven Southern States to withdraw from the Union. (See United States — Causes of the Civil War; Efforts to Settle the Slavery Question). South Carolina led by passing an ordinance of secession 20 Dec. 1860, followed by Mississippi, 9 Jan. 1861; Florida, 10 January; Alabama, 11 Janu¬ ary; Georgia, 19 January; Louisiana, 26 Janu¬ ary; and Texas, 1 February. On 7 February the Choctaw Nation declared its adherence to the Confederacy. See United States — Seces¬ sion; Secession in the United States.

During the autumn of 1860 and the early

spring of 1861 the forts, arsenals, custom¬ houses and other government property in those States, with few exceptions, had been seized by State troops, and large sums were voted for arming the States, Georgia leading in Novem¬ ber 1861 by appropriating $1,000,000. Maj. Robert Anderson, a Federal officer, who held Fort Moultrie on the inner line of Charleston harbor, becoming aware of active preparations for capturing that work, withdrew, on the^ night of 26 December, to Fort Sumter (q.v.) in the centre of the harbor. This move hastened results. Immediate preparations were made for bombarding the fort. The first firing upon the flag was 9 January by the batteries erected against Fort Sumter, the inciting cause being the appearance of the Star of the West (q.v.) off the harbor. This vessel had been sent from New York with provisions for Sumter, and with the accompanying fleet withdrew without replying to the fire.

*Delegates from the seceded States met at Montgomery, Ala., 4 February, and 8 February adopted a provisional government, <(The Con¬ federate States of America** (q.v.) and the next day elected Jefferson Davis of Mississippi President, and Alexander H. Stephens of Georgia Vice-President of the Confederacy. See United States — The Confederacy; Con¬ federate States of America.*

On 1 March Gen. P. G. T. Beauregard, appointed by the Confederate government, was sent to Charleston and took charge of the preparations for reducing Fort Sumter. On 4 March Abraham Lincoln was inaugurated as President of the United States. On 10 April Beauregard was instructed to demand the sur¬ render of the fort, and, in case of refusal, to reduce it. The next day Anderson received and promptly declined a demand to evacuate, and at daylight 12 April, the Confederate bat¬ teries opened upon Fort Sumter, compelling its surrender on the 14th. The expectation of a relieving fleet probably hastened this attack. See Fort Sumter.

With the news of the attack and surrender the country received President Lincoln's proc¬ lamation calling for 75,000 volunteers, and sum¬ moning Congress to meet on 4 July. In an instant discussion over the power to coerce States, the discussion of peace conventions and movements and all similar perplexing questions were brushed aside, and the North responded with intense enthusiasm, the predominating sentiment being the preservation of the Union. The South was equally aflame, rallying under the banner of State rights.

On 8 April President Davis had called for 20,000 volunteers, and the day following Presi¬ dent

Lincoln's proclamation he asked for 34,000. Two days later the Confederate Congress au¬ thorized the raising of 100,000 men. Three days after the surrender of Sumter Virginia seceded, followed 6 May by Arkansas and Ten¬ nessee,. and 20 May by North Carolina, the be¬ lief being then general that a policy of coercion had been decided upon. The border States of Kentucky and Missouri were held to the Union by their loyal element, and Maryland was held at first by the direct power of the national government, and later by its own loyalty. The first two were represented in the Confederate Congress throughout the War. The movement to take Missouri into the Confederacy was

thwarted by Gen. Nathaniel Lyon, who cap¬ tured Camp Jackson near Saint Louis 10 May, and on 17 June, having already taken the State capital, in a brief engagement dispersed a force which Governor Jackson had gathered at Booneville. This resulted in relieving the capital from those plotting secession. Ken¬ tucky at first declared for neutrality, but at the election for members of Congress, 20 June, it was made clear that the State was lost to the Confederacy. In May the Confederate capital was moved from Montgomery, Ala., to Richmond, Va., where troops from all parts of the Confederacy were rapidly assembling. In like manner, the Northern States were pouring troops into the national capital, and Washing¬ ton soon became a vast military camp. The Union forces crossed into Virginia 24 May and encamped opposite Washington.

For a brief time Baltimore resisted the pas¬ sage of troops to the capital. Four hundred Pennsylvanians reached Washington 18 April, but the 6th Massachusetts regiment was at-

affair, like another about the same time at Vienna in front of Washington, both caused widespread dissatisfaction and mortification in the North. See also Romney; New Creek.

Under President Lincoln's call Ohio promptly organized 13 regiments, and 23 April Capt. George B. McClellan was appointed major-general of Ohio militia. On 14 May he was commissioned major-general in the regular army and assigned to the Department of the Ohio, embracing that State, Indiana, Illinois, and, later, West Virginia. In May the Con¬ federate government had dispatched a small force to Grafton, W. Va., under Col. G. A. Porterfield, with the purpose of breaking the Baltimore and Ohio Railroad. On 26 May General McClellan threw troops from Ohio and Indiana into the State, defeating Porter¬ field at Philippi (q.v.), 3 June. West Vir¬ ginia seceded from Confederate Virginia 17 June, and set up a State government which was recognized by President Lincoln on the 26th. On 9 July United States senators were

tacked in Baltimore 19 April. The 7th New York reached Washington 25 April from An¬ napolis. Brig.-Gen. B. F. Butler, with the 8th Massachusetts, had reached Annapolis on the 20th, and on the 22d had proceeded to the Relay House. On the night of 13 May he oc¬ cupied Baltimore, and thereafter the route to Washington was unobstructed. Harper's Ferry (q.v)., with its arsenal and machinery for manufacturing small arms partially destroyed, was seized by the Confederates 19 April (see Shenandoah Valley), and Gosport Navy Yard, near Norfolk, 20 April, with guns, stores, ships and machinery of immense value.

On 20 May General Butler, having been made a major-general of United States volun¬ teers, was assigned to the command of the De¬ partment of Virginia and North Carolina, with headquarters at Fort Monroe. On 10 June he moved against a force under Gen. J. B. Magruder at Big Bethel (q.v.) and was defeated. While it was comparatively a small

elected, and on the 13th they took their seats at Washington. Congress met in special session 4 July. It legalized all President Lincoln's acts with respect to the army and navy, and au¬ thorized a further call for 500,000 men, a national loan of $250,000,000 and an increase of the navy to render effective the blockade of the Southern ports which had been declared 19 April by President Lincoln.

Following the Philippi defeat, the Confed¬ erates sent Gen. Henry A. Wise to the Kana¬ wha Valley, and Gen. Robert S. Garnett to Beverly. Gen. William S. Rosecrans, who was commissioned brigadier-general in the regular army 16 May, joined General McClellan from Ohio, and 11 July defeated the Confederate forces under Col. John Pegram (q.v.) at Rich Mountain (q.v.). On 13 July

General Garnett, during the retreat of his column, was killed at Carrick's Ford. His command escaped, leaving General McClellan in control of northwestern Virginia.

The latter part of July, upon hearing of the arrival of Gen. J. D. Cox of Ohio in the Kana¬ wha Valley, Gen. Robert E. Lee was ordered to the command of West Virginia. The cam¬ paign for regaining the State failed, and by November the Confederate authorities decided to abandon the plan of occupying it. General Lee was ordered to the command of the Depart¬ ment of South Carolina, Georgia and Florida. See West Virginia Campaign of 1861 ; Scarey Creek; Camp Bartow; Camp Alleghany; Carnifax Ferry; Gauley Bridge; Romney.

Early in July the army in front of Washing¬ ton under Gen. Irwin McDowell (q.v.) pre¬ pared to move against the main Confederate army under General Beauregard in front of Manassas. The flanks of each army toward the Shenandoah were protected by strong forces, Gen. Robert Patterson commanding on the Union side, and confronting Gen. Joseph E. Johnston (q.v.).

The Union advance was hastened by an al¬ most universal cry in the North of ((On to Richmond !)} General McDowell left his camps on the Virginia side of the Potomac on the afternoon of 16 July with five divisions, en¬ countering an advance brigade of Beauregard's army at Fairfax Court-House. This, with two other brigades, withdrew with light skirmishing to the main lines, which had been established behind Bull Run, its right at the crossing of the railroad from Manassas to Alexandria, and its left at the crossing of the Warrenton turn¬ pike from Alexandria. McDowell's forces were concentrated about Centreville on the 18th, and one brigade had quite an affair on that date at Blackburn's Ford. On the 20th General Johnston arrived with all except one brigade of his army and assumed command. On the 21st McDowell, feinting in front, turned the Confederate left, and maintained a suc¬ cessful battle until near 4 o'clock, when the last brigade (three regiments) of Johnston's army arrived with a battery on the Union right and checked its advance. A brigade of General Beauregard's troops moving farther to the left and more directly on the Union flank, changed this check into a retreat, which soon became a panic, and the entire Union army left the field in disorderly _ haste. There was slight pursuit, but the panic increased, and only ended when the army was inside the fortifications of Washington. (See Bull Run, First Battle of). The North was astounded at the result, and the South correspondingly elated. Both sections immediately redoubled their efforts to prepare for vigorous war. General McClellan was summoned from West Virginia and given command of the Department of the Potomac, and began to organize the troops pouring in from all parts of the North. On 20 August he took command of the Army of the Potomac, then for the first time organized under that title, and 1 November he was made command¬ er-in-chief of the armies of the United States in place of Gen. Winfield Scott who had asked to be retired on account of failing health. In the rapid organization going forward in both sections, the South had the advantage of the services of the majority of regular officers from that section who resigned their commis¬ sions and went with their States.

After Bull Run there was little heavy fight¬ ing during the remainder of 1861, both sides

devoted their chief attention to establishing their lines. On 15 August Jefferson Davis or¬ dered all Northern men to leave the South within 40 days ; and the next day President Lincoln proclaimed the seceded States in insur¬ rection and prohibited all intercourse. On the Union side, General Butler in command of a joint expedition of land and naval forces, sailed from Fort Monroe, and 29 August cap¬ tured the forts guarding Hatteras Inlet (q.v.) opening the way to Pamlico Sound. On the lines of the Army of the Potomac the Union forces under Col. E. D. Baker, senator from California, were defeated at Ball's Bluff (q.v.), 21 October, Colonel Baker being killed. On 7 November a joint expedition from Annapolis, under Gen. Thomas West Sherman and Adm. S. F. Dupont, captured Port Royal, thus securing one of the most important har¬ bors on the Southern coast. (See Port Royal Bay; Port Royal Ferry). Gen. E. O. C. Ord, with a Union brigade, defeated a brigade under J. E. B. Stuart, at Dranesville, 20 December. Gen. N. P. Banks succeeded General Patter¬ son in the Shenandoah ; General Rosecrans commanded in West Virginia. See also Pen¬ sacola in the Civil War; Fort Pickens.

On 29 Nov. 1861, Gen. Quincy A. Gillmore was ordered to reconnoiter Fort Pulaski at the mouth of the Savannah River. On 1 December he reported that it could be reduced with bat¬ teries at 1,700 yards' distance, a third greater than foreign authorities laid down as practica¬ ble against permanent works. His batteries opened 10 April 1862, breached the walls within 24 hours and the fort surrendered 11 April.

Gen. Robert Anderson was assigned to the Department of Kentucky – 28 May. His head¬ quarters were fixed at Cincinnati on account of the position of Kentucky in regard to neutrality, but on 1 September his headquarters were moved to Louisville. On 8 October General Anderson's health failing, Gen. W. T. Sherman succeeded to the command of the Department of the Cumberland. On 9 November this De¬ partment was discontinued, and under the title of the Department of the Ohio, embracing the States of Ohio, Michigan, Indiana and most of Kentucky and Tennessee, Gen. D. C. Buell was assigned to the command, which he as¬ sumed 15 November. Gen. Ulysses S. Grant was ordered to the pistrict of Southeastern Missouri with headquarters at Cairo, Ill., which he reached 4 September. On the 6th he seized Paducah at the mouth of the Tennessee, and 7 November was defeated in an expedition to Belmont. Gen. J. C. Fremont wTas ordered to Missouri, and assumed command 25 July. Be¬ fore his arrival General Lyon had moved against forces under Gen. Sterling Price with which ex-Governor Jackson was seeking to regain the State (see Carthage; Spring- field), and in the battle of Wilson's Creek (q.v.), 10 August, where Gen. Ben McCulloch commanded, Lyon was killed and Price occu¬ pied southern Missouri. Fremont, upon assum¬ ing command, advanced against Price, and oc¬ cupied Springfield. (See also Lexington, Siege of). Gen. H. W. Halleck succeeded Fremont, assuming command 19 November. Gen. David Hunter then in command at Springfield with¬ drew under orders, leaving the Confederates in possession of southern Missouri for the rest of the year.

On the Confederate side, Gen. Joseph E. Johnston commanded the Army of Northern Virginia, (

From January to April Gen. H. H. Sibley, with Texas forces, wras engaged in attempting to secure New Mexico to the Confederacy. He inflicted much loss on Union posts and com¬ mands under Gen. E. R. S. Canby, but aban¬ doned his purpose the middle of April and re¬ tired to Fort Bliss. See Valverde.

On 6-8 March a severe battle occurred at Pea Ridge (q.v.) or Elkhorn Tavern, Ark., be¬ tween the forces of Gens. S. R. Curtis and Earl Van Dorn, resulting in the retreat of the latter.

As Gen. George H. Thomas was concentrat¬ ing to attack General Crittenden at Beech Grove, Ky., opposite Mill Springs (q.v.) on the Cum¬ berland River, the latter marched at night from his entrenchments and attacked Thomas at Logan's cross roads the morning of 19 January. The Confederates were defeated, pursued to the river and dispersed. This, with Gen. J. A. Garfield's movement up the Big Sandy, and his defeat of Humphrey Marshall at Prestonburg (q.v.), 10 Januarv, broke the right of the Con¬ federate line through Kentucky. On 6 Febru¬ ary Admiral Foote's fleet, supported by Grant's forces, captured Fort Henry on the Tennessee, and Grant's army, moving at once to Fort Donelson on the Cumberland, forced its sur¬ render on the 16th, with about 15,000 men. (See Fort Henry and Fort Donelson). Gen. A. Sidney Johnston (q.v.) then evacuated

Bowling Green 15 February, and Gen. Leonidas Polk withdrew from Columbus 3 March, the movements of the latter being hastened by Gen. John Pope's advance on New Madrid and Island No. 10. This latter w2s captured 7 April. The Confederate forces in Kentucky and Tennessee then withdrew to the line of the Memphis and Charleston Railroad, General Johnston establishing his headquarters at Corinth. General Buell, moving rapidly from Kentucky, occupied Nashville, 25 November. General Johnston, learning that Buell was to join Grant, whose army had been brought from Fort Donelson to Pittsburg Landing, and was camped there awaiting Buell, marched from Corinth to attack Grant before the junction could take place. The Union army was unex¬ pectedly attacked 6 April at Shiloh Church, two miles and a half in front of Pittsburg Landing, and forced back to the immediate vicinit3r of the landing. The advance of Buell arrived about sundown, and during the night

four divisions, three of Buell's army and Lew Wallace's of Grant's, reached the field. The next day the Confederates under General Beauregard, being largely outnumbered, were defeated and returned to Corinth. Gen. A. Sidney Johnston was killed near the close of the first day's fight. See Shiloh.

General Halleck arrived from Saint Louis 11 April and took command. General Pope's army was brought from Island No. 10. On 30 April an advance began on Corinth (q.v.) by slow approaches. The Confederates brought Price and Van Dorn from west of the Missis¬ sippi. On 30 May General Halleck's lines were close to the city, and an attack was meditated, when it was found that the Confederates had already evacuated the place. After a short pursuit under Pope and Buell, as far as Black- land, the Union army was concentrated at Corinth, and extensive fortifications were erected. The army was soon divided, and Buell with the Army of the Ohio was sent toward Chattanooga, with orders to repair the railroad

as he advanced. Gen. Braxton Bragg, who had succeeded Beauregard, proceeding to Chatta¬ nooga by way of Mobile and moving rapidly north behind the Cuinberlands, compelled Buell to withdraw to the Ohio River to protect his de¬ partment, which included Indiana, Ohio and Michigan. (See Morgan's Raid). Gen. E. Kirby Smith, at the same time, invaded Ken¬ tucky by way of Cumberland Gap (q.v.), de¬ feated Union forces at Richmond (q.v.), 30 August, and threatened Cincinnati. Buell, upon reaching Louisville, advanced upon Bragg. On 8 October resulted the battle of Perryville (q.v.), by which Bragg was compelled to abandon Kentucky. Passing through Cumber¬ land Gap he retired to Chattanooga, whence he advanced to Murfreesboro in central Tennessee, and went into winter quarters. See Harts- ville; Parker's Cross Roads.

During the operations at Pittsburg Landing and Corinth Gen. O. M. Mitchell advanced with a division from Murfreesboro 5 April, reached Huntsville 11 April, and seized the Memphis and Charleston Railroad from Decatur to Bridgeport. Gen. J. S. Negley's brigade crossed the mountains and bombarded Chattanooga 7 June. Mitchell's operations drew Gen. E. Kirby Smith from East Tennessee, and left the way open for Gen. G. W. Morgan at Cumberland Ford, Ky., to seize Cumberland Gap.

In September Price and Van Dorn, who had previously joined Beauregard from beyond the Mississippi, moved against Grant and Rose- crans in the region of Corinth. Price was de¬ feated by Rosecrans 19 September, at Iuka (q.v.), and Van Dorn, supported by Price, 4 October, at Corinth (q.v.). (See also Hatchie River). From this campaign Rosecrans was sent to relieve Buell in command of the Army of the Cumberland, then styled the Fourteenth corps. On 30 October General Rosecrans re¬ lieved General Buell, and concentrated his army at Nashville (q.v.). On 26 December he moved toward Murfreesboro to attack Bragg. The battle began on the last day of the year, and continued during the days of 1-2 Jan. 1863. (See Stone River). General Bragg retreated the night of 3 January, eventually taking up positions at Shelbyville, Tullahoma and War- trace. General Rosecrans occupied Murfrees¬ boro. The respective armies remained on these lines until Rosecrans' advance in June 1863.

While Rosecrans was succeeding at Mur¬ freesboro, there was a noted Confederate victory at Galveston (q.v.). General Magruder, with a fleet of ordinary river boats, protected with hay and

cotton bales, captured the Harriet Lane 1 January, sunk the gunboat Westfield and re¬ ceived the surrender of the forces holding the city. The Confederate Alabama (q.v.), arriving shortly after, captured the gunboat Hatter as.

Both river fleets of armored and unarmored gunboats, mortar-boats and rams were actively engaged on the western rivers. The Union fleet, Com. A. H. Foote, was composed of 45 vessels of various classes and 38 mortar- boats. The Confederate fleet, Commodore Montgomery, was somewhat less, but con¬ tained several formidable vessels. Commodore Foote's gunboats captured Fort Henry on the Tennessee and played an important part at Fort Donelson, Pittsburg Landing and New Madrid. Commodore Montgomery awaited Foote's fleet, now under the command of

Com. C. H. Davis, before Memphis. The Union fleet was made up of 5 gunboats with 68 guns and 4 rams; the Confederates of 8 gun¬ boats with 28 guns. After a desperate battle, 6 June, against great odds, the Confederate flotilla was destroyed and Memphis surren¬ dered to the fleet. (See also Saint Charles). Davis left Memphis 29 June and 1 July reached Young's Point, where he joined Adm. David G. Farragut's fleet from New Orleans, which had run the Vicksburg batteries.

The year 1862 opened at the east with very general dissatisfaction over the long inaction of General McClellan. Gen. Joseph E. Johnston was at Manassas and Centreville with some 50,000 men, but General McClellan, misled by his secret service, continually insisted that there were three times that number. The Army of the Potomac numbered fully 150,000 present for duty. The Potomac was blockaded and the Confederate flag floated on Munson's Hill in sight of Washington. On 31 January President Lincoln gave McClellan a peremptory order to move on Manassas not later than 22 February. McClellan asked leave to present a plan of his own for a movement down the Potomac, up the Rappahannock, across to York and thence to Richmond. While he was discussing it, John¬ ston, placing <(Quaker guns® in his embrasures at Centreville, withdrew unmolested behind the Rappahannock to a line of works and field depot already prepared.

Just as his movement began occurred the ominous attack, 8 March, of the Confederate ironclad Merrimac, Flag Officer Franklin Bu¬ chanan, which suddenly moved out from Nor¬ folk and attacked the Union fleet in Hampton Roads (q.v.), sinking the frigate Cumberland, capturing and destroying the frigate Congress, doing much other damage and startling the entire Eastern coast. On resuming operations the next day the Merrimac was met and foiled by the Monitor, Lieut. John L. Worden (q.v.), which had just arrived. The Merrimac then retired to Norfolk, being blown up when the Confederates evacuated that city, 9 May. See Monitor and Merrimac.

McClellan was allowed to undertake his Peninsula campaign (q.v.). On 11 March he was relieved from the general command of the ar¬ mies. The Army of the Potomac was trans¬ ported to Fort Monroe and the movement up the peninsula toward Yorktown (q.v.) began 4 April. Heavy rains caused delays from the start. It was found at Washington that the designated number of men had not been left for the proper defense of the capital. McDowell's corps was therefore retained. Arriving before Yorktown with about three times the strength of the enemy, he concluded to lay regular siege to the position. (See Lee's Mills). Parallels were therefore opened, nearly 100 heavy siege guns were brought up and at the end of a month, as his batteries were about to open, Gen. J. E. Johnston evacuated the place 3 May and withdrew toward Richmond. He halted at Williamsburg (q.v.), where on the 5th an attack was made upon his lines and at night he withdrew toward .Richmond. (See West Point, Engagement at). McClellan followed to the Chickahominy. On 15 May the Union fleet in the James made an unsuccessful attack on Drewry's Bluff (See Fort Dar¬ ling), eight miles below Richmond. On

20 May the right of his army crossed the Chickahominy (see also Hanover Court House) and advanced to Seven Pines, or Fair Oaks (q.v.), about five miles from Richmond, where he was attacked by General Johnston 31 May. The prompt advance of Sumner's corps from the other side of the Chickahominy pre¬ vented serious disaster. At the close of the day General Johnston was badly wounded and carried from the field. Gen. Gustavus W. Smith commanded temporarily and was suc¬ ceeded 2 June by Gen. Robert E. Lee, who con¬ tinued in command of the Army of

Northern Virginia until Appomattox. On 1 June the battle was renewed by the Confederates, the troops regained their lost ground and Lee with¬ drew to the fortifications of Richmond.

On 16 June the Union forces on James Is¬ land in Charlestown harbor, under General Ben- ham, met with a severe repulse at Secession- ville (q.v). General ((Stonewall)) Jackson, by a brilliant campaign in the Valley, had prevented

the must of McDowell's corps, then in the vicinity of Fredericksburg, from reinforcing McClellan. (See Shenandoah Valley; Kerns- town ; McDowell ; Front Royal ; Harrison¬ burg). By moving rapidly down the Valley he defeated Banks at Winchester (q.v.) and forced him across the Potomac, 26 May. Re¬ turning, he defeated Gen. J. C. Fremont at Cross Keys, 8 June, on one flank and Gen. James Shields at Port Republic, 9 June, on the other, and after a week spent in .deceiving General Fremont into the belief that he was about to advance down the Valley, by a rapid and unsuspected movement he appeared 25 June at Ashland on the flank of McClellan's army in front of Richmond. Then followed the Seven Days' battles, beginning with Mechanics- ville 26 June and ending at Malvern Hill 2 July, whence the Army of the Potomac with¬ drew to Harrison's Landing on the Tames. (See Seven Days' Battles ; Oak Grove ; Mechanicsville; Gaines' Mill; Peach Or¬

chard; Savage Station; Glendale; Malvern Hill. See also Stuart's Ride Around the Army of the Potomac). The only victories of the series wrere the first and last battles. The Peninsula campaign had ended as a disastrous failure. General McClellan had been relieved from the command of all the armies 11 March, retaining that of the Army of the Potomac, and Halleck assumed the chief command 23 July.

Against McClellan's protest, it was decided to withdraw his army from the Peninsula to the vicinity of Washington. To cover this move¬ ment and protect Washington, Gen. John Pope was given command of the Army of Virginia, organized with the corps of McDowell, Banks and Fremont. Pope concentrated his army north of Culpeper and began with his cavalry to operate towards Lee's railroad communica¬ tions at Gordonsville. Lee, though McClel¬ lan's army was still within striking distance of Richmond, at once sent a portion of Jackson's

and Gen. James Longstreet's corps to Gordons¬ ville. Pope took the field 29 June and threat¬ ened Gordonsville again. ˆStonewall® Jackson advanced on the 7th, reaching Cedar Mountain on the 9th. Here Banks attacked and was de¬ feated. Jackson retired beyond the Rapidan, and upon Lee, with Longstreet, coming up, Pope retired behind the Rappahannock. By a long detour, by way of Salem and Thoroughfare Gap, Jackson moved rapidly around Pope's right and 26 July destroyed his stores at Bristoe Station and Manassas in his rear, retiring to the former battlefield of Bull Run. On the 23d Reynolds' division from the Army of the Potomac joined McDowell and on the 25th Gen. S. P. Heintzelman's corps, two divisions, arrived and the next day Fitz-John Porter's corps of two divisions reached Pope. The bat¬ tle of Gainesville followed on the 28th, result¬ ing in the retirement of two of McDowell's divisions. At Groveton on the 29th the head of Longstreet's forces reached the field and

took part in the closing fight. All the battles of the campaign had been desperately fought by both sides. On the 30th occurred the second battle of Bull Run (q.v.). Pope was defeated, but withdrew unmolested to Centreville beyond Bull Run. Here he was joined by the strong corps of Sumner and Franklin from McClel¬ lan's army. A flank movement by Jackson led to the battle of Chantilly (q.v.). Pope then, under orders, 2 September, withdrew his army to the fortifications of Washington.*

Pope was then relieved; his forces were added to the Army of the Potomac and Mc¬ Clellan took command of the combined army. The first Confederate invasion of the North followed. On 3 September Lee put his army in motion from Chantilly toward the Potomac. The crossing was accomplished in the vicinity of Leesburg on the 5th, the army moving for¬ ward to Frederick, where on the 7th Lee is¬ sued a proclamation setting forth that his army had come to help them regain the rights of which they had been despoiled. This was coldly received. Upon learning that the garrison of Har¬ per's Ferry (q.v.) had not withdrawn, he de¬ tached forces which invested and captured that place with its garrison of 11,000 men and over 70 guns. (See Maryland Heights). Lee, who, with

Longstreet's command, had marched to Hagerstown, turned back to hold Turner's Gap in South Mountain (q.v.), but was defeated on the 14th and fell back to Sharpsburg, where he was subsequently joined by the forces detached against Harper's Ferry.

McClellan advanced from Washington 5 September toward Frederick, Md., the right wing and centre passing through that place on the 13th, the right moving to Turner's and the left to Crampton's Gap. Both these posi¬ tions were carried on the 14th after sharp fight¬ ing. On the 15th Lee took position on the high ground beyond Antietam Creek and in front of Sharpsburg. Gen. Joseph Hooker's corps attacked his left toward evening of the 16th, the fighting continuing until after dark. The general engagement began at daylight on the 1 7th, lasting for 14 hours, the losses being greater than for any one day's fighting of the war. (See Antietam). The advantages were with the Union army, though Lee maintained his lines during the 18th, but at night withdrew and crossed the Potomac, ending the first in¬ vasion of the North. (See Maryland Cam¬ paign of September 1862). Lee remained a month about Winchester (see Shepiierdstown (Boteler's) Ford), and upon the Union army's crossing into Virginia and moving toward Win¬ chester he took position behind the Rappahan¬ nock.

Near Warrenton, 7 November, McClellan was superseded by Gen. Ambrose E. Burnside, under an order dated 5 November. The latter took position opposite Fredericksburg (q.v.) 19 November, and, 13 December, forced a crossing into the city and below it. After great slaugh¬ ter, largely incurred in assaults on Marye's Heights, he was repulsed and obliged to re¬ cross the river. The next month he attempted to cross above Fredericksburg and turn Lee's left. An unusual storm made advance impossi¬ ble, the army finding itself actually stalled, the movement becoming known as the great Mud March. After this failure Burnside was re¬ lieved by Hooker 26 Jan. 1863.

The navy was active and effective through¬ out 1862. The blockade became exceedingly stringent for the Confederacy; warlike and commercial supplies alike were very difficult to obtain. On 11 January General Burnside and Com. L. M. Goldsborough sailed from Fort Monro.e, capturing Roanoke Island (q.v.) 5 February, Newbern (q.v.) 14 March, and taking Fort Macon (q.v.) with its garrison 26 April. See also South Mills.

General Butler and Admiral Farragut sailed from Fort Monroe 25 February for a move against New Orleans (q.v.). After a terrific engagement, participated in by Commander D. Porter with mortar-boats, and in which the Confederates exhibited great endurance, the chain across the river below forts Saint Philip and Jackson was cut, and 24 April Far¬ ragut forced his fleet past the forts, and after terrific fighting, during which the V aruna was sunk by the fire of the forts, appeared before New Orleans on the 25th, General Lovell, who held the city with a small force, some 3,000, retiring. General Butler arrived with his troops 1 May, and took full possession, taking Baton Rouge 9 May, and Natchez on the 13th, neither being fortified. Farragut's fleet then ascended the Mississippi. He ran past the batteries at Vicksburg and joined Commodore Foote's (Davis') fleet from Memphis at Young's Point. Retiring to New Orleans, thus running the Vicksburg batteries a second time, he found letters from Washington urging him to clear the Mississippi. On 25 June his fleet, with Portef's mortar fleet, was assembled at Vicks¬ burg, and on the 28th, after a short engagement, two ships and five gunboats ran the batteries and again joined Davis' fleet above the city. On 15 July the Confederate ironclad Arkansas came out of the Yazoo, ran directly through the Union fleet, none of its vessels having steam up, and gained the shelter of the Vicksburg bat¬ teries. Farragut ran the batteries that night, and attempted to destroy the Arkansas while passing the city wharves, but failed. On 20 July his fleet w'as ordered to New Orleans, where it arrived on the 29th.

Grant, from Corinth, 1 November, began his first move against Vicksburg (q.v.), by ordering his troops forward to Grand Junction, purpos¬ ing to move along the railroad by way of Holly Springs and Grenada to the rear of the city, while Sherman should co-operate from Mem¬ phis. A raid by Forrest destroyed long reaches of railroad above Jackson, and the destruction of the depot of supplies with its immense stores at Holly Springs (q.v.) 20 December, by Van Dorn, effectually paralyzed Grant's advance toward Vicksburg.

During Forrest's and Van Dorn's opera¬ tions east of the Mississippi Gen. T. C. Hind¬ man, in Arkansas, attacked Gens. F. J. Herron and J. G. Blunt at Prairie Grove (q.v.), but retreated after a severe engagement. On 16 December Gen. N. P. Banks relieved General Butler at New Orleans.

Sherman was then sent, 20 December, from Memphis down the Mississippi to ascend the Yazoo and attempt the capture of the left flank of the defenses of the city at Haines' Bluff. He assaulted at Chickasaw Bayou (q.v.) 29 December, with disastrous results, and returned to the mouth of the Yazoo, where he was met by Gen. J. A. McClernand with orders to as-

sume general command. This officer at once moved up the Arkansas River with Porter's gunboat fleet and Sherman's and G. W. Mor¬ gan's corps, captured Fort Hindman (q.v.) 11 January, and returned to Young's Point. From this position the Vicksburg campaign of 1863 began, which opened the Union operations of that year.

The first attempt was to cut a canal across the peninsula opposite Vicksburg, which would allow the army to move below Vicksburg. After working on this from 22 January to 7 March, a flood destroyed it. Efforts were next made to open a way through Lake Providence to the Red River, making a circuit of 350 miles to a point below the city. Both this plan and one for the east side through the Yazoo pass leading to the rear of the city, being actively opposed by the Confederates, and found other¬ wise exceedingly difficult, were abandoned. See Yazoo Pass and Steele's Bayou.

A way was finally found from Milliken's

withdrew into Vicksburg, followed by Grant. On the 19th Grant ordered an assault, which was repulsed, and again on the 22d, with the same result. A regular siege was then under¬ taken, and Pemberton's army was starved out and surrendered 4 July. See also Jackson, Siege of; Yazoo City.

On 24 May 1863, Gen. J. M. Schofield, who had been active and prominent in Missouri from the first, relieved General Curtis in command of the Department of the Missouri. During the Vicksburg campaign he sent all troops that could be spared to Grant. Upon their return he was able to advance General Steele to the line of the Arkansas and hold it thereafter. (See also Helena; Little Rock; Pine Bluff). During 8-14 June, Grant received a division from Gen. S. A. Hurlbut's command, under Gen. Sooy Smith, one from the Department of the Missouri, under General Herron, and two divi¬ sions of the Ninth corps under Gen. J. G. Parke. During the operations of General Grant about

Bend (q.v.) by way of New Carthage to a point on the river opposite Bruinsburg. On the night of 16 April the memorable running of the Vicksburg batteries by the fleet of Admiral Porter, convoying transports, was successfully accomplished. The means of ferrying his forces over the Mississippi being thus secured, the advance of the army crossed 30 April. Port Gibson was captured 1 May, after a stubborn and most gallant defense against a greatly superior force by Generals Bowen, Baldwin and Cockrell. Grant was then on solid ground in rear of Vicksburg. See also Raymond.

He moved at once to intervene between Pem¬ berton at Vicksburg and Johnston, who was seeking a junction with Pemberton. Johnston was forced out of Jackson by Sherman's and Gen. James B. McPherson's troops 14 May. Grant then turned toward Pemberton, advanc¬ ing from Vicksburg, defeated him at Champion's Hill (q.v.) on the 16th, again at Big Black Bridge (q.v.) on the 18th, whence Pemberton

Vicksburg General Banks was active in Louis¬ iana. After three unsuccessful attempts against Port Hudson (q.v.), which he twice assaulted, it finally surrendered 8 July, upon hearing of the capture of Vicksburg.

In January, February and March 1863, the Union ironclads under Admiral Dupont made unsuccessful attacks upon Fort McAllister(q.v.) in the Ogeechee River, but in one of them de¬ stroyed the noted blockade-runner Nashville. The Confederates were active on the North Carolina coast early in 1863 (see Newbern; Washington; Suffolk) and General Hoke captured Plymouth (q.v.) 20 April 1864. See also Albemarle, The.

The campaign of the year in the Army of the Potomac was opened by Hooker. (See Stoneman's Virginia Raid). On 28 April Gen. John Sedgwick's corps was thrown across the Rappahannock at Fredericksburg, the rest of his army crossing above at Kelly's ford, and thence advancing across the

Rapidan at Get-

l v

maniia and Ely‘s fords, to and beyond Chancel- lorsville (q.v.). His force was fully twice that of Lee. On 1 May Hooker’s advance fell back to Chanccllorsville. On 2 May <(Stone- walP Jackson’s corps of three divisions was descried at different times during the day from several points of the Union line moving toward its right. No preparations were made to guard against a flank attack, though orders to that effect were early given. At 6 p.m., while the troops of the Eleventh corps holding the right were at supper* Jackson’s solid columns burst Upon them and disastrously routed the Union right. On the 3d Sedgwick’s corps advanced from Fredericksburg to Salem Church, was. de¬ feated that afternoon, and recrossed the river on the night of the 4th. The night of the 2d Jackson, reconnoitering in front of his pickets, was mistakenly fired on by them and mortally wounded. On the 3d, by hot fighting, Hooker’s lines were forced further to the rear. The 4th passed without an engagement, as Lee, with the greater part of his army, was at Salem Church. The night of the 5th Hooker, thor¬ oughly defeated, recrossed the river, and his army was reassembled at Falmouth.*

On 3 June, Lee, from Fredericksburg, be¬ gan his second invasion of the North, Long- street’s troops leading. After minor engage¬ ments in the Valley (see Fleetwood and Brandy Station; Winchester, Second Battle of; Middleburg, Aldie and Upperville; Han¬ over; Martinsburg), Gen. R. S. Ewell’s ad¬ vance crossed the Potomac at Williamsport 15- 16 June, moved forward to Chambersburg, and had reached the vicinity of Harrisburg and Columbia on the Susquehanna, and captured York 28 June, when recalled to Gettysburg, where Lee’s army was concentrating. See Stuart’s Raid to Chambersburg; Wrights- ville.

Meantime, the Army of the Potomac under Hooker reached the vicinity of Frederick, when Hooker, not being allowed to order the garrison of Harper’s Ferry, over 10,000 strong, to join him, asked to be relieved, and Gen. George G. Meade succeeded him. The two armies met at Gettysburg 1 July. A three days’ battle followed. Lee retreated the night of the 3d, but succeeded in recrossing the Potomac with¬ out a battle, and after a month’s rest in the Shenandoah resumed his former lines behind the Rappanhannock. (See Gettysburg, Battle of). Meade followed later to that stream. (See Manassas Gap; Jeffersonton ; Kelly’s Ford; Rappahannock Station).. With the exception of the Mine Run campaign (q.v.) 26 November to 2 December, inaugurated by Gen¬ eral Meade, but without important results, both armies remained in their camps until the spring of 1864. See also Richmond, Kilpatrick’s Expedition to.

The campaign of the Army of the Cumber¬ land for 1863 began 23 June, the objective be¬ ing the recovery of middle Tennessee. (See also Sanders’ Raid into East Tennessee). The Union army under Rosecrans held the line of Stone’s River, headquarters at Murfreesboro; the Confederates under General Bragg, the gen¬ eral line of Duck River, with headquarters at Tullahoma. By feinting against Bragg’s left at Shelbyville and turning his right, both flanks being established in entrenched camps, Bragg was forced out of his lines and retreated over

the Cumberlands and across the Tennessee to Chattanooga. It was chiefly a strategic cam¬ paign, carried on in continuous rains of most unusual severity, occupying nine days, and in¬ volving a total loss of only 560 killed, wounded and missing. The Union line advanced to the western base of the Cumberland Mountains. See Thompson’s Station; Vaught’s Hill; Streight’s Raid from Tuscumbia; Morgan’s Raid; Tullahoma Campaign.

The succeeding campaign, having Chatta¬ nooga for its objective, required extensive re¬ pairs to the railroad and an accumulation of supplies sufficient for leaving a base for a month, and moving in a mountainous region largely barren. The movement began 16 August. Bragg was at Chattanooga. Rose¬ crans’ army lay along the western base of the Cumberlands from Winchester to McMinnville. Rosecrans feinted with his left corps, Gen. T. L. Crittenden’s, by throwing it from McMinnville over the mountains, its advance being into the valley of the Tennessee above Chattanooga. This led to the belief that a junction was to be formed with Burnside from Knoxville, or an attack made upon the

city from that quarter. Bragg, as a result, fixed his attention upon this move. Meantime the centre corps, Thomas', and the right, Gen. A. McD. McCook's, crossed the Cumberlands and the Tennessee River some 30 miles below Chattanooga, continued over the Sand Mountains, and ascended the Lookout range — all bold mountains with palisaded sum¬ mits crossed only by very difficult and widely separated mountain trails. When Rosecrans' columns were ascertained to be on Lookout, Bragg, 7 and 8 September, withdrew from Chattanooga, the heads of the Union columns having in the meantime descended into Mc- Lemore's Cove, south of Chattanooga. Upon Bragg's reaching Lafayette, 26 miles south of Chattanooga, he awaited Longstreet's ar¬ rival from Virginia, meantime unsuccessfully demonstrating against Rosecrans' centre and left east of Lookout in the valley of the Chicka- mauga. Crittenden's corps, after having ac¬ complished its diversion, had crossed the Ten¬ nessee, left one brigade in Chattanooga, 9 Sep¬ tember, and moved south through Rossville to a position on Rosecrans' left at Lee and Gor¬ don's Mill on the Chickamauga. Bragg, strengthened by Longstreet, started back 17 September toward Chattanooga, seeking to in¬ terpose between Rosecrans and that city. Rose¬ crans, by a night march, 18 September, . pro¬ ceeded toward Chattanooga, formed his lines between Bragg and the city, nine miles south of it, at Chickamauga (q.v.). A two days' battle, 19 and 20 September, ensued for the possession of the roads to Chattanooga. At noon of the second day Longstreet broke through a gap at the centre of the Union lines, cut off two divi¬ sions of the right wing, and forced them with fragments of other divisions from the field, Rosecrans, McCook and Crittenden being caught in the break. General Thomas, with the greater part of seven divisions, held the field, and at night withdrew to Rossville and there reformed the army between Bragg and the city, thus securing its possession without further fighting. Bragg advanced on the 22d, and formed his lines in front of the city, which Rosecrans soon rendered impregnable by heavy earthworks. Bragg's lines embraced Lookout

Mountain and Missionary Ridge, heights over¬ looking the city, the mountain position closing the river line of supplies. The situation of the Union army soon became precarious for want of food and forage. (See also Philadelphia, Tenn., Military Operations at). Hooker, with the Eleventh and Twelfth corps was or¬ dered from the Army of the Potomac, reaching Bridgeport 30 September; and Sherman, with four divisions from the vicinity of Vicksburg. Grant was assigned to general command, ar¬ riving 23 October. Rosecrans was replaced by Gen. George H. Thomas 19 October. The river line of supplies was opened 28 October upon a plan devised by General Rosecrans and executed by Gen. W. F. Smith, Hooker being brought forward to Lookout Valley, and troops from Chattanooga forming a junction with him. The battle of Chattanooga (q.v.) ac- cupied three days. On 23 November Thomas, in the centre, threw forward one division, sup¬ ported by four, and captured the advanced line of Bragg. The night of the 23d Sherman crossed the river six miles above the city and seized an unoccupied range overlooking the north end of Missionary Ridge. On 24 Novem¬ ber Hooker carried the western and northern slopes of Lookout Mountain, and the next day moved against the south end of Missionary Ridge. The afternoon of 25 November Thomas, at the centre, assaulted Missionary Ridge, his storming line being two and a half miles front, carried the earthworks at the foot of the ridge, and next the ridge itself, captur¬ ing 37 guns on the summit, and forcing a gen¬ eral retreat. From this time Chattanooga re¬ mained in Union control to the close of the war. See also Ringgold Gap.

The same day that Rosecrans started from Winchester, Tenn., for Chattanooga, Burnside with the Army of the Ohio (Twenty-third corps) left Lexington, Ky., for Knoxville, Tenn. (q.v.), his Ninth corps being still with Grant near Vicksburg. He reached Knoxville 2 September. Being ordered to assist Rose¬ crans at Chattanooga, he was held by demon¬ strations of a small force from making the junction. (See Rogersville; Campbell's Sta¬ tion). On 4 November Bragg dispatched Longstreet's corps from Chattanooga to besiege Knoxville. On the 29th he assaulted Fort Saunders and was repulsed with serious loss. S'herman, who was sent by Grant from Chatta¬ nooga after the success there, now approaching, Longstreet retreated to Virginia. On 16 De¬ cember Burnside was relieved and ordered to recruit the Ninth corps, which was assembled at Annapolis.

Throughout these operations both Union and Confederate forces in Charleston harbor had been engaged in formidable attack and most stubborn and brilliant defense. General Gill- more, who had reached Charleston 12 June, immediately undertook engineering and siege work of unprecedented

character as to success at long ranges ; and finally, after several severe repulses, forced the evacuation of Fort Wag¬ ner (q.v.) 7 September, and soon shells reached the city from his long-range guns. While some of these fell in Charleston 31 August, the regular bombardment began 16 November.

On 28 Jan. 1864, General Rosecrans was ordered to relieve Gen. John M Schofield in Missouri, the latter being assigned a little later

to the command of the Department and Army of the Ohio at Knoxville. General Rosecrans repulsed the invasion of General Price, and then sent troops not needed to General Thomas at Nashville. On 20 February an expedition sent from Charleston to Florida by General Gillmore under General Seymour was dis¬ astrously defeated by General Finegan at Olustee (q.v.). From February to December 1864, General Forrest was active throughout West Tennessee and northern Mississippi and Alabama, performing much brilliant cavalry service, to the continued disturbance of all Union commands in those regions. See Fort Pillow; Guntown; Tupelo.

Early in the spring of 1864 Banks, supported by Admiral Porter's fleet, was ordered to ad¬ vance up the Red River (q.v.). (See also Sabine Pass; Sterling's Plantation). At Sabine Crossroads (q.v.) 8 April, he was de¬ feated and driven back to Pleasant Grove, and thence to Pleasant Hill 13 April, where A. J. Smith, from Sherman's army, reinforced him. The fleet narrowly escaped capture by the fall¬ ing of the river, and altogether the campaign was a decided failure. (See Yellow Bayou). The defeat of Banks enabled the Confederate general, J. F. Fagan, to force Gen. Frederick Steele, who was advancing to co-operate with Banks, back to Little Rock. (See Marks' Mills; Jenkins' Ferry; Poison Springs). Banks was relieved 12 May by Gen. E. R. S. Canby.

On 12 March 1864, General Grant, who had been commissioned lieutenant-general, that grade having been revived by Congress, was placed in command of all the armies. Early in April he had formed a plan for a combined movement of the armies to begin toward the last of the month, and had communicated the same to Meade with the Army of the Potomac, Butler at Fort Monroe, Sherman at Chatta¬ nooga and Banks at New Orleans. The main Confederate armies were those of Lee, at Orange, with Longstreet at Gordonsville, con¬ fronting Meade in the vicinity of Culpeper, and Johnston at Dalton, Ga., facing Sherman in the vicinity of Chattanooga.

Grant's general plan was for Gillmore, from South Carolina, with 10,000 men, to join But¬ ler at Fort Monroe, giving him 23,000 troops for a move up the James to capture City Point, threatening Petersburg and the rear of Rich¬ mond. (See Richmond, Union Campaigns Against). Burnside, with 25,000 men as¬ sembling at Annapolis, was to join Meade, and the Army of the Potomac was to advance toward Richmond by Lee's right. Sherman, with three armies, the Cumberland, under George H. Thomas, the Tennessee, under Mc¬ Pherson, and the Ohio, under Schofield, aggre¬ gating nearly 100,000 men, was to move against Johnston's army at Dalton and follow it. (See also Meridian, Expedition to; Yazoo City). Banks was to leave the Red River country to Steele and the navy, abandon Texas and move against Mobile with his 25,000 men, re-inforced by 5,000 from Missouri.

Grant established his headquarters with the Army of the Potomac, Meade having the full direction of the army under Grant's general orders. The Army of the Potomac moved toward the Rajiidan in the early morning of 4 May, and by night all the troops had crossed.

Grant's force was about 119,000, and Lee's about 62,000. Lee pushed rapidly to his right and struck Grant's advance in the Wilderness (q.v.) 5 May. Terrific fighting followed till the night of the 6th. (See Todd's Tavern). Lee pushed on to Spottsylvania (q.v.), reaching it in advance of Grant and interposing on the line to Richmond. Both armies entrenched, and from the 8th there was bitter fighting until the night of the 20th (see Po River), when Grant started for North Anna (q.v.). From Spott¬ sylvania 8 May, P. H. Sheridan (q.v.), com¬ manding Grant's cavalry, made a raid around Lee's army, encountering and defeating J. E. B. Stuart at Yellow Tavern 11 May, where Stuart was killed. Sheridan spent a day within the outer defenses of Richmond, and joined Butler on the James. (See Richmond, Sheridan's Raid on Communications with). Grant pro¬ ceeded to move to his left,

everywhere opposed by Lee, fighting heavily at North Anna and Bethesda Church (see also Hawes' Shop;

the rear of Richmond was defeated. Lee oc¬ cupied the Petersburg lines. Grant attacked the works several times unsuccessfully from 15 to 18 June. On 30 July an attempt on the works was made by exploding a mine. The explosion was a great success, but the assault to follow it was a failure. This was the battle of The Crater.

From the establishment of Grant's lines be¬ fore Petersburg frequent and heavy fighting continued until about 1 November, but with little permanent impression on General Lee's lines. (See Jerusalem Plank Road; Deep Bottom; Globe Tavern; Reams' Station, Poplar Springs Church ; Hatcher's Run [Boydton Road]; Fair Oaks — Darbytown Road). The Union left, however, was extended across the Weldon Railroad. On 28 September General Butler, with two corps, crossed to the north side of the James and captured Fort Harrison (q.v.), a position from which Rich¬ mond was seriously threatened. On 16 Novem-*

Confederate Possession

IOWA

KANS.

TENN.

U/ashngtan

licfiTnimi.

Close oJlflbH-

No. 5

■*Close o$ ist>9*

Pamunkey and Totopotomoy), reaching Cold Harbor (q.v.) 2 June. On the 3d Grant as¬ saulted along his whole line, to meet in an hour with terrible slaughter and repulse, so serious that an order for a second assault was not carried out. Grant had failed to interpose between Lee and Richmond. From Cold Har¬ bor he sent Sheridan with his cavalry to occupy the attention of Fitzhugh Lee's and Hampton's (qq.v.) cavalry while he withdrew to the James. Sheridan defeated both at Trevilian Station. (See Trevilian Raid; also Saint Mary's Church). Grant then moved without inter¬ ruption to the James, reaching it 13 June, and crossing it in the vicinity of City Point and Bermuda Hundred (q.v.). General Butler had occupied these points 5 May. (See also Swift Creek). On the 14th Butler carried the outer defenses of Drewry's Bluff (q.v.), but was thence driven back by Beauregard's troops, who had arrived from the south, and his contem¬ plated movement toward Petersburg (q.v.) and

ber Butler, supported by Porter's fleet, was sent to capture Fort Fisher (q.v.), but failed. Dur¬ ing the winter the lines of each army were greatly strengthened. On 7 December Grant had extended his left 20 miles to Hicksford on the Weldon Railroad. On 22 June Gen. James H. Wilson, with two divisions of cavalry, moved against the railroads south of Richmond, destroying nearly 50 miles of track, and in¬ flicting much other serious damage. His return route was blocked, but he brought his forces in with some loss of both artillery and trains. He had severed all railroad connections with Richmond, and they were not fully restored for several weeks. (See Weldon and South Side Railroads). Gen. Franz Sigel's campaign began 1 May. On the 15th he moved up the Shenandoah to New Market and was defeated, cadets from the Virginia Military Institute tak¬ ing prominent part. At Grant's request Sigel was suspended and Gen. David Hunter assigned. The latter pushed on to Lynchburg (see Pied-

mont), but was compelled by Gen. Jubal A. Early (q.v.) to retreat from that point by way of the Kanawha and Ohio rivers to Parkers¬ burg, and thence by rail to the east. Gen. George Crook's wing of Sigel's column from the Kanawha penetrated tq the Tennessee and Virginia Railroad at Wytheville (q.v.). See also Cloyd's Mountain.

On 6 May General Sherman moved from the vicinity of Chattanooga against General Johnston at Dalton (q.v.). The Union army had in round numbers 100,000, the Confederates being about half as strong. After vainly at¬ tacking the gaps and ranges in front of Dalton for several days, Sherman passed his army through Snake Creek Gap leading to the rear of Dalton. This compelled General Johnston to retire from his camps, and he was defeated at Resaca (q.v.). Johnston resisted stubbornly at every step, but he was successively flanked out of every new position until he reached Atlanta. (See Rome; Dallas; New Hope Church; Marietta ; Pine Mountain ; Kolbs Farm ; Kenesaw Mountain; Smyrna Camp Ground). Fighting had been in progress at some points of the line from May till September. Johnston was succeeded by Hood 18 July, and on the 20th Hood attacked at Peach Tree Creek (q.v.) and . was repulsed with great loss. He then moved out of Atlanta and attacked, and was again defeated. (See Leggett's or Bald Hill). General McPherson, commanding the Army of the Tennessee, was killed. The next attack was at Ezra Church (q.v.) 28 July, upon the Army of the Tennessee, this also being repulsed after three hours' severe fighting, with much loss. See also Stoneman's Macon Raid.

On 2 September Sherman occupied Atlanta, which was evacuated as a result of his moving to the rear of the city on Jonesboro (q.v.). Hood first raided Sherman's railroad communi¬ cations, fighting heavily at Allatoona 5 October, and soon after moved northward. General Thomas was sent to resist his movement if he invaded Tennessee, and Sherman started 15 November on his March to the Sea (q.v. See also Griswoldville) . While it was originally intended by General Grant that he should move from Atlanta to Mobile, the harbor there hav¬ ing been captured 5-23 August by Farragut and Canby, he decided upon the alternative which Grant had suggested before the campaign opened, and started for Savannah.

The fight of Farragut's fleet in the harbor of Mobile, which decided Sherman's march to Savannah, was one of the most brilliant in naval warfare. (See Fort Gains and Fort Morgan; Mobile Bay; Fort Blakely). The Confederate fleet was destroyed, including the far-famed ironclad ram Tennessee. Sher¬ man reached Savannah with slight opposition. (See Fort McAllister; also Honey Hill). On 17 December he summoned Hardee to sur¬ render. The latter refused, and on the night of the 20th retired with his force of 10,000 without molestation. The next morning the Union army entered.

Meantime Hood had invaded Tennessee with the entire army with which Sherman's three armies had been confronted from March till September. General Thomas left with two small but excellent corps, by great exertion organized an army to oppose Hood. (See Spring Hill). On 30 November General Scho-

field, commanding in the field in front of Hood, inflicted a nearly fatal blow upon him at Frank¬ lin (q.v.). After General Thomas' forces were united at Nashville (q.v.) 15-16 December, he attacked Hood's entrenchments in front of the city and dispersed and practically annihilated his army.. See also Russellville; Stoneman's Raid from East Tennessee; Saltville.

The forced retreat of Hunter from Lynch¬ burg over the mountains of West Virginia left the Shenandoah unprotected. General Early entered it, drove Sigel across the Potomac (see Martinsburc.; Maryland Heights), then on 9 July defeated Wallace, who was in small force at Monocacy, Md. (q.v.), threatened Baltimore and appeared before Washington 11 July. Here he was met by veterans of the Sixth and Nine¬ teenth corps, Army of the Potomac, hurried to Washington by Grant, and forced into rapid retreat. (See Washington, Early's Attempt on; Snicker's Ferry and Berry's Ferry; Stephenson's Depot; Shepherdstown ; Kerns- town, Second Battle of). Upon the with¬ drawal of the troops from the Army of the Potomac Early again sent a force under Gen. John McCausland, into Pennsylvania, and these invaders burned Chambersburg 30 July. (See McCausland's Raid). Sheridan, being as¬ signed to command, forced Early beyond Staunton; and devastating the Valley, he with¬ drew to Cedar Creek. While Sheridan was absent Early attacked and drove the army out of its camps. Gen. H. G. Wright, however, rallied the troops near

Middletown and re¬ stored the battle. Sheridan arriving, the army advanced, and Early was so seriously defeated as to close the campaign in the Valley. See Shepherdstown; Smithfield; Opequon ; Fish¬ er's Hill; Cedar Creek; Milford; NiNEyEH.

The first movement of the final campaigns of 1865 began 2 January in Tennessee, when General Schofield with the Twenty-third corps left Columbia, Tenn., for Clifton on the river bound for the east. The corps left Alexandria on transports soon after 1 February, and landed at the mouth of Cape Fear River, 9 February, where the Tenth corps was established, which, under Gen. Alfred H. Terry, had captured Fort Fisher (q.v.) that had been most stubbornly and gallantly defended against the army and the fleet by Gen. W. H. C. Whiting. Fort Ander¬ son was attacked by army and fleet, and abandoned 19 February; the position of Town Creek was carried 20 February, and Wilming¬ ton (q.v.) was taken 22 February. Operating next by way of Newbern, Gen. R. F. Hoke was defeated at Kinston (q.v.) 10 March. Golds¬ boro (q.v.) was occupied by General Schofield on the 21st. Sherman's army joined Schofield here on the 23d. On 26 January General Terrv had been dispatched to co-operate with Admiral Porter in reducing Fort Fisher at the mouth of Cape Fear River. A previous expedition under General Butler, 13-16 December, had failed, but the fleet had remained, and Porter had appealed to Grant to send another force. Terry's troops effected a landing above the fort 13 January. The next morning he was entrenched across the peninsula. Early on the 15th the fleet opened a terrific bombardment, which was continued until a force of marines was landed in the afternoon to co-operate in the assault of the army. This was delivered at 3.30 in the after¬ noon, the flank of the work next the river being

carried. Then followed severe fighting for each succeeding traverse. It was not until 10 o'clock at night that the fort was finally car¬ ried. Sherman started northward from Savan¬ nah 1 February (see Savannah to Goldsboro' . Marching through swamps, and crossing all streams at flood, he was before Columbia on the 16th. It was surrendered without fighting the next day. Charleston, being cut off from interior communications, was evacuated by Gen. \Y. T. Hardee 18 February. Fayetteville, X. C., was reached 11 March. The first opposition stronger than skirmishing was at Averasboro 16 March, where General Hardee made a brief stand. On 19 March Johnston's army, which had been collected on Sherman's front at Ben- tonville (q.v.), checked his advance and nearly overwhelmed his left wing before the right wing, which was widely separated from the left, could reach it. • On the 21st Johnston was de¬ feated after sharp fighting, and Sherman marched for Goldsboro, which he reached 23*

fighting; Columbus was carried by a night assault 16 April; Macon surrendered 20 April. Here Wilson received notice of the Sherman- Johnston truce. An expedition, sent out- 7 May by Wilson from Macon, under Colonel Pritchard, Fourth Michigan, captured Jefferson Davis, 10 May, at Irwinsville, Ga. On 6 February' the Confederates made a heavy attack at Hatcher's Run on Grant's left, but were finally repulsed with a L'nion loss of about 1,500. (See Hatcher's Run [Dabney's Mill and Arm¬ strong's Mill] Battle of). The night of 24 March Gen. J. B. Gordon made a daring and most successful assault upon the right of Grant's lines at Petersburg, capturing Fort Stedman (q.v.) and three strong works. These were recaptured the next day.

The Army of the Potomac was the last to move in the opening campaigns of 1865. It had occupied its lines before Petersburg without general movement from November till the last of March. The general movement, which was

Confederale Possession

WHCH

IOWA

KANS.

T£NH»

our render $

Jcinnslon,

QpiM6,\865.

— Capture, of ˆejjerson Ocvtt,

10,1865.

No.6

*-Richmond Surrender qf lee**

CLpr. 94865.

March. See also Stoneman's Raid in East Tennf.ssee,_ Southwestern Virginia and Western North Carolina.

On 2 March Sheridan advanced up the Val¬ iev. defeated Early at Waynesboro (q.v.) and proceeded through Charlottesville and along the Richmond and L. Railroad, destroying roads and stores, and joined Grant at Petersburg. Gen. James H. Wilson, operating under Gen. George H. Thomas, crossed the Tennessee 22 March with a thoroughly equipped mounted force of 12,500, and 1,500 dismounted, to follow, until horses could be captured. (See Wilson's Raid from Chickasaw to Selma and Macon). His first objective was Selma, Ala. A portion of Forrest's cavalry was encountered and defeated at Montevallo 30 March. The fortifi¬ cations of Selma (q.v.) were carried against Forrest 2 April, and immense war supplies and plants for the manufacture of war materials destroyed. Montgomery surrendered 12 April; West Point was captured 15 April, after sharp

to the left, began on the 29th, and brought on the battle of Dinwiddie Court House (q.v.) and White Oak Road on the 31st, and the battle of Five Forks (q.v.) on 1 April, in which latter engagement the Confederates were de¬ feated. On 2 April the Confederate entrench¬ ments were carried, and General Lee abandoned his lines during the night, having notified Presi¬ dent Davis during the forenoon that he would begin a retreat on Amelia Court House that night. Jefferson Davis received this dispatch in church. He and his Cabinet immediatelv col¬ lected personal effects and Confederate archives, and left Richmond on a special train. Gen. Godfrey Weitzel received the surrender of the city on 3 April.

General Lee's army was assembled at Amelia Court House 5 April, and continued its re¬ treat at night. On the 6th General Meade ad¬ vanced on Amelia Court House, but, finding that General Lee had left, he moved toward Deatonsville (Sailor's Creek), where the most

of Ewell's corps, the rear of Lee's army, was captured 6 April. (See Sailor's Creek). About the same time some 10,000 men of the dtvi sions of Anderson, Pickett and Bushrod Johnson (qq.v.), were captured. Lee continued his retreat and reached Farmville on the morn¬ ing of the 7th. Here his troops received their first rations since the retreat began. At 11 o'clock. Union troops appearing, the march was renewed, his men being greatly exhausted with loss of sleep, hunger and hard marching. On this day the correspondence began between Generals Grant and Lee. which, on the 9th, re¬ sulted in the surrender of Lee's remaining forces at Appomattox. The number paroled was 28,231 officers and men, extra duty men and detailed men of even,- description, this rem¬ nant being all that was left within the control of General Lee of his magnificent fighting machine, the Army of Northern Virginia. See Farmville and High Bridge.

In North Carolina Sherman and Schofield moved against Johnston, occupying Raleigh 13 April. On the 14th Johnston asked for a con¬ ference, and on the 18th terms of surrender were agreed upon, subject to the approval of the President of the United States. These, be¬ ing deemed in part political, were disapproved, and General Grant was sent to Raleigh to insist upon the same terms made with Lee. These General Sherman demanded of and received from General Johnston 26 April, and the

war was over, though small independent forces were in the field for a short time thereafter, Gen. Dick Taylor in Alabama not surrendering to General Canby till 4 May. The last engage¬ ment of the war occurred at Palmetto Ranch, Tex. (q.v.).

President Lincoln made nine calls for troops during the war. Under these about 2,800,000 men of all classes were enlisted, including emergency men ox a few weeks, three, six and nine months' men, two and three years' men, conscripts and substitutes. There were 52,000 drafted men held to service ; 75,000 conscripts who sent substitutes ; and 42,000 men who sent substitutes, although not themselves drafted.

The Confederate records are very deficient, having been largely destroyed. The best esti¬ mate from the data in the possession of the War Department places the Confederate strength at something over 600,000. After Mr. Davis' calls of the first year a general conscription act was passed 16 April 1862, including all white men between the ages of 18 and 35 for the term of three years. On 27 Sept. 1862. this act was extended to include those of 45 years. On 17 Feb. 1864, the law was extended to those be¬ tween 17 and 50, the term to be for the war.

According to the latest compilation of the record and pension office of the War Depart¬ ment, the total number of deaths from all causes in the Union army during the war was 359,528. As many records are incomplete, the actual number must be somewhat larger. On the basis of the figures given there were killed in action, 67.058; died of wounds received in action, 43,012; died of disease, 224.586. The Confederate losses were quite as severe in pro¬ portion to strength, but the records are want¬ ing to such an extent as to make definite esti¬ mates of little value. The most complete records show that 74,524 Confederates were killed or died of wounds and that o9,92 7 died

of disease. These returns are very incomplete and nearly all the Alabama rolls are missing.

Bibliography. — Allan, W., < Jackson's Val¬ le}' Campaign (Philadelphia 1880), and his- tory of the Army of Northern Virginia* (Bos¬ ton 1892) ; Ammen, D., (The Atlantic Coast* (New York 1883) ; Ashby, T. A., (The Valley Campaigns* (New York 1914) ; Barnard, J. G., Che Peninsula Campaign* (New York 1864) ; Battine, C. W., (The Crisis of the Confederacy* (London 1905) ; Bernard, Mountague, histori¬ cal Account of the Neutrality of Great Britain* (London 1870) ; Berry, T. F., hour Years with Morgan and Forrest* (Oklahoma City 1914) ; Bigelow, John, < France and the Confed¬ erate Navy* (New York 1888) ; Badlam, \V. H., (Kearsarge and Alabama* (Providence 1894) ; Bowman, S. M., (Sherman and His Campaigns* (New York 1865) ; Boynton, C. B., history of the Navy during the Rebellion* (New York 1867) ; Brooks, LT. R., (Butler and His Cavalry* (Columbus, S. C., 1909) ; Bruce, G. A., ˆGeneral Butler's Bermuda Campaign* (Boston 1912) ; Bulloch, J. D., (Secret Service of the Confed¬ erate States* (New York 1884) ; Burgess, J. W., (The Civil War and the Constitution* (New York 1901) ; Butler, B. F., (Autobiography* — Butler's Book (Boston 1892) ; Callahan, J. M., ˆDiplomatic Relations of the Confederate States with England* (In (Annual Report of the American Historical Association* for 1898, pp. 267-83, Washington 1899) ; Century Company,

(Battles and Leaders of the Civil War* (New York 1884-87) ; Chadwick, F. E., (Causes of the Civil War* (New York 1906) ; Chesnut, M.

B. , (Diary from Dixie* (New York 1905) ; Coppee, H., (Grant and His Campaigns* (New York 1866) ; Cox, S. S., (Union, Disunion, Re¬ union: Three Decades of Federal Legislation* (Providence 1885) ; Crawford, J. M., (Mosby and His Men* (New York 1867) ; Crawford, S. W., 4 Genesis of the Civil War* (New York 1887) ; Curry, J. L. M., Civil History of the Government of the Confederate States* (Rich¬ mond, Va., 1901) ; Curtis, N. M., (From Bull Run to Chancellorsville* (New York 1906) ; Dabney, R. L., (Life and Campaigns of Lieut. – Gen. T. J. Jackson* (New York 1866) ; Davis, Jefferson, (Rise and Fall of the Confederate Government* (New York 1881) ; De Peyster, J. W., (The Decisive Conflicts of the Civil War* (New York 1867) ; Dodge, T. A., (Bird's- eye View of Our Civil War* (Boston 1883) ; Draper, J. W., history of the American Civil War* (New York 1867-70) ; Du Bose, J. W., (Gen. Joseph Wheeler and the Army of Ten¬ nessee* (New York 1912) ; Duke, B. W., his¬ tory of Morgan's Cavalry* (New. York 1906); Early, J. A., (The Last Year of the War for Independence* (Toronto 1866) ; Eggleston, G.

C. , (The History of the Confederate War* (New York 1910) : Evans, C. A. (ed.), Con¬ federate

Military History (Atlanta 1899) ; Fiske, John, Che Mississippi Valley in the Civil W ar* (Boston 1900) ; Fite, E. D., (Social and Industrial Conditions in the North during the Civil War* (New York 1910) ; Fleming, W. L., Civil War and Reconstruction in Ala¬ bama* (New York 1905) ; Flinn, F. M., Cam¬ paigning with Banks in Louisiana* (2d ed., Boston 1889) ; Fox, W. F., (Regimental Losses* (Albany 1893) ; Fry, J. B., Che Army under Buell* (New York 1884) ; Giddings, J. R., history of the Rebellion* (New York 1864) ;

Goodrich, A. M., Cruise and Captures of the, Alabama) (Minneapolis 1906) ; Gillmore, Q. A.,

(Engineer and Artillery Operations against Charleston) (New York 1868) ; Gordon, J. B.,

(Reminiscences of the Civil War' (New York 1905) ; Gordon, G. H., (The Army of Virginia) (Boston 1880) ; Gough, J. E., (Fredericksburg and Chancellorsville) (London 1913) ; Grant, U. S., (Personal Memoirs) (New York 1885— 86) ; Greeley, H., (The American Conflict) (Hartford 1864-67) ; Henderson, G. F. R.,

(Stonewall Tackson and the American Civil War> (New York 1898) ; Hood, J. B., (New York 1907), and (The Outcome of the Civil War) (New York 1907) ; Howard, O. O., (Auto¬ biography } (New York 1907) ; Humphreys, A. A., (From Gettysburg to the Rapidan) (New York 1883) ; Irwin, R. B., (History of the Nineteenth Army Corps' (New York 1893) ; Johnson, Rossiter, (History of the War of Secession) (Boston, 1889) ; Jones, J. B., (A Rebel War Clerk's Diary' (Philadelphia 1866) ; Johnston, J. E., (Narrative of Military Opera¬ tions during the Late War} (New York 1874) ; Livermore, T. L., (Numbers and Losses in the Civil War' (Boston 1900) ; Longstreet, H. D., (Lee and Longstreet at High Tide) (Gaines¬ ville, Ga., 1904) ; Longstreet, J., (From Manas¬ sas to /vppomattox' (Philadelphia 1896) ; Maclay E. S., (History of the Navy) (New York 1902) ; McClellan, H. B., (Life and Cam¬ paigns of Maj.-Gen. J. E. B. Stuart' (Boston 1885) ; (McClellan's Own Story' (New York 1887) ; McKim, R. H., (Numerical Strength of the Confederate Army' (New York 1912) ; Mc¬ Pherson, E., (Political History of the United States during the Great Rebellion' (Washing¬ ton 1882) ; McGuire, H. H., and Christian, G. L., (The Confederate Cause and Conduct of the War between the States' (Richmond 1907) ; Meade, G. G., (Life and Letters) (New York 1913) ; Michie, P. S., (Life of Gen. McClellan) (New York 1901) ; Moore, Frank, (Rebellion Record' (New York 1861-68) ; Mahan, A. T., (The Gulf and Inland Waters) (New York 1883) and (The Navy in the Civil War' (New York 1905) ; Nicolay and Hay, (Abraham Lincoln: A History) (New York 1890); Cfficial Records of the Union and Con¬ federate Navies) (U. S. Naval War Rec¬ ords Office, Washington 1894-1904) ; Paris, Comte de, (Histcry of the Civil War in America) (Philadelphia 1875-88) ; Parker, F. A., (The Battle of Mobile Bay' (Boston 1878) ; Pennypacker, I. R., (Life of G. G. Meade' (New York 1901) ; Pickett, L. C., (Pickett and His Men' (Philadelphia 1913) ; Pike, J. S., (First Blows of the Civil War' (New York 1879) ; Pollard, E. A., (The Lost Cause) (New York 1866) ; Porter, D. D., (Naval History of the Civil War' (New York 1886) ; Porter, Horace, Campaigning with Grant' (New York 1897) ; Powell, W. H., (History of the 5th Army Corps> (New York 1896) ; Rhodes, C. D., (History of the Cavalry of the Army of the Potomac ' (Kansas City 1900) ; Rhodes, J. F., (History of the United States from the Compromise of 1850) (New York 1888-1906) ; Roman, A., (The Military Operations of Gen¬ eral Beauregard in the War between the States' (New York 1884) ; Rockwell, A. P., (The Tenth Army Corps in Virginia' (Boston 1912) ;

Ropes, J. C. and Livermore, W. R., (Story of the Civil War' (New York 1894-1913); Vaughan-Sawyer, G. H., (Grant's Campaigns in Virginia' (London 1908) ; Schaff, Morris, (Sunset of the Confederacy' (Boston 1912) ; Scharf, J. T., (History of the Confederate

States Navy' < (New York 1887); Schofield, J. M., (Forty-Six Years in the Army' (New York 1897) ; Schurz, Carl, (Reminiscences' (New York 1907-08) ; Schwab, J. C., (The Con¬ federate States of America : Financial and In¬ dustrial History' (New York 1901) ; Scribner, Campaigns of the Civil War' (New York 1881-83) ; Semmes, R., (Memoirs of Service Afloat' (Baltimore 1869), and Cruise of the Alabama' (New York 1864) ; Sheridan, P. H., (Personal Memoirs' (New York 1888) ; Shreve, W. P., (The Third Army Corps' (Boston 1910) ; Sherman, John, (Recollections of

Forty Years in the House, Senate and Cabinet' (Chi¬ cago 1895) ; Sherman, W. T., (Personal

Memoirs' (4th ed., New York 1892) ; Simms, J. H., (Morgan's Raid and Capture' (East Liverpool, Ohio, 1913) ; Smith, W. F., (From Chattanooga to Petersburg' (Boston 1893) ; Sinclair, A., Two Years on the Alabama' (Boston 1895) ; Snead, T. L., (The Fight for Missouri' (New York 1886) ; Soley, J. R., lThe Blockade and the Cruisers' (New York 1903) ; Speed, Thomas, (The Union Cause in Kentucky, 1860-1865' (New York 1907) ; Steele, M. F., (Jackson's Valley Campaign' (Fort Leavenworth, Kan., 1907) ; Stephens, A. H., Constitutional View of the Late War between the States' (Philadelphia 1868-70) ; Stevens, Hazard, (Military Operations in South Caro¬ lina in 1862' (Boston 1912) ; Swinton, W., Campaigns of the Army of the Potomac' (rev. ed., New York 1882) ; Swinton, W., (The Twelve Decisive Battles of the War' (New York 1867) ; Van Horne, T. B., (The Army of the Cumberland' (Cincinnati .1875) ; Victor, O. J., (History of the Southern Rebellion' (New York 1861-63) ; Walker, F. A., 'History of the 2nd Army Corps' (2d ed., New York 1891) ; (War of the Rebellion Official Records' (Vols. I-CXXXVI) ; Wheeler, Joseph, Campaigns of Wheeler and His Cavalry' (Atlanta 1899) ; Whiting, W., (War Powers of the President' (Boston 1863) ; Wilson, Henry, (Rise and Fall of Slave Power in America' (Boston 1872-77) ; Wilson, J. H., 'Under the Old Flag' (New York 1912) ; Wise, J. S., 'The End of an Era' (Boston 1902) ; Wise, G., Campaigns and Bat¬ tles of the Army of Northern Virginia' (New York 1916) ; Woodbury, A., 'Burnside and the 9th Army Corps' (Providence 1867) ; Wise, J. C., 'History of the Artillery of the Army of Northern Virginia' (Lynchburg 1915). See also the bibliographies under the titles of indi¬ vidual battles and of persons engaged.

H. V. Boynton.

Revised by Irving E. Rines.

CIVILIAN, in common speech a word denoting a person whose employments are wholly of a civil character as distinguished from one who belongs to the army or navy, while in legal acceptation it designates one who is learned in civil or Roman law.

CIVILIS, Julius, Germanic leader of the Batavi in their revolt against the Romans, 69- 70 A'.d. At one time he held a command in the Roman army, but being more than once charged

with treason he escaped and roused the Ba¬ tavians, his countrymen, to rebellion. Pretending to espouse the cause of Vespasian against Vitellius, he raised a powerful army and in¬ flicted severe defeats on the Romans. He routed an imposing force sent against him and shut them up in the military station, Vetera Castra, which after a long siege capitulated and all its defenders were slaughtered. Fortune at last forsook him, and he had to negotiate with the Romans, the Batavians returning to their alle¬ giance. His fate is unknown.

CIVILIZATION, History of. Pre-Chris¬ tian. A sketch of the intellectual and material achievements of humankind in ancient times ; of those productions of man's mind and skill, which have had a special influence upon the thought and life of the world. It is not assumed that civilization is or can be measured by material achievements, but without these accomplish¬ ments civilization would be impossible. With approximate dates assigned by scientists, here in brief and simple form are presented the vari¬ ous elements and tools by which humankind has progressed toward civilized life.

Food-Getting, Hunting and Fishing. — The first signs of man's development into a creature of more than animal intelligence and character appear in the roughly shaped Eolith flints, found in various parts of Asia and Eu¬ rope, notably in France, Belgium and southern England, which are assigned to a date, ranging c. b.c. 500000 to b.c. 100000. During these early periods man hunted with the throwing-stone, or with the crudely pointed flint held in the hand. After b.c. 100000 all uncertainty about man as a tool-user and tool-maker disappears.

Among the remains of the Acheulean Age, c. b.c. 75000 to b.c. 50000, so named from dis¬ coveries at Saint Acheul on the Somme, lance- pointed flints have been found; also small points seemingly designed to serve as darts or spear¬ heads, and in the Gorge d'Enfer were discov¬ ered points of

reindeer antler, <(with split base perhaps to receive the shaft,® indicating that man was hunting with greater skill and intelli¬ gence. By about b.c. 25000 he was probably fitting shafts of bone or wood to flint points and flinging them at his victims with a Mart- thrower,® his first really successful attempt to strike a crippling or deadly blow from a dis¬ tance. Skill and intelligence were slowly sup¬ planting brute force. On the walls of the cavern of Niaux an artist of early Magdalenian times, c. b.c. 16000, has pictured a large bison with spears and arrows showing on the flanks, and in the Perigord cave was found the vertebra of a young reindeer with an arrow point em¬ bedded in it. While there is good reason to suspect the Cro-Magnon race was familiar with the bow and arrow it is not until neolithic times that its use is established beyond question. With this weapon in his hand man was no longer under the necessity of defending him¬ self and hunting his food in close hand to hand combat and striving as had been the way of all animals. It gave him an entirely new domi¬ nance over his world and lifted his food-getting enterprises and himself above the level of the brute as no other invention had done up to that time. This in increasingly improved form remained man's most effective weapon until the invention of the gun.

The invention of the harpoon, c. b.c. 16000, is perhaps the oldest device for catching fish. ((This invention,® says Mr. Osborn, ffwas des¬ tined to exert a very strong influence on the habits of the people. . . . This new means

of obtaining an abundant food supply probably diverted the Cro-Magnons in part from the ar¬ dent and more dangerous pursuit of the larger kinds of game.® Some 10,000 years later man invented the net which in some form he used for catching fish, thus refining still further his food-getting methods. With the introduction of metals the hook was added to man's fishing- tackle.

Agriculture. — When man ceased to live on what Nature provided without effort on his part, and attempted to produce his own food supply, he wrought a mighty revolution in his habits and character. He had to stay in a place long enough to plant and to reap and this acquired a sense of ownership.

The first hints of agriculture are met with • in the rough axe-like flints presumably em¬ ployed <(for breaking clods, hoeing the ground and other simple agricultural operations,® and finely wrought flint knives, curved somewhat at the point and likely used as sickles. The earli¬ est sickles used in the Euphrates Valley, before b.c. 5000, were wooden models of a sheep's lower jaw set with flint points as a cutting edge. With the introduction of the plow, c. b.c. 5000, at first nothing better than a two-handled hoe and called ((the scratching wood,® drawn by a human being and later by oxen, agriculture be¬ came a definite part of life and made possible large and well organized communities. Even more important in the progress of civilization was the increased fertility of the soil and the extension of crop-growing in spots naturally unfavorable, wrought by the invention of schemes of irrigation. Ur-Nina, c. b.c. 3000, is among the first recorded as building irri¬ gating canals who thus by increasing the fruitfulness of the Babylonian fields made possible the growth and prosperity of the great Euphratean cities and the consequent human development.

Domestication of Animals. — The domesti¬ cation of animals changed man's attitude toward the animal world and put a power other than his own at his service. About b.c. 10000, from evidences found at Oban in northwestern Scot¬ land, the dog was the companion of man. At about the same time man domesticated to some extent the plateau horse and the forest horse and two varieties of cattle, the Celtic Short¬ horn and the Longhorn. From Babylonian rec¬ ords we learn that prior to b.c. 3000, oxen were used in agricultural operations and donkeys pulled wheeled carts and chariots.

Fire. — Without the use of fire, man could not have risen above the lowest depths of sav¬ agery and barbarism. Something of its im¬ portance may be judged from the fact that it early became an object of worship. To keep it burning was a religious duty and the fashioning of metals at the earliest forges was regarded as more than a human occupation.

The earliest evidences of the use of fire thus far discovered date c. b.c. 60000 and consist of ((charred wood and bones frequently found in the industrial deposits of early Acheulean times.® Osborn intimates that about b.c. 50000 the Neanderthal men first made real use of fire

by ■employing it as a weapon to drive the bears from the caves in the Neander valley.

In the grotto of La Mouthe a stone lamp, c. b.c. 16000, has been unearthed. This lamp, not unlike some used in Dordogne at the pres¬ ent day, is a piece of sandstone wrought into the shape of a shallow bowl, into which was placed, according to Berthelot, animal fat and a wick. About b.c. 10000 the flint miners of Norfolk had lamps of chalk with a much deeper bowl to carry a greater supply of fat, most likely that they might labor for a longer time in their underground workings. These lamps represent man's first attempt to put fire to do¬ mestic and industrial use. The life of man was profoundly affected by discovery of ways and means to cook his food. It meant better food and better health. When he took the fire and put it on a crude stone hearth just within the hut, it meant a better home and the. gath¬ ering about the hearth marks the beginning of the family circle with all that that has meant.

It was another step out of savagery when man with the aid of fire felled trees and hol¬ lowed logs to serve as boats. Much more mo¬ mentous for civilization was the day when he discovered that copper and iron could be smelt¬ ed from the rocks, and that these metals could be fashioned into very useful tools. Just when or where this happened there is no telling, but it would seem that the people in the Nile and Euphrates valleys had made this discovery and were using metals before or by b.c. 3500. Bronze came into use in Egypt as early as 3700 and there are indications of the use of iron as early as b.c. 3300.

Not less important for the upward progress of man was the invention by which he was able to make fire at any time and place he chose. It is believed that certain flint ˆfabricators® be¬ longing to the period b.c. 7000 (

Mining. — ((Picks® made of flint and <(the antlers of the red deer® found in the Thames Valley and elsewhere point to an organized min¬ ing industry for obtaining flint, needed for tool¬ making as early as b.c. 10000. One specimen of the picks made from deer antlers still re¬ tains <(the impression of a miner's thumb on the chalky clay which adheres to the surface.® There had been no change in the character of mining tools when man began to mine for cop¬ per, iron, tin, silver and gold, c. b.c. 4000. That he should be patient and persistent enough to wrest these metals from the earth with such difficulty bears witness to his deter¬ mination to live more effectively.

Metal-Working. — The discovery of metal, and that it could be wrought to any desired shape, put into human hands resources by which man speedily lifted himself above the level of the Stone Age. Tools and weapons of metal enormously increased man's skill and speed as a worker. Metal-working enabled hu¬ man ingenuity to manifest itself in many far- reaching inventions and improvements. To in¬ dicate all that it meant to man in his struggle to get out of the slough of savagery and bar¬ barism, in which he had floundered for so many thousands of years, is impossible within the lim¬ its of this article. A hint may suffice. A hol¬ lowed tree trunk or a bitumen-lined rush con¬ traption would have been the limit of water

navigation had the art of metal-working not been discovered. House building and city build¬ ing would have been practically impossible nor would there have been carts and chariots.

Textiles. — The growing of flax, first met with c. b.c. 7000, and the spinning-whorls, discs of pottery or stone used as balance wheels on primitive spindles, are good enough evidence that by this time man had invented the art of weaving. The first woven stuff must in the na¬ ture of things have been very coarse, but among predynastic Egyptians, earlier than b.c. 5000, weaving of a remarkably fine order, impossible without a loom it would seem, was already an accomplished fact. In China the silk industry attained a high degree of perfection b.c. 2500. It is recorded that b.c. 700 cotton was grown in the gardens of Sennacherib, that the people gathered and <(carded it for garments.® When man learned to weave (

Building and Architecture. — The first step toward housing himself was taken when the Neanderthal man drove the wild beasts out of the caves and took possession for himself. Probably man never really lived in the cave. From ((schematic drawings in lines and dots® on the walls of the cavern of Font-de-Gaume it is assumed that c. b.c. 30000 to b.c. 25000 <(huts and shelters built of logs and covered with hides® were grouped around ((or within the entrances of the grottos and caverns.® As late as the Danish Middens, c. b.c. 9000 and the lake-dwellers, the huts without chimneys and with

walls of wattle and daub were sorry enough places. The invention, in the Euphrates Valley 'before b.c. 6000, of the brick, a piece of clay, sun-dried and later (about b.c. 5000 burnt, easily handled, was epoch-making. Cut-stone, used where clay is scarce, is brick only of lar¬ ger size. This seemingly simple invention revo¬ lutionized man's whole mode of living. It no longer became necessary to rebuild after every storm or season. The durability of building ma¬ terial encouraged him to take a greater pride in the appearance and conditions of the home. It gave to the home a new and richer meaning.

There had always been a community life. Groups of huts resembling villages were built by the lake-dwellers and long before. Better houses, impressive temples and palaces inspired men to live a better sort of community life. Old manners and customs underwent a refine¬ ment that made them almost new. New politi¬ cal orders appeared. The cities and towns of increasing pretentiousness which sprang up in Egypt and Babylonia and elsewhere, the direct product of the invention of brick and the use of stone for building, became the cradle of real civilization.

The architect is largely responsible for the great strides toward civilization made between b.c. 4000 and b.c. 3000. The engineering, archi¬ tectural and artistic skill lavished upon temples and tombs and public buildings during this pe¬ riod and the centuries immediately following gave to mankind a new scale of values. The architect represents a great passion to improve life and living conditions. The invention of the arch, before b.c. 3000, besides making lighter buildings pointed the way to the bridging of streams, making road building possible. The use

of heavy blocks of stone taught men how to work together as a unit, giving rise to a new sense of human solidarity.

Art. — The birth of the artistic sense added another powerful influence to the process of civilization. As early as c. b.c. 25000 interesting examples of art are met with — crude line drawings on reindeer horn, human statuettes sculptured in ivory and soapstone, like those found in the Grottes de Grimaldi. The men of Aurignacian and Magdalenian times covered the walls 'of the caves with black and colored line drawings and pictures done elaborately in colors. The earliest instance of the use of color is perhaps the crude outline of a mammoth in red ochre on the wall of the cavern of Pindal, and what seems to be the finest example is the picture of a bison on the ceiling of the cave of Altamira c. b.c. 16000. Whether this art arose out of man's desire to beautify the caves where he and his fellows congregated, or whether it had something of a religious or magical origin and purpose, or whether it was the desire of man to describe and record what he saw, there is perhaps no knowing. This prehistoric art would indicate that man was feeling his way toward something other than a purely material and selfish interest in life. The impressive bas- reliefs descriptive of military exploits, indus¬ trial activities, religious and domestic relations which with increasing beauty adorn the cities of the Euphrates from b.c. 6000 and on, must have widened man's conception of things, enlarged his thoughts and deepened his interest in hu¬ man affairs. The wonderful sculpture which filled the Grecian world before and after b.c. 500 must have done much to awaken in the peo¬ ple a love of the beautiful and a distaste for whatsoever was ugly. Perhaps most important of all, this artistic impulse cradled the written word.

Music. — Without art in its broadest sense man's divergence from the animal would have been less pronounced. In his contemplation of actual and possible beauty man is led to hate whatsoever is low and mean. Music helps to lift man to this level of higher appreciation and refinement of the feelings.

If a whistle may be classified as a musical in¬ strument then music may be said to date from c. b.c. 20000. Whistles of that period which still give forth some sound, made from the phalanges of the reindeer, have been found in the caves of Perigord and elsewhere. M. Joly says that there have been found in the caves of the Pyre¬ nees, of the same period, tubes made of the bones of birds, which may have formed part of a flute like that which tradition ascribes to the god Pan. On a terra-cotta plaque, found in the lower strata at Nippur, c. b.c. 4000, is pictured a shepherd playing a lute. A rock-cut sculp¬ ture found at Tel-lo, c. b.c. 3000, shows men with cymbals and pipes and one playing a harp of very primitive construction, and is suggestive of Egypt rather than Babylonia.

What part this primitive music played in the life of the ancient peoples it is hardly possible to guess. At a quite early time it was used to celebrate notable events and entertain kings and princes. It also became an important part of religious ritual. In Greece, in the age of the Tyrants, music became a dominant feature, greatly in¬ fluencing its literature and national and com¬ munity life. It was one of the chief cultural

agencies and gave rise to institutions which have all through the centuries since played no small part in awakening and directing and shaping the thoughts and emotions of the people. The festival chorus, c. e.c. 500, so important in Gre¬ cian life, developed into the drama and the place where the chorus, dressed in goat skins and faces covered with masks, sang the song- stories became the theatre.

Domestic and Social. — For many thousands of years after his beginning man ate like the animal, and had no speech. Back of b.c. 25000 he attempted to cover his nakedness with the pelts of animals. Whatever its immediate ef¬ fect it led straight to a civilizing interest in ap¬ pearances and the welfare of the body. With the invention of the needle, c. b.c. 25000, and its notable improvement, c. b.c. 16000, the cloth¬ ing of the body not only became a habit but something of an art. Even though it originated, as some insist, as a sexual device, it became a mark of civilization. Fine clothes seemed to call forth finer manners. Personal adornment, other than clothing, such as the wearing of necklaces, c. b.c. 20000, as well as earrings, arm- lets and girdles may have originated in a de¬ sire to attract attention, or for religious or magical purposes, or as insignia of rank and accomplishment, but it led to a pride of person which must have urged the people ever further from animal-like habits. The shaving of the face and the cutting of the hair before b.c. 4000 in Egypt is evidence of a desire in man to fash¬ ion his life after his own ideas.

With the invention, c. b.c. 9000, of a vessel that would hold water and allow of heating the water either by putting in hot stones or placing the vessel over the fire it became for the first time possible for man to cook his food and, in the matter of food and eating, marks his defi¬ nite departure from savagery. Cooked food meant a more varied and healthful diet. It moved him to think of how he should eat. Be¬ fore b.c. 4500 man was eating a very coarse bread made of crushed wheat and barley and millet.

The use of the horns of cattle, as in two bas-reliefs beneath the overhanging cliff of Laussel, c. b.c. 20000, and cocoanut shells and other natural products as domestic utensils helped further to humanize the method of eat¬ ing and drinking. Other and more practical utensils were fashioned soon as ever man learned the art of fashioning and hardening clay into pottery. The invention of the potter's wheel, c. b.c. 3500, and the kiln for firing, added greatly to the beauty and usefulness of de¬ sign, and by increasing the output the refining influence of pottery upon the methods of eating food was more widespread and effective. The importance of table manners is recognized and insisted on in the savings of Ptah-hotep, c. b.c.

3200.

With the rise of the art of wood- and metal-working, the homes of the wealthier class, and eventually of the poorer, were furnished with stools and chairs and couches and bed¬ steads (after b.c. 3000). By thus adding to the comfort of the home it became a more desirable place and naturally exerted an increasing in¬ fluence upon the habits and character of the people.

No single fact has been more influential in the process of civilization than the rise of the

family. Respect, consideration for one an¬ other, chastity, obedience, honor, sacrificing love, virtues altogether fundamental to civiliza¬ tion, are its direct product. Judging from the precepts of Ptah-hotep, c. b.c. 3200, care and consideration for one another was the proper thing between man and wife. In Babylonia the importance of the family is recognized in the laws regulating marriage, divorce, rights of wives and children, c. b.c. 2700. The precepts of Khensu-hotep, b.c. 1500, counsel children not to forget the mother-love bestowed upon them, and in the Hebrew Decalogue somewhat later it is a religious obligation for children to honor father and mother. This creates an increasing

interest on the part of the parents in the bring¬ ing up of the children. The author of the He¬ brew Proverbs urges parents to ((train up the child in the way he should go,® Thus each new generation becomes trained a little more thor¬ oughly in the ways of civilization.

Government. — Forms of government do not imply civilization, yet without government there could not well be any departure from the sav¬ age state. Belonging to early Aurignacian times, b.c. 25000, and particularly in the later Magdalenian period, b.c. 12000, many horn im¬ plements have been discovered, conspicuous among them being the somewhat mysterious batons de commandment formed of an antler with one or more circular holes, supposed to have been, as Mr. Osborn says, ((insignia of au¬ thority borne by the chieftain® of possible prim¬ itive tribal organizations. It is pretty certain, according to Mr. Budge, that as far back as c. b.c. 8000 the Sumerians or their immediate ancestors were politically organized with a king at the head of things. These primitive efforts at law and order forced our wilder ancestors to hold themselves in check, to be less wild, to think before they acted. The earliest hint that men were beginning to adjust their disputes by presenting them to another for judgment is c. b.c. 4000, though no doubt the custom was older. Urukagina, ruler of Lagash, c. b.c. 2700, is among the earliest known law-makers ; the most noted is Hammurabi, c. b.c. 2200. These laws are attempts to compel a certain orderli¬ ness, and decency and honor in human activities and relationships. This growing custom of mak¬ ing a man face the wrong of his acts and in¬ flicting a penalty therefor, compelled him to see the need of taking some thought as to the char¬ acter and consequences of his deeds. Here and there a man, long before Hammurabi, made no¬ table efforts to give a more civilized character to human relationships. The districts of La- gash and Umma were ready to fly at each oth¬ er's throats over a boundary dispute whereupon Mesilim, king of Kish, c. b.c. 3000, intervened and the trouble was arbitrated. The introduction of slavery, whatever its later evils and the in¬ humanity of its beginnings, helped to transform man from the wanderer and loafer into a worker.

Before man can reach up to any worthy degree of civilization there must be justice and humanity as well as order and industry in human affairs. These important elements enter definitely into life with the Hebrew legislation of c. b.c. 800. Some 50 years later in Greece Hesiod, a farmer poet, raised a cry for social justice. In Palestine this cry grew into a religion iti the time of Josiah; i ti Greece it re¬

sulted in the constitutional reforms of Solon, c. b.c. 590, and later in democratic institutions, and the rise of the spirit of democracy. In the time of Herodotus and Pericles, b.c. 450, the people of Greece took active part in political affairs. At the same period a further step for¬ ward in civilization was taken when the people of Rome demanded the right to share in the mak¬ ing of new laws. Socrates, c. b.c. 400, brought into being the idea that government should aim to make it possible to live the best sort of life. It was a small contribution perhaps to civiliza¬ tion when the kings of smaller states conceived and put into practice the idea of getting together to defeat some particularly powerful and am¬ bitious neighbor. It was a step out of inter¬ national disorder and savagery when Burna- buriash, king of Babylon b.c. 1400, thought to improve the relations between his kingdom and that of Egypt by marrying an Egyptian- prin¬ cess. Militarism was often the only weapon that could be used to protect the attainments of civilization from destruction by the barbarians who frequently made war upon the settled com¬ munities. The introduction of the horse, b.c. 1900, was a benefit conferred by militarism. The need of transporting large bodies of soldiers and equipment to distant parts led to the planning and actual building of roads so essential to civilized communities.

The doctrine of the divine right of kings also became a decisive factor in the progress of civilization. About b.c. 3500 the Egyptian kings adopted the title (

Commerce. — In remote prehistoric days it was found to be generally advantageous for the man who could make arrow-heads better than anyone else to keep to that job and trade his wares for the food which the hunter brought home and could spare.

With the growth of cities in the Euphratean and Nile valleys and elsewhere the city dwellers needed food and supplies of many sorts, the builders needed materials from far and near, and so commerce rapidly grew to large pro¬ portions, challenging the food growers to grow more food and others to exercise their ingenuity to devise means of transportation of this in¬ creasing commerce. Records of b.c. 2500 in Babylonia, and the same must have been true in Egypt, make mention of commercial agents, bookkeepers, grain measurers, boatmen, garden¬ ers, capitalists, fishermen ; houses and land

and cattle and slaves were bought and sold ; money was loaned at interest at the general rate of 20 per cent ; contracts of all sorts were made and guaranteed. By b.c. 1000 the Phoenicians were altogether a commercial people establishing purely commercial towns westward beyond the Mediterannean and eastward and southward as well. These commercial cities were outposts and sources of civilization. From the very first, commerce contributed heavily to the process of civilization in that it gave rise to the spirit of fair-dealing, honesty and truthfulness.

Transportation. — Civilization can make but little headway so long as man is nothing better tjiarj a beast of burden. It is possible that in

prehistoric times he began to shift burden-carry¬ ing from his own back to the backs of animals. Rafts and hollowed logs as early as b.c. 10000 may have helped in the matter. With the estab¬ lishment of cities in the valleys of the Nile and Euphrates a considerable system of water trans¬ portation speedily developed. Rafts and basket¬ like contraptions woven of willow and rushes, lined within and covered without with bitumen, were likely the earliest type of water-carriers before b.c. 5000. Real boats did not lag far behind and the presence of a ship <(with masts and decks and oars® in the Deluge legend would indicate that by c. b.c. 4000 water transportation had attained a high degree of development, and that somewhere near to this date over-sea ports were visited. Eannadu, c. b.c. 4000, one of the Euphratean kings, built brick-lined canals for transportation purposes, and the great Ham¬ murabi c. b.c. 2200, complains that a navigable canal connecting Erech with the Euphrates was blocked so that the ships could not go up it. An exceedingly ambitious project was the canal dug by Pharaoh, c. b.c. 2000, connecting the Nile with the Red Sea. A 15th century b.c. painting at Karnak represents Queen Hatshepsut's fleet of five ships equipped with sails just returned from a voyage to the land of Punt. The sea¬ going vessels under the Phoenicians and the Greeks in no essential thing differ from these early boats and ships. With the establishment of harbors and docks and lighthouses (at Alex¬ andria, b.c. 300) the mercantile marine which has had so great an influence upon the life of tne world, became an important factor in the process of civilization.

Land transportation, except for the camel caravan, amounted to little because perhaps draft animals were too costly and wheeled vehicles, as seen in an 8th century inscription, impossibly cumbersome. The first real road to be planned was the highway which Alexander the Great proposed to build from Egypt to Carthage. The most notable feat of trans¬ portation was the hauling on sledges of im- . mense blocks of stone from quarry to boat and boats to Pyramid and up to the level desired. The development of transportation made pos¬ sible a thoroughly settled and organized life without which manners and customs were in¬ capable of permanent improvement. Journeying from place to place and dealing with peoples near and far distant, men were compelled to think of the world and life in larger terms.

Science. — At a remote date man became an observer of the overhead and of things about him. Peopling the overhead and every nook and cranny on earth with beings kindly or malicious was the sum total of his attempts to know the world he lived in. The desire to know how these kindly or malicious spirits wrought their will, resulted in the great com¬ plicated system of astrology and divination which possessed the world for so long a time and still has a large place in it. The elaborate observations necessary to the working out of astrological schemes led to the discovery or invention of time divisions, a matter of utmost importance to commercial and industrial life. As early as b.c. 4241 in Egypt a calendar di¬ vided into days and weeks and months very similar to our own and containing 365 days in the year was in use. Without such a time measurement contracts of any sort could not

*be made, nor agreements entered into. The necessity of dividing time into small divisions to measure the length of time a man should work, led to the invention of the clock — *a water or sand clock. What is known as the oldest clock in the world is the ((shadow clock® bearing the name of Thutmose III, c. b.c. 1400. These primitive observations furnished the material out of which was eventually fashioned the science of astronomy which has done so much to rid man of the terrors of astral and meteorological spirits and make long distance navigation possible. Reasoning from what*

he learned from the ancient Babylonian astro¬ nomical lists, Thales told the people to expect an eclipse of the sun before the end of the year

b. c. 585. Centuries before Babylonian astrono¬ mers had sometimes predicted eclipses, but the importance of the prediction of Thales is that it led him and others to realize for the first time that eclipses and other strange happen¬ ings in the sky were due not to the anger or whim of gods but to the operations of natural laws, — • the first real break with superstition. The understanding of the forces and operations of nature had begun and the way was open to the serviceable use of natural forces. Eratos¬ thenes, b.c. 200, suggested that the earth was round, that India could be reached by sailing to the westward and with surprising accuracy he computed the size of the earth. Aristarchus,

c. b.c. 150, demonstrated that the earth and planets revolve around the sun. All ideas that give man a greater mastery, boost civiliza¬ tion. Such is the idea suggested in the Jacob story, Gen. xxx, 37, c. b.c. 850, that the char¬ acter of the offspring of cattle can be con¬ trolled; and the belief set forth in Jer. xxxi, 29 that the conduct of parents affects the unborn generations.

The three centuries preceding the Christian era are notable for many important mechanical inventions or discoveries. Archimedes of Syracuse, b.c. 287 to 212, invented the pulley and lever. Screws and cranks and cogwheels and waterwheels and the endless chain came into use at this time. Euclid perfected his geometry.

Medicine. — • For long centuries the people on earth were few because human mortality was exceedingly high. From the first, man suf¬ fered grievously from disease and deformities.. Such conditions were an almost insuperable obstacle to the advance of civilization. Little is known of prehistoric medicine. Whether the trepanned skulls found in prehistoric strata are instances of surgery or a religious cere¬ mony is an open question. The amulet fre¬ quently worn by neolithic peoples, c. b.c. 9000, is the best clue we have to the character of pre¬ historic medicine. During most of the his¬ toric period back of the Christian era, sickness, being considered the result of demon posses¬ sion or other supernatural influence, cures were to be had by exorcism, incantation and prayers. The library of Assurbanipal has furnished a mass of literature descriptive of the disease demons and the prescriptions supposed to pos¬ sess the required potency to rout them. Simi¬ lar prescriptions come from Egypt dating back to b.c. 3000. Other conceptions of disease and cures were in existence as witness the seal of a Babylonian physician, Ur-Lugal-Edina, which shows as symbols of his profession, scalpel,

lancets (or knives) and cups. The laws relat¬ ing to doctors in the code of Hammurabi give a hint of what was being done to combat dis¬ ease and deformity. The scientific treatment of disease may be said to begin with the labors of Hippocrates, b.c. 460-377. By his researches and discoveries in anatomy and physiology, made possible by the opportunity for the vivi¬ section of criminals granted him by the king of Egypt, Herophilus, c. b.c. 300, laid the foun¬ dation for surgery and a more scientific medi¬ cine.

Religion. — Religion has played its part in helping and hindering and shaping civilization. The discovery at Le Moustier of the skeleton of a youth belonging to the Neanderthal race, c. b.c. 40000, with indications that a food offer¬ ing: had been made at his burial, is taken by some to show that at this early date man had some sort of belief in immortality. Apart from this instance of doubtful significance there are no other hints of religion until late Aurignacian times, c. b.c. 20000. Belonging to this period and widely scattered throughout Europe have been found statuettes of limestone and soap¬ stone and plastic models of the female figure. These statuettes, usually about four and a half inches high, are believed to be household gods of these primitive folk and were carried with them in their wanderings as was done by the Hebrews some 19,000 years later (Gen. xxxi, 19). Of religion as organized around the altar or systematized into ritual, there is little evi¬ dence from prehistoric times. The belief in spirit survival which plainly prevailed among the prehistoric peoples influenced the habits of men and women. By about b.c. 8000 kings and chiefs were buried with considerable pomp and ceremonial, and whether for the purpose of appeasing the spirits of the departed or recalling to mind the virtues and worthy deeds of the dead we do not know, but it became the

custom for the people to gather regularly at the tombs and hold high festival. Such festivities drew the bonds of fraternity a little tighter, the sense of community interest was quickened, and the friendly rivalry in the sports of the occasion put a little finer spirit into human relationships.

When man steps out into the increasing light of history, religion is conspicuous in his activ¬ ities. He worships gods which are usually fear¬ ful and many, and believes that these gods cause all things to happen. Man does not con¬ trol himself but the gods control him. It is difficult to estimate the influence on a person's character which must have been wrought by the belief that the gods watched him ; that what he did either pleased or angered the gods. The whole political structure of the world at and since that early time has been greatly affected by the close association of temple and palace, ruler and priest, and the inevitable rise of the idea of the sanctity of the person of the king and the infallibility of his commands. King Gudea of Lagash, c. b.c. 2400, was deified and worshipped and the Egyptian kings of the fifth dynasty, c. b.c. 3500, claimed descent from the Sun god Ra. The choice of Saul as king, I Sam. x, 1, is another instance. Religion in¬ fluenced architecture. It created the ziggurat, most conspicuous in Babylonian architecture ; it fashioned the pyramids of Egypt and its great temples; the famous Greek temples and the development of art and sculpture are but the

outward expression of the religious impulse and ideas. The belief that the gods could be in¬ fluenced or their will learned by mysterious rites performed by specially equipped persons created the priesthood and gave it a great con¬ trol of human affairs, making the priesthood a large factor in the process of civilization. The idea of deity as law-giver also profoundly affected human conduct. It gave to the crudely civilized man of c. b.c. 3000 a reason for obe¬ dience to law more powerful than any that had yet pressed upon him. Hammurabi is pictured, c. B.c. 2200, as receiving the law from Shamash, the god of law and justice. A similar origin is given to the Mosaic law. It is the deity that demands a certain kind of conduct and punishes the contrary. It was a momentous thing for civilization when, as in Amos, b.c. 750, the deity denounces hard-heartedness, greed, oppression, corruption, and the high value in the other world of good deeds and kindness here, as pictured in the Egyptian Book of the Dead about b.c. 3000, must have awakened a sense of the eternal importance of right living. The civilizing value of the idea of a God as a God of Righteousness proclaimed by the Hebrew prophets has even yet not been fully realized, and when under Josiah social justice was made virtually a religion, religion was destined to play a greater part in lifting civiliza¬ tion to higher levels.

Morals. — Closely bound up with religion are the moral principles which have appeared from time to time. However much civilization has always depended on material progress for its advancement it is something very much more than that. Civilization is nothing less than < (the humanization of man in society. ® No matter how learned, or clever or powerful, a man is not civilized unless he is in the best sense human. It was an epoch in the progress of man when Urukagina b.c. 2800 swept the whole army of political and priestly officials from office because they were guilty of taking • bribes, thwarting justice and imposing exor¬ bitant taxes. The high moral obligations which the Hebrew prophets insisted publicly that the people must meet, the rising protest against inhumanity in Greece, are simply so many added forces to the movement toward the Hmmaniza- tion of man in society.® The lack of moral strength has usually led to the downfall of the peoples that have been outwardly most civilized.

Culture. — About b.c. 7000 the written word becomes a fact — only a sign perhaps to indi¬ cate ownership, or a picture conveying some sort of information. Having once hit on the plan of conveying information by pictures, the pictures speedily became formalized, and still simpler forms of writing were, devised.

This invention gave to life practically a new beginning. Man came to have a past as real as the present. A sense of permanence and con¬ tinuity was given to life. All man's thoughts were widened. It opened the way out of the terrible ignorance which had held him down for nearly half a million years. From recording names and transactions and events man soon set to recording his thoughts, his speculations, and this set others thinking and speculating on many things. Man began to enjoy an intellectual life. There grew up a literature as for ex¬ ample the Precepts of Ptah-hotep in Egypt, c. b.c. 3900, by which the thoughts and achieve-

ments of one generation were passed on to the generations to come, thus making progress a surer thing. The value of the invention of writing is seen in the fact that when a man signed his name or his mark to a contract (b.c. 3000 and earlier most likely), he was held in the grip of an obligation to do what he had agreed. A new accuracy and truthfulness and honesty entered of necessity into human deal¬ ings. With the growth of commerce and politics and religion there had to be persons to keep books in the commercial houses ; the kings needed scribes to make record of the king's doings ; the making and administration of laws must needs have men who could write down the laws and the judgments of the courts; the temples must have men able to chronicle re¬ ligious matters, and so men had to be trained for these semi-intellectual jobs. We can hardly speak of the existence of schools and yet what¬ ever the limitations of the training given men to fill these semi-intellectual positions the effect must have been to increase the number of those who could read and write and create a desire on the part of an increasing number to be able to read and write. The school idea as we under¬ stand it is met with in Greece before b.c. 500. When old enough the boys were sent to a school conducted by some poor citizen, or an old soldier or a foreigner. Music and writing were taught, and what perhaps was of greater importance the boys learned many passages from the old poets. Of inestimable importance in the story of civilization is the school of Athens, where Socrates, Plato, Zeno and Aris¬ totle set forth political and social and philosoph¬ ical ideas which exercised a marked in¬ fluence upon the thought and character of the persons then living and all generations since. The rise of the gymnasium, b.c. 300 to b.c. 200, where the youth attended lectures on rhetoric, science, philosophy and mathematics was a notable step toward creating and setting the fashion for an educated citizenship. Not least influential of the pre-Christian scholastic insti¬ tutions was the school of intellectuals gathered in Alexandria, b.c. 300 and after. Men came hither from all civilized countries to listen to lectures containing the latest thought in astron¬ omy, physics, anatomy, medicine, grammar and religion. Here the Septuagint version of the Old Testament was compiled.

The founding of libraries is an item that deserves place in this summary. Copies of laws, of religious rituals, of medical prescriptions, commercial papers, and treaties between nations multiplied and were found in considerable num¬ bers in all important cities of the ancient world. But so far as known Assurbanipal, b.c. 668-626, grandson of Sennacherib, was the first to make a collection of the literature of the people and arrange it so that it could be used and was designed to be used. Of much greater import¬ ance was the founding of the library at Alex¬ andria by Ptolemy, b.c. 304. The library was the creation of the gifted poet and philosopher Callimachus who originated the name "book" and created the science of publishing correct editions of old works. Here too began the making of dictionaries.

Bibliography. — The material for the history of civilization is exceedingly voluminous. All histories of ancient peoples contain matter for this purpose. For those who wish to get at

the origins, the series of British Museum guides "The Antiquities of the Stone Age," "The Bronze Age," "The Early Iron Age," "The Egyptian Collections," "Babylonian and As¬ syrian Collections" are authoritative ; for the prehistoric period, Osborn, H. F., (Men of the Old Stone Age> ; Joly, N., (Man Before Metals) ; for the historic, Jastrow, M., Jr., (The Civilization of Babylonia and Assyria) ; Bos- cawen, W. St. C., (The First of Empires) ; Breasted, J. H., (Ancient Times) ; Petrie, W. M. F., (History of Egypt > ; Morgan, L. H.,

*(Ancient Society) ; Tylor, (Primitive Culture) ; for Greece, Botsford, G. W., and Sihler, E. G., (Hellenic Civilization.**

Charles Graves,

Chaplain, New York State Assembly.

CIVILIZATION, An Introduction to the History of, a noted work by Henry Thomas Buckle, an Englishman, published 1857-61. Al¬ though the progress of science has uncovered facts that prove the weakness of an occasional principle in the (History of Civilization, the work remains one of the greatest contributions of modern times to the new aspect of history, as a human document, to be read by the light of scientific discovery. No book of its time was more influential in turning the*

direction of men's thoughts to the phenomena of social and politi¬ cal science.

CIVILIZATION IN EUROPE, a history, by Frangois Guizot. In this work Guizot begins with the fall of the Roman Empire, and ends with the opening of the French Revolution. Although he analyzes all the important facts of history between the great landmark of 476 and the convocation of the States-General in 1789, he is far more anxious to grasp their import than to give a vivid relation of them ; and, there¬ fore, facts in themselves play but a small part in his exposition. They are simply a help in his effort to discover the great laws that direct the evolution of humanity, and to show its de¬ velopment in the individual and in society. His investigations are limited to purely social de¬ velopment, and he does not touch upon the in¬ tellectual side of the question.

civitA-di-penne, che'-ve ta de pen'na,

Italy (the ancient Pinna-Vestina), a small town in the province of Teramo, Naples, built on two hills, 23 miles southeast of the city of Teramo. It was formerly a place of importance. The Normans, under Roger I, made it the capital of their kingdom. It is a bishop's see. Pop.

4,337.

civitA-vecchia, vek'ke-a. See Citta Vecchia.

CIVITALI, Matteo, che-ve-ta'le, Tuscan sculptor and architect: b. Lucca, 5 June 1435; d. 12 Oct. 1501. He followed the occupation of a barber until about 1470, and evidently found some time to study sculpture. In 1495 he re¬ moved to Carrara, the site of the famous marble quarries. His first important work was the mausoleum erected in the cathedral at Lucca to Pietro de Noceto, secretary to Pope Nicholas V. His greatest works are, in the same church, six statues of white marble rep¬ resenting personages of the Old Testament; a bust of the humanist, Pietro di Avenza ; two beautiful angels belonging to the former Altar of the Sacrament, the shrine of which is in the

South Kensington Museum, London; the tomb of his friend and patron, Domenico Bertini, a miniature octagon temple; the statue of Saint Sebastian ; the altar of Saint Regulus, and the pulpit of the cathedral. Among his archi¬ tectural works is the Bernardini palace at Lucca, of simple style, and also the little temple which contains the miraculous crucifix in the church of San Martino. He also erected a monument to Saint Romanus in the church of San Romano. The Uffizi Gallery at Florence con¬ tains Civitali's statue of (Faith, > and another of the Saviour. The Metropolitan Museum of New York contains a charming painted terra¬ cotta < Angel of Annunciation. His last surviv¬ ing work is the group of statues in the chapel of Saint John the Baptist in the cathedral of Genoa, in the style of the high Renaissance. As an architect and engineer, he constructed a bridge near Lucca and the fortifications of his native town. He is best classed with the Floren¬ tine School, but his style is simple and more rugged and sincere. Consult monographs by Yriati; Roselli (1891); Cappellette (1892); Volpi (1893).*

CLAAR, klar, Emil, German stage director : b. Lemberg 1842. He was at first an actor mak¬ ing his debut at the Burg Theatre, Vienna. Later he appeared at Gratz, Innsbruck and Berlin. In 1864-70 he was stage manager of the Stadt Theatre, Leipzig, and in 1870-71 of the Court Theatre, Weimar. From 1879 to 1900 he was director successively of two large houses at Frankfort-on-the-Main, and after 1900 was manager of the Schauspielhaus there. His pub¬ lished works include

CLACKMANNAN, Scotland, the county town of Clackmannanshire, nine miles east of Stirling, on the Forth. Coal, iron and limestone are found nearby. Close to the town are the ruins of a castle of the Bruces. Pop. 2,203.

CLACKMANNANSHIRE, Scotland, the smallest county, being only about nine miles long, seven wide and comprising an area of about 34,927 acres or 55 square miles. Its great¬ est length is 10 miles from north to south, and is nine miles broad from east to west. It lies on the north side of the Forth, by which it is bounded southwest. On all the other sides it is enclosed by the counties of Perth, Fife and Stirling. The north border of the country is occupied by the Ochil Hills, but the other por¬ tions

are comparatively level, and in general are exceedingly fertile, yielding large crops of oats, barley, wheat, turnips and other green crops. The minerals are valuable, especially coal, which abounds. There are ironworks, breweries and distilleries, woolen manufactures, tanning, glass¬ works, etc. Pop. 31,121, or 570 to the square mile. The county unites with Kinrossshire in sending a member to Parliament. The princi¬ pal towns are Alloa (the largest, and famous for yarns), Alva, Tillicoultry, Dollar and Clack¬ mannan ; the last is the county town. It is rather poorly built, but has an interesting old tower and an old market-cross.

CLACTON-ON-SEA, England, a popular watering-place on the coast of Essex, 19 miles

southeast of Colchester by rail, with admirable facilities for sea-bathing, and of easy access from London both by rail and steamboat. It stands on cliffs over 40 feet high. The church of Great Clacton, one and a half miles distant, dates partly from Norman times. Pop. 9,777.

CLADEL, Leon, kla-del, Frenc'h roman- cist: b. Montauban, 13 March 1835; d. 1902. He rose suddenly into prominence with his story, (Les martyrs ridicules (1862), a satiri¬ cal description of the lower walks of literature in Paris. This first success was repeated with the later novels*

CLADIUM, kla'di-um, a genus of plants of the sedge family (Cyperacecc) , with about 30 species natives of tropical or temperate climes. They are akin to the Rynchosporas, the spike- lets oblong or fusiform, few-flowered, variously clustered. Scales imbricated all around, the lower empty, the middle ones mostly subtend¬ ing imperfect flowers, the upper usually fertile. It has no perianth and two or three stamens. Its style is cleft, deciduous from the summit of the achene, its branches sometimes parted. The achene is ovoid or globose, smooth or longi¬ tudinally striate. There are only three species found in America, of which the most common is the twig-rush (C. mariscoides), found in marshes from Minnesota eastward to Nova Scotia and southward to Florida. This plant is very common in certain of the fenny districts of England, where it is used for thatching. It flourishes from July to September.

CLADOCERA. See Daphnia.

CLADRASTIS, a small leguminous tree resembling the locust, with two species, one in Manchuria, the other (C. hitea) in eastern United States. It is called yellow wood, yellow ash, yellow locust and fustic in various places. The American or Kentucky yellow-wood is a species with smooth bark, and sometimes grows above 50 feet in the rich soils of Kentucky and Tennessee. The wood, which weighs about 40 pounds to the cubic foot, is strong and hard, and of a bright yellow color. It produces a dye of considerable commercial value, its bark having cathartic properties.

CLAFLIN, Horace Brigham, American merchant: b. Milford, Mass., 18 Dec. 1811; d. Fordham, N. Y., 14 Nov. 1885. He received a common school education, worked in his father's store until he was of age, when he went to Worcester, Mass., and in partnership with his brother-in-law, engaged in the dry goods busi¬ ness on a large scale. In 1843 he established in New York the firm of Bulkley & Claflin, im¬ porters and jobbers of dry goods; in 1851 it became Claflin, Mellin & Company, and in 1864 H. B. Claflin & Company, by which it is best known. Mr. Claflin conducted an enormous business extending all over the country, and since 1864 it has been the largest mercantile business in the United States, its sales in a single, year having reached $72,000,000. Its financial strength, and the money market's firm confidence in Mr. Claflin's methods and in¬ tegrity, enabled the firm to pass safely through most of the financial crises of the last 40 years. In 1861 and in 1873 it had to ask for slight ex-

tensions of time in which to settle accounts, but all were paid with interest before maturity. In 1864 Mr. Meilin retired from the firm and the name became H. B. Claflin & Company. Mr. Claflin was a man of domestic tastes, fond of books and horses, active in charitable institu¬ tions, and an intimate friend of Henry Ward Beecher.

CLAFLIN, John, American merchant : b. Brooklyn, 24 July 1850. He was graduated at the College of the City of New York in 1869 and in 1869-70 traveled in Europe and the East. He entered the dry goods business with his father's firm, H. B. Claflin & Company 1870, and in 1873 became a member of the firm. In 1890 he organized the H. B. Claflin Company and in 1909 organized the United Dry Goods Companies. He was president of both organi¬ zations until 1914, when he retired. He has served as trustee of many financial and chari¬ table corporations.

CLAFLIN, William, American merchant and statesman: b. Milford, Mass., 6 March 1816; d. 5 Jan. 1905. He was educated in the public schools and at Brown University. For many years he was engaged in the shoe and leather business in Saint Louis, Mo., but later settled in Boston, Mass. He was elected to the State house of representatives 1849-53 ; to the sen¬ ate 1860 and 1861 ; was a member of the Repub¬ lican National Committee 1864—72; lieutenant- governor of Massachusetts 1866-68; and gov¬ ernor 1869-71. From 1877 to 1881 he was a Republican member of Congress. He was vice- president of Boston University 1869-72 and its president from 1872. The degree of LL.D. was conferred on him by Harvard and Wesleyan universities.

CLAGHORN, Kate Holladay, American writer: b. Aurora, Ill., 12 Dec. 1863. She was educated at Bryn Mawr College, and has been engaged in research work for the United States Industrial Commission, was registrar of records 1906-12; is connected with the New York Tene¬ ment House Department and the New York School of Philanthropy since 1912 ; is a mem¬ ber of advisory council of the Society for the Protection of Italian Immigrants. Besides con¬ tributions to periodicals, she has published Col¬ lege Training for Women1 (1897).

CLAIBORNE, or CLAYBORNE, Wil¬ liam, American colonial official: b. Westmore¬ land, England, about 1589; d. about 1676. He went to Virginia as surveyor in 1621 and four years later became secretary of state of the colony. In 1627-28 he explored Chesapeake Bay, in 1631 founded a trading post on Kent Island. This post flourished and in time sent a representative to the general assembly of Virginia. Kent Island was included in the grant to George Calvert, first Lord Baltimore, whom Clairborne had previously opposed bit¬ terly in London. He took up arms to enforce his claim to Kent Island but was soon driven off. Maryland and Virginia continued to wran¬ gle about it until 1776. When Virginia and Maryland decided in favor of Charles II, Clai¬ borne sought and obtained a place on the Crom¬ wellian commission appointed to reduce them to submission. When Richard Bennett became governor of Virginia under the new regime Claiborne was made secretary of state. In Maryland all Catholics were removed from of¬

fice, which act caused general discontent and friction until 1658, when Lord Baltimore again came into possession of the province. After the Restoration Claiborne lost all influence at court and died in obscurity many years later. W. H. Carpenter's novel, (Claiborne the Rebel 1 (1845) is based on his career. (See Virginia — History). Consult Mereness, (Maryland as a Proprietary Province) (New York 1901) ; Claiborne, J. H., (William Claiborne of Vir¬ ginia1 (1917).

CLAIBORNE, William Charles Cole,

American politician: b. Sussex County, Va., 1775; d. New Orleans, La., 23 Nov. 1817. He received a good education, studied law at Wil¬ liam and Mary College and engaged in its prac¬ tice in Nashville, Tenn. He assisted in form¬ ing the constitution of Tennessee, and rep¬ resented that State in Congress 1797-1801. In 1801 he was appointed governor of Mississippi Territory, and in 1804 of the territory of Orleans, that part of the Louisiana purchase lying south of the territory of Mississippi and of the 33d parallel. When Louisiana became a State and adopted its constitution, he was elected governor 1812-16. During the War of 1812, he assisted with Jackson in driving off the British at New Orleans. He was later elected United States senator, but died before taking his seat in that body.

CLAIBORNE STAGE, in American ge¬ ology, the rocks, principally shales and lime¬ stones, laid down in Middle Eocene time along the Carolinas and the Gulf States and around an arm of the sea that reached northward to the present mouth of the Ohio River. See Eocene Series; Tertiary System.

CLAIM, a challenge of ownership of a thing which is wrongfully withheld from the possession of the claimant. The assertion of liability of some one, to the party making it, to do some service or pay a sum of money. The possession of a settler upon lands owned by a government which is not used for

any particular purpose, and from which no benefit is derived. When a new section of country is opened up, the government gives to each settler a certain amount of land on condition that he will live there, and improve and cultivate the soil for a definite time. The land taken is called a claim, and the settler receives an absolute title to the property when the conditions have been com¬ plied with. The ground must be staked out so that the particular claim may be identified. Mining claims are of this nature. Generally it is required that they be staked out, that a de¬ scription of the claim be filed and that a certain amount of work be done within a speci¬ fied time. These claims are considered personal property until the conditions are complied with, and are subject to sale and transfer, it being necessary for all but the original settler to be able to show how and through whom he ac¬ quired title, in order to get a complete and absolute title from the government, as it is necessary to show that the land has been used, and in what manner, for a definite length of time, before the settler acquires his title from the government.

There are claims for labor and wages by mechanics for work done, by materialmen for material furnished or by pilots for pilotage When filed of record these claims become liens

against the property which has been benefited by the work, material or care bestowed upon it.

Claims, when filed in the name of a munic¬ ipal corporation for improvements, such as opening or widening a street, laying sewers or any municipal improvement, are liens against the property benefited.

CLAIMS, Court of. See Courts.

CLAIRAC, kla'rak', France, a town in department Lot-et-Garonne, on the Lot, 16 miles northwest of Agen. It was built about an abbey in the 8th century. It was the first town in the south of France to declare in favor of the Reformation, and was the scene of many con¬ flicts between the Roman Catholics and Hugue¬ nots. It has a large trade in white wines. Theophile Viaud was born here in 1626. Pop.

2,388.

CLAIRAUT, kla-ro, Alexis Claude, French mathematician: b. Paris, 13 May 1713; d. there, 17 May 1765. In his 11th year he composed a treatise on the four curves of the third order, which, with his subsequent (Recherches sur les courbes a double courbure) (1731), procured him a seat in the Academy at the age of 18. He accompanied Maupertuis to Lapland, to assist in measuring an arc of the meridian, and obtained the materials for his work (Traite de la figure de la terre) (1743 and 1808), in which he proved, contrary to the opinion of Cassini, the flattening of the earth toward the poles. In the field of mathematics, Clairaut studied curves of the third order, tortuous curves and projections, and was the first to find the singu¬ lar solution of a differential equation of the first degree in X and Y. The equation used by Clairaut, often called Clairaut's form, is

y = px + f(p) in which p—ˆL. In physics, he

ax

explained capillary action by demonstrating the necessity of considering the attraction between the parts of the fluid itself ; computed the change in gravity at a high altitude, and so fully demonstrated the figure of the earth that little essentially new has since been added. In 1752 he published his (Theorie de la lune) (1752 and 1765), and in 1759 calculated the return of Halley's comet. Besides the works already mentioned, he wrote (Elements de geometrie) (1741 and 1765) ; (Elements d'alge- bre) (1746 and 1760) ; (Theorie du mouvement des cometes> (1760). A brother, who died at the age of 12, published in his ninth year a treatise entitled (Divers Quadratures of Cir¬ cular EllipticsP

CLAIRIN, kla-ran, George Jules Victor,

French portrait painter: b. Paris, 11 Sept. 1843. He studied in Paris under Picot and Pils, and obtained a second class medal at the Paris Exposition in 1889, and the Legion of Honor medal in 1888. Besides portraits he has painted several brilliant scenes from Spanish history. His paintings are fine in color, effective in com¬ position and have always aroused wide interest. Among them are (The Benediction of the Swords; (Allah ! Allah 1C' (The Two Hostile Tribes) ; (After the Victory) ; (The Massacre of the Abencerrages) ; (A Moorish Sentinel * (Metropolitan Museum, New York) ; (Entering the Harem) (Walters Gallery, Baltimore). His portraits include those of Mounet-Sully as Hamlet (1889), Sarah Bernhardt and Madame*

Ivrauss. He also executed a number of effective decorative paintings in the Paris Opera, the Bourse and in the Salle-des-Jeux at Monte Carlo.

CLAIRVAUX, klar-vo' (clara vallis, light¬ some vale), a village of northeast France, on the river Aube, 40 miles southeast of Troyes, noted as the site of the celebrated abbey of Cistercian monks, founded in 1115 by Saint Bernard, who was its abbot till his death in 1153. It was a vast establishment, comprising within its enclosure a large population both of monks professed, lay brothers, laborers and artisans employed in various industries. There was a large and magnificent church; four clois¬ ters surrounded by buildings for housing the monks, conversi or lay brothers, the novices and the superannuated members of the order; the abbots' hall with the guest house adjoining it, the kitchen, refectory, infirmary, scriptorium, etc. ; all these were grouped in one portion of the monastic domain. In another portion were the fish tanks, the wine-press, slaughter-house, barns and stables, saw-mill, grist-mill, oil-mill, tannery, tile works, etc., producing all neces¬ sary supplies for the use of the inmates. At the Revolution the monks were turned out and the lands and buildings, except the church which was destroyed by fire, occupied for pub¬ lic uses ; the buildings are now used as a peni¬ tentiary and workhouse.

CLAIRVOYANCE (Lat. clams, clear, + videre, to see), defined as the power of perceiv¬ ing without the use of the organ of vision or under conditions in which the organ of vision with its natural powers alone would be useless. It comprises the sight of things past, present or future. Various methods of clairvoyance are recounted; by direct vision of things at a dis¬ tance (opaque substances being no hindrance) ; by looking into a black surface ; by looking into water, into a crystal, etc.; or by laying the ob¬ ject to be described on the forehead or chest of the clairvoyant ; but clairvoyants now usually represent the cerebral region as the seat of illumination. From remote antiquity the pos¬ session of such powers by favored individuals has been believed. In the Old Testament (2 Kings vi, 15-17) is an account of the opening of the inner vision in the case of the servant of Elisha in answer to the prayer of the prophet.

Clairvoyant powers were claimed for the Pythia at Delphi. Apollonius of Tyana and Diodorus Siculus testify to the clairvoyance of the Indian sages. Macrobius gives an instance of clairvoyance on the part of the oracle of the Heliopolitan god when consulted by the Em¬ peror Trajan. Tertullian speaks of a seeress who could prophesy and prescribe for the sick. Clairvoyance was known among the nations of antiquity, and is still generally accepted as an undoubted fact among Eastern nations. As in¬ stances of clairvoyants in later times may be mentioned Jacob Bohme (1575-1624) and Emanuel Swedenborg (1688-1772), the Swedish scientist and founder of the religious body called ((The Church of the New Jerusalem.®

The phenomena of clairvoyance have been carefully observed. The clairvoyant state seems to be intimately connected with the mesmeric, the somnambulistic and the so-called ((biologi- cal.® Mesmeric somnambulism and clairvoy-

ance were first brought to notice by Puysegur in 1784. The clairvoyant is usually in a state of trance, which may be induced by mesmeric passes. In this state he is sometimes conscious only of his mesmerizer; in others, his clairvoy¬ ance is unrestricted; but the clairvoyant may enter the trance state spontaneously, or he may even be in possession of his ordinary faculties, both of which characteristics are to be found in Zschokke, the German novelist. In <(second- sight,® as found in Denmark, parts of Germany and especially in the Highlands of Scotland, the seer is not in a state of

trance similar to that in other forms of clairvoyance. Others consider that the results are to be explained by telepathic communication between the minds of one or more living persons and that of the percipient. Some modern scientists claim that the discovery of the X-rays, by Rontgen, in 1895, has solved a number of the questions raised by clairvoy¬ ance. Consult Flournoy, (From India to the Planet Mars) (New York 1900) ; Podmore,

(Apparitions and Thought Transference (Lon¬ don 1895) ; Hyslop, (Enigmas of Psychical Re¬ search } (Boston 1906).*

CLAM. While the vernacular name clam is indiscriminately applied to any large edible bivalve, it usually refers to the northern Hong® or soft-shelled clam (Mya arenaria), in dis¬ tinction from the round clam, hard-shell clam, or quahog (Venus mercenaria) , which extends from Cape Cod southward, though occasionally found as far north as the Maine coast (Casco Bay) and the Gulf of Saint Lawrence at Shediac. The soft-shelled clam occurs through¬ out the Atlantic Coast from North Carolina to Greenland, and on the British shores, where it is called (

clams artificially have met with success and promise valuable results in clam-culture. Clams have been taken five and three-quarters inches long, and weighing 15 ounces. Attempts have been made to plant the clam on the Pacific Coast.

The round, or little-necked clam, or quahog, as it is called in New England, lives in the sand from Cape Cod to Texas, just below low-water mark, and abounds at the mouth of estuaries. The shell is heart-shaped, the valves very thick and heavy. This bivalve is fished by means of long rakes and tongs, or is dredged like oysters. It has a very large ((foot,)) and plows through the sand, but does not burrow deeply.

The beach, surf or hen clam is Spisula (formerly Mactrd) solidissima. The large edi¬ ble species of the southern coast is the painted clam (Callista gigantca). Several large Pacific Coast bivalves are edible and known as clams, being species of Taper, Laxidomus and Glyci- mens. Very unlike any edible clam is the <(giant clam® (Tridacna gigas) of the coral reefs of the Pacific Ocean, whose shell often weighs upward of 400 pounds and whose soft part amounts to 20 pounds of edible flesh. Corlsult Mead, (30-33d Annual Reports of the Commissioners of Inland Fisheries of Rhode Island) ; Mayer, (Sea-Shore Life) (New York

1906).

CLAM-GALLAS, klam'-gal'las, Eduard,

Count, Austrian general: b. Prague 1805; d. 1891. He entered the army in 1823 and reached the rank of major-general in 1849. In 1848 he commanded the Transylvanian corps which joined the Russians and defeated Bern at Sepsi- Saint Gyorgy. He commanded the First Divi¬ sion of Bohemian Regulars in 1850 and won distinction at Magenta and Solferino in 1859. In 1866 he was defeated by the Prussians at Hiihnerwasser, Podol, Munchengratz and Git- schin. These disasters led to his appearance before a military tribunal, which acquitted him because the chief responsibility for the several defeats was traceaole to his superiors.

CLAMECY, kla-me-se', France, town in the department Nievre, 38 miles northeast of Nevers, left bank Yonne, at the mouth of the Beuvron. It was formerly surrounded by enor¬ mous walls, and defended by a castle which commanded the town and environs. One of its suburbs, situated on the opposite side of the Yonne, was the seat of a bishopric in partibus, known as the bishopric of Bethlehem, founded in 1180 for the bishop of that place, who had been expelled by the Saracens. Wood-rafts for the supply of Paris with fire-wood are made, up here, and floated down the Yonne and Seine. The parish church, founded in 1497, is remark¬ able for its tower and for some fine sculptures. Clamecy carries on several industries, the chief being that of tanning. Pop. 4,869.

CLAN (Gael, clann, Ir. clann, eland, off¬ spring, tribe), a tribe or number of families, bearing the same surname, claiming to be de¬ scended from the same ancestor and united under a chieftain representing that ancestor. The members shared certain rights and privi¬ leges, and vowed solemnly to avenge each other's wrongs. The clan system is essentially the same as that existing among the Arabs, the Tartars and tribes similarly situated. The clan differs from the village or pagus, which

was the first step toward the enlarging of tribal life. From ancient times the Vlans® existed in Ireland. The system is said to have sprung up in Scotland about 1008, while Mal¬ colm II was reigning, but it may have been of greater antiquity. In 1747 the legal authority of the chiefs over their followers was abolished as a punishment for the part which the former had taken in the insurrection which ended in 1745 at Culloden. While the clans flourished they were divided into two, the clans of the borders and those of the highlands. Consult Mayne, (Hindu Law and Usage } (London 1883) ; Morgan, (Ancient Society 5 (New York 1878); Leist, (Graeco-italische Rechtsgeschichte) (Jena 1884) ; Meyer, (Geschichte des Alter- tums) (Vol. II, Stuttgart 1893) ; Krauss, (Sitte und Brauch der Siidslawen5 (Vienna 1885) ; Skene, (Celtic Scotland) (3 vols., Edinburgh 1876-80) ; Lang, (The Secret of the Totem 5 (London 1905) ; Bradley, (Malta and the Medi¬ terranean Race) (London 1912).

CLAN-NA-GAEL, klan-na-gal, Irish secret society, founded in the United States for the purpose of aiding in securing "Home Rule® for Ireland. The Society has been charged with some grave crimes, said to have been perpe¬ trated for the purpose of intimidating the Brit¬ ish government ; but so little is really known about the workings of the organization nothing positive can be asserted.

CLAOSAURUS, kla-6-sor'us, TRACHA- DON, or TRACHODON, a genus of duck¬ billed dinosaurs (see Dinosauria) of the Cre¬ taceous Period. This dinosaur was bipedal, herbivorous, resembling the hadrosaurus (q.v.), but the bill was not so broad. Its remains are found in the Upper Cretaceous formations of North America. A mounted skeleton pos¬ sessed by Yale University is 30 feet long and stands 14 feet high.

CLAP, Roger, American pioneer: b. Sal- comb, Devonshire, England, 6 April 1609 ; d. Boston, Mass., 2 Feb. 1691. He came to Amer¬ ica in 1630, and with other colonists settled the present Dorchester, Mass. In the course of his life he held several military and civil offices, being captain of Castle William 1665-86, and representative in the general court 1652-56. His

CLAP, Thomas, American clergyman : b. Scituate, Mass., 26 June 1703; d. New Haven, 7 Jan. 1767. He was settled as a minister at Windham, Conn., in 1727, and in 1739 was elected president of Yale College. He contrib¬ uted much to improve that institution, and through his efforts a college edifice and chapel were erected. He was a man of exten¬ sive erudition, gave great attention to mathe¬ matics and astronomy and constructed the first orrery made in this country. He published a (History of Yale College) (1766) ; (Nature and Foundation of Moral Virtue and Obligation (1765) ; (Nature and Motion of Meteors)

(1781), etc.; and had made collections for a

history of Connecticut; but most of his manu¬ scripts were plundered in the expedition against New Haven, under General Tryon. He had a controversy with President Edwards respecting Whitefield, and opposed the latter, not so much upon religious grounds as from a misapprehen¬ sion of Whitefield's designs.

CLAPBOARD, klap'bord, colloq. klab'ord, a thin, narrow board commonly used for cover¬ ing the sides of wooden buildings. Clapboards are usually of white pine, four feet long and eight inches wide and are made much thinner on one edge than on the other, so that when nailed on to each other one can lap a little over the one next below it. This makes the covering of the building much tighter than if the boards were only set together one above the other and keeps the rain from driving in. Clapboards are sawn out of solid logs, not by sawing them clear through, as in making com¬ mon boards, but by sawing from the outside to the middle or heart of the log. They are thus made thicker on the outside than on the inside. They are afterward smoothed in a planing machine.

CLAPHAM, a southwest suburb of Lon¬ don, lying a mile south of the Thames and ad¬ joining Battersea, with which it forms a par¬ liamentary borough, three miles south-southwest of Saint Paul's. Pop. 51,353. Clapham Com¬ mon is still an open common of 200 acres. Clapham Junction, in Battersea parish, is one of the busiest and most perplexing railway junc¬ tions in the world.

CLAPHAM SECT, a name given by Syd¬ ney Smith to the Evangelical party in the Church of England; the Rev. Henry Venn was the vicar of Clapham, and some of the most eminent Evangelicals — Zachary Macaulay, Wil- berforce (q.v.), E. J. Eliot, James Stephen, Charles Grant, Henry Thornton and the Rev. W. Romaine — lived there. Thackeray's (New- comes) has made the phrase familiar to a later generation.

CLAPNET, a ground net used by bird catchers, consisting of two equal parts about 12 yards long by 2ˆ2 wide, and each having a slight frame. They are placed about four yards apart, and are pulled over by a string so as to enclose any birds on the intervening space. They are much used by the bird catchers who supply the London market.

CLAPP, Cornelia Maria, American zoolˆ ogist: b. Montague, Mass., 17 March 1849. She was graduated at Mount Holyoke College in 1871, and studied also at Syracuse Univer¬ sity and the University of Chicago. In 1896 she became professor of zoology at Mount Holyoke. From 1888 to 1902 she carried on investigations at the marine biological labora¬ tory at Woods Hole, Mass. She has con¬ tributed articles to technical journals on pro¬ fessional topics.

CLAPP, Henry Austin, American dramatic critic: b. Dorchester, Mass., 17 July 1841; d. there, 19 Feb. 1904. He was for many years clerk of the Supreme Judicial Court of Massa¬ chusetts and a well-known dramatic critic on the Boston press. He also lectured extensively on Shakespeare. He published (Reminiscences of a Dramatic Critic5 (1902).

CLAPP, Moses Edwin, American legis¬ lator: b. Delphi, Ind., 21 May 1851. He was graduated LL.B. at the University of Wiscon¬ sin in 1873 and was admitted to the bar in the same year. In 1878-80 he was county attorney of Saint Croix County and attorney-general of Minnesota in 1887-93. In 1896 he was can¬ didate for the Republican nomination for gov¬ ernor and in 1901 he was elected to fill the unexpired term of C. K. Davis in the United States Senate. He was re-elected in 1905 and

1911.

CLAPPERTON, Hugh, Scottish explorer: b. Annan, Dumfriesshire, Scotland, 1788; d. near Sokota, central Africa, 13 April 1827. He entered the merchant service, but was impressed into the navy, served in the East Indies and on the Great Lakes in the War of 1812, be¬ coming a lieutenant; returned to England in 1817. In 1822, with Dr. Oudney and Denham, he went to Africa, where he remained till 1825, returning with valuable information, though the disputed question of the course of the Niger was left undecided. On his return to England Clapperton received the rank of captain, and, with Richard Lander, who published an account of his chief's experiences, and three others who died early in the expedition, he immediately engaged in a second expedition, to start from the Bight of Benin. Leaving Badagry in De¬ cember 1825, he penetrated to Katunga, within 30 miles of the Quorra or Niger, but was not permitted to visit it. At Soccatoo the Sultan Bello refused to allow him to proceed to Bornu and detained him a long time in his capital. He was the first European who traversed the whole of central Africa from the Bight of Benin to the Mediterranean. Consult Lander, (Records of Captain Clapperton's Last Expedi¬ tion } (1830), and the narrative by Oudney.

CLAQUE, klak, a body of paid applauders at a public performance, according to tradition, an invention of Nero's. The recollection of this gave a 16th century poet, Jean Daurat, the idea of the modern claque. In 1820 this body of people was organized by M. Santon who opened an office for the supply of Uaquers. By 1830 the claque had become a regular institu¬ tion. There are several orders of claques. The chef de claque studies the piece and leads the applause. The commissaire learns the piece by heart and calls the attention of his neighbors to the good parts between the acts. The neurs laugh loudly at the jokes. The pleureurs feign tears at the sad parts ; the chatouilleurs keep the audience in good humor and the bisseurs simply clap their hands to secure encores. At the present time the claque is a recognized feature of theatrical management in Paris, and although said to be employed in London and New York, the use of such artifices is not recognized as legitimate outside of the French capital.

CLARE, Israel Smith, American historian: b. Lancaster County, Pa., 24 Nov. 1847. He has

published Ullustrated Universal History5 (1876) ; (Complete Historical Compendium 5

(1884) ; (Library of Universal History5 (1890) ; (History of British-Boer War5 (1900); Ullus¬ trated History of All Nations5 (15 vols., 1906) ; (True History of the Human Race (1916). He has also published 45 historical maps, a series of historical poems and many newspaper and VOL. 7 — 3*

CLARE

magazine articles on historical, economic and foreign political subjects.

CLARE, John, English peasant poet : b. Helpstone, Northamptonshire, 13 July 1793 ; d. Northampton, 20 May 1864. He led a rambling, unsteady life until 1818, when he was obliged to accept parish relief. In 1820 his (Poems De¬ scriptive of Rural Life and Scenery5 met with a favorable reception, and the issue of his (Vil¬ lage Minstrel5 in 1821 won him many friends. A subscription furnishing him with £45 annually was, however, dissipated by 1823, and his (Shepherd's Calendar5 (1827), which hehawked himself, was not a success. He brought out a new work, the (Rural Muse,5 in 1835, but became insane shortly afterward, and the greater part of his subsequent life was passed in the Northampton Lunatic Asylum. Clare was a genuine poet, and his pictures of rural life are eminently truthful and pleasing.

CLARE, Saint, or SAINT CLARA, Ital¬ ian nun: b. Assisi, 11 July 1194; d. 11 Aug. 1253. She was born of a noble family of Assisi. When very young she was attracted by the accounts of the work being done by Saint Francis (q.v.), a young man of her native place. At an early age she decided to give her life wholly to God and to work for him in poverty. She sought and received the advice of Saint Francis, and when only 18 years of age, gave up the world and began to devote herself wholly to charity. Other pious young women soon joined her and in time a recognized religious order was founded. For some years they had no special rule, but in 1218 they adopted the rule of Saint Benedict. Later (1224) Saint Francis gave them a rule, mitigating the rigors of the fast, but recog¬ nizing holy poverty in the extreme. Two years after her death she was canonized by Alexan¬ der IV. The order which she founded is known throughout the world as (

CLARE, Ireland, maritime county in the province of Munster; boundaries north and east, Galway Bay and county ; east and south, the Shannon separating it from Tipperary, Lim¬ erick and Kerry; west, the Atlantic. Area, 852,389 acres. Less than one-fifth of this area is under tillage, 80,000 acres are under water and what remains is under grazing or bog and mountain land. The cliff scenery on the coast

34

*CLARE COLLEGE — * CLARENCE*

is magnificent. The surface is irregular, rising in many places into mountains of considerable elevation, particularly in the east and west and northwest districts. The grazing lands are excellent; the chief minerals are limestone, lead and slate, and in the southwest coal ; the min¬ eral deposits are almost undeveloped. The chief crops are oats and potatoes. Sheep and cattle on the hillsides, salmon in Clonderlaw Bay, the rivers Shannon and Fergus and at Dunbeg are sources of income. There are oyster beds near Ballyvaughan and along the shores of Burren. Frieze and hosiery are manufactured. The chief town is Ennis. Pop. 104,232, of which 98 per cent are Roman Catholics.

CLARE COLLEGE, University of Cam¬ bridge, founded in 1326, and first called ((Uni- versity Hall.® In 1336 its patronage was given by Richard de Baden, then chancellor of the university, to Elizabeth de Burgh, sister of the Earl of Clare. Her object in giving of her riches to this college was to educate young men who would become priests, in order to replace the many clergymen who died from the plague. Many noted men have been educated in this school, among them Bishop Latimer and Arch¬ bishop Tillotson. In 1914-15 there were a mas¬ ter, 17 fellows, 32 scholars and 36 undergradu¬ ates. There are fellowships open to B.A.'s or persons of a higher degree, without restriction as to marriage. The master and fellows elect to the vacant fellowships, and the master is elected by the fellows. The foundation scholar¬ ships are eight of not less than $300, eight of not less than $200, eight of $100, four of $250 per annum each; three of about $300 per annum, tenable for three years, with preference to cler¬ gymen's sons, with several minor scholarships.

CLAREMONT, Cal., village in Los An¬ geles County, on the Atchison, T. and S. Fe Railroad, 35 miles east of Los Angeles. This is the centre of a large fruit growing and raisin making region, and large crops of oranges and lemons are raised here. It is the seat of Po¬ mona College, a Congregational institution, founded in 1888. Value of its tenable property is $1,464,410. Pop. (1920) 1,728.

CLAREMONT, England, a mansion sit¬ uated at Esher in Surrey, 15 miles southwest of London. Early in the 19th century it was the residence of Prince Leopold of Saxe-Coburg, afterward king of the Belgians. Louis Philippe, king of the French, resided here in 1848-50 and died there. It was long the headquarters of the Orleans party.

CLAREMONT, N. H., town in Sullivan County, on the Boston and Maine Railroad, 50 miles north of Concord. The cotton- and woolen-mills obtain their power from the Sugar River. There are also paper-mills, shoe fac¬ tories, a diamond drill factory, and lumber, granite, brick and marble yards. There are two national banks with a combined capital of $200,- 000; Stevens High School, and the Fiske Free Library, founded in 1873 and containing 8,000 volumes, are located there, and the town has six churches. The town was first settled in 1767, the predominating nationality in the popu¬ lation now being French Canadian. Claremont contains a Carnegie library and owns its water¬ works. Pop. (1920) 9,524.

CLAREMORE, Okla., city and county-seat of Rogers County, 25 miles north of Tulsa, on the Saint Louis and San Francisco and the Saint Louis, Iron Mountain and Southern rail¬ roads. ‘ Since 1903 it has become popular as a health resort, owing to the discovery at that time of medicinal springs. It is a stock-raising and oil centre. There are brickworks. The waterworks and electric lighting plants are the property of the city. Pop. (1920) 3,435.

CLARENCE, Dukes of, a title of English dukes whose origin and early history is identical with that of the family of Clare, earls of Glou¬ cester, who are sometimes called ((earls of Clare,® of which <(Clarence® is a later form.

The 1st Duke of Clarence was Lionel of Antwerp: b. Antwerp, 29 Nov. 1338; d. Alba, 7 Oct. 1368. He was the third son of Edward III, who received the title through his wife, Elizabeth, a direct descendant of the Clares, who brought lands called the (

The next was Thomas, Duke of Clarence: b. 1388; d. 1421. He was lieutenant of Ireland (1401-13); commanded the English fleet (1405) ; opposed his elder brother who was af¬ terward Henry V ; was for a short time at the head of the government, leading an unsuccess¬ ful expedition into France in 1412. When his brother became king, Thomas became a mem¬ ber of the royal council. He was present at Harfleur and led the assault on Caen in the expedition into Normandy. He was killed at Beauge whilst attacking the French and their Scottish allies. He left no legitimate issue and the title again became extinct. It was resumed by George, Duke of Clarence, English prince: b. Dublin, 21 Oct. 1449 ; d. London, 18 Feb. 1478. He is chiefly celebrated for his tragical end, and for the use made of his name and history by Shakespeare. He was the son of Richard, Duke of York, and brother of Edward IV, king of England, and on his brother’s accession to the crown in 1461 he was, as the reward of his assistance, created Duke of Clarence, and in 1462 lord-lieutenant of Ireland. When the Earl of Warwick deserted the cause of Edward, Clarence entered into alliance with him, married his daughter in 1469, retired with him to France and afterward landed with him at Dartmouth in September 1470, and in a Parliament held at Westminster by the Lancastrians had the crown settled on him, failing the issue of Henry VI. Clarence had already meditated a double treach¬ ery before leaving France, and at Coventry, on 30 March 1471, he left the party he had espoused on the field of an imminent battle and joined his brother Edward. After Warwick’s death Clar¬ ence seized his estates and was created Earl of Warwick and Salisbury in his wife’s name. Clarence’s wife having died in 1476, he offered himself, on the death of Charles the Bold, to Mary, heiress of the estates of Burgundy, but

the king opposed his suit, which hardly needed his opposition to cause it to miscarry. Some of his servants were about the same time hur¬ riedly put to death on an accusation of magic. Clarence

appeared in the council to complain of the injustice of their sentence. For this inter¬ ference with justice he was committed to the Tower. A parliament was summoned which condemned him to death, and he was found dead in the Tower. He was survived by two children, Margaret, Countess of Salisbury, and Edward, Earl of Warwick. Consult Stubbs, W., Constitutional History } (Vol. Ill, Oxford 1895) ; Ramsay, J. H., Lancaster and York) (Oxford 1892) ; Oman, C. W. C., (Warwick the Kingmaker (London 1891). On the title gen- erallv see Cokayne, G. E., Complete Peerage)

(1887-98).

CLARENCE HARBOR, a bay on the west coast of Alaska, 45 miles southeast of Cape Prince of Wales. It is in Seward Peninsula, on the east side of Bering Strait. An Eskimo village, Port Clarence, has long been situated on the northeast short. Here in May 1892 Dr. Sheldon Jackson, the commissioner of educa¬ tion for Alaska, established the Teller Reindeer Station, as an industrial school for instructing the natives in the management and propagation of the domestic reindeer.

CLARENCE ISLAND, (1) An island

south of South America and west of Tierra del Fuego; lat. 54° 10′ S., long. 71° 20′ W. (2) An island of the South Shetland group, south of Fuegia. Lat. 61° 16′ S. It is glaciated.

CLARENCE RIVER, a large river of Aus¬ tralia, rising in the McPherson Mountains and flowing eastward for about 250 miles through a fertile valley into Shoal Bay, New South Wales. It is navigable for 50 miles, to Grafton for ves¬ sels of 10 feet draught, and small steamers ply to Moleville, 30 miles farther up. It has a bar at its mouth where there is a lighthouse, lat. 29° 25′ S., long. 153° 25′ E., and a costly break¬ water.

CLARENCE STRAIT, (1) In the Persian Gulf, between the island of Kishm and the mainland. It is from 3 to 13 mile's broad and has many islands. (2) In Alaska, between the Prince of Wales Archipelago and Duke of York Island. (3) In Australia, the channel between Melville Island and the northwest coast, com¬ municating with Van Diemen Gulf.

CLARENCIEUX, or CLARENCEUX,

klar'en-shoo, or su, an officer of the English heraldic college. The jurisdiction of this pro¬ vincial king-of-arms includes England south of the Trent; that of Norroy, the second king-of- arms, the territory north of that river. The duties of the office include the granting and survey of arms, the registry of descent and marriages, etc. It takes its name from the Duke of Clarence, son of Edward III.

CLARENDON, Edward Hyde, Eakl of, English statesman: b. Dinton, Wiltshire, 18 Feb. 1609; d. Rouen, France, 9 Dec. 1674. He com¬ menced his political career in 1640, when he was returned to Parliament. In this Parliament he argued in favor of a grant to the king, which was successfully opposed by Hampden. He was returned to" the Long Parliament (Novem¬ ber 1640) by the borough of Saltash, and laid aside his legal business to devote himself to his

parliamentary duties. At first he acted with the more moderate of the popular party, but soon found reason to change his course. A dread of democracy seems first to have led him to op¬ pose his former friends, and his speeches and votes soon attracted the favorable notice of the court. He was offered the solicitor-generalship, which he declined, but agreed, at the king's request, to consult with his regular advisers, Falkland and Colepepper. Hyde was an honest and independent supporter of the royal author¬ ity, disposed to make moderate concessions to the popular demands and in no way responsible for the rash measures of the king, which were often taken without consulting any of his advis¬ ers. Upon the breaking out of the civil war he attached himself to the king's party, became Chancellor of the Exchequer and member of the privy-council ; and after vainly attempting to bring about a reconciliation between the con¬ tending parties, was appointed by the king to wait upon the Prince of Wales, who was first sent with an army to the west. Afterward, on the continued ill success of the royal party, he retired to Jersey in 1646. Here he remained for two years, while the prince was in France, and during that time began his (History of the Re¬ bellion. > He likewise composed in Jersey the various writings which appeared in the king's name as answers to the manifestoes of the Parliament. On the capture of the king, Hyde received orders to rejoin the Prince of Wales, but was becalmed and taken prisoner by pirates from Ostend. In September 1649 he rejoined Charles at

The Hague, who sent him to Madrid to see if any assistance could be obtained from the Spanish court. On the failure of this nego¬ tiation he retired to Antwerp, but soon resumed the business of the exiled court, of which he continued to be the most trusted adviser, first at Paris and afterward at The Hague, where Charles II appointed him Lord-Chancellor of England in 1658. After Cromwell's death Ed¬ ward Hyde contributed more than any other man to the success of the measures which placed Charles II on the throne. He subse¬ quently possessed the entire confidence of the king, who loaded him with honors. In 1660 he was created Baron Hyde, and in 1661 Viscount Cornbury and Earl of Clarendon. Many events occurred to disquiet him in the licentious court of Charles II ; among these was the marriage of the Duke of York, the king's brother, to his daughter. The Duke, while at Breda, the resi¬ dence of his sister, the Princess of Orange, became acquainted with Anne Hyde, Claren¬ don's eldest daughter, maid of honor to the princess, and married her secretly, 3 Sept. 1660, in order to legitimize their first child, born on 22 October. Anne was acknowledged as Duchess of York in December 1660, and two daughters, Anne and Mary, were of the fruit of this mar¬ riage, both of whom ascended the British throne. In 1663 Lord Bristol made an attempt to impeach the chancellor in Parliament, which, though some of the acts of Clarendon's admin¬ istration were questionable, proved unsuccessful. The Duke of Buckingham, moreover, was con¬ tinually laboring to make the chancellor ridicu¬ lous in the eyes of the king, and his position as chancellor made the nation regard him as answerable for all the faults of the administra¬ tion. The ill success of the war against Hol¬ land, the sale of Dunkirk and other events ex-

cited public indignation. The king's displeasure was changed into hatred when he saw his plan of repudiating his wife and marrying Lady Stuart defeated by Clarendon, who effected a marriage between this lady and the Duke of Richmond. The king deprived him of his offices and an impeachment for high treason was commenced against him. The Lords refused to imprison him on a general accusation by the Commons. This gave rise to a dispute between the two houses, to end which Clarendon retired to Calais, leaving an exculpatory letter to the Lords, which they communicated to the Com¬ mons, who ordered it to be burned by the com¬ mon hangman. The Lords still refused to join in his attainder, but agreed with the Commons in an act of banishment and incapacity. The hatred of the nation pursued him even to the Continent. At Evreux he was attacked by some British sailors, dangerously wounded and with difficulty rescued from their hands. He passed the next six years at Montpellier, Moulins and Rouen, at which latter place he died. His re¬ mains were afterward carried to England and buried in Westminster Abbey. Lord Clarendon, as long as he was minister, was the friend and supporter of the king against the factious and the defender of his country's freedom against the abuse of the royal power. Ingratitude and prejudice the more easily ruined him, as his stern and proud character prevented his gain¬ ing friends. Among his many writings, the most important is the (History of the Rebellion, from 1641 Down to the Restoration of Charles II. > It is the most valuable of all the contem¬ porary accounts of the Rebellion, and contains many excellent pen portraits of the chief actors in its events, but it is somewhat unequal, digres¬ sive and lacking in proportion. Consult Lister, (Life of Lord Clarendon) (1838).

CLARENDON, George William Fred¬ erick Villiers, 4th Earl of, English states¬ man: b. 12 Jan. 1800; d. 27 June 1870. By his mother, Lord Clarendon was indirectly related to the Hydes, the family of the great Earl of Clarendon, author of the (History of the Re¬ bellion.) He was educated at Cambridge, en¬ tered the diplomatic service at an early age and in 1833 was appointed Minister-Plenipotentiary to the court of Madrid. He was instrumental in negotiating a treaty, signed in 1834, called the Quadruple Alliance, in which the four con¬ tracting parties — England, France, Spain and Portugal — agreed to unite in expelling Don Carlos and Don Miguel, pretenders to the Span¬ ish and Portuguese crowns, from the Peninsula.

In 1838 Lord Clarendon succeeded to his uncle's title. In January 1840 he was appointed lord privy-seal ; and was lord-lieutenant of Ire¬ land from May 1847 to February 1852. The most notable events of this latter period were the great Irish famine and the rebellion headed by Smith O'Brien. Lord Clarendon's adminis¬ tration in regard to both of these difficulties was both firm and philanthropic; but his early popularity somewhat declined in Ireland, which was perhaps due to his impartiality in declining to favor the zealots either of the Roman Cath¬ olic or the Orange party. He was Secretary of Foreign Affairs in 1853-58 and during this period the Crimean War was

concluded, Claren¬ don being one of the British negotiators of the treaty of peace. He was again Foreign Secre¬

tary in Mr. Gladstone's administration in 1870 until his death.

For the office of Foreign Secretary, Lord Clarendon was generally admitted to possess high qualifications ; but it was complained, even by his admirers, that he adhered too much to the tradition of secrecy attaching to the foreign office. As a statesman he was remarkable rather for liberality and large-heartedness, which gave a conciliatory tone to his negotiations with for¬ eign powers, and for the undeviating rectitude of his conduct, than for any commanding qual¬ ities of intellect.

CLARENDON, Ark., town, county-seat of Monroe County, situated on the White River, on the Saint Louis and Southwestern and the Saint Louis, Iron Mountain and Southern rail¬ roads, 58 miles southeast of Little Rock. It is ■in a rich cotton-growing region and has lumber mills, boat-oar, barrel, button, plow-beam, wagon-material, telegraph and telephone sup¬ ply and shoe-last factories ; a foundry, cotton- gins, saw and planing-mills and bottling-works. Pop. (1920) 2,638.

CLARENDON, England, a lodge in Wilt¬ shire, near Salisbury. It is noted chiefly for being the place where were written, in 1164, the Constitutions of Clarendon, } defining the lim¬ its between the jurisdiction of the civil and ecclesiastical courts. Henry II called together the bishops and barons of his kingdom and they held council at Clarendon.

CLARENDON, Vt., town in Rutland County, on the Rutland Railroad, noted for its medicinal springs, the waters of which are of value in the treatment of kidney, liver and skin diseases. Its industries are fruit-raising, dairying and maple-sugar making. It is gov¬ erned by an annual town-meeting. Pop. 857.

CLARENDON, Colony of. This title represents a repeated effort to found the set¬ tlement near the mouth of Cape Fear River, N. C., later flourishing as Wilmington. If suc¬ cessful from the outset, it would have been a counterpart of Albemarle (N. C.), and Ashley River (S. C.), and very likely given us a State of Middle Carolina under some name. The first colony was of New Englanders, in 1660: they had trouble with the Indians and abandoned the place by 1663, leaving a post with a placard on it highly disparaging to the region. Early in October 1663, however, the river was ex¬ plored for 150 miles by Sir John Yeamans, a Cavalier adventurer from Barbadoes. He was delighted with the country, cared nothing for other people's opinions of it, and asked the lords proprietors of Carolina for a grant. They gave it, made him governor of it, and in May 1665 he returned with several hundred settlers from Barbadoes. But Yeamans had wider in¬ terests and could not stay with the colony — from 1672 to 1674 he was governor of Caro¬ lina ; trade was insufficient for more than the northernmost and southernmost settlements; and Clarendon (so named from the famous Lord Clarendon, one of the proprietors) was gradually abandoned, ending with 1690.

CLARENDON, Constitutions of, a code

of laws limiting the fields of ecclesiastical and secular power in the courts of England, adopted in the. reign of Henry II (January 1164), at a council of prelates and barons held at the vil-

lage of Clarendon, in Wiltshire. These laws, finally digested into 16 articles, were brought forward by the king as (III. The six articles approved of were of comparatively slight importance, mostly confirming the privi¬ leges of the ecclesiastical order; among the condemned articles the most important were the first, providing that disputes between laymen and ecclesiastics as to advowsons should be tried in the King's Court ; third, that ecclesias¬ tics accused of any offense against justice should be answerable to the civil courts for the civil offense, and to the ecclesiastical courts for the ecclesiastical offense; fourth, that ecclesias¬ tical dignitaries should not go out of the king¬ dom without the king's leave ; eighth, that ap¬ peals should be made from the court of the archbishop to the. King's Court, and should not go further (that is, to the Pope) without the king's consent; ninth, that in the event of a dispute between a layman and an ecclesiastic as to whether the civil or

ecclesiastical court should have jurisdiction in certain cases of ten¬ ure of property, the tribunal should be deter¬ mined by the king's chief justice upon a rec¬ ognition of 12 lawful men; 12th, that pleas of debt should belong to the king's jurisdiction. Notwithstanding the entreaties of the other prelates, and in defiance of the king, Becket, after a momentary appearance of yielding, per¬ emptorily refused his signature to the articles. After the murder of the archbishop, the king, on his reconciliation with the Pope in 1172, was compelled to promise the abolition of all laws and customs hostile to the clergy; and at the Council of Northampton in 1176 the constitu¬ tions of Clarendon were materially modified in favor of the ecclesiastical order, although some of them remained permanent gains to the civil power. Consult Stubbs, (The Constitutional History of England (Vol. I, Oxford 1896) ; Pauli, (Geschichte von England * (.Gotha 1853— 58) ; and for the text of the ˆConstitutions,® Stubbs, (Select Charters Illustrative of Eng¬ lish Constitutional History) (7th ed., Oxford*

1890).

CLARENDON PRESS, Oxford, the name by which the press of the University of Oxford is distinguished. In January 1586 delegates de itnpressione librorum were appointed by the Convocation of the University. About this time Joseph Barnes was styled ((Printer to the University,® and others bore the title after him. In 1633 Archbishop Laud procured letters pat¬ ent granting a large license in printing to the university, with a view to the publication of manuscripts from the Bodleian Library. The work was carried on from 1713 to 1830 in the building known as the Clarendon, the cost of which was defrayed partly from the sale of Lord Chancellor Clarendon's (History of the Rebellion, the copyright of which was given to the university. The management of the printing office is committed to a board con¬ sisting of the vice-chancellor and 10 other members of Convocation, nominated by the vice- chancellor and proctors, as vacancies occur. Five are perpetual delegates and five are nom¬ inated for a term of seven years. The south*

side of the present building (the additional ac¬ commodation required and opened) is appro¬ priated to the printing of Bibles and prayer- books. The north, called the ˆlearned® or ((classical® side is assigned for the printing of university documents, books printed by author¬ ity of the delegates and those sent in by pri¬ vate authors and publishers. Those printed for the university itself (but no others) bear on the imprint <(E Typographeo Clarendoni- ano,® or ((At the Clarendon Press.® Some ad¬ mirable specimens of typography have been produced by the Clarendon Press. It has now an American branch.

*CLARENS, kla-ran, Switzerland, a vil¬ lage in the canton of Vaud, on the northeastern coast of Lake Geneva, about 50 miles from Geneva and 1,200 feet above sea-level. The healthfulness of the climate and the beauty of the place make it a resort for invalids. It is the scene of Rousseau's (Nouvelle Heloise.**

CLARES, Poor. See Clare, Saint; Or¬ ders, Religious.

CLARET, a name originally given to wines of a light-red color, but now applied to the red wines imported from France, chiefly from Bor¬ deaux. These wines vary in composition ac¬ cording to the locality, season and age, but the produce of each vineyard usually retains its own peculiar characteristics. The most esteemed are those produced at the vineyards of Lafitte, Latour, Chateau Margaux and others. Many of the clarets formerly sold in the United States were nothing more than the vin ordi¬ naire used by the French peasants and working classes, but since the development of the Cali¬ fornia grape industry as good domestic claret can be obtained here as anywhere. A genuine claret should contain from 10 to 12 per cent of proof spirit.

Fictitious clarets were sometimes prepared by mixing a rough cider with a cheap French wine and coloring with cochineal, logwood, el¬ derberry, hollyhock, indigo, litmus, red cab¬ bage, beet-root or ros-aniline. To detect these coloring matters the following method may be adopted: Make a jelly by dissolving five grams of gelatine in 100 cubic centimeters of warm water and pour it into a square flat mold. From this cake of jelly cubes about three- fourths of an inch square are cut with a sharp, wet knife and are immersed in the wine; they are taken out after 24 to 48 hours, washed slightly and sections cut in order to see how far the coloring matter has penetrated. If the wine is pure, the color will be confined to the edges of the slice, or will not have penetrated more than an eighth of an inch. The coloring matters mentioned above permeate rapidly and color the jelly.

CLARETIE, klar-te', Arsene Amaud, called Jules, zhiil, French novelist and drama¬ tist: b. Limoges, 3 Dec. 1840; d. 1913. He studied at the Lycee Bonaparte of Paris and became known as a feuilletonist and dramatic critic. During the Franco-Prussian War he acted as correspondent for Paris papers for a brief period. He wrote a long series of very successful novels, the most noteworthy of them being (Madeleine Bertin) (1868) ; (The Mil- lion) (1882); (Monsieur the Minister (1882); (Noris, Manners of the Time* (1883) ; (The American Woman* (1892). He wrote also some*

striking chapters of contemporary history, as (The Revolution of 1870-71 } ; (Paris Be¬ sieged^ (Five Years After: Alsace and Lor¬ raine since Annexation. > His dramatic com¬ positions relate mostly to the time of the great Revolution. He became administrator of the Comedie Franqaise in 1885, and was chosen member of the Academy in 1888. Among his critical works are (La vie moderne au theatre (1868-69) ; (Moliere) (1871) ; and (Histoire de la litterature franqaise* (1905).*

CLARIBEL. (1) The bride of Phaon, as told in Spenser's (Faerie QueeneP Philemon endeavors to injure her by false stories to which Phaon gives credit and kills Claribel. When he learns of the deception he murders Philemon. (2) A poem by Tennyson.

CLARIBEL, Sir, a knight who figures in Spenser's (Faerie QueeneP One of four knights who fight for the false Florimel. Bre- tomart enters the combat with them ; Arthur ends the fray, as it is ^stinted® by him.

CLARIFICATION, the separation of the insoluble particles that prevent a liquid from being transparent. It may be performed by dep¬ uration, filtration or coagulation. In the first of these operations the liquid is permitted to subside, without being in the least disturbed, until all the particles which were in suspension are precipitated ; it is then decanted. This mode of clarification can be used only when the substance operated on is in a large quan¬ tity, or is of a nature not to be altered during the time necessary to complete the operation, and when its specific gravity is less than that of the particles which render it turbid. Filtration is a process by which a liquid is strained through a body, the interstices of which are small enough to stop the solid particles con¬ tained in it. Filters of wool, linen, paper, powdered glass, sand or charcoal may be used, according as the liquid is more or less dense, or of a nature to operate upon any one of these bodies. Clarification by coagulation is per¬ formed with the assistance of albumen (as isin¬ glass or white of eggs) added to the liquor for this purpose, which, by the action of heat, of acids, etc., becomes solid, forms a mass and precipitates the extraneous substances. Clari¬ fication is also now commonly effected by cen¬ trifugal machines.

CLARINDA, Iowa, city, county-seat of Page County; situated on the Nodaway River, 79 miles southeast of Council Bluffs and the Chicago, B. and Q. Railroad, and is 45 miles east of the Missouri River. It is surrounded by an agricultural and stock-raising country and contains carriage factories, brick works, flour-mills, iron works and two banks. The city exports live stock, poultry, butter, eggs, seeds, grain and coal. Valuable coal beds are near the city; also a State asylum for the in¬ sane. Pop. (1920) 4,511.

CLARINET, or CLARIONET, a wood¬ wind musical instrument with a single vibrat¬ ing reed, a cylindrical tube and a trumpet- formed mouth. It is played by means of 18 holes, of which 13 have keys. Its scale, though including every semitone within its extremes, is virtually defective. Its lowest note is E below the F clef, from which it is capable, in the hands of good performers, of ascending

more than three octaves sharply divided into four distinct qualities of tone characterized by clearness. The name is derived from clarinelto or clarion , signifying clarity of tone. Its pow¬ ers through this compass are not everywhere equal; the player, therefore, has not a free choice in his keys, being generally confined to those of C and F, which indeed are the only keys in which the clarinet is heard to advan¬ tage. The music for this instrument is there¬ fore usually written in those keys. There are, however, B flat clarinets, A clarinets, D clari¬ nets, B clarinets and G clarinets ; the three lat¬ ter are not ordinarily used.

CLARION, Pa., borough and county-seat of Clarion County, 100 miles northeast of Pittsburgh, on the Clarion River and the Penn- svlvania Southern Railroad. Oil, lumber and natural gas are produced in large quantities in the neighborhood. The borough has coal works, cigar factories and bottle factories, also a county courthouse and a State normal school. The borough was settled in 1839 and incorpo¬ rated two years later. It is governed by a burgess and a borough council, the former being chosen for a three-year term. Pop.

2,900.

CLARION, a musical instrument of the trumpet kind, with a narrower tube and a higher and shriller tone than the common trumpet.

CLARISSA FURIOSA, a story by W. E. Norris, first published in 1896. It may be re¬ garded in the light of a satire on the (

CLARISSA HARLOWE. ˆClarissa Har- lowe is the novel upon which rests the fame of Samuel Richardson. As originally pub¬ lished, it consists of seven volumes, which ap¬ peared in instalments ; the first two volumes in November 1747, the third and fourth in April 1748, and the fifth, sixth and seventh in the following December. The great length was oc¬ casioned in part by the form of narrative which the author adopted in this as well as in his other novels. Though Richardson was not the first novelist to make a free use of letters, he was the first one to weld several groups or series of letters into a coherent whole. And yet, in the ordinary sense, Richardson has no story. He takes a simple situation, which he carefully elaborates and then works out in minute de¬ tail. Clarissa is the daughter of a country squire, still in her teens, whom her family try to force into marriage with a man whom she loaths. In her dilemma she places herself un¬ der the protection of Lovelace, a libertine, whose character she suspects but does not fully know, and flees with him to London. Her pro¬ fessed lover betrays her by the basest act of treachery. Clarissa dies of a broken heart, and Lovelace expiates his crime in a mortal duel. This is all there is to (Clarissa Harlowe) as a story.*

It is the workmanship — the sure and cer¬ tain hand manipulating a multitude of emo-

tional incidents — that interests the reader of the novel. Richardson records Clarissa's emo¬ tions from day to day, and from hour to hour, in her distressful situation. One can almost hear her heart beat. There are two vol¬ umes depicting her state before she elopes, and a volume is necessary to describe her death. The result is a wonderfully realistic effect. People wrote and talked about Clarissa as if she really lived in the flesh, and they sought out the places associated with her name. While the novel was in progress, men and women, some of them unknown to the author, wrote to him, pleading that he should save the heroine from the fate they feared was impending; but he disregarded their remonstrance and let the tragedy move on to the inevitable end. There emerges a young woman of exalted character, beautiful and amiable, who, being smudged by a villain, prefers death to life. (Clarissa Har- lowe has become in our literature a type of pure womanhood, and Lovelace the type of the arrant villain, whose virtues — and he has many — are completely eclipsed by one shame¬ less vice.*

The novel, at once translated into several languages, created a sensation throughout western Europe. On its plan hundreds of nov¬ els have been written in England, France and Germany. From it derive, for example, Mac¬ kenzie's (Man of Feeling, Rousseau's*

is still lovely, still commanding, still the ob¬ ject of our veneration.®

Wilbur L. Cross,

Professor of English, Yale University.

CLARK, Abraham, American patriot : b. Elizabethtown, N. J., 15 Feb. 1726; d. Rahway, N. J., 15 Sept. 1794. He studied for the bar and practised in his native State with success. After serving as sheriff of Essex County, he was chosen a delegate to the Continental Con¬ gress in 1775 and signed

the Declaration of Independence. He was a member of the Con¬ tinental Congress 1776-78, 1780-83 and 1785— 88, 1791-94; of the Constitutional Convention of 1789, and aided in framing the Constitution of the United States.

*CLARK, Albert Curtis, English classical scholar: b. Salisbury, 21 Feb. 1859. He was educated at Balliol College, Oxford, was fel¬ low of Queen's College 1882, lecturer 1882-87 and tutor 1887-1913. Since 1913 he is Corpus Christi professor of Latin at Oxford. His publications are (Collations from Harleian MS. of Cicero 2682 * (1891) ; Cicero's (Pro Milone, Gesarianse, Philippicse) (1900) ; (The Vetus Cluniacensis of Poggio) (1903) ; Unventa Italorum* (1909) ; Pontes Prosie Numerosse* (1909) ; (Cursus in Mediaeval and Vulgar Latin* (1910) ; (Prose Rhythm in English) (1913) ; (The Primitive Text of the Gospels and Acts* (1914); (Recent Developments in Textual Criticism) (1914). He edited the Ox¬ ford (Cicero.*

CLARK, Alonzo Howard, American sci¬ entist: b. Boston, 13 April 1850; d. 31 Dec. 1918. He left his studies at Wesleyan Uni¬ versity to enter the service of the United States Fish Commission. In 1889 he was sent as ex¬ pert commissioner to the Paris Exposition of that year. From 1889 to 1908 he was assistant secretary of the American Historical Associa¬ tion. He wrote (History of Fish Industries of the United States1 ; (Whales and Sea Fish¬ eries } ; (History of the Mackerel Fisheries) ; (Food Industries of the World* ; (Statistics of Fisheries of Massachusetts* (1882) ; History of Mackerel Fishery* (1883) ; (National Register of the Societv of the Sons of the American Revolution* (1902).*

CLARK, Alvan, American astronomical- instrument maker : b. Ashfield, Mass., 8 March 1808; d. Cambridge, Mass., 19 Aug. 1887. He was at one time a portrait painter in Boston ; but in 1844 his attention was turned to tele¬ scope making. Two years later he definitely adopted the business of astronomical-instrument making and in time achieved a world-wide rep¬ utation. His famous telescopes include the Chi¬ cago 18h2-inch, the Washington 26-inch, the Russian 30-inch and the California 36-inch. Consult Proceedings of the Royal Astronomi¬ cal Society (Vol. XVII, London).*

CLARK, Alvan Graham, American astron¬ omer: b. Fall River, Mass., 10 July 1832; d. Cambridge, Mass., 9 June 1897. He was a son of Alvan Clark (q.v.), and became associated with him under the firm name of Alvan Clark & Sons. In 1859 they began work on an object glass with an aperture of 18ˆ4 inches, which ultimately became the property of the Astro¬ nomical Society of Chicago. With this instru¬ ment Clark discovered the companion of Sirius,

for which the French Academy awarded him the Lalande medal. Other telescopes constructed largely under his supervision were that for the Naval Observatory, a 26-inch instrument with which Prof. Asaph Hall discovered the two satellites of Mars; the McCormick telescope for the University of Virginia; the great 30-inch one for the Saint Petersburg Imperial Observa¬ tory; the powerful Lick telescope, with an aper¬ ture of 36 inches, at Mount Hamilton, Cal. (1886), with which Jupiter's fifth satellite was discovered; and, finally, the greatest of his achievements as a maker, the wonderful Yerkes lens of 40 inches, the gift of C. T. Yerkes to the University of Chicago, and installed in the observatory at Lake Geneva, Wis. As an as¬ tronomer he made several discoveries of double stars. See Telescope, Construction.

CLARK, Sir Andrew, Scotch physician : b. Aberdeen, 28 Oct. 1826; d. London, .6 Nov. 1893. He was educated at Aberdeen and Edinburgh. After an unusually brilliant career as a student of medicine at Edinburgh, he assisted Dr. Hughes Bennett and Dr. Robert Knox, the anatoriiist; had charge for four years of the pathological department at the Haslar Naval Hospital; curator of the museum of the London Hospital (1853), and assistant physician there (1854). After 1854 he became associated with the College of Physicians, becoming an officer of that body and president in 1888. He had a large practice in London, and wrote on many subjects, especially tuberculosis. He will live in remembrance as the ((beloved physician® of George Eliot.

CLARK, Champ, American statesman: b. Lawrenceburgh, Anderson County, Ky., 7 March 1850; d. Washington, D. C., 1 March 1921. He once said he had ((Worked as a hired hand, clerked in a country store, edited a country newspaper and finally practised law.® He was graduated at Bethany

College A.B. 1873, and at the Cincinnati Law School LL.B. 1875. He was president of Marshall College, West Virginia, 1873-74; was admitted to the bar in 1875, and practised in Bowling Green, Mo., from 1880. He was city attorney of Louisiana, Mo., and Bowling Green, Mo., 1878-81 ; presidential elector in 1880; prosecuting attorney in Pike County, Mo., 1885-89 ; representative in the State legislature, 1889-91 ; represented the 9th district of Missouri in the 53d Congress, 1893-95 ; was defeated for the 54th Congress at a time when Missouri sent 11 Republicans to Congress, and elected to the 55th and successive Congresses, including the 66th. He served on the House Committee on Foreign Affairs, and on the Committee on Ways and Means. He was vice-president for Missouri in the Trans-Mis¬ sissippi Congress, at Denver, Colo., May 1891, and was permanent chairman of the Democratic National Convention of 1904; and chairman of the committee to notify Judge Alton B. Parker of his nomination for the Presidency. He was minority leader in the second session of the 60th, the 61st and 66th Congresses, and was speaker of the House of Representatives during the 62d, 63d, 64th and 65th Congresses. In 1912 he was a candidate for the Democratic nomination for President and at the National Convention at Baltimore lead on 27 ballots, receiving a clear majority on eight ballots, but was defeated by Woodrow Wilson of New Jersey. He published

(My Quarter Century of American Politics'

(1920).

CLARK, Charles Edgar, American naval officer : b. Bradford, Vt., 10 Aug. 1843. He en¬ tered the naval service in 1860 ; took part in the battle of Mobile Bay and in the bombardment of Fort Morgan, and was promoted captain in 1896. In March 1858 he took command of the battleship Oregon at San Francisco, and when war with Spain was deemed inevitable, received orders to proceed to Key West, Fla., with all haste. After a voyage of over 14,000 miles he joined the American fleet in Cuban waters on 26 May, and on 3 July commanded his ship at the battle of Santiago. In March 1899 he was assigned to duty at the League Island navy yard; was promoted rear-admiral 16 June 1902, and retired 9 Aug. 1905. He wrote (My Fifty Years in the Navy' (1917).

CLARK, Charles Heber (< (Max Adeler®), American journalist: b. Berlin, Md., 11 July 1841 ; d. 10 Aug. 1915. In 1865 he entered news¬ paper work as reporter on The Philadelphia Inquirer. In 1865 became editor of The Phila¬ delphia Inquirer. In 1867 became associated' with Philadelphia Evening Bulletin and later as editor and one of the owners. In 1882 pur¬ chased the Textile Record and edited it until 1903. From 1887 to 1897 he edited The Manu¬ facturer. He wrote much on economic themes, but was best known to the general public as a humorist under the pseudonym, Max Adeler. He published (Out of the Hurly Burly' ; Ran¬ dom Shots' ; (Elbow Room' ; (The Fortunate Island' ; (Captain Bluitt' (1902) ; (In Happy Hollow' ; (The Quakeress' ; (By the Bend in the River. 5

CLARK, Charles Hopkins, American news¬ paper editor: b. Hartford, Conn., 1 April 1848. He was graduated at Yale in 1871 and since that year has been connected with the Hartford Courant , the oldest newspaper continuously published in America. After 1890 he was editor-in-chief. He has served as president and director of important corporations and since 1909 as director of the State Reforma¬ tory. In 1910 he became a fellow of the Cor¬ poration of Yale University.

CLARK, Charles Kirk, Canadian alienist: b. Elora, Ontario, 1857. He was educated at the University of Toronto and began his medi¬ cal career under the tutelage of Joseph Work¬ man. He became assistant superintendent of Hamilton and Rockwood hospitals for the in¬ sane, then superintendent of Rockwood Hospi¬ tal for Insane and eventually superintendent of Toronto Hospital for Insane until 1911, when he became, superintendent of the Toronto Gen¬ eral Hospital. He is also professor of psy¬ chiatry at Toronto University and dean of the medical faculty there since 1907. He has done a great deal of medico-legal work in Canada and is one of the authorities on psychiatric matters in the Dominion. He has written many brochures on psychiatric and medico-legal sub¬ jects; also many articles on ornithology. He is editor of the Medical Bulletin of Toronto Uni¬ versity, one of the editors of the Journal of Insanity and of the Johns Hopkins Press.

CLARK, Clarence Don, American legis¬ lator: b. Sandy Creek, N. Y., 1 April 1851. He was educated at Iowa State University and was

admitted to the bar in 1874. He practised his profession in Delaware County, Iowa, 1874-81 and at Evanston, Wyo., since 1881. He was a member of the 51st and 52d Congresses (1889- 93) from the new State of Wyoming, was United States senator 1895-99 to fill a vacancy and was re-elected in 1899, 1905 and 1911. In the 63d Congress he was chairman of the Com¬ mittee on Geological Survey.

CLARK, Daniel, Canadian pathologist : b. Grantown, Scotland, 29 Aug. 1836 ; d. 1912. He went to Canada when a child, graduated at Vic¬ toria University in 1858 and practised medicine in Ontario with great success. He was head of the Provincial Asylum for the Insane at To¬ ronto 1875-1905. He was twice president of the College of Physicians and Surgeons of On¬ tario. He was the author of 'Pen Photographs) (1873) ; 'Josiah Garth,) a novel.

CLARK, Edward, American architect: b. Philadelphia, Pa., 1822; d. 1902. He studied architecture under Thomas U. Walter and suc¬ ceeded the latter as architect of the extension to the United States Capitol in 1865. He was a member of the commission appointed by Con¬ gress for the completion of the Washington Monument and of the commission for the con¬ struction of the Congressional Library. He was a member of the American Institute of Architects and trustee of the Corcoran Art Gallery, Washington, D. C.

CLARK, Edwin Charles, English jurist: b. Yorkshire, England, 5 Nov. 1835. He was educated at Shrewsbury School and Trinity College, Cambridge. He practised for a short time as a conveyancer in London, being called to the bar at Lincoln's Inn, 1860. From 1872 to 1914 he was Regius professor of civil law at Cambridge. His books are 'Early Roman Law: Regal Period) (1872) ; (Analysis of

Criminal Liability) (1880) ; 'Practical Juris¬ prudence: a Comment on Austin (1883); Cambridge Legal Studies) (1888) ; 'History of Roman Private Law) (1906).

CLARK, Francis Edward, American cler¬ gyman : b. Aylmer, Quebec, 12 Sept. 1851. Son of Charles G. Symmes, he was orphaned at eight years and adopted by his uncle, Rev. E. W. Clark, whose name he assumed. He was grad¬ uated from Dartmouth College in 1873 and con¬ tinued his studies at Andover Theological Sem¬ inary. He became pastor of a Congregational church at Portland, Me., and there organized the first Young People's Society of Christian Endeavor, 2 Feb. 1881. He was pastor of the Phillips Congregational Church in South Bos¬ ton, Mass., 1883-87, and in 1887 was made president of the United Society of Christian Endeavor ; since then he has devoted his time to the Christian Endeavor work as its president and the World's Christian Endeavor Union, and is editor of the Christian Endeavor World ; has traveled around the world five times in the interests of the work. He is the author of many books and leaflets relating to Christian Endeavor work and to his Christian Endeavor journeys. He has published 'Our Vaca- tions) (1874); 'Life of William E. Har¬ wood) (1877) ; 'Our Business Boys) (1883); 'Looking Out on Life) (1883) ; (Danger Signals) (1884) ; (Young People's Prayer

Meetings) (1887) ; (Ways and Means) (1890) ; 'Christian Endeavor Saints) (1890); 'Qur

Journey Around the World) (1894) ; 'The Mossback Correspondence) (1898) ; (The Ever¬ lasting Arms) (1895); 'World-Wide Endeavor) (1895) ; (01d Lanterns for New Paths) (1898) ; (A New Way Around an Old World) (1900) ; 'Training the Church of the Future) (1902) ; (Christian Endeavor Manual) (1903) ; 'The

Gospel in Latin Lands,) with Mrs. Clark (1909) ; (01d Homes of New Americans)

(1912) ; (The Whole Land of Asia Minor) (1914) ; 'In Christ's Own Country) (1914).

CLARK, Galen, American naturalist: b. Dublin, N. H., 1814; d. 1910. He engaged in placer mining in California in 1853 and after a few years became a guide to tourists in the Yosemite Valley. In 1857 he discovered the great redwood growth at Maribosa and in 1865 he became guardian of the Yosemite Valley Park. He was succeeded by another, but from 1890 until his death he was again

guardian of the park. He was esteemed as an authority on the geology and other natural features of the Sierra Nevada. He wrote 'The Indians of Yosemite Valley) (1904) ; (The Big Trees of California) (1907) ; (The Yosemite Valley, its History, Characteristic Features and Theories as to its Origin) (1910).

CLARK, George Rogers, American pio¬ neer: b. Monticello, Va., 19 Nov. 1752; d. near Louisville, Ky., 13 Feb. 1818. He studied sur¬ veying and at 20 settled in Ohio, serving in the Indian wars of that region. In the spring of 1775 he was employed as deputy surveyor under Captain Lee and removed to Kentucky in 1775. In June 1776 he represented Ken¬ tucky in the Virginia legislature. He was soon regarded as the leader of that country, procuring the organization of the Territory and securing the much needed gunpowder for its protection. Governor Patrick Henry gave him the rank of lieutenant-colonel and detailed him to raise troops for the conquest of Illinois. Clark attacked the British post at Kaskaskia and took possession of the French villages up the Mississippi, Cahokia and Vincennes. In 1778 he was promoted to the rank of colonel. In 1780 he proceeded to the mouth of the Ohio and built Fort Jefferson. After receiving the commission of brigadier-general, he attempted to attack Detroit ; but the expedition proving unsuccessful, he returned to Kentucky and subsequently founded Fort Nelson on the site of Louisville. His successes in ttie Northwest, however, saved much territory to the colonies in the final treaty of peace with Great Britain. In 1786, Clark negotiated a treaty with the Shawnees. He then set out to conquer the tribes on the Wabash, but this, too, proved a failure, and he turned his efforts toward sup¬ porting the cause of the French of the Missis¬ sippi Valley against the Spaniards. He re¬ tired to Kentucky in his later years in great penury but was relieved a few years before his death by a grant of 8,049 acres of land in In¬ diana and an annuity from the Virginia legis¬ lature. He wrote two accounts of the con¬ quest of Indiana. Consult English, W. H., vLife of George Rogers Clark) (in (Conquest of the Country Northwest of the River Ohio 1778-1783) (2 vols., 1896) ; Roosevelt, 'Win¬ ning of the West) (Vols. I and II, New York 1889) ; Butterfield, 'History of G. R. Clark's Conquest of the Illinois and Wabash Towns.)

CLARK, Hubert Lyman, American zool¬ ogist: b. Amherst, Mass., 9 Jan. 1870. He was educated at Amherst and at Johns Hopkins University. From 1899 to 1905 he was pro¬ fessor of biology at Olivet College ; in 1905— 12 he was assistant in invertebrate zoology at the Museum of Comparative Zoology, Harvard, and curator of echinoderms after 1912. He has carried on scientific investigations in Jamaica, Bermuda and Torres Strait, Australia, and published many papers dealing with birds, snakes, echinoderms and flowers.

CLARK, Imogen, American novelist : b. New York. She was educated at Madame da Silva's French and English School and by pri¬ vate tutors. She has published (Will Shakes¬ peare's Little Lad5 (1897) ; (The Victory of Ezry Gardner) (1897) ; (The Heresy of Par¬ son Medlicott5 (1900) ; (God's Puppets5 (1901) ; (Santa Claus' Sweetheart5 (1906); (A Charm¬ ing Humbug5 (1908); (We Four and Two More5 (1909) ; (The Robert Collyer Anthol- ogy5 (1911) ; and (Rhymed Receipts5 (1912).

CLARK, Isaac, American theologian : b. Canterbury, Conn., 30 June 1833; d. 2 Sept. 1918; graduated at Yale in 1856, studied at the Union Theological Seminary 1858-59 and was graduated at the Andover Theological Seminary in 1861. He entered the Presbyterian ministry in 1861 and held pastorates at Elmira, N. Y., 1861— 68 ; Aurora, Ill., 1868-72 ; Brooklyn 1872-74 ; Rondout 1874-82 and Northampton, Mass., 1882-91. After 1891 he was professor of theol¬ ogy, homiletics and English exegesis, and after 1901 dean of the School of Theology of How¬ ard University.

CLARK, Sir James, Scottish physician : b. Cullen, Banffshire, 14 Dec. 1788; d. Bagshot Park, 29 June 1870. He studied law at Aber¬ deen, receiving his M.A. ; and then medicine at the University of Edinburgh, and entered the navy as assistant surgeon in 1809, and con¬ tinued in the service till 1815, when he re¬ turned to Edinburgh. After devoting some time to foreign travel, he settled in Rome, where he continued to practise from 1819 to 1826. He returned to England in 1826, and became physician to the Duchess of Kent in 1835, and on the accession of Queen Victoria was appointed first physician in ordinary to the queen, and shortly afterward made a baro¬ net. He

retired from practice several years before his death, but continued till near the close of his life to act as consulting physician to the royal family. Soon after his return to England Sir James Clark published, as a result of his continental observations, a work (On the Sanative Influence of Climate5 (1829), and a (Treatise on Pulmonary Consumption and Scrofula5 (1835).

CLARK, John Bates, American economist: b. Providence, R. I., 26 Jan. 1847. He was graduated at Amherst in 1872, and studied also at Heidelberg and Zurich. He was appointed professor of economics and history at Carle- ton College 1877, at Smith College in 1882 and at Amherst in 1893. He was lecturer on eco¬ nomics at Johns Hopkins University 1892-94, and president of the American Economic Asso¬ ciation 1893-95. He has been professor of eco¬ nomics at Columbia since 1895. In 1911 he was appointed director of the division of economics and history of the Carnegie Endowment for

International Peace. He is a member of the Royal Swedish Academy of Arts and Sciences. He has received the following honorary de¬ grees: Ph.D. and LL.D. from Amherst; LL.D. from Princeton; LL.D. from the University of Christiania. He has published the following works: (The Philosophy of Wealth5 (1885); (Capital and Its Earnings5 (1888); (Wages5 (1889) ; (The Distribution of Wealth5 (1901) ; (The Control of Trusts5 (1901) ; /The Prob¬ lem of Monopoly5 (1904; revised, in collabora¬ tion with John Morris Clark, 1912) ; Essen¬ tials of Economic Theory5 (1907), and nu¬ merous articles in scientific periodicals and monographs on economic subjects. Professor Clark occupies the first place among American economists. The distinguishing features of his economic theory are his distinction between the static and dynamic forces in economic life and a final productivity theory of wages and inter¬ est.

CLARK, John Emory, American scientist : b. Northampton, N. Y., 8 Aug. 1832. He was prepared for college at the Troy Conference Academy of West Poultney, Vt., and entered the University of Michigan, where he was graduated with the degree of Bachelor of Arts in 1856. The degree of Master of Arts followed in 1859. He was professor of mathematics in the Michigan State Normal School 1856-57, and assistant professor of mathematics in the Uni¬ versity of Michigan 1857-59. During the year 1859-60 he studied at the universities of Heidel¬ berg, Munich and Berlin. From 1861 to 1862 he was a United States deputy surveyor in Dakota. In August 1862 he entered the Union army as captain of the 5th Michigan Cavalry. On 3 July 1863 he was promoted to the rank of major, and was honorably discharged 25 Feb. 1865. On 13 March 1865 he was made brevet lieutenant-colonel, United States Volun¬ teers. In 1866 he returned to teaching, and was professor of mathematics and physics, and, after one year, of mathematics and astronomy, in Antioch College, Ohio, till 1872. In the summer and fall of 1869 he again served the government as deputy surveyor in Colorado, and in the summer and fall of 1872 he was assistant astronomer to the United States Northern Boundary Commission. The latter part of the academic year 1872-73 he was in¬ structor in mathematics in the Sheffield Scien¬ tific School of Yale University, and in June 1873 was appointed professor of mathematics in that institution. He held that position till June 1901, when on account of impaired health he resigned his chair and was made professor emeritus.

CLARK, Jonas Gilman, American philan¬ thropist: b. Hubbardston, Mass., 1 Feb. 1815; d. Worcester, Mass., 23 May 1900. He began life as a carriage maker and acquired a fortune in business and real estate investments. He is noted as the founder of Clark University (q.v.), at Worcester, Mass., which he endowed with $2,000,000 in 1887. He also conferred gifts on his native town. He bequeathed $200,000 to Clark University outright and $1,000,000 and the residue of his estate con¬ ditionally.

CLARK, Joseph, English painter: b. Cerne Abbas, Dorsetshire, 4 Tuly 1834. He was edu¬ cated by William Barnes, <(The Dorset Poet 55

(q.v.;, went to London at 18 and became a student at the Royal Academy. He first ex¬ hibited at the Royal Academy in 1857, and has exhibited there nearly every year since. Among well-known pictures by him are (The Return of the Runaway) ; (Hagar and IshmaeP ; (Three Little Kittens. >

CLARK, (Josiah) Latimer, English engi¬ neer : b. Great Marlow. He invented a gutta¬ percha

coating for underground wires and the ((Clark cell.® He also made valuable inves¬ tigations in regard to electric currents in sub¬ marine cables. He invented a submarine cable covering of asphalt, hemp and silica, and was engineer in charge of the laying of several submarine cables. He published (An Elemen¬ tary Treatise on Electrical Measurement (1868) ; (Electrical Tables and Formulae (1871) ; dictionary of Metric and Other Measures* (1891) ; (Memoir of Sir W. F. Cooke* (1895).*

CLARK, Kate Upson, American journal¬ ist and editor: b. Camden, Ala., 22 Feb. 1851. She was graduated at Wheaton College in 1869 and from the Westfield (Mass.) Normal School 1872. She was married to Edward Perkins Clark in 1874 (d. 1903). In 1872-73 she taught in the Central High School, Cleveland. She has edited many periodicals and departments and has lectured on literary, educational and domestic topics. She is a contributor to St. Nicholas, Youth's Companion, Atlantic Monthly and other magazines. She published (Bringing Up Boys) (1900); (White Butterflies) (1900); (How Dexter Paid His Way (1901) ; (Move Upward* (1902) ; (Up the Witch Brook Road) (1902); (The Dale Twins> (1906); (1907) ; (Art and Citizenship) (1907).*

CLARK, Lewis Gaylord, American jour¬ nalist and humorous writer: b. Otisco, N. Y., 5 March 1810; d. Piermont, 3 Nov. 1873. In 1834 he became editor of the Knickerbocker Magazine, and with Irving, Bryant, Longfel¬ low, Halleck and Willis as contributors, made it the foremost literary publication of that time, and an inspiration to a higher standard of periodical literature. (The Editor's Table,) written by him, overflowed with amusing stories and witty sayings. It was discontinued because of lack of funds in 1859. He was assisted out of his pecuniary difficulties by the sale of (The Knickerbocker Gallery, a book compiled by former contributors to the magazine. The Knickerbocker Sketch-Book) (1850) and Knick-Knacks from an Editor's Table) (1853) are his only publications in book form.*

CLARK, Marcus, Australian novelist : who produced in (For the Term of His Natural Life, a powerful problem novel dealing with the convict system over which there was strong agitation in Australia in 1837-38; and also in England, where it was shown that the convict system was then costing the country about £500,000 a year without any adequate advantage to England herself and that the evil done to the convicts was untold. In his novel Marcus Clark showed up these conditions so vividly that he found his audience as wide as the Eng¬ lish-speaking world.*

CLARK, Michael, Canadian legislator: b. Belford, Northumberland, 12 May 1861. He

was educated for the medical profession at Edinburgh University, and practised in England for some years. While in practice, he took a lively interest in public affairs, was a member of the school board of Newcastle-on-Tyne and took the unpopular course of denouncing on public platforms the policy that led up to the South African War of 1899-1902. He emi¬ grated to western Canada in 1902 and engaged in ranching and farming in Alberta. In 1908 he was returned to the Dominion House of Commons in the Liberal interest, and was re¬ elected in 1911. As a strong free-trader, he occupies a somewhat unique place in parlia¬ mentary life. After the outbreak of the Great War in 1914 he gave a steady support to the Borden administration in the measures which were deemed necessary to carry through Can¬ ada's part in the world conflict. He supported the compulsory service measure of the govern¬ ment in 1917 and voted against the referendum on that subject proposed by his party leader, Sir Wilfrid Laurier. His pungent and some¬ what unsparing criticisms of Sir Wilfrid's atti¬ tude, while they aroused enthusiasm among the Conservatives, were hotly resented by the ma¬ jority of his own party. It had been his intention to resign from Parliament at the gen¬ eral election of 1917, but the announcement that he would accept nomination in his riding if a party fight were avoided was followed by the withdrawal of the Conservative candidate. He is one of the most incisive debaters in the House and one of the best platform speakers in the Dominion.

CLARK, Thomas March, American Prot¬ estant Episcopal bishop: b. Newburyport, Mass., 4 July 1812; d. 7 Sept. 1903. He was graduated at Yale in 1831, and four years later entered the Presbyterian ministry, but in 1836 took orders in the Episcopal Church. He was successively rector of Grace Church, Boston (1836-43) ; Saint Andrew's, Philadelphia (1844-47) ; Trin¬ ity Church, Boston (1847-51) ; and Christ Church, Hartford, Conn. (1851-54). In the year last named he was consecrated bishop of Rhode Island. From 1899-1903 he was the pre¬ siding bishop of the Episcopal Church. He has written (Formation of Character ; (The Effi¬ cient Sunday-school Teacher* ; (The Dew of Youth) ; (Early Discipline and Culture) ; (Rem- iniscences) (1895).*

*CLARK, Victor Selden, American econ¬ omist: b. Portageville, N. Y., 12 June 1868. He was educated at the universities of Minne¬ sota and Chicago and in 1892-93 studied at Gottingen and Bern. In 1893-97 he was high school principal and superintendent in Minne¬ sota. He was superintendent of public instruc¬ tion and president of the Insular Board of Education of Porto Rico under the military government. In 1902-09 he was engaged in investigating foreign and insular labor condi¬ tions for the United States government. In 1910 he was placed in charge of the census of Hawaii and in 1910-13 was commissioner of immigration, labor and statistics for the Terri¬ tory of Hawaii. He resigned to resume active charge of the division of manufactures and economic history at the Carnegie Institute. He has published Kducation * in Porto Rico) (1902) ; (Labor Conditions in Cuba) (1902) ; Kabor Conditions in Hawaii* (1903-15) ; (La-*

bor Conditions in Mexico (1908); (Canadian Industrial Disputes Act* (1909); (Women and Children Wage Earners in Great Britain > (1908) ; (History of American Manufactures)*

(1915).

*CLARK, Walter, American jurist: b. Hali¬ fax County, N. C., 19 Aug. 1846. A.B., Univer¬ sity of North Carolina 1864, A.M. 1867, LL.D. 1888. He became lieutenant-colonel in the Confederate States army 1864, at 17 years of age, being the youngest officer of this rank in either army; was admitted to the bar in 1868; judge of the Superior Court of North Caro¬ lina 1885-89; judge of the Supreme Court 1889-1902; chief justice since 1 Jan. 1903. He is the author of ˆAnnotated Code of Civil Procedure) (3d ed.) ; translated from the French Constant's (Memoirs of Napoleon) (3 vols., 1895) ; compiled and edited (North Caro¬ lina State Records) (16 vols., 1894—1907) ; cHistories of North Carolina Regiments 1861— 65> (5 vols.) ; also issued reprints of 164 vol¬ umes of (North Carolina Supreme Court Re- ports) with annotations; edited article (< Appeal and Error** in (Cyclopedia of Law and Pro- cedure) ; is a contributor to magazines.*

CLARK, Walter Eli, American public offi¬ cial : b. Ashford, Conn., 7 Jan. 1869. He was graduated at Wesleyan University in 1895 and became in the same year a reporter on the Hartford Post. In 1897 he was Washington correspondent to the New York Commercial Advertiser, and in succeeding years was Wash¬ ington correspondent for several important journals. In 1909 he was made governor of Alaska by President Taft and remained in that office until 1913. He has contributed articles to magazines and weekly periodicals.

CLARK, William, American explorer: brother of George Rogers Clark (q.v.) : b. Virginia, 1 Aug. 1770; d. Saint Louis, Mo., 1 Sept. 1838. He emigrated with his family at the age of 14 to the falls of the Ohio, in Ken¬ tucky, on the present site of Louisville. In 1808 he was appointed, in conjunction with Capt. Meriwether Lewis (q.v.), to the command of an expedition designed to explore the northwest territory lying between the Mississippi and the Pacific Ocean. He acquitted himself with con¬ summate ability in this hazardous employment, which required the combination of military and scientific skill. His journal and the account kept by him of the astronomical observations made by him and Captain Lewis have been published. He was appointed in 1813 governor of the Northwest Territory and superintendent of Indian affairs, which offices he retained till 1820, when Missouri was created a State. Two years afterward he wras again appointed com¬ missioner and superintendent of Indian affairs. See Lewis and Clark Expedition.

CLARK, William Andrews, American business man and politician : b. near Connells- ville, Pa., 8 Jan. 1839, of Scotch-Irish parentage. He had a common school education and was preparing for college which was interrupted by the removal of his family to Iowa. In that State he attended an academy at Birmingham and later spent a year in the Wesleyan Univer¬ sity at Mount Pleasant, Iowa, where he also studied law. He afterward taught school in the State of Missouri, 1858-60. In the spring of

1862 he drove a team from Atchison, Kan., to South Park, Colo., and then worked in the mines at Central City, Colo., for nearly a year. In 1863 he migrated to Grasshopper Mines, a new discovery in eastern Idaho, which after¬ ward became a part of the State of Montana, where he mined two years in the placer dig¬ gings. He later formed a copartnership in a large mercantile and banking

business, in which he had a minor interest, which continued until 1872, when he sold his interest in the mercan¬ tile business and organized the First National Bank of Deer Lodge, Mont., of which he be¬ came president. He has continued in the bank¬ ing business up to the present time, being now senior member of the firm of W. A. Clark & Brother at Butte, Mont. In 1872 he first visited the mining camp at Butte, Mont., where he made some purchases, and has ever since that time been interested in large mining operations. In order to qualify himself for this business in the winter of 1872-73 he took a special course in the Columbia School of Mines. His mining interests were afterward enlarged until at the present time he is owner of large mining inter¬ ests in Montana, Idaho, Utah, Nevada and Arizona, where he is the principal owner of the famous United Verde Copper Company's mines, and is now the largest individual producer of the different metals in the United States, and probably the entire world. In connection with Mr. E. H. Harriman he built the railroad ex¬ tending from Salt Lake City to Los Angeles and San Pedro Harbor. A unique feature of this transaction was that no bonds were ever sold. The road was built from cash furnished by the principals, and this is now one of the leading railroad interests in the western coun¬ try. He was appointed by the governor to represent Montana as State orator at the Phila¬ delphia Centennial Exposition of 1876, and was also appointed a commissioner of the New Orleans Exposition in 1884. He was grand master of Masons in Montana in the years 1877— 78. He was appointed by the governor as major of a battalion of volunteers at the time of the invasion of the Nez Perces Indians, who were led by Chief Joseph. In 1884 at the for¬ mation of the first Constitutional Convention of Montana he was elected president. In 1898 a second convention was called, of which he was likewise elected president, and under the constitution then framed Montana was admitted into the union of States. In 1898 he was elected by the State legislature as senator from Mon¬ tana, but a protest was filed and an investigation of his election ordered. Before a report was made he resigned and returned to Montana where the question was decided by the people of his State and he was re-elected by a large majority in the year 1901 and served a full term in the Senate. He was placed on import¬ ant committees and was a member of the Com¬ mittee on Foreign Relations. At the close of his term he declined to be again a candidate for re-election and has been continuously engaged in the many industries which are owned and controlled by him.

CLARK, William Bullock, American sci¬ entist: b. Brattleboro, Vt., 15 Dec. 1860; d. 27 July 1917 ; graduated, Amherst College, 1884. After a course of European study he became instructor in geology at Johns Hopkins Uni-

versity in 1887, and since 1894 has been pro- lessor of geology there. In 1891 he was ap¬ pointed director of the Maryland weather service. In 1896 he was made State geologist of Maryland; in 1900 was appointed commis¬ sioner for the State of Maryland on the resur¬ vey of Mason and Dixon's line, and in 1908 he was made a member of the Maryland State Roads Commission. His publications include a number of interesting papers and reports deal¬ ing with subjects of American geology, con¬ tributed principally to the volumes of the Mary¬ land geological survey; also (The Mesozoic and Cenozoic Echinodermata of the United States) (1915).

CLARK, William George, English scholar: b. March 1821; d. York, 6 Nov. 1878. He was educated at Trinity College, Cambridge, whence he was graduated in 1844, becoming elected fellow, tutor and public orator of the university (1857) ; took orders in the Established Church, but gave up his orders in 1869, explaining his reasons therefor in a pamphlet, (The Present Dangers of the Church of England) (1870). He visited Spain (1849) and toured Greece (1856.) He published an account of these travels in (Gazpacho) (1850) and

CLARK, Sir William Mortimer, Canadian administrator : b. Aberdeen, Scotland, 24 May 1836; d. Prouts Neck, Me., 11 Aug. 1917. He was educated at Marischal College, Aberdeen, and Edinburgh University ; was admitted a writer to the Signet in Edinburgh in 1859, and settled in Toronto, Canada, in the same year. He was called to the bar of Ontario in 1869 and became Q.C. in 1880, in which year he was elected chairman of the board of management of Knox College, Toronto, a position he held until his death. He was a senator of the Uni¬ versity of Toronto for a number of years and was lieutenant-governor of Ontario (1903-08).

CLARK, William Thomas, American sol¬ dier: b. Norwalk, Conn., 1831; d. 1905. He was appointed lieutenant of an Iowa regiment at the opening of the Civil War, and at its close he had reached the rank of major-general. He was chief-of-staf¥ of General Grant's Army of the Tennessee. After the war he settled at Galveston and there he established the first negro school and befriended the black race at considerable risk to himself. In 1869-72 he was in Congress and secured the first appro¬ priation ($100,000) for jetties and other im¬ provements for Galveston harbor.

CLARK FORK, an important fork of the Columbia River, formed by the Flathead and Missoula rivers, Montana. It flows through Lake Pend d'Oreille in Idaho and enters Wash¬ ington near its northeast corner and flows into the Columbia River on the Canadian frontier. Its length is about 650 miles.

CLARK UNIVERSITY, a coeducational institution in Atlanta, Ga. ; organized in 1870 under the auspices of the Methodist Episcopal Church; reported at the end of 1915: Profes¬ sors and instructors, 40; students, 440; number of volumes in library, 5,000; value of property, $250,000; president, W. W. Foster, D.D.

CLARK UNIVERSITY, Worcester, Mass., founded in 1887 by the gift of Jonas Gilman Clark (q.v.), and the work of instruction began in 1889. At first the institution was devoted wholly to post-graduate work. Those only were admitted as students who had taken a first degree and who gave promise of high attain¬ ment in some department of science. No en¬ trance examination was required. The design and organization of the university were en¬ trusted to G. Stanley Hall, formerly a professor of philosophy at Johns Hopkins Uni¬ versity, Baltimore, and for years a close ob¬ server of schools and school methods in Amer¬ ica and Europe. But few departments have been organized, namely, mathematics, physics, anthropology, biology, philosophy and psychol¬ ogy. Pedagogy (1899) was made one of the sub-departments of psychology. One of the characteristic features in the design is that pro¬ fessors and students should meet on the same plane, the professors to be as older students, the students to lecture occasionally on spe¬ cial subjects. Instruction is entrusted in some degree to the fellows and also to the docents, the latter representing the highest academic university appointments. Original work is encouraged and demanded, and a number of fellowships and scholarships have been founded so that worthy students of limited means may devote themselves to re¬ search along special lines and not be hindered or hampered by doing outside work for the pur¬ pose of continuing their studies. No attempt has been made to secure large numbers of students ; in such a school a small number is desirable. In 1892-93 there were 53 students; in 1896-97, 38; in 1898-99, 48; in 1909-10, 110; in 1913-14,90; in 1920-21, 205.

There are 25 professors, 20 fellowships and 10 scholarships. In the library are 65,000 vol¬ umes, and the following publications are issued by the university, but not officially: American Journal of Psychology ; Pedagogical Seminary ; Mathematical Review.

Upon the death of Mr. Clark in 1900 the uni¬ versity received a bequest of additional funds for research — $600,000 for a library fund and $150,000 for a library building; $100,000 for an art department, and $1,300,000 for the establish¬ ment of an undergraduate department. In 1902 a collegiate department was opened of which Edmund C. Stanford is president. G. Stanley Hall is president of the university. See Hall, G. Stanley.

CLARKE, Adam, Methodist clergyman and scholar: b. Moybeg, County Londonderry, Ire¬ land, 1762; d. London, 26 Aug. 1832. He be¬ came an itinerant Methodist preacher in 1782, and continued to travel in various circuits till 1805, when he took up his residence in London, where he passed a considerable part of his sub¬ sequent life. He was learned in the Oriental languages and published a commentary on the Scriptures (1810-26), and various other works, among the rest a bibliographical Dictionary >

(1802). Consult the (Life) by Etheridge (Lon¬ don 1858).

CLARKE, Alexander Ross, English as¬ tronomer: b. 1828; d. 1914. He entered the Royal Engineers in 1847, was transferred to the Ordnance Survey in 1850 and retired as lieuten¬ ant-colonel in

1881. He was a delegate to the International Geodetic Congress in Rome in 1883 and in 1887 was awarded the Royal medal of the Royal Society. He published the results of two investigations on the figure of the earth and Comparisons of the Standards of Length of England, France, Belgium, Prussia, Russia, India, Australia) (1866) ; determination of the Position of Feaghmain and Haverford¬ west (1867); Comparisons of Standards and Lengths of Cubits5 (1873); Ceodesy5 (1880).

CLARKE, Sir Caspar Purdon, British art connoisseur: b. County Dublin, Ireland, 1846; d. 1911. He entered the Art Training School at South Kensington in 1862, assisted in the construction of the Houses of Parliament and the South Kensington Museum in 1865-67 and in 1879 was architect to the English legation in Persia. In the following year he was com¬ missioned to reorganize the Eastern collections at the South Kensington Museum. In 1896 he became director of the Museum and was knighted in 1902. In 1905 he became director of the Metropolitan Museum, New York, from which ill health compelled his retirement in 1910. He effected much reorganization in the Museum and during his regime many acquisi¬ tions were made.

CLARKE, Charles Cowden, English writer: b. Enfield, Middlesex, 15 Dec. 1787; d. Genoa, Italy, 13 March 1877. His father kept a small school and had John Keats as one of his pupils ; but in 1810 gave it up and removed to Ramsgate. The son frequently went up to London, where he came into contact with Leigh Hunt, Shelley, Hazlitt, the Lambs and Vincent Novello, and in 1828 he married Mary, the eldest daughter of Novello. He engaged for some time in business as a bookseller and a music publisher and from 1834 till 1856 lectured throughout the country, mainly on poets and poetry. His publications include his (Hundred Wonders5 (1814); (Adam the Gardener5 (1834) ; (Shakespeare Characters,5 chiefly those subordinate (1863) ; and (Moliere Characters5 (1865), the two last being collections of some of his lectures. He is best known, however, by the edition of Shakespeare which he an¬ notated in conjunction with his wife and by the (Shakespeare Key5 (1879). Plis wife has writ¬ ten his biography (London 1887).

CLARKE, Edith Emily, American li¬ brarian: b. Syracuse, N. Y., 5 Nov. 1859. She was graduated at Syracuse University in 1881, and after teaching school some years took up library work. Having served as head cata¬ loguer at Columbia University Library and at the Newberry Library in Chicago, she became chief cataloguer of public documents for the national government in 1895 and librarian of the University of Vermont in 1898. Leaving there in 1909 for travel and study, she has since lectured and written on library matters, making United States government publications a specialty. She has published (Guide to the Use of United States Publications5 (1916).

CLARKE, Edward Daniel, English trav¬ eler, antiquary and mineralogist : b. Willingdon, Sussex, 1769; d. London, 9 March 1822. In 1799 he started on an extensive and laborious tour through Denmark, Sweden, Lapland, Finland, Russia, Tartary, Circassia, Asia Minor, Syria, Palestine, Egypt, Greece and Turkey, returning in 1802 through Germany and France. On his return he obtained from Cambridge University the honorary degree of LL.D., in consideration of the services rendered to its public libraries and institutions by his liberal contributions, among which the greatest, perhaps, in value is the celebrated manuscript of Plato's works, with nearly 100 others and a colossal statue from Eleusis, believed by him to be that of Demeter (Ceres). To him also the British nation is in¬ debted for the acquisition of the famous sarcophagus of Alexander the Great, which he discovered in the possession of the French troops in Egypt and which was by his means surrendered to the British army. In 1807 he commenced a course of lectures on mineralogy at Cambridge, and in 1808 a professorship of mineralogy was instituted there in his behalf. He himself had made a splendid collection of mineralogical specimens, which was purchased after his death by Cambridge University. In 1805 he became vicar of Harlton and in 1809 rector of Yeldham, Essex. In 1817 he was ap¬ pointed librarian of Cambridge University. A complete edition of his travels appeared in 6 volumes (1810-23) and another in 11 volumes (1816-24), under the title of (Travels in Vari¬ ous Countries of Europe, Asia and Africa.5 His (Travels,5 which are the most popular of his works, are attractive from the enthusiasm of the writer and his prolific imagination.

CLARKE, Sir Edward George, English

lawyer arid politician : b. London, 15 Feb. 1841. He was admitted a barrister of Lincoln Inn in 1864 and was solicitor-general 1886-92. He sat in the House of Commons for Southwark in 1880, for Plymouth 1880-1900 and for the city of London, 1906. He held a leading place at the bar and

in Parliament, but disagreement with the Unionist party on the South African War and on the question of tariff reform led him on two occasions to resign his seat in the House of Commons. He retired from the bar in 1914. He has published a (Treatise on the Law of Extradition5 (1886), three volumes of speeches and addresses and contributions to biblical literature.

CLARKE, Elijah, American soldier of the Revolution: b. North Carolina; d. Wilkes County, Ga., 15 Dec. 1799. He removed to Georgia in 1774, became a captain in 1776 and distinguished himself in engagements both with Indians and British on the frontiers of Georgia; was appointed a colonel of militia, engaged in the battles of Musgrove's Mill and Blackstocks, afterward promoted brigadier-general and con¬ tributed to the capture of Augusta in June 1781. At the battle of Long Cave he was severely wounded and on his recovery joined the com¬ mand of General Pickens. He afterward fought many battles and made several treaties with the Creek Indians. He was accused in 1794 of a design to establish an independent government in the Creek nation, where he had settled in violation of law, and was suspected

of accepting a commission and receiving emolu¬ ments from the French government.

CLARKE, Frank Wigglesworth, Ameri¬ can chemist: b. Boston, Mass., 19 March 1847. He was graduated from the Scientific School of Harvard University in 1867, was instructor at Cornell 1869, professor in Howard Univer¬ sity 1873-74 and professor of chemistry and physics, University of Cincinnati, 1874-83. He has been chief chemist of United States Geologi¬ cal Survey and honorary curator of minerals, United States National Museum, since 1883. He is a member of many American and foreign scientific societies and was a member of the International Jury of Awards at the Paris Ex¬ position of 1900 and received from the French government the decoration of the Legion of Honor; past president of the American Chemi¬ cal Society and Washington Academy of Science, member of National Academy. He has published (Weights, Measures and Money of All Nations> ; (Elements of Chemistry) ; (A Report on the Teaching of Chemistry and Physics in the United States, ' the Smithsonian Constants of Nature,' (The Dicta of Geo- chemistry) and various official bulletins. He is also author of more than 100 scientific essays and memoirs published in magazines and scientific journals. His most important contri¬ butions to science have been his Recalculation of Atomic Weights) (3d ed., 1910), his in¬ vestigations upon the constitution of the natural silicates and his (Treatise on the Dicta of Geochemistry.' He is joint author with L. M. Dennis of two recent works, (Elementary Chemistry ' and (A Laboratory Manual.'

CLARKE, George Johnson, New Bruns¬ wick statesman: b. Saint Andrews, New Bruns¬ wick, 1 Oct. 1857. He was educated there and at Fredericton, was admitted to the bar of New Brunswick in 1886 and practised law in Saint Stephen. He was elected in 1903 as member for Charlotte County in the Conservative in¬ terest to the provincial legislature ; was speaker of (the assembly in 1909 ; attorney-general of the province January 1914, and became Premier and Minister of Lands and Mines in December of the same year.

CLARKE, Helen Archibald, American writer: b. Philadelphia. She was educated under governesses, at private schools, and by tutors in languages and is a graduate of the musical department of the University of Pennsylvania. She is editor (with Charlotte Porter) of Poet Lore, a journal devoted to the study of litera¬ ture and literary criticism ; also review writer for the Dial, and a contributor to various maga¬ zines. She is one of the founders of the American Drama Society, in which she is chair¬ man of the Play Reading section; of the Amer¬ ican Music Society of which she is president. She lectures on Browning and on modern drama ; is honorary member of the Boston and New York Browning Societies. She is editor (with Charlotte Porter) of (Poems of Robert Browning) (2 vols., 1896) ; (The Ring and the Book' (1897); .< Clever Tales' (1897);

Poets' ; (Hawthorne's Country' (1910) ; (The Poets' New England' ; (Dramatic Scenes and Pictures from the Ancient Epics' ; ˆtarry- locks in Butterfly-Land,' performed in Boston 1912; (Browning and His Century'; (Geth- semane,' a symbolic poem set to music by Gus¬ tav Strube; and, with Charlotte Porter, (Brown¬ ing Study Programmes' (1900) ; (Shakespeare Studies' (1902); (Balaustion's Euripides,' per¬ formed in Boston 1915; (Hermes at School.'

CLARKE, Henri Jacques Guillaume, Comte D'Hunebourg and Due de Feltre,

French military officer: b. Landrecies 1765; d. 1818. He was educated at the Ecole Militaire, Paris, joined the cavalry and was made brigadier-general for his services at Landau. He lost his command in 1793, but was reinstated two years later and made a general of division. Carnot appointed him chief of the topographical bureau at the Ministry of War. The Directory sent him to Italy to observe Napoleon there but Clarke fell in with that commander's aims and later became his private secretary. He was governor of Vienna in 1805, of Berlin in 1806 and from 1807 to 1813 was Minister of War He declared himself a Royal¬ ist after the fall of Bonaparte, was with Louis XVIII at Ghent during the Hundred Days, and was again Minister of War in 1815-17.

CLARKE, Jacob Augustus Lockhart,

English physician : b. London 1817 ; d. 1880. He was educated in France and studied medi¬ cine at Guy's and Saint Thomas' hospitals, London. He engaged in private practice and in original research in microscopic anatomy and pathology. A group of cells in the spinal column is known as (

CLARKE, James Freeman, American Unitarian clergyman and author : b. Hanover, N. H., 4 April 1810; d. Boston, Mass., 8 June 1888. His first pastorate was at Louisville, Ky., 1833-40. He then settled in Boston in 1841 ; and was pastor of the Church of the Disciples which was organized especially for him, and of which he had charge till his death. He was a clear thinker and a leader in all reform and edu¬ cational movements. From 1867-71 he was professor of natural religion and Christian doc¬ trine in Harvard University. Together with Emerson and William H. Channing, he pre¬ pared the (Memoirs of Margaret Fuller d'Ossoli.' His chief work was (Ten Great Religions.' Among others were (Service Hymn-book and Hymn-book of the Church of the Disciples' ; (Christian Doctrine of Prayer,' 1854, new edition 1874; (The Hour Which Cometh'; (Orthodoxy: Its Truths and Errors' ; (Steps of Belief' ; (Events and Epochs in Religious History' ; (The Ideas of the Apostle Paul' ; (Self-Culture' ; (Anti-Slavery Days' ; (Every-Day Religion' ; and (Vexed Questions'; (Theodore' (1841), a translation from the German of De Wette; (Campaign of 1812' (1848) ; (Eleven Weeks in Europe.' Consult Hale, E. E., edition of Clarke's (Au¬ tobiography, Diary and Correspondence' (Bos¬ ton 1891).

CLARKE, James P., American public official and legislator: b. Yazoo City, Miss., 18

Aug. 1854; d. Little Rock, Ark., 8 Oct. 1916. He attended the common schools of Yazoo v City and later obtained a finished education by saving his earnings as a printer on the Yazoo Herald. He studied law at the University of Virginia and was graduated in 1878. In 1879 he began practising law at Helena, Ark. He entered the political field in 1886, when he was elected to the house of representatives of Ar¬ kansas. He was elected to the State senate in 1888, becoming president of that body in 1891 and ex-officio lieutenant-governor. He was elected governor of Arkansas in 1894 and at the close of his term of office moved to Little Rock, where he resumed his law practice. He took his seat in the United States Senate on 9 March 1903, succeeding James K. Jones, and was re-elected in 1909 and 1915. He was a member of the Democratic National Committee. Senator Clarke has been president pro tempore of the Senate since the Democratic party gained control in 1913. He was chosen by the party caucus to succeed the late Senator Frye, of Maine, after a spirited contest and was elected to the place in the Sixty-fourth Congress de¬ spite determined opposition based upon his sen¬ sational revolt against the administration Ship Purchase Bill in the previous Congress. In the closing days of the 1916 session he pre¬ sided over the Senate owing to the absence of Vice-President Marshall. The railroad Eight Hour Bill was passed with Senator Clarke in the chair, but he was one of the two Demo¬ cratic senators to vote against the meas¬ ure, and he refused to sign it. He was many times the leader in opposition to measures pro¬ posed by his party. The climax to his inde¬ pendence was reached when he led the Democratic revolt against the Ship Purchase Bill, which gave new life to the Republican filibuster against the measure and made its passage impossible. When the bill was rein¬ troduced in the 1916 session, however, with the government ownership and operation features to which Senator Clarke objected, revised and modified, he supported it. He proposed the amendment to the Philippine Bill of 1916 which would give absolute independence to the islands in four years.

CLARKE, John, American clergyman : b. Suffolk, England, 8 Oct. 1609; d. Newport, R. I., 26 April 1676. He was a physician in London, and came to Massachusetts soon after its first settlement; but being one of the friends of Anne Hutchinson, was obliged to flee with her and her associates from that colony. Pro¬ ceeding to the south, they were welcomed by Roger Williams to his vicinity, formed them¬ selves into an organization, and obtained from the Indians a district to which they gave the name of the Isle of Rhodes or Rhode Island. The settlement commenced in 1638, at Pocasset, and Clarke began to employ himself as a preacher. In 1644 he founded at Newport the second Baptist church in America, and became its pastor. Venturing a few years later to preach in the vicinity of Boston, he was ar¬ rested by an officer of the government, was called first before a parish meeting and then be¬ fore the court, and was condemned for what were adjudged false teachings, to pay a fine of 20 pounds or be publicly whipped. In 1651 he was sent to England in company with Roger

Williams as an agent of the colony of Rhode Island, and published there a book entitled (Ill News from New England, or a Narrative of New England's Persecution. > He succeeded in obtaining a revocation of 'Mr. Coddington's com¬ mission as governor, and remained in Eng¬ land after the return of Williams, till at the end of a 12 years' mission he had procured a second charter for the colony, which secured to every person at all times his own judgment and con¬ science in matters of religious concernment. Bancroft alludes to him in his history as ((the modest and virtuous Clarke, the persevering and disinterested envoy.® Upon his return in 1663 he resumed the pastorate of his church at New¬ port, which he retained till his death. He served in the general assembly from 1664 to 1669, be¬ came deputy governor in 1669 and 1671, and afterward codified the Rhode Island laws. In his will he left his farm for charitable purposes, the income of it only to be expended; and it has since produced annually about $200. Con¬ sult Richman, (Rhode Island> (New York, 2 vols., 1902).

CLARKE, John Hessin, American jurist: b. Lisbon, Ohio, 18 Sept. 1857. He was gradu¬ ated at Western Reserve University in 1877, and was admitted to the Ohio bar in 1878. He practised law in the courts of Ohio from 1878 to 1914, when he was appointed United States district judge at Cleveland by President Wil¬ son. He has been conspicuous in progresssive movements in Ohio and in the nation at large, and has taken an especial interest in the natural¬ ization and Americanization of foreigners. In July 1916 he was nominated by President Wil¬ son as an associate justice of the Supreme Court of the United States, to succeed Charles Evans Hughes, the Republican nominee for

the Presidency.

CLARKE, John Mason, American geolo¬ gist : b. Canandaigua, N. Y., 15 April 1857. He studied at Amherst and the University of Got¬ tingen, and in 1881-84 was professor of geology and mineralogy at Smith College. In 1885 and 1886 he was lecturer on geology at the Massa¬ chusetts State College of Agriculture at Am¬ herst. In 1894 he was appointed professor of geology in the Rensselaer Polytechnic Institute at Troy, and in 1898 State palaeontologist of New York, becoming State geologist and director of the Museum in 1904. He has writ¬ ten (New Devonian Crustacea) (1882); (Cir- riped Crustacea from the Devonian) (1883); (Ueber deutsche oberdevonische Crustaceen) (1884) ; (On Devonian Spores (1885) ; (On the Higher Devonian Faunas of Ontario County, New York) (1886); (Early Devonic History of New York and Eastern North America* (1908) ; (The Eurypterida of New York,* with Ruedemann (1912) ;*

*CLARKE, McDonald, American poet : b. Bath, Me., 18 June 1798; d. New York, 5 March 1842. He was a*n eccentric character, familiarly known as ((the mad poet® ; and was the subject of an amusing poem by Halleck, called , (The Discarded. * The subjects of Clarke's verses were usually the belles of the city and topics of the day. His works include (Poetic Sketches) (1826) ; and (The Belles of*

Broadway5 (1833); 'A Review of the Eve of Eternity (1820) ; (The Elixir of Moonshine by the Mad Poet) (1822) ; (Death in Disguise) (1833); 'A Cross and a Coronet5 (1841). One of his best known conceits was (Now Twilight Lets Her Curtain Down and Pins it With a Star.5*

CLARKE, Mary Victoria Novello Cow- den, English story-writer, essayist and Shakes¬ pearean scholar: b. London, 22 June 1809; d. Genoa, Italy, 12 Jan. 1898. She married in 1828 Charles Cowden-Clarke, with whom she wrote the 'Shakespeare Key5 and edited an edition of Shakespeare's plays. Her best known work is her (Concordance to Shakespeare,5 published in 1844-45, which cost 16 years' labor. Other works from her pen are (The Girlhood of Shakespeare's Heroines5 (1850) ; 'World- noted Women5 (1858) ; 'Trust and Remittance5 (1873) ; 'A Rambling Story5 (1874) ; and an interesting autobiography, 'My Own Life5

(1896).

CLARKE, Samuel, English theological and philosophical writer: b. Norwich, 11 Oct. 1675; d. London, 17 May 1729. He became chaplain to Dr. Moore, bishop of Norwich, and between 1699 and 1701 published 'Essays on Baptism, Confirmation and Repentance, 5 replied to Toland's 'Amyntor,5 and issued a paraphrase of the Gospels. He was then presented with two livings, and in 1704 and 1705 delivered the Boyle lectures at Oxford on 'The Being and Attributes of God,5 and on 'The Evidences of Natural and Revealed Religion.5 In 1706 he published 'Immortality of the Soul,5 and a Latin version of Newton's 'Optics.5 He was then appointed rector of Saint Benet's, London, and shortly afterward rector of Saint James' and chaplain to Queen Anne. In 1712 he edited Caesar's 'Commentaries,5 and published his 'Scripture Doctrine of the Trinity,5 which be¬ came a subject of much controversy and of com¬ plaint in the Lower House of Convocation. His later productions were his discussions with Leibnitz and Collins on the 'Freedom of the Will,5 and his Latin version of part of the 'Iliad.5 His collected works were published in

1738.

CLARKE, Samuel Fessenden, American naturalist: b. Geneva, Ill., 4 June 1851. He was graduated at the Sheffield Scientific School of Yale in 1878 and took the degree of Ph.D. at Johns Hopkins in 1879. In 1879-81 he was fellow in biology at Johns Hopkins and since 1881 has been professor of natural history at Williams College. He is a member of the American Association for the Advancement of Science and of many other learned bodies and has written much on hydroids.

CLARKE, Thomas Shields, American sculptor: b. Pittsburgh, 25 April 1860; d. New York, 15 Nov. 1920; graduated, Princeton, 1882, studied painting and sculpture at the Ecole des Beaux-Arts, Paris, and in Rome and Florence. He exhibited works and won many medals at London, Madrid,

Paris, Berlin, Chicago, San Francisco and Atlanta. He executed many large works in bronze and marble for New York, Chicago and other large cities. His noteworthy works are the "Cider Press55 foun¬ tain in Golden Gate Park, San Francisco; 'Four Seasons5 on the Appellate Court budding, New vol. 7 — 4

York, and 'Alma Mater' at Princeton Univer¬ sity.

CLARKE, William Eagle, English natu¬ ralist : b. Leeds 1853. He was educated at Yorkshire College. He was made curator of the Leeds Museum in 1884 and in 1888 became assistant in the Edinburgh Museum. In 1906 he was appointed keeper of the natural history department of the Royal Scottish Museum, at Edinburgh. He also served as acting editor of the 'Annals of Scottish Natural History5 and the Naturalist and was joint editor of the Scot¬ tish Naturalist. He published 'Handbook of Yorkshire Vertebrata5 (1881) and 'Studies in Bird Migration5 (1912).

CLARKE, William Horatio, American organist: b. West Newton, Mass., 1840; d. 1913. He filled positions as organist in Dedham, Bos¬ ton and Woburn; was for some years super¬ intendent of schools at Dayton, Ohio ; was organist of Tremont Temple, Boston, Mass., 1878-87, where he retired to Reading, Mass., where he built the fine four-manual organ in Clarigold Hall. He published 'New Method for Reed Organs5 (1869), and 'Outline of the Structure of the Pipe Organ5 (1877); 'Short Service Preludes5 (1903) ; 'Valuable Organ Information5 (1904) ; 'Artistic Information for Reed Organs5 (1905) ; 'How to Use Organ Stops and Pedals5 (1908) ; 'Standard Organ Building5 (1909).

CLARKE, William Newton, American Baptist clergyman : b. Cazenovia, N. Y., 2 Dec. 1841; d. 15 Jan. 1912. He was graduated at Colgate University 1861 and at Hamilton Theo¬ logical Seminary 1863. He filled pastorates at Keene, N. H., Newton Centre, Mass., Montreal, and Hamilton, N. Y., 1863-90, and was a profes¬ sor in Toronto Baptist College 1883-87. From 1890 to 1908 he was professor of Christian theology and from 1908 to his death professor of ethics, at Colgate University, Hamilton, N. Y. He wrote 'Commentary on Mark5 (1881) ; 'Outline of Theology5 (1897) ; 'What Shall We Think of Christianity?5 (1899) ; 'A Study of Christian Missions5 (1900) ; 'The Use of the Scriptures in Theology5 (1905) ; 'The Chris¬ tian Doctrine of God5 (1909) ; and 'Sixty Years with the Bible5 (1909).

CLARKE, William Robinson, Canadian clergyman: b. Inverurie, Scotland, 1829; d. 1912. He was educated at Aberdeen and at Oxford. He became prebendary of Wells in 1870, came to Canada in 1882 and in the same year was appointed professor of mental and moral philosophy in Trinity University. He retired in 1908. He became widely known in America as preacher, writer and lecturer. He attended several Anglican synods and in 1891 became a fellow of the Royal Society of Canada and in 1900 was its president. For a time he was editor of the Canadian Churchman. His publications include 'The Redeemer5 (1863) ; 'The Comforter5 (1864) ; 'The Four Tem¬ peraments5 (1864); 'Witnesses to Christ5 (1888); 'Savonarola5 (1892); 'The Anglican Reformation5 (1896); 'The Paraclete5 (1900); 'Pascal and the Port Royalists5 (1902). He translated Hagenbach's 'Christian Doctrine5 and Hefele's 'History of the Councils.5

CLARKSBURG, W. Va., county-seat of Harrison County, one of the three richest counties in West Virginia. Clarksburg is rec-

ognized as the metropolis of north central West Virginia, is located on the main line of the Baltimore and Ohio Railroad, 14 hours from New York, eight hours from Washington and Cincinnati, 19 hours from Chicago and Saint Louis, also has four branches of the Bal¬ timore and Ohio leading out of here besides the main line east and west, also very excellent in- terurban trolley service operated by the Monon- gahela Valley Traction Company, and is lo¬ cated on the west fork of the Monongahela River. The city lies in a section abounding in natural resources, natural gas, coal, oil and hardwood. It is in the heart of possibly the richest gas field in the world and over 100 pro- ducing coal mines in this immediate vicinity justifies the name of the ((Fuel City of the Fuel State,® by which Clarksburg is popularly known. Coal mining is the largest industry and the abundant fuel has attracted many other manufacturing enterprises, 13 glass factories making window glass, glass

bottles, food con¬ tainers, a plant also produces tinplate, zinc spelter, carbon, tableware, etc., representing an investment of over $12,000,000, employing ex¬ clusive of coal operations close to 7,000 opera¬ tives with an annual payroll of about $8,000,000. There are two daily and one weekly papers, seven banks with combined resources of $18,— 255,557.23, combined deposits of $14,606,967.29. The city has excellent public schools, two high schools, two parochial schools and a good busi¬ ness college, two hospitals, about 25 churches, one of which is about the finest in the State. Clarksburg has a number of fraternal organ¬ izations, notable among which are the Elks, Masons, Knights of Pythias and Odd Fellows; has a splendid Rotary Club and a strong Chamber of Commerce with over 650 members.

The city was founded in 1782, became a county-seat in 1786, secured its first charter in 1897, when its population was about 3,000. Clarksburg is named after George Rogers Clark, the explorer, and is proud of being the birthplace of Gen. Stonewall Jackson. The city has a commission form of government ad¬ ministered by a mayor and two commissioners, one of whom is elected each year for a period of three years. Pop. (1920) 27,869.

CLARKSDALE, Miss., city and county- seat of Coahoma County, 75 miles south of Memphis, Tenn., on the Yazoo and Mississippi Valley Railroad. There is a large trade in lumber and in agricultural products. The city contains an Elks' Home and a Carnegie library. The waterworks and electric-lighting plants are municipally owned. Clarksdale has adopted the commission form of government. The city is located in a fertile alluvial region famed for its large quantities of agricultural produce. It is also the distributing centre for a large region and has an extensive trade in hardware, imple¬ ments, feeds, etc. Pop. (1920) 7,552.

CLARKSON, Ralph Elmer, American artist: b. Amesbury, Mass., 3 Aug. 1861. He was educated at the Amesbury High School, studied art at the Boston Art Museum until 1884 and at the Julien Academy under Lefebvre and Boulanger in 1884—87. He exhibited at the Salon of 1887, and returned soon after to New York where he painted portraits. In 1892 he again went abroad, spending part of the time in Italy. He returned to America in 1895 and set¬ tled in Chicago. He is president of the Chicago

municipal art commission and was member of the American art jury at the Paris Exposition of 1900, member of the art jury and inter¬ national jury of award at the Saint Louis Ex¬ position of 1904. He is one of the founders of the Friends of American Art and is a member of several art societies. Perhaps his best works are (Studio Corner > and (Twilight Harmony.)

CLARKSON, Thomas, English philan¬ thropist and emancipationist : b. Wisbeach, Cam¬ bridgeshire, 28 March 1760; d. Playford Flail, near Ipswich, 26 Sept. 1846. He was originally intended for the Church, and studied at Saint John's College, Cambridge. He early formed a connection with a Quaker association for the suppression of negro slavery, and was intro¬ duced to Mr. Wilberforce and other dis¬ tinguished opponents of slavery. While the latter advocated the cause of abolition in Par¬ liament, Mr. Clarkson was indefatigable in ob¬ taining information and evidence on the sub¬ ject, in attending meetings in different parts of the country, and generally conducting the agi¬ tation throughout England for the suppression of the slave traffic. In 1788 a committee of the privy council made an inquiry into the state of the African trade, and in that year a bill miti¬ gating some of the worst cruelties of the traffic was passed. In 1791 a motion by Wilberforce in favor of putting an end to the traffic was lost by 163 to 88; but his labors, and those of his party, were at last successful in England, the slave-trade being abolished by a bill passed 25 March 1807. This point gained, their next ef¬ fort was to procure the total abolition of slav¬ ery in the British colonies, and in this also, after a long struggle, they succeeded, by the passing of the emancipation act in 1833. Clark¬ son published the (Memoirs of William PemP (1813), and numerous works and pamphlets in opposition to the slave trade.

CLARKSVILLE, Tenn., county-seat of Montgomery County, situated on the Louisville and Nashville Railroad near the junction of the Red and Cumberland rivers. It is the trade centre of a large tobacco-growing district, and has a number of tobacco factories, being one of the 10 leading cities of the United States in the manufacture of snuff. It also manufactures lumber, flour and agricultural implements. Valuable iron ore deposits have been discovered in the vicinity. It is the seat of the South¬ western Presbyterian University, and of a Methodist school for girls. Pop. 8,548.

CLARKSVILLE, Tex., the county-seat of Red River County, on the Texas and Pacific Railroad, about 15 miles south of the Red River, and 100 miles northwest from Dallas. It is the centre of a fertile cotton country, and its industries are such as are related to the raising and marketing of this staple, with some traffic in grain, hides and live stock. Pop. (1920) 3,386.

CLASS, CLASSIFYING, CLASSIFICA¬ TION. When the domain of a science com¬ prehends a very great number of objects which it is necessary to describe, or whose analogies and differences require to be assigned, it is always useful, and sometimes indispensable, to make a methodical distribution of these objects, to group those which present the great¬ est number of common characters, to form with these groups new assemblages, continuing the process till a limit is reached where this mode

of generalizing may be stopped. The highest assemblage in this ascending series is a <(class® (though this term may not be technically ap¬ plied to it) ; the procedure necessary in form¬ ing it is ˆclassifying,® and the result, extending over some entire branch of natural science, is a Classification.® We do not begin to classify till we feel the need of it, for the task requires analysis, multiplied comparisons and researches as to the means of generalizing the particular and isolated notions which we had previously been contented to amass without regular ar¬ rangement. It is only, however, after the re¬ vision necessary for such arrangement has been undertaken that science can be said to have be¬ gun. The first attempts at generalization and classification often exercise a very important influence on the future progress of any science, and may even extend to the period when it seems to be approaching its perfection. A science consists principally in the relations of the facts observed, or knowledge acquired in connection with it. If the relations thus estab¬ lished are founded on accurate observations, they become in fact laws of nature, the most important and most prolific truths which human reason is able to discover. But if the imagina¬ tion has been allowed to take part in the work, if it has either furnished the materials or di¬ rected the construction of the edifice, it must sooner or later be demolished, and rebuilt with better selected materials and on more solid foundations. In modern times geology com¬ menced with faults of this description, and still seems to have difficulty in avoiding them. Natural history, to which a good classification is so essential, was not very fortunate in its first combinations : systems took possession of it, and too often blinded the inquirer to great truths which otherwise he could hardly have failed to discover. Influenced by this love of system, many, instead of submitting to the labo¬ rious investigation of facts, have come forward with some new fanciful combination, and made it almost their sole business to secure the credit of their particular classifications by over¬ throwing those of their predecessors or rivals. In a subject so comprehensive as natural history it seems vain to hope for a perfect classification until the resources of embryology are exhausted. Zoology is gradually tending toward a consist¬ ent system of classification, the basis of which is the resemblances of animals at various periods of their growth. The impulse to this line of research was given by Darwin. Being a strictly natural method, inasmuch as the affinities by common descent are sought after to the neglect of mere outward resemblances at a later period of life, the arrangements suggested by it to dif¬ ferent naturalists show a considerable amount of harmony, and even those who oppose Dar¬ win acknowledge the simplicity and consistency of embryological or genealogical classification. For the classification of the animal kingdom see Anatomy, Comparative.

CLASSICAL LITERATURE. The term ˆClassical Literature® is usually applied to the literatures of Greece and Rome, though sep¬ arate periods of these and other literatures are also called classical.

GREEK LITERATURE

Greek Literature may be conveniently di¬ vided into four periods, as follows: (1) Ancient

or Classical, from Homer to Demosthenes (c. 700 to 300 b.c.) ; (2) Alexandrian, from 300 b.c. to the subjugation of Greece by Rome in 146 B.C. ; (3) Graeco- Roman, from 146 b.c. to the division of the empire in 330 a.d. ; (4) Byzantine, from 330 a.d. to the capture of Constantinople in 1453 a.d.

I. The Classical Period. — The literature of the classical period is not artificial, but was developed naturally and in orderly succession, each branch of the race, Ionian, ZEolian, Dorian, contributing

its part, till the whole culminated in the glorious Attic, which is still the admiration of the educated world. We have no remains of Greek poetry before the Homeric poems, but the highly developed art displayed in them as well as the smoothness of the metres shows that some form of poetry must have been cultivated before such a state of perfection could have been reached. As forerunners then we may mention the Linus song and the songs of Ialemus and of Hylas, also hymns to the gods, marriage hymns, dirges, all which must have attained considerable artistic form before the Homeric poems were composed. During this mythic period from which we receive barely the names, such as Orpheus, Musaeus and Eumolpus, to mention the best known, were developing metrical form, appropriate epithets, fixed phrases, which be¬ came the professional stock of later periods.

1. Epic Poetry. — The only remains of this early period are the Homeric poems, the (Iliad 5 and the (Odyssey. } The (Iliad, > poem of Ilium or Troy, has for its subject the wrath of Achilles, about which is grouped in the most artistic way the development of the events dur¬ ing the 10 years' siege. It consists of 24 books and more than 15,000 lines. The Odyssey, poem of Odysseus or Ulysses, tells of the wanderings and homecoming of Odysseus after the capture of Troy, into which are woven many beautiful myths giving light and shade to the dangers and trials through which the hero passed till he reached his home in Ithaca. This also consists of 24 books, but with only a little over 12,000 lines. Down to the end of the 18th century all the world believed that these poems were the work of one man, Homer, when Wolfe's (Prolegomena ad HomerunP ap¬ peared in 1795. It is true that the ancients as early as 170 a.d. contended that Homer was the author of the c Iliad, 5 though not of the (Odyssey, } but this was as far as they went, and even then there was great opposition to this view of the ˆSeparatists,® as they were called. Vico, of Naples, about 1700, had sug¬ gested that Homer was a myth, but it remained for Wolfe to bring forward plausible proofs of his contention that the poems were not originally one composition, but made up of several shorter poems put together without common plan. Wolfe based his arguments on the belief that writing did not exist before 600 b.c., and that the poems were first collected and written down by order of Pisistratus and that poems of such length could not be handed down by oral recitation. Following Wolfe, Lachmann and other scholars divided the poems into lays, which they believed were col¬ lected by a school of singers, called Homeridae, and later put into their present form by order of Pisistratus. The question is still discussed, but scholars now generally accept the view that*

the two poems belong to separate periods, and that each is a growth from two or three smaller poems. The poems are probably Ionic in origin, though Fick has tried to show that they are Aiolic. As epic lays must have existed in abun¬ dance before the (Iliad and 'Odyssey* were reduced to form, it is only natural that we should find many remains of epic songs, which along with a number of hymns were all credited to Homer, but which are now described as the Epic Cycle, which has come down to us from Proclus, probably the grammarian of the 2d century after Christ. These poems lack the unity of the (Iliad > and (Odyssey) and were far inferior to them. Among the most import¬ ant were the 'Oedipodeia,*

2. Didactic. — Closely following epic poetry is the didactic, which is like epic in form and metre. Its origin is also obscure, but we must also here suppose that some forms existed be¬ fore Hesiod (c. 800 b.c.), its great representa¬ tive. His poem, (Works and Days, treats of the arts of husbandry with an attached calendar of 60 verses. The poem is a pessimistic com¬ plaint of life, with a high moral tone, filled with saws, maxims, allegories, etc., with occasional flashes of genius. The 'Theogony,* formerly attributed to Hesiod though probably not by him, treats of the origin of things and the genealogy of the gods. Other works ascribed to Hesiod are the Catalogue,* the 'Eoiae,* the '2Egimius,* and the 'Shield of Heracles.*

3. Lyric. — As epic was dying, tyric, w'hich had lain dormant during this brilliant period, and which also has its origin in the above men¬ tioned prehistoric hymns, dirges, etc., began to be artistically cultivated. This is a natural development, for when men began to look less to their overlord and to think more of their own concerns, this change of feeling was re¬ flected in their poetry, and thus the new per¬ sonal lyric sprang up in the place of the old impersonal epic that dealt with kings and their doings. Lyric may be subdivided into the Iambic and Elegiac, which are only partially lyric, and the Mclic, the true lyric type, which is itself subdivided into 2Eolic (or monodic) and Dorian (or choral)

lyric. Preceding both these subdivisions is the nome, cultivated by Terpander and Olympus, of which only frag¬ ments remain.

(a) Elegiac. — This was used at first in threnodies and funeral lamentations, but by the 7th century its sphere was greatly extended and it was now employed to describe all sorts of personal reflections, especially of a didactic or moral nature. The metre is a distich consisting of a hexameter verse followed by the so-called pentameter, which is really a verse composed of two catalectic, dactylic trimeters. It was recited, not sung, and was very energetic and lively, being early used as a means of con¬ veying personal reproach. Side by side and almost at the same time with the Elegiac was developed the Iambic, which was probably con¬

nected with the worship of Demeter. It early acquired a satyric turn, to which its lively tripping metre especially adapted it. It was an entirely different type from the Elegiac, but became early associated with it, because it had many characteristics in common, and the two types were often cultivated by the same poet. Like the Elegiac, the Iambic also soon gave up musical accompaniment. Among the masters in this department may be men¬ tioned Callinus (730 b.c.?) of Ephesus, who wrote martial elegies and was probably the first elegiac poet, though this honor is also claimed for Archilochus. Archilochus (700 b.c.) of Paros, who wrote some elegies, is mostly famed as the most illustrious wielder of iambic verse, which he is said to have invented and of which he is the earliest writer. Semonides (693 b.c.) of Amorgus, who has little originality, but is not without some elegance, is chiefly known by his satyric poem in iambic verse on women. Tyrtaeus (650 b.c.), the fabled lame school¬ master of Athens, like Callinus, wrote martial elegies. Mimnermus (630 b.c.) of Colophon, the sweet-voiced singer, was the first to use elegy for the expression of love. Solon (594 b.c.) of Athens, the soldier and patriot, wrote elegies of a martial and political nature. Theognis (544 b.c.) of Megara was a sharp and poignant writer of gnomic elegy. Phocylides (540 b.c.) of Miletus was another gnomic writer, and finally comes Hipponax (546 b.c.) of Ephesus, best known as the inventor of the scazon, choliambic (or halting verse), which is an iambic trimeter that ends with a spondee, and thus produces a sort of shock, often humorous in effect. Here may also be men¬ tioned the epigram, the literary form of which was the elegiac distich. It was cultivated by Archilochus to some extent, but the most dis¬ tinguished writer of epigram was the lyric poet, Simonides of Ceos.

(b) Melic. — Unlike the preceding, the melic type was musical throughout. It was especially adapted to religious chants and held its sway in every realm of human passion. It is highly valuable, not only from a literary but also from an historical standpoint. The 2Eolian type, which was not only monodic, but also choral, is much simpler, less ornate, less involved than the Dorian, which was generally choral. Alcaeus (606 b.c.) of Mitylene was a vigorous, graceful, passionate writer of songs of love, scholia, poli¬ tics and some hymns. Sappho (611 b.c.), also of Mitylene, though probably born at Eresos, the greatest of women poets, wrote love songs of the most passionate character, full of subtle charm and exquisite grace. She also wrote epithalamia. Both these poets used the highly colored Lesbian dialect and both were often imi¬ tated by Horace. Closely allied to these in form and content, though differing from them in dia¬ lect, was Anacreon (540 b.c.) of Teos, an Ionian city, who was a writer of love songs and hymns, and while not possessing the genius or passion of either . Alcaeus or Sappho, yet wrote graceful verse, with an occasional vein of humorous satire. The poems called (Anacreontics are imitations of the Alexandrian Age, and are not altogether bad, some possessing considerable merit. The Dorian type, much more ornate and more highly involved in structure and metre than the Lesbian, dealt mostly with matters of religion and of public interests, taking as its*

subjects the mythical traditions of the Dorians, and was sung at festivals in honor of the gods and heroes or in commemoration of some ath¬ letic victory or the founding of some city. The dialect is Dorian of an artistic literary type, and the form varied from the simple narrative to the highly artistic dialogue. The most import¬ ant forms in the order of their development were the Paean, a hymn of joyous thanksgiving to Apollo, the Hyporchema, also a hymn to .Apollo, accompanied by dancing; the Parthe- nion, a sort of processional song, sung by a chorus of young girls; the Dithyramb, in honor of Dionysus, of a wild and passionate nature, sung by a chorus encircling an altar; also march songs, marriage songs and such like. Thaletas (700 b.c. ?) of Crete is mentioned

as developing the Paean, and Hyporchema, the metre of which he brought from his native land to Sparta. Aleman (650 b.c.) of Sardis wrote hymns, paeans, hyporchemata and scholia, and especially gave artistic form to the Parthenion. His poetry is easy, graceful and often tender. Arion (650 b.c.?) of Methymna is especially noted as the founder of the artistic dithyramb. Stesichorus (611 b.c.) of Himera in Sicily treated epic subjects in lyric form and is famous for adding the epode to the strophe and anti¬ strophe, of choral song, whence he gets his name, his real name being Tisias. Ibycus (560 b.c.) of Rhegium in Italy, somewhat like Stesi¬ chorus in form and content, wrote both hymns and love songs. But the great masters of choral lyric arose after the Persian wars, which had a tendency to unite the widely scattered Greeks into one people and brought into prominence Athens, which then became the literary centre of the known world. Simonides (556 b.c.) of Ceos, an Ionian, of keen observation and philosophic temperament, gave his genius to the cultivation of the Dorian lyric and achieved the highest fame. He was also distinguished in other departments of poetry, notably the elegy and the epigram, hymns to the gods, paeans, dirges, odes of victory, etc. Simonides is also remarkable as being, so-to-speak, the first na¬ tional poet, for he was an Ionian by birth, wrote in the Dorian dialect, and at Athens, the future world power. Next may be mentioned his nephew, Bacchylides (470 b.c.), of whom 20 poems practically complete and several long fragments were discovered in 1897, which give us a much higher opinion of this smooth and graceful poet. Greatest of all the lyric poets was Pindar (521 b.c.) of Thebes, who was a contemporary of Bacchylides and contended with him for prizes, but was by no means a rival, for Pindar is brilliant, lofty in diction and in thought, full of religious reverence, deeply in earnest, abounding in poetic imagery, of an independent genius, always grand. His extant works consist of 45 complete odes of victory, written in honor of the victors at the great- national games, besides many fragments rep¬ resenting almost every species of lyric composition.

4. Drama. — As its name implies, drama is distinguished from epic by action, and grew out of the cult of Dionysus, which was deeply tinged with religion. The people of one section would gather together and worship Dionysus, the god of wine, at vintage time. When in time, the chorus leader impersonating Dionysus told of some adventure, the chorus would burst into

song suited to the feelings aroused by the story, which might be sad and dirge-like or joyous and hilarious. Later this story of adventure and the chorus singing developed into a dia¬ logue, and when such dialogue was repeated several times during a festival and then ex¬ tended to other myths, drama was begun. In time costumes were improved and masks were added; from the simple dialogue noted above, dialogue was now carried on between the chorus leader and one member of the chorus instead of the entire chorus, so that the number of actors was increased to two and later to three. The chorus was at the same time reduced to 12 or 15 (in comedy to 24), and thus became less prominent. When the drama developed, special actors were demanded and these were paid by the state. There was no theatre at first, though soon seats of wood were erected, and later of stone, cut out of the rock on the slope of a hill, with a capacity of 20,000 people; there was no covering. At the front of the seats was the orchestra or circular dancing place, in which was an altar, about which the chorus performed its evolutions. At the rear of the altar was a wall for the scenery and behind this was some rude machinery, such as the noted eccyclema, a sort of rolling platform; there was likely no stage. Dramatic representation was under the care of the state and consisted of a contest among three poets, each of whom con¬ tended with three pieces and a satyric drama. The drama was divided into tragedy and com¬ edy, which grew up side by side, though tragedy was first to attain artistic form.

(a) Tragedy. — Passing by Thespis, Phryni- cus and others who were helping to develop tragedy, we come to the masters, Hischylus, Sophocles, Euripides, in whose hands tragedy reached its greatest height. 2Eschylus (525-456 b.c.) was a stern, proud, deeply religious man, with a vigorous imagination, and gifted with the power of seeing the grand and terrible in nature. His plays show vigor and subtlety of thought rather than grace and delicacy. He is believed to have composed about 70 dramas and 20 satyr dramas, of which only seven have come down to us, the best being the (Agamemnon) and the (Prometheus Bounds Sophocles (495- 406 b.c.) , the greatest of the three tragic writers, was a man of charming personality, endowed with brilliant poetic talent; his imagination was haply not so vigorous as .TEschylus's, but more spontaneous and versatile, and he had a very keen insight into and appreciation of human nature. His plays exhibit deep reflection and serious thought combined with the most ex¬ quisite grace and perfection of form. Of about 120 plays only seven are extant, of which the best are the (Antigoneˆ (Electra) and (CEdipus Tyrannus,5 the last being perhaps the greatest tragedy ever written. Euripides (480-406 b.c.),

though a great poet, did not maintain the lofty standard set by 2Eschylus and Sophocles. He was a man of keen sensibility, with a highly impressionable and sympathetic nature, a glow¬ ing imagination, but thoroughly impregnated with the sophistry of his time. His plays have much grace and beauty, but lack the power of TEschylus and the perfection of Sophocles. There are often passages of brilliant effect, and he rises to his greatest height in the por¬ trayal of the innermost feelings of the heart. He was not so popular in his lifetime as he

*became later, and so of his 75 or 90 plays, only 18 are preserved, exclusive of the (Rhesus, * which is certainly spurious. The best plays are perhaps the c Medea,) the (Iphigeneia at Aulis* and the*

(b) Comedy. — From comus, which was a rustic procession bearing an emblem of fecund¬ ity and singing phallic chants at the country Dionysiac festivals, with which comedy was closely associated. When comedy became im¬ portant it was taken under the care of the authorities at Athens and the competitions were held especially at the Lensea, about the end of winter. Comedy is usually divided into the "Old,® "Middle® and "New.® Old comedy, which held sway from about 480 to 400 b.c., usually dealt with some political or moral sub¬ ject, and was characterized by the wildest ex¬ travagance of fancy and indulgence of keen personal satire accompanied with brilliant and too often coarse wit. Like tragedy, it had a structure of its own which varied little in the different plays. The Parabasis, consisting of songs and spoken passages, is a relic of the old comus and was used to present the personal views of the poet. The language is the spoken Attic in its highest purity. The chief repre¬ sentatives of the old comedy are Cratinus, Crates, Pherecrates, Aristophanes, Eupolis, ot whom Aristophanes (450 b.c.) is far the great¬ est. Eleven of his plays are extant showing the characteristics of old comedy, couched in ele¬ gant language and with the most exquisite grace. Middle comedy (400-330 b.c.), which arose at the end of the Peloponnesian War, loses the vivacity and extravagance of the old and has to do with character sketches and everyday life rather than with political satire. Its chief representatives were Antiphanes (425 b.c.?) and Alexis (390 b.c.). New comedy lost the chorus, and giving up the artificiality of the former period, came nearer to real life, taking its subjects from everyday experience, of which love is the enduring type. This is the prototype of the Latin comedians, Plautus and Terence, and was cultivated by Diphilus, Apollodorus, Philemon, Menander, Posidippus and others, of whom Menander (324 b.c.) was the greatest. No plays of these writers are extant, but the fragments abundantly testify to the loss we have sustained. Earlier than Attic comedy is Sicilian, which was cultivated chiefly by Epi- charmus and Sophron.

5. History. — While poetry was at its highest point of development, Greek prose was coming into life in Ionia and now became the medium of philosophical writings, which had earlier used the almost prose Iambic verse. The be¬ ginnings of history were made by the compilers of ancient myths and legends, records of events, genealogies, etc., mostly of a local nature, ana later they extended their sphere to foreign coun¬ tries, when some geography and description were added, but wholly of an uncritical kind. Among these early writers of history may be mentioned Hecatseus of Miletus (c. 500 b.c.), Pherecydes of Leros (450 b.c.) and Hellanicus of Mitylene (450 b.c.). But the only one whose works are now extant is Herodotus of Hali¬ carnassus (484-406 b.c.?), called the "Father of History.® In the earlier part of his life he was a great traveler and visited nearly every part of the then known world, making researches for his future work. His history consists of nine

books named after the Muses, of which the first part treats of the Persian Empire, its rise and power, while the latter half deals with the Persian invasion of Europe. He weaves into his work much geographical and social material. He uses the Ionic dialect and is really the first writer of artistic prose. His style is simple, graceful and charming. We cannot doubt his sincere search after truth, but his love for the marvellous and his great skill as a story-teller led him into exaggeration and caused him to bring in many side issues, which raise suspicion as to his credibility. Thucydides of Athens (471- 400 b.c.) , the greatest historian of Greece and one of the greatest of the world, wrote in eight books a history of the Peloponnesian wars, using the Attic dialect, and is justly styled the first philosophical historian, inasmuch as he not only gives the events, but also seeks the causes and the political and moral lessons to be drawn from them. Banished, probably for failure in a naval battle, he watched the progress of the war from the outside, but he was absolutely impartial. The speeches, largely imaginary, serve to con¬ vey his philosophical ideas of the causes of events. His style is

exceedingly forceful and intense, but often involved and obscure, due in large measure to his striving after brevity, for every sentence is overcharged with thought. Xenophon (434-355 b.c.), also of Athens, con¬ tinued the work of Thucydides in the first two books of his ellenicaC which consists of seven books and is a very dry history, full of moralizings and with strong predispositions in favor of Sparta. His greatest work is the (Anabasis in seven books, which is a very vivid account of the march of the 10,000 Greek mer¬ cenaries with Cyrus the Younger, when he tried to wrest the kingdom from his brother Artaxerxes. Xenophon was himself a member of the expedition, at first as an onlooker, but later as a leader, so that he gives us a vivid and interesting personal account of it. Among other works are

6. Philosophy. — Although philosophy had its beginnings in Ionia at the same time with his¬ tory we have no literature extant before Plato. Thales, Anaximander and Anaximenes were the first to seek the causes of things and busied themselves with the physical world. Then came Heraclitus (475-335 b.c.) of Ephesus, whose work on nature, of which some fragments are extant, is among the oldest Greek prose, and Py¬ thagoras (c. 540 b.c.) of Samos, who first used the name "philosophia,® founded an independent school, and brought philosophy into closer touch with everyday life. Xenophanes (c. 570 b.c.) oi Colophon, the father of pantheism, founded the Eleatic School. He was followed by Par¬ menides (510 b.c.) of Elea, his disciple, and by

Empedocles (492) of Agrigentum. Anaximenes (510 b.c.) of Clazomenae was one of the deepest thinkers and carried philosophy to Athens, where it received its highest perfection in Soc¬ rates (469-399 b.c.), who, though he wrote noth¬ ing, gave the mightiest impetus to his disciples. First and foremost is Plato (438-348 b.c.) of Athens, who founded the Academic School. Plato, of a highly sensitive and poetic tempera¬ ment, received the best possible education, which he enriched with extensive travel. He wrote much in every department of philosophy, ethics, metaphysics, politics, using the dialogue, with Socrates as the central figure. The vivid imagination and dramatic style which are seen in all his writings rendered them ever fresh and attractive. Forty-two dialogues are extant, of which about 25 are genuine, the best known being the (Apology, > Only fragments remain of Heraclides Ponticus, the scholar of Plato. Aristotle (384- 322 b.c.) of Stagira was the most distinguished pupil of Plato and founded the Peripatetic School. He was a ˆpractical® man, wholly un¬ like the idealist Plato. He ranged over the entire world of knowledge, treating everything from the practical standpoint, as opposed to the idealistic and speculative. His works, writ¬ ten in the common dialect, in a clear and precise, though often bald style, are very numerous, as he wrote on every department of knowledge, literature, philosophy and science. His greatest works are perhaps the Highly valuable also is the (Athenian Constitution,) which was discovered in 1891.

7. Rhetoric and Oratory. — Real Greek prose began at Athens between 430 and 410 b.c. The great orators of the early period, Themistocles and Pericles, did not write their speeches, as did the later orators, of whom only 10 were deemed worthy of a place in the Alexandrian canon. First in order comes Antiphon (480 b.c.) , whose style, elaborate and rugged, ex¬ hibits a fondness for antithesis somewhat like that of Thucydides. Fifteen speeches are ex¬ tant. Andocides (440 b.c.), of whom we have four speeches, is not a stylist, though he shows much force and vividness in description. These two cultivated judicial oratory. Lysias (440 b.c.) was an almost perfect stylist and greatly advanced Attic prose. Thirty speeches, com¬ posed in plain but graceful style, are extant. Isocrates (436 b.c.), of whose speeches 21 are preserved and who wrote speeches to be read rather than delivered, is famous for his smooth¬ ness of diction and periodic structure, a style which has been transmitted through Cicero to all the modern literatures. Isseus (420 b.c.), of whom we have 11 speeches and a fragment of a 12th, resembles Lysias in style, but is much more vigorous. Demosthenes (384 b.c.), who was a pupil of Isaeus, carried oratory to its highest pitch. He was an indefatigable worker, and while his speeches may seem somewhat elaborated, as is charged, they are sincere, vig¬ orous and intense, showing purity of diction and perfection of form. Famous is the oration (On the Crown* in reply to his contemporary, 2Eschines (389 b.c.), himself a distinguished orator. Eschines has left us three speeches in good fluent style, but lacking in sincerity. Two other contemporaries were good orators, but far

inferior, Lycurgus (390 b.c.) and Hypcreides (389 b.c).

8. Medicine. — The only works extant are those of Hippocrates (460 b.c.) of Cos, who was the founder of medicine. These are written in the Ionic dialect in plain language and without any pretensions of style.

II. Alexandrian Period (300-30 B.C.). — In this age the spontaneous production of litera¬ ture ceases and in its stead arise science and criticism, for the enlargement of the Greek world by the conquests of Alexander rendered the appeal to the learned few rather than to the masses inevitable. Prose becomes now more important than poetry, which is mostly learned and highly artificial. Ideality and art are gone; imitation and science have come in. Alexandria as a centre of literary activity rivals Athens. The following departments were cultivated :

1. Poetry. — Besides the new comedy, the most important is the pastoral poetry, the only new style, cultivated by Theocritus (270 b.c.) of Syracuse. His poems, called idylls, deal with the rustic life. The dialect is Dorian and the metre is hexameter. Theocritus is largely arti¬ ficial and conventional, but exhibits true emo¬ tion and a deep feeling for nature. Thirty-one idylls are extant besides some epigrams and fragments. Bion (260 b.c.) of Ionia, and Moschus (c. 150 b.c.) of Syracuse, also culti¬ vated pastoral poetry with considerable success. Here may also be mentioned Herondas (250 b.c.) , whose recently discovered poems, called (Mimiambi (sketches of daily life), were pub¬ lished in 1891. Learned poetry was represented by Callimachus (260 b.c.), of whom we have six hymns and some epigrams, but only fragments of his elegies. Apollonius Rhodius (194 b.c.), a grammarian, wrote an epic on Jason, called (Argonautica,* in imitation of Homer, but it is highly artificial. Lycophron (260 b.c.) culti¬ vated tragedy. In didactic poetry Aratus (270 b.c.) wrote a poem on astronomy, which has little merit, and Nicander (150 b.c.) wrote a medical treatise in verse. Nicander also wrote Eeorgics,* which had some influence on Virgil, and (Metamorphoses,* which were used by Ovid. Parody and satire also flourished in the hand of Timon (280 b.c.) of Phlius, whose satiric poems are called (Silloi.)*

2. Philosophy. — The old philosophy was gone and in its stead we find Stoicism and Epicurean¬ ism (qq.v.). Here may be mentioned Theo¬ phrastus (374-287 b.c.) , whose work on (Char¬ acter is still extant, and Chrysippus, the Stoic.

3. Philology and Criticism. — The establish¬ ment of the Museum by Ptolemy I gave great impetus to philological and critical study. Zen- odotus (280 b.c.) , who began the work of re¬ vising and explaining the Greek poets, wrote memoirs and lists of rare words and phrases. Aristophanes (200 b.c.) of Byzantium, who in¬ troduced the signs used to mark accents, and Aristarchus (150 b.c.), the text critic, were the greatest of the Alexandrian scholars. The science of grammar was now established. Apollodorus (140 b.c.) wrote a work on mythol¬ ogy". Dionysius Thrax (110 b.c.) wrote the first grammar, which was used as a textbook as late as the 12th century.

*4. Science. — Some advance had been made in astronomy, mathematics and geography, when Euclid (300 b.c.) gave to the world his Ele¬ ments of Geometry, * which is still a famous*

work. Archimedes (d. 212 b.c.), who invented the screw, was a distinguished scientist, as was also Apollonius. Eratosthenes (d. 194 b.c.) founded scientific geography and chronology. Here we may mention Hipparchus (160 b.c.), the founder of scientific astronomy, and also the Athenian philosophers, especially the Peripa¬ tetics, who busied themselves with science.

5. History. — • History was but sparingly culti¬ vated, its greatest representative being Polybius (204—122 b.c.) . His work was a record of Roman conquests in 40 books, of which we have the first five entire and fragments of the re¬ maining.

III. Roman Period. — In this period Greek literature spread over the civilized world. In¬ cipient universities sprang up in different places and with them the striving after form and style, especially in prose, poetry being practically neglected.

1. History was cultivated in the early part of this period by Diodorus Siculus (b. 40 b.c.), who wrote a history of the world in 40 books, of which only books I-V and XI-XX with some fragments are

preserved. Dionysius of Halicarnassus (d. 7 b.c.), of whose Archaeology (or Roman History) books I-X have reached us, is much better known by his rhetorical works and critical essays on the classic prose writers. We may also mention in this depart¬ ment Josephus (37 a.d.), who wrote a history of the Jews, Arrian (100 a.d.), who wrote the history of Alexander's expedition and of India, and Dio Cassius, Appian and Herodian, who wrote histories of Rome.

2. Biography was especially cultivated by Plutarch (40 a.d.), whose (Parallel Lives) and ethical works have come down to us. Diogenes Laertius, Flavius Philostratus and Apollonius of Tyana were also composers of lives.

3. Geography was represented by Strabo (18 a.d.) in 17 books, and Pausanias (160 a.d.), whose description of Greece is of the highest value. We may also mention Ptolemy (160 a.d.) of Alexandria, whose geography, based on mathematical and astronomical principles, held its own till replaced by the Copernican System.

4. Philology was studied by Julius Pollux, and Phrynicus, the Atticists, and by the gram¬ marians Apollonius Dyscolus and his son Herodian. Athenaeus (190 a.d.) is especially known for his (Diepnosophistae,) or

5. Rhetoric was systematized by Hermogenes (170 a.d.) It was also cultivated by Longinus (c. 213 a.d.), to whom is ascribed the work (On the Sublime, } Dio Chrysostum (c. 50 a.d.), and others. Especially worthy of mention is Lucian (160 a.d.), the satirist and rhetorican, whose works are of varied interest and con¬ stitute the best prose since the decline.

6. Philosophy was little cultivated. We may mention Epictetus and Marcus Aurelius, the Stoics and Moralists, Plotinus and Porphyry, the Neo-Platonists and Sextus Empiricus, the skeptic.

7. Poetry was practically neglected. The only name worthy of mention is Babrius (40

a.d.) , who put the fables ascribed to ZEsop into choliambic verse.

8. Here may also be mentioned the Christian writers, Justin Martyr (c. 105 a.d.), Clement of Alexandria (c. 150 a.d.) and his pupil, Origen (c. 185 a.d.) , who wrote in the Greek spirit for the advancement of Christian truth.

IV. Byzantine Period. — There is little to notice here. Poetry and Rhetoric are still cul¬ tivated slightly, but there is no creative faculty. Even the learning of the former age is dying out. It is the age of compilations, selections, anthologies. We have the novelist Heliodorus (390 a.d.) with his followers, Achilles, Tatius and Chariton. In poetry only Nonnus's (c. 400

a. d. ?) (The Adventures of Dionysus) and Quintus Smyrnseus's (Sequel to the Iliad) are worth mentioning. Well known is Stobaeus's (Florilegium and Eclogae) and the (Anthology of Cephalas, now called (Palatine. } Libanius gives some interesting features of university life. Learning is represented by Choerobuscus, the grammarian, Eustathius, the commentator of Homer, Photius, Hesychius and Suidas, the lexicographers. Zosimus, Procopius and Zono- ras cultivated history. The most important of the Christian writers are Eusebius, Gregory and Chrysostom.*

ROMAN LITERATURE

The Romans were an intensely practical peo¬ ple, endowed with less imagination and less creative power than the Greeks, and also lacked their fine feeling for the beautiful. Hence their literature does not have the same freshness and originality, though it is not less important, for through Cicero the prose style of Isocrates was transmitted to modern literature, and their laws live in many modern constitutions. The literary activity of the Romans may be divided into five periods: (1) Prehistoric; (2) Archaic from Livius Andronicus to Cicero (240-70 b.c.) ; (3) The Golden or Classical (70 b.c. to 14 a.d.), em¬ bracing the Ciceronian and Augustan Periods ; (4) The Silver Age (14-117 a.d.); (5) The Period of Decline (117-500 a.d.).

I. The Prehistoric Period. — The begin¬ nings of Roman Literature were poetic and we find here carmina or songs on historical sub¬ jects, hymns to the dead, sacred songs, etc., com¬ posed in the Saturnian metre, and some epi¬ taphs. The beginnings of drama are seen in the farce plays, XII

TabularunV which were committed to memory as the commandments. The only prose writer of this period was Appius Claudius Caecus, whose speech against Pyrrhus was long extant.

II. The Archaic Period. — Historic Roman Literature begins with Livius Andronicus (284- 204 b.c.) , who besides making a dull and dry translation of the (Odyssey, > wrote comedies and tragedies based on the Greek. Cn. Naevius (264-194 b.c.) also wrote plays and an epic poem on the First Punic War, still using the Saturn¬ ian metre but showing more skill and originality than Livius Andronicus. The most important comedian of all is T. Maccius Plautus (254—184

b. c.) , to whom about 130 plays are ascribed. Of these Varro selected about 31 as genuine and probably 19 others are genuine. Of the plays selected by Varro as genuine, 20 are still extant and considerable fragments of the 21st, the

(Vidularia.) Plautus's plays are all based on the Greek. He shows great ability in working out the plots, handles his metres freely, but skil¬ fully, and is a perfect master of the popular speech. His dialogue is bright and lively, full of rude wit and keen humor. His plays were long exhibited on the stage and studied in the schools and have been widely imitated in mod¬ ern times. P. Terentius (185-159 b.c.) was brought as a slave to Rome, where he was liber¬ ated. His intimacy with Scipio Africanus and Caius Laelius gave rise to the belief that Scipio was the author of his plays. Six plays are extant, which are mostly imitated from Menan¬ der. Terence has neither the luxuriant genius nor the creative ability of Plautus and lacks his pungent wit, but he is more reflective, more melodious, more artistic. His language is that of the best cultivated circles, and possesses ele¬ gance and grace. He was greatly admired by later Romans, and like Plautus has been a model for modern dramatists. Here may also be mentioned Statius Caecilius, who imitated the new comedy of the Greeks, and Luscius Lanuvinus, the enemy and rival of Terence. The Fabula Togata or national comedy found its chief representative in L. Afranius (c. 150 b.c.), a man of considerable ability. Tragedy was cultivated especially by M. Pacuvius (220-132 b.c.), of whose 13 plays we have only frag¬ ments, and L. Accius (170-94 b.c.), who wrote about 40 tragedies. He was greatly admired by Cicero, Horace and others. Besides Livius Andronicus and Cn. Naevius, already mentioned, the epic was treated by Q. Ennius (239-169 b.c.) , who far outshone the others and may be called with Horace <(Father Ennius,® as the real founder of Latin poetry. His great work, be¬ sides comedies, tragedies, saturse, was the (An- nales) in 18 books, of which only fragments are preserved. His verse is often rude and forced, but he was a man of talent, possessing a vivid imagination and great skill in handling the language. He introduced the hexameter verse to take the place of the Saturnian, and his work marks an epoch in the language changes pro¬ duced. He was greatly admired by Cicero, who was fond of quoting him. Ennius also wrote saturae, but he was surpassed in this by C. Lucilius (150-103 b.c.), whose verse was rude and unfinished, but full of keen wit and search¬ ing criticism of public men and public affairs. Lucilius deserves special mention for giving the satura the nature of an invective poem. About 900 fragments are preserved.

Before prose was sufficiently developed, the early historians, especially Q. Fabius Pictor (c. 210 b.c.) and L. Cinnius Alimentus (c. 209 b.c), used the Greek tongue. The real founder of Latin prose is M. Porcius Cato (234-149 b.c.), a voluminous writer on many subjects. His works comprise Engines1 in seven books, on the rise and growth of Rome and the origin of Italian cities, (De Re Rustical still extant, and many speeches. Among other historians may be mentioned S. Cornelius Sisenna (119-67 b.c.), Claudius Quadrigarius, Velerius Antias and Licinius Macer, whose work was much used by Livy. In oratory, besides Cato, we find S. Sulpicius Galba, C. Gracchus, M. Antonius, L. Crassus, Q. Fabius Maximus, M. Cornelius Cethegus and Q. Hortensius (114-50 b.c.), who was the bridge between these orators and Cicero. Also worthy of mention are: S. /Slins*

Psetus, who wrote the first law book, (Tripcr- tita, > and L. ˆElius Stilo, the first philologian. The (RhetoricaadHerenniumC in four books, an important work on rhetoric, also belongs to this period. Its author is unknown, but it does not belong to Cicero or Cornificius, to each of whom it has been ascribed.

III. Golden or Classical Period. — This period contains the best of Roman literature and may for

convenience be divided into the Ciceronian and Augustan ages, the former be¬ ing characterized by the highest development of prose, the latter of poetry.

(a) The Ciceronian Period. — The first great writer of this age is M. Terentius Varro (1 lb- 28 b.c.) , of ancient family and high rank, who was the most learned man and most extensive writer of ancient Rome. In his works, 74 in number, in more than 600 volumes, he treated almost every conceivable subject, literature, oratory, history, philosophy, grammar, juris¬ prudence, geography, agriculture, etc. Of especial importance are his (Saturse Menippeae, in which he used both prose and verse form to satirize the condition of his times. By far the greatest name in Roman literature is M. Tullius Cicero (106-43 b.c.), the son of a Roman knight, born near Arpinum in Latium. He was remarkably endowed both physically and mentally. He was tall and commanding in appearance, possessed of a fine memory, vivid imagination, quick and ready wit, intense feel¬ ing and a kindly, generous disposition. To these natural gifts he brought the most untiring energy in his eager acquirement of knowledge of every kind and enjoyed the instruction of the very best masters. He was an intense and honest patriot, but lacked political sagacity and the courage of his convictions. His apprecia¬ tion of the beautiful, supplemented by his study of the Greek writers, led him to reproduce their thoughts in Latin, and thus he became the founder of the finest prose that ever was known to the Romans. His highest achievement was in oratory, and his speeches, both political and legal, are among the finest remains of Roman literature. His correspondence was prolific and is of immense value from an historical as well as from a linguistic point of view. In his later years, when the party of Caesar was in the ascendency, he retired to private life and com¬ posed his philosophical works, largely as a solace for his troubles, but also to acquaint his people with the best systems of the Greeks. Of over 100 speeches we have 57 complete, and fragments of about 70 others, while the rest are known to us only by tradition. The great¬ est speeches are the four against Catiline, one for Milo, one against Verres and the second against Antony, one of the most powerful in¬ vectives in any language. His rhetorical works are an outgrowth of his preparation for oratory. In this work his aim was to modify and fit existing systems to Roman needs. The rhetor¬ ical works are as follows: (De Inventione,* in two books, very crude and immature; (De OratoreC in three books, in dialogue form, with the two great orators, L. Crassus and M. Antonius, as the chief speakers, a splendid work, full of vivacity and eloquence and composed in magnificent style; (Brutus, sive de Claris OratoribusC also in dialogue form, a history of Roman oratory. In the*

(Partitiones Oratoriae, didactic in nature, Cicero quizzes his son on rhetorical matters, ˆopica ad C. Trebatium) is an explanation from memory of Aristotle's (Topical (Dc Optimo Genere Oratorum) is a discourse on the Asiatic and Attic styles of oratory, being an introduction to his translation of the two famous speeches of yEschines and Demosthenes (On the Crown, > which translation is, however, unfortunately lost. Philosophy was not kindly received at Rome, and while Ennius and others had treated it slightly, it remained for Cicero to transplant it and settle it firmly on Roman soil. In philosophy Cicero was an eclectic, being almost wholly dependent on the Greek thinkers, so that his philosophical works are important more for their elegance of composi¬ tion and beautiful style than for their matter, though this is important too, as it often deals with systems of philosophy otherwise unknown to us. His philosophical works are (De Repub¬ lican a treatise on government in six books, of which only about a third is preserved; (De Legibus,* also incomplete and probably origi¬ nally in six books ; it is a treatise on Church and state law; (De Virtutibus) and (De AuguriisP with translations from Xenophon and Plato are now lost. Cicero also wrote (De Iure) and com¬ posed the history of his consulship, which are also lost. His two poetic efforts, (De suo Con¬ sulate and (De Temporibus Suis) were very unfortunate and subjected him to considerable ridicule. Cicero greatly dignified the art of letter-writing, and his letters, written in a graceful, conversational style, are a perfect storehouse of information for the history of his times. We possess in all 864 letters (includ¬ ing 90 addressed to Cicero) distributed as fol¬ lows: (Ad FamiliaresP 16 books; (Ad AtticumP 16 books; (Ad Quintum FratremP 3 books; (Ad BrutumP 2 books, the genuineness of the latter being vigorously disputed and defended by many scholars. Coequal with Cicero as a writer was the great Julius Caesar (100-44 b.c.), a man distinguished in many departments of life, being a great statesman,*

general, orator, historian and grammarian. His chief literary works that have reached us are

(b) The Augustan Period. — P. Virgilius Maro (70-19 b.c.), the greatest epic writer of Rome, enjoyed the highest educational advan¬ tagesˆ was gentle and pure, amiable, bashful, not a genius, but a slow, laborious worker, carefully polishing all he wrote. His extant poems are (Bucolicsˆ or (Eclogae,) 10 in number, which are imitations of Theocritus; ˆeorgicaP in. four books, in which he followed Hesiod, Aratus and others as models, though great independence is shown, as the subject was congenial to his personal taste and experience. The warmth and vividness, skilful use of language and pleasing arrangement of the episodes make these the most artistically perfect of all the Roman poems that have reached us. The (ˆEneid,) in 12 books, never received the poet's finishing touch, so that he wished it to be destroyed. This masterly poem, one of the greatest epics of the world, treats of the adven¬ tures of ./Eneas, the (Odyssey) being the model for the first six books, the Uliad5 for the last six. The language is elegant and at times sublime, but it lacks the simplicity of the Homeric poems. Besides these, several minor poems are perhaps wrongly attributed to Virgil. Q. Horatius Flaccus (65-8 b.c.), the most popu¬ lar poet of Rome, brought the satire to its

highest perfection. We have two books of satire, the former containing 10, the latter eight, poems, of which the subject matter is varied, the tone good-natured, though at times sharp, and the style easy and conversational. At about the same time, and in like tone, were produced the Epodes, which, like the Odes in form, are like the Satires in content, though more specific and less generous. The Odes, by which Horace is probably best known, and which are based on Greek models, especially Alcaeus, Sappho and Anacreon, though not wholly de¬ pendent on them, are elaborately wrought out, showing much warmth of feeling, but little of passion and imagination. The skilfully handled metres, the well-chosen language as well as the artistic and happy setting, make the Odes the delight of all. In his later years he pro¬ duced the (Epistles, > in two books, of which the first has 20, the latter three, poems. These are of the same general character with the Satires, but show greater care and better style. Especially famous is the third epistle of the second book, called by Quintilian (eroidesQ, 21 imaginary love let¬ ters by men and women in the heroic age, in elegiac metre; ˆmores, in three books, chiefly erotic; (Ars AmatoriaP in three books, and the (Remedia AmorisP in two books, its coun¬ terpart; (Medicamina faciei, } only partly ex¬ tant; (Metamorphoseon Libri XVP in hexameter verse, treats of various myths and their sources after Greek models; (Fastorum Libri VP is a calendar, with an account of the origin of Roman festivals; (Tristium Libri V> recounts the troubles of his journey and his wretched plight in a strange land; (Epistularum ex Ponto Libri IV> are of a like nature and the HbisP a very abusive poem against some un¬ known enemy, and finally the (HalieuticaP a didactic poem, in hexameters, of which only 132 lines are preserved, treating of the fish in the Black Sea. Here may also be mentioned Gratius Faliscus, whose (Cynegetica) is in a very imper¬ fect state, and Manilius, whose work on astron¬ omy (or better astrology) is drv but not without interest. The greatest prose writer of this age was T. Livius (59 bc.-17 a.d.) of Patavium, a man of vivid imagination, generous feelings, possessed with a love of truth and gifted with*

fine oratorical powers. His language, graceful and elegant, is made more charming by the archaisms and poetic coloring. Livy is a fine master in the portrayal of character and is perhaps the greatest stylist of the Romans. The charge of provincialism is hardly if at all dis¬ cernible to us. Besides his philosophical and rhetorical works, which are now lost, he wrote the history of Rome in 142 books, (Ab Urbe ConditaP of which books I-X and XXI-XLV are preserved, while of the rest we have epitomae, a very unsatisfactory substitute. Other prose writers of this period are Annaeus Seneca (c. 54 b.c-36 a.d.), a writer on rhetorical sub¬ jects, Pomponius Trogus, who wrote a universal history in 44 books, of which a compendium was made by Justinus, and Vitruvius Pollio, from whom we have (De Architectura Libri XP In law, we may mention S. Sulpicius Rufus, A. Ofilius, M. Antonius Labes and C. Ateius Capito. In grammar and philology, P. Nigidius Figulus, who, besides his work on theology and natural sciences, wrote 30 books, (CommentariiGrammaticP ; M. Verrius Flaccus, author of

IV. Silver Age. — C. Velleius Paterculus (18 b.c-31 a.d.), the court historian under Tiberius, wrote an Abridgment of Roman History,) in two books, classical in vocabulary, but exag¬ gerated and artificial in style. Valerius Maxi¬ mus (fl. a.d. 26) was not an historian, but a compiler, and his cFactorum et Dictorum Mem- orabilium Libri IX, } without taste and some¬ times without sense, seems to be a collection of models for rhetoricians. Much more import¬ ant is A. Cornelius Celsus

(fl. a.d. 50), the sci¬ entist, of whose encyclopaedia we have still ex¬ tant the eight books on medicine. Here also belongs Phaedrus, whose 92 fables in imitation of PEsop are good both as to metre and style. By far the most important writer of this time is L. Annaeus Seneca (4 B.C.-65 a.d.), poet and philosopher, who wrote on numerous subjects in a striking and brilliant, but highly artificial style. Besides many works known only by name, we have (Dialogi XIip on various top¬ ics; (De BeneficiisP in four books; (Naturales QuaestionesP in seven books; (De ClementiaP in two books, and (ApolocyntosisP a bitter sat¬ ire on the Emperor Claudius, and (Epistulae Morales ad LuciliumP 124 letters on moral sub¬ jects, abounding in saws and maxims. The correspondence with Saint Paul is spurious, but there is now little doubt that the tragedies ascribed to him are genuine. Q. Curtius Rufus (fl. a.d 50) wrote (Historiae Alexandri Magni Libri XP of which books I and II are lost; not a great work, though at times vivid and dra¬ matic, resembling Livy in the words and phrase¬ ology, but Seneca in the form of the sentences. Here may also be mentioned M. Columella, whose work, (De Re Rustica Libri XIIP shows considerable technical knowledge and good taste, and Pomponius Mela, whose (De Situ UrbisP in three books, reflects Seneca's style; A. Persius Flaccus a.d.), the Stoic, whose six sat¬

ires have been much admired on account of their ethical value. M. Annaeus Lucanus (39- 65 a.d.) wrote numerous poems, of which only 10 books of the

is highly artificial like Seneca's, his uncle. To Petronius Arbiter is ascribed the satirical novel, originally in 20 books, of which only fragments are now extant, and of these the (Cena Tri- malchionis,' a coarse, but witty description of a banquet given by a rich upstart. C. Plinius Secundus, Pliny the Elder (23-79 a.d.), a naval officer, wrote on history, tactics, grammar, rhetoric, etc., but the only work that we have is his (Naturalis Historian in 37 books, which is a compilation from numerous works, rich in learning, but dry and often crude in style. C. Valerius Flaccus, under Vespasian, wrote (Ar- gonautica,' in eight books, after the manner of Apollonius Rhodius, in a highly artificial and rhetorical style, which is often obscure. C. Silius Italicus (25-101 a.d.), under Domitian,. wrote tunica,' in 17 books, on the Second Punic War, imitating Livy in matter and Vir¬ gil in style. From P. Papinius Statius (45-96 a.d.) we have the incomplete poem, (Achilleis,' in one and a half books, I-IV and the first part of V are extant, contains an account of the Flavian dynasty; (Annales,' or more correctly (Ab Ex- cessu Divi Augusti Liber, ' originally in 16 books, of which only I-IV and XII-XV are extant entire, and parts of V, VI, XI and XVI, which treat of the Julian dynasty. Tacitus was an earnest and conscientious historian, a care¬ ful student of his authorities, and tried to be impartial. He shows the influence of Cicero and Sallust in his style, which is now grave

and compact, now sonorous and grand, very ir¬ regular at times, but always energetic. A charming writer of this time is C. Plinius Cae- cilius Secundus (62-113 a.d.), Pliny the Young¬ er, nephew and adopted son of Pliny the Elder. He was a distinguished advocate and speaker of his day. Of his speeches we have the (Panegyricus,' in which he thanks Trajan for the consulship. Far more delightful and inter¬ esting are his in nine books, written with a view to publication and so lacking the freshness of Cicero's letters, but forming a valuable help to understanding the temper and condition of his time; a tenth book contains the correspondence between Pliny and Trajan, when Pliny was governor of Bithynia. The style is smooth, equable and fluent.

V. Period of Decline, — The most important writer of this age is Suetonius, whose (Lives of the Twelve Gesars' and some fragments of his other works have come down to us. Here also belongs Florus, with his tasteless Epit¬ ome of Roman History,' the grammarian Terentius Scaurus, Fronto, the rhetorician; the jurists Ulpius, Marcellus and Gaius, Aulus Gel- lius, whose (Noctes Atticae' contains valuable material; Apuleius, a voluminous writer of prose and verse, whose (Metamorphoseon Libri XP is best known; the Christian writers Minu- cius Felix, who imitated Cicero and Seneca, and Tertullianus, author of the (Apologeticus,' and the grammarians, Acron and Porphyrion, authors of commentaries on the classic poets, and Terentianus Maurus, the metrician. In the 3d century we find Ulpianus and Paulus, the jurists, Cyprianus, Arnobius and Lactantius, the Christian writers, of whom the last is the Cicero of the Christian writers; and Nonius Marcellus, the lexicographer. In the 4th cen¬ tury worthy of mention are the grammarians and commentators, Victorinus, Donatus and Servius, Eutropius and Ammianus Marcellinus, the

historians; the poets, Ausonius and Pru- dentius, a Christian poet ; Damasus and Am- brosius, writers of Christian hymns, and Claudius, a brilliant poet for his time; and the Christian writers, Hieronymus (Saint Jerome), who translated the Bible, and Augustinus (Saint Augustine), the best of the late Chris¬ tian writers. With these it is perhaps best to close this sketch of Roman literature, though the writing of Latin continued for many cen¬ turies after these.

See also Assyrian Literature; Egyptian Literature; Jewish Literature; Chinese Lit¬ erature; Persian Literature; Sanskrit Lit¬ erature; Vedic Literature; Latin Litera¬ ture; Latin Writers; the biographies of the classical authors mentioned; and the articles Drama; Literature; Poetry.

Bibliography.— Greek Literature: Mahaffy, (Greek Classical Literature' (4 vols., London, New York 1895) ; Muller and Donaldson, KA History of the Literature of Ancient Greece' (3 vols., London 1840) ; Jevons, (History of Greek Literature' (New York 1886) ; Fowler, CA History of Ancient Greek Literature' (New York 1902) ; Mure,

1875-80) ; Sittl, (Geschichte der griechischen Litteratur5 (3 vols., Munich 1883-87) ; Christ, 'Griechische Litteraturgeschichte) (Vol. VII, Muller's ˆHandbuch der klassischen Altertums- wissenschaft,5 Munich 1898) ; and for the later periods, Susemihl, (Geschichte der grie¬ chischen Litteratur in der Alexandrinerzeit) (Leipzig 1891) ; Krumbacher, (Geschichte der byzantinischen Litteratur5 (Vol. IX, Muller's (Handbuch der klassischen Altertumswissen- schaft,5 Munich 1897) ; Couat, (La poesie alexandrine5 (Paris 1882) ; Jebb, (The Growth and Influence of Classical Greek Poetry5 (Bos¬ ton 1894) ; Wright, (A Short History of Greek Literature5 (New York 1907) ; Wagner et al., (Die hellenische Kultur5 (Leipzig 1905) ; (Die hellenistisch-romische Kultur5 (ib. 1913).

Roman Literature : Teuffel, (Geschichte der romischen Litteratur5 (Leipzig 1890, Eng¬ lish ed. by Warr, London 1891-92) ; Schanz, (Geschichte der romischen Litteratur5 (Vol. VIII, Muller's (Handbuch der klassischen Al- tertumswissenschaft,5 Munich 1899-1900) ; Duff, (A Literary History of Rome5 (London 1909) ; Leo and Norden et ah, (Die griechische und lateinische Litteratur und Sprache5 (3d ed., Leipzig 1912) ; Patin, (Etudes sur la poesie latine5 (Paris 1883) ; Simcox, (History of Latin Literature5 (2 vols., London, New York 1883) ; Cruttwell, (History of Roman Literature5 (London, New York 1899) ; Sellar, (The Ro¬ man Poets of the Republic5 (Oxford 1892), (Virgil5 (1891), (Horace and the Elegiac Poets5 (1892) ; Tyrrell, (Latin Poetry5 (Bos¬ ton 1893) ; Mayor, (Guide to the Choice of Classical Books5 (London 1898) ; Moulton, (The Ancient Classical Drama5 (2d ed., Ox¬ ford 1898) ; Michaud, (Histoire de la comedie romane5 (Paris 1912) ; Nettleship, lectures and Essays5 (2 series, Oxford 1885-95).

Charles W. Bain,

Late Professor of Ancient Languages and, Lit¬ erature, University of South Carolina.

CLASSICAL TIMES, Democracy in.

See Democracy, History of.

CLASSIFICATION OF LANGUAGES.

See Language, Science of.

CLASSIFICATION OF VOTERS. See

Voters, Vote, Voting.

CLASTIC, a term used to describe rocks that consist of particles or fragments of other rocks, mechanical sediments, in contrast to those of chemical or organic origin. They may be either terrestrial or marine. Sandstones, shales and conglomerates are clastic, while most limestones are not.

CLAUDE, klod, Jean, French theolo¬ gian : b. La Sauvetat, near Agenois, 1619 ; d. The Hague, 13 Jan. 1687. He studied at Mon- tauban, officiated as pastor at Nimes and Mont¬ pellier, but owing to his opposition to the gov¬ ernment scheme for the reunion of the Protest¬ ants and Roman Catholic was interdicted from preaching. The controversial abilities of Claude rendered him formidable and obnoxious to the Catholic party. In 1662 he obtained a post at Montauban, but was forced to relinquish it. He went to Paris, where he received an appoint¬ ment to the pastorate of Charenton (1666). On the very morning on which the revocation of the Edict of Nantes was registered at Paris, he was ordered to. leave France within 24 hours.

He retired to Holland, where he was received by the Prince of Orange, who settled a pension on him and allowed him to preach at The Hague. The most important of his works is his (Defense de la reformation5 (1673, Eng. trans., 1815). He also published a well- known (Traite de la composition d'un sermon.5 He wrote against Arnauld and Nicole on the doctrine of transubstantiation, and in 1678 held a discussion with Bossuet in presence of Mile, de Duras, a Protestant lady connected with the court, and niece of Turenne, who wished to re¬ view the grounds of her faith by hearing their arguments. Bossuet published an account of the conference, which was answered by Claude. His son published (GEuvres posthumes de Jean Claude5 (5 vols., Amsterdam 1688). Consult Rotolph, A., (Abrege de la vie de M. Claude5 (Amsterdam 1687).

*CLAUDE LORRAINE, klod lor-ran, or LORRAIN, so-called, French landscape painter and etcher: b. Chamagne in Lorraine, France, 1600; d. Rome, 25 Nov. 1682. His real name was Claude Gelee: he was called Lorraine from the province in which he was born. When 12 years old it is said he went to live with his brother, an engraver in wrood, at Freiburg. Afterward a relation of his took him to Rome, where the sight of some paintings of the Flem¬ ish painter, Godfrey Waels, who was then living in Italy, enchanted him so much that he traveled to Naples to study with the artist. Returning to Rome after two years, he was employed by the landscape-painter Agostino Tassi, as a color-grinder and otherwise. He is next said to have studied the paintings of Giorgione and Titian, whereby his coloring and chiaroscuro were greatly improved. After making a jour¬ ney into his native country, and residing for some time at Nancy, he settled in 1627 in Rome. Here he attracted the notice of Cardinal Bentivoglio, and was introduced by him to Pope Urban VIII, who gave him orders for four paintings. His position being now as¬ sured, he had many other eminent patrons, and was enabled to live much at his ease. The principal galleries of England, France, Spain, Russia and Germany are adorned with his pro¬ ductions. The public and private galleries of England are richest in these works, a number being in the National Gallery, others at Dul¬ wich, at Windsor Castle and elsewhere. Claude possessed the greatest power of inven¬ tion, by which he gave an inexhaustible variety to his paintings, united with an ardent and persevering study of nature. The truth with which he portrays the effect of the sun in every part of the day, soft breezes playing through the tops of the trees, and all the deli¬ cate beauties of nature, is surprising; and all his rivals fell far short of equaling the dewy humidity which he threw over dark, shadowy places. His figures are poor, and he used to say — <(I sell my landscapes, and give my figures * into the bargain.55 In a great number of his paintings the figures are the work of other artists. Claude most frequently chooses views in which the eye loses itself in agreeable pros¬ pects, without being able to define their limits. He often introduces grand architectural struc¬ tures, and makes his landscapes the scenes of mythological and historical events. Claude himself made a collection of some 200 drawings*

of his pictures. This record, now in the collec¬ tion of the Duke of Devonshire, is known as the (Liber Veritatis.5 Consult Dilke, Lady E. F., (Claude Lorrain, sa vie et ses oeuvres> (Paris 1884) ; Dullea, (Claude Gelee, le Lorrain5 (London 1887) ; Grahame, G., (Claude Lorrain, Painter and Etcher5 (London 1895) ; Earlom, R., (Liber Veritatis> (London 1819).

CLAUDIANUS, kla-di-a'nus, CLAUDIUS (commonly known as CLAUDIAN), Roman poet : b. Alexandria about 365 a.d. ; d. about 408. He went to Rome in 395 a.d., where his poems gained him such renown that a statue was erected to his honor in the forum of Trajan. Besides several panegyrical poems on Hono- rius, Stilicho and others, we possess his epic, the (Rape of Proserpine,5 an unfinished Gigan- tomachia, idyls, epigrams, epistles and occa¬ sional poems. Claudian, whose native tongue was Greek, possessed a remarkable command of the Latin language, and displays

poetic powers of a high character, brilliancy of diction, truth of description and richness of illustration. The best editions of his works are those of Ges- ner (1759) ; Burmann (1760) ; Jeep (1876-79) ; Koch (1893). There is a metrical translation of his works by A. Hawkins (1817). Consult Hodgkin, (Claudian: The Last of the Roman Poets5 (London 1875) ; Creet, C. H., Tome's Past in the Poems of Claudian5 (in the Classi¬ cal Journal, Vol. VI, pp. 108-15, 1910).

CLAUDIUS, kla'di-us, the name of a dis¬ tinguished Roman family which under its head, Attus Clausus, a Sabine, settled at Rome about 504 b.c., and soon branched off into a patrician and a plebeian stock, the former known as the <(Pulchri,)> the latter the ((Marcelli.55 1. Attus, admitted among the patricians, changed his name to Appius Claudius. 2. Claudius, Ap- pius, surnamed Crassus, was consul in 471 and 451 and also one of the decemvirs. His amour with the daughter of the plebeian centurion Vir- ginius resulted in a plebeian insurrection and the resignation of the decemvirs. The patrician Claudii were characterized throughout their whole history by their haughty and tyrannical bearing, displayed particularly toward the ple¬ beians ; while the plebeian branch were equally distinguished for the resolute assertion of the rights of their order. The patrician Claudii counted among their members 28 consuls, 5 dictators, 7 censors, etc. (See Appius Claud¬ ius Crassus). The plebian form of the name was Clodius.

CLAUDIUS I, or, in full, TIBERIUS CLAUDIUS DRUSUS NERO GERMANI- CUS, 4th Roman emperor: b. Lyons, 10 b.c.; d. 54 a.d. He was the youngest son of the elder Claudius Drusus Nero and Antonia the younger, the daughter of Augustus' sister. His early education was left to women and slaves ; owing to his ill health it was thought he would never become a robust man. He accordingly escaped the hostile notice of Caligula, and. availed himself of the leisure and more or less enforced retirement to compose extensive lit¬ erary works in Latin and Greek, which have unfortunately not been preserved. Among other works he wrote a Roman history, em¬ bracing the period from the death of Caesar to his own time. After the murder of Caligula, the body-guard, who were ransacking the palace, discovered him secreted in a corner, dragged

him out and proclaimed him emperor (41 a.d.). The Senate, who had determined on the restora¬ tion of the republic, were forced to confirm the appointment. Claudius, suddenly transferred from retirement and oppression to uncontrolled power, distinguished the beginning of his reign by some praiseworthy acts ; he recalled the exiles and restored their estates to them; embellished Rome and erected several large buildings for the public good. He made Mauretania a Roman province; his armies fought successfully against the Germans, and kept possession of several strong places in Britain. But while he was living in comparative retirement (for he never wholly abandoned the practice of earlier years), his wives, particularly the infamous Messalina, together with his freedmen, ad¬ ministered the government, sold offices and places of honor and committed the greatest atrocities unpunished. He died of poison ad¬ ministered by his fourth wife, Agrippina (mother of Nero), who entertained the sus¬ picion that her husband (and uncle) might otherwise live long enough to withdraw his appointment of Nero as successor to the Im¬ perial power. Claudius was deified in due course. His deification was the cause of Seneca's pasquinade entitled (Apocolocyntosis.5

CLAUDIUS II (Marcus Aurelius Flav¬ ius), surnamed Gothicus, Roman emperor: b. Illyria 214 a.d. ; d. of the pest at Sirmium 270 a.d. He was raised to the throne on the death of Gallienus, in 268, and by his splendid victories over the Alemanni and the Goths, he proved himself worthy of the confidence of his soldiers, who made him emperor because he was a good military leader.

CLAUDIUS, Appius, surnamed C.7ECUS (((the blind55), a patrician of Rome, who, when chosen to the censorship in 312 b.c., endeavored to break down class-distinctions by nominating men of humble birth as candidates for sena¬ torial rank. He performed an important serv¬ ice for all the public by the construction of the road (Appian Way) and the aqueduct which bear his name, though he is said to have pro¬ cured the removal of his colleagues from office that he might be able to appropriate the whole honor of these works to himself. In his old age he became blind ; but when Cineas, the deputy of Pyrrhus (280 b.c.), had gained over the Senate, which was on the point of accepting peace on the terms offered by him, Appius caused himself to be led into the Senate-house, and in a celebrated speech, of which Cicero speaks in the highest terms, succeeded in per¬ suading the Senate to resolve that they would listen to no proposals of peace in which the evacuation of Italy was not made an essential condition. From his two sons spring the two best known branches of the Claudian family, the one distinguished by the surname of Pul- cher and the other by that of Nero.

CLAUDIUS, Matthias, mat-te'as klow'- di-us, German poet and prose writer : b. Rhein- feld, 15 Aug. 1740; d. Hamburg, 21 Jan. 1815. In 1775-1812 he made a collection of his com¬ positions, which had appeared in the IVands- beck Messenger and other periodicals, with the addition of some which had not been printed, and gave the collection the title (Asmus omnia sua Secum Portans,5 or (Complete

Works of the Wandsbeck Messenger. } His works are written in a natural, and often humor¬ ous style, and support the cause of good morals, benevolence, patriotism and piety, while they attack folly and vice with the weapons of ridicule and scorn. Many of his songs have been set to music and have become a part of the national melodies. He also made a num¬ ber of translations from the English and French.

CLAUS, klows, Karl Friedrich Wilhelm,

German zoologist : b. Cassel 1835 ; d. 1899. He studied at Giessen under Leuckart. He was ap¬ pointed professor of zoology in Marburg in 1863, in Gottingen in 1870 and Vienna in 1873. He was also director of the Triest Zoological Garden. His (Textbook of Zoology) made him widely known. His published works include Eeitrage zur Kenntnis der Ostracoden) (1868); (Grundziige der Zoologie) (1869); (Ueber den Bau und die Entwickelung der Cumaceen) (1870) ; (Die Metamorphose der Squilliden) (1872); (Lehrbuch der Zoologie) (6th ed., 1897; Eng. trans., London 1897).

CLAUSEL, Bertrand, klo-zel, French marshal: b. Mirepoix, 12 Dec. 1773; d. near Toulouse, 21 April 1842. After gaining a high reputation by his services on the Pyrenees, in Haiti, Italy and Dalmatia, he accompanied Junot and Massena to Spain in 1810. He laid siege to Ciudad Rodrigo, and was wounded at Salamanca. By his skill and conduct the army of Portugal was preserved and led into Spain. In 1813 Napoleon rewarded his valor by con¬ ferring on him the chief command of the forces in the north of Spain. On the restoration of the Bourbons he came to the United States, and lived here for a long time in retirement at Mobile where he wrote his Expose justifi- catifP But when Charles X was overthrown in 1830 he received from Louis Philippe the command of the French troops in Algeria, which he retained till 1836, when he resigned in consequence of the defeat he had sustained at Constantine, and returned to France. Con¬ sult Clausel, Explications du Marechal ClauseP (Paris 1837) ; Duchesse d'Abrante's (Me- moires) ; Blanc, L., Eistoire de dix ans) ; De- Vaulabelle, Eistoire des deux restaurations) ; and the article on (ClauseP in Ea Grande Encyclopedic.)

CLAUSEN, klow' sen, George, English artist : b. London 1852. After studying at South Kensington 1867-73, he was for some time in Paris under Bouguereau and Fleury and subsequently visited Holland and Belgium, ex¬ hibiting at the Royal Academy in 1876, Eigh Mass at a Zuyder Zee Village. 11 Besides many works on Dutch themes he has painted Eaborers at Dinner) ; (Brown Eyes) ; Evening Song) ; (Turning the Plow. He became a member of the Royal Academy in 1908.*

CLAUSEN, Thomas, German astronomer: b. Niibel, Schleswig, 1801; d. 1885. From his early years he devoted himself to astronomical studies and was for several years assistant at the Altona Observatory. In 1842-72 he was engaged, first as observer, afterward director, at the Dorpat (Yuryer) Observatory. He made many important contributions to astrono¬ mical science and made extensive calculations relating to the paths of comets.

CLAUSEWITZ, klow'ze-vlts, Karl von, Prussian military officer: b. Burg, 1 June 1780; d. Breslau, 16 Nov. 1831. His family settled in Germany at the end of the previous century. He first saw service in the Rhine campaigns of 1793-94, receiving his commission at the siege of Mainz. After his return from garrison duty he began to study and finally entered the Berlin Academy for young officers, where he came greatly under the influence of Scharnhorst. In 1803 he was made aide-de-camp to Prince Au¬ gust and served in the campaign of Jena (1806). He was captured with the prince at Prenzlau and was for two years a prisoner. Returning to Prussia in 1809, he became de¬ partmental chief in the Ministry of War; teacher in the military school, instructor to the Crown Prince, and assisted Scharnhorst in the reorgan¬ ization of the Prussian army. In the Russian War of 1812 he

served as adjutant to General Phull and organized the Landwehr of East Prussia. He was present also in the Waterloo campaign as chief of General Thielmann's staff. In 1818 he was appointed head of the Allge- meine Kriegsschule. In 1819 he was chief of staff of Field-Marshal Gneisenau, after the dissolution of whose army he resumed his artil¬ lery duties. He died of cholera. His works were edited by his widow (Berlin 1832-37, 1874). They include his masterpiece, Worn Kriege) (in the first 3 vols.), an exposition of the philosophy of war. He is the founder of modern strategic science. English and French translations have been published. The remain¬ ing volumes cover the military history of the period. He wrote also a life of Scharnhorst and letters. Consult Schwartz, Eeben des Gen¬ erals von Clausewitz und der Frau Marie von Clausewitz) (2 vols., Berlin 1877) ; von Meer- heimb, Earl von Clausewitz } (Berlin 1875) ; Bernhardi, Eeben des Generals von Clause- witz) (10th Supplement, Militdrisches Wochen- blatt , 1878).

CLAUSIUS, klow'ze-us, Rudolf, German physicist: b. Koslin, Pomerania, 2 Jan. 1822 ; d. Bonn, 24 Aug. 1888. He studied at Berlin and afterward lectured on natural philosophy as privat-docent at Berlin, and as professor at the Zurich Polytechnic School. In 1869 he was appointed to the chair of natural philosophy at Bonn. He was elected a foreign member of the Royal Society in 1868, and in 1879 was given its highest honor, the Copley medal. His scientific labors cover parts of the field of optics and of electricity, but his especial work was his contri¬ bution to the science of thermo- dynamics, the honor of establishing which on a scientific basis he divides with Rankine and Thomson. To his research is due the discovery of the second law of this science that <(heat cannot of itself pass from a colder to a hotter body.® His studies in electrolysis are also important, par¬ ticularly his theory that a part of the ions are free to unite with other ions and are not in complete union. These uncombined ions are brought together under the action of the cur¬ rent at the anode and cathode. His mathe¬ matical methods he also applied to the theory of the steam-engine, the dynamical or kinetic theory of gases, and to electricity and electro¬ dynamics. His great works are Eie mechan- ische Warmetheorie) (1876) ; (Die Potential- funktion und das PotentiaP (1859); and

(Ober das Wesen der Warme, verglichen mit Licht und SchalP (1857). For a biography consult Riecke, ˆRudolf Clausis) (Gottingen

1889).

CLAUSON-KAAS, klow'zon-kas', Adolph von, Danish educator: b. near Altona, Holstein, 1826; d. 1906. He joined the Danish cavalry but resigned to devote himself to the promo¬ tion of education. He founded the Danish Clubs for Home Industry in 1870 and lectured on manual training in several of the larger European cities in 1873-78. He advocated the revival of working schools for boys, aiming at training the hand and eye along with the mind. He conducted training schools in Saxony and instituted courses in drawing and modeling in the institute for the blind at Dresden.

CLAUSS-SZAVARDY, Wilhelmina, Aus¬ trian pianist: b Prague, 1834; d. 1907. She received her musical education at the Proksch Institute of Prague. She made a tour of Ger¬ many in 1849 and came under the notice of Berlioz at Paris, where she had little success at first. Later under the patronage of Madame Ungher-Sabastier she attained the fullest meas¬ ure of success and thereafter toured through Europe. She was especially successful as an interpreter of Bach and Beethoven. She mar¬ ried the author, Frederick Szavardy in 1857.

CLAUSTHAL, klows'tal, Prussia, mining district and town in the province of Hanover. It is situated on the Zellerbach, 26 miles north¬ east of Gottingen. It stands in a bleak district, on the top and slopes of a hill, about 1,800 feet above the sea. It is regularly laid out, having been frequently burned down and rebuilt, but the houses are generally of wood. It contains a government mining school, with a good col¬ lection of models of mines and minerals, a library of 40,000 volumes, a mint at which 14,000 silver dollars are coined weekly, and over 600 gold ducats yearly, and it has also a church, courthouse and gymnasium. The mines of Clausthal yield silver, lead, copper, iron and zinc, and are among the most valuable and pro¬ ductive in Germany. They are owned and operated by the Prussian government. One of the mines reaches 500 feet below the level of the Baltic, and is drained by a tunnel cut through the mountain to a distance of six miles. The

machinery of the mines is worked by water power, and every stream in the vicinity is carefully appropriated to this purpose ; the various canals, which extend from mill to mill throughout the mines, have an aggregate length of 125 miles. These mines have been worked since the 11th century. The mines furnish em¬ ployment to the greater portion of the men, and a number of knitting mills give employment to the women. Pop. 8,266.

CLAVA CORONZE, kla'va ko'ro-ni («the Key of the Crown"), one of the names given to the star Alpha Coronae Borealis, the bright¬ est in the Northern Crown. The more common name is that of Arabic derivation, Alphecca.

CLAVARIA, kla-va'ri-a, a genus of fungi, belonging to the Hymenomycetes, many of them edible. They are known in general as the coral fungi, as their fleshy sporophores are often like branching coral in form. The spores are pro¬ duced over the whole surface of the branches. One species (C. botrytis), growing in Germany,

is a common article of food. It has a sweetish taste, and is said by Liebig to contain mannite (q.v.). Another species (C. flava) is used in the same way. Another species is the goat's- beard fungus. See Fungi, Moulds.

CLAVERACK, klav'er-ak, N. Y., town in Columbia County, on the Boston and Albany Railroad, about 30 miles south of Albany. The town was settled in 1660, and has a Dutch Re¬ formed Church building dating from 1767, and a courthouse erected in 1784, a home for crippled children, public library and Fresh Air Home for Children. The chief industries are agriculture and the manufacture of flour and farm implements. The town is the seat of a well-known school called the Hudson River In¬ stitute, established in 1854. It was organized as a town in 1778 and was the county-seat from 1786 to 1806. The government is administered by town meetings held every two years. Pop.

4,114.

CLAVERHOUSE, klav'er-us. See Gra¬ ham, John.

CLAVERINGS, The, a novel of contem¬ porary English life, by Anthony Trollope, pub¬ lished 1867.

CLAVICHORD, a keyed musical instru¬ ment, now out of use, somewhat in the form of a spinet, the strings of which are supported by five bridges. One .distinction in the clavichord is that the strings are covered with pieces of cloth, which render the sound sweeter, and at the same time deaden it, so as to prevent its being heard at any considerable distance. On this account it was formerly much used by the nuns, who could practise on it without disturb¬ ing the dormitory. It is sometimes called the (

1910).

CLAVICLE, or COLLAR-BONE, a bone situated immediately above the first rib, stretch¬ ing from the upper border of the manubrium of the sternum, outward and backward to the acromium process of the scapula or shoulder- blade. It connects the upper limb, the arm, with the trunk, and is so fastened that while its inner end rests on the sternum and cartilage of the first rib the outer end is associated with the scapula, supporting it firmly in its varied posi¬ tions and preventing it from falling forward from the chest. The clavicle is a long bone, and in men is much heavier than in women. It is absent or imperfectly developed in those animals which do not use lateral movements of the fore-limbs and is very much exaggerated or modified in animals such as birds, that exercise the arms very extensively. The clavicle is very frequently broken in children from the results of a direct fall, and as it does not always oc¬ casion a marked deformity the diagnosis is at times difficult. Consult Morris, (Human An- atomy) (3d ed.) ; Gerrish, (Text-Book of An-

atomy by American Authors, 2d ed. ; Spalte- holz, (Anatomy. > See Shoulder-joint.*

CLAVIGERO, kla-ve-ha'ro, Francisco Xavier Saverio, Mexican historian: b. Vera Cruz, Mexico, 9

*Sept. 1731 ; d. Bologna, Italy, 2 April 1787. He was educated as an eccle¬ siastic, and resided 36 years in the provinces of New Spain, where he acquired the languages of the Mexicans and other indigenous nations, col¬ lected many of their traditions and studied their historical paintings and other monuments of antiquity. The first of his researches was a (History of Mexico, * written in Italian, of which an English translation was published in 1787 by C. Cullen (2d ed., 1807). This is a most comprehensive work, affording a great deal of information relative to the natural and civil history, antiquities and religion of Mexico ; but it displays more industry than judgment on the part of the author. On the suppression of the Jesuits by the Spanish government in 1767 Clavigero went to Italy, the Pope assigning him a residence in Ferrara and then in Bologna, where he established a literary academy. Con¬ sult Castro, Ag., (Elogio del P.-Fr. Clavigero* (Ferrara 1787).*

CLAVIJO Y FAJARDO, Jose, kla-ve'ho e fa-har'do, Spanish publicist : b. Lanzarote, Canary Islands, 1730; d. 1806. He lived in Madrid, where he had the reputation of an intelligent scholar, and published a journal, El Pensador, and instituted a campaign against the public performance of (

CLAVIS, kla'vis (Lat. "key), a drawing, index, etc., which serves as a guide to the understanding of another work; for instance, clavis Ciceronia, clavis H omcrica, etc.*

CLAWS, sharp hardenings of the skin at the end of the limbs of animals. The term is often applied to the chelae and similar structures at the end of arthropod limbs, but is best restricted to the horny nails found at the end of the digits in most reptiles, on the toes, and often on the thumb and first finger, of birds, and seen in perfection in many mammals, such as the carnivores, insectivores, rodents, eden¬ tates and others, where the nails are sharp and serve for scratching and clinging. See Hoof; Horn; Nail.

CLAXTON, Alexander, American commo¬ dore: b. Maryland about 1790; d. Talcahuana, Chile, 7 March 1841. He entered the navy as midshipman in 1806, was promoted to a lieu¬ tenancy in 1813 and served on the sloop of war Wasp in her action with the British sloop of VOL. 7 — 5

war Frolic, on 18 Oct. 1812. He was promoted to the rank of master commandant in March 1820, and to that of captain in 1831, performing much active service in both grades. He died while in command of the squadron in the Pacific Ocean.

*CLAXTON, Kate (Stevenson), American actress: b. Somerville, N. J., 1850. She was the daughter of Spencer Wallace Cone, and was married to Charles Stevenson in 1878. She made her debut in Chicago with Miss Lotta in 1870, and in the same year joined Daly's Thea¬ tre Company, but her success dates from 1873, when she acted Mathilda in (Led Astray. * As Louise in (The Two Orphans1* she attained great celebrity. She was playing the part at the Brooklyn Theatre when, on the night of 5 Dec. 1876, that structure was destroyed by fire with great loss of life. She is considered one of the best emotional actresses of her time. Her first starring tour was in 1876.*

CLAXTON, Philander Priestly, American educator: b. Bedford County, Tenn., 28 Sept. 1862. He was graduated at the University of Tennessee in 1882 and studied also at Johns Hopkins 1884-85. In 1885-86 he studied educa¬ tion and school administration in Germany. For several years he was superintendent of schools in North Carolina. In 1896 he became professor of pedagogy and director of the Practice and Observation School at the North Carolina State Normal and Industrial College. In 1902-11 he was professor of secondary education and from 1906-11 inspector of high schools at the Uni¬ versity of Tennessee. In 1911 he was appointed United States commissioner of education. He is the author of many addresses and published articles on education. He edited the North Carolina Journal of Education in 1897-1901 and the Atlantic Educational Journal in 1901-03. In 1902-11 he was superintendent of the Summer School of the South.

CLAXTON, Thomas Folkes, English astronomer : b. London, 29 April 1874. He was, educated at the Colfe Grammar School and joined the Greenwich Royal Observatory in 1890. In 1895 he became assistant director of the Royal Alfred Observatory, Mauritius, and was made director the following year. In 1912 he was appointed director of the Royal Ob¬ servatory at Hongkong. His publications in¬ clude (Annual Magnetic and Meteorological Observations, Mauritius) (1896-1910) ; (Seis-mological Observations- (1898-1910) ; (Mag¬ netic Survey, Pamplemousses) (in Proceed¬ ings1* of the Royal Society, Vol. LXXVI, 1905) ; (Climate of Pamplemousses) ; and sev¬ eral papers on cyclones in the south Indian Ocean.*

CLAY, Cassius Marcellus, American diplo¬ matist : b. Madison County, Ky., 19 Oct. 1810; d. 21 July 1903. He was graduated at Yale in 1832, and three years later was elected to the legislature of Kentucky and again in 1837 and 1840. The improved jury system and the com¬ mon school system of Kentucky are in large measure due to his efforts while in the legisla¬ ture. He denounced the scheme of Texan an¬ nexation as designed for the extension of slavery, and in 1844 traversed the Northern States, addressing immense audiences in favor of the Whig presidential candidate On 3 June 1845 he issued in Lexington, Ky., the first num-

her of the True American , a weekly newspaper, devoted to the overthrow of slavery in that State. It aroused indignant opposition, and in August following his press was seized by a mob and sent to Cincinnati. He was threatened by public resolution with assassination, but revived his paper, printing it in Cincinnati and publish¬ ing it in Lexington. Public sentiment came gradually to support the principle of the free¬ dom of the press, and Clay was able to keep an anti-slavery journal in the field, first at Lexing¬ ton and afterward at Louisville. He served in the Mexican War, was an opponent of slavery and supported Lincoln for the presidency. From 1862 to 1869 he was Minister to Russia. In 1896 he supported the <(gold);> Democratic ticket. Consult Greeley, Horace (editor), Wife, Memoirs, Writings and Speeches of Cassius Marcellus Clay} (2 vols., Cincinnati 1886).

CLAY, Clermont Claiborne, American senator: b. Huntsville, Ala., 1819; d. there, 3 Jan. 1882. He was graduated at the University of Alabama in 1835, and after studying law in the University of Virginia was admitted to the bar in 1840. He was elected to the Alabama legislature, 1842, 1844 and 1845; was judge of the Madison County Court 1846-48. He was chosen United States senator in 1853, and re¬ elected in 1859, receiving every vote in the legis¬ lature. In the Senate he supported the admis¬ sion of Kansas under the Lecompton resolution, and was an ardent advocate of the State sover- eignt3ˆ doctrine. He was formally expelled in 1861, and became a senator in the Confederate Congress. In 1864 he was a secret agent of the Confederacy in Canada, but in May 1865 gave himself up to the United States authori¬ ties and was a fellow prisoner of Jefferson Davis at Fort Monroe. After his release in April 1866 he returned to the practice of law in Huntsville.

CLAY, Frederick, English composer: b. Paris, 3 Aug. 1839; d. Great Marlow, 24 Nov. 1889. Fie studied music at Paris, and settled in London as a composer for the stage, his most successful production being Walla RooklP (1877). This cantata also contained his most popular song, (I'll Sing Thee Songs of Araby} ; other songs being (She Wandered Down the Mountain SideP and (The Sands-o' DeeP

CLAY, Green, American soldier : b. Pow¬ hatan County, Va., 1757 ; d. Kentucky, 31 Oct. 1826. He was a cousin of Henry Clay (q.v.). He went to Kentucky early in life and there ac¬ quired a fortune as a surveyor. He filled many local offices, was a member of the convention that ratified the Federal Constitution, of the Kentucky Constitutional Convention of 1799, and served for many years in the State legisla¬ ture. On 16 March 1813, Governor Shelby com¬ missioned him a brigadier-general and in May of that year, when General Harrison was be¬ sieged by the British at Fort Meigs, on the Maumee River, Clay came to his relief with 3,000 volunteers. He was left in command of the fort and successfully defended it against a combined attack of British and Indians under General Proctor and Tecumseh.

CLAY, Henry, American statesman : b. Hanover County, Va., 12 April 1777; d. Wash¬ ington, D. C., 29 June 1852. Clay was born in a region of Virginia which was already de¬ clining and from which people were constantly

emigrating. His parents were, however, well- to-do owners of slaves. The father, John Clay, was a Baptist preacher of local reputation as an orator. The elder Clay died when Henry was four years old, leaving the mother with seven small children. Mrs. Clay married a sec¬ ond time and added six other children to her flock. The stepfather was a gentleman of good social standing and he secured for Henry a position as assistant to the clerk of the Vir¬ ginia High Court of Chancery, where he came under the immediate influence of Chancellor George Wythe who had been the teacher of

Jefferson and John Marshall. With the meagre training common to American boys of that day, young Clay began the study of law under the great master. He was licensed to practise at the Virginia bar in 1797 and almost immedi¬ ately thereafter he emigrated to Lexington, Ky. He found a hearty welcome in the new com¬ munity and within a short period he was as¬ sociated with Thomas Hart, a lawyer and real estate speculator known all over the West. In 1799 he married Lucretia Hart, the daughter of his patron. About the same time he began to take an active interest in public affairs, made speeches and wrote newspaper articles on the slavery question and the famous Kentucky reso¬ lutions, thus extending his influence and prepar¬ ing the way for his election to the legislature in 1803. The issue which brought him into pub¬ lic life was prepared by Felix Grundy who was attacking with wide popular support a Lexing¬ ton insurance company which had obtained a charter in surreptitious manner to do a bank¬ ing business. Banks were extremely unpopular in the West in 1803. Clay championed the cause of the local corporation and waged a successful war in its defense. Although the majority of the assembly had been elected spe¬ cially to annul the charter of the company, Clay defeated that purpose and so discomfited Grundy that he emigrated to Tennessee. Clay was now one of the acknowledged leaders of Kentucky; but he was so ardent a Republican that he fell an easy prey to the blandishments of Aaron Burr who visited Lexington in 1806 seeking recruits for his expedition against Mex¬ ico. Clay became sponsor for Burr's patriot¬ ism and denounced the activity of the Federal¬ ist district attorney who sought to convict the former Vice-President of treason in the Uni¬ ted States court. Clay appeared as Burr's counsel without fee and his friends made a hero of the defendant. But toward the end of the year Clay was elected to the United States Senate to fill an unexpired term. On his way to Washington he read the President's procla¬ mation calling upon all men to assist in the ar¬ rest and detention of Burr as a conspirator against the country. Immediately Clay and all Kentucky reversed their positions and without loss of popularity to Clay who was again elect¬ ed to a short term in the Senate in 1808. Dur¬ ing this period of service in Washington he ad¬ vocated the annexation of Canada and de¬ nounced the United States' bank in unmeasured terms; (

old and a new member, but he was promptly chosen speaker in preference to older members and recognized parliamentarians. For five vears Clay had urged upon the government the western program : War with England, the im¬ mediate invasion of Canada and the suppres¬ sion of Indian hostilities on the border which were everywhere supposed to be the result of English intrigues. The recent elections had returned men of this way of thinking to Con¬ gress from nearly all western and southern dis¬ tricts and Clay was the natural leader of the insurgents. He organized the committees of the House so that his war program could be given the right of way, while he and his friends, John C. Calhoun and Peter B. Porter of New York, "stiffened the backs® of the President's advisers and brought the peaceful and long- suffering Madison to the point of promising hearty support. Between Clay, as leader of the House, and Madison, the candidate of the party for re-election in November 1812, the reluctant Senate w.as finally compelled to yield, and war was declared in June. The war proved a fail¬ ure in so far as the annexation of Canada was concerned. Napoleon's great campaign against Russia and England collapsed in 1813 and the situation of the country became critical beyond comparison. To fight Great Britain alone seemed suicidal and Madison looked about for some way of securing an early peace. A com¬ mission to treat with England was appointed. Clay was made a member notwithstanding all he had done to bring on the war and he has¬ tened to join John Quincy Adams and the other commissioners at such point as England should designate. After anxious delays and humiliating experiences, the treaty of Ghent was signed. Clay returned to

Kentucky in 1815 and was again elected to the House of Representatives of which he became speaker at the opening session. This office he now held with the exception of one term, when he re¬ fused an election, till 1825. His influence was undiminished and he did as much as any other, perhaps, to secure the elevation of James Mon¬ roe to the presidency in 1816. But when Mon¬ roe was inaugurated he appointed Clay's politi¬ cal opponent, if not open enemy, John Quincy Adams, Secretary of State. This was regarded as settling the succession till 1832 and Clay and his friends were deeply offended. He refused a seat in the Cabinet and all his Western friends likewise refused high appointments from the Administration. As speaker of the House, Clay opposed every important measure of the President and offered policies of his own which threatened to break up the solidarity of the Republican party. Andrew Jackson, who had been sent to Florida to quiet disturbances there and who had carried his measures with a high hand, was a special object of Clay's anger. But the long and ominous struggle of the South and the East over the admission of Mis¬ souri, 1819-20, drew him into co-operation with Monroe and he became the principal author of and sponsor for the Missouri Compromise (q.v.). The accepted custom of the party since 1801 to allow the Secretary of State to suc¬ ceed to the presidency was attacked by Clay so bitterly that the different groups fell asunder and each offered its favorite for election in 1824. Clay was the .candidate of the West; John Quincy Adams of the East; William H.

Crawford of the South. Late in the campaign Jackson entered the race and the West divided its strength. The election showed that neither had won and that Clay, as the fourth on the list of candidates, could not be considered by the House when it came to select the next President. Crawford had been stricken with paralysis and this reduced the contest to two aspirants, Jackson, whom Ckˆ had denounced before the House and the country, and Adams, the most disliked man in the country among Clay's constituents and whom he had denounced since 1817. When Congress met in December, the one anxious query of all was what would Clay do. Few public men have ever been re¬ duced to such a dfficult position, the more dif¬ ficult since the leaders of the West were al¬ most unanimous in urging him to support and thus elect Jackson. To put Jackson in the President's chair would have been a self-deny¬ ing act on Clay's part, for the country would not have been willing to take two Western men in succession as presidents. Early in January Clay announced that he would support' Adams. This decision alienated his stronger Western supporters, Amos Kendall, Frank P. Blair and Thomas H. Benton. The disappointment of the people of Kentucky was very great. But what weakened Clay's position for the rest of his life was his acceptance of the position of Secretary of State in Adams' Cabinet. Follow¬ ers of Crawford, like John Randolph, now joined Jackson's friends and set up the cry of ((bargain and sale, coalition of Puritan and blackleg,® between Adams and Clay, which led to a duel of comic outcome. As chief of the Cabinet Clay was on the defensive during the four stormy years that followed. The Senate was little more than a national Jackson cam¬ paign committee, and even the House weakened in its support of the Secretary of State. When Jackson was at last elected Clay went home to "mend his fences.® Jackson had carried Ken¬ tucky in the recent election and nearly all Clay's prominent former friends had deserted him. He desired to be elected to the Senate in 1830 and he began a canvass of all the counties to regain his former popularity. R. M. Johnson, a man of little pretension to high leadership, opposed him. After a long and bit¬ ter contest Clay won by a very close vote in the assembly. It was the greatest contest of his life before his own people, for had he been defeated his position as a national leader must have been ruined. Once more in Washington, he began in the winter of 1832 to arrange the program for the presidential campaign ot that year. His American system, formulated in 1823-24, now received its widest advertisement. That is, he would stand for a protective tariff to the point of excluding all serious competition of foreign goods with domestic manufactures, for internal improvements which should absorb whatever revenues there might be, and for a strong national bank, which should have a monopoly of the government's financial busi¬ ness. It was clearly a combination of the East and the few Western States which he might control against the South and the greater West which followed Jackson. He was the logical candidate of the opposition and he made every effort to win. But the election showed that Jackson had carried every State, except Massa¬ chusetts, Rhode Island, Connecticut, Delaware,

Maryland and Kentucky. It was the most de¬ cisive election in American history since that of 1804. Yet Clay continued to lead the oppo¬ sition in Congress and the country against the <(Goths and

Vandals/)) as he called Jackson and his party. A break between Jackson and Calhoun, which had been threatening for a long time, now became inevitable. Nullification by South Carolina of the Federal tariff laws fol¬ lowed. Jackson denounced Calhoun and the nullification movement in December 1832. Civil war was imminent. Fearing the worst, Clay now changed his view entirely as to the tariff, brought in a compromise measure and extended his hand to Calhoun, wrho joined him in oppo¬ sition to Jackson. The compromise tariff scheme of Clay became a law in 1833 and nulli¬ fication was given up in South Carolina. A second time he had patched up a peace between the irreconcilable interests of the country. Clay remained in the Senate during the next decade and he was the master mind of the Whig party, as his followers now came to be called. He planned the campaign of 1836 against Van Buren and he seems to have named the three Whig candidates of that year, the object being to cause the election to be carried to the House as in 1824. Failing in this, he successfully blocked every important measure of Van Buren till June of 1840, when another election was approaching. He was a candidate for the nomination of the Whigs in 1840, but William Henry Harrison defeated him. It was a bitter pill. Clay swallowed it and lent him¬ self loyally to the campaign which followed — the famous log-cabin and hard cider campaign. Harrison won. Clay shaped the new adminis¬ tration and laid plans for the future only to find that death of. President Harrison removed from his reach control of affairs. When John Tyler succeeded to the presidency Clay undertook to guide the footsteps of the <(inex- perienced® man. Tyler refused guidance and Clay' denounced him and called upon the Cab¬ inet to resign. The Administration broke to pieces and a new Cabinet was formed. Clay now retired from the Senate with a formal farewell, which reminds one of Jackson's farewell of 1837. But in two years he was again the choice of his party for the presidency. The issue then before the country, the annexation of Texas, had been made by Tyler and on it the Whigs were sorely divided; one-half following the lead of John Quincy Adams, declared that annexation would be to them the dissolution of the Union; the other half, guided by Southerners like Preston and Mangum, were almost as earnestly in favor of annexation. Between these diverging forces Clay made a poor campaign and lost the elec¬ tion to James K. Polk, whom he had ridiculed at the beginning with the query: ((Who is Polk?® This third defeat was an ordeal which he did not endure without signs of bitterness. He remarked in a letter that he hoped the country would survive. The Mexican War developed hostile groups in the Democratic party and in 1848 Clay was again a candidate before the Whig convention. Thurlow Weed, architect and master of the great political machine of New York, aided by Alexander Stephens of Georgia and John J. Crittenden of Kentucky, former friends of Clay, secured the nomination of Gen. Zachary Taylor, who was

elected. Taylor organized his administration without the aid of Clay. But the problem of the time was once again to determine which of the two hostile sections, the East or the South, should have its way. The territories which had been ceded by Mexico were to be organ¬ ized, and California was asking admission to the Union as a State. The South demanded that slavery should be allowed in the territories and that California should come in as a slave State or not be admitted at all. How could the inexperienced Taylor solve the problem? More than 70 years of age, and marked with the evidences of many campaigns, Clay offered himself once more to the legislature of Ken¬ tucky as a candidate for the Senate. He was elected without difficulty and he appeared in Washington in December 1849. The South¬ erners, both Whigs and Democrats, were pre¬ paring for a Southern convention in Nashville the following June. The object of this gather¬ ing was to secede from the Union in event slav¬ ery should be excluded from the new terri¬ tories. The leaders of the East were equally resolute. There was to be no further extension of slavery and they were talking of secession in the event of failure. In January Clay offered himself as a compromiser of the quarrel. Later he prepared his program of concession and sought support from Webster, from his old friends of the South and from moderate news¬ papers like the Washington Union, official organ of the Democratic party. Calhoun op¬ posed him. William H. Seward of New York opposed and the influence of the President was wholly against him. Webster's speech of 7 March gave him a great advantage and later the members of the Nashville convention elected his friends to preside over that body. Still, the South stood firm against him in Wash¬ ington, and Taylor threatened to send an army into the disputed region. The deadlock lasted till 9 July, when the death of the President put Clay's friend Fillmore into the executive chair. The Cabinet was reorganized in the interest of the compromise and one by one the items of the measure became law during the remainder of the summer. The principal of these were the admission of California as a free State, the enactment of a rigid fugitive slave law and the provision that the new terri¬ tories south of the line of 36° 30′ might be left to determine for themselves whether they would have slavery or not. It was the greatest triumph of Clay's life, the

third treaty of peace between the sections which he had arranged. The coun¬ try received the news of the passage of the compromise with salutes of a hundred guns in the leading cities and men breathed a sigh of relief when they knew the crisis was passed. Some Southern leaders retired from public life as a protest and extremists in New England declared they would never obey the fugitive slave law. But the great majority North and South were satisfied. Yet the greatest hope of Clay's life had been repeatedly denied him be¬ cause of that sectional rivalry which he alone had proved able to quiet from time to time. He felt that he had been hardly handled by the country and the people of the country felt dur¬ ing these closing years of his life that they had refused the highest office in their gift to the greatest man of his time and country. His health was already broken ; still he remained in

the Senate to the last, where he died on the scene of his greatest triumphs as well as of his bitterest defeats.

Bibliography. — Clay, Thomas H., (Henry Clay' (in (American Crisis Biographies, Phil¬ adelphia 1910) ; Colton, Calvin, (The Life and Times of Henry Clay) (2 vols., New York 1846) ; Sargent, Epes, (Life and Public Serv¬ ices of Henry Clay* (New York 1859) ; Schurz, Carl, (Henry Clay) (in (American Statesmen,* Boston 1887). There are still other works on Clay, but no really good and critical biography has thus far been published.*

William E. Dodd,

Professor of American History, University of Chicago.

CLAY, any aluminous silicate having plas¬ ticity : that is, which can be molded, when moist, into forms which become stone-hard after exposure to a red heat or higher temper¬ ature. Plasticity is a physical quality, appar¬ ently having little relation to chemical composi¬ tion, and the exact reason why one clay is more plastic than another is even yet largely a matter of speculation. In a broad way clays may be divided into: (1) Pure clays, mostly silica and alumina, with small amounts of iron, lime, magnesia, soda and potash; (2) sandy clays or loams, comprising much of the arable soil of the world; and (3) limy clays or marls, clays containing a high per cent of lime. Clays are also given a great variety of names, accord¬ ing to special characteristics and economic use. The important divisions, based on use in the arts, are : Kaolin; or China clay, pottery clay, fire clay and brick clay.

Origin of Clay. — The base of all clays is the mineral kaolinite, having the formula Al203.2Si02 + 2H20, giving silica 46.3 per cent ; alumina, 39.8 per cent ; water, 13.9 per cent. It is made up of minute hexagonal plates. It results from the decay of feldspathic rocks, par¬ ticularly granites apd gneisses. Surface waters percolating through such rocks leach out the potash in the feldspar; some silica is also leached out and left in a hydrated state. Kao¬ linite results from the union of the broken- down alumina of the feldspar with the hydrated silica. Thus were formed in place the kaolin deposits of Cornwall, England, and some of the kaolin of North Carolina and Pennsylvania. (See Geology, section on Work of the Atmos¬ phere). By the erosion of the land the kaolin and other products of rock decay are carried away and deposited as silts in lakes or in the ocean. Also, under the grinding of glaciers, rocks are reduced to a fine rock flour, forming glacial clays (boulder clay or till). The beds of clay laid down in the ocean may be buried deeply under other deposits, and by heat and pressure be changed to shale. When the sea bottom is elevated and the new land surface eroded, the shale may distintegrate into clay again, or the shale itself may be mined by man, ground and used as clay.

Varieties of Clay. — Pure kaolin or China clay is rare. It is pure white and almost free from iron salts. The common chemical impuri¬ ties in the crude material are silica, iron, lime, alkalis, magnesia and titanium, and the com¬ mon mineral impurities are quartz, feldspar, mica, calcite, magnetite, limonite and pyrite.. If the product is white, contains very little iron

and is low in alkalis it passes in the trade as kaolin. Kaolin has little plasticity, and in mak¬ ing pottery other clays are often added to give this quality. It may occur as residual kaolin in the position of the original feldspar body, a vein or dike, or, if transported by streams and deposited at a

distance in beds, as sedimentary kaolin. Residual kaolin is apt to be of better quality than sedimentary, containing less iron and other impurities.

The United States imported about 235,438 tons of kaolin in 1912, valued at $1,528,257, the production for 1901 having been 97,253 short tons. Kaolin is mined in De Kalb and Jeffer¬ son counties, Ala. ; at Hockessin, Del. ; in Tay¬ lor County, Ga. ; at Blandford, Mass. ; in Macon, Jackson and Montgomery counties, N. C. ; in Chester and Delaware counties, and in the South Mountain region, Pa. ; in Aiken County, S. C. ; and in Lake County, Fla. ; and there are deposits in Missouri, Tennessee, Texas, Arizona, Utah and several other States. In 1910 the United States produced 34,221 short tons of kaolin, valued at $255,873.

Besides being used in making pottery and white tiling and brick, kaolin is largely em¬ ployed in the manufacture of paper, for weight¬ ing the paper and giving a better surface. The largest pottery manufactories in the United States are at Trenton, N. J., and East Liver¬ pool, Ohio. Nearly all the Chester County, Pa., kaolin goes to those places. The South Caro¬ lina kaolin is nearly all used in paper-making.

ANALYSIS OF VARIOUS CLAYS

Si 02

ai2 o3

H2 O

Fe2 Os

Ca O

Mg O

Na2 O1 K2 O

1

53.10

33.06

11.32

1.18

0.38

0.08

0.83

2

73.80

17.30

4.69

.35

1.18

2.49

3

59.83

24.58

7.83

1.66

0.28

0.87

3.11

4

68.13

20.80

6.72

1.20

0.42

0.37

2.55

5

67.80

11.55

0.20

6.50

8.90

5.32

2.42

6

56.10

27.42

8.90

2.68

0.18

2.71

7

40.22

8.47

20.71

2.83

15.45

7.80

3.20

8

57.46

21.15

5.52

3.65

1.50

4.72

1. Crude kaolin. West's Hill, N. C. 2. Refined kaolin. Mount Holly, Pa. 3. Fire clay, Bolivar, Pa. 4. Pottery clay, Zanesville, Ohio. 5. Paving brick clay, Bloomington, Ill. 6. Front brick clay, Sayreville, N. J. 7. Brick clay, Mil¬ waukee, Wis. 8. Terra-cotta clay, Glens Falls, N. Y.

Fire Clays differ much in color, hardness, texture and composition, and some clays used in making fire brick are not particularly refrac¬ tory, but are used for their high plasticity. Strictly a fire clay is a nearly pure mixture of sand and clay with only traces of iron, lime and magnesia, and hence makes white or light colored bricks which can stand very high tem¬ peratures. According to Ries a clay should not be considered refractory unless its fusing point is above 2,700° F. Fire clays are divided into plastic and flint, the former, if hard when dug, becoming plastic when ground and mixed with water; the latter, though sometimes having nearly the same composition, do not become plastic when similarly treated. Fire clays, like kaolins, are sometimes residual products of the decay of feldspar veins, but most are of sedi¬ mentary origin. Some form the underclay of

coal seams, but all such underclays are not re¬ fractory. The underclays of the Michigan coal beds are not. Fire clays in the United States are found in rocks of many geological periods, but chiefly in the Carboniferous and Cretaceous. Workable deposits are known in 18 States ; im¬ portant deposits being in western Pennsylvania ; in the coal-mining region of Ohio; in a belt across New Jersey from Perth Amboy to Tren¬ ton ; in Cecil, Garrett and Allegany counties, Md. ; near Saint Louis, Mo.; near Woodstock and Anniston, Ala., and near Golden, Colo.

Potters' Clay. — Clays for potters' use, apart from the materials used in accessory work, such as fire-brick, saggers, etc., are divided into two classes, kaolins and ball clays. The former term is

derived from the Chinese Kao-ling, meaning lofty hill. The Chinese porcelain clay was found in quantities in a hill thus named, and the term applied to the clay served to de¬ fine it. The word kaolin is now applied by com¬ mon consent to a residual clay which remains white after burning. A residual clay is one which lies as it was formed. Masses of feldspar have been decomposed, the contained potash has been gradually dissolved by carbonated waters, and the residue of silica and alumina has been left. There are usually more or less undecom¬ posed feldspar and grains of quartz associated with the clay, and hence most kaolins are washed before being put on the market.

Kaolin is well known as forming one of the ingredients in Oriental porcelain, the other ingredient being a quartzose feldspathic rock called in China petuntse. For Sevres porcelain kaolin is obtained from Limoges.

Ball clay, — probably corrupted from bowl clay, — is a sedimentary clay, having been washed up and redeposited. It is valued for a high plasticity which kaolin does not possess. The purest ball clay is found in Florida and is sold under the name of ((plastic kaolin.® Most of these clays burn to a cream or almost a stone color. They are mined in New Jersey, Kentucky, Missouri, Colorado and other States, in addition to the Florida clay already men¬ tioned. Ball clays are not usually washed be¬ fore use.

Brick Clays are mixtures of sand and pure clay with lime, magnesia, iron, potash and soda ; in fact, bricks are often made from sandy mix¬ tures which are not properly clay. A mixture with considerable iron burns red, from the ox¬ idation of the iron. Carbonate of lime, or mag¬ nesia, by forming light-colored silicates, coun¬ teracts this red color. Thus the red clays of Wisconsin, which sometimes contain 20 per cent of lime, make the cream-colored Milwaukee brick. The sedimentary glacial clays are largely used for brick-making in the Northern States, while sedimentary surface clays and loams are employed in the Western States and residual clays in the Southern States of this country. All that is required is that the brick shall be of good color, dense, hard and of regular form. Brick material of good quality is found in nearly every State of the Union.

For making paving-brick a clay or shale should be relatively high in lime, iron and the alkalis, that it may vitrify well in burning. When ground and mixed the clay or shale should be fine-grained and plastic, and should shrink but little when burned. Of the Western

States Illinois leads in the production of pav¬ ing-brick, with Missouri second.

The very plastic clay known as gumbo in the Southern States, besides other clays, is burnt in small lumps and used as ballast by a number of railroads.

Terra cotta, used in fire-proof construction and for decoration, may be made of any clay that will make good, strong brick and contains no excess of soluble salts that will "whitewash® on weathering.

Methods of Mining — The clay, if it lies

at or near the surface, is first stripped of soil or sand and gravel ; sometimes as much as 30 feet being removed. In New Jersey the clay is often dug in pits as deep as the thickness of the bed. Usually clay beds are worked either by dig¬ ging the clay entirely from the base of the bank, by working the bank on an incline of about 30 degrees or, where the bank is over 30 feet high, by working in benches six to eight feet wide and seven to nine feet high. Steam shovels are sometimes used. Where the clay is tough it is often worked by undermining several feet and then breaking a foot or more from the face by wedges. Blasting is used in very tough clay and in shale. If the clay lies at some depth, drifts large enough for a man and a wheel¬ barrow are driven into the bank side by side. Sometimes a shaft is sunk and drifts driven from the base, this method being used in Penn¬ sylvania and Ohio and in the fire-clay beds of Missouri.

Egyptianized Clay. — A discovery which gives good promise of affecting the clay industry and its various branches has been made by Mr. E. G. Acheson of Niagara Falls. While experimenting in crucible manufacture, Mr. Acheson had occasion to search for a clay pos¬ sessing certain qualities. After a series of ex¬ periments the account of Egyptian brick-making given in the fifth chapter of Exodus attracted his attention, and conceiving the idea that some property in the straw used in brick-making in Egypt might give him the result he sought, he boiled a quantity of straw, obtaining a

dark-red liquid which he used in the treatment of clay, finding it excellent for increasing its plasticity. He sought out the principle, and determined that the agent was tannin. He treated other clays with water in which tannin was in solu¬ tion, and realized that he had made an important discovery.

The name given by Mr. Acheson to clay treated by his process is "Egyptianized clay.® He has discovered that it is practicable so to treat clay and other earthy materials as to ensure greater strength in the products made therefrom, also to greatly reduce the shrinkage and warping in the process of drying and bak¬ ing and to increase the solubility and the plas¬ ticity of the material. By his process, non¬ plastic clays may be rendered plastic and plastic clays made more plastic by treatment with tannin or an agent having the astringent prin¬ ciples of tannin.

It has been found by experts of the highest standing that clay so treated is changed in a remarkable manner. Even one-half of 1 per cent of tannin develops a wonderful effect, requiring 13 per cent less water to make the clay soft. The maximum effect of the process and treatment, however, seems to be obtained

by the use of 2 per cent of tannin in a 10-day treatment, consisting in keeping the clay wet, so that the tannin is dissolved. In the burned form the strength of the clay is increased 50 per cent, while in the sun-dried form it is in¬ creased in tensile strength 350 per cent. It is also observed that the Acheson treatment re¬ moves the crackling tendencies of many clays. In cases where clay articles are to be made of a certain size, they can be made more exact by the Acheson process, as there is less shrinkage. All parts intended to carry loads may be greatly increased in strength, while there is decreased porosity. Many of the plastic clays are off color, but non-plastic clays of desired color will be brought into service by the Acheson process. In making glass pots it now takes months to ((age}) or temper the clay, while with the Ache- son process the maximum effect is obtained in a 10-day treatment. It is told of the Chinese that the people of one generation prepare the clay for the use of the next, all of which time is spent in making the clay plastic. Under the Acheson process the results are said to be more pronounced in 10 days than those obtained by old methods in years.

The total value of the clay products made in the United States in 1909 was $168,895,365. The output of the leading States was as fol¬ lows :

State

Brick and tile

Pottery

Total

Ohio .

$9,358,000 9,225, 000 4,073,000 9,765,000 8,433, 000 3,676,000 4,719,000 4,483,000

$21,173,272

8,962,738

9,587,832

3,488,282

3,403,496

4,068,701

2,965,768

464,265

$30,531,272

18,187,732

13,660,832

13,253,282

11,836,496

7,744,701

7,684,678

4,947,625

Pennsylvania .

New Jersey .

Illinois .

New York .

M issouri .

Indiana .

Iowa .

Bibliography. — Barber, (Pottery and Por¬ celain of the United States) (New York 1901) ; Binns, (The Potter's Craft* (ib. 1910) ; Bourry, (Treatise on Ceramic Industries) (ib. 1911) ; Merrill, (Rocks, Rock Weathering, and Soils * (ib. 1906) ; Prime, (Pottery and Porcelain of all Times and Nations) (ib. 1878) ; Ries, (Clays, Occurrence, Properties and Uses) (ib. 1908) ; Ries and Leighton, ˆHistory of Clay-Working Industry in the United States) (ib. 1909) ; Roh- land, (Die Tone) (Leipzig 1909) ; Searles, (Modcrn Brickmaking) (New York 1911) ; and the various reports of the State geological sur¬ veys. See Clay-working Machinery.

CLAY CENTRE, Kan., the county-seat of Clay County, is situated on the Union Pacific and Chicago, Rock Island and Pacific railroads, and on the Republican River, , which supplies ample water power and which is utilized by the electric light and power plants, both of which are owned by the municipality. The principal industries are flour mills, cigar, steel-tank, broom and cement-block factories and brickworks. There are two large greenhouses, which make extensive shipments to all parts of the State. Pop. 3,438.

CLAY IRON-STONE, oxide of iron (hematite) mixed with clay or sand, an iron ore of importance in England. It is hard and red to brownish-black in color. The name is also given to the argillaceous carbonate of iron oc¬ curring in nodules and beds in the coal regions

of Pennsylvania, Ohio and other States. When intimately mixed with coal, as in Scotland (((black-band iron-stoneˆ)* it is of importance as an iron ore.

CLAY MARL. See Marl; Soil.

CLAY PRODUCTS. See Mineral Pro¬ duction of the United States.

CLAY-WORKING MACHINERY, ma¬ chines designed for the proper preparation of clay which is subsequently used in the manu¬ facture of bricks, tiles, pipes, etc., in the produc¬ tion of which the importance of the proper preparation of the clay can scarcely be over¬ estimated. A great many of the subsequent difficulties, imperfections and the amount of waste product in the manufacture of articles from clay may be traced directly to the absence of proper treatment of the clay prior to its

use

Fig. 1. — Bevel-Geared Clay Granulator and Feeder

in the molding machines. Among the principal machines of this class are the bevel-geared clay granulator and feeder, designed to work on a horizontal plane and reduce plastic, lumpy clay into a mass of uniform texture, before it is fed into the crushing machines. It consists of a tub the sides of which may be made either flared or vertical, within which is rotated a main shaft of large diameter, carrying forged- steel knives. These machines are frequently used to feed into disintegrators, or some form

Fig. 2. — Detail of Clay Granulator

of crushing rolls used for fine grinding, afford¬ ing the advantage of having such crushers fed uniformly instead of being alternately over¬ loaded or empty. The double shaft clay feeder and mixer (Figs. 1 and 2) is designed for preparing and feeding plastic clay. As a feeder it forms the bottom of a clay storage bin and will discharge the material at a uniform rate determined by the speed at which the pulley is driven, by the pitch at which the knives are set and by the position of the adjustable gate which

regulates the final control. It may also be used to advantage as a double shaft pug mill, in which case the clay bin and the gate are omitted. The standard machine is bevel geared with the driving pulley on the right-hand side as shown in the illustration. Driving pul¬ ley may be placed on the left-hand side if desired. The machine may also be built spur geared. The standard machine discharges the material at the end of the mixing chamber opposite the driving gears, but the machine may be built so as to discharge the material between the mixing chamber and the gear frame.

The mixing and pugging machine is de¬ signed to mix two or more ingredients, or dry and wet materials, and to deliver a thoroughly mixed, well-pugged mass, in uniform quantity. It is especially valuable as a mixer of ˆgrog® or ground calcined material with plastic clay, ground shale with tough clays, and other finely ground or granular material with plastic binders.

Fig. 3 shows an all-iron and steel dry pan, which is probably the most useful machine for grinding shale, such as is generally used in the manufacture of street paving bricks, and in fact all of the ordinary brick clays when dried sufficiently to pass through a screen. The machine consists essentially of a pair of heavy

Fig. 3. — Nine-Foot Dry Pan Machine

iron rollers which rotate vertically and grind against an iron disc of sectional plates rotating horizontally. In the machine illustrated, the grinding rollers are 48 inches in diameter by 10 inches face, their combined weight together with that of their shafts and boxes being about 13,000 pounds. The plows or scrapers run close to the screens and are so constructed that the portions subject to wear are easily and cheaply renewable. The capacity of this ma¬ chine depends entirely upon the nature of the material ground and the amount of moisture contained in that material and the size and pat¬ tern of the screen openings. The total weight of the machine is about 30,000 pounds, and it is fitted with a friction-clutch pulley 48 × 12 inches.

A type of wet pan especially valuable as a mixing and clay preparing machine is shown in Fig. 4. It is a thorough pugger and mixer for all kinds of clay. The mullers or grinding rollers have hard chilled faces, are 48 inches in diameter, with 7-inch faces. This

machine is now generally supplied with a mechanical unloader for emptying the batch mechanically. Fig. 5 shows a form of the clay disintegrators employed to work plastic clays in which stone and gravel are embedded. It

Fig. 4.— Nine-Foot Wet Pan Machine

consists of two rollers, one of which is driven at a high rate of speed (700 revolutions per minute) while the other is run at a rate varying from 50 to 100 revolutions per minute and acts merely as a feed roll. The fast running roll is equipped with steel bars which project slightly beyond its face and act with a cutting action against lumps of strong, tough clays, and also throw out the larger stones against which they come in contact, while the pebbles are crushed and ground up with the clay. It has a broad, heavy iron bedplate. The parting strain between the two cylinders is borne by two heavy through-bolts which pass from one journal box to the other and also enable the regulation of the space between the rolls, varying the capacity of the machine and the degree of fineness of the ground material. Compound clay crushing rolls are made in a great variety of patterns. The machine illustrated in Fig. 6 combines the features of a disintegrator and a smooth roll crusher and is especially useful for the working of clays that require an extra amount of prep¬ aration. The upper section is made of two rolls running at variable speed. Similar to that of the disintegrator, the small or high speed roll has projecting blades of hardened steel. The large roll operates at a slower speed. The effect of the combined motions of these rolls is to shred or separate the material and prepare

Fig. 5. — Clay Disintegrator

it for the further action of the lower section, which is composed of two large chilled-face rolls for finer grinding. The lower rolls may be adjusted close to each other and thus act as fine grinders of the material partially pre~

pared by the upper set. The hollow-ware machine shown in Fig. 7 is particularly adapted for the manufacture of all kinds of hollow ware, such as fireproof partitions, and a great variety of other shapes from plastic ma¬ terial. There has been continuous progress in hollow-ware machines, due to increased use of hollow brick for partition walls. Sewer-pipe

Fig. 6. — Four-Roll Compound Clay Crusher

manufacture in the United States increased about 60 per cent in the period between 1904 and 1916, and there was a corresponding in¬ crease in the making of drain tile machines. Flower pot machinery has also come into con¬ siderable use. A variety of drying systems have been developed for hastening the drying of the clay in manufacture. One of these is the rotary clay dryer, having a long cylinder of large diameter, heated by a furnace. Clay feeders are made to supply material properly mixed to hollow-ware machines and the like. The clay plow and gatherer is a machine for taking clay from the surface of a field. There are several types of cutting machines on the market for separating the clay into bricks or

Fig. 7. — Hollow-ware Auger Machine, showing arrangement of Liners and Augers

paving blocks. A reciprocating automatic cutter is made, principally for severing paving blocks, and is adapted to repressed blocks or wire cut lug pavers. The rotary automatic cutter . is largely employed for brick work. The poin- dometer is a machine for measuring materials at the same time that it automatically tempers the clay. All material is weighed, measured and

delivered in predetermined quantity in an even, constant How. Since about 1905 there has been great improvement in methods of transportation about clay properties. Steam, electric and gasoline locomotives are employed to handle light tram-cars. A great variety of dryer cars are built, with single, double and triple decks. An increasing number are made with steel decks, upper decks being often made to fold or slide away. Other machinery used in clay working, such as conveyors, steam shovels, kilns, pyrometers, etc., will be found described under those titles.

C. B. Sharer,

The American Clay Machinery Company.

CLAYBERG, John Bertrand, American lawyer: b. Cuba, Ill., 8 Oct. 1853. Received his early education in the schools of Cuba and later entered the law department of the Uni¬ versity of

Michigan, from which he was gradu¬ ated in 1875. He was admitted to the bar in 1875 and was employed by Judge Thomas M. Cooley in his works of (Taxation) and orts He moved to Montana in 1884 and in 1889 was appointed attorney-general of the then Territory of Montana. From 1891 to 1913 he was non¬ resident lecturer on mining law in the Uni¬ versity of Michigan and during many years of that time was also non-resident lecturer on the law of irrigation. He has been an exten¬ sive contributor to the law journals of the United States. In March 1903 he was appointed chief of the Supreme Court Commission of the State of Montana and continued to perform the duties of that office until the work of the Supreme Court was brought to date, and re¬ signed 1 April 1905. In 1911 he organized the law department of the University of Montana and is the consulting dean of that department and a non-resident lecturer on mining law. He moved to San Francisco in 1912, at which place he has continued practice as a lawyer.

CLAYBORNE, William. See Claiborne, William.

CLAYDEN, Peter William, English Uni¬ tarian clergyman and author: b. Wallingford, England, 20 Oct. 1827 ; d. London, 19 Feb. 1902. After being pastor of Unitarian congregations at Boston, Lincolnshire, 1855-59; Rochdale 1860; and Nottingham 1860-68, he became one of the staff of the London Daily News , on

which he remained till 1896, in the meantime establishing the Reading Observer in 1873, re¬ maining its proprietor for six years. He was president of the Institute of Journalists (1 893— 94). He published (The Religious Value of the Doctrine of Continuity) (1866) ; Scientific Men and Religious Teachers (1874).; ˆEngland Under Beaconsfield* (1880) ; Samuel Sharpe, Egyptologist (1883) ; (The Eariy Life of Samuel Rogers* (1887) ; (Rogers and His Con¬ temporaries* (1889) ; (England Under the Coalition * (1892).*

CLAYMORE, formerly the large two- handed, double-edged sword .of the Scotch Highlanders ; now the name is given to a basket- hilted. double-edged broadsword, closely re¬ sembling the cuirassier's broadsword of the 1 7th centurv in England.

CLAYPOLE, Edward Waller, American geologist: b. Herefordshire, England, 1 June 1835; d. Long Beach, Cal., 17 Aug. 1901. He was

graduated at the University of London in 1862 ; was professor of geology and biology in the Antioch College, Yellow Springs, Ohio, of Butchel College, Akron, Ohio., and for a time was on the geological survey of Pennsylvania. He was the author of numerous reports on the geology of Perry County, Pa., and of papers and essays on geological and biological sub¬ jects. He was a member of a number of geo¬ logical societies in London, Edinburgh and America, and of the American Association for the Advancement of Sciences.

CLAYPOLE, Noah, the sneaking, cow¬ ardly apprentice in Dickens' (Oliver Twist, who robs his master's till, joins Fagin in Lon¬ don and by turning state's evidence insures the conviction of Bill Sykes for the murder of Nancy.*

CLAYS, klas, Paul Jean, Belgian artist: b. Bruges 1819; d. 1900. He studied under Vernet and Gudin at Paris. At first he failed of success, but later by adopting a broader style he attained a large measure of success. His favorite subjects were the waters of the Netherlands. His drawing is inferior but his coloring is delicate and his work has splendid charm. His best known works are (Bay of Ostend) (Brussels) ; (Shipwreck on the Shet¬ land Islands) (Brussels) ; two marine views in the National Gallery, London; (Open Sea (Munich) ; and (Celebration of the Freedom of the Port of Antwerp,* in the Metropolitan Museum, New York.*

CLAYTON, Augustine Smith, American lawTyer : b. Fredericksburg, Va., 27 Nov. 1783; d. Athens, Ga., 21 June 1839. He was gradu¬ ated at the University of Georgia 1804; was admitted to the bar and practised with eminent success. He served in the State legislature ; was judge of the Superior Court 1819-25 and 1828-31 ; and a representative in Congress from 1831 to 1835. He was removed from the Su¬ preme Court for differing with the legislature on one point of the controversy

concerning the occupation of the territory of the Cherokee Nation by the State of Georgia. In Congress he opposed the tariff and United States bank measures. He is said to be the author of the political pamphlet (Crockett's Life of Van Burcn. He compiled (The Laws of Georgia, 1800-KP (1812).*

CLAYTON, Henry DeLamar, American jurist: b. Barbour County, Ala., 10 Feb. 1857. He was graduated at the University of Ala¬ bama in 1877. He was admitted to the bar in 1878 and from 1880 to 1914 practised at Eufaula, Ala. He was register in chancery of Barbour County 1880-84 and member of the Alabama general assembly in 1890-91. In 1893-96 he was Federal district attorney for the middle district of Alabama. He was a member of Congress from 1897 to 1913, and after 1888 was a member of the Democratic National Com¬ mittee and was chosen permanent chairman of the Democratic National Convention at Denver in 1908. Since 1914 he has been United States district judge for the middle and northern dis¬ tricts of Alabama.

CLAYTON, James Benjamin, American clergyman : b. Washington, D. C., 9 Feb. 1867. He was educated at Columbian (now George Washington) University and at the Southern

Baptist Theological Seminary. He spent sev¬ eral years in evangelistic work and held pas¬ torates at Norfolk and Falls Church, Va., 1890- 91; Hannibal, Mo., 1897-98; Hynesboro Park, Md., 1898-99; and Washington, D. C., 1910. In 1903-09 he was chief clerk of the bureau of American ethnology, and since 1911 has been dean of the theological department of Potomac University. He is an extensive contributor to periodicals on educational and religious topics, especially comparative religion, symbolism and folklore.

CLAYTON, John, American botanist: b. Fulham, England, 1686; d. Virginia, 15 Dec. 1773. In 1705 his family came to Virginia, where his father became attorney-general, and took up his residence near Williamsburg. He entered the office of Peter Beverly, clerk of Gloucester County, succeeded him and held the office for 51 years. He was an enthusiastic botanist and throughout his long life delighted in exploring and describing the plants of his region. Gronovius and Linnaeus published an account of specimens of Virginia flora sent them by Clayton (Leyden 1739-43), and Grono¬ vius' son named a genus of herbaceous plants Claytonia in his honor. Clayton's studies of Virginia natural history were published in the Philosophical Transactions of the London Royal Society, and his descriptions of some new species of plants are to be found in the third volume of Peter Force's (Tracts. Two folio volumes of manuscript, almost ready for the press, were burned with the records of New Kent County during the Revolutionary War. See Claytonia.*

CLAYTON, John Middleton, American

statesman: b. Dagsboro, Del., 24 July 1796; d. Dover, Del, 9 Nov. 1856. He was graduated at Yale in 1815, admitted to the bar in 1818, and became a leading lawyer in the State. He was elected United States senator in 1829 and held office till the close of 1836, when he resigned. He was then appointed chief justice of his native State and continued on the bench for nearly three years. In 1845 he was again sent to the Senate and remained there till March 1849, when he became Secretary of State under General Taylor. In this capacity he negotiated the Clayton-Bulwer Treaty (q.v.), adjusting the respective claims of Great Britain and this country in Central America. Clayton resigned office on General Taylor's death in 1850, but remained in the Senate till his death. He was a zealous Whig, an able debater and a states¬ man of high talent and upright character. Con¬ sult Comegys, J. P., (Memoir of John Middle- ton Clayton (in Papers of the Historical So¬ ciety of Delaware, No. 4, Wilmington 1882).*

CLAYTON, Powell, American soldier and diplomatist : b. Bethel, Pa., 7 Aug. 1833 ; d. Washington, D. C., 25 Aug. 1914. He received an academic education in Bristol, Pa. ; later studied civil engineering and went to Leaven¬ worth, Kan., as engineer and surveyor in 1859. When the Civil War broke out he entered the Union army as captain of the 1st Kansas In¬ fantry. In May 1863 he led a successful expedi¬ tion against a band of guerrillas on the White River, Ark., and also to destroy Confederate stores; and in 1864 was promoted brigadier- general of volunteers. At the close of the war he settled in Arkansas ; was elected governor

in 1868; United States senator in 1871-77 ; appointed Minister to Mexico in 1897 and raised to rank of Ambassador in 1899.

CLAYTON, N. Y., town in Jefferson County, on the Saint Lawrence River, forming the gateway to the Thousand Islands. It is on the New York Central Railroad and is con¬ nected with Watertown by bus service. The principal industry is shipbuilding. There are two banks, a parochial school and a high school ; also a town-hall. It is governed by a president and board of trustees which it elects yearly. As a summer resort it is very popular. Pop. (1920) 1,849.

CLAYTON ACT, a so-called anti-trust act, passed by Congress 15 Oct. 1914, prohibit¬ ing corporations to create monopolies by indi¬ rect dealing, such as offering their products at special low prices until their competitors are driven out of business. The act forbade any forms of contract by which the purchaser of an article agreed not to buy the same kind of article or accessory articles from a competitor of the seller. Other clauses of the act forbade holding corporations and interlocking directo¬ rates. To the trade commission and also to the interstate commerce commission was given power to end these discriminations and other violations of the strong clauses against monop¬ oly. One clause declared that the provisions of the act should not apply to fraternal, labor or agricultural associations, not conducted for profit.

CLAYTON-BULWER TREATY, a treaty existing from 1850 to 1901 between the United States and Great Britain. It was an agreement designed to prevent either country from secur¬ ing exclusive rights over any interoceanic canal across Nicaragua. (Sec Panama Canal). Its origin represented a supposed mutual withdrawal from positions rapidly generat¬ ing war. Its lifetime has two opposite phases: (1) That in which the United States, wishing no such exclusive rights, held it and appealed to it as a bulwark against British en¬ croachments, opposing only an injurious inter¬ pretation of it; (2) that in which the same power did wish such- privileges, endeavored first to gain British assent to its abrogation, and after long and fruitless struggles 'and repeated threats of abrogating it without such assent, was only withheld from the abrogation by a compromise treaty which replaced the old. The three periods were as follows :

1. The English colony at Belize (now British Honduras), for a century or more had strength¬ ened their position against the Spaniards by a vague protectorate over the Mosquito Indians, occupying the northeast coast of Nicaragua. They termed their chiefs (

in the year the English seized the town and re¬ named it Greytown. A new English treaty was then made with Nicaragua, recognizing this oc¬ cupation. This roused great excitement in the United States, as equally a blow at the Monroe Doctrine and against American control of the canal; and an over-zealous Nicaragua charge of the fire-eating Polk administration drafted a treaty for United States fortification of the canal, and a guarantee of Nicaragua's sover¬ eignty over all the territory she claimed. This, if we made its provisions active, meant war with England. The pacific Taylor administration then in power framed a milder treaty for a right of way merely, allowing Nicaragua to make similar ones with other nations. This still left Greytown as an apple of discord, and conflicted with the English treaty. Both England and America were on edge with suspicion : the for¬ mer (whom events justified) that American ex¬ pansion would end in a claim to entire control of the canal, which would prejudice British co¬ lonial interests ; the United States, that the Eng¬ lish recognition of a fictitious and swollen sov¬ ereignty by a tribe of savages over the Atlantic end of the canal foreshadowed the total exclu¬ sion of the United States. Each party in fact wanted only to bar the other's monopoly. John M. Clayton (q.v.), Secretary of State, opened negotiations with the English Minister, Sir Henry Bulwer, in January 1850, for a joint control. Meantime Great Britain, to secure the Pacific end, sent an expedition to occupy an island in the Gulf of Fonseca (then sup¬ posed to be the natural western terminal) ; our then Nicaraguan representative, E. G. Squier (q.v.), obtained a temporary cession to us of Tigre Island, the nearest one to Nicaragua, to block this scheme, pending a formal treaty; shortly afterward the British expedition arrived, and seized Tigre ((for debt." Clayton, in great fear lest the popular indignation should force his hand, pushed the treaty through without sufficient insistence on clear definition of the points at issue. It was signed 19 April, and passed the Senate, 42 to 11. Its provisions were that (1) neither power was to have exclusive control over the proposed canal ; (2) neither was to fortify the canal or its vicinity; (3) neither was to occupy, fortify, colonize or have dominion over any part o-f Central America, either directly or through any <(alliance or pro¬ tection, intimacy, connection, or influence" in or over it ; (4) the two powers should mutually guard the safety and neutrality of the canal, and invite all

other nations to do the same ; (5) they should aid and protect any authorized and reasonably operated canal company; (6) the fifth article (to establish a general principle) should extend also to any other means of isth¬ mian transit.

England did not formally withdraw her Mos¬ quito protectorate, but with the neutralization of the canal it ceased to have any object, and was thought sure to drop. Before the ratifica¬ tions were exchanged, however, Lord Palmers¬ ton wrote to Bulwer that the British govern¬ ment would interpret the treaty as not apply¬ ing to Honduras <(or its dependencies." This could include Mosquitia, and it was Clayton's duty to settle that point before proceeding; but in fear of having his statesmanlike . plan wrecked, and confident of no practical evil re¬ sulting, he assumed that it referred only to the

islands, did not press Bulwer for assent to this construction, concealed the three quoted words from the Senate and the attorney-general and the ratifications were exchanged 4 July. Great Britain had won a distinct diplomatic victory; she had secured a pledge from the United States not to occupy any position in Central America, while herself retaining the entire east¬ ern coast of Nicaragua.

2. The ambiguous interpretation of the treaty satisfying neither power, Daniel Webster (q.v.), who succeeded Clayton in 1850, undertook nego¬ tiations with Bulwer to modify it ; but what each side most desired was what the other would not grant — recognition or abandonment of the bogus Mosquito claim to the mouth of the river. In 1851, to clear up the meaning of the word ((dependency,):> Great Britain – occupied Grey- town ; proclaimed afresh the Mosquito protec¬ torate; and in November one of her men-of- war fired on the American vessel Prometheus for refusing to pay port dues at Greytown. England disavowed this, but the question which Clayton had shirked must be settled. About this time the English had started a project to build a ship railroad across Honduras; and to hold the approaches, their government reoccu¬ pied (August 1852) a group of islands off the northern coast, called the Bay Islands, formerly part of Belize. American suspicion once more became hot; and the new Pierce Senate in De¬ cember ordered an investigation into the way the treaty had been kept, called for the papers and for the first time found how they had been tricked — not, however, by the English diplomat, but their own. In great wrath, they denounced the occupation of the islands and the Mosquito protectorate as an infraction at once of the treaty and the Monroe Doctrine, and Marcy, now Secretary of State, instructed Buchanan, Minister to England, to insist on the British evacuation of all English territory in Central America except Belize. Lord Clarendon re¬ plied that Belize was not a part of Central America as understood by the treaty; that the Bay Islands were a part of Belize; that the treaty did not refer to Mosquitia, but only pro¬ hibited further colonization ; and that the Mon¬ roe Doctrine was no part of international law. Just then a quarrel between the Mosquito In¬ dians and the American settlement south of Greytown led to a United States gunboat bom¬ barding and burning the latter. Then William Walker (q.v.), with the aid of a Nicaraguan faction, became for a time the master of the state, ostensibly in the interest of the United States, whose slaveholding government at last received a representative from his; and the British believed that this country intended to retain possession of Nicaragua. On the other hand, Costa Rican action against Nicaragua was laid to English incitement. Walker continued to make mischief till shot in 1860. Dallas, who succeeded Buchanan, drew up with Clarendon a treaty of 7 Oct. 1856, which came to grief on the question of the Bay Islands. In 1857 Buchanan became President, and supported his Secretary of State, Lewis Cass, in making a preferential canal treaty with Nicaragua: to which Great Britain objected as violating the Clayton-Bulwer Treaty, and it was not rati¬ fied. In the fall of that year, Buchanan an¬ nounced his intention of proposing an entire abrogation of the treaty and arranging a new

one on a satisfactory basis. Lord Napier, now British Minister, proposed three alternatives : a mutual abandonment of the treaty and return to the status quo ante ; submission of the question to arbitration; and the awaiting the issue of treaties pending between Great Britain and the Central American states. The last was ac¬ cepted, and the results were satisfactory enough to prevent further trouble for more than 20 years. The Bay Islands were retroceded to Honduras on condition of not parting with them to any other nation ; the Mosquito protectorate was abandoned, and a reservation set up for the Indians by Nicaragua, which was to pay them $5,000 a year or else the rights reverted

to Great Britain; and Greytown became a free port un¬ der Nicaraguan sovereignty. The conditional clauses of the renunciation were not pleasing to the United States, and in fact the money was never paid, partly because Nicaragua expected the United States to back its refusal ; but on the whole the settlement was accepted as a happy ending to the wrangle. Up to 1880, though the growing sentiment in favor of exclusive United States control of the canal sometimes fretted against the treaty, a host of treaties and other international actions were based upon its valid¬ ity, and it was more than once appealed to when British acts (as the erection of Belize into the colony of <(British Hondurasˆ in 1862) were assumed to violate it.

3. The latent feeling in favor of exclusive control was stirred into active life by the French canal at Panama, and the fear that it would give that nation the military control of Central America. In March 1880 President Hayes sent a special message to Congress enun¬ ciating the policy of ((an American canal under American control," expanded later into the claim that the banks of the Nicaragua Canal would be a continuation of the LJnited States shore¬ line. As a result, Congress passed several reso¬ lutions recommending the abrogation of the Clayton-Bulwer Treaty. Garfield in his inaugu¬ ral of 4 March 1881 spoke (though less strongly) in the same strain; the project of a joint European neutralization of the Panama Canal was arousing much American feeling. J. G. Blaine (q.v.), then Secretary of State, opened the attempt at an outright repudiation of the treaty. In a circular to the European powers, 24 June 1881, he declared that the United States would in future allow no foreign interference in the control of any isthmian canal, whose neutrality we would ourselves guarantee ; and that any European action toward sharing in such guaranty would be held equivalent to an alliance against the United States. Lord Granville, for Great Britain, re¬ plied briefly that this matter was already settled by the Clayton-Bulwer Treaty, and his govern¬ ment relied on its observance. Meantime and afterward, 19 and 29 Nov. 1881, Secretary Blaine sent two long arguments of his position to James Russell Lowell, then Minister to Eng¬ land. He did not, however, allege that the treaty was null, or commit the country to an open repudiation ofˆ it, but complained of it as so contradictory of interpretation, and mutually vexations, that it ought to be no longer binding under new circumstances. He also asserted that the joint control would be virtually exer¬ cised by England, from her superior naval strength. In fact, however, the treaty provided

not for a joint control, but a joint refraining from control, and prevention of any other power gaining control. Lord Granville replied by two dispatches of 7 and 14 Jan. 1882, traversing the logical and historical arguments adduced. Garfield's murder led shortly to Blaine's retirement, and F. T. Frelinghuysen's accession to his place. The outcome of further correspondence was, that England would not give up the treaty, and declared that the United States was stopped by its own acts from inter¬ fering with it, and that the Monroe Doctrine was a mere assertion of force, having no stand¬ ing in international law, and had the same place in diplomatic argument as a list of the military or naval forces. Congress and the President (Arthur) were much dissatisfied with this re¬ sult ; and the latter proceeded to draw up a treaty with Nicaragua in flat defiance of the Clayton-Bulwer Treaty. It formed a perpetual alliance between the United States and Nica¬ ragua, whose territorial integrity this country guaranteed; save that the United States was to build a canal and have exclusive control over it, and own in fee simple a strip on each side. The Senate shrunk from this direct repudiation, without stronger cause than yet existed, and refused, 32 to 23, to ratify the new treaty. Mr. Cleveland's accession put a stop to the agita¬ tion for many years, as he disapproved of the new movement, preferring a union of the na¬ tions in a common protection of what was for their common interest. So far from any at¬ tempt being made under his administrations to repudiate the treaty, on two important occa¬ sions it was appealed to in protest against acts of Great Britain. The first revival of the feel¬ ing of 1880-84 in practical form was in Presi¬ dent McKinley's second annual message, De¬ cember 1898, favoring a canal under American control ; and few then doubted that it must be through Nicaragua. The acquisition of new ter¬ ritory and the increase of the navy led many who had been opposed to the movement to change their minds, and favor a canal through which the United States at all times could pass its war vessels, and from which it could exclude its enemies. Others continued to argue that if the country were not superior in naval force it could not maintain that privilege against its enemies, and if it were, could

enforce it against them in any event, and that an exclusive control only made the canal the instant mark of our enemies. But the dominant feeling was strongly against the treaty; congressional resolutions de¬ clared it void ; the press denounced it ; and the sentiment was in favor of President Arthur's old scheme of acquiring a strip of land along the canal outright. The British feeling was by no means strong for the treaty, but it preferred a modification by decent diplomatic forms rather than a violent abrogation. To take the move¬ ment out of the hands of newspapers and dema¬ gogues, the American and British governments hastened to devise a new arrangement which should not throw all old principles to the winds, and a treaty was negotiated by Secretary John Hay on our side and Sir Julian Pauncefote on the other, known as the first Hay-Pauncefote Treaty, signed 5 Feb. 1900, and sent to the Senate. The majority were astonished and in¬ dignant, as the new treaty not only did not abolish the old, but proclaimed it in force and binding; adhered to its principles of neutraliz¬

ing the canal, which were what the growing sentiment wished to reverse ; and was in fact only the Clayton-Bulwer Treaty in new and tighter form, in all the points which had become most obnoxious. The ((Davis Amendments, }) pro¬ posed in committee, practically nullified the neutrality feature, but neither it nor the main treaty had been acted upon when the Senate adjourned in June. The period for ratification was extended to 5 March 1901 ; but the plat¬ forms of both parties insisted on exclusive American control. The amendments added to it in the following session of Congress made it unacceptable to Great Britain, which refused to ratify it, and it expired by its own limitation. The two statesmen, however, drew up another, less satisfactory in some respects than the old, and which specifically abrogated the Clayton- Bulwer Treaty, but succeeded in saving its general principles of neutralization (see Hay- Pauncefote Treaty) ; and it was ratified 16 Dec. 1901. By the irony of fate, this question of the control of a Nicaragua canal, so burning for half a century, and menacing war more than once, seems to have been dealing with a con¬ tingency never to happen, as the entire subject- matter was set aside in favor of the Panama Canal (q.v.). Consult Travis, (The History of the Clayton-Bulwer Treaty in Vol. Ill of Publications of the Michigan Political Science Association* (Ann Arbor, Mich., 1900).*

CLAYTONIA, a genus of plants of the purslane family (Portulacacece) , so named in honor of the American botanist, John Clayton (q.v.). It is among the earliest and most beautiful of the American wild-flowers, these two qualities giving it its common name of spring beauty. There are at least 25 species, most of them natives of North America. The plants grow in damp woods and wet places, and are found at all elevations up to 5,000 feet, in the region of Nova Scotia, south to the Gulf and westward to the Pacific Coast. The plants are low succulent herbs, the delicate rose- colored flowers striped with pink veins, and the leaves linear or obiong. C. perfoliata, Spanish lettuce, common from British Columbia to Mexico, is used as an anti-scorbutic in house¬ hold medicine. C. tuborasa, a native of Siberia, supplies a root that is eaten by the natives.

CLE ELUM, Wash., city in Kittitas County, 100 miles southeast of Seattle, on the Chicago, Milwaukee and Saint Paul and the Northern Pacific railroads, and on the Yakima River. It is a coal-mining and agricultural centre and has dairying, fruit-growing and lumber indus¬ tries. It contains a hospital and owns its water¬ works. The city was founded in 1887 and was incorporated in 1905. Pop. 2,749.

CLEANTHES, kle-an'thez, Greek Stoic philosopher of the 3d century b.c. He was a native of Assos, in Lydia, but, visiting Athens, became a zealous disciple of Zeno. In order to attend on that master in the day, he was ac¬ customed to labor by night. His mental and his bodily strength were immense, and despite all obstacles, he studied so successfully as to become Zeno's successor, 263 b.c. Of his writ¬ ings only some fragments remain, among which is his noble (Hymn to Zeus) preserved by Stobseus (ed., 1, 2. 12). The fragments have been collected by Wachsmuth, (Commentatio de Zenone et Cleanthe) (1874) ; and Pearson

(Cambridge 1891). Consult Ritter and Preller, (Historia Philosophise Grsec?e) (Gotha 1888) ; Zeller, {The Stoics, Epicureans and Sceptics > (trans. by Reichel, London 1892) ; Adam, (The Vitality of Platonism > (containing the trans¬ lation of the (Hymn to Zeus, Cambridge*

1911).

CLEAR, Cape. See Cape Clear.

CLEAR LAKE, a body of water lying in a picturesque region in Lake County, Cal., 110 miles north of San Francisco. It is 25 miles long, and from 2 to 10 miles wide. The out¬ let is Cache Creek.

CLEAR LAKE, Iowa, a city in Cerro Gordo County on the lake of the same name. The Chicago, Milwaukee and Saint Paul and the Mason City and Clear Lake railroads con¬ nect with the town. The principal industry of the city is ice transportation. There are three banks whose combined resources amount to $1,- 100,000. There are schools, a city hall and a Carnegie library. It is popular as a summer resort. Pop. (1920) 2,804.

CLEARANCE OF VESSELS, the ex¬ amination of them by the proper custom-house officers, and the giving of a certificate that the regulations have been duly complied with. Ves-‘ sels are said to clear inward or outward accord¬ ing as they arrive or depart.

CLEARCHUS, kle-ar’kus, Spartan general who commanded about 13,000 Greeks in the army of Cyrus the Younger when that Persian prince tried to wrest the throne of Persia from his brother, Artaxerxes II. When Cyrus was defeated at Cunaxa (401 b.c.), Clearchus and his chief officers were seized by treachery and put to death. Consult Xenophon, (Anabasis } ; and the account in Smith, dictionary of Greek and Roman Biography and Mythology (Bos¬ ton 1849).*

CLEARFIELD, Pa., the county-seat of Clearfield County, on the Susquehanna River (west branch), and on the Pennsylvania Rail¬ road. It is situated in the west-central part of the State, and is surrounded by a rich agricul¬ tural region, underlying which are deposits of coal, fire-clay and limestone. It has several novelty worKS, lumber mills, flouring mills, planing mills, brickyards and a steel plant, and has manufactories of sewer pipe, clay-working machinery, refrigerators, cut glass, silk velvet, knitting machines, wagons, swings, foundry products, tanned leather, etc. Clearfield was settled in 1805, and in 1840 was incorporated as a borough. Pop. (1920) 8,529.

CLEARING HOUSE, The. See Banks and Banking — The Clearing House (Article

7).

CLEARING-NUT, a small tree (Strychnos potatorum) of the same genus as the mix vomica, the seeds of which are used in India for settling or clearing muddy water. The seeds are rubbed upon the inside of the water-vessel, and within a few minutes after the water has been introduced it becomes clear, the sediment and non-soluble ingredients having sunk to the bot¬ tom. The wood is very hard and heavy, and is used for cabinet-making and house-building.

CLEARSTORY. See Clerestory.

CLEARWING, a. small moth with trans¬ parent wings, the caterpillars of which are the

borers that destroy peach-trees and fruit- bushes. Although common in America they are mostly importations from Europe or Asia.

CLEARY, James Vincent, Canadian clergy¬ man : b. Waterford, Ireland, 18 Sept. 1828. He was educated at Royal College, Maynooth, and ordained to the Roman Catholic priesthood in 1851. He became president of Saint John’s College, Waterford, in 1873, and in 1880 was ap¬ pointed bishop of Kingston, Canada, the see being made an archbishopric in 1889. In 1896 he reopened the Theological Seminary of Regiopolis College in Kingston.

CLEAVAGE. Many crystallized substances when sharply struck or subjected to pressure or heat or other disturbing forces split into fragments bounded by smooth plane surfaces which are parallel to crystal faces of the sub¬ stance.

If the separation can be obtained with equal ease in any part of any crystal and if there is only a mechanical limit to the thinness of the resulting plates this tendency to break parallel to crystal faces is called cleavage. If, however, the separation can be obtained only at irregular intervals, and only in some crystals, the character is called parting, and has a dif¬ ferent origin.

Cleavage occurs with equal ease parallel to all corresponding crystal faces, thus, for in¬ stance, a crystal of galena will cleave equally well parallel to all the faces of the cube. Cleavage is due to differences in cohesion, and conforms strictly to the theory of a regular in¬ ternal structure. (See Crystal). The breaking in one direction more easily than another im¬ plies differences of cohesion in different direc¬ tions, and the break is a plane because all lines perpendicular to it are directions of equal minimum cohesion, and finally the cleavage with equal ease parallel to corresponding faces implies equal cohesion at right angles to all of these.

A structure model shows not only that among the different sets of parallel molecular planes those parallel to the common crystal faces contain the largest number of molecules but also that the consecutive planes of such a set are furthest apart from those of other sets, and being further apart there is weaker cohesion.

The ease of cleavage is not a measure of the absolute strength of cohesion but a proof of marked differences in cohesion in different directions. Diamond and fluorite illustrate this. The property is shown equally well by the polyhedral and the faceless crystal independent of the external form.

Cleavage is in general limited to directions parallel to symmetry planes or perpendicular to axes of symmetry or parallel to the faces of prominent crystal forms. It may occur in the same substance parallel to the faces of two or more crystal forms ; for instance, gypsum splits easily into plates parallel to the faces of one form and these plates again break parallel to the faces of two others.

Directions of cleavage are sometimes indi¬ cated by a pearly lustre, due to repeated light reflections from cleavage rifts, or distinct cracks may occur. The absence of these is not proof that cleavage cannot be obtained, but only that the separation has not been started.

Cleavage is usually obtained by resting the crystal on a firm support, placing the edge of a knife or small chisel parallel to the supposed direction of cleavage and striking a quick, sharp blow upon it with a hammer. In some instances the cleavage is only obtainable by such methods as heating and suddenly plunging into cold water.

Cleavage is a valuable aid in classification and identification, the number of directions, the relative ease and above all the characteristic angles leading to rapid and safe conclusions.

CLEAVAGE, Rock. See Rock Cleavage.

CLEAVELAND, Moses, American pi¬ oneer: b. Canterbury, Conn., 29 Jan. 1754; d. there, 16 Nov. 1806. He was graduated at Yale in 1777, and began the practice of law in his home town, being several times elected to the legislature, and in 1796 commissioned a brigadier-general of militia. He was a leading shareholder in the Con¬ necticut Land Company which had bought for $1,200,000 the land in northeastern Ohio re¬ served to Connecticut by Congress, and subse¬ quently known as the Western Reserve. In 1796 Cleaveland went out with a party of 50 to survey the tract and arrange for its settle¬ ment by white emigrants. After successfully negotiating with the Indians who claimed cer¬ tain rights to the region, the party arrived at the present site of Cleveland, 22 July 1796. Cleaveland immediately chose it as a place for his settlement, surveyed it into town lots, and the members of the party named it Cleaveland in his honor. In 1830, when the Cleveland Ad¬ vertiser was founded, the headline was found too long for the form ; the editor therefore dropped the letter ((a® in the first syllable of the city's name, and the new spelling of Cleve¬ land was soon generally adopted.

CLEAVELAND, Parker, American min¬ eralogist: b. Rowley, Mass., 15 Jan. 1780; d. Brunswick, Me., 15 Oct. 1858. He was graduated at Harvard 1799, and was appointed tutor there 1803. In 1805 he was chosen first professor of mathematics and natural philosophy at Bowdoin College. Applying himself with energy to the new sciences of chemistry and mineralogy, his studies resulted in a treatise on (Mineralogy and Geology > (1816; 2d ed., 1822; 3d ed., 1856), which brought him

the offer of the chair of mineralogy in Harvard, which he declined, as he likewise did the presidency of Bowdoin in 1839. He stood first in his subject in this country, was a popular and lucid lecturer, an enthusiastic and inspiring teacher. When the medical school was founded at Bowdoin in 1820 he was made its dean and librarian.

CLEAVERS, one of the 70 common names applied to certain species of bedstraw (q.v.), of the madder family, occurring throughout the whole United States ; troublesome weeds, prob¬ ably naturalized from Europe. Other names by which they are known are goose-grass, catch- weed, beggar-lice, burhead, clover-grass, cling- rascal, scratch-grass, wild hedge-burs, stick-a- back or stickle-back, gosling-grass, gosling- weed, turkey-grass, pigtail, grip or grip-grass, loveman and sweethearts. They are as com¬ mon in Europe as in America, and seem not to be much used except in Sweden, where for many years their prickly stems have been used

as strainers for milk. They have sometimes been used for a yellow stain to color cloth or cheese. Cleavers was formerly of repute in household medicine as a diuretic, but is now so used only in the most remote settlements.

CLEBSCH, klapsh, Rudolf Friedrich Al¬ fred, German mathematician : b. Konigsberg, Prussia, 1833; d. Gottingen, 7 Nov. 1872. He was educated at Konigsberg, where his masters included Hesse, Richelot and F. Neumann. From 1858 to 1863 he was professor of theoreti¬ cal mechanics at the Karlsruhe Polytechnic School. In 1863 he became professor of mathe¬ matics at Giessen and at Gottingen in 1868. With Neumann he founded in 1868 the Mathe- matische Annalen. He is prominent as a geometrist because of his contributions to the theory of invariants and his use of the notion of the deficiency of a curve and his applica¬ tions of the theory of elliptic and Abelian func¬ tions to geometry. He wrote much also on the general theory of algebraic curves and took a prominent part in solving the generalized form of Malfatti's problem, and the Pfafhan problem of differential equations. For an estimate of Clebsch consult Mathematische Annalen (Vol. VII) ; Lindemann edited his (Vorlesungen uber Geometrie) (Leipzig, Vol. I, 1876; Vol. II, 1891; new ed., 1906).

CLEBURNE, Patrick Ronayne, American soldier: b. Cork County, Ireland, 17 March 1828; d. Franklin, Tenn., 30 Nov. 1864. While a stu¬ dent at Trinity College, Dublin, he ran away and enlisted in the English army, in which he served for three years. He came to America, settled in Helena, Ark., studied law and prac¬ tised successfully until the Civil War. Joining the Confederate army as a private, he rose rapidly to a brigadier-generalship, commanded a brigade at Shiloh, was wounded at Perryville and commissioned major-general, December 1862. He distinguished himself greatly in many fierce engagements, notably at Murfreesboro, Chickamauga, Ringgold Gap and Missionary Ridge, receiving the thanks of the Confederate Congress. He was killed at the battle of Frank¬ lin, after carrying two lines of Union works, and shortly after saying to General Hood : (XVIII, Richmond 1889).

CLEBURNE, Tex., the county-seat of Johnson County, on the Trinity and Brazos Valley, the Missouri, Kansas and Texas and the Gulf, Colorado and Santa Fe railroads. It carries on a large trade in grain, live stock, cotton, wool, hides and produce, and has cotton compresses, cottonseed-oil mills, flour mills, foundry and machine shops, and shops of the Gulf, Colorado and Santa Fe Railroad. The courthouse, Carnegie library and high school are notable features. There are municipal waterworks. Pop. (1920) 12,820, being almost four times that of 1890, when it had a popula¬ tion of 3,278.

CLECKHEATON, klek-e'-tun, England, town in the county of York, West Riding, situ¬ ated on a declivity in the Spen Valley, five and one-half miles southeast of Bradford. It is well built, has a technical institution, handsome premises belonging to the co-operative associa¬ tion, a fine town-hall ; large trade in textiles, card wire manufacturing and machinery. Pop.

12,866.

CLEEF, klaf. 1. Joost (yoost -) Van, called Zotte (mad) Cleef : b. Antwerp about 1510; d. about 1559. He was one of the most celebrated painters of his time, and in regard to beauty of coloring may challenge comparison with the most distinguished Italian masters. His ex¬ cessive vanity and

eccentricity caused him to be described as mad. A portrait of him and his wife are to be found in the gallery of Windsor. Althrop possesses his portrait. 2. Jan (yan) Van, a painter: b. Venloo, Guelderland, 1646; d. Ghent 1716. He was a pupil of De Cayer, and belongs to the Flemish school, of which he is one of the most eminent masters. His works, which resemble those of Poussin, are particularly remarkable for beauty of de¬ sign and coloring. The churches of Ghent are adorned with many of his paintings, in which the heads of children and the countenances of women are very beautiful.

CLEF (Fr. for key), a character placed at the beginning of a staff to show the elevation of that particular staff in the general claviary or system, and to determine the names of the notes according to their positions on the staff. See Musical Elements and Terms.

CLEFT PALATE. Cleft palate is the re¬ sult of failure of union, in embryo, of the ele¬ ments of which the palate is composed. Cleft palate, including the velum, uvula, hard palate and alveolar process, with harelip, either single or double, invariably is congenital.

Defects of the palate resulting from trauma or disease do not occur as frequently as con¬ genital defects.

Every developing child, prior to the second month of gestation, has a cleft palate. A child who has a complete congenital cleft palate, has in the palate at birth, with rare exceptions, the normal amount of tissue, although it is not united in the middle line. It is cleft. Nature does not often fail to develop the necessary tissues to form a normal palate, but sometimes does fail to bring them into apposition and unite them. Cleft palate is not, therefore, with few exceptions, due to arrested development nor absence of palatal tissues, but, as the child's age advances, the arch spreads and the muscles, for want of proper activity due to the separa¬ tion, fail to develop as the other muscles do that are normally employed.

There are, anatomically, 15 forms of cleft palate, some but slightly and others widely dif¬ fering in deformity and treatment.

The simplest form is a cleft of the azygos uvula only. The most complicated form pre¬ sents a complete cleft of the soft and hard palate; the vomer is separated from the hard palate; the premaxillary bones are not only separated from the hard palate, but often pro¬ trude far beyond the tip of the nose, with the further complication of double harelip which sometimes, though rarely, extends to the eyes.

CLEFT PALATE

The nostrils are abnormally broad and flat. In cases of single harelip and cleft palate, the vomer is nearly always attached to the long side of the palate.

There are six centres of ossification in form¬ ing a palate — two premaxillary, two maxillary and two palatal. These six bone centres carry with them other tissues, the soft parts consist¬ ing of periosteum, mucous membrane, connec¬ tive tissue, etc. All these centres are assembled during the formation of the palate, like a piece of machinery. If nothing interferes with the bones meeting and uniting, the palate will be normal. If, however, from any cause the bones fail to unite, the child will have a cleft palate, accompanied very frequently by harelip.

Cleft palate seriously interferes with degluti¬ tion in a young infant. The child, consequently, is poorly nourished. The open palate makes it difficult for the child to draw its milk, and what little it may get often regurgitates through the nose. A cleft palate nipple used with the bottle, or artificial velum which is employed in conjunction with the breast, will enable the child to swallow its food without difficulty. The English author, Lawson Tait, has stated that the mortality of children who have cleft palate is so great by reason of their failure to secure proper nutrition, that an early operation is desirable.

Etiology of Cleft Palate. — The literature

of this subject is voluminous and largely con¬ jectural. Among the causes assigned are heredity, maternal pre-natal impressions, de¬ fective nutrition during the early months of gestation,

intervening mucosa in tooth enamel formation, uterine inflammation, venereal diseases and pressure. These causes may be divided into two classes: Predisposing and Exciting.

Predisposing Causes of Cleft Palate.

Heredity. — The factor of heredity is so well recognized that reference to it here might seem unnecessary. In many cases the physical char¬ acteristics of the parents, normal or abnormal, may be observed in their children. The shape of the head, nose, eyes and other features often resemble those of a parent. The parents may have normal palates while a grandparent or even a great grandparent (and, no doubt, pro¬ genitors further back of whose physical con¬ ditions the parents know nothing), having had the defect, transmitted it to grandchildren or to generations even more distant.

It is thus the law of atavism, or reversion to type, asserts itself. The statement often made by parents, that no ancestor ever had a cleft palate or harelip, applies usually only to their grandparents whom they have known. As to those further back, as a rule, they know nothing.

Maternal Pre-natal Impressions. — Maternal pre-natal impressions are firmly believed in by many mothers, but proof that cleft palate has been due to such impressions has never been established. At the ninth week of embryonal life, or about the close of the second month, the fissures about the orbit and bones of the palate have been effaced and the bones are united. The fright or shock which the mother sustained, to which she ascribes her child's defect, as a rule, occurred subsequent to the time when nature completes the union of the

CLEFT PALATE

1 Cleft extending through the uvula and forward to the posterior border of the horizontal plates of the palate bones

2 Cleft of entire soft palate and the hard palate nearly as far forward as the original line of union between the palatal plates of the maxillary bones and the premaxillary bones

3 Complete single cleft of the entire soft and hard palate, usually accompanied by single harelip. The maxillary bone is separated from the premaxillary bone

4 Tripartite cleft, extending through soft and hard palate, separating premaxillary bones from the maxillary bones. Often complicated with double harelip

Forms T and should not be operated until between 12 and 18 months, just before speech is attempted; forms 3 and 4 should be operated in early infancy, prior to the sixth month. The bones should be approximated before the harelip is

operated

various bony elements which form the palate. After the bones are united no shock, however severe, could separate them.

Defective Nutrition. — Defective nutrition or general debility of the mother during the early months of gestation, from any cause, may de¬ lay union of the palatal plates. Nature does not, as a rule, fail to develop the necessary bone and soft parts to form a normal palate, but it does fail to bring the parts in apposifion and unite them.

Mothers who have suffered from a severe illness during the first 10 weeks of gestation may be so poorly nourished as to bear a child with cleft palate or other deformities. A preg¬ nancy shortly following the birth of a child often draws heavily upon a mother's vitality, especially if she is not strong, and the enfeebled condition may be followed by deformity of her child.

Intervening Mucosa in Tooth Formation and Supernumerary Dental Rudiments as Factors. — Professor Warnekros holds that cleft palate is always due to the rudiments of supernumerary teeth. Among the many causes that have been assigned for failure of union of the palate within the first two months of embryonal life, the one advanced by the late Dr. C. F. W. Bodecker is, I believe, most to be relied upon. It is based upon anatomical and physiological grounds. He believed that the membrane from which supernumerary teeth, or any other teeth, were developed prevented union of the bone.

We know that in the formation of the teeth, the mucosa dips deep down into the submucous tissue and forms the epithelial lamina, which contracts into the epithelial cord at the distal end of which the enamel organ is formed. It is too well known to admit of discussion that a layer of epithelium, under certain conditions, will form an obstruction to union of the tissues between which it intervenes.

It seems that Bodecker's conclusion, namely, that this epithelial cord delays union of the parts forming the maxillae; and the force ex¬ erted by the tongue and mandible from the beginning of the third month until birth and several months later, would account for the broad separation of the maxillary bones and the creation of the cleft.

Venereal Disease and Uterine Inflammation. — The influence of venereal disease on the de¬ veloping child unquestionably causes many physical defects. Likewise, inflammation of the uterus might easily affect the development of the palate as well as other parts.

Exciting Causes of Cleft Palate.

Pressure. — In early intra-uterine life, be¬ tween the second and third months, the tongue is much thicker than at birth. It occupies a great deal of space between the developing bony plates of the palate, and may interfere with the bones meeting and uniting.

At the third month the muscles of mastica¬ tion become active and the mandible brings pressure on the soft, flexible un-united bones of the palate and, acting as a wedge, mechani¬ cally forces them further apart, thus widening the breach.

If an examination be madeof a young child with a complete cleft palate, it will be noticed that the upper alveolar ridge is outside of the vol. 7 — 6

lower ridge. The uppeT arch is, therefore, spread by the wedge formed by the lower jaw.

The normal position of the foetus in utero is such that the weight of the entire foetal body may be

readily thrown upon the vertex and the pressure thus exerted would tend to force the mandible into contact with the sternal region and compress it against the forming hard palate. The flexed position of the head, with the symphysis of the mandible resting on the sternum, may contribute to some extent to the force which is exerted by the mandible. It is generally accepted that the lower jaw acts as a matrix or mold upon which the upper jaw is formed.

Treatment of Cleft Palate. — The object to be attained in operating on cleft palate and harelip is not only to overcome the visible de¬ formity, but to ensure, as nearly as possible, correct phonation.

The importance of the palate as an organ of speech is often overlooked, and the follow¬ ing quotation from the late Dr. G. Hudson- Makuen, noted author on voice-production, shows the necessity of a normal palate for perfect phonation :

" There is a popular notion that the tongue is the chief organ of speech and that the sense of taste is located in the palate. Both the palate and the tongue are important organs of speech, but the former is more so, for not only is it essential in the enunciation of nearly all the elements of speech, but, owing to its direct attachment to the larynx, it is also an important factor in the production of voice. The vowel sounds may be articulated when the palate is defective, but their resonance is so much impaired that they are scarcely recognizable, and their pitch cannot be changed with any degree of accuracy. It is in the articulation of consonant sounds, however, that the palate is especially essential."

When to Operate. — The time to treat a cleft palate is as early after birth as possible, preferably within the first month, when the separated bones of a cleft palate should be closed.

Palate Surgery is Bone Surgery. — A palate can never be normal unless the bones are united. Bone surgery, therefore, is necessary when the bones of the hard palate and the alveolar process are separated.

Steps in Operating. — Three steps are called for: (1) The bones should be united and the nose placed in its normal position. (2) The lip should be closed, usually about four weeks after the bone operation. (3) Finally, the soft palate should be closed so that the patient, when becoming old enough to speak, will speak dis¬ tinctly. This is done about the 14th month.

The cleft should be closed before ossification of the bones is far advanced, while they may be bent and moved without fracture. Bone at birth is about one-half organic matter, hence it is not difficult to bend the bones and close the cleft a few days after birth. Protruding pre-maxillary bones should never be removed, but should be fixed in the arch and held firmly in place until they unite with the maxillary bones and complete the arch.

The highest degree of success in the treat¬ ment of cleft palate is obtained by operating in early infancy, at which time the operation is more safely performed, but successful operation may be made at any time in life. If the patient has a harelip only, it may be operated upon at any time.

Truman W. Brophy, M.D.

CLEISHBOTHAM, klesh'both-am, Jede- diah, a character in Scott's (Tales of My Land¬ lordˆ who is represented to have collected the stories, of which Peter Pattieson is the imag¬ inary writer.

CLEISTHENES, klls'the-nez, or CLIS- THENES, an Athenian politician who flour¬ ished about 500 b.c. He was the grandson of Cleisthenes of Sicyon, and the son of Megacles, and at the end of the rule of the Pisistratidae (510 b.c.) was a leader of their enemies. When, with the assistance of the Delphian oracle and the Spartans, Hippias was banished from Athens, Cleisthenes, in order to secure his as¬ cendancy over his rival Isagoras, chose to de¬ fend the cause of the people and succeeded in introducing some important changes in the ancient constitution of Athens ; among others, the division of Attica into 10 instead of 4 tribes, each consisting of several demi, under de- rnarchs ; the increase of the number of the senators from 400 to 500, 50 of each tribe; and, as some say, the law

of ostracism (q.v.), so re¬ markable in the history of that state. Cleis¬ thenes, being suspected of the desire of tyran¬ nical power, was himself banished, but after¬ ward returned and triumphed over his enemies.

CLEISTOGAMOUS FLOWERS (from

Gk. kIelctoc, closed, and yafJ-og, marriage). In most of our familiar plants the flower is open to the air, so that there is a possibility of cross-fertilization. Indeed, in many plants, such as the primrose, the gentian, etc., self-pollination is rendered difficult or impossible by the struc¬ ture and development of the flower. In other plants, however, among which are the dog- violet, Impatiens fulva, Impatiens noli-me- tangere, etc., the reproduction of the plant is carried on in part, at least, by flowers that never open, and are hence of necessity self- pollinated. These flowers are called cleistoga- mous. They are more or less abortive : their petals are absent or stunted and colorless, and they lack the nectar and scent that attract in¬ sects in other blossoms.

No plants are known which possess only cleistogamous flowers. For example, in the dog-violet we find in addition to the fertile cleistogamous flowers the showy but usually sterile blossoms which alone are known to the casual observer. The sterility of the ordinary flowers of the dog-violet is due, not to any in¬ trinsic defect of the pistil or the germs in¬ cluded therein, but to the fact that the anthers often contain no pollen, and still more to the fact that they are not frequented by bees. When artificially fertilized the open flowers yield as much seed as the cleistogamous ones.

A very interesting fact about some cleis¬ togamous flowers, such as that of the dog- violet (Viola canina) is that the pollen-grains give rise to their tubes in situ. These must find their way from the anthers across the cavity of the flower to the stigma before they can fertilize the ovules. The mechanism of this peculiar process is not at all understood.

According to Darwin, the cleistogamous flowers are not merely ordinary flowers in a state of arrested development, as the existence in certain cases of a very complete series of transitional forms between the cleistogamous and the perfect flowers might seem to show, but have undergone modifications which fit

them especially for self-fertilization. They form a kind of insurance to the plant against interruption of the more customary modes of fertilization, and this may have caused their evolution in plants which already had a ten¬ dency to mature some of their flowers before they were completely open. Consult Darwin, C., (Forms of Flowers (London 1877).*

CLELIE. In < Clelie Madeleine de Scudery undertook to do for Parisian bourgeois society what she had done for the aristocratic precieux in (Le Grand Cyrus.* The first volume of (Clelie* appeared in 1654, the tenth and last in 1660. Together they count over 8,000 pages. The scene opens in ancient Carthage, soon shifts to Capua and thence to Rome, but with¬ out the least effort at historic detail. The heroine is the daughter of a Roman exiled by Tarquin, her lover a son of Lars Porsena. Much is said of Brutus, Tarquin, Lucretia, the last masquerading as a past-mistress in pre- cieuse coquetry, whose death leaves the reader as cold as it apparently did the author. The interest of (Clelie* is not in the story and never was, but in the 73 characters, each painted from life, each picturing some wealthy bour¬ geois with aspirations to culture, some pre- cieuse ridicule or perhaps some Madame Scar- ron, with a few from higher spheres, among whom may be named Louis XIV (Alcandre), his finance minister, Fouquet (Cleomine) and Mile, de Longueville (Clelie). What did most to make (Clelie * a sensation in its day, stamped it as a manual of gallantry, and has preserved its memory till ours, was its (*

Benjamin W. Wells.

CLEMANGES, kla-manzh, Mathieu Nicolas, French theologian: b. Clemanges 1360; d. about 1430. He studied at Paris under Pierre d'Aille and Gerson. In 1391 he was pro¬ fessor of theology at the University of Paris, and in 1393 became rector there. In the hope of helping to heal the Papal Schism of the time, he accepted the position of private secretary to Benedict XIII, the anti-pope at Avignon; but when Benedict excommunicated the French king in 1407 Clemanges resigned his office and lived in voluntary exile with the Carthusian monks. Here he devoted himself to his studies and writing, endeavoring to correct abuses in the Church, and seeking to place the study of theology upon a wider basis : his writings had much influence on the deliberations of the Council of

Constance. In 1425 he went back to Paris where he continued to lecture at the Col¬ lege of Navarre until his death. His works were collected and published by Lydius (1613). Con¬ sult Muntz, (Nicolas de Clemanges, sa vie et ses ecrits* (Strassburg 1846) ; and Creighton, (A History of the Papacy) (London 1882).

CLEMATIS, a genus of climbing vines or ascending herbs, of the crowfoot family (Ra – mmculacece) . It numbers upward of 150 spe-

cies, and is widely distributed throughout the temperate regions of the world. In the United States between 20 and 25 species are recognized. The best known is the virgin's- bower (C. virginiana) , a vine that climbs over shrubs and along fences. It is common from Nova Scotia to Georgia, and west to Kansas and Manitoba. Its sprays of white flowers make a showy appearance from July through September. Other species are found west of the Mississippi River, extending to the Pacific Coast, and south to the Gulf of Mexico. The only English species (C. vitalba) is called traveler's joy. Many species, chiefly of Asiatic origin, are commonly cultivated because of their showy flowers.

CLEMENCEAU, Georges Benjamin Eu¬ gene, e-zhan kla-moh-so, French editor and statesman: b. Chateau de l'Aubraie, Feole, Ven¬ dee, 28 Sept. 1841. He studied medicine at Paris, and began the practice of his profession there.

Before he was 20 Georges was thrown into prison for shouting ((Vive la Republique !® on the streets of Paris, in the midst of the celebra¬ tion of one of the Imperial anniversaries. He served his term in jail, and then, practically an exile, he came to America.

Between 1865 and 1869 he lived in the United States, chiefly in New York and in Stamford, Conn. Before he left France he had made the acquaintance of William E. Marshall, the artist who made the famous engraving of Lincoln, and it was as his friend, and indeed upon his invitation, that the young physician came to New York. During his stay there Clemenceau studied American ideas, conditions of living, government and language. He had had an academic knowledge of English when he left France; it soon became idiomatic. He traveled, too, visiting the Middle West, and going as far south as Richmond. But he could not travel further in the South, he said, be¬ cause the condition of that section of the coun¬ try, just defeated in the Civil War, was too sad for him to contemplate. He returned to New York, was a constant reader at the Astor Library, and made a number of good friends, especially Eugene Bushe, a lawyer, who was his neighbor on 12th Street. When Clemenceau failed to build up a medical practice and the money that he got from France proved insuf¬ ficient, Bushe introduced him to the mistress of a girls' boarding school, a Miss Aiken, who em¬ ployed him as teacher of the French language and literature in her "young ladies' seminary*® at Stamford.

There Clemenceau translated the works of John Stuart Mill into French, was an inde¬ fatigable student of American politics and be¬ came known as a serious scholar. Early in 1870, he left the school where he had taught for two and a half years, and returned to France.

Throughout the Franco-Prussian War and the siege of Paris Clemenceau was mayor of the district of Montmartre. One of his duties during the siege was to see that 150,000 men were properly fed. Another was to look after thousands of refugees. He was also respon¬ sible for large amounts of money, and they tell a story that, foreseeing the accusations against any one's honesty that might be made in those trying days, he took the precaution of engaging an expert accountant to ((check up® and make

public his use of every sou of public funds. At the end of the war he did all he could to gain (

His political power was increased by his journalistic activities. In 1880 he founded La Justice, the great daily paper, of which he be¬ came chief editor. He destroyed the Fourton- Broglie administration. He overthrew Boulan¬ ger. He caused the fall of Jules Grevy and of Jules Ferry. He wrecked the activities and position of M. Freycinet at least three times. Yet his own policy was a consistent radical Republicanism, clear and practical ; he stood for the realization of all that the Revolution had hoped and dreamed. He was opposed, we may note, to the alliance with Russia,

determined that his country should not be joined in so close a friendship with a despotic power. He un¬ ceasingly upheld the complete separation of Church and state. He urged constantly the development of French resources to the utmost. And those who have watched his career closely point out the growth of the man's political philosophy from his early reckless radicalism to the saner advocacy of a just and free democracy.

But in 1893 he fell. He fell with a com¬ pleteness that was universally believed to be hopeless. He was disgraced, finished. He was accused of complicity in disloyalties and dis¬ honesties in connection with the Panama Canal scandals. He met every charge against his integrity. The attack on him in the Chamber utterly broke down. But his own constituents turned against him. He was literally put out of politics. For nine years he had no connection with the government of France. But two years after his overthrow a very different Clemenceau made his appearance in the world of French letters. The wily politician, the reckless duelist, the insolent hounder of his foes, was gone. In his place was a philosopher and litterateur, a man who wrote exquisite prose, a lover of nature, a friend of humankind. Among his writings during that period were a book on the philosophy of nature, (Great Pan) ; a novel of social life, (The Strongest ; a play of which the scene was laid at the court of China, and some notable criticisms. But he returned in a few years to journalism. His old paper had gone down in the wreck of its chief's career. But when the Dreyfus affair suddenly burst upon France, a new journal, L'Aurore, edited by M. Clemenceau, made its appearance. It was devoted to the proving of Dreyfus's inno¬ cence. Clemenceau was back in the active

world of French affairs with a vengeance. With his tireless defense of Dreyfus, he be¬ came, as some one has said, "the sentient con¬ science of France in print.® It was in Clemen¬ ceau's paper that Zola published his famous 'J'accuseP Month after month Clemenceau wrote articles of which Sydney Brooks states : ((They remain, I suppose, the most brilliant mas¬ terpieces of polemics that French literature has produced since Pascal's famous 'Provincial Letters. } At the time of their appearance their effect was prodigious. No publicist did more, very few did as much, to guide French opinion through the mazes of that exhausting crisis.® And the political world that Clemen¬ ceau thus dramatically re-entered, he has never left. In 1902 the same constituency that had forsaken him in his hour of trial returned him triumphantly to the Senate. In the spring of 1906 he was appointed to public office as Min¬ ister of the Interior. In November of that year, upon the retirement of M. Sarrien, he became Premier. While he was in office the most important thing that happened was the great miners' strike, which the Socialists organ¬ ized. Knowing his revolutionary tendencies, the miners expected his sympathy, especially when he went personally to investigate their complaints. But with the first outbreak of violence Clemenceau became a ruler of iron. The soldiers were called out and the riots were put down. Clemenceau. found himself attacked by the Socialists and involved in a personal controversy with Jaures. But when he asked the latter whether he, in a position of authority, would have acted differently, the Socialist leader was unable to reply. In 1909 his old enemy, Delcasse, rose up suddenly and over¬ threw his Ministry. A discussion over naval affairs sprang up almost over-night. There were scandals, investigations, controversies. In a verbal duel with Delcasse — in the early years of Clemenceau's activity his duels were fre¬ quently not verbal — the Premier, to quote a newspaper dispatch, "seemed, for the first time in his Parliamentary career, to lose his head.® Certainly he lost his temper, declared that Delcasse had <(humiliated France,® and stalked out of the room. The President shortly after offered the Premiership to M. Leon Bourgeois.

But Clemenceau's power was not broken. He kept his place in the Senate. In 1912 he overthrew Caillaux's Ministry. In 1913 he wrecked Briand's Cabinet on the issue of pro¬ portional representation. He started a new paper, L'Homme Libre. When the war began in 1914 he entered the Viviani Ministry. For some time he was chairman of the Parliamen¬ tary Committee on the Army.

Clemenceau's L'Homme Libre (The Free Man) was suspended by the government in September 1914, but he at once issued a new journal called L'Homme Enchaine (The Man in Chains), which was temporarily suppressed several times. He severely criticised the con¬ duct of the war and his attacks on ((Boloism® in the autumn of 1917 caused the fall of the Painleve Ministry in November. Clemenceau was called to the premiership and immediately directed all the national resources to the

ener¬ getic prosecution of the war. He overcame all opposition with a ruthless hand, meriting the soubriquet of (

On 18 Jan. 1919, M. Clemenceau was unani¬ mously made Permanent Chairman of the Peace Conference at Paris, and he took a prominent part in the deliberations of that body. In Janu¬ ary 1920, having relinquished the premiership, he became a candidate for President of France. However, at the election of 17 Jan. 1920 he was defeated by Paul Deschanel. In 1920-21 M. Clemenceau made a tour of the East. He has written plays, novels, philosophic essays and sociological studies, including 'De la generation des elements anatomiques) ; 'La melee sociale) (1894) ; (Le grand Pan) (1895) ; (Les plus forts) ; 'Le voile du bonheur) ; (Aux embus- cades de la vie> ; 'Les requins, a play. See Bolo, Paul; Caillaux, Joseph; France — History.*

CLEMENS, Jeremiah, American politician : b. Huntsville, Ala., 28 Dec. 1814; d. there, 21 May 1865. He was graduated at the University of Alabama 1833, studied law at Transylvania University, Ky., and was admitted to the bar, 1834. He was United States attorney for the northern district of Alabama 1838; a member of the State legislature 1839-41, 1843-44; in 1842 raised a company of volunteer troops and went to Texas, having been appointed lieu¬ tenant-colonel, and subsequently held the same rank in the regular service. In 1848 he was governor of the civil and military department of purchase in Mexico, holding the position until the end of the war. He was a United States senator 1849-53, and held high rank as an able and eloquent debater. He took part in the Alabama secession convention, and though protesting against its action, subsequently yielded and held office under the Confederacy. In 1864 he advocated Lincoln's re-election. He wrote several novels which were popular in their day: (Bernard Lyle (1853); 'Mustang Gray* (1857); 'The Rivals: a Tale of the Times of Aaron Burr and Alexander Hamil¬ ton (1859); 'Tobias Wilson (1865), a story of the Confederacy. He left in manuscript an unfinished history of the war in northern Ala¬ bama.*

CLEMENS, Samuel Langhorne, American

humorist ; more generally known by his pseudo¬ nym Mark Twain: b. Florida, Mo., 30 Nov. 1835; d. Redding, Conn., 21 April 1910. He received only a scanty school education, and in 1848 became apprentice to a printer, subse¬ quently working at this trade in Philadelphia, New York and elsewhere. He afterward learned the business of pilot on the Mississippi, but left this occupation to become secretary to his brother, who had been appointed secre¬ tary of Nevada Territory. He then tried his fortune at the Nevada mines. In 1862 he became local editor of a newspaper in Virginia City, but soon went to San Francisco, where he was for some time a reporter. After meeting with slight success in the Calaveras gold- diggings he returned to journalism in San Francisco. In 1866 he went to the Sandwich Islands, and on his return commenced his lecturing career. A trip to the Mediterranean, Egypt and Palestine followed. He edited for a time a newspaper in Buffalo, and soon after married and settled in Hartford, Conn. He traveled widely, and many of the scenes and incidents in his works are drawn from his journeys. He lost heavily through the failure

SAMUEL LANGHORNE CLEMENS (" MARK TWAIN ")

*fesgassss^*

of a publishing house which he founded in 1884. In 1905 a dinner was given him at New York by his author friends celebrating his seventieth birthday. When he visited England, in 1907, he was everywhere hailed with respect, and received from Oxford the honorary de¬ gree of Litt.D. His humor is characteris¬ tically American, but has a coarser side, often sinning against good taste and being irreverent and flippant at wrong times and places. But his comic force and fertility offset all defects; and beneath what seems reckless levity there is sound morality as well as clear¬ eyed shrewdness and hard common sense. The predilection which he vaunts for exploiting the mean aspect of things venerable or impressive betrays a touch of the spirit of American philistinism. Of this the 'Innocents Abroad) is an instance. But not so (Huckleberry Finn> and (Tom Sawyer) ; in those, his best books, he appears as a master of humor and pathetic suggestion, and a truly creative genius. No other writer has so vividly portrayed the irre¬ pressible American boy, or given his

readers so adequate an impression of the large, homely, spontaneous life led by native Americans in the great valley of the Mississippi. Among his chief books are 'The Jumping Frog) (1867); (The Innocents AbroacP (1869); 'Roughing it> (1873) ; 'The Gilded Age (with Warner, 1873) ; 'Adventures of Tom Sawyer* (1876) ; 'A Tramp Abroad) (1880); 'Life on the Mississippi (1883); 'Huckleberry Finn1* (1885) ; 'A Yankee at the Court of King Arthur (1889) ; 'The American Claimant (1892) ; 'Tom Sawyer Abroad) (1894); 'Puddinhead Wilson* (1894) ; 'Joan of Arc* (1896) ; 'More Tramps Abroad* (1897) ; 'The Man That Corrupted Hadleyburg) (1900) ; 'Following the Equator) (1901) ; 'Christian Science > (1903); 'How to Tell a Story* (1904); 'Edi¬ torial Wild Oats> (1905); 'Eve's Diary> (1905); 'A Horse's Tale* (1906); 'The $30,000 Bequest* (1906); 'Autobiography of Mark Twain* (published serially). An edi¬ tion of his collected writings, 'Writings of Mark Twain, > was published in 25 volumes (New York 1910). 'Mark Twain's Speeches,* edited by W. D. Howells, also was first pub¬ lished in New York in the year of the author's death. For biography, consult Paine, A. B., 'Mark Twain : A Biography* (New York 1912) ; for bibliography, see Johnson, M., 'Bibliography of Mark Twain* (New York 1910) ; other books connected with this author are Hender¬ son, A., 'Mark Twain* (New York 1911) ; Sedgwick, H., "Mark Twain,® in the 'New American Type* (Boston 1908) ; Howells, W. D., 'My Mark Twain* (New York 1910) ; Macy, J., "Mark Twain,® in 'The Spirit of American Literature) (ib. 1913).*

CLEMENS, Titus Flavius. See Clement of Alexandria.

CLEMENT I (Clemens Romanus.), Pope and martyr and one of the apostolic fathers. By Irenaeus he is reckoned the third in the line of the bishops of Rome, and Origen holds him to be the same Clement who is named by the Apostle Paul in his letter to the Philippians, iv 3. Tradition declares that he suffered martyrdom in the reign of Trajan and that his term of episcopate extended from 93 to 101 ;

*his day in the Roman calendar is 23 November. There is extant a letter from the Church of Rome to the Church of Corinth now generally accepted as having been written by this Clement. A bishop of Corinth, Dionysius, writing about 166 to a later Pope mentions Clemens Romanus as its writer. The letter was read as Scripture for a long time in public worship. Consult Lightfoot, J. B., 'The Apostolic Fathers) (part 1) ; 'Saint Clement of Rome) (London 1890) ; Knopf, 'Per erste Clemensbrief * (Leipzig 1899) ; Gregg, 'The Epistle of Saint Clement, Bishop of Rome) (London 1899) ; Kruger, 'History of Early Christian Literature) (New York 1897) ; Harnack, 'Chronologie der altchristlichen Litteratur) (Leipzig 1897) ; Wrede, 'Unter- suchungen zum ersten Clemensbrief } (Got¬ tingen 1891).*

CLEMENT II, Pope. He was a native of Saxony, Suidger by name, and was made pope by Emperor Henry III, whose chancellor he had been, in 1046 on the abdication of Gregory VI. He was the earliest of the six German pontiffs and a determined opponent of simony.

CLEMENT III, Pope: b. Rome; d. March 1191. He was a Roman by birth and cardinal bishop of Palestrina. He was elected Pope in 1187; preached the third crusade against the Saracens, made the Scottish Church directly dependent upon Rome rather than on York. There was an anti-pope with this title, who died in 1100.

CLEMENT IV (Gui Foulques, ge fook), Pope: b. Saint Gilles, France; d. Viterbo, 29 Nov. 1268. He was descended from a noble Provencal family. He served first as a soldier; later he became archbishop of Narbonne and cardinal bishop of Sabina. He became Pope in 1265, succeeding Urban IV, and was the friend and protector of Roger Bacon. He vigorously supported the claims of Charles of Anjou against Manfred, son of Frederick II, in the dispute concerning the two Sicilies.

CLEMENT V (Bertrand d'Agoust, ber- tran da-goost), Pope: b. Bordeaux 1264; d. Roquemaure, Languedoc, 20 April 1314. He became Pope in 1305 and at the time of his election was archbishop of Bordeaux. He transferred his see from Rome to Avignon, and thus commenced "the Babylonish captivity® of the Church, which lasted about three-quarters of a century. Philip the Fair influenced him in his actions. Another memorable event of his reign was his bull suppressing the order of the Knights Templar, 1311. Consult Rabanis, 'Clement V et Philippe le BeP (Paris 1858) ; Lacoste, 'Nouvelles etudes sur Clement V (Bordeaux 1896).*

CLEMENT VI (Pierre Roger, rd-zha), Pope: b. near Limoges, France, 1292; d. Ville- neuve d'Avignon December 1352. He suc¬ ceeded Benedict XII in 1342. He refused to return to Rome from Avignon. The Emperor Louis of Bavaria was excommunicated and humiliated by him. In his capacity of ruler of the kingdom of Naples, he acquitted Queen Joanna of the murder of her husband, and by purchase secured possession of Avignon. He also resisted the advances of Edward III of England and made an attempt to bring about a reunion of the Latin and Greek churches.

CLEMENT VII (Giulio de Medici, ma'de- che), Pope: b. Florence about 1475; d. Rome September 1534. He succeeded Adrian VI 1523. His sympathies were at first with the Im¬ perial party, but he found it expedient, after the success of Charles I at Pavia, to join the other Italian powers in a league with France. An at¬ tack from the Roman nobles again drove him to seek another alliance with the emperor. His vacillating conduct incurred the wrath of the Imperial party. The constable Bourbon, with the connivance of the emperor, invaded the papal territory with an army and sacked the holy city and held the Pope a prisoner for six months. After being released, he took refuge at Orvieto. Returning to Rome in 1529, he made peace with Charles, who promised to restore the Medici at Florence, and was crowned by the Pope in 1530. Clement urged the emperor to persecute the Lutherans in Germany, and evaded all demands for a gen¬ eral council. His refusal to sanction the di¬ vorce of Henry VIII created a breach with England; the weakness of his policy lost half of the German membership of the Church, and his rule was decidedly unsuccessful. The title of Clement VII was adopted also by the anti-pope Robert of Geneva 1378-94.

CLEMENT VIII (Ippolito Aldobrandini), Pope: b. Fano, Italy, 1536; d. 5 March 1605. He succeeded Innocent IX, 1592, reconciled Henry IV to the Church and ordered the execu¬ tion of Giordano Bruno. He annexed Ferrara to the states of the Church. During the last years of his rule the controversy arose between the Jesuits and Dominicans on the question of grace, to settle which he established the Con- gregatio de Auxiliis Divinse Gratise in 1597. Fie was a man of great sincerity and piety and an eminent scholar, as shown by his revised editions of the Vulgate, the breviary and the liturgical books. The anti-pope Clement VIII resigned, 1429, but did not close the western schism.

CLEMENT IX (Giulio Rospigliosi, ros- pe-le-6'se), Pope: b. Pistoia 1600; d. 9 Dec. 1669. He followed Alexander VII to the papal chair in 1667. In his pontificate was ar¬ ranged the <(Pax Clementina, M which for a time closed the Jansenist controversy.

CLEMENT X (Emilio Altieri, al-te-a're), Pope: b. Rome, 13 July 1590; d. 22 July 1676. At nearly 80 he succeeded Clement IX and dur¬ ing his pontificate a notable controversy arose with Louis XIV relating to the enjoyment, during vacancy, of episcopal revenues and the right of filling such vacancies. Because of his age, much of the government was left in the hands of his nephew, Cardinal Paluzzo Paluzzi.

CLEMENT XI (Giovanni Francesco Al- bani, al-ba'ne), Pope: b. Pesaro, Italy, 22 July 1649; d. 19 March 1721. He was elected suc¬ cessor of Innocent III in 1700, and in 1713 sent forth the celebrated bulls, (Vineam Domini Sabaoth,5 and

CLEMENT XII (Lorenzo Corsini, kor- Se'ne), Pope : b. .Florence 1652; d. 6 Feb.. 1740.

He was the successor of Benedict XIII in 1730, and was the first pontiff to oppose Free¬ masonry.

CLEMENT XIII (Carlo della Torre Rez- zonico, kar'lo del-la tor'ra ret-so-ne'ko), Pope : b. Venice March 1693; d. February 1769. He succeeded Benedict XIV in 1758. He supported the rights of the Church and did all in his power to protect it against the encroachments of the free-thinking groups which were gaining power in Portugal and France. He published a bull in behalf of the Jesuits after their expul¬ sion from France and Spain in 1767.

CLEMENT XIV (Giovanni Vincenzo Antonio Ganganelli), Pope: b. San Arcan¬ gelo, near Rimini, Italy, 31 Oct. 1705; d. 22 Sept. 1774. He was a Franciscan friar, a man of great piety and worth; the friend and con¬ fidant of Benedict XIV. He was elected Pope in 1769 after a struggle in the conclave in which cardinals influenced by various of the Catholic powers made interest in favor of

the suppres¬ sion of the Society of Jesus. When the new Pope showed an unwillingness to do the will of the powers, the charge was made that he had received the support of many members of the conclave upon his promise to suppress the order; but this charge has been conclusively proved to be without foundation in fact ; yet such was the urgency of the powers, he felt himself constrained in the interest of peace and of the Church to disband the Jesuit order, which he did in the apostolic brief Do minus ac Redemptor which declares the Society of Jesus dissolved forever. The fact that the brief had been drawn up and completed in November 1772 but was not published till July 1773 is proof that he was loath to publish so severe a decree against the order. After its issue he fell into a rapid decline, presumably from re¬ morse, and though all his life he had been ex¬ ceedingly vigorous, died little more than 12 months after the brief was published. It was this pontiff who founded the Clementine Mu¬ seum in Rome. Consult Caraccioli, (Vie de Clement XIV5 (1775) ; Theiner, (Geschichte des Pontificats Clements XIV> (1853) ; Von Reumont, (Ganganelli (Papst Clement XIV), seine Briefe und seine Zeit5 (Berlin 1847) ; Ravignan, (Clement XIII et Clement XIV5 (Paris 1854).

CLEMENT, kla-man', (Frederic Jean) Edmond, French dramatic tenor: b. Paris, 1867. He received his education at the Institution Notre-Dame de Chartres and at the Paris Con¬ servatory. His first appearance was in He created roles in ˆBenvenuto5 ;

CLEMENT, Ernest Wilson, American educator: b. Dubuque, Iowa, 21 Feb. 1860. He was graduated at the University of Chicago in 1880. He taught in secondary schools in 1880- 87 and at the Mito High School, Japan, 1887-91. For the next three years he was teaching in the United States. . In 1894 he became principal

*oi the Duncan Academy, Tokio, retaining this post until 1911 when he was appointed teacher of the First High School, Tokio. In 1896-97 he was acting interpreter of the American legation at Tokio, and was librarian of the Asiatic Society of Japan in 1896-1900 and again after 1911. He was editor of the Japanese Evangelist 1899-1909 and of the Christian Movement in Japan 1907-09. He is a frequent contributor to American and Jap¬ anese periodicals. His published works in¬ clude (Handbook of Modern Japan * (1903) ; Japanese Floral Calendar) (1904) ; Christian¬ ity in Modern Japan) (1905) ; (Hildreth's Japan, as It Was and Is) (1906) ; Japanese Chro- nology) (1910) ; (Short History of Japan**

(1915).

CLEMENT OF ALEXANDRIA, Saint

*(Clemens Alexandrinus), Greek theologian, one of the most eminent and learned of the fathers of the Church. Very little, almost nothing, is known regarding his life. The first mention of him by a writer living in or near his time is made by Eusebius of Caesarea and by Photius; they give his name as Flavius Titus Clemens, and later writers add to the name the designation Alexandrinus, <(of Alexandria, ** From his names and surname one might infer that he was of Latin race; but he wrote in Greek, and his writings do not indicate any special acquaint¬ ance with Roman life or thought. Whether he was a native of Alexandria or of some Grecian city cannot be decided. He was a convert from paganism and had an intimate acquaintance with the literature of Grecian philosophy, but of the circumstances of his conversion to Chris¬ tianity, we know nothing. He was supposedly a disciple of Pantsenus, director of the Cate- chetic school of Alexandria and became his suc¬ cessor, and had among his pupils Origen, who in turn succeeded him. Further, Clement was a priest of the church of Alexandria. The per¬ secutions in the region of Septimius Severus drove him from Alexandria. He wandered to Palestine and Asia Minor, but there is no defi¬ nite information as to the rest of his career. A list of his writings is given by Eusebius, Saint Jerome and Photius. It contains the titles of 10 separate works, namely: (Hortatory to the Greeks) ; (The Tutor) (The Stromates) (usu¬ ally called Stromata) : this as its title indicates is a patchwork or collection of miscellaneous observations; (Who is the Rich Man that is Saved ?* These four works have come down to us complete ornearly so. The remaining six titles are works that have been lost: (Outlines) ; (On the Passover*; (On Fasting) ; En Slan¬ der* ; Exhortation to Patience* ; (The Church Rule.**

The (Hortatory to the Greeks ex¬ poses the absurdities and immoralities of the pagan religions ; but the Grecian philosophers and poets had a notion of the true author of the universe. (The Tutor) sets forth the rule of Christian living. (The Stromates) is a mis¬ cellany but it consists of the author's own studies of questions and problems in philos¬ ophy, literature, history, etc., not of passages taken from other authors. The treatise on the ((Rich Man® is a very judicious exposition of the passage in the Gospel of Mark x, 17-31. Con¬ sult editions by Potter (Oxford 1715) printed in Migne's (Patrologia Graecorum* (Vols. VIII*

and IX, Paris 1857) ; Eng. trans. in (Ante- Nicene Fathers (Vol. II, ed. by A. C. Coxe, New York 1885). Consult also Elem¬ ent* (in Smith and Wace, dictionary of Chris¬ tian Biography,* London 1877-87) ; Bigg, (The Christian Platonists of Alexandria* (London 1899) ; de Faye, Eugene, Element d'Alexan- drie* (Paris 1898).*

CLEMENTI, Muzio, kla-men'te, Italian pianist and composer: b. Rome 1752; d. Eves¬ ham, England, 10 March 1832. He studied under a relative, Buroni, and in 1761 became an organist. He studied counterpoint with Carpani and singing with Santarelli. As early as his 12th year he wrote a successful mass for four voices, and had made such progress in the pianoforte that an Englishman, Mr. Beckford, took him to England to complete his studies. He was then engaged as director of the orches¬ tra of the opera in London, and his fame hav¬ ing rapidly increased, he went in 1780 to Paris, and in 1781 to Vienna, where he played in a con¬ test with Mozart before the emperor. In 1784 he repeated his visit to Paris, but after that remained in England till 1802, when he went back to the Continent. He returned in 1810 to England, where he settled down as superin¬ tendent of one of the principal musical estab¬ lishments in London, and after the failure of his concern formed a partnership with Collard. He was absorbed in the mechanical perfection of the piano and also with the writing of theo¬ retical works. As a teacher he was unequaled. His most important compositions were his 60 sonatas for the pianoforte and the great collec¬ tion of studies known as the Eradus ad Par¬ nassian, a work of high educative value. He represented perhaps the highest point of tech¬ nique of his day, and his influence on modern execution has led to his being characterized as (*

CLEMENTINES, so named after Pope Clement V, who during his pontificate (1305- 14) had compiled the canons of the Church, chiefly out of the canons of the 1 5th Council of the Church, Vienne (1311). The Clementines are one of five great collections of Church laws, examined and decided upon according to the methods employed by ecclesiastical author¬ ity out of which the Eorpus Juris Ecclesias- tici is made up. The Clementines constitute five books of this, and were edited and pub¬ lished by the Benedictines (9 vols. with ap¬ pendix, 1885-92).*

CLEMSON AGRICULTURAL COL¬ LEGE, an educational (non-sectarian) institu¬ tion in Clemson College Station, S. C. ; organ¬ ized in 1890; reported at the end of 1917: volumes in the library, 18,480; students, 819; professors, 65.

CLEOBIS, kle'6-bis, AND BITON, bi'tun, two Grecian youths, the sons of Cydippe, chief priestess of Hera (Juno) at Argos. At the Heraia, a feast in honor of the goddess, it

was customary for the chief priestess to be drawn by two white oxen. Herodotus relates that on one occasion the procession had already begun to move and the oxen had not arrived, upon which Cleobis and Biton drew the chariot of their mother for a distance of 45 stadia, up the mountain where the Temple of Hera stood. The people applauded, and the mother was so affected by this instance of filial affection that she begged the goddess to grant her sons the best gift which could be conferred on mortals. While the youths were yet in the temple a soft sleep fell upon them and they never awoke. The Argives placed the statues of Cleobis and Biton in the temple at Delphi, and in a temple at Argolis they were represented drawing a chariot of their mother. Consult Cicero, 'Tus- cuP (Bk. I, 47) ; Stobaeus,

CLEOBULUS, kle-6-bu'lus, one of the Seven Wise Men of Greece. He was a native and tyrant of Lindus, or according to some, of Caria, and flourished 560 b.c. He traveled to Egypt to learn wisdom, like many of the sages of Greece. He was king of Rhodes, and was succeeded on the throne by his daughter Cleo- buline, whose riddles are not less famous than his own. He was the first to give

literary form to riddles. Diogenes Laertius has preserved several of his riddles. Consult Diogenes Laer¬ tius (I, 89-93) ; Mullach, F. G., 'Fragmenta Philosophorum Graecorum > (Bk. I).

CLEOMBROTUS, kle-om'bro-tfts, an an¬ cient Greek military leader, son of Pausanias, king of Sparta, succeeding his brother Agesipo- lis I. During his reign began the Theban War, in which he commanded the Spartans against Epaminondas and Pelopidas. He was killed in the battle of Leuctra, which happened 8 July 371 b.c., according to the Julian calendar. See Epaminondas.

CLEOME, kle-6'me, a genus of plants, herbs and shrubs of the caper family (Cap – paridacece) , comprising about 75 species, natives of tropical regions. Less than 10 species are found in the United States, most of them ad¬ ventitious additions from South America, es¬ caped from gardens. The native varieties be¬ long to the Rocky Mountain region, and when found to westward are naturalized specimens. Pink cleome or Rocky Mountain bee plant (C. scrrulata) has a stem from two to three feet in height, the pinkish-white flowers very showy and attractive. Its native habitat is the Rocky Mountain region from Canada to Arizona and Mexico, but it extends eastward to Lake Michi¬ gan. The spider flower (C . spinosa) of the eastern seaboard, from New Jersey to Florida, is a South American species escaped from culture.

CLEOMEDES, kle-6-me'dez, ancient Greek author. He wrote a treatise, in two books, (On the Circular Theory of the Heavenly Bodies, > which sets forth the Stoic theory of the uni¬ verse, and which is remarkable as containing, amid much error and ignorance, several truths of modern science — such as the spherical shape of the earth. Nothing is known definitely re¬ garding his life, but it seems most probable that he flourished in the 2d century a.d. Zieg¬ ler's edition of his work (1891) is probably the best.

CLEOMENES, kle-om'e-nez, the name of three kings of Sparta, of the Agiad line: (1) Cleomenes I, the son of Anaxandridas, whom he succeeded about 520 b.c. His chief exploit was the crushing victory near Tiryns over the Argives. (2) Cleomenes II, the brother and successor of Cleombrotus I. There is no record of his reign, except that it lasted from 327-309 b.c. (3) Cleomenes III, king from 236 to 220 b.c. He was the son of Leonidas II and the last of the Agidae. He distinguished himself in a war against the Achaeans. Returning to Sparta he put to death the ephori, made a new division of lands, introduced again the old Spartan system of education and bestowed the full franchise upon many who had not before had it. He lived very simply, was just and friendly and treated his enemies with gener¬ osity. He showed himself an able general in a war against the Macedonians and Achaeans united, but at last lost the important battle of Sellasia (222 b.c.). He fled to Egypt, where he attempted to raise an insurrection, but find¬ ing no supporters committed suicide. He was one of Sparta's best and ablest men, and with him perished the hope of Spartan supremacy. Consult Plutarch, (Cleomenes, Aratus (34- 46) ; Philopoemem (5-6) ; Polybius (II, 45- 70; V, 35-39; VIII); Holm, 'History of Greece, } (Vol. IV, cc. 10, 15).*

CLEOMENES, or THE SPARTAN HERO, a play by Dryden and Southerne, acted in 1692.

CLEON, kle'on, Athenian demagogue, killed at Amphipolis, Macedon, 422 b.c. He was the son of Cleaenetus and was a tanner by trade, but became well known in public affairs before the death of Pericles. By the year 427 he was high in favor with the people and distinguished himself by the atrocious proposal that all the adult males of the revolted Mytileneans should be put to death and the women and children sold for slaves. In 425 he took prisoners those Spartans who had been blockaded by an Athe¬ nian force in the island of Sphacteria. The next year Aristophanes attacked him in his comedy of the 'Knights — as he did also in the 'Wasps* in 422 — satirizing his venality, rapacity, ignorance, violence and cowardice. The portrait was probably correct in the main. In 422 he was sent to Chalcidice against Brasi- das, who was capturing the Athenian tributary cities there. He was taken unawares by a sally of Brasidas and was slain at Amphipolis. His death paved the way for the peace of Nicias in 421. Consult Grote, 'History of Greece) (Vol. VI, London 1888) ; Beloch, 'Die attische Politik seit Perikles* (Leipzig 1884) ; Holm, 'History of Greece* (Eng. trans., Vol. II, Chap. 23, New York 1902).*

CLEOPATRA, kle-6-pa'tra, the name of several Egyptian princesses, of whom the most renowned was the eldest daughter of Ptolemy Auletes : b. 69 or 68 b.c. ; d. 30 b.c. With her eldest brother Ptolemy she shared the throne of Egypt. Both were minors at the death of their father, and were placed under the guardianship of Pothinus and Achillas, who de¬ prived Cleopatra of her share in

the govern¬ ment 49 b.c. She went to Syria, and was form¬ ing plans for obtaining her rights by force, when Caesar came to Alexandria, and, captivated with her charms, successfully seconded her

claims. Pothinus stirred up a second revolt, upon which the- Alexandrian War commenced, in which the elder Ptolemy lost his life. Csesar proclaimed Cleopatra queen of Egypt ; but she was compelled to take her brother, the younger Ptolemy, who was only 11 years old, as her nominal husband and colleague on the throne. The Queen subsequently made a journey to Rome, where Csesar received her magnificently, and erected a statue to her next to the statue of Venus, in the temple consecrated to that diety. Cleopatra remained in Rome from 46 b.c. to 44 b.c., returning to Egypt after Csesar's death. She had by Csesar a son, Csesarion, afterward put to death by Octavius. When her brother, at the age of 14, demanded his share in the government Cleopatra poisoned him, and re¬ mained sole possessor of the regal power. Dur¬ ing the civil war in Rome she declined to take sides with either party, but after the battle of Philippi she sailed to join Antony at Tarsus. She was then 25 years old, and combined with extraordinary beauty, great wit and the high¬ est elegance of manners. She appeared in a magnificently decorated ship, under a golden canopy, arrayed as the goddess Aphrodite, sur¬ rounded by beautiful boys and girls who repre¬ sented Cupids and Graces. Her meeting with Antony was attended by the most splendid fes¬ tivals. After having accompanied him to Tyre she returned to Egypt. Antony followed her, and gave himself up to the most extravagant pleasures. She accompanied him on his march against the Parthians, and when he parted from her on the Euphrates he bestowed Cyrene, Cy¬ prus, Ccelosyria, Phoenicia, Cilicia and Crete on her, to which he added part of Judea and Ara¬ bia at her request. On her account, or as an expression of hostility to Octavius, who de¬ clared war against Egypt in 32 b.c., he di¬ vorced his wife Octavia and made his three sons by Cleopatra, and also Caesarion, kings. Instead of acting promptly against his adver¬ sary, Antony lost a whole year in festivals and amusements with Cleopatra at Ephesus, Samos and Athens, and at last determined to decide the contest by a naval battle. At Actium the fleets met. Cleopatra, who had brought Antony a reinforcement of 60 vessels, suddenly took to flight, and thus caused the defeat of her party; for Antony, as if under the influence of frenzy, immediately followed her. They fled to Egypt, and declared to Octavius that if Egypt were left to Cleopatra's children they would thence¬ forth live in retirement, but Octavius demanded Antony's death, and advanced toward Alexan¬ dria, which Antony hastened to defend. Cleo¬ patra determined to burn herself with all her treasures but Octavius pacified her by private messages. These communications, however, did not remained concealed from Antony, who, supposing Cleopatra treacherous, hastened to her, to avenge himself by her death. She, how¬ ever, escaped and took refuge in the mausoleum which she had erected near the Temple of Isis, and caused the report of her suicide to be cir¬ culated. Antony now threw himself upon his sword; but before he expired was informed that Cleopatra was still living, upon which he caused himself to be carried into her presence, and breathed his last in her arms. Octavius succeeded in getting Cleopatra into his power. She still hoped to subdue him by her charms, but her arts were unavailing, and becoming

aware that her life was spared only that she might grace the conqueror's triumph, she de¬ termined to escape this ignominy by a volun¬ tary death. According to the generally re¬ ceived account of her death she ordered a splendid feast to be prepared, desired her at¬ tendants to leave her, and put an asp, which a faithful servant had brought her, concealed amongst flowers, on her arm, the bite of which caused her death almost immediately. There is, however, some doubt as to the exact method by which she took her life. Her body was in¬ terred near that of Antony. At the time of her death she had reigned 21 years. Her daughter bv Antony married the king of Mauretania ; their son, Ptolemy, last of the line, was slain by Caligula in 40 a.d.

CLEOPATRA'S NEEDLES, two obelisks, formerly at Alexandria, one of which is now in New York, the other in London. They are made of red syenite, quarried at the First Cata¬ ract, and were originally erected by Thothmes III in the 40th year of his reign (about 1,460 b.c.) in front of the portico of the great tem¬ ple of Heliopolis, the On of the Scriptures, and the place where Moses was born and brought up. From Heliopolis the two obelisks were removed to Alexandria in 13-12 b.c., as shown by inscriptions on the claw of one of the bronze crabs placed by the Romans under the corners of the obelisk when they set it up in Alexandria nearly 17 years after the death of Cleopatra. How, then, they came to be called Cleopatra's Needles is not apparent; but it may be conjectured

*that they had been removed by her order some time before they were set up on their second site, or that their removal was the carrying out of an intention formed by Cleopatra. Mr. (after Sir) Erasmus Wilson, to whom the credit may be awarded of having been chiefly instrumental in getting the British obelisk conveyed to London, assumes that the association of Cleopatra's name with the two obelisks represents the popularity of the queen and the affectionate regard of her subjects, rather than any participation of herself in their transport or erection. The obelisk now at Lon¬ don lay for a long time prostrate in the sand. In 1820 it was presented by Mehemet Ali to the British nation, but the British government never did anything for its removal, which was at last effected solely through the public spirit of several private individuals, the obelisk being erected on the Thames embankment in 1878. The other obelisk was presented to the United States by the Khedive of Egypt, and its trans¬ portation to its present position in Central Park, New York, where it was erected in 1881, was made possible by the liberality of W. H. Vanderbilt. It stands upon four bronze crabs, reproductions of the original crabs upon which the obelisk formerly stood. Two of the orig¬ inals are now in the Metropolitan Museum, New York. The ˆneedle® in London is some¬ what the taller of the two, being 68 feet 5*4 inches in height, as against 67 feet 2 inches, the height of the other. The lateral measure¬ ments at the base are, in the British obelisk, 7 feet 5 inches in one pair of opposite . sides and 7 feet 10*4 inches in the other pair; in the one in New York, 7 feet 9ˆ4 inches, and 8 feet 2*4 inches. The weight of the British obelisk is rather more than 186 tons, and its mass 2,529 cubic feet. Both obelisks are inscribed with*

hieroglyphs, engraved to a depth of several inches and carefully polished. The hieroglyphs are inscribed in vertical columns, which are read from the top downward; and in each case the middle column is in honor of Thothmes, by whom the obelisks were first erected, and the side columns in honor of Rameses II.

CLEPSYDRA, klep-si'dra, or WATER- CLOCK, an instrument for the measurement of time by the escape of water from a vessel through an orifice. Its origin is extremely ancient, and has generally been attributed to the Egyptians. Two descriptions of clepsydrae have been employed — one in which the water merely escapes through the orifice, the other in which the same level is constantly maintained by the introduction of a fresh supply of water, and a uniformity of efflux secured by retaining throughout an equal amount of pressure on the fluid as it issues from the bottom of the vessel. In one kind of water-clock the measure of time is registered on a dial-plate by means of a hydraulic apparatus acted on by the efflux of water from a cistern. The simpler form was used in Athenian courts where a speaker was allowed so much water for his speech, accord¬ ing to the importance of his case. The more complicated form is said to have been invented by Plato ; or by Ctesibius, according to some. Both forms were introduced into Rome in 159 b.c. These instruments are now scarcely ever constructed.

CLERC, Laurent, klar, French deaf mute: b. La Balme, Isere, France, 26 Dec. 1785; d. Hartford, Conn., 18 July 1869. At the age of 12 years his uncle took him to Paris, and placed him in the institution for the deaf and dumb. He became the favorite pupil of the Abbe Sicard. His intellectual condition, like that of most of the uninstructed deaf mutes, was at this time deplorable. (

CLERESTORY, or CLEARSTORY, the

upper part of the nave in churches, above the triforium where a triforium is present, and formed by walls supported on the arches of the nave, and rising above the roof of the side.

aisles. In these walls windows are inserted for the purpose of increasing the light in the nave. The earliest known is that of the Hypostle Hall at Karnak. The Romans used the device in their lofty bath halls ; the same arrangement is seen in the basilica of Maxen- tius and in modern halls of the same type, e.g., the Pennsylvania Railway Station in New York. The clerestory was an essential feature of the Christian basilicas; occurs also in Hagia Sophia and the Byzantine churches. In Nor¬ man architecture the three stories of pier arcade, triforium and clerestory are of nearly equal height, but in Gothic the clerestory be¬ comes relatively of greater significance and in late Gothic work is often very lofty.

CLERGY (Lat. clericus, from Gk. tempos, a lot), in the Christian Church, that portion of the faithful which is set apart for the ministry of religion. The separation from the laity became more marked through the multiplica¬ tion of offices and titles, . privileges, rights, peculiar dress and habits. In the Roman Cath¬ olic Church there are eight grades or distinc¬ tions of clergy, namely, that of the simple cleric, those of the four minor orders and those of the three sacred orders of subdeacon, deacon and priest (qq.v.). The last three are regarded as being of divine institution. The simple cleric is one who has received the eccle¬ siastical tonsure; by that rite he is made a clerk or cleric, and as such is entitled to certain rights, privileges and immunities and assumes certain obligations not incumbent on the laity. In Protestant churches the distinction between clergy and laity is much less wide. See Holy Orders.

CLERK, formerly the name given to an ecclesiastic. Since learning of all kinds at first centred in the Church, the name was assumed by all men of learning, whether belonging to Church or laity. At present the term desig¬ nates one who has charge of an office or de¬ partment, subject to a higher authority, as a board, corporation, etc. ; a secretary, as the clerk of the House of Representatives or Sen¬ ate, clerks of the various courts, etc. In Eng¬ land a parish officer, a layman, whose business used to be to lead the responses in the church services and to perform other duties connected with the parish ; a parish clerk. The mediaeval use of the terms ((clerk in holy orders® and <(clerk in minor orders® still exists to distin¬ guish the various ministers of the Established Church.

CLERK-MAXWELL, James. See Max¬ well.

CLERKE, Agnes Mary, I rish astronomer: b. Skibbereen, Ireland, 10 Feb. 1842; d. London, 20 Jan. 1907. She gave her life to astronomical research, was awarded the Actonian prize and became a member of the British Astronomical Association. She was also honorary member of the Royal Astronomical Society. She pub¬ lished (A Popular History of Astronomy in the Nineteenth Century) (1885; rev. ed., 1902) ;

(System of the Stars) (2d ed., 1905) ; (The Herschels and Modern Astronomy) (1895) ; Problems, in Astrophysics) (1903) ; (Modern Cosmogonies) (1906) ; (The Concise Knowl¬ edge of Astronomy) (with J. E. Gore and A. Fowler, 1898). She contributed to the ˆCatholic Encyclopedia,) the (Dictionarv of

CLEOPATRA'S NEEDLE, CENTRAL PARK, NEW YORK

National Biography > and the Encyclopaedia BritannicaP She also wrote for the Edinburgh Review, the Tablet, Knowledge , etc.

CLERKENWELL, England, parish of Lon¬ don north of Saint Paul's Cathedral and within the metropolitan borough of Finsbury. It is inhabited by the better class of workingmen in the metal trades, being noted for its output of watches, optical instruments and articles of gold and silver. Technical education is pro¬ vided in these trades by the Northampton Poly¬ technic Institute. The name comes from the well around which the parish clerks of London used to meet. An attempt by Fenians to destroy the Clerkenwell prison was made on 13 Dec. 1867. Pop. 57,121. .

CLERMONT, The, the name given by Robert Fulton (q.v.) to the steamboat in which he made his first trip from New York to Al¬ bany, 11 Aug. 1807. The speed attained was only five miles per hour.

CLERMONT-FERRAND, klar-roon-fer- ran, France, town in the department of Puy- • de-Dome, of which it is the capital, 113 miles west of Lyons. It is situated on a hill at the foot of the volcanic range in which the summit of the Puy is conspicuous. It was originally the capital of the Arverni, possessed consider¬ able importance under the Romans and became a bishop's see in 250. It was afterward sacked by the northern hordes, but soon recovered, and was selected in 1095 for the meeting of the great council in which the crusades originated. In 1556 it became the capital of the duchy of Auvergne. Among its natives are Gregory of Tours, Pascal and General Dessaix-. The most remarkable edifices are the Gothic cathedral, a huge, irregular, gloomy pile, begun in 1248, and recently completed by the construction of the west front and two towers; the church of Notre Dame, founded in 580, and encrusted ex¬ ternally with rude mosaics ; the townhouse, courthouse, theatre, general hospital, etc. There are also a medical and a theological college, technical schools, observatory, library contain¬ ing about 125,000 works,' botanic garden and museums of natural history and antiques. It is the centre of a great rubber industry. Other manufactures consist chiefly of chemicals, ani¬ mal oils, table-linen, nails, hats, machinery, etc. It is an important centre of trade. Near it there are two mineral springs. Pop. of com¬ mune (1911) 65,386.

CLERMONT-TONNERRE, to-nar, the name of a distinguished ancient family of counts in Dauphiny. One of the most cele¬ brated is Stanislas Marie Adelaide, Count de: b. 1757; d. 1792. At the breaking out of the Revolution in 1789 he took his place in the States-General as deputy of the nobility. He maintained the doctrine of a constitutional mon¬ archy and incurred the displeasure of both the Aristocratic and Republican parties. As a counterpoise to the influence of the Jacobins, he, in concert with Malouet and other friends of monarchy, founded the Monarchical Club ; and with Fontanes started the Journal des Impartiaux. The club having been denounced by Barnave as a band of conspirators, was dis¬ solved, and the journal was suppressed after an existence of only two months. In 1791 he was arrested on the charge of having aided the king in his attempt to escape, but regained

his liberty on taking an oath of fidelity to the National Assembly. The next year he was dragged by a mob before the section. As no sufficient ground of detention appeared he was dismissed, but was pursued and murdered. His collected speeches were published under the title cRecueil des opinions) (Paris 1791). Aime Marie Gaspard, Marquis, afterward Duke de: b. Paris 1779; d. 1865. After receiv¬ ing education at the Ecole Polytechnique he entered the army, served in Italy, Germany and Spain and became aide-de-camp to Joseph, king of Spain. After the restoration of Louis XVIII he was Minister of Marine and in 1823- 27 Minister of War. The revolution of July was distasteful to him and he retired from political life.

CLERON, Joseph Othenin Bernard de

(Comte d'Haussonville), French statesman and writer : b. Paris 1809 ; d. 1884. He entered the diplomatic service and was successively secretary of embassy at Brussels, Turin and Naples. In 1842-48 he was member of the Chambre des Deputes, sitting for Provins. Being a Conservative, the revolution of 1848 caused his retirement from politics and there¬ after he gave his attention to literature. In 1869 he was elected member of the French Academy and in 1878 he was named Senateur perpetuel. He was active in behalf of the Alsatian exiles after the war with Prussia jn 1870. His works include (Histoire de la poli¬ tique exterieure du governement frangais de 1830 a 1848) (1850) ; cHistoire de la reunion de la Lorraine a la France) (1854-59) ; (L'Eglise romaine et le premier empire> (1864- 69). During the war of 1870-71 he published several pamphlets and political letters which exerted considerable influence throughout France; of these the most widely circulated was (La France et la Prusse devant 1'EuropeP

CL&RY, kla-re, Jean Baptiste, the valet de chambre of Louis XVI : b. near Versailles, 11 May 1759; d. near Vienna, 27 May 1809. When in 1792 the royal family of France were imprisoned in the Temple, Clcry was one of the few servants permitted to accompany them. Louis XVI, a few days before his death, di¬ vided a loaf of bread with this faithful com¬ panion of his misfortune, the only proof of his regard which he was able to show him. After the king's death, Clery was devoted to the Dauphin. He wrote a journal of what passed in the Temple from the captivity of Louis XVI until the

death of the Dauphin; it has been several times republished.

CLESINGER, kla-zan-zha, Jean Baptiste Auguste, French sculptor: b. Besangon, 22 Oct. 1814; d. Paris, 7 Jan. 1883. He obtained considerable reputation for busts of distin¬ guished persons, and also executed statues and historical groups. His colossal bust of (Lib¬ erty,) and his statues of (Fraternity,ˆ (Woman Bitten by a Serpent, (The Gipsy GirP and of Rachael and Cruvelli in some of their principal parts are among his best known works. Others are (Phryne* ; (Louise of Savoy,* in the Lux¬ embourg Gardens; and the statue of*

a daughter of Madame Dudevant (George Sand).

CLESSE, kles'e, Antoine, Belgian popular poet: b. The Hague 1816; d. Mons 1889. To the day of his death he followed his trade of armorer. His first ballad, (Godfrey de Bouil¬ lonˆ won for him a gold medal. His popular songs

CLETHRA, kleth'ra, the typical genus of the family Clethracece, or white-alder family. The family has but this single genus, which numbers about 30 species, indigenous to Japan, Madeira, Mexico, South America and the east¬ ern seaboard of North America. The United States species are the sweet-pepperbush or white-alder (C. alnifolia) , found near the coast from Florida to Maine, and the mountain sweet- pepperbush (C . acuminata), a shrub or small tree growing in the mountain woods of Vir¬ ginia, the Carolinas and Georgia.

CLEVEDON, England, watering-place on the Bristol Channel, about 15 miles southwest of Bristol. It is the burial-place of Hallam, the historian, and of his son Arthur, whom Tennyson's (In Memoriam' has made famous. Here Coleridge lived in 1795. Clevedon Court is the Castlewood of Thackeray's (Henry Es¬ monds Pop. 6,111.

CLEVELAND, Charles Dexter, American author : b. Massachusetts 1802 ; d. 1869. He was graduated at Dartmouth in 1827 and be¬ came professor of Latin and Greek in Dickin¬ son College, and of Latin in the University of the City of New York. He was United States consul at Cardiff, Wales, 1861-67. His chief works include an edition of (Milton's Poetical Works) with a

Literature' (1858) ; Classical Literature'

(1861).

CLEVELAND, Chauncey F., American lawyer and politician : b. Hampton, Conn., 16 Feb. 1799; d. there, 6 June 1887. He was ad¬ mitted to the bar in 1819, became active in local politics as a Democrat, and in 1826 was elected to the State legislature, serving 12 terms in all ; and was speaker of the lower house in 1836, 1838 and 1863. He was ap¬ pointed attorney-general of Connecticut in 1832 ; and was elected governor in 1842 and 1843 ; in both years the popular vote was indecisive and he was chosen by the legislature. In 1849 and 1851 he was elected to Congress. He was one of the leaders in the organization of the Re¬ publican party; in 1860 was a presidential elector ; and in 1861 was a delegate to the Peace Congress.

CLEVELAND, Frederick Albert, Ameri¬ can economist: b. Sterling, Ill., 17 March 1865; d. 15 Oct. 1914. He was graduated at De Pauw University in 1890. He studied for the bar, but gave up practice in 1896 and there¬

after gave his entire attention to economics, first at the University of Chicago and then at the University of Pennsylvania. He was in¬ structor in finance at the latter institution in 1900-03, and from 1903 to 1905 was professor of finance at the School of Commerce, New York University. He served as accounting ex¬ pert on several commissions, including that on the finances of New York city (1905) and President Taft's commission on economy and efficiency (1911) which recommended a national budget. He was appointed director of the bu¬ reau of municipal research in 1907. His publi¬ cations include (Growth of Democracy in the United States' (1898) ; (Funds and their Uses' (1902), school edition as (First Lessons in Finance' (1903) ; (The Bank and the Treas¬

ury' (1905) ; (Chapters on Municipal Admin¬ istration and Accounting' (1909) ; (Organized Democracy' (1913) ; (Railroad Capitalization and Promotion,' with F. W. Powell (1908); (Railroad Finance,' with F. W. Powell (1912).

CLEVELAND, John, English poet and satirist: b. Loughborough, June 1613; d. Lon¬ don, 29 April 1658. He studied at Christ Col¬ lege, Cambridge, where Milton was a fellow- student; became a fellow of Saint John's Col¬ lege 1634; and M.A. 1635. A royalist and gifted satirist, he was judge-advocate at New¬ ark 1645ˆ16, but after its capitulation under¬ went a series of vicissitudes and wanderings until his death. Among his contemporaries, Cleveland's poems were held in higher esteem than Milton's; (The Rebel Scot'; (Rupertis- mus' ; ˆmectymnuus, or the Club Divines' ; (Fuscara, or the Bee Errant' ; and three elegies on the king, are the most noteworthy. Consult Berdan, J. M., (The Poems of John Cleve¬ land' (New York 1903).

CLEVELAND, (Stephen) Grover, 22d

President of the United States: b. Caldwell, N. J., 18 March 1837 ; d. Princeton, N. J., 24 June 1908. Grover was the fifth of a family of nine children born to Rev. Richard F. Cleve¬ land, a graduate of Yale (1824) and Presby¬ terian clergyman, and Ann Neal, the daughter of a Baltimore merchant of Irish descent. He received a common school and academic edu¬ cation at Fayetteville and Clinton, N. Y., the successive residences of the family after leav¬ ing Caldwell, and was preparing for college when his father's sudden death (1853) changed his prospects entirely. To support himself and to aid in providing for the rest of the family he secured a clerical position in the New York Institution for the Blind, where his older brother William was a teacher. In 1855 he started West, but on his way stopped at Buf¬ falo to visit an uncle, Lewis F. Allen, a stock breeder and publisher of (The Herd-Book of American Short-Horn Cattle.' His uncle ad¬ vised him to stay in Buffalo and employed him in the preparation of the (Herd-Book,' until a position as clerk and copyist was secured in a law office, August 1855. He at once set to work with perseverance and industry to make himself useful and master the rudiments of the law, with the result that in 1859 he was made managing clerk of the firm at a salary of $600 (increased to $1,000 in 1863) and admitted to the bar. During the war, his two brothers being in the Union army, the support of his mother and sisters fell upon him. Unable to

GROVER CLEVELAND

Twenty-second and Twenty-fourth President of the United States

'

•

enlist, he borrowed money to pay for a sub¬ stitute. In 1863 he was appointed assistant dis¬ trict attorney of Erie County, serving with zeal and energy. He. attended every one of the 12 grand juries which met during each of the three years of his term and presented in full a majority of the cases. As the Democratic can¬ didate for district attorney in 1865 he was de¬ feated by his friend Lyman K. Bass. In 1869 he became a member of the law firm of Lan- ning, Cleveland and Folsom. Elected sheriff of Erie County (1870), he performed his duties faithfully and used his leisure in prosecuting further professional studies. At the end of his term (1873), he joined the firm of Bass, Cleve¬ land and Bissell, acquired increasing success in practice and took a still higher position at the bar. In 1881 the citizens of Buf¬ falo determined to check the flagrant corrup¬ tion in the city government. Cleveland was elected mayor on the Democratic ticket by a majority of 3,500 though the Republican State ticket received an average majority there of 1,600. As mayor, he displayed a thorough knowledge of the laws and a clear perception of the needs and rights of the city. He insisted upon placing public interests above party claims; saved the city over $1,000,000 by pre¬ venting corrupt schemes and bargains ; and won the gratitude of people and press irrespective of party. On 22 Sept. 1882 he was nominated for governor against the Republican candidate, Charles J. Folger, and elected by the unprece¬ dented majority of over 192,000 votes. As gov¬ ernor he conducted a thoroughly business-like administration, making frequent use of his veto power, but his vetoes were

always clearly in accord with his duty under the law. His record as mayor and governor won for him the Demo¬ cratic nomination for President, 10 July 1884. The ensuing campaign was unusually bitter. Its broad distinguishing feature was the rise in the Republican party of the independent or (

can intervene, none of the powers with which it is invested will be withheld when their ex¬ ercise is deemed necessary to maintain our na¬ tional credit or avert financial disaster.® Ac¬ cordingly he forced the repeal of the Sherman Silver Purchase Act, killed the bill for coining the seignorage, maintained the treasury's gold reserve by the successive issue of government bonds and saved its credit throughout the world, despite furious opposition by large sections of his own and the Republican party favoring the free coinage of silver. He repudiated the Ha¬ waiian annexation treaty made by President Harrison, enforced the neutrality laws during the troubles in Cuba, while firmly supporting American interests there, and insisted upon ar¬ bitration of the British-Venezuelan boundary dispute. During the Chicago strike in 1894, he effectively asserted the executive's right to in¬ terfere in State affairs in the interest of law and order. At the close of his term he settled in Princeton, N. J., where he resided till his death. He delivered an annual series of lec¬ tures on public affairs at Princeton University and wrote a number of articles on important questions with which he was required to deal while President. On 2 Tune 1886 he married, in the White House, Miss Frances Folsom, of Buffalo, a daughter of a former la\y partner. In 1884 Cleveland's popular majority was 62,683; in 1888 it was 98,017 ; in 1892 it was 380,810.

President Cleveland's messages and other public papers will be found in Richardson's (Messages and Papers of the Presidents, 1 789— 1897 5 (Vols. VIII, IX, Washington 1898). A collection of his magazine articles appeared in book form (1904) under the title Presidential Problems, 5 and he also published Pishing and Hunting Sketches) (1906).

Bibliography. — Campaign lives of Cleve¬ land by Thomas W. Handford and Eugene T. Chamberlain, Wm. Dorsheimer, Pendleton King and Deshler Welch, appeared in 1884; of these Hanford-Chamberlain's is the fullest and most authentic. Consult also Foster, (A Cen- tury of American Diplomacy) (New York 1900) ; Gilder, (Grover Cleveland) (New York 1910) ; Henderson, (American Diplomatic Questions5 (New York 1901) ; Hensel and Par¬ ker, (The Life and Public Services of Grover Cleveland5 (New York 1906) ; McClure, (Our Presidents5 (New York 1905) ; Parker, (Recol¬ lections of Grover Cleveland5 (New York 1909) ; Rice, William Gorham, and Stetson, Francis Lynde, (Was New York's Vote Stolen ?5 (New York 1915) ; (

W. N. C. Carlton,

Librarian, Newberry Library, Chicago.

CLEVELAND, England, a hilly district in the North Riding of Yorkshire, about 28 miles long and 15 broad, between the Tees and the coast at Whitby and giving its name to one of the parliamentary divisions of the county. The district gave the name to a famous breed of horses, the Cleveland bays. It has developed enormously since the discovery of its extensive deposits of iron ore, which is smelted chiefly at Middlesbrough.

CLEVELAND, Ohio, city and county-seat of Cuyahoga County. The city of Cleveland

was chartered in 1836, 21 years after

its incorporation as a village in 1815 ; the original survey was made under the superin¬ tendence of Moses Cleaveland for the Con¬ necticut Land Company in 1796. It is now the fifth city of the country in population and manufactures, its position on the south shore of Lake Erie giving it direct contact by rail and lake with sources of America's great mineral wealth. The city has an area of 56.65 square miles and lies on a plateau 100 feet above the lake and 580 feet above the sea- level ; 357 miles by rail east of Chicago ; 140 miles northwest of Pittsburgh; 623 miles by rail northwest of New York; and 183 miles west of Buffalo. The city's location, as re¬ gards the Great Lakes, and its proximity by rail to the coal and coke regions of Ohio and Pennsylvania are great assets. Its geographi¬ cal position has made it the most economical point in the United States for the

assembling of .these ingredients of iron and steel and it is not out of place to mention that the Standard Oil Company had its beginning here. The city's growth has been very rapid. In 1900 its popu¬ lation was 381,768; by 1910 it had increased to 560,663. Ten years later (1920) it had in¬ creased to 796,836. The tax duplicate of Cuya¬ hoga County, in which Cleveland is located, has increased over $278,000,000. The assessed valua¬ tion of Cuyahoga County is $1,491,086,810, which is greater than that of any one of 34 States of the Union, and exceeded by only 14. Over $33,000,000 were added to the deposits of Cleveland banks during the 12 months of 1917. The bank deposits of Cleve¬ land in 1917 amounted to $522,229,391, and are assessable but not assessed. The bank clear¬ ances for 1917 show a gain of 50 per cent over 1916, or about $1,256,287,918. The building per¬ mits show that Cleveland is essentially a city of individual homes as well as of great mer¬ cantile and industrial establishments, and figures also should take into account the growth of adjoining suburban communities where thou¬ sands of Clevelanders have their homes. The total number of building permits in Cleveland for the year 1917 was 11,952, at a valuation of

$30,483,750.

Manufactures. — The total value of goods manufactured in Cleveland in the year 1914 was $352,418,052, an increase of $80,457,052, or 29.6 per cent over the figures of five years previous. The capital invested in Cleveland manufactures was $312,908,956. The number of industrial ˆestablishments® enumerated by the census was 2,346, as compared with 2,148 in 1909. The value of material used was fixed at $198,515,000 as against $154,915,000 in 1909, a gain of 28.1 per cent. The value added by manufacture to these products was $153,925,488, an increase in five years of 31.5 per cent. The value added by manufacture formed 46.3 per cent of the total value in 1914, and 43 per cent in 1909. The salaries and wages of industrial plants in 1909 were $63,559,000, and this rose in 1914 to $92,- 868,865, an increase of 46.1 per cent. The num¬ ber of salaried employees was 17,766 in 1914 as compared with 12,240 in 1909, making an in¬ crease of 5,526, or 45.2 per cent. The average number of wage earners in 1914 was 103,334, as against 84,728 in 1909, the increase being 18,496. or 22 per cent.

Industries and Value of Output. — Iron and

steel works and rolling mills, $58,752,000; foundry and machine shop products, $50,951,- 000; automobiles, including bodies and parts, $27,117,000 (an increase of 486.4 per cent over 1904),; slaughtering and meat packing, $24,- 737,000; women's clothing, $16,243,000; printing and publishing, $14,099,000; paint and varnish, $10,093,000; men's clothing, including shirts, $9,546,000; malt liquors, $6,528,000; stoves and furnaces, including gas and oil stoves, $8,621,- 000; bread and other bakery products, $6,908,- 000; electrical machinery, apparatus and other supplies, $11,358,000; hardware, $5,766,060; lum¬ ber and timber products, $4,916,000. Industries in which the production passed the million dol¬ lar mark include copper, tin and sheet iron products, confectionery, hosiery and knit goods, tobacco manufactures, brass and bronze prod¬ ucts, cutlery and tools, cars and general shop construction and repairs, chemicals, millinery and lace goods, fancy and paper boxes, furni¬ ture and ' ref rigerators, patent medicines and druggists' preparations and shipbuilding. Only New York has a larger production of women's outer garments than. Cleveland, where some¬ thing like 10,000 people are engaged in this one industry. Over a half million dollars a year is spent for designing alone. There are no sweatshops in the Cleveland garment industry, no child labor, no exhaustive rush season with its subsequent long season of slackness and unemployment. In direct contrast to conditions in other garment manufacturing cities, Cleve¬ land's plants are models in construction, sani¬ tary conditions and welfare provisions.

*Commerce. — Cleveland's remarkable growth in wealth and population is mainly due to its excellent geographical situation. It is the eco¬ nomic focus of the Lake Superior iron and the Middle States coM regions ; and nowhere else in the United States can these two products be brought together with less cost for transporta¬ tion. In 1917 the total movement of freight was 37, 306,259 net tons, of which 24,877,522 tons were received and forwarded by rail and the remainder by lake. Grain receipts in 1917 amounted to 13,037,254 bushels and grain ship¬ ments to 5,190,256 bushels. These totals in¬ cluded 2,094,953 bushels of wheat received and 598,595 bushels shipped; 2*023,555 bushels of corn received, 1,226,335 bushels shipped; 4,575,- 497 bushels of oats received, 1,888,681 bushels shipped; 54,070 bushels of barley received, 72,383 bushels shipped; and 268,984 bushels of rye and other cereals received, 93,842 bushels shipped. Flour receipts were*

804,039 barrels and shipments 262,084. Iron ore receipts in 1917 aggregated 9,077,161 gross tons. Cattle and calves received in 1917 numbered 135,560, hogs 648,332 and sheep 182,065. The 1917 im¬ ports at Cleveland were valued at $10,812,369 and the exports at $6,859,935. For the Ohio customs district of which the city is the head¬ quarters, imports amounted to $16,616,285 and exports to $40,998,255.

Civic Growth. — The civic growth of Cleve¬ land has not lacked in interest. Its group plan of public buildings is (1918) approaching visualization, inasmuch as the Federal, county and municipal buildings are completed, and these, with the Public Library, will mark the four corners of the project. This work has been the outgrowth of many years' work on the part of the Cleveland Chamber of Com-

merce, the city administration being assisted by such well-known architects as the late Daniel H. Burnham, John M. Carrere, Arnold W. Brunner and John C. Olmsted. The first two named buildings overlook the shore of Lake Erie and the other two face Superior avenue. Between the two buildings on the lake front is to be constructed a Union Depot of com¬ mensurate dignity with the other public build¬ ings and at a cost of about $4,500,000. From this station a Mall 570 feet wide will extend to the Federal and Library buildings, a distance of nearly 2,000 feet. The arrangement for the transfer of surface city land on the lake front to the railroads will produce $1,400,000, which will be available for the future acquisition of property remaining to be acquired in the pro¬ posed Mall. However, owing to delay in the building of the Union Station on the lake front and by reason of changing conditions, it may be consolidated with other terminal stations in and about the Public Square. It might be said that the cost of the City Hall Building is about $3,330,000, the County Building about $5,000,000, the Federal Building $3,875,000 and the Library $3,000,000, making something like $15,000,000 for building purposes alone. A referendum for a bond issue of $2,500,000 was voted favorablv upon at the 1917 election for a Public Hall and Auditorium. Work already has been com¬ menced on this building and is progressing as rapidly as possible under existing war conditions.

Bridges. — Officially and legally Cleveland is one city, but from the earliest days it has been in reality two, divided at its centre by a deep ravine and flats, through which the Cuyahoga River makes its way to Lake Erie. Factories, docks and warehouses, with both water and rail facilities, find in the flats an advantageous location, but through traffic down one side and up the other has been out of the question from the first. It was to obviate this that 40 years ago the Superior Viaduct, three-quarters of a mile of stone arches, with a swing bridge at the river, was erected, but the swing bridge to let the lake boats through to the up-river docks, with its 15 minutes' delay several times a day, was enough to choke the development of the west compared with the prosperity of the east side, where the business district grew up around the Public Square and public buildings. A second viaduct was erected farther south be¬ tween Central avenue on the east side and Clark avenue and West 14th street on the west, but the steady growth of the city made even these provisions inadequate, and a new high level bridge has been completed to con¬ nect Superior avenue and the Public Square on the east with Detroit avenue on the west, at a total cost of approximately $3,000,000. This bridge has two levels to carry the immense traffic between the east and west sides. It spans the river at a height which allows the tallest stacks and masts on the Great Lakes to pass under it, 96 feet above mean lake level and 93 feet above the highest known water level. The upper floor of the bridge is 121 feet above the river. Six street car tracks occupy the lower level of the bridge, and road¬ way and sidewalk the upper. The river span is of steel, 591 feet in length, and 12 spans of concrete carry the rest of the upper structure, which has a length over all of 2,880 feet. The width is 81 feet 6 inches; width of roadway,

45 feet ; width of sidewalks, 14 feet 9 inches each. Twenty-eight miles of concrete piles were used, 108,000 cubic yards of concrete, 3,000 tons of reinforcing steel and 3,800 tons of structural steel. Five million dollars has been voted for another bridge across the river between Huron road and Lorain avenue.

Harbor Facilities. — Cleveland has 14.2 miles of lake frontage, protected by a break¬ water 5j4 miles in length, which ha^been con¬ structed by the Federal government at a cost of approximately $6,000,000, while an additional $1,000,000 has been expended in dredging and maintenance. The total lake front protected by the breakwater is 28,035 feet. The harbor has a spacious entrance, and the extension of East Ninth street has made possible the con¬ struction of two passenger piers, affording ample dockage for passenger service from De¬ troit and Buffalo. These docks are located east of the harbor entrance, while the harbor to the west affords unexcelled facilities for handling iron ore. The Cuyahoga River, which flows into Lake Erie at Cleveland, is also lined with docks, adjacent to which are many fur¬ naces, factories and lumber yards.

Public Health, etc. — The average annual mean temperature of Cleveland for a period of 33 years was 51.30°. The highest tem¬ perature in 1917 was 95° F. and the lowest 8° below zero. The normal rainfall is 35 inches. According to the city's new charter, the de¬ partment of health includes the bureau of food and dairy inspection, division of housing, bu¬ reau of child hygiene and bureau

of tuber¬ culosis — the last named one of the model in¬ stitutions of the country.

Notable Buildings. — Euclid avenue, for¬ merly renowned for its spacious lawns and elaborate homes, is rapidly becoming the new shopping district of Cleveland. Under the Cleveland Building Act, which regulates the height of the building by the width of the avenue on which it fronts, 12 stories is the ordinary limit for office building construction. This, it is hoped, will produce something of a uniformity of heights rather than a skyline composed of ill-proportioned skyscrapers and abnormally low buildings. Substantiality, rather than excessive height or garish design, marks the present day building construction here. The Rockefeller Building, the Brother¬ hood of Locomotive Engineers Building, the new Guardian Savings Bank, the Williamson, Citizens' Savings & Trust Company, the large department stores of the May and Bailey com¬ panies, William Taylor & Son Company, the Halle Brothers Company, the Higbee Company, the banking establishments of the First Na¬ tional, the Cleveland Trust Company, Union Commerce National and the Cleveland National banks are interesting examples of modern con¬ struction, as are the Swetland, Rose, Garfield, American Trust, Cleveland Electric Illumi¬ nating Company, Lcadcr-Neivs, Cleveland Plain Dealer and Press newspaper buildings, the Statler, Olmsted, Hollenden, Winton and Cleveland hotels. In semi-public buildings the Cleveland Athletic Club structure, the Y. M. C. A., the Hippodrome Theatre and the new Federal and municipal buildings, which are located on the proposed Mall, are important features of Cleveland's architectural growth. There are four large arcades on Euclid avenue,

reaching through to Superior and Prospect avenues, that are of distinctive architectural interest.

Boulevards, Parks, etc. — The first park was given to the city by J. H. Wade in the early 80's. The present park system was initiated by a group of six men. Mr. Charles Bulkley was elected first president of the Park Board in 1888, and much of the credit for Cleveland's 2,428 acres of fcity parks and 43ˆ4 miles of well- paved boulevards belongs to him and the Park Board as then constituted. Along the lake front in the heart of the city are open grounds marked by the entrance to the proposed Mall ; five miles east of this lies Gordon Park, a beautiful spot donated by the late W. J. Gor¬ don, containing 113 acres of lawn and woods; six miles to the westward is Edgewater Park, stretching 6,000 feet along the lake and con¬ taining 125 acres of attractive playgrounds. These are the principal park sites, but six miles back of Gordon Park, connected by a magnifi¬ cent boulevard, lies Shaker Lakes, a beautiful natural spot of 300 acres, just outside of the city limits in the attractive suburb of Cleve¬ land Heights. Mr. Patrick Calhoun gave a piece of land lying between Euclid avenue and Cedar avenue which forms the gateway to the Shaker Lakes. About equal distance to the south of Edgewater Park lies Brookside Park, and midway between this and Garfield boule¬ vard is Woodland Hills Park of 113 acres filled with playgrounds and devoted to athletic sports, while Garfield, Lakeview, Lincoln and Washington parks, with Monumental park in the Public Square, afford extensive and attract¬ ive breathing spots for Cleveland's growing populace. At the entrance of Edgewater Park and beginning a boulevard system that leads from the new high level bridge and extends to the extreme western limit of the city is Bulkley boulevard. A new public bath house was erected at Edgewater Park ready for the open¬ ing of the 1914 season. The building is de¬ signed in Spanish Mission style, is a very permanent style of construction with steel frame and fireproof walls. The building is 314 feet long, 50 feet wide, of sanitary construction, with cement and tile floors and cement plas¬ tered walls. The upper floor at the west end of the building contains an open pavilion and restaurant for spectators. The lower floors contain 665 separate rooms and two locker rooms for boys, furnishing in all accommoda¬ tions for about 3,000 bathers at one time. A concrete retaining wall has been built in front of the bath house to keep the beach from extending farther inland. The city's recrea¬ tional facilities may be said to contain 18 play¬ grounds, 3 public baths, 2 municipal dance halls, 43 baseball diamonds, 15 football grounds, 67 tennis courts and 14 skating ponds. Brook- side Park contains a zoological garden in which 154 acres are utilized. The valley connecting Gordon Park with the Shaker Lake district is known as Rockefeller Park, much of the terri¬ tory being donated by Mr. John D. Rockefeller, whose estate at Forest Hill is a park in itself. At Edgewater Park a municipal dance hall is maintained, while at Woodland Hills Park there is a ˆneighborhood center® and the shelter-house there is utilized as a dance pavil¬ ion in the same manner as at Edgewater. Re¬ freshment stands and a small charge for danc¬

ing privileges make the receipts not only cover expenses but show a small net profit. A vacant lot and home garden movement has obtained a strong foothold in Cleveland and in 1917 more than 15,000

(

Public Utilities. — The greater part of the electric light, power and steam heat for the city and surrounding towns is furnished by the Cleve¬ land Electric Illuminating Company. The newly erected municipal electric lighting plant was started on 1 July 1914; it has a capacity of 25,000 kilowatts. The city water is taken from Lake Erie through a series of tunnels connected with water stations, or cribs, some distance from shore. There are 985 miles of mains and the daily consumption in 1917 was 103,88 2,227 gal¬ lons. A $3,500,000 filtration plant with a ca¬ pacity of 150,000,000 gallons of water per day was ready for operation 1 Nov: 1915. Three new sewage disposal plants are under con¬ struction.

Area, Streets, etc. — The area of the city of Cleveland is 56.65 square miles. The total length of streets and alleys is 917.5 miles, of which 603.2 miles are paved. There are 792 miles of sewers, a number of which are lo¬ cated outside of the city limits, carrying the sewage to the points of disposal. Since 1900 there have been 59 railway grade crossings separated, and there still remain 180 railway crossings at grade, of which 23 are switch tracks ; 30 of the main line crossings will be separated in the near future as litigation for this purpose has either been completed or is pending.

Railroads. — Seven trunk lines touch Cleve¬ land, viz., the New York Central, the Pennsyl¬ vania, the Cleveland, Cincinnati, Chicago & Saint Louis, the Baltimore & Ohio, the New York, Chicago & Saint Louis (Nickel Plate), the Erie and the Wheeling & Lake Erie. The largest fresh-water passenger steamships in the country supply daily service between Cleveland, Buffalo and Detroit, and there is also through passenger steamboat service to Duluth. The Cleveland Railway Company operated 372 miles of track in 1917 and owned 1,477 revenue cars, with a seating capacity of about 73,850 persons. Under the <(Tayler Plan® of operating the Cleve¬ land railway, the city controls the service under the supervision of a street railway commis¬ sioner who fixes the schedules, routes, stops, etc., and reserves the. right at all times to take over the entire system, in the meantime guaran¬ teeing 6 per cent on investment. This guarantee is governed by a sliding scale, which is regu¬ lated from time to time by withholding or extending the penny price of transfers. The maximum rate is four cents cash, or seven tickets for 25 cents, and one cent for a transfer. This rate is now in force, 1 June 1918, but may have to be increased because of increased cost of labor, materials and equipment.

Fire and Police Service. — The divisions of fire and police are operated by the department of public safety in Cleveland. There are 604 firemen, separated into 54 companies, and 807 policemen, operating from 14 precincts: The appropriation for the division of police for the year 1918 is $1,350,741 ; for the division of fire, $1,038,491.

Libraries and Museums. — The Cleveland

nmn im

1 New High Level Bridge across Cuyahoga River, connecting East and West sides of Cleveland

2 New Terminals of C. & B. Line and D. & C. Line, East Ninth Street, Cleveland

3 Federal Building

Public Library, whose prospective home will make the fifth building in the group plan of public edifices, contains over 600,000 volumes. There are 14 large branch libraries and 11 smaller branches, 8 high school and 10 grade school libraries, 42 deposit stations, 66 delivery stations and 6 children's stations, also 486 class¬ room libraries, the Municipal Reference Library and the Library for the Blind, making 645 agencies for circulating books in addition to the main library. The Case Library has 90,000 volumes and the Adelbert College Library 93,000. The Cleveland Museum of Art (incor¬ porated in 1913) is based on the John Hunting- ton Art Polytechnic Trust and the Kelley

Trust, which became in 1913 the Horace Kelley Art Foundation.

Education. — Cleveland is conspicuous for its system of public instruction. In 1917 there were 116 public elementary schools, with 3,017 teachers and 91,983 pupils; 14 public high schools, 9 junior high schools and 10 parochial high schools. The city is the seat of Western Reserve University, with academic, medical, pharmaceutical, dental, law and library schools ; the Case School of Applied Science; a public Normal Training School and a private kinder¬ garten training school, besides numerous private and commercial schools, schools for nurses' training, art, music, languages, etc. Other col¬ leges are Saint Ignatius College and the Cleve¬ land School of Pharmacy.

Finances. — In 1917 the real estate valuation was $747,785,510, the personal property valua¬ tion $450,928,050 and the total tax rate $15.55 per $1,000. The city has six national banks and a Federal Reserve Bank. The bank clear¬ ances for 1917, as reported by the Cleveland Clearing House, were $3,730,204,000, as against $2,473,916,082 in 1916.

Federated Charities. — The Welfare Fed¬ eration of Cleveland, through its 59 affiliated organizations, which render practically every kind of human service, during the year 1917 aided over 33,100 people, from giving them food and clothing to caring for them when sick and providing wholesome recreation. The Federa¬ tion, as a central office, since its inception four years ago has cut the cost of charitable collec¬ tion one-third and has greatly increased the amount of money collected and the number of givers. It has increased the efficiency of the separate organizations and promoted co-opera¬ tion among them. The Federation was unique at the time of its organization in having specific representation of organizations, donors and the city at large on its board of trustees and in planning not only financial but social work. It is still the largest institution of its kind in the world.

Modern Reformatory Methods. — Cleve¬ land's most widely known public institution of charity and correction is the Warrensville Farm Colony. The division of charities and correction presents the problem of developing the usefulness of Cleveland's unfortunate, de¬ linquent and dependent people as well as caring for the sick and poor for their own sake and for the protection of the community. This is done through two institutions somewhat peculiar to Cleveland in their construction and operation. One is known as the ((Farm Move¬ ment® at the City Correction Farm at War¬ rensville, Ohio, and the other is the House of

Correction at Hudson. These institutions are the outgrowth of the city's desire to furnish better opportunities for its unfortunates in accordance with a special ordinance of the city council. The great tract of land at War¬ rensville, consisting of about 2,000 acres, was originally named the Cooley Farms, in recog¬ nition of the welfare director who planned and executed the Cleveland system of handling minor violators of the law. The Correction Farm property consists of a Colony Farm or the place of residence of the infirmary or almshouse group of people; the Overlook Farm, on which is erected the new sanatorium for tuberculosis patients; the Correction Farm, on which is the workhouse or house of correction group ; and the Highland Park Farm, on which has been laid out a magnificent municipal cem¬ etery. Each one of these separate farms con¬ sists approximately of 500 acres of land. To¬ gether they form a great tract in one body over 2,000 acres, or more than three souare miles, which furnishes a favorable enviroˆient and varied opportunities for work to the resi¬ dents and inmates of the different villages. It is not a collection of institutions located on an ordinary farm in the country. It is rather a group of estates, each one set apart to special uses. With this large area it is possible to have the different groups entirely distinct, and at the same time secure the advantage of controlling a large environment. Reference to the tuber¬ culosis sanatorium on Overlook Farm may give some idea of the general policy of the city toward these institutions. The tuberculosis sanatorium was made possible by the $250,000 bond issue voted for by the city in 1910. The site is on a high ridge, over one-half mile south of the colony group. It is of the mis¬ sion style of architecture, as are many of the other buildings, with white plaster finish and red tile roofs. The building stands 600 feet above the city and is protected on the north and northwest by a forest of 70 acres, while from the other side it looks out over miles of surrounding country. The hillsides are planted with pine, fir and balsam, which help to make an ideal environment. For seven years before erecting these permanent buildings, the city maintained a temporary sanatorium with ac¬ commodations for about 80 patients, in which in all 1,248 cases were treated and the success of the

treatment justified the expenditure of the larger amount for permanent buildings.

Churches. — There are in Cleveland about 425 churches of all denominations, many of which occupy buildings of monumental archi¬ tecture. The churches include 70 Roman Cath¬ olic, 32 Baptist, 2 Christian Reformed, 2 Church of God, 31 Congregational, 11 Disciple, 25 Epis¬ copal, 7 Evangelical, 2 Free Methodist, 3 Friends, 14 German Evangelical Synod, 19 Lutheran, 53 Methodist Episcopal, 27 Presby¬ terian, 1 Welsh Presbyterian, 1 Reformed Church in America, 1 Reformed Church of Hungary, 14 Reformed Church in the United States, 2 Dutch Reformed in America, 1 Re¬ formed Episcopal, 2 Swedenborgian, 1 Uni¬ tarian, 5 United Brethren, 1 United Evangelical, 6 United Presbyterian, 1 Universalist and 40 miscellaneous.

Newspapers. — Cleveland has one morning and two evening English newspapers with a circulation of 470,000 daily and two Sunday

newspapers with a combined circulation of

325,000.

Commercial Organization. — The Cleveland Chamber of Commerce was founded in 1848 as the Board of Trade of the City of Cleve¬ land and was reorganized in 1893 as The Cleve¬ land Chamber of Commerce. Since 1899 it has occupied its own building in the northeast cor¬ ner of the Public Square. The Chamber has become famous for its activity along civic lines, closely identified with all important civic move¬ ments. It initiated the Group Plan for Cleve¬ land public buildings, the Welfare Federation of Cleveland and the new tenement-house code. Throughout the year speakers of national repu¬ tation address Tuesday luncheon meetings of the membership. The organization's facilities include a large auditorium with a seating ca¬ pacity of 1,000, a club, restaurant and a com¬ modious library. There is a Manufacturers' and Wholesale Merchants' Board, a Convention Boapd, a Retail Merchants' Board, an Associa¬ tion fof Women's Wear Manufacturers and a Traffic Bureau maintained in connection with the Cleveland chamber.

War Activities. — With the entrance of the United States into the world war Cleveland became one of the most important munitions and war accessories centres in the country. Al¬ most since the beginning of the war Cleveland industries have been actively engaged in the manufacture of war materials for the Allied governments. When the United States became an active participant Cleveland industries at once began to organize so that they might give the government the most efficient co-operation. A war industries commission, organized by the Chamber of Commerce, made a complete survey of Cleveland's industries, so that govern¬ ment contracts could be handled without loss of time and in a manner calculated to give the government the best possible industrial service. This survey includes equipment of plants, ca¬ pacity, material it can produce, number of workmen and other data which shows at once in what quantity and at what speed any needed war materials can be turned out either in part or as a whole. Cleveland now is manufacturing practically every war necessity from uniforms to tanks and transports. The big plant and laboratories of The National Electric Lamp Association at Nela Park have been turned over for government research work.

The Housing Problem. — Cleveland, like other large industrial centres, early in the war faced the problem of caring for tens of thou¬ sands of workers, permanent and "floating,® attracted to the city by increased wages, im¬ proved working conditions and the expansion of industry. Early in the fall of 1917 a survey made by the Chamber of Commerce showed that there was urgent need for at least 10,000 homes which couldj be sold at around $3,500 on easy payments and rental properties which would bring from $18 to $30 per month. The cor¬ poration known as The Cleveland Real Estate and Housing Company was organized by a num¬ ber of the city's leading business men and social workers. While this company is not a phi¬ lanthropy its incorporators will handle the housing problem at a minimum expense and with minimum profits. One of the prob¬ lems that this organization will work toward

solving will be providing proper accommoda¬ tions for more than 15,000 negroes.

Foreign Trade. — The foreign trade depart¬ ment of the Chamber of Commerce, since its organization early in 1915 as a co-operative branch of the Bureau of Foreign and Domestic Commerce of the Department of Commerce, co¬ operated in an unofficial capacity with the War Trade Board at Washington, in assisting and advising Cleveland exporters and importers with respect to Trading with the Enemy and the Exports Control acts.

City Government. — The city of Cleveland is governed under a charter prepared and pro¬ posed by a charter commission at a popular election on Tuesday, 1 July 1913. In order to get a comprehensive grasp of the more im¬ portant provisions of the Cleveland government the following brief outline may be of assistance : Party primaries are eliminated, candidates for municipal office being nominated by petition only. The short ballot principle has been care¬ fully observed. At each election the voter is called upon to express his choice for only two officials — the mayor and the council from his ward. The recall is provided for city officials upon a petition signed by 15,000 electors in case of officials elected at large and 600 electors in case of officials elected from wards. The char¬ ter provides for a council of 26 members elected from wards for a term of two years, the sal¬ aries to be fixed by the outgoing council and its functions limited to legislation. The mayor and heads of departments have seats in the council with the right to take part in discussions, but without a right to vote. A proposed ordinance may be placed before the council by an initiative petition signed by 5,000 electors. If not passed by the council it must be submitted to the voters at the next regular election, or an addi¬ tional petition containing the signatures of 5,000 additional electors will compel its submis¬ sion to a vote of the people at a special elec¬ tion. If a majority of those voting thereon vote in favor of the proposal it thereby becomes an ordinance. A petition of 10 per cent of the total vote of the last municipal election will compel the submission of an ordinance to a vote of the people. The mayor is elected for a term of two years and responsibility is defi¬ nitely fixed on him for the proper administra¬ tion of the affairs of the city. The adminis¬ trative functions are divided among seven departments with a director at the head of each appointed by the mayor. These are the de¬ partment of law; department of public service; department of parks and public property; department of public welfare, having to do with health, charities, recreation, research and publicity and employment ; the department of public safety, including the divisions of police, fire, buildings, housing inspection and weights and measures ; the department of finance, em¬ bracing the divisions of accounts, treasury, as¬ sessments and licenses, and the division of pub¬ lic utilities for the supervision of water, light and heat. Appropriate functions are either assigned to these divisions in the charter or the power is given to the council to so assign by ordinance. A civil service commission is also provided for. It was the belief of the commission in presenting this charter to the voters that it would provide a simplified election system, definitely fix the responsibility upon

administrative officers, secure an adequate ac¬ counting system, conserve the rights of the city in matters relating to franchises, provide a merit system in the appointment of public officers and furnish Cleveland with a far better form of government than under the former plan. A preferential plan of elections provides for first and second choice ballot, and if no candidate shall receive a majority of the first- choice votes, then the second-choice votes re¬ ceived by such candidate shall be added to the first-choice votes and the candidate receiving the largest number of first and second-choice votes combined, if such constitute a majority, shall be elected.

History. — For the claim of Connecticut to the territory from lat. 41° to 42° 1′ N. and 120 miles west of the Pennsylvania line, see Western Reserve. That State conveyed its title to the Connecticut Land Company, which in 1796 sent out Moses Cleaveland to survey the land and establish (

to Newburg. The same year five steam rail¬ roads were chartered from Cleveland to every¬ where, and the Ohio Railroad to the Maumee sold a good deal of stock; but the panic of 1837 ended such speculations, and it was not until 1846 that more were even chartered, and about five years later before the first one was built. The advantage was immense, and it leaped from 17,000 to 43,000 within a few years. About the time of the Civil War the iron in¬ dustry began to take root and the manufacture of iron products for the government during the war crowded its manufactories, as did that of clothing. Since then its history is mainly that of an enormously expanding industrial city, but one that has never forgotten to keep its intellectual growth and the spirit of culture abreast of its material development. In 1872 it annexed East Cleveland; in 1873 Newburg; in 1893 West Cleveland and Brooklyn. In 1896 it celebrated its centennial.

Myron T. Herrick, Ambassador to France 1912-14; 1921.

CLEVELAND, Tenn., city and county- seat of Bradley County, about 30 miles from Chattanooga, on the Southern Railroad. In ad¬ dition to the usual industries of a town in an agricultural region, it has stove-works and woolen and flour mills, chair factory, hosiery mills, ice and cold-storage plant, lumber and planing mills and a coffin factory. It is the site of Centenary Female College. Settled in 1820, it was incorporated about 1880. The waterworks are owned by the city. Pop. 6,522.

CLEVELAND, CINCINNATI, CHI¬ CAGO AND SAINT LOUIS RAILWAY COMPANY, The. This road, better known as the (

On 30 June 1916 the company operated 2,383 miles of road, of which 1,688 miles were owned by the company, the remainder being held un¬ der leases, contract, proprietary rights or trackage rights. On 31 Dec. 1915 the capital stock outstanding totaled $57,056,300, of which $10,000,000 was preferred, and $47,056,300 was common. Of the latter the New York Cen¬ tral Railroad owned $30,207,700. On the same date the <(Big Four® owned $21,933,868 of the stock of other railroads and $20,082,230 of their bonds. In 1912 the company purchased coal lands in Illinois aggregating 76,000 acres.

For the year ended 30 June 1916 the oper¬ ating revenue amounted to $43,478,002 and the operating expenses to $29,195,230 — the net op¬ erating revenue being $14,282,772. The inter¬ est on the funded debt amounted to $4,851,981

and the tax accruals to $1,556,131. Rents paid for leased roads, equipment and other expenses reduced the net income to $7,103,089, of which $6,866,275 was passed to profit and loss account, wiping out a deficiency and leaving a credit balance of $1,763,933.

The year's transportation service totaled 16,851,148 train miles, an average of 7,072 train miles per mile of road. The number of pas¬ sengers transported was 8,735,964 and the amount of freight moved was 31,443,141 tons, about 15,000,000 tons being bituminous coal. The revenue per passenger carried averaged $1.04, and per passenger mile, two cents. The revenue per ton of freight averaged $0.97, and per ton mile, a little more than one-half cent. The equipment consisted of 804 locomotives, 365 passenger cars, 76 baggage and express cars, 40 postal cars, 400 refrigerator cars, 16,376 box cars, 11,024 coal cars, 1,106 flat cars and 636 stock cars. The road forms a part of the New York Central Railroad system.

CLOVES, klav (German Kleve), Prussia, chief town of the Rhine province, 70 miles northwest of Cologne and four and one-half miles from the Rhine, with which it is con¬ nected by a canal. It has manufactures of machinery,

tobacco, leather and cotton. In the centre of the town rises the old and re¬ nowned Schwanenburg (Swan's Castle), the ancient residence of the dukes of Cleves, founded, according to tradition, by Julius Caesar. The collegiate church, dating from the 14th century, contains monuments of the counts and dukes of Cleves. Under the Treaty of Xanten in 1614 Cleves passed into the pos¬ session of the Elector of Brandenburg (now represented by Prussia). Pop. 18,135.

CLEWS, Henry, American banker : b. Staffordshire, England, 14 Aug. 1840. He studied for the ministry, but left school to enter mercantile life at New York, whither his father had taken him on a visit. After the panic of 1857 he organized the banking firm of Stout, Clews and Mason, which later became Liver¬ more, Clews and Co. At the outbreak of the Civil War he was appointed by Secretary of the Treasury S. P. Chase government financial agent for sale of bond issues to continue the war. In 1877 he organized and has since been the head of the banking firm of Henry Clews and Co. He was appointed by General Grant fiscal agent of the United States government for all foreign nations. He also was adviser and agent in organizing the new financial sys¬ tem of Japan. He was a founder of the Union League Club, New York, and originated, organ¬ ized and nominated 65 members of the Com¬ mittee of Seventy. He published twenty- eight Years in Wall Street 5 (1885) ; (Wall Street Point of \riew5 (1900) ; (Fifty Years in Wall Street5 (1908); (Speeches and Essays5

(1910).

CLICHE, kle-sha', an electrotype or stereo¬ type cast from an engraving used to print from.

CLICHY-LA-GARENNE, kle-she-la-ga- ren, France (Latin, Cligiacum) , town in the de¬ partment of the Seine, near the right bank of the Seine, and on the railway between Paris and Saint Germain, about four miles northwest of Paris. In the 7th century it was frequently the residence of the court. It contains a parish

church, the erection of which is due to the celebrated Vincent de Paul, who was curate of Clichy in 1612; and has manufactures of starch, rubber, white-lead, chemical products and var¬ nish, etc. Pop. 46,676.

CLICK BEETLE, a member of the family Elateridae, also known as the snapping bug and skipjack. When disturbed these beetles curl up and lie on their backs on the ground for a few moments and then begin a series of springs into the air accompanied by a clicking sound. When the beetle lands on its feet it runs off. The larvae, known as wireworms, are brownish yellow in color and often live several years before attaining maturity. They live under bark and in rotten stumps and some are found in the roots of grass, Indian corn or of certain vegetables. When in great numbers they do considerable damage. Fall plowing is consid¬ ered the best remedy against them. There are about 500 species in America and 7,000 species are known altogether. Consult De Candeze, (Monographic des elaterides5 (4 vols., Liege 1857-81) ; and Le Conte, (Revision of the Elateridse of the United States5 (in Transac¬ tions of the Philosophical Society, Vol. X, Philadelphia 1853).

CLIENTS, citizens of the lower ranks in ancient Rome who chose a patron from the higher classes, whose duty it was to assist them in legal cases, and to take a paternal care of them. The clients, on the other hand, were obliged to portion the daughters of the patron if he had not sufficient fortune, to follow him to the wars, to ransom him if taken prisoner and to vote for him if he was candidate for an office. If a client died without issue and had made no will, his property fell to the patron. Clients and patrons were under mutual obli¬ gation not to accuse each other, not to bear witness against each other and in general not to do one another injury. This relation con¬ tinued till the time of the emperors. It may be considered as the transition from a patriar¬ chal state, in which family relations are pre¬ dominant, to a well-developed political system, securing the rights and independence of the individual. In modern law, a client is one who retains or consults an attorney or counsellor at law for advice, or to manipulate any action at law or to represent him in legal matters. The strictest confidence is required of the attorney, the breach of which may be heavily punished.

CLIFF. Nearly vertical rock walls are formed in a variety of ways by natural means. In the development of a drainage system in any high-lying tract of country, ravines, gorges, and canyons are formed by the down-cutting streams, as Watkins Glen, N. Y., the gorge of the Niagara River and the Grand Canyon of the Colorado. After long erosion the softer rocks may be removed, leaving the harder with steep faces standing above the surrounding country, as at the Delaware Water Gap, in the Catskills and many places in the Appalachian Moun¬ tains. In high mountains glaciers

dig out deep channels.. Cliffs formed in these ways may be called cliffs of erosion. Where a high coast borders any large body of water the waves eating into the land form cliffs, as on the north¬ ern shores of Scotland, southern England, the coast of Maine and elsewhere. Such cliffs may be called sea cliffs. Cliffs may also be formed

by the rock fractures known as "faults,® where the rocks on one side of a fracture rise faster than they are worn down by weathering. Such cliffs are not uncommon ; they are found in many parts of the West, being especially prom¬ inent in arid regions like the Colorado plateau, where weathering is slow. Such cliffs may be called "fault cliffs.®

CLIFF-DWELLERS. This term, although of broader application, means in America that prehistoric race that built the houses and vil¬ lages whose ruins are found in the southwest¬ ern part of the United States, and especially in the valley of the Rio San Juan and its tribu¬ taries. This river rises in the extreme south¬ western corner of Colorado, and flows west¬ ward along the borders of adjoining States to a junction with the Rio Colorado. Its course lies mostly in a series of deeply depressed val¬ leys, bounded on each side by tablelands (mesas) with abrupt and lofty faces, which in its lower course confine it in deep and nar¬ row canyons. Its tributaries have cut their way from their mountain-sources down through the soft sandstones of these mesas to the river, forming thus side-canyons, some of which have broad "bottoms® on both sides of the now shrunken streams, always hemmed in by steep walls that have weathered into ledges and re¬ cesses varying in depth with the varying hard¬ ness of their strata. The principal tributaries from the north are the Animas, the Mancos, the Hovenweep and the McElmo, in Colorado, whose canyons are cut through the Mesa Verde; and the Montezuma in Utah; and from the south the Chaco, in New Mexico, and the De Chelly and Navajo creeks in Arizona. The walls of all these streams, and of lesser tribu¬ taries, abound in the cliff-dwellings and other remains of prehistoric inhabitants.

Rumors of such ruins led to an effort by the United States Geological Survey in 1874 to find and investigate them, and a party led by W. H. Jackson and Ernest Ingersoll crossed the mountains in the summer of that year and ma-de a hasty survey of the Mesa Verde region. This party discovered the since famous ruins of the Mancos Canyon and many others west¬ ward; and Mr. Ingersoll's letters to the New York Tribune in 1874 contained the first intelli¬ gent account of them; while Jackson's report, in the Annual Report of the Survey for that year, gave extended details, illustrated from photographs taken in the field of these novel and

interesting remains. Since that time ex¬ tensive explorations of this region by the Bureau of Ethnology and by private persons have brought to light vast additions to this in¬ formation ; and the government has made national reservations of certain districts, in order that these ruins may be preserved and easily visited.

The area in which the cliff-dwellings occur is practically coextensive with that in which are now found traces of town-building and relics attributable to the Pueblo tribes. The general likeness throughout this region (and locally elsewhere in Arizona and northern Mexico) in architecture, implements, style of decoration, etc., shown by the ruins, establishes their close relationship, historically, with the existing vil¬ lage- Indians of the region (see Pueblo), and shows that in early periods, as now, numerous

tribal groups were represented in the region, and that then, as now, "there was a general community of culture if not of kinship in blood?® This similarity, and the evidence of records and tradition, make it certain that the builders of these abandoned houses and towns were men of the same sort as, if not directly ancestral to, the modern Pueblo Indians.

The valleys occupied are characterized, as has been said, by cliff-like walls of sandstone enclosing large spaces of flat bottom-lands, in which the soil is fertile when supplied with water. It will produce good crops under irri¬ gation — an art well understood by both ancient and modern inhabitants of that arid region. The annual rainfall even now is considerable, and there is evidence that anciently it was much more copious.

As to the origin of these vanished "cliff- dwellers® nothing is known ; but it is evident that centuries ago these valleys were occupied by a considerable, sedentary population, who had fixed homes and cultivated fields for crops of corn (maize), beans, gourds and probably other things, by means of extensive systems of irrigation. They made pottery, cloth, baskets, etc., and stone implements, but nothing me¬ tallic.

In this peaceful and industrious life they were exposed, however, to raids from the nomadic and more savage tribes of the moun¬ tains and plains north and east of them, and hence were compelled to concentrate their homes into defensive villages, to build fort-like walls and erect watch-towers along their fron¬ tiers and on surrounding heights. These struc¬ tures, as indicated by their ruins, appear essen¬ tially like those now occupied in New Mexico and Arizona. The habits and general culture of these prehistoric people, or peoples, were apparently much the same as those of their descendants when first visited by Spanish ex¬ plorers in the 16th century.

The walls of the canyon-valleys were com¬ posed of sandstones in strata of

varying hard¬ ness, so that in many places the wearing away of a softer layer left a long horizontal recess, sometimes several yards in depth, overhung by harder rock. These natural shelters were some¬ times low down and easily accessible, and were naturally taken advantage of as good situa¬ tions for storehouses for grain and for resi¬ dence. Often there was room for only one or two houses, which could be built economically, as little more was required than a front and one or more side walls, enclosing a space of the ledge-floor and roofed by the overhanging rock. Such single houses were often found occupying niches hundreds of feet above the valley-floor. In several places, however, the recesses, or shallow caves, were of sufficient length and depth to accommodate a large num¬ ber of houses, forming a real village, with granaries, kivas and protective front walls. The most extensive of these towns yet known is that in Walnut Canyon, a tributary of Mon¬ tezuma Creek, Colorado, called Cliff-Palace. This contained about 100 rooms. The terrace had been leveled and extended by building sup¬ porting walls along its irregular front, and long and prosperous occupancy is evident. This and another remarkable ruin nearby called Spruce Tree House, lately cleared of rubbish, are now national reservations and in the custody of the

Smithsonian Institution. Such reservations also ensure the continued safety of similar remains in various places elsewhere. See Casa Grande, etc.

Xhe construction of these houses is described in the (Handbook of American Indians) as follows :

((In the large shelters the buildings are much diversified in plan and elevation owing to the irregularities in the conformation of the floor and walls. The first floor was the rock- surface, or, if that was uneven, of clay and flagstones, and upper floors were constructed of poles set in the masonry, often projecting through the walls and overlaid with smaller poles and willows, finished above with adobe cement. The masonry is excellent, the rather small stones, gathered in many cases from dis¬ tant sites, being laid in mortar. The stones were rarely dressed, but were carefully selected, so that the wall-surface was even, and in some cases a decorative effect was given by alternat¬ ing layers of larger and smaller pieces and by chinking the crevices with spalls. The walls were sometimes plastered inside and out and finished with clay paint. The doorways were small and squarish, and often did not extend to the floor, except an opening or square notch in the centre for the passage of the feet. The lintels were stone slabs, or consisted of sticks or small timbers. Windows or outlook-aper¬ tures, were numerous and generally small. . . . Where the way is very steep niche-

stairways were cut in the rock-face, making approach possible. Ladders of notched logs were also used.®

In some parts of this district, as, especially on the eastern side of the Jemez Plateau, in New Mexico, great numbers of dwelling-places have been dug out of the rock, or crevices have been enlarged and the front walled up. Ari¬ zona and Mexico show these also. They are associated with the cliff-houses, but are more properly classified and described elsewhere. See Cave-Dwellers.

The age of these ruins, by whom built, and when and why they were abandoned, are matters of conjecture, with few substan¬ tial bases for hypothesis. They certainly antedate the coming of white men, for no objects of metal nor any evidences of domestic animals have been found. Esti¬ mates as to antiquity vary from 500 to sev¬ eral thousand years — the latter probably very excessive. Many places have evidently been occupied within comparatively recent times, and 1,000 years seems enough to allow to the oldest. The best opinion is that pressure by enemies led to the making of these inconvenient habitations, and that this with the increasing dryness of the climate (of which other evi¬ dence exists) finally compelled retreat. Speak¬ ing of the Mesa Verde district, Dr. J. Walter Fewkes, of the bureau of ethnology, who is perhaps the best informed man in the country on this subject, expresses the subjoined opinion :

((The inhabitants of these buildings strug¬ gled to gain a livelihood against their unfavor¬ able environment until a too exacting nature finally overcame them. . . . One of the

primary reasons was change of climate, which caused the water-supply to diminish and the crops to fail; but long before its final deser¬ tion many clans abandoned the place and

drifting from point to point sought home-sites where water was more abundant. . . .

Where the descendants of Cliff Palace now dwell, or whether they are now extinct, can be determined only by additional research.®

Bibliography. — Annual Reports United States Geological Survey (Hayden's, 1874, 1876) ; Reports Bureau of Ethnology, and Bul¬ letins, especially Nos. 30, 41, 50, 51 ; Hodge, (Handbook of American Indians (Washing¬ ton 1907) ; Nordenskiold, (Cliff-dwellers of the Mesa Verde) (Stockholm 1893).*

Ernest Ingersoll.

CLIFF SWALLOW, a swallow of North America, also known as the eaves swallow, which makes its nest about barns and outbuild¬ ings. It has a

white forehead, a gray breast and collar and a square tail. Its nest is always placed on the outside of the building, unlike that of the fork-tailed barn swallow. Before the country was settled these birds nested in colonies on the sides of cliffs. Its nests in these situations were globular with a narrow neck. With the advent of civilization the birds abandoned the cliffs and began to build their nests in the better-sheltered spaces under the eaves of houses and barns. Their nests have also in some cases lost their flask-like form, now being mostly in the shape of a cup. Con¬ sult Knowlton, (Birds of the World) (New York 1909).

CLIFFORD, the name of a very old Eng¬ lish family and barony, taken from the village of Clifford in Herefordshire, although the fam¬ ily was mainly associated with the north of England. The founder of the family, Walter, son of Richard Fitz-Ponce, a Norman baron, acquired the castle of Clifford, in Hereford¬ shire, under Henry II, and hence took the name of Clifford. Among the noted members of this family were Robert de Clifford, a prom¬ inent soldier during the reigns of Edward I and II ; John, the 9th baron, who fought on the side of Henry VI and is celebrated by Shakespeare in (King Henry VP ; Richard, bishop of Worcester and London; Henry, 10th baron, a student of astronomy and astrology who is celebrated by Wordsworth in (The White Doe of RylstoneP In 1525 the Cliffords became earls of Cumberland, but in 1643 this title became extinct. The male line of the Cliffords is at present represented by the baronial family Clifford of Chudleigh. The first Baron Clifford of Chudleigh was Thomas Clifford, one of the members of the Cabal, who was raised to this dignity in 1672. Consult Cokayne, (Complete Peerage (1887-98).*

CLIFFORD, Cornelius, American clergy¬ man: b. New York, 24 Aug. 1859. He was educated at Saint John's College, Fordham, and in the Jesuit scholasticates of Woodstock, Md., Innsbruck, Austria, and Saint Asaph, Wales, and at Louvain University. He entered the Society of Jesus about 1885; was professor of rhetoric at Georgetown University 1887-89, and Saint Francis Xavier's College, New York, 1889-90. He was transferred to England in 1892 and was headmaster of the senior school at Wimbledon 1895-97. He was ordained to the priesthood in 1898 and in 1898-99 was at Beaumont College, Old Windsor. He quitted the Society of Jesus in 1899 and was appointed professor of logic and history at Merriam Park

College, Saint Paul, Minn. In 1900-03 he edited the Providence Visitor and in 1905-07 was an assistant in the Assumption Church, Morristown, N. J. The two years following lie taught philosophy and Church history at Seton Hall College, New Jersey, becoming in 1909 pastor of a church at Whippany, N. J. Since 1913 he has lectured on scholastic philos¬ ophy to candidates for the M.A. and Ph.D. degrees at Columbia University. He is the author of (Introibo) (1903); (The Burden of the rime' (1904). He is a contributor to the (Catholic Encyclopedia' (1910), the Month, Tablet, Spectator (London), etc.

CLIFFORD, George, Earl of Cumber¬ land: b. Westmoreland 1558; d. 1605. A cele¬ brated English navigator. He studied at Cam¬ bridge, where he received the degree of M.A. in 1576. He had become Earl of

Cumberland in 1570. In 1588 he was placed in command of the Elizabeth Bonaventure and fought the Spanish Armada. He was notorious as a buc¬ caneer and captured many valuable prizes.

CLIFFORD, Harry Ellsworth, American electrical engineer: b. Lowell, Mass., 21 April 1866. He was graduated at the Massachusetts Institute of Technology in 1886, and spent three years as a graduate student at Harvard. In 1886-88 he was assistant in physics, in¬ structor in theoretical physics 1888-95, assistant professor of theoretical physics 1895-1902, as¬ sociate professor of theoretical electricity in 1902-04 and professor of theoretical and ap¬ plied electricity in 1904—09 at the Massachu¬ setts Institute of Technology. In the latter year he was appointed professor of electrical engineering at Harvard University. He also engages in a consulting practice.

CLIFFORD, Sir Hugh, English colonial administrator and civil servant : b. London, 5 March 1866. He entered the Malay States civil service in 1883 and was British resident at Pa¬ hang (1896-99), colonial secretary of Trinidad (1903-07) and of Ceylon (1907-12) ; governor of the Gold Coast Colony since 1942. He wras created K.C.M.G. in 1909. He has published (In Court and Kampong) (1897); (Studies in Brown Humanity ‘ (1898) ; (In a Corner of Asia’ (1899) ; (Bushwhacking’ (1901) ; and is joint author with Sir Frank Swettenham of a dictionary of the Malay Language) ; (Further India’ (1904) ; (Heroes of Exile’ (1906) ; (The Downfall of the Gods) (1911) ; (Malayan Monochromes) (1913) ; (The Farther Side of Silence) (1916).

CLIFFORD, John, English Baptist clergy¬ man : b. Sawley, Derbyshire, 16 Oct. 1836. He was educated at the Baptist College, Notting¬ ham, University College, London. He was minister of the Praed Street and Westbourne Park churches, London (1858-1915). He was president of the London Baptist Association (1879), of the Baptist Union (1888 and 1889) and of the Baptist World Alliance (1905-11), of the British Chautauqua (1899-1900). He has received degrees from several colleges as well as that of D.D. from Bates College, Lewiston, Me. Dr. Clifford has been for many years the acknowledged leader, not only of the Bap¬ tist community, but of a militant Union family in England. He organized the ((passive re¬ sistance” movement against the English Edu¬ cation Act of 1902, which largely contributed

to the overthrow of the Unionist government in 1906. He was editor of the Baptist Maga¬ zine (1870-83) and has published (Familiar Talks with the Young) (1872) ; (Is Life Worth Living ?’ (1880) ; daily Strength for Daily Living> (1885) ; (The Dawn of Manhood’ (1886) ; (The Inspiration and Authority of the Bible’ (1892); (The Christian Certainties’ (1893); ˆTypical Christian Leaders’ (1898); cGod’s Greater Britain’ (1899); (The

Secret of Jesus' (1904) ; dltimate Problems of Chris¬ tianity' (1906); (Gospel of Gladness' (1912); (State Education after the War' (1916) ; (Thc Spirit of Man in 1916′ (1917).

CLIFFORD, Lucy Lane, English novelist, married to William Kingdon Clifford (q.v.) 1875, after whose death in 1879 she turned to literature for support. Her writings, some of which are notably original and striking, in¬ clude (Very Short Stories' (1882) ; (Mrs. Keith's Crime' (1885) ; dove Letters of a Worldly Woman,' which attracted much at¬ tention (1891);

(Aunt Anne' (1893) ; (A Flash of Summer' (1895);

CLIFFORD, Nathan, American jurist: b. Rumney, N. H., 18 Aug. 1803; d. Cornish, Me., 25 July 1881. Through his own efforts he ob¬ tained a common school and academic educa¬ tion, studied law and began practice in York County, Me., 1827. He was a member of the State legislature, 1830-34; speaker of the House, 1833, and attorney-general of the State, 1834— 38. He served two terms as representative in Congress, 1839-43, advocated Van Buren's re- election, took part in public discussions with the leading Whig orators and established a reputation as one of the most eloquent of Democratic champions. He was United States Attorney-General under President Polk, and a special commissioner to Mexico to arrange terms of peace between that country and the United States, and he negotiated the treaty which secured California as a part of the United States. He resumed law practice in Portland, Me., 1849, and won an enviable repu¬ tation for forensic ability. In January 1858 President Buchanan appointed him associate judge of the United States Supreme Court. As the oldest associate judge in 1877, he presided over the electoral commission, conducting its proceedings with noteworthy impartiality, though a firm believer in Tilden's election. He published (United States Circuit Court Re¬ ports' (2 vols., 1869).

CLIFFORD, William Kingdon, English mathematician : b. Exeter, 4 May 1845 ; d. Ma¬ deira, 3 March 1879. Educated in his native city and at King's College, London, he pro¬ ceeded to Trinity College, Cambridge, where he graduated in 1867 as second wrangler. In 1871 he was appointed professor of applied mathe¬ matics at University College, London, a post which he held till his death. In mathematics his teachings and writings are regarded as

marking an epoch in the history of the science in England. His (Canonical

Dissection of a Riemann's Surface, his theory of (Biquater¬ nions } and his memoir (On the Classification of Loci) may be mentioned as his most import¬ ant contributions to this subject. He also wrote on philosophical subjects. Among his works the most important are (Elements of Dynamics) (Vol. I on*

(Seeing and Thinking) (1879) ; and (Common Sense of the Exact Sciences (1885, completed by Karl Pearson). In 1882 appeared a collec¬ tion of his (Mathematical Papers) and in 1879 his (Lectures and Essays.**

CLIFFSIDE, N. J., borough of Bergen County, on the Hudson River, opposite New York city, with which it has ferry connection. It is mostly a residential suburb of the cities of New York, Jersey City and Hoboken. Pop.

3,395.

CLIFTON, Ariz., city and county-seat of Graham County, 120 miles northeast of Bisbee, on the San Francisco River, and on the Ari¬ zona and New Mexico, the Morenci Southern and other railroads. Copper mining and stock raising are the principal industries. Division offices of the Arizona and New Mexico Rail¬ road are located here. Pop. (1920) 4,163.

CLIFTON, England, popular watering- place of Gloucester County. It is a suburb of Bristol situated within the city boundary, on the summit of lofty cliffs, whence its name. A suspension bridge 703 feet long here crosses the river Avon 245 feet above its bed. Clifton con¬ tains many handsome residences but neither trade nor manufactures. It is known for its hot mineral springs. Clifton College, founded in 1862, takes high rank as an educational insti¬ tution.

CLIFTON FORGE, Va., city in Allegheny County, 190 miles northwest of Richmond, on the Chesapeake and- Ohio Railroad. It con¬ tains railroad repair shops, foundries and ma¬ chine shops, flour mills, an ice-cream factory and planing mills. Iron ore and limestone are found near by. The city owns the waterworks. Pop. (1920) 6,164.

CLIFTON HEIGHTS, Pa., borough in Delaware County, six miles southwest of Phila¬ delphia, on the Darby River, and on the Phila¬ delphia, Baltimore and Washington Railroad. It has manufactories of woolen and cotton goods, towels and hosiery. It contains also a public library. Pop. 3,155.

CLIFTON SPRINGS, N. Y., summer and health resort in Ontario County, about 28 miles southeast of Rochester, on the New York Cen¬ tral and Lehigh Valley railroads, famous for its sulphur springs. It contains the Clifton Springs Sanitarium, the latter surrounded by three parks. There are manufactories of pumps, insect sprayers, automobiles, bicycles and

tinware. Settled about 1850, Clifton Springs was incorporated as a village in 1859. The waterworks and electric light plant are owned by the municipality. Pop. 1,600.

CLIMACTERIC (annus climactencus) , a critical year or period in human life wherein, according to astrologers, there is some notable alteration to happen in the body and a person is exposed to great danger of death. The word comes from /c/U/Hz/crfa, the step of a lad¬

der or stair. The first climacteric is, according to some, the seventh year; the others arc mul¬ tiples of the first, as 14, 21, etc.; 63 and 84 are called the grand climacterics and the dangers attending these periods are supposed to be great. Some held, according to this doctrine, every seventh year a climacteric ; others al¬ lowed this title only to the product of the mul¬ tiplication of the climacterical space by an odd number, as 3, 5, 7, 9; others considered every ninth year as a climacteric. The idea of climac¬ terics is very ancient and has purely symbolic, i.e. psychological, significance. The notion of seven-year changes as real, apart from such un¬ conscious psychological symbolizations, is an error.

*CLIMATE (Gr. K/it/m f «a slope or inclina¬ tion**). The term was used to denote the ef¬ fect of the oblique rays of the sun on the tem¬ perature of the earth and its atmosphere. To¬ day it is applied to the sum of the atmospheric conditions as recorded for a long period of time ; or, in other words, it is the totality of weather, while <(weather** is the physical condi¬ tion of the atmosphere at a given time or dur¬ ing a limited period.*

One may well speak of the weather to-day, or of last month, or of some past year ; but not of the climate of a day, a month or a year. The climate of a place is what may be expected to occur as the result of a study of its contin¬ uous weather records for a long period of years — the atmospheric pressure, the temper¬ ature, the rainfall and snowfall, the time and frequency of frost, the extremes of heat and cold, the direction and velocity of the wind, the amount of air that flows from the different points of the compass, the amount and intensity of sunshine, the humidity and transparency of the atmosphere and its electrification.

The study of the causes of the weather and of the laws of storms constitutes that branch of science . known as meteorology; climatology is to be considered as a subdivision of meteor¬ ology.

Climates may be broadly divided into ma¬ rine, continental, mountain and plain with the many variations produced as these conditions gradually or precipitately shade off the one into the other.

Basis of Climate. — If the axis of the earth's rotation were perpendicular to the eclip¬ tic (the plane of its orbit) there would no sea¬ sonal changes, for the rays of the sun would fall upon every point on a parallel of latitude with the same angle of incidence on each day of the year. There would be but one season at any place and it would never end ; and there would be little variation in the intensity of storms. But as the axis of the earth is in¬ clined at an angle of 23.5° to the plane of its orbit and as the direction toward which it points remains nearly constant, there are but two days in each year when both hemispheres (north and south) are exactly one-half in sunshine and one- half in darkness, that is, at the vernal and au¬ tumnal equinoxes, when the sun crosses the equator. At all other times in each hemisphere the angle at which the sun's rays strike the earth, the depth of the air through which they pass, the length of the day and the proportions of each hemisphere immersed in sunlight, are increasing or decreasing. As the two latter conditions increase in the northern hemisphere

after the vernal equinox the summer grows upon us, reaching its greatest degree of heat about four weeks after the summer solstice. The lag of temperature is due to the fact that the atmosphere, being heated much more by radiation from the earth than by the direct ac¬ tion of the solar rays, does not attain its great¬ est heat until after the land and water have reached their maximum temperature and in turn have communicated this heat to the air above. Up to 21 June, or the summer solstice, the northern hemisphere receives each day more heat than it loses, otherwise it could not gain in temperature ; after the solstice the sun each day at meridian is found to have receded a little to the south. At places north of the tropic of Cancer its rays fall with increasing obliquity and pass through a greater depth of air and impinge for a less time each day, so that within a few weeks the earth begins to ra¬ diate more heat each day than it receives. The maximum heat of summer occurs, on the aver¬ age, when the loss of heat from the earth is just equal to that gained during the day from the sun. This, as previously stated, occurs sev¬ eral weeks after the sun is well on its way southward. About 21 September the autumnal equinox occurs,

when the sun crosses the equa¬ tor, and, as at 21 March, the days are of equal length at all latitudes of both hemispheres. On or about 21 December — the winter solstice — the sun is farthest south and the same con¬ ditions prevail in the southern hemisphere that prevailed in the northern hemisphere on 21 June. North of the equator the sun is now least ef¬ fective ; its rays reach the earth at the lowest angle through the greatest depth of air and they are operative for the fewest hours during each day, of any portion of the year, but the greatest cold does not occur. This comes about four weeks later, when the increasing heat re¬ ceived each day by the earth from the sun is just equal to that lost by radiation.

The effect of latitude will be understood by reference to the following figure :

As the latitude increases, the rays of the sun will fall with increasing obliquity, and they lose in power by being spread over a larger surface, and by traversing a greater depth of air, which absorbs more of their heat.

The same beam A, ((when the sun is vertical, is spread over a surface such as CC. When the sun is inclined at an angle as shown in the, fig¬ ure the beam is spread over a surface, C C[, which is somewhat greater than the first, and it passes through a column of air B' B' C' C' , greater than that of BBCC. The intensity of insolation at midday decreases approximately as the cosine of the latitude.)}

Near the equator the sun's rays at midday fall perpendicular to the surface of the earth, and there is virtually no change in the length of the day and consequently there is little va¬ riation in the daily or seasonal temperature. As the variation in the length of the day in¬ creases with the latitude, there are regions, in the temperate zone, where the length of time that the sun's rays falls upon the earth each day more than compensates for their obliquity. On this account the interior of continents may have at midday a higher temperature than pre¬ vails at the equator.

Solar energy is about 7 per cent greater at perihelion (the point in the earth's orbit near¬ est the sun) than at aphelion (the point far¬ thest away). As perihelion occurs in Decem¬ ber, or the summer time of the southern hemi- spere, and aphelion in its winter, that region has a greater annual range in the intensity of solar insolation than the northern hemisphere. If the land surfaces of the two hemispheres were equal in area, the southern would have colder winters and warmer summers than the northern and this is the case in portions of the southern hemisphere – where the land area is large. But the great capacity of water for heat and the slowness with which it radiates the same, modifies seasonal extremes that oth¬ erwise would be much greater.

Variations in Climates. — If the earth were all water or all land and if the land were every¬ where of the same elevation, most of the fac¬ tors that cause variations in climates — often considerable for regions closely contiguous — would be eliminated from the equation. Every point on the same parallel of latitude would have the same mean annual temperature and the same average heat in summer and the same average cold in winter. New York and Lon¬ don, separated by 11 degrees of latitude, would not, as now, have about the same mean annual temperature. If it were all water, there would be no such extremes of heat and cold as we now know. It is probable that a thermometer exposed in shade four feet from the surface of the earth would not anywhere — even at the equator — ever register above 90° F. ; there would be no frost within 35° or 40° of the equa¬ tor, and zero temperatures would be recorded only in regions within 30° of the poles. If it were all land the heat would be much more in¬ tense than now in the tropics and in the temper¬ ate and frigid zones the heat of summer and the cold of winter would reach extremes un¬ known at this time.

All the anomalies of climates are caused by the different specific heat capacities of land and water; their different powers of conduction and radiation ; the irregular distribution of these twro surfaces ; the widely-varying eleva¬ tions of the land ; the trend of mountain ranges; the prevailing direction of the winds, and the carrying of large quantities of heat by ocean currents from the equator toward the poles and the relative quantities of cloud and rain or snow. It is germane to a proper under¬ standing of climate to know something in detail of the manner in which the air is heated. At 100 or 200 miles above the earth's surface there is only the hypothetical ether, which, while too tenuous to be detected or measured by any methods or appliances so far known, is sup¬ posed to be the medium that transmits solar

energy to the earth and diffuses it through space. This energy, coming in many different wave-lengths and with widely varying inten¬ sities of vibration, produces several different phenomena as it is absorbed by or passes through the air, or as it impinges on the sur¬ face of the earth. The waves differ in their effects on different objects, depending on the length and the absorptive response of the sub¬ stances upon which they fall. The waves have heating, lighting and chemical effects simul¬ taneously in themselves and it is only the na¬ ture of the objects upon which they fall that tends to differentiate them. The atmosphere, even at the surface of the earth, absorbs but a small part of the heat-waves. They there¬ fore reach the earth and warm its surface ; and the earth in turn, by radiation,

convection and conduction sends back into the air long heat-waves, which, unlike the shorter solar waves, are readily absorbed by the atmosphere. The atmosphere is thus mainly warmed from the bottom upward. This accounts for the per¬ petual freezing temperatures of very high moun¬ tain peaks, although they are nearer the sun than are the bases from which they rise. At the height of one mile in free air the temperature is about the same at midday as at midnight. Only during recent years have we begun to realize how extremely thin is the stratum of air next the earth that has sufficient heat for the inception, growth and maturity of both an¬ imal and vegetable life. The raising of the ther¬ mometer shelter at the New York city observa¬ tory from an elevation of 150 feet above the street to an elevation of 300 feet has caused an apparent lowering of the mean annual tempera¬ ture of 2.5° F. On the hottest day in summer, if one could be lifted up to a height of only 1,000 feet in free air, he would find a marked change in temperature. The United States Weather Bureau at 16 stations made a total of over 1,200 kite observations in the United States in 1897. They showed an average de¬ crease of 7.4° F. for the first 1,000 feet of ascent during the warm months and when the observations were taken near the hour of daily maximum heat the decrease was fre¬ quently as much as 15°. At the height of six miles the cirrus clouds common to this level are, on account of the low temperature, always composed of minute ice spiculae, never of wa¬ tery droplets like the lower cumulus clouds. In the middle latitudes of both hemispheres the air at this height is ceaselessly flowing toward the east, passing uninterruptedly over the cy¬ clonic and anti-cyclonic systems that cause our storms and cold waves at the surface of the earth. Glaisher and an assistant ascended to a height of about 30,000 feet. They suffered greatly from the cold, which measured many degrees below zero although the time of year was 5 September. At the height of six miles the average temperature, determined by many balloon ascensions, is about — 50° F.

The difference between continental and ma¬ rine climates is marked. The same amount of heat will raise the temperature of a land sur¬ face four times as high as it will raise that of a water surface. Land is a good absorber and a good radiator, but it is a poor conductor and a poor reflector. The absorbed heat does not penetrate into the ground to any great

depth. The land, therefore, retains its absorbed heat near the surface and quickly and freely ra¬ diates that which it has absorbed. These con¬ ditions give to large land surfaces much higher temperature during the day and much lower temperature during the night, than obtain over a water surface of the same latitude and much colder winters and much warmer summers. As an illustration, it may be stated that the Ber¬ muda Islands, in the North Atlantic Ocean, have a mean daily range of temperature of only 10° F., and an annual range of only about 50° ; while Memphis,

Tenn., near the same latitude, in the interior of a large continent, has a daily range of 17° and an annual range of 112°. At Memphis a temperature of 104J has been re¬ corded in summer and — 8° in winter. At Ber¬ muda the temperature generally reaches 90° during the summer, but very rarely exceeds that figure, while temperatures below 45° are also infrequent. The two places are typical of continental and of marine climates. All regions bordering closely on the sea partake of both climates, the predominating one being determined by the direction in which the coasts trend, their elevation and the direction and force of the prevailing winds.

In the middle latitudes of both hemispheres the prevailing winds are from the west, and therefore continents lying in these regions have a marine climate in their western coastal re¬ gions, where the air moves from the water to the land, and nearly continental climate in their eastern coastal regions, where the general movement of the air is from the land to the sea.

The distance to which moist and equable air conditions extend inland is determined by the elevation of the land and its trend relative to the incident winds, and the proximity of moun¬ tain ranges. The humid air from the Pacific meets the lofty range that skirts the western shore line of both North and South America; it is forced up the mountain side until the cold of elevation and the cooling of the air by expansion as it ascends cause it to precipitate its moisture mostly upon the western side of the mountain, and it passes to the interior of the continent bereft of that life-giving moisture which, were it not for the intervention of the mountains, would spread a mantle of luxuriant vegetation 1,000 miles inland. If the disinte¬ grating effects of temperature and rainfall had worn down the Sierras, the Plateau, and the rugged crags of the Rocky Mountains to the height of the Appalachians, the vaporous at¬ mosphere of the Pacific would flow eastward far more freely than now, and meet that which, by the convectional action of cyclones, is fre¬ quently carried from the Atlantic Ocean and the Gulf of Mexico inland to the Mississippi Valley; then rain would be more abundant and the whole of the United States would have arable land.

The specific heat of water is greater than that of almost any other substance. It re¬ quires 10 times the quantity of heat to raise a pound of water one degree that it does to raise a pound of iron one degree. Solar rays penetrate the sea to a considerable depth ; they are quite uniformly absorbed by the stratum penetrated. In consequence of these laws and conditions a vast quantity of heat is stored by

the ocean in the tropics and slowly given to the air as the ocean currents carry the warm water toward the poles. In this connection the writer would correct what he believes to be an exaggerated popular idea relative to the effect of the Gulf Stream on the climate of Europe. The North Atlantic circulation, flowing north¬ ward on the western side of the ocean (except a southward current from Davis Strait that chills Labrador and somewhat affects the tem¬ perature of the New England coast), and south¬ ward along the coast of Europe, is many times more effective in modifying climate than is the Gulf Stream. That the western part of Europe is warmer, more humid and subject to less radical changes in temperature than equal lati¬ tudes in North America, except on the Pacific Coast, is due primarily to the great ocean that lies on the west of Europe. Without ocean currents of any description, this body of water would give to the air that moves from it to Europe a more equable temperature than is possessed by the eastern part of the North American continent. Continents, therefore, partake largely of marine climates on their western borders, and principally of continental climates on their eastern borders.

Climate affects the health, happiness and well-being of people more than any other con¬ dition that goes to make up their environment. Within the broad confines of the United States there are many, but not all, shades and varie¬ ties of climate. One of the questions most fre¬ quently asked is, <(Where shall I find a climate possessing both dryness and equability of tem¬ perature?® To this interrogatory reply must be made that the ideal climate as regards equability of temperature and absence of moist¬ ure does not exist in the United States, but that the nearest approach to it will be found in the great Southwest.

The temperature of the Southwest is not equable in the sense of having an extremely small daily range, but it possesses the quality of annual uniformity in a greater degree than will generally be found elsewhere except on the seacoast, and there the humidity is great.

The most equable temperature on the globe will be found on the high table-lands and pla¬ teaus of the tropics. Santa Fe de Bogota, in the United States of Colombia, has an average temperature of about 59° F. for all months of the year, and the range for the entire year is less than is often experienced in a single day in some parts of th-e middle latitudes. But while the ideal temperature may be found on the higher elevations of the tropics, the rain¬ fall is much greater and more continuous than in this country.

The temperature of a place depends chiefly on three conditions, — latitude, elevation and contiguity to large bodies of water. At sea- level in the tropics extreme conditions of heat and moisture produce great physical dis¬ comfort. But even under the equator it is pos¬ sible to escape the tropical heat of low levels by ascending from 4,000 to 6,000 feet. . In the economy

of nature there is a certain limit be¬ yond which the two extremes, dryness and equability of temperature, cannot coexist;, thus we may find a region so deficient in moisture as to satisfy the requirements of the. case, but the very lack of moisture is a condition that

facilitates radiation and thus contributes to great extremes of temperature. Regions may be found, as on the lower Nile, where there is a lack of rainfall coupled with a high and mod¬ erately uniform temperature. The mean win¬ ter temperature of Cairo, Egypt, is 56° F. ; mean summer temperature, 83° ; a range from winter to summer of 27°. The mean winter temperature of Phoenix, Ariz., is 52° ; mean summer temperature, 87° ; a range of 35°. It is by no means difficult to find a counterpart of the far-famed Egyptian climate in the great Southwest.

The dryness of the air and the clearness of the sky are the conditions upon which daily ranges of temperature depend; the greater these, the greater the range of temperature from day to night. While a high summer tem¬ perature is characteristic of the Southwest and other portions of the Rocky Mountain plateau, it is a fact that the sensation of heat as ex¬ perienced by animal life there is not accurately measured by the ordinary thermometer. The sensation of temperature which we usually re¬ fer to the condition of the atmosphere depends not only on the temperature of the air, but also on its dryness and the velocity of the wind. The human organism, when perspiring freely, evaporates the moisture of its surface to the dry air of the interior arid regions, and thus lowers its temperature and prevents sunstroke, which, in the more humid regions from the Mississippi Valley eastward, occur in great number with the air temperature much less than obtains in the West.

The meteorological instrument that registers the temperature of evaporation, and thus in some measure the actual heat felt by the human body, is the wet-bulb thermometer. The latter, as indicated by its name, is simply an ordinary mercurial thermometer whose bulb is wetted with water at the time of observation.

Effect of Climate on the Races. — Climate is the most potent of any factor in the environ¬ ment of races. It is climate and soil, plus heredity and form of government, that produce either vigorous or weak peoples. In this re¬ spect the United States is unexcelled by any other region of the world.

Climate, soil and good heredity may pro¬ duce a race large of stature and of great physi¬ cal endurance, but unless such a people exists under a liberal form of government, in which public education is fostered and the arts and sciences taught, it is unable to employ its strength in those lucrative vocations that give a high per capita of wealth. It is weak in de¬ fending itself, either in war or in commerce, against a people of less numerical strength that is liberally educated, skilled and humanely governed.

If we consider the invigorating effect of cold air alone we might expect to find the strongest peoples inside of the Arctic Circle; and if we consider fruitfulness of soil alone we might reasonably expect to find the dominant peoples in the tropics. But the fact is that the greatest human potentiality occurs somewhere between these two extremes. The boundaries cannot be accurately determined by the naming of cer¬ tain parallels of latitude, but a close approxima¬ tion is made to 'the truth in the statement that the most vigorous people physically and the

most resourceful mentally will be found in the regions that produce an abundance of cereal crops.

It is probable that much of the activity that has caused the United States to take such a commanding place in the world is caused by the invigorating effect of the cold, dry, highly electrified air of the North Ameri¬ can cold wave. These winds have a much greater specific gravity than warm and humid winds, and this condition, added to the force with which they come, scatter and diffuse the befouled air near the surface of the earth. Enough has been said to indicate that climate is nearly as important a part of the environ¬ ment of animal life as it is of the vegetable existence, and that a considerable range of annual temperature, if it be not so great as to limit the production of cereal crops, favors the development of strong races of

men.

Elsworth Huntington, of Yale, has investi¬ gated the effects of weather and climate on the efficiency of several thousand factory workers in New England, Pittsburgh, North Carolina, Georgia and Florida, covering a period of four years, and for one year of some 1,700 students at Annapolis and West Point. He found that in the performance of skilled labor or in intel¬ lectual activity the greatest efficiency was neither in the coldest months nor in the warm¬ est months ; neither on the coldest days, nor the warmest days, but in the fall and spring, and on days of moderate temperature and considerable diurnal range. It appears that physical energy and mental acumen are least in mid-winter, and less in severely cold winters than in mild ones ; that there is a second minimum of human energy in midsummer, which is less when the summers are abnormally hot than when they are cool. As his investigations proceeded southward he found the relation of efficiency to the seasons to gradually undergo a change, until in Florida the conditions were exactly reversed, the greatest efficiency occurring in winter and the least in summer. The long, warm, humid summers and the late spring and early fall were enervating, while the short winter, instead of being cold enough to be de¬ pleting to the vital powers, was stimulating. The totality of human energy for the year was greater in the North than in the South.

It was found that people are physically most active when the average temperature of the day is 60° to 65°, that is, when the noon tem¬ perature rises to about 70°. Mental activity reaches a maximum when the average tempera¬ ture for the day is 38°, that is, when there are mild frosts at night. People do not work so well when the temperature remains constant, nor do they when the changes are excessive. The ideal conditions are moderate changes at frequent intervals. With an average tempera¬ ture of 65° to 70° a relative humidity of about 60 per cent is desirable. Tho relative humidity of places of habitation in winter is usually not over half the latter amount.

Change of Climate. — For long it has been the opinion of meteorologists that there has been no change in climate during the period of authentic history; that the vast changes that have occurred during geologic periods have been accomplished by slow mutations covering thousands of years before the accumulated

changes were measurable and apparent. But evidence is now multiplying that these views will need to be modified. The records left by moraines, the changing shores of inland seas and the thickness of the annual rings of the sequoia trees, which live for several thousand years, strongly indicate that since the last glacial period, of which there have been at least sev¬ eral, there have occurred climatic oscillations measurable by only a few

thousand years and others whose span would come within one to several hundred years. Gradually geologists have unraveled the skein of glacial tracings and perceived that the ice periods consisted of at least four epochs separated by interglacial epochs, during which the climate became mild as at present, or even milder. Then evidence was found of other glacial periods farther back in geologic time, also divided into epochs. In certain regions vast sheets of ice spread south¬ ward to the southern part of the temperate zone, while at other times tropical conditions existed as far north as Greenland. The record wrought by the last ice age shows that the melting of the ice sheet did not progress uni¬ formly. Several times the melting ceased and the climate seemed to return to glacial condi¬ tions, but these changes were minor in compari¬ son to the great pulsations of climate that caused the vast ice sheets. There are other evidences that there have been changes of climate other than the slow mutation between glacial periods. A study of the abandoned strands of inland seas yields strong evidence that the waters did not fall regularly, but in irregular periods of wet and dry times which were meas¬ ured by hundreds of years rather than by thou¬ sands. Huntington, whose valuable studies and researches have been long-continued and in many parts of the world, believes that during the past 20,000 or 30,000 years the climate of the earth has been subject to a great number of small changes, just as during the immense lapse of geological times it has been subject to a less though considerable number of great changes, each of which in turn seems to have been diversified by many minor variations. But this does not mean that there have been changes that are appreciable during the period of an in¬ dividual life, as many believe who have not made a careful comparison of meteorological records.

Certain it is that the advance students of to-day are. turning to the sun and studying variations in its radiations and other forms of activities with the hope of solving the problems of changing climate and the initiation and continuance of storms. The writer agrees with those who believe that variations in the number and magnitude of sunspots, prominences and faculse are not the cause of variations in terres¬ trial weather and climate but are themselves the effects of the same solar cause that effects earth conditions.

Effect of Forests on Climate. — It is often said that the climate of a place depends largely upon the extent and proximity of wooded areas ; that the number of rainy days and the amount of rainfall are modified by change of forest extent and drouths and floods affected. It is certain that in some regions trees once grew more abundantly than at present. This, however, should not be taken as proof that a

destruction of the forests has resulted in a decrease of rainfall. The forests have dimin¬ ished— in some cases wholly disappeared — and it is also true that the precipitation is less ; but this decrease of rainfall might better be regarded as the cause rather than as the result of the barren condition of the soil. There is no evidence that the forests were ever more extensive in Alaska and in other high altitude countries than they now are. Nevertheless, in these countries, just as in the arid regions of great continents, there is evidence of a long- period climatic change — a decrease of pre¬ cipitation or an increase of temperature, or both — « a change that cannot be due to defores¬ tation.

Professor Humphreys, of the Weather Bu¬ reau, says : (cThese universal slow climatic changes that for thousands of years have been modifying the glaciers and changing the inland seas might very well have led to extensive for¬ est destruction; but that it itself was the effect and the destruction of the trees the cause seems most unlikely.®

In the Lop Basin of Chinese Turkestan, Huntington found vast areas covered with the dead skeletons of trees. He says : ((It has of¬ ten been asserted that the destruction of forests has been the cause of the diminution in rainfall. In the Lop Basin the opposite appears to be the case; the supply of water has diminished, and therefore the forests have died.®

The late Prof. Cleveland Abbe says: <(In this day and generation, the idea that forests either increase or diminish the quantity of rain that falls from the clouds is not worthy to be entertained by rational, intelligent men.®

Gages exposed over forests catch more rain than similar gages exposed at the same eleva¬ tion over unwooded adjacent areas. This is due to the fact that the forests restrict the move¬ ment of the wind, and not to a difference in the precipitation.

The covering of tobacco plants with cheese cloth results in establishing a local climate which will continue so long as the cloth remains in position. Extremes of temperature, both heat and cold, are reduced, and the resulting climatic change produces a marked effect upon all vegetation grown under the artificial con¬ ditions. A rank vegetable growth may have a heavy frost deposited upon it, while the same character of soil that grew the vegetation im¬ mediately adjacent, at the same level, but covered with two inches of sand may receive no frost. This is due to the difference in specific heat of the two surfaces, the sand gaining a higher temperature during the day with the same insolation than the vegetation or the un¬ sanded surface, and radiating heat at a greater rate during the cold hours of night, thus keep¬ ing at a higher temperature the air immediately next

the ground.

The erection of a tent, of a barn, of a dwelling-house, of a village, or the growth of a great city, respectively, influence the local climate in proportion to the area that is cov¬ ered, modified by the character of the materials used in the constructions, each different form of matter having a different coefficient of ab¬ sorption, reflection and radiation. Likewise the vegetable covering of the earth may have a local appreciable effect. The flooding of an

area, the cutting away of forests and the covering with sand may have either minute or considerable effects upon local climates in pro¬ portion to the magnitude of the areas affected; but this does not mean that there is any great difference in the climatic effect between a forest covering and one of bushes, of grass or of growing crops ; and it does not signify that there is sufficient change in the thermal con¬ ditions, due to the activities of man, as to make an appreciable difference in the tempera¬ ture at an altitude of 100 or 200 feet, or to effect the general climatic conditions, or to cause storms to be more frequent than formerly, or of greater severity, or to increase the amount of precipitation.

Rainfall records for 100 years in New Eng¬ land and 60 years in the Ohio Valley do not show any appreciable effect on rainfall as the forest areas have been changed to cultivated fields. The precipitation for the last half of each period is practically the same as for the first half, but the rain curve in both cases shows pronounced oscillations in periods that vary from 8 to 11 years.

Effect of Forests on Floods. — Until recent years it has been quite generally believed that the effect of forests on the movements of water was to diminish the frequency and intensity of floods and to maintain higher stream-flow dur¬ ing dry periods. But a careful study by emi¬ nent scientists of the history of floods in the principal rivers of Europe for the period cov¬ ered by the past 200 to 500 years, of the run¬ off of the streams of Wisconsin by Prof. D. W. Mead, of the University of Wisconsin ; of the streams in the Yellowstone Park and elsewhere in the Rocky Mountains by Chitten¬ den; of the Missouri, Mississippi and Ohio rivers by army engineers ; and of the rivers of the Ohio Valley by the writer; do not confirm this view. Opinons differ. For¬ esters and many geologists take the affir¬ mative side of the question, while meteoro¬ logists and constructing hydraulic engin¬ eers generally take the view that the broken, permeable soil of seedtime, and the growing crops of summer and fall, each year, and the covering of bushes that quickly shades the ground when trees are cut, may be as potent as the forests themselves in the conservation of moisture and in the restricting of run off.

It is not clear how the planting of trees at the headwaters of streams can be effective in minimizing or controlling floods, as it requires only a superficial survey to show that of the various basins that catch precipitation and shunt it down into the valleys where it may accumulate and cause floods, only a minute area lies at the head-waters of streams. If it be granted that the planting of trees, or their preservation, reduces the destructiveness of floods, which it will not, then the trees must be placed where the flood waters fall in order to be effective, which is on the slopes and al¬ luvial plains some distance from headwaters, and it is not practicable to turn these food- producing areas back to the wild forested con¬ dition without doing a direct and positive injury to humanity.

Climate and Animals. — The geographic distribution of animals is doubtless the out¬ come of definite laws — laws that stand in close

relation with the past history of the earth through a large portion of geological time. What those laws are forms a subject of great importance in studies of evolution, — a subject, it may be remarked, entirely too great to be adequately treated in the present connection. Naturalists are generally of the opinion that all animals have been produced from those that preceded them by some process of slow trans¬ mutation or development, and that this modifi¬ cation of animal forms took place very slowly, as evidenced by the fact that the historical period of nearly 4,000 years has hardly pro¬ duced any perceptible change in a single species. That marked changes in the climate of the earth have occurred during the remote past there can be no doubt, and that those changes left a marked impress upon the fauna of the globe there can also be no manner of doubt. The great northern ice sheet and the accompanying cold of the glacial period, if it did not cause the extermination of the receding fauna, doubt¬ less led to its migration to more congenial climates.

The part played in the faunal distribution of the globe by the present climate seems to be indirect rather than direct, although there are many facts which seem to point to a direct rela¬ tion. While it is true that the fur-bearing ani¬ mals of the frozen north are generally to be found in Arctic regions, yet they send their representatives far into the temperate latitudes, and indeed into the borders of the regions in¬ habited by the more exclusively tropical species. On the other hand, the tiger, whose home is naturally associated with the hot districts of India and the Indian Archipelago, is equally at home in the elevated regions of the Caucasus and the Himalayas, where his footprints are not infrequently found impressed in fields of snow. Other groups of animals are more limited in their migrations. Some are so closely adapted to an arboreal life that they never stray far beyond the limits of forest vegetation, while others are so tolerant of climatic change that the limit of their possible range is conditioned only by the character and quantity of the food supply and the interposition of impassable physical bar¬ riers.

Climate and Plants. — The factors neces¬ sary to the development of plant life are light, heat, soil and moisture. The ideal conditions as regards these essentials do not usually obtain, or, if they do, multitudes of plants seek to take possession of the region, so that there is a con¬ tinuous struggle for existence in which many more plants fail than succeed.

The climatic factors .heat and moisture are combined in several ways in different parts of the globe, and these combinations give widely different vegetation; thus a maximum of heat and a minimum of water give desert conditions where only specially adapted plants can exist. If, on the other hand, a maximum of heat is combined with a maximum of water, the result will be vegetation such as exists only in the rainy tropics. The

possible combinations of the two climatic factors are very numerous, as are also those of soil and the effects of animal life and human agencies. Yet the vegetation of the globe is susceptible of A fairly definite classifi¬ cation. Following Humboldt, and adopting such terms as express in a general manner the

vegetation characteristic of each zone, we have the following classification :

Zones of

Average

temperature

1 . Palms and bananas .

78° — 82°

73° — 78°

68° — 73°

60° — 68°

48 °— 60°

40 °— 48°

32°— 40°

32° and below

2. Tree-ferns and figs .

3. Myrtles and laurels .

4. Evergreens .

5. Deciduous trees .

6. Conifers .

7. Lichens, saxifrages and dwarf shrubs. . .

8. Lichens and mosses .

While in a general way these zones stretch around the world in wavy belts, somewhat as do the isotherms, similar belts may be found en¬ circling mountain peaks and chains with in¬ creasing altitude above sea-level. Indeed it is possible to pass successively from tropic to arctic vegetation on a single mountain peak in the tropics.

Bibliography. — Abercromby, (Weather (International Scientific Series) ; Bacon, Cli¬ mate and the Atmosphere,* in the Nineteenth Century (Vol. XLVII, 94) ; Bartholomew,*

*(Meteorology, * Vol. Ill of his (Atlas* ; Dick¬ son, (Recent Researches on Climate,* in the Geographical Journal (Vol. X, 303) ; Hann, (Handbuch der Klimatologie) (3d ed., 3 vols., Stuttgart 1911) ; Koppen, (Versuch einer Klas- sifikation der Klimate,* in Geogr. Zeitschrift (6 Jahrg. 1901) ; Moore, (Descriptive Meteorol- ogy> (New York 1910) ; Waldo, (Elementary Meteorology) (New York 1896) ; Woeikof,*

. (Die Klimate der Erde (Jena 1887) ; Ward, (The Climatic Zones and their Subdivisions, > in Bulletin of the American Geographical So¬ ciety (July 1905) ; Mill, (Climate and the Effects of Climate, * in the Quarterly Journal of the Royal Meteorological Society (Vol. XXVII, 237), and the publications of the United States Weather Bureau.*

Willis L. Moore,

Professor of Meteorology, George Washington U niversity.

CLIMATE AND CLIMATIC SPECIES AND VARIETIES. Although a half century ago it was generally held that changes of climate have not profoundly affected organisms, yet the recent detailed study of variation has shown that climate and local influences have been the causes of origin of probably a very large number of the species contained in our museums and described in biological literature. Among insects, birds and mammals it has been estimated that from a third to a half of the known species are climatic or local species or varieties, or local races. As is well known, Americans born of foreign parentage are larger than their ancestors, whether English, Irish, Germans or French; and Boroditch has shown that the children of Americans of both sexes born in the United States are larger than those of foreign, races. Certain modifica¬ tions in the cephalic index have also been ob¬ served. This is generally attributable to dif¬ ference in the climate of the Old and New Worlds, our American climate being drier, more changeable and stimulating than that of Europe. It appears that the introduced English sparrow has undergone a gradual modification since its introduction into this country about 40 years ago. Bumpus has critically examined

over 1,700 eggs of this bird, one-half from England and the other half from Providence, R. 1. It was found that the eggs of the Amer¬ ican race or breed vary more than the European, that they are smaller and of a

strikingly different shape, being more rounded and with a much greater amount of color varia¬ tion. This is attributed by the author to a suspension of natural selection. However this may be, it belongs with the class of facts which show that the modification is primarily due to the change from one climate to another. Cock¬ erell has found that a common European snail (Helix nemoralis), introduced into this coun¬ try soon begins to present variations not known to exist in England, while of the introduced butterfly (Pieris napi), 12 American varieties, and of P. rapcc four varieties have appeared on American soil within the few years which have elapsed since their appearance and spread on this continent. Where different mammals are transported from temperate to tropical countries the wool tends to become replaced by hair, and other changes occur. The turkey does not vary in temperate regions, but when accli¬ mated in India it degenerates in size, is inca¬ pable of rising on the wing, becomes black and the long pendulous appendages over the beak develop enormously. Cold has naturally the inverse effect; mammals transported to the north from the tropics become more or less woolly. As the result of the severe winters and the elevation of Angora in Asia Minor, the cats, shepherd dogs, goats and hares are clothed with a long fleece-like wool.

Islands present different climatic features from the mainland, being damper, etc., and hence the birds, reptiles and other animals present slight but constant differences from their allies and probable ancestors on the near¬ est continents. Not only that each group, as in the case of the Galapagos Islands, but even each island is tenanted by a distinct local variety of birds. This has also been noticed by Wallace in the East Indian Archipelago. The swallow-tail butterflies of islands tend to have shorter tails, and the outlines of the wings differ. Thus the local races become incipient species, and by being isolated are prevented from crossing with the original stock or species, and in this way geographical varieties or repre¬ sentative species are produced. When great changes have taken place in the topography, portions of land cut off from the continent, or continents become divided, species have arisen. Thus in the late Tertiary, Asia and America were continuous, but when Bering Strait was formed, the bison of this country and that of Europe (aurochs) became specialized, becom¬ ing different species. In this way multitudes of species have probably arisen over all parts of the world. See Distribution of Living Mam¬ mals; Plant Geography.

CLIMATE IN THE TREATMENT OF DISEASE. The relation of climate to health and disease is a definite one and its varying conditions become more specifically available in prophylaxis and treatment as knowledge con¬ cerning them becomes more exact. Moreover, the genetic concept which is gaining prevalence, of a developed response of man to his environ¬ ment, which determines his adaptation at . all levels of his being psychical as well

as physical

introduces a very important element into the consideration of this relationship. The more accurate knowledge concerning the fac¬ tors which enter into climate obviates the more general classifications of the past which as¬ signed certain groups of diseases to the certain groups of climatic conditions for therapeutic effect. The more specific fitting of very definite and varying individual conditions to certain climatic elements and the avoidance of others as injurious includes also an intelligent utiliza¬ tion of certain climatic conditions available close at hand which in the past were passed over in ignorance of their advantages or of methods of appropriating them. All this has introduced a new economy into the climatic treatment of disease and is further indicative of more com¬ plete knowledge and control of environment in the light of individual need and capacity for adaptation toward the environment.

The chief objective features of climate relative to health are the chemical composition of the atmosphere, presence and proportion of gaseous constituents and presence or absence of septic solid particles; the mean or extremes of temperature; humidity; diathermancy or per¬ meability to heat rays; intensity of light; elec¬ trical conditions; density and pressure of at¬ mosphere; prevailing winds, their direction and velocity. The condition of the weather, that is, the particular manifestation of climatic con¬ ditions at certain times or periods, is also of practical importance in determining the avail¬ ability on the part of the patient of the ad¬ vantages of the general climate. The average number of fair, rainy or cloudy days and also the condition of the soil in regard to drainage or retention of the moisture are of such prac¬ tical significance. Artificial conditions, likewise, must enter into the choice of a suitable climate, living conditions, comfortable accommodations, presence or absence of sanatoria or other facilities for medical attention.

The complexity of the human body and its functions realizes its best health and usefulness in a well-adjusted balance between work and rest. It is best suited therefore by a climate of a moderate degree of constant variation. For an invalid, however, special conditions must be sought adapted to his particular con¬ dition. Certain climates possess certain qual¬ ities which supply these definite requirements. Marine or ocean climates are characterized by their equability, not only in the daily range of temperature but throughout the seasons as well, the presence of a large body of water tending to equalize temperature, moisture, winds, etc. The temperature varies, however, of course, with the latitude. The humidity of ocean climates acts as a veil, as it were, which miti¬ gates the fierce heat by day and gives up the heat at night to the air. Sea air is also im¬ pregnated with the vapors of salt, and perhaps those of iodine and bromine, and it is free

*from dust and bacteria. There is always abundance of ozone. The ocean climate has a sedative effect upon the nervous system and a stimulat¬ ing, tonic effect upon appetite and digestion. It increases the body metabolism and. conduces to sleep. Sea voyages are of. value in certain conditions of mental exhaustion, also in cer¬ tain chronic catarrhal and rheumatic conditions. They are of benefit also in scrofula,, hay fever * and asthma. Island climates, if the islands are*

not large, afford the advantages of a complete ocean climate. Coast climates are less equable because of the disturbing influences of in¬ creased land heat radiation. They are usually less humid, precipitation being more active. Winds are often an important factor in coast climates, hence a knowledge of the local con¬ ditions is essential to estimate correctly the qualities of any given coast climate in its variation from the perfect ocean climate.

Inland climates vary in temperature and humidity. As a rule they are drier than coast climates. This is modified, however, by the proximity of large bodies of water. The dry warm climate is of value to delicate or elderly people, or to those in a temporarily weakened state. It is also suitable for pulmonary tuber¬ culosis in many cases, chronic bronchitis, rheumatism, cardiac and renal diseases. It is the climate of deserts such as of Egypt, the lower regions of Arizona and New Mexico and the pine belts of some of our States. It is rich in ozone, the air is pure, there is an abundance of light and warmth. Prevailing violent winds and the consequent presence of dust offer a disadvantage.

Dry and cold climates of low levels may be of advantage to certain persons with good resisting power, since to some individuals cold acts as a stimulant and tonic and increases carbon dioxide output. The climate of higher altitudes is dependent also upon the surround¬ ing country and nearness to ocean or mountain ranges. Its advantages for tuberculosis lie in the purity of the air, greater opportunity for direct exposure to sunlight and its stimulation through quickened respiration and circulation to increase in red blood corpuscles. There is at the same time lessened proteid metabolism which therefore increases the storage in the tissues. The increased activity put upon the circulatory and respiratory organs makes such climate unsuitable in valvular disease of the heart and rapidly advancing pulmonary disease. Medium altitudes are usually chosen for san¬ atoria for tuberculosis. Many of these places, because of latitude and dryness of climate, afford most of the advantages of the higher altitudes. Tuberculosis of long standing with much expectoration seems to do best in a warmer

atmosphere not too far from the sea, such as the climate of Egypt, or of Arizona.

Moderately moist and cold climates are not to be recommended therapeutically, though various resorts have certain advantages in op¬ portunity for change, accessibility in being near large centres of population, and afford amuse¬ ments, games, etc., with good regimen for those in need of rest. The moist, low, warm, inland climate is the poorest in therapeutic value. It is enervating, depressing and mosquito- ridden, hence malarious and noxious in many particulars.

Such a variety of climatic influences and effects serves principally to emphasize the individual difference of response. This is evident not only in the special disease com¬ plex which has been built up and seeks its peculiar relief ; it lies also in the symbolic or psychic value which each climatic element in environment has to that particular individual in his expression of himself in relation to his surroundings and his success or failure attained thereby. Hence the problem becomes one not

alone of better understanding of climatic con¬ ditions and the elements which constitute them, but far more in appreciating and knowing the meaning and value of individual effort toward adaptation expressed through health and disease and the part in this greater whole which the elements of climate play. This manifests itself in individual difference of response to the same climatic factors and in the difference in ability to extract from this portion of en¬ vironment useful material for creative func¬ tional activity, which is health, or that imper¬ fect compromise between environment and antagonistic individual tendencies which results in disease symptoms and finally death.

Smith Ely Jelliffe.

CLIMATOLOGY, CLIMATOGRAPHY.

See Climate.

CLIMAX (Gr. a ladder or stairs),

a rhetorical figure in which a series of propo¬ sitions or subjects are presented in such a way that the least impressive comes first, and there is a regular gradation from this to the most impressive or final ; opposed to ˆanti-climax," in which the ideas are presented in the reverse order.

CLIMBING-FERN (Schizceacece) , a family of ferns, mostly tropical. It contains 5 genera and 75 species, two of which are repre¬ sented in eastern North America. On eSchiz&a pusilla, or curly grass, is a rare fern found in wet soil in the pine barrens of New Jersey and in Newfoundland and Nova Scotia. The other is the Hartford fern (Lyg odium palmci- tum),

occurring in moist thickets and open woods along the eastern seaboard of the United States from New Hampshire to Florida. The plant is a slender and flexible climber with palmate leaves, surmounted by a panicle of forked pinnules, making it a very desirable decorative house-plant.

CLIMBING-FISH, or CLIMBING- PERCH, a spiny-rayed fish (Anabas scandens) of the family Anabantidce which, with the Osphromcnidce, constitute the sub-order Laby- rinthici, characterized by the peculiar laby¬ rinthine structure within the gill-cavity, formed of excessively delicate plates of bone covered in life by a moist membrane and enclosing air¬ spaces between them.

In the climbing-perch this organ is greatly developed above the gills, and extremely complex, and serves as an air-breathing organ of such great importance that the fish is able to live out of water for several days without distress, during which it regularly breathes air. When it returns to the water it uses its gills, so that it may be regarded as truly amphibian. This species is about eight inches long, and is found in shore waters of India, Burma, the Malay Islands and, according to Semper, in the Philippines. Its name was given to it by the Malays in reference to its alleged habit of climbing trees in search of in¬ sects upon which, and small mollusks, it feeds. They described it as scrambling up palm-trunks by means of the rough edges of its gill-covers and the spines of its hinder fins. Such a feat is possible, especially on a sloping trunk, for these fishes do creep about rocks and cross spaces of land, but recent naturalists have not seen any tree-climbing. Consult Semper,

(Animal Life} (Intern. Sci. Series, New York

1881). ‘

CLIMBING PLANTS. See Lianas.

CLINCH, Charles Powell, American poet and play-writer: b. New York, 20 Oct. 1797; d. there, 16 Dec. 1880. For many years he was editorial writer, and literary and dramatic critic for the press; also writer of many poems, the¬ atrical addresses and dramas. In 1835 he was elected a member of the State legislature. Having lost his estates in the great New York fire, he obtained a place in the New York cus¬ tom-house, where he became deputy and then assistant collector. Among his publications are (The Spy ; (The Expelled Collegiates* ; and (The First of May. >*

CLINCH RIVER, a stream that rises among the hills in the southwest part of Vir¬ ginia, passes into Tennessee, flows through the valley between Clinch Mountain and Powell Mountain, and unites with the Holston at King¬ ston, to form the Tennessee. Its length is esti¬ mated at above 200 miles, for more than half of which it is navigable by small boats.

CLINEDINST, Benjamin West, Amer¬ ican artist: b. Woodstock, Va., 1860. He studied for a year in Baltimore and for five years in Paris under Cabanel and Bonnat and first attracted attention in New York with his illustrations for Leslie's Weekly. He is a painter of portraits and pictures in the genre style, and in 1900 was awarded the Evans prize of the American Water Color Society. He is best known as a popular illustrator of stories in the leading illustrated magazines, the Century, Harper's Magazine and Scribner's Magazine, especially containing much of his work. He has illustrated the works of Hawthorne, Steven¬ son and Mark Twain, although he works also in oil and water colors. His sympathetic collab¬ oration with the author gives his work an especial charm. He has painted portraits of Theodore Roosevelt, Admiral Peary, Gen. Cur¬ tis Lee, Edward Echols, etc.

CLINGMAN, Thomas Lanier, American senator: b. Huntsville, N. C., 27 July 1812; d. Raleigh, N. C., 4 Nov. 1897. He was graduated at the University of North Carolina 1832, adopted the legal profession, and was a member of the State legislature 1836-40. He was elected to Congress as a Whig and with the exception of the 29th Congress, served continuously from 1843 to 1858, when he was appointed United States senator. During his service in the House he took part in all the leading debates, not missing, it is said, a single day's session, and for a time was chairman of the Committee on Foreign Affairs. He later joined the Demo¬ cratic party. Entering the Confederate army as a colonel, he was promoted brigadier-general 17 May 1862, commanding the North Carolina troops, and served until his surrender with Gen. J. E. Johnston in April 1865. After the war he was chiefly engaged in mining and scientific pursuits. The important mica mines in Mitchell and Yancey counties were first opened by him. He also made known the ex¬ istence of diamonds, rubies and corundum in North Carolina. He published a volume of (Speeches and Writings) (1877) ; (

Follies of the Positive Philosophers) (1878) ; and (The Tobacco Remedy) (1885).

vol. 7 — 8

CLINGMAN'S DOME, a peak of the Smoky Mountains, near the boundary between Tennessee and North Carolina. It was so named in honor of Thomas L. Clingman (q.v.). Its height is 6,619 feet above the sea- level.

CLINIC, an institution devoted to the ex¬ amination and free treatment of patients, for the purpose of giving medicine and at the same time offering an opportunity to students of medical colleges for practical instruction. Clinics are usually held in dispensaries, where, by reason of free treatment, many patients con¬ gregate, thus affording good clinical material. The term <(clinical medicine" is applied to the branch of medicine occupied with the investi¬ gation of diseases at the bedside.

CLINK-STONE. See Phonolite.

CLINOMETER, kll-nom'e-ter, an instru¬ ment used for taking the dip and strike of rock strata. In its commonest form it consists of a sort of protractor with a pendulum attached. When the clinometer lies horizontally the indi¬ cator points to 0 degrees, and when inclined the amount of inclination is shown at once by the pendulum. It is most convenient to combine compass and clinometer in one instrument.

CLINOPODIUM, a genus of herbs or low shrubs of the mint family (Menthacece) , containing about 50 species, of which several occur in the southeastern United States and California. The plants are known under the common names of wild basil, calamint and basil balm.

CLINTON, Charles, American colonist, ancestor of the Clintons in New York: b. County Longford, Ireland, 1690; d. Ulster, now Orange County, N. Y., 19 Nov. 1773. His grandfather was an adherent of Charles I, and after the defeat of the royalists fled for refuge to the north of Ireland; and his mother was daughter of a captain in the parliamentary army. Having determined with a number of his friends to emigrate to America, he char¬ tered a ship, and sailed for Philadelphia 20 May 1729. After a passage marked by the at¬ tempt of the captain to starve the passengers in order to possess their property, and in which after the death of several, among whom were a son and daughter of Mr. Clinton, it was pro¬ posed, but not attempted, to wrest the command from the captain, he was landed with his com¬ panions 4 October at Cape Cod. The place for a permanent settlement was selected in the spring of 1731 in Ulster County, N. Y., about six miles west from the Hudson River, and 60 miles north from New York. Clinton was chiefly occupied as a farmer and land surveyor, but was also judge of the County Court, and in 1756 was appointed . lieutenant-colonel,

and served with two of his sons in the expedition against Fort Frontenac.

CLINTON, De Witt, American statesman ; b. Little Britain, New Windsor, Orange County, N. Y., 2 March 1769; d. Albany, 11 Feb. 1828. His descent on the father's side was from Eng¬ lish ancestors long domiciled in Ireland, and on the mother's side he was of French extrac¬ tion. His education was begun in a grammar school near his home, continued at the academy in Kingston, Ulster County, and completed at Columbia College, where he bore away the coK

lege honors in 1786. He immediately engaged in the study o£ the law and was admitted to the bar in 1788. His ardent temper and earnest ambition carried him at once into the political field, and his sentiments, sympathies and affec¬ tions determined his position under the banner of his kinsman, George Clinton, the chief within the State of the Republican party. While the question of the adoption of the Federal consti¬ tution was yet a subject of popular discussion, he proved his zeal and controversial power by writing a series of letters signed <(A Country¬ man,® in reply to the celebrated letters of the Federalist. He entered the legislature in 1797 and the State senate in 1798, soon becom¬ ing the leader of his party in the State. In 1801 he became United States Senator, resigning in 1803 to assume the office of mayor of New York. He remained undisturbed in the mayor¬ alty from 1803 until 1807, when he was re¬ moved. He was reappointed in 1809, was dis¬ placed in 1810, was restored in 1811 and thence¬ forward continued therein until 1815. Within this period of nearl 12 years, Clinton was also a member of the senate of the State from 1805 until 1811, was lieutenant-governor from- 1811 to 1813, and during a portion of that time also held a seat in the council of appointment. He was an unsuccessful candidate for the Presidency in 1812. He adopted early and supported ably and efficiently the policy of the construction of canals, from Lake* Erie and Lake Champlain to the tide-water of the Hudson, and showed, to his fellow citizens, with what seemed a spirit of prophecy, the benefits which would result from those works to the city, the State and the whole country, in regard to defense, to com¬ merce, to increase of wealth and population and to the stability of the Union. In 1815 he presented a memorial to the legislature in be¬ half of the construction of the Erie Canal and in 1817 a bill was passed authorizing the work. In 1817 he was elected governor of New York and re-elected in 1820. He declined re-election in 1822, but was again elected in 1824, and after overcoming constant, unremitting and factious resistance, he had the felicity of being borne, in October 1825, in a barge on the artificial river which he seemed to all to have constructed from Lake Erie to the bay of New York, while*

bells were rung and cannons saluted him at every stage of that imposing progress. No sooner had that great work been undertaken in 1817 than the population of the State be¬ gan to swell with augmentation from other States, and from abroad; prosperity became universal ; the older towns and cities expanded, new ones rose and multiplied ; agriculture, man¬ ufactures and commerce were quickened in their movements, and wealth flowed in upon the State from all directions He was re-elected governor in 1826, dying while in office. He wrote (Discourse before the New York His¬ torical Society (Memoir on the Antiquities of Western New York) ; (Letters on the Natural History and Internal Resources of New York) ; Speeches to the Legislature.) Consult Alex¬ ander, (Political History of the State of New York (Vol. I, New York 1906) ; Hosack, (Memoir of De Witt Clinton) (1829) ; McBain, (De Witt Clinton and the Origin of the Spoils System in New York* (New York 1907) ; Orth, (Five American Politicians) (Cleveland 1906) ; Renwick, (Life of De Witt Clinton)*

*(1840); Campbell, (Life of De Witt Clinton**

(1849).

CLINTON, George, Vice-President of the United States: b. Little Britain, Ulster County, N. Y., 26 July 1739; d. Washington, D. C., 20 April 1812. He was a son- of Charles Clinton (q.v.) and served as lieutenant under his brother James at the capture of Frontenac, but afterward studied law. He was a member of Congress in 1776, and voted for the Declara¬ tion of Independence, but was summoned to the army as brigadier-general before it was pre¬ pared for signature. In 1777 he was elected governor and at the same time lieutenant-gov¬ ernor of the State of New York, which latter office was, on his acceptance of the other, con¬ ferred upon Mr. Van Courtlandt. He held the office of governor during the next 18 years, for which eventful period the history of his life is that of the State.. He was again chosen gov¬ ernor after spending five years in private life, in 1801, and in 1804 became Vice-President of the United States. Consult Public Papers of George Clinton) (6 vols., New York 1899— 1902) .

CLINTON, George Perkins, American botanist : b. Polo, Ill., 7 May 1867. He was educated at the University of Illinois and at Harvard University. He was assistant botanist at the Illinois Agricultural Experiment Station and assistant in botany at the University of Illinois in 1890-1902, and since 1902 has been botanist at the Connecticut Experiment Station and botanist of the Connecticut State Board of Agriculture. He is the author of botanical monographs and experiment station bulletins dealing with parasitic fungi and contributions to botanical magazines.

CLINTON, George Wylie, American negro bishop: b. Cedar Creek Turnpike, Lan¬ caster Countv, S. C , 28 March 1859. He was educated at

*Brainerd Institute, at South Caro¬ lina University and at Livingston College, Salisbury, N. C. In 1879 he entered the min¬ istry of the American Methodist Episcopal Zion Church. He taught for 12 years in the Lan¬ caster (S. C.) High School and Union (S. C.) graded schools and was for eight years presi¬ dent of the Atkinson Literary and Industrial College at Madisonville, Ky. He founded the American Methodist Episcopal Zion Quarterly Rev-iezv in 1889 and edited it for two years. In 1902-06 he edited the Star of Zion and was elected bishop in 1896. He is a member of the executive committee of the Federal Council of the Churches of Christ in America and is prominent in the social and educational work among the negro race. He is the author of (The Negro in the Ecumenical Conference of 190P; (The Three Alarm Cries) (1906); (Tuskegee Lectures> (1907); Christianity under the Searchlight * (1909).*

CLINTON, Sir Henry, English general : b. about 1738; d. Gibraltar, 23 Dec. 1795. He was the grandson of Francis, sixth earl of Lin¬ coln, served in the Hanoverian War and was sent to America as major-general in 1775. He took part in the battle of Bunker Hill, and in the battle on Long Island which resulted in the evacuation of New York by the Americans; proceeded up the Hudson in 1777 in a vain effort to relieve Burgoyne, and was promoted to the chief command of the British army in America in 1778. After being forced by Wash-

ington to evacuate Philadelphia, he commanded an expedition to South Carolina in 1780, and blockaded and captured Charleston. He sailed from New York with 7,000 men to relieve Corn¬ wallis on the very day that the latter capitu¬ lated. He resigned in 1781, returned to Eng¬ land the next year and died soon after he had been appointed governor of Gibraltar. He wrote a narrative of his conduct in America (1783), and a rejoinder to Lord Cornwallis' ob¬ servations on it ; also 'observations on Sted- man's (History of the American WaD (1784).

CLINTON, James, American military officer: b. Little Britain, Ulster County, N. Y., 9 Aug. 1736; d. there, 22 Dec. 1812. He was the fourth son of Charles Clinton (q.v.). With his father he served at Lrontenac, in 1758, as captain, and commanded in 1763 the forces raised to protect Ulster and Orange counties against the Indians. He accompanied Mont¬ gomery to Quebec in 1775, and was appointed brigadier-general the following year. While his brother George was governor of New York, he was overpowered at Port Clinton by the superior force under Sir Henry Clinton, and being severely wounded narrowly escaped with his life. He afterward served against the Indians under Sullivan in 1779 and was present at the

surrender of Cornwallis. After the peace he was commissioned to adjust the boundary line between New York and Pennsyl¬ vania and occupied many distinguished civil stations. His son was De Witt Clinton.

CLINTON, Canada, town of Huron County, Ontario, situated on the Buffalo & G. branch of the Grand Trunk Railway, about 32 miles northwest of Stratford. Its industries are numerous. There are salt-wells, a tannery, grain-elevator, and a flour mill and factories for the production of carriages, organs, thresh¬ ing-machines, fanning-mills, etc. Pop. (1911)

2,254.

CLINTON, Ill., county-seat of De Witt County, situated on the Illinois C. Railroad, about 42 miles northeast of Springfield. The chief industry of the region is farming. There are machine shops here, and the city has an efectric-lighting system and waterworks, sev¬ eral churches and two public schools. It has adopted the commission form of government. Pop. (1920) 5,898.

CLINTON, Iowa, city and county-seat of Clinton County, situated on the Mississippi River and on the Chicago & N. W., Chicago, M. & St. P., Chicago, B. & Q., Chicago, R. I. & Pac. and Iowa Midland, 128 miles west of Chicago and 60 miles southeast of Dubuque. The city is a trade centre for a region of 50 miles radius and has large manufacturing and other industries, including lumber mills, fur¬ niture factories, sash and door factories, iron bridge works, gasoline engines, boats, automo¬ biles, wagons, harness, boxes, brick, locks and railroad machine shops. The United States census of manufactures for 1914 recorded 105 industrial establishments of factory grade, em¬ ploying 3,178 persons, of whom 2,679 were wage earners, receiving annually $1,614,000 in wages. The capital invested aggregated $8,- 068,000, and the year's output was valued at $10,484,000: of this, $3,535,000 was the value added by manufacture. The city has a good public library, hospitals, business colleges,

Wartbury Lutheran College, Mount Saint Clare Academy, Our Lady of Angels Seminary, churches of all denominations, public schools, five banks with a combined capital of $800,000, electric lights and railways. The present form of government is by a mayor and a council of nine members who are elected biennially. Pop.

(1920) 24,151.

CLINTON, Mass., town of Worcester County, 12 miles northeast of Worcester, 14 miles from Litchburg, and 40 miles west of Boston, on the Nashua River, and the Boston and Maine, New York, New Haven and Hart¬ ford and Massachusetts Central railroads. It contains a national bank, with a capital of $200,000, a savings bank and two co-operative banks. The Bigelow Pree Public Library con¬ tains over 41,000 volumes. There , are several churches and also the Clinton Hospital and the Clinton Historical Society. The town has recently erected one of the finest municipal buildings in the State at a cost of $200,000 and the union station is also a noteworthy building. There is a fine system of parks and playgrounds and there are many excellent schools. The great metropolitan reservoir and dam, costing $15,000,000, which supplies the city of Boston and 18 neighboring towns with water, is situ¬ ated here. There is electric and gas service and an electric car service connects Clinton with the surrounding towns. The chief indus¬ tries are the manufacture of wire-cloth, ging¬ hams, carpets and rugs, woolens, worsteds, Turkish towels, yarns, gasoline engines, harness, and iron and brass castings. The government is administered by means of town meetings. The board of selectmen holds office for three years and appoints the chief of police and other subordinate officials. Up to 1850 Clinton was a part of Lancaster (q.v.), but it was then in¬ corporated as a town. Pop. 13,075.

CLINTON, Miss., town in Hinds County, 10 miles west of Jackson, on the Alabama and Vicksburg Railroad. Hillman College and the Mississippi Baptist College are located here. The city owns the lighting plant and the water¬ works. Pop. 767.

CLINTON, Mo., county-seat of Henry County, 37 miles northwest of Sedalia, on Mis¬ souri, Iv. & T., the Saint Louis and San L. and Kansas City, Clinton and Springfield railroads. Clinton has three flour mills, two corn-meal mills, cooperage and railroad division shops, ice plant and foundry and gas-engine factory. It has two banks with a combined capital of $75,- 000, and has an annual business of $25,000,000. Clinton has an excellent public school system, and also colleges for men and women, includ¬ ing Bind College for Women and Clinton Busi¬ ness College. The city was first settled in 1837, became a borough in 1858 and a city in 1876. It is governed by a mayor and a council of eight members elected for two years. Pop.

4,992.

CLINTON, N. Y., village of Oneida County, situated on the New York, O. & W. Railroad, nine miles south of Utica. In the neighborhood there are

stone quarries. The chief interest of the place lies in its educational institutions. Here is located Hamilton College fq.v.), and there are seminaries for young women, an academy and a union school. Iron

ore mines and mineral springs are found in the vicinity. Pop. 1,236.

CLINTON, Okla., city in Custer County, 95 miles west of Oklahoma City, on the Washita River, the Chicago, Rock Island and Pacific, the Saint Louis and San Francisco, the Clinton and Oklahoma Western, the Kansas Central, Mexico and Orient railroads. It has cotton¬ seed-oil mills, alfalfa mills, cotton compresses and a broom factory. The most noteworthy buildings are the municipal hospital and the courthouse. The electric-lighting plant and waterworks are the property of the munici¬ pality. Pop. 2,781.

CLINTON, S. C, town in Laurens County, 60 miles northwest of Columbia, on the Sea¬ board Air Line and the Columbia, Newberry and Laurens railroads. The town is the seat of the Thorwell Orphanage and the Presby¬ terian College of South Carolina. Cotton manufacture is the chief industry. The munic¬ ipality owns the electric-lighting plant and the waterworks. Pop. (1920) 3,767.

CLINTON STAGE, in American geology, the middle member of the Niagara Series of the Silurian System. It comprises shales and shaly sandstones with some limestone, and is typi¬ cally developed at Clinton, N. Y. From New York the series extends southward along the Appalachians to Alabama, reaching its maxi¬ mum thickness of over 800 feet in Pennsylvania. From the Appalachians the series stretches 1,000 miles westward, except for the area of the Cincinnati anticline, to Wisconsin, where the series is represented by limestones. From one to three beds of oolitic hematite (fossil iron ore), from 1 to 10 feet thick, are found in the Clinton at many points along the Appalachians and have yielded considerable ore. See Niagara Series; Silurian System.

CLINTON STATE PRISON, penitentiary located at Dannemora, Clinton County, N. Y. It was begun in 1844. The prison buildings are enclosed in a stockade which encloses 37 acres of land. The site was chosen with the object of employing the prison inmates in the mining and manufacture of iron, much ore being discovered on the 37 acres surrounding the prison. Cotton spinning, the making of clothing, tinware and wooden ware are the in¬ dustries conducted there at present.

CLINTONIA, a genus of plants of the lily-of-the- valley family (

Cornvallariacea ?), named after De Witt Clinton, naturalist and governor of New York. It comprises six species, four of which are natives of North America, the other two being Asiatic. Yellow clintonia (C. borealis), has greenishly-yellow drooping flowers, with blue berries. It grows in moist woods from Newfoundland south to North Carolina, and westward to Wisconsin and Minnesota. The white clintonia (C . umbellulata) is found in the woods of New York and New Jersey, and as far south as Georgia, and westward through Tennessee.

CLINTONˆ BIG DITCH, a phrase ap¬ plied to the Erie Canal, connecting the Hudson River with the Great Lakes. The name was given in derision because the canal was planned and carried to completion by De Witt Clinton.

CLINTONVILLE, Wis., city in Waupaca County, on the Pigeon River, and on the main

line of the Chicago and Northwestern Railroad, 50 miles north of Fond du Lac. It is well built, has concrete streets and walks, public and parochial schools, a Carnegie library, several churches, two banks, opera-house and a city park. It manufactures automobiles, tractors, sashes and doors, washing machines and contains machine shops, feed mills, saw and planing mills, pickle and kraut factory, a creamery and an ice plant. It is located in a thriving dairy¬ ing section. The waterworks and electric¬ lighting plants are the property of the munici¬ pality. Pop. (1920) 3,275.

CLIO, (from Gk. kIciv, to celebrate), daughter of Zeus (Jupiter) and Mnemosyne (Memory), the muse of history. She is repre¬ sented with a wreath of laurel upon her head and a roll of papyrus in her left hand. She was the mother of Hyacinthus and Hymenaeus. There was also a sea nymph named Clio, daughter of Oceanus and sister of Beroe, who figures in Greek mythology.

CLIONIDZE, kll-on'i-de, a family of Pteropoda (q.v.), which lack the shell and ex¬ ternal gills, have the body spindle-shaped with wing-like fins situated near the head, and the head provided with short tentacles. They are pelagic animals of remarkable transparency, and live in vast numbers in the Arctic and Ant¬ arctic seas. Their chief popular interest lies in the fact that one species, Clio borealis, al¬ though only about an inch in length, furnishes the chief food of the great whalebone whales of the north. The whalers call the schools of these pteropods brit and deem their presence a good sign of whales.

CLIP HOOKS, two hooks, the points of which are turned in opposite directions. These points are made to overlap and lock closely so as to form a single eye when the necks of the hooks are lashed together. The eyes of

the hooks are on the same pivot and are also de¬ signed to fit closely to each other.

_ »

CLIPPER, the word used to designate a modern construction of large sailing vessel. The peculiarities of these vessels are, their long sharp bow, their greatest beam lying abaft the centre of the ship and their depth of keel. The speed attained by the opium and slave traders had attracted the attention of naval architects generally, and the shipbuilders of Great Brit¬ ain (notably those of Aberdeen and Liverpool) and of America vied with each other in pro¬ ducing vessels which, while preserving fair carrying capabilities, should, as the primary requisite, be fast sailers. In this they succeeded to a remarkable extent, and the feats of the Atlantic, Australian and China clippers, some of which attain an average speed during the voyage of over 15 miles an hour, used to be a topic of great interest and excitement among those connected with shipping and ocean traffic. Owing to the improvements in steam vessels, and the many advantages possessed by them over sailing vessels, clippers, as a special type of ship, are now little heard of. The effect of the model was shown in many subsequent ships and yachts.

CLIPPER BOW, an overhanging bow, found in some wooden steamers. It differs from the bow of the old sailing-ship in that it rises in a smooth curve from cut water to bow¬ sprit, while the latter had a reverse curve as it

neared the bowsprit. Most modern steamers have a vertical stem.

CLISSOLD, Augustus, English Sweden- borgian : b. about 1797; d. Tunbridge Wells, 30 Oct. 1882. He was graduated from Exeter Col¬ lege, Oxford, in 1823 was ordained priest, held the curacies of Saint Martin-in-the-Fields and Saint Mary, Stoke Newington, and about 1840 withdrew from the ministry. He had become a very close student of the writings of Sweden¬ borg, and though retaining through life his con¬ nection with the Church of England he was president of the Swedenborg Association, be¬ came a life member of the Swedenborg Society and liberally assisted it with funds. Clissold translated and published at his own expense Swedenborg's (Principia Rerum Naturalium) (1845-464 and

CLISTHENES. See Cleisthenes.

CLITOMACHUS (Gk. K Xe it 6 fia Xog)t Greek philosopher: b. Carthage about 190 b.c. ; d. Athens about 110 b.c. He went to Athens about 146 b.c., where he became identified with the Third, or New, Academy, of

whose founder, Carneades, he was one of the most distinguished disciples. On the death of Carneades in 129 b.c., Clitomachus succeeded to the academic chair. Carneades wrote nothing, and Clito¬ machus was the chief expositor of the system of the New Academy. Diogenes Laertius is authority for the statement that he wrote 400 books on philosophical subjects. Cicero, who appears to have devoted considerable study to the work of Clitomachus, praises him highly in the 'Academical He followed in his teach¬ ings the largely skeptical views of Carneades, denying the possibility of attaining absolute truth, or any certain criterion of truth. Of his works there remain only a few titles and some renderings by Cicero in the (Academical Con¬ sult Zeller, (The Stoics, Epicureans and Scep- tics) (trans. by Reichel, London 1892).

CLITUS, kir tus, son of Dropis, and foster brother of Alexander the Great. He was one of the generals of Philip and Alexander, and saved the life of the latter in the battle of the Granicus by cutting off the hand of Rhosaces, who had just lifted up his arm to kill Alexander. He held high positions in the Macedonian armies and in 328 was made satrap of Bactria. Notwithstanding this service, how¬ ever, Alexander killed him in a fit of anger at a banquet in honor of Dioscuri, an act of which he repented sorely afterward.

CLIVE, Catherine Raftor, Kitty Clive, English actress: b. London 1711; d. 6 Dec. 1785. She was the daughter of a poor Irish gentleman living in London, and coming to the notice of Colley Cibber, manager of Drury Lane Theatre, made her debut there at 17. She achieved instant success and till her retirement from the stage in 1769 was one of the most popular actresses of the time, her forte being comedy. She married George Clive in 1732, but was separated from him later. She was on intimate terms with many of the literary and social lights of her day and maintained an unblemished reputation. Among her friends was Horace Walpole, who presented her with a house at Strawberry Hill. She was the au¬

thor of four dramatic sketches. Consult Fitz¬ gerald, 'Life of Mrs. Catherine Clive) (1888); Doran, (Annals of the English Stage (1888).*

CLIVE, Robert, Baron Clive, English soldier and statesman : b. Shropshire, 29 Sept. 1725; d. London, 22 Nov. 1774. His father ob¬ tained for him the place of a writer in the East India Company's service, and in his 19th year he went in that capacity to Madras. Two years later Madras surrendered to the French, but Clive escaped to Fort Saint David, where he entered the military service. He took part in the unsuccessful attempt to capture Pondicherry in 1748. When the British opposed Chunda Sahib, whom the French wished to make nabob of the Carnatic, and their candidate was be¬ sieged in Trichinopoly by Chunda Sahib, Clive was sent in 1751 to attack Arcot, the capital of the Carnatic, which he captured without op¬ position and later with his small force beat off the attempts of overwhelming numbers to re¬ take it. He then relieved Trichinopoly, and captured the forts of Covelong and Chingleput. In 1753 -he went to England for a time, and on his return to India (1755) he was given the government of Fort Saint David. He was soon called to Madras to command the relief expedi¬ tion sent to Bengal, where the nabob Suraj-al-Dowlah had taken Calcutta. Clive took posses¬ sion of that city, and with a very inferior num¬ ber of men entered the nabob's camp and cap¬ tured his cannon. The nabob then offered terms of peace very advantageous to the Eng¬ lish. Clive very shortly formed a plot to de¬ throne Suraj-al-Dowlah and place Mir Jaffier on the throne. In the famous battle of Plassey (21 June 1757) Clive's force of 3,000 men put to flight the nabob and his army of more than 50,000. Mir Jaffier now wished to govern with¬ out British interference, but the rebellions against him forced him to seek the aid of Clive, who was appointed governor of Bengal. Clive again went to England in 1760, when he was elected member of Parliament for Shrewsbury and raised to the Irish peerage. A disagree¬ ment between Mir Jaffier and the British gover¬ nor officiating in Clive's absence caused Clive's return to India in 1764. He found the trouble with Jaffier settled, and devoted himself to the reform of the civil service in Bengal, and the

restoration of discipline in the army. After his final return to England (1767) severe attacks were made upon him for his conduct in India, and a parliamentary inquiry followed which resulted in the passing of resolutions condem¬ natory of certain of his acts, and of a subse¬ quent motion that he (

CLOACA, a sewer, an underground drain or conduit. The city of Rome was at first drained by three natural streams. These were eventually confined within stone vaulted chan¬ nels. The largest of these crossed the Argile-tum, the Forum and Velabrum and was called the Cloaca Maxima (the greatest or main sewer). It is said to have been constructed under the direction of King Tarquinius Priscus (616-578 b.c.), but none of the existing part is older than the 3d century b.c. It is still used in

the drainage of Rome. It received numerous other branches between the Capitoline, Palatine and Quirinal Hills. It is formed of three con¬ centric rows of enormous stones, piled above each other without cement. The height inside is about 13 feet and its width is about the same. The flooring is like that of a Roman road. Dur¬ ing the Republic, the duties of the censor in¬ cluded the supervision of the cloacae. Under Cato they were repaired. Special ((curatores cloacarum urbis® were placed in charge of them during the Empire.

In anatomy a cloaca is a part of the intestine in which the intestinal, ovarian and urinary outlets terminate. This structure exists in birds, in reptiles, in the amphibia and in the mammalian order Monotremata. In the Roti- fera also the perivisceral cavity terminates in a dilatation or cloaca, which forms the common outlet for the digestive, generative and water vascular system. There is a cloaca also in in¬ sects, and one also in tunicated mollusks. The latter is sometimes called the atrial chamber. In the embryonic development of man there is a period during which a cloaca also exists.

CLOCK. All instruments for the accurate measurement of time have three parts in com¬ mon. One is a vibrating body, which may be a pendulum swinging under the force of gravity, or a balance wheel vibrating on its axis through the action of an elastic spring. The second feature is a source of power, which may be a weight or a stiff steel spring, called the main spring; the object of either is to keep up the vibrations of the balance wheel or pendulum, which would otherwise soon cease through fric¬ tion and the resistance of the air. The third feature is a system of wheel work by which the power is transmitted from its source to the vibrating body, and by the

revolutions of which the time is indicated. The instruments by which these results are brought about may be classified as wratc.hes, chronometers and clocks. The watch is a portable form of the in¬ strument, generally so constructed as to be car¬ ried in the pocket and .moved about into any position without interfering with its going. This requires that the source of power shall be a spring and the vibrating body a balance wheel. The chronometer (q.v.) is a larger and most accurate watch constructed on the same gen¬ eral principles, but intended, when moved, to maintain a horizontal position. The term is sometimes applied to the most accurate pocket watches; and to distinguish it from them the chronometer proper is sometimes called a ma¬ rine chronometer. The term is chosen because the instrument is used to keep time at sea for the determination of a ship's longitude.

Construction. — In the original construction of the clock, to which this article is especially devoted, the vibrating body was the pendulum and the source of powder a weight wdiich could be wound up with a key. But, in order to se¬ cure the advantage of being easily handled and moved about it is now very common to make the smaller class of clocks with either a main spring or a balance wheel or both. But such clocks, unless made in the most expensive way, do not keep time as accurately as those with weight and pendulum ; the latter are, therefore, to be preferred in all cases where a clock can be kept in one and the same position, and is

wanted to keep fairly good time for consider¬ able periods.

In the earliest instruments of these different kinds the vibrating body was a small horizontal bar, which moved back and forth under the in¬ fluence of the wheel work. This was before the idea of applying a spring to keep up and regulate the vibrations had been- suggested. Such instruments were extremely inaccurate in their results. The possibility of the pendulum clock dates from the time of Galileo, who first showed clearly that a pendulum completed its swings in nearly the same time, whatever its arc of vibration, which time was dependent on its length. But the practical inventor of the pendulum clock was Huyghens, the great Dutch astronomer of the 17th century. He invented the various appliances of the clock, the strik¬ ing apparatus excepted, in substantially the form that we have them to-day. What is some¬ times called the astronomical clock does not differ in principle from the ordinary pendulum clock, and has nothing distinctive about it ex¬ cept that it is made with the greatest perfection throughout in order to go with the utmost at¬ tainable uniformity from day to day. So suc¬ cessful have clock-makers been in recent times that an astronomical clock which varied by one- tenth of a second during a day would be re¬ garded as practically useless. A good clock of the kind should keep time within three or four hundredths of a second a day.

The accompanying plate shows in detail the parts of the ordinary clock. Fig. 1 gives a lateral view of the wheel work. An end view of the mechanism is shown in Fig 2. P, Fig. 1, is a weight suspended by a cord which rests in a spiral groove going round and round the main cylinder C. In order that the clock may be wound up at any time, a ratchet wheel DD, Fig. 2, is used with a grooved cylinder, around which is wound a cord carrying the weight. The manner in which the ratchet acts is too obvious to need description. It is to be re¬ marked that, in the ordinary house clock, the action of the wheel work stops while the weight is being wound up. As the clock then loses all the time taken to wind it up, the best class of clocks are constructed with a second ratchet which keeps them going while being wound. The action of the weight is transmitted through the train of wheels d, E and F, to the scape wheel GH, which acts on the pallets IR, con¬ nected with the crutch which acts on the pendu¬ lum. In Fig. 1 By is the pendulum and its crutch vibrating in a plane perpendicular to that of the paper. In the upper part of its length, which passes through the crutch U, it turns on a horizontal axis which can be seen in the figure extending horizontally from the framework of the clock from just above X to the right. Thus, as the pendulum vibrates the arm of the crutch UX vibrates with it. This vibration releases alternately the teeth of the scape wheel GH, a double motion of the pendulum back and forth being required in order that first one tooth and then the other may escape. As shown in the figure the end R of the anchor is moving upwards, the tooth H of the scape wheel being just about to slide off. During the time that the pallet R is holding the scape wheel, the latter slides and presses upon it, thus pressing the side of the crutch against the pendulum. When the tooth H escapes, the an-

chor is in such a position that another tooth strikes the lower surface of I and acts on that in the opposite direction while the pendulum is swung the other way. Thus the teeth escape alternately, first one and then the other, in regular alternation, gently pressing the pendu¬ lum during its swing each way.

The construction of the escapement is of the utmost importance when the best per¬ formance of a clock is required. If one exam¬ ines the second hand of an old-fashioned house clock he will notice that, at the moment of each beat, the second hand moves forward to one second and then has a slight motion backward before the next beat. This backward motion takes place immediately after one tooth has escaped, and continues until the pendulum has sprung to its greatest distance on one side. This backward,*

action throwing extra action on the pendulum tends to accelerate its motion. Lienee, good clocks are provided with a (

Under the system just described, the pendu¬ lum is kept in continuous vibration and the wheel work in continuous motion from the time the clock is wound up until it is run down. But it is also necessary that the clock shall, at every moment, show the time on its face. This is brought about by the wheels O and N, Fig. 1, one of which is- arranged to revolve in an hour, the other in 12 hours. The result is too familiar to need any description. If the wheel work which moves the hand were rigidly connected with that of the clock, the latter could not be set without moving the whole of the clock work. The system of wheel work which carries the hands is, therefore, so ar¬ ranged as to be held on the axis c, by friction, thus admitting of its being turned at pleasure, while it is held by the axis so long as the hands are untouched. The minute hand is rigidly attached to its axis in order that it may be used as a hand in turning the wheel work of the two hands. Generally, but not always, the hour hand is held on its axis only by friction so that .it can be turned around at pleasure without interfering with the other hand or with the going of the clock.

Regulation. — It is, of course, necessary to the correct going of a clock that the length of the pendulum should correspond to the number of the teeth in such a way that, as the pendulum goes through its natural vibrations, the wheels shall go according to the time of day. In the old-fashioned house clock, and in most good modern clocks, when it is desired to show seconds as well as hours and minutes, the pendulum takes one second to oscillate in each direction. It is then called a ((seconds pendulum.® There are then 30 teeth in the scape wheel, the latter turning through one- sixtieth of the revolution as each alternate tooth escapes. The seconds pendulum is about 39ˆt inches in length. (See Pendulum). It is not easy to move a clock about when the pendulum is so long. Hence, in ordinary clocks

for household use either a balance wheel or a shorter pendulum is used. If the latter is one- fourth the length of the seconds pendulum, it will vibrate in half a second. But, as clocks are constructed, the pendulum is not always made to vibrate in any simple fraction of a second. In this case, although a second hand may be put on the clock, and may go through its revolution in a minute, its motions will not beat seconds.

The rate of going of ordinary clocks varies with the temperature, the clock going faster the lower the temperature. In the case of the pendulum clock this is because the pendulum rod contracts with cold and expands with heat. If a balance wheel is used, not only does the balance contract with cold but the spring which moves it becomes stronger; so that for a double reason the clock goes faster in cold weather. Hence if accurate time is to be kept the pendulum or balance wheel must be com¬ pensated for changes of

temperature. To show how this is done in the case of the balance wheel, see Chronometer. For the two methods of compensating a pendulum, see Pendulum. Between the extremes of temperature to which the house clock is ordinarily subjected the dif¬ ferences of rate will only be about five or six seconds a day. As few people are able to regu¬ late their clocks to this degree of precision it is only in very good clocks that compensa¬ tion is attempted. The effect of heat and cold is much greater on the balance wheel than on the pendulum and may amount to half a minute of more a day.

Striking Mechanism. — The striking mech¬ anism of the clock is brought about by a sepa¬ rate train of wheel work with its separate weight or spring, as shown in Fig. 2. There are two systems of making a clock strike the hour, one of which may be called the con¬ tinuous system, and is used in clocks of Amer¬ ican construction, while the other is mostly used in French clocks. The continuous system is one in which the striking goes on in its regular order, two always following one, three follow¬ ing two, and so on, no matter how the hour hand may be situated. In this system if the clock begins striking wrong through running down or from any other cause it will continue to strike wrong until a proper adjustment is made. This is effected by touching a spring or pulling a wire in the clock, by which the strik¬ ing mechanism is set in action and the clock made to strike around until it comes to the right hour. The French system is arranged with an eccentric cam on the axis of the hour wheel which stops the striking mechanism when the hammer of the clock has struck a number of strokes corresponding to the position of the hour hand. On this system the striking mech¬ anism needs no adjustment to strike correctly always.

Electric Clocks. — With the discovery of electricity and its development as a motive force, the horologists were among the first to attempt its use, as the ideal power to operate clocks. In the earlier devices the weight of the pendulum was changed from the usual vertical body to a horizontal form, provided with a coil, and caused to swing between two electro-magnets placed one above the other at the lowest point of the pendulum arc. Electri¬ cal connections made and broken alternately by

attachments to the pendulum stem actuated the magnets so as to attract the swinging weight as it approached the magnets and repel it after it had passed the centre. These impulses, how¬ ever, were found in practice to be unmanage¬ able, and quite inadequate to the task of keep¬ ing the clock running uniformly. This idea was extended to comprise a row of electro¬ magnets set in an arc close below the weight of the pendulum, the impulses

of attraction and repulsion being taken up consecutively by one magnet after the other. This device also proved impracticable. Another device experi¬ mented with was the release by electrical action of a weighted bar, which in falling gave the stem of the pendulum a direct push. The bar was immediately pulled back to its normal position by an electro-magnet, to be again re¬ leased when the pendulum should begin to flag in its appointed swing.

The so-called electric clocks of the present day are not time keepers but time transmitters. The actual measurement of time is made by a mechanical clock movement actuated by weights hanging from the barrel of a windlass — the centuries old and unrivalled "power® of the clock-maker. An electric current controlled by the clock mechanism is utilized to move the hands on a distant dial, or on several dials si¬ multaneously — as in the case of tower clocks with four dials. Or it may be used to move the hands on the dials of many clock faces in a large establishment. Electricity is also used in a similar manner to synchronise with a single master clock a series of individual clocks scat¬ tered over a wide area. The devices for this kind of regulation generally act only upon the hands, forcibly moving them at stated inter¬ vals into the exact position of the hands on the master clock. A common application of electricity to tower clocks is through a mechan¬ ism known as the (

Tower Clocks. — Tower or turret clocks are subject to unusual stresses owing to their exposed location as to wind pressures, and the fact that the very large and heavy hands are out in the open, unprotected from the weather, and so liable to be irregularly loaded with snow and sleet. The great difficulty of building a clock of sufficient power to overcome these varied stresses, while steadily pursuing its delicate task of measuring time accurately, led to the separation of the time keeping function from the time displaying mechanism, and con¬ necting the two by an electric, pneumatic or hydraulic transmission. The clock mechanism proper may then be located in a room near the ground where it is not affected by the swaying of the tower by the wind. It may be driven

by a comparatively light weight, and an auxili¬ ary and independent train in the tower, run by a heavy weight, be merely controlled by the clock. The weight in the tower train may be entirely dispensed with, and the power operat¬ ing the hands furnished by hydraulic pressure, or by compressed air, or bv an electric motor train, released, in all cases, by delicate connec¬ tions made or broken by the clock mechanism. These auxiliary power movements are generally arranged to operate pallets which impart direct motion to "escape wheels® and thus connect with the usual wheel train to move the hands. The so-called ((jumper clocks® are of this type, the half-minute or minute jumps being pro¬ duced by a power impulse released by the master clock, acting on a ratchet-wheel.

Bibliography. — Saunier, (Treatise on Mod¬ ern Horology in Theory and Practice) (trans. from the French by Tuppier and Rigg, London 1906) ; Kendall, 'History of Watches and Other Timekeepers) (London 1897) ; Grim- thorpe, (Rudimentary Treatise on Clocks, Watches and Bells) (London 1883) ; Britten, (01d Clocks and Watches and Their Makers5 (New York 1911) ; id., (Watch and Clock- Maker's Handbook, Dictionary and Guide5 (London 1907) ; Goodrich, (The Modern Clock5 (Chicago 1905) ; Cunnynghame, (Time and Clocks5 (London 1906); Abbott, 'Amer¬ ican Watchmaker and Jeweler5 (Chicago 1910) ; and in the Journal of the Society of Arts (London, 7 March 1890) is an article on 'Recent Progress in British Watch and Clock Making.5 The supplement of the Scientific American for 19 Sept. 1896 contains an article on 'Clocks Provided with Automotons5 ; and The Electrician (London for 22 Dec. 1899), contains an article on 'The Electric Time- Service.5

CLOCK AND WATCH INDUSTRY.

See Watch-making, Modern.

CLOCKS, Historical and Celebrated.

The most ancient form of clock was the clepsydra (q.v.) or water-clock. The clepsydra having been developed into a device with a dial and indicator operated by the current of water, the next improvement was the substitution of a weight for the water to operate the index. Archimedes is credited with this device. The necessity of some contrivance to regulate the descent of the weight led to the invention of the escapement and pendulum, a rude form of which is said to have been produced by Gerbert of Auvergne, afterward Pope under the name of Sylvester II, who died in 1003. In an old chronicle it is related that Charlemagne received a clock from Harun Al-Rashid in 809, to which small bells were attached and in which figures of horsemen, at the hour of 12, came forth through doors and retired again. There is a more exact description of this work of art in

the Franconian annals, attributed to Eginhard, in which it is particularly said to have been a clepsydra and that at the end of each hour little balls of metal fell upon a bell and pro¬ duced a sound. In the 12th century clocks were made use of in the monasteries, which announced the end of every hour by the sound of a bell put in motion by means of wheels. From this time forward the expression "the clock has struck® is often met with. The hand for marking the time is also made mention

ol. Of William, abbot of Hirschau, who died at the end of the 11th century, his biographer relates that he invented a horologium similar to the celestial hemisphere. Short as this account is, it still appears probable that this abbot was the inventor of clocks. In the 13th century there is again mention of a clock given by the Sultan Saladin to the Emperor Frederick II. I his was probably put in motion by weights and wheels, as it marked the hours, the course of the sun, of the moon and the planets in the zodiac. In the 14th century there are stronger traces of the present system of clock-work. Dante mentions clocks. Richard, abbot of Saint Albans, made a clock in 1326 which indi¬ cated the course of the sun and moon, as well as the ebb and flow of the tide. Large clocks on steeples were first made use of in the 14th century. In 1340 a monk named Peter Light- foot made for Glastonbury Abbey a clock with an escapement and regulator for securing equable motion. At the time of the Reforma¬ tion it was removed to Wells Cathedral where part of it still remains. In 1835, the mechan¬ ism being entirely worn out, the clock was sup¬ plied with new works and the dial somewhat remodeled and a minute circle and index added. At the base of the arched pediment which sur¬ mounts the square of the dial is an octagonal projection from which rises a panelled turret. Around this, fixed to two rings of wood, are sets of horsemen which formerly revolved in opposite directions as the hour was struck.

Of all horological machines, the successive clocks at Strassburg Cathedral have perhaps at¬ tracted the most attention as mechanical curiosi¬ ties. These have been three in number. The first was constructed about 1352, the second in the latter part of the 16th century. Early in the 19th century it was evident that recon¬ struction was necessary, and this was ultimately entrusted to Charles Schwilgue, who entered on his task in 1838 and completed it about the mid¬ dle of 1842. On the 2d of October of that year the new life of the resuscitated marvel was solemnly inaugurated. On the floor level is a celestial globe indicating sidereal time, and the rising, setting and passage over the meridian of Strassburg of all stars visible with the naked eye. Behind this is a calendar showing months, days of the month, dominical letters and all feast days. Above the calendar is a gallery with

allegorical figures representing the days of the week (Sunday, Apollo drawn in a chariot by horses; Monday, Diana drawn by a stag; Tues¬ day, Mars; Wednesday, Mercury; Thursday, Jupiter; Friday, Venus; Saturday, Saturn), which pass in order from left to right. Above this is a dial for showing ordinary time, a planetarium and a globe showing phases of the moon. Next come movable figures represent¬ ing the four ages of man, which strike the sec¬ ond stroke of each quarter on a bell. A genius seated beside the ordinary dial strikes the first note of each quarter with a sceptre; the genius on the opposite side turns an hour-glass at each hour. Death strikes the hour with a bone. Above, a procession of the 12 Apostles passes at noon before Christ, bowing at his feet, while he makes the sign of the cross. During the procession a cock perched on the top of the left-hand turret flaps its wings, ruffles its neck and crows three times.

A clock at Berne which dates from 1527

presents some curious features. Three minutes before the hour a wooden cock crows and claps its wings ; in another minute a procession of bears (baren, referring to the name "Berne®) passes around a seated figure of a bearded old man; the cock (above the arch, and to its right) then crows again. The hour is struck on a bell at the top of the tower, by a figure with a ham¬ mer, and at each stroke, the bearded figure raises his sceptre and opens his mouth, while he turns an hour-glass ; a bear inclines his head at the same time. Then the cock crows again.

Another celebrated clock is at Venice, dating back to the 17th century. It has a dial of blue and gold and is surmounted by bronze figures which strike the hours upon a bell. On Ascen¬ sion Day, and for 14 days after, figures of the Magi come forth in procession and salute the Virgin and Child (as shown above dial) when the clock strikes 12.

Yet another is the clock of the English Houses of Parliament at Westminster. It was designed by Lord Grimthorpe (then Mr. E. B. Denison) and was first set going in 1860. The tower is 320 feet high and the dials are 180 feet from the ground. Each of them is 22j4 feet di¬ ameter, of opalescent glass set in an iron frame¬ work. The hour figures are two feet long and the minute spaces one foot square. The works contain three trains — one drives the hands, another the mechanism for striking the hours, the third the chimes. The pendulum is fully 13 feet long and weighs nearly 700 pounds. The going part of the clock requires winding once a week, the striking parts twice. The hour bell weighs 13 tons, the quarter bells collectively eight tons. Though there are clocks with larger dials, this clock is probably the most powerful as well as the most accurate of all large time¬ keepers. It cost more than $110,000.

The United States has produced numerous notable clocks, most of them,

however, smaller than the great clocks of Europe, if we except several that have been erected on great build¬ ings of late years. Among the early American clocks which have become famous is one made by David Rittenhouse, in Philadelphia in 1767, and since then known by his name. It has six dials, each of which marks different astronomi¬ cal events. The <(Columbus, Ohio, clock® also records numerous astronomical events and contains many miniature figures, which are made to perform various motions. This clock is 11 feet high by 18 wide. Donaldson, Wilkes- Barre and Hazleton, all in the State of Penn¬ sylvania, have also produced notable clocks.

Felix Meyer of New York, in 1880, after 10 years' work and experimenting, produced a re¬ markable clock, which showed local time in hours, minutes and seconds, the days of the week and the month, the seasons, the signs of the zodiac, the revolutions of the earth round the sun and on its own axis, the movements of the planets round the sun and the phases of the moon. It shows the difference in time at Wash¬ ington, San Francisco, Chicago, Cairo, Mel¬ bourne, Constantinople, Peking, London, Paris, Berlin, Vienna and Saint Petersburg. A child strikes the quarter-hour, a youth the half-hour, an old man the three-quarter-hour and death the hour, while Washington rises from his seat and, extending his right hand, presents the Declaration of Independence. A servant opens a door and the other Presidents of the United

States, up to the time when the clock was made, each dressed in the characteristic costume of his day, come forward, salute the first Presi¬ dent of the nation and, passing on, disappear through another door. The Meyer clock is 18 feet high, 8 wide and 5 deep and contains over 2,000 wheels.

One of the notable modern clocks of the United States is that in the tower of the Met¬ ropolitan Life Building in the city of New York, where it was placed in 1909. It has four dials each 26}4 feet in diameter and situated one in each side of a tower nearly 350 feet above the street. This tower, which is twice this distance in height, is crowned by a lantern which signals, by flashes, the hours and quar¬ ters, the hours being lighted up by 88 white lights and the quarters by 56 red ones, the two giving a total candle power of 16,262. One of the features of this clock is a set of chimes which, among other things, sounds the hours and the quarters from 8 a.m. to 6 p.m. An idea of the enormous size of this clock may be gath¬ ered from the fact that the minute hand meas¬ ures 17 feet and the hour hand 13 feet 4 inches. In the office of the director of the building is a clock which controls all the machinery of the larger clock and handles the time

service of the whole building. It is driven by electricity and is self-winding. Naturally the great dial, situated as it is at such a height from the city street, is one of the noteworthy features of the clock. The numbers on it are 4 feet high and the minute marks are 10ˆ4 inches long. The minute hand is lit up by 16 and the hour hand by 10 incandescent lamps.

The largest clock in the United States is that erected over the works of the Colgate Company, in Jersey City. Its enormous dial is 38 feet across and it contains within its circle 1,134 square feet. The minute hand is 20 feet long and the mechanism is run by a 2,000-pound weight. The clock itself weighs six tons and its hands are outlined by incandescent lights, while brilliant red lamps mark each numeral. The minute spaces, which are 24 inches apart, are also shown by electric lamps. It has been estimated that the extreme end of the minute hand travels more than half a mile in the course of a day. The second largest clock was built for the Edison Electric Illuminating Com¬ pany, Boston, Mass. Specifications : Dial, 34 feet in diameter; weight of hands, 875 pounds; hour hand, 14 feet 4 inches long; minute hand, 18 feet 6 inches long.

CLODD, Edward, English writer: b. Mar¬ gate, Kent, 1 July 1840. He entered commercial life in 1860 and was secretary of the London Joint Stock Bank, 1872-1915. He is the author of (The Childhood of the World) (1872); (The Childhood of Religions) (1875) ; (Jesus of Nazareth) (1880) ; (Myths and Dreams' (1885) ; (Story of Creation' (1888) ; (Story of Primitive Man' (1895) ; (Primer of Evolution) (1895); (Pioneers of Evolution) (1897); (Grant Allen' (1900) ; (Story of the Alphabet' (1900); (Thomas Henry Huxley' (1902); (Animism' (1906).

CLODIA, one of the three sisters of Pub¬ lius Clodius Pulcher (q.v.). She was married about 60 b.c. to Quintus Metellus Celer, who died the following year, probably from poison. Cicero having rejected her advances, she con¬ ceived a mortal hatred against him, and, in

concert with her brother, used every possible means to effect his ruin. On her accusing Cselius Rufus of an attempt to poison her, Cicero undertook his defense, and depicted her dissolute life in a speech which is still extant. Her younger sister Clodia married Lucullus but was put away on account of her conduct. Consult the Prolegomena' to Ellis's edition of Catullus (LXIII-LXXII, Oxford 1889).

CLODION, cld-de-6n' (real name Claude Michel), French sculptor: b. Nancy, Lorraine, 1738; d. Paris 1814. His mother was a daugh¬ ter of Jacob Sigisbert Adam, a prominent French sculptor. Clodion went to Paris in 17£5 and entered the studio of his uncle, Lambert Sigisbert Adam, also a sculptor. Upon his uncle's death he continued his studies with Pigalle. In 1759 the winning of a prize opened the way for him to go to Rome three

years later. He remained there until 1771 with orders for the Due de la Rochefoucauld and Catherine II of Russia. When he returned to Paris it was with the fame of a successful artist. The king, the nobility and many other wealthy patrons kept him busily at work — not includ¬ ing the clergy who looked on Clodion's dally- ings with sujets libres with no little severity. As daring as his nude groups occasionally are, however, the sculptor's style is so masterly, his classical feeling for relations of form is so sure — even when copying in realistic manner the charms of a pretty model — that it would need a prude indeed to object to him. He is to be ranked with the most admirable of the Dix-Huitieme artists. Like so many of them he was relegated to a quite secondary place after the Revolution, which hated his patrons and had no use for the elegance in ideas or in art of the foregoing period. Clodion himself felt that he was no longer a man of his time. He withdrew to his native Nancy when commis¬ sions failed in Paris. The capital lured him back however in 1798 and he tried to fit in with the new style in art. It is pleasant to know that he again achieved some measure of well-being, though he never again reached the point of happiness and favor that he had en¬ joyed under Louis XVI. We may note the following works by Clodion in public galleries : Nantes, (Children Dancing About Pan' ; Ver¬ sailles, (Faith' ; Berlin, (Amours' and (Faun and Amours'; New' York (Metropolitan Museum), (Bacchus, a Nymph and Cupid' and (The Fascination of Wine.' Mention may also be made of his (Montesquieu' and (Vestal crowned with Flowers' at the Palais de l'ln- stitut, his decorations for the Arc du Carrousel and the Colonne de la Grande Armee all in Paris, and his statue and relief of Saint Cecilia at the Rouen Cathedral. Consult Thirion, (Les Adam et Clodion' (Paris 1885).

CLODIUS, Publius, surnamed Pulcher, a

Roman politician, son of Appius Claudius Pulcher, who lived from about 93 to 52 b.c. In the third Mithridatic War he served under his brother-in-law Lucullus, but considering himself ill-treated, he stirred up a revolt and then joined the army of another brother-in-law, Quintus Martius Rex, proconsul of Cilicia. He was given command of the fleet and fell into the hands of pirates, but obtained his liberty. He then went to Syria where he stirred up an¬ other mutiny. Returning to Rome in 65 b.c.,

he rendered Cicero service as a bodyguard. There are no sufficient reasons extant for believ¬ ing that he was implicated in the Catilinean conspiracy. Cicero's violent attacks on the ac¬ tion of Clodius at the mysteries of the Bona Dea where he attempted an intrigue with the wife of Caesar made Clodius resolve revenge. After returning from Sicily where he had been

quaestor, he renounced his rank and was elected tribune of the people. He enacted corn laws, re-established the guilds and adopted other measures destined to gain popular favor. Hav¬ ing gotten rid of Cicero, he confiscated his property and became master of Rome with the aid of gangs and secret societies. He resisted the proposal of the recall of Cicero by force. He became a candidate for the praetorship against Titus Annius Milo. The rivals collected armed bands and fought in the streets of Rome where Clodius was killed. The celebrated speech of Cicero in defense of Milo has saved the name of Clodius from oblivion. Consult Plutarch's (Lives) ; Beesley, E. S., (Cicero and Clodius) (in Fortnightly Review, Vol. V) ; White, H., (Cicero, Clodius and Milo (New York 1900).*

CLODT-JURGENSBURG, klot-yoor'gens- boorg, Peter Karlovitch, Baron, Russian sculptor : b. Petrograd 1805 ; d. 1867. He studied at the artillery school of his native city, served a short time in the army, and studied sculpture at the Petrograd Academy, where he was after¬ ward a professor. He was very successful in depicting horses in action. His noteworthy works are the horses of the quadriga group on the triumphal arch at Petrograd and the four groups of (Horse Tamers) in bronze, on the Anitchkov Bridge, Petrograd. There are rep¬ licas of two of the latter at the Schloss, Berlin, and at the Piazza del Re, Naples.

CLCELIA, kle'li-a, a girl of Rome, who, the legends say, having been given up to Por- sena as a hostage, escaped to Rome by swim¬ ming the Tiber. The Romans, however, to keep faith with Porsena, sent her back to him. Por- sena would not retain her, but, as a reward for the generosity of the Romans, freed her and her fellow hostages, and also gave her several of the Etrurian youths for her service. A statue was erected in her honor on the Via Sacra.

CLOG ALMANAC, an almanac or calen¬ dar made by cutting notches or characters on a clog or block, generally of wood. The block had generally four sides, three months for each edge. The number of days is marked by notches, while various symbols are used to de¬ note saints' days, the golden number, etc.

CLOISONNE, in ceramics, a method of enameling, applies for the most part to metal, since, the effects are more easily attained thus than when it is applied to porcelain ; specimens of the latter sort being, indeed, chiefly regarded as curiosities. In Cloisonne work (so-called from Cloison, a partition), fine metallic walls of the same material as the basis (for example, copper) are soldered by a strong cement by one edge to the basis; and these walls in this manner form numerous cells or compartments, in which the vitrifiable enamel pastes of various colors are placed. The enamel is then vitrified by several firings — three or four generally being required before enough enamel can be applied to afford an approximately level surface — and

subsequently is ground and polished to a high degree. The Gauls in Roman times and pre¬ viously made cloisonne, and it was employed for decorative purposes in shrines, altar-pieces and church plate in the Middle Ages. It has not since been used until recent experiments were attempted. The Oriental cloisonnes are well known, particularly the Japanese. The art is said to have been introduced into Japan from China in the 16th century of the Christian era. Japanese cloisonne is made chiefly at Owari, Kioto, Tokio and Osaka. In later specimens of the Japanese work the partitions are reduced to a minimum, apparently making no separation between the color

masses of the enamel. The finest examples of the Oriental cloisonnes dis¬ play great brilliancy. See Ceramics.

CLOISTER (O. F. cloistre, Lat. claustrum, bar, enclosed place), a court enclosed by cov¬ ered walks. The latter are, strictly speaking, the cloisters, the central space being termed the cloister garth. The walks, or ambulatories, are open on the side toward the garth and when appertaining to monastic or collegiate establish¬ ments were intended for the use of monks or nuns or the clergy attached to the church. The cloisters are usually, though not invariably, placed on the south side of the church. They are commonly square on the plan, having a plain wall on one side, a series of windows be¬ tween the piers or columns on the opposite side and covered with a vaulted or ribbed ceiling. They form part of the passage of communica¬ tion from the church to the chapter-house, re¬ fectory and other parts of the establishment. The chapter-house usually opens from the east walk, the refectory and certain other domestic buildings of a monastic house from the south walk. Sometimes there was a second story, but these have rarely been preserved. Both the Ro¬ manesque and Gothic types prevail. Germany presents some fine examples of the former style of architecture at Maulbronn and Heiligen- kreuz. In southern France the same type is seen in the monasteries at Arles and Velay. In Italy the Gothic arched cloister with its ornate pillar groups often varied with enameled and mosaic decorations are found at Salerno, Palermo, Amalfi. The later Roman school developed a form exquisite in delicate carvings of which a good example is to be found at the Lateran. France furnishes some very interesting ex¬ amples, notably that of Mont Saint-Michel (q.v.) on the coast of Normandy where the great cloister is built on the roof of a vaulted chamber, since the building itself is constructed on the top of a sheer, almost perpendicular, rocky height. Spanish cloisters are of both types, — the royal convent of Huelgas near Burgos, of the arcaded form, is remarkably beautiful. Greatest elegance of form is attained in those of Monreale and Cefalu in Sicily. In England the Gothic form is to be seen at Gloucester, Hereford, Norwich, West¬ minster and Canterbury. Several important colleges also have such ambulatories such as Eton and Winchester, Magdalen at Oxford and Christ Church.

Cloisters were used as places for quiet walks and contemplation; parts for lectures, educa¬ tion, study and recreation. Lavatories, or some¬ times large fountains were often provided in extensions of the ambulatory, so that the monks might wash before going to meals. The garth

was usually a plot of grass accessible in only a few places by means of gaps

in the low walls of the arcade.

CLOISTER AND THE HEARTH, The.

Charles Reade's (The Cloister and the Hearth) (1861), like George Eliot's (Romola) (1863), is a very great historical novel dealing with the Renaissance. George Eliot confines her theme to Italy, making a profound psychological study of a few typical characters. Charles Reade gives a broad picture of the life of the period not only in Italy but in France, Germany and especially Holland. Each novelist is su¬ preme in tne field chosen.

The events of Reade's novel are supposed to have occurred toward the close of the 15th century. The hero is one Gerard Eliassoen, a Dutch boy of humble birth, who displays in his youth a wonderful talent as a copyist and illuminator of Latin and Greek manuscripts. He is desperately in love with Margaret Brandt, the beautiful daughter of a physician — half alchemist, half magician. The lovers are form¬ ally betrothed, but their marriage is prevented, and Gerard flees to Rome, the centre of the new art and learning, with the intention of re¬ turning to Margaret after his fortune has been made and his fame has been established. The long journey to Rome on foot through dense forests infested with wolves and robbers, the association with other travelers met or over¬ taken by the way, the motley groups encoun¬ tered at inns, and the varied life of the Eternal City, enabled the author to unfold a panorama such as fiction had never known. All the pic¬ turesque elements of the Renaissance are in Reade's novel. In his pages we see, too, just how the people lived, what they did, what they thought, amid the uncertainty and turmoil when ancient ideas were coming into conflict with the ideals of the mediaeval church. There is the household of a Dutch shopkeeper in contrast with the sumptuous court; the village curate, the hermit, the great monasteries and the great unfinished churches with nave and chancel open to the sky, and Dominican friars travers¬ ing the banks of the Rhine and preaching to the people. We witness the cruel administra¬ tion of the law, we see the wheel and the rack and gibbets, from which dangle robbers hung by the neck. There is a thrilling escape from the tower of a prison, and a desperate en¬ counter with bears, and a castle stormed and besieged, and a shipwreck — all in the mediae¬ val style of wild adventure.

The world is in utter confusion. The bow and arrow are still used, but gunpowder is coming in ; manuscripts are copied and illumi¬ nated, but books have been printed in a strange new manner. There is no faith; there is only superstition, fanaticism and sorcery. The Pope has written an indecent novel; the ritual of the Church is only a revival of pagan worship in a new form, and the scholar in the presence of cardinals denounces the Church and lauds Greek hedonism above all else. Finally, the deep tragedy

of the age is depicted in the story of the lovers. While in Rome, Gerard hears that Margaret is dead, and, hopeless of further hap¬ piness in this world, he becomes a Dominican friar. And then he returns to Holland and finds that she is still alive and the mother of a boy. But there can now be no life together, for he has given himself to the Church, which

permits no union between the cloister and the hearth. The beauty, the conduct and the temper of Margaret are beyond all praise. There is no finer feminine character in fiction. The golden¬ haired son of Margaret and Gerard lived to be Erasmus, the great scholar and divine whose name soon resounded through the Western world. With Erasmus dawned a new civiliza¬ tion.

. Wilbur L. Cross,

Professor of English , Yale University.

CLONMEL, Ireland (Gaelic, /Vale of Honey®), a municipal borough situated on both sides of the Suir, a part in Tipperary and a small part in Waterford, and 90 miles south¬ west of Dublin. Three stone bridges cross the Suir and connect the parts of the town; it has good streets, well paved and well lighted. Clon¬ mel was founded by the Danes and has long been noted for its love of learning. The fame of the schools established by the Franciscans in the 13th century extended to all the seats of learning on the Continent. Traces of its old walls demolished by Cromwell in 1650 remain. The chief edifices now in the town are an Episcopal church, two Roman Catholic churches, a Fran¬ ciscan abbey, the courthouse, jail, barracks, free library, town-hall, convents, schools, luna¬ tic asylum, etc. The trade is chiefly in grain, cattle and provisions ; and there are flour mills, creameries, a brewery, etc. Laurence Sterne, the novelist, was born in Clonmel, and Lady Blessington, the writer, was born nearby. Pop.

10,209.

CLONTARF, Ireland, suburb of Dublin, in Dublin County, three miles northeast of Dublin, on Dublin Bay. It contains many handsome villas and is much frequented during the summer months for sea-bathing. Clontarf is famed in Irish history as the scene of the overthrow of the Danish power in Ireland by Brian Boroimhe on 23 April 1014. Pop. about

4,800.

CLOOTS, klots, Jean Baptiste von, Prus¬ sian baron, well known during the Revolu¬ tionary scenes in France under the appellation of Anarchist Cloots : b. Gnadenthal, near Cleves, 24 June 1755; d. 24 March 1794. He be¬ came possessed of a considerable fortune, which he partly dissipated through misconduct. He was educated in France and traveled In differ¬ ent

parts of Europe and formed an acquaint¬ ance with many eminent individuals, among whom was the celebrated Edmund Burke. At the age of 21 he returned to France and pub¬ lished an attack on revealed religion entitled (Certitude des preuves du MohametismeP The first work in which he distinguished him¬ self was the ridiculous masquerade called the (Embassy of the Human Race,* partly con¬ trived by the Duke de Liancourt. On 19 June 1790, Cloots presented himself at the bar of the National Assembly, accompanied by a considerable number of enthusiastic followers from the slums of Paris dressed to represent the various nationalities, English, German, Italian, Spanish and others. He described him¬ self as the orator of the human race and de¬ manded the right of confederation, which was granted him. To show his democratic spirit he abandoned his title and rank (but not his income). At the bar of the Assembly, 21 April 1792, he made a strange speech, in which he

recommended a declaration of war against the king of Hungary and Bohemia, proposed that the Assembly should form itself into a diet dur¬ ing a year, and finished by offering a patriotic gift of 12,000 livres. On 12 August he went to congratulate the Legislative Assembly on the occurrences of the preceding 10th, and offered to raise a Prussian legion, to be called the Vandal Legion. The 27th of the same month he advised the assembly to set a price on the heads of the king of Prussia and the duke of Brunswick, praised the action of John J Ankarstroem, the assassin of the king of Sweden, and, among other absurd expressions, he said, (XVI (

CLOSE TIME, a period of the year dur¬ ing which certain animals are protected by law, and are not allowed to be caught or killed. Such animals are chiefly those that are killed for food or sport, and include birds, fishes and quadrupeds, as well as certain others — crabs, lobsters and oysters, for example.

CLOSURE (often needlessly cloture, the same word in French), the European substitute for the American ((previous question® : the power of shutting off debate when the speaker or the majority think it has exhausted legiti¬ mate argument and is used for mere obstruc¬ tion. As the equity of neither deciding power can be guaranteed, it is also a possible weapon of mere <(gag-law® ; but it has shown itself to be the only method in which parliamentary institutions can be worked. In Congress the <(previous question® has existed in the House for many years, but because of its smaller size the Senate did not consider such a rule neces¬ sary until the closing hours of the 64th Con¬ gress, which terminated 4 March 1917. The filibustering tactics of the Uittle group of wil¬ ful men® had prevented the

passage . of the armed ship bill prior to adjournment, where¬ fore on 8 March 1917 the special session of the Senate passed a closure rule making possible the limitation of debate. The rule provides :

"That if at any time a motion signed by sixteen Senators to bring to a close the debate upon any pending measure is presented to the Senate the presiding officer shall at once state the motion to the Senate and one hour after the Senate meets on the following calendar day but one, he shall lay the motion before the Senate and direct that the secretary call the roll and upon the ascertainment that a quorum is present, the presiding officer shall, without debate, submit to the Senate by a yea and nay vote the question: 'Is it the sense of the Senate that the debate shall be brought to a close?'

"And if that question shall be decided in the affirmative by a two-thirds vote of those voting, then said measure shall be the unfinished business to the exclusion of all other business until disposed of.

"Thereafter no Senator shall be entitled to speak in all more than one hour on the pending measure, the amendments thereto and motions affecting the same, and it shall be the duty of the presiding officer to keep the time of each Senator

who speaks. Except by unanimous consent no amendment shall be in order after the vote to bring the debate to a cl se, unless the same has been presented and read prior to that time. No dilatory motion, or dilatory amendment, or amendment not germane, shall be in order. Points of order, including questions of relevancy and appeals from the de¬ cision of the presiding officer, shall be decided without debate."

*In the British Parliament no such rule ex¬ isted till 1882, debate being unlimited ; and the fairness of its members, and their unity of feeling as Englishmen, had prevented any serious ill results. But about 1872 Isaac Butt, the leader of the Irish Home Rule party, began the policy, carried on after his death by Par¬ nell, of putting a stop to all legislation on Eng¬ lish subjects until all Irish demands had been granted, by talking against time, making irrele¬ vant motions, calling for divisions on every motion, etc. For many years Parliament strug¬ gled under this, extremely loath to tie down the immemorial freedom of debate, but was finally forced to act, and in 1882 passed a <(closure® rule, which allowed the speaker, on request of 40 members, to pronounce debate closed and call for a vote. In 1902 the present rule was adopted, providing that upon the proposal of a question a member might move that the ques¬ tion be put and if the rules be not abused by such a motion and the rights of the minority be not infringed, then the question should be put at once and decided without further debate or amendment. In 1887, in order to shut off debate on the Irish Crimes Act, the House of Commons, owing to the ineffectiveness of the closure rule, employed a measure known as the ˆguillotine.® Debate on only four out of the 20 clauses had consumed 2*7 days, wherefore a motion was adopted providing that at the end of the following week the chairman, without further debate, should put the questions necessary to end the committee stage. Because of its severity, the procedure became known as the (Cguillotine.® In 1893, in connection with the Home Rule Bill, ((closure by compartments® was adopted, under which debate on certain clauses should cease on a specified date, debate on certain other clauses should cease on another specified date, and in this way to the end of the measure under discussion. The French cloture dates from Louis Napoleon's coup d'etat in 1851. See Previous Question; Parliamentary Law ; Legislative Bodies, Rules Governing. Consult Cushing, L. S., (Law and Practice of Legislative Assemblies) (Philadelphia 1907) ; Hinds, A. C., (Digest and Manual of the Rules and Practice of the House of Representatives) (Washington 1908) ; Lowell, A. L., (The Gov¬ ernment of England) (rev. ed.. New York 1912) ; May, Sir T. E., (A Treatise on the Law, Privileges, Proceedings and Usages of Parlia¬ ment } (12th ed., London 1917).*

CLOT AIRE, klo -tar, I son and successor of Clovis (q.v.), first king of the*

Franks in Gaul, reigned as sole king from 558 to 561. Clotairf. II, a king of the same Merovingian dynasty, reigned over the Franks 30 years later.

• CLOTH. See Weaving.

CLOTHES MOTH, a moth (Tinea pellio- nella), of the family Tineidce, in which the wings are long and narrow, pointed at the end, and with a long finger. It is pale buff-yellow, with no definite markings. It may be seen fly¬ ing about the house the last of May, or still

earlier if the weather be warm, when it lays its eggs in woolens and furs. The young caterpil¬ lar is whitish, and begins, on hatching, to con¬ struct a llattened cylindrical case in which it lives, dragging the case about with it. The mischief is done by the worm, the caterpillar working through the next 10 months, finally changing to a pupa in its case. The carpet- moth belongs also to this group. There is a straw-colored species Tinea biselliella , which spins silk over its food, but does not make a case. A cocoon is spun before pupation out of fragments of cloth. The best preventative is cold storage at a temperature of 40° F., or the use of naphthalium or camphor. Woolen gar¬ ments should be carefully brushed and put away in cotton sacks or in camphor trunks, or wrapped tightly in stout paper, or stored in large pasteboard boxes rendered tight by gum¬ ming a strip of wrapping paper around the edge, so as to seal the box completely. Con¬ sult Packard, (Guide to the Study of Insects; Howard and Marlatt, (The Principal House¬ hold Insects of the United States> (in Bulletin 4 of the United States Department of Agri¬ culture).*

CLOTHING. See Costume; Dress.

CLOTHING INDUSTRY IN AMER¬ ICA. As shown by the 1914 census of manu¬ factures in the United States, the value of the factory product of clothing exceeded that of all other industries except three, which, in order of magnitude, were iron and steel, slaughtering and meat packing and foundry and machine-shop products. Of the total for the clothing indus¬ try, $1,297,273,396, the value of clothing for men and boys was $458,210,985, or 35.3 per cent; clothing for women and children, $473,888,354, or 36.5 per cent; shirts, collars and other fur¬ nishings, including corsets, $122,440,522, or 9.4 per cent. Census statistics for these branches of the industry are shown in an accompanying table. Clothing for women and children and for men and boys, classified as two industries, ranked among all industries in 1914 seventh and eighth, respectively, in number of wage earn¬ ers, and 13th and 12th, respectively, in value of product.

Clothing manufacturing is peculiarly an American industry. By far the greater quantity of the clothing worn in the United States is factory-made. All classes of people in this country buy more clothes and are better dressed than corresponding classes in other countries. In Europe clothing factories are compara¬ tively few and small. Only a limited amount of special lines of clothing is imported into the United States. The statistics of imports and exports during the fiscal year ended 30 June 1914, a month before the war in Europe began, are: Wearing apparel of wool, imports, $2,268,- 125; exports, $2,148,235. Wearing apparel of cotton, except hosiery and other knit goods, imports, $2,898,167; exports, $8,220,626. Wear¬ ing apparel of silk, imports, $4,246,345 ; exports,

$11,673.

Clothing produced in European factories does not equal the American product in style except for women's outer apparel. Models of women's dresses, suits and cloaks are brought from Paris. In other lines the styles of cloth¬ ing worn in the United States originate with American style designers, though occasionally

suggestions from Europe are adopted. The styles of clothing for men in America are de¬ termined by designers in large factories, rather than by custom tailors. Clothing manufactures are the most extensive advertisers in this coun¬ try. The styles of factory designers are attrac¬ tively illustrated in newspaper and magazine advertising, and factory-made garments have been greatly popularized by this wide publicity. The best grades of factory clothing, though sold for much less than the handiwork of cus¬ tom tailors, is well tailored and compares favorably with it. The factory-made clothing industry has grown at a much more rapid rate than the population. The increase from 1900 to 1910 in the population of the continental United States, Alaska excluded, was 21 per cent, while the increase from 1899 to 1909 in the value of product was : clothing for men and boys, 75.5 per cent; for women and chil¬ dren, 142.1 per cent.

Before ready-to-wear clothing was manu¬ factured, clothing was made in the home or by tailors, who often were itinerant. Dealers in second-hand clothing supplied to some extent the demand for cheap apparel. The necessity for replenishing the clothing of sailors during their few days in port led to the manufacture of ready-made clothing at New Bedford about 1825 and at Boston about 1830. Production on a larger scale was begun about 1831 by George Opdyke, later mayor of New York, who had a store in that city, with a branch in New Or¬ leans. About 1834 his son-in-law, John D. Scott, moved from New Jersey to New York city, to take charge of the clothing factory, and thereafter the name of the firm was John D. Scott & Co. They had a large Southern trade, and soon opened branch stores in Charles¬ ton and Memphis. They supplied clothes for planters, but their

product was mostly garments of cheap materials for slaves on plantations. Other men, some of them merchants, began manufacturing clothing for sailors, for South¬ ern negroes and, after 1848, for gold miners in California. Not a large amount was made for other classes before 1861. Until then the factories were principally in New York, Bos¬ ton, Philadelphia and Baltimore, near the tex¬ tile mills, and where a labor supply was obtain¬ able, but some were in Rochester, Cincinnati and other cities. The cutting was done in the shops or factories, but many of the garments were made up in the homes of the workers. Some were sent to rural communities to be made Up by females in the families of farmers during winter or in any spare time.

The Civil War gave a great impetus to the industry. Manufacturers lost their Southern trade, but secured large government contracts, and many new factories were started to supply army uniforms. Sizes of clothing were stand¬ ardized by measurements that the government furnished, and these measurements were used in making clothing for civilians after the war. The requirements of the soldiers who returned to civil life in 1865, the re-establishment of Southern trade, the increase of immigration and the very rapid development of the West led to a large expansion, of the industry. In the seventies and eighties small merchants, clerks, teachers and men of other classes, who wished to wear clothes of good appearance but could not afford to patronize custom tailors,

began to buy factory-made clothing. Only a lew factories now make separate trousers, the demand being for suits of the same material. Formerly manufacturers sold mostly to jobbers, but now nearly the whole output is sold directly to retailers. By 1907 tailor-to-the-trade houses were established. They make suits from meas¬ urements forwarded by merchants whose cus¬ tomers have made selection from swatch samples and stylebooks. Mail order houses sell both ready-made clothing and made to order suits.

The industry could not have grown to its present magnitude without the invention of many labor-saving machines and devices. Pro¬ duction was greatly increased by the sewing machine, which, patented by Howe in 1846, was introduced in this industry about 1850. By 1855 10 important improvements were patented, for making chain or lock stitches, with two or more threads, and one for working button holes. The speed, 800 to 900 stitches a minute, was about doubled when mechanical power was applied, and by 1900 was increased to 4,000 stitches per minute. There are now special machines of attachments for serging, felling, binding, seaming,

seam-closing, two-row stitch¬ ing, blind stitching, canvas front making, collar and lapel padding, sleeve inserting, button hol¬ ing and button sewing. While most opera¬ tions formerly done by hand are now done by machines, hand work is still considerably em¬ ployed in felling and some other operations on the better grades of factory product. The first tool besides shears for cutting was a long knife, which, introduced about 1870, is still used for cheap garments. Pushed up and down through a slot in a table, it cuts many layers of cloth. The first power cutting machine, introduced in 1872, had a reciprocating blade, and soon after¬ ward a belt cutter was invented. Machines, elec¬ trically operated, that could be pushed about the cutting table to follow pattern marks, were introduced in 1892. One variety with a circular knife cuts a maximum of three inches of cloth, and one with a reciprocating knife cuts six to eight inches. Shears are still used for cutting the better grades of clothing. In large factories linings are laid on the cutting table by an auto¬ matic laying machine. Ordinary irons were formerly used for pressing and still are for coats of the better grades. Irons heated from within by gas from a rubber tube were intro¬ duced about 1903, and pressing machines about the same time. A machine operated by a pedal was followed by a more powerful machine operated by steam.

Still another important factor in the devel¬ opment of the industry has been the adoption of more efficient methods of manufacturing. Be¬ fore the Civil War, one worker usually made an entire garment by hand or by hand and machine. After factories were enlarged to make army uniforms subdivision of labor was introduced. The work has been divided more and more, so that now the operations in making a coat num- t>er from 30 to 60 or more. This subdivision, by which each worker does only one small sep¬ arate operation, permits the employment of less skilled labor, and thus increases, as well as cheapens, production. Only by a minute sub¬ division could manufacturers have utilized the hordes of unskilled immigrants after 1880.

Before, during and -Hfer the Civil War, the

making of garments after cutting was largely done under the contract system and the work¬ ers were employed for long hours at low pay. For 10 years after 1882, when large numbers of Russian Jews entered the industry, sanitary conditions in the shops were at their worst. Immigrants slept, cooked, ate and worked in small, dirty, foul-smelling rooms, without ade¬ quate ventilation or sanitary requisites. These places were usually called sweat-shops. The evils of such conditions were remedied in New York city, the most congested clothing centre, by the Tenement House Act of 1892, which prohibited contractors from manufacturing in their homes. Manufacturers adopted trade¬ marks and began extensive advertising

cam¬ paigns. The money thus spent was wasted un¬ less the product was of uniform quality. Man¬ ufacturers, therefore, gave closer attention to the work done in the shops of their contract¬ ors. In many cases one of the lofts in the fac¬ tory building was rented to the contractor, and this practice continues, a shop so situated being called an inside shop. To secure better work¬ manship, the contract system has been more and more abandoned, and in many of the larger factories all work is done under one roof by labor that the manufacturer directly employs. In Rochester splendid clothing factory buildings have been erected, and in the larger cities there are now factory buildings with all needful sani¬ tary arrangements. Of the 4,830 establishments making clothing for men and boys in 1914, the 2,331 regular factories had 123,939 wage-earn¬ ers and the 2,499 contract shops had 49,808. Corresponding figures for establishments mak¬ ing clothing for women and children were : regular factories, 4,470, with 151,950 wage- earners ; contract shops, 1,094, with 16,957. Of the 510,595 wage-earners in the whole clothing industry, reported by the 1914 census of manu¬ facturers, the males and females 16 years of age and over were respectively 36.1 and 62.6 per cent; and workers under that age, 1.3 per cent. Women, who operated sewing machines exclusively, were gradually supplanted as op¬ erators to a large extent by Hebrew men who, in the early 80's, began to come in large numbers from Europe. Women are still largely employed for hand-finishing, which consists mostly of felling. Cutters and pressers have always been men. Few children have ever been employed in the industry. During recent years working conditions have been greatly improved, partly through legislation and partly by agree¬ ments of labor unions with manufacturers or manufacturers' associations. Working-day hours have decreased and sweat-shops practi¬ cally no longer exist. Of the wage-earners in the whole industry, those that worked where the prevailing hours of labor per week were 54 or less were 58.1 per cent in 1909 and 90.2 in 1914. Despite the decrease in working hours, the earnings of employees have increased. In all branches of the industry nearly all em¬ ployees are paid for piece-work, instead of wages, and they, as wˆell as the manufacturers, prefer the piece-wˆork system, mainly because the workers differ so greatly in skill and speed.

The first census record of clothing manu¬ factured for men and boys was for 1849, the first record of clothing for women and children was for 1859. Garments made by dressmakers

constituted the women's clothing shown by the records for 1859 and 1869. Factory production of cloaks began about 1870 and of women's suits, dresses, waists and skirts about 1880. After 1890, the manufacture of

these garments increased at a wonderfully rapid rate. In 1914, the value of the factory product of clothing for women and children surpassed that of clothing for men and boys. In both branches of the in¬ dustry the factory, shop and working condi¬ tions have been about the same and similar ma¬ chinery has been used. In the manufacture of clothing for women and children there is less subdivision of labor and more hand-work than

so often if the collars were detached. She be¬ gan to make separate collars for him about 1825 and to make them for sale a little later. Ebenezer Brown, a small dry-goods dealer in Troy, began, about 1829, to sell separate col¬ lars made by members of his family. They were called (

The first shirt factory of which there is a

Clothing Industry in the United States — Principal Branches

Clothing for Men and Boys

Census Year

Establish¬

ments

Wage

earners

Wages

Cost of materials

1849 .

4,278

96,551

$15,032,340

$25,730,258

1859 .

4,014

114,800

19,856,426

44,149,752

1869 .

7,858

108,128

30,746,579

86,794,706

1879 .

6,166

160,813

45,940,353

131,363,282

1889 .

4,867

144,926

51,075,837

128,846,857

1899. .

5,729

120,927

45,496,728

145,218,798

1904 .

4,504

5,584

137,190

57,225,506

185,793,436

1909 .

191,183

89,644,921

252,522,567

1914 .

4,830

173,747

86,828,011

230,031,690

Clothing for Women and Children

1859 .

188

5,739

1,193,032

3,323,335

6,837,978

1869 .

1,847

11,696

2,513,956

1879 .

562

25,192

6,661 ,005

19,559,227 34,277,219 84,704,592 130,719,996 208,788,226 252 , 345 , 040

1889 .

1,224

39,149

15,428,272

1899 .

2,701

83,739

32,586,101

51,180,193

78,568,261

92,573,642

1904 .

3,351

115,705

153,743

1909 .

4,558

5,564

1914 .

168,907

Shirts for Men and Boys

1879 .

549

25,687

5,403,696

11,306,444

1889 .

869

31,207

9,193,495

15,704,343

1899 .

690

36,622

10,894,327

22,950,564

1904 .

641

36 , 499

11,233,392

25 , 639 , 402

1909 .

770

48,513

16,632,398

44,992,879

1914 .

792

51,972

19,169,697

50,148,535

Value of product

$48,311,709 80,830,555 148,660,253 209 , 548 , 460 251,019,609 276,717,357 355,796,571 485,677,493 458,210,985

7,181,039

12,900,583

32,004,794

68,164,019

159,339,539

247,661,560

384,751,649

473,888,354

20,130,031

33,638,593

47,121,530

50,971,105

82,399,142

95,815,013

Collars and Other Men's Furnishings

1879 .

161

11,174

2,644,155

6,500,164

1889 .

586

20,778

6,078,026

15,280,572

1899 .

457

30,322

9,730,066

23,669,929

1904 .

547

27,185

8,760, 108

26,564,500

1909 .

900

38,482

15,092,988

49,124,843

1914 .

802

42 , 205

17,185,752

52,864,625

11,506,857 29,870,946 44,346,482 49,031,582 87,710, 197 95,416,932

Corsets

1879 .

113

8,802

1,745, 969

3,686,821

6,494,705

1889 .

205

10,928

3,509, 039

5,662,140

12,401,575

1899 .

138

12,297

3,644, 593

6,357,189

14,451,198

1904 .

109

10,975

3,600, 462

6,135,237

14,862,081

1909 .

138

17,564

6,464, 144

15,640,415

33,257,187

1914 .

167

20,496

7,976,721

19,427,362

40,550,702

in the manufacture of clothing for men. Most of the factory-made clothing

manufactured in the United States is produced in New York city, and nearly three-fourths in the State of New York. Corsets are manufactured princi¬ pally in Connecticut and New York city. While models for styles of women's outer apparel have been mostly imported from Paris, many new designs have, in recent years, originated in America. All muslin underwear manufactured in the United States is of domestic designs.

The wife of a blacksmith in Troy, N. Y., is credited with having invented separate collars for shirts. It occurred to her that she would not need to wash and iron her husband's shirts

record was owned by David and Isaac N. Jor¬ dan, merchants in New York city. They fre¬ quently received from the. South orders for shirts which they employed seamstresses to make. In 1832 they started a factory for mak¬ ing stock shirts. In 1840 another firm in New York city began manufacturing shirts, and in 1845 a shirt factory was opened in Troy. At the present time the production of shirts in Troy about equals that in Philadelphia or Bal¬ timore, and the production in these three cities about equals that in New York city.

Walter B. Palmer,

Formerly Special Agent , Bureau of Foreign and Domestic Commerce.

CLOTHO

CLOUDS

129

CLOTHO, one of the three Fates (q.v,). In zoology, Clotho is a genus of snakes of the tribe Vipewna, family Viperidce. C, arietans is the puff-adder of the Cape of Good Hope. In astronomy, Clotho is the name of the 97lh asteroid, discovered by Tempel 17 Feb. 1868.

CLOTILDA, Saint, the daughter of Chil- peric, King of Burgundy: b. about 475 ; d. Tours 545. In 493 she became the wife of Clovis, king of the Franks. She was the chief means of securing the conversion of her husband to Christianity, and largely influenced his life. After his death she lived a life of austerity at Tours. She was canonized a few years after her death. Her remains were buried in the church of Saint Genevieve at Paris, and burned at the Revolution to prevent their dese¬ cration ; the ashes are still in the church of Saint Leu. There is a statue of her in the Luxembourg and a fine church was built in her honor in Paris about 1850. Consult Kurth, (Sainte Clotilde) (Paris 1905).

CLOTTING. See Pathology. cl6ture, klo-tiir. See Closure.

CLOUD, Saint, or CLODOALD, son of

Clodomir and grandson of Clovis, King of France. After the death of his father and the murder of his two brothers he became a monk and found refuge in a monastery near Paris, which took from him the name of Saint Cloud. He died there in 560.

CLOUD, Virginia Woodward, American author: b. Baltimore. She was educated in private schools in Baltimore, is unmarried and has been a writer by profession since 1893. She is literary editor of the Baltimore News and member of the board of managers of the Wo¬ man's Literary Club. Her publications in¬ clude Town Durley Lane) (1898) ; (A Reed by the River) (1902), and 19 connected tales of the Revolutionary and Colonial periods; char¬ acter studies of women, now republished in many collections of readings; a trilogy of con¬ nected tales; novelettes; also the (0'Tara Stories, published in Harpers Weekly and Uncle Remus's Home Magazine, and many stories, poems, etc., in leading magazines. She is represented by portrait and poems in the Bibliotheque Nationale of France.*

CLOUDBERRY, a plant (Rubus cliamce- morus) called also knobberry, mountain bram¬ ble and mountain raspberry, is found in peat¬ bogs and swamps from Maine and New Hamp¬ shire westward and northward to Alaska. The plant is of humble growth, the leaves few, large-lobed and kidney-shaped, the flower large and white, the fruit orange- red and of an agree¬ able flavor. It is a native of the northern parts of America, Europe and Asia. In Great Britain it is chiefly confined to elevated moors. In Norway and Sweden it is much more abun¬ dant; the fruit is highly valued and makes ex¬ cellent preserves. In Canada it is abundant in the north and greatly prized in Newfoundland, Labrador, Nova Scotia and northern Quebec. It is difficult of cultivation. Similar to it is the Rxibus gcoides, whose fruit is as large as a raspberry and one of the few native fruits of Tierra del Fuego and the Falkland Islands.

CLOUDBURST, a sudden and violent rainfall, covering a limited territory and of brief duration. The term generally connotes vol. 7 — 9

*six or more inches of rainfall and at the rate of 10 or more inches per hour. The area cov¬ ered by the heayy rains is probably not more than an acre; or not more than a square mile by the lighter storms. It occurs in the hottest season and most frequently on the slopes of mountains and in arid regions and is generally accompanied by severe and continu¬ ous lightning. The cloud-burst is caused by the contact of a warm current of air, sur¬ charged with moisture, with a cold current, the result being swift condensation and immediate precipitation of the water formed. Consult Ferrel, (Recent Advances in Meteorology * (Washington 1886), and his (Popular Treatise on the Winds* (New York 1889) ; Halm, (Lehrbuch der*

Meteorologie) (pp. 361-70, 1st ed., Leipzig 1901).

CLOUDS, masses of minute globules of water or crystals of ice and snow suspended in the atmosphere.

The minute globules of water that make the cloud are evidently condensed from the invisi¬ ble moisture that is always, present in the air in greater or less quantities. The studies of Aitken, J. J. Thompson, Wilson and others have thrown considerable light on the processes of condensation. It pure, dry air — that is, air from which all dust and traces of electricity have been removed — be mixed with pure vapor of water and the moisture be cooled below the temperature of saturation, it will be found that condensation of water vapor does not generally occur. If, however, fine dust be injected into the pure mixture without altering its tempera¬ ture or pressure, a fine mist is developed at once. It has also been discovered that if a charge of electricity, however small, be intro¬ duced, condensation takes place at once. From these experiments it is inferred that nuclei of some sort, such as dust particles or electric par¬ ticles, are necessary for the formation of water globules, other conditions being favorable.

The original classification of clouds by How¬ ard in 1803 took account of form only. A more recent classification — the one now in gen¬ eral use — takes account of both the form of the cloud and its altitude. In this system three principal forms are recognized, namely, cir¬ rus, cumulus and stratus, with their modifica¬ tions. These three main classes present the most obvious differences in form and shape ; they develop at widely different altitudes and move with varying velocities. It is possible to further subdivide each class into a number of varieties, and in practice this is done when an observer becomes skilled in distinguishing the special forms and subdivisions of the main types.

The definitions of the principal types as rec¬ ommended by the International Cloud Commit¬ tee, and generally adopted by meteorologists, are given below.

Cirrus (Ci.). — Isolated feathery clouds of fine fibrous texture, generally of a white color, frequently arranged in bands, which spread like the meridians on a celestial globe over a part of the sky and converge in perspective toward one or two opposite points of the horizon. (In the formation, of such bands Ci. S. and Ci. Cu. often take part).

Cirrus clouds are the highest of all and move with the greatest velocity. They develop up to a height of about 10 miles, although their mean height is a little over six miles, being higher in summer than in winter. Their aver-

age velocity in winter is about 75 miles per hour, and in summer 65 miles per hour. They may be formed by mixture of air strata of different temperatures or by the cooling of a moist streak in the upper atmosphere by expan¬ sion and radiation. In the latter case, if the surrounding air be very dry, the newly-formed cloud is soon dissipated.

Cirro-stratus (Ci. S.). — Fine whitish veil, sometimes quite diffuse, giving a whitish appearance to the sky, and called by many cirrus haze, and sometimes of more or less distinct structure, exhibiting tangled fibres. The veil often produces halos around the sun and moon.

This cloud, as its . name indicates, is one of the composite forms. Its structure is much on the same order as that of pure cirrus; in fact it is generally composed of cirrus fibres tangled and interlaced in a most complex manner. The variety of forms, however, is practically unlim¬ ited and it undergoes rapid changes, especially in advance of a cyclonic disturbance. Like cir¬ rus, it is composed of crystals of snow or ice, develops at a great elevation and moves with high velocity.

Cirro-cutnulus (Ci. Cu.). — Fleecy cloud. Small white balls and wisps without shadows, or with very faint shadows, which are arranged in groups and often in rows.

This is a broken layer of cloud, of which the component masses are not fibrous, like cir¬ rus, but more or less rounded. A second, al¬ though rather rare form of cirro-cumulus, is the mackerel sky of northern Europe. The cloudlets in this case are rounded, but not fleecy. The altitude of cirro-cumulus ranges from four to six miles and its movement, like cirrus and cirro-stratus, is quite rapid.

Cumulus (Cu.). — Woolpack clouds. Thick clouds whose summits are domes with protuberances, but whose bases are flat. These clouds appear to form in a diurnal ascensional movement which is almost always apparent. When the cloud is opposite the sun the surfaces which are usually seen by the observer are more brilliant than the edges of the protuberances. When the illumination comes from the side this cloud shows a strong actual shadow; on the sunny side of the sky, however, it appears dark with bright edges. The true cumulus shows a sharp border above and below. It is often torn by strong winds, and the detached parts (fracto- cumulus) present continual changes.

This cloud is undoubtedly formed by the condensation of water vapor in the summit of an ascending column of air. The flat base of the cloud marks the level when the condensa¬ tion temperature is reached, and the upper dome-shaped summit represents the head of the air column protruding into

colder space. In the temperate latitudes it is usually a cloud of the warm season and forms at an altitude of about a mile above the surface of the earth. Its average rate of movement ranges from about 20 miles per hour in summer to 30 in winter. There are many special varieties and forms of cumulus cloud.

Alto-cumulus (A. Cu.). — Dense fleecy cloud. Larger

whitish or grayish balls with shaded portions, grouped in flocks or rows, frequently so close together that their edges meet. The different balls are generally larger and more compact (passing into S. Cu.) toward the centre of the group, and more delicate and wispy, (passing into Ci. Cu.) on its edges. They are very frequently arranged in lines in one or two directions.

Alto-cumulus clouds may occur when the ascending currents are not strong enough or do not persist long enough to form thick cumuli, or .they may represent the vapor that is condensed in the upper portion of a series of atmospheric waves as suggested by Von Helm

holz. The alto-cumulus level ranges from one and a half to two miles. It is higher than the cumulus level, although the summits of cumulus clouds often penetrate into and abo'tfe it. The mean velocity of alto-cumulus clouds is about 40 miles per hour, being somewhat higher in winter and lower in summer.

Cumulo-nimbus (Cu. N.). — Thunder cloud; shower cloud. Heavy masses of clouds, rising like mountains, towers or anvils, generally surrounded at the top by a veil or screen of fibrous texture ("false cirrus") and below by nimbus-like masses of clouds. From their base generally fall local showers of rain or snow, and sometimes hail or sleet. The upper edges are either of compact cumulus-like outline, and form massive summits, surrounded by delicate false cirrus, or the edges themselves are drawn out into cirrus-like filaments. This last form is most common in spring showers. The front of thunderstorm clouds of wide extent sometimes shows a great arch stretching across a portion of the sky, which is uniformly lighter in color.

Cumulo-nimbus clouds are of massive di¬ mensions and the most impressive of all clouds in the realm of nature. The upper surface of this cloud, which is sharp and well defined in the earlier stages of its formations, becomes soft and wispy soon after rain begins to fall from its base. The cloud itself may be divided into three planes, namely, the lower, consisting of vapor, the middle of water and the upper of ice or snow. The tops of some of these clouds reach 6 or 8 or even 10 miles into the atmos¬ phere. Professor Bigelow computes that the temperature in one of the loftiest of these clouds ever observed fell from 79.5° F. at the ground to — 74° F. at a height of nearly nine miles.

Stratus (S.). — Lifted fog in a horizontal stratum. When this stratum is torn by the wind or mountain summits into irregular fragments they may be called "fracto-stratus."

This cloud, as its name implies, is merely a horizontal sheet floating at a low elevation and without any special structure. It is gen¬ erally formed by the intermingling at the sur¬ face of contact of air strata of different tem¬ peratures, and it indicates a horizontal flow of air rather than an ascensional movement in the case of cumulus clouds.

The average elevation of stratus clouds is less than half a mile and their average velocity about 15 miles per hour.

Strato-cumulus (S. Cu.). — Large balls or rolls of dark cloud, which frequently cover the whole sky, especially in winter, and give it at times an undulated appearance. The stratum of strato-cumulus is usually not very thick, and blue sky often appears in breaks through it. Between this form and the alto-cumulus all possible graduations are found. It is distinguished from nimbus by the ball-like or rolled form, and because it does not tend to bring rain.

This cloud is not sufficiently uniform to be called stratus, nor sufficiently lumpy to be called cumulus. It is a cloud of moderate elevation, about 9,400 feet in summer and 7,800 feet in winter, and its rate of movement varies from 20 to 30 miles per hour. It is often a thin cloud through which patches of blue sky can be seen. Again it covers the sky completely, and presents a gentle undulating surface with a tendency to break up into long parallel rolls or bars.

Alto-stratus (A. S.). — Thick veil of a gray or bluish color exhibiting in the vicinity of the sun and moon a brighter portion, and which, without causing halos, may produce coronae. This form shows gradual transitions to cirro-stratus, but, according to the measurements made at Upsala, was only one-half the altitude.

The average height of this cloud is about hree and a half miles in summer and three

CLOUD FORMS

HP

*■m. a * a ‘r~T*

fcK • %. .; ‘■ ■ •■: •

m «

*»4mM – S’T&H ■- ‘ *’«**Mr**;tt.—.*

w

pSaib ”

t.

fw.’ – . •■- ,f.ri . •• .•’

iRwil; rf. # w’ y

pfufii£jr^ ‘••••“ ^*

*IP rdf**

... : '.:'-':J" ' •>&

'■ ■- ;:: ; '•" ' -' ■■■ ■ ,5-rl

8 gaLiraV . *■ '

' ^ f.i

m& '**' ... *

. . rs' •■ : ^r-: ■

■ ■ • •{'• hhk ■■

§P"* . "

JF

l .; • *

, '*A'v,

- 1 W-

. r.:; .i.-^ii -.

MMngnpf

if <■ * ' r ■' :&*v.

■I'*" ■" W^ilMP

' " – 4 .„f,5~ ' «£ t ., j

t« .- . ^ *S ., . >' * *

*• ' 4r > ***!

- –

Nimbus

CLOUDS

131

miles in winter. Its average velocity ranges from 40 to 50 miles per hour.

Nimbus (N.). — Rain cloud. Dense masses of dark formless clouds with ragged edges, from which generally continuous rain or snow is falling. Through the breaks in these clouds there is almost always seen a high sheet of cirro-stratus or alto-stratus. If the mass of nimbus is torn up into small patches, or if low fragments of cloud are float¬ ing much below a great

nimbus, they may be called "fracto- nimbus " ("scud" of the sailors).

As soon as rain falls from a cloud it is called a nimbus, whatever its form before the beginning of rain, with one exception, namely, when rain begins to fall from a lofty cumulus cloud it is called a cumulo-nimbus to distin¬ guish it from a system of pure nimbus clouds, the latter being flatter and more in the nature of a sheet cloud.

Colors of Clouds. — The brilliant colors sometimes assumed by clouds at sunrise and sunset are probably caused by selective absorp¬ tion and reflection of light by dust particles or vapor haze in the atmosphere. The clouds of the day-time, especially those having a great elevation, are white, since they reflect the greater part of the light incident on them.

The bases of cumuli are generally of a dark shade, while the portions in shadow are mostly of a pearl gray.

Thunder clouds sometimes have an olive- green tint, and this is thought by some ob¬ servers to portend high winds and heavy rain¬ fall.

Utilization of Clouds in Weather Fore¬ casts. — This topic has been the subject of considerable study by Ley, Abercromby and others in Europe, and by McAdie, Clayton and the writer in the United States. In forecasting weather changes from synoptic charts the clouds frequently show the advance of a cyclonic disturbance, but not before the same information is given by the circulation of the surface winds and the fall in the barometer. Unfortunately it is not possible to fully de¬ scribe and telegraph the significant features of the various cloud forms so that they may be available at a central weather station ; in the case of a solitary observer, however, some skill in making local predictions of the weather may be attained by a careful study of cloud forms in connection with the barometer.

Methods of Observation. — The kind, amount and direction of clouds form a part of meteorological observations whether made for purposes of weather forecasting or for purely climatic studies. In the last-named event it is chiefly desired to know the extent of sky covered with cloud on the average of the season, since one is then able to judge of the nature of the climate with respect to sunshine. In weather forecasting it is important to know, not only the kind of cloud observed, but both its direction and apparent velocity, although in actual practice the last named is rarely at¬ tained. This information is best obtained by means of the nephoscope. An excellent form of nephoscope was devised by Prof. C. F. Mar¬ vin, United States Weather Bureau, in 1896. Professor Marvin's nephoscope is shown in the illustration.

The circular frame, A, is mounted upon three leveling screws, and its upper

surface is graduated to degrees, numbered from 0 to 360, the numbers increasing in a direction contrary to the direction of motion of clock hands. The

plate and mirror, M, revolve smoothly within the circular rim, A, being carried upon a hol¬ low vertical axis at the centre. The arm, B, carrying the sighting staff, S, also revolves upon the central axis, the outer end traversing the narrow annular space between the mirror and graduated rim. The staff, S, is telescopic in construction, and is attached to the arm at B by a hinge which permits the staff to be inclined from the vertical to any extent, but always in a plane perpendicular to the mirror. The top portion of the staff is provided with a crosshead, which is surmounted by a small sighting-knob, s. The crosshead is adapted to receive the secondary staff, S', which slides with gentle friction through the crosshead, and is tipped at either end with small secondary sighting-knobs, s' and s". By reason of the telescopic construction of the staff, S, the cross¬ head cannot only be turned about in any direc¬ tion, but it and the sighting-knob, s, can be raised by various amounts, being held in place by friction. The hinge at B is made in such a manner that when the staff, S, is placed in a vertical position, the small rod sliding inside can be forced down into a hole in the hinge, the effect of which is to lock the hinge so that the staff is held rigidly in a vertical position.

In using the nephoscope the observer looks

down upon the mirror, M, and observes the reflection of the cloud. By moving his eye he brings a point of the cloud image and the re¬ flection of the sighting-knob, s, into coincidence at the centre of the mirror. The head should be held so that the knob is always seen at the centre of the mirror. The cloud image will then appear to move away from the centre of the mirror. The mirror is then revolved until the graduated line becomes parallel with the motion of the cloud, when its direction of mo¬ tion may be read off and its apparent velocity determined by timing the image as it passes along the graduated scale of the mirror.

Other forms of the nephoscope have been devised and used, mostly in European countries, and Prof. Cleveland Abbe, of the United States Weather Bureau, has devised a very convenient form of nephoscope for use on vessels at sea.

In determining the height of clouds, direct observations of their angular altitude are made by two observers at the ends of a measured base-line, whence the altitude may be computed by trigonometric formulae. The same results may be obtained by photography, but the method is not so direct and the computations are more laborious. Consult Clayden, (Cloud Studies (London 1905). The literature of the subject*

is to be found in the reports of weather bureaus and. in meteorological journals.

Alfred J. Henry,

Professor of Meteorology, United States Weather Bureau.

CLOUDS, The, a comedy by Aristophanes ; acted in 423 b.c. It is an attack on the new spirit of intellectual inquiry with Socrates as the general type of faulty teacher. The ˆSophists® whom Aristophanes attacks are those who delved in science and the professors of letters and rhetoric. Though one of the most interesting and poetic of the author's plays, the people refused to' hear it a second time. But its literary popularity counterbalanced its fail¬ ure on the stage.

CLOUET, kloo-a, French family of artists, descendants from Flemish ancestry. 1. Je- han, ya'han, the first known of the family, was in 1475 a resident of Brussels. His works are unknown. 2. His son Jehannet: b. 1485; d. 1541. He migrated to France and located at Tours. In 1518 he went to Paris and became court painter and valet de chambre to Francis I. A portrait of the King, in the Louvre, is said to have been painted by this artist, also another portrait of the King, in the Pitti Gal¬ lery, Florence, is credited to him. Several other pictures in European galleries are said to have been painted by him. In all the style is that of the Flemish school. 3. Francois, son of Jehannet: b. 1510; d. 1572; succeeded his father as court painter to Francis I and re¬ tained the position under Henry II, Francis II, Charles IX and Henry III. He executed the wax masks of Francis and Henry II. His por¬ traits are mostly unknown but many have been attributed to him, among them full lengths of Henry II (Uffizi), Charles IX (Vienna), Eliza¬ beth of Austria (Louvre) and a miniature of Catherine de Medici (Vienna Museum). His works are mentioned in the records of the court. Some authorities mention a brother of Frangois, but of him nothing positive is known. Consult De Laborde, Leon, (La Renaissance des arts a la cour de France) (1855) ; Grand- maison, (Les Arts en Touraine) (1870).

CLOUGH, klo, Anne Jemima, English ed¬ ucator: b. Liverpool, England,

20 Jan. 1820; d. Cambridge, 27 Feb. 1892. She was a sister of Arthur Hugh Clough (q.v.), and after a girl¬ hood spent in Charleston, S. C., opened a day school at Liverpool in 1841. Becoming interested in the general subject of education, the North of England Council for Promoting the Higher Education of Women was founded through her efforts, and from this sprang the idea of the Cambridge higher local examinations. Lec¬ tures for women having been established at Cambridge in 1869, Miss Clough, in October 1871, took charge of a house of five women students, out of which grew the present Newn- ham College, over the administration of which she presided until her death. During her busy career she accomplished much for the higher education of English women. Consult Clough, B. A., (Memoir of Anne J. Clough } (1897).

CLOUGH, Arthur Hugh, English poet: b. Liverpool, 1 Jan. 1819; d. Florence, Italy, 13 Nov. 1861. He studied under Arnold at Rugby, then at Balliol College, Oxford, and became a fellow of Oriel College in 1842. In 1849 he became head of University Hall, Lon¬

don, but resigned in 1852 and went to America, where he lived for a few months at Cambridge, Mass. On his return next year he was ap¬ pointed an examiner in the education office. His poems were published, along with a genial memoir, by F. T. Palgrave in 1862 ; his poems and prose remains, with letters and a memoir, were published by his wife in 1869. (The Bothie of Tober-na-Vuolich) (1848) is his best known poem; others are 'Dipsychus and 'Amours de Voyage.* They are masculine and vigorous in tone and contain many noble thoughts and strokes of genuine humor, alter¬ nating with passages of deep pathos and ten¬ derness. He is affectionately commemorated in Matthew Arnold's*

CLOUGH-LEIGHTER, Henry, Ameri¬ can composer, editor and organist : b. Wash¬ ington, D. C., 13 May 1874; the agnomen of Clough was given at birth for perpetuation (together with his father's name) as family surname. He was educated privately and at Columbian University (Washington) 1887-89; at the age of 13 he obtained a scholarship at the latter university but relinquished it to give his whole time to the study of music. He be¬ came a pupil of Trinity University, Toronto, Canada, in preparation for musical degree ; studied harmony, counterpoint and composition under Dr. Edward Kimball, Dr. George Wal¬ ter, Henry Xander (of Stuttgart Conservatory of Music, Germany) and Dr. J. Humphrey An¬ ger, of Oxford, England. He began piano study at the age of 4, under his mother, a thorough musician and a cultured gentlewoman of high scholarly attainments. From the age of 9 to 12 was solo chorister in Saint John's Church, Washington. At 13 he began the study of the organ under Dr. Walter. At 14 was organist of Saint Michael's and All Angels (Washington) ; at 15 organist of Church of the Incarnation (Washington) ;

at 18 organist and choirmaster of Epiphany Chapel (Washing¬ ton) ; from 1892 to 1899 was organist and choir¬ master of Epiphany parish (Washington, D. C.) and also of the Jewish synagogue; from 1899 to 1900 organist and choirmaster of Grace Church, Providence, R. I.; 1900 to 1901 organist and choirmaster of Christ Church and supervisor of the music courses in the schools of Westerly, R. I. During the same year (1900-01) he was in¬ structor of musical theory of the Howe School of Music, Boston ; associate editor on editorial staff of Oliver Ditson Company, Boston, 1901- OS; became organist of the First Parish Con¬ gregational Church, Milton, Mass., in 1901 ; musical editor of the Boston Music Company since 1908. His published works include five can¬ tatas for voices, with organ or orchestral ac¬ companiment; lyric-suite, 'The Day of Beauty, for solo voice, piano and string quartet ; sym¬ phonic ballad, 'Lasca,* for voice and orchestra; victorian ode, 'Recessional,* for large chorus and orchestra ; many song-cycles • over 100 art songs, and a like number of choral works. He is also widely known as editor of innumer¬ able musical, technical and pedagogical works.*

CLOUS, klous, John Walter, American soldier: b. Germany, 9 June 1837; d. New York, 1 Sept. 1908. He came to America in 1855, enlisted in the United States army 2 Feb. 1857, and was promoted second lieutenant 29

CLOUDS

1 Cumulus

2 Strato Cumulus

CLOUDS

1 Cumulus

2 Cirrus

CLOUTIER — CLOVER

133

Nov. 1862. He took part in the siege of York- town, the Seven Days' battles in June 1862, Malvern Hill, Second Bull Run, Antietam, Fredericksburg, Chancellorsville and Gettys¬ burg, being twice brevetted for gallant conduct at the latter. He served on the frontier and in Indian campaigns 1868-86, as judge advocate in many important . trials and cases 1862-86, was assistant to the judge advocate-general 1886-90 and professor of law at West Point 1890-96. During the Spanish- American War he was ap¬ pointed a brigadier-general of volunteers and served on the staff of Major-General Miles. He attained his lieutenant-colonelcy 12 Feb. 1892. He was the author of lectures on < Military and Martial Law and Suspension of

the Writ of Habeas Corpus, delivered at Union College in the Butterfield lecture course.*

CLOUTIER, kloo'tya', Francois Xavier,

Canadian bishop : b. Sainte Genevieve de Ba- tiscan, 2 Nov. 1848. He was educated at Three Rivers and Laval University, and ordained to the priesthood in 1872. He was consecrated bishop of Three Rivers 25 July 1899.

CLOVE, the unexpanded flower-bud of an East Indian tree (Eugenia aromatica) some¬ what resembling the laurel in its height and in the shape of its leaves. The flowers grow in clusters, and the petals are small, rounded and of a bluish color; the fruit is an oval berry. The Molucca Islands, where the raising of dif¬ ferent spices was formerly carried on by the Dutch colonists to a great extent, appear to be the native land of the clove, and the best are still brought from that quarter. At one time, however, in order to secure a lucrative branch of commerce in this article to themselves, the Dutch destroyed all the trees growing in other islands and confined the propagation of them to that of Ternate. But both clove- and nut¬ meg-trees were transplanted from the Moluc¬ cas into the islands of Mauritius and Bourbon, and the clove is now cultivated with success in many warm countries, including Zanzibar and the West Indian islands. At a certain season of the year the clove-tree produces a vast pro¬ fusion of flowers. The operation of gather¬ ing is performed between the months of Octo¬ ber and February, partly by hand, partly by hooks and partly by beating the trees with bamboos. The cloves are subsequently dried by exposure to the smoke of wood fires, after¬ ward to the rays of the sun. When first gath¬ ered they are of a reddish color, but by drying they assume a deep-brown cast. This spice yields a very fragrant odor and has a bitterish, pungent and warm taste. It is most frequently used in culinary preparations. When fresh gathered, cloves will yield, on pressure, a fra¬ grant, thick and reddish oil ; and by distillation a limpid essential oil.

The medical value of cloves is due to the presence of eugenol, C10H12O2, in the volatile oil. Eugenol is extremely active, acting like the phenol, or carbolic acid group, to which it is related. Clove is a marked local anaesthetic, a strong antiseptic and bactericide, an excellent stimulant to the sympathetic nervous system, expelling flatus from the stomach and the in¬ testines, by increased peristalsis, and increasing the flow of the gastric and intestinal juices. Its value in toothache is due to its anaesthetic and bactericidal properties. A number of new compounds of eugenol are on the market. Ben¬

zoyl-eugenol and cinnamyl-eugenol are used in the treatment of tuberculosis.

CLOVE-BARK, the bark of various aro¬ matic trees, used in the manufacture of drugs and spices. A tree (Dicypellium caryophylla- tum) of Brazil supplies a cinnamon-like cylin¬ der which is commonly known as clove-bark in the American markets and is used in medi¬ cine as cassia caryophyllata. The name is often given also to culilawan and cinnamon.

CLOVE-PINK, or CLOVE GILLY FLOWER, the carnation (Diant hus caryophyl- las), more especially a whole-colored, clove- scented variety of it.

CLOVER, Richardson, American naval officer: b. Hagerstown, Aid., 11 July 1846; d. 14 Oct. 1919; graduated, United States Naval Academy in 1867. He was advanced through the various grades, attaining that of rear-ad¬ miral in 1907. He had charge of the survey of southeastern Alaska in 1885-86, was hy- drographer at the Bureau of Navigation 1889- 93 and chief of the Office of Naval Intelligence 1897-98. He commanded the Bancroft during the war with Spain and afterward returned to the Naval Intelligence Office. In 1900-03 he was naval attache at London, and in 1906-08 was president of the Board of Inspection and Survey. He was retired 11 July 1908.

CLOVER, species of the genus Trifolium, belonging to the pea family (Fabacece) . Of Trifolium about 400 species have been de¬ scribed; they are most abundant in the north temperate zone, a few in South America and South Africa. Some are very important in agriculture, either for pasturage, fodder or for soil-improvement.

The word “clover® is also applied to species of related genera, as bur-clover (Mcdicago) , sweet clover (Melilotus) , bush and Japanese clovers (Lespedeza) , prairie clover (Petaloste – mon), etc.

The true clovers (Trifolium) are herbs with mostly three-foliolate leaves ; purple, pink, white or yellow small flowers in dense heads or spikes ; and straight membranous pods con¬ taining one to four seeds.

The most important species to the farmer is the common red clover (Trifolium pratense), now naturalized in North America, but a native of Europe and northern Asia. It has been grown in England for over 300 years. It is a more or less hairy perennial, growing from six inches to two feet high. The flower-heads are dense, oval or ovoid, about one inch long; flowers sessile or nearly so, red, rarely white, remaining erect in fruit; calyx sparingly hairy. It is one of our best forage plants for nutritive value, high yield and good range of adaptabil¬ ity ; it is commonly found in meadows and pas¬ tures and is used as a green manure. It flowers from April to November. The seed weighs about 60 pounds to the bushel, and, if sown alone, 10 to 12 pounds will sow an acre.

Zigzag clover, cow-grass and marl-grass or mammoth clover (Trifolium medium) may be an offshoot of T. pratense, from which it dif¬ fers in being a larger plant, having zigzag stems, the flower-heads larger, longer stalked and often of a deeper purple color, with a practically smooth calyx tube. It is a native of Europe and Siberia and blooms during the summer.

Alsike or Swedish clover (Trifolium hy- bridum) is an erect perennial, growing one to two feet high. Its flowers are pink to white and are open about the same time as those of timothy. It is suited to heavy clay soils and is the only clover that will stand irrigation. It has smaller and shallower roots than com¬ mon clover. It is sometimes sown alone, when, owing to its small seed, four pounds per acre is sufficient. It is better suited to mixtures. It was introduced into Great Britain from Sweden in 1834.

White, Dutch or honeysuckle clover (T. repens) is a common perennial, low-growing plant with white to pinkish flowers, native of Europe, Siberia and perhaps of the northeastern United States. Its method of seeding makes it permanent. As its yield is small it is seldom grown alone, but is often incorporated in mix¬ tures. It is a bee-plant and is common on nearly all soils. See Dutch Clover.

Crimson, carnation, Italian or scarlet clover (T . incarnatum) is an erect, hairy annual, growing six inches to three feet high. The leaflets are nearly sessile, the flower-heads are terminal, oblong or ovoid, one to two and a half inches long; flowers red, purple, pink or white, sessile; calyx hairy. It is often grown as a catch or cover crop in orchards, etc., and sometimes for grazing and hay. It is quite ornamental and is now grown by the florist.

Yellow clover or hop clover (T. agrar- ium) is a hairless or slightly hairy annual clover, growing 6 to 18 inches high, with small yellow flowers which are open between May and September. It is common along roadsides and waste places. T. procumbens is also . called yellow clover or hop clover; it is more spread¬ ing and hairy than the above. It is common on dry soils. Alexandrian or Egyptian clover (T . alexandrinum) is an annual, bearing oval, pale yellow or whitish flowers. As it is an important fodder in Egypt it is presumed that it will be of value for the Southern States. Rabbit-foot, stone or old field clover (T . arvense) is a common annual of no value. T. dubinm is the least hop clover or hop-trefoil, also called yel¬ low suckling clover, and is regarded by some as the true shamrock.

Uses and Feeding Value. — Clovers are grown for hay, pasture, soiling, silage, green- manuring, cover-crops and soil improvement. Clovers or some

other legume should have a place in every rotation, because of their deep, fleshy root system and capacity for appropri¬ ating free nitrogen from the air in the soil by means of bacteria on their roots. Their deep roots penetrate the sub-soil and transfer valu¬ able plant food to the surface soil, which is liberated when they decay. It has long been known that the growing of legumes improved the soil ; Pliny recommended that such crops be grown previous to grain crops. The wisdom of this is now supported by recent research. In 1888 it was announced that the nodules on the roots of leguminous plants were colonies of bacteria, and that their work was to take up nitrogen from the soil-air for the benefit of their host ; hence we have the fact that a large quantity of nitrogen may be removed from the soil for a series of years in the form of clover-hay or alfalfa hay — yet the surface soil be richer in nitrogen at the end of the period than it was at the beginning. Plowing a crop

of clover under as green-manure is a very effective way of enriching the soil in humus. This is now practised in orchards to a consid¬ erable extent ; the tillage they receive and the crops removed rapidly deplete the fertility of the land, hence the introduction of the practice of seeding down the orchards during the sum¬ mer with some legume, as crimson clover, cow- peas, soy-beans, etc., to add humus, protect the land from washing during the fall and winter and in wet seasons, by using up the moisture, to aid in maturing the buds of the trees and enable them to stand the winter ; the crop being plowed under the following spring when culti¬ vation begins.

The average percentage composition of clover is given as —

Protein

Nitrogen-free

extract

Ether exlract

Crude fibre

Ash

Water

Red clover, green .

4.4

13.5

1.1

8. 1

2.1

70.8

Alsike clover .

3.9

11.0

0.9

7.4

2.0

74.8

Red clover, silage .

4.2

11.6

1.2

8.4

2.6

72.0

Red clover hay .

12.3

38.1

3.3

24.8

6.2

15.3

Alsike clover hay .

12.8

40.7

2.9

25.6

8.3

9.7

With ruminants the average coefficient of diges¬ tibility is —

Dry matter

Protein

Nitrogen -free

extract

Crude extract

Crude fibre

Red clover, green .

66

61

67

62

78

69

65

62

53

49

Red clover hay .

At the Wisconsin station, clover cut three times in one year yielded 25 tons of green forage per acre ; this may be regarded as a maximum yield. The first cutting, made 29 May, contained only 8.2 per cent of dry matter and was on this account unsatisfactory as a soiling crop, although, generally speaking, this crop is a most valuable one for this purpose, being relished by all stock. The total dry mat¬ ter -contained in the three crops was nearly four tons per acre.

If given in excess while green, or grazed, it is liable to cause bloat. To prevent this, give dry fodder in addition, and do not turn the animals out when they are very hungry or the dew is on. Clover pasture is excellent for growing pigs, and they may be fattened on it.

Experience has shown that the best time to cut clover for hay is when one-third of the heads are turning brown. As ordinarily cured it is liable to be dusty, hence it is not consid¬ ered a satisfactory feed for horses. For grow¬

ing and idle horses, bright, clean clover hay is both economical and valuable. Hay from over¬ ripe crimson clover is dangerous for horses ; the bristly hairs, accumulating in the intestines, form balls, causing stoppages and death. Clover hay is a most valuable forage for cattle, espe¬ cially milch cows; 10 to 12 pounds may be fed daily, its high nitrogen content permitting a reduction of the amount of concentrated feed.

It is one of the best coarse fodders for sheep, and when chaffed fine is used for feeding lay¬ ing hens in winter.

Clover Diseases. — The common diseases are: Clover rust (Uromyces trifolii), which appears in various stages on the leaves, leaf¬ stalks and stems of the plant, particularly of white clover. White minute cups appear in spring or early summer, accompanied or fol¬ lowed by small brown spores, which are finally followed by darker spores which live through the winter and germinate the following spring.

Clover rot (Sclerotinia trifoliorum) attacks 'many legumes. The disease causes a browning of the stem and leaves, which are soon spotted with a white mold, which ultimately forms solid, wavy, black bodies often half an inch long. These produce mushroom-like bodies the following spring. Burning over the infested field and a proper rotation of crops are advo¬ cated for both diseases.

A leaf-spot (Pseudopezica trifolii) is often destructive, especially during a wet fall. The leaves are covered with small black spots. Dodder (q.v.) is a parasitic plant responsible for considerable loss in some places.

Clover Insects. — Of the various insects which injure clover the following are prom¬ inent: The clover-root borer (Hylastes tri¬ folii), which has in some sections killed out the clover the second vear, thus necessitating a change in the rotation of the crops. The clover-stem borer (Languria mozardi) is widely distributed. The clover-leaf beetle (Phytono – ttius punctatus) is a weevil which feeds at night, consuming all parts of the plant. The clover-leaf midge (Cecidomyia leguminicola) is one of the worst pests ; the eggs are laid in the blossoms, where the larvae feed on what should be the seed. They pupate in the ground or in the seed. There are two or three broods annually. Various insects attack the stored hay, the most common being the clover-hay worm (Asopia costalis).

CLOVER-WEEVIL. See Weevil; Clover Insects.

CLOVES, Oil of. See Clove.

CLOVIS, king of the Franks: b. about 465; d. Paris, 27 Nov. 511. He succeeded his father, Childeric, in the year 481, as chief of the warlike tribe of Salian Franks. He united with Ragnacaire, king of Cambray, declared war upon Syagrius, the Roman governor at Soissons, and utterly routed the Romans near Soissons, in 486. Soissons was then made the capital of the new kingdom of the Salian Franks. Clovis married Clotilda of Burgundy (q.v.), who had been educated in the Christian faith and was desirous that her husband also should become a Christian. When he was hard pressed in a battle against the Alemanni at Tolbiac in 496, Clovis called on the God of Clotilda and the Christians. Consequently, when the victory was won, and territory of the Alemanni submitted to him, he was solemnly baptized at Rheims, 25 Dec. 496, with several thousand Franks, men and women. Hostilities soon broke out between Alaric, king of the Visigoths, and Clovis. In the battle fought at Vougle, near Poitiers, the latter gained a com¬ plete victory, slaying his enemy with his own hand. After this victory Clovis received the honor of the consulship from the Emperor

Anastasius. In the last year of his reign Clovis had called a council at Orleans, from which are dated the peculiar privileges claimed by the kings of France in opposition to the Pope. Flis plans for a unified Frankish kingdom, for which he labored unscrupulously all his life, were frustrated in his own last testament, which divided the newly organized realm among his four sons. Consult Gregory of Tours, (His- toria FrancorunP (Bk. II, ed. by Arndt for the (Monumenta Germanise Historical Hanover 1885) ; Junghaus, (Geschichte der frankischen Konige Childerich und Chlodwig) (Gottingen 1857) ; Schultze, (Deutsche Geschichte von der Urzeit bis zu den KarolingenP (Vol. II, Stutt¬ gart 1896) ; Kurth, (Clovis) (2d ed., Paris

1901).

CLOVIS II, king of Neustria and Bur¬ gundy; d. 655. He was the second son of Dagobert, whom he succeeded in 638.

CLOVIS III, king of France: d. 695. He was the son of Thierry III, whom he succeeded in 691 at the age of nine. He reigned five years, under the guardianship of Pepin d'Heris- tal, mayor of the palace.

CLOWES, klowz, Frank, English chemist: b. Bradford, Yorkshire, 1848. He was educated at the Royal School of Mines, London, Royal College of Science, Dublin, and the University of Wurzburg, and was professor of chemistry at University College, Nottingham, 1881-97, and first principal. He has published (Text-book of Practical Chemistry and Qualitative Analy- sis) ; (Text-book of Quantitative Analysis ; (Elementary Practical Chemistry * ; Unproduc¬ tive Quantitative Analysis* (1890), etc.*

CLOWES, Sir William Laird, English naval critic: b. London, 1 Feb. 1856; d. there, 14 Aug. 1905. Fie was educated at King's Col¬ lege, London; and from 1876 to 1895 was cor¬ respondent for various newspapers. He wrote much on naval development and on art and sociology. His works include (The Needs of the Navy; (Four Naval Campaigns) (1902); (Told to the Marines) (1902) ; (Black Amer¬ ica * (1892) ; (Eclogues) (1889). He was the editor and chief contributor to (The Royal Navy; a History) (1897-1903). He was knighted in 1902.*

CLOWN, a role peculiar to the stage of English-speaking people, but bearing some re¬ semblance to the gracioso of the Spaniards, and the Hanswurst of the Germans. The origin of the word is uncertain, some deriving it from the Latin colonus, in the sense of a peasant farmer, and others connecting it with certain Scandinavian and other Teutonic words. On the old English stage the clown was the privL leged laughter-provoker, who, without taking any part in the dramatic development of the piece represented, carried on his improvised jokes and tricks with the actors, often indeed addressing himself directly to the audience in¬ stead of confining himself to what was going on on the stage. In Shakespeare, on the con¬ trary, a distinct part was assigned to the clown, who no longer appears as an extempore jester, although the part he plays is to a cer¬ tain extent in keeping with his traditional func¬ tions. At a later period the clown was alto¬ gether banished from tragedy and allowed to appear only in the after-piece, performing gro-

tesque dances, singing comic songs, etc. He is now confined to the

pantomime, where his part is generally of a more burlesque character than that of the French Pierrot; and in cir¬ cuses where his performances are of the tum¬ bling and clumsily acrobatic nature.

CLOYD'S MOUNTAIN, Battle of. On

3 May 1864 Gen. George Crook of the Union army marched from Fayette, W. Va., to break the Virginia and T. Railroad at the New River bridge. He had 11 regiments of infantry and two batteries of artillery, in all about 6,100 men, brigaded under Col. H. G. Sickel, C. B. White and R.' B. Hayes. He marched through Ra¬ leigh, drove a small Confederate cavalry force from Princeton and on the 8th reached Shan¬ non's Bridge, seven miles from Dublin, where he was joined by 400 cavalry. Here he found next morning that the Confederates — three regiments and a battalion of infantry and two batteries — under Gen. A. G. Jenkins and Col. John McCausland, were barring his way, strongly posted behind log and rail breast¬ works, on a steep and thickly wooded spur of Cloyd's Mountain, with guns sweeping the road and open country in front. Crook opened on the position with artillery, and then, under cover of the timber, sent White with his own brigade and two regiments of Sickel's to turn the enemy's right, and the moment they were engaged Sickel and Hayes charged directly to the front across a meadow swept by artillery and musketry fire and up the steep ridge. Parts of the line were repulsed, again to rally and go forward, and after a hard contest, in which bayonets and clubbed muskets were used across the works, they were carried, the Confederates retreating to Dublin, leaving, as Crook reports, 230 unwounded men as prisoners, and two guns, in his hands. The Union loss was over 600, that of the Confederates about 500. General Jenkins was mortally wounded and left on the field. Crook followed the retreating troops, and when near Dublin encountered about 500 of Gen. John H. Morgan's command, under Colonel Smith, that had come from Sattville and endeavored to cover McCausland's retreat. These Crook drove back and at night he oc¬ cupied Dublin. On the 10th he marched to Newborn and thence to New River Bridge, which McCausland tried to save, but after a two-hours' artillery duel in which Crook had 11 men killed and wounded, he seized and de¬ stroyed the bridge and the railroad for a consid¬ erable distance, then marched by way of Union, Alderson's Ferry and Lewisburg to Meadow Bluff, which he reached on the 19th, his march harassed by the enemy's cavalry. Crook's en¬ tire loss was 109 killed, 513 wounded and 72 missing. On his return march he was obliged to leave 200 of his wounded, with surgeons, who were captured. The Confederate loss, as reported, was 76 killed, 262 wounded and 200 missing or captured. Consult (Official Rec- ords) (Vol. XXXVII) ; Pond, (The Shenan¬ doah Valley in 1864. >

E. A. Carman.

CLOYNE, Ireland, town 16 miles south¬ east of Cork. It has an ancient cathedral, near which is a round tower, a free school, founded by Bishop Crow in 1726, and is the seat of a Roman Catholic bishopric. It has boot and shoe manufactures. From 1638 to 1833 it was

the see of a bishop belonging to the Estab¬ lished Church of Ireland, but in the latter year it was united with Cork and Ross. From 1734 to 1753 George Berkeley, the philosopher, was bishop of Cloyne. Pop. of parish 2,203.

CLUB (A. S. cleofan , to divide, the club expenses being shared by the members), a company of persons associated for some com¬ mon object — social, literary, political, etc. It has been claimed that social clubs were known to the ancient Romans, but the evidence of their existence is scanty. Inscriptions tell of clubs of Roman citizens in foreign cities and also of military clubs. For several centuries' the club has been a peculiar institution in Eng¬ land and of late it has become a prominent feature in American life. It is not easy to de¬ termine at what time clubs originated in Eng¬ land, but Occleve mentions one to which he belonged (during the reign of Henry IV), called <(La Court de Bone Compaignie.® In 1659 Au¬ brey explained the word <(clubbe>:> as meaning ((a sodality in a taverne.® He adds, ((Here we had a balloting-box and balloted how things should be carried.ˆ The earliest London club of any celebrity was established about the be¬ ginning of the 17th century, at the Mermaid Tavern, Friday street (otherwise known as Bread street). Among its members were Shakespeare, Sir Walter Raleigh (the founder), Beaumont, Fletcher, Donne and Selden. Ben Jonson figured at another club, which met at the Devil Tavern, near Temple Bar. It ap¬ pears certain that clubs existed alongside of coffee-houses in the 17th and 18th centuries. At that time, however, their character was very different from what it is now. The coffee¬ houses of those days were the nearest repre¬ sentatives of the modern clubs, while the clubs were commonly nothing but a kind of restau¬ rants or taverns where people resorted to take their meals. There was one feature, however, which was peculiar to clubs from the first, and distinguished them from coffee-houses; namely, that, while anybody was free to enter a coffee¬ house, it was absolutely necessary that a person should have been formally received as a mem¬ ber of a club, according to its regulations, be¬ fore he was at liberty to enter it. Almack's, Brooks' and White's were among the best known coffee-houses. Among the earliest of the London clubs was the Kit-Cat Club, formed in the reign of Queen Anne. Among its 40 mem¬ bers, who used to meet at the shop of a pas¬ try-cook (Christopher Cat or Katt), in order to do justice to certain mutton pies for which he was famous, were six dukes, among them the Duke of Marlborough ; five earls ; many of the most distinguished leaders of the Whig party, such as Sunderland, Halifax, Sir Robert Walpole and others ; and several of the

leading authors of the day, among them, Vanbrugh, Congreve, Addison and Steele. The last two owed to the club idea the form given to the Spectator. Another club formed about the same time was the Beefsteak Club. Originally these two clubs had no pronounced political views, but in the end they began to occupy themselves with politics, the Kit-Cat Club be¬ ing Whig and the Beefsteak Club, Tory. There have been several Beefsteak clubs since. Dur¬ ing the last century it was common to give ec¬ centric names to clubs and the conditions of being admitted to membership in any one of

these clubs were as a rule equally remarkable. Among these may be mentioned the Surly Club ; the Split-farthing Club; the Ugly Club (of which Wilkes was elected president for life, and Mirabeau was an honorary member) ; the Unfortunate Club ; the Lying Club, the mem¬ bers of which were not permitted to utter a single truth during their sittings, unless they had been expressly authorized to do so by the president. Perhaps the most celebrated club of the 18th century was that which was first called (The Club, but which was afterward known as the Literary Club. It was founded in 1764 and numbered among its members Dr. Johnson, who was for a long time its president, Sir Joshua Reynolds, Edmund Burke, Oliver Goldsmith, Edward Gibbon and other distin¬ guished men. In 1864 the 100th anniversary of its foundation was celebrated. In the rules which Dr. Johnson wrote for another club, the Apollo, he coined the still-serviceable word, ((clubbable.® In 1800 there were only half a dozen clubs existing in London and within a century there were 100, with a total member¬ ship of 80,000. The most important London political clubs of the present day are the Carl¬ ton Club, founded by the Duke of Wellington, and the Reform Club. The former is the prin¬ cipal club belonging to the Conservative party in the kingdom and the building in which its members meet, which is the most palatial edi¬ fice of the kind in the kingdom, may be re¬ garded as the headquarters of the Conservative party. This club was founded in 18321 (2,000 members). The Reform Club, the building be¬ longing to which stands next to that of the Carlton Club, was long the great club of the Liberal party, founded in 1837. Among the other important London clubs are the National Liberal, Constitutional, United Service, Athe- nseum, Army and Navy, Travelers, Garrick, Primrose, etc. Similar clubs were started in the chief cities of England and in the colonies.*

The first French society to take the name club was Le Club Politique, established in 1782, and a few years later, Le Club de Boston or Club des Americains, was formed in Paris. The political clubs had no regular form, as they were tolerated only during revolutionary epochs. The Club des

Jacobins, the Club des Feuillants, the Club des Cordeliers and the Club de Mont- rouge were the most famous clubs of the time of the first French Revolution and formed the storm-centres of that movement. None of the French clubs survived the coup d'etat of 9 Nov. 1799, by which Napoleon overthrew the Di¬ rectory. Two clubs were formed during the revolution of 1830, but they were both dissolved by the law relating to associations. At the revolution of February 1848 hosts of clubs started into existence, the most celebrated of which was the Central Republican Society (Societe centrale republicainc) , but their dura¬ tion was short, for the Constituent Assembly in the following year ordered them all to be closed.

About the same periods as in France, politi¬ cal clubs were introduced into Italy, Germany and Spain, especially during the time of the first French Revolution and that of 1848. In Germany, however, they were put down by a law of the empire in 1793 and in 1832 a federal decree was issued prohibiting all kinds of po¬ litical societies and assemblies. In 1848 the

number of clubs found in Italy, and particularly in Germany, was very great, but their collapse was as sudden as their rise. Later in the cen¬ tury municipal clubs, somewhat on the (

Although clubs were not unknown in the United States toward the close of the 18th cen¬ tury (the Hoboken Turtle Club dating back to that period), yet their spread and development were slow previous to the Civil War. Among those antedating the War were the Union Club of New York (1836), the Somerset Club of Boston (1857) and the Maryland Club of Baltimore (1857). The Union League Club of New York (1863) grew out of the purpose to defend and perpetuate the national integrity, to encourage loyalty to the Federal govern¬ ment. Other Union League clubs were formed later in Philadelphia and other cities; and in all the important centres of the country there grew up large and flourishing societies of a political or social nature, or such as combined the two features. The Manhattan Club became the chief social Democratic club of New York. . The Saint Nicholas Club represented a different type, a society founded upon a similarity of ancestry or antecedents and endeavoring to preserve historical associations. As these or¬ ganizations have increased in number they have become more varied in character, until not only politics, science, art, music, literature, so¬ ciology, religion, philanthropy and professional, commercial, social and sporting life are all rep¬ resented, but the subdivisions are bewildering and continually increasing. Athletic clubs of various kinds are numerous and popular, abroad as well as in America.

University clubs draw together the college- bred men of various sections or cities. The largest one of the kind in the United States is that in New York, which has over 3,500 members. The city has also a Yale, a Harvard, a Princeton and several other college clubs. Among the largest clubs of the

metropolis, in addition to those already mentioned are the following: New York Athletic, New York Yacht, Century, Army' and Navy, Metropolitan, Players, Lotus, The Knickerbocker Club, Au¬ thors' Club, Press Club, Grolier Club, Catholic Club, Holland Society, etc. The Chicago Ath¬ letic Club has 3,000. In Philadelphia, in addition to the Union League, the Manufacturers' Club, the Art Club, the Rittenhouse, and the New Century, are numerically strong. Clubs de¬ voted to the cultivation of vocal music, many

formed of the German element in our cities, are prominent. Among these societies are the Liederkranz, the Arion and the Mendelssohn.

Wherever the Anglo-Saxon race is repre¬ sented in sufficient numbers, even in the remotest parts of the globe, the club idea has taken root, and we find English-speaking clubs or such as are suggested by or modeled upon English originals. India has more than 300 clubs ; Peking has its Reform Club; Cairo its Cycling Club, and Zanzibar its Golf Club. The Scotch Thistle Club of Hawaii shows its origin in its name and springs from the same source as the Caledonian clubs of America. Indeed, the ten¬ dency of men of a common blood to seek, when on a foreign soil, a social bond of unity, ac¬ counts for a special type of club. The line be¬ tween organizations calling themselves societies and those known as clubs is not always dis¬ tinctly marked, but in general it may be said that where the social element is slight or lack¬ ing, the term club is inappropriate. This element entered largely into organization of many women's clubs in the early history of such societies, but their literary, professional and especially their philanthropic features have become more prominent of late years. See Boys' Clubs ; Girls' Clubs ; Mothers' Clubs ; Women's Clubs; Workingmen's Clubs.

CLUB-FINGERS. See Hand.

CLUB-FOOT (Lat. Talipes), a congenital or acquired distortion of the foot, of which there are several varities. Sometimes the foot is twisted inward (T. varus) ; sometimes the heel is raised and the toes only touch the ground (T. equinus) ; sometimes the foot is twisted outward (T . valgus)', or it rests only on the heel (T . calcaneus) . The deformity con¬ sists at first in the contraction of the muscles and tendons of the feet, but ultimately the bones become distorted. If attended to in time,

. the foot may be gradually coaxed to its natural shape, and even in more advanced cases the deformity is usually curable by modern sur¬ gery. The deformity is usually acquired in an¬ terior poliomyelitis, the changes involving the tendons, muscles, bone and ligaments. The treatment is

manual, mechanical or surgical. Stromeyer performed the first operation for clubfoot in 1731. Consult Gould and Pyle,

(Cyclopedia of Medicine and Surgery) (Phila¬ delphia 1912).

CLUB-MOSS, the common name of the Lycopodiacece, a family of cryptogamic plants allied to the ferns, containing four genera and 150 species. Two of the genera, Lycopodium and Psilotum, are found in America, and two in Australia only. The club-mosses are found as gigantic fossils in the Upper Silurian, De¬ vonian and Carboniferous periods, and are a marked feature of the rocks of the two latter periods. See Lycopodium.

CLUBROOT, ANBURY, or FINGER- AND-TOE (Plasmodiophora brassicce) . This fungous disease is known under the above com¬ mon names; it attacks turnips, cabbages, cauli¬ flowers and allied plants, often seriously injur¬ ing the crop. The term "club-root® arose from the club or wart-like excrescences which result from a plant being infested; owing to the ten¬ dency of the root to split up in this manner the term "finger-and-toe® is also applied. In Europe these knob-like growths cannot be regarded as

conclusive evidence of this disease, as they may be due to attacks of a gall insect. This fungus belongs to a very low order known as the slime- fungi ; it can readily enter the young host plant, where it grows and reproduces rapidly; by the time the host should be mature, in fall, the fungus has formed millions of spores, which live over winter. The fungus can live for years in the soil, and no means of killing it is known, although applications of lime and pot¬ ash reduce its ravages considerably. Methods of prevention are advocated, as, keeping the land free from cruciferous weeds, as wild mus¬ tard, etc., and destruction of all affected roots by burying with quicklime, or burning; and ro¬ tation of crops. Special attention should be paid to the seedbed which is often the source of the spreading of the disease.

CLUGNET, cloo'nya, Joseph Leon Ti- burce, French Orientalist: b. Lyons, France, 8 May 1848. He was educated at the University of Lyons, the University of France, the Epis¬ copal College, Ware, England, and the Episco¬ pal College of Gibraltar. He was appointed professor of rhetoric at the College de Pontoise and fought in the Franco-Prussian War. From 1875 to 1880 he was librarian of the University of Lyons and since 1880 has devoted himself to research work in Oriental languages, hagio¬ graphy and folklore. From 1898 to 1908 he was director of the Revue de 1' Orient cliretien. In 1912 the Minister of War bestowed on him the Military Medal of the Volunteers of 1870-71. He has published (Geographic de la soie) (1877); (Carte des regions sericoles) (1877); (Nouveau guide du touriste au Mont-Dore) (1877) ; (Sculptures prehistoriques situees dans les environs des lacs des Merveilles) (1877); (Glossaire du patois Gilhoc)

(1883); (Diction- naire grec-frangais des noms liturgiques en usage dans l'Eglise grecque® (1895) ; (Les offices et les dignites ecclesiastiques dans l'Eglise grecque) (1899) ; (Bibliographic du

culte local de la Vierge Marie) (3 vols., 1899- —) ; (Vie et recits de l'abbe Daniel le Scetiote, (Greek text, 1901); (L'Empire ottoman,) (translation of Kellner's German text, 1877) ; (Calendrier de l'Eglise copte d'Alexandrie,* (from Nilles' Latin, 1898) ; (Ascensions du pic de l'Etendard, du Grand Sauvage, et du Mont Blanc) (1879). He was also one of the editors of (Bibliotheque hagiographique orientale) (1901 –) and is editor of Polybiblion.*

CLUMBER SPANIEL. See Spaniel;

Dog, Sporting Spaniel.

CLUNIACS, or CONGREGATION OF CLUNY, klii -ne, a monastery of that branch of the Benedictine order known as the Congre¬ gation of Cluny, or as Cluniacs. It was founded in 912, at Cluny, or Clugny, 15 miles from Macon on the Saone. In the 12th and 13th centuries Cluny was perhaps the most notable monastic foundation in Europe : it had many hundred monasteries under the jurisdiction of its abbot. The first Cluniac house in England was founded by the Earl of Warenne, com¬ panion-in-arms of William the Conqueror. The church of the mother, established at Cluny, built in the 11th century, was regarded as one of the wonders of the world: this monument of Gothic architecture was at the Revolution secu¬ larized by the republican government and was sold to the commune of Cluny, and by them

was leveled with the ground. Napoleon, on be¬ ing invited by the townsmen to visit the place, made reply, <(No; you are vandals.® There were suppressed by Henry VIII in England and Wales 35 Cluniac houses, one of them a convent of nuns.

CLUNY, or CLUGNY, a town in the de¬ partment of Saone-et-Loire, France, 12 miles northwest of Macon. It has an industrial col¬ lege and manufactures pottery, paper, leather and yarn. It has several splendid pieces of architecture, the Benedictine abbey of the 9th century, the church of Notre Dame dating from the 13th century; the church of Saint Marcel with a 12th century steeple; the ruins of Saint Mayeul, the abbot's palace; portions of fortifi¬ cations ; picturesque houses and other historical monuments. The abbey church, before the erec¬ tion of Saint Peter's at Rome, was the largest of its kind in Europe. It was destroyed in 1790. A

model is preserved in the town mu¬ seum. Cluny is the birthplace of the artist Prud'hon. Consult Bernard, (Les chartes de l'abbaye de Cluny > (Paris 1876-94) ; Duckett, (The Archives of the Ancient Abbey of Cluny (1886) ; Penjon, (Cluny, la ville et l'abbaye* (Cluny 1872).*

CLUNY, klu'ne, Hotel de, a Gothic edi¬ fice in Paris, built by the Benedictines of Cluny in the 15th century. It is located on the site of a Roman palace. In 1515 it became the residence of Mary, widow of Louis XII, and James V of Scotland was married there in 1537. It passed over to the state during the Revolution, and in 1833 was purchased by the antiquarian Du Som- merard. In 1842 it was purchased, together with its museum collections, by the state.

CLUPEIDZE, a family of soft-rayed fishes, containing the shads, herrings, anchovies, pilchards, sardines, etc., elsewhere described. They are mostly marine, but none live in deep water. The best known species go in schools and are anadromons; and those of northern seas include several of the most abundant and valuable of marine food-fishes. About 200 liv¬ ing species are named, and fossil members of the familv are numerous, especially in Creta¬ ceous and early Tertiary strata.

CLURICAUNE, kloo're-kon, in Irish mythology, an elf of evil disposition who usu¬ ally appears as a wrinkled old man and has knowledge of hidden treasures.

CLUSERET, kloo-ze-ra', Gustave Paul,

French officer and Communist: b. Paris, 13 June 1823; d. Toulon, 23 Aug. 1900. He was educated at Saint-Cyr, distinguished himself during the insurrection in Paris, fought in the Crimean War and in Africa against the Kabyles and became a captain in 1855. In 1858 he resigned his commission and in 1860, as com¬ mander of the French volunteers, joined Gari¬ baldi in the expedition to Sicily and Naples. He came to the United States soon after the breaking out of the Civil War, and after serv¬ ing on General McClellan's staff became a brigadier-general. In 1864 he edited the New Nation, in New York. Subsequently he re¬ turned to Paris, and was War Minister of the commune in April 1871. By his endeavors to improve the military organization of the Com¬ munist troops he gave offense to the central committee, but was accused of treachery and imprisoned at Mazas. From Paris he fled to

England and Mexico, and was condemned to death by a military tribunal in 1872. He was, however, pardoned and allowed to return to Paris in 1880, and in 1888, 1889 and 1893 was elected to the Chamber of Deputies. He pub¬ lished (Memories du general Cluseret (1887—*

88).

CLUSTERED COLUMN, or CLUS¬ TERED PIER, in architecture, a pier which appears to consist of several columns or shafts clustered together; they are sometimes attached to each other throughout their whole height and sometimes only at the capital and base. This form was characteristic of the Middle Ages, though not absolutely unknown to the ancient East, since one has been found at Tello. It is supposed to have originated from an at¬ tempt to vary the square pier then in use. From this Romanesque pier, which had a square core on each face of which a semi-column or shaft was attached, developed the Gothic clustered pier based on a circular core and more slender and varied. A fine example is in the Amiens Cathedral. There are many varieties of this form of pier, depending on the size, grouping, number, the connection with vaulting ribs, etc. The clustered column vanished in the Renais¬ sance, except in its simplest forms.

*CLUTCH, a mechanical device by which rotary motion of a shaft is transmitted to an¬ other gradually without shock by means of con¬ necting elements normally independent. The connection is established in several ways, as by teeth, by cams, by friction of two surfaces or by electro-magnets. Friction clutches of vari¬ ous types are in common use, and of these the disc type is perhaps that most frequently met with. Clutches have found extensive applica¬ tion in motor vehicles. Consult Holman, (Mo- tor Vehicles) (New York 1917) ; Souther, transactions of the American Society of Me¬ chanical Engineers for 1908. **

CLUTE, Willard Nelson, American bot¬ anist : b. Painted Post, N. Y., 26 Feb. 1869. He was educated in the public schools and in 1897 became assistant curator of the botanical depart¬ ment of Columbia University. In 1898-99 he was curator of the New York botanical garden. From 1903 to 1910 he was instructor in biology at the Joliet High School, and in 1910-11 at the Curtis High School, Chicago. Since 1911 he has been head of the biology department of the Flower Technical High School for Girls, Chicago. He was formerly publisher of the Plant World; also editor and publisher of the Fern Bulletin and the American Botanist. He has published (A Flora of the Upper Susque¬ hanna Valley) (1898) ; (Our Ferns in their Haunts> (1901) ; (The Fern Collector's Guide (1902) ; (The Fern Allies of North America> (1905) ; laboratory Botany for the High School (1909) ; (Agronomy for High Schools* (1912) ; laboratory Manual and Notebook in Botany* (1913).*

CLUTHA, kloo'tha, sometimes called Molyneux, the largest river of New Zealand, in the southern part of the South Island. It receives the waters of lakes Hawea, Wanaka and Wakatipu and flows in a southeasterly di¬ rection, traverses the province of Otago and empties into the sea in Molyneux Bay, after a course of 150 miles.

CLUTTERBUCK, Captain Cuthbert, the

feigned editor of three of Scott's novels, (The Monastery,5 (The Abbot) and (The Fortunes of Nigels

CLUVER, kloo'ver, or CLUVERIUS, Philipp, German geographer and antiquarian : b. Danzig 1580; d. Leyden 1623. He applied himself first to the study of law, but afterward, against the will of his father, almost exclusively to history and geography. Being on that ac¬ count left without support by his father, he was compelled to enter the service of the Austrian army, but at the end of two years he returned to his favorite pursuits. He now traveled through England, Scotland, France, Germany and Italy and then settled in Leyden, where he was made ((Geographus Academicus.55 In 1617— 18 he undertook a second journey through Italy and Sicily on foot. His first geographical work, (Germania Antiqua,5 was published in 1616. Two carefully prepared antiquarian works, one on Sicily, Sardinia and Corsica, the other on Italy, followed. His most important work was not published till after his death. It is entitled Hntroductio in universam Geogra- phiam tarn Veterem quam Novam,5 and is the first successful attempt at a systematic treat¬ ment of geography in the whole extent of its historical and political relations. The first edition appeared at Leyden in 1629, but it has been frequently republished. The most com¬ plete edition is that of Bruzen de la Martiniere (1729). His other works are Htalia Antiqua) (1624) and (De Tribus Rhein Alveis atque Ostiis5 (1611).

CLUYSENAAR, the name of a Dutch and Belgian family of architects, the most famous of whom was Jean-Pierre: b. Kampen, 23 March 1811; d. Brussels, 16 Feb. 1880. He studied at the Academy of Fine Arts at Brus¬ sels and under Suys. His works are numerous. Among them are the Palace of Arenburg and the palaces of the Academies (with Suys) ; the galleries of Saint Hubert at Brussels, where are also the hospital for the blind, hotels, the opera- house and the Royal Conservatory of Music. There are numerous churches, hotels and other buildings of his work to be found throughout Belgium. His son, Alfred, b. Brussels, 24 Sept. 1837 ; d. there, 23 Aug. 1902, at first studied sculpture with his father, but was more attracted to painting and subsequently studied art in Brussels and Paris, exhibiting (A Dominican Meditating5 in 1861. Other pictures of his are a (Vocation, 5 now in the Brussels Museum, and a (Mazeppa,5 and six large mural paintings for the University of Ghent. Consult Lucas, C., (Essai d'un Catalogue alphabetique des archi¬ tectures beiges et hollandais5 (in the Revue generate d' architectures, Paris).

CLWYD, kloo'id, Wales, a river in County Denbigh, rising on the northeast of the Bron- banog, and entering Abergele Bay, after a course chiefly northwest of about 30 miles, dur¬ ing which it is joined by several small tribu¬ taries.

CLYDE, Lord. See Campbell, Sir Colin.

CLYDE, N. Y., village of Wayne County, 35 miles west of Syracuse, on the New York Central and West Shore railroads, and on the State Barge Canal. Its industrial establish¬ ments include a boiler and steam-engine fac¬

tory, a canning factory, harness works and glassworks. Pop. 2,695.

CLYDE, Ohio, village in Sandusky County, 75 miles southwest of Cleveland, on Cleveland, Cincinnati, Chicago and Saint Louis, the Lake Shore and Michigan Southern, the Wheeling and Lake Erie and the Lake Shore Electric railroads. The village is the birthplace of Gen. James B. McPherson, and a fine monument has been erected to his memory. It has a Carnegie library and manufactures cutlery, bar¬ rels, screens, automobiles, etc. The village owns the waterworks and electric-lighting plants. Pop. (1920) 3,099.

CLYDE, klld, Scotland, a river which

rises as Daer Water in the Lowther Hills in the southern extremity of Lanarkshire. Its watershed is approximately concident with the boundaries of that county. In its upper reaches it is a mountain stream flowing through bleak uplands. Near Lanark are the celebrated falls, named respectively Bonnington Linn, Corra Linn, Dundaff and Stonebyres Linn, the finest of the series being Corra Linn, with a triple leap of 84 feet. Within four miles at this sec¬ tion the river descends from 560 feet to 200 feet. From Lanark to Bothwell it flows through a fertile and well-wooded country famous for its orchards and from that point its course is through the greatest mining and indus¬ trial district in Scotland. Passing through Glasgow, at Dumbarton (91 miles from its source) it begins to expand into an estuary and reaches the Irish Sea at the southern ex¬ tremity of the Island of Bute. Its drainage area is 1,481 square miles. The estuary is in¬ dented by numerous lochs, affording panoramas of exquisite beauty, and it is dotted by numerous watering places (Gourock, Dunoon, Rottesay, Ayr, etc.). Its principal tributaries are the Douglass Water, the Mouse, the Lethan, the Avon, the Calder, the North Calder, the Kel¬ vin, the White and Black Cart and the Leven. The Clyde by artificial deepening is now navi¬ gable by large ocean-going steamers to Glasgow, where, rather more than 100 years ago, there was only a depth of 15 inches at low water. It is the most important river for commerce in Scotland, with a great ship-building

industry located on its banks in the section between Glasgow and Dumbarton.

CLYDEBANK, a police burgh and town of Scotland, in Dumbartonshire, on the north or right bank of the Clyde, about six miles west by north of Glasgow. It is of modern origin, its chief industry being ship-building. Pop.

16,202.

CLYDESDALE, a breed of horses named from the valley of the Clyde in Lanarkshire. Scotland. Clydesdales are about 16 hands high, are compact and muscular in build, and have a long, easy stride. They vary in color, being black, gray, brown or bay, and are used for draft-horses. Specially fine specimens of this breed are found in the eastern United States, in the service of the municipal fire departments of large cities. See Horse.

CLYDESDALE, or PAISLEY TER¬ RIER. See Dog.

CLYMENE, kllm'e-ne, the daughter of Oceanus, and mother of Atlas and Prometheus.

CLYMER, kli'mer, Ella Dietz, American poet: b. New York. She began her career as an actress in 1872, but in 1881 she abandoned the stage. She has published three volumes of poems: (The Triumph of Love) (1878); (The Triumph of Time) (1884) ; and (The Triumph of Life) (1885). She was one of the founders of the ˆSorosis® Society, and its president in

1889.

CLYMER, George, American statesman : b. Philadelphia 1739; d. Morrisville, Pa., 23 Jan. 1813. He was orphaned at the age of one year, received an education at the College of Phila¬ delphia (now University of Pennsylvania), entered mercantile life when a lad and ac¬ quired a competence. He was prominent in public affairs prior to the Revolution, and in 1772 was appointed by Governor Penn to the position of justice of the Court of General Ses¬ sions and of the County Court of Common Pleas of Philadelphia. In 1775 he became one of the first Continental treasurers. He was chosen in 1776 to succeed a member of the Con¬ tinental Congress who had refused to sign the Declaration of Independence, to which he promptly affixed his signature, the 38th after John Hancock's. He was active in the patriot cause during the Revolution, served under Cadwalder in the battle of Princeton and was a member of the convention that framed the Federal constitution. In 1788 he was elected a member of the first Congress under that in¬ strument. In 1778, he was one of the special

commissioners sent by Congress to treat with the Indians at Fort Pitt. In 1790 he declined a re-election, and in the succeeding year was appointed collector of the excise duties on spirits, the collection of which in Pennsylvania led to the whisky riots. Clymer acted firmly, yet temperately in the troubles, till finding the office distasteful, he resigned it, and was ap¬ pointed, with Pickens and Hawkins, to negotiate a treaty with the Cherokees and Creeks in Georgia. After this he retired from public life, but devoted much of his time to study. He became president of the Philadel¬ phia Bank and the Academy of Fine Arts. No man was more averse than he to the assump¬ tions of aristocracy, to the excellencies, honor- ables and esquires, who, he said, abounded more in the United States than in any other country in the world. He seldom spoke in pub¬ lic, but when he did his ideas were expressed in language keen, pithy and laconic. Consult Dickenson in the Magazine of American His¬ tory (Vol. V, New York 1880).

CLYSTERS, an old term used to denote medicaments introduced into the lower bowel, usually for the purpose of expelling its con¬ tents. See Enf.mata.

CLYTEMNESTRA, klit-em-nes'tra, daugh¬ ter of King Tyndareus and Leda, and half- sister of Helen. She bore her husband, Agamemnon, two daughters, Iphigenia and Electra, and one son, Orestes. During the absence of Agamemnon in the war against Troy she bestowed her favors on yEgisthus, and, in connection with him, murdered Agamemnon on his return from Troy, and, to¬ gether with her paramour, governed Mycenae for seven years. Her son, Orestes, killed them both.

CLYTIE, kli-te, the daughter of Occanus and Thetis, who pined away through love for Apollo, who deserted her for Leucothca. Through the pity of the gods, she was changed by them into a sunflower. The name the Greeks gave it was ˆheliotropion,® of the same family as our heliotrope.

CNICUS (Latin for safflower, which name was first given to the thistle), a monotypic genus of the family Asteracece. The plant is an annual herb which came originally from the southern part of Europe, but is now sparingly naturalized in eastern North America. C. benedictus, or, as it is sometimes called, Saint Benedict's thistle, was formerly used as a febrifuge, but is now rather considered a tonic and diaphoretic.

CNIDUS, nl-dus, or GNIDOS, Asia Minor, a town in the province of Caria, at the extremity of the long narrow peninsula of Triopium. It was a favorite resort of Aphro¬ dite (Venus), who was hence surnamed the Gnidian Goddess. Her temple here contained her statue by Praxiteles. Here in 314 b.c., the Athenian Admiral Conon defeated the Spartan fleet under the leadership of Pisander.

CNOSSUS, no'sus, or GNOSSUS , more anciently Cnosus, or Gnosus, now Makro Teikho, the capital of Crete in the time of Minos, was built on the Caeratus, a short dis¬ tance from the northern coast, and founded by Dorians, who diffused their institutions over the island. Homer mentioned it as already a great city, and the residence of the celebrated Cretan king; it long maintained its preponder¬ ance, until it was weakened by the growing im¬ portance of Cydonia and Gortyna. It was re¬ nowned in mythology by numerous legends of Jupiter, born, married, and buried in its vicin¬ ity; of Minos, Ariadne, the minotaur, and the labyrinth. In later times it became a colony of the Romans. .TEnesidemus, the skeptic philoso¬ pher, and Chersiphon, the architect of the tem¬ ple of Diana in Ephesus, were born there.

COACH, a large, closed, four-wheeled vehicle generally constructed to carry pas¬ sengers inside and outside. It is used as a general term to cover all such vehicles, but the typical coach involves four wheels, springs and a roof. It took its name from the place whence it came, Kocs, a Hungarian town between Raab and Buda. The coaches of the Middle Ages were exceedingly elaborate and ornate. As late as 1550, Paris possessed only three coaches; Spain in 1631 could boast of a coach with glass windows in the possession of the Infanta.

In England a kind, of carriage called a Mvhirlicote® was in use in the reign of Richard II ; but coaches, properly so called, are stated by Stow to have been introduced in 1564 by a Dutchman, who became coachman to Queen Elizabeth. Stow adds :

After a while, divers great ladies, with as great jealousie of the queene's displeasure, made them coaches, and rid in them up and downe the countrie, to the great admiration of all the beholders; but then by little and little they grew usual among the nobilitie, and others of sort, and within twentie years became a great trade of coach-making.

They were, however, for a long period con¬ fined to the aristocracy and the wealthy classes. Sometimes six or even eight horses were har-

nessed to the coach, partly no doubt for the sake of display, but chiefly because the wretched state of the roads required that number. At first coach-wheels were very low, which circum¬ stance also contributed to prevent the attain¬ ment of any considerable speed, and to make it necessary to use several horses to draw them ; and no one seems to have pointed out the ad¬ vantages of large wheels until, in 1771, a Mr. Moore for a short time attracted a good deal of attention by pointing out the fact

that it was much easier to draw a coach or cart with large wheels than with small ones, and by actually constructing a coach ((very large and roomy,® which was ((drawn by one horse, and carried six persons and the driver, with amazing ease, from Cheapside to the top of Highgate Hill,® coming back <(at the rate of 10 miles an hour, passing coaches-and-four, and all other car¬ riages it came near on the road.® A contem¬ porary account states that this coach had two large wheels, nine and one-half feet in diameter.

Hackney-coaches (q.v.) were first used in London in 1625. They were then only 20 in number, and were kept at the hotels, where they had to be applied for when wanted. In 1635 an attempt was made to restrain their use by a proclamation of Charles I ; but, this being found unsuccessful, their number was limited, and a commission was given to the Master of the Horse to grant licenses for their use. In this year only 50 were licensed. In 1634 one Captain Baily, who had formerly been a sea- captain, hit upon the plan of keeping a number of hackney-coaches, with drivers in livery, standing at a particular place (the ((Maypole,® in the Strand), where they might be had when¬ ever they were wanted. Hackney-coaches now rapidly became more general. The four started by Captain Baily in 1634 had increased to 200 in 1652, to 800 in 1710 and to 1,000 in 1771.

The following facts relating to the history of stage-coaches are taken from Chambers' (Book of Days5 : Stage-coaches were intro¬ duced into England about the same time as hackney-coaches. The first stage-coach in London appears to have run early in the 17th century, and about the middle of the same century they appear to have become general both in London itself and in the better high¬ ways in the neighborhood. Before the end of the century they were started on three of the principal roads in England. Their speed at first was very moderate, about three or four miles an hour. They could run only in the summer, and even then their progress was often greatly hindered by floods and by the wretched state of the roads generally, fn 1700 a week was considered a marvelously short space of time to take to travel from York to London; and even 60 years later a fortnight was spent in going between Edin¬ burgh and London. The first stage-coach that traveled between Glasgow and Edinburgh, which was set on foot in 1749, occupied two days in the journey. The first efforts to accele¬ rate the speed of traveling was made by a body of Manchester merchants in 1754, who started a conveyance to which they gave the name of the ((Flying Coach,® and which was intended to cover the distance between Manchester and London in the unusually short period of four days and a half. In their prospectus, the pro¬

prietors of the new vehicle made the following announcement :

However incredible it may appear, this coach will actually (barring accidents) arrive in London in four days and a half after leaving Manchester.

Thirty years later, Mr. Palmer, of Bath, after a considerable amount of opposition, suc¬ ceeded in inducing the government to put in practice certain suggestions which he made, by which he showed that great saving both in time and money in the conveyance of passengers and letters would be effected. The result was the establishment of the system of mail-coaches,

which continued to be the means of traveling in England until their place was taken by the railways. The first mail-coach started between London and Bristol on 8 Aug. 1784.

The introduction of steam and motor cars has gradually superseded the manufacture of coaches. But they are still made to some ex¬ tent. The typical American coach is the Con¬ cord coach, so-called from the place of manu¬ facture. Two famous coaches of Great Brit¬ ain are the King's state coach, which was executed by Sir William Chambers, with paint¬ ings on the walls by Cipriani dating back to 1761 ; and the coach of the lord mayor of London of about the same date. Both are highly ornamented and the bodies are sus¬ pended on straps.

Coaching became a very popular exercise in the early 19th century. It 'required con¬ siderable skill to manipulate four spirited horses on the bad roads which were then avail¬ able. The sport survived, in a more limited measure, the introduction of railways. In 1856, the Four-in-Hand Club was started in Eng¬ land; and the Coaching Club in 1870 as suc¬ cessor to the old Bensington Driving Club (1807-52). In America, the New York Coaching Club began in 1875. To-day the sport has developed, in great centres and cities of the world, in the form of horse-racing. For a history of vehicles and their manufacture, see Carriage; Carriage and Wagon Industry.

Consult the Badminton, driving5 by the Duke of Beaufort (1888); Roger, ˆManual of Driving5 (Philadelphia 1900) ; Nimrod, As¬ says on the Road5 (1876); Adams, 'English Pleasure Carriages5 (London 1837) ; Thrupp,

(History of the Art of Coach Building5 (Lon¬ don 1877) ; Gilbey, (Early Carriages and Roads5 (London 1903) ; Straus, Carriages and Coaches: Their History and their Evolu¬ tion5 (London 1912).

COACH, or DALMATIAN, DOG. See

Dog.

COACH HORN, a tapering horn of brass or copper used to sound a few simple calls. It has no keys and its range is limited to six open notes (C-G'-C'-E'-Gˆ-C). The horn varies from 42 to 56 inches in length. The calls have a recognized place in coaching and were, of course, much more generally known in the days of the stage coach. To-day the horn like coaching is employed generally in connection with racing or by the few coaching clubs in the wealthier centres, as New York, London, Paris, Berlin, etc.

COACH-WHIP SNAKE, an American

snake (Zamenis flagelliformis) , characterized by a long, narrow head,

projecting upper jaw, superior orbital plates large and projecting

much over the eyes; nostrils large, lateral and near the end of the snout; eyes large, iris dark gray ; neck small, body long and tail attenuated like a whip-cord, which it also resembles in the braided appearance produced by the arrange¬ ment and dark border of the scales. The color of the head, neck and a third of the body is glossy black, becoming paler toward the tail, which is tawny brown; the scales of the tail have dark margins; the lower surface in front is bluish slate, behind white clouded with brown ; the colors vary in their shades, but near the head it is always black. They some¬ times attain the length of seven feet. It moves with great swiftness, and feeds on young birds and small animals ; though inoffensive to man, it defends itself bravely, twining its long folds around its enemy. The species is found in the South from the Atlantic to the Pacific. A red color phase is found in the West. The coach-whip snake is a congener of the black snake.

COADJUTOR, a Latin term, nearly sy¬ nonymous in its original meaning with assistant, and applied by the Romans to a kind of depu¬ ties or lieutenants given to magistrates to assist them in a press of business, or supply their place in absence. The term was afterward in¬ troduced into the Church and given to persons who were associated with prelates, archbishops or bishops, to assist them or act as substitutes for them in the discharge of their functions. The appointment usually made the coadjutor the successor of his principal, and in this way great abuses arose. The abuse of appointing relatives in this capacity, making the office of bishop hereditary, made rapid strides until the Council of Trent introduced several reforms, by providing that the nominations of a coad¬ jutor should not take effect except in cases of necessity or manifest utility, the Pope being made sole judge of these cases. Coadjutors, as now understood, are of two kinds, one tem¬ porary and revocable, allowed on account of illness or other incapacity, and allowing no right of succession ; the other irrevocable and carrying with it the right of succession. The Council of Trent did not favor the ˆirrevocable right of succession,® but the Pope grants it in special cases. A coadjutor differs from a ((suffragan,® in that the former is appointed to an old or infirm bishop, while the latter is assistant to a bishop whose see is too large, and has charge of a portion of it, the bishop remaining in charge of the central portion. The term and the office is not confined to the Roman Catholic Church; it is in use also in the Anglican Church.

COAGULATION (Latin, «to curdle®), the peculiar change from the state of a liquid to that of an amorphous solid, exhibited, under certain conditions,

by proteid bodies and their solutions. The hardening of an egg by boiling is a familiar instance of the process. In this case the change is induced by heat, and begins when the temperature reaches 160° F. or there¬ abouts. Another familiar case is the clotting of blood, which occurs from a very different cause. The blood contains two albuminous sub¬ stances which are concerned in the phenom¬ enon, and which are known respectively as ˆfibrinogen® and wfibrinoplastic substance.® These are normally held in solution ; but as

soon as the blood is removed from the body they undergo a change whose nature is not well understood, the product of which is a stringy, elastic, fibrous or jelly-like solid known as ((fibrin.® Casein, the principal proteid con¬ stituent of milk, does not coagulate from the direct application of heat, but it coagulates very quickly when rennet is introduced, and it also coagulates spontaneously under the in¬ fluence of certain of the products of fermenta¬ tion that develop in the milk after it has been exposed to the air for a time.

COAHUILA, ko-a-we'la, Mexico, state bounded on the north by the United States, on the east by Nuevo Leon, on the south by San Luis Potosi and Zacatecas and on the south¬ west, west and northwest by Durango and Chi¬ huahua. Its area is about 63,745 square miles. The capital is Saltillo. The principal mountain ranges are in the districts of Rio Grande and Monclova. Besides these we may mention the Sierra Madre, in the Saltillo district ; the Sierra Paila, in Parras; and Sierra Noas, in Viesca. The rivers are Rio Grande (also -called Rio Bravo), forming the boundary line with Texas ; the Sabinas, forming the boundary between the districts of Monclova and Rio Grande ; the Alamos, Monclova, Patos, Saltillo, Aguanaval, Nazas and their tributaries. The principal la¬ goons are those in the districts of Parras, Viesca and Monclova. Extending from the foot of the mountains northward are sterile plains, where the heat is intense ; to the south¬ east lies the Laguna region, fertile and temper¬ ate ; the mountainous district, rich in minerals, has frequent frosts. In general the climate is not healthful, the most common diseases being malarial fevers, typhus, rheumatism and affec¬ tions of the respiratory and digestive organs. Alining has recently become one of the chief industries. Silver, lead, coal, iron, zinc, copper and gold are found. The first position, how¬ ever, is still held by agriculture. Cotton, corn, wheat, sugarcane, etc., grow rapidly; and grape-culture is attracting special attention. The grapes of Parras are considered by some experts equal if not superior to the Alalaga and Granada varieties. Cattle-breeding is carried on quite extensively. The export trade is principally with the United States, to which, among other products, are brought ixtle and its various manufactures. The commerce of Coahuila is in the hands of Americans, Spaniards, Germans and Frenchmen; its total trade is of the estimated value of $11,000,000, or

$12,000,000, silver, per annum. Manufac- tures are cotton and knitted goods, wines, tanned skins and hides, soap, candles, cheese, shoes, molasses, furniture, pottery, carriages, wagons and chocolate. The railroad system in¬ cludes a number of important lines. There are good wagon roads ; also telegraph and tele¬ phone service and an efficient mail-service. The state is divided into five districts subdivided into 33 municipalities. Pop. 280,899.

COAITA, ko-i'ta. See Spider-monkey.

COAL, a mineralized form of carbon, con¬ stituting one of the metamorphic rocks. It is found in seams or beds, often in a series sep¬ arated by intervening strata of sedimentary rocks.

Origin. — Many theories have been ad¬ vanced as to the origin of coal. Thus coal

beds have been attributed to the drying up of petroleum lakes on old land surfaces, to the separation of carbon by some fanciful chemi¬ cal process from limestone and to accumula¬ tion of seaweeds along old ocean beaches. These theories may be dismissed without dis¬ cussion ; they may help explain some particu¬ lar instance, but are so unsupported by facts that they are of no wide application. The generally accepted theory applies to practically all kinds of coal deposits and is, briefly, as follows :

When the woody material, cellulose, of the leaves and stems of plants, falls on the ground, it soon oxidizes or decays, and the oxygen, hydrogen, carbon and nitrogen present pass into the air or soil as gases, the hydrogen and oxygen chiefly as water vapor, the carbon as carbon dioxide and the nitrogen as ammonia. Finally of the original material, say the trunk of a great tree, only the ash, composed chiefly of silica, alumina and iron oxide, is left. Thus it happens that the leaves, twigs and branches that have fallen for thousands of years in a forest are represented by a few inches of vegetable mold or humus, plant substance not yet oxidized to ash. If, however, the ground be covered by water, as in a swamp, air is partly excluded, and decay proceeds so slowly that vegetable or animal remains may be pre¬ served for long periods of time. Still oxidation goes on ; the dead plants gradually give up their hydrogen, oxygen and carbon as water, marsh gas and carbon monoxide and dioxide, and change to a mass of partly decayed veg¬ etable fibre or even to a black muck.

A damp climate and a land surface from which the rainfall runs off slowly, favor the formation of extensive swamps, though in a climate as damp as

that of Ireland peat bogs climb hillsides, the mosses (Sphagnum), the chief plant growth in such swamps, dragging up water by capillary action. On the plains of Alaska and Siberia, where the ground is permanently frozen, mosses cover the ground with a thick mat, and such swampy plains are called tundras. In a lake country can be found areas which a little investigation shows were at no very remote date covered by shallow bodies of water, but are now swamps, the original lakes having been filled by the dead mosses, rushes and other aquatic plants. Along the seashore in a region of average rainfall, where the coast is of low relief and the rivers slug¬ gish, sand-bars form by wave action off shore, and behind these bars are salt lagoons and marshes, changing, farther from the ocean, to brackish, and finally fresh-water, swamps.

Fresh or brackish water and a fairly warm though not torrid climate are indicated by the fossils of plants and animals found in or near coal seams. From these facts and from the vast extent of some coal fields it is believed that coal beds represent old coastal swamps, possibly of the type of the Dismal Swamp in Virginia. Now if we suppose such a swamp- covered coast to sink slowly, the encroaching ocean would cover the accumulated peat and muck with sand and silt until finally the swamp might be buried thousands of feet by sediments from the receding land surface. Instead of steadily sinking, however, the probabilities are that during the great coal-forming epochs the land alternately sank and rose through thou¬

sands upon thousands of years, and thus one swamp was buried over another, resulting in those alternating beds of coal, shale and sand¬ stone characteristic of all coal fields.

The progressive diminution of hydrogen and oxygen compared with carbon is shown by the following table from Percy's Metal¬ lurgˆ in which carbon is taken at the con¬ stant amount of 100:

Carbon

Hydrogen

Oxygen

Wood .

100

12.18

83.07

Peat .

100

9.85

55.67

Lignite .

100

8.37

42.42

Welsh bituminous .

100

4.75

5.28

Pennsylvania anthracite .

100

2.84

1.74

The loss of water and of combined car¬ bon, hydrogen, oxygen and nitrogen, in the change from peat to coal, caused a great loss of bulk. The pressure of overlying strata, or of those earth movements that warp and fold the rock formations, reduced the bulk still more. Thus it can happen that a coal seam one foot thick may represent what was 50 feet of peat in the ancient swamp, and it is fair to assume that an average seam of true coal is not one-fifth the thickness of the original peat beds.

Some geologists have believed that when the old swamps now represented by coal seams were accumulating thick beds of peat, the climate was torrid, while the earth's atmos¬ phere contained a higher percentage of carbon dioxide than now. It may be said, however, that a torrid climate is not necessary for the existence of great swamps ; and as to a higher percentage of carbon dioxide in the air, were the present land surface of the globe covere-d with a layer of coal one foot thick, the carbon contained therein, if restored to the atmosphere, would mean an increase in the amount of carbon dioxide of only about .5 of 1 per cent. This about represents the difference between air in the city and in the country, and the effect of such an increase in stimulating plant- growth is at best doubtful.

Following the submerging of the fallen vegetable substance biochemical changes take place through the action of certain bacteria and the material soon loses its vegetable structure and becomes metamorphic. Being later subject to stresses of earth movements, either through foldings of the strata, with more or less heat, or, through subsidence and the deposit of sedi¬ mentary rocks, to heavy pressures this meta¬ morphic bacterial residue becomes a true rock. The great variation in its constitution is due to the endless variation of conditions during its transmutation.

As to the age of the coal formations it may be said that true peat deposits are all of later age than the Tertiary, and in North America only peat and incoherent lignite occur in later formations than the middle Tertiary (Miocene) though the early Tertiary (Eocene) forma¬ tions contain great areas of lignite. In Europe there are lignitic deposits in the Triassic and in the Carboniferous. The great coal-forming age in North America and in Europe was the Carboniferous, though true coals occur in the Permian and in the Triassic, and in North

America there are very important coal fields of Cretaceous Age. Isolated pockets of coal, but no workable coal fields, occur in pre-Carbon- iferous formations. See Carboniferous Sys¬ tem.

An idea of the relative compositions of peat, lignite, and true coals may be

had from the following table :

H2 O

C

H

O

N

S

Ash

Condensed peat ….

20

47.2

4.9

22

9

5.0

Lignite, Alaska …. Bituminous coal.

16.52

55.79

3.26

19.0

.61

.63

4.18

Connellsville, Pa. Anthracite coal,

0.89

82.48

4.50

5.61

1.45

.94

34.1

Lykens, Pa .

0.73

82.89

4.53

.40

.64

.68

10.13

Varieties of Coal. — Various elaborate schemes of classifying coal have been advo¬ cated, but have not gained popular acceptance. In fact in the coal trade in this country the word coal is often applied to a true lignite. However, since the chief heat-producing ele¬ ment in coal is carbon, a classification in wide use is based on the value of the coal as fuel ; that is, on the percentage of carbon present and the condition of the carbon.

Part of the carbon is fixed, that is, cannot be driven off by heating in a retort; part is combined with the hydrogen and nitrogen as volatile hydrocarbon compounds which can be driven off. The percentage of fixed carbon is highest in anthracites, but even the semi- graphitic anthracite of Rhode Island contains a considerable percentage of hydro-carbons. The proportion of the volatile hydro-carbons to the fixed carbon in a coal is called its fuel ratio. On this basis the distinctions usually made are lignite, bituminous, semi-bituminous, semi-anthracite and anthracite. Cannel coal, in which the percentage of volatile hydro¬ carbons is very high, is believed to be of dif¬ ferent origin from other coals. It may repre¬ sent accumulations of seeds, spores, resins or gums, and possibly of fish remains, in pools in the ancient swamps. Generally speaking, in anthracite the volatile matter is below 6 per cent, in semi-anthracite below 10 per cent, in semi-bituminous between 12 and 18 per cent and in bituminous above 18 per cent. In cannel coal the volatile matter may be as high as 50 or even 65 per cent.

Lignite, or brown coal, is brown to black in color, though the powder is always brown. It often shows plainly its vegetable origin, containing stems

that look like undecomposed wood. The lustre may be resinous or dull ; the specific gravity is .5 to 1.5, some kinds floating on water. Lignites burn easily with a smoky flame, generally contain a high percentage of water, crumble easily and slack to mud on long exposure.

Bituminous or soft coal is black; the pow¬ der is black; the lustre may be resinous or dull; the specific gravity is 1.25 to 1.4. It con¬ tains less water than lignite and bears trans¬ portation better. Bituminous coals are sub¬ divided according to their properties or uses, into coking, free-burning, smokeless, gas coals, etc. Coking coals partly fuse or cake in burning. If low in ash and very low in sulphur they are highly valued for forging and for making coke and gas. The famous vol. 7 — to

coals of the Cumberland region in Mary¬ land are classified as semi-bituminous. In coking coals the less volatile hydrocarbons present, the higher the yield of coke, but in gas coals the more hydrocarbons the better. A good gas coal will give 10,000 cubic feet of gas per ton. Smokeless coals burn with little smoke and are used for domestic purposes and for steam production.

Cannel coal (from cannyl, ((a candle®), is black or brownish, has a dull lustre, does not soil the fingers and shows few or no traces of vegetable structure. It grades into bitumi¬ nous shale. It contains from 40 to 60 per cent of volatile matter, lights readily, burns with a steady flame, and is used as a fuel for open grates, but chiefly for enriching gas made from other coal. It is mined in the United States at Cannelburg, Ind., and in the Jellico district, Ky.

Anthracite, called also hard coal, is black with a black powder and does not soil the fingers. The specific gravity is 1.3 to 1.75. It kindles slowly, but, owing to the high per¬ centage of fixed carbon, burns without smoke and gives an intense heat. It was formerly much used in this country for smelting iron and is still used as a steam fuel, but its chief use is for household purposes.

Generally speaking, the less water, ash and sulphur in a coal the better. The water must be evaporated before the coal burns ; ash repre¬ sents inert matter and sulphur is objectionable for several reasons. A first-class coal should not contain over 6 or 7 per cent of ash and a good gas coal should have less than .7 per cent sulphur.

The following table gives the composition of some representative American lignites and coals :

Water

Volatile Hy¬ drocarbons

Fixed

carbon

Fuel ratio

Ash

Sulphur

LIGNITE

Cook Inlet, Alaska .

11.59

49.03

31.64

.64

7.73

Coos Bay, Ore .

9.56

49.85

35.98

.74

4.61

.94

Rock Springs, Wyo ….

6.98

34.42

52.60

1.53

2.00

Boulder, Colo .

21.37

33.38

40.31

1.21

4.95

....

BITUMINOUS

R.oslyn, Wash .

2.05

33.55

54.55

1.63

6.85

.11

Trinidad, Colo .

4.88

36.25

53.57

1.48

5.30

McAlester, I. T .

2.08

37.52

56.02

1.49

4.38

.80

Saginaw, Mich .

5.82

39.79

45.15

1.13

9.24

3.83

Brazil, Ind .

13.82

35.16

49.60

1.42

1.06

1.47

Pana, Ill .

1.94

36.59

58 . 32

1.59

2.24

.90

Clearfield, Pa .

.55

25.19

71.02

2.82

2.65

.58

Connellsville, Pa .

1.26

30.11

59.61

1.98

8.23

.78

Pratt Seam, Ala .

1.00

32.17

63.37

1.97

3.34

1.04

SEMI-BITUMINOUS

Spadra, Ark .

1.11

11.28

72.84

6.46

12.04

2.74

Pocahontas, W. Va ....

1 .68

17.45

75.90

4.35

4.20

Cumberland, Md .

.96

19.14

72.71

3.80

6.41

.79

SEMI-ANTHRACITE

Crested Butte, Colo. . . .

.72

7.62

87.51

11.48

4.15

Bernice, Pa .

1.29

8.10

83.34

10.28

6.23

1 .03

ANTHRACITE

Cerillos, N. M .

2.90

3.18

88.91

27.96

5.21

Wilkesbarre, Pa .

2.49

4.34

83.97

19.33

8.55

.65

Lehigh, Pa .

1.72

3.52

88.00

88.49

5.66

.61

Coal Fields of the World. — North Amer¬ ica, Europe and Asia contain the great coal fields of the world. In southern Africa, in Australia and in New Zealand are deposits

of importance. Only small and disconnected areas are known in South America and the only mines worked on a large scale are in Chile and Argentina. As to Asia, the coal fields of China are vast and of great promise but are still practically undeveloped. Coal is abundant in India and Burma and the output is increas¬ ing fast, particularly from the mines in Ben¬ gal. The rather small coal field of Japan is being opened rapidly. The chief coal-pro¬ ducing states of Australia are New South Wales and Queensland. The South African mines are in Cape Colony, Natal and the Trans¬ vaal.

Great Britain long led the world in coal-pro¬ duction, but was passed by the United States in 1899. The important coal fields of Great Britain lie in southern Scotland, stretching, with inter¬ ruptions, from the coast of Ayr to the mouth of the Firth of Forth; in the north of England, in Durham and Northumberland counties; in central England, where the several fields worked include parts of 10 counties, the most important being Yorkshire and Lancashire; in the west of England, near Bristol, and in the Forest of Dean; and the very important South Wales field in the counties of Monmouth (England), and Glamorgan and Carmarthen (Wales), this field producing the best coal mined in Great Britain.

On the continent of Europe, Germany, France, Belgium, Russia, Austria-Hungary, Italy, Sweden and Spain have coal fields of more or less importance. The French coal fields may be grouped in three divisions, those of the north, of the centre and of the south. The northern field, in the departments du Nord and Pas de Calais, extends into Belgium. The fields of central France are generally small and irregular, the most important being in the department of the Loire. In the south of France the coal fields of Alais and of the Aveyron are of some importance. The coal field of Belgium is a narrow belt extending across the country, ex¬ cept for a short interruption, from the Pas de Calais in France to the Aix-la-Chapelle coal field in Prussia.

Of the German states, Prussia has the largest and best coal fields. These include the Aix-la-Chapelle and the Eschweiler ; the very important coal fields of the Ruhr, or of Westphalia; and, extending into Bavaria, the Saarbrucken field, perhaps the most remark¬ able in Europe for the number of seams and total thickness of coal. In the extreme south¬ east of Prussia are the important and com¬ paratively undeveloped coal fields of Silesia at the head waters of the river Oder. Of the other German states, Saxony is a considerable producer of coal, the most important mines being near Zwickau.

In Central Europe, coal fields extend from Lower Silesia into Bohemia, and from Upper Silesia into Moravia with mines near Schlan, Radnitz and Pilsen. There are also great deposits of lignite, extensively developed near Einhogen and Bilin, and valuable mines of lig- nitic-bituminous coal near Fiinfkirchen in southern Hungary and about Syria and Ca- rinthia in the Austrian Alps.

The most important coal field of Russia is the Donetz basin, between the Don and the Dnieper rivers. It covers a large area and is being developed steadily. Spain has several

coal fields, one of some importance in the Asturias, and two others but little developed. Lack of railroads has prevented their exploi¬ tation.

North America, as noted before, surpasses all the continents in the extent and variety of its fuel supplies. The United States leads the world in coal production, and there is little prospect of any country surpassing it before that far distant day when the great coal fields of China are well opened. Canada has coal fields of importance near Pictou and on Cape Breton Island in Nova Scotia, known as the Acadian coal field; also a vast and but partly developed field of lignite and true coal in Al¬ berta and eastern British Columbia, and another field on Vancouver Island. Alaska has work¬ able beds of lignite on the coast and in the Yukon Valley at Rampart and Circle City.

The Mexican coal fields are of much local importance, but are not likely to produce any coal for export. The principal field is in the state of Coahuila, extending from Eagle Pass to Sabinas. Coal seams have been worked in Sonora, Hidalgo and Michoacan. During the past five years the output of coal in Mexico has greatly decreased on account of the unsettled political conditions.

The following table showing the produc¬ tion of coal and lignite of the chief coal-pro¬ ducing countries of the world is compiled from the United States Geological Survey figures :

Country

Production

Country

Production

United States. . .

531,619,487

China . ‘ . . .

24,000,000

Great Britain . . .

283,570.560

Japan .

22,596.750

Germany .

259, 139,786

France .

19,908,892

A istria-Hun-

India .

19,156,404

gary .

52,679,712

Belgium .

15,691,465

Russia

31,158,400

Canada .

13,269,023

In 1913 the world's production of coal had reached the enormous total of nearly 1,500,000,000 tons. On account of the un¬ settled conditions brought about by the war, there was a decrease in 1914, but the output for 1915 exceeded that of 1913. According to sta¬ tistics compiled by the Coal Trade Journal , the output in the United States during 1915 amounted to 525,124,700 tons.

During the past 15 years the production of coal in the United States has exactly doubled ; that of Great Britain has increased one-fifth while Germany's production has increased 80 per cent during the same period. Our annual tonnage now almost equals the combined pro¬ duction of Great Britain and Germany.

The coal fields of the United States, not including Alaska, are of various ages from the Carboniferous to the Eocene, the two great horizons being the Pennsylvanian of the Carboniferous, and the Laramie of the Cretaceous. The total area covered by possi¬ bly productive seams of lignite, bituminous coal and anthracite is over 450,000 square miles.

Of these vast reserves about 60 per cent is soft coal, including sub-bituminous and lignite, the rest being hard coal, or anthracite, semi¬ anthracite and bituminous.

According to recent classification made by the United States Geological Survey, the coal fields of the United States are divided into six

"provinces,® on a geographical basis, as follows : (1) Eastern province, including the bituminous area of the Appalachian region ; the Atlantic Coast regions, comprising the Triassic fields near Richmond and the Deep and Dan Rivers' fields of North Carolina and the anthracite regions of Pennsylvania, in all 70,000 square miles. (2) Gulf province, including the lignite fields of Alabama, Mississippi, Louisiana, Arkansas and Texas, comprising 2,100 square miles in which there have been actual development with areas believed to contain workable lignites embracing 78,000 square miles. (3) Interior province, including all the bituminous regions of the Mississippi Valley and the coal fields of Michigan, covering a total area of 132,900 square miles. (4) Northern and Great Plains provinces, including the lignite areas of North and South Dakota, and the bituminous and sub-bituminous areas of northeastern Wyoming and northern and eastern Montana, covering 88,590 square miles. (5) Rocky Moun¬ tain province, including the mountain regions of Montana and Wyoming and the coal fields of Utah, Colorado and New Mexico, an area of 37,000 square miles. (6) Pacific Coast province, including the coal

fields in California, Oregon and Washington, an area of 1,900 square miles.

Owing to »the competition of lower-priced bituminous coal in the form of coke, the use of anthracite for smelting iron has declined greatly of late years, and its consumption for industrial purposes is not increasing. For steam-production only the small sizes, pea, wheat, buckwhea-t and rice, are much used, and these chiefly on railroads running through the fields or in cities having strict smoke ordinances. Anthracite, being clean, smokeless, having great heating power, and burning slowly, is chiefly used for household purposes and is sent to market broken into lumps of several sizes, known as broken or grate, egg, stove and chestnut, these being called prepared sizes, in distinction from the small' or steam sizes before mentioned. The market supplied by the Pennsylvania mines is along the Atlantic seaboard from Nova Scotia to Georgia, also a narrow strip of country extending from Montreal westward through southern Ontario and the States of the Union bordering on the Great Lakes. The three States of Pennsylvania, New York and New Jersey consume over two-thirds of the anthracite and about half of the rest goes to New England; thus almost 80 per cent is con¬ sumed in the East.

The bituminous coals of the Appalachian field include gas, coking and steam coals of the highest grade. The largest and best seams or those most easily opened have been exploited so far, and the resources of the Appalachian field are still enormous. The State of West Virginia alone is estimated to contain more workable coal than the whole of Great Britain. The best-known of the various areas now opened, are the Clear¬ field, in Pennsylvania, producing coking, gas and steam coals, shipped largely to seaboard points; the Broad Top, in Pennsylvania, pro¬ ducing coal of rather better grade, shipped to the same markets ; the Cumberland, in Mary¬ land, producing a famous steam and . smithy coal, shipped to the seaboard and to interior

cities from Canada to the Rocky Mountains; the Pittsburgh, in Pennsylvania, whence come gas and steam coals largely used locally, but also shipped to points on the Great Lakes and on the Ohio River and lower Mississippi; the Connellsville, in Pennsylvania, yielding coal used chiefly for making a standard grade of coke ; the Hocking Valley, in Ohio, whence are shipped steam coals to near-by cities and to distant ports on the Great Lakes ; the Kanawha, in West Virginia, shipping gas and steam coal to various points on the Great Lakes or on the Ohio River and lower Mis¬ sissippi ; and the New River, Flat Top and Pocahontas fields in West Virginia, produc¬ ing steam, gas and coking coals of varying excellence, the best grades having no superior, which are shipped mostly to seaboard points, though an increasing tonnage is made into coke to supply blast

furnaces at Pittsburgh, Chicago and various Ohio cities. In eastern Kentucky is the Jellico field, whence gas and steam coal is shipped to a wide territory, in¬ cluding seaboard cities, and in eastern Ten¬ nessee are several basins yielding gas, steam and cooking coals, used locally and shipped to compete with the Jellico coal. The import¬ ant district in Alabama is about Birmingham : the coal is shipped to Atlantic and Gulf ports for steam- and gas-making, and a large propor¬ tion of the output is made into coke for use in local furnaces and foundries.

The eastern interior field covers western Indiana, nearly the whole State of Illinois and part of Kentucky. The coal is of Carbon¬ iferous (Pennsylvania) Age, but in general lies in thinner veins and is of poorer quality than that of the Appalachian field. Most of the output is used as a steam fuel by rail¬ roads and in the many manufacturing cities that lie in or near the field. Certain grades are much used as a household fuel. The field contains no first-class coking coal.

The northern interior field covers a large area in the southern peninsula of Michigan and has been opened chiefly by the mines near Bay City and Saginaw. The seams are comparatively thin, and the coal is generally of poorer quality than that of Indiana and Illinois. The output is used locally. The beds are of Upper Carboniferous Age.

The west central field extends from west¬ ern Iowa across western Missouri and into northwestern Arkansas and eastern Nebraska and Kansas, through Oklahoma into Texas. The coal beds vary widely. In parts of the field the coal is barely more than lignite, while in northwestern Arkansas it approaches semi-anthracite. The markets supplied cover a great area. Fully half of the output is used by railroads, and of the other half at least 40 per cent is used for household purposes. The measures are Carboniferous.

The Rocky Mountain field includes the numerous disconnected areas lying in narrow belts along either flank of the range from the Canadian frontier southward for 1,000 miles; Montana, Utah, Wyoming, Colorado and New Mexico having mines. Along the flanks of the mountains and in the parks or plateaus in the main range the coal is largely bituminous ; but eastward from the range the coal measures, which are of Upper Creta¬ ceous (Laramie) Age, are lignitic, and vast beds

of lignite underlie the plains of Montana, Wyoming and North and South Dakota. The mines now opened supply the great trans¬ continental railroads, the chief users. In places the coals make good coke, used by local smelting plants. The resources of the field are vast and but little developed.

The Pacific Coast coal field is of Tertiary Age and most of the output is lignite. It in¬ cludes some unimportant basins in California, several fields in Oregon, of which the Coos Bay has been most developed, and the Roslyn and Puget Sound fields in Washing¬ ton, the former producing a good bituminous coking coal. The California and Oregon fields are of little more than local importance, but the Washington mines supply railroads and steamships and are an important factor in the coal trade of San Francisco.

The rank of the principal coal-producing States is shown by the following table compiled from figures published in the 1915 report on the ˆProduction of Coal® prepared by the United States Geological Survey:

States

Short tons

Pennsylvania {

West Virginia .

88,995,061 157,955,137 77,184,069 58,829,576 22,434,691 21,361,674 17,006, 152 14,927,937 8,624,980 8,122,596 7,614, 143 7,435,906

Illinois .

Ohio .

Kentucky .

Indiana .

Alabama .

Colorado .

Virginia .

Iowa .

Oklahoma .

States

Short tons

Kansas .

Wyoming. . . . Tennessee. . . Maryland . . . New Mexico. Missouri …. Utah .

6,824,474 6,554,028 5,730,361 4, 180,477 3,817,940 3,811,593 3, 108,715

Montana …. Washington.. T exas .

2,789,755 2,429,095 2,088, 908

Arkansas. . . . Michigan ….

1,652,106

1,156,138

The coal reserves of the United States are 51.8 per cent of the total for the entire world, which in 1913 was estimated at 7,397,553 millions of metric tons. This leaves about 3,700,000,000,000 metric tons in the coal fields of the United States, available within 6,000 feet of the earth's surface. Up to the close of the year 1919 the output of all the mines was in round numbers about 13,000,000,000 tons. For every ton pro¬ duced and sold half a ton was formerly wasted, but better methods have reduced waste to a minimum. As compared with the amount of coal existing in all the United States fields, this exhaustion amounts to one-half of one per cent of the supply; and, at the present rate of use there is coal enough underground to supply the country for about 4,000 years to come.

The coal being consumed at present in the United States comes : from the

anthracite fields of Pennsylvania, 70 per cent; from the bitu¬ minous coal area of the Appalachian area, 20 per cent; and from the great Western fields, 10 per cent. Although the anthracite area in the northeastern part of Pennsylvania is less than 500 square miles, it has yielded in the aggregate 2,626,500,000 tons, and it is estimated that four times that quantity remains un¬ touched. Fully 70 per cent of the country's coal lies west of the Mississippi, but it is mostly of semi-bituminous and lignite grade. The high grade bituminous coal of the Appa¬ lachian area is being exhausted more rapidly in proportion to the supply than even the very limited anthracite deposits, and geologists assert

that its complete exhaustion is not far off. See Fuels

Bibliography. — Arber, E. A. N., (The Natural History of CoaP (Cambridge 1911); Campbell, M. R., (Map of the Coalfields of the United States: with Notes) (U. S. Geological Survey Office, Washington 1908) ; Gibson, W., (The Geology of Coal and Coal Mining) (Lon¬ don 1908) ; International Geological Congress XII, (The Coal Resources of the World (3 vols. and atlas) ; Kent, W., (Steam Boiler Economy > (London 1915); Somermeier, E. E., (Coal: Its Composition, Analysis, Utilization and Valuation* (New York 1911) ; U. S. Geo¬ logical Survey, (Mineral Resources of the United States) (Washington — annually); Wagner, F. H., (Coal and Coke* (New York*

1916).

Richard Ferris,

Editorial Staff of The Americana.

COAL CITY, Ill, village of Grundy County, 60 miles southwest of Chicago, on the Atchison, Topeka and Santa Fe, the Chicago and Alton and other railroads. Coal mining is the chief industry, followed by manufac¬ tories of clothing and bricks and tiles. Pop.

(1920) 1,744.

COAL GAS, the gas produced by the destructive distillation of bituminous coal. See Gas, Illumination, History of.

COAL GAS POISONING. See Carbon-

disulphide; Coal Mining; Gas Poisoning.

COAL LANDS. On 1 July 1864 the first act which specifically mentions coal lands in the public domain became law. This law fixed the minimum price at $20 per acre but in 1873 an act was passed reducing the price to $10 per acre where the land purchased was situated more than 15 miles

from a completed railroad. Only 160 acres are allowed to individuals, whereas associations may enter 320 acres, or twice that number after they have expended $5,000 in development. An effort has been made to induce Congress, as part of the pro¬ gram to conserve the natural resources of the country, to provide for the lease or sale of coal deposits without the rights to the soil, sub¬ ject to various regulations. Up to 1 Nov. 1910, pending legislation, more than 80,000,000 acres of coal lands had been withdrawn from entry. On 22 June 1910 an act became law providing for the entry of coal lands as agri¬ cultural lands, but to the United States is re¬ served all right and title to any coal in such lands and the right to prospect for, mine and remove the coal.

By act of 6 June 1900 such of the public land laws as related to coal lands were ex¬ tended to Alaska but since these laws contem¬ plated a public survey before location a supple¬ mentary act was passed 28 April 1904 permit¬ ting individuals to locate claims of 160 acres (at a flat rate of $10 per acre) by permanent monuments, and when entry applications were made (within three years) they were to be accompanied by plats and notes of private sur¬ veys. Individuals soon learned that condi¬ tions in Alaska prevented the profitable work¬ ing of a 160-acre claim independently and ac¬ cordingly on 28 May 1908 Congress passed a remedial act permitting the consolidation of individual claims located in good faith up to 2,560 acres of contiguous land, but the act

contained a stringent anti-monopoly provision. On 12 Nov. 1906 an executive order was issued withdrawing all coal lands in Alaska from entry under the coal land laws, but a later order modified this so as not to apply to claims which had been made prior to that date. In 1914 another act was passed to settle the dis¬ puted question of Alaska coal lands, a part of the lands, being reserved and the rest arranged in such a way as to prevent the monopoly of the coal deposits by any co-operation. On 30 Dec. 1914, the United States Commissioner of Public Lands issued an order under the pro¬ visions of which several local permits have been issued for the free mining of coal lands comprising 10 acres or less. There have been several accusations made against public offi¬ cials in connection with the methods of acquir¬ ing these lands, which led to the Bal- linger-Pinchot controversy, the Congressional investigation of the Interior Department and the Forest Service, the dismissal of Pinchot and Glavis and the subsequent resignation of Secretary Ballinger. See Public Domain; Lands, Public. Consult (Public Coal and Public Rails and Private Farms and Private Gold in Alaska, > in

Everybody's Magazine, Vol. XXXII, pp. 781-82 (June ***1915) ; U. S. General Land Office, (Coal Land Laws and Regulations Thereunder*** *(Washington) ; Un¬ developed Coal in the Public Domain of Alaska,* in The Outlook, Vol. XCIV, pp. 505- 06 (5 March 1910) ; Van Hise, C. R., Con¬ servation of Natural Resources) (New York*

1910).

COAL MEASURES. See Coal; Car¬ boniferous System.

COAL MINING. Coal mining differs from metalliferous mining chiefly in the better ventilation required, the extent and regularity of mine workings and the necessity of getting out the mine product with as little dust as possible. The principal gases found in coal mines are carbon dioxide, CO2, heavier than air, suffocating, but not inflammable, called choke- damp by miners ; carbon monoxide, CO, about as heavy as air, poisonous and inflammable, the dreaded whrte-damp of the miners; carburetted hydrogen, CFL, light, not poisonous but in¬ flammable, the chief constituent of fire-damp; also, but less important, sulphuretted hydrogen, poisonous and inflammable, but easily detected by its odor. Of these gases, marsh gas, given off in large quantities in some mines, is the chief agent in coal-mine explosions. A mine is said to be fiery when the coal-seams give off much fire-damp. Many of the deeper coal mines of Great Britain, France and Germany are very fiery. The most fiery mines in the United States are in the anthracite region of Pennsylvania, the South Wilkes-Barre shaft at Wilkes-Barre being one of the most fiery mines in the world. A mixture of marsh-gas and air in certain proportions explodes violently on contact with flame. Coal-dust in the air makes a much smaller proportion of marsh-gas an explosive mixture.

To enable men to work in places where suf¬ ficient air to carry away the gas does not circu¬ late, or to enable them to work in very fiery mines, safety-lamps are used. In a safety-lamp the flame is enclosed by wire gauze and cannot ignite gas in the air outside the gauze, unless

the gauze is heated to the combustion point of the gas. The safety-lamp was invented by Sir Humphry Davy in 1815 and has been improved in various ways. Many patterns are in use ; one of the latest types used in this country is an electric lamp, to which is attached a lead- plate battery, carried on the belt, a cable con¬ necting it with the lamp, which is held in a steel shell, carried on the cap. A safety-lamp indicates the presence of fire-damp by the lengthening of the flame.

Carbon dioxide and carbon monoxide given off by the coal in place are produced in the mined-out areas known as (

Good ventilation is thus a prime necessity in coal mining. It is sometimes

secured by a fur¬ nace over a shaft, the fire producing a suffi¬ ciently strong up-current. But in all fiery mines, and generally in all large mines, large revolving fans, sometimes 35 feet in diameter, are used to circulate the air. The fans may exhaust or force in air (up-draft or down- draft) ; various types of mine fans are used, but the majority of those in service in Great Britain and at the larger mines in this country are modifications of the Guibal type.

*As most coal-seams worked are a few feet thick, but of considerable extent, and as in this country at least, most coal-beds lie flat or dip at low angles, a coal-mine can be opened in a more regular way than a metalliferous mine. Two systems of mining are trsed — the pillar and room (((board and pillar**), and the long wall. The first, generally used in the United States, consists in taking out various portions of the coal as the work proceeds from the mine-opening, and the remainder in working back toward the opening. The long wall sys¬ tem, used in certain bituminous districts in the United States, and extensively used in Eng¬ land, consists in taking out all the coal in a long face as the work advances from the mine¬ opening, the roadways and air-passages being protected by packs or walls. It is best suited for thin coal-seams with weak roofs, while the pillar-and-room system is best suited for thick seams with rock roofs. The two systems grade into each other.*

*Coal is broken from the face of the seam by the miner under-cutting it with his pick and then putting in a blast strong enough to bring down the coal. Black powder is generally used in this country. Abroad explosives making less flame are required by law in many districts, and in some of the very fiery German mines wedges operated by hydraulic power are used. Blasting, or ((shooting off the solid,** is prac¬ tised extensively, entirely in some sections, 15 per cent of the total production being so mined in 1915, but it is considered a wasteful and a dangerous method, as it not only causes cave- ins, but shatters the coal. Fine coal is less valuable than lump, and dust greatly increases the danger of an explosion.*

To under-cut the coal, machines are some¬ times used. Those in general use in this coun¬ try are of two types : the Harrison, or puncher type, with a reciprocating piston impelled by

compressed air, carrying a cutting bit; and the chain machine, having an electrically driven chain carrying cutting teeth. The latter type, though not favored for fiery mines, is probably more used in newly opened mines, than the former. No machines are used in the Pennsyl¬ vania anthracite mines.

Of the total bitumi¬ nous coal (442,624,436 tons) mined in the United States in 1915, 243,237,551 tons were under-cut by machines.

There has been a steady tendency toward the increasing use of machinery. In 1903 only 27.6 per cent of the total production of bitumi¬ nous coal in the United States was machine mined. In 1910 it had increased to 41.7 per cent and in 1915 it was over half — 55 per cent. In that year 15,692 machines were in operation in the coal mines of the country, dis¬ tributed (in part) as follows: Pennsylvania, 5,935; West Virginia, 2,479 ; Illinois, 1,787; Ohio, 1,459; Kentucky, 1,399; Indiana, 660; Ala¬ bama, 373 ; Colorado, 299.

Recently steam shovels have been employed in mining bituminous coal in Kansas, Oklahoma, Missouri, Indiana and Illinois, where there are areas of flat-lying coal veins near the surface. Some of these shovels have a dipper capacity of eight cubic yards.

The coal, when broken down, is roughly sorted by the miner or his helper and loaded into mine cars which are hauled to the main haulage roads by mules. Here the cars from the various gangways are usually made up into trains (or ((trips))) and hauled to the shaft bot¬ tom or the entrance of the mine by a wire rope (tail-rope haulage), by a compressed air loco¬ motive, or by an electric locomotive. Some¬ times the cars are attached singly to an endless wire rope like cars on an ordinary surface cable road (endless-rope haulage). Mines of the shaft type are to be found in largest numbers in the hard-coal districts. The hard-coal mines are likewise the deepest. Occasionally an ex¬ treme depth of 1,500 feet is attained. Two other styles of mines are found in both anthracite and bituminous fields, — <(drifts® and ˆslopes.® The drift mine is dug straight into the mountain from one side. The passageway or heading may have an upward trend. The slope mine slants downward to the extent of perhaps 35 or 40 degrees, the main heading often measur¬ ing a mile or more in length.

An interesting process also is ((pocket min¬ ing,® but this is practised comparatively little to-day. An outcrop of coal at various points on the side of the mountain suggests the pos¬ sibility of a rich mineral vein. Digging is be¬ gun directly into the bed of coal projecting at the surface. This form of mining is seldom highly profitable, for when the digging has progressed at considerable expense to a point where the mine should be expected to pay, all operations are suddenly cut short by the en¬ countering of solid rock, which, owing to some upheaval of the past, has ((faulted® the vein of coal from its natural course. These pockets at intervals in the mountains where pocket mining is done present an interesting sight. About Shickshinny, Pa., they are numerous.

In shaft mines, and especially those of an¬ thracite, mules are used very

extensively. Where mechanical power is employed to haul trains in the main haulage-ways, these beasts

bring the cars only from the side headings or the rooms. The mules do not see daylight for months at a time. In bituminous drift mines evolution has included the introduction of min¬ iature trolley trains of 40 or 50 cars, each train being in charge of a motorman and brakeman. In anthracite drifts steam locomotives of a small and peculiar type, known as <(hogs,® haul the trains. In a slope mine cable trains trans¬ port the coal. One end of the cable is attached to the train, and the other winds upon a drum at the power-house. When the cable turns a corner it passes around what is known as a <(bull wheel.® Twenty-five one-ton cars may comprise a cable train of soft coal. Anthracite cars often hold four and a half tons. In soft- coal mines the man in charge of the cable train is called a <(rope rider.® In bringing his cars out of the mine he sits upon the ring which connects the cable with the train. In the an¬ thracite slopes a man stands upon the side of a car ready to ((sprag® the wheels when a stop is made. Spragging consists in throwing short but stout lengths of wood into the openings between the four spokes of the car wheel. The height of the bituminous vein is often not more than four or five feet, thus making the quarters of the miners rather cramped. In the mining o± anthracite only two-thirds loosened from the vein is of value. The miner must use good judgment in loading only the paying coal. To handle and transport chunks in which slate pre¬ dominates is unprofitable. Even the better coal has more or less slate in it, while in bituminous coal the slate is principally at the top and bot¬ tom of the vein and not mixed with the prod¬ uct as mined.

Off from the main or side headings of a hard-coal mine ((breasts® or Chambers® are opened. In bituminous fields these are known as ((rooms.® A tunnel or neck 40 to 60 feet long may connect the room proper with the main passageway. Beyond the neck the cham¬ ber may broaden out to a width of 30 or more feet, continuing indefinitely. The coal be¬ tween the rooms forms what is known as a <(rib® or ((pfllar.® As the rooms begin to broaden to their maximum widths, timber props are placed between the floors and ceilings to support the loose rock and earth. Apart from supporting the great mass of solid rock, they are of little service.

When all the coal that it is practical to mine in the chambers has been extracted, the work of drawing the ribs between the rooms is be¬ gun, eventually allowing the rock above to cave in. In addition to securing the coal in the ribs, this process is necessary, that the weight of the mountain bearing upon the entrance to the mine may be lightened. As mining progresses, the weight is thrown upon the main heading, until, were it not

for the drawing of the ribs, this main passageway would close.

When drawing a rib, the soft-coal miner keeps but one car beside him. He cannot tell how much of the rib he will able to remove before the rock above his head will fall. The first warning of approaching danger is a drum¬ ming noise from the layer of stone overhead. Sometimes this noise may be heard hours be¬ fore the final crash ; in anthracite mines it may be perhaps weeks before. Again, it may come with marked suddenness.

The coal, when brought to the surface, is

screened, and at many bituminous mines is then shipped as lump and slack. Sometimes it is broken and washed, and in the anthracite re¬ gion of Pennsylvania, where coal is shipped in seven or more sizes, the coal, as it comes from the mine, is passed through the breaker.

A modern coal breaker built on the side of a hill at Mocanaqua, Pa., will serve to illustrate the construction and operations connected with this important branch of coal-production. This breaker is 300 feet in length and 180 feet in height. It is capable of turning out 1,000 tons of clean coal per day. Some breakers have a much larger capacity. The Mocanaqua breaker was originally built at a cost of $50,000, but with recent improvements and the installation of the latest machinery its total cost reaches $100,000. It is heated by steam.

The anthracite is brought to the head of the breaker over a little railway leading from the mine in the side of the mountain. The coal, when dumped from the cars, passes over a screen 30 feet in length, through which the fine coal sifts. The big chunks next pass to the breaker proper, where rolls with sharp teeth crush it. It next runs into a screen which is cylindrical in shape, and not unlike a locomotive boiler in appearance. As the coal is handled in this device, it falls through perforations of different sizes, each size dropping into a separate chute. On benches at intervals on these chutes, sit the breaker boys, presided over by a foreman. As the coal passes slowly down the chute at their feet, these lads pick the slate from it and throw the refuse into a parallel chute. The inex¬ perienced boys are always at the upper end of the chutes. They succeed in picking a part of the slate from the coal, and then it passes to the next workmen in line, who continue the operation until, by the time the product has reached the boys at the bottom of the chutes, it is pretty well cleaned. The coal is also washed to free it from sulphur. From the chutes the various-sized coal finds its way into bins, from which it is discharged into cars.

Mechanical contrivances for sorting have recently been installed at great cost in modern breakers. These inventions are spiral in shape, and provide for ridding the coal of much of its slate by centrifugal force. But even with these machines the final operation must be per¬ formed by boys or men.

A large amount of the soft coal of Ohio and Pennsylvania is brought to the lower harbors of the* Great Lakes, bound for the Northwest and Canada. The cars which carry this coal have a capacity of 100,000 pounds, whereas, in the early days of the coal industry in this coun¬ try, coal cars scarcely carried 1,800 pounds. On reaching the lake ports, coal for

Canada may be taken 60 miles across Lake Erie in car fer¬ ries. But the bulk of the coal that comes to the lake ports is unloaded directly into the holds of lake vessels by means. of most wonder¬ ful and massive machines, which pick up a 50- ton car and dump its contents as quickly as a pail of coal could be emptied into the magazine of a stove. Some of these machines can be operated by three men, and yet have a capacity of 500 ton? per hour. A large and modern coal vessel will carry a coal cargo of 6,000 tons. More than 2,500,000 tons of coal have gone to the head of- the Great Lakes in a single season.

Historically considered, coal mining perhaps

dates back to about the end of the 12th century. Coal, as an inflammable substance, appears to have been known to the ancients, and to the Britons before the Romans visited their island, it being found frequently in ravines and beds of rivers of a color and texture so decidedly different from the strata which in general ac¬ company it ; but as at that period, and for cen¬ turies afterward, the country was covered with immense forests, which supplied abundance of fuel for every purpose of life, there was no necessity for using coal as fuel. The working of coal, therefore, only became an object of attention as population and civilization ad¬ vanced, when agriculture began to be studied, the woods cleared away and the arts of civil life cultivated ; accordingly we find that the working of coal in Great Britain, as an article of commerce, is comparatively of modern date. The first charter giving liberty to the town of Newcastle-upon-Tyne to dig coal was granted by Henry III in 1239; it was then denominated ((sea-coal," on account of its being shipped for places at a distance. In the year 1281 the New¬ castle coal-trade had become so extensive and important that laws were enacted for its regu¬ lation. In Scotland coal began to be worked much about the same time ; and a charter was granted in the year 1291 in favor of the abbot and convent of Dunfermline, in the county of Fife, giving the right of digging coal in the lands of Pittencrieff, adjoining the convent. Coal began to be used for iron-smelting about the beginning of the 17th century. The work¬ ing of coal gradually increased, though on a very limited scale, until the beginning of the 18th century, when the steam-engine was brought forward by Newcomen in the year 1705, and was applied to collieries in the vicin¬ ity of Newcastle about the year 1715. This machine produced a new era in the mining con¬ cerns of Great Britain, and, as it were in an instant, put every coal-field within the grasp of its owner. Collieries were opened in every quarter ; and the coal-trade rapidly increased to an astonishing extent. This extension of the trade was greatly aided by James Watt, who so very much improved the construction and power of the steam-engine as to render it one of the most complete and most useful pieces of mechanism. See Coal Mining Machinery.

Bibliography. — Dague, J. H., and Phillips, S. J., (Mine Accidents and Their Prevention' (New York 1912) ; Hughes, H. W., (Text-book of Coal Mining) (London 1917) ; Husband, J., (A Year in a Coal Mine' (Boston 1911) ; Kerr, G. L., (Practical Coal Mining' (London 1914) ; McGraw-Hill, (Coal Miners' Pocket Book' (New York 1916) ; Redmayne, R. A. S., (Modern Practice in Mining' (3 vols., London 1914) ; U. S. Mines Bureau Circular 14, (Gases Found in Coal Mines' (Washington 1914) ; Wilson, F. H., (Coal: Its Origin, Method of Working and Preparation for Market' (Lon¬ don 1912).

Richard Ferris,

Editorial Staff of The Americana.

COAL MINING MACHINERY. Dur¬ ing the past 50 years numerous machines have been introduced for mining coal. In the United States coal mining by machinery has proved most successful and divides the field with drill-

ing and blasting. 56 per cent of the coal product of the United States is now machine mined. In Europe, where coal mining by machines had its origin, the development has been slower. In Great Britain less than 10 per cent of the coal output is mined by machines. In the United States the practice has been to adapt the machines to the methods of mining in use, while abroad the attempt is often made to modify the mining methods to suit a particular type of machine. To obtain the best results methods and machines must be so planned and so operated as to secure the maximum of efficiency. The installation of mining machines, with the necessary plant for the production and transmission of power, re¬ quires large capital expenditure, with operating, maintenance and depreciation charges, and therefore machines should be kept steadily at work. A loss of 25 per cent of machine_time means that one-fourth of the invested capital is idle and earning no profit to meet the fixed charges. It is particularly important to increase the length of the working faces, and to reduce the distance between the different places to be worked by the same machine, in order to in¬ crease the time that the machine is working without interruption, and to reduce the idle time when the machine is moved from one place tc another. The machines should not be permitted to stand idle when ready for work, which means that the operations of timbering, track shifting, breaking down and loading of the coal, and especially the movement of the loaded and empty coal cars, must be so organized and systematized as to keep the mining machines at work. Incidentally such organization of the mine work reduces

the cost of these auxiliary operations and increases the output.

The advantages which have led to the large use of coal mining machines are in part direct saving of cost, and in part indirect increase of profits. The direct savings are often small, the indirect gains are sometimes large. The direct saving of labor cost is largely offset by increased wages paid to the machine miners and to their helpers. Machine mined coal contains less slack or fine coal than that mined by powder, and the coal sells at a higher average price. Machine mining lessens the amount of powder used, a comparatively small saving, but lessens the chance of fire-damp and coal dust explosions, avoiding destruction of life and property, a very great gain. Machine mining increases the out¬ put both directly and indirectly, and thus in¬ creases the earnings on the invested capital, and repays that capital in a shorter term of years.

Coal-mining machines are operated by com¬ pressed air or by electricity. Electric power is much more efficient on account of the smaller power losses in generation and transmission. Compressed air is safer and should be used in mines in which there is danger of fire-damp explosions. By the use of explosion proof motors, storage battery locomotives and care¬ fully insulated transmission lines, the employ¬ ment of electricity is made more safe and by effective ventilation of the mine workings the chance of fire-damp explosions is reduced. The tendency to-day is toward increased use of electric power.

Coal mining machines are of five types: (1) Rotary boring machines; (2) rotary bar cutters;

(3) rotary disc machines; (4) endless chain machines; (5) puncher machines. They are also divided according to their special applica¬ tion or their method of operation into: (1) Heading machines; (2) breast machines; (3) short wall machines; (4) long wall machines; (5) centre cut machines; (6) shearing ma¬ chines; (7) loading machines; (3) combined cutting and loading machines; (9) conveyors.

Rotary boring machines are chiefly used for boring blast holes in coal or in the softer rocks. They have been used for boring air-ways of small diameter and for boring entries.

The rotary machines for boring blast holes are known as coal augers and are made in many forms, driven by hand, compressed air, or elec¬ tricity, and mounted on bars, columns or other forms of support, or simply held in place bv hand.

Figure 1 is an auger drill operated by com¬ pressed air. The machine itself weighs but

Fig. 1

24 pounds and requires 18 cubic feet of free air per minute at 80 pounds pressure. Where the coal is soft it may be operated as a breast drill. For harder coal or soft rock it should be provided with a feed screw and column sup¬ port. These small power drills are also made to be driven by electricity, direct or alternating current, and of different sizes and weights, from 24 pounds to 125 pounds for the machine alone and from one-half to three horse power. These auger drills are not adapted for use in very hard rock but can be used in bituminous coal, anthracite, rock salt, gypsum, fire clay, shale, slate and similar rocks of medium hard¬ ness. In such material they will bore from one to eight feet per minute.

Figure 2 is a one and one-half horse power electric auger drill mounted on a column, with a

differential feed screw, by which the rate of boring can be adjusted to the hardness of the rock.

Figure 3 shows example of the cutting edges of these auger bits; (a) and (b) are the shapes usually employed; (c) is effective in soft material, and (d) is one of the forms used for

Fig. 3

larger holes four or five inches in diameter. For boring deep holes in contracted workings, the twisted rods are made in sections of con¬ venient lengths with socket joints.

Air hammer drills, with automatic rotation, and twisted cruciform drill steel with cross-bits, have been successfully used for boring blast holes in anthracite coal. These drills are more effective than augers in anthracite and can be used in hard rock. The twisted steel acts as a twist auger for discharging the cuttings from the hole.

The puncher machines (Figs. 4 and 5) are used instead of a pick for cutting coal. They are designed like machine drills, the cutting tool being fastened to the end of a piston rod driven

Fig. 4

at high speed by compressed air. Puncher ma¬ chines are also driven indirectly by electric power, which is used to compress the air, either in a portable compressor which is brought into

Fig. 5

the working place, or the air is compressed in the cylinder of the puncher machine itself. The first plan has been more successful.

Coal punchers are practically machine tools and possess great adaptability for work under difficult conditions. About 40 per cent of the coal mining machines now in use in this country are of this type. Disc and chain ma¬ chines are less flexible and can be used only under conditions that are favorable. Disc and chain machines are generally used for under¬ cutting only, that is, for cutting a kerf or deep grove under the coal so that the mass of coal above can be brought down by wedges or by a few blast holes.

Puncher machines, like the other coal cutters, are used for under-cutting the coal, but they

are also used for shearing the undermined block of coal, that is, for cutting a vertical kerf or deep channel in the middle of a long block, or at both ends of a small block of undermined coal. Puncher machines are also to be pre¬ ferred in hard or slaty coal, or where hard lumps of iron pyrite occur in the seam. Puncher machines are especially well adapted to narrow work, that is the driving of entries or narrow rooms.

Puncher machines for undercutting are mounted on wheels, as in Fig. 5. For shearing, wheels of larger diameter are used. A better method is to mount the machine on a column, with an arc and pinion support operated

by a crank by which the puncher can be swung from side to side for undercutting, or up and down for shearing. In England and on the Continent puncher machines are frequently mounted on cars. A heading machine for driving entries has been perfected. It consists of a large puncher machine mounted on a heavy frame capable of horizontal and vertical swing so as to command the whole face of the entry. A con¬ veyor and car loader disposes of the coal as it is mined. The rate of advance in an average entry is said to be 10 feet per shift of eight hours.*

The cutting bits used with the puncher ma¬ chines have three to seven points, either forged from a single piece of steel or inserted in a head. The points have chisel or fish-tail edges. (See Fig. 6).

Disc coal cutters operate like a circular saw. They are used chiefly for undercutting long faces of coal or in long-wall work. Disc ma¬ chines are not often used in this country, but are much favored abroad. The disc is armed with cutting chisels, which are replaced when

Fig. 6

dull, often twice or three times per shift. The disc is mounted on a flat arm, and is driven by a gear-wheel which engages in radial teeth inside of the cutting edge. This construction permits the disc to enter the coal nearly its full diameter. The cutting wheels are some¬ times arranged to be tilted so as to follow irregularities or avoid obstacles. Either com¬ pressed air or electric motors may be used. The machines are heavy, weighing one to two tons, and are usually run on a track laid along the face, which also acts as a guide to resist the tendency of the machine to swing out of line from the action of the cutter wheel. Some¬ times the machine slides on the floor without rails, and is guided between the face of the coal and the first row of props. The machine is pulled forward by a wire rope anchored at one end and attached to a windlass on the machine.

**lngersoll-Rand Heading Machine.*

Fig. 7

The machines require from 15 to 30 horse power and average 8 to 12 square yards of undercut per hour, 3 to 7 feet deep. The kerf is 3j4 to 5l/ > inches high and 3 feet to 5ˆ4 feet deep and is frequently made in the undercla}ˆ. The tendency seems to be toward the use of heavier and more powerful machines and to the use of motors permitting a heavy overload. At times disc machines may use as much as 50 to 100 horse power from friction on the disc or bind¬ ing from the weight of the coal. The coal as it

is undercut is supported at frequent intervals by sprags to prevent the cutting wheel from being caught and held by the premature settle¬ ment of the coal.

Bar cutters have been much improved in recent years, and are now powerful and efficient machines. While generally driven by electric motors, compressed air has been used. The cutter bar, from 5 to 8 feet long, is tapered from 3 inches to 7 inches in diameter and has spiral ribs which act as a screw conveyor to remove the cuttings. The bar revolves 300 to 400 times a minute and has a reciprocating motion of two inches. The steel cutting bits are pointed and are inserted at intervals in the spiral rib. Sometimes they are inserted in the hollow between the ribs when a narrow kerf is desired. The kerf in any case is wider than with a disc machine. Sometimes this may be an advantage. The machines weigh from one to two tons and have motors of from 18 to 26 horse power. In some of the English machines the bar can be raised and lowered while at work and can be swung through an arc of 180'degrees. The American machine in Fig. 7 is a short-wall machine and is shown loaded on its truck for transportation. At work it slides on the floor and is moved about by its own windlass and chain. Bar machines have about the same capacity as disc machines, 5 to 15 square yards per hour. A bar machine permits close sprag- ging and is not so likely to be caught by the weight of the coal as a disc machine, and will free itself with less expenditure of power. Bar machines follow irregularities and avoid ob¬ stacles in cutting, more readily than disc ma¬ chines. They can be used for undercutting in narrow rooms or entries. Bar machines operate with less noise than any other type of coal cutters.*

Chain machines practically divide the field with puncher machines in this country, with a tendency toward the adoption of the chain for

- *Not yet on the market* ■

new installations. In these machines the cutting bits are inserted in alternate links of an endless chain, which runs in guides on the cutter arm. As in other coal cutters, provision is made for easily replacing worn bits. In the breast chain machines the cutting takes place at the end of the cutter bar, in other types of chain machines at the side of the cutter bar. Fig. 8 is a chain

Fig. 8

breast machine. It is mounted on a fixed frame, at right angles to the face of coal to be under¬ cut, and slides forward cutting its way into the coal for the desired depth. The machine is then withdrawn, the frame moved to a new position and a second undercut made alongside of the first. This type of machine is best adapted for narrow work in small rooms and entries, but

even for this work is being super¬ seded by the short-wall machine.

Figure 9 is a chain breast machine as modi¬ fied for a vertical or shearing cut. It is raised and lowered on the standard by its own power. A coal cutting and loading machine has been developed which consists of a breast machine for undercutting, combined with two shearing machines and a battery of puncher machines. The machine is mounted on a carriage running*

-Jeffrey cuttir.g and loading machine.

on rails and is provided with an endless belt conveyor and car loader. This machine will cut and load into mine cars at one operation a block of coal 5 feet wide, 7 feet deep and tne

slides and swings about on the floor of the working place by its own power. A separate power driven truck is used to move the machine from one working place to another. The load-

Fig. to

full height of the coal seam, up to 7 feet. It is said to have a capacity of 75 to 100 tons per eight hours. It can be used for driving entries 10 feet or less in width at the rate of 20 feet per shift of eight hours.

The chain short-wall machine (Fig. 10) is an improvement of the breast machine, and is designed to avoid the labor and loss of time of the breast machine in withdrawing the coal

ing and unloading of the machine is effected by its own winch.

The manner in which the short-wall ma¬ chines are operated is shown in Fig. 11. At (a) the machine has been unloaded; (b) shows it in place for making the sumping cut; (c) is the position taken for the same purpose where the roof is bad and the props are set close to the face; at (d) the sumping is finished and the

Fig. 11

cutter and shifting the frame at each cut. The short-wall machine, like the disc and bar ma¬ chines, is designed for continuous work. The machine is provided with a winch or drum and

machine is ready to travel across the face; (e) shows the machine cutting across the face; (f) the cutter arm is advanced for hard cutting; (g) shows how the machine is manipulated where a

nodule of hard pyrite is encountered; (h) the cutting arm is turned out to set the bits and (i) returned to continue the cut; (k) the under¬ cutting is finished; (1) machine is ready to widen out a room; (m) cutting along the side; (n) moving and loading the machine on its truck. The above illustrations show the ease with which the short-wall machines are manipulated.

Short-wall machines as now constructed weigh about two and one-half tons

and are provided with 30 horse-power motors, either electric or compressed air. The cutter bars are from 5 to 10 feet long. Long cutter bars in¬ creased greatly the capacity of the machine and diminish the cost of cutting per square yard and per ton of coal. They can be used, how¬ ever, only where conditions are favorable.

As short-wall machines are used for under¬ cutting the coal in entries and rooms, their capacity is greatly reduced by the time lost in going from one working place to another, and in unloading and loading the machine and starting work at each place. Under average conditions from six to eight working places can be undercut in a shift of eight hours.

The endless chain long-wall machine (Fig. 12) differs from the short-wall type in that the

Fig. 12

cutter bar is pivoted so that it can be swung through an arc of 180 degrees. In cutting the bar is at right angles to the machine. This permits the machine to travel in a narrower space, so that props can be set within three feet of the space. The short-wall machine requires a space of six or seven feet.

The arc wall or turret type of chain ma¬ chine (Fig. 13) represents the latest develop¬ ment in coal cutting machinery. It is mounted

on a self-propelling truck, and is operated from the track without the delay of unloading. The cutter bar swings through a semi-circle and the machine is mounted on three standards and can be raised or lowered about one foot. By the use of different sized offset brackets, or by attaching the cutter bar without offset, the machine can be built to cut the kerf at the floor or roof of the coal seam or at any desired level between. This permits the kerf to be made*

Fig 14

in a dirty or slaty seam. The machine weighs six to seven tons and is provided with powerful motors. With a seven and one-half-foot cutter bar it commands a width of 20 feet. For rooms of greater width the track must be shifted or laid along the face. Two tracks may be used. It can be operated in an entry of ordinary width. The capacity of the machine is said to be about double the short-wall machine and three times that of the breast machine.

The loading of mine cars by hand is a slow operation. Fig. 14 shows a shoveling machine in successful use in the metal mines, which is now coming into use in the coal mines as well. These machines have a loading capacity of one to two tons of coal per minute. They are built to work in

coal seams as thin as four feet and can be used in narrow entries, rooms or long- wall workings. The machines weigh from 5 to 10 tons, and require iy2 to 12 horse power. They are driven by compressed air or electric power, and are generally equipped with motors 50 per cent above actual power requirements. The shovel should have sufficient lifting power to break up coal which has fallen in large blocks.

In long-wall mining the rapid loading of the coal from the long working face is difficult. The use of conveyors, extending along the face, to move the coal and load it on cars in the haulage entries greatly facilitates this work. Face conveyors are particularly useful in thin or inclined coal beds. These conveyors are of

Fig. 13

three types : (1) Small cars run back and forth by mechanical means, singly or in trains. These can be used in thin coal beds and at any in¬ clination, but do not provide for continuous loading. (2) Shaking troughs, used in inclined workings. The trough of sheet metal is given a combined reciprocating and up and down motion, and can be operated at a small inclina¬ tion. The breakage of coal is sometimes a serious objection. (3) Continuous mechanical conveyors either endless belt or scraper lines. The endless belt type conveys the coal with min¬ imum power and minimum breakage. These conveyors are loaded by hand or a shoveling machine may be used for the purpose. The remarks at the beginning of this article on the importance of keeping mining machines steadily at work by effective organization applies with especial force to loading and conveying ma¬ chinery. The haulage system must be well designed and equipped and efficiently operated that there may be no failure to supply mine cars as they are needed at any given point in the mine.

Mine Haulage. — Up to a very recent period, the coal cut by the various machines already described has been hauled from the side head¬ ings or rooms to the shaft bottoms almost ex¬ clusively by mules, but they are being rapidly supplanted by improved systems of steam haul¬ age in the anthracite coal regions, and electric haulage in the bituminous drift mines adopted to meet the demands of various conditions which necessitate haulage systems of greater speed and power than that afforded by the use of mules.

The solution of the problem of mine haul¬ age, constantly increasing in

complexity by the longer haulage consequent on the extension of the mines, and the demand for a larger output, requires the consideration of several important factors, such as the grades of the haulage roads, the height of the veins of coal and the expense of the installation and maintenance of the vari¬ ous forms of haulage machinery. Electricity as applied to mine haulage appears to satisfy these conditions better than any other form of power, and the development and extensive use of the electric mine locomotive is the natural result of the best efforts in this direction.

These locomotives are made in a great variety of forms and are equipped with single or double multipolar motors. They range in weight from 2ˆ2 to 15 tons, and are operated either by the more familiar overhead trolley wire, or the later third-rail systems. The latter consists of a stationary third rail of heavy iron bars running between the two track rails which are used as the return conductor. The bars of the third rail are perforated at regular intervals throughout their entire length, and are made into a continuous rail by means of fish plates. The locomotive consists of a substantial steel frame mounted on suitable track wheels. This frame also carries two steel sprocket or traction wheels, which are driven by the electric motors of the machine, by means of suitable gearing. These sprocket wheels engage the third rail through the perforations therein, and serve the double purpose of driving the locomotive along, and taking up the current from the third rail to feed the electric motor. The third rail is en¬ closed in an insulating wood casing, and is usually laid about five inches off the centre of

the regular track, thus allowing sufficient room for the animals to work without interrupting the operation of the mine while the plant is being installed. The chief advantage of the system appears to be its positive working; the practicability of using light rails on heavy' grades; and the minimum consumption of power in moving the dead weight of locomo¬ tives of comparatively light tonnage. The loco¬ motives used at the present time in operating the ftMorgan)) electric third rail haulage systems range from 6,000 to 10,000 pounds in weight, and range in capacity from 75 to 150 horse¬ power. The smaller machines are equipped with single motors and the larger with double motors, wound for either 250 or 500 volts, as may be desired.

These locomotives as well as those operating the trolley systems are capable of hauling trains of 40 to 50 cars each, or about double the number of cars usually comprising a cable train. These cars are made in a great variety of forms to adapt them for different kinds of service, and have either steel or wooden bodies. They are arranged to open at the side, or with a ˆdrop-gate® having ((wings>) which prevent the coal from spilling out at the ends of the gate when lowered. This gate also serves as an extension platform from which the coal may be conveniently shoveled.

Henry S. Munroe, Mining Engineer, Washington, D. C.

COAL OIL, a volatile oil distilled from petroleum (q.v.).

COAL-TAR, or GAS-TAR, the opaque, viscid, black or brownish liquid arising as a by-product from the dry distillation of bitumi¬ nous coal in the manufacture of coal gas, and also in the manufacture of coke. It consists principally of the substances grouped under the name of ((aromatic hydrocarbons,® and varies in composition according to the grade of coal distilled, the degree of heat employed in the distillation, and the shape of the retorts used. In the lower temperatures at which coke is made (about 850° F.) the tar consists of photo¬ gen, paraffin oil, lubricating oils, paraffin, cresol and about 57 per cent of pitch ; and the yield of tar may be as high as 20 gallons to the ton of coal. In the high temperatures em¬ ployed in making coal gas (from 1650° to 1830° F.) the tar consists of benzene (benzol), toluene, naphthalene, anthracene, heavy oils, much creosote, and about 82 per cent of pitch; and the amount secured is about nine gallons per ton of coal. In the latter case many of the constituents of coke tar are broken up into permanent gases by the higher temperature. With horizontal retorts the yield of tar is about two gallons less per ton of coal than with vertical retorts.

The specific gravity of coal-tar ranges from 1.0 for low temperature tar to 1.2 for that pro¬ duced at high temperatures.

Up to about the middle of the 19th century coal-tar was regarded as a waste product and thrown away, or burned under the retorts. About 1846 it began to be used in Germany for making roofing felt, and distillations of tar were used to impregnate railway sleepers. A year or two earlier, in England, coal-tar naphtha had been employed successfully as a solvent for India rubber. The discovery in

1856 of coal-tar colors caused a great demand for the crude substance, and it became a com¬ mercial product of increasing value.

Production and Uses. — The production of coal-tar in the United States in 1915 was 276,745,885 gallons of which 39,021,748 gallons (14 per cent) was used for fuel, and 237,724,137 gallons was sold into commerce. Of the total product 186,278,000 gallons came from old- style bench retorts and by-product coke ovens, and 51,446,344 gallons from gas plants. The aggregate value of the product was $6,656,276; an average value of 2.8 cents per gallon. The world's production in 1901 was reported at 2,660,440 tons : the United Kingdom producing 908,000 tons, Germany,

590,200 tons, and the United States, 272,400 tons. Thes-e three coun¬ tries thus produced two-thirds of the whole. The principal uses now made of coal-tar are : as fuel — its heat value being nearly double that of coal ; in preserving timber, stone and brick¬ work from the effects of moisture; in making roofing felt and roofing papers; as paint for metals; as a cement, in place of pitch; in the manufacture of lampblack and soot ; as a top¬ dressing for roads ; in the manufacture of dyes and medicines ; in the production of solvents and explosives ; and, to a limited degree, in gas manufacture — unprofitable at the prevailing value of coal-tar.

A considerable amount of the coal-tar mar¬ keted is artificially made by mixing coal-tar pitch with enough heavy oil (from petroleum) to give it the required fluidity at normal tem¬ peratures. (See also articles, Coal-Tar Colors; Coal-Tar Products). Consult Lewes, Car¬ bonization of CoaP (1912) ; Lunge, Coal Tar and Ammonia) (1909) ; Wagner, Coal Gas Residuals) (1914) ; Warnes, Coal Tar Distil¬ lation J (1913).

COAL-TAR COLORS, the coloring mat¬ ters or dyes artificially prepared from substances derived from coal tar. They are exceedingly numerous, and are mostly of complex chemical constitution, belonging to the group known as aromatic compounds (q.v.). They consist chemically of the natural element carbon in association with hydrogen, nitrogen, oxygen, sulphur and other elements. The coal-tar colors are of the greatest importance in the arts, and are used in enormous quantities in dyeing and calico-printing. In popular language they are often called aniline colors. This designation is inexact, however, for although they include the colors of the aniline class some of them are derivatives of phenol, anthracene and other substances. Some prejudice exists against the coal-tar colors in the public mind, because they are believed to be less permanent than the natural animal and vegetable colors, for which they are substituted. This criticism was quite justifiable some years ago, but a considerable number of coal-tar colors are now known which are fully as Mast® as the natural ones, and in some cases the coal-tar color has a decided ad¬ vantage in this respect. The coal-tar color in¬ dustry had its origin in England, where for 14 years it maintained pre-eminence, but the centre of the industry soon passed to Germany, then distilling enormous quantities of coal for other purposes. The first coal-tar dye was made by the English chemist Perkin in 1856. He called it <(mauveine.® In 1858 A. W. Hofmann published a paper in which he showed that

magenta (aniline red) can be prepared by the action of carbon tetra-chloride upon aniline, and in 1859 Verguin first separated fuchsine, and manufactured magenta in quantity. During the next few years various other colors, notably aniline blue, were discovered and placed on the market, and aniline black was discovered by Lightfoot in 1863. The coal-

tar color in¬ dustry was greatly stimulated when Graebe and Liebermann effected the- synthesis of alizarin from anthracene in 1868, thereby opening up a new and important field of chemical activity. Previous to this date alizarin was obtained from madder-root, but it is now almost exclusively manufactured from anthracene. Caro pro¬ duced the first eosin dye in 1874. The synthe¬ sis of indigo was the result of a long series of investigations, the final step in which was taken by Baeyer in 1878 ; and in 1880 a German com¬ pany placed on the market a substance known as nitrophenyUpropiolic acid, for depositing arti¬ ficial indigo upon fibres by Baeyer's method. Other methods for the artificial manufacture of indigo have since been discovered, but the natural dye is still largely used.*

The marks that are used in commerce for designating the shade of a color consist usually of certain letters affixed to the name of the color to be described. Thus R is used for red, O for orange, J or G for yellow (Fr. jaune; Ger. Gelb), B for blue and V for violet. Thus ((Scarlet RR® or ((Scarlet 2R® signifies a scarlet whose tint inclines toward red, and the doubled R signifies that an intermediate color is recog¬ nized, whose tint lies between that specified and the pure scarlet. Aniline blue occurs in a reddish shade which is designated as ((aniline blue R® ; while the finest quality of aniline blue is designated as (

Much attention has been paid to the connec¬ tion between the color of a substance and its chemical constitution. It is known that color depends on the structure of the molecule, but no absolute rule can be given for predicting the color of a compound whose formula is known. In the case of the aromatic series, however (which is of special interest to the student of coal-tar colors), the following may be said: All of the aromatic hydrocarbons are colorless (or white), and the same is true of such of their mono-substitution compounds as are obtained by replacing one atom of hydrogen with OH, N02 or NHo. If two hydrogen atoms are re¬ placed, the resulting compound is also colorless if the radicals introduced are alike. If they are unlike, and one of them is N02, then the result¬ ing compound is colored. For example, benzene, C6Ho, is colorless, and so also are its derivatives, aniline (C6H5.NH2) and nitrobenzene (CoH5. N02), which are obtained by replacing one atom of hydrogen by NH2 and N02, respec¬ tively. But if a second atom of hydrogen in the benzene nucleus of aniline be replaced by N02, we have the compound N02.CgH4.NH2, which is known as nitroaniline and is yellow. The presence of certain atomic groups in the molecule of a substance appears to have a strong influence, also, upon the color of the compound. This is particularly noticeable in the quinones, which contain the group .O.O., and in the azo compounds, which contain the group .N :H. . The difference between a colored substance and a coloring matter, or dye, must be borne in mind, however. A dye is a sub-

stance which unites directly with the animal or vegetable fibres of the fabric to which it is applied, or with a mordant with which those fibres are impregnated. According to Witt's theory, a true dye must contain two species of molecular groups, one of which is called the chromophore ("color-bearer®), while the other serves to make the compound acid or basic, so that it can form salts. The chromophores are very numerous. They have a distinct effect upon the color of the dyes formed with their aid. The groups N02, .N :N., and .0.0. are examples of chromophores. Compounds that contain chromophores but are neither acid nor basic are called chromogens ("color-gener¬ ators®). They are not dyes, but may be trans¬ formed into dyes by the introduction of a salt¬ forming group such as OH or NH2. Azoben¬ zene, C6H5.N :N.CeH3, is a colored substance, but it is not a dye. It is a chromogen, however, because it contains the chromophore-group .N :N. ; and if one of its hydrogen atoms is re¬ placed by the group OH, the compound CaHs.N :N.C«H4.0H, known as oxyazobenzene, is obtained, which is a true dye. Again if one of the atoms of hydrogen in azobenzene is replaced by NHj, the compound C6H5.N :N.C6H4.NH2 is obtained; this is also a true dye, and is known to chemists as amidoazobenzene. (Consult Hjelt, Principles of General Organic Chemis¬ try^ from which these examples are taken). Coloring matters that are basic in nature are always used, in dyeing, in the form of salts; that is, it is the compounds of these substances with acids that are used, and not the free bases themselves. "Substantive® coloring matters are those that are directly absorbed from solution by the fibre to be dyed. "Adjective® coloring matters are those that are not directly absorbed in this manner, but which require the fibre to be first "mordanted,® or charged with certain metallic salts, or "animalized® with albumen, or treated in some other manner, before the dyeing can be done.

Of the 155 distinct chemical substances found in coal-tar, only nine are used in making coal- tar colors. These are benzol, toluol, xylol, phe¬ nol, napthalene, anthracene, methyl anthracene, phenanthrene and carbazol. Nearly all of the commercial coal-tar dyes are made from benzol, naphthalene *and anthracene.

From the nine derivatives, or "crudes,® are made about 270 substances called "intermedi¬ ates® which are not dyes, but from which the dyes are made. The latter numbered recently over 1,500, entirely distinct, and each requiring a separate process of manufacture. It is worthy of note in passing that the list of 270 inter¬ mediates does not by any means exhaust the possibilities of the nine coal-tar crudes. On the contrary, it is estimated that there are probably more than 2,000 of these intermediate substances, with

millions of individual dyes yet to be discovered. In Germany alone upward of 8,000 patents have been granted for as many different coal-tar dyes and distinct processes of making them. Biilow calculated that theo¬ retically 3,160,000 azo-dyes alone may be pro¬ duced.

Classification. — Several different classifica¬ tions of the coal-tar colors have been proposed, some from the chemist's standpoint, others from the dyer's point of view. The classifica¬ tion here given is according to Wahl, and is

based upon the chromophore dominant in each group, the factor of greatest moment to the manufacturer of coal-tar dyestuffs.

I. Nitro-dyestuffs.

II. Nitroso-dyestuffs or quinone-oximes.

III. Azo-dyestuffs.

IV. Hydrazones.

V. Stilbene dyestuffs.

VI. Diphenylmethane dyestuffs.

VII. Triphenylmethane dyestuffs.

VIII. Xanthene dyestuffs.

IX. Acridine dyestuffs.

X. Anthracene dyestuffs.

XI. Quinone-imide dyestuffs (indamines, indophenols, oxazines, thiazines, azines).

XII. Indigo and indigoid dyestuffs.

XIII. Thiazol dyestuffs.

XIV. Sulphur dyestuffs.

XV. Aniline black.

Nitro-dyestuffs. — The dyes in this group contain the chromophore N02 which gives an acid character to the molecules of which it is a dominant constituent. This acid reaction is carefully preserved in making combinations to produce new colors. The majority of the nitro- dyes are derived from the phenols or naphthols, or their sulphonic acids.

As examples of this group may be mentioned picric acid, aurantia, martius yellow, victoria orange and naphthol yellow S. Picric acid was the first of the artificial dyestuffs, having been made in the 18th century by the action of nitric acid on hides, and aloes, and also on natural indigo. As its color (yellow) is not fast either to light or to washing, it is rarely used except in small admixtures with other dyes. Auraniia dyes wool and silk a shade of orange. It has been superseded by some of the azo-dyes, Martius yellow dyes wool and silk a bright yel¬ low which fades with heat, and is not altogether fast as to washing. Victoria orange dyes wool and silk yellow ; and napthol yellow S., also known as acid yellow, dyes wool and silk a brilliant yellow.

Nitroso-dyestuffs. — The nitrosophenols are obtained either by the action of nascent nitrous acid on phenol, or by the action of hydroxyla- mine on the quinones ; — hence the alternate title quinone-oximes. Their dyeing properties depend on their combination with metallic mordants, the one most commonly used being ferric hydroxide, which yields intense shades of green. The most important dyes of this group are fast green or Russian green — an olive shade, gambin G and gambin R and naphthol green, all produced on an iron mordant.

Azo-dyestuffs. — This group is founded on the chromophore .N :N. An intermediate step is the production of diazo-compounds — by treating the salt of a primary aromatic amine with nascent nitrous acid. While these diazo- compounds are, for the most part, colorless, they combine with amines and phenols to form dyes of great intensity. Further, azo-dyestuffs con¬ taining an amido-group may be diazotised to yield another series containing two .N :N. chromophores : these are called diazo-com¬ pounds. Similarly other series are produced — trisazo-compounds, with three azo-chromo- phores, and tetrazo-compounds, with four azo- chromophores.

The production of azo-compounds requires, first, the diazotisation of the primary amine; second, the "coupling® of the diazo-compound thus formed with an amine or a phenol; third, the precipitation of the dyestuff from the solution.

In the process of diazotisation, the salt of an amine is converted into the corresponding salt of the diazo-compound by the action of nascent nitrous acid, produced by the decomposition of sodium nitrite with dilute hydrochloric acid. As diazo-compounds are decomposed by heat, the process is carried on at between 15° and 32° F.

In ˆcoupling,® the substance to be combined with the diazo-compound is dissolved (in an alkaline solution if it is a phenol or a naphthol, or their sulphonic acids ; in an acid or neutral solution if it is an amine), and the diazo-solu- tion is added while the whole is stirred con¬ stantly.

The dyestuff rarely separates of itself, and is precipitated usually by the addition of com¬ mon salt; in some cases by a mineral acid. The dyestuff solution is warmed and stirred vigor¬ ously while the salt is being added. The liquid is then treated in a filter press, and the cakes dried in a vacuum oven. The dye is finally ground to an impalpable powder, and Stand¬ ardized® to a certain strength of color by the addition of salt, sodium sulphate, dextrine, etc.

The monoazo-dyes fall into two groups : the hydroxyazo-compounds, derived from a benzene hydrocarbon ; and the amidoazo-compounds, de¬ rived from naphthalene. Of the first group, tropceolin O or resorcin yellow is an example : it dyes wool a reddish shade of yellow. An¬ other example is chryso'idine : it dyes wool and silk, and also cotton when mordanted with tannin, shades of orange. Of the second group, examples are found in azorubine S., azoeosin and the (

Of the mordant monoazo-dyes, examples are found in the diamond

yellows, and, specifically of the chrome- mordanted dyes, diamond black.

Several of the insoluble salts of the mono¬ azo-dyes are made into pigments : they are chiefly shades of red and purple.

Of the disazo-dyes, napthol blue-black and other blacks, Bismarck brown, Biebrich scarlet and Kongo red, are important examples. Through the coupling with tetrazo-compounds is obtained a large number of dyes with a wide range of color, notably the extensive series of diamine colors.

The trisazo-dyes are represented by benzo olive and benzo blue-black.

Hydrazones. — This group of colors is pro¬ duced by the action of hydrazine or substituted hydrazines on aldehydes and ketones. The most important member of this group is tar- trazine, which dyes wool an extremely fast brilliant yellow of a greenish hue. The flava- zines, hydrazine yellows and xylene yellows be¬ long to this group, as also does eriochrome red, which gives dull red shades to wool. These may be changed to bluish reds by after-chrom¬ ing.

Stilbene Dyestuffs. — Stilbene or dipheny- lethylene is the source of several well-known dyes long in use. They arise from the treat¬ ment of />-nitrotoluene sulphonic acid, alone or in the presence of amido-compounds, with caus¬ tic soda. By varying the conditions as to tem¬ perature and dilution of the soda, various colors are obtained. As examples may be men¬ tioned sun yellow or heliochrysin and direct yel¬ low, which dye cotton directly shades of orange. Through the action of oxidizing agents, greener

shades are obtained. Stilbene yellow and stil¬ bene orange and the Mikado yellows belong to this group.

Diphenylmethane Dyestuffs. — Oxidation of diphenylmethane gives a ketone — benzophenone, and this, on reduction, yields a secondary alco¬ hol — diphenylcarbinol or benzhydrol, which, on further reduction, gives diphenylmethane. These compounds are colorless : the dyes of this group are obtained from their amido-derivatives or alkylamido-derivatives which are capable of undergoing the cycle of reactions outlined. The dye of principal importance in this group is auramine. It is a basic dyestuff for wool, silk and cotton mordanted with tannin, and gives shades of yellow. A series of auramines is produced by varying the derivatives employed.*

Triphenylmcthane Dyestuffs. — From this hydrocarbon and its higher homologues are derived by oxidation a series of colorless sub¬ stances known as carbinols. The dvestuffs of this division arise from the introduction of auxochromes into the carbinol molecule. There are two groups of these dyes: (1) The amido — or alkylamido — derivatives, in

which the auxochromes are NFL and NR2 groups; and (2) the hydroxy-derivatives in which the auxo¬ chromes are OH groups. The amido-deriva¬ tives include malachite green and its homo¬ logues — ethyl green, Guinea green, etc., and the magenta series. The hydroxy-derivatives include the aurines.

The extensive Magenta series includes the rosaniline group, represented by the aniline vio¬ lets and methyl violet, and the pararosaniline group, represented by spirit blue, opal blue, etc. Among the aurines are benzaurine, an intense red, and eriochrome cyanine R, giving a brick red on wool. This may be changed to a violet- blue by after-chroming.

Xanthene Dyestuffs. — Xanthene upon oxida¬ tion yields the ketone xanthone, and this is con¬ vertible into xanthhydrol by reducing agents. To obtain dyestuffs it is necessary to introduce auxochromes in the /ˆ-position to the carbon atom of the methane residue in xanthene, and to oxidize the leuco-bases thus produced. To this group belong the Pyronines — dyes containing the pyrone (

Acridine Dyestuffs. — Closely similar to xan¬ thene is hydroacridine, the oxygen atom in the former being replaced in the latter by the div¬ alent NH group. Upon being oxidized, hy¬ droacridine yields acridine, a basic yellow sub¬ stance which forms fluorescent solutions. Two forms of acridine are recognized : the symmetri¬ cal, springing from combinations with amines, and the asymmetrical, from combinations with diamines. The commercial dyes of this class are generally hydrochlorides. The principal dyes in this class are acridine yellow, dyeing tanned cotton a shade of yellow ; benzoflavine, which gives yello'" shades on wool, silk and tanned cotton ; and chrysaniline, a component of the dye phosphine, used in dyeing leather and printing cotton goods.

Anthracene Dyestuffs. — Oxidized with chromic acid, anthracene vields the important chromogen anthraquinone. From this, dyestuffs are obtained by introducing OH, NH2, NR2 etc.,

groups in suitable positions. The anthra¬ quinone dyestuffs are classified as (1) oxyan- thraquinones ; (2) amidoanthraquinones ; and

(3) those which contain also another chromo¬ gen besides anthraquinone.

The oxyanthraquinones dissolve in alkalis to form violet or blue solutions. Theiˆ value as dyes depends on the fact that they form in¬ soluble lakes with metallic hydroxides. The most important members of the group are alizarin and purpurin, both of which are formed naturally in the root of the

madder plant. Alizarin gives shades of bluish-red to violet and brown, with different mordants. Purpurin gives shades of scarlet on an alumina mordant. Anthracene blue is another important dye in this group ; with chrome-mordanted material it gives a shade of blue.

The amidoanthraquinone and hydroxyamido- anthraquinone dyestuffs produce very bright shades which are fast as to light. The most important are those which contain one or two NHR groups, where R represents a sulphonated aromatic nucleus. In the amido-group are alizarin cyanine green, anthraquinone violet, and alizarin astrol : in the hydroxyamido-group, alizarin saphirol, alizarin celestol and alizarin irisol.

Among the dyestuffs arising from the com¬ bination of other chromogens with anthra¬ quinone, characteristic examples are alizarin blue, alizarin green S and alizarin indigo blue.

An important group of dyes of the anthra¬ cene class are the so-called anthraquinone vat dyestuffs. They are insoluble in water, but give soluble products on reductions and have a decided affinity for textile fibres. These vat dyes are complex compounds of high molecular weight, containing nitrogen, sulphur and other groups in addition to the ketone groups of an¬ thraquinone. They are classified as indan- threnes (a title now used for all the anthra¬ quinone vat dyes), in shades of blue, gray and maroon ; flavanthrenes, or indanthrene yellow, also orange and scarlet ; benzanthrones, includ¬ ing cyanthrene and violanthrene, indanthrene violet and indanthrene green ; the anthraqui- noneimides, indanthrene red G and indanthrene bordeaux B ; and the acylamidoanthraquinones. comprising the extensive series of the algol dyes — in shades of yellow, red, blue and violet. These vat dyes are used almost exclusively for the dyeing of cotton, but may be employed also for wool which has been treated with formalde¬ hyde.

Quinone-Imide Dyestuffs. — This class in¬ cludes the indamines and indophenols derived from />-quinone; and the oxazines, thiazines and azines derived from ortho-quinone. .

The indamines are produced by oxidizing an equimolecular mixture of a />-diamine and a monamine in cold dilute solution. Phenylene blue, Bindschedler's green and toluylene blue are examples. The indamines are not used in dyeing because they hydrolyse in the presence of acids. They are used as raw material for making the oxazine, thiazine and azine dyes.

The indophenols are also sensitive to acids, and are used as raw material for making sul¬ phur dyestuffs.

The thiazines contain a characteristic ring composed of nitrogen, carbon and sulphur. Lauth's violet is an example of the subdivision vol. 7 — 11

thiazimes, and methylene blue of the subdivision thiazones.

The oxazines differ from the thiazines only by the substitution of an oxygen atom for the characteristic sulphur atom of the latter. If the auxochromes introduced are amido- oralkyl- amido- groups, the resulting dyestuffs are oxazimes : if hydroxy-groups, they are oxya- zones. Capri blue and Meldola's blue are ex¬ amples of the first division, and resorufine and resazurine of the second.

The azine dyestuffs are all phenazonium de¬ rivatives. They are subdivided into eurhodines, eurhodoles, safranines, mauveines and indu- lines. The eurhodines are weak bases, of which the monoacid salts are red, and the diacid salts, green. The most important dye of this group is toluylene red. The eurhodoles are obtained by heating eurhodines with concentrated hydro¬ chloric acid at 180°. The safranines are basic dyestuffs, which form three series of salts. The monoacid salts dye wool, silk and tanned cotton shades of red. The mauveines are phenyl-derivatives of the safranines. The group is now only of historic interest, mauveine having been the first coal-tar color discovered. The indulines are considered phenylamido-de- rivatives of the mauveines. They are used in the printing of cotton fabrics. The gray dye¬ stuffs known as nigrosines belong to this group.

Indigo and Indigoid Dyestuffs. — The produc¬ tion synthetically of indigotine (the coloring matter of the indigo plant) was accomplished in 1875 by the oxidation of indol by ozone. But it was not until 1890 that Heumann's syn¬ thesis with phenylglycine and its carboxylic acid afforded a profitable method of commercial manufacture. The sodamide modification of this process is the one now chiefly employed. Indirubine, a red dyestuff, is the isomer of indigotine, with which it occurs in the natural sources of indigo. It is synthesized by con¬ densing isatin chloride with oxindol. Not used itself as a dye, its bromo-derivatives are valu¬ able.

The indigoid dyestuffs are characterized by the presence of the indigo group, and are of two classes : symmetrical, obtained by oxidizing products similar to indoxyl ; and asymmetrical, prepared by condensing a compound similar to indoxyl with a cyclic ketone, such as isatin. The principal commercial dyestuffs in this di¬ vision are the thioindigo series of fast scarlets, reds and violet-reds used on cotton ; and the substituted indigoid dyestuffs. The latter group includes the ciba dyes, polyhalogenated derivatives of the indigoid division and the Helindone series. The first are vat dyestuffs for wool, cotton and silk, in shades of yellow ; the second, wool dyes of orange, scarlet, pink and red.

Thiazol Dyestuffs. — The thiazol ring is het¬ erocyclic, containing three carbon atoms, one nitrogen atom and one sulphur atom. The first known

derivative of this class was phenylbenzthiazol, obtained by fusing benzanilide with sulphur. The most important deriva¬ tive is primuline, containing a free NH2 group, which may be diazotised on the fibre and then combined with amines or phenols to give vari¬ ous shades. This class includes the so-called ((Ingrain dyes,® which are fast to washing, but not fast to light. The colors are yellow, red,

garnet and brown. Chlorophenine, thioflavine T and thiazol yellow belong to this class.

Sulphur Dyestuffs. — The sulphur or sulphide colors result from heating various organic sub¬ stances with sulphur. They are direct dyes for vegetable fibres. Commercially, the sulphur dyes are known by many different names. They are nearly all colored powders, insoluble in water, acids and the other usual solvents, but soluble in cold alkalis in the presence of re¬ ducing agents. Two methods of preparing them are employed : the first is to treat substituted aromatic amines with chlordinitrobenzene ; the second, to reduce indophenols or indamines. Several fine black dyes — vidal black, fast black, immedial black, etc. — 'blues, yellows and olives, maroon, browns and bronzes are found in this valuable class.

The sulphurized vat dyestuffs form a dis¬ tinct division under the sulphur class. They are produced by the action of polysulphides on certain organic compounds, but they are in¬ soluble in sodium sulphide. They are divided into (1) sulphurized anthracene derivatives, and (2) sulphurized vat dyestuffs of indo¬ phenols and allied compounds. The first are prepared by melting anthracene and some of its more complicated derivatives with sulphur at high temperatures. Indanthrene olive is a type of this class : it is obtained by melting anthra¬ cene with sulphur at 480° F. Other colors in this group are the cibarones — blue, black, green, yellow, orange and brown. The second division includes indocarbon and most of the hydron series — blue, blue-black and violet.

Aniline Black. — An insoluble dye obtained bv treating aniline with acid oxidizing agents. In its solid form it is not used in printing cot¬ ton fabrics, but is always developed on the fibre by special processes. Aniline black is perhaps the most important of all dyes for cot¬ ton fabrics. Depending for its color upon oxidation, it is thoroughly fast, and ungreen- able. See Coal Tar; Coal-Tar Products.

Bibliography. — Beacall, (Dyestuffs and Coal-Tar Products) (1915) ; Cain and Thorpe, (The Synthetic Dyestuffs > (1913) ; Fay, (Coal- Tar

Dyes) (1911); Green, (Analysis of Dye- stuffs) (1915); Lewes, (The Carbonization of CoaP (1912); Wahl, (Organic Dyestuffs) (1914); Warnes. (Coal Tar Distillation

(1913).

Richard Ferris,

Editorial Staff of The Americana.

COAL-TAR PRODUCTS. Coal-tar is separated into its many valuable constituents by distillation at gradually increasing tem¬ peratures. This is done usually in an iron still cylindrical in shape, about as high as it is in diameter, with a domed top and a concave bottom. The charge is usually 20 tons of tar, which has previously been completely freed from its water content. The distillate passes through a con¬ densing coil surrounded with water which is cold at first but is changed at intervals to hot — to prevent blocking of the coil with solid sub¬ stances which crystallize out.

The products of this primary distillation are (1) light oils of a specific gravity of 0.90 to 0.95, coming over up to the temperature of 342° F., and in amount varying from 2 to 8 per cent of the charge of tar; (2) middle, or car¬ bolic oils of a specific gravity of 1.01, coming over above 342° and up to 446°, in amount, 8

to 10 per cent of the tar; (3) heavy, or creosote oils of a specific gravity of 1.04, coming over above 446° and up to 518°, in amount, 8 to 10 per cent of the tar; and (4) anthracene oils of a specific gravity of 1.10, coming over above 518° and up to 752°, in amount, 16 to 20 per cent of the tar. The residue in the still is pitch, in amount, about 50 per cent of the original charge of tar.

These primary distillation products are treated in various ways to secure the large variety of coal-tar products known to com¬ merce and utilized in the economic arts.

The light oils are firs? redistilled, to separate them from a small admixture of the middle or carbolic oils. Then the purer liquid is agitated at a low temperature with concentrated sul¬ phuric acid in cast iron or lead-lined wooden vessels. This operation fixes the bases, and the unsaturated hydrocarbons, phenols, and sulphur compounds are dissolved or resinified. The acid portion is drawn off and yields ammonia sulphate and pyridine. The oil is then washed with water and a weak solution of caustic soda, and, after drying, is fractionally distilled.

The fractions are collected in four portions: (1) the <(first runnings,® up to a temperature of 158° F. — consisting chiefly of carbon disul¬ phide, pentane, hexane and aceto-nitrite ; (2) light benzol, coming over above 158° and up to 252° ; (3) heavy benzol, coming over above 252°, and up to 350° ; and (4) carbolic oils, which are turned back into that portion of the primary products.

The <(crude)) benzol thus obtained is again distilled, and separated into

pure benzol, toluol, xylol and a residue which is called "solvent naphtha.® The pure benzol and toluol thus ob¬ tained yield coal-tar dyes. The 90 per cent benzol is used in making a motor fuel, in laundry work and in the manufacture of illu¬ minating gas. Solvent naphtha is used ex¬ tensively in the rubber industry.

The middle or carbolic oils contain naphtha¬ lene, phenol and the cresols. Naphthalene crystallizes out when the oil is allowed to stand, and the crystals are separated in a centrifugal machine and by pressure. After the naphtha¬ lene is removed, phenol to the amount of 30 to 40 per cent is obtained by fractional extraction with a 10 per cent caustic soda solution, and then neutralized by sulphuric or carbonic acid — which precipitates the phenol fluid. This, again, is fractionally distilled and subjected to cold, when the phenol crystallizes out, leaving the cresols still liquid. The pure phenol is used in making picric and salicylic acids. The cresols remain in three forms mingled together — ortho-cresol, para-cresol and meta-cresol — and are used in the crude form as a disinfectant.

The heavy or creosote oils are a combination of neutral and acid oils, chiefly: naphthalene, dinaphthalene, methylnapthalene, xylenol, naph- thol and paraffins. The creosote oils are used principally for preserving timber.

1. *The anthracene oils contain some carbolic acid besides the anthracene. The latter is separated out by chilling the oils to a tempera¬ ture where the anthracene crystallizes into what is known as crude anthracene, from 10 to 12 per cent pure. The impurities consist chiefly of phenanthrene, methylanthracene, diphenyl, naph¬ thalene, pyrene, cretene and carbazol. The crude anthracene is subjected to a pressure of 3,000 to*

4,000 pounds to the square inch in a hydraulic press heated by steam. Nearly all the phenan- threne and naphthalene flow out in liquid form. The remainder is washed with solvent naphtha, and with the acid pyridine liquid from the first treatment of the oils, and anthracene of 90 per cent purity remains.

Anthracene, when oxidized, yields anthra- quinone, from which is obtained alizarine, and thence the whole large group of alizarine dyes. The fluid remaining after washing the light oils with sulphuric acid contains pyridine, and the other bases — the picolines, lutidines, etc. Ammonia gas is run into the liquid until the pyridine separates — as an oil. Quinoline is separated in the same way from the sulphuric acid washing of the heavy oils. It is used in making indigo.

These secondary products yield, besides the coal-tar colors, an extended list of medicinal drugs, perfumes, flavorings, disinfectants and preservatives, burning and lubricating oils, pig¬ ments, photographic chemicals, etc. Only a few of these can be mentioned here.

From benzol are derived nitrobenzene, yield¬ ing aniline and thence the aniline colors ; ery- throsine, used to render photographic plates orthochromatic ; fluorescine, used in testing the purity of drinking waters ; the flavoring < (bitter almond oil,® and a similar perfume ; acetanilide, the basis of headache powders ; and the hyp¬ notic, acetophenone.

From toluol are derived the preservative ben¬ zoic acid, and its salts ; picric acid, trinitrotoluol and other high explosives ; the benzaldehydes,, and others ; and the drug saccharine, 300 times sweeter than sugar.

From phenol come nitrophenol, and the amidophenol dyes ; coumarin, the artificial vanilla flavoring; carbolic acid, the surgeon's sterilizer; and salicylic acid and its medicinal salts.

Xylol is the source of xylidine scarlet and other dyes.

Naphthalene yields naphthol and amido- naphthol dyes ; is vaporized to enrich and add to the brilliancy of coal-gas ; and is burned to produce a high grade of lamp black.

From quinoline come antipyrine and other antipyretic medicines, and the photographic de¬ velopers, hydroquinone, eikonogen, etc.

The pitch which forms 50 per cent of the bulk of cbal-tar is the base of many water¬ proofing and paving materials, and the source of most artificial asphalt.

Production. — When the European War broke out in August 1914, there were in the United States six factories making coal-tar colors. They employed about 400 operatives, and manufactured annually about 3,300 short tons of coal-tar dyes. The consumption in the United States was about 29,000 short tons, of which 22,000 tons came from Germany. At the close of 1915, there were 14 concerns mak¬ ing finished dyestuffs in the United States, and a score or more making intermediates. Several of the larger textile mills also have established dye-making plants of their own. The aggre¬ gate production for 1915 was about 15,000 tons, with a much larger output in sight for 1916. See Chemistry, Progress of.

Bibliography. — Beacall, (Dyestuffs and Coal Tar Products (1915) ; Gardner, (The British Coal Tar Industry) (1915) ; Lewes, (The Car¬ bonization of CoaP (1912); Lunge, (Coal Tar*

and Ammonia) (1900); Wagner,

Richard Ferris,

Editorial Staff of The Americana.

COAL WASHING. Coal washing con¬ sists in the removal from coal of the impurities which it contains in nature. Some of these cannot be removed because they are part of the coal itself ; for example, some of the ash, of the phosphorus and of the sulphur. Others, as slate, bone or impure coal, and pyrite, can be removed to a certain extent by washing, because they are mechanically mixed with the true coal. The need for washing lies in the fact that when the slate is removed a ton of coal has greater heating power and is worth more to the con¬ sumer, and when pyrite is removed the coal has less sulphur and it is more advantageous for making coke and from it iron and steel. Coke for the iron business should not contain over 1 per cent sulphur nor more than 6 to 10 per cent of ash.

Bituminous Coal. — The operation of wash¬ ing bituminous coals consists of three steps : crushing, screening and washing. Of the many breakers the Bradford breaker has been much

used. It consists (see Fig. 1) of a revolving cylinder with perforated walls for screening the coal and with longitudinal lifting plates which lift and drop the lump coal and thus break it. The hard lumps consist mainly of pyrite balls

and slate and are sent direct to the dump as waste ; the fine coal is then ready for the washer. Crushing rolls with inserted teeth (see Fig. 2) are used in many collieries for crushing

the coal, the two rolls revolving toward one another break the coal which is fed in between them. The closer the rolls are set together and the finer the teeth, the smaller will the coal be broken.

The Jeffrey-Robinson coal washer (see Fig. 3) consists of a cone which is fixed and is fed

Fig. 3 — Jeffrey-Robinscn Washer

with its crude coal through the spout, g; it has revolving arms and from the arms are vertical revolving stirring rods, b, b; a current of water rising through the coal is fed in from the pump, p, and the annular distributing pipe and screen, i. This rising current loosens the coal which the revolving rods still further stir, and the heavy slate and pyrite settle to the bottom and are drawn into the pocket, d, by the upper gate valve, e, and later are

discharged by opening the lower gate valve, f. The clean coal over¬

flows at the top at j, is scraped over the coarse screen, k, by the scraper conveyor and discharged at m ; the fine coal which passes through k is scraped forward on the fine screen, 1, by its scraper conveyer and discharged at m'; the fine clay and sludge pass through this fine screen and are separated

from the water which is returned to do more washing. The New Century Nut Coal Jig (see Fig. 4) has a screen in a tank with two compart¬ ments, the screen occupies one compartment while a plunger occupies the other. As the plunger is pushed down it causes a rush of water up through the screen, the coal and heavy impurities resting on the screen are made liquid and mobile by the rising water, and the heavy particles quickly find their way to the bottom while the light pure coal rises to the top and overflows at the end and is saved; the heavy slate and pyrite are discharged under a gate and over a slight dam and are discharged as refuse beneath. The Pittsburgh jig (see Fig. 5) has no plunger to actuate the water, but it has its screen mounted in a large box and this box moves up and down in the water tank; as the box moves down the water rushes up through the intake valves and up through the perforated metal bottom or screen and liquifies the coal and slate, allowing the

Fig. 5 — The Pittsburgh Jig

coal to rise to the top and the slate to settle to the bottom; the cleaned coal overflows and is carried off by a drag conveyor while the slate is let out from time to time by opening the slate gate.' It goes to the bottom of the tank and is removed mechanically from there.

For cleaning very fine coals, bumping wash¬ ing-tables are used. The Campbell table (Fig. 6) is one of these ; it is operated by what is called the cam spring and bumping post mechanism ; the cam pushes the table down hill gently and is followed by the spring which pulls the table up hill more rapidly until it strikes the bump¬ ing post; at this instant all the particles on the table are jarred forward, the slate being heaviest is beneath, while the coal which is lightest is above; on the return stroke the water is acting to float this coal down hill. The end point is that the slate is all discharged at the upper end while the coal is discharged at the lower end. To do this the table is sus¬ pended on rods. The upper part of the table slopes slightly more than the lower part and the surface has thin cleats on it to prevent the slate from moving down hill.

A Robinson washery in Alabama is reported to treat 700 to 800 tons a day of which 40 per cent is shipped as lump and nut coal ; the re¬ mainder, about 400 tons, is washed. A plant of

this sort costs from $5,000 to $8,000; the cost of washing the coal for labor at washer is $2 per day ; for labor at boilers, fuel, etc, $4 ; for repairs and supplies, $3. This figured for 400 tons would be 2*4 cents a ton. The water required is 35.1 gallons per ton of coal washed.

Anthracite coal comes from the mine in all sizes from large lumps down ; the larger lumps must be broken and then the coal is screened into the commercial sizes known as steamboat, egg, stove, chestnut, pea, etc., and the slate, bone, dust, etc., are separated by hand pick¬ ing and mechanical means.

Trade Sizes for Anthracite Coal. — The table shows the distance between the screen bars or the diameter of screen opening which deter¬ mines the various sizes of anthracite coal as known to the trade.

Size of opening in inches, over and through which the dif¬ ferent sizes pass

Trade Name of

Size

Through

Over

Lump .

6

Steamboat .

6

41

Broken or grate .

4i

2

Egg .

2i

2

Stove .

2

It

Chestnut .

H

i

Pea .

i

h

No. 1 buckwheat. . . .

i

No. 2 buckwheat . . . .

1

1

No. 3 buckwheat ….

t

81

Culm .

It will be at

once

noticed that

the market

requires many more sizes of anthracite than of bituminous coal. This is because anthracite requires that its lumps shall be all nearly of the same size in order that they shall burn freely upon a grate. The anthracite breaker, as it is called, consists of a systematic grouping to¬ gether of screens, rolls, where breaking is required, of picking chutes from which the boys pick the slate as the coal slides past them, and of shipping bins to which the differ¬ ent sizes are led and from which the coal is loaded into cars to be shipped by train to the market. Besides hand picking, several mechan¬ ical slate pickers have been devised which de¬ pend upon some physical feature of the slate, as for example, its tendency to come in thin, flat plates, while the coal is more cubical in form; they have the disadvantage that a thin, flat piece of coal ranks as slate and is lost. For

the smaller sizes of anthracite the jigs have done very good work and are standard for cleaning those sizes. See Coal.

Robert H. Richards,

Massachusetts Institute of Technology, Author of (Ore Dressing 4

COALDALE, Pa., borough in Schuylkill County, 15 miles north of Pottsville, on the Central of New Jersey and other railroads. It is a coal mining centre and seat of the Panther Valley Alining Institute. Pop. 6,336.

COALGATE, Okla., town and county-seat of Coal County, 120 miles southeast of Okla¬ homa, on the Chicago, Rock Island and Pacific and the Alissouri, Kansas and Texas railroads. Coal mining and cotton raising are the chief industries. The waterworks are municipally owned. Pop. 3,255.

*COALING STATIONS, depots established by maritime governments at various important points throughout the world, where the ships of the navy may obtain supplies of coal. The utility of such stations, when properly fortified, as points of refuge, defense and repair for war¬ ships in the event of war can hardly be over¬ estimated. The more important of British sta¬ tions are Aden, at Trincomalee (Ceylon), Sin¬ gapore, Hongkong, Sierra Leone, Saint Helena, Alauritius, Jamaica and Simon's Town (Cape Colony). During 1898-1900 the United States established coaling stations for its navy at San Juan, Porto Rico; Pearl Harbor, Hawaii; Pago Pago, Samoa ; Cavite, near Manila ; at the chief port of Guam, Ladrone Islands; and at convenient points in Cuba ; and coal spiles** at La Paz, Mexico, and at several points in Alaska. Some of the British coaling stations supply both naval and mercantile vessels.*

COALINGA, Cal., city in Fresno County, 100 miles west of Fresno, on the Southern Pa¬ cific Railroad. It contains a Carnegie library and has a

grammar school and a high school. It is in a very productive oil centre, there being about 1,300 producing wells in the district. The city has oil-field supply houses, a refinery and machine shops. Distilled water is supplied di¬ rect to the houses through pipe lines. Pop.

(1920) 2,934.

COALITION, a combination of bodies or parts of a body into one body. In political his¬ tory it means a temporary alliance or union for joint action ot various powers or states; and especially of parties or members of parties. Several noted coalitions are (1) English: the joining of the Whig Party under Fox with the stronger faction of Lord North for the pur¬ pose of ousting the strongest body under Lord Shelburne ; the coalition of the Whigs and the Peelites under' Lord Aberdeen in 1852-53 ; and the Liberal Unionists and Conservatives in Lord Salisbury's third ministry in 1895. (2)

American: the joining of the Henry Clay party in the United States Electorate with the J. Q. Adams faction for the defeat of the supporters of Andrew Jackson.

COALS TO NEWCASTLE. To carry coals to Newcastle means to do something that is superfluous. Newcastle being a great coal field, carrying coals there would be a type of unnecessary action. The French have a saying ((to carry water to the. riveC' for the same

thing, and there are equivalents in almost every language.

COALVILLE, England, a town in Leices¬ tershire, 15 miles north of Leicester. It is a coal-mining centre and has iron foundries, car shops and brick works. Pop. 18,548.

COALVILLE, Utah, city and county-seat of Summit County, 40 miles southeast of Ogden, on the Union Pacific Railroad, and on the Weber River. It has large stock raising and agricultural interests and coal mining is an im¬ portant industry. The city owns the water¬ works and electric lighting plants. Pop. 976.

COAMO, P. R., town on the Coamo River, 15 miles northeast of Ponce. It is celebrated for its mineral springs known as Banos de Coamo. The town is situated in a municipal district of the same name. Pop. (town) 4,000; municipal district, 12,000.

COAN, ko'an, Titus, American missionary: b. Keillingworth, Conn., 1 Feb. 1801 ; d. Hilo, Hawaii, 1 Dec. 1882. He was ordained as a Congregational

minister in 1833 and in that year explored Patagonia, where his attempt to es¬ tablish a mission was unsuccessful. In 1835 he went to the Hawaiian Islands, and for the remainder of his life was a missionary at Hilo, where he converted more than 14,000 natives and organized missions from Hawaii to the Marquesas and Gilbert Islands. The largest volcano in the world was in his parish and for 40 years he was its unwearied explorer and historian. He published many valuable papers dealing with the volcanoes of Hawaii and two books (Adventures in Patagonia) (1880), and (Life in Hawaii > (1881). The latter is con¬ sidered a classic of missionary literature.

COAN, Titus Munson, American physician and author, son of Titus Coan (q.v.) : b. Hilo, Hawaii, 27 Sept. 1836. He was educated at Williams College and at the College of Phy¬ sicians and Surgeons of Columbia University. From 1861 to 1863 he served as an interne at Bellevue Hospital and in army hospitals. From 1863 to 1865 he served as assistant surgeon in Admiral Farragut's squadron. He now resides in New York where he founded in 1880 the New York Bureau of Literary Revision. His writings include (Ounces of Prevention (1885) ; (Hawaiian Ethnography) (1899) ; (The Natives of Hawaii: A Study of Polynesian Champ (1901) ; (Climate of Hawaii } (1901). He edited Topics of the Time.

COANZA. See Kwanza.

COAST ARTILLERY, a branch of the United States army entrusted with the defense of the coasts. For its function see Coast De¬ fense; for its organization see Army Organ¬ ization, and for its armament see Artillery and Guns. In 1918 a great part of the coast artillery was being used as heavy artillery in France.

COAST DEFENSE, systematic protection of a country against hostile attack along its coast-lines. The term should not be confused with Coast Defenses, which implies only those works erected at special points, for the de¬ fense of limited sections of the coast. In pro¬ viding such defense a nation will consider not only the safety of its territory, but also the se¬ curity of its commercial interests. In any sys¬

tem of coast defense a good navy is the most important feature; and so essential is it con¬ sidered, that all other means are regarded as adjuncts or auxiliaries of the navy. Along a well-defended coast, in suitable places, are sta¬ tions or points of support where is stored the requisite material for building, equipping, re¬ pairing and supplying naval vessels, and where provision is made for furnishing men when ad¬ ditional force is needed. Forts are built in places where the coast artiller}/- may co-operate with the navy in obstructing the advance of an enemy intending to capture a city or to invade the country; where their guns may command the entrance to a

harbor or other approach by water ; wherever they may cripple the enemy's attack on the defensive fleet, leaving it free to attack the enemy in turn ; where forts may as¬ sist each other and co-operate in repelling an invasion or preventing a blockade or a bom¬ bardment ; where minor channels of approach may be closed or guarded, thus enabling the navy to give entire attention to the main chan¬ nel, etc. Torpedo-boats, submarines, harbor-mines, the searchlight, which illuminates the harbor and permits detection of the enemy's manoeuvres, and hydroplanes, are all valuable aids for the forts. The unfortified coast, as well as the land approaches to cities, must be defended in time of war by whatever means are at command.

The guns for coast defense change with the places and purposes for which they are to be used. To pierce the side armor of battleships, the flat trajectory, high-power guns are used; for projectiles intended to fall on the decks of an enemy's ships, the high-angle guns (mortars or howitzers) are employed. The number and size of guns vary with the estimated number and calibres of those which may be brought to bear by an enemy. From the depth and length of the channel may be determined how many and what classes of ships the enemy can oper¬ ate in it, their armament, etc., and from these data the number and calibres of guns needed may be calculated.

The difficulty of obtaining naval supplies after war has been declared makes it necessary to store them during times of peace. Besides quantities of supplies at points of support for the navy, important harbors are generally equipped with torpedo storehouses, cable-tanks, mining casements, etc., for use in emergencies.

The tactics of coast defense have changed greatly since the beginning of the last decade of the 19th century. Besides defense against attack upon fortified places preparation is also necessary for resisting assaults upon unforti¬ fied coasts. The length of the United States coast-line makes its secure fortification a mat¬ ter of great difficulty and expense.

Methods of reconnaissance are important for defense as well as for attack. The defense seeks to veil all batteries, and even in times of peace a journey along a fortified coast might not discover many forts or other means of de¬ fense. The enemy, in preparation for attack, or in action, seeks to discover the nature and strength of the defenses; and the defense in turn uses all possible methods of ascertaining the number and classes of the enemy's ships, the probable line of attack and whatever else may be discoverable in regard to his strength and purposes. Pictures of every important warship

in the world are studied by certain officers of every navy and so close are

some of these studies that a war vessel may be recognized by such an officer in any position in which he sees it. For the important work of reconnais¬ sance, observation stations are fully equipped for the coast artillery, photographs, drawings, de¬ scriptions of warships, telescopes, etc., for use in procuring information of the enemy, being fully provided. One of the chief means of observation is the aeroplane or hydroplane.

In times of peace a country may, to its peril, neglect its coast defense, as was shown by the condition of the defenses of the United States at the beginning of the war with Spain. Euro¬ pean nations have for years divided their tide¬ water regions into naval zones and have as¬ signed to each zone reserves, torpedo divisions, lighthouse establishments, coast-guard services and signal stations.

In France the naval authority is made para¬ mount and all naval affairs are in charge of the Minister of Marine, assisted by a chief of staff. Not only the mobile defenses, but the coast fortresses, submarine mines and the fort bat¬ teries are under control of the minister or his aide. In the United States the army and navy are jointly responsible in several grand divi¬ sions, under a chief of staff, with the Secretary of the Navy, as now, at the head of the de¬ partment.

In recent times the navies of all leading countries have been enlarged, forts multiplied and strengthened, and more attention given to training young men in the tactics and strategy of defense, involving immense increase of national expenditure. In this general advance of naval preparation our own country is now maintaining a steady and quickened pace and questions of coast defense must here be solved with equal energy and intelligence. The work of providing a proper armament for the exposed harbors of the United States has been progressing as rap¬ idly as the Congressional appropriations would permit. Since the outbreak of the war with Spain, and especially since the beginning of the European War, Congress has been more liberal with its provisions for pushing this work. According to the annual report of the United States Board of Ordnance and Fortifi¬ cation for 1895, at the rate of progress then being made, it would require 50 years of work to place the great stretch of seacoast in proper •condition for defense. The board recommend¬ ed an appropriation of $2,000,000 for engineer work in the construction of implements, forti¬ fications, etc., and one of $5,000,000 for the con¬ struction of guns, mortars, gun-carriages, sea- coast armament and ammunition. Concerning future advancement, the board recommended that it be along the following lines : the devel¬ opment of smokeless powders; the development of a high explosive that can be safely dis¬ charged in a shell at a high velocity with cer¬ tainty of detonation; the development of rapid- fire field and seacoast guns and of an efficient system of fire control for harbor defenses. Re¬ cent reports show that satisfactory progress has been made in all these lines except that the use of armor-plates in forts has been abandoned for the more satisfactory earth and concrete emplacements.

By the beginning of 1915 all ports of com¬ mercial and strategic value along both coasts

of the United States had been fortified, with the exception of the entrance to Chesapeake Bay. During the previous year five 14-inch guns were manufactured, to supersede some of the 12-inch guns, hitherto the heaviest of our coast artillery, but no longer adequate to match the modern 15-inch guns with which the lar¬ ger battleships are being equipped. These latest 14-inch guns are designed to fire 1,660-pound projectiles with a maximum range of 18,000 yards.

It has been proposed by a committee of the Fortification Board to mount 16-inch, wire- wound guns at Cape Henry, throwing a pro¬ jectile weighing 2,200 pounds. Mobile guns, of at least 12-inch calibre, mounted on special trucks that may be drawn along the railroad by locomotives, or along well-laid roads by huge motor cars, such as are being used by the Ger¬ mans, were recommended for the defense of those sections of the coast not within the zone of protection of the permanent works.

The fortifications at both ends of the Pan¬ ama Canal have been completed and the guns mounted ; similar works are either completed or under construction in all the outlying pos¬ sessions of the United States. On El Fraile Island, in Manila Bay, several 14-inch, wire- wound guns, each weighing 70 tons, are being mounted. The present policy of armament con¬ templates the emplacement of at least one 16- inch gun in the system of fortifications guard¬ ing every important harbor. The importance of these coast defenses may be realized from the fact that there is within range of modern gunfire, from 10 of our principal harbors, prop¬ erty to the value of over four and one-half billions of dollars. Up to 1912 approximately $125,000,000 had been spent or appropriated for coast defenses.

The army troops of the coast defense are classified with reference to their duties as fol¬ lows : Coast artillery regulars, who man the guns as far as possible ; coast artillery militia, who are required to man certain guns in order to complete the personnel lacking in regulars ; coast artillery supports, whose function is local protection of fortifications against quick land raids from unprotected points; and the coast guard, which is composed of large bodies of infantry, cavalry and field artillery, prepared to oppose formal landings by the enemy.

The regular establishment of the coast de¬ fense at about the beginning of the European War was distributed as follows :

North Atlantic Coast Artillery District

Companies Companies

Portland . 12 Narragansett Bay . . . 12

Portsmouth . 1 Long Island Sound. . . 12

Boston . 12 Eastern New York.. . 6

New Bedford . 8 Southern New York.. 14

South Atlantic Coast Artillery District

Companies

The Delaware . 4

Baltimore . 3

The Potomac . 2

Chesapeake Bay . 10

Cape Fear . 3

Charleston . 3

Savannah . 4

Companies

Key West . 1

Tampa . 2

Pensacola . 5

Mobile . 2

New Orleans . 2

Galveston . 2

Pacific Coast Artillery District

Companies Companies

San Diego . 2 The Columbia . 4

San Francisco . 17 Puget Sound . 13

In Manila Bay there are 11 companies; in Hawaii 6, and in Panama 8. On 1 July 1914 the total force above enumerated amounted to 700 officers and 10,988 enlisted men.

The establishment of the coast artillery is 1,201 officers and 29,973 men by a bill passed by Congress in 1916. This force is practically sufficient to man all the necessary defenses. See Blockade; Bombardment; Fortification.

Bibliography. — Lieut. M. H. Thompson. U. S. Coast Artillery Corps, in North Amer¬ ican Review, February 1915, (The Problem of our Coast Defence ; Annual Report of Chief of Coast Artillery.*

COAST DEFENSE GUNS. See Guns,

History and Development.

COAST AND GEODETIC SURVEY, United States. To all nations whose territory touches the sea or other water navigable to any extent, or who have any interests in the com¬ merce of the sea, a full and complete knowledge of the coast — its nature and form, the charac¬ ter of the sea bottom near it, the location of reefs, shoals and other dangers to navigation, the direction and strength of currents and the character and amount of magnetic disturbance — Js of the greatest moment. To supply this knowledge the governments of all maritime na¬ tions have in modern times executed surveys of their coasts by the most exact methods.

Some idea of the importance to this country of like operations and their extent may be formed when it is remembered that the coast line of the United States and Alaska, measured along its general trend, exceeds 10,000 miles in length. To represent the actual shore line as surveyed, which includes all the islands, bays, sounds and rivers in the littoral or tidal belt, these figures would have to be multiplied many times. To this must be added the shore line of Porto Rico, the Hawaiian Islands and the Phil¬ ippine Islands. The length of the general shore line of only 14 of the principal islands of the latter group exceeds 11,000 miles.

On the recommendation of President Thomas Jefferson, Congress in 1807 authorized the establishment, as a bureau under the Secre¬ tary of the Treasury, of a national coast sur¬ vey. For the purpose of furnishing geographic positions and other data to State surveys, the scope of the bureau was in 1878 enlarged and its designation became the United States Coast and Geodetic Survey. The superintendents of the survey have been F. R. Hassler (1816-18, 1832ˆ-3) ; A. D. Bache (1843-67) ; Benjamin Pierce (1867-74) ; Carlile P. Patterson (1874- 81); Julius E. Hilgard (1881-85); Frank M. Thorn (1885-89) ; T. C. Mendenhall (1889- 94); W. W. Duffield (1894-97); Henry L. Pritchett (1897-1900) ; O. H. Tittmann (1900- 15); E. L. Jones (1915 –).

The plan upon which it is organized is the outgrowth of trial and experience during the first 50 years of its existence and from its in¬ ception almost every year has seen some new feature added or some old one discarded. Un¬ der the direction of a superintendent there are two great divisions of its work. They are the field and the office. The field work includes all of the practical operations, of the survey on land and sea. Except in time of war, in ac¬ cordance with the plan of reorganization of 1843, the work upon the land was divided be¬

tween civilian assistants and officers of the army, the hydrographic parties being in charge of naval officers. Since 1861 no officers of the army have been connected with the survey and the conduct of the hydrographic work was about equally divided between the civilian as¬ sistants and naval officers until 1898, when the naval officers were relieved, and since which

*time none have been assigned to the survey. The civilian assistants — now called hydro- graphic and geodetic engineers — and aides consist of a body of trained experts perma¬ nently attached to the survey and numbering about 152. The service owns a fleet of 15 steamers and one schooner, besides steam and motor launches. The office is that part of the establishment which receives the records, orig¬ inal sheets, etc., representing the results of field work. They are registered and deposited in the archives until in turn they are taken up for examination, computation and adjustment, prepared for publication .and finally published. Original charts are reduced or enlarged, en¬ graved, electrotyped and printed. For the con¬ venience of administration the operations of the main office at Washington are carried on by eight divisions, each having some specified portion of the general work to perform. In these divisions are employed clerks, draftsmen, computers, engravers, instrument makers, printers, etc., numbering in all abou*t 191. There are sub-offices at San Francisco, Seattle, New York, Galveston and Manila.*

Many of the field operations of the survey being geodetic in their nature, a system of pri¬ mary triangulation, together with the determi¬ nation of geographic positions by means of as¬ tronomic methods, must furnish the foundation upon which the whole rests. On the Atlantic Coast a chain of triangles, beginning at the east¬ ern boundary of Maine, stretches to the Gulf, constituting an oblique arc, which, besides serving as a basis for the coast triangulation, adds much to our knowledge of the figure of the earth. An extensive system of triangles ex¬ tends across the continent along the 39th paral¬ lel of latitude, connecting the surveys of the two coasts and furnishing a basis for the sur¬ veys of the 13 States through which it passes. It is also one of the longest arcs now available for the determination of the figure of the earth. Another triangulation system is being executed along the 98th meridian. Its extension south¬ ward through Mexico has already begun and there is a prospect of its extension northward through the British possessions. Other import¬ ant chains extend along the 112th meridian, the Canadian border and the Pacific Coast. In con¬ nection ’with these principal systems, the trian¬ gulation has been considerably expanded in the New England States, New York and several Western States, including California, where some exceptionally large figures were intro¬ duced. The longest line so far observed is from Mount Helena to Mount Shasta, over 190 miles.

A tertiary triangulation for topographic and hydrographic purposes has been completed along the entire Atlantic and Gulf coasts and over most of the Pacific Coast, including much of Alaska. Much progress has been made in the latter territory by methods which possess a suf¬ ficient degree of accuracy for immediate use and are capable of rapid execution. The coast of the Hawaiian Islands, of Porto Rico and of

the greater part of the Canal Zone and the Philippine Islands has also been topographically surveyed.

In the determination of astronomic posi¬ tions the exact methods originally developed in the survey have been adhered to and per¬ fected. The methods of using the zenith tele¬ scope for latitude and the telegraph for longi¬ tude have been constantly improved.

The topographical operations have been mostly restricted to a narrow margin, not often over three to five miles wide, along the coast and surrounding harbors, bays and rivers up to the head of tide water. In some cases it has been somewhat more extensive, notably in the survey of the District of Columbia, where the scale was 1-4800 and the contour interval only five feet.

The hydrographic operations have extended as far out from the coast as was necessary for the interests of navigation and have included all harbors, channels, bays, etc., as far as the work has gone. Much work has been done in the investigation of submerged rocks by the wire drag. Deep-sea soundings have been made extensively, especially in and about the Gulf Stream. Much attention has been given to tides, and continuous series of tidal records have been obtained at several important points.

The results of the operations of the survey in connection with the study of terrestrial mag¬ netism can be found on its charts and in its other numerous publications on the subject. In addition to the determination of the magnetic elements at many widely distributed points, and their frequent redetermination for secular vari¬ ation, special observations are also made at certain base stations, with the aid of self-regis¬ tering instruments, for the purpose' of obtaining the record of the numerous variations of the earth's magnetism continually taking place.

The study of the force of gravity as a part of the great geodetic problem has received at¬ tention for 30 years and the survey has of late years developed methods and instruments which will lead to a great extension of the work at a less cost than by older processes, but without lowering the standard of accuracy.

A network of precise levels has been ex¬ ecuted covering in a general way the United States, connecting the Atlantic Ocean, the Gulf of Mexico, the Great Lakes and the Pacific Ocean.

Throughout its history the survey has con¬ stantly been called upon to determine boundary lines, both State and national, which have been in

dispute.

The office of standard weights and meas¬ ures, charged with the maintenance of the stand¬ ards of length, weight and capacity, which was under the direction of the superintendent of the Coast and Geodetic Survey until 30 June 1901, is now an independent organization under the title of the ((National Bureau of Standards.®

The principal publications of the survey con¬ sist, among other things, of several hundred different charts; tide tables for all the princi¬ pal and many minor ports; (Coast Pilotsˆ con¬ taining minute sailing directions for all navi¬ gable waters along our coast; and the (Report of the Coast and Geodetic. Survey, > which con¬ tains, besides the reports of the superintendent and his assistants on the conduct of the work, a series of special reports upon various tech¬

nical and scientific operations of the service. For details of the work of the bureau see Chart; Coast Pilots; Geodesy; Gravity; Hy¬ drography; Leveling; Surveying; Tides.

COAST GUARD, a British force formerly under the Customs Department, but since 1856 under the Admiralty, and intended only to pre¬ vent smuggling, but now organized also for purposes of defense and governed by the Ad¬ miralty. The men, who are generally old men- of-war's men of good character, have high pay and are furnished with free cottages. The force numbers, with officers and men, about 3,000. In the United States the coast guard was formed by an act of Congress approved on 28 Jan. 1915 from the Revenue-Cutter Service and the Life-Saving Service (qq.v.), estab¬ lished respectively in 1790 and 1871. It is under the administration of the Secretary of the Treasury in times of peace, of the Secretary of the Navy in times of war. It takes care of the saving of life and property along the coast and at sea, the enforcement of maritime law, the prevention of smuggling, the removal of ob¬ structions to navigation, etc. It is commanded by a captain commandant, ranking with a navy captain. The other coast guard officers are senior captains and the engineer-in-chief, rank¬ ing with commanders in the navy; and captains, first, second and third lieutenants of the line and of engineers, ranking with lieutenant-com¬ mander, lieutenant, senior grade, lieutenant, ju¬ nior grade, and ensign, respectively. The es¬ tablishment is : 1 captain-commandant ; 6 se¬

nior captains; 31 captains; 37 first lieutenants; 94 second and third lieutenants ; 1 engineer-in- chief ; 6 captains of engineers ; 28 first lieuten¬ ants of engineers; 51 second and third lieuten¬ ants of engineers ; 2 constructors ranking as first lieutenants; 1 district superintendent rank¬ ing as captain ; 3 district superintendents, rank¬ ing as first lieutenants ; 4 district superintend¬ ents ranking as second lieutenants ; 5 district superintendents ranking as third lieutenants.

These officers are trained at the Coast Guard Academy, at New London, Conn. The ranks of warrant officers are master's mate, keeper, boatswain, gunner, machinist and carpenter. Petty officers and men are enlisted for a year. The coast guard has about 268 shore stations.

COAST PILOTS, a book compiled to assist mariners in the navigation of their vessels, and, when from any cause they are without charts, to enable them to safely carry their vessels from port to port along the coast. The governments of all large maritime nations pub¬ lish works for these purposes.

As early as 1796 a volume known as (The American Coast Pilots by Capt. Lawrence Fur¬ long, was published in Newburyport, Mass., by Edmund M.

Blunt, and the first edition met with so ready a sale that a second edition of the same work was published in 1798. Since the latter date numerous compilers have published coast pilots of the coast of the United States and its harbors. These works were compiled from charts, from reports by shipmasters pub¬ lished in the newspapers, and from surveys and the personal knowledge of the compilers, some of whom were experienced shipmasters.

The vessels of the Coast and Geodetic Sur¬ vey (q.v), while engaged in surveying the coast and harbors of the United States, collected

much information of importance to mariners which could not be shown on the charts or com¬ pletely given in (Notices to Mariners. (Coast Pilots* are published and distributed by the Coast and Geodetic Survey at the cost of the printing and binding. Similar information can¬ not be collected by private enterprise except at great cost and with imperfect means, and at the present time all the private publications con¬ taining' such information relating to the coast of the United States are compilations from government publications and based generally on the work of the Coast and Geodetic Survey.*

The compilation of the (Coast Pilots neces¬ sitates work in the office and in the field. The office work consists of the collection of the latest data from the reports and surveys of hydrographic and topographic parties, from the reports and surveys of the United States engi¬ neers engaged in the improvement of harbors and waterways, and from correspondence with local authorities and engineers. This informa¬ tion, in manuscript, is then put in the form of a volume which experience has shown to be convenient for the use of the mariner.*

For the field work a vessel of the survey, with the compilers of the (Coast Pilot on board, visits every part of the coast which is treated in the volume; the information col¬ lected in the office is verified and, if necessary, corrected on the spot ; the sailing lines and directions are tested by running over them ; such artificial aids and natural landmarks as are of use to the mariner are noted and hydro- graphic examinations of reported dangers and changes are made; pilots, shipmasters and local authorities are interviewed and the latest in¬ formation is incorporated, together with such notes as can only be obtained by observation and experience in the locality.*

On returning to the office from the field work, this manuscript, correct to date, is pre¬ pared for the printer, and when printed the volumes are issued with a supplement or in¬ sertion sheet containing the changes which have

occurred since the date of the preparation of the volume and while the matter was going through the press.

The (Coast Pilots published by the Coast and Geodetic Survey contain :*

1. A tabular description of lighthouses, light vessels and fog signals; lists of life-saving sta¬ tions, storm-warning display stations, and sea- coast telegraph stations, and information re¬ garding tides, tidal currents, variation of the compass, etc.

2. Nautical descriptions of the coast and har¬ bors and general information concerning the several bodies of water and harbors, including notes relative to pilots, depth of water, draft of vessels entering the harbor, supplies, facilities for making repairs, usual or best anchorage and other matters of practical value. In each case the information of this nature precedes the sailing directions and is printed in smaller type.

3. Sailing directions, with subordinate para¬ graphs treating of prominent objects, dangers, aids to navigation, etc. The arrangement con¬ forms to the order in which these matters would be considered in practice and be available when wanted promptly. For this purpose, and to afford a ready means of reference from one part to another, the sailing directions, where

long, are divided into numbered or lettered paragraphs, printed in large type, each fol¬ lowed by its own subordinate remarks in smaller type.

4. Appendices, containing rules of the road at sea and in inland waters ; laws and regula¬ tions relative to pilotage, harbor control, na¬ tional and local quarantine, and Marine Hospital service," and information regarding storm-warn ing displays.

5. Views of important points. These are only inserted in volumes which treat of local¬ ities which have not yet been surveyed or where the lighthouses and other aids to naviga¬ tion are not sufficiently numerous to readily locate and navigate a vessel.

6. Sections of charts covering the coast treated in the volume to aid in finding the geographic positions of different localities. In¬ dex maps showing the limits of the charts covering the localities treated in the volume.

The (Coast Pilot publications of the United States Coast and Geodetic Survey include :*

Six volumes of the (United States Coast Pilot, Atlantic Coast, as follows:*

Parts I— II. From Saint Croix River to Cape Ann.

Part III. From Cape Ann to Point Judith.

Part IV. From Point Judith to New York.

Section C. Sandy Hook to Cape Henry.

Section D. From Chesapeake Bay Entrance to Key West.

Section E. Gulf of Mexico, from Key West to the Rio Grande.

One volume of the (Pacific Coast Pilot ; California, Oregon and Washington.*

Two volumes of the (Pacific Coast Pilot ; Alaska: Part I, Dixon Entrance to Yakutat Bay, with Inland Passage from Strait of Fuca to Dixon Entrance* ; Part II, Yakutat Bay to Arctic Ocean.*

(United States Coast Pilot ; West Indies. Porto Rico.*

(Coast Pilot Notes in Hawaiian Islands.*

Unside Route Pilot ; Coast of New Jersey; New York to Key West; Key West to New Orleans.*

Six volumes of (Sailing Directions ; Philip¬ pine Islands.*

It is manifest that publications of this character must be subject to numerous correc¬ tions in the details after the lapse of a few years. To maintain the volume in a useful form corrections are issued in (Notices to Mariners, insertion sheets and supplements; and each volume is revised and passed to a new edition when the corrections have assumed proportions that impair its usefulness, or more recent surveys show changes or furnish addi¬ tions that render the old volume untrustworthy.*

COAST RANGE. The Pacific shore of the United States rises abruptly from the ocean along nearly its whole length, with practically no coastal plain of any size from southern Cali¬ fornia to the Strait of San Juan de Fuca. The hills and low mountains which border the ocean are given the general name of the Coast Range. They do not form, however, a continuous ridge but are rather parts of more or less disconnected uplifts, lower and possibly younger than the Sierra Nevada and Cascade ranges. North of the Strait of San Juan de Fuca the mountains of Vancouver Island and the Island Range of British Columbia mark the continuation of these

uplifts, although in British Columbia the name of Coast Range is given to the mountains which border the continental shore and are spurs of the Cascades.

In California the Coast Range comprises two parallel ridges, 400 miles long, 30 to 60 miles apart and parallel to the coast from Point Concepcion in lat. 35° to Cape Mendocino, the ridge on the coast being the Coast Range proper and the inner the Monte Diablo range ; the two separate the Sacramento and San Joaquin val¬ leys from the Pacific. In the south the coast ranges and the Sierra Nevada coalesce and the topography is complicated by east and west ranges; thus opposite the Santa Barbara channel is the Santa Inez Range, having a height of about 4,000 feet, and farther south is another east-and-west range, the Santa Monica. Still farther south the uplift is much broken and irregular without strongly marked ridges but with portions rising into central dominating points like the San Bernardino and San Jacinto mountains, about 11,000 feet high.

North of lat. 35°, toward San Francisco Bay, there are no very high peaks. The highest peaks near the bay are Monte Diablo, 3,856 feet, an isolated peak that is a conspicuous land mark for miles; Mount Helena, 4,343 feet; and Mount Hamilton, 4,400 feet, the latter famous as the site of the great Lick Observatory. North of San Francisco Bay the heights of the sum¬ mits gradually increase, and 150 miles north is Mount Bailey, 6,357 feet. Farther north the Coast Range becomes gradually a series of dis¬ connected mountain groups, and near the Ore¬ gon line east-and-west ridges develop which unite with the Cascades, the most important of these being the Calapooia Mountains in Oregon.

Along the Oregon coast the uplift is low, being generally less than 3,000 feet. In Wash¬ ington also the uplift is not great except in the Olympic Mountains between Puget Sound and the Pacific Ocean, which culminate in the fine peak of Mount Olympus, 8,150 feet.

Extending along such a length of coast, the coast ranges have a wide variety of climate and differ much in vegetation and attractiveness. In California, north of lat. 38° to San Francisco Bay, much of the outer range is covered with brush and has some timber. South, the moun¬ tains are covered with a thorny undergrowth known as chaparral. Near the coast, from Santa Barbara to San Francisco, there is a fair rainfall in the interior. The climate is very dry and the mountains are generally bare. North of San Francisco Bay the rainfall increases and the mountain valleys are fertile and pic¬ turesque. In Oregon the rainfall is heavy and in Washington very heavy; the mountains being covered with thick forests of fir, pine and spruce.

Geologically the mountains of the coast up¬ lifts, besides being newer than the Sierra Ne¬ vada and Cascades, are also less broken through by granite than the Sierra Nevada, and less covered by lava than the Cascades. The up¬ heaval began in late Tertiary time, and perhaps continued into the Quaternary, Pliocene rocks being upturned at a high angle near San Fran¬

cisco Bay. South of San Francisco Bay the rocks are mostly of the Miocene series, though there are large areas of Cretaceous in the east side of the Monte Diablo belt. North of San Francisco Bay and in Oregon the proportion

of Cretaceous increases and the Tertiary is much less. On Vancouver Island an uplift is believed to have taken place in Jurassic time.

Generally speaking, the rocks of the Coast Range in California are much metamorphosed, and large masses of serpentine and similar rocks are not uncommon. In places these serpentines sometimes contain workable deposits of chrome iron ore, though, owing to the limited demand, the production is small. The chief mineral wealth of the Coast Range is in quicksilver and petroleum, though some gold has been washed from placers in southern California. The quick¬ silver occurs at a number of places in the range where the altered rocks are silicified, and the total production, though the ore is generally of low grade, has been large.

South of San Francisco Bay, in the Miocene, in places is a great thickness of bituminous shale, there being several thousand feet of it near Santa Barbara and Los Angeles. This shale has been used extensively as a material for paving streets. Valuable oil-fields have been developed near Los Angeles. Little coal has been found in the range in California, and that is of poor quality. In Oregon is the Coos Bay field.

In Oregon and Washington the Coast Range contains very few mineral deposits of import¬ ance. On Vancouver Island, however, promis¬ ing copper deposits are being developed on the west coast, and on the east coast are large and important coal mines.

The Coast Range naturally has no river sys¬ tems, nor, except in California, is it a barrier to rivers of the interior. It is crossed by the Columbia, Coquille, Rogue, Klamath and other rivers.

For mineral resources of the range see Coal; Petroleum. See also British Colum¬ bia; California; Oregon; Washington.

COASTAL PLAIN. Where the foothills of a range of mountains descend to a lowland that slopes gently to the sea, this lowland is called a coastal plain. It represents what was once the sea floor, being composed of material eroded from the mountains and deposited in the sea. With further elevation the original sur¬ face of the plain may be removed by streams cutting their valleys and by the weathering of the valley slopes. The coastal plain of the Atlantic Seaboard extends from New York to Georgia. In the Carolinas and Georgia it is divisible into belts parallel to the shore. The outer is a smooth plain, often swampy, perhaps 50 miles wide with a gently rolling surface. Farther inland, where the streams have cut valleys, the

surface is more hilly, and 100 miles inland is a belt of hilly country some 600 or 700 feet high covered with pine forests where the original surface of the plain has been nearly destroyed. Back of this come the higher hills, formerly mountains, of the old land, forming what is known as the Piedmont belt. Other instances of coastal plains are the east coast of Mexico, north and south of Vera Cruz, and the east coast of India, skirting the Bay of Bengal.

COASTING TRADE, trade carried on by sea between the ports of the same country.. In some countries the coasting trade is retained as a home monopoly, and this used to be the case in the United Kingdom, but by. recent laws the coasting trade of Great Britain has been

opened to foreign vessels, subject to the same rules, dues and regulations as British sailing ships and steamers ; but power was given to impose by an order in council retaliatory pro¬ hibitions and restrictions on the ships of such countries as should impose restrictions and prohibitions on British ships. The dues and regulations to which vessels engaged in the coasting trade are subject are different from those which relate to vessels engaged in the oversea trade, and masters are required to keep books showing that their cargoes are strictly such as are allowable by the rules of the coast¬ ing trade. In the United States the coasting trade is restricted to vessels built and owned in the United States, as well as officered and chiefly manned by United States citizens. The term .also includes colonies or dependencies overseas. The commerce of the Great Lakes is included in the coasting trade. The great length of the sea and lake coasts, the number of good harbors and the fact that much of the coast region of the United States has been settled, makes the coasting trade of this country the most extensive in the world. Many hun¬ dreds of sailing craft and steamers are used in this trade, carrying the products and people of one part of the country to other parts. This trade is increasing rapidly ; the licensed tonnage of fisheries and trade in 1900 was 4,338,145 tons, an increase of nearly 1,250,000 tons in the pre¬ ceding 50 years. In 1915 the licensed tonnage in the coasting and fishing trade was 6,486,384 tons and 23,072 vessels. Consult (Annual Re¬ ports } of the Commissioner of Navigation.

COAT OF ARMS, heraldic insignia, origi¬ nally embroidered on the tabard, a short coat worn by knights over the armor. They origi¬ nated in the age of chivalry, when they were assumed as emblematic of the adventures and hopes of the knight, and were useful for dis¬ tinguishing individuals whom it was difficult to recognize when in full armor. The favorite emblem of the knight later became the adopted badge of the

family; the figures or characters employed in the coat of arms began to receive names, and so the language and science of heraldry came into existence. Modern nations have adopted coats of arms, in monarchical countries, sometimes an adaptation of the heraldic insignia of a dynasty. The coats of arms of the United States and of the individual States are arbitrarily adopted emblems without true heraldic significance. The emblem of a State sometimes represents its leading industry; some cities have also adopted similar coats of arms. See Heraldry.

COAT OF MAIL, a piece of armor in the form of a shirt, consisting of a close net-work of iron or steel rings, or of a strong linen or leather jacket covered with small laminae or plates, usually of tempered iron, overlapping each other like the scales of a fish. See Arms and Armor.

COATBRIDGE, kot'brij, Scotland, munici¬ pal burgh in Lanarkshire, nine and a half miles east of Glasgow. It owes its rise to the work¬ ing of the coal and iron-stone found in the surrounding district, and has grown rapidly from a village to a flourishing town. All the heavier metallurgical industries are here actively prosecuted. Nearly one hal f of the blast-fur¬

naces of Scotland are situated in this locality. Pop. 43,286.

COATES, Florence Earle, American au¬ thor: b. Philadelphia, Pa., 1 July 1850. She was educated at private schools in New Eng¬ land and at the Convent of the Sacred Heart, France; she also studied some time at Brussels. In 1879 she was married to Edward Hornor Coates. She was president of the Browning Society of Philadelphia 1895-1903, and 1907-08; is member of the Society of Mayflower De¬ scendants and the Colonial Dames of America. She has published (Poems) (1898) ; 'Mine and Thine) (1904) ; (Lyrics of Life) (1909) ; (Ode on the Coronation of King George V) (1911) ; (The Unconquered Air, and Other Poems (1912). She is a contributor to Harper's, The Century, Scribner's Magazine, the Atlantic Monthly and the Athenoeuvn, London.*

COATESVILLE, Pa., borough of Chester County, 39 miles west of Philadelphia, situated on the Pennsylvania and the Philadelphia and Reading railroads. It contains a fine Y. M. C. A. building, a hospital, and is noted as an indus¬ trial centre, the establishments including iron and steel works, steel-plate mills, boiler works, brass and iron foundries, machine shops, a tube mill, silk mills and factories of tobacco, phos¬ phate and automobiles. Settled about 1800, Coatesville was incorporated in 1867. The gov¬ ernment is vested in a burgess, elected every three years, and a borough council chosen on a general ticket. There are municipal water¬ works. Pop. (1920) 14,515.

COATI, ko-a-te, an American animal some¬ what related to the raccoons, of which two species are known, constituting the genus Nasua. One inhabits Mexico and roves as far north as southern Arizona; the other lives in Brazil The Mexican coati, or (

1889).

COATICOOK, ko-at'i-kuk, Canada, town of Stanstead County, Quebec, situated on the Coaticook River, and the Grand Trunk Rail¬ road. It has a number of factories and is a manufacturing centre. Pop. 3,165.

COATZACOALCOS, koˆat'Esa-ko-al'kos, or SNAKE RIVER, a river of the isthmus of Tehuantepec in Mexico, which rises in the Sierra Madre and empties into the Gulf of Mexico, 130 miles southeast of Vera Cruz. It is navigable for large vessels for 30 miles, and is interesting as part of a route which has been surveyed for an inter-oceanic canal. A

city of the same name, with a population of about 3,000, is situated at the mouth of the river.

COBALT, a metal which occurs combined with arsenic, nickel and other metals ; also as a sulphide and as an arsenate. After the ore has been calcined, oxide of cobalt remains, but impure from the presence of other metallic oxides. When this oxide has been purified and reduced to the metallic state the cobalt is ob¬ tained of a white color inclining to gray, and, if tarnished, to red, with a moderate lustre. Its fracture is compact; it is hard, brittle and of a specific gravity of 8.5 to 8.9. Like nickel, it is strongly magnetic. It undergoes little change in the air, but absorbs oxygen when heated in open vessels. It is attacked, though slowly, by sulphuric or hydrochloric acid, and is readily oxidized by means of nitric acid. Two basic oxides of cobalt are known, and some inter¬ mediate oxides. The protoxide is of an ash- gray color and is the basis of the salts of cobalt, most of which are of a pink hue. When heated to redness in an open vessel it absorbs oxygen and is converted into a higher oxide. It may be prepared by decomposing the carbonate of co¬ balt by heat in a vessel from which atmospheric air is excluded. It is easily known by its giving a blue tint to borax when melted with it. It is employed in the arts, in the form of smalt, for communicating a similar color to glass, earthen¬ ware and porcelain. Smalt, or powder blue, is made by melting three parts of fine white sand, or of calcined flints, with two of purified pearl- ash and one of cobalt ore previously calcined, and ladling it out of the pots into a vessel of cold water; after which the dark-blue glass, or zaffer, is ground, washed and distributed into different shades of color, which shades are occasioned by the different qualities of the ore and the coarser or finer grinding of the powder Smalt, besides being used to stain glass and pottery, is often substituted, in painting, for ultramarine blue, and is likewise employed to give to paper and linen a bluish tinge. The chloride of cobalt is well known as a sympa¬ thetic ink. When diluted with water so as to form a pale pink solution, and then employed as ink, the letters, which are invisible in the cold, become blue if gently heated. It is pre¬ pared by dissolving precipitated oxide of co¬ balt in hydrochloric acid with the aid of heat, and diluting with water. The nitrate of cobalt is obtained by dissolving cobalt or its oxide in nitric acid and crystallizing the solution. It is a deliquescent red salt, which dissolves in water with a pink color. The peroxide of co¬ balt is black, and is formed by adding a solu¬ tion of bleaching-powder to a .cobaltous salt, or by passing a current of chlorine gas through water holding cobaltous hydrate in suspension. It does not unite with acids ; and when digested in hydrochloric acid the cobaltous chloride is generated with the disengagement of chlorine. When heated it is converted into one of the intermediate oxides.

Ores of Cobalt. — "Bright white cobalt ore® is the popular name for the mineral cobaltite (q.v.), a sulph-arsenide of cobalt. "Gray co¬ balt ore,® also sometimes called "tin-white cobalt,® is the mineral smaltite (q.v.). It is the chief ore of cobalt and is essentially cobalt diarsenide, though it

always contains nickel and iron. “Red cobalt,® also known as “cobalt-

bloom,® is the mineral erythrite (q.v.), a hy¬ drous cobalt arsenate. “Earthy cobalt,® or “black cobalt,® is the mineral asbolite, a variety of wad containing up to 32 per cent oxide of cobalt. “Cobalt pyrites® is the mineral linnaeite, a sulphide of cobalt, often containing much- nickel. The principal supply of cobalt was for¬ merly derived from the smaltite of Germany and the cobaltite of Norway and Sweden. The discovery, about 1904, of rich cobalt and silver ores in northern Ontario has made the town ot Cobalt the centre of production. In the cobalt district smaltite and cobaltite occur in veins with native silver and other metallic minerals in rocks of Pre-Cambrian Age.

COBALT, Canada. Situated on Lake Co¬ balt, in northern Ontario, 330 miles north of Toronto. It was unknown up till 1903 as either town or mining camp. It was during the building of the Timiskaming and Northern On¬ tario Railway, a work of the provincial gov¬ ernment, that the first valuable silver ores were discovered which have since proved this district to contain the richest silver camp in the world. The discoveries of 1903 were followed by others in the succeeding years, but it was not till 1906 that the “boom® reached its height. In 1904 the value of silver extracted from four producing mines was $111,887 and this went up by leaps until in 1911 the limit was reached, the 34 mines producing 31,507,- 791 ounces, of the value of $15,953,847. Since then a steady decrease has taken place, the output of silver in 1914 being 25,217,994 ounces of the value of $12,765,461, a falling off as com¬ pared with 1913 of 4,506,937 ounces, or 15 per cent. Unless new rich deposits are discovered, this decline is likely to be accelerated. The ores of the Cobalt district, which were first shipped to the United States, are now mainly treated in Canada. The discoveries at Cobalt brought Canada at a bound into a front rank as a silver producer, being excelled only by the United States and Mexico. This district is not only famous for its silver production, but it leads in cobalt and arsenic, and is ex¬ celled in output of nickel only by Sudbury and New Caledonia. One remarkable result of development at Cobalt is shown in the relation the dividends paid bear to the total value of production, these reaching up till the end of 1914 the enormous total of $55,228,964, or 50 per cent of the gross value of all the silver yet produced from the mines of Cobalt. Pop.

5,638.

COBALT-BLUE, or THENARD’S BLUE, a compound of alumina and the oxides of cobalt, forming a beautiful pigment often used in the arts. Sometimes it contains also the phosphate or arsenate of cobalt, according to the mode of manufacture employed. It is non-poisonous and unacted on by acids and alkalis.

COBALTITE, “bright-white cobalt,® an important ore of cobalt, is its sulph-arsenide, CoAsS, and contains 35.5 per cent of cobalt. It occurs granular massive, but also in isomet- ric-pyritohedral crystals. These usually have a brilliant metallic lustre and a white color slightly tinged with copper-re.d. Their hard¬ ness is 5.5 and specific gravity 6 to 6.3. The most important localities are in Norway, Sweden and Cobalt, Ontario.

COBAN, kd’-ban’, or VERA PAZ, Guate¬ mala, city 90 miles northeast of the city of Guatemala. It is the capital of the depart¬ ment of Alta Vera Paz, on the left bank and near the source of the Cojabon. It was for¬ merly a mission station of the Dominicans, whose memory is still revered. It is pictur¬ esquely situated on the slopes of a hill and is irregularly built. Its modern buildings are of some merit. The town has minor manufac¬ tures and is the centre of a fertile district producing coffee, cocoa, vanilla and sugar cane. Pop. 30,770.

COBB, Henry Ives, American architect : b. Brookline, Mass., 19 Aug. 1859. He studied at the Massachusetts Institute of Technology and was graduated at Harvard in 1880. In 1881 he established himself in Chicago, and has built up a large and lucrative general practice in that city and other parts of the country. In 1893 he was one of the national board of architects of the World’s Columbian Exposition, for which he designed the Horti¬ cultural Hall, and at present is retained as a special architect for the United States govern¬ ment. Among the prominent public buildings erected from his design are the Newberry Library, city hall, courthouse, the opera- house, University of Chicago and church of the Atonement, all in Chicago; the Pennsyl¬ vania State Capitol at Harrisburg; American University at Washington, D. C. ; Booth Me¬ morial Theatre, New York, and government buildings at Chicago, League Island, Annapo¬ lis, etc.

COBB, Howell, American statesman: b. Cherry Hill, Ga., 7 Sept. 1815; d. New York city, 9 Oct. 1868. He was graduated at Frank¬ lin College in 1834, became a lawyer in 1836 and in 1843 was elected to Congress as a Democrat. He served eight years and was speaker of the House one term. Elected gov¬ ernor of Georgia in 1851, he returned to Con¬ gress in 1855, and was made Secretary of the Treasury by President Buchanan in 1857, re¬ signing in 1860 to urge secession. As presi¬ dent of the Confederate Congress he assisted in drafting and adopting the Confederate con¬ stitution. He withdrew because of his dis¬ approval of Jefferson Davis. He held a Con- . federate military commission in the Civil War, but saw little

service. In defense of slavery he published (A Scriptural Examination of the Institution of Slavery5 (1856).

COBB, Irvin Shrewsbury, American au¬ thor and humorist: b. Paducah, Ky., 23 June 1876. He- was a shorthand reporter and con¬ tributor to comic weeklies until the age of 17 ; became editor of the Paducah Daily News at 19; and after holding important offices on minor newspapers became special writer and editor of the humorous section of the New York Evening Sun (1904-05) ; New York Evening World and Sunday World (1905-11) ; war correspondent for the Saturday Evening Post (1914-15), and lecturer on the war (1915). He has written plays, including

of Fare> (1913); houghing it de Luxe (1914) ; (Europe Revised5 (1914) ; (kibble,

D.D.5 (1916) ; (Those Times and These)

(1917) ; (Twixt the Bluff and the Sound) (1918); (The Life of the Party5 (1919). He also wrote stories and humorous essays, cNew York Through the Funny Glass) ; (Live Talks with Dead Ones5 ; cThe Hotel Clerk, > etc.

COBB, Nathan Augustus, American scien¬ tist : b. Spencer, Mass., 30 June 1859. He was graduated at the Worcester Polytechnic In¬ stitute in 1881 and later studied at Jena under Haeckel, Hertwig, Lang and Stahl. From 1891 to 1904 he was engaged as pathologist in the Department of Agriculture, New South Wales. In 1904-07 he was director of the division of pathology of the Hawaiian Sugar Planters' Experiment Station, Honolulu. In 1907 he became agricultural technologist of the Department of Agriculture of the United States, and also since 1911 has served as act¬ ing assistant chief of the Bureau of Plant In¬ dustry. He has discovered and described about 1,000 new species of animals and plants of various parts of the world, mostly nema¬ todes. He has invented photographic and microscopic apparatus. He has written about 150 pamphlets and books, mostly on results of original research.

COBB, Sylvanus, American Universalist minister: -b. Norway, Me., 1799; d. 1866. He took a prominent part in the anti-slavery and temperance movements, was for 20 years ed¬ itor of the Christian Freeman of Boston. He was the author of (The New Testament, with Explanatory Notes5 (1864) ; A Compend of Divinity5; (Discussions5 ; Autobiography5 (Boston 1867).

COBB, Sylvanus, American novelist, son of the preceding: b. Waterville, Me., 1823; d. Hyde Park, Mass., 2 July 1887. He was editor and publisher of a periodical called the Rechabite, and besides contributing to other publications was a most prolific story-writer. His most popular novels are (The King's Talis¬ man5 (1851) ; (The Patriot Cruiser5 (1859) ; (Ben

Hamed5 (1864); (The Gunmaker of Moscow.5 He published a (Memoir5 with his father's Autobiography5 (Boston 1867).

COBB, Thomas Reed Rootes, American lawyer and soldier: b. Cherry Hill, Jefferson County, Ga., 10 April 1823; d. Fredericksburg, Va., 13 Dec. 1862. He was graduated at the University of Georgia 1841, was admitted to the bar and was reporter of the Georgia Su¬ preme Court 1849-57. As a lawyer he enjoyed a wide reputation and large practice. In the Confederate Congress he was chairman of the Committee on Military Affairs, but later be¬ came a brigadier-general in the army and was killed at the battle of Fredericksburg. He wrote (Digest of the Statute Laws of Georgia5 (1851) ; (Inquiry Into the Law of Negro

Slavery in the United States5 (1858) ; his¬ torical Sketch of Slavery from the Earliest Periods5 (1859).

COBB, William Henry, American li¬ brarian : b. Rochester, Mass., 2 April 1846. He was graduated at Amherst College in 1867, was ordained to the Congregational ministry in 1872. He held pastorates at Plymouth, Mass., 1872-76, and Uxbridge, Mass., 1878-

87. In 1887 he was appointed librarian of the Congregational Library and assistant treas¬ urer of the American Congregational Associa¬ tion, Boston. He was one of the three editors and publishers .of the Journal of Biblical Lit¬ erature after 1889. He has published (A Crit¬ icism of Systems of Hebrew Metre5 (1905); (The Meaning of Christian Unity5 (1915) ; also many articles in (Biblioteca Sacra) (1873— 99) and in the Journal of Biblical Literature.

COBBE, kob, Frances Power, Irish philan¬ thropist and religious writer : b. Dublin, 4

Dec. 1822 ; d. Aengwrt, Merioneth, 5 April 1904. She was one of the founders of the National Anti-Vivisection Society. Some of her works are descriptions of her travels in Italy, Greece, Egypt and Palestine, the others treating mainly of theological, religious and

humanitarian questions. In religion she had moved from orthodoxy to rationalism. The most important are (Essay on Intuitive Morals5 (1855) ; (Pursuits of Women 5

(1863); (Broken Lights: an Inquiry into the Present Condition and Future Prospects ot

Religious Faith > (1864) ; (Hours of Work

and Play) (1867) ; (Dawning Lights5 (1868) ; (Darwinism in Morals5

(1872) ; (The Hopes of the Human Race) (1874) ; (Duties of

Women> (1881) ; (The Peak in Darien) (1882), and (The Scientific Spirit of the Age5 (1888). She also wrote an enormous number of pamphlets and edited an edition of the works of Theodore Parker.

COBBETT, William, English writer and politician ; was the son of a farmer and pub¬ lican : b. Farnham, Surrey, 9 March 1762; d. near Guildford, 18 June 1835. In 1783 he set out to try his fortune in London and arrived there with only a half a crown in his pocket. He succeeded in obtaining a situation as copy¬ ing clerk to an attorney of Gray's Inn, where he remained for nine months. Determined to find some other sphere of employment, he left London for Chatham, enlisted in the 54th Regiment, and after continuing there for a year proceeded with it to Nova Scotia. During his stay at Chatham he had set him¬ self assiduously to study and the improvement of his mind. He remained four years in America, during which time his regular habits and ability and attention in the discharge of his military duties effected his promotion to the rank of sergeant-major. In 1791 he re¬ turned to England with the regiment and shortly after arriving there obtained his dis¬ charge. After a short stay in England and a stay of six months in France in 1792 he em¬ barked at Havre for America. He landed in New York in. October 1792 and continued in America for eight years, where he occupied himself with literary labors, chiefly of a politi¬ cal kind, commencing his career by an attack on Dr. Priestley, then recently landed in America, in a pamphlet entitled Observa¬ tions on the Emigration of a Martyr to the Cause of Liberty,5 and signed «Peter Porcu¬ pine.® Under this famous nom-de-plume a succession of papers appeared, all of a strongly anti-Republican tendency, which were afterward republished in England. Before leaving America he published a life of Thomas Paine. In June 1800 he sailed for England, and on his arrival started the Por¬

cupine, which zealously supported the meas¬ ures of Pitt, but met with little success. In a subsequent paper, the Weekly Register, he was more fortunate ; and it continued to appear regularly every week up to the period of his death. Not long after its commencement symptoms of a gradual change began to ap¬ pear in Cobbett's political opinions, and from highly conservative he passed over to extreme radical principles. In 1803 a prosecution for libel on the lord-lieutenant and other officers of state in Ireland was instituted against him and resulted in his being sentenced the fol¬ lowing year to a fine of $2,500; while a second action, brought almost immediately afterward, subjected him to a second fine of the same amount. In 1810, owing to some remarks of his in the Register of 10 July 1809, on the flog¬ ging of some militiamen, he was again prose¬ cuted for libel and sentenced to imprisonment for two years and a fine of $5,000. This last

was paid by a subscription among his friends. Nowise daunted, he continued his attacks on government as soon as he was liberated and commenced his celebrated (Twopenny Trashy which reached a sale of 100,000, and from its supposed influence on the working classes brought about the passing of the noted Six Acts. Partly to escape their operation, he retreated to the United States, and remained here for two years, residing principally in Long Island. He returned to England in 1819 and in 1820 endeavored, unsuccessfully, to be returned member for the city of Coventry. About the same period he commenced in the Register a series of papers entitled (Rural Rides, 5 afterward reprinted, which present most charming pictures of English country scenery and are among the best of his pro¬ ductions. In 1824-27 he published a (History of the Protestant Reformation in England and Ireland,5 in which he vilified Queen Eliz¬ abeth and the leading reformers, but added in no way to his literary reputation. The work was eagerly adopted by the Roman Catholics, who caused translations to be made of it into various European languages. In 1831 he was again prosecuted for libel on the ground of an article in the Register alleged to be published with the view of exciting the agricultural laborers to acts of violence. He conducted his own defense in a speech of six hours, and the jury not being able to come to a verdict the trial ended in their discharge. On the passing of the reform bill in 1832 Cobbett was returned member to Parliament for Oldham; but his success in this capacity was indifferent. Nevertheless, at the general election in December 1834 he was again re¬ turned to Parliament for Oldham. In addi¬ tion to the writings already referred to Cob¬ bett is the author of an English and a French Grammar; (Advice to Young Men and Women, 5 containing many useful hints; Cot¬ tage Economy5; (Village < Sermons5 ; (A Year's Residence in America5 ; and other works. Cobbett wrote in a pure and vigorous English style, and his writings contain a great amount of information and sound practical advice. Consult E. Smith, (Life of Cobbett5

(1878).

COBBOLD, Thomas Spencer, English sci¬ entist : b. Ipswich 1828; d. 1886. He studied

anatomy under Crosse and afterward took a regular medical course at the University of Edinburgh. He went to London in 1857 and for the four succeeding years lectured on bot¬ any at Saint Mary's Hospital. After 1861 he lectured at the Middlesex Hospital and later lectured on geology at the British Museum. In 1873 he was appointed professor of botany and

later of helminthology at the Royal Veterinary College. His investigations were principally in connection with parasitic worms. His published works include (Entozoa: An Introduction to the Study of Helminthology, with Reference more particularly to the Internal Parasites of Man (1864); ˆTapeworms* (1866); (1872);*

*(Parasites of Meat and Prepared Flesh Foods **

(1884).

COBBS, Nicholas Hamner, American Protestant Episcopal bishop: b. Bedford Coun¬ ty, Va., 5 Feb. 1796; d. Montgomery, Ala., 11 Jan. 1861. While studying for the ministry in the Episcopal Church he was engaged in teach¬ ing for several years. He was ordained dea¬ con in Staunton, Va., in May 1824, and priest the next year in Richmond, Va., by Bishop Moore. He was occupied in pastoral work in his native county for 15 years. In 1839 he be¬ came rector of Saint Paul's, Petersburg, Va., and in 1843 accepted a call to the rectorship of Saint Paul's, Cincinnati, Ohio. In 1844 he was elected bishop of Alabama, being the first to preside over that diocese, and was consecrated in Philadelphia, 20 Oct. 1844. Bishop Cobbs was a faithful overseer of the work committed to his charge, and as evidence of esteem for his memory a noble charity in Montgomery bears the name of the Bishop Cobbs' Home for Or¬ phans. He published some sermons and ad¬ dresses.

COBDEN, Richard, English economist, the great (

trade and peaceful intercourse. These views, although disregarded or considered as vision¬ ary in Parliament, were warmly received in in¬ dustrial and commercial circles and secured Cobden a considerable number of followers, especially in Manchester. After returning from extensive travels in the East and in Ger¬ many, he entered actively on a course of agi¬ tation with the view of carrying into effect his political views. Soon after the Anti-Corn Law League was formed in 1838, it was joined by Cobden, who expended all his energies on be¬ half of the cause to support which the league had been founded ; and it was chiefly the ex¬ traordinary activity and perseverance of Cobden, joined to the zeal of his supporter Bright, that brought about the final victory of free-trade principles. In 1841 Cobden was returned to Parliament by Stockport. In his very first speech in Parliament he took occasion to point out the unjust way in which the corn-laws op¬ erated, and, undeterred by the failure of his first attempts, returned again and again to this subject. After five years of unwearied con¬ test he at last succeeded in convincing Sir Rob¬ ert Peel himself, at that time Prime Minister, of the pernicious action of the corn-laws, and in inducing him to bring in a bill for their re¬ peal. The bill passed both houses of Parlia¬ ment before the end of June 1846, and Sir Robert Peel

was the first to congratulate Cob¬ den on his victory in a speech delivered in the House of Commons. During this long struggle Cobden had been obliged to neglect his busi¬ ness, which before agitation commenced had been a highly prosperous one. As a compensa¬ tion for the loss he had thus sustained a na¬ tional subscription was made and a sum of about $400,000 presented to him. After again visiting several countries on the Continent, where he was generally received with enthusiasm, he returned to his parliamentary duties in 1847, having been returned without opposition as one of the members for the West Riding of Yorkshire. He now appeared chiefly as the ad¬ vocate of parliamentary reform, economy and retrenchment in the management of the finances of the country, and a policy of non-intervention ; in all of which he found a firm and ready ally in Bright. His advocacy of a peace policy did not in every case add to his popularity. His opposition to the policy of Lord Aberdeen in 1853, which ultimately led to the Russian War, met with no success; and although in 1857 he carried a vote of censure on Lord Palmerston's Chinese policy, his action in this case was dis¬ pleasing to the country generally. In 1860 he negotiated a treaty of commerce with France, and in reward for his services on this occasion was offered a baronetcy, a seat in the privy- council and several other offices and dignities, all of which he persistently refused. A col¬ lection of his political writings appeared in 1867 and a collection of his speeches (Speeches on Questions of Public Policy (1870). Con¬ sult Gamier, (1865); Morley, (Life of Richard Cobden) (1881-83) ; McCann, (Six Radical*

Thinkers) (1910).

COBDEN CLUB, The, an organization named after Richard Cobden, formed about a year after his death, through the influence of John Bright and others, for encouraging the

diffusion of free trade and the other economical and political principles with which Cobden's name is associated. The Cobden Club has dis¬ tributed a vast number of books and pamphlets, especially in Great Britain, the United States and the British colonies.

COBEGO, ko-ba'go. See Colugo.

COBERN, Camden McCormack, American Methodist clergyman : b. Uniontown, Pa.. 19 April 1855. He was educated at Allegheny Col¬ lege and the Theological School of Boston Uni¬ versity and entered the ministry in 1876. He has been professor of English Bible and philosophy of religion at Allegheny College since 1906. He has published (Ancient Egypt in the Light of Modern Discovery5 (1892) ; (Ezekiel and Dan¬ iel: a Critical Commentary 5 (1901); (The

Stars and the Book) (1904); (Bible Etchings of Immortality5 (1905); (Recent Explorations in the Holy Land5 (1914) ; (The New Arch¬ aeological Discoveries in their Bearing on the New Testament5 (1916) and contributions to the Homiletic Reviezv, The Methodist Review and to the proceedings of learned societies.

COBHAM, Lord. See Oldcastle, Sir John.

COBIJA, ko-beha, or PUERTO LA

MAR, Chile, seaport in the province of Anto¬ fagasta (formerly belonging to Bolivia), on the shore of the Pacific, about 70 miles north of the town of Antofagasta. It stands in a desert re¬ gion and is entirely dependent on the mines in the neighborhood. The roadstead is tolerably safe, but the landing-place is far from good. All the water used for drinking must be ob¬ tained by distillation and the means of subsist¬ ence come from a considerable distance. It was formerly a considerable town, but has lost its commerce and now contains a population of but 500. It was once the only seaport of Bolivia but was ceded to Chile in 1883. It suffered from an earthquake and tidal wave in 1877.

COBLE, or COBBLE, a flat-floored boat with a square stern, furnished with a lug-sail and also propelled with oars. It has a sharp, high bow, is admirably constructed for en¬ countering a heavy swell, and is used in fishing, especially on the east coast of Great Britain. The rudder extends for some distance below the stern. There is also a small rowing-boat with the same name used by salmon-fishers and others.

COBLENZ, ko'blents, Germany, a forti¬ fied city, anciently called Confluentes, from its situation at the confluence of the Rhine and Moselle. It is the capital of Rhenish Prussia and is finely situated on the left bank of the Rhine, in the angle between that river and the Moselle and connected by a pontoon bridge over the Rhine with Ehrenbreitstein. It consists of the old town, along the Moselle, and the new town, farther up the Rhine. Among the prin¬ cipal buildings are the church of Saint Castor, founded early in the 9th century by the son of Charlemagne; the Liebfrauen-Kirche

of the 13th century; the so-called Kaufhaus, built in 1477 as a town-hall, the ancient Burg, erected bv the archbishop of Treves in 1276, restored by the town; and the large electoral palace, now a royal palace, completed in 1786. In 1905 the government completed a magnificent new building in which to centre the activities of the province. At the extreme point of the city, vol. 7 — 12

at the junction of the rivers, stands the splen¬ did equestrian statue of Emperor William I, erected by the province. Coblenz has numer¬ ous and excellent educational institutions, in¬ cluding a royal gymnasium, a teachers' semi¬ nary and a conservatory of music. Its chief in¬ dustry is the production of the sparkling Moselle wine. There are also manufactures of ships, hats, machinery, pianos and lacquered wares. A system of four forts, including Ehrenbreitstein on the opposite bank of the Rhine, makes it very formidable. Metternich, the Austrian statesman, was born here in 1773.

Coblenz was known to the Romans as Con¬ fluentes. In 1018 it was conferred by Henry II upon the archbishops of Treves. After 1789 it was the headquarters of the French emigres, and in 1794 it passed to France. In 1815 it was ceded to Prussia. Consult Daniel, 'Deutschland5 (Leipzig 1895); Gunther, 'Geschichte der Stadt Koblenz5 (Coblenz 1815) ; Bar, 'Urkunden und Akten zur Geschichte der Verfassung und Verwaltung der Stadt Koblenz bis zum Jahre 1 500 5 (Bonn 1898). Pop. 56,487.

COBOURG, ko'berg, Canada, town, port of entry and county-seat of Northumberland County, Ontario, on the Grand Trunk Railway, 69 miles northeast of Toronto and 92 miles west by south of Kingston. It has a safe and commodious harbor on Lake Ontario and en¬ joys a large export trade in provisions, lum¬ ber, flour, etc. It has regular steamboat con¬ nection with the important United States and other Canadian lake ports. The town is well built and has many fine residences. It was for¬ merly the seat of Victoria University (q.v.), now located at Toronto. It has woolen mills, a car factory, carpet and matting factory, breweries, etc., banks and weekly newspapers, electric lights, gas, electricity ana waterworks. Pop. 5,074.

COBRA DE CAPELLO, the Portuguese name of an East Indian Elapine serpent, the Naja tripudians, and sometimes applied to its congeners, among which is the king cobra or hamadryad of India, Naja hungarus, and an African genus, the Naja hceje, or asp, all of which are reptiles of the most venomous na¬ ture. The former inhabits India and south¬ eastern Asia, Java, etc. The ringhals of South Africa, sepedon hccmachates, is closely related, and is sometimes also known as cobra.

All are remarkable for the manner in which they spread out or distend the sides of the neck and head when disturbed or irritated. In the cobra de

capello the conformation necessary to this action is found in the most perfect con¬ dition, as some of the ribs are loosely articu¬ lated and moved by appropriate muscles on the sides of the neck, which, when expanded, give the anterior part of the body the appearance of an overhanging arch or hood, on the middle of which, posterior to the eyes, is a greenish- yellow mark, resembling the rim of a pair of spectacles. From this mark we have the name "spectacled snake.55 When disturbed by the approach of an individual or otherwise, the cobra raises the anterior part of its body, so as to appear to stand erect, expands its hood and is prepared to inflict a deadly wound The poi¬ son fangs are attached to the anterior end of the maxillary bone and are permanently erect,

not movable, as in the rattlesnakes. So ex¬ ceedingly poisonous is its bite that in numer¬ ous instances which are well authenticated death has followed within a few minutes; under ordi¬ nary circumstances a few hours is the longest term that intervenes from the infliction of the bite till the death of the sufferer, where prompt measures for his relief have not been resorted to. So numerous are these snakes in India, and so bold in frequenting human habitations, that the census returns attribute not less than 10,000 deaths annually to their bites.

The cobra may be as much as six and a half feet long and two inches through.

To minister to the curiosity of the multitude, the jugglers of India select these venomous rep¬ tiles for their exhibitions and having extracted their fangs keep them in cages or baskets to exhibit as dancing snakes. When the cage is opened, the juggler begins playing upon a pipe or other instrument ; whereupon the cobra as¬ sumes the erect attitude, distends its hood and remains balancing itself in this position until the music is suspended. It is possible that this snake, in common with lizards and other ani¬ mals, is peculiarly affected by musical sounds, but it is much more likely that the swaying of the body of the charmer baffles the snake's at¬ tempt to strike. With the exception of the spectacle mark on the back of the neck and its distensible hood, the cobra is not especially dis¬ tinguished as regards coloration or form. Con¬ sult Ditmars, (Reptiles of the World) (New York 1910) ; Boulenger, (Snakes of the British Museum5 (London 1893-96) ; Genther, Rep¬ tiles of British India5 (London 1901) ; Gadow, (Amphibia and Reptiles5 (London 1901). See Hamadryad.

COBURG, ko'boorg, a noted family of Ger¬ many, dating from the 5th century, distin¬ guished for intermarriages with royal houses, especially

during the 19th century. A sister of Duke Ernest I became Duchess of Kent and mother of Queen Victoria ; the duke's brother Leopold became king of the Belgians and mar¬ ried in succession daughters of George IV of England and of Louis Philippe ; one of his nephews, Ferdinand, married the queen of Por¬ tugal and was regent of that kingdom, 1853 ; another, August, married a daughter of Louis Philippe; one of his sons, Duke Ernest II, de¬ clined the crown of Greece, 1863, and another, Prince Albert, was the husband of his cousin, Queen Victoria of England.

COBURG, or KOBURG, Germany, capital of the state of Saxe-Coburg-Gotha, situated on the left bank of the Itz, 106 miles east by north of Frankfort-on-the-Main. 'Among the principal buildings is the Ehrenburg Palace, one of the town residences of the Duke of Saxe-Coburg-Gotha, formerly a monastery of the Recollets, but converted into a ducal resi¬ dence in 1549. It contains some interesting pictures, tapestry, etc. Some of the old doors exhibit beautiful specimens of marquetry or inlaid work. There are one or two other palaces and various monuments, including a statue of Prince Albert, consort of Queen Vic¬ toria. The chief church is the Moritzkirche, a spacious building in the late Gothic style, with a tower 334 feet high. The government house is a handsome structure in the Italian style. The educational institutions comprise a gymna¬

sium (founded in 1605), real school, normal school, etc. On an eminence overhanging the town is the ancient castle or fortress, now a museum, from which extensive views are ob¬ tained. In the museum are relics and writings of Luther, who resided here for three months in 1530, and here wrote some of his works. This castle was occupied by the Swedes in 1632, and was unsuccessfully besieged by Wallen¬ stein during the Thirty Years' War. Coburg has manufactories of porcelain and ceramic wares, carriages, furniture, etc., and has also malt-works, breweries, woolen and linen mills, machine works, colors, ironwork, lumber and basketware manufactories. Pop. 23,794.

COBURN, Foster Dwight, American farmer and agricultural writer: b. Jefferson County, Wis., 7 May 1846. After serving in two Illinois infantry regiments during the Civil War he went to Kansas in 1867. The agricul¬ ture of Kansas owes much to his expert knowl¬ edge and enthusiasm. He became secretary of the Kansas board of agriculture in 1882, and later, in 1894, holding the position until he resigned, 1 July 1914. He was chief of the de¬ partment of live stock at the Saint Louis Ex¬ position (1904). He was repeatedly a member of the board of regents of the State Agricul¬ tural College and president of the State Tem¬ perance Union; was editor for five years of the Kansas Live Stock Indicator. He is vice- president and director of the Prudential Trust Company, also of the Capitol Building and Loan Association, and director of the Bank of Topeka. In 1906 he refused an

appointment as United States senator. He published (Swine Husbandry5 (1904); < Alfalfa5 (1901);

COCA (Erythroxylon coca), a shrubby plant belonging to the family Erythroxylacece, found wild in the mountainous regions of Peru and Bolivia, and cultivated in districts 2,000 to 5,000 feet or more above sea-level. The leaves are gathered and dried in the sun, and chewed with a little powdered chalk. When taken in some quantity they produce an intoxication like that of opium. As the indulgence is repeated the appetite for it increases, while that for wholesome nourishment diminishes; the miser¬ able victim loses all power of resisting his craving, and becomes reduced to a condition of physical and mental prostration. When used in moderation coca lessens the appetite for food and enables those who have partaken of it to sustain greater fatigue than they otherwise could. It has been found the best preventive of asthmatic symptoms caused by the rapid ascent of lofty mountains. An infusion of the leaves is also used with the same effect.

COCAINE, ko'ka-Tn, a vegetable alkaloid, with the chemical formula Ci7H2iN04, obtained from the leaves of the coca shrub (Erythroxy¬ lon coca) growing on the eastern slopes of the Andes and cultivated in Peru, Bolivia, Colom¬ bia and Brazil, and in Java, Ceylon and the Malay States. Cocaine was first isolated by Niemann in 1860. Its anaesthetic qualities were discovered by von Anrep in 1880, but it did not come into use as a surgical adjunct until Koller

in 1884 began to employ it to produce local anaesthesia in operations upon the eye.

Ihe leaves of the coca contain alkaloids of lour types: (1) Cocaines — alkyl acyl deriva¬ tives of ecgonine ; (2) acylecgonines — acyl de¬ rivatives of ecgonine ; (3) pseudotropeines — acyl derivatives of pseudotropeine ; and (4) hygrines. The first and second types may be used as commercial sources of ecgonine, and thus for the manufacture of crystalline cocaine — benzomethyl ecgonine. The South American leaves yield about 1 per cent of total alkaloids, mostly cocaine ; the Ceylon and Malay leaves contain up to 1.6 per cent of total alkaloids, of which about 65 per cent is cocaine; the Java leaves contain 1.6 per cent of alkaloids, scarcely any of which is cocaine, but from which cocaine is readily obtained.

In Peru the coca leaves are macerated in water containing dilute sulphuric acid in a series of four vessels, in each of which the leaves remain four days, the liquor being changed every day from the oldest tank to the next

newer, the leaves from the oldest being thrown away. To this concentrated liquor is added carbonate of soda in a 60° (Be) solution. This precipitates the cocaine in solid form. Petroleum is then introduced and the whole gently agitated. The petroleum takes up the cocaine and is then washed with water to remove the last trace of acid. It is then treated with water containing dilute sulphuric acid in which the cocaine is redissolved, the whole being violently agitated for 30 to 40 minutes. After standing a short time the cocaine solution is drawn off, leaving the oil to be used again. The acid solution is treated with sodium carbonate and allowed to stand 12 hours, and then passed through a filter which collects the precipitate. This is washed with distilled water and pressed into a brown paste in a filter press. Another method prac¬ tised with the imported dry coca leaves is to macerate them, adding the sodium carbonate solution and the petroleum and agitating the mixture for some hours. The cocaine with cinnamyl cocaine (etc.) are taken up by the petroleum, which is then shaken with dilute hydrochloric acid. The resulting hydrochloride of cocaine crystallizes out and is pressed and dried. This crude salt is purified by dissolving in water, liberating the free base by ammonia and redissolving in alcoholic hydrogen chloride. The pure cocaine hydrochloride crystallizes out. The mother liquor contains the other coca al¬ kaloids, and these are converted into cocaine by heating with boiling hydrochloric acid and pouring into water. The truxillic acids sep¬ arate and are filtered off. The filtrate is con¬ centrated until ecgonine hydrochloride crystal¬ lizes out. This is benzoylated and methylated in turn to produce cocaine.

The crude cocaine of commerce is con¬ verted into hydrochloride, in which form it is used as a drug, by first dissolving it in dilute hydrochloric acid and then treating cold with a solution of potassium permanganate — which destroys the larger part of the alkaloids accom¬ panying the cocaine before attacking the latter. At that point the action is checked by adding sodium carbonate, and the precipitate is taken up with ether. The ether solution is evaporated to dryness and the residue dissolved in acetone and treated with hydrochloric acid.

Cocaine crystallizes from its alcoholic solu¬ tion in small monoclinic prisms which melt at 208° F. and dissolve sparingly in cold water — though fairly in hot water — and freely in ether and alcohol. The hydrochloride is readily soluble in water.

Salts of cocaine are precipitated from solu¬ tion by numerous reagents, among which are ammonia, caustic potash, sodium carbonate, picric acid, tannic acid, gold trichloride and platinum tetrachloride. Cocaine when taken internally is a cerebral stimulant, and moderate doses usually cause a pleasant sense of exhilara¬ tion and temporary increase in mental and physical power, though accompanied by a more or less complete loss of moral sensibility. This condition is followed by a corresponding period of depression. The sense of hunger and fatigue is lessened so that privations may for the time being be better endured under the influence of the drug. Moderate doses powerfully stimu¬ late respiration, and, to a less degree, the heart and circulation. The body temperature is not affected by small amounts, but in overdose it may be elevated several degrees. The drug is to a large extent oxidized in the body, though small amounts may be excreted by the kidneys. It is alleged that the quantity of nitrogenous material eliminated in the urine is decreased, indicating a reduction in tissue waste, but this has not yet been clearly proved. In poisonous doses cocaine produces narcosis — sometimes with epileptiform convulsions — with depres¬ sion, followed by paralysis, of the sensory nerves and to a less degree of the motor nerves. The symptoms of poisoning vary greatly in dif¬ ferent individuals. Moderately toxic amounts may give rise to disagreeable mental excitement and unrest, nausea, faintness, pallor, cold per¬ spiration and prostration, or to a sense of mal¬ aise and depression. Large doses cause rapid respiration, feeble and accelerated heart action, dilated pupils, headache, dryness of the throat and muscular twitchings. General convulsions may supervene — or collapse occurs, the skin is cyanotic and cold, the blood pressure falls through great cardiac depression, respiration be¬ comes slow and shallow and death occurs through failure of this function. The treatment of poisoning includes the evacuation of the stomach if the drug has been taken by mouth, and the use of stimulants such as ammonia, coffee, strychnine, ether or alcohol. If con¬ vulsions are present these must be combatted by the inhalation of small amounts of ether or chloroform and the cautious administration of sedatives. Morphine is said to be the best physiological antidote. Cocaine is used inter¬ nally to some extent as a stimulant in certain febrile and mental conditions, as well as on account of its topical action in gastric disorders or in obstinate vomiting, but its most important field of utility is the production of local anaethesia in minor surgery. When applied ex¬ ternally in proper strength it produces a loss of sensation, particularly to pain and touch, through paralysis of the terminations of the sensory nerves. Applied to the eye it

causes anaesthesia, contraction of the blood vessels, re¬ duction of intraocular tension and dilation of the pupil, but the reflex to light is not lost and there is little or no paralysis of accommodation. Brought into contact with the tongue it destroys the sense of taste for bitter substances, though

salt may still be recognized and sweet and sour fluids do not entirely lose their flavor. The sense of smell may be entirely abolished by the application of cocaine to the mucous mem¬ brane of the nose, but it is not absorbed from the unbroken skin. When injected under the skin or applied to mucous membranes a feeling of numbness is produced and incisions or other painful manipulations may be practised on the part so treated without giving rise to discom¬ fort. For this purpose solutions varying in strength from 2 to 10 per cent are usually employed.

The applicability of local anaesthesia hast been greatly extended by means of what is called nerve blocking. It has been found that on the injection of a small amount of a weak solution of cocaine into the trurtk of the main nerve supplying a part, sensation is cut off in that region and painless operating is possible. A plan which enables extensive areas to be anaes¬ thetized with but small amounts of the drug is called Schleich's infiltration method. For this purpose a very weak solution of cocaine, mor¬ phine and sodium chloride is injected into the tissues until considerable local swelling or edema is caused. In this way the effect of pressure on the local nerve filaments and the local anaemia combine to aid the action of the very small amounts of the alkaloids.

A very great advance was made when it was found that it was practicable to produce anaesthesia embracing almost the entire body bv injecting cocaine solutions into the spinal cord by means of a long hypodermic needle usually inserted between the fourth and fifth lumbar vertebrae. Anaesthesia of the legs and trunk about as high as the breasts is produced within 15 minutes and lasts from two to five hours. For this purpose as for use in other ways small quantities of adrenalin are often added to the cocaine solution with the idea of neutralizing some of its undesirable quali¬ ties. Spinal anaesthesia, however, is not alto¬ gether without dangers or drawbacks, and will probably never be used as a routine procedure.

Owing to the more or less serious dis¬ advantages of cocaine, particularly its tendenc3r to produce grave poisoning in some persons even when in small doses, and also because of the difficulty of sterilizing its solutions without impairing their virtue, substitutes have been sought by the synthetic

chemists, and with much success. By various combinations with the groupings in atropine, to which cocaine is closely allied chemically, there have been de¬ veloped eucaine-B, or beta-eucaine, nirvanine, novocaine, holocaine, stovaine and alypine. These all produce, when administered in suffi¬ cient quantity, a slowing down and diminution in the extent of the respiration and a fall in blood pressure. Use is also made of tropacocaine, an alkaloid found in the Java coca leaves. It is less toxic, though quite as effective in local anaesthesia, as cocaine. The relative toxicity of these substances as compared with cocaine is approximately: cocaine, 100; alypine, 90; holo¬ caine, 60; stovaine, 55; tropacocaine, 50; beta- eucaine, 40 ; nirvanine, 30 ; novocaine, 30.

Cocaine is sometimes used in the treatment of the morphine habit, not infrequently with the result that the victim only exchanges one form of bondage for another no less pernicious. Many persons innocently • acquire the cocaine

addiction through the use of various nostrums in the form of snuff or snuffing liquids, os¬ tensibly intended for the cure of nasal catarrh, hay fever, etc. The temporary alleviation of his symptoms produced by the compound induces the sufferer to continue its use until he is fairly in the grip of a servitude leading to certain de¬ struction unless its fetters are cast off by the exercise of almost superhuman fortitude. The cocaine habitue has to suffer from necrosis of the nasal cartilages, progressive loss of flesh and strength, digestive and circulatory disorders, trembling of the limbs, insomnia, headache, vertigo, etc. Hallucinations and even outbreaks of maniacal fury are not unusual and there is complete decadence of the mental and moral qualities. The cocaine fiend respects no con¬ vention or obligation, and will lie, steal or use any other base means to gratify his passion for the drug, being lost to all considerations of dut3r or social position.

In the endeavor to check the ravages of cocaine and other habit-forming drugs several of the States have passed laws more or less stringent. The Federal government has also aided to some extent with the so-called (

Bibliography. — Knapp, H., (Cocaine and

Its Use in Ophthalmic and General Surgery' (New York 1885) ; Mariani, A., (Coca and Its Therapeutic Application' (New York 1891) ; Mortimer, W. G., (Peru: History of Coca' (New York 1901) ; Wharton, F., and Stille, A., ˆMedical Jurisprudence' (Philadelphia 1882) ; Wood, H. C., therapeutics' (Philadelphia

1891).

COCAMA, ko-ka'ma, or UCA YALES, a

tribe of Tupian stock inhabiting the banks of the lower Ucayali River, in northeastern Peru, also near Nauta on the left bank of the Ama¬ zon, opposite the mouth of the Ucayali. Consult the works of De Castelnau and Marcoy and Rivet, (Les langues guaranies du Haut-Ama- zone,' in Journal de la Societe des Ameri- canistes de Paris (Paris 1908).

COCANADA, ko'ka-na'da, India, the cap¬ ital of the Godavari District, Madras, 315 miles northeast of Madras, and the second city on the

Coromandel coast. It is connected by navigable canals with the Godavari River. The harbor is silting up and has caused the port trade to decrease. Great quantities of cotton are ex¬ ported, also rice, sugar, oil, pulse and tobacco. Cheroots, iron and salt are manufactured. Pop.

54,110.

COCCEIUS, kok-tsa'yoos, Heinrich von,

German jurist: b. Bremen 1644; d. 1719. He studied at Leyden and Oxford; was in 1672 professor of law at Heidelberg, and in 1688 at Utrecht; in 1690 regular professor of laws at Frankfort-on-the-Oder. He went to The Hague in 1702, without giving up his office, on occasion of the disputes as to the hereditary succession of the house of Orange; and re¬ ceived for his services, in 1713, the rank of baron of the empire. As a lawyer he was the oracle of many courts, and his system of Ger¬ man public law ((Juris Publici Prudential was almost a universal academical textbook of this science.

COCCEIUS, or KOCH, Johannes, Dutch theologian: b. Bremen 1603; d. 4 Nov. 1669. He studied at Hamburg and Franeker, under Sixtimes Amama, a noted biblical scholar. Re¬ turning to Bremen in 1630, he taught biblical philology at the Gymnasium there ; and in 1636 became professor of Hebrew and theology at Franeker until 1650, when he became professor of theology at Leyden. He was the leading ex¬ ponent of the "covenant® or "federal® theology, which taught that the covenant was the basis of theology. There were two covenants, one be¬ fore the fall, the "Covenant of Works,® and after the fall the "Covenant of Grace,® to fulfil which the Messiah came. He found New Tes1- tament ideas in the Old Testament. A school of theologians which elaborated this philosophy were called "Cocceians.® His chief works were (Lexicon et Commentarius Sermonis Hebraici et ChaldaicP (Leyden 1669), a work which is the first scholarly dictionary of the Hebrew language; and (Summa Doctrinae de Foedere et Testamento Dei) (1648) in which his religious views are expounded. His

collected works.with a biography were published by his son in 12 folio volumes (Amsterdam 1673-75).

COCCO, COCOA-ROOT, EDDOES, TARO, various plants of the genera Caladium and Colocasia of the family Aracece. They are widely cultivated for food in the tropical and subtropical islands of the Pacific, the West In¬ dies and adjoining continental regions, and to a less extent in other warm countries. The edible part most desired is the starchy acrid tuber which is eaten like potatoes or made into poi, a substance obtained by roasting the tubers, pounding them with water to a paste and allow¬ ing the mass to ferment before being eaten either in that form or again prepared for the table. In this form the roots are a staple food of the Polynesians. During the process of roasting or boiling the tubers lose their acridity, which quality is, in some plants, almost wanting. The young leaves of some species are used as pot-herbs. The principal species is Colocasia antiquorum var. esculentum, a perennial herb with heart-shaped peltate green leaves often three feet long and nearly as wide, and an inconspicuous spadix. It is very popular as a bedding plant in the United States, since it gives a sub-tropical effect, especially when grouped

with cannas and crotons. Popularly ii is known as elephant's ear. It is easily grown, being started in the greenhouse, transplanted to the open ground after danger of frost, freely sup¬ plied with water and, at the approach of frost in the autumn, stored in a cool, dry cellar.

COCCOLITH, the name given in 1858, by Huxley to one of certain minute oval or globu¬ lar calcareous bodies found in countless num¬ bers in the ooze of the Atlantic, either detached or adherent to small pieces of protoplasm. They have since been dredged up from other places, and found in chalk, and, according to Guembel, in limestone of all ages. Carter thinks they belong to Melobesia , a genus of algae.

COCCOSTEUS, a genus of fossil Ar- throdira, sometimes classed with the Dipnoi, though regarded by others as aberrant Teleos- tomes, pertaining chiefly to the Devonian and Old Red Sandstone systems, but met with also in Silurian strata. The head and front of the trunk was protected by a great shield covered with tubercles. Besides this bony cuirass there was also a ventral shield, but the rest of the body was naked. The skull was autostylic. The mouth was furnished with small teeth, like those of the modern Dipnoi. Pectoral fins were lacking, but pelvic and dorsal fins were present. See Dinichthys; Dipnoi.

COCCULUS INDICUS, or fish-berry, as it is commonly known in the United States, is the seed of a herbaceous climbing vine (Ana – mirta paniculata) , of the family Menisper- macece. The dried berries are imported from the East Indies. The drupe resembles a round berry, the size

of a pea or larger, wrinkled ex¬ ternally, and with a brittle husk. The kernel is intens-ely bitter. It contains about one-fiftieth of its weight of a powerful bitter narcotic poison called picrotoxin, also bases called menis-permine, a crystalline base, paramenispermine, and several organic acids. Picrotoxin is used as an adulterant in enriching and imparting a bitter taste to malt beverages, and is thrown into rivers in which fish abound to stupefy them, so that they may be readily caught. It has been used in the form of an ointment in certain skin diseases, and in decoctions for killing vermin in the hair of children and ani¬ mals, although death is sometimes caused through this latter use. The symptoms of pois¬ oning are twitching and inco-ordination of the muscles, increased reflex excitability, convul¬ sions, coma and death from asphyxia.

COCCUS, in zoology , a genus of insects of the order Hemiptera, family Coccidce. See Scale Insects; also Cochineal; Kermes; Lac.

In Medicine. — Coccus is also the name of a family of bacteria characterized by their spherical form and consisting of a number of genera, all named for certain growth characters. Thus cocci that grow in chains are termed Streptococci in which group the virulent bac¬ teria that cause blood-poisoning, septicaemia, and the organism of erysipelas are found; cocci that grow in pairs are termed diplococci. The diplococcus of pneumonia and the diplococcus of gonorrhoea are in this group. Others grow in bunches, — Staphylococci. The common organism of pus is Staphylococcus pyogenes aureus, by bacteriologists usually called S.p.a. Other spherical forms are known as Micrococci ,

one of which group, the Micrococcus urea •, is found in the urine as causative agent in exces¬ sive urinary fermentation. Some forms of this family group grow in packets. These are termed Sarcince. They are very abundant in the air, and are frequently associated with chronic gastric fermentations. A large number of different forms of this family are known, the greater majority of which are not pathogenic but very useful in agriculture and the arts, par¬ ticularly in agricultural processes. As many as a hundred different species have been found in the air, and Chester has described 36 species of Streptococcus , 91 species of Micrococcus (Staphylococcus here included), 14 species of Sarcince, 3 species of Planococci , or movable cocci, and 3 species of Plano sarcince. (See Bacteria). Consult Chester, (Manual of De¬ terminative Bacteriology. >

COCCYGOMORPHiE, a group of birds, proposed by Huxley, and nearly equivalent to the Cuculiformes of recent authors. See Ornithology.

COCCYX, kok'siks. See Osteology.

COCHABAMBA, ko-cha-bam'ba, Bolivia, a central department of the republic, bounded on the north by the department of Beni, on the east by Santa Cruz, on the south by Chuquisaca and Potosi, and on the west by Oruro and La Paz. Its area is about 22,000 square miles. The following list shows its provinces and the varie¬ ties of climate: Tarata, Mizque, Punata and Ayopaya are tropical; Chapare, Tapacari, To- tora, Arque and Furacares are semi-tropical ; the capital district is temperate. The gold¬ mines at Choquecamata in Ayopaya have been worked for a long time, and were famous dur¬ ing the period of the Spanish supremacy. Silver and marble are found at Palca ; gold and sil¬ ver at Sayari ; silver in Mizque, Colcha de Ar¬ que and Quioma. Cochabamba has been called (

COCHABAMBA, Bolivia, the capital of the department of the same name,

on the Rio de la Rocha, in a fertile valley, about 8,000 feet above sea-level. It is laid out with wide and regular streets and contains several pretentious structures, notably the theatre, government building, and the hospitals of Viedma and San Salvador. It has a university, two colleges and secondary schools. The city manufactures cot¬ ton and woolen goods, leather, soap and earth¬ enware, and besides carries on considerable trade, especially in grain. Cochabamba was founded in 1563 and was called Oropesa. In

1847 it was created an episcopal see. Pop.

24,512.

COCHEM, ko'Hem, Prussia, capital of a district in the Rhine province, at the confluence of the Endert and Moselle, 24 miles southwest of Coblenz. It is beautifully situated, has a fine park on the river front. Here is a war monument by Schies. Nearby is the episcopal castle of the archbishops of Treves. It was destroyed by the French in 1689 and was re¬ stored in 1868. The city has several mills. Forestry and wine handling are important in¬ dustries. Pop. 3,758.

COCHERY, kosh're', George (Charles Paul), French public official : b. Paris 1855. He was the son of Louis Adolphe Cochery, was educated at the Lycee Condorcet and the Lcole Polytechnique. He was successively director in the Department of Posts and Tele¬ graphs, Minister of the Interior, president of the general council of Loiret, and in 1895-98 and in 1909-10 was Minister of FifRince. He is a chevalier of the Legion of Honor..

COCHERY, Louis Adolphe, French states¬ man : b. Paris 1819 ; d. 1900. He practised law in Paris and became Chief of Cabinet in the Ministry of Justice during the Revolution of 1848. Afterward he was editor of the Avenir National, and in 1868 founded U Inde pendant de Montargis. He was a member of the legis¬ lative assembly and opposed the war with Ger¬ many. In 1870 he became general commis¬ sioner of the National Defense in the depart¬ ment of Loiret. He was undersecretary of the Department of Finance under Dufaure and was Minister of Posts and Telegraphs in 1878-85. He was elected senator in 1888.

COCHIN, ko-shan, Charles Nicolas,

French engraver: b. Paris, 22 Feb. 1715; d. Ver¬ sailles, 29 April 1790. He was the son of an etcher of note and his productions excelled those of his father. He was chosen engraver to the king (1739) and in this capacity por¬ trayed a number of court subjects. The col¬ lection of his works contains more than 1,500 pieces, among which are 112 likenesses, in the form of medals, of the most renowned French scholars and _ artists of his time, who were among his friends. Besides his essays in the memoirs of the Academy, he published (Voyage d'Italie) (1758) ; criticisms on art under

the title (GEuvres diverses) ; and also (Memoires inedites du Comte de Caylus (1780). His frontispieces and vignettes are remarkable for neatness and taste. His views of 16 French seaports are of great value. His composition in general is rich, delicate and pleasing. He was a member of the Academy, was ennobled in 1757, and occupied several places of importance. Consult Rocheblave, (Les Cochins) (Paris 1893).*

COCHIN, Henri Denys Benoit Marie,

French author and deputy: b. Paris 1854. He received his education at the Lycee Louis-le-Grand, Paris. He served in the Franco-Prussian War 1870-71, became an at¬ tache of the Ministry of the Interior and after 1893 served continuously in the Chambre des Deputes. He was chosen member of the Academy in 1911. He has published (Giulietta et Romeo) (1878) ; (Le manuscrit de M. Lar- sonnier) (1880) ;• (Bocc.ace) (1890) ; (Un ami

de Petrarque) (1892) ;

COCHIN, ko-chen, India, seaport of Hin¬ dustan, in the Malabar district of the Madras presidency, situated on the coast. It is a picturesque place with many quaint old Dutch buildings. Its harbor, though sometimes inac¬ cessible during the southwestern monsoon, is the best on this coast. It is the chief port on the Malabar coast, and ranks third in import¬ ance in the Madras presidency. Cochin was one of the first places in India visited by Europeans. It was visited by Cabral in 1500; in 1502 Vasco da Gama established a factory; in 1503 Albuquerque built a fort, and here he died in 1524. In 1530 Saint Francis Xavier visited the seaport, and made many converts. In 1663 the Dutch took the place; in 1795 it fell permanently into British possession. Pop.

20,023.

COCHIN, a variety of the domestic fowl, imported from Cochin-China. It is a large, ungainly bird, valuable chiefly owing to its fecundity, eggs being laid even during the win¬ ter. They are brown, black, buff or variegated in color, and except in the black variety have yellow-feathered legs and single erect combs.

COCHIN-CHINA, a country forming part of the peninsula of southeastern Asia, and generally regarded as comprising the whole of Anam and Lower or French Cochin-China. Three of the six provinces into which the latter was divided were acquired at one period, and the remaining three at another period. A persecution of the French Roman Catholic mis¬ sionaries

in Anam furnished the French with an occasion of regaining a footing in the East. An expedition against Cochin-China was de¬ cided on in 1857, and Saigon was occupied. The Austro-Italian War deferred further operations till 1861, when the conquest of Metho gave the French possession of the most fertile district of Lower Cochin-China. The war continued till 5 June 1862, when a peace was concluded at Saigon with the king of Anam, which was ratified at Hue 15 April 1863. By this treaty the king agreed to cede to the French the three provinces of Bienhoa, Saigon and Metho, along with the island of Pulo Condore, to tolerate the Roman Catholic re¬ ligion, to open three of the ports in Tonquin to French ships, and to pay an indemnity of 24,000,000 francs (about $4,800,000). Although the inhabitants were found to be on the whole sufficiently tractable, yet a few revolts took place, whereupon Admiral De la Grandiere, on the pretext that all these disturbances had their origin in the provinces of Lower Cochin-China which had remained to Anam, namely, Vinh- long, Chaudoc and Hatien, took possession of these provinces, and declared them French ter¬ ritory, 25 June 1867. The territory thus ac¬ quired by France in this peninsula covers 21,- 980 square miles, and in 1915 had a population of 3,050,785. It is now. organized in depart¬ ments, prefectures, sub-prefectures and cantons. In 1882-83 France asserted a claim to the pro¬

tection of Tonquin, and indeed the entire Anam territory, and after some fighting this claim was conceded by the king. Tonquin was ac¬ cordingly taken possession of by France in 1884. Anam (q.v.) forms a protectorate. In 1888 it became part of the governor-generalship of Indo-China, is under the administration of a lieutenant-governor, and is represented by a deputy in the French chamber. Anamese troops served under French leadership in the Allied campaign in the Balkans in 1916.

The northern and eastern parts of French Cochin-China are hilly, but the rest of the ter¬ ritory consists almost entirely of well-watered low alluvial land, and from the deposits brought down by the rivers, oj extraordinary fertility. The lowlands, where the waters stagnate, are covered with a rank vegetation from 3 to 10 feet high; contiguous to the flowing streams are extensive rice-grounds. Where the soil is somewhat raised above the water-level it is very fertile, and in some places ranges of low hills follow the line of the rivers. In the more elevated districts are grown tobacco, sugarcane, maize, indigo and betel. Among the other products are tea, gums, cocoanut oil, silk, spices and various farinaceous and aroma¬ tic articles. The Anamites raise also great numbers of buffaloes, cattle, hogs and birds, the first being employed in agriculture, and, as well as oxen, for draft purposes; but since the French conquest, oxen are reserved more strictly for food. Industrial arts are as yet limited among the natives. They are skilful in all kinds of basket-work, in which they use the reeds and other similar

materials which abound in the low lands ; silk and cotton are also wrought. But they excel in the use of wood, of which their temples, pagodas and tombs are built, and ornamented with elaborate carv¬ ing. They live in villages — numbering nearly

I, 000 — adjacent to the rivers, which, in the unsuitableness of the country for land traffic, form almost the only means of communication. Their houses are either tiled or thatched with straw, the roofs being supported with wooden pillars; the better class are in two sections, the inner apartments and the outer veranda, which serves for use in the daytime; they are often well furnished, and not devoid of comfort. The only roads at present are those connecting Saigon, the capital (pop. 1915, 100,000, with

II, 250 white) with the principal towns. The most populous city is Cholon, with 191,655 in¬ habitants. There are 2,670 miles of telegraph in operation. The climate is humid and warm, and very trying for Europeans. The prevail¬ ing religion is Buddhism. There are some 600 schools in the territories. The principal ex¬ port is rice, of which there is annually ex¬ ported about 7,000,000 hundredweight, mainly to China; cotton and silk are also exported.

COCHIN-CHINA, Upper, or DONG- TRONG, a narrow strip of land, consisting of four provinces, on the east coast of Anam, to which empire it belongs, extending from Ton¬ quin on the north to Champa on the south. The most important river is that on which the chief town, P'hu-thua-thien or Hue, stands. In the most fruitful parts of this region aloes wood (of the Aquilaria ovata), corn, sugar¬ cane and cinnamon flourish. From October to January the weather is often very stormy, and

typhoons rage frequently. The climate is healthy and pleasant. Camphor is produced in the district in the utmost perfection.

COCHINEAL, koch'i-nel, one of the scale insects (Coccus cacti), used as a dye. It is a native of Mexico, but has been introduced into Europe, Algiers, and the Canary Islands, where the plantations of cactus were cultivated for their nourishment. It is a small insect with the body wrinkled transversely; its abdomen of a deep mulberry color, and bristly in the pos¬ terior part; the legs are short and black. The principal district in which they are now reared is in the province of Oaxaca, those of the dis¬ trict of Mestique being considered the best insects. There are plantations of the nopal (Opuntia ciccinellifera) , upon which they feed, the insects being tended with care equal to that ordinarily bestowed upon silkworms. Before the rainy season sets in, branches of the nopal covered with insects are cut off and brought under shelter to protect them from the weather. At the close of the wet season, about the middle of October, the plantations are stocked from these supplies by suspending little nests made oi some soft woody fibre, each containing 8 or 10 females, upon the spines of the nopal. The insects, warmed by the sun, soon emerge and lay their eggs, each female producing more than 1,000 young. These spread rapidly over the plants, and as the young females become im¬ pregnated they attach themselves to the leaves and swell to great size, presenting the appear¬ ance more of vegetable excrescences than of animated creatures. In this condition they are gathered for the cochineal. The males, which are few in number, not more than 1 to 100 or 200 females, are of no value for this purpose. The females are picked off with a blunt knife, the first crop about the middle of December, and subsequently several more of as many suc¬ cessive generations, the last being in May. A laborer can pick off in a day only about enough to make two ounces of cochineal. Those taken off full of young lose about two-thirds of their weight in the process of drying, to which they are subjected as soon as they are killed, which is done either by dipping them in a basket into boiling water, or placing them in a hot oven, or on plates of hot iron. By the first method, usually considered the best, the insects turn to a brownish red color, losing a portion of the white powder with which they were previously loaded between the wrinkles of the body. In the oven they retain this, and their color is then gray. Those killed on hot iron turn black. Such is the origin of the different varieties known in our market as <(silver grains and black grains, w and the <(foxy}) of the London market, the last being those killed by boiling water, though others ascribe it to the former being the female before laying her eggs, and the latter after she has parted from them. The quality of the cochineal is

the same in both cases. When dried, the cochineal presents the form of grains, convex on one side and concave on the other, about one-eighth of an inch in diameter, with the transverse wrinkles still vis¬ ible. It is stated that it takes about 70,000 insects to weigh a pound. The market value of cochineal has declined so much since the intro¬ duction of coal-tar dyes that the cultivation of the insects has been abandoned elsewhere than

in Mexico, and comparatively little of this dye is now produced even there. See Scale Insects.

COCHINEAL-FIG, a name given to Nopalea coccinellifcra and several other species of cacti, natives of Mexico and the West Indies, the plants on which the cochineal insect lives. See Cactus; Cochineal.

COCHITUATE, ko-chitu-at, LAKE, Mass., a narrow body of water, about four miles long, in Middlesex County, 17 miles west of Boston. From this lake for many years Bos¬ ton has derived its principal water-supply.

COCHLEA, kok-le'a, an important part of the internal ear, so called from its shape, which resembles that of a snail-shell. See Ear.

COCHLEARIA, kok-U-a'ri-a, a genus of annual maritime herbs of the mustard family (Cruciferce) . It numbers upward of 25 species, all natives of the colder parts of the north tem¬ perate zone, and not familiar generally. About four species are found on the Arctic and northern Pacific coasts of North America. Two very distinct species quite well known are the horse-radish (C. armoracia) , escaped from cultivation, and now found wild in the moist ground along streams, and scurvy-grass (C. of¬ ficinalis), considered of great value as an anti¬ scorbutic. If eaten fresh, it is a stimulant and diuretic, but is feeble if allowed to dry before being taken.

COCHRAN, kok'ran, John, American soldier and lawyer : b. Palatine, Montgomery County, N. Y., 27 Aug. 1813; d. New York, 7 Feb. 1898. He was graduated at Hamilton Col¬ lege 1831, practised law in Oswego from 1834 to 1845, when he removed to New York, where his talents as lawyer and orator at once brought him into prominence. He was surveyor of the port of New York 1853-57, and a Democratic member of Congress 1857-61, serving as chair¬ man of the Committee on Commerce. During the Civil War he commanded the 1st United States Chasseurs in the Peninsula campaign ; was commissioned a brigadier-general 17 July 1862, and commanded a brigade in General Couch's division of the Army of the Potomac; was with the reserve at the battle of Antietam and took an active part in the pursuit of the enemy. He was attorney-general of New York State 1863-65. In 1864 he was nominated on the Fremont ticket for the Vice-Presidency. He was active in securing Greeley's nomination for President in 1872 ; was president of the New York common council 1872,

and acting mayor when Mayor Hall retired during the Tweed ring disclosures ; again a member of the council in 1883, and a police justice 1889.

COCHRANE, Frank, Canadian statesman : b. Clarenceville, Quebec province, 18 Nov. 1852, and educated in the academy of his home town. He was for several years mayor of Sudbury, Ontario, in which town he had a hardware busi¬ ness and became interested in mining, lumbering and industrial ventures. He was returned for East Nipissing in the Conservative interest to the provincial legislature of Ontario in 1905, becoming Minister of Lands and Mines in the Whitney Cabinet. At the general election of 1908 he was returned M.P. to the Dominion Parliament, and on the defeat of the Laurier administration in 1911 accepted the portfolio

COCKATOOS (Cacatuinse)

1 The Slender-billed Cockatoo (Licmetis nasicus)

2 The Black or Crow Cockatoo (Calyptorhynchus galeatus)

of Railways and Canals in the Borden gov¬ ernment.

COCHRANE, Thomas, 10th Earl of Dun- donald, British naval officer : b. Annsfield, Scot¬ land, 14 Dec. 1775; d. Kensington, England, 31 Oct. 1860. While still a boy he was enrolled in the navy, and gained the rank of captain. He entered Parliament in 1806. He was noted for his attacks on naval abuses by which he himself profited. In 1814 he was accused of conspiring to circulate a false report of Na¬ poleon's death for speculative ends, and though he protested his innocence he was imprisoned for a year, fined and was expelled from the navy and the House of Commons. In 1818 he accepted an invitation to organize the navy of Chile and performed many brave exploits dur¬ ing the contest with Spain. He left the service of the Chileans and was commander of the Bra¬ zilian navy from 1823 to 1825, when he resigned, because accused of insubordination. In 1827 and 1828 he commanded the Greek army. In 1832 he was cleared of the charges brought against him in 1814, and restored to the Order of the Bath and to the English navy. He was appointed vice-admiral in 1841 ; admiral in 1851, and rear-admiral of the United Kingdom in 1854. He was of an inventive turn also, and took out patents for lamps to burn oil of tar, for the propulsion of ships at sea, for facilitat¬ ing excavations, mining, sinking; and as early as 1843 was an advocate of steam and screw pro- pellors in warships. He was exceedingly dar¬ ing, but his irascible temper

and hastiness caused him unnecessary misfortunes. His son pub¬ lished a (Life) based on his (Autobiography of a Seaman) (1860-61).

COCHRANE, Canada, town in the Timis- kaming district of Ontario, 500 miles north of Toronto, on the Transcontinental and the Timis- kaming and Northern Ontario railways. It has a custom-house and is the trading centre for northern Ontario and northern Quebec and is an outfitting point for miners, trappers and hunters. There are repair shops of both rail¬ ways here, and the town has electric lighting and power, water and sewerage systems. Pop.

1,715.

COCK. See Poultry.

COCK LANE GHOST, a famous hoax by which many people of London were deceived in 1762, arising from certain knockings heard in the house of a Mr. Parsons, in Cock lane. Dr. Johnson was among those who believed in the supernatural character of the manifestations; but it was found out that the knockings were produced by a girl employed by Parsons, for the purpose of haunting Mr. Kent, a former resident whose wife had died. Her ghost was supposed to accuse him of murder. Consult Lang, (Cock Lane and Common Sense> (Lon¬ don 1894).

COCK OF THE ROCK (Rupicola crocea), a South American bird of a rich orange color, with a beautiful crest, belonging to the family Cotingidcz. The name, or its French equiva¬ lent, is also applied to several related species.

COCKADE (Fr. cocarde), a plume of cock's feathers, with which the Croats in the service of the French in the 17th century adorned their caps. A bow of colored ribbons was adopted for the cockade in France, which

soon became a national emblem and party in¬ signia. During the French Revolution the tri¬ colored cockade — red, white and blue — be¬ came the national distinction. National cock¬ ades are now to be found over all Europe. In Germany cockades of black, red and gold, after being forbidden in 1832, were again allowed in 1848, and even introduced into the army. Since 1850, however, they have again ceased to be publicly worn. In Italy the former emblem of the party of progress, the green, red and white cockade, was recognized by the government of Piedmont in 1848, and since the formation of the kingdom of Italy it has formed the national cockade. Consult Carter, (Cockades : Their His¬ tory and Significance) (Genealogical Magazine, Vol. Ill, London 1899) ; Racinet, (Le costume historique) (Paris 1888).

COCKAIGNE, kok-an', Land of, an imag¬ inary land of idleness and plenty, in which the houses were roofed with cake, the rivers ran wine and

roasted fowl offered themselves to be eaten. The term was applied in derision to both London and Paris. The corresponding term in English is Hubberland,® and in Ger¬ man (

COCKATOO, an English rendering of a Malayan name for certain species of birds of the parrot family (Psittacidcz) . They are com¬ prised in Cacatua, and five other genera form¬ ing a sub-family, which, besides having some peculiarities of internal anatomy, is distinguished from true parrots by the greater height of the bill, and its being curved from the base, and by the lengthened, broad and rounded tail. The head is also large, and in the true cockatoos is surmounted by a crest of long and pointed pink or yellow feathers, with their tips directed forward, which can be erected and expanded like a fan, or depressed, at the pleasure of the bird. They live on fruits and seeds, insects, larvae, etc. The true cockatoos are also all of generally whitish plumage, but often finely tinged with red, orange and other colors, or mixed with these colors in more brilliant dis¬ plays. The cockatoos are confined to the Aus¬ tralian region and the neighboring Malayan Islands, with the exception of a single Philip¬ pine species. The sulphur crested cockatoos (Cacatua sulphnrea and galerita) are well-known cage birds which may be taught a few words, but their vocal efforts are chiefly limited to the harsh cry ˆcockatoo.® Several allied genera are also given this name, as Calyptorhyn- cus and Microglossus, both of which are dark.

COCKATRICE, a fabulous serpent or serpent-like monster anciently believed to be hatched from a cock's egg; It is often simply another name for the basilisk (q.v.).

COCKBURN, ko'bern, Sir Alexander James Edmund, English jurist: b. 24 Dec. 1802; d. 20 Nov. 1880. He studied at Cambridge; was called to the bar in 1829, and soon became dis¬ tinguished as a pleader before parliamentary committees. In 1847 he became member of Parliament for Southampton in the Liberal in¬ terest ; became solicitor-general and was knighted in 1850 and attorney-general, 1851— 56. He was made chief justice of the common pleas in 1856; and lord chief justice in 1859.

Among the many famous trials over which he presided were the Tichborne case and the Wainwright murder. He represented Great Britain at the Geneva arbitration tribunal for the adjustment of the ((Alabama Claims,® 1871—

72.

COCKBURN, Alicia or Alison Ruther¬ ford, Scottish lyrist: b. Fairnalee, Selkirkshire, about 1712; d. Edinburgh, 22 Nov. 1794. In 1731 she married Patrick Cockburn, advocate, and in 1753 was left a widow. She died after having for 60 years and more been one of the queens of Edinburgh society. In person she was said to be not unlike Queen Elizabeth. Of her lyrics the best known is the exquisite version of (The Flowers of the Forest) ((

COCKBURN, Sir George, English naval officer : b. London, 22 April 1772 ; d. Leaming¬ ton, 19 Aug. 1853. He entered the navy in early youth, and about 1812 obtained the rank of rear-admiral. He took part in the capture of Washington City in 1814, and conveyed Napoleon to Saint Helena in 1815. He was a first naval lord of the Admiralty from 1841-46, and sat in Parliament for many years.

COCKBURN, George Ralph Richardson,

Canadian educator: b. Edinburgh, Scotland, 15 Feb. 1834; d. London, Ontario, 17 Jan. 1912. He graduated at Edinburgh University 1857, went to Canada in 1858 and became rector of the Upper Canada Grammar School. In 1861 he was made principal of Upper Canada College, and under his administration of 20 years it at¬ tained a high reputation for the excellence of its teaching and discipline.

COCKBURN, Henry Thomas, Lord, Scot¬ tish judge: b. Edinburgh, 26 Oct. 1779; d. Bonaly, near Edinburgh, 26 April 1854. It was chiefly in connection with political cases that he rose to eminence in his profession, one leading transaction being his gratuitous de¬ fense of several persons tried for treason in the year 1818. He became solicitor-general for Scotland in 1830, and in 1834 one of the lords of session. (Memorials of His Time) (1856) is an invaluable record of the social history of Scotland, narrated in the raciest and most genial manner. Not less interesting is his life of his friend Lord Jeffrey (1852).

COCKBURN, Sir John Alexander, Aus¬ tralian statesman : b. Corsbie, near Duns, Scot¬ land, 23 Aug. 1850. He was educated at Kings' College,

London, and settled in South Australia in 1875, was mayor of Jamestown 1877-81 ; sat in the House of Assembly for Burra 1884-87, and for Mount Barker 1887-98. He was Min¬ ister of Education 1885-87; Premier and Chief Secretary 1889-90; Chief Secretary 1892; Min¬ ister of Education and Agriculture 1893-98; agent-general for South Australia 1898-1901. He represented South Australia at the Inter¬ national Commercial Congress in Philadelphia in 1899, and other important conferences. He was created K.C.M.G. in 1900.

COCKCHAFER. See Chafer.

COCKER, Edward, English engraver and teacher of writing and arithmetic: b. 1631; d. 1675. He is said to have published 23 books of exercises in penmanship, one of which is preserved in the British Museum. The great work with which his name is so intimately as¬ sociated that th~ phrase, <(according to Cocker,® has become proverbial, was first published in 1678 under the title of (Cocker's Arithmetic, Being a Plain and Familiar Method, Suitable to the Meanest Capacity, for the full Under¬ standing of that Incomparable Art, as It is now Taught by the Ablest Schoolmasters in City and Country, Composed by Edward Cocker, late Practitioner in the Arts of Writing, Arith¬ metic, and Engraving.) The book reached a 37th edition by 1720, and upon it most of the succeeding treatises on arithmetic were based. Two other works bear Cocker's name — a treatise on (Decimal Arithmetic and an Eng¬ lish Dictionary,) but it has been surmised that they are not of his authorship, but of that of his publisher, Hawkins.

COCKER, a variety of spaniel (q.v.).

COCKERELL, kok'er el, Charles Robert,

English architect: b. London, 28 April 1788; d. London, 17 Sept. 1863. He wrote monographs on the mausoleum of Halicarnassus and other archaeological subjects. Advancing to the front rank of his profession, he became an associate of the Royal Academy in 1829, a member in 1836 and professor of architecture in 1840, de¬ livering lectures which were highly esteemed and largely attended. He was happier in fol¬ lowing classic models than in the Gothic style. He was the designer of the Taylorian building at Oxford, and completed the Fitzwilliam Mu¬ seum at Cambridge, and Saint George's Hall, Liverpool. He wrote on the (Iconography of Wells CathedraP ; (Sculptures of Lincoln and Exeter Cathedrals > ; (Tribute to the Memory of Sir Christopher Wren) ; etc.

COCKERELL, Theodore Dru Alison,

American zoologist: b. Norwood, England, 22 Aug. 1866. He was educated at the Middlesex Hospital Medical School. In 1887-90 he re¬ sided in Colorado, and there studied ento¬ mology, botany, etc. In 1891-93 he was

curator of the public museum of Kingston, Jamaica, and was professor of entomology at the New Mexico Agricultural Experiment Station 1893—96, and was entomologist there from 1893 to 1901. In 1903-04 he was curator of the Colo¬ rado College Museum and since 1904 has been lecturer on biology at the Colorado State Pre¬ paratory School. He was also lecturer on entomology 1904—06, professor of systematic zoology 1906—12 and since 1912 professor of zoology at the University of Colorado. He is the author of over 2,800 articles and notes in scientific publications, principally on mollusca, insects, fishes, palaeontology and subjects con¬ nected with evolution.

COCKERMOUTH, England, town in the county of Cumberland. It is situated at the confluence of the Cocker with the Derwent, 32 miles southwest of Carlisle by rail and 260 miles northwest of London. It has industries in textiles, paper, hats, agricultural implement works and tanneries. Coal mines are in the vicinity. The old castle, supposed to have been built, soon after the Conquest, stands on a bold eminence. Mary Queen of Scots was im-

prisoned in it in 1568, and in 1648 it was dis¬ mantled by the parliamentary forces. Cocker- mouth is the birthplace of the poet Words¬ worth, in memory of whom a fine stained-glass window has been inserted in the church of All Saints. Pop. 5,203.

COCKFIGHTING, an ancient sport of unknown origin, but practised among both the Greeks and the Romans. An annual cockfight was instituted at Athens, and HUschines re¬ proaches Timarchus, and Plato the Athenians in general, with their fondness for the cock-pit. The breeds of Rhodes and of Tanagra in Bceotia were in great esteem in Greece. The Romans seem to have used quails and partridges also for this purpose. This sport has long been a favor¬ ite with both Americans and English, although repeatedly denounced and prohibited by the laws. The size proper for game-cocks may be said to be not less than four pounds eight ounces, nor above four pounds 10 ounces. The strain from which the cock is chosen ought to be distinguished for victory. For the combat they are armed with steel or silver spurs, or <(gaffles.3) The place appropriated to fighting is called a <(pit,® and consists generally of a mound of earth covered with sod, and surrounded by seats in circular tiers. The battle is conducted by two ((setters-to,® who place the cocks beak to beak. When they are once <(pitted® (this verb owes its origin to the sport of cockfighting), neither of the setters-to can touch his cock so long as they continue to fight, unless their weap¬ ons get entangled. In the Philippine Islands cockfighting is

pushed almost to the verge of a craze. Nearly every village has its pit, and every peasant his cock. The peasant, too, is said to rescue his fighting-cock rather than his wife or child in the event of fire, and wherever he goes he takes it with him. The sport is there practised in a very cruel form, and many are ruined by excessive betting. Throughout all Spanish-America cockfighting is more or less in favor. It was formerly a regular sport in the public schools of England, and schoolmas¬ ters received dues in connection with it. Cock- fighting is still prevalent in China, Persia and Malacca. For early history consult Markham, (The Pleasures of Princes or Goodmen's Rec- reations) (London 1614) ; Fairfax, (Complete Sportsman) (ib. 1764) ; Blain, (Rural Sports) (ib. 1853).

COCKLE (Cardium), a genus of bivalve shellfish forming the type of the family Car- diidcE. The general characteristics are — shells nearly equilateral and equivalvular ; hinge with two teeth, one on each side near the beak, and two larger remote lateral teeth, one on each side; prominent ribs running from the hinge to the edge of the valve. The animal has a powerful foot with which it burrows in the sand. For this purpose it first distends it with water, to give firmness to it. This foot may also be used to enable the animal to move from place to place, for by first bending it and then suddenly straightening it the animal may pro¬ ject itself to a considerable distance. The com¬ mon cockle (Cardium edule) is common all round the coasts of the British islands wherever it finds suitable sand- beds to live in, and is also found in the Baltic, and elsewhere. It is much used as an article of food. A prickly species, the Cardium aculeatuni, found on the coast of

Devon, is also eaten. Among American species, which, however, are not eaten, are C. islandi- cum, found to the north of Cape Cod, and C. pinnulatum, found about Long Island Sound. On the coast of Labrador Serripes groenlandi- cus reaches a large size, being nearly four inches long and two inches thick. This genus is represented by fossils from the Devonian Period onward, but it attains its maximum in recent seas. Consult Lovell, (Edible Mollusks of Great Britain.)

COCKLE, kok'l. See Corn-cockle.

COCKLE, Order of the, that of Saint Michael, the knights of which wore the scallop as their badge. This order was instituted by Louis XI of France, who began to reign 1461 a.d. The dress is thus described from a MS. inventory of the robes at Windsor Castle in the reign of Henry VIII ; ((A mantell of cloth of silver, lyned withe white satten, with scallope sheelles. Item, a hoode of crymsin velvet, em- braudeard with scallope shelles, lyned with crymsin satten.®

COCKLEBUR, coarse annual plants, species of Xanthium, belonging to the

ragweed family (Ambrosiacece) . There are five or more species widely distributed throughout temperate re¬ gions. Some of these species occur very com¬ monly in waste grounds in nearly every part of the United States. Wool-growers are seri¬ ously troubled by the hook-spined burs of these plants, which catch in the sheep's wool, de¬ preciating its value. In South Africa the in¬ jury to the wool industry is so great that strict laws are enforced to keep the plant from multi¬ plying.

COCKNEY, a nickname for a native of London, especially for a person both born and bred there, within the sound of Bow Bells, the term being often used with a certain sense of disparagement and as implying ignorance of other than city affairs, or as suggesting ef¬ feminacy. As to the origin of the word there has been much dispute, and many explana¬ tions, some of them sufficiently absurd, have been propounded. In the 14th and 15th cen¬ turies it was used to mean a petted or cockered child; and, according to the most recent etymology, its original meaning was ((cock's egg,® a small or misshapen egg. For an excel¬ lent study of the historical explanations of the use of this word, consult Murray, J., (New English Dictionary. >

COCKPIT, in old time men-of-war, a place situated under the lower gun-deck, where the ship's surgeons tended the wounded. The term is also applied to the open space in a yacht or canoe in which the crew or passengers sit.

COCKRAN, kok'ran, William Bourke,

American lawyer : b. County Sligo, Ireland, 28 Feb. 1854. He was educated in Ireland and France, receiving his LL.D. from Saint Francis Xavier College in 1887. He came to America in 1871, taught school for several years and be¬ came principal of a public school in West¬ chester County, N. Y. At the same time he studied privately for the bar. He soon at¬ tained prominence as a lawyer, and entered ac¬ tively into New York politics, his eloquence causing him to be much in demand as a Demo¬ cratic public speaker. He was a member of Congress 1891-95, made noteworthy speeches

at the Democratic national conventions of 1884 and 1892, at the latter of which he opposed Cleveland's nomination; and in 1896 refused to follow his party on the silver question, cam¬ paigning for McKinley, and advocating the gold-standard in effective addresses. He was re-electad to Congress in 1904 to succeed George B. McClellan, re-elected to 59th and 60tn Congresses (1905-09); practised law at New York after 1909; re-elected to Congress 1920.

COCKRELL, Francis Marion, American senator: b. Johnson County, Mo., 1 Oct. 1834; d. 13 Dec. 1915. He was graduated at Chapel Hill College, Mo., 1853, studied law, and prac¬ tised that profession until his election to Con¬ gress. During the Civil War he was a brigadier-general in the Confederate army, was severely wounded during Hood's invasion of Tennessee, and commanded a division in the operations around Mobile, Ala. He was chosen United States senator to succeed Carl Schqrz, took his seat 4 March 1875, and was re-elected four times, his last term expiring 3 March 1905. From 1905-10 he was a member of the Interstate Commerce Commission and in 1911 he was United States Commissioner to readjust the boundary between Texas and New Mexico.

COCKROACH, any of the species of Blatta or allied genera, belonging to the family Blat- tidee, order Orthoptera. The body of the cock¬ roach is much flattened, being adapted to life under the bark of trees, under stones, in cracks, etc. The four wings are much alike in size and net-veined ; the antennae are long and slender, and to the end of the body are appended many jointed antenniform limbs which contain olfac¬ tory organs like those in the joints of the an¬ tennae. Cockroaches are hatched in nearly the same form as the parent, differing mainly in not having wings. The eggs are deposited in a bean-like case (ootheca), which is divided into two compartments, each containing about 30 eggs ; these egg-sacs are carried about for some time by the female, projecting from the end of her hind-

body. One small native species (Platymodes pensylvanicus) lives under stones, but the species so abounding in our homes have been introduced from the Old World. The pe¬ culiar odor given out by cockroaches is ex¬ pelled from glands in the hind-body, and either present in both sexes, or only in the males. In the croton bug or common small cockroach of our cities, these glands are very large, giving out a foetid odor, and occur only in the males.

While nearly a thousand species of blattids are known to be now living and 200 fossil spe¬ cies are described, mostly from Palaeozoic strata, chiefly the carboniferous states, several forms are household pests. They swarm in our kitchens, spreading through those parts of the house warmed by hot water or steam pipes, and are troublesome from eating clothing, cereals, devouring the paste in bindings of books ; they also abound in ships, where they devour ship biscuit, etc., impregnating the pantry with their disagreeable odor. On the other hand, the cock¬ roach is an enemy of the bed bug, doing great service in reducing their numbers. The devel¬ opment of the cockroach is slow and the num¬ ber of eggs deposited not great. Phyllodromia germanica, the German roach or croton bug, reaches maturity in from four and a half to six months.

Of the many species known the most annoy¬ ing is the German roach, whose native country

is, however, not known, though supposed to have had an eastern origin. The Oriental cock¬ roach (Periplaneta orientalis) is derived from tropical Asia, and is supposed to have been in¬ troduced into Europe two or three centuries since. The female is nearly wingless ; it is a large dark brown species, living in colonies. The best remedies are insect powder, phosphorus paste, and a proprietary substance called Ger¬ man snowflake powder. Consult the textbooks on entomology; also Howard and Marlatt, (The Principal Household Insects of the United States5 (Bulletin No. 4, U. S. Department of Agriculture, Division of Entomology, Wash¬ ington 1896) ; Unsects Injurious to the House¬ hold5 (New York 1912).

COCKSCOMB, a name sometimes given the genus Celosia cristata of the amaranth family Amarcinthacece. It is an annual plant, natice in the tropical regions of America, Asia and the East Indies. The naturalized plant from tropi¬ cal America is found during the months of August, September and October as a weed or herb in waste places, also in cultivated ground, throughout the United States. The cultivated plant grows with an upright stem bearing a brilliantly colored and wavy crest, formed by the minute flowers on the surface of the pointed bracts. There are both tall and dwarf forms, and a number of colors of each. See Amaran- thus.

COCKSWAIN, or COXSWAIN, colloq.

kok's'n, the officer who manages and steers a boat, and has the command of the boat's crew.

COCKTON, Henry, English humorous novelist: b. London 1807; d. 26 June 1853. His stories were very popular in their day, the most noted among them being (Valentine Vox, the Ventriloquist5 (1840). He wrote also Sylves¬ ter Sound5 (1844) ; (The Sisters5 (1844) ; (The Love Match5 (1847).

COCLES, ko'klez, Horatius. See Hora-

TIUS COCLES.

COCO DE ACEITE (oil cocoa), ko'-ko da a-sa'-e-ta, a nut (and tree) native of Mexico, Central America and the northern part of South America, about the size of a nutmeg and very much like it in appearance. It contains a very edible white kernel much like the meat of a coconut. It is covered by a thin purple pellicle. The oil, which is sweet-scented, very readily congeals, in which condition it is soft and white as snow.

COCO DE MER, or SEA or MALDIVE DOUBLE COCOANUT, the fruit of the Lodoicea seychellarum palm. The fruit weighs 40 to 50 pounds and usually contains four nuts which are 18 inches long and lobed at each end. Before maturing the inside of the nut is soft and edible. The hard black shell is carved into ornaments and the young leaves yield an ad¬ mirable material for baskets and plaited work; the. older leaves for thatching. As a sovereign antidote to poison, and long known only from specimens thrown up on the Maidive coasts by monsoons, it was supposed to grow on a submarine tree, and had other fables attached to

it. The tree on which it grows is peculiar to some of the Seychelles Islands, reaches a height of 100 feet and has very large fernlike leaves.

COCOA, or THE CHOCOLATE TREE:

derived from the word Cacao, which has the scientific preference in English, from Mexican (Aztec) Caucatl, Cacahuatl, Chocolatl (the suffix <(latl® meaning water). The origin of the word is in doubt, being by one authority ascribed to the name of the district — Choco — of its greatest production. Etymologically, however, it would seem to be the name in its doubled or intensive form of the tree from which it is produced, the word <(Ca,® among the Central and South American Indians, mean¬ ing ((the plant,® and, intensified, ((Ca-ca-o,® <(the plant or plants.® It is analogous to ((Yerba Mate,® known to the Guarani Indians as ((Caa® —

((the plant.® Botanically it bears the name Theobroma — the <(Food of the Gods® — so called by Linnaeus.

The cocoa tree is indigenous to the sub¬ tropical and tropical portions of the Western Hemisphere. It is mentioned by the earliest of the Spanish-American chroniclers — par¬ ticularly by those who wrote concerning the conquest of Mexico, in which country it was the principal beverage. It is stated (Prescott, and authorities cited by him) that the annual tribute of the royal household of Montezuma included ((20 chests of ground chocolate, 80 loads of red chocolate, 200 loads of chocolate, and 800 xicaras,® the vessels from which the prepared beverage was drunk. The same authority states that the royal account book showed annual expenditures for cocoa to the amount of 2,744,000 fanegas (fanega, about 100 pounds). So generally was cocoa used that it constituted a part of the currency of the Aztecs, it being circulated in small bags each containing a specified number of beans.

The tree is a perennial evergreen of the natural order of Sterculiacece, Byttneriacece, thriving in low altitudes and high temperatures- from — 80° to 100° F. It is generally found at about 50 feet about sea-level, but recent experi¬ ments with cultivated varieties indicate that it may be successfully grown at 1,500 feet above the sea if compensating rainfall and temperature conditions exist. In its wild state the tree at¬ tains to a height of about 40 feet,- but under cultivation the growth is maintained at from 15 to 20 feet, to the end of producing a fuller developed fruit, for convenience in caring for the tree, and as a safeguard against high winds. At from five to seven feet from the ground the bare stem or trunk divides into several lateral branches, at the juncture of which rises another stem, which, in turn, divides likewise, and so on to the maximum height. The destruction of the perpendicular stem checks the upward growth of the tree. The leaves are large, alternate and undivided, of an oblong-lanceolate or lance ovate, acute shape, and the blossoms are pale-pink, five-pctalled clusters growing from the axes of old leaf scars, developing into straight, oblong, cucumber-shaped fruit — about 20 to 30 per tree — with a five- or a ten-fur- rowed rind. The fruit, or pod — gathered twice every year — is from 5 to 10 inches in length and 3 inches in diameter, and is filled with a sweetish, pulpy mass in which five rows of seeds, or beans, are embedded. These — the cocoa beans — are the part of value, in com¬ merce. They are from 0.6 to 1 inch in length, and are covered by a thin, fragile, paper-like skin, within which are the embryo and two

oily cotyledonal lobes — the last named being the nourishment for the germinating seed, and the source of cocoa butter.

The preparation of the seed for commerce begins with its removal from the fruit, cleaning, drying and sorting, at which time it has a bitter, astringent

taste. It is then subjected to a sweating process by being piled in heaps and covered with green plantain or other leaves, or enclosed in a receptacle and buried for a few days. On extensive plantations these operations are carried on in specially constructed sweating houses, affording every facility for uniformity of treatment. At the end of this operation, a chemical change is noted, resulting in the loss of much of the bitterness and astringency. After the sweating, the seeds are roasted (similar to the roasting of coffee), being then ready for the mill, the operations of which vary in accordance with the ultimately desired form of the cocoa or chocolate. The method ordinarily followed is to break and shell the roasted beans, grind the same with the addi¬ tion of sugar, starch and flavoring matter, then mold and pack. The various products are: (1) The cocoa shells; (2) cocoa nibs, the broken or partly crushed beans, the simplest state of commercial cocoa; (3) chocolate, the ground cocoa nibs with the addition of sugar, or sugar and starch and flavoring matter; (4) cocoa, the ground cocoa nibs with most of the fat extracted, used as a beverage; and (5) cocoa butter. So indiscriminately are the two terms, cocoa and chocolate, used, that the dis¬ tinction between the two is in many cases not recognized, but the addition of other elements to the pure cocoa is commercially accepted as producing chocolate. Another form of cocoa is the paste passed through the grinding mill, known as flake cocoa.' The usual commercial form of cocoa — known as both rock cocoa or chocolate — -consists of cocoa, approximately 44 per cent, sugar 40 per cent, and arrow-root, or other form of starch, 16 per cent. Milk chocolate, so-called, is similar, with the addi¬ tion of vanilla, cinnamon, or other flavoring extract, and condensed milk, and frequently an extra proportion of cocoa butter.

The oil, fat or cocoa butter (Oleum Theo¬ broma) is separated from the remainder of the bean during the crushing process in a series of horizontal millstones, each succeeding pair be¬ ing closer set than its predecessor, at a tem¬ perature of 200° F. It is soluble in alcohol melts at 85° and solidifies at 73°. At ordinary temperatures it is brittle, with a smooth and even fracture. Its taste and odor are pleasant, and it is utilized for suppositories and in the making of pomatums, soaps, etc. The shells that are removed from the cocoa bean are possessed of the same theobromic principle as the re¬ mainder of the seed, and they, in turn, are pulverized and used as a beverage, similar to tea or coffee. Of the chocolate forms the best known are <(simple chocolate,® (by the ad¬ dition of water or milk, or both — and as a flavoring principle, sweetmeat, and, to a con¬ siderable extent, as a food, cocoa or chocolate are well known, their use in the various prod

nets of the confectionery industry being uni¬ versal.

Theobromine, the active principle of cocoa, is an alkaloid, physiologically identical with theine and caffeine, differing, however, in im¬ portant particulars from either in its operation. While its utilization therapeutically has been negligible, experiments have indicated its avail¬ ability as a substitute for either of the others mentioned, as likewise of guaranine or cocaine.

While no two varieties of cocoa are the same, a typical analysis of the bean is the fol¬ lowing (dictionary of Applied Chemistry,5 article ((Cocoa55) :

Moisture . 5.23

Fat (cocoa butter) . 50.44

Albuminous matter, soluble . 6.30

Albuminous matter, insoluble . 6.96

Astringent principle . . 6.71

Gum . 2.17

Cellulose . 6.40

Alkaloids . 0.84

Cocoa red . 2.20

Indefinite organic matter, insoluble . 5.80

Ash . 2.75

Total . 100.00

Of the cocoa tree there are many varieties, many of which are of no commercial value. Of these latter, some are utilized as stocks on which to graft less hardy, but commercially valuable, varieties. The most generally culti¬ vated are known as Theobroma cocoa (10- furrowed fruit) and Theobroma pentagona, or Alligator cocoa (5-furrowed fruit). Of the former, the chief classes are the Criollo, Foras- tero and Calabacillo, each being subdivided into divers varieties. Of the numerous non-com¬ mercial varieties cultivated — for grafting pur poses — the chief are' the Bicolor and Augusti- folio, or Monkey cocoa. The tree is produced direct from the seed, or by transplanting and grafting or budding. It begins to bear fruit when three years old, and reaches its full productiveness in its seventh or eighth year, and maintaining it for generations, cases being known of trees retaining their vigor for more than a hundred years. The tree thrives best in a deep alluvial soil covered with a thick layer of humus of decayed vegetation, with a pervious subsoil allowing of about six feet of

unobstructed downward root growth. From 150 to 600 trees are planted per acre. Due to the damage caused by tropical storms, other timber is usually planted at a distance as a wind-break, and, while the cocoa plant is young, intermediate rows of coffee, or other trees, or leguminous plants — for soil enrichment — are provided as shelter against the heat of the sun. Constant care is required for the success of a cocoa plantation — pruning, spraying and fer¬ tilization with elements furnishing nitrogen, potassium and phosphorus in judicious propor¬ tions. On this care depend the healthy tree growth and the development, quality and quan¬ tity of fruit. Diseases of the tree and its fruit are numerous, the most destructive being the so-called ((Cocoa Disease,55 producing dead patches on the cortex of the tree, and the (

The world's production of cocoa for the year 1905 was — according to the leading cocoa- trade journal, the Gordian, of Hamburg — 143,537 metric tons (metric ton, 2,204.6 pounds) , in 1915, 283,300 metric tons. The world's con¬ sumption for the same two years was, accord¬ ing to the same authority, for 1905, 143,566 metric tons; and for 1915, 294,300 metric tons. The production and consumption for 1915, ac¬ cording to the principal countries, is as fol¬ lows (from computation of the Gordian, re¬ published in United States Commerce Reports 26 May 1916) :

Production,

Consumption,

Countries

metric tons

Countries metric tons

Gold Coast: Accra

. . 76,022

United States . . . .

84,181

Brazil .

.. 46,260

Great Britain ….

47,267

Ecuador .

.. 32,834

Germany .

43 , 600

Sao Thome .

.. 29,598

The Netherlands..

40,955

Santo Domingo:

France .

31,000

Samana .

.. 23,389

Switzerland .

11,311

Trinidad .

.. 21,808

Spain .

6,512

Venezuela .

.. 12,250

Austria-Hungary .

5,650

Grenada .

7,363

Italy .

4,093

Lagos .

3,900

Belgium .

3,800

Fernando Po .

3,710

Russia .

3,650

Jamaica .

3,405

Denmark .

2,550

Ceylon .

3,251

Norway .

1,851

Kamerun .

2,250

Canada .

1 , 850

Haiti .

All other .

2,028

15,260

All other .

6,000

Total .

.. 283,328

Total .

294,270

Due to the successive rounding off, omitting fractions of tons, the preceding totals are less than the actual figures as elsewhere reported by the same authority.

During the fiscal year ending 30 June 1917, the United States imported 338,653,876 pounds of raw cocoa, valued at $39,834,279, and of pre¬ pared cocoa and chocolate (not including con¬ fectionery), 1,829,521 pounds, valued at $553,139. During the same year no raw cocoa was ex¬ ported, but prepared cocoa and chocolate (quan¬ tity not given) to the value of $3,451,518 was sold abroad. Consult (Cocoa Production and Trade5 (Department of Commerce and Labor. Washington 1912) ; (Cocoa Culture in the West Indies5 (published by Agricultural Bureau of German Kali Works, Habana, n.d.) ; Commerce Reports, Bureau of Foreign and Domestic Com¬ merce, Washington 1914—1 7.

W. B. Graham.

COCOA-PLUM, the fruit of Chrysobalanus icaco, belonging to the family Rosacea, which is eaten in the West Indies. It is about the size of a plum, with a sweet and pleasant though somewhat austere pulp. The root, bark and leaves of the plant are employed as remedies in diarrhoea and other troubles. It has simple, alternate leaves and cymose flowers.

COCONUT, or COCOANUT, a palm tree

(Cocos nucifera) probably native of tropical America, but widely distributed in warm countries throughout the world. The tree grows naturally upon sandy soil bordering the sea or not far inland except where planted by man. It is remarkable as one of the first tree species to gain a foothold upon newly formed tropical islands. Its stem, which often attains a height of 100 feet, is crowned by a rosette of long pinnatisect leaves from 10 to 20 feet long, gracefully curving upward at their bases and downward at their tips. From among the bases of the leaf-stems appear large pointed spathes from which proceed yellow or white flowers

followed by large hard-shelled nuts. Several of the spathes in various stages of development are usually found upon the trees, which often commence to bear when less than 10 years old and continue productive for more than half a century, yielding about 100 nuts as an annual crop.

Since the tree does not produce well when remote from the coast, it is planted along the shores upon sandy or shelly land where little else of value will grow. The seeds are the sole means of propagation. They are planted in rows in the nursery and when the seedlings are large enough they are

transplanted about 20 feet apart, where they are to remain, given clean cultivation for three or four years, and then allowed to shift for themselves, occasional mulches of seaweed, etc., but no manure, being given. The only part of the United States in which the coconut palm bears fruit with rea¬ sonable certainty is the extreme south of Flor¬ ida, but even there it has not become commer¬ cially important. It may be taken as an index of the dividing line between the tropical and subtropical regions, since it thrives best in re¬ gions where frost never comes.

This palm is one of the most important economic trees of the world. Its fruit is a staple food either ripe or unripe, raw or pre¬ pared in various ways, in many tropical coun¬ tries. It is also exported to temperate cli¬ mates, where the nuts are used in confection¬ ery and for cake and dessert-making. . The oil, of which there is about 70 per cent in the nuts, from which it is obtained by expression or heating in water, is largely used for mak¬ ing soap and candles and for food. (See Coco¬ nut Oil). The central part of. the stems of young plants is used for food, as is also the ter¬ minal bud or ((cabbage.® A drink and a kind of sugar are made from the sap of the young spathes. The dried leaves are used for thatch¬ ing, baskets, mats, etc., and the petioles for oars. The wood in the lower portions of the trunks of old trees is commercially important under the name of ((porcupine wood,® which is used in cabinet-making, etc. The fibrous centres of old stems are used for cordage mak¬ ing, as is also the fibrous husk of the nuts (see Coir). This latter is widely used for making coconut-matting, which is put down in corridors where there is a great deal of tramping. It is exceedingly durable. The coconut shell is used for drinking cups, bottles, etc., and for orna: ment when carved and polished. The fibre of the husks is used by florists as a moisture- retaining medium in which to plunge potted plants and in which to propagate various seed¬ lings and cuttings.

COCONUT CRAB. See Robber Palm.

COCONUT OIL, a solid vegetable fat, largely used in candle making and in the manu¬ facture of soaps and pomatum. This fat is ex¬ pressed from the albumen of the cocoanut ker¬ nel, and is as white as lard, and somewhat firmer. From Manila and Ceylon large quanti¬ ties of the oil are exported. See Coconut.

COCOON, ko-koon', the pupa case of in¬ sects. See Silkworms; Insects, Pupa.

COCOS, a genus of palms. There are about 55 species, natives of South America, but culti¬ vated for their fruits or for ornament in many warm countries. They vary considerably in

height, but are all characterized by absence of spines, ridged trunks,

pinnatisect leaves in a ter¬ minal crown or rosette, spadices erect at first, but later drooping, spathes two, flowers white or yellow, fruit of various forms. Some species are cultivated under glass on account of their graceful foliage. The most important species of the genus is unquestionably C. nucifcra, the coco palm or coconut tree (see Coconut). Of the other species the following are perhaps best known in the United States : C. flexuosa, a medium-sized Brazilian species often planted in southern Florida and southern California as a street tree and to some extent cultivated in northern greenhouses. C. eriospatha, a stouter, somewhat taller species from southern Brazil, is by some considered the hardiest of the genus and often planted along avenues in the region mentioned and in the West Indies. It is little cultivated under glass because of its rather coarse leaves. C. datil, an Argentine species, found to be hardy in southern California as a street tree. Its fruits, which are edible, resem¬ ble those of the date palm. C. plumosa is the most generally cultivated street tree of the genus ; it is of quick growth, soon reaching a height of 30 feet, and, with age, 50 feet. It is indigenous to central Brazil. C. weddelliana, a dwarf species from central Brazil, is unquestion¬ ably the most popular greenhouse palm, not only of the genus, but of all genera. Its foliage is small, delicate and graceful, and on this account it is frequently used as a table decoration. It is probably the most easily cultivated of . the palms used in house decoration, and since it is of slow growth it retains its beauty for a con¬ siderable time, never becoming coarse or un¬ attractive.

COCOS, or KEELING, ISLANDS, British India, a group of about 20 small coral islands, lying about 700 miles southwest of Sumatra and 1,200 miles southwest of Singapore, in the Straits Archipelago, being a little horseshoe-shaped cluster of isles lying south of Java at about the distance of a three days' sail by steamer. Es¬ timated population in 1914 was 795. Census population (1911) 794. The inhabitants are di¬ vided between the Cocos natives and coolie laborers from Java. The islands have a roman¬ tic history. A Scotch sailor named Ross landed here in 1825 and established himself as. ruler; in 1851 he hoisted the British flag; but in 1857 the islands were formally annexed to Great Britain, and authority over them still remains in the hands of the Scotch sailor's descendants. An enlightened civil government is maintained; schools have been established; and industries connected with cocoanut and other products are carried on. In 1903, the islands were annexed to the settlement of Singapore in the Straits Settlements.

COCUM-BUTTER, or COCUM-OIL, a

pale, greenish-yellow solid oil obtained from the weeds of Garcinia purpurea, a tree oj the same genus with mangosteen, used in India to adul¬ terate ghee or fluid butter. It is used in some pharmaceutical preparations,

in pomatums, etc.

COCYTUS (from Gr. kokuein, to lament), a river of ancient Epirus which falls into the Acheron. Also, among the ancient Greeks, one of the rivers of the lower world.

COD, the typical representative (Gadus cal- larias or Gadus morrhua) of a family (Gadi –

dee , q.v.) of marine fishes of pre-eminent eco¬ nomic importance. Although most widely and generally known as the codfish, or simply cod, perhaps not less than 50 other names are applied to it more or less colloquially, many of them derived from the same root as cod. The cod is moderately elongated, heavy in front, with a large head, and tapering gradually into a slen¬ der tail terminated by a slightly notched fin. There are three dorsal fins, none of which is elevated, and two anals, and the ventral fins are normal in structure and placed far forward on the throat. The mouth and eyes are large, and the chin bears a long barbel. Very small scales cover the entire body and most of the head. Although varying much in shade, the color is usually reddish-brown with small rounded spots of darker brown and a conspicuous pale lateral line. Unlike the haddock, all the bones of the shoulder girdle are thin and lamellar. There is much variation in size, certain localities and schools always yielding large fish, others small or mixed. An average length is from three to four feet; and the weight from 7 to 40 pounds, but very much larger ones, several exceeding 100 pounds, and one of 160 pounds, have been recorded.

The cod is a cold water fish, preferring a temperature of from 35° to 45°. Whether there is more than a single species is doubtful, though it is well known to fishermen and ichthyologists that the Alaskan cod have much larger swimming-bladders than those of the Atlantic. The cod may be said to have a circumpolar distribution, ranging south in the Atlantic as far as the Bay of Biscay on the European side, and to Cape Hatteras on the American shore. In the Pacific it is abundant in the waters of Alaska and Bering Sea, and occurs on banks off the mouth of the Columbia River. The cod is sometimes found as far north as 80 degrees and probably beyond. Sometimes it enters fresh water, ascending rivers, as it formerly frequently did the Delaware, perhaps in pursuit of food. That any north-and-south migration takes place is doubtful, but seasonal migrations between deep and shallow waters, and irregular ones in search of food, are well known both on our coasts and on those of Europe. Thus Professor Sars has described the so-called <(mountains of fish® which annually approach

the coast of Norway. North of Cape Cod the fish approach the shores during the summer, and retire, upon the approach of cold weather, to the deeper waters of the off-shore banks, where they are followed by the Glouces¬ ter fishermen. On the shores of New Jersey and Virginia no cod are found except during the winter, the shallow waters becoming so warmed in summer that they are driven sea¬ ward to the cold Labrador current. Rocky and stony banks, where a rich fauna has con¬ gregated at moderate depths to about 120 fathoms, are the favorite resorts of the cod, but considerable numbers are taken down to 250 fathoms on the edges of the outer banks, and the trawl has brought up cod from a depth of 300 fathoms.

The cod devours everything of an animal nature it comes across. Great clams are swallowed in their shells, and, after being digested, the hard parts are regurgitated in such numbers that the sea-bottom over large areas is said to be paved with them. Spawning takes

place at moderate depths, but the buoyant egg S rise to the surface, where they float until hatched. On the European coasts the spawning season is in March and April, but with us dur¬ ing the winter. The fecundity of the codfish is truly astounding, not less than 9,100,000 eggs having been estimated to be produced in a single year by a 75-pound fish, while 2,000,000 to 4,000,000 is the average yield of those of ordi¬ nary size. The eggs are small, about one-sev¬ enteenth of an inch in diameter, and, although buoyant, have no oil globule, as do many other pelagic eggs. They hatch in from 12 days to 3 weeks, and the young fry, which feed on small crustaceans, grow rapidly, becoming about two inches long in four months and about one foot at the end of a year, though the variation in size is very great. That there has been a great decrease in the numbers of cod frequent¬ ing the inshore banks is well known, and many suggestions have been made to account therefor. The late Professor Baird connected it with the decrease in the number and size of the schools of herrings, a favorite food of the cod, itself due to the building of dams and other obstruc¬ tions which have prevented their entrance into the rivers for spawning purposes. In an at¬ tempt to overcome this condition the United States Fish Commission has been engaged for several years in collecting and hatching enor¬ mous numbers of cod eggs at its Gloucester and Woods Hole stations, with every promise of a considerable degree of ultimate success. Dur¬ ing a recent winter, the last season for which statistics are available, no less than 338,000,000 cod eggs were thus handled.

Next to the herring, the cod is the world's most important economic fish. During 1901 the aggregate value of the fresh and salt cod landed at Gloucester and Boston, the two lar¬ gest shipping points, was nearly $3,000,000, and the total annual value of the cod-fisheries of both sides of

the North Atlantic is about $22,-

000,000.

Some idea of the magnitude of the cod¬ fishing industry may be gathered from the fact that out of a total population in Newfoundland of 220,000, more than half that number gains its livelihood from it. The Newfoundland cod fisheries are the oldest in America, and a de¬ scription of the methods pursued there may well represent those of other and younger stations.

The island was discovered, or, granting an earlier discovery by the Northmen, rediscov¬ ered, by John Cabot, 24 June 1497. Soon after this event Portuguese, French, Basque and Spanish fishermen established fisheries on its shores. When, in 1583, Sir Humphrey Gilbert took possession of the island in the name of Queen Elizabeth, small English colonies were established along the east coast, and several French on the southern shore. In 1713 the Treaty of Utrecht declared Newfoundland and its dependencies to belong wholly to Great Britain, but reserved to the French a right to fish and cure on parts of the coast, now known as the (

must he deemed to mean codfish, which, in the northern and southern coast settlements, is so often used as an equivalent of money as to be called ˆNewfoundland currency.® It is measured by the quintal of 112 pounds, and in this form pays for food, clothing and medi¬ cines, as well as fees for physicians, the clergy¬ man and the lawyer. The fish (

While Newfoundland craft are to be seen in numbers upon the Grand Banks, during the last few years the crews have confined their operations largely to the waters in the vicinity of the island. Although the cod are somewhat smaller, they are fully as numerous and of ex¬ cellent quality, while in a good season fish weighing 10 or 12 pounds are frequently caught. The vessels range in size from the schooner, 125 feet long and over 100 tons burden, to the sailboat manned by two men, who cast their lines or set their nets under the lee of the rocky shores perhaps not more than 500 feet from land, for schools of fish are to be found in proximity to the coast as well as 100 miles away from it, depending largely upon the course of the Labrador current, which fur¬ nishes their principal food supply. The larger vessels are schooner-rigged, and usually carry two jibs, a mainsail, foresail and main topsail, with sometimes a small jigger extending over the stern, and staysail rigged between the two masts. In addition, they carry a triangular riding-sail to assist in steadying them when at anchor. The larger ones are manned by from 15 to 30 men, provided with lines for deck-fish¬ ing as well as with set lines and trap-nets. Each carries its complement of boats. On arriving at a fishing-ground, a part of the crew throw their lines over from the deck, while others bait and put out the set-lines and the trap-nets from the smaller boats, and visit them at regular in¬ tervals to gather in the fish, which are taken to the schooner, hastily cleaned, salted and packed in the hold until the ffare® is completed. The captain usually keeps his boat anchored as long as the school which has been <(struck® remains. The fish may stay on one feeding- ground four or five days, or perhaps disap¬ pear in four or five hours after the vessel has cast anchor. Then the set-lines and nets are taken up, the vessel weighs anchor, and search for another school begins.

In offshore fishing the trap-net is also used in addition to set-lines, . and the larger boats occasionally use hand-lines, if the fish bite freely. A very large catch is made, with the set-lines and nets, and the boatmen go out every morning to take out the fish and bait the hooks, perhaps paying another visit in the evening. Upon the return of the men to the home settlement with their boatload of fish, the women and children join them in cleaning the fare, salting it and spreading it on ((flakes® to dry. At times the fishing is so good that the men make three and four trips daily to the nets and lines, carrying home a good load on each trip. Then the women and children pre-iˆre the fish in order to save time.

The time required to cure the codfish varies voi.. 7—13

from 4 to 10 days according to the weather. With a succession of sunny days, the fare will be thoroughly cured in less than a week, but the fish must be protected against rainy weather, in spite of the salt with which they are rubbed after being cleaned.

The ((flakes® are composed of platforms of boughs elevated from 6 to 10 feet above the ground upon scaffolding; and the fish are laid upon the boughs so closely together that at a distance the <(flakes® look as if they were cov¬ ered with pieces of white canvas. Each fish is turned over at least once every 24 hours, in order to cure both sides thoroughly; and when the process is completed the fish is as stiff as a piece of board. No other ingredient except salt is required for the ordinary curing, al¬ though some of the cod prepared at the larger settlements are ground into fine particles after being dried, and mixed with a jam made of small berries. This is placed in jars and sold as a preventive of scurvy. The fares secured by the larger vessels remain in their holds until the cargo is completed. On arrival at Saint Johns, or the home port, the cargoes are sold, in a partly cured condition, to the mer¬ chants, who finish the preserving process. In buying the fish from the large vessels, as well as from the fishermen in the settlements about the coast, the cod are valued according to their weight, and generally sorted in three different sizes, the largest bringing a proportionately greater price. The merchant, as he is known in Newfoundland, is the large dealer who ex¬ ports the fish to the tropics and Europe. He buys from both the fishermen and the ((planters.® The latter are a sort of middlemen, and usually have ˆstations® located at different points along the coast. These stations include general stores containing everything required by the fishermen. The people in the vicinity can go to the station and exchange their har¬ vest for what they need at home and the outfit required for fishing, and, if anything is left to their credit, can obtain its equivalent in money. Many of them, however, are usually in debt to the planter, and, in a good year, the sur¬ plus remaining after obtaining their necessities goes in payment of the debt of a previous sea¬ son. The planters also buy schooner loads, and many of them own steamers and sailing ves¬ sels which make regular trips around the island, carrying the fish purchased by the planter to the general market at Saint Johns or one of the other large towns.

While the number of cod caught varies con¬ siderably according to the season, the average catch is from 1,250,000 to 1,700,000 quintals, the value, of course, depending on the price. Within the last two or three years the revenue from this source has aggregated about $3,000,000. The number of crews engaged in codfishing can only be estimated, owing to the variety of craft and the wide field of their operations. Au¬ thorities on the

subject, however, estimate that fully 90,000 men are engaged in the fishery each year, and that a fleet of fully 1,000 two-masted vessels, hailing from the island alone, ply upon the nearby waters and on the banks. Practi¬ cally all of these vessels are home-made, the wood for both hulls and spars being secured from forests in the interior, while the sails and rigging are imported chiefly from England. For a full account of the natural history of the

codfish, consult Goode, (American Fishes) ; and for statistics of the fisheries and other information, the (Annual Reports) of the United States Commissioner of Fish and Fish¬ eries.

COD-LIVER OIL, an oil (oleum morrhuce) obtained from the liver of the common cod (Gadus callarias) and allied species. In medi¬ cine it is of great use as a nutritive in certain debilitated or wasting conditions, on account of the great ease with which it is absorbed. There are three grades known in commerce, pale or shore, pale-brown or straits and dark-brown or banks, the first being the purest. The oil was formerly, and is still to some extent, obtained by rotting the livers for several months, but most of it is now got by heating the fresh liv¬ ers with steam after they have been cleaned and have had the gall-bladders removed. Cod- liver oil is prepared now in Norway, the United States, Canada, Newfoundland, Great Britain, Iceland and Russia. The largest quantity and the best quality comes from the Lopoten Isles in Norway. Cod-liver oil consists of about 70 per cent olive, 25 per cent palmitine, small quantities of stearine and glycerides of the lower fatty acids, cholesterine, 0.002 per cent — 0.003 per cent iodine, organic compounds of chlorine, bromine, sulphur and iron, ammonia and its substitution products, certain character¬ istic bases, certain characteristic organic acids and peculiar pigments, known as lipochromes.

CODAZZI, ko-dat'se, Agostino, Italian engineer: b. near Ferrara 1792; d. Colombia, June 1859. He made several campaigns under Napoleon and afterward distinguished himself as an engineer in South America. He entered the Colombian service with the rank of lieuten¬ ant-colonel of artillery, and was employed in making charts and in preparing plans of de¬ fense. In 1831 he was appointed by Paez to prepare partial charts of the new republic of Venezuela. This work occupied nearly nine years, and was .twice interrupted by military defensive expeditions, in which Codazzi took part. He was rewarded with the rank of colonel. He devoted the years 1838-39 to ex¬ ploring the wilderness of Guiana and penetra¬ ted nearly to the sources of the Orinoco. The important additions to geography which were obtained from this expedition induced the Con¬ gress of Venezuela to

furnish him means to make public the result of his labors. For this purpose he went to Paris, where his work appeared in 1841, entitled (Resumen de la geografia de Venezuela' accompanied by an extensive chart of Venezuela. Codazzi after¬ ward established a German colony in Venezuela. In 1848 he was employed by the government of Colombia in a topographical survey of that country and made surveys of the Isthmus of Panama.

CODDINGTON, William, New England colonist: b. Boston, Lincolnshire, England; d. Rhode Island, 1 Nov. 1678. He was one of the founders of the colony of Rhode Island. He arrived in Massachusetts in 1630, remained in Boston for several years, but not being able to agree with the authorities of the colony, he re¬ moved in 1638 to Aquidneck, or Rhode Island, where he founded a colony to be governed <(by the laws of the Lord Jesus Christ? It was soon found necessary to abandon this vague

scheme and in 1640 he himself was chosen gov¬ ernor and in 1647 aided in the formation of a regular body of laws. In 1649 he wTent to Eng¬ land and two years later was made gov¬ ernor of Aquidneck and Conanicut for life. His opponents succeeded in having this re¬ voked and he became a Quaker in 1666. He resumed his governorship in 1674. He pub¬ lished demonstration of True Love unto the Rulers of Massachusetts) (1674). Consult (William Coddington in Rhode Island Colonial Affairs (No. 4 of the Rhode Island Historical Tracts, Providence 1878). He was unable to secure the reception of Rhode Island into the colonial confederacy. In 1674 and 1675 he was again elected governor.*

CODE, a term now generally confined to jurisprudence, and used to designate a sys¬ tematic compilation of law authorized by gov¬ ernmental authority to take the place of prior existing law. It is in this sense applied to the codes of Theodosius, Justinian and Napoleon. The word is used more generally in the United States as applied to a concise, comprehensive, systematic formation and re-enactment of the law, deduced from both its principal sources, the pre-existing statutes and the adjudications of courts as distinguished from compilation of statute law only. Codes such as here described have been adopted and are in use in many States. They are, in the most part, modeled upon the Code of Civil Procedure of New York The purpose of a code is to simplify methods of legal procedure and to model and bring to¬ gether in a codified form the confused mass of laws, contradictions, repetitions and disorder which have grown up during a long period of time. Such a codification of law has always been deemed a most difficult task, and though many times agitated in England, it has never been earnestly undertaken, and is not likely to be for some time. The same causes which made such a codification necessary in the time of the Emperor Justinian exist to-day in many coun¬ tries and in most of the

States of the United States. While the Corpus Juris Civilis, or body of civil laws, drawn up by Justinian's commis¬ sion of 10 learned civilians, was the most im¬ portant and complete of ancient codes up to that time, there had been other compilations under the empire. These compilations had been made by private lawyers, and formed the basis of the Codex Gregorianus et Hermogenianus, which in turn were the models for the Imperial codes of Theodosius and Justinian.

The Codex Theodosianus was the work of a commission of 16, to whom, in 435 a.d., the Emperor Theodosius entrusted the task of col¬ lecting the edicts and constitutions. Published in 438 a.d., it was a work of great importance, and formed the masterpiece on which every later code was based. It was the initiative of a digest of the whole Roman law. In 528 the Emperor Justinian ordered a new collection to be made, and for this purpose appointed 10 commissioners with full power to make such changes as they might deem necessary in the language of the constitution. They were au¬ thorized in their compilation to use the codes. Gregorian, Hermogenian and Theodosian and the constitutions, with the understanding that the new code was to supersede the sources from which it had been compiled. The Code Jus-

tinian was completed within 14 months, and was subsequently revised to take in new decisions and constitutions of the emperor. The original code was lost. The revised one, which has been preserved, was published in 534. It is divided into 12 books and each book into titles.

Code Napoleon. — The Civil Code of France, in force at the present day, takes its name from the great Napoleon. It was undertaken under the consulship of Napoleon I by the most emi¬ nent jurists of France, and was published in 1804. It is the most celebrated of modern codes. The Code Napoleon (under which name four other codes of commercial law, criminal law, penal law and the law of procedure, drawn up at the same time, are often included) was a code in the fullest and strictest meaning of the word, in that it was not merely a collection of the law, but was a complete and thorough statement of the law. The need of a codifica¬ tion of the laws of France had been urged by eminent jurists and statesmen for some time before Napoleon took the matter up and car¬ ried it through. Previous to the adoption of the Code Napoleon there had been some partial codes in France; such as the Code Henri, made by Brisson in the reign of Henry III; the Code Murvillac or Michan under Louis XIII (1629), relating to judicial procedure, and the Code Louis XV, by Chaussepierre, containing the ordinances from 1722 to 1740. There were several of these ordinances

enacted in the reign of Louis XVI. No decided move was made to bring about a codification of the confused con¬ dition of the laws of France for the purpose of shaping them into a homogeneous jurispru¬ dence until the Revolution had cleared the way. By the consular decree, 12 Aug. 1800, a com¬ mission was constituted to compare the order which had been followed in the preparation of the projects for a civil code <(hitherto published, to determine the plan which the commissioners should think best to adopt, and to discuss the chief principles of civil legislation.

Napoleon, on becoming consul, appointed a commission headed by M. Tronchet, and includ¬ ing Portalis, Bigot de Preameneu and Maleville, to review all previous efforts at codification and to suggest a new plan. In 1801 the com¬ missioners reported a draft for a civil code, which was submitted to the Court of Cassation and other courts of appeal, and with the reports of the judges was finally brought before the Council of State, in which Napoleon (then first consul) presided in person and took part in the discussion as to the terms and scope of the code. The whole revision after much debate was finally adopted under the _ title of Les Cinque Codes, consisting of the Civil Code, dis¬ tinguished by the name Code Napoleon, the Code of Criminal Procedure, Penal Code, the Code of Civil Procedure and the Code of Commerce. The entire work was first pub¬ lished under the title Code civil des Francois. but Napoleon subsequently had it published as the Code Napoleon, as he considered the code one of the crowning glories of his reign. The Code Napoleon consists of 2,281 articles. It has been said of this code that it is the product of Roman and customary law, together with the ordinances of the kings and the laws of the Revolu¬ tion. Although political upheavals have caused some changes and modifications, the code

remains virtually the same as when it left the hands of its framers. The extent of its influ¬ ence upon the laws of other countries has been very great, as it formed the basis of the codes of the two Sicilies (1819), the Netherlands in 1837, . the Swiss cantons from 1819 to 1855, Bolivia in 1843 and the Civil Code of the State of Louisiana.

Code Frederic. — This is a revision of the Prussian laws, published by Frederick the Great 1749-51, and revised after 1780, but not in force until 1794, was intended, according to its preface, to obviate the difficulties of the Roman codes, the disputes of the commentators and the contradictions between Roman and Ger¬ man law. It has been subjected to many changes.

Codes in the United States. — The first in- portant experiment with a code in the United States was made in Louisiana, which State, originally a French colony, afterward ceded to Spain, again returned to France, and subse¬ quently acquired by the United States from France, has had many

changes of law. After the United States acquired Louisiana there arose a strong demand for a code, owing to the great confusion of laws. In 1806-08 a code was adopted, but only to supersede the ancient laws when they conflicted with it. A complete civil code was adopted for the State in 1824, which had for its basis the Code Napoleon, although some provisions of the common law were injected into it.

The most important code ever undertaken in the United States is the one which was pre¬ pared for the State of New York many years ago under the guidance and supervision of David Dudley Field. This code, although pub¬ lished, and having formed the foundation for many of the codes adopted by the various States, was never accepted by the legislature of New York. As early as 1839 David Dudley Field advocated and urged the adoption of a code by that State. The revised constitution of New York (1846) ordered the appointment of two commissions : one to reduce into a system the whole law of the State, the other to revise and simplify the rules of pleading. Both commis¬ sions were appointed by the legislature in 1847. The commissioners to revise and simplify plead¬ ings and practice made a report on 27 Feb. 1848, which contained an incomplete code of civil procedure and practice in the courts of record. This report was immediately adopted by the legislature, but the complete codes of civil and criminal procedure were never adopted. On 6 April 1857 the legislature cre¬ ated a new commission to prepare codes. The commissioners named were David Dudley Field, William Curtis Noyes and Alexander W. Brad¬ ford. After some eight years they reported a code — or rather three codes — which was never adopted, although reported favorably by the committees of several legislatures.

The code of civil procedure of the David Dudley Field commission formed the founda¬ tion, and was largely adopted in the codes of Ohio, Indiana, Missouri, Wisconsin, Iowa, Minnesota, Kansas, Nebraska, Nevada, Cali¬ fornia, Oregon, North Carolina, South Caro¬ lina, Washington, Montana, Alabama, the Da¬ kotas, Wyoming, Utah and Arizona, and it is the basis of the present codes of civil and crim¬ inal procedure in the State of New York, which

are codes of practice and pleading, as distin¬ guished from a code of substantive law. The principal feature of the Code of Civil Procedure as adopted by these States was the fusion of law and equity and the simplifying of the written pleadings.

Lewis P. Clover.

CODE, International. A code of interna¬ tional law was published in 1910 by the Inter¬ national Code Publishing Company of New York, having the unusual page arrangement of parallel statements in three languages — Eng¬ lish, French and Italian. The author is Jerome Internoscia of Montreal, a member of the bar of the province of Quebec, Canada.

For the ideas and rules which the work con¬ tains, Mr. Internoscia acknowledges his indebt¬ edness to the laws, treaties and treatises that have been published in the three languages. By law he means (

The ideal of peace, he finds in the aspira¬ tion toward a new organization of the Com¬ munity of States, an organization in which ail the controversies between state and state must, without exception, be solved by judicial means provided for that purpose — namely, an ade¬ quate body of laws, magistrates to apply them, punishments for infringers and a regular force sufficient to inflict the punishment that any state may incur.

About one-third of Mr. Internoscia's (Code> contains innovations. First and most import¬ ant of these is the abolition of war, which is replaced by the forced execution of judgments and, therefore, by an International Procedure, which, while having a scientific basis, he deems complete and eminently practical.

The first part of this treating of public international law, fixes the rights that states must recognize, respect and even protect in man, and establishes to what extent every nation expects its own citizens to do their duty in order to secure peace and happiness for all. A very marked change in the field of inter¬

national criminal law is a crusade against capital punishment and against crime in gen¬ eral. This 'Code® is opposed to capital punish¬ ment, as it is to war, because these are nothing better than murder and manslaughter, permitted by some temporary law. Mr. Internoscia ar¬ gues that no man can give back life to a dead body, so no law can give to a person the right to take away the life of another.

This

The second part of this 'Code is intended to solve all possible conflicts of the different laws, by fixing rules that are most reasonable and practicable. This part is divided into two books, the first for conflicts in civil law and the second for conflicts in commercial law. All questions of procedure and of jurisdiction — formalities, proof, judgment and executions — are treated in the third part of the 'Code.**

This is the largest code ever written. Most interesting and fundamental is the author's pro¬ posed system of courts of international juris¬ diction.

The novelty of their organization lies in the fact that they are adjuncts or offshoots of one great international tribunal. The judges of such courts are at the same time the clerks, under-secretaries, secretaries and counsels of the international representatives who will con¬ stitute an international assembly, which will be the highest international legislature and court.

CODE OF KHAMMURABI. See Ham¬

murabi, Code of.

CODE NAPOLEON. See Code.

CODEINE, CODEIN, CODEINA, or CODEIA (Gr. nodeiay ((poppy-head®) , a veg¬ etable alkaloid closely allied to morphine and constituting about 0.5 per cent of the weight of opium. Codeine has the formula CitHis (CHs) NOs + H20, and is known to the chemist as methylmorphine, since it is derived from morphine by substituting methyl (CH3) for one atom of the hydrogen that morphine contains. Codeine may be prepared by adding calcium chloride to an aqueous extract of opium and evaporating to the point of crystallization. The hydrochlorides of morphine and codeine which are obtained in this manner are dissolved in water, and the morphine is precipitated by the addition of ammonia. Codeine hydrochloride remains in solution and may be obtained by evaporation and crystallization, and further purified by recrystallization from ether. Codeine acts as a strong base, and its solution reddens litmus paper, neutralizes acids and precipitates solutions of lead, iron and copper. From aqueous solution it is deposited in the form of trimetric crystals, as indicated by the formula given above. Crystals free from water may be obtained by deposition from a solution in car¬ bon disulphide. When treated with strong sul¬ phuric acid and a small quantity of ferric chloride (FeCh), codeine compounds give an intense blue color. This reaction is of great value in testing for the presence of the alkaloid. Codeine is used in medicine as a narcotic and hypnotic. Its properties are very similar to those of morphine, but by reason of the methyl

groups introduced it has more action on the spinal cord than morphine has. It thus does not cause sleep or relieve pain as readily as morphine, and causes more reflex excitability. It may even cause convulsions in children. It is valuable where a milder sedative than mor¬ phine is desired, as there is less euphoria pro¬ duced and less likelihood of forming a habit. Its use is not free from danger, however, and very small doses have been known to prove fatal.

CODEX, with the ancients, the trunk of a tree stripped of the bark. Before the invention of paper, wooden tablets covered with wax, which were written on with the style and put together in the shape of a book, were called codex. The word was afterward retained, in times when paper was used for writing, to de¬ note a large book. Thus important works, particularly old manuscripts of poets, his¬ torians, etc., which had been preserved, were called codices manuscriptL In like manner a collection of laws was called codex, with the addition of the name of the sovereign under whom, or of the person by whom, it had been compiled, as Codex Gregorianus, Codex Theo- dosianus, Codex Carolinus. Codex rescriptus (Latin, a rewritten codex) is the name given to ancient manuscripts, which, in the Middle Ages, were used, after the original writing had been in a great measure effaced, for the copying of other works, generally ecclesiastical treatises. Thus the institutions of GaiusP discovered by Niebuhr at Verona in 1816, and published by Goschen in 1821, is a codex rescriptus. Some skill is required to read the ancient letters under the others. The Greek name for codex rescrip¬ tus is palimpsest, now more frequently used. The biblical writings themselves have been sometimes effaced to make way for homilies and legends. One of the oldest manuscripts of the New Testament, designated by the letter C, is a codex rescriptus, on which the works of Ephraem Syrus have been written. (See Book; Bible; Paleography; Palimpsest). Consult Scrivener, F. H. A., introduction to the Textual Criticism of the New Testament (London 1894) ; Gregory, (Textkritik des neuen Testaments J (Leipzig 1900) ; Birt, (Das antike Buchwesen) ; Wattenbach, (Palaographie) (Leipzig 1877-78).

CODEX ARGENTEUS. See Gothic Literature.

CODEX SINAITICUS, sl-na-it'I-kus, a

very ancient and valuable manuscript of the Greek Septuagint version of the Old Testament (including the Apocrypha), the whole of the New Testament, the Epistle of Barnabas, and a part of the Shepherd of Hermas, discovered in the monastery of Saint Catherine, on Mount Sinai, by the German scholar Tischendorf, 4 Feb. 1859, while traveling in the East by the desire of the Tsar Alexander II. When the discovery was made Tischendorf endeavored to persuade the monks to make a present of the manuscript to the Tsar, and although he was not immediately successful, he was allowed to take it to Saint Petersburg on loan. Ultimately, in 1869, the manuscript was formally presented to the Tsar as Tischendorf had desired. In 1860 an account of the manuscript was pub¬ lished by the discoverer at Leipzig. It is writ¬ ten on parchment in four columns, in early

unical characters, and bears every mark of pos¬ sessing great antiquity, perhaps being even older than the Vatican manuscript, which, be¬ fore the discovery of the Sinaitic manuscript, was recognized as the oldest known

manuscript of the Old and New Testaments. It is assigned by Tischendorf himself to the 4th century. The Old Testament in this manuscript is defective, but the New Testament is complete, not a word being wanting, which is the more remarkable, inasmuch as it is the only manuscript of the New Testament which is complete. From this circumstance, as well as from its great age, it acquires a value in relation to the text of the New Testament, which can scarcely be overesti¬ mated. Two gaps in the Old Testament part of the manuscript are curiously supplied by another manuscript which Tischendorf had dis¬ covered in the same monastery in 1844, and which he had brought to Germany and named Codex Friderico-Augustanus , in honor of the king of Saxony. From this coincidence, as well as the general resemblance of the two manu¬ scripts, it is inferred that the last-named manu¬ script is really a part of the Codex Sinaiticus, which is generally believed to be the case. A splendid facsimile of the manuscript was pub¬ lished by Tischendorf under the auspices of the Tsar at Saint Petersburg, in four volumes folio, toward the end of 1862. This was followed in 1863-64 by two smaller editions of the New Testament part of it.

. CODEX VATICANUS. See Bible.

CODICIL, an addition to, qualification of or change in a will. It must be in the same form as a will, and be executed with the same formalities. All the laws applying to wills apply to a codicil. A codicil properly exe¬ cuted is a republication of the will and makes the will speak from the date of the codicil. The will and codicil are read together as one instru¬ ment. There may be more than one codicil to a will; and where there are several, if the last one is properly executed, referring to a former paper in such a manner as to identify it, that paper, although not properly executed, may be read into the will. See Will.

CODMAN, John, American sea-captain and miscellaneous writer : b. Dorchester, Mass., 1814; d. Boston, 6 April 1900. He was the author of (Sailor's Life and Sailor's Yarns) (1847) ; (The Mormon Country > (1876) ; (Round Trip by Way of Panama, etcP (1879) ; (Winter Sketches from the Saddle) (1888).

CODOGNO, ko-don'yd, Italy, a town in a fertile district between the Po and Adda, 15 miles southeast of Lodi. It has a large trade in Parmesan cheese and wheat, and carries on a number of manufactures. The French defeated the Austrians here in 1796. Pop. 10,033.

CODRINGTON, Sir Edward, English admiral: b. 27 April 1770; d. London, 28 April 1851. He entered the navy as midshipman in 1783, becoming captain in 1794. He served at the battle of Trafalgar, took part in the Walcheren expe¬ dition and was afterward actively employed both in the

Peninsular War and the War of 1812. In 1825 he became vice-admiral. His name is principally famous in connection with the battle of Navarino, where he commanded the united squadrons that overthrew the Turk¬ ish fleet in 1827.

CODRINGTON, Sir William John, Eng¬ lish military officer: b. 1804; d. 1884. He en¬ tered the army in 1821, commanded a brigade at the Alma and at Inkerman in the Crimean War, and in 1855 succeeded Sir James Simpson as commander-in-chief in the Crimea. He was elected to Parliament in 1857, was governor of Gibraltar 1859-65, having reached the rank of general in 1863.

CODRUS, the 17th and last king of Athens. Tradition tells that during his reign Attica was attacked by the Dorians, or, according to some, by the inhabitants of the Peloponnesus, or the Thracians. The assailants, inquiring of an ora¬ cle what would be the result of their incursion, received for answer that they would be suc¬ cessful if they avoided killing the Athenian king. Codrus, becoming acquainted with this answer, resolved to sacrifice himself for his country. He disguised himself in a peasant's dress, entered the enemy's camp, provoked a quarrel with the soldiers and was slain. The Athenians, upon hearing of this, sent a herald to demand the body of their king. The courage of the assailants was so dampened that they retired without striking a blow. In honor of their patriotic monarch the Athenians abolished the royal dignity, substituting that of a respon¬ sible archon, esteeming no one worthy to be the successor of Codrus. They also used his name as a common term to express a man of dis¬ tinguished excellence.

CODY, Henry John, Canadian preacher and educator : b. Embro, Ontario, 6 Dec. 1868. He was educated at Galt Collegiate Institute and Toronto University, where he graduated in 1889. He was ordained deacon in 1893 and priest in the following year. After teaching in Ridley College, Saint Catharines, he became professor of Old Testament Exegesis and church history, Wycliffe College, Toronto, 1894—99, and after¬ ward professor of systematic theology; was act¬ ing rector of Saint Paul's Church, Toronto, 1899-1907, after which date he became rector. He became a canon of Saint Alban's Cathedral, Toronto, in 1903, was an unsuccessful candidate for the bishopric of Toronto in 1909, and in the same year was appointed archdeacon of York. He was one of the founders of Havergal Ladies' College, Toronto. Possessed of excep¬ tional pulpit gifts and of wide learning, he is one of the outstanding men in the Low Church or evangelical school in his communion.

CODY, William Frederick, American scout, hunter and showman, best known as <(Buffalo Bill® : b. Scott County, Iowa, 26 Feb. 1846; d. Denver, Colo., 10 Jan. 1917. His parents moved to the country about Fort Leavenworth, Kan., where in 1856 the father was stabbed by a white man, named Dunn, for expressing his hatred of slavery. The father never quite re¬ covered from his wound and died in 1857. "When still very young he was employed by the express companies as a rider to carry pack¬ ages and valuables on horseback across the country, a most dangerous occupation. Soon he became known as a fearless and perfect rider, a keen scout, a reliable plainsman and hunter. When but little over 21 he attracted the notice of United States army officers, who were constantly in need of the services of ex¬ pert scouts who could be depended upon and who knew the habits and language of the red

man. In 1868-69 he was made chief of scouts by General Sheridan, then campaigning against the hostiles. Colonel John Schuyler Crosby, then adjutant under Sheridan, says of Cody: ((He carried despatches 100 miles for General Sheridan through terrific fire of hostile bands of Indians and returned with replies safely.® This and his many personal encounters with the Indians, in some of which he saved the day for the troops, made him a noted man. He was the last of the six great scouts of America — Boone, Crockett, Carson, Bridger, (

(1908).

CODY, Wyo., village and county-seat of Park County, situated on the Shoshone River at the northwest terminus of the Chicago, Bur¬ lington and Quincy Railroad. It takes its name from its founder, Col. W. F. Cody (Buffalo Bill) and was incorporated in 1900. It is at the eastern entrance to Yellowstone Park, with which it is connected by a boulevard of 55 miles.

Farming by irrigation and cattle and stock raising are the chief industries of the section. The town is well known to tourists. Pop. (1920) 1,242.

COE, Edward Benton, American clergy¬ man : b. Milford, Conn., 11 June 1842; d. New York, 19 March 1914. He was graduated at Yale 1862, studied at Union Theological Sem¬ inary 1862-63 and in France and Germany 1864-

67. From 1864 to 1879 he was Street professor of modern languages at Yale, and on 2 Oct. 1879 was ordained by the Classis of New York as one of the ministers of the Collegiate Re¬ formed Dutch Church. He was pastor of the Fifth Avenue and West 48th Street Church till January 1899, when he became senior minister without charge of a specific congregation. He published a number of sermons and a volume entitled (Life Indeed) (1899).

COE, George Albert, American educator : b. Monroe County, N. Y., 26 March 1862. He was graduated at the University of Rochester in 1884; studied theology at Boston University and in 'Berlin; was professor of philosophy in the University of Southern California 1888-93 ; and Evans professor of philosophy in North¬ western University 1893-1909. Since 1909 he has been professor of practical theology in Union Theological Seminary, New York. He is a member of the Religious Education Society of America and was its president in 1909-10. He is the author of (The Spiritual Life: Studies in the Science of Religion } (1900) ; (The Re¬ ligion of a Mature Mind) (1902) ; (Education in Religion and Morals) (1904), and contribu¬ tions to various philosophical and theological magazines.

COE, Wesley Roswell, American biologist: b. Middlefield, Conn., 11 Nov. 1869. He was educated at the Connecticut Agricultural Col¬ lege and at the Sheffield Scientific School of Yale University and at the universities of Wurzburg and Naples. In 1892-95 he was assistant in biology at the Sheffield Scientific School, in 1896-1902 instructor, in 1902-08 as¬ sistant professor of comparative anatomy, and in 1909 professor of biology at Yale University. He accompanied the Harriman expedition to Alaska in 1899. He has published (The Nemer- teans) (1901) ; (The Nemerteans of Porto Rico) (1901) ; (The Nemerteans of the Hawai¬ ian Islands) (1906) ; (Echinoderms of Con¬ necticut > (1912).

COE COLLEGE, an educational institution for both sexes, located at Cedar Rapids, Iowa. It was organized in 1881, under the auspices of the Presbyterian Church, and reported at the end of 1921 that it had 61 professors and in¬ structors, 1,179 students and 12,300 volumes in the

library.

CCECILIAN, or C2ECILIAN, se-sil'yan, limbless amphibians, constituting a family, Coeciliidce or Ccceciliidce , and an order Apoda or Gymnophionia. They are remarkable for the entire absence of limbs, even the internal limb girdles having disappeared, and the bony roof to the temporal region of the skull. In the lat¬ ter feature they simulate the extinct Stegoce- phali, to which some zoologists believe them to be rather closely related, though the temporal roof is formed by different bones. The form is worm-like, and, notwithstanding that the number of vertebrae may exceed 200, the tail is very short. A series of annular scales, some¬ what embedded in the skin, protect the body externally, and as a further adaptation to their burrowing habits the eyes are rendered nearly or quite useless by being buried beneath the skin, the deficiency in sight being compensated by the presence of a pair of nearly unique retractile sensory tentacles.

Some species are viviparous, others ovipa¬

rous. In the case of the latter the iemale coils about the eggs and protects them until hatched. The young of many are noteworthy in the pos¬ session of external gills, while the respiration of the adults is pulmonary. Their food consists principally of earthworms and subterranean in¬ sect larvae.

Dr. Boulenger recognizes 17 genera and 40 species, but probably many remain undiscov¬ ered. None have been found except in a zone encircling the earth, chiefly within the limits of the tropics ; South and Central American spe¬ cies are numerous ; but none are certainly known from North America. Consult Boulen¬ ger, Proceedings of the Zoological Society of London) (1895); Sarasin, (Forschungen auf Ceylon (Vol. II, 1887-90).*

COEDUCATION, a term meaning joint education, has come to be specifically applied to the instruction of both sexes as a single body in the same classes of the same educational institutions. Coeducation was first tried on a large scale in the United States and has reached its fullest development here. Indeed until very recently it has been regarded as a peculiarly American system of education, but its economy and simplicity, and the difficulty of providing equal educational opportunities for girls by any other method, have led other countries, especially within the last decade, to adopt coeducation in some form or other. This tendency may be expected to show itself more clearly after the close of the great war. The general shortage of men, including of course men teachers, will create a demand for the training of women to fill their vacant places that cannot be resisted by boards of public education. Also the many countries which have recently adopted (or which will soon adopt) woman suffrage will be compelled by the pressure of public opinion backed by women's votes either to open their elementary and secondary schools and univer¬ sities to girls,

or to maintain at almost prohib¬ itive cost equally good separate secondary schools and universities for girls. The expense and impracticability of duplicating higher education have already brought about the admission of women to colleges and universities not only in the United States but elsewhere, and will un¬ doubtedly make the secondary school systems of other countries coeducational as soon as the necessity of educating women is seriously faced. In Great Britain all Scottish universities are frankly coeducational; all the newer English and Welsh universities are coeducational, such as London, Liverpool, Manchester, Birmingham, Sheffield, Leeds, Durham, Bristol, and the Uni¬ versity of Wales. Oxford and Cambridge open their lectures and examinations, but not their degrees, to women, and various privately sup¬ ported women's colleges in their immediate neighborhood prepare women for their exam¬ inations, but this last discrimination against women may be expected to disappear now that the votes of British women will directly in¬ fluence grants to higher education. In Ireland, the National University of Ireland, the colleges of Dublin, Cork, Galway, and Queen's Univer¬ sity, Belfast, are coeducational, and even Trinity College of the Catholic University of Dublin admits women to all lectures except those in divinity, engineering, and anatomy. All the universities of South Africa are co-educa- tional. The four universities of India give

degrees and open many of their classes to women. In general it may be said that all British and colonial universities, except Oxford and Cambridge and a few native colleges and divinity schools, are open to women on the same terms as men. But, with the exception of the elementary schools in Scotland which are coeducational, state-supported primary and secondary education in Great Britain is still conducted separately for boys and girls. Only small village board schools not attended by sufficient children to form two classes and a few experimental private schools are coedu¬ cational. But it is safe to predict that the whole question will be taken up afresh after the war and in all probability solved in the American way in as far as state-supported secondary schools are concerned. Coeducation is the prevailing system in the public schools and uni¬ versities of the Dominion of Canada and Nova Scotia and New Brunswick, the only exception to university coeducation being the Catholic University of Ottawa. The same is true in the Commonwealth of Australia, New Zealand, Denmark, and Finland. In Norway women are admitted to the universities and co¬ education is being experimented with in some of the <(people's high schools." In all other civilized European countries, France, Italy, Spain, Sweden, Belgium, Holland, Switzerland, Greece, Germany, and Austria-Hungary, all the

universities are open to women, apart from a few unimportant exceptions such as theological and technical departments where few, if any, women wish to study. Before the Revolution, Russian universities were closed to women, but separate women's university classes were main¬ tained by the government in Petrograd and Moscow, and more or less consistently in the other university towns. By the law of 1912 girls were admitted to the so-called (

schools and colleges have greatly increased, while separate schools and colleges have pro¬ portionally decreased and the whole question of coeducation has recently become an inter¬ national issue of such importance as to justify a fresh study of the way in which it has worked in the United States. America is trying separate education and coeducation on such a vast scale that statistics cover¬ ing so many years may be trusted to indi¬ cate results clearly. Also, three generations of women have now been subjected to coeduca¬ tion and sufficient time has elapsed for its results, whether good or ill, to make them¬ selves felt. The statistics of American co¬ educational high schools will be of special in¬ terest because provision must be made by foreign countries within the next few years for the secondary education of girls, and more especially for the preparation of girls for the universities. Coeducation began in the United States as an almost accidental consequence of the endeavor of the American colonists to carry on the English educational tradition and pro¬ vide their children with free education in a newly settled country. During the great school revival of 1830-45 and the ensuing years until the outbreak of the Civil War, in 1861, free elementary and secondary schools were grad¬ ually established throughout New England and the middle States and in such western States as existed in those days. It was a fortunate circumstance for girls that the country was at that time sparsely settled : in most neighbor¬ hoods it was so difficult to secure pupils for even one grammar school and one high school that girls were admitted from the first to both. In the reorganization of lower and higher edu¬ cation that took place between 1865 and 1870 this same system, bringing with it the complete school coeducation of the sexes, was strength¬ ened and enlarged in New England and the middle States and was extended to every part of the west. It was also introduced throughout the south both for whites and negroes. For more than 50 years this great American system of state-supported coeducational primary, gram¬ mar, and high schools has withstood all hostile criticism and has spread throughout the whole United States. In no part of the country, except in the conservative east, is any distinction . made in elementary or secondary education between boys and girls. Only in a few large cities of the Atlantic seaboard, such as Boston, New York, Philadelphia, Baltimore, Charleston, and in some of the larger cities of the southern States are separate boys and girls' high schools included in the public school system — in almost every instance to the detri¬ ment of girls' education. The

second fortu¬ nate, and in like manner almost accidental, fac¬ tor in the education of American women was the occurrence of the Civil War at the forma¬ tive period of the public schools, with the result of placing the elementary and secondary education of both boys and girls overwhelm¬ ingly in the hands of women teachers. This effect proved not to be temporary, but perma- ment, and from 1865 until the present time the relative proportion of women teachers in the public schools has steadily increased from year to year. In 1880 women formed 57.2 per cent; in 1890. 65.5; in 1900, 70.1; in 1910, 78.9; in 1914, 80.2. of all teachers in the public schools. It is significant that the percentage of women

teachers is highest (86.5) in the earlier settled North Atlantic Division (Maine, New Hamp¬ shire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Penn¬ sylvania) where the public schools have been longest in operation. (Report of the United States Commissioner of Education, 1916, Vol. II, p. 29). Like coeducation, the teaching of boys by women in the public schools has been bitterly attacked, especially by German educa¬ tional authorities, but none of the objections urged against it seem to be supported by ex¬ perience. American men educated by American women are so far from being feminized thereby that it is generally admitted they can hold their own in competition with men of other countries in athletics, games, daring sports of all kinds, in business enterprise, invention, sci¬ entific research, and technical skill. Fifty years of experience in coeducational schools seems to prove conclusively that women teachers of first rate mental ability and training succeed better with boys, as well as with girls, than men teachers of second or third rate intelli¬ gence ; and further, that while business and professional life offer to men so much greater rewards than the public schools, only such second rate men can be induced to teach in them in considerable numbers. The increase of women teachers .is already manifesting itself in other countries and as in the United States is noticeable first in primary schools. For example, in 1915, women formed 85 per cent of all teachers in the elementary schools of Can¬ ada and Newfoundland, and 71.3 of all teachers in the primary schools of Norway. The great war now in progress will undoubtedly accelerate the falling percentage of men teachers in the United States and will create in Europe a much greater shortage of men public school teachers than existed in America after the Civil War. As in the United States, in 1865-70, an over¬ whelming increase in women teachers may be looked for in all the warring countries. It is probable that a similar situation will bring about similar results and that as one of the by¬ products of the present war coeducation will be introduced very

generally into all state-sup¬ ported schools, especially in the more expen¬ sively organized higher schools for boys which prepare for the universities. Whenever women teachers are in the majority it is clear that they must receive the best possible training to teach the children of a nation, and their claim to be admitted to state-supported schools and universities becomes irresistible. In the United States coeducation spread from the public schools to the State universities of the west and from the State universities to the more conservative private university foundations of the eastern States. When most of the State universities of the west were founded they were in reality scarcely more than secondary schools supplemented in most cases by large preparatory departments. Girls were already being educated with boys in all the high schools of the west, and not to admit them to the State universities would have been to break with tradition. Women were also firmly estab¬ lished as teachers in the secondary schools, and it was patent to all thoughtful men that they must be given opportunities for higher educa¬ tion, if only for the sake of the secondary edu¬ cation of the boys of the country. The co¬

education of men and women in colleges, and at the same time the college education of women, began in Ohio, the earliest settled of the western States. In 1833, Oberlin Collegiate Institute (not chartered as a college until 1850) was opened, admitting from the first both men and women. It was the first institution for collegiate instruction in the United States where large numbers of men and women were edu¬ cated together, and the uniformly favorable testimony of its faculty exerted great influence on the side of coeducation. In 1853, Antioch College, also in Ohio, was opened and ad¬ mitted from the beginning men and women on equal terms. From this time on it became a custom for State universities as they were opened one after another in the west to admit women. The State universities of Utah, opened in 1850, Iowa, opened in 1856, Washington, opened in 1862, Kansas, opened in 1866, Minne¬ sota, opened in 1868, and Nebraska, opened in 1871, were coeducational from the first. In¬ diana, opened as early as 1820, admitted women in 1868. The University of Michigan, at this time the most important western university and the only western university well known in the east before the Civil War, opened its doors to women in 1870 and admitted them for the first time to instruction of true college grade. This step was taken against the wish of the faculty as a whole in response to public sentiment as is shown by the action of the Michigan legis¬ lature. The example of the University of Michigan was quickly followed by all the lead¬ ing universities of the west. In the same year women were allowed to enter the State universities of Illinois and California; in 1873, the only remaining western State university closed to women, that of Ohio, admitted them. Wisconsin, which, since 1860, had given some instruction to women, became in 1874 un¬ reservedly coeducational. All the State univer¬ sities of the west, organized since

1871, have admitted women from the first. In the 23 States which, for convenience, are classified as western, there are now 23 State universities open to women. The College of Hawaii and Porto Rico University are also coeducational. The 16 States included in the South Atlantic and South Central Divisions by the United States Commissioner of Education, all of them southern in sympathy, admitted the claims of women more slowly, as was to be expected. Missouri, the most western, became coeduca¬ tional as early as 1870, and the University of Texas and the University of Oklahoma were opened in 1883 and 1892 respectively, as coedu¬ cational institutions; Mississippi admitted women in 1882 ; Kentucky, in 1889 ; Alabama, in 1893; South Carolina, in 1894; North Carolina, in 1897 (but only women prepared to enter the junior and senior years) ; West Virginia, in 1897 ; Delaware College, the one State college of Delaware, as recently as in 1914 opened an af¬ filiated college for women, supported by the State legislature. The state-supported universi¬ ties and colleges of Maryland, Virginia, Georgia and Florida are all still closed to women, but strenuous efforts, which may be expected ulti¬ mately to succeed, have been made at the last three sessions of the Virginia legislature to secure the admission of women to the Univer- sity of Virginia, which is the most conservative and also one of the best of Southern universi-

ties. In the States enumerated earlier in this article as belonging to the North Atlantic Di¬ vision all the State-supported colleges are open to women although these institutions are rela¬ tively unimportant as compared with the privately supported colleges in this section. This brief review of educational conditions in the United States shows conclusively that pub¬ lic opinion based on 48 years of experience has definitely settled the question of coeduca¬ tion, i.e., the right of women to share equally with men the instruction given in schools, col¬ leges and universities supported by the state. Whenever State agricultural, technical or me¬ chanic arts institutions are not coeducational it is safe to conclude that women have not yet wished to be admitted to them. The few at¬ tempts that have been made to segregate men and women in State universities have failed. For example, a proposal made in 1907 to section the large elementary classes of the University of Wisconsin on the basis of sex rather than of ability, or alphabetically, was effectively dis¬ posed of by the 1909 act of the Wisconsin legis¬ lature depriving the board of regents of the power to introduce sex discrimination into the instruction of the university. It may be urged, however, that coeducation has been universally adopted in state-supported schools and univer¬ sities under the compulsion of public opinion operating through public boards of educa¬ tion and State

legislatures and not by reason of the genuine success of coeducation itself as a system of education. From this point of view the adoption of coeducation by privately endowed colleges and universities, especially by the older men's colleges in the east which were founded long before women were allowed to teach, or even to study, in American schools, is more convincing. Moreover, the education of young people in school and college is car¬ ried on in private institutions to a much greater extent in the United States than in any other country except Great Britain. Our independent schools and colleges founded by private or denominational initiative and main¬ tained by voluntary gifts were originally modeled on similar English foundations and have in the past reached a great development. Of the 569 universities, colleges and technical schools tab¬ ulated by the United States Commissioner of Education (including six affiliated women's col¬ leges omitted from his tabulation) 473 are pri¬ vate foundations teaching 140,371 students as compared with 96 state or municipal institutions teaching 96,797. Of these 473 private colleges and universities, 19 are technical or industrial schools where women do not as yet wish to study, five are military schools, and 62 are col¬ leges under the control of the Roman Catholic Church, which in the United States is opposed on principle to the coeducation of the sexes and is impervious to argument. Of the remain¬ ing 387 institutions of liberal arts, 62 are sep¬ arate colleges for men, 56 are separate colleges for women, nine are colleges for women affiliated to colleges for men, and 260 are frankly coeducational, i.e., even of all pri¬ vate colleges of liberal arts where men study, only 20 per cent teach men sep¬ arately from women, and nine, including some of the most important of these 62 separate men's colleges, share their professors, and in some cases their endowments, with an affiliated

woman's college. All separate universities for men maintaining graduate schools of art and science of any importance except the Uni¬ versity of Virginia and Princeton University, open their graduate schools to women. All university schools of medicine, law, and theology either now admit women or will soon admit them. Of the 95 medical schools tabu¬ lated in the 1916 Report of the United States Commissioner of Education, 67 were coeduca¬ tional, including four of the most important private university schools, John Hopkins, Cornell, Rush, and the University of Pennsyl¬ vania. The private medical school of Tulane University admitted women in 1915 ; the private medical schools of Columbia, Yale, and Wash¬ ington universities have announced that they will admit women, and the medical school of Harvard is expected to follow their ex¬ ample. Of 29 State university medical schools, 22 are coeducational. Professional schools of law in all State universities are either opened, or will be opened as soon as women wish to study in them, and three of the most important private university law schools in the United States, Pennsylvania, Columbia and Harvard, are already open, or have announced that they expect to admit

women. Coeducation has steadily increased in favor from the beginning of the experiment on a large scale in 1870 until the present time when an insistent public opinion enforces the claim of women to their share in the education given to men even in privately endowed universities. This public opinion is all-powerful in the case of public foundations and cannot be disregarded by private educational institutions dependent for support on private gifts. It has already compelled all the leading graduate and pro¬ fessional university schools to admit women and has established side by side with men's undergraduate colleges co-ordinate, or affiliated, women's colleges in eight privately supported men's universities and colleges and in the State college of Delaware, all except one (Western Reserve) situated in the east of the United States. Separate colleges for men will continue to exist in the eastern States only as long as through their strongly developed dormitory and campus life they partake of the nature of pri¬ vate clubs. Their separate existence has in a sense compelled the foundation of the great women's colleges in the east with the same highly organized social life and college tradi¬ tions and customs. The extravagance of such duplication, however, has limited the spread of separate men's and women's colleges, which show even now a tendency to attract as students specially selected men and women whose parents are able to pay for the combination of high academic standards with a peculiarly attractive social life. Much of the culture and many of the priceless associations of college life are to be obtained only by residence in college halls. Coeducational colleges have not as yet suc¬ ceeded in offering their students such a com¬ plete college life as the separate men's and women's colleges although the progress made in this direction within the last 10 years indi¬ cates that there is no reason why it cannot be organized both for men and women equally well in coeducational universities. All the arguments against the coeducation of the sexes in colleges have been met and answered by

experience. It was feared at first that co¬ education would lower the standard of scholar¬ ship on account of the supposed inferior quality of women's minds. The unanimous experience of coeducational colleges goes to prove that the average academic standing of women is slightly higher than the average standing of men, that women win proportionally more prizes given for scholarly excellence and obtain pro¬ portionally higher examination marks. Many explanations of the greater academic success of women students have been suggested but the fact, however it be explained, remains. None of the serious difficulties have arisen that were feared from the association of men and women of marriageable age. The question of health has also been finally disposed of. Thousands of women have been working side by side with men in coeducational institutions for the past 48 years and undergoing exactly the same tests without a larger percentage of withdrawals on account of illness than men, or any appreciable bad effects on health after graduation. A sta¬ tistical study (made in 1900 and privately printed by the Association of Collegiate Alum¬ nae) of 3,636 women graduating from college between 1869 and 1898 furnishes satisfactory evidence as to their length of life, present health, rate of marriage, number of children, number of living children, etc., as compared with their sisters and cousins who are not college graduates. A larger percentage of women graduates of coeducational colleges are married, and their average age of marriage seems to be about a 3ˆear earlier than that of graduates of separate colleges, but both these facts may be due to the difference in local customs between the east and the west. A college education, whether obtained in separate colleges for women or in coeducational col¬ leges, justifies itself in many surprising and rather unexpected ways. College women as a whole seem to marry on an average two years later than their sisters who have not received a college education ; but as they have on an average more children than their sisters, and succeed in bringing up a few more of the children born to them, this would seem to be rather an advantage than otherwise, especially as they also seem to make slightly better mar¬ riages financially than their sisters. The four careful statistical studies that have been made of the after effects of college education on women indicate clearly that vitally important racial matters, such as the marriage rate, the number of children born per marriage, the health, the occupations of men and women, etc., are controlled not by the (from this point of view) relatively unimportant question of whether or not they have spent four years in college, but by the customs and ideals of the social and financial groups to which they and their families belong. It has been observed that women and men in western coeducational colleges tend to choose different subjects of study, for example, more men than women elect economics, mathematics, physics,

and chemistry, and more women than men elect Latin, Eng¬ lish, French, and German. In the separate men's and women's colleges in the east, how¬ ever, the popular electives are the same for men and women, women crowding into eco¬ nomics, and men into English, and both de¬ serting mathematics and Greek for French and

Spanish. It is probable that the difference in the choice of electives, where it exists, is due not to sex preference but rather to the more strictly vocational character of college courses in western universities and to the difference in the occupations to be engaged in after grad¬ uation by men and women students. Up to the beginning of the great war teaching has been the chief profession of college women. From 60 to 65 per cent of all women in western co¬ educational colleges have expected to teach and consequently have taken the college courses that best fitted them for this occupation; whereas men have elected courses to prepare them for business, industry, politics, and the school posi¬ tions in science which are as a rule filled by men in western high schools. Also many more women than men in the college departments of coeducational western universities are taking a college course for the purposes of general culture and consequently tend to select the same studies that are taken by both men and women students who are studying in the sep¬ arate men's and women's colleges in the east with a similar purpose. That coeducation is regarded favorably by men and women (or at least that it does not in any way interfere with their preferring coeducational to separate col¬ leges), is shown by the striking increase of co¬ educational colleges, and of men and women students studying in them, as compared with the decrease of separate colleges for men and women and of students studying in them. In the 45 years that have elapsed between 1870 and 1915, 235 higher educational institu¬ tions classed as colleges and universities by the United States Commissioner of Edu¬ cation have been founded. Of these, 21 (19 mens' and 2 women's) are Roman Catholic, 14 are schools of technology and mechanic arts in which women do not as yet desire to study. Of the remaining 200 colleges giving a liberal college education 156 colleges are co¬ educational, only six are separate colleges for men, 29 are separate colleges for women, and nine are separate colleges for women affiliated to separate undergraduate colleges for men; or 78 per cent of the whole number are co¬ educational, only 3 per cent are separate col¬ leges for men, and only 19 per cent are sep¬ arate women's independent or affiliated colleges. Of all liberal arts undergraduate colleges open to men founded since 1870 (excluding Roman Catholic colleges) 96 per cent are now co¬ educational and only 4 per cent teach men separately from women. Of the above six sep¬ arate men's colleges 3 are situated in the south¬ ern States, and in the case of two only (Johns Hopkins in Maryland and Clark College in Massachusetts), is the exclusion of women from their college departments of any special moment, and both these institutions admit women freely to all their graduate and

pro¬ fessional work. Only 1,156 men were studying in the year 1915 in the college departments of these six college as compared to thousands studying in the college departments of the 156 coeducational colleges. The trend toward co¬ education has become still more marked since 1900. Only one separate college for men, Clark College, Massachusetts, with 141 stu¬ dents, has been opened since 1900. Of the 29 separate women's colleges only six have been founded since the year 1900,

four of the six being situated in the southern States, and three being under denominational control. Apart from Simmons College, which is more of a technical or vocational school than a liberal arts college, and should be classified rather with the nine technical schools for men omitted from these statistics, no one of the other five separate women's colleges is of any considerable academic standing and only 699 women students of college grade are studying in them. Of the nine separate affiliated women's colleges only four (affiliated to Tufts, Hobart, Richmond, and Delaware,) have been opened since the year 1900 and only very few women are studying in them. Since 1870 only one of the smaller eastern coeducational colleges (Wesleyan, with 454 men college students) has excluded women and become a separate men's college; only one small western college, Downer (now Milwaukee-Downer, with 198 women students) has excluded men and be¬ come a women's college, and only two (Western Reserve University, with 426 women, and Tufts, with 92 women) have segregated their women students in affiliated colleges ; while on the other hand during the same period of time large numbers of private men's colleges have become coeducational. Including the two above mentioned colleges there were in 1915 only nine such affiliated colleges in the United States. Only one private university, Leland Stanford Junior, has limited the number of women undergraduates and only two other private foundations (Chicago University in Illi¬ nois and Colby College in Maine) make any attempt to segregate women students in certain elementary classes. Colby teaches its 155 women separately in the first two years of the college course but Chicago, which has been experi¬ menting with segregation since 1902, has practically discarded it, and in April 1918, taught its great body of over 4,000 women sep¬ arately from men in only 4 out of 52 classes offered to first and second year students. All other classes in the university were coeduca¬ tional. In 1870, when coeducation was first generally adopted in State universities, co¬ educational colleges formed only 30.7 per cent of all colleges and universities in which men were studying. Since then the increase of coeducational colleges and the decrease of separate men's colleges have been extraordinarily rapid, as follows: 1870, percentage of

co¬ educational colleges to whole number of liberal arts colleges open to men, 30.7; 1880, 51.3; 1890, 65.5; 1900, 70; 1910, 70.7, or (omitting Roman Catholic colleges) 80.7 ; 1915, 76.5, or (omitting Roman Catholic colleges) coeduca¬ tional colleges formed 88.3 per cent of all liberal arts colleges open to men and 91 per cent of all such colleges open to women. (Consult col¬ lege and university statistics published in Re¬ ports of the United States Commissioner of Education for the corresponding years, it being noted that military and technical colleges, and in some cases, when stated, Roman Catholic colleges, have been omitted in calculating these percentages). The 1915 statistics have been cor¬ rected throughout by the addition of the five affiliated women's colleges (College for Women of Western Reserve University, Women's Col¬ lege in Brown University, Jackson College of Tufts College, William Smith College of Ho¬ bart College, Westhampton College of Rich¬

mond College, Women's College of E)elaware State College) omitted by the Commissioner of Education and by the transfer of the six corre¬ sponding men's colleges from the group of co¬ educational colleges to the group of separate men's colleges. In 1915, 71 per cent of all men undergraduate students and 76 per cent of all women undergraduate students were study¬ ing in coeducational colleges and universities. This cannot be explained by the fact that for financial reasons students prefer public univer¬ sities, which offer education free of charge and are also with very few exceptions coeduca¬ tional, because the greater number of men and women are still studying in private colleges and universities which offer the choice of a sep¬ arate or coeducational college education. In 1915 women formed about 35 per cent of all graduate and undergraduate college students in the United States, _ but, if the students of Roman Catholic, military, and technical colleges be omitted, women studying in undergraduate coeducational colleges of liberal arts formed 42 per cent of the total number of men and women in coeducational colleges. In many co¬ educational colleges women now equal and sometimes exceed men, and their numbers are steadily increasing. In 1915 there were 79,763 undergraduate and 5,098 graduate women stu¬ dents, in all 84,861 women, studying in American colleges and universities. The United States is the only country in the world where many thousands of women are receiving a university education. This statistical study speaks for itself and shows clearly the overwhelming trend toward coeducation in the college education of both men and women. It shows also that the tendency toward coeducation has become even more marked since the year 1900, that is, after 30 years of successful trial of the system. In like manner the school statistics published by the United States Commissioner of Educa¬ tion prove that coeducation in primary and secondary schools has been equally successful. The common school system of the United States is uncompromisingly coeducational. No dis¬ tinction between coeducational

and separate schools is made by the United States Commis¬ sioner of Education in giving the statistics of public elementary schools, presumably because they are all coeducational. In 1915, of all children in elementary schools 91 per cent were in public elementary schools. Not only are practically all public elementary schools co¬ educational, but almost all privately sup¬ ported elementary schools are coeducational. Public high schools also are almost en¬ tirely coeducational. In 1915 there were 11,674 public and 2,248 private high schools. Of the 11,674 public high schools all except 63 were coeducational and only 37,043 girls were studying in separate high schools for girls, as compared with 690,497 studying in coeducational high schools, i.e., only 5 per cent of the total number of girls studying in public high schools were in separate girls' high schools — an altogether negligible quantity. In the 25 years from 1890 to 1915 the percentage of pupils studying in private high schools as compared with pupils studying in public high schools has steadily decreased, as follows : in 1890, private high school pupils were 39.25 per cent of all high school pupils ;• in 1900, 17.59 per cent; in 1910, 11.37 per cent;

in 1915, 10.45 per cent. During these 25 years the number of public high schools has increased from 2,526 to 11,694 while private high schools have not even doubled themselves, increasing only from 1,632 to 2,248, and of all the boys and girls studying in high schools in. 1915 only 10.45 per cent were studying in private high schools. The great increase of public high schools, which are practically coeduca¬ tional, as compared with private high schools shows the success of high school coeducation in the United States. Moreover, 44 per cent of all private high schools are also coeduca¬ tional and 42 per cent of the girls receiving a private high school education, and 45 per cent of the boys, are studying in these coeducational private high schools. In 1915 boys and girls in public and private separate high schools formed only 12 per cent of all pupils in public and private high schools. All the other 88 per cent were in public and private coeducational high schools. In the larger high schools, boys and girls are frequently separated in athletics, gym¬ nastics, recreation, and to some extent in study periods, but the few attempts that have been made to segregate them in separate classes have not succeeded. In vocational work espe¬ cially when organized in special trade or voca¬ tional high schools boys and girls naturally tend to elect different vocational work in order to be fitted for the different occupations open to men and women, but during the present war girls are being trained to undertake men's jobs and after the conclusion of peace the tendency will be to continue to give boys and girls the same vocational work in the high schools. The numbers of both boys and girls

studying, in high schools in the United States are increasing at a faster rate than the population. There are slightly more girls than boys studying both in public and private high schools, and more girls than boys complete the high school course and graduate. In 1915 girls formed 54.54 per cent of all high school pupils. The extraordi¬ nary success of elementary, secondary, and col¬ lege coeducation in the United States cannot fail to exert a profound influence on the de¬ velopment of the education of girls and women in all European countries. After the conclusion of the present war all other civilized countries must make immediate provision for the higher education of women who will greatly outnum¬ ber men in this generation- and must conse¬ quently receive the best preparation for self- support and national service. As is shown by the experience of the United States women in considerable numbers will be unable to obtain higher education unless like boys they can be prepared for admission to the universities in state-supported schools. The experience of the United States also shows that only compara¬ tively few children of rich parents can afford to study in separate private schools, even if they wish to do so, of which there is no indica¬ tion. Only 12 per cent of all girls and boys in the United States are studying in separate high schools. There is reason to believe that within the next half century coeducation will become the universal system of school, college and professional education, not only in the United States, where it is now the prevailing system, but also in all other civilized countries.

M. Carey Thomas, President Bryn Mawr College.

COEFFICIENT OF EXPANSION. See

Heat; Thermometry.

COEFFICIENT OF FRICTION. See

Friction.

COEHORN, koo'horn, Menno, Baron van, Dutch engineer: b. near Leeuwarden, Fries¬ land 1641 ; d. The Hague, 17 March 1704. He studied at the University of Franeker and in his 16th year he entered the Dutch service as captain, and soon rose to the rank of a colonel. During the siege of Graves he made use for the first time of the small mortars, called in honor of their inventor coeliorns, used for throwing grenades. In the war of 1689, against France, he again distinguished himself. His defense of Fort William, in 1692, which he himself had planned, against the attacks of Vauban, attracted much attention. Both com¬ manders displayed all their talents. In the war of the Spanish Succession Coehorn was made general of the fort and succeeded in re¬ ducing six French strongholds. In 1702 he published in Leeuwarden his new theory of fortification. In 1703 he directed several sieges. He fortified almost all the strong places in Holland.

Bergen-on-Zoom he considered his masterwork. His system is different from that of Vauban. Vauban operated by ma¬ noeuvres, and by the skilful direction of his ordnance and his men saved both, and wearied and divided the forces of the enemy; Coehorn crushed by an overpowering mass of artillery and men, and sacrificed both for a rapid and powerful effect. Consult De Peyster, (Life of Coehorn) (New York 1860) ; Bonomer, (Essai generale de fortification (Paris 1814) ; Cos- seran de Villenoisy, (Essai historique sur la fortification (1869).

*CCELE-SYRIA, se'le-sir'i-a ("Hollow Syria**), the ancient name of the large valley lying between the Lebanon and Anti-Lebanon mountain ranges in Syria. The valley is about 100 miles in length. Near its centre are the ruins of Baalbek, or Heliopolis, and near the ruins rise the rivers Orontes and Litany, which water and fertilize the plain. The name in the 2d century included all the country (except Judea and Phoenicia) extending from Seleucis to the confines of Egypt and Arabia. In Roman times it was again confined to the territory east of the Jordan, consisting of Perea, the Decapolis and the provinces which constituted the tetrachy of Philip. In 47 B.c. Herod was delegated by the Romans as mili¬ tary head. Later in the Roman period 297 A.D., the term receded to the region between Taurus and Phoenicia. To-day, it is used in the sense first noted. Consult Holscher, (Palastina in der persischen und hellenistischen Zeit) (1903); Smith, historical Geography of the Holy Land) (11th ed., 1904); Leary, (Syria, the Land of Lebanon) (1913).*

C CELEBS IN SEARCH OF A WIFE, a

moral tale by Hannah More, published 1808. This is the best known work of fiction by that prolific moralist. It was written after she had passed her 60th year, and was intended as an antidote to what she considered the deleterious influence of the romantic tales of that day.

CCELENTERATA, se-len-te-ra'ta, a phylum of animals distinguished from all

others by the following aggregate of char¬ acters : Its members consist of two layers of cells only, separated by a gelatinous layer, and exhibit a more or less pronounced radial sym¬ metry. They possess peculiar nematocysts (q.v.) or stinging organs, which are developed from the cells of the outer and sometimes of the inner layer. Such cells are not certainly known in any other group. Sense organs responsive to light and to sound or changes in equilibrium may exist among the ccelenterates, but are of the very simplest character. The differentiation of nerve and muscle cells is

indicated, but is as yet very imperfectly developed. There is but one body cavity, which serves the purposes both of digestion and of circulation. All ccelenterates are carnivorous. One opening serves the purposes both of the mouth and of the vent. The individuals may be free, in which case they are known as medusae or jelly¬ fishes, or fixed, as with the coral individuals and the sea-anemones, when they are known as polyps. An alternation between the poly¬ poid and medusoid generations is common, with the polypoid generation asexual and the medusoid generation sexual. Either genera¬ tion may be aborted or entirely absent. It is not yet known which represents the original ccelenterate condition. The asexual genera¬ tions multiply by fission, or more commonly, by gemmation, and these processe-s also may occur in the sexual forms. The gemmation often re¬ sults in the formation of colonies. Both polyps and medusae may be either separate or colonial. In the colonial forms a high degree of di¬ vision of labor among the zooids is often found, with a corresponding differentiation of form. A chitinous or calcareous exoskeleton is often found. The coelenterata are classified as fol¬ lows :

1. Hydrozoa. — The sexual cells discharge directly to the outside. The digestive pouch opens directly to the exterior and is not sub¬ divided by bands of the inner body layer.

2. S chyphozoa. — The sexual cells discharge into the digestive-circulatory pouch, which ap¬ pears to open directly to the exterior, and is not subdivided by bands of the inner body layer. Filaments of the inner body layer may extend into the digestive pouch.

3. Anthozoa or Actinozoa. — The sexual cells discharge into the digestive-circulatory pouch, which opens into the outside through a tube lined with the outer body-layer, and is subdivided by bands of the inner body layer supporting this tube, the so-called mesenteries. Radial symmetry is partly replaced by bilateral symmetry. Medusae are unknown.

The Ctenophora (q.v.) are often included among the Ccelenterates, but they possess a middle germ layer and no nematocysts, and show affinities to the flatworms, so that they will be treated under a separate head.

The Hydrozoa include many jelly-fish, the common hydra and many other polyp-like forms, and certain so-called (

Fossil Coelenterata can be found even in the Lower Cambrian rocks. Not only the skeletons of the various calcareous forms, but the im¬

pressions of the circulatory-digestive sac of the frail medusae, are found from a very early period. The graptolites (q.v.) have been as¬ sociated with the Coelenterata by some writers, though others believe them to be Polyzoa. See Actinozoa ; Alcyonaria ; Coral ; Ctenophora ; Gorgonia; Hydra;

Hydrozoa; Jelly-fish; Polyps ; Portuguese Man-of-War ; Sea- anemones; Sea-pen; Siphonophora ; Zoo¬ phytes. Consult Hickson,

(Cambridge Natural History, 5 Vol. I, London 1906) ; Mayer, (The Medusae of the World) (Carnegie Inst. Pub., Washington 1911) ; Min-chin, (Coelenterata > (in Lankester's (A Treatise on Zoology, > Vol. II, London 1900).

CCENOGENESIS. See Recapitulation.

CCEPHORI. See 2Eschylus.

COERCION. A term employed in political science to describe the means (principally non¬ judicial) for securing obedience to law.

State Coercion. — When the Southern States issued their ordinances of secession in 1860 to 1861, the action constituted an effort to nullify the action of the Federal government upon in¬ dividuals by setting up the authority of States in opposition to that of the Federal government. The South believed that the Federal govern¬ ment was simply a compact between separate and sovereign political bodies, that the powers of the Federal government were held in trust for the States themselves, and that sovereignty therefore was not in the hands of the Federal government but in the hands of the people who had created these governments, not, however, as a mass, but rather as individual States. The South thought that under the Constitution the Federal government was given only cer¬ tain specific powers which it did not possess under the Articles of Confederation (q.v.) and that the Constitution did not conflict with nor the Federal government supersede the sover¬ eignty of the States.

There was considerable discussion of the right of the Federal government to coerce a State. In 1832-33, during the dispute over nullification (q.v.) in South Carolina, Presi¬ dent Jackson said: ((To say that any State may at pleasure secede from the Union is to say that the United States are not a nation. Seces¬ sion, like any other revolutionary act, may be morally justified by the extremity of oppres¬ sion, but to call it a constitutional right is con¬ founding the meaning of terms.® And again : ((The right of the people of a single State to absolve themselves at will and without the con¬ sent of the other States from their most solemn obligations, and hazard the liberties and hap¬ piness of the millions composing this Union, can not be acknowledged. Such authority is be¬ lieved to be utterly repugnant both to the prin¬ ciples upon which the general government is constituted and to the objects which it is ex¬ pressly formed to attain.® On the other hand he said : <(That a State or any great portion of the people, suffering under long and intolerable oppression and having tried all constitutional remedies without the hope of redress, may have a natural right, when their happiness can be not otherwise secured, and when they can do so without greater injury to others, to ab¬ solve themselves from

their obligations to the

government and appeal to the last resort, needs not be denied.® (Richardson, J. D., (Messages and Papers of the Presidents, > Vol. II, pp. 640- 56). On 25 Nov. 1860 the New York Herald, an independent journal, said: ((Coercion in any event is out of the question. A union held to¬ gether by the bayonet would be nothing better than a military despotism.® And again : <(Each State is organized as a complete government, holding the purse and wielding the sword, possessing the right to break the tie of the confederation and to repel coercion as a nation might repel invasion. . . . Coercion, if it

were possible, is out of the question.®

In his message of 3 Dec. 1860 President Buchanan declared that no State possessed the right to secede, but on the other hand he stated that the Constitution contained nothing which would grant the Federal government the right to coerce a State, and therefore he apparently had no right to prevent secession. (Richardson, (Messages, J Vol. V, pp. 626-653). Buchanan based his message on an opinion given him by his Attorney-General, Jeremiah S. Black, 20 Nov. 1860, in which, among other things, the latter said that the Federal govern¬ ment had the right to <(preserve itself in its whole constitutional vigor by repelling a direct and positive aggression upon its property or its officers,® but thai ((an offensive war to com¬ pel a State to recognize the supremacy of the government of the United States® would destroy the Union, immediately and completely. ((Opinions of the Attorney-Generals, Vol. IX, p. 516 et seq.). The seceding States held that there was no constitutional provision that met the case because a State could not be coerced; in his speech of 21 Jan. 1861, when resigning from the Senate, Jefferson Davis said: ((If it be the purpose of gentlemen they may make war against a State which has withdrawn from the Union ; but there are no laws of the United States to be executed within the limits of a seceded State. ... A state [in such con¬ dition] . . . claims to be exempt from any*

power to execute the laws of the United States within her limits.® (Congressional Globe, 36th Congress, 2d session, p. 487). The South¬ erners made much of the fact that the Federal convention did not provide for coercion of States but on the contrary omitted it from the Constitution. But the power of coercion was omitted because a government over people was established which had the right to enforce law on persons. The Northern statesmen insisted that no State could exist or act except under its

obligations to the Federal Union ; and that the power to coerce individuals could not be dissolved by any State. It would have been appropriate to provide for the. coercion of States in a union of sovereignties where obligations might have been enforced suitably by war; but where the system established pro¬ vided for a government immediately over men who were subject directly to the commands of that government, coercion was inappropriate. Any action by a State government which con¬ flicts with its duty as a member of the Union is illegal ; officials who carry out unconstitu¬ tional legislation are not properly State offi¬ cers; people cannot legally perform illegal acts. Lincoln and the Federal government in¬ sisted that they were dealing only with indi¬

viduals. In his speech of 29 Dec. 1860 Lyman Trumbull said:

"If there is anybody in this Senate, or in this country, who ever talked of the United States declaring war against one of its States, or of coercing one of its States, or ever entertained such notion, I know not who it is. I have never seen him. This phrase, ‘ coerce a State,’ is a phrase calcu¬ lated to mislead the public mind. . . . Nobody pro¬

poses to declare war against a State. That would admit at once that the State was out of the Union — a foreign govern¬ ment. Of course we cannot declare war against a State. Nobody proposes to coerce a State or to convict a State of treason. You cannot arraign a State for trial; you cannot convict it or punish it; but you can punish individuals.” (Congressional Globe , 36th Congress, 2d Session, Pt. I, p. 156).

<(A reading of President Buchanan’s mes¬ sage above mentioned shows that he entirely confused the power of the United States to coerce a recalcitrant State — a power it surely possesses — with its right to enforce the laws of the United States wherever they are appli¬ cable, and to use the armed force whenever it may be necessary to accomplish this end — a power which it undoubtedly possesses. Even the most strenuous opponent of secession would probably not have defended the right to apply coercion against a State as a corporate political entity. But the power to proceed against its citizens for violating the laws and to protect the public property was a very different thing, for the President is bound by oath to see that the laws are faithfully executed. President Lincoln in his inaugural address practically agreed with President Buchanan that the Fed¬ eral government had no power to wage war against a State, as such, or to proceed against it by way of Federal execution, but he denied that, because it could not coerce a State, it could not defend the public property against attack or compel obedience to its laws by those subject to its jurisdiction. The Union, he said, was sovereign and it was intended to be perpetual, from which it followed that no State upon its mere motion could lawfully get out of the Union; that resolves and ordinances to that effect were legally void ; and

that acts of violence within any State or States against the authority of the United States were in¬ surrectionary or revolutionary, according to circumstances. At the same time he announced his determination to hold, occupy and possess the property and places belonging to the gov¬ ernment of the United States and to collect the duties and imposts everywhere. No attempt was to be made to coerce any State as such, but only to compel obedience to the laws ; and in his call for the militia it was stated that their services were to be employed in over¬ coming the resistance to the laws by combina¬ tions of persons too powerful to be suppressed by the ordinary course of judicial proceedings.® (J. W. Garner, in Wiley and Rines, ˆhe United States, Vol. VIII, p. 8). For Lin¬ coln's messages above mentioned, consult Rich¬ ardson, (Messages,* (Vol. VI, pp. 5-14) ; Nicolay and Hay, (Life of Lincoln,* (Vol. Ill, pp. 327-344).*

In his amnesty proclamation of 8 Dec. 1863 Lincoln offered to recognize the communities containing such combinations of individuals if they would again establish State governments in conformity with the Constitution. (Rich¬ ardson, (Messages, Vol. VI, pp. 213-15; Nicolay and Hay, (Complete Works of Abra¬ ham Lincoln,* Vol. II, pp. 442-44). Lincoln*

and his supporters believed that the Hoyal® clement of the Southern States was large but that the functions of the State governments had been usurped by combinations of disloyal persons and that therefore the rights of the States had not been destroyed but simply sus¬ pended temporarily by the acts of the Con¬ federate officials, who were not recognized. Lincoln did not regard the acts of the Con¬ federate authorities as legal or quasi-legal, and held that the existence of the States themselves was not affected by the disloyal acts of a por¬ tion of their inhabitants. These States there¬ fore were simply out of their (

Individual Coercion. — It is necessary for the proper conduct of government that suf¬ ficient physical force be provided to protect government officials in the exercise of their designated functions. Our laws define offenses that strike at the root of government ; our judicial courts have authority to cause the arrest of offenders; and offenders should be tried and punished. If the regular processes be prevented by force the Federal and State courts have power to appoint temporary offi¬ cers who may call for assistance on the ((posse comitatus® — that is, all able-bodied men within their jurisdiction. If these forces be impotent the governor of the State may be requested to send aid, his usual force being the militia. The purpose of the militia is not to arrest this or that individual but to break up organized re¬ sistance, wherefore they may be ordered or

compelled to fire into rioters or mobs which may only have the appearance of creating a disturbance but which may not have committed any other offense. Individuals in such in¬ stances are regarded as outside the protection of the law and have no redress, being subject to dispersal so long as they maintain an atti¬ tude of resistance. If the militia be insufficient to protect the State against domestic violence the State executive may request aid of the President of the United States (Constitution, Art. IV, Sec. IV), who may, if necessary, use the militia of other States or regular troops or sailors. Sometimes these local disturbances (like the Pullman strikes in Chicago in 1894) interfere with the execution of Federal laws, whereupon, without calling upon the States, the President may send militia or regulars on his own initiative. If the disturbances be¬ come especially violent, the habeas corpus may be suspended or martial law may be declared,

in either of which cases a suspected person may be arrested and held without charge or trial for any length of time in the discretion of the proper authorities.

Bibliography. — Davis, Jefferson, (Rise and Fall of the Confederate Government' (New York 1881) ; Dodd, W. E., (Jefferson Davis' (Philadelphia 1907) ; Hart, A. B., (Actual Gov¬ ernment' (New York 1908), and (National Ideals Historically Traced' (New York 1907) ; McPherson, Edward, c Political History of the United States during the Great Rebellion) (4th ed., Washington 1882) ; Rhodes, J. F., his¬ tory of the United States' (New York 1 893— 1906) ; Stephens, A. H., Constitutional View of the Late W r between the States' (Phila¬ delphia 1868) ; Von Holst, Hermann, Consti¬ tutional and Political History of the United States) (Chicago 1892) ; Whiting, W., (War Powers of the President and the Legislative Powers of Congress in Relation to Rebellion, Treason and Slavery' (8th ed., Boston 1864) ; (The South in the Building of the Nation, ' (esp. Vol. IV, Richmond, Va., 1909) ; (Federal Aid in Domestic Disturbances) (Senate Doc. 209, 51st Congress, 2d session) ; and the articles by Grover Cleveland entitled (The Govern¬ ment in the Chicago Strike of 1894) (in The Fortnightly, N. _ S., Vol. LXXVI, pp. 1-19, London 1904; in McClure's Magazine, Vol. XXIII, pp. 227-40, New York 1904) ; and in Presidential Problems,' (pp. 79-117, New York 1904).

COERCION, in law, any application of physical or other force by which a person is compelled to do or refrain from doing some¬ thing; intimidation. The legal effect of coer¬ cion depends upon its violence and other at¬ tendant circumstances. Where one commits a crime under coercion in the reasonable belief that he will be killed or seriously injured if he does not do so, his act is held to be excusable. Coercion may be indirect, as when applied to one's husband, wife, mother, father, brother, sister or other near relative, and in some cases such coercion may have the same effect as if

applied to the person directly. Where a wife commits any crime except treason, homicide or perhaps highway robbery in the presence of her husband, she is usually presumed to have done so under his coercion, and is therefore not pun¬ ishable. Coercion is a ground for invalidating a contract in a civil suit.

COERCION ACTS, a bill introduced by the Grey ministry into the English Parliament 1833. See Ireland — History.

COERNE, Louis Adolphe, American com¬ poser: b. Newark, N. J., 27 Feb. 1870. He was educated at Harvard University and at the Royal Academy of Music, Munich. He was musical director at Buffalo, N. Y., 1894-97 ; Columbus, Ohio, 1897-99; and Troy, N. Y., 1907-09. In 1910-15 he was professor of the history and science of music at the University of Wisconsin, and since 1915 he has been pro¬ fessor of music at Connecticut College. He is author of

(Sakuntalaˆ (1904); and (Zenobia,) grand opera (1905-06). The last named work was the first grand opera by a native of the United States to be performed in Europe.

COETHEN, ke'ten, Germany, a town in the state of Anhalt, in a fertile and attractive dis¬ trict on the Ziethe about 80 miles southwest of Berlin. It was, till 1853, the capital of the former duchy of Anhalt-Cothen. It consists of the old and the new town and several suburbs ; has a fine Protestant cathedral church in the Gothic style, with old glass-paintings and a fine organ; the former ducal residence with library, picture-gallery and museum ; a gymna¬ sium, normal and several other schools. There are manufactures of machinery and metal goods, and various other industries. Beet- sugar is a stable article of commerce. The town dates back to the 10th century. Pop about 23,000.

CCEUR, ker, Jacques, French merchant and royal treasurer : b. Bourges toward the end of the 14th century; d. Chios, in the island of Scio, 25 Nov. 1456. His vast commercial enter¬ prise attracted the attention of Charles VII, who in 1435 appointed him master of the French mint, and afterward treasurer. His excellent management of affairs caused the king to enno¬ ble him, and to entrust him with high functions in the French provinces, and diplomatic missions in Italy. Cceur contributed 200,000 crowns to help the king in rescuing Normandy from the English. After the successful end of the war, his influence became so great as to give offense to envious persons, who after the death of the king's mistress, Agnes Sorel, charged him with having poisoned her, and caused him to be ar¬ rested (1451), and his vast property to be con¬ fiscated. Although the charge was proved to be groundless, he was detained in prison until 1455, when he effected his escape. Repairing to Rome, he was kindly received by Pope Nicholas V, and was enabled to gather the broken re¬ mains of his fortune. He had vainly claimed the clemency of Charles VII in favor of his family, and it was under Louis XI only that his memory was exculpated from all charges, while a part of his property was afterward restored to his descendants. Consult Clement, (Jacques Cceur et Charles VIP (Paris 1866).

CCEUR D'ALENE, ker da-lan (Fr. ((awl- heart®). (1) A name given by the French voy- ageurs, traditionally from the stinginess of a chief, to a tribe of Indians of the Salishan stock, though with a dialect widely different from the other members. Their own name is Skitswish, which Lewis and Clarke rendered Skitzoomish. When found by Lewis and Clarke they occupied a considerable tract in northern Idaho and Washington, near the lake named after them. There were perhaps 2,000 of them, rather squalid and unadventurous, though cruel ; they lived on roots, fish and small game, and did not visit the buffalo grounds. Father de Smet visited them in 1841, and the next year a Catholic mission was established among them, and they became Christians. They had reg¬ ular dwellings and a mill ; but they were hos¬ tile to the encroaching whites, and in 1858 their chief, Vincent, with a band of his warriors, joined in a war on them, which was only put

down by General Wright after two sharp battles, at Four Lakes and Spokane Plains. In

1867 part of them were placed on a reservation in Idaho, and in 1872 the rest were removed to the Colville Reservation, between the Okanogan and Columbia rivers. (2) A lake in northern Idaho, situated among mountains of the same name. The rivers Cceur d'Alene and Saint Joseph flow into the lake at its southern end, and the Spokane River is its outlet at the north. It is about 30 miles long and from two to four miles wide. The region is a mining district, and has been the scene of serious labor troubles, especially in 1892 and 1899. (3) City and county seat of Kootenai County, Idaho, 33 miles east of Spokane, Wash., on the lake of the same name, and on the Northern Pacific and Chicago, Milwaukee and Saint Paul railroads. The city contains a college, a Catholic academy, two parks and the Old Fort Sherman military grounds. It manufactures lumber, ties, shingles, brick and trades in fruits and farm products. The town is popular as a centre of a fishing and hunting region.

CCEUR DE LION, ker de le-on, a title given to several historical personages, as Richard I of England; so called from the prod¬ igies of personal valor performed by him in the Holy Land; Louis VIII of France, fre¬ quently called Le Lion; and Bolaslas I of Poland, also called ((The Intrepid.®

COFFEE, the seed of a small evergreen tree, which is cultivated in tropical countries, supposed to be native to Abyssinia, although it was early found in Arabia. The plant be¬ longs to the genus C'offea, order Rnbiacece: In the wild state it grows to a height of from 6 to 30 feet, but in cultivation it is pruned and kept between 6 and 10 feet. The leaves are green, glossy on the upper side, and somewhat resemble those of the laurel, but less dry and thick. The flowers are white, fragant and grow in clusters from the axils of the branches. The fruit, often called berries, grows in clus¬ ters of from 3 to 12, each with a short stem or sessile. The fruit when ripe resembles in appearance a dark red cherry, or a medium-sized cranberry. Each berry contains two seeds em¬ bedded in a yellowish, sweetish pulp which, when ripe, is delicious.

The trees are raised from seed grown in nurseries, and when of a size to endure varia¬ tions of temperature, usually in about six months' time, they are transplanted to the coffee orchard. They begin to bear when three years old, and yield fruit for about 20 years. Considerable space is left between the trees, and corn, bananas and plantain are grown among them, especially when young. The first year's crop is small, but when in full bearing a tree will yield from one to five pounds, according to location and

variety. The regions best adapted to the growth of coffee are between the parallels of 15 north and 15 south latitude, and from 1,000 to 4,000 feet above sea-level. It is culti¬ vated from lat. 25° N. to 30° S., in places where the temperature does not fall below 55° F. Moist and somewhat shady slopes are found most desirable. Little streams of water are conducted to the roots of' the trees, which are kept very wet until the fruit is nearly ripe; then the water is turned off to keep the fruit from becoming too succulent. The fruit varies in size and color according to the altitude in which it grows; that from highlands is small and

green; that grown on lowland and near the coast is larger and of a yellowish tinge. The wild trees of Liberia, which grow in the low¬ lands, produce the largest fruit known, but it is of inferior quality. The coffee from the Far East can be distinguished by its large bean of a yellow color, while that of Central and South America is smaller and of greenish color. The fruit is harvested with great care, cloths being placed under the trees before shaking them. The fruit is then exposed to the, sun to dry, after which it is pulped, washed, dried again, hulled, cleaned and sorted before it is ready for the market. In some places, espe¬ cially Brazil, the bean is pulped by machinery as soon as it is taken from the tree, and thus the time necessary to get the coffee ready for mar¬ ket is shortened.

Some of the coffee-producing countries of the world to-day are Brazil, Colombia, the Philippines, Hawaii, Cuba, Porto Rico, Jamaica, Central America, and parts of Africa, Arabia, Java and Ceylon. Brazil has a larger coffee¬ bearing area than any other country; it produces more than two-thirds of all the coffee consumed in the world. Coffee planting in Brazil has been the most successful farming in the world. Sao Paulo, a city of 400,000, owes its prosperity to the trade in the coffee raised in the great orchards in the vicinity. What has made coffee growing especially profitable in Brazil is the ˆvalorization scheme carried on by the Brazil¬ ian government, whereby it stores the coffee in warehouses when prices show a downward tendency, advancing the planters' loans on it as security. This practice was put an end to, so far as the United States was concerned, in 1913. In some of the orchards there are about 5,000,000 trees. Large quantities of the Brazilian coffee are shipped annually to Aden (Arabia) and reshipped to other parts of the world as mocha. The producing of coffee in Yemen, or Wady Negram, or anywhere near Mocha is a thing of the past; but one kind of coffee berry raised in Brazil and in some other countries much resembles in form and flavor the old market mocha. The red lands in the province of Sao Paulo, in Brazil, seem to be particularly favorable to the growth of the tree, and this section seems immune to the

leaf disease which has destroyed the industry in Ceylon and in some parts of the West Indies. The prepon¬ derating volume of the coffee crop of Brazil makes its annual production a matter of world¬ wide importance, and with the seasonal reports of the condition and prospective yield of each Brazilian crop, account is taken of stocks on hand in the world's markets and new estimates made of the stocks held secretly in storage in Brazil, in order that a new price may be made. Within the last few years the Liberian coffee plant, which is a larger and harder variety, has been introduced into Ceylon. So far it has suc¬ cessfully resisted the leaf disease, so that it now seems likely that Ceylon may again be among the places- producing an excellent quality of coffee. The names given coffee are usually those of the cities from which shipments are made.

The difference in taste of coffee as found in our markets is principally due to two causes : (1) the roasting to either a reddish-brown or a dark brown ; (2) the picking of coffee when

some berries are green, others red and still others a dark purple, the last being the ripe fruit. Thus we have three grades from each tree; add the difference in roasting, as men¬ tioned, and we have six grades ; then take the perfect berry, which is flattened on one side, and the spherical berry, the so-called mocha, and that gives 12 grades of coffee.

In Porto Rico coffee of excellent quality is raised. In the Hawaiian Islands also very good coffee is produced, and the orchards are increas¬ ing in size and number. Hawaiian coffee brings the highest price of any on the Pacific Coast. The importation of coffee from Porto Rico and Hawaii has increased greatly within recent years. In 1914 the imports from Porto Rico were 2,793,052 pounds, as compared to 372,427 in 1894. In 1914 approximately 3,500,000 pounds of Hawaiian coffee was consumed in the United States. In the Philippines there are splendid orchards, especially in the southern islands of the archipelago known as the Sulu or Jolo group. On the island of Jolo are fine coffee-trees that bear much earlier after planting than those of Brazil. There are tracts of land in the Phil¬ ippines which are as favorable for coffee grow¬ ing as any in Brazil, but the area that may be devoted to coffee farming is not so great.

The United States leads the world in the consumption of coffee. It is estimated that the people of the United States consume 10 pounds per capita, which is about three times as much as they consumed 50 years ago. The yearly con¬ sumption in Great Britain declined steadily dur¬ ing the last half of the 19th century. This is attributed to the adulterations which at one time were extensively practised. Probably few articles of food are subjected to so much adul¬ teration as coffee. Substances of an entirely foreign nature are often palmed off as genuine coffee, or are offered as substitutes. Dandelion, parsnip, carrot and beet roots, beans, lupins, rice

and various cereals, roasted and ground, have all been employed, and within recent years the manufacture of artificial coffee has been undertaken on a considerable scale, the material being mixed to a stiff paste and run through a machine for which patents have been granted, and from which it emerges in the shape of ˆcoffee-beans,® which, after drying and roasting, are well calculated to deceive the eye, though not the nostrils or palate. These adulterations can be readily detected, for genuine roasted coffee may be soaked in cold water indefinitely without the bean losing its smooth surface or hard, tough consistency, nor will it impart its color to the water; whereas chicory and other imitations become soft and spongy and render the water muddy. As far back as the '80s it was estimated that something like 18,000,000 pounds of various vegetable substances were annually sold as coffee.

In Medicine. — Many of the leading medical men of the day hold that the action of coffee on the body is due to two or three factors. If coffee is mixed with milk or cream, it gives a certain amount of nutritive matter; but its ac¬ tion is usually due to the volatile oils, and to the caffeine contained. The volatile oil, like others in this class, stimulates peristalsis ; but taken too. often and in too large quantities the oil contributes to the causation of a certain amount of gastric indigestion. The more deli-

catc the aroma of coffee the less the oil, and the better from this standpoint. The action of caffeine is much more complex.

So far as coffee-drinking is concerned, the action of caffeine is that of a cardiac stimu¬ lant, a nerve-muscle excitant, a diuretic and a cerebral excitant. Thus it may cause a sense of undue fullness in the blood vessels. It almost invariably causes a slight muscular tremor, which is noted in those who use their hands for fine work, as artists, for example. It causes an increased flow of urine, and tends to prevent sleep. Time, custom, usage, dose and the individual's reaction all modify these gen¬ eral laws ; but these reactions occur, although none of them may be of sufficient grade to make the observer cognizant of the action. Thus many people are not kept awake by coffee. They have probably habituated themselves and require larger doses.

Hot coffee is one of the best heart tonics known, and it is sometimes administered in large quantities in cases of shock, opium poisoning, pneumonia, etc. Coffee is also valuable in many types of headache and in many cases of nausea. Its excessive use leads to great muscular irri¬ tability, gastritis, restlessness and sleeplessness. It is held by many medical

men that the effects of coffee as a beverage are wholly bad. They say that the caffeine in the coffee, or in other vegetable substances — tea, coffee, kola, guarana and mate, or Paraguay tea — is a stimulant to the brain, nerves, heart and kidneys. In small doses it helps to resist fatigue, increases mental power and promotes excretion of urine. Large doses or continued use, however, tend to make a person nervous, to induce irritability of the heart, with considerable depression, and to up¬ set the stomach. The mildest results of an overdose are a tendency to wakefulness, but there are recorded a number of deaths from heart-failure due to its employment in large doses. It is used largely as a heart-stimulant and diuretic, but its action is characterized by great variability. Individual susceptibility to it varies so greatly that what would be a poisonous dose to one person would scarcely affect an¬ other. The usual dose is half a grain to three grains.

History. — The early history of coffee is ob¬ scure; as an article of diet, its introduction is recent ; to the Greeks and Romans it was wholly unknown. It was first introduced into Persia from Abyssinia, and next in the 15th century by a Mohammedan priest at Aden. From Aden it was carried to Mecca, where first the pil¬ grims or Hadjis, and then the rest of the peo¬ ple, began to use it. From Arabia it was taken to Cairo, Egypt, where in 1511 it was prohibited because it was believed to be an intoxicant and came within the class of things forbidden as food by the Koran. The Sultan Causon re¬ moved the prohibition, and coffee passed along the coast by way of Syria and around to Con¬ stantinople. Again it was opposed as one of the articles not to be used as food according to the Koran. Thus its use was sometimes forbidden, sometimes allowed, for many years. The Turks are now immoderate coffee-drinkers.

Prior to the 18th century all the coffee used in Europe was brought from Arabia Felix via the Levant. In 1652 Edward, a merchant, in trade with Turkey, introduced coffee into Eng¬ land; in 1697 Van Horn introduced it into Ba¬

tavia, and from there it was taken to France and the West Indian Islands. In 1754 Father Villaso, a Franciscan monk, took a plant to Rio de Janeiro and cultivated it in the garden of the monastery of Saint Anthony. This one plant was the means of introducing coffee into Brazil. See article Brazil: Agriculture.

The great increase of the coffee trade in the United States within the past few years is shown in the following table :

Year Total importation From Brazil From Colombia

1913 852,529,498 lbs. 625,002,095 lbs. 87,176,447 lbs.

1914 1,001,071,873 “ 725,800,529 “ 99,189,096 “

1915 1,228,761,626 “ 898,175,974 “ 111,413,170 “

The total coffee stocks in Europe on 31 July 1916 amounted to 3,555,000 bags, of which 2,- 877,000 bags came from Brazil and 678,000 bags from other sources. These stocks were dis¬ tributed as follows: Havre, 2,376,000 bags ; Mar¬ seilles, 255,000 bags ; Bordeaux, 90,000 bags ; Eng¬ land, 601,000 bags; and the Netherlands, 228,000 bags.

Bibliography. — Cook, (Shade in Coffee Culture) (United States Botany Division, Bul¬ letin 25) ; Hangwitz, (The World's Coffee Trade in 1898} (United States Consular Reports, Vol. LX 258) ; Hewitt, (Coffee, Its History, Cultiva¬ tion and Uses) ; Lock, (Coffee, Its Culture and Commerce in all Countries) ; Caswell, (Coffee Culture in Our New Islands (in the Overlaud Monthly, new series Vol. XXXII, 459) ; and United States Bureau of American Republics,*

*(Special Report on Coffee Culture in Central and South America. **

COFFEE-BUG, an insect (Lecanium coffees'), of the Coccus family (Coccidce) , very destructive in coffee plantations.

COFFEE-HOUSE, a house of entertain¬ ment where persons are supplied with coffee and other refreshments. Such houses were formerly the chief resorts of every class for purposes of conversation and information, and the meeting-places of politicians, literary men, etc. Constantinople is believed to have been the first European capital in which coffee-houses were instituted, the year of their establishment there being 1554 a.d. In 1650 the first one in England was opened in Oxford. Each par¬ ticular house attracted a special coterie of visitors ; and because newspapers had not yet come into vogue, these places became the centres of the spreading of news, political gos¬ sip, etc. They were patronized daily by the upper and middle class. They were suppressed by Charles II in 1675, but were soon allowed to be reopened. Consult Macaulay, (History of England (Vol. I, New York 1858).*

COFFEE-NUT: COFFEE-TREE. See

Kentucky Coffee-tree.

COFFER, in Modern as well as in Renais¬ sance, Neoclassic and Classic architecture a recessed panel, usually octagonal or square. Such panels occurring most frequently in ceil¬ ings or on the inner surfaces of cupolas, domes, barrel vaults and the like, were, in original Roman construction — as in the dome of the Pantheon, where the background was gilded, in the Basilica of Maxentius, etc. — a sinking in the solid masonry; but in modern wrork coffers are often produced in lath and plaster, or other thin and cheap material. Coffers are either plain, as are those in the ceiling of the

main room of the National City Bank, New York, or foliated, as those in the ceiling of the library of the Metropolitan Museum of Art, New York, the latter being ornamented with modified or conventionalized acanthus leaves.

COFFER FISH, or TRUNK FISH, a

peculiar genus (Ost ration) of bony fishes in the small order Plectognathi, and in the suborder Sclerodermi, which also includes the file-fishes. The body is enclosed in a firm box formed of hexagonal bony scales fitted into one another like a mosaic. The snout, the bases of the fins and the end of the tail are the only soft-skinned parts. Over a score of species are known from tropical and subtropical seas. The best known form is O. quadricornis from the tropical Atlantic.

COFFERDAM, a water-tight enclosure round a space where it is intended to found the pier of a bridge, quay, etc., so constructed that the water may be pumped out of it and the masonry executed ((New York 1905).

COFFEYVILLE, Kan., city of Mont¬ gomery County, situated on the Verdigris River, and on the Missouri Pacific, Atchison, Topeka and Santa Fe and other railroads. It has a public library. The city carries on an extensive trade with Oklahoma and has strawboard, planing and flour mills, railroad shops, oil re¬ fineries, a plow factory, glass factories, oil-well, packing plant, a large oxide smelter, foundiy, vitrified brick works and a roofing-tile factory. The United States census of manufactures for 1914 recorded 45 industrial establishments of factory grade, employing 628 persons, of whom 497 were wage earners, receiving $356,000 annually in wages. The capital invested aggre¬ gated $2,092,000, and the year's output was valued at $3,788,000: of this $1,691,000 was the value added by manufacture. Coffeyville was incorporated in 1871 and adopted the com¬ mission form of government in 1909. The waterworks and electric-light plant are owned and operated by the municipality. Pop. 13,452.

COFFIN, Charles Carleton, American novelist and lecturer: b. Boscawen, N. H., 26 July 1823; d. Brookline, 2 March 1896. He began life as a civil engineer, and afterward gave his attention to telegraphy. In 1851 he began to write for the Boston papers; and during the Civil War and the Austro-Prussian War of 1866 was war correspondent for the Boston Journal , writing over the signature of ((Carleton.® He was a member of the Massa¬

chusetts legislature (1884-85). His books in¬ clude (Days and Nights on the Battle-Field> (1864); (Four Years of Fighting) (1866);

COFFIN, Sir Isaac, English admiral : b. Boston, Mass., 16 May 1759; d. England, 23 July 1839. He entered the English navy as midshipman in 1773, and served on various ships on the American station. On 16 March 1781 he acted as signal-lieutenant to Admiral Ar- buthnot in the action off Cape Henry, and in 1782 was present as a volunteer under Admiral Hood in the engagement between Rodney and De Grasse. In 1798, when Minorca fell into the hands of the English, he was appointed superintendent of the arsenal at Port Mahon. In 1805 he was created a baronet; in 1814 he attained the rank of admiral. In 1826 he founded a school in Nantucket, Mass., still called by his name.

COFFIN, James Henry, American sci¬ entist: b. Williamsburg, Mass., 6 Sept. 1806; d. Easton, Pa., 6 Feb. 1873. He was graduated at Amherst 1828. He taught at Greenfield, Mass., Ogdensburg, N. Y., 1829-40; at Williams College 1840-43; Norwalk (Conn.) Academy 1843-46, when he was elected professor of mathematics and astronomy in Lafayette Col¬ lege, Easton, Pa., where he remained till his death. His reputation is due to his achievements in meteorology, a subject he began to investi¬ gate as early as 1838. He established an ob¬ servatory on Mount Greylock, 4,000 feet above sea-level. For use there, he invented an anemometer. In 1853 he published his theory of atmospheric circulation, including the principle quoted in Europe since 1860 as (Buys- Ballot's Law. He wrote (Solar and Lunar Eclipses* (1845) ; (Winds of the Northern Hemisphere) (1853); (Psychometrical Tables* (1856) ; (The Orbit and Phenomena of a Me¬ teoric Fire-Ball, 20 July i860* (1869) ; (Elements of Conic Sections) (1874) ; (The Winds of the Globe ; or, the Laws of Atmospheric Circulation over the Surface of the Earth) (1875), com¬ pleted by his son, S. T. Coffin. Consult Clyde, (Life of J. H. Coffin > (1882).*

*COFFIN, John Huntington Crane, Amer¬ ican mathematician : b. Wiscasset, Me., 14 Sept. 1815; d. Washington, D. C., 8 Jan. 1890. He was graduated at Bowdoin 1834, and in January 1836 entered the United States navy as professor of mathematics, serving in the West India squadron, and at the Norfolk navy yard. He had charge of the mural circle in the Naval Observatory at Washington from 1843 to 1853, when he was transferred to the An¬ napolis Naval Academy, taking charge of the department of mathematics, and later astronomy and navigation. From 1865 to 1877 he had charge of the (American Ephemeris and Nauti¬ cal Almanac. * In 1877 he was placed on the retired list. Bowdoin conferred the degree of LL.D. upon him in 1884, and in 1863 he became one of the corporate members of the National Academy of Sciences, named by Act of Con-*

gress. He published Observations with the Mural Circleˆ with Formulas, Tables and Dis¬ cussions, 1845-49, published in the observatory volumes for those years; 'The Compass-* (1863); 'Navigation and Nautical Astronomy* (1868); 'Observations of the Total Eclipse of the Sun, August 1869* (1884).*

COFFIN, Joshua, American antiquary: b. Newbury, Mass., 12 Oct. 1792; d. there, 24 June 1864. He was graduated at Dartmouth College in 1817, and was a teacher for many years. Whittier was one of his pupils, and addressed to him the poem 'To My Old Schoolmaster. Coffin was an ardent abolitionist, being a founder and first recording secretary of the New England Anti-Slavery Society 1832. He compiled 'Sketch of the History of Newbury, Newburyport, and West Newbury, 1635-1845* (1845); 'List of Some of the Descendants of Mr. E. Woodman (of) Newbury, Mass., 1635* (1855) ; 'The Toppans of Toppan's Lane: Their Descendants and Relations* (1862) ; 'An Ac¬ count of the Principal Slave Insurrections in the Last Two Centuries* (1860).*

*COFFIN, Levi, American philanthropist: b. near New Garden, N. C., 28 Oct. 1798; d. Avondale, Ohio, 16 Sept. 1877. He was a farmer's son, and early evinced interest in the negro's welfare. In 1826 he settled in Wayne County, Ind., where he kept a country store. Proving successful in business, he actively aided slaves to gain freedom, largely through the "underground railroad.** Thousands of escap¬ ing slaves were aided on their way to Canada by him. He founded a store in Cincinnati for the handling of "free-labor goods** only. He helped found the Freedman's Bureau in 1863, and after the Civil War was active in schemes to advance the welfare of the colored people. He was known popularly as "President of the Underground Railroad.** Consult his 'Re¬ miniscences* (Cincinnati 1876).*

COFFIN, Lorenzo S., American philan¬ thropist : b. Alton, N. H., 1823. He studied a short time at Oberlin College and taught in Geauga Seminary, Chester, Ohio, where J. A. Garfield and Lucretia Garfield, nee Randolph, were his pupils. He served with the Iowa in¬ fantry during the Civil War. He became a preacher after the war and in 1883-88 was member of the Iowa board of railroad commis¬ sioners. He founded a Railroad Temperance Association, and was one of the founders of a Home for Aged and Disabled Railroad Men near Chicago in 1893. He was president of the Iowa Anti-Saloon League and in 1907 was the Prohibition candidate for governor and in 1908 was the candidate of the United Christian party for Vice-President of the United States.

COFFIN, Robert Barry, American jour¬ nalist and miscellaneous writer : b. Hudson, N. Y., 21 July 1826; d. Fordham, N. Y., 10 June 1886. He was on the staff of the Home Journal of New York (1858), and was also art critic of the Evening Post. His humorous sketches, which appeared in many

*periodicals over the pen-name "Barry Gray,** have been extensively read. Among his publications are 'My Mar¬ ried Life at Hillside* (1865) ; 'Cakes and Ale at Woodbine* (1868) ; and 'The Home of Cooper* (1872).*

COFFIN, William Anderson, American painter: b. Allegheny, Pa., 31 Jan. 1855. He

was graduated at Yale 1874, studied art in the United States 1874-77, and then in Paris under Leon Bonnat 1877-82. He opened a studio in New York 1882, and has become well known as a painter of landscapes and figure pieces. In 1886 he won the Hallgarten prize of $200; was awarded a medal at the Paris Exposition 1889; received the Webb prize of the Society of Amer¬ ican Artists 1891 ; and was geld medalist of the Philadelphia Art Club 1898. He was art critic of the New York Evening Post 1886-91, and of the New York Sun 1896-1900. In 1901 he was director of fine arts at the Pan- American Exposition in Buffalo, N. Y. At the Saint Louis Exposition (1904) he exhibited 'Sunrise in Winter and 'Evening, Somerset Valley.* He is member of the Society of Amer¬ ican Artists and of the Architectural League of New York; he won a silver medal, Charleston Exhibition (1902), and two silver medals at Saint Louis World's Fair (1904) ; was ap¬ pointed member of New York Advisory Board to the Art Department of the Panama-Pacific International Exposition, San Francisco (1915) ; appointed by French government (1915) at¬ tache honoraire French commission to Panama- Pacific International Exposition (1915) ; mem¬ ber of honor of the Societe des Artistes Fran- gais, Paris; and member of honor of the So¬ ciete Nationale des Beaux-Arts, Paris; ap¬ pointed chairman (1915) of the American Art¬ ists' Committee of One Hundred in charge of Relief Fund for the Families of French Soldier-Artists. Among his best-known pictures are 'The Rain,* in the Metropolitan Museum; 'Une academie de peinture moderne* ; 'An Examina¬ tion* (time of Louis XIII) ; 'The Close of Day* (1881) ; 'The Hayfield* (1886) ; 'Septem¬ ber,* in the National College, Washington, D. C. ; 'A Maple in Blossom,* Municipal Gallery, Venice, Italy; 'At Break of Day,* Buffalo Free Arts Academy; 'October Morning,* and 'A Thunder Shower,* Brooklyn Institute of Art and Sciences.*

COFFIN, a box or case designed to hold a corpse for interment or cremation. Coffins were used by the ancients mostly to receive the bodies of persons of some distinction. Among the Romans it was latterly the almost universal cus¬ tom to consume the bodies with fire, and de¬ posit the ashes in urns. Even at the present time coffins are not used in the East, either by Mohammedans or Christians. In Egypt coffins seem to have been used in ancient times univer¬ sally. They were of stone, earthenware, glass, wood or a kind of pasteboard made by gluing cloth together. (See Sarcophagus). Coffins among Christians were probably introduced with the custom of

*burying. (See Burying- places). The Plains Indians merely wrapped the body tightly in a buffalo robe. Other tribes constructed "houses of the dead,** in which the corpse, fully, dressed in his best, was placed. Maritime folk often bury their dead in canoes. See Cremation.*

COG-WHEEL, a wheel with cogs or teeth. See Wheel-gearing.

*COGGESHALL, England, town in the county of Essex, 42 miles northeast of London, on the left bank of the Blackwater. The place was once famous for the manufacture of a kind of baize, celebrated under the name of "Cogge- shall whites.** It has manufactures of velvet,*

(

silk and isinglass. Pop. of parish 2,365. The hamlet of Little Coggeshall is on the opposite side of the Blackwater, which is crossed here by an ancient bridge of three arches, said to have been built by King Stephen, who founded here also an abbey for Cistercians.

COGHETTI, co-get'ti, Francesco, Italian

*painter: b. Bergamo, 4 Oct. 1804; d. Rome, 21 April 1875. He studied under Diotti di Castal- maggiore and Camuccini in Rome and was a profound student of Raphael. He settled in Rome and was for a number of years president of the Academy of San Luca. He is best known by his masterly frescoes in the basilican church at Savona. Lie adorned several Roman palaces with frescoes, and was knighted for his Con¬ demnation of Saint Stephen.**

COGHLAN, kog'lan, Charles Francis,

American actor : b. Paris 1841 ; d. Galveston, Tex. 27 Nov. 1899. He was born of Irish parents, was educated for the bar in London, but went on the stage, making his American debut in 1880 as Captain Absolute in (The Rivals. He took leading parts for many years, being a refined and capable impersonator of old school gentlemen. He wrote (Jocelyn) ; Cady Barter) ; and other plays.*

COGHLAN, Joseph Bullock, American naval officer: b. Frankfort, Ky., 8 Dec. 1844; d. New Rochelle, N. Y., 5 Dec. 1908. He was graduated in 1863 from the United States Naval Academy, and he at once saw service as ensign in the Civil War; in 1868 he rose to be lieutenant-commander, and later served suc¬ cessively on board the Richmond, Saugus, Monongahela and Indiana. In 1882 he was promoted commander, and in 1896 captain. As commander of the Raleigh of the Asiatic sta¬ tion from 1897, he took part in the battle of Manila Bay, 1 May 1898. On 2-3 May he com¬ manded expeditions for the reduction of all Spanish batteries at the mouth of the bay, and on 7 July an expedition for the capture of Isle

Grande, Subig Bay, Luzon. He was com¬ missioned rear-admiral in 1902 and appointed to command the Caribbean squadron of the North Atlantic fleet 1902-04; was appointed commandant of the New York navy yard, 1904, which important post he held for two years, retiring in December 1906.

COGHLAN, Rose, American actress: b. Peterboro, England, 1853. She is a sister of the late Charles Coghlan, played soubrette parts at the Theatre Royal, Cheltenham, later becoming leading lady, went to London and traveled through the provinces in burlesque and comedy. She came to the United States in 1872 with Lydia Thompson and soon after joined E. A. Sothern. She returned to England and sup¬ ported Barry Sullivan and in 1880-89 was lead¬ ing lady with Wallack. She has starred since then in various companies in the United States and England, became a naturalized citizen of the United States in 1902 and engaged in stock raising in Montana. Consult Strang, (Famous Actresses of the Day in America) (Boston

1899).

COGHLAN, Timothy Augustine, Aus¬ tralian statistician: b. Sydney, New South Wales, 9 June 1856. He was educated in his native city and in 1884 became assistant engi¬ neer for rivers and harbors. In 1886-1905 he

was government statistician for New South Wales. He was also registrar of friendly so¬ cieties 1886-1905, and chairman of the board of old age pensions 1901-05. He served on vari¬ ous royal commissions, was president of the conference of Australian and New Zealand statisticians to determine number of representa¬ tives in each state in the Federal Parliament and to arrange for uniformity in the census of 1901. In 1902 he was president of the Aus¬ tralian Society for the Advancement of Science. He has published (Wealth and Prog¬ ress of New South Wales) ; (Picturesque

New South Wales ; (The Seven Colonies of Australasia) ; (Discharge of Streams in Re¬ lation to Rainfall*; (Childbirth: a Study in Statistics1* ; (Notes on the Financial Aspect of Federation* ; (Report on the Eleventh Census of New South Wales* ; (Deaths of Women in Childbirth* ; (Child Measurement* ; (Decline in the Birthrate of Australia and New Zealand* ; Statistical Account of Australia and New Zealand.**

COGNAC, kon-yak, in southwest France, in the department of Charente, on the Charente River, 22 miles west of Angouleme. It is situated on a hill crowned by an old castle. It contains a 12th century church, was a Huguenot stronghold, and suffered much in the religious wars of the 16th and 17th centuries. It is famous for the brandy which bears its name and

which is exported to all parts of the world, chiefly to England, the north of Europe and America. Some English houses, estab¬ lished here in 1780, began the manufacture of this brandy and developed its enormous trade. Pop. 19,188.

COGNIET, kon-ya, Leon, French his¬ torical and portrait painter: b. Paris, 29 Aug. 1794; d. there, 20 Nov. 1880. He studied under Guerin, obtained the Grand Prix de Rome in 1817 and became a member of the Institute in 1849. His first picture of note was (Marius among the Ruins of Carthage (1824), now in the Museum of Toulouse. His other works include (the Massacre of the Innocents,* and his masterpiece, (Tintoretto Painting the Por¬ trait of His Dead Daughter* (1845) in the Bordeaux Museum. Of his portraits may be mentioned the (Marechal Maison,* (Louis Philippe* and (M. de Crillon.* He decorated several ceilings in the Louvre and the Halle de Godiaque in the Hotel de Ville, Paris, and a chapel in the church of Madeleine. At first he painted in classical style, but later adopted the methods of the Romanticists. His pictures are careful in composition but lack imagina¬ tion and strength of color. Many famous ar¬ tists of a later day were pupils in his studio.*

*COGNIZANCE, an old term in common law signifying legal jurisdiction or acknowl¬ edgment of a fact entailing certain legal con¬ sequences. The term is used in the United States to signify a general sense of jurisdiction as in the phrase <(to take cognizance of a cause of action.** In pleading, cognizance signi¬ fies a formal acknowledgment of an act alleged. In former times cognizance of pleas was jurisdiction of causes, a privilege granted by the king to a city or town to set up a tribu¬ nal fpr the trial of suits. The term is also used in heraldry to signify some distinguishing mark as a crest or badge.*

COGNOVIT, in law, a written confession given by the defendant that the action of the plaintiff is just, or that he has no available defense.

COGSWELL, Joseph Green, American librarian and bibliographer: b. Ipswich, Mass., 27 Sept. 1786; d. Cambridge, Mass., 26 Nov. 1871. He was graduated at Harvard in 1806 and practised law for a few years in Belfast, Me. He was a tutor at Harvard 1813-15 and after four years of study in Europe he was made professor of geology and mineralogy and librarian at Harvard. In 1823, in connec¬ tion with George Bancroft, he founded the famous Round Hill school at Northampton, Mass., the plan and methods of instruction being based on an examination of the best English and German systems of education. The school was discontinued in

1836. After a period of editorship of the New York Review, Cogs¬ well, with John Jacob Astor, Fitz-Greene Hal- leck and Washington Irving, formulated the plan of the Astor Library. Cogswell was ap¬ pointed its chief (1848), a place for which his remarkable attainments as a bibliographer eminently qualified him. He went abroad to purchase books and laid the foundation of the present collection with rare discrimination and economy. He presented to it his own fine col¬ lection of bibliographical works and prepared a catalogue of its contents. Advancing years caused his retirement in 1861. He was a fre¬ quent contributor to the leading reviews, such as the North American Review, Backwoods and the Monthly Anthology. Consult Ticknor, (Life of Joseph Green Cogswell as Sketched in his Letters) (Cambridge, Mass., 1874).

COGSWELL, Mason Fitch, American physician: b. Canterbury, Conn., 28 Sept. 1761; d. Hartford, Conn., 10 Dec. 1830. He was adopted by Samuel Huntington, president of the Continental Congress and governor of Con¬ necticut, and was graduated valedictorian at Yale 1780. He studied medicine with his brother James, at the soldiers' hospital in New York during the Revolution, and eventually became one of the best known surgeons in the country. He was the first in the United States to remove a cataract from the eye, and to tie the carotid artery (1803). Mainly through his influence the first asylum for deaf-mutes was founded in this country at Hartford, and his daughter Alice was its first pupil. He was also a founder of the Retreat for the Insane in the same city.

COHABITATION, the act of a man and woman in living together as husband and wife. It does not necessarily include the notion of sexual intercourse between the parties, but is commonly held, even in law, to do so, and this is always the case when the parties are un¬ married. Applied to husband and wife it may mean only consortium. Cohabitation raises a legal presumption of marriage between the parties cohabiting, which may be rebutted by- other evidence. See Marriage.

COHAN, George Michael, American come¬ dian and playwright : b. Providence, R. I., 1878. When nine years old he appeared in (Daniel Boone and later with other members of his family toured the country as <(The Four Cohans.® They were among the greatest attrac¬ tions on the vaudeville stage. From 1899 to 1914 George M. Cohan wrote and produced a*

great number of musical comedies, usually ap¬ pearing himself in the principal part. These plays included such successes as (Little Johnny Jones; (The Governor's Son) ; (Forty-Five Minutes from Broadwav) ; (George Washing¬ ton, Jr.* ; (The Yankee Prince * ; (Get-Rich- Quick Wallingford* ; 'Broadway Jones) ;*

(Seven Keys to Baldpate. In 1920-21 Mr. Cohan produced 'Mary,* a musical comedy; (The Tavern,* and (The Meanest Man in The Worlds all big successes.*

COHEN, Alfred J. See Dale, Allen.

COHEN, Emil, German mineralogist: b. Jutland 1842; d. 1905. He was educated at Berlin and at Heidelberg and was as¬ sistant in mineralogy at the latter university in 1867-72. In 1872-73 he traveled in South Africa and after his return spent some years in preparing accounts of his explora¬ tion there. In 1878 he became professor of petrography at Strassburg, and in 1885 was appointed to the chair of mineralogy in Greifs- wald. He published 'Geognostisch-petrograph- ische Skizzen aus Siidafrika (1874) ; 'Erlau- ternde Bemerkungen zu der Routenkarte einer Reise von Lydenburg nach den Goldfeldern und von Lydenburg nach der Delagoabai im ostlichen Siidafrika) (1875); 'Sammlung von Mikrophotographien zur Veranschaulichung der mikroskopischen Struktur von Mineralien und Gesteinen) (1883; 3d ed., 1899); 'Meteoriten- kunde* (2d ed., 1903).*

COHEN, Henri, French numismatist: b. Amsterdam, Holland, 1808; d. 1880. He was for several years curator of the numismatic collection in the National Library in Paris. He wrote several valuable works including de¬ scription generale des monnaies de la republique romaine (1857) ; description historique des monnaies frappees sous l'empire romain* (7 vols., 1868 ; 2d ed., prepared by Feuardent, 1880 et seq.) ; (Guide de l'amateur de livres a vig¬ nettes du XVIIIe siecle* (1870; 5th ed., 1886). Cohen enjoyed also a reputation as a composer and writer on the theory of music.*

*COHEN, Henry, American rabbi : b. Lon¬ don, England, 7 April 1863. He was educated in London, was ordained rabbi in 1884 and held pastorates at Kingston, Jamaica, 1884-85, Wood- ville, Miss., 1885-88, and Galveston, Tex., since 1888. He is honorary vice-president of the Jewish Publication Society of America. He has published 'Six Hundred Talmudic Sayings * (1894; 2d ed., 1910) ; (Prayer in Bible and Talmud* (1894) ; many pamphlets on historical and biblical subjects. He contributed nine articles to the (Jewish Encyclopedia. *

COHEN, Hermann, German philosopher: b. Koswig 1842. He was educated at Breslau, Berlin and Halle, and in 1875 was appointed professor at Marburg. He is a prominent leader of the Neo-Kantian school and his inter¬ pretations of Kant's critical philosophy are of permanent value. He has done as much as any other to make Kant's writings popular with students. His writings include (Kant's Theorie der Erfahrung) (1871; 2d ed., 1895); (Kant's Begriindung der Ethik) (1877) ; 'Platon's Ideenlehre und die Mathematik) (1879); (Ein Bekenntr.iss und die Judenfrage (1880) ; (Kant's Begriindung der Aesthetik) (1889) ; (System der Philosophie) (1902-06) ; (Kom- mentar zu Kants Kritik) (1907) ; 'Religion und*

Sittlichkeit) (1907). Consult Cassirer (in Kant-studien, Vol. XVII, 1912), and (Philoso- phische Abhandlungen, H. Cohen zum 70sten Geburtstag dargebracht) (Berlin 1912).

COHEN, Jacob da Silva Solis, American physician: b. New York, 28 Feb. 1838. He was graduated M.D. at the University of Pennsyl¬ vania 1860, and in 1861 became assistant sur¬ geon of the 26th Pennsylvania regiment, serving with the expedition to Port Royal and with the South Atlantic blockading squadron till January 1864, and subsequently acting assistant surgeon in army hospitals. In 1866 he settled in practice in Philadelphia, and has made a specialty of diseases of the throat and chest.

He also accepted a professorship in the Phila¬ delphia Polyclinic and College for Graduates in Medicine. He is now professor emeritus of dis¬ eases of throat and chest at Philadelphia Poly¬ clinic and honorary professor of laryngology of Jefferson Medical College. He has written many important articles and books on these topics, chief of which are (Diseases of the Throat and Nasal Passages) (2d ed., 1879) ; (The Throat and the Voice) (1880) ; (Treatisc on Inhalation) ; (Croup in its Relations to

Tracheotomy, 5 and since 1880, 30 other special studies, which have been published in the New York Medical Journal, Philadelphia Medical News, etc.

COHEN, Katherine M., American artist: b. Philadelphia, 18 March 1859 ; d. Philadelphia, Pa., 14 Dec. 1914. Receiving her early training at private schools and at Ogontz, Pa., she dis¬ played a taste for art which was developed by study at School of Design, Pennsylvania Acad¬ emy of Fine Arts, Students' Art League under St. Gaudens, and six years in Paris schools. She was engaged in sculpture after 1880 and her chief works have been portraits and bas- reliefs, decorative works and paintings of figure and landscape. Among her principal suc¬ cesses have been Portrait of General Beaver for Smith Memorial, Fairmount Park; (The Is- raelite) ;

COHEN, Mendes, American civil engineer: b. Baltimore, 4 May 1831 ; d. there, 13 Aug. 1915. Educated in private schools he soon dis¬ played a bent toward engineering and engaged in practical study at the locomotive works of Ross Winans, Baltimore, 1847-51. His active service became continuous, first in the engineer corps of the Baltimore and Ohio Railroad 1851— 55 ; then as assistant superintendent Hudson River Railroad 1855-61 ; and 1861-63, as presi¬ dent and superintendent Ohio and Mississippi Railroad (of Illinois). For some years he was engaged in the special service of the Phila¬ delphia and Reading, and became comptroller and assistant to the president of the Lehigh Coal and Navigation Company. In 1894 he was appointed by President Cleveland as mem¬ ber of the board to examine and report a route for the Chesapeake and Delaware Ship Canal. In Baltimore he was long honored with import¬ ant civic trusts.

COHEN, Solomon Solis, American physi¬ cian : b. Philadelphia, 1 Sept. 1857. He was graduated from the Central High School in 1872 (with the degree of A.B.) and after some years of work as a bookkeeper and teacher studied medicine and was graduated from Jef¬

ferson Medical College in 1883. From 1888- 1902 he was lecturer in, and since 1902 has been professor of clinical medicine at, Jefferson Medical College, and from 1889-1902 professoi of clinical medicine and therapeutics at Phila¬ delphia Polyclinic and College of Graduates in

Medicine. He was president of the Philadelphia County Medical Society, 1898-99, and recorder of the American Association of Physicians, 1902-13. His published writings include (Therapeutics of Tuberculosis) ; (Essentials of Diagnosis) ; and he has edited (A System of Physiologic Therapeutics.) He has written many papers for scientific societies and encyclo¬ paedias and has been on the editorial staffs of a number of medical journals. He has written much verse, including translations from mediaeval Hebrew poets, published only in periodicals and anthologies. His most noted original poems are (I know that my Redeemer Liveth5 ; (At the Gates of God) ; (When Love passed by) ; (Love called Me not away5 ; (From Master to Mas¬ ter.5 He was one of the founders and editors of the American Hebrew. Wrote an essay, (A Menace to Freedom5 (Arena 1898) in warn¬ ing and protest against proposed seizure of the Philippines, and was a founder and vice-presi¬ dent of the Anti-Imperialistic League ; is an ardent advocate of Single Tax and has pub¬ lished a number of papers, especially tuber¬ culosis: An Economic Problem,5 to show re¬ lation between taxation and health; (How to Keep Well5 ; (Hygienic Abstracts of the Mo¬ saic and Rabbinic Legislation.5 He has written in favor of Zionism, and represented American Federation of Zionists in 3d Zionist Congress. He was a founder and trustee of Jewish Theo¬ logical Seminary of America and is trustee of Gratz College.

COHERER, an electrical instrument, part of the receiver in Marconi's system of wireless telegraphy, consisting of a small glass tube about one and a half inches long, into which two silver plugs are tightly fitted. A small gap separates these plugs, and in this gap a mixture of nickel and silver filings is placed. See Electrical Terms; Telegraphy, Wire¬ less.

COHESION, the force by which the vari¬ ous particles of the same material are kept in contact, forming one continuous mass. Its action is seen in a solid mass of matter, the parts of which cohere with a certain force which resists any mechanical action that would tend to separate them. In different bodies it is exerted with different degrees of strength, and it is measured by the force necessary to pull them asunder. Cohesion in liquids is very much weaker, the parts being disjoined with much more facility; and in substances existing in the gaseous form it is entirely overcome, the particles repelling instead of attracting each other.

Cohesion in bodies is weakened or over¬ come by two general causes — by the repulsion communicated by heat, or by the attraction which may be exerted by the particles of one body on those of another.

Heat communicated to a solid body always diminishes the force with which the attraction of aggregation or cohesion is exerted; if the heat be increased to a sufficient extent the co¬ hesion is so far weakened that the body passes

into the liquid form ; and if carried still far¬ ther, the attractive force is still more completely overcome and the body passes into the gaseous state. See Gases, General Properties of.

The same effects are produced by the exer¬ tion of that attraction which unites the particles of one body with those of another. If a liquid be poured on a solid, it often happens that their mutual attraction is sufficiently powerful to overcome the cohesion of the solid; its par¬ ticles are consequently disunited, to combine with those of the liquid, and it entirely dis¬ appears. This forms the process of solution (q.v.).

When these powers are withdrawn, cohesion resumes its force, but .with results which are different, according to the circumstances under which this happens. When the attraction of aggregation is suddenly and forcibly exerted the particles are united, in general, indiscrimi¬ nately, and according to no regular law. If a body which has been melted is suddenly cooled to a sufficient extent, it becomes solid and forms a mass of no regular structure or figure ; or if its cohesion has been suspended by the chemical attraction exerted by another body toward it, and if this attraction suddenly cease to operate, the force of cohesion is re¬ sumed, and the solid substance appears in the form of a powder. This latter case forms the chemical operation denominated precipitation (q.v.). But if the force of cohesion is exerted more slowly the particles are united, not in¬ discriminately, but usually with regularity, so as to form masses of regular structure and figure, bounded by plane surfaces and determi¬ nate angles. This forms the operation of crys¬ tallization ; and such masses are denominated crystals (q.v.). See Strength of Materials.

COHESION FIGURES. When small drops of various liquids lighter than water, and slightly soluble in it, are allowed to fall on the surface of perfectly pure water, the drops form curious figures on account of the differ¬ ences between the capillary tensions of the air surfaces of the liquids. (See Capillarity). These are called cohesion figures. They were investigated by the late Mr. Tomlinson, the re¬ sults of whose researches are published in various papers in the Philosophical Magazine since October 1861. Creosote, for example, forms a disc which sails about on the surface with a rapidly quivering motion. The figures last for a short time, gradually disappearing as the drop becomes dissolved in the water. The slightest impurity in either liquid changes the figure by altering the superficial capillary tension of the liquid. Hence Mr. Tomlinson proposed to observe the figure as a test of the purity of certain essential oils.

COHN, Adolphe, American educator: b. Paris, France, 29 May 1851. He was grad¬ uated from the University of Paris in 1868 and served as a volunteer in the French army during the Franco-German War from July 1870 to February 1871. In 1875 he came to New York and taught languages for some years, when his ability secured him a tutorship in French at Columbia University in 1882, in which he served as instructor for two years. He was instructor at Harvard 1884-85, and assistant professor in French 1885-91. In 1891 he became professor of Romance languages and literature at Colum¬

bia, which position he still holds. He is a singularly successful teacher, and many of his pupils hold posts of prominence. He delivered the lecture on French literature in the Columbia University Lectures on Literature 1911. In ad¬ dition to numerous contributions to literary periodicals, he has published (Voltaire's Prose) (with Woodward, 1897) ; (Le Sage's Gil Bias (with Sanderson, 1899) ;*

COHN, Ferdinand Julius, German bot¬ anist: b. Breslau 1828; d. 1898. He was edu¬ cated at the universities of Berlin and Breslau, began his connection with the latter institution in 1850 and was appointed full professor there in 1871. He made several invaluable contribu¬ tions to our knowledge of the physiology and morphology of plants. He made very careful studies of the lowest fonns of plant life, which greatly aided the study of bacteriology. He also made a microscopic analysis of water. He wrote a very great number of papers on pro¬ fessional topics and the following works: (Zur Naturgeschichte des Protococcus pluvialis) (1850) ; Wntersuchungen fiber die Entwickel- ungsgeschichte der mikroskopischen Algen und Pilze) (1853) ; (Die Wunder des Blutes) (1854) ; c Anthrax (1876) ; (Neue Untersuch- ungen fiber Bakterien) (1872-75) ; (Die Pflanze Vortrage aus dem Gebiete der Botanik) (2d ed., 1895-97). He also edited the Beitrage znr Bi¬ ologic der Pjlanzen and the Kryptogamenflora Schlcsiens. Consult Cohn, Pauline, Werdinand Cohn, Blatter der Erinnerung> (Breslau 1901).*

COHN, Gustav, German economist: b. Marienwerder 1840. He received his education at Berlin and Jena. He made a tour of Eng¬ land in 1873 and there gathered material for his ***(Untersuchungen fiber die englische Eisen- bahnpolitik) (1874). He was made professor of political science at Gottingen in 1884 and in 1892 served on the Imperial Commission to investigate the business and rules of the Stock Exchange. He has written (System der Na- tionalokonomie) (1885, 1898; Eng. trans. in the Wconomic Studies) of Chicago University) ; (Zur Geschichte und Politik des Verkehrs- wesens) (1900) ; (Zur Politik des deutschen Finanz-, Verkehrs- und Verwaltungswesens*** *(1905) ; Weber die staatswissenschaftliche Vor- bildung zum hohern*

Verwaltungsdienst in Preussen> (1900) ; and (The Science of Fi- nance) (tr. by Veblen, 1895).

COHNHEIM, kon'him, Julius Friedrich,

German pathologist : b. Demmin, Pomerania, 1839; d. 1884. He studied medicine at Berlin and Wurzburg and other universities and joined the pathological institute of La Charite, Berlin. He became professor of pathology at Kiel in 1868. From 1872 to 1878 he was professor at Breslau and from 1878 until his death was pro¬ fessor at Leipzig. Cohnheim was the first to demonstrate that pus is composed largely of white blood corpuscles. He published (Unter- suchungen fiber die embolischen Prozesse (1872) ; (Neue Untersuchungen fiber die Ent- zfindung* (1873) ;*

handlungen von J. F. CohnheinP (Breslau 1885) and Ponfick, (Gedachtnisrede auf Cohn- heim) (Breslau 1884).

COHOBATION, an operation in which a fluid is converted into vapor by heat, and is then condensed, but instead of being collected in a separate receiver, as in distillation, it is made to flow back into the heated vessel. It is employed to produce a change in the fluid by continued heating, but more frequently to subject some substance to the action of a fluid without either loss of the latter or the necessity of adding fresh quantities of it.

COHOES, ko-hoz', N. Y., city of Albany County, at the confluence of the Mohawk and Hudson rivers, near the debouching point of the State Barge Canal, and on the New York Central and the Delaware and Hudson railroads, nine miles north of Albany and opposite the northern part of the city of Troy. The Mo¬ hawk River has a fall of over 70 feet at this point, and supplies great power, making Cohoes a very important manufacturing community. The Mohawk River is crossed by a dam above the falls, and the water is supplied to the mills and factories by means of canals. The principal manufactures are hosiery and knit goods, foun¬ dry and machine shop products, paper boxes, lumber and planing mill products, patent medi¬ cines, saddlery and harness, printing and pub¬ lishing, etc. The United States census of manufactures for 1914 recorded 106 industrial establishments of factory grade, employing 6,179 persons, of whom 5,781 were wage earners, receiving annually $2,792,000 in wages. The capital invested aggregated $14,649,000, and the year's output was valued at $11,706,000; of this, $5,136,000 was the .value added by manufacture. The city has fine public buildings, schools, churches, well-paved streets, a modern sewer system, municipal waterworks and filtration plant and is connected with Albany, Troy'and other neighboring cities by electric street rail¬ ways. Cohoes was first settled by the Dutch, and for some time a portion of the city was included in the Rensselaer Manor. It was chartered as a city in 1870. Pop. (1920) 22,987.

COHORT, a division of the Roman army, the tenth part of a legion, containing three maniples or six centuries. The number of men varied with that of the legion, the 10 cohorts always containing an equal number. When the legion numbered 4,000 men, the cohort consisted of 60 triarii, 120 principes, 120 hastati and 100 velites, in all 400 men. The centurion of the first century of the first maniple of the first cohort was the guardian of the eagle or colors of the legion, and hence the first cohort was always regarded as superior in dignity to the others.

COHOSH, ko-hosh' (Cimicifuga racemosa) , also called black snakeroot, is a plant belonging to the crowfoot family (Ranunculacea) . Be¬ sides this species there are about four others also called cohosh, herb-christopher and

rattle¬ snake herb, which are widely distributed from Nova Scotia and Anticosti, south to Georgia, westward to Missouri and northward to British Columbia. It is an erect perennial herb grow¬ ing in the woods. The plant has powerful medicinal properties and is a valued remedy in rheumatism, epilepsy, etc. The blue cohosh (Caulophyllum thalictroides) is a powerful anti-

spasmodic and emmenagogue. It is also a dia¬ phoretic and diuretic, and has been used suc¬ cessfully in this country as an anthelmintic.

COIF (French coiffc) (1) the badge of serjeants-at-law, who are called serjeants of the coif, from the lawn coif which they wore under their caps when created serjeants. (2) The cap worn by women of religious orders, usually white, and worn under the veil. (3) The name sometimes given to the small cap worn by monks who have the tonsure.

COIMBATORE, ko-im-ba-tar', or COIM- BETOOR, British India, an inland district in the south of Madras presidency, with an area of 7,860 square miles. The country has on the west and south the Nilgiris and Anaimalais ranges, and on the north the Eastern Ghauts. On the east it is bounded by Salem and Trich- inopoly. It is fertile, producing sugar, cotton, rice and tobacco ; and well watered by several rivers. The climate is very malarious in some parts. The principal towns are Coimbatore, Erroad and Carroor. In 1799, on the death of Tippoo and the division of his territories, Coim¬ batore was ceded to the East India Company. Pop. 2,300,000.

COIMBATORE, British India, city and capital of the district of Coimbatore, situated at the foot of the Western Ghauts, on the river Noyel, 305 miles southwest of Madras by rail. It has wide streets, is well built and well drained, has an agreeable climate and is more suitable for the residence of Europeans than most Indian towns. Cotton-spinning, tanning and coffee-curing are among the industries. It suffered much in the wars waged with the Brit¬ ish by the Mysore sovereigns, passing finally into British possession in 1799. Pop. 47,007.

COIMBRA, kd-em'bra, Portugal, capital of the province of Beira, on a hill above the Mon- dego River, here crossed by a stone bridge, 115 miles by rail north-northeast of Lisbon. Its streets are steep and narrow, its manufactures confined chiefly to earthenware and combs, and its interest consists mainly in its historical as¬ sociations. The place derives its name from the Roman Conimbria, traces of which lie to the south; it was held by the Goths and from them passed to the Moors, from whom it was finally conquered in 1064 by Fernando the Great, aided by the gallant Cid. Coimbra was the capital of Portugal for about two centuries and a half from its erection into a kingdom in 1139, and many of the early kings are buried in and around the old town. Of the public build¬ ings, the most

noteworthy are the older of the two cathedrals, the church of San Salvador and the ruined convent of Santa Clara ; across the river is the Quinta das Lagrimas, (

COIMBRA, University of, a national uni¬ versity of Portugal and until 1910 the only uni¬ versity in that country. It was founded in

1290 by King Diniz at Lisbon. It was trans¬ ferred to Coimbra in 1308, receiving at the same time a new charter. For the succeeding 80 years its seat was changed several times from Coimbra t© Lisbon and back again to Coimbra. In 1380 it was settled at Lisbon, but in 1537 it was transferred anew to Coimbra where it has since remained. Camoens was one of its members in 1537. It is the only conti¬ nental university which has preserved the mediaeval academic dress. It has faculties of law, medicine, mathematics and philosophy, a library, hospitals, an observatory, museums and laboratories. There are about 1,400 students enrolled. Consult Braga, (Historia da Univer- sidade de Coimbra > (Lisbon 1892).

COIN, Spain, city in the province of Mal¬ aga, 18 miles west-southwest of the city of Malaga. Surrounded by vineyards and fruit groves, it consists of well-built houses, spacious and clean streets, three squares — in the cen¬ tre of the largest square is a handsome foun¬ tain. The chief manufactures are linen and woolen fabrics, esparto mats, soap, paper, hempen shoes, wine and oil. The exports are cattle, grain and fruits. In the neighboring hills are marble quarries and jasper of all col¬ ors. Pop. 13,000.

COIN, a piece of metal, circulating as money with an official certified impression as to weight, fineness and value. United States coin as described further on is nine-tenths fine; that of Great Britain eleven-twelfths fine. The place where coin is manufactured is called a mint and it is always a monopoly exercised by an established government. The mint of the United States was author¬ ized by Act of Congress 1792, and its general operations began in 1793. At that time the appliances of coinage were few and crude, the striking of coin being by the old screw hand-press and the annual out¬ put confined to narrow limits. It was not until 1836, when the mint was removed from Seventh street, Philadelphia, to more commodious quar¬ ters at Chestnut and Juniper streets, that im¬ proved appliances were introduced. At that time the steam-operated coining-press invent¬ ed by M. Thonnelier, a Frenchman, was intro¬ duced, and greatly facilitated the process of minting. Twenty years later this press was re¬ modeled and much improved, continuing in use for 14 years, when it was superseded by the perfected machines now in use. The introduc¬ tion of the steam

coining-press inaugurated the improvements which have made the mint of the United States one of the finest equipped mints in the world. From 1836 to the present time the progress of the mint has been largely ex¬ perimental. New and improved machinery has been added from time to time and improved scientific processes have been adopted. The humid assay process for determining the fine¬ ness of gold and silver was introduced in the year 1836. The platinum apparatus for the as¬ say of gold was introduced in 1867. This was an English invention and a great improvement upon the method formerly in use. Automatic machines for the separation of coin blanks into ˆstandard," ˆheavy," (

be said to have completed the equipment of the mint.

The organization of the mint, under the original and subsequent Acts of Congress, and until 1873, provided for a director, located at the parent mint at Philadelphia, an assayer, melter and refiner, coiner and engraver of dies, with a necessary subordinate clerical force, the assayer, melter and refiner, coiner and en¬ graver, being designated as ((operative officers." The director was subject to the orders of the Secretary of the Treasury. After the creation of branch mints and assay offices the heads of such institutions reported to the director at Philadelphia. By the Act of 1873 the mint was reorganized, with a bureau at Washington, where the director was located. The resident chief officer at the mint was by that Act desig¬ nated as superintendent, ranking with the chief officers of the mints at San Francisco and at New Orleans and tlie chief of the assay office at New York. The chief officers of the branch mints and minor assay offices were designated as ˆassayers-in-charge," reporting to the di¬ rector at Washington. The mint service is now under this reorganized form. The super¬ intendents and the operative officers are ap¬ pointed by the President and hold their offi¬ cial positions at his pleasure.

The processes of the mint can best be con¬ sidered under the head of routine. The mint purchases at its counter all gold presented in value not less than $100, providing the deposit is not too base for commercial conversion into coin or fine bars. All deposits are made with the weigh clerk at the weigh room, who care¬ fully weighs the same on the delicate balances, which are adjusted to show variations of one- hundredth of a tro}' ounce. The weight is care¬ fully recorded in the books of the weigh clerk and registrar of deposits, together with the de¬ scription of the bullion and the name of the depositor, both officers being present and care¬ fully noting the same. The deposit is then locked in a copper box and sent to the deposit melting room, where it is melted and cast in the form of a bar. From this bar the assayer cuts clips, weighing from 18 to 20 one-hundredths of an ounce, two clips being taken, one from the upper side at one end, the other from the under side at the other end. These clips are

assayed separately to determine the homoge¬ neity of the metal. This assay determines the proportions of fine metal in the bar, and upon this assay the money value is determined and the depositor is paid. The loss of weight by melting is carefully noted and recorded. A slight allowance is made after melting to the melter and refiner and the weight so estab¬ lished becomes the true weight. As soon as the fineness of a day's deposits is reported by the assayer, they are delivered to the melter and refiner, and by that officer sent to the refinery, where the silver is separated from the gold and the base metals eliminated wholly, only the precious meals being accounted for.

The next step in the conversion of bullion into coin is the assembling of the refined metal into ˆmelts" of about 3,000 ounces to which sufficient copper is added to render the melted mass 900 parts fine, which is the standard fine¬ ness of United States gold and silver coin. When melted the metal is cast into ingots of the size proper for the production of the coin

required. This alloy is rigidly tested by assay, and if found standard within the legal tolerance it is so declared, and the ingots are delivered to the coiner for conversion into coin. They are first taken to the rolls, (

The standard, heavy and light coins are then separately counted by gauge and made into drafts of $5,000 each, if gold, and drafts of $1,000 each, if silver. As the standard weight of gold drafts of. $5,000 is 268.75 troy ounces, the standard, heavy and light coins are mingled in due proportion to make that standard weight, no greater variation than one one-hundredths of an ounce being allowed. The standard weight of $1,000 in silver dollars is 859.375 ounces and of subsidiary silver 803.75 ounces, with a tolerance of two one-hundredths of an ounce. The perfected drafts are then weighed in the presence of the superin¬ tendent, enclosed in canvas bags and delivered to that officer. The mint balances are adjusted to the troy pound (5,760 grains) which is the mint unit of weight. This weight is a dupli¬ cate of the troy pound established by a royal commission in England in 1758, reaffirmed in 1838. It is kept in a special safe at the Phila¬ delphia mint. In order to secure an exact con¬ formity in weight and fineness of United States coin, a fixed number of coins is taken from every delivery, sealed in the presence of the superintendent and the assayer, and deposited in a receptacle called (flhe pyx,® each of those officers having a key, both keys being required to open the pyx. These reserved pieces await the assembling of the Assay Commission, an¬ nually appointed by the President to meet on the second Wednesday in February, when the

pyx is opened and exhaustive tests of the weight and fineness of the contents are made.

Location and Equipment. — The principal mint of the United States is located on Spring Garden street, between 16th and 17th streets, Philadelphia. Other mints are at New Or¬ leans, San Francisco and Denver. The equip¬ ment of the Philadelphia mint, which covers 58,000 square feet, consists of eight boilers of 1,200 horse-power capacity, for heating, venti¬ lating and electric lighting. To avoid the trans¬ fer of power by shafting the machinery is chiefly operated by independent motors. The building is lighted by 4,000 incandescent and 16 arc lights. There are 51 telephones connecting the departments and various offices. A gas plant, capable of delivering upward of 20,000 cubic feet per hour, furnishes fuel for the melt¬ ing, annealing and assaying furnaces. The ven¬ tilating is by fans operated by attached motors. The spacious melting department is equipped with 13 gas and 3 coal heated furnaces, with power topping machines. The coining depart¬ ment has 23 coining-presses with an average capacity of 110 pieces of finished coin, each, per minute; 10 milling or upsetting machines, each capable of an out-turn of an average of 500 milled blanks per minute ; a full equipment of trains of break-down and finishing rolls ; 8 strip annealing gas furnaces and 1 furnace for an¬ nealing blanks ; 8 automatic presses for cut¬ ting blanks from coin strips; 6 automatic weighing machines for the separation of blanks into standard, heavy, light and con¬ demned pieces, together with appliances for cleaning, whitening and drying blanks after an¬ nealing. The assaying department is equipped with every known appliance for determining the fineness of gold and silver, both by the plat¬ inum and the humid processes. The refinery operates largely the acid process of separating, but it has a plant for refining by electrolysis and the process has proved a success, consider¬ ably increasing the capacity of the refinery.

The engraving department provides all of the coin dies used in the mints of the United States. It has every facility for die-sinking, hubbing and annealing the steel from which dies are produced, as well as a geometric lathe for transferring designs. The department for the manufacture of medals of a national char¬ acter is in charge of the engraver, who pro¬ vides the dies. The medal department is equipped with three hydraulic presses of the re¬ spective capacity for exerting a pressure of 1,100, 400 and 300 tons. These powerful presses are operated by electric motors. The machine shop has every appliance for the construction or the assembling and finishing of all machinery used in the mint. There are 20 steel-lined vaults for the storage of coin and bullion and for the use of the operative officers. One of these vaults has a floor-space of 5,200 square feet, with a storage capacity of 112,000,000 sil¬ ver dollars. Another has a floor-space of 4,160 square feet. Six others have each a floor-space of 2,562

square feet. The basement vaults are built wholly independent of the en¬ closing walls, with a free passageway around them. The doors arc massive and provided with the finest locks procurable, to which time- locks are attached. More than 3,250,000 pounds of steel enter into the construction of these vaults. The vestibule is highly ornate, the cor-

ridor extending through the cross-section from east to west is finished in richly variegated marble and the main staircase is of white mar¬ ble. The floors are of messanine, the symbolic panels in the vestibule of glass mosaic. The ceilings are finished in white and gold.

The cabinet, or museum, is in a spacious room at the head of the main staircase in the rotunda. It contains a fine collection of the coins of all nations, ancient and modern, a full line of medals of a national character and many rare medals of foreign countries. There is also a fine collection of curios, many of them col¬ lected in distant lands. The working capacity of the mint considerably exceeds the national demand for its product. Congress has there¬ fore authorized coinage for other nations at a fair remuneration. Pursuant to this authoriza¬ tion the mint has coined much gold and silver, as well as copper and nickel coin, for several of the South American and most of the Central American states. Prior to the annexation, the mint at San Francisco coined money for the Sandwich Islands. Admission to the mint is free to the public on every working day between the hours of 9 a.m. and 2 p.m. The building is patroled day and night by an armed guard. See Banks and Banking; Bullion; Coinage; Coins, Foreign, American Equivalent of; Currency; Dollar; Gold; Gold Standard and Production ; Gold Standard Bill ; Legal Tender; Mint; Money; Numismatics; Silver.

John H. Landis,

Former Superintendent of United States Mint, Philadelphia.

COINAGE, the process of converting an authorized alloy of the money metals into the circulable coin of the country. The metal is alloyed and cast into ingots of sizes suitable to the production of the denomination of the coins required. Thus, for the double eagles, our largest coin, the ingot is cast 12ˆ4 inches in length, \y2 inches in width and half an inch in thickness. Such an ingot weighs about 80 ounces troy, of the approximate value of $1,488. The ingots for the eagles are cast ll16/i6 inches in length, 1 inches in width and half an inch in thickness. The weight of such an ingot is about 62 ounces troy. The half eagle requires an ingot 12 inches in length, ˆ inch in width and 7/i6 inch in thickness. The ingots are taken to the break-down rolls in drafts of about 50 ingots, where they are passed through the rolls several times, according as they prove more or less malleable. If passed through the rolls six times the dimensions of a double eagle ingot will be increased to 26ˆ4 inches in length, 1%6 inches in width and %2 inch in thickness. The broken-down ingots are then sent to the annealing furnace, heated by gas fuel to about 1,500° F. and being laid singly upon a carrier traveling the whole length of the furnace, remain until the strips become a uniform cherry-red. They are then removed and plunged into a bath of cold water to remain until cool enough to handle. The strips are then wiped dry and passed on to the finishing rolls.

The next step will depend upon the condition of the metal. Should it retain indications of the hardness and springiness resulting to the break¬ down

process, it is subjected to a second break¬ down by being passed three or four times through the rolls. The malleability of the metal

being sufficient, the strips are taken to the finish¬ ing rolls or <(rolls of precision.® After being passed through these rolls four times the strips develop the required thickness and uniformity for the production of blanks. At this stage the double eagle strip attains a length of 47ˆ6 inches, a width of 1ˆ inches and is reduced to a thick¬ ness of 7/ie of an inch. For ease in handling the strips are now cut in half by multiple shears and delivered at the cutting presses, where test planchets are cut from several strips and weighed to determine if the strip, when con¬ verted into planchets (coin blanks), approx¬ imates to standard weight. The cutting presses are automatic. The strip is seized by a grip and drawn under a steel punch working in a matrix cutting the planchets at the rate of 80 each minute. The planchets are next cleansed and sent to the selecting table where the im¬ perfect pieces are separated from the perfect and the latter are sent to an adjusting room. The adjusting consists in the careful weighing of each blank separately to ascertain if it cor¬ responds to the standard weight and legal tol¬ erance, the latter being for double eagles and eagles y2 grain per piece, and grain each for half eagles and quarter eagles. Pieces found in excess of legal weight and tolerance are re¬ duced by filing the edges until they conform to the limit. Such pieces are placed by themselves and marked ((heavies.® Pieces a little less than the standard weight, but within the limit of legal tolerance, are placed in another receptacle and marked (

The planchets so adjusted are then taken to the milling machines by the operation of which a protecting edge is raised on each piece. This edge is to preserve the face of the coin from abrasion. When milled the planchets are conveyed to the cleaning room where they are annealed until of a cherry-red and then treated to a bath of dilute sulphuric acid, by which process they are thoroughly cleansed and bright¬ ened. The annealing of the planchets after the milling process having prepared them for the stamping, when cleansed and brightened they are washed in boiling water, dried by riddling in sawdust, when they are ready for the coining press. It will be understood that the three de¬ scriptions of blanks, namely : ((Heavies,® ((lights® and ˆstandards® — have been kept separate throughout the processes, and are never mingled until the coiner makes up the drafts of finished coin for bagging. The planchets therefore go to the presses by those divisions.

The coining press used in all first-class mints is a wonderful exhibition of mechanical skill. Its frame is of cast-iron of several tons weight, with a central arch in which are placed the working parts. The frame combines stability and rigidity. The mechanism of the working parts is automatic. The setting of the dies is a work of precision and can be properly done only

by a person, who, being a skilled mechanic, has reinforced his native ability by long experi¬ ence. In order to set his dies properly he must take into account the condition of the metal to be stamped, whether it be soft and ductile or hard and brittle. Upon these qualities of the metal depends the distance apart of the dies at the moment of their impact upon the planchets. The blanks are fed into a vertical tube of equal

diameter, and when the press is in motion auto¬ matic fingers seize the bottom planchet by its periphery and carry it forward to a collar, a little larger than the piece to be stamped. The piece drops into the collar, and a toggle joint causes the dies to approach each other and exert a pressure of about 160 tons upon the soft planchet. The planchet, being ductile, is by this pressure made to fill the entire space within the collar, which is grooved, and imparts the reeding to the edge of the coin. The finished coin is automatically released and falls into a pan below, to be followed by other coins at the rate of 90 or 120 per minute. The first number relates to large gold coins and silver dollars, the latter to small gold and small silver coins. It should perhaps be stated here that while the essential processes in coining are the same in all modern mints, the routine is not uniform. In the mint of the United States the coin after stamping is returned to the adjusting room and each piece weighed separately. The necessity for this arises out of the possibly defective rolling of the strip from which the blank is derived. The density of the metal varies some¬ what, and there may be also defective sonority developed in the process of stamping. In order to secure sonorous coin it is sometimes the practice to ring every piece (this relates to gold coin and silver dollars), and if any fail to give the proper tone they are rejected and sent to the melting pot. The pieces which stand thv, test are then returned to the coiner for conversion into uniform drafts for delivery to the superintendent or other officer authorized to receive and hold coined money of the gov¬ ernment.

As a matter of law and regulation the coiner is required to make up gold coin into drafts of $5,000 of the uniform weight of 268.75 troy ounces. As the weight of the pieces separately weighed are not uniform, though all within the limit of legal tolerance, the coin is separated by the adjusters into ((heavies,® <(lights® and <(standard.® Gold coins may vary from one- fourth of a grain in the half and quarter eagles to one-half a grain in double eagles and eagles. The coiner takes ((heavies,® <(lights® and ˆstandards® in such proportions as will make drafts of 268.75 ounces and mingles them in the delivery pans. The drafts are then weighed, after counting the pieces in detail, and being found of the required weight, are set aside for final delivery. The drafts must not vary to exceed one one-

hundredth of on ounce above or below the standard weight of $5,000, stated in the foregoing. Before delivery to the superintendent the latter takes a good number of pieces at random from the proposed delivery and care¬ fully weighs them. If found within the legal limit of tolerance the delivery is accepted; but if the weight of any piece proves it outside of that limit the delivery is rejected, to be weighed, readjusted and recounted. It is proper to say that such a necessity seldom arises.

The practice now is to adjust all silver coins, excepting dimes. Dollars are made in drafts of $1,000 of the weight of 859.375 ounces. These drafts are constituted of (

with an allowance of two one-hundredths of an ounce for half and quarter dollars, which are adjusted, and one one-hundredth of an ounce for dimes, which are not adjusted. It will be seen that all of the processes involved in coining money are works of precision, from the break¬ ing down of the ingot to the issue of the perfect coin. All must be rigidly calculated, nothing can be left to chance. The presence of any of the base metals, as well as of the rare and valuable ones, may destroy the ingot for coin¬ age. Arsenic lead and antimony cause most of the unworkability of the money metals, but this disability is lessening through the process of advanced science.

Great advances have been made in the proc¬ esses involved in coining as conducted in mod¬ ern times. The substitution of the coining press operated by power for the hand screw press of olden times practically revolutionized the busi¬ ness. The introduction of automatic weighing machines for separating the blanks into <(heavies,® ˆlights,® Standard® and ((con-demned,® has simplified the process of adjust¬ ing. In fact the silver coins, with the exception of dimes, are now separated by the automatic weighing machines. The very great improve¬ ment in rolls for producing the coin strips from the ingot has made this new and rapid mode of selection possible. The draw-bench, made necessary to cure the defects of the rolls, has practically disappeared. Constant trying has produced rolls of such precision that the thick¬ ness of a coin strip can be regulated to the thousandths if required.

The automatic selecting machine in use at the mint of the United States at Philadelphia was invented and constructed by Seyesse, an Austrian, at Vienna. The blanks are fed into the machine through a vertical tube the size of the diameter of the blank. The feed is auto¬ matic and the pieces are conveyed into minute balances finely adjusted to grains, and by a com¬ plex and ingenious arrangement of parts are, according to weight, whether light, heavy, standard or condemned lights, shunted into the conduits strictly according to their varying weights, and through these conduits, or ways, are delivered, each to its proper receptacle at the discharged end of the machine. The stand¬ ard and the accepted light

pieces are then ready for milling. The heavy pieces are ad¬ justed by weighing on a delicate balance, and if found to exceed the legal tolerance are reduced by filing the edge of the piece. By this method the necessity for hand adjusting is minimized and the rapid production of coin greatly facili¬ tated. Other automatic selecting machines are employed in the mints of foreign countries, but ha.ve not been found so satisfactory as the Aus¬ trian machine in this country.

One of the most difficult of the processes of coining has been the annealing process, be¬ cause it is vital to the successful reduction of the ingot to the coin strip. Formerly the process was conducted in a furnace heated by wood fires. Much depended upon the fuel. Per¬ fectly seasoned hard wood, preferably oak, was required for good work. In annealing gold strips in a wood furnace the strips were en¬ closed in copper canisters, sealed to air tight¬ ness, and remained in the furnace about three- fourths of an hour. Silver strips were some¬ times subjected to the heat for an hour or more.

In all annealing of strips in the wood-fire fur¬ naces the strips were superposed unavoidably, and it was not always easy to determine when the draft reached a uniform cherry-redness. Delays and refractory metal were common with the old method of annealing. Besides, the method was the reverse of economical, owing to oxidation of the metal.

*In substituting the gas annealing furnace for the wood-fire furnace the work of rolling the metal soon became a work of precision. A considerable saving of time was also effected. The gas annealing furnace for strips has a heating chamber 10 feet in length, 17*4 inches in width and 10 inches in depth. A score of hol¬ low rolls, named ˆconveyers,® mounted on hol¬ low shafts of cast-iron, are so ribbed as to di¬ vide the face into several parts conformed to the width of the strips. These ribs separate the strips and prevent superposition. The gas burn¬ ers enter the heating chamber at the bottom and are in sections, in order to secure independ¬ ent control. Through these burners a mixture of gas and air is injected along the whole length of the chamber. The strips to be annealed are placed on the rolls at the entrance of the furnace, the rolls are rotated by worm wheels and pass entirely through the chamber, to enter a hood at the discharge end of the furnace. In this hood the strips, now of a cherrv-red, are met by a flame surcharged with gas to prevent oxidation. A spray of water is applied to the strips outside the hood to cool them before they reach the air. This prevents the oxidation of the copper with which the metal is alloyed. The process thus described occupies about six minutes, instead of the hour, or even more, by the wood-fire furnaces. The time required in annealing silver is*

about 20 or 25 minutes as to the larger denominations. Dimes, however, not being adjusted, and the coin strip being pro¬ duced from the dollar ingot, require a more prolonged annealing. The improvement in an¬ nealing has made it possible to produce from the ingot strips as high as 83 to 96 per cent of standard blanks and blanks within the limit of tolerance, suitable for coining. This high per¬ centage of good blanks is undoubtedly due to improved annealing and rolling. It is a higher percentage than has ever been secured when the defects in annealing and rolling were in part remedied by the draw-bench. As that ma¬ chine is still employed in mints not strictly up to date, it may not be amiss to say, that in principle the draw-bench is a wire-drawing ma¬ chine. As under the old mode of developing the ingot into the coin strip the ductility of the strip was not uniform, some parts being more refractory than others, and hence not reduced to a uniform thickness by the rolls, it was found necessary to pass the strips through a rigid die. The strips were then pointed so as to be firmly gripped by the nippers of the draw-bench which, retreating, drew the strip through the rigid die and gave it a uniform thickness, now imparted by rolls of precision without wasteful annealing. This improvement not only works a reduction of waste, but saves a delay between the finish¬ ing rolls and the cutting presses.

The largest gold pieces ever coined by the United States government are the 600 $50 pieces coined as mementoes of the Panama-Pacific In¬ ternational Exposition. Up to 30 June 1915, the gold coinage of the United States was, in number

of coins : Double eagles ($20) 120,757,306 ; eagles ($10) 51,122,910; half eagles ($5) 77,421,791 ; quarter eagles ($2.50) 17,260,490; $3 pieces 539,792; $1 (gold) 19,814,837. The silver coin¬ age totals: Standard dollars 578,303,848; trade dollars 35,965,924; standard half dollars 379,- 768,022; Columbian and other souvenir half dol¬ lars 5,110,000; quarter dollars 410,991,308; 20- cent pieces 1,355,000; dimes 733,837,547 ; half¬ dimes 97,604,388; 3-cent pieces 42,736,240; nickels 855,008,587. A 3-cent nickel piece and a 2-cent bronze piece have also been coined and a half-cent of copper. The cent has been coined in copper, nickel and for many years in bronze to the total of about 2,700,000,000. The total coinage of the country is in dollars $4,439,067,- 448.35. The principal foreign coins and their value in United States gold are: English, the sovereign or pound sterling, $4.86; French and Swiss franc, $0.19; German mark, $0.23; Rus¬ sian ruble, $0.51; Italian lira, $0.19; Swedish and Denmark crown, $0.27; Netherlands florin, $0.40; Spanish peseta, $0.19; Argentine peso, $0.96; Brazilian milreis, $0.55; Chilean peso, $0.36; Japanese yen, $0.50; Indian rupee, $0.32. See Coin and its cross-references. Consult (Coinage Laws of the United States) ; Hepburn,

(History of Coinage and Currency in the United States) (New York 1903).

John H. Landis,

Former Superintendent of United States Mint,

Philadelphia.

COINS. See Currency.

COINS, Foreign, American Equivalent of.

— As the monetary value of national coins is subject to frequent change, it is impossible to prepare a statement which would correctly specify the value of any particular coin at any future time. As such changes are correspond¬ ingly slight, however, the following list of the coins of all nations will always be comparatively correct, the values in the moneys of account of the United States having been corrected by the director of the mint, United States Treasury Department :

Argentine Republic. — Gold coins: argentine ($4,824) and half argentine; silver coins: goldpeso ($0,965) and its divisions: paper peso ($0.4245).

Austria-Hungary. — By a law passed 2 April 1892, the monetary system of Austria-Hungary was reformed on a gold basis, with the crown ($0,203) as a unit. The coins issued under the old system are still in circulation, however. They are, gold: eight florins ($3,858), 4 florins, ducat ($2,287), and 4 ducats; silver: florin ($0.5052) and 2 florins. The coins under the new system are, gold: the 100 crown piece ($20.20), 20 crowns ($4,052), 10 crowns ($2.03); silver: five crowns ($1.01); 2 crowns ($0,406); 1 crown ($0,203); nickel: twenty hellers ($0.0405) and 10 hellers; bronze: two hellers, or 1 kreutzer ($0.0040), and 1 heller.

Belgium. — Belgium being a member of the Latin Union, its monetary unit is the franc ($0,193), and its coins the gold 10 and 20 franc pieces and the silver 5 francs.

Bolivia. — The boliviano ($0.3893) is the theoretical unit of Bolivia. In 1906 a monetary law was passed providing for the adoption of a gold standard. The unit of account is the gold peso of one-fifth of a pound sterling ($0.97). Its coins, silver, are the boliviano, the 50, 20, and copper 10 and 5 centavo ($0.0211) pieces.

Brazil. — The milreis ($0,546) is the monetary unit of Brazil. Its gold coins are 5, 10 and 20 milreis pieces; its silver coins, L 1 and2 milreis; nickel 1/10, l/5and 2/5 milreis.

Bulgaria. — The monetary unit is the lev ($0,185) which is supposed to correspond to the franc of other double stand¬ ard countries. In fact, but

few Bulgarian gold coins are in circulation, the necessary gold coins being supplied by foreign 10 and 20 franc pieces. The silver coins are the 1, 2 and 5 leva pieces; the nickel coins are the 2?, 5, 10 and 20 stotinki ($0.0385), and there are copper coins of 1, 2, 5 and 10 stotinki. .

Canada. — The gold dollar ($1) is the monetary unit. The silver coins are the 50, 25, 10 and 5 cent pieces. Penny (2 cents) and half penny pieces are in circulation.

Chile. — The value of the peso, the monetary unit, is

($0,365). The gold coins of the country are the escudo ($1,825), doubloon ($3.65), and the condor ($7.30). The peso and its divisions are coined in silver.

China. — The monetary system of China is in an ex¬ tremely chaotic condition. The unit and sole official coinage is the copper cash, 11 of which are equal to one cent. The silver tael, or liang, varies in value in different parts of the country, as follows:

THE CHINESE TAEL

Place

Value

Place

Value

Amoy .

$0.8146

0.8122

Nankin .

$0.8061

Canton .

Ninchwang .

0. 7640

Chefoo .

0.7792

Ningpo .

0. 7832

Chin Kiang .

0.7958

Peking .

0.7832

Fuchau .

0.7536

Shanghai .

0.7942

The Haikwan or

Swatow .

0.7942

customs tael . . .

0.8289

Takau .

0.8198

Hankow .

0.7622

Tientsin .

0.7894

In Hongkong and Labuan, the "British Dollar" has the same legal value as the Mexican dollar.

Colombia. — The gold dollar ($1) is the monetary unit. Other gold coins are the condor ($9,647) and the double condor, and 2\ and 5 peso pieces. The silver peso ($0.9352) and its divisions are coined.

Costa Rica. — The gold colon ($0,465) is the unit of the country. Two, 5, 10 and 20 colon pieces are coined in gold; 5, 10 25 and 50 centimos ($0.2326) pieces in silver. Foreign gold is legal, but not foreign silver.

Cuba — By a law of 1914 a new coinage issue was author¬ ized; this includes a gold peso as the monetary unit. Gold coins are the 20, 10, 5, 4, 2 and 1 peso pieces; the 20, 10 and 5 peso pieces are of the same weight and value as the cor¬ responding United States gold coins. Silver is coined

in pieces of 1 peso, 40 cents, 20 cents and 10 cents, while nickel coins of 5, 2 and 1 cent pieces are issued. United States coinage is legal tender.

Denmark. — The monetary unit is the crown ($0,268) and gold 10 and 20 crown pieces are coined. The minor coinage, in silver and bronze, is represented by the 50 ore ($0.1247) and its divisions.

Ecuador. — The gold sucre ($0,487) is the unit, but the 10 sucre piece is the only gold coin. The minor coinage, the 10 and 5 real ($0.0467) pieces, is of silver.

Egypt. — The gold pound, representing 100 piasters ($4,943) is the unit, and 50, 20, 10 and 5 piaster pieces are also coined in gold. The silver coinage is represented by the 1, 2, 5, 10 and 20 piaster pieces.

Finland. — The markka ($0,193) is the monetary unit, and the gold coins are 20 and 10 markka pieces. The 50 penni ($0.0944) and the 10, 5 and 1 penni ($0.0019) pieces, in bronze, constitute the smaller coinage.

France. — The gold franc, valued at $0,193, is the unit of the country. Gold 5, 10, 20, 50 and 100 franc pieces, and silver 5 and single franc pieces are coined. The minor coinage is represented by the 50, 20, 10 and 1 centime ($0.0019) pieces.

German Republic. — The gold mark ($0,238), is the unit and 10 and 20 mark pieces are coined in gold. The 5, 2 and 1 mark pieces, the 50 pfennigs ($0.1039) and the thaler ($0.6928) represent the silver, the 5 pfennigs, the iron, and nickel, and the single pfennig the aluminum and bronze coinage.

Great Britain. — While the monetary unit for the colonies varies, that for Great Britain itself is the gold pound sterling ($4.8665). The pound sterling (the sovereign), and the half sovereign are coined in gold; the crown ($1.0872), half crown, florin ($0.4348), shilling ($0.2174), sixpence ($0.1017), four pence ($0.0724), three pence ($0.0543), and the two pence ($0.0362) in silver, with the penny ($0.02), half penny and farthing ($0,005) in bronze.

Greece.— The drachma ($0,193) is the monetary unit. Five, 10, 20, 50 and 100 drachma pieces are coined in gold, 5 drachma pieces in silver, 20 and 5 lepta ($0.0096) in nickel and 1 and 2 lepta pieces in bronze.

Guatemala.— The silver peso ($0,439) is the monetary unit and this coin and its divisions are coined in silver. This silver peso is not now current, the money in use being paper or fractional nickel and copper coin.

Haiti. — The gourde ($0,965) is the unit of the country; 1, 2, 5 and 10 gourde pieces are coined in gold, and the single gourde and its divisions in

silver and nickel. The smaller coin is the bronze centime ($0.0096).

Hawaii. — Same as United States.

Honduras — The peso ($0,439) is the monetary unit and this com and its divisions are coined in silver.

India. — – The pound sterling, or sovereign, is the standard coin of India, but the rupee ($0.324433) and its divisions is th§ money of account.

Italy. — The lira ($0,193) is the monetary unit. The 5, 10, 20, 50 and 100 lire pieces are coined in gold; 5 lire pieces in silver, while the 20, 10 and 1 centesimo ($0.0019) in nickel and bronze represent the minor coinage.

Japan. — The yen ($0,498) is the unit of the country. Gold 5, 10 and 20 yen pieces are coined; 10, 20 and 50 sen (100 sen = 1 yen), silver pieces, with 5 sen, 1 sen and 5 rin ($0.0024) pieces in bronze.

Liberia. — The onlv official coin of Liberia is the gold dollar ($1).

Mexico. — The silver dollar, valued at $0,498, has long been the monetary unit ot Mexico, but a change to the gold standard, which has been established recently, gives the country a gold dollar of the value of about 50 cents. The several divisions and multiples of the dollar are also coined.

Netherlands, The. — The gold florin ($0,402) is the mone¬ tary unit. Gold 10 and 5 florin pieces are coined as well as 5, 1 and 2\ florin pieces in silver. The cent ($0,004) is of bronze.

Newfoundland. — The gold dollar of Newfoundland is valued at $1,014.

Nicaragua. — The gold cordoba ($1.00) is the unit, and 10, 5 and 2\ cordobas are of gold. Silver cpins are the cordoba, the £ and j cordoba, 10 cents; and minor coins of nickel and copper.

Norway. — >■ Same as Sweden.

Panama. — The balboa, valued at $1 in gold, is the monetary unit. At present no gold is coined, the only coin being the silver dollar ($0.50) and its divisions.

Paraguay. — The country has no coinage, but the silver pesos of other South American republics circulate there at the same value as in the countries where they are issued.

Persia. — The silver kran ($0,915) is the monetary unit. Gold j, 1 and 2 tomans ($3,408) pieces, and silver j, 5, 1, 2 and 5 krans are coined. The copper coins are the chai ($0.0085) and the abassi, valued at 4 chais.

Peru. — The sol ($0,487) is the monetary unit. Gold libra ($4.8665) are coined, as well as the silver sol and its divisions.

Philippine Islands. — By act of the 57th Congress the authorized coins of the Philippines are silver pesos of 10, 20 and 50 centavos (cents) value, and of copper ranging from £ cent to 5 centavos in value.

Portugal. — The escudo ($1.08) is the monetary unit and 2, 5 and 10 escudo pieces are coined in gold. The silver cpins of this country are 1 escudo, and 50, 20 and 10 centavo pieces. Bronze coins are 4, 2, 1 and 5 centavo pieces.

Rumania. — The gold leu ($0,193), corresponding to the franc, is the monetary unit. Twenty and 10 and 5 leu pieces are coined in gold, single leu pieces in silver, and 20, 10, 5 and

1 bani ($0.0019) pieces in nickel.

Russia. — The ruble ($0,515) is the monetary unit. Gold imperials, valued at 15 rubles, and half imperials are coined. New gold coins are the 10 and 5 ruble pieces. The ruble, as well as the 50 and 5 copeck ($0.0187) pieces, are of silver, while the single copeck and a 5 copeck piece are coined in copper.

_ Salvador. — The silver peso ($0.3978) is the unit, and this coin and its divisions are coined in silver. Nickel coins in circulation are 5, 3 and 1 centavo pieces.

Santo Domingo. — In 1897 the United States gold dollar was adopted as the standard of value. A small amount of debased silver coin circulates as small change at the ratio of 5 to 1.

Serbia — The dinar ($0,193) is the monetary unit. The 20 and 10 dinar pieces are of gold; the 5, 2, 1 and 5 dinar pieces of silver, while the 20, 10, 5 and 1 para ($0.0019) pieces, in nickel and bronze, represent the minor coinage.

Siam. — The monetary unit is the silver tical ($0.38), The other coins current arethedos (10 ticals), salung (J tical),

2 salung piece, and the juang (f tical), 10 satang, 5 satang, satang (1/100 tical).

Spain. — The peseta ($0,193) is the monetary unit. The several divisions and multiples of the peseta are coined in gold and silver, while the minor coinage, ranging from one centimo ($0.0019) to 50 centimos, are of silver or bronze.

Sweden and Norway. — The gold crown ($0,268) is the unit, and 10 and

20 crown pieces are coined in gold. The silver coinage includes the 2 crown piece, the single crown and the 50 and 10 ore ($0.0241), while the single and the 5 ore pieces are of bronze.

Switzerland. — The gold franc, valued at $0,193, is the monetary unit. Gold 5, 10, 20, 50 and 100 franc pieces, and silver 5 and one franc pieces are coined. The minor coinage includes the 50, 20, 10 and single centimes ($0.0019).

T urkey.- — The piaster ($0,044) is the monetary unit and the gold coins include the 25, 50, 100 (the lira), 250 and 500 piaster pieces. The single piaster and the 2, 5, 10 and 20 piaster pieces are of silver, while a piaster and the para ($0.0001) are of copper. The piasters, half piaster (20 para), quarter piaster (10 para), and | piaster (5 para), are of nickel.

Uruguay. — The peso ($1,034) is the only gold coin au¬ thorized in Uruguay, but the silver peso ($0,403) and its divisions are also coined. Nickel coins are 5, 2 and 1 cen¬ tesimo pieces.

Venezuela. — The bolivar ($0,193) is the monetary unit. Gold coins are the old Spanish onza (80 bolivars) and 20 bolivars. Silver coins are 5 bolivar pieces (fuerte), 2£ bolivars, 2 bolivars, 1 bolivar, 5 bolivar {real), and j bolivar {medio). Nickel coins are 0.125 bolivar {locha) and 0.05 bolivar {centavo) .

See Coin and its cross-references.

COIR

COITUS

225

COIR, the outer coating of the cocoanut, often weighing from one to two pounds; when stripped oft longitudinally it furnishes fibres from which are manufactured matting, bagging, sails, ropes and cables. The general preparation is simple; after being soaked for some months in water the fibrous coats become soft; they are then beaten to remove the other substances with which they are mixed, which fall away like sawdust. The fibres thus cleaned are ready for being spun into long yarns, woven into sailcloth or twisted into cables. Cordage made of this material rots in fresh water and snaps in frost, but from the fact of its being strength¬ ened by salt water, and its extreme buoyancy as compared with hemp cables, floating as it does in water, and also its great strength and elasticity, it is preferable in many respects to ropes of hemp. It has been proposed to employ it in the construction of deep-sea telegraphs, as being much cheaper and lighter than gutta¬ percha.*

COIRE, kwar, or CHUR, Switzerland, capital of the canton of the Grisons, on the rivers Plessur and Rhine, 74 miles from Ziiricb by rail, situated 1,950 feet above sea-level. It is irregularly built, and possesses many

houses in the ancient style of architecture. The most remarkable buildings are the old Romanesque cathedral, partly dating from the 8th century, and the old Episcopal palace. Adjoining this is a lofty tower believed to be of Roman origin. Among modern buildings are a Protestant church, government buildings and a hospital. Not far from Coire the Rhine begins to be navigable for small vessels. Ruled by bishops in the Middle Ages, it entered the Swiss Con¬ federation in 1498. Repeatedly in the hands of the Austrians, French and Swiss, in 1802 it was definitely united to the Swiss republic. Pop. 14,485.

COIT, James Milnor, American educator: b. Harrisburg, Pa., 31 Jan. 1845. He was grad¬ uated at Hobart College 1865, and was manager of the Cleveland Tube Works 1873-77. In 1876 he became master in natural sciences at Saint Paul's School, Concord, N. H., and was ap¬ pointed acting head master there in 1904. He engaged in research work at the University of Munich in 1909, and later became head of the Coit School for American Boys in Munich. He is president of the American Red Cross Committee. He is a member of the leading scientific societies of the country and has pub¬ lished 'Manual of Chemical Arithmetic^ (1866); 'Treatise on the X-Rays and Their Relation to the Medical and Surgical Sciences) (1897) ; 'Liquid Air) (1899).

COIT, Stanton, American lecturer on ethics: b. Columbus, Ohio, 11 Aug. 1857. He was educated at Amherst and Columbia col¬ leges and Berlin University, and has for many years lived and lectured in London, England, where he is chairman of the West London Ethical Society. In 1910 he was Labor candi¬ date for Parliament from Wakefield. He was editor of the International Journal of Ethics 1893-1905, and has done much for the organ¬ ization of the English ethical societies, espe¬ cially in compiling 'The Message of Man: A Book of Ethical Scriptures) (1902); an 'Ethical Hymn Book) (1905) ; 'Responsive Services J (1911); and 'Social Worship)*

(1913). He has published in German and Dutch, 'The Ethical Movement in Religion) (1890) ; in English, German and Dutch, 'Neigh¬ borhood Guilds) ; 'National Idealism and a State Church) (1907); 'National Idealism and the Book of Common Prayer) (1908) ; 'Woman in Church and State) (1910) ; 'The Soul of America) (1913); 'The Spiritual Nature of Man) (1910).

COITUS, the act to permit fertilization of the female. In the higher animals this takes place by the insertion of the male organ — the penis — within the female organ — the vagina. In many lower animals male secretions — sper¬ matozoa — simply mingle with or mechanically come in contact with the female ova. Thus in the fish the ova are deposited in a sort of a crude

nest ; the male, swimming above the nest, discharges the spermatozoa over them and im¬ pregnation of the egg takes place. In the human animal the process is quite complicated, and since much human happiness is bound up in a properly performed sexual act a correct knowl¬ edge of its physiology should be made avail¬ able. The sexual act may be divided into three stages: (1) desire, (2) erection and excitement and (3) ejaculation or orgasm. In the human being sexual desire is present from the moment of birth although it rarely enters into conscious¬ ness as such and is partially distributed into polymorphous trends to all parts of the body, being inextricably compounded with nutritional desires, with desires for movement, for urina¬ tion, for defecation, etc., etc. In this phase of its evolution the primary instinct for re¬ production has not obtained any conscious di¬ rection, nor found a proper object nor appro¬ priate method. Every sense organ of the body seeks gratification to satisfy its own needs — these are pursued with much vigor by the child but are rarely directed toward an external object. In many children, perhaps most, geni¬ tal manipulation causes local excitement, but this genital excitement is only a part of the general infantile reaction of reaching out for pleasurable sensations. Nevertheless the chief disturbances which later come to make the sexual act non-satisfying, or perverse in its trends, can be traced back to faulty adjustments of the values of these early infantile poly¬ morphous trends. As one instance of many such faulty adjustments the perversion known as sodomy, in which the rectum is used as a substitute for a vagina, can often be traced back to severe constipations or diarrhoeas in infancy, worms or too many enemas, so that the rectum becomes the seat of an exaggerated series of pleasurable excitements, the retention of the memory of which may divert the adult interest away from the physiological goal, the vagina. For the most part, and in the adult whose sex¬ ual adaptation takes a proper course — the in¬ fantile pleasurable trends just spoken of become harmonized, are largely put away by a complex series of repressions and remain latent sources of higher types of creative per¬ formance.

Thus in the more healthy types the repro¬ ductive function desire only reappears, and then more consciously, at about the time of puberty. Even then repression is constantly operative and that which is socially under a ban is diverted to other constructive activities. Desire is now evoked by a series of changes, chief of

which are physical, but also conditioned by the presence of the internal secretions of the testes and ovaries. By some it is thought that in the absence of these internal secretions the psy¬ chical associations, which may

be denominated the love associations, are unable to bring about sexual excitement and its consequent erection and orgasm ; this is true for most cases prob¬ ably, as in eunuchs who have been castrated, but still it is known that it is not invariably so, since some castrated individuals are sex¬ ually very active. Furthermore, there are many individuals, who, with absolutely intact glands and healthy internal secretions, nevertheless are very impotent from various types of psycho¬ logical blocking. Some are cured of this by proper psychotherapy. Thus all that can be said is that the physical and mental here as well as everywhere else in the body are inter¬ dependent one upon the other. There are innumerable pathways for the psychic stimuli which lead up to sexual desire. No two indi¬ viduals are just alike in this regard. Some¬ times the early infantile smelling trends deter¬ mine certain odors as the specific stimuli for the bringing out of desire, with others eye stimuli, others sound stimuli, again touch stim¬ uli, in others urinary or rectal stimuli are the essentials. These are all unconscious associa¬ tions which have been built up from the earliest infantile period. In fact for some even in¬ trauterine stimuli are known to have deter¬ mined certain abnormal trends in this difficult field of the reproductive instinct. Whatever the stimulus or series of stimuli, whether they come from the external world or arise within the body itself, the impressions are carried by certain nerve pathways down the spinal cord to reach the spinal centres, or reflex arc path¬ ways, the integrity of which permits the second essential in the reproduction act, erection. Up to this point male and female act alike — save the influence of the menstrual cycle as a spe¬ cific stimulus to desire in the female, largely missing in the majority of males. There is probably no more difficult subject of investiga¬ tion and one in which so many variations may be found as to what shall determine sexual desire. Within its realm lie all the mysteries of (

(2) Erection. The physiological nervous mechanisms consist of nerve fibres which estab¬ lish a complicated series of reflex arcs which acting upon the blood vessels of the corpora cavernosa of the penis bring about its erection. Two factors are prominent in this blood vessel control. There is an active dilation of the small and medium sized blood vessels, so that from 8 to 10 times as much blood enters the penis, and secondly the return of this blood to the venous channels is partly prevented by the contraction of certain fibres of the ischio- cavernosus or erector penis muscle which shut off the dorsal vein of the penis. Psychical stimuli after passing down the spinal cord to

the lumbar region are switched off, as it were, through cerebro-spinal nerves which make up the nervus erigens to the muscles of the penis. The peripheral reflex paths, which carry im¬ pressions from the skin and mucus membrane of the genital regions, pass by way of the nervus dorsalis penis and the nervus pudendis communis to sympathetic ganglia and in con¬

junction with psychical stimuli act upon the vegetative nerve fibres controlling the blood vessels. The spinal connections of this reflex path lie in the second sacral segment. A part of this vegetative reflex arc is made up of many fibres and carries stimuli from the seminal vessels, the bladder and rectum. These pass through the hypogastric plexus and con¬ tribute to the vascular action. It may happen that the spinal connection of this series of fibres may be cut or diseased. This accident will not prevent erection but there will be no erotic sensations, the erection then only being seen rather than felt. Certain quack-remedy sellers and perverse panderers make use of this mechanism empirically and endeavor to bring about prolonged erection with diminished feeling, thus endeavoring to "restore lost man¬ hood,® as they call it. These remedies and methods are extremely dangerous and bring about serious types of impotence. Certain sur¬ gical procedures such as passing cold sounds, prostatic massage, anal lavage, etc., also pro¬ duce at times the most serious results, especially when carried out by ignorant quacks. Since such irregular so-called doctors are not licensed no legal redress can be obtained as a result of such malpractice.

As a result of certain diseases of the spinal cord — usually transverse lesions in the cervical or dorsal region, permanent erec¬ tion — priapism — may take place. In other spinal cord injuries or diseases as in tabes dorsalis usually lying in or involving the lum¬ bar and sacral segments loss of the power of erection may take place. Loss of this power, however, is chiefly due to psychogenic causes and can often be cured by appropriate psycho¬ therapy. The obstinate cases are usually amenable to psychoanalysis, by which procedure the unconscious psychogenic roots of the diffi¬ culty "re discovered. The mechanism of erec¬ tion has its analogue in the female and the same reflex pathways are present. The clitoris tends to become erect, also the erectile tissues of the vulva. The glands of the vulva, includ¬ ing the large glands of Bartholini, secrete mucus and lubricate the vagina in a manner analogous to the secretion of the prostate gland in the male which serves a similar purpose.

(3) Orgasm consists in the discharge in the male of the mixed secretion called the semen into the vagina accompanied by rhythmical con¬ tractions, followed by a sense of relief of tension and satisfaction. An analogous series of contractions takes place in the female, with a mucous discharge from the vaginal glands and movements of the uterus.

In the act of ejaculation, as in all motor ac¬ tivities, both the sympathetic and spinal systems come into action.

The reflex functions of the former come into play in that the summation of adequate stimuli (rubbing movement) acting upon the erected organ causes peristaltic contraction of the smooth muscles of the three secretion-bear-

ing organs, the vas deferens, seminal vesicles and prostate. This causes the orgasm and empties the mixed secretions into the prostatic urethra. A secondary reflex of a somatic na¬ ture now occurs, namely, a contraction of a spinal cord origin of the cross striated bulbo cavernosi and ischiocavernosi muscles which act forces the semen out of the prostatic urethra.

The sympathetic arc of this reflex mechanism is seldom disturbed, while on the other hand the somatic arc frequently is injured by spinal cord lesions, particularly deep-seated diseases of the conus. » When this injury occurs there is also disturbance of the mobility and sensa¬ tion of parts supplied by near-by muscles. The semen under these latter circumstances is not forcibly ejaculated, but flows off drop by drop.

The relaxation following ejaculation is partly due to a passive process, decrease in tone in the N. erigentes, partly to an active process, contraction of the smooth muscle of the skin of the penis and of the erectile bodies. Noc¬ turnal flow of semen during sleep or pollution may occur without sensory stimuli acting upon the individual and may yet be accompanied by the marked and well-known feelings of passion. This may be called orgasm and is regularly accompanied by the manifestations of stimula¬ tion in the rest of the vegetative system (my¬ driasis, hyperidrosis and tachycardia).

An enormous variation exists among men and women with reference to orgasm. The prevailing maladjustment in men is premature ejaculation; frigidity or delayed orgasm in the female. Failure of a satisfactory sexual rapport in married life is extremely frequent and is chiefly a result of faulty sexual educa¬ tion, largely induced by social customs. It may be said that the human being is sex-obsessed and it is the function of a rational sexual edu¬ cation to relegate the genital satisfactions to their proper role as but one of the sources of human happiness. The prevailing prudery of the Victorian period, while based upon rational sex-ethics, was a movement which overshot its mark and is in need of revision. A more sen¬ sible and honest handling of the entire problem, and it' is a highly complicated one, must be entered into before a pragmatic sexual ethics can be evolved. The scientific application of psychoanalysis has proved of inestimable value in evolving general principles of great practical aid in this difficult field of ethics. Consult Freud, (Three Contributions to the Theory of Sex) ; White, (Mental Hygiene ; Jelliffe, tech¬ nique of Psychoanalysis* ; Forel, (Sexual Problem.)*

Smith Ely Jelliffe.

COJUTEPEQUE, ko-hoo'ta-pa-ka, Cen¬ tral America, town in the republic of Salvador, capital of the department of Cuscatlan, and on the direct route between the town of San Salvador and San Vincente, and about 20 miles east of the former. There is a lake of the same name at some miles distance, the fish of which are often cast ashore dead in considerable quantities. It is situated north of the volcano Cojutepeque and near Lake Isopango. The city has considerable transit trade. For a few years after 1854, when San Salvador was de¬ stroyed by an earthquake, it was the capital of the republic. Pop. 10,000.

COKE, kok, Sir Edward, English jurist: b. Mileham, Norfolk, 1 Feb. 1552; d. Stoke Pogis, 3 Sept. 1634. He was educated at Trin¬ ity College, Cambridge. From the university he went to London and entered the Inner Temple. He pleaded his first cause in 1578 and the fol¬ lowing year was appointed reader of Lyon's Inn, where his lectures were much frequented. His reputation and practice rapidly increased and he was placed in a situation of great respecta¬ bility and affluence by a marriage with a co¬ heiress of the Paslon family. He was chosen recorder of the cities of Norwich and of Cov¬ entry; was engaged in all the great causes at Westminster Hail and in 1592 chosen one of the knights of the shire for his county and speaker of the House of Commons. In 1592 he became solicitor-general and soon afterward was appointed attorney-general. He acted the usual part of a Crown lawyer in all state prose¬ cutions ; and one of the most important that fell under his management, as attorney-general, was that of Essex, which he conducted with great asperity. Soon

after the accession of James I he was knighted. The celebrated trial of Sir Walter Raleigh followed, in which Coke displayed a degree of arrogance to the court and of rancor and insult toward the prisoner, which was universally condemned at the time, and is one of the greatest stains upon his char¬ acter. On the discovery of the gunpowder plot he obtained great credit by the clearness and sagacity with which he stated the evidence. In 1606 he was appointed chief justice of the Common Pleas; and in 1613 became chief jus¬ tice of the Court of King's Bench, but was in much less favor with James than his rival, Lord Bacon. He was, in fact, too wary and staunch a lawyer to commit himself on the subject of the prerogative; and as his temper was rough and his attachment to law truly professional, he could scarcely forbear involving himself with a court so notorious for arbitrary principles as was the English during the reign of James. The honorable zeal which he displayed in the ex¬ ecrable affair of Sir Thomas Overbury and in the prosecution of the king's wretched minions, Somerset and his countess, for that atrocious murder, made him enemies ; and advantage was taken of a dispute in which he erroneously en¬ gaged with the Court of Chancery, to remove him, in 1616, both from the council and his post of chief justice. His real offense, how¬ ever, was a refusal to favor the new favorite, Villiers, in some pecuniary matter. Coke was recalled to the council in 1617 and actively en¬ gaged in prosecutions for corruption in office and for offenses the punishment of which by exorbitant fines was designed as a means of replenishing an exhausted treasury. On the accession of Charles I he was nominated sheriff of Buckinghamshire, in order to prevent his being chosen member for the county, which, however, he represented in the Parliament which met in 1628. The remainder of his career was distinguished by his defense of the law against the attacks of the royal prerogative ; he greatly distinguished himself by his speeches for re¬ dress of grievances ; vindicated the right of the Commons to proceed against any individual, however exalted; openly named Buckingham as the cause of the misfortunes of the kingdom; and, finally sealed his services to the cause by proposing and framing the famous "Petition of

*Rights,** the most explicit declaration of Eng¬ lish liberty which had up till that time appeared. This was the last of his public acts. His principal works are (Reports,* from 1600 to 1615;*

COKE, Thomas, first bishop of the Meth¬ odist Episcopal Church in the United States : b. Brecon, South Wales, 9 Sept. 1747 ; d. at sea, 2 May 1814. He was educated at Oxford and entering the ministry of the Established Church obtained a curacy at South Petherton. Sympathizing strongly with the Methodists, he sought an interview with Wesley, which

result¬ ed in his joining that society and being appoint¬ ed to London. He rendered valuable assistance to Wesley in procuring what was called the deed of declaration, which provided for the settle¬ ment of the Methodist chapels in the connection and restricted the conference to 100 of the preachers and their successors forever. He was appointed president of the Irish conference in 1782. Wesley set apart Coke by ordination as superintendent of the Methodist Church in America and gave him authority to ordain Fran¬ cis Asbury as joint superintendent. In 1784 he arrived in New York and exceeded his instruc¬ tions by ordaining Asbury a bishop. As such they were duly accredited, to Wesley's annoy¬ ance, as the joint bishops of the Church in America. In company with Asbury he traveled, visiting the different conferences, until June 1785, when he returned to England and visited Wales, Scotland and Ireland. Subsequently he returned to America. The first mission which he established was in the West Indies, in 1786, whence, after visiting the several islands, he went to South Carolina and engaged again in the regular work of the episcopacy. After traveling through the States, he embarked from Philadelphia for England in 1787. He revisited the West Indian and other American missions again and again, crossing the Atlantic 18 times in all. He was a prolific author and published Commentary on the Holy Scripture (1803— 07) ;*

COKE. Introduction. — One of the most important fuels of to-day is coke. It has in¬ fluenced to a greater extent than any other one fuel the immense advances made in the iron and steel industry of the present time. The immense production of pig iron is due in a great measure to its peculiar adaptability to the special requirements of the blast furnace. Its manufacture has influenced many millions of dollars invested in the development of its by¬ products, and from these by-products have been developed, especially in Continental Europe, many important industries. Modern war as fought with high explosives would be impos¬ sible without the by-products of the coke ovens. Tar is the raw material in the aniline dye and briquette industry, as well as others of great importance; from the gas, light, fuel and oils are obtained, and from the ammonia sulphate,

*the anhydrous ammonia and aqua ammonia utilized to such a large extent in refrigerator plants. The present is an <(era of coke,** as well as of iron, steel and electricity, for without this invaluable fuel the others would-hardly have been possible.*

Definition. — Coke is the solid residue re¬ maining from the dry distillation of bituminous coal. It consists chiefly of carbon with the min¬ eral matter or ash of the original coal and such small proportion of the volatile components of the coal as the degree of heat employed has failed to dislodge. There are, two types of coke — • furnace coke and gas coke. The former is produced at a high temperature gained as rapidly as possible in

order to form a hard crust on the outside of the coke fragments to retain as much as possible the carbon vapors from the interior. The coal selected for this operation has a low content of volatile resinic matters, and the retort in which it is made is packed closely with the coal, so as to leave little empty space. In the manufacture of gas coke the valued product is the gas, and the coal chosen has a high content of volatile resins and the retort is loosely and only partially filled. Gas coke averages : Carbon, 84.4 per cent ; hy¬ drogen, 0.2 per cent ; nitrogen and oxygen, 6.3 per cent; sulphur, 0.8 per cent; and ash, 8.3 per cent. Furnace coke averages : Carbon, 86 to 92 per cent; ash, 6 to 9 per cent; volatile mat¬ ter, 0.3 to 1.3 per cent; moisture, 0.2 to 0.7 per cent. Coke differs in porosity and specific gravity to some extent according to the type of retort in which it is made. Coke from a verti¬ cal retort will show 40 per cent pores and a specific gravity of 1.08; that from a horizontal retort a porosity of 46 per cent and a specific gravity of 0.91. The heating value of coke is aoout 14,400 B.T.U. The basic analysis on which most coke is now bought and sold is as follows: Fixed carbon, 85.5 per cent; ash, 12 per cent; volatile matter, 1.0 per cent; sulphur, 1.1 per cent. Moisture is deducted, the pay¬ ment being on the dry coke. By volume the coke is estimated at 50 per cent porosity and the standard specific gravity is 1.89 for the solid coke substance.

*Discovery and History. — Coke is reported to have been an article of commerce in the Chinese province of Hunan some 2,000 years ago. The process seems to have been adapted from the charcoal industry that flourished ex¬ tensively in the Middle Ages. Coke was made in Germany in 1584, at the Hohenbuechen mines in the Harz, by Duke Julius von Braun-schweig-Liineberg, and about the same time the master of the Anhalt mint, Daniel Stump- felt, made a similar discovery. It appears that in both instances the coke was designed for use as a smokeless fuel, rather than for iron smelting, a use that developed later on. In Eng¬ land a patent for the <(de-sulphurizing** of bitu- minuous coal was granted to the dean of York in 1590, and in 1619 Dud Dudley, an ironmas¬ ter of Worcestershire, was successful in mak¬ ing coke. Up to this time the coke appears to have been made in the same way as charcoal, namely, by burning in a mound or <(meiler,** the coal lumps being so piled as to leave draught openings and the whole covered with coal dust or earth. This primitive method gave place to a pit dug in the ground, or to a walled enclo¬ sure, into which the coal was piled, and later*

into a covered structure known as the <(bee-hive oven,® so-called from its shape. Such an oven was patented by Sir William St. John and others in England in the year 1620, particular mention being made of the use of the

coke so made in manufacturing iron or steel. The bee¬ hive oven did not come into extended use in England until about 1735, when Abraham Darby operated a blast furnace at Colebrook- dale, Shropshire, with coke, an example soon followed by others. This innovation was has¬ tened by the increasing scarcity of wood for charcoal, which was the fuel first used for iron smelting. In France, Gabriel Jars, who had visited the English iron-works, is reported to have introduced the use of coke at the iron¬ works in Sainbel. In Germany, Prince Wilhelm Heinrich made coke in closed muffle-ovens of peculiar design, at Sulzbach near Saarbruecken, in 1767, and with it made, it is stated, the first coke-smelted iron on the Continent, at the Fischbacher furnace, near Sulzbach.

Beehive ovens of the English type were built in rows or batteries, both for convenience in operation and to save the heat radiated from one to another, instead of to the atmosphere. Later, modifications were made in the design of the oven, to improve its thermal efficiency and to cheapen the operation. These gave rise to the elongated shape instead of the round or square section, and the retort type of oven was thus gradually developed. The Belgian oven is typical of this form. In it the coking cham¬ ber was from 20 to 30 feet or more in length, 5 or 6 feet high and 18 to 30 inches wide, closed by movable doors at either end, and the coke was removed by a pushing ram which forced out the coked mass as in the present form of by-product oven. This oven was heated by the gas from the coal, which burned in vertical or horizontal flues built into the walls sepa¬ rating adjacent ovens, air being supplied by ducts from the top, and draught from a stack located at one end of a battery of such ovens, connected with them all by an underground flue. Ovens of this general type were constructed by Rexroth, Coppee and Smet about 1857-60. In 1856, however, Knab was experimenting with a closed retort oven, externally heated, from which he obtained both coke and by-products at Commentry, France. A modification of this oven was built by Carves, and later, by Hues- sener, who built a plant at Gelsenkirchen, West¬ phalia, in 1881. At the same time, an experi¬ mental plant of 10 ovens was built at Watten- scheid, Germany, by Otto, the two last men¬ tioned being of the true by-product type. Thus, while the origin of the by-product oven may be conceded to the French experiments of Knab, the development was due to Germany. The Wattenscheid experiments gave rise to the type of oven known as the Otto-Hoffmann, since widely extended, particularly in Germany. The modification of the Knab-Carves oven by Simon, known as the Simon-Carves oven was of the by-product type and was further devel¬ oped by Semet, a Belgian, who in 1881 took out a patent for the oven known as the Semet- Solvay.

In the United States the beginning of the development of the coke industry dates about 1810-13. For the same reason that England was forced into its

manufacture so was Amer¬ ica. The Pennsylvania Society for the Promo¬

tion of Internal Improvements about this time sent an expert to England to study develop¬ ments in the mother country in the person of W. Strickland. This occurred about 1825.

Mixtures of charcoal and coke were tried, and in 1835 in Pennsylvania a premium of a gold medal was offered to the person who would manufacture in the United States the greatest quantity of iron from the ore during the year, using no other fuel than bituminous coal or coke, the quantity to be not less than 20 tons. Results were not satisfactory, prob¬ ably due to the poor quality of the coke, pos¬ sibly through selecting a poor coking coal or in the method of blast furnace practice.

The first coke ovens in the Connellsville re¬ gion were built in 1841, but not until 1856 was its use augmented to any great extent; at this time there were established in Pennsylvania alone 21 furnaces in blast on coke. A gradual increase in its successful use was made during the period from the use of Connellsville coke up to the year 1880. At this point the growth was extremely rapid, and its effect of increas¬ ing the iron output of the world of vital import¬ ance.

Methods of Manufacture. — Coal was first coked in heaps or mounds in the open air, fol¬ lowing the methods of the charcoal burners, and although resulting in a first-class quality of coke was extremely wasteful. It consisted in arranging rectangular heaps or mounds with longitudinal, transverse and vertical flues to obtain a draft, sufficient wood having been dis¬ tributed in the mass to produce general igni¬ tion. The mound was ignited and the fire al¬ lowed to spread to the whole mass. After the gaseous matters had been expelled, the mound was partially smothered by fine coal dust, the final operation consisting of the application of a small quantity of water, which .permeated the whole mass. The application of the water tend¬ ed to develop a coke with few cells and under proper management a low moisture. The yield of coke was in the neighborhood of 55 to 60 per cent, the loss being 40 to 45 per cent of the coal.

The second advance in manufacture was that of enclosing the mound in a furnace, thus utilizing to some extent the heat passing off from the coal. This form of manufacture was termed the ((Bee Hive Oven,® and finally re¬ sulting in having a series of ovens, utilizing the heat on three sides of the oven and the heat of the escaping gases, to assist in coking. There was also a development in this form of oven which endeavored to throw down the solid con¬ stituents of the escaping gas in the form of tar, but the methods were, comparatively speaking, very crude, and resulted in saving but little of the 40 per cent unaccounted for.

About 1881-82 two forms of ovens ap¬ peared, which, since that date, have been de¬ veloped to such an extent that but 10 to 15 per cent of the calorific efficiency of the coal is lost. In America to-day there are two standard types of ovens, the beehive and the by-product, both of which are described in a following paragraph.

Chemical and Physical Qualities. — These two qualities of the coke do not seem to hold much if any relation to each other — that is, the coke may have a fairly good analysis chem¬ ically and yet, if its physical qualities are below

the standard, it would be useless for the metal¬ lurgist.

Several theories have been brought forward to explain the coking of coal, and that held by M. Lemoine is presented but the question is still undecided. Lemoine comes to the conclu¬ sion that there is a substance, which he calls ˆCarbene,® which determines the coking quality of coals. This substance he claims resembles a Mat coal.® It is black, solid, friable, with a tendency toward crystallization, and is of the formula C22H14O5.

Carbene, he says, has the property of ad¬ hering to solid bodies and spreading itself over their surface to an extent which is unknown in any other body. When a large amount of coal is subjected to distillation, as in a coke oven, the carbene may be driven from one part of the heated coal to settle itself upon the cooler portion of the mass, and thus to increase the agglutination of this part. This process may continue throughout the entire thickness of the mass until the coke is formed.

M. Lemoine claims that laboratory experi¬ ments have shown the possibility of trans¬ forming a non-coking coal into a good coking coal by means of the addition of 2 per cent of carbene. In one coal tested, which had 10 per cent volatile, the yield was 93 per cent. In con¬ clusion, he claims we may therefore hope to produce good coke from coals which have hitherto been considered non-coking coals, and further experiments in this direction are being carried on.

The physical characteristics of a coke are of far greater economic importance than its chemical character. Hardness is exceedingly important, and porosity is an essential. Certain coals in the coking operation, in giving off their volatile ingredients, produce in the viscous mass a greater amount of cellular structure than others. According to Fulton, good coke has a hardness of body of 2 to 3 in the usual physics scale. Condensed coke does not mean great hardness, but, on the other hand, means softness.

An important point which goes to prove the extreme adaptability of coke in blast furnace and lime kiln practice is the fact that, due to its cellular condition or porosity, the heat can the more readily prepare it for combustion, and consequently after it has in its descent in the furnace reached the zone of combustion it is in the most perfect state possible for such action, and yet, due to its hardness, it has held its form and sustained the immense mass above it without being crushed, thereby allowing the highest per cent efficiency for blast.

Another consideration is that in equal cal¬ orific quantities of anthracite coal and coke the volume of space occupied by coke is much greater than that of coal ; hence, it can dis¬ tribute its heat to a greater mass of burden than the coal and avoid concentration of an ex¬ cessive heat at one point as when using anthra¬ cite coal.

Economical and Commercial Considera¬ tion of Coke Manufacture. — These features of the industry should not be considered inde¬ pendently. As stated previously, the waste from the beehive method of producing coke to-day is enormous ; not alone is part of the coal consumed in the coking operation, but all the gases and volatile matters escaping from the furnace contain material of great value.

The by-product oven of to-day requires in its management a large amount of chemical and metallurgical skill.

The distillate from tar has many new uses besides the well-known one of creosoting rail¬ road ties. The expansion of the American dyestuff industry, due to the failure of the European supply, and the immense increase in munition manufacture has made a new market for tar distillates.

Another branch of the by-product industry is the recovery of oils of the aromatic series from the gases. Of the 10,000 cubic feet of gas produced from a ton of coal, 6,500 cubic feet are required in the coking process. This gas contains on an average 0.75 per cent of benzene (benzol) and its homologues. The heat value of this gas is affected only slightly by the removal of the benzene. By washing gas with petroleum or coal tar oil, a benzolized oil containing 2 to 3 per cent of benzene is pro¬ duced, and by

distillation of crude benzene light oil is obtained.

Only slight quantities of impurities, carbon disulphide, hydrogen sulphide, thiophene and napthalene are found to be present, and purifi¬ cation and redistillation furnish a benzene 100 per cent pure, and suitable for nitrifying and converting into aniline.

From the oil which is with the pitch (the result of the distillation of crude coal tar) is obtained anthracene, another important base of dyestuffs. From creosote oil are obtained napthalene, carbolic acid and other homologues. Carbolic acid is the base of picric acid, which is the main ingredient of the latest high ex¬ plosives, as English Lyddite, French Melinite, the Japanese Shimose powder and our own Maximite.

The by-product ovens are the leading pro¬ ducers of ammonia in the country, and this crude product forms the raw material for re¬ fined ammonia products, and also furnishes a supply for the manufacture of soda by the am¬ monia process. Ammonia is also being used for the manufacture of explosives and for the pro¬ duction of the refined aqua ammonia which is largely consumed in refrigerator machines, either as aqua ammonia or anhydrous ammonia. As sulphate, ammonia is largely consumed in the manufacture of fertilizer. The consumption of fertilizer is increasing in this country, espe¬ cially in the South, and sulphate of ammonia is regarded as a most valuable form of plant food. Commercially speaking, therefore, the by¬ product oven cannot have a healthier growth than is justified by the demand of the indus¬ tries that consume its by-products.

The Beehive Oven. — The type of this oven is as shown in illustration. It is 12 to 13 feet in diameter, with a 7 to 8 feet height of dome above floor level, lined with siliceous brick backed with concrete or masonry. The charging hole is on top, and the oven door slightly higher than the level of the charge.

Various systems have been established to utilize the waste gases and heat of the coking operation, either by surrounding the furnace with ducts, or utilizing the heat in an adjoin¬ ing plant. All these steps in the progress of development tend toward the by-product oven, but more particularly is it true when it is the ' aim to save the by-products.

At the close of 1905 practically 89 per cent

5

' p

*?

. M

1

(

1

1 J

U

1

Pig

.

nVi

1 .1

i it

"1

!r-,r

L —

| Ml a

iwwd

1 Bv-oroduct Coke Ovens. United Otto System 2 By-product Coke Ovens. Semet Solvay System

3 Bee Hive Coke Oven

COKE

1 Semet-Solvay Ovens at Dunbar, Pa

2 Beehive Ovens at Uniontown, Pa,

COKE

231

of the coke in the United States was manufac¬ tured in beehive ovens, due to the non-available market for the by-products. In 1915 the bee¬ hive ovens made only 66 per cent of the whole. The cost of erecting a beehive oven is very small in comparison with that of a by-product oven, hence the commercial policy of replacing the beehive oven with a by-product oven only as fast as the market conditions demand the by-products.

The By-product Coke Oven. — The by¬ product coke ovens are of two types : the waste heat oven adopted where the gas produced is not in demand by local industries and the regenerative oven built in localities where the surplus gas can be sold. Coals not available in the beehive ovens can be coked in the by¬ product ovens and specific grades of coke can be produced by skilful mixing of different kinds of coal. The yield of coke in a by-product oven is commonly 75.3 per cent of the coal consumed as against 64.7 per cent in the beehive oven. If the larger yield had been obtained for the coal coked in the beehive ovens also, the coun¬ try would have been the richer by 4,253,218 tons of coal, wholly wasted in the beehive process, to say nothing of the value of the by¬ products recovered. The coal consumed in the by-product ovens is a mixture of high volatile or gas coal — from Kentucky, the Kanawha or Fairmont districts of West Virginia or from southwestern Pennsylvania — with the low vola¬ tile or smokeless coal from the Pocahontas and New River fields of West Virginia, or from central Pennsylvania. It is not uncommon to find West Virginia coal at the coke ovens of Wisconsin and Minnesota. A representative plant of 100 ovens has been selected for de¬ scription as applying the principles underlying by-product oven practice to-day in the United States.

The ovens are arranged in two groups or batteries of 50 ovens each. Each oven is an air tight retort, consisting of a rectangular chamber 43 feet 6 inches long, 17 inches wide and 6 feet 6 inches high. The ovens are placed side by side and are supported on a steel struc¬ ture, consisting of light I-beams, running the length of the battery, which rest on cross gir¬ ders supported by steel columns. The construc¬ tion allows the brick work to be inspected at all points. The primary object, however, is the uniform distribution of fuel gas to the com¬ bustion chambers for heating the oven retorts. The retorts are separated by hollow walls, which are divided into 10 compartments, each compartment containing four, preferably vertical, flues. Alongside this chamber, and directly un¬ der the vertical flues, are 10 combustion cham¬ bers. The gas supply to each of the chambers is controlled independently, and a uniform heat is maintained throughout the entire length of the oven. The air for combustion is admitted through an opening in the wall between the air and combustion chambers. The air is heated to 1800° F. by a pair of regenerators, placed together under the centre of the battery and running its entire length. A vertical flue conducts the air from the regenerator to the air-chamber under the oven.

The well-known Siemens principle is used in operating the air generators, with reversals every 30 minutes. The fuel gas is reversed at the same time as the air by means of a suitable

valve; but the gas is not regenerated. The gas unites with the hot air in five combustion cham¬ bers, ascends through the vertical flues to a horizontal flue above, through which it passes and descends through the five chambers in the other end of the oven, thence through the air chamber and vertical flue connection to the regenerator, and through the reversing valves to the stack. The regenerators are built entirely independent of the oven structure, so that their expansion does not affect the oven brickwork.

Coal Handling. — A steel coal storage bin of a capacily equivalent to about two days' coal consumption is placed between the batteries. The coal is elevated to the bin from a hopper placed under the coal receiving track, by a belt or other type of conveyor. A coal larry of eight tons' capacity runs on a track on the top of the batteries and under the coal bin. The larry consists of a long narrow bin with eight spouts in the bottom through which the coal is run into the oven retort through holes in the top of it and is leveled by means of a bar worked through a small opening in the doors at the ends of the oven. The larry is operated by an electric motor and receives its load of coal from the storage bin, under which it passes. A very dense metallurgical coke can be produced, and the output of an oven largely increased by com¬ pressing the coal into a mold slightly smaller than the retort and charging the mass through the oven door.

Coke Handling. — Upon the completion of the coking process, the oven doors are raised and the mass of six tons of coke is pushed upon a movable platform by means of a ram. The pushing ram, as well as the machine on which it is mounted, are operated by electric motors. The coke after being pushed upon the platform is quenched with a spray of water and allowed to cool. The platform is then tilted by an elec¬ tric motor, and the coke slides off into cars, which run on a track at the back of the machine. At some ovens the coke is discharged into cars and there quenched, or the cars are run off to a quenching station.

Gas Mains. — The gas distilled from the coal during the coking process is conducted to the condensing house by two independent sys¬ tems of mains. These mains run on top of the battery the entire length — one on each side. Each oven is connected to each main by a vertical pipe and valve. During the first part of the process, the rich gas is taken off through the rich gas main. The valve to this main is then closed and the balance of the gas is taken off through the poor gas main. When the cok¬ ing is completed, the valve to the poor gas main is closed, disconnecting the oven from both mains.

Condensing Plant. — The gas leaving the coke ovens is divided into two fractions, viz., the first fraction of ((rich):> gas, which is sent out as illuminating gas, and the second fraction or ((poor® gas, which is used for heating the ovens. The cooling of the gas and the removal of the tar and ammonia are done in the usual apparatus, hence it is not necessary to discuss it here in detail. Both the rich and poor gases are treated in the same manner.

The rich gas when freed of tar and ammonia leaves the condensing plant and passes into the purifying plant, and from there into a large gas holder for illuminating gas, from which it goes

into the city. The poor gas, after being treated in the same manner as the rich gas, leaves the ammonia washers and passes through two ben¬ zol scrubbers. Here it is mixed with producer gas, when necessary, and carried to the ovens for heating.

The tar oil by which the gas is washed runs first from a tank through the second benzol scrubber into another tank. From here it is supplied by a pump into the first benzol scrub¬ ber. The tar-oil enters the tank with about 5 per cent of benzol, and finally leaves the washer with about 15 per cent of benzol. It is col¬ lected in another tank. From here it is fed by a pump into a still, in which the benzol is re¬ duced again to about 5 per cent. The exhausted oil collects in another tank. From here it is taken by a pump through the oil cooler in order to be again supplied to a tank for a new ab¬ sorption of benzol.

A small additional plant is needed, by which a small percentage of the oil is revivified, in order to keep it active for benzol absorption. This consists of a simple tar still and con¬ denser, in which the tar-oil is freed from most of the napthaline and other hydrocarbons in¬ cidentally absorbed. The presence of an exces¬ sive percentage of them in the tar-oil would in¬ terfere with a complete benzol absorption. It is unnecessary to describe here the details of the benzol distilling plant. A great number of these are in operation in connection with German by¬ product plants.

Coke Oven Brick. — Under construction the principal feature of an oven is in the brick used. What is termed silica brick is now being used, and probably will be the standard coke oven brick of the future. It has been deter¬ mined that the fusing point of a silica-alu¬ mina brick reaches the lowest temperature at 60 per cent silica and 40 per cent alumina, but if the silica is increased up to say 90 per cent, an infusible brick of the highest quality is the result.

For all classes of work, a good high grade plastic No. 2 fire clay, with possibly a small amount of flint clay, should be used. This will make a creamy, sticky slip, which wall make an excellent joint. The joints are always weak spots, and are therefore a necessary evil. The brick should always be dipped into the mortar, which should be of the consistency of cream, and rubbed on each other to make a good tight contact.

Coking Coals. — There are three principal coal area sections in the United States supply¬ ing good coking coal. The Connellsville section m Pennsylvania was the first developed, and it is reported that this supply is fast disappearing. The second section is that of the Pocahontas field in West Virginia, and the third is in Colo¬ rado. As the good coking coal fields disappear, so will the by-product ovens come into use, for it is possible to coke a coal in a by-product oven that it is practically impossible to coke in the beehive type.

Production. — In 1915, according to the re¬ port of the United States Geological Survey, there were in the United States in active opera¬ tion 48,985 coke ovens of the beehive type and 5,982 by-product ovens. There were also 44,125 beehive ovens and 286 by-product ovens idle; and 557 beehive and 1,191 by-product ovens building. During the year 1,563 ovens were

abandoned. The quantity of coke produced in that year was 41,581,150 tons, valued at $105,- 503,868, about the usual average production, but an increase of about 20 per cent over the low production of 1914. The beehive ovens con¬ sumed 42,278,516 tons of coal, producing 27,- 508,225 tons of coke, valued at $56,945,543, an average value of $2.07 per ton. The by-product ovens consumed 19,554,382 tons of coal, produc¬ ing 14,072,895 tons of coke, valued at $48,558,325, an average value of $3.45 per ton.

Among the coke-making States Pennsylvania ranked first, producing 22,530,567 tons of bee¬ hive coke, and 4,301,726 tons of by-product coke. Virginia ranked second in the production of beehive coke, with 1,250,235 tons, followed by Alabama with 1,001,479 tons. Indiana was sec¬ ond in by-product coke, with 2,768,099 tons and followed by Alabama with 2,070,334 tons and Illinois with 1,686,998 tons.

About two-thirds of the entire output of coke in the United States is made in Pennsylvania, and 72 per cent of the Pennsylvania output is made in the Connellsville district, with its upper and lower extensions. In Connellsville in 1915 there were 21,343 ovens active; in Lower Connellsville, 16,037 ovens ; and in Upper Con¬ nellsville, 2,552 ovens; and 605 more were under construction.

The value of the by-products of the coke industry in 1915 was $29,824,579, an increase of more than $12,000,000 over the previous high record mark of 1914. The greater part of this increase was in benzol and benzol products, which in 1914 were valued at $997,007, and in 1915 at over $7,000,000. Previous to 1914 the demand for these products had been small and the prices low, the market being supplied almost wholly

by the coke ovens of Germany. But the shutting off of this source by the war created an imperative demand at almost any price for the raw material for dyestuffs and high explosives, the products of the distilla¬ tion of coal, and the by-product coke ovens be¬ came of unwonted importance. Among the more valuable by-products of the coke industry in 1915 may be mentioned the following: Gas, illuminating and fuel, 213,667,614,000 cubic feet, valued at $8,624,899 ; ammonia, anhydrous and liquor, a value of $9,867,475 ; tar, 138,414,601 gallons, valued at $3,568,384; benzol, 2,516,483 gallons, valued at $1,428,323; toluol, 623,506 gallons, valued at $1,529,803 ; crude light oils, 13,082,678 gallons, valued at $4,304,281. The yield of coke in the different plants ranged from 1,340 to 1,550 pounds per ton of coal con¬ sumed, and the tar production ranged from 5.5 to 13 gallons per ton. The recovery of ammonia reckoned as anhydrous was from 4.33 to 6 pounds per ton, equivalent to from 13.5 to 25 pounds of ammonia sulphate.

Consumption. — The consumption of coke in the United States in 1915 amounted to 40,394,445 tons, of which 53,222 tons were imported, and the remainder of domestic origin. About 36,- 700,000 tons (91 per cent) were used in blast furnaces; 1,665,000 tons (4 per cent) in foundries; and 1,974,000 tons (5 per cent) for domestic purposes. The exports of coke for 1915 amounted to 895,509 tons, of which about 74 per cent went to Canada and 18 per cent to Mexico.

Bibliography. — Byrom, T. H., and Chris¬ topher, J. E-, (Modern Coking Practice) (Lon-

don 1910) ; Fulton, J., (A Treatise on the Manufacture of Coke) (Scranton 1905) ; Gas Machinery Company, (By-product Coke Ovens > (Cleveland, Ohio, 1915) ; Lewes, V. B., (The Carbonization of CoaF (London 1912) ; Wagner, F. H., (Coal and Coke) (New York 1916) ; United States Bureau of Mines Tech¬ nological Papers 8 "Methods of Analyzing Coke" and 50 "Metallurgical Coke" (1912-13) ; United States Geological Survey, "Mineral Re¬ sources of the United States, 1915® (Wash¬ ington 1917).

COKE OVEN GAS ENGINE. See In¬

ternal Combustion Engine.

COLA, a genus of trees of the family Sterculiacece, consisting of about 40 species, natives of tropical Africa. One species is ex¬ tensively grown in the tropics for the cola- nuts, which are said to sustain the African natives in

feats of endurance. They are im¬ ported into the United States for use in medical preparations and in summer drinks.

COLA-NUT, the seed of a tree (Cola acuminata) from 20 to 30 feet in height, be¬ longing to the natural order (Sterculiacecz) , whose habitat is a region of West Africa stretch¬ ing 500 miles from the coast into the interior, between Sierra Leone and Lower Guinea. The tree has become naturalized in the West Indies and Brazil. It bears a profusion of purplish flowers. The flower yields a large brownish- yellow fruit, which enfolds in the same follicle the red and white seeds called cola-nuts. In its tenth year the tree reaches its greatest fecundity, and then yields 120 pounds of seeds. They are gathered in October and November from a June flowering, and again in May and June from a December flowering. In the tropics the natives use the cola-nut as a stimulant and for medic¬ inal purposes, and only recently has the nut passed from the narrow use of the aborigines into an extensive service of civilized man. An analysis of it shows that it contains nearly all the constituents of coffee, tea and cocoa, and other constituents not possessed by them.

COLBERG, or KOLBERG, Prussia, sea¬ port and watering-place in the province of Pomerania, on the Persante, near its mouth, 170 miles north-northeast of Berlin. It stands on a hill, surrounded with three suburbs. The principal church dates from 1316. Colberg had its origin in an old Slav fortress. It received municipal rights in 1255 and joined the Hanse¬ atic league in 1284. The town hall was built by Zwirner, the architect of the Cologne Cathedral. It has a gymnasium, a school of navigation, and new government buildings. In 1102 Duke Boles- lairs of Poland vainly besieged Colberg, which endured long sieges in the Thirty Years' War, in the Seven Years' War, and again in 1807, wheli it was most gallantly defended against the French. Colberg has a well-protected harbor at its suburb of Munde, which is a favorite sea¬ bathing resort. Its industries include iron foundries, machine works, and it also makes pharmaceutical preparations, lumber and tobacco. Its former strong fortifications have been demolished.

COLBERT, koKbar, Jean Baptiste, French statesman and financier : b. Rheims, 29 Aug. 1619; d. Paris, 6 Sept. 1683. He entered in K4Q the service of Cardinal Majzarin, who

availed himself of his assistance in the financial administration of the kingdom. Mazarin re¬ warded him in 1654 with the office of secretary to the queen, and recommended him to the king at his death in 1660. Louis XIV made Colbert comptroller-general of finances. His task was to remedy the evils which the feeble and stormy reign of Louis XIII, the splendid but arbitrary measures of Richelieu, the troubles of the Fronde and the confused state of the finances under Mazarin had occasioned. He found fraud, disorder and corruption prevailing every¬ where. Burdens, privileges

and exemptions were multiplied without measure ; the state was the prey of the farmers-general of the state revenues and at the same time maintained only bv their aid. The revenues were anticipated for two years, and the treasury empty. He be¬ gan with establishing a council of finances and a chamber of justice. For the purpose of alleviating the public burdens he endeavored to lower the interest of the public debt; and in order to mitigate the odium of this measure consented to a considerable diminution of the taxes, and the remission of all arrears up to 1656. He abolished many useless offices, re¬ tracted burdensome privileges, diminished sal¬ aries, and by a better distribution and collection of the taxes was able to reduce them almost one-half. Notwithstanding the expenses of nearly 10 years' war, and the prodigality of a luxurious king, Colbert succeeded in 22 years in adding to the revenues more than 28,000,000 livres, and making an equal diminution in the public burdens. At his death in 1683 the rev¬ enue actually received amounted to 116,000,000 livres. To his talents, activity and broad views the development and rapid progress of industry and commerce in France were largely due. He constructed the Canal of Languedoc ; formed the plan of that of Burgundy; granted premiums on goods exported and imported ; regulated tolls ; established insurance offices and made uniform laws for the regulation of commerce. He was appointed Minister of Marine in 1669. Under his administration naval schools were estab¬ lished, and order was introduced into all branches of the marine. He was the creator of the French navy, to which he added, in three years, a fleet of over 100 vessels, among which were 60 ships of the line and 40 frigates. By the advice of Colbert Louis XIV caused the civil and criminal legislation to be improved, and the arts and sciences encouraged. Under the protection and in the house of the Minister (1663) the Academy of Inscriptions was founded. Three years afterward he founded the Academy of Sciences, and in 1671 the Academy of Architecture. The Academy of Painting received a new organization. He en¬ larged the Royal Library and the Garden of Plants, and built an observatory in which he employed Huyghens and Cassini. He began the measurements of the meridian in France, and sent men of science to Cayenne. After hav¬ ing conferred the greatest benefits on his coun¬ try he died, out of favor with the king, and dreading the exhaustion of the treasury by the new war Louis was resolved upon making against Holland. Consult Gourdautt, (Colbert, Ministre de Louis XIV. >

COLBORNE, Sir John, English soldier and administrator: b. 1778; d. 1863. He was educated at Christ's Hospital and Winchester

College, entered the army in 1794, was present at the battle of Corunna

and saw service under Wellington in the Peninsula and at Waterloo. From 1828-35 he was lieutenant-governor of Upper Canada, and founded Upper Canada Col¬ lege. His endowment of the Crown rectories was regarded by Durham as a predisposing cause of the Rebellion of 1837. He was created Lord Seaton in 1839, and was subsequently governor of the Ionian Islands, and com- mander-in-chief in Ireland.

COLBURN, kdl'bern, Warren, American mathematician : b. Dedham, Mass., 1 March 1793; d. Lowell, Mass., 13 Sept. 1833. He at first worked at a machinist's trade, but de¬ veloped a taste for mathematics, and was graduated at Harvard (1820). He devised im¬ portant improvements in machinery, and for many years was a popular lecturer on the sciences. He is best known for his (First Les¬ sons in Intellectual Arithmetic' (Boston 1821) which he had planned while a student at Har¬ vard. He also published a (Sequel' to the arithmetic (rev. ed., 1833), and an (Algebra'

(1827).

COLBURN, Zerah, American engineer : b. Saratoga, N. Y., 1832; d. Massachusetts, 4 May 1870. In 1854, he started in New York, the Railroad Advocate. He visited Europe in 1857, and in 1858 began writing for the London Engineer, of which he shortly became editor. He began the publication of Engineering in London 1866 but in 1870 he returned to the United States, where he finally committed sui¬ cide. He wrote (The Locomotive Engine) (1851), and a number of valuable technical papers.

COLBY, Bainbridge, American lawyer and statesman : b. St. Louis, Mo., 22 Dec. 1869. He was graduated from Williams College in 1890 and from Columbia Law School in 1891. In 1892 he began the practice of law in New York City and soon attained eminence. He served as a member of the New York assembly in 1901 — 02. In 1912 he actively identified himself with Theodore Roosevelt's Presidential candidacy and conducted the contests to seat Roosevelt delegates in the Republican National Convention held in Chicago. After Mr. Roosevelt's defeat Mr. Colby assisted in founding the Progressive National Party which nominated Mr. Roosevelt for President at a convention held in Chicago to which Mr. Colby was a delegate. Mr. Colby was twice the candidate of the Progressive Party in New York for United States Senator, 1914—16. In 1917 he was appointed a member of the United States Shipping Board and later a mem¬ ber of the Emergency Fleet Corporation. On 25 Feb. 1920 he was nominated Secretary of State by President Wilson and served in that capacity until 4 March 1921. While a member of the Wilson Cabinet Mr. Colby, in several notes, out¬ lined in strong terms the foreign policy of the United States with respect especially to the mandates over former German colonies.

COLBY, Charles William, Canadian ed¬ ucationalist and author: b.

Stanstead, Quebec province, 25 March 1867. He was educated at Stanstead College, McGill University (gradu¬ ated 1887) and Harvard University. He was lecturer in English language and history at McGill University 1893-95, and was Kingsford professor of history 1895-1910, He is the

author of (Sources of History' (1899); rCa- nadian Types of the Old Regime' (1908) ; 'The Fighting Governor' (1916), etc.

COLBY, Everett, American public official : b. Milwaukee, Wis., 1874. He was graduated at Brown University in 1897 and was admitted to the New York bar in 1899. In 1903-05 he was a member of the New Jersey House of Assembly and in 1906-09 was a member of the Senate, despite the opposition of the (

COLBY, Frank Moore, American writer: b. Washington, D. C, 10 Feb. 1865. He was graduated at Columbia University 1888, and took graduate studies in political science there. He taught history at Amherst College 1890-91 ; was lecturer in history at Columbia 1891-95 ; professor of economics in New York Univer¬ sity 1895-1900, when he became an editorial writer on the Commercial Advertiser. He has done a large amount of editorial work on John¬ son's Cyclopaedia' ; the (International Cyclo¬ paedia,' and (International Year Book,' editing the latter from its foundation in 1898, until 1902, and editor of the (New International Year Book' since 1907, and was one of the editors of the first edition of the

naval officer: b. New Bedford, Mass., 28 Jan. 1846. He was graduated at the United States Naval Academy in 1867. He was promoted through various grades to captain in 1902 ; served on the DakotaJi during the Civil War and was commander of the Hannibal and the second district coast defense, also selecting proper vessels for the government to purchase during the Spanish-American War. He was re¬ tired with the rank of rear-admiral, 28 Jan. 1908. He was executive officer of the yacht America in the race for the Queen's Cup with the Cam¬ bria and other yachts.

COLBY, Thomas Frederick, # English en¬ gineer: b. 1784; d. 1852. He is tne inventor of the Compensation bar" used in base measure¬ ments. For over 45 years he was connected with the British Ordnance Survey. In 1824 he planned and for 22 years thereafter supervised the survey of Ireland. Consult Portlock, Me¬ moirs of the Life of General Colby' (London

1869).

COLBY COLLEGE, coeducational institu¬ tion in Waterville, Me. ; founded in 1818, under the auspices of the Baptist Church. It was chartered by the legislature of Massachusetts in 1813 and was known as (

to the college amounted to $200,000. The name was changed to Colby College in 1899. The principal college buildings* include Memorial Hall, Champlin Hall, Foss Hall, North College and South College. It offers courses leading to the B.A. degree, without requiring Greek for entrance, and courses leading to the B.S. degree. Men and women are admitted on equal terms and pursue the same studies. After the first year's work, the courses are nearly all elective. The average number of students, each year, is 425. In the library are 50,000 bound volumes and about 21,000 pamphlets. The col¬ lege is endowed about $600,000, and the property is valued at $500,000.

COLCHAGUA, kol-cha'gwa, Chile, a prov¬ ince bounded on the north by the provinces of Santiago and O'Higgins, south by the province of Curico, on the east by Argentina and west by the Pacific. It has an area of 3,851 square miles. The Andes traverse its eastern part while the coast range crosses its eastern half. The section between the two ranges is of great fertility, is well watered and well cultivated. Cattle raising is the principal industry. Corn, wheat, oats and beans are raised also in great quantities. The region is served by the Santi- ago-Valdivia Railway. The population in 1914 was 159,930, or 41.53 to the square mile. The capital is San

Fernando.

COLCHESTER, kol'ches-ter, England, parliamentary and municipal borough and river port of Essex, on the Colne, 52 miles northeast of London by rail. It is partially encircled by a wall built during the Roman period, and among relics of the past it contains a castle whose enormously thick walls date from the time of William Rufus, a picturesque, ivy- grown ruin of Saint Botolph's priory, while in the church of the Holy Trinity is a Saxon doorway. The most important modern struc¬ ture is the spacious and handsome town hall, completed in 1902. Colchester was known to the early Britons and the Romans as Camu- lodunum, and to the Saxons as Colneceaster. It has a large oyster-fishing trade, exports of corn and malt, iron manufactures, and boot and shoe factories. It is the headquarters of a mili¬ tary district, with cavalry and artillery bar¬ racks. In 1648 Colchester stood a memorable siege of 11 weeks against the Parliamentary forces, who eventually starved out the Royalist garrison and hung the leaders. The borough returns a member to the House of Commons. Pop. 43,452. Consult Cutts, (Colchester > in (Historic Town Series) (1889).

COLCHESTER, Vt., town in Chittenden County, comprising the village of Winooski, two miles from Burlington, on the Central Vermont Railroad. It contains a public library and has cotton and woolen mills, machine shops, brick works, a butter factory, lumber and cider mills and screen works. Pop. 6,450.

COLCHICINE, a vegetable alkaloid ob¬ tained from plants of the genus Colchicum (principally from the roots and seeds) by suc¬ cessive extraction with hot alcohol, water and chloroform, and subsequent repeated crystalli¬ zation from all three of these solvents. It is a yellowish-white powder, with the probable formula GˆHasNOa, or CisH«. (OCHs)3.NH COCH;..COOCH3. It acts as a weak base, but

most of its compounds are decomposed by water. Preparations of colchicine are used in medicine for the treatment of gout. It is very actively poisonous, half a grain having proved fatal. It causes gastro-intestinal inflammation. No ade¬ quate antidote is known.

COLCHICUM, kbl'chi-kum, a genus of herbs of the family Liliacece. About 30 species, natives of the Mediterranean region, have been described. They are nearly all autumn-bloom¬ ing perennial plants which produce their leaves in spring from corms. The perianth, which re¬ sembles but is much larger than that of the crocus, is long and tubular, and varies in color from white to purple (in one species yellow). The leaves, which are broad and long in propor¬ tion to the size of the plants, die in early sum¬ mer, and the flowers appear when nature is preparing for the winter. For this reason the autumn-blooming species are very popular in gardens. They are of

easiest culture, the bulbs being planted in late summer and protected in severe climates with a winter mulch of litter or straw, which is removed in the spring. Beds once planted will need no further attention for several years, when they should be dug up, the corms divided and set in fresh soil in a sunny situation. The plants of some species are very acrid and are reputed poisonous, and when cattle have access to them are said to produce injuries of various kinds. The corms and the seeds have been used in medicine for gout and rheumatism. C. autumnale , the best-known species, is popularly known as meadow saffron and autumn crocus, names also given to other species.

In medicine the corm and seeds of Colchicum autumnale are used. Colchicum has in medicine but one use ; that is, in attacks of acute gout. These it cuts short, relieving the pain and short¬ ening the attack better than any other drug The reasons for this are at present unknown, and the remedy is one of the few now remaining in modern medicine that are still used on em¬ pirical grounds only. Poisoning by this drug is not uncommon. The symptoms are those ol an acrid gastro-enteric poison, with great pain, nausea, vomiting and diarrhoea. There is marked depression of the pulse and of the respiration, and death is due to shock and collapse. Wash¬ ing of the stomach is the first indication for treatment, notwithstanding the self-conserva¬ tive vomiting. Castor oil, heat, alcohol and mucilaginous drinks are indicated.

COLCHIS, kol'kis, or COLCHOS, the an¬ cient name of a region at the eastern extremity of the Black Sea, resting on the Caucasus, and corresponding more or less to the Russian province of Kutais. It is famous in Greek mythology as being the destination of the Argonauts. The people were celebrated for frugality and industry, and from their dark complexion, crispy hair, language and customs, Herodotus is of opinion that they were of Egyptian origin. The country abounded, ac¬ cording to Strabo, in all kinds of fruits and ma¬ terial for shipbuilding. Linen was an import¬ ant branch of manufacture, and wool of fine quality and in great quantity was produced. It was fruitful in poisonous herbs. In the .1 5th century it was subdivided into several principali¬ ties, and is now comprised in the Russian gov¬ ernment of Trans-Caucasus,

COLCOTHAR, red oxide of iron, ferric oxide, Fe203. The reddish-brown powder that remains in the retorts when ferrous sulphate is distilled in the manufacture of Nordhausen sul¬ phuric acid. It is used for polishing glass, and also as a pigment, under the name of ˆIndian red.® When in the finest state of subdivision it is known as ((rouge,® and is much used for fine

polishing by jewelers and others. Colcothar was the caput mortuum vitrioli of the alchemists.

COLD. 1. In physics and physiology, a relative want of heat. Since there are no deter¬ minate boundaries between cold and heat, it is a mere arbitrary distinction to call the degrees of the thermometer below the freezing-point de¬ grees of cold. When the atmosphere, or any substance which comes in contact with the body, is at a lower temperature than the skin, it absorbs heat from the body, and is called cold. The physiological action of cold on the animal organism requires a brief notice. All animals (the warm-blooded animals to the greatest extent) have a certain power of main¬ taining the heat of the body in defiance of ex¬ ternal cold. This power is mainly due to a process analogous to combustion, in which car¬ bon and hydrogen taken into the system in food are made to unite with oxygen derived from the air by respiration. If the combustible materials are not duly furnished, or if the supply of oxygen be deficient (as in various diseased conditions), there must be a depression of temperature. Now, if the temperature of a bird or mammal (except in the case of hibernat¬ ing animals) be lowered about 30° below its normal standard (which in birds ranges from 100° to 112°, and in mammals from 96° to 102°), the death of the animal is the result. The symptoms indicating that an animal or a man is suffering from a depression of the tem¬ perature of the body are : (1) Retardation of the circulation of the blood, causing lividity of the skin, which is followed by pallor, in consequence of the blood being almost entirely driven from the surface through the contracting of the ves¬ sels ; (2) a peculiar torpor of the muscular and nervous systems at the same time, manifesting itself in an indisposition to make any effort or exertion, and in intense sleepiness. The respiratory movements become slower and the loss of heat goes on, therefore, with increasing rapidity, till the fatal limit is reached and death supervenes. In hibernating animals (the mar¬ mot dormouse, bat, etc.) the power of generat¬ ing heat within their own bodies is very slight, their temperature following that of the external air, so that it may be brought down nearly to the freezing-point. Great or prolonged atmos¬ pheric cold is a most powerful depressing agent, and is a fruitful cause of disease and even of death. Whenever the temperature of the atmosphere is suddenly reduced, and par¬ ticularly when it is reduced below the freezing- point, a considerable addition takes place to the mortality of the region. The effects of cold are, in ordinary circumstances, most apparent among the aged and the very young, and among those suffering from chronic disease.

2. In medicine, cold, as well as heat, is fre¬ quently employed for its therapeutic value. Cold is one of the most valuable means of ob¬ taining lowered temperature. Cold sponging, ice-packs, alcohol evaporation, arc useful in

most fevers, are indispensable in sunstroke and very refreshing in minor indispositions. Cold applied to an ififlamed area diminishes the blood-tension by contracting the blood vessels, and thus tends to limit inflammation. Cold ap¬ plied to the skin, as by a wet pack, or as a shower, is a tonic, increasing metabolism, aug¬ menting the appetite and giving mental and physical vigor. Cold applied as 'iced drinks, or cracked ice itself, is one of the best agents in nausea and gastric distress. Cold by means of ether or ethyl chloride spray is an excellent local anaesthetic for the treatment of local boils, felons, ulcers, etc., and is also used frequently in the extraction of teeth.

Catching cold is a term of wide popular use, and signifies an affection which is little treated of in medical literature, although an affection widespread and unpleasant. Catching cold is a process of disturbed equilibrium of the blood vessels. It is usually due to excessive evapora¬ tion from the skin caused by drafts of air, to which is added contraction of the blood vessels of the periphery of the body, with consequent engorgement and congestion in some internal organ. Keeping quiet, taking hot foot-baths, or hot drinks, sweating, etc., are measures that tend to bring the blood to the contracted areas, and away from the congested areas, with consequent good results. If, however, the disturbance be¬ comes marked, if the exposure has been exces¬ sive, the congestion in an area becomes so seri¬ ous that its local functions are diminished or aborted, and the congested blood vessels may be over-distended and paralysis result. Then an inflammatory reaction may ensue ; the reduced vitality of the part encourages the multiplica¬ tion of the ever-ready bacteria, and an acute diseased process may result. It may be a simple acute inflammation of the kidney; or if the pneumococcus is present in the lung, a pneu¬ monia; or it may be a bronchitis. Taking cold is therefore a distinct process that predisposes to more severe affections. In most cases the secondary reaction of taking cold manifests itself in the mucous membrane of the air- passages, and running from the nose, some de¬ gree of cough, general malaise, languor and muscular and joint pains are the results. Sec¬ ondary infection, frequently through the super¬ imposed influenza bacillus (if the condition be not primarily induced by that organism) results in the ((grippe,® following which bronchitis and pneumonia are very frequent.

No cold in the head, no general cold should be neglected. Rest in bed, cathartics, hot drinks and medical advice are desirable.

For cold in physics, see Heat; Thermody¬ namics ; Gas, Liquefied.

COLD CREAM, a cooling ointment made according to various recipes, one of which consists in melting four ounces of white wax in one pound of almond oil by means of a gentle heat, mixing gradually with a pint of rose-water in a warm mortar. Another recipe is: Take two parts of spermaceti,

two parts of white wax and three parts of almond oil ; melt together, and then add rose-water as before. This ointment cools the skin, rendering it soft and pliable, and is successfully applied for the cure of chapped hands.

COLD HARBOR, Battle of. One of the

most desperate battles of the Civil War, fought

1 and 3 June 1864, at Cold Harbor, Va. By a series of bloody assaults and flank movements, beginning at the Wilderness 5 May 1864, Gen¬ eral Grant had, at the end of the month, forced General Lee back to within a few miles of Richmond, and confronted him on the line of the Totopotomoy. On 31 May his army was along the road from near Hanover Court House to Cold Harbor; the Sixth corps about six miles southeast of the courthouse; to its left, in the order named, the Second, Ninth and Fifth corps, these near Bethesda Church. The Eigh¬ teenth corps was at White House, on the Pamunkey, where it had just arrived from the Army of the James. Gen. J. H. Wilson's cavalry division was on the right of Grant's line, and Sheridan, with the two cavalry di¬ visions of Torbert and Gregg, on the left. On the 31st Sheridan, after a severe fight, occu¬ pied Cold Harbor, but was so hard pressed by the Confederate cavalry division of Fitzhugh Lee and Clingman's brigade of infantry, and his position so exposed, that he fell back at night; but receiving an order from General Meade that the place must be held at all hazards, he returned, and entrenched during the night. Lee's position was so difficult of access that Grant determined again to extend by his left on Lee's right, and in view of this extension, Cold Harbor was an important point, as there the roads concentrated from Bethesda Church, Old Church, White House, New Bridge and all the bridges across the Chickahominy above and be¬ low New Bridge. Grant extended in that direc¬ tion by transferring from his right. At 11.45 on the night of 31 May, Gen. H. G. Wright's Sixth corps was ordered from its position on the right to march along the rear of the army to Cold Harbor, 15 miles distant, and to be there by daylight on 1 June to support Sheridan, who, it was believed, would be heavily attacked at daybreak; but it was nine o'clock before he arrived, and Sheridan meanwhile had repulsed two determined attacks of Kershaw's division. At 3 p.m. 31 May the Eighteenth corps, Gen. W. F. Smith, was ordered by General Grant to march from White House and form on the right of the Sixth. By a mistake in the order given it, it was late in the afternoon of 1 June when it reached its position. Opposing the two corps were the Confederate divisions of Gen¬ erals Hoke, Kershaw, Pickett and Field, their main entrenched line about 1,400 yards distant; the interval between mostly open ground. About 300 to 400 yards in advance of the main line was a line of rifle-'pits. It was necessary to take this position before General Lee could concentrate on that flank and thus cover this road to Richmond. Between 5 and 6 p.m. Wright and Smith assaulted, and under heavy artillery and musketry fire Smith carried the advanced Confederate works and held them, taking many prisoners. Wright carried the advanced line and, breaking the left of Hoke and right of Kershaw, took parts of the main line, some of which he held, the Confederates falling back to a new line. The loss in the two assaulting corps was about 2,200. On the night of the 1st Sheridan had been ordered to attack on Wright's left, but received the

order too late to execute it. On the morning of the 2d he advanced Gregg's division to Sumner's Bridge, on the Chickahominy, attacked a force of infantry, cavalry and artillery, posted near

the bridge, carried their advanced position, and held it until Hancock's corps arrived. Han¬ cock's Second corps moved after dark of the 1st from the extreme right, under Meade's order to march with all speed, join Wright by day¬ break of the 2d, and take position on his left, extending the line if possible to the Chicka¬ hominy. By an error of Hancock's engineer a wrong road was taken, and it was after seven o'clock when his head of column arrived. Then under heavy skirmishing he formed line across the road from Cold Harbor to Dispatch Station. It had been the intention to attack the Con¬ federate line early in the morning. Smith de¬ clared that the idea <(was simply preposterous.ˆ Hancock's men were in an exhausted condition, and the attack was suspended until 5 p.m., and then deferred until 4:30 a.m. 3 June. At this time Grant's line was held on the right by Gen. J. H. Wilson's cavalry from the Pamunkey to Bethesda Church. Warren's Fifth corps, which had not moved, stretched from Bethesda Church about three miles to Beulah Church. Burnside's Ninth corps had been ordered to withdraw from the extreme right and form in Warren's rear to support his right. The Eighteenth corps was on the left of the Fifth, a wide interval between them ; the Sixth and Second corps were on the left of the Eighteenth. Lee had observed that Grant was transferring the right of his army, by successive movements, to the left, and not proposing that Grant should take the initiative in attack, took it himself. On the morning of 2 June he ordered Early with three divisions to attack Grant's right flank and drive it down in front of the Confederate line. Early found Burnside in the act of withdrawing from near Sydnor's Mill, to take position in Warren's rear, attacked and captured the skirmish line, which had been left in the works, and fell upon his rear division, by which, with the assistance of the other divisions, Early was checked, but not before he had got in the rear of a part of Warren's skirmish line, from which he took •many prisoners. Warren repulsed Rode's di¬ vision, which had attacked his front, and at night both sides entrenched. The Union losses 1 and 2 June were over 5,000 killed and wounded. Meanwhile Lee closed in to the right and formed his lines in front of Grant's left, his right on the Chickahominv, near Alexander's Bridge, his left extending a little west of north in the direction of the Totopotomoy. A. P. Hill's corps was on the right ; Longstreet's, com¬ manded by R. H. Anderson, in the centre ; and Early's on the left, cavalry covering both flanks of the infantry. The line included the ground on which was fought the battle of Gaines' Mill, June 1862, and covered all the main roads to Richmond, being about six miles from the main exterior fortifications of the city and but half that distance from its most advanced works. Grant's whole line, except the cavalry on the left, was ordered to assault Lee's lines at 4.30 a.m. 3 June. Wilson,

reinforced by 2,000 cav¬ alry and 3,000 infantry, was ordered from Han¬ over Court House to Hawes' Shop to attack Early's left and rear. The main work was to be done by the Second, Sixth and Eighteenth corps, supported by the Fifth and Ninth. No recon¬ naissance had been made in front, where the Confederate works were so constructed as to give a cross-fire upon assaulting columns. At the signal the assault was made at 4.30 a.m.

On the left Barlow's and Gibbons' divisions of the Second corps leaped their works and, under a severe fire of artillery and musketry, drove in the enemy's advanced line and, in many places, gained the main line, but the latter was. soon retaken and, in 20 minutes from the time the signal was given, the Second corps was repulsed with a loss of 3,000 men, including many of its most promising officers, who were killed on the works. The men did not retreat far, but lay down within a few yards of the Confederate works, and with bayonets, tin cups and plates, began to entrench, skirmishing all the while. It fared no better with the Sixth corps. Its three divisions went forward, carried some advanced rifle-pits, assaulted the main line, and were met by a severe musketry fire and an enfilading artillery fire. They were repulsed with a loss of 800 killed and wounded, but gained positions at some points only 30 or 40 yards from the enemy's works, and held and entrenched them. On the right of the Sixth corps, the Eighteenth was obliged to form one division to the right to protect its flank. Martindale's and Brooks' divisions assaulted and were quickly driven back by a cross-fire of artillery and musketry, and desisted from further effort after a loss of about 1,000 men. In less than an hour the three corps had lost nearly 5,000 in killed and wounded. Warren, on the right, reported that he could not advance unless the troops on his left advanced at the same time. Wright said that if he advanced without a corresponding advance of Smith on his right he would be taken in flank and reverse, and he was waiting for Smith and Hancock to move, and Smith said he could not move unless Wright covered his left flank. General Meade ordered another assault, each corps to go forward without re¬ gard to those on the right or left, but it was not made, Hancock would not take the re¬ sponsibility. Smith had all he could do in hold¬ ing his own; Wright, also Hancock, merely transmitted the order to brigade and regimental commanders without enforcing it; and the men opened fire from their sheltered positions, with¬ out an effort to advance. Meade gave a third order for an advance of the entire line. Smith positively refused to obey, as it meant but a wanton waste of life to attempt it. Wright and Hancock merely transmitted the order, and again the men complied with it only by renew¬ ing fire from their positions. Grant got the opinion of his corps*

commanders that further assault was inadvisable, and at 1.30 p.m. orders were given to entrench <(with a view to moving against the enemy's works by regular ap¬ proaches. Farther to the right Burnside with the Ninth corps and Warren with the Fifth, who were to support the main assault, attacked Early in the morning, occupied some of the positions taken from him on the 2d, entrenched close up to Early's main line, and were about to assault, when they received orders to suspend attack. They had fought sharply during the morning, the Fifth corps losing about 500 killed and wounded, the Ninth corps about 800. Wil¬ son's cavalry had a sharp engagement at Hawes' Shop, driving the enemy with some loss, and attacking the left and rear of Heath's division ; but failing to connect with Burnside, they with¬ drew to Hawes' Shop. The loss of the Army of the Potomac for the entire day of 3 June was about 7,000 killed and wounded. All night

of the 3d both armies were entrenching; no pickets could be thrown out, so close were the lines, between which lay many wounded. Some of the wounded were brought in, but it was not until the 7th that a truce was agreed upon, by which all could be removed, when exposure and starvation had transferred the greater part of them to the death-roll. Regular approaches were made by the Union lines, accompanied by constant and heavy skirmishing; an assault gave no promise of success; and on the night of the 12th Grant withdrew to cross James River. Grant had 103,000 ((present for duty® at Cold Harbor. His loss (1-12 June) was 1,845 killed; 9,077 wounded; 1,816 missing; an aggregate of 12,738. Lee had not under his command more than 65,000 men. His loss cannot be accurately given, but probably did not exceed 2,600 killed and wounded. General Grant, in his (Personal Memoirs, ' says: <(I have always regretted that the last assault on Cold Harbor was ever made. No advantage whatever was gained to compen¬ sate for the heavy loss we sustained.® Consult (Official Records' (Vol. XXXVI) ; Grant, U. S., (Personal Memoirs' (New York 1895) ; Walker, F. A., (History of the Second Army Corps) ; Humphreys, A. A., (The Virginia Cam¬ paign of 1864-65' (New York 1883) ; Penny- packer, I. R., (Life of General Meade'; bat¬ tles and Leaders of the Civil War' (New York

1887).

E. A. Carman.

COLD LIGHT, a term applied to the illu¬ mination produced by a machine, invented by C. F. Dussaud, wherein several incandescent lamps rapidly succeed one another. The under¬ lying principle of the machine is a wheel which carries on its circumference a number of tungsten lamps. When the wheel is rotated each lamp is illuminated at a particular point and again cut off from the current supply, but one lamp being illuminated at one time. When the rotation is rapid the effect on the observer is that of a continuous

source of light. The short period during which a lamp is lighted allows but little development of heat, hence the term cold light. The apparatus is useful in connection with a moving picture machine, be¬ cause it allows the latter to be run at any speed and even to be stopped without danger of igniting the film.

COLD SPRING, N. Y., a village of Suf¬ folk County, on Cold Spring Harbor, and on the Long Island Railroad. It was formerly a whaling port. It is now a summer resort, and has a fish hatchery, laboratories of the Brook¬ lyn Institute and an experimental station of the Carnegie Institute, Washington. Pop. about

(1920) 1,422.

COLD STORAGE, a method now generally employed for preserving perishable articles of food by the use of machines which reduce the temperature of the air. The same method is used extensively for preserving articles other than food which are destructible by high tem¬ perature. Refrigeration is often called ice¬ making, but in a cold-storage building the area kept at a certain temperature by the frozen liquid is small compared with that kept at a proper temperature by ammonia and other sub¬ stitutes for ice. Perhaps no produce ever came into common use more rapidly than air treated according to the cold-storage method, unless

electricity or. steam be excepted. It is now in¬ dispensable in connection with some of the largest business enterprises, which, without it, would soon cease to exist. One of the most important uses of cold storage is in the trans¬ portation of beef, fruit and vegetables, etc., from place to place and from one country to another, especially from the United States and South America to Europe.

The extensive systems employed in breweries, provision depots, dairies and distilleries have familiarized the public with the use of cold air; and no modern hotel or apartment house on a large scale is constructed without a plant for producing it by some process. It is as much a portion of the mechanical equipment as the elevator motor, or the lighting and heating apparatus. It is also being introduced for cooling purposes in theatres and other audi¬ toriums ; it maintains a pleasant temperature during the heated term in the hospital ward, and several companies have been formed to distribute it in cities through mains, as water and gas are supplied to the consumer. In some of the largest packing-houses of Kansas City and Chicago, not a pound of ice is used in a year for preservative purposes, although every department where the products of the beef, sheep and hog

are stored any length of time is required to be at a temperature near or below the freezing point. Plants are now being made in this country to generate cold air for butter and butterine factories, ice-cream factories, chemical works, sugar refineries, molasses fac¬ tories, paraffine works, oil refineries, stearine factories, chocolate factories, morgues, office buildings, skating rinks, steel-tempering plants, blast-furnaces, laundries, glue works, dry-plate works, dynamite-works, paint factories, soap factories, fur storage, India-rubber works and plants for seasoning lumber — a list including some of the country's most important industries.

*While an extensive variety of machinery is being manufactured for refrigeration under a score of patents, the aim of all the inventors is the same — to perfect the most economical process to remove the heat from a certain tem¬ perature level to a higher level, discharging it at this point. With one *ton of coal, a cold-air equivalent of from 8 to 14 tons of ice has been produced, the quantity varying according to the process employed. In the United States the refrigerating machines use anhydrous ammonia as the agent for generating low temperatures, mostly in conjunction with brine made from chloride of calcium and water. The ammonia is circulated through a series of pipes in which it evaporates. Then, in its gaseous form, it is pumped by the machine into the condensers and liquefied. The brine-cooler consists of a double pipe-coil. A small quantity of ammonia is injected through a needle valve, which allows a very fine stream to pass into the space be¬ tween two pipes, running in a coil approximately 300 feet long surrounding a pipe containing the brine. From this coil the ammonia gas is drawn to the machine. The gas is forced thence into other coils, called the ammonia condensers, which have water circulating over them. It is now in a heated condition from the compres¬ sion. The water running over these coils cools off the gas, and at the same time condenses it into liquid anhydrous ammonia. In this form the ammonia is conducted to a receiving tank,*

and from there it again passes through the needle-valve into the brine-cooler, going through the same circuit again and again. The brine-cooler represents the apparatus where the brine and ammonia systems are in conjunction, the brine being pumped through the cooler, and from there through coils of pipe in the room in which it is desired to reduce the temperatures. This is sometimes to 20° F. below zero for freezing fish, sometimes to 32° F. for preserv¬ ing meat, and often to 50° F. for preserving fruits and other perishables. The temperature is easily adjusted to the required degree by con¬ trolling the brine-flow in the piping. By les¬ sening or increasing the flow in a single pipe, a wide range of temperature can be produced. Thus the same room can be used either for freezing the articles it contains, or merely for chilling them.

The capacity of a refrigerating machine is based upon the weight of ammonia in the gaseˆ ous form which it can discharge in 24 hours, each pound of gas representing a certain quan¬ tity of heat-absorbing power. The unit of ca¬ pacity is the refrigeration which would be ac¬ complished by the use of one ton of ice. Such a quantity will lower the temperature of 28,400 pounds of water 10 degrees. Therefore, if a ˆone-ton" machine is employed, it will cool 197% pounds of water to the extent of one degree a minute. Tests made of the York type machines of this capacity show that one will keep the ˆcuring® department of a packing¬ house containing 12,000 cubic feet of space, at a temperature of 40° F. or 1,500 cubic feet at zero. In other words, it is sufficient to keep 10 beeves or 25 hogs chilled at the former tem¬ perature. As a single plant used in the large packing-houses and breweries may represent 500 tons capacity, it will be seen that the cold storage compartments are maintained on a very elaborate scale, a single one containing thou¬ sands of carcasses. The horse power required for one of these large machines aggregates 625. The air-compressors are built in various de¬ signs, and are known as single and double acting. A recent invention, the Westinghouse- Leblanc refrigeration machine, represents a new process that is now being introduced, which involves the use of water vapor for producing a temperature of from 35° F. to 50° F.

In large cold-storage warehouses the floors are not over eight or nine feet high. The pipe is attached to the walls, and in wide rooms to the sides of posts running through the middle of the room, so that an equal temperature can be maintained in all portions. In others, like fish-freezing rooms, the pipes are even used as shelves to hold the tins filled with fish, which are frozen into bricks and piled away in another compartment. Poultry and game are also kept in a frozen state, and the meat remains almost as hard as stone while in the cold room. But¬ ter also is kept at a temperature near zero, which is said to preserve the flavor contained in its volatile oil, so that it is equal to fresh butter. Eggs are preserved sometimes from two to six months, but require particular care. The air in the room should be neither too moist nor too dry, and the chamber should be neither without ventilation nor supplied with too much, as then the eggs would lose in weight on ac¬ count of their liability to evaporate through the shell. Eggs, butter and milk are also liable to

be tainted by any smell arising from the wood¬ work, or articles stored in the neighborhood, and the rooms have to be constructed and ar¬ ranged with this point in view.

The above, it may be said, have been prob¬ lems for the cold-storage

experts to solve by practical experiments ; but food products can be preserved in properly constructed houses with as little difficulty as any other articles. In the preservation of meat, from the time that the beef, sheep or hog is killed, it is kept in cold storage or <(chill):> rooms, until the time that it is taken from the refrigerator to be prepared for the table. The <(chill55 rooms are used to take the animal heat out of the meat, and reduce its temperature from about 98° F. to cold-storage temperature, that is, from 32° F. to 40° F. For this purpose the meat is hung on rails in rooms which have chambers in the upper part over the rails for ammonia or brine piping, which reduces the temperature to a point near freezing before the meat is put in. After the meat is put in, the animal heat it still contains raises the temperature in the room, but this is again gradually lowered, in the course of 24 to 48 hours, to the proper degree for re¬ frigeration. This length of time is required in order to chill the meat thoroughly. Should it become chilled on the outside and remain warm in the centre, the centre part of the meat would be spoiled. From the ((chill55 room the meat is run into the cold-storage rooms and hung on rails, where it is kept until such time as it is to be shipped. The choicest pieces are kept at least four weeks in cold storage, as the quality is thus improved, and, if the rooms are kept clean, these pieces will taste better than meat which has been recently slaughtered. For this reason, not only slaughter-houses, but depots of packers and other buildings where meat is kept in cold storage, even to small butcher es¬ tablishments, are preferably cooled by refriger¬ ating machinery, owing to its drying and clean¬ liness.

In some of the large hotels refrigerators cooled by machinery are even placed close to the ovens or ranges where the viands are prepared for consumption, the refrigeration being main¬ tained at the proper standard despite the out¬ side temperature. High temperature is also the rule in candy factories, but manufacturers of chocolate candy have been using refrigerating machines for some time. They are forced to do this, as the compound is apt to become soft in hot weather, which, of course, would spoil the appearance of the goods for the market. The arrangement of the refrigerating piping for chocolate factories has been made in various ways. In some instances a large refrigerator is cooled in the centre of the workroom with the piping inside of it, this refrigerator being of such length that endless belting carrying tins with chocolate enters it on one side and brings them out chilled on the other. In other work¬ rooms a series of pipe coils are simply placed along the ceiling, and the cold air coming down chills the confectionery as it is made by the employees in the same room. The chocolate is then stored in refrigerators, apart from the workroom, and there properly packed at a low temperature. After being packed it can be sent out, and ordinarily will keep for an in¬ definite length of time.

One of the most interesting applications of

cold storage, however, and one which has be¬ come very extensive, is for preserving furs and woolens, which are kept at a temperature of not over 20° F. to keep the moths from de¬ stroying them. These rooms have a very in¬ teresting appearance, as among the trunks, boxes and drawers of clothing there appear figures of bears, tigers and other stuffed ani¬ mals in threatening attitudes, put away through the hot season by their owners and taken out in the fall. Sometimes furs are left in storage continuously for several years, yet at the end of the time they are invariably found in per¬ fect condition. Many of the trust companies in the larger cities have such cold storage com¬ partments. In these fur and clothing rooms, where valuable carpets and rugs are also stored, the air is generally cooled outside af the room and circulated through it by means of fans.

The cold storage building erected by the United States government at Manila is probably unexcelled in scientific construction. It has a storage capacity for 1,200 tons of beef, 200 tons of mutton, 50 tons of butter, 100 tons of pota¬ toes and 100 tons of bacon; or, in other words, sufficient food to feed an army of 10,000 men for three months. In addition to the ordinary freezing apparatus it has an ice plant with a daily output of 40 tons. The elevator, with its 2,400 pound lifting capacity, as well as most of the other appliances in the building are operated by electricity. Connecting with the elevator is an overhead tracking system extending four miles, and the mechanism is so complete that a ship landing at a near-by pier has only to open her hatches and her cargo is transported to the storage almost automatically. The power in the building is furnished by three 200-horse¬ power engines. Consult Levey, (Refrigeration Memoranda 5 (1906) ; Macintire, (Mechanical

Refrigeration (1914) ; Cooper, M., (Practical Cold Storage5 (1914).

COLD WAVE, a term commonly used in the United States to denote a fall of at least 20° in temperature in 24 hours, bringing the temperature below the freezing point. It is due to steady winds from the northwest, which bring with them the chill conditions of the great west Canadian plains. This chill seems due to anti-cyclonic conditions which bring down to the surface the cold air of the upper atmosphere, and cause it to flow out over the southern and eastern United States. (

COLDEN, kol'den, Cadwallader, American scientist and colonial official : b. Dunse, Scot¬ land, 17 Feb. 1688; d. Long Island, N. Y., 28 Sept. 1776. He was graduated from the Uni¬ versity of Edinburgh in 1705, and emigrated to the American colonies in 1708. He devoted

himself to botany and astronomy and also to public affairs, becoming surveyor-general of £sew York and president of the council. He sided with the Crown in the contest over the Stamp Act. Among his correspondents were Franklin and Linnaeus, and he wrote (Cause of Gravitation } and (History of the Five Indian Nations. >

COLDEN, Cadwallader David, American lawyer and nephew of Cadwallader Colden, the naturalist: b. near Flushing, L. I., 4 April 1769; d. Jersey City, N. J., 7 Feb. 1834. He studied law and began practice in New York in 1791, where he soon attained high rank in his profes¬ sion. He was a member of the legislature and mayor of New York (1818), a member of Con¬ gress (1821), and of the State senate (1824-27). He was an earnest advocate of the system of internal improvements that was an important political issue early in the 19th century and of public education. He wrote (Life of Robert Fulton) (1817); Vindication of the Steamboat Right Granted by New York State) (1819) ;

(Memoir of the Celebration of the Completion of the New York Canals) (1825).

COLDSTREAM, Scotland, town in Ber¬ wickshire, 13 miles southwest of Berwick, situ¬ ated on the northern bank of the Tweed, which is here crossed by a bridge (erected by Smeaton in 1766) that unites the two kingdoms, and forms a well-frequented thoroughfare. The ford of Coldstream was a favorite point with the invading armies of England and Scotland when they passed alternately into each other's country. The Coldstream Guards, the second oldest regiment in the British army, was em¬ bodied here by General Monk (1659-60). Pop.

1,375.

COLDSTREAM GUARDS, a regiment in the Foot Guards or Royal Household Brigade, the oldest in the British army except the First Foot, now called the Royal Scots. Raised in 1660 by General Monk at Coldstream, it was at first called ((Monk's Regiment,):> but when Parlia¬ ment consented to give a brigade of guards to Charles II, this corps, under the name of Cold¬ stream Guards, was included in it. It has seen service in every war of importance in which Great Britain has been engaged since its or¬ ganization and its military record is looked upon as one of the most brilliant in the British army.

COLDWATER, Mich., city and county- seat of Branch County. It is in the southern tier of counties, 153 miles east of Chicago and 126 miles west-southwest of Detroit, on the Coldwater River and the Lake Shore and Michi¬ gan Southern Railway. Coldwater was first settled in 1830 by Hugh Campbell, became a borough in 1837 and a city in 1862. It is gov¬ erned by a mayor and a common council of eight members, four members of which are elected yearly for a term of two years. The citv has three banks, churches of all denomina¬ tions, is in the centre of a rich farming com¬ munity, has cement, shoe, wagon, milling and other industries, and owns and controls its waterworks and electric-light plant. It con¬ tains the Bromo-Hygeia Mineral Wells. Pop.

(1920) 6.114.

COLE, Alfred Dodge, American physicist: b. Rutland, Vt., 18 Dec. 1861. He was gradu¬ ated at Brown University in 1884. He also vol. 7 — 16

studied at Johns Hopkins, Harvard, Berlin, Cornell and Chicago universities. He was in¬ structor in chemistry and physics 1885-87, act¬ ing professor 1887-88, and professor 1888-1901 at Denison University. In 1901-07 he was pro¬ fessor of physics at Ohio State University, in 1907-08 at Vassar College, and since 1908 pro¬ fessor of physics and head of the department at Ohio State University. In 1901-07 he was a trustee of Denison University and again after 1911. He is the author of various researches on electric oscillations, electric waves, capillary electrometer, impact excitation, infra-red radia¬ tion, etc., in Physical Review and other periodi¬ cals.

COLE, Asahel N., American agriculturist and editor: b. 1821; d. Wellsville, N. Y., 14 July 1889. He figured prominently as a Repub¬ lican in the party's early days, and in 1852 he founded the Genesee Valley Free Press, the pioneer Republican paper. He was noted as an agriculturist, and known as the father of sub¬ surface irrigation.

COLE, Frank Nelson, American mathema¬ tician: b. Ashland, Mass., 20

Sept. 1861. He was graduated at Harvard in 1882, lectured on mathematics there in 1885-87 and became in¬ structor and assistant professor of mathematics at the University of Michigan in 1888-95. In the latter year he became professor of mathe¬ matics at Columbia University. He became secretary of the American Mathematical Society in 1895 and editor of its Bulletin in 1897.

COLE, George Vicat, English landscape artist: b. Portsmouth, Eng., 1838; d. London, 6 April 1893. He was a pupil of his father, George Cole (1810-83), a landscape painter also, was especially noted for his studies from nature in Surrey, and became a royal academician in

1880.

COLE, George Watson, American bibliog¬ rapher: b. Warren, Conn., 6 Sept. 1850. He was educated at Phillips Academy, Andover, Mass., and was admitted to the bar in 1876. He practised until 1885 when he became cata¬ loguer of the Fitchburg Public Library. In 1891-95 he was librarian of the Free Public Library, Jersey City, N. J. He resigned to de¬ vote himself to bibliographical work. Since 1915 he has been librarian of the private library of Henrv E. Huntington of New York. He is the inventor of a size card for measuring books in accordance with the stand¬ ard adopted by the American Library Associa¬ tion, which is in general use. He has published (Catalogue of Americana) in the Library of E. Dwight Church, New York (5 vols., 1907) ; (Bermuda in Periodical Literature> (Boston 1907) ; Catalogue of English Literature and Miscellanea) in the E. Dwight Church Library (2 vols., 1909) ; (First Folio of Shakespeare> (1909) ; (Book-Collectors as Benefactors of Public Libraries > (1915) ; also articles in periodicals on bibliography, libraries and library economy.

COLE, Grenville Arthur James, English geologist : b. London, 21 Oct. 1859. He was educated at the Citv of London School and the Royal School of Mines, and has been professor of geology at the Royal College of Science for Ireland since 1890 He has published (Aids in Practical -Geology y (1891); (The Gypsy Road) (1894); (1895);

(As VVe Ride) (with Blanche Cole, 1902). (The Changeful Earth5 (1911) ; (Rocks and their Origins) (1912) :

(1915).

COLE, King, a legendary British king, de¬ scribed as a (

COLE, Thomas, American landscape painter: b. Bolton-le-Moor, England,

*1 Feb. 1801; d. Catskill, N. Y., 11 Feb. 1848. In 1819 his father and family emigrated to America. Here Cole began work as a wood engraver in Philadelphia, while his family went on to the West. In 1820 he followed them to Steubenville, Ohio, where he spent two years. He helped his father's wallpaper business by mixing colors and designing patterns. But he had always de¬ lighted in natural scenery and he was greatly interested in the surrounding landscape. His attention turned to painting and after a while he left home and after some wandering he came to New York in 1825. Here after a win¬ ter's work he sold some pictures, which enabled him to make a trip up the Hudson, already famous for its picturesque and romantic scenery. On his return he sold three pictures to Colonel Trumbull, William Dunlap and A. B. Durand, and this introduction gave him a defi¬ nite position in American landscape painting, where he soon became a leader. In 1829, feel¬ ing a need for study of the recognized masters of landscape he went abroad. He went first to England and then to Italy. For almost four years he painted earnestly and studied the works of the painters whom he admired. He did not, however, attach himself to any one master nor did he copy many paintings ; he re¬ ceived impressions on art and formed ideas but did not labor for advance in any particular kind of technical skill. The results of his tour were natural. Before leaving America he had had for his chief ideal the presentation of nature as *he saw it. While he was abroad his mind turned more to a rendering of thoughts and ideas. On his return to America he painted the series of pictures called (The Course of Empire5 and some years afterward another series called (The Voyage of Life,5 besides a number of other pictures in which his concep¬ tions and ideas found almost allegorical ex¬ pression. He also painted many purely Ameri¬ can landscapes which became widely known, but the ideal pictures he came to think his great¬ est and most representative work. The general estimate, however, has been different ; these ideal works have been neglected and Cole's chief work has been found in his purely Ameri¬ can landscape. Cole will always be thought of as the leader of those earlier artists who de¬ voted themselves to a presentation of the natural beauty of their country with a genius and a skill that delighted their own day and gave rise to a movement that has become rather the most characteristic thing in American painting. Cole was the leader and representa¬ tive of the first group of American landscape*

painters, often loosely called the "Hudson River School.® The latter part of his life he lived at Catskill, N. Y. There is no recent life of Cole. (The Life and Works of Thomas Cole5 bv L. L. Noble, written shortly after Cole's death, gives a valuable but contemporary view.

COLE Timothy, American engraver : b. London, England, 1852. He came to America in 1857 and was rendered penniless by the Chi¬ cago fire in 1871. He studied under Bond and Chandler and in 1875 entered the

employ of the Century Magazine (then Scribner's Month¬ ly). In 1883 he was sent to Europe to engrave pictures by the old masters. His first series (The Old Italian Masters5 was finished in 1892. The Dutch and Flemish series followed in 1896 and the English in 1900. The (01d Spanish Masters5 was begun in 1902 and com¬ pleted in 1907. The French series followed in 1910. Since 1914 he has been engaged on the old masters in American public and private gal¬ leries. He has received first-class medals at every exposition since 1893 ; is a member of the American Society of Arts and Letters. In 1914 he received the degree of M.A. from Princeton University. He stands easily at the head of living wood engravers. He is most effective in his use of the white line and in reproducing textures ; his results in general are produced by conservative methods, in the employment of which he has gained breadth and power and appreciation of light and of the personality of his subject. Consult Weitenkampf, (American Graphic Art5 (New York 1912). He wrote (Notes to Old Italian Masters5 (1889-92) ; (Monograph on the Lives of Dutch Masters5 (1892-96); (Notes to English Masters5 (1897—

1901).

COLE, William Morse, American teacher: b. Boston, Mass., 10 Feb. 1866. He was gradu¬ ated at Harvard in 1890, and was instructor in political economy there 1890-93. From 1894 to 1898 he was a university extension lecturer and secretary of the Massachusetts commission on the unemployed. From 1898 to 1908 he taught English in Massachusetts high schools and ac¬ counting in Harvard University. In 1908 he became assistant professor of accounting at Harvard; associate professor 1913; professor 1916. He is the author of (An Old Man's Romance5 (1895), under the pseudonym of "Christopher Craigie® ; (Accounts: their Con¬ struction and Interpretation 5 (1908) ; (The Am¬ erican Hope5 (1910) ; Accounting and Audit¬ ing5 (1910) ; (Cost Accounting for Institutions5 0913) ; Accounts5 (rev. ed. 1915) ; (Problems in the Principles of Accounting5 (1915).

COLEBROOK, Henry Thomas, English Sanskrit scholar: b. London, 15 June 1765; d. there, 10 March 1837. In 1782 his father's in¬ fluence procured him a writership in the Ben¬ gal service. His duties as revenue officer at Tirhut led him to make a minute study of the state of husbandry in Bengal ; his legal func¬ tions led him to study Indian law and leam Sanskrit; and he began in 1794 publishing es¬ says on Indian religion, poetry and science in the Asiatic Researches5 of the Asiatic Society of Calcutta. His removal in 1795 to the magis¬ tracy of Mirzapur gave him the opportunity of cultivating the acquaintance of the learned men of the neighboring Sanskrit college at Benares, and with this advantage he brought out his

' Digest of Hindu Law on Contracts and Suc- cessions) (1798). A mission to Nagpur (1 799— 1801) interrupted his work and on his return he was appointed a judge of the new Court of Appeals at Calcutta and at the same time hon¬ orary professor of Hindu law and Sanskrit at the college of Fort William. Yet he con¬ trived during this busy period to publish the first (and only) volume of his (Sanskrit Gram¬ mar J (1805), based upon Panini and the native commentators, to write his famous articles on the Vedas and on the sect of Jains, besides many other valuable essays for (Asiatic Re¬ searches, > and also to supplement his (Digest } by (Two Treatises on the Hindu Law of In- heritance) (1810). He became blind in his later years. His(Life) was published by his son in 1873. Colebrook is noteworthy as the first great Sanskrit scholar in Europe.

COLEMAN, Arthur Philemon, Canadian educator : b. Lachute, Quebec, 4 April 1852. He was educated at Victoria University and at the University

of Breslau. After some years of scientific work he became professor of geology and natural history in Victoria University; in 1891 professor of assaying and metallurgy in the School of Practical Science, Toronto; and from 1901 professor of geology, Toronto Uni¬ versity. .He was geologist for the Ontario bureau of mines from 1893-1909.

COLEMAN, Caryl, American ecclesiol- ogist : b. Buffalo, N. Y., 1847. He was edu¬ cated privately and at Canisius College, Buffalo. From 1872 to 1874 he was a teacher in Buffalo, N. Y., and in 1875-76 studied ecclesiology in Europe, prosecuting these studies further in England and Belgium in 1888. In 1889 he opened the church department of Tiffany & Company and directed it for 10 years. He founded the Church Glass and Decorating Com¬ pany, of which he has since been president, and was appointed American representative of John Hardman & Company of Birmingham, Eng¬ land. He has written (Symbolism in Religious Art> (1899) ; (A Mark of Honor> (1903) ; and has contributed ar¬ ticles on the decorative arts, symbolism, iconog¬ raphy and architecture to the Architectural Record and other periodicals.

COLEMAN, John, American clergyman : b. Baltimore, Md., 11 Feb. 1803; d. Saint Louis, Mo., 16 Sept. 1869. Until 1834 he was a Meth¬ odist. He entered the Protestant Episcopal ministry in 1836 and for 20 years was rector of Trinity Church, Philadelphia. He edited the religious paper Banner of the Cross (Philadel¬ phia) ; and also edited Faber's c Difficulties of Romanism > ; and Wilmer's (Episcopal Manual. >

COLEMAN, Leighton, American Protest¬ ant Episcopal bishop: b. Philadelphia, 3 May 1837; d. Wilmington, Del., 14 Dec. 1907. He was graduated at the General Theological Sem¬ inary in 1861, was ordained to the Episcopal ministry in 1862, and after holding important rectorships was consecrated bishop of Dela¬ ware in 1888. He wrote (A History of the Le¬ high Valley) (1872) ; (The Church in America) (1895) ; (The Church in the United States >

(1901).

COLEMAN, Lyman, American clergyman and scholar: b. Middlefield, Mass., 14 June 1796; d. Easton, Pa., 16 March 1882. He grad¬ uated at Yale 1817; taught in Hartford, Conn., 1817-20; was tutor in Yale 1820-25, studying theology at the same time. He was pastor of the Congregational church in Belchertown, Mass., for seven years, when he again took up teaching. He studied in Germany 1842-43, where he formed a close friendship with Nean- der, and returning, taught German at Prince¬ ton and Amherst 1845-46. In 1856 he traveled extensively through the Orient. He was pro¬ fessor of Latin and Greek in Lafayette College from 1861 to 1868, when he was transferred to the chair of Latin, which he

held until his death. His writings, which were highly praised and re¬ garded in their day, are (Antiquities of the Christian Church) (1841), translated from the German; (The Apostolical and Primitive Church) (1844) ; (Historical Geography of the Bible) (1850); (Ancient Christianity) (1852); historical Text-Book and Atlas of Biblical Geography) (1854; rev. ed., 1859) ; (Prelacy and Ritualism (1869); and (Genealogy of the Lyman Family in Great Britain and America)*

(1872).

COLEMAN, William Tell, American pio¬ neer: b. Cynthiana, Ky., 29 Feb. 1824; d. San Francisco, Cal., 22 Nov. 1893. In 1849 he made the overland trip to California and opened several stores for the sale of mining supplies. When in 1851 the famous Vigilance Commit¬ tee of San Francisco was formed to rid the city of its formidable criminal element, Coleman became one of the most active members. In 1856 the committee was revived in consequence of the murder of James King, an editor; Cole¬ man took charge of the trials, resisted official pressure against interfering with <(the people,® directed the execution of Casey and the other murderers and carefully avoided any clash with the United States authorities. From 1857 to 1864 he directed his business from New York, aided in suppressing the draft riot and con¬ tributed liberally to patriotic benefactions. In 1877-78, at the request of the citizens of San Francisco, he organized the Committee of Safe¬ ty, to fight Dennis Kearney and his sand-lots mob, and in this was highly successful. In 1888 his firm failed with liabilities of $2,000,000, but in 1892 he personally paid off his entire in¬ debtedness.

COLEMAN, Canada, town in the Macleod district, on the Old Man River and on the Ca¬ nadian Pacific Railway, 10 miles from Crow's Nest Pass. It is a coal and coke centre, these industries giving employment to about 1,000 men. The town has waterworks, an electric¬ lighting plant and banking facilities. Fishing and hunting in the vicinity are both good. Pop.

1,557.

COLEMAN, Tex., city and county-seat of Coleman County, 120 miles southwest of Fort Worth, on the Gulf, Colorado and Santa Fe Railroad. Beef, cotton and grain are im¬ portant articles of trade. There are brick¬ works and nearby are deposits of coal and oil gas. The city owns the waterworks and elec¬ tric-lighting plant. Pop. (1920) 2,868.

COLEMANITE, a hydrous borate of cal¬ cium, 2 CaO, 3 B2035H20. The most common

source of borax and boracic acid in the United States. Principal deposits are in California.

COLENSO, John William, English clergy¬ man, bishop of Natal: b. Saint Austell, Corn¬ wall, 24 Jan. 1814; d. Bishopstowe, Natal, 20 June 1883. He was educated at Saint John's College, Cambridge; was assistant-mas¬ ter at Harrow 1838-42; resided at Saint John's College 1 842—46, when he was preferred to the rectory of Forncett Saint Mary, Norfolk, and on 20 Nov. 1853 was appointed the first bishop of Natal. His numerous writings ex¬ tend over a wide field. His treatises on arith¬ metic and algebra have become textbooks in schools and universities. In 1853 he published a collection of (Village Sermons> ; in 1855 (Ten Weeks in Natal5 ; and in 1861 a Commentary on Saint Paul's Epistle to the Romans. 5 In the following year public attention was widely at¬ tracted by the first part of his work on (The Pentateuch and Book of Joshua Critically Examined,5 in which the historical accu¬ racy and Mosaic authorship of those books were called in question. This work was condemned as heretical by slight majorities in both Houses of Convocation of the province of Canterbury in 1864, and Colenso was declared to be de¬ posed from his see by his metropolitan, the bishop of Cape Town. The deposition was, however, declared null and void on appeal to the Privy Council in March 1865. Notwithstand¬ ing this decision the prelates forming the coun¬ cil of the Colonial Bishoprics Fund refused to pay him his income and he appealed to the Court of Chancery. The master of the rolls delivered judgment on 6 Oct. 1866, ordering the payment in future of his income, with all ar¬ rears and interest, but declaring that if his ac¬ cusers had refused payment on the ground of heretical teaching he should have felt it his duty to try that issue, an offer which they de¬ clined to accept. One of the results of this ecclesiastical quarrel was that the Anglican community of the Cape was divided into two hostile parties ; Colenso still remained the only bishop of the Church of England in Natal, but the Rev. W. K. Macrorie was consecrated bishop of Maritzburg for the Church of that province of South Africa 25 June 1869. About the end of 1874 Colenso visited England, and during this visit he pleaded before the Secre¬ tary for the Colonies and other members of the government the cause of Langalibalele, a Zulu chief, who had been dispossessed of his terri¬ tory and imprisoned at Cape Town. From that time forward the humane bishop was foremost in advocating the cause of the aboriginals against the oppression of the Boers and the en¬ croaching policy of the Cape officials supported by Sir Bartle Frere. The captive Cetewayo (see Zululand) appealed to Colenso to place his case before the English people, and it was mainly owing to the bishop's efforts

that the Zulu king was allowed to go to England to plead his own case with the ministry. In the meantime Colenso continued his literary labors. (The New Bible Commentary by the Bishops and Other Clergy of the Anglican Church Criti¬ cally Examined) was published in 1871, the sev¬ enth and last part of his work on the Penta¬ teuch in 1879, and (Lectures on the Pentateuch and Moabite Stone) in 1873. Consult Cox, (Life of Bishop Colenso) (1888).

COLEOPTERA (Gr. koleos, a sheath, and riTEp6v} a wing), an order of insects, the spe¬ cies of which are commonly known by the name of beetles. The insects which constitute the order Coleoptera may be characterized as having four wings, of which the two superior are not suited to flight, but form a covering and protection to the two inferior, and are of a hard and horny or parchment-like nature and when closed their inner margins, which are straight, touch and form a longitudinal suture. The inferior wings, when not in use, are folded transversely under the superior and are mem¬ branous. The appendages of the mouth are well adapted for cutting and the metamorphosis is complete. See Beetle.

COLER, Alwin Gustav Edmund von,

German army surgeon : b. Groningen 1831 ; d. 1901. He studied medicine in Berlin, en¬ tered the Prussian army in 1856, became sur¬ geon-general in 1874 and chief surgeon of the general staff in 1889. He introduced several important reforms and improvements in military hygiene, established the corps of sanitary offi¬ cers and introduced antiseptics into military surgical practice. He also took a prominent part in formulating the medical regulations for the German army, which have since been adopted by all civilized armies. In 1892 Coler was appointed professor at the University of Berlin. He published (Sanitatsbericht fiber die deutschen Heere im Kriege 1870-7P; (Ver- offentlichungen aus dem Gebiete des Militar- sanitatswesens5 (1892) ; (Die transportable La- zarettbaracke5 (with Langenbeck and Werner,

1890).

COLER, Bird Sim, American politician : b. Illinois 1868. He removed to New York, and with his father established the stock¬ broking firm of W. N. Coler & Company. He became active in Democratic municipal and State politics, was elected comptroller in the first administration of Greater New York un¬ der the new city charter (1897-1902) and was Democratic candidate for governor of the State in 1902. In 1905 he was elected president of the borough of Brooklyn on the municipal ownership platform. He has written (Munici¬ pal Government, as Illustrated by the Charter, Finances, and Public Charities of New York) (1900); Socialism in the Schools5 (1911); 'Two and Two Make Four5 (1912).

COLERAINE, kol-ran', Ireland, town in the county of Londonderry, situated on both sides of the river Bann, about four miles from its mouth, and 61 miles northwest of Belfast by rail. It has long been celebrated for its fine linens. Its trade, chiefly in agricultural produce and provisions, is considerable ; there is a large distillery, and it has a valuable salmon fishery. Pop. 7,785.

COLERIDGE, Hartley, English poet: b. Clevedon, near Bristol, 19 Sept. 1796; d. Rydal, Westmoreland, 6 Jan. 1849. He was the eldest son of S. T. Coieridge (q.v.), and upon the elder Coleridge taking up his residence in the Lake district, Hartley and his brother Derwent were placed as day scholars under the charge of a clergyman at Ambleside. In 1815 he be¬ came a student at Merton College, Oxford, and having inherited his father's conversational talents, was soon in great request at the wine parties and other festivities of the undergrade

COLEOPTERA

nates. An unfortunate propensity was thus formed for drinking, which proved even more ruinous than his father's craving for opium. He obtained a fellowship at Oriel College, but forfeited it on account of his intemperance before the close of his probationary year. He then left Oxford and resided for two years in London, contributing occasionally to the Lon¬ don Magazine, in which his first sonnets ap¬ peared. His friends induced him against his will to settle at Ambleside for the reception of pupils, but this scheme, as might have been expected, failed. He continued, however, to reside in the Lake country, and during this period enjoyed the friendship and good offices of Wordsworth, who had taken a paternal in¬ terest in him from a child. He likewise employed himself extensively in study and lit¬ erary composition, contributing to Blackwood's Magazine, and producing a volume of (Poems) and (Worthies of Yorkshire and Lancashire.* Many of his sonnets will rank with the finest in the English language, while the charming vivacity of his biographies leaves only room for regret that he had not accomplished more as a prose writer. In 1839 he wrote a life of Massinger for an edition of his works published by Moxon. He was buried in Grasmere church¬ yard, adjoining the spot where Wordsworth was laid a few months afterward. A memoir, with a collection of poems written by him in his later years, was published after his death by his brother Derwent.

COLERIDGE, Henry Nelson, English writer: b. Ottery Saint Mary, 25 Oct. 1798; d. 26 Jan. 1843. He was a nephew of S. T. Coleridge (q.v.) and was educated at Eton and King's College, Cambridge. Having ac¬ companied, in 1825, his uncle, the bishop of Barbados, on a voyage to that island, on his return he published an account of his sojourn, under the title of (Six Months in the West Indies.* He was called to the bar in 1826, and shortly afterward married his cousin Sara, only daughter of Samuel Taylor, and sister to Hartley Coleridge. In 1830 he published an (Introduction to the Study of the Greek Classic Poets, * and after his uncle's death set himself to the task of committing to writing the rem¬ iniscences of Coleridge's conversation, which were published under the title of Specimens of the Table-talk of the late Samuel Taylor Coleridge.* He was his uncle's literary exec¬ utor and edited his posthumous writings in¬ cluding three volumes of ˆLiterary Remains,) published in 1836 and 1838, and (Confessions of an Inquiring Spirit,) in 1840.

COLERIDGE, Herbert, English philolo¬ gist: b. Hampstead, England, 7 Oct. 1830; d. London, 23 April 1861. He was a son of Henry Nelson Coleridge (q.v.), and was one of the original planners of the dictionary outlined by

the Philological Society and which in subse¬ quent years has expanded into the (New Eng¬ lish Dictionary on Historical Principles, now being issued from the Clarendon Press, Oxford.*

COLERIDGE, John Duke Coleridge, 1st

Baron, Lord Chief Justice of England: b. Lon¬ don, 3 Dec. 1820; d. 14 Tune 1894. He was the eldest son of Sir John Taylor Coleridge (q.v.), judge, who was a nephew of Samuel Taylor Coleridge. He was educated at Eton and Ballirl College, Oxford, and was called to the

bar at the Middle Temple in 1846. In 1855 he was appointed to the recordership of Ports¬ mouth; from 1865 till 1873 represented Exeter in the House of Commons as a Liberal, and in 1868 he became solicitor-general under Mr. Gladstone, being knighted at the same time. Three years later he became attorney-general, and in 1873 he was appointed chief justice of the Court of Common Pleas. In the same year he was raised to the peerage as Baron Coleridge of Ottery Saint Mary, and in 1880 succeeded Sir Alexander Cockburn as Lord Chief Justice of England. Lord Coleridge distin¬ guished himself very highly when acting as chief counsel for the Tichborne family in the famous trial of 1871-72. He was the first lord chief justice who was granted the office with the present title, instead of the older one of lord chief justice of the Court of Queen's Bench.

COLERIDGE, Sir John Taylor, English jurist and author, a nephew of the poet, Samuel Taylor Coleridge: b. Tiverton, England, 1790; d. Ottery Saint Mary, 11 Feb. 1876. He was educated at Oxford, and was called to the bar of the Middle Temple in 1819. In 1835 he was appointed justice of the King's Bench, and was sworn of the Privy Council in 1858. He was, for a time, editor of the Quarterly Review. As a literary critic he took high rank, and be¬ sides editing an edition of (Blackstone's Com¬ mentaries (1825) published (Public School Education* (1860) ; (Life of John Keble*

(1869).

COLERIDGE, Samuel Taylor, English poet and critic : b. Ottery Saint Mary, near Exeter, in Devonshire, England, 21 Oct. 1772; d. Highgate, London, 25 July 1834. It is cus¬ tomary to divide Coleridge's life into three periods, according to the prevailing interest of each ; most of his poetry was written before the close of 1798; from that year till 1818 he was chiefly interested in criticism ; and the last 16 years of his life were given mainly to meta¬ physical studies. As in the case of De Quincey, the first part of his life usually receives by far the more attention, and the interest of the last period resolves itself into an account of his writings.

He was the son of the Rev. John Coleridge, vicar of Ottery Saint Mary, a man inclined to mysticism and transcendentalism, but also a pretty

successful school teacher, and his second wife, Anne Bowden, a competent woman of much common-sense. Coleridge, the youngest of 10 by this marriage, was the precocious one of the family and was regarded as a prodigy for his early attainments. His amusements were reading and dreaming and he early showed a marked liking for mysterious and spiritual things. In 1782, after schooling at his native place, he was sent to Christ's Hospital for eight years, where he was subjected to a rigorous intellectual discipline at the hands of the Rev. James Boyer, of whose methods he spoke with respect in {Biographia Literaria. At school he left a tradition, preserved by Lamb, of his intellectual and spiritual attainments. At Jesus College, Cambridge, which he entered in 1791 with a view to taking orders, he gained some distinction as a writer of Latin and Greek, read a great deal, particularly in the philoso¬ phers Berkeley and Hartley, and absorbed and*

advocated the doctrines of the French Revolu¬ tion. This last brought him such notoriety that, in the fall of 1793, he ran away incognito to London, and enlisted in a company of dragoons, but weary of this experiment, obtained his release the following spring. The following summer he tramped about in England and Wales, made the acquaintance of Southey (q.v.), with whom he devised the ˆPantisocracy® scheme for a social settlement on the banks of the Susquehanna, became engaged to Sarah Fricker, the sister of Southey's fiancee, and definitely terminated his university career. The year was an active and somewhat critical one. It was followed by his addresses on political subjects (Condones ad Populum, or Addresses to the People) (1795), which preached liberty, praised revolutionary doctrines and condemned government. By his marriage (1795), his edi¬ torial venture on the Watchman (March to May 1796), in which he tried to expound true opinions on such subjects as the principles of the French Revolution, Godwin's ideas and the like, and, more important, by his settlement in Nether Stowey, Somerset, in 1797, where he came in contact with Wordsworth, a new and important period in his literary life was ushered in.

The meeting with Wordsworth had import¬ ant results in English literature, for it led, in 1798, to the publication of the (Lyrical Ballads. Coleridge's own contribution to this volume, designed by its authors to change poet¬ ical taste, was his masterpiece, (The Ancient Mariner. > The year practically marks the end of his poetical production, though the famous ˆhristabeP was not finished till two years later, and remained unpublished till 1816. Cole¬ ridge had previously written many poems ; many of these were published in 1796 and 1797, under the title (Poems on Various*

Subjects, and he had also tried his hand at several dramas. Aside from the masterly (Ancient Mariner,* (ChristabeP and (Kubla Khan,* on which, to¬ gether with a few others, his fame as a poet rests, the poems are chiefly interesting as show¬ ing the tenor of Coleridge's mind. In substance they are what is generally termed romantic, and are almost always treated with a view to ex¬ pressing some underlying mystery. In style they might be called accumulative, in that they progress by the piling up of a great number of images, and in many respects they imitate the epithetical manner of Gray, but are less suc¬ cessful and less restrained- The great poems named are, of course, among the most original in the language. 1797-98 was the poet's golden year.*

The middle period of Coleridge's life is marked by great desultoriness. It opened with much promise. After a journey to Germany (September 1798 to September 1799), in company with Wordsworth, he returned to England, where his first work was his brilliant translation of Schiller's (Wallenstein,) usually regarded as one of the masterpieces of English translation. That same year and the following year he wrote a number of able articles for the Morning Post condemning, # on the one hand, the policy of Pitt, and, with equal zeal for the cause of lib¬ erty, the aggressions of Bonaparte. The im¬ pulse was short-lived. Failing health and growing restlessness caused him to go to Malta in 1804. It is known that at this period he

was taking opium; whether strictly for the alleviation of pain, or whether to opium was due the cause of his failing health, is not defi¬ nitely known. He made the acquaintance of the drug nearly 10 years before and the severest of his critics, Mr. Robertson, maintains that all his most brilliant poems were written under its influence, but the whole matter is in some un¬ certainty, except for the fact that for a matter of 12 years he was, except at rare intervals, in¬ capacitated from doing sustained work. From 1804 to 1816 he lived in great depression. A residence of two years and a half at Malta, where he was secretary to Governor Sir Alex¬ ander Ball, was of no benefit to his health, and on the whole he showed a weakening of pur¬ pose, as was natural to a man of weak will when removed from the guiding influence of friends. On his return his life was desultory and nomadic and he found himself in hard cir¬ cumstances. Gradually becoming estranged from his friends and family, he finally sep¬ arated from his wife, and in 1810 left the Lake region for good. From that year till 1816 he lived at Hammersmith, London, and at Caine, in Wiltshire, with an old friend, John Morgan, by whom he was treated with the utmost kind¬ ness. Early in 1816, however, the Morgans, owing to loss of property, were obliged to give up the task, and, moreover, Coleridge, to whom the six years had been the most futile of his life, felt obliged to take some more energetic measures to redeem himself. Accordingly, in April 1816, a home was found for him

with Dr. Gillman, in Highgate, London, where his health might be watched with care and firmness, and here he remained the rest of his life.

Up to 1818, as has been said, Coleridge was chiefly interested in criticism, but his work was, naturally, of a desultory nature. His first pub¬ lic utterances, after the articles in the Morning Post, were a series of 18 lectures on (Poetry and the Fine Arts, delivered at the Royal In¬ stitution in London, from January to May 1808. He had previously projected a course of lec¬ tures on the same subject, but they had come to nothing. The lectures of 1808 were very poorly given and were unsuccessful; De Quincey has a vivid picture of the miserable figure that Coleridge presented as he faced his audience. Three courses in the winter of 1811-12, chiefly on Shakespeare and Milton, had a better fate, and, from accounts, must have made a great impression. These courses were recast into two which were badly delivered at Bristol in the winter of 1813-14. In 1818, Coleridge closed his career as a lecturer with a course on the history of literature, which added much to his reputation. These various talks were published for the first time in 1836, in Vols. I and II of Coleridge's (Literary Remains.* In their pres¬ ent shape they are fragmentary; some are pretty complete, others merely marginal jottings, and others exist only in name.*

Considered as a whole, these lectures at¬ tempted to define poetry, to trace in some de¬ tail the course of literature, to exalt to an unprecedented height the name and fame of Shakespeare and to give his readers material for a sound critical judgment. Concerning the last of these points he said, for example, in the course of 1818, that he desired ((To convey, in a form best fitted to render them impressive at the time, and remembered afterwards, rules and

principles of sound judgment, with a kind and degree of connected information such as the hearers cannot generally be supposed likely to form, collect, and arrange for themselves by their own unassisted studies,® and he added, UI hope to satisfy many an ingenious mind, seriously interested in its own development and cultivation, how moderate a number of volumes, if only they be judiciously chosen, will suffice for the attainment of every wise and desirable purpose; that is, in addition to those which he studies for specific and professional purposes.® Among the many great names which he chose to illustrate this oft-repeated idea, Shakespeare, in all the courses of lectures,, occupied the chief place. His chief thesis, that Shakespeare is a poet of consummate poetical power and that his judgment is equal to his genius, he illustrated and illuminated with copious analysis and crit¬ icism, chiefly by running interpretation of the

different plays and by pregnant statements of the fundamental differences in dramatic inter¬ est in the different types of play. Generally speaking his point of view is that of a man in¬ terested in works that express the soul, the rea¬ son and the imagination, rather than outward situation, intelligence, fancy or wit. More nar¬ rowly, it is the criticism of a man who gloried in the superiority of the literature of his own country, and of the moralist who abhorred the quality of the (Decameron } and the misanthropy of Swift, and who praised the moral lessons of (Robinson Crusoe and (Macbeth.) Nearly all his criticism in these lectures shows a love of fundamental distinctions, as, for example, the chivalric spirit of Spenser as compared with the universal, impersonal spirit of Shakespeare; or the distinctions between the witty, the droll, the odd, the humorous, etc., as illustrated by Rabelais, Swift, Sterne and others. This idea of drawing fundamental distinctions, has had a great influence on succeeding criticism.*

*Even more characteristic of the Coleridge of this period was the series of essays called (The Friend. * This he intended to issue in January 1809, but he characteristically put it off until the midsummer. Thence it ran till March 1810. He attempted to publish it himself as a weekly periodical from the Lake district, but his prac¬ tical mismanagement was such that it rarely came out on time, and the scheme came to an end with the 27th number, long before he had reached his main point. The work was re¬ issued in 1818 with additions. The plan of the periodical, as well as Coleridge's conduct of it, foredoomed it to failure. Without regard to the work of his predecessors in the essay field, he attempted to treat philosophical questions and inflicted them on his readers with little variety and much diffuseness. The volume as it stands to-day contains three main parts deal¬ ing respectively with the laws of right thinking for the individual as an individual, the prin¬ ciples of political knowledge and the <(grounds of morals and religion and the discipline of the mind requisite for the understanding of the same.® These are separated by essays in a lighter vein entitled (Landing Places.* In spite, however, of the total lack of adaptation of the subjects to the tastes of his readers and to the periodical form, and his own unbusinesslike ways, the book as it now stands is regarded as containing much of Coleridge's most stimu¬ lating work, his best flashes of insight, and is,*

in particular, replete with those famous dis¬ tinctions, like that between reason and under¬ standing, truth and veracity, which have proved stimulating to the spirits of succeeding genera¬ tions. Much of its value lies in its point of view, which is that of an idealist who believes that motives are more important than results and that right thinking on all questions is bet¬ ter than action directed by mere prudence; and it lies also in his persuasive and winning style.

*More important than (The Friend, * indeed his most valuable work, is the (Biographia Lit- eraria.* This he projected and in a measure composed in 1815, but the happy results of his change to Gillman's home probably allow him to improve the form of the book for its publi¬ cation in 1817. His specific purpose, character¬ istically enunciated after the book was well under way, was to give voice to miscellaneous reflections suggested by particular events, to state his views on politics, religion, philosophy, poetry and criticism, and to settle, on principle, the controversy that had grown up about the (Lyrical Ballads.* On the philosophical side, the book amounts to a protest against ma¬ terialist views of the origin of ideas, and it is notable for its digressions and distinctions, as that important one, which he borrowed largely from Schelling, between the objective facts of the world and a self-sustaining and self-regulating consciousness, independent and indestructible. The critical ideas, brought out most vigorously in his classic criticism of Wordsworth, are more important, and are among the most influential ever enunciated by any English critic. Abandoning the formalism of preceding English critics, and eschewing the oracular dogmatism of contemporary reviewers, such as Jeffrey, he rested his critical case on (1) a theory of poetry deduced, not from au¬ thority, but from philosophy, logic, psychology, and what he called ((the nature of man® ; (2) on the actual phenomena as presented by the actual vogue of an author, a complete, rather than a partial, view of an author's production, the purpose of the author as revealed in the interpretation of his meaning, and an analysis of the qualities of his style; and (3) in a wholly impressionistic way, on a feeling for what is good in poetry — which last, indeed, is really his ultimate test. So far as can be seen by a comparison with such earlier critics as Dryden, Addison and Johnson, he pushed to a further degree than his distinguished prede¬ cessors his dependence on a theory of art and on philosophy, his reliance on analysis of quali¬ ties and his personal feeling for what is good ; and he is practically original among English critics up to his time in taking into account as necessary points of departure the vogue of an author and his purpose. He differs from such contemporary critics as Lamb and Hazlitt in not trusting, at least ostensibly, to feeling alone, and from De Quincey, in that the latter usually lays chief stress on what might be termed the intellectual contribution of an author. The more strictly autobiographical parts of (Bio- graphia Literaria> deal for the most part with Coleridge's intellectual experiences and the in¬ fluences to which he was subject.*

The remaining literary work of this period is of less importance. It comprises some desul¬ tory and comparatively colorless articles for the Courier in 1808 and 1811, chiefly against Bona-

parte, the recasting and acting (1813) with some success of his drama

The last named titles anticipate the chief subject of the so-called last period of Cole¬ ridge's career — his interest in theology and metaphysics. His writings on those subjects are embraced in three chief titles — (Aids to Reflection (1825), (On the Constitution of the Church and State (1830) and the posthumous Confessions of an Enquiring Spirit) (1840,*

written between 1824 and 1834). Though these writings probably did more than any other of the author's to give him the great reputation which he had in the contemporary and suc¬ ceeding generation, they add little to our knowl¬ edge of the great principles which dominated Coleridge's intellectual life. The (Aids to Re¬ flection, } his most important spiritual work, is a series of aphorisms designed to help the reader to think and feel rightly, that is, in an orthodox, Anglican way, on spiritual matters. In his own words, he aimed ((to direct the read¬ er's attention to the value and science of words — to establish the distinct characters of prudence, morality, and religion — to substan¬ tiate and set forth at large the momentous dis¬ tinction between reason and understanding — to exhibit a full and consistent scheme of the Christian Dispensation, and more largely of all the peculiar doctrines of the Christian Faith.® His point of view is characteristically theoret¬ ical, introspective and mystical, rather than ob¬ jective and historical, and his exposition is, as usual, fragmentary and unsystematic. (On the Constitution of the Church and Stated a more regularly sustained thesis, contains much the same premises, and is a piece of special plead¬ ing, ostensibly designed to show the people of England how to think and vote rightly on the question of Catholic emancipation. It is sub¬ stantially an argument in favor of the national Church. The (Confessions) is one of the most striking expressions of a well-known doctrine of the 19th century that the Bible, the only suffi¬ cient rule of faith and practice, is nevertheless not to be taken literally but in what Arnold later called a literary way and Coleridge here called < (according to reason.® The demonstra¬ tion of its truth is internal, not dogmatic. To this period also belongs Coleridge's (Table Talk, published after his death from the notes made by H. N. Coleridge between 1822 and 1834, and containing a rich and varied array of ob¬ servations, chiefly philosophic in character, from the most brilliant talker of the time.*

Critics of Coleridge are pretty well united in calling him one of the great sources of intellectual stimulus of his generation. His supporters, like Mill, point out the fundamental fact of his vast influence in fecundating the mind of his contemporaries. His detractors,

like J. M. Robertson, lay stress on his desul¬ tory habits of mind, his weakness of character and his vast plagiarism, ((unparalleled in lit¬ erary history.® The truth is probably that he so keenly and genuinely desired to find funda¬ mental principles and sanctions for belief and action that he

did not mind where he got his principles so long as they impressed him. Set¬ ting aside the question of his influence, his work (aside from his poetry) is, as it stands, remarkable for its avoidance of history in all its forms, of science as we know the term and for its confinement to the fields of philosophy, metaphysics, theology and criticism. In these fields it is almost wholly introspective, it con¬ sists of an examination of the contents of his mind and is noteworthy for an almost com¬ plete lack of sense for external fact. Within these limits, few writers have scattered broad¬ cast so many stimulating ideas ; his apothegms and pregnant sayings are enormous in number, as well as recurrent. Added to this is an acute logical sense for detecting flaws in the argu¬ ments of an opposing view, a feeling for axiomatic proof, and a style, which, though desultory and essentially a monologue, is often marked by grandeur and charm. See Ancient Mariner, The; Christabel; Kublai Khan.

Bibliography. — (The Friend) (London 1831) ; Cottle, Joseph, (Reminiscences of Sam¬ uel Taylor Coleridge and Robert Southey) (New York 1847) ; Shedd, (Complete Works of Coleridge) (1853) ; Calvert, G. H., Cole¬ ridge, Shelley and Goethe) (1880) ; Traill, H. D.,

(Golden Book of Coleridge (London 1909) ; Cooper, Lane, (The Power of the Eye in Cole¬ ridge* (1910) ; Coleridge, E. H., Complete Works of Samuel Taylor Coleridge* (1912) ; Knight, W. A., Coleridge and Wordsworth in the West Country* (London 1913) ; Wise, T. J., (Biography of Coleridge* (London 1913).*

William T. Brewster, Professor of English , Columbia University.

COLERIDGE, Stephen, English author and artist : b. 31 May 1854. He is a graduate of Trinity College, Cambridge. He has exhib¬ ited pictures at Birmingham, Leeds and else¬ where, is honorary secretary of the National Anti-vivisection Society, and has published (Demetrius (1887); cThe Sanctity of Con¬ fession* (1890) ; (Gloria* (1903) ; (Songs to Desideria* (1907); (New Poems* (1911); (Memories* (1913); (A Morning in My Li¬ brary* (1914).*

COLERIDGE-TAYLOR, Samuel, British composer: b. 15 Aug. 1875; d. 1 Sept. 1912. His father was a native of Sierra Leone and his mother an Englishwoman. He studied music under Villiers Stanford, and set three sections of Longfellow's poem ***Hiawatha*** *as a cantata. Among other of his compositions was (The Atonement,* and oratorio, and (The Blind Girl of Castel-Caille.**

COLES, Abraham, American prose writer and poet: b. Scotch Plains, N. J., 26 Dec. 1813; d. Monterey, Cal., 3 May 1891. In 1835 he was graduated from Jefferson Medical College, Philadelphia. He published 13 original

transla-

tions of the celebrated hymn (Dies Irae5 (1859) ; c01d Gems in New Settings> (1866); (The Microcosm,5 and (The Light of the World5 (1884). He also made metrical versions of many of the psalms.

COLES, Edward, American political leader: b. Albemarle County, Va., 15 Dec. 1786; d. Philadelphia, Pa., 7 July 1868. He was graduated from William and Mary College in 1807. He was Madison's private secretary from 1810 to 1816, and in 1817 was sent on a diplo¬ matic mission to Russia. Shortly after his re¬ turn to the United States he. removed to Illinois ; while living in Virginia he had owned slaves, but took them with him and liberated them, and soon became prominently identified with the anti-slavery party in Illinois. In 1822 he was elected governor of the State, holding that office till 1826. During his administration an attempt was made to amend the State constitu¬ tion in favor of slavery, but under his leader¬ ship the anti-slavery party carried on a vigorous campaign in opposition to the proposed amend¬ ment and decisively defeated it. After 1833 he lived in Philadelphia. Consult Washburne, (Sketch of Edward Coles.5

COLET, kol'et, John, English divine, founder of Saint Paul's School, London : b. Lon¬ don 1466; d. there, 16 Sept. 1519. His father, Sir Henry Colet, was twice lord mayor of London. About 1493 he set out to make a continental tour, and became acquainted with several of the most eminent men of the time, among them Erasmus and Budseus. While on the Continent he studied Greek, canon and civil law and the writings of the fathers. In 1496 he returned to England, and in the following year he was ordained, took up his residence in Oxford and lectured in Latin on Saint Paul's Epistle to the Romans. He was an ardent advocate of the new learning and an admirable Bible scholar. Erasmus was one of his audience at a later series of lectures on the First Epistle to the Corinthians, and from this time (1498) the two became warm personal friends. In 1505 Colet was appointed dean of Saint Paul's. With Sir Thomas More and ethers he urgently advocated the reform of cer¬ tain ecclesiastical abuses, but it is a mistake to suppose that he held anything in common with the spirit of the Protestant Reformation for which his work helped to a very considerable degree to pave the way. Saint Paul's School was founded and endowed by him in 1512, the earliest school in England in which Greek was a regular part of the curriculum. His writings are not numerous, but give good evidence of his learning and piety. In 1867-76 J. H. Lup- ton produced an edition of those of Colet's works not published during the 16th and 17th

centuries. The most recent biography is that by Lupton, J. H. (1887 and 1909) ; Seebohm, F., (Three Oxford Reformers: Erasmus, Colet and More> (London 1887).

COLET, ko-la, Louise Revoil, French poet and novelist: b. Aix, France, 15 Sept. 1810; d. Paris, 8 March 1876. She was the wife of Hippolyte Colet, a noted musical composer and professor in the Conservatory (1809-51). She went to Paris with him in 1835 and the follow¬ ing year she published her first book of poems, (Fleurs du Midi.5 # She was a very beautiful woman, passionate in her expression of thought, and gifted with wonderful faculties of expres¬

sion and depth of feeling. Her salon became one of the noted literary centres of Paris. She went the way of her day and her liaisons with noted men became notorious. Four times, 1839, 1843, 1852 and 1855, poems of hers were crowned by the French Academy. She was a graceful lyrist and often struck the chord of deep passion with effect. Of her verses, poured forth with marvelous facility, (The Woman's Poem5 is perhaps her best after the four offered to the Academy. Among her other poetical works are

COLEY, William Bradley, American sur¬ geon: b. Westport, Conn., 12 Jan. 1862. He was graduated at Yale in 1884 and at Harvard Medical School in 1888. He has been in prac¬ tice as physician since 1888, is attending sur¬ geon at the General Memorial Hospital and the Hospital for Ruptured and Crippled, and also professor of clinical surgery at the Cornell University Medical School. He is author of the article on ((Cancer55 in twentieth Century Practice of Medicine5 (1897) ; article on (

COLFAX, Schuyler, American statesman : b. New York, 23 March 1823; d. Mankato, Minn., 13 Jan. 1885. He removed in 1836 to Indiana, where in 1845 he acquired a newspaper at South Bend, which he made the most influen¬ tial Whig journal in the district. He was a delegate to the Whig conventions of 1848 and 1852 ; was elected to Congress in 1854 by the newly formed Republican party and re-elected until 1869, being thrice chosen speaker; and in 1868 he was elected Vice-President of the United States, in Grant's first term. Implicated, unjustly, as he and his friends claimed, in the Credit Mobil ier charges of 1873, he spent the remainder of his life in political retirement, making public appearances only on the lecture platform. He was the founder of the Daugh¬ ters of Rebekah branch of American Odd Fel¬ lowship.

COLFAX, Iowa, city in Jasper County, 22 miles east of Des Moines, on the Chicago, Rock Island and Pacific Railroad. The city has noted mineral springs and a public library. Coal min¬ ing and the bottling of spring water are the chief industries. The waterworks are munic¬ ipally owned. Pop. 2,524.

COLFAX, Wash., city, county-seat of Whitman County. It is situated on the Palouse River, the line of the Oregon Railroad and Navigation Company, and 80 miles south of Spokane. It is a trade centre for the products of the fertile, surrounding country; grains, lumber, fruits and live stock are the chief ex¬ ports. Manufactures are increasing. The

waterworks are owned by the city. It contains a hospital and fine courthouse. Pop. 3,027.

COLGATE, Austen, American manufac¬ turer : b. Orange, N. J., 12 Aug. 1863. He was graduated at Yale University in 1886. Im¬ mediately afterward he entered the firm of Col¬ gate and Company; in 1896 was admitted to partnership, and became vice-president of the company on its incorporation. He took a great interest in political events, gained a place in the councils of the Republican party, and has taken part in all important campaigns of recent years. In 1906 he was elected member of the New Jer¬ sey assembly and served in 1906-08 and 1909. Governor Fort appointed him chief of staff and his personal aide. He was also made Deputy Adjutant-General of the New Jersey National Guard, with the rank of colonel. In 1911 he was elected to the New Jersey senate, and was re-elected in 1914.

COLGATE, James Boorman, American financier and philanthropist: b. New York, 4 March 1818; d. Yonkers, N. Y., 7 Feb. 1904. He was for some years a member of the dry goods firm of Colgate & Abbe in New York, and in 1852 formed a partnership with J. B. Trevor as dealers in stocks and securities. To Colgate University (q.v.) he gave several buildings and an endowment of $1,000,000 called the Dodge Memorial Fund, and also gave to other institu¬ tions. For several years he was president of the New York Gold Exchange, of which he was one of the founders.

COLGATE, Samuel, American manufac¬ turer, brother of James B. Colgate (q.v.) : b. New York, 22 March 1822; d. Orange, N. J., 23 April 1897. He was a son of William Colgate, founder of the soap and perfumery house of Colgate & Company. Samuel Colgate succeeded his father as head of the firm, and continued his father's generous benefactions to religious, edu¬ cational and charitable enterprises. With his brother he erected Colgate Academy building in Hamilton, N. Y., at a cost of $60,000, and in recognition of their gifts to Madison Univer¬ sity, in the same place, the name of that institu¬ tion was changed to Colgate University (q.v.). He bequeathed to Colgate University a collection of

Baptist reports and literature, numbering 40,000 titles, in several languages, made during the many years he was president of the New York Baptist Education Society.

COLGATE, William, American manufac¬ turer: b. Kent, England, 25 Jan. 1783; d. New York, 25 March 1857. He came to America in 1795 and to New York in 1804, and became ap¬ prentice to a soap-boiler. In 1806 he established himself as soapmaker at 6 Dutch street, New York, and for half a century followed this busi¬ ness with an intelligence and industry that com¬ manded the largest success. He was one of the leading members of the Baptist denomination in New York and was distinguished for his zeal and liberality in all its missionary and educa¬ tional enterprises.

COLGATE UNIVERSITY, an educa¬ tional institution at Hamilton, N. Y., founded 1819 by the Baptist Education Society of the State of New York. The early name of the institution was the Hamilton Literary and Theological Institution. It was changed to Mad¬ ison University in 1846. In 1890 the name was

again changed to Colgate University. The uni¬ versity consists of two distinct institutions, a college and a theological seminary under the same corporate management. The theological courses of three years lead to the degrees of Bachelor of Divinity and Master of Arts. The college offers courses leading to the degrees of Bachelor of Arts and Bachelor of Science, pro¬ vision being made for graduate work for the corresponding master's degrees. The campus of the University comprises 220 acres, on which are 15 university buildings. The faculty num¬ bers 50 and the students 600. There are 75,000 volumes in the library. Endowment of the University is about $2,500,000; value of grounds and buildings about $1,000,000.

COLIC, in pathology, a painful affection of the intestines, especially of the large bowel or colon, whence the name. The pain is due to spasmodic and irregular contractions of the colon, and is felt chiefly in the region of the navel. It is of a severe twisting character, and comes on in paroxysms, occasionally so severe that the patient rolls and twists about, usually doubled up and grasping his abdomen, and not seldom groaning or crying. Constipation of the bowels usually accompanies colic, and the pain may give rise to vomiting. Often, however, severe colicky pains are the forerunner of looseness of the bowels, caused by some food which has disagreed. The pain may be caused by wind, the discharge of which affords great relief. There is no fever with the attack, but the pulse is usually lowered, and the face pale and anxious-looking. In this respect colic dif¬ fers from inflammatory attacks of the bowels. Pressure on the abdomen generally gives relief in cases of colic, but in cases of inflammation the patient cannot endure pressure. Whether the attack be one of colic or not may readily be learned from the attitude of the sufferer and the fact of his exerting or avoiding pres¬ sure. Treatment consists in applying hot cloths or bags of hot salt across the abdomen. Doses of medicine, such as castor-oil, should also be administered, and a large injection of water at a gentle warmth will probably bring relief.- In the case of an adult patient 30 drops of lau¬ danum may be given along with the castor-oil, or shortly after it. Magnesia and dill-water are also used as remedies for colic in young children. What is called biliary or renal colic is caused by the passage of gall-stones or kidney stones toward the bowel or bladder respectively. It occurs oftener in women than in men.

COLIGNY, ko-len-ye, Gaspard de, French soldier: b. Chatillon-sur-Loing, 16 Feb. 1517; d. Paris, 24 Aug. 1572. After a brilliant military career he was made in 1552 admiral of France. He was distinguished for valor in battle, for strict discipline and for his conquests over the Spaniards, in particular for his defense of Saint Quentin. When Saint Quentin was taken by storm, the admiral was made prisoner. After the death of Henry II, the intrigues of Catha¬ rine de Medici induced him to place himself at the head

of the Calvinists against the Guises. He formed so powerful a party that the Catholic religion in France seemed to be in danger. _ Conde was more ambitious, enterpris¬ ing, active ; Coligny more considerate, prudent and more fit to be the leader of a party; equally unfortunate in war with Conde, but skilled in

remedying even what appeared irretrievable losses, he was more to be feared after a defeat than his enemies after a victory. The first bat¬ tle between the Huguenots and Catholics (1562, at Dreux) was lost to the admiral, but he saved his army. When the Duke of Guise was mur¬ dered at the siege of Orleans, he was accused of being author of the murder. The civil war recommenced with increased fury in 1567. Coligny and Conde encountered the Constable Montmorency at Saint Denis. This indecisive action was followed by the battle of Jarnac in 1569, which was fatal to the Calvinists. Conde fell and the whole burden of command de¬ volved on Coligny. An advantageous peace seemingly put a stop to this contest in 1570. Coligny appeared at court, and was, with his adherents, loaded with favors. Charles IX gave him 100,000 francs as an indemnification for his injuries, together with a seat in the council. From all sides he was warned not to trust to these caresses. As the admiral was leaving the Louvre, 22 Aug. 1572, his right hand and left arm were wounded by a shot from a window. One Maurenal had fired at him from a building belonging to the monastery of Saint Germain l'Auxerrois, according to the plan of Catharine de Medici, probably with the knowl¬ edge of the Duke of Guise. Charles testified the deepest sorrow, caused search to be made for the assassin and said td Coligny, (

COLIIDiE. See Mousebird.

COLIMA, ko-le'ma, Mexico, state in the southwest of the United States of Mexico. It includes the four desert islands, Socorro, Rosa Partida, San Benedicto and Clarion, which form the Revillagigedo group. The northern section of the state is occupied by the slopes of the Colima volcanoes. The Armeria River flows through the state, and the Coahuayama is on the boundary. There are two lakes, Cuyu- than and Alcuzague. The climate, except in the mountainous region, is hot and unhealthful. Rainfall is abundant and malaria prevails. Salt, silver, gold, sulphur and copper are found; about 170 species of trees, including fruit, and trees, the parts of which are useful for tanning, dyeing, clothing, food and medicine. The chief products are coffee, cacao, tobacco, rice, cot¬ ton, indigo, sugarcane, cereal and leguminous plants. The principal industries are agriculture, stock-raising and working in the salt sections. Much of the trade is with the

other states of Mexico, especially those along the coast, but it has a growing trade with Germany, Hawaii and the United States cities on the Pacific. Ex¬ ports are rice, coffee, rubber, fruits, cabinet and dye woods, corn, hides and skins and minerals. Imports are woolen, linen and silk goods, food¬ stuffs, wines and liquors, glassware, firearms and ammunition. The Pacific Mail, Red Line, Izaquirre and the Sinaloa and Durango Railway

Company's steamers connect the port of Man¬ zanillo with other ports, foreign and domestic.

COLIMA, Mexico, capital of the state of Colima. It is situated in a fertile valley, which is irrigated by the Colima River. It is gener¬ ally well built and has fine plazas and a number of pretentious buildings, among which are the government building, the San Juan Hospital, the city hall, cathedral, theatre, the station of the Mexican Northern Railroad and a new market. It has an electric-lighting system, a street-car line, etc. The town has connections by rail and water with the port, Manzanillo, and is the seat of considerable trade. Colima was founded in 1523 by Gonzalo de Sandoval. About 40 miles to the northeast of the town is the volcano of Colima, nearly 13,000 feet high, which is constantly in a state of eruption. Pop.

25,148.

COLIN, Jean Lambert Alphonse, French general and military historian: b. 1864; d. 1 Jan. 1918. Educated for the army, he entered the artillery and had attained the rank of cap¬ tain when, in 1898, he published (Etudes sur la Campagne de 1796-97 en Italic. } This anony¬ mous essay on Napoleon's first campaign immediately attracted the attention of military historians and critics by its masterly style of narration, exactitude and criticism. The work became a classic and at once superseded all pre¬ viously-written accounts of that campaign. Cap¬ tain Colin was soon attached to the historical section of the French general staff and for sev¬ eral years a number of important works by him were published. (The Military Education of Napoleon) (1900) threw the first clear and full light on Napoleon's early studies and on the sources of his theory and practice in war. This was followed by a series of brilliant histories,

his death wounds. It is said that no European officer of our time equalled Colin in his mas¬ tery of the strategy and tactics of the great commanders.

COLIN CLOUT, a satire by John Skelton. It was a vigorous pre-

Reformation protest against the clergy's lack of learning and piety. Edmund Spenser adopted ((Colin Clout" as his nom-de-plume. Colin Clout is also the name of a shepherd in (The Shepherd's Week, a pastoral poem by Gay.*

COLISEUM, more properly COLOS¬ SEUM, a gigantic ruin in Rome, the greatest amphitheatre which Roman magnificence ever erected. It was commenced by Vespasian (reigned 69-79 a.d.), and practically finished by Titus about the year 80 a.d., who dedicated it with shows in which 5,000 animals were killed. It was built to furnish a place for amusements for the Roman people ; such as gladiatorial combats, fights with wild beasts and less harmless athletic sports. In the early days of Christianity it was the scene of the martyrdom of a number of Christians. It is said to have held 100,000 spectators, of whom aDout 87,000 were seated. For the greater part it consists of travertine, is elliptical in shape, 1,680 feet in circumference and 157 feet high, and has three rows of columns, one above the other: the lowest is of the Doric, the second the Ionic and the hightest the Corinthian order. The diameter of the arena from side to side was 182 feet, from end to end 285 feet. Down to the 6th century this monument of ancient grandeur remained almost uninjured, when Theodoric, king of the Goths, caused material to be taken from it for the construction of va¬ rious buildings; afterward Pope Paul II took all the stones from it, which were used for the construction of the palace of Saint Mark, and in later times some other palaces were erected from its fragments.

COLLAR-BONE. See Clavicle.

COLLARD, Charles Frangois Thomas,

Belgian sociologist and author : b. Louvain, 22 Oct. 1882. He was educated at the College Saint Pierre, Louvain, and at the universities of Louvain, Berlin, Bonn and Zurich. He stud¬ ied law, became a deputy justice of the peace and deputy royal prosecutor at Louvain and later deputy royal prosecutor at Brussels. He traveled in Germany, Holland, Italy and Swit¬ zerland and was secretary to the Congress of Administrative Sciences at Brussels in 1910. He also served as recorder or secretary to the Congress of the International Union of Penal Law at Brussels 1910; the International Con¬ gress of Children's Courts at Paris 1911, and the Congress for the Protection of Former Con¬ victs and Wayward Children, Antwerp 1911. He is a member of the International Union of Penal Law, the Society of Political Economy of Brussels and the General Society of Pris¬ ons of France. He has published (L'Education protectrice de l'enfance en Prusse) (1908) ; (Les tribunaux speciaux pour enfants (1911) ; (L'Institution et l'organization des tribunaux speciaux pour enfants) (1911) ; (Notice et tra¬ duction de la loi du 13 Juillet,*

1907, sur le con- trat de travail en Hollande) (1908). He is a member of the editorial staff of Revue de droit penal et de criininologie, and has con¬ tributed articles on sociology and economics to

(The Catholic Encyclopedia, La Re forme So- ciale, Revue sociale Catholique, Revue pratique de droit industries Jugendwohlfahrt, etc.*

COLLARED LIZARD, one of the iguanid lizards of the genus Crotaphytus. Its habitat is in the open country of the southwestern Uni¬ ted States from the Ozark Mountains to Cali¬ fornia. The name is derived from the double black collar around the neck of the species Crotaphytus collaris. This species is entirely insectivorous, can run rapidly and often on its hind legs alone. Another well-known species is the leopard lizard (Crotaphytus wislizenii), which is noted for its fierce disposition. It feeds on leaves, insects, young horned toads and smaller lizards even of its own species. In the breeding season both male and female un¬ dergo a change of color. Consult Ditmars, (The Reptile Book) (New York 1907).

COLLARS AND CUFFS, Manufacture

of. The collar trade, a distinct and important branch of the Agent's furnishing" industry, originated at Troy, N. Y., about 1825, when the wife of a blacksmith conceived the idea of making the first detachable collar. Prior to that time shirts had always been made with the collars and cuffs attached to them. The de¬ tachable collar soon became extremely popular, and, in 1829, Rev. Ebenezer Brown, who had retired from the Methodist ministry to estab¬ lish a dry goods store in Troy, opened a small collar factory.

As this branch of Mr. Brown's business in¬ creased very rapidly it was not long before he had several imitators. Somewhat prior to 1834 Montague & Granger erected a still larger fac¬ tory and devoted it to' this industry. About a year later Independence Stark began to make collars in quantities, and, about 1837, he opened an establishment for the laundering of collars, both his own and other manufacturer's make. This was the first (

The manufacture of detachable cuffs began in 1845. When in 1851 Nathaniel Wheeler, of the firm of Wheeler & Wilson, attempted to introduce his new sewing machine into the col¬ lar and cuff business, the makers laughed at him for his presumption in declaring that his invention would enable them to produce as good collars and cuffs at a cheaper cost than any human agency could sew them. Among all the Troy manufacturers only one, Jefferson Gardner, was willing to give the machine a trial. His experience was so satisfactory that within 12 months the other factories were supplied with similar machines, and one of the manufacturers, W. O. Edson, of the firm of Bennett & Edson, was

operating them by means of steam power.

The second great invention to which the amazing growth of the collar. and cuff industry is so largely due was the introduction of the button-hole sewing machine, in 1875.

A single collar will often pass through 25 different operations, each of which requires the attention of an expert in his particular line of the trade. The designing of patterns is also ex-

COLLATION

COLLEGE

pert work and there are sometimes many pat¬ terns for a single collar, each ply being cut to a different measure.

It is an extremely difficult matter to secure anything like reliable statistics relating to the collar and cuff industry, because, as an industry, it is of such recent origin that it was not hon¬ ored with a separate classification in any United State census report prior to that of 1900. More¬ over, as the making of collars and cuffs is carried on conjointly with the making of shirts by many of the big manufacturers, it is not easy to make a satisfactory arrangement of such data as may be obtainable. Of the sta¬ tistics published, however, those of the cen¬ sus bureau have met with the most favorable reception.

According to these figures, the total value of the collar and cuff product of the United States for the year ending June 1910 was $17,230,450. In the last census year no less than 22, 000,000 dozen collars and cuffs were made in the United States, of which more than 17,000,000 dozen were made in Troy, while of the 12,421 workmen who depended upon this in¬ dustry for their support, those who resided in Troy received over $4,000,000 in wages out of the total amount of wages paid in this industry in the United States, $4,912,316. The importance of the industry to the city of Troy is further indicated by the fact that, according to the same census reports, the collar and cuff fac¬ tories located there represent more than 31 per cent of the combined industrial interests of the city.

COLLATION. (1) In the canon law of the Anglican Church, the act of a bishop in ap¬ pointing a clergyman to a benefice (whether rectory, vicarage, canonry or prebend) when the living is ift his own gift through lapse or otherwise. In such a case the combination of the act of presentation and admission or insti¬ tution constitutes collation. In the Roman Catholic Church the word has much the same meaning when applied to the conferring of a benefice, except that some benefices are con¬ ferred by the bishop or some delegated ecclesi¬ astic; others, and in a few cases only, by special grant of the Pope, a king or an abbess. In several countries of Europe the right of con¬ ferring the higher ecclesiastical dignities is reg¬ ulated by a concordat between the Holy See and the respective governments. In English civil law collation means the bringing together of all the assets of an estate into a common fund for distribution among the heirs or next of kin. In England it is commonly known as hotchpot. Neither term is in common use in the United States.

(2) Collation, the name given to the re¬ stricted meal, sometimes permitted on fast days, usually food to the amount of about eight ounces or one-

fourth of an ordinary meal.

COLLECT (Collecta) in ecclesiastical lan¬ guage means a collection, as of alms, taken up during the church service; this is of apostolic origin, and Saint Paul mentions the collections for the saints taken up on the first day of the week. Used in still another meaning it signi¬ fied what collect still does in English, a brief prayer pronounced by the priest in celebrating mass after the Gloria.

COLLECTIVISM, a plan of social organ¬ ization in which the means of production and distribution in a community would belong to the people collectively. The term is also applied to the theory that society should be so organized. In the collectivist commonwealth the people co¬ operatively organized would have full control of production and distribution. Collectivism does not involve the abolition of all private property, but only of private property in the means of production. Collectivism is consid¬ ered by Socialists as the natural successor to the present social system, and is the form of organization which they seek to establish ; hence the term collectivism is often used as synony¬ mous with Socialism (q.v.).

COLLECTOR OF THE PORT. See

Customs.

*COLLEEN BAWN, kol'en ban, The, a noted play by Dion Boucicault. It was based on Gerald Griffin's novel (The Collegians) (1828) and was first played 10 Sept. 1860. The novel was republished in 1861 as c Colleen Bawn or the Collegian's Wife.**

COLLEGE (Latin, collegium) , in its pri¬ mary sense, a body of colleagues, a corporation or society of persons invested with certain powers and rights, performing certain duties or engaged in some common employment. In Great Britain and America some societies of physicians are called colleges. So, also, there are colleges of surgeons, a college of heralds, etc. Colleges of these kinds are usually incor¬ porated or established by the supreme power of the state. The most familiar application of the term college in English is to a society of per¬ sons engaged in the pursuits of literature or science, including both professors and students. At first the students of the universities had no common bond of union, except that of study and discipline, and were lodged where they could find it convenient. Then hostels or board¬ ing-houses were provided (principally by the religious orders, for the benefit of those of their own fraternity), in which the scholars lived under a certain superintendence. Chari¬ table persons subsequently endowed these hos¬ tels that poor scholars might have free lodgings. The colleges of Oxford and Cambridge are academical institutions of this kind, each en¬ dowed with revenues of its own, and having fellows,

students and tutors, who live together under a head, in particular buildings. Each college is regulated by laws framed by its founder, with such modifications as have been deemed necessary to introduce from time to time. According to these laws, the head (vari¬ ously styled master, principal, warden, rector, etc.), is either chosen by the fellows from their own number, or appointed by the Crown or other authority. The fellows are graduates who receive special emoluments for a term of years, and are generally elected to the position on account of special scholarship; while the scholars, admitted as undergraduates, are either chosen from particular localities, schools, etc., or elected according to merit after free competition. There are also a number of ordinary students, all as a rule occupying cham¬ bers belonging to the college. The under¬ graduates receive their instruction chiefly from tutors, who are generally resident fellows. The colleges are subordinate to the university, and it is the university that confers degrees,

and institutes and carries out the necessary ex¬ aminations. Generally speaking, the term col¬ lege implies an institution inferior to a univer¬ sity, so far at least as the right of conferring degrees is concerned; but in Scotland, Ireland, Germany and elsewhere there are no colleges such as those of Oxford and Cambridge, and the college or colleges in Scotland and Ireland are simply edifices in which the teaching is carried on. Some modern colleges are called university colleges, either because equipped similarly to a university, or because connected with a university, and able to train students for degrees to be obtained from that university. Institutions for teaching theology are often called colleges, and some schools that train pupils for the universities, or give a good secondary education, are also so called. In American usage college commonly indicates the stage of instruction intermediate between the high school and the university.

In France there are university colleges or facnltes in all large towns, besides lycees, corre¬ sponding to what are called, in Germany, gym¬ nasia. Other institutions of a similar kind, that is, schools for secondary education, are called colleges communaux. These are public establishments aided by the communes, and sub¬ ject to the direction of the public authorities. Besides these, there is the College de France , which deserves the name of a university. It was instituted in 1529 by Francis I, and here numerous professors, among whom there are always some of the most distinguished men, lecture publicly and gratuitously. See Ameri¬ can College; American University; Cam¬ bridge, University of; and articles on different colleges and universities.

COLLEGE, The American. See Ameri¬ can College, The.

COLLEGE OF THE CITY OF NEW YORK, The, originally entitled the Free Academy, was established in 1848 by the Board of Education of New York city. In 1854 the legislature of the State passed a law endowing the institution with collegiate powers and privileges ; and in 1866 the name was changed to that of <(The College of the City of New York.® The college is supported by the city and is open only to residents of the city, to whom instruction and the use of textbooks and ap¬ paratus are entirely free. It thus stands in the same relation to the city as the American State university to the State, being the uppermost member in the scheme of public instruction. About two-thirds of its students are drawn from the high schools of New York, and the remainder from the preparatory department of the college itself and from private schools. The requirements for admission and for the degree .are those of the ordinary American college. The degrees conferred are Bachelor of Arts and Bachelor of Science only, i.e., the college has no professional schools and no graduate department. None but male students are ad¬ mitted to the regular courses of the college, al¬ though its extension courses are open to all public school teachers of the city, whether male or female. From the time of its founda¬ tion to the year 1907 the institution was located at the corner of Lexington avenue and 23d street. In 1907 it removed to new buildings which had been erected for its use on the

crest of Washington Heights and which form, by virtue of their commanding posi¬ tion and their architectural beauty, one of the most dignified and splendid ornaments of the city. The number of students in attendance in October 1917 was 9,439, distributed as follows: Regular students (candidates for the bachelor's degree), day session, 1,623 and evening session, 791; in extension courses, 4,875; extra-mural courses, 250; preparatory, 1,900.

COLLEGE OF THE PACIFIC. See

University of the Pacific.

COLLEGE DRAMATICS. The co-opera¬ tion of the arts of the theatre with the arts and aims of pedagogy — an alliance which has the profoundest roots — may be summed up in a few words. Most religious and worshipful in its origin, the primitive theatre becomes, in some sort, a moving picture aid to the teacher in his character of mystic; then, because hi? public craves jˆet more reality, history re¬ peatedly gives us the view of the teacher-actor- dramatist evolving into the instructor of ethics (as distinct from mysticism), in a theatre within the Church itself, or within the School. At this point both Church and School conserve ; while the secular dramatists and actors, taking the general public with them into a freer and

often richer air of art, round out the humanities. Yet, observing that conservative educationists in all ages have been inclined to frown upon the theatre either as a frivolous amusement or a dangerous one, nevertheless in some form or another, high or base according to the times, toleration or lack of it, the mind of energetic youth has quite as stubbornly inclined to theat¬ rical performances. And youth has ever pre¬ vailed. Thus we must constantly view the union of the academy and the theatre from two stand¬ points: first, the pedagogic, and then the dis¬ tinctly theatrical. Oftentimes, as in ancient Greece, recitative or oratorical exercises have taken the place of a fuller expression of the dramatic instinct, but only as alternatives and palliatives. The plays of ˆEschylus, Sophocles and Euripides were used in the schools ; and Plato in (The Republic refers to their influ¬ ence. It is noteworthy that even he objected, on moral grounds, to the use of such master¬ pieces. But, of course, Time is not with Plato in this respect.

The Roman schools used plays as textbooks, and probably gave performances. Down the Middle Ages, the dramatic records are few and negligible. We have no evidence of a school theatre during this period till the 10th century, when Hrotsvitha, the Benedictine abbess in Saxony, wrote comedies after the manner of Terence, understood to have been performed in her convent school. But till the latter part of the 16th century plays and playing were mainly encouraged in the universities of western Europe for the purpose of Latin teach¬ ing. Even in this we see the beginnings of a development. Old form plays paved the way for the Neo-Latin plays of the schoolmen, until the Reformation made itself felt. At this day we have a survival in the Latin play of the Westminster School. Then, Latin falling out of general use, school plays came to be written in the vernacular. Italy, Holland, France, Ger¬ many and England were all exponents of school and university drama. Dutch scholars (led by Erasmus) gave the drama what was perhaps

the warmest welcome in the schools. France introduced Ravinius Textor, who, through the school drama, is said to have been the first Continental playwright to influence the English stage. At this period also the university intro¬ duced George Buchanan, the sturdy Scottish humorist, who was compelled to flee from Scot¬ land, where he wrote histories, to France, where he made plays. His (Jephthes> was <(the first classical tragedy written north of the Alps.® Montaigne played in Buchanan's school theatre, and writes his love and praise of his master in Essay I — 215 (Hazlitt edition). German school drama, more religious and probably more spectacular than that of other countries, be¬ came widely popular with the people. Schmidt tells us that the aim of the school drama was ((to gain a

mastery of the Latin language, to develop the pupil's oratorical powers, to picture vividly moral truths, to interest the pupils, parents and townspeople, to help pay the teach¬ er's salary and sometimes to develop a knowl¬ edge and love of the dramatic arts.®

Many illustrious youths took part in these plays all over western Europe. In England, Oliver Croimvell, according to his biographer, Heath, played Tactus, the sense of feeling, in a school drama on the Five Senses. Francis Bacon was a famous dramaturg of <(showes® at school and of masques at court; whence, doubtless, he drew the matter for his essay on (Masques and Triumphs. } Since then many a college man, pleading with cold authority, has leaned heavily on the words of his incomparable Elizabethan prototype : (Vol. VI) ; E. K. Chamber's (The Mediaeval Staged

Toward the end of the 17th century the academic drama passed out almost completely, although since that time occasional attempts have been made to revive the old spirit. These, however, have represented a tradition rather than any native genius.

During the later and less virile period of

school drama, when there was little joy in either the school or its drama, some amazing textbook compendiums in dialogue form passed into academic currency as plays. The 16th century, for example, contributes Rastell's 'Interlude of the Nature of the Four Elements) ; the 17th, Samuel Shaw's (Dramatized Rhetoric ; the 18th, a (History of England, by John Holmes, for the performance of his (Gentlemen of the Public Grammar School at Holt in Norfolk.* The least formidable of such works was the 'Scholo Ludus, or Gate of Tongues Unlocked,* by John Amos Comenius. No English edition of the book is known, which is not to be re¬ gretted, for even this, the top of all these pseudo-plays, is of a most forbidding texture in the original. But Comenius was a theorist with an open vision for all that ; and, with Daniel G. Morhof of those times, another worthy reformer, a staunch believer that "schooling can be advanced by the acting of plays.®*

In the 19th century, the neglect of the theatre by the universities opened the door to the wildest burlesques and other vagaries by the students themselves ; these impertinences being ignored by dignity while, to the shame of scholarship, the serious theatre was stubbornly opposed by prejudice. The experience of Ox¬ ford and of Harvard amateurs will serve to illustrate the state of the university world dur¬ ing this period. For the amusing details of these and other similar bodies — details that often have an earnest purpose behind them — consult (The Oxford Amateurs> ; the Harvard 'Hasty Pudding Club Theatricals ; the pam¬ phlet on 'The Fight for the Drama at Oxford) ; the entertaining article on the (Men Who Took Female Parts in Oxford [and Cambridge] Uni¬ versity Plays> ; 'Rise and Development of [American] College Musical Comedies) ; Col¬ lege Folk) [American], and other articles and books listed below. It is interesting to note that The Hasty Pudding Club is the oldest dramatic organization in the United States, hav¬ ing been established in 1795. Now, in these early years of the 20th century, the world-wide Renaissance of the living drama has again touched the academies and a new chapter of much promise begins.*

The first of the schools of England to revive interest in the ancient drama was Bradfield College under Dr. Gray, a modern among edu¬ cationists, who for 30 years as warden and headmaster has proved a valiant foe of dr}r-as- dust methods. Bradfield is as famous in Eng¬ land for its miniature Greek theatre, embowered among trees in a shady green hollow, as the University of California is in the United States for its fine theatre at Berkeley; and the per¬ formances at each are of equal note. Many other schools in England are following in spirit the lead of the distinguished classical scholar of Bradfield (consult his article in the English Review of Revieivs, listed below) ; and the movement is spreading over the whole English-speaking world. The first production of a Greek play in the United States was given by Harvard students in 1882. A full account has been written by one of the participants, Mr. Henry Norman, and illustrated by 15 excellent plates (Boston 1882).

At Harvard, Yale, the University of Califor¬ nia, at Stanford and other universities, an ex¬ cellent training is given, and many fine experi-

ments are made in all the arts dramatic. Classes are held on the technique of dramatiz¬ ing, prominence being given to modern dramatic writing. The Harvard Dramatic Club produces plays by Harvard graduates and undergraduates with the co-operation of a professional stage director of standing. Competitions are held, for glory and a prize of $500 — and a

production at the Castle Square Theatre. Several of these prize winners have already become known to play¬ goers. Some years ago the interior of Sanders Theatre, — the academic theatre of the univer¬ sity, — was remodeled into a replica of an Elizabethan Theatre under the supervision of Professors Baker and Langford Warren (the latter representing the architectural department of the university), for the performance of Mr. Forbes Robertson's (Hamlet 5 on the oc¬ casion of that distinguished actor's first repre¬ sentation of the part in America. Professor Baker also devised and directed, in co-operation with his students, the MacDowell pageant of Peterborough, N. H. A dramatic workshop within the university is famous throughout the country, and has trained and stimulated more than one man of superior talent for the wider scope outside its walls. At Yale University the main interests centre round the Dramatic Asso¬ ciation. The roots of this Society were planted in 1899, four years after a talk on the drama by Mr. Joseph Jefferson in the Art School, 2 May 1895. Professor Phelps suggested the formation of the association, and two plays were produced at the Hyperion Theatre. The plays were a success, and the undergraduates were thereafter allowed to maintain an organi¬ zation. Different in kind from the Harvard Hasty Pudding and the Princeton Triangle clubs in having a serious purpose, the Yale Dramatic Association was founded in the be¬ lief that the university is the natural cradle for the fostering of a better drama and for the encouragement of the new art of the theatre. Up to the year 1908, the Association took short Easter trips to such nearby towns as Hartford, Waterbury and Bridgeport. In 1908 the policy was changed and a long Christmas tour, the first of many such enterprises, was undertaken. In 1910 the Dramatic Association was incor¬ porated. Perhaps the most outstanding event in its history was the presentation by Miss Maude Adams at the Grand Theatre, of (What Every Woman Knows, 5 19 April 1909. The entire gate receipts of the play were generously contributed to the building fund for the Yale Theatre. This proposed theatre is to cost $250,000 ; of which amount about $20,000 has been collected. The plays already performed include Uphigenia in Tauris) ; (Troilus and Cressida) ; (An Ideal Husband) ;

and practical, offering courses in contemporary drama, and in modern dramatic technique, in addition to the usual historical courses.

At the University of California the new era in dramatic work began with the dedication of the Greek Theatre in 1903. Under the leader¬ ship of Prof. C. M. Gayley of the depart¬ ment of English the students have received so much scope and wise guidance that this uni¬ versity has become one of the chief dramatic centres of the nation. All productions are under the supervision of the musical and dramatic committee. The chief play-producing body, The English Club, is a student organiza¬ tion which in the spring and autumn of each year gives some noteworthy performance

in the Greek Theatre. The plays, since 1903, have in¬ cluded (King Shudrakas> ; (The Little Clay Cart,5 from India; (Abraham and Isaac) (a.d. 1316) ; ; Yeats's (The Countess Cathleen) ; , Bulwer-Lytton's (Richelieu5 ; Lawrence Housman and Granville Barker's (Prunella5 ; four of Shakespeare's comedies and his (Henry VP For the Shakes¬ pearean Tercentenary in 1916 a dignified produc¬ tion of (King Lear) was presented by the students in the Greek Theatre, without the usual stage settings and ˆbusiness.®

Stanford University dramatics date from the founding of the university in 1891. A few years later, an organization called the Sword and Sandals was founded for promoting the drama, and with a view to presenting a good standard or current play each year. This Society still exists as the mainspring of dramatic enter¬ prise in the university, and their plays have ranged from the Greek classics to (Seven Keys to Baldpate5 ; some of the more successful of these being (The Great Divide5 ; (Only Way5 ; (Men and Women5 ; (The Man from Home,5 and, in 1917, (Justice. 5 There are six other organizations for the production of plays given throughout the year, including a women's society, the ˆMasquers,55 and the junior class, which specializes on original opera. All dra¬ matic enterprise is governed by the dramatic council, composed of the presidents of the various student organizations concerned, faculty representatives, the student stage-man¬ agers and the professional director.

At Princeton University, the famous Tri¬ angle Club devotes itself entirely to light comedy; and each year presents an original musical comedy, produced entirely by the under¬ graduates. They write the <(book,)5 the music, the lyrics and plan the entire production. The Triangle Club usually takes an extended trip during the Christmas vacation, presenting plays in many of the larger cities under the auspices of the alumni associations. The Princeton Dramatic Association devotes itself to the pres¬ entation of plays of a more serious type under the direction of the faculty of the English de¬ partment. It has given such plays as Marlowe's (Dr. Faustus5 and (The Jew of Malta5 ; Mas¬ singer's (New Way to Pay Old Debts5 ; Beau-

mont and Fletcher's (Knight of the Burning Pestle' ; Shakespeare's ˆenry the Fourth' and (Comedy of Errors) ; Ben Jonson's (The Silent W oman' ; Ibsen's (Pillars of Society) ; Bernard Shaw's (Candida) and Moliere's (Les Femmes Savantes.'

At the University of Pennsylvania, in Phila¬ delphia, the most prominent dramatic event of the year is the Easter week production of the Mask and

W ig Club. For 30 successive years the club has staged a new play in the nature of an extravaganza or a burlesque, the book and music being written entirely by its mem¬ bers. About 100 undergraduates usually take part. Other dramatic events are the round of French, German, Italian, Old English and Greek plays by the various depart¬ ments. In May 1916 (The Comedy of Errors' was presented by the Philomathean Society in a specially constructed theatre modeled after the old Globe Theatre in London. This was one of the principal features of the Shakespeare Tercentenary celebrations in Phila¬ delphia in 1916. In the spring of 1915 a com¬ pany of English actors gave a fine production of (Iphigenia in Tauris) and (The Trojan Women' before an audience of more than 10,000 people. In June 1916 a production of Verdi's (A'ida' was attended by people from all over the country. This is said to have been the most magnificent open-air operatic event ever given in America.

Brown University has a reputation for good acting and shows enthusiasm in the cultivation of audiences beyond the usual academic circles. The Sock and Buskin Society gives spring and autumn productions of modern classical plays, and aims in particular to keep alive the best of the old comedies in English, and good farces.

The University of Vermont has for some years carried on the interest in dramatics with purely student undertakings, and with open-air performances under the strict supervision of the university. A club for men and another for women present old English comedies, Shakespeare and the modern drama, in both separate and joint productions. In addition, the modern language clubs read and produce plays.

At Dartmouth College the dramatic renais¬ sance has gathered up the best available talent among expositors and critics in New England. No college in the country has shown more energy in the way of dramatic art than Dart¬ mouth. On the practical side the professional coach was dispensed with, and the full responsi¬ bility for productions given over to the Dra¬ matic Association of the undergraduates. Within a year the Association had a repertory of 22 plays, not including those produced during the summer session. Every class of play, from Maeterlinckian gossamers to vaudeville sketches and Broadway melodramas, were presented.

The women's colleges of the United States are in no way behind the men's in their interest in the subject. At Vassar College, the Philale- thean Society aims to interest and instruct its members in dramatic art ; and all students are admitted on payment of dues. Five plays by the different chapters, called the Hall Plays, are given each year: Three major and two minor. The three major plays for the year 1915—16 are typical selections: (The Melting Pot,' (Deirdre of the Sorrows) and (The Tempest.' The Idler vol. 7 — 17 •'

Club of Radcliffe College gives six productions each year, mainly the works of modern drama¬ tists of the advanced school. Only one of these six productions is open to the general public ; but the final play of the year, usually presented out of doors, is repeated at Commencement. All the productions are staged, coached, cos¬ tumed, lighted, etc., by the girls themselves. A recent development is the competition for origi¬ nal plays, and the production of all that reach a given standard. Smith College is active — par¬ ticularly on the literary side — and has lent the weight of its patronage to the one Municipal Theatre in the United States, at Northampton. At Wellesley College dramatic events fall into major and minor classes. The former include the senior play given in June, and the two so¬ ciety plays usually performed in December. The minor events are the less formal plays of the year given by the ((Barnswallows," a social or¬ ganization which includes the entire college. The Bryn Mawr College has a tradition of act¬ ing that stands among the best of college work. Every year each class undertakes a production. The sophomores and the seniors are usually re¬ sponsible for a modern comedy; and the vaude¬ ville ((Freshman Show" and (

In the Middle West, the interest in dramatic work in colleges and universities is almost un¬ bounded. Ohio University, the oldest seat of higher learning in the <(01d North West," finds that no department of the university evokes a broader and deeper concern than the school of oratory, of which the Players Club is the out¬ growth. There is a course in dramatics giving a full knowledge of stage technique, with a view toward preparing young high school teachers and others for the demand for trained stage directors in the schools.

Oberlin College, Ohio, ever since its founda¬ tion in 1833 has held consistently that the fine arts are essential factors in a liberal educa¬ tion, and the drama came into its own here somewhat more thoroughly than in the majority of American colleges. Actual work is required for the Oberlin degree; and, in keeping with this fact, plans have been drafted for an even more fully equipped theatre than the college has at present. Greek, Shakespearean and modern plays are presented with completeness and integrity. Every detail, even to the most approved electrical equipment, is carried through by the undergraduates ; some of these students having had professional training in the scenic studios of New York and elsewhere. Through the enthusiasm of Dr. Philip D. Sher¬ man, the head of the department of English, Oberlin is kept directly in touch with the most advanced movements in the world's theatres; and all touring art-theatre companies are en¬ couraged to make a stand here.

Butler College, Indianapolis, within the last three years has developed a sound taste for theatricals, and particularly for opera, under the auspices of the I. T. S. Club, a secret order, now a chapter of Duzer Du. In the spring of 1916 Butler, DePauw University and Allegheny College united in what is hoped will be a move¬ ment for a national dramatic fraternity.

The department of English at the University of Minnesota, under the leadership of Prof. Richard Burton, is in close touch with the three undergraduate dramatic clubs of the university. These present a number of ((worth while® plays during the college year. A professional trainer is employed ; and the college sends out over the State, as part of the extension work, several good plays yearly. This work is recognized to be so vital that the actors are excused from examinations because of it. In 1915 this uni¬ versity opened a little theatre on the campus. It seats 300. Playwriting is taught in class, and the product of the students tried out in the theatre.

At the University of Nebraska in 1915 a de¬ partment of drama was organized which has shown extraordinary vitality, and is somewhat unique in its methods. Forty public productions were given in its own theatre and on the road. When expert in their work in this department the students are elevated to another company, the University Players. This is operated on the plan of a stock company, and a new play is shown every month at the Temple Theatre. The most successful of these plays are taken on the road for trips of from 2 to 10 days. Each branch of dramatic work has its group of students ; and an original play, with music written entirely by the undergraduates, is pro¬ duced every year. Nothing is more notable in the intellectual life of the Northwest than the theatre craftsmanship of the University of North Dakota, under the guidance of Prof. Frederick H. Koch of the English Department. Two original contributions to the movement toward a new drama are claimed by this centre : The first, a plan of communal authorship, by which a masque, (Shakespeare, the PlaymakerP was designed and written by a group of 20 students to commemorate the tercentenary of the death of Shakespeare ; and, the second, the establishment in 1914 of a new form of the open-air theatre, the Bankside Theatre, — a

narrow stream running between the sunken stage and the amphitheatre; the desired effect of distance being gained, while the acoustic properties are intensified by the frontage of water. The communal masque has been pub¬ lished in book form by the university. The dramatic movement at North Dakota has had an all round steady growth of 10 years. The Sock and Buskin Society is the focal point of the work and supplements the university courses. They have also an indoor theatre on modern lines, ((The Little Playhouse.®

In the colleges and universities of the South¬ ern States the new movement

has begun, as it invariably begins everywhere, with masques and pageants, many of these being carried out on a grand scale; the Shakespearean Tercen¬ tenary celebrations in the spring of 1916 serv¬ ing to initiate many Southern institutions into various forms of community drama. Perhaps the most conspicuous of the kinds were those of Greensboro College, N. C., and of the Uni¬ versity of North Carolina. The universities of Texas, of Tennessee and of the South are rapidly growing into centres of modern dra¬ matic art on the scale of the great Northern academies.

At Columbia University, New York, as in some few other universities, emphasis is laid on straight theory rather than on theory-cww- practice. The proximity of Columbia to the Metropolitan theatrical centre is deemed an im¬ portant argument against this particular univer¬ sity maintaining a theatre of its own. However, the department of public speaking does, in part, supply the lack of a students' theatre. The dramatic publications of this university are of special interest to students of the theatre, and Prof. Brander Matthews' theatrical museum is one of the sights of New York. (Con¬ sult Townsend, George, (Classic Plays in Holi¬ day Season,) 1910). As the amateur stage in¬ creases in strength and in credit, this work promises to become a still more important fea¬ ture of university life and work (consult Mack- aye, Percy, (Civic Theatre, } and a plea for the propagandist play in (Amateur Acting at Ox¬ ford and Elsewhere) by the Hon. and Rev. James Adderley in the Oxford and Cambridge Review, 1908. The University Theatre Associa¬ tion Plan, by Mr. Charles D. Coburn, is a plea from the professional standpoint). We may venture to speculate that it is only a question of a few years for the modern university to make the arts of the theatre and other fine arts as much a part of the curriculum as, say, medical or agricultural science.

Bibliography — College Plays: The Drama League . of America publishes a very useful descriptive list of plays (American, American Indian, Oriental, Classical, English, French and German) for college and high school production, prepared by the League's committee on plays for secondary schools and colleges, and the committee on plays for schools and colleges of the National Council of the Teachers of Eng¬ lish. There is also a (

one-act plays for School or College Dramatic Work with Notes on each Play) (in Quarterly Journal of Public Speaking, Chicago 1915); Dithridge, Rachel L., 'High School Plays) (Quarterly Journal of Public Speaking, Chicago 1915) ; Morris, E. B., 'College Comedies' (Philadelphia 1911); McFadden, Elizabeth A., (winner of prize play at Harvard) and Davis, Lillian, E., 'A Selected List of Plays for Ama¬ teurs and Students of Expression in Schools and Colleges; with notes' (Cincinnati 1908) ; a series of (Standard Plays for Amateurs in Girls' Schools and Colleges ' illustrated by many cos¬ tume plates, edited by Elsie Fogerty (of Bed¬ ford College, London) ; Barbee, Miss Lindsey, (Ed. The Crescent; National organ of the Gamma Phi Beta): (In the College Days; Twenty monologues of College Life and Folks' (Chicago).

Literature : Adderley, Hon. and Rev. J., (The Fight for the Drama at Oxford' (Ox¬ ford) ; Boas, F. S., 'University Drama in the Tudor Age' (Oxford 1914), (University Plays: Tudor and Early Stuart Periods-' (in (Cambridge History of Eng. Lit.' Vol. VI,

1910) ; Coburn, C. D., (The University Theatre Association ; a plan for the acted drama as a factor in higher education' (New York

1911) ; Dickinson, T. H., (The Case of Ameri¬ can Drama' (Boston 1915), contains descrip¬ tion of Greek Theatre at Berkeley, Cal ; Gofflor, L. V., (La Theatre au college du mo>en age a nos jours avec bibliographic et appendices,' preface by Claretie, J. (Paris 1907, Le Cercle Frangais de l'Universite de Harvard) ; Gar¬ rison, .L. M., (An Illustrated History of the Hasty Pudding Club Theatricals' (Cambridge 1897) ; Konrad, Karl, (Die Deutsche Studen- tenschaft in ihrem Verhaltnis zu Buhne und Drama' (Berlin 1912) ; McConaughy, J. L., (The School Drama' (Teachers' College Co¬ lumbia University: Contrib. to Educ. No. 57); Mackay, Constance D., (Costumes and Scenery for Amateurs' (New York 1915), includes chapters on every branch of new stage art, and a plan for the making of a small Greek Theatre by experimenters with limited means ; McKinnon, A., (The Oxford Amateurs A short history of theatricals at the University' (London 1910) ; Norman, H., 'The Harvard Greek Play' (Boston 1882) ; Schmidt, Karl, 'Die Biihnenverhaltnisse des deutschen Schul- dramas' ; Townshend, G., 'Classic Plays in Holiday Season' (New York 1910).

Periodical Literature : 'Bryn Mawr May Day Revels' (in the Outlook , 21 May 1910) ; 'The Greek Theatre at the University of Cali¬ fornia' (in the Outlook, 1 Aug. 1910) ; 'Greek Tragedies in the Stadium of the College of

the City of New York' (in Theatre , Vol. XXI, 1915) ; 'Hist. Pageant of Illinois as given at the Northwestern University' (in the Outlook, 22 Jan. 1910) ; 'Men who took Female Parts in Oxford University Plays' (in The Strand, December 1909) ; 'The National Drama and the University Towns' (in New York Nation, De¬ cember 1905) ; Adderley, Hon. and Rev. J., 'Amateur Acting at Oxford and Elsewhere' (in Oxford and Cambridge Review, No. 3, 1908); Bergengren, R., 'Elizabethan Theatre at Harvard University' (in New York Theatre, December 1907) ; Brown, K. S., 'College Dra¬ matics' (in New York Green Book Album, January 1911); Everitt, Ruth, 'The Catholic

College Play' (in Werner's Magazine, New York, Vol. XXV, p. 513, 1910) ; Gaige, R. C., 'Stag¬ ing a College Play' (in Cosmopolitan Magazine, Vol. XXXVII, p, 227, 1904) ; Gray, Dr. H. B., 'Greek Plays at Bradfield College' (in Review of Reviews, London 1914) ; Koch, F. H., 'Ama¬ teur Values in Pageantry (Quarterly Journal of Public Speaking, University of Chicago, Oc¬ tober 1915) ; Lederer, A., 'A History of Co¬ lumbia Dramatics' (in Columbia University Quarterly, Vol. IV, 337; Vol. V, 174) ; Merrill, Catherine, 'The Art of Drama in Colleges' (in Education, March 1906) ; Moderwell, H. K., 'Students in a Greek Play' (in New York Theatre, October 1912) ; Pierce, Lucy F., 'Rise and Development of College Musical Comedy' (in Green Book Album, October 1910) ; Stuart, J). C., 'The Endowed Theatre and the Univer¬ sity' (in North American Review, November 1911). See Amateur Theatrical; Community Drama; Festival; Outdoor Theatres and the references under those headings.

Duncan Macdougall,

Formerly Lecturer on Public Speaking at Saint Andrew's College, University of Sydney, Australia; and Lecturer for the Department of Education , New York.

COLLEGE ENTRANCE REQUIRE¬ MENTS. A term among the institutions of higher learning covering the moral, physical and intellectual qualifications deemed prereq¬ uisite for the enrolment of a student in a particular course or department. The moral requirement is generally not more than a state¬ ment of good character from some responsible person in behalf of the candidate. The physical requirements are usually the attainment of the minimum age of 17 years (variable in different institutions, and waived often in case of excep¬ tional students who have attained the intellectual requirement at an earlier age) ; and soundness of body and mind. The intellectual requirement embodies the main problem of college admission. It includes the satisfactory completion of a group of studies based on the work at a school of recognized standing. For convenience, this academic work is divided into units, each of which expresses about one-fourth of a year's work in a preparatory school or high

school. Thus the subject of plane geometry is estimated at one unit, and four books of Caesar at the same value. The number of units for entrance varies usually from 14 to 16. The subjects for admission are divided into two groups: (1) Specified subjects ; (2) elective subjects. From two to three years' study of English is usually specified ; algebra, plane geometry and a year or more of foreign language. The full quota of units is made up of electives, which include studies in history, science, mathematics, lan¬ guage, economics, music, drawing, and the manual and industrial subjects. The admission to technical courses specified some previous scientific knowledge also. The requirements are most diverse, some institutions admitting students by examination only (such as Bryn Mawr, Columbia, Harvard, Haverford, Prince¬ ton, Radcliffe, Stevens, Yale); others by pres¬ entation of certificate from a recognized sec¬ ondary school ; some on probation iipon the recommendation of high school principals. A great majority of colleges admit students on certificates, a system which in many instances

includes an intelligent inspection of the schools from which certificates are acceptable. Students are usually admitted to college under one of three general classifications: (1) Regular stu¬ dents who have fully met the requirements and are candidates for a degree ; (2) conditioned students, or those who have failed by a small margin to meet the full requirements, but who are admitted as candidates for a degree; (3) special students or those who do not meet the regular entrance requirements, but who, usually on account of maturity of years, are deemed qualified to enter certain courses, and are not candidates for a degree. There is a general tendency at present to restrict the admission of special students, as many of these in the past have made use of this means of entering college life to enjoy its pleasures without any commensurate exertion on their part. The pur¬ poses of making a standard for entrance are (1) to eliminate the unfit; (2) to keep the secondary schools vital and purposeful.

The history of college entrance requirements dates back to Harvard 1642, where a speaking knowledge of Latin, ability to make Latin verse and a thorough grammatical education in Greek were the only requirements. These remained unchanged until 1734, and even then were modi¬ fied only a very little, when a knowledge of the rules of Latin prosody was substituted for a speaking knowledge of Latin. In 1745 Yale added common arithmetic and the other col¬ leges soon followed its example. With the es¬ tablishment of the academy as the dominant secondary school in place of the old Latin grammar school, there came the enlargement of the curricula of both schools and admission requirements. Geography was

added in 1807 ; geometry, history, algebra and foreign lan¬ guages followed in its wake. As late as 1897, however, 402 of the 432 colleges in the United States required Latin and 318 Greek. Since then the expansion has been along the lines of English and sciences. There is at present much diversity in requirements for entrance.

Until a comparatively recent time, examina¬ tions for entrance were general. But with the widening of the college and high school curric¬ ula, the introduction of the elective system and the absorption of the academies into the public school system, the old division between the secondary schools and colleges tended to break down. In 1870 Michigan began the system of accrediting schools (adopted from the Prussian State system) from which pupils might be ad¬ mitted to colleges without further examination. This plan has been adopted by all of the col¬ leges and universities except a few of the more conservative ones, listed above. The certify¬ ing body varies. Sometimes it is the college or a group of colleges. In New York, Minne¬ sota and elsewhere certification is con¬ trolled by the State. The admission by certificate from schools does not include those students from non-accredited schools, nor those prepared by private tutors. The argu¬ ments in favor of this form of admission are: That it brings a close union between school and college; that it lifts the high school standard; that it equalizes instruction in high schools for students not preparing for college; that the evil of cramming for examinations is obviated

and the student studies the subject per se; that the record of four years' work is a fairer test than examinations taken under strange con¬ ditions; that it secures a better grade of pupils than the examination system. Those in favor of the examinations argue that they raise the standard of work in secondary schools ; keep the college up to a high standard of admission ; that they really test the student's proficiency; that even though conducted under strange and unusual conditions, they do not rate the student unfairly; that the privilege of certification is abused by principals ; that competent inspection of secondary schools being difficult and costly, poor schools often remain on the list; and lastly, that examination procures a better type of student for the college. All of these argu¬ ments are matters of opinion, and remain to be proved.

One of the most effective and far-reaching movements in this whole field is the work of the College Entrance Examination Board, an association of colleges and preparatory schools for the purpose of establishing: (1) A fair degree of flexibility in high school and college curricula and college entrance requirements ; (2) uniformity in standards of high school and college; (3) adequate and uniform administra¬ tion of policies. The first effort grew out of a conference of New England colleges in 1879, since

when it has enlarged its work and scope considerably. Various local college entrance examination boards have been formed, central¬ ized under the National Conference Committee on Standards of Colleges and Secondary Schools, composed of delegates from the .various boards, and the United States Commissioner of Education. This committee publishes a state¬ ment of the ground which should be covered by secondary schools and arranges for an im¬ partial marking of examination papers. Its report for the year 1915-16 shows the excellent progress of the accredited school system of ad¬ mission. A modified plan, which involves both certification and examination, was adopted as an alternative by Harvard in 1911, by Prince¬ ton and Yale in 1915. In June 1916, the ex¬ aminations prepared by the College Entrance Examination Board were adopted as the stand¬ ard of admission for all colleges represented on the Board. The advantages of this centraliza¬ tion are: (1) That the papers embody a wider range of preparatory training; and (2) it gives the university a much wider distribution of its examination papers. The new method will go into effect at Mount Holyoke, Smith, Vassar and Wellesley in 1919.

Bibliography. — Broome, (College Entrance Requirements> (New York 1903) ; Eaton, Col¬ lege Entrance Requirements (Boston 1893-94, 1900) ; Henderson, J. L., (Admission to College by Certificate* (New York 1912) (contains a good bibliography) ; Nightingale, A. F. (in School Review, Vol. V, p. 449, p. 343; Vol. VI, p. 344;. Vol. IX, p. 316; Vol. Ill, p. 92, Vol. V, p. 233) ; Harvard Reports on English (Cam¬ bridge 1896) ; Modern Language Notes (Vol. XIII, p. 259) ; Mann, C. R., (in Education Re¬ view (Vol. XLVIII, p. 150). Consult also the various publications of the College Entrance Examination Board and the Fourth Annual Re¬ port of the Carnegie Foundation for the Ad¬ vancement of Teaching.*

COLLEGE DE FRANCE, kol-lazh de f rans, _ a celebrated institution founded by Francis I between 1518 and 1545, originally a College de Trois La)igues or a college in which would be taught Greek, Hebrew and Latin, is a. Yery important educational institution, now giving instruction over a very wide field of literature, history and science. The University of Paris at various times sought to gain con¬ trol over it but it managed to maintain its in¬ dependence and its activity has been continuous since its foundation. It is distinguished for its freedom of teaching and its encouragement of scientific research. It is under the charge of the Minister of Public Instruction. It is inde¬ pendent of the University of France, is under the direct supervision of the Minister of Public Instruction and is supported by the government. As in the Sorbonne, the lectures are gratuitous, and for the most part are designed to attract auditors older than

ordinary university students. No examinations are held, and no diplomas given. The college comprises two faculties, one literary, one scientific; each has about 20 pro¬ fessors. Among the professors have been some of the most distinguished scholars and sci¬ entists in France, such as Laboulaye, Gaston de Paris, Saint-Hilaire, Ramus, Gassendi, Sylvestre de Sacy, Renan, Michelet, Rollin and others.

COLLEGE FRATERNITIES. See

Greek Letter Societies.

COLLEGE OF WOOSTER, The, at

Wooster, Ohio, was chartered in 1866 as The University of Wooster and was renamed in 1914. It was founded by the Presbyterian Synod of Ohio, which elects its governing board of trustees. The 100-acre, hill-top campus is of unusual beauty. The buildings, because of the burning of the original building in 1901, are all modern and cost over a million dollars. The productive endowment is about a million and a quarter. The library has 43,000 volumes. In the four college classes are 299 men and 218 women. Students in the academy number 178. The teaching staff numbers 51 ; the graduates to date 1,954.

COLLEGES, Land Grant, colleges estab¬ lished and maintained in whole or in part by the Land Grant Act of 2 July 1862. Justin S. Morrill, a representative from Vermont, intro¬ duced in Congress the first bill asking that grants of government land be donated for the purpose of aiding in the education of the peo¬ ple, in scientific and technical subjects. This bill, introduced in the lower House 14 Dec. 1857, authorized the establishment of colleges of agri¬ culture and mechanical arts in all States, and provided for the support of said colleges, 20,000 acres of land for each senator and representa¬ tive. The bill passed both Houses but was vetoed by President Buchanan. In December 1861 Mr. Morrill introduced a new bill, bestow¬ ing 30,000 acres of land for each member of Congress for the establishment and maintenance of industrial colleges. Ben Wade, of Ohio, introduced the bill in the Senate. The House committee on public lands made an adverse re¬ port, but the bill passed both Houses and was approved by President Lincoln 2 July 1862. This act gave to the cause of industrial educa¬ tion 30,000 acres of land for each senator and representative in Congress to which the States were entitled by apportionment of the census of

1860, or in all, about 13,000,000 acres of land for educational purposes. The act was entitled <(An act donating public lands to the several States and Territories who may provide col¬ leges for the benefit of agriculture and mechani¬ cal arts.® The object of the act is expressed as follows :

((The endowment, support and maintenance of at least one college where the leading ob¬ jects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the indus¬ trial classes in the several pursuits and pro¬ fessions of life.®

In 1889 Mr. Morrill and others began to form plans to secure another appropriation, and Mr. Morrill introduced another bill in Congress, providing that there shall be appropriated an¬ nually to each State, out of the funds arising from the sale of public lands, the sum of $15,000 for the year ending 30 June 1890, and an annual increase by the additional sum of $1,000 to such appropriation for 10 years thereafter until the appropriation shall become $25,000, at which figure it shall remain fixed. The bill passed both Houses and was approved by President Harrison 30 Aug. 1890. The act says that this appropriation shall be applied (

The Act of 4 March 1907 amended the Act of 1890 by increasing the yearly appropriation and extending the conditions for its use. The benefits of the Act of 1862 or of later acts in lieu of it are received by 48 States, and 53 in¬ stitutions are thereby aided — one in each of 43 States, two in Massachusetts and Missouri and one colored and one white institution in Missis¬ sippi, South Carolina and Virginia each. The appropriation is now fixed at $50,000 to each of the 48 States and the two insular possessions, Hawaii and Porto Rico, and aids 69 institutions; 17 States maintain special colleges for colored students, which receive aid from this fund.

The reports for the year ending 30 June 1914 received by the commissioner of education from the presidents of the land grant colleges show that the States have received 10,931,267 acres of land, of which 910,586 acres remain unsold. The invested funds from the sale of the land and other sources of revenue give their schools and colleges a total annual income of approximately $38,559,397.

The total number of students in the agricul¬ tural and mechanical departments was 115,054. For information in detail about each land grant college, consult (Report of Commissioner of Education) (Vol. II, Washington 1915).

COLLEGES FOR TEACHERS, or col¬ leges in which are special departments for the study of the history of education, psychology as applied to teaching, pedagogy, and all subjects bearing upon methods of instruction.

To the English schoolmaster, Richard Mul- caster, is given the credit of being one of the first, if not the first, to propose a college for the training of teachers. He classified his. chief reasons for desiring the establishment of such a school under four heads: (1) Importance of the work, it will make or mar the State; (2) The great numbers who are to teach and be taught;

(3) Need of the profession of teaching, professors must be trained; (4) That teachers may acquire wisdom is arranging and present¬ ing subjects, in economizing time and that they may attain staidness of demeanor.

Instruction in the science and art of teach¬ ing was included in the university scheme that was proposed for Columbia College in 1858, but then without avail. Again President Barnard urged upon the trustees of the same college in 1881 and 1882 the same plan, wdiich he had now worked out much more fully. The next step forward was the organization in New York, in 1888, of Teachers' College, which was chartered the following year. While this college was or¬ ganized outside of the Columbia system, it was still under the control, in great part, of Colum¬ bia men, and was loosely affiliated with the college. The last step in the evolution came in 1898, when Teachers' College was made an integral part of the educational system of Co¬ lumbia University. The president of Columbia is president also of the college, and the univer¬ sity professors of philosophy and education and of psychology are members of its faculty, while the college is represented in the university coun¬ cil by its dean and an elected representative. The college, however, continues its own sepa¬ rate organization, having its own independent board of trustees, which is charged with the sole financial responsibility of its management.

Teachers' College is the professional school of Columbia University for the study of edu¬ cation and the training of teachers, ranking with the schools of law, medicine and applied science. The university accepts courses in edu¬ cation as part of the requirement for the de¬ grees of A.B., A.M., and Ph.D. ; while graduate students who prefer to devote their entire time to professional study may become candidates for the higher diploma of the college. The col¬ lege diploma is conferred upon students who have successfully completed some one of the general courses, and a departmental diploma upon those who have fitted themselves for particular branches of school work. Under¬ graduate students of Columbia and Barnard colleges may, if they desire, obtain the diploma of Teachers' College at the same time that they receive the degree of Bachelor of Arts. The Horace Mann school, fully equipped with kin¬ dergarten, elementary and secondary classes, is maintained by Teachers' College as a school of observation and practice.

These are the undergraduate courses : Secondary course leading to the degree of A.B. and the college diploma ; general course lead¬ ing to the college diploma in elementary teach¬ ing; general course leading to the college diploma in kindergarten teaching. Then there are several courses leading to the college diploma in art, domestic art, domestic science and manual training. Candidates for the first of these courses must be either college graduates or candidates for the degree of A.B. in Colum¬ bia

University. There is a combined course of

study prescribed for the degree of A.B. in Columbia University and the diploma of Teachers' College. Graduate work is also well developed. The Extension Department, which was established in 1902, since when it has in¬ creased wonderfully in importance, furnishes afternoon and evening courses for those whose occupation prevents them taking the regular course of study. The Speyer School and the Horace Mann high, elementary and kindergarten schools are equipped and used by the college as schools of observation and practice. The col¬ lege possesses an educational library of over 60,000 volumes, an extensive educational museum and a residential building, Whittier Hall, pre¬ sented to it in 1908. In the following year the School of Household Arts, costing over $500,000, was opened. In 1918 the college buildings and grounds were valued at about $4,000,000. It had 230 instructors and 4,883 students, in its college and related work. For the year 1898-99 the teaching staff counted more than 60 persons.

New York University School of Pedagogy, established in 1890, aims to furnish graduate work equal in range to other professional schools. The school is an organic part of the university, having its own dean and faculty. More definitely, its aim is declared to be to furnish thorough and complete professional training for teachers. The plan of the school places it upon the same basis as that of the best schools of law, medicine and theology. The work is of distinctively university grade, and graduates of colleges and normal schools, and others of equal experience and maturity, may find in this school opportunity for the thor¬ ough study of higher pedagogy. In 1898-99, the instruction was distributed in four major and eight minor courses, namely, history of education ; physiological and experimental psychology ; analytical psychology ; history of philosophy; physiological pedagogics; elements of pedagogy; comparative study of national school systems ; aesthetics in relation to educa¬ tion ; sociology in relation to education ; in¬ stitutes of pedagogy, ethics, school organiza¬ tion, management and administration. Special facilities for research are offered to the semi¬ naries. The degree of Master of Pedagogy is conferred upon candidates who have completed five of the foregoing courses, three of them majors; the degree of Doctor of Pedagogy upon candidates who have completed the four major and five of the minor courses.

Clark University, opened in 1889, has given much attention to education from the first, and the subject has now been made a sub-depart¬ ment in the department of psychology, in which a minor may be taken for the degree of Doctor of Philosophy. The work is intended to meet the needs of those intending to teach some other specialty than education, but who wish a general survey of the history, present state, methods and recent advances in the field of university, professional and technical education, and of those

who desire to become professors of pedagogy, or heads of instruction in normal schools, superintendents, or to become profes¬ sional experts in the work of education. Great stress is placed on original investigation. The president, Dr. G. Stanley Hall, has been the leader of the child study movement in the United States. The Pedagogical Seminary is the organ of the educational department of

the university. It is an international record of educational research and literature, institu¬ tions and progress, and is devoted to the in¬ terests of education of all grades.

The department of pedagogy in the Univer¬ sity of Chicago has as its primary aim to train competent specialists for the broad and scien¬ tific treatment of educational problems. The courses fall under three heads: Psychology and related work, educational theory and the best methods of teaching the various branches. Stress is laid upon the relation of pedagogy to other subjects, and courses are offered in the proper departments in which the methodology of such subjects is employed.

The University of Chicago has also estab¬ lished a college for teachers on a somewhat novel plan. This institution, which was founded in October 1898, is an outgrowth of the class study department of the extension division of the university. It is a <(downtown® college, and aims to provide instruction of high grade for busy people; or, more definitely, ((for any and all persons qualified to do the work, who are so engaged by other imperative duties as to make continuous attendance at the other colleges of the university impracticable.® The work of the college is of the same grades as that of the other colleges of the university. See Chicago, University of.

The University of Wisconsin school of edu¬ cation is an expansion of the former department of education. The four main lines of instruc¬ tion are the history, the philosophy, the science and the practice of education. The school aims to afford practical instruction to intending teachers, professors, principals and superintend¬ ents, and to those students who desire to pur¬ sue studies and investigations in the science of education.

COLLEGES FOR WOMEN. Three types of the collegiate education for women in the United States prevail. The first in time and in popularity is known as coeducation ; the second, as separate education ; and the third, as co-ordination in education. Under the first form, men and women are educated together under identical conditions ; under the second, women are educated by colleges founded and administered for them as women; under

the third, there are established in the same univer¬ sity two colleges, one for men and one for women. The third form is subject, however, to considerable varieties in administration.

The first college founded for both men and women was Oberlin. Its charter was granted in 1834. The college was the result of the philanthropic and missionary movements of the first decades of the last century. The town and the Institute, as the college was called for about a score of years, were closely allied. In the first circular published regarding the institution, it was said that among its great objects was the extending of the benefits of the most useful education to <(both sexes.® ((The elevation of female character® was also noted as a purpose. The giving of a college education to both men and women together was not a primary thought. The primary thought was to offer the best education to women. The conditions obliged the giving of the education to both sexes upon equal terms. In the first year of the college, 40 women were enrolled, Few of them were

fitted, however, to pursue college studies. A preparatory department was formed. In 1837 four women offered themselves as candidates for college rank. Their classification was more or less irregular. At the commencement of 1841 three women received a degree, the first women to receive a degree in arts in the United States. For about a score of years Oberlin alone received women into its classes on the same terms, substantially, as those on which it received men.

The second step in the education of men and women together was taken 20 years after the beginning was made at Oberlin in another Ohio town. Antioch College, in Yellow Springs, was founded by Horace Mann in 1852. In his inaugural address Horace Mann declared him¬ self heartily in favor of what is now known as coeducation. He affirmed that coeducation is the only method to be pursued, at least for many years, on the ground of its relative inexpensive¬ ness. He believed that social intercourse be¬ tween young men and women would prove ad¬ vantageous to each, preventing manners from becoming rude and sentiments coarse. He be¬ lieved that the peril of forming undesirable at¬ tachments is less under academic than under ordinary social conditions.

The beginning thus made in two Ohio col¬ leges advanced rapidly. Its chief field of growth lay in the universities founded by the various States. In 1856 Iowa, in 1866 Kansas, in 1868 Minnesota, in 1871 Nebraska, founded universities for both men and women. The University of Indiana, founded in 1820, was in 1868 opened to women. The universities of Michigan, of Illinois, of California, of Mis¬ souri, were open to women in 1870, and the Ohio State University three years after. In 1874 Wisconsin adopted complete coeducation. At the present time every State university, ex¬ cepting three or four, is open to women.

The older parts of the country approached the question of the education of women through the establishment of new colleges for them. It was easier to found colleges for women than to adjust colleges already organized for men, and whose conditions and traditions were estab¬ lished, to the admission of women. Yet Mid- dlebury, Colby and other colleges were opened to them ; and Boston University, Bates in Maine and Cornell in New York were coeducational cither in the beginning or soon after. The founders of the four more eminent colleges for women in the seventh and eighth decades of the 19th century were moved by the same pur¬ pose. They desired to establish institutions which should give to women an education as good as the older colleges were giving to men. The purposes of Matthew Vassar, of Sophia Smith, of Henry F. Durant, the founder of Wellesley, and of Dr. Joseph W. Taylor, the founder of Bryn Mawr, were alike slow in fruition. In the year 1845, at the age of 53, Matthew Vassar decided to devote a large por¬ tion of his estate to some benevolent purpose. It was not until 20 years after that Vassar Col¬ lege was opened to students. In the year that Vassar received its acts of incorporation Sophia Smith began to think of the establishing of a college for women. The college was_ incor¬ porated in 1871 and opened for students in 1875. In 1864 Henry F. Durant, losing by death an only son, determined to use a part of his estate

in philanthropy. In 1870 the institution was in¬ corporated as the Wellesley Female Seminary ; three years after the name was changed to Wellesley College, and in 1877 the college was authorized to grant degrees. For many years Dr. Joseph W. Taylor considered the question of devoting his estate to the education of women.

In these endeavors for the higher education of women help was derived from a foundation laid at Elmira in the year 1855. But the foun¬ dation was not adequate for offering the train¬ ing which women were desirous of receiving. Its chief value, therefore, lay in the incentive it gave rather than in its actual educational achievement.

The general purpose and conditions under which all these foundations were laid are well indicated in an address given by Matthew Vas- sar to the trustees of his college in June 1864 at the time when the question of the election of professors was being discussed.

JIt is my hope — it was my only hope and desire — indeed, it has been the main incentive to all I have already done, or may hereafter do, or hope to do, to inaugurate a new era in the history and life of woman. The attempt you are to aid me in making fails wholly of its point if it be not an advance, and a decided ad¬ vance. I wish to give one sex all the advan¬ tages too long monopolized by the other. Ours is, and is to be, an institution for women — not men. In all its labors, positions, rewards and hopes, the idea is the development and exposi¬ tion, and the marshaling to the front and the preferment of women — of their powers on every side, demonstrative of their equality with men — demonstrative, indeed, of such capacities as in certain fixed directions surpass those of men. This, I conceive, may be fully accom plished within the rational limits of true woman¬ liness, and without the slightest hazard to the attractiveness of her character. We are indeed, already defeated before we commence if such development be in the least dangerous to the dearest attributes of her sex. We are not the less defeated if it be hazardous for her to avail herself of her highest educated powers when that point is gained. We are defeated if we start upon the assumption that she has no powers save those she may derive, or imitate, from the other sex. We are defeated if we recognize the idea that she may not, with every propriety, contribute to the world the benefits of matured faculties which education evokes. We are especially defeated if we fail to express, by our acts, our practical belief in her pre-emi¬ nent powers as an instructor of her own sex.®

The third type of the collegiate education of women is known as co-ordination. It repre¬ sents the inclusion in, or the alliance of, a col¬ lege for women with a college for men. Cer¬ tain communities, in their desire to promote the education of women, and in their unwillingness to duplicate educational equipment, have estab¬ lished colleges for women as an annex to, or as institutions parallel with, the institutions founded at an earlier date for men. This method represents the English tradition. Gir- ton, at Cambridge, existed nine years before the foundation of the Society for the Collegiate Instruction of Women, organized in Cambridge, Mass., in 1879. The more conspicuous of these colleges arc Radcliffe, affiliated with Harvard;

Barnard, affiliated with Columbia ; the Woman's College of Brown University, the College for Women of Western Reserve University of Cleveland, and the H. Sophia Newcomb College, affiliated with Tulane University. The in¬ tramural administration of these colleges differs from

each other. In Radcliffe. Barnard and Brown at least, the larger part of the instruction is given by members of the faculty of the older college for men. In the College for Women of Western Reserve University a distinct faculty is established which is co-ordinate with the faculty of the college for men — Adelbert — of the same university.

Colleges of each of these three types have special advantages, and are subject to special disadvantages. Each apparently has come to occupy a permanent place in American educa¬ tion. Coeducation, however, is by far the more popular. About nine-tenths of all colleges are coeducational institutions. The number of de¬ grees conferred on women in all American col¬ leges in the last year was about 4,000. The more common degrees are A.B., Ph.B., B.L. and B.S., of which A.B. is conferred on about five-eighths of all candidates.

Charles F. Thwing,

President of Western Reserve University, Cleveland.

COLLEGEVILLE, Minn., village in Stearns County, on the Great Northern Rail¬ road, nine miles northwest of Saint Cloud. Saint John's Abbey and Saint John's University, in charge of members of the order of Saint Benedict, are the chief institutions of the village. The university was opened in 1867. The number of students is greater than the number of inhabitants of the village. Pop. 606.

COLLEGEVILLE, Pa., borough in Mont¬ gomery County. It is situated on the Perkimon River, the Philadelphia and Reading Railroad, and is 27 miles northwest of Philadelphia. Ursinus College, established in 1870, is an insti¬ tution belonging to the German Reformed Church. The manufactures are iron machinery, boiler-making and hot water heaters. Pop. 621.

COLLEGIATE ATHLETICS. See Ed¬

ucational Athletics.

COLLES, kolz, Christopher, American philosophic adventurer: b. Ireland about 1738; d. New York 1821. In 1765 he set out, a wanderer from his native land, and we find him in Philadelphia in 1772, delivering illustrated lectures upon pneumatics. He is said to have been the first to build a steam engine in this country. In April 1774 he proposed to erect a reservoir for the purpose of conveving water through the several streets of the city of New \ ork. His proposals were ((read and referred.® In 1775 he delivered lectures on gunnery, and was further employed in giving instruction to the artillery department of the American army in the principles of projectiles. Colles was the first who suggested canals and improvements to connect Lake Ontario with the Hudson. Ac¬ cording to the records of the assembly

of New York, in November 1784 he presented a memo¬ rial on the subject, and in April following a favorable report was made thereon. In 1808 Colles published an elaborate pamphlet on the interests of the United New York, and in 1789 a book of roads through New York,

COLLIE, the domestic sheep-tending dog developed in Scotland, and for a long time bred there exclusively, but now known in all parts of the world. It is one of the most beau¬ tiful, and perhaps the most intelligent, of all dogs, and many anecdotes are told illustrative of its sagacity. Collies have for hundreds of years aided the Scotch shepherds in caring for their flocks, under all conditions and in all sorts of weather. To meet the inclemency of stormy days and cold nights, these dogs have acquired an outer coat of thick, rough hair, black or black-and-tan in color. It has an un¬ dercoat so close and soft that, even when it is parted, one can scarcely see the dog's skin. The chief points of these dogs are long, sharp heads ; bright, keen eyes, set rather close together; small ears, drooping at the tips; a full ruff of hair around the neck; strong, wiry frames; and rounded feet. Their intelligence is remarkable — almost human; and their affec¬ tion so constant that they have been known to die of grief after the death of a master.

*The collie measures from 22 to 24 inches at the shoulder and weighs generally from 45 to 60 pounds. He is as alert as a fox and as fleet as a deer. In fact, no dog, except the greyhound, can excel him in speed and grace of movement, and it is safe to state that no dog is so faithful and trustworthy a companion to man, for the collie gives implicit obedience and unfaltering loyalty to his master, and will yield his life rather than desert his master's charge. This it is that makes him invaluable as a sheep-dog. Detailed information in regard to the collie may be found in most books relating to dogs (q.v.), and special books treating of him from the point of view of both the shep¬ herd and the fancier are accessible. Consult Lee, (Collie or Sheep-Dog) ; and Wickham, Practical Training of the Shepherd Dog.**

COLLIER, Arthur, English philosopher: b. Langford Magna, Wiltshire, 12 Oct. 1680; d. there 1732. He was educated at Pembroke and Balliol colleges, Oxford, and in 1704 became rector of Langford, a living which had belonged successively to his great-grandfather, grand¬ father and father, and which he retained till his death. In 1713 he published a work entitled (Clavis Universalis, in which he maintained both the non-existence and the impossibility of the existence of any objects external to the mind. Berkeley had three years before ad¬ vanced incidentally his*

theory of the negation of an external world, but the two philosophers appear to have had no knowledge of each other, and it is certain that Collier meditated upon his opinion for 10 years before promulgating it. Though they developed simultaneously the first systematic scheme of absolute idealism, and though Collier was inferior to his contemporary rather in the graces of composition than in acuteness or method, yet the 'Clavis Univer¬ sal^ attracted not the slightest attention in England. In Germany a copious and able ab¬ stract of its contents was given in 1717, in a supplemental volume of the (Acta Eruditorum,> and it was quoted by Wolf, Bilfinger and others. In 1756 a complete translation of it into German was made by Eschenbacln Thus rendered accessible in Germany, Collier has enjoyed among the thinkers of that country high repute for talent and originality, and the best comparative view of his doctrines and

*those of Berkeley is that given by Tennemann. Other publications of Collier were the Speci¬ men of True Philosophy * (1730) ; and 'Logol- ogy) (1732). In religion he was an Arian, and at the same time a high churchman on grounds which his associates could not under¬ stand.*

*COLLIER, H. Price, American writer: b. 25 May 1860; d. 3 May 1913. He was educated at Harvard. Entering the Unitarian ministry, he was for nine years in charge of churches in Hingham, Mass., and else¬ where, and during the Spanish-American War served as a naval officer. For two years he was European editor of the Forum, and wrote a volume on "Driving** (1903) in Macmillan's Sportsman's Library. But he at¬ tained celebrity as the writer of essays on national characteristics, which were marked by much insight and real literary quality. He has published (Essays) ; (Mr. Picket Pin and His Friends) ; 'America and the Americans from a French Point of View* (1897) ; 'England and the English, from an American Point of View> (1909) ; 'The West in the East from an American Point of View) (1911) ; and 'Ger¬ many and the Germans from an American Point of View> (1913). At the time of his death he was preparing a similar discussion of Norway and Sweden.*

COLLIER, Henry Watkins, American jurist: b. Lunenberg County, Va., 17 Jan. 1801; d. Bailey's Springs, Lauderdale County, Ala., 28 Aug. 1855. He was educated in the Abbeville District, S. C., where his father settled in 1801, removed with the family to Madison County, Ala., in 1818, and studied law in Murfreesboro, Tenn., and at Huntsville. Ala., where he was admitted to the bar and began practice. In 1823 he settled in Tuscaloosa, where he was elected district judge in 1827. In 1836 he was appointed associate justice of the Supreme Court of Alabama, in 1837 was made chief justice, and held that office till 1849, when he was elected, without opposition, governor of the State. His support was sought both by the Southern Rights and the Union parties ; but he favored neither side of the

question that then agitated the Southern States, and in 1851 was renominated and elected without a regular nomination. When his second term expired he retired to private life.

COLLIER, Jeremy, English bishop : b. Stow Quy, Cambridgeshire, 23 Sept. 1650 ; d. London, 26 April 1726. He was educated at Caius College, Cambridge, entered the Anglican Church in 1677 and was rector of Ampton, Suffolk, in 1679. The revolution of 1688 found in him a most zealous opponent, and he not only refused to take the oaths to the government of William and Mary, but came boldly forward in defense of his non-juring principles, and sub¬ jected himself to repeated imprisonment, both for writings and other overt acts, which a more tyrannical government might easily have con¬ strued into treason. His political writings have almost been forgotten; but he wrote two other works, which have preserved his name, and prove him to have been a writer of distin¬ guished ability. The one entitled 'Essays Upon Several Moral Subjects) (1697) is distin¬ guished by learning and wit, and an easy flow¬ ing style; the dther, entitled 'Short View of the

Immorality and Profanencss of the English Stage5 (1698), is unquestionably a masterpiece, and is still perhaps the best work written on the subject. It enjoyed great popularity not¬ withstanding the fierce opposition it encountered especially from Congreve and Vanbrugh, and is said to have had the effect of greatly purifying both the sentiments and the language of the theatre. The only other work of Collier de¬ serving of special notice is his (Ecclesiastical History of Great Britain to the End of the Reign of Charles IP (1708 and 1714). It cost him many years of labor and displays much ability, but is strongly tinctured with his non- juring views. In 1713 he was consecrated bishop among the non-jurors. Consult (The Ec¬ clesiastical History,5 edited by Lathbury (Lon¬ don 1852).

COLLIER, John Payne, Shakespearean critic: b. London, 11 Jan. 1789; d. Maidenhead, 17 Sept. 1883. He wrote many critical articles in periodicals, published in 1820 his (Poetical Decameron, 5 and thenceforward continued his editions of poems and plays, notably those of the less-known Elizabethan writers: His best work, (History of English Dramatic Poetry5 appeared in 1831. He took great interest in and edited many publications for the Camden, Percy and Shakespeare societies, and completed in 1844 an eight-volume edition of Shakespeare. In 1852 he professed to have discovered, on the margins of a copy of the second folio Shakes¬ peare, bought from a second-hand bookseller, manuscript notes and emendations written in a 17th century hand. When these notes and emendations were

published they became the subject of eager discussion by the critics, the best of whom were not disposed to set a high value on them, and in 1859 an examination of the volume convinced the British Museum au¬ thorities that the marginal notes were forgeries. Collier published a weak and inconclusive reply, in which he maintained their genuineness, and thenceforward he maintained complete silence on the matter. He continued to produce edi¬ tions of English writers, among them Spenser (1862), and also critical and autobiographical works. Of his later publications the next most important is (An Old Man's Diary5 (1872). Among his papers were found indisputable proofs of a long series of literary forgeries. As a consequence suspicion has rested on all his work, and has obscured the real services he indisputably did to English literature. For a list of Collier's forgeries and the bibliography on the controversy, consult Lee, (Life of Shakespeare) (3d ed., London 1900) ; Warner, (Catalogue of MSS. of Dulwich College) (ib. 1881), and Ingleby, C. M., (Complete View of the Shakespeare Controversy) (1861).

COLLIER, Robert Joseph, American pub¬ lisher: b. New York, 17 June 1876; d. 9 Nov. 1918; graduated at Georgetown Universitv in 1894, and afterward spent one year each at Har¬ vard and Oxford universities. He became asso¬ ciated with his father, Peter F. Collier, in the latter's publishing business, and after the latter's death in 1909 became head of the firm of P. F. Collier and Son. r>ublishers of Collier's Weekly, of which he was editor. He initiated the Lincoln Farm Association, which raised, by popular ■subscription, funds for purchase of the old Lincoln farm in Kentucky and erected a granite

memorial at the log-cabin where Lincoln was born. He is a member of the New York Munic¬ ipal Art Commission, of the Metropolitan Museum of Art and the American Museum of Natural History.

COLLIER, William, American actor: b. 1868. He made his debut in a children's com¬ pany in 1879. He was a member of Augustin Daly's company in 1883-88. He starred in (On the Quiet) in 1901-02, and (The Dictator, > in which he achieved a great London success in 1905, and in which he toured Australia the fol¬ lowing year. His later appearances were in (A Lucky Star5 (1909); (Bunty Pulls the Strings) (1912-13) ; (A Little Water on the Side5 (1914). He is part author of the following plays in which he also played roles: (I'll be Hanged if I Do5 (1910) ; (Take My Advice) (1911); (Never Say Die) (1912). He is sole author of (Caught in the Rain5 (1906) and (The Patriot5 (1908). He has become widely known as a comedian.

COLLIER, William Miller, American diplomat: b. Lodi, N. Y., 11 Nov. 1867. He was graduated at Hamilton College in 1889, spent one year in the Columbia College Law School and was admitted to the bar in 1892. He

was referee in bankruptcy for the Northern District of New York in 1898, was president of the New York State Civil Service Commission 1899-1903 and lecturer on the law of bank¬ ruptcy at the New York Law School 1903-05. In 1904 he was appointed special assistant attor¬ ney-general of the United States Department of Commerce and Labor. From 1905 to 1909 he was United States Minister to Spain. In the latter year he became general legal counsel and diplomatic agent for various American corpora¬ tions in Europe, with offices at Auburn, N. Y., and Paris, France. He is author of (Collier on Bankruptcy5 (1898) ; (Collier's Annotated

Rules in Bankruptcy5 (1899) ; (Collier on Civil Service Law5 (1901) ; (The Trusts5 (1900) ; (At the Court of His Catholic Majesty5 (1911).

COLLIMATION, Line of. In a measur¬ ing telescope there is placed at the focus of the eyepiece a system of spider-threads. In a tran¬ sit instrument there are several vertical and two horizontal <(wires,55 as shown in the diagram.

In spite of numerous experiments in a search for something more durable than spider threads, ((wires55 are still almost universally formed of this fragile material. Quartz fibre and finely drawn platinum wire have at times been em¬ ployed, but it is found that the fineness and evenness of threads from chosen varieties of spiders exceeds anything that can be produced by artificial means. In smaller instruments the wires are frequently fine lines drawn on a glass plate.

In taking an observation the time at which the star passes behind each wire is noted. Tak¬ ing the mean of these times, we obtain what is called the time for the <(mean wire,55 an imagi¬ nary wire which would, if the adjustments were perfect, coincide with the middle vertical wire. The mean of these observations gives a better result than if only one central wire were used. The line of collimation is defined to be the straight line that joins the centre of the object- glass with the point of this imaginary vertical wire midway between the two horizontal wires. A definition similar to that here given applies in

other cases, in the case of the mural circle, for example, and in the case of instruments for terrestrial surveying. The proper adjustment of the line of collimation of these instruments is one of the most important of the adjustments.

In the case of the transit instrument, for in¬ stance, in observing the passage of a star, what is noted is practically the instant, according to the observatory clock, when the line joining the star and its image coincides with the line of collimation. The following is one of the condi¬ tions to be satisfied when the instrument is in perfect adjustment. The line of collimation must be perpendicular to the geometrical axis on which the telescope revolves, and will then describe a great circle. The framework that carries the spider-lines admits of several small movements for their adjustment. After the ad¬ justment has been carefully made, however, there always remains a slight error, which is de¬ termined and allowed for in calculations under the name of the collimation error. Adjustments and corrections are similarly made in the other telescopes for measuring.

When the central wire has been fully ad¬ justed and placed in the meridian

by the obser¬ vation of stars, it is usual with larger instru¬ ments to facilitate its future adjustment by the use of Collimators. These are telescopes mounted horizontally on piers, one north and one south of the instrument, and so arranged that when the latter is horizontal it will point directly into one of the collimator telescopes, which are made of the same aperture as that of the instrument itself. At the focus of each lens a spider thread is placed, which is thus viewed through the collimator exactly as if it were at an infinite distance away. Having ad¬ justed the collimator threads in the meridian, the middle thread of the instrument can at any future time be placed upon them in a few sec¬ onds, thus saving a great deal of time. Some¬ times the collimator lenses are made of a very long focus, even so great as a few hundred feet. The wires, or artificial stars, are then placed upon piers in so-called Collimator Houses. , or Mire Houses, one north and one south of the meridian house, and a few hun¬ dred feet distant from it.

•

COLLIN, Louis Joseph Raphael, loo-e zho-zef ra-fa-el kol-lan, French figure and por¬ trait painter: b. Paris 1850; d. there, 21 Oct. 1916. He studied under Bouguereau and Ca- banel, obtained a second-class medal in the Paris Salon in 1873 and the medal of the Le¬ gion of Honor in 1884. In 1902 he was ap¬ pointed professor at the Ecole des Beaux-Arts. He is perhaps best known for such works as the decorations in the Sorbonne and the ceilings of the Odeon and the Opera Comique, Paris. He also decorated several ceilings in the United

States. The most noted of his easel pictures are those of nudes in the open air, such as an (IdylP (Arras) ; (Daphne and Chloeˆ (Alen- gon) ; (FloraP (Luxembourg 1886) ; (Eveil et Primerose) (Bucharest 1894), and many others in private collections, including the Anderson collection, New York. He was also a portrait painter, illustrator and painter on faience. His work is in the classical style of his masters, Bouguereau and Cabanel.

COLLIN D'HARLEVILLE, darlvel, Jean Francois, French dramatist: b. Mevoisins, near Maintenon, 30 May 1755; d. 24 Feb. 1806. He studied law but soon abandoned this field to devote himself to literature. He worked a genuine vein of comedy, yet never slighted the moral side of conduct, and some of his plays still keep the stage. Notable among his works are (The Old Bachelor, > his masterpiece (1793); and (Castles in Spain) (1806) ; (LTncon- stanU (1780) ;

COLLINGSWOOD, N. J., borough in Camden County, on Cooper River and on the Pennsylvania Railroad, adjoining Camden. It is well laid out and well built, has few indus¬ tries, except manufactories of wall paper and wagons, but does a large trade in the agricul¬ tural products of the surrounding district. Pop. (1920) 8,714.

COLLINGWOOD, Cuthbert, Lord, Eng¬ lish admiral: b. Newcastle-upon-Tyne, 26 Sept. 1750; d. at sea near Minorca, 7 March 1810. He entered the royal navy in 1761, gradually rose in service and became a close friend of Nelson. In 1799 he was made rear-admiral of the white. His most distinguished service was the part he bore in the great victory of Trafal¬ gar, in which his gallant manner of bringing his ship, the Royal Sovereign, into action, and the skill and resolution with which he fought her, excited the personal admiration of Nelson him¬ self, upon whose fall the command of the fleet devolved upon Collingwood as senior officer. He was promoted to be vice-admiral of the red, continued in his command of the fleet and was elevated to the peerage wdth the title of Baron Collingwood. A monument has been erected to him at Tynemouth. His (Memoirs and Corre- spondence) was published by his son-in-law7 (2 vols., 1828).

COLLINGWOOD, William Gershom,

English writer and artist : b. 1854. He wˆas educated at Liverpool College and University College, Oxford. He first exhibited at the Royal Academy in 1880, while from 1881 to 1890 he was secretary to John Ruskin. He has pub¬ lished (Life of Ruskin) ; (Thorstein of the Mere) ; (The Bondwoman' ; (Coniston Tales > ; (The Lake Counties) ; Scandinavian Britain, > etc.

COLLINGWOOD, Canada, port of entry and county-seat of Simcoe County, Ontario, on Georgian Bay, Lake Huron and the Grand Trunk Railway, 95 miles northwest of Toronto. It is an important commercial port, the terminus

of steamship lines to Owen Sound, Sault Sainte Marie, Fort William, Duluth and other ports of the Great Lakes, and has a large trade in lumber, grain, produce, iron ore, etc. It is the seat of a United States consulate. It has tan¬ neries, breweries, Hour mills, sash, blind and pump factories, and is lighted by gas and elec¬ tricity. Pop. 7,090.

COLLINS, Anthony, English theologian : b. Heston, Middlesex, 21 June 1676; d. London, 13 Dec. 1729. He was educated at Eton and Cambridge, and devoted himself to general literature. During the years 1703-04 a corre¬ spondence was carried on between him and Locke who regarded him as having <(as much of the love of truth for truth's sake as he had ever met with in anybody.® Among his numerous writings, all published anonymously, the one most commonly associated with his name is entitled a 'Discourse on Freethinking.5 It attracted considerable notice at the time, and was answered, among others, by Bentley, under the assumed name of Phileleutherus Lipsiensis. Another work, entitled Philosophical Inquiry

Concerning Liberty and Necessity,5 was an¬ swered by Samuel Clarke. He also wrote (Essay Concerning the Use of Human Rea- son) (1707); Priestcraft in Perfection (1709); (Discourse of Freethinking) (1713);

(Historical and Critical Essays on the Thirty- Nine Articles) (1724) ; (Defence of the Divine Attributes) (1710) ; 'Grounds and Reasons of the Christian Religion (1724) ; Piteral Scheme of Prophecy5 ; (A Letter to the Rev. Dr. Rogers on Occasion of His Eight Sermons on the Necessity of Revelation and the Truth of Christianity5 (1727). His benevolent and tolerant spirit gained the respect of many who widely differed from him on theological ques¬ tions. Consult Stephens, (English Thought in the Eighteenth Century5 (1881).

COLLINS, Arthur, English theatre man¬ ager: b. London 1863. In 1881 he was ap¬ prenticed to a scenic artist, Henry Emden, at the Theatre Royal, Drury Lane. He was stage manager there in 1887-96 and in 1897 leased the Drury Lane and formed a managing com¬ pany with himself as director. He produced 'Hearts are Trumps5 (1899); Pen Hur5 (1902); (The Prodigal Son5 (1905); (The Bondman5 (1906) ; (The Sins of Society5 (1907); (Marriages of Mayfair5 (1908); 'The Whip5 (1909) ; Pverywoman5 (1912).

*COLLINS, Frank Shipley, American bot¬ anist: b. Charlestown, Mass., 6 Feb. 1848. He was graduated at the Malden High School in 1863. He was engaged in commercial pursuits from 1864 to 1912. He has been a student of botany for many years and is a member of many botanical societies. He is the author of Plora of Middlesex County5 *(1888) ; (*

COLLINS, John Churton, English author and educator: b. Bourton-on-the-Water, Gloucestershire, 26 March 1848; d. Lowestoft, England, 12 Sept. 1908. He was educated at King Edward's School, Birmingham, and Balliol College, Oxford, whence he was graduated in 1872. He engaged in journalism, education and in public lecturing, especially pleading, both in

his writings and lectures, for the study of liter¬ ature as distinct from philology. In 1904 he became professor of English literature at the University of Birmingham. Among his publica¬ tions are 'Bolingbroke5 and (Voltaire in Eng¬ land5 (1886); (Study of English Literature' (1891); Plustrations of Tennyson5 (1891); 'Dean Swift, a Biographical and Critical Study5 (1893) ; (Essays and Studies5 (1895) ; 'Ephem- era Critica5 (1901) ; (Studies in Shakespeare5 (1904) ; (Studies in Poetry and Criticism5

(1905), etc. He has also edited Plays and Poems of Cyril Tourneur5 (1878) ; Poems of Lord Herbert of Cherburg5 (1881) ; Plays and Poems of Robert Greene5 (1899); Dryden's 'Satires5 ; Pope's (Essay on

Criticism5 ; Tenny¬ son's Poems5 (1901); Tennyson's 'In Memo- riam, Maud and Princess5 (1902) ; More's 'Utopia5 (1904); Matthew Arnold's (Merope5 ; (A Treasury of Minor British Poetry,5 etc., and is also general editor of the series (Shakes¬ peare for Schools5 and Pritish Classics for Schools.5 In his works on Tennyson he re¬ vealed, in early English poets, some of the sources of his inspiration.

COLLINS, Joseph William, American ich¬ thyologist : b. Isleboro, Me., 8 Aug. 1839; d. 1904. His boyhood was spent on fishing schooners and he was entirely self-taught. He made the statistical inquiry into New England fisheries for the 10th United States census, 1879-80, and for the United States Fish Com¬ mission, with which he remained connected until 1892. He was an official of the International Fisheries Expositions at Berlin, 1880; London, 1883; chief of the Fish and Fisheries Depart¬ ment at the Chicago World's Fair, 1893 ; and organized the section of Naval Architecture in the United States National Museum, and he was curator of the department for almost 10 years. He was a contributor to the 'Century Diction¬ ary5 ; edited the Fishing Gazette , 1893-94; and wrote many papers and reports on his specialty.

COLLINS, Mortimer, English man of let¬ ters and by many considered the greatest Eng¬ lish lyrist of his century; b. Plymouth, England, 29 June 1827; d. Knowl Hill, 28 July 1876. His father, who was a solicitor, published a volume of verse and seems to have been a good mathematician. His mother was con¬ nected with the Mortimers of Dorset. While at school, the boy wrote verse and prose for local newspapers; and began to contribute to Fraser's and Punch. At the age of 22 he married, and settled at Guernsey as mathematical master of Queen Elizabeth's Col¬ lege. This position, which interfered with his literary work, he resigned in 1856, the year after the appearance of his first volume of poems, (Idyls and Rhymes.5 During the next 10 years he edited several provincial news¬ papers and contributed extensively to the Lon¬ don press. A strong Tory in politics, he was accounted one of the best at political squibs. His lyrics and epigrams in the Owl werˆ especially well received. In 1860 appeared 'Summer Songs5 and in 1865 his first novel, 'Who is the Heir?5 By 1862 he was settled at Knowl Hill, Berkshire, some 30 miles from London, where he passed the rest of his life in unremitting industry. He wrote novels, reviews, sketches of travel and an enormous amount of verse. 'The Marquis and the Mer-

chant) (1871) was regarded as his best novel. (The Secret of Long Life* (1871), a collection of essays, including a notable one on laziness, ran through several editions. Collins was a ((well-made man, over six feet in height, with a handsome face and well-shaped head.** Among his numerous friends were Edmund Yates and R. D. Blackmore. His first wife died in 1867. The next year he married Frances Cotton, who collaborated with him in fiction and published on her own account a novel called a (Broken Lily) (1882). Consult Mor¬ timer Collins; His Letters and Friendships) (2 vols., London 1877), a scrappy but interesting biography by his widow. To fen Sketches by a Vanished Hand from the Papers of the Late Mortimer Collins) (London 1879) Tom Taylor prefixed a memoir. For some of his best pieces, consult also (Thoughts in my Garden) (London 1885), collected and edited by E. Yates, and (Attic SalV (1880), a selection of Collins's epigrams, by F. Kerslake.

Wilbur L. Cross,

Professor of English, Yale University.

COLLINS, Thomas Wharton, American jurist: b. New Orleans, La., 23 June 1812; d. 3 Nov. 1879. He became a printer, then an editor, studied law, was admitted to the bar in 1833, was reporter and clerk of the State senate in 1834, then edited the True American, was clerk of the United States Court in 1836-38, district attorney for the Orleans district in 1840-42, judge of the City Court in 1842-46, a member of the Constitutional Convention in 1852, and in 1856 was elected judge of the first District Court of New Orleans. At the close of the war he resumed the practice of law in New Orleans, and in 1867 was made judge of the seventh District Court, which office he held until the court was abolished when he returned to legal practice. He was the author of a tragedy called (The Martyr Patriots,* which was successfully performed; also of

COLLINS, William, English poet: b. Chi¬ chester, England, 25 Dec. 1721 ; d. there, 12 June 1759. He was educated at Winchester school and at Oxford where he was noted for (

of execution, and even advertised one, Pro¬ posals for a History of the Revival of Learn¬ ingˆ but did not write it. He subsequently be¬ gan several tragedies ; but his indolence and irresolution retarded his progress, and the trage¬ dies rarely advanced beyond the preliminary stage of devising the plot. Constantly in debt and in fear of the bailiff, he finally persuaded a bookseller to advance money to leave London, in return for which he was to translate Aris¬ totle's

COLLINS, William, English painter of landscapes and domestic scenes : b. London, 8 Sept. 1788; d. there, 17 Feb. 1847. His picture of the (Young Filer,) exhibited in 1811, was purchased for 80 guineas, and in 1813 he at once raised himself to a position of eminence by his (Sale of the Pet Lamb, so well known by engravings. In 1820 he was elected a Royal Academician. For his picture of the fisher¬ man's Departure,* painted in 1826, he received 350 guineas. Other noted works of his are fustic Hospitality* ; (Sunday Morning, * and (Happy as a King.* Two sacred pictures, (Our Saviour with the Doctors in the Temple-* and (The Two Disciples at EmmausJ were exhib¬ ited in 1840 and 1841, but were unsuccessful. He visited Italy 1836-38; also visiting the Shetland Isles (1842) and illustrating Scott's novel (The Pirated He was the father of Wilkie Collins, the novelist, whose memoir of his father was published in 1848.*

COLLINS, Sir William Job, English sur¬ geon : b. London, 9 May 1859. His medical training was obtained at Saint Bartholomew's Hospital, London, and he has since held various professional positions of importance. He was elected to the London County Council for West Saint Pancras in 1892, 1895, 1898, 1901 and 1904, and contested that electorate for Parliament 1895 and the University of London in 1900. He has published (Specificity and Evolution in Dis-

rase (1884); 'Pathology of Cataract) (1897);*

COLLINS, William Wilkie, English novel¬ ist : b. London, 8 Jan. 1824; d. there, 23 Sept. 1889. The eldest son of William Collins (q.v.), the landscape and portrait painter, he also bore the name of David Wilkie, the distinguished academician. Among his friends and in letters he was always known as Wilkie Collins. Edu¬ cated privately, he passed two years (1836-38) with his father in Italy, where he became greatly interested in Italian art, scenery and history. In 1841 he obtained a clerkship in a London firm of tea-merchants with a view to a business career. After five years of this, he began the study of law, and was called to the bar in 1851. While thus hesitating between law and business, he had shown for some time a bent toward art and literature. For land¬ scape especially he possessed talent. His first book to be printed was a memoir (1848) of his father, who died in 1847 ; but he had written, long before this, 'Antonina, or the Fall of Rome/ an historical romance of the Bulwer- Lytton type. It was given to the public in 1850. The next year he published an account of a summer in southwest England under the title 'Rambles beyond Railways.) Both books were well received. He now met Dickens, and at once became

a man of letters. Thereafter the two novelists lived on terms of the most delightful friendship. They frequently collabo¬ rated on novels, and Collins contributed largely to Dickens's 'Household Words and 'All the Year Round.* The new influence upon Col¬ lins — Dickens in place of Bulwer-Lytton — was at once manifest in 'Basil* (1852), which dealt realistically with contemporary life in London. From history his descent was quick to a clerk and a linendraper's daughter. Then followed 'Hide and Seek) (1854), 'The Dead Secret 1 (1857) and numerous short stories like the clever series of ghost tales called 'After Dark> (1856). In this early work Collins sometimes displayed great skill in concentrating attention upon a dominant motif which engrossed the reader as well as himself. In his view, the novel was a twin sister of the drama. But he first discovered his extraordinary talent in 'The Woman in White* (1860), which nobody left unread. It was absolutely a new type, depending in no wise upon the interest in char¬ acter nor in adventure or incident as such, but upon the adroit manipulation of incident for first concealing and then revealing a secret. Collins is the father of the detective story. His first great success was repeated in 'The Moonstone) (1868). In other novels of the period he usually molded his plot to a dis¬ tinct didactic purpose. This is particularly true of 'No Name} (1862), 'Armadale) (1866), 'Man and Wife* (1870) and 'The New Mag¬ dalen* (1873), all of which are among the most interesting novels of their kind. In 1873— 74, Collins visited the United States, where he gave readings from 'The Frozen Deep) and other stories which he had just written. Sev¬ eral of his novels, dramatized either by himself*

or by others, were popular on the stage both in England and in the United States. He was buried at Kensal Green. Notable appreciations of Collins have been written by Swinburne, 'Studies in Prose and Poetry) (London 1894) ; Quilter, Contemporary Revieiv for April 1888; and Lang, Contemporary Review for January

1890.

Wilbur L. Cross,

Professor of English, Yale University.

COLLINSVILLE, Ill., city in Madison County, 10 miles east of East Saint Louis, on the Vandalia Railroad. It contains a hospital and a tuberculosis colony. It is a busy coal¬ mining centre and has zinc works, lead smelters and knitting and flour mills. Collinsville was settled in 1800 and incorporated in 1830. The government, under charter of 1872, is vested in a mayor, chosen for two years, and a council of one chamber. The city owns its waterworks. Pop. (1920) 9,753.

COLLISION, in navigation, the shock of two ships coming into violent contact, whereby one or both may suffer more or less injury. Of 104 major shipping disasters over the past half century, 24 occurred through collision, with a total loss of 6,615 lives, or 23 per cent of shipping disasters and over 23 per cent of lives lost. In order to avoid accident, it is the practice of the great transatlantic lines trading between England and America to choose each definite lanes of travel, which are rigidly ad¬ hered to. The American rules in regard to the prevention of collisions are based upon the same principles as the English, with which they are substantially identical. The leading doc¬ trines of English law on this subject are thus stated by Lord Stowell : "In the first place, col¬ lision may happen without blame being im¬ putable to either party, as where the loss is occasioned by a storm or any other vis major, in which case the misfortune must be borne by the party on whom it happens to light. Sec¬ ondly, a misfortune of this kind may arise where both parties are to blame — where there has been a want of due diligence or skill on both sides; in such case the loss must be appor¬ tioned between them, as having been occasioned by the fault of both of them. Thirdly, it may happen by the misconduct of the suffering party only, and then the rule is that the sufferer must bear his own burden. Lastly, it may have been the fault of the ship which ran the other down, and in that case the injured party would be entitled to an entire compensation from the other. In a court of common law the same rule holds in the first, third and fourth cases; but in the second (where both parties are to blame) the rule is, that if the negligence of both substantially contributed to the mishap, neither has an action against the other; but if. one of them, by exercising ordinary care, might have avoided the consequence of the other's negligence, the former is liable for any injury sustained by the latter." In pursuance of the Merchant Shipping Amendment Act (1862), orders wˆere issued in 1863, 1879, 1884 and 1885, giving regulations for preventing col¬ lisions. These contain rules concerning lights and fog-signals, and sailing and steering rules. With respect to lights it is enacted that steamers shall, when under way, carry a white mast-head light, on the starboard side a green and on the

port a red light; when towing other vessels they must carry two mast-head lights, placed vertically. Sailing vessels shall carry only the side lights ; fishing and other open boats are not required to carry side lights, but may use a lantern with a red slide on the one side and a green slide on the other, and such lantern must be exhibited in sufficient time to prevent collision, and so that the green light shall not be seen on the. port side nor the red light on the starboard side. Ships at anchor in a road¬ stead must

exhibit a white light where it can be seen, not more than 20 feet above the hull, in a globular lantern eight inches in diameter, showing at a distance of a mile all round. The sailing and steering rules demand that if two sailing ships are approaching each other end on, or nearly so, the helms of both must be put to port, so that each may pass on the port side of the other; in crossing so as to involve risk of collision the sailing ship with the wind on the port side shall keep out of the way of the ship with the wind on the starboard, but if they have both the wind on the same side the ship which is to windward shall keep out of ihe way of the one that has it to leeward. If a steamship and a sailing ship are approaching so as to involve collision, the former must keep out of the way of the latter. The rules for two steamships passing or crossing are nearly the same as for sailing ships. If one vessel is over¬ taking another she must keep out of the way of the last-named vessel. When, according to the rules, one of the ships keeps out of the other's way, that other shall generally be under¬ stood to keep her course. See Navigation Laws ; Rules of the Road.

COLLITZ, Hermann, American philolo¬ gist : b. Bleckede, Hanover, 4 Feb. 1855. He was educated at Liineburg, Gottingen and Ber¬ lin. In 1883-86 he was assistant librarian, and in 1885-86 instructor in Sanskrit and compara¬ tive philology, at the University of Halle. In 1886 he became associate professor of German, and in 1897 professor of comparative philology and German, at Bryn Mawr. In 1907 he was appointed professor of Germanic philology at Johns Hopkins University. His early, work was principally in the field of comparative philology in general and in the Greek dialects; his later work has been mostly confined to German phi¬ lology. His works include (Die Verwand- schaftsverhaltnisse der griechischen Dialekte> (1885) ; (Die neueste Sprachforschung) (1886) ; (Das schwache Prateritum und seine Vorge- schichte) (1912). He is editor of (Sammlung der griechischen Dialektenschriften) (4 vols., 1884-1915) ; (Bauers Waldeck Dialect Diction¬ aryˆ (Leipzig 1902) ;

COLLITZ, Klara Hechtenburg, American philologist : b. Rheydt, Rhenish Prussia, 1863. She was educated at Neuwied am Rhein, at Lausanne, London, Oxford and Heidelberg, specializing in languages. She married Her¬ mann Collitz (q.v.) in 1904. In 1895-96 she was lecturer in French philology at Victoria College, Belfast, Ireland, in 1897-99 in charge of Germanic philology' at Smith College, and lecturer in German philology for women stu¬ dents at Oxford in 1901-04. She is author of

(Das Fremdwort bei GrimmelshauseiP (1901) ; (Der Briefstil im 17. JahrhunderD (1903) ; (Fremdworterbuch des 17. Jahrhunderts) (1904). She edited Selections from Early German Lit¬ erature (1910); Selections from Classical German Literature* (1914). She is also a fre¬ quent contributor to philological journals.*

COLLODION (Gr. koXXo)6 h/gt <(like glue"), a solution, in mixed alcohol and ether, of soluble pyroxylene (or ˆgun-cotton"). It is colorless and highly inflammable. The gun-cot¬ ton that is used in its manufacture is commonly prepared by the action of a mixture of nitric and sulphuric acids upon cotton-wool that has been first boiled in a solution of sodium car¬ bonate (to remove all greasy and resinous mat¬ ters) and afterward thoroughly washed and dried. The following procedure is followed in the subsequent operations : Three fluid ounces of strong nitric acid are poured slowly into two fluid ounces of water, and nine fluid ounces of strong sulphuric acid are added, stirring con¬ stantly. When the mixture has cooled to about 140° F., 100 grains of the prepared cotton-wool are added in tufts weighing about 10 grains each. At the end of 8 or 10 minutes the acid is poured off and the cotton is subjected to gentle pressure to expel the greater part of the fluid that its fibres have retained. The cotton is next thoroughly washed with water and a weak solution of sodium carbonate until the acid ha9 been entirely eliminated, after which it is allowed to dry. The product is ((soluble gun-cotton." It does not differ materially, in appearance, from the original cotton; but if the operations to which it has been subjected have been correctly carried out, it will be found that the cotton has become soluble in a mixture of equal parts of alcohol and ether. Commer¬ cial collodion contains 100 to 120 grains of gun¬ cotton to 10 ounces of ether and 5 ounces of alcohol, a further 5 ounces of alcohol being added after the salts have been dissolved. Be¬ fore the advent of the dry-plate process, col¬ lodion was greatly used in photography for the preparation of sensitive plates; and at the pres¬ ent day it is used to some extent in this way, especially in certain branches of photo-engrav¬ ing. In the preparation of these plates the col¬ lodion is first iodized and brominized by the addition of the iodide and bromide of cadmium or of ammonium, or a mixture of both, and the addition of a few drops of nitric acid, and is then poured over a carefully cleansed glass plate. The volatile solvent evaporates rapidlyr, leaving a film of iodized gun-cotton upon the glass. Immediately before the exposure is made the coated plate is immersed in a solution of nitrate of silver, with the result that a deposit of iodide and bromide of silver, sensitive to light, is formed in the guncotton layer. The plate is next exposed in the camera, and after¬ ward developed by a ferrous sulphate solution in water. Collodion is used in the place of adhesive plaster, in the case of trivial injuries, to afford protection from the air, and from pyogenic and other objectionable germs. When applied to the injured spot it quickly dries, leaving a tough, elastic coating which is im¬ pervious to moisture. It was first employed in surgery by Dr. J. Parker Maynard, of Boston, Mass., in 1847. In this application it is often medicated in various ways, one of the best-

known examples being blistering collodion, which contains cantharides, and is applied to the skin for the purpose of producing a blister. Medicated collodion is also largely used in chiropody.

COLLOID CHEMISTRY had its begin¬ ning in the discovery by Thomas Graham in 1860-61 that aqueous solutions of various sub¬ stances did not act in the same way when sub¬ jected to diffusion through parchment mem¬ branes such as used in osmosis experiments. He noted that in the case of substances which formed crystals when the water was evaporated from their solutions, the aqueous solution passed through the membrane unchanged; while in the case of substances which did not so crystallize, but formed amorphous solids, the water alone passed through the membrane, leav¬ ing the substance on the farther side, proving that these latter substances had not been in true solution, but in suspension. This discovery led Graham to divide all soluble substances into two classes : the crystalloids, like salt, sugar, alum, etc., and the colloids, like gelatine, gum arabic, raw albumen, etc. The conclusion reached by Graham was that the colloid molecules were constituted by grouping together the smaller crystalloid molecules, and that the difference in diff usibility was explainable on the relative size of the molecules.

For some years the newly opened field of research was not cultivated, but interest' in Graham's discoveries was revived in 1900 by Hardy, who attempted a classification of the colloids into reversible and irreversible groups. Later, investigators made experimental in¬ quiries as to the electrical constitution of the colloids, and the ultramicroscope confirmed the supposition that the colloids did not form true solutions, but mixtures. Since then researches have been many, particularly by the German scientists, and the development of the chemistry of the colloids has been rapid. The literature of this branch of chemistry now numbers hun¬ dreds of professional papers and several sub¬ stantial volumes.

The practical applications of colloid chemis¬ try have been many, particularly in the dyeing and tanning industries, the manufacture of soaps, casein and albumen products and gelatine photographic films ; the study of enzymes, fer¬ ments and soils; the purification of drinking waters and of sewage; and in the investigation of many important bacterial and biological prob¬ lems, such as the reactions of toxins and anti¬ toxins, and the applications of immuno-chemis- try. Consult Burton, E. F., (The Physical Properties of Colloid Solutions) (London 1916) ; Stewart, A. W., (Chemistry and Its Borderland- (London 1914) ; Taylor, W. W., (The Chemistry of the Colloids1* (New York 1915) ; Zsigmondy, R., (Colloids and the Ultra- microscope) (Alexander's translation, New York 1909).*

COLLOIDS (Gr. ˆglue-like®),

*substances, such as albumen and silicic acid, which, when combined with water in certain proportions, exhibit a gelatinous consistency. The word does not imply that there is any chemical resemblance among the bodies to which it is applied, the distinction between colloids and non-colloids being wholly physical. The term ˆcolloid** was proposed by Thomas Graham, in*

*1861, to designate substances that are practically incapable of diffusion through porous mem¬ branes. Substances such as salt, sugar and the mineral acids, which diffuse readily through such membranes, were called by him <(crystal- loids.** Colloids and their properties are of special interest to students of biology, since the cells of all living organisms are made up of a mixture of chemical substances known as protoplasm, the structure of which is due to colloids. As Matthews has said, (*

*C'OLLOP MONDAY, the Monday after Quinquagesima Sunday and preceding Shrove Tuesday. It was so named because on that day the faithful ceased eating flesh meat or col lops.**

*COLLOPHANITE (Gr. KoUa, «glUe** + aivELv , «to appear** = <(glue-like**), a native amorphous phosphate of calcium, somewhat resembling opal in structure, and having the formula CasILOs+HoO. It is found*

princi¬ pally on the island of Sombrero, the phos¬ phoric acid that it contains being derived from the guano deposits there. Collophanite is white or nearly so, with a specific gravity of 2.7 and a hardness of from 2 to 2.5. The name is given on account of the glue-like appearance of the mineral.

COLLOQUIES OF ERASMUS, The.

The (Colloquies of Erasmus (Eras mi Col- loquia) has probably been the focus for more bitter criticism than any book of its size ever published, and it is by far the best known work of its famous scholar-author, the only one generally read down to our time. It*

was condemned by the Sorbonne as dangerous to morals in 1526; Luther in his (Table Talk0 declared, (III, one of the great reforming popes, refusing it for reasons of health.

The Colloquia is a bitter satire on religious and other abuses, in which good and evil are sadly confused, and one is as likely to come in for condemnation as the other. It is brilliant but cynical ; it is extremely clever, but utterly unsympathetic toward the mental and spiritual limitations of human nature. Like most pure satire, it was calculated to do ever so much more evil through embitterment than good through correction. It was a typical example of destructive criticism. A reflection on human nature worthy of Rochefoucauld is that in spite of all this the book was popular from the very beginning, though even its author deprecated <(the caprice of fortune® which had made, as he confessed quite candidly in later years, ((a book full of foolish things, bad Latin and Solecisms® so much read.

The (Colloquies) is one of the great humanistic contributions to the literature called out by the Reformation movement, and its vivid vigorous Latinity has made it the favorite handbook of many a teacher who utterly disliked its content. Erasmus wrote Latin not as a dead but as a living language. His ' satiric humor has done the rest. The (Colloquies) remains one of the books that no educated man cares to confess that he does not know. As a mirror of the foolishness of mankind in many ways, it is too essentially true to nature ever to lack interest. While it satirizes man's credulity in matters religious, it does not fail to hold up for ridicule his over-anxious desire to make money which so often leads him into equally foolish credulity, and shows that the promise of the transmuta¬ tion of base metal into gold catches his fancy and runs away with it just as does any other superstition. Psychic researches and spiritists are bitingly satirized. It is ever a commentary on the morning paper. Consult (Erasmiana) (University of Geneva Press, Geneva, 1897- 1901) ;

Seebohm, (The Oxford Reformers, John Colet, Erasmus and Thomas More) (London 1887). A number of editions of the Collo¬ quies) in English have been issued in England and America. Bailey's translation is usually chosen.

James J. Walsh.

COLLOT D'HERBOIS, ko-lo dar-bwa, Jean Marie, French revolutionary leader: b. Paris 1750; d. Cayenne, South America, 8 Jan. 1796. He was an actor, who adopted the name of D'Herbois. On the breaking out of the French Revolution he zealously espoused the views of the ultra-party, and published his (Almanach du Pere Gerard, 5 which gave him much influence with the most violent revo¬ lutionists. After the events of 10 August he became a member of the municipal council of Paris, and a few days after the horrors of

September was chosen deputy to the National Assembly. He afterward became an active leader of the Mountain against the Girondjsts. He was sent by Robespierre along with Fouche to Lyons, in 1793, with almost unlim¬ ited powers and was guilty of the most flagrant enormities. Declaring that he found the guil¬ lotine too tedious and formal, he introduced the method of executing wholesale by the sword and by discharges of musketry. On his return from Paris he became a determined opponent of Robespierre, and being chosen president of the convention (19 July 1794), contributed powerfully to his fall. A few weeks later his own downfall followed. On the motion of Merlin he was expelled from the assembly and banished to Cayenne. Con¬ sult Morse-Stephens, (The French Revolution (London 1891) ; and Statesmen and Orators of the French Revolution (Oxford 1892).

COLLUSION, kol-lu'zhon (Lat. collusio, ((a playing together in the sense of to defraud®), a secret agreement between opposing litigants to obtain a particular judicial decision on a preconcerted statement of facts, whether true or false, to the injury of a third party. Collu¬ sion, when proved to exist, nullifies the judg¬ ment obtained through it. The term is some¬ what broad in meaning and generally includes cases where two parties get together to de¬ fraud another or to defeat the aims and pro¬ visions of the law. If a husband and wife, for instance, mutually agree to institute di¬ vorce proceedings without just cause, the law would consider their act as collusion.

COLLYER, kol'yer, Robert, American clergyman: b. Keighley, Yorkshire, England 8 Dec. 1823; d. 30 Nov. 1912. He came to the United States in 1849, being then a Wesleyan preacher and a blacksmith. His license as a Methodist minister was revoked partly for his preaching against slavery. In

1859 he became a Unitarian, and preached some years in Chi¬ cago, where he founded Unity Church in 1860 and was its pastor in 1860-79. He was made pastor of the church of the Messiah, New York, in September 1879, and pastor emeritus in 1896. Included in his publications are (Nature and Life5 (1864); (The Life That Now Is5 (1871);

COLLYRIDIANS, kol-i-nd'i-anz (Gr. k oi¬ ly ridia, ((little cakes®), a sect toward the close of the 4th century, so denominated from the little cakes which they offered to the Virgin Mary. The sect consisted chiefly of Arabian women, who, out of an extravagant devotion to the Virgin, met on a certain day of the year to celebrate a solemn feast and to render di¬ vine honors to her as to a goddess, eating the cakes which they offered in her name. It is said that the members of this sect were not native Arabs, but immigrants from Thrace and Scythia. While pagans they had been accustomed to offer similar cakes to Venus or Astarte.

COLMAN, Benjamin, American clergyman: b Boston, Mass., 19 Oct. 1673 ; d. there, 29 Aug. 1747. He graduated at Harvard in 1692, began preaching, sailed for England 1695, was captured by a French privateer, and after a short imprisonment reached England. He re¬ ceived ordination in London, and returned to take charge of the Brattle Street Church, Bos¬ ton, remaining with that society until his death. He was for many years one of the leading clergymen of New England, exerting a strong influence on civil affairs that fre¬ quently drew censure upon him. He procured considerable benefactions for Harvard and Yale, and was offered, but declined, the presi¬ dency of the former, in 1724. His collected sermons were printed at Boston 1707-22, and his (Life) was written by his son-in-law, Rev. E. Turell (1749).

COLMAN, George (The Elder), Eng¬ lish dramatist: b. Florence 1732; d. London, 14 Aug. 1794. He wrote in 1 760—01 the come¬ dies of (Polly Honeycomb) and the (Jeal°lls Wife.5 (The Clandestine Marriage) (1766) we owe to him and Garrick. This was left un¬ finished, and it has never been ascertained to which of the authors most credit is due for that admirable comedy. (The Royal Mer¬ chant (1767), the (Oxonian in Town' (1767), and other pieces followed the forego¬ ing. In 1777 he purchased the little theatre in the Haymarket and continued in the personal superintendence of it till the year 1790.

COLMAN, George (The Younger), Eng¬ lish dramatist, son of the preceding b. London, 21 Oct. 1762; d. there, 17 Oct. 1836. He was educated at Westminster School, Christ Church College, Oxford, and

Aberdeen University ; was entered as a student in the Temple, but early abandoned legal studies for dramatic and general literature. He assisted his father as director of the Haymarket Theatre and succeeded him as its patentee. After selling his interest in the theatre he was appointed ex¬ aminer of plays in 1824, the duties of which he performed with a severe, not to say ridicu¬ lous, purism, hardly to have been expected in a man who wrote with almost licentious free¬ dom himself. Most of his dramas were well received, and some of them still keep the stage; as (J°Im BulL ; the (Heir-at-law) ; (Poor Gentleman) and (Love Laughs at Locksmiths.)

COLMAN, Norman J., American office holder : b. Richfield Springs, N. Y., 16 May 1827 ; d. 1911. He settled in Saint Louis, Mo., and adopted the legal profession. He served in the Union army during the Civil War as lieutenant-colonel of volunteers. In 1865 he established an agricultural paper, Colman's Rural World, which he continued to edit to the close of his life. In 1874 he was elected lieu¬ tenant-governor, and was Commissioner of Agriculture in President Cleveland's first ad¬ ministration 1885-89. Shortly before his term of office ended. Congress enacted the law rais¬ ing the Department of Agriculture to the rank of an executive department, with its chief a Cabinet officer, 11 Feb. 1889.

COLMAN, Samuel, American artist: b. Portland, Me., 4 March 1832; d. New Yjork, 27 March 1920; studied art in Paris, Madrid, Dres¬ den and London. He was a landscape painter,

working both in oil and water colors. His principal' pictures are (The Ships of the West¬ ern Plains,5 now in the possession of the Union League Club; (The Spanish Peaks 5 and ˆloon- rise in Venice5 in the Metropolitan Museum of Art, and the (Mosque of Side Bou Hac, Tlem- cen Algeria5 in the New York Library. He traveled extensively in Europe, Africa, Mexico, California and the Canadian Rocky Mountains ; was made an associate of the National Academy of Design in 1861, receiving a full membership in 1864. He was one of the founders and first president of the American Water Color Society, also one of the founders of the Society of American Artists. He was engaged for many years in an investigation of polar force in rela¬ tion to angular magnitude, beauty and propor¬ tional form. This resulted in a book, (Nature's Harmonic Unity5 (1913). Consult his biog¬ raphy by Koehler, in American Art Review (1880), and Isham, (History of American Painting5 (1905). See Painting in the United States.

COLMAR. See Kolmar.

COLNE, koln, England, municipal borough in the county of Lancaster, and 34 p2 miles north of Manchester by rail. The most re¬ markable edifice is the Piece Hall, in the Eliza¬ bethan style. The chief manufactures are cot¬ ton goods. Colne was one of the earliest seats of the woolen and cotton manufacture in Eng¬ land, but woolens — the trade in which goes back to the 14th century — are no longer made there. Limestone and slate are quarried in the neighborhood. It is a place of great antiq¬ uity at which important discoveries of Roman coins have been made. Pop. 25,689.

COLOCASIA. See Cocco.

COLOCOLO, kd-l6-k6rid', a wildcat (Felis colocolo) found in Guiana and Chile. It is. somewhat larger than the domestic cat, is whitish-gray in color, with elongated black markings on the back and sides. In appear¬ ance it is much like the ocelot of Mexico and Central America, which enters so largely into the mythology and legendary history of the native races of Mexico and Guatemala. One of the highest orders of knighthood and no¬ bility among the Aztecs was named after this native tiger or ocelot, the hide of which the knight wore as his special insignia of knight¬ hood. The colocolo's pelt was used along the northeastern coast of South America by warriors as a distinction of rank much as the ocelot was in Mexico. The Minitaris dressed themselves in the hide of a wolf when going into battle just as the Central American tribes dressed themselves in that of the ocelot.

COLOCYNTH, kobo'-sinth, the fruit of Citrullus colocynthis, deprived of its rind. The plant, one of the Cucurbitacece , or melon family, is widely distributed over waste lands in Asia and Africa. It is also extensively cul¬ tivated. It is collected when the fruit is nearly ripe and peeled while fresh. The fruit subse¬ quently contracts somewhat, is whitish in lustre and very porous and light. As found in the market colocynth occurs as light, yellow¬ ish white balls, from one to three inches in diameter, that are very porous and fragile. It contains a large number of whitish seeds in six compartments. On breaking, the fruit splits irregularly, although there may be a

tendency to dehisce in threes. The active prin¬ ciples are a tesin and a bitter glycoside, colo- cynthin (C50H42O23 Walz). Colocynth is an active drastic purgative and is rarely admin¬ istered alone because of its harsh action, but in small doses in combination with other drugs, it is widely used as a laxative and purge. The compound cathartic pill and the vegetable pill are the chief vehicles that contain colocynth. The compound extract, made of colocynth, aloes, scammony, soap and cardamom, is widely employed in

other preparations. Colo- cynthin is recommended as a rectal cathartic in doses of one-eighth to one-half grain. Colocynth itself can be given in doses up to five grains.

COLOGNE, lco-lcm' (German. Koln), Ger¬ many, an important metropolis of Prussia, in the Rhine province, on the left bank of the Rhine. It stands upon the river in the form of a crescent, and is connected with Deutz, on the opposite side and forming part of it, by a bridge of boats and an iron bridge. Till re¬ cently it was surrounded by fortifications dat¬ ing from the Middle Ages, but these have been cleared away, their site built upon and a wider circuit of works constructed. Until the middle of the 19th century a great part of the city bore the impress of the Middle Ages, the streets being dark, narrow and filthy ; but now the municipality has paid great attention to the appearance and sanitary condition of the town generally by opening up thoroughfares, widen¬ ing and paving the streets, etc.

Among the principal buildings are the townhouse, a remarkably fine Gothic building, partly of the 14th century; the Giirzenich (1441-52), a splendid Gothic building, used for public festivities, and also accommodating the exchange; the Tempelhaus, a fine Romanesque building of the 12th or 13th century, occupied as the Chamber of Commerce; the government buildings, courthouse, post-office, Imperial bank and railway station. But the object of greatest interest in the town is the cathedral, begun in 1248, one of the finest and purest Gothic monuments in Europe. It is in the form of a cross; its entire length is 490 feet; its breadth, 231 feet; the roof rests on 100 columns, of which the four centre ones are 30 feet in circumference. The choir was long the only part finished; it is 161 feet high, and, with its pillars, arches, chapels and its superb painted glass windows, presents one of the finest sights conceivable. In 1842 the completion of this magnificent edifice was begun, after designs by Zwirner ; the works were vigorously prosecuted from that time onward, and were completed in 1880. The two western towers are each 511 feet high, and are among the highest edifices in the world. The other remarkable churches are those of Saint Peter, in which is an altar-piece of the crucifixion of that saint, by Rubens, who presented it to this church, in which he was baptized; Saint Mary, on the capitol, occupying the site of the capitol of the ancient Roman city, and dating from about the year 1000, with some good stained glass windows; the Apostles' church, in the Neumarkt, built about the year 1200, a perfect specimen of the Romanesque style, having a singularly elegant and picturesque exterior; the church of Saint Ursula, filled with the bones of the 11,000 British virgins, who, ac¬ cording to the legend, were destroyed here on

their return to Britain, under the guidance of Saint Ursula; the church of the Jesuits, or Maria Himmelsfahrt, dating from 1636, over¬ loaded with

gorgeous decorations of marble sculpture, etc. ; and Saint Gereon's which, like the church of Saint Ursula, is lined with bones, not, however, of virgins, but of the Theban legion of martyrs, slain, according to tradition, during the reign of Diocletian; this is one of the finest and oldest churches in the city.

The city contains several gymnasia and other high-class institutions ; a technical school ; an observatory and botanical garden ; a normal school, a public library, a theatre, several hos¬ pitals, a school of design, a museum, etc. The manufactures are very extensive and varied, embracing sugar, chocolate, tobacco and cigars, glue, liqueurs, mineral waters, starch, vinegar, soap, candles, velvet, silk, woolen and cotton goods, India-rubber, and gutta-percha wares, ma¬ chinery and metal goods, etc., and the celebrated eau de Cologne, of which there are a great many different manufacturers. Its commerce is considerable ; it has a good port on the Rhine, and an extensive railway communication with the interior of Germany and with Belgium and Holland. It is the principal entrepot of the corn, wine and oil trade on the river, and has active commercial relations with the Nether¬ lands, Germany, Belgium and Switzerland.

Cologne is of ancient origin, and was origi¬ nally called Oppidum U biorum, being the chief town of the Ubii, a German nation. The Ro¬ mans made it a colony 51 a.d., and called it Colonia Agrippina. It was annexed to the Ger¬ man Empire in 870, and became one of the most powerful and wealthy cities of the Han¬ seatic league, its population then amounting to 150,000. As early as the. 11th century Cologne carried on an extensive trade with foreign countries, including England, in the produce of the country — wine, corn, flour, malt, beer, etc. The arts and sciences also flourished, and its university was one of the most famous in Germany. Intestine divisions, and other causes, finally effected its ruin, and in 1792 it ceased to be a free city. It was taken by the French in 1794, ceded to them by the Treaty of Luneville in 1801, and restored to Prussia in 1814. Duns Scotus died in Cologne in 1308, and was in¬ terred in the chapel of the Minorites; and Ru¬ bens was born here in 1577, in the same house in which Mary de Medici died, in 1642. Pop. 516,527. Consult Heldmann, (Der Kolngau und die Civitas Kolu) (Halle 1900).

COLOGNE, Eau de. See Eau.

COLOGNE EARTH, a kind of ochre, of a transparent deep-brown color, especially valu¬ able in water-color painting and distemper work. Unfortunately it is not very permanent in thin washes. In the paint trade it generally goes by the name of Vandyke brown. In oil it is a very slow drier and should be ground in strong boiled oil. It is an earthy variety of lignite or partially fossilized peat.

COLOGNE YELLOW, a pigment consist¬ ing of chromate of lead and sulphate of lead in varying proportions. It is prepared by pre¬ cipitating a mixture of lead chromate and lead sulphate with a mixture of potassium bichro¬ mate and sulphuric acid. A cheaper form of much paler hue and less covering power is made by mixing finely powdered sulphate of

lime into a solution of potassium chromate and precipitating with neutral acetate of lead.

COLOMB, ko-lonT, Sir John Charles Ready, English military writer: b. 1 May 1838; d. 27 May 1909. He was educated at the Royal Naval College and entered the Royal Marine Artillery in 1854, retiring in 1809 with the rank of captain. He was a member of Parliament for Bow and Bromley 1886-92, and for Great Yarmouth 1895-1906, and was created K.C.M.G. in 1888. He has published Protection of Com¬ merce in War) (1867); (Imperial Strategy' (1868) ; (The Distribution of Our War Forces) (1869); (Colonial Defense and Colonial Opin¬ ions' (1873) ; (The Defense of Great and Greater Britain' (1879); (Naval Intelligence and Protection of Commerce (1881) ; (The Use and Application of Marine Forces' (1883); (Imperial Federation: Naval and Military' (1886); (British Defense' (1900); (British Dangers' ; (Our Ships, Colonies, and Commerce in War' (1902).

COLOMB, Philip Howard, British admiral: b. Galloway, Scotland, 1831 ; d. 1899. In 1846 he entered the navy and saw much service against Chinese pirates in 1848-51, in the Bur¬ mese war of 1852, the Arctic relief expedition of 1854, in the attack on Sveaborg 1855 and in the suppression of the slave trade 1868-70. He became rear-admiral in 1887 and vice-admiral in 1892. He perfected the system of flash signals adopted by the British navy in 1867 and revised the evolutions for steam warships. He made a particular study of maritime collisions and many of his recommendations were adopted in the code of marine regulations put forth by the Washington Conference of 1889. His book, (Naval Warfare' (1891; 3d ed., 1900) showed the vast importance of the command of the sea, and had the same theme as the works of the American officer, A. T. Mahan. He also wrote (Slave-Catching in the Indian Ocean' (1873) and (Memoirs of Sir Astley Cooper Key' (1898).

COLOMBA. This novel by Prosper Meri- mee is one of the gems of French romantic literature, and is considered as the author's best work. It combines all the qualities of his other Avorks, precision, skilful selection of the most expressive details and self-effacement of the author's personality ;

it has, besides, a glow of fiery passion intensified by its own restraint, but this may be due at least in part to the nature of the subject. Colomba is Corsica itself writh its ideas and customs as rugged and savage as its shores and landscapes. Since the days of the Romans, the vendetta or law of revenge has remained the first law of the land and the basis of its ethical system. It is per¬ sonified in the heroine, Colomba, whose thirst for revenge against those whom she believes responsible for her father's death overcomes the scruples of her brother, a young officer who had partly forgotten his native manners during a few years' residence on the Continent and in the army. A phlegmatic English colonel and his romantic daughter furnish the needed con¬ trast to the intense Corsican girl and her more civilized brother. The careful handling of the plot, the dramatic situations in the story, the vivid touches of local color and a style combining strength and precision unite to make ' this short novel a literary masterpiece; There

are a number of equally good translations of Colomba in English. Consult . Taine in his preface to (Letters to an Unknown' ; and Sainte-Beuve, Portraits Contemporains,' (Vol. III).

Louis A. Loiseaux.

COLOMBES, ko'lonb', France, town in the department of the Seine, three miles northwest of Paris, of which it is a suburb. It has oil refineries and manufactories of wroolens, oil, vinegar, gelatin, starch and surveying and measuring instruments. Pop. 22,86 2.

COLOMBIA. Physical Features, Flora

and Fauna. — The republic of Colombia is bounded on the north and northwest by the Caribbean Sea and the republic of Panama; on the east by Venezuela and Brazil; on the south by Brazil, Peru and Ecuador; on the west by the Pacific Ocean. Its area cannot be stated precisely. The estimate in the latest census is 461,606 square miles; in the pamphlet entitled (Latin America' (Washington 1915), 438,436. The boundary lines between it and four of the neighboring countries are in dispute.

The Andes of Colombia are divided into three ranges — the Cordillera Oriental, Cordil¬ lera Central and Cordillera Occidental — with intervening uplands of great extent, which are habitable and fertile, but as yet rather inac¬ cessible. Of the three ranges mentioned, the Western Cordillera is the least impressive; the Central Cordillera has the greatest number of snow-clad summits. There are four river sys¬ tems in the republic: (1) The western system, comprising the streams which flow from the western Cordillera into the Pacific Ocean ; (2) the river Cauca and its affluents; (3) the Magdalena River with its affluents ; (4) the streams of the eastern slope of the eastern Cordillera. Of special interest is the Atrato

River, which is not included in any of the fore¬ going systems. This navigable stream flows to the Gulf of Darien near the disputed Panama-Colombia boundary. As Mr. Eder has writ¬ ten, when discussing the topography of this country. Colombia presents three main divisions for study, namely the coast regions, the low-lying eastern territory, and, between the two, the great Andean land, with its valleys, plateaux and mountains. The eastern region is subdivided into a northern part, where the llanos or open wild pastures are found, and <(a southern part, of impenetrable forests, the selvas sparsely populated, except by savages, and much of it still but imperfectly explored." Besides the three main Cordilleras, the other mountain systems of Colombia comprise the great mountain block called the Sierra Nevada of Santa Marta in the northern part of the country near the Caribbean Sea; far to the south a line of worn-down ancient mountains separating the Amazon basin from the Orinoco system ; and the Baudo Range which runs along by the Pacific Coast from the mouth of the San Juan River to the Isthmus of Panama, and belongs to the Antillean system (See Central America), while the true Western Cordillera of the Andes, running northward a little farther from the Pacific Coast, is separated from the Baudo Mountains by valleys through one of which the San Juan River flows into the Pacific while in the other the Atrato takes its course toward the Atlantic. On the Pacific slopes of

1

2

10

3

4

5°

5

6

7

Los Monoes

5\C Chichibacoa ©ifta . Espada

*Pueblo * Ajpacas Uuenal*

GULF OF

*1»XflOV**

loro

tf'Uapatari'Ui Dahajuruj S. Lui

“ F C (

Cabure

JjChuruguara0

**aragui*

rB. Calabozo

TP SA-

*>11 ,**«*»» .« *J*

U Juan de Cesar a/lino \ . f YillaniWg

Vallc.de Upar X

rCapadarcˆ'

Lsuncloo

Barranfiwillai eˆlCjlaa 1 SabanˆfargaloJ

_ 4 fT (fiJpi<»o>

Cartagena i?jˆEv

ba"" vTXn

Barba coavp+tY fafes

CCBAOUA lv,'S^\otMB I.

Pen. or Abaya^_ ^

Gulf of Ca riac^ariaw

'|“C1‘icoCAHM*s’ls.

(N. Bare vlo uanta^CuinnnBCOu

;G u a j Minos . ')U\V Ara

gr Centimla

S. Rafael ! V t .Maracaibo i 1 Canada^

racial

njppis

Duac*

' CARABo^BO \) Valcnciiiv " Moatalbun^

» Ow:L;\',,

falamar

Su-uifiqoc-

LAKE

(tf Fedcracion

Lagun Hitts'

i\Caroi*a

— ' CaicaraD — –

eo /Aroo \ Maturii

jSta. Rosa'

„FreiteS/C? ...

'Carmen,

8. Ber:

MorroBqui

Puerto ,

GULF OF – DARIEN 1

Pta. Arholetes/

v fVbttfon

i VA \?fuz'

ITinaco Sombrero 1

I A /S-ljoseV'

Cordial

\ Orituco \ ’ »

\ /Gun nape

arl^coas/^J (Tbauipe izf !/^ Chaguaramas

Pt Manzanillo

jTncelejvo1

ipChima

Pilar

Sanco^/JjtfV xgT

*L /" i\ -*5 N/JS*

*/jTauial airfeq uo^S/^*

If /o'

1/ Ptor'N atonal / 65 / //gto-VlllloW

JBadUlat ^jOcana/ J j v ^ ^8. 'Jose de.Cu^ntl

PS

pSpimNAsj; iO \G uan arc £aul; \ © Portuytieac

Papclou-' -~> ~

Guador,., v«» qp«ro j£_!

Pascua

Chinu

Calabozo / Orifucoo,

i

'Calvario

Tabasta °

Penoir

Mamo.

pEARL Is,

BarrancaSj

\\ Morale agual ^

~>f) Sitniti c

iSolcd:

Guan?

mftguan

oGuayab

Tovary/ y " Orita/ _/ , , o Lobatcr.a ^Tariba;/ ^*

arre QUARAUNi

ivar Guayonavjeja — n AF

pata> Palnjat! Frnii'

V U H T E RlRVTO'RVifoVv

i o\Guacipati\?:

\ Elc^^cva^ovidencia

• \ Me

a. r In .

*If. iv (v(cp * / z7[*

\ I Ay" nruan ' –

Ciudad

a£X?‘

Pe^jiui

Jabrutal

Aycagua'

*_St*rBarbara*

*mpl«HaRu^ *

ANDER Vv

w(, It uˆir;Vm a 'i.fcfAgs •" 1 P i e & c uˆtjE ˆ

Altagracia / Purguci M r®S. Pedro'-)

PANAMA

■Sr'RafaeJ

CaicaVˆi

Sta A Rosalia It SuripcˆNF~

Sucio 4P' /d

-barador ■fx—

v ieent<

Urbana

Rf Caparro'

ittsdualito-ˆ —

Puerto Quetna(Iu'*pfi£2. Pta. Marzoˆlpp Bahia CklaiiciXˆˆ Bahia Citpica jj B. de Solano i Pta Solano P Pto. Utria

S. Antonio

lalinarito l

i n i d a d — M

—

\ ˆ — • — '$_n$~L del Tepriino.

'•ante

labetbao t 3 ˆKrontihoiOˆA

vfpA N IT

SuiVjG'

1 Soafll

gain os

Arauei

111

S f " > -P. “jVuU < *|U}* 7/K.

%

WtmbA0ˆF:iSffo fi?C

' Chioapuri iV/SA":1 VA O IPG

[nrinllla

GUAHIBOS-

loreno

MT. CHANARO ^'5,47Ss-y ^ .

)) Ctiiquinquira0 o fL.Fuquene t

Muzrtv 1 Yn. A-'

4?B &

Zip a,q uira 2/fiA^T]

C. Corrientcsr Cabita B.

mrifi,

v ' S . £

.Rafael

Grani

a^Miruflore*

iuateque

"Arecuna^

Pueblo' Nuevo

RORAi

xftUlZ.Vb^iF

TOLIMA ^(j/3'Sl 8.4(H)

6?^ta

/NovIta^'Ai

Am ha lema

Geiba

Barrabaca

Barapang

llarakittao

Noanami

Curaro.

Guaturiva

.i|\\YO'

1 Victor ino'

'obaimaj

labuyaro

Ma5.tr iaSˆ ■ ˆ — Jc Ocunc Guacotno *

inal 4} 1 ˆ

1 /Guani0'MPf'

Puri/ficacionˆ_ˆ; “■

'\ I f

Barbara ySun Fernando dc Atubg

,/Tulna , ˆA'Or'

0Bu|S < # . <

L. Caiicagua – MituaV-

Buenai

oˆillaA'i cenci 6

.De suma ,PAZ

•rsoo— ' c u

'S. Martin-'-ˆ

AArrocij/al

!°Palmiri

Zapuara

N/atagdit

7f,LUPˆ " ˆ

“ r, Esmeralda

Buenaguardiar

Caloto/ˆs

Branco

Matraca

Neiyai

ˆgufrt

ivfta

*ˆ MaroaT**

• rd Ango9tvra\ Fall Tigroˆ

cowMicai / bj /jimbiquixˆ

oQuapi

Qaaviare

\noJ Of ;hiqu£ oT;. – 30 Li Silvia

vaiT?p\IJRACEˆ

•

l – s

let'Angostura'

\fa«.

-ml Angostura

Fall

,A0AVIDA – -

*M' Mjˆl*P|C *ferd 0E LESSEPS*

' c Guacamayo Gran Laguna

Buena Vista"

Xag.\ Ca x>

\ Turai>ua\\..

h y Af-fi_v0 s

Tumaco

tPescado'.

Tta. Manglares.

Sta. Rosaˆ

A Macaquinlis

3ˆ8®!)

ducuhy

dflocoaoXA \ L'unon

EQUATOR

Putuni 1

'Caof^SL

COLOMBIA

and VENEZUELA

SCALES

Statute Miles 125 ~1 Inch.

0 _ 20 40 60 60 100 _ 200

Kilometres, 201 = 1 Inch.

PM'fec'<4- V/f

Rand, McNally k Co.'s New 11×14 Map of Colombia and Verezuela.
Copyright by Itand McNally k Co.

Curacao ^

(Di.T. iijK ^c.'S (NjBONAIRE I.

»A Nfe, V

. (1ST. VlSCENI

<

BaRRAKOS

jvWO

Pta.

Galera^

7?. Baudot^ V'VLao

B. Docampado Pto. Chirambira„/=

B. Mugdalenu\ Bahia del Choco

Goroona I. Pta. Beye Guascama Pt. F

iurs LESS

Los Roques j

•jtf Orchilla

Cavo Grakue

E R A

*BLANQtmXA I. Aˆueda * los h ek manos*

Lob FraILM Margarita l.ˆunnOricso

Fj Grenada

{ / (B«.)

ˆV0,LlfeLo

% TRINIDAD //I (BfUTieii)

.Gu/f of raria(lsf,e[limU>

Pents Mouth

-rt (1? ANftr/o y

1 % >

1

2

10°

3

4

5°

5

e

0°

7

.

-

.

.

-

.

.

COLOMBIA

277

the Western Cordillera the rainfall is excessive and the vegetation is luxuriant, while the eastern slopes are comparatively arid. Near the border of Ecuador are the twin snow peaks, Chiles (16,912 feet) and Cumbal (17,076 feet). With these exceptions the height of the Western Cordillera is in general not above 12,000 feet; and on the other hand it is as a rule not

below 6,000. There are, however, a few low passes, the most remarkable of which is the valley of the Patia, a precipitous gorge 1,676 feet deep. Here the Patia River has forced its way through the Andes and empties into the Pacific. Near the southern end of the continent there are other examples of rivers cutting the Cordillera from east to west, rather than from west to east; nevertheless the gorge of the Patia is decidedly noteworthy, and it will be referred to later. The Central Cordillera's high plateaux, in the regions of Pasto and Popayan, are well adapted to agriculture, and towns of some im¬ portance are located there, at no great distance from groups of volcanoes, some of which are ((perpetually emitting smoky clouds from their snowy caps.® Dominating Cauca Valley, north of Popayan, is one of the highest mountains in Colombia, Huila (17,700 feet). Thence north¬ ward the Central Cordillera has a nearly con¬ stant altitude of about 12,000 feet. There are several passes, but through none have roads been built north of the pass near Popayan till near Quindiu. For the bulk of travel and traffic between the Cauca and Magdalena valleys, there is still available only the old Spanish highway. Near the Quindiu are the snow-crowned Tolima (18,400 feet), Ruiz and Herveo (18,300 feet), and Santa Isabel (16,700 feet). North of these high mountains, the Central Cordillera, widens out and here we find the important mineral region of Antioquia. The Eastern Cordillera (of Cretaceous and Tertiary formation), which broadens out into the great tableland or savannah of Bogota, also has high peaks, such as those of the Sierra Nevada de Chita and Cocui (16,800 feet). (

are investigating the habits and customs of its people or its trade routes, markets and in¬ dustries — we find the mountains an ever¬ present, a predominant factor. The immense tropical forests have been scarcely less an im¬ pediment.® The effects of the extreme rugosity of the second in size of the West Indian Islands should be studied in this connection. See the article on Santo Domingo.

Climate. — The coast and some interior val¬ leys are intensely hot and insalubrious. On the elevated plateaux the temperature is that of perpetual spring. The lowest average tem¬ perature in any inhabited part of the moun¬ tainous country is 20° F. The peaks of the Cordilleras are covered with snow al¬ ways. In spite of the equatorial situation of Colombia, the Andes make temperature merely a question of altitude. At Bogota the ther¬ mometer ranges from 55° to 70° F. Alternat¬ ing periods of dry weather and rainy weather, each generally of three months' duration, are Colombia's "summer® and Svinter.®

Flora and Fauna. — Vast tracts of forest re¬ main to be explored. It is assumed that rare botanical treasures will be found in their re¬ cesses ; and with good reason, since the known varieties of Colombian flora are of

exceptional interest. Building, cabinet and dye-woods are plentiful ; the rubber-tree, the cinchona, wax- palms, cedar, balsam of tolu, lignum vitae, copaiba and mahogany flourish. The aloe, the sarsaparilla and other medicinal plants grow in abundance. Wild animals of the intertropical or higher regions are the puma, bear (two species), jaguar, sloth, armadillo, tapir, deer, cavy, opossum and 17 distinct species of monkeys. Serpents are not found at a greater height than about 5,000 feet above the sea, though they are very numerous in the low¬ lands. Characteristic birds are parrots (many varieties), paroquets, cockatoos, lorries, cranes, storks and condor.

Political Divisions and Population. — The

republic of Colombia consists of 14 departments, 2 intendencies and 7 commissaries. These with their areas, populations and capitals were in 1912 as follows :

Departments

Area

(in square miles)

Population

Antioquia .

Atlantico .

Bolivar .

Boyaca .

Caldas .

Cauca .

Cundinamarca . .

Huila .

Magdalena .

Narino .

Santander Norte Santander Sur. .

Tolima .

Valle .

22,752

739,434

1 , 008

114,887

22,320

420,730

16,460

586 , 499

7,380

341,198

20 , 403

211,756

8,046

713,968

8,100

158,191

19,080

149,547

9,360

292 , 535

6,255

204,381

17,865

400 , 084

10,080

282,426

3,897

217,159

Intendencies

Choc6 .

Meta .

68,127

68,127

29,309

Arauca . . . Caqueta. . Goagira . . . J urad6 . . . Putumayo , Uraba. . . . Vaupes . . .

Commissaries

Total .

440 , 846

4,922

24,334

53,013

8,207

31,380

6,476

5,545

5 , 064 , 308

Capital

Population

Medellin …. Barranquilla . Cartagena . . .

Tunja .

Manizales. . . Popayan ….

Bogota .

Neiva .

Santa Marta.

Pasto .

Cucuta .

Bucaramanga Ibagu6. ; . . . . Cali .

71,004 48,907 36,632 8,971 34,720 18,724 121 ,000 21,852 8,348 27,760 20,364 19,755 24 , 693 27,747

Quibdo .

Villa vicencio

Arauca ._ .

Florencia .

Puerto Estrella

Pizarro .

Mocoa. .

Acandi .

Calamar .

Of the 5,000,000 inhabitants 10 per cent are pure whites, 5 per cent pure blacks, 40 to 45 per cent aborigines, 30 per cent Cholos (de¬ scendants of Europeans and aborigines), and 10 to 15 per cent mulattoes. The urban popula¬ tion, in the 12 cities of 19,000 or more inhabit¬ ants, may be placed at 500,000 ; or about 600,000 if we include towns of 6,000. The estimate made by Professor Sievers is, for the inhabit¬ ants of such cities and towns, 10 to 12 per cent of the entire population.

History. — In 1508 the Spanish Crown granted to Ojeda the district between Cape Vela and the Gulf of Darien, and to Nicuesa the country from the Gulf of Darien to Cape Gracias a Dios. The two territories were united in 1514. Balboa's discovery of the (

Nunez held the same office, which he made im¬ portant, again in 1884 and 1886. In 1891 he was elected for the fourth time, but allowed Vice-President Caro to assume his duties.

A new constitution was adopted in 1886. By this the states were reduced to departments, with governors appointed by the President of the republic, and legislative assemblies elected by the people. The President's term of office was extended from two to six years. Colombia passed from the extreme of a loose federation to a centralized republic. Subsequent revolu¬ tions have shown the desire of the Liberals to return to the old irresponsibility. In 1892 sub¬ sidies were granted for the construction of several important railways, and new cable lines along the coast and telegraph lines in the in¬ terior were authorized. Two years later a law was passed providing for the free coinage of gold and the redemption of the paper currency. Very little progress was made, however; on the contrary the means of communication and transportation, as well as the medium of ex¬ change, displayed a tendency to go from bad to worse. The rebellion of 1895 was suppressed in 45 days, but a civil war which broke out 17 Oct. 1899 proved to be more ruinous than any preceding conflict. The Liberals attempted, by force of arms, to drive the Conservatives from power. An issue which, in a republic, should be settled at the polls, cost the lives of 50,000 soldiers, while among the wretched non-com¬ batants the number of deaths from privation and disease was vastly greater. As usual, the department of Panama was a centre of dis¬ turbance. American marines were landed to guard the stations and railway at Colon and Panama, in accordance with the treaty of 1846 between the United States and New Granada, by the terms of which the United States guar¬ anteed the neutrality of the isthmus and as¬ sumed the obligation to protect free transit between the ports mentioned. Toward the end of 1902 the flame of civil war finally went out. The government was almost destitute of money; it could neither pay interest on the national debt nor meet current expenses. Congressional elections were held throughout the country. The most important matter to come before Congress was the question of ratifying a con¬ vention concluded at Washington 22 Jan. 1903, between the Secretary of State of the United States of America and the charge-d'affaires of Colombia, for the construction of a ship canal to connect the Atlantic and Pacific oceans. The French Panama Company, formed in 1881, had suspended operations in 1889, and in 1894 a new company had been organized, securing a con¬ cession for 10 years, which term was subse¬ quently extended by six years. The board of this company had offered (4 Jan. 1902) to sell all its property and rights to the United States for $40,000,000. The Panama route had been approved by the Isthmian Canal Commission of the United States. After a long discussion in the Senate of the United States, the convention was submitted to the Colombian Congress, the constitution of 1886 providing that ratification by both Houses is requisite for the validity of such an agreement as that relating to the Panama Canal. The convention, commonly known as the Hay-Herran treaty, was defeated at Bogota, 24 members of the Senate voting on 12 Aug. 1903 to reject it. A

counter-

proposition prepared by a commission (29 August) was debated for a while, but not adopted. The adjournment of the Colombia Congress on 31 October was followed almost immediately by the outbreak of a carefully planned (< Separatist® movement in Panama. Independence was proclaimed 3 November and Colombian army and navy officers in the prin¬ cipal city of that department were imprisoned. A provisional government was organized. American warships were ordered to the Isth¬ mus ; marines landed at Colon ; and the Colom¬ bian troops withdrew from that town. On 6 November the government of the United States entered into relations with the government of the republic of Panama, and on 13 November M. Philippe Bonau-Varilla was formally received by President Roosevelt as minister of the new country. At that time hostile demonstrations against the Colombian government occurred at Bogota, and another revolution seemed im¬ minent.

While political factions have continued to resort to arms for the settlement of differences of opinion within the nation's boundaries, the better sentiment of an increasing class of educated people has begun to make itself felt in the disputes with neighboring republics touching the location of those boundaries. Arbitration has repeatedly taken the place of foreign wars. An agreement was made 15 Dec. 1894 for submitting to arbitration the question as to the southern line between Colombia and Ecuador and Peru. President Loubet oi France acted as arbitrator of the boundary dispute with Costa Rica, rendering a decision 11 Sept.

1900.

In recognition of difficult questions that had arisen, and in anticipation of those that might arise out of Panama's secession from Colom¬ bia and the creation of the Panama Canal Zone, Secretary Taft effected (17 Aug. 1907) an agreement between representatives of Colom¬ bia, Panama and the United States. This agree¬ ment was general in its scope, and particular applications of its main principle were observed, both at the end of the year 1908, when ne¬ gotiations between Colombia and Panama reached an advanced stage, and at the beginning of 1909, when a treaty between the United States, Panama and Colombia was signed. Hostility was manifested in Colombia to that portion of the treaty which exonerated the United States and Panama from the charge of injustice to Colombia in the matter and manner of Panama's secession. Thereupon President Reyes tendered his resignation, and his suc¬ cessor, President Valencia, advocated the

refer¬ ence to The Hague of that question and also of the question as to indemnity for the aliena¬ tion of Colombia's most famous and valuable department. The following year (1910) saw riotous demonstration of the anti-American feeling in Bogota, for which an apology was offered to the Minister of the United States. On 20 July the centennial anniversary of Colom¬ bia's independence wras celebrated. In 1911 territory claimed by Colombia as a portion of her southern domain was occupied by Peruvian troops. A battle was fought there, and the Colombians were defeated. In 1913 the pro¬ posed d vclopment of the petroleum industry in Colombia by a British syndicate aroused op¬ position in the United States. The liberality of

the terms was construed as the grant of a monopoly, and the proposals were with¬ drawn. For an explanatory inference to Colombian oil-fields, see section Banking and Finance. On 4 Nov. 1913 the Congress at Bogota adopted a resolution affirming Colombia's isthmian rights, 10 years having passed since the severe loss had been sustained. Don Jose Vicente Concha (clerical-conserva¬ tive) became President in 1914. During that year there was (

Government. — -Some of the amendments to the constitution adopted by legislative Act number 3 of 1910 were : The legislature shall in no case prescribe the penalty of capital pun¬ ishment; new emissions of paper money of compulsory circulation are absolutely pro¬ hibited ; and the Congress shall annually elect two designates, a first and a second, who shall exercise the executive power in that order in case of a vacancy in the presidency. The Senate shall be composed of as many members as correspond to the population of the republic in the ratio of one for each 120,000 inhabitants and two substitutes shall be elected for each senator. The Chamber of Representatives shall be composed of one representative for each 50,000 inhabitants. The President of the re¬ public is elected by direct vote, for a term of four years. In case of foreign war or civil disturbance he, with the signature of all the ministers, may declare public order disturbed and the republic or any part thereof to be in a state of siege. By such a declaration the government has, in addition to the powers con¬ ferred by the laws, such powers as govern war between nations pursuant to the accepted rules of international law.

The old doctrine of the sovereignty of de¬ partments has been rejected in favor of the centralized system. The brief sketch which follows shows the leading provisions of the constitution adopted in 1886 and transformed by amendments in more recent years :

The executive overshadows the legislature and judiciary. (Contrast: Chile — Govern¬ ment). Appointed by the President and freely removable by him are the ministers of state and government, foreign relations, hacienda

or exchequer (in charge of government revenues), treasury (in charge of disbursements), war,

public works arid education. These ministers are also responsible to the legislature. Natu¬ rally, then, frequent shifts and changes in the ministry are the rule (

Sessions of the Senate and House of Repre¬ sentatives, forming the Congress, are held annually. "Presidents have exercised the right, instead of having elections for Congress, of convoking a National Assembly, the member¬ ship of which has been appointed by the de¬ partmental assemblies, upon which pressure can be somewhat more readily exerted by the executive than upon a direct vote at honestly conducted polls. The distinction between a Congress and a National Assembly is somewhat hard for the foreigner to grasp, especially as the constitution makes no provision for the latter body; but it is held that the right of the sovereign people to assemble is inherent and superior even to the constitution itself.® It was stated in the preamble of the executive decree convoking such an assembly in 1905 that the basis for an act of such transcendent im¬ portance must be sought, not in the constitu¬ tion but in the supreme law of necessity. Such an assembly can, indeed, amend the constitu¬ tion without the more deliberate proceedings which that instrument prescribes. The con¬ stitution may be amended only by a legislative act first discussed and approved by the Con¬ gress in the usual manner, and in like manner considered at the next succeeding annual session and thereat approved by both chambers, after second and third hearings, by an absolute majority of the whole membership of each of the chambers.

The Judiciary and the Codes. — The Su¬ preme Court has nine members, four elected by the Senate and five by the House of Repre¬ sentatives. In each case the term is five years, and nominations are made by the President of the republic. The Supreme Court magis¬ trates appoint, as judges of the Superior Courts, the nominees of the departmental assemblies. Municipal judges, however, are elected by the local boards. The Commercial and Maritime- Commercial codes are chiefly based on Spanish

law, though the influence of French law is not to be overlooked. The same influence strongly affects the Penal Code, and the Civil Code is founded on the Code Napoleon. The title "doctor® is commonly bestowed upon lawyers of prominence or university training.

Education and Religion. — Colombia has long claimed to be the most literary country in Latin America. The best of her scholars and writers have

been regarded at home and in the mother country as inferior only to those of Spain among the peoples using the Castilian tongue. But in spite of this distinction, it is only lately that the nation has come to realize the importance of educating the mass. Now, how¬ ever, the direction of the educational system of the whole republic is in the hands of the Minister of Public Instruction. In 1916 there were in Colombia 5,137 primary schools and 5,733 teachers with 325,756 pupils. Most of the secondary schools are as yet entrusted to the corporations of the Catholic Church, which is by law the established religion of the republic ; and as such are financially assisted in the work of education by the national treasury. In 1916 there were 344 secondary and professional schools with 29,138 pupils; and in addition to these, 43 art and trade schools with 2,380 pupils; and several higher colleges and universities. Of these the oldest is the University of Bogota, founded in 1572, which with the School of Mines at Medellin are national institutions. Several of the political departments maintain universities. Among these are the universities at Medellin, Cartagena, Popayan and Pasto. In the 28 normal schools of the republic there were, in 1914, nearly 2,000 students. There are also schools of mines at Pasto and Medellin where pupils are graduated as engineers. The amount devoted to education in Colombia is be¬ ing increased from year to year. The amount expended for this purpose in 1914 was 3,445,225 pesos, the greater part of which came from the treasuries of the various departments. There are numerous libraries and museums through¬ out the country and a national museum, national library and national observatory at the capital, Bogota. The University of Cartagena, depart¬ ment of Bolivar, comprises five "schools,® de¬ voted to philosophy and letters, science, medi¬ cine and the natural sciences, law and political science and mathematics and civil engineering. A school of mines is maintained by the national government at Medellin, capital of the depart¬ ment of Antioquia. According to the report of the director of education 266 primary schools, public and private, gave instruction, in the de¬ partment of Cartagena, in 1916 to about 12,250 students, with an average attendance of 8,059. Primary education is free, but not compulsory. The private schools are generally superior in instruction to the primary public educational institutions and are attended by children of the upper classes. In Colombia there are four Catholic archbishops: of Bogota, Cartagena, Medellin and Popayan, the first of which has four suffragans, and each of the others two, among which is that of Panama, attached to Cartagena.

Agriculture. — Agriculture is the principal industry of Colombia and is especially favored by soil and climate. »The low and torrid regions (coast and valleys produce coffee,) sugar cane, bananas, cacao, yucca, cotton, tobacco, indigo,

vanilla, rice and many kinds of tropical fruits. 1 he temperate middle region of the Andes is suited to the cultivation of wheat, barley, corn, etc., but these grains are not produced in very large quantities owing to the lack of means of transportation. The rubber tree and copaiba grow wild and are tapped. The cattle raising industry is important in the great plains of the southeast and cattle hides are an important export. The total number of cattle in the re¬ public is about 7,000,000. There are some ex¬ cellent horses and mules of Andalusian stock. The government has adopted measures to make experiments in irrigation of tropical lands and to place artesian wells at various points on the plains. A recent law covers this project and provides for the establishment of schools of tropical agriculture and a central bacteriolog¬ ical institute. Coffee is Colombia's most im¬ portant article of export, is grown principally in the Medellin district and the Cauca Valley. Colombian coffee commands a high price and finds a ready market in Europe and the United States. The new Cali Railway will stimulate the industry in the Cauca Valley. Much of the rubber shipped abroad is of the uncultivated variety, but in the Atrato Valley and elsewhere the tree is under cultivation. The production in 1915 increased 100 per cent over that of the preceding year, and the industry is still in its infancy. The Sinu and Atrato valleys abound in fibrous plants, such as fique and pita, and on the banks of the Magdalena River plants of .the agave family and a species of henequen, called locally ˆplantanillo,® grow in great num¬ bers. These various plants produce an ex¬ cellent grade of fibre which is used throughout the country for making rope, rugs, hammocks, etc. The manner of separating and cleaning the fibre is crude and primitive, the plants be¬ ing flagellated until the fibres separate, when they are put in the sun to dry. The introduc¬ tion of machinery for separating the fibre economically should create a thriving industry. Ipecac is an important agricultural export. In 1915 there was a large increase in the tonnage and value of shipments of this commodity. The plant grows wild in the Sinu Valley and a small toll is assessed by the government on all ipecac gathered on public lands.

There are productive tobacco lands near the coast and in the department of Santander, but the district of Ambalema produces the best grade and the greatest quantity of tobacco. The larger part of it is used locally for manufactur¬ ing cigars and cigarettes, although the exports have been important during some years. There was less tobacco grown than usual in 1915 owing to the expected curtailment of the market abroad. The invoiced price of exported tobacco early in 1915 was six cents a pound, which in¬ creased to eight cents in November.

The elimination of Germany from the market in 1915 left the exporters of

tagua or ivory nuts in this district with quantities on hand that could not be disposed of elsewhere. It is owing to the neglect in sorting the nuts according to size and grade that has prevented Colombian exporters from selling greater quantities in the United States. The prevailing local price of tagua during the year was $40 a ton. Land for agricultural and other purposes is cheap and generally well watered, but the scarcity of labor is one of the greatest diffi¬

culties in developing the country. There are many varieties of hardwood, but only cedar and mahogany arc exported to any extent.

Commerce. — The value of Colombia's im¬ ports in the last normal year before the Euro¬ pean War, 1913, was given as $28,535,800, ex¬ ports in the same year reaching the sum of $34,315,800. After Brazil, Colombia exports more coffee than any other country. It is esti¬ mated that the annual exports amount to 1,000,- 000 bags of 60 kilos each (132 pounds), pro¬ duced by 125,000,000 coffee plants. As these plants are valued at 30 cents apiece, they rep¬ resent an investment of $37,500,000. The ex¬ ports of coffee in 1915 were valued at more than half of the total exports, being $16,247,672 out of a total of $31 ,579,131. The United States consumes the bulk of Colombian coffee, import¬ ing 91,830,513 pounds out of Colombia's total exportation of 136,215,413 pounds in 1914, and taking 111,077,449 pounds out of the exports of 149,111,674 pounds in 1915. Other items in the export list are : Bananas, tagua, hides, leaf to¬ bacco, rubber, gold, ˆPanama' hats and plati¬ num. Imports from the United States in 1913 were valued at $7,629,500, and exports to the United States $18,861,800. In the same year, the imports from Great Britain were valued at $5,837,490, and exports to Great Britain, $5,- 566,000; imports from Germany, $4,012,100 and exports to Germany, $2,216,200; imports from France, $4,408,600 and exports to France, $797,- 000. Colombia imported from the United States, Great Britain, Germany, France, Bel¬ gium, Italy and other countries in normal years, before the outbreak of hostilities in Europe, articles of the following classes: Textiles, foodstuffs, metals, cars and carriages, materials for arts, drugs and chemicals, fuel and light¬ ing, agricultural and mining implements, electri¬ cal supplies, paper and cardboard, wines and liquors, arms and munitions, etc. In domestic commerce many articles appear which are manu¬ factured in the country on a very small scale, partially supplying home consumption. Ex¬ ports from the United States to Colombia were valued at $8,980,177 in 1915. Exports to the United States from Colombia in 1916 increased over $9,000,000, according to the declared re¬ turns received from the consulate of the United States at Barranquilla. The total exports for 1915 were $18,656,662 and for 1916 they were $27,- 759,081. Large increases are shown in the ship¬ ments of bananas, coffee, gold bullion and hides. The increase in exports of platinum is especially*

large. In 1916, coffee to the value of $16,616,686 was exported as compared with $12,632,829 ; hides and skins valued at $3,632,359, as com¬ pared with $2,122,595; gold bullion, $2,009,079 against $903,441 in 1915; bananas, $1,667,213 against $863,483; platinum, $1,456,648 against $504,302 in 1915. Rubber, sugar, tanning ex¬ tract and ivory nuts figured in the exports to the extent of about $250,000 each.

Manufactures and Mining. — According to government statistics Colombia in 1916 had 121 manufacturing plants, in which was invested a total capital of $12,406,000. The list prepared by the government is not complete, as several well-known factories are not represented. There are two plants (sugar and oil) of over $1,000,- 000 capital. Three textile factories and one electric plant have capitalizations of over $500,- 000 each, and 10 enterprises (4 textile mills, 2

match factories, 1 flour mill, 1 cement plant, 1 chocolate factory and 1 tanning extract plant) are capitalized between $200,000 and $500,000 each. Twelve factories have capitalization be¬ tween $100,000 and $200,000; 15 between $50,- 000 and $100,000; 50 between $10,000 and $50,- 000; and 28 less than $10,000. The principal manufacturing centres are Bogota, Medellin, Barranquilla and Cartagena. Bogota has 40 plants with a combined capital of $3,013,000; Medellin has 30 with a capital of $2,380,600; Barranquilla, 18 with $1,370,000 capital ; and Car¬ tagena, 12 with a total capital of $2,993,000. In the Cartagena factories are included a sugar mill at Sincerin, some 20 miles distant, which is capitalized at $2,000,000. With the exception of sugar, the exports of which in 1915 amounted to $98,265, practically none of the products of these manufacturing industries is exported. In fact their output, except in a few articles, is not sufficient to meet the domestic demand. For instance, with 7 large and 14 small textile mills in the country, the imports of drills, sheetings and print goods amounted to $3,343,383 in 1915.

The manufacture of Panama hats is an al¬ most entirely decentralized industry, which oc¬ cupies many individuals and families in the small communities of the interior. The 1915 production of hats was valued at about $1,000,- 000, exports having amounted to $966,846. The industry suffered greatly in the early part of 1915 through the curtailment of the purchasing power of the buyers and the decreased demand from the principal market, the United States. Declared exports of Panama hats at American consulates amounted to $566,683 as against $1,080,508 for 1914, a decrease of $513,825, or almost 50 per cent. The wages paid male laborers in Colombian factories are $0.50 to $1 per day, the average being about $0.60. Women receive $0.25 to $0.35 daily. In the coast towns most factories work only eight hours, but in the interior 10 hours is the rule. Shipbuilding is an important industry in Cartagena in normal years, but in 1915 there was a noticeable de¬ crease in the number of vessels constructed. The ships built here are for the coastwise trade and consist of small skiffs and schooners, some¬ times equipped with motor power engines which are generally imported from the United States;

Mineral Resources. — Gold which has been and continues to be the most important mineral product of Colombia is found both in lodes in the mountains and as grains and dust in the alluvial deposits of the river valleys. The principal gold area is between the Magdalena and the Pacific Coast, and south of the point where the Cauca joins the Magdalena. The province of Antioquia is the most important area of production, which centres around Medellin. In 1912 the exports of gold were $6,634,914. The rapid growth of platinum pro¬ duction since 1907, when only 245 troy ounces of the metal were exported, can be realized from the fact that in 1915 the shipments amounted to 11,046 troy ounces and were valued at $494,888. This entire amount came from the Choco and was panned out of the gravels of the small streams. The area of the platinum pro¬ ducing zone is small, beginning near the mouth of the Condoto River and extending a short way north of the rivers Nemota, Bebarama and Negua, a longitudinal distance of about 90 miles. The strip is not much more than 30 miles wide.

An American company was formed during the latter part of 1915 to exploit platinum-bearing lands and to dredge a section of the San Juan River. Silver is mined to a certain extent, the normal output fluctuating but running between $400,000 and $700,000 annually. Copper is pretty generally distributed, being found especially all along the mountains adjoining the Magdalena Valley, from the Ecuadorian boundary to the mountains of Santa Marta on the coast. Iron ore in large quantities occurs in various parts of the country but is especially important in Cundinamarca. Extensive coal deposits have been discovered and seem to

be scattered over many parts of the country. The principal beds now worked are near Amaga in Antioquia. Coal mines do not come under the provisions of the Mining Code in regard to filing of claims. The government controls the coal in its unoccupied lands, and it may be worked only by contract with the government, but owners of lands con¬ taining coal may work their mines independ¬ ently. Oil has been found in various parts of the country, especially around Cartagena and Barranquilla. Sulphur, salt, emeralds, lime, nitre, chalk, marble, asphaltum, alum, magnesia, amethysts, lead, tin, manganese, mercury and cinnabar are found in various parts of the country.

Banking and Finance. — The principal banks of the capital city are the Banco de Bo¬ gota, Banco de Colombia, Banco del Co- mercio, Banco Central and C. Schloss y Cia. ; those of Cartagena are the Banco de Bolivar, Banco de Cartagena, Banco Industrial and Pombo Hermanos ; those of Barranquilla are the Banco Comercial de Barranquilla and Al- zamora, Palacio y Cia. ; those of Medellin are the Banco Aleman-Antioqueno and Restrepos y Cia. The circulating medium was only paper, having approximately the value of one cent American gold per peso in 1914. It is both gold and paper. The theoretical unit was the peso of 1.5976 grammes of gold .91666 fine, di¬ vided into 100 centavos; and a law was passed designed to fix its value at one-fifth of a pound sterling, which would be the actual value of such a coin. For official payments and ju¬ dicial liquidations the legally established value of the paper currency at the time was given in relation to the pound sterling and in the pro¬ portion of £1 as the equivalent of 500 paper pesos. Mr. Joseph T. Cosby wrote in 1915 as follows : <(Since then the actual par of exchange is 10,000 per cent, when quotations vary from this par they are considered as at either a dis¬ count or a premium, as the case may be. For instance, if the commercial quotation for de¬ mand draft on London is expressed as 10,500 per cent, this would represent a premium over par of 5 per cent, since £1 would cost 525 pesos instead of 500 pesos, the par at 10,000 per cent.® American and English gold coin circu¬ lates freely in Colombia. The shipments of Co¬ lombia's export products are usually financed through the medium of credits, and these credits were, to a large extent, canceled soon after the war in Europe began, exchange rates advancing to 11 per cent above normal. At that rate, $100, currency of the United States, cost 11,150 Colombian paper pesos. The method of quoting exchange rates in Colombia is as follows: Madrid, 500 pesetas, 9,550 per cent = 9,550 pesos paper; New York, 100 dol-*

lars, 10,250 per cent = 10,250 pesos paper ; Paris, 500 francs, 9,950 per

cent = 9,950 pesos paper; Berlin, 400 marks, 9,850 per cent = 9,850 pesos paper; London, £20, 10,000 per cent = 10,000 pesos paper. A coinage law was promulgated by the President in the Diario Oficial of 19 Dec. 1916. Under this law the government will coin gold, silver and nickel pieces, and will recoin old and foreign pieces, standardizing in value the money in use throughout the country. The government is authorized (1917) to coin gold pieces ol established weight and fineness in the mints of Bogota and Medellin, when gold is needed in circulation, and when individuals present gold for coinage, the work is to be done at cost price ; to complete the mint at Bogota, and to arrange with the departmental government of Antioquia for the purchase or lease of the mint at Medellin to be enlarged and put into shape to coin an adequate amount of money. An appropriation of $50,000 annually for coinage purposes is to be included in the next budget and in succeeding budgets until the amount of $200,000 is reached. The funds of the conver¬ sion board may be used in exchange for na¬ tional silver pieces coined before 1911 and foreign silver coins now in circulation in Co¬ lombia. The Colombian government recently authorized the exchange of gold notes for the old paper money in circulation. The Diario Oficial announced that the exchange would be made in Bogota by the conversion board, through the exchange office, during the period from 1 March to 19 Dec. 1917. Three com¬ prehensive pamphlets dealing with the financial and economic situation of Colombia, with her public works, etc., were submitted by the Co¬ lombian delegates to the First Pan American Financial Conference and are embodied in the report of proceedings (Washington 1915). At¬ tention was invited especially <(to the geographi¬ cal location of the Republic of Colombia, its relation to the Panama Canal and the proximity of the principal Colombian ports to both en¬ trances of the canal. This being visualized, it is at once self-evident that the hostage to the future given by the United States by the con¬ struction of the canal makes it imperative in the interests both of the United States and of Colombia that the two countries should estab¬ lish relations of the greatest intimacy.® The Colombian committee also expressed a belief that it is ((in the interest of all the American republics, whose future commerce will pass through the Panama Canal, and especially es¬ sential to the United States, that adequate harbor accommodations and facilities for trans¬ shipment and storage should be installed at the Colombian ports of Santa Marta, Carta¬ gena and Buenaventura. To assure the proper development of these ports it is also felt that the sanitation systems should be perfected.® In addition, the attention of the conference was called ((to the possibilities of railway construc¬ tions which would stimulate the development of the rich natural resources of the country, and thus build up a traffic which .would find its way to the markets of the world through the ports mentioned.® The. suggestion was offered that, if American capital should go to this country,

which is larger than Germany and France together, or larger than all the coast States from Maine to Florida, including Ohio and West Virginia, it ((could take advantage of

the greatest and best classes of business and also obtain the contracts for the construction of the most indispensable public improvements of the country,® as the English did in Argentina from 1860 to 1880. Interesting statements made by the Colombian committee are the following: In the order of their importance, the workable mines are, first, those of gold, silver, iron, cop¬ per, platinum and emeralds; second, petroleum (found in large fields both near the coast and in the interior) ; third, coal, which (

The foreign debt for loans, subventions and guarantees of interest on railways is payable in London and amounts to £3,923,720 or $19,051,-479, only $3.75 per capita. Law 69 of 1909 gave the control of the currency to a board of three persons, called the Junta de Conversion, the paramount duty of the board being to collect a conversion fund in gold coin with which to guarantee the paper money in circulation; and it appears that about 50 per cent of the gold value of the paper money (in the proportion £1 = 500 paper pesos, for official payments, etc., as above) had been collected (1917). The banks doing business in Bogota have a total capital of $4,350,000. The law does not allow banking institutions to issue notes. In 1913 the exports were larger by $5,780,000 than the im¬ ports, so that the liabilities assumed in the first six months of 1914 were not based on credit alone; and for that reason it was not found necessary, when the European War broke out, to grant a moratorium either in favor of the banks or of private business men.

Transportation and Communication. — About 700 miles of railway were in operation (1917). These railways belonged to different companies. As the commerce of the interior is carried on the river systems, with railways as their auxiliaries, the lines of the latter are short. Important in this respect are the follow¬ ing rivers: Magdalena (navigable for over 900 miles), Cauca, Nachi, Cesar, Lebrij and Soga- moso. Steamers ascend the Magdalena to La Dorada, 592 miles from Barranquilla, while smaller boats carry on traffic far into the in¬ terior up the tributaries. About 50 steamers (1918) plied regularly on these waters. The only way of reaching the national capital from the Caribbean coast is up the Magdalena and thence over the mountains, partially by highway and partly by railway. The chief ports are (on the Caribbean side) Barranquilla, Cartagena, Santa Marta and Riohacha, and, on the Pacific, Buenaventura. The government had under con¬ sideration (1917) a survey of the Bay of Malaga or Magdalena on the Pacific Coast, with

a view of establishing a new port there with modern facilities. Points of export and entry on the Venezuelan frontier are Cucuta and Arauca. The ports are in communication with European and American countries. There were, before the European War, seven lines of mail steamers (three British and the others French, Spanish, Italian and German), and trade service between the United States and Colombia was furnished by The United Fruit Company, weekly sailings, American ; Hamburg American Line, weekly sailings, German ; Panama Railroad Company's steamers, weekly sailings, American ; Royal Mail Steam Packet Company, fortnightly sailings, British. The number of post-offices is given as 843 (in 1915), and there are 12,000 miles of government telegraph lines.

Army and Navy. — Military service is com¬ pulsory under the law for from one to one and one-half years, but military training is bestowed upon a handful of young men only. The peace footing of the army is 6,000 to 7,000, consisting of three divisions of two brigades of two regiments of infantry, a total of 12 infantry regiments, one cavalry regiment of four squadrons, one artil¬ lery section, one engineer battalion and one transport battalion of three companies. The infantry arms are Remington, French Gras and Mauser rifles ; and the police strength in 1914 is given at 2,328 men. Vessels of the navy con¬ sist of a few cruisers and gunboats, tugs and troopships. There are no modern or really valuable ships.

Bibliography. — Acosta, J., (Compendio His- torico del Descubrimiento y Colonizacion de la Nueva Granada* (Paris 1848) ; Bandelier, A. F., (The Gilded Man* (New York 1893) ; Cieza de Leon, P.,

(New York 1914) ; Harding, E., (In Justice to the United States) (New York 1914 — in Clark University, Worcester, Mass., (Latin Amer¬ icaˆ ; Humboldt, A. de, and Bonpland, A., (Voy¬ ages aux Regions Equinoxiales,* etc. (Paris 1810-35) ; Levine, V., (Colombia* (London 1914) ; Markham, C., (The Conquest of New Granada* (London 1912) ; Moore, J. H., Man¬ ama's Independence of Colombia* (Washington 1914) ; Mozans, H. J., (Up the Orinoco and Down the Magdalena* (New York and London 1910) ; Pan American Union, (Latin America* (Washington 1915) ; Pereira, R. S., (Les Etats- Unis de Colombie* (Paris 1883) ; Petre, F. L., 'The Republic of Colombia* (London 1906) ; Serret, F., (Voyage en Colombie* (Paris 1912) ; Sievers, W., (Die Cordillerenstaaten* (Vol. II, Berlin 1913) ; Restrepo, (Estudios sobre los aborigenes de Colombia* (Bogota 1892).

John Hubert Cornyn, Editorial Staff of The Americana.

COLOMBO, Mateo Realdo, Italian anat¬ omist: b. Cremona; d. Rome

1559 (date dis¬ puted by some authorities). He devoted him¬ self to the practice of pharmacy, then studied surgery and anatomy at Padua under Vesalius,

whose assistant and friend he became, and Leonicus. He then spent some time in Venice, and was called in 1542 to fill the chair left temporarily vacant by Vesalius, who had gone to Germany. When Vesalius left Padua defi¬ nitely in 1543 to go to Spain, Colombo was his successor, and met with great success. In 1546 he went to Pisa to teach, and in 1549, at the call of Paul IV, to Rome. While Colombo perpetuated some of the errors of Vesalius, and introduced some anew, he was an able anat¬ omist. He made more human dissections than any of his predecessors and introduced the practice of vivisection on the dog and the swine. He discovered numerous facts in anatomy, among which was the pulmonary cir¬ culation, which he found out by his vivisec¬ tions independently of Servetus. His researches are to be found in his (De re Anatomica Libri XV (Venice 1559).*

COLOMBO, Ceylon, the capital, seaport on the southwest coast, near the mouth of the Kelani River, and about 70 miles southwest of Kandy, the principal place on the island. It is a handsome town, and a portion of it, com¬ prising most of the best houses, is within the walls of its very extensive fort, which occupies a projecting point of land and embraces a cir¬ cumference of nearly one and a fourth miles. The houses of the Europeans outside the town are very beautifully situated, especially those near the sea. There are several bazaars or mar¬ ket-places. The public buildings comprise the government offices, government house, hall of the Supreme Court, the valuable museum, etc. Some of the noted buildings are an old Dutch church, Presbyterian, Anglican and Roman Catholic churches, hotels, orphan asylum, mili¬ tary hospital and barracks, the town-hall, the railway station, the Colombo Royal College, Saint Thomas' College and Wesley College. The Moors have two handsome mosques with minarets ; the Hindus also have their temples, rudely sculptured. Water is brought from a distance of 30 miles to the town and there are extensive gas-works. The harbor was for¬ merly capable of receiving small vessels only, and large ships had to cast anchor upward of a mile from the shore, exposed to the southwest monsoon ; but breakwaters now give complete shelter and Colombo is the regular calling sta¬ tion for the large steamers bound for Bombay, Madras, Calcutta, the Straits, China, Australia, etc. It is the chief port of Ceylon, its exports and imports including the great bulk of the goods sent from and brought to the island. Colombo is one of the most important coaling stations for British and foreign steamers on the Australian and East Asiatic routes. It is connected by rail with Kandy, Galle and the north of the island. It is the seat of a United States consulate. The natives are mostly ar¬ tisans and laborers, while the Europeans are*

either owners of large plantations or merchants. It was occupied by the Portuguese in 1517 and named in honor of Christopher Columbus. It was taken by the Dutch in 1656 and by the British in 1796. Pop. 213,396.

COL(5n, sometimes called ASPINWALL,

Panama, city of 20,000 inhabitants on the north¬ ern side of the Isthmus of Panama, connected with the citv of Panama by a railway 49 miles in length. During the civil war in 1885 it was partly burned, but has been rebuilt, It stands

geographically within the Canal Zone, upon an island which divides an inlet of the sea into the ports called Manzanillo and Limon Bay. American marines and sailors were landed there

?onAng jhe rev.olutions which began in 1885, 189; and 1903, in accordance with the treaty by which the United States guarantees to pre¬ serve from interruption free transit across the isthmus. It is the northern terminus of the Panama Railway and the Panama Canal. Prac¬ tically all of the land in the city is owned by the Panama Railroad, under its original fran¬ chise from the United States of Colombia, and as the United States now owns the Panama Railroad it has thus become the owner of the land, but cannot sell it. Adjacent to Colon, on Limon Bay and practically forming a part of the city, is the American city of Cristobal, where are located the great cold-storage plant of the Isthmian Canal Commission and the shops of the Panama Railroad. The deep but exposed harbor of Colon, in Limon Bay, is inferior to that of Porto Bello, 20 miles to the east, but has been improved by a long break¬ water from Toro Point, erected by the Canal Commission. Steamships can come alongside the piers and the docking equipments are modern, including cranes and other ap¬ paratus. Colon was formerly either the terminus or a port of call for about a dozen lines of steamships. The city has served as an entrepot for much of the commerce be¬ tween Atlantic and Pacific ports, but has lost much of its steamship business to the new and better equipped port of Cristobal. In 1915 the number of steamships entering the port of Colon was 103 (275,410 tons) as compared with 687 (2,120,704 tons) in 1914. In addition 131 sailing vessels, of 4,536 tons, entered this port. The imports into Colon for the year 1915 were valued at $3,892,534. Of this amount, a value of $2,833,439 was taken from the United States and a value of $740,155 from Great Britain and her colonies. Figures for the exports are not available except those for exports going to the United States, furnished by the American consulate. The value of these exports for 1915 was

$509,583. Of this total the larger items were : Coconuts, $234,205 ; rubber, balata, $128,- 794; tagua (ivory) nuts, $56,420; turtle shells, $29,778; cocoa, $17,850; and hides, $15,202. The prevalence of war in Europe has served to revolutionize the foreign trade of Colon, and the above figures must be regarded as indicating only a passing condition. Colon consists largely of unattractive frame houses and small shops, but many of the newer houses, including the modern municipal building and the principal public school, are of concrete. Following the great fire of April 1915, which destroyed 20 blocks in the business section of Colon, this part of the city is being rebuilt with substantial concrete structures in modern style. Under the treaty of 1903 the cities of Colon and Panama, while remaining Panaman territory, came under the jurisdiction of the United States in all matters relating to sanitation and quarantine. Formerly Colon was a notoriously unhealthful place, but the unsanitary conditions were rem¬ edied by the Canal Commission in 1906-07 ; sewers and a system of waterworks were con¬ structed and stringent sanitary regulations es¬ tablished. Unlike Panama, Colon is not an old city, having been founded in 1850 by the build¬

ers of the Panama Railroad, which was com¬ pleted in 1855. For a time it was called Aspin- wall, in honor of William H. Aspinwall, one of the builders of the railroad, but subsequently the name was changed by statute to Colon, in honor of Christopher Columbus, who sailed into Limon Bay in 1502. A fine statue of Columbus, the gift of Empress Eugenie in 1870, stands near the mouth of the old (French) canal in the present city of Cristobal. When the Canal Commission undertook its work, the population of Colon was probably not much over 3,000, consisting largely of Jamaica negroes and of natives of mixed Spanish, Indian and negro blood. The census of 1911 returned a popu¬ lation of 1 7,748 ; estimated by the Isthmian Business Directory at 20,000 in 1915.

COLON, Venezuela, a federal territory em¬ bracing the Venezuelan islands in the Carib¬ bean Sea, except those belonging to the state of Rivas. The islands forming the territory are Blanquilla, Los Hermanos, Frailes, Sola, Testigos, Venados, Esmeraldas, Caracas, Pi- cudas, Chimanas, Borracha, Arapos, Monos, Piritu, Farallon, Ocumare, Orchila, Los Roques, Aves, Los Monjes and several smaller ones. The natural products are phosphate of lime, guano, lime, woods and fish. Large quantities of the plant called orchila are exported for industrial purposes. There »are salt deposits in Los Roques. Gran Roque is the capital. Nearly all of the islands are uninhabited. The territory is directly dependent upon the national govern¬ ment, and, like the territory of Amazonas, is governed by special laws.

COLON, that part of the large intestine which extends from the caecum to the rec¬ tum, the greater part of the large intestine. It consists of three

divisions, the ascending colon on the right side of the abdomen, the transverse colon, which passes horizontally from right to left just beneath and behind the liver and stomach which cause it to bend slightly in its course, and the descending colon which passes down on the left side of the abdomen to the left iliac fossa where it joins the sigmoid flexure which extends into the rectum. The structure of the colon in comparative forms is dependent upon its function, which varies according to the nature of food. In herbivorous animals, where nutritive material in the food stuffs is enclosed in cellulose walls, the large intestine plays a considerable part in digestion. The dissolving of these cellulose walls is dependent upon the action of bacteria which are present in the large intestine for this purpose. Carnivorous animals possess a short and narrow colon, since their food undergoes practically complete digestion and absorption before it reaches this portion of the intestine. Man occupies an intermediate position in regard to structure and function of the colon. There is properly speaking no in¬ testinal secretion in the large intestine, but the presence of alkaline substances which may favor the growth of bacteria while at the same time they neutralize the acid products of bacterial activity. The question of the normal presence and action of bacteria is a debated one. The excessive action of bacteria leads to disease conditions and yet they seem to be necessary, at least in some instances, to complete the digest¬ ive process. Antiperistaltic waves of contrac¬ tion keep the food in the large intestine under

a constant mixing and kneading process. Ab¬ sorption from the colon is slow and consists of a variable amount of nutrient material which was not absorbed by the small intestine and of a considerable quantity of water. The excre¬ tory function is of more importance. The waste matter from the small intestine receives here the addition of many decomposition products while a large amount of water is absorbed by the colon, leaving the excretory products in the form of feces. A secretion of mucus aids in the passage of the waste material and perhaps interferes with the excessive propagation of bacteria. Consult Howell, (A Text-Book of Physiology } ; Starling, (Human Physiology.)

COLON BACILLUS, a very common bacterium (Bacillus coli communis) , of the in¬ testinal canal of many animals, including man, in which place it seems to serve some useful function in the breaking down of food-stuffs, although, for lower animals at least, it is not indispensable for proper digestive processes. It is a short motile bacillus and closely resembles the typhoid organism, from which it is separated only by careful bacterial technic. While a nor¬ mal inhabitant of the intestines of man, it may in abnormal situations be a cause of disease- processes. Its presence or absence in potable waters is of service in determining the pres¬ ence of contamination of a water supply by animal fecal matter. See Typhoid Bacillus.

COLONEL, ker'nel (Fr. colonel; Sp. coro- nel; fr. Lat. columna), a military officer inter¬ mediate in rank between a lieutenant-colonel and a general officer. When a regiment is a tactical and administrative unit it is com¬ manded by a colonel, but in the present British infantry of the line the regiment is a mere aggregate of separate battalions, and colonels are either staff officers or commanders of brigades. In the British cavalry, artillery and engineers, and in the armies of most other countries the colonel has active command over bodies of troops. The regiments of the British and Continental armies have besides their active commanding officers, if the regiment is a fight¬ ing unit, or in place of these otherwise honorary colonels, who are general officers or princes of the blood and receive the emoluments of the position in addition to those of their regular rank. In Germany officers ranking between generals of infantry, cavalry or artillery, and general field-marshals are called colonel-gen¬ erals.

COLONIA INDEPENDENCE, en"da- pan-dan'se-a, Venezuela, in the Altagracie dis¬ trict of the old state of Miranda, about 70 miles from Caracas. Its area is 555 square kilo¬ meters ; its altitude 5,400 feet above sea-level. Taguacita is its principal town, and its agri¬ cultural products are coffee, sugarcane, yucca and cacao. There are extensive forests and

two rivers. The colony was founded in 1874.

COLONIAL, or COMPOUND, ANI¬ MALS, organisms which cannot be fairly re¬ garded as unities, but consist of numerous more or less similar individuals united in a common life. Among the usually single-celled simplest animals or Protozoa, loose colonies not infre¬ quently occur, and are of not a little importance as suggestions of the bridge between the single-

celled and many-celled animals. Such colonies arise when the original cell, instead of repro¬ ducing discontinuously, retains its daughter- cells in union with itself or with one another, much like the segments of the egg-cell of a higher animal. By sacrifice of individuality at the time of reproduction, a higher unity is formed. In the same way a simple cup-shaped sponge, by continuous budding, forms a colony of similar forms, which may possess more or less distinct individuality. The common fresh¬ water Hydra, to mount a step higher, buds off daughter Hydrce, which remain for a while con¬ nected with the parent organism and make it temporarily colonial.

Many marine hydroids retain their polyps permanently as constituents of such a complex organism, and, as a differentiation of these into nutritive and reproductive, and often into still other kinds, takes place, a higher order of more complex individuality arises ; the polyp life is in part subordinated to the colony life. Among the most perfectly organized of such colonies are the floating Siphonophora (such as the Por¬ tuguese man-of-war), in which five or six per¬ fectly differentiated and specialized kinds of zooids act together in mutual interdependence to support the whole. In most cases such zooids are incapable of performing any but the one function, or set of functions, to which they are adapted, and consequently cannot sustain inde¬ pendent life. This is one way of approaching the questions of individuality and of organiza¬ tion of the higher Metazoa. Among the higher animals that occur in colonial form are Poly- zoa, Ascidia and Clicetopoda. See Comparative Anatomy.

For social communities or colonies composed of numerous free individuals, all working to¬ gether for mutual benefit, and how new colonies are founded, see Ant; Bee; Wasp; Termites, etc.

COLONIAL BOUNDARIES. See Bound¬ aries of the United States.

COLONIAL DAMES OF AMERICA, The National Society of. An ancestral and patriotic organization of American women, founded 19 May 1892, and composed of one Colonial Society from each of the 13 original States, one society from the District of Colum¬ bia and one associate society from each of the non-colonial States. The objects of the Na¬ tional Society are: To preserve colonial his¬ tory, traditions, manuscripts, records, relics and

buildings ; to perpetuate the brave deeds and glorious memory of the colonists, and to en¬ gender and encourage patriotism. To be eligible to membership a woman must be descended from some worthy ancestor who rendered valu¬ able service to the colonies and who became a resident of America previous to 1750. Mem¬ berships are obtained only upon invitation from those already enrolled, and must be procured through admittance into the Colonial Society, of the ancestral State, where the service of the ancestor was rendered. The work of the Society has been patriotic. During the Cuban war nurses and supplies for the sick were sup¬ plied ; at the close of the war a splendid monu¬ ment, in Arlington Cemetery, Washington, D. C., <(to the memory of . the soldiers and sailors, who gave up their lives in the late war with Spain was erected by the Society (*

name of the Women of the Nation. ® One of the most valuable and interesting collections of colonial relics and furnishings is under the control of the New York Society at the old Van Cortlandt manor house in Van Cortlandt Park. Churches and colonial houses of historical im¬ portance have been restored; historical sites marked with tablets ; prizes awarded for essays on patriotic and historical subjects to pupils of public schools and colleges. A complete list of the soldiers and sailors who fell in the Cuban campaign form the contents of a Record Book compiled by the Society. Great credit is due this organization for preserving many historical places which otherwise might have been destroyed. The Society numbers (1918) 9,000 members. It holds a biennial council in Washington, D. C.

COLONIAL ELECTIONS. See Elec¬ tions; Electoral Qualifications; Woman Suffrage.

COLONIAL FURNITURE. See Fur¬ niture, Colonial.

COLONIAL GOVERNMENT, Propri¬ etary. The 16th and 17th centuries constituted a period of financial and economic weakness in the English government and the proprietary colony was one of its results. When the Eng¬ lish began their colonization enterprises the monarchy had to a great extent thrown off the evil influences of the feudalistic system, but its organization had not been brought to a state that would permit it entirely to dispense with feudalistic precedents. Hence the mon¬ archy granted to individuals or groups of in¬ dividuals extraordinary privileges in the hope and expectation that extraordinary returns would accrue to the government. Under the grant of 1584 by Queen Elizabeth to Sir Walter Raleigh, after a royalty of one-fifth of the gold and silver found had been

paid to the Crown, the rights of the Crown amounted to little . or nothing unless Raleigh or his assigns should (

The early grants were made to individuals but when these showed themselves incapable of producing results without outside assistance, those aiding the enterprises were included in the grants. The chartered company was an established fact in the commercial world and accordingly, when serious attempts at colonization were made, it was natural that an experiment was tried by giving collective proprietorship to the members of such a company. Since the collective proprietors would not possess the influence of a court favorite, the London and Plymouth charter of 1606 vested the supreme government in a council resident in England and named by the king, with ordinances and laws given under his signed manual ; while the subordinate jurisdiction for the conduct of affairs in the colonies was committed to a council resident in America which was to act in accordance with the king's instructions. This system did not prove feasible and under the new Virginia charters of 1609 and 1612 full

control of the colony was in effect given to the company, the stockholders choosing the supreme council from among their own mem¬ bers and the power to legislate and govern the colony being made entirely independent of the king. The quarterly courts managed affairs in England while the governor looked after company interests in the colony. For a time harmony prevailed in the colony but abuses of power and position by the governor, the growth of settlements and the lack of any voice in the government led the colonists to demand a representative assembly, which convened at Jamestown 30 June 1619. Moreover the pat¬ entees in England began to quarrel among themselves, whereupon in 1624 the Crown can¬ celed the charter of the Virginia Company and appropriated to itself the fruits of the labor of private individuals, thus establishing the first royal province in the country.

In 1632, therefore, when granting to Lord Baltimore the province of Maryland, the Crown returned to the practice of making individual grants and endeavored to reproduce in Amer¬ ica the County Palatinates of Europe. Upon Baltimore and his heirs was conferred absolute proprietorship of the soil. The governmental powers bestowed are involved in some obscurity. On the one hand, the proprietor was given all the powers possessed, then or previously, by the bishop of Durham. Of itself, this was a very comprehensive grant, for the authority exercised in this northern palatinate by the dig¬ nitary mentioned was little short of absolute. The effect of the grant was materially lessened, however, by subsequent clauses in the charter which imposed large limitations. Thus the laws and ordinances of the colony must not be repugnant to the laws of England; the laws must receive the consent of the freemen of the province; and no

interpretation of the charter involving any impairment of the allegiance due the king should be permitted. Still it may be said that the independent powers of the pro¬ prietor were very extensive. They included the making of war and peace, the appointment of all officers, the enforcement of martial law, the pardoning of offenders and the conferring of titles of nobility. An interesting provision was that no tax should be levied by the Crown on any person or on any goods in the colony. The proprietor possessed full power to deter¬ mine the colony's government. Baltimore planned the government to consist of a gov¬ ernor, a council, appointed by the proprietor, and a primary assembly in which any freeman of the province might be present to speak and vote. With the growth of population the hold¬ ing of a primary assembly became impracticable and in 1639 the assembly was made up mainly on the representative principle, with the hun¬ dred as the electoral area. In 1647 the assembly was divided into two chambers, the lower con¬ sisting of the elective burgesses, the upper of the councillors together with persons specially summoned by the proprietor. The suffrage, at first restricted, was broadened until the colony came to be rather more democratic than Vir¬ ginia. Likewise the system of land tenure, originally aristocratic and based on the prin¬ ciple of large semi-feudal estates, was modified until Maryland, as compared with all the other southern colonies, became a region of numerous small freeholders.

In 1639 the province of Maine was granted to Sir Ferdinando Gorges, but this grant proved abortive. In March 1663 eight men received from Charles II a grant to Carolina in the hope that the imperial expansion policy might further the material interests of those concerned. The proprietaries could enact and publish any laws deemed necessary, with the assent, advice and approbation of the freemen of the colony; they were empowered to erect courts of judicature and appoint civil judges, magistrates and offi¬ cers; to make war and in cases of necessity to exercise martial law; to enjoy customs and sub¬ sidies, imposed, with the consent of the free¬ men, on goods loaded and unloaded. In 1665 a new charter was granted and in order that the colony might have a settled form of govern¬ ment Shaftesbury drafted a code of laws in which he was aided by the famous John Locke (q.v.), who in 1669 promulgated his (

"The eldest of the eight proprietors was always to be palatine, and at his decease was to be succeeded by the eldest of the seven survivors. This palatine was to sit as president of the palatine's court, of which he and three more of the proprietors made a quorum, and had the management and execution of all the powers in their charter. This palatine's court was to stand in room of the king and give their assent or dissent to all laws

made by the legislature of the colony. The palatine was to have power to nominate and appoint the governor, who, after obtaining the royal approbation, became his representative in Carolina. Each of the seven proprietors was to have the privilege of appointing a deputy, to sit as his representative in parliament, and to act agree¬ ably to his instructions. Besides a governor, two other branches, somewhat similar to the old Saxon constitution, were to be established — an upper and lower House of Assembly; which three branches were to be called a parlia¬ ment, and to constitute the legislature of the country. The parliament was to be chosen every two years. No act of the legislature was to have any force unless ratified in open parliament during the same session, and even then to con¬ tinue no longer in force than the next biennial parliament, unless in the meantime it be ratified by the hands and seal of the palatine and three proprietors. The upper House was to consist of the seven deputies, seven of the oldest landgraves and caciques and seven chosen by the Assembly. As in the other provinces, the lower House was to be com¬ posed of the representatives from the different counties and towns. Several officers were also to be appointed, such as an admiral, a secretary, a chief justice, a surveyor, a treas¬ urer, a marshal, and register; and besides these each county was to have a sheriff and four justices of the peace. Three classes of nobility were to be established, called barons, caciques, and landgraves; the first to possess 12, the second 24, and the third 48,000 acres of land, and their possessions were, to be unalienable. Military officers were also to be nominated, and all inhabitants from 16 to 60 years of age, as in times of feudal government, when summoned by the governor and grand council, were to appear under arms, and, in time of war, to take the field."

This code was only partially put into opera¬ tion; from the first the settlers regarded it with horror as a revival of feudalistic institu¬ tions and a hindrance to the progress of pure democracy and made war upon it with the result that a popular assembly was secured in North Carolina in 1677 and a few years later in South Carolina ; while the ((Grand Model® was formally abrogated by the proprietaries in 1693. Disputes over legislation and discon¬ tent occasioned by corrupt and oppressive con¬ duct of some of the officials led the colonists to send an agent to London, where, after a hear¬ ing in 1720, legal process was taken for vacat¬ ing the Carolina charter. Pending this process the administration of affairs was assumed by the Crown.

On the other hand, when the later colonies of Pennsylvania and New Jersey were founded an effort was made to merge the democratic institutions into the proprietary

system. By his charter Penn (q.v.) was cre¬ ated (

In spite of every attempt to avoid a con¬ flict of interest, it was inevitable

that the pro¬ prietor must choose either one of two capaci¬ ties in which he could act conscientiously — as a life tenant of certain material interests, or as a trustee for the interests of the colonists. It is true that Penn in his <(holy experiment® endeavored to inject democratic features in his proprietary plan of government, but even in his case the natural conflict of interest re¬ sulted i-n a serious wrangle between him and his colonists; and the granting of increased governmental rights only served to aggravate the economic grievances. The settlers could not be convinced that the proprietary interests did not conflict with the interests of the col¬ ony; they would prefer to pay their quit-rents as a tax for the support of their own colonial government rather than to pay them to the proprietor in the character of a private debt. The parent government, too, regarded the pro¬ prietorships as objectionable since great diffi¬ culty was experienced in enforcing royal com¬ mands, while in the case of the acts of trade and navigation the interests of the proprietors might seriously conflict with those of the par¬ ent government. Hence the colonies gradu¬ ally became royal provinces with the exception of Pennsylvania and Maryland, which were under proprietary governments at the outbreak of the Revolution; but the friction between the proprietors of the former and the people in the colony had caused almost an open rupture, and it is probable that within a short time the government would have undergone a radical change, even had not the Revolution decided the nature of the government. In both prov-

inces, when Imperial questions were at issue, English legislation had come into a more ef¬ fective control.

Bibliography. — Bozman, J. L., 'History of Maryland, 1633-60′ (Baltimore 1837) ; Bas¬ sett, J. S., ' Constitutional Beginnings of North Carolina' (in 'Johns Hopkins University Studies in Historical and Political Science,' Series XII, Nos. I-II, pp. 97-169) ; Hawks, F. L., 'History of North Carolina' (Fayette¬ ville, N. C., 1857-58) ; Mereness, N. D., Mary¬ land as a Proprietary Province' (New York 1901) ; McCrady, E., 'History of South Caro¬ lina under the Proprietary Government, 1670- 1719′ (New York 1897); MacDonald, William, 'Select Charters and other Documents Illus¬ trative of American History, 1606—1775′ (New York 1904) ; Osgood, H. L., 'The American Colonies in the Seventeenth •Century' (New York 1904) ; Osgood, 'The Proprietary Prov¬ ince as a Form of Colonial Government' (in American Historical Review , Vol. II, pp. 644- 664, Vol. Ill, pp. 31-55, 244-265, New York 1897- 98) ; Proud, R., 'History of Pennsylvania, 1681-1742′ (Philadelphia 1797-98) ; Reinsch, P. S., (Colonial Administration' (New York 1905) ; Shepherd, W. R., 'History of Pro¬ prietary Government in Pennsylvania' (in 'Columbia University Studies in History, Economics and Public Law,' Vol. VI, New York 1896) ; Whitney, E. L., 'Government of the Colony of South Carolina' (in 'Johns Hopkins University Studies,' Series XIII, Nos. I-II, pp. 1—121) ; Wiley and Rines, 'The United States' (Vols. I-II, where text of char¬ ters is given, New York 1913); and the rec¬ ords and archives of the various colonies.

Irving E. Rines,

Author of ' History of the United States. '

COLONIAL SILVERWARE. See Sil¬

verware.

COLONIAL SYSTEM. See Colonies and Colonization.

COLONIAL WARS, Society of. The

Society of Colonial Wars in the State of New York was incorporated 18 Oct. 1892. It is a patriotic organization for perpetuating the names and valor of those participating in the warfare of American colonial history. To be eligible it is necessary to have a line of descent from an ancestor: (1) Who served as a mili¬ tary or naval officer, or as a soldier, sailor or marine, or as privateersman, under authority of the colonies which afterward formed the United States, or in the forces of Great Britain which participated with those of the said colo¬ nies in any wars in which the said colonies were engaged, or in which they enrolled men, from the settlement of Jamestown, 13 May 1607, to the battle of Lexington, 19 April 1775; or

(2) who held office in any of the colonies between the dates above mentioned, either as (a) direc¬ tor-general, vice-director-general or member of the council, in the colony of New Netherlands; (b) governor, lieutenant or deputy , governor, lord proprietor, member of the king's or gov¬ ernor's council, in the colonies of New York, New Jersey, Virginia, Pennsylvania and Dela¬ ware; (c) lord proprietor, governor, deputy governor or a member of the council, in Mary¬ land and the Carolinas; (d) governor, deputy governor, governor's assistant or commissioner vol. 7 — 19

to the United Colonies of New England, or body of assistants in any of the New England colonies. Membership is hereditary in the male line. The insignia of the Society is a "badge pendant by a gold crown and ring from a silk ribbon bordered with white and edged with red," a nine-pointed white star bordered with red on one side and gold on the other, on a field of blue, pendant from the crown. The Hag of the Society bears a red Saint George cross on a white field.

There are more than 25 co-ordinate State societies united in the general society, with a membership approaching 5,000. In New York "business courts" are held in March and No¬ vember; a "general court," for the annual elec¬ tion of officers, in December. At these courts papers are read dealing with the colonial period. An annual banquet is held in honor of the founding of New Amsterdam. A "general assembly" of the general society meets once in three years at such time and place as the pre¬ ceding assembly designated. These general as¬ semblies are composed of the members of the general council, together with five delegates chosen by each of the State councils.

The Society has erected commemorative bronze tablets at Fort Oswego and Ticon- deroga; and one of marble to General Forbes. An oil portrait of General Bouquet has been presented to the city of Philadelphia, and adorns Independence Hall. Many members of the Society participated actively, either in the army or the navy, during the Spanish- Ameri- car War, many thousands of dollars being con¬ tributed by the several State societies, from Maine to California, in equipping State regi¬ ments, caring for the sick and wounded, and for hospital supplies, flags, band instruments, etc. The yearbooks of the Society contain valuable historical and genealogical data.

Sydney H. Carney, Jr., M.D., Historian Society of Colonial Wars , New York.

COLONIAL WARS IN AMERICA. A

resume of the colonial wars in America must of necessity omit many local disturbances which were of importance historically and which the student

can find graphically de¬ scribed in many of the volumes included in the bibliography at the close of this article. Some of the most important are here chrono¬ logically presented.

1607. Jamestown, Va. — Although Capt. Gabrill Archer and a sailor were severely wounded by arrows tipped with deer's-horn and sharp stones, the night the English landed in Virginia, the first real conflict in American colonial history came two weeks after the Jamestown settlement, at the end of May 1607, 200 Indians being repulsed by the set¬ tlers under Capt. Edward-Maria Wingfield; English casualties, one killed, 11 wounded. From this encounter to the battle of Lexington (q.v.), 19 April 1775, scarcely a generation in the several colonies reached manhood without knowing the horrors of war.

1620. Plymouth, Mass. — The Pilgrims of New England had their first encounter with the dusky Nausite tribe, whose arrows were headed with hart's horn, eagle's-claws and brass, 8 Dec. 1620, and for over half a century the warfare continued with exacerbations of varying ferocity.

1622. Virginia. — Two years later their kins- people of Jamestown escaped annihilation by the warning of a converted Indian. On 22 March at midday 347 men, women and chil¬ dren were slain by supposedly friendly sav¬ ages, among the scattered hamlets along both banks of the river.

1633-37. Pequot War. — The Pequot In¬ dians, in 1633, killed several English traders who came to their Connecticut River territory; 1634 found the Pequots at war with the Narra- gansett tribe, and hostile to the Dutch as well. Then the New England colonists prepared for the inevitable encounter. Sassacus ruled as Pequot chief. About this time John Oldham and two young lads were slain by the savages at Block Island. Governor Endicott promptly sent a force which destroyed a major part of this band. The Pequots then tried to enlist the co-operation of the Narragansetts, but this failed, owing to the influence exerted by Roger Williams over this tribe. The murder of 30 men and women followed. Connecticut, in May 1637, placed John Mason in command of troops contributed from Massachusetts and Plymouth under Capt. John Underhill, allies being Mohegans, Uncas their sachem, and 400 Narragansetts and Nyantics. The desperate battle of Pequot Hill, Groton, Conn,, was fought 26 May 1637. Mason says : (

1642- 47. Ingle's Rebellion. — Indians began to molest Europeans in Maryland in 1642 and following these attacks came Ingle's Rebellion, July 1643, aided by Clayborne, and which caused internal discord in the colony until peace was declared between contending parties in 1647.

1643- 47. Kieft's War. — Kieft was appointed governor of New Netherlands in 1638. In the winter of 1643 he made war on the Mohawks, causing an outburst of hostilities among the Algonquin tribes. Massacres and conflagra¬ tions continued through the winter and follow¬ ing summer. John Underhill of Connecticut commanded the troops and successfully routed the Long Island tribes. In March 1644, Under¬ hill, with 150 Dutch soldiers, landed at Green¬ wich, Conn., attacked an Indian village of 700, slew 180 in an hour, then set fire to the village, causing the death of 500 Indians by fire and sword. Kieft proclaimed a public thanksgiv¬ ing for this victory. Nearly all Dutch farms and 1,600 Indians had been destroyed when Peter Stuyvesant succeeded Kieft in 1647 and peace was established.

1644. Virginia. — On Holy Thursday, 1644, Opechancanough and his warriors killed 500 white settlers in Virginia. Vigorous measures were taken by settlers, and the Indians were dispersed, their villages and the Powhatan confederacy (embracing nearly 50 petty tribes) destroyed, their chief captured and shot.

1648-56. New Sweden. — In April 1638 Peter

Minuit, with his colony of Swedes, reached Delaware Bay. The colony was unusually prosperous, while Dutch interests there waned. Disputes arose as to titles of land; in 1648 the Dutch tried to erect a fort and houses on the Schuylkill, but were repulsed by the Swedes. Continued friction, between the two races resulted, although Stuyvesant of New Netherlands and Printz of New Sweden agreed to be, and for three years were, allies. First one side would capture a fort, then the other; until, in 1656, after discussion by the States-General and Sweden (which came to naught), the city of Amsterdam bought the West India Company's interest on the South River (Delaware), and the colony of New Amstel was launched, while the authority of New Netherlands ceased.

1660. Bacon's Rebellion. See Bacon's Re¬ bellion.

1664-73. New Netherlands. — England seized New Netherlands, 8 Sept. 1664, and war was formally declared in March 1665. England suffered greatly at the hands of Holland in 1666, but continued to hold her American con¬ quests. On 8 Aug. 1673 a Dutch fleet of 23 vessels, with 1,600 men, arrived off Staten Island and on the 9th anchored off the fort. The Dutch commander, Evertsen, at length opened fire, which the fort returned, but it then surrendered and the Dutch flag was raised.

1666. French and Iroquois. — The French waged war with the Iroquois and other tribes for 60 years, coming down from Canada, in¬ vading and destroying their villages. As a result, peaceful white settlers suffered from

Indian retaliation.

1675. King Philip's War. — John Sassamon or Sausaman, secretary and interpreter of the Wampanoags' chief (he had been a pupil of the apostle Eliot) heard of a plot to exter¬ minate the English and reported it to the Plymouth authorities. King Philip, second son of Massasoit, who had been chief sachem of tribes between Charles River and Narragan- sett Bay, was summoned and examined by the authorities. Learning of the informer, he caused his death, 20 Jan. 1675. His slayers were, in turn, executed by the authorities. Then followed a series of Indian retaliations; eight or nine whites were killed at Swansy; in June companies from Massachusetts and Plymouth drove Pokanokets from Mount Hope; Philip fled to Nipmucks, who killed Captain Hutchinson and 16 others ; Brook¬ field was burned; Deerfield and Northfield attacked; Captain Beers and 20 men from Hadley slain ; Captain Lathrop and 80 men killed at Bloody Brook, near Deerfield, which was then burned; and Springfield and Hat¬ field were attacked. War continued through the summer, and in October, fearing an attack from the Narragansetts, Governor Winslow with 1,000 men marched against them. All troops were assembled 18 December and on the 19th began the memorable battle, which ended in the complete rout of the once power¬ ful Narragansetts. On 10 Feb. 1676 occurred the Lancaster massacre by the Nipmucks; and this, taken with the series of calamities at Medfield, Worcester, Marlborough, Mendon, Groton, Weymouth, Sudbury, Clemsford, Springfield, Wrentham, Hatfield, Hadley,

North Hampton, Andover and Bridgewater, make an appalling list of horrors. War was actively waged by Canonchet, son of Mian- tonomo, until his capture by Captain Dennison and the Connecticut troops, and subsequent death at the hands of Mohegans. King Philip was killed at Bristol 12 August and the war was at an end.

1680. Port Royal, S. C. — The Spaniards from Florida attacked the Scotch settlement at Port Royal, S. C., in 1680, completely destroy¬ ing it. A force of 400 men was raised to re¬ taliate, but this plan was forbidden by the proprietors, inasmuch as the colonists were supposed to be not wholly blameless.

1687-89. French and Senecas: Montreal. — The French waged war with Senecas 1687, de¬ feating them. Indians then destroyed Fort Frontenac. In 1689 the Iroquois attacked Montreal, causing great devastation and loss of about 1.000 French.

1689-91. Leisler's Rebellion. — See Leis- ler's Rebellion.

1690. First Intercolonial War: King Wil¬ liam's War: Quebec. — War between England and France was declared in 1689. The French in Canada planned an attack on Boston and New York. They came down from Canada with Indian allies ; attacked Schenectady 8 Feb. 1690; Salmon Falls, 27 March; horrible massacres ensued and the colonies were aroused. March 19 the General Court of Massachusetts proposed a congress, at which measures for their protection should be ar¬ ranged. The several colonial bodies were notified. Representatives from Massachusetts, Plymouth, Connecticut and New York met at New York. On 1 May they signed an agree¬ ment to send 855 men for the support of Al¬ bany and, (

1696. Frontenac's Expedition. — Frontenac's expedition against Iroquois, Oneida and Onon¬ daga tribes, occurred in 1696, when he was 74 years of age. The tribes were humbled by him but not subdued.

1702- 10. Second Intercolonial War: Queen Anne's War. — -War was declared 15 May 1702. In August 1703 the French and Indians at¬ tacked Wells, Saco and Casco. Deerfield and Lancaster also suffered. In May 1704 Col. Benjamin Church, with troops, sailed from Boston, against Acadian settlements. In 1705 French and Indians destroyed Petit Havre and Saint John's, N. F. In 1709 Haverhill was attacked by French and Indians; 16 Oct. 1710, Port Royal was captured by the English tinder Nicholson, and renamed Annapolis, . in honor of the Queen. Varying degrees of Indian hostility were experienced along the coast to the

Kennebec River, until 1725, when peace prevailed.

1703- 15. Southern Wars: Charlestown.—

On 15 Jan. 1703, a battle was fought between Carolina troops under Colonel Moore and the

Spanish forces under Don Juan Mexia, and 800 of the latter were killed. In August 1706, Charlestown was attacked by a Spanish fleet, with small loss to either side.

1711. Tuscarora War. — On 22 Sept. 1711, Tuscaroras and Corees slaughtered inhabitants along the Roanoke River and Pamlico Sound. During several days they killed the whites along Albemarle Sound. Col. John Barnwell, with South Carolina troops and Indian allies, guided an expedition which made several at¬ tempts to drive them away; finally captured 800 in a fort; fought a severe battle 28 Jan. 1712, and killed 400 warriors., The remaining hostile Tuscaroras migrated to Oneida Lake, joining the Iroquois confederacy.

1714-15. Yemassee War. — The Yemassee War was instigated, so it is claimed, by the Spaniards. A series of Indian outbreaks oc¬ curred in 1714 —15, in one encounter 400 South Carolinians being killed. The Yemassees were driven out of Carolina into Florida, but disas¬ trous warfare continued, hundreds suffering brutally at the hands of savages.

1739-48. War with Spaniards in Florida: War of Jenkins' Ear: Carthagena. — The English South Sea Company, under the Treaty of Utrecht, was permitted to supply slaves to Spanish colonies. A smuggling-trade de¬ veloped, which a Spanish fleet (guarda costa) tried to discourage. England and her colonies heard of terrible severities imposed by Spaniards on suspects captured. Runaway slaves from South Carolina made their way to Florida, were well received, protected and given grants of land by the Spaniards, who de¬ clined to return slaves. In 1738 Oglethorpe, appointed military commander of Georgia and South Carolina, returned from England with a regiment. The same year. Captain Jenkins, skipper of the ship Rebecca, was examined in the House of Commons. He described how, having unjustly accused him of smuggling, the Spaniards first hung him at the yardarm, then lowered him, and cut off his ear, telling him to take it to his king. Public clamor caused Walpole to declare war 23 Oct. 1739. An English fleet under Admiral Vernon visited the Isthmus of Darien, and captured Porto Bello. Oglethorpe, having perfected a treaty with the Creek Indians, called on them and South Carolina for aid. Although an expe¬ dition captured Fort Picolata (thus preserving navigation of Saint John's River, and pre¬ venting Spaniards communicating with posts at Saint Mark's and Pensacola), Oglethorpe

found the 1,200 men under his command un¬ able to make any impression on Saint Augus¬ tine, and gave up the siege of that place after heavy loss to his Highland regiment, and desertion of Indians and some Carolina troops. In the spring of 1741 Admiral Vernon, co-op¬ erating with land forces under General Went¬ worth, failed in an assault on Carthagena, A fleet under Commodore Anson secured several valuable Spanish prizes. The Peruvian town of Paita was destroyed. In 1742 a Spanish fleet of 56 vessels, carrying 7,000 or 8,000 men, fitted out at Havana, and appeared off the Georgia coast at the end of June. Its attempts to capture the island of Amelia and forts at Frederica were frustrated by General Ogle¬ thorpe on 7 July 1743, and the Spaniards lost heavily at the battle of Bloody Marsh ; 24 July

Oglethorpe proclaimed a general thanksgiving for the end of the invasion.

The following reproduction of the gov¬ ernor's speech to the general assembly of his majesty's colony of New York is of interest. It is for the first time reproduced from the only known copy, in possession of the New York Historical Society, and bears upon this period of martial activity, giving an idea of the style of appeal from king to colonists.

Journal of the Notes and Proceedings of the General

Assembly of His Majesty's Colony of New York,

30th Day of June 1740.

Gentlemen: His Majesty having been called upon, by repeated Provocations, to declare War against Spain, and being determined, by God's Assistance in so just a Cause to Vindicate the Honor of His Imperial Crown, to Revenge the Injuries done to His Subjects, to Assert their undoubted Rights of Navigation, and by all possible Means, to Attack, Annoy, and Distress a Nation that has treated His People with such Insolence and Barbarity, has given Orders for the Equipping and setting forth an Expedition against the Territories of the Catholic King in the West-Indies, which will consist of a large Squadron of Ships of War, and of a considerable Body of Land Forces, with a suitable Train of Artillery, Store-ships, and all Things requisite: and has likewise given Orders to raise the Body of Trpops in His Majesty's Colonies on the Continent of North America, to join those to be sent from England, at a particular Rendezvous. I have, in Obedience to His Majesty's Com¬ mands, taken the best Measures in my power, to invite and encourage in His Majesty's faithful Subjects in this Province, chearfully to enlist in His Majesty's Service for

this Expedition: But it is in your Power to do much more, by giving a Bounty to every Man who enlists in this Service. And I am perswaded it will be such as will shew the World, that you will not be behind the most Zealous of His Majesty's Subjects, 'in promoting this Glorious Enterprise. Now, although by the Success of this Expedition, the Commerce and Navigation of this Province, to and from the West- Indies, will not only be secured, but greatly increased by the large Possessions which, by the blessing of God on His Majesty's Arms, will fall into his Majesty's hands; And although by such acquisitions a Door will be opened for a larger Consumption of Provisions (the Staple of this Province) whereby the Farmer, as well as the Merchant, may be greatly enriched, Yet, it is but little that His Majesty expects from his Dutiful and Loyal Subjects of this Province, towards the Expense of this Expedition. And I am com¬ manded by His Majesty, to Recommend it to you, in His Name, as I do most earnestly, That you provide Victuals, Transports, and all other Necessaries for the Troops to be raised in this Province, except Cloathes, Tents, Arms, Ammunition and Pay till their arrival at the general Rendezvous in the West-Indies from which Time the Said Transports are to enter into His Majesty's Pay. In the doing whereof, I hope you will loose no Time, that the Expedition may not be retarded His Majesty's Expectations are so just and reasonable, and the Prospect of Advantage to the Province so clear, that I perswade myself, you will chearfully and immediately provide for the Expence of what is recommended to you. These Things being Matter of the highest Importance, I will not now take off your Attention, by Recommending anything else to your Consideration, hoping you will give this Business the utmost Dispatch, wherein you will, in a very particular manner, Recommend yourselves and your Country to His Majesty, Whom God long Preserve.

George Clark.

A bill covering the above passed the assem¬ bly 10 July 1740, and Colonels Morris and Philipse carried the same to the council for its concurrence. It was passed by the council 11 July and signed by the lieutenant-governor 12 July.

1744-48. Third Intercolonial War: King George's War. — On 13 May 1744, Governor Duquesnel of Cape Breton captured an English settlement on the island of Canso, near Nova Scotia ; destroyed the fort, removing all pris¬ oners to Louisburg; but was unsuccessful in an attempt against Annapolis, N. S., and Placen¬ tia, N. F. New England colonists declared war on Nova Scotia Idians, who attacked Annapolis and planned the capture of Louis¬ burg. Men, money and supplies were con¬ tributed by Pennsylvania, New Jersey, New

York, Connecticut, Rhode Island and New Hampshire, but the chief burden

was imposed on Massachusetts. Command of the forces (some 4,000 men) was given to William Pep¬ pered, who left Boston in April 1745, Commo¬ dore Warren, commanding in the West Indies, furnishing ships of convoy. Five assaults were made on an island battery protecting the harbor before the French surrendered, 17 June. For this success Peppered was made a baronet. An expedition the following year proved unsuc¬ cessful and Louisburg was returned to the French by the Treaty of Aix-la-Chapelle, 7 Oct. 1748.

1754. Great Meadows. — In December 1753 George Washington carried a request from Governor Dinwiddie of Virginia to the French commander of Forts Venango (confluence of French Creek and Allegheny River, now Frank¬ lin, Pa.) and Le Bceuf (west fork of French Creek, now Waterford, Pa.) that he retire from territory claimed by the English ; request was refused. Governor Dinwiddie then ordered a fort constructed at the forks of the Ohio, and while work was in progress the French appeared and the English retired. A regiment organized under Col. Joshua Fry, with Washington second in command, pushed on with 150 men. On 28 May 1754, when near Great Meadows, the French were met in a glen. In ensuing hostilities the French commander, Jumonville, was killed and those under him captured. Washington retired to Great Meadows and threw up entrenchments, awaiting Colonel Fry's force, which finally ar¬ rived. Colonel Fry had died suddenly. Wash¬ ington made a second advance, which proved ineffectual against a French force of 700, and he retired with the honors of war, 3 July 1754.

The same month Benjamin Franklin, Thomas Penn and others assembled at Albany by request of the <(Lords of Trade10 (a standing committee of England's privy council), hoping to make an agreement with the chiefs of the Six Nations for protection in the event of further hostilities with France. Franklin's plan was unanimously approved at this congress, but the several assemblies failed to ratify it. Had his plan been adopted, it is said, the sev¬ eral colonies would have been united and strong enough to withstand attacks from enemies without England's assistance and the later pre¬ tense for unjust taxation. Thus the Revolu¬ tionary struggle might have been averted.

1755-63. Seven Years' War: French and Indian Wars: Braddock's Defeat. — The Eng¬ lish government, in 1755, placed General Brad- dock over a force intended to drive the French from the Ohio Valley. Washington was on his staff. Braddock planned the capture of Fort DuQuesne, at the confluence of the Allegheny and Monongahela rivers. Untrained in methods of frontier warfare, having seen no enemy on his tedious march (2 April to 9 July), Braddock scoffed at the employment of scouts as he ap¬ proached the immediate vicinity of the enemy, with the result that when his command was at¬ tacked it was completely defeated, half his 1,600 men killed or wounded and he himself died from a wound received in the onslaught. His papers were captured by the French, who found therein all the English plans.

1755. Battle of Lake George. — At a coun¬ cil of war, called by General Johnson at early

morning 8 Sept. 1755, it was proposed to send ,~P h^l11 to Fort Edward. The noted Indian King Hendrick, when consulted about this num¬ ber, said: <(If they are to fight they are too few; ll to be killed, they are too many.® The f?rce was doubled. Johnson then proposed di¬ viding it into three parties. Hendrick took several arrows, handed one of them to Johnson, requesting that he break it, which the general did ; Hendrick then placed three arrows in the generals hand, saying: ((Put them together and you can t break them ; take them one by one and you will break them easily.® This argument was conclusive. Col. Ephraim Williams led ; Lieutenant-Colonel Whiting had the second di¬ vision ; King Hendrick, with 250 Mohawks, was in advance of the Provincials. Rocky Brook was reached ; here the enemy was in ambush ; but for friendly warning from Senecas, the troops would have perished. . Colonel Williams and King Hendrick lost their lives; General Johnson was wounded ; Lieutenant-Colonel Whiting con¬ ducted a successful retreat, followed by the French and Indian allies. Lieutenant-Colonel Cole, with 300 men, came from Lake Gejorge; a brilliant dash was made on the enemy, driving them and capturing Baron Dieskau. Colonel Blanchard advanced from Fort Ed¬ ward, where the firing had been heard, with 250 men ; discovered 300 Indians resting at Rocky Point ; slew most of them. Among 500 lost by the French was Le Gardeur de Saint Pierre, whom Washington had met the year before at Great Meadows.

1756-57. Forts Oswego, Ontario, George and William Henry. — England declared war against France 18 May 1756. Governor Shirley was

commander-in-chief of colonial forces; Marquis de Montcalm general of French. Shirley slowly matured plans of attack on Crown Point and Fort DuQuesne ; mean¬ while Montcalm destroyed three forts, Os¬ wego, Ontario and George. This activity of the enemy cost Shirley his position, the Earl of Loudon taking his place, General Abercrombie second in command. In 1757 Montcalm attacked Fort William Henry, at the head of Lake George, garrisoned by'2,264 regu¬ lars, under Colonel Munroe. The attack lasted from 3 August to 9 August, when a capitulation was signed.

1758. Louisburg: Ticonderoga: Crown Point: DuQuesne. — Three expeditions were proposed for 1758: the first against Louisburg; the second against Ticonderoga and Crown Point ; the third against Fort DuQuesne. May 1758 found Admiral Boscawen at Halifax with a fleet of 157 vessels (23 ships of the line, 18 frigates and transports). There were 12,000 men under Jeffery Amherst to co-operate with him. The attack on Louisburg began 9 June and lasted until 26 July, when the garrison capitulated, becoming prisoners of war. Vast quantities of ammunition and stores, 218 can¬ non and 18 mortars fell into the hands of the English.

General Abercrombie led a force of 15,000 men against Ticonderoga, embarking on Lake George 5 July; advanced toward the fort; ex¬ perienced many difficulties, including a skir¬ mish in which Lord Howe was killed, and finally had to retreat. He lost about 2,000 men.

Lieut.- Col. John Bradstreet proposed an at¬ tack on Fort Frontenac (now Kingston, Can¬

ada) ; Abercrombie consented and gave him 3,000 men. This was successful toward the close of August; Bradstreet captured quanti¬ ties of stores, ammunition and cannon.

DuQuesne. — Early in July General Forbes left Philadelphia en route to Fort DuQuesne, with Cherokee allies; Colonel Bouquet was at Raystown ; in September Colonel Washington joined Forbes; late in November Fort Du¬ Quesne was in possession of colonial forces, receiving the name of Pittsburgh in honor of the elder William Pitt.

1759. Quebec. — Maj.-Gen. James Wolfe was appointed to proceed against Quebec. He had 10 battalions of infantry, 6 companies of rangers, artillery, engineers and the Louisburg Grenadier Corps. Under Admiral Saunders were 22 ships of the line, 5 frigates and sev¬ eral transports; Wolfe had, as brigadier-gener¬ als, Monckton, Townshend and Murray; Col. Guy Carleton commanding the grenadiers, and Lieut. -Col. William Howe (brother of Lord Howe) the light infantry. At Quebec were more troops than the English had, under Mont¬ calm, who placed them along the north shore, below the city, from Saint Charles River to the Falls of

Montmorency. Wolfe placed batteries within cannon-shot of Quebec at the west point of the Isle of Orleans, and at Point Levi. The lower town was destroyed ; conflagrations occur¬ ring in the upper town from red-hot balls and shells. Wolfe crossed from the Isle of Orleans to the north branch of the Saint Lawrence 9 July, camping below the Montmorency; 18 July he made a successful reconnoitre. His attack on redoubts at the ford was unsuccessful, with a loss of 400 men and two vessels. While ill, and waiting the arrival of General Amherst, he called a council of war ; and it was decided to draw Montcalm into the open field. Camp was broken and the troops moved to Point Levi.

De Bourgainville, with 1,500 French, guarded the north shore to prevent landing. The Eng¬ lish admiral deceived the French by moving his vessels below the real landing-place (Wolfe's Cove, near Cape Diamond). Ascent was made to the Plains of Abraham; the memorable battle was fought, Wolfe and Montcalm both dying from wounds therein received; and the citadel surrendered 17 September to General Towns¬ hend.

Fort Niagara. — Soldiers under Prideaux landed 1 July 1759, within six miles of Fort Niagara. A sally was made 11 July. Prideaux was killed by a bursting shell 19 July; Amherst appointed General Gage to succeed him ; until his arrival General Johnson carried on a siege; the fort surrendered 25 July.

Presqu' Isle: Venango: LeBoeuf: Ticon¬ deroga. — Colonel Bouquet captured with ease Presqu' Isle, Venango and LeBoeuf. General Amherst had 11,000 men for an attack on Ticon¬ deroga, which he took late in July (the French having withdrawn), only losing 75 men in a skirmish. He also took Crown Point. The English now fortified these places.

1759-60. Cherokee War. — While the above events were transpiring trouble arose with the Cherokees, who had accompanied General Forbes against Fort DuQuesne the previous year. On the return of the Cherokees numer¬ ous instances of loss of life occurred between Indians, Virginians and Carolinians. Governor Littleton, with 1,500 men, marched against the

Cherokees, demanding surrender of the mur¬ derers ; he received 22 Indian hostages as se¬ curity for peace, and retired from the field owing to disease and insubordination in his command. The Cherokees attempted to take Fort Prince George, at the head of the Savan¬ nah. Hostages were placed in irons through fear of an effort to release them ; one of them wounded a soldier, and his friends promptly killed all the Indians. This enraged the Cherokees, and war-parties were sent out in every direction

and laid siege to the fort ; the South Carolina assembly offered £25 for each Indian scalp, and voted to raise 1,000 men. General Amherst sent 1,000 Scotch Highland¬ ers under Colonel Montgomery, who raised the blockade at Fort Prince George, and met In¬ dians in June 1760. Victory was claimed by both sides. Montgomery retired to Charlestown, prepared to return north, by order of General Amherst. Lieutenant-Governor Bull now ordered 400 regulars for frontier protection. Upper Cherokees besieged Fort Loudon so suc¬ cessfully that the garrison lived on horse-flesh until it surrendered under promise of protection to the settlement ; the promise was broken, many lives lost and many taken prisoners. In June 1761 the Highland regiment returned and de¬ feated the Cherokees with great slaughter. They sued for peace, which eventually was con¬ cluded.

1760. Quebec. — The delay caused in re¬ building and strengthening Ticonderoga and Crown Point prevented Amherst from moving on Montreal. The French had time to rally under De Levis, who succeeded Montcalm, and planned retaking Quebec. The plan was put in operation 17 April 1760. De Levis with 10,000 men went down the river to Quebec, where Murray was in control. De Levis camped three miles from the city. On 28 April an attack was made, in which Murray lost 1,000 men and a train of artillery. The French loss was esti¬ mated at 300. De Levis built trenches about the city, preparing for a long siege. Swanton arrived 15 May and destroyed all the French ships at Quebec. The siege was raised 17 May and on 8 Sept. 1760, the English flag was raised in Montreal.

1762. Martinique: Havana. — General Rob- bert Monckton sailed from New York late in

1761 with two line-of-battle ships, 100 transports and 12,000 regulars and colonials; in February

1762 he captured Martinique; next, Fort Royal, Saint Pierre, Saint Vincent, Grenada and Saint Lucia surrendered; the French fleet was de¬ stroyed; on 12 Aug. 1762, Havana was captured by forces under the Duke of Albemarle, after a

. fierce struggle of 44 days, and great loss of life.

1763-64. Pontiac's War. — Pontiac, chief of the Ottawas, posed as friend of the English after their victories; in secret he was plotting against them with Algonquins, Wyandots, Sen¬ ecas and others. He planned simultaneous at¬ tacks on Western posts in the spring of 1763. Major Gladwin, commanding at Detroit, was forewarned, and when Pontiac and his 60 chiefs appeared on 6 May, they found the garrison under arms. The fort was unsuccessfully at¬ tacked for two months; then relief came from Fort Niagara. Captain Ecuyer at Fort Pitt (Pittsburgh, Pa.) was also

prepared. At the first attack, 22 June, the Indians were repulsed. The second attack, 26 July, lasted four days,

and the Indians were defeated. General Am¬ herst sent Colonel Bouquet with 500 men to its relief ; while en route, 25 miles east of the fort, he fought a stiff battle with Indians at Bushy Run, coming off victorious. In September 1764 Colonel Bouquet was again at Fort Pitt. Toward the close of November the Delawares and Shawnees returned 200 captive whites. This border war had caused much distress, and the following forts had been lost before Sir William Johnson and Bradstreet successfully treated with 2,000 representatives of the Otta¬ was, Ojibways, Iroquois and Wyandots at Fort Niagara, and Pontiac's war was over:

May 16, 1763, Fort Sandusky.

May 25, Fort Saint Joseph (at the mouth of Saint Joseph River, Mich.).

May 31, Fort Onatanon (on the Wabash, Lafayette, Ind.).

June 2, Fort Michillimackinac (Mackinaw, Mich.).

June 17, Fort Presqu' Isle (Erie, Pa.).

June 18, Forts Le Bceuf (Erie County, Pa.), Yenango (Venango County), and forts at Car¬ lisle and Bedford, Pa.

1774. Lord Dunmore's War. — When Lord Dunmore was royal governor of Virginia in 1774, dissension as to boundary lines arose be¬ tween Virginia and Pennsylvania, as well as to ways and means of dealing with Indians. Vir¬ ginia wished to possess their lands ; Pennsylva¬ nia desired their trade ; as whites encroached more and more on lands, Indians became an¬ gered; outrages followed, perpetrated by Shaw¬ nees, Mingos, Cherokees, Wyandots and Dela¬ wares. In the spring of 1774 a ruffian borderer, Greathouse, killed nine kinsmen of the Iroquois Logan. This caused continued hostilities until the battle of Great Kanawha, or battle of Point Pleasant, in October. The effect of this battle kept the northwest Indians submissive during the early years of the Revolution, and at the same time permitted settlement of the Ken¬ tucky regions.

BIBLIOGRAPHY.

1607. — Fiske, John, (01d Virginia and Her Neighbors } (Ch. 3, p. 95).

1620. — Bancroft, George, 'History of the United States (5th ed., Vol. 1, p. 312) ; Pal¬ frey, J. G., 'History of New England* (Vol. 1, p. 170).*

1622. — Brown, A., 'First Republic in America) (pp. 466, 475, 495, 500) ; Campbell, C., 'History of the Colony and Ancient Dominion of Virginia.)

1637. — Bodge, G. M., 'Introd. Ch. Soldiers in King Philip's War ; Fiske, John, 'Be¬ ginnings of New England* (Ch. 3, p. 129) ; Hildreth, R., 'History of the United States) (Vol. 1, ch. 9).*

1638— 47. — Lamb [Mrs], 'History of New York (Vol. 1, ch. 6-8) ; Lodge, H. C., 'Short History of the English Colonies in America) ; Gerard, J. W., 'Ad. of Wm. Kieft) (Mem. Hist. N. Y. City; Vol. 1, ch. 6).*

1638-56. — Bryant, W. C., (History of the United States (Vol. 1, ch. 17) ; Ferris, B., 'Historical Settlements on the Dela- ware> (p. 1, ch. 3, 4, 5, 6 and 7).*

1640. — Broadhead, J. R., 'History of the State of New York) (Vol. II, ch. 3, 8). 1644. — Hildreth, R., 'History of the United States) (Vol. 1, p. 340).

1664-73.— Eccles, ‘Records of the State of New „ York' (Vol. 1, p. 628).

1666. Broadhead, J. R., ‘History of the State of New York) (Vol. II, ch. 38) ; Bryant, W. C., ‘History of the United

*iA*7c *70 States> (Vol. II, ch. 11, 14).*

1675-78. Wilson, Woodrow, ‘History of the American People) (Vol. I, p. 277); Bailey, S. L., ‘History of Andover, Mass.> (Ch. 2).

1686. Ramsay, D., ‘History of South Carolina) (Vol. 1, p. 127).

1687-89. Bancroft, George, ‘History of the United States) (Vol. II, Cent, ed., p. 347) ; Morgan, L. H., ‘League of the Iroquois) (Book I, ch. 1).

1690. Johnson, R., ‘History of the French War> (Ch. 6) ; Frothingham, R., ‘Rise of Republicanism in the United States) (Ch. 3, 4).

1696. Parkman, F., ‘Count Frontenac and New France) (Ch. 18-19).

1702-15. — Hannay, James, ‘History of Acadia) (Ch. 17-18) ; Fairbanks, G. R., ‘His¬ tory of Florida) (Ch. 13, p. 177) ; Doyle, J. A., ‘English in America) (pp. 461, 492, 498).

1739. — ‘Journal, Votes and Proceedings of the General Assembly of New York, 1733-4D (N. Y. Historical Society) ; Bryant, W. C., ‘History of the United States) (Vol. II, ch. 23).

1744-48. — Parkman, F., ‘Capture of Louis- bourg> (Atlantic Monthly 1891) ;

Drake, S. A., ‘Taking of LouisbourgP 1754. — Irving, W., ‘Life of Washington ;

Lodge, H. C., ‘George Washington.) 1755-63. — Franklin, Benjamin, ‘Autobiog¬ raphy) ; Parkman, F., ‘Montcalm and Wolfe } (Vol. I, ch. 5, 7, 9, 10, Vol. II, ch. 19, 20, 21) ; Sargent’s ‘History of Braddock’s Campaign.)

1759-62. — Hildreth, R., ‘History of the United States) (Vol. II, pp. 497-500) ; Drake, S. G., ‘Indian Biography) or ‘The American Races of North America.) 1763-64. — Parkman, F., ‘Conspiracy of Pontiac) (Vol. I) ; Fernow, B., ‘Ohio Valley) (Ch. 8, p. 165) ; Farmer, S., ‘History of Detroit) (Ch. 38).

1774. — Roosevelt, Theodore, ‘Winning of the WesD (Vol. I, ch. 8-9) ; Bancroft, George, ‘History of the United States) (Cent. Ed., Vol. IV, ch. 15).

COLONIES AND COLONIZATION.

In the older and stricter sense, a colony is a body of people who, having migrated and settled beyond the borders of their native coun¬ try, retain a political connection with the parent state. Since, however, the colonists may be mingled in any proportion with the natives, it is impossible to maintain a firm distinction between colony and dependency. It has there¬ fore become customary to apply the term "colony)) to an outlying possession of a national state the administration of which is carried on under a system distinct from but subordinate to, the government of the national territory. According as the dominant feature is the ex¬ ploitation of a dependent population, the settle¬ ment of immigrants from the mother country or the investment of capital, colonies may be divided into possessions, settlement colonies and investment colonies.

The Greek colony was formed in a natural way by the swarming off of surplus population, and was usually independent from the begin¬ ning. The bond between the mother state and the colony was sentimental, not political, and the former seldom expected any advantage from the founding of the colony save relief from the pressure of population. The Roman colonies formed part of an elaborate scheme for extend¬ ing Roman dominion. They were instituted by the state, and were its chief instrument in con¬ firming its conquests. In their origin they were little more than garrisons in conquered, forfeited places, where land was allotted to the soldiers instead of pay and provisions.

When the discovery of America occurred, Europe was not overpeopled, and there was for a long time little spontaneous outflow of sub¬ stantial elements to create new communities. The conauest of large and industrious popula¬ tions, settled upon rich lands, tempted the cupidity of rulers, and gave rise to the concep¬ tion of the colony as a possession, an estate to be mined or worked by the state or its favorites for purposes of revenue. Says Seeley: "A native population reduced to serfdom, in some parts driven to compulsory labor by caciques turned into state officials, in other parts exterminated by overwork and then replaced by negroes; an imperious mother country drawing from the colony a steady revenue and ruling it through an artful mechanism of division, by which the settlers were held in check by the priesthood, and by a serf population treated paternally, that it might be available for that purpose; such was the typical colonial system.®

The exploitation of subject populations by such means as tribute, serfdom, forced labor on public works and government plantations, or the maintenance of Crown or company monopo¬ lies, has come to be generally recognized as short-sighted, and no longer commends itself to enlightened nations. The old, harsh policy has, moreover, become more difficult with every step toward popular government in the domi¬ nant country, and every increase in the power of public opinion.

Entirely different from the type just de¬ scribed is the settlement colony, which grows up in desirable temperate regions, vacant or sparsely peopled by savages. Although the love of adventure, the crusading spirit and the de¬ sire to escape political, religious or racial op¬ pression are by no means to be overlooked, it is chiefly the economic motive that leads to the founding of settlement colonies. A stationary population enjoying rapid industrial expansion yields few colonists, but a clogged labor market, a narrowing circle of opportunities and a dark¬ ening prospect stimulate large numbers to face the unknown in the hope of bettering their condition. Not only is a population stimulated to its utmost capacity, provided it remains in vitalizing touch with the mother country, but the mixture of races results frequently in a beneficial crossing of stocks, and the severe

struggle in a new and untamed environment ac¬ celerates the improvement of the race by natural selection. The growth of numbers, changing constantly the relation between population and opportunities, carries a colony through well- defined stages. First comes the appropriation of natural wealth, hunting, trapping and mining ; then follows pastoralism; then agriculture, to

which in time is added manufacturing. Dur¬ ing the earlier stages, when the colony is com¬ plementary to the mother country, each finds in the other a convenient vent for its surplus products. The volume of exchanges is rela¬ tively large, and their trade reaches its maxi¬ mum importance. But as population thickens and wealth accumulates, the colony, acquiring home manufactures and home markets, be¬ comes an integral, self-sufficing community, and evinces a growing disposition to assert its in¬ dependence of the mother country, formerly its complement, but now its competitor.

The granting of large entailed estates may lend a colony a semi-feudal character. But if the land system is popular, landed property will be diffused, the proceeds of labor will go to the producer and the colony will contain few persons living on incomes derived exclusively from ownership. Moreover, being more favor¬ able to production than to consumption, the colony will draw to itself adult males from the industrial population of the mother country, but will attract few members of the less active classes. Since the reward of industry is greater than in older societies, and the com¬ munity is but little differentiated, economically or socially, manhood rather than property controls the body politic, the temper is indi¬ vidualistic and liberty-loving and the conditions favor the germination and rootage of demo¬ cratic ideas. Despite its social and political radicalism, the colonial society is conservative in its moral and religious ideals. Unless non¬ economic motives have presided over the be¬ ginnings of the colony, the pursuit of wealth is the chief interest of the settlers, and there is little room for speculative thought. The lack of cities, of intercourse and of leisure is unfavorable to the cultivation of the sciences or the fine arts. During the early life of the colony the preoccupation with private affairs leaves little margin for public life. If the mother country is wise enough to establish security without interfering vexatiously with private interests, the administration of affairs of general concern is turned over to it without regret. A dependence upon the richer and riper culture of the parent state may indeed cause the political connection to continue long after the colony is ready for self-government. Lands thickly peopled by non-European races, and tropical regions where the climate is such that white men will not settle there with their families, do not develop into settlement colonies. Unfit to

serve as an outlet for the surplus popu¬ lation of the temperate zone, they can be legiti¬ mately utilized by the more advanced races only as a field for the employment of com¬ mercial or industrial capital.

The commercial type of the investment colony is best seen in the early establishments of Portugal, Holland and England, for trade with the East Indian and African peoples. When colonial enterprise is dominated by the commercial motive, penetration of the interior of a new region is not required. Trade is con¬ ducted from the decks of merchantmen, from hulks anchored at the mouth of streams or from fortified stations situated on the sea coast or on the banks of navigable rivers. Settle¬ ments of traders and soldiers spring up, but there is little motive to extend political control over large inland regions. A chartered com¬

mercial company has at first no occasion to clash with the natives. Its armament is chiefly directed against envious rivals, eager to share in its lucrative trade. Later, when in its eager¬ ness for an exorbitant profit, it attempts to dictate to the natives or limit their production of the staples of trade, it comes to blows with them, and squanders its resources in profitless wars. The earlier commercial colony was valued as a source of tropical products, such as sugar, coffee and spices, which could be resold in Europe at a large advance. Since the advent of machine industry, however, the commercial colony is valued rather as a market for surplus manufactures.

The chief means of relieving the superabun¬ dance of capital that threatens to lower the rate of profits in the advanced countries is the appli¬ cation of capital in the industrial development of the more backward regions. Tropical lands un¬ der native systems are almost invariably under¬ exploited from the point of view of modern industry. The forest and mineral wealth is largely untouched, and even the area under in¬ tensive native cultivation, lacking as it does the best facilities for irrigation, tillage and trans¬ portation, produces by no means the value it might yield. Owing to ignorance, to unstable conditions or to the lack of accumulated wealth, industry is almost wholly deprived of the aid given by large applications of capital. Under these circumstances it is possible for the more civilized peoples, without in any way exploiting the native populations, without depriving them of their earnings or their patrimony, to apply capital and directive skill in such a manner as to reap a generous profit.

The example of Mexico and of certain coun¬ tries of South America shows that backward regions may be developed by capital invested under the protection of local governments, and that no adequate reason exists for administering these countries from a distance. In other cases, however, a rapacious and unstable native rule paralyzes industry, and the utilization of natural resources is impossible until a responsible and equitable

government has been instituted. It is necessary for some civilized power to suppress tribal and local warfare, to stamp out brigand¬ age and to establish an efficient police, a right¬ eous administration of justice and a rational system of taxation. When order and stability have thus been assured, the next step is the investment of development capital in the form of harbors, railways, highways, telegraphs, im¬ proved natural waterways and irrigation works. As the means of communication are perfected, there follows naturally the employment of capi¬ tal in the opening of mines, the cutting of forests, the clearing and planting of estates, and, possibly, the establishment of factories. The development of a tropical region by the aid of capital from abroad requires the presence of a small body of white men in the capacity of officials, traders, planters and superintend¬ ents, representing in the midst of the less ad¬ vanced population the superior power and in¬ telligence of the civilized peoples.

The extension of modern forms of agricul¬ tural exploitation into climates where white men cannot endure heavy field-work creates special problems respecting the relations of capital and labor. Successful enterprise requires an abun¬ dant supply of suitable and reliable labor, and

this can come only from the natives or from other colored races. In the old plantation colony the problem was solved by enslaving the local population, or by kidnapping negroes from Africa. Owing partly to the racial in¬ equality of employer and employee, and partly to the character of tropical agriculture, which cannot bear interruption, especially at harvest¬ time, there is a strong tendency in all planting colonies to compel the specific performance of the labor contract. Under the indentured labor system in the British colonies strikes are un¬ lawful, and refusal to work can be punished; on the other hand, the government closely super¬ vises the terms of the labor contract, suppresses all obnoxious features and provides machinery for compelling the fulfilment of its provisions by the employer.

If the welfare of the colony is the first desid¬ eratum, the degree of control exercised by the mother country over the internal affairs of a settlement colony will be moderate at the be¬ ginning, and will tend constantly to diminish. The prosperity of the English colonies in Amer-

the other hand, this gradual ripening off the parent stem is by no means the normal course of a tropical colony, where there are two un¬ mingling elements in the population — a colored race and an incoming European race. In the West Indies, for example, self-government means the rule of the one race or the other. There is either the domination of a large native

population by a permanently resident European caste, cut off from the moral and political condi¬ tions which have produced European standards, or else the subjection of the white element to the uneducated and politically inefficient ma¬ jority race. Here, the home government pre¬ sents itself as a power superior to local prej¬ udices and able to override the antagonistic class or race interests which otherwise might wreck the prosperity of the colony. For these rea¬ sons the system of self-government now en¬ joyed by the colonies of Canada and Austral¬ asia is not likely soon to be extended to the remaining 500,000,000 human beings in existing colonies, dependencies and protectorates.

The method of direct administration —

Num-

Area

Population

Countries Having Colonial or Non-Con- tiguous Territory

ber of colo¬ nies, etc.

Mother

country

Colonies, and other non-con- tiguous ter¬ ritory

Mother

country

•Colonies, and other non-con- tiguous ter¬ ritory

United Kingdom .

55

Square miles

120,953

Square miles

**12,043,806*

46,052,741

**391,582,528*

France .

29

207,076

4,110,409

39,602,258

62,350,000

Germany .

10

208,830

1,230, 989

64,925,993

13,074,950

Netherlands .

8

12,761

782,863

6,102,399

37,410,000

Belgium .

1

11,373

910,000

7,571,387

15,000,000

Chinese Empire .

5

4,287,000

2,786,000

421,000,000

19,000,000

Turkey .

5

204,682

489,060

11,066,000

8,250,000

United States .

6

3, 026,789

125,610

98,781 ,324

10,020,982

Portugal .

8

35,500

804,440

5,960,056

9,680,000

Japan .

5

140,191

95,689

50,052/798

15,965,000

Russia .

3

8,770,70 3

115,000

173,359,900

3,500,000

1

261,037

19,760

51,390,223

1,932,000

Italy .

4

110,623

591,250

35,238,997

1 ,396,176

Spain .

6

197,700

24,021

19,588,688

1,167,645

17)pn marie .

4

15,042

90,586

2,757,076

125,143

Total .

150

17,640,260

24,221,481

1,033,449,840

599,454,424

- *Includes feudatory states of India, whose.area is 731,944 square miles: population, about 70,000,000; also, Since the annexation in 1914, Egypt, area, 363,181 square miles, population, 11,300,000.*

ica was largely due to the salutary neglect of the mother country. They revolted when she sought by a stricter control to make them sub¬ serve her economic interests. The home gov¬ ernment, even with the best of intentions, is likely through sheer ignorance to press upon the colony institutions ill-adapted to local condi¬ tions. On the other hand, during the early life of the colony, the settlers, preoccupied with private affairs, have little leisure for the study of the problems of administration and govern¬ ment. Their political life is unduly dominated by selfish, special interests, and there is danger that the first comers may monopolize or waste the natural wealth which ought to be reserved for later arrivals. As impartial umpire and as custodian of the interests of the future, the home government may wisely exercise a super¬ vision which will diminish as the colonial soci¬ ety grows in mass, stability and . variety of interests. In the final stage of political connec¬ tion. the colony is granted autonomy in all save external affairs, or even becomes with the mother state a member in a federal empire. On

known as <(the Crown colony system" — while excellent as a means of balancing conflicting interests and protecting the native majority against oppression by the white minority, errs in trusting too much to the power of ordinance, and showing too little deference to the deeply ingrained customs and characteristics of the native population. The direct government of an alien race by European officials is, moreover, very expensive; and if it is sought to utilize natives as magistrates and police, the best among the native leaders will stand aloof, leaving often only the riffraff to become the

instruments of administration. Provided there exists an ad¬ vanced civilization and a highly organized native society, the legitimate ends of European control over a tropical region can best be attained by preserving and working upon the native government through the instrumentality of a protectorate. By this method the natives continue to follow their natural leaders and retain their time-hallowed laws and customs. Resident agents of the suzerain country super¬ vise the native authorities and, by the exercise

of personal influence, prevent misrule, suppress obnoxious practices and introduce gradually the standards of civilized administration. Com¬ mercial and industrial development proceeds apace, while the local population is better safe¬ guarded against exploitation.

The present century has seen a marked in¬ crease of political dependency. Strong nations have evidenced a growing disposition to police and place under orderly administration all regions where potential wealth exists, in order to make safe and profitable the improvement of such resources by means of the capital and skill of their citizens. The investment motive is likely to become in the future even more imperious than now, and the increasing speed of communication favors the permanence of the colonial relation where once it is estab¬ lished. In fact, in the more advanced nations a larger and larger share of attention is devoted to colonial affairs and problems. See Colony.

Bibliography. — Alston, L., (The White Man's Work in Asia and Africa) (London 1907) ; Beaulieu, P. L., (De la colonisation chez les peuples modernes) (Paris 1908) ; Bigelow, P., (The Children of the Nations) (New York 1901) ; Caldecott, A., (English Colonization and Empire) (London 1901) ; Dilke, C., (The Brit¬ ish Empire) (London 1899) ; Egerton, H. E., (British Colonial Policy) (London 1897) ; Flammarion, C., domination et colonisation (Paris 1910) ; Hobson, J. A., (Imperialism) (London 1902) ; Kidd, B., (The Control of the Tropics* (New York 1898) ; Morris, H. C., (History of Colonization (New York 1902) ; Peters, C., (Zur Weltpolitik* (Berlin 1912) ; Reinsch, P. S., (Colonial Administration* (New York 1905) ; Roosevelt, T., (African and Euro¬ pean Addresses) (New York 1910).*

COLONIZATION SOCIETY OF AMERICA, The National. An association to colonize free negroes in Africa or elsewhere. The idea was evolved by friends of negro ad¬ vancement and opponents of slavery. Dr. Samuel Hopkins, of Newport, R. I., in 1770 sug¬ gested the Christianizing and

civilizing of Africa and the assisting of emancipation here by providing a place to which free negroes could go; and this was proposed by Jefferson during the Revolution. But about 1800 it was taken up by the slaveholding interests, for exactly the opposite purpose — to strengthen their system by deporting the free negroes, who made the slave discontented and were consid¬ ered otherwise objectionable. Virginia tried repeatedly to obtain a national grant for colo¬ nizing purposes, and failing this, in 1806 en¬ acted that any slave thereafter free should leave the State within a year or be again re¬ duced to slavery; and in 1816 the petition to Congress was renewed, to force some national action. On the first of January the society above was organized. The president (Judge Bushrod Washington), all the managers and all but a small minority of the vice-presidents, were slave holders ; its constitution professed no purpose to benefit the blacks, and its ablest Northern advocate denied that it had any. Support was asked for it in the North on the ground of its civilizing Africa and lead¬ ing to gradual emancipation; in the South, on the ground of its contributing to the continu¬ ance and strengthening of slavery, augmenting

*the value of slave property and providing an overflow for the excess of slaves beyond profit¬ able employment. This impossible ((straddle** of purposes ruined its chance of accomplishing much; though a number of the best Northern philanthropists, and their Southern peers like Birney, clung to it for some years and hoped for good from it. A great many State branches were organized and vigorous public appeals made for it. Charles Carroll, James Madison, Henry Clay and Latrobe the architect were its presidents. In 1820 a colony of a few hundreds was sent to Sherbro Island, West Africa, with tools and arms, and in 1822 another was sent to found Liberia, with sincere hopes. But the per¬ petual vilification of the free negroes by the managers, advocates and organs of the Society, their anxiety to do nothing to antagonize the slaveholders and their advocacy of the severest ((black laws® to force the freedmen into desiring deportation as a refuge, alienated the anti-slav¬ ery element, who felt that they were being used as cats'-paws of the slave interest. Even Daniel Webster in 1825 refused to join it on that ground, though in 1822 he favored it. By 1830 the Tappans, Gerrit Smith, Birney, Lundy, Gar¬ rison and others had withdrawn from it, and the last-named was openly denouncing it. In 1833 he went to England to expose it before the anti.-slavery people there, and they united in a public protest against it. A similar society was organized there, but accomplished nothing. The American society maintained its organization even after the War, though its problem was altered, as well as the Southern attitude toward it. An effort a few years since to promote a large negro emigration to Kansas or Oklahoma was met with strong objection from Southern employers of labor. Consult Wilson, (Rise and Fall of the Slave Power in America) (Vol. I, Chap. 15) ; Alexander, (History of Coloniza¬ tion on the West Coast of Africa) (Philadel¬ phia 1846) ;*

*Birney, (Letter on Colonization (New York 1834) ; Jay, Hnquiry into the Character and Tendency of the American Col¬ onization and Antislavery Societies * (ib. 1834).*

. COLONNA, ko-lon'na, Aegidius de, Ital¬ ian scholastic theologian : b. 1247 ; d. 1316. He was prior-general of the Augustine order and an ardent realist and disciple of Saint Thomas Aquinas, under whom he studied at Paris.

COLONNA, Fabio, Italian botanist: b. Naples 1567; d. there about 1650. He published several botanical works and is classed as the founder of genera in botany.

COLONNA, Fabrizio, fa-bret'se-o, Italian

general: d. Naples 1520. He was the cousin of Prospero Colonna (q.v.) and father of Vittoria, served in the army of Charles VII of France in 1494; in that of Frederick, king of Naples, in 1497 ; and afterward in that of Ferdinand the Catholic, by whom he was made grand constable of Naples in 1507. Subsequently he served in the papal army under Julius II. In 1512 he was made prisoner at the battle of Ravenna by Al¬ fonso d'Este, Duke of Ferrara, who treated him with distinction and dismissed him without ran¬ som. To show his gratitude he tried to recon¬ cile Alfonso with the Pope and gave him a safe conduct to come to Rome, but Julius kept him prisoner and attacked his states. Colonna, in¬ dignant at this breach of faith, rescued Alfonso

from the papal troops and reconducted him to Ferrara.

COLONNA, Marco Antonio, Italian com¬ mander: b. 1535; d. 1 Aug. 1584. He com¬ manded the papal forces at the battle of Lepanto ana was subsequently viceroy of Sicily.

COLONNA, Ottone. See Martin V, Pope.

COLONNA, Pompeo, pom-pa/os Italian ecclesiastic, nephew of Prospero Colonna (q.v.) : d. 1532. He was a restless and intrigu¬ ing Roman cardinal who quarreled in succession with the popes Julius II, Leo X and Clement VII, and had part in all the troubles of the court of Rome. When Clement VII was the prisoner of the Constable de Bourbon, Pompeo exerted his influence for his liberation. He at length became viceroy of Naples.

COLONNA, Prospero, Italian general : b. 1452: d. 1523. On the invasion of Italy by Charles VIII he took part with that prince, owing to his enmity

against the Orsini family. He shortly afterward, however, abandoned the French cause and bore arms in the Spanish interest. Among his most noted victories were those gained at Vicenza over the Venetians, 1513, and at Bicoque over the French, 1522. He also took Milan from 'the French in 1521, and Genoa in 1522. In 1523 he defended Milan successfully against Admiral Bonnivet.

COLONNA, Vittoria, Marquise of Pes¬ cara, Italian poet : b. Marino at Marino castle near Naples 1490; d. Rome, 13 Feb. 1547. She was the daughter of Fabrizio Colonna (q.v.) and when four years old was betrothed to a boy of the same age, Fernando d' Avalos, son of the Marchese di Pescara. At 17 they were mar¬ ried. After her husband's death in the battle of Pavia (1525) Vittoria found her chief consola¬ tion in solitude and the cultivation of her poet¬ ical genius. For seven years she resided at Naples and Ischia, then removed to the convent of Orvieto and afterward to that of Viterbo. In her later years she left the convent and re¬ sided in Rome. Her earlier poems were chiefly devoted to the memory of her husband. Among her later verse the (Rime Spiritualˆ (1548) is remarkable for truth of sentiment and enlight¬ ened piety. Her work is of importance on account of the influence it had on the literary movement in Italy in the 16th century and con¬ sequently on that of succeeding centuries. In her day she was called ((Victoria the Divine, }) and the first edition of her works published in 1538 bore the significant title (Rime della divina Vittoria Colonna. > Since then many editions of her works have been issued both in Italy and in foreign countries. She was the friend of Michelangelo, who wrote several poems to her, and of manv of the noted characters of her day. Consult Campori, (Vittoria Colonna) (1878) ; Mrs. Roscoe, (Vittoria Colonna, Her Life and Poems) (1868).

COLONNA, village in the papal states, which gave its name to one of the most power¬ ful and celebrated aristocratic Roman families. During the Middle Ages the family played an important part in the affairs of Europe, became allied to the greatest houses of Italy, Spain and Germany, and furnished many celebrated war¬ riors, popes and cardinals.

COLONNA, Cape. See Sunium.

COLONNA PALACE (It. palazzo Co¬ lonna), a handsome and interesting structure at the foot of the Quirinal, belonging to the family from whom it is named, but occupied of late years by the French embassy. It was com¬ menced by Pope Martin V in the 1 5th century and was the residence of Julius II and of Car¬ dinal Borromeo. It contains a picture gallery, open to the public every day except holidays, which in point of size and architecture ranks with the finest in Rome. The ceiling of the great hall, supported by handsome columns of giallo antico, is covered with frescoes illustra¬ tive of the history of the Colonnas, the central subject being the battle of Lepanto. The col¬ lection of paintings, formerly numbering 1,362 pieces, has been greatly reduced by division among branches of the family, but still em¬ braces many magnificent works by Titian, Guido, Salvator Rosa, Guercino, Paul Veronese, Giulio Romano, Holbein and lesser artists. Almost equally celebrated as the picture gallery are the Colonna gardens, which extend behind the palace in terraces up the west slope of the Quirinal. They are planted with box, ilex, lau¬ rel, etc., and have long rows of straw houses in which the lemon is brought to rich perfec¬ tion. There are some colossal ruins in the gar¬ den, supposed to belong to the temple of the sun erected by Aurelian, and to the baths of Constantine. •

COLONNADE, a range of columns. If the columns are four in number it is tetrastyle ; if six in number, hexastyle; when there are eight, octastyle; when 10, decastyle, and so on according to the Greek numerals. When a col¬ onnade is in front of a building it is called a portico ; when surrounding a building, a peri¬ style, and when double or more, polystyle. The colonnade is, moreover, designated according to the nature of the intercolumnations introduced as follows : Pycnostyle, when the space between the columns is one diameter and a half of the column ; systyle, when it is of two diameters ; eustyle, when of two diameters and a quarter; diastyle, when three, and arasostyle, when four or more. A colonnade differs from an arcade in this respect, that the columns of the former support straight architraves instead of arches.

COLONNE, ko'lon', Jules Jude («Ed- ouardw) , French conductor and violinist: b. Bordeaux, 1838; d. 1910. He studied at the Paris Conservatory, where he was a pupil of Sauzay, Elwart and Ambroise Thomas. He was awarded the prize in harmony and the first violin prize by the conservatory. He became first violinist at the opera-house, but soon re¬ signed to undertake a series of Sunday concerts at the Odeon. He introduced the works of Tschaikowsky, Grieg, Wagner and Raff to the Parisians. He was an admirer of Berlioz, whose music he did much to make popular. He visited the United States in 1904.

COLONSAY, kol on-sa, and ORONSAY,

o-ron-sa, two islands off the west coast of Argyle, Scotland, united at low water, and at high water only about 100 yards apart; united length about 12 miles; breadth varying from one to three miles. Colonsay is much the larger and has a diversified surface with fine rock and other scenery and beautiful sandy beaches. On Oronsay are the imposing ruins of an extensive priory and near it a fine sculptured cross. Cat-

tie and sheep are reared and fishing is carried on.. Visitors land at Scalasaig pier, on the island of Colonsay. The islands are named after Saint Columba and Saint Oran.

COLONUS, ko-lo'nus, an eminence near Athens, to which CEdipus retired during his ban¬ ishment to Thebes, and from which Sophocles gave the title of ((CEdipus Colonens ® to one of his finest tragedies. According to Pollux, there were two places at Athens known as Equestris and Agoraeus Colonus.

COLONUS, in civil law, a freeman of in¬ ferior rank, corresponding with the Saxon ceorl and the German rural slaves. It has been held probable that many of the ceorls were descended from the coloni taken into Saxony by the Ro¬ mans. The names of the coloni and their fami¬ lies were all recorded in the archives of the colony or district, from which fact they were also known as ads crip tit it.

COLONY, a settlement formed in one country by the inhabitants of another. Colo¬ nies may either be formed in dependence on the mother country or in independence. In the latter case the name of colony is retained only in a historical sense. The motives which lead to the formation of colonies and the manner of their formation are various. The lust of territory; the requirements of commerce; the desire of increasing wealth, combined with the love of adventure; the necessity of relieving the pressure of redundant population; political dissensions; the convenience of removing to a distance persons likely to disturb the peace of the state, and especially the apparent ease with which a numerous criminal class may be got rid of by expatriations, are among the chief motives which have influenced colonization. Colonization is only a more formal develop¬ ment of the migratory tendency; and a colony may be considered as an organized and perma¬ nent migration.

Colonies among the Ancients. — Among ancient nations the principal promoters of colo¬ nization in the more formal sense were the Phoenicians, the Greeks and the Romans, and the greatest colonizers in modern times have been the English and the Spaniards, next to whom may be reckoned

the Portuguese, the Dutch and the French. The Phoenician colo¬ nies, extending along the shores and through¬ out the islands of the Mediterranean, were mainly commercial. The most famous of them was Carthage, itself a great colonizing state. From the distance that divided the daughter communities from the mother states, and the slowness of communication, many of them must have been practically independent from a very early period ; but this was not the case with the colonies of Carthage, which wielded power¬ ful armies and maintained great fleets, both for commerce and for conquest. The Greek colo¬ nies were widely spread, being numerous in Asia Minor, the Balkan Peninsula and the islands and coasts of the Mediterranean, in South Italy and Sicily. They were commonly independent and frequently soon surpassed the mother states in power and importance. Con¬ stantinople, Naples, Palermo and Marseilles were all originally Greek colonies. Greek civ¬ ilization was largely based upon and highly fa¬ vorable to individual liberty, and the independ¬ ence of spirit which it fostered made political

dissension a frequent cause of colonization. A still more pressing one was the limited extent of the Greek territories and the inviting char¬ acter of those by which they were surrounded. Rome was a state which left nothing to the in¬ dividual. Its colonies were chiefly military and while the empire lasted were all in strict sub¬ ordination. As the Roman power declined the remains of them amalgamated with the peoples among whom they were placed and contributed largely to the homogeneous growth of modern civilization.

Portugal. — Before America and the way by sea to the East Indies were discovered, the states of Europe in the Middle Ages, with the exception of the Genoese and the Venetians had no foreign colonies. The in¬ tercourse and wars of the Portuguese with the Moors, then more advanced in civiliza¬ tion than most of the European nations, served to incite their rivalry and stimulate them to maritime enterprise, and they became the pio¬ neers of Europe in maritime discovery. One of the chief names in this connection is that of Henry the Navigator, son of John I of Portu¬ gal. The Portuguese in 1419 discovered Ma¬ deira; in 1431-60 the Azores; in 1487 Bartolo¬ meo Diaz doubled the Cape of Good Hope ; and on 20 May 1498, Vasco da Gama landed near Calicut on the Malabar coast, after a voyage round the south of Africa. The Moors had pre¬ viously been in possession of the inland trade of India and it was not without a struggle that the Portuguese succeeded in establishing settlements on the coast of Malabar. The first Portuguese colonies were formed of garrisons placed along the coasts of the continents and islands they visited for the security of their commerce, as Mozambique, Sofala and Melinda on the east coast of Africa, Ormuz and Muscat, in the Persian Gulf ; Goa, Diu and Damao, on the Malabar coast of India. Goa became the capi¬ tal of their Indian

dominions. Colonies were established in Ceylon in 1505; in the Moluccas in 1510; Java, Sumatra, Celebes and Borneo were also colonized, though the settlements there did not attain so great importance. The direction taken by the Portuguese navigators made them miss the discovery of America ; but Brazil was discovered by Cabral in May 1500, a few months after Pingon, and was colonized by the Portuguese about 1530. The splendid colonial empire of which the foundations were thus laid was not destined to last. As in the case of Spain, the energy of the Portuguese was trammeled by climatic and other condi¬ tions, and this, together with a despotic colo¬ nial policy, had weakened the power of Por¬ tugal before she fell in 1580 under the dominion of Spain. The colonial possessions of Portugal were afterward assailed by the Dutch as ene¬ mies of the Spaniards, and when she recovered her independence in 1640, many of them were irretrievably lost. Brazil declared its independ¬ ence in 1822. The colonial possessions of Portugal are now mostly in Africa, the whole of her possessions in that continent embracing an area of 793,980 square miles. See Portugal.

Spain. — Soon after the Portuguese the Spaniards commenced the work of colonization. On 12 Oct. 1492, Columbus discovered the island of San Salvador. Haiti, or San Domingo, named by Columbus Espanola, was discovered in the course of the same voyage, December

1492, and immediately colonized. Porto Rico and Jamaica were colonized in 1509; Cuba in 1511. On the mainland a Spanish settlement was effected in Colombia (New Granada) in -511. Mexico was conquered 1519-21; Ecuador, Venezuela, New Granada, Peru and Chile were occupied and subdued between 1524 and 1541 ; and Spain was raised to the first rank among the colonizing powers of Europe. The Span¬ iards regarded their new possessions in vari¬ ous respects. Some, animated by a zeal for re¬ ligion, considered the conversion of the natives as the great end which Heaven had assigned to them. Others were inspired by the love of glory or the passion for gain and scrupled at no means by which it was possible to gratify their wishes. Owing to the degraded character of many of the first colonists, who were often mere adventurers and released criminals, the first settlements suffered much from internal strife and confusion. After many dissensions the government of the colonies, in its funda¬ mental traits, was settled in 1532, during the reign of the Emperor Charles V. A council of the Indies in Europe, viceroys, at first two, afterward four, together with eight independent captains-general in America, were the heads of the administration. Cities were founded, at first along the coasts, for the sake of commerce and as military posts ; afterward also in the in¬ terior,

especially in the vicinity of the mines ; as Vera Cruz, Cumana, Porto Bello, Cartha- gena, Valencia, Caracas; Acapulco and Panama on the coast of the Pacific ; Lima, Concepcion and Buenos Aires. The whole ecclesiastical discipline of the mother country was trans¬ ferred to the colonies, except that in them the Church was much more independent of the king. The intercourse with Spain was con¬ fined at first to the single port of Seville, after¬ ward to that of Cadiz, from which two squad¬ rons started annually. Thus, although com¬ merce was not expressly granted by law to a society, it remained nevertheless entirely in the hands of a few individuals. Spain took pos¬ session of the Philippine Islands in 1565 and a regular intercourse was maintained from 1572 by the South Sea galleons between- Acapulco and Manila; but owing to the great restrictions on commerce those islands, notwithstanding their advantageous situation, were an expense to the Crown. Spain proved to be the fore¬ most of the colonizing powers of Europe in respect to the formation of new states; the most unfortunate of all in regard to the re¬ tention of her possessions. The causes of the loss of her colonies differed from those which prevailed in the case of the Portuguese. Euro¬ pean wars and the decline of her home power were the most important, but they did not so often lead to the colonies falling under other powers, as in the case of Portugal. They more frequently became the occasion of revolt and the opportunity for declarations of independ¬ ence on the part of the colonies themselves. Thus were formed the republics of Mexico, of Central America, of Venezuela, New Granada, or Colombia, Ecuador, Peru, Bolivia, Chile, etc.; but as the weak government of the mother country served to promote this early defection, few of the states formed in this un¬ fortunate school have yet attained the repose of settled government. An insurrection began in Cuba in 1895, and after Spain had in vain en¬

deavored to suppress it the United States inter¬ fered. War followed, with the result that after a brief struggle not only Cuba, but also Porto Rico and the Philippine Islands were lost to Spain. See Spain.

The Netherlands. — The Dutch, during the struggle for independence, first became the formidable rivals of the Portuguese, then sub¬ ject to the Spanish yoke. They had already for some time carried on the trade in East In¬ dia merchandise between Lisbon and the rest of Europe, but their intercourse with Lisbon was prohibited by Philip II in 1584. The pro¬ hibition was revived in 1594 with the utmost severity, and a number of Dutch vessels in the harbor were seized. Excluded from the Eu¬ ropean trade in the productions of India, they resolved to import directly from India the arti¬ cles which were refused to them in Europe. Companies were formed, which were united into one by a charter granted 20 March 1602 to the Dutch East India Company, established in 1595. This charter, which was renewed after¬ ward at different times, conferred not only the

monopoly of the East India trade, but also sov¬ ereign powers over the conquests which the com¬ pany should make, and the colonies which it should establish in India. An entirely new colonial policy was thus introduced, which, in¬ stead of political or ecclesiastical aggrandize¬ ment, contemplated mercantile advantage as its main object. The Dutch colonies in the East Indies were thus commercial colonies ; and the islands of the Malay Archipelago, being more easily defended than the continent of India, became the principal seat of the Dutch power. This was undoubtedly the chief cause of their colonies being so long in a flourishing condition, as they required only the dominion of the sea to maintain them. In 1619 the newly built Batavia was made the capital of the Dutch East Indies. About the middle of the 1 7th century the power of the Dutch reached its highest point. They effected the establishment of a colony at the Cape of Good Hope in 1652, which afforded an excellent bulwark for their East India posses¬ sions, and took Ceylon from the Portuguese, after a long and sanguinary struggle in 1658. All the Dutch colonies in the East Indies were under the governor-general of Batavia. In 1621 the Dutch also established a West India Company, which at first made extensive con¬ quests in Brazil, but soon lost them entirely (1624-62). Their settlements on some of the smaller West India Islands, as San Eustatia, Curagoa, Saba and San Martin (1632-49), were more permanent. On the continent Surinam, Paramaribo, Essequibo and Berbice were in the hands of the Dutch in 1667. In North America the Netherlands held the valley of the Hudson and pushed south at the expense of the Swedes, winning the present States of New Jersey and Delaware, only to lose them to England. The decline of the Dutch colonial power, partly caused by European wars and partly by the successful rivalry of the English, continued from the end of the 17th century till the French Revolution. On the recovery of its independ¬ ence, the commerce and the colonial importance of Holland somewhat revived and though many of her colonies were lost the value of the re¬ mainder was enhanced by improved adminis¬ tration. The Dutch still possess numerous co¬ lonial possessions in the East Indies, including

Java, Sumatra, parts, of Borneo, the Moluccas and part of New Guinea; several small islands in the West Indies and Surinam. See Netherlands.

Great Britain. — No colonizing power has had a career of such uniform prosperity as Great Britain. The freedom of her institutions and the practical enterprise and self-reliance of her people peculiarly fitted her for the work of colonization and it has steadily advanced with her equally in peace and in war. Her in¬ sular situation freeing her from the ambition of direct territorial aggrandizement and giv¬ ing her the command of the seas

enabled her in every war to strip her opponents of colonial possessions which were not unfrequently re¬ tained as the price of peace. The only break in a career of prosperity which has resulted in the formation of an empire greater in ex¬ tent of territory and of population than any other known to history was the revolt of her American colonies, which resulted in the for¬ mation of a state destined ultimately to rival Great Britain herself in political and commer¬ cial importance and in the freedom of its in¬ stitutions. This state, too, by the successful re¬ sult of the war of 1898 with Spain, itself en¬ tered on a policy of colonial expansion.

The English made their appearance as a colonial power nearly at the same time with the Dutch, but at first with far inferior success. After many fruitless attempts to find a north¬ east or northwest passage to the East Indies, English vessels found their way round the Cape of Good Hope to the East Indies in 1591. In 1600 Elizabeth granted a charter to the East India Company. Its commerce with India, how¬ ever, was not at first important. It established only single factories on the continent, and at the beginning of the 18th century the posses¬ sions of the English in the East were limited almost exclusively to Madras, Calcutta and Bencoolen. The ruin of the Mogul empire in India, which commenced in internal disturb¬ ances after the death of Aurungzebe (1707), and was completed by the incursions of Nadir Shah (1739), afforded the opportunity for the growth of British power, as the British and French were compelled to interfere in the con¬ tentions of the native princes and governors. The French, under Labourdonnais and Du- pleix, appeared at first likely to maintain the superiority; but the British succeeded in ac¬ quiring the ascendency in the Carnatic; and in the middle of the 18th century they greatly ex¬ tended their dominions under Clive. By the de¬ struction of Pondicherry they secured their superiority on the coast of Coromandel ; and the victory of Clive at Plassey, 23 June 1757, laid the foundation of their exclusive sover¬ eignty in India. By the Treaty of Allahabad, 12 Aug. 1765, Bengal was surrendered to the British by the titular Great Mogul ; and the fall of the empire of Mysore, the dominions of Hyder Ali and Tippoo Sahib, may be consid¬ ered as completely establishing the British su¬ premacy in India. The Mahrattas, with whom the British waged war at intervals from 1775 to 1818, and the Sikhs, subdued in 1849, were the last formidable enemies of the company. With the exception of a few dependent states the British territory now embraced nearly the whole of India, and this vast territory was still under the government of a chartered mercantile

company, exercising many of the most import¬ ant functions of an independent sovereignty. On the suppression of the Indian mutiny (1857—58) this state of things was deemed too haz¬ ardous to last and the government of India was transferred to the Crown by act of Parliament in 1858. Ceylon was first occupied in 1 795—96.

The discoveries of the Cabots, following soon after the voyages of Columbus, gave the English Crown a claim to North America, which in the reign of Elizabeth led to coloniza¬ tion on a large scale. In 1606 James I divided the territory claimed by England into two parts — South Virginia, extending from Cape Fear to the Potomac; and North Virginia, from the mouth of the Hudson to Newfoundland. Two companies were formed for the colonization of America — the London Company, to which was granted South Virginia ; and the Plymouth Company, to which was granted North Virginia. The region between the Potomac and the Hud¬ son was neutral ground. The London Com¬ pany in 1607 founded the commonwealth of Virginia by building Jamestown on the James River, so called in honor of the king. A House of Burgesses for the new colony met for the first time on 19 June 1619, and thus was con¬ stituted the beginning of representative govern¬ ment in the British colonies of America. In 1614 Capt. John Smith, having examined the coast from the Penobscot to Cape Cod, named the country here New England. The next per¬ manent settlement on the North American coast was effected in this district by the body of Puritans, known as the Pilgrim Fathers, who sailed from England 6 Sept. 1620, in the Mayfloiver, and arrived 9 November in Massa¬ chusetts Bay. The government of this colony was that of a religious oligarchy. Another col¬ ony was established in New Hampshire in 1623, and in the same year Maine, which had pre¬ viously been colonized by the French, received its first permanent English settlement. New Jersey was colonized in 1634. Connecticut was colonized in 1635 by emigrants from Massachu¬ setts. Rhode Island was settled in 1636. Sam¬ uel Champlain, the French navigator, was the first European who entered the region now forming the State of New York (1609). In the same year Henry Hudson, an Englishman in the service of the Dutch East India Com¬ pany, discovered the river to which his name has been given, where Dutch settlements were effected and gradually spread. The English, who claimed this territory as included in Ca¬ bot's discoveries, finally seized the Dutch col¬ ony of New Amsterdam by force in 1664, giv¬ ing it the name of New York in honor of James, Duke of York (James II), to whom Charles II had made a grant of the province. In 1670 the charter of the Hudson's Bay Company was granted, by which ownership of all the regions whose waters discharge into Hudson Bay — a territory as large as the whole of Europe — was conferred on the company, the rights to which were only finally extinguished in 1869. In 1681 the territory west of the Delaware was granted to William Penn, who colonized it with Quakers, and founded Pennsylvania in 1682. The first settlement in Maryland was made in 1631 by a party from Virginia. In 1633 a col¬ ony of Roman Catholics arrived here from Great Britain. The country south of Virginia was permanently settled in 1670 by a party of

English colonists who landed at Port Royal and afterward removed to Charleston. The colony was called Carolina. Georgia, originally a part of Carolina, was granted by George II, after whom it was named, to a colony from England in 1732.

Colonies were early established in the West India Islands, including Barbados, half of Saint Christopher's (1625) and soon after many smaller islands. Yet the West India posses¬ sions did not become important as plantations until the sugarcane was introduced into Bar¬ bados in 1641 and into Jamaica in 1660. This island had been taken from the Spaniards in 1655. The cultivation of coffee was introduced into the West India Islands in 1732. New¬ foundland was taken possession of by the Eng¬ lish in 1583, and colonized in 1621 and 1633. Canada was surrendered by France to Great Britain at the Peace of Paris in 1763 (see sec¬ tion on French colonies below). In 1764 be¬ gan the dispute between Great Britain and its North American colonies, on the question whether the former had the right to impose taxes on the colonies when they were not rep¬ resented in the British Parliament ; and on 19 April 1775 commenced the war which termi¬ nated with the acknowledgment of the inde¬ pendence of the 13 provinces. Though the United States thus entered on their independent career, Canada still remains as a great and flourishing self-governing dominion.

Australia was discovered in the beginning of the 17th century. The first Australasian settle¬ ments of Great Britain were penal colonies. New South Wales, discovered in 1770, was established as a penal colony in 1788; Tasmania (Van Diemen's Land), discovered by Tasman in 1642, followed in 1803. West Australia, for some time a penal settlement, was founded as a free colony in 1829; Victoria (Port Phillip) was colonized in 1835, and made an independent colony in 1851 ; South Australia was settled in 1836; Queensland became a separate colony in 1859; New Zealand, discovered by Tasman in 1642, began to be used in connection with the whale fishery about 1790, was settled in 1839 and made a colony in 1840. In 1851 -gold was discovered to be plentiful in Victoria. This gave a great impetus to the prosperity of the Aus¬ tralian colonies, and the influx of population it caused has largely contributed to promote their general development. A federal union of the British colonies in Australia was proclaimed 1 Jan. 1901, with the title of the Commonwealth of Australia. The Fiji Islands became a colony in 1874, and other islands in the Pacific have been acquired since, as well as part of New Guinea and part of Borneo.

The acquisition of the South African col¬ onies dates from the Napoleonic period, the Cape Colonv and Mauritius being both secured to Great Britain in 1814. Natal was proclaimed a British colony in 1843. The Guinea Coast

settlements date from the 17th century. Ex¬ tensive spheres of influence have been recently acquired, being partly developed by chartered companies.

In Europe Great Britain has only two pos¬ sessions of the nature of colonies, acquired for military reasons: Gibraltar in 1704; Malta and Gozo, 1800. t .

It is estimated that the existing British col¬ onies and dependencies embrace fully one-fifth

of the land surface of the globe, and a rather larger proportion of its population. The whole of the British colonial possessions have been grouped in about 40 administrative divisions and they are situated in every quarter of the globe. See Great Britain.

According to their governmental relations with the Crown the colonies are arranged un¬ der three heads: (1) Crown colonies, in which the Crown has the entire control of legislation, while the administration is carried on by pub¬ lic officers under the control of the home gov¬ ernment; (2) colonies possessing representative institutions, but not responsible government, in which the Crown has no more than a veto on legislation, but the home government retains the control of public officers; (3) colonies pos¬ sessing representative institutions and respon¬ sible government, in which the Crown has only a veto on legislation, and the home government has no control over any officer except the gov¬ ernor. All colonies are, however, disabled from such acts of independent sovereignty as the initiative in war, alliances and diplomacy gen¬ erally.

France. — France was somewhat late of entering fully upon a colonial career, being re¬ tarded by internal dissensions and religious wars. Between 1627 and 1636 Pierre Belain d'Esnambuc colonized Saint Christopher's, Gua¬ deloupe and Martinique. Champlain was the pioneer of the French in the exploration of the North American continent, where they soon had considerable possessions, including Canada — -in which they had settlements as early as 1604-05, and where Champlain founded Quebec in 1608 — and Louisiana, colonized in 1699. Commercial companies were then deemed essential in colo¬ nizing, and a West India Company and an East India Company were established by Colbert in 1664. He purchased on several West India Islands, as Martinique, Guadeloupe, Saint Lucia, Grenada and others, settlements already formed by private persons, and sent out colonists in 1664 to Cayenne. But the settlements in part of San Domingo, by the buccaneers, became of more importance than those effected by the government. The West India Company survived only 10 years. The East India Company, after fruitless attempts to form a colony in Mada¬ gascar, founded Pondicherry on the Coroman¬ del coast

in 1683. This became the capital of extensive French possessions in the East Indies. The French also acquired Bourbon (Reunion) in 1649 and the Isle de France (Mauritius) in 1715. At the beginning of the 18th century France had attained an important position as a colonial power. In North America her settle¬ ments extended from Canada to California, particularly along the Great Lakes and the Mississippi River, embracing many districts which have since become of the highest im¬ portance. Nova Scotia (Acadie) and New¬ foundland (Terre Neuve), which had been disputed with Great Britain, were then in her possession. Her West Indian islands were more flourishing than those of England, and she still had a prosperous career before her in India. The superiority of the fleet of England gave that power a great advantage in colonial con¬ tests, and many of the French colonies subse¬ quently fell under the power of Great Britain. The struggle for the supremacy in India, though France was finally unsuccessful, was

long and gallantly maintained, and more than once seemed to promise a different issue. The North American colonies were partly lost by conquest and partly suffered to fall into decay. Of the West India possessions several were taken by Great Britain and finally ceded to her. Canada was finally ceded to England in 1763 ; Louisiana, after being surrendered to Spain, to prevent it from falling into the hands of the English, was sold by Napoleon to the United States in 1803. At the general pacification of 1815 France recovered some remains of her colonial possessions, and since then she has acquired extensive regions beyond sea, some of them highly valuable. She occupied in 1830 and began in 1833 to colonize Algeria, a country whose irregular and lawless government had exposed her as well as other European states to frequent annoyance. Tunis, Senegambia, great tracts of the Sahara, Sudan and Kongo regions, the islands of Madagascar and Reunion are all comprised in France's African posses¬ sions, while in Asia she possesses a large por¬ tion of the Indo-Chinese Peninsula, and in America French Guiana. Some of the French colonies are represented in the National As¬ sembly by members chosen for the purpose. See France — 'Colonies.

Denmark; United States; Sweden. — Denmark established an East India Com¬ pany in 1618 with a view to enter on the colonial trade ; and other companies were after¬ ward formed. In the same year, with the formation of the first company, the colony of Tranquebar was founded on the Coromandel coast. Its success was fluctuating, like that of the companies formed to manage it, and at last, in 1845, it was sold to the East India Com¬ pany. Saint Thomas in the West Indies was settled by the Danes in

1672; Saint John and some of the smaller islands in the same group (the Virgin Islands) were also occupied by them. The island of Santa Cruz was purchased from France in 1733. By a treaty signed 4 Aug. 1916, the West India islands belong¬ ing to Denmark passed into possession of the United States at the purchase price of $25,000,000. Formal transfer took place on 31 March 1917, and the islands are now called the Virgin Islands of the United States. Sweden established an East India Company in 1741. She acquired the island of Saint Bartholomew from France in 1785, but restored it in 1878, and has now no colonies.

Germany. — A German historian of the colonial movement dates his story from the end of the Crusades, while another, not to be outdone in the national virtue of thoroughness, seek its origins in pre-Christian annals. For practical purposes, the German colonial move¬ ment, as we know it to-day, is barely over 30 years old. There were genuine if tentative efforts at colonization as early as the 1 7th cen¬ tury, when the Great Elector of Brandenburg established settlements on the west coast of Africa. Earlier still the Hanseatic Towns would have traded with foreign territories had they not been frowned upon at home. Prus¬ sia's and Germany's dreams of world-conquest and colonization were dispelled when Frederick William I of Prussia (1713-40), more concerned to assure his sovereignty at home, abandoned the Great Elector's settlements. The new policy was shared by Frederick the Great (1740-86),

who considered all distant possessions (

and it was not until he fell that the traditions of colonial expansion were revived under Prince Hohenlohe in the nineties. Thus the Caroline Islands were annexed in 1899, also the Pelew and Marianne groups. In the same year the Samoan Islands were brought under the German flag ; already in 1897 Kiau Chau had been wrested from China. The total area of Germany's colonial possessions in 1914 was 1,027,820 square miles, with a white population of 24,389 and a- native population of 12,041,603. In the course of the European War one after another of her colonies became lost to German. Togo was taken by combined British and French forces on 7 Aug. 1914. Cameroon was conquered by French and English troops on 18 Feb. 1916. South West Africa fell to the South African forces of General Botha on 9 July 1915 and is administered by the Government of the Union of South Africa. East Africa was occupied during the war by British, Belgian and Portuguese forces and was finally con¬ quered in 1917. Kiau Chau fell to combined Japanese and British forces on 7 Nov. 1914. In the north Pacific the German possessions were captured by the

Japanese shortly after the outbreak of the war in 1914 and were handed over to the Australian forces. The islands south of the equator are administered by Australia, those north of the equator by Japan, and Samoa by New Zealand. German colonial administration has not been happy in its methods nor yet in its officials. The prin¬ ciple laid down by Bismarck was soon departed from: the trader, having obtained protection, went back to his plantation, his compound, his stores ; he certainly was not urged to play any part in the government of his colony; grad¬ ually the whole system of Prussian bureaucracy was introduced in each of the colonies, large and small. The secret of the administrative order that reigns at home is <(system,® and it was taken for granted that if sufficient ˆsystem® were introduced into the government of the colonies the same results would follow. Fur¬ thermore, far too little regard was paid to native customs and traditions of life. Instead of studying native law systematically and regu¬ lating administration in each colony according to its peculiar traditions, all colonies alike were governed according to set Prussian legal maxims interpreted in a bureaucratic spirit by jurists with little experience of human nature, and none at all of native usages. The choice of officials was also unfortunate in a majority of cases; the colonies being regarded as relief institutions for the benefit of men who had failed at home. It was declared from the throne in 1888 that it must be a solemn duty of the Empire to <(win the Dark Continent for Christian civilization.® Not much Christian civilization, or civilization of any kind, was car¬ ried to the colonies. Stories of slavery, vio¬ lence, cruelty, illegality and lust, committed both by officials and planters, were reported only too frequently by missionaries and clean¬ handed men in the colonial service, who could not see these things and be silent. The use of force as the only method of civilizing the native was constantly advocated with a daring frankness. In South West Africa the Hereros were decimated by the armed forces of Ger¬ many. General von Trotha wrote in his proc vol 7. — '20

lamation of 2 Oct. 1904 : ((The Herero people must leave the land. If it refuses I shall compel it with the gun. Within the German frontier, every Herero, with or without weapon, with or without cattle, will be shot. I shall take charge of no more women and children, but shall drive them back to their people or let them be shot at.® The leader of the German People's party in the Reichstag said before that body on 24 March 1906 that <(The legal position of the blacks is miserable in the ex¬ treme. The honor of the German name suffers under this absolutely arbitrary system. We have lost the sympathy of the black race.® The Great War has brought about the loss to Ger¬ many of its colonial possessions acquired within the memory of the majority of men living. On the colonial record of Germany as on many other records of that nation must be written in large letters the word failure.

Italy. — Italy has also shown the same ambition, and has established the colony of Erethrea on the African side of the Red Sea, between it and Abyssinia, in Somaliland; and as a result of the war with Turkey in 1912 acquired Tripoli.

The colonial policy of paternalistic coun¬ tries as Spain, Portugal and France naturally differed from that of commercial and industrial nations like England and Holland. In the former the expense and risk of colonizing was borne by the government, who retained direct control over the colonies and their productions ; but in the latter the work, being too much for individual enterprise, was entrusted to com¬ panies, whose charters conferred on them not only exclusive privileges in regard to trading, but also extensive powers of conquest and administration. In respect to trade a very ex¬ clusive and jealous policy long prevailed, but since the adoption of a free-trade policy in Great Britain the whole trade of her colonies has been thrown open without reserve, as far as the privileges of the mother country are concerned, to the competition of foreign na¬ tions. Other countries, while not following her commercial policy entirely, have relaxed more or less the stringency of the regulations affect¬ ing their colonial trade. See America, Col¬ onization and Discovery ; Canada — Era of Early Discoveries ; Colonies and Coloniza¬ tion ; Imperialism.

Bibliography. — Altamira y Crevea, R., (His- toria de Espana y de la Civilization Espanola (3 vols., Barcelona 1902) ; Lannoy De, C., and Van der Linden, H., (Histoire de l'expansion coloniale des peuples Europeens* (Brussels 1908) ; Root, W. J., (Spain and Its Colonies* (London 1898) ; Hassert, K., (Deutschlands Kolonien* (Leipzig 1910) ; Johnston, Sir H., (The Colonization of Africa) (Cambridge 1899) ; Keltie, J. S., (The Partition of Africa) (London 1895) ; Jones, J., (Fall of Tsing-Tau* (ib. 1916) ; Wegener, G., (Deutschland in der Siidsee* (Bielefeld 1903) ; Bisiker, W., (Across Iceland) (London 1902) ; Pellenc, (Les Italiens en Afrique 1880-96) (Paris 1897) ; Blount, J., (American Occupation of the Philippines) (London 1913) ; Morris, R., (Our Island Em¬ pire* (Philadelphia 1899) ; Fiske, A. K., his¬ tory of the Islands of the West Indian Archipel¬ ago* (New York 1899) ; Carpenter, E. J., (America in Hawaii* (London 1899) ; Under-

wood, J. L., (Alaska, an Empire in the Making> (London 1913) ; Ortroz, F. von, (Conventions internationales concernant l,Afrique> ; Lalanne, (La France et ses colonies (Brussels 1898) ; Colonial Reports issued by Secretary of State for the Colonies (London) ; Statistical Ab¬ stracts for the Colonies (Annual) ; Blue books of the respective British colonies; (*

Colonial Office List ; Leroy-Beaulieu, (De la coloniza¬ tion chez les peuples modernes) (3d ed., Paris*

1887).

COLOPHON (Gr. Kolophon, “summit®), an ancient Ionian (Greek) city of Asia Minor situated at a short distance from the coast and about 15 miles north of Ephesus. Its inhabitants were removed by Lysimachus after the death of Alexander the Great. Colophon was one of the places that claimed to be the birthplace of Homer. It was the native city of Mimnermus and other poets. Its site was discovered in 1887 by the German explorers, Schuchhardt and Wolters. Proverbially Colo¬ phon came to mean “a finishing stroke® be¬ cause of the many instances in which the city’s cavalry carried the day. The word took this proverbial meaning in Latin and was used by early printers as the imprint at the close of a volume; commonly used before the introduc¬ tion of the title page. See next article.

COLOPHON, kol'd-fon, an inscription at the “Finis® of a book, giving the printer’s name and date and place of printing; in the early days of printing nearly all books had colophons. Usually they are ludicrous in the extravagant claims the printers made for the unapproach¬ able excellence of their handiwork; but some are modest and dignified, while a few are pathetic, showing the hard struggle made by masters of the noble craft for a bare sub¬ sistence.

COLOPHONIUM. See Rosin.

COLOPHONY, a name formerly used for common rosin (q.v.), but now found only in books.

COLOQUINTIDA. See Colocynth.

COLOR. Color may be studied objectively as a wave phenomenon (see Light), in its psycho-physiological aspect as a retinal stimulus (see Vision), or, subjectively, as an appearance or ocular sensation ; this last is the viewpoint of the present article.

Isaac Newton (Philosophical Transac¬ tions, } No. 80, 1672) was the first to show that white light (sunlight or daylight) may be re¬ solved into elemental colored lights or rays which cannot be further decomposed, but which on being superposed form white light. The question whether sunlight contains these colors in the form of a mixture analogous to a mix¬ ture of, say, nitrogen and oxygen gases in the air or is a compound, as water is of hydrogen and oxygen, belongs to physics. Newton adopted the first point of view; at the present time the second is gaining favor. The elemental lights, distinguished visually by their colors, are seen in the rainbow, the sparkle of a diamond, in soapbubbles, in a film of oil on water, by look¬ ing at one's eyelashes through nearly closed lids, and in many other phenomena discussed in phys¬ ical optics under the names dispersion, inter¬

ference, absorption, polarization, fluorescence, diffraction, refraction. They are called spec¬ trum colors — popularly, (

Color Sensation. — Color is a sensation pro¬ duced through the excitation of the retina by rays of light. Thus black (Bk) and white (W) are color sensations, although Bk is due to no, and W to complete, stimulus. The infra-red rays — • below the red end of the spectrum — and the ultra-violet — beyond the violet end — are invisible. Heat is the principal effect of the infra-red and chemical action, as on a photo¬ graphic plate, that of the ultra-violet rays. To the physicist all of these visible and invisible emanations are regarded as electromagnetic waves differing essentially in wave length alone. All have chemical and thermal effects but only some give to the eye the sensation called color. Although none of the spectral colors can be resolved into others, some can be imitated to the eye by combinations of others. Combina¬ tions of R and V produce purples which are not in the spectrum at all ; such compounds are nevertheless resolvable into their constituents by spectroscopy. Two colors not distinguish¬ able to the eye may have quite different com¬ positions. For example, a solution of potassium dichromate and one of potassium dichromate and neodymium ammonium nitrate in suit¬ able proportions impress the eye as having pre¬ cisely the same yellow color ; but whereas a mer¬ cury arc light will look yellow on being viewed through the first solution, it will look brilliant green through the second. No pigment is mon¬ ochromatic, yet it is possible in many cases to match spectral colors by means of pigments. Color to the eye is therefore not color in the sense of being one definite constituent of white

light. Since color is entirely subjective it must be influenced by personal idiosyncracy ; indeed some people are color-blind and cannot, for in¬ stance, tell red from green. (See Vision). On the other hand, santonin poisoning produces, in otherwise normal people, a pathological condi¬ tion called chromatopsia, in which all "colors® are yellow. In short, the eye is unable to ana¬ lyze color in the way that the ear can detect the component tones in a chord.

Color Constants. — Artists speak of cold, warm, advancing, and retiring colors. By warm are meant red, orange and yellow, and any tendency toward them ; it has no connection with heat, but is suggested rather by the lumi¬ nous glow of sunlight. An advancing color

COLOR

complements

SOLAR SPECTRUM OR RAINBOW COLORS

DIAGRAM ILLUSTRATING THE PRIMARY, SOLAR SPECTRUM OR RAINBOW COLORS AND LAW OF THE COMPLEMENTARY COLORS

DIAGRAM ILLUSTRATING THE PRIMARY COLORS AND THEIR COMBINATIONS OR TINTS.

I

r

COLOR

307

Se?imi nearer the eye than one which is

called retiring; the effect is evident in only a few simple cases : orange seems to be nearer than green when both occur in juxtaposition on the same surface, green nearer than violet, yel¬ low than red, red than blue, black than yellow, i he reader may easily experiment with the excellent colored coated-papers suitable for the purpose, various sizes of which can be obtained in black, white and in 18 spectral hues, with two tints and two shades of each. Color has three characteristics : hue, purity or saturation, and luminosity or brightness. Hue is color per se, such as blue, pink, black, etc. ; purity depends on treedom from admixture with white; only mon¬ ochromatic colors are saturated. Luminosity de¬ pends on the amount of light given by the color. A tint is a departure from a normal or dominant spectral hue in regard to purity, i.e., tints are whiter than the arbitrarily selected normal. A shade is darker than the normal and may be produced by decreased illumination or by the addition of black. It must be clearly

under¬ stood that luminosity does not affect purity: a tint cannot be made to look as saturated as its normal merely by decreasing the illumination, thus pink never looks red in a subdued light. A compound color can be defined accurately only in terms of the characteristics of its monochro¬ matic components. But every color, simple or compound, except purple, can be matched so far as the eye is concerned by a tint or a shade of some simple spectrum hue.

Color constants are measured with a spec¬ trophotometer, which is a combination of a spectroscope with a photometer. The spectro¬ scope produces an ordinary white-light spec¬ trum, one narrow transverse band of which can be passed through the photometer ; at the same time white light of any intensity is superposed on this colored band. The colored light which is to be examined — in the case of a colored surface the light reflected by it — also passes through the photometer and forms a field next to the combination of spectral ray and white light. By selecting the proper hued spectrum ray, controlling the added white and adjusting the resultant until it matches in color and brightness the light to be examined, we can determine hue, saturation and luminosity. De¬ scriptions of instruments and full references are given by Luckiesh. The following are typical results; they will vary with the reflection coefficient of the surface, i.e., with the relative amount of white light it reflects. The wave lengths of the hues are expressed in microns : 1 micron —0.001 millimeter. The columns headed (

(ABNEY, ‘ RESEARCHES IN COLOR VISION,’ 1913)

Per cent

Pigment Hue white

Vermilion . 0.610 ft

Emerald green . -522

Fr. ultramarine blue . .472

Brown paper . • 594

Orange . -591

Chrome yellow . • 583

Blue-green . • 500

Eosin dye . -640

Cobalt blue . 482

2.5

59

61

50

4

26

42

72

55

(NUTTING, ‘ BULLETIN BUREAU STANDARDS,’ 1913, 9, NO. 187)

Per cent

Materials

Sulphur .

Cork .

Hue

white

48

56

Tobacco leaf .

65

Chocolate .

70

Butter, dark .

28

Paris green .

56

Manila paper .

65

Copper .

70

Brass, light .

60

Gold, medium .

64

(L. A. JONES, ‘ TRANS. I. E. S.,’

1914, 9, p.

687)

Per cent

Source

Sunlight .

Hue

white

100

Average clear sky .

*f**

60

Tungsten lamp .

.588

35

Carbon lamp .

.591

25

Nitrogen tungsten lamp .

.584

45

Mercury vapor arc .

.490

70

Carbon arc .

62

Acetylene flame .

.585

36

These results are color matches rather than color analyses. They show, for example, that highly colored butter, manila paper, chrome yel¬ low paint, the nitrogen tungsten lamp and the carbon arc light are all of about the same hue and differ only in purity and brightness, i.e., they are tints and shades of one another. As the three observers did not use identical light sources in their experiments, the purities in the tables are relative. The following values from Hurst ((Color, } p. 17) give a rough idea of the lumi¬ nosity of, or the amount of white light reflected by, various pigments in terms of white paper as a standard.

White paper. Vermilion. . . Orange red . . Yellow ochre

100

Emerald green .

. . . 51

20

Ultramarine .

. . . 50

40

Umber .

. . . 22

56

Chrome yellow. . . .

. . . 61

On comparison with the first table it is seen that although vermilion is very pure, very nearly saturated, it reflects comparatively little light. The two sets of numbers are quite independent and express two different characteristics of color.

Color Analysis. — Analysis of a compound color is used here to mean separation into spec¬ tral components. For example, French ultra marine is a fair match to what is regarded as the typical spectral blue of wave length

0.472 microns; both give rise to the same sensation and are therefore physiologically identical, yet the spectrum ray is monochromatic and the pig¬ ment decidedly complex. If the light reflected from a colored surface is analyzed spectro¬ scopically it is found to contain all the spec¬ trum hues in varying intensity.

The following diagrams, adopted from Luc¬ kiesh, give spectroscopic analyses of certain pig¬ ments. Vertical distances indicate the relative intensities with which the wave lengths along the base are reflected and correspond to lumi¬ nosities in the absorption spectra. The area under a curve measures the luminosity of the pigment itself. White is a horizontal line at greatest height because it reflects all colors equally; black reflects none and therefore is chosen as the base. Gray would be some inter¬ mediate horizontal line. No analyses of mixed pigments are as yet available and it is difficult to predict the exact form of the resultant curve. However, we can arrive at approximate results. According to the diagrams a surface painted

with cadmium yellow will look intensely yellow when illuminated with monochromatic yellow light, orange in orange light, red in red and green in green, but in blue or violet light it will be grayish. French ultramarine will be violet, blue, green in corresponding illuminations but grayish in yellow, orange, red. The only color which cadmium yellow and ultramarine both reflect is green, the others being largely but not entirely absorbed. The green produced by a mixture of these two pigments although far from being monochromatic is much more nearly so than the pigments themselves. But its luminosity has been considerably reduced by absorption ; in fact a mixture of monochromatic blue and yellow pigments would be black be-

White

White

cause no light would be reflected at all. Mixed pigments tend toward blackness ; painters there¬ fore select pigments which possess inherent color and do not mix unless a subdued, murky or grayed effect is desired. Unfortunately there is as yet no accepted theory of inherent color; it is not known why chromium oxide is green, hydrated ferric oxide red or ferric hy¬ droxide yellow. Consult (Berichte d. deut. chem. GeselP (1906, 39 p. 1959), and Journal of the Chemical Society (1906, 89 p. 1787) ; see also Dyeing.

When a surface is illuminated with colored light, as in stage lighting effects,

the hue actually seen depends on the local color of the surface, on the light reflected before absorption takes

place and on the remainder reflected after ab¬ sorption. Ogden Rood found that non-mono- chromatic yellow light looked bright green on Prussian blue and white on ultramarine. The Prussian blue had evidently absorbed all but the green component that must evidently have been in the yellow, while, as will be seen later, the ultramarine had absorbed all but the mono¬ chromatic yellow component. In the first case green was the dominant hue reflected, in the second case it was yellow plus blue. This shows that the parts played by absorption and reflec¬ tion are difficult to predict.

Additive Combinations. — Combinations of colors are always combinations of spectral lights whether they are made additively by di¬ rect superposition of the components or sub- tractively by absorption as in a mixture of pow¬ ders or solutions. When red and green spec¬ trum rays are thrown upon a white surface both colors are simultaneously reflected to the eye and give the sensation of yellow ; on the other hand a mixture of red and green paints will in certain proportions give a gray which may be reddish or greenish, but never yellow, because together they subtract from the white light (daylight, etc.) which illuminates them all colors except those whose combination im¬ presses the eye as gray. Such apparently con¬ tradictory results have been the source of many absurd controversial (

Colors may be added in several interesting ways. Fine lines alternately red and green or blue and yellow, etc., ruled close together on white paper and examined from a distance through the large end of opera glasses so that the individual lines are not distinguishable give the eye two simultaneous sensations whose ef¬ fect is quite different from that of the corre¬ sponding pigment mixtures. This method was used by Miles as early as 1839. It may be per¬ formed also by painting one end of a pack of papers with one color and the opposite end with another and then reversing alternate pa¬ pers; or otherwise by stippling points of differ¬ ent hues on a white surface, or by using the color-wheel described later. Artists often em¬ ploy the stippling process with beautiful results because the surface so treated fluctuates in hue according as one or another of the components momentarily predominates by reason of the varying degrees of fatigue of the color nerves in the retina. It has been found experiment¬ ally that all hues can be produced by suitable combinations of three physiological primaries : monochromatic red, green, blue (or violet). Thus red plus green in different proportions produce additively all the hues from red through orange, orange — yellow, — yellow, yellow

— green, green ; red plus blue give violet, red

— violet, blue — violet and the purples; blue plus green produce blue — green and green — blue; red plus green plus blue in certain proportions give white, in others they reproduce colors obtained from pairs of the primaries. This is the first great group of phenomena that can be accounted for only by studying the subjective effect of color. It is strikingly illustrated by the Lumiere, Joly and Ives-Cros processes of color photography (see

*Color Photography), in all of which three pho¬ tographs taken through red, green and blue filters are dyed with these respective colors and then presented simultaneously to the eye. * Ives and Cros used three separate filter screens, Joly ruled a single one with lines alternately red, blue, green, and Lumiere formed the screen directly on the sensitized plate by spreading it with a thin paste containing potato starch grains, some of which were stained red, some green and some blue.*

The reasons for the facts in the above group are unknown. But by assuming a cer¬ tain functioning of the retina we can form a theory which will correlate them. Like every theory this is outside of the region of fact and non-fact and is simply a mechanistic formula by means of which a whole class of phenomena can be stated in terms of a selected few. The Young-Helmholtz method of explaining color vision (see Vision) hypothecates the existence of three sets of nerves in the retina : one is strongly stimulated by the red — orange end of the spectrum and less by the rest, an¬

other most strongly by the yellow— green region and less by the ends and the third by the

violet— blue end and rapidly less as we

approach the red end. It is then assumed that when all three sets of nerves are acted on in about the same degree the sensation of white is produced because it is a fact that red plus

green plus blue does produce white. Consider now the superposition of yellow and blue lights ; according to the theory yellow stimu¬ lates red and green because red plus green equals yellow. Therefore yellow plus blue equals red plus green plus blue equals white. This does not tell why yellow and blue cause white but it enables us to predict it without experiment. If however it can be shown di¬ rectly or indirectly that the eye really does con¬ tain such nerves the Young-Helmholtz theory at once enters the realm of fact. It may be in¬ teresting to note that the whitening of linen and

cotton fabrics by bluing in the laundry consists in adding hardly perceptible traces of indigo or Prussian blue to the ivory yellow tint to which they revert after being washed ; it is essentially not a bleaching process.

Maxwell's color wheel affords a simple and interesting method of experimenting with ad¬ ditive combinations. It owes its present form and use to J. C. Maxwell although it was known to the astronomer Ptolemy in the 2d century and was rediscovered by the Dutch physicist Musshenbroek in the 18th. A smooth, stiff pasteboard disc graduated at its circum¬ ference into 25, 50 or 100 parts is mounted on the shaft of a small electric motor which can be operated by a single dry-cell. A circular piece of paper painted, for instance, half ver¬ milion and half emerald green is placed over the shaft against the disc and a small wooden sleeve is then forced on so that paper and disc may turn with the axle when the motor runs. When the painted disc turns red and green are presented alternately to the eye and if the alternation is so rapid that one color occupies the place of the other before the retinal im¬ pression of the latter has vanished then both stimuli act at the same time. The resultant color will be yellowish : not pure yellow, be¬ cause the pigments are not monochromatic. Maxwell introduced single-colored discs, each

one perforated at the centre and slit along a radius ; two or more such discs can be slipped over one another and adjusted to expose to view sectors of any desired angle. They may be cut out of the Bradley colored coated-papers ;

a complete set will consist of the following col¬ ors: red, orange, yellow, green, blue, violet, black, white and neutral gray and should be made in two sizes, one about twice the diam¬ eter of the other. Dividers, into one leg of which a needle sharpened to a chisel edge is set, form a convenient instrument for cutting circles. If the motor is small the discs should not be much more than two inches in diameter, otherwise air resistance will retard the rota¬ tion enough to produce flicker. This resistance varies as the fourth or fifth power of the di¬ ameter depending upon whether the speed is low or high, and is therefore 16 to 32 times as much for a four-inch disc as for one half the size. The discs must be put together so that the radial edges do not catch the wind.

Very instructive experiments may be made by putting together a colored disc with a black, a white or a gray one. The brightness or luminosity of a color may be diminished by ro¬ tating black with it ; this produces a shade such as would be seen in lessened illumination but does not reduce the hue or the saturation. The saturation may be lowered by using a white disc ; the resulting colors are tints. But if a neutral gray and a colored disc of equal lumi¬ nosities are rotated simultaneously the satura¬ tion will be lowered without change of hue or brightness. In short, black absorbs all

colors and therefore changes only the amount of light reflected from the composite disc; white re¬ flects all and, in effect, adds the physiological primaries to the disc; gray may be regarded as a mixture of black and white (or also, as will be seen presently, of other pairs) and is thus more luminous than black and more saturated than white. Ogden Rood succeeded in match¬ ing almost 500 colors with combinations formed of seven discs painted with the following water- color pigments, the numbers in parentheses being the wave lengths, in microns, of the cor¬ responding spectral hues : matt white (zinc oxide), matt black (lampblack), vermilion (0.644), mineral orange (0.614), light chrome yellow (0.585), emerald green (0.521), artificial ultramarine (0 425).. His formulas are given in the (Standard Dictionary) under spectrum. The wave lengths of the Bradley papers are: red, 0.657; orange, 0.608; yellow, 0.579; green,

0.516; blu-e, 0.469; violet, 0.421. Consult also Bradley, Milton, (Elementary Color > (1895).

Some pairs of discs produce gray which must be regarded as a shade of white, or so to say, as a dark white, due to the comparatively low luminosity of the pigments ; the correspond¬ ing spectral hues, being monochromatic and of greater brightness, produce real white. Two colors whose addition produces white are called physiological complementaries ; their number is unlimited. Physiological complements depend of course upon the source of illumination, for if the subdued white which they produce in daylight be examined in some other illuminant it will partake of its color. Additive combina¬ tions in general tend toward white ; if actual lights are superposed the luminosity of the re¬ sultant equals the sum of the luminosities of the components, but on the color wheel the result¬ ant has a luminosity equal to the average (weighted mean) brightness of the sectors. When the eye is stimulated to fatigue by any hue, say red, its complement is subjectively called up because the eye then sees all the constituents of white except red. Now since red and green make white, and all the spectral hues together also make white, white minus red equals green ; that is, green is complement¬ ary to red.

ADDITIVE COMPLEMENTARY HUES

*Wave lengths, fji Colors **

0.6562

0.4921

Yellow,

Genuine ultramarine.

.6077

.4897

Green-yellow , Artificial ultramarine

.5853

.4854

Gamboge,

Cobalt blue.

.5739

.4821

Red,

Green-blue.

.5671

.4645

Orange,

Cyan blue.

.5644

.4618

Green,

Purple.

.5636

.4330

effect, for instance in textile fabrics and pottery. Unusually handsome charts illustrating pigment mixtures have been prepared by commercial firms of Boston and New York.

Contrast and Harmony. — The effect which two colors have in modifying each other's hue when they are placed in juxtaposition has been determined with reasonable certainty. It can be studied by putting colored strips of paper next to each other or by placing a small piece on a larger one. The general result of such experi¬ ments is that each color becomes tinged with the complement of the other, or rather is moved

- *The names do not correspond to the wave lengths at the left.*

Subtractive Combinations. — When two pig¬ ments are mixed each subtracts from white light those elements it cannot reflect. The re¬ sultant hue is therefore never identical with the corresponding additive mixture and is usually entirely different. It was known to antiquity that any color may be fairly matched in hue although not in purity by proper mixtures of yellow, blue, red. These are the pigment pri¬ maries ; to them white and black must be added to lighten or darken the hues to be produced. The

production of all colors by combinations of the subtractive primaries is beautifully illus¬ trated in the three-color process of printing in ink reasonably faithfully copies of paintings (see illustrations accompanying the article, Process). A mixture of yellow, blue and red in about equal intensities gives the effect of black because they absorb practically all the constituents of white light. If this black is spread thinly as a tint it becomes gray. In gen¬ eral, mixtures of pigments tend toward black¬ ness on account of the absorption of color and thus of light.

Pigment primaries have complementaries ; thus red and green, purple and yellow, blue and orange are complements and produce black or gray according to the density of the mixture. This gray is to be regarded as a tint of black, that of additive complements as a shade of white ; the difference between the grays is of the utmost importance and is by no means a verbal quibble. A small amount of a color added to its complement dulls or grays the lat¬ ter; such grayed hues are among our most beautiful colors and are used with wonderful

Rood's Color Circle

nearer the complement. The diagram above was invented by Rood for predicting these changes. Diametrically opposite colors are physiologically complementary. If yellow and red are placed side by side the hue of each shifts around the circle toward the complement of the other, i.e., yellow becomes greenish, red becomes more violet or less red. In the case of red and blue, the red becomes tinged with orange and the blue looks greenish. Complements intensify each other. Whether or not these effects are agreeable depends on idiosyncracy and circum¬ stance. Red makes yellow look greenish ; this may be pleasant or not — or neither — in, say, a wailpaper design. But a sallow-complexioned woman does not wear a red dress unless she wants to look bilious; green clothing would make her look ruddier unless some of the green were reflected to her face, in which case red would have been better. The question is not quite as simple as Rood's circle, for the in¬ fluence of the complement is not evident when two equal areas are separated by any third color; furthermore, a small area has no notice¬ able effect on a much larger one. Chevreul, Rood, Church, Bruecke and others have found from examinations of paintings, ornaments, etc., of generally accepted beauty that the following pairs and triads are considered to be harmoni¬ ous and pleasing.

Good pairs: red, blue; red, blue — green; orange, green — blue ; yellow, violet ; yellow, black.

Good triads : red, yellow, blue ; red, yellow, green — blue ; orange, green, violet ; white, yel¬ low, violet.

The following are to be regarded as bad :

Bad pairs: green, blue; yellow, green; violet, red ; violet, blue ; crimson, orange ; orange, yellow.

It will be seen on comparing these combina¬ tions with the diagram that colors which do not go well together, e.g., green and blue, are adjacent in the circle while good pairs and triads, e.g., red, yellow, green, are separated. Tints, shades and grays, being less colorful or vivid, form less offensive combinations and are easier to harmonize. By generalizing the fore¬ going results we arrive at some of the various methods of harmonizing colors ; they show rather how to avoid discord than to produce beauty.

Harmony by Contrast: use of complements in pure hues, tints, shades or grays. An ex¬ ample of this is the use of red (figure, chimney, etc.), in a green landscape.

Monochromatic Harmony: tints, shades and grays of a single hue as in the different greens of a landscape. This includes harmony by variation or gradation. Ruskin in (Elements of Drawing, says (*

Harmony of Analogous Colors: tints, shades or grays of components which are side by side or close together in the color circle, for instance in autumn leaves which contain various tones of yellow, orange, red, brown and intermediate colors. The effect is usually not pleasing when the normal hues are employed yet the beauty of green trees, blue sky and blue-green water fur¬ nishes a striking exception to the rule.

*Chevreul, director of the Gobelins tapestry works, published in 1839 a great many rules or laws of harmony which are merely detailed developments of those above. Unfortunately all such results as these are debatable, for the question of a good or bad combination depends on the individual's training and susceptibility; if he has been taught either explicitly or by his environment that this or that is bad he is likely to believe it. Association also is not without influence ; ((loud® clothes are considered in¬ compatible with dignity and gaudy wallpaper is regarded as ((cheap,® Southern or Oriental. In consequence of this we have the strange fact that brightly colored things more often than not cost less than those more delicately colored although so far as color and design are con¬ cerned the difference in cost of production is negligible. If the prices of, say, wallpapers were reversed — the cheaper being made the more costly — it is safe to predict that a notice¬ able reversal of taste would take place. Other important factors which determine the beauty of a color scheme are texture of surface, quan¬ tity, composition and design ; thus silks, on ac¬ count of their lustre, may be handsomer than cottons, but the same hues in crayon, because of their lack of shine, may be better than in oils. Moreover, the difficulty with rules of taste is that they tend to create and thus to trammel it. Many interesting illustrations of actual color schemes are shown in Vanderpoel, cColor Problems.**

Strong contrast in colored signs and signals is not as closely related to legibility as might be expected. Observations on advertisements led to the following results which are arranged

in the order of decreasing legibility; it is pos¬ sible that they are influenced somewhat by personal equation (Scientific American Sup. 2 Feb. 1913) : Black on yellow, green on white, red on white, blue on white, white on blue, black on white, yellow on black, white on red, white on green, white on black, red on yel¬ low, green on red, red on green. (See Paint¬ ing; Pigment). Consult, besides the references given above, Jorgensen, (The Mastery of Color) (2 vols., with 22 colored plates, showing about 1,000 colors, Milwaukee 1906) ; Luckiesh, (The Language of Color (New York 1918) ; Ridg- way, (Color Standards and Color Nomenclature) (with 53 colored plates and 1,115 named colors, Washington, D. C., 1912).*

R. F. Deimel,

Assistant Professor of Mechanics, Stevens In¬ stitute of Technology, Hoboken, N. J.

COLOR IN ANIMALS. See Coloration Protective.

COLOR-BLINDNESS, Achro matro psia, popularly known as Daltonism, a singular affection, producing an inability to distin¬ guish one color from another, and in certain rare cases to discern color at all, the eye per¬ ceiving only light and shade, or black and white. Although recognized for centuries, its modern study dates from the time when the famous English chemist, Dr. Dalton, brought it into notice by publishing in 1794 an account of his own case as marked by this peculiarity. More recently, Dr. George Wilson of Edin¬ burgh also examined minutely into this phe¬ nomenon, and collected many striking instances. From the result of these investigations it would appear that color-blindness is much more com¬ mon among men than among women, and that of the former 1 in 20 is unable to discern the nicer shades of color, and 1 in 50 to dis¬ tinguish certain primary colors from one an¬ other. The colors most liable to be confounded are red and brown with green, purple and green with blue, red with black, light hues of all sorts with white, and dark shades with black. Color-blindness may be either con¬ genital or acquired. The latter is believed to be an affection of the optic nerve and retina, may result from disease or accident and may be caused by the excessive use of tobacco, alcohol or other drugs. It sometimes happens that persons having contracted color-blindness may be able to distinguish colors accurately when they are near at hand, while they are not able to do so when they are at a distance. Con¬ genital color-blindness is frequently hereditary and generally exists in both eyes. Sometimes it exists only in a slight degree, at others it is found in a marked degree, while- in others it is complete; generally, however, it is only partial; that is, the person affected fails to distinguish properly one or two of the funda¬ mental colors, red, green and blue. Based on these known facts and on extended investiga¬ tions and experiments, several theories have been advanced to account for and explain color¬ blindness. One of these, the Hering theory, maintains that the retina contains three pairs, of visual materials, namely, white-black; red- green and blue-yellow. According to this theory color-blindness results from one or more of these materials. The Young-Helmholtz theory, on the other hand, maintains that there exist in ev.ery . normal person- . three primary

perceptions, red, green and violet, in the ab¬ sence of any one of which the sense of color is defective; and the resulting missing color seems to be

composed from the others. This theory is based partially on the fact that the most common forms of color-blindness are green, red and red-green blindness. Various tests have been arranged for the detection of color-blind¬ ness, the best of which are those devised by Professor Holmgren of Upsala, Sweden. They consist of skeins of wool of certain ((test colors, including various tints and shades of the same colors. These the person under ex¬ amination is required to match.

Very stringent laws have been passed in most modern civilized countries to prevent color-blind people from occupying positions where their defective vision might endanger the lives of others. Sweden was one of the first countries to make laws for the protection of the traveling public against the danger aris¬ ing from the employment of people affected with color-blindness in the railway service. As early as 1877 a law was passed in Sweden re¬ quiring that only people of normal vision for color should be employed in the railway service of the country. In the United States, Great Britain (and all her colonies), Germany, France, Italy and Austria provisions of some kind have been made to protect the traveling public from the danger of color-blind em¬ ployees in the service of the railways. Consult Holmgren, (De la cecite des couleurs) (1877) ; Thompson and Weiland, (Detection of Color- blindness) (in (System of Diseases of the Eye,J Vol. II, by Norris and Oliver, Philadelphia 1897) ; Posey and Spiller, (The Eye and the Nervous System (Philadelphia 1906) ; Eldridge- Green, (Color-blindness) (1911); Parsons, J. H., Untroduction to the Study of Color Vision>*

(1915).

*COLOR PHOTOGRAPHY. From the earliest days of photography efforts have been made to reproduce pictures in the colors of nature, wrholly through the aid of sensitized plates and the camera. It was found as long ago as 1801 by Ritter, of Jena, that the vari¬ ous rays of the spectrum differed considerably in their action on silver chloride, and in 1810 Seebeck, also of Jena, obtained a reproduction of the spectrum, in some approach to natural colors, on paper coated with silver chloride. These images could not, however, be fixed. In 1891 Lippmann laid the foundation of the process known by his name, which is based on the theory of Zenker and work of Wiener, with due acknowledgment to both. This is distinguished as an "interference** process, the effect being produced by decomposition of the light.*

The apparatus employed for the production of the picture is very simple, differing but little from that used for ordinary photography. Any transparent sensitive film answers as the photo¬ graphic surface. This film is exposed in an ordinary camera, having the plate backed by a layer of mercury as a mirror. A slide is so arranged that mercury can be allowed to

flow into a space back of the plate after the plate has been placed in the slide. After exposure, the mercury is allowed to flow out and the plate is then developed in the usual way.

The materials on the finished plate are the

same as those on an ordinary negative, but a difference exists in the structure of the deposit, by which it is enabled to decompose the light by which it is illuminated and reflect those por¬ tions of it which correspond to the natural colors of the object from which the picture was taken.

The reason for the formation of this struc¬ ture as formulated by Lippman is that the light waves, as they pass through a plate as ordi¬ narily arranged, impress the plate more or less strongly, and thus leave a design of different intensities of the image, but in this rapid pas¬ sage they leave no record of their own forms. Each ray of light of a certain color has a cer¬ tain structure ; it is made up of waves which have a certain wave-length. If there be a mir¬ ror behind the plate, the light, says Lippman, is reflected back on itself; the light rushes in and rushes out again with the same velocity ; the entering and issuing rays interfere, and the effect of the interference is that vibration takes place; but the effects of propagation aiˆe stopped, and instead of having propagated waves we get stationary waves ; that is, the waves now rise and fall, each in its own place ; they pause, therefore, in the interior of the film and impress their form upon it.

On looking through a film obtained by the Lippman method it appears like an ordinary negative ; its color effect is obtained only when viewed by reflected light, different portions of the plate reflecting different colors according to the light-waves by which it had been impressed. In order that the interference colors may be seen so that they are true to nature, the plate must be viewed by vertical incidence, which is inconvenient. They may be projected by an arrangement devised for the purpose.

In 1861 Professor Maxwell showed at a lecture at the Royal Institution that by taking photographs of a colored ribbon through three solutions colored to represent the primary col¬ ors, and then projecting these photographs so that their images were superposed, a colored image of the ribbon was given, which was faulty, however, from lack of photographic ma¬ terials more sensitive to the less refrangible rays. In 1873 Professor Vogel announced that dyes would influence the distribution of color¬ sensitiveness in plates.

On these facts are based the process of Ives, brought out in 1892. In his process three negatives are obtained through color-filters; from these positive transparencies are made (in monotone), which are placed in a special view¬ ing instrument, each in combination with its properly

adjusted color-screen; these being then combined, the images are seen in the original colors of nature.

For a proper understanding of the method developed by F. E. Ives, see Color Printing.

The next development in this method was the introduction of the process worked out by Professor Joly in 1894. This differs consider¬ ably from the Ives method in the manner of working, but in principle it is very similar. Only one negative, instead of three, is required, but this is taken through a transparent lined screen, ruled very finely and closely with parallel al¬ ternate lines of orange, yellowish-green and blue. After development a positive transparency is made from the negative, which, when mounted accurately and in close contact with a viewing-

screen similarly ruled with parallel lines of red, green and violet, the image is seen in its original colors. These mounted positives are usually viewed as lantern-slides, but arc some¬ what marred by the obtrusiveness of the lines when seen too closely.

To go back to the underlying principle of the three-color process — the "filtering® out of certain rays in taking the different plates — it is Understood that the primary colors from which white light is formed are now set down as a particular shade of red, a particular green and a particular blue-violet. The primary pig¬ mentary colors, it may be added, are red, yel¬ low and blue, as has always been taught. If we obtain three negatives from an object, each taken through a color-filter or screen adjusted for the red, the green and the blue-violet respectively, these plates will present negative images of the object in the negative values of the colors named. When from each of these negatives there is produced a positive in the complementary color, and these positives are placed in accurate registration, there results a reproduction of the original object in the col¬ ors of nature. The ordinary photographic plate is not sensitive to all the rays. If the addition of certain colored substances, chiefly aniline compounds, be made to the emulsion, these apparently combine with the haloid sil¬ ver salt to form an organic compound of silver which is sensitive to the light reflected from various colors according to the particular dye employed ; and in this way it is possible to obtain a plate which will be sensitive to the light reflected from all the colors of the spec¬ trum, though for convenience in working the extreme red is generally excluded, or otherwise the plate could be made and handled only in complete darkness.

In the working of the three-color process the negatives are taken through

color-screens of red, green and blue-violet, adjusted for use with a spectrum plate. By means of a re¬ peating back, used in connection with a frame containing the screens, these may all be taken upon one plate ; that is, when the size of the picture required is small, such as is suitable for a lantern-slide. The length of exposure varies with each of the screens, an ordinary ratio being, say, 55, 13, 4 for the red, green and blue- violet respectively; but on account of unavoid¬ able variations in different batches of emulsion, largely due to the difficulty in obtaining gela¬ tin of uniform quality, these ratio exposures are liable to differ, but can be readjusted with¬ out great difficulty by making a trial exposure upon some subject with well-marked high lights and half-tones, such as a crumpled piece of white blotting-paper, which should appear equal in all three negatives. The length of the ex¬ posure through the red screen may be gauged by a fraction tint actinometer, by timing to a certain tint; from the time thus obtained the remaining two exposures can then be calculated from the ratio numbers.

There is a special form of camera in which the exposure for the three negatives can be made simultaneously by means of mirrors. The plate must be developed either in darkness or by a special "safe® light supplied for use with such a plate, and a developer of the rapid type should be used, yielding a soft negative of good gradation without stain, Correctness of

exposure is essential, forced levelopment being almost certain to result in failure. Intensifica¬ tion and reduction can be effected only at great risk of interfering with the gradation of the image, and should never be resorted to un¬ less it is impossible to make another exposure. The best intensifying reagent is said to be mercuric iodide with sodium sulphite.

The next step is the production from the negatives of the three positives. From the negative obtained through the red color-filter, there is produced a greenish-blue positive. This, in the Sanger-Shepherd process, is done by first making a lantern-slide positive in the ordinary way by contact, taking care to secure one of good quality and well representing all the detail and gradation in the negative clear and free from fog, for the density and detail of the finished slide will largely depend upon the blue positive. This, after fixing and wash¬ ing, is treated with a solution of potassium ferri-cyanide, again well washed, then im¬ mersed in a solution of ferric salt, rinsed, and replaced in the fixing solution, and finally again washed to free from hyposulphite. The effect of this is to convert the deposit of silver into one of Prussian blue. When dry, this plate should be varnished, preferably with a solution of celluloid.

The remaining two positives, the pink and the yellow, are produced by modifications of the carbon process. A celluloid film coated with an emulsion of silver bromide in soft and soluble gelatin is employed. This is sensitized by immersion in a solution of potassium or ammonium bichromate, and, when dry, printed in contact with the two other negatives, care being taken to place the celluloid side next the film side of the negative. The necessary ex¬ posure varies from 1 to 10 minutes, according to the light, and should be gauged by means of the fraction tint actinometer. The silver bromide takes no part in the formation of the image, its functions being to afford some guide in the exposure and development by giving a faintly visible image, and to assist in the more rapid disintegration of the gelatin in the warm water used for the development. The water used should be of a temperature of from 90° to 100° F., as in the carbon process, and when all the soluble portions which have not been acted upon by light are removed, the silver bromide is dissolved out by a solution of hyposulphite, leaving the almost invisible pho¬ tographic image in relief in clear gelatin. The positive thus obtained from the negative taken through the green filter is then immersed in a dye-bath of a pinkish-red color, and that from the negative taken from the blue-violet filter in one of a yellow color, and they are stained to the required depth, comparing the result, by holding in approximate position oc¬ casionally with the blue positive, without touch¬ ing each other. It is usually better to over¬ stain these positives and then wash down in water to the required depth of color.

The blue positive may be obtained in similar manner upon a thin celluloid support, using a weak solution of methylene blue as the stain, and this method is preferred by some workers. The advantage, however, rests with the prus- siate process, in that a positive is produced of maximum sharpness, being printed in actual contact, without the necessity for the inter-

position of the celluloid, this being more es¬ sential in the case of the blue print, which forms the foundation of the finish slide, for however slight the diffusion may be, it must necessarily be more apparent if it exists in each of the three monochromes.

In the method of working recommended by Messrs. Lumiere the three stained positives are produced upon a mica support. The mica has the great advantage of rigidity, but the still greater disadvantage of frequently failing to retain the gelatin film, which will sometimes float off, even in the bichromate sensitizing solution.

But all these methods have proved com¬ mercially useful only as assisting the production of tricolor printing plates. For producing actual color photographs to be handled in the ordinary way, they have been commercial failures.

It has remained for Frederick E. Ives to perfect and market a satisfactory photograph in natural colors, produced wholly by mechani¬ cal means. He first obtained three impressions of a picture on glass, in such manner that when superimposed and backed by a light they gave the effect of a single picture in colors and could be thrown on a screen with a lantern. It will be understood that one of the three im¬ pressions of this composite picture represented the yellow, one the red and one the blue rays. Having demonstrated the practicability of thus rendering the triplate visual, Mr. Ives next set himself the task of producing the three color plates in the camera at one exposure. This was the supreme task, the successful accomplishment of which crowns him as the perfecter of the art of color photography. Three plates must be arranged in one camera with such filters and light effects that one plate should reject the red and blue rays, gathering the yellow only; one plate reject the yellow and blue, gathering only the red; and one reject the red and yellow, gathering the blue. He succeeded with what he terms the Tripack process. Three glass dry plates are set up in a special holder. The camera is provided with a thin glass plate set at 45 de¬ grees as a reflector and color filter. The blue plate is placed in the bottom of the camera and receives its light by reflection on

exposure. The other two plates are placed vertically at the back of the camera, receiving the rest of the light, re¬ flected and filtered for color. One of the ver¬ tical plates has to be placed in reverse, but this proves no disadvantage. The combination is such that the desired three negative plates are obtained at the one exposure. To reproduce for use and exhibition, prints from these, three color-record negatives are made on sheets of celluloid coated with gelatine. These sheets are stained with dyes, cemented together and mounted between two sheets of glass, forming one transparent photograph of superb beauty, in natural colors, that is viewed by being held to the light. The negatives produced by the orig¬ inal exposure, if treated in a different way, may be used to make three-color plates for ordinary tricolor printing. See Color Printing; Pho¬ tography.

A method of printing silk fabrics by color photography, due to Messrs. Valette at Feret, of the Manufacture Nationale des Gobelins, France, presents results which appear to be interesting in the sense that the process makes

possible the production on silk fabrics of dec orative effects the perfection of which does not seem to have been hitherto attained by printing. The method is of course borrowed from color photography, and consists in making three suc¬ cessive impressions — blue, yellow and red — from three selected photographic, prepared plates. The fabric is rendered sensitive by the aid of mixtures of alkaline phenols and diazo sulphites, products which possess the property of giving coloring matters only through the influence of light. The precision needed in superposing the three impressions is secured by carrying out the work on a special frame, the fabric having been previously provided with metallic eyelets to avoid tearing it. The de¬ velopment of the colors is accomplished with better regularity by exposing to electric light. The method is recommended by its authors as more especially applicable in the treating of articles de luxe of the sort that cannot well be printed by machine.*

Charles H. Cochrane, Founder of New York Master Printers' Asso¬ ciation.

COLOR IN PLANTS. The prevailing

color of vegetation is green, owing to the presence of chlorophyll in all external tissues not turned to wood or bark. This is a green substance produced in and necessary to all the growing parts of plants exposed to sunlight; but the flowers and fruits of many families as well as the whole form of seaweeds, lichens and fungi, often exhibit brilliant hues ; and some lowly groups, as the molds, etc., are white, or nearly so, because they do not contain chlorophyll. Chlorophyll is green because, as the spectroscope shows, it absorbs the red and blue rays in the sunlight, and leaves only the remainder of the visible rays of the spectrum to come to our eyes, and

these, in combination, affect us with a sense of green. The red and blue rays stopped by the chlorophyll are the ones useful to the plant, for it is only their vibrations that are able to break up the car¬ bon dioxide breathed in by the plant-leaves, and to separate its constituents into sustenance (carbon) and waste (oxygen). Chlorophyll, then, is not a true pigment, although it produces the most universal color in nature.

Many, leaves and other surfaces of plants do contain, however, a true, reddish pigment, sometimes so abundantly as to redden a whole part or even an entire plant, as is seen in sea¬ weeds. The excessive development of the prop¬ erty by artificial cultivation gives the gardener such gay vegetables as red cabbage, the gaudy foliage-plants, and such shrubs or trees as the copper-beech. This red pigment is erythrophyll (or anthocyan) , and when dissolved out in hot water it shows a beautiful rose tint. It appears strongly in leaf-buds as they begin to shoot forth in spring, and in the earliest of the growing twigs that in March give a ruddy tone to thickets in advance of the leafing. Several explanations of its supposed usefulness to the plant have been offered, while others treat it as merely a chemical incident of no par¬ ticular utility.

The same sort of red reappears in the rich colors that beautify our woods in autumn, when there also becomes strongly manifest in the "turning® leaves another coloring-matter, the

bright yellow pigment, anthophyll, which is al¬ ways present in plants, but in very minute quantity. These reds and yellows show them¬ selves plainly in the fall because stimulated by chemical reactions as the chlorophyll disappears with the slow decay of the leaf; and their presence seems to have little if any utility in the economy of the plant.

Turning now to the variegated and often vivid coloring of flowers and fruits, we enter the domain of the relation between plants and insects. The blossoms of primaeval vegetation seem to have been virtually colorless, and this condition persists in those, like the grasses, etc., which are fertilized by means of the wind. Night-blooming flowers, and those growing in shaded places, are usually white — the most conspicuous hue in a dusky light. Most flowers, however, are now more or less brilliant in color, and there is evidence that this is a characteristic that has been gradually acquired, along with other characteristics, the effect of which is to increase the likelihood of the flowers being visited by insects, and thus obtaining an ex¬ change of pollen with other plants of the same kind. Colored flowers become conspicuous amid green leaves, and, aided by odor, serve as signs

of the presence of the sweet food (nectar) that insects seek and must have. Many simply con¬ structed blossoms have only a uniform tint, as the plain yellow of the evening primrose; but more, probably, have a complicated structure and are varicolored, especially in a striped way on the inside of the corolla. It is found that in these cases the lines of color lead straight to the nectary and thus indicate the pathway for the insect to follow. The benefit to the plant is, of course, that by following that route the insect is sure to deliver any pollen it may have brought, and will be dusted with more for de¬ livery to the next blossom visited.

Ernest Ingersoll.

COLOR PRINTING, the art of repro¬ ducing pictures, designs, letterpress, etc., by any of the processes of printing, in two or more colors. It may be divided into — (1) primitive color printing, as Japanese brushwork from color blocks; (2) chromolithograph^ printing, in which colors are superimposed by litho¬ graphic processes (see Lithography) ; (3) off¬ set printing in colors (see Printing) ; M) typo¬ graphic color printing, done from type or relief plates, by typographic mechanisms. As a sub¬ division of typographic color printing, the tri¬ color process of reproducing in natural colors by photo-engraving forms practically an art by itself.

Japanese Color Printing. — The modern survival of primitive color printing is found in the brushwork from color blocks produced bv the Japanese and Chinese. These are sold for a small price in the shops of Eastern cities. They represent the combined work of an artist, engraver and printer. The artist makes a brush drawing on paper of local manufacture pro¬ duced from rice or bark fibres, laying on the color in masses. The engraver pastes this color drawing on a printing block, usually made of wild cherry (Yamazakura) wood. With chisels and gouges rudely resembling the tools of the Western wood engraver, he cuts the main out¬ line of the design on the wood, thus making this the key-block of the resultant picture. In cutting the block into relief he destroys the

drawing, but the body tints show on the wood, to guide him in engraving blocks for the other colors. A proof of this first key-block is taken on paper, and transferred to another block, on which the red portions of the picture are re¬ produced. A blue and a yellow, and perhaps other color blocks, are produced in the same way. Register or correct superposition is secured by cutting an L nick in one corner of the proof of the key-block, and of all reproduc¬ tions, so that they can be laid in similar posi¬ tion on all the blocks of a series. To prevent the blocks from warping, dovetailing is em¬ ployed. The printer takes the set of color

blocks, and with dampened bark paper proceeds to printing one color at a time, inking the block with a brush, dexterously laying on the sheet with the

L nick to secure accurate position or register, and impressing the sheet on the block by rubbing, in a manner somewhat similar to the taking of a burnished proof by a modern engraver. The rubber is a ball of hemp thread. Ground vegetable and mineral substances are used for color pigments. When all the colors are on, a wash of rice paste is sometimes added to give a brilliant effect. By such primitive methods the Japanese printer can produce about 100 to 125 impressions per hour. If the pictures are in four colors, he can thus print 25 to 30 complete copies per hour.

Two-Color Printing. — This is accomplished typographically, either by two separate print¬ ings, as in black and red ink; or by the use of a two-color press, on which the sheet is fed first to a form inked with one color, and then to a second form inked with another color. Thus the two colors are produced at one operation though not simultaneously. Booklets and cir¬ culars, and sometimes sections of magazines are now commonly printed in two colors ren¬ dering them more attractive. Duographs, or half-tones in two colors, are produced by this method.

Three-Color (or Tricolor) Printing. — As

early as 1704, it was known that the three primary colors, yellow, red and blue, could be printed so as to produce theoretically all color combinations. Jacques Christophe le Blon, born in Frankfort in 1670, made beautiful three-color prints, which he styled mezzotints, and which sold for the equivalent of $125 to $165 each. In 1722 he published a book titled (I1 Colorito, which demonstrated that he had a conception of the color theory. He kept his process a secret, but took it to London, where a company was formed that exploited it with considerable profit. The first American three-color printing by the modern half-tone process, from a relief block, was the work of William Kurtz, and appeared as a frontispiece in the Engraver and Printer, of Boston, in 1893. The modern tricolor process from half-tone plates mechanically made is the joint product of the photo-engraver and printer. The photo-engraver makes three plates of the one subject, using color-screens to shut out the other colors from each plate. These three plates, printed one in yellow, one in red and one in blue, superposed, on a typo¬ graphic press, constitute the three-color pictures produced by commercial printers. The story of the development of this modern process is best told in the words of the following paragraphs by Frederick E. Ives, the most conspicuous and prolific inventor in this field.*

COLOR PRINTING

Description of the Three-Color Process. —

The C(three-color process® and the <(tri-chro- matic process,® are the names given to an in¬ direct process of color photography and color printing which has been successfully developed in various applications. The first modern sug¬ gestion of such a process was made by Prof. James Clerk-Maxwell, in 1861 or before, and the principle was reinvented and elaborated by Louis Ducos Duhauron and Charles Cros in 1869, but the results obtained experimentally were unpromising, and owing probably to this fact and also to the existence of a general preju¬ dice against the idea of color photography by any but a "direct® process, the subject received but little further attention until F. E. Ives, in 1888, stated a new and definite principle of photographic color selection, and gave a suc¬ cessful public demonstration at the Franklin Institute, in Philadelphia. This was followed by a great revival of interest and active experi¬ ment, and the commercial development of the

process in various applications. The first step in this process is the production of three pho¬ tographic negatives which constitute a record of the color values in terms of spectrum red, green and blue-violet lights, these being the only spectrum colors which will by admixture in various proportions reproduce all other colors without material degradation of purity. Such sets of negatives are made by exposing color- sensitive photographic plates in the camera through selective <(color screens.® Formerly a special red sensitive plate was exposed through a red or orange screen, a green sensitive plate through a green screen and an ordinary plate through a blue or violet screen. Following Ives, most authorities now recommend the use of only one kind of plate, sensitive to all colors, in order to ensure uniformity of gradation and density in the three images with simultaneous development. The equalization of the ex¬ posures, also an important element of success, is best accomplished by the use of special cameras, which form the three images simul¬ taneously, from one point of view. Several such cameras designed by Ives make the three images, identical in size and perspective, side by side upon one plate, at one exposure, thus making the negative process as simple as it is in monochrome photography.

From the photographic negatives thus ob¬ tained, which record the colors only by# differ¬ ences of density and gradation in the separate images, colored pictures can be made by two synthesis methods, one (

made from the three negative images, and super¬ posed in white light, or upon a white surface. It is an interesting fact that the colors used in

printing are not the red, green and blue-violet photographing colors, but their complementary colors, a peacock blue, a crimson pink and yel¬ low, commonly but incorrectly called (

The negative made through a red screen must print a positive, uncolored in its high lights and peacock-blue in its shades. The negative made through a green screen must print a posi¬ tive, uncolored in its high lights and crimson- pink in its shades. The negative made through a blue screen must print a positive, uncolored in its high lights and yellow in its shades. It is also important that these colors be perfectly transparent. When these prints are superposed, equal parts of all three colors form blacks and grays, and the pure colors, red, green and blue- violet, appear where yellow is superposed on crimson-pink, peacock-blue on yellow and crim¬ son-pink on peacock-blue. Unlike the method of positive synthesis, no method of negative syn¬ thesis fulfils all theoretical requirements in ordi¬ nary white light, and if the process is employed to reproduce as difficult a test as the spectrum itself, it must fail to do full justice either to gradation of hues and luminosity values or else to purity of color. The degradation of purity of color resulting when the analysis perfectly differentiates all hue and luminosity values, as in the original method of Ives, is not so consider¬ able as to appear objectionable when perfectly transparent and correct printing colors are em¬ ployed ; on the other hand colors showing diffuse absorption in the spectrum are often pretty cor¬ rectly reproduced with an analysis in the neg¬ ative process which, while favoring brilliancy of color in the reproduction, would fail to secure a passable representation of the spectrum. Con¬ sequently, authorities, having different opinions as to what qualities are most desirable in a re¬ production, must and do disagree as to what is the best principle of color selection for neg¬ ative synthesis.

This difference of opinion is particularly justifiable in connection with the half-tone tri¬ chromatic process, thus far the most important commercial development of three-color photog¬ raphy, because the subjects most often repro¬ duced have colors showing diffuse absorption in the spectrum, and the best reasonably perma¬ nent printing inks thus far obtainable are neither correct in hue nor of sufficient purity and trans¬ parency to fulfil their theoretical functions.

The first half-tone trichromatic process prints were made by Ives in 1881. but the process was not developed commercially until reinvented and patented by Albert, Duhauron and Kurtz, more than 10 years after. In this process, half¬ tone blocks are made from the three negatives, and printed in the type press, with the peacock- blue, crimson-pink and yellow inks. In order to prevent the production of an offensive moire pattern, the lines of the half-tone blocks are dis¬ posed at different and suitable angles for the dif¬ ferent colors. Owing to the complications of the process, and the

theoretical imperfections of materials and means necessarily employed in its commercial operation, the printing plates are

more or less re-etched in parts until proofs show the desired result, but with so little work and cost altogether that the process is competing suc¬ cessfully with chromolithography for many pur¬ poses, and may eventually supersede it, as half¬ tone engraving has already superseded wood engraving.

Four-Color (or Quadricolor) Printing. —

Since some color values are lost in three-color reproduction by photography, it has been cus¬ tomary with many to produce a fourth plate, called a key-plate, in which the main design is emphasized. This key-plate is printed either in gray or photo-brown ink, and is usually printed the last of the series. Otherwise the process is similar to tricolor printing.

Presswork in Colors. — There is a great dearth of literature on this branch of color printing. Experience has demonstrated that ordinary printers handling black work do not secure satisfactory results when handling the printing of three and four-color plates, hence this work is done mainly in printeries devoted wholly to color work, developing into a separate branch of the printing art. One of the great difficulties of the color printer arises from the uncertainties of the paper surface on which he prints. Rough paper will not yield good results, and to secure the smoothest surface highly coated papers have come into use for color printing. If the coating is a little too heavy or too brittle, it tends to flake off, and minute specks are pulled off the paper in printing, mix¬ ing with the ink, clogging the inking rollers, and producing no end of annoyance. The great variations in humidity in American atmospheres invite stretching and shrinking of paper, and when a sheet either stretches or shrinks between the times of printing any of the colors, of course the colors will not strike exactly as they should, and exact superposition of tints becomes impossible. To avoid danger of shrinkage it is common to print the most particular color work in sheets or forms of small size; but in the ef¬ fort to keep down the cost of printing large forms are desired, hence a good deal of three and four-color printing has been done on large sheets with more or less uncertainties of regis¬ ter. By improved methods of heating and producing uniform high heat in the pressroom these irregularities have been reduced. The modern color printer seeks to avoid loss from shrinkage by maintaining a high and uniform heat in the pressroom — 75 to 80 degrees, and by keeping the piles of paper protected from dampness by coverings. It is found best to print the colors in this

order: yellow, red, blue and lastly the key-plate. In making ready for the yellow plate, a flat printing was at first employed, but it was learned that color values were thus lost, and the best practice now is to start the printing of the yellow in a dark ink, so that the pressman can see the design clearly, and bring up all parts of it sharply, before going ahead with the regulation yellow, which is hard to see when alone on a white sheet. The second color should not follow until the first is dry, and it is best to run the sheets through the press in the same order as on the first printing, rather than to reverse the order. See Color Photog¬ raphy; Engraving; Photography.

Charles H. Cochrane,

Founder of New York Master Printers' Asso¬ ciation.

COLORADO, kol-6-ra'do, the <(Centennial State® (admission to the Union planned for 4 July 1876, consummated 1 August), is bounded north by Wyoming and western Nebraska, south by New Mexico and western Oklahoma, east by Kansas and Nebraska, west by Utah. Capital, Denver. Area, 103,925 square miles (280 of it water). Pop. (1920) 939,629.

Topography. — 'Eastern Colorado, one-third the total area, is the westernmost portion of the great treeless plains that continue the Kansas prairies. Near the abrupt rocky faces of the mountains, they rise in low sharp-ridged foot¬ hills, called ((hog-backs,® composed of an exten¬ sive series of fresh water and marine forma¬ tions (remnants of the junction of sedimentary with primary rock). The remainder of the State belongs entirely to the Rocky Mountain system. The Front Range connects the plains with the main range of the system. The western portions fall in minor slopes toward the Pacific. Colorado contains the greatest mass of high land in the United States, if not on the continent.

The main mass of the Rockies crosses Colorado in two principal lines of elevation. The eastern, or more recent line, is composed of the Medicine Bow Range, which extends into Wyoming; the Front Range, the one first en¬ countered by the early immigrants and still crossed by the main line of transmontane travel, the Sangre de Cristo and the Culebra. The western, or main line, is composed of the Park Range from the north and the Sawatch Range, which is a continuation of the Sierra Madre of Mexico. West of these main lines lies a compli¬ cated series of broken ranges and plateaux, parallel, lateral and oblique, but with a general trend northwest and southeast. Of these the principal ones are the Roan or Book, north of the Grand River in the extreme west ; the Un- compahgre parallel to the Gunnison River on the south ; the San Miguel further south ; the San Juan to the east; and the Elk near the centre obliquely to the Sawatch (incorrectly spelled Sagauche). The Elk is a very notable range about 30 miles long, geologically inter¬ esting from the extraordinary displacement

of strata, with a number of lofty and rugged sum¬ mits ; Castle Peak, 14,259 feet ; Maroon, 14,003 feet ; Snow Mass, etc.

The best-known peaks in the State, Long's (14,271) and Pikes (14,108), noted landmarks of the immigrant trail, are in Front Range, which also contains Audubon, Arapahoe, James, Rosalie, Grays (14,341), Torreys (14,336) and Evans (14,330). The loftiest range, as a whole, is the Sawatch, a granite mass over 13,000 feet high for many miles together and from 15 to 20 miles wide. Its peaks are Harvard (14,375), Princeton (14,196), Yale (14,187), and others. After a depression of 18 miles, the range rises in the Mountain of the Holy Cross, where a deep ravine and a transverse fissure outline a gigantic cross in the snow. The highest point in the- State is Mount Massive (14,424).

The great passes are far higher than any mountain summits east of the Rockies. There are several over 10,000 feet above sea-level : Al¬ pine (13,550), Cottonwood (13,500), Argentine (13.286), Marshall (10841), Tennessee (10,418) and Fremont (11,313).

Lying between the two parallel elevations

are four great parks which are separated from each other by cross ranges. By far the largest is San Luis Park, which extends into New Mexico and has an altitude of about 7,000 feet and lies between the Sangre de Cristo and Cu- lebra ranges on the east and the Sawatch on the west and is more nearly level than the plains. It is nearly the size of Massachusetts. It is drained by the Rio Grande through the southern centre, while the mountain streams of the north flow into the San Luis Lake, the largest lake in Colorado. North of San Luis Park is South Park, between Front and Mosquito ranges, 8,000 to 12,000 feet high, and about the size of Rhode Island. Further north is Middle Park, still more elevated and somewhat larger. Lying be¬ tween Medicine Bow and Park ranges is North Park, the second in size. There are many smaller parks, the most famous of which are Monument Park and the Garden of the Gods near Colorado Springs ; in the latter <(rise towers and pinnacles consisting of the vertical strata of the white Dakota sandstone and of the red triassic sandstone below. Some of these huge masses rise vertically for 200 or 300 feet, and serve as examples of erosion of steeply up¬ turned strata of varying consistency. Lower white ridges of Jurassic gypsum or Cretaceous limestone afford strong contrast in color when compared with the red sandstone.®

River Systems. — The main Rocky Moun¬ tains must obviously be the greatest of Ameri¬ can watersheds anl chief source of river sys¬ tems,

except Minnesota ; they contain the con¬ tinental divide between the waters flowing to the Atlantic and those flowing to the Pacific. One part of it is the southern boundary of North Park, the streams of which flow north to the Platte-Missouri-Atlantic system, those south of it feed the Grand-Colorado-Pacific ; another is between Creede and Ouray, separating the headwaters of the Rio Grande from those of the Gunnison and Uncompahgre of the Colo¬ rado system. The eastern plains are divided chiefly between the two great systems of the Arkansas and the South Platte; the former occupies more than one-half their area in the State, the southern portion; the South Platte, the larger portion of the northern half ; be¬ tween them on the east is a section draining into the Republican River, an affluent of the Kansas. The South Platte rises in South Park; the Arkansas in the mountains west of it, Lead- ville lying on one of its head creeks. Except for these and the Rio Grande in San Luis Park, the mountain section is almost entirely drained by the Colorado River system; the Yampa (or Bear) and the White, in the northwest, flowing to the Green ; the Grand through the centre, with its chief affluent the Gunnison from the south ; and the Dolores in the southwest.

Of equal fame with the giant peaks and even greater beauty are the stupendous moun¬ tain canyons through which its rivers cut their way. Western Colorado forms the eastern edge of what Major Powell has called the Plateau Province ; and all the wonders and beauties of this remarkable region are found in Colorado. There are the terraced platforms, ending in rock faces dropping sheer upon other platforms hundreds of feet below, and ending in vertical gorges from 1,000 feet to a mile in depth, where the sand-laden currents with a steep fall have cut their channels through countless strata of

brilliantly variegated sedimentary rock; here are barren mesas, and cool grassy forested levels and slopes above the plane of perpetual drought where the mountains bar off the vapors ; rock headlands around curves or junctions of streams or gullies, fantastically carved in strik¬ ing likeness to the work of human architects. The canyon of the Grand, the Black Canyon of the Gunnison, the Royal Gorge, a part of the Grand Canyon of the Arkansas, are famed for their beauty and their grandeur.

Climate and Rainfall. — The dry, cool, thin air of mountainous Colorado makes its accessible eastern portions, especially the parks, widel> famed as sanatoriums for patients with asth¬ matic or pulmonary diseases. Colorado Springs, the Rocky Mountain Saratoga, is built up by Eastern invalids. The summer days are some¬ times hot, but the dry air and bare rocks cause so rapid a radiation that the nights are always cool and dewless. There is little severe winter cold, zero being rare; the frost season is short, and the snows, seldom deep, soon melt, except on the mountains.

The January mean tempera¬ ture for the leading places is about 28.5 °F. ; the July 72° to 74° F. The average rainfall is 14.8 inches, fairly even through the State, though naturally much heavier on the higher levels, varying from nearly 30 inches at Pikes Peak to 12 inches at Las Animas in the Arkansas plains. Hence, agriculture can be carried on without irrigation in many mountain regions, though better with it.

Surface, Farming, Stock Raising and Irri¬ gation. — There are about 16,000 square miles of forested land in the State, the trees being mostly conifers, with cottonwoods along the eastern streams. Of the 40,000 square miles of plain and parks, about one-third is arable, the rest being grazing-ground, to which, however, must be added many thousand square miles of grassy mountain slope. The pasturage in many parts lasts through the winter ; and the plains are covered with gorgeous wild flowers. The soil of the plains is mostly sandy loam, with some clay. Along the water-courses the soil is rich, but the rainfall is not sufficient, and irriga¬ tion is needed; but is scarcely feasible there except along a few large streams, or near the mountains. But the system of dry-farming promises to extend largely the area farmed. But there is an estimated irrigable area of 4,- 800,000 acres, or 7,500 square miles, in the State ; and in recent years an immense amount of energy has been turned to utilizing its pos¬ sibilities. Irrigation is one of the outstanding enterprises of Colorado. In 1889, 890,735 acres were under irrigation, but in 1910 there were 2,792,032 acres, an increase of 200 per cent in acreage irrigated. Colorado stands first in the arid region in irrigated area. In 41 of the 63 counties of the State more than half of the farms are irrigated. Three and one-half mil¬ lion acres are devoted to dry farming, the 1915 income of which was $32,902,334. Sixteen mil¬ lion acres are devoted to grazing. Stock feed¬ ing, a very important industry, has developed in the San Luis Valley where field-peas grow luxuriantly. In addition to the large govern¬ ment enterprises, there are 9,065 independent enterprises with a total ditch mileage of 22,570 miles. Of this amount over one-third is in a solid block along the South Platte, at the north¬ east corner of the mountains in the State ; the

COLORADO

Estimated population, 962,060

COUNTIES

Pop.

8,892

Adams .

D 15

7,483

Alamosa .

K 11

10,600

(Pop. included in

10,812

10,263

Conejos County)

25;270

Arapahoe .

.E 15

33,643

3,302

Archuleta .

. L 7

5,917

2,516

Baca .

.L 21

9,549

5,043

Bent .

J 18

22,197

30,330

Boulder .

• C 12

1,239

7,622

Chaffee .

. G 10

3,687

Cheyenne .

.G 21

5,001

Clear Creek .

.E 12

11,285

Conejos .

5,029

5,498

Costilla .

L 12

10,291

Crowley .

I 17

9,577

(Pop. incl. in Otero

Co.)

20,201

3,514

1,947

Custer .

2,492

13,688

Delta .

. G 5

3,179

213,381 Denver .

4.566

642

Dolores .

9,520

3,192

Douglas .

. F 14

52,223

2,985

Eagle .

2,332

5,331

Elbert .

F 16

6,563

43,321

El Paso .

G 15

7,561

18,181

Fremont .

H 12

4,160

10,144

Garfield .

3,063

4,131

Gilpin .

. D 12

4,700

1,862

Grand .

.C 10

3,061

5,897

Gunnison .

H 7

2,003

646

Hinsdale .

. . J 6

14,351

13,320

Huerfano .

■ *K 14*

6,002

1,013

Jackson .

. B 9

39,177

14,231

Jefferson .

- *E 13*

8,499

2,899

Kiowa .

Incorporated Cities.

Towns,

858

Aguilar .

• K 15

2,712

647

Akron .

.C 19

268

3,013

Alamosa .

K 11

11,451

301

Alma .

614

145

Altman, Teller. .

.G 13

2,800

164

Anaconda .

.G 13

431

200

Animas .

J 5

925

681

Antonito .

266

26

Arrow, Grand. . .

D 11

42

840

Arvada .

D 13

81

1,834

Aspen .

881

569

Ault .

B 14

950

679

Aurora .

. D 14

33

235

Basalt .

. .E 7

2,019

227

Bayfield . .

L 5

2,477

104

Bellvue .

B 13

1,112

758

Berthoud .

,C 13

359

668

Black Hawk .

D 12

40

96

Bonanza .

. . I 10

7,754

11,669

Boulder .

.C 13

268

834

Breckenridge . . .

.E 10

576

850

Brighton .

. D 14

tl,420

997

Brush .

.O 18

30

1,041

Buena Vista ….

.G 10

368

Burlington .

.F 22

158

146

Cameron, Teller.

.G 13

5,162

Canon City .

.H 13

1,026

284

Carbondale .

. .E 6

693

365

Castle Rock .

.E 14

295

Cedaredge .

. G 5

341

385

Center .

L 10

314

1,728

Central City .

.D 12

724

270

Cheyenne Wells .

.G 22

659

676

Coal Creek .

I 13

131

156

Collbran .

. . F 5

600

4,333

Colorado City. . .

G 14

343

32,971

Colorado Springs

.G 14

2,154

411

Como .

F 11

48

565

Cortez .

.. K 2

157

392

Craig .

B 6

198

741

Creede .

962

904

Crested Butte . . .

304

231

Creston .

.J 11

183

6,206

Cripple Creek . . .

• G 13

141

180

Dacona .

C 14

1,892

149

De Beque .

448

958

Delagua .

L 15

4,154

840

Del Norte .

R 9

405

2,388

Delta .

. .G 4

103

260.800 Denver .

134

Dillon .

.E 10

2,977

320

Dolores .

. R 2

2,008

4,686

Durango .

L 4

691

186

Eagle .

62

1,157

Eaton .

7,508

712

Edgewater .

D 13

534

293

Edith .

. ,L 8

1,373

81

Eldora .

D 12

4,256

194

Elizabeth .

.E 15

1,706

179

Empire .

.D 11

3,651

2,983

Englewood .

E 14

632

596

Erie .

.O 13

788

87

Eureka .

567

600

Evans .

. B 14

1,357

265

Fairplay .

F 11

428

110

Firestone, Weld.

.B 16

782

Kit Carson . P 21

Lake . F 9

La Plata . L 5

Larimer . B 12

Las Animas _ _ _ L 17

Lincoln . G 18

Logan . A 19

Mesa . F 2

Mineral . K 7

Moffat . B 4

(Pop. incl. in Routt Co.)

Montezuma . L 2

Montrose . H 3

Morgan . C 17

Otero . J 18

Ouray . 15

Park . F 11

Phillips . B 21

Pitkin . F 7

Prowers . J 22

Pueblo . J 15

Rio Blanco . D 4

Rio Grande . K 9

Routt . B 7

Saguache . J 9

San Juan . J 5

San Miguel . 1 3

Sedgwick . A 21

Summit . E 10

Teller . G 13

Washington . D 19

Weld . B 16

Yuma . D 21

Florence . H l3

Florissant . G l3

Fort Collins . B l3

Fort Lupton . C l4

Fort Morgan . O l4

Fountain . G l5

Fowler, Otero . . . , J 18 Frederick, Weld. .C l4 Freshwater, Park . F 1 1

Frisco . E l0

Fruita . F 2

Georgetown . D ll

Gillett . G 13

Glenwood Springs. . E 6

Golden . D 13

Goldfield . G 13

Granada . J 22

Granby . C 11

Grand Junction . . . F 3

Grand Valley . E 4

Gray Creek . L 16

Greeley . . B 14

Green Mountain Falls, El Paso. .G 15 Guadalupe,

Conejos . L 10

Gunnison . H 8

Hastings, Las

Animas . L 15

Haxtun . B 21

Hayden . 0 7

Holly . . . . I 23

Holyoke . B 22

Hooper, Costilla. .L 12

Hotchkiss . G 5

Hugo . F 18

Idaho Springs. . . . D 12

Ironton . J 5

Jamestown . O 12

Johnstown . C 14

Julesburg . A 22

Kersey . B 15

Kokomo . E 10

Kremmling . 0 9

Lafayette . O 13

La Jara . L 11

La Junta . J 18

Lake City . I 7

Lakeside,

Jefferson . E 13

Lamar . I 21

Las Animas . I 19

La Veta . K 15

Lawrence, Teller. G 13

Leadville . F 9

Limon . F 18

Littleton . E 13

Longmont . C 13

Louisville . O 13

Loveland . B 13

Lyons . 013

Manassa . L 11

Mancos . L 13

Manitou . G 14

Manzanola . I 17

Marble . F 7

Pop.

114 Mead, Weld . O 14

807 Meeker . C5

241 Minturn . D 9

2,544 Monte Vista . K 10

134 Montezuma . E 11

3,254 Montrose . H 4

149 Monument . F 14

251 Morrison, Jefferson

E 13

390 Mountain View,

Jefferson . E 13

446 Nederland . D 12

367 Nevadaville, Gilpin

D 12

493 Newcastle . E5

122 North Creede . J 8

260 North Longmont,

Pop.

698 Rifle . .E 5

78 Robinson, Summit E 10

1,413 Rockvale . /..Hl2

3,230 Rocky Ford . I 18

42 Rosita . I 13

620 Saguache . I 10

46 St. Elmo . G 9

4,425 Salida . H 10

261 San Rafael, Conejos

L 10

564 Sanford . L 11

121 Saw Pit, San Miguel J 5 498 Sheridan, Lake … H 22

250 Silver Cliff . I .2

460 Silver Plume . D 11

2,153 Silverton . J 5

1,321 South Canon . E 6

Boulder . C 12

212 Norwood . 13

143 Nunn . A 14

222 Oak Creek . C 7

153 Ohio City . G 8

458 Olathe . H4

124 Ophir . J 5

705 Ordway . I 18

1,644 Ouray . I 5

669 Pagosa Springs. ...L7

900 Palisade . F 3

163 Palmer . F 14

1007 Paonia . G 5

250 Pitkin . H 9

430 Platteville . C 14

43 Poncho Springs . . H 10 157 Prospect Heights,

Fremont . H 12

54,462 Pueblo . J 15

383 Red Cliff . E 9

26 Red Mountain,

Ouray . 15

368 Rico . J 4

376 Ridgway. . . 15

1,227 Steamboat Springs B 8

3,044 Sterling . B 19

808 Sugar City . I 18

182 Sulphur Springs.. .D 3 349 Superior, Boulder C 12

310 Swlnk . I 18

1,756 Telluride . J5

13,875 Trinidad . L 15

3,162 Victor . G 13

162 Walden . A 10

2.423 Walsenburg . K 14

129 Ward . o 12

459 Wellington . A 14

232 Westcliffe, Custer 1 12

34 West Creek . F 13

197 Wiley . 121

556 Williamsburg,

Fremont . H 13

935 Windsor . A 19

163 Woodland Park. . G 13

1,000 Wray . C 22

332 Yampa . C8

333 Yuma . D 22

/09u

41

S W

yy, y o m:

E E T W A TER

3T

n te

B

C

COLORADO

Rand McNally's Now 11 x 14 Map of Colorado.

Hater np

Battlo Cr«

1 anipa

Lily

Cedar IWt oLay

juniper Qf&J

l A°'J A

Hahns

Elk Head

R O

—I /'Deepcreek Mystic

Trul

~ s. Fool i

SCALE

Statute Miles, 33-1 Inch.

ID 15 20 2ii 30 3S 40 4S SO 55 60

_ Railroads _ _ , , Electric Lines

15

104

18

19 103° 20

22 1Q2o 23

5=

Thornburg

D

E

, (j C'T”

Independortc £'rty- Mt.

Cfeefc

•Hayden , ,

„,v Steamb< >at S4’r .« w Pagoda Junction Cityo ˆSjdTs-g35f,l

**1 Hamilton Aq tv. Routtcf ˆeef- Pa«£_Kr*

4 Clark fi t 'V j

At/ mfl&F

ˆ Hebron

ffi –

Axialo’A Jtoixcpos! Duo'C"? oak C,M \ -.AST

- 4 , | . – \ Pallnao I / — – —

° Pyramid

F

39

G

C HAS E

s

H UNTMA NS

-•tor

R

AJ

Qli W hitewafcccSS:*, ,

1 '■ SP

Creek

H

38

o Uranium

> Paradoxˆ M Q

_ _ , . ae/ > / as-

30®”",ˆ EJot _ ˆ /- ˆ Paonia w\V,4ˆ Cor;

Roubideau

ff'Y

Bed roc)

tˆMenokcn

? Ced ar_C r eekN\ˆl'- > (, 4

l/jL ■ ■ –

ic

Montroa <

R |o

Uncompahgr

Colo nax\ -A^l f,// ^_ _ \P#

Somerset

n ninvn ^ i> ^P©. . v

Floresta0

Baldwin

I Kublero

Gothic _ =r ;

Anthracite f € WlWHL –

•ted Butte » r ' ^ .AA

VlW, Karan,

Jacks Cabin A f A CHAF

T'W'Sf'" PelaM^

G U NVN li/3 O N =£-■

Toachoutlr? /^a'"“ont i<8>

G un n Iso iif/ hi

1 f^&Vfcaaha Spring*’

p , ^ *' ^ Lodge ■^o2S^oJd:lfef?^-

^ Marion

%

^»C

ScV*'^

DUNDY

,^o Wolf creek

^cgchVy /

\AilyTop / Uargisville '?^Ca^tJe p^ck < Kiowa Bland

r^ihoth J _

l/b e

Norton

oir* ver“on^

1 /$ Harrisburgo

C o Plum Bush %gejk'

o Lindon

Spence

Flat Top Thurl

Aricfca

Glen c

>Hughes

Mildred 0 / Armel 0

Gurney o I ldalia0 (

Joes 1 N°wta, T'08’-

Kirk Gtndaa,^A ^

Shaw °

WeUdns

/ Vo0o _A . Mosby W Svirber o „ .

-■ 1 .Yoder

w V,Burt e* oArno \

K°ckk,^

ekcieic

1SLANO a / I

T C A^R SON .

yinia;oloTad« Springs vWado City EuiJott Rush'

s,.^wid.«.,dpv A S O '

_ < *' w«s OA Lileneatlro /K e

Gfl?®;?- -* ,IJt Fountain/ lo

X‘ -JwiU.ur Ke, < ^i IL \SqUl . iCrtwans

'ijLASf® Kutch

A

Beavertono • Oriska

Cole o

k«ar«

•V.,

s,x,vSaljtla

' F R E M

RSOgway i r'l i 16 Yoaman

, A -'A I A's.®

Powder horn \

Cochetopa \ ˆ \ VillagroVe

° ft,) ˆ 'Z? ,H- .1 „ • o _ : J

cvt>

Jcilm?'. Kayinunc!/'1 VL

teJackeL I F&OA JL

Lcwis0\ V/zl-ts -Diilori T> Arriola0 I o ˆ > Lebanon „ ,

•y – C "'o

Q Her nit

La .a.)

i.ii.l

Man cos;

®Corteˆ

j M 0,N T E Z .U'J|VIY

I MESA V lilt DP VATf PK. _ i > – \l/TF

G"-,

££

k{f uascaa-

.gonˆ\V..-

\UTE

RESERVATION

fpnfetxz, » >

- -

Copyright by Rand McNally it Co.

oKline

°Redmesa

lElco

■ =• < ^r~ Mineral Hot Springs

•el Af//' ^ 4k 1 ?\ (f

4m?. a

lra' ^ ^ hcre,&

&«t»®y'0ce ®. OiL Fountain/ \o

it rim,0M

'»'6 5 ifennoverlT

S00«a e\ Buttes'^ f** t

end rick Maior* I (ilfard

c H E v Et-N L _hkj^

. • Ilnscn ' AT /ft

Karva\ «

■ ©

\ 0Catr CrWng

- '* ?■$ y? ^ £ * M

° Meil ill _

n A ?\ pr . # \jy*atcUffeV QOilver^UU ^Rook CreekGiine,

^ Vs^sT0 Mirage! -J0 U S T Ej;Ry'~"'J Urnf Furman °/und«rcllfrc V^Mun^Tia^

U A^a H >Ef;pfe \ Rosita 1 J 1 >! w#iu

IN E R A L;

WH'il ^°V icv Haywood

/VRockwood v. ., v ■ dJi v

data 0/Hermosa Pa0O6« P4k.fe

„ nc/Trimble Vallecito

ˆ P L A > y˚A

fll)

espcrusXI £ J}l)uran

, . . Carboi Breen Jc.r'/,- . (A^' _ v,;!.. //Lodo

t IjPagosa Sl)chtgS^|(;,\conejos Peak

"°5i j ww ^i#.

E T A§?1 a

Chromo't^ N-^ ^

Filjfh – -^-c fliferso Qaiero Mcigote^

!ap^uli ni^7

ONE JUO/8 (i»! "Stamford " fSjM^SSSg'

LET A#; a Co, ,yjf iBgTT !«g3°"»T

yF^n 11 lntnnite C^a ^ I 1 ' h i t— ^

'J arose \'Clm9mk' Te

*t'Lr – r

2

♦o

D

E

F

39

H

Webb ,

NoEtliway^^il^' I

^ – oplains I

Two Buttes

°Lycan J

Blaine

Maxcy o

”i ^ _ySprlngfle > d

JjBy

to®4, CVC’*

^^orruo Ci

Rod'ey*

oy

o DSetoijs' ar“ 100 saairi/Arroy°

bstelcne “paler Richards o

Cairito Campo0 prl(j

ntero oTowlinsville

■u!i°

F- ' 4kP”"

StouingtonQ

Wentworth 0

Lamport0

109 0

107 0

8

9

lO

106°

1 1

12

13

105°

14

15

16

zo-t"

LTT?'f > A- LI ,g> At

K

37′

17

18

19

21

22

102°

23 3080

COLORADO

319

next greatest, nearly a fifth of the whole, in San Luis Park. There are lines along, the South Platte and Arkansas blocks on the Grand in Mesa County, on the Gunnison in Delta and Montrose, and again in Gunnison County; scat¬ tered sections on the White and Yampa, along the southern Arkansas tributaries, and indeed in every quarter of the State. In 1910 there were 434 wells used for irrigation purposes, an increase of 59 per cent in 10 years.

Colorado has become a great farming State, producing not only large quantities, but an excellent quality, of the staple products. The production for 1915 is as follows:

	Acreage	Yield per acre, bushels	Production, bushels	Value
Com .	470,000	24	11,280,000	$6,204,000
Wheat .	560,000	23.8	13,310,000	10,650,000
Hay .	970,000	*2.2	*2,134,000	16,218,000
Oats .	300,000	39	11,700,000	4,797,000
Potatoes…	53,000	135	7,155,000	3,935,000
Rye .	30.000	18	525.000	368,000
Barley .	130,000	36	4,680,000	2,246,000
Sugar beets.	172,000	*11	*2,008,118	11,818,000

**Tons.*

The largest individual product of the irri¬ gated farm is the sugar beet.

There were 15 factories operated during 1916, with a substan¬ tial increase in 1917. Over $25,000,000 are in¬ vested in these factories.

Orchard, small fruits and grapes amounting to $5,078,654 were marketed in 1909. Most of the fruit-raising is in Delta, Mesa and Montrose counties, on the Grand and Gunnison, in Boulder County, on the South Platte, and in Fremont County, on the upper Arkansas. A valuable crop on the Arkansas is that of muskmelons, including the famed Rocky Ford cantaloupes.

Stock raising has increased with the produc¬ tion of feed, or vice-versa. The livestock in¬ dustry of Colorado is characterized by a marked increase during the last decade. In 1915 there were 296,368 horses valued at $20,031,314; 23,284 mules valued at $1,999,800; 1,332,479 ranch cat¬ tle valued at $38,230,231 ; 101,037 dairy cattle valued at $5,786,281 ; 1,823,491 sheep valued at $4,573,120. All other animals were valued at more than $2,000,000. This was full valuation for the purpose of taxation. The number and value of all kinds of stock have had a remarkable increase, yet the quality has im¬ proved more rapidly than the quantity. Many of the stockmen have devoted much time and attention to improving the quality of their stock. Dairy and poultry products are in great de¬ mand. In 1910 there were 69 butter, cheese and condensed milk establishments.

Geology and Mining. — The main ranges, particularly the east range, have a core of schist and gneiss with an occasional area of granite. These main ranges are flanked on all sides with sedimentary rocks. In many cases, these rocks show practically all the geological epochs from Cambrian Quartzite to the Quaternary, while again the most recent is found resting on the most ancient. There are large areas of purely eruptive rock, such as the San Juan Range in the southwest and the Spanish Peaks, near Walsenburg. The prairie land is so com¬ pletely clothed with soil that it is difficult to follow the geological skeleton, but it is probable that nearly all geological periods are represented in its formation. Great coal deposits are found

in the upper Cretaceous, and most of the metal¬ lic deposits are found in igneous formations.

Colorado leads the Western States in mineral production. Total output (1903) $65,-

284,009; (1904) $68,870,280; (1905) $89,309,861;

(1909) $59,189,974. The output (1909) from the State's mineral resources was as follows : . gold, $21,846,600; silver, $4,600,100; lead, $2,- 522,036; zinc, $2,173,068; copper, $1,493,132; clay products,

$2,049,024.

In 1915 there were some striking changes in the value of metals mined: gold, $22,425,518; silver, $3,517,972; lead, $3,223,583 ; copper, $1,-233,405 ; zinc, $13,660,040 ; tungsten, $5,000,000. The production of zinc worth $6,000,000 in 1906 and more than $13,000,000 in 1916 places Colo¬ rado as the fourth State in the production of this metal. Boulder County is noted for its tungsten. Colorado's production of the precious and semi¬ precious metals in 1916 reached a total value of $49,200,675, an increase of 13 per cent over the figures of 1915. This mineral wealth was se¬ cured from 2,699,243 tons of ore raised from 825 deep mines, and from 27 placer workings. Lake County, which includes Leadville and the surrounding districts, held its former record of a much larger yield than any other portion of the State, with the single exception of gold, in which it was surpassed by Teller County, which includes the famous Cripple Creek dis¬ trict.

The total yield was distributed as follows : gold (39 per cent), 926,506 fine ounces, valued at $19,153,821; zinc (37 per cent), 134,285,463 pounds, $17,994,252; silver (10 per cent), 7,656,- 544 fine ounces, $5,038,006; lead (9 per cent), 70,914,087 pounds, $4,893,072 ; copper (4 per cent), 8,624,081 pounds, $2, 121,524. Nearly the entire output was smelted in the 10 smelting plants of the State, and these plants also handled a considerable quantity of ore from Idaho, South Dakota, Oklahoma and Ken¬ tucky and from Canada also.

Iron sulphides are mined at Creede and other places from which sulphur is obtained in paying quantities. Uranium and vanadium are found in large quantities. There is a vast quantity of oil shales in the northwest. The output of silver is steadily increasing. About three-fourths of the silver is from lead ores, and Colorado's lead product is one-sixth of that of the whole country. Lead is not only sold as a raw material, but is a most valuable flux for smelting gold and silver ores, there¬ fore large quantities are imported from other states. The mines of Cripple Creek and Lead¬ ville are among the best equipped in the country. Cripple Creek is the leading gold- producing section in the State and Leadville leads in the production of silver, lead, copper and zinc.

As a coal-producing State Colorado ranks ninth. Its greatest production was in 1910 when 12,104,887 tons were mined. The normal production, averages 10,000,000 tons per year, about one-half coming from Las Animas County in the central part of the State.

Marble, fuller's earth, potter's clay, fire clay, cement shales (the finest in the world), lime¬ stone and abrasives, petroleum and natural gas are valuable and abundant minerals. The Florence oil fields produce the finest oils in the world.

Manufactures. — The chief industries of

Colorado could be predicted from a glance at its raw materials — precious metals, copper and lead, coal and iron, wood, cattle and grain. These mean smelting, iron and steel and rail¬ road work, lumber manufacture, meat-packing, ilouring-mills and breweries. In 1909 there were 2,034 manufacturing establishments in the State; in 1916 there were 2,350; the capital invested amounted to $162,668,000; there were 28,067 wage earners, whose wages aggregated $25,560,000; the cost of materials used was $80,491,000; and the value of the products was $130,044,000. The latest information, for the year 1916, on manufactures in Colorado places

the number of manufacturing establishments at 2,350 and laborers engaged in manufacturing 35,000, capital invested $189,000,000, the value of the product produced $150,000,000 and amount paid for labor and salaries $30,350,000, and the material used cost $95,000,000. The prospect for manufacturers in Colorado, particularly in Denver, is better than ever before in the history of the State.

Railroads. — Colorado has about 5,814 miles of main track of steam roads valued for pur¬ poses of taxation at $179,460,890; besides well-developed electric systems, not only in cities, but between mining camps. A number of great trunk lines cross the State ; while short lines pierce to the heart of its mountain districts, giving the best transportation service of any State along the Rocky Mountains. The chief systems are the Union Pacific, the Missouri Pacific, the Atchison, Topeka and Santa Fe, the Denver and Rio Grande, the Rock Island, the Colorado and Southern, the Colorado Mid¬ land, the Rio Grande Western, the Burlington, the Denver and Northwestern (the Moffat Railroad). Within the past few years two im¬ portant branch lines have been built from Denver, connecting with the Burlington and the Northwestern systems.

Finances. — In 1918 the assessed valuation was $1,305,286,409, and the gross floating and bonded debt was $4,735,800. The state's normal receipts and disbursements approximate $10,- 000,000 annually. There were in Colorado. 1 Nov. 1916, 121 National banks, 196 State banks and trust companies, 5 savings banks and 31 private banks, with a combined capital of $20,013,000 and a total deposit of $187,- 471,000, an increase of 35 per cent in capital and 50 per cent in deposits since 1907.

Churches. — There are about 700 churches and 1,000 Sunday schools in the State. The Methodists, Presbyterians, Roman Catholics, Baptists, Congregationalists and Disciples of Christ are the strongest denominations, while the Episcopalians, Lutherans and other denom¬ inations have many churches throughout the State. The various denominations are very aggressive both in spiritual and secular affairs. The Jews are a very important element in the growth and development of the State ; they number not less than 10,000.

Education. — The organization of the school system, the efficiency of teachers and the equip¬ ment of schoolhouses, places Colorado with the States that lead in educational affairs. In 1916 there were 267,241 children of school age. Of these 178,811 were enrolled in the public schools, while many were in private schools. There are 2,963 schoolhouses and 6,082 school¬ rooms in the State with a valuation of $11,220,-

853, for the support of which a tax of $8,176,- 856 was collected. Teachers' salaries amount to $ 4,402,242 . The total expenditure for all

pur¬ poses was $7,110,987. The institutions of higher learning are the University of Denver (1864,

M. E.), the pioneer institution of higher learn¬ ing in the Rocky Mountains, with (1916) 225 professors and instructors, 1,456 students, 3,163 graduates; Colorado College (1874, Con¬ gregational), 48 professors and instructors, 710 students, 940 graduates ; University of Colorado (1877, State), 200 professors and instructors, 2,009 students, 2,861 graduates; College of Sacred Heart (transferred from Las Vegas,

N. M., in 1884, Jesuit). The State supports the School of Mines at Golden, ranking among the best in the world, and the State Teachers College at Greeley, with 63 teachers, 644 students above the Training School, and 1,200 students in the summer school and 2,000 graduates. An aggressive growing State Normal School is maintained at Gunnison. The College of Agriculture and Mechanic Arts at Fort Collins has a large student body doing excellent work. Its experiment station has attracted the attention of the world by its cross¬ breeding of animals and plants. The Uni¬ versity of Colorado maintains a medical school. There are many private schools in Denver, Boulder, Canon City, Leadville and other cities of the State. In Denver the Baptists maintain the only women's college (Colorado Women's College) in the Rocky Mountains. The West¬ minster University of Denver (Presbyterian) is in the process of organization.

Charitable and Penal Institutions. — The State maintains an asylum at Pueblo, a State prison at Canon City and a reformatory in Buena Vista, all under the control of the Board of Corrections, consisting of three members. There is a Soldiers' and Sailors' Home at Monte Vista. The counties and cities have organiza- ti ns for the care of the poor. The prisoners in the State Prison and Reformatory are em¬ ployed in purely institutional labor on the in¬ side and in roadmaking and farming on the outside. The indeterminate sentence with maximum and minimum periods is used. An Industrial School for male juvenile offenders at Golden, where the inmates are not confined or marked with penal badges, and an Industrial School for girls at Morrison are among the best institutions of the kind in the world.

State Government.— The State constitution, which was largely modeled after that of Illi¬ nois, was ratified 1 July 1876. Colorado was ad¬ mitted to the Union by proclamation of the President 1 Aug. 1876. A few important amendments have been made to the constitution. The most important are the one that provides optional home rule for certain cities and the one that gives women the right of suffrage. The suffrage amendment was voted in 1893. The women have full right to hold office. In the State the office of superintendent of public instruction and in many counties the office of county superintendent of schools are conceded to the women. Experience is leading both the women and the men to believe that

other posi¬ tions are successfullv filled by the women, even more so than the educational offices, and there is now a tendency to elect women to such offices as county clerk, county treasurer, and even county judge, and the women are asking for

COLORADO

GRAND CANYON

1 North wall, showing great wedge of Algonkian rocks

2 Looking north from Grand View to Kaibab Plateau on north rim

COLORADO

GRAND CANYON

1 Looking east from south rim near Bass' Camp. (In the centre is the granite gorge)

2 Looking west from Zuni Point

COLORADO

GRAND CANYON

1'Looking east up the river from Zuni Point

2 Looking up from Grand View Point

COLORADO

i Pike's Peak, Showing Carriage Road

2 Garden of the Gods

COLORADO

321

the oilice of secretary of State, State auditor, etc.

Executive. — Elective executive officers hold office for two years. The governor (salary $5,000) may veto any bill and specific items in an appropriation bill. In either case the veto may be overruled by a two-thirds vote of each house. Three boards of great importance have been recently organized — The Tax Commis¬ sion, The State Public Utilities Commission and The Industrial Commission. Each of these boards is composed of three members appointed by the governor and confirmed by the Senate for a period of six years. The salaries of The Tax Commissioners are $3,500 each; of the members of the other boards, $4,000 each. The duties of The Tax Commission are the assess¬ ment of corporations, supervision of assessment and the collection of taxes in counties, making the State tax levy, acting on all petitions for abatements, rebates or refunds of taxes. The Industrial Commission has charge of the State Compensation Insurance Fund and it is its duty to inquire into and supervise the enforce¬ ment of law as far as respects relations be¬ tween employer and employee, of the laws relat¬ ing to child labor, laundries, stores, factory in¬ spection, employment of females, employment offices and bureaus, mining — both coal and metalliferous, fire escapes and means of egress from places of employment and all other laws protecting the life, health and safety of em¬ ployees, etc. The Public Utilities Commission has 'supervisory power over all public utilities, whether privately or municipally owned, in¬ cluding automobile lines in competition with railroads. It has power to fix the rates and to pass upon the service rendered.

Legislative. — The general assembly meets biennially; the 35 senators are elected for four years and the 65 representatives are elected for two years. The constitution limits the total membership of the two houses to 100 members.

Judiciary. — The Supreme Court consists of seven members, elected for 10 years. The court is divided into three departments. The chief justice, who is the judge having the shortest term to serve, providing he has been elected for the full term, presides in each department. Constitutional questions must be heard by the full bench, other questions may be. There is no appeal from the decisions of a department. The district judges are elected for six years and the county judges for four years.

Militia. — The National Guard, a part of the militia of the State, consists of one regiment of Infantry, one squadron of Cavalry, one bat¬ talion of Field Artillery, one company of Sig¬ nal Corps, one Hospital Corps, two companies of Engineer Corps. The complete organization contains 1,500 men.

Population and Divisions. — The first (Ter¬ ritorial) census, that of 1860, showed 34,277 people; 1870, 39,864; 1880, 194,327; 1890, 412,198. The census of 1900 showed a population of 539,700; that of 1910, 799,024 and that of 1920, 739,629. Of the total population of the State in 1910, 475,136, or 59.5 per cent, are native whites of native parentage, and 181,428, or 22.7 per cent are native whites of foreign or mixed parentage, 126,851 are foreign born whites and 11,453 are negroes. There is very little change in percentages over the cen- vol. 7 — 21

sus of 1900. Thirty-four and nine-tenths per cent were born in Colorado; foreign born were from Germany, Italy, Russia, Austria, Sweden, England, Canada, Ireland, Scotland, Denmark and Mexico, the largest percentage being from Germany. There are 194,164 foreigners re¬ ported.

There are 63 counties in the State, as fol¬ lows, with their county-seats:

Adams, Brighton.

Alamosa, Alamosa. Archuleta, Pagosa Springs. Arapahoe, Littleton.

Baca, Springfield.

Bent, Las Animas.

Boulder, Boulder.

Chaffee, Buena Vista. Cheyenne, Cheyenne Wells. Clear Creek, Georgetown. Conejos, Conejos.

Costilla, San Luis.

Crowley, Ordway.

Custer, Silver cliff.

Delta, Delta.

Denver, Denver.

Dolores, Rico.

Douglas, Castlerock.

Eagle, Redcliff.

Elbert, Kiowa.

El Paso, Colorado Springs. Fremont, Canon City. Garfield, Glenwood Springs. Gilpin, Central City.

Grand, Sulphur Springs. Gunnison, Gunnison. Hinsdale, Lake City. Huerfano, Walsenburg. Jackson, Walden.

Jefferson, Golden.

Kiowa, Sheridan Lake.

Kit Carson, Burlington.

Lake, Leadville.

La Plata, Durango. Larimer, Fort Collins. Las Animas, Trinidad. Lincoln, Hugo.

Logan, Sterling.

Mesa, Grand Junction. Mineral, Creede. Moffat, Craig. Montezuma, Cortez. Montrose, Montrose. Morgan, Fort Morgan. Otero, La Junta.

Ouray, Ouray.

Park, Fairplay.

Phillips, Holyoke. Pitkin, Aspen.

Prowers, Lamar. Pueblo, Pueblo.

Rio Blanco, Meeker. Rio Grande, Del Norte. Routt, Hahns Peak. Saguache, Saguache. San Juan, Silverton. San Miguel, Telluride. Sedgwick, Julesburg. Summit, Breckenridge. Teller, Cripple Creek. Washington, Akron. Weld, Greeley.

Yuma, Wray.

In 1900 there were 27 places in Colorado of over 2,000 people; 17 of over 3,000; and 8 of over 4,000. The urban population of the State had so grown by 1920 that 34 incorporated places were over 2,000 in population ; 21 over 3,000, and 16 over 4,000. The metropolis is Denver (q.v.), on the east flank of the Rocky Mountains, north of the centre, with 133,869 in¬ habitants in 1900 and 256,491 in 1920, almost doubling in 20 years ; it is the head of the Rocky Mountain trade, and chief United States market for ranching, prospecting, and moun¬ taineering supplies. Pueblo with 42,908, and Colorado Springs with 30,105, are on the same front line of the mountains ; the former a min¬ ing emporium ; the latter the greatest sanato¬ rium of the West. Leadville 4,959, is the head of a great mining district on the upper Arkansas west of South Park; Cripple Creek, 2,325, is the centre of its rich mining region, west of Colo¬ rado Springs ; Boulder, 10,989, in the mountains northwest of Denver is a sanatorium with medicinal springs, also a manufacturing town ; Trinidad, 10,906, in the extreme south, is the southernmost of the frontal towns, below Pueblo ; Greeley, with a population of 10,833, is the chief city of Weld County.

Colorado towns are growing so rapidly and have developed so many suburbs that even the figures of the cen¬ sus give a very inadequate idea of their popula¬ tion or importance.

History. — Colorado (Sp., pp. of verb Co- lorar, to color; colloquially used for red- colored) was named either from the river of that name or from the varied colors of the landscapes. Its territory is composed of three portions: one from the Louisiana Purchase; one from the Texas Cession; and the third from the Mexican Cession of 1848. The south-

west portion was, in prehistoric times, inhabited by the Pueblos (the Cliff Dwellers). A few of the followers of De Soto and Coronado seem to have entered the territory of the State about 1541. It was explored in the southwest by Escalante in 1776, and its eastern mountain and plain regions by Zebulon Pike (1806) and Stephen H. Long (1820). Later John C. Fre¬ mont, led by Kit Carson, penetrated many por¬ tions of the Rocky Mountain region. Gold had been discovered in small quantities many times from 1806 to 1857 but the discoveries of 1858, near the confluence of Cherry Creek with the Platte, brought a large number of prospectors into the State. People from Georgia, Kansas, Missouri and other Eastern States came in large numbers. Prospectors from Kansas and Georgia built Montana on the Platte near where Denver now stands; other towns followed; Auraria, Saint Charles Town (now Denver), Golden, etc.

The discoveries of George A. Jackson at Idaho Springs on the south fork of Clear Creek and by J. H. Gregory on the north fork at Central City brought immigrants by the thou¬ sands. At once, local political organizations were made without regard to the territorial government of Kansas, of which Colorado was then a part. It was but a step from making laws for a mining camp to making laws for a whole district, from city building to State build¬ ing. This step was soon taken. In 1859 dele¬ gates met and adopted a constitution for the State of Jefferson with an area somewhat larger than that of Colorado. The opposition to a State led to a second convention which, under the fiction of erecting a territory, established a new State and called it the "Territory of Jeffer¬ son.® The constitution adopted by the first con¬ vention was ratified but never went into effect. The constitution adopted by the second con¬ vention was almost unanimously ratified 24 Oct. 1859, on which day a full complement of State officers was elected. R. W. Steele, who was elected governor, continued in office until 1861, when he surrendered his office to William Gil¬ pin, first governor of the Territory of Colorado.

Colorado was anxious for statehood, but it was not until party necessity compelled the ma¬ jority party of Congress to turn to the West for more senators, that the enabling act was passed. The Constitutional Convention (in session 20 Dec. 1875 — 14 March 1876) provided that the territorial officers should become the State officers and serve until their successors were elected (at the regular election) and qualified.

Politics. — Colorado was admitted as a Republican State, but has since undergone re¬ peated changes in its political faith. It left the Republican ranks on the <(money issue,® but the improved methods of handling silver ore made silver smelting more profitable at the later rul¬ ing prices than it was in 1896. In recent years the tendency of the State is to be Democratic. Henry A. Buchtel was elected governor on the Republican ticket in 1906. He was succeeded by John Shafroth, now United States senator, in 1909. Elias A. Ammons, Democrat, became governor in 1913. He was succeeded by George A. Carlson, a Republican, in 1915. Julius C. Gunther, a Democrat, became governor in 1917. In the history of the State there have been 10 Republican governors and 10 Democratic gov¬ ernors, six of whom were born in Ohio.

The following is a complete list of governors :

TERRITORIAL GOVERNORS

William Gilpin . 1861-62

John Evans . . 1862-65

Alexander Cummings . 1865-67

A. C. Hunt . 1867-69

Edward M. McCook . 1869-73

Samuel H. Elbert . 1873-74

Edward M. McCook . 1874—75

John L. Routt . 1875-76

STATE GOVERNORS

John L. Routt . Republican . 1876-79

Frederick W. Pitkin . . Republican . 1879-83

James B. Grant . Democrat . 1883-85

Benjamin H. Eaton. . Republican . 1885-87

Alva Adams . Democrat . . 1887-89

Job A. Cooper . Republican . 1889-91

John L. Routt . Republican . 1891-93

Davis H. Waite . Populist and Democrat.. . 1893-95

Albert W. Mclntire.. Republican . 1895-97

Alva Adams . Democrat and Silver Rep. 1897-99

Charles S. Thomas. . . Dem., Pop. and Silver

Rep . . 1899-01

James B. Orman . Dem., Pop. and Silver

Rep . 1901-03

James H. Peabody. . . Republican . 1903-05

Alva Adams . Democrat. Served 10 Jam-*

16 March . 1905

Republican. Served one day 1905

Republican . 1905—07

Republican . 1907-09

Democrat . 1909-11

Democrat . 1913-15

_ _ _ Republican . . 1915-17

Julius C. Gunter . Democrat. . . 1917—19

Oliver H. Shoup . Republican . 1919—21

- *In 1904 Alva Adams and James H. Peabody were can¬ didates for governor. The Executive Department, entrusted with the canvassing of the vote, gave the certificate of election to Alva Adams and he was inaugurated governor 10 Jan. 1905. James H. Peabody filed a contest before the legislature which decided the contest in favor of Peabody, who became governor 16 March. He resigned and on 17 March Jesse F. McDonald succeeded him as governor.*

James H. Peabody. Jesse F. McDonald. Henry A. Buchtel. . John H. Shafroth . . Elias M. Ammons. . George A. Carlson .

Bibliography. — Hubert Howe Bancroft's

Works (Vol. XXV) ; Smiley, 'History of Denver ; Hall, 'History of Colorado.)*

Frank H. H. Roberts,

Professor of History, University of Denver; and President of Neiv Mexico Normal Uni¬ versity.

COLORADO, Tex., city and county-seat of Mitchell County, 260 miles by rail southwest of Dallas, on the Texas and Pacific Railroad and on the Colorado River. It is a cotton¬ growing and stock-raising centre. It has cotton gins and salt works and there is a trade in gravel and sand. The city owns the water¬ works. Pop. 1,840.

COLORADO, University of, a coeduca¬ tional institution at Boulder, Colo., supported by the income from a tax levy and by special ap¬ propriations made biennially by the legislature. It was incorporated in 1861 by the Territorial legislature; when Colorado became a State in 1876, the constitution provided that the "Uni¬ versity at Boulder® should become the State University, thus giving it the advantage of the lands appropriated by the national Congress for such institutions. The University was opened in September 1877, with two depart¬ ments, the normal and the preparatory. In 1878 a College of Liberal Arts was established. The normal and preparatory departments have been discontinued. In addition to the College of Liberal Arts the University now comprises the following: Colleges of commerce, educa¬ tion, engineering and pharmacy, the schools of social and home service, medicine, law, and the graduate school, the training school for nurses, summer session and the university ex¬ tension division. In 1915-16 there were 1,413 students enrolled in the regular academic

a;

XI

*+ * © r< ©*

o

«s

5 ©

03

u°-

.«

c

3

od

O

M £5 sj 3

6 –

o «

<2

|-3 2«

as

"O

a

a

u

v

>

a

Q

V

J3

+ +

s«

O a, • 4» O'''

■go

2«

S«

O 2

V -T3 O 3

rt—

3«

C « o . •g-o

s§

uS ^ 3

0)

C a;

C/3 5

■c 2

oO

Cfl

COLORADO

1 The Dutch Wedding, in Mountain Park

2 Pike's Peak, from the Garden of the Gods

COLORADO AGRICULTURAL COLLEGE— COLORADO RIVER

department, 697 in the summer session and 445 in correspondence and study classes of the extension division, a total, excluding duplica¬ tions, of 2,453. The library numbers 96,701 bound volumes, 25,000 pamphlets and 1,800 maps.

COLORADO AGRICULTURAL COL¬ LEGE, a coeducational institution at Fort Collins, Colo., providing instruction in agricul¬ ture, mechanical engineering, veterinary science, etc., a four years' course leading to the degree of B.S. Its gross income is about $210,000. It includes a school of veterinary medicine, re¬ quiring four years to gain the degree of D.V.S. The library contains about 55,000 volumes. The attendance is about 650 in collegiate grade. It also conducts a school of agriculture of second¬ ary grade with an attendance of 370, and a conservatory of music with an attendance of over 100. The activities of the college are divided into education, research and extension. It was opened in 1879, and received a grant of 90,000 acres of land under the act of Congress of 1862. In 1916 there were 89 instructors and over 1,100 students in all departments.

COLORADO CITY, Colo., city in El Paso County, 75 miles south of Denver, on the Denver and Rio Grande and the Colorado Mid¬ land railways. The city has a Carnegie library, railroad repair shops, gold-reduction works and an iron foundry. In 1913 the commission form of government was adopted. Pop. 4,333.

COLORADO COLLEGE, a coeducational non-sectarian institution in Colorado Springs, organized in 1874. It offers full collegiate courses and confers the degrees of A.B. and B.S. The college has departments of en¬ gineering, forestry and of business administra¬ tion and banking. It has 14 large stone build¬ ings, costing $1,000,000 with their equipment. The library contains 70,000 volumes and 40,000 pamphlets. The endowment of the college is $1,040,000. In 1916 it had 710 students and 56 instructors. It has a system of exchange in¬ structors with Harvard University.

COLORADO DESERT. See Desert.

COLORADO PLATEAU, an extensive plateau region lying west of the southern Rocky Mountains, and east of the southern Pacific Ranges. It includes parts of the States of Utah, Colorado, Arizona and New Mexico. The plateau consists chiefly of Paleozoic and Mesozoic rocks with some Tertiary gravel and lava flows. The rocks are nearly flat lying, but are cut by great north and south faults, of which the best known are the Hurricane and Grand Wash. These faults, together with the Vermilion and other cliffs, divide the plateau into several separate units of differing eleva¬ tions, varying from 6,000 to 10,000 feet above sea level. These are trenched by the Grand Canyon and its tributaries. The lower parts of the area are desert, the higher parts rather well forested. The plateau has little mineral wealth and is sparsely populated.

COLORADO RIVER, one of the chief streams of Texas. Rising in the high

table¬ lands of Bexar, near the line of New Mexico, about lat. 32° 30′ N. and long. 102° W., it flows southeast, receiving in its upper course the Conca, the San Saba and the Lano on the south, and the Pecan from the north, and empties into Matagorda Bay. Austin, Bastrop

and Columbus are on its banks, and Matagorda near its mouth. For most of its course it flows through a fertile region, and has an average width of 250 feet. It is a clear stream ; its name, meaning red, was originally applied to the Brazos, north and east, but the two were interchanged. The Colorado is some 900 miles long, and navigable to Austin or farther.

COLORADO RIVER, or COLORADO OF THE WEST, a great river of the United States and Mexico, formed at about lat. 38° N. and long. 110° W., by the junction of the Green and Grand rivers. The Green River rises in the Rocky Mountains in the west of Wyom¬ ing, receiving in its southwestern course the waters of the Bear, the White, the Uintah and San Rafael. From Flaming Gorge, a point in the northwest of Colorado, where the Uintah Mountains rise, the Green River cleaves its way rapidly through canyons, the walls of which tower up to a height of nearly 1,500 feet. The Grand River rises in the Rocky Mountains, west of Denver, Colo., receiving in its south¬ western course the South Fork or Gunnison, the San Miguel and Dolores. After the junc¬ tion the Colorado flows southwest through Utah, joined on the east by the San Juan, on the west by the Dirty Devil and Escalante ; southwest through the north of Arizona, till its waters are increased by the Colorado Chiquito, or Little Colorado of Arizona. Near the in¬ flow of this tributary is the Marble Canyon, 3,600 feet deep and about one-third the length of the greater canyon below.

From the mouth of the Little Colorado the river bends west and for more than 200 miles flows through the wonderful Grand Canyon. The successive divisions of the canyon are known as the Kaibab section, the Kanab sec¬ tion, the Uinkaret section and the Sheavwitz section. The walls of this water-worn trench are often vertical, or nearly so, for a distance of thousands of feet at a time ; sometimes they slope steeply, or constitute magnificent terraces. The cliffs or rock-walls attain a height of from 4,000 to 7,000 feet above the stream. (For heights of particular points, see Canyon). There are frequent whirlpools and waterfalls. Below the canyon the valley opens, and there is much fertile bottom-land on one or both sides of the river. Numerous tributaries pierce the high plateau on either side, the whole present¬ ing a strangely intersected topography. Escap¬ ing from the Grand Canyon, the river flows southwest to the borders of Nevada, receiving from the west the Paria, Tapeat, the Kanat (of Arizona) and the Virgen (of Nevada).

Above Callville, Nev., the Colorado, with its tributaries, again bores its way through deep canyons, the sides of which, in some places, present walls of

solid rock nearly 7,000 feet high. The plateaus at the top of these rock masses, generally treeless, are again surmounted by terraces 1,000 feet or more high. These lower and higher terraces are both piled with mas¬ sive ruins, once the walled towns and cities of a race said to be represented by the present Moqui Indians in the northeast of Arizona and the Nahuas of Mexico. Below Callville the river is again shut in by the last of the canyons, the Black Canyon, 25 miles long, and from 1,000 to 1,500 feet high. Shortly after re¬ ceiving the Virgen, the Colorado takes a southerly course, severing Arizona and Sonora

on the east from Nevada, California and Lower California on the west, and receiving on the east Bill Williams' Fork and the Gila. After absorbing the latter the river sweeps round in a westerly direction for 7 or 8 miles, and soon expands to a width of 1,200 feet. Thence it pursues a tortuous course of 180 miles, the last portion being through Mexican territory, to its mouth in the Gulf of California. There is a vast delta or flood plain formed by the waste from rock erosion. From the sources of the Green River the Colorado measures a total length of about 2,000 miles. It is navigable for steamers as far as Callville, 612 miles from its mouth, and can be made so, it is thought, to the foot of the Grand Canyon, 57 miles higher. The first attempt to navigate the upper part of the Colorado was made in 1891. In 1893 the stream was proved navigable for 130 miles between Green River and Cataract Canyon.

The investigation of geologists dispelled the theory once held that the Grand Canyon was a fracture of the earth's crust. It is now clear that a long period of erosion through plateaus successively uplifted has produced this remark¬ able gorge. At the bottom of the canyon throughout a considerable part of its course the Archaean system is laid bare. The Algonkian beds with their high coloring give brilliancy to that portion of the canyon where they can be traced. The Cambrian beds are found above the Algonkian, but in places rest directly on the Archaean. The thickness of the Cambrian (here known as the Tonto formation) is in places 1,000 feet. The upper part of the canon walls consists of carboniferous formations (Red Wall formation below, Aubrey limestone and sandstone above). It has been estimated that all the Eocene, Cretaceous, Jurassic and per¬ haps Triassic beds and the greater part of the Permian were worn away from the plateau region during the period of erosion. The Marble Canyon platform, like that of the Grand Canyon, consists of carboniferous strata with a considerable number of Permian remnants scat¬ tered over it.

In 1540 the Colorado was visited by a de¬ tachment of Coronado's

expedition and another of his exploring parties gave the first descrip¬ tion of the Grand Canyon as seen by white men. About the same time Fernando Alarcon as¬ cended the stream in boats for a long distance. Catholic missionaries subsequently traveled through these regions. For about 300 years, nothing more was learned concerning the Col¬ orado. Much light was thrown on the subject by the investigations of Ives in 1858. In 1869 Powell explored the region and made the descent through the whole course of canyons to the mouth of the Rio Virgen, a distance of more than 1,000 miles. Dutton made geological studies of the Grand Canyon in 1875. In 1889 the canyons were explored by a party of en¬ gineers sent out to make surveys.

Bibliography. — Powell, (Exploration of the Colorado RiveU (1875) ; David, W. M., (An Expedition to the Grand Canon of the Col¬ orado } ; Dutton, (Monograph II, U. S. Geol. Survey) (1882) ; James, G. W., (In and Around the Grand Canyon) (1902); id., (The Grand Canyon of Arizona) (1910).

COLORADO SPRINGS, Colo, city and county-seat of El Paso County, on the Denver and Rio Grande, the Denver T. and G, the

Santa Fe, Rock Island and Missouri Pacific and the Colorado Mountain railroads. It is situated on a plain at an elevation of 6,000 feet, near Pikes Peak, and has a world-wide reputa¬ tion as a health and pleasure resort. Colorado Springs is an attractive city and is the midway gate to the western section of the State. The celebrated mineral springs of Manitou attract many visitors. Colorado Springs was settled in 1870 and its wonderful growth since 1892 may be largely attributed to the development of the Cripple Creek gold mines, which are 30 miles distant on the opposite side of Pikes Peak. A great deal of wealth flows into Col¬ orado Springs, whose population has almost doubled in the past 15 years, and whose bank deposits have increased 600 per cent in the same period. The city has a great variety of manufactures, chief among them being pot¬ tery and tiles, ore refineries and reduction works. The United States census of manufac¬ tures for 1914 records 75 industrial establish¬ ments of factory grade, employing 742 persons, of whom 538 were wage earners, receiving annually $401,000 in wages. The capital in¬ vested aggregated $2,090,000, and the year's output was valued at $1,908,000: of this, $1,-010,000 was the value added by manufacture. The city boasts a handsome opera-house and five clubs, one occupying an edifice worth $80,000, 17 fine school buildings, Colorado Col¬ lege (q.v.), one of the oldest institutions of its kind in the State, with over 500 students, a State institution for the education of the blind and mute, sanatoriums, church edifices, 2 hos¬ pitals, and 6 trunk lines, 28 miles of electric railway and a modern telephone system. The city was one of the first to adopt the

commission form of government. Colorado Springs has a water su,pply costing over $3,000,000 and a sewerage system perfected at an expense of $10,000,000. Pop. (1920) 30,105.

COLORADO STAGE. The rocks of the Colorado, one of the lower divisions of the upper Cretaceous series, are chiefly of marine origin and cover a great area, having been laid down in an interior sea that stretched from northern New Mexico, where it opened into what was then the Gulf of Mexico, to the Arc¬ tic Ocean. This sea at about the latitude of Duluth, Minn., was over 1,000 miles wide. The Colorado is separated into two sub-stages, the lower, or Fort Benton, clays, shales and lime¬ stones, and the upper, or Niobrara, shales, sand¬ stones, . chalk and chalky marls. The Colorado Stage is of interest because of its marking the time when more of North America was under water than at any other time since the Car¬ boniferous Epoch, and because of the beds of chalk in South Dakota, Kansas, Arkansas, Texas and Mexico. See Chalk; Cretaceous Series.

COLORATION, Protective. The color of plants and animals is primarily due to the reflection of light, and is dependent in some cases on the pigment in the tissues of flowers, and #in the skin, scales, hair or feathers of animals, and in others to structural surfaces which by diffraction give color. Plants are colored green by chlorophyll, so are cater¬ pillars from eating plants. The ((chro- matic function is that adaptation of color of the skin of the frog, chameleon, squid, fish or*

crustacean, which rapidly changes so as to simulate the tints of the objects on which they rest. In most animals the coloration is due to pigment-cells (see Chromatophores), which are more or less ramified, and which, under the stimulus of the prevailing color of the habitat, cause the animal to simulate in hue the ground, or tree, or sea-bottom. In most animals the coloration is permanent, in a few it changes with the change of color of the immediate surroundings of the animal, as in the chameleon. In insects, fishes and birds, where the variety of colors is almost endless, it has been found that even the most striking colors are aids to concealment of the identity of the wearer and thus are its protection.

Pigment in Animals. — That this is pri¬ marily due to the action of light is proved by the fact that cave animals, or those living in darkness, are white or bleached out, so that the pigment cells become degenerate, the pig¬ ment losing its more or less dark color, while in insects the colors are either optical or natural ; the pigments, when present, are formed in the cellular layer of the skin (hypodermis) . These colors tend to fade after death, but

when en¬ closed and preserved in air-tight sacs, such as the scales and hairs of butterflies, and the wing- covers of beetles, they remain bright for a longer time, though eventually fading when dried specimens are exposed to the light. It has been shown that red, yellow, brown and black colors in the scales of certain butterflies are always due to pigments, while in a few cases greens, blues, violets, purples and whites are due to pigments in the scales themselves. Mayer finds that the pigments of the American silkworm moth (telea polyphemus) are de¬ rived from the blood of the chrysalis. He has artificially produced several kinds of pigments from the blood, which are similar in color to various markings on the wings of the moth, and has found that chemical reagents have the same effects on their manufactured products as on similar pigments in the wings of the living moth.

Origin of Spots, Bands or Stripes. — The

markings of caterpillars, the stripes of the zebra, of many African antelopes and of the tiger are supposed by some writers to be due to the direct effects of light and shade, to shadows cast in jungle-grass or in forests. As proofs of this they instance the experiments of Steinach, who glued strips of black paper to the skins of frogs which were kept in the dark; when they were exposed to the light, only the uncovered parts of their skins returned to a lighter hue, while the covered parts remained dark. The reflected green light in the case of frogs turning green when among leaves is by these writers believed to act directly upon the pigment cells. When the bottom of the vessel is covered with felt or with a wire net, the frogs become black, but recover their green color when a green branch is introduced into the vessel containing them. Again those cater¬ pillars living among pine needles are green, striped with white, yellow and red, exactly harmonizing with the red and yellow or white portions of each cluster of needles; this is ascribed to the direct reflection of different shades of light on the moist skin of the cater¬ pillar. In other caterpillars the longitudinal lines are broken up into spots, and if the

process is carried on farther the spotting be¬ comes transverse. Eyelike spots on certain caterpillars have been observed to be gradually formed at successive molts from what were originally continuous lines or stripes. It thus appears that the wonderful variety of colors and markings in animals is primarily due to the direct result of the environment, bringing about different results in animals of different groups and exposed to different environments. An alternative theory which has received wide¬ spread acceptance is that built up by Abbott H. Thayer upon his observations covering many years, namely, that color in animals is based upon its ability to conceal them in their usual haunts. Obviously this theory works in ex¬ cellently with the Darwinian theory of Natural Selection. The individuals whose accidental or inherited colorings most effectively concealed them

would be those most certain to escape attack and destruction, and survive as parents to reproduce in their progeny the peculiar colors which proved most protective. In this way, it is argued, the coloring of wild animals has eventually come to reflect the colors pre¬ vailing in their native environments. The Thayer theory develops upon a basis of the obliteration of relief by the shading of the color from darkest on the upper side, which is best lighted from the sky, to lightest on the under side, which is naturally darkened by the shadow. The result is a flat tint conveying no suggestion of solidity. Upon this primary basis, obliteration of outline is accomplished by (1) a color system which is practically a picturing of the salient features of the background against which the animal is most likely to be seen; and (2) a color scheme which, though striking in tone, by its very boldness baffles recognition of the true form. (The theory is set forth in great detail in the book by G. H. Thayer, noted below). (For coloration due to changes of temperature see Seasonal Dimor¬ phism under Dimorphism).

General Protective Resemblance. — Cases in illustration are the white animals of the Arctic regions, where extreme cold and dryness have turned the hair of the polar bear and the feathers of the snowy owl white. This applies to species ; the individual ptarmigan, ermine, hare, fox, etc., turn white in winter, but of a russet hue in summer, due to the differing light reflected from the ground in summer and the snow in winter. The ptarmigan, grouse, prairie chicken and the like, which build open nests, are protectively colored, while the conspicuously marked kingfisher, parrot, etc., build a nest which conceals the sitting bird.

The under side of the wings of certain but¬ terflies, such as the species of Polygonia, Su- vanessa antiopa and the East Indian Vallima, are assimilated in color, together with their often ragged outlines, to dead and tattered leaves ; when the butterfly is resting on the ground or in bushes among the dead leaves, it is difficult to distinguish. On the other hand the upper side of the wings are conspicuously marked with reddish hues and conspicuous bars. In the light of the Thayer theory these mark¬ ings, although conspicuous, became meaning¬ less bits of color in harmony with the environ¬ ment, and thus afford practical concealment. Certain moths, when resting on the lichen- covered bark of trees, are wonderfully similar

to the surroundings, and are thus protected from the attacks of birds or lizards. In the Arctic regions and in Labrador certain butter¬ flies and moths are of the color of lichen- covered rocks, so much so that when at rest they are difficult to detect.

Special Protective Resemblances. — The most striking examples are the measuring- worms, or geometrid caterpillars, which, when holding themselves out straight and stiff, re¬ semble twigs, not only in shape, but in color and markings ; and still more wonderful are those species whose bodies are provided with tubercles which in shape resemble the leaf-bud and other excrescences in the back of the twigs. How to account for the origin of such pro¬ tuberances is a puzzle. The stick-insect is an¬ other example; though not common with us. and supposed to be well protected from the bills of birds, yet in the East Indian Archipelago they are said to be the principal food of one kind of bird. Another example is the famous leaf-insect (phylliiim) of Java, in which the wings are very broad, thin and marked with veins like the mid-rib and side-ribs of a leaf. Such instances as these are cited as buttresses to the Thayer theory of concealment.

Recognition Marks. — By Waller and others the stripes of the African antelopes, the up¬ turned white tail of the rabbit and hare, and the bars and other conspicuous markings of birds that fly in flocks, are regarded by some as recognition marks, but others consider that this is rather fanciful and that they are pro¬ tective alone.

Warning Colors. — Certain animals, of which the skunk affords an example, are so marked as to be easily distinguished by their enemies, which, knowing by experience their offensive nature, pass them by. Hence the con¬ spicuous stripes of the different species of these animals in the New World. There are many cases of brightly colored caterpillars which are avoided by birds and lizards which greedily devour green ones. The conspicuous red, blue and purple spots and stripes are ad¬ vertisement of their inedibility. In Nicaragua, Belt observed that while ducks and fowl fed on ordinary green frogs, a small species gorgeously colored with red and blue was avoided. On offering one to ducks and fowl they all refused to eat it, except one young duck, which took the frog in its mouth, only to drop it, going about jerking its head as if the taste of the frog was nauseous. Although these striking markings are supposed to be the result of natural selection, Eisig's theory that the abundant secretion of pigment is the cause of the distastefulness seems better grounded. Indeed a large number of cases of protective mimicry seem due to the direct action of light and warmth in bringing about the varied hues of the pigment — moreover the

range of pri¬ mary colors is not very great, and the hues are apparently due to the action of the environ¬ ment, so that we need not, in most cases at least, invoke the somewhat fanciful hypothesis of Wallace, Poulton and others to account for these resemblances. As Eisig claims, the abun¬ dant secretion of pigment has caused the in¬ sects to be inedible, rather than that the bad taste has caused the production of bright colors as an advertisement or warning signal.

Insects Attracted Rather by the Odors of Flowers than Their Colors. — It has been argued by Lubbock and others that the colors of flowers attract insects, and that the gay lines and stripes leading down to the bottom of deep corollas are guides to the nectar. At present this view has been stoutly opposed by Plateau, after many observations, who thinks that the color of flowers has no connection with the visits of insects, but that they are attracted by the odor of the nectar. He finds that any flower is freely visited if it be nectariferous, no matter how colorless or inconspicuous it may be. Many gay flowers are wholly avoided by insects, but on placing nectar at the base of such flowers insects were at once attracted. It appears from Plateau's observations that color is not a primary factor in attracting in¬ sects to flowers. Though bright blossoms are undoubtedly seen by insects from a distance, when they once reach the flowers it is a matter of indifference to them what their color is — blue, red, yellow, green or white — if they differ from one another in no other respect. Consult Beddard, F. E., (Animal Coloration) (New York 1895) ; Newbigin, M. I., (Color in Nature} (London 1898) ; Poulton, E. B., (The Colors of Animals> (New York 1890) ; Thayer, G. H., (Concealing Coloration in the Animal Kingdom > (New York 1909) ; Wallace, A. R., Natural Selection and Tropical Nature) (New York 1895) ; also works by Lubbock, Plateau, Coste, Urech, Eimer, Hopkins, Weismann, Tenneck.

COLORIMETER, an instrument for measuring the depth of color in a liquid by comparison with a standard liquid. They are of three general types, based upon the three variables in the intensity of colored solutions : (1) the quantity of coloring matter required to make the match; (2) the volume of the solvent in which it is held; (3) the thickness of the solution through which the light passes before it reaches the observer's eye. These principles are applied (1) when two solutions are brought to agreement in color by the addition of color¬ ing matter; (2) when the match is effected by dilution of one of the two solutions; (3) when the solutions are made to match by changing the thickness through which the light beyond is forced to pass. The form most commonly in use is of the second type. It consists of two long, narrow glass tubes placed side by side on a stand. The standard liquid and the one in question are poured, in equal quantities, one into each tube ; and water is then added to the darker till its tint becomes the same as the other. The amount of water used is a measure of the depth of

color in the given liquid. The White colorimeter is the principal exponent of the third class. It consists of two hollow wedges of glass placed side by side, and ar¬ ranged so that one may slide up and down on a bar upon wffiich is marked a scale. The solution to be measured is placed in one of the wedges and the standard solution in the other. Both are viewed through a horizontal slit. The wedge containing the standard is raised or lowered until the color is matched, and the scale is read.

Another type of colorimeter is employed to measure or test the colored light reflected from opaque bodies. The Ives colorimeter is of this type. It consists of a hollow box about 3

by 4 inches and 20 inches long, with a viewing lens at one end, a diffraction grating, and at the farther end lenses and slits which can be ad¬ justed. The field of view is divided by means of a diaphragm so that the light to be tested appears in the upper half while the lower half is lighted by a mixture of red, green and blue- violet rays from the grating. The slits through which the color rays come are opened or closed as the case may require, and the analysis is read on the three color scales. A new (1912) pre¬ cision colorimeter constructed for the United States Bureau of Standards measures the wave length of the color which is to be tested. The instrument is so arranged that colored rays taken from a spectrum are mixed with white light to match the unknown hue ; or, in the case of purples, the rays from the spectrum are mixed with the unknown to make white light. The instrument is operated through the use of a Lummer-Brodhum photometer cube.

COLORING, one of the essential parts of painting — namely, that part which relates to colors. Besides a knowledge of the art of pre¬ paring and mixing colors, and the whole me¬ chanical process from the beginning to the fin¬ ishing of a picture, which in the various kinds of painting varies according to the ma¬ terials of each, coloring comprehends the knowl¬ edge of the laws of light and colors, and all the rules deducible from the observation of their effects in nature, for the use of the artist. This subject has been treated by Leonardo da Vinci in his work on painting; Lomazzo and Gerard Lairesse in books on the same subject; Mengs in his (Praktischer UnterrichU ; Goethe in his (Farbenlehre) ; etc. The skill of the painter presupposes a natural ability founded on su¬ perior sensibility — namely, the ability to image forth, and to express with characteristic truth, the peculiar substance and color of any object under the influences of the light and air. With the limited range of pigment colors at his dis¬ posal, bounded at one end by the dead white of a piece of white paper, many

degrees darker than a sunlit cloud, and at the other end by a flat black many degrees lighter than a piece of black velvet, the artist's work becomes prac¬ tically a translation from nature, instead of an imitation. For if the colors of nature were re¬ produced faithfully, her effects would be lost through the limited scale of expression avail¬ able. The skill of the artist is exhibited in so adapting his translations of local colorings that the effects of nature are virtually reproduced in colors so correct relatively to the other colors of the painting that they are recognized as eminently truthful. To make this translation successful, accurate attention to the relative values of the local tones and tints is requisite. By local tones we understand the natural color of an object as it appears on the spot where it stands, or from the spot where the spectator is supposed to be stationed. In works of art the natural color of an object appears always as a local tone, because every object, must be re¬ garded from only one point of view, conform¬ ably to which the natural color is modified ac¬ cording to the supposed distance. By tints we understand, in a more restricted sense, the gradations of the clear and obscure which lights and shadows produce on the colored surface. In no object of art do these modifications and shades exist in greater delicacy and diversity

than in the human face, which is consequently the most difficult subject for a painter. Color¬ ing, in as far as it is an imitation of the color and character of flesh (the naked body), is called carnation (q.v.). If, in addition to the skilful translation of the natural colors, local tones and tints of its original, the artist also ex¬ presses in his work the peculiar character of the substance of which the object consists, the coloring is called true. But to truth should be joined beauty, which is attained by the har¬ monious union of all the tones of the painting into one dominant tone. The coloring must conform to and promote the object of the painting as a work of art, and by the harmony of the colors and lights, as well as by the truth of the local colors, and of the individual parts of the subject, constitute one beautiful whole. In the choice of lights and the distribution of colors the artist should aim not only at clear¬ ness of representation, but at the same time at the production of a pleasing harmony, which should aid the general impression of the work. Consequently harmony and chiaroscuro are comprised in the idea of correct, beautiful color¬ ing. We often see pictures in which the colors are true to nature but which have little merit and are deficient in a harmonious union of ex¬ cellences.

COLORING MATTERS. This name ought to include every substance, organic or in¬ organic, which is the cause of color in another, but in practice it is restricted to the natural coloring matters of vegetables and animals, and to the dyes that are used for coloring fabrics. The reason of this restriction probably is that these coloring matters are distinctly different from the tissues or fluids which contain them, whereas the color of

a mineral is not in general due to a separable body, but is peculiar to the mineral itself. It is impossible, for instance, to take away the blue color of a copper compound, or the green or yellow of one of chromium. In the mineral world the analogy to the coloring of plants is found rather in rocks; for example, in a sandstone colored with oxide of iron, where the coloring matter may be removed without the rock mass being destroyed.

The organic coloring matters derived from vegetables are both important from their uses in the arts and interesting from their character and decompositions. They may be divided into two classes, those which exist ready formed in the plant, and those which are obtained by the spontaneous or artificial decomposition of some principle in the plant. Of those belong¬ ing to the first class, chlorophyll, the green coloring matter of leaves, and the different colors in flowers, are the most obvious. Those however, which are used in the arts are not at first sight apparent, being contained in the seed, bark, stem or roots, from which they can be extracted by water, alcohol, ether, dilute alkalis, etc. The second class includes bodies which re¬ sult by oxidation or other chemical change from some usually colorless matters, to which the name ˆchromogens,® color-producers, has been given ; and, indeed, the question has been raised whether all coloring matters, even in plants, have not been produced from prior chromogens. Although coloring matters have been subjected to numberless investigation by chemists, very little is known about their real constitution. Coloring matters are generally odorless, with a

rough taste, soluble, some in water, others in alcohol. Indigo and alizarine can be sublimed but most are decomposed by a comparatively slight elevation of temperature. They all con¬ sist of carbon, hydrogen and oxygen, to which in some cases nitrogen is added. Some exhibit a weak acid tendency, combining with the oxides of lead, copper and especially tin, iron and aluminum, and forming insoluble colored compounds called ((lakes.)) Some have the power of attaching themselves permanently to different vegetable and animal fibres, as silk, wool, cotton and linen ; others are unable to give a color which will not redissolve in water; in such cases the fibre is mordanted, that is, treated with one of the metallic oxides just mentioned, and then, when immersed in the color, the insoluble lake is precipitated in the fibre. Many coloring matters are liable to change by exposure to daylight ; they are also affected by a number of chemical reagents — certain blues, for example, are turned green by alkalis, and red by acids ; they are destroyed by nitric acid, bleached by chlorine, decolorized, but not always permanently destroyed, by sul¬ phurous acid, sulphuretted hydrogen, etc.

Of the vegetable coloring matters the yel¬ lows are the most abundant, and different shades are obtained from different plants: fustic, turmeric, quercitron, Persian berries, morindin, saffron, arnotto, purree, chrysophanic acid and others ; of the blues, indigo and litmus are the most familiar; and of the reds and purples, madder, logwood, Brazil-wood, safflower and a few more. Most of these colors require com¬ plicated operations to separate them in the pure state.

The only green coloring matter known, of no importance as a dye, but indispensable to the life of the plant, is chlorophyll. It was for¬ merly supposed to be a simple substance. It was obtained from an alcoholic extract of leaves by adding lime, then decomposing the lime-chlorophyll compound with an acid, and agitating with ether, from which the chlor¬ ophyll was got by evaporation. But by another process it was found that it could be separated into two bodies, one yellow, the other blue ; and by the application of the spectroscope, Stokes showed that chlorophyll contains four coloring matters, two yellow and two green, differing in optical properties. By further study in the same direction Mr. Sorby thinks he has proved that besides the greens there are four or five distinct yellow coloring matters, to which he has given special names. It is quite obvious, if this be so, that our knowledge of the nature of chlorophyll is just beginning, for each col¬ oring matter will become an object of chemical and physiological investigation, and not till then will it be possible to say how chlorophyll is produced and acts in a plant. Experiments have been recently made to elucidate precisely the fading of chlorophyll when exposed to light, a change which is accompanied by altered spectrum bands, but in their present state they are too inconclusive to be detailed here.

The chief animal coloring matters are those of the blood, the bile, the urine, the retina, of the muscle and of the skin. The blood's color¬ ing matter is the well-known hemoglobin, while the pigments of the bile, bilimbim and its oxida¬ tion product, biliverdin, are derived from the blood pigments. Biliprasin and fuscin, bilicy-

anin, bilipurpurin and bilixanthin, are other bile pigments. They may be regarded as various products of oxidation and reduction of the ini¬ tial bile pigments. Urochrome is the general name applied to the urinary pigments. Its exact composition is by no means definitely under¬ stood. In the retina there are a number of pig¬ ments or chromophenes. They are mostly lipochromes, or fatty pigments, and have been named rhodophane, chlorophane and xantho- phane, these being red, green and yellow re¬ spectively. There is a further black pigment in the eye, fuscin, allied to the melanins of the skin and hair. The muscle pigments are identi¬ cal with the blood pigments. The skin pigments belong to a group known as the melanins. It is undecided whether these are iron pigments or not.

The artificial coloring matters may be di¬ vided into two classes, those which exist ready formed in nature, as many of the common red and brown earths, or which are formed by the mechanical mixture of such naturally existing colors, and those which do not exist in nature, but are produced by chemical operations. The latter are of mineral or of organic origin, ex¬ amples of the first class being afforded by Scheele's, Guignet's and other greens, artificial ultramarine, smalt and many others, and of the latter by Prussian blue and especially by the aniline colors. The artificial colors are more particularly described in the articles Coal-Tar Colors ; Dyes ; Pigments.

COLORS, in the army, the flags carried by each dismounted regiment. The correspond¬ ing flags of mounted units are called standards. They differ from colors in size alone. Each British infantry battalion (formerly regiment) except rifles carries two colors, the royal or first color, and the regimental or second color ; neither of these is now carried into battle. They are carried by subalterns and formerly were guarded by the respective chief non-com¬ missioned officers of the companies, the color- sergeants. At present there are no color-ser¬ geants. Each United States regiment or sepa¬ rate battalion carries the national and the regi¬ mental color or standard, the latter of the corps color, bearing the regiment's number ; they are carried by non-commissioned officers, the color- sergeants, and guarded by two privates. In the navy the term colors is applied only to the national flag.

COLORS. See Coal-Tar Colors.

COLORS IN ART AND SYMBOLISM.

When a connoisseur examines an Oriental rug he takes into consideration the symbolic intent of the color scheme as well as of the motifs depicted. He remembers that, to the Moham¬ medan, green is a sacred color and must not be trodden on. Collectors of Chinese ceramics in examining examples claimed to belong to a certain reign in the Ch'ing Dynasty have to bear in mind that yellow was for some time in that Dynasty an Imperial color and its use strictly forbidden except for the Imperial court. Hence any other than the finest art work appearing on such a piece of porcelain containing yellow in its decorative composition proves it to have belonged to some other pe¬ riod. But while symbolism generally origi¬ nated in the East its antiquity in and among the European peoples dates very far back. And the arts, both profane and ecclesiastical, have

used colors with symbolical intent almost uni¬ versally.

White. — As symbol of innocence and purity white has been adopted over a large portion of the globe even during prehistoric days. In pagan times we find it as symbol also of light, and the Druids in white robes sacrificed white oxen to the sun ; the head of Osiris of the Egyptians wore a white tiara. The Romans dedicated white to Jupiter (god of light), and on the first day of January the consul, robed in white and mounted on a white horse, rode up to the Capitol to celebrate the triumph of Jupi¬ ter over the spirits of evil; the priests of Jupi¬ ter wore white vestments and the victims sac¬ rificed to that god were white. The Greek priests sang sacred chants in white robes. In antiquity white was dedicated to the dead and was sign of mourning, and this remains so to this day with the Persians, Chinese and Indian Mohammedans. In old biblical lore white vest¬ ments were symbolical of the soul's regenera¬ tion and a recompense of the elected. Early Christian artists depicted God the Father draped in white and Jesus was pictured in white robes after the Resurrection. The dead were swathed in white and Pythagoras called the practice a happy presage of immortality. Aaron, the Jewish high priest, was commanded to wear a white garb in the sanctuary. In Christian art, white being considered emblem of innocence and purity, lilies are found in pictures of the Immaculate Conception ; it was for the same reason that some monks and nuns of the Christian Church wore white robes. The Magi were robed in white. In Christian iconography white is represented by the dia¬ mond or by silver as emblems of light, inno¬ cence, virginity, faith, joy and love. But white roses opposed to red ones signified death, rest, killing of inordinate desires.

Black. — In pagan antiquity black repre¬ sented the underworld. Black, as <(the nega¬ tion of colors® is symbolic of death, darkness and evil, also of falsehood and error, sorrow and vice. The illuminators of the Middle Ages represented Christ draped in black while wrestling with the Spirit of Evil, and in the 12th century, in Byzantine art, the Virgin Mary often has a black complexion symbolic of woe. Black for mourning and mortuary color is a very ancient tradition. Georgius writes : (

Violet. — The Roman Catholic Church con¬ sidered violet and black so closely allied as to use them indiscriminately for one another on days of mourning and fasting. Violet cloth¬ ing was worn by cardinals and old women and was an acknowledgment of old age.

Purple. — To the Tyrians (whence came the purple dye) and Romans a purple robe or

band of purple signified authority; it became the Roman symbol of majesty, and its use was allowed only for royalty and for persons in high office or for priests.

Blue. — Eusebius tells us blue was the color of the clothing of the gods, especially of Juno (Queen of the Heavens). In Christian art light blue (sky-blue) was symbol of divine eternity and human mortality, hence was used as a mortuary color. The coffins of the young were covered with blue cloth and the mortuary cloth was of this color ; a red and a blue pall, one over the other, signified divine love, raising the soul to immortality. The baldachin, as emblem of heaven (((canopy of heaven®) was blue beneath, and church ceilings (from the Latin caelum , (

Red. — In symbolism red signifies life, love, passion, fire, heat. It is the color of blood and hence represented anger, war and incendiarism. Red lions, foxes, squirrels were sun and fire symbols. In Christian art red represents, op¬ posite attributes; it is sign of burning zeal for the faith, of energy and courage, also of cruel¬ ty and guilt of bloodshed. The Israelites stained their door posts with red as a sign that the Avenging Angel should allow life to its dwellers. Red is the prominent color in Pas¬ sion Week and on Good Friday. Rose-color sig¬ nifies divine wisdom with the Buddhist and Mohammedan. In modern times red is sym¬ bol of revolution and anarchy. Red flowers are love signs.

Yellow. — This color very generally signifies envy, hate, quarrelsomeness. In Christian art yellow was symbol of the sun, also of the good¬ ness of God, of marriage and initiation, faith and fruitfulness. In Christian iconography we find the illuminators and miniature artists of the Middle Ages depicted Saint Peter in a yellow robe as faithful guardian of the Church. Yellow has been symbol of treason, hence in France the doors of traitors were daubed with yellow and Judas is often found clothed in .yel¬ low in pictures. In some countries the Jews, for betrayal of the Lord, were enforced to wear yellow clothing. In Spain the executioner wears yellow or red, the former indicating treason of the victim and red its punishment. In heraldry yellow is symbol of love, constancy and wisdom, or in opposition, inconstancy, jeal¬ ousy and adultery. The Japanese consider golden yellow symbol of the sun, riches, joy, etc., hence their chrysanthemum fete. Yellow was a Chinese symbol of royalty, also of high office under royalty, hence the gift of the (

Green. — To the ancient Egyptians this color was symbol of hope, growth, joy of spring. In the Middle Ages green became sym¬ bol of unripeness, as green youth, also of poi¬ son, hence dragons and snakes were painted green. Green was supposed to be good for the eyes, and Theophrastus wrote that emeralds were mounted in rings for persons with bad sight to be looked at by them. To the Moham¬ medan green is a sacred color and

symbol of immortality. In modern times green has come to signify envy.

Brown. — With the ancient Egyptians brown was dedicated to Typhon and in olden times was generally a sign of mourning. Compound¬ ed of red and black, this color has been also symbol of treason and evil deeds. In monastic robes it signified renunciation. The Moors considered it emblem of evil, and in Christian art, brown, the color of the dead leaf, symbol¬ ized spiritual death.

Gold. — In Christian art, when used as a background, gold meant majesty of the subject depicted; it was also used for the nimbi of saints as <(glory.® Gold signifies purity, dignity, wisdom and glory.

Orange. — With the Buddhists and Moham¬ medans orange is the color symbolizing sor¬ row.

Clement W. Coumbe.

COLORS OF FLOWERS. See Flower; Flowers and Insects.

COLORS OF THIN PLATES. See In¬

terference.

COLOSS2E, kd-los'e, an ancient city in Phrygia, situated on the Lycus, a branch of the Maeander. Colossae had disappeared by the Middle Ages, and it is uncertain whether it was superseded by the town of Chonae in its neigh¬ borhood, or whether Chonae was Colossae with only a change of name. It was first mentioned by Herodotus, Xerxes passed through it on his march to Sardis, 481 b.c., and it was a place of considerable mercantile importance in the time of Strabo. One of Paul's epistles was ad¬ dressed to the Colossians, from which it is known that Colossae was the site of one of the early Christian churches. Consult Ramsay, (Cities and Bishoprics of Phrygia> (Vol. I,

1895).

COLOSSAL CAVERN, The. A large cave discovered in 1895, the entrance to which is about one and a half miles distant from the entrance to the Mammoth Cave, of Kentucky. On account of its immense size and the varied character of its formations, the Colossal Cav¬ ern is a most worthy rival of the Mammoth Cave. The Louisville and Nashville Railroad Company purchased the Cavern in 1896; ac¬ quired the land under which its course was found to run, and widened narrow passageways, smoothed rough places, built stairways and did many other things to make exploration easy. There are four separate entrances to the Cav¬ ern, only one of which (an artificial entrance) is used by visitors. Among the attractions of the Cavern are Colossal Dome, 135 feet high, which is the

most symmetrical as well as one of the largest domes known-; Vaughn's Dome, 78 feet in height, which is approached through a magnificent canyon, about 300 feet in length ; the Twin Pits, 65 feet deep; the Lover's Gal¬

lery, 400 feet long; the Ruins of Carthage, 400 feet long and 100 feet wide; Pearly Pool; Pul¬ pit Rock, and Dining Room.

COLOSSEUM. See Coliseum.

COLOSSIANS, Epistle to the. An

epistle of the Apostle Paul addressed to the ((Saints and faithful brethren who are at Colos¬ sae.® Colossae, though 100 miles east of Ephe¬ sus and less important than the adjacent Lao- dicea (Col. ii, 1) and Hierapolis (iv, 13) in the Lycus Valley, yet lying like them on the great trunk road which joined the .TEgean with Syria, was in living communication with <(all the [Roman] world® (Col. i, 6). Paul the apostle may have passed that way from (

The content of Paul's gospel to this Gentile population (Col. i, 27) may be divined from his contemporary first Corinthian epistle, in which his characteristic stress is laid upon the trans¬ cendent and cosmic rank of Christ, as sole di¬ vine agent in all creation (1 Cor. viii, 6) and upon his unique redemptive function through his incarnation, death and resurrection (1 Cor. xv, 1-4; i, 23-24, 30; vi, 11). The apostle's foreboding that after his departure from Asia some of his own converts would ((speak per¬ verse things to draw away the disciples after them® (Acts xx, 30) was to be realized in Co¬ lossae. His failure to visit the valley churches, a natural local jealousy toward Epaphras and scant regard for his teaching ability, gave an ambitious leader (note singular number in ii, 4, 8, 16, 18) an opportunity to promulgate an alleged higher type of doctrine, with syncre-tistic elements of ultimate Jewish (ii, 14, 11, 16), and perhaps Grecian (ii, 8, 23; i, 26; ii, 3), Phrygian (ii, 12) and Oriental (i, 16) origin. The new teaching, harmonizing with the in¬ herited prepossessions of Gentiles but newly won to the Christian faith, and addressed not to the common herd but to persons flattered as possessed of superior intelligence, made a head¬ way which Paul's unlearned sponsors found themselves powerless to arrest. They felt that no less potent a reasoner than he of the school of Tyrannus, now unfortunately a prisoner in distant Rome, could cope with the subtle and sinister propaganda. Epaphras, therefore, takes the bold venture of an arduous and per¬ chance futile journey all the way to the im¬ perial capital. He finds the apostle still among

the living and prepared to meet the dire emer¬ gency in the valley churches. Tychicus, pos¬ sibly an abler representative than Epaphras, is armed with oral instructions and dispatched with a circular letter (our so-called ((Ephe- sians®) to ((the churches of Asia® (1 Cor. xvi, 9), a second letter to the Colossian church deal¬ ing with the heresy, and a personal letter to Philemon, together with a ((living epistle® (2 Cor. iii, 2) in the person of the latter's con¬ verted runaway slave, Onesimus (Col. iv, 7-9; Eph. vi, 21; Philem. 10-16).

Paul's method in refuting the false teach¬ ing at Colossae is to renew his earlier emphasis upon the transcendence and imma¬ nence of the crucified and risen Christ Jesus (Col. i, 15-17) as taught in the school of Ty- rannus (1 Cor. xv, 1-4; viii, 6; iii, 23). He whom they have <(received as Lord® (Col. ii, 6) is One <(who is before all things,® ((through whom and unto whom all things have been created,® and <(in whom all things consist® (i, 16-17), who therefore is ((all, and in all® (iii, 11) and ((in them, the hope of glory® (i, 27). After the opening salutation, thanksgiving for their Christian graces of faith, love and hope, and prayer for their deeper spiritual knowledge and for life worthier the indwelling Christ, he sets forth in the doctrinal section (i, 13— ii, 3) the pre-eminence of Christ as Redeemer from sin, unique revealer of God, creative agent and sustainer of the universe, including every rank of intermediate beings (i, 13-17) ; and as cruci¬ fied and risen Head of the Church, the sole divine mediator for restoring harmony in heaven and earth, through the Gospel divinely entrusted to Paul for them and all Gentiles of every class and condition (i, 18— ii, 3). The polemical section following (ii, 4 — iii, 4) con¬ trasts the sufficiency of Christ's gospel with the insufficiency of the false teaching. Cleav¬ ing to Christ and his gospel, they are to accept no false human philosophy as a substitute (ii, 4-8) ; for in him dwells the whole living om¬ nipotent Deity, as in no lesser being, to meet every human need (ii, 9-10) ; to raise them with himself from the corruption and death of sin to the life of obedience, to put an end to the servitude of the Mosaic law and of the powers of evil (ii, 11-16). The new ceremo¬ nialism is shadow: but Christ is substance; its worship of angels a fiction of the imagination, replacing personal and vitalizing union with Christ, the living Head; its ascetic rules a pitiful substitute for ethical death and victor¬ ious life with Christ over the power of the flesh (ii, 20— iii, 4). The hortatory application follows: Put off the old nature: put on Christ! (iii, 5-iv, 6). United to Christ they are to reproduce His own death to the world and its vices (iii, 5-11), His life of love and joyous service to God and man (iii, 12-17) ; in their homes they are to incarnate His spirit (iii, 18- iv, 1) and live His life of prayer for the ex¬ tension of His gospel (iv, 2-6). The personal conclusion (iv, 7-18) contains a reference to Tychicus and Onesimus, salutations, instruc¬ tions as to exchange of epistles with the Laodiceans and the autograph signature.

Bibliography. — Critical discussions of the problems of authorship, vocabulary, style, rela¬ tion to Ephesians and the Colossian heresy may be found in the New Testament

B. Weiss (1897), H. J. Holtzmann (1892), Jiilicher (Eng. tr., 1904) ; W. Sanday's article in Smith's (Bible Dictionary) (2d ed., 1893) and detailed exegesis in the commen¬ taries of J. B. Lightfoot (1875), H. von Soden (1893), A. S. Peake (1903), Haupt (Meyer

1897).

Marcus D. Buell,

Professor of New Testament Greek and Exe¬ gesis, School of Theology, Boston Univer¬ sity.

COLOSSUS, ko-los'us, in sculpture, a statue of enormous magnitude, from which our adjective colossal is derived. The people of the East from the most ancient times have been celebrated for colossal sculpture. The pagodas of China and of India and the excavated cav¬ erns of the East abound with colossi of every description. The Asiatics, the Egyptians, and in particular, the Greeks, have excelled in these works. The celebrated colossus of Rhodes was reckoned one of the seven wonders of the world. It was raised by the Rhodians in honor of Apollo. Strabo, Pliny and other ancient authors who lived at the time that the colossus of Rhodes is said to have been in existence have given its height as 70 cubits, or about 105 feet. Other authors who flourished since its destruction report its height at 80 cubits. The statue stood at the entrance of the harbor of Rhodes, but there is no authority for the state¬ ment that it bestrode the harbor mouth and that the Rhodian vessels could pass under its legs. Of other colossal statues of ancient times the most celebrated are the Olympian Zeus and the Athena of the Parthenon, both the work of Phidias. The virgin goddess was represented in a noble attitude, 26 cubits or 39 feet in height, erect, clothed in a tunic reaching to the feet. In her hand she bran¬ dished a spear, and at her feet lay her buckler and a dragon of admirable execution, supposed to represent Erichthonius. The statue of Zeus was 60 feet high. The earliest colossus re¬ corded to have been sculptured in Rome was the statue of Jupiter Capitolinus, which Spurius Carvilius placed in the capitol after his victory over the Samnites.

Among modern works of this nature are the colossus of San Carlo Borromeo at Arona in the Milanese territory; the four colossal statues at Paris in front of the fagade of the palace of the Chamber of Deputies, representing four of the greatest French legislators; and a statue of Germania, 34 feet high, on a pedeetal over 81 feet high, erected near Riidesheim in com¬ memoration of the unification of the German Empire.

In the United States a figure of ((Lib- erty Enlightening the World,® 151 feet high on a pedestal 155 feet high, has been erected in New York, overlooking the harbor and serving as a beacon. It was the work of the French sculptor Bartholdi, and was constructed mainly through the efforts of a French-American Union formed in 1874. In 1880 it was pre¬ sented by France to the United States, and six years later it was placed on its present site, Bedloe's Island.

The statue of Charles IV of Spain at the head of the Paseo de la Reforma in the City of Mexico is the largest equestrian statue on the American continent and the second largest in the world,

COLOSTRUM, the name given to the first milk yielded after the birth of the young. It differs from ordinary milk in appearance and composition. It contains a larger percentage of ash and total solids than ordinary milk and a greater proportion of albumin to casein, but less sugar of milk. There are also minute fat granules known as colostrum bodies and which are believed to be the debris of the cells of the mammary gland. Colostrum has a purgative effect upon the new-born infant and removes the meconium from the foetal intestine. Colos¬ trum gradually assumes the characteristics of normal milk within a few days after parturi¬ tion.

COLQUHOUN, ko-hoon', Archibald Ross, British colonial administrator, explorer and author : b. off Cape of Good Hope, March 1848; d. 18 Dec. 1915. He entered the Indian Public Works Department in 1871, and was a member of the mission to Siam in 1879. In 1881-82 he explored the proposed railway route between Burmah and China, and was deputy-commissioner of Upper Burmah 1885-89. He was administrator of Mashonaland 1900-02. In 1895 he visited America to explore the Nicara¬ gua and Panama Canal routes. He had trav¬ eled extensively and was the author of numer¬ ous works, including (Among the Shans) (1885); (The Key of the Pacific) (1895);

(China in Transition (1898) ; (The Mastery of the Pacific) (1902); (Germany and Sea Power (1909).*

COLQUHOUN, John, Scottish writer on sport : b. Edinburgh 1805 ; d. 1885. He was educated at the university of his native city. In 1840 he published (The Moor and the Loch, an extremely diverting account of his adven¬ tures as a sportsman. The volume was im¬ mensely popular and an autobiographical pref¬ ace was added to the fourth edition (1878). Other works by him are (Rocks and Rivers* (1849) ; (Salmon Casts and Stray Shots) (1858) ; (Sporting Days) (1866).*

COLQUHOUN, Patrick, English magis¬ trate and advocate of police reform : b. Dum¬ barton 1745; d. 1820. He went to Virginia at an early age and there became a successful merchant. In 1766 he returned to Glasgow, be¬ came prominent in the public affairs of that city, founded the Glasgow Chamber of Com¬ merce in 1782, the oldest institution of the kind in Great Britain. In 1789 he removed to Lon¬ don, where in 1795 he issued his (Treatise on the Police of the Metropolis, in which he ad¬ vocated a complete reform of the London police system. Many of his recommendations were adopted subsequently by the authorities. In 1798, having come into notice through the inauguration of important municipal reforms, he was appointed magistrate at Westminster. Other works by him are (System of Educa¬ tion for the Laboring People) (1806) ; (On In¬ digence* (1806) ; (On the Population, Wealth, Power and Resources of the British Empire) (1814, 2d ed., 1815).*

COLQUITT, Alfred Holt, son of Walter T. Colquitt (q.v.), American legislator: b. Walton County, Ga., 20 April 1824; d. Wash¬ ington, D. C., 26 March 1894. He was grad¬ uated at the College of New Jersey in 1844 and settled in his native State as a lawyer. He served in the Mexican War, and was elected

to Congress in 1852 as a Democrat. Upon the outbreak of the Civil War he entered the Con¬ federate army as a captain and rose rapidly to the rank of major-general. He was governor of Georgia in 1876-82 and United States sena¬ tor in 1882 and in 1888.

COLQUITT, Walter T., American law¬ yer: b. Halifax County, Va., 27 Dec. 1799; d. Macon, Ga., 7 May 1855. He was educated at Princeton; was admitted to the bar in 1820; became a district judge in 1826, holding the first court ever held in Columbus, Ga. He was a successful lawyer, and in criminal practice was without a rival in his State. He was a member of the Georgia State senate 1834, 1837 ; a representative in Congress 1839-42 ; a United States senator 1843-55, and a member of the Nashville Convention 1850.

COLT, LeBaron Bradford, American ju¬ rist: b. Dedham, Mass., 25 June 1846. He was graduated at Yale in 1868 and two years later from the Columbia Law School. He practised law in Chicago and Providence, R. I., and from 1879 to 1881 was a member of the Rhode Island House of Representatives. In 1881 he became United States district judge for Rhode Island, and in 1884 was made United States circuit judge for the first judicial circuit. He retired from this office in 1913 when he was elected to the United States Senate for the term 1913-19.

COLT, Samuel, American inventor: b. Hartford, Conn., 19 July 1814; d. there, 10 Jan. 1862. He had a common school education and was

employed in his father's textile mill, but went to sea as a sailor when 15. His attention being drawn to firearms while at sea, he began to perfect a revolver and patented it in 1835. Its great success led to the erection by him at Hartford of one of the most extensive weapon factories in the world. Among his other in¬ ventions are a battery for submarine harbor defense, and the first submarine telegraph cable.

COLTMAN, Robert, Jr., American physi¬ cian: b. Washington, 19 Aug. 1862. He was graduated at . the Jefferson Medical College, Philadelphia, in 1881 and began the practice of medicine in the same year. In 1896 he became professor of anatomy at the Tung Wen Col¬ lege, Peking, and in 1898 was appointed pro¬ fessor of surgery at the Imperial University of the same city. He was appointed foreign correspondent of the Chicago Record in 1900, to which he sent out during the siege of Peking by the Boxers the first message that reached the outside world. He is now the representa¬ tive of the Standard Oil Company of New York at Pekin, China. He published (The Chinese, their Present and Future: Medical, Political and Social) _ (1891), and (Yellow Crime, or Beleaguered in Peking) (1901).

COLTON, Arthur Willis, American writer: b. Washington, Conn., 22 May 1868. Pie was graduated at Yale in 1890, held the Foote scholarship there 1890-93, and was in¬ structor in English literature 1893-95. Since 1895 he has devoted himself to writing, and his stories, essays and verse have appeared in the Atlantic Monthly, Scribner's, Harper's and other magazines. In book form he has pub¬ lished (Bennie Ben Cree) (1900) ; (The Debat¬ able Land (1901) ; (The Delectable Moun- tains) (1901); (Tioba, and Other Tales)*

(1903); (Post Argent5 (1904);

(Harps Hung Up in Babylon5 (1907). In 1906 he . became librarian of the University Club, New York.

COLTON, Charles Henry, American Ro¬ man Catholic prelate: b. New York, N. Y., 15 Oct. 1848; d. Buffalo, 9 May 1915. In the schools of that city he pursued his elementary studies, later attended the Latin school con¬ nected with Saint Stephen's Church, and in 1869 began a theological course at Saint Fran¬ cis Xavier's College. After three years he repaired to Saint Joseph's Diocesan Seminary, Troy, N. Y., where he was ordained priest 10 June 1876. He was then made assistant pastor of Saint Stephen's Church, New York, and, in 1886 assumed charge of the church of Our Lady of Mercy, Port Chester, N. Y. In 1887 he was recalled to New York to aid the Rev. A. J. Donnelly of Saint Stephen's. Father Col¬ ton was

named administrator of the parish, and subsequently appointed rector. In 1896 Arch¬ bishop Corrigan appointed him chancellor of the New York diocese and upon Bishop Quig¬ ley's promotion to the archbishopric of Chicago, Ill., the Holy See chose Father Colton to suc¬ ceed him as bishop of Buffalo. He was conse¬ crated in New York by Archbishop (now Car¬ dinal) Farley, 24 Aug. 1903.

COLTON, Gardner Quincy, American scientist: b. Georgia, Vt., 7 Feb. 1814; d. Rot¬ terdam, Holland, 11 Aug. 1898. He discovered the anaesthetic properties of nitrous oxide, or Uaughing gas,55 credit for which is also given to Dr. Horace Wells. He perfected an electric motor in 1847.

COLTON, George Radcliffe, American public official: b. Galesburg, Ill., 10 April 1866; d. 7 April 1916; educated, Knox College, was a ranchman in New Mexico in 1881-86, member of the Nebraska House of Representatives, 1889- 90 and national bank examiner for the district of Nebraska in 1897. He went to the Philippine Islands as lieutenant-colonel of the First Ne¬ braska Volunteer Infantry, organized the cus¬ toms service at Manila upon the American occupation and served with it until 1905, when he went to the Dominican Republic and organ¬ ized the Dominican customs receivership under the modus vivendi between the United States and the Dominican Republic. In 1907-09 he was insular collector of customs for the Philip¬ pine Islands. He drafted and presented to Congress the tariff for the Philippines, enacted by special session of Congress 1909, and also took part in drafting provisions of the Payne Bill relating to free trade between the United States and Philippines. In 1909-13 he was gov¬ ernor of Porto Rico.*

*COLTON, Walter, American writer: b. Rutland, Vt., 9 May 1797; d. Philadelphia, Pa., 22 Jan. 1851. He became professor of moral philosophy and belles-lettres at Middletown Academy, Conn. (1825) ; in 1828-30 was editor of the American Spectator, Washington. In 1845 he went to California, and in Monterey established the first newspaper of the State, called the Californian. He wrote several books of interest, including (Ship and Shore in Ma¬ deira, Lisbon and the Mediterranean5 (1835) ; < Visit to Athens and Constantinople5 (1836) ; *Three Years in California5 (1850) ; Deck*

and Port5 (1850); (The Sea and Sailor5

(1851).

COLTON, kol'ton, Cal., city in San Ber¬ nardino County, 58 miles east of Los Angeles, on the Atchison, Topeka and Santa Fe, the Southern Pacific and other railroads. Great quantities of fruit and vegetables are shipped from here and the city has railroad repair shops, canneries and packing-houses, cement works, flour mills and fertilizer works. The city owns the waterworks and electric-lighting plant. Pop. (1920) 4,282.

COLUBRID.7E, ko-lu'bn-de, a family of snakes, typified by the limited genus Coluber of Linnaeus, which comprises nine-tenths of all living snakes. As arranged by Cope the fam¬ ily contains non-venomous snakes (Aglypha) only, but under Boulenger's more approved sys¬ tem it embraces both the Opisthoglypha and Proteroglypha, which include all the poisonous snakes except the vipers and pit-vipers (qq.v.). Even in the limited sense, a vast majority of snakes, not less than 1,000 species, fall within the family. All are of relatively small size, only a few giants attaining a length of 10 feet, and all have continuous rows of small teeth in both jaws, and none enlarged to serve as poi¬ son fangs. The head scales are large non-im-bricate plates, but the body scales usually over¬ lap, tile-like. They are oviparous or ovovivip- arous and feed on insects, small mammals, birds, etc., though a few, as the king-snake, habitually devour poisonous serpents. Most of them are terrestrial, but some are aquatic and others arboreal. Nearly cosmopolitan in their distribution, but very sensitive to the influence of cold, they are absent from the polar regions, and in temperate climes hibernate during the winter. Many species are found in North America. (See Blacksnake; Cornsnake; Gartersnake; Pinesnake; Watersnake; etc.). Consult books mentioned under Snake, espe¬ cially Cope, (Snakes of North America5 (Ann. Rept. Smiths. Inst. 1898, Washington 1900) ; and Gadow, (Amphibia and Reptiles5 (New York 1901) ; (Catalogue of Snakes of the Brit¬ ish Museum,5 where full references will be found.

COLUGO, ko-loo'go, COBEG O, ko-ba'go, or KAGUAN, ka'gwan, an East

Indian insecti- vore of the only genus of the family Galeo- pitliecidcc, as yet imperfectly known. It is a slender creature about 18 inches long, its body covered with peculiarly sleek fur and provided with a parachute of membrane furred on both sides and extending from the neck nearly to the tip of the tail, by which it is enabled to make long sailing leaps like a flying-squirrel, a fea¬ ture which gives it its technical name, Galeo-pithecus volitans. Like the bat, which the co- lugo resembles in various actions, it is a crea¬ ture of twilight, hanging suspended by its hind legs from branches during the glare of day and seldom venturing forth in the complete darkness of night. It feeds upon leaves, fruit and insects. Consult Moseley, (Notes by a Naturalist on H. M. S. Challenger5 ; Wallace, (Malay Archipelago5 (New York 18691.

COLUMBA, Saint, apostle of the northern Piets of Caledonia and founder of numerous monasteries in the Hebrides and the Scottish mainland: b. 7 Dec. 521 in the territory of the Kinel-Conal, modern Donegal. He was a scion

of the illustrious race of Conal and was thus of kin to the northern princes of Ireland and of the Gaelic princes of Scotland. Whether his name, or surname, Columba, is Latin or a Latin modification of a Gaelic name cannot be deter¬ mined; it appears also in the form Colm (whence the name Malcolm, servant or devotee of Columba) ; and the saint is also known as Columkille (Columba of the churches, or cellae, the c in Gaelic being equal to k), because of the great number of churches and monasteries he founded both in Ireland and in Scotland and the isles. He became a monk in his youth in the monastery of Moville in Donegal, and at the age of 30 was a priest. Among the monas¬ tic establishments founded by him in Ireland are those of Daire-Calgaich (Calgach's oak grove), the site of the famous city of Derry or Londonderry; and Dair-mach (oak of the plain) where now is Darrow. This was the greatest of all his Irish monasteries. It is worthy of note that after his migration to Scot¬ land, he and his immediate successors in Iona exercised jurisdiction over these Irish monas¬ teries. About the year 563, being then under excommunication for the part he had taken in the bloody battle of Cooldrevny, he set sail for North Britain with a band of his monks to preach the Christian religion to the still pagan Piets of northern Caledonia. He was enter¬ tained hospitably by his kinsman, Conal, king of the Scots in Argyll (Airer-Gsedhill, land of the Gael) who gave him for his residence the island in the Hebrides later called I, or Iona and I-Columkille. Having established in Iona a monastery and training-school of mission¬ aries, he crossed over to the country of the northern Piets — the southern Piets had already been converted to Christianity —

and to them preached the gospel with such effect that their king Brude and the whole people embraced the faith. Before Columba's death all northern Caledonia was Christian and monasteries were very numerous whether on the mainland or in the islands. Iona was the mother house, and thence Columba and his successors, abbots of Iona, governed not only the monastic houses but the churches also ; and though there were bishops for the special functions of the episco¬ pate — the ordering of priests, for example, the administering of confirmation, the consecrating of churches and the like — those bishops were subject to the authority of the abbot of Iona, though he was never more than a presbyter in ecclesiastical order. What time was at his disposal amid the many cares of his station, Columba devoted to study and to transcription of the Scriptures. On 8 June 597 he was em¬ ployed in this labor, transcribing the psalm Benedicamus Domino (the 33d in the Septua- gint and the Vulgate, but the 34th in the au¬ thorized English version) ; after penning the words <(Inquirentes autem Dominum non minu- entur omni bono® — they who seek the Lord shall want no manner of thing that is good. ((Here,® he said, ((I must stop ; what follows let Baithen write,® and laid down the pen. At the midnight hour he was in choir for the office of Matins, having come to the church unaided and knelt at the altar; through sleep he in a few moments passed to death. Three Latin hymns are attributed to him, and, in ad¬ dition, some Celtic poems. The story of his life and miracles was told first by Cuimine

Ailbhc, who was also abbot at Iona (printed at London 17S9 and at Paisley 1889). Based on this account Adamnan, the ninth abbot, wrote another (Vita Sancti Columbse) (edited by Reeves, Dublin 1857; J. T. Fowler, London 1894-95). Consult Troup, (Saint Columba; the Lord's Song in a Strange Land} (London

1913).

COLUMBA, or COLUMBA NOACHI,

no-a'ki (Lat. <(Noah's dove®), a small constella¬ tion of stars south of Lepus. and Canis Major, about the time of whose discovery there are different statements. It is generally believed that it was first named by Royer in 1679 or 1680. This is easily disproved by the fact, sel¬ dom noted, that Bayer in his ranometria published in 1603, on the 37th map, just below Canis Major, pictures the dove flying with the olive-branch in its mouth. Dr. Gould states that it was mentioned by Petrus Plancius, an eminent Dutch geographer and teacher of Petrus Theodori. The latter died in 1596. The constellation is known to-day by the simple name of Columba, and is situated between Pup- pis, Pictor, Caelum, Lepus and Canis Major.

COLUMBA, a sub-order of charadriiform birds containing the pigeons, fruit-eating pigeons, sand-grouse, etc. The typical family is Columbidce, or true pigeons and doves. See Pigeon.

COLUMBANUS, kol-um-ba'nus, mission¬ ary and founder of a monastic order, that of the Columban monks, was born in Ireland about 543 ; died in his monastery of Bobbio, in the Apennines, Italy, 21 Nov. 615. The order founded by him was for a while hardly inferior to the order of Saint Benedict in number of monasteries or in the services it rendered to the Church. He was an alumnus of the great mon¬ astery of Benchor or Bangor, in Ulster, and thence in his 45th year he went to France as a missioner, accompanied by 12 young disciples. In France he founded the monasteries of Lux- euil, Arnegray and Fontenay, giving to the monks a rule identical with that of the Celtic monasteries of Ireland. He gave offense to the French bishops by the fashion of his ton- sure and by his observance of Easter in ac¬ cordance with the calculation of the Eastern churches. And his apostolic outspokenness in rebuking the vices of the Burgundian court, the king (Thierry II) and the queen mother (Brunehaut) led to his expulsion from that country. He now decided to cross the Alps and labor as a missionary in Italy. On his route thither he tarried a while among the Swiss, preaching the gospel on the shore of Lake Constance. One of his 12 companions, named Gallus, falling sick, was left behind when the missionary party resumed their travel: this Gallus afterward laid the founda¬ tions in Switzerland of a monastic institute which later was called by his name, Saint Gall (Sankt Gallen) and which was one of the no¬ table centres of monasticisin in Europe. Co- lumbanus, in 612, founded the great monastery of Bobbio in the Apennines, giving to the monks of that house, which soon was recog¬ nized as the mother-house of a multitude of abbeys and monasteries, a rule of great auster¬ ity. The keynote of it is implicit, unquestion¬ ing obedience in all things to the abbot or su-

penor. It prescribes perpetual silence save where speech is absolutely necessary. The use of animal food of all sorts is interdicted. The monks are allowed one meal daily, taken at eventide, and it consists of vegetables and bread. The monks of his monasteries, called Columbans, came under the Benedictine rule in the 8th century and the Columban order was merged in the Benedictine. Columbanus was a man of learning, acquainted not only with the Latin language current in his time, but with the classic Latin authors, as also with the He¬ brew and Greek languages. He left a few writings, all in Latin; they have all been pub¬ lished more than once. They comprise his Monastic Rule (Regula Ccenobialis) ; a few poems of considerable merit ; 16 brief sermons and several letters of value for

ecclesiastical history. A town in Lombardy, San Colomb- ano, perpetuates the memory of this Celtic mis¬ sionary to Italy.

COLUMBIA, the popular name of the United States; derived from Columbus and ap¬ plied to the greatest nation of the New World from a feeling of poetic justice to the memory of its great discoverer.

COLUMBIA, British. See British Co¬ lumbia.

COLUMBIA, District of. See District of Columbia.

COLUMBIA, Mo., county-seat of Boone County, situated 10 miles north of the Missouri River, on the Wabash and the Missouri, Kan¬ sas and Texas railroads. It was first settled in 1815 by Kentuckians and is governed by a mayor and a council of eight members, who are elected semi-annually. The city has four banks with a combined capital of $370,000. Co¬ lumbia has many public and educational insti¬ tutions, including Missouri University, Missouri State Farm and Experiment Station, Parker Memorial Hospital, Stephens Baptist College for Women, Christian College for Women, Co¬ lumbia Normal Academy, Columbia Business College, University Military Academy and high school. Its industries include flour and plan¬ ing mills, grain elevators, a packing plant and a shoe factory. Pop. (1920) 10,379.

COLUMBIA, Pa., borough, in Lancaster County, on the Susquehanna River and on the Pennsylvania and the Philadelphia and Read¬ ing railroads, about 26 miles southeast of Har¬ risburg and 80 miles from Philadelphia. The place, originally called Wright's Ferry, was founded in 1726 by Quakers from Chester County. Columbia was one of the places pro¬ posed, in 1789, for the capital of the United States. The bridge, which connected Columbia with Wrightsville, was burned in 1863, to pre¬ vent the Confederate forces from proceeding to Philadelphia. A fine bridge, one of the longest in the United States, has taken the place of the old one. Columbia is an industrial and trade centre of considerable importance. The chief manufactures are foundry and machine- shop products, boilers and engines, flour, beer, wagons, glass, automobiles, shirts, silk, lace and lumber. The United States census of manufac¬ tures for 1914 showed 61 industrial establish¬ ments of factory grade, employing 2,315 per¬ sons, of whom 2,140 were wage earners, re¬

ceiving annually a total of $824,000 in wages. The capital invested aggregated $3,513,000, and the yearly output was valued at $3,341,000: of this, $1,486,000 was the value added by manu¬ facture. It has three national banks, a high school, a state armory and the value of its tax¬ able property is about $3,000,000. Pop. 11,454.

COLUMBIA, S. C., State capital, and county-seat of Richland County, situated in the centre of the State, on the east bank of the Congaree River,

at the head of navigation, two miles below the junction of the Broad and Saluda. It is on the Atlantic Coast Line, the Seaboard Air Line, the Southern and the Co¬ lumbia, N. and L. railroads, 129 miles north¬ west of Charleston, 82 miles northeast of Au¬ gusta, Ga., and 153 miles north of Savannah.

Topography. — Columbia is one of the hand¬ somest cities of its size in the country and in a district noted for sanatoria. It is built on a sand-hill plateau which forms a bluff 100 feet high at the river and sloping away on all sides, giving excellent drainage. The streets which are 100 feet wide are at right angles to each other, and there are four avenues 150 feet wide radiating from the capitol. All the chief streets are boulevards, with handsome shade-trees not only along the sides but in the centre. There is also a fine park.

Public Buildings. — • The business buildings are rapidly increasing in size and architectural beauty. The granite State-house, costing $4,000,000 and modeled on the capitol at Wash¬ ington, is one of the most imposing in the South and one of the handsomest in the coun¬ try. Spacious grounds surround the capitol, and among the city's attractions are the monu¬ ments, which include a ((Palmetto Tree® in bronze. The executive mansion, the govern¬ ment building, the county courthouse, the city hall, the State insane asylum and State peni¬ tentiary are also noteworthy. The city is rich for its size in important educational institu¬ tions: South Carolina College, now the Uni¬ versity of South Carolina, founded 1801 ; the Presbyterian Theological Seminary, also very old; Lutheran Theological Seminary; Colum¬ bia Female College (Methodist Episcopal Church South), founded 1859; Allen Univer¬ sity (African Methodist Episcopal), 1881; the College for Women (Presbyterian) 1890; and Benedict College (colored). It has also a well- attended public school system and two high schools.

Municipal Conditions. — The principal streets are asphalt ; the roads are chiefly of sand and clay and are excellent. The city owns its waterworks and has gas, electric light and power and an electric railway system. Colum¬ bia was the first city in South Carolina, and one of the first in the Union to adopt the com¬ mission plan of government.

Business Interests. — The city affords one of the most remarkable instances of manufac¬ turing development in the country. It is in the heart of a fertile cotton district and near for¬ ests of pine, oak, walnut and maple ; but its site is the key to an important future. A rocky shelf projecting for four miles from the junc¬ tion of the Broad and Saluda forms the bed of the Congaree, 500 feet wide, which plunges down it in rapids, affording immense power, which is made available by a canal miles

long, 110 feet wide at bottom and 150 at top, with 31 feet fall, furnishing 14,000 horse power, and operating dynamos which create electricity for manufacturing power, light and street rail¬ ways. But the greatest establishments are in¬ dependent of this except as a resource, using steam dynamos — for all Columbia's industries are run by electricity. In 1892, there was one cotton mill in the city employing 125 men. Now the great Whaley system of cotton mills in¬ cludes four in Columbia, with 197,000 spindles, 4,840 looms and $3,100,000 invested capital. The Olympia mill, with 9 to 10 acres of floor space and over 100,000 spindles, is the largest in the world operating under one roof ; the Granby and Richland are also large and well-equipped mills ; and the three, owned by one company and employing almost 3,000 hands, are the nu¬ cleus of a large village of 500 acres owned by the company, with sewerage, fire department, electric street lighting, cottages wired and plumbed, churches, schools, etc. The Columbia Mills Company is also a great organization, capitalized at $1,500,000, and turning out over 20,000 bales of cotton duck a year. Besides this predominant industry, there are growing hosiery works, glass works which utilize the fine sand found nearby, four quarries of fine granite, large lumber works starting up and small mis¬ cellaneous industries. The vast beds of kaolin in the vicinity now supply outside potteries, but local works are contemplated. The United States census of manufactures for 1914 reported 71 industrial establishments of factory grade, employing 2,571 persons, of whom 2,228 are wage earners receiving $1,091,000 annually in wages. The capital invested aggregated $7,348,- 000 and the year's output was valued at $6,765,- 000 : of this, $2,540,000 was the value added by manufacture. The rock ledge before mentioned extends two miles below the city with only four feet of water over it, dropping off to 10 feet or more at Granby. Deep water is now brought up to Columbia by a floating dam 15 feet high, costing $250,000, which enables ves¬ sels of 10 feet draft to come up to the city instead of unloading and trucking up from Granby as heretofore. Two steel steamers run from Columbia to Georgetown and will ultimately go to Charleston. This improvement makes Columbia the great distributing point for central and northern South Carolina.

History. — The town was settled about 1700, but remained farm land till 1786, when the people of the State demanded a capital more centrally located than Charleston, and Colum¬ bia village was laid out. The legislature first met there in 1790. In the Civil War it shared the general fortunes of the State, till Sher¬ man's army entered it 17 Feb. 1865. The fol¬ lowing night a fire broke out which lasted all the next day and laid

over half the city in ashes, including a number of business blocks, private residences, schools, the railroad station, several churches and a convent, and destroyed a great quantity of cotton. Its development since is part of the general industrial awaken¬ ing of the South. Pop. (1860) 8,052; (1870)

9,298; (1880) 10,036; (1890) 15,353; (1900)

21,108; (1910) 26,319; (1914) 33,500, not in¬ cluding the mill villages, chiefly that of the Whaley mills, with several thousand inhabitants, just outside the old city limits though close by. Since that time several suburbs have been an¬

nexed, giving Columbia a population (1920)

37,524.

Rawley W. Holcombe,

Secretary of Columbia Chamber of Commerce.

COLUMBIA, Tenn., county-seat of Maury County, situated on the Duck River and on the Louisville and N. and the Nashville, C. and Saint L. railroads. It is the trade centre of a fertile agricultural region, and has a stock yard, a grain elevator and cotton and flouring mills. It is the seat of Jackson College, two seminaries for young women and a mili¬ tary academy. It also has a United States arse¬ nal. Pop. 5,754.

COLUMBIA, or OREGON, after the Yukon, the largest river on the western side of America. It rises in the Kootenay District of British Columbia, on the western slope of the Rocky Mountains, near mounts Brown and Hooker, in about lat. 50″ N. Its course, which is very irregular, is generally southwest through British Columbia and Washington. It forms the northern boundary of Oregon for about 350 miles and enters the Pacific by an estuary 35 miles long and from 3 to 7 wide. Its estimated length is 1,400 miles, and the area drained by it and its tributaries, of which the largest are Clarke's Fork (with the Mis¬ soula, 700 miles long), and the Snake River (940 miles in length) along which are very remarkable canyons, has been computed to be 298,000 square miles. The river is broken by falls and rapids into separate portions, and formerly a bar across its mouth obstructed nav¬ igation. The construction of a jetty two and one-half miles long has provided a good har¬ bor, but the silt deposit calls for constant dredg¬ ing and other work. Sea-going vessels ascend the Columbia for 100 miles to the Willamette and from the junction with the latter to Port¬ land (10 miles), while steamboats reached the Cascades (160 miles), where there was a port¬ age of 6 miles which was bridged over by a railway; and beyond this another navigable stretch of 50 miles to the Dalles. In

*November 1896 the government completed a canal and locks at the Cascades, at an expense of nearly $4,000,000, and thus opened navigation to the Dalles, where a 14-mile railroad passes round the Great Dalles channel to the next section above (185 miles), beyond which there is a final part navigable for 250 miles by steam¬ boats. The Columbia and its branches have 2,132 miles of navigable waters. The extraor¬ dinary abundance of salmon in the river has developed numerous fisheries which have been well exploited. Near the mouth are a number of canneries. Captain Gray of Boston entered the river in 1792, and Lewis and Clark ex¬ plored it in 1805. **

COLUMBIA CITY, Ind., county -seat of Whitley County, in the northeastern part of the State, situated on Blue Creek and on the Wa¬ bash and on the Pittsburgh, Fort W. and Ch. railroads. It has lumber mills and manufac¬ tures furniture, wagons, etc. Pop. 3,448.

COLUMBIA PLATEAU, a broad upland region lying in Washington, Oregon and Idaho. It averages about 3,500 feet in elevation, but is deeply trenched by Columbia and Snake River Canyons. The plateau, which lies be¬ tween the Rocky Mountains and the Cascades, consists of broad level expanses of Tertiary

lava flows. The southern part is a desert. In the north, particularly in the Big Bend country, considerable wheat is raised. The mineral wealth is very limited.

COLUMBIA RIVER HIGHWAY, a 60-

mile scenic highway leading out of the city of Portland, Ore., to Hood River, and travers¬ ing the notably picturesque scenery along the Columbia River. The engineering work has been carried out with the most careful obser¬ vance of artistic possibilities and effects, and the results are hailed as a model for similar enterprises. The roadway is 18 feet in width, of bitulithic pavement, and the steepest grade does not exceed 5 per cent. The highway joins the Lincoln Highway at Cheyenne and forms a link in the route through Yellowstone Park.

COLUMBIA SALMON. See Quinnat.

COLUMBIA UNIVERSITY, a seat of learning in New York. The idea of establish¬ ing a college in New York was more than 50 years in contemplation before it was carried into effect. In 1746 provision was made by law for raising money by public lotteries. Five years later the proceeds of these lotteries amounted to about $1,700 and were given to trustees. The fact that two-thirds of these trustees were in communion with the Church of England and that some of them were ves¬ trymen of Trinity Church excited opposition to the proposal as a scheme to strengthen the Established Church and delayed the procure¬ ment of a royal charter. Friends of the enter¬ prise proceeded, however, with the arrange¬ ment for opening the college and elected for their first president the Rev. Dr. Samuel John¬ son of Stratford, Conn., who assumed the office 17 July 1754, in the schoolhouse belonging to Trinity Church. There was a class of eight students.

The cosmopolitan character of the governing body of the college is due to its charter. To meet the objections that had been made, it was so drawn as to include in its board of gover¬ nors, besides other ex officio representatives, not only the rector of Trinity Church, but the senior minister of the Reformed Protestant Dutch, Ancient Lutheran, French and Presby¬ terian churches. It is probably due to this cir¬ cumstance that Columbia almost alone of all the pre-Revolutionary colleges in the United States has never had a theological faculty connected with it. The trustees, at present, are members of the Episcopal Church, and also of the Re¬ formed, Presbyterian and Roman Catholic churches, showing that this cosmopolitan char¬ acter has never been lost. A prominent He¬ brew rabbi was at one time a member of its councils.

The charter of King's College, the original name of Columbia, was granted by George II, and finally passed the seals on 31 Oct. 1754, from which day the college dates its existence. It received from Trinity Church, according to a promise previously given, a portion of a grant of land known as <(the King's Farm,® upon the site of which its first building was erected. It was stipulated in the royal charter that its president should be a communicant of the Episcopal Church and that proper selec¬ tions from the liturgy of that church should be used in the religious services of the college. This caused much angry controversy, and after vol. 7 — 22

the Revolution it was stricken out of the char¬ ter, but remains as the condition of the deed of gift from Trinity Church. King's College played a conspicuous part in securing and con¬ firming the independence of the United States. The Revolutionary War caused a suspension of the activities of the college, and in 1776 the college building was used as a military hospital. After eight years the college work was resumed by act of the

legislature, 1 May 1784, under the name of Columbia College.

On 13 April 1787 the legislature revived the original charter with amendments, which abolished ex officio membership of its govern¬ ing body, canceled the requirement that the president should hold a certain form of re¬ ligious belief or that a certain form of prayer should be used in the services of the college, and named a body of 29 trustees, which, when reduced to 24 members, was made a self-per¬ petuating body, under which government the college has remained. The medical faculty was organized in 1792 and a professorship of law was established in 1793.

The original site of the college was in what became later the block bounded by College Place, Barclay, Church and Murray streets. In 1857 the college was moved to 49th and 50th streets and Madison avenue, where it remained until 1897. In 1892, for $2,000,000, purchase was made of 17ˆ2 acres of land lying between 116th and 120th streets, Amsterdam avenue and the boulevard. Here in 1897 the college was reorganized on the basis of a university.

Columbia University, in a technical sense, consists of the faculty of law, the first professor of which (1792), James Kent, during the period of his second appointment in 1823 delivered the courses of lectures which developed into the first two volumes of his famous (Commenta¬ ries } ; the faculties of medicine; philosophy, po¬ litical science ; pure science and applied science. The College of Physicians and Surgeons, the outcome of the medical faculty, established in King's College in -1767, became in June 1860 the Medical College of Columbia. In 1891 it surrendered its separate charter and became an integral part of Columbia College. A peculiar¬ ity of the Columbia organization is the system by which seniors in Columbia College, who have entered the college not later than the beginning of the junior year, are allowed to select part or all of the courses necessary for the bachelor's degree from among those designated by the university faculties, professional or non-profes¬ sional, as open to them. The object of this arrangement is to shorten the time necessary to the attainment of the higher, particularly of the professional, degrees. The degree of master of laws is conferred for advanced work in law done under the faculties of law and political science together. The faculties of law, medi¬ cine and applied science conduct respectively the schools of law, medicine and mines, chem¬ istry, engineering and architecture, to which students are admitted as candidates for profes¬ sional degrees on terms prescribed by the fac¬ ulties concerned. The school of mines was due to the exertions of Thomas Egleston, who was made professor of mineralogy and metallurgy in 1864, and who opened the school of mines the same year in the basement of the old col- lee'e building in 49th street. There is also the school of chemistry, engineering and architec-

turc, set off from the school of mines in 1896. Out of the school of mines grew the school of pure science, established in 1892. In 1912 a school of journalism was established and in 1916 a school of business. Under President Barnard's influence, in April 1889, the trustees gave their official approval to the plan for founding Barnard College for women studying for Columbia degrees. It is financially a sepa¬ rate corporation, but educationally it is part of the system of the university. Teachers' Col¬ lege, a professional school for teachers, is also financially a separate corporation and educa¬ tionally a part of the university. It was founded in 1888, chartered in 1889 and included in the university in 1898. (See Colleges for Teachers). Some of these courses are ac¬ cepted by Columbia University, and may be taken without extra charge, by students of the university in partial fulfilment of the require¬ ments for the degrees of Bachelor of Arts, Mas¬ ter of Arts and Doctor of Philosophy. The university has experienced

an extremely rapid growth, the student body having increased from 11,876 in 1914-15 to 26,658 in 1920-21. Its li¬ brary comprises over 550,000 bound volumes. The library, a greatly admired building, is a gift from ex-President Low, and cost over

$1,000,000.

The Presidents of the University have been : Samuel Johnson (1754-63); Myles Cooper (1763-75) ; the Rev. Benjamin Moore (1775- 76) ; William S. Johnson (1787-1800) ; Charles H. Wharton (1801) ; the Rt. Rev. Benjamin M. Moore (1-801-11); William Harris (1811-29); William A. Duer (1829-42) ; Nathaniel Moore (1842-49) ; Charles King (1849-64) ; Frederick A. P. Barnard (1864-89) ; Henry Drisler, act¬ ing (1889-90) ; Seth Low (1890-1901) ; and Nicholas Murray Butler (inaugurated 1902).

COLUMBIA UNIVERSITY SCHOOL OF MINES. See Columbia University.

COLUMBIAN COLLEGE. See George Washington University, The.

COLUMBIAN FORMATION, a senes of gravels, sands and clays of Pleistocene Age covering the coastal plain of the Atlantic slope from New Jersey southward and typically de¬ veloped in the District of Columbia. The for¬ mation in the north covers the plain up to ele¬ vations of 400 feet, and in the south up to 100 feet. It includes estuarine and delta deposits, and the fossils are recent marine and terres¬ trial species, indicating a very slight submer¬ gence and re-elevation of the coast. The forma¬ tion may correspond to the Champlain stage of the glaciated portion of the continent. See Champlain Stage; Glacial Period.

COLUMBIAN UNIVERSITY. See

George Washington University, The.

COLUMBIAN WORLD'S FAIR. See

World's Columbian Exposition.

COLUMBID.3E, ko-lum'bi-de, the family of true pigeons, the typical one of the order Columba, of which it embraces the bulk of the known species, more than 300 belonging to this family of true pigeons and doves. Over half of them are found in the Malayan and Austro-Malayan Archipelago, and 75 in South and Central America, while all other parts of the world, except the polar regions, have their representative species in

smaller numbers. Although our native species give but a faint idea of the richness of color and other peculiarities of adornment of the tropical pigeons, the structural features are re¬ markably constant and well exemplified in the domestic pigeon. The bill is moderate and com¬ pressed,

having at its base a soft skin in which the nostrils are placed. The feet have three di¬ vided toes before and one behind, all of which are on the same level ; the tarsi scutellate. The wings are rather long and exceptionally power¬ ful; the plumage generally compact and the feathers without aftershafts. One of the most variable features is the tail, which may be short and square or long and pointed, and its rec- trices from 12 to 16. Although classed by Cu¬ vier with the gallinaceous birds, the C olumbidcc differ from them in structure and especially in habits, being monogamous and good flyers. Be¬ sides they are unlike the domestic fowl which is the type of the Gallince, in that the males as¬ sist in nest-building and incubation and the young are not able to walk, and are nourished by the parent birds, which secrete in the double crop a milky fluid utilized to soften their food. Moreover the Columbidce drink at a single draught. They eat seeds and berries, more rarely insects. See Dove ; Pigeon ; etc.

COLUMBINE, a popular name for Aqui- legia vulgaris or other species of the genus Aquilegia. The common columbine has droop¬ ing purplish-blue flowers with five flat sepals; five petals, with long spurs, often curved; five follicles; the root-leaves twice or thrice ter- nate, the others once ternate. Numerous species of the genus occur in North America. A. ccumlca, the Rocky Mountain columbine, with very large, sky-blue flowers, the showiest plant of the genus, is the State flower of Colo¬ rado.

COLUMBITE, a mineral of variable com¬ position, consisting of a compound niobate (columbate) and tantalate of iron and manga¬ nese. When niobium is present in large amount relatively to the tantalum, the mineral is called columbite, and when the reverse is the case, it is called Hantalite® ; the two minerals pass¬ ing into each other, in nature, by insensible gradations. Typical columbite has a hardness of 6, and a specific gravity of from 5.4 to 5.8, the specific gravity increasing with the propor¬ tion of tantalum present. The crystals are short and prismatic, often tabular and belong to the orthorhombic system. The mineral is black or brownish-black in color and is often iridescent. In the United States columbite is known to oc¬ cur in most of the States lying near the Appa¬ lachian Mountain system and also in Colorado, South Dakota and California. One crystalline mass of it, found in the Black Hills region, is said to have weighed about a ton. The existence of columbite in the United States was first made known through a specimen sent by Governor Winthrop of Connecticut to Sir Hans Sloane, president of the Royal Society of Great Britain.

COLUMBIUM, a metallic element, better known as niobium. It was discovered by Hatchett in 1801 and named columbium and rediscovered by H. Ross in 1846 who named it niobium. . It is found in small quantities in va¬ rious minerals ; but principally in columbite and tantalite. Columbium

has been found in various parts of the United States, Sweden,

COLUMBO

Mexico and other Central and South American countries. It is a very hard metal, especially when combined with carbon, its normal condi¬ tion. It was called niobium on account of its resemblance to tantalum with which it occurs. The allusion to the name is classical as Tantalus was the father of Niobe. Chemical symbol Nb; atomic weight 93.5. It is a brilliant metal of steel-gray color. Chemically it is akin to bis¬ muth.

COLUMBO, the root of a climbing plant, Jateorrhiza columba, of the family Menisper- macecB, which grows in great profusion in the island of Mozambique. It is also called calum- ba. The root, sliced transversely into discs, is dried and used in medicine in the form of an infusion as an appetizer and tonic. It contains a bitter alkaloid, berberine, and another bitter principle, colnmbin. It is free from tannic acid, so, unlike most bitters, it may be mixed with the preparations of iron. It was formerly employed for diarrhoea, dysentery and gas in the bowels, being carried to India, whence it is exported.

COLUMBUS, Bartholomew (Sp. Bartolo¬ meo Colon ; It. Bartolommeo Colombo, his real name), Italian navigator, brother of Christo¬ pher Columbus : b. Genoa before 1455 ; d. San Domingo, 12 Aug. 1514. The events of his early years are not on record. In 1470 we find him established at Lisbon as a mariner and con¬ structor of maps — one of those adventurous navigators whom the patronage of the Portu¬ guese princes had drawn to their capital. About 1486 he visited the Cape of Good Hope, prob¬ ably with Barthelemi Diaz. His brother sent him to England to seek the aid of Henry VII in 1488, but it appears certain that Christopher was ignorant of his fate, further than that he was captured by pirates. He did, however, at¬ tain the ear of the English monarch and pre¬ sented him with a map of the world, but it does not appear that he succeeded in securing Eng¬ lish aid. On his return to France, where he became cartographer to Anne de Bourbon (de Beaujeu), he learned that his brother had al¬ ready discovered the new world and had sailed on a second voyage (1493). Hastening to the Spanish court, he was received as became the brother of the admiral. Queen Isabella sent him in command of three store ships to the new colony of Hispaniola (1494) where Chris¬ topher received him with joy and appointed him adelantado or lieutenant-governor of the Indies. In this position Bartolommeo showed great bravery and decision. He shared his brother's imprisonment, and with him was lib¬ erated on reaching Spain, where the Spanish monarchs confirmed his title and gave him the lordship of the small island of Mona near San Domingo,' with 200 Indians as his personal body-guard. The fierce energy of his character, however, made them jealous of giving him too much latitude in public affairs.

COLUMBUS, Christopher (Sp. Cristobal Colon; It. Cristoforo Colombo, his real name), Italian navigator, the discoverer of America: b. Genoa probablv 1451 ; d. Valladolid, Spain, 20 May 1506. His father, Domenico Colombo, a poor weaver, gave him a a careful education in that trade — better characterized as an in¬ dustrial art or handicraft, highly regarded in Italy during the 15th century, and indeed with

good reason esteemed long beforq and long after the very noble Quattrocento. (See Professor Venturi's account of the Quattrocento or 14th century, in the article Italy — His¬ torical Synopsis of Italian Art). The de¬ tails of his early life are confused and unsatis¬ factory. The date of his birth has never been definitely established ; different historians range between 1430 and 1456, those most often given being 1436 and 1446. Judging from the ages of his younger brother (b. 1468) and his still younger sister, the year 1451 given above seems the most likely estimate. He is shown by documents cited by Henry Vignaud to have sailed to Chios when about 23 or 24 years of age. Again, in 1476, he sailed for England, and about one year later engaged in commerce at Lisbon. There he married Felipa Moniz Peres- trello, a daughter of a distinguished navi¬ gator who had founded a colony in Porto Santo, an island recently discovered and be¬ longing to the Madeira group, and had left many charts and nautical instruments. Colum¬ bus made use of these materials, and his opinion that the other side of the globe con¬ tained land, belonging to eastern Asia and connected with India, which was, as yet, little known, became more and more fixed. While the Portuguese were seeking to reach India by a southeast course round Africa, he was con¬ vinced that there must be a shorter way by the west. He applied in vain to Genoa for assist¬ ance, and equally fruitless were his endeavors to interest John II of Portugal in the enterprise. He also sent letters on the subject to Henry VII of England, with the same ill success. He then determined to apply to the Spanish court, Ferdinand and Isabella being at this time the sovereigns of Spain, and after an eight years' struggle with the obstacles thrown in his way by ignorance and malice, he received three small vessels. These were named the Pinta , the Niiia and the Santa Maria ; and the docu¬ ments show the complement of men to have been, for the crews 90, officers and all others 30, total 120. The Capitulations of Granada provided that, after successful accomplishment and conclusion of the adventure — not before — its leader should be advanced to the dignities and offices of peer, admiral and viceroy of such regions as he should or might discover and take possession of — (

It was early in the morning of Friday, on 3 Aug. 1492, that Columbus set sail from the port of Palos. Eighteen years had elapsed since he had first conceived the idea of this enterprise. The most of that time had been passed

in almost hopeless solicitation, amidst poverty, neglect and ridicule ; the prime of his life wasted in the struggle. Nor should it be forgotten that it was to Isabella alone that he was finally indebted for the means of execut¬ ing his project, which had been coldly rejected by the prudent Ferdinand. Having provided himself at the Canary Islands with fresh water, he sailed at first due west but later southwest into an ocean never before navigated. But when 21 days had elapsed without the sight of any land, the courage of his men began to sink. It was certain, they said, that they should per¬ ish, and their visionary commander ought to

be forced to return. Some of them even pro¬ posed to throw him overboard ; and Columbus had to exert all the powers of his daring and commanding spirit to quell the mutiny. It seems clear that his triumph in this crisis was due in part to Pinzon's able and loyal assistance. A phenomenon, which surprised even him, filled his pilots with consternation : the needle de¬ viated a whole degree. But the sea appeared suddenly covered with grass, and again showed symptoms of shoals and rocks. Numbers of birds were also seen. Columbus sailed in the direction from which they flew. For some days the voyage was continued with revived courage, until at last the dissatisfaction of the crews be¬ gan again to break out into open violence; but Columbus, after endeavoring in vain to pacify his men by promises, finally assumed a different tone, and told them it was useless to murmur; that he was determined to persevere. Fully con¬ vinced that he must be near the land, he promised a reward to the man who should first catch sight of it. On the night of 11 and 12 October Columbus himself descried a light which sometimes flickered in the distance and sometimes disappeared, and at two o'clock on the morning of the 12th a cannon shot from the Pint a announced that a sailor belonging to that vessel had sighted land. That sailor was Rodrigo de Triana.

It was the island of Guanahani, which Co¬ lumbus believed to belong to eastern Asia, the Indies or India, a belief which he carried with him to his grave. Hence the mistaken names of Indians applied to the natives of America, and that of West Indies applied to the group of islands of which Guanahani forms one. On landing Columbus threw himself upon his knees and kissed the earth, returning thanks to God. The natives collected round him in silent aston¬ ishment, and his men, ashamed of their dis¬ obedience and distrust, threw themselves at his feet, begging his forgiveness. Columbus, draw¬ ing his sword, planted the royal standard, and in the name of his sovereigns took possession of the country, which, in memory of his pres¬ ervation, he called San Salvador. He then received the homage of his followers, as ad¬ miral and viceroy, and representative of the

sovereigns. Being informed by the natives that there was a rich gold country toward the south, Columbus directed his course toward that region, and reached Cuba on 28 October, and Espanola (Hispaniola, Haiti), on 6 December; but as one of his vessels was wrecked and the other separated from him, he resolved to carry the news of his success to Spain. Having built a wooden fort from the wreck of his vessel, he left in it 39 volunteers, and set out on his return, 4 Jan. 1493. The day after he left the island he met the Pinta , which had been miss¬ ing. Both vessels were afterward nearly wrecked in a tremendous storm. Columbus, more interested for his discovery than for him¬ self, wrote an account of his voyage on a piece of parchment, which he secured in a cask, and threw the whole overboard, in the hope that it might be carried ashore. He had hardly fin¬ ished his work when the gale subsided. On 15 March he re-entered the port of Palos amid the acclamations of the people, the thunder of cannon and the ringing of bells. He hastened immediately to Barcelona, where the court then was, and entered the city in a triumphal pro¬

cession, with the productions of the newly dis¬ covered countries carried before him. A chair was placed for him next to the throne, and, seating himself, he gave an account of his dis¬ coveries. He was created a grandee, and all the marks of royal favor were lavished upon him.

On 25 Sept. 1493, he set sail from Cadiz with three large ships of heavy burden and 14 caravels, carrying 1,500 men. On 3 November he discovered the island of Dominica, and after¬ ward Maria Galante, Guadeloupe and Porto Rico, and on the 22d arrived at Hispaniola. Finding the colony he had left destroyed, he built a fortified town, which he called, in honor of the queen, Isabella, and of which he ap¬ pointed his brother Diego governor. He im¬ mediately left the island in order to make new discoveries, visited Jamaica, and returning after a voyage of five months, worn down with fatigue, found to his great joy that his brother Bartolommeo, who had escaped from his cap¬ tivity, had arrived at Isabella with provisions and other supplies for the colony. Meanwhile a general dissatisfaction had broken out among his companions, who, instead of the expected treasures, had found hardships and labor. They set on foot many calumnies and gave the most unfavorable description of the country and the viceroy. Columbus thought he could not better oppose these reports than by sending consider¬ able treasures to his sovereigns, and for this purpose collected gold from the natives, which was not done without violence and some cruelty. Aguado, a personal enemy of Columbus, was sent as commissioner to investigate the com¬ plaints against the great discoverer, who, think¬ ing it time to vindicate himself in the presence of his sovereigns, prepared to return to Spain. Having appointed his brother Bartolommeo adelantado or lieutenant-governor, he em¬ barked for Spain in March 1496 with 225 Span¬ iards and 30 natives. In Spain calumny was silenced by his presence, and probably still more by his treasures. Yet his enemies were power¬ ful enough to detain the supplies intended for the colony a whole year, and to retard the fit¬ ting out of a new expedition.

It was not till 30 May 1498, that he sailed with six vessels on his third voyage. To man these vessels criminals had unwisely been taken — a measure which Columbus himself had ad¬ vised, and which had been taken up with great satisfaction by his enemies. Three of his ves¬ sels he sent direct to Hispaniola ; with the three others he took a more southerly direction, for the purpose of discovering the mainland, which information derived from the natives induced him to suppose lay to the south of his former discoveries. He visited Trinidad and the con¬ tinent of America, the coasts of Paria and Cumana, and returned to Hispaniola, convinced that he had reached a continent. His colony had been removed from Isabella, according to his orders, to the other side of the island, and a new fortress erected called San Domingo. Columbus found the colony in a state of con¬

fusion. After having restored tranquillity by his prudent measures, in order to supply the deficiency of laborers he distributed the land and the inhabitants, subjecting the latter to the arbitrary will of their masters, and thus laying the foundation of that system of slavery which has lasted down to our time. His enemies, in

Hv

V V;

W

- 1

CHRISTOPHER COLUMBUS

COLUMBUS

341

the meantime, endeavored to convince his sov¬ ereigns that he had abused his power, and that • his plan was to make himself independent, till at last even Isabella yielded to the wishes of Ferdinand, who had previously become con¬ vinced of the truth of the slanders. Francisco de Bobadilla was sent to Hispaniola with exten¬ sive powers to call the viceroy to account. As soon as he reached the island he summoned Columbus to appear before him and put him in irons. His brothers were treated in the same manner. All three were sent to Spain, accom¬ panied by a number of written charges, drawn up from the statements of the bitterest enemies of Columbus. Columbus endured this outrage with noble equanimity, and wrote, as soon as he had arrived in Cadiz, 25 Nov. 1500, to a lady of the court vindicating his conduct, and de¬ scribing in eloquent and touching language the, treatment he had received. The fetters with which he had been bound he kept to the day of his death, and his son Hernando states that he even ordered that they should be enclosed with him in his coffin. Orders were immediately sent directing him to be set at liberty, and inviting him to court, where his sovereigns received him with the same distinction as formerly. Isabella,, was moved to tears, and Columbus, overcome by his long-suppressed feelings, threw himself upon his knees, and for some time could not utter a word for the violence of his tears and sobbings. He then defended himself by a sim¬ ple account of his conduct, and was reinstated in his dignities. Ferdinand even consented to dismiss Bobadilla, which was intended for the first step toward the promised restoration of the great discoverer to his dignities. But these dis¬ positions in the monarchs were soon changed. There was much talk of great expeditions, and in the meantime Nicolas de Ovando y Lares was sent as governor to Hispaniola. Columbus still urged the fulfilment of the promises solemnly made to him;

but after two years' of delay he became convinced that there was no intention to do him justice.

But he had now learned to suffer, and he was principally desirous of completing his work. Supposing the continent which he had seen to be Asia, he did not doubt that he should find, through the Isthmus of Darien, a way to the Spice Islands, from which the first fleet of the Portuguese had just returned richly laden. In four slender vessels supplied by the court for this purpose Columbus sailed from Cadiz on his fourth and last voyage, 9 May 1502, with his brother Bartolommeo and his son Hernando; arrived contrary to his original intention off San Domingo 29 June, and was denied permis¬ sion to enter the port for the purpose of refitting his vessels, and escaping an approaching storm. He succeeded, however, in anchoring his small squadron in a place of safety, and rode out the storm, while a fleet of 18 vessels, which had put to sea in spite of his warning, was almost entirely destroyed. He then continued his voy¬ age to Darien, but without finding the expected passage. Two of his vessels were destroyed by a gale ; the two others were wrecked off Jamaica, where he was scarcely able to save himself and his companions. Here the severest trials awaited the constancy of Columbus. Sep¬ arated from the other part of the world, his destruction seemed to be certain. But he suc¬ ceeded in procuring a few canoes from the

natives, and prevailed on some of his boldest and best men to attempt a voyage to Hispaniola, in two canoes, in order to inform the governor of his situation. Several months elapsed with¬ out a glimpse of -hope. Part of his companions, reduced to despair, rebelled, repeatedly threat¬ ened his life, separated from him and settled on another part of the island. Here they alien¬ ated the minds of the natives by such cruel treatment, that the latter ceased to bring them supplies. The death of all seemed inevitable ; but Columbus, whose courage rose with the danger, preserved his men in this crisis. He had ascertained that a total eclipse of the moon was about to take place, and threatened the natives with the vengeance of his God if they should persist in their enmity. As a proof of his assertion the moon, he said, would lose its light, in token of the chastisement which awaited them. When they beheld his threat verified they hastened to bring him provisions, and implore his intercession with the Deity. But hostilities now broke out between him and the rebels, in which several of the latter were killed, and their leader was taken prisoner. After remaining a year on the island, relief at last appeared. The two canoes had reached Hispanrola in safety, but the messengers could not prevail on the governor to undertake the deliverance of the admiral. They finally bought a vessel themselves, and it was on board this ship that Columbus left Jamaica, 28 June 1504. He went to San Domingo, but only to repair his vessel, and then hastened back to Spain. He arrived in Spain ill and exhausted. The death of the queen soon

followed, and he urged in vain on Ferdinand the fulfilment of his con¬ tract. After two years of illness, humiliations and despondency, Columbus died at Valladolid. His remains were transported, according to his will, to the city of San Domingo, but on the cession of Hispaniola to the French they were removed in January 1796, with great pomp, to the cathedral of Havana in Cuba. A splendid monument was erected to him, in a convent at Seville, where his body lay before being trans¬ ferred to San Domingo. In 1898 his remains were again removed to Spain, Cuba being no longer a Spanish possession since the war with the United States.

In the vigor of manhood Columbus was, ac¬ cording to tradition, of an engaging presence, tall, well formed and muscular, and of an ele¬ vated and dignified demeanor. His visage (here also we can be guided only by tradition and relatively late portraits, inasmuch as an authentic contemporaneous portrait probably does not exist) was long, his nose aquiline, his eyes light gray and apt to kindle. His whole countenance had an air of authority. Care and trouble had turned his hair white at 30 years of age. He was moderate and simple in diet and apparel, eloquent in discourse, en¬ gaging and affable with strangers, and of great amiability and suavity in domestic life. His temper was naturally irritable, but he subdued it by the benevolence and generosity of his heart. Throughout his life he was noted for a strict attention to the offices of religion ; nor did his piety consist in mere forms.ˆ but par¬ took of that lofty and solemn enthusiasm with which his whole character was strongly tinc¬ tured. Of a great and inventive genius, a lofty and noble ambition, his conduct was char-

acterized by the grandeur of his views and the magnanimity of his spirit.

Bibliography. — Asensio, D. Jose M., Cris¬ tobal Colon, su vida, sus viajes, sus descubri- mientos) (Barcelona 1892) ; Bernaldez, A., Hflistoria de los reyes Catolicos) (Seville 1870) ; Biggar, H. P., (The New Columbus) (American Historical Association Annual Report, Washing¬ ton 1914) ; Columbus, Fernando, (Historic del S. Fernando Colombo5 (Venice 1571) ; Des- champs, E., (La Tumba definitiva de Cristobal Colon) (Por Esos Mundos, Madrid 1915) ; Elton, C., (The Career of Columbus) (London 1892) ; Ferre, M. S., (E1 Descubrimiento de America segun das ultimas investigaciones) (Seville 1893) ; Garcia de la Rega, C., Colon, EspanoP (Madrid 1914) ; Harrisse, H., (Notes on Columbus) (New York 1866) ; also (Fer¬ nand Colomb) (Paris 1872), Christophe Co- lomb et la Corse) (Paris 1883), Christophe Colomb5 (Paris 1884), and Christophe Colomb devant l'histoire5 (Paris 1892) ; Irving, Wash¬ ington, (A History of the

Life and Voyages of Christopher Columbus) (1828) ; Major, R. H.,

(Select Letters of Columbus) (London 1870) ; Markham, Sir C., (Life of Christopher Colum¬ bia (London 1892) ; Moores, C. W., Che Story of Christopher Columbus5 (Boston 1912) ; Navarette, M. F. de, Colleceion de los viages y descubrimientos,5 etc. (Madrid 1825-37) ; Olson and Bourne, Che Northmen, Columbus and Cabot, 985-1503) (New York 1906) ; Oviedo Y Valdes, G. F., (Historia General y natural de las Indias5 (Madrid 1851) ; Payne, E. J., (History of the New World called Amer- ica) (Oxford 1892) ; (Raccolta de Documenti e Studi Publicati dalla R. Commissione Colum- biana) (Auspice il Ministero della Publica Istruzione, Rome 1894) ; Rosa, G. De la, (La solution de tous les problemes relatifs a Chris¬ tophe Colomb) (Paris 1902) ; Ruge, Dr. S., Columbus5 (Berlin 1902) ; Sanguinetti, Abbe, (Anno della nascita di Cristoforo Colombo5 (Genoa 1891) ; Sweetser, K. D., Cen Great Adventurers5 (New York 1915) ; Tarducci, F., Che Life of Christopher Columbus5 (Detroit 1891) ; Thatcher, J. B., Christopher Columbus, His Life, His Work, His Remains5 (New York and London 1903) ; Vignaud, H., (Histoire critique de la grande enterprise de Christophe Colomb5 (Paris 1911) ; also Coscanelli and Columbus5 (London 1903) ; (Etudes critiques sur la vie de Colomb avant ses decouvertes5 (Paris 1905) and Che Real Birth-Date of Columbus5 (London 1903) ; Winsor, Justin, Christopher Columbus5 (New York 1891) ; Young, Filson, Christopher Columbus5 (Lon¬ don 1906-11).

COLUMBUS, Diego, or Giacomo (It. Giacomo Colombo), Italian voyager: b. Genoa about 1446; d. at Seville, 21 Feb. 1515. He was a brother of Christopher Columbus, whom he accompanied on the second voyage to America, in 1493. He was sometimes left in command at the settlements of Isabella and San Do¬ mingo and returning to Spain in 1500, subse¬ quently entered the priesthood.

COLUMBUS, Diego (Sp. Colon, kd-lon') : b. probably at Lisbon about 1476; d. Montalvan, near Toledo, Spain, 23 Feb. 1526. He was a son of Christopher Columbus (q.v.) and from 1492 to 1504 was a page at the Spanish court. In 1508 he married into the famous and in¬ fluential Alba family and through his wife's

influence he was confirmed admiral of the Indies

• and governor of Hispaniola in 1509, where he ruled with great pomp and splendor. Through¬ out his life he continued his claim to the office of viceroy of the Indies which had been con¬ ferred upon his father; and this kept him in a constant legal battle in which his opponents generally got the better of the fight, until 1520 when he finally won the contest ; only, however, to hold his hardlv won prize until 1523, when he was summoned back to Spain, where he died three years later.

COLUMBUS, Ferdinand (Sp. Ferdinando Colon, fer-de-nan'do ko-lon'), Spanish voy¬ ager: b. Cordova, Spain, 15 Aug. 1488; d. Seville, 12 July 1539. He was a son of Christopher Columbus, whom he accompanied on his fourth voyage 1502-04. His li-

. brary of 20,000 books was bequeathed to the cathedral chapter of Seville and was known as the <(Columbina.55 But 4,000 of these now remain and the history of the Indies by him is also lost, as well as the original Spanish of his life of his father, largely drawn upon by Las Casas. This is the basis of the majority of the (Lives5 of Columbus.

• COLUMBUS, Luis, loo-es' (Sp. Colon),

Spanish noble : b. San Domingo 1521 or

1522; d. Oran, Africa, 3 Feb. 1572. He was a son of Diego Columbus 2d (q.v.), and a grand¬ son of Christopher Columbus. He was given the title of admiral of the Indies, but in 1530 was obliged to relinquish the title of viceroy, receiving in exchange the island of Jamaica, an estate 25 leagues square in Veragua, a pension of 10,000 ducats and the titles of Duke of Veragua and Marquis of Jamaica. He was captain- general of Hispaniola 1542-51. Arrested in 1559 for having three wives, he was imprisoned for three years and then banished to Africa. Felipa, his daughter, married her counsin, Diego, who then became Duke of Veragua, but dying childless in 1518 the family of Columbus then became extinct in the male line. The present Duke of Veragua (b. 1857) traces his descent from Columbus through Diego, Cristobal, Diego's son, and Francesca, the daughter of Cristobal and sister of Diego Columbus, who died in 1578.

COLUMBUS, Ga., city and county-seat of Muscogee County, 95 miles southwest of At¬ lanta, on the Chattahoochee River and on the Seaboard Air Line, the Southern and the Cen¬ tral of Georgia railroads. It is at the head of navigation on the river and steamboat service is maintained with Apalachicola, Fla. Colum¬ bus is the centre of a rural territory which is a large producer of beef and dairy cattle, live stock and hogs, peanuts, corn, oats, wheat, etc. The city's manufacturing industries have earned for it the title of the <(Lowell of the South55 and are operated mostly by hydro-electric power, of which the river at this point is capable of furnishing about 60,000 horse-power, 20,000 of which has been developed. The city has cotton and hosiery mills, lumber and building material plants, agricultural implement plants, iron and steel mills, bottling plants, fertilizer factories, flour and grist mills, cotton-seed oil mills, pea¬ nut factories, showcase and fixture manufac¬ tories, brick and sewer-pipe works, and barrel factories. About $20,000,000 is invested in the city's industries and the value of the output is approximately $16,000,000 annually. The city

contains an industrial school, three national banks, two exclusive savings banks and fine State banking institutions, and in addition the usual quota of churches, clubs, libraries, etc. The waterworks are controlled by the city. Columbus was settled in 1828 and incorporated the year following. In the Civil War the city was an important supply depot of the Con¬ federates and a vast quantity of supplies for the Southern armies was manufactured here. On 16 April 1865, the city fell into the hands of the Federals. Pop. (1910) 20,554; (1920,

United States census) 31,125.

COLUMBUS, Ind., county-seat of Barthol¬ omew County, in the southern central part of the State, situated on a fork of the White River and on the Cleveland, C., Ch. & Saint Louis and the Pittsburgh, C., Ch. & Saint Louis railroads. It has large manufactories of cerea- line, agricultural implements and furniture, starch and flour mills and gasoline engines. Pop. 8,990.

COLUMBUS, Kans., city and county-seat of Cherokee County, 55 miles south of Fort Scott, on the Missouri, Kansas and Texas, the Saint Louis and San Francisco and the Joplin and Pittsburgh railroads. The region is rich in coal, lead, zinc and farm products, in all of which the city has large interests. It contains flour mills, grain elevators, a cigar factory, bottle works, canning factory, machine shops and large brickyards. Natural gas also is found in the district. The city has a high school, a public library and owns the water¬ works. Pop. 3,155.

COLUMBUS, Miss., county-seat of Lowndes County, situated on the Tombig- bee River and on the Mobile and Ohio and the Southern railroads, 150 miles southeast of Memphis and the same distance northeast of Jackson. It is the farming trade centre of the country, and has a large cotton- mill, machine shops and lumber mills. The United States census of manufactures for 1914 reported 27 industrial establishments of factory grade, employing 636 persons; of whom 521 were wage earners. The capital invested aggre¬ gated $984,000, and the year's output was valued at $1,249,000; of this, $502,000 was the value added by manufacture. It is the seat of the State Industrial Institute and College for Girls and of Franklin Academv. The value of its taxable property is about $7,800,000. Pop. 10,501.

COLUMBUS, Neb., county-seat of Platte County, in the eastern part of the State, situated on the Loup River, near the Platte and on the Union Pacific and the Burlington & M. rail¬ roads. It is the seat of a Roman Catholic academy and has flour mills, a brewery, a wooden-shoe factory and a roller mill. In the vicinity are some Indian mounds of scientific interest.

Pop. 5,410.

COLUMBUS, Ohio, the capital of the State and the county-seat of Franklin County, is located on a plateau about 800 feet above sea- level, in the geographical centre of the State, and practically in the centre of the population of the United States, in lat. 39° 57′ 41″ N. and long. 82° 59′ 46″ W. It is 120 miles northeast of Cincinnati and 135 miles southwest of Cleve¬

land, at the junction of the Scioto and the Olentangy rivers. Eighteen steam railroads, in¬ cluding the C. H. V. & T. and the P. C. C. & Saint L., radiate from Columbus to all parts of the State, intersecting all through lines running East, West, Northeast, Northwest and South, and there are Desides eight electric interurban traction lines in operation.

Area, Parks, Streets and Squares. — The area of the present city is 22.362 square miles. It is laid out on the same scale and plan as Washington, and in general outline resembles a Maltese cross. It has an area of 280 acres in public parks, 100 acres in other parks and 952 acres in public grounds, and the fine system of parks and boulevards is being steadily enlarged. The Ohio State fair grounds of over 100 acres are just outside the city limits. There are 252 miles of paved streets, about 65 miles of which are asphalt, within the city confines, the main thoroughfares lighted by a system of electric cluster standards. The longest streets are High street and Broad street, which run north and south and east and west respectively. The uni¬ form width of the former is 100 feet, its length about eight miles ; the breadth of the latter is 120 feet; its length 7.13 miles. Broad street is planted with four rows of shade trees for its entire length east of the Capitol Square, where it penetrates the fashionable residence district. Here are many beautiful homes and fine man¬ sions. High street is the leading business thoroughfare, and on this and on the other business streets are situated many steel, brick and stone office buildings from 8 to 16 stories high. Capitol Square, a miniature park of 10 acres, is situated at the intersection of High and Broad streets, two squares east of the Scioto River. At the main entrance is the McKinley ˆemorial (modeled by H. A. Mc¬ Neill), and northwest of the Capitol buildings is a group of statues of famous men known as (

Public Buildings. — The first State House was of brick and cost $85,000; the present mas¬ sive buildings and additions are of dressed native gray limestone, in the Doric style of architecture. They cover nearly three acres and their total cost has been $2,500,000. Among other public buildings of interest are the new Federal Building, Memorial Hall and Audi¬ torium, the Athenaeum, city hall, post-office, chamber of commerce, union station, Y. M. C. A. building, the opera house, athletic club and Elks club. There are 59 hotels, including the new Deshler Hotel erected at a cost of

$2,000,000, six theatres and five auditoriums with a combined seating capacity of 40,000.

Public Institutions. — Columbus is the loca¬ tion of the State Hospital for the Insane, of State institutions for deaf-mutes, blind and imbecile youth, and has 12 general hospitals be¬ sides a number of private sanatoria. The Ohio State Penitentiary, in which Morgan and his raiders were imprisoned during the Civil War, is one of the oldest and most famous in the country. A United States pension office and the Columbus barracks, the largest interior military recruiting station in the United States, are also situated at Columbus.

Schools and Churches. — There are 59 pub¬ lic school buildings in the city, six being de¬ voted to high school purposes, with an average attendance of 29,000, the high schools having

2,300. The churches number 175, with an active church membership of about 75,000.

Educational Institutions. — Chief among the institutions for higher education is the Ohio State University, with a campus of 440 acres, 38 buildings valued at $6,500,000, and a student body of nearly 7,000. There are, besides, the Capital City University, the Josephinum College and Saint Mary of the Springs (both Catholic), and a number of other religious and private educational institutions. The professional schools include one dental and two medical col¬ leges, a law school, a school of oratory and music, school of art and the Bliss Business Col¬ lege. The city has also seven public libraries with over 3,000,000 volumes.

Trade and Industry. — Prominent business interests of th-e city are represented by 7 national and 20 private banks, trust companies, savings and building and loan associations, with clearings amounting in 1917 to $525,641,400. Besides its other important commercial and manufacturing interests, Columbus is a great distributing centre for hot-house fruits, vege¬ tables, lumber, coal, iron and steel. It has 900 manufactories (including those just outside the city limits), with an approximate annual prod¬ uct of $95,000,000. Seven of these are the largest industrial concerns of their kind in the world, and produce mine and mill machinery, electrical machinery, trucks, wheelbarrows, shoes, butterine, regalias, uniforms, dental sup¬ plies, drugs and patent medicines, agricultural implements and vehicles. There are also steel plants, blast-furnaces, malleable iron works and manufactories of steel, iron and wood products, beer and liquors, cash registers, watches, furni¬ ture, agricultural implements, mine, mill and

farm supplies, cloth fabrics, gloves, hosiery, clothing, automobiles, novelties, specialties and general merchandise. The Unitea States cen¬ sus of manufactures for 1914 reported 643 in¬ dustrial establishments of factory grade within the city limits, employing 21,323 persons ; of whom 17,236 were wage earners receiving a total of $11,177,000 annually in wages. The capital invested aggregated $52,098,000, and the year's output was valued at $57,698,000 : of this, $26,972,000 was the value added by manufacture.

Finances. — In 1917 the assessed property valuation was $305,423,900 ; the revenue from taxation for the city was $2,001,635 ; for schools,

$1,878,623.

Newspapers, etc. — The newspapers and periodicals include four English and one Ger¬ man dailies, and about 20 papers and periodicals devoted to special interests.

Sewerage, Waterworks, etc. — The city has over 358 miles of sewers and owns a sewerage disposal plant costing $1,200,000, and a garbage disposal plant costing $500,000. There is a model waterworks system, costing $1,500,000, which includes a storage dam establishing a reservoir seven miles in length, and a purifica¬ tion and softening plant. The electric light plants are also owned by the municipality. Natural gas is the principal fuel for domestic use, and bituminous coal is found in unlimited quantities a few miles south of Columbus.

Government. — Under a new charter sub¬ mitted in May 1914, and which became effective 1 Jan. 1916, the government of the city is vested in a mayor and council of seven members, elected at large every four years. It is a modi¬

fied federal form and contains several progres¬ sive features, such as non-partisan ballot, pref¬ erential voting, referendum and recall.

History. — Columbus was made the capital by the legislature in 1812 and became the per¬ manent capital in 1816, the original Territorial and State capital having been Chillicothe. In the same year it was incorporated as a village, and was chartered as a city in 1834.

Population. — Three-fourths of the popula¬ tion are native born. The largest foreign ele¬ ments are German, Irish, Welsh, English and Italian. Since 1880, when it had 52,194 inhabit¬ ants, Columbus has grown rapidly. In 1910 it had a population of 125,650; in 1910, 181,511; by 1920 its population had grown to 237,031 (U. S. census). Metropolitan Columbus, in¬ cluding contiguous suburbs, in 1920 had over 260,000 inhabitants.

C. E. Dittmer, Editor of City Bulletin.

COLUMBUS, Tex., county-seat of Colo¬ rado County, situated on the Colorado River and on the Southern P. Railway. Its chief industry is its cotton trade. It is the seat of Colorado College. Pop. (1920) 2,000.

COLUMBUS, Wis., city of Columbia County, 65 miles southeast of Milwaukee, on the Little Crawfish River, and on the Chicago, Milwaukee and Saint Paul Railroad. It con¬ tains a public library, Saint Mary's Hospital and a county normal school. It has a flour mill, canning factories, carriage and wagon works and has a good trade in agricultural products and live stock. Pop. 2,600.

COLUMBUS, Knights of. See Knights

of Columbus.

COLUMBUS BARRACKS. See Colum¬ bus, Ohio.

COLUMELLA, Lucius Junius Moderates,

Roman practical writer on agriculture : b. Cadiz, Spain. He flourished about th-e middle of the 1st century, and wrote 12 books on gardening ((De Re Rustical one of which was a metri¬ cal combination of the Georgies of Virgil. He treats in this work of all the branches of agri¬ culture. The earlier editions of this work con¬ tain also his treatise (De ArboribusC in one book. According to Pliny, Columella wrote a work on ancient sacrifices for obtaining the fruits of the earth, but this is lost. The editio princeps, printed in folio by Jenson at Venice, in 1472, and forming part of a collection of (Rei Rusticae Scriptores varii, is very rare. The most complete edition is contained in the (Scriptores Rei Rusticae) of Schneider (1794-97). Consult Barbaret, (De Columellae Vita et Scriptis) (Nancy 1888) ; Becher, (De Columellae Vita et Scriptis) (Leipzig 1897).*

COLUMN (Latin, columna), in architec¬ ture, a supporting pillar, usually round. In the earliest times the column was merely a tree- trunk, or its imitation in stone, used to sup¬ port the roof. The original sense of the word is something that is high or rises in height. The root of the word survives in ˆColonel® and the French ((colline,® hill. The gods of nature were originally worshipped in certain places they were supposed to haunt, in the woods. The first temples were rude shelters in which the trunks of the trees of the forest, the <(high things® were imitated. Hence, th-e first columns

were of wood, being merely trunks of trees, and nearly all the existing primitive columns are round. The parts of a complete column are its base, on which it rests ; its body, called the shaft; and its head, called the capital. Columns are used to support the entablature of an order, which has also its proper division. In countries like Egypt, where timber fit for construction is scarce and stone abundant, the latter became the principal material for columns, and those of Egypt are remarkable for the beauty of their workmanship and the durability of their materials. The Egyptian columns were numerous, close, short and very large. They were generally without bases, and had a great variety of capitals, from a simple square block ornamented with hieroglyphics, or faces, to an elaborate composition of palm leaves, not unlike the Corinthian capital. The Greeks, for their columns, used marble of the finest kind, with which their country abounded

; and other nations the stone or material of their country. The Greeks considered the column as an essential part of the architecture of their temples, and never used it as a mere decoration. In fact the primitive Greek temples were little else than roofed columns, thus showing clearly their origin.

The manner of constructing the columns of all the orders rests on similar principles. They are all divided into three primary parts or divisions, the base, the shaft and the capital, except the Doric order, which has no base. The lowest or thickest part of the shaft is used by architects as the universal scale or standard whence all the measures which regulate and de¬ termine heights and projections are taken; and this standard or scale must be understood be¬ fore any architectural design can be com¬ menced. The universal architectural scale is called a diameter, and is the diameter of the lowest or the largest part of the column; and, unlike the foot, inch or yard, is 'as various as the size of columns. By the diameter, of course, is meant that of the circle which forms the bottom of the column. Half of this diameter, or the length of the radius which forms the circle, is called a module, and is used as well as the diameter as a primary stand¬ ard of mensuration by some writers upon architecture. These measures of length are subdivided as follows, namely: the diameter into 60 parts, and the module into 30 parts, called a minute. The Ionic column has a base peculiar to itself called the Attic, which, with that of the Corinthian order, is described under Architecture.

The shafts of the orders differ in height and even in various examples of the same order. The capitals also are as various. Columns are either plain or fluted, and the flutes and manner of dividing them are different in the Doric and Corinthian orders. The Ionic flutes much resemble the Corinthian, and in many instances are exactly similar. Columns of all the orders taper gradually toward the top, but in the middle there is sometimes a slight swelling called an entasis. Roman architecture being derived from the Greek, Roman columns were either exactly similar to Greek or modifica¬ tions of the latter. The principal modifications of the column made by the Romans were that form of the Ionic capital in which there were four pairs of diagonal volutes instead of two

pairs of parallel ones, and that peculiar to the Composite order, in which the capital of the Corinthian column was combined with that of the diagonal or modern Ionic.

Columns are also often used for com¬ memorative purposes as well as for architec¬ tural supports; and such are the Trajan and Antonine columns in Rome, and the Monument in London, erected in commemoration of the great conflagration of 1666, one of the loftiest, best constructed and most beautiful in exist¬ ence. It is a Doric fluted column, 202 feet high from the

bottom of the pedestal, which is ornamented with bas-reliefs of Charles II and his court giving protection to the fallen city, and various inscriptions, to the top of the vase of flames, by which it is surmounted.

COLUMN, in military tactics, a formation in which the units (soldiers, squads, sections, platoons-, companies, troops, squadrons or bat¬ talions) are arranged from front to rear, or in general any formation with relatively great depth and a narrow front. Columns are found in different forms both in close and in ex¬ tended order. In close order they may be divided into those that are purely drill for¬ mations and those that are march formations. The drill-formation columns may be open, when the distance between two successive units per¬ mits wheeling or turning into line, or close, when this is not possible. The units of which close columns are formed are companies in America, platoons in Great Britain. Double columns are used by several countries.

The marching formation of infantry in America is the column of squads, in which the change from line into column is made by the bodily turning of the squad, a body two men deep and four men wide, under the command of a corporal. Germany has a similar forma¬ tion, but provides for a place for the officers, sergeants and other file-closers in the column, and not merely beside it. Great Britain and most other countries form the column from the line and vice-versa without a bodily shifting of distinct units. The change from line to column is accomplished in Great Britain by the com¬ mand (

In open order lines of small columns are used by infantry to gain ease of movement through brush and security from fire, especially on reverse slopes. They are also far easier to manoeuvre than lines. In the American army, these columns are either squad columns, in single file, under a corporal, or platoon columns, in double file, under a sergeant or subaltern. In the French army, a section deploys into squad columns by the mere lateral separation of its squads. The French often arrange their squad columns in two echelons.

The principle of the column formation, that of echelonment in depth, is emphasized strongly by the French in actual fighting tactics. It enables one to secure that the reinforcement of

a depleted body of troops shall come from its own organization, and that as little confusion of command as possible shall result.

The term ((column55 is also used of the sup¬ ply, ammunition, engineer

and sanitary trains in the line of communication. These start from a rail-head or water-head, and turn over their supplies, etc., to the trains proper or take up wounded at refilling or distributing points.

Consult Balck, tactics5 (tr. Fort Leaven¬ worth 1915) ; United States Small Arms Firing Manual ; Infantry Drill Regulations ; Cavalry Drill Regulations; Field Artillery Drill Regula¬ tions ; Field Service Regulations. See also Artillery; Cavalry; Infantry; Line; Tac¬ tics.

COLUMN OF JULY, a monument erected in Paris in 1840, on the site of the old Bastile in honor of the citizens killed in the revolution of 1830. It is a shaft of bronze on a marble base, capped with a gilded statue of the Genius of Liberty. It is 154 feet high and 13 feet in diameter.

COLUMN OF SAINT MARK. See

Venice.

COLUMN OF TRAJAN, a monument erected in Rome in 114 a.d. in honor of the emperor. It is a Roman Doric column of white marble of 34 blocks, 23 composing the shaft, on which are carved representations of various scenes in Trajan's campaigns, containing 2,500 figures of men, each about two feet in height. The quadrilateral pedestal bears art inscription ■which can easily be read. It is 127ˆ4 feet high, exclusive of the statue of Saint Peter, which now stands on the apex of the column, having taken the place of the colossal figure of Trajan in 1587.

COLUMN VENDOME, von-dom, a mon¬ ument erected in the Place Vendome, Paris, by Napoleon I, to commemorate the victories of the Grand Army over the Russians and Austrians in 1805. It is similar in design and ornamentation to the Column of Trajan, but is built of masonry encased in bronze taken from 1,200 captured guns, and capped by the statue of Napoleon. It is 142 feet high and 13 feet in diameter. It was overthrown in 1871 dur¬ ing the Commune but was restored in 1875.

COLUMNAR JOINTING, and COLUM¬ NAR BASALTS. In lava flows (q.v.) and sills (q.v.) there is often manifested a peculiar structure consisting of five or six sided prisms or columns, separated by narrow cracks. These are usually at right angles to the cooling sur¬ face of the igneous mass. The cause is sup¬ posed to be contraction during cooling. Such columnar jointing is well displayed in the Giants Causeway (q.v.), at Fingals Cave (q.v.), along the Palisades of the Hudson (q.v.), in Yellowstone Park (q.v.) and at numerous other points.

COLURE, ko-lur', one of two imaginary great circles of the celestial sphere passing through the celestial poles ; one passing through the equinoctial point of Aries and Libra and the pole of the equator; and the other through

the solstitial points of Cancer and Capricorn, and the poles both of the ecliptic and equator. For this reason the first is called the equinoc¬ tial, and the second the solstitial colure. The name, meaning <(docked®)5 or ˆdock-tailed,® is

now rarely used ; it was originally applied be¬ cause a portion of these circles is always con¬ cealed under the horizon.

COLVILLE, Sir Edwin Henry, English general: b. 10 July 1852; d. 1907. He was educated at Eton and entered the grenadier service in 1870. He served in Egypt, the Sudan, Uganda and South Africa, where his failures led to his recall. He has published (A Ride in Petticoats and Slippers) (1879) ; (The Accursed Land) (1884) ; (History of the Sudan Campaign5 (1887) ; (The Land of the Nile Springs5 (1895) ; (The Work of the Ninth Division5 (1901). He was created K.C.M.G. in 1895.

COLVILLE, Wash., town and county-seat of Stevens County, 85 miles north of Spokane, on the Colville River and the Great Northern Railroad. It has extensive lumbering and agri¬ cultural interests and a number of small in¬ dustries. hlear here was established a Jesuit mission in 1846, for the christianizing of the Salishan Indians. In 1872 a reservation was established, the Indian population of which in 1910 was 785. Pop. of Colville 1,796.

COLVIN, Sir Sidney, English critic: b. Norwood, England, 18 June 1845. He was Slade professor of fine arts at Cambridge 1873— 85 and keeper of prints and drawings at the British Museum 1884-1912. His writings in¬ clude (Children in Italian and English Design5 (1872); (Life of Walter Savage Landor5 (1881) ; (Life of Keats5 (1887) ; (A Florentine Picture-Chronicle5 (1898) ; (Early History of Engraving in England5 (1905). He edited the Edinburgh edition of the works of Robert Louis Stevenson (1894-97), and also his letters. He was knighted in 1911.

COLVOCORESSES, George Partridge,

American naval officer: b. Norwich, Vt., 3 April 1847. During the Civil War he served two years on the ships Supply and Saratoga and then entered the United States Naval Academy from which he was graduated in 1869. He was advanced through the several grades, becoming captain in 1905 and retiring, at his own request, as rear-admiral in 1907. He was present with Dewey at Manila Bay in 1898 and was advanced five numbers in grade (

COLWELL, Stephen, American lawyer and writer: b. Brooke County, Va., 25 March 1800; d. Philadelphia, 15 Jan. 1872. He was graduated at Jefferson College, studied law, was admitted to the bar and practised for some years in Pittsburgh. About 1830 he fire- moved to Philadelphia, became an iron mer¬ chant and amassed a fortune. He early de¬ veloped a fondness for the study of finance, political economy and social science, and fre¬ quently published the results of his studies on questions of current interest or debate. Dur¬ ing the Civil War he aided the administration with pen, purse and voice, and was a liberal supporter of the work of the sanitary commis¬ sion. He was appointed by the government one

of the commissioners to examine the internal revenue system and suggest improvements. He left his large and valuable library of works on political and social science to the University of Pennsylvania, where he also endowed a pro¬ fessorship of social science. Of his writings the following

may be mentioned: (Relative Position in Our Industry of Foreign Com¬ merce, Domestic Production, and Internal Trade5 (1850) ; (New Themes for the Prot¬ estant Clergy5 (1851); (The South ; . . . Ef¬ fects of Disunion on Slavery5 (1856) ; 'Ways and Means of Commercial Payment5 (1858), his last and most important work.

COLY, a bird of the African family Coliidce. See Mouse-bird.

COLYMBIFORMES, an order of archaic birds, all aquatic, with webbed or lobed toes, the metatarsi extraordinarily flattened, and having great power in swimming and diving. There are two suborders: (1) Colymbi, the loons; and (2) Podicipedes, the grebes (q.v.). See Ornithology.

COLZA OIL, COLESEED, or RAPE OIL, an oil, familiar from its use as an illu¬ minating agent in the moderator and other lamps, expressed from the seeds of several plants of the cabbage and turnip genus, the name being originally "kolzaad55 (Dutch), that is kail- or cabbage-seed. It is yellowish brown, has a specific gravity of .92, and little or no smell, and dissolves in hot alcohol and in ether. It becomes thick and solid only at very low temperatures ; when heated it volatilizes, but not completely, undergoing partial decomposi¬ tion. It is purified for use by continued agita¬ tion with sulphuric acid, which destroys muci¬ laginous matter from the seed, and washing with water to remove all trace of the acid. The oil is used in Great Britain and on the Continent in soap-making, tanning, fulling of cloth, lubricating machinery and for burning. For the last it is so well adapted that it was specially recommended for lighthouse purposes. It is brilliant and steady, is managed with very little attention and is cheap. In these respects it is said to be superior to spermaceti.

COMA, in medicine , a state of complete or almost complete unconsciousness, resulting from various diseases, as apoplexy; from poisons, as opium, uraemia, diabetes, alcohol ; from accident or injury to the brain; or from excessive cold. In cases of coma the pulse is usually slow and soft, but sometimes quick, the breathing is rarely stertorous, the pupils of the eyes are commonly more or less dilated and the face is often swollen and livid. The patient is either altogether unconscious and in¬ capable of replying to any question, or he makes incoherent and rambling statements. Stimulating agencies and blistering are some¬ times used in the treatment of comatose cases, but generally the disease or injury producing the condition determines the remedy.

COMA BERENICES, ber-e-nl'sez ("the Hair of Berenice55), a northern constellation, the name of which is due to the flattery of Alexandrine astronomers, who professed to see in the new constellation a lock of the beautiful hair of Berenice, wife of Ptolemy Epergetes. Callimachus in Greek and Catullus in Latin wrote poems descriptive of the apotheosis of

the curl. Ptolemy did not introduce it into the Almagest as a distinct constellation, but called it Plokamos (Gr., "hair,55 or "curl55). Tycho Brahe restored it as a distinct constellation in his catalogue of 1602. It is formed of rather faint stars, none being brighter than the fourth magnitude. Baily, in the ((B. A. C.)5 in 1845, attached the first three letters of the Greek alphabet to three of the brighter stars. The constellation is surrounded by Ursa Major, Canes Venatici, Bootes, Virgo and Leo.

COMACCHIO, ko-ma-che'o (ancient Co- mactium), Italy, town in the province of Ferrara, in Emilia, about 20 miles north of Ravenna and 30 miles southeast of the city of Ferrara. The town is built on 13 islands which are connected by bridges. The chief industries are fishing and manufacturing salt.

COMAN, Katherine, American teacher: b. Newark, Ohio, 23 Nov. 1857; d. Wellesle)ˆ, Mass., 11 Jan. 1915. She wras graduated with the degree of Ph.B. at the University of Michigan 1880, and at once joined the faculty of Wellesley College, remaining there until her death. She was professor of economics there from 1900 to 1914. She went abroad in 1913— 14, and made a special study of social insurance, as worked out in England, Spain, Belgium and the Scandinavian countries. This study, which was to have included France, Germany and other countries of Europe, was interrupted by the illness which brought her home to die. She published (Growth of the English Nation5 (1895); (History of England5 (1899); 'His¬ tory of England for Beginners5 (1901), and in collaboration with her colleague Katherine Lee Bates, 'English History Told by English Poets5 (1902); 'Industrial History of the United States5 (1905) ; and 'Economic Be¬ ginnings of the Far West5 (2 vols., 1911).

COMANA, ko-ma'na. (1) An ancient city of Cappadocia, supposed to be the modern Elbostan, on the river Sarus, celebrated in antiquity for its temple of Artemis Tauropolis, and for the great devotion of its inhabitants to the worship of that goddess. Over 6,000 persons were engaged in the service of the temple. The city was governed by the high priest, who was always a member of the reigning family, and took rank next to the king. (2) A city of Pontus, now Tokat, on the river Iris, and almost as famous for its devotion to Artemis as the other city of the same name. There is evidence to show that this worship to Artemis or Ma, as the goddess was generally called in both the cities of Comana, was originally that given to the Moon goddess ; and it had some suggestive resem¬ blances to that of Isis in Egypt.

COMANCHE, kd-man'che, CAMANCHE, CHOUMAN, COMANDE. Their own name is Niim, "people55; the Sioux gave them one which the French turned into Padouca, a powerful and ferocious tribe of the widely dis¬ tributed Shoshonean stock, speaking the same language as the Shoshones of

Wyoming, and traditionally their neighbors. When first made known to the whites by the French under Dutisne, they were located in eastern Colorado. They had already obtained horses from the Spaniards and become nomads and expert horse¬ men, and horse-breeders, for the French bought

horses from them. In 1724 another French ex¬ pedition made a treaty with them. They seem shortly after to have been pushed southward by the Sioux, and we find them later roving the plains of northwestern Texas, making plundering raids from Colorado through Texas, deep into Mexico, and westward to Santa Fe. They lived in skin wigwams, with few or no fixed villages except near the Spaniards, and were in eight bands, with a very loose organiza¬ tion. They probably numbered 5,000 warriors, and 25,000 in all, at their best estate. One vil¬ lage near the Spaniards had 800 warriors, and over 4,000 in all. They were at constant war, both with the Spaniards and the other Indian tribes, and in 1783 engaged in a wholesale war with the former ; but Anza inflicted a crushing defeat on them, killing 30 of their chiefs, and there was peace for a time. In 1816 they are said to have lost 4,000 of their number by an epidemic of smallpox ; but they were still esti¬ mated at 9,000; and in 1847 at 10,000 or 12,000, one-fifth warriors. They recruited their num¬ bers by kidnapping and adopting Mexican chil¬ dren, boys or girls. For all the years of im¬ migration into those regions, down to 1875, they were the bloody and relentless scourge of the white settlers, and furnished a good part of the Indian horrors of the Southwest. They were once placed on a reservation in Texas, but were driven off. In 1868 the bulk of them agreed to go on a reservation in western Oklahoma; but the Quahada or Staked Plain band refused, and kept up their murderous forays. They were sharply punished by Colonel McKenzie at Mc¬ Clellan's Creek in 1872, in which year they were estimated at 3,218 on the reservation, with 1,000 more in roving bands. The last of these sur¬ rendered in 1875. In 1901 their reservation in Oklahoma was thrown open to settlement. At present they number about 2,000. Consult Hodge, W. H., (Handbook of American In¬ dians } (Washington 1907),

COMANCHE, Tex., city and county-seat of Comanche County, 110 miles southwest of Fort Worth, on the Fort Worth and Rio Grande and the Saint Louis and Southwestern railroads. It is an agricultural centre, has brickyards, cot¬ ton gins and stockyards. Comanche was set¬ tled in 1857 and is governed under a charter of 1876 which provides for a mayor, elected for two years, and a council. The waterworks are municipally owned. Pop. (1920) 3,524.

COMANCHEAN. See Cretaceous.

COMAYAGUA, ko-ma-ya'gwa, or VAL¬ LADOLID LA NUEVA, Honduras, C. A., a town, capital of the department of the same name, situated on the southern border of the plain of Comayagua, on the Humuya River, 220 miles east of Guatemala. It is the seat of a bishopric, has a large and handsome cathedral, a richly endowed hospital, several convents and a college, it was founded by Alonzo Caceres in 1540, and up to 1827 was a thriving place, with about 18,000 inhabitants. In that year, however, it was burned by the monarchical fac¬ tion of Guatemala, and has never recovered. Pop. 3,100.

COMB (A.S. camb), an instrument to sepa¬ rate and adjust the hair, too well known to need description. We have no certain authority

that either the Greek or the Etruscan women applied this useful article regularly to their hair in the operations of the toilet, although it was used by the Greek women, at least, to arrange their hair. The combs used by the Greeks were of boxwood, and had teeth on both sides, while those used by the Egyptians had teeth only on one side. The Romans also had combs of box¬ wood, and at a later time probably of ivory and other materials. In the work of Guasco Della Ornatrici there are several representatives of ancient Roman combs. One of them is a long one of box, of which the handle is over¬ laid with ivory, and appears to have been orna¬ mented with a small meander in gold. It has two rows of fine teeth, delicately wrought and well proportioned. Modern combs are gen¬ erally made of tortoise shell, ivory, horn, wood, bone, metal, india rubber and celluloid. Ma¬ chinery has been perfected for their production. In making combs the material is first cut to the form which the comb is to have, and the teeth are then made all at once by means of circular saws mounted on the same axle and placed at a suitable distance from one another. Large combs in horn or shell, with wide teeth, are sometimes made with a punch, which cuts in the piece the teeth of two combs by the same operation. The teeth are afterward finished with the file. Combs made of vulcanized india- rubber, which are now so common, are made by pressing the caoutchouc while soft into molds, and then bringing them to the desired degree of hardness by the process of vulcanization. Canova and other modern sculptors have made great use of the comb, placed in the heads of their women, to which they add much grace and elegance.

COMB, the wax cavities in which bees lodge their honey. The comb of a bee is com¬ posed of hexagonal cells, of which there are two tiers, the cells of which are placed end to end, so that the three plates of wax, which serve as the bottom of the cell in the one tier, constitute also that of the corresponding one in the other. The mathematical problem in ((max- ima and minima,® how to construct the greatest number of cells within the

smallest possible room, and with the least expenditure of mate¬ rial, is solved.

COMBA, kom'ba, Emilio, Italian author; b. San Germano Chisone 1839. He became a professor at the Istituto Valdese at Florence; there he founded in 1873 the review entitled Rivista Cristiana, devoted to the discussion of religious problems and topics. He is the his¬ torian of the religious reform in Italy. His works include Hntroduzione alia storia della riforma in Italia) (1881) ; (I nostri protestantP (1897); (Storia dei ValdesP (latest ed., 1901; Eng. trans., London 1889).

COMBACONUM, Madras, British India, town in the district of Tanjore, 194 miles from Madras. It is regarded by the Hindus as a place of peculiar sanctity, and is inhabited large¬ ly by the Brahmans. It contains numerous pagodas and tanks with water, supposed to come from the Ganges River. One of the oldest places in southern India, it is one of the strong¬ holds of Brahmanism and Brahmanical culture. Pop. about 64,000.

COMBASOU — COMBERMERE

COMBASOU, the trade name of an African weaver-bird (Hypochcera chalybeata) , kept in aviaries for its pretty plumage and man¬ ner. The male is black with a bluish gloss, bill white and legs pink; the female is brownish.

COMBAT, in its general sense signifies a fight. The noun form is derived from the verb and the latter from the French of the same form. Owing to the prevalence of single com¬ bats in Normandy and England in early Nor¬ man times, the word combat, in England, where it was not altogether at home, came to be re¬ stricted in sense generally to a fight between two individuals or between two parties, each chosen to uphold the honor of its own party or faction. Trial by combat and the ordinary sin¬ gle combat encounter have both the same origin, which goes back to the dim ages long before formal history began. Originally single combat was frequently made use of to adjudge the guilt or innocence of the contending parties, and it was itself the same in import and origin as the trial by combat in all its various forms. The witch was tried by water, which she was popularly supposed to hate. In India women accused of unfaithfulness to marriage vows were subject to trial by fire to test their innocence or guilt. The single combat, early in the organization of society, came to be a union of two social inclinations, that of the tendency of two disputants to fight out their quarrel, and that of the potent influence of magic in which all primitive tribes believed and which was supposed to help the more powerful contendant. Later on this magic idea of the barbarian races and the savages gradually sur¬ rounded itself with a moral atmosphere, the re¬ sult of attributing the magic itself to the in¬ fluence of the gods and their interference in behalf of one of the contendants, generally the one in the right. Later the idea of a divine guardianship of every human being' came to lend a still more pronounced moral atmosphere to the single combat fought to decide a ques¬ tion of right or wrong. Gradually, however, this moral idea lost ground in ordinary single combat encounters, as the age of chivalry ad¬ vanced, without a weakening of influence in its own particular sphere of trial by ordeal, into the service of which the trial by single combat still continued frequently to be pressed to the end of the age of chivalry. Very ancient usage was evidenced by Goliath (1 Sam. xvii), and by Ajax in the (Iliad, > and by many of the characters in the mythologies of various nations. Among the Scottish clans the combat was sometimes be¬ tween individuals; but just as often between a certain picked number on each side. Then again not infrequently one clan defied another to combat. The Norse practice of principals go¬ ing alone to a small holm or island, to be free from disturbance while settling their quarrels by strength and skill, gave rise to the Saxon term Holm-Gang. In the days of

chivalry the single combat received the strong support of law and custom, and was resorted to both in civil and in criminal cases. The accuser or plaintiff swore to the truth of his tale, the other gave him the lie, a gage of battle was thrown down and taken up, and they fought it out under rules before an assembly, the supposi¬ tion being that God would give victory to the right. The barbarous practice survives in

European countries, without its excuse of superstition, in the modern duel, which is legally prohibited in the United States. In England it was still a legal method of trial well into the 19th century, but was abolished by statute 59 George III, cap. 48.

COMBAT TRAINS. See Ammunition.

COMBE, kom or koom, Andrew, Scottish physiologist: b. Edinburgh, 27 Oct. 1797; d. there, 9 Aug. 1847. He was educated for the medical profession, and in 1822 he commenced practice at Edinburgh, and had considerable success. In 1838 he was appointed one of the physicians extraordinary to the queen in Scot¬ land. His chief works are Observations on Mental Derangement (1831); Principles of Physiology > (1834) ; Physiology of Digestion (1836); (A Treatise on the Physiological and Moral Management of Infancy * (1840). Like his brother George (q.v.), he was a zealous phrenologist.*

COMBE, George, Scottish phrenologist: b. Edinburgh, 21 Oct. 1788; d. Moore Park, Sur¬ rey, 14 Aug. 1858. He was a brother of Andrew Combe (q.v.), was bred to the law, and in 1812 admitted a member of the Society of Writers to the Signet. He was the first to introduce the doctrines of phrenology into Great Britain ; and visited Germany and America, lecturing on his favorite science. He was also a zealous promoter of the cause of popular education and social progress ; and was among the first to ad¬ vocate compulsory education and the establish¬ ment of a board of health. He was a frequent and important contributor to the Phrenological Journal and he wrote for other publications, and in his own works, on education, theology, politics, economics and other subjects and mat¬ ters of general interest. He had a way of presenting his subject that made him an im¬ mensely popular writer. Besides the Consti¬ tution of Map (1828), which has had an enormous circulation, he was the author of (A System of Phrenology) (1825) ; Pectures on Popular Education (1833) ; (Moral Philoso¬ phy* (1840) ; (The Life and Correspondence of Dr. Andrew Combe) (1850) ; Principles of Criminal Legislation and Prison Discipline In- vestigated) (1854); 'Relation Between Science and Religion* (1857).*

*COMBE, William, English writer: b. Bris¬ tol 1741; d. Lambeth, 19 June 1823. His (Tour of Dr. Syntax in Search of the Picturesque) (1812) was once very popular. Other works by him are 'The Diaboliad, * a poem*

(1776) ; 'The Devil Upon Two Sticks in England- (1790). After 43 years within the rules of a debtor's prison, and previous vicissitudes of fortune from army officer to cook, he died in Lambeth.*

COMBERMERE, kum'ber-mer, Sir Staple- ton Cotton, Viscount, English general : b. Denbighshire, 17 Nov. 1773; d. Clifton, 21 Feb. 1865. He entered the army in 1790, served in Flanders and India, and with the rank of major-general accompanied the Duke of Wellington to the Peninsula in 1808. In 1809 he succeeded to the family baronetcy. At Salamanca, in 1812, he headed the brilliant cavalry charge which greatly contributed to the decisiveness of that victory, and was subse¬ quently present at the battles of the Pyrenees,

Orthez and Toulouse. Shortly after the last battle he was raised to the peerage with the title of Baron Combermere. From 1817 to 1820 he was governor of Barbados ; 1822-25 commander-in-chief of the army in Ireland, and in 1825 was sent to India as commander- in-chief of the forces there, to put down the usurper Doorjun Sal. After a siege of less than two months, Bhurtpore, the chief city of Door¬ jun, was taken by storm on 6 Feb. 1826, for which Combermere was raised to the rank of viscount. The remainder of his life was passed in England. In 1852 he was appointed con¬ stable of the Tower; and in 1855 made a field- marshal.

COMBES, koomz, Justin Louis Emile,

French statesman: b. Roquecourbe, Tarn, France, 6 Sept. 1835 ; d. 24 May 1921. He was educated in a Roman Catholic seminary for the priesthood, but subsequently studied medicine, and began practice in Pons, where he filled vari¬ ous posts of responsibility, such as those of mayor and county councillor. In 1885 he was elected to the Senate, of which he was vice-president 1893-94, becoming Minister of Public Instruction in 1895. He was active in the re¬ organization of primary and secondary edu¬ cation. In June 1902 he succeeded Waldeck- Rousseau as President du Conseil des Minis- tres. In this capacity he enforced the Asso¬ ciation Act, abolishing liberty of teaching in France and aimed at the clergy. The law against the religious orders was enforced with great severity, and over 500 teaching, preach¬ ing and commercial orders were suppressed under the Combes regime and their members underwent great hardships. His opponents claimed that this was done with needless severity. It caused widespread disturbances throughout the country. On his becoming Prime Minister, M. Combes announced his in¬ tention to reduce the period of military service to two years, and to establish a general in¬ come tax. Steps were also

taken during his ministry which were to lead later to the separa¬ tion of Church and State. In spite of the fact that M. Combes was upheld by the Chamber in all his acts, he resigned in 1905 because of the intense bitterness which these acts aroused among the Conservatives. M. Combes was a latter-day Voltaire, with all of his master's hatred of clericalism in all its forms. To him the Catholic Church appeared as the sworn enemy of modern life and culture and particu¬ larly of the Republic of France. Personally he was what is called in France an ((austere Repub¬ lican, w a man simple in his private life and rigid in his adherence to Republican principles.

COMBINATION, in mathematics, the selection, from a given set of objects, of a stated number without regard to their arrangement. Each combination can, by varying the arrange¬ ment of the constituent objects, be made to give rise to several permutations. Thus of the four letters, a, b, c, d, four combinations, three at a time, are possible ; namely, ab c, a b d, a c d, bed. Each of these combinations, however, produces six permutations, according to the order of the letters. For example, the combina¬ tion ab c yields the six permutations ab c, acb, b c a, b ac, c ab, cb a. Thus, of the four let¬ ters, a, b, c, d , the number of permutations three

at a time is 24. It is easy to prove that the number of permutations of n objects two at a time is n (n- 1) ; three at a time n (n- 1) (n-2); four at a time n (n-\) (n-2)

(w-3); and so on, the number when r at a time are taken being n (n-1) (n-2)...

(n-r~\- 1). The number of permutations of n things n at a time is therefore n (n-1) (n-2)... 4, 3, 2, 1, a product usually repre¬ sented by Ln or n !, and read as "factorial w.® The theory of permutations and combinations is of very great importance in higher mathe¬ matics, and may be studied in any textbook of algebra, such as those by Chrystal, Todhun- ter and Smith.

COMBINATION, Industrial, in law, a union of individuals, companies or corporations formed for the purpose of accomplishing a particular object or purpose. In the United States a combination is not unlawful in itself, though it becomes so if it seeks to obtain its ends in an unlawful manner or by unlawful acts. Combinations may be divided into two general classes, those formed by employees or "labor,® and those formed by employers or "capital.® Combinations formed by employees, or labor, generally bear the designation of unions. The purpose of a union is to better the condition of its members in relation to the work in which they are engaged, by securing higher wages, less working hours, different methods of doing the work and similar changes. A union generally tries to enforce its demands by striking, or threatening to strike. A strike is a combination effected by employees

whereby at a prearranged time they all stop working unless their demands are granted. A strike is usually organized through a union.

A boycott is a combination to cause a loss to a particular person by restraining others from doing business with that person. It is often so conducted that the person is affected socially as well as in his business. When a boy¬ cott has been declared against a person, any one having either business or social relations with that person is also boycotted.

When the objects of such combinations are effected in a peaceful and lawful manner there is no legal means by which they can be inter¬ fered with ; but it generally happens that when a number of working-people strike there is a breach of contract, or a conspiracy, in which case there is a legal redress. The usual action is for the injured party to proceed in equity and ask for an injunction restraining the for¬ mer employees from committing certain acts. Sometimes damages are asked for, and it makes no difference what the status is when the cause is heard, as damages can be recovered for acts committed during a strike, although the strike may have ended long before the demand for damages.

Combinations formed by employers, or capi¬ tal, are usually known as trusts. Trusts are generally formed with the object of regulating the supply or price of a product, or both, or for the purpose of reducing expenses or competi¬ tion.

It has .been found. very difficult to frame a law which will be effective against all the different arrangements under which a trust can do busi¬ ness. The State courts have no jurisdiction outside the limits of the State to which they

belong, and it is very seldom that a trust would be formed whose business would be con¬ fined to any one State. The Federal govern¬ ment has passed several anti-trust laws, and up to the present time the most effective way of dealing with this class of combinations is by laws passed under the clause in the Federal Constitution (Art. I, § 8, cl. 3), which provides that Congress shall have power ((to regulate commerce with foreign nations, and among the several States, and with the Indian tribes.® See Boycott; Strikes and Lockouts; Trust Companies. Consult Jenks, T., (Trusts and Industrial Combinations) (in Bulletin of De¬ partment of Labor, No. 29, July 1900).

COMBINATIONS AND PERMUTA¬ TIONS. Combinations and permutations deal with the arrangement and grouping of ob¬ jects. They

arose out of problems such as these : ((How many numbers can be thrown with two dice?® ((How many striped flags can be made with three colors? ® ((How many whist hands of 13 cards each can be dealt from a pack of 52 cards, the cards being put back and shuffled after each deal?® Although games of chance furnished most of the problems in the begin¬ ning, the modern aspect of the subject finds ap¬ plications in statistics, probabilities and the the¬ ories of numbers, finite group, and algebraic forms. Aside from isolated references to sin¬ gle questions in the works of the Greek mathe¬ maticians, the earliest attempt at organized treatment of combinations and permutations occurs in the treatise of the Hindu astronomer Bhaskara Acharya in the 12th century. The subject received no further attention until the time of Cardan (1501-76) and another cen¬ tury elapsed before Pascal (1623-62) succeeded in building it into a science, as yet, however, in its infancy. Hindenburg (1741-1808) is re¬ garded as the founder of the modern theory, but his school, known as the ((combinatory school® held aloof from the rest of mathemat¬ ics. Since then the researches of Jacobi, De Morgan, Sylvester, Cayley, Franklin, Mathews and MacMahon have shown its use in the gen¬ eral theories of arithmetic and algebra. We shall take up only elementary combinations and permutations; for a complete treatment of com¬ binatory analysis consult MacMahon, Combina¬ tory Analysis) (1915), and Netto, (Kombina- torik) (1901).

Permutations. — A permutation of n ele¬ ments taken r at a time is a linear arrange¬ ment, as in a row, of r of those n things with regard to the order in which they may be placed ; e.g., a b c and a c b are permutations of a, b, and c. This name was given by Jacob Bernoulli ((Ars conjectandP 1713). The num¬ ber of permutations will be denoted by Pn, r, n being the total number of elements and r the number in a group; the notation (nr) or (n) r is often used. To find Pn, r, observe that the first one of the r objects may be selected in n ways and for each selection there are n — 1 things left from which to choose the second object; both may thus be chosen in n(n — 1) ways. By continuing the argument we find :

Pn,r = n(w — 1) (n — 2).... (n— [r — 1]) there being r factors. The following table gives numerical values of Pn, r from n — 4 to 10 and r — 2 to 10. From the table Pz, 5 = 6720 and is found under w = 8 and opposite r— 5.

Pz , 3 — Pz, 2 — 6 ; P2, 2 — Pz, 1 — 2. SP will be ex¬ plained later.

VALUES OF Pn r and Sp

n

r

10

9

8

7

6

5

4

2 .

90

72

56

42

30

20

12

3 .

720

504

336

210

120

60

24

4 .

5,040

3,024

1,680

840

360

120

24

5 .

30,240

15,120

6, 720

2,520

720

120

6 .

151,200

60,480

20,160

5,040

720

7 .

604 , 800

181 ,440

40,320

5,040

8 .

1,814,400

362,880

40,320

9 .

3,628,800

362 , 880

10 .

3,628, 800

Sp .

9,864,100

986,409

109,600

13,699

1,956

325

64

When r = n

Pn, n=n(n- 1) (n- 2) .... ±2 n factors.

This product of the integers from 1 to n is rep¬ resented by

n! n(n — 1) . . . 2

and is read factorial n ; it is due to Kramp (dements d'arithmetique universelleP 1808). The number of r permutations is therefore written

n!

Pn • r= («-?)/

Now when r = n , Pn,n~ti! hence (n-n) ! or 0! must equal unity. That is, if Kramp's nota¬ tion is to be carried out consistently we must regard 0! as a symbol for unity although ac¬ cording to the strict meaning of n! factorial 1 is 1 and factorial 0 is 0. But as both 1 ! and 0 ! must be taken as unity

P n , n= = P n , n — 1 ; the table shows this to be so.

When n is large as in the theory of proba¬ bilities, n! can be computed from the series due to Laplace ((Theorie des probability) :

„l = „ne-nˆ/Jˆlf + —+ - gˆ+..)

which as n increases indefinitely approaches n! = nne~n approx.;

this is Stirling's formula ((Methodus Differen- tialisP 1730). For example, when n — 10 this approximation gives 3,598,700 which differs from the

correct value in the table by 0.83 per cent. For n — 20 the error is less than one-half per cent. The number of permutations often runs astonishingly high ; the number of whist hands in the problem stated at the beginning of this article is P52, i3:=:635, 01 3,559,600 so that the prob¬ ability of a player getting the same hand twice in a lifetime is remote to say the least.

The sum of the permutations of n things successively one at a time, two at a time, and so on up to all at a time is

m = »

2 Pn, m, = Sp, say,

m = 1

where Sp is given in the last row of the table. Since

fil _

Pn, m = ^ — fn)t P n,n = = ^>n' n 1

s*=nl (1 + T7 + Ti + • ' ' + (nˆTji)

When n is large the parenthesis approaches the

base of Naperian logarithms £=2.7183. . . .

yil _ _ _ _

Sp = — — nn e n 1V2 rcn approx.

€r

The following results are useful: consult Chrystal, (Text Book of Algebra) ; Hall and Knight, (Advanced Algebra. >

1. The number of permutations of n things of which a are alike, b are alike and the rest different is n!/a!b[image]

2. The number of permutations of n things in a circle is (n — 1) 1/2 if the clockwise or anti¬ clockwise order is indifferent. Thus 8 people may be seated around a table in 2520 ways.

3. The number of r permutations of n things when each thing may be repeated up to r times is nT. With a night signal of 4 colored lights each of which may occupy 3 positions, 34=81 signals may be made.

Combinations. — In a combination the order of elements in a group is indifferent, i.e., a b c and a c b are not different combinations. The word is due to Pascal ((Usage du triangle arithmetique,5 1665). The formula for com¬ binations follows from that of permutations, for Pn, r consists of groups of r things at a time and each group of r exists in r! arrange¬ ments; hence if the arrangements within a group are not counted

_ Pn, r ,w/ _w(w— 1) • . • (n—r+ 1)

n' r r! r!(n — r)! r!

But each time that a group of r is formed a group of n — r is left

Cn, r=Cn, n~r

which shortens the computation when r ˆ >n/2

VALUES OF cn< r AND Sc

. n

r

10

9

8

7

6

5

4

2 .

45

36

28

21

15

10

6

3 .

120

84

56

35

20

10

4

4 .

210

126

70

35

15

5

1

5 .

252

126

56

21

6

1

6

210

84

28

7

1

7. .

120

36

8

1

8

45

9

1

9

10

1

10

1

5 .

1,023

511

255

127

63

31

15

c

The coefficients of the binomial expansion are combinations :

(a- f b)n = an f Cn, i a71-1 b -p . . . -p Cn,n bn when a — 1 = b

2n — 1 = Cn, i -p Cn, 2 -p • . . -p Cn, n = = Sc, say ,

which is sometimes called the total number of combinations and is the total number of ways in which a selection can be made by taking some or all of n things. Now each element may be taken or left and for each of these two ways of dealing with it each remaining element may be taken or left; therefore the number of ways of selecting or leaving the n elements is 2n. But this includes the one case in which all are left; thus S c— 2n — 1 as above. As an interesting illustration consider the Baudot Sig¬ nal Code which is used by the Western Union Telegraph Company for the simultaneous trans¬ mission of messages. Each character (letter of the alphabet, etc.) consists of some or all of five crosses occupying five blank spaces repre¬

sented by dashes; e.g., a – h + – ,b — +

- + +, c— — + + + —. Five dashes mean

that no crosses are used, i.e., the case where all the elements are left. The number of signals possible is consequently 25 — 1—31.

Richard F. Deimel,

Department of Mechanics, Stevens Institute of Technology.

COMBUSTION is chemically the rapid

oxidation of a substance with the evolution of light and heat. It is generally accompanied by flame and the production of carbon dioxide, carbon monoxide and the vapor of water. The substances which are consumed are popularly termed combustibles. Chemically, the sub¬ stances oxidized are the carbon and hydrogen components of the combustibles. The heat in combustion is a result of the chemical changes which take place during oxidation. The light is emitted by incandescent particles of carbon in the flame. The temperature to which any particular substance must be raised in order that it shall take fire is called the “ignition point” of that substance. Ignition points vary with the different combustibles. They may even be below the temperatures which ordinarily pre¬ vail. In such case the substance will burst into flame when that temperature is reached, and this phenomenon is called “spontaneous com¬ bustion.” Some kinds of vegetable and animal oils when spread out thinly, as on a rag, may oxidize so rapidly as to become very hot, and if in a confined place will eventually take fire spontaneously.

In combustion two classes of combustibles are recognized: (1) Those which in the proc¬ ess generate heat sufficient to continue the combustion until the whole of the combustible is consumed; (2) those in which the combus¬

tion can only be kept continuous by the con¬ stant application of external heat. When the processes of combustion take place instantane¬ ously the combustion is called an explosion. Acetylene may be mentioned as an example in this connection. It has a tendency, especially when under pressure, to decompose, with the evolution of so great a degree of heat as to expand enormously and result in an explosion. The economic use made of combustion is chiefly for the generation of power, but also in cooking and the heating of houses and the production of all artificial lights but electric light. The combustibles utilized in this way are called fuels. See Explosion; Fuels; Fur¬ nace; Gas; Heat; Light; Oxygen; Phlogis¬ ton. Consult Hayes, J. W., Combustion and Smokeless Furnaces) (Chicago 1915).

COMBUSTION, Spontaneous, the ignition

of bodies by the internal development of heat without the application of an external flame. It not infrequently takes place among heaps of rags, soot, paper, woolens, cotton and other substances strongly lubricated with oil, when, if the oil is freshly made, it is very ready to com¬ bine with the oxygen of the atmosphere and give out carbon and hydrogen. The heat thus developed, diffusing itself through a mass of highly inflammable substances, will in certain circumstances be sufficient to set them on fire. A remarkable instance of spontaneous combus¬ tion among hemp was afforded in June 1861, being the cause of the terrible conflagration in Tooley street, London. Bituminous coal, piled

up in heaps, is apt to ignite by the decomposi¬ tion of the sulphuret of iron which it contains. In ships laden with coal impregnated with sul¬ phur and iron in the form of bi-sulphuret of iron (pyrites), decomposition of this substance is sometimes occasioned by the access of mois¬ ture, and heat is evolved to such a degree as to cause the combustion of the coal, especially if air is admitted freely. Water poured upon the burning material only adds to the intensity of the action. Charcoal and green hay are liable to spontaneous combustion. A somewhat un¬ usual case of spontaneous combustion occurred in 1916, when an explosion in a flour mill was found to be due to accidental spark ignition of an intimate mixture of flour du^t and air. Legends and tales exist of spontaneous com¬ bustion of human bodies ; but no authenticated case has been recorded, and it is regarded as impossible.

COMBUSTION, Velocity of. It can be

shown by direct experiment that the burning of a grain of powder in a fire-arm is progres¬ sive, and that the size of the grain exerts a great influence

on the velocity of the projectile. For instance if one piece of the press cake were placed in a small mortar and fired, little or no motion would be given to the projectile. If this piece be divided into seven or eight parts, the projectile will be thrown a short dis¬ tance; and by increasing the number of parts or grains, so will the effect of the powder on the projectile also increase. The progressive burning of powder is further confirmed by the fact that burning grains are sometimes pro¬ jected from the gun with sufficient force to perforate screens of paper and wood at con¬ siderable distance. It is even found that they are set on fire in the gun and afterward ex¬ tinguished in the air before they are completely consumed. The velocity of combustion of powder varies with the purity, proportions, triturative, density and condition of the' ingre¬ dients, also with the pressure under which the powder is burned. By varying the proportions and increasing the sulphur there is a tendency to make a more violent explosion and a more quickly kindling mixture. A general formula may be deduced to show the amount of gas developed and the quantity of powder burned at any instant of the combustion of a grain or charge of powder. For this purpose take a spherical grain of powder and consider it in¬ flamed over its entire surface. Let t represent the time of burning, from the instant of igni¬ tion to the moment under consideration; R, the radius of the grain. Since the combustion of the grain passes over the radius R in the

time t, the velocity of combustion is equal —

and for the time, t, it will pass over the space R t

t j or R the radius of the decreasing sphere

will therefore be R (1 — y). The volume of the grain of powder and that of the decreasing

sphere are f R‘ and f respec-

tively; and their difference ™ or the quantity of powder burned, will be equal to 1 ttT?8 (1 — -j) 8).

The first factor of this expression represents the primitive volume of a grain of powder, and the other expresses the relation of the volume burned to the primitive volume. vol. 7 — 23

The same expression will answer for all of the grains of a charge of powder, if they are of the same size and composition ; consequently, if we let A represent the volume or weight of the grains composing a charge of powder, the quantity remaining unburned after the time, t,

t

will be represented by A (1 — y)3; and the quan-

tity burned by A\ — (1 — — -)3). Although the grains

t

of powder are not spherical, their sharp angles are partially worn away by rubbing against each other in glazing and in transportation ; and the mode of fortification and inspection reduces the variation in size within narrow limits; therefore, if we examine the influence which the actual form and size of the grains exercise over the phenomenon of combustion of powder, we shall find that the effect varies but slightly from that due to the spherical form. If we consider the velocity of the projectile on leaving a gun and the time necessary to over¬ come its inertia in the first period of its move¬ ment, we shall see that a very large portion of each grain is burned up before the projectile leaves the gun. If the size of the grain be in¬ creased, the effect will be to diminish the amount of gas evolved in the first instant of time, and to diminish the pressure on the breech. This principle has been made use of to increase the endurance of large cannon.

COMBUSTION ENGINE. See Internal Combustion Engine.

COMEDIE FRANQAISE, ko'ma-de' fran'- saz', the official name of the national theatre of France which is supported by public funds for the purpose of advancing dramatic art. It was long known popularly as (

of the national theatre, which are still, with some subsequent modifications, in force. The government appoints a general manager of the thtatre, the members of the stock company of which divide the profits according to laws and regulations prescribed by the articles of incorporation of the organization. The (

The building of the <(Comedie Frangaise" was so badly damaged by fire in 1900 that it had to be practically rebuilt. This resulted in making the edifice much more modern in every way. The names of nearly all the great actors and dramatists of France have, at some time in their career, been associated with that of the "Comedie."

Bibliography. — Bonnassies, J., (La Comedie Frangaise, histoire administrative) (Paris 1874) ; Cochrane, (The Theatre Frangais in the Reign of Louis XV) (London 1879) ; Etienne and Martainville, (Histoire du Theatre Frangais' (Paris 1802) ; Hawkins, F. W., (The French Stage in the Eighteenth Century' (Lon¬ don 1888) ; Joannides, (La Comedie Frangaise 1680 a 1900) (Paris 1901); Lucas, (Histoire philosophique et litteraire du Theatre Frangais) (Paris 1862) ; Pougin, A., (Dictionnaire his- torique et pittoresque du theatre' (Paris 1888) ; Rigal, Eugene, (Les Theatres de Paris 1548 a 1635′ (Paris 1887) ; Soubies, A., (Almanach des Spectacles) (1890) ; Weiss, (Autour de la Comedie Frangaise' (Paris 1892).

COMEDIE HUMAINE, ii-man, La, a series of novels by Balzac, so designated by their author, and intended to form a picture of the manners and morals of the period. The first volume of the (Comedie Humaine' appeared in 1829; but it was not until 1842 that Balzac adopted the general title. The author intended to present a panorama of his time in France, and he wrote nearly 100 novels without com¬ pleting the herculean task he had set himself.

COMEDIETTA, ko-ma-dl-et'ta (It. di¬ minutive of commcdia) , a dramatic composi¬ tion of the comedy class, but not so much elab¬ orated as a regular comedy, and generally con¬ sisting of one or at most two acts.

COMEDONES, kom'g-donz, a name ap¬ plied to the little cylinders c?f sebaceous and epithelial substances which are apt to accumulate in the

follicles of the skin and to appear on the surface as small round black spots. When squeezed out they have the appearance of minute maggots, or grubs with black heads, and thence have derived their name. They are gen¬ erally associated with a weak state of the skin as well as of the individual. Generous diet and tonic treatment with soap-and-water cleansing and friction will be useful; as an astringent to invigorate a debilitated skin, a lotion of cor¬ rosive sublimate (two grains) in emulsion of bitter almonds (one ounce) and dilute alcohol will be effective. See Acne.

COMEDY, a dramatic representation of a light and amusing nature, in which are satir¬

ized pleasantly the weaknesses or manners of society and the ludicrous incidents of life. Comedy took its origin in the Dionysian festi¬ vals, with those who led the phallic songs of the band of revelers (Gr. komos) who, at the vintage festivals, gave expression to the ex¬ uberant joy and merriment by parading about, dressed up, and singing jovial songs in honor of Dionysus. These songs were frequently in¬ terspersed with extemporized jokes at the ex¬ pense of the bystanders. Comedy first assumed a regular shape among the Dorians. The first attempts at it among the Athenians were made by Susarion, a native of Megara, about 578 b.c. Epicharmus first gave comedy a new form and introduced a regular plot. That branch of the Attic drama known as the Old Comedy begins properly with Cratinus. It lasted from 458 b.c. to 404 b.c. The later pieces of Aristo¬ phanes belong to the Middle Comedy. The chorus in a comedy consisted of 24. The Mid¬ dle Comedy lasted from 404 b.c. to 340 b.c. and the New Comedy till 260 b.c. Middle Comedy found its materials in satirizing classes of people instead of individuals. New Comedy answers to the comedy of the present day. The most distinguished of Roman comic writers were Plautus and Terence, whose plots were mainly derived from the Greek. See Drama; Literary Forms.

COMEDY OF ERRORS, The. This,

Shakespeare's shortest play, is certainly one of his earliest. Conservative modern critics are inclined to fix upon 1591 as the probable date of composition and to place it second only to (Love's Labour's Lost' in the order of the poet's independent works. To the general reader the comedy is chiefly known as Shakes¬ peare's solitary effort at direct imitation of a classic model ; and the neglect it suffers may be due to the mistaken notion that it is no more than a free rendering of the (Men3echmi' of Plautus. The idea of the indistinguishable Antipholus twins and the rough pattern of their adventures, to be sure, come from the (Me- naechmi,' and certain other points from a sec¬ ond Plautine play, the (Amphitruo' — notably the situation in Act III, scene I, where the true master and his slave are shut out of their house while their doubles revel within. Both in plot, however,

and in development the Shakespearean play invents more than it bor¬ rows, and it deserves respect as an instance of the same kind of treatment of sources which marks the poet's maturest work. Short as it is, (The Comedy of Errors' is vastly richer and more varied than the (Menaechmi.' The clever notion of duplicating the twin Antipholi by twin servants (the Dromios) trebles the op¬ portunity for mirthful misunderstanding; while the creation of the pathetic figures of the old father and mother and the charming sister-in- law, Luciana, introduces a depth of human feeling and a romantic atmosphere entirely alien to Plautus. The reader of (The Comedy of Errors' will find many suggestions of later plays. Compare the old father Pigeon with Egeus in (A Midsummer Night's Dream' ; the business of the chain with the trouble over the ring in (The Merchant of Venice,' and note particularly the forecast of (Twelfth Night' in the story of the escape of the shipwrecked twins, their subsequent confusion and the epi¬ sode of the supposed madman bound and laid

in a dark room. An English translation of the 'MenaechmP was printed in 1595 and may con¬ ceivably have been accessible to Shakespeare in manuscript at an earlier date. It seems more likely that he got his general knowledge of this play as well as of the untranslated (Amphitruo> while at school, where Plautus was often a regular subject of study. For the influence of Plautus on English drama in the 16th century, consult the introduction to M. W. Wallace's edition of (The Birth of Hercules) (Chicago 1903). The 1595 translation of the (Menaechmi,) with parallel Latin text and introduction, has been edited by W. H. D. Rouse in the Shakes¬ peare Classics Series) (New York 1912).

Tucker Brooke,

Assistant Professor of English, Yale Univer¬ sity.

COMENIUS, ko-me'm-us, or KOMEN- SKY, Johann Amos, Moravian educational re¬ former: b. probably at Nivnitz, Moravia, 28 March 1592; d. Amsterdam, 15 Oct. 1671. His family belonged to the sect of Moravian breth¬ ren. He studied at Herborn in Nassau and at Heidelberg. He became rector of a school at Prerau and later, after taking orders in the Church of the sect of his parents, accepted the position of pastor and rector at Fulnek. The plunder of that town by the Spaniards after the battle of Prague in 1620 cost him all his possessions and writings. He fled to Poland, where in 1632 he was elected bishop of his communion at Lissa. Here in 1630 was pub¬ lished his (Pansophiae prodromus, a work on education which attempted to organize all human knowledge within reach of the minds of*

everyone. In 1631 there appeared his (Janua Linguarum reserataP which outlined his method of teaching languages through the ver¬ nacular and by means of illustrations and object lessons. This work obtained widespread popularity and was translated into many Euro¬ pean languages as well as into Persian, • Ara¬ bian and Mongolian. His (Orbis pictus) was an abridgment of the (Janua) with many illus¬ trated cuts for use by children, and was the first of its kind. In 1638 he went to Sweden to plan a system of education for that country. In 1641 he visited England on a similar mis¬ sion which was unsuccessful because the political upheaval made the time unripe for reforms of that sort. He therefore returned to Sweden in 1642, and, with the assistance of Oxenstjerna, worked on plans for the curricula and management of the Swedish' schools. At Elbing, in West Prussia, whither he went in the same year, he worked on further elabora¬ tions of his schemes ; and then continued both this and his religious duties at Lissa (1654). In the war which followed, he again lost all his manuscripts, and was obliged to flee. He went to Amsterdam, where he remained for the rest of his life.

His educational theories were remarkably broad and inclusive. His system of schools has not yet been superseded in practice. His efforts were directed toward arousing the in¬ terest of the pupil. In his curricula, music, economy, politics, world history and science were included. Education was to him a means of interpreting and enlarging every-day ex¬ perience by use of its own terms as well as by means of the classics, religion and ethics. His writings on education are numerous.

As a theologian he was mystical, a believer in prophecies, dreams and revelations. Among his works in this field are (Synopsis physicae ad lumen divinum reformatae) ; and (Lux in tenebrisP a prophetic work. Consult Laurie, (John Amos Comenius) (1881) ; Keatinge, (The Great Didactic of Comenius) (London 1896), and Monroe, (Comenius and the Be¬ ginning of Educational Reform> (New York

1900).

*COMET (Greek, ˆhair,® alluding to the luminous appendage or tail with which the brighter comets are always associated, and which formerly won for them the name of ((hairy stars**). Comets may for convenience be divided into two classes, periodic and un¬ expected. From 2 to 3 of the former, and from 3 to 4 of the latter, appear on the average every year, but the number varies greatly. In 1898 as many as 10 were discovered, 5 being found in 12 days. Of the 10, 7 were un¬ expected.*

Every comet, no matter how magnificent it may subsequently be, when first discovered, if remote from the sun, appears as a small, very faint, hazy

ball. As it comes nearer it becomes brighter, and generally larger, although some¬ times it contracts in size. If it is going to be a fine comet it gradually lengthens out, and develops a short tail. The tail rapidly brightens and lengthens as the comet ap¬ proaches perihelion, as the point in its orbit is called where it is nearest the sun. If the earth is favorably situated the comet appears at its best a few days after -the passage of perihelion, and then gradually fades out and disappears as it came. About one unexpected comet in eight is visible to the naked eye. The periodic comets move in elliptical orbits about the sun in planes not in general greatly in¬ clined to the ecliptic. The longest period so far definitely known, that of Halley's comet, is 76 years. The unexpected comets have still larger orbits, lying in all planes, with much longer periods. Many of them have a retro¬ grade motion, and occasionally one visits the sun never again to return to it. When an un¬ expected comet arrives, its orbit is first com¬ puted from three observations made on dif¬ ferent nights, on the assumption that it is moving in a parabolic orbit. If we are able to observe it through a long period we frequently find that its path differs slightly from a para¬ bola. It is not likely that any comet moves in an exact parabola. If it moves a little slower than the parabolic velocity, its orbit is an ellipse, and the comet really becomes periodic, although it is not classed as such until it has been certainly identified at another return. If it moves a little faster than the parabolic velocity, its orbit is a hyperbola, and the comet will recede into space never to return.

Should a comet happen to pass near one of the larger planets, its orbit may be somewhat changed by the approach and its speed may be

either increased or diminished. In this manner new members of the periodic class of comets are from time to time added to the list. On the other hand, its velocity may be so far accel¬ erated as to change its orbit, or even drive it out of our S}'Stem, never to return to it. In this way some of the members of our periodic family of comets are subject to change; others, how¬ ever, have been permanently added to the solar system. Out of 33 well-known periodic comets 24 have, or did have, periods lying between five and nine years. Many of these were doubtless brought into our system by the giant planet Jupiter. Some of them have already disap¬ peared, owing to a change in their orbits, while some have lost a large part of their gaseous constituents and thus become invisible.

This last statement naturally brings us to the question, What is a comet? In early times comets were supposed to be objects within our own atmosphere, presaging famines, wars and the death of kings. It was first shown by Tycho Brahe that they were celestial bodies independent of the earth, and Newton proved that, excepting their tails, they were bodies subject to the law of gravitation. In the middle of the last century it was shown by H. A. Newton, Schiaparelli and others that our chief meteoric showers, those of 10 August and 14 November, were due to great swarms of meteoric bodies moving in elliptical orbits, practically coincident with the orbits of two well-known periodic comets, 1862, III (Tut¬ tle's), and 1866, I (Tempel's).

In several instances two or more comets are known to be following practically the same path, and it was but a step from this to see that the head of a comet was only a concentrated swarm of meteors. It is only within the last few years, however, that we have begun to understand the nature of a comet's tail. That it is matter in a state of extreme tenuity is obvious, since, when millions of miles of it is interposed between us and the faintest stars, they are still visible and practically undimmed. What has puzzled astronomers since the time of Newton, however, is the fact that while all other bodies in the sidereal universe, as far as we are aware, obey the law of gravitation, comets' tails are clearly subject to some strong repulsive force, which drives the matter com¬ posing them away from the sun with enor¬ mously high velocities. The tail, therefore, always lies outside of the comet's orbit, being somewhat behind the comet when the latter is approaching the sun, and somewhat in ad¬ vance of it when the comet is receding.

That the tail is gaseous is proved conclu¬ sively by the spectroscope, also that it is in an extremely rarified condition ; but why the ex¬ tremely small particles which constitute a gas should act in any way differently under the law of gravitation from the larger meteoric masses which constitute the head of the comet is not at first sight obvious. If, however, we consider the matter carefully, we shall see that if all objects are attracted to the sun in proportion to their mass, and repelled from it in propor¬ tion to their surface, then the attraction will vary as the cube of the diameter of the objects and the repulsion as the square. For objects of ordinary size the repulsion is so slight that we cannot detect it; but if the object becomes gradually smaller, the attraction of the mass

will diminish much more rapidly than the re¬ pulsion on the surface, and a time will come when they will be equal, and if the particle be¬ comes still smaller, the repulsion must exceed the attractive force. It therefore becomes evident that if such a repulsive force existed, and if the gaseous molecules were sufficiently small, we should have an effect exactly like that which we observe.

It has been shown by J. J. Thomson ˆPro¬ ceeding of the Royal Society, > LVIII, No. 350) that if hydrogen gas is electrified positively, the green line in its spectrum will be brighter than the red, and, on the other hand, if negatively charged, the red will be brighter than the green. In the case of the sun the red is the brighter line, so that we may infer that the solar surface is charged negatively.

It is a well-known fact that if the ultra¬ violet rays of the spectrum be allowed to fall upon a metallic body little corpuscles or elec¬ trons leave the atoms forming the metallic body and fly away from them with enormous velocity. These corpuscles either carry a nega¬ tive charge of electricity, or what is perhaps more probable, constitute the negative electric¬ ity itself. The atoms lacking these corpuscles are as we usually express it positively charged.

Surrounding the meteor swarm and with it forming the comet's head is a mass of gas. When a flying corpuscle comes in contact with a molecule of this gas the two unite, the mole¬ cule becomes negatively charged, and both be¬ ing repelled by the negatively charged sun, recede from it. The subject will be found treated in more detail by R. A. Fessenden, Astrophysical Journal , III, 36. He there com¬ putes the potential of the sun's surface at about 15,000 volts. According to Arrhenius and Thomson the corpuscles which constantly deliver a negative charge to the earth, and would therefore also deliver it to a comet, proceed directly from the sun. The tail prob¬ ably receives a charge from both these sources, but the latter would seem to be much the more effective of the two.

The question may now naturally be asked, since there is an abundance of extremely rarefied gas at an altitude of a few hundred miles above the earth's surface, and since we too are exposed to the flying corpuscles, why is not the earth itself provided with a comet¬ like tail ? In answer we reply that at certain times it is. (Annals of Harvard Observatory, > XXXII, 288. Our great auroras are indeed nothing else than the appearance of a small cometary tail. . These great auroras, which exist at an altitude of several hundred miles, and envelope the whole earth, must not be con¬ founded with the small but intensely brilliant local auroras always existing at low altitudes in the polar regions.

The reason that these great auroras only reach an altitude of a few hundred miles, in¬ stead of several millions, like the tail of a comet, is on account of the great mass of the earth, which does not permit the electrified gases to escape from it. The great auroras exhibit two notable characteristics. They ap¬ pear only when the electro-magnetic condition of the sun. is greatly perturbed, and they are most conspicuous at those times when the earth is approaching or receding most rapidly from it ; that is, at the end of March and September.

The same appears to be true of comets. The longest tails belong to those comets that ap¬ proach closest to the sun's surface, and accord¬ ingly approach and recede from it with the greatest rapidity. Of the comets that do not approach remarkably close to the sun's surface, those which come during years of great solar activity are more likely to be provided with long tails than those coming when the solar surface is quiescent. Of the past 62 years dur¬ ing which sun spots have been recorded, 31 have been classed as of greater, and 31 as of less, solar activity. If the sun's activity had no influence upon a comet's tail, we should expect that an equal number of comets provided with long tails would have appeared in each of these intervals of 31 years. During the 62 years 10 comets have appeared that were furnished with long tails, and yet did not pass within 10,000,000 miles of the sun's surface. Of these, seven came during the years of great solar activity, and only three during those of less. From this we see that comets' tails, like our auroras, other things being equal, appear to be more pro¬ nounced during years of great solar activity.

Since the electric current spreads out from the nucleus on all sides as it recedes from the sun, there must, by the well-known laws, of currents, be a rotation produced by the mag¬ netic force of the sun acting upon the current ((Annals of Harvard Observatory, } XXXII, 275). The tendency would be for the tail to revolve about its axis, in one direction, if located north of the sun's magnetic equator, and in the other direction if located south of it. Such a rotation has in fact been observed in the case of the bright comets of 1825 IV, 1835 III (Halley's) and 1892 I (Swift's).

Quite recently another explanation of comets' tails has been given by Arrhenius. He attributes the recession of the particles form¬ ing the tail, however, to the repulsion of light. It was first shown mathematically by Maxwell that light must exert a slight mechanical pres¬ sure upon all bodies above a certain size that are exposed to it. Gaseous molecules are too small to be affected by it. In the case of large bodies it would be concealed by the over¬ whelming attraction of gravitation. In order to be repelled from the sun, particles having the density of water must have diameters lying between 1-1000 and 1-14000 of a millimeter, or between 1-25000 and 1-350000 of an inch. For particles of greater specific gravity the dimen¬ sions will have narrower limits.

It is most likely that several causes com¬ bined produce the observed repulsion of the tail. Several of these are suggested by Nichols and Hull in their article describing their at¬ tempt to produce an artificial cometary tail (Astro physical Journal , 1903, XVII, 352). It was shown in the (Harvard

Annals, XXXII, 288, that the gaseous spectrum persisted in the tail of Swift's comet to a distance of 3,000,000 miles from the head. The presence of dust would be indicated by reflected light giving the solar spectrum. On account of the faintness of the tail we should hardly expect to distinguish the solar lines, but a distribution of photo¬ graphic intensity in the spectrum similar to that which we find in the sun might be accepted as evidence of the presence of dust in the tail. Such a distribution was found in the case of the bright comet of 1881 III.

We may therefore say that the most prob¬ able explanation of a comet is that the head consists of a more or less concentrated swarm of meteors enveloped in gas and dust and that the tail is a current of gas and sometimes dust proceeding from the head, being most pro¬ nounced when the comet crosses the greatest number of electro-magnetic equipotential sur¬ faces.

The shape and size of the tail enable us to compute the intensity of the repulsive force causing the tail to recede from the sun. This was done by Bredichin, who divided all comets' tails into three classes according to the sharp¬ ness of their curvature, and suggested that the sharpness of the curve indicated the atomic weight and therefore the general chemical con¬ stitution of the matter forming the tail. This last suggestion is open to doubt.

More recently, by means of photography, we have been enabled to detect condensed areas in the tails of certain comets, and by compar¬ ing the photographs upon successive nights we have measured directly the speed of recession of the particles forming the tail from the head of the comet. Two comets so far have been measured in this manner that of 1892 I (Swift's), by the writer, and that of 1893 II (Rordame's), by Hussey. For the comet of 1892 the repulsive force was 39.5 times that of gravity. In the case of the comet of 1893, the repulsive force was 36 times as great ((Pub. Astron. Soc. Pac.,* VII, 185), portions of the tail at times receding with a velocity exceeding 150,000 miles an hour. A remarkable be¬ havior of a part of the material composing the* tail was observed in the bright comet, Moorehouse, during the month of October 1908. Two great cloudlike knots appeared, an approximately normal, fan-shaped tail extend¬ ing outward from the first knot, and the second being merely connected to the comet's head by a narrow band of luminous matter. It was evident that for some cause the great repulsion of material had almost ceased for a short time ; the matter already expelled and forming the first condensation had receded some distance when a second active repulsion took place, thus pushing away the second condensation. The latter was found to be receding with a speed of 99,000 miles an hour, which was 10,000 miles greater than the rate of recession of the first. It was this fact, combined with the forward

motion of the comet itself in its orbit, that caused the two clouds of material to be seen later side by side in the interrupted tail. It has become evident from this and from several other anomalous cases that comets' tails are not due to simple light pressure, or to the comets passing steadily into regions of higher or lower electric potential, but that the full causes must be of a very complicated nature.

Since the gaseous particles receding from a comet's head can never again return to it, and since a comet is visible to us chiefly, and gen¬ erally wholly, by the electrical illumination of this gaseous medium, it is clear that a comet must become less and less luminous after each return to the sun. But not only does it become less luminous on account of the loss of the material forming its tail, but the meteors com¬ posing its head likewise become more and more widely distributed along the course of its orbit. This is in part due to the positive charge left

by the tail, which neutralizes the gravitation — or pull of the various portions of the comet's head for one another — and therefore permits those portions of the meteoric swarm which are nearest to the sun to move at a higher speed than those portions which are more remote.

In some cases, like our August meteors, the distribution extends throughout the orbit, with but one luminous condensation, known as the comet of 1862 III. In other cases there are two or more condensations. Thus Biela's comet was seen to split into two parts. Four distinct comets were found following in the track of the great comet of 1668.

We must now discuss the important ques¬ tion of the origin of comets. It is known that the sun, with its attendant planets, is traversing space in the direction of the con¬ stellation Lyra at a speed of about 11 miles per second. If comets come from remote inter¬ stellar space, or from the other stars, it is obvious that we should meet more comets com¬ ing from Lyra than would overtake us coming from the opposite direction. Also that those comets we met would have a greater velocity relative to the sun than would those that might overtake us. Nothing of the sort is found, however — the distribution is uniform in all directions. There is but one conclusion to be drawn from this, and that is that all the comets that we have observed possess the same com¬ mon speed as the sun, omitting relative motion, and travel in the same direction. In short, they are all of them parts of the same original gaseous mass from which the solar system condensed, being merely those portions which were originally left on the outside, before the great common rotation was established, and which now occasionally drop in

toward the centre, and then fly back again to their original position on the outskirts of the system. The normal path of every comet is therefore an ellipse. If the paths of some comets have be¬ come slightly hyperbolic through the action of some outside body, they can never again visit the sun. As we have just seen, a comet not belonging to our system would be most likely to approach us from the general direction of the constellation Lyra, with a high hyperbolic velocity. We are acquainted with the orbits of about 400 comets, but no such body is cer¬ tainly found among them.

From this point of view it is interesting to determine of what chemical elements comets are composed. To this the spectroscope gives a ready answer, and shows that by far the most common elements are hydrogen and carbon in chemical combination. This answer, however, is only a partial one, because most comets do not approach sufficiently near to the sun to enable their more refractory elements to be volatilized. The bright small comet of 1882 I (Wells') approached so close to the solar sur¬ face that the distance at perihelion amounted to only about 5,000,000 miles. Some of its metallic constituents were accordingly vapor¬ ized, the most prominent of them being sodium. The great comet of 1882 III approached within 300,000 miles of the sun's surface. This was so near that not only the sodium but even some of . the iron lines appeared in its spectrum. This is what we should have expected, judging by the chemical composition of most of the meteors I Hat reach the earth's surface. We

thus see that incidentally comets are able to give us information regarding the temperature that bodies would attain at different distances from the sun. When the metallic lines are present in the spectra of these comets the carbon bands vanish. This is precisely the effect that is produced in our laboratories when the cause of the illumination is an electric cur¬ rent. The current by preference selects the molecules which are the best conductors. If the illumination of the comet were due merely to heat, there is no reason why the carbon bands should have disappeared.

Few persons now living remember distinctly the great comet of 1843. It appeared suddenly in the northern hemisphere about the middle of March, and was not long visible. It was notable for the great length of its tail and its small perihelion distance, — the smallest on record. This amounted to only 511,000 miles. Its centre therefore came within 78,000, and the nearer side of its head within 32,000, miles of the sun's surface.

The great comet of 1858, known generally at Donati's, was a magnificent object. Not only was it a fine comet in itself, but it seems as if everything conspired to enable it to be well seen from the earth. It was a most conspicuous object in the northern sky during the early evenings in October, and was nearest us shortly after the passage of perihelion. Its tail reached a length of 60 degrees and swept as a broad curved plume across the

heavens. It was visible for several months, which enabled it to be care¬ fully observed, and there is no doubt but that it moves in an elliptic orbit. Its period is about 2,000 years.

The great comet of 1861 w:as discovered by Tebbutt in Australia. It appeared suddenly in the northern hemisphere at the end of June and, according to Sir John Herschel, was the brightest comet of the century up to that time. It was not long visible.

The great comet of 1882 was remarkable on many accounts. In the first place it was shown to be one of a group of five comets all follow¬ ing nearly in the same orbit. The four others were those of 1668, 1843, 1880 and 1887. The last was comparatively inconspicuous, but the others were all notable. The nucleus of the comet of 1882 moreover showed a tendency to fall apart, five different condensations in it be¬ ing visible at once. Schmidt, Barnard and Brooks all noticed small companion nebulosities in the immediate vicinity of the comet and mov¬ ing with it. It was visible for about nine months — an unusually long interval, and in this time it traversed 340 degrees of its orbit. It clearly follows an elliptical path wfith a period which lies between 772 and 1,000 years. The tail was very extraordinary. It measured about 200,000,000 miles in length, and was strongly forked at the end. Moreover it wTas accompanied by a clearly seen but filmy sheath of light, extending three or four degrees toward the sun. The whole comet was surrounded by an elliptical envelope of enormous dimensions and of a still more filmy nature. That this most remarkable object was not more generally observed by the public is due undoubtedly to the fact that it was visible only in the early morning hours. It was certainly the brightest comet of the century, and it was so bright that it wˆas watched in perihelion passage until in

contact with the sun's limb, when it suddenly disappeared, being of too filmy a nature to be detected upon the sun's surface. For three days it was visible to the naked eye with the sun above the horizon. There have been so far 14 different comets placed on record which were bright enough to be seen under these cir¬ cumstances.

Turning now to the periodic comets; by far the finest is Halley's. Our first record of it is

chief reason for its relative faintness in 1835 is that the material which formed the tail has been largely used up by its frequent visits to the sun, and that it will thus never again present the brilliancv of its past appearances. An ac¬ count of its last appearance is given below.

The following table of the elements of the orbits of the periodic comets has been con¬ densed and brought up to date from Holden's tables of periodic comets :

TABLE OF THE MOST IMPORTANT PERIODIC COMETS

T

0)

il

i

Q

a

U

e

1910

April 20 .

111°

55°

162°

0.59

17.99

76.29

0.97

Halley.

1905

Jan.

11 .

184

335

13

0.34

2.22

3.30

0.85

Encke.

1904

Nov.

10 .

186

121

13

1.35

5.28

5.28

0.54

Tempel II.

1903

Dec.

6 .

344

18

6

1.96

3.69

7.10

0.47

Brooks.

1884

II.

Aug.

16 .

301

5

5

1.28

3.08

5.40

0.58

Barnard.

1879

I.

Mar.

30 .

15

101

29

0.59

3.10

5.47

0.81

Brorsen.

1891

V.

Nov.

15 .

107

296

5

1.09

3.13

5 . 53

0.65

Tempel — L. Swift

1886

IV.

June

7 .

177

54

13

1.33

3.15

5.60

0.58

Brooks.

1898

II.

Mar.

20 .

173

101

17

0.92

3.24

5.72

0 72

Winnecke.

1894

IV.

Oct.

12 .

297

49

3

1.39

3 . 25

5.86

0.57

De Vico — E. Swift

1879

III.

May

7 .

160

79

10

1 . 77

3.30

5.98

0.46

Tempel I.

1892

V.

Dec.

11 .

170

207

31

1.43

3.38

6.23

0.58

Barnard.

1890

VII.

Oct.

26 .

328

45

13

1.97

3.45

6.40

0.47

Spitaler.

1896

VII.

Nov.

25 .

164

247

14

1 11

3.46

6.44

0.68

Perrine.

1896

V.

Oct.

26 .

140

192

12

1.48

3.50

6.55

0.58

Giacobini.

1852

III.

Sept.

23 .

223

246

13

0.86

3.53

6.62

0.76

Biela (I and II).

1893

III.

July

12 .

316

52

3

0.99

3.53

6.62

0.72

Finlay.

1897

II.

May 24 .

173

146

16

1.32

3.55

6.68

0.63

D' Arrest.

1898

IV.

July

5 .

173

206

25

1.60

3.60

6.82

0.56

Wolf.

1900

III.

Nov. 28 .

172

196

30

0.93

3.62

6.66

0. 74

Giacobini.

1899

II.

April 28 .

14

332

21

2.14

3.62

6.87

0.41

Holmes.

1895

II.

Aug.

21

168

170

3

1.30

3.68

7.06

0.65

L. Swift.

1894

I.

Feb.

10 .

46

84

6

1 . 15

3.80

7.42

0. 70

Denning (II).

1896

II.

Mar.

19 .

201

210

11

1.74

3.85

7.57

0.55

Faye.

1889

VI.

Nov. 30 .

7C

331

10

1.35

4.18

8.53

0.68

L. Swift.

1881

V.

Sept. 13 .

312

66

7

0.72

4.23

8.69

0.83

Denning (I).

1899

III.

May

4 .

207

270

54

1.02

5.74

13.66

, 0.82

Tuttle.

1866

I.

Jan.

11 .

171

231

163

0.98

10.32

33. 18

0.90

Tempel.

1867

I.

Jan.

20 .

358

78

18

1.58

11.71

40.09

0.86

Stephan.

1852

IV.

Oct.

13 .

57

346

41

1.25

15.44

60.7

0.92

Westphal.

1884

I.

Jan.

26 .

199

254

74

0. 78

17.2

71.56

0.96

Pons-Brooks.

1887

V.

Oct.

8 .

65

84

45

1.20

17.4

72.65

0.93

Olbers.

1846

IV.

Mar.

6 .

13

78

85

0.66

17.90

75.7

0.96

De Vico.

in the year 11 b.c. Since then it has appeared regularly every 76 or 77 years, in all 25 times. We have a drawing of it as it appeared in 684, and another drawing of it in 1066. During its latter appearance it was considered to be the precursor of the conquest of England by Wil¬ liam of Normandy. It was a magnificent object in 1145, and again in 1223, when it was sup¬ posed to foretell the death of Philip Augustus of France. In 1456 it was a superb object ap¬ pearing shortly after the Turks had taken Con¬ stantinople. In 1682 it was observed by Halley, who computed its orbit, and showed that it was identical with the great comets of 1531 and 1607, and predicted its return for the end of 1758 or the beginning of 1759. This is the first time that the return of a comet was ever pre¬ dicted, and although Halley knew that he could not expect to live to see his prediction fulfilled (he was born in 1656), yet he left a somewhat plaintive appeal to posterity, that in case the comet should reappear, it should be remembered that this first prediction was made by an Eng¬ lishman. The comet appeared Christmas day 1758. At its next appearance, in 1835, the comet was a fine object, but did not correspond in brilliancy to the descriptions of some of its earlier apparitions. This may perhaps he ex¬ plained by the fact that it was but two years after a sun-spot minimum. Its next appearance was in 1910, which was also unfortunately very pear a sum spot minimum. But very likely the

The question is often asked the astronomer, what would happen if the earth should come into collision with a comet? As far as the tail is concerned,

that is probably a frequent occur¬ rence. It happened twice during the last cen¬ tury, in the case of the comets of 1819 II and 1861 II, and it probably occurred also during the apparition of Halley's comet in 1910, but in no case were any particular effects observed. Should we come into contact with the head of a small comet there would undoubtedly be a fine meteoric display. That is in fact what prob¬ ably happened in 1833, and also on a number of previous occasions, notably in 472, 902, 1029, 1202 and 1799, although the comet itself was not luminous. If the comet were moving rapidly with regard to the earth, as in these cases, the meteors would be consumed at a great altitude in our atmosphere, and no harm would be done. If the comet were moving in the same direction as ourselves, however, and at about the same speed, the matter would then become more serious, as many of the meteors might reach the earth's surface.

The self-luminous, and therefore visible comet, which has come nearest to the earth, as far as we are aware, was that of 1770 I (Lexell's). It approached within 1,400,000 miles, or six times the distance of the moon. Its head appeared about four times the diameter of the moon, but its mass was imperceptibly small… Should the earth strike the nucleus of a

great comet, like that, for instance, of 1858, it is impossible to foretell what would happen, but possibly the temperature and shock would be such that all life within several thousand miles of the point of contact would become extinct. Considering the vast recesses of celestial space, however, and the insignificant size of our earth, the probability of such an encounter is almost infinitely small.

For a more detailed account of the indi¬ vidual peculiarities of the more interesting comets, see Clerke's (History of Astronomy) ; Chambers' (Story of the Comets) (1910).

William H. Pickering, Harvard College Observatory.

COMET, in ornithology, one of a group of humming-birds with long forked tails. One of the most imposing of all humming-birds is the Sappho comet (Cometes Sappho), or bar-tailed humming-bird, native to Bolivia, but migratory, and in the winter generally visiting eastern Peru. Specimens are secured only with great difficulty, owing to the rapidity of the complex evolutions of the bird when on the wing. Mounted examples, gorgeous as they are, do not convey an adequate idea of the brilliancy of the plumage.

The Phaon comet (Cometes Phaon) is equally magnificent, but larger. It also inhabits Peru and Bolivia. It is distin¬ guished from the Sappho comet by the fact that the tail is wholly crimson red, while that of the Sappho comet is ruddy brown at the base and is tipped with a black band. See Humming- Birds.

COMETAS, called Sciiolasticus, Greek author, generally assigned to the 9th century a.d., although his time is doubtful. There are extant of his works a paraphrase of. part of the 11th chapter of Saint John's Gospel, in 57 hexameter verses, and six epigrams in the Greek Anthology. It appears from some of these epi¬ grams that he made a new rescension of the Homeric poems, effecting radical changes for the better in the punctuation. Clemens Alexan- drinus refers to a Cometas of Crete as a com¬ mentator on Homer. By some he has been identified with the Cometas who was made pro¬ fessor of grammar at Constantinople in 856.

COMETS, 1910A and Halley's. — During the year 1910 two brilliant comets appeared which excited world-wide popular interest — the first being a new comet known as 1910A, the second the celebrated comet of Halley. We shall add a brief account of these remarkable objects. Comet 1910A belonged to the group of great southern comets, and was discovered in South Africa about 15 January. On 16 January the startling news that a comet visible to the naked eye was near the sun was cabled to Europe by Director Innes of the Transvaal Observatory in Johannesburg, and thence tele¬ graphed to all observatories. Wherever the weather was clear astronomers scanned the region about the sun with eager interest, as this was the first naked-eye comet to appear so sud¬ denly since the great comet of 1882, which also was a southern comet, announced in the same way. At Lick Observatory, California, the comet was promptly observed by Aitken and Wright, the latter working with the spectro¬ scope and finding an abundance of sodium vapor in the brilliant head, which rivaled Venus in splendor. It was also observed at the Lowell

and Harvard observatories; and at the Yerkes Observatory by Barnard, as well as at several observatories in Europe. In a few days an orbit was computed by Kobold, editor of the Astronomische Nachrichten, in Kiel, Germany. This showed that the comet had passed per¬ ihelion on 17 January, at a distance of some 4,000,000 miles from the sun's centre, and would rapidly decrease in brightness. The pas¬ sage so near to the sun had exposed the comet to a terrific radiation and produced the brilliant tail with sodium vapor in the head. During the latter part of January and early part of Feb¬ ruary the comet hung in the western sky in the form of a great plume, with curved tail some 30 degrees long; and it was observed by all classes of people on sea and land. As Halley's comet was expected and had been much talked of, 1910A was at first taken to be this cele¬ brated

historical object; but the confusion of thought was soon removed, and the new comet popularly described as a Hramp® comet which had unexpectedly come along, and occupied the centre of the stage months before Halley's comet hove in sight to the ordinary citizen watcher of the skies.

The question may be asked : Why did not astronomers detect 1910A till it got so near the sun? To this we answer that the comet had approached the sun from behind, and thus it had been constantly obscured by the sun's rays, and only became visible when its head had attained splendor comparable to that of the planet Venus. Comets which approach the sun from the further side usually are invisible un¬ less they are quite brilliant. On more than one occasion astronomers have been astonished at noticing a small comet near the sun during a total eclipse ; but where it is not brilliant enough to observe by daylight, even with the telescope, such an object is again lost as soon as the eclipse is over, and thus the orbit of such eclipse comets cannot be determined.

The apparition of Halley's comet during 1910 had long been looked forward to by as¬ tronomers. Some three years before the ex¬ pected return, astronomers Cowell and Crom- melin of the Greenwich Observatory took up the problem of laboriously calculating the effect of the perturbations of the planets since the last appearance of this comet in 1835. These skilful mathematicians calculated an ephemeris which enabled the astronomer to point his telescope toward the region where the comet was known to be long before it got near enough to the sun to become visible even with the most powerful of modern instruments. Finally, on 11 Sept. 1909, Dr. Max Wolf, of the Heidelberg Observatory, photographed the pre¬ dicted region for Halley's comet, using a wide field, and sensitive plates and long exposure. On developing the plate he found on it a small blotch, the first such record ever made of Hal¬ ley's comet, photography having been invented since the last appearance of the comet in 1835. The comet was found to be very near the place predicted by Cowell and Crommelin, the out¬ standing error not exceeding 4 minutes of arc, or one-eighth of the diameter of the moon This was a splendid triumph for mathematical astronomy.

The place of the comet being thus detected by photography, Prof. S. W. Burnham was able to see it a few days later with the 40-inch

refractor of the Yerkes Observatory, Chicago, and it was soon under the scrutiny of hundreds of telescopes in all parts of the world. When first detected Halley's comet was about half way to the orbit of Jupiter; at this great dis¬ tance both from the sun and from the earth it appeared extremely faint. It was due to pass perihelion 20 April 1910, and astronomers made extensive preparations to observe it over as long a period as possible. Special calculations on the perturbative effects of Mars, the Earth and Venus were made by Professors Leuschner and Crawford, of the University of California, in order to determine the exact time of the expected transit of the comet's head over the sun's disc, 18 May 1910.

The transit of a comet over the sun is a very extraordinary phenomenon — only one other, that of the great comet of 1882, hav¬ ing ever been observed — and as such a thing is not likely to happen more than once in a cen¬ tury, it was felt that every effort should be made to observe it, in the hope of finding out whether there is any solid matter in the head of a comet. The calculations of Leuschner and Crawford showed that the transit would begin a little before 8 p.m. of 18 May, Pacific Standard Time, and thus after the sun had set on the Pacific Coast of the United States; so that the transit could be observed only from the islands of the Pacific and the East Indies and Australia. Mr. Ellermann of the Mount Wilson Solar Observatory was sent to Honolulu to observe the transit ; and it was diligently looked for also by Father Algue at Manila, and by several observers in Australia. None of these observers, however, could detect any trace of the comet passing over the sun. In transit Halley's comet must have totally disappeared, just as happened also when the great comet of 17 Sept. 1882 was noticed by astronomers at the Cape of Good Hope to vanish the instant it entered upon the sun's disc, so that they thought it had gone behind the sun. The conclusion to be drawn from the failure of these two comets to become visible on the sun's disc is that the heads of the comets are such rare, unsubstantial masses that they do not sensibly obstruct the sun's light ; and that if solid nuclei exist, they must be too small to be noticed. This con¬ firms our general experience that comets are very unsubstantial bodies.

One other result of considerable interest was the detection by Lowell of hydrogen mon¬ oxide as the chief constituent of the tail of Halley's comet. Hydrocarbons, cyanogen and other gases were found in the head.

Just before the transit the earth was ex¬ pected to pass through the tail, and popular alarm existed lest some harmful results might ensue. The length of the tail was at the maxi¬ mum from 100 degrees to 120 degrees in length. It stretched across the morning sky, from Pisces to Ophiuchus, like a great searchlight, having an extreme width of perhaps 10 degrees. After the transit of 18 May it was still visible for a day or two in the

morning sky, which was explained by the usual backward curvature of the tail.

No sensible effect from the passage of the earth through the edge of the tail could be detected, though it was watched for by astron¬ omers throughout the world. Innes of Johan¬ nesburg has made it probable that a slight

electric charge borne by the earth's atmosphere tended to scatter the tail as it neared our planet, so that hereafter comet's tails will have less, terror for the people than heretofore. No harmful effects of any kind from the appear¬ ance of Halley's comet could be observed, and popular excitement rapidly died away. Alto¬ gether Halley's comet proved to be the most interesting object of this kind which has ap¬ peared since Donati's great comet of 1858.

T. J. J. See,

Professor of Mathematics, Naval Observatory, Mare Island , Cal.

COMETTANT, ko-met-tan, Oscar, French musician, composer and author: b. Bordeaux, 18 April 1819; d. Montivilliers 1898. He was a pupil of Elwart and Carafa at the Conserva¬ toire, and first became known as a pianist ; he also wrote several works for the piano, duets for violin and piano, and choruses and songs. Among the piano compositions were (Robert Bruce) and (Le juif errant) ; the vocal in¬ cluded

COMFORT, George Fisk, American scholar and educator : b. Berkshire, Tompkins County, N. Y., 20 Sept. 1833 ; d. Syracuse, N. Y., 1910. Graduated from Wesleyan University in 1857, he studied archaeology and the history of the fine arts in Europe, in 1865-68 was pro¬ fessor of modern languages and aesthetics in Allegheny College (Meadville, Pa.), and in 1868-72 lecturer on Christian art and archaeol¬ ogy in the Drew Theological Seminary (Madi¬ son, N. J.). In 1872 he was appointed professor of modern languages and aesthetics in the newly- established Syracuse University, where he organized the college of fine arts, of which he was dean from 1873 to 1893. In the latter year he became president of the Southern College of Fine Arts, at La Porte, Tex. He organized the Syracuse Museum of Fine Arts in 1896, and became its director. He was also one of the chief organizers of the American Philological Association, and from 1869 to 1874 its secre¬ tary. From 1872 to 1893 he was editor of the art department of the Northern Christian Ad¬ vocate. He also contributed extensively to periodicals, and published (Art Museums in America) (1869) ; (Modern Languages in Edu¬ cation (1886) ; (Woman's Education and

Woman's Health) (1894) ; (The Land Troubles in Ireland) (1898) ; and a series of German textbooks.

COMFREY, kum'fri, the common name of the genus symphytum of the natural order Bo- raginacece or Borage family. There are about 20 species, all natives of the Old World, where many of them are used in household medicine or for forage plants. Attempts have been made to naturalize them in America for commercial purposes, but the experiments have not given

much promise of success. There is but one known American species growing wild, S. officinale , naturalized from Europe or Asia. It is a coarse perennial weed, from two to three feet high, with flowers in long racemes. The roots are mucilaginous, and are supposed to have medicinal virtues as a cure for diarrhoea. It is known also as blackwort, bruisewort and boneset. In England the leaves, gathered while young, are sometimes used as a substitute for spinach, and some people of unrefined taste eat the young shoots after blanching them by forcing them to grow through heaps of earth. Comfrey stewed in sugar, with a small amount of paregoric added, makes a highly prized domestic remedy for coughs and bronchial irri¬ tations.

COMINES, ko-men, COMMINES, or COMYNES, Philippe de, French statesman and historian: b. Comines near Lille 1445; d. Argenton, 18 Oct. 1509. He stood high in the favor of Charles of Burgundy, afterward Charles the Bold, and on occasion of Louis XI's imprisonment by Charles at Peronne, succeeded in bringing about a treaty of peace between them. In 1472 he forsook the cause of the Duke of Burgundy and became councillor and chamber- lain of Louis XI, who compensated him so amply for the loss of his property, which had been confiscated by Charles, that he soon be¬ came one of the most wealthy and influential noblemen in France. The death of Louis, how¬ ever, proved fatal to his fortunes. He was no favorite with Anne de Beaujeu, the regent, and was imprisoned on a charge of conspiracy against her. On the accession of Charles VIII, however, he was again employed in the public service, but went into retirement after the ad¬ vent of Louis XII, who seemed reluctant to favor him, although he left him in possession of a pension. The fame of Comines rests not only upon his astuteness as a statesman, but still more upon his ˆemoiresR which give a complete view of the political affairs of his time, and present a vivid picture of the character of Louis XI. They have been frequently printed. Lenglet-Dufresnoy's edition (London 1747) is still sought for, especially on account of its annotations ; but the best are those published by Mile. Dupont (Paris 1840-47) ; and Chantelauze (1881). Comines figures in Sir Walter Scott's romance of (Quentin DurwardP

COMING RACE, The, a story by Edward Bulwer-Lytton, published in

1871. It was a skit at certain assumptions of science; but its clever invention and brilliant treatment, added to the craving wonder of humanity as to what its evolution is to be toward, gave it a large popu¬ larity.

COMITAT, kom'i-tat (L, comitatus), that which went with or accompanied the name given to administrative districts of some size into which Hungary and Transylvania are divided. In old English law comitatus, of which comitat is a contraction, was a county or shire. The comitatus were the personal followers of the king or earl, and the county or shire was the land of the comitatus or comitat. Hence the present use of the term in various European countries in the sense of a division of land.

COMITIA, ko-mish'i-a (Lat. ˆassemblies"), with the Romans, the assemblies of the people

in which the public business was transacted, and measures taken in conformity with the will of the majority. They existed even under the kings. In the time of the republic they were convoked by the consuls; in their absence often by the dictator, the tribunes, and in extraor¬ dinary cases even by the pontifex maximus. There were three comitia ' among the Romans, which were called comitia curiata, comitia cen- turiata and comitia tribiita. (1) The oldest of these was the comitia curiata , so called because in it the people voted by curice or wards. It consisted exclusively of the patricians, the original ruling class at Rome, and the class to which the name of populus was at first restricted. They were divided into three tribes, the Luceres, Ramnes and Tities, each of which was divided into 10 curiae, so that there were 30 curiae who voted in the comitia curiata. (2) The comitia centuriata was a mixed assembly of the patri¬ cians and plebeians, in which the people voted by centuries, as these had been formed by Servius Tullius. On the institution of this co¬ mitia the principal privileges of the comitia curi¬ ata were transferred to it, and in course of time the functions of the latter became a mere for¬ mality, so that even before the time of Cicero these were not performed by the curiae them¬ selves, but by 30 lictors representing them. The rights of the comitia centuriata were thus very important, comprising the right of electing the higher magistrates, the right of passing or rejecting laws proposed to them, the right of deciding upon war on the ground of a senatus consultum or decree of the Senate, and the highest judicial power. This comitia could be held only on certain days, and it must be sum¬ moned 17 days before the day of meeting. On the day of the comitia itself the presiding magistrate, with an augur, went into a tent be¬ fore the city in order to observe the aus¬ pices. If the augur declared them unexception¬ able, the comitia was held ; if not, it was post¬ poned to another day. Before sunrise and after sunset no business was transacted in the comitia. The presiding magistrate, on his curule chair, opened the assembly by a prayer, which he re¬ peated after the

words of the augur. In earlier times, first the equites, then the centuries of the first class, etc., were called upon to vote. In later times lots were cast for the order of vot¬ ing. The opinion of the century- which first voted was usually followed by all the rest. In the earliest times every century voted verbally ; in later times by ballot. What was concluded in each century by the majority was proclaimed by the herald as the vote of this century. The comitia was interrupted if any one in the assem¬ bly was attacked by a fit of epilepsy (which was called for this reason morbus comitialis) , or if a tribune of the people pronounced his veto, and under some other circumstances. (3) The other comitia, the comitia tributa, which was also an institution, of Servius Tullius, was es¬ sentially plebeian in its nature, for if the pa¬ tricians were not, as some think, entirely ex¬ cluded from it, they were in so small a minority that their influence was scarcely felt. It was based upon the division which Servius Tullius made of the whole Roman territory into 30 local tribes, which were afterward increased to 35. Its power was at first very limited, being merely local, but it gradually increased, so that it in the end came to possess the right of exercis-

ing electoral, legislative and judicial functions, though not so extensive as those of the comitia centuriata. It had the right of electing only the inferior magistrates; legislatively, it was merely entitled to pass resolutions proposed by the tribunes, which before becoming law had to be sanctioned by the Senate; judicially, it had the right of trying only those who had com¬ mitted offenses against the majesty of the peo¬ ple, and the only punishment it could inflict was a fine. It might assemble either within or with¬ out the walls of the city, but not at a greater distance than 1,000 paces, which was the- limit of the power of the tribunes. The comitia cen- turiata, on the other hand, always met in the Campus Martius. Sometimes the comitia cen- turiata was mixed with the comitia tributa, but in what manner it is not known. The emperors retained these assemblies for the sake of ap¬ pearance, but used them only as instruments for the accomplishment of their purposes. Con¬ sult Greenidge, (Roman Public Life) (London 1901) ; Botsford, (The Roman Assemblies' (New York 1909) ; Mommsen, (Romische For- schungen (Berlin 1879).*

COMITIUM (Lat. ((place of assembly®), a square in the ancient city of Rome between the Curia and the Forum, where the comitia curiata (q.v.) met. It contained the original rostrum or speakers' platform.

COMITLAN, ko-met-lan', or COMITAN, ko-me-tan', Mexico, town in the state of Chia¬ pas, on the Grijalva River, 35 miles southeast of San Cristobal. It has a magnificent church and is a place of considerable trade.

The town is largely engaged in agriculture and cattle raising, but has manufactures of cotton and woolen goods, liquors, etc. It is supported chiefly by contraband trade. with Guatemala and British Honduras, as the duties on foreign goods are excessive. Comitlan suffered con¬ siderably from the raids of Juan Ortega in 1855-64. Pop. 10,196.

COMITY OF NATIONS (very fre¬ quently mentioned by its Latin equivalent, comitas gentium), the international courtesy by which effect is given to the laws of one state within the territory and against the citizens of another state. "In the silence of any positive rule,® says Story, ((affirming, or denying, or re¬ straining the operation of foreign laws, courts of justice presume the tacit adoption of them by their own government, unless they are re¬ pugnant to its policy or prejudicial to its in¬ terests.® The comity of nations rests upon common consent of the nations themselves and not upon positive law. In the United States the provisions of the constitution cover ex¬ plicitly the question of comity between the States of the Union, in Art. IV, Sec. 1, which reads as follows : ((Full faith and credit shall be given in each State to the public acts, records and judicial proceedings of every other State.® This, however, only applies where a State has a right to act or render judgment for the federation. Consult Story, (Conflict of Laws.'

COMLY, Samuel Pancoast, American naval officer: b. Woodbury, N. J., 13 July 1849; d. 10 April 1918; graduated United States Naval Academy in 1869. He was promoted through the various grades, became captain in 1905 and rear-admiral in 1909. He was on the

Juniata in the Polaris search expedition of 1874. During the Spanish-American War he was in action at San Juan, P. R.. and at the destruction of Cervera's fleet, 3 July 1898 In 1905-07 he commanded the Alabama and in 1910 commanded a division of the Atlantic fleet. In 1910-11 he was on court-martial duty and was retired in the latter year.

COMMA, the stroke or mark used in writ¬ ing and printing to separate from each other phrases and clauses in a sentence. The word is of Greek origin and is the noun of the verb kopto, to cut ; hence literally comma is section, and in grammatical works written in Greek and Latin comma or its diminutive kommation means a clause in a period as well as the punc¬ tuation mark, and in prosody the caesura. In German typography the punctuation mark comma is a downward short stroke from right to left (/).

COMMA BACILLUS. See Cholera.

COMMAGENE, kom -a-je'ne, in ancient times a district in the north of Syria, bounded on the east by the Euphrates, on the north by Mount Amanus and on the west by Cilicia, for some time attached to the kingdom of the Seleucidae, but afterward for more than 100 years an independent state. It seems to have become independent about 100 b.c., and on the death of its fifth king, Antiochus III, in 17 a.d., it was made a Roman province. It was again for a time allowed by the Romans to hold a position of nominal independence, but was re¬ duced to a Roman province by Vespasian, 73 A.D.

COMMANDER-IN-CHIEF, the supreme commander of the united forces of any country. In the United States the President is com- mander-in-chief pf the army and navy, and of the militia of the several States when the latter is in the national service and forms part of the national provisional army. In all other cases the governor of each State is the commander- in-chief of the State troops. In England he is officially called the officer commanding-in-chief. He is the head of a department of the military administration. He acts, under the Secretary of State for War, as the head of the army, and when military operations are undertaken on a sufficiently large scale to require his presence, is charged with the duty of commanding the army in the field, though, as a matter of fact, this very rarely occurs. In Germany the em¬ peror is the supreme commander-in-chief of the army and navy. The British sovereign, while he talks of ((my army and my navy,® has little or nothing to do with the chief command of military or naval matters, which are in the hands of a war council. Even the title of com¬ mander-in-chief of his majesty's forces was abolished in 1904; since which date there has been no holder, in deputy, of the once regal title of commander of the forces on land and sea of the nation. The Secretary of State, as head of the war council, is now responsible to the Crown and Parliament for the conduct of military affairs.

COMMANDER OF THE FAITHFUL,

a title assumed by the Caliph Omar, father-in- law of Mohammed, and retained by his suc¬ cessors. See Caliph.

COMMANDER ISLANDS, two islands belonging to Russia lying east of Kamchatka in Bering Sea. The larger, Bering Island (q.v.), lies nearest the coast; the other island of the group, Miedni, is nearly 30 miles long but nar¬ row ; it is sometimes called Copper Island, be¬ cause copper is found

there in small quantities. The climate is mild and there are few inhab¬ itants.

*COMMANDERY. (1) Among the Knights Templar, Hospitallers, etc., a district under the administration and control of a mem¬ ber of the order, called the commander or pre¬ ceptor, who received the income of the estates within that district, expending part for his own use and accounting for the rest. In England more especially applied to a manor belonging to the Knights Hospitallers or Knights of Saint John of Jerusalem. These establishments formed at the same time branches. On the first creation of these (branch) establishments they were denominated Preceptories, the superior being called the preceptor ; but eventually the name became changed to that of commandery by which they were always afterward known. The council reserved to themselves the power of at any time recalling a commander from his post and substituting another in his place, he being merely considered as the steward of their property. Time, however, gradually wrought a great change in the relative position which the commanders held to the council ; and, eventu¬ ally, a nomination to a commandery came to be considered in the light of a legal acquisition, subject only to the payment of a certain amount of annual tribute to the public treasury, which tribute received the name of Responsions. (2) A regular assembly of Knights Templar, which confers certain degrees. Consult (History of Knights of Malta.**

COMMANDING OFFICER. (1) In mili¬ tary service, the senior officer of a regiment, corps, post or detachment, where there is no higher local authority, is regarded as the com¬ manding officer. (2) The officer in actual command of a vessel of war. He is an officer of the executive corps and is usually addressed by the courtesy title of ˆcaptain® without re¬ gard to actual rank, provided he is permanently in command and not in charge temporarily dur¬ ing the absence of a senior. The commanding officer of a modern battleship is responsible for the safety of ship and crew and for the proper care of batteries, engines and other machinery.

COMMANDITE, kom-mon-det', En, a term used in France, primarily for a partner¬ ship or firm, in which one advances the funds, while another devotes his skill and assiduity; but by extension, a copartnership en command¬ ite oftener means a company for manufactur¬ ing or trading, <(with limited liability.® In terms of French commercial law, those whom we would call the sleeping partners or silent partners in such associations are denominated commanditaires.. Their names do not appear in the nominal title of the firm ; they may assist it with their counsel, but they cannot order or sign for its benefit, nor act overtly for it in any way; on the other hand, they are not bound to incur a final loss in case of its failure, beyond that of the entire sum they have ad¬ vanced, should indeed such be

needed to satisfy the claims of agents and creditors. For all

details on the rights and obligations of com- manditaires, consult the French (Code de Com¬ merceˆ articles 23-28.

COMMELIN, kom-lan', Hieronymus, hl-

e-ron'i-mus. See Commelin, Jerome.

COMMELIN, Isaac, Dutch historian : b. Amsterdam 1598; d. there 1676. Among his works the history and description of Amster¬ dam is still much valued.

COMMELIN, Jan, yan, Dutch botanist: b. Amsterdam 1629; d. 1692. He was for many years a professor of botany in the university of his native city, where with his nephew, Cas¬ per, he founded the botanical gardens renowned throughout Europe. He wrote much on horti¬ cultural subjects in Latin, the inspiration in some cases being his interest in these gardens over which he exercised a fatherly care.

COMMELIN, Jerome, Flemish printer: b. Douay; d. Heidelberg 1598. He was distin¬ guished by his excellent editions of Greek and Latin classics. His emblem is a figure of Truth, and on many editions the words Ex Officina Sand. Andreana.

COMMELINA, kom-me-ll'na, or day- flower, is a genus of the spiderwort family (Commelinacece) . It contains about 100 species widely distributed in warm and temperate zones. There are about eight species found in the United States, along streams and in waste places, from Massachusetts to Missouri, south¬ ward to Florida and Arizona. The fleshy rhi¬ zomes of some species may be eaten when cooked, as they contain much starch and mucilage. In Asiatic countries some are used for medicinal purposes. The plant receives its name from Jan and Casper Commelin, two noted Dutch botanists.

COMMEMORATION ODE. The and none of the clever satire of the (Biglow Papers,) and it lacks something of the youthful energy and enthusiasm that accompanies the idealism of the (Present Crisis1 and the (Vision of Sir Launfal.* But if it does not show these distinctive characteristics of the author, it is the best expression of Lowell, the*

dignified scholar and patriot, and as such some of his admirers have ranked it as his best work. Among the finer passages are the tribute to Lincoln, and the third .strophe, beginning ((Many loved Truth.®

William B. Cairns.

COMMENCEMENT. In the colleges of the United States this term denotes the day when the students are made bachelors of arts. The degree of master of arts and the degrees of doctors in the professions are also conferred at the same time. The term is given also to the closing exercises of secondary and even elementary schools. The commencement cus¬ tom is a very old one. Originally it was really a commencement or inception, for the term meant, not the beginning or commencement of a school or term, but the inception of the pupil graduate as a teacher and his recognition as such by his master and other members of the profession. He at once entered upon the duties of his new' work ; so in this sense the ceremony signified a commencement.

COMMENDAM, kom-men'dam (Lat. com- mendare, that is, to intrust), used in ecclesiastic law to denote the administrative or provisional management of a benefice during a vacancy. The person entrusted with the management is called commendator. The grant or benefice was sometimes converted into a regular fief and was then said to be in perpetnam com- mendam. The practice gave rise to great abuses, and is now almost unknown.

COMMENSALISM, the intimate connec¬ tion or partnership between animals of quite different affinities ; thus commensals, messmates, or fellow-boarders take up their abode to¬ gether for their mutual benefit. A good ex¬ ample is a large sponge, whose canals and pas¬ sages shelter innumerable worms, Crustacea, etc., which lodge there without expense to their host. Floating jellyfish shelter certain pelagic crustaceans (Hyperina) and little fishes. The oyster-crab {Pinnotheres) is a typical case of commensalism; it does no harm to the oyster or mussel in whose shell it lives, and which protects it from danger; while, as the result of its sheltered life, its shell is soft and thin. The pearl-oyster, besides taking in a Pin¬ notheres as a boarder, admits a kind of shrimp. Certain small slender, eel-like fishes (Fieras – fer) insinuate themselves into the body of holothurians, which also keeps open house for Pinnotheres and shrimps; hence a holothurian has been compared to a hotel with its table d'hote. Other crustaceans board in different animals ; thus a little crab (Fabia chilensis) lodges in the end of the intestine of a sea- urchin ; another (Porcellana) lives on the Brazilian coast in a starfish. Polyps and corals shelter various species of crabs, snails, etc., all being of the same color, wffiile a crinoid (Comatula) takes in as a permanent lodger a decapod crustacean (Galathea) . Hermit crabs, taking up their abode in an empty snail-shell, are obliged to admit a variety of intruders who come to stay. Certain mollusks live in star¬ fishes and other echinoderms and, as the result of their semi-parasitic life, become more or less modified and

degenerate. Thus Stylina lives on a crinoid (Comatala) ; a species of Stilifer becomes encysted on the rays of a starfish (Linckia) , and on the underside of the

arms of the same Linckia lives a limpet-like snail (Tliyca), while 5. astericola lives in the body of a Bornean starfish, and so on with a number of similar cases. Ascidians throw their (

Rising to the higher animals there occurs on an island off the New Zealand coast the case of the interesting lizard <(tuatara,® which shares its deep burrows with a petrel, though the latter may at times be the work of the bird. Each builds its nest on opposite sides of the chamber, the lizard almost invariably choos¬ ing the right and the petrel the left side. The former sits with its head close to the entrance ready for any attack; it feeds partly on worms and beetles, and in part on the remains of fishes and crustaceans brought to their com¬ mon table by the petrel.

By far the most numerous assemblage of messmates are the different kinds of beetles and other insects which live in ants' nests, the number of kinds of which amount to upward of 1,500. See Ant; Cockroach; Symbiosis.

COMMENSURABLE, among geome¬ tricians, an appellation given to such quantities or magnitudes as can be measured by one and the same common measure. Commensurable numbers, whether integers or fractions, are such as can be measured or divided by some other number without any remainder; such are 12 and 18, as being measured by six or three. Magnitudes having no common measure are said to be incommensurable. Thus the diam¬ eter and the circumference of a circle are in¬ commensurable as are also the diagonal and side of a square. The word commensurable is also used in a slightly different sense. Num¬ bers like p2 which are not commensurable with ordinary rational numbers are said to be be incommensurable.

COMMENTARY, a term used (1) in the same sense as memoirs, for a narrative of particular transactions or events, as the Com¬ mentaries of Caesar. (2) A series or collec¬ tion of comments or annotations. These may either be in the form of detached notes, or may be embodied in a series of remarks written ancl printed in a connected form.*

COMMENTRY, ko -man-tre, a town in central France, in the department of Allier, eight miles southeast of Montlugon, in the midst of a vast coal field, to which the town owes its prosperity. There are important iron works in the vicinity. Pop. of commune 10,112.

COMMERCE, Tex., city in Hunt County, 90 miles northeast of Dallas, on the Saint Louis Southwestern and the Texas Midland railroads. East Texas Normal College is located here. The city has considerable trade in live stock, cotton and grain, and manufactures flour, cot¬ tonseed oil and lumber. It contains also plan¬ ing mills, railroad repair shops, bottling works and machine shops. The waterworks are the property of the municipality. Pop. 3,842.

COMMERCE, a card game in which each player contributes an equal sum to the pool, and a full pack of cards is dealt to the players. The eldest hand, that is, the one who received the first card on the left of the dealer, then exchanges one of his cards with his left hand player, who, in turn, exchanges one with his left hand player, and so on, until some one finds that his hand consists entirely of cards of one suit, when he calls out <(My Ship Sails.® Aces count 11, court cards 10, the rest accord¬ ing to ((Pips.® Each player, through all the exchanges, is aiming to hold a tricon, three cards alike ; a sequence, three following each other in the same suit ; or a point, the smallest number of pips on three cards. The winner of the pool is the player who has the highest tricon, or, if none is displayed, the highest se¬ quence, or in its place the holder of the best point. Consult Cassell, (Book of Pastimes.)

COMMERCE, Chambers of. See Cham¬

bers of Commerce.

COMMERCE, Department of. One of

the main divisions in the executive branch of the government of the United States. We shall here describe its origin and organization and the duties assigned to the office of its secretary. In the year following the adoption of the con¬ stitution of the United States three of the executive branches of

the government with secretaries were established. First, the De¬ partment of Foreign Affairs, by act approved 27 July 1789 (the name of which was changed to Department of State by act approved 15 September of the same year) ; second, the War Department, created by act of 7 Aug. 1789 (then embracing naval affairs) ; and third, the Treasury Department, established by act of 2 Sept. 1789. Until the Department of Commerce (and Labor) was organized, in 1903, the Treas¬ ury Department was the principal agency of government through which a limited super¬ vision of the commerce and industrial life of the nation was administered, and the designa¬ tion sought to be given to its chief officer in the Constitutional Convention was that of (*

Petitions for Its Establishment. — Com¬ mercial conventions at Detroit in 1865 and at Boston in 1868 and the National Board of Trade in 1874 memorialized the Congress for the establishment of a Department of Com¬ merce, in order that the rapidly increasing vol¬ ume of capital invested in commerce and manu¬ factures might be the subject of governmental aid and supervision. Many similar petitions were subsequently presented to Congress, and the subject was referred to in political plat¬ forms and annual messages of the President. These petitions, and the representations of commercial organizations before the committees of Congress, stated that the twelfth census showed, the aggregate value of the products of the manufacturing establishments of the United States, during the census year ended 1 June 1900, to exceed $13,000,000,000, which was probably almost four times the aggregate value of all the products of agriculture during the same year; that the manufacturing inter¬ ests in the United States exceeded in volume and importance the industrial interests of any nation in the world, and yet there was no gov¬ ernment office specially charged with any duties relating directly to them, and that in this re¬

spect the United States was almost alone among the nations of the world.

The Department Established. — In the 57th Congress legislation providing for the or¬ ganization of a Department of Commerce was enacted. On 4 Dec. 1901 Senator Nelson intro¬ duced in the Senate a bill (

Organization. — The department, as at pres¬ ent constituted, in addition to the offices and divisions in the immediate office of the Secre¬ tary, consists of the bureau of the census, the coast and geodetic survey, the bureau of fish¬ eries, the bureau of foreign and domestic com¬ merce (which has among its duties the direction of the work of commercial attaches at foreign capitals and of commercial agents at home and abroad), the bureau of lighthouses and the lighthouse service, the bureau of navigation, the bureau of standards and the steamboat inspec¬ tion service.

Duties of the Secretary's Office. — The

organic act of 14 Feb. 1903, creating the de¬ partment, as modified by the act of 4 March 1913, creating the Department of Labor, pro¬ vides for a Secretary of Commerce whose term of office shall be the same as that of other Cabinet officers. It is the duty of the depart¬ ment, under its organic act, to foster, promote and develop the foreign and domestic com¬ merce, the mining, manufacturing, shipping and fishery industries, and the transportation facili¬ ties of the United States; and the Secretary of Commerce is charged with the responsibility of carrying out the purpose of the department as thus broadly outlined. Specifically, how¬ ever, the powers and duties of the Secretary may be summarized as follows : The adminis¬ tration of the lighthouse service, including the establishment and maintenance of aids to navi¬ gation ; the taking of the census; the making of coast and geodetic surveys ; the collection and publication of statistics of foreign and domestic commerce, and the promotion and development of the foreign and domestic commerce of the United States; the investigation of the cost of production, including field investigation at home and abroad; the inspection of steam¬ boats and the enforcement of laws pertaining thereto for the protection of life and property; the propagation and distribution of useful food fishes and the supervising of Alaskan fur-seal and salmon fisheries; jurisdiction over mer¬ chant vessels; the standardization of weights and measures; the formulation (in conjunc- tion with the secretaries of the Treasury and Agriculture) of regulations for the enforce¬ ment of the Food and Drugs Act and the In¬ secticide Act. It is the further duty of the Secretary to make such special investigations and furnish such information to the President or Congress as may be required by them on

the foregoing subject matters and to make annual reports to Congress upon the work of his department. The organization includes an assistant secretary, solicitor, chief clerk and superintendent, disbursing clerk, the appoint¬ ment division, the division of publications and the division of supplies. During the fiscal year which ended 30 June 1915 the organization of the department was changed by the creation of the Federal Trade Commission into which the Bureau of Corporations was merged on 16 March 1915.

COMMERCE, History of. — Commerce is a division of labor among the people of the world. By it man assigns, unconsciously per¬ haps, the production of certain articles to cer¬ tain areas in which they can be most conven¬ iently produced, and other articles to other areas or groups of people. Some of these articles may be food, others manufacturing material, the others manufactures, but they are in each case the class most natural to

the cir¬ cumstances surrounding the groups of people who respectively produce them. Manufactures are the natural product of certain areas and peoples, while foodstuffs or manufacturing material are natural to others. The community whose population is greater than is required to cultivate the soil and work the mines and fisheries of the area which it occupies naturally develops a manufacturing industry, and the sur¬ plus of its manufactures are gladly exchanged for the food and manufacturing material of other communities. The inhabitants of the less densely populated areas naturally give their attention to the production of those articles of food or manufacturing material which the con¬ ditions of their soil and climate most readily supply and gladly exchange their surplus for the manufactures of the more densely populated areas. Thus commerce is the exchange of the products most natural to the conditions sur¬ rounding the various peoples and climatic areas of the world, and is thus a division of labor among men. These exchanges of the products of different people and climatic areas have be¬ come more general with the cheapening of transportation and enlargement of the facili¬ ties for distribution of natural as well as manufactured products. The exchange of the products of the respective areas and groups of people has become a convenient division of labor, the principle which underlies all success¬ ful business and industrial activities of civili¬ zation.

The history of commerce divides itself into three great periods. The first is that in which merchandise was transported by men and animals on land and in vessels sailing along the coasts and seldom venturing out of sight of land; the second began when man learned the use of the compass and traversed the great ocean, but by sailing vessels only. The third began when he applied steam power to the movement of vessels on the ocean and vehicles on land, and this period was simul¬ taneous with that of the establishment of in¬ stantaneous communication by the use of elec¬ tricity.

These three periods vary greatly in length. The first period, that of the sailing vessel creeping along the shores or crossing narrow seas bv the observation of the heavens, extends from the earliest period of history down to

about the year 1300. The second, that of the sailing vessel guided by the compass, extends from about 1300 to 1819, when the first steam vessel crossed the ocean. The third, that of the steam vessel on the ocean, steam transportation on land and instantaneous intercommunication by electricity are all included within the last 100 years. These three periods, of course, greatly overlap one another. The period of the sailing vessel, guided by the observation of the shores or the sun and stars, merged almost insensibly into that in which vessels were guided by the use of the compass, and no exact date can be named as that of the transfer. The compass was known

as early as the year 1300, but it took more than a century to so develop its practical use as to lead man to the explora¬ tion of the great oceans which he had always looked upon as a barrier to travel or explora¬ tion ; nor can it be said that the transition from the sailing to the steam vessel occurred at a fixed date, for it took 20 years after the first steam vessel crossed the ocean to establish even a limited trans-Atlantic service, and for many years thereafter a large part of the commerce was carried by sailing vessels. The construc¬ tion of railways, a part of the third period, oc¬ cupied many years of time and experimental work. The telegraph and ocean cable, the tele¬ phone and wireless telegraphy, which are im¬ portant factors in the third period, were a gradual development but multiplied enormously the commerce demanding the services of the steamship and railways.

In the first period commerce centred in the Mediterranean and extended over western Europe, northern Africa and western Asia. In the second period, when the use of the com¬ pass encouraged man to explore the oceans, the Atlantic was crossed in 1492, India reached in 1496, China in 1516, and the first voyage around the world made in the period 1519-22. Yet with these long experiences of the sailing ves¬ sel, 3,000 years of the first period and 500 years of the second, the entire international trade of the world when the period of steam began 100 years ago was but $1,500,000,000, and to-day is $45,000,000,000. Thirty-five hundred years of the sailing vessel on the oceans and animal transportation on land had developed but $1,500,000,000 of international trade, then, with the advent of steam and electricity 100 years brought the total to $45,000,000,000, or 30 times as much in 100 years as had been developed in 3,500 years without steam and electricity.

The exchanges between nations and peo¬ ples have always been governed by certain great natural laws. Tropical products have always been wanted by temperate zone men and tem¬ perate zone products are wanted by the people of the tropics. Also, the people of the older and more densely populated areas demand the food and other natural products of the more recently developed regions and the newly de¬ veloped areas demand the manufactures and luxuries of the older communities. Densely populated Europe buys the foodstuffs and manufacturing materials of the more newly developed continents, North America, South America, Asia and Oceania, and these newly developed areas take the manufactures of Europe in exchange for their natural products. This is the division of labor among the world population, accomplished by commerce.

COMMERCE, HISTORY OF

The earliest records of commerce between great groups of people relate to

the exchanges between Egypt and Mesopotamia 4,000 years ago. The Egyptians were chiefly an agricul¬ tural people, while those of the Mesopotamia Valley, although agricultural, had developed certain manufacturing industries, and drew other manufactures from India, and perhaps China, and also certain temperate zone prod¬ ucts from the upper waters of the Tigris and Euphrates. So, there grew up limited trading between the two valleys, carried across the des¬ ert by the caravans of the Arabs, chiefly the silks, precious stones, spices and gems of the Orient, exchanged for the cotton and flax and cattle and food grains of Egypt. The Phoeni¬ cians, a Semitic race closely allied to the He¬ brews, removed about this time from the Persian Gulf to the eastern end of the Mediter¬ ranean, and slowly built up a carrying trade along its shores, their vessels first propelled by oars, but later by sails. Gradually they ex¬ tended their operations along the shores of the Mediterranean, passing through the Bosporus into the Black Sea, and also pushing westward along the northern shore of Africa, and even in a limited way along the western coast of Europe as far north as the British Isles and the Baltic. They built great cities, Tyre, Sidon and Carthage, established manufacturing in¬ dustries and became the great traders of the world during a very long period, bringing the temperate zone products of the Baltic Sea region and of northeastern Europe, wool, furs, grain, tin and copper and silver, and exchang¬ ing them for the semi-tropical products of the Mediterranean countries and Euphrates Val¬ ley and the manufactures of their own great cities. Of course it took hundreds of years to develop these cities and their manufacuring industries and build up the commerce with the great frontage stretching from the Baltic Sea along both sides of the Mediterranean and the western coast of Europe, and the Phoenicians were the great trading people of the world for more than 1,000 years.

Gradually, however, the Greeks, who from their homes nearby witnessed the successes of the Phoenicians, followed in their footsteps, Athens and Corinth became manufacturing and commercial cities, and Greek vessels and merchants entered upon the trade of the same area in which the Phoenicians had been so successful. The conquests of Alexander, which extended to Persia and India, also aided Greek commerce by the views which they disclosed of Oriental civilization and the increased use of money in commerce, just as the experiences of the Crusaders in the same area did for Western Europe many generations later. The Greeks, however, did not develop as successful commercial qualities as did the Phoenicians, and the period of their control of world commerce was much shorter. The Romans succeeded the Greeks, as they ex- • tended their political control over an area nearly as great as the present United States, and with a population nearly as big as our own it the present time, stretching from the Eu¬ phrates valley on the east to northern Europe, and including both frontages of the Mediter¬ ranean. They built up great fleets of commer¬

cial vessels, developed roads and commercial routes throughout their colonies, and Rome be¬

came the great centre of their enormous area. The natural products of northern and western Europe and the manufactures and luxuries of the Orient supplied the demands of that great and luxurious city of more than 1,000,000 in¬ habitants. The decline of the Roman power reduced this commerce very greatly, though that with the East was somewhat revived by the transfer by Constantine of the seat of govern¬ ment to Byzantium, since called Constantinople.

The development of the Mohammedan Empire in the 7th century a.d. made great changes in the commercial world. The Moham¬ medan religion favored commerce, and as its followers occupied most of the Mediterranean shore the effect upon commerce and industries was very great. Damascus, Bagdad, Alexan¬ dria, Cairo and the cities of Spain became great centres of industry and trade, and the people of the Christian world learned from the Mohammedans many important lessons of in¬ dustry and traffic. Even the Crusades, which were organized military movements against the Mohammedans in the Holy Land, taught the people of western Europe many valuable les¬ sons in manufacturing through the opportuni¬ ties thus offered to the Europeans of observing the superior industries of the Mohammedan world, in manner similar to that resulting from Alexander's invasions of the Orient, and these lessons resulted in the development of manu¬ facturing industries in western Europe.

During the long period extending from the fall of the Western Roman Empire to the application of the compass to ocean navi¬ gation, the period which is usually designated as the Middle Ages, new trade routes and com¬ mercial centres were developed. Venice and other Italian cities became great trading and manufacturing centres, sending their ships to the eastern end of the Mediterranean and the Baltic Sea for the Oriental products of tropi¬ cal Asia and the grains and wool of the Baltic Sea frontage, redistributing them with their own manufactures to northern and western Europe by land routes and coasting vessels and bringing back the woolens and linens and leather and other products of France and Great Britain and Germany and the Low Coun¬ tries. Again it was the exchange of the prod¬ ucts of different climatic areas and different civilizations. Venice became a great manu¬ facturing, commercial and financial centre and sent its manufactures to Asia Minor, northern Africa and northern and western Europe. Its vessels were numbered by thousands, yet their operations were confined to the inland seas and the Atlantic Coast. It sent its consuls to report upon conditions of the countries with which it traded, built up a great banking and credit system with branch banks in these countries, and its example was followed by other Italian cities, especially Genoa and Florence. These commercial activities of the Italian cities de¬ veloped trading stations and cities in northern Europe. Antwerp, Amsterdam, London, Co¬ logne, Hamburg and Lubeck became active commercial centres, while fairs and markets were built up along the routes over which this merchandise was carried, developing into trad¬ ing towns and cities.

Commerce during this period of the Middle Ages was, however, subject to constant attack by brigands and petty feudal lords, and as a

result the great trading cities and stations of northern Europe built up organized leagues for the protection of their trade. They sup¬ plied armed guards to protect the commerce moving along the land routes, and this facili¬ tated the establishment of new trading stations which developed into towns and cities. The Hanseatic and Rhenish leagues, organized in Germany, included nearly 100 towns in each, and their influence in the protection to and development of trade was very great and was an important influence in developing orderly government and new political governments. Their activities extended over a term of nearly 250 years, and only ended when the use of the compass turned the activities of trade to the oceans, greatly reducing the importance of the Italian cities and the trade systems which they had built up. The commercial and financial ac¬ tivities of this long period, however, developed great commercial, financial, banking and credit systems, as well as organized governments, and fitted western Europe to begin trade with the Americas and eastern Asia when the applica¬ tion of the compass to ocean navigation revo¬ lutionized trade routes and commercial methods.

The period of the practical application of the compass to ocean navigation began about 1400, although its use was begun in a limited way about the year 1300. The eastern front¬ ages of the Atlantic were explored and the islands off the coast of Africa occupied. Co¬ lumbus, convinced that the earth was a globe, and that India could be reached by sailing westward, ventured boldly out on the Atlantic, discovering America in 1492. The circumnavi¬ gation of Africa and the opening of the route to India occurred in 1496, the extension of the route to China in 1516 and the circumnaviga¬ tion of the globe 1519-22. This developed new routes of commerce and also the true functions of commerce, the interchange of the products of different climatic areas and different types of civilization, the division of labor among the people of the world. The great masses of Oriental population were found possessed of certain products desired by those of Europe who were able to offer in exchange their own manufactures and the precious metals which they had begun to receive from America. Com¬ merce then became truly international and intercontinental, exchanges between different climatic areas and civilizations. To develop this new form of commerce, the interchange of the products of the various quarters of the entire globe, new facilities were required, and large sums of money demanded, both in the transportation of merchandise and in the finan¬ cial operations of the exchange. The govern¬ ments of Europe, stimulated by the prospects of gaining additional territory as well as com¬ mercial profits, entered the field. The Spanish, Portuguese, Danish, English and French govern¬ ments chartered commercial companies for the development of trade and exploration and granted them liberal aid, and at

the same time encouraged colonization, especially in America, where there were vast unoccupied areas. The Portuguese sent their trading ships around Africa and established a trading station at Goa, on the coast of India, and the commerce was conducted under the direction of the govern¬ ment, but open to all Portuguese. Spain ex- vol. 7 — 24

plored and conquered Mexico and the western coast of South America, and established com¬ merce with those areas, with squadrons escorted by ships of war. Merchandise was sold to the natives and colonists, and large quantities of gold and silver transferred to Europe, stimulat¬ ing manufactures and proving extremely use¬ ful in the trade with the Orient. The English, who had been buying quantities of Oriental merchandise from the Portuguese, were ex¬ cluded from that market by the Spanish govern¬ ment, and so established the great East India Company in the year 1600. It developed import¬ ant trading relations with the Indies and later with China, and with the co-operation of the government extended its control over parts of India, laying the foundations for the occupation of that country by the British. The Dutch also excluded from their large trade with the Portuguese, established the Dutch East India Company in 1602 and sent their ships to the Orient, taking possession of Java and develop¬ ing a very large business in Oriental products, especially spices which were extremely popular in Europe at that time. Their business was highly successful and Holland became a great commercial, financial and banking country. The French government also established an East India trading company, also one for the West Indies, but they were less successful than those of Great Britain and Holland.

These great commercial companies, char¬ tered by their respective governments, were not only traders but explorers and colonizers as well, especially those operating in America, while those operating in the Orient established trading stations and by obtaining concessions from the native governments gained control of important areas. The colonies and trading stations thus established contributed greatly to the advantage of the mother country, both by their contributions of needed supplies and by •the market they furnished for manufactures. As a result of the desire to develop the produc¬ tion of the tropical areas, especially in America, the African slave trade was built up, multiply¬ ing the production of the colonies, in the New World, and only terminating with the American Civil War. The application of the compass to navigation had a profound effect upon world commerce. Prior to that time most of the international trade was the exchange of the products of the near East and the sub¬ tropical Mediterranean area for those of north¬ ern and western Europe, a limited exchange of the products of the different climatic prod¬ ucts and civilizations. But with the exten¬ sion of the transportation and trade to every part of the world, and the development of the producing power of the new countries the exchanges

between different civilizations, cli¬ matic areas and manufacturing communities was greatly enlarged, and commerce became more than ever a division of labor among great groups of people a'nd great sections of the world.

The transition from the sail on the ocean and animal power on land to steam vessels on the ocean and the railway on land was not accomplished in a single year or decade. The first steam vessel crossed the ocean in 1819, and another from England to India in 1825, but it was not until 1838 that successful trans-Atlantic steam service was established.

All of these vessels were propelled by the paddle wheel, which proved unsatisfactory for ocean service, and in about 1845 the screw pro¬ peller was introduced and soon displaced the paddle wheel. Iron began to be substituted for wood for the construction of vessels about 1850, and steel for iron about 1865. The en¬ gines used by the vessels were at first very simple and unsatisfactory, and it was not until 1864 that the compound engine was adapted to marine use, and the triple-expansion engine in 1874, and other equally important changes later. By these improvements the speed and carrying power of vessels was quadrupled. A single steamship of to-day will carry 600 modern car¬ loads of ordinary merchandise. The result of this development of the steamship is that the tonnage of the sailing vessels of the world is now but about one- fourth that of 1860, while that of the steamships is 16 times as great as in that year, and when we remember that the average steamship will, by reason of its greater speed and more complete control in all kinds of weather, make four times as many trips over a given course in a year as the sailing vessel we begin to realize the enormous expan¬ sion of the carrying power which came with the ocean steamer. The growth of the railway on land was an equally important factor in the development of the third period, and so was that of the telegraph. The railways of the world were but 24,000 miles in 1850, now they are 725,000 miles, or 30 times as much, and their carrying capacity per mile is probably four times as much as then, due to the im¬ provement of roadbeds, the change from iron to heavy steel rails, double and quadruple tracks, stronger, larger and faster engines and larger and better cars. They have made pos¬ sible the transportation of merchandise from the interior of the continents to the water's edge, and this fact has stimulated the develop¬

ment of population in the interior. The popu¬ lation of the interior of the United S.tates, for instance, has trebled since 1870, and the value of its products increased from $2,000,000,000 to $20,000,000,000. World

population, which was but 650,000,000 in 1818, grew to 1,690,000,000 in 1918, due in part to the opening of new areas to population, and in part to the practicability of increasing the density of population at any point and transporting from other parts of the world the food which is required.

Instantaneous communication has also con¬ tributed greatly to the growth of commerce in the latest period. The land and ocean tele¬ graphs in 1850 aggregated but 5,000 miles and to-day are more than 2,000,000 miles, with greatly increased facility of transmission per mile, and even this wonderful system has been greatly intensified by the telephone and wire¬ less telegraph. The fact that the business man or producer in any part of the world can now speak instantly to the business man in any other part of the world, on the other side of the globe, in the interior of the continent and even to the vessels in the midst of the oceans, and may also transmit funds by the same instantaneous process, if desired, adds enorm¬ ously to the convenience and activity of com¬ merce.

Finance has also participated largely in this growth of commerce in recent years. The world's production of gold prior to 1850 was less than $10,000,000 a year; now it is $460,000,- 000 per year, or 50 times as much. The quan¬ tity of gold mined in the short period since 1870 is twice as much as in the 400 years prior to 1870. This enormous increase in the quantity of the world's accepted medium of exchange has greatly aided the growth of commerce, while the development of the banking and credit systems has been quite as important. The banking pow'er of the w'orld, by which we of course

world's development of population, production, vessel tonnage and commerce: 1800 to 1916

•

Year

Popula¬ tion 1

Commerce

Nominal tonnage of vessels of over 100 tons

Railways

Telegraphs

Cables

Gold pro¬ duction, decade ending year named

Total

Per capita

Sail

Steam

Million

Thousand

Thousand

Thousand

Thousand

Thousand

Million

Millions

dollars

Dollars

tons 2

tons 2

miles 2

miles

miles

dollars 3

1 800 .

4 640

1,479

2.31

4,026

128 5

1820 .

6 780

1,659

2.13

5,814

20

76 1

1830 .

6 847

1,981

2.34

7,100

111

0.2

94 5

1840 .

6 950

2,789

2.93

9,012

368

5.4

134 8

1850 .

6 1,075

4,049

3.76

11,470

864

24.0

5

363.9

1860 .

« 1,205

7,246

6.01

14,890

1,710

67.4

100

1,334.0

1870 .

7 1,310

10,663

8.14

12,900

3,040

139.9

281

15

1,263.0

18.80 .

81,439

14,761

10.26

14,400

5,880

224.9

440

49

1,150.8

1890 .

9 1 ,488

17,519

11.80

9,166

8,295

390.0

768

132

1,060. 1

1900 .

1,543

20, 105

13.02

6,674

13,857

500.0

1,180

200

2,100.0

1906 .

1,579

27,418

17.36

5,809

19,713

564.0

1,200

io 270

3,099.8

1910 .

1,616

33 , 634

20.81

4,624

22 , 046

637.0

1 ,307

291

3,780.7

1911 .

1,630

35,909

21.71

4,366

23,932

666.0

1,356

11 318

3,981.7

1912 .

1,643

39,570

24.08

4,083

24,978

683.4

1,400

U320

4,151.1

1913 .

1,652

40,420

24.47

3,891

26,517

690.2

1,462

ii 330

4,283.4

1914 .

1,661

37,760

22.73

3,686

27,988

703.5

1,489

n 335

4,375.1

1915 .

1,672

31,302

18.72

3,583

28,160

717.5

1,526

335

4,465.3

1916 .

1,682

46,523

27.50

3,435

27,858

720.5

1 Figures for later years include certain unimportant areas for which information was not available in earlier years.

2 Mulhall's estimates except for 1830, 1890, 1900, 1906 and later years.

3 Soet beer's estimates prior to 1860.

4 Malte-Brun's estimate for 1804.

5 Based on Balbi's estimate for 1828.

6 Based on Michelet's estimate for 1845.

7 Based on Behm-Wagner estimate for 1874.

8 Levasseur's estimate for 1878.

9 Royal Geographic Society's estimate.

10 Figures of the Bern International Institute.

11 Estimate of the imperial post-office of Germany.

PRODUCTION OF GOLD AND SILVER IN THE WORLD SINCE THE DISCOVERY OF AMERICA

«

Period

Gold3

Silver

Total for period

Total for period

Ounces, fine

Value

Ounces, fine

Coining value

1492 .

424,773,668

$8,780, 192,000

7,999,084,548

$10,343,518,867

1896 .

9,783,914

202,251,600

157,061,370

203,069,200

1897 .

11,420,068

236,073,700

160,421,082

207,413,000

1898 .

13,877,806

286,879,700

169,055,253

218,576,800

1899 .

14,837,775

306,724,100

168,337,453

217,648,200

1900 .

12,315 , 135

254,576,300

173,591,364

224,441,200

1901 .

12,625,527

260,992,900

173,011,283

223,691 ,300

1902 .

14,354,680

296,737,600

162,763,483

210,441 ,900

1903 .

15,852,620

327,702,200

167,689,322

216,810,300

1904 .

16,804,372

347,377,200

164,195,266

212,292,900

1905 .

18,396,451

380,288,700

172,317,688

222,794,500

1906 .

19,471 ,080

402,503,000

165,054,497

213,403,800

1907 .

19,977,260

412,966,600

134,206,984

238,166,600

1 908 .

21,422,244

442,836,900

203,131,404

262,634,500

1909 .

21,965,111

454,059,100

212,149,023

274,293,700

1910 .

22,022,180

455,239,100

221,715.673

286,662,700

1911 .

22,348,313

461 ,939,700

226,192,923

292,451,500

1912 .

22,549,335

466,136,100

224,310,654

290,017,800

1913 .

22,249,596

459,939,900

223,907,843

289,497,000

1914 .

21,240,416

439,078,260

160,626,019

207,678,038

1915 .

22,674,500

468,725,000

178,850,000

231,241,000

1916 .

22,108,000

457,006,000

156,627,000

192,813,000

19171 .

20,723,000

428,381,000

161,445,000

208,736,900

Total2 1492-19173 .

823,743,071

17,028,281,023

11,986,745,132

15,497,987,905

1 For 1917 figures of the previous year are repeated for those countries from which no returns were received.

2 The figures are those of the Director of the Mint, but do not represent the footings of the respective columns, as that official, for the period from

1871 to 1885, employs Soetbeer's averages upon a somewhat different basis from that used in this table.

3 The value of gold production of the world from the discovery of America (1492) to the celebrated silver campaign in the United States (1896) was $8,780,000,000, and from 1896 to the end of 1918, $8,680,000,000 (1918 estimate based on 1917 production).

mean capital, surplus, deposits and circulation, has grown from approximately $8,000,000,000 in 1870 to $80,000,000,000 at the present time, and credits have expanded with an equal rapid¬ ity.

It is for these reasons that the third period of world commerce, that of steam, electricity and finance, has been one of unparalleled de¬ velopments. In the first period, extending over thousands of years of the sailing vessel without the compass, in which the oceans were con¬ sidered a barrier to commerce or exploration, the world trade in an entire year was less than that of a single day at the present time. In the second period, that of the sailing vessel and compass, covering about 500 years, in which man traversed the globe by sailing vessels only, he built up world commerce to $1,500,000,000 a year. In the third period, which has covered but 100 years, he has developed a trade of $45,000,000,000 per annum, or 30 times as great as he had been able to create in 3,500 years without the aid of steam, electricity and mod¬ ern finance. International commerce at the beginning of the third period averaged about $2 per capita for the entire world population ; in 1913 it was about $24 per capita for the greatly increased population. In this last period of growth the same principles of a division of labor among the people of the earth, the ex¬ change of the products of certain peoples and areas and climates for the different products of other areas and peoples and climates stand out more clearly than in the earlier periods. Manufacturing Europe buys food and manu¬

facturing materials from the other continents and pays for them in manufactures ; the United States draws upon the tropics and Orient for manufacturing material and certain foodstuffs and pay? for them with the product of her factories; Asia exports her silk and tea and fibres to Europe and the United States and takes manufactures in exchange ; South Amer¬ ica and Oceania sell their foodstuffs and raw material to the United States and Europe and take the product of their factories; and Africa sells gold and diamonds and ostrich feathers and high grade cotton and buys manufactures from Europe and America. Everywhere it is the exchange of the products natural to the area in which they are produced for the natural products of some other area and people, and thus the division of labor becomes more and more sharply defined with the enlargement of transportation, intercommunication and finance.

Bibliography. — Cunningham, (The Growth of English Industry and Commerce) (Cam¬ bridge 1890) ; Day, (A History of Commerce) (New York 1907) ; Gibbons, (History of Com¬ merce in Europe) (London 1891) ; Greenwood (compiler), Classified Guide to Technical and Commercial Books) (New York 1905) ; Levi, (History of British Commerce, 1763—1878 } (London 1880). Consult also Bartholomew's (Atlas of the World's Commerce) (London 1906) and Chisholm, (Handbook of Commercial Geography 5 (ib. 1890), and the various publi¬ cations of the Department of Commerce of the United States, the consular reports of Great Britain, Germany, France, Austria, Italy,

the Netherlands, and the annual c Statistical Abstract of Foreign Countries) issued by the British Board of Trade.

Oscar P. Austin,

Statistician, National City Bank of New York.

COMMERCE, Internal, of the United States. The internal commerce of a country is the exchange of merchandise among its own people. Studies of the internal commerce of a country are valuable, especially from the economic standpoint, in determining the indus¬ trial and commercial activity of the people, at stated intervals and also in comparison with that of other groups of people.

To fully determine the internal commerce of a country would require a knowledge (1) of the original value of the merchandise ex¬ changed; (2) the number of times that each article was bought and sold between the origi¬ nal producer and consumer; (3) the cost added

by transportation from the producer to the consumer; and (4) the cost added by the ex¬ penses and profits of the dealers or (

Obviously it is impossible to determine with accuracy the costs added by these processes through which the product passes on its way from production to consumption. In some cases they involve short and in other cases long dis¬ tance transportation ; in some cases a small number of transfers from hand to hand, and in other cases many; in some cases the cost of the product is greatly increased by the processes required to fit it for consumption, and in certain articles the charges added for <(expenses and profits® form a much higher per¬ centage of the original value than in others. Fruits from the Pacific coast cross the con¬ tinent and after numerous handlings by dealers are consumed in the Atlantic coast cities

and

towns. Manufactures produced on the East¬ ern frontage from material produced in the extreme south or on the other side of the globe pass through the hands of jobbers and re¬ tailers and are consumed by those on the Pacific coast who grew the fruit sent to the Atlantic frontage, and this is true in a less extreme form of the various products inter¬ changed. By one process, however, it is possible to get a fairly accurate index of the commercial activities of a country. If we can determine at stated intervals the value at the place of production of all articles forming the exchanges among the people we can at least approximate the growth from decade to decade of the ac¬ tivities of exchange among the people of the country and the increase or decrease per capita, and can also compare the same with those of other countries, and even determine the re¬ lation which our own internal trade bears to

our foreign trade, or to the total international commerce of the world.

The principal articles forming the internal commerce of a country are (a) products of agriculture; (b) products of the mines; (c) products of forests and fisheries; (d) manufac¬ tures produced within the country; and (e) articles imported and sold among the people. All these are measured in a single unit of measurement, the dollar, at the place of pro¬ duction. While the manufactures are of course made from the products of the other industries, agriculture, mining and forestry and from cer¬ tain foreign products, and their use as a basis thus involves a second sale of a part of the already recorded product, the fact that the manufactured article presents this material in an entirely new form seems to justify the in¬ clusion of all manufactures among the five great groups of articles forming the internal commerce of a country, agricultural products,

Value at the Place of Production of Articles Forming tfie Internal Commerce of the

United States, 1850 to 1914

Census year

Manu¬

factures

Farm

products

Minerals

Forests,

fisheries,

etc.

Imports

Total materials of internal commerce

Popula¬

tion

Per

capita

internal

1 commerce

1850 .

Million

dollars

1,019

Million dollars t

1,003

Million

dollars

97

Million dollars §

150

Million

dollars

311

Million

dollars

2,580

Millions

23

Dollars

112

1860 .

1,896

1,300

157

200

408

3,961

31

128

1870 .*

3,385

1,458

220

250

624

5,973

39

153

1880 .

5,370

2,013

401

300

855

8,939

50

179

1890 .

9,373

2,160

616

500

1,022

13,661

63

217

1900 .

13,107

4,017

1,107

600

1 ,083

19,914

76

262

1910 .

t22 , 100

7,498

1 ,991

800

1,892

34,281

92

372

1915 .

f26,300

8,895

2,393

1,000

2,185

40,000

100

- Manufactures and agricultural products reduced to gold basis. t Includes estimate for hand trades and neigh¬ borhood industries. t Exclusive of estimated consumption on farms. § Estimated.

minerals, forest and fishery products, manufac¬ tures, and imported merchandise.

The acceptance of these five great groups as the articles forming the internal exchanges of a country enables us to measure the internal commerce of the United States at various dates and its average value per capita of the entire population, and also to determine how our own internal trade compares with that of other countries when estimated on the per capita basis. To measure the value of the mer¬ chandise forming the internal commerce of the countries we must also utilize the official or other acceptable valuations of these five great groups of articles. The census of 1915 put the value of the factory products of the United States in 1914 at $24,246,000,000, and we know from the reports of earlier censuses, that the value of the manufactures produced by the ((hand trades and neighborhood industries® is nearly $2,000,- 000,000 which must be added to the value of the factory products in an effort to obtain the true value of all manufactures produced in the country. So we may set down the value of the manufactures turned out in the United States in 1914 at fully $26,000,000,000. The Secretary of Agriculture estimates the value of the farm products of the United States in 1914 at ap¬ proximately $10,000,000,000, though it is esti¬ mated that about one-tenth of this, or say $1,000,000,000, was consumed on the farm and did not therefore enter internal trade, leaving the amount of agricultural products entering internal commerce at approximately $9,000,- 000,000. The Geological Survey of the United States estimates the value of the mineral prod¬ ucts of the country in 1914 at over $2,000,- 000,000, and to this we must add at least $1,000,000,000 for the products of the forests and fisheries and others of a miscellaneous character. The merchandise imported in 1914, all of which entered internal commerce after passing through the customs houses, was valued at nearly $2,000,000,000 on its arrival at the ports, and of course the tariff duties were added to this cost before it entered trade.

These great groups of merchandise, the manufactures, the agricultural products, the minerals, the products of the forests and fish¬ eries and the merchandise imported, form the internal commerce of the United States, the merchandise exchange between its people, for even that which is finally exported is a part

of the internal commerce before exportation. The value of the manufactures in 1914 was $26,000,000,000; agricultural products exclusive of those consumed on the farm, $9,000,000,000; minerals, $2,000,000,000; miscellaneous products, $1,000,000,000; imports, $2,000,000,000, making an aggregate of $40,000,000,000 as the value at the place of production of all. the articles ex¬ changed among our own people, and forming the internal commerce of the country in the year 1914.

This grand total of $40,000,000,000, the esti¬ mated value of the merchandise forming the internal commerce of the country, represents the products in question at the place of produc¬ tion, and does not make any allowance for the cost added by transportation or the profits of various dealers who handle it between the producer and consumer. Nor does this total of $40,000,000,000 represent more than one sale of the merchandise in question, the original sale by which it passed from the hands of the producer to the markets of the country. How many times it is handled and resold before it reaches the consumer and how much advance he pays upon the price received by the producer is a matter of conjecture rather than of pos¬ sible statistical measurement. There are no accepted standards, governmental or otherwise, by which we may determine the average num¬ ber of times that the merchandise is handled or the percentage added to the price at which it is sold by the producer.

With this basis of measurement of the value at the place of production of the merchandise forming the internal commerce of the United States, it is possible to measure the growth of the merchandise exchanged among her own people from year to year or decade to decade, though the fact that this must be expressed in a single unit of measurement, the dollar, re¬ duces the value of the comparisons . since gen¬ eral advances or reductions in prices would show greater fluctuations in the value figures than those in quantities. For purpose of gen¬ eral comparison in measuring the growth of the grand total of all products forming the internal commerce of the country, it is, how¬ ever, necessary to utilize the single standard applicable to all, the dollar. Accepting the above discussed standards of measurement of the internal commerce of the country, a single measurement at the place of production of all

articles forming the internal commerce of the country, we find that the internal commerce of the United States grew from $2,500,000,000 in 1850 to $4,000,000,000 in 1860; $6,000,000,000 in 1870; $9,000,000,000 in 1880; $14,000,000,000 in 1890; $21,000,000,000 in

1900; $34,000,000,000 in 1910 and $40,000,000,000 in 1914, a per capita average of $112 in 1850, $128 in 1860, $153 in 1870, $179 in 1880, $222 in 1890, $276 in 1900, $371 in 1910 and $400 in 1914, all of these figures being in very round numbers.

It is interesting at this point in the study of the internal commerce of the United States to compare it with that of other countries. This comparison can be only in very general terms, because of the fact that no other country has as complete facilities for such study as has the United States, since no complete and pe¬ riodical census of manufactures is taken in the European countries. Utilizing, however, the partial censuses which have been made from time to time and supplementing these with estimates of the statisticians and economists of the respective countries, the comparison of the value of merchandise forming the internal commerce of the United States, Great Britain, Germany and France in 1913 is shown by the following table.. The estimates for the Euro¬ pean countries are upon a basis similar to that used in the above discussion of the United States, namely, products of agriculture, mining, fisheries, forests, manufacture and imported merchandise. It will be seen that the per capita of the internal commerce of the United States is much larger than that of the other countries enumerated.

Estimated Value of Merchandise Form¬ ing the Internal Commerce of Germany, France, United Kingdom and the United States, 1913:

Material forming internal commerce	Population	Per capita
Germany . $15,000,000,000	68,000,000	$221
France . 10,500,000,000	40,000,000	262
United Kingdom _ 12,500,000,000	46,000,000	272
United States (1914) 40,000,000,000	100,000,000	400

The causes of the greater interchange of merchandise among the people of the United States than in other countries lies in part in the large area and great diversity of production in the United States. With an area practically equal to that of Europe great mountain regions and long sea frontages the United States has varying climatic conditions from temperate to sub-tropical, and consequently a greater variety of products than the smaller countries of Europe with which comparison is made in one of the above tables. It is in this fact, that our own country by its very bigness and diversity of climate produces such a great variety of products, and has exceptional facilities for their interchange, that we have applied in the United States more fully than elsewhere the great economic law of a

division of labor among men and thus made our interchanges greater in pro¬ portion to population than is natural to other and smaller countries.

It is, however, when we compare the value of the merchandise forming the internal com¬ merce of the United States with that forming the international commerce of the world that we begin to fully realize the great volume of our own internal trade. International com¬

merce, as it is usually stated, consists of an aggregation of the imports and exports of all countries of the world, but as every article exported is again counted when it becomes an import at destination, it is ap¬ parent that this customary aggregation of all the exports and imports of all countries of the world really counts the merchandise twice; first, when exported from the country of pro¬ duction, and again, when imported into the country of consumption, and that, therefore, the real value of the merchandise forming international trade of the world is but about one-half that of the customary statement of international trade. For example, the inter¬ national trade of the world in 1913, the year preceding the European War, which may be accepted as a normal year of international trade, aggregated $40,000,000,000. But as this aggre¬ gation included all exports plus all imports, it is apparent that the real value of the merchan¬ dise, counted when exported and again counted when imported, is in fact but $20,000,000,000, or one-half of the usual statement of international trade in 1913, $46,000,000,000.

The table which follows shows the aggre¬ gate value of exports and imports of all countries of the world, the value of the mer¬ chandise forming the international trade, and the value of the merchandise forming the in¬ ternal commerce of the United States, from

1850 to 1914.

Comparison of Internal Commerce of the United States with International Trade of the World, 1850-1914.

Value of Value of

Aggregate merchandise merchandise

value of imports forming inter- forming internal and exports of national trade commerce of

all countries of world United States

1850 $4,050,000,000 $2,025,000,000 $2,580,000,000

1860 7,246,000,000 3,623,000,000 3,961,000,000

1870 10,664,000,000 5,332,000,000 5,973,000,000

1880 14,760,000,000 7,380,000,000 8,939,000,000

1890 17,520,000,000 8,760,000,000 13,661,000,000

1900 20,106,000,000 10,053,000,000 19,914,000,000

1910 33,634,000,000 16,817,000,000 34,281,000,000

*1914 *40,420,000,000 *20,210,000,000 40,000,000,000*

- *1913*

The fact that the internal commerce of the United States grew more rapidly than the inter¬ national commerce of the world is accounted for in part by the fact that our population in¬ creased practically 100 per cent in the period in question, while that of the world as a whole increased but 15 per cent in the same time.

There are no gateways through which the internal commerce of a country must pass and therefore no governmental or other machinery by which it may be measured in detail. We know that Congress passes laws for the regula¬ tion and control of the ((commerce between the States® and that we have an ˆInterstate Com¬ merce Commission® yet there is no record, financial or otherwise, of the value of the merchandise passing between the respective States or other divisions of the country, and billions of dollars worth of merchandise cross and recross State and municipal boundary lines without a record of any sort as to their char¬ acter, value, the place of production or final destination.

By one process, however, it is possible to estimate the value of the merchandise forming the internal commerce of the United States.

Necessarily, the merchandise exchanged among our own people consists chiefly of the products of our own industries, and while it is not possible to measure the actual movement of merchandise between the States, it is practicable to obtain a general view of the interchanges between the great sections of the country. Nature and man in conjunction have divided the United States into four pretty distinct sec¬ tions. These four great sections are (1) the North Atlantic area usually designated as the New England and Middle States; (2) the upper Mississippi Valley; (3) the South; (4) the mountain regions of the West. These four sections differ radically in their products and as a result, the interchanges between them are very large and

form a large part of the internal commerce of the country. They are in fact an application of that great economic law of di¬ vision and labor among great groups of people and the interchanges of their respective prod¬ ucts. It is the operation of this great economic law of a division of labor among the people of the world which has developed the inter¬ national trade of the globe and it has become equally effective in producing the great inter¬ changes of merchandise between certain sec¬ tions of our country which we designate as our internal commerce.

In the North Atlantic area which occupies all of the New England and Middle States, there is a long ocean frontage, rivers furnishing power for manufacturing purposes, a com¬ paratively light soil in most of the area, a dense population, great industrial and trade centres, plentiful supplies of fuel and plentiful trans¬ portation facilities. These conditions have made it the great manufacturing section of the United States. The second mentioned area, the upper Mississippi Valley stretching from the eastern boundary of Ohio to the western edge of Kansas, Nebraska and the Dakotas, is the great temperate zone producing area of the United States with a rich deep soil, pro¬ ducing most of the wheat and corn and meats of the country, and while it has a population slightly larger than the North Atlantic section, the density of population is much less since its area is four times as great. The third sec¬ tion, the South, including everything south of the Potomac and Ohio rivers as far west as the western boundaries of Oklahoma and Texas, has in a part of the area a sub-tropical climate and its most important products are cot¬ ton, rice, tobacco, cane sugar, and other sub¬ tropical growths, timber, live stock, petroleum and limited quantities of cereals. The fourth section, the mountainous area stretching from the western borders of Texas, Nebraska, Kan¬ sas and the Dakotas to the waters of the Pacific has a larger area and smaller population than any of the other sections mentioned and produces materials of a radically different char¬ acter, minerals, precious metals, wool, lumber, beet sugar and fruits. To put it in a single sentence, the North Atlantic area produces the bulk of the manufactures of the country; the upper Mississippi area produces most of the foodstuffs; the South produces manufactur¬ ing material and tropical foodstuffs; the West minerals, wool, sugar and fruits; and these four great areas freelv interchange their products, thus forming a large part of the internal commerce of the country.

The North Atlantic Section which is com¬ posed of the New England and Middle States, has a comparatively small area, only about as much as that of the State of California, yet its population is 30 per cent of the entire coun¬ try, the area being 160,000 square miles, and its population 30,000,000. It produced in 1914, the last census year, over $11,000,000,000 worth of factory-made manufactures out of a total of less than $24,000,000,000, or practically one-half of the factory products

of the entire United States when measured by values. The capital invested in its manufacturing industries was $11,000,000,000 out of a total of $23,000,000,000 invested in the entire manufacturing industries of the United States.

Yet this North Atlantic area with 30 per cent of the population and one-half of the man¬ ufactures of the country produces but a small proportion of the food or manufacturing ma¬ terial which its people and industries require. With 30 per cent of the population of the country, it produced but 5 per cent of the wheat, 3 per c

The Upper Mississippi Section is equally distinctive in its products and equally depend¬ ent upon other sections of the country for cer¬ tain of its requirements. This section includes the States of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Missouri, Iowa, Kansas, Nebraska and the Dakotas. With an area form¬ ing about 25 per cent of the entire United States exclusive of Alaska it has 32 per cent of the population of the country. It is clearly the great grain and meat producing section of the United States. It produces about 75 per cent

of the wheat of the country, 70 per cent of the corn, 50 per cent of the potatoes, 50 per cent of the butter, 45 per cent of the food animals and turns out 55 per cent of the flour and 70 per cent of the products of slaughtering and packing. It produces 58 per cent of the value of all foodstuffs turned out in the United States and the value of its farms is 57 per cent of that of the entire country. Of manufactur¬ ing material, it produces about 20 per cent stated in value, of the entire manufacturing ma¬ terial of the country. The total of its manu¬ factures in 1914 was nominally about 33 per cent of those of the entire country, though a very considerable part of these so-called man¬ ufactures consisted merely of meats and flour which the census classes as manufactures, though in fact foodstuffs. Having 45 per cent of the food animals of the country, it turned out in 1914 75 per cent of the products of slaughtering, having plentiful timber supplies ; it manufactures 80 per cent of the agricultural implements, 70 per cent of the automobiles and 50 per cent of the furniture, and producing 75 per cent of the wheat of the country, it turns out 60 per cent of the flour. Producing 85 per cent of the iron ore of the country and about 25 per cent of the coal, it turns out 33 per cent of the pig iron and 30 per cent of the manufactures of iron and steel. Producing no cotton, little wool or other fibres for indus¬ trial purposes, it relies almost exclusively upon the North Atlantic section for its manufactures of cotton and wool and silk and fibres, also for its chemicals and many other

high grade manu¬ factures and those of a miscellaneous charac¬ ter. For these, it exchanges its wheat and flour and food animals and meats and furni¬ ture and automobiles, while it also pays with like products for the minerals and sugar and fruits and live stock which it brings from the southern and western sections of the country.

The Southern Section which includes all of the States south of the Potomac and Ohio riv¬ ers and extending to the western boundaries of Texas and Oklahoma has 30 per cent of the area of the country and 32 per cent of the population. Its industries are chiefly agricul¬ ture, forestry and mining. It produces prac¬ tically all of the cotton of the country, about 18 per cent of the cereals, 28 per cent of the food animals, over 50 per cent of the petro¬ leum and has 40 per cent of the farm acreage of the country. It turns out about 30 per cent of the value of farm products of the country, and 24 per cent of the value of the foodstuffs of the United States. With its monopoly of cotton production, and its valuable minerals and forests, it supplies about 50 per cent of the raw material required for manufacturing. It supplies 26 per cent of the coal, over 50 per cent of the petroleum, all of the raw cotton and practically all of the sulphur produced in the United States. Producing 50 per cent of the country's raw material for manufacturing, it turns out but 14 per cent of the total value of manufactures produced in the United States, and the capital invested in its factories is but about 12 per cent of the total manufacturing capital in the entire country. It produces about 40 per cent of the cotton goods manufactured in the United States, 34 per cent of the lumber and 10 per cent of the manufactures of iron p.rd stee] but comparatively little jn other lines

of manufacture. For all of its woolen and silk goods, its manufacture of fibre, its higher grade cottons, its chemicals and most of its iron and steel manufactures, it depends on the North Atlantic Section; for the bulk of its auto¬ mobiles, cars, carriages and for farm machin¬ ery it depends upon the Upper Mississippi Sec¬ tion. For these it exchanges its natural prod¬ ucts, cotton, petroleum, sulphur, tobacco, live cattle and its partly manufactured product — lumber.

The Mountain Section covers the entire area from the western boundary of Texas, Kansas, Nebraska and the Dakotas to the waters of the Pacific. It has a larger area than any of the others, about 40 per cent of the entire country exclusive of Alaska, but only 7 per cent of its population against 32 per cent in the Southern Section, 32 per cent in the Upper Mis¬ sissippi Section and 29 per cent in the North At¬ lantic Section. It produces but 6 per cent of the manufactures of the country, 5 per cent of the cereals, 9 per cent of the foodstuffs, has but 12 per cent of the acres in farms, 3 per cent of the swine, 15 per cent of the cattle,

but 55 per cent of the sheep of the country. Clearly it is not, mountainous as it is, a great agricultural or manufacturing section, though it does supply most of the beet sugar pro¬

duced in the country, over one-half of the wool, and large quantities of fruits. Its chief products are minerals ; it produces 80 per cent of the copper and practically

all of the gold and silver produced in

the United States, about 33 per cent of the petroleum, 25 per cent of the minerals of the country as a whole and about 20 per cent of the entire manufacturing material produced in the United States. Its sheep produce 65 per cent of the value of the wool product of the country and its forests 20 per cent of the lum¬ ber. Its natural products it must exchange for the food and manufactures of other parts of the country. While it turns out about 7 per cent of the total manufactures of the country, and its total population is about 7 per cent of that of the entire United States, it does not follow that it is self-sustaining in the mat¬ ter of manufactures, for the output of its fac¬ tories are composed of few articles, such as lumber, iron and steel, sugar and the products of slaughtering and packing leaving its popu¬ lation dependent upon the manufacturing sec¬ tions, the North Atlantic, and the Upper Mis¬ sissippi Section for its cotton, woolen and silk goods, its clothing, agricultural implements, cars, carriages and high grade manufactures of iron and steel and miscellaneous products. For these it exchanges its minerals, wool, fruits and sugar.

The four great requirements of man are food, fuel, manufacturing material and manu¬ factures. The North Atlantic Section with 6 per cent of the area of the United States and 29 per cent of its population produces 50 per cent of the manufactures and 33 per cent of the fuel but only 9 per cent of the food and 7 per cent of the manufacturing material of the entire country. The Upper Mississippi Section with 25 per cent of the area and 32 per cent of the population produces 60 per cent of the food, 33 per cent of the fuel, 21 per cent of the manufacturing material and 33 per cent of the manufactures though about one- fourth

of its so-called manufactures are merely the products of slaughtering and milling which are scarcely entitled to be classed manufactures. The Southern Section with 30 per cent of the area and 32 per cent of the population produces 23 per cent of the food, 28 per cent of the fuel, 50 per cent of the manufacturing material and 6 per cent of the manufactures. The Western Section with 40 per cent of the area and 7 per cent of the

population produces 20 per cent of the manufacturing material, 13 per cent of the fuel, 9 per cent of the food and 7 per cent of the manufactures of the country.

Thus the great economic principle of a division of labor among men, which had been unconsciously but consistently developed in

of the North Atlantic and Upper Mississippi Sections and the sub-tropical products of the Southern Section.

These exchanges between these great areas of the United States having products with distinctly varying characteristics form the bulk of the internal commerce of the country in which the value of the merchandise is twice as great as that forming the entire inter¬ national commerce of the world.

The table which follows shows the principal products of the four great industrial sections of the United States: the North Atlantic Sec¬ tion, whose chief industries are manufactures ; the Upper Mississippi Section, the chief pro¬ ducer of foodstuffs ; the Southern Section, pro-

PRINCIPAL PRODUCTS OF THE FOUR GREAT INDUSTRIAL SECTIONS OF THE UNITED STATES, ALSO AREA AND POPULATION

North Atlantic Section

Area, square miles .

171,000

29,000,000

$616,000,000

$189,000,000

$6,338,000,000

$11,047,000,000

$11,000,000,000

220,000,000

2,000,000

19,000,000

$1,077,000,000

Population, 1916 .

Foodstuffs produced, 1909 .

Fuel produced, 1909 .

Manufacturing material used, 1914

Manufactures produced, 1914 .

Capital invested in manufacturing. Coal produced, 1915, tons .

Iron ore produced, 1915, tons .

Pig iron produced, 1915, tons .

Iron and steel manufactures, 1914. Copper produced, 1915, pounds. . .

Silver produced, 1916 .

Gold produced, 1916 .

Petroleum produced, 1915, bbls. . . Lumber produced, 1914 .

9,000,000

$220,000,000

Cotton produced, 1916, bales .

Cotton manufactures, i914 .

Wool produced, 1915 .

$420,000,000

$3,000,000

$355,000,000

$245,000,000

$410,000,000

$150,000,000

65,408,000

$3,890,000,000

$1,092,000,000

200,000,000

37,000,000

120,000,000

$130,000,000

90,000,000

Woolen manufactures, 1914 .

Silk manufactures, 1914 .

Boots and shoes manufactured,

1914 .

Automobiles, 1914 .

Farms, 1909, acres .

Farm property, 1909 .

Farm products, 1909 .

Cereals, all, 1909, bushels .

Wheat, 1915, bushels .

Corn, 1915, bushels .

Milling products, 1914 .

Potatoes, 1915, bushels .

Sugar, 1915, pounds .

Food animals, 1910 .

10,460,000

3,770,000

2,360,000

2,330.000

$237,000,000

Cattle, 1910 .

Swine, 1910 . . . . : .

Sheep and goats, 1910 .

Slaughtering products, 1914 .

Upper

Mississippi

Section

Southern

Section

Mountain

Section

Total

767,000

32,000,000

$3,973,000,000

$182,000,000

$5,192,000,000

$8,574,000,000

$7,000,000,000

105,000,000

47,000,000

14,000,000

$828,000,000

250,000,000

$8,000,000

30,000,000

$310,000,000

130,000

$25,000,000

$20,000,000

$30,000,000

$10,000,000

901,000 32,500,000 $1,607,000,000 $160,000,000 $1,916,000,000 $3,130,000,000 $3,000,000,000 124,000,000 6,000,000 5,000, 000 $188,000,000 76,000,000

150,000,000

$480,000,000

11,381,000

$245,000,000

$6,000,000

$5,000,000

1,189,000 8,500, 000 $592 , 000 , 000 $75,000,000 $919,000,000 $1,506,000,000 $2,000,000,000 25 , 000 , 000 1,000,000 1,000,000 $90,000,000 1,060,000,000 $37,400,000 $86,000,000 91,000,000 $225,000,000

$10,000,000

$36,000,000

$5,000,000

3,028,000 102,000,000 $6,788,000,000 $606,000,000 $14,368,000,000 $24,247,000,000 $23,000,000,000 474,000,000 56,000,000 39,000,000 $2,183,000,000 1 , 386 , 000 , 000

$37,400,000 $94,000,000 280,000,000 $1,235,000,000 11,511,000 $700,000,000 $65,000,000 $395,000,000 $255,000,000

$180,000,000

$450,000,000

350,677,000

$23,554,000,000

$4,934,000,000

3,320,000,000

682,000,000

1,890,000,000

$526,000,000

170,000,000

290,000,000

79,032,000

30,007,000

36,150,000

14,875,000

$1,310,000,000

$6,000,000

$15,000,000

352,441,000

$8,909,000,000

$2,976,000,000

780,000,000

126,000,000

972,000,000

$175,000,000

52,000,000

493,000,000

50,435,000

20,390,000

21,085,000

8,960,000

$75,000,000

$4,000,000 $15,000,000 110,861,000 $4,538,000,000 $848,000,000

215,000,000 158,000,000 25,000,000 $45,000,000 48,000,000 1,160,000,000 41,026,000 9,446,000 1,880, 000 29 , 700 , 000 $50,000,000

$600,000,000 $630,000,000 879,387,000 $40,891 ,000,000 $9,850,000,000 4,515,000,000 1 ,003,000,000 3,007,000,000 $876,000,000 360,000,000 1,943,000,000 180,953,000 63,613,000 61,475,000 55,865,000 $1,672,000,000

it Note. — The North Atlantic Section includes the New England and Middle States.

Upper Mississippi Section: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Missouri, Kansas, Nebraska and the Dakotas.

Southern Section: All States south of the Potomac and Ohio rivers extending to the western boundary of Texas and Oklahoma.

Western Section: All States west of Texas, Oklahoma, Kansas, Nebraska and the Dakotas.

world industries, has been also unconsciously applied in the United States. The North At¬ lantic Section, producing one-half of the manu¬ factures, exchanges them for the food of the Upper Mississippi Section and the manufactur¬ ing material of the South. The Upper Mis¬ sissippi Section, producing 60 per cent of the food, exchanges it for the manufactures of the North Atlantic Section, the food animals and lumber of the Southern Section and the min¬ erals, sugar and fruits of the Mountain Section. The Southern Section produces its cotton and oil and timber and sulphur and sugar and ex¬ changes them for the manufactures of: the North Atlantic and the Upper Mississippi Sec¬ tions of the country. The Mountain Section produces its minerals and wool and sugar and fruits and exchanges them for the manufactures

viding the cotton and other raw materials ; and the Mountain Section, producing the minerals and wool.

Oscar P. Austin,

Statistician, National City Bank of New York.

COMMERCE, Interstate. Complete free¬ dom of trade among the States wras established by the Federal Constitution. The States were forbidden to'(

with foreign nations and among the several States,® which Congress was empowered to regulate, was almost exclusively water-borne. Overland traffic was practically non-existent ; the cost of transportation of heavy commod¬ ities, in large quantities and for long distances, wras prohibitive. Interstate commerce, then and long after, meant trade conducted by schooners, sloops and "yankies® on the bays, sounds and estuaries skirting the Atlantic shore ; and there was little thought of exercising the regulative powers of Congress over any other. The only national legislation on the subject for half a century after the foundation of the government was that contained in the Navigation laws, whereby the coasting trade between ports of the United States was required to be conducted in vessels of American registry, American-owned and American-built. When steam-propelled vessels had come into general use, and laws for the inspection of steamboats and the licensing of masters and engineers were enacted by

Congress, this legislation applied, of course, to all steam vessels, including those engaged in traffic on rivers and lakes wholly within the territorial limits of a single State. With respect to overland traffic on the other hand, there are instances on record where States in¬ corporated transportation companies, with ex¬ clusive rights of running their stage coaches and wagons over roads in other States. The earliest Federal activity with respect to over¬ land communication, which might inferentially be called a regulation of commerce, was the establishment of the pre-existing postal system as a governmental service. The next in time and importance was the construction of the Cumberland Road, or <(National Pike,® from Cumberland, Md., through Wheeling and Co¬ lumbus. This highway, begun in 1806, finally reached Vandalia, on the Kaskaskia River, in 1827. It had been intended to project this road to Jefferson, Mo., but long before its con¬ struction had progressed to the Mississippi River line the superiority of the railroad for long-distance overland traffic had been demon¬ strated. As early as 1772 George Washington had directed attention to the need of improving the means of inland communication by roads, rivers and canals. Especially desirable, in his estimation, was a through route from the sea¬ board to the region west of the Alleghany Mountains ; but this was not realized until, 26 years after the death of Washington, a con¬ nection between the Great Lakes and the Hud¬ son River was established by the completion of the Erie Canal. The first direct assertion by Congress of the right to regulate overland com¬ merce among the States was the act of 15 June 1866 (31 Statutes at Large, 1446, chap. 866) which provides as follows : "Every railroad company in the United States is authorized to carry ... all passengers, troops, government supplies, mails, freight and property on the way from State to State, and connect with the roads of other States, so as to form continuous lines for the transportation of the same to the place of destination.® This has been called, not inappropriately, the <(Magna Charta® of the interstate railways.

Long before this, however, the potentialities latent in the "Commerce Clause® of the Con¬ stitution had been disclosed by the courts. The epochal case of Gibbons v. Ogden (9 Wheaton

1) turned on the interpretation of the word "commerce.® The State of New York had granted an exclusive right of navigation over its territorial waters; but the court decided that commerce includes navigation, so that, in mak¬ ing a grant of the character described, the State had exceeded its powers and encroached upon those of the United States. In the written opinions of Chief Justice Marshall and his asso¬ ciates on the Supreme Bench the superior and exclusive authority of Congress is declared with the greatest possible emphasis. The power of Congress to regulate commerce "is complete in itself, and may be exercised to its utmost ex¬ tent, acknowledging no limits other than are prescribed in the Constitution.®

The power is plenary, because it is vested in Congress "as absolutely as it would be in a single govern¬ ment® ; it may be exercised "whenever the sub¬ jects exist.® "If there was any one object riding over every other in the adoption of the Constitution, it was to keep commercial inter¬ course among the States free from all invidious and particular restraints. ... In all com¬ mercial regulations we are one and the same people.® In the ensuing years the scope of the Federal authority was determined mainly by decisions of the United States courts enjoining the enforcement of State regulations, or the collection by the States of tolls and taxes, deemed to be obstructive of or burdensome on interstate commerce. With the opening of the railroad era overland traffic steadily gained on navigation in relative importance ; but the idea of the "Commerce Clause® as a check upon hindering legislation by the States, rather than as an invitation to Federal regulation, per¬ sisted. As late as 1869, in the State Freight Tax case (15 Wallace 232) Justice Strong still adhered, and gave expression, to this idea — saying, that when this clause was framed, "a power to prevent embarrassing restrictions by a State was the thing desired.® Pennsylvania had placed a tax on all charges made by rail¬ roads for the transportation of freight within the State and, though the impost was on earn¬ ings and not, directly, on the commodities car¬ ried, and though no discrimination was made in favor of local traffic, it was declared to be a toll on interstate commerce and its collection was inhibited. In the Covington Bridge case the establishment of toll rates on the bridge from Cincinnati to Covington was declared to be a regulation of interstate commerce and, therefore, not within the legislative power of a State. And this notwithstanding the fact that the regulation of ferries, even when operated across rivers forming State boundaries, had always been regarded an exclusive function of the adjacent local authorities. The right of a State to prohibit the entry of intoxicating beverages was denied, when the goods were imported in the "original packages® as ˆarticles of interstate commerce. The law on this sub¬ ject has been recently changed, however, and such shipments are now excluded by act of Con¬ gress from States which prohibit their entry. The imposition of license fees on persons or employments, even though not discriminatory, have been declared unlawful when they were, in effect, regulations of interstate commerce; for instance, when imposed on persons solicit¬ ing orders for goods or freight to be shipped into or out of a State to or from another State.

COMMERCE, INTERSTATE

379

Several years ago the United States Circuit Court sitting at Minneapolis forbade the execu¬ tion of a new Wisconsin grain inspection law, on the ground that the Minnesota system of grain inspection had become

practically an interstate system by custom of the trade.

Laws passed by States in the exercise of their police powers, however, are valid, though they may incidentally affect interstate com¬ merce. The States may exclude persons or goods by quarantine ; regulate or restrict the sale of merchandise by pure food laws or other legislation in the interest of public health or morals; regulate the use of highways; impose conditions on the conduct of business by foreign corporations within their limits, and oust corporations or associations which have been declared monopolies. In a few cases which involve direct regulations of interstate commerce — for instance, the transportation, or storage for transshipment, of explosives — State laws have been held operative in the absence of Federal regulations on the subject. But it is the ((elementary and long-settled rule that there can be no divided authority over inter¬ state commerce, and that regulations of Con¬ gress are supreme. In cases where, from the particular nature of the subject, the State may exert authority until Congress acts, it is under the assumption that Congress by inaction has tacitly authorized the State to do so. Action by Congress, though not expressly inhibitiv0, destroys the possibility of such assumption, since such action covers the whole field and renders the State impotent.® — Southern Rail¬ way Co. v. Reid (1912), 222 U. S. 424; Railway Co. v. Hardwicke Farmers' Elevator Co. (1913), 226 U. S. 426.

The gigantic extension of the railroads of the country in the decade following the Civil War resulted in a complete change in the aspect of our commercial problems. Not inter¬ state commerce, but the most important instru¬ mentality thereof, appeared to be in urgent need of regulation. The authority given by the act of Congress of 15 June 1866 had facilitated railroad connections and the establishment of continuous lines, overleaping the boundaries of States and defying their control. The railroads thus connected were consolidated by merger, or by lease, into great interstate systems, com¬ petition among which was stifled by pooling agreements. New lines projected as competi¬ tors to existing ones were bought out, or frozen out by means of stock jobbery or legal and political sculduggery. Of the many evils grow¬ ing out of uncontrolled railroad operation the greatest of all was the practice of discriminat¬ ing in service and rates between individual shippers and localities. Favored shippers were enriched at the expense, and often by the ruin, of business rivals, who had to pay more for service, if they got it at all. The prosperity of towns and whole sections, with the farms, mines and industries they contained, were de¬ pendent upon the good will of those who com¬ manded the means of communication and transportation. The Granger movement, which started about 1870, resulted in the enactment of stringent regulative laws in the States of the Northwest and Middle West. Local legislation, however, was of little avail. More than two- thirds of the railroad traffic was interstate

and

lay wholly outside of Stale control. Nearly all of the grain and other produce that went into the elevators and warehouses was intended for transshipment to other States, or for export to foreign countries. Neither could terminal services be effectively regulated, nor could un¬ fair and discriminative through rates be pre¬ vented. The only limitation on charges was <(what the traffic would bear.® The first at¬ tempt at regulation by Congress was made in 1873, when a bill was introduced to forbid any railroad company to charge more per mile for a short, than for a long, haul. This crude measure, which took no account of the ((rule of diminishing cost,® was very properly de¬ feated. Judge Reagan, of Texas, introduced into the House of Representatives in 1878 a series of bills covering the whole subject, some provisions of which ultimately found their way into the Cullom bill. Not until nine years later, however, was this bill finally passed as the Interstate Commerce act of 4 Feb. 1887. The principal objects of this law, as defined by the Supreme Court, are: <(to secure just and reasonable charges for transportation ; pro¬ hibit unjust discrimination in the rendition of like services under similar circumstances and conditions ; to prevent undue preferences to persons, corporations or localities ; to inhibit greater compensation for shorter than for longer distances over the same lines ; and to abolish combinations for the pooling of freights.® — Interstate Commerce Commission v. Baltimore (1892), 145 U. S. 263.

The law at first was made applicable to carriers wholly by rail or partly by rail and water, and to the instrumentalities of shipment and carriage. Transportation on water routes, by navigation companies or individual owners, operating their lines or vessels independently and not under direction of a railroad as com¬ ponents of a combined rail and water route, was not in the purview of the law. The Hep¬ burn act of 29 June 1906 extended the act to pipe lines and specified with great particularity the ((services required in connection with the receipt, delivery and transfer in transit, ventila¬ tion, refrigeration, elevation, storage or hand¬ ling of property transported® ; the Mann-Elkins law of 18 June 1910 included telegraphs, tele¬ phones (wire or wireless) and cables, also ex¬ press companies, sleeping car companies, bridges and ferries. The pooling of freights having been absolutely prohibited by the Interstate Commerce law efforts were at first made to secure a uniformity of rates by agreement among the member railroads in each of the several regional traffic associations. Such agreements, however, were declared by the Interstate Commerce Commission, which had been created to administer the law, and by the courts, to be in violation of the Sherman Anti- Trust law, being ((contracts in restraint of trade.® But, inasmuch as the whole spirit of the law was the principle of equality, and prefer¬ ences among localities similarly situated were expressly forbidden by the act, the inevitable

consequence was a practical identity of rates and classifications of freights in each of the regions covered by the traffic associations. Regulation had superseded competition as the means of adjustment. Nevertheless, mergers or combinations of parallel and competing lines

and systems are prevented by State laws, which have been declared valid by the United States Supreme Court ; and the same court un¬ scrambled the Northern Pacific and Great Northern merger, and dissolved the combina¬ tion, through stock ownership, between the Union Pacific and Southern Pacific systems. The prohibition in the original act of lower rates for a long haul than for a shorter haul was unconditional ; but the commission, with the concurrence of the courts, applied the qualifying phrases attached to other provisions of the law so that, where a railroad between two given terminals is in competition with an all water route, or a foreign overland route out of the jurisdiction of the commission, it was decided that there was ((a substantial dif¬ ference in the circumstances0 such as would warrant the establishment of a lower through rate for the longer haul from terminal to ter¬ minal than for a shorter haul to intermediate points on the same line. By the Hepburn act rate-making of this character was finally and definitely authorized. The same law also abolished the right to a judicial review of the commission's orders, making the rates estab¬ lished by it unappealable except on constitu¬ tional grounds — as being denials of the equal protection of the law, or involving the taking of property without compensation. The re¬ quirement to construct and operate switch con¬ nections by request of any lateral or branch line or shipper, if practicable and justified by the business furnished, and the ˆcommodities clause,0 which forbade railroads to haul coal from mines owned or controlled by them, were other features of the Hepburn law.

It was found necessary several times to in¬ crease the severity of the penalties provided by the original law for discriminations in rates and services. The Elkins act of 4 Feb. 1903 made the giving of rebates, or the granting of any special favors which were differentials in effect, punishable by the imprisonment of the agents or officers responsible for the wrong, as well as by the imposition of a fine on the bodv- less and soulless corporation. But the principle of selling cheaper at wholesale than at retail has been declared by the courts to be operative in the sale of transportation, just the same as in the sale of other services or of commodities. The existence of (

In determining the reasonableness of a charge the interests of the carrier,

*the shipper and the public must all be considered ; the cost of service to the carrier would be an ideal basis, but is impracticable ; the value of the service to the shipper is a factor; also the density of traffic, the ability of some traffic to bear a greater charge than some other, having regard for the character of the commodities and the locality or other circumstances of production ; and rates may be unreasonable because too low. As a downward limit the courts have fixed the sufficiency of the rates to produce 6 per cent on capital, over and above operating cost and fixed charges. Pursuant to this suggestion the Interstate Commerce Commission, *by the act of*

1 March 1913, was directed to make a physical valuation of all railroad property in the United States, the assumption being that the value so found would be less than the nominal value of the stock in the hands of shareholders, and copious infiltrations of ((water° could be squeezed out of the nominal capitalization.

The Panama Canal act of 24 Aug. 1912 made it unlawful for any railroad to own, lease, operate, control or have any interest (by stock ownership directly, or indirectly through a holding company or individual stockholders) in any carrier by water or any vessel carrying freight or passengers operated on any water route with which it (the railroad) does or may compete. By this act also the Interstate Com¬ merce Commission was authorized to require the establishment of physical connection be¬ tween the lines of carriers by rail and the docks of carriers by water by means of spur tracks. The connection must be reasonably practicable, and the amount of business must justify the outlay; the commission to apportion the cost of installation and determine the conditions and charges of operation. The law applies even when the dock belongs to neither carrier, so that piers owned by municipalities or inde¬ pendent wharfingers are brought under Federal regulation. The commission may determine through-routes and maximum joint rates; es¬ tablish maximum proportional rates by rail to and from ports, to and from which traffic is carried by water. Any carrier by rail entering into engagements with a carrier by water for handling through business may be required to enter into similar arrangements with any or all lines of steamships operating from the same port. By this law of Federal regulation of rates, authority was still halted at the water fronts; moreover, ferries unconnected with transporta¬ tion by rail appear to be still under exclusive State jurisdiction. This is so even when the ((ferry boats0 have to go 20 miles across the high sea as they do from San Pedro, Cal., to Santa Catalina Island. Consult Wilmington Transportation Co. v. California R.R. Commis¬ sion (1915), 236 U. S. 151. The Sherman Anti- Trust law of 2 July 1890, though it purports to be an act <(to protect trade and commerce against unlawful restraints and monopolies0 was at first declared inapplicable to a monopoly in the

production of a necessary of life, which is transported to, and sold in, every corner of the land. But the sugar trust decision has long since become obsolete and the prohibition of the Sherman law of trading in trust products makes it a most effective regulative of inter¬ state commerce. The power of Congress to prohibit, as well as to regulate, trade is in¬ voked also in the Federal Meat Inspection and the Food and Drug laws. But the act of Con¬ gress prohibiting interstate commerce in the products of child labor has been declared un¬ constitutional by the United States Supreme Court, though by a bare majority. The Interstate Commerce Commission has nothing to do with the administration of these laws and the regulation of transportation and rates on salt water routes, which the government has at last assumed, is in the hands of the United States Shipping Board.

The regulative powers of the Interstate Commerce Commission have been practically suspended by the establishment, as a war meas-

lire, of a Directorate General, whereby the gov¬ ernment has assumed complete control of rail¬ road operations ; though the commission con¬ tinues to receive from the corporations owning the lines, as required by law, monthly financial reports, including reports of operating income. One of the first acts of the Director General was to abolish many of the wasteful methods induced by competition for business and to co¬ ordinate facilities in order to promote efficiency in service. Whatever else the future may bring forth, it is certain that the railway and other inland routes of transportation will hereafter be considered as interrelated parts of one great system.

Stephen Pfeil.

COMMERCE OF THE WORLD, Inter¬ national. World commerce is primarily the interchange of the products of its great natural divisions. Nature gave to the world three great natural divisions : the broad tropical belt stretching around the globe at the equator, and on either side of this a temperate zone. Between the 30th parallel of north latitude, which runs through New Orleans, Cairo and Shanghai, and the 30th parallel of south lati¬ tude, which runs through Southern Brazil, the southern tip of Africa and the southern part of Australia, the products are chiefly tropical. North and south of these lines the products are chiefly temperate. Curiously, the area between these two lines, the 30th degree north and the 30th south, is about one-half of the land sur¬ face of the globe, exclusive of the Arctic and Antarctic regions. That tropical area has, too, about one-half of the world's population. Its products — 'Cotton, silk, hemp, sisal, jute, rub¬ ber, hides, sugar, tea, coffee, cacao and fruits — are demanded by the people of the temperate zone for food and clothing and for use in manufacturing. The temperate zones, with one-half of the world's area and population, produce the cereals, meats and other food¬ stuffs, and are the great manufacturing section of the world. These products of the temperate zones are demanded by the people of the tropics, for food, clothing and the requirements of their domestic and industrial life. So there are great and perfectly natural interchanges of the natural and artificial products of these two great climatic sections of the globe, the tem¬ perate zones and the tropics.

Nature, however, not content with these climatic divisions of the earth's surface, also subdivided them by the creation of continents and islands, separating them by great oceans, across which the various products of these climatic divisions must be transported by ves¬ sels. To add to this complication of inter¬ changes, certain of these natural sections were populated and their producing powers de¬ veloped long before others of them. Western and southern Europe, northern Africa, India, China and the Euphrates valley, were the seats of a busy population long before America, central and southern Africa, Australia, or the islands of Oceania were peopled or began to contribute their products to the requirements of the world.

It is the interchanges between these great sections of the globe and the various countries into which they are subdivided which we call international commerce. The exchanges began in a small way, with commercial caravans pass¬

ing between Egypt and the Orient, and coasting vessels creeping along the waterfronts of south¬ ern and western Europe. But these exchanges were of

comparatively little value, and it was not until the introduction of the compass when men learned that the oceans were a highway and not a barrier to commerce that trade be¬ tween the great natural divisions and subdi¬ visions really began.

It is not surprising, then, to find that the international trade of the world in 1700 was but about $350,000,000, of which about $200,000,000 was conducted by Europe and the remainder by Asia and America. _ Great Britain was then, as she has been ever since, the leader of commerce, her trade amounting in 1700 to about $50,000,000 a year, Spain $40,000,000, France and the area which we now call Germany about $25,000,000 each, Spanish America and the East Indies $40,000,000 each, and the British colonies $10,- 000,000. By 1750 world commerce had doubled, amounting to about $750,000,000, and by 1800 it doubled again, reaching $1,500,000,000 at that date, these figures being a rough aggregate of the imports and exports of all the countries of the world at that time.

In the next half century, however, a series of events changed entirely the commercial movements of the world and greatly stimulated commerce, multiplying the interchanges and stimulating development and the producing powers of the hitherto undeveloped regions of the globe. In 1819 a little vessel of 300 tons, the Savannah , crossed the ocean from the United States to Great Britain by steam power, and gave to the astonished world a lesson in multi¬ plying the usefulness of the oceans in commerce, and at the same time reducing greatly the cost of interchange between the great natural di¬ visions. About the same time man learned to transport merchandise and people on land by the use of steam power, the railway. The result of these two great contributions to trans¬ portation and commerce was that in the year 1850 there were upon the oceans nearly a mil¬ lion tons of steam vessels and on land 25,000 miles of railways, and international commerce in that year was about $4,000,000,000, or nearly three times as much as in 1800.

From that time international trade grew by leaps and bounds. By 1870 it was $10,000,- 000,000, and by 1900 $20,000,000,000. Even this rapid increase, however, was outdone in the opening years of the present century, for in 1913, the year before the opening of the great European War, the international -trade of the world was $40,000,000,000, having actually doubled in the short period 1900-1913.

The causes of this rapid growth following the application of steam to transportation were the opening of new areas to population and production, a reduction in the cost of transportation by which many articles were added to the list of international exchanges, the increased facility of intercommunication by the mails, the telegraph, the telephone

and the wireless telegraphy, the increase of money and of banking power, and the development of great manufacturing systems, which supplied their products to all the world and took in ex¬ change the manufacturing material from all sections of the globe. Steam vessels on the ocean grew from 1,000,000 tons in 1850 to 30,000,000 in 1913; railways from 25,000 miles

to 700,000, and telegraphs and ocean cables from 5,000 miles to about 2,000,000. World currency enormously increased and the banking power of the world grew from $3,000,000,000 in 1850 to $65,000,000,000 in 1913. Meantime world population increased with extreme rapid¬ ity, the result of the opening of new areas to population and production; and with the trans¬ portation of plentiful food supplies from the new areas, world population which was but little more than 1,000,000,000 in 1850 grew to 1,600,000,000 in 1913, and the producing and purchasing power of each man greatly in¬ creased. North America, which had in 1800 but about 7,000,000 people had in 1900 about 140,000,000, and in many other areas the de¬ velopment of population and producing power was phenomenal.

With the increase of transportation there came a great reduction in the cost of moving merchandise between the continents and cli¬ matic sections. The wheat and corn and meats, and cotton and other manufacturing material of North America were transported to Europe and the manufactures of that continent sent in exchange ; the meats and wool and hides and grain of South America and Austra¬ lia crossed the equator to Europe, and were also paid for in manufactures ; and the tea and coffee and cacao and spices and sugar and fruits and manufacturing materials of the tropics were sent to the north temperate zone in great quantities, and paid for in the prod¬ ucts of the farms and factories of the temper¬ ate zones, upon which the tropics rely for their flour and meat as well as clothing and other manufactured articles.

The wonderful growth of the world's com¬ merce is pictured in tables presented herewith. One of these shows the total world trade and the trade of each grand division at 25-year in¬ tervals from 1800 to 1900, and also in 1913 and 1916, showing not only the total commerce at each period, but the population and the aver¬ age per capita commerce at each of the dates, both for the entire world and for each grand division. Another table shows the commerce of each of the principal countries of the world, imports and exports separately, at intervals from 1850 down to 1916, though in certain of the countries at war the commerce of 1916 can only be

estimated by reason of the absence of official figures. Care has been exercised in the preparation of these tables to include only the domestic exports of merchandise of the vari¬ ous countries, omitting the precious metals and the foreign merchandise re-exported, though in certain of the smaller and newer countries this has been impracticable.

An examination of these tables of imports and exports of the various countries will dis¬ close the fact that in many of the older coun¬ tries, notably those of Europe, the imports con¬ stantly exceed the exports, while in the newer countries exports are greater than imports. This excess of imports by the European coun¬ tries is due to the fact that they are compelled to draw upon other parts of the world for a large proportion of their food and manufac¬ turing material, and as they have little except manufactures to offer in exchange their im¬ ports in most cases exceed their exports, the difference being made up by the earnings of their steamships, the earnings of their capital

invested abroad, the profits upon the merchan¬ dise imported and re-exported. Many of the countries of Europe have, however, consider¬ able quantities of natural products to export, which is in some degree an offset to the general fact that manufactures are the chief exportable material of that part of the world. Great Britain, for example, exported prior to the European War large quantities of coal, which she sent to all parts of the world largely as ballast for her ships carrying the lighter products, manufactures, and scouring the world for foodstuffs and manufacturing material as the return cargo. Some of the coal she supplied the adjacent countries of Eu¬ rope, taking in exchange the beet sugar of Germany, Russia and Austria ; the iron of Spain and Sweden ; the lumber and timber and wood pulp of Norway, Sweden and Russia ; the copper of Spain, and the cork of Portugal, though much of this she paid for in certain manufactures. The imports of Eu¬ rope as a whole, as shown elsewhere, are nor¬ mally less than those of the exports, while in America, Africa and Oceania the exports ex¬ ceed the imports. In the case of the United States the exports have for many years ex¬ ceeded the imports by from $300,000,000 to $600,000,000 per annum, and in most of the South American countries and Australia the exports also exceed the imports, and this is also true of most of Africa. Tables presented here¬ with show the total imports and exports of the countries forming each continent, and also the excess of imports or exports, also the total imports and exports of certain principal coun¬ tries of the world for a series of years. It will be noted that the aggregate trade of the coun¬ tries of each grand division other than Europe shows larger exports than imports, while in Europe the imports exceed exports by $2,700, 000,000 in 1913, the latest normal year.

The table showing the imports and exports of the countries forming each continent and therefore the aggregate of the international commerce of the world shows for the year 1913, the latest normal year, $21,400,000,- 000 of imports and but $19,550,000,000 of exports, and indicates that the stated value of the world imports therefore exceeded that of exports by $1,850,000,000. When we reflect that all the exports necessarily become imports in some other part of the world (except any part which may have been lost en route) we might expect that the stated value of the imports would about equal that of the same articles when exported from the country of their pro¬ duction. But it is a fact that the stated total of imports is in most instances greater than the stated value of the same merchandise when ex¬ ported. It is not unusual for the grand totals of world imports to exceed the grand total of exports by about 10 per cent. This discrepancy between the stated value of the merchandise when exported and again imported is account¬ ed for in part by the value added by cost of transportation, and in part by the fact that the countries importing the merchandise are likely to give it a slightly higher valuation than did the countries from which it was originally ex¬ ported, by reason of the fact that much of the merchandise when imported pays an ad valorem rate of duty, and the authorities are on the alert to give to it as high a valuation as dr-

cumstanees will justify, while as few countries have an export tax the merchandise when ex¬ ported is not subjected to so close scrutiny in determining its full value. The suggestion that the cost of transportation is added to the valuation of the merchandise when imported, does not however apply to the United States, which, by law, accepts as the value of its imports the valuation declared before the United States consul when it is sent to the United States.

It will be seen from the above discussion of the valuation of the merchandise when leaving the country of exportation and again on enter¬ ing the country of importation that the value of the merchandise is stated both when it leaves the country of origin and again when imported, and that the real value of the mer¬ chandise forming the international commerce of the world is therefore but about one-half of the usual figures of <(world commerce.® Records of world international trade are formed by aggregating the imports and exports of all countries of the world, and while we can only determine the value of the trade of any given country by aggregating its imports and exports, it must be remembered that the aggregation of the imports and exports of all the countries of the world necessarily counts the merchandise twice, once when it leaves the country

of production as an export, and again when it enters some other country as an im¬ port, and that when we say that the interna¬ tional commerce of the world in 1913 was $40,000,000,000 we therefore mean that the value of the merchandise forming that trade was but about one-half that sum, or say $20,000,000,000, since its value was counted twice, once as it left the country of production as an export and again when it entered the country of its destination as an import.

The inter-continental trade of the world is much less than is usually supposed. Much of the trade of the various countries occurs with adjacent or neighboring countries, on the same continent. The trade of the United States with Canada, for example, which now amounts to over a billion dollars a year, is properly con¬ sidered international commerce, yet none of it leaves the continent, and our trade with all of the North American countries in 1917 was nearly $2,000,000,000. In fact, only 64 per cent of the imports of all the North American countries in 1913, the latest year of normal commercial interchanges, was drawn from

other continents, and only 67 per cent went to other continents. Thus about one-third of the international trade of the North American countries in 1913 was intra-continental, or trade within the continent, while about two-thirds was inter-continental, or trade with other con¬ tinents. During the war period, 1914 to 1918, with the lack of inter-continental transporta¬ tion, the proportion of the intra-continental trade increased. In the case of Europe the intra-continental trade formed in normal years a larger share of the total than wˆas the case with our own continent. Of the total imports by all the European countries in 1913, the latest year for which complete figures are avail¬ able, only 44 per cent were drawn from other continents, and of their exports only 36 per cent was sent to other continents, the remain¬ der in each case being intra-continental, or trade between the countries of Europe. Of the total international trade of the countries form¬ ing the continent of Europe, aggregating in 1913 in round terms $25,000,000,000, only $10,000,000,000 was with other continents, the other $15,000,000,000 being exchanges among the countries forming that continent. In the case of Asia the share of the international commerce which was intra-continental, or trade among the countries of that continent, was about 45 per cent and the share which was inter-continental was about 55 per cent. In South America, Africa and Oceania, where manufactures are the chief import and food and raw material the chief export, about 90 per cent of the trade is with other continents. Of the entire commerce of the world in 1913, the latest normal year, only 55 per cent oc¬ curred between the continents, the remaining 45 per cent being intra-continental, or trade between the countries of the continent of which they respectively formed a part, or in other words only a little more than one-half of the merchandise entering international trade leaves the continent in

which it was produced. In the years of the great European War, in which ocean transportation was difficult and costly the share of the world trade occurring between continents was below normal.

This fact, that only about one-half of the world's international trade ever leaves the con¬ tinent of its production, suggests a further in¬ quiry, as to the share of the total world's products which enter international trade and the share which is exchanged between conti-

International Commerce of the World, by Grand Divisions 1913

World Divisions

Imports of all countries of the continent

Exports of all countries of the continent

Total

imports

From other countries of the continent (intra-conti¬ nental)

From other continents (inter-conti¬ nental)

Total

exports

To other countries of the continent (intra-conti¬ nental)

To other continents (inter-conti¬ nental)

Europe .

North America .

South America .

Asia .

Africa .

Oceania .

Total, world .

Million

dollars

13,980

2,822

1,028

2,084

760

695

Million

dollars

7,826

1,027

74

990

65

47

Million

dollars

6,154

1,795

954

1,094

695

648

Million

dollars

11,280

3,273

1,158

2,107

997

805

Million

dollars

7,267

1 , 059

98

882

59

44

Million

dollars

4,013

2,214

1 ,060 1,225

938

761

21,369

10,029

11,340

19,620

9,409

10,211

384

nents. This, however, cannot yet be deter¬ mined for the entire world, or indeed for many of the countries, because of the fact that the facilities of measuring the value of all the products of the various countries are in most cases insufficient to render available accurate figures as to the total value of the produce and thus determine the share entering international or inter-continental commerce. In the case of the United States, however, it is estimated from official figures of the production of the various classes of articles, agricultural, manu¬ factures, mines, forests, fisheries, etc., that the value of the total products in 1913, the latest normal year, was about $40,000,000,000, of which a little more than 6 per cent was ex¬ ported, and of this but about two-thirds, or approximately 4 per cent of the total passed to other continents.

Attention has been called to the fact that a considerable part of the international commerce of the world is the interchange between the climatic sections, the temperate zones and the tropics. The strictly tropical sections now ex¬ port about $3,500,000,000 worth of merchan¬ dise annually, and import about an equal quan¬ tity, and most of this is inter-continental trade. Their chief exports are sugar, rice, coffee, tea, cacao, rubber, silk, cotton, jute, hemp, sisal, hides, gums, tobacco and fruits, and it happens that certain of the important minerals of the world, notably tin, nitrates and much of the gold, silver, lead and copper are also mined in that section. Practically all of these go to the north temperate zone. This tropical belt could produce and supply much more of these im¬ portant articles, all of which are demanded by the temperate zones for food and manufac¬ turing, if they had railroad facilities to bring their possible products to the water's edge, where the temperate zone countries gladly send their vessels to get whatever the tropics have to offer. Thus about $3,500,000,000 worth of the $20,000,000,000 worth of merchandise entering international trade is now produced in the tropical belt, and most of it sent to the tem¬ perate zones, a large part of that trade being inter-continental while nearly

all of this trop¬ ical production exported is paid for in the manufactures, breadstuffs and meats of the north temperate zone, and is thus chiefly inter¬ continental.

The remainder of the inter-continental trade, aside from that of the tropics is the inter¬ change of the foodstuffs and manufacturing material of the newly-developed areas for the manufactures of those which have great manu¬ facturing systems, Europe, the United States and Japan. The countries of the south tem¬ perate zone send their fresh meats in refriger¬ ating vessels across the equator to the mar¬ kets of Europe, where they arrive in perfect condition for consumption, also their wool and grains and hides and fibres and coffee and tea and sugar and fruits and metals, and most of these are received by the north temperate zone and paid for in manufactures, chiefly the prod¬ ucts of Europe and the United States, for prac¬ tically all the factory products of the world are produced in the north temperate zone, and chiefly in Europe, the United States and Japan. The total value of the manufactures produced by the factories of the world is nor¬ mally about $70,000,000,000 per annum, of

which approximately $7,000,000,000 or 10 per cents enters international trade, the other 90 per cent being consumed in the countries of pro¬ duction. Of this $7,000,000,000 worth of manu¬ factures entering the international trade of the world the United States, in normal years, sup¬ plies about $1,000,000,000 worth, though the great increase in our exports of manufactures under the stimulus of the war gives reason to hope that we may permanently retain a larger share of the world's trade in manufactures after a return to peace conditions.

INTERNATIONAL COMMERCE OF THE WORLD. BY GRAND DIVISIONS AND TOTAL

Year

Total

commerce,

million

dollars

Popula¬ tion, in millions

Per capita commerce

1800 .

Europe

$1,109

175

$6 34

1830 .

1,291

215

6 01

1850 .

2,812

269

10 45

1875 .

9,015

335

26 91

1900 .

13,170

408

32 93

1913 .

25,300

462

54 74

1916 .

(a)

465

(a)

N

1800 .

orth Americt

140

i

12

$11 67

1830 .

235

20

11 75

1850 .

387

33

11 43

1875 .

1,265

65

19 46

1900 .

3,210

119

26 97

1913 .

6,092

135

45 18

1916 .

8,100

138

58 66

St

1800 .

ntfh America

80

8

$10 00

1830 .

120

11

10 91

1850 .

298

19

14 27

1875 .

690

32

21 86

1900 .

1 ,011

48

21 07

1913 .

2,185

55

39 73

1916 .

2,010

57

35 44

1800 .

Asia

116

335

$0 38

1830 .

275

4-10

57

1850 .

428

619

79

1875 .

1,280

763

1 66

1900 .

1,634

802

2 14

1913 .

3,750

825

4 55

1916 .

3,840

828

4 59

1800 .

Africa

19

95

$0 20

1830 .

30

100

30

1850 .

64

107

59

1875 .

270

112

2 41

1900 .

560

120

4 66

1913 .

1,473

130

11 41

1916 .

1,500

132

11 39

1800 .

Oceania

14

15

$0 93

1830 .

20

20

1 00

1850 .

60

28

2 14

1875 .

240

35

6 86

1900 .

520

40

13 01

1913 .

1,500

45

32 89

1916 .

1.6C0

46

34 69

Grand Total of World International Commerce

1800 .

1,479

640

$2

31

1830 .

1,981

847

2

34

1850 .

4,049

1 ,075

2

93

1875 .

10,856

1,345

3

02

1900 .

20,105

1,543

13

07

1913 .

40,420

1,652

24

41

1916 .

(a)

1,677

(a)

(a) No figures are available for 1916 commerce of Central Powers of Europe. Totals and per capita for Europe and entire world cannot therefore be stated for 1916.

Note. — Figures are as far as possible those of imports for consumption and exports of domestic merchandise. In some cases, however, gold and silver are necessarily in¬ cluded with figures of commerce, notably in

earlier years in America and later years in Africa and Oceania. Early figures are estimates of Mulhall and Malte-Brun.

Oscar P. Austin,

Statistician, National City Bank of New York.

COMMERCIAL ASSOCIATIONS

385

COMMERCIAL ASSOCIATIONS. Early Organizations. — There were but few commercial associations in the United States before the Civil War. As a rule, only the larger cities possessed them. The functions of these organizations were scarcely more than to hold annual meetings to elect officers and to have occasional banquets where local politicians spoke. 'The strictly commercial organizations frequently aimed to maintain a produce ex¬ change and provide room-trading facilities in such staples as grain, cotton and tobacco. The larger of these associations compiled and pub¬ lished trade statistics in their annual reports. These early statistics are very interesting to the historian. The volumes of the New York Chamber of Commerce give statistics of the movement of freight by the Erie Canal. The Cincinnati reports chronicle the rise and fall of the Ohio River trade and give the figures for Western pork packing. The Saint Louis volumes contain an account of the lumber rafts of the Mississippi River, of the Galena lead trade, of the furs and gold brought down from the upper waters of the Missouri River, of the buffalo skins shipped East from the plains and of the merchandise which passed to the Southwest by wagon over the Santa Fe trail.

Trade Associations. — After the Civil War there began to be formed in various parts of the country organizations of men engaged in the same line of trade. The wagon makers united ; the window glass blowers got together ; the hotel keepers began to consider their prob¬ lems, etc. These various organizations, planned along trade lines, were local, state or national in scope. Among the important functions which they attempted were to standardize com¬ mercial usages, to exchange craft knowledge between the members and to control prices more or less directly. Some of these associa¬ tions have done good work. The Society for Testing Materials (an organization of pur¬ chasing agents) has formulated many scien¬ tifically complete buyers' specifications. The Association of Railway Master Mechanics called attention, some years ago, to the dearth of skilled mechanics,, and started the move¬ ment for apprenticeship courses and shop schools, which has accomplished so much in the hands of American railroads. Some of the trade associations have brought their members upon a more or less uniform plane of effi¬ ciency by prescribing a standard system of cost accounting suited to the industry. The majority of the associations formed along trade lines are of merchants. If an organization be of wholesalers it is very likely to plan trade¬ getting trips, to make special arrangements for buyers' weeks either by securing railway transportation of members at reduced rates or by giving free transportation to those who buy a specified amount of merchandise, and to organize a credit rating bureau. Organizations of retailers often make arrangement for style shows, draw up rules to prevent unprofitable advertising, operate a co-operative delivery system or establish a local credit bureau to identify delinquent debtors.

The Civic Basis of the Modern Move¬ ment. — The recent rapid growth of commer¬ cial associations in this country may be at¬ tributed to a revival of local civic life and to a new understanding of the basis of local busi- vol. 7 — 25

ness prosperity. The civic motive is about equal in importance with the economic one in the typical modern board of trade or chamber of commerce. There is coming to exist a more vivid civic consciousness. People now travel about so much that they get into the habit of appraising towns and cities as com¬ munities and of comparing them with their home town. Young businesses now look about more diligently for an advantageous location than was once the case, and less frequently grow up where the original idea happened to strike the founder. In other words, there is now a competition not only of individuals and firms but of neighborhoods for social, civic and economic prestige.

So long as the primitive communities had mud roads, oil lamps at the street corners, in¬ dividual wells in the back yards ; so long as locomotion was

on foot or on horseback and there was plenty of space between the struc¬ tures, the administration of local government was a routine affair. But when it became necessary to provide waterworks, grant fran¬ chises to a variety of public utility corpora¬ tions, undertake such matters as street paving and the cleaning and sprinkling of streets, erect expensive bridges, maintain an efficient fire department, administer a complicated building ordinance, provide parks and technical schools and consider comprehensive schemes of city planning, it began to be realized by business men that the administration of a city was very much like that of a large business. And so there came a demand for (

In relation to this demand commercial as¬ sociations have proved to be a convenient means for free and informal discussion. They have provided a centre where the progressive elements of the community could gather. They may be called the ((planning department® of the city government, to borrow a term from Sci¬ entific Management. y They are training schools for a new type of citizenship. This function has been defined by Pres. H. A. Gar¬ field of Williams College, in an address be¬ fore the Cleveland Chamber of Commerce as follows: (

The Economic Basis. — Membership com¬ mittees of commercial associations have often to deal with the man who says, ((How can I feel it in my business?® <(What is there in it for me?® This brings up a critical economic point, the answer to which is, in brief, that business has been rapidly changing in charac¬ ter, and changing in such a way as to produce a more intimate local solidarity in economic matters. Business units have grown larger, margins of profit have grown smaller, more care is needed in buying, delays in local traffic are more hurtful, competition for labor is ad-

vancing to a higher plane, a wider and more even market is demanded, more science is available and more is needed. Of the local solidarity of business let us select one phase only, — namely, that which pertains to the equipment of a place as a market. How does a city become a good buying and selling centre? Merchandising involves measurement of quan¬ tities (systems of weights and measures), meas¬ urement of qualities (systems of grades), means of protecting merchandise while it is being held (warehouses and warehousing law) and an adequate assortment for the buyer. A suffi¬ cient assortment can only be ensured for out- of-town trade buyers by a systematic survey of the merchandise requirements of the trib¬ utary territory. A market also requires fair prices. The formula for fair prices is to bring to bear upon each transaction all possible de¬ ments of supply and demand. This means to bring past and future supply and

demand to bear upon the present by providing adequate warehousing and cold storage. It means to bring to bear upon the market of one commod¬ ity the state of the market for other commod¬ ities which are either its raw materials or its manufactured derivatives ; a thing which can be done by having the converting or manufac¬ turing interests actively represented. It in¬ volves bringing the price of money to bear upon the price of goods by taking such steps as will interest the banks actively in commer¬ cial transactions and will make out of goods in storage an acceptable collateral for loans. It means, also, to bring different markets to bear promptly upon each other, by adequate market reports. A perfect market must have flexible credit for persons of ability and char¬ acter. It must have efficient local trucking. It requires prompt railway transportation, which means not only the presence of railways but proper rates, frequent train service, a mini¬ mum of delay, convenient package car accom¬ modations and a low percentage of loss and damage. A market is completed by an ade¬ quate information service of trade and general papers, and by a wide range of service indus¬ tries to facilitate each item of trading transac¬ tions. From this bare enumeration it can be seen that a market is a complex thing. A

large market is, indeed, about the most com¬ plex thing the mind of man has devised. Mar¬ kets, well organized and of high efficiency, are still rare in the United States. Such a market does not merely happen ; it does not grow*

like Topsy, nor emerge Phoenix-like from the fires of competitive hatred, nor blossom from the narrow stem of policy known as <(every man minding his own business.'^ It is the result of persevering joint effort. The eco¬ nomic activities of commercial associations can be scarcely more than suggested by means of a few illustrations. The Commercial Asso¬ ciation of Bridgeport (Conn.) maintains a trade school. At Grand Rapids vocational

guidance for boys over 15 years of age is

provided. The Lynchburg (Va.) Chamber of Commerce promoted a new hotel, and finally a municipal public market. Atlanta (Ga.) manages a buyer's' convention twice a year. The New Orleans Merchants' and Manufac¬ turers' Bureau publishes a Spanish magazine, Mercurio, twice a month; the Saint Louis Manufacturers' and Exporters' Association also

publishes a monthly journal in Spanish. The Galveston (Tex.) Commercial Association sent a party of merchants to Guatemala, Honduras, Costa Rica and Panama in 1913. The San Francisco Chamber of Commerce helped to found the Remedial Loan Association. The Spokane Chamber of Commerce has aided the North Pacific Fruit Distributors to organize. The Minneapolis Civic and Commercial Asso¬ ciation took a census of farmers' opinions on good roads. The Houston (Tex.) Chamber of Commerce maintains a

bureau which chron¬ icles all freight delays in and out of the city. Hannibal (Mo.) has a Commercial Club which bought a large tract of land between the tracks of three railways and sold it to new plants. A number of associations, including those of Davenport, Iowa, Williamsport, Pa., Rockford, Ill., Jackson, Mich., and Boston, Mass., have loaned credit to new business concerns. It is now estimated that there are over 3,000 paid secretaries of commercial associations in this country. In 1912, President Taft, through Secretary Nagel of the Department of Com¬ merce and Labor, invited the commercial or¬ ganizations of the country to attend a national conference. The result was the formation of the Chamber of Commerce of the United States. This organization serves as a means of formulating the opinion of the business men of the country upon such economic questions as require a certain national co-ordination in action, or which rise into the domain of prac¬ tical politics and require legislation or the attention of the administrative departments of government. The organ of this Chamber is The Nation's Business. See Chambers of Commerce.

Bibliography.— Brand, E. A., Commer¬ cial Organizations) (in Bulletin of United States Department of Commerce and Labor, Bureau of Manufactures, Agents' Series, No. 60, Washington 1912) ; Doonan, Geo. W., Com¬ mercial Organizations in Southern and West¬ ern Cities) (in Department of Commerce and Labor, Bureau of Foreign and Domestic Com¬ merce Bulletin, Special Agents' Series, No. 79, Washington 1914) ; Sturges, Kenneth, Amer¬ ican Chambers of Commerce) (New York 1915) ; Proceedings of the Conventions of the National Association of Commercial Or¬ ganization Secretaries (yearly since 1915) ; files of the American City, The National Mu¬ nicipal Review and of Town Development. As representative publications of individual or¬ ganizations there may be consulted Current Affairs, published by the Boston Chamber of Commerce, and Chicago Commerce, which is the organ of the Chicago Association of Com¬ merce.

Edward D. Jones,

Professor of Commerce and Industry, Univer¬ sity of Michigan.

COMMERCIAL BANKS AND DIS¬ COUNT HOUSES. See Banks and Bank¬ ing — World's Systems (Article 3).

COMMERCIAL COLLEGES. See Edu¬ cation, Commercial.

COMMERCIAL COURTS. Tribunals distinct from the ordinary civil courts, in some, countries are established in various com¬ mercial towns, or within 'certain districts, to settle disputes with regard to rights and obli-

gations between persons engaged in trade, with the assistance of experienced merchants, by a brief process, according to equitable prin¬ ciples,. The general introduction of tribunals of this sort began in the Middle Ages. The first was probably that established at Pisa, in the 11th century, and the basis of its decisions was the code of maritime laws of Pisa, con¬ firmed by Pope Gregory VII in 1075. At first the commercial tribunals were not so much courts established by government as arbiters of disputes, freely chosen by the merchants and confirmed by the governments. Under the name of commercial consuls such committees of arbitration were appointed in all the great commercial cities of Europe ; and in the course of time they really became tribunals of justice, and were, in part at least, administered by men of legal learning and experience. Pope Paul III confirmed the commercial consuls in Rome. Francis II in 1560 granted to the Parisian mer¬ chants particular arbiters for the adjustment of commercial disputes; and in 1563 was estab¬ lished the Parisian Court of Commerce, con¬ sisting of a judge and four consuls. The same thing soon followed in all the important com¬ mercial towns of France. In London Henry VII appointed particular commercial judges. The president of the commercial tribunal for the Hanse towns, established in 1447, bore the name of alderman. At Nuremberg, in 1621, a similar tribunal was instituted under the name of inspectors of the markets. The diets of the empire even called upon the German princes and commercial cities to follow this example, as the decrees of the empire in 1654 and 1668, and the decree of the Imperial Commission of 10 Oct. 1663, show. In many of these cities, as in Frankfort-on-the-Main, and in Leipzig, they were not so much independent authorities as delegates from the city councils. When commercial courts take cognizance particularly or solely of disputes relating to maritime affairs, they may be called courts of admiralty. Such a court was erected in Hamburg in 1623. The internal regulations of commercial courts commonly require that a part of the members, or at least the presidents, should be lawyers ; the rest are for the most part experienced mer¬ chants, who are better adapted than regular judges to give counsel on commercial affairs, with which they are more acquainted, and which very often are not to be reduced to simple principles of law, but are to be decided according to commercial practice. Their juris¬ diction commonly extends over all commercial disputes, matters of exchange, insurance, freight, bottomry, average, etc. ; and further, over bankrupts, the hiring of shops and stores, clerks and apprentices; the debts of those who receive goods from merchants upon credit; and all natives and foreigners who traffic in the place and are found there, all shipowners, contractors for transporting goods, brokers, factors, etc., are obliged to submit to their decisions. They do as much as possible by oral investigation ; and the intention of their institution is that they shall avoid the long and

formal process of other courts. But when the difficulty and confusion of the matters in dispute occasion the necessity of an investiga¬ tion in writing recourse is had thereto. The greater dispatch of these courts consists prin¬ cipally in this — that the defendant is orally

summoned, once or several times, to appear before them at an early day, and if he fails to come, he can be brought by force. The com¬ plaint is then made orally, both parties are heard and sentence is given, if possible, imme¬ diately after. But as this can seldom be done, and most cases require reference to written documents, a day not far distant is appointed for the answer to the complaint and for the evidence on both sides, and the time is seldom or never prolonged. The remedies against a sentence must be sought from the same judges and are not easily obtained. Appeals are only allowed in very important cases, and upon the deposit of a large sum as a pledge that the final decision shall be obeyed without delay. The principal features of this process form the basis of most commercial codes. From the sentence of these tribunals appeal is made to the court of appeal within whose jurisdiction they happen to be. The other countries where these tribunals exist are Belgium, Spain, Por¬ tugal and Italy. See Commercial Law; United States Commerce Court.

COMMERCIAL EDUCATION. See

Education, Commercial.

COMMERCIAL FERTILIZER. See

Agricultural Chemistry; Fertilizers.

COMMERCIAL GEOGRAPHY. Com¬ mercial geography is the study of the ex¬ changes of merchandise between the geographic sections of the world. Nature has greatly diversified the productions of the globe. Trop¬ ical growths for example differ in quality from those of the temperate zones and those of the mountain regions differ from those of the plains. Certain areas are especially fitted to produce foodstuffs, others manufacturing ma¬ terials and in still others, the circumstances of population, transportation and supplies of raw material and fuel have developed great manu¬ facturing industries. Commercial geography studies these conditions and notes the produc¬ tion ©f each area, and the interchanges present and possible. It is in fact a study of the geography of commerce.

The great improvement in facilities of transportation, communication and production which have characterized recent years, has stimulated the study of commercial geography. World international commerce has made its chief growth in the life time of the present generation. It was but $4,000,000,000 in 1850, $10,000,000,000 in 1870, $20,000,000,000 in 1900 and then jumped to $40,000,000,000 in 1913, the year preceding

the great European War, which disarranged the commerce of the entire world and especially that of the great European coun¬ tries, the world's largest importers and ex¬ porters. International trade quintupled in the half century, 1850 to 1900, and then doubled again in the 13 years 1900-13. The per capita of international commerce taking the entire world population, averaged in 1850 $4 per capita, in 1900 $13 per capita, and in 1913 $24 per capita.

This growth in international trade is, of course, very' unevenly divided among the vari¬ ous countries and geographical sections of the world. The United States for example doubled its sales to Europe from 1900 to 1915, and doubled its purchases from that continent from 1900 to 1914, and this is true in a general

way of its trade with Asia, Africa and South America. Equally striking is the fact that the United States' imports of tropical and sub¬ tropical products, including those from island possessions, grew from $335,000,000 in 1900 to $1,060,000,000 in 1916, having thus actually trebled in value in the short 16-year period, and this is a mere illustration of the grow¬ ing demand of the temperate zones upon the tropical world. The international trade of the United States averaged $15 per capita in 1850, and $43 per capita in 1913. The international trade of all the countries forming the continent of Europe averaged $10 per capita in 1850, and $54 in 1913; that of the countries of the North American continent averaged $11 per capita in 1850, and $45 in 1913; that of the countries forming the con¬ tinent of Asia 69 cents per capita in 1850, and $4.64 per capita in 1913. The contrast in com¬ mercial conditions in the different countries is illustrated by the fact that the commerce of China in 1916 averaged $1.63 per capita of its population, and that of japan, which lies just alongside $11.20 per capita in the same year. Commercial geography studies these currents and cross-currents of trade, and seeks to de¬ termine the underlying causes of the contrasts and changes which these studies disclose.

Nature divided the land area of the globe into two great land masses stretching from the Arctic regions of the north to the Antarctic at the south. Then she ˆcross-sectioned® these by climatic belts, thus multiplying the ex¬ changeable qualities of the products of their respective areas. America stretches in a con¬ tinuous land mass from above the Arctic circle at the north to within a comparatively short distance of the Antarctic circle at the south. The continent of Eurasia, which we improperly divide into Europe and Asia, stretches in a continuous land mass from above the Arctic circle well into the tropics, and then by one southern extension, Africa, extends well into the south temperate zone, while its easterif limb, the Malayan Peninsula, with the co-operation of the chain of islands extending to Australia, stretches well into the south temperate zone. These two great masses, America on the one hand and Eurasia with its southern extensions on the 'other, are separated by two great oceans, the Atlantic and Pacific, thousands of miles in width, while climatic conditions cross- section each into a half dozen distinct belts, Arctic and Antarctic, north temperate and

south temperate, tropical and sub-tropical.

Local conditions within the continents also affect production and producing possibilities. The great elevations which we call mountains and the tablelands adjacent to them lift their producing surfaces into temperatures radically different from those lying alongside on a lower level. Certain areas in tropical America for example, which lie a mile or two miles above the ocean level,- enjoy a temperate zone climate although distinctly within the area designated as the tropics, while the adjacent areas lying but a few feet above the ocean level swelter in the fiercest tropical heat and their respective products vary in like propor¬ tion. On the other hand, certain land masses in the far interior of the continents are so distant from the ocean that they receive little if any rain, for, as is well known, all the water

*which the land receives is carried to it by the currents of air which have obtained their moisture from the evaporation of the ocean. Air which has been so charged in passing over the ocean begins to lose its moisture in the form of mists, rain or snow as it passes over the land and is forced upward, and so may lose practically all of its moisture before reaching the far interior of the continent, espe¬ cially if it crosses high mountain ranges in its passage. As a result, we have the great desert areas in central and southwest Asia, North Africa, in the western part of the United States, the interior of Australia and certain sections of South America. Thus certain areas which lie within the tropics may have a tem¬ perate zone climate and certain *other countries in the temperate zone or tropics may be abso¬ lutely unproductive by lack of moisture, which is plentiful in the same latitude a few hun¬ dred miles away.*

Air currents and the currents of water which they have formed in the ocean have also a marked influence upon the productive con¬ ditions of the land, especially in the vicinity of the ocean. The <(trade winds® so-called or air currents moving from the north and south toward the equator to fill the partial vacuum caused by the upward movement of the in¬ tensely heated air of that region blow more and more toward the west as they approach the equator, by reason of the fact that the surface of the earth at that point is traveling toward the east more rapidly than that part over which they passed in their movement from the north or south. This continuous flow of air toward the west during untold ages has set up currents of water in the ocean over which it passes, which also move toward the west in the vicinity of the equator, and when these currents of water come in contact with the land of the continent, they are forced to the north or south as circumstances may dic¬ tate, and carrying the great masses of water heated by their long passage through the tropics affect, to a greater or less degree, the climate of the land masses with which they come in contact. The great northern equatorial cur¬ rent which flows west across the Pacific

Ocean from the Panama Canal to the Philippine Islands and the Asiatic coast is deflected northward along the eastern frontage of Asia and thence eastward to the northwest coast of North America, carrying some of the heat which it received in the tropics and materially modifying the climate of Japan and also that of the west coast of North America from Alaska to the southern part of the United States. Not only does it modify their climatic conditions but also gives to those areas much greater supplies of moisture than they would otherwise receive. The similar currents of air and water crossing the Atlantic Ocean just above the equator force the current of warm water through the Caribbean Sea and the Gulf of Mexico and thence northward along the east coast of the United States and across the north Atlantic forming the (

in their production and contribution to com¬ merce.

By these various conditions, the temperate and tropical climates, the differences of eleva¬ tion, and the modification of climate due to air and ocean currents, nature has greatly diversified the production of the earth's sur¬ face, while she has also by other processes distributed beneath the surface the minerals which man has learned to utilize in the manu¬ facturing industries and in transportation of the various natural products now so freely interchanged the world over. Within the last century man has learned to apply the power of steam and that of the waterfall in the form of electricity to the transportation of the great natural products of these various sections of the globe, and also to utilize these powers in transforming the natural products into the form required to make them useful to man. One hundred years ago there was not in all the world a steamship on the ocean or a mile of railway or telegraph on land. Now steam¬ ships seek their landing place at the frontage of every continent, and 700,000 miles of railway bring the products of the interior to the water's edge or receive that which the steamship has brought across the ocean and distribute it to . the interior. One hundred years ago the world had less than 800,000,000 people ; now it has over 1,600,000,000 with vastly greater produc¬ ing and consuming power per capita than those of a century ago, and their vastly greater com¬ merce, $40,000,000,000 per annum at the present time against $4,500,000,000 a century ago. Thus geography and geographic conditions, coupled with the power of transportation between the geographic sections and areas produce com¬ merce, and in studying commerce we must study the geographic conditions which bring it into existence.

The value of the merchandise forming in¬ ternational trade was in the

latest normal year, 1913, about $20,000,000,000 or one-half of the usual statement of $40,000,000,000, which is obtained by counting the merchandise when exported from the various countries of the world and counting it again when -it becomes an import in some other country. If we as¬ sume that the cost of transportation is about 5 per cent of the value of the merchandise transported we shall find that the world is paying $1,000,000,000 a year for mere car¬ riage of the merchandise which it exchanges between the countries or continents, while the profits, legitimate or otherwise, of the millions of middlemen who handle the products in the passage from producer to the consumer thousands of miles from the place of produc¬ tion, are of course several times as much as the mere cost of transportation. Yet the peo¬ ple of the world ungrumblingly pay these bil¬ lions of dollars every year for the sake of obtaining food, clothing, manufacturing ma¬ terial and manufactures accumulated from any and every part of the globe.

Trade between the climatic belts is very large irrespective of continental relationship. The tropical and sub-tropical areas of the world lie between the 30th parallel of north latitude which runs through New Orleans, Cairo and Shanghai and the 30th parallel of south latitude which falls a little north of Buenos Aires, Cape Town and Sydney, Aus¬

tralia. This tropical and sub-tropical belt around the world lying between the 30th parallel of north latitude and the 30th parallel of south latitude has one-half of the land area of the globe and half the world's population and it sells to the temperate zones at the north and south about $3,500,000,000 worth of its annual pro¬ ducts.

Attention is especially called to the fact that only about one-half of the international trade of the world crosses the oceans. The other half is merely exchanges of merchandise be¬ tween countries lying alongside each other or at least within the same 'Continent. For ex¬ ample, the trade between the United States and the other countries of North America is, in nor¬ mal years, one-third as much as that with all the other grand divisions of the world and the total interchanges of merchandise among the countries of North America are one-half as much as their trade with the other continents. In Europe, the interchanges among the coun¬ tries forming that continent are actually greater than their trade with all the other grand di¬ visions of the world. The aggregate of the imports of all the countries of Europe in 1913 was $14,000,000,000 and of this large total only $6,000,000,000 worth was drawn from other grand divisions, the remaining $8,000,000,000 being trade between the countries forming that continent; and of the $11,000,000,000 of ex¬ ports of all the European countries, only $4,000,000,000 passed ˆoverseas® or out of that grand division, Europe, the remainder being exchanges between the countries of

Europe and therefore intra-continental. The share of the aggregate trade of the European countries which occurs with other continents is about 40 per cent, in the case of Asia about 50 per cent, North America 66 per cent, South Amer¬ ica, Africa and Oceania 90 per cent. North America sells to the other grand divisions $2,250,000,000 worth of her products annually, and buys from the other continents $1,750,- 000,000 worth. South American exports to the other grand divisions are over $1,000,000,000 a year, and her purchases from them range about $750,000,000, and in exceptional years as much as $1,000,000,000. Asia sends $1,250,- 000,000 worth of merchandise to the other grand divisions, and takes from' them $1,000,- 000,000 worth of their products. Slightly more than one-half of the entire interna¬ tional trade of the world is intercontinental or exchanges between the continents or grand divisions, the remainder is intra-continental or exchanges between the countries of the con¬ tinent in which the merchandise originates.

What are the principal articles which form the exchanges between the great geographic and climatic divisions of the world? Food, manufacturing material and manufactures. Man must have food, he must have manufac¬ tures and therefore he must have manufacturing materials. The countries having a dense popu¬ lation produce less food than their own people require and must import the remainder. The countries having a sparse population produce more food than their own people require and can export the surplus. The country having the surplus is willing to sell its surplus to the country having the shortage, if the latter has something with which to pay for it, and it usually happens that the country which must

buy food has a surplus of manufactures to sell, and as the new and less densely populated countries are not manufacturers, they are will¬ ing to take manufactures in exchange for their surplus food. If it is not convenient to make the exchange by the direct process, the purchas¬ ing country pays for the foodstuff in cash and the selling country takes the cash and buys its manufactures from a more convenient market. The manufacturing countries must also have manufacturing materials, and these they draw largely from the tropical and sub-tropical world, and as the tropical people are not manu¬ facturers, they gladly accept manufactures in exchange for their natural products. They have also certain foodstuffs peculiar to the tropics, such as rice, sugar, coffee, cocoa, spices, fruits and nuts, which the temperate zone countries want and pay for in manufactures and in certain kinds of food which the tropics can not con¬ veniently produce, especially flour and meat. In studying these natural exchanges and inter¬ changes of commerce between climatic as well as continental sections, we therefore

develop the study of commercial geography.

What have the respective geographic divisions to offer to the other parts of the world, and what do they respectively take in exchange? Europe has a population of 465,000,000 and an average of 120 persons per square mile; Asia, 80 per square mile; North America, 16 per square mile; Africa, 12 per square mile; South America, 7 per square mile, and Australia, 5 per square mile. Not only is the population of Europe much more dense than that of any other continent, but its people are much larger con¬ sumers per capita than those of certain other continents, notably Asia and Africa. So, it is quite apparent that Europe, densely populated as she is and having a population with a large consuming power, must draw large quantities of food from other parts of the world. That continent is also the largest manufacturer of the world, and with its dense population and closely occupied acres must draw much of its manufacturing materials from the other grand divisions. Europe as a whole produces in normal years about $45,000,000,000 worth of manufactures per annum out of a world total of about $80,000,000,000 of fac¬ tory products, and supplies about $7,000,- 000,000 out of the $8,000,000,000 worth of manufactures entering international trade. For the food and manufacturing material which she requires, she draws chiefly upon North and South America, Australia and South Africa, and pays in manufactures and in the earnings of her ships and invested capital. North Amer¬ ica, with a population of but 16 per square mile, has more of food and certain classes of manufacturing material than she requires ; and although the United States is a large manu¬ facturer and supplies nearly a half billion dol¬ lars worth of manufactures to her neighbors, the continent as a whole takes nearly a billion dollars worth of manufactures from Europe. South America, with a population of but seven per square mile, has a billion dollars worth of food and manufacturing material to spare an¬ nually, and Europe gladly takes most of it and pays for it with a half billion dollars worth of manufactures and the remainder in the serv¬ ices of her shipping and the earnings of her invested capital in that continent. This does

not mean that all of the merchandise of South America goes to Europe, for parts of its wool and rubber and coffee go to North America, especially the United States. In Asia, with a population of 80 per square mile, the exportable surplus is small, and consists chiefly of silk, fibres, rubber, tea, coffee, tin, and certain other minerals, and for these she takes manufactures, chiefly from Europe, but in smaller quantities from the United States. In Africa and Oceania, the chief surplus is in tropical products and precious metals, though Australia and New Zealand supply large quantities of wool, meats and wheat, and all of Africa and Oceania take manufactures chiefly from Europe in exchange for the natural products above noted.

The tropical and sub-tropical world, while not a continent or grand division in the ordi¬ nary sense of the term, is in fact, a climatic division — a broad belt stretching around the world between the 30th parallel of north and south latitude already described. It supplies to the world about $3,500,000,000 worth of its prod¬ ucts per annum, chiefly fibres, hides, rubber, coffee, tea, sugar and fruits, and takes manu¬ factures in exchange, chiefly from Europe, but in limited quantities from the United States. Practically all of the surplus of the tropics is consumed in the temperate zone — chiefly in the . United States and the manufacturing countries of Europe. The imports of tropical and sub¬ tropical products by the United States, includ¬ ing those from island possessions, increased from $335,000,000 in 1900 to over $1,000,000,000 in 1916.

While it is not practicable to indicate in the limits of a discussion of this character the exact commercial relation of the various countries of the world to the various geographical sections, the broad extent of distribution, especially by the great industrial countries, is illustrated by the fact that the United States draws certain of its imports, especially manufacturing ma¬ terials, from more than 75 different geographi¬ cal or political divisions of the globe — con¬ tinents, islands or countries and colonies, — and sends certain of its products to more than 100 geographical and political divisions, extending to every part of the world.

Oscar P. Austin,

Statistician, National City Bank of New York.

COMMERCIAL LAW. This term is

rather loosely applied to a body of laws of the greatest diversity in their origin and character, but which have this in common, that they have arisen out of the usages of merchants and that the legislation and judicial pronouncements thereon have taken note of and embodied these usages. There is no better way of indicating what Commercial Law, or the Law Merchant, is than to enumerate the chief topics which it comprises. These are : Agency, arbitration and award, auctioneers, bailments, bankruptcy, common carriers, composition with creditors, corporations, factors and brokers, guaranty and suretyship, insurance, monopolies and restraints of trade, negotiable instruments, partnerships, patents, sales, trade-marks and warehousemen. The classification of Commercial Law here given is in substantial accord with that adopted in the French (Code de Commerce) and in the German 'Handelsrecht' although the French codification is more inclusive ami

covers also the whole field of maritime law. The Law Merchant was regarded a distinct department of the common law and the word <(trader® had once a technical meaning in Eng¬ lish jurisprudence, being defined as ((a person subject to the lex mercatoria .® Inferentially therefore, persons not traders were not subject to this law, and in the provisions of the Eng¬ lish and American bankruptcy acts, limiting their applicability to merchants and traders, one may see a survival of the distinctiveness above re¬ ferred to. The Law Merchant, however, was not an outgrowth of the unaided Anglo-Saxon genius. Commercial law was well developed among the civilized nations, which lived and flourished in Mesopotamia and the Euphrates delta from a period prior to 4000 b.c., and the Jewish bankers of Babylon and Nineveh had learned to deal in foreign exchange, their primitive drafts being inscribed in cuneiform letters on clay tablets. The commercial usages of remote antiquity, assimilated and added to by the Romans, were preserved by Venice and other trading communities of the Mediterra¬ nean during the period of the Middle Ages. A goodly part of the Law Merchant was ab¬ sorbed into the common law of England directly from the Roman Corpus Juris, while some of it came indirectly, through the admi¬ ralty courts. It goes without saying, however, that a nation so active in world-embracing trade as the English would develop a mass of mer¬ cantile usages and of interpretive apd regula¬ tive law on a subject of such momentous interest to it. And the statement that the Eng¬ lish-speaking peoples, including the people of the United States, have made larger contribu¬ tion to the body of commercial law during the past century and a half than all the rest of the world has contributed in half a millennium, is an indisputable fact.

One of the most original contributions of the Anglo-Saxon genius to the instrumentalities of commerce is the (

transporting and insuring the same while in transit ; also any demurrage charges accruing through failure of the consignee promptly to accept the goods shipped and take them off the carrier's hands A common carrier may not discriminate between shippers in the render¬ ing of services, nor in his charges for the same ; he must receive and carry freight offered to the extent of his facilities, and may be compelled to increase facilities when the same are inade¬ quate to the traffic. A bill of lading issued by a common carrier becomes an instrument of credit, acceptable as collateral and entitling the holder to the possession of the property billed on payment of transportation charges. The rights and obligations of warehousemen con¬ stitute important elements of commercial law. When a consignee unreasonably delays accept¬ ance of goods shipped to him the common car¬ rier is authorized to place them in storage, to be held subject to the carrier's lien and such fur¬ ther charges as may accrue in caring for and

insuring the same. In many cases the ware¬ house, or some of the modern developments thereof, for example, cold storage and bonded warehouses, grain elevators and coal ports, are the intended destination of shipments ab initio. A warehouse receipt, unless it be specifically stipulated to the contrary on the face of the same, is a negotiable instrument.

The four main forms of commercial paper are the bill of exchange and its derivative the bank check, the promissory note and its deriva¬ tive the bank note, the bill of lading and the warehouse receipt. Local usages have caused slight divergences in the law of negotiable instruments in the various States of the Union and other political subdivisions of the English- speaking world. Thanks to the efforts of the American Bar Association in propounding uni¬ form State laws on this and related subjects, the inconveniences resulting from diversity are in the way of being remedied. From the latest Report of the proceedings of the Association (1917) it appears that the uniform Negotiable Instruments Act has become a law in 46 States (Georgia and Texas being the exceptions) as well as in the territories of Alaska and Hawaii, the District of Columbia and the Phil¬ ippine Islands; the uniform Warehouse Re¬ ceipts Act has been accepted by 39 States, and the Bills of Lading Act by 20 States.

The greatest addition made to commercial law at one stroke by judicial authority was the statement of the law of Bailments by Lord Holt in the celebrated case of Coggs vs. Ber¬ nard, which is reported in 2 Ld. Raymond, page 909. What a large block of law this is will appear from a consideration of the fact that carriers, depositories (including banks), factors and brokers, innkeepers, pledgees, warehouse¬ men and all other persons who borrow, hire or receive goods and chattels for selling, transport¬ ing or safekeeping, or for performing some work on or with the same, are bailees with respect to the property thus put into or left in their possession. The commission merchant who receives a consignment of goods to sell is a bailee, so is a banker who receives a note for collection ; so is one who hires a team by the hour, day or week and, also, the tradesman who makes <(pants® for Agents® from their own cloth or makes furs for ladies <(from their own skins.® The word bailment is derived from the

r – – ••*

Norman French, bailler, to deliver. Whatever is delivered by the owner to another person, in any of the ways or for any of the purposes above indicated, is bailed to him ; and the law of Bailments comprises the rules and usages whereby the rights and duties of the parties in relation to the

property and to each other are determined. Justice Holt, however, borrowed most of his principles, perhaps all of them, from the (Institutes> of Justinian and the (Corpus Juris Civilis. }

Under the subhead Arbitration and Award are embraced the rules of law and usages whereby merchants may obtain decisions of controversies between themselves without re¬ sort to the regular courts of law. An arbitrator is appointed by the parties on each side of the controversy and the two arbitrators select an umpire ; whereupon the tribunal thus consti¬ tuted proceeds with the hearing of evidence and the making of an award. The proceedings are informal and, while nobody can be compelled to arbitrate, when the parties have once sub¬ mitted a case the submission is irrevocable, and the award made is enforcible just the same as is the judgment of a court of law. Some com¬ mercial exchanges, under special legislative authority, maintain courts of arbitration, pre¬ sided over by permanent judges, who act either alone or as umpires in association with arbi¬ trators appointed by the parties. Latterly efforts have been made to extend this method of adjudicating disputes among merchants in¬ ternationally, and notable progress has been made toward an agreement between the Cham¬ ber of Commerce of the United States and the corresponding Argentine body at Buenos Aires. Composition with creditors is a common law method for the discharge of an insolvent debtor from his obligations. Usually the composition is preceded by an assignment of the debtor's property for the benefit of all of his creditors, with the object of preventing any creditor from obtaining a preference. All of the creditors must agree to the composition and the terms of settlement must be equal for all. If a single creditor, no matter how small his claim, refuses to sign the composition deed, or if by secret arrangement any discrimination whatsoever be made in favor of one or more creditors, the settlement is a nullity. To all intents and pur¬ poses compositions with creditors have been superseded by proceedings in bankruptcy (q.v.). Originally the law terms guaranty and war¬ ranty were of identical meaning. In time, however, ˆwarranty® became employed exclu¬ sively as a term of assurance of the title, quality or quantity of a thing sold. Guaranty is an undertaking on the part of the guarantor to pay the debt or perform the obligation of another in the event of the latter making de¬ fault. A guaranty, generally speaking, is not negotiable; nor is it transferable in such a way as to enable anybody except the party with whom the contract was originally made to maintain an action thereon. Regarding marine insurance as a subdivision of maritime law, the form of indemnity contract with which commercial law is chiefly concerned is fire in¬ surance. This kind of insurance is sometimes made to indemnify against loss by fire of ships in port; more often this form of insurance is made to cover warehouses and mercantile prop¬ erty therein contained, or goods and chattels

in stores and factories. The general principles of the law of contracts will answer most ques¬ tions raised by fire insurance policies; but the analogies with marine insurance are many. A debtor, however, may insure his life for the benefit of his creditor. The law of agency rests on two fundamental principles: (1) The agent is a mere instrument, though a living and in¬ telligent one; for, whether a man signs his name with a pen which he takes from the table, or by another man whom he requests or author¬ izes to sign for him, in either case the act is that of the principal; (2) as between^ the prin¬ cipal and a third party, the former is respon¬ sible for all the acts of the agent, if there was colorable reason for the belief of the third party that he was dealing with a principal or that the agent was duly authorized. Like the law of agency, the law of partnership and its modern outgrowths, the law of joint-stock associations and of corporations, are subjects too large for cursory treatment under the gen¬ eral head of commercial law. The modern law against monopolies and restraints of trade, though the same has become the subject of voluminous statutory regulations and judicial opinions, is a mere amplification of a few prin¬ ciples of the common law on the subject. The epochal opinion of Chief Justice White in the Standard Oil case was little more than a re¬ statement of old and familiar legal maxims embodying commercial usages. The codifica¬ tion of the law of sales has been accomplished in England, but the Sales Act submitted to the National Conferences of the Commissioners on Uniform State Laws has, thus far, been ratified by only 18 States and Alaska Territory. The two controlling principles of the law of sales are: (1) That, where goods are sold by sample or according to description, there is an implied warranty that they correspond to the sample or description; (2) that in the absence of an express warranty the purchaser, having an opportunity to examine the goods, must be on his guard against defects.

In default of codification the Commercial Law as it exists in the United States must be sought under the titles of the subjects which it comprises. Even such a codification would be of little service to layman inexpert in the interpretation and construction of statutes. The hodge-podges published under .such names as (Business Laws) or (Every Man his own Lawyer) are to be shunned as traps for the unwary. The saying that ((a man who is his own lawyer has a fool for a client® is as true as ever. There are no short cuts to a knowl¬ edge of the law any more than there are to the knowledge of other sciences. Consult Parsons' (On Contracts (9th ed., 1909) or any other of the standard textbooks used by law students, which fairly cover the ground. An excellent English work is Smith, John William, Mer¬ cantile Law* (11th ed., London 1905).*

Stephen Pfeil.

COMMERCIAL LIFE INSURANCE.

The primary purpose of life insurance is the protection of domestic relations. Obviously the proceeds of a life policy may serve at the same time to protect the insured's business interests when these are unexpectedly deprived of his directing hand and brain ; but in recent years the agency of life insurance has been more

directly and broadly applied to commercial af¬ fairs. After providing suitably for the family bv means of a policy made in their favor, an individual may provide guaranty for business credit beyond his tangible assets by means of a policy made payable to his estate; and co¬ partners may provide against untoward dis¬ turbance of their joint capital and prospects by policies made in favor of the firm or of each other; while corporations may provide against loss through the untimely removal of ex¬ perienced executive heads or of peculiar and essential talent by means of policies covering the lives of those on whom the company's prospects for the time depend. Owing to the immense development to-day of combined commercial interests and the consequent weight of responsibility resting on single lives, insurance running often to hundreds of thou¬ sands of dollars, and in some cases to millions, is now placed to safeguard the financial sta¬ bility of corporate concerns or to indemnify them in case of the loss of service difficult or impossible to replace. The simpler business organization of a generation past called not often for such protection, but such is the pe¬ culiar genius, talent or experience involved to¬ day in many large enterprises that untoward removals in their personnel would cause serious if not irretrievable loss. Thus, on the one hand, commercial life insurance serves to aid in the development and stability of business by afford¬ ing an additional guaranty for credit or for emergency loans, and on the other hand con¬ serves business interests that might otherwise suffer from the loss of lives essential to their prosperity. The prediction is ventured by an authority that the life insurance policy will soon be an integral part of every considerable business arrangement. All the common forms of life policy are in use for commercial pur¬ poses, and the premium is considered an expense charge.

COMMERCIAL PAPER. A general name for checks, drafts, notes, bills of lading, bills of exchange, warehouse receipts, treasury warrants, orders for delivery of goods, certifi¬ cates of stocks and bonds and sometimes loosely applied also to contracts and agree¬ ments. The term is intended to cover all that class of documents which arc used commer¬ cially in place of money, and is therefore some¬ times restricted to checks, drafts and notes.

Checks. — A check is an order on a bank, trust company or broker

connected with a clearing house, calling for the payment of a specified amount of cash, from the funds of the maker on deposit, made to the order of some one named, or to <(Cash® or ((Bearer.® It is frequently numbered, and written on a printed form blank, which may be on paper with a printed tint to prevent erasures. It is usually filled in with ink, and often the figures are also punched out of the paper or embossed so as to prevent alteration. It is good, how¬ ever, if written in lead pencil, on any sort of paper. Its payment depends on the bank official's recognition of the signature, or his knowledge of and confidence in the party pre¬ senting the check for payment. Business houses seldom cash their checks, but deposit them as received, and draw their own checks for the payment of their bills. The check

after payment is punched or canceled and eventually returned to the signer or maker, who thus secures a receipt which is positive evidence of the payment of the sum named, as the party receiving a check has to put his name on the back before it will be cashed or credited to his account. A check is payable whether dated or not, but if dated ahead is not payable until the date stated. To give a check dated ahead is sometimes necessary for a conditional transaction, but it is an improper proceeding unless the cash is in the bank. When a bank is asked to certify a check, it will do so, if the funds are there to the credit of the maker, and it then becomes primarily liable, and the sum no longer remains to the credit of the signer of the check. Checks are usually printed in quantities in blank and bound in books with stubs, on which may be kept a record of the transactions. Banks have to pay all the checks they handle or make themselves liable for them ; but they turn the checks over daily to a clearing house, which figures out the balances due to or receivable from each bank, and settles only the balances in cash. This system relieves each bank of the immense detail of collecting each individual check.

Drafts. — A draft is very similar in form to a check, but it is an order from one bank to another bank to pay a sum stated to the party in whose favor it is made. A small merchant in a small town, who is not known, desiring to send a payment to a large city house and secure immediate shipment of the goods he orders, gets from his local bank a draft on a city bank, and uses this instead of his own check. The city merchant receiving such draft can cash it at once, knows that it is good, and has no hesitation in shipping the goods. A sight draft is an order drawn by a party to whom money is due, for the payment of money by another party at a bank named, and sent through the bank for collection. If the party to whom it is addressed through the bank pays it, it is said to be accepted.

Bills of Lading, etc. — A bill of lading or a warehouse receipt is a receipt from a trans¬ portation company or warehouse showing that the goods

specified have been delivered to them. Such bills are often commercially important, being frequently used as a basis for borrowing money. Wholesale merchants sometimes handle goods vastly in excess of their capital, but through borrowing on such receipts secure funds for transacting a large business.

Notes. — A promissory note is a promise to pay a specified sum on demand or at a future date. (See Promissory Note). The sigiler of a note, draft or check is the drawer or maker. The one to whom payment is to be made is the payee. One who signs on the back is an en¬ dorser, and he thus guarantees the payment. To hold an endorser liable for the non-payment of a check or note, he must receive prompt notice. There may be several endorsers. A release by the holder of a note to one endorser releases all other endorsers.

Money Orders, etc. — In the United States these are issued at nearly all post-offices by the postmaster for amounts up to $100, on payment of a fee of 3 cents for $2.50 or less and up to 30 cents. They are payable at the post-office named or can be banked for collection for $100.

Express orders are also issued by express com¬ panies for moderate amounts and are payable at any office of the company, or can be banked like ordinary checks.

Certificates of stocks and bonds that have recognized value may be deposited with banks as collateral security for loans. See Nego¬ tiable Paper; Banks and Banking (Article

17).

COMMERCIAL POTASH. See Potash, Commercial.

COMMERCIAL REVOLUTION AND DEMOCRACY. See Democracy, History of.

COMMERCIAL TERMS. The following list is practically a short dictionary of the terms used in commercial or business life. As it is manifestly impossible to include all the terms applied in this relation, care has been taken as far as possible to omit those that may be ordinarily regarded as self-explanatory. Some of the more important terms are defined more fully under their respective headings.

Abandonment. — Used in the customs when an importer abandons his property to avoid paying duties upon it. Abatement. — A creditor's

voluntary reduction of his claim. Abbrochment. — The act of controlling the market by monopolizing goods.

Acceptance. — An engagement to meet a draft or bill of ex¬ change. To make it legally correct the person against whom the bill is drawn must write his name across its face. Sometimes the word "Accepted" written above the name, is also insisted upon. An acceptance is " clean " when no qualification is affixed and "qualified" when some modification accompanies the signature.

Acceptor Supra Protest. — A person who, while not a party to a bill of exchange which has been protested, engages to pay it if the drawee does not.

Accessory Contract. — An engagement made to secure the observance of a prior contract; sometimes by the same parties; sometimes by others, as in the case of surety¬ ship, etc.,

Accessory Obligation. — An obligation that is subordinate to another obligation, as when a mortgage is made to secure the payment of a bond.

Accommodation. — A term usually used to denote pecuniary aid in time of emergency.

Accommodation Bill. — A note, or bill of exchange, not founded upon a prior debt, but endorsed by one or more responsible parties that others may obtain credit on it. Account. — (a) A record of money transactions, as with a bank; (b) in business, the statement of debits and credits, with balance on hand, or due; (e) on the stock-exchange, a transaction to be settled on the regular settling-day. Account Current. — A detailed account of business dealings still continuing between specified parties. Sometimes called an open account.

Account Sales. — An account rendered by a broker or commission merchant to his principal, specifying the goods sold, prices obtained and the net result after the deduction of commissions, expenses, etc.

Accountable Receipt. — The form of receipt given when the money or goods received are to be accounted for. Accrued Dividend. — The proportion of dividend not yet due, computed to a date prior to the time set for payment, or the elapsed time since the last previous payment. Accrued Interest. — The amount of interest not yet due computed to a date prior to the date of payment. AccmvHJLATED Dividend or Interest. — Dividend or interest past due and unpaid.

Acquittance. — An acknowledgment in writing that a debt has been paid.

Active. — A term used to denote brisk, or lively trading, as: an active

market.

Adulteration. — The act of debasing goods by admixture with other substances. When performed to meet the tastes and demands of the public it is called "conventional" adulteration; when done with intent to deceive it is "fraudulent" adulteration; when through carelessness it is known as "accidental" adulteration .

Ad Valorem. — According to value. Usually applied to duties levied by the customs.

Advantage. — Another term for usury; (b) the thirteenth article added to make what is commonly known as the baker's dozen.

Advices. — A notification respecting mercantile transactions especially in the dispatching of goods.

Affreightment. — • The act of hiring a ship in which to transport goods.

Against. — Used in commerce in reference to a balance, as when an exporter draws against the merchandise he has shipped.

All-Around Price. — A price which includes all charges and costs.

Allocation. — Allotment, as of stock or bonds to bidders.

Allonge. — Sometimes called a rider. A paper attached to a note, or bill of exchange to receive endorsements for which there may be no room on the back of the bill.-

Allotment. — The act of dividing a ship's cargo into separate portions that they may be assigned by lot to different purchasers.

Allotment Certificate. — The memorandum issued to an applicant for stock, showing the number of shares alloted, etc., as well as the dates on which the payments are to be made.

Alongside. — Delivery of goods at the side of the vessel on which they are to be loaded.

Amortization. — A term used chiefly to denote the extinc¬ tion of a debt by a sinking fund.

Appraisement. — Chiefly used to denote the value placed upon special articles by disinterested person.

Appreciation. — An increase in the value of property — as of real estate.

Arbitrage. — A branch of the stock exchange business, its transactions being based upon the temporary difference in the price of securities in two markets, the purchases being made in the cheaper, the sales simultaneously in the dearer market. As applied to exchange it is called arbitration.

Articles of Association. — The document containing the internal regulations of an incorporated company with all the laws by which its affairs are conducted.

Assessment. — Used on the stock exchange to denote the sum charged against stockholders to pay debts of a corporation.

Assets. — The entire property, both real and personal, that may be devoted to paying the debts of the person, estate or corporation.

Assignment. — The transfer of title or interest in property; chiefly used when the transfer is made for the benefit of creditors. The term is applied both to the action and to the document making said transfer.

Attachment. — A legal process directing that the person or estate of a person be taken and held by an officer of the court to secure a debt, or demand, etc.

Audit. — Official verification of accounts and claims made to prevent fraud on the part of the person keeping the books.

Average. — (1) As applied to a series of accounts, the date at which the whole sum due may be regarded as payable; (2) The charges, over and above freight charges, paid to the master of a ship for his personal attention to the care of the goods. The small charges paid by the master for pilotage, towage, etc., are specified as "petty average."

Average Adjuster. — When a loss is to be divided between several interested parties the expert accountant who ascertains and states the sum to be paid by each person is called the average-adjuster, or average-stater.

Back Spread. — An arbitrage in which the price in either market is less than the price in the other plus the trans¬ portation charges.

Balance. — The sum required to equalize the debit and credit sides of an account. _ If added to the debit side it is a credit balance, and vice-versa.

Balance of Trade. — The difference shown between the total value of a country's annual exports and imports.

Balance Sheet. — A condensed statement showing the finan¬ cial condition of a business.

Bank Bill or Bank Draft. — A bill or note drawn by one bank upon another and payable according to specifications.

Bank Credit. — An arrangement by which, upon the giving of proper security, a person is permitted to draw to a specified extent upon the bank's funds.

Bank Note. — A promissory note by which the bank of issue agrees to pay its face value to bearer on demand. In the United States and Canada, where these notes are issued only by banks authorized by law, such paper passes as currency.

Bank Rate. — The rate of discount established by the banks. The term is used generally in reference to the rate established in foreign countries by the government banks.

Bankrupt. — A person who, having become insolvent, or unable to pay his debts in full, is adjudged a' bankrupt by the court, either upon his own application or on that of his creditors.

Bar. — Commercially a bar is an ingot, or lump of gold or silver, run in a mold, but still unwrought.

Bear. — In the stock exchange the term denotes a person who sells stocks or shares that he does not possess for future delivery in the expectation that he will be able to buy them, in the meantime, at a lower price.

Bear Market. — A condition of the stock market in which prices are tending downward.

Bill. — A written statement of goods delivered or services rendered with the amount of money charged for the same.

Bill-book. — A book in which the merchant keeps the detailed record of promissory notes, bills of exchange, etc

Bill of Adventure. — A document by which a master or ship-owner shows that the goods shipped on a vessel are at the venture of another person, he Joeing responsible only for their delivery.

Bill or Letter of Credit. — A letter requesting that credit in goods or money be given to the bearer.

Bill of Entry. — A written statement of goods entered at the custom-house.

Bill of Exchange. — A written order to pay on demand, or at some

specified time, a certain sum of money to a specified person, or his order; usually in foreign commercial dealings.

Bill of Health. — An official certificate showing the condi¬ tion of a ship's company at the time of her clearing port. Such bills are termed "clean," "suspected," or "foul," according to conditions prevailing, both on the ship and at the place from which she cleared.

Bill of Lading. — A receipt for goods delivered to a common carrier for transportation. Usually applied to goods delivered to a railroad or on board ship.

Bill of Sale. — A contract by which an absolute or condi¬ tional transfer of goods is made; often given as a security for debt.

Bill of Sight. — A custom-house entry which permits the importer to inspect goods before they are officially accepted.

Bill of Stores. — A license granted by customs officials by which merchant vessels are permitted to carry stores and provisions for their voyage free of duty.

Bill of Sufferance. — A license authorizing coasting vessels to trade from port to port without the payment of customs duties. Under such license all goods must be loaded and landed at sufferance wharfs.

Bills Payable and Receivable. — Bill of exchange, prom¬ issory note or other commercial paper. The person who is to pay it terms it a "bill payable," the person who is to be paid holds it as a "bill receivable."

Blank Endorsement. — An endorsement without direction as to whom the funds are to be paid: the bearer then becomes the owner.

Blind Pool. — A fund contributed by several persons and placed in the hands of one for secret investment.

Blotter.— Called also the day-book: the running record of a business.

Boarding-officer. — A custom-house official whose duty it is to board ships upon their arrival, to examine papers and prevent smuggling.

Bond. — (a) An instrument by which the maker binds himself to perform a specified act; (b) a surety; (c) goods or merchandise left in charge of custom-house or excise officers.

Bonded Debt. — An obligation contracted under and secured by a bond.

Bonded Warehouse. — Often called "public" or "bonded stores." A building in which goods or merchandise is stored pending the payment of

customs duties or excise tax.

Bonus. — (a) A premium for a loan; (b) an extra-dividend or allowance paid out of accumulated profits; (c) an hono¬ rarium, or extra' sum paid voluntarily as a reward for successful efforts or as a stimulus to extra exertions.

Book-account. — In double-entry bookkeeping, an account showing transactions in some particular commodity, without reference to the individual with whom they may have been effected.

Book Value. — The value of stock as based on the records of the company as distinguished from the market price.

Booth age. — The sum charged for the right to erect booths at fairs or in market places.

Bottomry. — The mortgage of a vessel to secure a loan.

Bought and Sold Notes. — Contracts issued between brokers at the conclusion of arrangements for sales or purchases. Also called "Contract notes."

Bounty. — A premium or reward offered by a government to encourage some particular branch of industry.

Bourse. — The name applied to the stock exchanges, or money markets of Continental Europe.

Broker. — The middleman who negotiates the purchase or sale of stocks, commodities, etc., for others, accepting a commission, called "brokerage," in return for his efforts. There are many classes of brokers, the following being examples: Bill-brokers, insurance brokers, cotton brokers, stock exchange brokers, curb brokers, ship brokers, etc.

Broker's Note. — A voucher containing the particulars of a transaction delivered by a broker to his principal.

Bucket Shop. — While nominally established for the conduct of a stock exchange business, the fact that there are neither transfers nor deliveries of the stocks or commodities dealt in has led the courts to determine that its transactions are nothing more than gambling wagers.

Bull. — On the stock exchange, one who purchases stock for future delivery, expecting to sell at a higher price before the time of settlement.

Bullion. — Chiefly used to denote uncoined gold and silver in bars and other forms. Bullion value is the market value of the metal in coins as metal.

Buyer Four (or Ten, Twenty, Thirty or Sixty) — refers to the number of days during which a buyer of stock may elect to demand its delivery upon 24 hours notice. The period may not be less than 4 days nor more than 60 (New

York Stock Exchange). Buyer the Year is permitted on some exchanges.

By-bidder. — A person employed to make fictitious bids upon goods sold at auction, to secure higher prices for the owner.

Call. — (a) A privilege secured by contract and a considera¬ tion, of claiming and receiving either a certain number of shares of some particular stock at a stated price and within a given period, or the difference in value between the date of the demand and the date of the contract. (b) A notice of withdrawal of bonds, upon receipt of which holders must present them and receive payment of the principal and whatever interest may be due. (c) An assessment upon stockholders to pay instalments or losses.

Call Loan, or Call Money. — Money loaned on condition that it may be recalled at any time.

Called Bond. — A bond called in by the maker for the purpose of payment. A bond ceases to earn interest when it is called.

Camarage. — The rental paid for a storage house.

Cancel.— A bill, or bond becomes void when the word "Canceled" has been written across it, or the signatures punched out or cut.

Carrier. — – One who conveys goods or persons for hire. A "common" carrier carries as a business; a "private" or "special" carrier, by special agreement.

Carrying Charges. — Interest paid by purchasers of stocks on margin, on the difference between the market price of the stock bought and the amount of margin deposited to hold ownership in it.

Cash. — A term ordinarily applied to coin, and other currency, although readily negotiable securities are sometimes included. The term "hard cash" is also frequently applied to money actually in hand.

Cash Account. — An account of money transactions: receipts, payments and balance on hand; (b) a term used in banking to denote the credit given to depositors on receipt of a properly secured bond for the repayment of the amount advanced with interest.

Certificate of Deposit. — A negotiable receipt issued by a bank upon deposit of money. The legal possession of the certificate carries with it the ownership of the money deposited.

Charge. — (a) To fix as a price; (b) to set down at a price;

(c) to enter on the debit account.

Charges Forward. — – The accumulated expenses of goods in transit to be paid on delivery. They may include the purchase price also.

Charter. — (a) A document given in evidence of a govern¬ ment grant conferring privileges on the fulfilment of specified conditions; (6) the hiring of a ship by special contract.

Charter Party. — The written agreement under which a vessel is leased.

Check. — To all intents a check is practically a bill of exchange, payable on demand, being a written order for money previously deposited with a banker. When a check has been endorsed by the payee, and paid to a third party it loses its claim against the endorser if not deposited or mailed for

collection by the day after its receipt by the holder.

Chop. — An exporter's brand, representing a certain definite quality of goods.

C.I.F. — Cost, insurance and freight (q.v.).

Circular Note. — A letter of credit issued on foreign firms by bankers to travelers.

Circulating Medium. — The recognized means of making payments.

Clear Day. — A business day intervening between the day a transaction is entered upon and the day it is concluded.

Clearance. — An official document certifying that a vessel leaving for a foreign country has complied with the laws of the port sailed from.

Clearing. — A term used in several branches of trade, and usually to denote different actions. A vessel is "cleared" when it has furnished all particulars about its crew and cargo when about to leave port. In importations goods are "cleared" when all duties and dues have been paid. In banking, "clearing" is a term applied to a plan by which checks and bills are exchanged daily.

Clearing House. — An institution where local banks meet daily to settle their mutual claims. Its certificates of deposit are negotiable only between members of the association.

Collateral Security. — Any property given to secure the performance of a contract and that is to be surrendered upon the performance of the latter.

Commercial Paper. — Drafts, bills of exchange and other negotiable paper given m the course of business.

Commutative Contract. — A contract in which each of the parties interested gives and receives an equivalent.

Composition. — The sum, or rate agreed upon in compound¬ ing with creditors. When a contract is signed by which the creditors agree not to molest their debtor the document is termed a "composition deed."

Compound Interest. — Interest paid not only on the principal but on the interest that accumulates thereon, the latter being added to the original amount.

Concession. — A grant or privilege made by governments to individuals to encourage them in carrying out under¬ takings that promise to be mutually beneficial.

Confirmation. — A document remedying a defect or sup¬ plying an omission in a contract.

Condition of Sale. — A written statement of the particular terms under which property may be sold at auction.

Consignment. — Goods sent for sale or delivery according to agreement. The sender is called the "Consignor;" the recipient, the "Consignee."

Content. — A term used in the customs to denote the paper given by the master of a vessel before she clears outward. It details the vessel's destination, describes goods shipped, etc.

Contraband. — Goods exported or imported contrary to the laws of the country concerned.

Cooked. — • A term used to stigmatize a report or accounting which has been intentionally made deceptive.

Corner. — Commercially the term is used to denote the fact that some person or clique has purchased so largely of a certain stock or commodity for immediate and future delivery that nearly the whole available supply had been monopolized.

Corporation. — A company of individuals whose acts are recognized by law as those of a single person. A corpora¬ tion which fills its own vacancies is known as a "close" corporation.

Cost, Insurance and Freight. — Items of expense some¬ times grouped to make the purchase price of goods — said to be sold c.i.f. In such case the carrier becomes the agent of the buyer, and delivery to the carrier is construed delivery to the buyer.

Coupon. — A warrant for the payment of interest or dividends that may be detached from bonds and presented for col¬ lection when such payments fall due. The expression "coupon off" means that the current interest has already been collected; "coupon on," that it is still to be collected.

Covering Shorts. — The term "to cover shorts" is used in the stock exchange to denote the fact that some person has bought in such stocks as he had previously sold short to enable him to meet his engagements or to protect himself against loss.

Credit. — A term applied when goods are sold upon the understanding that they are to be paid for at a future date. The time given for such payment

denotes whether the accommodation shall be known as a "long" or a "short" credit.

Currency. — The legal coinage, or any form of money which is current as a medium of exchange.

Customs Duties. — The tax, or duty imposed by law upon the exportation or importation of merchandise.

Cutting a Melon. — A distribution of extra dividends of money or stock to shareholders in an enterprise.

Days of Grace. — The number of days which may expire after payment is due before said payment may be demanded. In the United States and Canada three days of grace are usually allowed, except on "demand" or "sight" paper although some States, like New York, have abolished all grace in the payment of obligations.

Dead-pledge. — Lands or goods pawned, or pledged.

Debenture. — (a) A deed given by a corporation as an evidence of debt which may be negotiated like any other investment paper; (ft) in the customs the term is used to denote a certificate of drawback indicating that the holder is entitled to a refunding from the government on the re-exportation of goods upon which the duties have been oaid.

Debit.— That which is entered upon an account as a debt.

Deferred Bonds and Shares. — Bonds on which the pay¬ ment of interest does not begin till some future date. Holders of "Deferred shares" do not participate in the profits until the expiration of a specified time.

Del Credere. — An additional commission paid to a factor, or agent when he binds himself to be responsible for the transaction of business, but also to guarantee the solvency of those with whom he contracts.

Delegation. — A term used in banking to denote a non- negotiable letter employed by bankers in transferring a debt; also, a third person substituted for the original debtor in a transaction.

Demurrage. — A charge made as compensation for the detention of a freighter in loading or unloading; also applied to railroad cars so detained.

Deposit. — (a) A sum of money placed with bankers for credit under agreed conditions; (ft) partial payment on goods before delivery as a security for the order.

Depreciated Money. — Money which will not exchange for its face value in gold coin.

Differential. — A transportation rate made lower for a less advantageous route, in order to equalize attractions for business.

Disagio. — The percentage retained by a banking house for exchanging foreign money.

Discount. — Allowance made on bills paid before they are due; also interest collected in advance, as in discounting notes. The term "At a discount" implies that an investment is below par. "Discount day" in banking is the day set apart for the discounting of bills or notes.

Dishonor. — When acceptance of a draft is refused ; or when an acceptor fails to pay a bill when due it is said to be "dishonored."

Dividend. — (a) An individual share of profit due upon an investment. (ft) The payment made by a bankrupt to creditors in adjusting the difference between his assets and liabilities.

Document Bill. — A bill of exchange accompanied by such security as a bill of lading, an insurance policy, etc., given in return for an advance in money.

Dollar Exchange. — Exchange drawn in dollars and cents to be paid in a foreign country; or drafts drawn in a foreign country to be paid in dollars in America.

Domiciled. — A term applied to a note or draft made payable at a designated place.

Draft. — A term used in many connections, but usually as a bill of exchange. A draft requires acceptance by the person on whom it is drawn. The drawer assumes no liability for the draft when making it; as he does when making a check.

Drawback. — Duty paid on imported goods refunded because of re-exportation.

Due Bill. — A cashier's check issued by a bank in lieu of the usual form of certification, the original check being retained by the bank holding the account.

E. & O.E. — An abbreviation of "errors and omissions excepted." By the affixing of these letters to an account, the right to correct it is reserved.

Earnest Money. — Money paid to bind a bargain.

Embargo. — An official seizure of ship or merchandise to prevent its removal from port.

Ex. — As used in combinations ex-dividend or ex-interest means not including the accrued interest or dividend.

Exchange. — (a) To part with in return for an equivalent;

(ft) a place where merchants, brokers, etc., meet daily to transact business.

Exchanges. — The checks, drafts, etc., on any bank pre¬ sented for payment through the clearing house.

Excise. — The tax imposed upon certain articles of home production. Also called the "Internal Revenue tax."

Extended. — Applied to a bond which is continued after ma¬ turity for a certain period.

Factor. — A selling agent to whom is given possession of goods to be sold — in distinction from a broker who does not have the goods.

Fat Loan. — A loan secured by an overplus of collateral.

Fiduciary Capacity. — A relation of trust and confidence. Thus a "fiduciary loan" denotes a loan granted without other security than confidence in the borrower's honor.

Fiscal Year. — Any 12 consecutive months covering financial operations, as distinguished from the calendar year. The fiscal year of the United States extends from 1 July to the following 30 June.

Five Ports.— An exporter's term referring to Boston, New York, Philadelphia, Baltimore and New Orleans.

Flat. — Without interest.

Floating Capital. — Money tied up temporarily in raw material and partly manufactured goods, wages, etc. ; — as distinguished from fixed capital, invested in buildings and machinery.

Floating Debt. — An unfunded debt.

Flotsam. — Goods from a wreck that are found floating.

F. O.B. — Free on board: — all expenses paid to and including the loading of freignt on cars or vessel.

Force Majeure. — Circumstances that are beyond human control.

Foreclosure. — To deprive a mortgagor of his right to redeem the property mortgaged.

Forwarding Note. — A descriptive note sent by the con¬ signor with goods conveyed by carrier.

Four Ports. — • The four principal ports on the Atlantic coast — Boston, New York, Pniladelphia and Baltimore.

Fourth Week. — In railroad accounts, all the days of a month remaining after the 21st, numbering 9 days in months of 30 days, and 10 days in months of 31 days.

Fraught Money. — Money paid for the transportation of goods.

Free Alongside. — The purchase price for goods sold under this condition includes their delivery alongside of a desig¬ nated vessel; at which juncture

the seller's responsibility ceases, and the buyer's begins.

Free Overside. — The purcnase price of goods thus sold includes delivery out of the hold of a vessel upon a lighter, or upon a dock. When so delivered, the seller's responsi¬ bility ceases.

Funds. — The accumulation of money, or its equivalent, devoted to, or available for the maintenance of some business 'or institution, or for some other specific purpose.

Goodwill. — The value supposed to attach to an established business connection.

Gross. — (a) Weight and amount without deduction for any purpose; (ft) 12 dozen, or 144 articles.

Guarantee. — An engagement to fulfil another person's obligations provided he fail to do so.

Hedging. — Guarding against loss by purchasing against a previous sale or selling against a previous purchase, not necessarily in the same security.

Honor. To meet a claim, or obligation at the time when it is due.

Hypothecation. — (a) The act of pledging, by delivery or otherwise, stocks, bonds, etc., as security for obligations; (b) the mortgage of a vessel or her cargo.

Impost. — A government tax or duty laid on goods imported. Indenture. — A sealed agreement between two or more parties.

Insolvent. — A person whose assets are insufficient to enable him to meet his liabilities.

Interest. — The sum paid for the use of money or the profit derived from the employment of capital.

Investment. — A sum of money expended with the hope of making profit. As applied to securities, it signifies those bought outright and not on margin.

Invoice. — An account sent to the buyer or consignee of goods, in which the seller gives details respecting quantity and price.

Jetsam. — Part of a ship's cargo that sinks in time of wreck. Joint Stock Company. — An association the membership in which is attained by the

purchase of stock which is issued in shares.

Judgment Note. — A promissory note to which a power of attorney to appear and confess judgment for the sum ˆ named has been attached.

Killing. — A very large profit made as the result of a "corner," or a condition of panic.

Lake-and-Rail. — Signifying transportation in part on the Great Lakes and in part by railroad; used generally as to a combined rate for such service.

Lamb. — A term used in the stock exchange to denote an inexperienced person who has made losing investments. Lay-days. — The stipulated number of days allowed to a charterer for the shipping or unloading of a vessel.

Lease. — The grant of temporary possession, as of lands or tenements, for a fixed compensation, and a specified length of time. The person granting this right is called the "Lessor" the person accepting the grant is the "Lessee," or " Leaseholder."

Letter of Advice, or simply, Advice. — A notification of the fact to a party upon whom a bill of exchange has been drawn.

Letter of Credit. — A document, usually issued by bankers, authorizing their agents to pay a sum of money to the bearer.

Letter of Delegation. — See Delegation.

Lighterage. — The sum paid for unloading a ship's cargo by means of a lighter, or barges, and delivering it at a dock. Limitation. — Many statutes fix a period after which debts cannot be collected. This period of limitation ranges in the different States from 6 to 20 years.

Limited Liability Company. — A concern the shareholders in which cannot be held responsible for the company's debts for more than the nominal value of their own shares. Liquidation. — The act of winding up a business, or extended transaction.

Locum Tenens. — One who temporarily holds the place of another.

Long. — Having a large supply. A speculator is "long" of a certain stock when he has bought it largely.

Manifest. — A statement giving full details as to the items of a cargo and its consignees prepared before the sailing of a ship.

Manipulation. — Fictitious sales and purchases of stock through two allied brokers, at constantly rising or falling prices, for the purpose of creating an appearance of activity at the new prices.

Margin. — The percentage deposited by a speculator with the broker who buys or sells stock for him. This money is forfeited to the broker if the stock so rises or falls as to absorb it. The usual margin demanded is from 5 to 20 per cent on the face value of the stock dealt in.

Matched Order. — An order to sell and buy the same stock. See Manipulation.

Maturity.— The time at which notes, drafts, etc., become due.

Measurement Goods. — Light goods which are charged for carriage by bulk instead of weight.

Memorandum Sale. — The act of sending goods to a pro¬ posing buyer subject to his approval, title vesting in the . intending seller until they have been accepted. Moratorium. — A special enactment of a government de¬ ferring the time at which the payment of debts may be demanded for a certain specified period.

Mortgage. — A method of pledging property for debt in which the lender may foreclose upon the security if the interest agreed upon is not maintained.

Negotiable Paper. — An evidence of debt which can be transferred by indorsement to another.

Net. — The sum remaining, after all deductions for expenses, costs, etc., have been made.

Non- Cumulative Stock. — Stock on which dividends accu¬ mulate only when declared.

On Memorandum. — At a secret price agreed upon between the buyer and seller.

Open Order. — An order which is in force until counter¬ manded.

Option. — The privilege of either receiving or supplying specified goods or stocks at a stated price agreed upon by the buyer and seller.

Outlawed.— As applied to a claim means that the time within which suit may be brought under the law has ex¬ pired. In New York State the limit is six years from the time the last payment of interest was made.

Overdrawn. — A bank account is said to be overdrawn when checks amounting to more than the balance of the account have been drawn against it.

Par. — The face value of shares or bonds.

Pass Book. — A small book issued by bankers in which to show the receipts and payments made on a customer's account.

Passed Dividend. — Omission to declare a dividend at the accustomed date.

Per Procuration. — Abbreviated commonly to "P.p." meaning, by power of attorney — of the person whose name follows the two initials.

Permit. — The written authority to remove goods on which duty has been paid from the custom-house is called the revenue officer's "permit."

Piker. — One who trades in stocks in small lots.

Pinholed. — Exhibiting many pinholes — indicating, in the case of a certificate of stock, that it has changed owners several times, and is therefore of a speculative character.

Point. — In the price of stocks a point is 1 per cent; in cot¬ ton and coffee a point is 1-100 of one cent.

Pool. — A combination of mercantile and manufacturing in¬ terests to regulate production and prices.

Postdated. — As applied to a check, a date in the future. The check cannot be legally paid before the date it bears.

Preferred Creditor. — A creditor whose claim under the law takes precedence of payment over other claims.

Preferred Stock. — Stock upon which the dividends are first paid out of the earnings: what remains is paid to the common stock. Generally the preferred stock receives a certain designated percentage, and it may happen that the overplus will give the common stock a much larger dividend.

Premium. — When shares' or bonds are quoted above par they are said to be " at a premium."

Price Current. — A list published by a merchant showing the prices at which goods are to be sold for a fixed period.

Price Mark. — The secret code of letters used in marking goods. One or more words are chosen having just 10 differ¬ ent letters, which are used to indicate the numerals 1 to 9 and 0. Supposing the code words are "white sugar," a price of $1.25 would be represented by whe; a price of $0.70 by ur; etc.

Price of Money. — The rate of discount at which money may be borrowed.

Prime Cost. — The first, or original cost of an article.

Pro Forma Invoice. — A statement of the condition of the market issued for the information of a prospective buyer. It may be presented in lieu of a formal invoice at the custom-house, where, if duly verified, it is accepted as a substitute.

Procurator. — The person who is empowered to act for another.

Procuration-fee. — The sum taken for effecting loans of money.

Pro Rata. — To distribute proportionally.

Promissory Note. — A written agreement to pay a specified sum of money at a certain time.

Proof in Bankruptcy. — An affidavit in which a creditor declares that his claim to bankrupt's estate is correctly stated.

Protest — ■ The certification by a notary that a note or bill of exchange was presented for acceptance or for payment, and the proper disposal refused. The protest binds the endorsers; without it, they are released from liability.

Proxy. — A term applied both to the person who acts for another and to the document that gives him the power to act.

Puts. — An option to deliver certain stock at a certain price at a future date. A term used in stock exchange specu¬ lation.

Pyramiding. — The speculative process of using the profits on stocks bought on margin in a rising market to buy other stocks also on margin. The term is applied also to selling on a declining market.

Qualified Endorsement. — An endorsement prefixed by the words "without recourse to" — signifying thatthe endorser simply passes his title to the paper, but disclaims respon¬ sibility for payment.

Quotation. — The prices at which goods are offered. Stock quotations are given in eighths of 1 per cent; cotton and coffee in 5-100 of one cent; pork, lard, and grain in eighths of one cent.

Rate of Exchange. — The sum given in one country's currency for the currency of another country. Rates of exchange fluctuate widely, being subject to many in¬ fluences.

Rating. — The estimate of the financial soundness of a per¬ son or firm — as given by a qualified commercial agency.

Readjustment. — A voluntary reconstruction of the finances of a company: when the reconstruction is compelled by a court action, it is termed a reorganization.

Rebate. — A discount given by the bankers in return for ready-money payments.

Registered Bond.— A bond bearing the name of its owner and recorded as his property. The interest on such a bond is payable only to the registered owner. When the owner¬ ship is transferred, a new bond is issued to the new owner.

Reserve. — The sum kept for the purpose of enabling the holder to meet special contingencies.

Sack. — In the United States a "sack" of flour signifies 140 pounds; in Great Britain, 280 pounds.

Salvage. — A term applied both to the goods rescued and to the money paid for their rescue from damage or loss, especially at sea.

Scalper. — ■ A speculator who aims for quick, small profits.

Scrip. — A provisional certificate, or receipt for money paid for fractional parts of shares or as instalments for shares to be exchanged for a more formal certificate when con¬ ditions agreed upon have been complied with. The pos¬ session of scrip does not carry voting privileges. Scrip is sometimes issued as a dividend on stock.

Secured Creditor. — A creditor whose claim is protected by a lien.

Securities. — Documents given as an evidence of debt.

Seller Four (or Ten, Twenty, Thirty or Sixty). — The right of the seller to deliver stock (on one day's notice) within the time specified. See. Buyer Four

Set-off. — The balancing of one debt by another.

Share. — The unit, or one of the entire number of equal parts into which the capital stock of a company or cor¬ poration has been divided.

Shaving. — As applied to a note, buying it at a sum less than its value at regular legal interest or discount.

Shoestring. — A term applied to a small beginning of a speculation which results in large profits.

Short. — Owing stocks sold but not yet in hand. Such selling is done on the expectation that the price of such stocks will fall and that then they can be bought for de¬ livery for less than they were sold for.

Sight Paper. — Bills of exchange, 'notes, etc., which are pay¬ able upon presentation.

Silent Partner. — A person who maintains an interest in a business enterprise but who takes no active part in its management.

Sinking Fund. — A fund constituted for a special purpose; usually for the amortization of a debt, as the redemption of bonds.

Smart Money. — Money paid for the privilege of being released from fulfilling a contract.

Spread. — A double speculation covering the option of a delivery of a designated stock at one price, or its purchase at another price. The speculator pays a sum of money for the option. See Back Spread.

Stock. — (a) The accumulation of merchandise in the pos¬ session of a merchant; (b) the share capital of a corporation.

Straddle.— The double privilege of either buying or selling a stock at a fixed price. The profit or loss depends wholly on the changes of the market.

Supercargo. — The person who has charge of a ship's cargo.

Suspension of Payment. — The act of discontinuing the payment of debts because of insolvency.

Tare.— A deduction made from the gross weight of goods to allow for the weight of the box, or package containing them.

Tender. — An offer, in writing, to perform some specific service or to supply certain articles at a specified rate and upon stipulated conditions.

Tolerance.— The limit of wear which a coin may sustain and still be worth its face value at the United States Treasury. For gold coins this limit is one-half of i per cent in 20 years use (from date) : for a shorter period the tolerance is pro rata. On silver and lesser coins the toler¬ ance is without limit.

Tontine. — An annuity, in which the subscribers to the loan share under the benefit of survivorship, the share of each increasing as other subscribers die until the whole reverts to the last-living subscriber.

Trade Mark. — The special mark or brand used by a com¬ mercial firm to distinguish goods of .their individual trade. Such a mark becomes the property of the firm, and is protected as such by the courts. It need not be registered at the Patent Office.

Tret. — A now almost obsolete custom of making an allow¬ ance to purchasers who were compelled to transport their own goods.

Truck System. — The system of paying employees partly or wholly in goods instead of money.

Ullage. — The estimated measure of the empty portion of a cask.

Unbalanced Bid. — A bid for the performance of work in which the rates specified for each of the various kinds of labor or material required have been based upon an erroneous estimate of the quantities of each, thus making a high bid appear as a low estimate.

Unearned Increment. — The increase in the value of land resulting from such general causes as the increase of population, etc., as distinguished from the increase due to the efforts of its individual owner.

Upset Price. — The lowest figure at which bids for property will be accepted at auction sales or other competitive buying.

Usance. — The time allowed for the payment of bills of exchange drawn on foreign countries. The term is also used as another word for interest.

Voucher. — A written document in proof of money transactions.

Washing. — The practice of buying and selling the same stock by a combination of brokers for the sole purpose of recording the quotations, and making it appear active. See Manipulation.

With Exchange. — As included in a draft, signifies that the cost of collection is to be paid by the payee of the draft.

COMMERCIAL TREATIES. Definition.

Treaties of commerce and navigation are agree¬ ments between nations relative to the privileges and immunities which may be enjoyed by the commerce and by the citizens or subjects of each party to the treaty within the territory of the other. In general or specifically such treaties, conventions or agreements define the terms under which the citizens or subjects of each of the contracting governments may re¬ side and pursue their industries and occupa¬ tions within the territories of the other gov¬ ernment, and under which the vessels and com¬ merce of each may enter the ports, etc., of the other for trade and transportation. The object of such treaties is to procure the greatest pos¬ sible freedom from discrimination in the pur¬ suit of trade and the expansion of industries, and to this end they are reciprocal in terms.

In Case of War. — Permanent rights and general arrangements made between countries by treaty do not cease on the occurrence of war, but are, at the most, only suspended while the war lasts. (U. S. Supreme Court 1823 — 8 Wheat. 464, 494 — Moore, Vol. V).

Modern Policy. — A policy of discrimination in favor of one foreign nation as against others is repugnant to the modern spirit of commerce. The application of the principle that a favor granted by one nation to another must be equally extended to all other nations for like consideration is now almost universal. Usually nations entering into a treaty of commerce and navigation agree, reciprocally, to extend to the citizens or subjects and to the commerce of the other within its territories the same privileges that are enjoyed by natives, under the laws of the nation within whose territories such privi¬ leges are granted.

Great Britain, France and Germany. —

Great Britain, France and Germany has each a distinct policy as to concessions for trade expansion, each applying a form of discrimina¬ tion in its own favor without violation of the principle of equality of treatment of foreign nations. Great Britain, as a free trade nation, opposes the employment of discriminating cus¬ toms duties and places the broadest possible construction upon the <(most favored nationˆ principle. The policy of France has been that of specific reservations favorable to her own citizens, but is tending toward greater liberality. In 1882 -she terminated all her European tariff treaties, and in 1892 adopted a minimum tariff for all nations with whom she had a most favored nation agreement and a maximum tariff for all others. The Entente Cordiale convention be¬ tween France and Great Britain (1904) made provision for equality of import, customs dues,

etc., as to trade, commerce and navigation facilities of each with Morocco and Egypt; with reference to the Suez Canal and Gibraltar and as to fisheries in certain portions of the territorial waters of Newfoundland. In 1907 a reciprocal treaty was entered into between the two governments as to Canada, dealing with specific schedules, later (1909) enlarged in scope.

Germany in 1902 adopted a tariff system which was put into effect in 1906, making an increase in tariff rates, but providing lesser or "conventional® rates to be made effective by commercial treaties. The most favored nation clause in existing treaties of the empire was terminated and in 1905 treaties were made with Austria-Hungary, Russia, Italy, Switzerland, Belgium, Rumania and Serbia, by which these countries get the benefit of the "conventional® rates.

United States. — In the enactment of the 1909 tariff the United States adopted the maxi¬ mum and minimum system effecting commercial agreements, but preserved the most favored nation principle as interpreted by this govern¬ ment. A concession of the lower rates was accorded to countries not unduly discriminating against the United States, and all countries now enjoy this concession.

Most Favored Nation. — The most favored nation clause, contained in nearly all treaties, may be declared in a few words with respect to each provision of a treaty, or be made the subject of a separate article. The form ap¬ proved by the United States is : "Except as otherwise expressly provided in this treaty, the High Contracting Parties agree that, in all that concerns commerce and navigation, any privi¬ lege, favor or immunity which either contract¬ ing party has actually granted, or may hereafter grant, to the citizens or subjects of any other State shall be extended to the citizens or sub¬ jects of the other contracting party gratui¬ tously if the concession in favor of that other State shall have been gratuitous , and on the same or equivalent conditions, if the concession shall have been conditional ,®

The United States construes ; the most favored nation clause to imply a reservation as to favors granted gratuitously, as expressed in the above article, whether so stated in exact terms or not. (Adams, 1817; and adhered to by United States State Department). Great Britain and some others contend that there is no such reservation unless expressed in terms.

Form and Scope of Commercial Treaties. —The most recent commercial treaty of the United States is that made with Japan and pro¬ claimed in 1911, superseding that of 1894. In express terms, this treaty provides :

“The citizens or subjects of each of the High Contracting Parties shall have liberty to enter, travel and reside in the territories of the other, to carry on trade, wholesale or retail, to own or lease and occupy houses, manufactures, warehouses and shops, to employ agents of their own choice, to lease land for residential and commercial purposes, and generally to do anything incident to or necessary for trade upon the same terms as native citizens or sub¬ jects, submitting themselves to the laws and regulations there established.

“They shall not be compelled, under any pre¬ text whatever, to pay any charges or taxes

other or higher than those that are or may be paid by native citizens or subjects.

“The citizens or subjects of each of the High Contracting Parties shall receive, in the territories of the other, the most constant pro¬ tection and security for their persons and prop¬ erty, and shall enjoy in this respect the same rights and privileges as are or may be granted to native citizens or subjects, on their submit¬ ting themselves to the conditions imposed upon the native citizens or subjects.

“They shall, however, be exempt in the ter¬ ritories of the other from compulsory military service, either on land or sea, in the regular forces or the national guard, or in the militia ; from all contributions imposed in lieu of per¬ sonal service, and from all forced loans or mil¬ itary exactions or conditions.®

Other articles of the treaty provide that the dwellings, manufactures and shops of the citi¬ zens or subjects of one country in the terri¬ tories of the other, and all premises appertain¬ ing thereto shall be respected . . . That

there shall be no domiciliary search of prem¬ ises nor examination of books, papers or accounts, except under conditions prescribed by law for the natives . . . Provide for the

appointment of consular officers, with all the authority and immunity accorded those of any nation, in all ports, cities or places opened to commerce to any nation. . . . That there

shall be freedom of commerce, reciprocally between the two countries, the citizens of each, equally with those of the most favored nation, having liberty to come with their ships and cargoes to all places, ports and rivers opened to foreign commerce, subject to the laws of the country into which they come. . . . That

the import on articles imported shall be regu¬ lated by treaty or internal legislation . . .

That no export duties or charges shall be made nor prohibition of export or import imposed, except such as apply to all foreign nations, this not to apply, however, to prohibitions imposed as sanitary measures or to protect animals and useful plants. . . . Reciprocal enjoyment

upon equal terms is accorded to the people of both countries in the territories of the other, in exemptions from transit dues and privileges relative to warehousing, bounties, facilities and drawbacks.

Limited liability and other companies and associations, commercial, industrial and finan¬ cial, already or hereafter to be organized in accordance with the laws of either country and domiciled in the territories of such country, are authorized, in the territories of the other coun¬ try, to exercise their rights and appear in the courts either as plaintiffs or defendants, subject to the laws of such other country. This stipu¬ lation has no bearing upon the question of whether a company or association organized in one of the two countries will or will not be permitted to transact its business or industry in the other, this permission remaining always subject to the laws and regulations enacted or established in the respective countries or in any part thereof.

No discrimination is permitted by either country against the vessels of the other in the matter of import charges, reciprocal equality of treatment being accorded whether articles of import come directly from the place of origin or from any other foreign place. No

discrimination of any sort as to either import or export is permitted. No duties of tonnage, harbor, pilotage, quarantine or other similar or corresponding duties, are to be levied except as applied to vessels of the most favored nation. Coasting trade is to be regulated by the laws of the respective countries, but each is to have the same treatment as that accorded the most favored nation. Rights as to trade¬ marks, designs and patents are reciprocally the same as those accorded to natives ; and the general declaration as to most favored nation is incorporated as a separate article of the treaty.

This treaty illustrated the general scope and purpose of such compacts between nations for reciprocal treatment of commerce and naviga¬ tion. Local laws, habits and conditions require variations in form, and national policies deter¬ mine how far such engagements may be ex¬ tended to the colonies of a nation, or what ports may be closed to all foreign commerce.

Open Ports. — The United States, by an act of Congress approved 24 May 1828 opened all ports of this country to the vessels of all nations on the same terms as our own vessels in return for reciprocal treatment, without dis¬ crimination as to the nature of the merchandise carried or the ports where laden. In general, throughout the world, ports that are open to foreign commerce are open to all foreign nations on equal terms.

Retaliation and Embargo. — The application of the principle of retaliation and embargo has in recent years been generally recognized to be detrimental to expansion of commerce and un¬ profitable to the nation applying it. Any de¬ parture from the most favored nation principle reciprocally applied meets with disfavor among nations engaged in commerce. Attempts by various nations to apply such discriminations, for profit or in resentment, have not been bene¬ ficial to their own commerce.

Treaty Tariffs. — Reciprocal benefits from reductions in tariff dues are resorted to for the encouragement of better commercial relations between rival nations, but customarily the most favored nation principle is observed, at least in theory. Reciprocal tariff treaties with South and Central American republics by the United States under the provisions of the McKinley tariff act failed of ratification. Similar treaties made with leading foreign countries under a provision of the tariff act of 1897 were termi¬ nated on account of the constitutional objection to tariff regulations not approved by legislative enactment, and in the place of these the maxi¬ mum and minimum system adopted by the tariff act of 1909 was applied to our commercial rela¬ tions. This act provided that the minimum rates (a reduction of 25 per cent) might be collected from countries which do not

unduly discriminate against the United States, the higher rates to apply to all others. President Taft proclaimed the lower rates to all countries, after the ad¬ justment of some differences with Germany and France (1910). France and Germany also have the maximum and minimum system, under which (in their practice) discriminations occur.

The Open Door. — At the instance of the United States in 1899-1905, agreements were entered into between the United States and France, Germany, Great Britain, Italy, Japan

and Russia, extending the enjoyment of perfect equality of treatment for their commerce and navigation within the ((spheres of influence® over which any should exercise control in China, the most favored nation provision being the ruling principle.

The treaty between Great Britain and Japan (1905) provided for ((The preservation of the common interests of all Powers in China, by insuring the independence and integrity of the Chinese Empire and the principle of equal opportunity for the commerce and industry of all nations in China.® It also recognized the paramount right of Japan to take measures of guidance and control over Korea, (

Special Features of United States Treaties. — By notice of the United States, the <(most favored nation® clause in the (1850) treaty with Switzerland was ((arrested® in 1899, together with some other articles, the general features of the treaty remaining in force.

The Argentine treaty (1853) provides that in case of war between the two countries, the citizens of either of them residing in the terri¬ tory of the other shall have the privilege of remaining and continuing their trade or occu¬ pation therein without any manner of inter¬ ruption so long as they behave peaceably and commit no offense against the law ; and their effects and property, whether entrusted to in¬ dividuals or to the state, shall not be liable to seizure or sequestration, or any other demands than those which may be made upon the like effects or property belonging to the native inhabitants of the state in which such citizens may reside. Provision is made also for religious liberty and the right of burial in grounds owned by aliens.

The Belgian treaty (1875) reserves the right on the part of Belgium to grant special importa¬ tion privileges to products of her national fish¬ eries, and provides for the termination of the most favored nation clause by either party by one year's notice, without affecting the other provisions of the treaty.

The Bolivian treaty (1858, proclaimed 1863) makes reservation of waterways artificially rendered navigable, while opening freely all others

under terms of the favored nation pro¬ vision. This treaty also grants, reciprocally, the right of refuge or asylum to vessels of either country, "whether merchant or of war,® from "stress of weather, pursuit of pirates or of enemies . . . giving them all favor and protection for repairing their ships and placing themselves in a situation to continue their voyage without obstacle or hindrance of any kind.® All the provisions of this article apply to privateers or private vessels of war as well as to public until the two countries relinquish this right in consideration of the general relin¬ quishment of the right of capture of private property upon the high seas.

Free Ships and Free Goods. — In the Bo¬ livian treaty and other treaties of about that period, some of which, like that of Bolivia, are still in force, the following broad principle of international law is made : ((The two High Con¬ tracting Parties recognize as permanent and immutable the following principle, to wit : (1) That free ships make free goods, that is

to say, that the effects or goods belonging to the subjects or citizens of a Power or State at war are free from capture or confiscation when found on board a neutral vessel, with the ex¬ ception of articles contraband of war. (2) That the property of neutrals on board an enemy's vessel is not subject to confiscation unless the same be contraband of war. The like neutrality shall be extended to persons who are on board a neutral ship with this effect, that although they may be enemies to both or either party, they are not to be taken out of that ship unless they are officers or soldiers, and in the actual service of the enemies. The contracting parties engage to apply these principles to the com¬ merce and navigation of all such Powers and States as shall consent to adopt them as per¬ manent and immutable.,®

The treaty enumerates articles which shall be regarded as contraband of war, limiting these to arms, munitions, uniforms, horses and actual military equipment, and extending liberty of navigation to all merchandise other than the character of articles enumerated.

In case of war between the two countries, the merchants of either doing business within the territory of the other must depart within six months if on the coast or within one year if in the interior. All of other occupation may remain.

The Brazilian treaty (1828), of similar char¬ acter, was abrogated in 1841, except as to the most favored nation clause and general provisions for freedom of commerce and navi¬ gation. A reciprocity treaty made in 1906 was terminated under provisions of the United States Tariff Act of 1909.

The Chilian treaty (1832), similar to that with Bolivia, was abrogated in 1850.

The Chinese treaty of 1903 re-enacts pro¬ visions of treaties then in force except in so far as they are modified by other treaties to which the United States is a party. The broadest most favored nation clause is provided by this treaty. The (

The Colombian treaty (1846) contains the <(Free ships make free goods® article of the Bolivian treaty, to which it is similar.

The Cuban relations (1902) are exceptional, articles from the Island being admitted to the United States at a reduction of 20 per cent and articles to Cuba at a reduction of from 20 to 40 per cent.

The treaty with Denmark omits the most favored nation clause.

The Dominican treaty was abrogated in 1898. Now the United States supervises the collection and application of Dominican rev¬ enues.

The Ecuadorian treaty (1839) was termi¬ nated in 1892.

In the treaties with Egypt and Ethiopia the most favored nation clause is incorporated.

The ˆtemporary convention® entered into with France in 1822, for two years, or «until the conclusion of a definite treaty,® is still in force. It provides discriminating duties during a period of four years only; so that now it provides that the ((duties of tonnage, lighter- money, pilotage, port charges, brokerage and all other duties on foreign shipping . . . shall not exceed in France, for vessels of the United States, five francs per ton of the vessel's Amer- vol. 7 — 26

ican register; nor for vessels of France in the United States, ninety-four cents per ton of the vessel's French passport®; and that no dis¬ criminating dues shall be levied by either coun¬ try on goods transported in vessels of the other.

Germany renounced her reciprocity treaty with the United States in 1906 — before all similar treaties were legislated out of existence by the United States Tariff Act of 1909. Treaties with all Germanic governments made prior to the formation of the German Empire in 1871, not conflicting with the Prussian treaty, were assumed by the empire. The United States does not stand in ((most favored nation.® rela¬ tions with Germany, so as to enjoy the mini¬ mum tariff rates of that country, but an ar¬ rangement was entered into in 1910 satisfying the requirements of the United States for the extension of the minimum United States tariff rates to Germany.

The treaty with Great Britain made in 1815 was indefinitely extended in 1827. It applied the favored nation clause to British East Indies as well as to England, but prohibits com¬ merce by American vessels with India and Cape of Good Hope. Reciprocal relations between the United States and Canada, based upon an accommodation of customs dues and the free entry of a specified list of articles into each country, are established by a treaty approved by legislative action by the United States Con¬ gress in 1891.

The Italian treaty (1871) contains the ((Free ships make free goods® declaration and agrees (

The Korean treaty (1882), the execution of which was assumed by Japan in 1905, with the proviso that Korea should make no more treaties except through Japan, contains the most favored nation clause, temporarily recognized extra¬ territorial jurisdiction of the United States and confined commerce to the coast, prohibiting in¬ terior trading.

The Mexican commercial reciprocity treaty of 1884 lapsed in 1887, because of a failure on- the part of the United States Congress to enact tariff legislation essential to its operation.

The Netherlands treaty (1852) regards trade between the East Indies of the Netherlands as coast trade and reserves the right to discrimi¬ nate in import and export duties in favor of direct trade between Holland and her colonies, but grants to American vessels the same privi¬ leges as those under the Dutch flag.

The Serbian treaty (1881) excepts local traffic with neighboring states in the application of the most favored nation clause.

The Russian convention (1832) was termi¬ nated by a resolution of the United States Con¬ gress in 1911 because ((no longer responsive in various respects to the political principles and commercial needs of the two countries® ; and because ((the construction placed by the respect¬ ive contracting parties differ upon matters of fundamental importance and interest to each.®

The United States has no commercial treaty with any of the following nations, but they have treaties with other nations as follows:

Brazil has commercial treaties with France (1900), Italy (1900) and Japan (1895).

Chile has a commercial treaty with Japan

(1897).

Ecuador has treaties with France (1898) and Italy (1900).

Guatemala made a treaty with Germany in 1887 until 1911.

Mexico has treaties with France (1888), Germany (1882), Great Britain (1888), Italy (1900) and Japan (1888).

Nicaragua has treaties with France (1900), Germany (1896), Great Britain (1905) and Italy (19°6).

Peru has treaties with Great Britain (1850), Italy (1874) and Japan (1895).

Salvador has a treaty with France (1901).

Uruguay has treaties with France (1892), Germany (1892) and Great Britain (1885).

Venezuela has treaties with France (1902), Great Britain (1825) and Italy (1861).

John Pierce Miller.

COMMERCY, ko'mar'se', France, town in northeast France, in the department of the Meuse, on the left bank of the Meuse River, about 180 miles east of Paris. In its ancient castle the Cardinal de Retz wrote his memoirs. The town is tolerably well built, and its indus¬ tries include ironworking, boot and nail mak¬ ing, hosiery, embroidery, tanning and brewing. The cavalry barrack was once the residence of King Stanislas of Poland. Pop. 8,876.

COMMERSON, ko-mar-son, Philibert,

French botanist: b. Chatillon-les-Dombes, 18 Nov. 1727; d. Mauritius 1773. At the request of Linnaeus he composed a treatise on the (Fishes of the Mediterranean, } the most im¬ portant ichthyological work that has yet ap¬ peared. In 1767, at the command of the king of France, he accompanied Bougainville on his voyage round the world. He died on the Isle de France (Mauritius), after residing there for about four years, which he spent in gathering and correlating and studying a vast amount of material which helped greatly the study of biol¬ ogy. He wrote, among other things, a botanical martyrology — a biography of those who have fallen victims to their efforts in the cause of botany. He left his plants, drawings and papers . to the royal cabinet at Paris. Commersonia, a genus of the family Sterculiacece, was named in his honor.

COMMINATION, an office in the liturgy of the Church of England,

appointed to be read on Ash Wednesday (the first day of Lent), containing a recital of God's anger and threat- enings toward sinners.

COMMINES, ko-mens, or COMINES,

France and Belgium, towns on opposite sides of the Lys, eight miles north of Lille. The one on the right bank is in the department of the Nord, France, and communicates by a draw¬ bridge with the other, which is in the province of West Flanders, Belgium. Anciently they formed a single town, which was fortified and had a castle, in which the celebrated historian, Philippe de Commines, was born. The manufac¬ tures are chiefly ribbons and cotton goods, tan¬ ning and cutlery. Pop., of French Commines, 8,575; of Belgian Commines, 6,641.

COMMISSARIAT, kom-mis-sar'i-at, that department of an army which provides pro¬

visions, forage, camp equipage and all the daily necessaries, other than those connected with actual fighting. Up till 1912 the provisioning of the United States army was in the care of the Department of Subsistence; but in that year this department was united with the quar¬ termaster's and pay departments into one of supply under the title of the Quartermaster's Corps, and charged with the provision of sub¬ sistence, pay, transportation, clothing and quar¬ ters. In the British army the duties of the commissariat have been managed by different bodies at different times, and at present there is no department so named. The commissariat duties now partly fall on the Army Service Corps, while there is also an ordnance store department for the supply of wrar provisions. It is only in the latter body that there are officers designated commissaries.

COMMISSARY (L. commissus, pp. of com¬ mitter e, commit, Fr. commissaire, one entrusted with a task, duty or office). In a general sense a commissary is, as its root meaning signifies, one to whom some charge, duty or office is committed by a superior power ; hence one who is sent, with delegated power, to execute some official duty in a certain place. Here it has the sense of commissioner. An officer of a bishop who exercises spiritual jurisdiction in remote parts of a diocese, or one entrusted with the performance of duties in the bishop's absence. In Scotts law a commissary is a judge in a Commissary Court (q.v.). For this term in its military sense, see Commissariat.

COMMISSARY COURT, in Scotts law , was a Supreme or High Court established in Edinburgh in the 16th century which took to itself the duties formerly incumbent upon and performed by the bishops' commissaries. It had jurisdiction over actions for divorce, declarator of marriage and nullity of the same and all matters related thereto. This court, which was abolished in 1836, is embodied in the powers of the Court of Sessions. A second meaning of this term is that of a Sheriff's Court or County Court having the power to decree and confirm executors to deceased persons leaving property in Scotland. See Commissary.

COMMISSION. (1) Formal act of trust; a warrant by which any trust is held or author¬ ity exercised. (2) A written document invest¬ ing a person with an office or certain authority. (3) A certificate issued by authority by which a military officer is constituted; as, a captain's commission. (4) A body of persons joined in an office or trust, or their appointment ; as, a building commission. (5) Brokerage, allow¬ ance or compensation made to a factor, agent, etc., for transacting the business of another; as one per cent commission on sales. (6) A war- ship is said to be <(in commission® when she is fitted out for service and her commanding offi¬ cer has taken charge under his commission (see definition (3), above). (7) In an official sense, a commission is a legally created body of per¬ sons invested with

limited but welLdefined juris¬ diction, as the Interstate Commerce Commis¬ sion, the Civil Service Commission, the Anthracite Coal Commission, etc.

Commission of Bankruptcy. — A commis¬ sion appointed to investigate the facts relative to an alleged bankruptcy and to secure all

available assets and effects for the creditors concerned.

COMMISSION, Governmental. A more or less temporary board to which authority is delegated for a specific purpose. Commis¬ sions may be used either for domestic govern¬ ment or for international arbitration. Among the more important commissions which have been employed in the United States for the settlement of internal problems are the Inter¬ state Commerce Commission and the Industrial Relations Commission (qq.v.). In Great Britain a recognized means of collecting in¬ formation for the purposes of determining a policy or formulating legislation is the em¬ ployment of commissions of inquiry. These are classed as royal, statutory or departmental, according to whether they are appointed by a command of the Crown, by an act of Parlia¬ ment or by a treasury minute or the authority of a Secretary of State. The authority of these commissions is dependent on the particular terms of their creation.

The United States has often made use of commissions to adjust the claims of individual citizens with reference to international disputes. Commissions of this sort were employed in connection with the Treaty of 1819 with Spain, in which Florida was ceded; under the Treaty of 1826 with Great Britain, to distribute the indemnity granted for slaves deported in viola¬ tion of the Treaty of Ghent; under the Treaty of 1831 with France, to distribute the indemnity for the Spoliation Claims; and under the Treaty of 1871 with Great Britain, to distribute the indemnity for the Alabama Claims.

Arbitrations are usually carried on by inter¬ national commissions, which may or may not contain, in addition to the representatives of the nations involved in the dispute, the repre¬ sentatives of disinterested neutral nations. The commission may have authority sufficiently wide to settle the entire question at issue, or it may recommend courses to the governments concerned, without imparting to these recom¬ mendations any binding force. See Arbitra¬ tion ; Bering Sea Controversy ; Boundaries of the United States ; and the accounts of the various boundary and fisheries disputes between England and America which were likewise settled by commissions.

COMMISSION, Military, a certificate ■which entitles one to execute the more import¬ ant functions of command or staff duty in an army or navy. They are granted by the head of the government, and in the United States are confirmed by the Senate and are made public through the adjutant-general's department. In the national guards of the several States they are granted by the governor. In general, com¬ missions are granted after courses of training such as those discussed under the heads of Military Academy, United States ; Military Education; Naval Academy, United States. These are generally supplemented by systems of examination whereby qualified non-commis¬ sioned officers or warrant officers may acquire commissions. In most European armies certain social or financial qualifications are required for commissions. Up to 1871, when Gladstone abolished it notwithstanding vigorous . opposi¬ tion, a system of purchase of commissions ex¬ isted in Great Britain, except in such technical

arms as the engineers and artillery and in a few other organizations. This system, initiated in the time of Charles II, continually became more expensive, until in 1854, during the Crimean War, the prices ranged from £450 for the commission of an ensign in the line to £7,250 for the commission of a lieutenant-colonel of footguards. Under the present system in times of peace, besides the regular course of training as cadet and the examinations given to highly recommended non-commissioned officers, the avenues of approach to commissions in the British army are the officers training corps of the universities, the special reserve of officers and the territorial force. In the United States army, besides West Point and promotion from the ranks, commissions may be obtained on examination and appointment from civil life, by specially recommended men from various training corps at educational institutions, where army officers are stationed, and in the Officers Reserve Corps, by the methods explained in the article on that corps. In the European War, special training courses for aspirants to com¬ missions were initiated at Plattsburg and else¬ where. Of course, in all armies, the bars to commissions — which are then usually tem¬ porary — are greatly let down in times of war, and it is possible for a qualified enlisted man or civilian to get a commission without going through the course of training or the highly technical examinations necessary in times of peace. See Rank.

COMMISSION FORM OF GOVERN¬ MENT. Definition and Origin. — The com¬ mission form of government is that system of city administration in which all legislative and executive powers are vested in a single body of five elective commissioners or councilmen. The plan originated in Galveston, Tex., in 1901. Prior to that time all American cities were governed by a mayor and various administrative boards exercising the executive functions of government and by a city council of one or two chambers exercising the legislative power. The Galveston experiment accordingly marked a

departure from the traditional principle of di¬ vision of powers in American municipal affairs. Its adoption in Galveston was intended as a temporary measure to carry the city through the grave financial emergency caused by a tidal inundation which had destroyed a great deal of private and municipal property in September 1900. But the commission plan proved success¬ ful in its workings and soon attracted the attention of other communities.

Outline of the Galveston Plan. — As origi¬ nally framed, the commission plan in Galveston provided that all powers formerly vested in the mayor, the various administrative boards and the city council should be vested in a body of five citizens of whom three were to be appointed by the governor of Texas and two elected at large by the voters of Galveston. The provision for the appointment of three commissioners by the governor was decided by the courts to be unconstitutional, however, and the scheme was amended to provide for the election of all five commissioners. At the ensuing election the voters endorsed the com¬ missioners who had been already appointed by the governor. Under the terms of the charter of 1901, as thus amended in 1903, the members of the commission were to serve for a two-

year term and one of the commissioners was given the title of mayor-president but with no special functions save that of acting as chair¬ man at meetings of the commission. It was provided that the commission should hold regu¬ lar sessions, open to the public, and that by a majority vote of its members it should enact municipal ordinances, make the appropriations, award all contracts for public work and de¬ termine all appointments to positions in the city's service. It was further provided that the commissioners should, by majority vote, apportion among themselves the headships of the four main departments of civic administra¬ tion, namely, finance and revenue, waterworks and sewerage, police and fire protection, and streets and public property. The mayor-presi¬ dent was not to be assigned to the headship of any department but to exert a co-ordinating influence upon them all. These were the es¬ sentials of the Galveston Plan.

Extension to Other Texan Cities. — Al¬ though it had been prepared hastily, with little or no experience elsewhere to serve as a guide, the Galveston experiment soon demonstrated its success. When the commissioners took over their duties the city had already defaulted in the payment of interest upon its debt; its bonds were selling at 40 per cent below parity and it had a large floating debt which could not be funded. Within a few years, however, this situation had been enormously improved. The city was once again able to pay its way in spite of the great burdens

due to the cost of re¬ constructing the inundated sections. Accord¬ ingly, what had been designed as a makeshift to tide over a serious emergency not only be¬ came a permanent scheme of government for Galveston but was within a few years adopted by the other cities of Texas.

The Des Moines Plan. — In due course this Galveston system found its advocates in other States of the Union. Its progress was slow, however, because of the feeling that the plan concentrated too much power in the hands of a small group of men. While retaining its main principles, therefore, some cities sought to improve its practical applications. Most important among these was Des Moines, Iowa, which in 1907 adopted a new charter providing for a commission of five men nominated at a non-partisan, open primary and elected at large with additional provision for the use of the initiative and referendum by the voters of the city as well as (see Initiative and Referendum) for the recall of one or more of the commis¬ sioners at any time after three months' tenure of office (see Recall). The Des Moines plan further provided that no franchise giving rights in the city's streets should be valid until con¬ firmed bv popular vote. In general it aimed to establish what the Galveston plan did not seem to provide, namely, some adequate safe¬ guards against the abuse of the large powers entrusted to the five commissioners.

Spread of the System. — With the new safe¬ guards which the Des Moines plan added to the original scheme, the commission plan of city government gained great popularity. During the next few years it found adoption, without any change except as regards minor details, by many American cities, large and small, in nearly all the States of the Union. At the present time more than 300 municipalities of

all sizes are governed by commissions. The majority of these are small communities with populations not exceeding 10,000; but some of the largest cities of the United States, notably Buffalo, New Orleans, Jersey City, Portland, Saint Paul and Oakland are included in the list. Among commission governed cities there are now six with populations exceeding 200,000 and 13 with more than 100,000. Of the larger municipalities which once adopted the plan only two, Denver, Colo., and Salem, Mass., have since abandoned it.

The Commission-Manager Plan. — A fur¬ ther development of the original plan soon took place in the adoption by many cities of an ar¬ rangement which, while retaining the commis¬ sion, established a new administrative post known as that of city manager. Under this plan the commission retains all its legislative and policy-determining powers but devolves responsibility for the actual administrative work upon a highly-paid, professional official who makes the subordinate appointments and is ac¬ countable for securing efficiency in the various departments. This variation of the original scheme

is now used by 50 or more cities in addition to many others which have established the city manager plan in conjunction with a larger city council instead of a small commis¬ sion. See City Manager.

Merits of the Commission Plan. — The chief advantages of the commission form of government are first of all the concentration of power in definite hands thus avoiding the delays, friction and evasion of responsibility which characterized the old system of govern¬ ment by a mayor, various boards and a double- chambered council. In the second place, by reducing the number of elective offices it has raised the plane of officeholding, securing for the commission citizens of a better type than those ordinarily elected to municipal positions. It has not wholly succeeded in ousting the pro¬ fessional office-seeker, but it has given the man of business ability a better opportunity to serve the city in an official capacity. In the third place, the commission plan has made possible the introduction of many notable improvements in the routine conduct of the city's business, as for example, improved methods of budget¬ making and accounting, the extension of the civil service system, publicity in the award of contracts, the development of new sources of city revenue, and the adoption of a pay-as-you- go policy in municipal finance. It has faciliated the introduction, in many cities, of the so- termed newer agencies of democracy such as the initiative and referendum, the recall, preferential voting, proportional representation, the short ballot and the open primary. Finally, it has had an educative value, awakening the interest of the citizens in their public affairs, making the government of the city simple and intelligible which is the first necessary step in making it responsible to them. More has been claimed for the plan, however, than it or any system of local government could of itself be expected to accomplish, but its substantial achievements are beyond question.

The Defects of Commission Government.

— The chief objections to the commission form of city government, on the other hand, are that it may place a dangerously large amount of power in the hands of a few men and enable

them, by collusion, to carry corruption or dis¬ honesty a long way without detection. It is furthermore urged that the plan violates a cardinal principle of American government by vesting both the appropriating and the spending powers in the same hands, something that is not permitted in national or State government. There the tradition of checks and balances is still powerful. It is contended, however, that a legislative body ought to be fairly

representative of all interests in the community and that a body whose membership is limited to five men cannot be adequately representative. Finally, there is the allegation which experience seems to support, that it divides among five men the responsibility which was formerly concentrated in one man, the mayor. In other words, the plan goes too far in one direction and not far enough in another. The commission is too small to be adequately representative as a legislative body and too large to be efficient as an adminis¬ trative organ. The adoption of the city manager plan, with provision for a city council, is a recognition of this defect in the commission form of government.

Financial Results. — The financial results of the commission plan have been shown to be good as the result of a careful investigation made in 1916 by the United States Bureau of the Census. Comparing cities which have re¬ mained under the mayor and council frame¬ work with those which have had some years of experience with commission government the balance of advantage appears to rest with the latter in such matters as lowered tax rates, more efficient checks upon expenditure, better budget methods and a reduction on municipal debts. See Municipal Government; City Manager.

*Bibliography. — Bradford, E. H., Govern¬ ment of Cities by Commission (1911) ; Bruere, H., (The New City Government (1912) ; Mac¬ Gregor, F. H., (Commission Government**

(1911) ; Woodruff, C. R., (City Government by Commission (1911) ; Annals of the American Academy of Political and Social Science, (Com¬ mission Government and the City Manager Plan (1914) ; National Municipal League, (Report on the Commission Plan and Commis¬ sion-Manager Plan (1914) ; United States Bureau of the Census, (Financial Statistics of Cities) (1916).

William Bennett Munro, Professor of Municipal Government, Harvard University.

COMMISSION MANAGER, the chief ad¬ ministrative officer under the commission plan of municipal government. H'e is responsible for the efficient administration of all depart¬ ments. See City Manager.

COMMISSIONAIRE, kom-mis-syo-nar', the attendant attached to European hotels, who awaits the arrival of the trains to secure customers, to look after their luggage, etc. He may also be employed as guide or otherwise. In London, Edinburgh and elsewhere bodies of commissionaires have been established, the men being drawn from the ranks of military pen¬ sioners of undoubted character. In a second¬ ary sense a commissionaire is in general a kind of light porter or messenger.

COMMISSIONER, a member of a com¬ mission. See Commission.

COMMISSURE, an anatomical term ap¬ plied to nervous connections between adjacent parts of the nervous system. Though it is not always used in quite the same way, the general signification of the term, and the physiological import of the structure, is that of a uniting bridge. It has the sense of a suture, seam, joint or closure, the places where two bodies or parts of a body meet or unite. In architec¬ ture the commissure is the joint between two stones formed by the application of the one to the other; in botany it signifies the face by which one carpel coheres to another ; in an¬ atomy it is the name for certain bands of nerve- tissue which connect the right and left parts of the brain with the spinal cord; while in zoology it is a nerve cord connecting the larger ganglia of the nerve system.

COMMITMENT, in law , a written warrant for the arrest of a person named or described therein; also, the placing of a person in jail, as by warrant, for crime, contempt or the like. The word is applied usually when the detention is for a short period, so as to secure bail or to hold for trial. A commitment is made only after the person to be committed has made his appearance or has been summoned, in which particular it differs materially

from a warrant. Commitments may be made by civil courts, although they are more commonly made by criminal courts.

COMMITTEE, one or more persons elected or deputed from among a larger body to ex¬ amine, consider and report on any matter of business.

Large deliberative assemblies, with a great variety of business coming before them from time to time, are unable, when sitting as a whole, sufficiently to discuss and investigate many subjects on which they are obliged to act. Committees, therefore, are appointed to ex¬ amine and report to the assembly from which they are selected. In the legislative bodies of the United States and in the British Parlia¬ ment — in fact, in all legislative bodies in rep¬ resentative governments — there are committees for various purposes. What are known as ˆstanding committees® and <(grand committees® are regularly appointed at the beginning of every session, and have a definite class of sub¬ jects with which to deal, the object being to divide the work of the assembly among several bodies, and so facilitate the progress of legisla¬ tion. In the British Parliament there were formerly four grand committees — of Religion, of Grievances, of Courts of Justice and of Trade, but they fell into disuse and were dis¬ continued in 1832. Another ancient committee is that of Privileges, which is still appointed at the beginning of every session, but has seldom any work to do, questions of privilege being generally laid before a select committee spe¬ cially appointed. In the United States Congress there are numerous standing committees. Among the most important of them in both Senate and House (though each House has not the same committees) are those on Appro¬ priations, Commerce, Elections, Foreign Af¬ fairs, Judiciary, Military and Naval Affairs, Rules and Ways and Means. (See Congress, United States). ((Select committees® are ap¬ pointed by both Houses of the British Parlia¬ ment and of the United States Congress to take

up special questions and investigate them pre¬ vious to legislation. In these witnesses may be examined upon oath, and evidence of all kinds brought forward, the proceedings being such as could not be carried on before the whole House. When their reports are given in, measures may be based upon them and passed into law. What is known as a Committee of the Whole House can only be regarded as a committee in so far as its procedure is concerned, since it consists of all the members who are present. Matters of great concernment (as supply, ways and means, etc.) are usually referred to a commit¬ tee of the whole House, in which bills, resolu¬ tions, etc., are debated and amended till they take a shape which meets the approbation of the majority. The sense of the whole assembly is better taken in this way,

because in all com¬ mittees the member is permitted to speak as often as he pleases. When in the British Par¬ liament, the House is in committee, the chair is regularly taken by the chairman of commit¬ tees, a member who receives a salary and holds the post during the duration of the Parliament, acting as deputy speaker. (See Parliament). When the House is desirous of forming itself into committee, the speaker, on motion, puts the question whether the House will resolve itself into a committee of the whole, to take into consideration such a matter, naming it. The previous question cannot be put in com¬ mittee; nor can the House in committee ad¬ journ, as ordinary committees may, but if the business is unfinished, must hold an entirely new sitting. If the business is finished, the chairman reports, either immediately, or, if the House wish, at a later period. The committee stage of a bill takes place between the second and third reading, when the measure is dis¬ cussed clause by clause. Private bills are re¬ ported on by select committees.

In law , a committee is a guardian appointed to take charge of the person or estate of one who has been found to be of unsound mind, or who is laboring under some other disability. The next of kin is usually selected, but the appointment rests in the discretion of the court. It is the duty of the person appointed to take care of the incompetent.

COMMITTEE OF PUBLIC SAFETY

(Comite dn Salut Publique) , a body elected by the French Convention, 6 April 1793, from among its own members, at first having lim¬ ited power conferred upon it — that of super¬ vising the executive and of accelerating its ac¬ tions. Later, its powers became extended; all the executive authority passed into its hands, and the ministers became merely its scribes. At first composed of nine, it was increased to 12 members — Robespierre, Danton, Couthon, Saint- Just, Prieur, Robert-Lindet, Herault de Sechelles, Jean-Bon Saint- Andre, Barrere, Carnot, Col- lot d'Herbois and Billaud-Varennes. In the terms of its constitution the members should have been elected only for one month, but all the above-mentioned held their seats for a whole year. The prevailing party acted on the ground that France, threatened from within and without, could not be governed as if at peace, but could only be saved by desperate measures, as in times of the greatest danger. But after the downfall of the Girondists, 1 and 2 June 1793, when the Mountain, on the recommenda¬ tion of the Committee of Safety, declared that

the population of France consisted of but two parties — patriots and enemies of the Revolu¬ tion — and consigned the latter to the persecu¬ tion of all good citizens, terror took the place of law. From this time the committee gov¬ erned the Mountain party, and through it the Convention. As the sole rule of his conduct Robespierre declared that the mainspring of a popular government in a state of revolution was la vertu et la terreur!

Carnot confined himself to the direction of the armies, and left to his colleagues the affairs of the interior. At the motion of these men the new constitution was suspended for a time, and the revolutionary government conferred on the Committee of Safety by a decree of the Convention of 4 Dec. 1793. The committee now instituted in all the communes of the republic, as judges of the sus¬ pected, revolutionary committees, composed of the most furious zealots : the number of these new tribunals was as great as 20,000. The last remaining forms of regular process were abol¬ ished; their place was supplied by violence, and often by avarice and folly. In this time of internal revolutions and danger from without, it was not in the power of man to restrain the exasperated fury which probably alone pre¬ vented France from being conquered. Finally Danton, who had absented himself for a time from the committee on account of the influence of Robespierre, declared himself against the system of bloodshed; and Robespierre himself acquiesced in the condemnation of the ring¬ leaders of the Paris mob (24 March 1794), among whom was Hebert; but soon after (5 April) Danton, with Herault de Sechelles, was himself overthrown by Robespierre. Till 28 July 1794 the latter now remained master of the lives of 30,000,000 of men. He appointed Fou- quier-Tinville public accuser. Prisons were multiplied and crowded; the prisoners were cruelly treated, betrayed by spies and con¬ demned without being allowed the privilege of defense; the property of all imprisoned on suspicion was confiscated, and the guillotine remained en permanence. The same violence was practised in the provinces by some of the delegates of the committee. Among the num¬ berless victims of the system were the noble Malesherbes and the celebrated Lavoisier. The members of the Committee of Public Safety and of the comite de surete generate at last disagreed among themselves. Each committee contained three parties. These, and not Tallien, were the real causes of the 9th Thermidor (27 July). _ In the Committee of Public Safetv Robespierre, Couthon and Saint-Just (gens de la haute main) formed one party; Barrere, Bil- laud and Collot d'Herbois (les gens revolution- naires) another, and Carnot, Prieur and Lindet (les gens d' ex amen) a third. In the comite de surete generate one party comprised Vadier, Amor, Jagot, Louis (du bas Rhin) and Voul- land (the gens d' expedition) ; to a second be¬ longed Danton and Lebas (ecouteurs) ; to the third Mo'ise Bayle, Lavicomterie, Elie Lacoste, Dubarran (les gens de centrepoids) . Robes¬ pierre attempted to remove the unyielding Car¬ not from the Committee of Safety. On the other hand Billaud-Varennes labored to effect Robespierre's downfall. Couthon, Saint- Just, the Jacobins and the commune of Paris alone adhered to Robespierre. But when Saint-Just actually proposed in the committee a dictator-

ship for the safety of the state an opposition was raised against Robespierre

in the National Convention by Vadier, Collot d'Herbois, Billaud- Varennes, and especially by Tallien and Freron; the dictator and his faction were proscribed, and the victory of Barras (q.v.) on the 9th Thermidor brought Robespierre, his brother, Saint- Just, Couthon and others, 105 in all, to the scaffold, 28 July. The Convention now re¬ covered its authority; the Jacobins and the partisans of terrorism (le queue de Robes¬ pierre) were completely overthrown; at the same time the Convention gave the Committee of Safety and the revolutionary tribunal a more limited power and jurisdiction. The bloody despotism ceased ; and when a new constitution introduced (28 Oct. 1795) a directorial govern¬ ment (see Directory), the Convention was dis¬ solved, and with it sank into its grave the revo¬ lutionary government, the reign of terror and the Committee of Public Safety.

COMMITTEES OF CORRESPOND¬ ENCE, in American Revolutionarv history, public functionaries of a type first appearing in England, created by the parliamentary party of the 1 7th century in their struggles with the Stuarts. In 1763, when the English gov¬ ernment attempted to enforce the trade and navigation acts in America after the Peace of Paris, the colonial leaders advised the merchants to hold meetings and appoint committees to memorialize the legislature and correspond with each other to forward a union of interests. This was done in Massachusetts, Rhode Island and New York 1763-64. On 13 June 1764 the Massachusetts General Court appointed a com¬ mittee to communicate to other colonial govern¬ ments its instructions to its agent in London, to protest against the Sugar Act and the proposed Stamp Act. When the latter was passed in 1765, the Sons of Liberty formed committees of correspondence to organize resistance. Samuel Adams, during the decade 1764—74, constantly urged the adoption of this plan by the patriots of every town and county in each colony, and moved the general court to that effect in 1770— 71. A few public bodies in the country ap¬ pointed such committees, but there was no general concert. The payment of judges' salaries by the royal government in 1772 was seized upon by Adams as a fresh incitement, at first with scant effect, but on 21 November a slender town meeting at Faneuil Hall, Boston, appointed a correspondence committee of 21 to communicate with other Massachusetts towns concerning infringements of popular rights. It consisted of the foremost popular leaders — Adams, Otis, Warren, Quincy, etc. — and until late in 1774 (see Committees of Safety) re¬ mained the real executive of the town and largely of the province. A report of its first meeting was printed and sent to all the towns and to other provinces, and in a few weeks 80 Massachusetts towns had appointed similar committees, many more doing so in a short time. No fresh places in other colonies joined, though the report was printed in their news¬ papers. But the royal commission to investi¬ gate the burning of the Gaspee in Rhode Is¬ land and send the culprits to England for trial effected Adams' purpose — –

curiously, not in Rhode Island itself, but in Virginia, where the House of Burgesses, on 12 March 1773, ap¬ pointed a committee of 11 to communicate with

other colonies on the doings of the administra¬ tion, especially in Rhode Island, and report. The plans were characteristically different, the Massachusetts being by the town voters, the Virginia by the legislature, but the latter was immediately effective in eliciting response. Committees were appointed by Rhode Island

7 May, Connecticut 21 May, New Hampshire 27 May, Massachusetts 28 May, South Carolina

8 July. This threat of united opposition daunted the government; the Gaspee prosecu¬ tions were not pressed, and the commission found adversely to its commander. There be- inˆ nothing more to do, the legislative com¬ mittees stopped for the time, after exchanging proceedings. The Boston committee alone con¬ tinued its political activities, and the tea ques¬ tion (see Boston Tea Party) soon revived the others. The Boston committee, followed by that of Connecticut, sent out circulars urging the defeat of British purposes; and the former, by legal town-meeting, was made the executive of Boston. It called the committees of five surrounding towns into consultation, and sat Nike a little Senate, Flutchinson said. Under its direction the tea was thrown into the harbor. The Tea Act roused the refnaining colonies: Georgia in September, Maryland and Delaware in October, North Carolina in December, New York and New Jersey in February, chose legis- tive committees of correspondence; and new municipalities joined the movement — several in New Hampshire and Rhode Island and the city of New York. After the Boston Port Bill came into effect the Boston committee invited those of eight other towns to meet in Faneuil Hall, and the meeting sent circulars to the other colonies recommending suspension of trade with Great Britain, while the legislative committee was directed by the House to send copies of the Port Bill to other colonies and call attention to it as an attempt to suppress American lib¬ erty. The organization of the committees was at once enormously extended; almost every town, city or county had one, though a few dismissed theirs in fear of the coming storm. The Boston opposition attempted this, but were crushingly defeated. In the middle and south¬ ern colonies the committees were empowered, by the terms of their appointment, to elect dep¬ uties to meet with those of other committees, to consult on measures for the public good. The history of the committees from this time on is the history of the preliminaries of the Revolu¬ tion. Consult Frothingham, Pise of the Re¬ public (1872) ; Howard, Preliminaries of the Revolution > (1905).

COMMITTEES OF SAFETY, in Ameri¬ can Revolutionary history, these were a later outcome of the committees of correspondence (q.v.). In

Massachusetts, as affairs drew to¬ ward a crisis, it became usual for towns to appoint three committees, of correspondence, of inspection and of safety. The first was to keep the community informed of dangers either legislative or executive, and concert measures of public good ; the second to watch for viola¬ tions of non-importation agreements, or at¬ tempts of loyalists to evade them ; the third to act as general executive while the legal au¬ thority was in abeyance. In February 1776 these were regularly legalized by the General Court; but consolidated into one, called the <(Committee of Correspondence, Inspection and

Safety,® to be elected annually by the towns. This possessed all the powers of the other three, but in addition was empowered to notify the proper authorities of all violation of any of the acts, resolves or recommendations of the legislature ; also to send for persons and papers, call out the militia, take charge of con¬ fiscated property and prisoners of war, and carry out the laws against Tories. An appeal lay from them to the legislature, but was not often thought judicious. Previous to this, how¬ ever, in October 1774, the first Provisional Congress of Massachusetts had appointed a provincial committee of safety, with 11 mem¬ bers, to act as the general executive of the province ; and in the next few weeks it made arrangements to raise and support an army. On 9 Feb. 1775 the second Provincial Con¬ gress constituted five members a permanent executive, and instructed it to ((alarum, muster and cause to be assembled with the utmost ex¬ pedition, and completely armed, accoutred, and supplied, such and so many of the militia of the province as they shall judge necessary,® such levy to be made when the committee thought a forcible attempt was to be made to carry out the Boston Port Bill. It was this committee's decision to take possession of Charlestown and Dorchester Heights, on the rumor that Gage was to have heavy reinforce¬ ments and occupy them, which led to the battle of Bunker Hill. New York had also a commit¬ tee of safety, of 100 men, but it is characteristic of the undeveloped politics of the time that several of these were conservatives who after¬ ward joined the British side. Partly from this, and partly from the unwieldy size of the com¬ mittee, an inner committee was formed con¬ sisting entirely of Sons of Liberty, and directed its operations. At the news of the battle of Lexington, they called a public meeting in New York at the city hall, and secured the arms and ammunition in the arsenal. John Lamb and Isaac Sears led the action, arrested all Brit¬ ish vessels about to sail for Boston, locked up the custom-house, and discharged the cargo of a vessel detained by British authorities as loaded with supplies for the patriots, formed a military company, armed it from the arsenal, surprised and captured the chief depot of British stores

at Turtle Bay, and when the British commander ordered his men to join the army in Boston, refused to allow them to take any arms but those in their hands. Otherwise they were to be allowed to embark unmolested. The more ardent members were displeased at this, but kept the letter of the promise and no more. The muskets being carried in wagons, they confis¬ cated them as not ((in the hands,® the soldiers declaring that they should not be used against their brethren in Boston. Consult for the func¬ tions of the committees, Sparks, (Life of Gouverneur Morris, (Vol. I, Chap. 2), and Hunt, A., Provincial Committees of Safety)*

(1904).

COMMODORE, in the United States navy, formerly an officer ranking next above a captain, and commanding a few ships when they were detached for any purpose from the rest of the fleet. The grade was abolished by Con¬ gress in 1899, when all commodores became rear-admirals. While there is no actual grade of commodore in the British navy, it is by

courtesy applied to the commander of a flotilla of submarines, or to the captain in command of a squadron. The word is also a title given in courtesy to the president of a yachting club, or to the senior captain of a line of merchant vessels.

COMMODUS, kom' mo-dus, Lucius .ZElius Aurelius, Roman emperor: b. 161 a.d. ; d. 31 Dec. 192. He was the son of Marcus Aure¬ lius Antoninus and gave early proofs of his cruel and voluptuous character. On the death of Marcus Aurelius, 17 March 180 a.d., Commodus ascended the throne. A conspiracy against his life in which his sister Lucilla played a promi¬ nent part, having been discovered in 183, he showed himself a more execrable monster than even Caligula, Nero or Domitian. For his amusement he cut asunder persons, put out their eyes, mutilated their noses, ears, etc. His brutal character made him jealous of all those who had risen to prominence during his father's reign, and most of them were put out of the way. He was endowed with extraordinary strength, and often appeared in imitation of Hercules, dressed in a lion's skin, and armed with a club. To fill the treasury, exhausted by his extravagances, he imposed unusual taxes upon the people, sold governments and offices to • the highest bidder, and pardoned criminals for money. To display his strength and skill in arms he appeared publicly in the amphitheatre. He is said to have fought in this way 735 times, and as his opponents were armed with weapons of tin or lead, while he was encased in impene¬ trable armor, he had naturally an easy victory on every occasion. In his combats with wild beasts he was securely protected by a screen of net work, through which he hurled his darts or shot his arrows. A part of the city having been consumed by fire, and the people reduced to despair by famine, disturbances broke out, and the Emperor was obliged to consent to the death of his minister, Cleander, who was charged with being the author of these calami¬ ties. He demanded that he be himself wor¬ shipped as a god under the title of Hercules Romanus. Commodus was strangled by the gladiator Narcissus, who was hired to commit the deed by Marcia, the mistress of Commodus, who had plotted with Laetus, the prefect, and Eclectus, the imperial chamberlain, to put him out of the way, and on the news of his death, which was reported to be the consequence of an apoplexy, the Senate declared him an enemy of the state, ordered his statues to be broken to pieces, and his name to be erased from all pub¬ lic inscriptions. Rome was indebted to him for her handsomest baths — the Thermae Antoni- nianae. He established also an African fleet, in addition to the Egyptian one, for the purpose of supplying the city with corn.

COMMON, that which belongs as a priv¬ ilege or right equally to more than one, to many, or to the public at large; free to all; general; universal; public; having no separate owner; as, the common weal. In Scotts Law. common good, taken in its widest sense, signified all the properties of a corporation over which the magistrates had a power of administration ((solely for behoof of the corporation.® In the sense of that which is for the general public the Court of Common Pleas is often called the (fCommon Bench.®

(

with another or with others, or for equal use or participation by two or more. Hence the old expression <(tenants in common® which is still in use.

The word is also applied to an open and (generally) unenclosed space, the use of which is not restricted to any individual, but is free to the public or to a certain number. In most of the cities and towns in the United States there are considerable tracts of land appro¬ priated to public use. These commons were generally laid out with the cities or towns where they are found, either by the original pro¬ prietors or bv the early inhabitants.

In logic the word is applied to terms or names, in opposition to individual, singular or proper. (

COMMON ACCIDENT, a term in logic used to denote a character or predicate which is nearly always or, it may be, always found in a certain kind of subject. See Logic.

COMMON ASSURANCES, in law , the

legal evidence of the transfer of the title to property, as deeds or wills. In most countries such evidences must be registered in con¬ formity with the provisions of the law in order to become operative and effective.

COMMON BENCH, the Court of Com¬ mon Pleas. See Common.

COMMON-BUD, a term used in botany to indicate a bud which is, at one and the same time, a leaf-bud and a flower-bud.

COMMON CARRIERS, such as carry goods for hire indifferently for all persons. The term includes carriers by land and by water and is sometimes applied to those who regularly and as a matter of business convey messages. On the one hand they comprise stage-coach proprietors, railway companies, truckmen, wagoners and teamsters, car-men, porters and express companies, whether such persons undertake to convey goods from one portion of the same city to another, or through the whole extent of the country, or even from one country to another; and on the other hand they include the owners and masters of every kind of vessel or water-craft, who undertake to carry freight of any kind for all who choose to employ them, whether the extent of their navigation be from one continent to another or only in the coasting trade, or whether employed in lading or unlading goods or in ferrying, with whatever motive power they may adopt. (Story,

Bailments, §§ 484-496). Common car¬ riers are liable for all damage or loss during the transportation from any cause, except the act of God or the public enemy. Common car¬ riers both by land or water, when they under¬ take the general business of carrying every kind of goods, are obliged to carry all which offer, and if they refuse without just excuse, they are liable to an action. Common carriers may qualify their common-law responsibility by

special contract. The bill of lading is usually the written evidence of the contract between the parties. The responsibility of the carrier begins on receipt of the goods from the owner. Carriers of passengers are not held responsible as insurers of the safety of those whom they transport, as common carriers of goods are. They are, however, bound to a high degree of care in the selection of appliances, employees, etc., in order to secure the safety of their pas¬ sengers. Extensive powers over carriers, es¬ pecially in regard to the fixing of rates, are pos¬ sessed by the Interstate Commerce Commis¬ sion, appoffi.ed by the act of 1887. Consult Fetter, (The Law of Carriers of Passengers' (Saint Paul 1897) : Hutchinson, (Treatise on the Law of Carriers' (Chicago 1891) ; Judson, (The Law of Interstate Commerce' (Chicago 1905). See Commerce, Interstate.

COMMON COUNCIL, the council of a city or corporate town, empowered to make by¬ laws for the government of the citizens. In American cities the city council is generally composed of but one chamber, but the name may be, and sometimes is, applied to a body consisting of two cameras. They arc elected by the people.

COMMON DIALECT, a name given to the common tongue of the educated classes in Greece and other countries after the death of Alexander the Great. This ((dialect" which was both written and spoken was also known as the "Hellenic dialect," a form of the Greek tongue much like pure Attic, which, with the writings of Aristotle, begins to change into the ((com- mon dialect.® The latter had pretty well changed into Byzantine Greek at the beginning of the 5th century.

COMMON DIVISOR, or COMMON MEASURE, in mathematics, a number that divides each of two or more given numbers exactly, that is, without leaving a remainder in the form of a whole number, fraction or decimal. The theory of divisors is that part or section of the theory of numbers relating to their divisibility; while the method of divisors is the means of finding the commensurable roots of an equation. By this method they are ren¬ dered integral, after which they are sought for among the factors of the absolute term.

COMMON FIELD, a term generally used in the plural to denote the arable land of a village community in ancient times. These lands were divided into

three long, narrow strips and were cultivated in co-operation though the land was alloted to several owners. In French Canada and those parts of the south of the United States which formerly belonged to France small tracts of land, usually quite narrow and long, fenced in and cultivated by the inhabitants in general, were long known by the name of the common land or common field.

COMMON LAND, a term loosely used to indicate that land is held in severalty but used in common. It also has the signification of land owned by the community and used as a waste or open land for common pasturage. Such land has not been appropriated to cultiva¬ tion by an individual. There was a great deal of such land in all the Latin-American coun¬ tries less than half a century ago ; and in cer¬ tain retired communities considerable of it

still exists, more especially in the Latin-Ameri- can countries. It was a common manner of holding land among all primitive peoples given to the cultivation of the soil on a scale extensive enough to make the possession of land a con¬ sideration in the life of the community or of the individual.

COMMON LAW, the great body of un¬ written law in England and the United States as distinguished from the written or statutory law. The ultimate sources of the common law of England are the usages and customs which were observed by the barbarous ancestors of the Saxon and Norman conquerors, and adminis¬ tered in their rude forest courts long before the beginning of their historic records. This origination is not peculiar to Teutonic law. < (Custom is law,® said Cicero. – Usage, or rather the spontaneous evolution by the popular mind of rules, the existence of which is proved by their general observance, is the oldest form of law making. The criminal law was a major part of the early English as of every other rudi¬ mentary legal system. All law was penal in its beginning, and the licensed revenge of in¬ jured parties, next to popular opinion, was the most powerful means of enforcing customary rules of conduct in loosely organized primitive communities. Indeed, compounding for injury was the beginning of criminal and, also, of civil procedure; the privilege of paying ((weregild® to buy off the avenger passed by almost imper¬ ceptible stages into the obligation to pay dam¬ ages for breaches of contract as well as for in¬ juries resulting from distinctively tortious acts. Oliver Wendell Holmes, Jr., now justice of the United States Supreme Court, in his ' Common Lawˆ published nearly 40 years ago, illustrated this evolution, and also the almost perfect parallel in the development of the Roman and Teutonic systems. A few examples of the early law of liability drawn from each of

these sys¬ tems may be useful as well as interesting. In the Twelve Tables (b.c. 451) it was provided that if an animal had done damage it must be surrendered to the injured party or his personal representatives, or compensation paid for the damage done. The same rule was applied (con¬ sult Gaius, (Institutes)) to the torts of children or slaves. The underlying idea in all these cases was the surrender of living things, from which an injury had proceeded, to the vengeance of the obligee ; the owner's privilege to pay damages in compensation being in effect a right of ransom. The forfeiture of the thing causing injury was afterward extended to inanimate objects by the Roman law; but an even more revolutionary innovation was the making of a person answerable for the wrongs of a free man in his employ as well as for injuries caused by slaves and other persons and things over which he had, or claimed, a proprietary right. Failure to observe a contractual obligation might not be considered a wrong that would excite a desire for vengeance; still, it is provided in the Twelve Tables that an insolvent debtor should be surrendered to his creditors, who, after the observance of certain formalities, obtained the right to cut up the bankrupt's body and divide the parts among themselves. Now as to the Teutonic parallels : According to the Salic Law, if a man was killed by a domestic animal, the owner was required to pay one-half the com¬

position (weregild) which he would have had to pay to buy off the blood feud if he himself had killed the man; for the other half he was required to surrender the animal to the com¬ plainant. The same law provided for payment of one-half the customary weregild where the slayer was a slave, and for the surrender of the latter to the vengeance of the blood kindred of the slain. In more primitive Teutonic law, as in the Twelve Tables, injuries done by animals were atoned for by their surrender alone. The (Lex Saxonica) made the master responsible for wrongs done by his bondmen at his com¬ mand and, according to the Thuringian law, the master was required to pay damages for all in¬ juries resulting from the acts of his slaves. In the Kentish laws of Hlothaere and Eadric (a.d. 680) it is provided that if a slave slay a freeman ... let the owner pay with 100 shillings and give up the slayer.® According to the laws of Ine, <(if a Wessex slave slay an Englishman, then shall he who owns him de¬ liver him up to the lord and the kindred, or give 60 shillings for his life.® (Consult Thorpe,

(Ancient Laws, I, pp. 27, 29 and 149). In the laws of King Alfrea (a.d. 871-901) is the pro¬ vision that (*

Edward III, cited in Fitzherbert's Abridg¬ ment, ' under title

< (Mainprise,® pi. 12.

The distinction is very properly made by American and English jurists between (

tion on the part of the receiver to complete the contract, had taken firm root in England before Bracton's time. The Roman principle as to the liability of the master for the default of his servant was first adopted in a case decided in the time of Edward III (reigned 1327-77) but the authority relied upon is the law of Oleron. The original English rule, as stated in the <(Laws of Henry I,® was, that t(the lord has to pay unless he can clear him¬ self of complicity®; the Roman law held the master responsible even though himself guilt¬ less of wrong. The Roman origin of the exist¬ ing English rule on the subject appears clearly from the fact that for more than 400 years past every English court and every English law writer has repeated the shallow arguments whereby the Roman jurists have defended the principle of liability without default. While it seems rather illogical to call ((unwritten® a body of laws recorded in thousands of volumes of printed reports and treatises, the distinction between this and the <(written® law incor¬ porated in statutes is completely justified. A statute law takes effect only from the time of its enactment and, generally speaking, affects only legal rights subsequently created or ac¬ quired. An ((unwritten® law is presumed to have been always in effect, and to be applicable to rights acquired, or existing, in the remotest time past. When a court renders a decision in accord with an immemorial custom or usage it does not make a law ; it merely records the fact of its existence, though the legal rule thus established may never before have been written down. The qualification ((unwritten® is, there¬ fore, quite properly given to such law. In their origin, indeed, legislative enactments and judicial pronouncements are indistinguishable. The sovereign himself, in theory and often in fact, dispensed justice in his court, and judicial pronouncements the same as royal ordinances or caricc emanated from the king. The in¬ vestiture of distinct officials with judicial func¬ tions, however, took place at an early date, and forms of action and rules of procedure, apparently, had been invented by the time of Henry I. Glanville in the succeeding reign speaks of the <(Action of Debt® as ancient, and the Action on Covenant® was probably estab¬ lished contemporaneously. A writ of (

devoted to the law of "Actions.® From this time forth the law reports, the issue of which increases in volume from year to year, became the repositories of the judicially declared un¬ written law. In the "Year Books® the report of a case generally consists of a statement of the form of action, the plea, a summary of the facts and the judgment of the court,

whether for the plaintiff or the defendant; the rule of law involved must usually be inferred. From the time of Coke judicial opinions be¬ came more and more elaborate and, nowadays, they are frequently of inordinate length even in cases involving no point of particular novelty or importance, while the reporters fol¬ low no discoverable principle of selection in making up their volumes. The Roman system of laws begins and ends with a code. The theoretical descent of this body of law from the Twelve Tables and the theoretical ascrip¬ tion of the common law to immemorial un¬ written tradition were the chief reasons for the difference in the development of the two systems.

The early Teutonic law scarcely recognized individual property. A man might own his spear, his sword, his shield and other weapons of offense or defense ; but the allod, or domain of each household, was incapable of being dis¬ posed of by sale or testament, being strictly reserved to the kindred. Even chattels were regarded as common possessions, the family partaking somewhat of the character of a cor¬ poration, of which the pater-familias was the trustee, and the members of which were clothed with certain inalienable rights. Under the feudal system a new viewpoint was taken with regard to property in land. The Gothic, Frank¬ ish and Saxon chieftains, who conquered the domain of the decadent Roman Empire, par¬ celed out their conquests among their retainers in fiefs. But the land thus distributed was not owned by the person in possession. It was merely held in tenure by way of reward for prospective, as well as past, military service. When the holder of a tenure died or failed in his loyalty the property, which had theoreti¬ cally remained vested in the sovereign, reverted absolutely to the latter. The succession to land was in the disposition of the overlord, who could demand homage and fealty from the successor as conditions of investiture, and who would also see to it that the latter was a person capable of fulfilling his military obliga¬ tions. The preference of males in the line of descent and the practical disinheritance of all but the first-born were natural outgrowths of feudal institutions. The privilege of con¬ veying land without regard to these limita¬ tions and the view of a will, which regards it as conferring power to divert property as the fancy of the testator may dictate, are not older than the later portion of the Middle Ages. The modification of the strict feudal rules of inheritance in England was an achievement of the courts and lawyers, which was not obtained without conflict with the landed interests represented in Parliament. For instance, where a conveyance or devise of land was made to a person "and his heirs,® the courts held this condition to be satisfied when an heir was born to the grantee or devisee; though the heir might subsequently die, the right to dispose of the land by sale

or will was complete. The statute (De Donis' reversed this rule of the lawyers and declared that in the event of the non-existence of an heir on

the demise of the holder of a fee in land the title reverted to the grantor. The feudal law recognized entails, but the lawyers invented the process of "fine and recovery® whereby an entail could be defeated. Finally, by the rule in Shelley's case, the word "heirs® in a conveyance of land was held not to be a word of limitation curtailing the grantee's right of disposition, unless so qualified that another interpretation would necessarily have to be given to it. Another legal fiction, whereby the alienation of estates in land was facilitated, was introduced by the equity juris¬ diction The holder of a fee simple was per¬ mitted to create a "use® by conveying the legal title to another, with the understanding that the grantor was to retain an equitable estate therein. The court of chancery would enforce this understanding against the grantee, who held the legal title, and a "use® was capable of testamentary disposition. In the event of intestacy the "use® descended to the heir. Finally Parliament made a statute declaring the beneficiary of a "use® to be the real owner and permitting the disposal of estates in land by will. In this roundabout manner were "ten¬ ures® converted into absolute rights of owner¬ ship. In theory the holder of a tenure con¬ tinued to owe homage to his immediate land¬ lord, though by Coke's time the obligation to perform military service as a condition of holding had become in the main a legal fiction. A tenancy in fee was tantamount to ownership, and there were lesser estates, as copyholds, in the creation of which the possibility of the tenant trailing a pike in the service of his liege was never thought of. A copyholder was simply a lessee who paid rent, and a lease had become simply a contract. The provision made by law for the widow was attributable to the exertions of the Church, which achieved one of its greatest triumphs when the express promise exacted from the husband at marriage to endow his wife was con¬ verted into a legal right and the principle of "dower® was grafted on the customary law of all western Europe. A milestone in the history of the common law was placed when Thomas Littleton's famous treatise on ten¬ ures > was published (about 1481). This work, written in Norman French, was the first really systematic exposition of the English law of real property. It contained not merely a clear and accurate account of the great variety of tenures then known in England, but of the rules with respect to the alienation and inheritance of land, including the law of primogeniture and entailment, as well as the rights incidental to land holding, as easements, or the right to the usufruct. Also the property rights growing out of personal relations between the parties, for instance, a husband's estates by curtesy and a wife's right of dower. Also the absence of rights resulting from a low position in the social order, as, for example, villeinage. Also the law of actions on (Covenant and of (Fine and Recovery. In fact, for a community which was just emerging from the feudal stage of organization, and in which land alone was, literally speaking, considered real property, the law of tenures contained a practically complete*

system of rules for the governance of society in its ordinary civil relations. It was this that moved Camden, in his ˆritannica,* to speak of Littleton as ((the famous lawyer, to whose (Treatise on Tenures } the students of common law are no less beholden than are the civilians to Justinian's Institutes.® Coke called the book <(the ornament of the common law, the most absolute and perfect work that ever was written in any human science® — and, when he had drowned the original rivulet of text in an inky flood of commentary, he put forth the product (in 1628) as the (First Institute of the Law of England.) In this form the work for nearly two centuries remained an authoritative textbook on the common law and, though now almost wholly obsolete, it still has undeniable historic value.

The legislative or statutory contributions to the common law have been massive in quantity and of transcendent importance in their subject matter. It is impossible to even men¬ tion more than a few, which stand out above the rest in the formative influence they have exerted. The statutes of Mortmain and Chari¬ table Uses were designed to prevent perpetuities. They marked the growth of the right to alien¬ ate land and the gradual undermining of the feudal system. Frequent additions and amend¬ ments were required to overcome the ingenuity exercised by the lawyers to evade the statutes against the formation of ecclesiastical and other latifundia. Of equal importance, though in a quite different direction, was the Statute of Frauds. A distant progenitor of this was the provision of Magna Carta which required secta (witness proofs) for parol debts, and set a limit to contentious and vexatious litigation by for¬ bidding suit for such debts except within the traditional limits of the secta. The statute of Charles II (1677) for the Prevention of Frauds and Perjuries requires written instruments as proof in many classes of contracts and in all contracts not to be performed within a year. The imperfection and danger of oral testimony as proof of past transactions make this one of the most salutary legislative measures in English jurisprudence. The Statute of Limitations, passed during the reign of James I, should also be mentioned. The barring of stale claims from litigation after long lapse of years, when oral and other evidence concerning the trans¬ action was no longer procurable, is the only effective means of quieting titles and assuring the members of society from provocative inter¬ ference with other long enjoyed rights and promoting the peace. Other sources of the common law, which may here be conveniently mentioned, are the charters granted to munici¬ palities and trading companies, many of the "liberties® granted in these having become gen¬ eral rules of law. The "Law Merchant® was a body of usages common to traders in all parts of Europe relating mainly, of course, to mer¬ cantile

transactions. The law was laid down by the merchants themselves. The traders of the later Middle Ages were cosmopolites and their established customs and legal rules were observed by all alike, irrespective of nationality. The law was administered by special tribunals — in England by the Courts of Staple and Pie¬ powder Courts. It was administered as dis¬ tinct from the Common Law even after Coke, in whose time the ordinary law courts had be¬

gun to take jurisdiction of controversies be¬ tween traders. The customs had to be proved as facts in each case. During the presidency of Lord Mansfield over the King's Bench, the Law Merchant was finally incorporated with the common law (see Commercial Law). Finally, the equity jurisdiction assumed by the lord chancellors at an early date, and continu¬ ally broadened, wielded a tremendous in¬ fluence on the matter, form and practice of the common law ; more particularly with regard to women, children and other persons of im¬ perfect legal capacity. This department of law reached its full development in the 18th century under Lord Eldon (see Equity). The laws of marriage and the family, of consanguinity and testamentary succession had their origin in the civil and canon law and until modern times (in England) they were administered by the ecclesiastical courts. The title "Surrogate,® quite common in the United States, was origi¬ nally that of the officer who presided over the probate of wills in the Ordinary's Court.

In the domain of constitutional rights the common law has drawn its tenets from a variety of sources; but all of them are purely English. The right of freemen to representa¬ tion in their own government is traditional, and the Saxon "witenagemots® and Norse "folke things® were the prototypes of Parlia¬ ment and Congress and all other later legis¬ lative assemblies. Immemorial usage also is the basis of the right to trial by jury, though this is also confirmed by Magna Carta. The English Bills of Rights, as their names import, were acts of Parliament, though in America they have generally been embodied in written constitutions, State and Federal. The inde¬ pendence of the judiciary of royal prerogative and the answerability of judges to God and their own conscience, and to no other authority whatsoever, were pronounced in a defi of King James I by Lord Chief Justice Coke. The latter also anticipated the United States Su¬ preme Court by nearly 200 years in passing upon the constitutionality of statutes, saying that "the common law doth control acts of Parliament and adjudge them void when against common right and reason.® The fiction that English sovereigns rule by divine right was shattered at least four times, when reigning monarchs were deposed and it was shown that kings in England ruled only by grace of the law and of Parliament. This was the complexity of political liberties and public and private rights, known as the common law, which the English colonists carried with them to America as a

cherished heritage. It may suffer in the estimation of precisians because of its lack of form ; its nomenclature, as has been truly said, is "a mosaic of many languages® — and the law itself, "except so far as it has been deduced with much logical punctiliousness from the theory of feudal tenure,® is little more than a collection of rules strung together on a slender thread of analogy, through which the practi¬ tioner must be content to find his way by the help of indices, abridgments or so-called "Digests® arranged in alphabetical order. On the other hand the case against the embodi¬ ment of the law in a code, where the rules would be restated in the language of the codifier, is a strong one. A code, being in¬ flexible in its character, prevents true growth

in the law. Discussions in court would turn on the interpretation of words employed in the codification instead of the examination of legal principles. Moreover, an uncodified system of law can be mastered by the student whose scientific equipment enables him to cut his own path through the tangled growth of enactment and precedent and, so, to codify for his own purposes. The common law as it existed at the time of the Declaration of Independence, including the acts of Parlia¬ ment in so far as they were not repugnant to the rights and liberties contained in their re¬ spective constitutions, was formally adopted in all the original States of the Union and by most of the commonwealths subsequently ad¬ mitted as States. Louisiana, where the (Code Napoleon prevailed at the time of its admis¬ sion to statehood, is an exception. Feudal tenures, the right of primogeniture and entails were abolished in all the original States, and were never recognized by the common law in America. Though the Constitution of the United States in no words adopts the common law, its provisions no less recognize the exist¬ ence and continuance thereof as the law of the States, with which the national government might not interfere. But even statutes are to be construed with reference to the common law, for it is not to be presumed that the legis¬ lature intended to make any innovation upon the common law further than the case abso¬ lutely required. This rule of construction has been held applicable to acts of Congress. The Federal courts have no jurisdiction over com¬ mon law crimes ; however, in the trial of ac¬ tions between citizens of different States involving ordinary legal rights these courts necessarily take cognizance of the laws of the States and of the principles of the common law governing the cases thus brought before them. The Constitution of the United States, together with foreign treaties and acts of Con¬ gress made under its authority, are the supreme law of the land. In the States their constitu¬ tions, statutes and the common law rank in authority in the order*

*given. When the Ameri¬ can colonies had achieved their independence Blackstone's Commentaries on the Laws of England, * which Horne Tooke called (*

Lord Mansfield, who during his 30 years' in¬ cumbency of the office of Chief Justice of England (1756-88) reduced the mercantile law to a systematic and harmonious form. The rise of the United States early in the 19th cen¬ tury to the position of a maritime power sec¬ ond only to Great Britain, and the long-con¬ tinued state of war on the high seas during that period, naturally produced litigation pertaining to shipping and commerce. Accordingly, the early American law reports are noteworthy for the large proportion of judicial opinions they contain on bills of exchange, bills of affreight¬ ment, charter party and, particularly, marine in¬ surance. Little was left for succeeding courts to add to the law on the last named topic. The growth of trade and industry made a form of association desirable, to which many could sub¬ scribe capital, with liability limited to the amount of their subscription ; therefore, the adaptation to the requirements of manufacturing, trading and other business enterprises of the corporation, which had theretofore served mainly for the ad¬ ministration of charitable, ecclesiastical and educational foundations, of municipalities and such politico-commercial entities as the East India Company. The institution and develop¬ ment of the business corporation are to be counted among the great achievements of Amer¬ ican jurisprudence. The partial emancipation of married women from the disabilities of cover¬ ture was begun by legislative enactments in the States in the 40's of the last century. In the systematization or codification of the substan¬ tive law no great progress has been made in the United States. The law on such topics as negotiable instruments, bills of lading and sales has been reduced to the form of nroposed statutes, which have been recommended to the States for adoption — and the first mentioned has been almost unanimously adopted, so that the law on this subject is practically uniform throughout the country. New York led the way in the codification of the rules of civil pro¬ cedure, with incidental simplification and the abolition of the distinction between common law and equity pleadings. The example has been pretty generally followed and the penal law and criminal procedure have likewise been codified in many States. See Commercial Law; Criminal Law ; Equity ; Family Law ; Hus¬ band and Wife; Jurisprudence; Maritime Law.

Bibliography. — Haynes, J. F., (Students' Leading Cases (London 1878) ; id., (Students' Statutes* (London 1876) ; Holmes, O. W., Jr., (The Common Law* (Boston 1881) ; Inder- maur, J., Principles of the Common Law* (5th ed., London 1900) ; id., (Leading Conveyancing and Equity Cases) (3d ed., London 1877) ; Kent, James, Commentaries on American Law* (14th ed., by J. M. Gould and O. W. Holmes, Jr., Boston 1896) ; Littleton, Thos. de, tenures) (London 1846) ; Mitchell, W., Parly History*

of the Law Merchant (Cambridge 1904) ; Pattee, W. S., Hllustrative Cases in Personalty) (Part II, Pales, Philadelphia 1894) ; id., Hl¬ lustrative Cases in Realty; (ib. 1894); id., Hllustrative Cases in Contracts) (ib. 1893) ; Pollock and Maitland, (History of the Law of England1* (2d ed., Boston 1899) ; Salmond, J. W.,*

the Common Law} (author's 3d cd., London 1886 — 7th ed. by Watson, London 1904); Stephen, J. Fitzjames, (Digest of the Law of Evidence } (5th ed., London 1887) ; Stephen, John H., (New Commentaries on the Laws of England — partly founded on ((Blackstone))) (15th ed., London 1908); id., Principles of Pleadingˆ (ed. by F. F. Heard, Philadelphia 1867) ; Terry, H. T., (Leading Principles of Anglo-American Law> (Philadelphia 1884) ; Thorpe, Benj., (Ancient Laws and Institutes of England (Record Commission, London 1840) ; see also bibliographies under titles Criminal Lam ; J urisprudence ; and Marriage.*

Stephen Pfeil.

COMMON LIFE, Brethren of the, or THE COMMON LOT, a religious institute founded about 1376 by Geert or Gerhart Groot at Deventer in the Low Countries. Groot on a visit to the noted mystic Ruysbroek was so im¬ pressed by the spectacle of peace and joyful co-operation shown in the community of Austin friars over which Ruysbroek presided that he resolved to form a society embracing both cler¬ ics and laymen who, without taking the mon¬ astic vows, should lead an austere Christian life in common. One of the aims of the brother¬ hood was to conduct schools for the religious and moral education of children, and their la¬ bors in that field were so successful and so highly appreciated that their school at Hertog- enbosch had 1,200 pupils and another school even a larger number. Establishments of the brotherhood were founded in Italy, Sicily and Portugal, and in 1430 there were in existence 130 societies of the institute. At the same time there was formed a similar institute for women: here the superior of each society was styled the Martha. Among the eminent characters who were members of the brotherhood or alumni of their schools were Thomas a Kempis, Nico¬ laus Cusanus and Erasrrtus. Many of the ((ob- scurantist® letters in the Ppistolae Obscurorum Virorum> purported to be written by members of the Deventer Brotherhood, who are made to appear as irredeemable blockheads.

COMMON METRE, a term used in psalmody to indicate a special form of iambic stanza, consisting generally of four lines, with eight and six syllables alternately to the line. It received its name because it was actually the (

COMMON PLEAS, Court of. See Court.

COMMON PRAYER, Book of. See Book of Common Prayer.

COMMON RECOVERY is, in law, a col¬ lection suit instituted by the intended grantee of land against the intended grantor in which the land is suffered to be recovered by the grantee. This device, which was once in com¬ mon use to avoid legal restraint on alienation by conveyance, is now gone out of use, as ad¬ ditional provisions of the law have made its employment impracticable.

COMMON SCHOOLS, schools for the common people or the people in general. It is only in modern times that education has spread to the masses. In ancient times education was generally confined to a limited class and it was only after the Reformation that common schools came into being. At first they were under ec¬ clesiastical direction, but were gradually secu¬ larized and placed under the control of the state. Most of the American colonies estab¬ lished common schools and by 1825-50 the free school system developed. Since then the sys¬ tem has extended to all the States and the scheme of instruction has been greatly enlarged. In the United States, therefore, the term means schools to which all persons within certain ages, except criminals and those with contagious dis¬ eases, may attend and implies, moreover, that such schools are supported and controlled by the people and charge no tuition. At first the term was confined to elementary and secondary schools, but there is a growing tendency to include in the common schools of the United States all grades and degrees from the kinder¬ garten to the university. There were in 1917 enrolled in the elementary and secondary com¬ mon schools 19,153,786 persons or 73.66 per cent of the school population. The average daily attendance in the same year was 14,216,459 or 74.2 per cent of the pupils enrolled. There are 580,058 teachers employed in the common schools, of which number 19.8 per cent are males. The average monthly salary of teachers was $66.07, and the estimated value of all pub¬ lic property used for school purposes was $1,444,666,859. A total of $555,077,146 was expended on the common schools, or $5.62 per capita of total population and at a cost of $39.04 per capita of average attendance. The common school system in general use in the United States has been extended into Porto Rico, Hawaii and the Philippine Islands. Cuba has adopted the same system. See Education, History of; Education in the United States ; Education, Elementary, Secondary, etc. See also Public Schools ; Parish Schools.

COMMON SENSE, the philosophy of the so-called Scotch school of philosophy founded by Thomas Reid (1710-96), who aimed to es¬ tablish a series of fundamental truths indispu¬ table as primitive facts of consciousness. He taught that the general consent of mankind as to the

existence of an external world, as to the difference between substance and qualities, be¬ tween thought and the mind that thinks, is sufficient to establish the reality of a permanent world apart from ourselves ; and he maintained that sensations are not the objects of our per¬ ception, but signs which introduce us to the knowledge of real objects. The name is applied in colloquial language to that power of mind which arrives at correct conclusions, even if the thinker has no knowledge of laws of though_t

COMMON-TIME, time with two beats in a bar or any multiple of two beats in a bar. The beats may be of the value of any note or rest or compound of notes and rests, providing the sum required by the time sign be exactly contained in each bar. Common-time is of two kinds, simple and compound. Simple com¬ mon-time is that which includes four beats in a bar, or any division of that number, or square of the number of the divisions. The signs used

to express simple common-time are the follow¬ ing: f, |, I, I, s, and the characters C and Q. In these signs the upper figure denotes the quan¬ tity of notes required in the bar, and the lower figure the quality of the notes. Com¬ pound common-time is expressed by the signs 4 , V'* such signs meaning two or four beats

of three crotchets or quavers to each beat.

COMMONS, John Rogers, American economist: b. Hollandsburg, Ohio, 13 Oct. 1862. He was graduated at Oberlin College with the degree of A.B. in 1888, and received the de¬ gree of LL.D. from the same institution in 1915. He studied at Johns Hopkins University 1888- 90 and became professor of economics and sociology at Oberlin College 1892, at Indiana University 1893-95, Syracuse University 1895— 99, and at the University of Wisconsin since 1904. He was director of the Bureau of Eco¬ nomic Res.earch 1899-1901, and is director of the American Bureau of Industrial Research since 1904. He was investigator for the United States Industrial Commission 1901-02. In 1911 he was appointed a member of the Wisconsin Industrial Commission; and in 1913 he pub¬ lished a report of the work of the Milwaukee Bureau of Economy and Efficiency. He is the author of articles on wealth, labor, representa¬ tion, etc., in scientific and other journals, and of (The Distribution of Wealth) (1893) ; So¬ cial Reform and the Church) (1894) ; Propor¬ tional Representation (1895, rev. 1907) ; (Trade Unionism and Labor Problems) (1905) ; (Races and Immigrants in America) (1907) ; (Labor and Administration (1913) ; (Labor Legislation (with John B. Andrews, 1916). He edited Restriction of Output by Employers and Employees) (the 7th special re¬ port of the United States Commissioner of Labor, 1904). He was also one of the editors of (A Documentary History of American In¬ dustrial Society) (1910) ; (History of Labor in the United States) (1917) ; and wrote (Prin-ciples of Labor Legislation5 (with John An¬ drews, 1917).

COMMONS. The commons of Great Britain, in a general sense regarded as com¬ prising all such men in the kingdom as had not seats in the House of Lords, and every one of whom had a voice in Parliament, either personally or by his representatives. With women now (1917) enrolled in the parliamen¬ tary franchise, the Commons must be regarded as including both sexes. Commons in Parlia¬ ment is the lower House, the third estate of the realm, and consist of representatives elected by the counties or divisions of counties, and by the cities and boroughs. In the election of rep¬ resentatives anciently all the people had votes; but in the 8th and 10th of

King Henry VI, for avoiding tumults, it was enacted that in coun¬ ties none should vote but such as were free¬ holders, did reside in the county, and had 40s yearly revenue, equivalent to nearly £20 a year of the present money; the persons elected for counties to be milites notabiles, at least esquires or gentlemen fit for knighthood; native Eng¬ lishmen, or at least naturalized, and 21 years of age; no judge, sheriff or ecclesiastical person to sit in the House for county, city or borough. The House of Commons, in Fortescue's time, who wrote during the reign of Henry VI, consisted of upward of 300 members : in Sir

Edward Coke's time their number amounted to 493. At the time of the union with Scotland, in 1707, there were 513 members for England and Wales, to which 45 representatives for Scotland were added; so that the whole num¬ ber of members amounted to 558. In conse¬ quence of the union with Ireland, in 1801, 100 members were added for that country; and the whole House of Commons therefore consisted of 658 members. By the reform bill of 1832 the number of members was altered as fol¬ lows : 500 for England and Wales, 53 for Scot¬ land and 105 for Ireland. The reform acts of 1867 and 1868 introduced a further alteration, the numbers being 493 for England and Wales, 60 for Scotland and 105 for Ireland; by the act of 1885 they became respectively 495, 72 and 103. See Parliament; Great Britain — Par¬ liament.

COMMONWEALTH, the state or pros¬ perity of a country without any reference to the form of government under which it may be at the time. Owing to the semi-independent position of the States of the American Union the term commonwealth is of frequent applica¬ tion to the various members of the great Fed¬ eral government, which itself is spoken of as the National or Federal Commonwealth in con¬ tradistinction from its constituent autonomies. In many of the States the legal proceedings against criminals, etc., are instituted in the name of the (for example) <(Commonwealth of – v. John Doe.®

The word is also applied to the period in the history of England during which the parlia¬ mentary army and the Protector, Oliver Crom¬ well, exercised the power of government. King Charles I was beheaded on 30 Jan. 1649; but if the beginning of the commonwealth be de¬ ferred to the time when Oliver Cromwell be¬ came Protector, then its beginning wras not till 16 Dec. 1653. It received an all but fatal blow by the death of its great chief, 3 Sept. 1658. On 22 April 1659, Richard Cromwell, his in¬ competent son and successor, resigned, and on 29 May 1660, Charles II was restored to the throne. The Commonwealth of Australia, em¬ bracing the states of New South Wales, Vic¬ toria, Queensland, South Australia, West Aus¬ tralia and Tasmania, was established by act of Parliament passed 9 July 1900, and proclaimed at Sydney, 1 Jan. 1901'.

COMMUNALISM, the theory of govern¬ ment by communes or corporations of towns and districts, adopted by the advanced republi¬ cans of France and elsewhere. The doctrine is that every commune, or at least every important city commune, as Paris, Marseilles, Lyons, etc., should be a kind of independent state in itself, and France merely a federation of such states. This system must not be confounded with ˆCommunism® (q.v.), with which, however, it is naturally and historically allied, though the two are perfectly distinct in principle.

COMMUNE, kom'mun, the unit or lowest division, in the administration of France, cor¬ responding in the rural districts to the English parish, or township, and in towns to the English municipality. In France there are about 36,000 communes, with a considerable measure of self- government, with the power of holding prop¬ erty, etc. Each commune has a council elected by universal suffrage, and the council is pre-

sided oyer by a maire and one or more adjoint s or assistants. In the larger communes the maire is selected by the central government out of the members of the council ; in others he is appointed by the prefect of the department. The central government, through its officials, exercises generally a very large control over the affairs of the commune.

The rising of the Commune of Paris in 1871 should not be confounded with "Communism" (q.v.). It was a revolutionary assertion of the autonomy of Paris; that is, of the right of self-government through its commune or munic¬ ipality. The theory of the rising was that every commune should have a real autonomy, the central government being merely a federa¬ tion of communes. The movement was based on discontent at Paris, where the people found themselves in possession of arms after the siege of the Germans. The rising began on 18 March 1871, and was only suppressed 10 weeks later after long and bloody fighting between the forces of the commune and a large army of the central government ; 6,500 Communists having fallen during 20-30 May, and 38,578 being taken prisoners. Consult Du Camp, (Les con¬ vulsions de Paris) (4 vols., Paris 1878-79) ; Lessagaray, (Histoire de la Commune' (Paris 1896) ; March, (History of the Commune of 1871 ' (London 1896).

COMMUNICATIO, kom-mu-ne-ka'shi-o, or COMMUNIO, Idiomatum, Id-i-6-ma'tum, a

term or phrase hardly capable of translation into English, which is used to

signify the ap¬ propriation mutually of divine attributes to Christ as man, and of human attributes or human affections to Christ as God because of the hypostatic union of the divine nature and the human nature in Christ ; thus, we say "God died for us," and the mother of Jesus is theotokos, deipara, mother of God. Idioma , plur. idiomata, is Greek equivalent to Latin proprietas, and means that which belongs to one, an attribute. The theological phrase in Greek is antidosis idiomaton.

COMMUNION, the reception of the Eucharist. In the Roman Catholic Church the Eucharist is administered to the faithful only in one kind, the species of bread. Only the priest who performs the act of consecration receives the sacrament in both kinds. In the Protestant churches the laity receive the sacra¬ ment in both kinds, and the usage of the Greek and Oriental churches is the same. The withholding of the cup from the laity was not required by the laws of the Latin Church till the Council of Constance ordered it in 1414, though by that time usage had made it an almost universal custom. Yet down to the

11th century communion under both species was universal, and as late as the middle of the 13th century Saint Thomas Aquinas notes the communion under one kind as the usage only of "some churches." As it is purely a Church regulation, the Church can and does dispense from it, or the Church can abrogate it and bring back the original usage of com¬ munion in both kinds. Even in the earliest times communion under one kind was the rule when the sacrament was to be administered to the sick and infirm in their homes ; in that case the one kind was under the species of bread, but in the same early period it was cus- vol. 7 — 27

tomary to administer the Eucharist to infants immediately after baptism, but only under the one species of wine. See Lord's Supper.

COMMUNISM. Although aiming at the abolition of private property, communism must not be understood as including at all times an equal division of all property. In its limited application it may mean the common manage¬ ment of industry and the sharing of the fruits of some of these in common. Socialism is not communism, though some socialistic schools are communistic, that of Edward Bellamy's (Looking Backward' being purely so.

Communism, or the sharing of things in common, is, in a limited form, practised by every civilized community. There is to-day common management of parks, schools and other utilities, and practical communism in water, which is supplied free to the poorest inhabitant of our cities. In the case of com¬ modities which are plentiful and cheap, as, for example, matches, there is a kind of commun¬ ism prevailing among individuals. But perfect communism as a social theory finds few ad¬ herents, and practical

experiments in the past in such directions have been, save for limited periods, unsuccessful. Even where the com¬ munism of certain societies or settlements has succeeded temporarily it has done so largely by their trading with or manufacturing for the greater world of capital and labor that touches them from without. Few of such communities that have remained entirely isolated have at¬ tained even a measurable degree of success.

Communism in the Christian Church. — It is not too much to say that in primitive times property was in common, and that indi¬ vidual ownership arose as a natural develop¬ ment out of communism. The Cretans and the Spartans possessed communistic societies, and there seems to be little doubt that communism as a supernatural ideal was practised among the early Christians. That it was successful for a time in the primitive state of society then prevailing among the disciples of Jesus also seems highly probable. The communistic so¬ cieties that have since been formed have been successful in the measure of religious devotion that inspired sacrifice, and have declined as this religious ardor subsided or became cor¬ rupted by other elements. But whatever their temporary success may have been among the early Christians, the experiments were soon utterly abandoned, and the principle of indi¬ vidual ownership of property finally and fully asserted itself. That even the early Christians adopted without qualification the theory of communism may be doubted. Certainly authori¬ ties are disagreed, so that even here we are without the necessary data to conclude that perfect communism was temporarily successful. During the Middle Ages many of the religious orders, notably those that strove to preserve thie apostolic simplicity of the early Ghurch, the Franciscans, the Brothers of the Common Lot and others, taught and practised com¬ munism.

Communism in the United States. —

Fourierism. — The communities that have been formed in the United States, mostly in New England and the West, have nearly all died out, or exist in a moribund condition. We need not speculate upon the reasons, though

it would seem that the desire of individual ownership, with the incentive to action which such ownership inspires, is indestructible and therefore fatal to perfect communism. The most famous of all American communistic or semi-communistic societies that arose as a re¬ sult of the teachings of Charles Fourier (q.v.), was that of Brook Farm (q.v.) because of the intellectual and literary eminence of its founders. Horace Greeley (q.v.)

*was a warm friend of the Fourierite movement from the first, advo¬ cated it powerfully in the New York Tribune and was vice-president of the North American Phalanx, in Monmouth County, N. J., one of the most successful of the Fourierite com¬ munities, for it lasted over 12 years, dying in 1856. It was intended as the model of its kind, and at the beginning it prospered. Perhaps no similar movement has ever received anything like the influential support accorded to Fourier¬ ism. The teachings of this remarkable man, the insight and value of much that he wrote, as well as the warmth that suffused his prophecies, enlisted the enthusiasm and aid *of some of the most eminent men of the time. But feuds and disharmony set in, and slowly the movement began to disintegrate. The noble dreams of Fourierism were either founded upon mistaken generalizations, or were too early anticipations of the industrial and social development of mankind. It was only at a lat'e period of its career that Brook Farm came to be modeled on the Fourier plan, and its simple life became perhaps too systematized. Work was in common, and at the most menial occupations men who became the glory of American letters, and women of the highest New England culture, cheerfully took their turns. But with the ebbing of the tide of Fourierism the Brook Farm experiment came to an end. The North American Phalanx out¬ lived it for a short period ; but with the death of that settlement a movement which embodied one of the most pretentious and sweeping phi¬ losophies of social regeneration perished from the American continent. Fourierism, which in France had died for lack of funds', had re¬ ceived in America as fair and adequate a trial as was ever accorded to any mooted social re¬ form. For years its disciples had taught and experimented, only to end with failure. When the New York Tribune abandoned its advocacy it ceased even to be a topic of general discus¬ sion, and in 1856 came its final collapse.*

New Harmony. — In connection with early attempts in the last century to found com¬ munistic settlements in this country the name of Robert Owen (q.v.) is conspicuous. This English manufacturer, an enthusiastic com¬ munist, having seen his efforts in Great Britain fail of fruition, visited this country and founded a number of communities, the best known of which was that of New Harmony, Ind. Most of the others were short-lived, and that of New Harmony, born in 1825, expired in 1827.

The Shakers.— Among the communities that owe their origin to religious fervor, and which still survive at Mount Lebanon, N. Y. ; Union Village, Ohio; Watervliet, N. Y. ; and elsewhere are those of the Shakers (q.v.). Their founder, Ann Lee (q.v.), landed in New York in 1774, with eight followers from Eng¬ land. They had fled to escape the persecution

which had followed her bold assertion of divine revelation. The Shakers are celibates, and thus their communities have not grown very rap¬ idly, yet 15 are said to exist to-day.

Oneida Community. — The Oneida Com¬ munity, another of the very few survivals of that communistic spirit which swept over the country in the middle forties, was established in 1848. It ignored the regulation of marriage, founding the union of the sexes purely on the mutual consent of the man and woman. It was because of this that the Oneida Community fell into evil repute, and this reputation ex¬ tended in many cases to communities less deserving of the stigma. The union of one man with one woman the community expressly discouraged as an "exclusive and .idolatrous attachment.® When a man and woman were brought together, and showed a tendency to c*

Harmony Society. — The Harmony Society, which was succeeded in 1825 by New Harmony, Robert Owen having purchased the land of that settlement from George Rapp (q.v.) and his followers, was a notable experiment. Rapp's notions were queer enough, but he had great influence with his followers, who re¬ garded him as possessed of supernatural powers. They practised communism and celi¬ bacy from 1805, the date of the founding of the community in Butler County, Pa., where they remained until 1814, when they changed their location to the Wabash Valley. Here the settlement flourished until the purchase of the lands by Robert Owen.

Amana Community. — The Amana Com¬ munity, still surviving, was formed in 1842 by emigrants from Germany and Switzerland, who originally belonged to the peasant class. They settled in New York State, near Buffalo, and later removed to Iowa. They were spiritual¬ ists who regarded themselves as the subjects of special revelation. This religio-communistic settlement is probably the earliest in origin in this country, for it traces the beginnings of its creed as far back as the early part of the 18th century. Their rules of life are rigid and for¬ bidding; amusements are prohibited; and much that ministers to innocent pleasure is banished as sinful.

The lcarian Community. — To mention even the names of all the communities that exist or have existed in the United States would take more space than can be given to the subject. The appended bibliography

will guide to all the information of which the reader may be in search. But special mention ought not to be omitted of the lcarian Community, remarkable as owing its origin to a book, (A Voyage to IcariaB by Etienne Cabot (born 1788), who had been a member of the French legislature and a leader of the Carbonari. He sailed in 1848 with a number of his followers from France,

and established the community in Illinois in accordance with the ideas contained in his work. They numbered as many as 1,500 at one time. Later they were compelled to seek other settlement in Iowa. This community was peculiar in that it came nearer to the ideal of democratic communism ; the rigid regulations of other communities were absent, the point aimed at being to let every one do as he pleased.

A settlement in which no community of property save that of land obtains, and in which the government is nearly as purely demo¬ cratic, is that of Fairhope, Ala., founded a few years ago by a handful of disciples of Henry George. It is organized as a corporation, by which its real estate is administered. The annual value of the land is taken for communal purposes. It numbers about 300 members, and up to the present time is prosperous.

Significance of Communism. — All these ex¬ periments which have been reviewed have failed to demonstrate the feasibility of communal life. Existence within its confines is, for the most part, meagre and unsatisfying. Though these communities sometimes grow rich, prog¬ ress in its finer sense there is none ; they do not rise in culture and intelligence above their original level. Yet some things they have demonstrated, among which are the possibil¬ ities of a more peaceful industry, more un¬ selfish lives, together with a fuller leisure, and freedom from the harassing fear of want. Abnormal as they seem, they are really pro¬ tests against what in our civilization is ab¬ normal. Clothed, as the most successful of them are, in religious guise, the fact that they are impulses, even when most eccentric, of the more profound and imperishable nature of man, is vastly significant.

Bibliography. — Lavaleye, Primitive Prop- erty) ; Nordhoff, (The Communistic Societies of the United States5 ; Hinds, W. A., Ameri¬ can Communities5 ; Lockwood, (The New Har¬ mony Communities5 ; Noyes, J. W., (History of American Socialisms5 ; Emerson, R. W., 'Remi¬ niscences of Brook Farm5 ; Swift, Lindsay, 'Brook Farm5 ; Gronlund, L., 'A Co-operative Commonwealth5 ; and Dixon, W. H., 'New America,5 for an interesting account of the Shakers.

Joseph Dana Miller.

COMMUNISTIC SOCIETIES. See

Communism.

COMMUNITY CHRISTMAS TREE MOVEMENT. The Community Christmas Tree Movement, which was initiated in New York with festivities for the children at Madi¬ son Square, in 1912, has very rapidly devel¬ oped in popularity. The tree is lit from Christmas Eve till the midnight of 31 Decem¬ ber, when thousands of children welcome in the New Year with music. Even before 1912, at San Francisco, the public singing of carols led bv Madame Schumann-Heink and other distinguished artists was an eagerly watched event. Other cities all over the land have pro¬ moted the Christmas tree celebrations. The American Pageant Association Bulletin 41, 15 Oct. 1916, entitled "Some Suggestions for Com¬ munity Christmas Celebrations,55 gives lists of Christmas mysteries and plays and music with much other valuable information. Bulletin I\o. 42, 15 Nov. 1916, "The Possibilities of the

Christmas Masque,55 by William Chauncey Lang- don, should also be consulted.

COMMUNITY DRAMA, or CIVIC DRAMA. This is a term that has recently sprung into widespread use to embrace various kinds of performances, generally more or less dramatic in form, but sometimes merely pro¬ cessional and picturesque, presented by large bodies of people (marching, singing, dancing, acting and so forth) in co-operation with writ¬ ers, designers and others. The differences in kind are denoted by the use of the names : pageant, masque, festival; and, somewhat loosely, the rural play, the school play and the outdoor play. Mr. William Chauncey Langdon, the well-known pageant master, has cleared away much of the difficulty of classification by pointing out that the essential characteristics of these forms may be differentiated as fol¬ lows : The pageant is historical ; the masque is philosophical ; the outdoor drama like the regular drama is individual ; and all these are objective in their character. On the other hand, while the festival is lyrical, it is subjective in character. The school play is educational and subjective. These forms are all treated separately under special headings.

The history of the community festival, all that may be written with reasonable certainty, covers the long stretches of the past, under many a ritual, back to the immemorial religious cults. There can be little doubt that all thea¬ tres had their rude beginnings when human beings first began to dwell together in com¬ munities, and to hunt, feast, play and worship in common. For a fuller account of the primi¬ tive drama consult Grosse, E.,

'Beginnings of Art,5 and Frazer, J. G., 'The Golden Bough.5 Mr. L. Havemeyer's 'The Drama of Savage Peoples5 (Yale 1916) contains the new ma¬ terial in accessible form. The first chapter of Prof. Brander Matthews' 'Development of the Drama5 gives an excellent summary of the broad facts.

The archetype of the Greek theatre itself, the apex and crown of all primaeval culture, may be seen in active existence at the present day in the islands of Melanesia. There, in the rustic dancing circle, we have a perfect example of the Greek orchestra, in embryo; and in the little robing hut of these simple islanders of the south seas we are in at the birth of the magnifi¬ cent Skene of the theatre of Athens; the word skene originally meaning a booth or tent, and then a stage, projecting our English word scene. These two extreme cases of the Greek theatre and the Melanesian circle provide us with exemplars of sites as suitable to-day as ever for either the community drama or festival.

In mediaeval times, when first the Church and later the guilds and schools encouraged and assisted in the performances of the mystery and morality plays, all that existed by way of a theatre was distinctly communal. The pas¬ sion plays, still performed in Oberammergau, Bavaria, and in Selsach, Switzerland, and else¬ where, are survivals of the mysteries and mir¬ acles of the old communities. In the spreading liturgy of the mediaeval Church we mark the beginnings of the long slow rise toward the compact drama of the most modern playwright. Following the ecclesiastical period of play-mak¬ ing and play-going and entering upon the secu-

lar period of folk drama, the culmination was reached in the works of members of the trade guilds, of whom the wise old cobbler Hans Sachs (1494—1576), and merry John' Heywood (1497-1590), are the classic types. Thereafter came the development of the regular theatre and the narrowing down of the expression of the dramatic instinct of the folk to the usual calendar festivals, games, etc., described with droll particularity in such compilations as Chambers' (Book of Days.- In the 19th cen¬ tury, with the growth of machinery and the new industrialism, when men discussed the humani¬ ties more than they practised humanity, men and women and children, too, well-nigh forgot even these simple festive joys of the open air. They, however, remained in literature and in tradition for a new and more democratic prac¬ tice in this present century.*

((The civic theatre idea, as a distinctive issue, implies the conscious awakening of a people to self-government in the activities of its leisure. To

this end, organization of the arts of the theatre, participation by the people in these arts (not mere spectatorship), a new resulting technique, leadership by means of a permanent staff of artists (not of merchants in art), elim¬ ination of private profit by endowment and public support, dedication in service to the whole community; these are chief among its essentials, and these imply a new and nobler scope for the art of the theatre itself.® Mr. Percy Mackaye, author of (The Civic Theatre) from which the above lines are taken, deplores the severance of joy from labor under modern commercial conditions, and conceives the one answer to the workers' protests to be in (

On the other hand, the opponents of the community festival movement, while acknowl¬ edging the fine disinterestedness of its leaders, do not recognize any pulsing life in the pag¬ eantry of to-day, so far as it relates to America ; they deny real interest on the part of the people, and maintain that we have no traditions upon which to found a vital community theatre com¬ parable to the same in Europe. For an able expression of this view, consult ((Modern Pag¬ eants not Spontaneous® (in (The Nation,5 Vol. XCV, p. 245, New York 1912).

The supporters meet these disavowals by reminders of our native Indian, Spanish, French, Colonial and Post-Revolutionary lore, and partly admitting a tincture of artificiality and crudeness incidental to the early stages of the cultivation of the form, point to the amazing growth of the movement among all classes over all the States. Particularly have they sought and found expansion, where alone vitality can be reached in any concern touching the genius of the mass, in the co-operation of the industrial and rural folk, as well as in that

of the children. In point of fact no country or district in Europe, or any other part of the world, can show wider or more enthusiastic interest in community drama, especially on the part of the young people and educationists of all grades, than has been demonstrated by the United States. Indeed, in this form of the drama, and in this alone, can the United States show herself more forward than Europe. This holds good not only in respect to organization and scope but also to actual performance. See College Dramatics; Children's Theatres; Festival; Masques; Outdoor Theatres; Pag¬ eant; Rural Th'eatres.

Bibliography. — Anon., (Guide and Index to Plays, Festivals and Masques5 (1912; pub¬ lished by the Neighborhood Workers' Associa¬ tion) ; Beegle, Mary P., and Crawford, Jack R., (Community Drama and Pageantry5 (New Haven 1916; surveys of technicalities in writ¬ ing and staging pageants, contains completest bibliographies in English on the new arts of the theatre) ; Casson, Lewis, (Steps towards a Civic Theatre5 (Chicago 1911) ; Chambers, E. K., (The Medieval Stage5 (2 vols., Oxford

1903 ; standard work on English festal origins) ; Dickinson, T. H., (The Case of American Drama5 (New York 1915; contains chapters on The Theatre in the Open and Festivals and Pageantry) ; Gulick, Dr. L. H., 'Popular Recreation and Public Morality5 (Boston 1912) ; Hone, W., (Ancient Mysteries Described5 (London 1823) ; Mackaye, P. W., (The Civic Theatre5 (New York 1912; includes special sections on country districts, industrial districts, industrial players, outdoor theatres, schoolhouse plays) ; Mantzius, Karl,

(History of Theatrical Art5 (5 vols., London 1903 ; the standard work of its class ; published up to the end of the 18th century; other vol¬ umes are in preparation) ; Miller, G. M., (The Dramatic Element in the Popular Ballad5 (Cincinnati, University of Cincinnati series) ; Porter, Charlotte, (Civic Theatres: the Newyest and the Oldest5 (in Drama, Chicago 1913) ; \ iollet-le-Duc, E. L. N., (Ancien Theatre Francais: depuis les mysteres jusqu'a Cor¬ neille5 (10 vols., 1854—57; important and valu¬ able lists of mysteries, spectacles, masques and plays) ; Strutt, J., (The Sports and Pas¬ times of the People of England5 (New ed. by W. Hone, London 1833; standard work).

Duncan Macdougall.

COMMUNITY MUSIC, a term recently brought into wide currency through the char¬ acteristic interests of the day along lines of social administration ; and, in general, some¬ what loosely embracing both old and new forms of organized musical practice. More strictly, however, it describes the newer, popu¬ lar expressions of the love of music by way of recreational, ameliorative and educational settlements, as well as through countless neigh¬ borhood and municipal centres, both rural and urban, that have had their origin in the peculiar industrial, social and political conditions of re¬ cent times; many of these organizations corre¬ sponding to the more spontaneous outgrowths of merrymaking in olden days. See Festivals.

In the social consciousness of our day music has come to be regarded as a tremendous force in the well-being of the community, — recreational, educational, moral and spiritual, — whether the people be viewed in their capacity of listeners or performers. Loving the songˆ

and simple melodies they know well, the people are also moved intensely by even the difficult and unfamiliar classics, provided they are played with feeling and intelligence. ((Great music greatly performed,® says Professor Dykema, (

This community movement, many-sided by its inherent nature and unfailingly democratic, sweeping over the greater part of the world, has had a most remarkable success in the United States. Its main sources of influence, both old and new, amateur and professional, are in (1) domestic and industrial circles; (2) schools and colleges; (3) churches; (4) specific musical organizations; (5) places of amusement ; and (6) various musical activities ; the notes of special interest being gathered under these headings, as follows :

Domestic and Industrial Circles. — No one can fail to make observation of the almost universal distribution of various modern me¬ chanical inventions for the rendering of both instrumental and vocal music; the pianolas, phonographs, etc. — which, while retarding in¬ dividual technical development in some circles, have in others encouraged group singing and playing to a point of enthusiasm and excellence in districts where the greatest performers of the day would otherwise, in all probability, have remained unheard. This applies most pointedly to a legion of large and small com¬ munities of factory, shop, studio, agricultural and other workers, who, till the advent of these new mechanisms, were often

musically stranded, both in town and in country, to an extent that is only now being realized. In¬ numerable industrial groups have from such beginnings organized themselves until their trained bands, choirs, etc., have become of wide importance in musical affairs. Nevertheless it is regrettable that the antique custom of both solo and concerted singing at actual labor has well-nigh passed into oblivion in the greater part of both hemispheres. In America our own aboriginal people, the Indians, to whom song is the very consecration of the spirit of life, rarely undertake even the most menial tasks without an appropriate song. Like all real folk music, the music of the Indian is the spontaneous and most earnest expression of the soul of a people, and of all music the most distinctively Ameri¬ can. Old tradition, tribal history, the counsels and warnings of every day, the mighty deeds and sayings of the wise and the brave, the unchallengeable verities, the call to worship and to the feast, all are expressed in the ritual of song and poetry.

Schools and Colleges. — Within the last decade a great change in musical instruction in the schools has resulted from the recognition by educationists throughout the country that music in the schools must be more than another type of disciplinary study; above all, in the insistence by the pedagogic leaders of the move¬ ment on the use of better musical material and a larger number of songs before beginning tech¬ nical drill. They also point out the possibility of cultivating original art power among gifted pupils by allowing scope for individuality, and of developing the more conscious sympathetic aspects of the children's singing by allowing them to take part in musical festivals and con¬ certs for the general community. In most of the larger communities throughout these States it has become customary to hear good music, ranging from simple unison songs, light operas and cantatas to the great oratorios creditably performed in the large auditoriums and parks by the children from the public schools. There are even orchestras and bands in some of the schools. These are able to assist at concerts with choruses of children ; and churches, thea¬ tres, clubs and private individuals are seeking, and even competing against each other, to unite with the schools. Elgin, Ann Arbor and Day- ton have already given remarkable offerings at low prices. Another step in advance has been made by the recognition by the schools of private instruction in music and by granting credit to pupils for work done outside. The public high schools, with the colleges and uni¬ versities, are also allowing the courses taken writh accredited music schools and private in¬ structors to count for admission. A large number of high schools practise chorus singing and maintain musical appreciation classes ; and certain of the more progressive offer instruction in the technique of music, in solo-singing and in instrumental work. In Richmond, Ind., for instance, the teacher of public school music was engaged on condition that he devote half time to municipal music. In Wisconsin there is a popular movement to create by

law a city- social centre where the musical and other recreations of the people may be more com¬ pactly and more intelligently controlled than under the present haphazard system, or lack of system. It has been proposed that com¬ munity directors be appointed from among prin¬ cipals of high schools and officials of like standing, writh a definite salary for each office.

Churches. — For a very large proportion of the adult population church music includes practically all the serious music which they are in the way of hearing, and carries the one com¬ plete opportunity for chorus singing. A num¬ ber of churches, recognizing the fact, are deal¬ ing wTith the situation from its many points of view; and some are very wisely opening their doors to good secular work, in the lighter as well as the heavier vein, — operettas, pageants, etc. The American Guild of Organists has nobly responded to the call for wider activity. The church choir is in some districts doing much of the work formerly sustained only by the choral society; these choirs being found to have more influence upon the community than the work of the soloist. A number of churches, both in this countty and abroad (as in Amer¬ ica's Musical Shrine® at Bethlehem, Pa., and at Worcester Cathedral, England, where fes-

rivals of music have been annual events for nearly 200 years), have generously cultivated the love of song and instrumental music.

Specific Organizations. — Early in the last quarter of the 18th century the Stoughton (Mass.) Musical Society, which still flourishes, was founded by William Billings, a tanner by trade, an eccentric and a music teacher of some genius. This energetic man gave a healthy impulse to popular music that is yet felt. About the same time the excellent Handel Society of New Hampshire was organized; and the year 1807 saw the foundation of the Massachusetts' Musical Society. On 8 Jan. 1792, at Medfield, Mass., the <(father of music in America,® Lowell Mason, was bom. To him we owe our best ideas in the promotion of music among the masses. He pointed the way to a higher order in church music, introduced music into the public schools, popularized class chorus singing, spread the art of teaching music on the rational inductive plan and established teachers' conven¬ tions and institutes. He died in 1872. In vari¬ ous corners of New England musical festivals with large choruses and orchestras, formed from small choral societies of neighboring towns, are held regularly. Two typical instances of these are the concerts at Conobie Lake Park by a chorus of over 300 singers from four nearby towns, — Lowell and Lawrence, Mass., and Manchester and Nashua, N. H., — under the direction of Eusebius G.

Hood; and the Litch¬ field Country Choral Union at Norfolk, Conn, (originally, in 1897, the Norfolk Glee Club; and united with the Litchfield, Torrington and other local organizations in 1899, with a total membership, in 1914, of 677), conducted by Richmond P. Paine, and promoted and housed by the generosity of Mr. and Mrs. Carl Stoeckel.

Scattered widely over the country, a num¬ ber of cities and towns of small size have lately come into prominence and have sometimes astonished critics of high standing with their general musical activity, and, particularly, with performances of the (Messiah, } the Creation) and other classic oratorios. Two signal exam¬ ples are to be found in Bethlehem, Pa., and in Lindsborg, Kan. At Bethlehem, by the ad¬ mirable patience and perseverance of Mr. J. Wolle, extending over 30 years, a choir has been nursed up to so high a standard that its renditions of Bach are conceded to be the best of any of this kind in America. The annual festivals of our Pennsylvania Oberammergau® have for years attracted the music lovers of this and other countries. At Lindsborg, a little town with a population of only 2,000, the Bethany Oratorio Society performs Handel's (Messiah > with a chorus of 500 voices and an orchestra of 40 pieces, during each Easter week. The chorus is more than 30 years old and has given Handel's masterpiece nearly a hundred times ; and has, besides, undertaken all the standard oratorios. During the Easter festi¬ val the population is increased threefold, — visitors pouring into the centre from far and near.

Places of Amusement. — While the Amer¬ ican citizen is a generous spender on concerts and all other forms of musical activity, the status of musical taste and ability is generally admitted to need advancement. Audiences are characterized as being too good natured and too

careless of standards. That the leaders of music in our numerous communities are creat¬ ing a warmer and more spiritual understanding between themselves and their audiences is the most hopeful of all signs. Even in unexpected quarters the people have been shown invari¬ ably to follow a good lead. At the New York Rialto Theatre, a vaudeville and motion picture house, music of a high standard was lately tried with such success that the orchestra soon be¬ came the chief feature of the performances.

Possibilities in the Ordinary Community. — The signs on the horizon point to the re¬ sponsibility for the development of community music being in the hands of city governments; though, as yet its progress has been due mainly to private enthusiasm and enterprise. In a num¬ ber of communities professional musicians dur¬ ing prolonged visits unite the amateur talent of a neighborhood, and with a few imported players produce worthy musical festivals. The results at Meriden, N. H., in the Pageant of 1913, under the musical direction of Mr. Arthur Farwell, and in similar performances of the

kind elsewhere, illustrate how well the folk of small country places may be inspired by an oc¬ casion to play music of a high grade most acceptably. (See Pageants and College Dra¬ matics). And the possession of an excellent band or orchestra has proved a possibility for the most unpromising of communities. Most of the great orchestras in large cities are main¬ tained through a guarantee fund by subscribing citizens on a private basis. In one State a bill has recently been passed for the support of a State orchestra that will have a complete and regular circuit. In a number of places through¬ out the country music, concerts and lectures for adults are part of the educational system. One community extends musical instruction to all who are willing to embrace the offer. In New \ork, Boston, Rochester and in La Porte, Ind., a special official has been appointed to super¬ vise the city music. In New York three munic¬ ipal concerts began in the spring of 1910 on a new untried basis under the administration of Mayor Gaynor. There were bands in about 30 of the 150 parks in the city on one evening of the week during summer. Sometimes bands performed on all recreation piers every evening for a season, and sometimes only on three evenings, with afternoon folk-dancing for the children on the piers. In Central Park the crowds were enormous ; and at Tottenville, S. I., the farmers and others gathered round in their wagons to listen to the worlds' master¬ pieces played by an excellent local band that for the first time in 20 years had joined the pro¬ fessional ranks. In many other centres through¬ out the country bands and orchestras are en¬ gaged by the authorities to give free concerts to the people in summer and even in winter. In the State of Wisconsin, any city, town or village is now authorized and empowered to conduct public concerts in parks (to be paid for out of the park funds) and in various kinds of auditoriums (to be paid for in any way that the board, town council or other stated official may determine).

Citizens as Performers. — The highest spiritual point in community music would ap¬ pear to have been reached in the extension of a welcome to everybody, trained and untrained.

to sing in chorus. The wisest heads in the movement rule that in every healthy com¬ munity there should be opportunity for all people to sing as much as they wish, and that at least one combined function might be held, of an informal sort, and almost without direc¬ tion. The success that has already attended the carrying out of this principle has been ex¬ traordinary. The supervisor of music in the Minneapolis city schools reports that in Anoka, with a population of 3,000, everybody was invited, everything was donated, and over 2,000 more than the whole population of the town arrived to sing 'Home, Sweet Home, 'Come Thou Almighty King/*

'Suwanee River/ etc. Recently in Minneapolis Park, at a free concert with a chorus of children, no less than 15,000 people attended. But perhaps the most remark¬ able expression of this kind is found in the Community Chorus movement, an offshoot of the Music School Settlement of New York, that in a very short space of time has taken whole communities by storm. It is essentially demo¬ cratic and includes all who would meet together for the joy of singing, without voice trials and without dues. Hundreds of community choruses have been formed, and reports of organization and inquiries are entering from every State in the Union. New York, Buffalo and the Oranges (N. J.) have community choruses of over 1,500. Kansas has over 30 community choruses, with the University of Kansas in support of the movement; Wisconsin is carrying out the community music idea in the broadest fashion and has a leader in the University of Wisconsin. Newspapers in New York and everywhere are devoting full col¬ umns to accounts of the movement and its af¬ fairs. In New York the Community Chorus has sung every week since its organization, 9 Jan. 1916. During the summer seasons its "sings® were held every Sunday afternoon in Central Park with thousands present. It gave the memorable (

park commissioners and have proved eminently successful.

Beyond the large choral clubs there are the smaller organizations; such as the Frauenchor and Maennerchor of the German communities in the United States, and the various types of choirs in the communities of Wales and other countries. The enormous extent of musical activity possible in a community is indicated by the numerous competitive musical festivals of Europe. Blackpool, England, for example, has such a festival with about 5,000 competitors from all over England entering 64 types of contests, including choruses of 60 voices and all variations of fewer numbers for men or women or both men and women, down to solo.

In the United States the closest resemblance to such festivals is found in the Saengerfest and the Eisteddfod. At a recent Welsh cele¬ bration in Pittsburgh by Cambro-Americans the chief interest was music, although there were competitions in other arts. The choirs came from the mills, mines and factories for the most part. For Christmas and other festivals by various sorts of communities, see Festivals.

Instrumental Music. — There are many nur¬ series of instrumental music scattered over the great cities of the world, but perhaps the most significant of them all is the Music School Set¬ tlement on the East Side of New York. In 1917 there were 1,100 enrolled pupils, as well as an "outside® department and a very long wait¬ ing list, with a staff of 100 teachers. There are four orchestras, aggregating 200 players, a wind instrument department, a musical bureau which secured over 300 paid engagements

for pupils in 1916, a library of 2,500 readers, an instrument department with 100 instruments for the use of pupils, lectures, concerts, festivals and plays. There is a social centre in charge of a head resident and her assistants who man¬ age the various clubs, etc., and help the music teachers in the effort to develop the children physically, mentally and morally. There are 15 nationalities represented; and the terms to pupils run from 50 cents for an individual les¬ son to 10 cents for a class lesson. A limited number of scholarships are provided for tal¬ ented pupils who cannot pay these fees. The Maidstone movement in England is of the same type.

The National Union of School Orchestras, London, was founded in 1905, giving its first performance at the Crystal Palace with 700 girl and boy violinists, with such success that in 1914 the performance at the Crystal Palace was given by 6,800 children. But even these figures represent but a small fraction of violin-playing children over the kingdom ; for with 5,000 schools having orchestras already formed there are at least 200,000 children who are mem¬ bers or adherents of the Union. There are scholarships which entitle the winners to ad¬ vanced instruction at the Guildhall School of Music. The official mouthpiece of the organ¬ ization is The Young Musician , published monthly in London for one penny. The various objects and interests of the National Union of School Orchestras, as well as many other im¬ portant matters, are discussed by Mr. Paul Stoeving, (A New Mission for the Violin (in the Proceedings for 1915 of the Music Teach¬ ers' National Association, Hartford, Conn.,*

1915).

A curious and remarkably successful at¬ tempt to increase violin playing in Great Britain was made recently by a firm of musical instrument makers who distributed complete violin outfits for the moderate sum of $5. In a short time no fewer than 400,000 people had received instruments.

The Music Teachers' National Association with headquarters in Hartford, Conn., have a special committee for community music.

Bibliography. — Anon., 'The Community Chorus Song Book) (in the Illinois State Reg¬ ister, Springfield, Ill., 1915) ; Anon., (Great Modern Choral Work} (in the Outlook, Vol. XC, p. 810, New York 1908) ; Barnhouse, C. L., Organizing and Training Community Bands and Orchestras1 (Oskaloosa, Iowa) ; Dykema, Peter, 'Community Music: an Opportunity> (in the Journal of the Proceedings and Addresses of the National Educational Association of the United States, pp. 627-33, 1914) ; id., 'Some Essential Passing-tones : Certain Phases in the Community Music Movement (in the Proceed¬ ings for 1915 of the Music Teachers' National Association, p. 182, Hartford 1916) ; Engel, C., (An Introduction to the Study of National Music : comprising researches into popular songs, traditions and customs> (London 1866; contains excellent bibliographies of many nations) ; id., (Literature of National Music* (London 1879, with excellent descriptive bibli¬ ographies) ; Erb, J. L., 'The Musician and the Community) (in the Proceedings for 1916 of the Music Teachers' National Association, Hartford 1917) ; Farwell, Arthur, ˆ Com¬ munity Music and the Music Teacher 5 (in the Proceedings for 1916 of the Music Teachers' National Association, ib. 1917) ; id., Com¬ munity Music Drama* (in the Craftsman, Vol. XXVI, p. 418, New York 1914) ; id., 'Municipal Music in New York) (in the Ptoceedings for 1913 of the Music Teachers' National Associa¬ tion, Hartford 1914) ; Harding, A. A., 'The Band as a Community Asset) (in the Proceed¬ ings for 1915 of the Music Teachers' National Association, p. 188, Hartford 1916) ; Mees, Arthur, 'Choirs and Choral Music) (New York 1901) ; Parkhurst, E. R., 'Canada's Champion Choir) (in the Canadian Magazine, Vol. XLVIII, p. 343, Toronto 1907) ; Surette, T. W,, 'Community Music* (in 'Music and Life,* Chap. 4, Boston 1917) ; Wilson, A. B., 'Com¬ munity Work in Music) (in the Musician, Vol. XIV, p. 251, Boston 1909).*

Duncan Macdougall.

COMMUTATOR, a piece of apparatus used in connection with many electrical instru¬ ments for reversing the current from the bat¬ tery. There are various forms, which will gen¬ erally be found described with their proper in¬ struments. See Electrical Terms.

COMNENUS, or COMNENI, kom-ne'ne, an extinct family of Byzantine

sovereigns, originallv from Paphlagonia, which numbered, on the throne of Constantinople (1057 to 1204) and on that of Trebizond (from 1204 to 1461), 18 emperors, besides 19 kings and numerous in¬ dependent princes. When the Crusaders had overturned the throne of the Comneni in Con¬ stantinople, and established the Latin empire there in 1204, a prince of the ancient house of the Comneni founded an independent state at Trebizond in Asia Minor, where he was gov¬

ernor. The last sovereign of this house was David Comnenus. From him, it is said, was descended Demetrius Comnenus, a French cap¬ tain of dragoons, who died without children at Paris in 1821, with the title of Marechal de camp. But his descent cannot be historically traced. Ducange asserts without hesitation that Mohammed II, the conqueror of Constantinople, after he had obtained the empire of Trebizond, so called (which was scarcely as large as a French department), from the Emperor David, by a treaty, sent for this prince and his seven children to Constantinople. In order to get possession of the income which had been secured to the Greek prince he ordered him to be put to death, with all his children, at Adrianople in 1462, under pretense of a conspiracy. This is confirmed, according to Ducange, by all contem¬ porary writers — Chalcondylas, Ducas, Phranzes. A remarkable member of the family was the Princess Anna Comnena, daughter of the Em¬ peror Alexius I, who flourished in the first half of the 12th century.

COMO, ko'mo (anciently Comum), Italy, capital of the province of Como, in Lombardy, 24 miles northwest of Milan in a delightful val¬ ley at the foot of Lake Como. It is a bishop's see. The city contains some antiquities, a splen¬ did marble cathedral dating from the 14th cen¬ tury and 12 beautiful churches ; also a cabinet of natural history and natural philosophy. During the 11th and 12th centuries Como was at the head of the Ghibelline party, and the rival of Milan. In 1127 it was destroyed by the Milanese and rebuilt by Frederick I in 1159. Later it was ruled by the Rusca family and in 1335 came into the possession of the Visconti. In 1859 it was a centre of the agitation headed by Garibaldi. Here was born Pliny the Younger and Volta and Giovio, writers, also the popes Clement XIII and Innocent XI. A number of the inhabitants travel about with small-wares, such as mirrors, spectacles, little pictures. Even in the time of the Roman emperors this taste for emigration manifested itself. The inhabit¬ ants of Como were then to be found in all parts of Italy in the capacity of masons. Silk, velvet, optical glasses, shoes, stockings, metal work and knit wear are manufactured. The province of Como has an area of 1,049 square miles and a population of 515,134. It has fine pastures, and yields grain, olives, wine and silk. Popu¬ lation of the commune 43,439.

COMO, Lake (Lago di Como, la'go- de ko'mo, anciently Lacus Larius), a

lake in the north of Italy, at the foot of the Alps. Toward the middle it is divided into two branches by the point on which is situated Bellagio. The branch extending toward the southwest to the city of Como goes under the same name ; that which turns to the southeast to Lecco takes the name of Lake Lecco. The length of the lake to Bellagio is 16 miles, that of the southwest branch 19 miles and that of the southeast branch \2y2 miles. The greatest width is two and a half miles. More than 60 rivers and rivulets flow into it, and the Adda passes through it. It is about 700 feet above the level of the sea, and about 190 feet above Milan. Lake Como, the most delightful of all the lakes in Upper Italy, is surrounded by mountains 3.000 or 4,000, or even 7,000, feet high, which descend toward the lake, and in many parts atv

clothed with woods. It is bordered by delight¬ ful gardens and country seats. Fish, particu¬ larly trout, are caught in the lake. The neigh¬ boring country is rich in minerals — iron, copper and lead.

COMO STAGE, a thin mass of shales and sandstones representing clays and sands de¬ posited in a fresh-water lake that covered south¬ ern Wyoming and extended into Colorado. The exact age of the beds is still in dispute; they have been assigned to the top of the Jurassic, though there are good reasons for placing them at the base of the Cretaceous. The beds are re¬ markably rich in fossils of land reptiles and mammals, including such giant saurians as Atlantosaurus, and are typically developed near Como, Wyo. See Cretaceous System; Juras¬ sic Series.

COMONFORT, Ygnacio, lg-na-se-o ko- mon-fort', Mexican general: b. Pueblo, 12 March 1812; d. 13 Nov. 1863. He became a captain of cavalry in 1832, in 1834 was made prefect and military governor of the district of Tlapa, and in 1842 he was elected member of the National Congress. This Congress was soon dissolved, and Comonfort resumed his functions in Tlapa, displaying great energy in repelling the aggressions of hostile Indians. Appointed 3d alcalde of the capital, and after¬ ward prefect of western Mexico, he relinquished these positions to engage in the war with the United States ; and on Santa Anna's dissolving the army and leaving the capital open for the Americans, Comonfort commenced organizing guerrillas, when he was summoned to the Con¬ gress of Queretaro, where a treaty of peace was concluded with the United States. He was now chosen senator by his native state, and served in this capacity until 1851. In 1852-53 he was the representative in Congress of the newly created state of Guerrero, and acted as custom¬ house director of Acapulco and other places until Santa Anna's return to power, when he was dismissed from

office. He now joined Gen. Juan Alvarez, raised the standard of rebellion, proclaimed the plan of Ayutla, 11 March 1854, and compelled Santa Anna, who endeavored to seize that town, to retreat. At the end of the campaign in 1855, Santa Anna was finally com¬ pelled to abdicate. Alvarez assumed the su¬ preme government, but shortly afterward dele¬ gated his authority to Comonfort, who became provisional President of Mexico, 11 Dec. 1855. He soon met, however, with the most strenuous opposition on the part of the clergy, the army and the large body of the Conservative party. The junta of Zacapoaxtla declared itself on 19 December against tne President, and a little later the seat of revolution was transferred to the city of Pueblo. Over 5,000 men assembled there in February 1856. Comonfort marched against them, forced the rebels to surrender on 20 March, promulgated on 31 March a decree or¬ dering the confiscation of the property of the Church, followed on 28 June by another decree forbidding the clergy to hold landed estate. At the same time he sent a Mexican envoy to Rome to settle with the Holy See the. questions raised by these measures ; but the Mexican clergy made all possible effort to prevent his reception, while at home they labored to undermine the govern¬ ment. Congress, which was opened by the Presi¬ dent, 5 Feb. 1857, assembled under very inau¬

spicious circumstances. It proceeded, however, to draw up a new constitution, which vested the legislative power and the control over religious and military affairs exclusively in Congress. The President, finding it impossible to meet the difficulties which agitated the country under such restrictions, was eventually constrained, on October 1857, to apply for extraordinary powers. These were granted by Congress on 4 November and he was proclaimed constitutional President on 1 December. His position, how¬ ever, became more and more critical. Opposed by the clergy and the army, he found himself isolated, and could only depend upon the brigade of General Zuloaga, which was attached to him personally. By a pronunciamento at Tacubaya, 17 December, this brigade, too, de¬ clared itself against the new constitution, but appointed Comonfort chief of a new govern¬ ment. By a new pronunciamento, however, of 11 Jan. 1858, they discarded him altogether, and the insurrection which broke out on that day in the capital led to a fierce struggle of several days. Appointing Juarez, president of the Supreme Court, provisional President, Comonfort attempted to regain his authority by force of arms, but in. vain. On the morning of 21 January the capital was in the hands of the rebels. The House of Representatives, con¬ voked on the same day by Zuloaga, appointed that general provisional President, while Juarez convened a Congress at Guanajuato, to guard the rights of Comonfort. The latter in the meantime, deserted by his soldiers, and unable any longer to maintain his power, repaired to the United States. He returned in 1861 and was Minister of War in the Juarez cabinet. He was also appointed general of

one of the armies of the Republican party, and for a time he held command of Zaragoza. He was sent to the relief of Puebla in 1863; but he was de¬ feated by an Imperialistic force to which the city was afterward forced to surrender. Sub¬ sequently Comonfort was killed by a party of guerillas who shot him from ambush.

COM'ORIN. See Cape Comorin.

COMORO ISLANDS, a volcanic group in the Indian Ocean, between the northern ex¬ tremity of Madagascar and the continent of Africa. They are four in number — Angareja (called also Comoro), Mohilla, Johanna and Mayotta. In 1843 France took possession of the last mentioned island, and the others were taken under the protection of the same coun¬ try, by treaty, in 1886. They are extremely fertile, well stocked with cattle, sheep, hogs and birds of various kinds. They produce, likewise, sweet and sour oranges, citrons, bananas, honey, sugar-cane, rice, ginger, coconuts, etc. The people are chiefly engaged in rearing cattle, and in the manufacture of coarse cloths, jewelry and small arms. They are professed Mohammedans, but fetish worship is customary. Pop. Arabs and negroes, 70,000.

COMPANY (Old Fr. companie, from Lat companirem, ˆmess,® from com-, Svith,® and panis, ˆbread®), an association of individuals formed for some purpose of mutual advantage, especially for business purposes. The commer¬ cial use of the word which bulks most largely now has two separate uses : in general of a firm or corporation ; and particularly of the silent members of a business house whose

names do not appear in its style but are com¬ prehended by the affix <(and Company.® His¬ torically the earliest occurrence of the term in connection with business enterprise dates in England back to the 14th century when the Merchant Adventurers of England about 1359 began trade. English commerce and empire are equally indebted to the efforts of the com¬ panies formed in the early part of the 17th cen- turv. The Eastland Company, the Muscovy Company and the Turkey Company carried English trade into eastern Europe. The East India Company won the major part of the Asiatic trade for England, and gained posses¬ sion of India and administered that country until the middle of the 19th century. The Vir¬ ginia Company and the Massachusetts Bay Company prepared the way for English colonization in America, but never flourished. The history of the Hudson Bay Company is another interesting episode because of the com¬ bination of territorial and trading grants which it long held and because it still enjoys trading privileges. England still employs the same

method of opening up trade, and the North Borneo Company, the British East Africa Com¬ pany and the famous South Africa Company were formed between 1880 and 1890. Germany with her new imperial policy fosters the forma¬ tion of such associations, and in 1884 the Ger¬ man East Africa Company was started, with the object of extending trade and colonization. The London City companies also are histori¬ cally important as outgrowths of the mediaeval guilds and because for many years membership in them was a necessary preliminary to political privilege of any sort; their authority was cur¬ tailed in 1725 and by the reform bills of the 19th century, but members of the companies are still the only electors for civic offices.

In modern commerce companies may be most conveniently divided into the simple firm or partnership, which is a mere mutual agreement, and the stock company, which, by reason of its complex character and quasi-public nature, comes under State control and has displaced to a great degree the simpler method. In the stock company, instead of a private agreement, the members, under State authorization, make a company with a fixed capitalization divided into a certain number of shares, possession of which carries the right to vote, proportionally to hold¬ ings, on matters of business policy. State regu¬ lations require in all cases that one of the con¬ tracting parties be a resident of the State in which the company is incorporated, and that an office of the concern be located in the State. Other requirements vary in different States, es¬ pecially in the matter of fees, which some of the western States have reduced to a minimum for the sake of attracting business to the State, and replenishing its treasury; and in the breadth and range of powers granted by the charter. The corporation laws of the State of New Jer¬ sey, together with its convenient situation near New York, have drawn a tremendous volume of this business to it. See Corporation; Trusts.

A particularly American class of stock com¬ pany is the industrial, which is especially adapted to mine-exploiting or the development of agri¬ cultural business. In mode of government it differs from the usual shareholder controlled company, as it is largely managed by a pro¬

moter. (See Joint-Stock Banks; Part¬ nership). Consult Anderson, 'Origin of English Commerce) ; Cawston and Keane, (Early Chartered Companies; Cunningham, (Growth of English Industry and Commerce*; Davis, 'Corporations : Their Origin and De¬ velopment (New York 1905) ; Bonassieux, (Les grandes compagnies de commerce) (Paris 1892) ; Ditchfield, 'The City Companies of London and their Good Work) (London 1904) ; Unwin, 'Industrial Organizations in the Six¬ teenth and Seventeenth Centuries) (Oxford 1904) ; id., (The Guilds and Companies of London* (London 1908).*

COMPANY, in military nomenclature reg¬ ularly designates an integral part of a regiment or battalion and consists of 100 men. A looser and typically American use of the word applies it to any small body of soldiers or uniformed men, especially as independent of a State or national soldiery. These independent com¬ panies form a valuable supplement to army and State militia, as was evidenced by their service in the. Spanish War. See Army Organi¬ zation ; Tactics.

COMPARATIVE LITERATURE. See

Literature, Comparative.

COMPARATIVE PHILOLOGY. See

Language, Science of.

COMPARATIVE PSYCHOLOGY. Ani¬ mal psychology, comparative psychology and genetic psychology should be defined together and by contrast, first, because they are inti¬ mately related, and second, because there is serious disagreement between popular or current usage and strictly technical usage. Briefly, animal psychology designates certain materials of observation; comparative psychology, a particular scientific method of procedure ; and genetic psychology a particular aim, goal or purpose, namely, genetic or historical descrip¬ tion of mind. These statements may be some¬ what expanded as follows.

Animal psychology actually means, in com¬ mon usage, the study of mind in animals ex¬ clusive of man.. Logically, it should mean the study of mind in animals (including man) as contrasted with plants, for there appears ade¬ quate ground for assuming that mind exists in plants.

Comparative psychology has long been used as practically synonymous with animal psy¬ chology, that. is, as the study of infrahuman animals. Logically, and by analogy with other sciences, it should mean the application of the method of comparison to the phenomena of mind wherever and however presented for observation. Its meaning in terms of purpose and method should be the same as that of com¬ parative anatomy, comparative physiology, com¬ parative philology or comparative literature, namely, the more nearly complete and more profitable knowledge and understanding of a group of facts by comparison thereof with more or less closely related facts. The problems of origins and of developmental re¬ lations must ever be prominent in a compara¬ tive science. Secondly, the comparative method contributes directly and importantly to genetic description.

Genetic psychology is the study of the evolu¬ tion of mind (phylogenesis of mind) in plants and animals and of the development or growth

of mind (ontogenesis of mind) in individuals. This branch of psychology is definable solely in terms of its primary purpose or aim, which is genetic description. Indeed, genetic psychol¬ ogy is simply the historical aspect of the study of mental life. Animal psychology, as also plant psycholog > % child psychology, abnormal psychology and social psychology, should con¬ tribute facts to genetic psychology, and com¬ parative psychology should supply special methodological assistance. But genetic psy¬ chology as a special aspect of the general science should be restricted to no particular group of mental facts, to no single method. Instead, it should command all materials and all methods in the interests of a description of the processes of mental development and mental evolution. See Animal Psychology; Genetic Psychology; Psychology.

Robert M. Yerkes,

Professor of Psychology, University of Minne¬ sota.

COMPARETTI, kom'pa-ret'te, Domenico Pietro Antonio, Italian philologist : b. Rome 1835. At first he gave his attention to mathe¬ matics and natural science. Afterward he studied Greek by himself and in 1859 was ap¬ pointed professor of Greek at the University of Pisa. He soon after removed

to Florence and thence to Rome where he lectured on Greek antiquities at the university and studied the excavations in the Forum. He is also eminent in Romance philology and in the social history of the Middle Ages. After 1884 he edited the Masco italiano di an tic hit a classica. His more important works are (Saggi dei dialetti greci dell' Italia meridional (1866); (Virgilio nel medio evo5 (1872; Eng. trans., 1899); ˆapiro ercolanese> (1875) ; (La commissione omerica di Pisistrato e il ciclo epico) (1881) ; Uscrizione arcaica del foro Romano5 (1900). With D' Ancona he edited (Conti e racconti del popolo italiano5 (9 vols., 1870—91) ; and was also one of the editors of Rivista di filologia e d'istruzione classica.

COMPARISON, in grammar, the variation of an adjective or adverb used to express a higher and the highest degree, or a lower and the lowest degree of what is denoted by the word, thus modified in its grammatical form. The positive can scarcely be considered as a degree, as it denotes the quality generally with¬ out comparison. The comparative compares two things only, the superlative compares one thing with any number of others. In English the comparative is generally formed by the ad¬ dition of er, the superlative by the addition of est, to the positive or monosyllabic adjectives and dissyllabic adjectives ending in y, or by the use of the words more and most, less and least, when the adjective is of more than one syllable and does not end in y. Adverbs are nearly al¬ ways compared by the latter method. There are some adjectives, such as good, better, best; little, less, least, that do not form their degrees of comparison in the regular manner.

COMPASS, Mariner 's, an instrument to ascertain directions at sea by means of the at¬ traction of the earth for a movable magnet or a set of magnets. Similar instruments consist¬ ing of a magnetized needle resting on a pivot are used by the soldier or woodsman to de¬ termine directions on land. In the mariner's

compass a thin circular sheet of mica is sup¬ ported so as to turn with great freedom in a horizontal plane about its centre. This is called the compass-card. The bearing usually consists of a small plate of agate let into the card, and has a conical hole at the centre, and this rests on a fine needle-point of hard steel. This ar¬ rangement gives very little friction. To the under surface of the compass-card several parallel magnets are attached. Many experi¬ ments have been made to find the best arrange¬ ment for the magnets, but there is probably still something to be learned on this question, though the scheme patented by Lord Kelvin, in which the needles are suspended from the card in such a way that the moment of inertia of the card about every diameter shall be the same, is the most generally used. The compass-card is marked with a star of 32 rays, which are called the rhumbs, or the points of the compass. A line joining two of these points diametrically opposite is or ought to be exactly parallel with

the magnetic axis of the arrangement below; and at the extremities of these points are

marked n. (north) and s. (south), e. (east) and w. (west) are marked at the extremities of another diametral line at right angles to the first. The other points have also names ; and to repeat these from memory in order, beginning at north and going round the whole circle, is what sailors call ((boxing the compass.55 Most compasses are also graduated in degrees, either separately in each quadrant from north and south, or from 0° to 360° from north in a clockwise direction.

The card is supported, as we have said, on a steel point, which is attached either to a hemi¬ spherical bowl of thick copper, or to a thick copper ring when the compass is to be used for night-sailing in which case a lamp placed be¬ low the ring shines up through the mica card and makes the markings on it visible. This thick copper bowl or ring is called the compass-box. Its use is to damp the vibrations of the needle; for it is found that the presence of a large mass of copper properly placed damps the vibrations of a freelv suspended magnet rapidly, while it does not at all prevent it from coming to rest in the proper position. In certain forms

of compass, part of the weight of the card is borne by a non-freezing liquid, which also serves to damp its oscillations. The compass- box is suspended on gimbals, which are two concentric copper rings. The larger turns on a horizontal axis, whose extremities rest on the inside of the case that contains the compass. The smaller ring turns on a horizontal axis at right angles to the former, and resting on the outer ring. The compass-box is attached to the inner ring, and its weight tends to keep both horizontal. Thus supported, the compass- box and card always remains horizontal how¬ ever the ship rolls or pitches. The chief diffi¬ culty in making use of the compass arises from the magnetism of the ship itself. In iron ships particularly, the magnetism of the ship greatly interferes with its indications. The effect of

a b, Needle. c c. Box. d d, Inner gimbal. //, Outer gimbal. i. Pivot upon which the card is placed. m, Reflector. r r, Card. 1 1, u u, Supporting pivots.

the ship's magnetism is determined by swing¬ ing the ship, and determining a correction to be applied for every position. This, however, is liable to some uncertainty, for it is found that rough weather and other circumstances alter the magnetism of the ship, and therefore its effect on the compass. It is usual to place a compass at the mast-head of large ships,

and from time to time to compare the deck compass with it. Furthermore, the inherent magnetism of the ship is compensated for to a great degree by an extremely complicated arrangement of bars of soft iron and magnets placed in the binnacle.

The origin of this instrument cannot be traced with anything like certainty. It has been supposed that the Chinese knew something about the polaric property of loadstone more than 2,000 years before the Christian era. In the

12th century the compass became known in Europe. Whether it was learned from the Orient is not certain. The Italians ascribe the invention of the compass to Flavio Gioja, a native of Amalfi, giving the dates 1300-20, but it has been shown that he can be credited only with some important improvement of the in¬ strument. The discovery of the variation of the needle has been generally attributed to Columbus, but is now supposed to have been known much earlier. See Gyroscopic Compass ; Magnetism.

Bibliography. — Bowditch, (The American Practical Navigator) (Washington, new edi¬ tions from time to time) ; Cornwell, (Compass Disturbances in Iron Ships5 (1887) ; Diehl, deviations of the Compass5 (Washington

1902) ; Capt. F. J. Evans and Archibald Smith,

1903) .

COMPASS PLANT (Silphium laciniatum), a tall composite yellow-flowered plant growing on the prairies of the Mississippi Valley, and remarkable from the fact that its erect radical leaves stand so that their edges point almost exactly north and south, especially in midsum¬ mer. This is said to be due to the action of light, and to depend on the leaves having an equal number of stomata on either face. The plant is known in some localities as <(resinweed,55 because it contains such a large amount of resinous matter. A European species of lettuce (Lactuca scariola) has received the same name.

COMPASSES, mathematical instruments used for describing circles, measuring lines, etc. They consist simply of two pointed legs mov¬ able on a point or pivot. For describing circles the lower end of one of the legs is removed and its place supplied by a holder for a pencil or pen. Hair compasses have a spring tending to keep the legs apart, and a finely threaded screw by which the spring can be compressed or re¬ laxed with the utmost nicety, and the distance of the legs regulated to a hair's-breadth. Bow compasses have the legs united by a bow pass¬ ing through one of them, the distance between them being adjusted by means of a screw and nut. Proportional compasses, used for reduc¬ ing or enlarging drawings,

have the legs cross¬ ing so as to present a pair on each side of a common pivot. By means of a slit in the legs, and the movable pivot the relative distances be¬ tween the points at the respective ends may be adjusted at pleasure in the required proportion. Beam compasses are used where greater lengths are needed than can be secured by the ordinary pivot compasses. Points are arranged on a slid¬ ing bar so they can be clamped at certain dis¬ tances from each other. Triangular compasses, having three legs, are used when it is desired to transfer the vertices of a triangle. Club compasses, or bullet compasses, are constructed with a ball instead of one of the points of the ordinary compasses ; the ball being arranged so as to turn in a hole or socket.

COMPENSATION, that which is given or received as an equivalent for services rendered, losses sustained, sufferings endured or in pay-

mcnt of a debt; amends, remuneration, pay¬ ment, recompense. When one is sued for a debt, it is competent for him, partially or wholly, to bar the claim by alleging that he is the plaintiff's creditor for services rendered or money lent. If the sum claimed from the plaintiff is found to be the exact equivalent of that for which he sues, the two are held to com¬ pensate or balance each other; if, on the con¬ trary, it be less, it diminishes by so much the prosecutor's claim. If, however, the defendant feels that he owes the plaintiff more than that individual is indebted to him, he is required at the outset to pay into court the smaller sum for which he admits himself to be responsible.

Compensatio injuriarum is a defense against actions for damages claimed for slander, false accusations and like causes.

COMPENSATION, Workmen's. See Ac¬ cidents, Causes and Preventions of; Work¬ men's Compensation.

COMPENSATION BALANCE, or PEN¬ DULUM, a balance-wheel or pendulum for a watch or chronometer, so constructed as to make isochronal (equal time) heats, notwithstanding changes of temperature. This effect is usually attained by having the balance-wheel cut into two segments, the arcs being fixed at one end each. This allows space for the expansion and contraction to counteract the varying strength of the spring. A compensation pendulum is generally what is known as a mercurial pendu¬ lum or a gridiron pendulum. It is constructed of two different metals, such as brass and iron, which so work against each other, that the ex¬ pansion of the one downward is counteracted by that of the other upward. By this arrange¬ ment the pendulum does not vary in length, and consequently, in frequency of vibration, what¬ ever the temperature may be. Arnold's com¬ pensation balance-wheel for chronometers and watches is constructed on a similar principle. See Chronometer.

COMPENSATION INSURANCE. See

Workmen's Compensation.

COMPENSATION PENDULUM. See

Compensation Balance.

COMPETITION, a term nearly equivalent to the phrase ((struggle for existence.® Lamarck was the first to point out definitely the fact of competition in the cases of man and the sloth, but it was not until a half-century later that Darwin and Wallace emphasized its far-reach¬ ing importance as a biological agent in evolu¬ tion. Competition may be most strikingly illus¬ trated by a case in which it is entirely absent. The Great Salt Lake of Utah is inhabited by the brine shrimp (Artemia fertilis), which

abounds in enormous numbers in the dense briny waters; hundreds may be dipped up in a dish of water and thousands captured by a few sweeps of the tow-net. As the water is so salt that no other animal can live in it except a maggot near shore, it has absolutely not an enemy, and there is no other form to compete with it. Its food is a floating green alga (Poly – cystis packardii). It is absolutely harmless and without means of defense, and lays but few eggs ; yet its success in point of numbers is beyond all precedent. Another case is that of a fly (Ephydra gracilis) whose larva abounds at the margin of the same lake. These two cases

illustrate how a species may abound in profu¬ sion, though not crowding out other forms, since there are no competitions.

A familiar example of the crowding out of native species by those introduced from foreign countries in the struggle for existence among plants is the ox-eye daisy, which was introduced from Europe, first appearing in Leicester, Mass., in 1740. Many years ago what were once throughout New England green fields of grass became white with its flowers; it drove out even the grasses introduced. On the other hand, in central Europe, throughout France, the Pyrenees and the Alps, as recently ob¬ served, it grows sparsely, never in extensive patches. Other examples are the introduced European injurious insects, the gipsy moth, the scale insects and many others, whose numbers in the Old World are kept within due limits by ichneumon parasites, but whifch in the United States and Canada, owing to the absence of their natural enemies, breed in unlimited num¬ bers. Another case is that of the Colorado potato-beetle, which spread eastward from com¬ paratively limited tracts in the Rocky Mountain region, and invaded the Eastern States to the shores of the Atlantic. The English sparrow, introduced during a period from 1850 to 1870, has become, owing to the lack of competition, a grievous pest, driving out the native birds. The periwinkle (Littorina littot ea) of the Euro¬ pean coast, introduced on our shores, about 1855, has multiplied to such an extent that it lives between tide-marks in millions, to one of our native species of the same genus. Such cases as these throw light upon the subject and prove that there is a silent but unceasing strug¬ gle for existence going on over nearly all the earth's surface. Yet in the case of desert plants which grow sparsely, separated by barren spaces, there is, as Henslow has observed, no struggle for existence.

Nowhere is the agency of competition more marked than in human society. In the lower savage races, as in the black race of Africa or the natives of Australia, the scattered tribes have confined their contests to simple raids, and no single people or sub-race has gained marked pre-eminence over another, with the ex¬ ception of the Hottentots and Bushmen, who were largely exterminated by negro tribes from the North. But as we ascend to

the higher or white race, to the Semitic, the western Asi¬ atic and European peoples, we have examples of the sudden rise to power and pre-eminence of vast hordes of barbarian peoples under Tamer¬ lane, the Grand Mogul, Attila and other con¬ querors, which have swept over vast territories and crushed the weaker, more peaceful or even civilized but less resistant nations. The rapid¬ ity with which the Arabs overran and still dom¬ inate northern Africa in language, social cus¬ toms and religions; the Mongolian movements eastward into China, and westward to the bor¬ ders of Europe; the successive rise and irre¬ sistible waves of migratory hordes from east¬ ern to northern Europe, throughout prehistoric and historic times; the colonizing and expan¬ sion of the powers of Greece, of Rome, of th 1 Norsemen, Anglo-Saxon, the Spanish, French and German peoples ; the success of the white race in the struggle for pre-eminence; the dis¬ appearance of the lower, weaker races, less fa¬ vored intellectually and morally, some of which

had become fossilized, or semi-fossilized, and practically inept and unfit, — all these phenomena, which are historic facts, are of a piece with what we witness, though in a less distinct and marked way, in the plant and brute realms. The results are in the long run beneficent, though the injustice, moral degeneration, suffer¬ ing and evils which attend human progress are pitiful and deplorable.

In the economic as in other fields, competi¬ tion is the natural law, and is taken to repre¬ sent, through the free play of individual self- interest, the (

replacement the constant spur to human energy and resourcefulness which the system affords may be lost.

Bibliography. — Consult in the field of natural history, Darwin's (Origin of Species,' and Wallace's (Darwinism,' and in that of economics, Bliss, W. P. D., Encyclopedia of Social Reform ' (New York 1908) ; Eddy, (The New Competition (New York 1912) ; Gill, C., Eatural Power and Prosperity: a Statement of the Economic Causes of Modern Warfare' (London 1916) ; Palgrave, R. H. A., (Diction¬ ary of Political Economy) (New York 1910— 13) ; Seligmann, E. R. A., Principles of Economics' (New York 1905) ; Webb, S., (In- dustrial Democracy' (London 1902) ; Wil¬ loughby, W. W., (Social Justice' (New York

1900).

COMPIEGNE, kon-pya'nye, town of north¬ ern France, in the department of Oise, and on the left bank of the river Oise, 45 miles north- northeast of*

Paris. It has a tribunal of com¬ merce, a communal college, a public library, a theatre, manufactures of muslin, hosiery and cordage, besides a trade in wood, grain and cattle. The Hotel de Ville is a Gothic structure of the 16th century. The splendid chateau, surrounded by its extensive and beautiful park, bordering on the celebrated forest of Com¬ piegne, was a favorite autumnal residence of Napoleon III. Charles VI took this town from the Duke of Burgundy in 1415. In 1430 Joan of Arc was taken prisoner here by the English. Compiegne was the headquarters of the Ger¬ man army in 1870-71. In 1914 the town fell to the Germans in their drive toward Paris. In the battles of the Marne and Aisne the town suffered severely from shell fire, was retaken by the French, but during the German advance in June 1918, was again threatened by the Ger¬ mans who pushed on toward it on the Noyon- Mondidier front. Compiegne is the birthplace of George Guynemer, the foremost airman of France, who before his tragic death in 1917 had won every honor that his grateful country could bestow. Pop. 17,046.

COMPLAINT, in law, the name given in some States to the written statement on which the plaintiff's case is founded ; corresponding to the declaration at common law, the bill in equity and the libel in admiralty. In criminal law, an allegation made to a proper officer that a designated offense has been committed, accom¬ panied by an offer to prove, and a request that the offender be punished.

COMPLEAT ANGLER, The. Though

Izaak Walton's (Compleat Angler' is actually, as its title implies, a treatise on angling, it is not by reason of any technical excellence that it has become an English classic. The prosaic angler of Walton's own day (consult Robert Franck's (Northern Memoirs,' 1694; re-edited by Sir Walter Scott, 1821) was ill-satisfied with him as a. practical fisherman; but the whole of angling is not in the catching of fish — else there were little distinction between an angler and a fishmonger. It is the animating spirit of any sport which is the most important thing about it, and Walton's success largely lies in his having so persuasively caught and preserved the spirit of angling, the peculiar aptitudes which fit a man to follow what Walton happily described, in his sub-title, as (

live Mail's Recreation,® the natural gift to (has become the sacred book of those, who, as Walton was fond of reminding his readers, follow Saint Peter's call¬ ing; and that Walton is not only (

green "quiet® is the more surprising as (The Compleat Angler) was

written in that time of storm and stress succeeding the execution of Charles I. It was first published in 1653, and from that date on — such a remarkable appeal has this quiet book had for mankind — a new edition has, on the average, been published every two and a half years. Walton was a meticulous reviser of his work, and in 1676 (being then 83; he died at 90) he gave forth his final "definitive® edition, the 5th. To this edition he invited his friend Charles Cotton to add a second part, which has thus become an integral, not unnecessary, portion of (The Compleat Angler. > It has the value, moreover, of commemorating a charming friendship, a friendship the more surprising as Cotton was a brilliant young man-about-town, and Walton a patriarchal associate of bishops and deans. But both men had the gift of humanity, and it is by that sovereign gift, inclusive of all others, that (The Compleat Angler) still remains a classic in a day which has too much forgot its final admonition — "Study to be quiet® (1 Thess., iv, 11). (The Compleat Angler > has been a favorite book with many famous writ¬ ers. Dr. Johnson considered "the preservation and elucidation of Walton® — ((a pious work,® and such different men as Scott, Wordsworth and Lamb have been among his many "dis- ciples.®

Richard Le Galliene.

COMPLEMENT, that which fills up to a certain unit. Thus the complement of an angle is the angle which would, by addition, make the given angle a right angle ; and the complement of a number is a number which would, by addi¬ tion, make the given number equal to the next higher unit, or the next higher power of 10.

In music complement is the interval formed by the higher note and the note an octave above the lower note of a given simple interval.

In medicine the complement or the comple¬ mentary body is supposed to be a substance in the blood serum that is necessary for its anti¬ bacterial or bacteriolytic action. In order to bring about a lysogenic action (Pfeiffer phe¬ nomenon), two bodies seem to be necessary in the blood serum. One known as the im¬ mune serum is developed during the process of immunization. It alone cannot however cause bacteriolysis. There must be present in the blood serum another body, the complement. It is also called alexine or cytaSe. See Im¬ munity.

Complement also has the signification of that which is added as ornamental but not as necessary, as an accessory or appendage or as an accomplishment. It has exactly the same origin as compliment, which is used to express a formal act or expression of civility, respect or regard.

COMPLEX NUMBERS. See Algebra.

COMPLEX VARIABLE, Theory of Functions of a. 1. Function. — The Theory of Functions of a Complex Variable deals with ordinary complex numbers, z — x + yi, when x and y are real, and i denotes the pure imaginary

number V — 1. Just as real numbers are repre¬ sented by points on a line, e.g., the points of the axis of x in analytic geometry, so complex numbers are represented by points in a plane, called the complex plane, z corresponding to

that point whose Cartesian co-ordinates are (x, y). The distance V x2 ff y2 of z from the point £ = 0 is called the absolute value of z and is written \z\. Let S denote a region of the plane bounded by one or more closed curves. To every point z of 5 let one or more numbers zj, real or complex, be assigned according to some definite law. Then w is said to be a single or multiple-valued function of z : w~f(z). For the present we shall restrict ourselves to single-valued functions.

2. Continuity and Limits. — The function w — f(z) is continuous in the region S if, when z descrmes any continuous curve in S, the image w of z describes a continuous curve in the w- plane. The variable /(.?) is said to approach b as its limit, if, when z approaches a along an arbitrary path, the corresponding point w=f(z) approaches the point w —b ; in symbols,

lim f(z) — b.

z = a

A complex variable z is said to become infinite: lim 2 = o°, if its absolute value becomes infinite; i.e., if the corresponding point of the complex plane recedes indefinitely, no matter in what direction.

3. Derivative. — The function w=f(z) has a derivative, f(z), if the quotient Aw/Az ap¬ proaches a limit, when Jz approaches 0 :

lim f(z + Az) — f(z) _ ˆ ˆ n

A 2=0 j2 / (") U zw.

When z is the independent variable, dw — DzwA z ;

and it is shown, as in the differential calculus, that

dz — Az and dw — Dzwdz , the latter relation holding no matter what the independent variable may be. The general rules for differentiation apply here, e.g.,

d(U+ V)=dU + dV , etc.

Moreover, we have

=nz n— l, n = pos. integer. dz

Hence it follows that all rational integral func¬ tions, i.e., polynomials in z, and all other ra¬ tional functions of z, can be differentiated ac¬ cording to the same rules as reals.

Theorem : The necessary and sufficient con¬ dition that the function

»“#• T vi — f(x~\~ yi)

have a continuous derivative is that the real functions u and v of the real variables x andy have continuous first partial derivatives satisfy¬ ing the Cauchy-Riemann Differential Equations:

du dv du dv

dx dy dy dx

The condition is necessary. For since we shall always get one and the same limit, no mat¬ ter along what path Az may approach 0, let Az pass first only through real values: dz=Jx; thus

lim Aw dw

J = °Tx = te~D‘w-*

Secondly, let Az be pure imaginary: then

lim Aw 1 dw

Ay 0 iJy i dy z

Az — iAy

1 dw

Hence

dw _

dx i dy

and it remains only to separate the real and the pure imaginary terms. omit the proof

of the sufficiency of the condition.

Two functions which satisfy relations (1) are called conjugate functions.

Example : Let

w = e(cos y i sin y).*

Then

du dv

— = ex cos y = — > dx dy

du . dv

— — — ex sin y — — —

dy

dx

Hence w has a derivative, and furthermore

dw dz

■ *w.*

A function which is single-valued through¬ out a region S and has a continuous derivative in 5 is said to be analytic in S. The terms holomorphic, monogenic and synectic are also sometimes used in this sense.*

4. Conformal Mapping. — Given any two functions

u = (x,y), (2)

we may interpret them geometrically as trans¬ forming the points of one plane into the points (u, v) of a second plane. Thus a region 5 of the first plane will be mapped , if certain further conditions are fulfilled, in a one-to-one manner and continuously on a region 2 of the (u, v)- plane. For example, let*

m. = x2 — 'y2, v~2xy.

Here the first quadrant of the (x, y) -plane is mapped on the upper half of the (u, v) -plane, the family of lines w = const. going over into the family of equilateral hyperbolas whose axes lie in the co-ordinate axes, and the family of lines

v = const, going over into the orthogonal family, whose asymptotes are these axes.

If u and v have continuous first partial derivatives and if their Jacobian

du du dx dy J = dv dv dx dy

does not vanish, then, at least for a restricted region S0 about a point (x0 , y0), the equations (2) will always define a one-to-one map of So on a region £0 including the point (u0, v0). This map will represent approximately (i.e., to in¬ finitesimals of higher order than the first) a pro¬ jection— in other words strain — of the imme¬ diate neighborhood of (x0,y0) on that of (uo, Vo), a small circle about (x0y0) going approximately into an ellipse about (m0, Vo). If, however, u and v are conjugate functions, the ellipse be-

comes a circle, and the angle under which two curves intersect in the (, y)-plane is preserved in the {u, v) -plane. Thus the shapes of small figures are but slightly distorted. Such a map is called conformal or isogonal. The elements of corresponding infinitesimal arcs in the two planes are connected by the relation*

dS = Mds,

where M is a positive function of x and y, and does not depend on ds, dS. The Jacobian here has the value

Referring to the developments of § 3 we see that the theorem just stated is coextensive with the following:

Theorem : If zxr = f(z) is single-valued and analytic in the region S, then this function maps the neighborhood of any point zo of S, in which f (zo) 4 = 0, in a one-to-one manner and conformally on the neighborhood of the point Wo = f(z0).*

The problem of conformal mapping first studied was that of making a map of the earth such that the shapes of small regions should be but slightly distorted. The two principal solutions that presented themselves were (a) Ptolemy's Projection , known in mathematics as stereographic projection, which consists in pass¬ ing a variable ray through a fixed point of the sphere, which we will think of as the north pole. Let P and Q be respectively the variable intersections of this ray with the sphere and with the plane of the equator, or a parallel plane, taken as the plane of the projection. Then Q is the projection of P. (h) Mercato/s Chart.

By a simply connected region is meant a region bounded by a single curve. Any simply connected region can -be mapped in a one-to-one manner and conformally on the interior of a circle, and hence any two such regions can be mapped conformally on each other (Riemann,

1851).

5. The Elementary Functions. — (a) The

Exponential Function. For real values of x the function ex can be expanded by Taylor's Theorem into the series

v2 v3

ex =1 + X + — f yj- -f ...*

Substituting formally for .v a pure imaginary value and operating with the infinite series as if it were a polynomial, we get

*yl y4 3,6 / yZ yS yl *

= =cos y+i sin y.

This formal work suggests a definition of ex for a pure imaginary value of the argument, namely :

£yf=cos y+i sin y, (3)

and it is this definition that we shall adopt, setting it at the same time more generally e= ex + yi=ex (cos y + i sin y) .*

The function of ez thus obtained is a true generalization of ex, for it is single-valued and analytic for all values of z, reduces to ex when z is real, and satisfies the same functional rela¬ tions as ex :

, dez

*ezi e*t = e*\ + **, — = ez.*

dz

(b) The Trigonometric Functions. When x is real, we have from (3)

sin x-

ex'-

2 i

•> cos

ex* + e

The right-hand sides of these equations have a meaning for complex values of the argument. By means of them we define the functions sin z, cos z:

ezi — e — *

sin z= – i

2 1

cos z—

ezi f 1

These generalized functions are single¬ valued and analytic for all values of z and sat¬ isfy the same functional relations as sin x, cos x; e.g.,

sin (2i+ˆ2) = =sin Zi cos 22+cos zi sin Z2.

The tan z is defined as sin z/ cos z, etc.

(c) The Inverse Functions. The function log z shall be defined as the inverse of the ex¬ ponential function :

ew=z, z«/=log z.

Setting w — u+vi, z — r (cos 0 f i sin 0), we have eu{cos v + i sin v) = r(cos 0 + i sin 0). Hence w=logr, v—

log z = log | z | + (0 + 2 krr)i.

Thus it appears that the logarithm is no longer single-valued when complex numbers are ad¬ mitted to consideration. For example.

log 2= =.693 . . . +2kni.

In a similar way each of the other inverse functions is defined. We find _

cos— lz=i log (s + Vz2 — 1),

tan— lz =

From the foregoing it appears that in the domain of complex quantities the trigonometric functions can be expressed in simple form in terms of the

exponential function and con¬ versely; while the inverse trigonometric func¬ tions express themselves in terms of the loga¬ rithm. Thus the formulas of integration :

ah > 0;

ab

apparently in no wise akin, are seen to be equiv¬ alent in the complex domain.

6. Laplace's Equation. — (a) Flow of Heat or Electricity. Let the points of the boundary of a homogeneous (or more properly isotropic) conducting substance be maintained at given temperatures (for example, a steam-pipe, the interior being kept at 100° and the exterior at 0°). Then a flow of heat ensues within the conductor and the temperature at any given point approaches a limiting value, u, as time goes on. In fact, if each point were brought to this limiting temperature, it would continue there so long as the boundary conditions are maintained and we should have a steady flow. The corresponding temperature u satis¬ fies Laplace's Equation in three dimensions :

, d2u d2u . d2u U ~dx2 + dy2 a? — °'

If in particular the solid be bounded by cylin¬ drical surfaces whose elements are parallel to

the ˆ-axis, and if the given temperature be con¬ stant along each element, then u will evidently be constant along any line parallel to the z- axis, and we shall have in substance a two- dimensional flow, for which

. _ d2u . d2u

Ju = W + dyi = 0-

We may conceive the solid itself in which the flow takes place as two-dimensional if we think of a thin section as cut out of the above solid by two planes parallel to the (x, y)-plane and very near together. The flat faces of this slab are then to be thought of as coated with some adiabatic substance, so that no heat can enter or leave the slab across these faces.

The electrical problem is mathematically identical with the heat problem, u being in¬ terpreted as potential instead of temperature. As conductor consider for example a piece of tin- foil whose edge is connected with a thick piece of copper. Let one pole of a battery be at¬ tached to the copper and the other to the tin- foil at an interior point. We thus have a point source.

The curves w=const. are called isothermals or equip otential curves. The orthogonal trajec¬ tories of these curves 7/=const. are the lines of flow.

(b) Flow of an Incompressible Fluid. Con¬ sider the flow of an incompressible fluid con¬ strained to move between two parallel planes, the particles which lie in any line perpendicular to the planes at any moment always remaining in that line. If there be a function u whose partial derivatives with regard to x and y give the components of the velocity of each particle of the fluid along the axes, then u is called the velocity potential. If u does not depend on t, we have a steady flow with velocity potential, and u here satisfies Laplace's Equation.

Conversely, let u be any harmonic function, i.e., a solution of Laplace's Equation, in two dimensions. Then this function defines a steady flow of heat, electricity, or an incompressible fluid with velocity potential.

Let us turn now to analytic functions of a complex variable :

w~u + vi=f (x~\~yi) .

Differentiating the first of the equations (1) with regard to x, the second

with regard to y, and adding, we see that u satisfies Laplace's Equation. Hence

Theorem : Every analytic function of a

complex variable defines a steady flow of heat, electricity, or an incompressible fluid.

The converse is also true. Let us first recall the condition that

$P\ dx\ +\ Q\ dy$

be an exact differential, namely,

rLP $=$ *a*<*2*

dy dx

If this condition is fulfilled throughout a finite region S, then

/

$P\ dx\ +\ Q\ dy$

taken over the complete boundary of S will vanish. Furthermore, if .S' has but a single boundary,

P dx -f Q dy b)

will be a function of the upper limit (x , y)

r(x,

J (a,

alone, not of the path of integration; cf. Gour- sat, (Cours d'analyseˆ Vol. I, § 152. It can now be shown that, given a steady flow of heat or electricity, a possible flow results if we inter¬ change the equipotential lines and lines of flow.

Returning now to the main question, let u be any solution of Laplace's Equation, and form the function

du du dydx^~ dxdy + C-

Then the value of the integral will be inde¬ pendent of the path of integration, — at least if we confine ourselves to a finite region 5 with a single boundary. The derivatives of this func¬ tion have the values

dv du dv du

dx dy dy dx

and thus satisfy (1). Hence u and v are con¬ jugate functions, and u~hvi is an analytic func¬ tion of x~hyi.

The relation here pointed out between the theory of functions of a complex variable and certain problems of mathematical physics was employed by Riemann (1851-66) as a means of investigation in the former subject, and his method has been further developed by Klein (since 1881) and others.

7. Cauchy's Theorem. — Let f(z) be single¬ valued and continuous throughout a region S, and let C be a curve lying in S. The integral of f(z) taken along C is defined much as a curvilinear integral is in the calculus. Let C be divided by the points Zo= a, Zi, ... , z„ — h

into n arcs; setz/c-j- i — zK—dzK. Then if, as n increases, the lengths of all the arcs approach 0,

lim 2 f(ZK)JZK= i f(z)dz . n~ °c K — o J a

The following theorem, due to Cauchy (1825), is fundamental.

Cauchy's Integral Theorem. Let f(z) be single-valued and continuous throughout a finite region S, inclusive of the boundary, and let f(z) be analytic within S. Then the integral of f(z), extended over the entire boundary C of S, has the value 0:

f{z)dz = 0. C

Writing f(z) — u + vi, z — x + yi, we have

fcmdz-=Jc

(udx

vdy) + i | (vdx + udy).

c

But each of these latter integrands is an exact differential (§6), since u and v are conjugate functions. Hence, by the theorem of § 6, each integral vanishes.

By means of this theorem many real definite integrals may be computed. In fact, it was through the attempt to obtain a rigorous deduc¬

tion of such formulas that Cauchy was led to his theorem (memoir of 1814). We will give

one example: Consider the integral of e~ Z?

extended along the boundary of the region indi¬ cated. Its value is 0. Hence

(j C \ C \f{z)dz = 0.

V OA J AB J BO)

Now let OA—R increase without limit. The first integral thus becomes the well-known in¬ tegral of the Theory of Probability:

/OO

0

V

e—^-dx =

7T

o 2

The second integral can readily be shown to approach the limit 0. In the third,

z = r(cos 45° + i sin 45°) = , — – (1 + i)r.

Hence

V 2

V

7 r

+

1

(1 +i)

o f°e~r,i

dr~ 0.

2 V 2

Setting e — = cos r + i sin r2 and separating reals and pure imaginaries, we obtain the eval¬ uation of the Fresnel integrals :

r . rx i it

I sin r2dr — I cos r2dr— x- \ — .

Jo Jo 2 \2

The residuum of a function f(z) in a point a in whose neighborhood, with the exception of the point a itself, the function is single-valued and analytic, is defined as

M,

f(z)dz,

the path of integration C being a closed path surrounding the point a and containing no other singularity of the function. If f(z) is single¬ valued and analytic in a finite region S except at a finite number of points lying within the region, then the sum of the residua of f(z) at these points is given by

where C refers to the boundary of S.

8. Development into a Taylor's Series. —

In 1831 Cauchy extended Taylor's Theorem to functions of a complex variable and at the same

time discovered a simple test for the range of values of the variable for which the series con¬ verges. Let f(z) be single-valued and analytic in a region S, and let a be an interior point of S. Let K be the largest circle that can be drawn in S with a as centre so as to include in its interior no point of the boundary of S. Then, for all points z within this circle, f(z) can be represented by the series /O) = c0

— u) + c2(z — a)* + . . . ,

where

1 C f(t)dt _f(nHa)} 2*i J c(t — a)n+l n\

| Cn |

where M denotes the maximum value of | f(z)\ on the circumference of the circleˆ — a\=r.

Example. Let f(z) = =(1 — 2f*z + z2)— i, where B is a real constant numerically less than 1. Here either value of the function is con¬ tinuous and analytic except where the radicand vanishes :

1 — 2 fJ-z+z2=0, z— B it iV 1 — b2,

i.e., at two points on the unit circle about z = 0. Hence we can develop either value of the radical into a Taylor's series:

1

V 1—2 b2+z2

=Po+iV+/V2-f

7

where the coefficients Pn depend on b alone, and the series will converge for all values of z within the unit circle.

The proof of the theorem is based on Cauchy's Integral Formula, by means of which the value of the function f(z) at any interior point of S can be expressed solely in terms of the value of f(z) along the boundary, C, of N :

This formula is deduced directly from Cauchy's Integral Theorem, and is analogous to the theorem in the Theory of the Potential by which the value of a harmonic function u at any point within a region is expressed in terms of its value U (s) on the boundary, and of a function peculiar to the shape of the region, namely, the Green's Function G :

In fact, each formula can be deduced from the other one. The whole theory of functions of a complex variable can be based on Cauchy's Integral Formula as well as on the Taylor's development.

Conversely, let

Co + CiZ + c2z 2 + . . . (4)

be any power series converging for values of z =|= 0. Then it can be shown that this series converges within a certain circle of radius R and (excepting the special but important case that it converges for all values of z and thus represents a so-called integral transcendental function of z) diverges outside of the circle. Within this circle, called the true circle of con¬ vergence, the series represents an analytic func¬ tion and forms in fact the Taylor's (or Mac- laurin's) development of this function about the point z = a — 0.

9. Other Series. — (a) Laurent's Series. If f(z) is single-valued and analytic within a cir¬ cular ring of radii rt and r2 about the point a, then f(z) can be developed into a Laurent's Series :

/(z)= 2cn(3 — a)n,

n= — oo

convergent for all values of z within this ring: n < | z — a | < r2. Here

_ JL C f(t)dt

n 27t ij c(t — a)n +

— n

\cn \ < Mr

where C denotes a closed curve lying within the ring and encircling the point a, and M, r have the same meaning as in § 8.

and

(/;) Lagrange's Series. Kepler's problem of developing a root w of the equation

w — a + z sin w

(or more generally a function $ (w) of this root) according to powers of z led Lagrange to formulate the following problem : To develop a root w of the equation

w — a + zf(w),

or more generally a function 4 (w) of this root, according to powers of z. He thus obtained the series that bears his name :

**(a) + *'ro)/(o) +*

n = 2fl ! da11—1

Example: Let f(w) = b(u/> — 1),

1 V 1 — 2 az + z2

w — – .

z

Then dw/daz

1

(1 — 2az + z2) and

2 zn dn n— x n\ dan

(a2 — l)w 2 »

V 1 — 2 az + z2

Thus the form of the coefficients Pn in the ex¬ ample of § 8 is determined:

'02— i)ni

dn

2 n

n ! dpn _

These functions are known as Zonal Harmonics.

10. Roots and Singular Points. — A function f(z) is said to have a root or zero at an in¬ terior point a of the region .9 of § 8 if f(a) =0. It follows that f(z) can then be written in the form

/(z) = (z — a)m[c Cm 4- 1(2 — a) where m is a positive integer and 0 (un¬

less f(z) =0). The point a is called a root or zero of order m ; f(z) is sometimes said to have m roots in z — a. A circle of definite radius can always be drawn about the point a containing no further root of f(z).

If f(z) is single-valued and analytic through¬ out the neighborhood of a point a with the exception of this point itself, and if f(z) be¬ comes infinite no matter how z approaches a, then a is called a pole of f(z). Since \/f(z) then has a zero in a, f(z) can be written in the form

/(z) =

9(z)

(z — a)m'

where m is a positive integer and 9 (z) remains finite and different from 0 at a; f(z) is said to have a pole of order m, or to have m (simple) poles in z — a.

If, however, f(z) does not approach a limit when z approaches a, and does not have a pole there either, a is called an essential singularity. In the neighborhood of such a point Weierstrass has shown that the function comes as near as one pleases to any arbitrary preassigned value.

11. Linear Transformations. — The linear transformation

Z — az..'~ ad — bc^pO, cz + d

plays an important role in the theory of func¬ tions. If c — 0, we have an integral linear transformation. Interpreted geometrically as a transformation of the plane into itself, it comprises as special cases :

(a) Z — z-pb, i.e., a translation;

(b) Z = eaiz, " a rotation;

(c) Z = Az, A >0, " a stretching.

The general integral linear transformation can be generated by a succession of these trans¬ formations.

If, however, c if: 0, we need to consider one further transformation :

W z=t

This corresponds to an inversion in the unit circle: R—\/r, followed by a reflection in the axis of reals: Y — — y.

The general linear transformation carries circles over into circles, straight lines being re¬ garded, as in the geometry of inversion, as cir¬ cles with infinite radii. The infinite region of the plane is considered as a point (not, as in projective geometry, as a line), and this is the convention which it is desirable, for reasons that cannot be named here, to make in the theory of functions. We speak of the point 2—>. — Cf. an article by F. N. Cole, linear Functions of a Complex Variable, } Annals of Math., Ser. 1, Vol. 5 (1890), p. 121.*

12. Multiple- Valued Functions. — When in the definition of § 1 more than one value is assigned to each point of S, the first thing to be done is to group these values in such a way that they form several single-valued functions.

Consider for example the function V z. Setting

w=Re(f>l, z=rei,

we have

9=19, +71-.

If now we sever the plane along a line running from z = 0 to z—00, say along the positive axis of reals, we can then spread out two single – valued functions each analytic in this region, namely,

cpi

Wi —\/ r e 2 and w2 =j= — V r e 2 , and these two functions together just exhaust

the values of the multiple-valued function V z. Let us, therefore, consider two planes instead of one, each severed along the cut in question and lying one above the other like the leaves of a book, and assign the values Wi to the points of the one plane, w2 to those of the other. We observe, furthermore, that the values of Wi along the upper side of the cut in its leaf and those of w? along the lower side of the cut in the second leaf agree with each other. Let these two edges be united, so that z, moving continuously in the surface thus formed, will pass from leaf I to leaf II without interruption when it crosses the positive axis of reals from the upper side. Similarly the values of uh along the lower edge of the cut in leaf I and those of w2 along the upper edge of the cut in leaf II

correspond. Hence we shall unite these two edges. The final result is a closed surface of two

sheets in which the function z is single-valued. The sheets cut through each other along a line ; but the point z in crossing this line is not at liberty to pass into either sheet, z has not come to a fork in the road, but to a switch which has already been set, and its further course is definitely determined.

The point z= =:0 is called a branch-point, the cut a junction-line.

More generally, let

G(w, z)=Ao(z)wm-\-Ai(z)w'rn—1-Jr . . . + Am{z) = 0 be an algebraic equation. Then to each value

of z correspond in general m distinct values iih, ... , Wm ■ Mark the points fli , . . . , aK

(finite in number) for which this is not the case. Draw a curve C, not cutting itself, through these points and continue C from the last point to z — °° . Then spread out m leaves over the 2-plane and cut each leaf along C. The m values uh, ... , wm of the function can now be assigned to the points of these leaves so as to form m single-valued functions analytic throughout these regions. Finally, correspond¬ ing edges of the leaves are to be connected along each of the segments into which C is divided by the points ai, ... , aK™ . The re¬ sult is a closed surface on wThich w is a single¬ valued function of z. If G(w, z) is irreducible, the surface will consist of a single piece, and conversely. A branch-point in which g leaves are connected in cycle is said to be of order f1 — 1.

The surfaces here described are due to Rie- mann (Gottingen, thesis for the doctorate, 1851) and are known as Riemann's Surfaces. Corresponding to any given analytic iunction there can always be constructed a Riemann's surface on which the function becomes single¬ valued. In all ordinary cases the leaves are joined together in cycle in branch-points, and the}" always pass over into each other along junction lines, never merely at isolated points. See Analysis Situs.

13. Analytic Continuation. — If a function f(z) be single-valued and analytic in a region S, it may happen that the function can be

defined in an adjacent region Si in such a way that the extended function is analytic through¬ out the enlarged region (.S', Si). In this case f(z) is said to be continued analytically beyond the region A into the region Si. If 5i overlaps S, it will in general be necessary to introduce a Riemann's surface for the extended function.

Consider, for example, a function given by the power series (4). Let zo ˆ 0 be an interior point of the circle of convergence K. Develop the function by Taylor's Theorem about the point Zo. The new power series, which pro¬ ceeds according to powers of z — Zo, will surely converge within a circle tangent internally to K, and it may converge throughout a larger circle Ki. In the latter case analytic continuation is possible, the region Si corresponding to the part of Ki exterior to K.

We are now in a position to complete the definition, according to Weierstrass, of an ana¬ lytic function. Let f(z) be analytic in a given region V. Continue f(z), if possible, analytically beyond S. Repeat this step so long as it is possible to do so. The most extended function that can thus be generated out of the given function is known as the monogenic analytic function f(z). It is uniquely determined by the values of f(z) in S. Weierstrass employed the method of overlapping circles and power series for obtaining the successive analytic con¬ tinuations. The function is completely defined

as soon as any one of these power series, called elements, is known.

The rational functions and the elementary functions ez, log z, etc., are examples of mono¬ genic analytic functions. By an algebraic func¬ tion is meant any monogenic analytic function which satisfies an algebraic equation, G (w, z) = 0, where G denotes a polynomial. Every irre¬ ducible algebraic equation in w and z defines such a function.

Two analytic functions which agree in value with each other along an arc of a curve, how¬ ever short, lying wholly within their domain of definition, are identical throughout their whole extent.

It may happen that the singular points of an analytic function are not isolated, but exist in every internal of a curve (for example an arc of the whole circumference of a circle, the latter being the case with the function defined by the series

00

2znl n= 1

throughout the interior of the unit circle | z |< l), so that the function is analytic up to the curve, but cannot be extended beyond it. Such a curve is called a natural boundary. A region of the plane into which a given function cannot be continued analytically is called a lacunary space.

14. Reflection in Analytic Curves. — A

curve which can be represented by the equations

y=

where f and are both developable by Taylor's Theorem about every point to of the above in¬ terval and where, furthermore, f(t) and

Let 5 be a region bounded in part or wholly by an analytic curve T having no multiple point. If

u + vi=r=f(z)

is analytic in S and takes on real boundary values along f, then f(z) can always be con¬ tinued analytically across T . In particular, let r be an arc of a circle. Then the analytic continuation is effected by inverting S' in this circle and assigning to f(z) in the transformed points values conjugate to those in the original points. The method is fundamental in the study of minimum surfaces, and of the elliptic modular and the automorphic functions.

15. Dirichlet's Principle. — In order to show that a simply connected region S can be mapped in a one-to-one manner and conform¬ ally on a circle (§ 4), it is necessary to estab¬ lish the existence of a function u which (a) is single-valued and continuous in S, (b) satisfies Laplace's Equation (§6) throughout the in¬ terior of S, and (c) takes on preassigned values along the boundary of S. In similar cases in mathematical physics Gauss, Thomson and Dirichlet had attempted to give a proof of the existence of such a function by making con¬ nections with a skilfully constructed corre¬ sponding problem of the Calculus of Variations. Riemann adopted this method in order to obtain his existence proofs, both for the present problem and for the case of algebraic functions corresponding to a preassigned Riemann's sur¬ face. The problem of the Calculus of Varia¬ tions which matches the present problem is as

follows: To find a function u which is con¬ tinuous in S, together with its first derivatives, takes on the prescribed boundary values, and makes the integral

a minimum. If such a function exists and if, furthermore, it has continuous second deriva¬ tives, then it will satisfy Laplace's Equation within S and thus yield the desired solution. It was assumed by the mathematicians named above that the problem of the Calculus of Variations necessarily has a solution. This method of proof is known as Dirichlet's Prin¬ ciple. Weierstrass pointed out the insufficiency of the reasoning involved in the assumption to which we have just called attention. Other methods of proof were then devised by Schwarz and Neumann. Recently Hilbert has, with con¬ siderable labor, partially filled the gap in the original method.

16. Weierstrass's and Mittag-Leffler's Theorems. — It is always possible to form a polynomial which has n roots situated arbi¬ trarily in the complex plane. The question presents itself as to whether this

theorem can be extended to transcendental integral func¬ tions. This question Weierstrass answered in 1876 as follows : Let a0, ah . . . be any set of points in the complex plane such that lim an=°° when n =°° . Then there exists an integral transcendental function G(z) which has in each of the points an a zero of arbitrarily preassigned order, and does not vanish for any other value of z. The most general such function is given by the formula

G(z)=erW@(z),

where (&) denotes a particular function of the

class in question and F is a rational or tran¬ scendental integral function. This theorem has formed the point of departure for many recent researches, chiefly of French mathematicians.

Mittag-Leffler's Theorem : Let do, Oi, . . . be any set of points in the complex plane such that lim an=°° when n = <*. In each of these points let an arbitrary polynomial in 1/ (z — av) :

A M A M A

fn(z)= — 1 — 7 — ~ — O

2 — an (Z— On)2 (2 — a?i),c

be chosen. Then there exists a single-valued function F (z) analytic throughout the whole plane except at the points an and behaving in each of these points like f7i(z) ; i.e., the differ¬ ence

F(z)-fn(z)

has no singularity in the point an. The most general such function is given by the formula

FWˆgW + cw,

where ˆ denotes a particular function of the class in question and G is an integral function, rational or transcendental.

17. Elliptic and Abelian Integrals. — The

motion of a simple pendulum and the length of the arc of an ellipse lead respectively to the elliptic integrals

where y2 — (1 — x2) (1 — * k2×2) , 0 < k < 1 .

If we set the first of these integrals equal to w

and let x take on complex values z, then the inverse function z defined by

dz

V (1 — z2) (1 — k2z 2)

turns out to be a single-valued function of its argument w having two linearly independent periods (§ 18) and being analytic throughout the whole w-plane except for poles.

A generalization which now presents itself is the following : The integrand in each of the foregoing cases is a rational function of x and y, and these variables are connected by an alge¬ braic equation. Consider, therefore, generally an algebraic equation

G(w, z)z= =‘0,

where G denotes an irreducible polynomial in w and z, and construct the Riemann's surface corresponding to it. Let R(w,z) be any rational function of >w and z. Then, setting w equal to the algebraic function of z defined by the fore¬ going equation, we have in R(w,z) a function which is singled-valued and in general con¬ tinuous on the above surface. If now we ex¬ tend the definite integral

R(w, z)dz

along an arbitrary path on the surface, we have before us an Abelian Integral. It is obvious that the logarithm and the inverse trigonometric functions, e.g.,

r zdz

sin— I — ' z2 + w2 = 1 ,

J ow

are special cases of Abelian integrals. When the equation G = 0 is of the form zv2 = =f(z), where f(z) denotes a polynomial in z of degree >4 having all distinct linear factors (or can be thrown into this form by means of birational transformations), the integral is called a hyper- elliptic integral.

The only Abelian integrals whose inverse function is single-valued are those which lead to the exponential (including trigonometric) and the elliptic functions. The Abelian Functions are single-valued periodic functions, not of a single argument, but of p independent variables, where p denotes what is known as the de¬ ficiency of the corresponding Riemann's surface G(w, £) = 0. They have 2 p periods. These functions arise as the inverse functions Zli (w i, . . . wp), (k = 1, ..., p) of a system of p equations:

Ai Fzp

Wk- = | ^/C^i + . . . + I ^/c^2p,

J A dp

where the integrals^* ty^dz are p linearly inde¬

pendent Abelian integrals on the Riemann's sur¬ face for G(w,z) = 0.

18. Automorphic Functions. — A function f(z) is said to admit a linear transformation into itself if

where a., ... d are constants and ad — /3y_ ± 0. A familiar class of such functions are the

periodic functions. Here the transformation reduces to a translation :

/(* + w) = /0).

The most general single-valued periodic func¬ tions of a single variable z, which are in general analytic, are the simply and doubly periodic functions, i.e., those functions whose periods can all be expressed as integral multiples no of a single primitive period ot or else in the- form no f n'o)', where o and! o' form a primitive pair of periods. In the latter case of o' cannot be a real quantity.

If the coefficients are integers and ad — (3} = ± 1, we have the elliptic modular functions. More generally the coefficients may have non-integral values, being restricted only in such a way that the transformations form a <(discrete group. These most general functions, including the special cases above mentioned, are known as the auto morphic functions.

19. Definite Integrals. — The /"-function may be defined by the definite integral

r(zb

/so

o'

t^—^e—Ldt,

the variable of integration t being real and posi¬ tive. This integral converges only for values of z which lie to the right of the axis of pure imaginaries : z = x + yi, x' > 0. A new definite in¬ tegral can be formed as follows which converges for all values of z = f = — n, where n denotes a positive integer, namely,

/:

tz—le—dt,

extended over the loop indicated in the figure.

oo

It is readily shown that the second integral is equal to the first multiplied by 1 — e2Mz for all values of z for which the first integral con¬ verges. Hence we have generally

r(z)

i e«J(

t^—ie—tdt.

By means of this integral the /"-function has been systematically treated.

The above is an example of a loop integral, i.e., a definite integral extended over a certain loop-circuit. Such integrals have been gener¬ alized, being extended over double circuits, and these latter integrals are an aid in the study of the solutions of certain linear differential equations.

20. Functions of Several Variables. — In

each of n complex planes let a region Si, . . ., Sn be given, and let zK be an arbitrary point of S k.

Then the set of values (zi,. . .,zn) is called from analogy with the case n— 1 a point. The totality of these points constitutes the region (S). In every point of S let a function f(zi,...,Zn) be uniquely defined. The idea of the limit and of continuity can be extended at once to such a function. f(zi,..., zn) is said to be analytic in (S) if it is continuous in (S) and if, further¬ more, when all the Zk but one, — Zm, let us say, — are held fast, f is then analytic in Sm ; this condition to be satisfied for m~ 1,..., n. For

brevity let n — 2. Cauchy's Integral Formula becomes

ti, tf)dti

t(x _ L_ c C

(27rf)2j Ci ti zij c tt-

■Zi

The function can furthermore be developed by Taylor's Theorem as follows: Let (ai, a2) be an interior point of (T), and let Kk be the largest

circle that can be drawn in SK about aK as centre, containing in its interior no boundary point of Si c. Then

/(&,&) =

where

OC

2

/ = 0, m = 0

C. (Zi- Im

ai)t(z2 — a2J™,

1 de+mf(suz,)\

'lm

V-m'

dzl, dz2m \(av fl2)

i r dh r

'2ˆrJ Ct ((. — + (

f(h, t*)dU

rt (/2 — ai)m – h 1

and zK is an arbitrary interior point of the circle Kk • We have, as in the case n — 1,

\clm\< Mn-bi-m,

where \zi — -fii |=n, | z2 — a2| — r2.

The idea and the method of analytic con¬ tinuation can be extended without difficulty to functions of several variables, and thus the monogenic analytic function is completely de¬ fined. For implicit functions and analytic con¬ figurations lysing in hyperspace the reader is referred to the author's report in the Encyklo- pddie, §§ 44 and 47 (see below).

The following theorem is due to Weierstrass : Let (b , Oi,..., an) be an interior point of a region (S) in which f(ur, Zi, . . ., Zn) is analytic. Let / vanish at this point; but f{w, Oi, ..., a n) shall not vanish identically. Then f(w, Zi, . . . ,Zn) = j Wm + Acwm — 1 S . . . T Am ˆ

where (w, Zi,. .., zn) is analytic throughout a certain neighborhood of the point (b, ai, . . . , an) and does not vanish there, while each of the coefficients Ai(zi, ..., zn), ...» Am(zi, ..., zn) is single-valued and analytic throughout a re¬ gion including the point (ai, ..., a?i) in its in¬ terior. The excluded case f(w, a±, ..., a n) =0 is also treated by Weierstrass.

21. Bibliography. — Burkhardt, (Theory of Functions of a Complex Variable) (New York 1913) ; Forsyth, (Theory of Functions) (1893) ; Goursat, (Cours d'analyse) (Vol. II, 2d ed., Paris 1910-13, has been translated by Hed¬ rick) ; Harkness and Morley, (Treatise on the Theory of Functions) (18*93), and (Intro¬ duction to Analytic Functions) (1898) ; Osgood, (Lehrbuch der Funktionentheorie) (Leipzig 1905-07) ; Picard, (Traite d'analyse) (Vol. II, 2d ed., Paris 1901-08). For a comprehensive report on the theory of functions, including numerous historical and bibliographical refer¬ ences, see the author's article: ((Allgemeine Theorie der Funktionen a) einer und b) meh- rerer komplexer Grossen,ˆ in (Encyklopadie der mathematischen Wissenschaftenˆ Vol. II, B. 1.

William F. Osgood,

Professor of Mathematics, Harvard University.

COMPLEXION, the term generally used to signify the special color or hue of a person's skin. The human skin, till the time of Mal¬ pighi, was supposed to consist only of two parts — the epidermis or outer skin, and the cutis or

true skin ; but that anatomist, about the middle of the 17th century, discovered between these a cellular texture, soft and gelatinous, to which the names of rete mucosum, rete Malpighi, or Malpighian tissue, have been given. He dem¬ onstrated the existence of this membrane at first in the tongue and in the inner parts of the hands and feet ; but by his subsequent labors, and also by those of Ruysch and other anato¬ mists, it was proved to exist, between the epidermis and cutis, in all parts of the human body. Malpighi, on the discovery of this mem¬ brane, offered a conjecture respecting the cause of the color of negroes. He supposed that this membrane contained a juice or fluid of a black color, from which their blackness arose. The actual existence of a black pigment has been since ascertained. The rete mucosum is of very different colors in different nations ; and the difference of its color so completely agrees with the difference of their complexions, that there can be no doubt that it is the sole, or, at least, the principal seat of the color of the human complexion. Its thickness varies in different parts of the body; and the depth of its color, for the most part, is in proportion to its thick¬ ness. It is now, however, not regarded as al¬ together a distinct tissue, being considered rather as the innermost and newest layer of the epidermis or cuticle. The black color of the negroes is destroyed by whatever destroys the rete mucosum, as wounds, burns, etc. ; the scar remaining white ever afterward. The greatest contrast in complexion is between the fair white peoples of northern Europe and the ebony-colored negro of Africa.

The nature and color of the hair seem closely connected with the complexion. In proportion to the thinness of the skin and the fairness of the complexion the hair is soft, fine and of a white color; this observation holds good not only in the great varieties of the human race, but also in albinos. Next to them in fairness of complexion is the Teutonic race, the rutile v coma (fair locks) of whom were a distinguish¬ ing characteristic even in the time of the Romans. The Celtic people are not so fair as the Teutonic, and their hair is darker and less inclined to curl ; but it is perhaps more difficult than in the case of the Teutons to be sure of unmixed blood. But though the color of the hair is evidently connected with the complex¬ ion, yet its tendency to curl does not appear to be so. Many brown-complexion Celts have curled hair; the Mongolian and American races, of a much darker complexion, have hair of a darker color, but long and straight. Among that portion of the Malay race which inhabits some of the South Sea Islands, soft and curled hair is said to be met with. The color of the eye is also connected with the complexion. In the African, Professor Sommering remarks that the white of the eye is not so resplendently white as in Europeans, but rather of a yellowish brown, something similar to what occurs in the jaun¬ dice. The iris in the negroes, in general, is of a very dark color; but the iris in the Kongo negro is said to be frequently of a bluish tinge. The Teutonic tribes are not more distinguished by their fair complexion than by their blue eyes, — carulei oculi, while the iris of the darker- colored Finn is brown, and that of the still darker Laplander black. The color of the eyes also follows, jii a great degree, in its changes,

the variations produced by age in the complex¬ ion. The most singular class of people in point of complexion are the albinos, but albi- noism is not confined to the human race. An intermediate complexion is produced where children are born from parents of different races. If the offspring of the darkest African and the fairest European intermarry succes¬ sively with Europeans, in the fourth generation they become white; when the circumstances are reversed, the result is reversed also. Along with the successive changes of complexion is also produced a change in the nature and color of the hair; though, in some instances, the woolly hair remains when the complexion has become nearly as fair as that of brown people in Europe. It does not, however, always hap¬ pen that the offspring is of the intermediate color between that of the respective races to which the father and mother belong; it sometimes resembles one parent only, while perhaps, in the second or third generation, the color of the other parent makes its appearance. An instance has been given of a negress who had twins by an Englishman: one was perfectly black; its hair was short, woolly and curled; the other was white, with hair resembling that of a European. In another case the child of a black man and an English woman was quite black; and still more remarkable : a black married a white woman, wrho bore him a daughter, re¬ sembling the mother in features, and as fair in all respects, except that the right buttock and thigh wrere as black as the father's.

The generally received opinion concerning the varieties of complexion which are found in the different races of man throughout the globe is, that they are caused entirely by the influence of climate. Respecting the primary color of man the supporters of this opinion are not agreed. The opinion that climate alone will ac¬ count for the various complexions of mankind is very plausible, and supported by the well- knowm facts that in Europe the complexion grows darker as the climate becomes warmer; that the complexion of the French is darker than that of the Germans, while the

natives of the south of France and Germany are darker than those of the north ; that the Italians and Spaniards are darker than the French, and the natives of the south of Italy and Spain darker than those in the north. The complexion also of the people of Africa and the East Indies is brought forward in support of this opinion; and from these and similar facts the broad and gen¬ eral conclusion is drawn, that the complexion varies in darkness as the heat of the climate increases ; and that, therefore, climate alone has produced this variety. But it can be shown that the exceptions to this general rule are very numerous; that people of dark complexions are found in the. coldest climates, people of fair complexions in wrarm climates, people of the same complexion throughout a great diversity of climate, and races differing materially in complexion dwelling near together.

1. In the coldest climates of Europe, Asia and America we find races of a very dark com¬ plexion. The Laplanders have short, black, coarse hair; their skins are swarthy, and the irides of their eyes are black. According to Crantz the Greenlanders have small, black eyes ; their body is dark gray all over ; their face brown or olive; and their hair coal-black.

The complexion of the.Samoiedes and other tribes who inhabit the north of Asia is very similar to that of the Laplanders and Green¬ landers, who are Eskimos by race. Humboldt's observations on the South American Indians illustrate and confirm the same fact. If climate rendered the complexion of such of these In¬ dians as live under the torrid zone, in the warm and sheltered valleys, of a dark hue, it ought also to render or preserve fair the com¬ plexion of such as inhabit the mountainous part of that country; for certainly, in point of cli¬ mate, there must be as much difference between the heat of the valleys and of the mountains in South America as there is between the tempera¬ ture of southern and northern Europe ; and yet this authority expressly assures us that <(the In¬ dians of the torrid zone, who inhabit the most elevated plains of the Cordillera of the Andes, and those who, under the 45th degree of south latitude, live by fishing among the islands of the archipelago of Chonos, have as coppery a complexion as those who, under a burning cli¬ mate, cultivate bananas in the narrowest and deepest valleys of the equinoctial region.® He adds, indeed, that the Indians of the mountains are clothed, but he never could observe that those parts which were covered were less dark than those which were exposed to the air. The inhabitants also of Tierra del Fuego, one of the coldest climates in the world, have dark complexions and hair.

2. Fair-complexioned races are found in hot climates. Ulloa informs us that the heat of Guayaquil is greater than at Carthagena; and by experiment he ascertained the heat of the latter place to be greater than the heat of the hottest day at Paris ; and yet in Guayaquil, <(not- withstanding the heat of the climate, its natives are not tawny® ; indeed they are <(so fresh- colored, and so finely featured, as justly to be styled the handsomest, both in the province of Quito and even in all Peru.® According to a statement of Humboldt, in the forests of Guiana, especially near the sources of the Orinoco, <(are several tribes of a whitish complexion of whom several robust individuals, exhibiting no symptom of the asthenical malady which charac¬ terizes albinos, have the appearance of true Mestizos. Yet these tribes have never mingled with Europeans, and are surrounded with other tribes of a dark brown hue;® The inhabitants of Boroa, a tribe in the heart of Araucania, are white, and in their features and complexion very like Europeans. Even in Africa darkness of complexion does not increase with the heat of the climate in all instances ; the existence of comparatively fair races in this quarter of the globe is noticed by Ebn Haukal, an Arabian traveler of the 10th century, and has been con¬ firmed by subsequent travelers.

3. The same complexion is found over im¬ mense tracts of country, comprehending all pos¬ sible varieties of climate. The most striking and decisive instance of this is on the continent of America, all the inhabitants of which, with the exception of the Eskimo, exhibit the copper- colored skin and the long and straight black hair. Australia is an instance of a similar na¬ ture, though on a less extensive scale : over the whole of the island, even in the comparatively cool climate of the southern parts, the complex¬ ion of its inhabitants is of a deep black, and their hair is curled like that of negroes.

4. Different complexions are round under the same physical latitude, and among the same people. Illustrations and proofs of this have al¬ ready been given. The physical latitude in which the

Norwegians, the Icelanders, the Finns and the Laplanders live scarcely differs ; and yet their complexion, and the color of their eyes and hair, are widely different. There is a great diversity of color and features among the Morlachs, who inhabit Dalmatia. The inhabit¬ ants of Kotar, and of the plains of Seigu and Knin, have fair blue eyes, broad face and flat nose. Those of Duare and Vergoraz, on the contrary, have dark-colored hair; their face is long, their complexion tawny and their stature tall. M. Sauchez, who traveled among the Tartars in the southern provinces of Russia, describes a race or tribe as having countenances as white and fresh as any in Europe, with large black eyes. In the south of Africa we find the Kafirs, who are of a brown or iron-gray color, and the Hottentots of a yellow color. In the island of Madagascar, according to Mr. Sibree, the observer <(finds almost every shade of color from a very light olive, not darker than is seen in the peoples of southern Europe, down through all gradations of brown to a tint which although not black is certainly very dark. In the quality of the hair, too, there is a good deal of difference; the lighter-colored people having usually long, black and straight hair, while the darker tribes have, as a rule, shorter and more frizzly hair.®

Besides a Malayan olive-colored race, people with the negro complexion and features are found in the Philippine Islands; and in Java, the Hindu and Malay character may be clearly traced in the complexion and features of the two classes of inhabitants which are found in that island. In several of the Moluccas is a race of men who are blacker than the rest, with woolly hair, inhabiting the interior, hilly parts of the country. The shores of these islands are peopled by another nation, whose inhabitants are swarthy, with curled, long hair. In the interior hilly parts of Formosa the inhabitants are brown, frizzle-haired and broad-faced; while the Chinese occupy the shores.

It is observed that there are two great varie¬ ties of people in the Pacific islands ; the one more fair, the other blacker, with their hair just beginning to be woolly and crisp. The first race inhabits Tahiti and other of the Society Is¬ lands, the Marquesas, the Friendly Isles, Eas¬ ter Island and New Zealand; the second race peoples New Caledonia, Tanna and the New Hebrides, especially Mallicolo. If we examine the relative situation and latitudes of these is¬ lands on a map, we shall be convinced not only that darker complexioned people are found where the climate is comparatively colder, but that the same complexion is found under very different latitudes. It is not meant to be denied that a burning climate will render the complex¬ ion very dark, and that a climate of less extreme heat will bronze the complexion of the fairest European ; but there are some material points in which the dark complexion of the Caucasian, or naturally fair-skinned variety of mankind, caused by climate, differs from the dark com¬ plexion of all the other varieties of the human race.

1. The offspring of the Caucasian variety is born fair; the offspring of the other varieties is

born of the respective complexion of their par¬ ents. Ulloa informs us that the children born in Guayaquil of Spanish parents are very fair. The same is the case in the West Indies. Long, in his history of Jamaica, expressly affirms <(that 'the children born in England have not, in general, lovelier or more transparent skins than the offspring of white parents in Jamaica.® But it may be urged that this is not the case with respect to the other nations of the Caucasian variety, who have been settled in warm climates from time immemorial, and that the question ought to be decided by the Moors, Arabians, etc. Their children, however, are also born fair complexioned, as fair as the children of Euro¬ peans who live under a cold climate. Russell informs us that the inhabitants of the country round Aleppo are naturally a fair complex¬ ion, and that women of condition, with proper care, preserve their fair complexion to the last. The children of the Moors, according to Shaw, have the finest complexions of any nation what¬ soever; and the testimony of Poiret is directly to the same effect. <(The Moors are not naturally black, but are born fair, and when not exposed to the heat of the sun remain fair during their lives.®

2. Individuals belonging to the Caucasian variety, that inhabit warm countries, preserve their native fairness of complexion if they are not exposed to the influence of the climate; while there is a uniform black color over all the parts of a negro's body. The hue which Europeans assume is the same, though the tinge may be lighter or darker, whether they settle in Africa, the East Indies or South America. They do not become, like the natives of those countries, black, olive-colored or*

copper-col¬ ored; their complexion merely resembles that of a tanned person in this country, only of a darker tinge. The negroes that are settled in the West Indies or America do not assume the copper color of the Indians, even though a milder climate may have some effect on the darkness of their complexions. The children of Europeans, of negroes and of Indians are all born, in America, of the same reddish hue; but in a few days those of the negro begin to assume the black complexion of their parents, those of the Indian the copper complexion, while those of the European either continue fair, if kept from the influence of the sun, or become tanned ; not black like the negro, or copper-colored like the Indian, if exposed to its influence. Europeans who settle in Canada, or in the northern parts of America, where the climate resembles that of their native country, do not assume the complexion of the Indians, but continue fair like their ancestors. The same observation may be made respecting the Rus¬ sians who are settled among the Mongolian variety, in those parts of the Russian Empire in Asia, the climate of which resembles the middle or northern parts of European Russia. Indeed the wide extent of country over which the Mongolian variety is spread, including the ex¬ treme cold of Lapland and the north of Asia, the mild temperature of the middle parts of that continent, and the warmth of the southern parts of China, is in itself a proof that dark complexion does not arise either from the in¬ fluence of heat or cold.

Lastly, radical varieties of complexion are always accompanied with radical varieties of

features. We do not .find the olive color of the Mongolian variety with the features of the Malay; nor the brown color of the Malay with the features of the Mongolian ; nor the black skin of the Ethiopian variety, or the red color of the American, united with any set of features but those which characterize their respective va¬ rieties. It, however, by no means follows that the hypotheses of different races having been originally formed must be adopted, because cli¬ mate is not adequate to the production of the radical varieties of complexion which are found among mankind. Man, as well as animals, has a propensity to form natural varieties ; and the variations may in process of time involve all the tissues so as to yield permanent differences in color and quality of hair, color of skin, size and form of bones, especially those of the skull and limbs. See Epidermis; Histology; Mal¬ pighi; Races and Nations.

COMPLINE, the last or seventh of the daily canonical hours in the Roman Catholic breviary; the complement of the Vespers or evening office. Saint Benedict, in the 6th cen¬ tury, added Compline to the hours, thus making the number seven, answering to the praises of which the psalmist speaks of ((seven times a day.® Matins and lauds were classed as one hour.

COMPLUTENSIAN POLYGLOT, the

earliest complete polyglot edition of the Bible compiled and printed in Alcola. It was made by seven scholars under the auspices and at the expense of Cardinal Ximenes. It was begun in 1502, and finished in 1517, but was not actually published till 1522. It consists of six folio volumes. In the Old Testament, on the left hand page, are the Hebrew original, the Latin Vulgate and the Greek Septuagint; and on the right hand page, the Vulgate, the Septuagint, with Latin translation above, and the Hebrew, with primitives belonging to that language on the outer margin. At the lower part of the page are two columns used for a Chaldee paraphrase and a Latin translation. The Greek Testament, constituting part of the Compluten- sian Polyglot, was the first complete edition of that part of Scripture printed.

COMPOSING-MACHINES, a general

title for all classes of machines that compose or set either type or matrices, arranging them in lines and columns for printing. There are four prominent types of these: (1) Those that set matrices in line and cast therefrom a solid line or slug, as the Linotype, Intertype, Linograph and Monoline; (2) those that cast and set type, as the Monotype and Graphotype ; (3) those that set and distribute ordinary founders' type, these being the only ones properly styled type¬ setting machines, as the Thorne (or Unitype), McMillan, Empire, Dow, Fraser, Kastenbein, etc. ; and (4) those that impress male dies into soft material and cast lines from these- impres¬ sions.

Historically, the type-setting machine comes first, William Church of Connecticut devising a machine, which was patented in England in 1822, that was the first practical effort in this direction.. He employed a keyboard, and stored the type in channels. From 1842 to 1872 there were

57 United States patents granted on com¬ posing machines, and from 1822 to 1872 a like number were patented in Great Britain. The

THE COMPLETE MONOTYPE — BUILT ON THE UNIT SYSTEM

COMPOSING MACHINES

1 Model 9 Linotypes, Fairchild Press, New York

2 Composing-room, Public Ledger, Philadelphia, Pa

. . i'i ii

most noteworthy of these were the Mitchell and the Alden machines in the United States, and the Kastenbein, Hattersley and Fraser machines in England. These machines all came into use during the period between 1853 and 1872, and a few may still be found in operation in England. The difficulty with all of them seems to have been that they required several persons to operate each machine, and that the consequent cost was very nearly the same as for composi¬ tion by hand. From 1872 up to 1880 there were invented or constructed over 50 different machines designed to supersede the compositor, practically all of which failed of commercial success. During the period between 1880 and 1890 the Thorne type-setting machine, originat¬ ing in Connecticut, came into considerable use, being employed by many newspapers through¬ out the United States, and beginning to find a market abroad. During this period the Burr and McMillan machines also found some sale in the United States, and the Fraser, Hattersley and Kastenbein in England and Germany. In 1898 the Thorne was remodeled and renamed the Simplex, and later the Unitype.

Of all the machines devised for setting founders' type, the Unitype was most success¬ ful, but its manufacture was practically dis¬ continued about 1914. The types are contained in 90 channels, set radially in the periphery of an upright cylinder. As the operator fingers the keys, the types called for are pushed out of the lower ends of the channels and carried around on a circular raceway to the point where they are brought into line. A second operator draws to him from the composed type thus emerging enough to form a line of the de¬ sired length. This he puts in the galley and justifies, or spaces out to length, by hand. The leads, or spaces between lines, are also inserted by this operator. The type is distributed by an upper grooved cylinder, this being per¬ formed automatically in the later machines. In the last models of this machine one operator did (or could do) all the work.

The Empire machine, first known as the Burr, was a modification of the Kastenbein. It was produced in New York, and required three operators. It therefore fell into disuse as the one-man machines became common. Nickel type was employed, and a machine would handle only one body size of type.

The McMillan machine, developed in Ilion, N. Y., was provided with automatic justifica¬ tion, thus dispensing with the labor of one operator. The distributor was a separate ma¬ chine, operating quite simply at a speed of about 10,000 ems an hour. These machines were used for some years by the New York Sun and the DeVinne Press.

The Cox type-setting machine attracted con¬ siderable notice in the printing trade in Chicago and New York in 1898. The most unique feature of Cox's machine was the employment of crimped or corrugated spaces made of lead. The line was overset in length, and then squeezed down to measure by compressing the corrugations. This justification was satisfac¬ tory in some respects, but the crimped spaces created difficulty in many others, and its use was abandoned.

The Calendoli type-setting machine, devel¬ oped in France by a priest of that name, at¬ tracted much attention because of the won¬

derful claims made for its speed. Though ex¬ ploited for several years, it was never per¬ fected for the market. It employed short types grooved so as to slide on rails, and the key¬ board had

numerous combinations to enable the operator to strike whole words or syllables at a single motion of the hand.

There was exhibited at the Pan-American Exposition in Buffalo, in 1901, a one-man type¬ setting machine that appeared to work success¬ fully. It was the invention of Alexander Dow, and handled founders' type, being adapted to use the several sizes in one machine. The justification or spacing out of the lines was entirely automatic, requiring no thought by the operator. Had this machine been brought out at an earlier date, doubtless it would have secured a large sale.

Among other composing-machines that have been built in the United States, and attracted the attention of the printing trade at one time or another, are the Converse, projected about 1894, which did good work, but was obstructed bv previous patents ; the Paige, on whose devel¬ opment nearly $2,000,000 was spent, and which proved too costly to construct for the general market, the two machines built being now stored with Cornell and Columbia universities as mechanical curiosities; the St. John Typobar, consisting of cold-pressed metal clamped on a steel base, to form a line ; the Lagerman Typotheter or Chadwick, a little machine for enabling a compositor to set type with both hands; the Johnson, which justified the lines by sawing a space of the required width ; the composite type-bar machine, in which short, notched type were transformed into a line or type-bar by casting metal around their bases and between them ; the Sears, in which dies were impressed in a block of wood, and a slug cast from the matrix thus formed; the Risley and Lake, in which the type were impressed in a soft sheet like blotting paper, and a stereotype taken after a quantity had been thus impressed, and the Heath Matrix Typograph, of the same class ; and the Goodson Graphotype, which re¬ sembled the Monotype, but was much smaller, employing only 100 characters. The Grapho¬ type was later rebuilt, but failed to find com¬ mercial sale.

The Scudder Monoline machine produces a slug like that of the Linotype, and was barred out of the United States as an infringing ma¬ chine. It was much smaller than the Linotype and did a more restricted class of work. Early in the present century it passed into the hands of the Mergenthaler Linotype Company, and was never placed on the American market.

The Linotype is a machine designed to do the work of both type setting and type casting, by substituting for lines of individual type metal bars or slugs with raised letters on one edge. These bars, when arranged in page form, have the same appearance as pages of separate type and may be used either to print from direct or to produce stereotype or electro¬ type plates in the usual manner. The machine will produce type faces of any kind desired, from 5 to 36 point, some up to 60 point; re¬ quires but one operator, and gives a product equal to five or six hand compositors, furnished with ordinary type.

The Linotype was invented in 1885 by Ott- mar Mergenthaler, a German by birth, then liv-

ing in Baltimore, and first put into practical use by the New York Tribune in 1886. Since then it has come into general use by news¬ papers and printing offices throughout the world.

The machine contains as fundamental ele¬ ments several hundred brass matrices. Each matrix consists of a flat plate having in one edge a female character or matrix proper, and in the upper end a series of teeth which are used for distributing the matrices to their proper places in the magazine of the machine. Matrices are also made having two characters, Fig. 1, as for instance, a Roman and Italic letter, either of which may be used at will. There are in the machine a number of matrices for each letter, and also matrices representing special characters and spaces.

The general organization of the machine is shown in outline in Fig. 2. A represents an inclined fixed magazine, con¬ taining channels In which the assorted matrices are stored and through which they slide, enter¬ ing at the upper and escaping • at the lower end, one at a time. Each channel in the magazine has at the lower end an escape¬ ment B, connected by a rod C with a finger key D, represent¬ ing the letter or character of the matrices in the corresponding channel. There is a key for each character, and also keys for quads and for the wedge spacers.

The operation of the various keys results in the selection of the matrices and spacers and their collection in assembler G, until it contains all the characters to be represented in one line of print. After the line is thus composed, it is transferred mechanically, through the path indi¬ cated by dotted lines in Fig. 2, to a position in

Fig. 2

front of a mold or slot extending through the wheel K, from its front to its rear face. This mold is of the size and shape of the slug or

line of type required, and it determines both the measure and the body of the line. While the line is in place in front of the mold, the wedge spacers are pushed up through the line, which is instantly and exactly justified thereby.

Behind the mold, there is a melting pot M, heated by flame from a gas, gasoline or elec¬ tric heater. After the matrix line is in place against the front of the mold, as shown in Fig. 2, a pump forces the molten metal through the pot mouth into the mold, against and into the characters in the matrix line. The metal in¬ stantly solidifies, forming a slug having on its edge raised characters formed by the matrices. The slug is then automatically removed from the mold, being trimmed to the proper length and thickness by knives. The line is then lifted from the mold and shifted laterally, until the teeth in the upper end of the matrices engage the horizontal ribs on a bar which rises, as shown by dotted line at R, lifting the matrices to the distributor at the top of the machine. The matrices pursue a circulatory course through the machine, starting singly from the bottom of the magazine, passing thence to the line being composed, thence to the mold, and finally back to the top of the magazine. This circulation permits the operations of com¬ posing one line, casting from a second and distributing a third to be carried on concur¬ rently, and enables the machine to run at a speed exceeding that at which any operator can finger the keys. There are a dozen or more models of Linotypes in present use with a wide latitude of accomplishment. The modern models handle all type bodies from 5 point to 36 point, and assemble matrices from all maga¬ zines in one line. All machines set from 4 to 30 ems pica measure. Wider measures are obtained by assembling two or more slugs end to end. The later models have many added con¬ veniences, and the larger machines carry two or more simultaneously acting distributors. From one to four interchangeable magazines are supplied with individual machines. Each magazine contains two-letter matrices repre¬ senting 180 characters. On models 16 and 17, each having two magazines, the mere touching ot a key brings either magazine into operation, rendering available 360 characters from one keyboard of 90 keys. In other models an aux¬ iliary magazine is added with keyboard of 28 keys representing 56 characters, making a total of 416 characters in the machine.

The quadruple magazine Linotype carries eight faces, and gives the operator 720 charac¬ ters from one keyboard. In 1915 the quad¬ ruple magazine head-letter machine was broughi out for setting newspaper display heads in 48-, 54- or 60-point. It will be apparent that the modern machines can set the great majority of advertising and display composition, as well as the straight body reading matter, to which they were originally confined. Among recent im¬ provements is an electrically heated metal-pot for heating the metal. This not only reduces the nuisance from lead fumes, but permits ex¬ tremely close regulation of the temperature of the metal. In 1918 there were over 35,000 Lino¬ types in actual use all over the world.

The Monotype Composing Machine, type- and-rule caster, is so named because it oasts each character on a separate body and auto-

rnatically assembles them into lines and columns ready for the press. The system consists of two separate mechanisms, a keyboard and a casting machine, frequently looked after by one operator. The equipment is arranged to make production continuous, for both keyboard and caster are busy on the same job, but should either be temporarily stopped it does not inter¬ fere with the other, which keeps right on pro¬ ducing. The composition is done on the key¬ board, which perforates the paper controller ribbon for the casting machine. This keyboard, consisting of 225 keys, has the same arrange¬ ment of characters for every alphabet as any standard typewriter. The keys are coupled by

means of keybars with valves, which admit air beneath small pistons, which in turn drive the punches through the paper controller ribbon when a key is depressed by the operator. When the key is released, the punches withdraw from the paper and the controller ribbon feeds for¬ ward ready to receive the perforations for the next character. The punches are so arranged that certain combinations of perforations across the paper ribbon will position the matrix for the desired character over the mold at the cast¬ ing machine.

In addition to the key and. perforation mechanisms, the keyboard has a counting and justifying mechanism. The counting arrange¬ ment counts the width of each character as struck and adds it to the width of the charac¬ ters previously struck in the line, so that the operator can tell at a glance just how much has been put into the line and how much space still remains. The justifying mechanism consists of a pointer which rises one notch each time the space bar is struck, to put a justifying space between words, and a cylinder (the justifying scale) which revolves automatically when the operator has put sufficient characters and spaces in the line to bring it within four ems of the end of each line. The surface of this scale is divided into small rectangles, each containing numbers which refer to the justification keys on the keybank. The keys corresponding to the two numbers indicated by the pointer are struck by the operator, when sufficient charac¬ ters have been put in the line, and the perfora¬ tions produced by these keys set the wedges at the casting machine to produce spaces the correct width to exactly justify the line.

The casting machine is entirely automatic in its operation and is controlled by the controller ribbon perforated at the keyboard. Two hun¬ dred and twenty-five matrices are carried in the matrix case; and, for different combinations, characters may be substituted, or the matrix case removed and a new case inserted in the machine. The face of the type is cast in the matrix, but the body of the type is cast in the mold on which the matrix seats while the type is being cast. The type comes out on the cast¬ ing machine in automatically justified lines, as previously described, and these lines are assem¬ bled on an ordinary galley ready for the make¬ up man. It composes type in any measure up to 60 picas and in sizes from 5- to 24-point ; when required, measures up to 120 picas may be composed at the keyboard. The duplex key¬ board unit composes simultaneously the same matter in two different faces, point, sizes and measures; the same keystroke that produce the ribbon for magazine columns in 8-point,

for example, 'also produce the ribbon for the same matter in 10- point for book pages, etc.

When operated as a type-and-rule caster, the Monotype casts type for the cases, borders and space material, both high and low, in sizes from 5- to 36-point. An ingenious new unit casts rules and both high and low leads from 2- to 12-point in continuous strips, and auto¬ matically cuts them to any required measure from 6 picas to 25 inches in length.

The versatility of the Monotype and the ability to supply practically everything needed in the composing room has made possible the non-distribution system now in use in many newspaper and book and job printing offices. The machine-set matter as well as the hand¬ set matter, when used, is simply pushed off the imposing stone into the melting pot and recast into new material for every job — Type, bor¬ ders, leads, slugs, etc. — this new method prov¬ ing more economical than distribution by hand for re-use. The Monotype thus, while a com¬ posing machine, also brings to the printing office a practicable, small type foundry which supplies the greater part of the material needed in the composing room.

The Intertype composing machine, intro¬ duced in 1913, is manufactured on the expired patents of Ottmar Mergenthaler, combined with many modern improvements. The operator manipulates a keyboard of 90 keys, and matrices are arranged in lines, automatically spread to column measure, and carried to the mold, where a line-slug is automatically cast, while the matrices are returned to their original position by an automatic distributor. Either the matrices supplied by the manufacturer or linotype mat¬ rices may be used. One standard machine is built, on the unit principle, to which every im¬ provement can be added by the purchase of more units. Thus the purchaser of a low-priced machine does not have to discard it to secure the conveniences of the higher-priced machines. From one- to three-magazine machines are made, and the one-magazine machine is readily changed into a three-magazine outfit, which will supply 540 characters from the one key¬ board. A simple lever movement brings a new magazine to operating position. The Intertype is remarkable for its scientific design and the small number of parts used in its construction ; the escapement has only two

parts. All Inter¬ types produce from 5 to 36 point body, and 5 to 30 ems pica measure.

The Linograph machine is manufactured in Davenport, Iowa. It is very similar to the 1900 style of Linotype, plus a number of modern additions. It is designed to supply the needs of the small newspaper desiring a low-priced machine. The Stringer composing-machine sup¬ plies a product either in single type or in line- slugs, at the choice of the operator. It was brought out in England in 1914, and is not yet in general use. Several inventors have tried to produce a one-man machine that would cast and set single type at one operation, at a speed commercially profitable. Such a machine is theoretically possible. The Goodson, Wicks, Pierson and other type-casting and setting machines have been developed more or less ex¬ perimentally, at great expense, but have not found general sale. The Wicks machine cast type at a speed of 60,000 an hour, and was used for some years on a London newspaper.

Consult John S. Thompson's (The History of Composing Machines, > C. H. Cochrane's * Mod¬ ern Industrial Progress> and the files of the American Printer and Inland Printer.

Charles H. Cochrane, Of the Staff of N ewspaperdom.

COMPOSITE (Lat. "compound,® (

The Compositce may be regarded, especially from a consideration of their flowers, as the

highest order in a scale of vegetable evolution. Their peculiarly efficacious methods of pollina¬ tion, this process being simplified by the close set florets which permit of insect-fertilization or wind pollination, and by a peculiar action of the style which in the individual flower pushes itself in the way of wind or insect. Dissemination also is highly developed, there being three prom¬ inent types, the plumose pappus, as in dandelion and thistle, which is wind-sown ; the hooked achenes, as in the burdock and tickseed, which fastens to passing animals, and the gummy seeds of other plants, which are dispersal adaptations. On the order in general consult Bentham, (On the Classification, History, and Geographical Distribution of the Compositae) (1873).

COMPOSITE ORDER, a term denoting the last of the five orders of architecture. As its name implies, it is composed of two orders, the Corinthian and the Ionic. Its capital is a vase with two tiers of acanthus leaves, like the Corinthian; but, instead of stalks, the shoots appear small, and adhere to the vase, bending round toward the middle of the face of the capital ; the vase is terminated by a fillet, over which is an astragal crowned by an ovolo. The volutes roll themselves over the ovolo, to meet the tops or the upper row of leaves, whereon they seem to rest. The corners of the abacus are supported by an acanthus leaf bent upward ; and the abacus itself resembles that of the Co¬ rinthian capital. In detail, the Composite is richer than the Corinthian, but it is less light and delicate in its proportions. Its architrave has only two fasciae and the cornice varies from the Corinthian in having double modillions. The column is 10 diameters high. The principal ancient examples of this order are the temple of Bacchus at Rome, the arch of Septimius Severas. The Composite order differs from the Corinthian in the design of its capital and in no other way. The capital is made up of the foliage of the Corinthian and the volutes of the Ionic capital. Most of the Byzantine cap¬ itals were based on the Roman Composite in its varying forms. The Italians, in their at¬ tempts to follow the ancient Roman Composite, have vitiated the true Composite forms, and in this they have been followed by some famous foreign architects, notably by Imigo Jones.

COMPOSITION, in law, an agreement between debtor and creditor or creditors, by which the latter accepts part of the debt due in satisfaction of the whole. Composition also bears the secondary meaning of the sum or rate paid or agreed to be paid in compounding with creditors.

COMPOSITION OF FORCES AND MOTIONS. See Mechanics.

COMPOST, any mixture of decomposed or¬ ganic matter with earth, used as a fertilizing compound. A compost is most frequently made by alternating layers of sods and stable manure in piles three or four feet thick and sprinkling them with lime, kainit and some potash salt, such as the sulphate or

muriate. After several weeks, during which they are kept moist by applications of water or, better, liquid manure, they are cut with a spade and turned over to form a new heap in which the various substances are mixed as much as possible. They may be turned several times to ensure the decay of the various organic materials. By varying the pro-

portions of manure and fertilizer to soil and organic matter composts may be obtained suit¬ able for various purposes ; rich ones for suc¬ culent crops and less rich for plants that must be kept stocky. In a general way the term compost is also, used for any heap of decaying vegetable or animal matter which is to be used as a manure. Thus stable manure and litter become compost heaps ; also the piles of leaves, etc., from which leaf mold is obtained for greenhouse use. Directions for making com¬ posts for particular kinds of plants may be found in all books on gardening, floriculture, etc., and many of the works dealing with manures and manuring also devote space to composting. A mixed dish is called a compost or compote ; and the term is also applied to a composition for plastering the exterior of houses. In this latter use it is often popularly contracted to compo.

COMPOSTELLA, kom-pos-ta'la, Order of Saint James of, an order of Spanish knights formed in 1175 to protect from the Moors the Christian pilgrims wTho had flocked in vast num¬ bers to Santiago de Compostella Galicia, Spain, where the relics of Saint James the Great were preserved. At first there were but 13 members of the order, but it grew rapidly in numbers and they became not only strong defenders of the relics of their patron but champions of Christianity against the invasion of the Moors. In time this order attained great wealth, thereby exciting the jealousy of the Crown, which suc¬ ceeded in securing the grand-mastership in 1522, after which the order rapidly declined. On the overthrow and expulsion of the Moors from Spain in 1492 the excuse for the existence of the Society ceased, and the following year Fer¬ dinand and Isabel, who then ruled Spain as joint sovereigns, took possession of the abbeys, villages, towns and landed property of the Compostella order and held them until 1522, when a papal bull vested the grand-mastership permanently in the Crown.

COMPOUND ALCOHOL, rectified spirits to which has been added one or more flavoring ingredients. They are called also compounds. The chief compounds are gin, British rum, Brit¬ ish brandy, and some grades of American whisky, cordials and liqueurs, such as curagao, lovage, cherry brandy, noyeau, rum shrub, etc., are also denominated compounds. These are prepared by adding to clean rectified spirits various essences or oils and sweetening with sugar or syrup. Sweetened compounds usually contain from 20 to 35 per cent of proof spirit.

COMPOUND AMMONIAS, or AMINES,

a large and very important class of complex substances derived from ammonia by replace¬ ment of the hydrogen with an organic radical. They are termed primary, secondary or tertiary, according as one-third, two-thirds or the whole of the hydrogen is replaced by an organic radical. They are found in nature in the veg¬ etable alkaloids and among decomposition products of animal and vegetable organisms. They are all basic in function, combining with acids to form crystalline salts. They have an alkaline reaction. Some of the lower members of the group are gases and volatile liquids, generally inflammable, with a pungent fishy odor. As the molecular weight increases they become more stable, and the higher members

are solid and odorless. They are of great im¬ portance in the investigation of the constitution of various organic bodies. See Amine.

COMPOUND ANIMAL. See Colonial Animals.

COMPOUND DUTIES. See Duty.

COMPOUND LOCOMOTIVES. See

Locomotive.

COMPOUND STEAM-ENGINE. See

Steam-engine.

COMPOUNDING A FELONY, the act

of. accepting from a felon, by the person ag¬ grieved, a return of the goods, a consideration or a reward, on the express condition that he will not prosecute the felon. The mere failure to prosecute a person committing a crime is not, even if the goods are returned, com¬ pounding a felony; but the essence of the action is the agreement not to prosecute for a consid¬ eration of any kind. It is usually illegal to accept the return of money or goods stolen or to hide or condone other illegal acts per¬ formed or procured by the offending party or another, in his interest, upon a promise of immunity from prosecution or the withdrawing of evidence. The person aiding the felon is an accessory to the crime and can be prosecuted, although the person committing the crime has never been tried. In English law, to advertise a reward for the return of stolen goods renders the advertiser liable to a fine.

COMPRESSED AIR. Compressed air has a wide application in the various branches of mechanical engineering and in the arts and manufactures. As compared with steam, com¬ pressed air transmission of power is valuable and convenient because (a) its loss in trans¬ mission through pipes is relatively small, (b) the question of the disposal of exhaust steam under¬ ground is avoided and (c) the exhausted air is a help in ventilation. Although electricity has become a rival of compressed air in many branches of work, their spheres of usefulness are not identical. The first cost of an electric plant is lower than that of an equivalent com¬ pressed air plant; but a point is soon reached where compressed air transmission becomes the cheaper. In recent years the principles of air compression have become better understood and a substantial improvement has taken place not only in the design of the compressors them¬ selves, but also in the installation of pipe lines and in the operation of the machines. In the production, transmission and employment of compressed air a greater total efficiency is now realized than was formerly thought possible.

Cooling During Compression. — If air at atmospheric pressure and 60° F. could be com¬ pressed to 100 pounds gauge pressure and all the heat due to the work of compression taken away as fast as generated, so that the tem¬ perature during compression would remain con¬ stant, the mean effective pressure during one stroke of the air piston would be 30.2 pounds. If, on the other hand, none of the heat due to the work of compression was taken away the mean effective pressure during the stroke would be 41.6 pounds and the terminal temperature would reach .485° F.. As the power required for compression is directly proportional to the mean effective pressure, it will be seen that the additional power required in the latter case is

37ˆ2 per cent. In practice neither extreme is reached, for it is impossible to completely cool the air during compression, and, on the other hand, some of the heat of compression will be radiated ; but the lower extreme is the ideal, and the nearer it can be approached the more eco¬ nomical the compressor will do its work.

Heat of Compression. — Various plans for taking away the heat generated in compression, such as injecting a spray of water into the cyl¬ inder, circulating cooling water through the piston and around the heads and cylinder barrel, etc., have been tried. The use of the cooling spray, or so-called ((wet compression,® has long since been abandoned, as has also the plan of circulating water through the piston, for the disadvantages more than offset the advantages. Cylinder heads and barrels are still water- jacketed, not so much on account of the heat that can be taken from the air as to keep the cylinder cool enough for proper lubrication. The most effective means for taking away the heat of compression and reducing the amount of power required consists of dividing the com¬ pression into two or more stages, depending upon the terminal pressure, and cooling the air as much as possible between stages by means of suitable cooling apparatus ; the water-jacketing of the cylinders being retained for the reason above stated. Where the work of compression is done in two or more cylinders, it is cus¬ tomary to so fix the ratio of cylinder volumes as to divide the work equally between the cylinders. By using two-stage compression and cooling the air between the stages

to its initial temperature (60° F.), without considering the cooling by water-jacketing, it is possible to reduce the mean effective pressure to. 35.5 pounds as compared to 41.6 pounds, which is equivalent to a saving of 15 per cent. At the same time the terminal temperature will be only 245° F. instead of 485° F.

Clearance. — Another factor in compressor design is the clearance in the compressor cyl¬ inders. It is not possible to run a compressor without some space between the piston and cylinder head at the end of the stroke, and in addition to this space there is the volume of the inlet and discharge passages between the valves and cylinder bore. The aim of all compressor builders should be to make this clearance space as small as possible in propor¬ tion to the volume swept through by the piston; for at the end of the stroke the clear¬ ance space is filled with air at the terminal pressure, which must expand back to the initial pressure before the inlet valve, is opened. This is particularly important in single stage com¬ pression, as at discharge pressures ordinarily used the expanding of the compressed air in the clearance space back into the cylinder seri¬ ously affects the volumetric efficiency of the compressor.

Initial Heating. — The capacity and effi¬ ciency of a compressor is also affected by the initial heating of the air. Under ideal condi¬ tions the cylinder would, on the suction stroke, be filled with air at full atmospheric pressure and at a temperature no higher than that of the outside air, but such ideal conditions are im¬ possible of attainment.. Even with an unob¬ structed inlet passage air will not flow into the cylinder without some indifference in pressure to force it in, and when, as in many compres¬

sors, the inlet valves are of the spring weighted poppet type, this difference as to its effect upon capacity and efficiency becomes a serious mat¬ ter. Then again, the entering air comes in con¬ tact with the cylinder walls, cylinder head, pis¬ ton and clearance surfaces which have become highly heated during the preceding compression stroke, and is heated thereby to a temperature above that of the surrounding air. This not only reduces the volume of free air at the out¬ side temperature which can be handled, but also raises the terminal temperature of compression.

It is essential to economy in air compression : (1) That the percentage of clearance be kept as small as possible. (2) That the inlet and out¬ let areas should be large in order to reduce friction losses and heating and to ensure the complete filling of the cylinder at all speeds. (3) That the entering air should pass through short ports, in a solid stream, and over as small an extent of heated surface as possible. (4) That the cylinders and cylinder heads should be water-jacketed in order to take away as much of the heat of compression as possible. To accomplish this as well as to facilitate cleaning, all water spaces and pipes should be large and an ample supply of cooling water used, as cold as can be obtained. Suitable hand holes or openings for cleaning out water spaces should be provided and made use of frequently, and the water should be as clear and free from sediment as possible. (5) That multi-stage compression should be used for anything be¬ yond very moderate pressures.

Hydraulic Compression of Air. — The method of compressing air by means of falling water forms a most interesting topic in the subject of air compression. One of the old forms of compressing air is by means of a trompe or water bellows. Many improvements have been made on this early apparatus and distinct types developed from it, prominent among which are the Frizell, Baloche, Krahnass, Taylor and Arthur devices. There are several phenomena in connection with hydraulic air compression that at first sight seem paradoxi¬ cal. In compressing air by hydraulic means, the air becomes drier during the compression, but whatever may be its initial condition as to hu¬ midity at the end of compression it will be saturated with moisture. Again isothermal compression is secured and, generally speaking, at uniform temperature a given volume of air implies a capacity for a certain weight of water whether the air is at a pressure of one or 100 atmospheres, but if the air is compressed through a range from one to 100 atmospheres, its volume will be reduced, if the compression is isothermal, to 1/100 part of the original vol¬ ume, and in consequence 99/100 of the weight of moisture it originally held will be precipi¬ tated. In connection with this type of com¬ pressor it has been found that the compressor air contains less oxygen than the free air of the atmosphere and in consequence its use in mines is not as beneficial as air from other types of compressors. The losses inherent in hydraluic compression are: (1) The heat expended in impregnating the water with air; (2) a loss which may be called the slip due to the velocity with which the bubbles tend to rise; (3) a loss due to the increasing solution of the air in the water. with the increasing pressure as the water and air descend.

Multi-Stage Compression. – It frequently happens that high pressures are demanded for commercial purposes, and in order to satisfy this demand, avoid the danger of explosion due to high temperatures and reduce the losses due to adiabatic compression, engineers have adopted a multi-stage system of compression — compressing the air partly in one cylinder, pass¬ ing it through an intercooler where its tempera¬ ture and volume are reduced, then compressing it still further in a second cylinder, and, if the pressures required are high, this compressed air is passed to a second intercooler, thence to a third cylinder and in some cases a third inter¬ cooler and a fourth cylinder, and required to secure the desired compression pressure eco¬ nomically. The advantages of this system of compression more than offset the extra expense in constructing the compressor. The larger the volume of the intercooler, the more time is required for the compressed air to cool; for this reason receiver intercoolers, as they are termed, are more efficient than those of small volumetric capacity. See Air Compressors; Air Pump; Condenser; Power Transmission.

Bibliography. — Hiscox, (Compressed Air) (New York 1901) ; Peele, (Compressed Air Plant* (ib. 1913) ; Unwin, ˆCompressed Air) (ib. 1903) ; Simons, c Compressed Air* (ib.

1914).

Edward S. Farrow, Consulting Civil and Military Engineer.

COMPROMISE OF 1820, in American political history, .a national law enacted by Con¬ gress 6 March 1820. In 1819 the Territory of Missouri, with a population of 60,000, demanded admission into the Union as a slave State. Ar¬ kansas was preparing to make similar demands. Such action would have given the South the balance of power in Congress, and the North made this a national issue. The North con¬ trolled the House of Representatives, while the South controlled the Senate. A deadlock was inevitable, and a party of compromise sprang up, which succeeded in producing a temporary arrangement acceptable to both parties. This was the compromise of 1820. It divided the Louisiana Purchase between freedom and slav¬ ery by a line drawn at 36° 30′ N. lat. See United States — Abolition and the Free Soil Movement.

COMPROMISE OF 1833, Henry Clays tariff compromise, to prevent civil war on account of nullification by South Carolina. The tariff of 1828 was regarded by the South as injurious and inequitable, raising its expenses and reducing its income, and laying burdens upon it without compensating advantages. The tariff was borne in the hope that Jackson, a Southern man, would throw his influence against it, but when he signed the amended act of 1832, leaving the duties much as they were, South Carolina took the lead in revolt. On 19 Nov. 1832, a convention called by its legislature de¬ clared the act of 1828 and its amendments null and void, forbade its enforcement in the State or appeal to the Supreme Court regarding it, and decreed secession in case the United States should attempt to use force. On 4 Dec. 1832, Jackson's annual message mildly criticised the tariff as overgrown and needing gradual re¬ trenchment to a revenue basis, and apologized for the popular resistance, which he thought the

laws adequate to suppress. The nullifiers and their opponents alike thought he had surren¬ dered to the former as in the Cherokee case (see Cherokee Nation v. Georgia) ; but on the 10th, apparently from a sudden shift of emo¬ tional feeling, he issued a powerful proclama¬ tion against them, characterizing nullification as an absurdity ˆincompatible with the exist¬ ence of the Union,** and declaring that it would be resisted by the entire national force. There was great enthusiasm throughout the North, and general approval even in the South, but South Carolina returned a defiant counter¬ proclamation, and Calhoun resigned the Vice- Presidency, to be immediately returned to the Senate as the champion of nullification. To re¬ move the grievance the House Committee of Ways and Means on the 27th reported the Ver- planck Bill, reducing the tariff within two years to the standard of 1816, the primitive basis. But the President, angered by the new South Carolina threat, asked for a bill to enforce the law by military power, and extend Federal jurisdiction over revenue cases — called by the people the Force Bill, and by the South Caro¬ linians the <(Bloody Bill.® All parties were per¬ plexed and unable to act. South Carolina had relied on Southern

support, which was not forthcoming; the House could not agree on the Verplanck Bill nor the Senate on the Force Bill. On 12 February, 20 days before the final adjournment of the 22d Congress, Clay under¬ took a compromise. He introduced a bill into the Senate which reduced the duties to a general 20 per cent by a sliding scale to end in 1842, enlarged the free list, etc. Clay's assigned motive was, that without some such measure the protective system was likely to be abolished altogether, but not before there had been civil war, in which the South would not let South Carolina stand alone. A further motive was, that he dreaded to see Jackson made a virtual dictator with a large army in his hands, as none could tell what he might do with it. Cal¬ houn struck hands with Clay, though the pend¬ ing Verplanck Bill was a far greater relief to the South. But Calhoun was far more anxious for a triumph of nullification and the conse¬ quent mastery by the South of her own des¬ tinies, than, for mere lightening of material burdens, and the compromise bill would be notoriously a concession wrung from the North by the threat of nullification while the Ver¬ planck Bill, even if passed (which was dubious), would be only a bill like any other. The compromise bill was referred to a select committee with Clay for chairman. The manu¬ facturers' lobby insisted on amendments, of which the chief was very obnoxious to the South — that for computing ad valorem duties on the basis of valuation at the home ports. As they made this an ultimatum, Clay supported it in the Senate, while Calhoun denounced it as both oppressive to the South and unconstitu¬ tional. Finally Clayton of Delaware, a strong Protectionist, threatened for his party to lay the whole on the table unless the Calhounists and their leader voted for *the amendment, which they did. Meantime the Force Bill had passed the Senate ; and Clay urged it to pass the com¬ promise tariff bill also, so that the bill for vio¬ lence should have that for harmony to coun¬ teract it. The objection was raised that the bill was one to raise revenue, and could not

originate .in the Senate. This was met by the shrewd device of moving the House to strike out all but the enacting clause of the Verplanck Bill and substitute Clay's bill, and send it to the Senate for concurrence, — which it did the next day, and the Senate adopted it. South Carolina, which had appointed 1 February for the nulli¬ fication ordinance to go into effect, repealed it, and the country hailed it as a great deliverance. Clay himself later confessed, however, that he doubted whether he had done wisely. The nullifiers denied that they had abandoned a jot of their contention ; hailed the result as a proof that it was the only means by which the South could obtain justice; and professed to have postponed the date of its operation only out of friendship to Virginia, which sent a commis¬ sioner to deprecate it. It is certain that the South won both the material and the moral fruits of the victory. Consult Schurz, 'Life of Henry Clay) (Vol. II, Chap. 14) ; also other lives of Clay and biographies of Jackson and Calhoun.

COMPROMISE OF 1850. The Missouri Compromise of 1820 (q.v.) had divided the Louisiana Purchase between free and slave ter¬ ritory at 36° 30′ (the general boundary between Arkansas and Missouri), except that Missouri was to be slave. The extreme pro-slavery mem¬ bers, about one-fifth of the House and one- fourth of the Senate, based their opposition on the ground that Congress had no power to leg¬ islate on slaveholding in the Territories, it being a fundamental right implied in the Constitution ; but the majority admitted the jurisdiction by passing the bill. The joint resolution for admit¬ ting Texas in 1845 extended the same line to any new bodies formed out of that State ; and was supported by the most ultra slavery men, as taking the merest sliver from them and securing solidly the enormous remainder. When the Mexican War seemed likely to add new territory, the Wilmot Proviso (q.v.) of 8 Aug. 1846, attempted to bar slaveholding from it, as did existing Mexican law ; and the struggle to prevent this transformed.political parties. After the annexation had taken place, 2 Feb. 1848, bills for organizing the Territories of New Mexico and California were introduced: at first in an omnibus bill with Oregon (the Clayton Compro¬ mise), to force all of them to permit slavehold¬ ing; then to extend the Missouri compromise line to the Pacific (including in slave territory nearly all the present New Mexico and Arizona and the entire southern half of California) ; then the Democratic Senate receded from the Oregon "hold-up/ and the House repeatedly attempted to organize the other bodies as terri¬ tories with the proviso ; while the Senate regu¬ larly killed the bills, and once attempted to attach its own as rider to an appropriation bill. This went on till the end of 1849, when the gold discoveries in California forced the hand of both the Southern slavery party and its North¬ ern allies. The immense immigrant popula¬ tion there formed a constitution prohibiting slavery and demanded admission of California as a State. Even the

deniers of the right of Congress to legislate on slavery had always admitted that the people of a State had the right to live under any constitution they pleased; and the Democrats, to hold their vote •in North and South, now took the position that

*the inhabitants of an inchoate State should be allowed to decide their own destinies. As this meant the immediate reinforcement and ulti¬ mate supremacy of the free States, the Southern Whigs and Democrats began to draw together and formulated the doctrine that the people of a Territory had no right to exclude the indus¬ trial or social system of any part of the Union ; that Congress should force them to rescind such exclusion if made; and that the exclusion, if permitted, was a wrong which justified seces¬ sion. But California was not a Territory: it was a body of unorganized settlers who would come in as a State from the first, and certainly could be admitted by Congress on their own terms. The Southern leaders, therefore, re¬ solved that they should not be admitted except by passing through the territorial stage, so as to come under the congressional prohibition. Zachary Taylor, a slaveholder, but a moderate and just-minded man, had been inaugurated as President in March 1849, and his first Congress met in December. The Senate had a large Democratic majority; the House was so evenly divided that the few Free-Soilers held the bal¬ ance, and it required 63 ballots and three weeks to elect a speaker, Howell Cobb, of Georgia. On their meeting Taylor had sent a message recommending California's wish to become a State, to their favorable consideration ; on 21 Jan. 1850, he sent a special message, declaring that the people would not sustain them in denying the Californians the right of self-gov¬ ernment. The South, nevertheless, was passion¬ ately determined not to yield; and Henry Clay undertook one of the great compromises which were the pride of his life, the shortest- lived and most destructive compromise in American history. The difficulty was to find anything that either side wanted badly enough to take as a price for yielding. For the South, this was found in the Fugitive Slave Law (q.v.), which Alexander H. Stephens declared to be the very essence and heart of the whole compromise and the breach of which by the Northern person¬ al-liberty laws was accounted the crowming justi¬ fication of secession; and in a money indemnity to Texas for abandoning her claim to the Rio Grande as a western boundary, which that State was ready to fight for, but the payment for which would raise the market value of her bonds, largely held in the South. For the North, it was found in the admission of California as a free State and the prohibition of the slave- trade in the District of Columbia — the latter a mere sop, as slavery was not abolished in the District. The sacrifices were, that the South gave up the right of insisting that no free State should be admitted into the Union except as paired with a slave State, and so in her own view gave the North the fruits of the Mexican VVar; the North gave up the proviso and the right of stopping the interstate slave trade, though this was later stricken out. On 16 January a bill had been brought into the Senate to organize ((the Territories of California, Deseret [Utah], and New Mexico** ; on the 29th Clay unfolded his compromise, in eight resolu¬ tions: (1) admitting California with her free- State Constitution ; (2) organizing the re¬*

*mainder of the newly acquired lands as terri¬ tories, without restriction as to slavery, as ift Jdid not exist [there] by law, and was not likely to be introduced, ** — merely slaving off*

the question till they formed State govern¬ ments; (3, 4) annulling Texas' claim to New Mexico, but paying her a blank indemnity; (5, 6) non-abolition of slavery in the District of Columbia without the consent of Maryland, but prohibition of the slave trade in it; (7) a more effectual fugitive slave law; (8) non¬ interference with the interstate slave trade. Clay said that the question with the South was one of interests, with the North one of sentiment, and the latter was easier to sacrifice than the former. The Northern members and their constituents did not agree to this, nor did the South as to the equivalents ; and after two months' debate the question was referred to a compromise committee of 13, of which Clay was chairman. On 8 May it reported a bill of four parts, known in history as the Omnibus Bill (par excellence, for there have been others), to be passed or rejected as a whole. The essential changes were, that New Mexico and Utah were forbidden to pass laws respect¬ ing slavery, that California should not be ad¬ mitted unless this were granted, that the blank for the Texas indemnity should be filled with $10,000,000 and that no mention was made of the interstate slave trade. It will be observed that the gains in this revised ˆcompromised were pretty much all by the South. The bill of course embodied the specific legislation needed to make the resolutions effective. Part 1 con¬ sisted of the provisions for admitting Califor¬ nia, New Mexico and Utah, and

indemnifying Texas; parts 2 and 3 were the Fugitive Slave Law of history; part 4 the provisions about the District of Columbia. This bill was storm- ily debated for nearly three months more, until 31 July, and amended until one item only was left, that admitting Utah, which passed the next day. Meantime Texas was arming and threat¬ ening war, and other States proposing to aid it ; and Congress saw that the bills must be passed in some shape. The items were therefore voted on as separate bills, and all passed in Clay's form: Texas bill — Senate, 10 August, 30 to 20; House, 4 September, 108 to 97. California — Senate, 13 August, 34 to 18 ; House, 7 Sep¬ tember, 150 to 56. New Mexico — Senate, 14 August, 27 to 10; House (together with the Texas bill), 4 September, 108 to 97. Fugitive Slave Bill — Senate, 23 August, 27 to 12; House, 12 September, 109 to 75 ; District of Columbia — Senate, 14 September, 33 to 19; House, 17 September, 124 to 47. The Fugitive Slave Law, the vital part of the compromise, was also its assured ruin, as it gradually turned the entire North into abolitionists; but the im¬ mediate cause of its collapse was the Kansas-Nebraska Bill (q.v.), which repealed not only the Missouri Compromise, but the present com¬ promise which practically reaffirmed that. Con¬ sult Von Holst, Constitutional History of the United States) (Vol. Ill) ; Benton, ˆDebates of Congress) ; Stephens, (War between the States) (Vol. II) ; and lives of Clay.

COMPROMISES OF THE CONSTITU¬ TION. See Constitution, Formation of the.

COMPSOGNATHUS, komp-sog-na'thus, a genus of extinct reptiles of carnivorous dino¬ saurs (see Dinosauria) of the Jurassic Period, of very small size, hardly larger than a domes¬ tic cat, and slenderly proportioned. A very perfectly preserved skeleton has been found

in the lithographic limestone of Solenhofen in Bavaria. It is remarkable as being the most bird-like reptile known. It had a light, bird-like head, very long neck and hind limbs, small fore¬ limbs and many teeth. It is supposed to have walked or hopped in an erect or semi-erect position just as a bird does. In this position it must have resembled a bird very much.

COMPTOMETER, compt-om'e-ter (from Fr. compter, to count + Gr. meter, a measure), an adding and calculating machine, on which can be performed rapidly and accurately all arithmetical problems involving addition, multi¬ plication, division and subtraction. The name was coined by Dorr E. Felt, inventor of the machine, in 1885. The comptometer is now widely used on all forms of figure work in all lines of business in the United States and throughout the world. It differs from all the earlier constructive efforts directed to the pro¬ duction of mechanical calculating devices in that it was the first successful multiple-order machine to be wholly operated by the rapid depression of keys, an advantageous feature as a time-saving factor. Illustrative of the fun¬ damental principle of direct key operation and its simplicity in practice are the following brief descriptions of how the results are obtained.

Comptometer

Addition is performed by merely depressing the keys according to the numbers to be added. The item 346, for example, is added by striking the 3-key in the third or hundredths column, the 4-key in the second or tens column and the 6-key in the first or unit column, and the answer ap¬ pears in the register. Subsequent items are added in the same manner, the accumulated total being shown in the register. To multiply, the fingers are placed on the keys representing one factor, which are struck according to the digits of the other factor. For example, to multiply 578 by 463, place the fingers on 578 and strike three times; move one column to the left and strike six times; once more to the left and strike four times and the register shows 267,614. Each key also bears on its top a small figure which indicates the power of that key for subtracting and dividing. These operations are the converse of adding and multiplying and

are likewise performed by simply depressing the keys, but with reference to the small figures on the keytops. The only function of the lever at the side of the machine is to zeroize or cancel the answer registered preparatory to the begin¬ ning of a new operation. In its commercial application, the use of the comptometer extends in a practical way to all arithmetical calculations of accounting, including additions; extending and footing of invoices, inventory, payrolls, estimates ; making

engineering, astronomical and scientific calculations; in all of which, frac¬ tions decimally expressed, are as easily handled as whole numbers. Provision for the addition of common fractions is made by inclusion in the keyboard of a special fractional column or columns. By this means fractional values are automatically accumulated and carried forward in progressive order from the lower to the next higher denomination. To meet special require¬ ments, such as the adding of fractional denom¬ inations of foreign currency of various kinds, the different unit divisions of weights and measures, and special uses in the various de¬ partments of commercial accounting, suitable combinations of fractional columns are em¬ ployed. Thus the pounds, shillings, pence and farthings comptometer, widely used in England and other parts of the British Dominion for adding British currency, is provided with frac¬ tional columns of 20ths, 12ths and 4ths. In a similar manner a model with fractional columns to 12ths and 16ths serves for adding British- Indian currency, consisting of rupees, annas and pies. 12 pies — 1 anna, and 16 annas = 1 rupee. Another model supplied with fractional columns to 40ths is used for adding funts and poods, the Russian measure of weight, in which 40 funts = l pood. A combination designed for the use of contractors, engineers and architects has columns for 12ths and 16ths which facilitate the adding of feet, inches and fractions of inches. Fractions in 60ths are provided for adding hours and minutes; and double 60ths for adding hours, degrees, minutes and seconds in the compilation of astronomical and geo¬ graphical data. The formation of many other combinations is possible on the comptometer.

Mechanical arithmetic, as practised on the comptometer, being universal in its scope, con¬ stitutes in itself a complete system of mathe¬ matics. It is, of course, based on fundamental laws of mathematics, many of which are em¬ ployed in arithmetical operations by the mental method but utilizing others not ordinarily so used. It is none the less a distinctive and orig¬ inal system in that it involves as many and as varied rules as are involved in the performance of arithmetical operations by the instrumen¬ tality of paper and pencil. The full significance of the difference between the processes em¬ ployed in mechanical and mental arithmetic could be clearly shown only by the aid of illustrative examples too lengthy for insertion in this article. The system of applied mechani¬ cal arithmetic, with the rules for its application to all forms of arithmetical calculations, was first originated and developed by Mr. Felt. Con¬ sult Felt, D. E., (Applied Mechanical Arithme¬ tic (Chicago 1895).

COMPTON, Edward, English actor: b. London 1854. He made his debut at the new Theatre Royal, Bristol, in 1873 and in London

at Drury Lane in 1877. In 1879-80 he accom¬ panied Adelaide Neilson on her American tour. He organized the Compton Comedy Company in 1881 and with this built up a repertoire of over 50 plays in about 30 years. He was asso¬ ciate manager of the Kennington Theatre in 1911 and toured as Nobody in (Every woman } in 1912-13.

COMPTON, Henry, English bishop: b. Compton Wynyates, Warwickshire, 1632; d. Fulham, 7 July 1713. He was the youngest son of Spencer, 2d Earl of Northampton, studied at Oxford, and after the Restoration became a cornet in a regiment of horse. After he left the army for the Church, became bishop of Oxford in 1674, and bishop of London in 1675. Charles II made him a member of his privy council, and entrusted to him the education of his nieces Mary and Anne. He was distinguished for his hostility to the Roman Catholic Church. After the accession of James II, Dr. Sharp, rector of Saint-Giles-in-the-Fields, having become highly obnoxious to the court, Compton was required by a royal order to suspend him. His refusal to obey was made the ground of his own sus¬ pension. He was restored to his see at the Revolution of 1688, and, together with the bishop of Bristol, made up the majority of two in the House of Lords for filling the vacant throne. He performed the ceremony of the cor¬ onation of William and Mary, and was after¬ ward appointed one of the commissioners for revising the liturgy. During the reign of Anne he was put on the commission for the union of England and Scotland. The reconciliation of dissenters with the Church of England was one of his favorite projects.

COMPTROLLER, State. An officer — sometimes an ˆauditor® — directly responsible to the legislature, who sees that all legal re¬ quirements for the payment of State funds are complied with, that claims are valid, that the payment of same have been authorized and that the funds have been appropriated and are avail¬ able, whereupon bills are paid on his warrant. He supervises the State finances to the extent also of compelling clearness, accuracy and com¬ pleteness in the accounts, the indication of all receipts and the legality of all disbursements. In some States the comptroller has

been partly supplanted by the board of control. Consult Ashley, R. L., (The American Federal State > (New York 1908) ; Bryce, James, (The Ameri¬ can Commonwealth > (rev. ed., New York 1914) ; Wilson, Woodrow, (The State) (rev. ed., Boston 1909).

COMPTROLLER OF THE CUR¬ RENCY, the name of the head of the currency bureau of the United States Treasury Depart¬ ment. He has special jurisdiction over the national banks of the country, supervising and examining them and recommending legislation for their regulation, besides approving all appli¬ cations for the establishment of new banks. He has charge of all the national bank examiners, and five times each year, upon call, the national banks must render to him, according to fur¬ nished forms, a report of their condition. He may place, a bank in receivership if satisfied that it is insolvent, but must exercise a large amount of discretion and sound business judg¬ ment since, particularly in times of panic and commercial depression, it may be unwise to

compel a bank literally to comply with the terms of the law. Under the act of 23 Dec. 1913 the comptroller is a member of the Federal Reserve Board and has supervision over the reserve banking system created by that act. The comptroller of the currency also issues circulating notes to the national banks and ex¬ changes old currency for new. Consult Fairlie, J. A., (National Administration of the United States) (New York 1905).

COMPTROLLER GENERAL OF THE UNITED STATES. The offices of Comp¬ troller General and Assistant Comptroller Gen¬ eral of the United States were created by an act of Congress, known as the Budget Act, which was approved by President Harding 10 June 1921. The same measure, in a section which took effect 1 July 1921, abolished the offices of Comptroller and Assistant Comptroller of the Treasury, the first of which had existed since 1789, and transferred their duties to a new governmental establishment called the Gen¬ eral Accounting Office, of which the Comptroller General is the head. The Comptroller General and the Assistant Comptroller General are ap¬ pointed by the President, with the advice and consent of the Senate, hold office for 15 years, receive salaries of $10,000 and $7,500 a year respectively, and are removable for cause by joint resolution of Congress. The act of 1789 creating the Treasury Department provided for an auditor, who would see that accounts against the Government are in proper form, and a comp¬ troller, who should see that such accounts con¬ form to the law and that payment of the same have been authorized by statute. He had au¬ thority over all expenditures, subject only to judicial review by the courts. The General Accounting Office is independent of any of the executive departments.

COMPTROLLER OF THE TREAS¬ URY. See Comptroller General of The United States.

COMPULSORY ARBITRATION. See

Arbitration, Industrial.

COMPULSORY EDUCATION. See

Education, Compulsory.

COMPULSORY HEALTH INSUR¬ ANCE. See Social Insurance.

COMPULSORY VOTING. See Vote; Voters ; Voting.

COMPURGATION, a mode of defense allowed by the Anglo-Saxon law in England, and common to most of the Teutonic tribes. The accused was permitted to call a certain number (usually 12) of men, called com¬ purgators, who joined their oaths to his in testimony to his innocence. They were persons taken from the neighborhood, or otherwise known to the accused, and acted rather in the character of jurymen than that of witnesses, for they swore to their belief, not to what they knew ; that is, on the accused making oath of his innocence, they swore that they believed he was speaking the truth. Compurgation in the ecclesiastical courts was not abolished till the reign of Elizabeth and it was used in some civil cases as late as 1833. The Assize of Clarendon, 1166, is credited with helping strongly to the doing away with compurgation in the King's Courts as a mode of trial for

crime. Consult Blackstone, 'Commentaries on

the Laws of England* ; Pollock and Maitland, 'History of English Law.*

COMPUTING SCALES. As is well known, the weight of a commodity is ascertained in order to form a basis for ascertaining its value at a given price per pound if in the United States or Great Britain and her colonies, or at a given price per kilogram in nearly all other civilized countries.

The computing scale is an instrument by which the value is obtained, mechanically, at a given price per pound or kilo, thus avoiding any error of making the calculations mentally, and causing the operation of weighing and ascertain¬ ing the value to be more speedily accomplished.

The computing scale business, as a success¬ ful commercial enterprise for the world, was inaugurated in 1891. Several earlier attempts were made, but without success. The business has rapidly increased since the above date, and hundreds of thousands of these machines are now in use throughout the world. Until recent years the United States was by far the largest market, but they have been introduced into Europe, South Africa, Australia and both the east and west coasts of South America, besides Canada, Mexico and West India Islands, until export trade in computing scales aggregates several hundred thousand dollars per year.

Construction of Computing Scales. — Broadly speaking, there are two types of com¬ puting scales : first, the variable leverage type, and second, the computed-chart type. The first type consists of a mechanism wherein the lever¬ age of the computing beam may be varied so as to conform to the several units per pound or price per pound.

The computed-chart scale is further divided into two distinct kinds : first, the beam scale with computed chart, and second, the automatic scale with the computed chart. The former, or beam scale with computed chart, is a manually operated scale, operated as in ordinary scales by the movement of a sliding counterpoise, this sliding poise passing over the computed chart, and when the load is balanced by the movement of the poise, pointers on the poise indicate the total value of the commodity being weighed at the several prices per pound provided for on the computed chart.

The second, or automatic computing chart scales, are so constructed that when a com¬ modity is placed upon the scale pan the load is automatically counterbalanced by the use of either counterbalancing springs or a pendulum counterbalancing weight, moving either the computed chart past a stationary indicator or moving an indicator past or over the stationary computed chart, the indicator in either instance having placed thereon the several prices per pound, and each price per pound placed ad¬ jacent to a pointer or other means of indication showing the total value of the commodity being weighed at the several prices per pound pro¬ vided for in the construction of the scale.

The automatic chart scale is further divided into two distinct types of scales with respect to the construction or arrangement of the chart : One type being constructed upon the principle of arbitrarily dividing the pound into as many parts as there are cents in the price per pound as a means of computing weight. For instance, at 11 cents per pound the pound is divided into 11 parts, each part representing one-eleventh of

a pound. The other type is constructed on the principle of dividing the pound into ounces and fractions of ounces on the binary system as a means of computing values. In other words the pound is divided into uniform fractions of the pound as in ordinary pound and ounce scales, and the true commercial value of each subdivision of the pound is indicated on the chart at the several prices per pound provided therefor. See Balance; Weighing Machines.

COMSTOCK, Anna (Botsford), American natural history scientist, artist and engraver : b. Otto, N. Y., 1 Sept. 1854. After graduation from Chamberlain Institute, Randolph, N. Y., in 1873, and from Cornell University in 1878, she studied art at the Cooper Union, New York city, and under John P. Davis. In 1899 she was appointed assistant professor of nature stud}'- in Cornell University

extension work, and 1899-1900 was lecturer in Leland Stanford Junior University extension work and assistant professor of nature study in Cornell 1913. She was awarded the bronze medal for wood en¬ graving at the Pan-American Exposition of 1901. She is the author of (Problems of the Six-Footed} ; (How to Keep Bees (1904); Confessions to a Heathen IdoP (1906); (Handbook of Nature Study* (1911) ; (The Pet Book) (1914) ; (Bird, Tree, and Plant Note¬ books) (1914).*

*COMSTOCK, Anthony, American re¬ former: b. New Canaan, Conn., 7 March 1844; d. New York, 21 Sept. 1915. In 1863 he enlisted in the 17th Connecticut regiment, served under General Gilmore and was mustered out in July 1865. In March 1873 he became secretary and special agent of the New York Society for the Suppression of Vice and completely identified himself with its work. It is said that largely through his special efforts 2,500 criminals were brought to justice and over 80 tons of indecent literature and pictures seized and destroyed. He wrote (Frauds Exposed; How the People are Deceived . . . and Youth Corrupted**

(1880), an exposure of various schemes oper¬ ated through the mails; (Traps for the Young) (1883) ; (Gambling Outrages; or, Improving the Breed of Horses at the Expense of the Public Morals (1887) ; (Morals Versus Art* (1887) ; and minor tracts for the furtherance of his work.*

*COMSTOCK, George Cary, American astronomer: b. Madison, Wis., 12 Feb. 1855. He was graduated at the University of Michigan 1877 and from the law department of the Uni¬ versity of Wisconsin 1883, devoted himself en¬ tirely to astronomy and since 1887 has been professor of that subject and director of the Washburn Observatory, and since 1906 dean of the Graduate School in the University. of Wis¬ consin. He is a member of the National Acad¬ emy of Sciences. He has written (Text-Book of Astronomy * (1901) ; (Field Astronomy for Engineers : > (1902); (Method of Least Squares* (1890) ; and numerous papers upon astronomi¬ cal subject's.*

COMSTOCK, Harriet Theresa (Smith), American author : b. Nichols, N. Y., 1860. She was educated in public schools and in the acad¬ emy at Plainfield, N. J. She married Mr. Philip Comstock in 1885. Since 1895 she has become known as a prolific v riter of juvenile stories

and is author of (Molly, the Drummer Boy) (1900) ; (Cedric the Saxon (1901) ; (A Boy of a Thousand Years Ago) (1902) ; (A Little Dusky Hero) (1902); (Tower or Throne * (1902) ; (When the British Came) (1907) ; (The Queen's Hostage) (1907) ; (Janet of the Dunes* (1912) ; (Joyce of the North Woods) (1913) ; (Camp Brave Pine> (1913); (A Son of the Hills J (1913) ; (The Place Beyond the Winds) (1915) ; and (The Vindication (1916).*

COMSTOCK, John Henry, American entomologist: b. Janesville, Wis., 24 Feb. 1849. He was graduated at Cornell University 1874; was United States entomologist at Washington, D. C., 1879-81, professor of entomology and general invertebrate zoology at Cornell 1881— 1914, and since that date professor emeritus. His investigations deal with the morphology, classification and economic relations of insects. In this work he has been assisted by his wife, Anna Botsford Comstock (q.v.). He has been a constant contributor to the literature of his subject, the following being the more important of his works in book form: (Report on Cotton Insects) (1879) ; (Introduction to Entomology (1888) ; (Manual for the Study of Insects) ; Unsect Life* (new ed., 1901) ; Elements of Insect Anatomy) (3d ed., 1903, with Kellogg) ; (How to Know the Butterflies) (with his wife, 1904) ; (The Spider Book) (1912) ;*

COMSTOCK, John Lee, American writer on physics: b. Lyme, Conn., 1789; d. Hartford, Conn., 21 Nov. 1858. He received a common- school education, studied medicine and during the War of 1812 was assistant surgeon at Fort Trumbull, Conn., and on the Northern frontier. He settled in Hartford, Conn., practised medi¬ cine until 1830, when he became an author by profession and attained remarkable success in the compilation of textbooks for educational purposes. His Untroduction to Mineralogy* (1832) was used at West Point; of the Ele¬ ments of Chemistry* over 250,000 copies were sold; while the (System of Natural Philosophy) (1831) had a sale of over 900,000 copies (94th ed., New York 1847) and was translated into the chief European languages. Others were his¬ tory of the Greek Revolution* (1828) ; (History of the Precious Metals) (1849) ; Natural His¬ tory of Quadrupeds* (1829) ; < Grammar of Chemistry* (1825) ; Untroduction to Botany* (3d ed., 1835).*

COMSTOCK, Theodore Bryant, Ameri¬ can geologist : b. Cuyahoga Falls, Ohio, 27 July 1849; d.

26 July 1915. He was graduated at Pennsylvania State College 1868, and at Cor¬ nell 1870, where he was professor of economic geology 1875-79. In 1873 he was geologist to Capt. W. A. Jones' Wyoming and Yellowstone Park expedition and accompanied Hartt's ex¬ pedition to Brazil 1870. He was professor of mining engineering and physics in the Univer¬ sity of Illinois 1885-89, and assistant State geologist of Arkansas 1887-88, and of Texas 1889-91. He founded the Arizona School of Mines, was its director 1891-95, and president of the. University of Arizona 1893-95. He was at various times engaged as manager, engineer and consulting expert to many mining com¬ panies and syndicates, both American and for¬ eign. He published (Outline of General Geol¬ ogy* (1878) ; (Classification of Rocks* (1877) ;

(Notes on the Geology- of the San Juan Coun¬ try > (1882) ; (The Geology and Vein Structure of Southwestern Colorado) (1886) ; the last two in the (Transactions) of the American In¬ stitute of Mining Engineers ; and numerous papers in the American Journal of Science, American Naturalist and Engineering and Min¬ ing Journal.

COMSTOCK LODE, a remarkable vein near Virginia City, Nev., carrying silver sul¬ phides with some native silver and considerable native gold. The wide vein is a faulted fissure following the contact of a basaltic dike with the andesite country rock, the latter of Tertiary Age. The gangue is mainly quartz. The ores are of recent origin, and the waters ascending along the fissure are hot, making mining costly. Some wonderfully rich ore bodies, ˆbonanzas,® were found in certain of the mines along the lode, and the history of its discovery, the great mining speculations based on it, and the final abandonment of nearly all the mines, reads like a romance. At present the deepest shaft on the lode is being reopened. The total yield of the lode from its discovery in 1859 up to 1890 was over $340,000,000; the greatest yield for a single year was $38,000,000 in 1877. The yield has declined since 1890. The Comstock Lode had been of great interest to scientists. In 1868 Von Richthofen studied here the geologic rela¬ tions of the ore bodies and Van Hise, Becker and others evolved the modern classification of igneous rocks through their studies of the for¬ mations here. Barus conducted experiments here to determine temperature variations at different depths. Consult Becker, ˆGeology of the Comstock Lode and Washoe District,® (in (Monograph of the United States Geological Survey, ' Vol. Ill, Washington 1882) ; Lord, "Comstock Mining and Miners,® (in Mono¬ graph of the United States Geological Survey,' Vol. IV, ib. 1883) ; Reid, Structure and Gene¬ sis of the Comstock Lode® (Berkeley, Cal.,

1905).

COMTE, kont, Isidore Auguste Marie Frangois Xavier, generally known as Auguste Comte, a famous French philosopher: b. Montpellier, 19 Jan. 1798, of a strict Catholic family; d. Paris, 5 Sept. 1857. He was very precocious in his intellectual development ; in his own words, at the age of 14 he went through all the necessary stages of the revolutionary tendency, and felt the necessity of a general political and religious rebirth. In 1814 he entered the Lcole Polytechnique at Paris. Though the school was broken up by the gov¬ ernment in 1816 for political reasons, Comte remained in Paris and developed a close ac¬ quaintance with Saint Simon (q.v.), from whom he learned the need of substituting a new spiritual power for the mediaeval hierarchy in Church and State. However, a breach developed between these two men, dating from the pub¬ lication of Comte's "Plan des Jravaux scienti- fiques necessaires pour reorganizer la societe," which found the greatest hindrance to the de¬ velopment of society in the continued ascend¬ ancy of the revolutionary tendency. In 1825 he married Caroline Massin, but the marriage was unfortunate from the start. The following year he began to lecture on philosophy at his own house, but after his first few lectures he wras struck down by an attack of insanity, which

resulted in an attempt at suicide. This proved to be temporary, however, and in 1828 he was again able to carry on his intellectual labors and his lectures. In 1832 he became tutor in mathe¬ matics at the ficole Polytechnique, and in 1837 examiner at the same institution. He also engaged in secondary-school teaching. He held the post of examiner for some 10 years, but incurred the displeasure of his colleagues by some reflections on mathematics and lost the position. His British disciples, including Anongothers Grote and J. S. Mill (q.v.) then supported him, sending him $1,200

in 1845. For the rest of his life he lived on the proceeds of a public subscription initiated by Littre in 1848. He was separated from his wife since 1842, and in 1845 he met Clotilde de Vaux, whose husband was serving a life sentence. He became ex¬ cessively fond of her, and after her death the following year had another, though a less serious, attack of mental aberration.

Besides the book already named Comte wrote (Cours de philosophic positive) ; (Dis¬ cours sur l'esprit positif' ; (Calendrier positi- viste) ; (Svsteme de politique positive) ; (Biblio- theque posiitiviste' ; 'Ca'techisme positiviste' ;

(Appel aux conservateurs, par le foundateur du positivisme) ; (Synthese subjective' ; (Systeme de logique positive.' Comte believed that knowl¬ edge passed through three stages of development, the theological stage, in which the imagination plays the greatest part in giving accounts of things. The metaphysical stage, in which ab¬ stract principles replace the imaginary deities of the theology, and in which the tendency to unification takes the lead; and the positive stage, where both imagination and argumentation are subordinated to observation, and agreement with the facts becomes the ultimate scientific criterion. The facts arrange, themselves in certain irreducible groupings, which are at least as many as there are distinct sciences, so that the unity of knowledge is subjective, not objective. These sciences Comte classifies ac¬ cording to the order in which they have reached their positive stage, as follows : mathematics, astronomy, physics, chemistry, biology, sociol¬ ogy. This order is also the decreasing order of broadness of scope in the sciences concerned and the order of the importance therein of in¬ duction as compared with deduction. Comte devotes special attention to sociology and ethics ; he finds the division of the forms of civilization into militaristic, juristic and industrial quite parallel to the threefold division of science. He desires to unite the treatment of the emotional and intellectual needs of man. For this pur¬ pose a new religion becomes necessary, the ((Religion of Humanity, "and a new political Utopia. See Positivism.

Bibliography. — Caird, (The Social Philos¬ ophy and Religion of Comte) (Glasgow 1885) ; Fezensoc, L. De, (Le systeme politique d'Au- guste Comte) (1907) ; Fiske, (Outlines of Cos¬ mic Philosophy' (Vol. 1, Boston 1874) ; Gruber, (August Comte, sein Leben und seine Lehre) (Freiburg 1889) ; Levy-Bruhl, (La philosophic d' Auguste Comte' (1900; tr. 1903) ; Lewes, G. H., (Comte's Philosophy of the Sciences) (London 1875) ; Littre, < Auguste Comte et la Philosophic positive' (Paris i877) ; Mill, J. S., (Comte and Positivism' (London 1865) ; Robinet, (Notice sur l'ceuvre et sur lavie de Comte' (I860); Spencer, H.,

Classification of the Sciences) (New York

1864).

COMTE, Pierre Charles, French painter: b. Lyons, 23 April 1823; d. 1895. He studied at Paris as a pupil and adopted son of Robert Fleury, and exhibited his picture (Lady Jane Grey,* in 1847, which won him considerable at¬ tention. His other works include (Crowning of Ines de Castro) (1849); (Henry III Meet¬ ing the Duke of Guise* (1855) ; (Joan of Arc at the Coronation of Charles VIP (1861); (A Scene at Fontainebleau) (at Washington, D. C.) ; (Gipsies Before Louis XI* ; (The Last Visit of Charles V to the Castle of Ghent,*

(1880).

COMTE DE PARIS, de pa-re. See Paris, Louis Philippe Albert d'Orleans, Comte de.

COMUS, kd'mus (Greek komos), in an¬ cient Greece the name given to a kind of festal procession in honor of some of the gods (as Bacchus) and sometimes in honor of victors in the public games. The term had also the wider sense of revel and merry-making. This name was also given to a divinity supposed to pre¬ side over such festive occasions, but as his name does not occur in early ancient writers whose works have been preserved, he is evi¬ dently a creation of later times. He is first mentioned by Philostratus (about 200 a.d.).

COMUS. This is the title given to a masque by John Milton, produced in honor of the Earl of Bridgewater, upon his entrance on his duties as Lord President of Wales, at Ludlow Castle, on Michaelmas night, 29 Sept. 1634. The young Puritan poet was induced to furnish the words for the entertainment — such things were not in favor with most of his coreligionists — by a family friend, Henry Lawes the musician, who gave instruction to the Earl of Bridgewater's children. Three of these acted in the masque, and Lawes himself took the part of the Attend¬ ant Spirit besides furnishing the music. Ap¬ parently Milton about a year before had ren¬ dered Lawes a similar service by writing for him the less elaborate 'Arcades. We know little about the production of by the Louvain professor Erycius Puteanus (Hendrik van der Putten) ; and Ben Jonson's masque 'Pleasure Reconciled to Virtue.* That Milton drew to some extent upon these and*

other works seems indisputable, but the fact does not impair his essential originality, which is seen, not merely in the unsurpassed charm, purity and philosophical elevation of his poem taken as a whole, but in his developing the shadowy Comus of mythology into a well-de¬ fined and not unimpressive character.

Criticism of

William P. Trent,

Professor of English Literature, Columbia U niversity.

COMYN, kum'in, John, The Elder, Scottish noble: d. about 1300. He was one of the com¬ missioners sent to confer about the marriage of the Maid of Norway to Prince Edward of England. On the competition for the Scottish throne in 1291 Comyn put in a claim as a de¬ scendant of Donald Bane.

COMYN, John, Scottish noble: d. Dum¬ fries 1306. He was called the <(Red Comyn,55 was chosen one of the three guardians of Scot¬ land and defeated the English at Roslin in 1302. He submitted to Edward I in 1304 and was killed by Bruce in the Convent of the Minorites at Dumfries in 1306, a well-known episode in the life of the great Scottish king. A sort of vendetta followed and many of' the Comyns of succeeding generations perished in attempts to avenge the death of the Red Comyn.

CON, kon, an Italian preposition signifying with, and of frequent occurrence in musical phraseology; con amore, with feeling; con brio, brilliantly; con gusto, with taste, etc.

C'ONANICUT, an island of Rhode Island, situated in the lower part of Narragansett Bay. It is about nine miles long and one mile wide. The town of Jamestown is near the east shore and there is a lighthouse at the north end. Pop. of township about 1,200.

CONANT, Alban Jasper, American artist : b. Chelsea, Vt., 24 Sept. 1821 ; d. New York, 3 Feb. 1915. He settled in Saint Louis in 1857, and during the Civil War visited Washington and painted portraits of President Lincoln, Sec¬ retary Stanton and Attorney-General Bates. He was a curator in the University of Missouri for eight years and made valuable studies of the archaeology and antiquities of the Mississippi Valley. In 1880 he was appointed Delegue Cor- respondant de lTnstitution Ethnographique of Paris. He published footprints of Vanished Races in the Mississippi Valley) (1879, 4to 1) ; (The Archaeology of the Missouri Valley> ;

CONANT, Charles Arthur, American eco¬ nomic writer: b. Winchester, Mass., 2 July 1861 ; d. New York, 5 July 1915. He was for some years after 1880 a journalist in Boston, from 1889-1901 was Washington correspondent of the New York Journal of Commerce and in 1903 became treasurer of the Morton Trust Company. He did important work for the gold standard and the gold-exchange standard and aided in the development of a monetary sys¬ tem in the Philippines. He was a member of the New York Chamber of Commerce com¬ mittee on currency reform (1906), which rec¬ ommended a central bank ; and in 1910 he was American delegate to The Hague Conference on Bills of Exchange. He wrote many articles for periodicals and encyclopaedias on American banking

and on Latin-American finance and trade, and published (A History of Modern Banks of Issue) (1896) ; (The United States in the Orient: the Nature of the Economic Problem 5 (1900); Alexander Hamilton 5 ; Se¬ curities as Payment5 ; (Wall Street and the Country 5 (1904) ; (The Principles of Money and Banking) (1905).*

CONANT, Hannah O'Brien Chaplin,

American author: b. Danvers, Mass., 1809; d. Brooklyn, N. Y, 18 Feb. 1865. In 1830 she married Thomas Jefferson Conant (q.v.). She was a woman of versatile talent, having an ex¬ cellent knowledge of Oriental tongues, which enabled her to share in the biblical studies of her husband. She frequently contributed to the literary and religious periodicals of the day, and in 1838 became editor of the Mothers' Monthly Journal at Utica, N. Y. She published

(Lea : or the Baptism in the Jordan, 5 by G. F. A. Strauss (1844) ; first Epistle of John Prac¬ tically Explained, 5 by A. Neander (1852) ; (The New England Theocracy, 5 by H. F. Uhden (1859), all translations from the German; (The Earnest Man : Sketch of the Character and Labors of Dr. A. Judson5 (1855) ; (The Eng¬ lish Bible: Popular History of the Translation of the Holy Scriptures into the English Tongue 5 (1856; English ed., 1859; new ed., 1881).

CONANT, Thomas, Canadian descriptive writer: b. Oshawa, Ontario, 15 April 1842; d. there, 14 March 1905. He was educated in the public schools and at Eddystone Seminary in Geneva, N. Y., and achieved distinction with brilliant sketches of scenery and articles on Canadian and other subjects.

CONANT, Thomas Jefferson, American biblical scholar: b. Brandon, Vt., 13 Dec. 1802; d. Brooklyn, N. Y., 30 April 1891. He was graduated from Middlebury College in 1823, and between 1825 and 1857 taught the classics and biblical literature in Columbia College, Waterville (now Colby) College, Maine, Madi¬ son, now Colgate, University, Hamilton, N. Y., and Rochester Theological Seminary. Taking up the studies that soon gave him a wide repu¬ tation, he was appointed by the American Bible Union one of a committee to prepare a revision of the English version of the New Testament. He was also a member of the American commit¬ tee on the English revision of the Old Testa¬ ment, and his revisions were highly esteemed and constantly used by the English revisers. His numerous publications include translations of the 11th and 1 7th editions of Gesenius' (Hebrew Grammar5; (Job; Revised Version, and Notes5 (1856) ; (Matthew, Revised Ver- sion) (1860) ; faptizein, Its Meaning and Use> (1860); (Genesis, Revised Version) (1868; 1873) ; (The New Testament; Common Version Revised) (1871); fsalms, Revised) (1871) ; froverbs, Revised) (1872) ; (Greek Text of the Apocalypse, as edited by Erasmus5 (1873) ; frophecies of Isaiah, Chapters 1-12) (1874) ; and (Historical Books of the Old Tes¬ tament, Joshua to 2 Kings5 (1884).

CONATION (from Lat. conari, to at¬ tempt), a term in its original sense used simply to express the idea'or to designate the act of at¬ tempting or undertaking something. In present usage it is appropriated by psychologists to the expression of desire and volition as manifested in or constituting voluntary agency, although as a factor in consciousness and effort its pre¬ cise implications appear not to have been finally determined. In the exertion of the mus¬ cles, and in direct conscious attention, the agency of conation in an individual finds its two representative aspects. Attention, desire and endeavor, with their accompanying states of thought and feeling, are held by some psy¬ chologists to be the completing aspects of conation; while others maintain that its func¬ tion is limited to the sensations of straining, with consequent states of consciousness, pleas- ure.able or otherwise, attendant upon contrac¬ tion of the muscles. Whether conation is to be regarded as simple or complex in its psychologi¬ cal aspects remains therefore a question for further research and experiment. Consult James, Principles of Psychology5 (New York 1890) ; Titchener, (Experimental Psychology5

(New York 1901) ; (Text-book of Psychology > (ib. 1910); Hyslop, Syllabus of Psychology; Stout, (Analytic Psychology * (London 1896).*

CONATY, Thomas James, American Ro¬ man Catholic prelate : b. Ireland, 1 Aug. 1847 ; d. Coronado Beach, Cal., 18 Sept. 1915. In 1850 he came with his parents to America, the family settling in Taunton, Mass., and in the district schools of that city he received his primary education. He entered the college of Saint Sulpice, Montreal, in 1863, completed his humanities in 1867, and spent the following two years at Holy Cross College, Worcester, Mass., being graduated in 1869. His ecclesi¬ astical course was pursued at the Seminary of Saint Sulpice, Montreal, where he was ordained priest 21 Dec. 1872. First named assistant at Saint John's Church, Worcester, Mass., and afterward chosen pastor of the church of the Sacred Heart in that city, Father Conaty was actively interested in the advancement of Cath¬ olic education. He was likewise an ardent pro¬ moter of the temperance cause, being first pres¬ ident of the Springfield Diocesan Temperance Union, and, in 1887, national president of the Catholic Abstinence Union of America. Father Conaty was also prominent in establishing the Catholic Summer School in 1892 — the same now flourishing at Plattsburg, N. Y. — being its president from 1893 to 1897. In 1889 George¬ town University conferred upon him the title of D.D., and in 1896 Laval University, Que¬ bec, bestowed the same honor. He was chosen rector of the Catholic University in 1896, made a domestic prelate in 1897, consecrated titular bishop of Samos, 24 Nov. 1901, and appointed bishop of Monterey and Los Angeles, 27 March 1903. He was a frequent contributor to various periodicals, and is the author of (New Testa¬ ment Studies now used in many Catholic schools.*

CONCENTRATION CAMP, sometimes applied to rendezvous near an intended point of departure of troops; but generally to a camp into which non-combatants are gathered in time of war. During the Cuban, rebellion of 1895— 98 many peaceable and defenseless people were forced to abandon their homes in the agricul¬ tural regions and were imprisoned upon the barren waste outside the residence portions of the cities, and within the lines of entrenchment. It is estimated that at least 400,000 persons, mostly old men, women and children, were thus subjected to concentration under Weyler's ad¬ ministration. They were known as reconcen- trados. The British also carried on a scheme of concentration of non-combatants — men, women and children — during the Great Boer War, and in which provision was made for the education of Boer children. Provision was made at Mindanao, in the Philippines, in 1902, for the accommodation of non-combatants dur¬ ing the military measures undertaken by the American government. In 1914 about 5,000 Mexican revolutionists, driven across the border into American territory by government forces, were disarmed and interned temporarily in con¬ centration camps.

CONCENTRIC, similar figures having a common centre are called concentric.

CONCENTRIC WEATHERING, See

Exfoliation.

CONCEPClдN, Bolivia, a lake in ihe central portion of the department of Santa Cruz.

concepci6n, Chile, province lying be¬ tween the provinces of Nuble and Bio-bio. Area 3,532 square miles. It is divided into the departments of Coelemu, Puchacay, Rere, Con¬ cepcion, Talcahuano and Lautaro. The im¬ portance of its capital, its commercial activity and its numerous ports make this the most interesting province in the south of Chile. Two of the largest bays in the republic are on its coast, those of Talcahuano, which is defended by fortifications, and Arauco, which includes the ports of Lota and Coronel, notable for their coal mines. The city of Concepcion (55,000 in¬ habitants) is the capital. Talcahuano (15,500 inhabitants) is a military port, with a dry-dock for repairing warships and mercantile vessels, and at the same time an active commercial port. Products of the whole southern region are brought to it for exportation, and it supplies cities o-f the interior with a large part of their merchandise. The port of Tome (5,000 in¬ habitants), situated near rich agricultural dis¬ tricts, exports a large quantity of wine and has a woolen mill, etc. Penco, a small port 10 miles by rail from the city of Concepcion, is a favorite seaside resort and has a sugar refinery and coal mines in the neighborhood. The population of the province is 225,000.

concepci6n, Chile, the capital of the

province of the same name. It is situated on the banks of the Bio-bio River, and is connected by a short railway with its ports of entry, Tome and Talcahuano, eight miles distant on the Bay of Concepcion. In the latter city a United States consular agent resides. The streets and squares of the

ciity are wide, well paved, well' lighted and clean. An electric rail¬ way traverses the principal streets. Concepcion is the seat of a bishop. The chief buildings are the city hall, the cathedral, theatre, the agricultural school and the normal school. The city is in a fertile agricultural region and has an active trade in agricultural products, hides, tallow, wine, flour, beef, etc. ; very little manu¬ facturing is carried on, the largest establish¬ ment being breweries, furniture and carriage factories, saw-mills, flour-mills, distilleries, etc. It is in importance the third city of Chile. Concepcion was founded in October 1550 by Pedro de Valdivia, and was originally situated on the site of the present city of Penco. In 1555 the place was pillaged and destroyed by Araucanian Indians; and in 1557 was refounded by Garcia Hurtado de Mendoza. In 1730 the town was totally ruined by an earthquake, and in 1751 suffered from a like catastrophe in con¬ sequence of which the site was removed and the city rebuilt in its present location in the fertile plain on the north side of the Bio-bio, 270 miles southwest of Santiago. At the time of the Spanish occupation Concepcion was the second largest city in the country. In 1818 the declara¬ tion of Chilean independence took place here. In 1835 another disastrous earthquake visited the city and for a long time the place was al¬ most entirely desolate, but it was afterward re¬ settled and from that time the buildings have been more substantially and pretentiously erected, the streets reconstructed and the area of the city greatly extended. Pop. 55,000.

CONCEPCION

CONCEPT

450

CONCEPCION, Paraguay, also called Villa Concepcion, the second city of the republic in commercial importance, though not in the num¬ ber of its inhabitants. It is situated on the left bank of the Paraguay River, 125 miles from Asuncion. It is a port of entry and de¬ livery, where the steamers navigating the upper Paraguay regularly touch. The prin¬ cipal buildings are the city hall, custom-house, parish church, market and some fine private residences. It has a line of street-cars, tele¬ phone service, two banks, and several commer¬ cial houses that trade directly with Argentine and European cities. Yerba-mate or Paraguay tea and cattle are the principal items of the city's commerce. Pop. 15,000.

CONCEPCION, Philippines, former dis¬ trict of the island of Panay, now part of the province of Iloilo, situated on the northeast part of the island; area 683 square miles. The former capital, Concepcion is a pueblo situated on the east coast of the island, 47 miles north¬ east of Iloilo; pop. 4,565. Pop. of the district about 20,000.

CONCEPCI6N, Philippines, town (pueblo) in Tarlac province in the island of Luzon, 12 miles south of the town of Tarlac. It has an important sugar industry; rice, tobacco and corn are also raised in the surrounding country. Pop. 12,593.

CONCEPCI6n DEL URUGUAY, Ar¬ gentina, city in the province of Entre Rios, on the Uruguay River about 160 miles north of Buenos Aires. It is connected by railway with Parana, and the river is navigable for large vessels, thus rendering the city an important shipping point. It is in an extensive and fertile agricultural region and the trade consists chiefly of these products and cattle and packed meat. There are also some salting establishments in the city. A national college and a normal school are located in the city. Concepcion del Uruguay was founded in 1778 and was originally called Concepcion-del-de-la-china ; was formerly the capital of the province and is now the episcopal city. Pop. 6,111.

CONCEPT. A concept is an idea which has been formed by thinking, and which is permanently embodied in language by a word or other definite symbolic expression. There are two main differences between a concept and a percept. In the first place, the latter seems to be directly presented through the senses and does not imply any conscious reflection. And again, a percept as presented has always a par¬ ticular individual form, while a concept is an' ideal construction, and, as such, has universal significance. For example, I may perceive through my senses the particular object which I call my watch; but to form a concept of "watch" is to think in general terms the relation of the mechanism of the parts to the purpose of the whole. The concept must also be dis¬ tinguished from the mental image which appears in memory or imagination when the object is not

directly present in sensation. The latter is always a particular psychological process, and therefore cannot adequately represent the gen¬ eral relations of the concept. We must not con¬ fuse the presence of images in the mind with thinking. It is true that a concept cannot be represented in terms of psychological content except by a particular image, and it probably

always is represented by some such image. But the concept is a universal mode of thinking, and the psychological imagery which accompanies it is largely individual and indifferent. The uni¬ versal relations of the concept of triangle, for example, are not limited by the form of the particular figure which I represent to myself mentally, or draw upon paper, though the latter may aid me in comprehending those relations. The concept is ideal in character; it is a univer¬ sal significance, and must never be confused with a particular psychological image.

Socrates was the first to bring this universal element of knowledge into clear light. When the Sophists pointed to the differences and vari¬ ations of perceptions and feelings in individu¬ als, and drew the conclusion that objective knowledge was impossible, Socrates showed that concepts which are true for all men can be discovered and defined, and that this is the true quest of thought. Amid the flux of individual opinion, science is still possible, since it is con¬ stituted by this system of universal concepts. Plato and Aristotle developed further the So- cratic doctrine of concepts and gave it an onto¬ logical application. By means of the concept, the true form or permanent essence of things is said to be apprehended, as opposed to the accidental and changing appearances. The question as to the nature of the concept played an important part during the Middle Ages. (See Nominalism, Realism, Conceptualism). The view that is perhaps most commonly held to-day regards the concept as derived by abstraction (q.v.) from perceptual experience, by selecting out what is common in a number of instances and combining these common elements into a general idea. It must not be forgotten, however, that concepts are not formed by the piecing to¬ gether of psychologically common elements in a mechanical way, but are the products of thinking; and that thinking is itself judgment or interpretation of significance in universal terms. It is true, as Kant said, that concepts without percepts are empty; our thinking does not go on in a vacuum apart from concrete ex¬ perience. But the concept is not universal be¬ cause it has been compounded out of elements that are common to a number of objects, but because it is the mind's expression in terms of ideal significance. Concepts, however, can attain to any degree of elaboration only through the aid of language. The relation between thought and the words which express it is of the closest and most intimate kind. The word sums up in itself the results of the conceptualizing process, thus giving to it a reality and per¬ manence which make progress possible. It is through learning the words of a language that we are able to share in the concepts of other men and other generations. Language is thus a permanent record of thought's achievements, and its development is not something external to the evolution of thinking, but in one aspect may be said to be a different side of the same process. The concept then cannot be defined apart from its expression in language; for this expression is no mere external and accidental feature of the idea, but is organically and necessarily connected with it.

James E. Creighton,

Professor of Logic and Metaphysics. Cornell University.

CONCEPTION. This is a term signifying the beginning of the life of the child following fertilization, which latter is brought about by the union of the chromatic elements of the spermatozoon with the ovum. After orgasm (see Coitus), the male elements, or sperma¬ tozoa, many thousands of which are discharged in coitus, commence to move toward the mouth of the uterus, largely attracted by alkaline chemical substances which characterize the mucus membranes of the cervix and uterus. On entering the uterus they swim against a current there at a rate of about one-eighth of an inch a minute. The entire length of the uterus can thus be traveled in about an hour or less. The ovum may be met in the uterus or in the Fallopian tube when fertilization takes place. The spermatozoan may live from five to eight days in the uterus or tube — the ovum a similar length of time — and impregnation may take place at any period between menstruations, although it is more likely when coitus precedes or follows within seven to eight days of the mentsrual period. See Embryology.

CONCEPTION, Immaculate, of the Blessed Virgin Mary. A dogma of the Roman Catholic Church, defined as such by Pope Pius IX in 1854. See Immaculate Conception.

CONCEPTION OF OUR LADY, Sisters of the, an order of nuns, founded in Portugal in 1484 by Beatrix de Sylva, in honor of the Immaculate Conception. It was confirmed in 1489 by Pope Innocent VIII, and the Cistercian rule was adopted. In 1489 Cardinal Ximenes put the nuns under the direction of the Franciscans, and imposed on them the rule of Saint Clara. The order subsequently spread into Italy, Belgium and France. The Sisters of the Immaculate Conception of the order of Franciscans were established at Little Falls, Minn., in 1891 by sisters from Italy. They now have several hospitals, an orphanage, an ex¬ tensive school and nearly 100 teachers.

CONCEPTUALISM, kon-sep'tu-al-izm, in metaphysics, a doctrine in a sense intermediate between realism and nominalism. Conceptual¬ ism assigns to universals an existence which may be called logical or psychological, that is, independent of single objects, but dependent upon the mind of the thinking subject, in which they exist as notions or conceptions. Thus, for instance, according to conceptualism, the mean¬ ing of a general class-name as horse, red, can be fully represented in thought or be actually present to the consciousness. Locke was the best known advocate of this psychological doc¬ trine, which is little known outside of English- speaking countries. See Nominalism; Real¬ ism.

CONCEPTUALIST, one of a metaphysical sect — if indeed it has coherence enough to be called a sect — which arose in the Middle Ages during disputes between the Nominalists and the Realists; or one who holds the views of conceptualism. The conceptualist school sought to occupy an intermediate position, but is ap¬ proximated much more nearly to the Nomi¬ nalists than to the Realists.

CONCERT, a public performance of mu¬ sical compositions without the aid of scenic representation. They were unknown before 1672 when the first concerts were established in

London by John Banister. Britton continued the practice after Banister's death in 1679 and in 1725 the concerts spirituels were established in Paris. The organization of the latter was soon copied by organizations in France, Ger¬ many and England. The foundation of the Berliner Singakademie in 1790 inaugurated public performances of large choral works with orchestra. Consult Hanslick, E., (Geschichte des Konzertwesens in Wien) (Vienna 1869) ; Pohl, K. F., (Mozart und Haydn in London > (Vienna 1867) ; Schering, A., (Geschichte des instrumentalkonzerts bis auf die Gegenwart (Leipzig 1905).*

CONCERT PITCH, the pitch of a certain note in the musical scale adhered to by the general body of musicians. The middle C (seated on the ledger-line which unites the G and F clefs) is produced by a string making, according to theorists, 512 vibrations per second. In England, however, the pitch has risen to 538, while in Germany it is 528, and in France 522. The gradual rise of the pitch from the theoretical 512 vibrations is attributed to the necessities of piano-tuning on the one hand, and the desire to attain a more intense and brilliant tone on the other. See Pitch ; also Musical Elements and Terms.

CONCERTINA, kon-ser-te-na, a musical instrument invented by Sir Charles Wheatstone in 1829. It is generally polygonal in shape, is held between the hands so that the fingers drop naturally down on studs which raise the valves and allow the air (supplied by the bellows between the finger-boards) to act upon a series of metal tongues of the same construction as those of the accordion or harmonium. The usual range of the instrument is from the lowest G on the violin to the C three and a half octaves higher, including the chromatic tones. The German concertina is a much less perfect instrument, as only tunes on a limited number of keys can be performed on it.

CONCERTO, kon-char'to, a kind of com¬ position first introduced by the Italian musi¬ cians of the 17th century, really a symphony with a solo instrument. The principal com¬ posers and artists in this department are Corelli, Viotti, Rodes, Baillot, Kreutzer, Alard, Beriot and Vieuxtemps. Subsequently concerti were written for other instruments, such as the flute, the piano, etc. Among the most successful composers for the piano are Bach, Mozart, Hummel, Chopin, Schumann, Ries, Czerny and Thalberg. Concerti are written in the so-called sonata or symphony form in three movements, an allegro, an andante, or adagio and a lively rondo. Except in the tutti the orchestra

should be as. subservient to the instrument for which the piece is written as it should to a vocalist. It is found for any instrument capable of technical or heroic treatment. Between the soli there are orchestral interludes — ritornelli, which, most often treat the thematic material more fully. The Concerto da Camera, or Chamber concerto was popular before the days of full symphony orchestras, a string quartet and cembalo being sufficient to accompany the solo instrument. Concerto da chiesa or church concerto was more loosely applied, meaning often a work for voices and organ.

Concerto grosso is an expression applied to the great or grand chorus of the concert, or to

those places of the concert in which the ripienos and every auxiliary instrument are brought into action, for the sake of contrast and to increase the effect. All the 18th century concerti for two or more solo instruments are concerti grossi.

Concerto . spiritnale was a concert at Paris, performed in the religious seasons, when the theatres were closed. The pieces performed, however, were not always of a spiritual kind. It was introduced in 1725 by Anne Danican, called Philidor.

CONCH, konk (univalve mollusks), a name of certain large marine gastropods, especially of the king conch (S trombus gigas), abundant in the southern United States and parts of the West Indies. In Florida the shells are made into horns used for calling the farm hands, as is still done in the East Indies with shells of the genus Triton. Conch shells were in use over a large extent of territory in Mexico, Central and the northern part of South Amer¬ ica for the manufacture of beads many cen¬ turies before the discovery of America by Columbus. This is one of the shells used for making cameos, and great quantities are col¬ lected in the Bahamas and shipped to Liverpool for this purpose to some extent, but more for conversion into buttons and similar small articles, in allusion to which industry the native whites of the Bahamas are called ˆConchs.® Conch shells are also used very extensively in the manufacture of lime and porcelain. The name is also applied to two large sea-snails, the Fulgur carica and Sycotypus canaliculata, com¬ mon on most parts of the Atlantic coast.

CONCHA, kon'cha, Jose Gutierrez de la

(Marques de la Habana), Spanish general: b. Cordova, Argentina, 4 June 1809; d. Madrid, Spain, 5 Nov. 1895. He went to Spain in childhood, entered the army, took part in the struggles in South America, and against Don Carlos, was appointed lieutenant-general in 1839, and officiated as captain-general of the Basque provinces 1843-46. He was captain- general of Cuba 1849-52, when he was replaced by Canedo. Joining his brother Manuel (q.v.) in opposing the government, he was banished from Spain in 1854, and fled to France, where he was detained at Bordeaux. After the July revolution of 1854, he was reappointed captain- general of Cuba, and, with the exception of a short suspension of his functions by Narvaez's administration in 1856, when Lersundi was ap¬ pointed as his successor, he continued to hold office until December 1858, when he tendered his resignation. Returning to Spain he was at various times Minister to France, president of the Senate and Minister of War, and captain- general of Cuba again 1874-75.

CONCHA, Manuel de la (Marques de Duero), Spanish general and statesman: b. Cordoba, Argentina, 25 April 1808; d. Muro, 28 June 1874. He was a brother of Jose Gutierrez de la Concha (q.v.), fought in early life against Napoleon and the revolted Spanish colonists in South America, and afterward against Don Carlos. In 1847, during the com¬ plications with Portugal, he was put in com¬ mand of 6,000 men, and took possession of Oporto. Having issued at the end of 1853, in concert with O'Donnell and Bravo-Murillo, the famous protest against the policy pursued by

the government, he was banished from Spain after the revolution of July 1854, and repaired to Paris ; but was soon recalled to Madrid by the outbreak which terminated in the exile of Maria Christina, the downfall of Narvaez and the restoration of Espartero. Concha was now made inspector-general of cavalry and marshal ; but on 12 Oct. 1856, when Narvaez came again into power, he was compelled to relinquish these posts. He was killed in the battle of Muro while serving in the republican army against the Carlists.

CONCHOID, kong'koid, a curve, shell-like in flexure (whence the name), invented by Nicomedes in the 2d century b.c., and used by him for finding two mean proportionals. If a straight line always passes through a fixed point o, and a point q, fixed into the revolving line, always moves along the line a b, then any point p in the revolving line always at the same distance from v will trace out a conchoid. And, since the length q p can in any position of the revolving line be measured either toward or from o, it is evident that, corresponding to any given length assigned to q p, two conchoids can be described, one above and the other below the line a b. These are known as superior and in¬ ferior conchoids. Moreover, with a given point o, and a given straight line a b, any number of pairs of different conchoids can be described by varying the length q p. Moreover, the shapes

of all such curves will vary according to the length of q p. Thus, if Q p is less than the per¬ pendicular from o on a b, the shape is as given in the adjoining figure, and this isolated point o is also a point on the curve.

The equation of the conchoid is

when a denotes the length of the modulus and b the perpendicular distance from o to the line a b.

CONCHOLOGY, kon-kol'o-je, the science of shells. See Mollusca.

CONCHOS, kon'cho-s, or CONCHAS,

Mexico, river in the state of Chihuahua; rises high up in the Sierra Madre, flows southeast, northeast and then north through a beautiful country, comprising rich table-land, and empties into the Rio Grande near Presidio del Norte, after a course of about 350 miles. It is the largest tributary of the Rio Grande, and very little inferior in size to that river itself. Its principal branches are the Florido, Buena- vista, San Pedro, Chihuahua and Balleza,

which, with their lesser tributaries, water more than one-third of the state.

CONCHYOLIN, kon-ki'6-lin, an organic base allied to chitin (q.v.), which enters into the composition of the shells of mollusks. The conchyolin forms a thick cuticular layer of or¬ ganic matter containing carbonate and a slight proportion of phosphate of lime. In dead shells the conchyolin soon disappears, leaving the shell much more brittle than when it was alive.

CONCIERGERIE, La, la kon-se-er-zhe-re. A noted prison in Paris, which was a part of the Palais de Justice. Many royal prisoners were there confined, and during the Reign of Terror it was the scene of fearful butcheries, 328 prisoners being put to death in one week. Marie Antoinette went from her cell in this prison to her execution.

CONCILIUM IN TRULLO, or CON¬ CILIUM QUINISEXTUM (Council in Trul- lus, Fifth-Sixth Council). A council or synod of the Church convened in a hall (called the Trullus) of the Imperial palace at Constanti¬ nople in the year 692. It was an assembly of Eastern and Western bishops called for the pur¬ pose of enacting canons of Church discipline; this the council did, adding to the existing canons 102 new ones and confirming ancient canons that had fallen into desuetude. Its work was to supplement the decrees of the 5th and 6th councils of the Church : hence it is known as the Quinisext Council.

CONCLAVE, both the apartment in which is conducted the election of a Pope and the college of cardinals assembled there. The pro¬ cedure in electing popes is substantially the same to-day as it was in 1274 when it was pre¬ scribed by the Council of Lyons. When a Pope dies, a secretary of the college of cardi¬ nals summons all the cardinals to an election to be held on the 10th day after the demise. In whatever city the Pope dies, there the con¬ clave must be held. The conclave apartment must be immediately prepared in such a place and manner as will ensure safety of person and non-interference from outsiders. If the con¬ clave is held in Rome, the great halls of one of the papal palaces are divided by wooden partitions into small rooms or cells, two or at most three cells for each cardinal and his per¬ sonal attendants. The apartments all open on one corridor, and to that

there is but one means of access from without, and that is strictly guarded. After the 10 days have elapsed, the cardinals all assemble in the Vati¬ can church and assist at the Mass of the Holy Ghost, after which they form a procession and proceed to the conclave, each one taking the apartments assigned to him. The first day the conclave is open to the public, and numer¬ ous persons, high and low, avail themselves of the permission to enter. In the evening all outsiders leave, and the cardinals must remain until a Pope is chosen. A two-thirds majority vote is requisite. Since 1848 food is prepared in the conclave: if no election is had after five days the food supply is restricted to bread, wine and water, or rather used to be, for the rigor of the law is now much relaxed. A car¬ dinal coming from a distance is admitted after closure. The election is made by scrutiny, that

is, by ballot, or by compromise, that is, by a committee chosen by a majority of the con¬ clave, or by acclamation. Formerly each car¬ dinal in the name of his country had the right of excluding a candidate not acceptable to his government. This privilege he could exercise but once during the conclave. The last time this right of veto was allowed was at the con¬ clave of 1903 when Cardinal Rampolla was excluded as obnoxious to Emperor Francis Joseph of Austria. On 20 Jan. 1904, Pius X prohibited any cardinal, under pain of excom¬ munication, to exercise the right of veto. The cardinals take an oath to this effect. Cardinals only may vote, but non-cardinals are eligible to the Papacy. All are sworn to secrecy. No voting by proxy is allowed. A two-thirds vote is necessary to elect. Sometimes a conclave has sat many weeks, or even months, before reaching an election : the conclave which elected Pius VII (1799) sat during six months. The conclave in which Leo XIII was elected Pope consisted of 62 cardinals, and it began its session the evening of 18 Feb. 1878. The scrutiny of the morning of the 20th showed that Cardinal Pecci was chosen. The election was then ended and he was made Pope by ac¬ clamation. The conclave at which Pius X (q.v.) was elected began its session 31 July 1903, and the first ballot was cast the morning of 1 August. The scrutiny of the morning of 4 August, the seventh ballot, showed that Cardinal Sarto, patriarch of Venice, was elected. He chose the name of Pius X. This conclave was remarkable as being the first of which a cardinal from the United States was a member.

C'ONCONE, Giuseppe, j oo-sep'pe kon- ko'na, Italian teacher of vocal music: b. Turin 1810; d. there, June 1861. From 1838-4S he was a teacher at Paris, and then became organ¬ ist of the royal chapel at Turin. He wrote a large number of vocal exercises which are still used in the teaching of music.

CONCORD, Mass., town in Middlesex County, on the Concord River and on the Bos¬ ton & M. Railroad, 20 miles northwest of Boston ; settled in 1635. It is situated in a beautiful rural district, and has several manu¬ facturing establishments. Here is located the Massachusetts Reformatory. The town has an excellent public library and a national bank. The government is by town council, and the municipality owns the waterworks and electric- light plants. At the beginning of the Revolu¬ tion the Americans had a large stock of arms and military stores at Concord. General Gage, the British commander in Boston, hearing of this, sent a body of soldiers to destroy these stores, and on their way (19 April 1775) they fought the battle of Lexington, the first of the war. When they reached Concord, the same day, they destroyed What stores they could find, but were soon driven off by the Americans. Concord is celebrated as the home of many authors — of Ralph Waldo Emerson, Nathaniel Hawthorne, Henry David Thoreau, Amos Bronson Alcott, Louisa May Alcott, the poet William Ellery Channing and others. Pop. about 6,500. Con¬ sult Hurd', (History of Middlesex County' (Philadelphia 1890).

CONCORD, N. C., county-seat of Cabarrus County, on the Southern Railroad. Here are

large industrial interests, including cotton goods, foundry and machine-shop products, etc. there are also roller mills, a cannon manufac¬ tory and brick works. Concord is an old place to which in recent years new industries have brought rapid growth. The Jackson Training School and Scotia Seminary are located here. Pop. 8,715.

CONCORD, N. H., city, capital of the State and county-seat of Merrimack County, on the Merrimack River, and on the Boston & M. Railroad, 75 miles northwest of Boston. The city has an

abundance of water-power, and manufactories of carriages, shoes, twine, elec¬ trical apparatus, silverware, leather goods, ma¬ chine-shop products, etc. The United States census of manufactures for 1914 recorded 86 industrial establishments of factory grade, em¬ ploying 3,178 persons ; of these, 2,856 were wage earners, receiving annually $1,956,000 in wages. The capital invested aggregated $5,- 701,000, and the year's output was valued at $6,744,000 : of this, $3,032,000 was the value added by manufacture. Near Concord are ex¬ tensive quarries of a fine-grained white granite. There are three national banks with a com¬ bined capital of $550,000 and a surplus of $779,000, and several private banking houses. The assessed property valuation exceeds $20,- 000,000. The city is well laid out, has finely shaded streets, is well lighted, and its water¬ works are excellently constructed. The note¬ worthy buildings include the State-house, a fine building of Concord granite, the city hall and courthouse, the State prison, State insane asy¬ lum and the United States government build¬ ings. The public schools are 26 in number and are admirably organized and conducted, and represent a property valued at more than $325,- 000. This city is the seat of the well-known Saint Paul's School (Episcopal) for boys. Concord was settled by whites in 1725, on the site of the Indian village of Pennacock. It was called by this name until 1733, then incor¬ porated as the town of Rumford, and became a city in 1853. It is noted as the place near where Hannah Dustin (q.v.) made her escape from Indian captors. Pop. 22,167.

CONCORD, an expression used in music denoting the combination of two or more sounds pleasing to the ear, and requiring no further combination before or after it to make it so. Concords are the eighth (or oc¬ tave), the fifth, third and sixth. Their ratios are 2:1, 3:2, 5:4, 5:3. The two first are called perfect, because as concords they are not liable to any alteration by sharps or flats. The two last are called imperfect, as being alterable. The fourth is considered as a discord by some authorities; as a component part of an inver¬ sion of the perfect chord it may be classed among the concords. See Counterpoint.

CONCORD, Book of (Liber Concordia) , the name given to a collection of confessions of faith which are generally accepted by the Lutheran Church. The Formula of Concord (1580) was the result of a series of. confer¬ ences and discussions upon the following sub¬ jects: The Rule of Faith and the Creed; Original Sin; Free Will; Justification; Good Works; The Law and the Gospel; The Third Use of the Law; The Lord's Supper; The Person of Christ ; The Descent of Christ into

liell ; The Customs of the Church; Predestina¬ tion and Election ; Heresies and Sectaries. The whole received the sanction of a large number of the Germans. Other subjects treated in the Book of Concord are The Three Ecumenical Creeds — Apostles, Nicene and Athanasian ; The Six Particular Confessions of the Lutheran Church — Augsburg, Apology of the Augsburg, Schmalkald Articles, Cate¬ chisms of Luther (larger and smaller). Con¬ sult Schaff, (Creeds of ChristendonP (Vols. I and III, New York 1878).

CONCORDANCE, a book in which the more important words of a volume or collec¬ tion of writings are arranged alphabetically, part of a passage being extracted with each and the place of its use specifically given. The first known concordance of the Bible in any language was that of Saint Anthony of Padua, who was born in 1195, and died in 1231. His work was called (Concordantiae Morales, > and was of the Latin Vulgate. It formed the basis of a more elaborate concordance, also of the Vulgate, that of Hugo de Santo Caro, bet¬ ter known as Cardinal Hugo. This was pub¬ lished in 1244 a.d. The first Hebrew concord¬ ance was that of Rabbi Mordecai Nathan, be¬ gun in 1438 and finished in 1448. The first Greek concordance to the New Testament was thait of Xystus Betuleius, whose real name was Birck; it came forth in 1546 a.d. The first English concordance to the New Testa¬ ment was that of Thomas Gybson, before 1540 a.d. ; the first to the whole English version of the Bible that of Marbeck, 1550 a.d. These, of course, preceded the appearance in 1611 a.d. of the authorized version of the Bible. The elaborate and well-known work of Cruden ap¬ peared first in 1737. All these works, with the exception of the last named, have been super¬ seded by vastly improved works by modern scholars. Of the Septuagint the standard is that by Hatch and Redpath (London 1897) ; of the Vulgate, that by Coornaert (Bruges 1892), and that by Peultier, Etienne and Gantois (Paris 1902) ; of the Hebrew Bible the best is that by Furst and Delitzsch, in Latin (Leipzig 1841) and also that by Davidson, Tregelles and others, in English (London 1873) ; of the Greek New Testament are those of Bruder (Leipzig 1842; 5th ed., Gottingen 1900); in English Moultrie and Gedden (New York 1897) ; of Luther's Bible the best is that of Buchner (Jena 1740; 23d ed., Berlin 1899); of the English Bible in addition to Cruden are those by Young (Edinburgh 1879), Walker (Bos¬ ton 1874) and Strong (New York 1894).

Scholars have also compiled concordances of the works of several great authors. The first known concordance to Shakespeare was that of Ayscough, in 1790. Mrs. Mary Cowden Clarke's elaborate and most useful work was first published in London in 1845, and in 1894 appeared a still more excellent one, that of John Bartlett, published in New York. A concordance to Milton was published in Madras in 1856 and 1857, and one to Tennyson in Lon¬ don in 1870 and another in 1912. Others of this kind are (Dante's Works,) by E. A. Fay (Bos¬ ton 1889) ; (Omar Khayyam, > by J. R. Fultin (London 1899) ; 'Chaucer, by the Chaucer Society (London 1872-) ; 'Pope,* by E. Ab¬ bott (ib. 1875) ; 'Cowper's Poetical Works,**

by J. Neve (ib. 1887) ; 'Gray, y by A. S. Cook (ib. 1909) ; 'Dickens, by G. A. Pierce (ib. 1898) ; and by Williams (ib. 1907) ; ' Brown¬ ing, J by Molineux (New York 1896).*

CONCORDAT, kon-kor'dat (cone or datum, or, plur., concordata) , a compact or conven¬ tion entered into by the Holy See and a secular government to determine their respective powers and rights in the regulation of ecclesi¬ astical affairs within the jurisdiction of the state which is a party to the compact. The earliest example of such compacts is the con¬ vention between Calixtus II and the Emperor Henry V, concluded at Worms in 1122: it marked the end of the great dispute about in¬ vestitures. In 1448 was concluded the so- called concordat with the German nation, or with the Emperor Frederic III, under which the patronage of ecclesiastical dignities in the empire was divided between the Imperial Crown and the Holy See.

A more comprehensive compact is that of which the foundation was laid at Constance in 1848, and subsequently modified by the Frank¬ fort Concordat, and by that of Vienna, which last continued in use till the end of the Holy Roman Empire in 1803. Its place was sup¬ plied, under Pius VII and his successors, by separate concordats with Bavaria, 1817; Prus¬ sia, 1821 ; Baden, Wiirtemberg and several small states in 1818; Hanover, 1824; Saxony, 1827, and the Netherlands, 1827. A concordat was concluded at Vienna in 1855. Its chief pro¬ visions were that the Pope should have direct communication with the bishops, clergy and people ; and archbishops and bishops with their priests and people, and the right to govern their sees according to the canon law. Educa¬ tion was put under the control of the Churdh. The bishops were to settle what books should be used. All questions of marriage, except so far as they involved civil consequences, were reserved exclusively to the ecclesiastical courts. The emperor had the power of choosing bish¬ ops, but with the advice of the existing bishops. The Church might acquire new property; but once acquired, it should not be sold or mortgaged without the consent of both Pope and Em¬ peror. In 1868 this concordat was set aside in all the dominions of the Emperor of Austria.

In Italy, an agreement regulating the elec¬ tion of bishops was concluded with Nice and Savoy in 1451, and a formal concordat was made with Sardinia by Benedict XIV in 1740, and with Naples in 1741, and a new concordat was entered into with Naples by Pius VII in 1818. Charles V of Spain concluded a con¬ cordat with Adrian VI and Clement VII, and a further concordat was made by Clement XII and Philip V in 1737. A concordat with Portugal was made by Benedict XIV in 1741. Memorable is the concordat of 1515 between Leo X and Francis I ; the King agreed to annul the pragmatic sanction of Charles VII, which restricted the right of appeal to Rome ; and in return the Pope conceded to the king the right of nomination to all Church benefices within the realm, with a reservation of the annates to the Holy See, and with the proviso that the nominees should be acceptable to the Pope. Another celebrated concordat is that concluded 15 July 1801 between Pius VII and Napoleon as First Consul ; it recognized the legal exist¬

ence of the Catholic Church in France which had been annulled by the Revolution. The eccle¬ siastical topography of France was altered, the number of episcopal sees being reduced from more than 100 to 80. The confiscation of ecclesiastical property by the republican gov¬ ernment was to pass for fait accompli and res judicata and the Pope and his successors were not to move to disturb purchasers or grantees of such properties. The government was to have the right of nomination of bishops, but the Pope that of canonical institution. Pro¬ vision was to be made by the state for the support of bishops and clergy in lieu of their property, which had been appropriated by the Revolutionary government. Immediately after the concordat was concluded there arose in France an

agitation for its abrogation, and this agitation grew more insistent than ever after the Dreyfus affair (q.v.) and the Concordat was abrogated finally in 1906.

CONCORDIA, or CONCORD, personified

and worshipped as a goddess in Rome, where she had several temples, the most important of which was that in the Forum, erected by Camil- lus in 367 b.c. An annual feast was celebrated in her honor 16 January. She w'as represented with wreaths of flowers on her head, and in one hand a cornucopia, in the other an olive branch or a patera.

CONCORDIA, Argentina, town of the state of Entre Rios, on the Uruguay, 302 miles north of Buenos Aires by river. It has oil mills and slaughter-houses. It has a custom-house and a river trade exceeded only by that of Buenos Aires and Rosario, exporting salted- meat, leather and Paraguay tea. It has railway con¬ nection with Parana, Uruguay and South Brazil. Pop. about 13,000.

CONCORDIA, Kan., city and county-seat of Cloud County, situated on the Republican River and on the Atchison, Topeka and Santa Fe, the Missouri Pacific and the Union Pacific and other railroads, 110 miles northwest of Topeka. It has good water power and shows considerable manufacturing activity. There are iron-works, grain elevators, creameries, produce¬ packing plants and flour mills and factories for making plows, wagons and cigars, brick and cement blocks. The city contains Nazareth Academy, Saint Aloysius' School, Saint Joseph's Hospital and a Carnegie library. Pop.

4,705.

CONCORDIA COLLEGE, an educational institution in Fort Wayne, Ind., organized in 1839 under the auspices of the Lutheran Church; reported at the end of 1915: Pro¬ fessors and instructors, 12; students, 261; vol¬ umes in the library, 10,000; grounds and build¬ ings valued at $100,000; income, $12,400; number of graduates, about 1,000.

CONCRETE (from Latin concretus , ((that which is grown together®), an artificial stone, a composition of hydraulic cement, sand and broken stone, used for a long time for sub¬ marine foundations', and since 1890 more and more in place of building stone. In place of hydraulic cement pure lime was originally used and the name concrete applied only to this com¬ pound, ((beton® being the proper term for the composition based on hydraulic cement until it became the only method. The mixture of sand

and cement is termed the matrix, and the broken stone or other addition is styled aggre¬ gate and is composed usually of local crushed stone, but may be slag, coke, broken bricks, gravel or pebbles. The ideal aggregate is broken, sharply angular and irregular stone, as this material mixes better with the matrix than rounded pebbles, minute particles of gravel or the more spongy brick shell or coke, although broken stone or gravel may be used advanta¬ geously in connection with pebbles, even in such small proportion as three to five. Broken lime¬ stone is considered especially efficacious as an aggregate, possibly because of an affinity be¬ tween the molecules of carbonate of lime in it and the matrix. The proportions of the various parts approximate 1 part of cement, 3 parts of sand and 4 to 6 parts of aggregate, but no fixed norm is to be followed, the true rule being that the cement paste is to be thoroughly incorpo¬ rated with sand coating each particle and that the matrix thus formed shall fill all interstices in the aggregate. In the process of mixture there are two extreme methods of watering, one very wet and the other scarcely more than moist. The spraying is followed by a mixture by shovel or by mixing machines. These ma¬ chines are of two types : continuous, a trough or cylinder with a revolving screw shaft which works until the mixture is complete ; and inter¬ mittent, a box being rotated slowly. The con¬ crete may either be made into blocks, one layer of comparatively small depth being made at a time. By the newer method it is applied to its place on the building or foundation in the soft state and allowed to harden there. The world is indebted to Germany for the revivifi¬ cation of the concrete industry. They diffused a wider knowledge of the artificial manufacture of cement from lime and clay (see Portland Cement), and demonstrated that the degree of expansion and contraction of structural steel and concrete under changes of temperature were the same. The United States was very prompt to make use of this development,

which has so greatly altered building construction throughout the civilized world. While the large use of concrete is a comparatively modern de¬ velopment, it was employed in ancient times and in some of the most renowned works of history. The factitious stones employed by the Babylonians and the early Egyptians, as well as among the Greeks and Romans and at the present day in Barbary and among the nations of Malabar, were all a species of beton. Pliny mentions that the columns which adorn the peristyle of the Egyptian labyrinth were of this material, and the great length of time it has existed (over 3,600 years) shows the durabil¬ ity of this mode of construction. Puzzonlana, a volcanic earth, formed ihe basis for an ex¬ cellent natural hydraulic cement used by the Romans. The aggregate consists of broken stone and was poured in wooden molds. In Rome the pyramid of Ninus is formed of a single block, as was also the square stone that formed the tomb of Porsena, which was 30 feet wide by 5 feet high. The Romans made free use of this material in constructing their walls, aqueducts, piers and roads, many por¬ tions of which exist at the present day. The mole which shelters the harbor of Algiers is so much exposed to the effect of winds that breaches were continually being made in it by vol. 7 — 30

the force of the sea, and to such an extent that in former times the Moors were compelled to employ a large number of workmen constantly repairing it, at an annual expenditure of over $60,000. Between 1833 . and 1840 the French rebuilt this with concrete, or beton as it was then called, this being among the earliest of modern successful use of artificial cement-made stone. The action of the sea is so tempestuous here that the engineers calculated that stone blocks would have to be of about 350 cubic feet to remain in place. The impracticability of quarrying and transporting such enormous blocks of stone led to the employment of arti¬ ficial stone or beton. Two kinds of blocks were manufactured: the first in the water, in the place they were intended to occupy, and the second on shore, to be afterward thrown into the sea. In the process of reconstruction, these blocks were used as follows : Those of the first kind, made in lined caissons, formed an outer sea line ; on these blocks molds were placed filled with beton, and after these second blocks had set, they were launched into the sea, form¬ ing a line in front of the first; the intervening space was then filled up with blocks of natural stone. Behind this embankment thus formed, the ground was dredged to a depth of over six feet, and the whole of this space filled up with a continuous mass of beton. The entire work was performed in five years, at a cost of less than $420,000, notwithstanding that the mole, at the time of the occupation of Algiers by the French army in 1830, was in a state of complete dilapidation, in spite of the extensive repairs which had been annually executed upon it by the Moors during a period of two centuries. Marine works of the above character present numerous advantages over constructions in which natural stone is employed, of which the following are some of the most prominent: (1) immediate stability, while ordinary pierre perdue is never secure; (2) incomparably greater fa¬ cility in transportation, which is always expen¬ sive and troublesome when blocks of stone are to be quarried exceeding 100 cubic feet; (3) a considerable reduction in the sectional area of the pier, and consequent economy of cost; and (4) that the system can be applied in every locality, now that our advanced knowledge of the subject of hydraulic mortars enables us to manufacture beton in any place where it may be needed. See Concrete Bridges ; Concrete Construction ; Portland Cement.*

CONCRETE BRIDGES. These include arch, girder, slab, truss and trestle forms. The location of piers, length of span and thicknesses of main members will be determined by the character of foundations and loading to be carried ; the width by the traffic, and the height by high water mark, and adjoining property, and the length of flood discharge, and channel width. The character of finish, ornamentation and other aesthetic features will be determined by the situation. Since concrete bridges are permanent, they should provide for increased loading of future. On important highways, motor trucks of 30 tons must be carried; and on interurban bridges, from electric cars of from 75 tons to electric locomotives of 100 tons.

Reinforced Concrete Arches are either of closed-spandrel or of open-spandrel type. The first type is similar in form to a stone masonry

arch, with thinner sections. The reinforcement should be about 1 per cent of the crown sec¬ tion in both extrados and intrados, and should continue throughout the arch ring, bonding into the piers. The two lines of reinforce¬ ment should be connected with substantial wiring, sufficient to transmit stresses. Re¬ inforcement should run transversely to the arch ring and be tied in the spandrel walls. Reinforcement may be preferably rods, or a light built-up framework of struc¬ tural shapes (Melan System). W. J. Douglas ((American Civil Engineer's Pocket Book) gives a formula for the cost of a reinforced concrete bridge with ordinary foundations as follows: Cost in dollars =0.8blVd where b = width in feet, 1 = length in feet and d — aver¬ age depth in feet of bed of stream below road¬ way level (1916).*

Arch bridges are developing into the open spandrel type, becoming more articulated and skeletonized; similar to the development from the Romanesque to the Gothic cathedral. In the open spandrel type, the loads are carried by a slab deck to transverse walls or columns, and in turn by these to the arch ring. A further development is to divide the arch ring into two or more separate ribs upon which columns rest to carry the load of the deck. The ex¬ treme articulation of the Arroyo Seco Bridge is notable.

By such skeletonization, the designer can more certainly arrange the shape of the arch ring to the load, span and rise, and more economically carry the loads and reduce the weight upon the foundation. The subsequent life of the structure due to expansion can be better provided for. Waterproofing is also more simple.

For high rise bridges of usual width the open-spandrel type is more economical. Closed- spandrel, earth-filled arches, when of low rise and under 100 foot in span, are usually more economical than open-spandrel arches.

In both open- and closed-spandrel types side¬ walks may project beyond the faces of the structure and so reduce the length of the pier.

Form of Arch Rings. — When circumstances of waterway and head room permit, the shape of the arch ring may be chosen from the standpoint of economy, and will then vary with the character of loading. For instance when the load is uniform per horizontal unit of length, as in open-spandrel structures, the parabolic curve is chosen (see Arroyo-Seco Bridge). For closed-spandrel, earth-filled arches with a ratio of rise to span greater than one-fourth, an ellipse is suitable, and when this ratio is less the curve should be between a segment of a circle and an ellipse. In this case the curve is approximated to by a three or five- centered curve. An arch springing down low upon the piers

imposes less transverse action on the pier.

Expansion and contractions due to change of temperature must be provided for in con¬ crete bridges. Heavy concrete sections demand provision for a range of 35°C. or 40°C. only. Sliding joints provide for movement of floor system and must often be waterproofed.

Thickness of Arch Rings. — Empirical for¬ mulas for determining the thickness of arch rings at crown are generally used. The thick¬ ness of an arch ring should increase toward

the spring, except for hinged arches. The radical thickness at any point may be taken as the crown thickness, multiplied by the secant of the angle which the radial section makes with the vertical. For segmental and three- centred arches the thickness at the spring is from two to three times the crown thickness. However these dimensions, useful for pre¬ liminary plans, should always be checked by an analysis, using the method of the elastic theory.

The appearance of concrete arches must often receive attention and at times they are faced with cut stone. However, by the use of selected aggregates, or by tooling and setting of tiling, ornamental appearances, are secured, and are preserved, when the arch is properly waterproofed. It is of importance, however, that arch lines and surfaces be kept simple and accentuated, and not lost in inappropriate and meaningless applications of ornament. The use of pedestals, massive lighting standards is satis¬ factory. The design of overhangs, off-sets, pilasters gives relief from the flatness.

In the United States, arch rings are usually built continuous with the piers. Rarely in this country, but more often in Europe, the arch ring is built in two parts with hinges at the crown and at the abutments, with the object of fixing the action line of the loads, thus lessening the flexure on the ring, and the effects of change of temperature.

Cantilever Concrete Bridges have the ap¬ pearance of arches but are composed of bal¬ anced cantilevers. These are suited to spans too long for girders ; and, since they exert only a vertical pressure, they will fit foundation conditions too yielding to withstand the thrust of a real arch. The cantilever arms are ribs supporting a slab and beam deck. Examples of such highway structures are Hopple Street, Cincinnati, Ohio, 70-foot span ; Wayne County, Mich., 100-foot 6-inch span ; Runnymede Ave¬ nue, Cincinnati, Ohio, 72-foot span ; Washington Street Bridge, Norfolk, Conn., 50-foot span.

Bowstring and Open-web Cased Girders are common in Europe and increasing in the United States in cases where arch construction through limitations of heading or foundation conditions do not permit an arch.

The Benson Street Bridge over Mill Creek, at Lockland, Ohio, is an example of an arch with a suspended floor consisting of slabs and girders to which suspenders are attached.

Slab Bridges, used up to 25-foot span, con¬ sist of a simple slab span to which the parapets are attached, resting on abutments. A highway bridge of 22-foot span, for instance, has a slab thickness of \2l/2 inches, reinforced with rods, spaced 5j4 inches c.c. ; and parapets 41ˆ> inches above the slab; ˆ2-inch rods spaced 12 inches c.c. run transversely to the bridge. Expansion slid¬ ing joints of tarred paper or galvanized iron are placed on top of the abutments. Vertical drain pipes drain the roadway.

Girder Bridges are used up to 50 feet span and may be preferably of deck type, where there is headroom, or of the through type. The two or more girders receive the deck slab. A span of 30 feet, for instance, has three girders 17 inches wide and 2 feet 9 inches deep below the deck slab, whidh is 10 inches thick. For addi¬ tional information see Bridge.

Railroad Trestles are built by placing pre¬ viously molded slabs on concrete bents, spaced

rmv

111UˆJ| N«|| |JWf|| y

1 Tunkhannock Creek Viaduct, Lackawanna Railroad

2 Larimer Avenue Bridge, Pittsburgh, Pa.

3 Arde Bridge at Reading, Pa.

4 Bridge over Arroyo Seco, Pasadena, Cal,

\

t

*■

♦

• ™

4’

Examples of Long Span Concrete Arches

Name and Location	*Loading*	*Span*	*feet*	*Rise*	*feet*	*Plain Concrete*
Connecticut avenue, Washington,						
D. C .						
H.						
150						
75.0						
Munderkingen, Wurtemberg .						
H.						
164						
16 4						
Oviedo, Spain .						
H.						
165						

18.0

Neckerhausen, Germany .

H.

165

13.5

Walnut lane, Philadelphia .

H.

233

70.3

Reinforced Concrete

Missouri Standard .

H.

40

8.0

Stinson Creek Branch, Fulton, Mo. .

H.

66

15.0

Elk's Run, W. C. F. & N. Ry .

Ry.

70

16.0

Danville, Va .

H.

79

8.0

Yardley, P. & R. Ry .

Ry.

90

35.0

Atherton Avenue, Pittsburgh .

H.

90

45.0

Main street, Fort Worth, Tex .

H.

105

48.0

Arroyo Seco, California .

H.

105

45.0

Monessen Viaduct, Pennsylvania. . . .

H.

150

53.9

Chatellerault, France .

H.

164

15.8

Route Bormida, Italy .

H.

167

16.7

Tunkhannock, D., L. & W. Ry .

Ry.

180

90.0

Decize, France .

H.

183

15.3

Gruenwald, Munich, Bavaria .

H.

230

42.0

Walnut lane, Philadelphia, Pa .

H.

233

70.0

Monroe Street, Spokane, Wash .

H.

281

115.0

Larimer Avenue, Pittsburgh .

H.

300

67.0

Tiber River, Rome, Italy .

H.

328

32.8

Thickness at crown in feet

Solid

rib

2-rib

5.0

3.4

3.7

2.8

5.5

1.2

2.7

3.6

4.6

1.8

1.9

1.6

2.5

0.7

/ 2.6

\ 4.0 wide

I 24 ,

\ 2.6 wide

6.0 .

2.0 .

/ 4-5

\ 4.5 wide

8.0

14.0 wide

5.5 .

6.8 .

I 8.0 \ 8.0 wide

Curve

Circ .

Segm

Segm . . .

5-centre . .

Segm

Segm Segm Segm . . . . Parabolic.

Parabolic.

Circ .

Segm .

3-hinged. Segm . . .

Segm . . .

Spandrel

Open

Solid

Open

Solid

Deck on 2 ribs

Solid

Solid

Deck on 3 hinge Open

Open

Open

Open

Open

Open

Cellular

15 to 20 feet, composed of concrete of vertical piles and a concrete cap. They are also built in place.

W. K. Hatt,

Professor of Civil Engineering, Purdue Uni¬ versity.

CONCRETE CONSTRUCTION. A His¬ torical Account. — • As in the history of other arts we find early disclosures of the principles of action of various later constructions. Before construction in reinforced concrete strengthen¬ ing of brick masonry arches by iron ties to prevent opening of cracks in tension was well known. In 1836 Brinell experimented with brick beams so strengthened and found the two acted together. In 1871 Sir Shafto Adair built a concrete arch of 50-foot span with a rise of five feet three inches, containing an embedded iron skeleton frame. The treatise on concrete by Franqois Coignet, of France, published in 1861, describes the embedment of an iron mesh work in concrete to increase its resistance to tension, and describes the making of pipes. It is said that he built a roof slab 12 inches thick and 20-foot span, in 1852 at Saint Denis. {Concrete, London, June 1910).

Coignet's patent of 1869 consists in the in¬ troduction in the body of the structure of double headed nails, double T pieces, clamps, hoops — for the purpose of strengthening some and giving it greater cohesive strength. The iron was to be interlaced so that by the com¬ bination of the metallic skeleton and of ag¬ glomerated artificial stone paste the thickness of the walls or size of articles might be con¬ siderably reduced and yet great strength be attained. Troughs were to be strengthened at the corners by iron clamps.

The book by Thaddeus Hyatt published in 1877 discloses improvements in fireproof con¬

struction, describes experiments in reinforced concrete beams and analyzes the principles of action of these. He protects the I beams from fire by a covering of concrete, and between these he builds slabs reinforced for tension by plates of iron placed vertically in the bottom of the slab and connected by small round rods. He understands the mechanics of the reinforced concrete beam ; and the part played by the metal in moment and horizontal shear. He also investigated experimentally the elements of strength of the two materials, strength, modulus of elasticity, expansion and contrac¬ tion, fireproof qualities. Hyatt was a practical contractor, a successful inventor, and his book is the first definite treatment of reinforced con¬ crete.

J. F. Monier, a gardener, was one of the fathers of reinforced concrete. His first work was in making flower pots. His first patent was dated 1867 and the drawings disclose many of the elements to-day employed. In 1884 the rights of the Monier patents for Ger¬ many were purchased by Wayss &

Company, which, after experimental and theoretical study, published a brochure entitled (Das System Monier, describing the various engineering ap¬ plications of reinforced concrete. Following this it was rapidly introduced in the construc¬ tion of buildings, railroad structures and pub¬ lic works. In 1892 the important names of Hennebique and E. Coignet appear. Their designs of beams and bridges extended rein¬ forced concrete to a new construction of a mon¬ olithic character. In eight years, between 1892 and 1899, Hennebique applied reinforced con¬ crete to 3,000 constructions, including bridges, buildings, stairways, retaining walls, reservoirs, piles, etc. Other well-known practitioners of that time are Cottaucin, Bordenave, Bonna, Matrai,*

Melan. The French Exposition of 1890 showed many remarkable structures in reinforced con¬ crete. Considere after 1900 brought new ideas. Since then the range of size and importance has been extended, scientific data for accurate com¬ putation determined experimentally, and prin¬ ciples of action more clearly known.

In the United States, Ransome in 1884-95 was building various structures with hoop iron and wire rope. A house of reinforced con¬ crete with beams and slabs was built in the United States by Ward in 1875. Thatcher ap¬ plied the Melan system to bridges. J. Kahn and A. L. Johnson designed and built up a wide range of structures. After 1902 the uni¬ versity laboratories were fruitful in research. For further reference consult P. Christophe, (Le Beton Arme} (ed. by Beranger, Paris).

Composition. — Concrete here considered is composed of hydraulic cement (generally Port¬ land cement) and a fine and coarse aggregate and water. Mortar is composed of cement, fine aggregate, and water. Subsequently the mixture sets by chemical action. Fine aggregate is usually sand but may be crushed stone or gravel screenings graded from fine to coarse up to J^-inch size ; the coarse aggregate is pebbles, broken stone or slag, up to a size de¬ pending upon use. For buildings and bridges where steel reinforcing is used the maximum size should be not greater than x/2 inch. For concrete in large masses, such as piers, sizes up to 2^4 inches' may be used. Under proper precautions large boulders may be embedded in the concrete. Occasionally banks of gravel are found of approximately the proper proportions of fine and coarse aggregate. For mass con¬ crete cinders, composed of hard, clean, vitreous clinks free from sulphides, unburned coal or ashes may be used. The fine aggregate should be hard, free from organic matter; 5 per cent of clay, if finely divided and nonadherent, may be allowed. Not more than 6 per cent of fine aggregate should pass a standard sieve having 100 meshes to the inch. Dirty sand when rubbed in the palm will discolor the hand. Avoid very fine sand. Sand or gravel is cleaned by washing.

Proportions. — For reinforced concrete con¬ struction for structural concrete, engine foun¬ dations, tanks, arches, a real rich proportion of 1 part cement to 6 parts of fine and coarse aggregates by volume ; usually 1 cement, 2 sand, 4 broken stone or pebbles (1 :2:4). For reinforced columns up to 1 :1 :2. For ordinary foundations, walls of buildings, floors, side- walls, use 1 :2^2 :5. For heavy walls, piers and abutments, an ordinary mixture of 1 :3 :6. For unimportant work, in large mass, as ordinary foundations, backing, farm floors, a lean mix¬ ture of 1:4:8 may be used if well handled. These proportions assume that the voids to be filled in the fine and coarse aggregate approxi¬ mate 50 per cent. In important work the most favorable proportions to yield the densest mix¬ ture are determined by experiment. A grading of sizes of aggregate approximating an ellipse, vertex at zero size, is the ideal.

Mixing should continue for at least one minute in a batch concrete machine mixer. If mixed by hand ingredients should be turned at least six times on a watertight platform until homogeneous in color. The cement should be spread on the sand and the two well mixed by

turning over three times. Then place this on the coarse aggregate, add the water and turn over. Generally the amount of water should be such as to yield a plastic concrete, whose surface will be horizontal in a container, but in which the coarse aggregate will not sink. However, a dryer concrete may be tamped into place for foundations, walks, curbing, etc. Before mixing and placing concrete should not be allowed to set. Fresh concrete, as on a subsequent day, should not be placed on par¬ tially set concrete until the old surface has been cleaned of laitance or dirt, roughened and wetted,

and slushed with a mortar of 1 part cement to 2 parts fine aggregate.

Concrete should not be deposited in freezing weather unless special precautions are taken to heat the aggregate, the water and to protect the concrete. Salt is used to lower the freezing point of the water in amount of 1 per cent of the weight of the water for a temperature of 32° F. and an increase of one per cent for each degree of lower temperature to a maximum of 10 per cent. The strength of the concrete is not greatly affected. Salt should not be used in reinforced concrete. Wet concrete may be con¬ tinuously placed under still water by use of a tremie or pipe with lower end buried in the flowing mass.

Usually forms of wood or steel are required to hold concrete to the desired shape while hardening. Accidents are likely when forms are removed too soon. Two weeks to one month in important structures are needed. A simple test is that a tenpenny nail will bend and not drive in concrete. Frozen concrete may be detected with a torch. Expert inspection is necessary where collapse is possible.

Strength. — The following table gives the expected compressive . strength of various con¬ cretes at 28 days, in pounds per square inch :

Aggregate

1:1:2

l:l£:3

1:2:4

1 :2§ :5

1:3:6

Wt. lbs. per cu. ft. 1:2:4

Granite, Trap, rock .

3,300

2 , 800

2,200

1,800

1,400

160

Gravel, hard limestone and hard sandstone

3,000

2,500

2,000

1,600

1,300

155

Soft limestone and soft sand¬ stone .

2,200

1,890

1,500

1,200

1,000

148-143

Cinders .

800

700

600

500

400

112

The expected strength of 1 :2 :4 concrete at 28 days is 2,000 pounds per square inch. The tensile strength is about one-tenth and the shearing strength about two-thirds the com¬ pressive strength. True shearing failures are difficult to procure; usually tensile failures result.

The modulus of elasticity ranges from 2,500,- 000 to 3,000,000 pounds per square inch. Usually in design it is assumed to be 2,000,000, or one-fifteenth that of steel. The bond or resistance to withdrawing steel or iron rods from 1:2:4 concrete at 28 days is: For plain and deformed rods at first slip, 260 pounds per square inch of contact surface ; at ultimate strength, for plain rods, 400; for rods with deformed surface, 600 pounds per square inch. A plain rod should be embedded 40 diameters

to develop its tensile strength. Concrete grows in strength with age. With compressive strength at 28 days is unity; 7 days, 0.60; 28 days, 1.0; 60 days, 1.20; 3 months, 1.25; 4 months, 1.30; 6 months, 1.35; 1 year, 1.45; 3 years, 1.50.

The quantity of concrete is less than the sum of the fine and coarse aggregate, since the fine aggregate fills the voids in the coarse aggregate. Fullers' rule is : The number of barrels of Portland cement required for a cubic yard of concrete is the sum of the parts of the ingredients divided into 11. Let c equal num¬ ber of parts of cement ; j equal number of parts of sand ; g equal number of parts of broken stone or gravel ; P equal number of barrels of Portland cement to cubic yard of concrete.

11 3 8

Then $P = \frac{}{c+s+g}$; $\frac{}{27}$ Then $P \times g =$ num-

ber of cubic yards of sand required for one

3 8

cubic yard of concrete; $P \times i \times$^ = number

of cubic yards of stone or gravel required for one cubic yard of concrete. A barrel of Port¬ land cement weighs 376 pounds. Here 3.8 is the number of cubic feet of loose sand per barrel of cement. For a proportion of 1:2:4 a cubic yard of concrete requires 1.57 barrels of cement; 0.44 cubic yards of sand; 0.88 cubic yards of stone.

Safe working stresses are (in per cent of compressive strength) : For bearing on con¬ crete, 33 per cent ; for axial compression, piers and plain columns, 22.5 per cent ; for com¬ pression in extreme fibre of beams, 32.5 per cent; for bond, plain bars, 4 per cent ; deformed bars, 5 per cent. A tensile stress of 40 to 50 pounds per square inch, when shrinkage cracks are not likely, and the conditions are not critical, may be allowed. Coefficient of expan¬ sion and contraction of concrete with tem¬ perature for one degree Fahrenheit is 0.0000055 to 0.0000060. Expansion joints must be pro¬ vided about every 30 feet in plain concrete. By use of steel expansion is reduced, and distrib¬ uted with a number of fine cracks that do not seem to affect the structure. Concrete shrinks when hardened in air and swells when hardened in water. Sudden change in dimen¬ sion of sections should be avoided, or fillets should be used.

Destructive Agencies. — In all cases concrete should be impervious to water. Steel embedded in good watertight concrete is preserved from corrosion above or below water level. Stray electric currents may cause corrosion of steel but the concrete is practically immune. Sea water, entering porous concrete, is likely to ciuse disintegration. Frost acting on water in porous concrete will cause spalling. Strong acids and organic acids and rapid crystalliza¬ tion of alkali salts under wet and dry condi¬ tions attack concrete. Mineral oils have no action.

Concrete has low heat conductivity, and is a good fireproofing material. Dehydration begins at 500° F. and is completed at 900° F ; but is confined to outer surfaces of two to three inches, in conflagrations. The most severe conflagration of the Edison factories at West Orange, N. J., 9 Dec. 1914, in which temperatures of from 1000-2500° F. were de¬ veloped, showed reinforced concrete buildings

(in this case of defective design) to withstand such extreme fires satisfactorily; columns and beams suffered spalling; some failed; the cost of restoration was from 10 to 15 per cent.

Imperviousness of concrete to water is best ensured by a dense concrete mixed wet. Dry or porous concretes are rendered less pervious by various integral compounds or surface coat¬ ings ; many of these are of temporary effect. Hydrated lime, in amount of 10 per cent of the cement, has been recommended.

Structures, such as retaining walls, bridge floors, subways, basements, are waterproofed by a membrane made up of one or more layers of fabric impregnated with asphalt, or coal tar pitch, cemented together with asphalt or coal tar pitch preparation. The fabric may be a wool felt, an asphalt felt or burlap. From two to six layers are used often. The membrane is protected from abrasion or other injuries by a covering of asphalt mastic or paving brick.

For damp-proofing, coal tar pitch, either dis¬ solved in benzene or applied hot, is painted on like a paint. Surface of concrete must be dry. A coal tar paint when made up of one part kerosene, four parts Portland cement, 16 parts refined coal tar, is very effective and may be applied cold.

Cost of Waterproofing. — Cost of coal tar when applied in three 'coats is Y cent for material and Yz cent for labor per square foot. Cost of membranes is from 20 to 45 cents per square foot, including protection. For surface work a mixture of concentrated lye and alum in proportions one pound lye to five pounds alum is used successfully by the United States army engineers. Paraffine ap¬ plied hot is sometimes used. A wall may be impermeable, but not damp-proof, for the water may enter by capillary action into minute openings and eventually may render damp the air of a room where there is little circulation of air. The secret of success is dense concrete laid continuously.*

Efflorescence. — The whitish or yellowish stains that occasionally appear on a concrete surface exposed to action of the weather are due to the leaching out of lime or other salts. The more waterproof the concrete the less probable these are. Unsightly appearances are also due to leakage through construction or shrinkage joints.

Surface Treatment. — Surface of concrete may be treated to improve its appearance by scrubbing

off the film of mortar when green or tooling it when hard, to expose the aggregate, which may be selected for aesthetic effect. A wash of 10 per cent acid solution is also used. Plastering or stucco on concrete must be applied with care. (See Stucco). For large and important structures, smooth forms and careful spading of dense concrete against these forms is preferable to any after effects. For ornamental work, best effects are produced by use of dry selected aggregate next to forms and by settinghn tiling. By the use of the cement gun fine aggregate and cement and water are blown by air pressure through a nozzle onto a surface to be covered.

Cost. — The cost of concrete depends upon cost of cement, sand and stone, upon conditions of work and size of work. Where forms are simple, cost ranges from $4 to $7 per yard.

Thin sections, with expensive forms and handling, will bring this up to from $10 to $20 per yard. A reliable estimate must take ac¬ count of all of the circumstances.

Applications of Massive Concrete. — Mas¬ sive concrete, or plain concrete not reinforced with steel, -as used up to about 1850, is applied to foundations, walls, piers, dams, retaining walls, short arches, etc. In these uses, the principal stresses are compressive. No tension is expected on the concrete. For instance in a massive retaining wall, the resultant force of the lateral pressure of the earth on the wall, and the weight of the wall is directed outwardly downward and acts within the middle-third of the horizontal width of the wall. Consequently no bending action exists and no tension exists in the concrete on the interior face of the wall. Structures of massive concrete are the old stone masonry forms built in concrete.

With metal reinforcement to carry prin¬ cipal tensile stresses, concrete structures can become more constructed in cross-section, more skeletonized, and the members can withstand bending action.

The advantages of massive concrete over stone are availability of local materials; use of unskilled labor and machinery in mixing and placing; adaptability for placing in small spaces ; monolithic character of resulting struc¬ ture. The following elements need careful con¬ sideration : Cost of forms, expansion and con¬ traction; uncertainty of quality of materials, demanding skilled inspection ; appearance of surfaces ; necessity of extra good foundations to prevent cracks due to settlement in an un¬ yielding material.

Application of Plain Concrete. — Sidewalks usually are 4 to 5 inches thick on a foundation of porous material 10 inches thick. For a 4- inch walk, the base is a dry tamped concrete 3 to 3K inches thick, and laid in blocks about 6 feet long, or the width of the walk, separated by a joint, formed by tarred paper or sand. After a few of these blocks have been laid, and protected from dirt and dust, and before they have set, the wearing surface of mortar from % to 1 inch is placed, is leveled with a straight edge and floated with a plasterer's trowel. The final floating is performed from two to five hours afterwards. Grooves are made in the wearing surface just above the joints in the base. Skill is necessary in prop¬ erly floating the surface at the right time. The finished wall must be protected from the hot sun. Basement floors are constructed in the same manner except that a wetter concrete may be used for the base, and in cellars the joints omitted. Driveways are similar to side¬ walks, and are from one inch thick for ordinary traffic up to five inches for heavy trucking.

Concrete roads are now established con¬ struction. Knowledge of the necessity of skilled contractors, very best materials, for difficult service conditions has been gained at expense of early failures. National confer¬ ences on concrete road building in 1914 and 1916 crystallized practice. The travel on rural and suburban roads has increased rapidly in recent years and changed in character to motor driven vehicles that destroy the surface of ordinary water bound roads; so that the maintenance of these throughout the entire year to meet the demands of modern conditions has

become impracticable from an economic stand¬ point.

The selection of clean, hard, well-graded aggregates is of the utmost importance. Prac¬ tice in supplying reinforcement to minimize cracks, or in inserting transverse joints, is not yet settled. The function of the small amount of reinforcement supplied is to keep together two portions of the

concrete which have in¬ evitably cracked due to settlement or shrinkage, and so prevent failure of the slab, rather than to prevent cracks. The latter remain small and soon fill up. Reinforcement is so formed of reticulated metal, as wire mesh, expanded metal, in amount about 28 pounds per 100 square feet of surface. Transverse joints 34 inch thick spaced 36 feet apart are filled with fibre matrix or bitumen and are protected by metal plates which, however, may be omitted if the filler is of a character that runs out under traffic.

A single track road should be 10 feet wide, and a double track road 18 feet wide. On each side is a macadam or gravel strip for turning out, the total width of roadway is 20 and 26 feet, respectively. The thickness of the road¬ way slab is 6 inches at the edges and increases to 7 or 8 inches at the middle, depending upon loads and other circumstances. The slab is built either with a wearing surface on a con¬ crete base as in sidewalks, or preferably as a one course slab floated on the surface. In 1914 there were 14,200,000 square yards built, equiva¬ lent to 1,500 miles of 15-foot roadway, and in 1915, some 15,000,000 square yards.

The cost of constructing concrete roads in 1915 in the United States, excluding grading, drainage or roadbed, varied from 98 cents to $1.28 per square yard, depending upon locality and other conditions. In 13 States out of 17 the cost was less than $1.12 a square yard, or $6,570 a mile for one mile of single track road 10 feet wide.

Maintenance of concrete roads is taken to mean, not the repair of obviously defective con¬ struction, resulting from careless workmanship and poor materials, but such work has been usually done in filling cracks or joints or small holes, with tar and sand. The cost per mile for such work in Ohio in 1914-15 was $29 per mile for 122 miles. Extensive data of cost of maintenance are lacking. It may be estimated that the maintenance cost just cited is not likely to be exceeded in pavements one to five years old.

Concrete walls for foundations and cellars may be made 1 :3 :6. A 10-inch thick wall will stand when hardened a pressure of 6 feet of earth, and if supported laterally by joists may be 6 inches thick. Building walls are single, or double with an open space. A single wall 6 inches thick is equivalent to a 12-inch brick wall. Each face of a hollow wall is 3 or 4 inches thick, and the air space may vary in middle, 9 inches being a convenient size. Con¬ crete should be wet to flow readily in the forms. Concrete building blocks with air spaces of various designs are machine made of rather dry or porous concrete. These are apt to be of inferior quality of concrete, and un¬ sightly in place. With special machinery and aggregates a satisfactory wall can be secured. Plain concrete is used for retaining walls, piers, dams, in about the same sections as the stone

CONCRETE CONSTRUCTION

1

2

Glens Falls Bridge, Arch of Concrete, with Spiral

Stairway

Fireplace of Concrete Inlaid Tiles

with Selected Aggregate and

5 Concrete

3 Back of Reinforced Concrete Counterfort Retaining

Wall .

4 Reinforced Concrete Building with Wall Girder and

Columns

Fence

TOC- <•> . %Sf

■

'

l ;

g

1 Concrete Building with Tooled Surface Finish

2 Reinforced Concrete Hollow Tile Rib Floor Construction

masonry it displaces. The sections of brick or stone arches may be reduced from 10 to 20 per cent. Some reinforcement in arches is always advisable. Reservoirs and tanks, chim¬ neys, silos, etc., should be reinforced. Especial extension of uses of concrete on the farm is to be noted.

Reinforced Concrete. — Reinforced concrete is concrete with metal, usually steel embedded to assist in carrying tensile stress. Good con¬ crete carries tensile stress in the earlier stages of loading up an extension corresponding to about 5,000 pounds per square inch in the steel, after which the steel does increasing duty. Computations for design omit this tension in the concrete. Steel is also used to assist in carrying compression in concrete in columns, arches and the compression flange of beams. Steel is also inserted in concrete to provide for shrinkage when setting and expansion and contraction under change of temperature and to minimize effects of settlement.

A simple beam of plain concrete breaks on the lower or tension face, when the strength of the concrete in compression on the upper face has reached only about l/10th its capacity. When steel rods whose cross section equals about 1/ 100th of the cross section of the beam are introduced in the tension side, the beam becomes more nearly of equal strength in both faces of 1 :2 :4 concrete. Its capacity is very largely increased. The composite action of the steel and concrete depends upon the bond between the steel and concrete. The possibility of carrying tensile stress through the concrete by steel leads to great flexibility in design, and allows new forms and constricted sections. The advantage of such construction in difficult situations is marked. Reinforced concrete has thus replaced stone or brick masonry in many fields of construction, such as retaining walls, arches, foundations, and has opened up new fields in reservoirs, tanks, buildings, conduits, chimneys. The combination possesses in a large degree the advantages of both steel and concrete. Steel is protected from corrosion and fire, and is used in its most economic form. Expensive con¬ nections, use of skilled labor and scarcity of product in rush times are obviated. The artistic possibilities are apparent. As in plain concrete construction, the necessity of care in inspection of materials and building operations, the effect of freezing weather or of rapid dry¬ ing, the dead weight on foundations and the problems of waterproofing need consideration.

Systems in reinforced concrete, such as the Monier, Hennibique, Kahn, Johnson, etc., are named after the inventor of a special arrange¬ ment of reinforcing to provide for the stresses, or for a specially formed bar, or unit assem¬ blage of bars. These are described in special treatises. Patents in reinforced concrete are many, and the designer must have knowledge of some of them to anticipate payment of royalties. Recently there has been a tendency in the courts to invalidate patents that claim rights to particular arrangements of bars in reinforced concrete on the ground that only mechanical skill, and not inventive faculty, is required to place steel where tensile stress is to be met, or else to interpret the patent to narrow claims covering only the particular thing described in the patent. v- y)m ˆ .

Use of Steel.— Steel for reinforcing is in

form of bars, usually round or square with ordi¬ nary surfaces (plain bars) or deformed surfaces, such as corrugations, lugs, bent fins. The en¬ deavor is to design the bar so that the cross section may be equal throughout. Reticulated metal, such as expanded metal or woven mesh, is also used for short spans, and to resist volumetric change. Steel is usually of low ˆcarbon steel, especially when bars of greater diameter tˆan one inch are to be used, but high carbon steel, both from billets and rerolled from steel rails, is extensively used. Usual thick¬ nesses of steel rods are : for slabs fa-inch to j4-inch; for beams fa-inch to Ifa-inch; for girders up to 2 inches.

The amount of steel in a beam depends upon the unit working stress for which the structure is designed. For stresses of 16,000 pounds per square inch in the steel, and 750 in the concrete in compression, a beam or slab is balanced mechanically, i.e., will have the assumed stresses, when 0.87 of 1 per cent of steel is present. This statement is based upon the conventional methods of design. In col¬ umns longitudinal steel is used up to 4 per cent and spiral steel from 1 to 2 per cent. In arches, 1 per cent of the cross-section at the crown both in the extrados and the intrados. Rein¬ forcement for temperature is generally from 0.25 to 0.4 per cent of the cross-section which is subjected to temperature change.

Structural Forms in Reinforced Concrete. — Reinforced concrete construction is gen¬ erally continuous and monolithic, all parts of the structure being tied together except for expansion joints. In this it is contrasted to wooden or steel construction where the parts act more as separate units. Concrete beams or girders are reinforced with about 0.9 per cent of steel at the lower side at the centre and an equal amount over the support when con¬ tinuous. The latter amount is obtained by bending one-half of the bars up from the bot¬ tom around the quarter-point of the span, the remaining one-half coming from the other side of the support. The bars that are not bent continue horizontally to the support. Width of beams and girders is generally one-half to one-third the depth. The ends of beams and girders are strengthened against shear when necessary, by use of web reinforcement con¬ sisting of stirrups either vertically or inclined upward toward the support, rigidly attached to the horizontal bars and running to the top of the beam. The bent bars also provide this strengthening, which is necessary when the unit shearing stress (that is the load carried to the support divided bv the cross-section of the beam above the horizontal steel), exceeds 49 pounds per square inch. In no case should this shear stress exceeds 120 pounds per square inch in strengthened beam. The size of beams de¬ pends upon loading. A moment of 1/12WL must be provided for in continuous beams. W — total load on beam and L = span from clear to clear plus depth of beams. A non- continuous span must carry a moment of ~fa WE. This resisting moment is calculated bv multi¬ plying the area of the steel by the unit stress and by a leverage (about the compression centre) of approximately fa the depth of the beam above the steel.

Slabs run between beams, and are designed upon the same principles as beams. Slabs have

spans from 4 to 20 feet. For usual loads a span of 8 feet between beams is economical.

Columns may be reinforced by from 1 to 4 per cent, longitudinal rods well tied together by % and wire at distances not to exceed 16 times the diameter of the rod. There should be a minimum of 2 inches of concrete outside the rods. The concrete of the core, i.e., inside the steel, may be loaded to 500 pounds per square inch plus the amount carried by the steel. The unit stress on the latter is 15 times the unit stress on the con¬ crete. Preferably columns should be rein¬ forced with longitudinal rods and spirals, the latter to at least 1 per cent. In this case the core can carry safely 750 pounds per square inch plus the amount on the longitudinal steel for 1 :2 :4 concrete. In case of richer concrete an increased stress in proportion to the increased strength of the concrete may be used. Columns should not be too slender. Lengths of from 15 to 20 times the diameter are conserva¬ tive. Practice in design is largely regulated by the Report of the Joint Committee on Concrete and Reinforced Concrete.

The first buildings of reinforced concrete were designed of slabs, beams and girders, similar to wooden construction. A modern type, the so-called flat-slab floor, dispenses with all beams and girders, and uses a continuous flat slab of equal thickness throughout, sup¬ ported on columns with

flared heads. At times the slab thickness is increased around the column head, a so-called (

6-inch capital. The slab is 18 inches thick at centre and 30 inches thick for an area of 9 feet square, surrounding the columns. The reinforcement is 4-way, consisting of jˆ-inch rods spaced 5j4 inches. The structure is with¬ out expansion joints.

An excellent type of floor slab is composed of hollow tile spacers between reinforced con¬ crete joists, giving a stiff, light flat ceiling that holds plaster well. Some buildings are con¬ structed by erecting previously and separately molded elements such as columns, beams and slabs. Occasionally a light structural steel framework is erected and supports the forms. After the concrete is poured, the framework becomes the reinforcement.

Finish of concrete floors is similar to wear¬ ing surface in sidewalks. If a wood floor is desired, nailing strips of wood about 2 inches by 4 inches spaced 16 inches are laid on the rough slab and embedded in a lean cinder con¬ crete. Linoleum may also be laid directly on a smooth base. Various special floor finishes have been devised.

Footings in uniform soils should be designed for equal soil pressure so that the settlement of the entire building shall be uniform to avoid cracks. The dead load is chiefly considered. In firm soils such as gravel, hard clay, footings may be plain, without reinforcement, sloping from the column base at an angle of 60 degrees with the horizontal. Column footings on yield¬ ing soil are spread, and designed as cantilevers to resist flexure. The load on the column plus the dead weight of the footings divided by the bearing capacity of the soil equals the required area of the footing. The rods may run in either 2-way at right angles, or 4-way, i.e. rectangular and diagonal. Often the footing for a wall col- umnˆ on a property line cannot project into the adjoining property; then a combined footing for the wall column and the adjoining interior column is constructed of trapezoidal shape to carry both columns. Raft foundations, consist- . ing of a simple slab under the entire building, . float the structure in yielding soil, or support it on piles.

Reinforced or plain concrete piles are either formed in place, as the Simplex and Raymond, or separately molded and driven, as the Gil- breth and Chenoweth. Unlike wooden piles, they may extend above the level of permanent ground water. In the Simplex pile, a hollow cylindrical steel tube or fprm 16 inches in diameter and ˆ4-inch thick is driven to a suit¬ able bearing. Then the pile is filled with con¬ crete and the tube withdrawn. The driving point may be either a conical cast-iron point, that is left in place, or more rarely, a hinged cutting edge, an ((alligator point,® which opens as the tube is withdrawn. For the Raymond pile, a conical shell, made of wire encased in a thin sheet steel shell, is driven along with a mandrel, to re¬ fusal. The mandrel is withdrawn, and the shell filled with concrete. In these two types it should be certain that the soil does not fall back as the tube is withdrawn, or else deform the green concrete; and that the back pressure does not deform the shell. Apart from simnle reinforced piles, patented forms of separatelv molded piles are the Gilbreth pile, a tapered reinforced pile with longitudinal corrugations, and a central hole for a water jet; and the Chenoweth pile, which is rolled. A layer of

concrete, two inches or more in thickness is laid on wire cloth, attached to a mandrel ; after rolling the wire cloth becomes a spiral in the pile, which is also wrapped around with wire. Separately molded piles are made under favor¬ able conditions as to concrete. (See Piles). In the. McArthur construction a hole is driven to a firm stratum, and enlarged at the bottom by tamping concrete.

Walls of concrete buildings are preferably ol skeleton construction, with wall girders and columns, and curtain walls of concrete 6 inches thick, or of brick or tile. The surface is often veneered with brick, tile, marble, etc., which is tied on with metal ties, previously fixed in the concrete.

Stairs of concrete are reinforced as beams between floor and landings. For common spacings of about 6 feet from floor to landing, the steps are 5 inches thick from the re-entrant angle of tread to bottom, with y2- inch round rods 6-inch centres ; at each floor is a girder about 10 inches by 15 inches deep and the landing is a simple reinforced slab 5 inches thick, when the stairs are parallel ; if at right angles, the landing is hung by rods to a girder above the stairway.

Windows of wire glass in metal frames, sliding or pivoted either horizontally or ver¬ tically, are a part of the complete equipment of a modern reinforced concrete building.

Partitions are of concrete 3 or 4 inches thick, slightly reinforced against shrinkage cracks ; but metal lath and plaster terra cotta tile, or plaster lath partitions are more common. Metal lath and plaster partitions 4 inches to 6 inches thick have a framework of steel studding running between floors, upon which is fastened the metal lath, which is then plastered with a mixture of lime and cement mortar in three coats ; the first and scratch coat with hair or fibre. The hollow space may be filled with cinder concrete. Metal lath of various com¬ mercial forms with integral projecting ribs need no separate studding. Plaster blocks made chiefly of gypsum, or plaster of paris, with an admixtured fibre are easy to handle and cut, but are not as fireproof as other forms.

Considerable ingenuity is shown in devising forms of light concrete beams, factory made, for floor systems .of dwellings.

Floor Loadings. — Concrete will spread heavy loads, on small areas, to adjoining portions not so heavily loaded and thus permits of partial overloads. Such floors are often loaded to as much as twice the design load, and therefore there should be conservative designs to begin with. As a test of workmanship it is common practice to load a simple panel or two adjoining panels with a test load equal to twice the design load plus once the dead load. Floor live loads per square foot to be provided for are (Boston practice) : dwellings and apartment-houses and public hotels, 50 pounds ; office floors, and for public rooms of apartment and public hotels, 100 pounds; floors of retail stores and public buildings, except schoolhouses, 125 pounds ; schoolhouses, other than floors of assembly rooms, 80 pounds and for floors of assembly rooms, 125 pounds ; drill rooms, dance halls and riding schools, 200 pounds ; warehouses and mercantile buildings, at least 250 pounds. Concrete floors are designed up to 1,000 pounds per square foot. Ordinarily the increase in

loads to allow for impact is small in concrete structures, from 20 to 50 per cent of the live load in bridge floors, and none in arch rings or heavy members.

Reinforced concrete retaining walls ap¬ peared early in the art before 1894. In the L type the vertical stem which holds the trans¬ versely-acting earth pressure is a cantilever. There is also a cantilever transversely act¬ ing horizontal base, projecting back, acting upon which the weight of earth equilibrates the lateral pressure. This type is used up to heights of about 18 feet. Reinforcement runs vertically down the face of the vertical stem next to the earth, and is anchored in the base. Horizontal rods run on the upper side of the base (the heel) and are anchored in the vertical stem. The horizontal base may pro¬ ject in front of the wall to form a cantilever toe with rods in the bottom. Reinforcement in the exterior outward face of the vertical stem provides for shrinkage and expansion. Expansion joints may be provided. In excess of heights of about 18 feet, the counterfort type is used, in which the vertical stem and hori¬ zontal base are connected on the inside by counterfort walls. The vertical and horizontal elements now become slabs carrying earth pressure and weight to the counterforts which are designed as vertical cantilevers, and to which the slabs are well tied. Types of plain and reinforced concrete retaining walls merge into one other.

Abutments for bridges are similarly de¬ signed. Cellular construction in abutments and similar construction in reinforcement concrete is a logical development, by which thin sections, properly reinforced, replace heavy masses.

Reinforced concrete dams have a sloping water tight reinforced concrete deck or slab supported on vertical concrete walls. The water pressure increases, instead of opposes, stability. The sloping deck may continue to rise over a crest and fall to an overfall slab sloping down stream. The two slabs are con¬ nected by vertical walls or buttresses. The deck slab is designed to carry the water pres¬ sure to the vertical walls. The Schuylerville, N. Y., dam is 250 feet long and 25 feet high. Vertical walls, 10 foot centres, 12 inches thick, support a deck tapering from 8 inches to 12 inches thick, while the overfall apron is 8 inches thick. A foot bridge passes under the dam, supported on the vertical walls. Such dams are commonly known as Ambursen dams.

Open concrete reservoir walls are designed upon similar principles to those applied to re¬ taining walls. Expansion joints and water¬ tightness are important. They are lined with a concrete bottom 4 inches to 8 inches thick, pre¬ ferably reinforced with a mesh of metal.

Covered reservoirs have concrete bottoms carrying the upward pressure to columns that also support the concrete roof. Roof and bottom may be groined arches or slabs. Reser¬ voirs of groined arches in the United States have spans from 10E> feet to 16 feet, a rise of from 1 foot 6 inches to 4 feet, and a crown thickness of 6 inches. Since the exterior walls are supported by the roof, thinner sections are needed than for open reservoirs. A circular reservoir wall supporting a domed roof needs a ring of reinforcing at the top.

Reinforced concrete water tanks must be

constructed of impervious concrete, and arc gen¬ erally built in one operation of wet concrete. They should be reinforced, not only for mechan¬ ical stress, but for shrinkage. The tank of the filtration plant at Merrimack, N. H., is 40 feet high, and 14*4 feet in diameter. The walls are 10 inches thick at the top. Rings of deformed round bars 7/&- inch in dimension, are spaced 6 inches vertically in centre of wall, intersected with 24-inch vertical rods, spaced 5 feet centres.

Examples of reinforced concrete stadia and grandstands are found at Harvard, Tacoma, Syracuse, Yale. These offer a suitable appear¬ ance, require no repairs and prevent accidents that arise from lack of maintenance of wooden structures. The following statistics show seat¬ ing capacity of well-known stadia :

Stadia, Circus Maximus, Rome, estimated 380,000; Colosseum, Rome, estimated 45,000 to 100,000; Yale Bowl, 125,000; Athens Stadium, 50,000; College of City of New York, 10,000; Syracuse, 20,000; Tacoma, 20,000; Harvard, 45,000; Princeton, 41,500. Construction cost per seat ranges from $36 for the stadium of the City of New York, $8.50 for the Princeton Stadium to $7.35 for the Yale Bowl.

Grain and ore bins, coal pockets are other containers that are common.

Bibliography.— Hool, (Reinforced Concrete Construction* (New York 1912) ; Morsch,

- Concrete Steel Construction* (Engineering News, New York 1910) ; Sabin, L. C., (Cement and Concrete* (New York 1907) ; Taylor and Thompson, (Concrete: Plain and Reinforced* (New York 1908) ; Turneaure and Maurer, Principles of Reinforced Concrete Construc¬ tion* (New York 1909).

W. K. Hatt,

Professor of Civil Engineering, Purdue Uni¬ versity.

CONCRETE MACHINE MIXERS. Ma¬ chine mixers used in the United States may be grouped into three classes: (1) continuous; (2) batch and (3) gravity mixers. The contin¬ uous mixer usually consists of a central shaft, to which are attached arms or paddles, rotat¬ ing in a long trough. The paddles are set at such an angle that they have an endless screw action, cutting and pushing the materials down toward the lower end of the trough, out of which a continuous stream of concrete flows. Two types of machines are used — one in which the materials are thrown into the trough by men standing at the sides of the machine, part shoveling sand and part stone, another in which the materials are placed in hoppers at the head of the trough and measured automatically. Batch mixers are divided into cube mixers, the double cone or Smith mixer and the Ransome or drum mixer. In operation the batch mixer is turned 10 or 15 times or more after charg¬ ing and then the materials are discharged. In the gravity type the falling materials strike baffle plates, which throw them together in their descent through the machine. The materials are measured in layers on a platform above the machine, and then shoveled into it.

CONCRETE SHIPS. For vessels of mod¬ erate size, reinforced concrete has taken its place as a real shipbuilding material. It pos¬ sesses obvious advantages for the building of many useful types of craft. Among its recom¬ mendations are simplicity and rapidity of con¬

struction, the readiness with which repairs can be executed, high resistance to strain and shock, incombustibility and fire-resistance, relatively low cost and the virtual elimination of main¬ tenance charges. Experience appears to show that the skin-resistance of a reinforced con¬ crete vessel to passage through water is slight, owing to the smoothness of the surface and the absence of joints, and the ease with which scraping can be effected.

Reinforced concrete lends itself to the most modern developments in shipbuilding design, and although the skin of the hull must neces¬ sarily be thicker than when steel plates are used, it need scarcely be thicker than would be the case if timber were employed. Assuming three inches to be the thickness adopted, the weight per square foot would be less than that of steel one inch thick. Therefore the question of dead- weight does not appear to constitute a very serious objection, especially in view of the fact that the weight of the hull of a vessel is small in comparison with the weight of equip¬ ment, fittings and cargo.

After America's entry into the war in April 1917, the pressing need for ships and the ex¬ isting congestion in American shipyards led marine engineers to. consider the possibility of utilizing other materials than wood and steel for shipbuilding. The most promising alterna¬ tive was found to be reinforced concrete. Its application to the construction .of ships was at once studied intently by prominent engineers of Britain and America. Fortunately valuable pioneer work in this field had been proceeding successfully for a decade or more and showed the way along which successful development was possible.

History. — The first example of what we know as reinforced concrete was a rowboat built in 1849 by M. Lambot, of Carces, France. The process of construction was patented and M. Lambot exhibited his work at the Paris Exposition of 1855. The French government investigated the work of M. Lambot in 1850, but, as usual, further development was left to private initiative. In 1899, Carlo Gabellini, of Rome, Italy, began the construction of concrete scows and barges. His process had been so developed by 1905 that a 150-ton barge was constructed for the city of Civita Vecchia. The following year another barge was built for the military harbor at Spezzia, for the use of the Italian navy. This latter barge before accept¬ ance was put to the severe test of being driven against some piling and afterward being rammed by a steel towboat. Results of these tests were so satisfactory that construction of similar boats and barges followed.

Methods of Construction. — In the Gabel¬ lini method the first step in (

CONCRETE CARGO STEAMSHIP "FAITH" ARRIVING IN SEATTLE AFTER HER MAIDEN VOYAGE FROM SAN FRANCISCO

The " Faith " is the first and the largest concrete ship built in America

these ribs Jfj-inch wire mesli is placed with a thin mortar covering plastered on. Finally a third and coarser wire mush is pressed into the soft mortar and the entire surface troweled over. This completes the hull. Bulkheads are next concreted and the boat finished with a wooden sheer strake and gunwale.

The first concrete boat in Holland was built in 1887 by the Fabrieck van Cementljzer Werken. This firm first built barges up to 11 tons capac¬ ity, which proved so successful that plans were elaborated resulting in the building of barges 64 feet long and 14 feet beam, of 55 tons capacity. Briefly, the system of construction consisted of building longitudinal and trans¬ verse bulkheads spaced approximately on 6-foot centres, thus providing a cellular construction, which made the ship practically unsinkable. German shipbuilders, in 1909, at Frankfort-on- the-Main, constructed a concrete freighter of 220 tons. Simple forms were set up and con¬ crete placed between them. A concrete sail¬ boat was built in 1912 by Johannes Lescher of Dresden. It embodied the latest principles of sailing vessel construction as to shape of hull, etc. In 1914 the Sydney Harbor Trust had con¬ structed a pontoon of reinforced concrete for use in Sydney Harbor, N. S. W. It is 110 feet long, 53 feet 3 inches wide at the bow, 67 feet 7 inches at the stern, has a draft of 7 feet 9 inches and deck area of 6,000 square feet. The total displacement is 783 tons. Concrete barges have been

in use for some years on the Man¬ chester Ship Canal, and one on the Welland Canal has successfully withstood very severe tests since its installation in 1910. Concrete barges built on the Panama Canal in 1911 proved good examples of what service such barges could render under adverse conditions. In this case concrete was selected as the con¬ struction material because no skilled labor for steel or wood ship construction was available, nor could steel plates nor suitable seasoned timber be obtained within the time required. Concreting materials were at hand in large quantity and the expediency of using concrete suggested itself as a happy solution of the problem. Concrete barges have been con¬ structed also and placed in successful operation at Baltimore, Md., and Mobile, Ala.

In 1917 a concrete lighter was built at Pors- grund, Norway, and its success led to the con¬ struction of larger ships at the same plant. In the same year a 300-ton concrete motorship was built in England for coastwise and channel traffic. At the end of the first half of 1917, 20 or more barges and ships of similar type were in use on the Paris ship canal. Canada came forward in the same year with a concrete ship proposed for lake traffic. A concrete ship ap¬ proximating 5,000 tons was built for trans¬ pacific service at Redwood City, Cal., in 1917, and a New York company in the same year built a 700-ton concrete barge, and in 1918 had contracts in hand and work progressing on a number of similar vessels. Norway came to the forefront in this field in 1917 in the numbers of concrete barges, lighters and ships varying from 200 tons up to 3,000 tons, launched. Some of these are in ocean traffic between Norway and England. The year 1918 saw rapid ad¬ vances in the construction of concrete ships, due to the great necessity of overcoming the losses in merchant tonnage through Germany's

submarine warfare. This development has been chronicled in the daily press and in the periodicals of the nation. Consult (Concrete Ships J (issued by the Portland Cement Asso¬ ciation, Chicago 1918), from which the fore¬ going account has been compiled; Concrete and Constructional Engineering (Vols. XI, XII, XIII, London 1916-18) ; Marine Review (Cleve¬ land, August 1917) ; Scientific American (28 July 1917; 17 Nov. 1917); Shipping Illustrated (New York, 23 June 1914; 18 Aug. 1917; 29 Sept. 1917 ; 20 Oct. 1917) ; The London Times (Engineering Supplement, 25 May 1917).

CONCRETION (the act of growing to- together), the act of becoming united into one mass. (1) In a restricted sense the term is used to signify a solid mass, a clot or a lump formed by a process of growing together, as in animal economy, the hard substances that oc¬ casionally make their appearance in different parts of the body, as well in the solids as in those cavities destined to contain fluids ; in the former case they are denominated concretions or ossifications; in the latter, calculi. The con¬ cretions are named from the parts of the body in which they occur. Pineal concretions, from their being found in that part of the brain called the pineal gland, consist of carbonate and phosphate of calcium with organic mat¬ ter; salivary concretions, as being discovered occasionally in the salivary glands, also consist mainly of earthy phosphates ; pan¬ creatic concretions are hard substances found in the pancreas ; pulmonary concretions, which have been sometimes coughed up by consump¬ tive persons, contain mucus and albumen in addition to the salts ; hepatic concretions, of which the liver is sometimes full, are composed chiefly of cholesterin, mucus and coloring mat¬ ter ; urinary concretions are found in the bladder, and their constituents are very variable, uric acid, urates, fibrin, oxalates, phosphates and several other bodies being found. Gouty concretions consist of urate of sodium and small quantities of other salts with organic matter. Concretions have been discovered in the intestines and stomach of man, but more frequently in the bodies of other animals. Those found in the intestines of a horse were examined by Fourcroy, and found to consist of magnesia, phosphoric acid, ammonia, water and animal matter. (See Calculus). (2) In geology concretion signifies an aggregation of mineral matter, in concentric layers and cast in a spherical form which is frequently flattened. (3) In logic concretion is the act of rendering a concept more determinate or concrete.

CONCRETIONS, masses of mineral mat¬ ter, sometimes arranged in concentric layers, sometimes with a radiating structure, sometimes almost structureless, which have been built up particle by particle by circulating waters within the mass of another rock. Most concretions are circular or nearly so, but sometimes they occur in irregular shapes. Concretions of flint are common in limestone, and concretionary masses of iron pyrites frequently occur in coal. They vary greatly in size ranging from a frac¬ tion of an inch to several feet

CONCUBINAGE, the act or practice of cohabiting without a legal marriage ; the state of being a concubine ; a natural marriage as distinguished from a legal marriage. Among

the Greeks concubinage was allowed even to married men : the number of their concubines, also, was unlimited. Among the Romans con¬ cubinage was neither unlawful nor disgraceful. It was, moreover, formally permitted to unmar¬ ried men by the Lex Julia, and by the Lex Papia Poppaea, but with the provision that it should be limited to a single concubine, and that only women of mean descent, as freed women, actresses and the like, should be chosen for the purpose. The children begotten in concubinage were not considered as legitimate, but were called natural, and the right of inheritance of the concubine and her children was very much limited. With the introduction of Christianity concubinage ceased; and, indeed, Constantine the Great made laws intended to put a stop to it. Concubinage also signifies a marriage with a woman of inferior condition, to whom the husband does not convey his rank. By French law the presence of a concubine in the house entitles the wife to a divorce. See Marriage.

CONCURRENT JURISDICTION, the

jurisdiction of different courts authorized to take cognizance of the same case. In criminal cases the court which first takes up a case has what is called the right of prevention, that is, the right of deciding upon that case exclusive of the other courts, which but for that right would have been equally entitled to take cogni¬ zance of it. In civil cases it lies with the suitor to bring his cause before any court he pleases, which is competent to take it up. Concurrent, also called cumulative, jurisdiction is opposed to privative jurisdiction. Where concurrent juris¬ diction exists in the United States courts a de¬ cision of a State court may be taken up to the Supreme Court for review.

CONCUSSION OF THE BRAIN, a term applied to certain injuries of the brain resulting from blows and falls, though unattended with fracture of the skull. Stupor or insensibility, sickness,' impeded respiration and irregular pulse are the first symptoms, and though these may subside there is always for a time more or less risk of serious inflammation of the brain setting in. Although all the conditions attend¬ ing concussion of the brain have been care¬ fully studied experimentally yet authorities dis¬ agree as to the causes which induce it. These causes have been variously stated as laceration of minute blood vessels, molecular changes in the brain cells or changes in the cerebrospinal fluid. The patient should be put to bed at once with the head low, and kept warm ; but stimu¬ lants should, except in special cases, be with¬ held. All excitement should be avoided, and for some time after apparent recovery great care is necessary.

CONDE, kon-da, the name of a French family, the younger branch of the Bourbons, who took their name from the town of Conde, department of Nord. One Godfrey de Conde, about 1200, was in possession of a part of the barony of Conde. His great-granddaughter, Jeanne de Conde, married, in 1335, Jacques de Bourbon, Comte de la Marche, and the barony of Conde went to their second son, Louis de Bourbon, Comte de Vendome, whose great- grandson, Louis de Bourbon, Prince of Conde, in virtue of his blood-relationship to the royal family, assumed the title of Prince, and is re¬

garded as the founder of the new house of this name.

CONDE, Henri (on-re) II de Bourbon,

Prince de: b. 1588; d. 1646. At the request of Henry IV he became a Catholic. In 1616 he was sent to the Bastile, where he remained for three years. After the death of Louis XIII the prince was liberated, and was made Minister of State to the regent.

CONDE, Louis (loo-e) I de Bourbon,

boor bon, Prince de, French general: b. Ven¬ dome, 7 May 1530; d. 15 May 1569. He mar¬ ried the grandniece of the Constable de Mont- morenci. He served his early campaigns in Piedmont, but first distinguished himself at the defense of Metz, besieged by Charles V in 1552. Affronted at court, and hated by the Guises, he joined his brother, the king of Navarre, at Nerac, and joined the

Huguenots in 1559. In 1560 he took part in the Amboise conspiracy to overthrow the Guises. He was arrested and sentenced to death, but was discharged after the death of Francis I and was made governor of Picardy through the influence of Catherine de Medici (q.v.) who was then all powerful in France. He soon after appeared as head of the Protestants, and was defeated and captured at the battle of Dreux, 1562. After being over a year in prison he was liberated, and for four years he kept the peace but fresh persecution of the Huguenots called him to arms again. In 1567 he fought the battle of Saint Denis without decisive re¬ sult. Two years later the Protestants were defeated, and Conde was taken prisoner, badly wounded, at the battle of Jarnac, 13 March 1569. He was almost immediately assassinated by Captain Montesquieu, a Swiss soldier who was probably acting under orders from the Duke of Anjou. See Coligny, Gaspard de.

CONDE, Louis II de Bourbon, Prince of, French general : b. Paris, 8 Sept. 1621 ; d. near Fontainebleau, 11 Dec. 1686. He was the son of Henri II, Prince de Conde (q.v.) and during the life of his father bore the title of Due d'Enghien. He immortalized this name at the battle of Rocroi, in which, at the age of 22, he defeated the Spaniards (1643). The same year he was sent to Alsace to help Turenne. Wherever he appeared he was victorious. He besieged Dunkirk in sight of the Spanish army, and gained this place for France in 1646. The death of his father in this year made him head of the Conde family with all its vast wealth and extensive estates; so that there were in the kingdom only the king himself and the Duke of Orleans who were more important personages than he. He was given command of the army in the Netherlands and appointed captain-general of the French forces. A great victory at Leas in 1648 won him a wonderful reputation. During the troubles of the Fronde he at first took the side of the court against the Parliament and the nobles, and after a siege of a few months brought back the young Louis XIV to Paris (1649) ; but believing himself ill requited by Mazarin for his services he put himself at the head of the faction of the Petits Maitres. Be¬ ing captured, however, he was imprisoned by Mazarin (1650), and was not released till after the lapse of a year. He at once put himself at the head of a new Fronde, and entered upon

negotiations with Spain. In spite of several checks he then marched upon Paris, where he was met and opposed in the suburb Saint Antoine (1652). The battle which ensued was indecisive ; and Conde, finding himself aban¬ doned by many of his friends, retired to the Netherlands, and joined the Spaniards, who ap¬ pointed him generalissimo of the Spanish armies. In 1658 he was defeated before Dun¬ kirk, by Turenne, and was only restored to royal favor by the Peace of the Pyrenees in 1659. In 1668 he was charged with the reduc¬ tion of Franche Comte (then belonging to Spain), which he accomplished in three weeks; and in 1674, at the head of an army sent by Louis XIV against the United Provinces, de¬ feated the Prince of Orange (afterward Wil¬ liam III of England) at Senef. He was un¬ able, however, to take advantage of this victory, as he was obliged to withdraw into Alsace to defend it against Montecuculi, to whom it was thrown open by the death of Turenne in 1675. He succeeded in driving Montecuculi across the Rhine. This was his last triumph. Four years later he retired to Chantilly, near Paris, where he devoted himself to the sciences.

CONDE, Louis Joseph de Bourbon,

Prince of: b. Chantilly, 9 Aug. 1736; d. Paris, 13 May 1818. In the Seven Years' War he dis¬ tinguished himself by his courage and skill, and at the outbreak of the Revolution he sided with the monarchy and afterward formed in 1792, at Worms, a little corps of emigrant nobil¬ ity, which joined the Austrian army under Wurmser., In 1795 he entered with his corps into the English service. In 1797 he entered the Russian service, but in 1800, after the separation of Russia from the coalition, re¬ entered the English service. The campaign of 1800 ended the military career of the prince. He returned to Paris in 1814; where, being ap¬ pointed president of a bureau of the Chamber of Peers, he remained some time, but at last re¬ tired to Chantilly. He published (Essai sur la Vie du Grand Conde, par L. J. de Bourbon, son 4me Descendant (1806).

CONDELL, kun'del, Henry, English actor: d. Fulham, England, December 1627. With John Heming he edited the famous first edition of Shakespeare's plays, 1623. He be¬ longed, as did Shakespeare, to the lord cham¬ berlain's company of players and is named in Shakespeare's will.

CONDENSATION, the reduction of any¬ thing to another and denser form, as of a vapor or gas to a liquid, or a liquid to a solid; the passage of gases or vapors from the aeriform to the liquid state. It is sometimes called also the liquefaction of vapors. It may be due to one of three causes: cooling, compression or chem¬ ical affinity. Before the first or second of these causes can operate, the vapor must be satu¬ rated. Various salts also condense vapors by means of chemical affinity. When vapors are condensed their latent heat becomes free. The condensation of liquids is the reduction of. a liquid to smaller bulk, with a proportionate in¬ crease in the specific gravity.

CONDENSED MILK as generally man¬ ufactured and sold fresh daily for delivery to consumers is pure cow's milk reduced in volume by the evaporation of water in vacuum. No other constituent part of the milk is re¬

moved. This article is not put up in hermeti¬ cally sealed cans nor intended for long-distance shipments.

Sweetened condensed milk is the product resulting from the evaporation of a consider¬ able portion of water from milk to which sugar (sucrose) has been added for the purpose of preservation. It contains not less than 28 per cent of milk solids and not less than 8 per cent of milk fat.

Sweetened condensed skimmed milk is the product resulting from the evaporation of a considerable portion of the water from milk from which the greater part of the milk fat has been removed and to which sugar (sucrose) has been added for the purpose of preserva¬ tion. It contains not less than 28 per cent of milk solids.

Evaporated milk is the product resulting from the evaporation of a considerable portion of the water from milk and contains not less than 25.5 per cent of milk solids and not less than 7.8 per cent of milk fat.

Evaporated skimmed milk is the product resulting from the evaporation of a consider¬ able portion of the water from milk from which the greater part of the milk fat has been removed. It contains not less than 22.5 per cent of milk solids.

Early Experiments. — The first application of a practical process for condensing milk was made by Gail Borden, who was born in Nor¬ wich, N. Y., in 1801, and at the time of his experiments a resident of New York, through his adaptation of the vacuum evaporating process on original lines. Most of the earlier experiments of previous investigators were what might be called ((open process? The earliest known patents for reducing the volume of milk or attempting to preserve it are the following:*

Newton, 1835. — For evaporating in " any known mode " alludes to the vacuum pan as affording a good method of introducing warm air through the milk.

De Lignac, 1847. — Evaporating in large, fiat, shallow pans, heated by steam bath to 186° F., product put in tins, sealed and again heated to 210° F.

Grimwade, 1847. — Preserving milk by " the mixing of saltpetre with the milk, and then exposing it to heat in vacuo, so as to evaporate and extract the aqueous particles thereof" and then enclosing "in bottles from which the air has been previously exhausted." Never put in practice.

Louis, 1848. — Evaporating in shallow pans, with steam jackets, etc.

Grimwade, 1855. — Carbonate of soda or potash is first added and the milk then evaporated in pans with agitation until a doughlike substance is obtained, sugar is then added, and the mass pressed by rollers into ribbons, further dried and then pulverized. Practised for some years.

Cook, 1855. — Evaporating in steam evaporating pans.

Borden, 1856. — In vacuo, put into successful practice and has superseded all others.

House, 1857. — Substantially like De Lignac's, except evaporating at lower temperature.

Gail Borden's experiments began shortly after 1851 and his first application for a United States

patent was made in 1853 which was at first rejected on the ground that it lacked novelty and usefulness. The patent, however (No. 15, 553), was granted 19 Aug. 1856, on the following claim :

Producing concentrated sweet milk by evaporation in vacuo, substantially as set forth, the same having no sugar or other foreign matter mixed with it.

This was followed by other patents: No. 1,306 dated 13 Mav 1862; No. 1,389 dated 10 Feb. 1863; No. 2,103 dated 14 Nov. 1865; No. 2,226 dated 17 April 1866.

Every feature of Borden's various claims as well as the state of the art was carefully and thoroughly investigated by the patent office examiners.

Necessary Sanitary Regulations. — Ex¬ perience covering a period of over half a cen¬ tury establishes the fact that the sanitary pre¬ cautions surrounding the manufacture of con¬ densed milk, evaporated milk, etc., are the most stringent, and necessarily so, because the safety of the business depends upon thoroughness. Not only are the cattle inspected by competent veterinaries, but rules and regulations of the strictest kind provide for the cleanliness of these cattle, proper feeding of wholesome, non¬ fermenting foods, cleanliness of stables, the isolation of the milk room, cooling facilities, in fact every well-tested plan that facilitates the production of pure rich milk handled in the most cleanly manner. While seemingly these rigid requirements involve some extra expense on the part of the dairyman, he is more than compensated by having a steady, firm market for his product at better prices than he can get anywhere else. The consumer is benefited by obtaining a pure and uncontaminated product at a most reasonable price. There are of course, concerns in the business whose facilities and experience do not enable them to perform all of this work as thoroughly as those con¬ cerns, which have been established for many years.

The receiving platform is an interesting sight, for as the farmers deliver their cans of milk, each is examined by a trained inspector and tested. If it is not found to be up to the standard of the company, it is rejected. From the receiving room, the milk is drawn into what is called the <(well room® where preliminary heating is effected in specially designed heating wells. If sweetened condensed milk is to be made, the necessary amount of sugar is dis¬ solved in the milk at this point. The mixture is then drawn to the vacuum pan where the con¬ densing process takes place in accordance with formula as to temperature, vacuum, etc., as found by the manufacturers to be best qualified for making the highest grades. The concen¬ tration is continued until the density indicates the milk to be of the desired composition. It is then drawn from the vacuum pan and cooled to the proper temperature for canning, before being conveyed to the sealing room. In the case of sweetened condensed milk, the product is supplied to the filling machines which auto¬ matically deliver the exact quantity desired into the cans. These are in turn capped, sealed and labeled by machines, and are then packed in cases for transfer to the warehouse where they await shipment. If the product made, however, is evaporated milk, it is conveyed to the process¬ ing room, where the necessary sterilizing of the sealed package is performed in large steam retorts. After the cans have been cooled, they are packed in cases and sent to the storage room.

A condensed milk plant properly operated buys its supplies in large quantities ; milk-sugar, tin cans or tin plate for making its cans (a factory sometimes containing a complete can¬ making tin-shop) ; lumber in shooks for making boxes ; so that nearly all the work incidental to completing the product is done in the fac¬

tory. Such a plant represents a large invest¬ ment.

Chemical Analysis. — As condensed milk forms such a very large and important item of food, especially for the infant, it is proper in this article to incorporate information on the question of analysis that the public may be correctly informed on the subject. For some years past, the methods for the analysis of con¬ densed and evaporated milk products have been very unsatisfactory. Unless operated by an¬ alysts of considerable experience, the results were inclined to be decidedly misleading. It is a matter of record that many chemists have erroneously reported samples of superior brands of milk as skimmed or partly skimmed, when in reality, the error was solely in the

work of the analyst.

In order to clarify this situation, the Milk Section of the National Canners Association appointed a committee to develop a method of analysis which would prove satisfactory to both the milk trade and the Federal authorities. After an exhaustive survey, the Roese-Gottlieb method was finally selected as being the most accurate and reliable one available. At the same time, collaborative studies were being conducted by the Association of Official Agri¬ cultural Chemists ror the purpose of finding a method which would give concordant results in the hands of any competent analyst. As a re¬ sult of this work, this organization adopted the Roese-Gottlieb method at its last meeting. In order, therefore, to secure official recognition, all analysts of condensed and evaporated milk products should be guided by the above recom¬ mendation. The fact that such a satisfactory method is now in use should do much to pre¬ vent such unfortunate misrepresentations as have occurred in the past.

Food Value. — An analysis of condensed milk (preserved) of high average quality would be about as follows :

Per cent Per cent

Fat.. . 9.50 Ash . 1.80

Protein . 8.18 Cane sugar . 40.50

Milk sugar . 12.30 Water . 27.72

The following analysis is representative of the evaporated milk now sold on the market :

Per cent Per cent.

Fat . 8.00 Ash . 1.51

Protein . 7.12 Water . 72.98

Milk sugar . 10.39

Of all the foods available to the public, it is doubtful if any rank as high in purity, keep¬ ing quality and uniformity. For infant feeding, household uses, for supplying the army and navy, shipping trade, exploring parties or

pioneer life, no food article prepared has greater value.

A. W. Milburn,

President Borden's Condensed Milk Company.

CONDENSER, one who or the thing which condenses. Some of the methods in general use are :

Steam-engine. — An apparatus for reducing to a liquid form the steam in front of the pis¬ ton, so as to obtain a partial vacuum at that point, and thus utilize the natural pressure of the atmosphere. Watt invented the injection condenser and the separate condenser. The surface condenser has a series of flat chambers or tubes, usually the latter, in which the steam

is cooled by a body of water surrounding the tubes.

In the jet condenser the steam and water meet in an air-tight chamber. A modified form of the jet condenser, known as the siphon condenser, makes use of the Torricellian vacuum. Distilled water for ships' use is ob¬ tained by the condensation of steam in a sur¬ face condenser. Condensers are always em¬ ployed on ocean-going steamships, never on locomotives. Elsewhere the practice varies.

Distilling . — The still-condenser is an appa¬ ratus generally made of the worm-tube form; the coil containing the alcoholic vapor travers¬ ing a tub which receives a constant accession of cold water, condensing the vapor in the coil. The liquid escapes at a cock valve below.

Metal. — An apartment in which metallic or deleterious gaseous fumes are condensed to prevent their escape into, and contamination of, the atmosphere. The device consists of a pro¬ longed duct for the fumes, with showers of water to condense the arsenical, sulphurous and other fugitive volatile matters. It also serves an economical purpose in saving fugitive fumes of lead, zinc, mercury, sulphur, antimony and similar metals.

Electricity. — An instrument for concen¬ trating electricity by the effect of induction. It usually consists of confolded sheets of tin- foil, whose layers are separated by a thin sheet having a non-conducting surface.

Other forms are the Leyden Jar, and the variable condensers made of metal sheets which can be moved in and out through an air gap, that are used in wireless telegraphy and for other similar purposes. With induction appara¬ tus, a condenser may be used as a device for absorption or suppression of the extra current induced by the rapid breaks in the main cur¬ rent. See Electricity; Induction.

CONDENSING AND NON-CON¬ DENSING ENGINES. See Steam-Engines.

CONDER, Claude Reignier, English army officer: b. 1848; d. 1910. He was educated at University College, London, and entered the Royal Engineers. He was chief of the Pales¬ tine survey in 1872-78 and in 1881-82. Later he served in Egypt and Bechuanaland and in 1887-94 was British commissioner at Ordnance Survey headquarters on the Transvaal border. In 1895 he was engaged in relief work in Ire¬ land and served on the Irish Ordnance Survey from 1900 to 1905. He wrote much on the topog¬ raphy and archaeology of Palestine. His pub¬ lished works include (Tent Work in Palestine> (1878) ; (Judas Maccabaeus) (1883) ; (Heth and Moab' (1883) ; (Memoirs of the Palestine Sur- vey> (1883; 1890); (Primer of Bible Geog- raphy> (1884);

Rise of Man) (1908) ;

CONDER, Josiah, Anglo- Japanese archi¬ tect: b. London, 28 Sept. 1852. He was edu¬ cated at the Bedford Commercial School (now the Modern School). He studied at the South

Kensington Art Schools and Slade Life Classes at University College. He became architectural assistant to the late William Burges and be¬ come a student of the Royal Institute of British Architects. In 1876 he was engaged by the Japanese government as professor of archi¬ tecture to the Imperial Japanese Engineering College, Tokio, and as architect of the Public Works Department. He designed and erected many government buildings and private build¬ ings in Tokio. He also was lecturer in archi¬ tecture at the Imperial Tokio University. In 1884 he received the fourth class decoration of the Rising Sun and in 1894 the third class of the Sacred Treasure. He is now retired and receives a life pension from the Japanese gov¬ ernment, still retaining the position of honorary adviser in architecture to the Home Office and engages also in private practice. His publica¬ tions include ˆhe Floral Art of Japan' ;

(Landscape Gardening in Japan' ; (Notes on Japanese Architecture' ; (Paintings and Studies by Kawanabe Kyosai.'

CONDILLAC, kon-de-yak, Etienne Bon¬ not de Mably de, French philosopher: b. Grenoble, 30 Sept. 1715; d. Beaugency, 3 Aug. 1780. He founded an international reputation on (The Essay on the Origin of Human Knowl¬ edge (or Sense Perceptions)' (1746); duly succeeded by the celebrated (Treatise on the Sensations' (1754), the central standpoint of these and other works being what is, philosophi¬ cally speaking, sensationalism ; a belief, that is, that what we know we know only through the senses, and hence our ideas of deity, love, the soul, etc., are largely modified .forms of the objects that impress us in our daily material ex¬ perience. These standpoints were practically those of French philosophy till the advent of Cousin. Among his other works are (Traite des Sensations' (1755) ; (Cours d'Etudes' (1755) ; (Le Commerce et le Gouvernement Consideres Relativement Tun a l'autre' (1776) ; (La Logique' (1781) ; (Langue des Calculs'

(1798).

CONDIMENTS, substances employed at table for the purpose of imparting a flavor to or seasoning ordinary foods. The principal condiments are common salt, butter, oil, vine¬ gar, sugar, honey, ginger, mustard, pepper, pic¬ kles, etc. These not only are pleasing to the appetite but also supply various wants of the system, many of them being necessary to the proper functioning of the alimentary system.

CONDITION, in law a statement of terms, a provision or stipulation, as in a contract, by which the parties thereto consent to be bound; or an undertaking to do something, pay money or other consideration, etc., as a proviso in an agreement by which the other parties thereto bind themselves to perform some act in return. Conditions must be made at the same time as the original conveyance or contract, but may be by a separate instrument, which is then con¬ sidered as constituting one transaction with the original. Unlawful conditions are void. Con¬ ditions in restraint of marriage generally are held void; but this is not true of conditions restraining from marriage to a particular per¬ son, or restraining a widow from a second mar¬ riage. A condition in general restraint of alienation is void, but a condition restraining alienation for a limited time is good. \\ here

land is devised, there need be no limitation over to make the condition good, but where the sub¬ ject of the devise is personalty without a limi¬ tation over, the condition, if subsequent, is held to be in terrorem merely, and void. But if there be a limitation over, a non-compliance with the condition devests the bequest. A limi¬ tation over must be to persons who could not take advantage of a breach. Performance should be complete and effectual. An incon¬ siderable casual failure to perform is not non¬ performance. Any one who has an interest in the estate may perform the condition, but a stranger gets no benefit by performing it. Conditions precedent, if annexed to land, are to be strictly performed, even when affecting mar¬ riage. Conditions precedent can generally be entirely performed, and usually at any rate equity will not interfere to avoid the conse¬ quences of non-performance.

The word ˆcondition® also means the situa¬ tion of every person in some one of the differ¬ ent orders of persons which compose the gen¬ eral order of society and allot to each person therein a distinct separate rank. For instance, at common law, a person under 21 is an infant, with certain disabilities and privileges. Every person is presumed to know the condition of the person with whom he deals.

CONDITIONAL IMMORTALITY, a

tenet held by a theological school which denies the inherent immortality of the soul, and the consequent doctrines both of eternal misery and of Universalism as contrary to the teach¬ ings both of nature and of revelation. Its ad¬ vocates maintain that the Bible sets immortality before men as something to be sought after (Rom. ii, 7), as a divine gift offered on cer¬ tain conditions (Rom. vi, 23; John iii, 15, 16), and as a matter of hope and promise in the present life (Titus i, 2) ; that this immortality is not a present possession (Mark x, 30), and is to be realized by the assumption of a spiritual body at the resurrection of regenerate men from the dead (Luke xx, 35, 36), an event synchronous with the second coming of Christ (1 Cor. xv, 51, 52). Divine testimony, no less than experience, they say, declares unequivocally that man has the same natural life as all other animals (Eccles. iii, 19), and only those who by faith and obedience are- united to Christ have the promise of immortality. The Calvinis- tic doctrine of eternal misery is untenable, the punishment of sin being death or everlasting destruction, to be inflicted subsequent to a judg¬ ment after the Lord returns (2 Thess. i, 9, 10). The dogma of Universalism, the only alterna¬ tive to endless torment if the soul must live forever, is also, they maintain, unfounded, since the punishment of sin (death) is said to be everlasting, like the life which is the reward of the righteous (Matt, xxv, 46). The Condi¬ tional Immortality Mission began in Great Britain in 1878. It has an organ The Bible Standard, published

monthly by the secretary. Churches have been established in the United States.

CONDITIONAL LIMITATION. (1) A

condition providing for the determination of an interest in land upon the happening of a particular contingency. It is a present interest only, lasting until terminated by the happening cof the contingency, and is synonymous with

a limited or qualified fee, such as a grant of an estate in land so long as the grantee shall re¬ main unmarried or while any of his children are minors. At common law a contingent in¬ terest formerly remained in the grantor of such an estate, and upon the happening of the contingency the property reverted to the grantor or his heirs. This rule was abolished in England by statute late in the 13th century, thus making such an estate an absolute fee, but in many States of this country it has been held that the old rule that the estate will revert to the grantor or his heirs remains in effect. However, the grantor of such an estate cannot legally alienate the contingent interest he may possess therein before the happening of the contingency which terminates the estate in the grajitee. (2) A use or interest in land in futnro effective on the happening of a given contin¬ gency.

In this sense the term is synonymous with shifting use or springing use. For example, a conditional limitation is granted to D in the following clause of a deed : <(Said land is granted unto A and his heirs to the use of B provided that, if C lives and reaches his majority, the land shall go to the use of D in fee simple.® Often the estate determines only upon breach of a condition, as where land is devised to A while he remains in a given city or State, and if he fails to do so, the property to vest in B unconditionally. Upon the happen¬ ing of the prescribed contingency, the estate first limited comes at once to an end, and the subsequent estate arises. ... A conditional limitation is therefore of a mixed nature, par¬ taking both of a condition and of a limitation : of a condition because it defeats the estate previously limited ; and of a limitation be¬ cause, upon the happening of the contingency, the estate passes to the person having the next expectant interest, without entry or claim. 63 Am. Dec. 725 (at 727). This form of estate is common both in Great Britain and the United States.

CONDITIONED, Philosophy of the, or Philosophy of the Unconditioned. The name given by Sir William Hamilton to certain philosophical views first promulgated by him in an article contributed to the Edinburgh Re¬ view, in October 1829, forming a critique on Victor Cousin's philosophy, especially of his doctrine of an absolute cause. The Uncondi¬ tioned is regarded by Sir William Hamilton as a genus including two species : the Infinite, or the unconditionally unlimited, and the Absolute, or the unconditionally limited ; and the thesis which he maintains and expounds in the essay referred to, and which forms one of the leading doctrines of his philosophical system, is that the Unconditioned, as thus explained, is en¬ tirely unthinkable. In his own words, ((the mind can conceive, and consequently can know only the limited, and the conditionally limited.

. . . Conditional limitation is the fundamen¬

tal law of the possibility of thought.® This he illustrates by stating that we can neither con¬ ceive an absolute whole, that is, a whole so great that we cannot conceive it also as a part of a still greater whole ; nor an absolute part, that is, a part so small that we cannot conceive it as a relative whole, divisible into still smaller parts. And this he declares to hold good as to

CONDOM

CONDOR

481

spa e, time and degree. (

CONDOM, kon-don, town in southeast France, in the department of Gers, on the Ba'ise River, which is here crossed by two stone bridges, 25 miles northwest of Auch. It con¬ tains an ancient church, a Gothic edifice of the 16th century, and in the outskirts are a number of handsome villas. The manufactures are iron founding, saw milling, porcelain, woolen yarn, leather and brandy. It was formerly the capital of Pays-de-Condomois. Bossuet was appointed Bishop of Condom in 1669, but re¬ mained here only one year. Pop. 6,380.

CONDONATON, in law, a forgiveness of injury, such as to restore the person who has committed an offense to the same position which he or she held before it was committed. In an action on the ground of adultery it is a legal plea in defense. If the act is committed anew, the condonation is annulled and the old charges are reconsidered.

CONDOR, the popular name of the great vulture of the Andes, formed by a mispronun¬ ciation of the Indian name kunter, which, ac¬ cording to Humboldt, is derived from another word in the language of the Incas, signifying «to smell well.® This species (Vultur gryphus, Linn., or Sarcoramphus gryphus) belongs to the family {Cat liar tides) of diurnal rapacious birds, and which is distinguished by the fol¬ lowing characters : The bill is elongated and straight at base; the upper mandible is covered to the middle by the cere; the nostrils are medial, approximate, oval, pervious and naked ; the tongue is canaliculate, with serrated edges ; the head is elongated, depressed and rugous; the tarsus rather slender ; the lateral toes equal ; the middle toe is much the longest, the inner free and the hind one shortest; the first pri¬ mary is rather short, the third and fourth are longest.

The natural history of the condor was in a fair way to rival the ancient fables of griffins, basilisks and dragons or even of exceeding

the roc of Sinbad the Sailor, in extravagant exaggeration, until Humboldt placed it upon the basis of truth. His careful measurements es¬ tablished the fact that the wonderfully gigantic condor is not generally larger than the lam- mergeyer, or bearded vulture, of the Alps, which it closely resembles in various points of character. These birds prefer to dwell above all animal life, and at the extreme limit of even Alpine vegetation, inhaling an air too highly rarefied to be endured, unless by creatures ex¬ pressly adapted thereto. From such immense elevations they soar upward until their great bulk diminishes to a scarcely perceptible speck, or is lost to sight. The condor is a carrion bird, and is quickly lured to the plains by the sight or scent of a carcass. To such a feast considerable numbers repair, and commence their banquet by first plucking out the eyes, and then tearing away the tongue of the animal ; next to these the bowels are eagerly sought for, and devoured with that gluttony which dis¬ tinguishes the whole vulture tribe. Tschudi mentions one in captivity which ate 18 pounds of meat in a single day and had its usual appetite the day following. The appetite of these birds seems to be limited only by the quantity of food that can be gorged into their stomachs ; and when thus overloaded they ap¬ pear sluggish, oppressed and unable to raise themselves into the air. The Indians profit by this condition to revenge themselves for the robberies which they commit upon their flocks, and, watching while they eat until flight has become exceedingly difficult, attack and secure them by nooses, or knock them down with poles before they can get out of the way. If the condor, thus loaded, succeeds in rising a short distance from the ground, he makes a violent effort, kicking his feet toward his throat, and relieves himself by vomiting, when he soon ascends out of reach. Many, however, are sur¬ prised, and are captured or killed before they are able to ascend. But the condor does not exclusively feed upon dead or putrefying flesh; he attacks and destroys deer, vicunas and other medium-sized or small quadrupeds; and when pinched by hunger a pair of these birds will at¬ tack a bullock, and by repeated wounds with their beaks and claws harass him until, from fatigue, he thrusts out his tongue, which they immediately seize and tear from his head; .they also pluck out the eyes of the poor beast, which, if not speedily rescued, soon falls a prey to their voracity. It is said to be very common to see the cattle of the Indians on the Andes suffering from the severe wounds in¬ flicted by. these rapacious birds. It does not appear that they have ever attacked man. When Humboldt, accompanied by Bonpland, was col¬ lecting plants near the limits of perpetual snow, they were daily in company with several con¬ dors, which would suffer themselves to be quite closely approached without exhibiting signs of alarm and never showed any disposition to act offensively. The nesting-time of the condor varies with the latitude and the place selected for the nest is usually some inaccessible ledge of rock. It lays two white eggs

from three and a half to four inches long, which are hatched in about seven weeks. The develop¬ ment of the young birds is very slow, since they are not able to fly until they are a year old, and they have to remain with the parent

birds for a year or two longer. They are oc¬ casionally seen even on the shores of the south¬ ern ocean, in the cold and temperate regions of Chile, where the Andes so closely approach the shores of the Pacific. Their sojourn, how¬ ever, in such situations is but for a short time, as they seem to require a much cooler and more highly rarified air and prefer lofty solitudes from 10,000 to 15,000 feet above the level of the sea. When they descend to the plains they alight on the ground rather than upon trees or other projections, as the straightness of their toes renders the first-mentioned situation most eligible. Humboldt saw the condor only in New Granada, Ecuador and Peru, but was in¬ formed that it follows the chain of the Andes from the equator to the seventh degree of north latitude into the province of Antioquia. There is now no doubt that it ranges from 9 or 10 degrees north of the equator to the Straits of Magellan. The king vulture (S . papa) is another bird of the same genus.

The head of the male condor is furnished with a sort of cartilaginous crest, of an oblong figure, wrinkled and quite slender, resting upon the forehead and hinder part of the beak for about a fourth of its length ; at the base of the bill it is free. The female is destitute of this crest. The skin of the head in the male forms folds behind the eye, which descend to¬ ward the neck and terminate in a flabby, dila¬ table or erectile membrane. The structure of the crest is altogether peculiar, bearing very lit¬ tle resemblance to the cock's comb or the wat¬ tles of a turkey. The auricular orifice is of considerable size, but concealed by folds of the temporal membrane. The eye, which is pecu¬ liarly elongated and farther distant from the beak than the eagle's, is of a purple hue and very brilliant. The neck is uniformly marked by parallel longitudinal wrinkles, though the membrane is not so flabby as that covering the throat, which appear to be caused by the fre¬ quent habit of drawing the neck downward to conceal or warm it within the collar or hood. The collar in both sexes is a fine silken down, forming a white band between the naked part of the neck and beginning of the true feathers and is rather more than two inches broad, not entirely surrounding the neck, but leaving a very narrow naked space in front. The rest of the surface, the back, wings and tail are of a slightly grayish-black, though sometimes they are brilliantly black ; the feathers are triangular and placed over each other tile-wise. Hum¬ boldt never saw male condors with white backs, though descriptions of such have been given by Molina and others. The primaries .are black; the secondaries in both sexes are exteriorly edged with white. The wing-coverts, however, offer the best distinction of the sexes, being grayish-black in the female, while in the male their tips, and even half of the shafts, are white, so that his wings are ornamented with beautiful white spots. The tail is blackish, wedge-shaped, rather short and contains 12 feathers. The feet are very robust and of an ashen blue color marked with white wrinkles. The claws are blackish, very long and but slightly hooked. The four toes are united by an obvious but delicate membrane; the fourth is the smallest and has the most crooked claw. The largest male condor described by Hum¬ boldt was three feet three inches long from the

tip of the beak to the tip of the tail ; height, when perched, with the neck moderately ex¬ tended, two feet eight inches; from the tip of one extended wing to the tip of the other, eight feet nine inches. Humboldt states that he never saw a condor which measured more than nine feet across the wings; but a specimen described by Dr. Shaw measured 14 feet. Notwithstand¬ ing, therefore, what is said by Humboldt of the general correspondence in size of the Alpine lammergeyer and the condor of the Andes, we cannot avoid believing that a full-grown indi¬ vidual of the latter species would be much more than a match in every respect for any Euro¬ pean species. The condor is peculiarly tena¬ cious of life and has been observed, after hav¬ ing been hung for a considerable time by the neck in a noose, to rise and -walk away quickly when taken down for dead, and to receive sev¬ eral pistol bullets in its body without appearing greatly injured. Its plumage defends its body to a considerable degree from the effects of shot. It is easily killed when shot, or struck sufficiently hard, about the head.

A very similar species is the California con¬ dor or vulture, which may be easily distin¬ guished from the true condor, which it nearly equals in size, by the lack of the white neck- ruff and of the caruncle of the male. The Cali¬ fornia vulture formerly ranged on the Pacific coast into British Columbia, but its habitat is said to be shrinking and now reaches only to Monterey on the north. The species may be ap¬ proaching extinction. Like the condor, in addi¬ tion to feeding on carrion, it attacks and kills young or sick animals, particularly lambs and calves. The rough nest of sticks, in which two dirty-white eggs are laid, is built on the ground, rock ledges or stumps. Consult Adams, (The Condor) (Vol. IX, California 1907) ; Beebe, ˆZoological Society Bulletin, No. 3D (New York 1908) ; Darwin, (A Naturalist's Voyage) (London 1860) ; Lucas, (Annual Report of the United States National Museum* (Washington 1891) ; Stejneger, (Riverside Natural History > (Vol. IV, Boston 1885). Lor the California condor see Beebe, (Zoological Society Bulletin, No. 32) (New York 1909) and Finley, (The Condor* (Vols. VIII, IX, X, California 1906,

1907, 1908).

CpNDORCANQUI, kon-dor-kan-ke', Jose Gabriel (<(Tupac Amaru"), Peruvian revolu¬ tionist: b. Tinta 1742; d. Cuzco, 18 May 1781. He is called (

CONDORCET, kon'dor'sa', Marie Jean Antoine Nicolas de Caritat, Marquis de,

French philosopher and mathematician: b. Ribemont, Picardy, 17 Sept. 1743; d. Clamat, 28 March 1794. He was educated by the Jesuits and showed a taste for mathematics at a very early age. Later he studied at the College of Navarre at Paris. At the age of 21 he pre-

stilted to the Academy of Sciences an 'Essai sur le calcul integral.' His 'Memoir stir le probleme des trois points' appeared in 1767. Both works were afterward united under the title of 'Essais d'analyse. ' The merit of this work gained for him in 1769 the distinction of a seat in the Academy of Science. With astonishing facility and versatility Condorcet treated the most difficult problems in mathematics ; but his genius inclined him rather to lay down beauti¬ ful formulas than to pursue them to useful ap¬ plications. He became the friend of D'Alem¬ bert, Turgot and Voltaire, whose opinions in¬ fluenced him greatly. His mind seized upon social problems, which he solved in a manner equally as brilliant as that of his famous con¬ temporaries. In defense of free internal trade in corn, he wrote 'Lettre d'un laboureur de Picardie a M. N.' and 'Reflexions sur le com¬ merce des bles' (1776). Against religious domination he wrote 'Lettre d'un theologien.' He also supported the American Revolution with great enthusiasm. His principal writings on this subject are 'Lettres d'un citoyen des Etats-Unis sur les affaires presentes' (1788) ; 'Lettres dun bourgeois de Newhaven a un citoyen de Virginie' (1787) ; 'Reflexion sur l'esclavage des negres' (1781). D'Alembert persuaded him to contribute to the ' Encyclo¬ pedic, ' to which he responded by his facile and brilliant 'Eloges des academiciens de 1' Acade¬ mic Royale des Sciences morts depuis 1666 jusqu'en 1699' (1773). The ability which he manifested in this work gained for him the life secretaryship of the Academy of Sciences. In 1777 his 'Theory of Comets' gained the prize offered by the Academy of Berlin. The aversion of the minister Maurepas to Condor¬ cet delayed his entrance into the French Acad¬ emy till 1782. In 1785 appeared a distinguished mathematical treatise on the doctrine of prob¬ ability. In the following year he married Sophie de Grouchy, a sister of Marshal Grouchy, a talented and beautiful woman. At about this time Condorcet became inspector-general of the mint, and at his residence at the Hotel des Monnaies, there gathered the "Intellecti" of Paris. His 'Vie de Turgot' and 'Vie de Vol¬ taire' appearing in 1786-87 became popular im¬ mediately. In point of style they are the best of his works.

When the Revolution finally came, Condor- cet's eager and indefatigable pen rushed to the support of the democracy. He was chosen a member of the municipality of Paris (1790) and later a representative for Paris in the Legisla¬ tive Assembly, of which he became a secretary. In this capacity he composed the addresses of that body to foreign powers and developed a strikingly comprehensive scheme of public in¬ struction, which, after the turmoil of political strife had abated, was put into effective opera¬ tion and still remains the basic structure of the French system of education. His program of organization had five steps: (1) pri¬ mary schools; (2) secondary schools

; (3) insti¬ tutes; (4) lycees; (5) the Society of Arts and Sciences. After the flight of Louis XVI, Con¬ dorcet denounced royal authority as an anti-social institution and supported the National Convention. He took his seat in this body for Aisne and directed his first efforts toward the framing of a con¬ stitution, which was rejected. The trial of

Louis XVI by the Convention was offensive to him, since he did not believe that body right in exercising judicial functions. He voted in favor of the removal of Louis and the inflic¬ tion of any punishment except death. His critical and independent attitude toward the new constitution and toward the oppression of the Girondists and the terroristic principles of the party of the Mountain brought down on him the suspicion of the revolutionists. He was declared an outlaw. Refuge was found for him at the home of Madame Vernet, who did all in her power to prevent his escape and surrender to his enemies, even at the peril of her own life. Her words wrere remarkable for their lofty sympathy: "The Convention, Mon¬ sieur, may declare you outside of the law, it cannot place you outside of humanity." While at her house he wrote 'Esquisse d'un tableau historique des progres de l'esprit humain,' by which he is best known. This work is a philo¬ sophical treatise on the history of man, tracing his evolution from a barbaric stage to the age of reason. He conceives that the chief errors in civilization have been brought about by the mismanagement by the clergy and monarchs. He outlines the future of man's progress on three lines: (1) The destruction of inequality between nations; (2) the destruction of inequal¬ ity between classes; and (3) the unlimited im¬ provement of individuals, mentally, morally and physically. Condorcet derives his theories from no spiritual postulates. His appeal is always to reason and to emotion aroused through rea¬ son. He finally quitted the house of Madame Vernet, and was captured in a half-famished condition at Clamat by a member of the revo¬ lutionary tribunal of that town. His captors threw him into prison, pending trial, and on the following morning he was found dead, either from apoplexy, exhaustion or poisoning.

Madame de Condorcet published a transla¬ tion of Adam Smith's 'Theory of Moral Senti¬ ments' ; edited Condorcet's 'Eloges' ; and, with Cabanis, published her husband's complete works (1801-04). Consult Arago, 'Biographic de Condorcet' (prefixed to the edition of 1847— 49) ; Morley, 'Critical Miscellanies' (London 1893) ; Comte, 'Cours de philosophic positive' (Vol. IV) ; Cahen, L., 'Condorcet et la Revo¬ lution franqaise' (Paris 1904) ; Guillois, A., 'La Marquise de Condorcet, sa famille, son salon et ses oeuvres' (Paris 1897).

CONDOTTIERI, kon-dot-tya're, class of mercenary adventurers in the 14th and 15th centuries, who commanded military bands, amounting to armies, on their own account and sold their services for temporary engagements to princes and states. The bands under com¬ mand of the Condottieri were well armed and equipped. Their leaders had in many instances considerable military skill ; but, as they took no interest in national contests, except to receive pecuniary advantages, the wars between them became a sort of bloodless contest, in which the only object of each party was to take as many prisoners as possible for the sake of the ransom. This singular system of warfare was put to an end by the more serious military op¬ erations of the French, who invaded Italy un¬ der Charles VIII. Though many Condottieri acquired much honor as well as emolument, one only attained to high rank and independ¬ ent power; this was Francesco Sforza, origin-

ally a peasant, who in 1451 made himself Duke of Milan and transmitted that sovereignty to his descendants. Consult Semerau, (Die Con- dottieri (Jena 1909) ; Block,*

CONDUCTING TISSUE, in botany, the system of vessels by which water and aliment is brought from one part of a plant to another.

CONDUCTION (from Latin conductio, bringing together). In botany, this is the tech¬ nical name for the process whereby water and food-stuffs are transmitted from the roots of a plant to its trunk or stem and leaves. The paths by which these substances traverse the plant are well known. They enter the thin- walled root-hairs by osmosis, the food-salts being in a state of aqueous solution. From this point up, there is good evidence that the path of the water and the salts dissolved in it lies through the tracheids and the long tubular ves¬ sels of the fibro-vascular bundles, which are situated in the

wood of the roots and stems of the Dicotyledons and Conifers, and form part of the leaf-veins. Only the young wood, how¬ ever, takes part in this upward flow of sap. The motive force in the process has only re¬ cently been understood: the osmotic pressure of the juices of the root unquestionably plays a large part in the matter, but it is alone un¬ able to make the sap rise to the tops of our larger trees. Furthermore, a cut branch with its end dipped in water will still show a flow of sap. Furthermore, if a living twig be di¬ vided under mercury, the wood-vessels will be found to contain some of the mercury on mi¬ croscopical examination. As mercury will not enter a capillary tube of cellulose except under the action of a force, this result indicates that the pressure in the wood-vessels is less than that of the atmosphere. This could not be the case if root pressure were the only agent tend¬ ing to produce the upward flow of sap; there must be accordingly some force producing a suction from above. This force is furnished by the osmotic attraction for water of the leaf- cells, whose contents are concentrated by evap¬ oration and the consumption of their water in the photosynthesis of carbohydrates. This ac¬ tion is propagated from cell to cell until it reaches the vessels of the stem, each cell being, to put it loosely, sucked dry by its thirsty pred¬ ecessor. This suction, producing a pressure in the vessels less than that of the atmosphere, causes the sap to give up part of its dissolved gases. This is probably one of the reasons why the vessels of a plant contain gases, -which are, of course, in a state of rarefaction.

It has been shown that the path of the car¬ bohydrates and other substances generated in the leaves is quite different from that of the water which comes up from the roots with its dissolved salts. For example, a girdled twig will keep green if its end is immersed in water, which shows that wood transmits water, but it will send down roots only from points above the injured region, because the portion of stem beneath the girdle has lost its power of ob¬ taining food-material from the leaves and of growing thereby. The bark, therefore, and more specifically the bast layer of the bark, as it has been shown, is the path of the sap de¬ scending from the leaves. This layer contains

the remarkable sieve-cells — elongated cells placed end to end in long chains, with the plates between adjacent cells in these chains perforated with numerous small holes. The mechanism of the transmission of food-stuffs appears to be diffusion.

In addition to the tracheids, vessels and sieve-tubes, we find another system of tubes in the vascular tissue of plants. This system bears the milky juice or latex of such plants as the rubber-tree, the dandelion and the milk¬ weed. Though there is evidence that the latex exercises a nutritive function, the nature of this is not thoroughly known. Consult Timi- riazeff, C. A., (The Life of the Plant (trans. by A. Cheremetieff, London 1912).*

CONDUCTION OF HEAT. See Heat.

CONDUIT, kon'dit, in a general sense a medium or means of conveying; anything serving as a channel for passage or transmis¬ sion; in architecture, a long narrow passage between two walls or underground, for secret communication between various apartments, of which many are to be found in old buildings ; also a canal of pipes for the conveyance of water, a sort of subterraneous or concealed aqueduct. The construction of conduits re¬ quires science and care. The ancient Romans excelled in them and formed the lower parts, whereon the water ran, with cement of such an excellent quality that it has become as hard as the stone itself which it was employed to join. There are conduits of Roman aqueducts still remaining, of from five to six feet in height and three feet in width. Conduits in modern times are generally pipes of wood, lead, iron, cement, reinforced concrete or pottery for conveying water from the main spring or reservoirs to the different houses and places where it is required.

CONDURANGO, kon-du-rang'gd, or CUNDURANGO, (from the native Peruvian cundur, condor, and ango, vine), the bark of the Marsdenia Condurango or perhaps Macro- scepis, a medium-sized twining plant of Ecua¬ dor and adjacent states. It is somewhat bit¬ ter ; at one time it was much vaunted as a specific in the treatment of cancer.

CONDYLARTHRA, kon-di-lar'thra, a

primitive order of fossil ungulates of the early part of the Tertiary Period, collateral ancestors of the later hoofed animals and connecting them with the primitive clawed animals, especially with the Creodonta. They were mostly of small size, five-toed, omnivorous, with bunodont teeth like those of

the pigs, long tail, small brain and other primitive features. Phenaco- dus, of the Lower Eocene, of the size of a wolC is the largest and best known. Remains of Condylarthra are found chiefly in North America, but also in Europe and in South America. They became extinct in the Middle Eocene.

CONDYLE (Fr. condyle, Lat. condylus, Gr. kondulos, knuckle), kon'dil, in anatomy, a pro¬ tuberance on the end of a bone serving to form an articulation with another bone, and more especially applied to the prominence of the occipital bone for articulation with the spine ; to the distal extremity of both the humerus and femur and to the proximal ar¬ ticular extremity of the lower jawbone of mammals.

CONDYLE, in ancient Greece, a lineal measure one-eighth of a foot.

CONE, Helen Gray, American poet : b. New York city, 8 March 1859. Since 1899 she has been professor of English in the New York Normal College (now Hunter College). She is the author of (Oberon and Puck: verses Grave and Gay> (1885); (Baby Sweet¬ hearts) (1890); (The Ride to the Lady and Other Poems) (1891); 'Soldiers of the Light (1910). She assisted Jeannette L. Gilder in editing (Pen Portraits of Literary Women)*

(1887).

*CONE, Orello, American educator and author: b. Lincleau, N. Y., 16 Nov. 1835; d. 23 June 1905. He was professoi of biblical lan¬ guages and literature in Saint Lawrence Uni¬ versity, N. Y., 1865-80; president of Buchtel College, Ohio, 1880-96; and Richardson pro¬ fessor of biblical theology in Saint Lawrence University, 1900-05. He published Gospel- Criticism and Historical Christianity * (1891) ; (The Gospel and Its Earliest Interpretations) (1893) ; 'Paul, the Man, the Missionary, and the Teacher * (1898) ; edited (Epistles to the Hebrews, Colossians, Ephesians, Philemon, etc.* (1901) ; 'Rich and Poor in the New Tes¬ tament (1902).*

CONE, Spencer Houghton, American clergyman: b. Princeton, N. J., 30 April 1785; d. 28 Aug. 1855. After a varied career as school teacher, actor, journalist and government clerk, he joined the Baptist Church in 1813 and be¬ gan to preach. He was chaplain of the House of Representatives, 1815-16; pastor at Alex¬ andria, Va., for seven years; of the Oliver Streef Church, New York, for 18 years, and of the Broome Street Baptist Church in the same place from 1841 until his death. He was president of the American and Foreign Bible Society, 1837-50, and of the American Bible Union from its formation until he died. For many years he was one of the most popular and influential clergymen of his denomination in the United States. There is a

CONE. (1) In geometry, the solid figure traced out when a right-angled triangle is made to revolve round one of the sides that contain the right angle ; this is more strictly a right cir¬ cular cone. A more comprehensive definition may be given as follows : Let a straight line be held fixed at one point and let any other point of the line be made to describe any closed curve which does not cut itself ; the solid figure traced out is a cone. The moving line is known as a generating line or generator of the cone. When the axis of the cone, that is, the line joining the fixed point to the centre of symmetry of the closed curve, is perpendicu¬ lar to the plane of the base, the cone is right; and when in addition the curve which the sec¬ ond point describes is a circle, the cone is a right circular cone. Cones whose axis are in¬ clined to their bases at any angle other than a right angle are known as oblique cones. If a cone be cut in two by a plane parallel to the base, the lower portion is called a frustum or a truncated cone. The geometry of the cone is important on account of the curves called conic sections, which are obtained by cutting a right circular cone by planes in various directions. The cubic content of a cone is one-third of*

that of a cylinder on the same base and of the same altitude. The cubical content of the cone is therefore found by multiplying the area of the base by the altitude and taking one-third of the product. The area of the slant or curved surface of a right circular cone is ob¬ viously equal to that

of a sector of a circle of radius equal to the slant height, an arc equal to the circumference of the base. It is there¬ fore obtained by multiplying the slant height by the circumference of the base and taking one-half of the product.

(2) In botany, a dry compound fruit, con¬ sisting of many open scales, each with two seeds at the base, as in the conifers ; a strobilus.

(3) In geology, the heap or mountain of ash, cinders and lava piled up around a vol¬ canic vent. Small cones on the flanks of larger ones are called parasitic. The term cone is also applied to the mound of silicious sinter (q.v.) built up around a geyser. See Geysers; Mountains; Volcano; and the section on V ol- canism in the article on Geology.

*CONE-NOSE. A true bug (Conorhinus sanguisugus) of the family Reduviidce , related to the bedbugs and having similar habits in the South ; it is nearly an inch long and black, blotched with red. In 1898 much excitement was occasioned in the North by newspaper ac¬ counts of attacks by "kissing-bugs,** which were two related species, Opisocoetus persona- tus and Melanolestes picipes, the former fre¬ quently found in dirty houses feeding upon cockroaches, bedbugs, etc., and breeding in dusty corners. The bite is painful, but not poisonous.*

CONE-SHELLS, or CONID.®, a family of ctenobratichiate Gastropoda, so called on ac¬ count of their form. All the cones have a similar external outline ; the aperture is long and narrow, the head of the living animal is more or less lengthened, the proboscis elon¬ gated, the foot is splay and abruptly cut off in front, the tentacles are rather widely separate and the eyes are placed on these organs. All of the species are carnivorous. Several hun¬ dred species have been described, about one- fifth of them from tropical American waters. Owing to their beauty and variety the cones are much sought by collectors, who pay ex¬ travagant prices for the rarer forms. The tex¬ tile cone-shells (Conus textilis), brought from Mauritius, a handsome species four or five inches in length, are marked with narrow, an¬ gular lines of dark brown, variegated with dashes of yellow and irregular white spots. They haunt the fissures and holes in rocks and warmer pools in coral reefs. They all take a moderate range of depth, varying from 1 to 40 fathoms.

CONEPATL, or CONEPATE, kone-pat, the name given in Mexico to Conepatus,' the large white-backed skunk of that region. See Skunk.

CONES, Pyrometric, or SEGER CONES,

instruments for measuring heat, consist¬ ing of three-sided pyramids about two and a half inches high and one-half inch base. They are composed of fusible substances and are graded so that they melt, each at its own temperature. The cones were invented by Dr. Hermann Seger, of Berlin, for use in pottery kilns and have since been largely adopted. An earlier method of heat measurement was the

fusible alloys invented by Prinsep. Alloys of silver, gold and platinum were so calibrated that they would, as to melting-point, cover the whole range between the two extremes of fu¬ sion of the metals. Many objections to these were found in practice, notably the expense and liability to loss. The Seger cones per¬ form the same service and are very inexpen¬ sive. The cones range in numbers from 1 to 36 and back from . — 1 to . — 22. In practice two or three cones, approximating the re¬ quired temperature, are set upright in the kiln upon a morsel of soft clay. The softer of them will, as the temperature reaches the proper point, bend over and melt, to be fol¬ lowed in regular order by the successive higher numbers. They can be easily seen through the hole left in the kiln wall for the inspection of trials.

CONESSI-BARK, the bark of Holar- rhena anti-dysenterica, of the family Apocy- nacccc, a plant of India, used as a tonic, a febri¬ fuge and an astringent in diarrhoea. The plant is a shrub with opposite leaves and terminal cymes of flowers.

CONESTOGA, kon-es-toga, or CONES¬ TOGAS, a tribe of Indians belonging to the Iroquois

linguistic stock, and formerly living on the lower course of the Susquehanna and at the head of Chesapeake Bay. At the time of the settlement of Virginia (1607) the Cones¬ toga were at war with the Mohawks, whom they had almost exterminated. Later they be¬ came a source of serious trouble to the white settlers. With the Dutch and Swedes they were more friendly than with the English. By 1675 the tribe was holding land on the eastern bank of the Potomac River in Maryland. Giv¬ ing way before the Iroquois they retreated southward, committing depredations upon the white settlements. Some of the refugees of the tribe escaped to North Carolina; others after submission to the Iroquois returned to the Susquehanna. In 1701 the Conestoga made a treaty with William Penn.

CONEY, CONY (Lat. cuniculus ; M. E. cony, cunig, rabbit). The word is believed to be of Hispanic origin and to have been bor¬ rowed into Latin. The name was formerly given in England to the rabbit. In the western United States, the name is applied to a distant relative, the pika (q.v.), although this creature has little resemblance to the rabbit. The term as found in Scripture is a translation of the Hebrew shaphen, the local name for the Syrian species of hyrax, or daman. The word Coney enters into a number of family and local names, as for example, Cunningham (Conyngham), Coney, Coningsby, Conington and Conythorp. The fur of conies or rabbits once much used in England, was called cony. The word also has the signification of a simpleton, dupe, gull. In the 17th century in England the den of thieves, cheats and swindlers was known as their war¬ ren, and their victims as conies, which, in this case, has the sense of young, inexperienced rabbits. This is the origin of the term simple¬ ton as attached to the rabbit. See Hyrax.

CONEY ISLAND, New York city, small island in the borough of Brooklyn, about 10 miles southeast of the borough of Manhattan. It is about five miles in length and from half to three-quarters of a mile in width; separated

from the mainland by Coney Island Creek, a narrow tidal inlet, Gravesend Bay and Shecps- head Bay. It is connected with the boroiighs of Manhattan and Brooklyn by steam and elec¬ tric railroads and steamboat lines. It is a noted day summer resort and has numerous bathing houses, hotels, concert and other amuse¬ ment halls, carousels, pavilions, electric lights and a fine cycle path connecting it with Pros¬ pect Park, Brooklyn. Coney Island is divided into four sections : Sea Gate, the home sta¬ tion of the Atlantic Yacht Club; West Brigh¬ ton; Brighton Beach and Manhattan Beach. There is a lighthouse at Sea Gate and many summer cottages, besides the Atlantic Yacht Club House. Sea Beach is the site of several charitable sanatoria and is a popular pleasure resort. Brighton and Manhattan have exten¬ sive hotels and are the preferred resorts for the wealthier class. There is a splendid thea¬ tre at Brighton Beach and also the Brighton Beach race-track. Coney Island was one of the first landing-places of the Dutch, and for over 200 years was considered a worthless waste. In 1840 steamboats began making ex¬ cursions there and for 25 years it was a popu¬ lar resort. In 1875 steam railroads were built and since then the island has been the most popular resort in the immediate neighborhood of New York. In 1903 the city opened a small public park on the island; and again in 1911.

CONFARREATIO, kon-far-e-a'tyo, the most solemn of the three ceremonies of mar¬ riage used among the ancient Romans. The other forms of marriage were coemptio and usns. These last are the only ones mentioned by Cicero, which shows that confarreatiorr had fallen into disuse before his time. The cere¬ mony was performed by the pontifex maxi- mus, or flamen dialis. A formula was pro¬ nounced in the presence of 10 witnesses, and the man and woman partook of cake of salted wheaten bread; part of which only they ate, the rest being thrown upon the sacrifice, which was a sheep. The cake was called far , or panis farreus, hence the term "confarreatio.® By this form the woman was said to come into the possession of her husband by the sacred laws, and became a partner of all his substance and sacred rites, those of the penates as well as the lares. If the husband died intestate and with¬ out children, the wife inherited the whole prop¬ erty like a daughter; if therq were children, she received with them an equal share. The offspring of this form of marriage were called patrimi or matrimi; and from them were chosen priests and priestesses, especially the flamen dialis and vestal virgins. In the reign of Tiberius, he wished for a priest of this pure lineage, but the ceremony had fallen into disuse, so that three patricians thus qualified could not be found. Confarreatio could only be dissolved by a form of divorce equally sol¬ emn, called disfarreatio. The custom of bride cake is a relic of confarreatio; until within 200 years it was made of wheat or barley, without fruit.

CONFECTIONERY (Lat. conficere, (

name which suggests etymologically conserved fruits or seeds; in England “boiled sweets® is the usual term, derived from the commonest method of preparation. Historically the earli¬ est use of confectionery was to disguise the taste of unpleasant medicines, a method dat¬ ing back to the primitive smearing with honey the rim of a cup holding a bitter draught, a practice common with Greek and Roman doc¬ tors. The medicinal use was long the com¬ monest, fruit conserves being the first excep¬ tion. In Italy, even in the Middle Ages, con – fetti were used in the mock battles of the car¬ nival maskers. The true development of the manufacture of confectionery began in the 19th century, and in England, where the trade spread after the great exhibition of English dealers at the Exposition of 1851, to Germany and France. The latter country took the lead in the manufacture of elaborate bonbons and confitures and was especially superior in its chocolate candies. But the greatest growth of the business and especially the greatest in¬ crease in the variety of confections has been in the United States. The custom of making “confectionery® without the use of sugar was common in Mexico at the time of the Con¬ quest. Different kinds of fruits were dried, mixed and compounded so as to make sweet¬ meats. The Indians soon learned the value of sugar in sweetening and preservation of these compounds ; and “confectionery® in the mod¬ ern sense was used in Mexico and Central America before it appeared in Europe where it was probably brought through the medium of Spain.

CONFECTIONERY TRADE. It is

doubtful if there is any modern industry that has experienced more radical changes during the past hundred years than the trade of confectionery-making. Prior to the year 1851, the manufacture of “boiled sweets,® as candy was then called, was so largely an English specialty that the manufac¬ turers of Great Britain might be said to have had almost entire control of the industry. In fact, it was not until the time of the great in¬ ternational exposition at London that the con¬ fectioners of other countries began to realize just how much their British brethren had achieved, but their unique display of candies and sweetments gave such an impetus to the trade that the effect was felt in every part of the civilized world. Germany imitated all its choicest products; France excelled, especially in the making of chocolate bonbons, and the candy-makers of the United States returned from the “big show® with ideas that soon made the importation of English sweets unnecessary.

In spite of the fact that England had long been the great candy-making country of the world, however, there had been confectioners in the United States long before the opening of the London exposition, and there are ample records in proof of the fact that they, too, had produced original creations that other nations were glad to copy. As early as 1816 there were no less than 20 confectioners in the city of Philadelphia, all of whom were engaged in the manufacture and sale of candies. Among these pioneers in the confectionery business one may record the names of Sebastian Henrion, who was succeeded by the firm of Henrion & (T.ativenu, in 1844. and Sebastian Chauveau,

the first candy-maker to manufacture gum-drops, jujube paste and marshmallows in the United States. Another prominent manufacturer of the old time was Paul Lalas, who, in 1831, changed his business from that of candy-mak¬ ing to that of sugar- refining, while the list of Philadelphia confectionery-makers includes the names of George Miller, William N. Herring, S. S. Rennels and J. J. Richardson. Among the many old-time confectioners in the city of New York were Ridley & Company, a firm that was established as early as 1806; R. L. Stuart, James Thompson, John Stryker and Delmonico Brothers. In Boston, as early as 1816, Arnold Copenhagen, Lawrence Nichols and William Fenno were prominently identi¬ fied with the candy industry, while Joseph Bouvey, Augustus M. Price and John L. Bridges were among the leading manufactur¬ ers and dealers in confectionery in Baltimore. Throughout the United States there were some other cities that could boast of candy-makers, but the records of those days are so meagre that but few of the names can be recalled.

In the beginning, of course, the art of candy manufacture was in a very crude state. Prior to 1845, it was almost invariably the rule that the manufacturers themselves sold at re¬ tail practically all the candy that they manu¬ factured. As a rule this stock in trade was confined to such ordinary

products as the old- fashioned stick candy, sugar plums and the ordinary molasses candy. Finer goods, or candies in fancy shapes, were almost exclusively imported and were sold at a much higher price than the crude candies of home manufacture. About 1825 the foreign manufacturers began to use a little machinery in their factories, but the actual introduction of machinery in the making of confectionery dates from about 1840. The first machine of this character to be brought to the United States was imported by Sebastian Chauveau of Philadelphia, in 1845. This was a revolving steam-pan. In 1846 Oli¬ ver R. Chase, who, with his brother, formed the firm of Chase & Company, invented a ma¬ chine for the making of lozenges. For some years this firm had been engaged in making this once popular confection as a specialty, and it was to meet the constantly increasing de¬ mand for their product that this new invention was conceived and constructed to their model. In 1866, a further innovation in the lozenges manufacture was produced by Daniel G. Chase. This was a machine for printing on candies, and it was to this invention that the well-re¬ membered conversation lozenges owed its ex¬ istence.

Since that day the history of the confec¬ tionery trade has been a constant record of de¬ velopment. Year by year new improvements have been made and new and more perfect ma¬ chinery has been invented, all of which have quickly been adapted to the manufacture of the various kinds of goods that the constantly widening demands of the business have re¬ quired. While the actual manufacture of candy has extended until it has become one of the nation's greatest industries, it has created around it a number of dependent industries, each of which now represents a special busi¬ ness of no slight importance. Thus, for ex¬ ample, the making of confectioner's machin¬ ery is now a separate industry in which a

great amount of capital is invested, and the business of confectioner's supplies represents an annual product that is by no means to be despised.

There are other factors that have played an important part in this extension of the con¬ fectionery industry. The low prices of sugar and the other materials used in the making of confectionery have exerted an influence, the ef¬ fect of which cannot be disregarded, while the introduction oi new and improved machinery in all our candy factories has a tendency to reduce the cost of manufacture to such a de¬ gree that the American producers have been able to make the best goods at a cost so low as to bring them within the reach of all.

Much of the credit for this satisfactory con¬ dition of affairs is due to the labors of the mem¬ bers of the National Confectioners' Association of the United States. This organization, founded in 1884, which includes in its membership all the leading candy manufacturers of the country, has for its declared purpose, (

Since this association has been in existence the results of its work have been clearly mani¬ fested in the securing of necessary legislation in the several States by means of which the manufacture or sale of all candies containing harmful ingredients or poisonous coloring mat¬ ters has now been prohibited by law ; by ef¬ fectually stamping out all attempts at adultera¬ tion which were once so common among the makers of the cheaper grades of goods, and by the establishment in the mind of the consumer of a degree of confidence in the purity of the American product that is a strong argument for the purchase of such goods. As the result of this happy combination of circumstances we have the great American confectionery indus¬ try of to-day.

Candies may be divided roughly into hard and soft grades. The hard candy is made of sugar, glucose, flavoring and coloring, with sometimes additions of nuts, etc. Starch is a leading constituent of soft candies. The hard candies were the first to be made by machine, but gradually mechanism has been developed for making soft and fancy candies largely by machinery, and makers of high-priced, hand¬ made candies are kept busy devising new con¬ coctions to keep ahead of the machine prod¬ uct. Cane-ground sugar is almost wholly em¬ ployed, and for hard candy the proportion is usually 85 per cent sugar to 15 per cent glu¬ cose. Glucose being a pure product of Indian corn adds to the nutritive value of candy. The hard candy ingredients are mixed in copper kettles and cooked, more heat being required in summer than in winter to ensure a hard candy. When cooked it is

poured on a slab and cold water run on. Marble is now seldom used for slabs, steel proving more satisfactory. The product is then kneaded and pulled on a hook until white. It is pulled by hand, the candy-maker wearing buckskin gloves ; or it may be pulled by an ingenious machine with continuous cranks that imitate the motions of

hand-pulling. When it is pulled white, it is cut into sticks, slabs or rolled into balls or other forms.

In a large candy factory the sugar, glucose, starch and other materials go to the top floor, where all operations are begun. Here are the steam- jacketed cooking kettles. If starch goods are being made, the cooking kettle used is directly over the "depositorˆ machine on the floor below, so that the mixture may go down by gravity. If hard candy is being made, the first kettle is right over the continuous cooker. If it is cream candy, the kettle is positioned to discharge to a cooler; when cooled the cream goes to a beater and is distributed in trucks. The centres or soft interiors go to a coating-machine, styled an "enrober,® which supplies the familiar chocolate coating, and then to the coolers and packers. Traveling platforms are employed where gravity is not available. In the modern candy factory the formulas used are exact, everything is measured and weighed and no guesswork permitted, hence spoiled batches are rare.

Very numerous machines have been devel¬ oped for performing the different processes and producing the desired varieties of confection¬ ery. The number of machines required for a varied product was so great that an equipment became burdensome to the manufacturer. Therefore in recent years the machine manu¬ facturers have bent their energies to reduce the number of machines required in a candy fac¬ tory, and to simplify the processes, as well as to eliminate hand labor. One of the most in¬ teresting of these machines is the Mogul, which is really a combination of machines grouped in one. It takes a pile of starch trays, filled with candy and starch, hardened to the de¬ sired degree, picks the bottom tray from under a pile, carries, it to a screen and turns it upside down, delivering the contents to the screen, re¬ stores the tray to position, passes it under a cascade of starch, levels off the starch and brushes it up neatly, prints all the starch molds in a tray at one operation and adds the exact amount of candy desired, then delivers the tray to a truck to go to the drying-room. Sur¬ plus candy dosed with starch is automatically cleaned by the machine for reuse.

The work of this Mogul machine is done in some factories by three machines, the Simplex starch buck, which cleans molded candy, re¬ fills and levels the trays ; the Springfield printer, which prints the molds in the leveled trays of starch; the Springfield depositor, which deposits candy into molds. The enrobing machine, which chocolate-coats centres, is often provided with an attachment for making extra heavy bottoms, as for chocolate drops. The enrober has an ingenious decorating at¬ tachment. The centre candy is rotated under a fine stream of colored chocolate or other tint¬ ed liquid and may thus be decorated with an endless variety of patterns. An enrober will dip 6,000 cream bars in a day.

The old-fashioned vacuum pan is disap¬ pearing from candy factories and the continu¬ ous cooker taking its place ; it uses more glu¬ cose and less sugar and gives a glossy product. The disc reducer and disc refiner for choco¬ lates displace a whole line of old machinery. The reducer grinds the chocolate, mixes in th? granulated sugar, butter, etc., and the mixture

is pumped as a fluid to a revolving disc oper¬ ating between two stationary corrugated discs, where the mixture is refined in a few seconds. The candy-maker also uses gooseberry or ball machines for round candies; specially designed packing tables, wrapping machines for doing up the candies in dainty individual wrappers, syrup coolers, cream beaters and a variety of minor conveniences.

Statistics. — Few industries have grown as rapidly and extensively as the confectionery industry of the United States. In the 30 years from 1880 to 1910, the number of employees and the gross production increased nearly six times. The capital invested has risen from $8,486,000 in 1880 to $97,467,000 in 1914. In 1900 there were more candy factories (2,921) than in 1914 (2,317), but the total 1900 production of confections was valued at only $55,997,000, as against $170,645,000 in 1914, a gain of over 200 per cent. In 1914 there were 65,791 persons employed in the industry,

receiving annually $33,813,000, of which the 53,658 factory opera¬ tives got $21,472,000, and the clerks and salaried men $12,341,000. This was over three times the wages paid in 1900. The value of the ma¬ terials used rose from $35,354,000 in 1900 to $101,015,000 in 1914; and the factory produc¬ tion from $60,643,000 to $170,845,000. But to this latter figure must be added upward of $5,- 000,000 production of confectionery made in bakeries and other establishments, leaving the total of 1914 as a round $175,000,000. In 1916 the figure was estimated to be $200,000,000. These totals are somewhat misleading, how¬ ever, for the true measure of an industry is not its gross production, but the value created above the cost of the materials used. This latter according to the special census of 1914 was $69,830,000 in the factories and about $3,- 000,000 in the other manufacture, leaving $73,- 000,000 as the actual measure of the industry in America, above the cost of materials used. These figures include the establishments mak¬ ing chewing gum which is classified by the United States Census Bureau as a branch of the confectionery industry. (See Chewing Gum). New York is the leading State in con¬ fectionery, having 18 per cent of the produc¬ tion ; Pennsjdvania and Massachusetts each have nearly 12 per cent, Illinois 8, Ohio 5 and Missouri and Wisconsin each 4 per cent.

The chocolate and cocoa industry lives mainly on supplying the confectionery trade with materials, producing $22,390,000 of goods in 1910. Probably $13,000,000 of this went into candies. The most costly ingredient is of course the sugar, bought from the refineries, and the next the glucose, purchased of corn products manufacturers. For further detail of the confectionery industry consult Grilten, (Modern Practical Gum Work Manual) (1911); Friedman, (Common Sense Candy Teacher) (1912); and the files of the Candy News.

CONFEDERACY, Daughters of the. See

United Daughters of the Confederacy.

CONFEDERATE STATES OF AMER¬ ICA. The name adopted by the Southern States which seceded from the Union and formed a government at Montgomery, Ala.,. 9 Feb. 1861, comprising South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana, with Jefferson Davis of Mississippi President,

and Alexander H. Stephens of Georgia Vice- President. Texas, Arkansas, Tennessee, North Carolina and Virginia afterward joined, and Missouri and Kentucky became disputed terri¬ tory, the Federal Congress and the Confederate each receiving and welcoming delegations claim¬ ing to represent those States.

The act of secession was passed by each State in full confidence that the legal right peaceably to secede was assured by the Con¬ stitution. And if the interpretation of any ambiguous provisions or expressions in any contract is to be governed by the joint intent of the parties at the time of making it, this right to secede must be conceded by all impar¬ tial historians.

Goldwin Smith, the English historian, has written : <(Few who have looked into the his¬ tory can doubt that the Union originally was, and was generally taken by the parties to it to be, a compact, dissoluble, perhaps most of them would have said, at pleasure ; certainly on breach of the articles of union.®

Henry Cabot Lodge of Massachusetts has written : ((It is safe to say that there was not a man in the country, from Washington and Ham¬ ilton on the one side, to George Clinton and George Mason on the other, who regarded the new system as anything but an experiment en¬ tered upon by the States, and from which each and every State had the right peaceably to with¬ draw, a right which was very likely to be exer¬ cised.®

In 1803, at the purchase from France of the Louisiana territory, and again in 1812, at the declaration of war with Great Britain, influen¬ tial and leading public men in New England not only asserted the right of secession, but urged its exercise, in the celebrated Hartford Convention (q.v.) in 1814-15.

Nowhere, however, until 1860, was the issue actually made. Had it been made in the earlier days, it would doubtless have been accomplished peacefully. But in all human affairs, political, social, moral or commercial, there are silently but forever at work forces which make for the survival of the fittest,

and the passing away of the unfit ; and these forces, when at last a crisis has been reached, declare themselves, and operate with a volcanic power, against which the barriers of no constitution can prevail.

Within the lifetime of a generation the moral sense of a majority of the civilized world had grown to condemn the institution of slav¬ ery ; and the invention of steam-power, rail¬ roads and telegraphs had begun to knit com¬ munities into nations, to their great commercial advantage. The prejudices against slavery gave rise to issues between the sections of the country, which became inflamed by events — such as the raid of John Brown— until certain States were wrought up to the point of seced- ing.

But now — born, not legitimately of the Constitution, nor of consent between the States (which could never have generated anything more cohesive than a rope of sand), but of in¬ exorable laws of nature — there stood a giant in the path. Perhaps, indeed, it was of origin unsanctioned by legal form. But it was born of proximity and geographical dependency, and it was nourished by the prosperous tide of commerce already beginning to transform the entire world. It already felt itself the natural

heir to the vast and rich territory within its grasp. There it stood in the way of peaceable secession • — a young nation, which denied the right of secession and stigmatized it as rebel¬ lion.

In vain did President Davis plead his con¬ stitutional rights, in a message to his Congress : (

It needed now but a first blow to precipitate a war to the death. Concerning first blows, Richard Cobden once said: ((From the moment the first shot is fired, or the first blow is struck, in a dispute, then farewell to all reason and argument : you might as well attempt to reason with mad dogs as with men when they have begun to spill each other's blood in mortal com¬ bat.®

The first blow came speedily, but by delib¬ erate intent of neither party. In Charleston a status quo had been agreed upon by both sides, to permit negotiations. On 25 Dec. 1860, Maj. Robert Anderson seized Fort Sumter. He did so by night, without orders, and contrary to his instructions, abandoning Fort Moultrie and dis¬ abling its guns. President Buchanan was about to order him to return to Fort Moultrie; but before the order could be issued the act was approved so enthusiastically by Northern poli¬ ticians that he did not dare to reverse it. Hold¬ ing Fort Sumter, he was then constrained to dispatch an armed force to provision and sup¬ ply it. Thus the Civil War was begun, the Confederates not waiting for the arrival of the armed force, but making their attack.

This breaking out of hostilities brought into the Confederacy the Border States, not so vitally interested in the subject of slavery, but with every tradition and instinct keenly alert to their legal rights under the original Consti¬ tution.

This was the real issue of the War, and not slavery, as is often loosely asserted. It is attested, not only by the titles ((Union® and <(Rebel,® universally applied to the two armies by the North, but by the passionate claim of the Confederates that their struggle was for that liberty of self-government so dear for ages to the Anglo-Saxon race. And at the Fort Mon¬ roe conference in February 1865 between Presi¬ dent Lincoln and Vice-President Stephens, the South's surrender of her claim to integrity of the Union was the one point upon which Lin¬ coln insisted, and the one which Stephens could not yield, although utter destruction awaited him scarcely 60 days off. It is further shown in the desperate character of the struggle upon both sides, involving, with equal ardor, indi¬ viduals and communities of most diverse de¬ grees of interest in the question of slavery.

The combatants were very unequally matched, and as each side was in deadly earnest, the final outcome of the contest was inevitable from its beginning. On the Union side was a population of over 20,000,000, with an army, a navy, a treasury, a highly developed system of transportation by land and sea, as well as of

manufactures, of commerce and of credit. On the Confederate side was a much scattered pop¬

ulation, almost entirely agricultural, of from 8,000,000 to 10,000,000, comparatively destitute of all those elements of military strength. Even their agriculture was so little devoted to food products that actual starvation of men and horses in their armies finally hastened the in¬ evitable end.

In this population there were included about 4,000,000 slaves. It was believed by many at the North that if their freedom was proclaimed by President Lincoln, as a war measure, while their masters were absent in the field, they would rise in insurrection, or at least desert their labor in mass. The experiment, however, being tried, proved a failure. The slaves gen¬ erally remained faithful everywhere, except in the sections overrun by the enemy. During the four years of the war there were actually mus¬ tered into the Union army 2,898,304 men. The Confederate numbers cannot be accurately known, but the total white male population be¬ tween the ages of 18 and 45 was, by the census of 1860, 984,475. In 1864 the ages of military service were extended to include all between 17 and 50, an ' act which was described by General Grant as ((robbing the cradle and the grave.® Nearly 2,000 battles and skirmishes were fought, and in them the number of killed and wounded on the Union side is officially given as 389,345. The numbers on the Confed¬ erate side are not accurately known, no com¬ plete records existing, but they are estimated at about 300,000.

Of lives lost in the war from battle, wounds and disease, the official records of the Union army report 316,516. The lives lost in the Con¬ federate army could not have been less than

250,000.

The Confederates appreciated the odds against them, but with firm conviction of the righteousness of their cause they trusted to be able by fortitude and endurance to wear out and discourage their adversaries. The fighting was often very desperate as shown by the casualties upon both sides, which frequently exceeded the casualties of the severest battles of Europe. Upon three occasions, some historians have imagined, the Confederates were within reach of very important results.

At Bull Run, the first battle of the war, the Federals were completely routed and Washington might have been captured, it is supposed, had the victory been followed up. Gettysburg is considered by many to have been the crisis of the war, a desperate attack by the Confederates being repulsed. But there is strong evidence that the greatest period of discouragement on the Union side followed the battle of Cold Harbor, 3 June 1864. It was, however, of brief duration and of no effect. Successes elsewhere soon followed and made it apparent that the Confederate resources were approaching exhaustion.

There are notable parallels between the war for the Union and the war between Great Britain and the Boers, in the issues involved and in the course of their events. Like the Confederates, the whole of the Boer population considered themselves fighting for personal lib¬ erty as against subjection to a foreign power. Like the Confederates, the Boers fought prac¬ tically without pay; and although they were

inferior in numbers their important engagements were generally victories; or, if not victories, were drawn battles. And as the end came to the Confederates, so it came to the Boers only with their utter exhaustion — through their being worn out, rather than defeated in battle.

But a great contrast is to be found in the treatment of the two peoples after their defeat. That of the Boer was liberal and generous, fully in accord with the civilization of the day. To parallel the treatment of the South every effort must have been made to put the political control of the country into the hands of the Kaffirs. Of course the efforts to give the negro political control over the Anglo-Saxon at the South were foredoomed to failure. They pro¬ longed ill-feeling for 10 years ; but subsequent events, notably the Spanish War, at last inaugu¬ rated a new era in .which few traces of it yet linger. And it is due to history to record that it is unlikely that any such effort would ever have been made, but for the assassination of Lincoln. Although for this unspeakable crime and folly the South was in no way responsible, it brought upon her a whirlwind of resentment and at the same time it removed a President who, there is evidence to show, had already risen to the height of his great opportunity as a statesman, and was now planning terms of liberality upon which to

reconstruct the Southern States.

Within the few days that intervened between the surrender at Appomattox and the assassina¬ tion of Lincoln, one in his close confidence prophesied that his plans of reconstruction would ((win over the South's good will and affection, and astonish the world." And in giv¬ ing his plans effect, no one can doubt that he would have had the cordial as well as powerful aid of General Grant, who had already set the example of magnanimity, and won the gratitude of Lee's army by the generosity of his terms of surrender.

History records no crime greater than that of the assassin, who cheated the civilization and humanity of the world of the great example which Lincoln would have set _ to all nations, and who sowed bitterness and ill-will between the sections, bringing poverty and distress to the South, to the North the mortifying failure of its political experiment and to the negro only an injury. But in connection with the negro question, as it confronts us to-day, it may be remarked that the problem of the races can be safely committed to time and to the racial instincts implanted by the Creator.

The Constitution which was adopted by the six States in Montgomery, February 1861, and in turn accepted by the others, was modeled closely after that of the United States. It for¬ bade the slave-trade, or the importation of slaves from any foreign country other than the slaveholding States and Territories of the United States. It forbade "bounties" or "trusts" and provided a "tariff for revenue." It allowed the President to veto any part of a bill and approve the remainder, giving his rea¬ sons for such action ; and fixed his term of office at six years and made him ineligible for a second term.

The internal history of the Confederate States during the Civil War furnished a most instructive lesson as to the weakness of the bond by which they had associated themselves.

Already, before the close of the war, it had proved itself but little better than the federa¬ tion of the colonies for the Revolutionary War. The last message of President Davis to the Confederate Congress, and the answering re¬ port upon the message by a committee of the Senate, contained much crimination and re¬ crimination, and revealed an utter loss of con¬ fidence between the executive and the legislative branches, fatally paralyzing all action, and im¬ possible to be healed. In a letter to the Secre¬ tary of War, on 5 March 1865, Judge John A. Campbell, assistant secretary, wrote : "The po¬ litical condition is not more favorable. Georgia is in a state that may properly be called insur¬ rectionary against the Confederate authorities. Her public men of greatest influence have cast reproach upon the laws of the Confederacy and the Confederate authorities, and have made the execution of the laws nearly impossible." In several of the other States there were also very serious issues between State and Confederate authorities.

In view of these facts, and of the history of all confederations of many small countries, it may now be clearly seen that the prize for which the South contended so strenuously would have proved but a calamity had she won it. There would have been in the country a condition of unstable equilibrium, with many centres of disturbance, which would surely have involved further division and probably further wars. To-day her people are citizens of a na¬ tion second to none in military renown or com¬ mercial strength, or in its power and influence for peace and civilization among the peoples of the earth. Were the right peaceably to secede, for which the South cheerfully endured all the bitterness of war, now tendered her as a free gift, every State would unanimously reject it as a curse.

Few generations of modern times have con¬ fronted sterner problems than did the men of the South in 1861. In the natural world, when¬ ever the climate has changed, the fauna and flora have had to change to conform to new conditions. This is the law of evolution, the one great truth of which mankind may feel assured "Eternal Justice" will alone prevail through "Conformation to Environment." And the natural resistance to change by all interests in possession makes evolution mean war to the death of the least fit and the survival of the fittest.

Had the South been quick to apprehend these truths, then being first published to the world by Darwin, she might have accepted compensation for her property in slaves and surrendered her constitutional right to secede. Had she done so, over 500,000 lives and $10,000,000,000 of property would have been saved.

But the Anglo-Saxon is not a ready barterer of what he deems his "rights." Nor would any nation thus founded upon "consent" have com¬ manded confidence, or even inspired the national pride and

loyalty which form the greatest treas¬ ures of a people. The conflict, with all its death and destruction, its sorrows and its suf¬ ferings, was but the necessary baptism of this nation, legitimating its disputed birth by a ver¬ dict in the great high court of war, rendered in accordance with the laws of evolution, beyond which there is no appeal.

But while the generation which so lavishly poured forth blood and treasure may rightfully cherish to the last an ardent affection for its (

And in its influence upon national character, and upon the standing of this nation among other nations, it is no small matter to have made the record for valor and devotion to principle which the South has set ; or to have produced such leaders and types as Lee and Tackson and their colleagues.

Briefly it may be said that the rise and fall of the Confederate States of America consti¬ tute the most important feature of modern his¬ tory, marking the sudden birth of a great nation. Such a nation could never have been founded in peaceful debate. The world may eventually reach a stage of development where such an event may be possible, but it had not done so in 1860. Previous to that date there was no assurance of stability to the nation. Since 1865 no convulsion could shake it. Suc¬ ceeding years only demonstrate to the inhabit¬ ants of every section the increasing advantages of living in an undivided and an indivisible country. See United States — The Confed¬ eracy.

Bibliography. — Important works present¬ ing the Southern viewpoint are Davis, Jefferson, (Rise and Fall of the Confederate Government5 (2 vols., New York 1881) ; Pollard, A. E.,-

Edward Porter Alexander.

CONFEDERATE STATES OF AMER¬ ICA, Recognition of the. The failure of the Confederate government to secure recognition was not due to lack of confident or persevering effort or deficiency in number of agents sent abroad. Unsuccessful in its effort to negotiate a peaceful separation by a commission sent to Washington, and failing in a plan to form an alliance with Mexico, it continued to press for recognition at the 'chief courts of western Eu¬ rope. At the beginning its hope of success was largely based upon the dependence of Europe on the supply of Southern cotton and no seri¬ ous consideration was given to the possibility of a blockade such as that which became the determining factor in preventing independence.

It continued to expect that the need of cotton would force recognition or intervention by Eng¬ land and France or by France and Spain, whose West Indian possessions she offered to guar¬ antee in return for alliance. These hopes were temporarily raised by the Trent affair, by the earlier policy of the British government in failing to prevent the escape of Confederate cruisers built in English ports, by Lee's invasion of the North preceding the battle of Gettys¬ burg, and by the later complications of France in Mexico which encouraged Napoleon to favor a counterpoise to the growing strength of the United States. They declined with the progress of events, but were revived by the prospects of an Anglo-American or a Franco- American war and by attempts to impress Eng¬ land and France with the belief that the United States was planning aggression against neigh¬ boring possessions or that the restoration of the Union would result in an aggressive war against England and France and finally feeling that European public opinion was opposed to slavery the Confederacy in its last death struggle offered emancipation for recognition and inter¬ vention.

Attempts to secure recognition of independ¬ ence failed because of conditions over which the Confederate government had no control and could not fully appreciate.- Recognition was prevented largely by the diplomacy of Seward, the proclamation of emancipation, the increas¬ ing success of Federal military operations, and the obstinate persistency of the Federal gov¬ ernment in avoiding any official communication which might be interpreted as a recognition of the existence of even a de facto Confederate government. To this may be added the friendly attitude of the Russian government and the hesitation of the English government to join France in a policy which would have been resented by the American government as ex¬ cessively unfriendly. Although during the war, the United States government, usually through military officers, from necessity communicated informally and unofficially with the agents of the Confederate authorities in regard to such questions as

exchange of prisoners and terms of surrender, it persistently avoided any formal act which could have been interpreted as a recognition of the Confederate government. This is illustrated by the character of the Hampton Roads Conference. The Federal courts have always held that the Confederate States were ((an unlawful assemblage without corporate power55 and that the government of each separate indestructible State when it chose to act as a part of the Confederate States did not exist either de jure or de facto. The British proclamation of neutrality of 13 May 1861 (followed by similar declarations by France, Spain and other powers), which recog¬ nized the belligerent rights of the Confederacy on the ground that it was justified by the declaration of an effective blockade of the insurgent ports by the de jure government at Washington at the beginning of the war, was strenuously but unsuccessfully opposed by Seward who affirmed that the neutrality procla¬ mation of the European powers would be liable to be construed as a recognition of independ¬ ence and really created the belligerency of the Confederacy which had not exhibited a single privateer upon the ocean nor shown capacity

to maintain any kind of warfare except in its own harbor. This concession of belligerency was not withdrawn by England and France until June 1865 although Seward took steps early in 1862 to secure its revocation or re¬ vision. Charles Francis Adams took some con¬ solation in observing that Great Britain by this act had released the United States from liability for the misdeeds of the Confederates toward her. The United States courts have repeatedly decided that a state of civil war, which entitled the Confederacy to recognition as a belligerent, did not exist until President Lincoln issued his proclamation of 16 Aug. 1861 (based on the act of Congress of 13 July).

In the face of reported danger of European recognition of Confederate independence Seward urging that the likelihood of success was the only ground for recognition frequently issued instructions or circulars defining the American position against such action or against any form of European mediation or intervention. Seward early notified England and other powers that the recognition of the ((so-called Confederate States0 would be re¬ garded in the United States as intervention and war to create a hostile state within the national boundaries — and that it would result in the immediate suspension of diplomatic relations and would be resented on the principle of self-preservation. He objected to the reception of Confederate commissioners by other nations or the consideration of any proposals which might seem to recognize the Confederate States in any way except as a part of the United States. Although he continued to insist that the informal reception of Confederate emis¬ saries by officials of foreign governments was improper and unfriendly to the United States and consistently governed his own conduct ac¬ cordingly in cases of unofficial missions from other countries, he left untried the policy of retaliatory non-intercourse which he early pro¬ posed in his instructions to Adams. In the summer of 1861 he revoked the exequatur of a British consul at Charleston who with the authority of his government had conducted negotiations with the Richmond authorities in regard to the rights of neutrals ; and he could not grant the right claimed to communicate with a de facto government such as the central authority at Richmond or the governors of separate States to provide for temporary secu¬ rity of persons or property of British subjects or to claim redress and reparation although Earl Russell declared that such communications did not imply any acknowledgment of the Confederacy as an independent state. With the knowledge that France and England, acting in concert on questions relating to the American Civil War, might try by combined pressure to prevent the United States from regulating its own internal affairs, he announced that he could not recognize any combination or understand¬ ing of the powers, and insisted upon dealing with each government separately. He also de¬ clined Napoleon's offer of mediation, the officiousness of which was rebuked by Congress. Seward's efforts to prevent recognition were greatly aided by the Russian government which refused the invitation of the French emperor in the autumn of 1862 to co-operate on some plan of intervention to stop the Civil War, and later sent its fleet to American waters to show

friendship for the American Union just after the crisis of the middle of 1863 during which Napoleon, before the arrival of the news of Gettysburg and Vicksburg, had hoped to push the careful government of England into a policy of joint recognition and intervention.

Bibliography. — Adams, C. F., (C. F.

Adams } (1900) ; Adams, C. F., (Lee at Appo¬ mattox and Other Papers (1903) ; Bancroft, F.,*

CW. H. Seward (1900); Bigelow, John, (France and the Confederate Navy* (1888) ; Bigelow, John, Retrospections of an Active Life* (1909) ; Callahan, J. M., diplomatic His¬ tory of the Southern Confederacy * (1901) ;*

Moore, J. B., digest of International Law> (1906) ; Richardson, J. D., (Messages and

Papers of the Confederacy) (2 vols., 1906).

James M. Callahan,

Professor of Political Science , University of West Virginia.

CONFEDERATE VETERANS' ASSO¬ CIATION, a federation of all organizations of survivors of the Civil War on the Southern side. This association was organized at New Orleans 10 June 1889. Its avowed purpose is strictly social, literary, historical and benev¬ olent. Its constitution says that it (

CONFEDERATION, Articles of. See

United States — Articles of Confederation.

CONFEDERATION OF THE RHINE.

A league of German princes which was formed, under the protection of Napoleon, in 1806. In the war of 1805, which turned out so unfor¬ tunately for Austria, several of the princes of the south of Germany allied themselves to France. The Peace of Presburg (26 Dec. 1805) gave the first impulse to the entire dissolution of the German empire, by conferring crowns on the electors of Bavaria and Wiirtemberg, and on both, as well as on Baden, complete sovereignty, such as had been already exercised by the other great German states. Ultimately 16 German princes made a formal declaration of their separation from the Emperor and the Empire, in the act of confederation signed at Paris 12 July 1806, by the kings of Bavaria and Wiirtemberg, the elector arch-chancellor of the Empire, the Elector of Baden, the new Duke

of Cloves, and Berg (Joachim Murat), the Landgrave of Hesse-Darmstadt and other less important rulers. Other princes soon joined, and ultimately the confederacy extended over a space of 125,160 square miles, with 14,608,877 inhabitants ; and the confederate forces were increased from the originally stipulated num¬ ber of 63,000 to 119,180. After Napoleon's Russian campaign of 1812 the whole structure fell to pieces in 1813. Consult Rambaud, (La domination frangaise en Allemagne, 1804— IP (Paris 1876), and any good history of Germany.

CONFERENCE (Lat. conferee, <(to bring together®) (1) In general a meeting for con¬ sultation, discussion, instruction or the like; or any interview for interchange of views. The term is specifically applied to consultations be¬ tween committees of the two Houses of Con¬ gress in the United States, and to similar con¬ sultations between delegates of the two Houses of Parliament in Great Britain. Such confer¬ ences are usually called to discuss the pro¬ visions of a bill with regard to which the two houses are disagreed, with the object of effect¬ ing an agreement between them.

(2) A term much used in ecclesiastical gov¬ ernment, etc. The annual meetings of Wes¬ leyan preachers in England for deliberation on the affairs of the body are called conferences. In the United States the Methodist Episcopal Church has an assembly called the general con¬ ference, which meets once in four years ; numerous assemblies called annual conferences ; district conferences; and quarterly conferences; these assemblies variously dealing with local or general interests of the Church. In the Roman Catholic Church there are instituted pastoral conferences, chapter conferences, etc. ; and in various Protestant denominations there are stated local or general assemblies of chosen delegates from individual churches, who meet to consider or adjust denominational affairs.

(3) The word conference also covers inter¬ national meetings, and there have been many noted international conferences, some of which have been of a religious nature. Of these latter a very

notable gathering was the ecclesiastical conference called together by King James I of England and which met at Hampton Court Palace in 1604, for the establishment of a com¬ mon creed. It led to King James' famous trans¬ lation of the Bible which is still known to all Protestant English-speaking readers as the ((Authorized Version.® Another famous eccle¬ siastical gathering was that known as the Savoy House conference, which at a meeting held in 1661 made some important changes in the Prayer Book of the Established Church of Eng¬ land. Political conferences have been many and some of them important. The conferences of London and Geneva both held in 1864; two other conferences of London held respectively in 1867 and 1871 and the Balkan conference also held in London (1912-13) form links in the chain of modern history; while the con¬ ference of The Hague of 1899 and recent meet¬ ings of a similar nature have attracted general attention.

CONFERVA (Lat. con, ˆtogether,® and fervere, ((to be hot®), kon-fer'va, a genus of green algae. Most species are marine, though a fewr are freshwater. The name is also ap¬ plied to a genus of the chlorophycccp.

CONFESSION, in criminal lau), the vol¬ untary admission or declaration made by a person who has committed a crime or misde¬ meanor, to another, of the agency or partici¬ pation which he had in the same. Judicial confessions are those made before a magistrate or in court in the due course of legal proceed¬ ings. Extra-judicial confessions are those made by the party elsewhere than before a magistrate or in open court. Confession is admissible only when voluntary; but if it is obtained by tem¬ poral inducement, threats, promise or hope of favor held out to the party in respect of his escape from the charge against him, by a person in authority, it is not allowed. Likewise, if the confession is made in answer to questions not containing or in any way implying threats or bribes, it is then admissible. A confession differs from a statement or declaration in that the former applies to an acknowledgment of guilt after the deed has been committed and does not apply to a mere statement or declara¬ tion of an independent fact from which such guilt may be inferred. The court primarily de¬ termines whether the confession is voluntary or not. If the various evidence conflicts as to whether the confession is voluntary, the court may leave it to the decision of the jury with the direction that they shall reject the con¬ fession, if on hearing the whole evidence, they are convinced that it was not the voluntary act of the defendant. See Criminal Law.

CONFESSION, Sacramental, the act of a

penitent accusing himself of his sins to a priest who has power to grant absolution, it is called auricular confession because addressed to the ear (auricula) of the minister of the sacrament of penance, and not made in open congregation ; though of course were such public confession to be made the priest would, unless the laws of the Church should forbid, possess the same power of absolution as in auricular confession. The law of the Catholic Church, as defined by the Council of Trent, requires that the faith¬ ful shall confess to a duly commissioned priest all their mortal sins, and are advised to confess venial sins, committed after baptism and since a previous confession and absolution, so far as they can recall them by a diligent examination of their conscience. The penitent is strictly re¬ quired to confess all his mortal sins, their kinds and their number as well as he can recall them ; wilful concealment of a mortal sin or even of what the penitent may erroneously deem a mortal sin, renders the confession of the peni¬ tent and the absolution of the minister null, and both of these acts must be done over again and made good. If a penitent, after examina¬ tion of his conscience, fails to recall any mortal sin he is under obligation to confess that sin afterward and to receive absolution for it. See Absolution.

CONFESSION AND AVOIDANCE, a

plea showing new facts by which it is designed to negative the allegations in the pleading of the adverse party. It may apply to the whole or to a part of the pleading, but if only to a part it must be so stated. This plea expressly or impliedly admits at least the apparent truth of the allegations of the plaintiff. All state¬ ments in confession and avoidance must be both specific and clear. Pleas in confession and avoidance must conclude with a verification.

They must plead matter either in excuse and justification or in discharge, as a release.

CONFESSION OF FAITH, Westmin¬ ster, a document prepared by the Assembly of Divines which met at Westminister in obedi¬ ence to an ordinance of Parliament issued 12 June 1643. The whole number of the assembly amounted to 174 members, 32 of whom were members of Parliament appointed as lay as¬ sessors. The greater part of the assembly were Puritans. One of the chief results of the deliberations of the Assembly was the framing of the Confession of Faith, intended to be that of the national Church of Great Britain. In England it nominally held this position for a short time.. On the return of the Scottish com¬ missioners it was laid before the General Assem¬ bly of the Church of Scotland, by whom it was adopted as the creed of the Church by the act of assembly ,of 27 Aug. 1647. It has been adopted by the other Presbyterian churches generally, in some cases, however, with certain reservations. Its theology and discipline are thoroughly Calvinistic. See Creeds ; West¬ minister Assembly.

CONFESSIONAL, in Roman Catholic churches and chapels, a kind of enclosed seat, stall or box in which the priest sits to hear persons confess their sins. The confessional is often not unlike a sentry-box, the priest sitting within and the penitent kneeling without and speaking through an aperture. Many confes¬ sionals are in three divisions or compartments, the centre, for the reception of the priest; the side compartments, which communicate with the centre by grated apertures, are for the penitents. The word confessional is often used in the sense of the tomb of a martyr or con¬ fessor. Sometimes an altar was erected over the grave and the name was extended to the altar. If a church was erected over the tomb another altar was placed, in the building, ex¬ actly over the tomb with its altar below. The upper altar was called a confession or con¬ fessional.

CONFESSIONS, Les, an autobiographical work of Jean Jacques Rousseau (q.v.). It was written during the six most agitated years of his life, from 1765 to 1770; and his state of health at this time, both mental and bodily, may account for some of its peculiarities. The first six books were not published until 1781, and the second six not until 1788. According to more than one critic, the (Confessions, > how¬ ever charming as literature, are to be taken as documentary evidence with great reserve. They form practically a complete life of Rousseau from his earliest years, in which he discloses not only all his own weaknesses, but the faults of those who had been his friends and intimates.

CONFESSIONS OF AN ENGLISH OPIUM EATER. The ˆConfessions exist in two distinct forms. The earliest form, con¬ taining the two papers printed in the London Magazine for September and October 1821, ap¬ peared the next year (1822) and passed through no less than six editions in the next 30 years without essential change. In 1845 De Quincey began a series of articles in Blackwood's Maga¬ zine, under the title ((Susp'iria de Profundis, be¬ ing a sequel to the Confessions of an English Opium Eater;® but the series ran through only four numbers. In 1856, however, when he*

collected and arranged his writing for a uni¬ form edition, he rewrote the volume of 1822 throughout, enlarging it to nearly three times its original dimensions. The introductory chapter, in particular, which in 1822 had been a brief account of his early years, was now enormously expanded by the insertion of some matter from the Suspiria and by crowding into it a multitude of incidents and experiences, many of which have no connection with opium eating and some of which seem to have been drawn rather from his imagination than from his memory.

This enlarged edition is really a vivid pic¬ ture of De Quincey himself, not only as the opium eater, but as the scholar, the critic, the gossip. His mind was abnormally active; but he could never follow a straight line of thought or course of narrative. Everything reminds him of something else. But if the story takes a long time to get anywhere, its path is set thick with curious incident and subtle observa¬ tion. Even the dreams and phantasies of the opium eater were not due principally to opium. De Quincey was a dreamer always. His early childhood, years before he ever tasted the drug, was largely passed in a mood of waking dream ; in his autobiographic papers we find record of hours when visions in sight or sound, vague and solemn, came upon him with the compelling sense of reality. The effect of opium in later years seems to have been to re¬ call these earlier experiences with strange vivid¬ ness, to combine other incidents with them, and to repeat them habitually in his dreams. Indeed, the very best specimens of what he calls his dream phantasy seem not to have been suggested by any particular experience, or to have owed anything to the influence of opium. That wonderful fragment, the Three Ladies of Sor¬ row, from the Suspiria, is an embodiment of three of the darkest forms of human grief, mysterious but strangely vivid, but without a hint of anything

morbid in its genesis — a work of the pure creative imagination.

It is in such passages as this we may see at its best that particular form of prose-poetry which De Quincey claims to have been of his own invention. He always admired the large, sonorous style of the early 17th century men, and sometimes caught their manner very suc¬ cessfully. In the 1822 edition of the (Confes- sions) is an apostrophe to opium, imitated from Walter Raleigh's famous apostrophe to death, which is quite as lofty as its original. This elaborated style is indeed ill adapted to the rambling gossip that makes up so large a part of De Quincey's writing, but his passages of revery and dream owe their strange effect upon our sensibilities very largely to their stately movement and music. Consult Saintsbury, (Essays in English Literature. (1780-1860); Stephen, Leslie, (Hours in a Library) (1st series) ; Winchester, C. T.,*

Caleb T. Winchester.

CONFESSIONS OF SAINT AUGUS¬ TINE, The. Autobiographies are as a rule utterly conventional and commonplace, inter¬ esting only to those immediately concerned with the author. We have any number of them that are waste paper, but a few of them like Cellini's life of himself, Montaigne's (Essays, and Rousseau's (Confessions,* show that when a*

man pours himself out he can make a supremely human document that is enduring literature. Among these immortal autobiographies, prob¬ ably the work that has had most influence, in the intellectual world at least, is (The Confes¬ sions of Saint Augustine (354-430 a.d.). He wrote them shortly after he became bishop of Hippo, just before 400 a.d., when he was in his early forties. The fact that the book has main¬ tained its popularity now for over 1,500 years shows from how close to the human heart it is written. For the Confessions are the history of Augustine's heart. We have two other sets of autobiographic documents from his hands, the Retractations,* which are the story of his mind, and his letters, which give an account of his activities. These two are little known beyond the narrow circle of students of theology and Church history. Most writers of autobiography seem to think that it is the story of their minds and actions that will interest men around them. Augustine's immortal record of his affections which still continues to attract the attention of each generation of thinkers shows that it is by the heart men live. Saint Augustine's Confessions are not, however, as so many people imagine, an account of past deeds and above all not an avowal of youth¬ ful transgressions as such. The word con¬ fession is used in the biblical sense of the Latin word confiteri as an acknowledgment. Augustine's Confessions are quite literally the acknowledgment of a soul forced to admire the action of God within itself, though it has to admit the many obstacles that it placed in the way of Divine influence. It is full of the psy¬ chology of human conduct, though so many people seem to think that only in comparatively recent years have men begun to reflect thus carefully on their inner activities. It has been said of the book, (*

the inconsistencies of elders, have drawn many a one to reading the rest of the book. The boy Augustine was very human, hated Greek and liked (

James J. Walsh,

*Author of c Catholic Churchmen in Science .**

CONFESSOR, in the Roman Catholic Church has two principal significations. (1) De¬ noting a canonized male saint outside of the classes of the apostles, evangelists and martyrs. The only saints, who in the earliest times were publicly venerated in the Church after death were, in addition to the Blessed Virgin and the apostles, the martyrs; and such are all the saints named in the Roman canon of the Mass, though the Milan canon (Ambrosian) has the name of other saints. (2) the other meaning of the word confessor, the priest who hears con¬ fessions, answers to the more correct Latin word confessarius. The confessor, minister of the sacrament, of penance, does not exercise that ministry simply in virtue of his having re¬ ceived priestly order: he must receive juris¬ diction from the bishop of the diocese. The general law of the Church requires each of the faithful to resort to the confessional at least once in every. 12 months, and to make confes¬ sion each to his own parochus or parish priest; but under the law they may now lawfully con¬ fess to any priest who has due authorization from the bishop.

CONFIDENTIAL OR PRIVILEGED COMMUNICATION. In law, a communica¬ tion made by one person to another which the

latter cannot be compelled to give in evidence as a witness. The laws of the United States and of some other countries are, that all com¬ munications made between a client and his agent, between the agent and the counsel in a suit, or between the several parties to a suit, shall be treated as confidential ; but in some minor points the practice varies in the different States. Legal agents are of course required to produce any papers entrusted to them by their clients, which the clients themselves would otherwise have been required to produce. The privilege of confidentiality regarding disclosures made to a medical adviser, even although it may have been necessary for the patient to make them in order to enable the physician to understand and treat his case, have not been defined by statute, but the custom has been that such communications are privileged. The same holds true regarding confessions made to a priest. No instances are cited where the con¬ fession of a penitent has ever been revealed by a priest. Communications made between hus¬ band and wife during marriage are in some States not admissible as evidence, although in most civil cases a husband and wife may legally be called as witnesses against each other. The laws in the United States differ in different States regarding the admission of testimony of husband or wife for or against each other.

CONFIRMATION (Lat. confirinare, <(to make strong®), one of the seven sacraments of the Roman Catholic Church; in the Lutheran, the Anglican and the Protestant Episcopal Church confirmation is not a sacrament, but only a solemn rite wherein the one who is confirmed renews in the face of the Church the promises made on his behalf by his sponsors in baptism. Confirmation admits the person upon whom it is conferred to the status of a communicant and to full membership in the Church. In the early times of the Catholic Church the sacrament or rite of confirmation was administered immediately after baptism, even of infants : hence the two rites have often been, even by orthodox writers, viewed as one ; and in the Greek and Oriental churches this custom still persists. But in the present dis¬ cipline of the Latin Church confirmation is usually not administered till about the 12th year, though a child might be held competent to receive it at the age of seven. It is customary for the confirmant to take an additional name as a memorial of the rite. In administering it the bishop — and the bishop is the ordinary minister of this sacrament — with chrism (q.v.) marks the sign of the cross on the forehead of the recipient, and gives him a gentle slap on the cheek, in signification that he must be ready to suffer for Christ's name's sake. The formula of words used by the bishop in signing the con¬ firmant is, (

CONFISCATION. In international law, the act of one state in appropriating property belonging to another state or to its subjects, either as a belligerent right or as a punishment for carrying contraband of war, blockade run¬ ning or the like. The term is used also to indi¬ cate the seizure of property by the state as an act of punishment for non-compliance with VOL. 7 — 32

the law, as for violation of internal revenue regulations.

In English law some early authorities, in¬ cluding Blackstone, seem to use the term as a synonym for "forfeiture,® though at common law it has been held to embrace only seizure by the Crown of goods found on a felon, but not claimed by him, and to articles dropped by a thief fleeing from justice. (See Forfeiture). By statute in England, passed in 1914, enemy property which had been subjected to confisca¬ tion by the Crown was placed under the care of a legal custodian.

In Roman law goods which had been sub¬ jected to confiscation by the state were called by the civilians bona confiscata, and belonged to the fiscus, or imperial treasury.

One form of confiscation long known to in¬ ternational law is called angaria or angary , which is defined as the seizure or destruction of neutral property by a belligerent when urgently necessary, with due compensation later. This right was exercised in the Franco-Prus- sian War by Germany.

In the United States, enemy property has frequently been confiscated under international law and by Federal statutes. In 1861 and 1862, during the Civil War, Federal statutes were passed providing for the confiscation of prop¬ erty used for insurrectionary purposes, and these statutes were later held to

be constitu¬ tional by the Supreme Court. Congress, dating from the adoption of the Constitution, has had the exclusive power of confiscation of alien property. Shortly after the outbreak of hostili¬ ties with European powers in the spring of 1917, the United States seized a large number of ships belonging to Germany and Austria found afloat in various ports, under a well- known rule of international law justifying the act. By a Federal statute enacted 6 Oct. 1917, a legal custodian was appointed for all alien enemy property confiscated in the United States during the war then pending.

By proclamation of the President of the United States, 20 March 1918, under the au¬ thority conferred upon him by the Naval Bill of 1917, "in exercise of our indisputable rights and in accordance with the law and practice of nations,® 68 ships, representing about 470,000 tons, belonging to Holland, lying in United States ports, were confiscated. The seizure was condemned by Germany and also in other quarters, as in Holland, as a violation of the rules of international law. It has been vigor¬ ously defended, however, as lawful by eminent jurists and justified by the law of angaria or angary, long recognized in legal usage, as stated above, and also as incorporated in The Hague conventions of 1899 and 1907. At about the same time Great Britain, claiming under the same right, took control of a number of Dutch ships representing about 400,000 tonnage.

CONFISCATION ACT OF 1861, a

United States statute <(to confiscate property used for insurrectionary purposes.® See Con¬ fiscation.

CONFUCIUS, kon-fu'shi-us (Latinized form of Chinese K'ung-futze, the Master Kung), Chinese philosopher: b. province of Shan-tung, about 551 b.c. ; d. in Lu, 478 b.c. His father, Kung Shuh-liang-heh, who was of royal descent, died three years later, and the

hoy was reared in comparative poverty by his mother, Ching-tsai. At the age of 17 he was made inspector of corn-markets, keeper of granaries and overseer of public fields. Here he made such a good record that he gained the favor of the governor. At 19 he married, and some four years later he began his career as a teacher. By 520 he had worked out the general direction of his philosophy from which he departed very little thereafter. The disregard for the moral law then prevalent in the province of Lu induced him to make a study of the ancient writings of China. At the age of 22 he had already become a well-known teacher and expounder of the ancient writings, and many noted persons gathered at his house to gain instruction from him. He had no inten¬ tion of teaching a new religion or philosophy. He aimed to bring men to a realization of the utility, beauty and truth of the old. He bent all his energies to reviving old customs ; and in this he set a fashion still strong in China to-day. In 517 b.c. he was induced, by two members of one of the principal houses in Lu who had joined his band of disciples, to visit the capital with them, where he had interviews with Lao-tze, the founder of Taoism. Though temporarily driven from Lu to Tsi by a revolu¬ tion, he soon returned thither with an increas¬ ing following; and there he remained for 15 years, during which he kept constantly in view his mission as a philosophical teacher. At the age of 52 he was made chief magistrate of the city of Chung-too. So striking a reformation was effected by him that he was chosen for higher posts, became minister of crime, and with the aid of two powerful disciples, elevated the state of Lu to a leading position in the kingdom. Through the political intrigues of the governors of neighboring states Confucius was removed from office (496 b.c.), and became a wanderer in many parts of China for 13 years.

In 485 he returned to Lu, but would not take office. The death of his favorite disciples, Yen Hwin and Tze-lu, in 481 and 478, did much to further his own, which took place ill the latter year. Confucius left no work detailing his moral and social system. His five canonical books (Yih-king' ; the (Shu-king' ; the (Sin¬ kingˆ the

strong feudal leaning which advocates almost unlimited authority for the sovereign over the minister ; for the father over the son ; the hus¬ band over the wife; the elder brother over the younger. Subordination to superiors he looked upon as one of the greatest of all essentials for the existence and proper conduct of the state. To these must be added virtuous conduct among all and upright dealing among friends. The education of the young he declared to be the foundation of the welfare

of the state. Democracy had not yet made its appearance in China and Confucius' ideal of government was a paternal despotism wisely and honestly directed and administered. This position he modified by the assertion that a ruler's maintenance of power should depend upon his just and upright conduct and his honest endeavor to make his government good.

His philosophy is not deep, but its general tendency is good, affecting strongly the usual intercourses of life. It is thoroughly practical and terrestrial, and it avoids theology and meta¬ physics and all those subjects that Confucius could not make clear by example and apply rigidly as rules of life. He never attempted to solve questions that he considered beyond his reach. Fast and hard rules of morality and action he made to govern the intercourse of the human race ; and in this sense he tied China to a system for hundreds of years. He oc¬ cupied himself altogether with the problems of this world and let the next take care of itself. F'rom the Christian point of view, therefore, there is nothing spiritual about the work of Confucius. His attitude toward spiritual ques¬ tions he has put clearly upon record: <(To give one's self up earnestly to the duties incumbent upon men and, while respecting spiritual beings, to keep aloof from them, may be considered wisdom." His teachings have left China more materialistic and less spiritual than is any of the other great nations. While he instilled morality and national and individual honesty, yet more than 24 centuries of his teachings have not driven superstition and ignorance out of the land, nor improved the government, nor raised the condition of the masses of the people, nor driven illiteracy out of the nation. They have retarded the progress of democracy in a people, in spirit, essentially democratic, and they have encased the national spirit in a hard shell of rules and conventionality from which it has just begun to make spasmodic efforts to free itself. The thinking people have, however, begun to realize dimly that his philosophy is, in many ways, unsuited to an age in which the spirit of all progressive government is ex¬ pressed by the will of the people. Since the overthrow of the monarchy, candidates for public offices are no longer required as formerly to pass a rigid examination in the <(nine classics." As the teachings of Confucius gave their strong sanction and support to the despotic form of government which ruled China, almost uninterruptedly for more than 30 centuries, the royal family and the nobility naturally gave to it an importance that it did not intrinsically possess. They saw to it that there were magnificent shrines erected to Con¬ fucius in every city, town and community throughout the Chinese Empire, and that his priests were specially honored, so that they became one of the mightiest forces in the

CONFUSION

direction of the life of China. However honest they may have been in the fulfilment of their great duties and obligations, they have hung upon the chariot wheels of progress.

Bibliography. — Douglas, (Confucius and Taoism (London 1879) ; Dvorak, (Chinas Re- ligionen, Band 1, Confucius und seine Lehre) (Munster 1895) ; Haug, (Confucius der Weise Chinas* (Berlin 1880) ; Legge, J., (Chinese Classics* (London 1861) ; Loomis, A., Con¬ fucius and the Chinese Classics* (San Fran¬ cisco 1867) ; Plath, J. H., (Co\ifucius und seine Schuler: Leben und Lehren) (4 parts, Munich 1869-74) ; Smith, A. H., Chinese Characteristics* (New York 1900).*

John Hubert Cornyn, Editorial Staff of the Americana.

*CONFUSION (Lat. confusio, <(a mixing together**), the act of confusing or mingling together two or more things or notions that are properly separate. (1) In mental diseases acute confusion occurs in the early stages of general paralysis, in acute mania, in melan¬ cholia, in dementia praecox, and in most of the insanities. It might be called an initial symp¬ tom of insanity. The characteristic symptoms are lack of correct appreciation of external expressions, loss of continuity of thought, with a certain enfeeblement of judgment. There are certain insanities characterized purely by acute confusion. See Insanity.*

(2) Confusion is used, in a legal sense, in civil law, to signify the merger of two titles in the same person. In both civil law and Scots law ,it implies the extinction of an obligation or servitude through the fact that the two parties whose divided position is neces¬ sary for the continuance of the debt or obliga¬ tion become one person. This might happen -when one of them became the heir of the other for instance.

CONG& D'ELIRE, kon-zha-da-ler (Fr. Heave to elect®), in England, the sovereign's warrant

authorizing the dean and chapter of a vacant see to proceed with a new election. The nomination to bishoprics, originally understood to have been vested in the Christian people, who made it by election, was afterward trans¬ ferred to the sovereigns of most states, and remained with them till the 11th century, when, with the assistance of the Pope, it was wrested from them and conferred upon the clergy. In England, the Constitutions of Clarendon, in 1164, conferred the election on the chapters, and this right was formally confirmed by Magna Charta, subject, however, to a right in the sovereign to grant a conge d'elire, and also to confirm the chapter's choice. Thus matters remained till the Reformation, when the Crown made a very important encroach¬ ment, and provided by 25 Henry VIII c. 20, that though the dean and chapter were still required to go through the form of an election, the person to be chosen should previously be absolutely fixed by the sovereign. This act is still the regulating statute, and not only provides that on every vacancy in a see the sovereign may grant a license to proceed to the election of a successor, and with it a letter containing the name of the person to be elected, but that, if the dean and chapter delay the election beyond 12 days or elect any other person than the one named in the letter, or do

anything else in contravention of the act, they incur the penalties of a prcemunire, that is, forfeiture of goods, deprivation of certain civil rights and imprisonment. Any bishop or arch¬ bishop neglecting to assist at the consecration and investment of the bishop-elect, within 20 days after the legal announcement of his elec¬ tion, is liable also to the penalties of prcemunire.

CONGENITAL DISEASE, a disease which the new-born child inherits from its father or mother, or it may be its grandparents. Syphilis, gout, congenital anomalies such as hare-lip, web fingers and toes, etc., are among the few truly congenital diseases. During child-birth children may acquire infections, but these are not truly congenital diseases. It is often very difficult to tell whether a child be¬ comes diseased in the parturient canal of the mother, at the time of birth, or through ac¬ cident, or through contact with the mother fol¬ lowing birth. See Children, Diseases of.

CONGER, kon'ger, Edwin Hurd, Amer¬ ican diplomatist : b. Knox County, Ill., 7 March 1843 ; d. Pasadena, Cal., 18 May 1907. He was graduated at Lombard University in 1862, served in the Union army 1862-65, was grad¬ uated at the Albany Law School in 1866, and was elected to Congress in 1884 and twice re¬ elected as a Republican. He was Minister to Brazil (1890-98), and then to China. He wras at his post throughout the Chinese crisis of 1900, in Peking, being imprisoned with his family and the entire diplomatic corps in the British legation from 20 June to 15 August. His rescue on 20 August was effected by the allied powers barely in time to save him and his colleagues from a general massacre. He was appointed Ambassador to Mexico early in 1905 but resigned in August of that year.

CONGER EEL, a species of marine eel (Leptoceplialus conger) with a long dorsal fin reaching forward nearly to the head and con¬ tinuous posteriorly with the caudal ; the pectoral fins present; strong, close-set teeth in the jaws; mouth and eyes large, and scales absent. The conger is a large eel, the ordinary specimens commonly captured along the New England shores being four feet long, while those taken in the open sea are six to eight feet, and weigh 50 to 60 pounds, and, in rare cases, upward of 100 pounds. Very little is known of their habits in the natural state, but they are easily kept in aquaria and are known to be ravenous crea¬ tures, which devour fishes, crustaceans and mollusks, and even the smaller members of their own species. From observations made on specimens in captivity in England Dr. Cunning¬ ham has concluded that, as in many other fishes, spawning takes place but once ; the females, upon the approach of that period, ceasing to feed and undergoing degenerative changes in respect to the skeleton and other parts. Spawning occurs in the deep sea and during development a transparent band-like larva is formed which was long ago described as a distinct genus under the name of Lepto- cephalns. The conger is a prolific fish, pro¬ ducing about 3,000,000 eggs. After nightfall the conger eel may be induced to take the hook and affords good sport.

*CONGESTION (Lat. congestio , «accumu- lation**), an abnormal amount of blood in the*

vessels which is caused by pressure on the arteries or by obstruction to the emptying of the veins. It is usually due to some acute in¬ flammatory reaction, causing rapidity of the heart beat or dilatation of the blood vessels with consequent congestion in some area. In venous congestion, as a rule, the cause is due to some constriction of the venous return to the heart. Congestion is present during many diseases, and may be caused temporarily by over exertion, drugs, intoxication or a severe blow, fall or cold. See Cold.

CONGLETON, England, a market towrn and borough of Cheshire, in a deep valley, on the Dane, 26 miles south of Manchester. Among the chief buildings are the town hall and the grammar-school. Congleton is a seat of the silk manufacture, ribbons, handerchiefs, and other articles being made ; it also carries on fustian-cutting, the manufacture of agricul¬ tural implements, rope-making, brewing, etc. Near it are collieries and quarries, and salt is abundant in the neighborhood. Pop. 11,309.

CONGLOMERATE (Lat. conglomerate, <(rolled together^), or PUDDING-STONE, a firm sedimentary rock made up of rounded detrital pebbles and even boulders, the inter¬ stices usually filled wdth sand or other fine¬ grained rock material. Silica is the commonest cementing material, calcite and limonite coming next. The pebbles and boulders may be of any kind of rock, though quartz and quartzite are the most frequent, since the most resistant material in gravels. According to the character of the pebbles, different names are given, as quartz conglomerate, limestone conglomerate, etc. Conglomerates grade through pebbly sands and sandstones into true sands and sandstones. Under dynamic stress, in the folding of rock strata, the pebbles of a conglomerate may be much distorted, and by further metamorphism a conglomerate may pass into a gneiss. Some notable conglomerates are the copper-bearing Calumet and Hecla conglomerate on the Keweenaw Peninsula, Michigan, of Algonkian Age ; the great conglomerate at the base of the coal measures of Carboniferous Age, in Penn¬ sylvania and adjacent States; the Roxbury con¬ glomerate of uncertain age, near Boston, Mass. ; and the famous ^banket,® possibly of Permian Age, on which are located the great gold mines of the Transvaal. See Breccia; Gneiss; Rock; Sandstone.*

CONGO. See Kongo.

CONGO FREE STATE. See Kongo. CONGO SNAKE. See Kongo Snake.

*CONGREGATION (Fr. congregation, Lat. congregatio , from congregare, ((to come together in a body**), a gathering or collection of persons; usually a religious assembly; in its most ordinary use, an assembly of Christians met in one place for worship. (1) In the Roman Catholic Church, it often designates a sort of board of cardinals, prelates and divines, to which is entrusted the management of some important branch of the affairs of the Church. Thus the Congregation of the Index examines books and decides on their fitness for general perusal. The Congregatio de Propaganda Fide is instituted for the propagation of the Roman Catholic faith and4 the government of the Church in non-Catholic countries. The Con¬*

gregation of Relics inquires into the genuine¬ ness of supposed relics. The Congregation of the Holy Office takes cognizance of heresies, etc. The Congregation of Rites regulates the festivals and offices of new saints. There are numerous other Congregations. The word is also used in the Roman Catholic Church to describe communities of ecclesiastics who live together under rule, but without being bound by vow, or at least by solemn vow. Such are the Congregation of the Oratory, the Congre¬ gation of the Most Holy Redeemer, usually called Redemptorists, etc. See Congregation of Our Lady of Calvary; Congregation of the Mother of God; Free Congregations.

(2) In the Old Testament, congregation has the religious sense of the whole body of the Hebrew people gathered together and set apart for the service of God ; while in the Christian Church it bears both the older meaning of the Church in general and also that of an assem¬ bly of worshippers, in a restricted sense.

(3) Congregation was also the name given to the Protestant Reformers in England during the reign of Mary.

CONGREGATION OF BISHOPS; CONGREGATION OF THE CONSIS- ' TORY, etc. See Congregations, The Sacred.

CONGREGATION OF OUR LADY OF CALVARY. A French order of Benedictine nuns, which had a

somewhat stormy career. Organized at Poitiers in the early part of the 17th century, the Society, after having played an important part in the religious life of France, was broken up during the Revolution and its members dispersed over the face of Europe. The order was reorganized and again secured a firm footing in the land of its birth. See Congregation.

CONGREGATION OF THE MOTHER OF GOD. A monastic order instituted at Lucca, Tuscany, about 1574 by Giovanni Leonardi. It was originally known as Clerks Secular of the Blessed Virgin, and later, while Leonardi was still alive, as Clerks Regular of the Blessed Virgin, a name it kept until the Society was suppressed in 1867. The former residence of the clerks, who also kept a large, flourishing and famous boys' school, is now the Public Library of Lucca. On its reor¬ ganization the Society was known popularly as the Congregation of the Mother of God.

CONGREGATIONAL EDUCATION SOCIETY, a body incorporated at Boston 1816, for the purpose of educating youths for the gospel ministry. After changing its name several times, in order to cover the scope of its wrork in secondary and missionary schools, it finally adopted the name it now holds and included in its purpose, not only the support of students, but of all schools of Christian teaching.

CONGREGATIONAL METHODIST CHURCH, an ecclesiastical body in the United States, organized in Monroe County, Ga., by seceders, lay and clerical, from the Methodist Episcopal Church, in 1852. The movement was in the direction of a more democratic or congregational polity, designed to give the members of individual churches larger and more direct control of their own affairs; but the body still preserves the more essential forms

of organization and procedure, such as the con¬ ference system, etc., characteristic of the Methodist Episcopal Church. It has a mem¬ bership of over 20,000 distributed among about 350 churches.

CONGREGATIONALISM had its origin in an attempt in England to carry the principles of the Protestant Reformation regarding the authority of Scripture to their radical conse¬ quences. Accepting the Bible as the sole rule of faith and practice, the founders of Congre¬ gationalism sought to find in it not merely an authoritative source of Christian doctrine ; but, also, a complete, adequate and binding pattern of church government and organization. They grew out of the Puritan party of the reign of Queen Elizabeth, of which party they were the most advanced wing. They shared fully the intense Calvinism of that party and differed from it only in matters affecting church or¬ ganization and government. The great ma¬ jority of the Puritans held to the conception of a national Church, of which all baptized and non-excommunicated inhabitants of the king¬ dom were members. The reformation of this Church, though earnestly to be sought by private Christians, they viewed as ultimately the work of the national government, and hence they held it to be a duty to remain in the Church of England, while laboring for what seemed to them its betterment. This reforma¬ tion involved, in the conception of the Puritans generally, the establishment everywhere of a learned, earnest, preaching ministry; of efficient discipline ; of what they deemed a more scrip¬ tural organization of the Church ; and the dis¬ use of such vestments and forms of worship as seemed to them to be without biblical authority or to savor too strongly of Roman usages.

The founders of Congregationalism sympa¬ thized with these aims and criticisms of the Puritans, but, unlike the majority of that party, they believed that the reforms which they de¬ sired in the Church of England should come about through individual initiative, by the separation from that Church of those who criticised it. Hence the early Congregational- ists of England were called "Separatists They rejected the thought of a national Church. They held that the only proper form of the visible Church is the local congregation, com¬ posed of a company of professed disciples of Christ who can claim personal religious ex¬ perience, and are united to Christ and to one another by a voluntary covenant which trans¬ forms a company of Christians into a Church. Of these congregations Christ is the immediate head. Each, they conceived, is completely self- governing, choosing its own officers and ad¬ ministering its own discipline. While no earthly authority outside of such a Church has jurisdiction over it, each such congregation owes advice and aid to its sister congregations as necessity may require. This mutual re¬ sponsibility and helpfulness has. always led American Congregationalists to reject the name "Independent* which is popularly attached to the*

churches of this order in Great Britain. The officers of such a local Church were con¬ ceived by the founders of Congregationalism, following what they thought the New Testa¬ ment model, to be a "pastor, and a "teacher* who should preach and administer (he sacra¬ ments; a "ruling elder* who should aid the*

"pastor and "teacher* in the administration of discipline ; "deacons* to administer the financial affairs and charities of the congregation, and "widows* to care for those in illness and the poor. In their revolt from the prescribed liturgy of the Church of England they held that public prayer should be wholly free; and, like the Calvinists generally, they gave the chief place in public worship to the sermon.*

Though Richard Fitz and his associates, whose congregation at London was broken up by the English government in 1567, may be deemed the earliest organized Congregational¬ ists, the first clear presentation of Congrega¬ tional principles was made in the works of Robert Browne, a graduate of the University of Cambridge in 1572, who passed from Puri¬ tanism to Separatism, probably in 1579, or¬ ganized a church at Norwich in 1580 or 1581, and issued a series of tracts in defense of his views, from his exile at Middleburg in Hol¬ land, in 1582. Though Browne not long after conformed to the Church of England, a similar work was taken up by others, notably by Henry Barrowe, a lawyer of London, and Rev. John Greenwood and Rev. Francis Johnson in the same city, where a Congregational church was organized in 1592. In 1593 Barrowe, Green¬ wood and Rev. John Penry were hanged at London for opposing the ecclesiastical author¬ ity of Queen Elizabeth, and the Church in Lon¬ don was driven into exile. It found a refuge in Amsterdam under the pastoral care of Francis Johnson and Henry Ainsworth.

Contemporaneously with the later of these events, an apparently independent movement in the vicinity of Gainsborough and Scrooby, led at first by William Brewster, the postmaster at Scrooby, Rev. Richard Clyfton, rector at Bab- worth, and later also by Rev. John Robinson and Rev. John Smyth, resulted in the organi¬ zation, about 1606, of congregations at Scrooby and Gainsborough, which were compelled to seek refuge speedily in Holland. That of Scrooby settled, in 1609, at Leyden under the pastoral care of Robinson, and a portion of this congregation, led by William Brewster, Wil¬ liam Bradford and Edward Winslow, crossed the Atlantic in the Mayflower, and laid the foundations of Plymouth Colony in 1620, thus establishing the first of the Congregational colonies in America.

The settlers of Plymouth were Separatists, but during the years immediately succeeding their establishment in the New World, the course of politics in England under James I and Charles I was such as to lead many of the Puritans to despair of the attainment of the reforms they desired in Church and State in the home land. The consequence was a large Puritan emigration across the Atlantic ; and the establishment, in the course of a decade (1628-38), of the three Congregational colonies of Massachusetts Bay, Connecticut and New Haven. These Puritan settlers were all led by the radical development of their own principles in a new environment, and the influence of Plymouth example, to establish churches on the Congregational model, at their settlement in New England.

These colonies differed slightly from one another in the degree in which they applied theocratic principles to the organization of the State. In Massachusetts from 1631 to 1664, and

in New Haven from 1639 to 1665, when New Haven was absorbed in the Connecticut Colony, the franchise was confined to church members. In Connecticut and Plymouth colonies no such restriction existed. Doctrinal discussion aroused by Mrs. Anne Hutchinson and her ad¬ herents at Boston occasioned the meeting of the first "Synod® or council representative of the Congregational churches of New England, in 1637. At the Cambridge Synod in 1648, these churches, by their pastors and delegates there assembled, adopted the ((Cambridge Plat¬ form® as a compact manual expressive of their views of the organization, officers and discipline of the churches. The first century of New England Congregationalism saw, however, lit¬ tle theological debate, for the New England churches stood on the common doctrinal ground of Calvinistic Puritanism. The chief contro¬ versy of this period was that regarding church membership known as the <(Half Way Cove¬ nant® discussion. In the view of the founders of Congregationalism the reception of a parent to church membership by "owning the cove¬ nant® involved the admission into church mem¬ bership of his immature children. But adult membership implied experimental Christian character. When the children of the first set¬ tlers began to grow to maturity the question of their status forced itself, therefore, on the at¬ tention of the churches. A ministerial con¬ vention, representative of Massachusetts and Connecticut, held at Boston in 1657, and a <(Synod® of the Massachusetts churches con¬ vened in 1662, decided that such as were church members in childhood by reason of their parents' membership could, when they in turn became parents, bring their children to baptism, and could confer upon such children the same degree of membership which they themselves possessed ; but unless consciously and personally of Christian experience could not vote on ecclesiastical questions or partake of the Lord's Supper. Hence a distinction between members in «full communion® and in ((half way cove¬ nant® was made, which continued till early in the 19th century, when it disappeared, largely owing to the opposition which Jonathan Edwards and his disciples had manifested to it from 1749 onward.

Congregationalism, like the Calvinistic churches in general, believed in the necessity of education, and therefore the New England colonies speedily after their foundation estab¬ lished schools, and planted Harvard College in 1636. Yale College followed in 1701. This spirit has characterized Congregationalism throughout its history and has led Congrega- tionalists to be pre-eminently founders of schools and colleges as they have extended westward in the United States. The elaborate system of church officers already described, and believed by the founders of Congrega¬ tionalism to be scriptural, outlasted the first generation of the settlers of New England in only a few instances. While they existed "pastor,® ((teacher® and "ruling elder® all re¬ ceived salaries from the churches they served; but in most of the New England churches "teachers® and (

clerk, a treasurer, a Sunday-school superin¬ tendent, and often one or more standing com¬ mittees, and no feeling now exists that officers should be limited to those mentioned in the New Testament as possessed by the early Church. The pastor remains, with rare ex¬ ceptions, the only salaried officer. The support of public worship which was originally by voluntary gifts, and has always been so in Great Britain, became, between 1638 and 1655, a matter of public taxation in all the Con¬ gregational colonies. In Connecticut this rela¬ tion to the State which made Congregational¬ ism practically a State-supported Church lasted till 1818, and in Massachusetts till 1834; but since the latter date Congregationalism has no¬ where enjoyed State aid.

The high-wrought spiritual impulse mani¬ fested by the first settlers of New England was followed by a period of decreasing religious interest affecting the second, third and fourth generations on New England soil. This condi¬ tion was terminated by a series of "revivals,® of which the first manifestation was in that at Northampton, Mass., under the pastorate of Rev. Jonathan Edwards in 1734, and of which the culminating expression was witnessed in the two years following the

preaching tour of Rev. George Whitefield in 1740. This spiritual quickening is known as the "Great Awakening,® and undoubtedly added many to the member¬ ship of the churches. It was marked, however, by much excitement, and was followed . by a period of spiritual decline lasting through the troubled years of public conflict and debate which ended with the adoption of the Consti¬ tution of the United States. It resulted in serious controversy in the churches of New England as to its merits, those who opposed it as on the whole harmful being called "Old Lights® while those who favored it were nick¬ named "New Lights.® In the teachings of Jonathan Edwards (1703-58) a theological movement of importance in American religious history began ; and the modified Calvinism of the Edwardean school was further developed by Joseph Bellamy (1719-90), Samuel Hopkins (1721-1803), the younger Jonathan Edwards (1745-1801), Timothy Dwight (1752-1817), and Nathanael Emmons (1745-1840) into a distinctive New England theology. In eastern Massachusetts, on the other hand a "liberal® school arose before the American Revolution, which grew slowly and was made clearly evident in the Unitarian separation of the early years of the 19th century — a separa¬ tion that had its most conspicuous manifesta¬ tion in the adhesion of Harvard College to the "liberal® side in 1805, though the full signifi¬ cance of the division was not apparent until 10 years later.

With the decade beginning in 1791, the Con¬ gregational churches of New England experi¬ enced a series of revivals which were repeated at intervals until 1858. Under these impulses not onl)/ was the membership of the churches much enlarged, but a rapid development of agencies for missionary evangelization and religious education took place. The churches of Connecticut, which had already done home missionary work in Vermont and New York for more than 20 years, organized their "Gen¬ eral Association® in 1798 as the "Missionary Society of Connecticut.® A missionary society

was formed in Massachusetts in 1799. In 1801 the "New7 Hampshire Missionary Society® was inaugurated, and in 1807 a similar organiza¬ tion was effected in Vermont. These societies were chiefly engaged in home missions in the then Western States and Territories, though some work was done by them among the Indians; but in 1810, the "American Board of Commissioners for Foreign Missions® came into being and enlisted the activities of the Congregational churches in evangelization abroad. This society was followed, in 1815, by the formation of what is now known as the "Congregational Education Society® for assist¬ ing ministerial candidates and institutions of learning. In 1826 an "American Home Mis¬ sionary Society,® now known as the "Congre¬ gational Home Missionary Society® was or¬ ganized to undertake home missionary work. These were followed later by the formation of the "American Missionary Association,® in 1846, for labor, especially, among the negroes and Indians of the United States — a society which has done a large missionary and educa¬ tional work in the South since the Civil War. In 1853, the "Congregational Church Building Society® came into being, under the title of the "American Congregational Union® — an organization the work of which is sufficiently described by its more recent name. All these societies still exist and serve as agencies for the missionary activities of the Congregational churches of the United States. By the action of the "National Council® of 1913, ratified by these societies, the voting membership of the council are voting members of each of these "national® societies, which are then brought into direct relations to the churches. A con¬ siderable consolidation of these societies has been planned but the details have not been fully worked out.

Contemporary with this awakening of mis¬ sionary activity and immediately consequent upon the passage of Harvard University to the "liberal® side occurred an extensive develop¬ ment of theological education, beginning with the opening of Andover Theological Seminary in 1808. Bangor Theological Seminary was founded in 1816; and, in 1822, the theological department of Yale University was organized. Local disputes in Connecticut growing out of the modified type of Edwardean theology pre¬ sented by Prof. Nathaniel W. Taylor of Yale led to the organization in 1834 of what is now7 known as "Hartford Theological Seminary.® The theological department of Oberlin College came into existence in 1835, and the westward growth of the denomination brought about the opening of "Chicago Theological Seminary® in 1858, and of "Pacific Theological Seminary,® nowr at Berkeley, Cal., in 1869. The latest school for ministerial training is that opened at At¬ lanta, Ga., in 1901. These eight . theological seminaries are the principal agencies for the training of the ministry of the Congre¬ gational churches of the United States. The

Congregationalists of Canada have a seat of ministerial education in the "Congregational College of Canada,® established in 1830, and now affiliated with McGill University at Mont¬ real. In Great Britain no less than 11 Congre¬ gational "colleges® do a w7ork similar to that of the "theological seminaries® on this side of the Atlantic,

To the close of the 18th century the Con¬ gregational churches of the United States wrere practically confined to New England; and, in the subsequent westward extension of New England emigration, Congregationalism and Presbyterianism long w'orked together in the formation of churches in the newer States under the so-called "Plan of Union® of 1801. This "Plan® was repudiated by the "Old School® wing of the Presbyterian body in 1837, and by the Congregational churches, through the "Albany Convention,® in 1852. Congre¬ gationalism has now extended in force to those parts of the United States, especially, which have been settled through New England emi¬ gration. Throughout the latter half of the 19th century, the Congregational churches of the United States have felt an increasing de¬ nominational consciousness, which has found its expression, among other ways, in the gathering of bodies representative of these churches as a whole. A "Convention® met at Albany in 1852, a "National Council® at Bos¬ ton in 1865, and since 1871 a "National Coun¬ cil® has met every three years. In 1913, by a new7 constitution then adopted, its sessions be¬ came biennial. Besides this "National Coun¬ cil® in which delegates of the churches of the United States are regularly assembled, the churches of each State are represented in an annual "Conference® ; and the churches of smaller districts, usually counties, meet in more local "Associations.® None of these bodies are in any sense courts of discipline, but they gather for deliberation, consultation and joint action by committees, or otherwise, in matters of common concern.

Each Congregational church is a self-gov¬ erning body, capable of choosing its own offi¬ cers, expressing its creed in such forms as seem best to it, determining the conditions for the admission of its members, and ordering its public worship as it deems most fitting. But while a Congregational church is a self-govern¬ ing democracy, Congregationalism, always in the United States, and increasingly in Great Britain, has insisted that its churches are knit together in sisterlv fellowship, and owe, there¬ fore, to one another, advice in all matters of importance, discipline in evident error and mutual helpfulness. Hence in questions of serious ecclesiastical concern such as the set¬ tlement or dismissal of a pastor, the manage¬ ment of a case of discipline which the local church finds it impossible to handle, the or¬ ganization of a new church, and the like, Con¬ gregational usage in the United States, though not in Great Britain, requires the summons of an "advisory council® composed of a variable number of churches, chiefly from the vicinity, which are represented in the council by their pastors and a delegate each. These councils oftentimes also include a few individuals sum¬ moned by name as experts in the matter under consideration. By such an "advisory council,® met for the particular occasion, advice is given; and, though this advice is not obligatory, it is seldom that the opinion of such a council is disregarded.

Membership in a Congregational church is conditioned on the vote of the local church itself, in view of the candidate's profession of faith in Christ, evident determination to live a Christian life and acceptance of the covenant

obligations of Christian service in connection with the local company of Christian disciples of which he desires to become a member. While all matters of concern in a local congregation are determined, ultimately, by the votes of the membership, Congregational churches transact their business chiefly through the use of com¬ mittees, and a standing <(prudential committee® to assist the pastor and deacons is appointed in most churches of numerous membership.

But while each church is thus free to estab¬ lish such a test of the faith of candidates for its membership as it deems proper, Congrega- tionalists in representative assemblies or in a more informal way have always been ready to testify to their faith of public creed declara¬ tions. Examples of such witness-bearing have been the approval of the doctrinal portion of the Westminster Confession by the New Eng¬ land churches by the Cambridge Synod in 1648; the modification of that confession by delegates of the English churches gathered at the ((Savoy,® London, in 1658,

and its publica¬ tion as the ((Savoy Declaration® ; and the sub¬ stantial confirmation of this ˆDeclaration® by the churches of Massachusetts in 1680, and of Connecticut in 1708. Later examples of the same readiness of Congregationalists to wit¬ ness to their beliefs is seen in the ((Principles of Religion® adopted by the <(Congregational Union of England and Wales® in 1833 ; the <(Burial Hill Declaration® approved by the <(National Council® of the United States in 1865 ; the ((Commission Creed® issued by a committee of the same American body in 1883 and the brief statement of faith and polity prefixed to the constitution adopted by the National Council which met at Kansas City in 1913. All of these statements have been re¬ garded, however, as testimonies rather than as tests of ministerial fitness or church-fellowship.

Aside from its representation in the United States, Congregationalism is strongly en¬ trenched in Great Britain, where its adherents are often known by the name independents.® The churches of this order in Great Britain are grouped together in county and district ((Unions® and ˆAssociations® and are repre¬ sented in the <(Congregational Union of Eng¬ land and Wales® and the ((Congregational Union of Scotland.® In general, however, the Congregational churches of Great Britain have emphasized mutual accountability and organ¬ ization into representative bodies much less than those of the United States. Congrega¬ tionalism is creditably represented in the Dominion of Canada and in Austria, as well as on missionary soil, where the two extensive Congregational missionary agencies, the ((Amer¬ ican Board,® and the ((London Missionary So¬ ciety,® have labored. An ˆInternational Coun¬ cil,® representative of all lands in which Con¬ gregationalism has found a home, held its first session at London in 1891, its second at Bos¬ ton in 1899 and its third at Edinburgh in 1908.

Congregationalists in foreign countries num¬ bered 666,669 on 1 Jan. 1914, of whom by far the larger number are in the British Isles. There are :

In England and Wales . 45.1,457

“ Scotland . 35,666

“ South Africa . 72,ˆ2″

“ Japan . 16,105

and the rest in other countries.

The Congregationalists of the United States reckoned their communicants at 763,182 in 1915, with 6,093 churches and 5,923 ministers. The enrolment in Congregational Sunday-schools of the United States in 1915 was 757,873. The home expenses of the churches of the United States for the year 1914 were $10,716,311 ; their benevolent contributions in 1914 were $2,272,040.

The “American Board of Commissioners for Foreign Missions® by which the missionary work of Congregational churches of the United States is carried on reported the following sta¬ tistics for the year 1915: Mission stations, 103; out stations, 1,458; American missionaries, 656; native laborers, 4,777; churches, 676; communi¬ cants (members), 80,844, of whom 5,834 had been added during the previous 12 months. The “London Missionary Society,® through which the foreign wrork of the churches of Great Britain is chiefly carried on, reported, during the same period, 1,730 stations and out sta¬ tions, 480 missionaries, 6,987 native laborers and a church membership of 82,319, of whom 4,000 had been added the previous year.

While the title “Congregational® designates a particular fellowship of churches, or religious denomination, in the United States and Great Britain, the Congregational form of church organization, especially in its aspect of the self-government of the local congregation, is that of many other religious bodies, notably of the Baptists, the Christians, the Unitarians and of certain branches of the Adventists, and Lu¬ therans, so that the Congregational polity is much more widely extended than the adherents of the churches wdiich officially or popularly bear the Congregational name.

Bibliography. — Dexter, H. M., Congrega¬ tionalism of the Last Three Hundred Years (New York 1880), contains bibliography of over 7,000 titles; Goodwin, John A., (The Pilgrim Republic (Boston 1888) ; Arber, Edward, Che Story of the Pilgrim Fathers) (London 1897) ; Dexter, H. M. and M., Che England and Holland of the Pilgrims) (Boston 1905) ; Bur- rage, Champlin, (The Early English*

Dissenters) (Cambridge 1912) ; Dale, R. W. and A. W.,

(History of English Congregationalism (Lon¬ don 1907) ; Waddington, J., Congregational History* (5 vols., London 1880) ; Bradford, A. H., Che Pilgrim in Old Englandˆ (New York 1893) ; Ross# J., (History of Congrega¬ tional Independency in Scotland* (Glasgow 1900) ; Walker, Williston, Che Creeds and Platforms of Congregationalism * (New York 1893) ; Boardman, George N., (A History of New England Theology) (New York 1899) ; Foster, Frank Hugh, (Genetic History of the New' England Theology) (Chicago 1907) ; Hood, E. Lyman, Che National Council of the Congregational Churches of the United States* (Boston 1901), Consult also Yearbook (Boston annually).*

Williston Walker,

Professor of Church History , Yale University.

CONGREGATIONS, Religious, commu¬ nities or orders, bound together by a common rule either without vowrs or with solemn vows. In France the name is so used as to include associations or confraternities of the laity. A group of monasteries is sometimes called a Congregation, wrhen they unite themselves closely by ties of government and discipline and

by similarity of rule. The Cassinese congrega¬ tions of Benedictines and the Congregation of Cluny are examples. The Roman Catholic Church uses the term to designate a committee of cardinals entrusted with a department of Church affairs, such as the (

CONGREGATIONS, Sacred. A Congre¬ gation is a committee or college under the su¬ perintendence of the Pope for the transaction of the business of the Church. Cardinals resi¬ dent in Rome make up in large part the mem¬ bership of the congregations, and one of them is usually president or prefect.

It is evident that the Pope cannot provide personally for all the needs of the universal church. From early times the popes made use of counsellors and assistants. Pius IV and es¬ pecially Sixtus V (1585-90) created the Roman congregations upon which devolved the burden of supervising the ordinary affairs of the uni¬ versal church. Sixtus V instituted 15 congre¬ gations ; but in the course of time some were overburdened, while others lost their importance. This led Pius X to issue a constitution Sapienti Consilio June 1908, in which he reorganized the whole Curia, and defined the duties and powers of each Congregation. Benedict XV made fur¬ ther progress in reorganization when in March 1917 he suppressed the Congregation of the In¬ dex, assigning its functions to the Holy Office, and transferred the Department of Indulgences from the Holy Office to the S. Penitentiary, and increased the scope of the Congregation of Studies. The constitution and function of each Congregation are now determined by the pro¬ visions of the Code of Canon Law — Lib. II; Pars. I ; Tit. VII ; Cap. IV ; Canons 246-257. The Code prescribes that each Congregation shall be composed of a number of cardinals ap¬ pointed by the Pope, and of minor officials nec¬ essary for the work of the Congregation. Each Congregation has a Prefect. In the case of the Holy Office, the Consistorial Congregation and the Congregation of the Oriental Church, the Pope is the Prefect, and he is represented in the meetings by a Cardinal Secretary. In all other cases there is a Cardinal Prefect. While the power of each Congregation is limited by law to the matter assigned to it, these matters may affect any part of the world, because the Con¬ gregations attend to the business of the univer¬ sal church, and they make or at least interpret laws for the whole Catholic world. The form of procedure varies according to the nature of the Congregation and the matter submitted. No extraordinary matter may be dealt with, or ex¬ traordinary decision reached, without special permission of the Pope. But routine matters are settled by the Prefect or Secretary. .

The decisions are usually given in simplest form. “Affirmative” or “Negative” is the usual answer; though at times an advice or “mens” is added. The decisions too. are practically final, since the only recourse is a petition for another hearing.

The Sacred Congregations are:

1. The Congregation of the Holy Office. — This Congregation is a later development of the Roman Inquisition. Acting on the principle that the Church is commissioned by Christ to "preach the Gospel to every creature" (Mark xvi, 15) the supreme authority must take cog¬

nizance of what is being taught in the name of the Church, and protect the members of the Church from error, no matter what the source of the error may be. Sixtus V committed this duty to the Congregation mentioned. The duty of examination, revision and condemnation of books belonged originally to the Holy Office, but it was later given to a special Congregation, viz., the Congregation of the Index. It is now again attached to the Holy Office. The Holy Father is the Prefect of the Congregation of the Holy Office. The Congregation has general su¬ pervision of all matters of faith and morals, and judges of these matters both in the first instance and on appeal. To it are committed also certain matrimonial cases, namely, the Pauline Privilege and so-called "mixed mar¬ riages," i.e., marriage of a Catholic to a non- Catholic. The Holy Office is also the censor of books ; it issues the Index, or list of prohib¬ ited books. It may call for correction of errors by the author, or forbid the publication of a book, or give warning of erroneous teaching in a book already published. This Congregation alone is competent to decide questions regard¬ ing the Eucharistic fast of priests celebrating mass.

2. The Consistorial Congregation. — We must not confuse "Consistory" and "Consistorial Con¬ gregation." A Consistory is a meeting of the College of Cardinals present in Rome, and as¬ sembled before the Pope, for consultation and for the decision of very important ecclesiastical affairs. This meeting of the Pope and the car¬ dinals may be secret or public. The Public Consistory is restricted to certain solemn func¬ tions such as the conferring of the Red Hat on newly created cardinals, and is usually the oc¬ casion of an "allocution" or speech by the Holy Father, in which he may wish to make clear the policy of the Holy See on public questions. The Secret Consistory is the private meeting of the Pope and the cardinals at which important matters may be decided. The matters dis¬ cussed depend on the wishes of the Pope, and on previous action of the Consistorial Congrega¬ tion which prepares the agenda for the Consis¬ tory. The Consistorial Congregation is com¬ posed of the Pope as Prefect, and certain car¬ dinals ex officio, namely, the Secretary of State, Secretary of the Holy Office and the Prefect of the Congregation of Studies. The Assessor of the Holy Office, the Secretary for Extraor¬ dinary Ecclesiastical Affairs and the Secretary of the Congregation of Studies are Consultors of this Congregation. The Consistorial Con¬ gregation has assumed new importance since the reorganization of the Curia by Pius X. On it devolves not only the preparation of the agenda for the' Consistories, but also, in places not subject to the Propaganda, the erection of dioceses and provinces and their division ; the proposal of bishops, apostolic administrators, episcopal coadjutors and auxiliaries. The Con¬ sistorial Congregation receives the report of bishops when they go to Rome for ad limina visits. In a word to it belongs all that pertains to the constitution, preservation and state of the various dioceses throughout the world, with the exceptionMhat missionary countries remain sub¬ ject to the Propaganda. As the United States is no longer a missionary country it is the Con¬ sistorial Congregation that decides these im¬ portant matters for this country.

3. S. Congregation of the Sacraments.—- This Congregation is entirely new. To it is subject whatever concerns the seven sacraments. Certain matrimonial cases are reserved to the Holy Office, and the ceremonial to be ob¬ served in the administration and reception of the sacraments can be decided only by the Con¬ gregation of Rites. Whenever there is need of dispensation from impediments of a public character appeal must be made to the Congre¬ gation of the Sacraments. To this Congregation belongs also the decision of many questions concerning the Mass and the preservation of the Holy Eucharist, and all questions concern¬ ing the validity of Ordination and the obliga¬ tions imposed on those who receive the Major Orders.

4. The S. Congregation of the Council. — This Congregation was charged originally with the interpretation and execution of the reform decrees of the Council of Trent. It was insti¬ tuted by Pius IV in 1564; Pius V and Sixtus V enlarged its faculties. The importance of this Congregation has diminished since the institu¬ tion of the Congregation of the Sacraments ; but it still administers many matters pertaining to the secular clergy, to confraternities, pious bequests, Mass stipends,

ecclesiastical property and similar questions. Besides it grants per¬ mission to hold councils and examines the docu¬ ments and decrees of councils which must be submitted for approval. Its officers are a Car¬ dinal Prefect, a Secretary, sub-secretary, con- suitors and minor officials.

5. The S. Congregation of Religious. — This Congregation was formerly part of the Congre¬ gation of Bishops and Regulars, which at one time had great authority. It is now an inde¬ pendent Congregation, with its own Prefect and other officials. To this Congregation are referred all questions concerning the govern¬ ment, discipline, studies, property and privi¬ leges of religious and of all who live the life of religious. Hence all orders of men or of women, and the so-called third orders, are sub¬ ject to the supervision of this Congregation. It decides also questions of entrance, novitiate, studies, discipline, etc., of the religious orders ; and it is competent to grant dispensations in the same matters.

6. The S. Congregation of the Propaganda (de propaganda Fide). — Since it is the mission of the Church (

503

Scotland and Canada are withdrawn from the Propaganda and placed under the hierarchy or common government of the Church. The Propaganda still regulates ecclesiastical affairs in many parts of the world. In such places it not only provides for the preaching of the Gos¬ pel, but regulates all things <(necessary and op¬ portune® to the work of the Church. It can¬ not however infringe on the rights of other congregations in matters peculiarly subject to them. The Congregation is presided over by a cardinal called the Prefect-General. There are also a Prefect of Economy (who supervises temporalities) and a Protonotary Apostolic (for the records). The Congregation super¬ vises all societies of ecclesiastics and seminaries founded exclusively for foreign missions, and has besides a college of its own, called (VIII to prepare young men for mis¬ sionary labors.*

7. The Congregation of Sacred Rites. — Man naturally expresses his worship of God in an external manner. The rites and ceremonies which the Church makes use of in the worship of God are an external expression of the faith. To see' that the proper rites are observed, to make liturgical laws, to enforce and interpret them, to issue or approve of liturgical books is the duty of the Congregation of Rites. Hence the ceremonies of the celebration of Mass and the administration of the sacraments in the Latin Church, and the solution of all questions pertaining to them, depend on this Congregation. The Congregation of Rites also prepares the causes of Beatification and Canonization, and supervises the use of sacred relics. The num¬ ber of cardinals assigned to the Congregation of Rites depends on the reigning Pontiff. There is always a Prefect, a Secretary, the Promoter of the Faith, a Chancellor, a Hymnographer who arranges and corrects the offices of the saints and other liturgical prayers, and a num¬ ber of consultors.

8. The S. Ceremonial Congregation. — This Congregation is entrusted with the direction of ceremonies to be observed in the Papal Chapel and Court, and of the sacred functions which cardinals perform outside of the Papal Chapel. It also decides questions of precedence among cardinals and among ambassadors accredited to the Holy See.

9. The S. Congregation for Extraordinary Ecclesiastical Affairs. — This Congregation deals with Church government in matters that are arranged according to Concordat with some civil government. Hence' it is entrusted with the erection and division of dioceses and with the filling of vacant sees when these are sub¬ ject to Concordat. Special questions may be re¬ ferred to it by the Pontiff through the Secre¬ tary of State.

10. The S. Congregation of Studies in Sem¬ inaries and Universities. — This Congregation watches over the government, discipline, tem¬ poral administration and course of studies in ecclesiastical seminaries, except those subject to the Propaganda. It also moderates discipline and course of studies in Catholic universities, examines and approves new institutions, grants the faculty for giving degrees and determines the requirements for them, and may itself con¬ fer degrees on anyone distinguished for learn-

CONGRESS

507

ing. 1 he Cardinal Secretary of the Consisto- rial Congregation is ex officio a member, and the .Assessor of the same Congregation is ex officio a Consultor of Studies. The beginnings of the Congregation of Studies may be found in the. Bull of Sixtus V. But the learned Leo XIII is generally considered to have perfected its institution, as he extended its authority to all Catholic universities of the world. The Congregation of Seminaries and Universities, founded in 1915, was distinct from the Congre¬ gation of Studies. Now however both form one Congregation under the fuller title, and this Congregation has jurisdiction over both semi¬ naries and universities, and watches over dis¬ cipline as well as studies.

11. The S. Congregation for the Oriental Church. — This was formerly part of the Con¬ gregation of the Propaganda, but is now an in¬ dependent Congregation. To it belong all af¬ fairs which touch persons, discipline or rites of the Oriental Churches, even if these concern Latins also. So that this single Congregation has the same powers for the Oriental Churches that all the other congregations have for the Latin Church, without however infringing on the authority of the Holy Office which is in its own sphere truly of universal jurisdiction. The Pope is the Prefect of the Congregation of the Oriental Church. The Congregation settles matters administratively only. Judiciary ques¬ tions are referred to tribunals designated by the same Congregation.

Besides the foregoing the Sovereign Pontiff makes use of commissions for the performance of certain duties. See Curia Romana and con¬ sult Ferraris, ; Wernz, (Jus DecretaliunP (Vol. II, p. 11) ; Ojetti, Synop¬ sis Rerum Moralium et Juris PontificiP ; Father Augustine, (A Commentary on Canon Law) (Vol. II, St. Louis 1918) ; Constitution, (Sapienti Consilio) (1908) ; (Codex Juris

CanonicP (Canons 246 et seq.).

John F. Turner, D.D., St. Joseph's Seminary, Dunwoodie, N. Y.

CONGRESS (Lat. <(coming together,® ˆmeeting®), a meeting of rulers or representa¬ tives of several states, to adjust disputes be¬ tween different governments. It is necessary to distinguish the meeting in which prelim¬ inaries are settled, from the principal congress, which is to bring the affair in question to a decision. The plenipotentiaries when they meet, after mutual greetings, appoint, in a preliminary conference, the day on which the congress is to be opened, and determine the manner in which business is to be transacted, the forms of ne¬ gotiation, the order of precedence among the different powers and the time of session. The congress opens by the exchange and perusal, of credentials among the plenipotentiaries, which, in case the negotiating parties have, referred, to the arbitration of a mediator, are given to him. The envoys of the contending powers then carry on their negotiations directly with each other, or by the intervention of a mediator, either in a common hall or in their own resi¬ dences by turns, or, if there is a mediator, in his residence. These negotiations are con¬ tinued either by writing or by verbal commu¬ nication, until the commissioners agree upon a treaty, or until one of the powers dissolves the congress by recalling its minister. Such meet¬

ings of the representatives of different countries are sometimes called conferences. The nominal difference between a conference and a congress is this, that the representatives of the different countries at the former are the ordinary ambassadors of the respective countries at the court at which the conference is held, while the representatives at the latter are specially deputed for the purpose. Among congresses of the 19th century the chief are the Congress of Vienna, 1815; of Paris 1856; of Berlin 1878; The Pan-American Congress at Washington, D. C. (1888-90).

CONGRESS, Continental. The first recog¬ nition of a solidarity of interests among the English colonies in America, and attempts at joint action against a common foe, were made in 1690, by Jacob Leisler, revolutionary dictator of New York; and his efforts were stimulated by the fact that New York bore the first brunt of Canadian invasion, and needed help. He invited the other colonies to send delegates to New York and contribute men and money for a counter-invasion ; but none farther south than Maryland responded. A much more com¬ prehensive plan was devised by Franklin in 1754 (see Albany Congress), but fell through. In 1765, on occasion of the Stamp Act (q.v.), a colonial congress from all the North except New Hampshire, and only South Carolina of the South below Maryland, met at New York 7-25 October, but took no action except to petition Parliament. In 1773, when the Revolu¬ tion was impending, Franklin renewed his former suggestion in a letter to the assembly of Massachusetts, whose agent in London he was, but still nothing was done.

The next year, however, on receiving news of the Boston Port Bill, Virginia proposed to the other colonies a Continental Congress in the fullest sense; that is, including Canada, for it was not doubted that this recently subjugated province would gladly join in a revolt against its conqueror. Massachusetts responded 7 June, others followed, and the first real American Congress met in Philadelphia, 5 Sept. 1774, sitting till 26 October. Canada, however, was not represented ; nor was Georgia, though it shared in all succeeding Congresses. The in¬ structions to the delegates did not contemplate separation or forcible resistance, but only the proposal of measures to ((restore harmony® with Great Britain ; and the Congress merely drafted addresses to the king and the people of that country, to the Canadians, and to their own constituents, and recommended non-im¬ portation and non-exportation agreements, and the forcible resistance to any forcible attempt to carry out the Parliament's taxation measures. It also advised the immediate election of dele¬ gates to a fresh Congress in Philadelphia 10 May 1775; which was carried out by various bodies — legislative assemblies in some cases, popular conventions or committees of safety (q.v.) in others. None of these had any legal power to act for this purpose, and the title of all alike was the will of the force majeure of the people; for the loyalist section had equal right to oppose the elections, and it was tacit acceptance of superior fighting force that gave the title. The fact that this Congress was con¬ sidered necessary at all, and was to have power to organize combined resistance to Great Brit¬ ain, would be conclusive evidence that the

leaders of public opinion had determined on independence unless highly improbable conces¬ sions were made, were it not for the extreme reluctance the Congress displayed in declaring it, only doing so under irresistible urgency from public opinion. A parallel case is the memory of the hopes of accommodation and conciliation by Union leaders not only in 1860-61, but all through the Civil War. The frequent charge of hypocrisy against the Revolutionary leaders involves one against all the patriotic statesmen of the decade before 1860.

As soon as war was actually proclaimed by Great Britain the second Congress assumed the fullest powers of sovereignty; much greater than those of the British Parliament, for it combined the powers of that body with those of the king, being itself both executive and legislative head of the nation. It raised military and naval forces and directed belligerent opera¬ tions with them, authorized privateering, con¬ tracted treaty alliances, issued national cur¬ rency, etc., in both capacities. This was by no usurped power, but by the urgency of the people, who were far more anxious to have it take the powers than it was to exercise them. The provincial congresses appealed to it for authorization, and the people urged it to more energetic action. Its crowning act was the Declaration of Independence; its business from 12 July to 20 August the debating of the scheme of government it had drafted (see United States — Articles of Confederation), but which was not put in force for five years, and for which it was perhaps slight misfortune to have waited. It sat till 12 Dec. 1776.

The session of 20 Dec. 1776 has been hesi¬ tantly called the third Continental Congress ; for the delegates were selected entirely by the State legislatures, and the body as a whole had a title more definite and regular, though not in reality more legal. But in fact, the second Con¬ gress, from the opening on 10 May 1775, was a continuing body in perpetual session ; with no definite term of sitting or terms of member¬ ship ; the State legislatures which had selected members did not specifically send new ones for the new session, but each chose them for such terms as it pleased — Congress exercising no right of control in this matter — and recalled them at will. Each State had but one vote, all being thus equal, as in the Senate, where each has two ; but in the Senate the members have individual votes. This provision in the Con¬ tinental Congress was avowedly made only be¬ cause a census could not then be taken to ascer¬ tain the relative populations. As under the Confederation, the Congress dealt with States, not individuals ; and much of the impotence with which it is reproached in the Revolution was involved in this, though not all of its follies are thus excusable. Some of its worst perform¬ ances, however — as the misdealing with the officers which drove some of them from the service permanently and others temporarily, and deeply injured the cause — were directly due to the tenacious individuality of the States, which claimed their share of the military patronage then as thev do of the civil patronage now.

A history of the Congress is a history of the country during its lifetime; but some of its migrations are

significant of military reverses and recoveries. From 20 Dec. 1776 to 4 March

1777 it sat at Baltimore; 4 March to 18 Sept. 1777, at Philadelphia; 27 Sept. 1777, at Lancas¬ ter, Pa.; 30 Sept. 1777 to 27 June 1778, at York, Pa.; 2 July 1778 to 21 June 1783, at Philadel¬ phia. But before this it had ceased to be the Continental Congress, and had become the Con¬ gress of the Confederation, on 2 March 1781, after the ratification of the Articles by Mary¬ land. Consult Histories of the United States by Bancroft, Hildreth, Schouler, Von Holst, etc.; Fiske, 'Critical Period of American History)

(1888).

*CONGRESS, Library of. The National Library of the United States, an institution in Washington, D. C., since its removal from the Capitol in 1897, occupying the building erected for its accommodation under the acts of Con¬ gress of 15 April 1886, 2 Oct. 1888 and 2 March 1889, at a cost of $6,347,000 (limit by law, $6,500,000) exclusive of the land, which cost $585,000. The building occupies three and three-quarter acres upon a site 10 acres in extent at *a distance 1,270 feet east of the Capitol, and is the largest and most magnificent library building in the world. In the decora¬ tions, 40 American painters and sculptors are represented. The floor space is 326,195 square feet or nearly eight acres. The book stacks contain about 100 miles of shelving, affording space for 3,540,000 octavo books and 84,000 ..volumes of newspapers. Annual appropriations are made by Congress for various purposes. In 1916 these amounted to $660,105, covering serv¬ ice and contingent expenses $451,460; purchase of books, $98,000; building and grounds, $110,- 645. The number of employees is 541 ; for the library proper, 255; distribution of cards, 44; disbursement and care of buildings and grounds, 134; legislative reference, 17; and for the copyright office, a distinct division of the li¬ brary, 91. The main reading room, the period¬ ical reading room and a reading room for the blind, are open to the public from 9 a.m. to 10 p.m. week-days, and from 2 p.m. to 10 p.m. Sundays and holidays, except Christmas Day and the 4th of July. The Library of Congress was established in 1800, destroyed in 1814 by the burning of the Capitol, afterward replenished by the purchase by Congress of the library of ex-President Jefferson, 6,760 volumes (cost, $23,950) ; in 1851, 35,000 volumes destroyed by fire ; in 1852, partially replenished by an appro¬ priation of $75,000; increased (1) by regular appropriations by Congress; (2) by deposits under the copyright laws; (3) by gifts and exchanges; (4) by the exchanges of the Smith¬ sonian Institution, the library of which (40,000 volumes) was, in 1866, deposited in the Library of Congress, with the stipulation that future accessions should follow it. Fifty sets of gov¬ ernment publications are placed at the service of the Library of Congress for international exchanges through the Smithsonian. Other special accessions have been : the Peter Force collection (22,529 volumes, 37,000 pamphlets), purchased 1867, cost $100,000; the (Count de) Rochambeau collection (manuscript), pur¬ chased 1883, cost $20,000; the Toner collection (24,484 volumes, numerous pamphlets), gifts in 1882 of Dr. Joseph M. Toner; the Hubbard collection (engravings), gift in 1898 of Mrs. Gardiner G. Hubbard ; in 1905, 72 manuscript maps once owned by Richard, first Earl Howe, ami 860 letters received by President Van*

Buren. Notable recent accessions are the Weber library of Sanskrit literature, 3,018 volumes, 1,002 pamphlets; the Hattala (Slavic, about 1,500 volumes) ; Yudin (Russian, 80,000 volumes) ; the Huitfeldt-Kass (Scandinavian, 5,000 volumes) ; the John Boyd Thacher col¬ lection of Incunabula (deposited); the Deinard collections of Hebraica comprising upward of 14,000 titles given to the library by Mr. Jacob H. Schiff in 1912 and 1914; the Henry Harrisse bequest, 1914, of 220 volumes and pamphlets, mostly dealing with early phases of American history; and the gift, 1915, from Mr. Nieh Chi-Cheh, vice-chairman of the Honorary Com¬ mercial Commission from the Republic of China, consisting of a diary kept by his grand¬ father, in 40 volumes. The entire collection, now the largest in the American hemisphere and the third in the world, is rich in history, political science, in Federal documents and Americana in general, including important files of American newspapers and original manu¬ scripts of colonial, revolutionary and formative periods. At the end of the fiscal year 30 June 1920 the collection comprised 2,710,556 printed books and pamphlets (including the law library which, while a division of the Library of Con¬ gress, still remains at the Capitol), manuscripts, maps and charts, pieces of music and photo¬ graphs, prints,

engravings and lithographs, numbering about 1,000,000. While it is pri¬ marily and essentially a reference library, it maintains an inter-library loan system by which special service is rendered to scholarship by the loan of rare and unusual books to other li¬ braries for the use of investigators engaged in serious research. Through its distribution of printed catalogue cards it also places at the disposal of all libraries, large or small, the best expert cataloguing and book information at a price much below the cost of even the crudest manuscript cataloguing. The service which perhaps reaches more citizens than any other is the response made to letters of inquiry from all parts of the country and on every con¬ ceivable topic. The relations of the Library of Congress to the other government libraries (which number about 63 out of a total of 137) are also of necessity very close, since they are all under the same controlling influence — service to the Federal government. Its rela¬ tions to the libraries of Washington city, not governmental, while less direct, are hardly less intimate. They all draw from its immense reservoir, and their acquisitions and even their management are largely influenced by their proximity to the Library of Congress. Several of the larger government libraries have attained a real distinction, notably the Library of the Surgeon-General's Office, 7th and B streets S. W., which is now perhaps the leading medical library of the world containing about 525,000 volumes and pamphlets ; the library of the Department of Agriculture at 12th and B streets, consisting of about 155,000 volumes; the library of the Bureau of Education in the old Post-Office Department building at 8th and F streets, N. W., containing about 175,000 vol¬ umes ; the library of the Geological Survey at 1330 F street, containing over 190,000 volumes; the Public Documents Library; the libraries of the Bureau of Labor Statistics, of the Rec¬ lamation Service, of the Bureau of Standards, and of the Bureau of Railway Economics;

while the libraries under the jurisdiction of the Smithsonian Institution offer an interesting group to those concerned with the natural sciences. The largest is the library of the National Museum, containing 300,000 volumes, and about 75,000 unbound pamphlets, the largest assemblage of the transactions of learned so¬ cieties which exists in the country. Altogether the Library of Congress with its affiliations is considered by many who are familiar with the national libraries of foreign countries to be more truly a national library than any other in the world in the extent and variety of the functions it performs and the service it renders to libraries and to citizens throughout the country. The chief librarians since its incep¬ tion have been : 1800-14, the contemporary clerk of the House of Representatives; 1815-29, George Watterson; 1829—61 , John S. Meehan; 1861-64, John G. Stephenson; 1864-97, Ains¬ worth R. Spofford; 1897-99, John Russell Young; Herbert Putnam since 1899.

CONGRESS OF THE CONFEDERA¬ TION. See Congress, Continental.

CONGRESS AND EXECUTIVE. See

Executive.

CONGRESS OF RELIGIONS or WORLD'S PARLIAMENT OF RE¬ LIGIONS. A congress held at the Columbian Exposition, Chicago, in 1893, in an attempt to bring together in one great world convention representatives of the great and historic re¬ ligious creeds of the world. The congress was very successful, and all its meetings passed off in perfect harmony, notwithstanding the doubt previously expressed in many quarters as to the expediency of calling such a congress at the World's Fair which was to be essentially a bid for the amity and co-operation of the nations. The Congress of Religions, which was what its name implies, was made up of representa¬ tives of the creeds of all the great countries of the world ; and it treated of almost every as¬ pect of religion. It was the outcome of many attempts to bring together the great religions of the world. The idea of a union of this kind had often appeared in Chinese fiction and poetry; and both China and Japan had led the way in religous toleration by allowing various creeds to flourish side by side in their respective territories hundreds of years before religious toleration was thought of in Europe. More than three centuries ago John Comenius, the great religious thinker and reformer, had sug¬ gested such an idea. Almost half a century ago the Free Religious Association of Boston advocated the idea of a congress of the va¬ rious religions of the world with a view to mak¬ ing a scientific study of religious thought, origin and growth. In 1873 b.c. the Buddhist Emperor of India, Asoka, called a congress of all the religions of the East, and more espe¬ cially those of India, at Palateputra, now Patna ; and he actually gathered the brightest minds of the East in religious circles in the congress, which was a pronounced success. So the religious centres of India, owing to their comparative liberalism, were ready to respond to the call issued in June 1891 for a Congress of Religions to be held in Chicago in connec¬

tion with the World's Fair in 1892. The expo¬ sition was unavoidably postponed until the fol-

lowing year and with it the meeting of the Congress of Religions. This was fortunate for the latter as it gave the organizers much more time in which to reach the leaders of religious thought throughout the world. The World's Parliament of Religions, as the congress was ultimately named, set for its aim a wide and varied program which included the bringing together into a congress of leading representa¬ tives of the great historic religions of the world; the showing of the important truths held by various religions; the promoting of the spirit of human brotherhood among re¬ ligious men of diverse faiths ; the setting forth of the important distinctive truths held and taught by each religion and by the various branches of Christianity. It aimed to indicate the impregnable foundations of theism and the reasons for man's faith in immortality ; the spiritual and other effects of the various re¬ ligions upon literature, art, commerce, govern¬ ment and domestic and social life. The Con¬ gress was asked to consider what light each religion has afforded or may afford to other religions; the present condition and outlook of religions among the leading nations of the world and the light religion has thrown upon the great problems of the present age, such as temperance, labor, education, poverty, wealth. The promoters expressed their hope of eventu¬ ally bringing about permanent international peace by bringing the nations of the earth into a more friendly fellowship. Consult (World's Parliament of Religions, 5 a collection of the addresses made at the congress and an account of the proceedings of the same.

CONGRESS OF THE UNITED STATES. The legislative branch of the Federal government of the United States. The discussion of this body falls naturally into three parts: (1) The constitutional mandates con¬ cerning it; (2) its own rules and usages; (3) its practical functions as developed by historical evolution.

1. By the first article of the Constitution, the legislative power of the country, so far as granted at all, is ((vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.®

The Senate must consist of two senators from each State (thus equalizing the power of the States to safeguard their own interests), elected by the State legislatures for six years; the terms so arranged that one-third are vacated every two years, making it a continuing body. Each legislature fills any vacancy in its State delegation caused by death or resignation, but if one occurs while it is not in session, the gov- ernnor of the State may fill it pro tern, till the legislature meets. A senator must be 30 years old, nine years a citizen and an inhabitant of the State which elects him ; but the legal definition of residence is impliedly left to the State. The president of the Senate is the Vice-President of the United States, who has only a casting vote; but in his absence, or on his accession to the presidency, it shall choose a president pro tern. All impeachment trials are its preroga¬ tive, to be decided by a two-thirds vote; if the President is impeached, the chief justice pre¬ sides; it can inflict no punishment but removal from and disqualification for office. No treaties are valid without the consent of two-thirds of the Senate ; nor any appointment to office by

the President without the consent of a majority of it, unless Congress takes away this power from the senatorial half of itself, which it is not likely to do.

The House must consist of members chosen for two years by popular election, so that each House is a new body; the voters to be the same who choose the most popular branch of each legislature ; each member must be 25 years old, seven years a citizen, and an inhabitant of the State. The number from each State must be graded by population, determined by a decennial national census (in the body of the Constitu¬ tion, three-fifths of the slaves are to be counted in, a provision made obsolete by the Thirteenth Amendment). These representatives must not exceed one to 30,000 inhabitants — which would allow a maximum of about 2,550 at present, in place of the actual 440. The members receive an annual salary, determined by Congress, the amount of which at present is $7,500. In case of vacancy, the State executive is to issue a writ of election to fill it. The House chooses its own speaker who receives a salary of $12,000. And lastly, it has the sole power of presenting the impeachments which the Senate has the sole power of trying.

The State legislatures were to fix the times, places and manner of electing members of either House, subject to the right of Congress to change anything but the place of electing sena¬ tors, which was the legislative chamber until 1913, when the 17th Amendment to the Consti¬ tution, providing for the direct vote for senators by the people, was ratified and declared in force. But the numerous deadlocks and failures to elect, due to the two branches of the legislature being under different political control, and the minority House refusing to meet the other for an election, led to the law of 2 July 1866, pre¬ scribing a uniform rule for all States. Congress is to meet at least once a year ; on the first Mon¬ day in December unless it orders otherwise. The President can convene a special session on "extraordinary occasions® ; but he cannot ad¬ journ or prorogue it except in case of disagree¬ ment between the Houses — a provision sug¬ gested, like so many others, by the quarrels of the English Parliaments with the kings. Each House is the judge of the qualifications of its own members. A majority of each constitutes a quorum; but a single member can adjourn from day to day, and can compel the attendance of enough absent members to make a quorum if the House will provide a rule for so doing. Each House makes its own rules of procedure, can punish members for disorderly behavior and two-thirds can expel a member. Each must keep a journal of its proceedings (see Censure, Congressional, for argument on the implica¬ tions of this), and publish it, except such part as the House judges best to keep secret. One- fifth of the members present at any time may compel a yea and nay vote to be taken on any question and entered on the journal. Neither House during a session shall adjourn for more than three days or to any other place, without consent of the other. Members of both Houses shall be paid by the nation. They shall be exempt from arrest during the session and in journeys to and from, and from liability for any utterances in debate — a reminiscence of the burning need of such provision in older English history; not often invoked now, and still less

often for creditable reasons. No member shall be appointed to any office created or its pay increased during his term — again a souvenir of temporary political squabbles ; and no office¬ holder shall be at the same time a member. Bills for raising revenue must originate in the House (originally a safeguard for the large States, against the small ones using their power in the Senate to throw the financial burdens on their richer neighbors) ; but the Senate can pro¬ pose amendments. Bills vetoed by the Presi¬ dent must be reconsidered by, and the objec¬ tions entered in full on the journal of, the House where they originated; and a two-thirds vote may pass it to the other House, a two- thirds concurrent vote of which makes it a law. (The first Congress, on the question arising, de¬ cided this to mean two-thirds of those present and voting, not of the whole membership). Such votes must be yea and nay and entered on the journals. A bill not returned by the Presi¬ dent within 10 days (Sundays excepted) be¬ comes a law ipso facto, unless Congress ad¬ journs meanwhile, when it lapses. No order, resolution or vote of the concurrent Houses is valid without the assent of the President, ex¬ cept one to adjourn.

The powers of Congress arc generally those inherent in every sovereign assembly of the people; but there are two important restrictions. The President's veto (above) is a very real restraint on tyranny by a bare majority, perhaps not honestly obtained and always inviting dis¬ honesty with such supreme power; and it re¬ tains full vitality, while the English royal veto has perished. Still more important is its con¬ finement by the Constitution to the powers ex¬ pressly granted : its laws are invalid if pro¬ nounced by the Supreme Court contrary to the Constitution, while a majority vote of the Eng¬ lish Parliament could theoretically abolish the monarchy or hang the entire population. Too much is sometimes made of this, however. The (

publish the disposition of the money drawn, was not one.

There being at present 48 States, the num¬ ber of senators is 96. The number of repre¬ sentatives has never been determined by the constitutional provision, whose minimum was fixed when the country had but 2,500,000 or so of inhabitants. The maximum has been slowly 'enlarged at each census, each State retaining all it had, while the States with increased popu¬ lation have been given more members. The basis of apportionment under the census of 1910 is one representative to every 212,407 in¬ habitants. This furnishes the following repre¬ sentation for the several States: Alabama, 10; Arizona, 1; Arkansas, 7; California, 11; Colo¬ rado, 4; Connecticut, 5; Delaware, 1;

Florida, 4; Georgia, 12; Idaho, 2; Illinois, 27; Indiana, 13; Iowa, 11; Kansas, 8; Kentucky, 11; Louisi¬ ana, 8; Maine, 4; Maryland, 6; Massachusetts, 16 ; Michigan, 13; Minnesota, 10; Mississippi, 8; Missouri, 16; Montana, 2; Nebraska, 6; Nevada, 1; New Hampshire, 2; New Jersey, 12; New Mexico, 1; New York, 43; North Carolina, 10; North Dakota, 3; Ohio, 22; Oklahoma, 8; Ore¬ gon, 3; Pennsylvania, 36; Rhode Island, 3; South Carolina, 7 ; South Dakota, 3 ; Tennessee, 10; Texas, 18; Utah, 2; Vermont, 2; Virginia, 10; Washington, 5; West Virginia, 6; Wiscon¬ sin, 11 ; Wyoming, 1 ; and 5 delegates from Ter¬ ritories as follows : Alaska, Hawaii and Porto Rico, 1 each; Philippines, 2. Total, 440.

2. Each house has its own system of rules for business (78 in the Senate, 45 in the House), with vital differences. The most far-reaching is the previous question in the House and the absence of it in the Senate. The reasons for the difference are obvious : the great number of representatives, and the fact that most bills are first introduced there, would make business not merely difficult but impossible if everyone could talk at will to any length; the smaller numbers and lesser business of the Senate en¬ able free debate to be retained. The House restricts speeches to an hour; the Senate has no restriction except that a member cannot speak over twice a day on the same question. Each system of course has its attendant possibility of evil : the suppression of needful public light on bills in the one case, ˆfilibustering® and holding up of public business by a factious or inter¬ ested minority in the other. The business of both houses is done by committees; neither will consider bills or memorials at once on presenta¬ tion, except on suspension of the rules — which to be sure, during the latest days of a session, lets through vast numbers of undebated, un¬ examined and unknown bills. But by rule they must be referred to some standing committee, of which there are now 48 in the House and 32 in the Senate, besides 10 select committees in the House and 12 in the Senate; and three joint standing committees. The functions of these committees are assigned by the rules ; but as these lap over, two or three committees often contend vigorously for the possession of some one bill. In the Senate, these bills are pre¬ sented in open session on the floor; in the House they are handed to the clerk indorsed with such reference or disposition as the pre¬ senting member wishes made. These commit¬ tees are appointed in the House by the Speaker; in the Senate they are chosen by caucus of the majority party and elected by a single yea and

nay vote though the rules say hy ballot <(unless otherwise ordered.ˆ In case of differences be¬ tween the Houses which continually occur, they are harmonized by committees of confer¬ ence, three senators and three representatives. The most steadily powerful of these committees, which can obtain the floor at any time, are those on Appropriations in each house, disbursing the money in the treasury, and on Privileges ancf Elections, deciding the right of every member to his seat; next to these, on revenue (Ways and Means in the House, Finance in the Sen¬ ate), with enormous power to help or harm the great businesses of the country — many think too much — and on Printing, which of course is an immediate matter. Next in actual favor come, perhaps, those on Rivers and Harbors and on Pensions, branches of that on Appro¬ priations which they involve; and when new States are to be admitted, on Territories. In formal dignity the Senate committees on For¬ eign Affairs, on the Judiciary and on Military and Naval Affairs, take high rank; so in the House do those on Rules, Foreign Affairs, Ju¬ diciary, Military Affairs and Naval Affairs ; and of course special circumstances at any time may temporarily make any one of these, or almost any other committee, the centre of in¬ terest to which everything else must give way. In some respects most important of all except the Appropriations Committee are the special conference committees, which do an immense share of the actual legislation of the country : they compromise conflicting business and politi¬ cal interests, include or exclude bills, decide on appropriations, etc., and being usually appointed in the crowded closing days of a session, gen¬ erally have their recommendations heeded.

3. The changes in congressional functions and relations, from the intent of the framers of the Constitution, come under three heads :

(1) The position of Congress as a whole re¬ garding the executive; (2) the position of the two houses regarding each other; (3) the posi¬ tion of the whole body regarding legislation.

(1) The Constitution attempted a total sepa¬ ration and absolute equality between the execu¬ tive

and legislative branches, the latter deciding on measures of public welfare and the formej carrying them out. How far this would be de¬ sirable if perfectly accomplished — altogether forbidding one branch of ihe government to think and the other to act — might be ques¬ tioned, but will not be argued here. At any rate, it was never remotely realized except when both were in deadly need of the same thing, or one was content to forego thinking. The ideal example of its best is probably the Lincoln ad¬ ministration, a strong executive and a strong Congress with the same essential purposes; of its worst, the Johnson administration, where the thoughts of the one and the acts of the other were at irreconcilable variance, and what the one most wished done was what the other was most set on not doing. More usually, one side or the other has been master. The extreme instance of executive mastery was the Jackson administration, where a resolute and aggressive leader, with a not too reflective popular ma¬ jority behind him, got such legislation as he wished; of congressional mastery, each reader may prefer to choose his own instance. But there can be no question that the balance in¬ clines more and more decisively to the con¬

gressional side. Of late years the results of attempted executive independence have been more picturesque than successful. The Senate, which has the confirmation of treaties and ap¬ pointments, cannot be prevented from signify¬ ing in some form what treaties and appoint¬ ments it will confirm ; and the body which can grant or refuse money for public purposes can decide what those purposes shall be.

(2) The change of power between the Houses is not so dramatically obvious, but it is quite as notorious and is easily explicable. The Senate has some superiorities : its long terms both attract superior men on an average and enable them to acquire parliamentary knowledge and public weight; its committees are still its servants rather than its masters — preparing legislation for it to discuss, rather than merely killing most of it, and leaving the rest to run in an undiscussed huddle through the open sluice at the last; and it has time and rules that permit some genuine argument, for its own and the public's enlightenment. But these very terms render seats so valuable and desirable that members are more loath to peril them than House seats ; and the Senate, which was ex¬ pected to have more independence than the House from the length of terms, has actually of late years had less backbone and less willing¬ ness to run counter to popular currents within its own party than the House. Moreover, the license of debate has too often been a mere license of wanton obstruction, bringing forward no new facts or illuminating discussion, but only exhibiting the spectacle of the will of 100,000,000 people nullified by one or two of its servants. This does not contradict, but only supplements, the other evil. On the other hand, the unity and dispatch of public business made possible in the House by the nominal autocracy and real leadership of the Speaker, aided by the committees and the previous question, have made it seem more and more the body where something is accomplished and the will of the people carried into execution.

(3) The drift of our form of government, and the coming position of Congress and its organs within it, are to some extent matters of prophecy rather than fact ; and political philoso¬ phers have been busy with them. But some things are certain, and 'though commonplace, must be recited. Chief of them are the control of the Speaker and the committees over legisla¬ tion. That the Speaker is a totally different officer from the English Speaker is obvious. He puts motions, decides question of rule and order, and represses disorder, it is true ; but instead of being a sworn judge he is a recog¬ nized party chief, with functions which approxi¬ mate the English premier much more closely than the other. By his appointment of the com¬ mittees he determines the line which legislation shall take, and in a broad way the bills which shall or shall not be considered; and by his daily power of recognizing members who wish the floor, in which he is held to none but party re¬ sponsibility, he still further molds the total im¬ pression which the measures shall make on the public. But he is no autocrat; his very in¬ fluence can only be exercised by appointing the chief party leaders to the committees, and once there, it is they and not he who hold the deci¬ sive power; he and they together, in fact, form something like the shaping committee which

is what the English Cabinet, headed by the premier, has fully become. The Cabinet offi¬ cers, moreover, are fast becoming advisers of the committees rather than of the President. These approximations to the English position have caused many to think that the transforma¬ tion will be

fully carried out, and the parlia¬ mentary system established in fact if not in form in the future; the speaker having the full power of the premier, and the President be¬ coming a dignified nullity like the sovereign of England. But there are still some vital differ¬ ences, and it is not easy to foresee the process by which they will be overcome. It is true that the admission of Cabinet officers to the floor of either House, to expound their views and needs and explain doubtful questions, is within a sim¬ ple permissive vote of that House at any time, and can perfectly well be made a standing rule ; and that the consequent necessity of their being skilful speakers and capable expositors would profoundly modify the character of men chosen for that position. But the committee do not want information on the floor of the House of Representatives at least: they have no time to attend to it there, and the rules would mostly shut it off before anything material had been communicated. They want it in their commit¬ tee rooms, .and that, needs no change in the men and would involve none before the public. The officers cannot become primarily public speakers and secondarily executive officers un¬ less the House gives up its time to debate ; and the whole tendency is the other way, nor is it evident where the new time would be found or taken. The place where the change would have to take place is in the Senate, if at all ; but the power of legislation more and more drifts away from the Senate except as concur¬ rent ; and the new debaters, if they arrive, will seemingly be more in the position of those in the House of Lords than of Commons, which wrould be immaterial. Still greater is the ob¬ stacle of fixed terms. The English members of the Commons remain no longer when the people vote that they do not want them, and it is consequently the great party object to ob¬ tain such a vote and to put the other party in a position where they must be disgraced if they do not ask the people to give one pro or con. But the American member must serve out his term, and he can do so if his party has lost all public favor: the tremendous sweep of 1874 did not shorten any Republican member's term for a day, nor imperil any piece of Republican legis¬ lation, for which they had an entire session after they were voted down, and as many spe¬ cial ones as the President had chosen to call; and similarly with reverses of the other side. This alone prevents debate from taking up time in the House ; it is mainly a sham battle, the real one having been fought in committee. Still further, the English committee called the Cabi¬ net is all of one party, represents it, goes down with it; and the bills it puts forward are the party's bills.

F. M. Cockrell,

Late United States Senator from Missouri.

CONGRESS OF THE UNITED STATES, Sessions of and Politcal Parties in.

In accordance with the usage of the (Annals of Congress, > the < Register of Debates in Con¬ gressˆ the Congressional Globe and the Con- vol. 7 — 33

gressional Record, we have used the legislative day for the termination of the first 56 Con¬ gresses and the calendar day beginning with the 57th Congress in 1901. The practice of Con¬ gress in this connection is based on the fact that it does not recognize :he calendar day but only the legislative day, nor are Sundays and the fore'noon of 4 March recognized as legisla¬ tive days. The legislative day of 3 March does not expire until 12 o'clock noon of 4 March. In the Monthly Catalogue United States Public Documents (No. 195, p. 492, March 1911) is¬ sued by the superintendent of public documents, is the following note:

" If on any day either Senate or House refuses to adjourn, but instead takes a recess, no matter of what duration, the legislative day continues without regard to the almanac. This prolongation of the legislative day has, under the rules, various effects upon the status and the progress of pending bills and motions. . . . Whatever they may be, the

*legislative day remains simply a legislative fiction. The calendar day, the real day, of course can not be affected by any action of Congress. In the Proceedings of Congress as reported in the Congressional Record both the fictitious legislative date and the true calendar date have been pub¬ lished in recent years when the two dates conflict. Of course as a general rule the two dates harmoniously agree. It is only when a parliamentary struggle or * filibuster ' is afoot that the fictitious legislative day sets the Gregorian calendar at defiance. Almost the only cases in which the recognition of the legislative day affects the accuracy of the public records is when it makes the sessions of Congress seem to have closed at a time when they really did not close.*

“ The Constitution fixes the duration of Congressional terms, but the constitutional provision has been differently construed at different periods. In the early years of the Republic it was generally held that the term of a Congress lawfully ended at midnight of March 3 in the odd-numbered years. As a matter of fact it never did end then. The work of legislation was usually continued far into the small hours of March 4, despite earnest protests often made. Finally, March 3, 1851, both the Senate and the House took official action determining that the legal date for the closing of Congress is 12 o’clock noon of March 4 (Consult A. C. Hinds, ‘Precedents of the House of Representatives,’ Vol. V, pp. 862-863). This ruling has been ever since invariably fol¬ lowed. Whenever the legislative varies from this date as the closing date of a Congress it is wrong. Minor departures, provided for by turning back the official clocks, and winked at by all departments of the government, have of course been disregarded in compiling the check list.”

In spite of this ruling and another in 1881, however, the Congressional Record continued to use the old legislative day as the running headline date until the end of the 56th Congress in 1901, though the text indicates the calendar days covered by the legislative days, which is very apt to confuse one not accustomed, to this method. Moreover, in several instances (as in the last sessions of the 39th, 50th, 53d and 56th Congresses) 3 March was Sunday, wherefore the Record is antedated to 2 March (Saturday), though the pages of the volumes themselves in¬ dicate not only that Congress sat on Sunday but also on Monday, 4 March. Hence, while the Record shows that in these cases a member of either House made a speech on Monday, 4 March, calendar day, he is said to have spoken on Saturday, 2 March, legislative day.

Another source of probable confusion to those unfamiliar with Congressional proceedings is the method pursued by Gales and Seaton in printing the (Annals of Congress.) The pro¬ ceedings of some special sessions will be found in the volumes containing the proceedings of the Congress which had just expired. For in¬ stance, the proceedings of the special session of the Senate 8-26 June 1795 (which was a part of the 4th Congress) will be found at the end of the proceedings of the second session of the 3d Congress. As they are incorporated therq

without explanation or comment of any kind, the reader may be misled into supposing that this session of the Senate belonged to the 3d Congress.

When the government came into being in 1789 there were two parties — the Federalist and Republican, which, like European and Eng¬ lish parties, were based largely on class distinc¬ tions. For all practical purposes the first ses¬ sion of Congress was non-partisan, since the few Senators and Representatives who openly avowed anti-Federalist sentiments never acted together as a party. But when the measures of Alexander Hamilton (q.v.) were introduced and pushed, the opposition gradually began to assume permanent form, though members did not consider themselves strictly party men. The following figures indicate as nearly as possible the number of those who upheld and those who feared and disliked the government and its measures.

First Congress

First session — 4 March to 29 Sept. 1789.

Second session — 4 Jan. to 12 Aug. 1790.

Third session — 6 Dec. 1790 to 3 March 1791.

Senate — 17 Administration; 9 Opposition.

House — 38 Administration; 26 Opposition.

Speaker of House — Frederick A. Muhlenberg (Pa.), Opposition.

After the first Congress opinions became more widely divergent and to the followers of Jeffer¬ son and Hamilton the names of Republicans and Federalists began to be attached. Still many mem¬ bers

of Congress were pleased to called them¬ selves independents, and not before the end of Washington's second term did party loyalty in its strict sense make its appearance. At the opening of the second Congress, the Federalists, being in the majority, took away the speakership from Muhlenberg and gave it to a recognized supporter of the administration.

Second Congress

Special session of Senate — 4 March 1791.

First session — 24 Oct. 1791 to 8 May 1792.

Second session — 5 Nov. 1792 to 2 March 1793.

Senate — 16 Federalists; 13 Republicans.

House — 37 Federalists; 33 Republicans.

Speaker of House — Jonathan Trumbull (Conn.), Fed¬ eralist.

In the third Congress the party majorities were reversed, and accordingly the Republicans again placed Muhlenberg in the Speaker's chair. From this time the election of a Speaker was indicative of the party strength in the lower house, whereas the office of President pro tem¬ pore of the Senate, though regarded as a party office, did not carry with it in later years the power accorded to the Speaker and hence never involved a test of party strength. For that rea¬ son no mention is made here of Presidents pro tempore of the Senate.

Third Congress

Special session of Senate — 4 March 1793.

First session — 2 Dec. 1793 to 9 June 1794.

Second session — 3 Nov. 1794 to 3 March 1795.

Senate — 13 Republicans; 17 Federalists.

House — 57 Republicans; 48 Federalists.

Speaker — Frederick A. Muhlenberg (Pa.), Republican.

In the fourth Congress the parties were nearly ■evenly divided, but while at the outset the Republicans were supposed to have a ma¬ jority, a moderate Federalist was elected Speaker, and on all important administrative measures the Federalists were able to control a majority. After the fourth Congress, how¬

ever, party lines became fixed and easily dis¬ tinguishable, wherefore the division in each house can be clearly indicated.

Fourth Congress

Special session of Senate — 8-26 June 1795.

First session — 7 Dec. 1795 to 1 June 1796.

Second session — 5 Dec. 1796 to 3 March 1797.

Senate — 13 Republicans; 19 Federalists.

House — 52 Republicans; 54 Federalists.

Speaker — Jonathan Dayton (N. J.), Federalist.

Fifth Congress

Special session of Senate — 4 March 1797.

First session — 15 May to 10 July 1797.

Second session — 13 Nov. 1797 to 16 July 1798.

Special session of Senate — 17-19 July 1798.

Third session — 3 Dec. 1798 to 3 March 1799.

Senate — 20 Federalists; 12 Republicans.

House — 58 Federalists; 48 Republicans.

Speaker — Jonathan Dayton (N. J.), Federalist; George Dent (Md.), pro tempore.

Sixth Congress

First session — 2 Dec. 1799 to 14 May 1800.

Second session — 17 Nov. 1800 to 3 March 1801.

Senate — 19 Federalists; 13 Republicans.

House — 64 Federalists; 42 Republicans.

Speaker — Theodore Sedgwick (Mass.), Federalist.

Seventh Congress

Special session of Senate — 4-5 March 1801.

First session — 7 Dec. 1801 to 3 May 1802.

Second session — 6 Dec. 1802 to 3 March 1803.

Senate — 18 Republicans; 14 Federalists.

House — 69 Republicans; 36 Federalists.

Speaker — Nathaniel Macon (N. C.), Republican.

Eighth Congress

First session — 17 Oct. 1803 to 27 March 1804.

Second session — 5 Nov. 1804 to 3 March 1805.

Senate — 25 Republicans; 9 Federalists.

House — 102 Republicans; 39 Federalists.

Speaker — Nathaniel Macon (N. C.), Republican.

Ninth Congress

Special session of Senate — 4-6 March 1805.

First session — 2 Dec. 1805 to 21 April 1806.

Second session — 1 Dec. 1806 to 3 March 1807.

Senate — 27 Republicans; 7 Federalists.

House — 116 Republicans; 25 Federalists.

Speaker — Nathaniel Macon (N. C.), Republican.

Tenth Congress

First session — 26 Oct. 1807 to 25 April 1808.

Second session — 7 Nov. 1808 to 3 March 1809.

Senate — 28 Republicans; 6 Federalists.

House — 118 Republicans; 24 Federalists.

Speaker — Joseph B. Varnum (Mass.), Republican.

Eleventh Congress

Special session of Senate — 4-7 March 1809.

First session — 22 May to 28 June 1809.

Second session — 27 Nov. 1809 to 1 May 1810.

Third session — 3 Dec. 1810 to 3 March 1811.

Senate — 28 Republicans; 6 Federalists.

House — 94 Republicans; 48 Federalists.

Speaker — Joseph B. Varnum (Mass.), Republican.

Twelfth Congress

First session — 4 Nov. 1811 to 6 July 1812.

Second session — 22 Nov. 1812 to 3 March 1813.

Senate — 30 Republicans; 6 Federalists.

House — 108 Republicans; 36 Federalists.

Speaker — Henry Clay (Ky.), Republican.

Thirteenth Congress

First session — 24 May to 2 Aug. 1813.

Second session — 6 Dec. 1813 to 18 April 1814.

Third session — 19 Sept. 1814 to 3 March 1815.

Senate — 27 Republicans; 9 Federalists.

House — 112 Republicans; 68 Federalists.

Speakers — 1813-14, Henry Clay (Ky.), Republican; 19 Jan. 1814-15, Langdon Cheves (S. C.), Republican.

After the War of 1812 came the era of good feeling, during which there was practically no opposition in Congress to Madison and Monroe, and while the old names persisted they ceased to have any political significance, beyond the

CONGRESS OF THE UNITED STATES

fact that few Federalists were appointed to of¬ fices under the national government. After 1815 the members of the House ceased to vote for a separate candidate for Speaker, so that it is almost impossible to state precisely the number of Federalists in Congress. Even in 1824, when the Republican presidential nomi¬ nation was to be made, a rough guess placed the number of Federalists in Congress at 40 or 45, but this was only conjecture. However, as closely as it is possible to come, the division was as follows :

Fourteenth Congress

First session — 4 Dec. 1815 to 30 April 1816.

Second session — 2 Dec. 1816 to 3 March 1817.

Senate — 25 Republicans; 11 Federalists.

House — 117 Republicans; 65 Federalists.

Speaker — Henry Clay (Ky.), Republican.

Fifteenth Congress

Special session of Senate — 4-6 March 1817.

First session — 1 Dec. 1817 to 20 April 1818.

Second session — 16 Nov. 1818 to 3 March 1819.

Senate — 34 Republicans; 10 Federalists.

House — 141 Republicans; 42 Federalists.

Speaker — Henry Clay (Ky.), Republican.

Sixteenth Congress

First session — 6 Dec. 1819 to 15 May 1820.

Second session — 13 Nov. 1820 to 3 March 1821.

Senate — 35 Republicans; 7 Federalists.

House — 156 Republicans; 27 Federalists.

Speakers — 1819-20, Henry Clay (Ky.), Republican; 15 Nov. 1820-21, John W. Taylor (N. Y.), Republican.

Seventeenth Congress

First session — 3 Dec. 1821 to 8 May 1822.

Second session — 2 Dec. 1822 to 3 March 1823.

Senate — 44 Republicans; 4 Federalists.

House — 158 Republicans; 25 Federalists.

Speaker — Philip P. Barbour (Va.), Republican.

Eighteenth Congress

First session — 1 Dec. 1823 to 27 May 1824.

Second session — 6 Dec. 1824 to 3 March 1825.

Senate — 44 Republicans; 4 Federalists.

House — 187 Republicans; 26 Federalists.

Speaker — Henry Clay (Ky.), Republican.

In 1825 Jackson became the presidential nominee of those opposed to the administration of President John Quincy Adams, which oppo¬ sition ultimately developed into the Democratic party. But Jackson's adherents had no definite policy in Congress, their main object being to elect Jackson, and hence the existence of Jack¬ sonian majorities in the Houses of Congress had no legislative significance. With the Jack- sonians it was purely a question of loyalty to their chief, and so long as he had no Congress- sional policy, his followers might differ widely on all other national issues save that of placing Jackson in the presidential chair. For some years the actual leadership in legislation was exercised by the minority members. In 1828 those who supported Adams took the name Na¬ tional Republicans, and the Jacksonians became known as Democrats.

Nineteenth Congress

Special session of Senate — 4-9 March 1825.

First session — 5 Dec. 1825 to 22 May 1826.

Second session — 4 Dec. 1826 to 3 March 1827.

Senate — 26 Administration; 20 Jacksonians.

House — 105 Administration; 97 Jacksonians.

Speaker — John W. Taylor (N. Y.), Administration.

Twentieth Congress

First session — 3 Dec. 1827 to 26 May 1828.

Second session — 1 Dec. 1828 to 3 March 1829.

Senate — 28 Jacksonians; 20 Administration.

House — 119 Jacksonians; 94 Administration.

Speaker — Andrew Stevenson (Va.), Jacksonian.

Twenty-first Congress

Special session of Senate — 4-17 March 1829.

First session — 7 Dec. 1829 to 31 May 1830.

Second session — 6 Dec. 1830 to 3 March 1831.

Senate — 26 Democrats; 22 National Republicans.

House — 139 Democrats; 74 National Republicans. .

Speaker — Andrew Stevenson (Va.), Democrat.

In the 22d Congress appeared some members of the Anti-Masonic party and there were some Democrats, followers of Henry Clay, who termed themselves Clay Democrats. After 1833 Jackson began to lose his following owing to his nullification policy (when the Nullifiers formed a separate faction) and his determina¬ tion to have Van Buren succeed him in the Presidency, which drove into opposition a num¬ ber of "State rights® Democrats. In the 24th Congress the National Republicans, Anti-Masons and State Rights or anti-Van Buren Democrats banded together as Whigs. After Van Buren became President, the Democrats who opposed the sub-treasury plan became known as Con¬ servatives, while a group of former State Rights Whigs supported Van Buren's policy and the Nullifiers rejoined the Democratic party.

Twenty-second Congress

First session — 5 Dec. 1831 to 16 July 1832.

Second session — 3 Dec. 1832 to 2 March 1833.

Senate — 25 Democrats; 21 National Republicans; 2 Anti- Masons.

House — 141 Democrats; 58 National Republicans and Clay Democrats; 14 Anti- Masons.

Speaker — Andrew Stevenson (Va.), Democrat.

Twenty-third Cong iess

First session — 2 Dec. 1833 to 30 June 1834.

Second session — 1 Dec. 1834 to 3 March 1835.

Senate — 20 Democrats; 6 State's Rights; 2 Nullifiers; 20 National Republicans.

House — 147 Democrats; 10 State's Rights; 7 Nullifiers; 43 National Republicans; 53 Anti-Masons.

Speakers — 1833-34, Andrew Stevenson (Va.), Demo¬ crat; 2 June 1834-35, John Bell (Tenn.), Democrat.

Twenty-fourth Congress

First session — 7 Dec. 1835 to 4 July 1836.

Second session — 5 Dec. 1836 to 3 March 1837

Senate — 27 Democrats; 25 Whigs.

House — 145 Democrats; 98 Whigs.

Speaker — James K. Polk (Tenn.), Democrat.

Twenty-fifth Congress

Special session of Senate — 4-10 March 1837.

First session — 4 Sept, to 16 Oct. 1837.

Second session — 4 Dec. 1837 to 9 July 1838.

Third session — 3 Dec. 1838 to 3 March 1839.

Senate — 30 Democrats; 3 Conservatives; 1 Nullifier; 18 Whigs.

House — 108 Democrats; 13 Conservatives; 11 Sub- Treasury Whigs; 107 Whigs.

Speaker — James K. Polk (Tenn.), Democrat.

Beginning with the 26th Congress, the vari¬ ous factions opposed to Van Buren united un¬ der the name YVhig and for the next 16 years, despite all disturbing influences, the two-party system held sway. In the 27th and 28th Con¬ gresses a few members were known as Tyler- ites but were soon absorbed in the Democratic party, while in the next Congress appeared the Native Americans who represented a move¬ ment against foreigners in the larger cities (see American Party). From 1849 to 1855 Congress contained a number of Free-Soilers, or Free Democrats as they afterward called themselves, composed of about an equal number of former Whigs and Democrats.

Twenty-sixth Congress

First session — 2 Dec. 1839 to 21 July 1840.

Second session — – 7 Dec. 1840 to 3 March 1841.

Senate — 28 Democrats; 22 Whigs.

Hails » — 124 Democrats; 118 Whigs.

Speaker — R. M. T. Hunter (Va.), Democrat.

Twenty-seventh Congress

Special session of Senate — 4-15 March 1841.

First session — 31 May to 13 Sept. 1841.

Second session — 6 Dec. 1841 to 31 Aug. 1842.

Third session — 5 Dec. 1842 to 3 March 1843.

Senate — 28 Whigs; 22 Democrats; 2 Tylerites.

House — 133 Whigs; 102 Democrats; 6 Tylerites.

Speaker — John White (Ky.), Whig.

Twenty-eighth Congress

First session — 4 Dec. 1843 to 17 June 1844.

Second session — 2 Dec. 1844 to 3 March 1845.

Senate — 25 Democrats; 28 Whigs; 1 Tylerite.

House — 142 Democrats; 79 Whigs; 1 Tylerite.

Speaker — John W. Jones (Va), Democrat; George W. Hopkins (Va.), pro tempore.

Twenty-ninth Congress

Special session of Senate — 4-20 Marcn 1845.

First session — 1 Dec. 1845 to 10 Aug. 1846.

Second session — 7 Dec. 1846 to 3 March 1847.

Senate — 31 Democrats; 25 Whigs.

House — 143 Democrats; 77 WTiigs; 6 Native Americans.

Speaker — John W. Davis (Ind.), Democrat.

Thirtieth Congress

First session — 6 Dec. 1847 to 14 Aug. 1848.

Second session — 4 Dec. 1848 to 3 March 1849.

Senate — 36 Democrats; 21 Whigs; 1 Independent.

House — 108 Democrats; 115 Whigs; 4 Independents.

Speaker — Robert C. Winthrop (Mass.), Whig.

Thirty-first Congress

Special session of Senate — 5-23 March 1849.

First session — 3 Dec. 1849 to 30 Sept. 1850.

Second session — 2 Dec. 1850 to 3 March 1851.

Senate — 35 Democrats; 25 Whigs; 2 Free-Soilers.

House — 112 Democrats; 109 Whigs; 9 Free-Soilers.

Speaker — Howell Cobb (Ga.), Democrat; Robert C. Winthrop (Mass.), Whig, pro tempore.

Thirty-second Congress

Special session of Senate — 4— 13 March 1851.

First session — 1 Dec. 1851 to 31 Aug. 1852.

Second session — 6 Dec. 1852 to 3 March 1853.

Senate — 35 Democrats; 24 Whigs; 3 Free-Soilers.

House — 140 Democrats; 88 Whigs; 5 Free-Soilers.

Speaker — Linn Boyd (Ky.), Democrat.

Thirty-third Congress

Special session of Senate — 4 March to 11 April 1853.

First session — 5 Dec. 1853 to 7 Aug. 1854.

Second session — 4 Dec. 1854 to 3 March 1855.

Senate — 38 Democrats; 22 Whigs; 2 Free-Soilers.

House — 159 Democrats; 71 Whigs; 4 Free-Soilers.

Speaker — Linn Boyd (Ky.), Democrat.

In 1854 the dispute over the Missouri Com¬ promise (q.v.) caused a split in the Whig party, most of the Southern members and many of the Northern joining a new party called the Amer¬ ican or Know-Nothing party. The other North¬ ern Whigs, the Free-Soilers and a few Demo¬ crats united to form the new Republican party (q.v.). When the 34th Congress convened there was much confusion as to exact party adhesion but by the second session there were three fairly well-defined groups.

Thirty-fourth Congress

First session — 3 Dec. 1855 to 18 Aug. 1856.

Second session — 21-30 Aug. 1856.

Third session — 1 Dec. 1856 to 3 March 1857.

Senate — 40 Democrats; 15 Republicans; 5 Americans.

House — 83 Democrats; 108 Republicans; 43 Americans.

Speaker — Nathaniel P. Banks (Mass.), Republican.

In the 35th and 36th Congresses the Demo¬ cratic party was rent by the dispute over ad¬ mitting Kansas under the Lecompton Consti¬ tution (q.v.), Douglas's followers opposing the administration. When the Civil War broke out in 1861 a Union party made its appearance in the northern slave States, later spread to the free States and ultimately for a short time was united with the Republicans.

Thirty-fifth Congress

Special session of Senate — 4-14 March 1857.

First session — ■ 7 Dec. 1857 to 14 June 1858.

Special session of Senate — 15-16 June 1858.

Second session — 6 Dec. 1858 to 3 March 1859.

Senate — 36 Democrats; 20 Republicans; 5 Americans; 3 Anti-Lecompton Democrats.

House — 118 Democrats; 92 Republicans; 15 Americans; 11 Anti-Lecompton Democrats.

Speaker — James L. Orr (S. C.), Democrat.

Thirty-sixth Congress

Special session of Senate — 4—10 March 1859.

First session — 5 Dec. 1859 to 25 June 1860.

Special session of Senate — 26-28 June 1860.

Second session — 3 Dec. 1860 to 2 March 1861.

Senate — 36 Democrats; 26 Republicans; 2 Americans; 2 Anti-Lecompton Democrats.

House — 92 Democrats; 114 Republicans; 24 Americans; 7 Anti-Lecompton Democrats.

Speaker — William Pennington (N. J.), Republican.

Thirty-seventh Congress

Special session of Senate — 4-28 March 1861.

First session — 4 July to 6 Aug. 1861.

Second session — 2 Dec. 1861 to 17 July 1862.

Third session — 1 Dec. 1862 to 3 March 1863.

Senate — 31 Republicans; 10 Democrats; 8 Unionists.

House — 105 Republicans; 43 Democrats; 30 Unionists.

Speaker — Galusha A. Grow (Pa.), Republican.

Thirty-eighth Congress

Special session of Senate — 4-14 March 1863.

First session — • 7 Dec. 1863 to 4 July 1864.

Second session — 5 Dec. 1864 to 3 March 1865.

Senate — 36 Republicans; 9 Democrats; 5 Unionists.

House — 102 Republicans; 75 Democrats; 9 Unionists.

Speaker — Schuyler Colfax (Ind), Unionist.

Thirty-ninth Congress

Special session of Senate — 4-11 March 1865.

First session — 4 Dec. 1865 to 28 July 1866.

Second session — 3 Dec. 1866 to 2 March 1867.

Senate — 42 Unionists; 10 Democrats.

House — 149 Unionists; 42 Democrats.

Speaker — Schuyler Colfax (Ind.), Unionist.

The reconstruction question caused an up¬ heaval in political as well as in social life and in the election of the 40th Congress caused a new party alignment, many who had been Unionists during the war period returning to the Democratic party, while the Republican party reappeared as an organization. Since that time the Republican and Democratic or¬ ganizations have steadily opposed each other in the Congressional government of the country and every effort to destroy or supplant them has failed. After 1870 some Republicans who opposed Grant's administration formed the Lib¬ eral Republican party, and in 1872 joined the Democrats in an endeavor to prevent Grant's re-election. In 1876, however, most of the Lib¬ erals returned to the Republican ranks. In the 46th to the 49th Congresses were a group of Greenbackers of the so-called National party, and also a faction of Virginians called Read¬ justers, who ultimately were absorbed by the Republicans.

Fortieth Congress

Special session of Senate — 1-20 April 1867.

First session — 4-30 March, 3-20 Julv, 21 Nov. to 2 Dec.

1867.

Second session — 2 Dec. 1867 to 27 July, 21 Sept., 16 Oct., and 10 Nov. 1868.

Third session — – 7 Dec. 1868 to 3 March 1869.

Senate — 42 Republicans; 11 Democrats.

House — 143 Republicans; 49 Democrats.

Speakers — Schuyler Colfax (Ind.), Republican; 3 March 1869, Theodore M. Pomeroy (N. Y.) Republican.

Forty-first Congress

First session — 4 March to 10 April 1869.

Special session of Senate — 12-22 April 1869.

Second session — 6 Dec. 1869 to 15 July 1870.

Third session — 5 Dec. 1870 to 3 March 1871.

Senate — 56 Republicans; 11 Democrats.

House — 149 Republicans; 63 Democrats.

Speaker — James G. Blaine (Me.), Republican.

517

CONGRESS OF THE UNITED STATES

Forty-second Congress First session — 4 March to 20 April 1871.

Special session of Senate — 10-27 May 1871.

Second session — 4 Dec. 1871 to 10 June 1872.

Third session — 2 Dec. 1872 to 3 March 1873.

Senate — 52 Republicans; 17 Democrats; 5 Liberals. House — 134 Republicans; 104 Democrats; 5 Liberals. Speaker — James G. Blaine (Me.), Republican.

Forty-third Congress

Special session of Senate — 4-26 March 1873.

First session — 1 Dec. 1873 to 23 June 1874.

Second session — 7 Dec. 1874 to 3 March 1875.

Senate — 49 Republicans; 19 Democrats; 5 Liberals House — 194 Republicans; 92 Democrats; 14 Liberals. Speaker — James G. Blaine (Me.), Republican.

Forty-fourth Congress

Special session of Senate — 5-24 March 1875.

First session — 6 Dec. 1875 to 15 Aug. 1876.

Second session — 4 Dec. 1876 to 4 March 1877.

Senate — 29 Democrats; 45 Republicans; 2 Liberals. House — 169 Democrats; 109 Republicans; 14 Liberals. Speakers — 1875-76, Michael C. Kerr (Ind.), Democrat; 4 Dec. 1876-77, Samuel J. Randall (Pa.), Democrat.

Forty-fifth Congress

Special session of Senate — 5-17 March 1877.

First session — 15 Oct. to 3 Dec. 1877.

Second session — 3 Dec. 1877 to 20 June 1878.

Third session — 2 Dec. 1878 to 3 March 1879.

Senate — 36 Democrats; 39 Republicans; 1 Independent. House — 153 Democrats; 140 Republicans.

Speaker — Samuel J. Randall (Pa.), Democrat.

Forty-sixth Congress

First session — 18 March to 1 July 1879.

Second session — 1 Dec. 1879 to 16 June 1880.

Third session — 6 Dec. 1880 to 3 March 1881.

Senate — 42 Democrats; 33 Republicans; 1 Independent. House — 149 Democrats; 130 Republicans; 14 Na¬ tionalists.

Speaker — Samuel J. Randall (Pa.), Democrat.

Forty-seventh Congress

Special session of Senate — 4 March to 20 May 1881. Special session of Senate — 10-29 Oct. 1881.

First session — 5 Dec. 1881 to 8 Aug. 1882.

Second session — 4 Dec. 1882 to 3 March 1883.

Senate — 37 Republicans; 37 Democrats; 1 Independent. House — 147 Republicans; 135 Democrats; 9 National¬ ists; 2 Readjusters.

Speaker — J. Warren Keifer (Ohio), Republican.

Forty-eighth Congress

First session — 3 Dec. 1883 to 7 July 1884.

Second session — 1 Dec. 1884 to 3 March 1885.

Senate — 36 Democrats; 38 Republicans; 2 Readjusters. House — 197 Democrats; 118 Republicans; 5 Readjust¬ ers; 4 Independents; 1 Nationalist.

Speaker — John G. Carlisle (Ky.), Democrat.

Forty-ninth Congress

Special session of Senate — 4 March to 2 April 1885. First session — 7 Dec. 1885 to 5 Aug. 1886.

Second session — 6 Dec. 1886 to 3 March 1887.

Senate — 34 Democrats; 43 Republicans.

House — 183 Democrats; 140 Republicans; 2 Nationalists. Speaker — John G. Carlisle (Ky.), Democrat.

Fiftieth Congress

First session — 5 Dec. 1887 to 20 Oct. 1888.

Second session — 3 Dec. 1888 to 2 March 1889.

Senate — 37 Democrats; 39 Republicans.

House — 169 Democrats; 152 Republicans; 2 Labor; 2 In¬ dependents.

Speaker — John G. Carlisle (Ky.), Democrat.

Fifty-first Congress

Special session of Senate — 4 March to 2 April 1889. First session — ■ 2 Dec. 1889 to 1 Oct. 1890.

Second session — 1 Dec. 1890 to 3 March 1891.

Senate — 39 Republicans; 37 Democrats.

House — 166 Republicans; 159 Democrats.

Speaker — Thomas B. Reed (Me.), Republican.

Beginning with 1890 the Farmers' Alliance movement, culminating in the People's party, or Populists, disturbed the balance of Republicans and Democrats, and, to add to the confusion, the question of the free coinage of silver was injected into political discussions, so that the two large parties were much cut up, there being

Gold Democrats and Silver Republicans. Hence the task of determining the party affilia¬ tions of those elected by fusion to these Con¬ gresses is very difficult since the claims of par¬ tisans vary widely, as do also all contempo¬ raneous statements. But when the free silver issue had been abandoned, the scattered ele¬ ments again entered the parties of which they had previously been members, and nothing arose to disturb this party alignment until the so-called Bull Moose movement of 1912, when the Republican party was split by the formation of the Progressive party. While the Progres¬ sive candidate Roosevelt received 88 electoral votes against eight for the Republican candi¬ date, Taft, the Progressive party had not suf¬ ficient strength in Congress materially to influ¬ ence legislation. In the election of 1916 large numbers of the Progressive voters returned to the Republican party.

Fifty-second Congress

First session — 7 Dec. 1891 to 5 Aug. 1892.

Second session — 5 Dec. 1892 to 3 March 1893.

Senate — 39 Democrats; 47 Republicans; 2 Populists.

House — 235 Democrats; 88 Republicans; 9 Populists.

Speaker — Charles F. Crisp (Ga.), Democrat.

Fifty-third Congress

Special session of Senate — 4 March to 15 April 1893.

First session — 7 Aug. to 3 Nov. 1893.

Second session — 4 Dec. 1893 to 28 Aug. 1894.

Third session — 3 Dec. 1894 to 2 March 1895.

Senate — 44 Democrats; 38 Republicans; 3 Populists.

House — 218 Democrats; 127 Republicans; 11 Populists.

Speaker — Charles F. Crisp (Ga.), Democrat.

Fifty-fourth Congress

First session — 2 Dec. 1895 to 11 June 1896.

Second session — 7 Dec. 1896 to 3 March 1897.

Senate — 43 Republicans; 39 Democrats; 6 Populists.

House — 244 Republicans; 105 Democrats; 6 Populists; 1 Silver.

Speaker — Thomas B. Reed (Me.), Republican.

Fifty-fifth Congress

Special session of Senate — 4-10 March 1897.

First session — 15 March to 24 July 1897.

Second session — 6 Dec. 1897 to 8 July 1898.

Third session — 5 Dec. 1898 to 3 March 1899.

Senate — 47 Republicans; 34 Democrats; 5 Populists; 2 Silver.

House — 204 Republicans; 113 Democrats; 11 Populists; 3 Silver; 26 Fusionists (Democrats and Populists).

Speaker — Thomas B. Reed (Me.), Republican.

Fifty-sixth Congress

First session — 4 Dec. 1899 to 7 June 1900.

Second session — 3 Dec. 1900 to 2 March 1901.

Senate — 53 Republicans; 26 Democrats; 5 Populists; 2 Silver; 1 Independent.

House — 185 Republicans; 163 Democrats; 7 Populists; 2 Silver.

Speaker — David B. Henderson (Iowa), Republican.

Fifty-seventh Congress

Special session of Senate — 4-9 March 1901.

First session — 2 Dec. 1901 to 1 July 1902.

Second session — 1 Dec. 1902 to 4 March 1903.

Senate — 55 Republicans; 31 Democrats; 4 Populists or Silverites.

House — 197 Republicans; 151 Democrats; 9 Fusionists.

Speaker — David B. Henderson (Iowa), Republican.

Fifty-eighth Congress

Special session of Senate — 5-19 March 1903.

First session — 9 Nov. to 7 Dec. 1903.

Second session — 7 Dec. 1903 to 28 April 1904.

Third session — 5 Dec. 1904 to 4 March 1905.

Senate — 5 7 Republicans; 33 Democrats.

House — 208 Republicans; 178 Democrats.

Speaker — Joseph G. Cannon (Ill.), Republican.

Fifty-ninth Congress

Special session — 4-18 March 1905.

First session — 4 Dec. 1905 to 30 June 1906.

Second session — 3 Dec. 1906 to 4 March 1907.

Senate — 5 7 Republicans; 33 Democrats.

House — 250 Republicans; 136 Democrats.

Speaker — Joseph G, Cannon (Ill.), Republican.

Sixtieth Congress

First session — 2 Dec. 1907 to 30 May 1908. .

Second session — 7 Dec. 1908 to 4 March 1909.

Senate — 61 Republicans; 31 Democrats.

House — 222 Republicans; 164 Democrats.

Speaker — Joseph G. Cannon (Ill.), Republican.

Sixty-first Congress

Special session of Senate — 4-6 March 1909.

First session — 15 March to 5 Aus;. 1909.

Second session — 6 Dec. 1909 to 25 June 1910.

Third session — 5 Dec. 1910 to 4 March 1911.

Senate — 61 Republicans; 32 Democrats.

House — 219 Republicans; 172 Democrats.

Speaker — Joseph G. Cannon (Ill.), Republican.

Sixty second Congress

First session — 4 April to 22 Aug. 1911.

Second session — 4 Dec. 1911 to 26 Aug. 1912.

Third session — 2 Dec. 1912 to 4 March 1913.

Senate — 41 Democrats; 51 Republicans.

House — 228 Democrats; 161 Republicans; 1 Socialist.

Speaker — Champ Clark (Mo.), Democrat.

Sixty-third Congress

Special Session of Senate — 4-17 March 1913.

First session — 7 April to 1 Dec. 1913

Second session — 1 Dec. 1913 to 24 Oct. 1914.

Third session — 7 Dec. 1914 to 4 March 1915.

Senate — 51 Democrats; 44 Republicans; 1 Progessive.

House — 291 Democrats; 127 Republicans; 9 Progressives; 7 Progressive Republicans; 1 Independent.

Speaker — Champ Clark (Mo.), Democrat.

Sixty-fourth Congress

First session — 6 Dec. 1915 to 8 Sept. 1916.

Second Session — 4 Dec. 1916 to 4 March 1917.

Senate — 56 Democrats; 40 Republicans.

Hotise — 230 Democrats; 196 Republicans; 7 Progres¬ sives; 1 Socialist; 1 Independent.

Speaker — Champ Clark (Mo.), Democrat.

Sixty-fifth Congress

Special Session — 5 March 1917 to 16 March 1917.

First Session — 2 April 1917 to 6 Oct. 1917.

Second Session — 3 Dec. 1917.

Senate — 53 Democrats; 42 Republicans.

House — 216 Democrats; 210 Republicans; 2 Progres¬ sives; 1 Prohibitionist; 1 Socialist; 2 Independent.

Speaker — Champ Clark (Mo.), Democrat.

Bibliography. — Article by Theodore Clarke Smith, in McLaughlin and Hart, (Cyclopedia of American Government > (Vol. I, pp. 388-392, New York 1914) on which the above data re¬ garding party alignments is based; Niles, Heze- kiah, (Weekly Register (1811-49); Poore, B: P., Political Register and Congressional Directory* (1878) ; Congressional Directory * (1870 to date) ; (Annals of Congress) ; Regis¬ ter of Debates in Congress) ; Congressional Globe; Congressional Record; Senate and House*

Irving E. Rines,

*Author of (History of the United States *.*

CONGRESSIONAL DISTRICT. See

District.

CONGRESSIONAL RECORD, a journal

of the proceedings of the Congress of the Uni¬ ted States, dating from 1799. Prior to that date the Senate held secret sessions only, but thereafter publication was required, save in the case of C(executive sessions.® Record has been the title since 1875; before that date the jour¬ nal was entitled Annals of Congress (1789-99 for the House, and 1799-1824 for both branches), Register of Debates until 1837, and until the end of 1874 Congressional Globe, and since then, its present name has been in use. Undelivered speeches on the grant of ((permis- sion to print® appear in the Record

as if they

had actually been given, and stenographic re¬ ports of debates are revised by the participants before being printed.

CONGRESSMAN AT LARGE, a national representative elected by the entire State and not as a member for some district. There is no permanent system of the sort. At present the plan is used to give a State the additional memberships' allotted it by apportionment under a new census until it can be redistricted. Sev¬ eral states have one or more.

CONGRESSMEN, Pay of. An act of 1789 fixed the compensation of congressmen at $6 a day plus $6 for each 20 miles traveled. In March 1816 this was changed to a fixed salary of $1,500 a year but general indignation caused the act to be repealed. In 1818 there was an increase to $8 a day and $8 for each 20 miles traveled. On 16 Aug. 1856, the pay was made $3,000 a year with mileage as before; and in July 1866 increased to $5,000. An act of 3 March 1873 raised the pay to $7,500 but owing to public disapproval the act was repealed in 1874. The present pay of $7,500 a year was fixed in 1907. In addition to his salary each member of Congress receives a mileage of 20 cents a mile once to and from his home each session, $125 for stationery each year, and $1,500 yearly for clerk hire. The <(f ranking® privilege saves him postage on all official cor¬ respondence, while from the Department of Agriculture he receives annually about $225 worth of garden seeds ((which, sown broadcast throughout his district are supposed to yield a goodly crop of votes.® The Speaker of the House and the President of the Senate receive $12,000 a year each.

*CONGREVE, William, English dramatist: b. Bardsey, near Leeds, 1670; d. London, 19 Jan. 1729. He entered the Middle Temple, London, to prepare himself for the legal profession, but soon deserted the law for literature. At a very early age he wrote a novel entitled (Incognita, * followed by his comedy of the (01d Bachelor, * produced in 1693, and pronounced by Dryden the greatest first play that he had ever beheld. His next play, the Rouble Dealer) (1693), was not so successful in representation ; but his third, the comedy of Rove for Love* (1695), proved extremely popular. Its success acquired for the author the patronage of Lord Halifax, who conferred on him several very lucrative posts, so that he was far more prosperous than most men of letters. Not content with his fame in comedy, he essayed tragedy; and in 1697 pro¬ duced his (Mourning Bride,* the reception of which was extremely favorable. The composi¬ tion of four such plays before he had attained the age of 28 is a remarkable proof of early genius in a line of composition demanding great observation and experience. The licentiousness of his writings caused him to be attacked by Jeremy Collier in his (Short View of the Im¬ morality and Profaneness of the English Staged to which Congreve published a lame and inef¬ fective reply. He soon after closed his dra¬ matic career with the (Way of the World) (1700), considered by many critics as the most perfect of his comedies, but which was received so coldly that he resentfully determined to re¬ linquish a species of writing in which, upon the whole, he had been eminently successful. A masque, entitled the (Judgment of Paris, * and*

*1 Scmclc, ' an opera, neither of which was pre¬ sented, close the list of his labors for the stage. He, however, continued to write occasional verses on public subjects; and in 1710 published a collection of his plays and poems. Dryden declared him to be the equal of Shakespeare. Steele dedicated to him his * Miscellanies,* and Pope his translation of the Iliad. He was buried in Westminster Abbey, where a monu¬ ment was erected to him by the Duchess of Marlborough. Congreve's comedies are chiefly distinguished for the sustained flow of wit in the dialogue. But his characters are repulsive. It is now rare for any of his plays to be pro¬ duced on the stage, which without rigorous pruning, to adapt them to modern manners, it would be impossible to do. His poetry is of little value. (See Way of the World, The). Consult Macaulay, (Comic Dramatists of the Restoration ; Hazlitt, (Lectures on the English Comic Writers) ; Gosse, (Life of Congreve)*

(1888).

CONGREVE, Sir William, English in¬ ventor: b. 20 May 1772; d. Toulouse, France, 16 May 1828. After passing through the Royal Academy at Woolwich he entered the artillery in 1791, served under his father, a lieutenant- general, and in 1814 succeeded him in his post of comptroller, and

also as second holder of the baronetcy, conferred in 1812. He invented the rocket which bears his name about 1804. It was first used in active service in the attack on Bou¬ logne, 1806, and on Copenhagen 1807. He took an active part in army improvements ; became a Fellow of the Royal Society in 1811; obtained a patent for manufacturing gunpowder in 1815; and one for the manufacture of bank-note paper in 1819.

CONGRUISM, CONGRUIST, terms de¬ rived from the expression meritum e congruo, which signifies the view of some writers on the doctrine of divine grace and human merit, that though a man may not in the strict sense merit a given grace or favor of God he may be said to merit in a looser sense, on the ground that there is a certain congruity, a certain fitness with what we believe concerning the relation between man and his Creator, in assuming that the Creator will, out of his infinite mercy, grant to his faithful servants favors that they do not in any tolerable sense of the word merit. An example of meritum e congruo is had when a saintly man by his prayers obtains the conver- sion of a sinner : that conversion is not merited at all in any strict sense; but it is congruous, it is what we like to think about the Creator's love for his chosen ones, that he should be moved to grant the petition of one who is admitted to his friendship.

CONHYDRIN, kon-hi'drin, an alkaloid con¬ tained, along with conia, in the flowers and seeds of the hemlock. The physiological action of conhydrin resembles that of conia (q.v.), but it is not nearly so rapid or powerful.

CONI, ko'ne, or CUNEO, koo-na'o, Italy, capital of the province and district of Coni, on a high hill, at the confluence of the Stura and the Gesso, about 55 miles south of Turin, in a pleasant, well-cultivated district. The old fortifications, the arcades along the principal street, a Franciscan church of the 12th century, a handsome town-house, with a tall tower, and

a cathedral, are the picturesque items of the town. There are silk spinning-mills, and manu¬ factures of silk, paper and woolen goods. Grain, hemp and silk form articles of commerce. It was taken by Napoleon in 1796, by the Austrians in 1799, and again given up to the French in 1801. Pop. 29,122.

CONIA, or CONIINE (CsHˆN), an alkaloid in the hemlock, discovered in an im¬ pure state by Giesecke in 1827, and subsequently prepared in the pure state by Geiger, who recog¬ nized it as a vegetable base. It exists, combined with malic acid, in all parts of the plant, but especially in the not quite ripe seed. When pure it is a colorless oily liquid, specific gravity 0.89, which changes by exposure to air to a brown fluid, and ultimately to a resinous, bitter mass, slightly soluble in water, soluble in alcohol, and when purified yielding a jelly with a butyric odor. It can be distilled without much altera¬ tion, provided the air be excluded, its boiling- point being 168° C. At a higher temperature it burns with a bright smoky flame. It is slightly volatile even at ordinary temperatures. It has a very disagreeable odor, sharp and choking when strong; its taste is nauseous. It is some¬ what soluble in water, readily in alcohol, ether and oils, and itself acts as a solvent of sulphur. It has a strong alkaline reaction when moist, and combines with the acids to form salts, most of which are crystalline but deliquescent. The salts are unstable in aqueous solution ; they evolve the odor of the base and gradually change color. It precipitates the oxides of iron, zinc, manganese, aluminum, copper and the other heavy metals, from solutions of their salts. It is attacked by chlorine, bromine and iodine, and oxidized by nitric acid, yielding butyric acid. The poisonous action of conia has been minutely investigated, but although it has been proved to be rapidly fatal to all classes of animals when administered in doses of from 3 or 4 to 10 or 12 grains, the nature of its action is not fully ascertained ; but the breathing and pulse are affected, and the extremities paralyzed. Some experimenters have tried its effect upon themselves, and ac¬ cording to their account the minutest doses produce burning in the mouth, salivation, nausea and vomiting, pressure in the head, tot¬ tering, indistinct vision, cramps and other symptoms. Similar observations have been made on persons to whom the alkaloid has been given therapeutically. It has been shown that conia can be detected in a poisoned ani¬ mal, even after a considerable time. The tonic power of conia seems to be little if at all affected by the introduction into it of the alcoholic radicals, methyl, and ethyl. The ac¬ tion is perhaps not so rapid, but it is the same in character, and takes place with quite as small quantities. In this respect conia differs from some other alkaloids, for instance, codeia.

CONIBO, ko-ne'bo, a tribe of Indians be¬ longing to the Panoan family in eastern Peru, allied to the Ucayali tribe. They were an agri¬ cultural people and built villages. The Spanish missionaries tried

to convert them in 1683, but were driven out after 1695, when Father Ritchie was killed by the savages. They are now partially civilized and are often employed as canoe men and rubber gatherers. Their country is along the middle Ucayali River in north-

eastern Peru. Along the river they are given to fishing; but those back from the water are, many of them, gatherers of sarsaparilla.

CONIC SECTIONS, three curves, the hyperbola, the parabola and the ellipse, are called the conic sections, because these curves are formed by the intersection of the surface of a cone with planes that cut the cone in various directions. If the cutting-plane be parallel to the axis of the cone (fig. 1), the curve formed is the hyperbola, which has two branches, as shown in the figure. If the cut¬ ting-plane be parallel to a straight line on the surface of the cone (fig. 2), the curve formed is a parabola. Any other section is an ellipse (fig. 3). It must be noticed, however, that this general description includes three peculiar cases. In the case of a plane parallel to the axis of the cone, when that plane contains the axis, the section, instead of being a hyperbola,

is in this limiting case a pair of straight lines meeting each other at an angle equal to that of the angle of the cone so as to form a triangle (fig. 4). When a plane, which would other¬ wise form a parabolic section, is a tangent plane to the cone, the parabola degenerates into a straight line passing through the vertex of the cone. Lastly, when a plane that would other¬ wise form an ellipse is perpendicular to the axis of the cone, the ellipse becomes a circle (fig. 5). Lastly, when a plane cuts the cone only in the vertex, the conic section degenerates into a single point (fig. 6). A pair of points cannot be produced by any plane section of a cone, but on account of its analytical proper¬ ties, this figure is also considered as a degen¬ erate conic section. The properties of these curves are discussed under their several names. It will there be seen that other definitions may be given of the curves; and that from these their properties are more conveniently derived than from the consideration that they are formed by the sections of a conical surface. The most important of these properties are that of being represented in a system of Cartesian co-ordinates by an equation of the second de¬ gree, and that of being the locus of the corre¬ sponding lines of two projective pencils in the plane. The properties of these curves are of the greatest physical interest ; and the geometry of the conic sections has, ever since the time of the Greek mathematicians, been considered as the best of the more advanced geometrical studies.

CONIFERiE, a group of trees and shrubs consisting of about 40 genera and 300 species, which are most numerous in the temperate regions of the world, especially in the northern hemisphere. Among the few species found in the tropica, the most important are those be¬ longing to the genera Araucaria (q.v.), Dam¬ mam, Phyllocladus and Dacrydium. In the Arctic regions and the correspondingly cold

mountain climates various conifers approach very nearly the line of perpetual snow, and like other plants of such climates are reduced to gnarly dwarfed specimens which bear but slight resemblance to those of the same species in less rigorous climates. In the United States and Canada about 15 genera and 100 species and sub-species are indigenous and of these the majority are native to the Pacific coast. In addition to the number of species mentioned fully 400 horticultural varieties must be added. These are listed in Bulletin No. 17 of the Division of Forestry, United States Department of Agriculture.

No forest trees are of more economic im¬ portance than the conifers. Their notable blend¬ ing of maximum strength, stiffness, and durabil¬ ity with minimum weight, and their abundance have won them prominence in house, ship and bridge building, wharf making and sidewalk constructing, etc. They are also of great im¬ portance in planting, both for use and orna¬ ment, their evergreen habit (except in Larix) and the retention of their lower limbs until comparative age, making them especially good for wind breaks, these characters coupled with their conical form and the striking colors of their foliage rendering them particularly useful for grouping with deciduous trees and shrubs or for individual specimens in parks and upon lawns.

The species are characterized by straight shafts which elongate terminally, and, like the shape of the

trees, form a more or less atten¬ uated cone. They have either needle-shaped or awl-shaped leaves (except in Podocarp-us) which are specially adapted by these forms and by the thickened epidermis to resist excessive transpiration, a necessary adaptation since the leaves are usually retained throughout the year. They have naked ovules which are fertilized directly by the exceedingly light pollen which is produced in enormous quantities and carried by the wind even miles away from the forests, to fall as so-called ((showers of sulphur.ˆ These ovules are borne in a strobile which en¬ larges after fertilization into what is popularly known as the cone, the group being named from this character. The cone is an aggrega¬ tion of scales, above the bases of which are borne the seeds. These are in some species utilized as food, and have been introduced in the markets of the United States by the Syrians. The internal structure of the conifers is also peculiar to the group. Like the dicotyledons, the woody cylinder increases in girth by the external development, beneath the bark, of homogeneous woody fibres marked on two sides with circular discs and among which are few true vessels. Since these woody fibres are fitted together without overlapping, the grain of the wood is fine and uniform, which ac¬ counts for its easy working qualities, especially in the direction of the ˆgrain.®

Botanists divide the species into two great families, the Taxacece and Pinacece. The for¬ mer includes two tribes, Podocarpece , the lead¬ ing genus of which is Podocarpus, with about 40 species, and Taxece, chief of which is the genus Taxus, the yew. The species of this family have more or less fleshy fruits. The Pinacece embraces four tribes: Abietece, the pine family proper, of which the principal genera are Pinus , pine ; Picea, spruce ; Tsuga,

hemlock; Abies, fir; and Larix, larch; Taxo- diece which includes Taxodium, the bald cypress; and Sequoia, the redwood; Cuprcs- sinece, which includes Thuya, arborvihe; and Juniperus, juniper; Chamcecy paris, cedar; Araucarince, including Araucaria, Norfolk Is¬ land pine and its allies. The most widely dis¬ tributed of these groups are undoubtedly the genera Pinus and Juniperus, and the most re¬ stricted are Taxodium, two species of which are indigenous to the United States and one to China; and Sequoia, of which only two species are known, both found in occasional groves on the Pacific Coast. During geological ages these two genera were far more widely distributed.

So far as is known from fossils conifers appeared on the earth in Silurian time, though they may have appeared earlier. They in¬ creased and developed during the Devonian and Carboniferous ages. Unlike the acrogens (ferns, ground-pines and horse-tail rushes), the conifers have increased rather than de¬ clined since the Carboniferous. Species of yew were abundant in North America in early Devonian time. In the Carboniferous the gymnosperms that grew in the great swamps were related to the cycads and yews. True conifers may have grown upon the drier hill¬ sides. The genus JValchia began, near the close of the Carboniferous, and in the Permian the conifers included species of Dadoxylon, Pinites, Ullmania, etc.; common Triassic coni¬ fers are the genera V oltzia, Baiera and Arau- carites.

Conifers are propagated by means of seeds which may usually be obtained in autumn, though some species open their cones at irregu¬ lar intervals through the winter and others only when artificial heat such as that of a forest fire is applied. The seed should be planted in a sandy loam, given a light mulch, of pine needles or sphagnum, and the seedlings kept free from weeds. They must be kept moist but not wet until they have formed their crown buds, which appear when they are about three months old. If proper methods are practised, trans¬ planting may be done at any time of year, but spring is generally much the best season, since the roots are then most active and the check to growth is least. As a rule conifers do best upon light soils. They are attacked by a large number of insects and diseases both in foliage and trunk, but since these trees and shrubs are planted mainly for ornament or are growing in the forest where systematic war cannot often be successfully carried on, little attention has been given to the control of these pests. Standard fungicides and insecticides, may be used effectively in some cases, care being taken to determine the mode of attack of the par¬ ticular pest. Consult Veitch, (Manual of Coni¬ fer ; Beissner, .(Handbuch der Nadelholz- kunde) ; Carriere, (Traite des coniferes) ; Bailey, (Standard Cyclopedia of Horticulture.)

CONIINE, CONEINE or CONNIE. See

CONINGSBY, a novel by Benjamin Dis¬ raeli, Lord Beaconsfield, published 1844. It was his sixth and most successful novel. In three months it had gone through three edi¬ tions, and 50,000 copies had been sold in Eng¬ land and the United States. It was a novel with a purpose; the author himself explained

that his aim was to elevate the tone of public life, to ascertain the true character of political parties and especially to vindicate the claims of the Tories. Incidentally he wished to empha¬ size the importance of the Church in the de¬ velopment of England, and he tried to do some justice to the Jews. There are more than threescore characters in the book, and part of its popularity came from people's interest in identifying them with men and women promi¬ nent in English social and political life.

CONINGTON, John, English classical scholar : b. Boston, Lincolnshire, 10 Aug. 1825 ; d. there, 23 Aug. 1869. He was educated at Beverley, Rugby, and Oxford, and in 1854 was appointed to the newly founded chair of Latin language and literature at Oxford, which he filled until his death. His greatest work is his edition of (VirgiP (3 vols., 1861-68), with its singularly subtle and suggestive essays. His edition of the (Agamemnon > (1848), and

ˆhoephorP (1857), of .TEschylus are of less moment, though indeed the latter is admirable. In his later years he gave himself much to translation, the results of which were his metri¬ cal versions of the cOdes) of Horace (1863), the <2Eneid) (1866), in Scott's ballad-metre, the

CONISTON LAKE, England, a lake in North Lancashire at the eastern foot of the Coniston Fells, nine miles west of Bowness on Windermere. It is five miles long, one-half mile broad, 147 feet above the sea, and its greatest depth is 260 feet. Its waters abound with trout and perch. On the eastern shore stand Ruskin's home, Brantwood and Tent House, once Tennyson's residence. The Old Man of Coniston, to the northwest, is 2,633 feet high.

CONIUM (<(spotted hemlockˆ), the full- grown fruit of Conium maculatum gathered while green. Conium maculatum is a stout, erect biennial, three to six feet high, with a much branching, smooth, furrowed, dark green hollow stem, covered with purplish spots, very widely present throughout Europe and natural¬ ized in the eastern United States. It grows commonly in wet places, wayside brooks, swamps and dark, moist gardens. All parts of the spotted hemlock are active, but the poison¬ ous principle coniine is found most abundantly in the full-grown but unripe seed, the principle being a volatile alkaloid. Only fresh hemlock is of any service, and much of the lack of uni¬ formity of results in the use of this drug as a remedy has come from the neglect of this pre¬ caution on the part of the manufacturers of the drug. The composition of conium is complex. It contains a slight amount of volatile oil and two or three alkaloids, the most important of which is coniine. Coniine is present in small amounts only. It is a strongly basic, colorless, oily liquid, with a penetrating odor and a sharp taste resembling tobacco. It boils at 166° C. ; its chemical formula is CgHˆNH.CˆCH-CHs. It has been made synthetically, being one of the first of the alkaloids thus synthetized. The physiological action of conium is practically identical with the action of coniine. The gen-

eral effect is paralysis of the motor end organs of voluntary muscles; it is thus a motor de¬ pressant. It is an irritant to the stomach, in¬ creasing the salivary secretions. Its effect on the heart is slight ; its effect on the nervous sys¬ tem is very little save in extreme poisoning, when blood changes cause changes in the ner¬ vous system. The early symptoms of poisoning are heaviness of the muscles of the legs, and of the eyelids, ptosis, staggering gait, muscular re¬ laxation and muscular paralysis; paralysis of the vocal chords causing derangement of speech; dilatation of the pupil; and finally paralysis of the muscles of respiration with asphyxia, convulsions and death. Treatment of the poisoning is by means of the stomach-pump, strychnine, coffee. Alcohol and rapid elimina¬ tion by hot baths are desirable.

The therapeutics of conium is restricted. It is very questionable whether it is of use in any affection

other than habitual motor spasms of voluntary origin such as spasmodic tics, torti¬ collis and other like affections. It is certainly of very little value in spasmodic affections not associated with voluntary action such as chorea, epilepsy, myoclonus, etc.

CONJEVERAM, kon-je-ver-um', CAN- CHIPURA («the Golden City), a town of Hindustan, in the presidency of Madras, dis¬ trict of Chinglepat. It stands in a valley, is irregularly built, and from five to six miles long, resembling a series of villages, inter¬ mingled with gardens and cocoanut plantations. Conjeveram is one of the Hindu sacred cities, and is sometimes called the ((Benares of the south.® There are here two splendid pagodas ; one dedicated to Vishnu, richly sculptured, and highly venerated ; the other, a larger and more imposing structure, dedicated to Siva, from the summit of which a magnificent view is obtained. There are many smaller pagodas ; and houses of accommodation for travelers abound. Cot¬ tons are manufactured. There is a flourishing school here connected with the Free Church of Scotland. Pop. 43,000.*

CONJUGAL RIGHTS (Lat. conjugalis, ((husband® or <(wife®), in law, the right which husband and wife have to each other's society, comfort and affection. The suit for restitution of conjugal rights is a matrimonial suit, cog¬ nizable in the Divorce Court, which may be brought whenever either the husband or wife lives separate from the other without any suffi¬ cient reason. Conjugal rights are matrimonial, nuptial and connubial.

CONJUGATE FOCUS. See Lens.

CONJUGATION (Fr. conjugation, Lat. conjugatio, (< joining together®). In some uni¬ cellular plants and in one-celled animals (Protozoa) , after multiplying by self-division perhaps for many generations, reproduction by germs is brought about by a process called con¬ jugation. It may be illustrated by a flagellate monad (Heteromita). In this form, two indi¬ viduals come together and completely fuse, the result is a thin-walled sac (the zygote), the protoplasm of which divides by multiple fission into very minute spores or germs. Each of these spores finally grows to become an adult Heteromita, In a much more specialized pro¬ tozoan (Paramcecinm) , after self-division has been repeated for a certain number of genera¬ tions, it is interrupted by conjugation. In this

case two individuals become applied by their ventral faces, but do not fuse, but the nuclei melt together, so that the fusion of the two individuals takes place, after which the two original infusorians separate. This process js akin to and anticipates sexual reproduction in animals higher than protozoa. The process seems to lend new life to the species; it is a process of rejuvenescence, and is necessary for the maintenance of the life and vigor of the species.

CONJUNCTION, in astronomy, one of the aspects of the planets. Two heavenly bodies are in conjunction when they have the same longitude — that is, when the same perpendic¬ ular to the ecliptic passes through both. If they have, at the same time, the same latitude — that is, if they are both equally far north or south of the ecliptic — they appear from the earth to be in the same spot of the heavens, and to cover one another. The sun and moon are in conjunction at the period of new moon. In the case of the inferior planets Mercury and Venus, the conjunction is inferior when the planet is between the earth and the sun, and superior when the sun is between the earth and the planet. In general, a heavenly body is in conjunction with the sun when it is on the same side of the earth, and in a line with the sun, and it is in opposition to the sun when it is on the opposite side of the earth, the earth being in a line between it and the sun. Planets are invisible when in conjunction with the sun, except in rare cases when an inferior planet passes over the sun's disc, and may be seen as a speck on his surface. Conjunctions are either geocentric or heliocentric, according as they are actually witnessed from the earth, or as they would be witnessed if observed from the sun. In observing a conjunction from the earth's surface it is usual to reduce the observation to what it would be if made from the earth's centre ; by this means the exact times of con¬ junction are more accurately fixed, and the observations of one astronomer made available to every other, wherever he may be on the earth's surface. Grand conjunctions occur when several stars or planets are found to¬ gether. Chinese history records one about 2500 b.c., which astronomers calculate actually took place.

CONJUNCTION, that grammatical part of speech which couples words, clauses and propositions. Conjunctions differ from preposi¬ tions in their mode of affecting'the cases of the nouns which they connect with the previous word or phrase. The preposition is said to govern the noun, that is, to

determine its case ; the conjunction also may determine the case of a noun, but in a different manner ; it always requires the case of the noun or pronoun which follows it to be the same as that of the noun with which it connects the second noun. The conjunction also affects actively the modes of verbs, though less frequently in English than in other languages. Conjunctions are divided into those that co-ordinate the clauses they relate, such as ((and,® ((or,® < (but,® and those that render one clause subordinate to the other, as "if,® "for,® "when,® "notwithstanding that.®

CONJUNCTIVA DISEASES. See Eye. CONJUNCTIVITIS. See Eye.

CONJURATION — CONKLING

523

CONJURATION (Lat. conjuratio, (

CONJURING, the production of effects apparently miraculous by natural means. The earlier professors of the art claimed bona fide supernatural powers ; and in ages when the most elementary principles of physical science were unknown beyond a very limited circle, it was not difficult to gain credence for such a pretension. The modern conjurer makes no such claim, but tells the public frankly that his marvels are illusory. Of the conjurers of re¬ mote antiquity we have few reliable records ; though it is a toleijably safe conjecture that the prestige of the ancient mysteries rested in no small degree upon effects of natural magic. Perhaps the earliest really trustworthy author¬ ity is Reginald Scot, who in his (Discoverie of Witchcraft > (1584) has enumerated the stock feats of the conjurers of his day.

The conjurers of Scot's time, and those of even much later date, were accustomed, in order to facilitate the substitutions on which a great part of their tricks depended, to wear an apron with pockets, known (from its resem¬ blance to a game-bag) as the gibeciere. A later school suppressed this tell-tale article of cos¬ tume, and used instead a table, with cover reaching nearly or quite to the ground. This table concealed an assistant, who worked most of the required transformations, etc., either handing the needful articles to the conjurer as he passed behind the table, or pushing them up through traps in the table-top. Conus the elder, a French conjurer who flourished at the close of the 18th century, made a further improve¬ ment by discarding the concealed assistant, and using an undraped table with a secret shelf (now known as the servante) behind it, on which his substitutions were made. His im¬ mediate competitors did not follow his example, a whole generation of later conjurers, includ¬ ing Comte, Bosco and Philippe, retaining the suggestive draped table. Its death-blow, how¬ ever, was struck by Robert Houdin (1805-71), with whom about 1844 a new era began. The most modern school of conjurers, following the lead of Wiljalba Frikell, etc., represented by Hartz, Herrmann, Buatier de Kolta, Verbeck, Lynn, Bertram, etc., generally aim at producing their magical results with the minimum of visible apparatus.

The word ˆconjuring® also still bears all the meanings of conjuration ; the sense in which the ancient conjurer always used it; and in which medicine men of savage tribes invariably use it to-day.

CONKLIN, Edwin Grant, American

zoologist: b. 24 Nov. 1863. Graduated Ohio Wesleyan University (S.B. 1885, A.B. 1886, A.M. 1889, Hon. Sc.D. 1910), Johns Hopkins University (Ph.D. 1891), University of Penn¬

sylvania (Hon. ScD. 1908) ; trustee Marine Biological Laboratory 1897 — ; professor of biology Ohio Wesleyan University 1891-94; professor of zoology Northwestern University 1894—96; professor of zoology University of Pennsylvania 1896-1908, and of same at Prince¬ ton, 1908. Member American Society of Zoologists, American Society of Naturalists, Fellow of American Association for the Ad¬ vancement of Science, member National Acad¬ emy of Sciences, American Academy of Arts and Sciences, foreign member K. K. Bohmische Akademie der Wissenschaften, vice-president Academy of Natural Sciences of Philadelphia, secretary of American Philosophical Society (1900-08), past president American Morpholog¬ ical Society, American Society of Naturalists, Section F (Zoology) American Association for the Advancement of Science, associate editor of Biological Bulletin, Journal of Morphology, Journal of Experimental Zoology, Proceedings National Academy of Sciences, Genetics ; author of about 100 scientific papers among which the following are the most important : fertilization of the OvunP ; (The Embryology of Crepidula> ;

(The Phenomena and Mech¬ anism of Inheritance) ; factors of Evolution) ; (The Organization and Cell-Lineage of the Ascidian Egg ; (Experimental studies on*

Nuclear and Cell Division, 5 fell Size and Body Size) ; (Heredity and Environment, etc.*

CONKLIN, Jennie Maria (Drinkwater), American author: b. Portland, Me., 14 April 1841 ; d. New Vernon, N. J., 28 April 1900. She was educated in the public schools, and while still in her teens won fame with her stories for children. In 1880 she married Rev. Nathaniel Conklin. Her works include (Miss Prudence ; (Tessa Wadsworth's Discipline) ; and fifteen. * She originated the (*

CONKLING, Roscoe, American legislator: b. Albany, N. Y., 30 Oct. 1829; d. New York, 18 April 1888. He removed to Utica in 1846, studied law and was admitted to the bar in 1850. He was mayor of Utica in 1858, and sat in Congress as a Republican (1858-62 and 1865- 67). During the Civil War he was an active supporter of the administration, ap¬ pearing constantly in debates and on commit¬ tees. He was elected to the United States Senate in 1867, 1873 and 1879, and as senator he supported the reconstruction policy, actively opposed President Johnson and was a staunch supporter of President Grant. He was active in almost every move of importance made by his party. He was one of the foremost advo¬ cates of the Second Civil Rights Act, in 1875; of the bill creating the Electoral Commission to settle the disputed election of 1876; and of the act calling for the resumption of specie payment (1875). He became an extremely in¬ fluential member of his party; in 1876 receiving 93 votes for the presidential nomination, and in 1880, by his support of Grant and his personal opposition to Blaine, dividing the Republicans into two sections. In May 1881, he and his colleague, Thomas C. Platt, suddenly resigned from the Senate, owing to a dispute with Presi¬ dent Garfield on a question of patronage, and sought re-election ; but after a warm canvass, both were rejected, though vigorously supported by Vice-President Arthur. Conkling afterward

practised law in New York. He was appointed associate chief justice of the United States Supreme Court in 1882, but declined the posi¬ tion. Conkling was a thorough believer in the system of political patronage and he and Plˆtt attempted to say where this patronage should go and to whom in the State of New York.

CONN, Herbert William, American biolo¬ gist: b. Fitchburg, Mass., 10 Jan. 1859; d. Mid¬ dletown, Conn., 18 April 1917. He was edu¬ cated at Boston University and was professor of biology at Wesleyan University, Middletown, Conn. He published (Evolution of To-day > (1886); (The Living World> (1891); (The Story of Germ Life) (1897) ; (The Story of the Living Machine > (1890) ; (The Method of Evo- lution> (1900) ; Agricultural Bacteriology) (1902); (An Elementary Physiology and Hy¬ giene for Use in Schools) (1903); and also over 150 scientific memoirs.

CONN, Lough, Ioh kon, a lake in the north of Mayo County, Ireland, united with Lough Cullin by a narrow channel. The two extend for about 13 miles and are studded with islands.

CONNATE WATER. See Ground Water.

CONNAUGHT, kon'-nat, AND STRATHEARN, Duke of, Arthur William Patrick Albert, English prince, sixth child and third son of Queen Victoria : b. Buckingham palace, 1 May 1850. He entered the Military Academy at Woolwich as a cadet in 1866; lieutenant, Royal Engineers, 1868 ; Royal Ar¬ tillery 1869; captain, Rifle Brigade, 1871. On attaining his majority in 1871, Parliament voted him a grant of $75,000 a year, and an addition of $50,000 was voted on his marriage in 1879 to Princess Louise Margaret of Prussia. She died in London 14 March 1917 at the age of 57. Three children were born of the union, Princess Margaret (Crown Princess of Sweden), Prince Arthur and the popular Princess Patricia, in whose honor a Canadian regiment mobilized for the war was named <(Princess Pat's Own/ The Duke of Connaught led an active life of 50 years' public service. In 1870 he served in Canada, was assistant adjutant-general at Gib¬ raltar till 1876, when he was appointed personal aide-de-camp to Queen Victoria. He com¬ manded the Guards' Brigade in the Egyptian campaign of 1882, and in 1886 was sent to India to assume command of the Bombay army. He returned home in 1890, commanded at Portsmouth for three years, and then succeeded

Sir Evelyn Wood as commander-in-chief at Aldershot. From 1900 to 1904 he commanded the forces in Ireland and was created field- marshal in 1902. In 1901 the Duke was elected Grand Master of Freemasons in England in succession to his brother, the late King Edward. On the reorganization of the War Office in 1904, he became the first inspector-general of the forces and president of the selection board. In 1908 he was appointed to the newly-created post of commander-in-chief and high commis¬ sioner in the Mediterranean. In 1910 the Duke opened the first Parliament under the Union of South Africa, in Cape Town, and in 1911 became governor-general of Canada for five years. Since his return to England in October 1916 he has taken an active part in national organization. With the sole exception of King George, no member of any English royal family

has seen more of the world and especially of the British Empire, than the Duke of Connaught.

CONNAUGHT, Ireland, one of the four provinces, bounded east and northeast by Lein¬ ster and Ulster, south by Munster, and north and west by the Atlantic; length, north to south, 112 miles; breadth, 99 miles; area, 6,867 square miles. It is the smallest, most westerly and least populous of the provinces. Its west coast is much broken up by numerous bays and inlets, and is thickly studded with islands. The surface is rugged and mountainous, except in the central part, which is comparatively level. It is, on the whole, the least fertile of all the provinces. Agriculture and fishing are the chief industries. Sheep raising is largely en¬ gaged in. Connaught was formerly one of the Irish kingdoms. Its kings were of the race of O'Connor, but they were almost exterminated at Athenry in 1305. In 1590 the English divided it into six counties — Galway, Leitrim, Mayo, Roscommon, Sligo and Clare — one of which, county Clare, was afterward transferred to Munster. Pop. 610,984, 96 per cent . being Roman Catholics. »

CONNEAUT, Ohio, town of Ashtabula County, situated at the mouth of Conneaut Creek, on the Lake Shore and Michigan South¬ ern, the New York, Chicago and Saint Louis and the Bessemer and Lake Erie railroads. It has a good harbor at the mouth of the creek, where there is a lighthouse. It is an important ore and coal port, being noted for its excep¬ tional facilities for handling large cargoes. There are extensive railroad shops and man¬ ufactories of canned goods, self-sealing pack¬ ages, bricks, shovels, leather, lumber, etc. Conneaut also exports molding sand and farm produce. The city contains three hospitals, a Carnegie library and a public park. The electric-light plant is owned and operated by the city, which was first incorporated in 1832. It is governed by a mayor, elected biennially, assisted by council. Pop. (1920) 9,343.

CONNECTICUT, kon-net'-i-kut, «the Nutmeg State,® (

History. — There is no doubt that the claim of the Dutch to Connecticut by right of dis¬ covery was well founded, for the accounts of the voyages of Henry Hudson in 1609 and of Adrian Bloch in 1614 give the first descriptions which history records of this region. The at¬ tempts of the Dutch to maintain their foothold by this right were few and ineffectual, failing to prevent William Holmes of Plymouth colony from establishing a trading post at or near Hartford in 1633.

Settlement. — The first permanent settlement by the English was made in 1636, though a dis¬ astrous attempt had been made in the previous year by a party from Massachusetts to occupy the three original towns. In June 1636 Rev. Thomas Hooker and Rev. Samuel Stone, with about 100 men, women and children, made their way from Massachusetts to the Connecticut Val-

CONNECTICUT

Estimated population, 1,244,479

COUNTIES

Pop. Pop.

245,322 Fairfield . K 533 7,282 New Haven . 110

250,182 Hartford . D 12 9 1,253 New London ...G 19

70,260 Litchfield . D 6 2 6,459 Tolland . C 17

45,637 Middlesex . H 14 4 1,361 Windham . C 21

Incorporated Cities and Boroughs 16,704 Ansonia . 18

3,041 Bethel . I 4

2,560 Branford . J 11

121,579 Bridgeport . K 6

15,927 Bristol . E 10

978 Colchester . G 17

22,556 Danbury . I 3

2,934 Danielson . D 22

9,655 Derby . J 7

897 Farmington . E 11

34 Fenwick . K 17

19,159 Greenwich . Ml

1,895 Groton . I 20

1,608 Guilford . J 13

110,900 Hartford . D 11

3,023 Jewett City . F 21

903 Litchfield . E 6

29,130 Meriden . G 11

13,273 Middletown . G 12

14,093 Naugatuck. . . H 8

53,794 New Britain . F 12

1,672 New Canaan . L3

149,685 New Haven . J 9

20,985 New London .... I 19

434 Newtown . I 5

26,899 Norwalk . L 3

21,274 Norwich . G 19

13,960 Orange . J 8

6,637 Putnam . B 22

1,114 Ridgefield . J 2

7,977 Rockville . C 15

4,807 Shelton . J 7

3,714 Southington . G 10

South Norwalk. . M 4 (Pop. incl. in Norwalk) 3,059 Stafford Springs . B 16

30,884 Stamford . M 2

9,539 Stonington . J 22

18,018 Torrington . D 7

9,917 Wallingford . H 10

86,973 Waterbury . G 7

12,670 Wlllimantic . E 19

7,754 Winsted . C 8

194 Woodmont . K 8

73 30

10

11

12

14 72° 30′ *5

16

18

20

21

42

B

Tl JjBear Mt. 4r\

I ssi‘p,eoy ** cahaS / -B-at! Mt-

Lake

D

E

Stissing

islmV.v

Sajis! S A

Lakeville' •e IIH,

Whiting River ˆ

_ _ _ Flnystac

- ~ZˆfHhystack *

past Hartlapd North Granby ‘ IiANBY I West Granby

1 U

Ernie Roclc _

-

Sharon Mt.tˆ

rnMndge Pond / £

f Mine Mt.Cf/ y Sharon Valley ˆ

Sharon-v,ˆ' i n n S/H ARON

ft

!(

Bulls Bridge

{Kent.

throve «».(. .i—y- . , — ^br

P™#WMffihy9 p J ,Sorf«ltf0utto„ lyit.COLEBK.^K /rT" .hill?

i Bradford, vnvtwoi VC/ RobertavtlleV ' /Lenteih

■^uthACan^n6umunV\^ir^^M'iBIf^k-^i{[|^^ J _

Lawrence

C\Y

Falls .

Barrack oHuntsyille

NAAN _.

Village /' Grants!;

acko^Hunts^i

S

Shaknr Sta. , ^ 'Thom pso nville Hazard vi lie

ENFI'EL ' Enfield) field Bridg.

Mt \ J , , -To . . V

Lime Rock Sta.' South Norfolk l£-tfle pmcL + eSz

- -V -/ – - – / VW. W instep

Cornwall / / } \ E.V

Hollow YAWeA Pomf

HL

^Klbb^wPJrjiins Mt.

S O M K Hi

HJ el

/Mashapaug^ (/Mashapaugt

_ 1 _ o!f '

T

ftordville* ,]/ Uniono

/Staffo J/ UNIO/N-

Q R D f j

N. Woodstock'

East Wood)

izard vjlle Bajd|Mt., Sta 5citiy> P.JD: -5^. Oncntts ^0 Somers g rj<| ^p*

'^psToZ1 V // _ J _ W/OORSXOCK\ V D^eV'

X Stafford Sprin^ji ^

dtlrose ^ – ! (V f \° ^°odstock_[South

I West ford. tdo\v i^st fordo

TiF

B

—2

W.-stjvav' _^o/

) T Jr ^ -41-4

,Cry&tiil-Lffke~\ ^

/Valley \ Woodstocl

, 1 l T

\ Shen i psif 1 W est

Pnnrl\ Willingto

fWmdcHRre Tolland

Rockville NON l

Caml>beSLtep vo, non Center

Moose I Me a do'

, . o /

" 'Vwillinej ASH. _

CufJ ' y P«ft

VWarrenVillfe r

V \KASTFORD

S p O R D_\\phce'iv

ixvifleP/O M jPomfrel

Pomfret c

\ °

FRcET y or \ /yt

nte

/v Mechani cs)

Kile ! ('

U Putnam |

rt

r\p u T N a|

M J

t \ ^ 1

K 't

1 c

H

c

South Kent BjjkH:hr4lH Mt.1

.FP * ~ . 1 — – o

Jr _ — j-' — iNew Prest<

Ga (ylorasvnle 70 Marble Me

H

trwjnsville /

/

5. Litchfield I ;

Litchfield®

r.

v-HAR?

NorthdCent . Aˆecyt't'dju

Mt. f, ,JVAlO\®'i Y «rospect\wiy»- / v 4.

J *, ia4vmˆ-

Klifil T \SPˆ3 BMe“-2Ste' r.3k ˆ

pparemaufif Lalctftefc jp o.odyillˆj gm ˆ

ˆ Bantam. Lake

« »ˆateav ; ˆ

® «ˆ/ “ˆwmtnjton if. | „\A/ I , /.* NJtbingtSr

. D_rjˆfoJj if e!h l

_) 0 Mansfield f

Merrow Mt. Hope / 1 ,Y~ˆ

Mansfield 0 Guile Ai

ˆDepot] *i

\ M A N ST

r , Vs—

\ 1 l, 1 /Hampton

Gurley vjlle Chaplin Jˆ0/ \ _

Rawsom

r- . wLon9 .

New Preston Sta.Nˆ) Pond K

PUT/ /N A, M

PO.M o RoRT\S

iTerryvill

Romford AJor.ls\ˆVˆOMASWfoplymou"i . r- – mLonq Meadˆvl}}ˆ // 1 PLVMOUT ˆ

; ROmaW"ddsB,:idgA, MirfovtownJ \ Oakvilleˆ

New MillWrd \ ' W(ˆ0DBpUY \

d)ROXBURYˆ H ,ule A—

BRIDGE- \ 4 Bridge watˆ WATER \

. Roxbur; Falls

’ JjN – d « s’

\sVj oxbury, \North

v’ Sta. J Woodbury Woodbu

iV' 'east ' s. Manchester ^ BOLTON \"(= "

\ Highland Pa°rk i) And

lz JJIhartforDo ' . . . — \ I fJSYe

Hillstown] – — /I I JO

\r 'ffi.'S'aubuc^wn fieooF y 'H —

y -o ..Addison o y \ I \ AXhOV

dC Glastonlmry Bucl inghamv / V

jk Glastonburyi J A "

3)V. (il.ASlilXBI.'RY /Tl0'®"1!

f^csrj / (V. h)*i

rfAMi\TONIf | Clarks\Corp(

Brooklyn ^

i1 Danielson

-

C ent ral] V CANTERBURY

f . £.

avion < >«

Jk PROSPECT

Bei K?ei

NG'TON J

Southin^tor

Planl!svil)e

■illaala_L

C/HESHIRE^* —■

■ ^ Neversinkx) , j, .

Pond Hawley^njc) Jc / I

\\C ON 1 V Beacon

Cheshire Stal Cheshire

Falls /

_ j / Hfuldam (bDurhai^ Center _ Arnolds, D U R H.A M 1 ConsettoShailerviHe •Pisguag^ H A D D AJVI

r

Tjwville

/Brewster Sta. I ri

FaiuGio

ih Ali

Tftain V,/VJ\BETHEL

\\ Bethel

K

[Goldens J Bridge

K

Bethany Hi

Jit/ Carmel \ . Qenterviile Ym O J ^ Haindenjcf ’

x / 1

rrutqxnfff

7E “• IN

^Di^ncan

’ t^CH

^ V.-

o V-

MtFor^°Little^adAST East(

- Haddara^ ^

\ N.orth Plain

^ Fit^hv

F \A/S / bozrar I /

U y/ , J Norwich

r ^-Cnivf«ers|J|_ . . \ o

I ^ (Ln/cc LeHWgweU^

! /S.A. 1 _ T ..1.7.01 i ^ i

Gardner Lake°l Oksehok nee Lnk

\ ir,Uin4o.,S' A Lj M I ^ "Salem I

ry H (A I) h A M I \

{: J';f Mt. Parnassus, ft

,) M O N 1\V 1 L L E

\ MXssaPea^Stoddard t\

J ^~Montville0\ '

- -r "Chesterfield M^ntvilledi

I

ESTER

Deep River ^

Ansoma

sl)erbyjc.

ncas^iRe_Pi-^

Lakes, Pond QuakeiHill

V PLAINFIELD.

I'ii'kW yfl'lainfield. 1

p 0F,konk

iJiv

r Bjshops

A

i ,0

N \/V Campbells!

\\ 0 RTillc *—

1

. N

o Oakdale

ay;i vt

)o Millings K 0 ,"T — f – 1

- Pendleton g

Hill

\ “ 'NpRx{r H \ ^ ^Laurel Glen

V S Tn£ > /N I NO T O

D

E

G

WESTBROOK! ULUA ![_• 'SAVBRO\OKy

- broole

. *.'fy _

\4T feVH. STA5IFO,ri i'Stanwifh L»-„ , (cj

- 1 / Riverbank \ j

\ \ "o

1 Adams

\ EASTON \

O/Tousc

ner Island

) Roumyirill}

i\vicHV

G

L

A N V

CONNECTICUT

SCALE

Statute Miles, 8.4 = 1 Inch.

10 U

0 1 2 3 4 5

R.„d McN.,1, •.Half

Copyright by RMh •h*'"1

73°S0'r.

10

11

12

13

14

72 30

dank

'Jint

15

16

17

18

19

20

72

K

M

21

22

23 2840

CONNECTICUT

525

ley, and there re-established the almost aban¬ doned settlements at the three towns which bore the transplanted Massachusetts names of New¬ town, Watertown and Dorchester, but were, in the following year, respectively named Hart¬ ford, Wethersfield and Windsor. Within a year from the time of this settlement about 30 of the settlers had been wantonly killed by the Pequot Indians, who appeared to be plotting the extermination of the English. In May 1637 Maj. John Mason, with a band of 90 men, was dispatched to attack the Pequots at their stronghold in the present town of Groton. Reaching, by strategic movements, the stock¬ ade, where a large number of them were en¬ camped, he took them completely by surprise, killing about 700 by setting fire to their in¬ flammable wigwams and putting to death in hand-to-hand conflict those who escaped the flames. This resulted in the extermination of the Pequot tribe, and secured to the settlers exemption from Indian depredations for all time to come.

The colonists now began to prosper under the leadership of the pastors, Hooker and Stone. Finding themselves outside of the juris¬ diction of Massachusetts, to which they at first supposed that they were answerable, they pro¬ ceeded to form a civil government of their own, adopting in 1639 the Constitution which stands unique in history as the first written con¬ stitution of a self-governing people. Its prin¬ ciples had been preached from the pulpit by Thomas Hooker, and its spirit, if not its form, prevailed in the Federal Constitution which was adopted through the influence of Oliver Ells¬ worth, Roger Sherman and William Samuel Johnson of Connecticut just 150 years later. By this Constitution of 1639 much less rigid ecclesiastical control prevailed than in Massa¬ chusetts Bay and Plymouth colonies, the people were recognized as sovereign, and the authority and even the

existence of the ruler of Great Britain was ignored. Meantime there had sprung up in Quinnipiack a budding colony, afterward known as New Haven colony, under the leadership of Theophilus Eaton and the Rev. John Davenport. This colony in 1639 adopted resolutions which vested the govern¬ ment in seven pillars of the Church, and dis¬ franchised all who were not church members. In 1662 John Winthrop, the younger, then gov¬ ernor of Connecticut, obtained in England from Charles II a charter which established Con¬ necticut as an independent colony under the constitution already adopted, and defined the boundaries to include New Haven colony, which was thus absorbed, though sorely against its will.

Charter Rights. — From this time onward, for 50 years, Connecticut was engaged in a constant struggle to maintain the rights which the charter had granted. Conflicting grants by Charles II to his brother, then Duke of York; boundary disputes ; conflicts of authority with other colonial governors ; and the fear that the charter might be annulled by royal decree, kept the statesmen o'f the day in an attitude of con¬ tinual vigilance, and schooled them in diplo¬ macy, tact and political alertness. But once in her history, and then only for a year and a half, did Connecticut lose that autonomy which she cherished as her birthright. This was dur¬ ing the usurpation of Andros, in 1687. But the

charter was preserved, though Andros de¬ manded it. Its preservation was the result of one of the Yankee tricks for which Connecticut has always been famous, and which may have had something to do with giving her the equivocal title of ((the Nutmeg State.® The charter was brought into the general court toward nightfall at Andros' request. Candles were lighted and, by some mysterious agency, suddenly extinguished. During the darkness which prevailed the charter disappeared. An¬ dros assumed the government, and Secretary John Allyn wrote ((FINIS® at the close of the record of the proceedings. In May 1689 came the downfall of Andros, and the government and charter reappeared, with the astute Gov¬ ernor Treat once more in the chair, and an un¬ dying reverence established for the old charter oak, where, as tradition tells us, Capt. Joseph Wadsworth hid the precious document when it so suddenly disappeared.

War Services. — From the resumption of the government under the charter to the close of the French war in 1763, Connecticut saw much military service, for which she furnished her full quota, on other soils than her own. The short intervals of peace during this long period did not suffice to regain prosperity, and the year 1763 found the colony impoverished by contributions of men and money in the French and Spanish wars, and confronted with the odious news of the Stamp Act. The enforce¬ ment of this measure was prevented by com¬ pelling the stamp-master to sign a paper stating that he resigned (

In the War of the Revolution which fol¬ lowed, the share of Connecticut forms a most important feature, still hardly appreciated by his¬ torians. The colony was amply, though quietly, prepared in every way for the coming struggle in 1775. Perfect unanimity prevailed. It was unnecessary either to reconstruct the govern¬ ment, as was done in Massachusetts, or to de¬ pose the governor, as was done in all the other colonies. Connecticut alone of all the 13 colo¬ nies had from the beginning a governor, Jona¬ than Trumbull, who was an ardent believer in the cause of his country. He became a trusted adviser and helper to Washington. A cherished Connecticut tradition asserts that the national nickname, ((Brother Jonathan,® is derived from the fact that Washington had used this sobri¬ quet in speaking of Governor Trumbull. From recent compilations of muster-rolls it is safe to assert that Connecticut furnished 40,000 men in her various enlistments in this war. In the adoption of the Declaration of Independence she was the first colony to instruct her dele¬ gates to vote for this measure. During the war, she gained the title of (

As in the French, Spanish and Indian wars, so in the Revolution, Connecticut's position was, in a certain sense, altruistic, for but little fight¬ ing was done on her soil, and it was done at times when her own fighting men were serving their country beyond their own immediate bor¬ ders. The ravages of two of the most savage

massacres and two of the most barbarous raids of the war brought their horror and devasta¬ tion to this little commonwealth. The Wyo¬ ming massacre was an attack on Connecticut settlers on

disputed Connecticut soil, justly claimed under grants of the charter, which ex¬ tended the western boundaries to the ((South Seaw or Pacific Ocean, whose location was majestically ignored by Charles II and his ad¬ visers. Wyoming or Westmoreland, now in Pennsylvania, was at the time of the horrible massacre of July 1778 a county of Connecticut, having been previously a part of Litchfield County, and having been for 25 years settled by a Connecticut company after repeated re¬ pulses which only served to strengthen resist¬ ance and establish an apparently permanent foothold on the part of the settlers. The refugees, of whom women and children com¬ posed a large majority, fled to their homes in Connecticut after the massacre, the terrible re¬ sults of which did not prevent many of the former inhabitants from returning to Wyoming, and once more establishing themselves in that beautiful region from which they had been so often ruthlessly driven. The other massacre, at Groton, occurred toward the close of the war, 6 Sept. 1781. The raid was commanded by Ben¬ edict Arnold, to whom it is unfair to attribute the most disgraceful part of it. He was in New London at the time of the occurrence, his troops having burned a large portion of the town. The little garrison of Fort Griswold at Groton made a brave resistance against forces outnumbering them six to one. When, at last, the British entered the fort, Ledyard, the Amer¬ ican commander, presented his sword to the officer in command of the British in token of surrender. This brute, whose name, fortunately for his memory, has never been discovered, re¬ ceived the swrord and plunged it at once through Ledyard's heart. This was a signal for in¬ discriminate slaughter, in which hardly a man of this surrendered force was left unhurt, and but few left alive.

The raids of Gov. William Tryon on Dan¬ bury in April 1777, and on New Haven, Fair- field and Norwalk, in July 1779, resulted in great destruction of property by fire and plunder, and in the loss of many lives on both sides. It may be truly said that never but twice did these invaders remain on Connecticut soil over night, and in each case took to their ships the next morning with Connecticut troops in hot pursuit.

Notwithstanding the terrible drain which the Revolution made upon her resources, Connecti¬ cut, through her wise financial policy, was bet¬ ter prepared, at the close of the war, to avail of the advantages of peace than were any of the other States with the exception of Dela¬ ware. It is hardly surprising that the War of 1812 should have been unpopular in Connecti¬ cut as well as in all New England; but too much opprobrium has teen heaped on Con¬ necticut by giving the protesting convention for all New England the name of the Hartford Convention for the simple reason that it was held, for convenience, in Hartford. It will be found that Connecticut furnished for this war, too, a goodly number of men, though there were some disputes as to the manner and form of doing it. For the half century following this war, peace and prosperity prevailed, broken

only by the comparatively insignificant, but sufficient, contribution which was made to the Mexican War.

The outbreak of the Civil War in 1861, like the outbreak of the Revolution in 1775, found Connecticut with a governor in office who was equal to the emergency. Gov. William A. Buckingham, upon his own responsibility, called for a regiment of volunteers, 16 April 1861, when there was not a regiment of organ¬ ized militia in the State to meet Lincoln's first call. The private citizens and the towns voted money to forward troops ; and soon, instead of one, three regiments of volunteers reported for service, making it necessary for the gov¬ ernor to go to Washington to have three times the quota accepted under the call. At the close of the war, the official record shows that Con¬ necticut had furnished 54,882 volunteers, which number was largely in excess of her quota.

Industries. — This war stimulated the indus¬ tries of Connecticut, which had, at the time, reached a high stage of development. The de¬ mand which the large and suddenly equipped army and navy of the country made upon these industries could not fail to have this effect. During the years which have followed the War, the development of manufactures has continued to keep up a healthy growth. This little commonwealth, originally composed of in¬ telligent farming communities, has, by a per¬ fectly natural process of evolution, developed into a manufacturing State which, small though it is in area, holds the rank of eleventh in the gross value of its manufactured products, and the rank of second in the per capita value of these products among the 52 States and Ter¬ ritories enumerated in the latest census. Still more significant is the fact that a larger num¬ ber of patents in proportion to the population have been issued to Connecticut inventors than to those of any other State in the Union during the past 10 years.

It appears to be a fact that in early colonial times the same inventive genius which has de¬ veloped in this little commonwealth was born of necessity, and that it was transmitted by heredity down to the present day. The first settlers brought with them intelligence, broadened views of ecclesiastical control and little or nothing more. There were no industrial specialists among them ; and a century after the towns of the colony had taken root in various parts of the soil the leading townsmen, besides being still farmers with a growing tendency to trade, were each of them equal to any industrial or political emergency which might arise. Diaries covering the first half of the 18th cen¬ tury show, for example, that the diarist was a ship-carpenter, house-carpenter, millwright, surveyor, judge of probate, soldier and deputy to the general assembly, while pursuing the regular occupation of a trading farmer; and that his neighbors were equally versatile in their industrial and political pursuits. This di¬ versity of individual talents naturally grew, in time, to specializing, as the resources and needs of the commonwealth developed. In 1705 the Granby copper mines were discovered, and un- profitably worked, leaving as souvenirs the Granby copper coins, and the old mine itself, which was used as a prison during the Revolu¬ tion, and abandoned at the time of establishing the State prison at Wethersfield in 1827. Other

attempts at mining for precious metals were equally unsuccessful, but the working of the Salisbury iron mines, .which have been in operation since 1730, proved to be a lasting suc¬ cess. From these mines cannon balls, camp- kettles and other useful articles were furnished during the Revolution, including the chains which were used to bar the progress of the British fleet on the Hudson. The anchor of the famous ship Constitution was forged from Salisbury iron in later days. The ore is a rich hematite, which, prepared by the use of char¬ coal, yields pig-iron which rivals the famous product of the Swedish and Norwegian mines.

Manufactures. — As early as 1749 we find that John Allyn had experimented in brass¬ making; and in 1768 the first paper-mill of Con¬ necticut, if not the first in the country, was successfully established by Christopher Leffing- well of Norwich. Tinware was first made in Berlin in 1770, and furnished for a century or more an important industry in which the Yankee peddler exercised his wit and shrewd¬ ness. In 1773 Thomas Harland from London established at Norwich a shop for making and repairing watches and clocks.' In this shop Eli Terry learned the mechanism of the time¬ pieces of the day, and afterward applied his inventive genius to the manufacture of pillar- scroll and case clocks, which he perfected in 1793. Other Connecticut inventors, especially Seth Thomas and Chauncey Jerome, have brought clock-making to, or very near, its pres¬ ent advanced stage. Eli Whitney, the inventor of the cotton-gin, though not a Connecticut man by birth, owed his fortune to the successful manufacture of firearms at New Haven in 1798, after having been robbed of his great invention in the South in 1792.

The first manufacture of sewing-machines on an extended scale was established by Elias Howe, at Bridgeport, followed in the same city by the improvements of Wheeler and Wilson. In 1844 Charles Goodyear of New Haven ob¬ tained his first patent for the process of vul¬ canizing india-rubber, a process entirely of his own discovery, which revolutionized this im¬ portant industry in his day, or rather made a new and still enormously increasing industry in the use of material which, without this in¬ vention, would have continued to occupy an unimportant place in the industries of the world. The invention of electro-silver plating is traced to the Rogers Brothers of Hartford. In 1846 these three brothers, Asa H., William and Simeon S., succeeded, after much experiment¬ ing, in finding a successful way of applying this process to articles made of various metals. From small beginnings, the business grew to large proportions, resulting in great establish¬ ments in Hartford, Meriden, Waterbury, Nor¬ wich and elsewhere.

The manufacture of textile fabrics had its beginnings in a small woolen factory in Hart¬ ford in 1788, and a small cotton mill in Vernon in 1804, but the growth of this industry to its present proportions did not begin in any marked degree till after the enactment of the Joint Stock Act, in 1837, allowing small sums to be capitalized and small proprietors to join their forces in manufacturing. This act, form¬ ing a long step in the evolution of the modern trust, since it was copied by nearly every State in the Union, and by Great Britain, thus

changing the business of the world, was the work of a Connecticut man, Theodore Hins¬ dale.

Many cotton mills are on the Shetauket, Yantic and Quinnebaug rivers. The Ponemah Company, at Taftville, has a mill, which, when it was built, was the largest cotton mill in the world. The Willimantic Linen Company is one of the greatest thread producers in New England. More than seven-tenths of the cot¬ ton spindles of the State are operated at Nor¬ wich, Thompson, Plainfield, Killingly and Willimantic. The woolen mills are more widely distributed throughout the State, at Vernon, Stafford, Broad Brook, New Britain, Norwich and elsewhere. Among the textile manufactures that of silk is important, having had its small beginnings so early as 1732 and now placing the State third in the Union in that industry. In 1914 the silk products were valued at $30,592,000. The works of the Cheney Brothers, at South Manchester, estab¬ lished in 1838, are among the largest in the country.

The manufacture of textiles, including silk, wool, worsted, cotton, felt, hosiery and knit goods, forms one of the leading manufacturing industries of the State. Recently manufactures gave employment to 226,264 wage-earners, re¬ ceiving wages amounting to $126,210,000, with capital invested amounting to $620,194,000, and manufactured products valued at $545,240,000. Waterbury is prominent in making brass; Meri¬ den in silver and plated ware; New Britain (which has the largest proportion of wage- earners, 34.2 per cent, and the greatest number of nationalities represented in its population) in hardware, cutlery and knit goods; New Haven and Bridgeport in firearms, corsets anc rubber goods; Hartford in hardware and fire¬ arms. The variety of manufactured articles is noticeable, from blotting-paper to aircraft. Connecticut was the leading State in the value of firearms and munitions manufactured in 1910, two-fifths of the total for the United States having been reported ; and that amount has been vastly increased since 1914 by the output of Winchester's, Marlin's and Maxim's in New Haven, of the Union Metallic Company and American-British Company in Bridge¬ port, of Colt's in Hartford, besides other firms in Meriden, Norwich and elsewhere The prodigious activity of these establishments has added many thousands to the population of those cities. Connecticut ranks first in brass and bronze products, in clocks and watches, corsets and plated ware, producing two-thirds of the total amount of the last in the United States ; is second in cutlery and rubber boots and shoes, the Candee Rubber Company in New Haven turning out 25,000 pairs of rubber shoes every day. The automobile and aircraft manufactures show great increase since 1900.

Agriculture. — Although the history of agri¬ culture in Connecticut presents a contrast to that of manufacturing by showing a decline in proportion to the population, agriculture is still second in importance among industries. It must be remembered that the little common¬ wealth is the smallest but two of the States and Territories. Its area may be rather indefinitely divided into the central lowland, the coast, the eastern and western uplands. Of these, the central lowland, lying in the valley of the Con-

necticut River, is from Middletown to the northern boundary best adapted to cultivation ; and here it was that, after spying out the land, the first colonists, whose sole industry was agriculture settled.

From Middletown to the coast, the river leaves the lowland and cuts a narrow valley through the eastern upland. The portion of the central lowland between Middletown and New Haven is less fertile. The eastern upland varies in fertility, but contains some rich farm¬ ing land. It has also the advantage of a lower average elevation than the western upland, where the only mountains of the State are found. One of these, Bear Mountain, reaches an elevation of 2,000 feet or more.

Hay and fodder rank first in value, as crops ; tobacco, second; market gardening, poultry raising and dairy farms stand high as profitable employments. The large proportion of con¬ sumers, and, especially, the facility of market¬ ing, generally, without middlemen, and often without even railroading, cause the profit from crops to be larger in Connecticut than in States more strictly agricultural. The whole output can be sold easily within the limits of the State; and the cities of New York and Boston offer good markets. Connecticut brings in $198.34 per acre for small fruits, more than any State except Florida; her apples bring in a return in bushels per tree surpassed by New

York and Colorado only, and in value, by Massachusetts, New York, Colorado and Ari¬ zona only; and she raises more corn per acre than any other State, with an average yield annually of 53.2 and 48.5 bushels per acre. An acre of vegetables in Connecticut brings more money than in any other State except Massachusetts and New Hampshire. Peach raising is important, with large crops and cor¬ responding profits. Wallingford and Glaston¬ bury leading the State in that industry. The cultivation of tobacco began in the Connecticut Valley, near Hartford, as early as 1680. Im¬ proved methods of curing the harvested plant have added much to its value in late years, the tobacco being of the best quality for wrappers. Three types are raised, the Havana seed-leaf, principally on the west bank of the Connecticut River, the broad leaf, on the east side, and the shade grown, mostly on the west side, the last having steadily increased in acreage, the ad¬ vantage derived being still disputed. In all, 29,970,000 pounds were raised in 1915, valued at $5,095,000. Tobacco is worth more per acre as a crop than in any other State. In the other New England States, the number of dairy cattle has decreased since 1905, but Con¬ necticut has maintained her dairy industry un¬ impaired. The raising of cattle for food has decreased. In 1915 the average value per acre of farm land for the whole State was $33.03 ; in the southwestern part, it was from $75 to $100 per acre. This average value of farm land increased 21.14 per cent between 1900 and 1910, or over one and three-fourths times as much as during the preceding half century. From 1912 to 1915, there was a gain in value per acre of farm land of $7 for improved and $5 for unimproved.

The shell-fish grounds belonging to the State are an important source of revenue ; and are protected by strict regulations under the careful watch of the Shell-Fish Commissioners,

who keep the grounds guarded by patrol boats in all but very inclement weather

Railroad and Other Companies. — The rail¬ roads are the New York, New Haven and Hartford, with 851 miles operated in the State and a total mileage of 2,004.58; New London and Northern, with 56.10 miles in the State, total mileage, 58.60 (operated by the Central Vermont) ; Central New England, with 83.08 miles in the State, total mileage, 522.80; Central Vermont, with 58.60 miles in the State, total mileage, 572.60; Hartford and Connecticut Western, leased by Central New England, with 77.26 miles in the State, total mileage, 123.96; Norwich and Worcester, with 53.16 miles in the State, total mileage, 71.07 (operated by New York, New Haven and Hartford) ; South Man¬ chester, total mileage, 3.15; Branford (freight only), total mileage, 4.20. The total mileage in the State is 999.58, and the total miles operated by companies in the State, 5,638.01 (all tracks). Since the government has taken over the railroads, it is difficult to give figures for receipts, expenses, and profits, which in fact may vary from month to month.

The Public 'Utilities Commission reported, in 1915, 25 electric companies, 2 express com¬ panies, 12 gas companies, 15 gas and electric companies, 8 railroad companies, 22 street rail¬ way companies, 3 telegraph companies, 10 tele¬ phone companies and 87 water companies, most of these companies showing an increase of 'business.

Banking and Finance. — In the banking business of the State, the most important item is the deposits in the 82 savings banks, January 1915, making a total of $335,086,694.93, and an increase during 1914 of $25,448,326.74. The State ranks third in the number of its savings bank depositors, if mutual or trustees savings banks only are considered, those being the pre¬ vailing kind in New England and the East. Considering stock savings banks, which are found in the other parts of the United States, California is third and Connecticut fourth. In 1915, the number of depositors was 629,655. There were 73 national banks of deposit, with aggregate capital of $19,784,300, and surplus of $11,121,000; 58 State banks and trust com¬ panies, with capital of $8,098,200, and surplus of $4,168,388.29; 5 investment companies, with capital stock of $664,150; and 4 Morris Plan companies with gross resources of $421,125.30; and 20 building and loan associations.

The oldest bank of deposit in the State and the fifth in age in the United States is the Union Bank and Trust Company of New Lon¬ don, chartered in 1792, and still doing business under its old charter. Still earlier, in 1732, Thomas Seymour and others, of New London, secured a charter for banking purposes, but it was revoked within four years. The four old¬ est banks in the State, in Hartford, Middle- town, New London and New Haven, are well on in their second century, and are still very prosperous. The Middlesex Banking Company, of Middletown, chartered in 1872, is the oldest mortgage company in the country.

Insurance. — The insurance business of the State centres in Hartford, where are 7 of the 8 stock fire insurance companies, which represented, in 1916, in all, capital of $15,750,000, and surplus of $25,618,617.38; 12 mutual fire insurance companies report, in all,

a surplus of $2,447,520.61 ; and there are many other mutual companies. The 6 life insurance companies are all in Hartford, and reported, in 1916, aggregate assets of $343,203,670.66. There were also 6 indemnity companies and 6 miscellaneous insurance companies. Of the many fraternal benefit societies, 8 reported in 1910 assets amounting to $107,649,937.50.

*Religion . — The ecclesiastical history of Connecticut would fill a large volume, and is an interesting study of the development of religion in this country. It is enough to say that, at the beginning, the colony stood unique as a compromise between the rigid ecclesiasti- cism of Massachusetts Bay and Plymouth colonies, and the religious liberty which Roger Williams was, at the time, establishing in Rhode Island. Unique though it was, it can be called a theocracy only at the beginning, for the State was then the Congregational Church, pure and simple, and though others than church members could vote, they were obliged by the early code to vote taxes for the support of the church. The process of emancipation from these theocratic conditions was slow, and did not reach perfection until the adoption of the new Constitution in 1818. Through this period of nearly two centuries there were executions for witchcraft at Stratford in 1651 ; at Fair- field in 1653 ; and possibly at Windsor in March 1646 or 1647, if the journal of John Winthrop is to be taken as an authority; and in the theological tenets which wrere adopted from time to time under direction of the general court and otherwise, we pass through a maze of solemn discussions of the Half-way Cove¬ nant, the Cambridge Platform, the Saybrook Platform, w*ith the later New Lights and Old Lights arrayed against one another as Separat¬ ists and Conservatists. Legislation exempting the Church of England from taxation for sup¬ port of the Congregational Church was had in 1727, and in 1729 was extended to cover cases of the Baptists and Quakers. In 1791, the right of incorporation was allowed, under certain restrictions, to all religious bodies. The first Baptist elder was ordained at New Lon¬ don in 1726,.but the sect did not gain largely until the beginning of the 19th century. The Protestant Episcopal Church was not estab¬ lished under a regularly ordained bishop until after 1784, although it had made beginnings before that time, but was practically exter¬ minated during the Revolution, owing to the Toryism of its clergy. In 1789, the first Metho¬ dist Episcopal church in the State was estab¬ lished at Stratford. The first Roman Catholic church in Connecticut was established in 1830, and in 1843 the diocese of Hartford, embracing the entire State, was established.*

The statistics of religious denominations are but partially available, only a few of the de¬ nominations publishing complete reports. The Protestant denominations are divided into many sects. The number of ordained ministers is given as follows : Advent, 23 ; African M. E. Zion, 15; Baptist, 209; Catholic Apostolic, 5; Congregational, 497; English Lutheran, 17; German Lutheran, 19; Swedish Lutheran, 17; Hebrew, 8; Methodist Episcopal, 177; Presby¬ terian, 14; Episcopal, 194 ; Roman Catholic, 432; Unitarian, 5 ; Universalist, 10.

Charitable Institutions. — The educational institutions which are partly or wholly voL.t-» — 34

sectarian in character will be mentioned in speaking of the general subject of education. The Board of Charities reported, in 1914, as in successful operation, 26 hospitals, public and private; 6 sanatoria for tubercular patients; 2 State hospitals for the insane; 12 private asy¬ lums for the insane; 1 colony for epileptics; 1 school for imbeciles; 2 schools for the deaf; 1 school for the blind; 2 homes for old soldiers; 8 county temporary homes for children ; 67 almshouses; 20 private homes for old people; 19 private homes and asylums for children; and recent additions to the list have been made. Of these, the Roman Catholic Church supports 3 orphan asylums, 5 hospitals, 2 homes for aged poor, and the Swedish Congregational Asso¬ ciation largely supports one orphanage. Of the almshouses, 61 are owned by the towns or cities in which they are situated, and 6 are owned and managed by private individuals, 101 towns caring for their poor in their own houses or in families. The Hartford Retreat for the Insane, the third in age in the United States, having been opened in 1821, holds a unique position, because, although always a private in¬ stitution, it was long the only

place in which State patients could be received ; and some such are still committed to it each year.

Penal and Reformatory Institutions. — There are 1 State prison; 10 county jails; 1 State reformatory for male delinquents be¬ tween 16 and 25 ; 1 school for boys ; 1 indus¬ trial school for girls; 3 homes for young women offenders, of which last the Roman Catholic Church supports one. The State Reformatory, opened in 1913, is doing a very satisfactory work, and is an important addition to the cor¬ rectional work of the State. The total expense to the State for the care of delinquents, defec¬ tives and dependents in 1914 was $1,946,517.92.

Education. — The educational system of Connecticut was planted almost literally with the first corn that was planted by the early settlers. From the small beginnings in the few towns, the present system of public schools has been evolved, aided materially in 1795 by the proceeds of the Western Reserve Lands, now in the State of Ohio, which were sold in order to establish a school fund. The lands, to the extent of about 3,500,000 acres, were granted to Connecticut by the United States in 1786 as a tacit compensation for her loss of the Wyoming territory by a decree of 1782. About 500,000 acres were granted by Connecti¬ cut to those within her jurisdiction who had suffered from the incursions of the British during the Revolution, and the remaining 3,000,000 acres were sold for the establishment of a school fund. That fund remains intact to the present day, and amounted, in Octo¬ ber 1916, to $2,008,590.79, yielding an income of $116,850.55 for that year, and providing 43 cents of the $2.25 per child, distributed to the schools on the basis of enumeration. Another fund, known as the town deposit fund, was Connecticut's share of the apportionment from the surplus of the United States Treasury in 1837, and was given by the State to the towns. Under the law of 1859, the entire income of this fund was to be used for education ; but it has become so merged in the general treasuries of the towns that it scarcely has a separate ex¬ istence. Beyond this State support, the com¬ mon school system depends on taxation in vari-

ous towns and school districts to meet expense. By a recent decision of the courts, a school dis¬ trict may, in lieu of the payment made by the State of $2.25 per year for each enumerated school child, receive from the town the actual expense of conducting the schools for 188 days in the year.

Education is compulsory, within the limits of 7 and 16 years. The control of the com¬ mon school system is varied, being by commit¬ tees, either of towns or of school districts, or by boards of education, the tendency being toward the consolidation of districts in each town. Supervisors have been introduced with good effect, and in increasing numbers. Trade schools, where vocational preparation is given by practical experts in the different trades, are assuming a prominent place in the scheme of public education, and are well equipped. In addition to the common schools, to whose sup¬ port it contributes, the State now supports four normal training schools for teachers. It also supports and controls an agricultural college and an agricultural experiment station. In 1915 the public school buildings numbered 1,510, employing continuously 6,392 teachers, with many others employed at times. The average daily attendance during 1915 was 175,- 881. The value of school property was $23,- 193,194.84; the total expenditure for public schools as reported by towns was $9,590,562.67 ; the receipts on account of public schools, as reported by towns, was $7,656,423.37 ; received from loans, $1,949,796.13; indebtedness of towns on account of schools, $8,703,329.31. The expenditure per child registered in 1915 was $23.67 ; per child in average attendance, $36.87 ; the increase in cost per child in average attend¬ ance in the 10 years preceding 1916 averaged $1 a year.

In addition to the public schools, there are in the State 261 private schools, of which 82 are parochial schools of the Roman Catholic Church, 6 parochial schools of the Lutheran Church, and the rest are non-sectarian, being business colleges, boarding schools and second¬ ary schools. These 261 private schools employ 1,726 teachers and are attended by 52,293 pupils. The higher institutions of learning are all sup¬ ported by tuition and endowment, or church funds. The principal ones are Yale University, Wesleyan University, Trinity College, the Hart¬ ford Seminary Foundation, including Hartford Theological Seminary, School of Religious Pedagogy and Kennedy School of Missions, with other schools to be added ; the Berkeley Divinity School, Saint Thomas Catholic Semi¬ nary, Saint Joseph Catholic Seminar)'-, and the Connecticut College for Women at

New Lon¬ don. Each of these, except the last, has a large library of its own, that of Yale University be¬ ing the largest in the State with over a million volumes. The Yale Elizabethan Club owns the best collection of Tudor and Stuart drama to which the public has access in this country. The collections, mineralogical, geological and palaeontological, of the Peabody Museum of Yale University are of great value, as are the collections of Greek and Etruscan vases, and of Babylonian antiquities, the Jarves gallery of early Italian paintings, the photographs col¬ lected by the Yale Peruvian Expeditions and the Steinert collection of musical instruments.

The State Library at Hartford contains a

large and valuable collection of the laws and official documents of other States and the gen¬ eral government ; besides which it has accumu¬ lated a general collection in which history is prominent; it also contains many rare and original documents, including the charter of 1662. In 1916 there were in the State 218 public libraries.

The principal historical societies are the Connecticut, the New Haven Colony, the New London County, the Middlesex County, the Mat- tatuck (of Waterbury), Historical societies, and the Bridgeport Scientific and Historical Society.

The growing desire for increasing the artis¬ tic sense of the community is shown by the organized efforts in New Haven, Bridgeport, Hartford and other places, for the purpose of developing beauty in their own domains.

Government. — The government of Con¬ necticut has been conducted under two different constitutions, the first of which was adopted in January, 1638-39, and was fortified and pro¬ tected by the charter of 1662 ; and the second, which was adopted as the result of a con¬ stitutional convention in 1818. This constitu¬ tion, with its subsequent amendments, forms the organic law of Connecticut at present. Under it the governor, lieutenant-governor, secretary of state, treasurer, comptroller and members of the general assembly are chosen biennially by the people. Other State officers are appointed either by the governor, sometimes with, and sometimes without, the consent of the senate, or by the general assembly.

*The General Assembly is composed of a senate consisting of 35 members, *and a house of representatives, consisting of 258 members. One senator is elected from each of the sena¬ torial districts; one representative each from 78 towns, and two each are elected from 90 towns. In 1911 the State was divided into 5 senatorial districts, instead of 4. for electing members of Congress. In 1914, 87 towns voted for no license and 90 for license, one being equally divided. The courts are the Supreme Court of Errors and the Superior Court, the judges serving for terms of eight years; the Court of Common Pleas, and the District Court, for four years, all of these judges being ap¬ pointed by the general assembly on nomination by the governor. Judges of city, borough and town courts are appointed for terms of two years, by the general assembly. There are in the State 113 probate districts, the judges of which are elected by the people.*

COLONIAL GOVERNORS Connecticut Colony

John Haynes . 1639-40

Edward Hopkins. . 1640-41

John Haynes . 1641-42

George Wyllys. . . . 1642-43

John Haynes . 1643-44

Edward Hopkins . 1 644-45

John Haynes . 1645-46

Edward Hopkins. . 1646-47

John Haynes . 1647-48

John Haynes . 1649-50

Edward Hopkins. . 1650-51

John Haynes . 1651-52

Edward Hopkins. . 1652-53

John Haynes . 1653-54

Edward Hopkins. . 1654-55 Thomas Welles. . . 1655-56

John Webster . 1656-57

John Winthrop _ 1657-58

Thomas Welles _ 1658-59

John Winthrop… 1659-76

William Leete . 1676-83

Robert Treat . 1683-87

Edmund Andros. . . 1687-89

Robert Treat . 1689-98

Fitz John Winthrop 1698-1707 Gurdon Saltonstall 1707-24 Joseph Talcott … . 1724-41 Jonathan Law. . . . 1741-50 Roger Wolcott …. 1750-54

Thomas Fitch . 1754—66

William Pitkin. . . . 1766-69 Jonathan Trumbull 1769-76

(Originally no one was to be chosen governor two years in succession; which accounts for the alternating terms of office. In 1660, this restiiction was abolished by the free-

CONNECTICUT

Capitol, Hartford, Conn.

CONNECTICUT

531

men. Until 1752, the legal year in England began 25 March, not 1 January. This, with the difference of 11 days between Old Style and New Style, accounts for many appar¬ ent discrepancies in dates).

New Haven Colony

Theophilus Eaton . 1639-58 Robert Newman. . 1658-60

William Leete. . .

. . 1661-65

STATE

GOVERNORS

Jonathan Trumbull .

Federalist .

. . 1776-84

Matthew Griswold .

ii

. . 1784-86

Samuel Huntington .

U

. . 1786-96

Oliver Wolcott .

U

.. 1796-98

Jonathan Trumbull ……

U

.. 1798-1809

John Treadwell . . .

u

. . 1809-11

Roger Griswold . . .

it

.. 1811-13

John Cotton Smith . . .

u

. . 1813-17

Oliver Wolcott . . .

Anti-Federalist . . . .

.. 1817-27

Gideon Tomlinson .

it

. . 1827-31

John S. Peters .

Whig .

. . 1831-33

H. W. Edwards .

Democrat .

. . 1833-34

Samuel A. Foote .

Whig .

. . 1834-35

H. W. Edwards .

Democrat .

. . 1835-38

W. W. Ellsworth .

Whig .

. . 1838-42

C. F. Cleveland .

Democrat .

. . 1842-44

Roger S. Baldwin .

Whig .

. . 1844-46

Isaac Toucey .

Democrat .

. . 1846-47

Clark Bissell .

Whig .

. . 1847-49

Joseph Trumbull . . .

U

. . 1849-50

Thomas H. Seymour .

Democrat .

. . 1850-53

Charles H. Pond .

it

. . 1853-54

Henry Dutton .

Whig .

. . 1854-55

W. T. Minor .

Know-Nothing. . .

. . 1855-57

' H. Holley .

Whig .

. . 1857-58

A. Buckingham .

Republican .

. . 1858-66

oseph R. Hawley .

it

. . 1866-67

mes E. English .

Democrat .

. . 1867-69

. ' a shall Jewell .

Republican .

. . 1869-70

j s E. English .

Democrat .

. . 1870-71

Marshall Jewell . Republicen . 1871-73

Charles R. Ingersoll .

. . Democrat .

_ 1873-76

R. D. Hubbard .

it

_ 1876-79

C. B. Andrews .

. Republican .

_ 1879-81

H. T . Bigelow .

U

_ 1881-83

Thomas M. Waller .

, . Democrat .

_ 1883-85

Henry B. Harrison . .

. . Republican .

_ 1885-87

Phineas C. Lounsbury. . ,

U

_ 1887-89

Morgan G. Bulkeley . . . .

U

_ 1889-93

Luzon B. Morris .

. . Democrat .

_ 1893-95

O. Vincent Coffin .

. . Republican .

_ 1895-97

Lorrin A. Cooke .

it

_ 1897-99

George E. Lounsbury. . .

u

_ 1899-1961

George P. McLean .

_ 1901-03

Abiram Chamberlain . . . ,

u

_ 1903-05

Henry Roberts . .

u

_ 1905-07

Rollin.S. Woodruff .

u

_ 1907-09

George L. Lilley .

u

_ 1909-

Frank B. Weeks .

_ 1909-11

Simeon E. Baldwin .

. Democrat .

_ 1911-15

Marcus H. Holcomb .

. . Republican .

_ 1915-17

Marcus H. Holcomb. .

U

_ 1917-19

Marcus H . Holcomb . . .

U

_ 1919-21 ,

Everett J. Lake .

u

_ 1921-23

Population and Finance. — The population of the State, as estimated by the United States

census in 1920, was 1,380,631, showing a great increase in recent years, and making it fourth in rank, as to density. Of this population, about two-thirds are native born and one-third foreign born. In 1910, 3.8 per cent of the population was classed as illiterate, being the smallest per¬ centage of any State except Massachusetts with 3.5 per cent of illiterates. The total grand list as computed in October 1916, by the State Board of Assessors, was $1,278,696,735. New Haven, Hartford and Bridgeport supply one- half of the grand list of the 19 cities. The receipts for the fiscal year ending 30 Sept. 1916 were $11,532,806.94; the expenses, $8,439,944.59.

Legislation. — In 1916, the State legislature was composed of 11 Democratic and 24 Re¬ publican senators ; and 60 Democratic and 198 Republican representatives. Recent bills of im¬ portance include a Public Utilities Commission, Workmen's Compensation Act ; one eliminating a congressman at large; the election of county commissioners by the people; the appointment of judges of the minor courts by the governor

instead of the general assembly; the adoption of uniform laws as to the sales of goods and as to warehouse receipts, recommended by the Conference of Commissioners on United States Laws ; bills to prevent infection with tuber¬ culosis and to provide State hospitals for con¬ sumptives; to establish a State reformatory; appointing a public service corporation regula¬ tion commission; as to uniform bills of lading; establishing a State civil service law ; strength¬ ening the corrupt practices law ; for a (

In 1917 under the auspices and direction of Governor Holcomb the State took a foremost place in war preparation and organization. A census of the resources of the State in men and materials was begun early in the year and com¬ plete returns were available by December. A home guard was established, numbering 20,000 members, of whom about half were fully equipped. By act of the legislature the governor received far-reaching powers, being authorized to take any steps he might deem necessary due to the emergency of the war. Commerce and manufactures throve after the opening of the war due to the fact that the State contained hundreds of factories which were engaged in the manufacture of war mu¬ nitions. The legislature of 1919 will consider a constitutional amendment granting suffrage to women.

Bibliography, — Andrews, C. M., (The River Towns of Connecticut (Baltimore 1889); Clark, G. L., (A History of Connecticut, its Peoples and Institutions) (New York and London 1914) ; Hollister, G. H., (The His¬ tory of Connecticut from the First Settlement of the Colony to the Adoption of the Present Constitution > (2 vols., New Haven 1855) ;

Johnston, A., Connecticut (in (American Commonwealths' Series, > Boston, Mass., 1887), contains a bibliography of the State's history to 1886; Loomis, Dwight, and Calhoun, J. Gil- ert, (Judicial and Civil History of Connecti¬ cut (Boston 1895) ; Mead, N. P., Connecticut as a Corporate Colony) (Lancaster 1906) ; Morgan, Forrest, Connecticut as a Colony and State* (4 vols., Hartford 1904) ; Sanford, E. B., (A History of Connecticut (Hartford 1889) ; Steiner, B. C., (History of Slavery in Connecticut* (Baltimore 1893) ; Trumbull, Benjamin, (A Complete History of Connecti¬ cut (2 vols., New London 1898) ; Trumbull, J. Hammond, (Memorial History of Hartford County, Connecticut (2 vols., Boston 1886) ; Trumbull, J. H., Che Colonial Records of Connecticut (Hartford 1859) ; Norton, Che Governors of Connecticut (Flartford 1905) ; Rice and Gregory, (Manual of the. Geology of Connecticut (in Bulletin No. 6 of the Con¬ necticut Geological and Natural History Sur¬ vey) ; (Reports* of the various Executive De¬ partments of the State (Hartford, annually) ; Che Register and Manual of Connecticut (Hartford annually). For information on the physical geography of the State consult Davis,

William M., (Physical Geography of Southern New England) (National Geographical Soci¬ ety Publications 1895).

Jonathan Trumbull, Librarian of Otis Library, Norwich.

CONNECTICUT AGRICULTURAL COLLEGE, a coeducational institution situated at Mansfield, Conn., eight miles north of Willi- mantic. It was founded in 1881 by the Con¬ necticut general assembly as the Storrs Agri¬ cultural School. It became a land-grant college and likewise, through the extensive work of its experiment stations, an important factor in the State. Its name was therefore changed to the one it now bears. It offers courses leading to degrees in agriculture, domestic science and the mechanic arts. It covers 874 acres and has 11 buildings. Important work in agricultural experiments and university extension is con¬ ducted here. The students number 214; in¬ structors, 35.

CONNECTICUT COLLEGE FOR WOMEN, an institution for higher education at New London, Conn. It was chartered 4 April 1911. The curriculum includes instruction in the humanities, arts and sciences. It con¬ fers the degrees of A.B. and B.S. The campus comprises 340 acres. Elaborate plans have been perfected for the buildings, of which the archi¬ tectural style is in general the domestic Tudor with some edifices in Collegiate Gothic. The college has received several generous gifts of money, including an endowment of $1,000,000 from the Hon. Morton F. Plant. In 1913 the trustees authorized the erection of an initial group of five buildings adequate for the use of the college at the outset. Construction has been proceeding on these and other buildings since early in 1914. The college opened in September 1915. Its foundation is due to the desire of the people of Connecticut to provide within the State adequate facilities for the higher education of women.

CONNECTICUT LAKES, four small lakes in the northern part -of Coos County, N. H., which are connected with Connecticut River in the beginning of its course. They are named in numerical order, from southwest to northeast, the largest one, Connecticut Lake proper, being known as First Lake. The smallest two, Third Lake and Fourth Lake, which are very near the Canadian boundary, are the ultimate sources of the river.

CONNECTICUT RESERVE. See

Western Reserve.

CONNECTICUT RIVER, a river of New England ; it rises in Connecticut Lake on the northern border of New Hampshire, 2,000 feet above sea-level, forms the boundary be¬ tween Vermont and New Hampshire and flows southward, passing through the western part of Massachusetts, the central part of Con¬ necticut and falls into Long Island Sound. Its total length is about 350 miles, and its drain¬ age basin is more than 11,000 square miles in extent. Its principal affluent is the Farmington which joins it above Hartford. Throughout its course between New Hampshire and Ver¬ mont the banks are wooded, the river bed very narrow and all affluents are small, but at cer¬ tain seasons . become so many torrents. The average fall in this upper course is from 18 to

32 feet per mile. After entering Massachu¬ setts the river flows through Triassic shales and sandstones and the river valley becomes very broad. Near the Connecticut border and after its entry into the latter State the river has cut its way through heavy deposits of sand, gravel and clay of the late Glacial Period. This por¬ tion is also marked by several rapids and water¬ falls ; of these the principal are the Enfield Falls, 10 miles above Hartford. The river val¬ ley from Middletown to the sea is narrow, the stream here working through the crystalline rocks of the lowlands. The valley is a great manufacturing region, ample water-power being supplied by the river at many points, such as Bellows Falls, Vt., Turners Falls and Holyoke, Mass., and Windsor Locks, Conn. Below Brattleboro, Vt., a great power dam has been constructed recently by the Federal govern¬ ment. The latter has had elaborate surveys made with a view of rendering the river navi¬ gable as far as Holyoke. Subsidiary canals at present make it navigable for about 25 miles above Hartford, while from this city to the sea (50 miles) it is navigable for vessels draw¬ ing from 8 to 10 feet. The sand bars which are constantly forming at the mouth of the river are removed by dredging. In Colonial times the river played a prominent part in the settlement of the region. It was the highway for the English and Dutch fur traders, and the fertility of the lands along its banks soon at¬ tracted settlers. Until the advent of the rail¬ way it remained the principal thoroughfare be¬ tween the northland and the

sea. Consult Bacon, E. M., (The Connecticut River and the Valley of the Connecticut (New York 1906) ; Genth, M. K., (Valley Towns of Connecticut (American Geographical Society, Vol. XXXIX, No. 9, ib., 1907).

CONNECTICUT YANKEE IN KING ARTHUR'S COURT, a humorous tale by Mark Twain published in 1889. It is the story of a superintendent of an arms factory in Hart¬ ford, Conn., who one day lost consciousness from a blow received in a quarrel with his men. and when he awoke found himself in England at the time of King Arthur. The contact of Connecticut Yankeedom with Arthurian chiv¬ alry gives rise to strange results; yet amidst all the fun and pathos, . the courtliness, the sin¬ cerity, and the stern virtues — as well as what seems to us the ridiculousness — of the age are well shown.

CONNECTIVE TISSUE, the most im¬ portant supporting tissue of the body, derived like bone and cartilage from the mesenchyme of the embryo. It is made up of cells, which are relatively scanty, fibres and an intercellular ground substance secreted by the cells. The cells may be amoeboid (in embryonic tissue), or may be the vacuolated so-called plasma-cells! or may assume a spindle-like or plate-like shape; and may contain pigment, granules of substance showing a peculiar affinity for certain dyes or fat. Besides these cells formed in situ, leucocytes often invade connective tissue. The white fibres of connective tissue are formed in bundles, are easily stained by acid fuchsin, yield gelatin on boiling, and are digested by artificial gastric juice, though not by pan- creatin. The. yellow fibres or elastic fibres, un¬ like the white branch and anastamose, are highly refractive, and during life, owing to the

tension under which they are, are straight. They are only slowly digested by the gastric juice, but rapidly by the pancreatic juice. Orcein acts as a specific stain for elastic tissue. The so-called reticulum is made up of fibres much like the white fibres, but not so easily attacked by artificial gastric juice.

Embryonic connective tissue is made up of spindle-shaped and amoeboid, stellate cells, with few fibres and, in the less mature tissues, all of these white. The ground substance is fluid. Embryonic connective tissue is found not only in foeti and infants, but also in tumors and during the regeneration of injured connective tissue.

Gelatinous connective tissue occurs only in the umbilical cord and in the vitreous humor of the eye. It contains plate-like cells and reticulum, sparse in the vitreous humor and relatively dense in the umbilical cord. The ground substance is gelatinous.

Areolar connective tissue occupies all other¬ wise unfilled regions. The white fibres form interlacing bundles. The elastic fibres are isolated and comparatively few in number. The cells are of all varieties. The ground sub¬ stance is a fluid which can be coagulated by silver nitrate.

Dense white fibrous tissue consists mainly of parallel bundles of white fibres with plate¬ like cells in their interstices. Yellow fibres are scarce and there is little ground substance. This tissue forms most tendons, ligaments, fascial and muscular sheaths, and envelopes many of the viscera. The valves of the heart, the chordae tendinae and the tendinous rings about the mouths of the great vessels are all formed from white fibrous tissue.

Elastic tissue is made up of bundles of elastic fibres with sheaths of white fibres. It contains but little ground substance. It is found in the ligamenta subflava dorsal to the spinal column and in the ligamentum nuchae supporting the head in the lower mammals.

Adipose tissue is composed of cells dis¬ tended until they have become mere sacs of fat and of fibrous bands supporting these cells. It is found beneath the skin of many parts of the body, about the lymphatic nodes, adrenals and kidneys, in the mediastinum and the grooves of the heart wall, and in the mesentery and omentum.

Reticular tissue is found as the stroma of many glands and in bone marrow. Its tissue juice is lymph.

It consists of a reticulum of fibres closely joined in anastomosing bundles, with cells of a plate-like nature at the points of bifurcation.

Lymphoid tissue is reticular tissue per¬ meated by the close-packed spheroidal lym¬ phatic corpuscles. Lymphoid tissue is found in the tonsils, spleen, thymus, lymphatic glands, and in Peyers patches and the solitary follicles of the intestine. More diffuse lymphoid tissue is found elsewhere in the respiratory and di¬ gestive tract.

Connective tissues are richly supplied with blood vessels and nerves. They are nourished by the lymph exuding from the blood capil¬ laries. The waste products of metabolism are taken up by the lymph capillaries.

CONNELLEY, William Elsey, American author: b. Johnson County, Ky., 15 March

1855. Though almost entirely self-educated, he was for a number of years a school teacher in Kentucky and Kansas 1872-82. He went to Kansas in 1881 and was county clerk of Wyan¬ dotte County, 1883-88. For four years (1888- 92) he was in the wholesale lumber business, and then engaged in banking. His leisure has been chiefly devoted to the study of the history and antiquities of the North American Indians, and the States of the Middle West. He com¬ piled the first vocabulary of the Wyandot lan¬ guage, and has made valuable studies of the languages of the Delawares, Shawnees and other tribes. He is secretary of the Kansas State Historical Society. His papers have mostly appeared in the publications of the Ontario, Kansas, Nebraska and Ohio Historical societies, the Bureau of Ethnology and Smithsonian In¬ stitution. Some of their titles are (The Pro¬ visional Government of Nebraska Territory> (1899) ; (Notes of the Clan System of the Wyandots5 (1899) ; (Notes on the Folk-Lore of the Wyandots5 (Journal of American Folk- Lore, 1900) ; (James Henry Lane, the Grim Chieftain of Kansas5 (1899) ; Hvansas Terri¬ torial Governors5 (1900); (John Brown: the Last of the Puritans5 (1900) ; (The Overland Stage to California5 (with Root, 1902) ; Doni¬ phan's Expedition5 (1907) ; (Quantrill and the Border Wars5 (1909) ; (The Ingalls of Kansas5 (1909) ; ˆEastern Kentucky Papers5 (1910) ; (Life of Preston B. Plumb5 (1913).

CONNELLSVILLE, Pa., borough in Fay¬ ette County, on the Youghiogheny River, and the Baltimore and Ohio and the Pennsylvania railroads, 57 miles east of Pittsburgh. It is the centre of the most extensive coke-burning region in the United States. Until 1903 the coke output of this region was from 40 to 50 per cent of the total output of the United States. The estimated annual output is about 21,000,000 short tons. It also contains one of the largest lock factories in the country. Other important industries are machine shops, pump works, brick works and coal mining. In 1914 there were in operation 42 establishments, with a capital of $3,246,000, and giving employment to 1,246 per¬ sons. Salaries and wages paid during the year aggregated $818,000, and the value of the prod¬ ucts $1,994,000, of which $1,205,000 had been added by manufacture. It is the seat of Cottage State Hospital. Settled in 1770, Connellsville was erected into a township and named in honor of Zachariah Connell, the founder, in 1793, and was incorporated as a borough in 1806. It is governed by a mayor, elected for three years, and a common council. Connellsville contains the grave of Edward Braddock, the Irish gen¬ eral with whom Washington fought in the French and Indian wars. Pop. (1920) 13,804.

CONNEMARA, kon-ne-ma'ra, Ireland ((

CONNERSVILLE, Ind., the county-seat of Fayette County, situated on the Whitewater River and on the Cincinnati, Cleveland, Chicago

and Saint Louis and the Cincinnati, Fort Wayne and Louisville railroads. Among its features are a Carnegie library, a high-school building, Roberts Park and Fayette Sanitarium. Con- nersville manufactures automobiles, pianos, paper, gloves, brick, blowers, carriages, mirrors, furniture, triple signs, overalls and flour. The waterworks are owned by the city. It was in¬ corporated in 1813 and is governed by a mayor, elected biennially, and a council. Pop. 9,901.

CONNERY, Thomas Bernard Joseph,

American journalist: b. Ireland, 13 Oct. 1838. The greater part of his career was spent in the service of the New York Herald, on which he held nearly every position except that of finan¬ cial editor, 185G-84. He was editor of New York Truth, 1885; Once a Week, 1893-95; Collier's Weekly, 1895. He was United States secretary of legation and charge d'affaires in Mexico, 1866-68. He was a member of the New York Board of Education in 1902. He has published (Don Tiburcio) ; (Black Friday) ; (History of American Comic Journalism ; Character Marks Autorial* ; (Essays on Liter¬ ary Women of England) ; (A11 the Dog's*

*Fault * ; (That Noble Mexican * ; (My Trip to Mars*; (Violet Bland*; (Forgotten Incidents: Lincoln's Visit to West Point* ; also magazine articles.*

CONNOR, Ralph. See Gordon, Charles William.

CONNOR, Selden, American soldier: b. Fairfield, Me., 25 Tan. 1839; d. 9 July 1917; graduated, Tufts College, 1859; enlisted as a private in the 1st Vermont regiment 1861 ; be¬ came lieutenant-colonel of the 7th Maine regi¬ ment 1861, colonel of the 19th Maine 1864, and brigadier-general of volunteers June 1864. He was present at the battles of Fredericksburg, Gettysburg and the Wilderness, where he was severely wounded. After the war he held sev¬ eral minor Federal offices, was governor of Maine 1876-78, United States pension agent 1882-86, and 1897. On 3 Oct. 1889 he delivered the oration at the dedication of the Maine mon¬ uments at Gettysburg. In 1890 he became presi¬ dent of the Society of the Army of the Poto¬ mac, in 1896-99 was senior vice-commander-in¬ chief of the Order of the Loyal Legion, and in 1897 was again appointed pension agent, contin¬ uing in this office until the abolition by law of all pension agencies in 1913. His address on (Hannibal Hamlin was published in 1909.*

*CO NO DO NTS (Gr. <(cone-teeth**), minute fossils found in Palaeozoic strata. They look very like the teeth of different kinds of fishes, some being simple slender pointed sharp-edged cones, while others are more complex, resem¬ bling in form the teeth of certain sharks. The old opinion was that they are minute teeth of fishes allied to the living hag-fishes and lam¬ preys, but it is more likely that they are the jaws of annelids and naked mollusks. Consult Zittel and Rohon, (Ueber Conodonten) (in Sitzungsberichte der koniglich-bayerischen Akademie der Wissenschaften, Munich 1886).*

CONOID, in geometry, a surface generated by a straight line moving parallel to a given plane in such a manner that it constantly touches a curve and a straight line ; more gen¬ erally, a surface generated by a line through two given straight lines and a given curve.

CONON, Athenian commander: d. after 392 b.c. Having been defeated in a naval en¬ gagement at zEgospotamos by Lysander, he for a time went into exile ; but being aided by Artaxerxes, king of Persia, he returned and defeated the Spartans near Cnidus 394 b.c. Conon then began to rebuild the fortifications of Athens, and restored it to liberty and security.

CONON, of Samos, Greek astronomer and mathematician who lived in the 3d century b.c. He was a friend of Archimedes and invented the curve known as the Spiral of Archimedes. His works do not survive, but the main testi¬ mony to his genius is found in the laudatory comments in the surviving works of Archi¬ medes.

CONQUEST, Ida (Mrs. Riccardo Ber- telli), American actress: b. New York, June 1882. Her first stage experience was at the age of eight, when she appeared as Little But¬ tercup in the Boston Museum juvenile produc¬ tion of (Pinafore, a part she played over 300 times. Her professional debut was made in 1894 as Constance in (The Transgressor, * with Olga Nethersole, in Palmer's Theatre, New York. She had an ingenue part with the Em¬ pire Stock Company in 1896; and was leading lady with John Drew in (Tyranny of Tears,* (Second in Command* and (Richard Carvel, * 1902; leading lady with William Gillette in (Sherlock Holmes* ; with Nat Goodwin as Helena in (Midsummer Night's Dream,* 1903; starred with Charles Frohman in (Girl with the Green Eyes,* 1904, and was leading lady with Richard Mansfield in (01d Heidelberg,* (Ivan the Terrible,* etc. She was leading lady with William Collier in (On the Quiet,* 1905; ap¬ peared as Ann Whitfield in cMan and Super¬ man,* 1906, and later played in (The Wolf* and (A Little Brother of the Rich* ; appeared with Nazimova as Asta in (Little Eyolf,* 1910; and starred in (The Talker,* 1911; after which she retired from the stage. She married Cava¬ lier Riccardo Bertelli, of Genoa, Italy, 23 Oct.*

1911. Others of her parts are Phyllis Lee, in (The Charity Ball ; Carey, in (Alabama* ; Sybil, in (The Dancing Girl* ; Renee de Coche fort, in (Under the Red Robe* ; Babiole, in (The Conquerors.* Consult Strang, (Famous Actresses of the Day.*

CONQUEST, Right of. The appropria¬ tion of an enemy's territory by military occu¬ pation. In ancient times such occupation immediately passed title to the conqueror, but in modern times military occupation alone does not give such title to the invader. Title passes only when the invader manifests his intention of appropriating the territory by formal an¬ nexation, and when the acquiescence of the state from which it is taken shows the con¬ queror's ability to retain it. The Hague Con¬ ferences of 1899 and 1907 expressly detailed the rights and duties of the occupying power in (Conventions Concerning the Laws and Cus¬ toms of War on Land, according to which the conqueror assumes ownership of all public property in occupied territory, and assumes the rights and obligations of the ousted state. The citizens of such occupied territory transfer their allegiance to the conqueror, although in modern times they are given the choice of leav¬ ing the territory if they refuse to swear al-*

lcgiance to the new government. See Diplo¬ matic Relations of the United States with the principal foreign nations; Belligerent; Wars of the United States.

CONQUEST OF MEXICO, The, a noted history by William Hickling Prescott, published

1843.

CONQUEST OF PERU, The, a history published by William Hickling Prescott (1847). Of the five books into which this work is divided, the first treats of the wonderful civiliza¬ tion of the Incas; the second of the discovery of Peru; the third of its conquest; the fourth of the civil wars of the conquerors ; and the fifth of the settlement of the country. The first book hardly yields in interest to any of the others, describing as it does, on the whole, an unparalleled state of society. From the necessi¬ ties of its material, the work is more scattered in construction than is the (History of the Con¬ quest of Mexico, > usually regarded as the author's most brilliant production.

CONRAD I, Emperor of Germany; d. 23 Dec. 918. He was elected king of Germany in 911; but Arnulf, Duke of Bavaria, and Henry, Duke of Saxony, disputed this title, and engaged the Huns to overrun Germany. Conrad, who was favored and supported by the Church, is said to have received a mortal wound in combat with these revolted chiefs, who were almost independent of the Crown, and the obedience of whom, therefore, Conrad was unable to command or win by other means. He is chiefly noteworthy for the revival in his case of the elective title to the crown.

CONRAD II, Emperor of Germany: b. about 990; d. Utrecht, 4 June 1039. He was the son of Henry, Duke of Franconia, and was elected king of Germany in 1024. Attempts were made to displace him, but without suc¬ cess, and in 1027 he was crowned emperor at Rome, in the presence of Canute, king of Eng¬ land, and Rudolph, king of Burgundy. He is regarded as the true founder of the Franconian or Salic line. He was often engaged in con¬ tests with the greater barons and princes of the empire, and endeavored to form a counter¬ poise to their influence by encouraging the formation of minor independent fiefs. With the same view he endeavored to appropriate several of the larger duchies to members of his own family, and thus convert the elective empire into a hereditary monarchy similar to that of France. These designs, though con¬ ducted with considerable ability, failed, mainly in consequence of the incessant contests in which he was engaged with the popes. He crossed the Alps in 1026, defeated the Italians and had himself crowned king of Italy at Milan. After a war which occupied most of the years 1032-34 he conquered Burgundy and made it a part of his empire.

CONRAD III, Emperor of Germany: b. 1093;. d. Bamberg, Germany, 15 Feb. 1152. He was the founder of the house of Hohenstaufen ; and was elected emperor in 1138. His title was disputed by Henry the Proud, Duke of Saxony, and the rivalry of these two princes was the germ of the factions afterward so famous un¬ der the names of Guelfs and Ghibellines. In 1146, at the Diet held at Spires, Conrad was per¬ suaded by the eloquence of Saint Bernard to undertake a crusade, on which he set out the

following year at the head of a large army. It was fruitless and disastrous, and Conrad returned with the wreck of his army in 1149.

CONRAD IV, Emperor of Germany: b. Andria, Italy, 25 or 27 April 1228; d. Lavello, Italy, 21 May 1254. He was chosen king of the Romans in 1237, but was never crowned ; was a son of the great Emperor Frederick II, and like him excommunicated by the Pope, Innocent IV, who set up a rival emperor in William, Count of Holland. On the death of his father in 1250, Conrad marched into Italy to recover the towns which had declared against him. He took Naples, but could not get the investiture of the kingdom of Sicily from the Pope. In the midst of his troubles and conten¬ tions, he died of fever.

CONRAD V, or CONRADIN OF SWABIA, German prince: b. 1252; d. Naples, 29 Oct. 1268. He was the son of Conrad IV, and the last of the Hohenstauffen. He accepted the invitation of the Italian Ghibellines to place himself at their head and the sale of a large portion of his possessions

enabled him to raise troops. In the autumn of 1267 he crossed the Alps with 10,000 men, and at Verona was warmly received by the Scala family, the chief of the Ghibelline party. His relatives here, persuading him to part with his remaining possessions at a low price, deserted him with their followers, leaving but 3,000 men. The Ghibellines, however, remained true to him. Verona raised a large army, Pisa a fleet, and Rome, whose pontiff was forced to flee to Viterbo, opened its gates to him. Conradin entered lower Italy, and at Tagliacozzo met the French army under Charles d'Anjou, on whom the crown of Naples had been bestowed by Pope Urban IV. He beat Charles back, and his men, supposing the victory won, dis¬ persed in search of plunder, when they were attacked by the French and utterly routed, 23 Aug. 1268. Conradin escaped, but was betrayed into the hands of Charles at Astura, who caused him to be beheaded in the market place of Naples. His extreme youth, his unfortunate fate and the stories that clustered about him made him a good and favorite subject of poetry and more especially of the drama.

CONRAD, Charles M., American soldier and statesman: b. Winchester, Va., about 1804; d. New Orleans, La., 11 Feb. 1878. He went with his father to Mississippi, and thence to Louisiana while an infant, received a liberal education, studied law, was admitted to the bar in 1828 and practised in New Orleans. He served several years in the State legis¬ lature, was elected to the United States Senate as a Whig in the place of Alexander Mouton, who had resigned, and served from 14 April 1842 to 3 March 1843. In 1844 he was a member of the State Constitutional Convention. He was elected to Congress in 1848, and served until August 1850, when he was appointed Secretary of War by President Fillmore, serving from 13 Aug. 1850 to 7 March 1853. He was one of the leaders of the Secession movement in Louisiana in December 1860, a deputy from Louisiana in the Montgomery provisional con¬ gress of 1861, a member of the first and second Confederate congresses of 1862-64, and also served as brigadier-general in the Confederate army.

CONRAD, Frederik Willem, Dutch en¬ gineer: b. Delft 1769; d. 1808. He was the pupil and friend of Brunings, who did so much for the construction of the sea dykes of Hol¬ land, and on his death succeeded him in his situation of inspector-general of sea dykes in the province of Rynland. He afterward held the office of administrator-general of the sea dykes in the Low Countries. He rendered a lasting service to his country by reclaiming large tracts of land from the sea, and more especially by the formation of a proper outlet for the waters of the Rhine.

CONRAD, kon'rat, Johannes, German po¬ litical economist: b. West Prussia 1839; d. Halle, 21 May 1915. He was educated at the universities of Berlin and Jena. He was made professor of political econ¬ omy at the latter institution in 1870 and at Halle in 1872. He was a member of the second commission appointed to revise the Ger¬ man Civil Code and took a prominent part in its deliberations. In 1878 he was appointed editor of the Jahrbiicher fiir N ationalokonomie und Statistik and associate editor of the Hand- worterbuch der Staatswissenschaften (1889-95; 2d ed., 1898 et seq.). He has published (Das Universitats-studium in Deutschland wahrend der letzten fiinfzig Jahre) (1884; Eng. trans. by Hutchison, with preface by James Bryce, 1885) ; (Grundriss zum Studium der politischen Oekonomie) (1896-1909) ; (Leitfaden zum Stu¬ dium der Nationalokonomie } (1901).

CONRAD, Joseph, English novelist: b. Poland 1856, the son of a Polish revolutionist. He was educated in Cracow, and at 13 went to sea, becoming subsequently a captain in the merchant service. After a long experience as a sea rover, he settled in England and began putting his various experiences into literature. His writings include (Almayer's Folly > (1895) ; (An Outcast of the Islands) (1896) ; (The Nigger of the Narcissus, issued in America as (The Children of the Sea* (1897) ; (Lord Jim) (1900) ; (The Inheritors) (with F. M. Hueffer, 1901) ; (Youth and Other Tales) (1902) ;*

(Typhoon (1902) ; (Mirror of the Sea) (1906) ; (A Set of Six* (1908) ; (Under Western Eyes* (1911); (Twixt Land and Sea) (1912); (Chance> (1914); (Within the Tides) (1915).*

CONRAD, Robert Taylor, American law¬ yer and dramatist: b. Philadelphia, 10 June 1810; d. there, 27 June 1858. He wrote for the press of Philadelphia; was a member of the Court of Criminal

Sessions ; and on its dissolu¬ tion became editor of Graham's Magazine and associate editor of the Philadelphia North American. He was mayor of Philadelphia and judge of the Court of Quarter Sessions (1856- 57). He wrote (Aylmere (1852), a tragedy in which Edwin Forrest played the role of Jack Cade; (Conrad of Naples,* a tragedy;*

(1852).

CONRAD, Timothy Abbott, American palaeontologist : b. Philadelphia 1803 ; d. there, 1877. In his youth he followed the occupa¬ tion of publisher and printer in his father's shop. He became interested in natural his¬ tory, and published papers on marine con- chology in 1831 ; and in 1832 began to publish in parts his work on the fossil mollusks of the Tertiary formations of North America, which was the beginning of

systematic research in that department. He became State geologist of New York in 1837, and worked as State palaeontologist from 1838- 41, issuing during that time his serial mono¬ graph on the Unionidce of the United States. It is upon this work and subsequent papers that his excellent fame rests. He finally re¬ turned to Philadelphia. Consult Merrill, in (Report of the United States National Museum for 1904) (Washington 1906).

CONRADER, kon'ra-der, Georg, German painter: b. Munich 1838; d. 1911. He studied under Foltz and Piloty at the Munich Academy. He first came into notice with (Tilly in the Grave-Digger's Dwelling) ; On the Eve of Breitenfeld) (Kunst Halle, Hamburg). Other well-known and much-admired works by him are (The Destruction of Carthage) (Maxi- milianeum, Munich), (Hauer Painting Charlotte Corday in Prison, (The Death of Joseph II,* and portraits in the Budapest National Museum.*

CONRADIN OF SWABIA. See Con¬ rad V.

CONRIED, Heinrich, American impre¬ sario : b. Bielitz, Austrian Silesia, 13 Sept. 1855 ; d. Meran, Tyrol, Austria, 27 April 1909. Graduating from the Oberrealschule of Vienna, he came to the United States, and was for several years a manager of German theatrical and operatic organizations. As director of the Irving Place Theatre, New York, he became known for excellent presentations of German classic drama, frequently repeated at Cambridge and other university centres. In 1903 he be¬ came director of the Metropolitan Opera-house, where he presented Wagner's (ParsifaP for the first time outside Bayreuth. He resigned in 1908. Consult Moses, M. J., (Life of Hein¬ rich Conried) (New York 1916).

CONRING, kon'ring, Hermann, Dutch

scholar: b. Norden, East Friesland, 9 Nov. 1606; d. Helmstedt, Brunswick, 12 Dec. 1681. He studied at Helmstedt and Leyden, devoting himself chiefly to theology and medicine; was appointed in 1632 professor of philosophy at Helmstedt, in 1636 professor of medicine, and remained in this city until his death. He was distinguished in almost every department of knowledge, and the title of a councillor was conferred on him by the kings of Denmark and Sweden and the elector of the Palatinate. He was then made professor of law. The German emperor likewise distinguished him. From far and near his advice was sought in political and legal cases. He did a great deal in compiling of the history of the German Empire, and for the improvement of German public law, in which he opened a new path. He wrote (De origine juris Germanici (1643) ; (Exercitationes de re publica Germanica) (1675) ; and very many other treatises to the number of over 100. His works, with his biography, were published in 1730. Consult Stobbe, (Hermann Conring, der Begrunder der deutschen Rechtsgeschichte* (Berlin 1870) ; Goldschlag, (Beitrage zur po¬ litischen und publizistischen Tatigkeit H. Con- rings* (Berlin 1884).*

CONSALVI, kon-sal've, Ercole, Italian

statesman and cardinal: b. Toscanella, 8 June 1757; d. Rome, 24 Jan. 1824. Having in 1797 entered the public service of the court of Rome in an humble capacity, he was four years later

one of the 12 auditors of the Rota, a commis¬ sion in effect a supreme court of appeal in all matters secular as well as ecclesiastical. When the French took possession of Rome, Consalvi, falsely accused of having had part in an assassination, was for a while held in prison and then banished. When Pius VI died, Con¬ salvi was largely instrumental in procuring, in the conclave held at Venice, the election of Cardinal Chiaramonti to the papal throne as Pius VII, and thereafter was that pontiff's chief counsellor ; he was now second only to the Pope in all dealings with the European powers and specially with Napoleon. In the course of the controversies between Rome and the French emperor, he showed a firmness that won him the unwilling respect indeed of Na¬ poleon, but also his irreconcilable enmity. It was while the Emperor was flushed with the victory of Austerlitz that he sent to Consalvi through Cardinal Fesch the message, ((Tell Con¬ salvi that if he loves his country he must either resign or do what I demandˆ ; and the cardinal prudently withdrew from public life for a season. In 1809 he had an interview with Na¬ poleon at Paris, in which the Emperor in effect made an apology for that act ; but Consalvi persisted in his opposition to Napoleon's de¬ signs; and was one of the 13 cardinals who refused to concede the lawfulness of the second marriage of Napoleon. .In punishment of his obstinacy in that matter he was held in con¬ finement three years at Rheims. After the fall and banishment of Napoleon, he resumed his station in the papal court and devoted himself to the institution of many reforms in the gov¬ ernment, being in effect chief governor of Rome and the papal states. He was always a liberal patron of art, literature and science. He left the bulk of his property to the poor. Con¬ sult Cretineau-Joly, (Memoires du Cardinal ConsalvP (Paris 1895).

CONSANGUINITY, relationship of per¬ sons descended from the same ancestry or common stock. Consanguinity may be either direct (known also as lineal) or collateral. Consanguinity is direct when the relationship is that which exists between ascendants and descendants, as grandfather, father, son. It is collateral when the relationship is that which exists between persons who have the same ancestor but who are the issue of different children, as first cousins. Various degrees of consanguinity are recognized by law, but the manner of computing collateral consanguinity varies with the locality, depending on whether the civil or the canon law is followed. In the civil law the degrees from the common ancestor are numbered on both sides, brothers thus being related in the second degree and first cousins ia the fourth. In the canon law, which is the same as the common law in this particular, the steps between the remoter person and the common ancestor are counted, brothers thus being related in the first degree and first cousins in the second degree. The rule, for computing the degree of lineal consanguinity is the same for the canon, civil and common law. English law and the law of most of the States in this country follow the canon law in reckoning downward from a common ancestor. Con¬ sanguinity is an important question in the law of marriage, inheritance and descent, certain crimes as incest, and in determining the ˆ3-

qualifications of judges, jurors, etc. The term consanguinity must be carefully distinguished from affinity, which latter term means relation¬ ship by marriage, either through the husband or wife, and not through a common ancestor. See Descent in Law; Inheritance.

CONSCIENCE, kon-syans, Hendrik, Bel¬ gian novelist : b. Antwerp, 3 Dec. 1812 ; d. Brussels, 10 Sept. 1883. He was mostly self- educated. He entered the army in 1830 but resigned in 1836 and in the following year published his first novel in Flemish, (In the Wonderfiil Year 1 566. > It was a great success but the author was left under a burden of debt to his printer. (Phantasy) and (The Lion of Flanders } followed soon after. Conscience was one of the first to use Flemish as a medium of literary expression and his example heartened others, who had less patriotic courage, to do likewise. It also secured for him a measure of government patronage, being granted a post in a government office. He abandoned this for gardening and soon after¬ ward was appointed to a post at the Royal Academy of Painting. In 1845 he was made associate professor at Ghent and instructor in Flemish to the royal children, and in 1868 became custodian of the Wiertz Museum. He published in all over 100 volumes and the occasion of the publication of his 100th volume in 1881 was made a national celebration. His historical novels are inferior to his works deal¬ ing with Flemish home life, which he knew. In addition to those noted above his most note¬ worthy works are (How One Becomes a Painter (1843) ; (Poor Nobleman* (1851) ; (The Good Luck to be Rich* (1855) ; (Duke Carl's Justice) (1876) ; 'and (Benjamin of Flanders* (1880). (See Lion of Flanders, The; Rikki-Tikki-Tak). Consult the biog¬ raphies by Eeckhoud (Brussels 1881) and Pol de Mont (Haarlem 1883).*

CONSCIENCE, the mental basis of our judgments of moral obligation. The conscien¬ tious

examination of a course of action consists in: (a) the fullest possible inquisition into the motives, results and other bearings of the ac¬ tion ; (b) the approval or disapproval of the entire course of action in the light of this inquisition. The act of approval or disapproval does not appear to be essentially different in character from that involved in judgments of taste or of pleasure or the dicta of prejudice. It is the vastly wider scope of the preliminary examination, together with the fact that its judgments are most usually concerned with conduct and its principles, which marks con¬ scientious judgments off from all others of a normative nature. See Ethics; Norm.

CONSCIENCE MONEY, stolen or wrong¬ fully acquired money returned to its rightful owner when conscience is awakened to a sense of right dealing. In the United States such money paid into the treasury at Washington by self-avowed debtors anonymously is known as the conscience fund. In England the phrase is applied to money forwarded, as a rule anony¬ mously, to the Chancellor of the Exchequer for unpaid income tax. It amounts to some thou¬ sand pounds a year.

CONSCIOUSNESS (Ger. Bewusstsein ; Fr. conscience ; It. conscienza) is the term by which psychology distinguishes one of the two

great categories into which experience falls, viz., mental experience, from the other, physical experience. The one division, mental experi¬ ence, includes all facts that may be construed as subjective, the other division all facts that are considered by the uncritical mind to be objective. From time immemorial the former order of experiences has been customarily held to constitute a series of immaterial sequences that in their totality construct a personal life history; the latter has just as stoutly been looked upon as forming a causal chain of events in a material world external to but reflected by the mental series. This picture of mind in re¬ ciprocal relationship with an external world portrays the naive dualism of common-sense thought.

Regarded analytically consciousness breaks up into a series of processes producing sense- percepts, images of memory and imagination, associations, judgments, reasonings, feelings, emotions and volitions. Regarded from the standpoint of their totality these processes of consciousness constitute an individual mental history or mind. The objective facts above al¬ luded to form the content of consciousness, forming in their entirety the world of external realities, a world distinguished into the two great subdivisions of living and non-living nature.

There is probably no term in the nomen¬ clature of psychology that is subject to such vagueness of reference and ambiguity of mean¬ ing. Professor Ward has declared it to be ((the vaguest, most protean, and most treacher¬ ous of psychological terms. n Alexander Bain in his day discovered that it had already ac¬ quired thirteen distinct meanings, and he would doubtless find additional ones were he con¬ versant with the vastly increased psychological literature of the present time. Considering this lack of fixity in meaning it seems almost audacious to attempt an accurate definition. But, holding the term to its most important significance, one may define consciousness as the aggregate of the mental processes of any period of life.

The question of the relation of conscious¬ ness to other biological functions is one of great importance but one upon which present scientific knowledge throws little light. There is every reason to believe that states and de¬ grees of consciousness are directly correlated with the activities of the nervous system, and especially with the functions of the great master- ganglion, the cerebrum. The evidence in ques¬ tion can be but briefly mentioned in this article. It is along two lines. First, comparative studies of the nervous systems of animals reveal the fact that their complexity increases pari passu with their level in the evolutionary series in other aspects of structure, and that with com¬ plexity of nervous system goes increasing intelli¬ gence in adjustive behavior. This is especially true of the cerebrum, the part of the nervous system that undergoes greatest elaboration as the animal scale is ascended, and also admits of the highest degree of organization under stress of the life experiences of each individual. Sec¬ ond, experimental studies on the nervous sys¬ tems of the lower animals, supported by patho¬ logical evidence in the case of man, lead to the conclusion that the several conscious processes are conditioned upon neural activity of a defi¬

nite kind. Furthermore, functions have been accurately located in special cerebral areas, im¬

pairment of which results in a decrease or cessation of the correlated form of conscious¬ ness. Collateral evidence is also to be found in the facts of sleep and hypnosis. The cere¬ brum during profound slumber has a lowered blood circulation, probably has a lessened rate of metabolism, and is analogous to an important part of a mechanism temporarily out of gear with the rest of the system. Likewise during sleep consciousness completely or partially dis¬ appears. The hypnotic state gives indications pointing in the same direction, though knowl¬ edge of the cerebral condition during hypnosis is so slight that one can speak only conjecturally. The hypnotic subject appears to the observer to have an artificially delimited consciousness. His attention is acute within a narrowed field of stimulation. He is oblivious to all suggestion outside of this restricted range. When restored to normal condition there is usually a more or less complete forgetfulness of what took place under the hypnotic spell, analogous to the usual treacherous memory for dreams when recall is attempted some time after awaking from sleep. It is probable that there is a corresponding splitting off of cerebral activities into minor disconnected systems, some of them heightened into intense activity at the expense of others which become partially or completely somnolent.

Psychological s-elf-examination (introspec¬ tion) coincides with the verdict of common- sense in distinguishing degrees of conscious¬ ness. That such degrees are to be found in the ascending animal scale is the inevitable in¬ ference from comparative studies of nervous mechanisms and of animal and human behavior. Evidence leading to the same conclusion comes from the scientific observation of a normal human being from earliest infancy to maturity. Further proof is found in the normal experi¬ ences of sleep and waking as well as in the unusual ones of swooning and anaesthesia. The characteristic mark of consciousness at the lowest ebb is perceptual chaos and vagueness. The signs of full consciousness are great clear¬ ness and vividness. A high degree of con¬ sciousness is hence practically identical with focalized attention, whereas a low measure of consciousness is similar to fleeting or scat¬ tered attention. It would seem from this that consciousness and attention are terms with es¬ sentially the same meaning.

Whereas older conceptions of consciousness regarded its contents as furnished entirely by sense-impressions, by intellectual intuitions, or by both together, more modern views have called attention to the contributions made by bodily movements. Recent views maintain that the stream of consciousness is a composite of external factors derived through sense and of other elements furnished by bodily move¬ ments and activities. These movements give rise to so-called kinaesthetic (movement) sen¬ sations. All perceptual judgments, for ex¬ ample, arc conditioned upon strains and ten¬ sions that blend with the other contributions of sense to construct the objects of our world. The content of consciousness is just these ob¬ jects or things plus the residue of memory- images, images of imagination and ideas which form the sum-total of conscious experience.

The last statement leads to a reiteration of the fact that consciousness always has content. The content includes all the mental acts by which life adjustments are carried on, such as sense-percepts, images, thoughts, acts of will and feelings. Consciousness is thus seen to embrace all the concrete elements of mental life. Its function would seem to be the biologi¬ cal one of securing superior and far-reaching adjustments. It emerges at some unknown level in the animal scale in response to the necessities of living imposed by increasing com¬ plexity of structure. It is sharply contrasted with the purely nervous mechanisms of reflex, impulse and instinct. The acquired mechanisms of habit are usually preceded by a conscious stage of learning in which there is a temporary guidance of ideation, but lapse completely into the non-conscious when perfected. So likewise of other psychic functions when the psychic shock of initial performance is dulled through inveterate use. From this fact it is manifest that consciousness is par excellence the organ of intelligent action. It is stocked with the percepts, images and concepts by means of which a more salutary contact with the world about us is secured.

A closing word is required to speak of a very convenient antithesis to consciousness, the subconscious. Titchener defines it as i(an extension of the conscious beyond the limits of observation ?y ((A Beginner's Psychology, p. 326). The concept has proved its usefulness in abnormal psychology, especially in the de¬ partments of psychiatry and psychotherapy. The insane are often found to be dominated by complexes taking the form of dominant ideas and acting as urgent forces*

that over¬ master self-control. Hysterical subjects exhibit similar compulsive psychoses of such power as to produce elaborate and persistent hallucina¬ tions. Oftentimes there is no memory of the original experiences out of which these com¬ plicated mental structures are pieced together by a diseased imagination. It is convenient to assume that the building up of these mental edifices of imagery takes place somewhere be¬ hind the veil, much as the apparent dream imagery may be assumed to have been thrown into form behind the curtain of profound slum¬ ber before it is marshalled into the presence of the hazy consciousness of the partially aroused dreamer. The investigations of such eminent psychopathologists as Freud and Jung tend to confirm the significance of the sub¬ conscious as a convenient working hypothesis. It can scarcely be more ; for direct evidence of its existence seems logically impossible.

Bibliography. — Angell, 'Psychology (4th ed., Ch. 3) ; Baldwin's dictionary of Philoso¬ phy and Psychology > (Vol. I, Art. "Conscious¬ ness**) ; Bain, Appendix to (Emotions and WilP ; Beneke, die neue Psychology (pp. 171-206) ; Hamilton, 'Metaphysics* (Lects. 9, 11, 13) ; Holt and others, (The New Realism* (pp. 136-150, 273-286, New York 1912) ; James, dsychology: Advanced Course) (Vol. I, Chs. 9-11); Jastrow, (The Subconscious*; Lewes, dhysical Basis of Mind) (353 ff.) ; Locke, 'Essay Concerning Human Under¬ standing* (Bk. II, Ch. 1, 19) ; Ladd, 'Psvchol- ogy, Descriptive and Explanatory * (Pt. 3, Ch. 6) ; Marshall,*

*dssays Philosophical and Psychological in Honor of William James, * by his colleagues in Columbia University) ; Miinsterberg, dsychol¬ ogy, General and Applied* (Chs. 3 and 15) ; Pillsbury, dssentials of Psychology* (Ch. 3) ; Reid, 'Works* (Hamilton's ed., Vol. I, p. 222) ; Sigwart, dogic) (Eng. trans., Vol. II, pp. 130— 134) ; Stout, (Analytic Psychology) (Vol. I, Intro., Bk. I, Ch. I, Bk. II, Ch. 2) ; Strong, 'Why the Mind Has a Body) ; Titchener, 'An Outline, of Psychology) (Ch. 1, Sec. 3, and Ch. 6), also 'A Beginner's Psychology) (Ch. 12, Sec. 77) ; Wundt, (Grundriss der Psy¬ chologic } (3te Auflage, 240 ff. ; Eng. trans., under title (Outlines of Psychology,* 3d ed., Pt. 3, Sec. 15), also dhysiologische Psycholo¬ gy (5te Auflage, Bk. I, 466 ff.).*

William J. Taylor,

The Brooklyn Training School for Teachers.

CONSCIOUSNESS, Biological Aspects

of. Apart from subtle metaphysical or abstract psychological distinctions we shall arbitrarily conceive of consciousness as those directing cerebral mechanisms which handle life's energy for the production of useful work, the word useful being used in an extremely broad sense. Just how consciousness grew out of tropisms, what its subtle distinctions may be from re¬ flexes, what are its relations to the unconscious, these are matters which for the present lie outside of this discussion. It is here assumed that consciousness is a higher evolutionary prod¬ uct, assuming greater and greater control and precision as the opportunities and needs for adaptation to reality grow in the advancing ani¬ mal scale. That consciousness may still be made a better and better instrument for adapta¬ tion to reality goes without saying.

Adaptation to reality is a complex function of the cerebral mechanism and we may follow Bergson in saying that it is through both in¬ stinct and intelligence that this takes place. In intelligent or logical activities consciousness is assumed. Is there a consciousness in in¬ stinct? This question brings one back to the matter of tropisms, of reflexes, and of the un¬ conscious. To present this latter problem Bergson assumes two kinds of unconsciousness, one in which consciousness is an absent factor and one in which consciousness is merely nullified. As he says both are equal to zero, but in one case zero expresses the fact there is nothing, in the other that there are two equal quantities of opposite sign which compensate and neutralize each other. Thus one may speak of the unconsciousness of a falling stone. In¬ stinct however has a different type of uncon¬ sciousness. When one performs an habitual action, when a somnambulist automatically acts out a drama, as did Lady Macbeth, uncon¬ sciousness may be absolute and yet of what does it consist. Bergson holds with reason that the representation of the act itself resembles the idea so perfectly, and fits it so exactly, that consciousness is unable to find room between them. Freud, Jung and Bleuler would speak of this as a special kind of thinking in which consciousness is suppressed into unconscious¬ ness by reason of emotional blocking. Fan¬ tasy thinking or autistic thinking results. The dramatization is the action and as Bergson shrewdly notices the representation is stopped by the

action. As proof this latter author calls

to mind the fact that if the accomplishment of the act is arrested or thwarted by an obstacle, consciousness may reappear. It was there but neutralized by the action which fulfilled, thereby filled the representation. This inade¬ quacy of act to representation is what Bergson calls consciousness. He is worth quoting fur¬ ther on this point since much of the knowledge of psychopathology gained by psychoanalysis tends to confirm a part of his attitude. If this point be examined more closely, it is found that consciousness is the light that plays around the zone of possible actions or potential activity which surrounds the action really performed by the living being. It signifies hesitation or choice. Where many equally possible actions are indicated without there being any real action (as in a deliberation that has not come to an end), consciousness is intense. Where the action performed is the only action possible (as in activity of the somnambulistic or more gen¬ eral automatic kind), consciousness is reduced to nothing. Representation and knowledge exist none the less in the case if a whole series of systematized movements are found, the last of which is already prefigured in the first, and if, besides, consciousness can flash out of them at the shock of an obstacle. From this point of view, the consciousness of a living being may be defined as an arithmetical difference between potential and real activity. It meas¬ ures the interval between representation and action.

It may be inferred from this that intelligence is likely to point toward consciousness, and instinct toward unconsciousness. For, where the implement to be used is organized by nature, the material furnished by nature, and the result to be obtained willed by nature, there is little left to choice; the consciousness inherent in the representation is therefore counter-balanced, whenever it tends to disengage itself, by the performance of the act, identical with the representation which forms its counterweight. Where consciousness appears, it does not so much light up the instinct itself as the thwart- ings to which instinct is subject; it is the deficit of instinct, the distance between the act and the idea that becomes consciousness, so that con¬ sciousness, here, is only an accident. Essen¬ tially, consciousness emphasizes only the start¬ ing point of instinct, the point at which the whole series of automatic movements is re¬ leased. Deficit, on the contrary, is the normal state of intelligence. Laboring under difficulties is its essence. Its original function being to construct unorganized instruments, it must, in spite of numberless difficulties, choose for this work the place and the time, the form and the matter. And it can never satisfy itself entirely, because every new satisfaction creates new needs. In short, while instinct and intelligence both involve knowledge, this knowledge is rather acted and unconscious in the case of instinct, thought and conscious in the case of intelligence. Before discussing this subject further a glance at the organs in which these mechanisms are concentrated may aid in fashioning a workable concept.

Cerebral Localizaton. — The general biolog¬ ical principle of the concentration of energy as a feature of advanced evolutionary develop¬ ment finds its expression for the psychical sphere in the more or less distinct localization

of definite functions to certain portions of the brain.

For the purely vegetative activities such lo¬ calization is as yet indefinite, but it is known that the areas governing the various members are accurately located. The important sense organs also show a like integration, and the localization of so-called centres for sight, hear¬ ing, smell and motor speech now admits of little question.

It is, by more or less common consent, based on general grounds, as well as on the data afforded by physiological experiment and pathological observation, as well as by the study of the comparative psychology of the lower animals (by Romanes, Darwin, Morgan, Mills and Thorndike), that the higher mental processes (i.e., those that are more complex and those which have developed late in the evolu¬ tion of the race) utilize the frontal lobes of the brain in their activities ; but it is certain that, so far as the ego is concerned, taken in its totality, no such localization can exist. The whole body is a psychical organ, and the sense of the ego depends on such a multitude of sensory impressions that its location is coexist¬ ent with the nervous system in its totality. It is to be borne in mind that the complex nexus of associational fibres should be considered con¬ stant factors in the

idea of a consciousness. The great modifications that occur in conscious¬ ness — due to the cutting out of action of cer¬ tain of such associated fibres — is a constant feature in certain hemiplegic states, and prob¬ ably some similar pathological entities lie at the foundation of some of the modifications of consciousness in some of the psychoses, notably general paresis.

Within recent years the labors of the histo- pathologists have brought into prominence the importance of minute structural changes of the connections of the various nerve processes ; collaterals, axis cylinders and dendrites, form¬ ing plexuses of communication between various systems of nerve-cell groups. Such changes are closely correlated and are probably direct causative agents of many of the symptoms of mental disease, such as loss of attention, dimin¬ ished initiative, amnesia, blunting of the higher ethical ideas, insomnia, and many of those psychical activities which modify conduct so largely, and hence are representative of the empirical ego.

From such a purely preliminary sketch it can be seen that it is futile to attempt to speak of a localization of consciousness as if such a faculty were a thing per se rather than a func¬ tion of psychical nerve activities.

Connected, however, with this question there are to be considered certain localizations of some of the more clearly defined psychical activities.

Evidence derived from the lower animals points to the fact that following the cutting out of the prefrontal lobes there is more or less mental degradation. Close attention is lost, and observation which looks for the safety of the animal is often notably affected. Attention, judgment, memory and notably inhibition are factors of the ego which are greatly modified by disease or injury to the frontal lobes, and with such are associated hesitation, fear, un¬ certainty and motor restlessness due to im¬ paired inhibition.

Studies of monsters without a brain have shown that without a cortex, but yet possessing enough of the cerebrospinal mechanisms to bring spino-thalamobulbar fibres into play, many automatic activities may take place, notably sucking. Goltz's celebrated decerebrate dogs and the later studies of Rothmann also have shown that highly complex reflex activities may be carried out by these pallium-minus dogs. Hence one may say that certain instinctive activities persist but no intelligent ones. In these instinctive activities there is that type of unconsciousness already spoken of as repre¬ sented by the absence of consciousness. The thwartings to which the instinct is exposed in this case cannot give rise to consciousness. See Consciousness; Consciousness, Disorders of.

Smith Ely Jelliffe.

CONSCIOUSNESS, Disorders of. From the unconsciousness of death and that of acci¬ dent, and the profound intoxications, to sleep; through the mild grades of unconsciousness in many of the sleep phenomena, somnambulism, the hypnotic state, and its allies; through normal walking consciousness; through the active states of dramatic abandon, ecstasy, the minor intoxications, to the distinctly diseased emotional states of hysteria and epilepsy and the psychoses, finally to the living death of dementia, there is the gamut of the human psychical activities divided into a few cardinal categories which admit of general classification.

Just what shall constitute a normal state and what an abnormal state must be left largely to study of majorities. Conduct is the great criterion of consciousness, and for most prac¬ tical purposes it may be assumed that dis¬ ordered consciousness is correlative with dis¬ ordered conduct.

In discussing the subject of disordered con¬ sciousness it has been the custom to describe three types : exalted, diminished and perverted states. While this classification is extremely convenient for many purposes, it fails to give an idea of the clinical significance of any par¬ ticular phase. It is only too frequently the case that the same clinical groups, hysteria or epilepsy, for example, will demonstrate all these separate states, which at times merge within each other or follow one another with bewilder¬ ing rapidity.

The more important question seems to be : Given a definite mental state, which, judged from conduct, departs so far from what a broad experience teaches to be a fairly average state, to what factor or factors is such an abnormal state due, into what category does it fit, and how can it best be regulated or con¬ trolled to ensure the best results to the indi¬ vidual and to society?

The subject of categories of the clinical groupings of such disordered conscious states will be here only touched upon. Such a prob¬ lem in classification is manifestly extremely difficult because of the richness of the emotional content of consciousness, and the few rather broad categories here proposed are to be re¬ garded purely in the light of general conven¬ ience rather, than as attempts to cover the entire ground.

The disorders of consciousness for the present purposes are broadly divided into a few general groups. There are: (1) Disorders of sleep and the allied phenomena; (2) dis¬

orders of the neuroses and psychoneuroses, in¬ cluding the phenomena of automatism, double personalities, amnesia, etc.; (3) the intoxica¬ tions ; and (4) the psychoses. Such a classifi¬ cation is manifestly incomplete and imperfect. Thus many of the phenomena of groups (1) and (2) are interchangeable. It is moreover popular at the present time to attribute most of the physical ills to various toxaemias, either autogenous or heterogenous, and it is certain that no hard-and-fast line can be drawn clin¬ ically between certain maniacal states due to intoxication and those of a purely psychical etiology. In the present unsettled conditions of neutral pathology, to say nothing of psycho¬ logical classification, the question of categories may be an academic one after all.

(1) Disorders of Sleep and Allied Phe¬ nomena. — (Dreams, Somnambulism, Trance, Lethargy, Catalepsy, Hypnotism, etc.). Under this category there are included a large number of closely allied phenomena, the most striking feature of which is a state originally termed by Janet dissociation of consciousness. In most of these phenomena the ordinary waking con¬ scious state, with its refinements of judgment, inhibition, etc., is in temporary abeyance, naturally or artificially induced, and the patient dramatizes his unconscious fantasies. The meaning of these dramatizations may be evident or they may suffer from a number of psychical modifications, such as conversions, distortions, displacements, condensations, etc. (see article on Dreams), which mechanisms make it diffi¬ cult or impossible to understand the meaning of the whole fantasy. Consult Hischmann, c Freud's Theories of the Neuroses, Nervous and Mental Disease, Monograph Series, No. 17.*

Somnambulism. — The simplest type of such fantasies is found in some somnambulistic states. In these the individual may perform, while still asleep, many of the simpler acts of the waking state, and indeed even many ex¬ tremely complex acts are carried to completion. The patient awakes without any conscious recollection of the acts performed, and often such acts have been harmful to self and society.

The clinical phenomena are not constant. The eyes are frequently closed or semi-closed, or even wide open and staring. The pupils are apt to be sluggish in their reactions, but may be normal in diameter, dilated or contracted. The data collected by Gould and Pyle (Anom¬ alies and Curiosities of Medicine) may be referred to by those who would learn more of the complicated motor acts that many notable cases have been known to perform. Suicide and homicide have been committed by persons in the somnambulistic state. The somnambulistic state is recognized to be a special instance of autistic or fantasy thinking. The patient acts his unconscious fantasy, often with evident, but more often with complex and veiled, symbol¬ isms. Association experiments and psycho¬ analysis seem to prove that the experiences lived during the somnambulistic state may be brought to consciousness. Some register is made in consciousness since a memory of them may be awakened. This does not mean that the individuals have a knowledge of what they were doing at the time it was done. This com¬ monplace of medical science is one of the stumbling blocks of law, where the ignorance of lawyers has given rise to the stupid and*

unjust definition of responsibility. Somnam¬ bulistic performances carry out the general trend of the unconscious, i.e., toward fulfilment of instinctive desires.

Nightmare. — This is a painful dream state. In many instances, where such are extremely distressing, they have been known to precede grave cerebral disturbance, but it is not certain that they have any close relationship with the same, save perhaps in certain types where the fear of death appears in symbolic form. The more recent studies of Freud, Jones and others have pointed the way to a better hypothesis of these nightmares. They are discussed more fully in the article on Dreams.

Lethargy, Catalepsy, Trance. — These are terms used to describe atypical unconscious states which are as yet imperfectly classified, partly on account of the fugitive character of the alterations and partly because of the com¬ plications of the picture with other symptoms of the hysterical and epileptic conditions. The phenomenon of hypnotic sleep is best put in this categoiy.

In catalepsy the prevailing phenomenon con¬ sists of the wax-like rigidity which the limbs can be made to assume, at times unconsciously; again, especially in the hypnotic condition, by the suggestion of the operator. In trance con¬ ditions there may be manifest a great variation of phases, most of which are accompaniments of the hysterical state. All of these phenomena which occur in a variety of the psychoneuroses as well as in the psychoses, cataleptic states, lethargies, trances, etc., being extremely fre¬ quent in hysteria and more particularly in cata¬ tonic types of schizophrenia (dementia prsecox), have been much better understood, thanks to Freud's ingenious hypotheses. They all repre¬ sent, as stated, wish-fulfilling fantasy dramati¬ zations, the precise significance of which can be laid bare by the principles of psychoanalysis.

(2) Disordered Conscious States in the Neuroses and Psychoneuroses. — No sharp dividing line separates the neuroses from the psychoneuroses so far as the prevailing dis¬ turbances of consciousness are concerned. Here under the neuroses are considered neur¬ asthenia and anxiety neuroses, while hysteria and the compulsion neuroses (morbid phobias, fears, compulsion ceremonials, etc.) are here termed psychoneuroses. For neurasthenia, the chief phenomena are fatigue state, anxiety states in the anxiety neuroses, conversions of psychical unconscious states into physical phe¬ nomena (blindness for not willing to see, deaf¬ ness for not desiring to hear, paralysis from fantasies of various kinds, etc.) ; indeed the whole gamut of somatic signs of hysteria may be mentally reviewed by the reader as falling under the formula conversion. Finally in the compulsion neuroses there is an erection of psychical defenses which show the phenomena of substitution. Here the sources of the emotion in unconsciousness are transferred or displaced to some irrelevant matter which comes to symbolize in a specific manner the nature of the unconscious, suppressed emotional situation.

In many neurasthenic stages organic factors loom large in determining the feelings of fatigue in consciousness. Others again, however, are purely emotional in their development and here conscious and unconscious processes are in

rivalry. The desire to be sick to escape obliga¬ tion ; the reversion to indolence unconsciously is a large motive. The libido, that is, the energy of these individuals, concerns itself with their own bodies and they live, in fantasy, as neuras¬ thenics, the life of the cared-for and nursed child. Here unconscious fantasy helps to dis¬ guise the task — that is, to be independent captains of their own destinies.

In the anxiety neuroses, physical states are also present, such as flutterings, tremblings, gaspings for breath, air hunger, very frequently palpitation, fear of impending death, anxiety lest something may happen to self, to others or to material welfare, diarrhoeas, mucous colitis, gastric irregularities of all types, etc. These make up the physical signs induced by the unconscious fantasy, largely of tempta¬ tion. These patients are constantly repressed ; they suffer from suppressed excitement and the symptoms mentioned constitute the outlet for the repression, the exact nature of which is veiled behind the symptom, not as a true con¬ version as in the hysterical mechanism, save in certain mixed anxiety hysterias. Freud and Stekel as well as many others assume that this type of disorder is found more particularly in those who find the demands of culture too arduous, and yet whose ethical attitude refuses to face a certain, often but not invariably a sexual, situation. Unrequited affection, dis¬ satisfaction with life's sternness, actual sexual stimulation without gratification — ■ as in coitus interruptus, coitus reservatus, menopause, arti¬ ficial and natural — unconscious temptations toward dishonesty, hateful impulses repressed from consciousness — these are among the dynamic factors bringing about these peculiar modifications of conduct to meet these situa¬ tions.

In hysterical conversions the mechanisms are more complex. Here the complexes play a more determining role and the cast-off and yet still retained complex is more precise and definite.

Thus the essential factor, so far as con¬ sciousness is concerned, is dissociation which, according to the original view as held by Janet, is due to an inborn weakness, namely, some factor in the constitution of the individual which predisposed him to this type of reaction. Hence, by the French school, and by those who followed Janet's teachings, the search for this inborn factor was made chiefly in the prenatal life of the individual, namely in heredity, and unfortunately as a correlate of such teachings a pessimistic attitude toward therapy was in¬ evitable. The chief advance made in the hypothesis formulated by Freud was that the factor bringing about dissociation was not so much to be sought in heredity as to be looked for in the psychological dynamics of the nerv¬ ous system, so that, for reasons which psycho¬ analysis has revealed, a certain group of ideas or complexes remained in the unconscious, but were still active. Hence arose the concept of repression as worked out by Freud.

Inasmuch, however, as the dynamics of the nervous system could not be interfered with, some form of expression of energy must take place. The repression acting upon this dis¬ charge of energy brings about the process of conversion, that is, there is a motor discharge but the repression distorts it — puts a different

face upon it, so that the patient carries out the unconscious repressed wish in a form of drama¬ tization known as the symptoms of the disease.

This dramatization, concerning which a much more extended discussion will be found in the article on Hysteria, presents a number of distorted mechanisms which a study of the dream life has made clear. These distorting mechanisms permit the living out of the wish, at the same time that it remains practically un¬ conscious. Mixtures of conscious aud uncon¬ scious fantasy are present in practically all hysterical attacks, so that they present various combinations.

The symbolism of the attack itself may represent a number of things. Thus, among the commoner forms of dramatization one finds that :

1. The hysterical symptom is the memory symbol of certain actual traumatic impressions and experiences.

2. The hysterical symptom is a substitute created by conversion for the associative re¬ turns of these traumatic experiences.

3. The hysterical symptom is like other psychic formations, the expression of a wish fulfilment.

4. The hysterical symptom is the realization oi an unconscious fantasy, which serves a wish fulfilment.

5. The hysterical symptom serves to repre¬ sent a sexual gratification, and represents a part of the sexual life of the patient.

6. The hysterical symptom corresponds to a return to a kind of sexual gratification which was real in infantile life, but which has since been repressed.

7. The hysterical symptom arises from a compromise between two opposed affective and instinctive impulses by which the one brings a partial instinct or component of the sexual re¬ pression to expression, the other seeks to sup¬ press the same.

8. The hysterical symptom can become the representation of different unconscious non- sexual impulses, which cannot, however, be without a sexual meaning.

9. An hysterical symptom is the expression on the one hand of a masculine, on the other of a feminine, unconscious sexual fantasy.

These represent the more easily recognized interpretative formulae of an hysterical attack, number 7 being the most frequent.

The chief interest, however, in interpreting this pantomime resides in the close similarity which it presents to the pantomimes of dreams and myths, and of fairy tales. We thus see that the misleading, incomprehensive and in¬ distinct outlines of the attack consist:

1. In a combination of several simultaneous fantasies, for example, a recent wish and a revival of an infantile repression.

2. In a multiple identification when the patient undertakes to carry out the activities of both persons appearing in the fantasy.

3. In the antagonistic conversion of motor innervation so that a negativistic expression is to be interpreted in the light of its opposite.

4. In an inversion of the time sequences; this complicates the picture, just as an inversion in the motor character of the phenomenon and an hysterical attack may begin backward and work forward, just as a cinematograph film may be displayed running backward.

In hysterical dream states the unconscious activities may be readily understood by one who is capable of understanding the pantomime. The patient plays the part with unerring ac¬ curacy.

Compulsion Neuroses. — Here the uncon¬ scious factors are handled in a manner some¬ what different from that seen in hysteria. Under this head is usually included a large number of obsessive, phobic and compulsive ideas which represent an unsuccessful repres¬ sion of the psychosexual conflict. Unlike hys¬ teria, the conflict is apt to come into conscious¬ ness ; it cannot be entirely disguised by the distorting mechanisms. Conversion is not so frequent a phenomenon, but instead another type of reaction is met with, namely, substi¬ tution. By this is meant that the repressed con¬ flict, breaking into consciousness, does not come into consciousness in its true light, but is im¬ mediately transferred or transposed, that is, substituted, upon something that is innocuous. A common illustration from every-day life il¬ lustrates in part this mechanism. Thus, an irritable husband with a burden to carry, im¬ mediately on sitting down to breakfast, com¬ plains about the coffee ; notwithstanding the fact that the coffee may be the same that he has been drinking for 15 years, on this particular morning it is atrocious. Here the psychical disturbance, the discomfort, the ir¬ ritability is transposed or substituted upon the innocuous object, and one that has nothing whatever to do with the original source of irri¬ tation, but serves as a carrier or outlet for it. Thus the phobia, the compulsive act, the obses¬ sion becomes the innocent object for the ex¬ pression of the emotional or complex disturb¬ ance of the patient. Thus, a patient will be unable to look upon a negro, will refuse to go out of the house without securing the door a number of times, or may have to put white papers under the beds, or in dark closets, have to look at people two or three times to be persuaded that they are not negroes, and a complicated ceremonial grows up about the question. The negro is only a symbol and behind the symbol lies the original difficulty.

To understand the activities of the uncon¬ scious in the compulsion neuroses is very diffi¬ cult, but perhaps the most illuminating hy¬ pothesis that has been utilized for the ex¬ planation of these phenomena is that of Freud. He assumes that the fairly developed neuro¬ sis, say of a person of from 25 to 35, or even 40 years of age, represents the terminal stage of a complicated series of phe¬ nomena. The initial stage is usually laid down in childhood where, as a reaction to in¬ fantile attitudes, usually of a nature to satisfy sexual curiosity, then not known to be sexual, the patient comes to a sense of guilt concern¬ ing these activities. This sense of guilt is usually overcompensated for by little manifesta¬ tions as it were of overgoodness. The children become very punctilious, very fond of their parents, intensely religious or intensely self- sacrificing, do everything they can to be good, which is hardly the normal state of childhood. They are compensating for something which needs to be compensated for apparently, and the compensation aids in pressing memories of the early experiences or fantasies into uncon¬ sciousness. It may be that this overcompensa-

tion is effective, as it frequently is in mystics, religious enthusiasts, zealots, reformers, ex¬ tremists and cranks of various kinds, but not infrequently the overcompensation breaks down, the original fantasies which have been put to sleep reawaken now with a much stronger imperativeness, and immediately a con¬ flict arises, whereby the demands of the original instincts of gratification can be accomplished, and also whereby the demands of a cultural attitude may be maintained. A ceremonial which represents these conflicting tendencies develops whereby the patient can keep his cake and eat it too. The mask that is worn is of various types, as any one who has had a large experience with compulsion neuroses can tes¬ tify. Sometimes an overdetermined symbolism may in the course of time become extremely complicated. The patient is driven from one level to another, and in the search for rest lights upon a series of islands of safety as it were, to be away and have to search for a new one. Thus successive lines of defenses grow up, and in every old compulsion neurosis the unraveling of the various lines of defense be¬ comes an extremely difficult matter. It is highly probable that no compulsion neurosis can be analyzed within six or eight months, and some cases take one or two years. They constitute the hardest problems in the treat¬ ment of the psychoneuroses.

Intoxications. — • An adequate discussion of the disturbances of consciousness in the in¬ toxications would require a large volume. Those resulting from the action of alcohol alone would require a monograph. The study of the influence of alcohol upon consciousness is one of intense interest, since in increasing dosage one can observe, along the retrograde path, the whole phylogenetic and ontogenetic development of consciousness. In compara¬ tively small doses the conscious development of higher culture may be peeled off, then those of less advanced grades disappear; an indi¬ vidual man may in successive layers be shown through all of his psychical stages of develop¬ ment. At the vital level he represents the spinal animal, still feeling and living, but reflex orientation may be preserved. Consciousness is here reduced to unconsciousness and all of the reactions of the anencephalous monster may be preserved. Finally passing below vital levels alcohol reduces the human animal to a physico-chemical apparatus, in which the only functioning parts are the sympathetic meta- meres. Here unconsciousness is at its lowest level, if unconsciousness one wishes to call it, for here mere tropisms show themselves. The lungs continue their oxygen exchange, the kid¬ neys their chemical filtration and all other organs of the body carry out their physical chemical functions, but lacking all co-ordination, all interrelationship. Every cell is looking out for itself independently one of the other, anarchy and chaos rule, and only the vagus preserves its activity in respiration and in the heart beat. Here are bits of primordial pro¬ toplasm which started the evolutionary series. Everything that man is or ever has been may be reached by the alcohol path, and as is well known it chiefly is the ((has beens® that are acquired.

Psychoses. — Here disturbances of con¬ sciousness are most varied. It is practically

impossible in the present state of our knowledge to apply the scheme of our stages of evolution to them. Certain psychoses reduce the indi¬ vidual to the physico-chemical level, such for instance as paresis, senile decay, even certain stages of dementia pnecox drop to this level. The intoxication and infectious psychoses, those associated with disintegration and degeneration of brain tissues, also show the same results. Other psychoses only bring man down to his vital levels, return him to the animistic stages of development, whereas others again only in¬ volve him in his higher psychical sphere. Here symbolism becomes affected, and although the patient may not come in conflict with his sur¬ roundings, nevertheless he is out of touch with certain types of reality. No consistent applica¬ tions of the hypothesis can as yet be made to the psychoses without a much more extended discussion.

Smith Ely Jelliffe.

CONSCIOUSNESS IN ANIMALS. See

Mind in Animals.

CONSCRIPTION, the enlisting of men for military service by a compulsory levy, at the pleasure of

the government. It is dis¬ tinguished from recruiting, or voluntary en¬ listment. Conscription was enforced in the states of ancient Greece, most especially in Sparta. The name is derived from the Roman military constitution. Every Roman citizen was obliged to serve as a soldier from his 17th to his 45th year; the consuls announced every year by a herald or written order that a levy was to be made (milites cogere colligere, scribere conscribere) ; and all citizens capable of bearing arms assembled in the Campus Martius or near the capitol, where the consuls assisted by the legionary tribunes made the levy, choosing as many men as were needed from each tribe. The renascence of conscrip¬ tion in the form of a scheme of universal serv¬ ice embracing the greater part of the popula¬ tion dates from the French Revolution. The combination of volunteers and conscripts which constituted the army prior to 1792 was replaced by a purely conscriptive scheme. However, as the administration of this scheme was left in the hands of the local authorities, the army soon became filled with vagabonds and crim¬ inals. After 1796 the revulsion against war led to a considerable opposition to conscription. In 1798 the famous conscription law of Jourdan was enacted, which made all male citizens be¬ tween the ages of 20 and 25 liable to a call to the colors. A most vicious clause in this law, which remained in force until 1870, and may fairly be charged with contribution to the loss of the Franco-Prussian War, was that which permitted the buying of exemption.

The German system of conscription, which was abandoned under the terms of the Treaty of Versailles, dated from the degradation of Prussia after Jena. The treaty following Jena forbade a large standing army and Prussia turned her army into a vast training school, whereby at a small expense and without vio¬ lating her treaty agreements a vast reserve was built up from the many quotas that under¬ went a brief period of service with the colors. Until the Great War of 1914-18 this system was the basis of the military organization of all Europe and of Japan. The treaties imposed by

the victors in that conflict forbade conscription in Austria, Germany, Bulgaria, Hungary and Turkey. Switzerland (q.v.) is unique among the Continental nations in replacing the service with the colors by a few weeks' training each year.

Until the beginning of the European War, England and America were the only two countries which relied exclusively on the voluntary system. In England the voluntary system was attacked by Lord Roberts, but de¬ fended by Lord Haldane and Sir Ian Hamilton, on the grounds that the volunteer, especially the trained volunteer which the British long period of service furnished, was proportionally so much a better soldier for such remote and difficult wars as those into which Great Britain was likely to enter as to counterbalance his relative fewness in numbers. Meanwhile, Australia had the distinction of being the first English speaking nation to initiate a limited compulsory military training and service. Until January 1916 England retained the scheme of voluntary service, but with a con¬ tinually increasing moral pressure from un¬ official and official sources on those who did not enlist. In the autumn of 1915 Lord Derby de¬ vised a system whereby it was possible for a man to enroll himself for military service so that he would be called up when he was needed. Soon afterward certain restrictions were adopted prohibiting the emigration of unmar¬ ried men. These restrictions obviously had in view the ultimate adoption of compulsory serv¬ ice. This was enacted in a bill introduced by Mr. Asquith, the Prime Minister, on 4 Jan. 1916. The Derby scheme remained in effect until 2 March, when conscription came into force. The conscription scheme adopted is unique ir exempting from armed service (not from all service whatever) those who have con¬ scientious objections to warfare. The sincerity of their objection, however, is subjected to a rigorous examination. Ireland was excluded from the provisions of the act. See War, European.

Immediately upon entering into the Euro¬ pean War America adopted conscription. (For the details of the scheme adopted, and for the practice of conscription in the War of the Rebellion, see Drafts ; also Selective Service Law and Draft. Canada also initiated con¬ scription in 1918, but Australia, which had con¬ scription for home service long before the War, declined to adopt it for foreign service. It was put to a vote, and rejected. The policy of England, the United States and Canada toward conscription in time of peace is as yet indetermi¬ nate. (For the organization of the conscript armies of the world, see Army ; Army Organi¬ zation). Consult Beyerlein, F. A., (Jena oder Sedan (1903); Chevrillon, A., (England and the War* (London 1917) ; Hamilton, Sir Ian, (Compulsory*

Service) (London 1911) ; Lord Roberts, (Fallacies and Facts) (London

1911).

CONSCRIT DE 1813, Histoire d'un

(History of a Conscript of 1813), a famous story, by Erckmann-Chatrian, published 1868- 70. The narrative turns mainly on the con¬ trast between the perpetual mourning that is going on in families and the perpetual Te Deums for disastrous victories. This is the dominant note ; and in the mouth of the humble vol. 7 — 33

conscript, this thesis, interpreted by scenes of daily carnage, is more eloquent and persuasive than if it borrowed arguments from history or philosophy. The style is simple, familiar ; but never trivial or commonplace, and is always in harmony with the speaker. As the work was hostile to the Napoleonic legend, numerous ob¬ stacles were put in the way of its circulation at the time of publication. But notwithstanding, it was scattered in profusion throughout France by means of cheap illustrated editions.

CONSECRATION, an act by which mate¬ rial things and persons are dedicated to sacred uses and sacred ministries. Celebrations of rites of consecration are traced back to the earliest historic periods of Assyrian, Chaldaic, Egyptian and Hebraic civilizations. The word Consecration is also used in the Roman Cath¬ olic ritual and liturgy to signify the act of Transubstantiation (q.v.) by which the bread and wine are in the Mass changed into the body and blood of Christ. In the Roman Pontificate or ritual for episcopal functions there is a form for consecration of a bishop, consecration of a church, consecration of the sacred vessels used in the liturgy of the Church. In the consecration of a bishop — ordinarily performed by the metropolitan and two other bishops — the consecrating bishops impose hands on the bishop-elect and the metropolitan delivers to him the pastoral staff and the ring, emblems of his office, and anoints him with chrism, the sacramental mixture of olive oil and balsam, pronouncing the formula of words by which is expressed the commission of authority to rule the Church committed to his charge. The consecration of a church is a very elab¬ orate ceremony, requiring several hours to com¬ plete it: there is chanting of the office of Matins and Lauds by the clergy; there are pro¬ cessions of clergy, headed by the consecrating bishop and other bishops who may be present, around the walls outside and thrice around the interior, with continuous chanting of psalms ; there is anointing of the doors, of the walls, of the high altar; and a number of other rites. The consecration of the vessels destined for the service of the altar is also an episcopal function : it is a rite that has descended from high Christian antiquity : in this rite also chrism is employed.

CONSENT (OF. consente, Lat. consentire, <(to agree"), in law, a free and deliberate act of a rational being. Any voluntary act by which the agent takes away his own power of giving a deliberate consent, such as partial in¬ toxication, will not invalidate the consent ; but it is invalidated by any undue means — intim¬ idation, improper influence or imposition — used to obtain it. The law does not, in general, take cognizance of the wisdom or folly of men in entering into contracts before it enforces them; but where clear proof can be brought that a person has been wilfully misled or en¬ trapped into a contract, it will refuse to enforce it. In pathology consent signifies an agreement or sympathy in virtue of which one affected part of the system affects another part or parts.

CONSEQUENT STREAM. On a newly emerged portion of the sea bottom, forming a coastal plain sloping toward the ocean, the run¬ off from rainfall gathers into little rivulets that flow down the slope to the sea. These channels

enlarge till finally the water courses constitute true rivers. Streams like this, whose course is determined as a consequence of the initial slope of the land, are called consequent streams. See also Subsequent Stream.

CONSEQUENTIAL DAMAGES OR LOSSES, in law, are losses incurred in con¬ sequence of an act, but not flowing directly from it. The liability for consequential dam¬ ages resulting even from an unlawful act is more limited than that for direct damages, as it is evident that the power of the law

in trac¬ ing and enforcing such damages must be limited ; but in some cases they can be enforced.

CONSERVATION OF ENERGY. See

Energetics.

CONSERVATION OF MATTER. See

Matter.

CONSERVATION OF NATURAL RE¬ SOURCES. The conservation movement, first clearly started in the United States in 1908, aims to protect and to develop the fullest per¬ manent usefulness of the great national re¬ sources — forests, lands, minerals and waters — whose use has heretofore been accompanied by such great waste. Its chief principles are that the resources shall not be wasted, that the national resources shall be administered by the national government and that both public and private resources shall be administered with some reference to the interests of future gen¬ erations. The movement is also part of a general effort to prevent the private monopoly of valuable resources. Its chief purpose is to secure by intelligent direction a wise and ca.e- ful use of national resources, but not to with¬ hold them from necessary use. In the case of some resources (as timber) its problem is to provide for renewal as used ; in the case of others (as minerals) its problem is to secure more careful use or substitutes, and prevention of waste.

The American people, bred to carelessness and drifting policy, in the midst of plenty, be¬ came known for their wastefulness. In the long period of the settlement of new lands, the natural resources, regarded as practically un¬ limited, were exploited with prodigal waste. The pioneers claimed the right to. occupy and the right to exterminate whatever stood in the way of occupation. They destroyed valuable timber, wild game and fur-bearing animals. They would have exhausted the fishing grounds but for the work of the State and national fish commissions. Great lumber companies used commercial methods which proved even more destructive than the acts of the pioneer. Fires, both from heedless and intentional sources, were frequently more destructive than the wasteful methods of lumbering. Deforestation, resulting from American reckless policy, brought indirect losses even more serious than the direct loss of timber — the losses from erosion and serious depletion of soil, irregu¬ larity of stream-flow, flood and landslides. Unrestricted by national regulations, the cattle barons, by a system of wasteful exploitation, ruthlessly and rapidly exhausted the public pasture land of the great watershed between the Mississippi and the Rockies. The sheep- herders followed and completed the work of depletion, precipitating disputes with the cattle men over the public range to which neither had

a legal title. The pioneer farmers by reckless exploitation and unscientific methods exhausted the farm lands. The pioneer exploiters of coal mines exhausted the mineral resources by crim¬ inal waste. The pioneer oil men wantonly de¬ stroyed natural gas. The same heedless waste characterized the early stages of exploitation in the mining of precious metals. The captains of industry were no less ruthless in the ex¬ ploitation of the energy of human beings in factories, foundries and mines, and in railway service, by methods which contributed to the general industrial waste.

Americans, who until the close of the 19th century still exulted in the strength of their limitless resources, in the first decade of the 20th century began to regard the protection of the rights of the people in the public domain as more important than the immediate exploita¬ tion of its wealth, and began to favor public control and legislative limitations on private enterprise as essential to industrial liberty and the general welfare. Fearing the exhaustion of their natural resources, they expressed their fear in a well-developed movement for con¬ servation. They urged more careful attention to the soil with a view to restoration of fer¬ tility by scientific farming. They favored gov¬ ernment projects for extension of irrigation begun by private enterprise. They sought to find plants and methods which would bring crops to semi-arid areas and unirrigated deserts. They sought through national and State gov¬ ernments and great corporations to establish forest reserves to prevent exhaustion of timber and to prevent alternate floods and droughts, and encouraged scientific study of forest prob¬ lems. They began an agitation to prevent waste of supplies of coal and iron, and to save coal supply, by urging the importance of the pres¬ ervation and development of latent water power to produce electricity. They were awakening to the fact that power sites should be leased, not sold or given

away, and that privileges of using this natural source of wealth should be granted on terms conserving the rights of the public to adequate service at a reasonable charge. They lessened the demands on forest and iron ore by use of cement as a substitute for wood and iron. Finding that a large amount of the resources upon which the future must depend were held by a comparatively few indi¬ viduals or corporations, they began to demand that the unappropriated resources should be ad¬ ministered primarily for the benefit of the public, and that those already in private hands should be subject to government control. They began to urge selection of trained experts to study the economic utilization of resources, and co-operation to regulate the life of the community for the good of all.

With changes of conditions which brought a realization of dangers from waste, the need of a national policy of conservation arose. A rise of prices of raw materials in connection with every resource is probably the strongest economic force leading to more scientific utiliza¬ tion, and this is the strongest guarantee of con¬ servation, but legislation is also needed.

The Roosevelt administration first saw the importance of a more active national control of natural resources for the benefit of the pub¬ lic. In February 1907, calling attention to the waste of mineral resources, the President

recommended legislation for separation of the title to the surface of the land from the title to the underlying mineral fuels, in order that the latter at least might be withheld from monopolizing or speculative private interests and kept for the public benefit. He considered that "the conservation of our natural resources and their proper use constitute the fundamental problem which underlies almost every other problem of our national life.® Early in 1907 he took the first practical step toward the solu¬ tion of the problem by the appointment of the Inland Waterways Commission to investigate and recommend a full and comprehensive plan for the development and utility of the water resources of the country. In Mav 1908 he took the second step in calling at the White House a conference of governors to which facts regard¬ ing natural resources were presented by ex¬ perts and at which plans for conservation were considered. This conference began a definite movement for conservation. Following its first meeting the President took an additional step by the appointment of a National Conservation Commission composed of about 50 members under the chairmanship of Gifford Pinchot who was head of the forestry division. This com¬ mission made the first national inventory of natural resources, published in 1909. It directed attention to the waste in extraction and treat¬ ment of mineral products, the decrease of soil fertility, the extinction of wild game and fur¬ bearing animals, the decrease of forests by timber industries and by fires, the waste of water in public and private irrigation projects and the great losses by failure to utilize the power of water flowing over government dams.

Disclosures of recent government investiga¬ tions thus begun are appalling. Experts report that many natural resources are rapidly nearing exhaustion ; that at the present rate of con¬ sumption and with present wasteful methods the timber can last only 30 or 40 years, that the supplies of available coal can be expected to last only 150 years, and the supply of petroleum only 50 years, that the supply of high grade iron can last only 100 years and the known copper deposits only 50 to 100 years.

Advocates of the new policy proposed not only to conserve by more economic methods of extraction but also by substitutes to reduce the consumption. The storage and properly di¬ rected release of vast water power which has remained uncontrolled and unused can be made to save other resources from damage and at the same time to conserve enormous supplies of coal. By complete utilization of this neg¬ lected resource, floods may be reduced, better means for irrigation provided, waterways im¬ proved for navigation, and larger power se¬ cured for industrial purposes.

President Roosevelt withdrew large areas of western public land from sale and settlement for the purpose of investigating their resources, and recommended legislation for protection of the interests of the general public in their for¬ ests, minerals and water powers. Important steps toward a national policy were taken by the creation of national forests (under acts of 1891 and 1907) and

the Forest Service. The latter is a bureau of the Department of Agri¬ culture which successfully protects and admin¬ isters the public interests in the national forests, which contain one-fifth of all the standing

timber in the United States, protect the head¬ waters of every western river and aid in sup¬ porting half the sheep in the western ranges. It also co-operates with State bureaus. It protects the forests from fire and depredations, improves the conditions for timber growth, pro¬ tects the water supply and utilizes the forage crop. Besides the practice of scientific forestry it conducts investigations and collects much useful information for dissemination. The new policy defeated the attempts to cede the national forests and the entire public domain to the Western States which cannot so well administer them in the interests of the whole people.

In the Far West a decided opposition arose against the new forest policy, but by 1911 the policy of Congress not to release any of the safeguards against the forestalling of land by corporations and large individual owners and to continue the forest policy and to reserve public mineral rights became clear.

In 1911-12 Congress began appropriations for the purchase of forest reserves in the Appalachian and White mountains.

In 1909, the first steps were taken to prevent plans of great capitalists to obtain control of valuable natural resources in Alaska. Ex- President Roosevelt led in the support of a plan of government ownership with leases to corporations.

The conservation policy was also manifested in the agitation to reserve water-power sites, to secure new laws for the disposal of coal lands and to modify the Homestead Act. By act of 1910, the President can reserve public lands for water-power sites or irrigation. The Secretary of the Interior recommended that the Federal government be authorized to lease such power sites at a moderate rate for a period of not to exceed 30 years. It has been urged that the development of power in navigable and source streams should be co-ordinated to re¬ duce drain on other resources, to aid in the control of streams for navigation, to prevent soil wash and to purify water supply. For the proper conservation of water power the most important thing is to prevent private monopolies from getting the sites and to preserve the use of them for the benefit of the whole people. The importance of this is indicated by the fact that 65 per cent of all the developed water power of the United States was controlled by 10 groups of power interests, several of which were closely related by interlocking directorates. The new policy of national conservation de¬ feated the latest selfish attempt of organized power interests to obtain in perpetuity and for nothing the unregulated control of water powers of navigable streams in the national forests and on the public domain.

Recently the Federal government has begun active participation in the reclamation of arid lands by irrigation projects which were first begun by private corporations as early as 1880. The national irrigation policy emerged from disputes of western farmers with the large private water companies which by 1900 had secured and developed the best irrigation sites, and also from the necessity of protecting rivers and lakes from which irrigating waters were drawn. The Federal government has en¬ couraged irrigation by the desert land laws of 1877 and 1891, by the later Carey act of 1895 (modified in 1901 and 1908), and by the more

important Newlands reclamation act of 1902, by which the government began to reserve from settlement .many areas of water supply and could hold the mountain streams necessary to fill reservoirs and use the water drained from the dams. Congress advanced $20,000,000 for the construction of irrigation dams to be satis¬ fied from the proceeds of the sales of the improved land.

Congress has gone far toward committing the government to the policy of control by authorizing the President to withdraw public lands from private use whenever important for conservation of forest or grazing lands, water power, irrigation possibilities or scenic beauty, but has not yet determined the

terms on which mining and development rights will be conceded. Little effort has been made to pro¬ tect mineral resources from waste or improper exploitation. In 1900, Congress enacted a law authorizing the President to withdraw tem¬ porarily from settlement and sale and to re¬ serve for public purposes any lands in the United States and Alaska or to reserve as government property the coal and other min¬ erals beneath the surface. The National Con¬ servation Commission advocated the disposal of coal lands only under leases safeguarding the interests of both the mining investor and the public. Steps were taken to withhold from private ownership the coal deposits in Alaska, and the government undertook the construction of a railway leading to the Matauska coal field. This is the beginning of a new system in line with the example of many European countries.

Another illustration of the new policy of conservation is found in the guarding of the north Pacific seal fisheries by an international agreement of 1896 between the United States, Great Britain and Russia, and by a later treaty of 1911 in which Japan joined.

To make resources safe from waste and unregulated monopoly, the advocates of con¬ servation still urge legislation for the develop¬ ment of water power of the national forests and other public lands on terms fair both to the people and to the power interests, for im¬ provement of public grazing lands by regulated use, for preventing by adequate penalties the needless pollution of streams, and for the utilization ,pf the resources of Alaska for the benefit of the people.

Bibliography. — (American Year Book) (1910) ; Gregory, (Checking the Waste1 (1911); Newell, irrigation in the United States* (1906) ; Pinchot, Gifford, ˆConservation of Natural Resources* (1908); id., (Fight for Conservation* (1910) ; Spahr, distribution of Wealth in the United States* (1896) ; Treat, P. J., cNational Land System* (1910) ; United States National Conservation Commission Re¬ port (1908-) ; Van Hise, (The Conservation of Natural Resources in the United States* (1911) ; Weyl, (The New Democracy* (1912).*

James M. Callahan,

Professor of History and Political Science, West Virginia University.

*CONSERVATIVE, as applied to one of the two great parties in English politics, was first used by J. W. Croker in an article in the Quarterly Review for January 1830, and was by Macaulay, in the Edinburgh Review for 1832, referred to as a <(new cant word.** Con¬ servative accordingly began to supersede Tory*

about the time of the Reform Bill controversies. The plural form of the word, or its equivalent in other tongues, has been assumed as a dis¬ tinctive name by certain political parties in many nations. These parties are sometimes actually, and always avowedly, opposed to changes from old and established forms and practices. In United States history these names have never been in general use, but in Van Buren's administration the name of Conserva¬ tives was applied to those Democrats that at the special session of Congress of September 1837 opposed the establishment of the sub¬ treasury system. In the Congress that met in December 1839 they had practically disappeared. The name was also assumed by Southern whites during the reconstruction period following the Civil War, to show their adherence to the old State governments, the abolition of which by Congress they opposed. In Virginia the name was in use until 1872. The name was also used in the North during this period. The Demo¬ crats applied it to themselves to draw moderate Republican votes. In the United States (1830- 40) the name of Conservatives was adopted by seceding Democrats, 4 in the Senate and 14 in the House, who voted with the Whigs against the sub-treasury, though voting with their party on other questions. They called them¬ selves Conservatives, as wishing to conserve the prosperity of the State banks, which they held the sub-treasury to be a disguised attempt to ruin. They held the balance of power in the House 1837-38, and voted down in two success¬ ive sessions Silas Wright's sub-treasury bill, which had been passed by the Senate. The elec¬ tions of 1838, however, returned only four of them to the House, and these ceased their active opposition — partly because the govern¬ ment had only escaped bankruptcy in 1838, on account of uncollectible claims against banks and individuals, by issuing fresh treasury notes in place of those canceled. The Whigs held the power and passed the Wright bill in 1840. In the Civil War the Northern Democrats, and especially the border State Democrats, often called themselves Conservatives, as wishing to preserve the old balance of State and national powers ; and the name was much ridiculed by the other side. During the Reconstruction period, the Southern whites to a considerable extent took the name of

Conservatives as wish¬ ing to preserve their old State governments, which they held to have the same existence and sovereignty as before the war, according to the declarations of the Northern leaders and Con¬ gress themselves, in stating the purposes of the war. The name, more particularly in Virginia, lasted down to 1872. See Tory; Whig.

CONSHOHOCKEN, Pa., town of Mont¬ gomery County, on the Schuylkill River and Canal, 13 miles northwest of Philadelphia, and on the Pennsylvania and the Philadelphia and Reading railroads. It has a number of manu¬ facturing interests, including blast furnaces, rolling-mills, woolen- and cotton-mills and pot¬ tery works, rubber works, surgical-implement works, the principal products of which form the basis of an extensive trade. Conshohocken was founded in 1830 and was incorporated as a borough in 1852. Pop. (1920) 8,481.

CONSIDERANT, kon-se-da-ran, Victor- Prosper, French Socialist: b. Saline 12 Oct

1808; d. 27 Dec. 1893. After being educated at the Polytechnic School of Paris, he entered the army, which, however, he soon left to promul¬ gate the doctrines of the Socialist Fourier. On the death of his master (1837), Considerant became the head of his school, and undertook the management of the Phalange, a review de¬ voted to the spread of their opinions. Having gained the support of a young Englishman, Mr. Young, who advanced the money, Considerant established, on a large estate in the department Eure et Loire, a Socialist colony or phalanstere, but the experiment failed, and with it the Phalange fell to the ground. Thereafter he continued to promote his views in the Dem- ocratie Pacifique. Among his numerous writ¬ ings, the chief is the (Destinee sociale, dedi¬ cated to Louis Philippe, which contained little more than a review of the principles of Fourier. In 1849 Considerant as a member of the Con¬ stituent Assembly was accused of high treason and compelled to flee from France. Near San Antonio, Tex., he founded a Socialist com¬ munity, La Reunion, which flourished for a time, but afterward came to nothing and he returned to France in 1869. Of his works, the one which has the greatest claim to originality is his (Socialisme devant le vieux monde) (1849). In religion Considerant was a con¬ servative; and was also opposed to the Revolu¬ tion.*

CONSIDERATION, a legal term covering the principle governing contracts and signify¬ ing something in the way of price or compen¬ sation which may be of value to the contractor or of detriment to the contractee. In law no contract is valid if it does not expressly stip¬ ulate the amount or consideration for which any lease, sale or transfer is made. As there are various kinds of contracts recognized in law, so are there different sorts of considera¬ tions. The simplest case is that where one party surrenders some property right to another for a consideration. In dual contracts the promises are mutual — each promising a consideration to the other. But whatever the nature of the contracts — and they grow in complexity from day to day — no legal action can be taken upon them unless the consideration is clearly specified therein. But considerations need not always involve direct benefits to the contracting parties. Promises made after services rendered cannot become the basis of legal action, because such services are not rendered in viciv of a con¬ sideration. Thus, promising a reward after being saved from drowning, for instance, does not make one liable. Nor are promises binding when they involve the performance of what is one's legal duty, anyhow. No promise is legal which involves the performance of an illegal act. The adequacy or inadequacy of a con¬ sideration, however great or small, never mat¬ ters in law. Thus, one may legally transfer property rights worth thousands of dollars in consideration of one cent.

The history of the law of contracts, could it be entered into here, would show the origin of the requirement of consideration. It clearly grew out of the original custom of requiring proof of damage or detriment suffered by the plaintiff seeking pecuniary consideration. Con¬ sideration as applied to a court, in legal phra¬ seology, means the judgment of the court, (

is considered by the court® being equivalent to (

CONSIGNMENT, in law, the act of send¬ ing goods, as to an agent, for sale ; also, the goods so sent. The one who sends the goods is known as the consignor, and the one to whom they are sent is known as the consignee. Usually when a consignment is sent by com¬ mon carrier a bill of lading is

given which serves as a receipt and contract of shipment.

CONSISTORY, in ecclesiastical usage, means a court or council of ministers and Church officials or dignitaries, for transaction of business relating to the Church. In the Roman Catholic Church the Consistory by eminence is the whole college of the cardinals, which is, so to speak, the Pope's senate, as¬ sembled at stated or occasional times to de¬ liberate questions of Church administration. It is usually presided over by the Pope in person, but often by his delegate ; the stated meetings are twice a month ; the sessions are secret usually and the meeting is merely formal, but often they are public when the cause of the meeting is the conferring of the hat on newly created cardinals ; or semi-public, Church digni¬ taries of rank inferior to the cardinalate being admitted, the purpose of the meeting being to discuss a canonization. In the Church of Eng¬ land every bishop of a diocese has a consistorial court for determination of ecclesiastical causes arising within his jurisdiction.

consolaci6n del sur, kdn-sd-la-

the-on' del soor, Cuba, the name of a district and a city in the eastern central part in Pinar del Rio province. It has railroad communica¬ tion with Havana. Pop. of the district about 17,000; of the city 3,062.

CONSOLATO DEL MARE, kon-so-la'to del ma're, a compilation of sea laws. See Com¬ mercial Law.

CONSOLIDATION OF SCHOOLS, the

term used when two or more rural school dis¬ tricts are made into one district, one school in one building replacing two or more small schools in several buildings. In most districts this includes the transportation of pupils to the school at the public expense, either in special vehicles provided by the school, or in private vehicles, the expense being paid by the school. The primary motive is to secure better educa¬ tional advantages for the pupils of the rural districts. The district schools have been piti¬ fully inadequate because their number made necessary small salaries, and therefore poor teachers and poor equipment. The plan of the consolidated school is, in brief, as follows : two, three, four or five existing school districts, each maintaining small, inefficient rural schools, vote to unite their schools, or are consolidated by some central authority. A three- or four-room schoolhouse, built on modern lines, well venti¬ lated and heated is erected at some central location. Arrangements are made for the transportation of all of those students living at a distance. The school is organized under a principal, and often several consolidated schools unite in employing a supervising principal and teachers in special branches. The stimulus has been great enough in many cases to instigate the formation of a high school, grade school

- 4

and a specialized teaching staff. This plan of union is not possible in mountainous or sparsely populated districts. The advantages are nu¬ merous, although at first the Middle Western States which are now the strongest supporters of the plan objected strenuously. The first im¬ provement is to be found in the better teachers and the greater interest shown on the part of the teacher and pupil. Secondly the opportunity for the country boy or girl is made equal to that of the city pupil, on account of the in¬ creased curriculum, the better organization and instruction and the other activities opened up for the country child. A third advantage is the cheaper cost. The effect on the neighborhood has been to increase interest and pride in the school and the stimulating of effort to provide better trustees, teachers and equipment. The objections, that the consolidated school is im¬ practical, burdensome to the children, and de¬ preciates value of the property near which the school formerly stood, have been removed slowly by experience, and the consolidated school has become a well-recognized institu¬ tion both in the United States and Canada.

The movement began in New York State in 1853, when an act was passed permitting consolidation, known as the Union School Law, incorporated as Title IX of the Consolidated Act of 1864. Massachusetts followed next, and the movement spread rapidly. The North Central States have made excellent progress in consolidation ; and nearly every State has some provision for union

schools.

Bibliography. — Monohan, A. C., Consoli¬ dation of Rural Schools and Transportation at Public Expense) (with bibliography in Bulletin 1914, No. 30, U. S. Bureau of Education) ; Martin, G. H., Conveyance of Children to School in Massachusetts) (in Educational Re¬ view, February- 1894, Vol. VII, pp. 147-153) ; State School Reports. Many of these contain good articles giving progress and condition in the several States. See especially Arkansas (De¬ cember 1910) ; Illinois (4th ed., 1914) ; Kansas (1908); Kentucky (1913); Indiana (1911-12, pp. 105-159) ; Michigan (No. 19, 1906) ; Missis¬ sippi (May 1913) ; Nebraska (1910) ; etc.; Betts, G. H., and Hall, O. E., Consolidation and Rural School Efficiency > (in (Better Rural Schools, > Indianapolis 1914) ; Knorr, G. W., Consolida¬ tion of Rural Schools and Organization of a County System (Washington 1910, U. S. Dept, of Agriculture, Bulletin 232) ;*

CONSOLS, or CONSOLIDATED AN¬ NUITIES, a public stock forming the greater portion of the national debt of Great Britain. It was formed in 1757 by an act consolidating several separate stocks bearing interest at 3 per cent into one general stock. At the period when the consolidation took place, the principal of the funds united amounted to $45,689,105; but through the addition of other loans it has increased so much that now, after considerable reductions, it still amounts to more than half of the national debt, which in 1914 reached the enormous sum of $3,443,799,000.

CONSONANCE. See Concord.

CONSONANT. See Alphabet.

CONSORT, he, she or that which shares the same lot with another; a companion; a part¬ ner; an intimate associate; a wife or husband; applied in a modern sense chiefly to persons of royal degree or position, in countries where women are able to reign; as a queen consort; a prince consort ; that is, the wife of a reigning monarch, or spouse of a queen-regnant. It is also applied to a ship sailing in company with another.

The queen consort, the wife of the reigning king, is, in all legal proceedings, looked upon as a single, not as a married woman. She may purchase and convey lands, grant leases and do other acts of ownership without the inter¬ vention of the king. She may also sue and be sued in her separate person, and possesses courts and officers distinct from those of the king. She pays no toll, and is free from any fine which a court could impose upon women in general ; but in other respects she is on a similar footing with the other subjects of the king. In her life and person, however, she en¬ joys the same protection as the king, it being high treason to design the death of either. The husband of a queen-regnant is not endowed by the constitution with any distinctive rights or privileges. All his privileges and honors, there¬ fore, must emanate from the Crown, under the form of a warrant, grant or patent, or else be conferred by act of Parliament introduced after a royal message on the subject. Up to 1857, when the title of Prince Consort was bestowed upon him by letters patent, the late Prince Al¬ bert possessed no distinctive title and no place in court ceremonial but such as was accorded to him by courtesy. An opposite instance was that of Ferdinand of Aragon, who, on his marriage to Isabella of Castile, became joint ruler of that country.

CONSPIRACY, legally defined, ffa com¬ bination by two or more persons, by some con¬ certed action, to accomplish an unlawful pur¬ pose, or to accomplish a purpose not in itself unlawful, by unlawful means.® Some of the more important common law conspiracies were those to commit treason or sedition, to murder, to cheat and defraud and to injure another maliciously. The common law recognizes as an offense the agreement between the con¬ spirators to do an unlawful act, and no overt act is necessary for the completion of the crime. Changes have been made in this holding of the common law by the laws of several of the States and by Federal legislation in the United States. Where the changes have been made it has been declared that an overt act was necessary to make the conspiracy a crime. Conspiracies are ranked as misde¬ meanors, except such as by acts of legislation have been declared statutory conspiracies, and punishable as such, and they are ranked as felonies. Consult Bishop, (New Commentaries on the Criminal Law) (Boston 1900) ; id., Commentaries on the Non-Contract Law) (Chicago 1889) ; also Encyclopedia of the Laws of England> (2d ed., London 1907).

CONSTABLE, Archibald, Scottish pub¬ lisher: b. Carnee, Fifeshire, 24 Feb. 1774; d. Edinburgh, 21

July 1827. He was the original publisher of the Edinburgh Reviezv, the poems of Sir Walter Scott, the (Waverley Novels,* and other well-known works, In 1826, however,

the firm was compelled to stop payment, with liabilities exceeding $1,250,000. Sir Walter Scott, who was heavily involved, practically sacrificed his life in the endeavor to meet his creditors. Constable himself did not long sur¬ vive his misfortunes. He became publisher of the Scots' Magazine (1801) and of the Edin¬ burgh Review (1802), and owner of the En¬ cyclopedia Britannica (1812), which he enlarged. He edited also a (Chronicle of Fife) (1810) and wrote a (Memoir of George Heriot5 (1822). Consult Constable, (Archibald Constable and His Literary Correspondents) (3 vols., Edin¬ burgh 1873), and Lockhart, (Life of Scott5 (7 vols., London 1838).

CONSTABLE, Archibald, and His Lit¬ erary Correspondents, a work by Thomas Constable (1873). It is the story of the Edin¬ burgh publishing house which established the Edinburgh Review; initiated the publication of cheap popular volumes of literature, art and science ; and by a bold liberality in payment of authors, with remarkable sagacity in judging what would succeed with the public, virtually transformed the business of publishing. In October 1802 the first number of the Edinburgh Review appeared. The generous scale of pay¬ ment soon adopted — 25 guineas a sheet' — startled the trade, and greatly contributed to make Constable the foremost among publishers of his day.

CONSTABLE, Henry, English poet: b. Newark, England, 1562; d. Liege, Belgium, 9 Oct. 1613. His chief work was his book of sonnets, (Diana, 5 published in 1592, when few sonnets in the Italian form had been written. He was probably the author also of the (Forest of Fancy) (1579), attributed to Chettle.

Suspected of treason against Elizabeth, he was compelled to leave the country, and on his re¬ turn in 1604 was confined in the Tower for a short time. His lyric (Diaphenia) and his pastoral (Venus and Adonis5 take a high place in contemporary song.

CONSTABLE, John, English pastoral painter: b. East Bergholt, Suffolk, 11 June 1776; d. London, 1 April 1837. His father was a wealthy miller, and was at first desirous that his son should enter the Church, and then on finding him disinclined to this career, proposed that he should follow his own business. At the latter employment he continued for several years, but his favorite pursuit was painting, and in this he would occupy his leisure hours. After considerable objection on the part of his father, but encouraged by Sir George Beau¬ mont, he entered as a student of the Royal Academy in 1799. For many years his progress as an artist was extremely slow. He did not sell a single picture to a stranger until 1814, but he had one or two private buyers who de¬ tected the promise of great things in his work. In 1816 he married secretly Maria Bicknell, who died in 1828. In 1819 his (View of the River Stour5 attracted some attention, and pro¬ cured him admission as an associate of the Academy. His talent first received recognition abroad : he was awarded the medal at Lille in 1824, and another at Paris in the following year. Then followed his admission as a member of the Royal Academy (1826) — a tardy recogni¬ tion which he did not value much. Constable's pictures are remarkable for the truth and vivid¬

ness with which country scenes and natural phenomena are represented. Fuseli said of them that they made him call for his umbrella ; and a French critic declared that his leaves and grass were bespangled with morning dew. He chose (5 localities for his ex¬ quisite pastorals, and was the first to abandon the brown grounding adopted by the Dutch School for fresh and natural tints. For the first 12 years of his career he was able to de¬ velop along his own lines by having private buyers, and ever after that, it was by the in¬ heritances to which he succeeded, not by what he earned, that he was enabled to live. Some authorities regard him as the founder of the impressionist school which culminated at Bar- bizon. Among the finest of his works are (A View of Salisbury Cathedral5 ; (The Corn¬ field5 ; (The Lock5 ; and (The Valley Farm.5 Lately several good examples of Constable's art have been added to the Louvre, and the late Henry Marquand presented two fine pictures by him to the Metropolitan Museum of Art in New York. Consult Leslie, (Memoirs of Con¬ stable5 (1845) ; Wedmore, (Studies in English Art5 (1876-80) ; Brock- Arnold, (Gainsborough and Constable5 (1881) ; Chesneau, (La Peinture Anglaise5 (1882) ; Muther, (History of Modern Painting5 (1896)

; Holmes, C. J., (Constable and his Influence on Landscape Painting5 (New York 1903) ; and memoirs by Henderson, M. S. (1905), Tompkins (1907) and Bankart (1910).

CONSTABLE (Lat. comes stabuli, count of the stable = master of the horse). 1. A great noble under the later Roman Empire, and so down through the Middle Ages ; usually the commander-in-chief of the army; in France also of the navy, and the chief subject in the state, when Richelieu abolished the office in 1627. Napoleon revived the title but not the authority, and it lapsed with him. In England the lord high constable and the earl marshal held the courts-martial and courts of chivalry; but Henry VIII left the office unfilled, and it is only revived temporarily for great pageants. There were constables who were wardens of castles, and whose office is still existent, heredi¬ tary or appointive. 2. In England, a petty con¬ stable was the chief parish officer for keeping the peace, but is now mostly supplanted by the police. 3. In the United States, outside of cities and incorporated villages, the constable is still the chief conservator of the peace. The office was borrowed from England, and in colonial times was of high importance, includ¬ ing functions now assigned to various other officers. In New England he was appointed by the selectmen, in Virginia by the hundred, in other provinces or States chosen by the town. He not only made arrests, imprisoned, had right of search and executing processes, etc., but he was often tax collector, overseer of the roads, and even petty judge, and gave notice of town- meetings. There was no legally defined scope of his duties, each community deciding them for itself, but the place was always considered one of power and dignity. Philadelphia and New York had high constables, the latter up to about 1830, when his functions were given to the chief of police. The office of "constable of the commonwealth55 has also been created in some States. Consult Bacon, (New Abridge¬ ment of the Law5 ; Dalton, (The Country

Justice: Containing the Practice, Duty and Power of the Justices of the Peace. }

CONSTANCE (Ger. Constant, or Kon¬ stanz, ancient Constantly), Germany, city and lakeport in the state of Baden, occupying the only territory belonging to Germany on the south side of the Lake of Constance, at the place where that lake communicates with the arm known as the Untersee, (

27,591.

CONSTANCE, General Council of, the

16th ecumenical council of the Church, was held at Constance in Switzerland ; it was presided over by Pope John XXIII, in its opening ses¬ sion 5 Nov. 1414, and was dissolved in its 45th session 1418. It was called at the suggestion of the Emperor Sigismund for the purpose of dealing with the Hussite heresy; of considering measures for the general reform of the Church, and of restoring peace to the Church, which was troubled with schisms owing to the rivalry of three claimants of the papal throne. There was Balthasar Cossa, styled John XXIII : his title seemed to be sound in point of law, but the man was eminently unfit for the office ; then there was Petrus de Luna, styled Benedict XIII : he was a Spaniard, but was chosen by the French cardinals: his style, Benedict XIII, was formally disallowed when the Pope, Vin¬ cenzo Marco Orsini, who at first assumed the style of Benedict XIV (1724), afterward changed that to Benedict XIII ; and there was Angelo Corario, styled Gregory XII : both of these had been condemned as perjured men, heretics and schismatics, by the Council of Pisa, which Council (

Sigismund. The Council condemned the doc¬ trines of Huss and ordered him to be given up to the civil power, to be dealt with according to the laws: he perished at the stake. Jerome of Prague met with the same fate. Memorable among the acts of this Council is its decision of a question submitted to the fathers regard¬ ing the succession to the sovereignty of the margraviate of Brandenburg. The Council recognized the superior validity of the claim of Conrad of Hohenzollern ; from him is sprung the royal line of Prussia. The Council in the 12th session 29 May 1415 published a decree deposing John XXIII, who after a while form¬ ally resigned. In the 14th session Gregory XII (Corario) gave in his resignation. Petrus de Luna (Benedict XIII) refused to resign: but being no longer sustained by the king of Spain, he was simply ignored, and Cardinal Otto Colonna was elected Pope 11 Nov. 1417 under the style of Martin V. The schisms caused by the rival popes were ended. After a few re¬ formatory measures, quite inadequate for the needs of the situation, were enacted, the Council was

dissolved 22 April 1418. Consult Richten- thal, (Kronik des Konziliums in Konstanz) (Augsburg 1553; Tubingen 1882); Creighton, (A History of the Papacy during the Reforma¬ tion (London 1882) ; Wylie,*

CONSTANCE, Lake (anciently Lacus Brigantinus ; German Bodcn See), in central Europe, forming a common centre, in which Switzerland and the territories of Baden, Wiir- temberg, Bavaria and Austria meet. Length, northwest to southeast, 40 miles ; greatest breadth, about 10j/2 miles; area, 204 square miles; greatest depth, 827 feet; 1,309 feet above sea-level. At its northwest extremity the lake divides into two branches or arms, each about 14 miles in length ; the north arm is called the Uberlingen Lake after the town of t)ber- lingen, on its north bank; the south branch the Zellersee or Untersee. The Rhine enters the lake at Rheineck, at its southeast extremity, and leaves it at Stein, at its northwest termination. The lake, the waters of which are of a dark- green hue and very clear, are subject t> sudden risings, the causes of which are unknown. In 1770 it rose in one hour from 20 to 24 feet above the ordinary level. It freezes in severe winters only. It is frequented by numerous aquatic birds, and contains a great variety and abun¬ dance of fish, including salmon, salmon-trout, pike and carp. The traffic on it is considerable, although its navigation by sailing vessels is rendered dangerous by sudden and violent squalls. There are numerous remains of lake*

dwellings on its shores. Steamers ply on the lake between Constance and various points on its shores. The principal towns are Constance, Bregenz, Friedrichshafen, Lindau and Rors¬ chach. The land near is either flat or gently undulating, and fertile, and is covered with corn-fields, orchards and gardens, interspersed with ruined castles, and other remains of the Middle Ages, and with numerous towns and villages, producing altogether a very pleasing and striking effect.

CONSTANS, Flavius Julius, Roman em¬ peror : b. about 320 a.d. ; d. in Gaul 350 a.d. He was a son of Constantine the Great, and divided the empire after the death of his father with his brothers, Constantine II and Constantius II, receiving for his share Illyri- cum, Italy and Africa. Constantine, who in¬ vaded his provinces, having been slain in the battle of Aquileia, Constans became emperor of the whole West. He was weak, profligate and rapacious. His misrule caused an insur¬ rection in Gaul under Magnentius ; he fled to Spain, but was overtaken at the foot of the Pyrenees by the soldiers of the usurper, and slain. Constans protected the creed of Nice against the Arians and the Donatists, and closed the pagan temples.

CONSTANS, kon'stan', Jean Antoine Ernest, French statesman: b. Beziers, 3 May 1833; d. Paris 1913. He was a professor of law in 1876, when he was elected a deputy and affiliated with the Left Centre. He was Under¬ secretary of State in the Freycinet Cabinet in 1879, and was Minister of the Interior in the Freycinet and Ferry cabinets of 1880-81. After serving for one year as governor-general of Indo-China, he was compelled in 1888 to resign this position as incompatible with his duties as a deputy. From 1889 to 1892 he was again Minister of the Interior, and his vigorous measures served to overthrow Boulangerism. In 1897 he was elected to the Senate, and in the following year became Ambassador to Con¬ stantinople.

CONSTANT, k on's tan', Jean Joseph Benjamin, French portrait painter: b. Paris, 10 June 1845 ; d. there, 26 May 1902. He studied in the Lcole des Beaux-Arts at Toulouse and Paris, and under Cabanel. A journey to Morocco in 1872 strongly influenced his artistic development. He has exhibited with growing distinction, at successive salons, from that of 1860, with his v Hamlet, > his (Samson in 1872, his (Scenes from Algiers> in 1873-74, his great historical painting of (Mohammed II in 1453 J in the Exposition of 1878, and in 1885 a large Oriental subject, as melodramatic as possible, with splendid rendering of the human figure and strong effects of color. Other noted can¬ vases by him are (Le roi du desert* ; Le tigre favori* ; and portraits of Mrs. Walters; Madame Calve; Queen Victoria, exhibited in the Salon of 1901 ; Queen Alexandra ; and De Blowitz. A good example of his portraiture is*

CONSTANT DE REBECQUE, d?re bek', Henri Benjamin, French politician and author: b. Lausanne, Switzerland, 25 Oct. 1767; d. Paris, 8 Dec. 1830. His mother died at his birth and his father was an officer in the military service of Holland. He was brought up at Brussels at the home of Mme. de

Nassau; studied at Erlangen in Franconia, and later at

Oxford and Edinburgh where he met Mackin¬ tosh and became familiar with the government of the British Isles which he admired very much. Here he began his governmental studies in his paper (Essai historique sur les mceurs des temps heroiques de la Grece. His ill health and general dissatisfaction with life caused him to leave England. He returned to Switzerland in 1786, where he remained but a short time, leaving for Paris in the following year. Here at the salon de Suard he met Mme. de Charriere, a woman of great mental powers, 27 years older than himself, with whom he formed a liaison which lasted for almost 10 years. A wild affair took him to England for a brief visit. After his return he became chamberlain at the court of Charles William of Brunswick. Here he married Mile. Wilhelmine, Baroness of Chramm, a woman of little beauty but good intellect. His father became involved in politi¬ cal difficulties. The matter was finally settled satisfactorily with Benjamin's assistance and his father was not only exonerated but made a gen¬ eral. At this period Benjamin ventured on some new literary projects: (Account of Corsica and Memoirs of Paoli* (1768), (De la religion * ; he undertook a comparison of the customs of the Greeks with those of the Celts, Germans, Scotch and Scandinavians. After Brunswick's manifesto against France, he divorced his wife (1794) and returned to Lausanne. He now entered upon a period of political restlessness and personal entanglements which consumed his entire life. At Lausanne he met Mme. de Stael, for whom he conceived a violent passion, and followed her to Paris in 1795. In the republican circle of which she was the centre, he soon became an important figure. He was a staunch supporter of the Directory and of a moderate republicanism. The consistent factor in his political life was his desire to see France a well-governed state. In defense of this he published his first political pamphlet, (De la force du gouvernement,* in which he sought to induce all of the parties of the Directory to rally against the Counter-Revolution. This essay in¬ volved him in a duel with Bertin de Veaux, — one of a series of such encounters. In 1793 his title as a citizen had been contested on the ground of his Swiss birth, but his election as president of the canton of Luzarches and the reunion of Geneva and France in 1799 suppressed the ques¬ tion. About this time he formed the consti¬ tutional club of Salm, named after the hotel where it held its seances. It was formed to oppose the Royalist faction at the club of Clichy. In attempting to find a working middle ground, he joined forces with Barras and Tal¬ leyrand against Carnot and Barthelemy — a move which he regretted later. In 1799 he was made member of the Tribunate where he was attacked violently for his republican sentiments, which alienated the trust of Napoleon, and in 1802 he was finallv eliminated. Mme. de Stael was held accountable for his republicanism, and she was also banished. Constant followed her to Germany, where her salon again became re¬ nowned at Coppet. He spent much time also at Weimar, where he became steeped in the religious and literary opinions of Schiller, Wieland, Schlegel, Muller and Goethe. He re¬ turned to Coppet in 1805 ; contracted a short liaison with Mme. Lindsay and eventually be¬ came married secretly to Charlotte de Harden-

berg in 1808. At this time he produced a tragic poem, (Wallenstein, after the manner of Schiller's trilogy. At Hardenberg he lived for a time with his wife's parents, where he worked on his book on religion. Here he was influenced by the spiritual mysticism of Herder, Cremer, Schleiermacher and Heeren, and his sceptical philosophy was lost. His father died in 1812. Constant continued his studies and published several political pamphlets attacking imperialism. At Hanover, he received a visit from the crown prince of Sweden who con¬ ferred on him the Royal Star. After the ab¬ dication of Fontainebleau he returned to Paris and at the salon of Mine, de Stael once more became an ardent publicist in behalf of liberal principles and freedom of the press. A series of pamphlets set forth his views on these sub¬ jects. During the One Hundred Days his po¬ litical policy was decidedly weak. The return to Paris of Napoleon caused him to flee for a short time, but he soon returned, doubtless be¬ cause of his unrequited passion for the famous beauty, Mme. Recamier, and had an interview with Napoleon who appointed him a Coun¬ cillor of State. After Waterloo and the return of Louis XVIII he went to England, where he published (Adolphe, > the first psychological ro¬ mance. It is largely autobiographical. Mme. de Charriere and Mme. de Stael are the prototypes of the heroine. In 1816 he returned to Paris, where he founded two liberal journals in which he renewed his advocacy of freedom of the press and liberal constitutionalism. In 1819 he was re-elected to the Chamber of Deputies ; and again in 1824 and 1827. Although ill and crip¬ pled, he took part in the coronation of Louis Philippe, and on 27 August was made president of the Chamber*

of Deputies. His position was weakened by the acceptance of 200,000 francs from the king for the payment of his gambling debts which he had accrued when the death of Mme. de Stael in 1817 had caused him to withdraw almost entirely from society. In 1830 he was presented to the Royal Academy, but was rejected. Constant's egoism and his amours prevented his political ability from reaching its highest point. His greatest contribution to his party lay in his persistent fight for the freedom of the press. He was a poor debater, but the brilliant forcefulness of his philippics minimized that fault. His speeches are collected in (Dis- cours) (2 vols., 1828) ; his essays on govern¬ ment in

Rose Boochever,

Editorial Staff of The Americana.

CONSTANTIA, a district in the province of Cape of Good Hope, South Africa, on the

eastern and northeastern slopes of Table Moun¬ tain range, and distant from Cape Town seven miles. Constantia consists of only three estates, High, Great and Little Constantia, which have long been famed for the quality of the wines produced upon them. The wines are sweet wines of delicious aroma, both red and white. Consult Mrs. Trotter, (01d Cape Colony) (Lon¬ don 1903).

CONSTANTINE (kon'stan-tln) I, Pope. He was elected in 708 and died in 714. The principal events of his reign were the submis¬ sion of Felix, archbishop of Ravenna, to Rome; and Constantine's confirmation of the Quinisex- tan Council at Constantinople. There was also an anti-pope of this name, who usurped the holy office in 767.

CONSTANTINE I, Flavius Valerius Au¬ relius Constantinus, called the Great, Roman emperor b. Naissus, in Moesia (Serbia), 27 Feb. 274; d. Nicomedia, 22 May 337. He was the son of the Emperor Constantinus Chlorus, and after the death of his father was chosen emperor by the soldiery, in the year 306. Galerius was very unwilling to allow him the title of Augustus, and gave him that of Cesar only. Constantine, however, took possession of the countries which had been subject to his father, namely, Gaul, Spain and Britain. He overcame the Franks, who had formerly over¬ run the territory of Gaul, made prisoners of two of their leaders, followed them over the Rhine, surprised and defeated them. He then directed his arms against Maxentius, who had joined Maximian against him. In the campaign in Italy he saw, it is said, a flaming cross in the heavens, beneath the sun, bearing the in¬ scription, <(/n hoc signo vinces » (Under this sign thou shalt conquer). He accordingly caused a standard to be made in this form, which was called the labarum. Some days after this he vanquished the army of Maxentius, under the walls of Rome, and drove it into the Tiber. He then entered the city in triumph, set at liberty all whom Maxentius had unjustly imprisoned and pardoned all who had taken up arms against him. He was declared by the Senate chief, Augustus, and pontifex maximus. In the year 313, together with Licinius, he published the memorable edict of toleration in favor of the Christians. By this every one wat allowed to embrace the religion most agreeable to his own mode of thinking, and all the property was re¬ stored to the Christians that had been taken from them during the persecutions. They were also made eligible to public offices. This edict marks the period of the triumph of the cross and the downfall of paganism.

Constantine had married his daughter to Licinius; but the latter, jealous of his fame, conceived a mortal hatred against him, which he displayed by persecuting the Christians. Both emperors took up arms and met in Pan- nonia 314 a.d. Licinius was defeated, but the conqueror granted him peace. He, however, re¬ newed hostilities, was vanquished again, taken prisoner and put to death at Constantine's com¬ mand. Thus the latter became, in 325, the sole head of the Eastern and Western empires. His first and chief cares were the establishment of peace and order, and the propagation of his religion. Many beneficial decrees were pro¬ claimed by him. Among these were those which

abolished all the establishments of debauchery, ordered the children of the poor to be supported at his expense, gave permission to complain of his officers and promised that the Emperor would not only hear complaints, but compensate the complainants for injuries received, when they were proved to exist. He diminished the land-taxes and caused a new valuation of estates to be taken. The state treasury had always been enriched by the property of criminals ; but Con¬ stantine spared the property of their wives and ameliorated the condition of their children. Death in prison, he said, was a cruel punishment for the innocent, and an insufficient penalty for the guilty; he therefore ordered all trials of prisoners to take place at once. He forbade the use of unwholesome dungeons and oppressive chains. He gave leave to sick persons, widows and orphans to appeal from the local magis¬ trates, and refused this privilege to their adver¬ saries. It had been customary for the heirs of a person deceased to divide his slaves among them ; Constantine forbade the separation in these cases of husbands from their wives and of parents from their children. To the Chris¬ tians he gave permission not only to erect churches, but to be remunerated for the cost of them from his domains. Amidst all the cares of government and the occupations of war he found leisure to assemble the Council of Arles, to put an end to the schism of the Donatists. The ecumenical council held at Nice, in Bithynia 325 a.d., was attended by him in person.

On 26 Nov. 329 he laid the foundations of a new capital of the Empire, at Byzantium, upon the Bosporus, in Thrace. The city of Byzantium had been almost entirely destroyed by Severus ; it was

rebuilt by Constantine, enlarged and adorned with open squares, fountains, a circus and palaces, and called by his own name. Con¬ stantine divided the Empire into four parts, governed by four praetorian prefects. Toward the close of his life he favored the Arians, to which he was induced by Eusebius of Nico- media ; and he even banished many Roman Catholic bishops. In the year 337 he fell ill in the neighborhood of Nicomedia, was baptized, and died after a reign of 31 years.

Constantine committed a great political error in dividing his empire among his three sons, Constantine, Constantius and Constans. His zeal for Christianity appears to have been ex¬ cited not less by the knowledge that the religion which was embraced by a majority of the in¬ habitants of the Roman Empire must prevail, and that, of course, the strength of the govern¬ ment must be increased by protecting it, than by a wish to apply its consoling powers to the relief of a heavy conscience. He has been accused of inordinate ambition, excessive liberality and an Oriental fondness for parade. But he was brave at the head of his army, mild and indulgent in his intercourse with his subjects, the favorite of his people, the terror of his foes. He was fond of the sciences as well as of arms, and gave them his protection. He read much, and wrote nearly all his own letters. In Eusebius we find many proofs of his theological learning. Some of the martyrologists have counted him among the saints, and fix 20 May as his festival. The Greeks and Russians observe it upon the 21st of the same month. Among all the writers who have attempted to describe the character, influ¬ ence and policy of Constantine, Gibbon, from

the extent of his researches and the profound¬ ness of his views, appears to deserve the first place, though his impartiality is more than doubtful. Consult Eusebius, 'Vita ConstantinP ; Gibbon, ' Decline and Fall of the Roman Em¬ pire) ; Firth, 'Constantine the Great > (New York 1905) ; 'Cambridge Mediaeval History) (Vol. I, ib. 1911) ; Fletcher, 'Life of Constan¬ tine the Great) (1852).

CONSTANTINE II, Flavius Claudius Constantinus, Roman emperor : b. Arles, Gaul, 7 Aug. 312; d. near Aquileia, Italy, 340. He was the eldest son of Constantine I, and received as his share of the empire, on the death of his father, Gaul, Spain and Britain. Being de¬ sirous, however, of possessing himself of the territory of his brother Constans, he invaded the latter's dominions, but was defeated and killed.

CONSTANTINE III, a son of the Em¬ peror Heraclius: b. 3 May 612; d. 23 June 641. He reigned only a few months after his father's death.

CONSTANTINE IV, Flavius Constan¬ tinus, Emperor of the East ; surnamed Pogo- natus, or the Bearded : d. 685. He was son of Constans II, whom he succeeded in 668. His two brothers, Tiberius and Heraclius, shared the title of Augustus, but had little or no share in the government, and toward the close of his reign Constantine IV, under the influence .of suspicion, had them mutilated and put to death. Constantinople was unsuccessfully attacked by the Mussulmans in 672 and the six following years ; and it was during these wars that the famous "Greek fire® was invented. He was unable to repel the attacks of the Bulgars who crossed the Danube and settled in the country which they still inhabit (679) . Constantine con¬ voked and took part in the sixth general council held at Constantinople, at which the doctrine of the Monothelites was condemned.

CONSTANTINE V, Emperor of the East: b. Constantinople 719 ; d. near Selymbria, Thrace, 14 Sept. 775. He was surnamed Copronymus and succeeded his father, Leo the Isaurian, in 743. He sided with the Iconoclasts, who hurled down the images of the saints, and persecuted the followers of the Roman Catholic Church. The important result was that the Pope turned to Pepin, king of the Franks, for protection, and thus shifted the dependence of the popes from Constantinople. In spite of his religious persecutions, he was a splendid civic ruler, and did much to restore trade and commerce. He died in an expedition against the Bulgarians.

CONSTANTINE VI, Flavius Constan¬ tinus, Emperor of the East : b. 771 ; d. Con¬ stantinople about 797. He was son of Leo IV, whom he succeeded in 780. Being only 10 years old when his father died, his mother, Irene (q.v.), was his guardian and regent of the Empire. On arriving at a mature age he wished to assume the government himself ; but Irene, made cruel by ambition, had him im¬ prisoned. He escaped in 790, exiled his mother, recalled her, and finally, ruined by his licentious living, and despised by his subjects, Irene led a conspiracy against him. He was imprisoned and his eyes were put out by her order. With him the Isaurian dynasty died out. Consult Schlosser,

F. C., 'Geschicfite der bildersturmen-

,den Kaiser des ostromischen Reichs) (Frank¬ furt-am-Main 1812).

CONSTANTINE VII, Emperor of the East: b. 905; d. 15 Nov. 959. He was surnamed Porphyrogenitus (born in the purple), and succeeded Leo the Wise as sole ruler in 945. He was destitute of energy, and devoted him¬ self chiefly to study and the patronage of arts and letters. He admitted colleagues to the throne so that at least five emperors were reign¬ ing together. He was poisoned by his son Romanus in 959. Constantine VII left a treatise on state affairs, a geography of the empire and the (Life of the Emperor Basilius, the Macedonian. > Several important works, to which we are indebted for historical knowledge, undertaken at his instigation, were (Historical (Basilica, >

CONSTANTINE VIII, Emperor of the East : d. 1028. He was the son of Romanus II, succeeded John Zemisces, and was proclaimed emperor of the East, with his brother, Basil II, who held the principal authority till 1025, when he died. Constantine VIII was, after that, sole emperor.

CONSTANTINE IX, surnamed Mono¬ machos, was emperor from 1042-55. He owed his position to his marriage with Zoe, the widow of Romanus III, who became empress in 1041. His reign was occupied with rebellions both at home and abroad. He had to wage war against the Turks, the Normans, the Patzinaks and the Russians.

CONSTANTINE X, Ducas, emperor from 1059-67: b. 1007; d. 1067. He was the husband of Eudoxia. He succeeded Isaak Comnenus, whose friend and minister he had been. He was unsuccessful in repelling the attacks of the Normans in Italy and of the Turks and Mag¬ yars as well, and thus lost large portions of the kingdom. He besieged the Russians in 1043. A plague was more effectual in resisting the encroaching enemies.

CONSTANTINE XI, Palaeologus, Dra-

gatses or Dragoses, Emperor of the East: b. 1394; d. 29 May 1453. He was the son of Manuel II and the last of the Greek emperors, succeeding to the throne in 1448. His wife, Helena, was of the dynasty of Palaeologus. He took possession of Morea and of much of the Peloponnesus and defeated the Turks in many battles. In 1446 Murad II forced him to sur¬ render the Peloponnesus again. He was killed in bravely defending Constantinople against Mahomet II, who in 1453 besieged the city with 300,000 men. The heroic valor displayed by Constantine XI in this unequal contest de¬ mands our admiration ; but valor was of no avail, the city was taken by storm, and thus ended the Greek Empire. Consult Mijatovich, (Constantine, the Last Emperor of the Greeks) (London 1892).

CONSTANTINE, Nikolaevitch, Russian grand duke: b. Saint Petersburg, 21 Sept. 1827; d. there, 24 Jan. 1892. He was the second son

•

of the Emperor Nicholas of Russia, and brother of the Emperor Alexander II, grand duke and great admiral of Russia. In the war of 1854-56 he had the defenses of the Baltic entrusted to his care, in conjunction with Admiral Liitke ; but the policy of the emperor hardly allowed the prince any display of courage or ability. He supported his brother's liberal reform plans and worked earnestly for the enlightenment of Russia. He was made viceroy of Poland in 1862, but resigned next year. He was president of the council of state 1865-81, but being sus¬ pected of sympathizing with the revolutionary party was dismissed from office. When Alexan¬ der III became king, he removed his uncle from all of his important offices, and Constan¬ tine retired to the Crimea.

CONSTANTINE, Pavlovitch, Russian grand duke: b. Saint Petersburg, 8 May 1779; d. Vitebsk, 27 June 1831. He was the second son of the Emperor Paul of Russia, and with his brother Alexander was brought up under Catharine II. In the wars against France he distinguished himself by his personal bravery, though not by his capacity for command. He was the elder brother of Emperor

Nicholas, to whom he ceded the crown on the death of Emperor Alexander I, their brother. Constan¬ tine was afterward made viceroy of Poland, and ruled that unfortunate country with great severity. Poland revolted in 1830 and he was obliged to flee. He died of the cholera.

CONSTANTINE, Africa, town in the French territory of Algeria, capital of the de¬ partment of Constantine, on a rocky peninsula, 2,162 feet above the sea, 830 feet above the river Rummel, which washes it on two sides, and accessible only on one side. It is sur¬ rounded by walls, built by the Arabs chiefly with stones which the Romans had hewn and carved, and is entered by four handsome gates. The streets, though well paved, are narrow and dirty, and the houses are very indifferent. The only edifice deserving of particular notice is the palace of the bey, now the residence of the French governor. It is more remarkable for its internal decorations than for its external structure. Both within the town and in the vicinity Roman remains abound. It is the episcopal see of a Catholic bishop. The mod¬ ern or French portion has wide streets and open squares. Its principal buildings are the Palais de Justice, administration buildings, the Protestant church and a theatre. The French have here a college and the Mohammedans a seminary. The manufactures consist chiefly of woolen and linen goods and various articles in leather; the trade is in corn, linen and wax. It is connected by railroad with Philippeville, its port of entry, 47 miles distant, and with the largest towns in the territory. Constantine was built by the emperor whose name it bears, on the site of Cirta, the capital of the Numidian kings, which had fallen into decay. In 1837, after a long siege, the French took it by assault. Pop. 61,413.

CONSTANTINE, Arch of, one of the

noted triumphal arches of the world, erected by order of the Roman Senate to commemorate the victory gained by Constantine over Maxen- tius. It is situated between the Ccelian and Palatine Hills, and was built in 315. This monument of victory is well preserved, but

while it tells of the power of the Emperor Con¬ stantine, it also bears witness to the incom¬ petency of the Roman sculptors of the period in which it was built. The whole design was copied from the Arch of Trajan, even the reliefs were removed to the Arch of Constan¬ tine, and they illustrate the battles and victories of Trajan and not of Constantine. The parts copied or taken from Trajan are of superior design and workmanship, but the sculpture of the artists of the day, representing the deeds and victories of Constantine, are inferior in design and crude in workmanship. Four stately columns are on each face, one high and two lower entrances. The inscriptions proclaim the great deeds of the emperor. The arch was left standing in the Middle Ages probably be¬ cause it was built by a Christian emperor. Con¬ sult Platner, (Topography and Monuments of Ancient Rome1 (New York 1911) ; Frothing- ham, (The Mystery of the Arch of Constantine Unveiled) (in the Century Magazine for Jan¬ uary 1912) ; Frothingham, (Who Built the Arch of Constantine? (in American Journal of Archeology, 2d series, Vols. XVI, XVII,*

1912-13).

*CONSTANTINOPLE, Turkey («the city of Constantine**), called Istambol by the Turks (corrupted into Stamboul) , from the Greek eis ten polin, to the city; in official Turkish always ˆConstantinieh** : capital of the Ottoman Empire, situated at the junction of the Bosporus and the Sea of Marmora, in lat. 40° O' 16″ N., long. 28° 59′ 14″ E. It is practically an ag¬ glomeration of three towns, Stamboul, Galata- Pera and Skutari, besides a number of suburbs scattered for a distance of 12 miles along both sides of the Bosporus. The two first-named are on the European shore, divided by the Golden Horn, an inlet of the Bosporus about 500 yards wide and nearly six miles long.*

Stamboul, or Constantinople proper, occupies the site of ancient Byzantium, built, like ancient Rome, on seven hills. The peninsula on which the city stands has the form almost of a triangle or, more correctly, of a trapezium, sur¬ rounded on all sides by water excepting the west, with a total waterfront of some 12 miles in extent. The eastern side projects into the Bosporus; the western forms a lofty double wall of five miles in length, stretching across the promontory from the Sea of Marmora to the Golden Horn ; on the opposite side of the latter, also occupying the extremity of a promontory, sometimes called the Peninsula of Pera, are the extensive suburbs of Galata, Pera, Top

Haneh and TCassim Pasha. Galata (for¬ merly Sykae = fig-trees) received its name from the Gauls who formed a settlement there. It is now the district where the banks, shipping agencies, stock exchange and offices of the rep¬ resentatives of European firms are established. Pera, adjoining Galata, is situated on the heights immediately above it, and is called the European or (

*sheds and workshops. Directly above is the Naval Hospital. Opposite Kassim Pasha, on the Stamboul side, lies Phanar, a grimy suburb, inhabited mainly by Greeks. It is the seat of the patriarch and contains the Greek Cathedral of Saint George. Just beyond lies Balata, noted for its filthy condition, almost exclusively in¬ habited by Jews; the better class Jews live at Haskeui, on a hill opposite Balata, with a large percentage of Armenians. Farther up, on the opposite shore again, lies the village of Ayub (Eyoub), exclusively inhabited by Moslems; no Christians are allowed to hold property here. The spot is deeply revered by the faithful on account of the mosque built by Mohammed II, the Conqueror, in which each succeeding sultan is girded with the sword ot Othman at the coronation ceremony. The adjoining burial ground contains the mausoleums and graves of numerous high personages. Skutari, properly <(Uskiidar,** over the Bosporus, stands on the site of ancient Chrysopolis ; population, about 50,000. Its main objects of interest are the British and Turkish cemeteries and the con¬ vent of Howling Dervishes. The British Cem¬ etery is the finest in Constantinople, and is situated at the Marmora end of Skutari, near Haidar Pasha. In it are buried many British soldiers who died during the Crimean War; one part was reserved for the interment of Brit¬ ish residents. Adjoining the cemetery is the Skutari Hospital, once the scene of the devoted labors of Miss Florence Nightingale (q.v.) and her staff of British nurses. The Turkish Cem¬ etery is the largest in Constantinople — a vast city of the dead — a wilderness of tombs — thickly planted with the funereal cypress. On a submerged rock off Skutari is the square lighthouse known as Leander's Tower, a name given to it by the Crusaders, though it has no connection with the legendary hero of that name. The Turks call it Kiz Kuleh, or the Maiden's Tower. It was first built as a mauso¬ leum in 340 b.c., subsequently became a wooden lighthouse and was gradually replaced by a mas¬ sive stone tower 90 feet hight. Skutari has sev¬ eral theological colleges, schools, baths and a large Turkish printing-press, founded 1723. Hai¬ dar Pasha and Kadikeui, farther south, face the Sea of Marmora; the former is the terminal of the Constantinople and Angora Railway and a favorite Moslem picnic resort; the latter, standing on the site of ancient Chalcedon, is largely a European residential district, having all-day steamer communication with Galata. The other suburbs on the Asiatic side of the Bosporus above Skutari are, next, Ivuzgunjik, a Jewish village where the Chief Rabbi re¬ sides; Beylerbey, exclusively Turkish, with a fine mosque and a white marble palace ; the latter formerly contained the private menagerie of Abdul Aziz; Chengel Keui, a village; Ku- lehli, or Kuleh Bagtchch (Garden Tower), where some 25 years ago Roman and Byzantine tombs, columns and marbles were unearthed ; Vani Keui, founded 1665 ; Kandili, on the site of ancient Perirrhous; Anadoli Hissar (q.v.); Kanlija (bloody village), so named from the color of the rocks; Chibukli, where Saint Mar- cellus founded the monastery of the Order of Vigilants in 420 a.d. ; Pasha Bagtcheh, notable for its fine mosque built in 1763; lastly, Beikos, the largest village on the Bosporus, with exten¬ sive vineyards and a palace built by Mehemet Ali*

Pasha of Egypt. Crossing over to the Euro¬ pean shore again and starting from Galata up the Bosporus, the following suburbs and places of interest included with Constantinople are Top Haneh (cannon building, i.e., gun fQundry) ; Kaba Tash; Beshik Tash (((cradle-stone"), the tomb of Ghazi Khaireddin, <(the terror of the Christians" ; Orta Keui a large village the ancient Saint Phocas, containing great market- gardens, the Yeni Valideh Mosque, and resi¬ dences of state ministers ; near by is the im¬ perial residence, Yildiz Kiosk (q.v.) ; Kuru Chesmeh, a dirty village inhabited by Armeni¬ ans and Jews, formerly the residence of Wal- lachian Hospodars; Arnaut Keui (q.v.), the Byzantine Michaelion; Bebek (q.v.), where the famous Robert College (q.v.) is situated; Ru- meli Hissar (q.v.), the ((Citadel of Europe"; Balta Liman, where the treaties of 1838, 1841 and 1849, relating to the Danubian tributary states, were signed; Boyaji Keui, a village; Emirghian, site of the ancient Kyparodis, famous for its cypress grove, mosque, marble fountain, college, summer residences and pal¬ aces; Stenia (q.v.); Yeni Keui, containing ambassadorial summer residences and magnifi¬ cent villas of wealthy Levantines ; Therapia (q.v.), the famous health resort; and Buyuk- dereh (((Great Valley"), also a summer resort for the wealthy, situated 11 miles from Galata.

Constantinople is far from being a beautiful city, yet its natural position and picturesque appearance combine to make it one of the most gorgeous sights in the world — at a distance, which in this case truly <(lends enchantment to the view." No other city can claim to be sit¬ uated on two continents, Europe and Asia ; and certainly none has a more thrilling and ro¬ mantic history. Poets, artists and authors have endeavored in song, color and prose to depict the vision of Constantinople from the deck of a vessel on a fine summer's morning. It re¬ sembles rather some enchanted city of the (Arabian Nights than a real town of stone, bricks and mortar. The seven low-lying hills covered with buildings of all descriptions down to the water's edge, painted in more colors than the rainbow can boast of, with white kiosks, marble palaces, cypress trees, minarets and cupolas piercing the heavens, with a background of soft blue Oriental sky and a foreground of the Sea of Marmora, in the limpid waters of which the town is reflected as in a mirror; the Golden Horn, crowded with shipping and bright with the flags of all nations ; innumerable caiques (rowing and sailing boats) and steam launches bearing gaily-attired civilians and uni¬ formed officials ; the multitude of different languages and jargons that greet the ear, mark¬ ing the dividing line between the poetic East and the prosaic West: all these make up a rare confusion of form, color and sound, land, sky and water, that create a lasting and in¬ describable impression on the mind. Gibbon was fascinated by the scene, <(formed by Nature for the centre and capital of a great monarchy"; Aubrey de Vere wrote that <(the view of Con¬ stantinople from the sea is the most splendid of all the pageants presented to the human eye by the metropolitan cities of the earth." More recently Dr. Edwin A. Grosvenor wrote, (*

poetry . the queen city of the earth, seated

upon a throne." He also calls attention to the remarkable fact that the same great parallel which encircles the globe between 40° 20′ and 41° 50′ in north latitude includes Constanti¬ nople, Rome, Madrid, New York and Chicago.

But the scene changes suddenly and painfully when the traveler steps ashore and proceeds to stumble along the narrow, dirty, wretchedly- paved alleys which do duty for streets, and climbs the rocky staircase leading from Galata to Pera. Until 1910 he had to pick his way cautiously among and over the countless mangy, half-starved pariah dogs which infested the town and lived on street garbage. These have since been captured by gypsies, conveyed in caiques to the isle of Oxia in the Sea of Mar¬ mora and left to devour each other. Noisy, vociferating hamals or porters shuffle along the streets staggering under heavy loads and shouting (

Population. — In the absence of any re¬ liable official statistics the population of Con¬ stantinople is estimated at between 1,000,000 and 1,200,000, about half being Mohammedans and the rest Orthodox Greeks, Armenians, Jews, Europeans, Africans and Asiatics.

The climate is healthy on the whole but extremely variable, and unsuited for those suffering from pulmonary affections. The best time for visiting Constantinople is in April, May, September and October, before and after the hot season.

Walls. — Constantinople was formerly walled on all sides ; very little now remains of the walls on the seaward sides, but those on the land side are still in a fair state of preservation and extend across the peninsula from Ayub to Yedi Kuleh (Seven Towers) on the Sea of Marmora, from which begin the Walls of Theodosius (354 miles), a double line with a moat 64 feet wide and a breastwork 58 feet thick running between them. The moat is now divided into market garden plots. The inner wall is 36 feet high and was flanked by 116 towers, of which about 90, in a dilapidated condition, still re¬ main. The outer wall is 31 feet high and 13 feet thick, and was flanked with 78 towers, most of which are still there. Fourteen gates led through the walls, seven being formerly used for military purposes. Of the Seven Towers, the Byzantine citadel, three were de¬ stroyed by earthquake in 1758. The place also served as a state prison. The main gates are the Golden Gate, Yedi Kuleh Kapu., Yeni Kapu (New Gate), Silivri Kapu, Mevlevi Hanch Kapu, Top Kapu (Cannon Gate), Eghri Kapu (Crooked Gate) and Edirneh Kapu (Adrianople Gate). Near the Golden Gate is the grave of Ahmed Kiupruli Pasha, who was hanged on his return from the capture of Candia after a 24 years' siege. Each of the gates is rich in historical associations, inscriptions and archi¬ tectural embellishment. An excellent account of these is given in the Constantinople guide book of D. Coufopoulos (London 1895). Be¬ yond Tekfur Sarai stand the Wall of Leo the

BIRD'S EYE VIEW OF CONSTANTINOPLE

CONSTANTINOPLE

Photographs by G. Berggren, Constantinople

1 Mosque of Aya Sofia — Saint Sofia, the ancient Christian " Church of the Divine Wisdom " founded 532; dedicated 53? I Interior

Armenian (813 a.d.) and the Wall of Heraclius (62 7 a.d.) .

Mosques and Churches. — There are 379 mosques scattered over Constantinople and environs, all of them more or less distinguished by grandeur and beauty ; but the most remark¬ able are the royal mosques, of which there are about 15, among the finest in the world. Of these the largest and most splendid is the Suleimanieh, situated on the northeast side of the city, and standing in the midst of a large square, surrounded inside by an arcade upon pillars of granite and marble. Next to it in extent, but of much older date, is the famous mosque of Saint Sophia (((Ayiah Sofia"), near the east extremity of the city, the pattern of almost every mosque in the land ; its walls and domes, of which last it has 20 of equal dimensions, springing from the same level, and sustained by 12 huge columns, are encrusted with mosaics, forming various figures and de¬ vices. The court or open square in which it stands is paved with marble and shaded by fine plane-trees. It was restored by Italian and English architects in the 19th century by order of the sultan, and the layer of plaster removed by which the superb mosaics and frescoes that decorate its wralls were covered. The mosque of Yeni Djami, known also as that of the Sultana Valideh, was built by the mother of Mohammed IV, and is esteemed one of the most magnificent in the capital. It is con¬ structed of white marble and has two peculiarly elegant minarets, encircled by three galleries of richly perforated workmanship. The principal dome rests upon four lesser ones, which appear to lift it to the clouds. The celebrated mosque of Sultan Ahmed is noted for its vastness and its enormous columns, 75 feet in circumference. The minarets are of great beauty and ascend to an immense height. The mosque of Sultan Bayazid contains the finest courtyard in the city. A vast number of pigeons haunt its pre¬ cincts. Rustem Pasha mosque is remarkable for its tile work. The church of Saint Irene is now used as a museum of ancient arms. Among its relics are the swords of Mohammed II and Skander Bey and an armlet of Tamer¬ lane. The Mehemet Pasha mosque is supposed to be the ancient church of Saint Anastasia Pharmakolytria, of the 5th century. All the other mosques are much less in size than those described, but very much resemble them in plan and other features. All of them are encircled by splendid columns of marble, Egyp¬ tian granite or serpentine, and have massive and highly ornamented gateways and porches, and handsome courts and cisterns for ablution. The church of the Fountain of Life and the Blachernse Church are Byzantine edifices still belonging to the Greeks.

Monuments, etc. — Among other historic monuments of Constantinople are the magnifi¬ cent tombs of the sultans Selim II, Mahmud II, Suleiman the Great and Mohammed II ; the obelisk of Theodosius, the Serpent Column, the Colossus in the Hippodrome, the Porphyry or Burnt Column, Marcian's Column, the Column of Theodosius II in the Seraglio and the Column of Arcadius ; the Philoxenos and the Basilica water cisterns; the China Pavilion; the Hippodrome ("At-Maidan" = Race Course), originally laid out by Septimius Sever us on the model of the Circus Maximus in Rome, 1,300

feet long and 600 feet wide; the aqueduct of Valens; the fountain of Sultan Ahmed; and the fire towers of Galata and Stamboul. The Imperial Museum of Antiquities contains a mag¬ nificent collection of treasures; of minor im¬ portance is the Museum of Ancient Costumes.

Palaces. — Besides the smaller palaces al¬ ready mentioned, there are the Old Seraglio, the Dolma Bagtcheh and Yildiz Kiosk. The first of these, situated on the promontory named Seraglio Point, at the junction of the Bosporus and the Sea of Marmora, was for centuries the residence of the

Byzantine emperors and Turk¬ ish sultans. It now contains the Treasury, the Imperial College of Medicine, the Mint, an art school and the Museum of Antiquities. The beautiful Dolma Bagtcheh Palace (q.v.) lies on the Bosporus, while Yildiz Kiosk, the resi¬ dence of the sultan, is a collection of palaces and other buildings. (See Yildiz Kiosk and Harem). The Cheragan Palace, also on the Bosporus, was destroyed by fire in 1910. It was built by Abdul Aziz, and here he committed suicide in 1876.

Bridges, Bazaars, etc. — Two iron pontoon bridges span the Golden Horn and connect Galata with Stamboul. They have each a draw to allow the passage of vessels. The bazaars are numerous ; some are covered, others open. The covered bazaars have a somewhat mean appearance, resembling a row of booths at a fair, but the arrangement and manner of ex¬ posing the gay and glittering wares is suffi¬ ciently attractive. The principal or Great Bazaar consists of long avenues covered over with lofty arches of brick, lighted by apertures in the roof and branching off in different direc¬ tions. The ceilings of the vaults, and various parts of the walls, are ornamented with painted flowers and devices. On each side of the passage are counters and stalls, with a wide passage between them, and on each counter sits the merchant, generally smoking his pipe or chibouk, with his crossed legs drawn under him. The bazaars, both the open and covered, are severally allotted to particular trades and mer¬ chandise ; they are generally so crowded that it is difficult to pass through them. The numerous public baths in the city are mostly of marble, of plain exterior, but handsome and commodious within, with every accommodation and appli¬ ance requisite. They are divided into a number of circular rooms, lighted from above, and suffi¬ ciently spacious to admit a number of bathers at the same time. There are a vast number of coffee-houses and lodging-houses, called khans, dispersed throughout the city. The latter re¬ semble immense stone barracks or closed squares. They are intended for the use of strangers during their temporary sojourn in the city, who may have an apartment here, with command of the key. Considerable modern im¬ provements have been made in the commercial section of the city. Electric cars and telephones have been introduced. French and German waterworks companies provide water from res¬ ervoirs in the forest of Belgrade.

Industry. — The few manufactures of Con¬ stantinople are chiefiv confined to articles in morocco leather, saddlery, tobacco-pipes, fez caps, arms, perfumes, gold and silver em¬ broideries. etc. ; but its foreign commerce is considerable. The Golden Horn is deep, cop- modious, well sheltered and capable of contain-

ing 1,200 large ships, which may load and unload alongside the quays. It is usually crowded with vessels and light boats, and presents a lively, bustling scene. Among the imports are corn, iron, timber, tallow and furs from the Black Sea and Russia ; cotton stuffs and yarn, woolens, silks, watches, furniture, jewelry, coffee, sugar, pepper and spices, spirits, etc. The exports consist of silks, carpets, hides, wool, goats' hair, madder, valonia, etc. In 1914 a tonnage ot nearly 12,000,000 entered and cleared the port in 14,761 vessels.

History. — The city was founded, according to tradition, by a band of settlers from Megara under the leadership of Byzas, in 658 b.c., and received the name of Byzantium. It was in turn attacked by the Thracians, Bithynians, and even the Gauls ; it was repeatedly invested by the Persians, who, during the campaign of Darius against the Scythians, compelled the town to surrender to Otanes, one of Darius's generals, and subsequently burnt it. After the battle of Plataea (479 b.c.) the Lacedaemonians under Pausanias took Byzantium from the Persians, and refounded the colony. Seven years later the town was captured by the Athenians ; within 30 years it revolted and returned to its former allegiance. It was again besieged and taken by Alcibiades in 408 b.c. The Athenians remained in possession for three years when they lost the town again to the Spartans under Lysander. A few years later Xenophon with his 10,000 passed through it on their march from Persia. In 390 b.c. it was once more brought under the sway of Athens. Philip of Macedon laid siege to the city in 340 b.c., but the Athenians, roused by the fiery eloquence of Demosthenes against the Macedonian conqueror, came to the rescue. After repelling Philip of Macedon, Byzantium had to submit, some years later, to Alexander, who passed it on to his successors. On the death of Lysimachus the city regained — and maintained — its independence for a century, until the mighty

power of Rome invaded the region of Thrace and the Hellespont.

In return for the assistance it rendered to the Romans in their wars with Macedon and Antiochus, the Senate conferred on Byzantium the status of a <(free and confederate city®; it lost these privileges under the Emperor Ves¬ pasian, and became an ordinary provincial town in a.d. 73. In the struggle between Septimius Severus and Pescennius Niger for the Roman Empire, Byzantium espoused the cause of the latter, but was captured by Severus after a three years' siege, and reduced to ashes. A few years later, however, he rebuilt the city, and embellished it with porticoes, magnificent public baths and a hippodrome. During the civil wars which followed the abdication of Diocletian, the city fortifications were restored, and afforded refuge to Licinius after his defeat by Constantine at Adrianople in a.d. 323. Con¬ stantine then advanced on Byzantium, and, by means of constructing ramparts and towers as high as those of the city, finally succeeded in taking it.

The name ˆByzantium® now disappears, and ˆConstantinople® takes its place. The city is also called ((Roma Nova,® or <(New Rome,® for it is raised to the dignity of capital of the Roman Empire, thanks to its geographical posi¬ tion, which alone is responsible for its vicissi¬

tudes and chequered fortunes. A new political centre was required for the reunited Empire ; frequent wars with Persia, revolts of Asiatic nations, incursions of Scythians, troubles at Rome and a host of other considerations de¬ manded that the capital should be transferred further eastward. Christianity was established, the city was dedicated to the Virgin Mary, and the foundations of Saint Sophia were laid. The old capital was plundered of its art treasures to decorate the new, and a 40 days' festival inaugurated the second founding of the city. Immigration was encouraged, schools were built, liberal laws enacted and a bishop, after¬ ward raised to the rank of patriarch, was ap¬ pointed. Historic Church Councils were held on the Bosporus — in 337 a.d., against the Arian heresy; in 359, when 150 orthodox bishops added to the Nicene Creed; in 553; in 681, when Pope Agatho presided ; and again in 870, to condemn the iconoclasts, and when the Emperor Basil attended.

But Constantinople was not destined to tread the path of peace and Christianity. The decline had set in ; the fall was at hand, and a new star had risen in the East — Islam. The city had been attacked by the Huns in 450; again by the Huns and Slavs in 553, and by the Persians in 626. The Saracen conqueror, Moawiyah, besieged the walls for seven years, and finally abandoned the enterprise. A second invasion by the Saracens under Moslemah was repulsed in 718, and toward the end of the 8th century the hero of the <(Arabian Nights,® the redoubtable Calif Harun al Rashid, planted his standard on the heights of Skutari, but was drawn off by concessions. During the 9th and 10th centuries Constantinople was assailed by six invasions — from Bulgaria, from Hungary, and four times from Russia.

In 1096 the Crusaders, under Godfrey de Bouillon, passed on their way to Jerusalem. The fourth crusade turned aside from their holy purpose, and decided to take Constanti¬ nople, with the aid of the Venetian Republic. The plan succeeded, and Baldwin, Count of Flanders, the valiant leader of the Norman knights, was elected to the throne. This new dominion lasted 58 years, during which time a large European army held the city. The Latin rule collapsed when the Crusaders evacuated Palestine, and the Greek Empire was restored, with the assistance of the Republic of Genoa. In return for their aid the Genoese were granted exclusive rights in Galata, which they promptly surrounded with walls, behind which they claimed independence, and defied the emperor. A state of civil war ensued within the city, which was kept up till the final con¬ quest by the Turks. Sultan Bayazid determined to obtain possession of Constantinople in 1396. He commenced this task, but had to leave it suddenly to defend his own territories against Tamerlane. Bayazid was defeated in that en¬ counter, and taken prisoner, in 1402. Twenty years later, his grandson, Murad II, after delivering his country from the Mogul yoke, led his victorious army to the gates of Con¬ stantinople. The reigning emperor, John Palceologus, yielded to his demands, and pur¬ chased an alliance by a heavy annual tribute. Murad II was a true Moslem, and kept his engagements religiously. For the 30 years of his subsequent reign Constantinople was in-

sured against Turkish aggression. His son, Mohammed II, abrogated the treaty, and built a fort (((Cut-Throat Castleˆ) on the European side of the Bosporus, which remains to this day. In 1453 Mohammed arrived with 60,000 horse and 20,000 foot. The city could only muster 7,000 defenders. After a desperate struggle of 40 days, the city was captured, and Saint Sophia was converted from a Christian church into a Mohammedan moscpie. The dust had claimed the Byzantine, the Roman and the Greek Empires, and the sword of Othman has' held the city on the Bosporus against all comers for over four centuries and a half.

The more important historic events which have taken place in Constantinople since then may be briefly summarized. Peace was con¬ cluded there between Turkey on the one side and Venice, Spain and the Pope on the other, in 1540; another peace treaty between Turkey and Russia in 1700; and an abortive alliance between Prussia and Turkey against the am¬ bitions of Russia and Austria. In 1821 a massacre of Greeks took place, in which the Greek Patriarch was hanged. The rising of the Janissaries and their complete annihilation oc¬ curred in 1826. In the same year 6,000 houses and many palaces were destroyed, whilst other serious conflagrations, as well as earthquakes, worked their havoc upon the city in 1714, 1755, 1808, 1883, 1890, 1893, 1894, 1908 and 1910. The most disastrous fire for a century broke out 31 May 1918 and in two days covered 2j4 miles of old Stamboul, destroying over 5,000 houses, 20 baths, a dozen bazaars and as many mosques. Over 200,000 were left homeless.

It was in Constantinople, too, that the alli¬ ance between Great Britain, France and Turkey against Russia was concluded — a few weeks before the Crimean War broke out. In the winter of 1876-77 the Great Powers held a futile conference here with a view to settling the Eastern Question, but could not prevent the Russo-Turkish war which followed. In Febru¬ ary 1878 the Russian army reached almost to the gates of the city, and forced the Treaty of San Stefano upon the Porte, while British war¬ ships lay at hand to prevent the capture of Constantinople. In 1909 Sultan Abdul Hamid II was deposed, and Shevket Pasha entered the city at the head of the Macedonian army and the new regime was announced. During the Balkan Wars of 1912-13 the Balkan Allies almost reached the walls of the city, and again in 1915 the French and British attempted to capture Constantinople by forcing the Darden- elles. See War, European.

Bibliography. — Guide books of Baedeker, Macmillan and Murray; Amicis, E. de, (Con- stantinople) (Philadelphia 1896) ; Barker, B. G., (Cambridge, Mass., 1917) ; Dwight, H. G., 'Constantinople, Old and New' (London 1915) ; Dwight, H. O., 'Constantinople and Its Prob¬ lems > (New York 1901) ; Elliott, F., 'Diary of an Idle Woman in Constantinople) (London 1893) ; Essad, Djelal, 'Constantinople de By- zanz a StambuP (Paris 1910) ; Hutton, W. H., < Constantinople5 (London 1909) ; Pears, Sir E., 'Fortv Years in Constantinople) (London 1915; New York 1916) ; Ramsay, Sir W. M., 'The Revolution in Constantinople and Turkey' (London 1909) ; Spry, W. J. J., 'Life on the

Bosphorus : Turkey Past and Present' (London 1895) ; Van Milligen, A., 'Constantinople' (Lon¬ don 1906). See also Turkey.

Henri F. Klein,

Editorial Staff of The Americana.

CONSTANTINOPLE, General Councils

of. The most important of these ecclesiastical councils were: the First, attended by 150 East¬ ern bishops, and held in 381 is reckoned as the second ecumenical council of the Church, the first being that of Nicsea in Bithynia, 325. Its president was at first Miletius, patriarch of Antioch, and after him Gregory of Nazianzus, then archbishop of Constantinople. The council, comprising only Eastern bishops, was not reputed ecumenical till after the Western Church had approved its decrees by express or tacit consent. The council defined the creed of the Church as opposed to the heresy of Arius and kindred heresies growing out of it, among them the heresy of Macedonius who denied the godhead of the Holy Spirit ; hence to the creed called of Nicaea this council added the clause, "and in the Holy Spirit, the Lord and life-giver who proceedeth from the Father, who with the Father and the Son is together worshipped and glorified, who spake by the prophets.ˆ Not till a later date was

added "and the Son}) (in Latin filioque) to declare the procession of the Spirit from the Son also. The Second Council of Constantinople — the fifth ecumenical — was held in 553, with 165 bishops, all Eastern. The heresies it condemned had relation to the heresy of Nestorius, who held that there were in Christ two persons, a human and a divine. This council, at first regarded as Oriental, was later accepted as ecumenical. Vigilius, the Pope, refused to attend, and was excommunicated. The council was accepted by the emperor, and was generally received in the East, but was repudiated in the West. A schism resulted which lasted until the synod of Aquileia about 700. The Third General Council of Constan¬ tinople, held in 680, was presided over by legates of the bishop of Rome, Pope Agatho. The errors it condemned were those of the Monothelites (q.v.). It anathematized all Mon¬ othelites living or dead, especially Sergius and his successors, the former Pope Honorius and Macarius, the patriarch of Antioch. The banned sect fled to Syria where they formed the sect of the Maronites. It was the Sixth ecu¬ menical council. The Quinisext Synod (692) was regarded as supplementary to the fifth and sixth ecumenical councils. Its work was legis¬ lative and its decisions were set forth in 102 canons. The synods of 754 and 815 set forth decrees against image worship. The Fourth General Council of Constantinople (the eighth ecumenical), held in 860, was convoked for the purpose of ending the schism then separating the Eastern from the Western Church. This council decreed the deposition of Photius, the usurping patriarch of Constantinople, and the restoration of Ignatius the rightful patriarch ; but both this decree and the measures proposed by the council for reconciling the Eastern with the Western churches were repudiated by the Greek Church; and the schism grew wider and has continued, with an interval of communion now and again till the present time. Consult Mansi (Vol. Ill, pp. 521-599; Vol. IX, pp. 24- 106, pp. 109-922; Vol. XII, pp. 575 seq. ; XIII,

pp. 210 scq; XIV, pp. Ill seq., 787 seq. ; XV, pp. 143-476; XVI, pp. 1-500; XVII, pp. 66-186,

365-530).

CONSTANTINOPLE, Strait of. See

Bosporus.

ˆCONSTANTIUS I, Flavius ~ Valerius,

Roman emperor, surnamed Chlorus : b. about 250; d. York, England, 25 July 306. He was nephew of the Emperor Claudius II, became Caesar in 292, received Britain, Gaul and Spain as his government, and after re-establishing Roman power in Britain and defeating the Alemanni, became one of the Augusti in 305. He was distinguished for his intrepidity as a soldier and his breadth of humanity as a ruler. Constantine the Great, his son, was his suc¬ cessor.

CONSTANTIUS II, Flavius Julius: b.

Illyricum 317; d. 361. He was the second son of Constantine the Great and Fausta, was em¬ peror of Rome from 337 to 361, reigned first in the East, and waged a protracted war against the Persians, which prevented him from par¬ ticipating in the struggles of his brothers Con¬ stantine II and Constans in the West. After the fall of both he marched in 350 against Magnentius and Vetranio, who had usurped the purple. Vetranio submitted; Magnentius was finally crushed and committed suicide. Con- stantius now reigned over the whole empire. In 354, having returned to the East, he put to death his cousin Gallus, whom he had left there at the head of the army. He chose his cousin Julian as Caesar, and sent him to Gaul, where he successfully fought against the Alemanni and Franks. In 360 Julian was proclaimed emperor by the army at Paris. Constantius marched against him, but died on the way in Cilicia. Julian was his successor. Consult The Cam¬ bridge Mediaeval History (Vol. 1, New York*

1911).

CONSTANTS OF NATURE, a term ap¬ plied to various unchangeable quantities that are found to be characteristic of natural phe¬ nomena or relations. The propagation of light through space takes

place invariably at the rate of 186,770 miles per second, and hence the velocity of light may be referred to as a con¬ stant of nature. In choosing the units of pre¬ cise measurement, which form the basis of all calculations in pure and applied science, it is necessary in certain cases to employ the con¬ stant quantities of nature. The constants of nature characterize natural phenomena and enter into all the mathematical laws of science. Consult Lupton, Everett, (C. G. S. System of Units) (London 1902) ; Landolt and Bornstein, (Physikalisch-chemische Tabellen (4th ed., Berlin 1912) ; Clarke, (The Constants of Nature) (5 parts, Smithsonian Miscellaneous Collections, Washington 1873-88).*

CONSTELLATION, a famous United States vessel built in 1798, as one of the frigates ordered by the government for service against the Barbary pirates. It was commanded by Commodore Truxton and did service in cap¬ turing the French warship L'Insurgente, 1799, and won a brilliant victory over the French frigate La Vengeance (1800). During the en¬ tire War of 1812 the Constellation was block¬ aded at Norfolk. In 1815 she was part of Decatur's fleet in the Mediterranean, and was

one of the squadron which captured the Moroc¬ can vessel Mashouda after a conflict. Consult Maclay, (History of the American Navy) (Vol. I, 1900).

*CONSTELLATIONS (Lat. con, (star**). From the earliest times men have formed certain groups of bright stars into constellations. Thus the names of the 12 zodiacal constellations are prehistoric. The same is true of many of those clustering about the north pole of the heavens. Quite a number bear the names of members of the Argonautic expedition, or of persons who were in some way connected with it, which deter¬ mines the age of their formation approximately. The earliest description of the constellations of which we have any record is by Eudoxus, who lived about 360 b.c. This work is lost, but a poetic paraphrase of it by Aratus, who lived about 100 years later, is still extant. This work mentions 45 constellations. The earliest star catalogue which has survived to modern times is the (Syntaxis\ that is, (Compendium. } This is usually known as the (Almagest which means ((The Greatest, ® of Ptolemy. His ob¬ servations were made between 121 and 151 a.d. The catalogue contains 1,028 stars divided among 48 constellations. This completes the ancient classification, and no permanent addi¬ tions were made to it until 1602, when one con¬ stellation was added by Tycho Brahe. The next year appeared Bayer's (Uranometria,* a series of star-maps containing 1,709 stars and 12 new southern constellations. These maps were decorated by a series of drawings made by Diirer, whose outlines have until recently served to ornament the constellations as rep¬ resented on certain maps and stellar globes. These were the first star-maps published, al¬ though stellar globes were introduced in the middle of the previous century by Mercator.*

Before Bayer's time it was customary to describe the position of a star by its location in the animal or figure represented by the con¬ stellation. Thus Aldebaran was the bright star in the eye of the bull. From this it would appear that the ancients had manuscript maps with figures drawn upon them, but none of these maps have come down to our time. Bayer introduced the important innovation of letter¬ ing the various stars with the letters of the Greek and Roman alphabets, a separate set of letters being used for each constellation, thereby greatly simplifying the designation of any par¬ ticular star. Strangely enough he did not letter his 12 new southern constellations, so that these stars still had to be designated by the cumbrous methods of the ancients. In Flam¬ steed's catalogue, issued early in the 18th cen¬ tury, the stars are numbered in the order of their right ascension, and both letters and num¬ bers are still in general use. From the earliest times some of the brightest stars have received special names, such as Sirius, Arcturus, etc. Although these are still in common use, there is a tendency among astronomers to substitute Bayer's nomenclature in their place.

Following Bayer a number of new constel¬ lations were introduced by various astronomers, notably Hevelius, Lacaille and Royer. Many constellations were proposed which have failed to meet with universal acceptance, and the num¬ ber which is now generally adopted by astron-

omers is 67. There is no definite agreement as to their exact outlines. Indeed, such an agree¬ ment would be impossible unless the boundaries followed definite circles of the celestial sphere. All stars

brighter than the 9.5 magnitude are now designated by their numbers in certain large modern catalogues. Fainter stars are lo¬ cated by their right ascension and declination at certain dates. These quantities correspond to terrestrial longitude and latitude.

The shapes of the constellations are entirely matters of accident, and in only a few instances are the brighter stars contained in them ar¬ ranged in such a manner as to bear any resem¬ blance to the object for which the constellation is named. The exceptions to this rule are the Scorpion, the Southern Cross, the Northern and Southern Crowns and the Southern Triangle. On the other hand, certain characteristic forms are obvious in the heavens which bear no rela¬ tion to the name of the constellation in which they occur. The Great Dipper in Ursa Major, known in England as Charles' Wain (or Wagon), the Y in Bootes, the Sickle in Leo and the Cross in Cygnus are well-known exam¬ ples. Good modern star-atlases have been published by Schurig and by Upton. For the most complete work in English on the early history of the constellations and the origin of the names of the stars, consult Allen, R. H., (Star Names and Their Meanings) (1899).

William H. Pickering, Astronomical Observatory , Harvard.

CONSTIPATION, a condition in which the normal number of evacuations from the intestinal canal does not take place, or one in which the faeces are extremely hard and painful in passing. Constipation affects all ages, being prevalent in childhood, youth, adult life and old age. It can for the most part be regulated by proper hygienic living, but by reason of extreme carelessness in this regard is very prevalent.

The symptoms of constipation vary consider¬ ably. In infants there is always pain ; the child cries, especially on attempts to defecate; there is usually much colic; there may be fever. In adult life the symptoms are fairly well marked. There is the time element, which is known ; there is pain on passage, due to hardness of the fseces ; and there may be feelings of bloat¬ ing, coated tongue, headache or backache, all of which are characteristic of this condition. In fact the symptoms which are described very widely in patent-medicine circulars as due to disease of the kidney, brain, lost manhood and vague menstrual irregularities are the usual symptoms of ordinary constipation, and the patent-medicine business succeeds largely be¬ cause it ascribes to this extremely common malady names of very much more dangerous illnesses. Practically most patent medicines are hardly more than cathartics.

The causes of constipation are in the main two, — lack of water in the intestines and lack of muscular tone of the unstriped muscle of the intestinal walls. Lack of water may result from insufficient drinking of water. It may also result from increased elimination of water, as in excessive sweating. It may also be the result of diminished secretions of the normal juices of the intestines,— the gastric juice, the bile from the liver and the pancreatic and intestinal juices.

These are all essential in adding lluid to the intestinal canal. Insufficient muscular power in the intestines may be due to a number of causes. Lack of tone of the body in general, resulting from insufficient exercise and insufficient food, is one of the most important. Bad dressing is a second cause for this loss of muscular tone. It may be a symptom of a nervous disorder such as is very frequently found in paraplegia, in locomotor ataxia and other grave spinal dis¬ orders, in which case the motor paralysis is more or less permanent. Lack of muscular power may also be the result of taking fluid diet; thus the intestine has less of the proper type of stimulus and the muscular power is not invoked. A frequent cause of constipation is tea-drinking. The most frequent cause of con¬ stipation is unconscious hate. This causes too much tension in the muscles of the lower bowel with the retention of the faeces.

The treatment of constipation is self-evident if one takes into consideration the two under¬ lying causes and remedies them. The drinking of water, outdoor exercise, sunlight, the eating of food that has plenty of residue, such as bread, spinach, lettuce, cabbage, celery, etc. ; these are very helpful. The first absolute neces¬ sity, however, in the treatment of constipation is to establish a habit of regular daily move¬ ment. In order to do this it is essential that a time should be taken which is ordinarily not interfered with, and the individual should con¬ sider a certain 15 minutes of the day to be sacredly devoted to this duty. So far as drugs are concerned in the treatment of constipation, they are best left alone ; but if it becomes ab¬ solutely necessary that a drug should be used, it is a cardinal principle to remember that alternation of drugs is advisable. The same drug used day in,

day out, and week after week, tends to diminish the power of the intestine and habituate it to a given drug. This results in some frightful cases of constipation. In a few cases of constipation in which the cause is due to some obstruction, as some solid body situated near the intestinal canal and pressing upon it, surgical treatment is imperative. The use of external massage is largely useless. The normal stimulus to muscular action comes from within — it is largely of unconscious nerve origin. It does not come from without. Con¬ stant use of enemas for constipation is a form of intestinal masturbation and leads to serious forms of neuroses and psychoneuroses, even to psychoses — or insanities, in later life. Hence the best type of treatment for most chronic constipations is mental. See Cathartic.

CONSTITUENT ASSEMBLY, a name given to the first convention of the delegates of the French nation (1787-91) to distinguish it from the Legislative Assembly of 1791. It drew up and obtained the acceptance of. the first of the famous revolutionary constitutions. The Constituent Assembly of 1848 had a similar aim. See Assembly, General; France, His¬ tory.

CONSTITUTION, the fundamental law of a state, whether it be a written instrument of a certain date, as that of the United States of America, or an aggregate of laws and usages which have been formed in the course of ages, like the English Constitution. Its primitive meaning is that of any law given force by

proclamation and put into effect by the power of the supreme head of the government or nation.

I. Constitutions, according to their origin or their fundamental principle, may be divided into three classes: (1) Those established by the sovereign power; (2) those formed by contracts between nations and certain individuals whom they accept as sovereigns on condition of their complying with the terms of the contract ; (3) those formed by a compact between differ¬ ent sovereign powers.

1. The first class may be again divided into:

(a) constitutions established by a free sovereign people for their own regulation, of which sort is the Constitution of the United States ; and

(b) such as have been, in some instances, granted by the plenary power of absolute monarchs to their subjects, and which in theory are the voluntary gift of the beneficence of the ruler. These are called by the French constitu¬ tions , octroyees, from octroycr, to grant.

2. The second great class of constitutions mentioned above includes such as have been formed by a contract between the future ruler and the people. These are mutually binding on each party as long as the other fulfils his duty. Such, in a great degree, is the British Consti¬ tution.

3. Some constitutions are compacts between several sovereign powers. Such was the Consti¬ tution of the German Empire and that of the United Provinces of Holland, and such is also the Swiss Confederation. The Constitution of the United States, though the different States call themselves sovereign, proceeded, in point of fact, from the people of the United States collectively, as is apparent from the very begin¬ ning of the instrument: <(We, the people of the United States,® and not (

II. In regard to political principles, consti¬ tutions are: (1) Democratic, when the funda¬ mental law guarantees to every citizen equal rights, protection and participation, direct or indirect, in the government, such as the Consti¬ tution of the United States and those of some cantons of Switzerland; (2) aristocratic, when the constitution establishes privileged classes, as the nobility and clergy, and entrusts the govern¬ ment entirely to them, or allows them a very disproportionate share in it ; such a constitution as that of Venice, and such as, at one time, those of some Swiss cantons, for instance, Bern; (3) of a mixed character, to this latter division

belonging some monarchical constitutions, which recognize the existence of a king whose power is modified by other branches of government of a more or less popular cast. The British Constitution belongs to this last division.

III. The forms of government, established by the various constitutions, afford a ground of division important in some respects; and, lastly,

IV. The principle on which a constitution establishes the representation, or the way in which the people participate in the government, furnishes an important means of classification : (1) Some allow the people to partake in the government without representation, as was the case in many of the small states of ancient Greece, and also in the ancient Roman republic, and is still the case in several of the small Swiss cantons, in which the whole people assem¬ ble and legislate ; it being obvious that such a constitution can operate only where the number of citizens is very small, and even then will be almost always objectionable; (2) some are of a representative character ; that is, all the citi¬ zens do not take an immediate part in the government, but act by their representatives ; constitutions of this sort, either establishing a general and equal representation, as those of the United States ; or connecting the right of rep¬ resentation with particular estates and corpora¬ tions. The term representative constitution is frequently applied exclusively to the former by way of eminence.

V. Representative constitutions may be di¬ vided into: (1) Such as are founded on the union of the feudal estates, the clergy, nobility, citizens and peasantry, the two latter of which derive their right of representation from the charters of the ancient corporations; (2) such as establish the right of a general representa¬ tion, like the American Constitution, and such as partake of both characters, like the British Constitution. Those of the first class either originated in feudal times or have been since copied from such as did. The feudal states were conglomerates of many heterogeneous bodies ; and it was reserved for later ages to unfold the true principles of government, to separate the essential from the unessential and injurious, to give stability, distinctness and ex¬ tent to principles before unsettled, indefinite and limited in their operation. See articles on the different countries of the world for informa¬ tion respecting their various constitutions.

CONSTITUTION, Framing of the.

When the resistance to British rule in America began, independence was not its aim, and pro¬ visional governments only were established in the several colonies, temporarily to take the place of the English colonial governments, which had been suppressed. The several colo¬ nies jointly instituted the Continental Congress for the purpose of prosecuting the war. This Congress in June 1776 appointed a committee to frame an instrument of government. This was entitled the (Articles of Confederation and Perpetual Union) (see Confederation, Ar¬ ticles of). It was not until 1 March 1781 that all of the States had finally signed it. Its de¬ fects were so numerous and serious that for a time it looked as if the Union would go to pieces. Several amendments were proposed and failed of adoption, chiefly because the approval of all States was necessary for an amendment.

CONSTITUTION

By 1786 everything pointed to a speedy dis¬ solution of the Union as it existed under the Articles of Confederation, when aid came from an unexpected quarter and quite by accident. This was the Annapolis Convention (q.v.), called to settle commercial disputes between Virginia and Maryland. The friends of efficient government dominated the convention ; it had no authority but to regulate trade, but reported that nothing could be done under such a gov¬ ernment, and recommended calling a fresh convention to amend it — 'the changes of course to be consented to by all the States. Congress issued the call for 14 May at Philadelphia ; but a quorum (seven States, a majority) was not secured until the 25th. George Washington was appointed president; by 2 June four more States had come in, and on 23 July the New Hamp¬ shire delegation arrived. All were thus finally represented but Rhode Island, which was un¬ alterably opposed to the scheme, and was the last to ratify the Constitution.

Three prime obstacles lay in the path of the convention : the small States' fear of the large, the one-crop States' fear of the national taxing power (and general tenacity of hold on the port dues by those which had ports) and the slave-trading States' determination not to have the business summarily stopped. The first, if not compromised, would have prevented any union at all, as the three <(large States,® Massa¬ chusetts, Pennsylvania and Virginia — New York then counting as a <(small State® — were scattered through the line ; commercial interests quite possibly might have created three con¬ federacies, the New England, Middle and Southern ; the slavery question would have created two, from New York to Delaware and from Maryland south. The first was assuaged by equal representation in the Senate ; the second by the prohibition of taxing exports, with some other safeguards ; the third by per¬ mitting the slave-trade for 20 years. These were three primary concessions which secured the votes of enough States to overlook the irregularity of the convention's title to create a new government, and join the Union under it; and without them there would have been no Union then, and most probably none now.

The first was by far the most difficult of all. The second and third could be and were cured by one or two single provisions, not difficult to draft nor very difficult to agree on; the first involved the very basic structure of the government, and cost a long struggle, great ingenuity and much doubt about ratification. The situation was this : The convention as¬ sumed as a basis of debate that the 11 States represented the following populations : Vir¬ ginia, 420,000 (including three-fifths of the slaves, as with all the five Southern States) ; Massachusetts, 360,000 ; Pennsylvania, 360,000 ; New York, 238,000; Maryland, 218,000; Con¬ necticut, 202,000; North Carolina, 200,000; South Carolina, 150,000; New Jersey, 138,000; Georgia, 90,000; Delaware, 37,000. New Hamp¬ shire with 102,000 came late, and Rhode Island with 58,000 held aloof altogether. The three largest States were regularly reinforced by the three southernmost, who were next to or mixed with huge and powerful Indian confederacies against which they would like to turn the entire national force, and therefore favored a strong government ; this gave a pretty constant large

State vote of six for a ˆnational® system, where the weight should be in proportion to size, and a small State vote of five for a federative one, like the Confederation, where each State had one vote. This further involved that the latter should be a one-chamber system, since two houses each representing sovereign States equally would be an absurd duplication. These two irreconcilable propositions were embodied in what were called the ˆVirginia® and the (< Jersey® plans.

The former, presented by Edmund Randolph 29 May, was intended to obliterate the States as bodies from the government almost entirely. It was, in substance, that the Congress should have two branches, membership in both propor¬ tioned to population, but the lower ones chosen directly by the people, the upper by the lower out of nominations by the State legislatures, the executive by both houses jointly; that Congress should have a veto on the State laws, and the President with a part of the judiciary a veto on those of Congress ; that Congress might coerce delinquent States, and should legislate on all matters where State action would cause discord in the Union (that is, commerce and taxation) ; that new States might be admitted; that all the obligations of the Confederation should be assumed, that members of State governments should take oath to support the national govern¬ ment and that the new Constitution should be ratified by popular conventions instead of the State legislatures. A plan of Pinckney of South Carolina was in the same line. The committee of the whole, after debate and amendment, reported the amended bill favorably 13 June. The amendments had cut out the power of coercing the States, taken the veto from the judiciary and restricted it to the

executive; made the executive's term seven years and not renewable, the senators' seven and the repre¬ sentatives' three; had the State legislatures choose the senators ; and styled the new system a (

Hamilton attempted to forward a plan by which the Senate was to be chosen for life by electors chosen by popular vote, the executive chosen for life by electors chosen by popular vote and the State governors to be appointed by the national government, with an absolute veto on the acts of the legislature. It found no sup¬ porters.

The first problem was to settle the basis of

power between the States. Under Randolph's plan, the Senate would have had 28 members, of which the three "large States® would have had 13; and the House 65, of which they would have had 26 — two-fifths of the latter and about half the former. Obviously they would be able, by a bargain with one or two of the smallest States, to choose the President and dictate the entire operations of the government. On the other hand, Paterson's plan was practically the Confederation plus more wind and paper de¬ crees. The deadlock was absolute. John Dick¬ inson of Philadelphia suggested consolidating the two plans, which was like consolidating a democracy and an autocracy. But on 21 June William Samuel Johnson of Connecticut pro¬ posed the "Connecticut plan,® the one finally adopted, making the States equal in the Senate and proportional in the House. His colleague, Ellsworth, supported him; but Ihe vote on it showed a tie, five large to five small States, and Georgia's delegation divided. The question was referred to a committee of one from each State, which reported a compromise to win over the large States by restricting the power of origi¬ nating money bills to the House, which they would control, and secure the slave States by counting in three-fifths of the slaves as a basis of representation. With the addition of the power to the Senate to propose amendments to money bills, the compromise passed after a hot debate. The two New York delegates left the convention in wrath.

Another point which had to be compromised was the power of Congress over commerce. As matters stood, not only could each State lay any duties it pleased, so long as it did not vio¬ late treaties already made or take national prop¬ erty, and therefore fill the Union with pro¬ hibitive barriers, but a State like New York could ruin its neighbor, New Jersey, and deal a crushing blow at western Connecticut, whose port it was. Further, several States were not agriculturally diversified, but had one great crop of tobacco, or rice, or naval stores — a severe tax on which would bankrupt the entire State. The first of these difficulties was met at the out¬ set by the conditional power given to Congress to regulate commerce between the States ; the second was acknowledged by the insertion of the prohibition to tax exports, as said. A "com¬ mittee of detail® reported a draft Constitution 6 August. It had 23 articles (finally boiled down to seven) ; the President was to have one term of seven years, and be chosen by Congress; there was no Vice-President, and the Senate chose a president for itself. This was debated till 12 September, and amended to its present form. The slave-trading States were given their solatium in the shape of permission to con¬ tinue the trade for 20 years, and the entire slave group were placated by the fugitive-slave pro¬ vision ; the Vice-President and the electoral sys¬ tem were added, and a restriction of Congres¬ sional control of commerce to a two-thirds vote stricken out. On 12 September a committee of five was appointed to revise its form, and the actual work was mainly done by Gouverneur Morris (q.v.). The next day it was reported back, after a few changes — the chief requiring only a two-thirds instead of a three-fourths vote to pass a bill over a President's veto — and accepted. A new convention to consider amend¬ ments proposed by the States was voted down ;

they must take or leave it as it stood. Of the 55 delegates present, only 39 signed. On 17 September the convention adjourned. The Con¬ stitution and the resolutions of the convention were transmitted to Congress, which on 28 September ordered them sent to the State legislatures for action. (For the amendments, and the consequent difficulties about ratifica¬ tion, see Constitutional Amendments, His¬ tory of). Only three States — New Jersey, Delaware and Georgia — ratified it unanimously; Connecticut, Pennsylvania, Maryland and South Carolina, by heavy majorities; Massachusetts, New Hampshire, New York (see Federalist, The) and Virginia by light ones, after a bitter and protracted

struggle; North Carolina re¬ fused to ratify without many amendments and a bill of rights, and Rhode Island refused altogether till it was carried without her and she would have been shut out. There was great dissatisfaction, and only the commercial classes were heartily in its favor: John Adams said afterward that the Constitution was "extorted from the grinding necessity of a reluctant people.® See United States — Ar¬ ticles of . Confederation ; United States — Federal Convention of 1787.

CONSTITUTION, Immutability of the.

The Constitution of the United States is the product of a few great minds assembled in a brief convention. A great statesman (Glad¬ stone) has termed it "the most wonderful work ever struck off at a given time by the brain and purpose of man.® This characteriza¬ tion has been accepted by all thinking men. There have been, indeed, cavils at some pro¬ visions, and speculative suggestions of altera¬ tions and improvements by individual minds ; but the universal wonder is that the framers of the Constitution did so well ; and that wonder was never so great as now at the close of a stormy century, littered with the wrecks of governments and nations and dynasties and constitutions.

The "given time® ! The work was great, the difficulties many — • most men then deemed them insuperable — and the work and its diffi¬ culties have had commentators and historians for 70 years or more ; but will there be a single reader of this article who has noted how short a time it took to frame the Constitution? Has there been a single commentator or his¬ torian who has adequately shown how exceed¬ ingly brief the "given time® was? Less than a hundred working days measured it.

Moreover, the framers had had no means of previous personal communication by telegraph and almost none by mail ; there were no stenog¬ raphers or typewriters ; there was, indeed, no clerical assistance ; for the proceedings of the convention were secret and the clerical work was done by great men. When we see recent conventions with modern facilities for rapid work spending months in putting a few patches on existing State constitutions, we can best appreciate the ability of the men who in 85 working days forged the great compact of the people of the United States with themselves — • a compact which has lasted more than a century substantially unchanged, which survived the storm of the greatest civil war of the modern world, which has expanded with an unforeseen and unprecedented expansion of inhabited ter-

ritory from a narrow strip upon the Atlantic seaboard to the shores of the Pacific, and which, notwithstanding changed conditions of life and thought, has grown steadily in the power of moral obligation and become more and more truly the (

As the time was brief, so were the framers few. The convention was composed of 55 members; the Constitution was signed by 39, including Washington; 51 members took part in the debates (according to the most complete report we have of them, the Journal of Madi¬ son), again including Washington. It is gen¬ erally assumed that he took no part in the debates; but Professor Fiske has said in words which cannot be too often brought before the American citizen :

It was suggested that palliatives and half measures would be far more likely to find favor with the people than any thorough-going reform, when Washington suddenly interposed with a brief but immortal speech, which ought to be blazoned in letters of gold and posted on the wall of every American assembly that shall meet to nominate a candidate or declare a policy or pass a law, so long as the weakness of the human nature shall endure. Rising from his President's chair, his tall figure drawn up to its full height, he exclaimed in tones unwontedly solemn with sup¬ pressed emotion: "It is too probable that no plan we pro¬ pose will be adopted. Perhaps another dreadful conflict is to be sustained. If, to please the people, we offer what we ourselves disapprove, how can we afterward defend our work? Let us raise a standard to which the wise and the honest can repair; the event is in the hand of God."

Some of the 55 took no real part in framing the Constitution, and some were obstructionists. Their objections may have exercised a whole¬ some influence on the convention, but added much to the

cares and perplexities of the greater men who assumed the responsibility and did the work. But whether we take the 39 members who signed the Constitution, or the 51 who took part in the debates, or the 55 who composed the convention, the number seems perilously small to be entrusted with the titanic task of founding for all time a great and growing and intensely active nation. Edmund Randolph, speaking of the time when the Articles of Confederation were framed, apologetically called it ((the then infancy of the science of constitutions and of confederacies.® He might have said the same of the moment at which he was addressing the convention. Very little did the world then know of the science of constitutions or con¬ federacies ! He well summed up the new and added difficulties which confronted the conven¬ tion, and which it must meet and overcome :

The inefficiency of requisitions was unknown [to the framers of the Confederation] — no commercial discord had arisen among any States — no rebellion had appeared, as in Massachusetts — foreign debts had not become urgent — the havoc of the paper money had not been foreseen — treaties had not been violated; and perhaps nothing better cpuld be obtained, from the jealousy of the States with regard to their sovereignty.

There were other difficulties which Ran¬ dolph, like a tactful statesman, left unnoticed. At one end of the line of financial troubles Rhode Island stood intent on her great scheme of making fiat paper money the equivalent of gold and silver by imprisoning the citizen who charged more for a commodity in the one kind of money than in the other. At the other end of the line stood New York, with the greatest custom-house of the country, her chief source of revenue, which she would be called upon to surrender to the new Federal government as a part of the price she must pay for coming within

the sovereignty of the Constitution. Virginia owned a vast territory which she must cede that it might become the public lands of the United States. Even in the greatness and authority of the men who composed the convention there were dangers and impediments. Three of the greatest proposed things would have de¬ feated the great work: Franklin, the wisest member of the convention, proposed that the legislative power be vested in a single house, which would have been substantially the House of Representatives; Hamilton, the brilliant genius of the convention, advocated a govern¬ ment of which the President and the senators should hold office during good behavior, that is, for life; Madison, the most sagacious statesman in the convention, would have cast the respon¬ sibility of legislation on the judiciary by lodg¬ ing a veto power in the Supreme Court. Any one of these provisions would have wrecked the Constitution before it was adopted; and any one of them, if it had been adopted, would have given us a government essentially different from that which we possess.

There is still another extraordinary fact connected with the framing of the Constitution which has received little if any attention, and substantially no comment. In the order of philosophical research the first subject of in¬ vestigation would be the means or process by which the framers worked. A true philosopher, contemplating the clearness and conciseness of the Constitution, the masterly handling of the chief elements of the future government, the wonderful adaptation of insufficient means to a glorious end, would instantly exclaim, ((Such a work is not born of the human mind com¬ pleted ! What was the secret process by which these great inventors attained their grand re¬ sult®? And the philosopher would find, as he suspected, that even as the Constitution stands alone in the records of constructive statesman¬ ship, so do the means and methods by which the convention did its work. It speaks badly for the century that none of the lesser conventions which have assembled frequently to experiment with State constitutions has done its work in the same way. In a word, there is nothing which equals the Constitution ; there is nothing which approaches the patient, painstaking workman¬ ship of the great convention.

At the beginning, propositions for considera¬ tion and discussion were tentatively placed be¬ fore the convention in an abstract form. These propositions were embodied in 15 resolutions, which were immediately referred to the Com¬ mittee of the Whole. They were taken up one by one, and considered and discussed and amended or rejected or adopted or postponed for later consideration. The abstract of a part of a single day's proceedings will give a clear idea of the way in which the convention worked :

Tuesday, June 5. Mr. Randolph's ninth proposition — The national judiciary to be chosen by the national legislature — Disagreed to — To hold office during good behavior and to receive a fixed

compensation — Agreed to — To have jurisdiction over offenses at sea , captures, cases of foreigners and citizens of different States , of national revenue, impeachment of national officers, and questions of national peace and harmony — Postponed.

At the end of two weeks of such considera-

tion and discussion (13 June), the Committee of the Whole reported the conclusions which had so far been reached in the form of 19 resolu¬ tions. But everything was still abstract and tentative. No line of the Constitution had yet been written ; no provision had yet been agreed upon. The 19 resolutions in like manner were taken up, one by one, and in like manner con¬ sidered and discussed and amended or rejected or adopted or postponed. Other propositions coming from other sources were also consid¬ ered; and so the work went on until 26 July, when the conclusions of the 'convention were referred to the Committee of Detail, and the work of reducing the abstract to the concrete began. The convention then adjourned to 6 August, to enable the committee to ((prepare and report the Constitution.®

On 6 August the Committee of Detail re¬ ported and furnished every member with a printed copy of the proposed Constitution. Again the work of consideration began, and went on as before, section by section, line by line. Vexed questions were referred to special committees, — composed of one member from each State, — amendments were offered, changes were made, the Committee on Detail incor¬ porated additional matters in their draught, until, on 8 September, the work of construc¬ tion stopped. But not even then did the labors of the convention cease. On that day a com¬ mittee was appointed, (ffiy ballot, to revise the style of, and arrange, the articles which had been agreed to.® This committee was after¬ ward known as the Committee of Style. It reported on 12 September, and the work of revision again went on until Saturday, the 15th. On Monday, the 17th, the end was reached, and the members of the convention signed the Constitution. Well might Franklin exclaim in his farewell words to the convention : <(It astonishes me, sir, to find the system approach¬ ing so near to perfection as it does !® He had been overruled more than once in the conven¬ tion; provisions which he had proposed had been rejected; provisions which he had opposed had been retained ; but he was a great man and saw that a great work had been accomplished.

This article should treat of the Constitu¬ tional changes of the century. But the extraor¬ dinary fact is that from the framers' point of view there has been, with one trivial exception, absolutely no change in the Constitution of the United States. ((Are there not 15 amendments,® it wall be asked, and (

The w'ork of the great convention was the making of a government; and the government which the framers made has remained abso¬ lutely unchanged. Madison, who was a wˆary as well as sagacious statesman, carried the first 10 amendments through the first Congress at the first session to assuage public excitement and strengthen the new government and close*

the mouths of those who railed against it. He introduced into the 10th amendment a rule of construction which would not have been adopted by the convention, a clause which politically has made much mischief during these 100 years, but which under the necessities of judicial construction has amounted to nothing, namely, that powers not delegated or prohibited by the Constitution (

The Eleventh Amendment was caused by the extreme ground taken by the early Supreme Court in Chisholm v. Georgia, 2 Dali. 419, and the incipient rebellion of that State. Its purpose wras to overrule that decision and to exempt a State from suit by a citizen. If Marshall had been upon the bench the decision would never have been made; and, singularly, it was overruled by the same court a hundred years afterward (Hans v. Louisiana, 134

U. S. 1). The Thirteenth, Fourteenth and fifteenth Amendments grew out of the Civil War. They

abolished slavery ; they impose restraints upon State governments ; they confer on some persons constitutional rights ; they guarantee certain rights, privileges and im¬ munities to citizens and persons; and they con¬ tain some provisions relating to representation in Congress. Much litigation has been caused by them ; some statutes have been held constitu¬ tional and some unconstitutional ; a larger pro¬ portion of representation has fallen to the South¬ ern States; the guaranty given to all citizens of the right to vote without regard to ((race, color or previous condition of servitude® is not abso¬ lutely effective, and the government of the United States moves on precisely as it did before.

It has been said herein that from the point of view of the framers of the Constitution their work has been changed in only one trifling par¬ ticular. That change relates to election of the President, and was effected by the Twelfth Amendment. Under the Constitution as it orig¬ inally stood each elector voted for two persons for President. He who should have the great¬ est number of votes would become President ; he who might come next would be Vice-Presi¬ dent. Under this provision, Mr. Lincoln, in 1861, would have become President, and Mr. Seward Vice-President. That is to say, the Re¬ publican electors, following the direction of their party, as expressed by the national conven¬ tion, would have cast all their votes for Mr. Lincoln, and all but one for Mr. Seward. The purpose of the framers was a wise one: to se¬ cure for the country the two strongest states¬ men of the party constituting for the time be¬ ing the majority of the people, to fill the offices of President and Vice-President. No better plan could have been devised for obtaining a strong executive. We see a weak and modified application of the principle in national conven¬ tions when the defeated ((wing of the party® is placated by being allowed to designate the candidate for Vice-President. But in 1801 there had been a tie, whereby the electors had failed to elect, and the election had gone into the House. If it had not been for that mishap, the Twelfth Amendment would not now exist; and if the original system had survived until the time of rapid communication by railroad and telegraph and better party organization, it is safe to say that it would now be in unquestioned operation. Political conventions would long ago have adopted its leading principle, and the struggle would have been as to which of the two strongest candidates should be first or second upon the ticket. The system would have given greater dignity to the office of Vice- President, and would have brought the possible importance of that office always before the eyes of the citizen. But whether we think well or ill of the original method, one thing is certain, that the only change made by the Twelfth Amend¬ ment is a trivial one of administrative detail. After all the changes this country has passed through in the last hundred years — changes in civilization, of territory, of population, of ideas, education and public convictions, and individual life — changes such as the world has never wit¬ nessed in one country or in one century, the only change made in the Constitution has been the paltry one of having the electoral vote cast in one form instead of in another,

The unwritten amendment of the Consti¬ tution, as it has been called, also relates to the selection of the President. It is said by some of the commentators, and indeed it is now gen¬ erally believed, that the electoral colleges were intended to be deliberative bodies.® In one sense this is true — in the legal sense. The electors are not ministerial or administrative officers ; they do not perform a specific work in a way determined by higher official authority ; in legal contemplation the responsibility of their action rests upon themselves. But the framers of the Constitution never supposed that the electors would disregard the political pledges upon which they were chosen, or that the American people, either directly or through their State legislatures, would blindly choose electors to evolve a President out of their inner consciousness. On the contrary, they contem¬ plated the successful candidates receiving the votes of <(a majority of the whole number of electors,® and they required the electors to vote ((in their respective States,® and to vote on the same day. If they had framed a provision re¬ quiring all of the electors to convene at the seat of the government in one body, and there in their own way and time proceed to choose a President, there would be good reason for saying that actual deliberation was intended ; but they did not give to the electors one single power or attribute by virtue of which they could deliberate.

That very thing was attempted and the at¬ tempt failed. The question before the conven¬ tion was, in effect : (

The idea that it was ever intended that the electors should nominate the candidate for whom they themselves should vote is a myth which has been unthinkingly reiterated by most eminent writers, but which does not rest upon a single fact. Nothing perplexed the conven¬ tion more than the subject of the executive. Plan after plan was weighed and found want¬ ing. The electoral system was late in coming to the front, and was the solvent of many difficulties. Hamilton early foresaw the inev¬

itable, and proposed that Hhe selection be made by electors chosen by the people.® Madison, later, said that the option before the conven¬ tion <(lay between an appointment by electors chosen by the people and an immediate appoint¬ ment by the people® ; and he at the same time said that (

of intent is even more conclusive. He who sup¬ poses that the framers intended that 13 different bodies should convene in 13 dif¬ ferent places at one time for one object and for one day, and that object the selection of the executive of a nation, confesses a most superficial knowledge of the greatest construc¬ tive statesmen of their century and of the great work which they deliberately planned and built.

And what better could the framers of the Constitution have done? Wilson, who proposed (

It has been a fashion of late to speak of the electoral system as curious machinery which may give rise to serious complications ; but viewed amid the difficulties and conditions and limitations of 1787, there is no stroke of prac¬ tical statesmanship in the Constitution more wise and ingenious. The choosing of candi¬ dates soon drifted into Congress ; with the coming of the steamboat and the railroad it passed from the congressional caucus to national conventions ; and yet, notwithstanding these radical changes of usage, the expansion of territory, the multiplication of States, and the unscrupulousness of political partisanship, there have been no more mishaps than are in¬ cident to any system of human device.

To foretell the future of the Constitution is to foretell the future of the American people. They will change before it is changed. As with Washington and Lincoln, the more we know of them the better they appear; so of the Constitution, the more we contemplate its trials the better it appears adapted to our national needs. With the growth of knowledge there has been a growth of reverence. The people will experiment with State constitutions and tear them up and experiment again, but when it comes to the Constitution — the great Consti¬ tution — there is a sturdy sentiment of <(hands off,® and that sentiment is incomparably stronger now than it was at the beginning of the century. Judicial construction has moved backward rather than forward, and where Mar¬ shall left it, it stands, substantially, to-day.

The amendatory provision of the Constitu¬ tion is an unbarred door which may be opened at any time. It was wise and prudent of the framers to leave it thus unlocked. But he who tries to swing open that door will find two things of which he did not reckon : first, a vis inertia in the ignorance and indifference of congressmen — in their doubts whether the amendments will be popular — in their absorp¬ tion in lesser things ; and, second, that there is always some one on the other side pressing back the door.

Charles C. Nott, Late Chief Justice Court of Claims.

CONSTITUTION, The, or OLD IRON¬ SIDES (from the slightness of the injury her hull received in the fight with the Guerriere) , one of the most famous vessels of the Amer¬ ican navy, now fixed in Boston harbor. She was a 44-gun frigate of 1,576 tons; one of the six war vessels ordered by Congress early in 1794, on account of the Algerian piracies. (See Barbary Powers, U. S. Wars and Treaties with the). During the wars against Tripoli she was Preble's flagship and. in 1805 took part in three of the five bombardments off Tripoli.

When the War of 1812 broke out Hull started to join the New York squadron with her, 12 July; was cut off by a British squadron, including the Guerriere, but in a wonderful chase of three nights and two days out¬ manoeuvred and escaped it. On 19 August, off Cape Race, she ran into and fought a battle with the Guerriere, a somewhat weaker English frigate which she left a total wreck after an engagement of 25 minutes, the English losing 79 of their crew, the Americans 14. The Guerriere was sinking and could not be towed into port; she was therefore blown up. Hull sailed into Boston with his prisoners, to such an ovation as few men have ever earned in so short a time. In less than 25 minutes of actual fighting he had lifted the despised American navy and nation to an equality with the proud¬ est of the world; and drew from Great Britain such an explosion of rage and humiliation as it has never known before or since. Later the Constitution was made Bainbridge's flagship for a

cruise against English commerce in the East Indies. On 29 Dec. 1812 it encountered the Java, Captain Lambert, off the coast of Brazil, and at 2.10 p.m. joined action. The Constitution had 54 guns, with 787 pounds of metal ; the Java 47, with 568 pounds. The crews were 480 and 426. One of the fiercest of naval battles ensued for nearly two hours, in which the Constitution's wheel was shot away at the outset, making its navigation difficult, and the English vessel was the better sailer anyway. But the American gunnery was incomparably more intelligent and improved every oppor¬ tunity for raking broadsides, while the British did not. As soon as the Constitution came to close quarters, she inflicted ruinous damage and frightful slaughter. The Constitution was taken into Boston for repairs ; but before they were completed, Boston was closely blockaded, and she did not escape till New Year's Day 1814, under Capt. Charles Stewart. See United States, War of 1812.

In a cruise to the West Indies, Captain Stewart captured four prizes, with 24 guns and 76 men ; one of them was the 14-gun schooner Picton. Again blockaded by a powerful British squadron she did not escape until 17 Dec. 1814. In 1815 she encountered two British vessels, the Cyane and the Levant.

The Cyane struck ; the Levant temporarily escaped, but was overhauled by the Constitu¬ tion, and surrendered also. The two ships had lost 35 killed and 42 wounded; the Constitu¬ tion, 4 killed and 10 wounded. Cut off by a powerful British squadron at a neutral port whose neutrality the English treated with utter contempt, the Constitution and Cyane succeeded by fine seamanship in escaping, but the Levant was recaptured. In 1830 she was reported un¬ seaworthy, and condemned to be broken up, but

Oliver Wendell Holmes published in the Bos¬ ton Advertiser his thrilling poem 'Old Iron¬ sides' and the public clamor excited by it saved the noble vessel, which was rebuilt and again put in service in 1833. In 1855 she was laid up at the Portsmouth Navy Yard, but used sometimes as a training-ship ; in 1877 was again partially rebuilt, and took her last trip across the Atlantic the next year. In 1897 sh-e was roofed in at the Boston Navy Yard, and has since been used as a barrack ship, etc. Consult Hollis, 'The Frigate Constitution (1900) ; Maclay, 'History of the United States Navy' (Vol I, 2d ed., 1898) ; Adams, Henry, 'History of the United States) (Vols. VI, VII, IX, 1900-01) ; Roosevelt, 'Naval War of 1812 } (1882); Barnes, 'Naval Actions of the War of 1812 J (1896).

CONSTITUTION OF MATTER. See

Gases, Kinetic Theory of; Matter; Molec¬ ular Theory.

CONSTITUTION OF THE UNITED STATES, the governing instrument of the United States of America, adopted in 1787, when it took the place of the Articles of Confedera¬ tion. (For details of its adoption see Consti¬ tution, Framing of The). Political discussion of the time played a much greater part in the compromises of this instrument than its provi¬ sions in turn exerted on political history in the following period, which to a surprising degree may be attached to only two clauses of the instrument and to these two simply because of their vagueness, and their mutually contradic¬ tory nature. Section 8 (18) in defining the powers of Congress adds the blanket provision of power, "to make all laws which shall be necessary and proper for carrying into execu¬ tion the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or officer thereof.' The second historic clause occurs in the Amendments, where Article X reads : "The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States re¬ spectively, or to the people. }) The former is the famous elastic clause. In this accommoda- ing provision interpreted radically, or con¬ servatively, in the light of the Tenth Amend¬ ment all shades of political theory find proof- texts for their peculiar doctrines. So im¬ mediately upon the formation of the new gov¬ ernment two political parties arose, the Dem¬ ocratic-Republican party, strict constructionists of the elastic clause, who limited the powers of Congress to the minimum and exalted State rights to the maximum, and the Federalist party in favor of a highly centralized government doing everything possible for and in the States. Around this fundamental difference may be grouped the great political questions up to and culminating in the Civil War, and to a less degree recent political discussions are based upon the

same variance in interpretation of the Constitution, although neither party now holds to the strict construction theory as it was set forth by the early opponents of the Federalists. This change has been brought about very largely by practical experience of affairs, it being well known that the foremost strict con¬ structionists who have come to the presidential chair were forced by the exigencies of adminis¬

tration to a broader exposition of the clause. This was notably the case in the administrations of Jefferson and of his immediate lieutenants and successors.

The text of the Constitution follows:

CONSTITUTION OF THE UNITED STATES

We the people of the United States, in order to form a more perfect union, establish justice, insure domestic tran¬ quillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

ARTICLE I

Section 1. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Section 2. 1 The House of Representatives shall be

composed of members chosen every second year by the people of the several States, and the electors in each State shall have the qualifications requisite for electors of the' most numerous branch of the State legislature.

2 No person shall be a representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State in which he shall be chosen.

3 Representatives and direct taxes shall be apportioned among the several States which may be included within this Union, according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of rep¬ resentatives shall not exceed one for every thirty thousand, but each State shall have at least one representative; and. until such enumeration shall be made, the State of New Hampshire shall be entitled to choose three, Massachusetts eight, Rhode Island and Providence Plantations one, Con¬ necticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten. North Carolina five, South Carolina five, and Georgia three.

4 When vacancies happen in the representation from any State, the executive authority thereof shall issue writs of election to fill such vacancies.

5 The House of Representatives shall choose their speaker and other officers, and shall have the sole power of impeachment.

Section 3. 1 The Senate of the United States shall

be composed of two senators from each State, chosen by the legislature thereof for six years; and each senator shall have one vote.

2 Immediately after they shall be assembled in con¬ sequence of the first election, they shall be divided as equally as may be into three classes. The seats of the senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one third may be chosen every second year; and if vacancies happen by resignation, or otherwise, during the recess of the legislature of any State, the executive thereof may make temporary appointments until the next meeting of the

legislature, which shall then fill such vacancies.

3 No person shall be a senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhab¬ itant of that State for which he shall be chosen.

4 The Vice President of the United States shall be Presi¬ dent of the Senate, but shall have no vote, unless they be equally divided.

5 The Senate shall choose their other officers, and also a president pro tempore, in the absence of the Vice President, or when he shall exercise the office of President of the United States.

6 The Senate shall have the sole power to try all impeach¬ ments. When sitting for that purpose, they shall be on oath or affirmation. When the President of the United States is tried, the chief justice shall preside: and no person shall be convicted without the concurrence of two thirds of the members present.

7 Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust or profit under the United States: but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment and punish¬ ment, according to law.

Section 4. 1 The times, places, and manner of holding

elections for senators and representatives, shall be prescribed

in each State by the legislature thereof; but the Congress may at any time by law make or alter such regulations, except as to the places of choosing senators.

2 The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day.

Section 5. 1 Each House shall be the judge of the

elections, returns and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner, and under such penalties as each House may provide.

2 Each House may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two thirds, expel a member.

3 Each House shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secrecy ; and the yeas and nays of the members of either House on any question shall, at the desire of one fifth of those present, be entered on the journal.

4 Neither House, during the session of Congress, shall, without the consent of the other, adjourn for more than thiee days, nor to any other place than that in which the two Houses shall be sitting.

Section 6. 1 The senators and representatives shall

receive a compensation for their services, to be ascertained by law, and paid out of the Treasury of the United States. They shall in all cases, except treason, felony and breach of the peace, be privileged from arrest during their attendance at the session of their respective Houses, and in going to and returning from the same; and for any speech or debate in either House, they shall not be questioned in any other place.

2 No senator or representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased during such time; and no person holding any office under the United States shall be a member of either House during his continuance in office.

Section 7. 1 All bills for raising revenue shall originate

in the House of Representatives; but the Senate may propose or concur •with amendments as on other bills.

2 Every bill which shall have passed the House of ep- resentatives, and the Senate, shall, before it become a law, be presented to the President of the United States; if he approve he shall sign it, but if not he shall return it, with his objections to that House in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration two thirds of that House shall agree to pass the bill, it shall be sent, together with the objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a law. But in all such cases the votes of both Houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each House respectivley. If any bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a law, in like manner as if he had signed it, unless the Congress by their adjournment present its return, in which case it shall not be a law.

3 Every order, resolution, or vote to which the con¬ currence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States; and before the same shall take effect, shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

Section 8. 1 The Congress shall have power to lay

and collect taxes, duties, imposts and excises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imposts and excises shall be uniform throughout the United States.

2 To borrow money on the credit of the United States;

3 To regulate commerce with foreign nations, and among the several States, and with the Indian tribes;

4 To establish an uniform rule of naturalization, and uniform laws on' the subject of bankruptcies throughout the United States;

5 To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures;

6 To provide for the punishment of counterfeiting the securities and current coin of the United States;

7 To establish post offices and post roads;

8 To promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries;

9 To constitute tribunals inferior to the Supreme Court;

10 To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations;

11 To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water;

12 To raise and support armies, but no appropriation of money to that use shall be for a longer term than two years,

13 To provide and maintain a navy;

14 To make rules for the government and regulation of the land and naval forces;

15 To provide for calling forth the militia to execute the laws of the Union, suppress insurrections and repel invasions;

16 To provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress;

17 To exercise exclusive legislation in all cases what¬ soever over such district (not exceeding ten miles square) as may, by cession of particular States and the acceptance of Congress, become the seat of the government of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the State in whicˆ- the same shall be. for the erection of forts, magazines, arsenals, dockyards, and other needful buildings; and

18 To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or officer thereof.

Section 9. 1 The migration or importation of such

persons as any of the States now existing shall think proper to admit, shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight, but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.

2 The privilege of the writ of habeas corpus shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

3 No bill of attainder or ex post facto law shall be passed.

4 No capitation, or other direct, tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken.

5 No tax or duty shall be laid on articles exported from any State.

6 No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another; nor shall vessels bound to, or from, one State be obliged to enter, clear, or pay duties in another.

7 No money shall be drawn from the treasury, but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

8 No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them, shall, without the consent of the Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign State.

Section 10. 1 No State shall enter into any treaty,

alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any biil of attainder, ex post facto law, or law impairing the obligation of contracts, or grant any title of nobility.

2 No State shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts laid by any State on imports or exports, shall be for the use of the

treasury of the United States; and all such laws shall be subject to the revision and control of the Congress.

3 No State shall, without the consent of Congress, lay any duty of tonnage, keep troops, or ships of war in time of peace, enter into any agreement or compact with another State, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II

Section 1. 1 The executive power shall be vested ip a

President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice President, chosen for the same term, be elected, as follows:

2 Each State shall appoint, in such manner as the legisla¬ ture thereof may direct, a number of electors, equal to the whose number of senators and representatives to which the State may be entitled in the Congress: but no senator or representative, or person holding an office of trust or profit under the United States, shall be appointed an elector.

3 The electors shall meet in their respective States, and vote by ballot for two persons, of whom one at least shall not be an inhabitant of the same State with themselves. And they shall make a list of all the persons voted for, and of the number of votes for each; which list they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the president of the Senate. The president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted. The person having the

•greatest number of votes shall be the President, if such number be a majority of the whole number of electors appointed; and if there be more than one who have such majority, and have an equal number of votes, then the House of Representatives shall immediately choose by ballot one of them fpr President; and if no person have a majority, then from the five highest on the list the said house shall in like manner choose the President. But in choosing the President, the votes shall be taken by States, the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two thirds of the States, and a majority of all the States shall be necessary to a choice. In every case, after the choice of the President, the person having the greatest number of votes of the electors shall be the Vice President. But if there should remain two or more who have equal votes, the Senate shall choose from them by ballot the Vice President. (This clause was changed by the Twelfth Amendment).

4 The Congress may determine the times of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States.

5 No person except a natural born citizen, or a citizen of the United States, at the time of the adoption of this Consti¬ tution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years a resident within the United States.

6 Iir case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice President, and the Congress may by law provide for the case of removal, death, resignation, or inability, both of the President and Vice President, declaring what officer shall then act as President, and such officer shall act accord¬ ingly, until the disability be removed, or a President shall be elected.

7 The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he snail not receive within that period any other emolument from the United States, or any of them.

8 Before he enter on the execution of his office, he shall take the following oath or affirmation: — "I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will to the best of my ability, preserve, protect and defend the Constitution of the United States."

Section 2. 1 The President shall be commander in

chief of the army and navy of the United States, and of the militia of the several States, when called into the actual service of the United States; he may require the opinion, in writing, of the principal officer in each of the executive de¬ partments, upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

2 He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two thirds of the senators present concur; and he shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law: but the Congress may by law vest the appointment of such inferior officers, as they think proper, in the President alone, in the courts of law, or in the heads of departments.

3 The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

Section 3. He shall from time to time give to the Congress information of the state of the Union, and recom¬ mend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both Houses, or either of them, and in case of disagreement between them with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States.

Section 4. The President, Vice President, and all civil officers of the United States, shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors.

ARTICLE III

Section 1. The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the Supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services, a compensation which shall not be diminished during their continuance in office.

Section 2. 1 The Judicial power shall extend to all

cases, in law and equity, arising under this Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; — to all cases affecting ambassadors, other public ministers and consuls; — to all cases of admiralty and maritime jurisdiction; — to contro¬ versies to which the United States shall be a party; — to controversies between two or more States; — between a State and citizens of another State; — between citizens of different States, — between citizens of the same State claim¬ ing lands under grants of different States, and between a State, or the citizens thereof, and foreign States, citizens or subjects.

2 In all cases affecting ambassadors, other public minis¬ ters and consuls, and those in which a State shall be party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned, the Supreme Court shall have appellate jurisdiction, both as to law and fact, with such exceptions, and under such regulations as the Con¬ gress shall make.

3 The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the State where the said crimes shall have been committed; but when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

Section 3. 1. Treason against the United States, shall

consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

2 The Congress shall have power to declare the punish¬ ment of treason, but no attainder of treason shall work corruption of blood or forfeiture except during the life of the person attainted.

ARTICLE IV

Section 1. Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. Arid the Congress may by general laws prescribe the manner in which such acts, records and pro¬ ceedings shall be proved, and the effect thereof.

Section 2. 1 The citizens of each State shall be entitled

to all privileges and immunities of citizens in the several States.

2 A person charged in any State with treason, felony, or other crime, who shall flee from justice, and be found in another State, shall on demand of the executive authority of the State from which he fled, be delivered up to be removed to the State having jurisdiction of the crime.

3 No person held to service or labor in one State, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

Section 3. 1 New States may be admitted by the

Congress into this Union; but no new States shall be formed or erected within the jurisdiction of any other State; nor any State be formed by the junction of two or more States, or parts of States, without the consent of the legislatures of the States concerned as well as of the Congress.

2 The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or of any particular State.

Section 4. The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion; and on applica¬ tion of the legislature, or of the executive (when the legisla¬ ture cannot be convened) against domestic violence.

ARTICLE V

The Congress, whenever two thirds of both Houses shall deem it necessary, shall propose amendments to this Con¬ stitution, or, on the application of the legislature of two thirds of the several States, shall call a convention for pro¬ posing amendments, which, in either case, shall be valid to all intents and purposes, as part of this Constitution, when ratified by the legislatures of three fourths of the several States, or by conventions in three fourths thereof, as the one or the other mode of ratification may be proposed by the Congress: Provided that no amendment which may be made prior to the year one thousand eight hundred and eight shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no State, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI

1 All debts contracted and engagements entered into, before the adoption , of this Constitution, shall be as valid against the United States under this Constitution, as under the Confederation.

2 This Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every State shall be bound thereby, anything in the Constitution or laws of any State to the contrary not¬ withstanding.

3 The senators and representatives before mentioned, and the members of the several State legislatures, and all executive and judicial officers, both of the United States, and of the several States, shall be bound by oath or affirmation to support this Constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII

The ratification of the conventions of nine States shall be sufficient for the establishment of this Constitution between the States so ratifying the same.

Done in Convention by the unanimous consent of the States present the seventeenth day of September in the year of our Lord one thousand seven hundred and eighty-seven, and of the independence of the United States of America the twelfth. In witness whereof we have hereunto sub¬ scribed our names,

Go: Washington —

Presidt. and Deputy from Virginia

New Hampshire John Langdon Nicholas Gilman

Massachusetts Nathaniel Gorham Rufus King

Connecticut Wm. Sami. Johnson Roger Sherman

New York Alexander Hamilton

Delaware

Geo: Read

Gunning Bedford Jun John Dickinson Richard Bassett Jaco: Broom

Maryland James McHenry Dan of St. Thos. Jenifer Danl. Carroll

Virginia John Blair —

James Madison Jr.

New Jersey Wil: Livingston David Brearley Wm. Paterson Jona: Dayton

Pennsylvania B. Franklin Thomas Mifflin Robt. Morris Geo. Clymer Thos. Fitzsimons Jared Ingersoll James Wilson Gouv Morris

Attest

North Carolina Wm. Blount Richd. Dobbs Spaight Hu Williamson

South Carolina J. Rutledge

Charles Cotesworth Pinckney Charles Pinckney Pierce Butler

Georgia William Few Abr Baldwin

William Jackson Secretary.

Articles in addition to, and amendment of, the Constitution of the United States of America, proposed by Congress, and ratified by the legislatures of the several States pur¬ suant to the fifth

article of the original Constitution.

ARTICLE I

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridg¬ ing the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the govern¬ ment for a redress of grievances.

ARTICLE II

A well regulated militia, being necessary to the security of a free State, the right of the people to keep and bear arms, shall not be infringed.

ARTICLE III

No soldier shall, in time of peace be quartered in any house, without the consent of the owner, nor in time of war, but in a manner to be prescribed by law.

ARTICLE IV

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirma¬ tion, and particularly describing the place to Cc? •.earthed, and the persons or things to be seized.

ARTICLE V

No person shall be held to answer for a capital, or other wise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service in time of war or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI

In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been com¬ mitted, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defense.

ARTICLE VII

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise reexamined in any court of the U nited States, than according to the rules of the common law.

ARTICLE VIII

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

ARTICLE IX

The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people.

ARTICLE X

The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

ARTICLE XI

The judicial power of the United States shall not be con¬ strued to extend to any suit in law or equity, commenced or prosecuted against one of t he United States by citizens of another State, or by citizens or subjects of any foreign State.

ARTICLE XII

The electors shall meet in their respective States, and vote by ballot for President and Vice President, one of whom, at least, shall not be an inhabitant of the same State with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice President, and they shall make distinct lists of all persons voted for as President and for all persons voted for as Vice President, and of the number of votes for each, which lists they shall sign and certify, and transmit sealed to the seat of government of the United States, directed to the pres¬ ident of the Senate. — The president of the Senate shall, in presence of the Senate and House of Representatives, open all the certificates and the votes shall then be counted; — The person having the greatest number of votes for Presi¬ dent shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the high¬ est numbers not exceeding three on the list of those voted for as President, the House of Representatives shall choose immediately by ballot, the President. But in choosing the President, the votes shall be taker, by States, the represen¬ tation from each State having one vote; a quorum for this purpose shall consist of a member or members from two thirds of the States, and a majority of all States shall be necessary to a choice. And if the House of Representatives shall not choose a President whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice President shall act as Presi¬ dent, as in the case of the death or other constitutional disability of the President. The person having the great¬ est number of votes as Vice President shall be the Vice President, if such number be a majority of the whole num¬ ber of electors appointed and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice President; a quorum for the pur¬ pose shall consist of two thirds of the whole number of senators, and a majority of the whole number shall be neces¬ sary to a choice. But no person constitutionallyin eligible to the office of President shall be eligible to that of Vice -p ss'c' '!'■ f United States.

CONSTITUTIONAL AMENDMENTS

575

ARTICLE XIII

Section 1. Neither slavery nor involuntary servi¬ tude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

Section 2. Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV

Section 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

Section 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabit¬ ants of such State, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion, or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

Section 3. No person shall be a senator or representa¬ tive in Congress or elector of President and Vice President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath, as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may by a vote of two-thirds of each House, remove such disability.

Section 4. The validity of the public debt of the United States, authorized by law, including debts incurred for pay¬ ment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations and claim shall be held illegal and void.

Section 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV.

Section 1. The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of race, color, or previous con¬ dition of servitude.

Section 2. The Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XVI

The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without appor¬ tionment among the several States, and without regard to any census or enumerations.

ARTICLE XVII

Section 1. The Senate of the United States shall be composed of two Senators from each State, elected by the people thereof, for six years, and each Senator shall have one vote The Electors in each State shall have the qualifica¬ tions" requisite for Electors of the most numerous branch of the State Legislatures.

Section 2. When vacancies happen in the representa¬ tion of any State in the Senate, the Executive authority, of such State shall issue writs of election to fill such vacancies, provided that the Legislature of any State may empower the Executive thereof to make temporary appointments until the people fill the vacancies by election as the Legislature may direct.

Section 3. This amendment shall not be so construed as to affect the election or term Gf any Senator chosen before it becomes valid as part of the Constitution.

Bibliography. — Ames, H. V., (Proposed Amendments to the Constitution of the United States During the First Century of Its History'

in Annual Report of the American Historical Association (Vol. II, 1896) ; Beard, C. A.,

(Economic Interpretation of the Constitution of the United States) (Chicago 1913) ; id., "Read¬ ings in American Government and Politics' (New York 1911) ; Borgeaud, C., (Adoption and Amendment of Constitutions in Europe and America,' (trans. by C. D. Hazen 1895) ; Bryce, James, (American Commonwealth' (4th ed., New York 1910) ; Burgess, J. W., Political Science and Comparative Constitutional Law' (1893) ; Cleveland, F. A., (Grow.h of Democ¬ racy in the United States' (1898) ; Cooley, T. M., Constitutional Limitations' (7th ed.,

1903) ; Dodd, W. F., (Modern Constitutions' (1909) ; de Tocqueville, Alexis, (On Democracy in America' (2 vols., New York 1894) ; Far- rand, M., (The Compromises of the Constitu¬ tion' in American Historical Review (Vol. IX,

1904) ; Fiske, J., Critical Period in American History' (1901); Follett, M. P., (The Speaker of the House of Representatives' (1896) ; Goodnow, F. J., (Social Reform and the Con¬ stitution' (New York 1911) ; Johnston, A.,

(First Century of the Constitution' in New Princeton Review (IV, 1887) ; Lobingier, C. S., (The People's Law' (New York 1909) ; Mc- Conachie, L. G., Congressional Committees' (1896) ; McLaughlin, A. C., and Hart, A. B., Cyclopedia of American Government' (3 vols., New York 1914) ; McLaughlin, A. C., Con¬ federation and the Constitution' (1905) ; Robin¬ son, J. H., Criginal and Derived Features of the Constitution' in Annals of the American Academy of Political and Social Sciences (Vol. I, 529-557, 1891) ; Schouler, J., Constitutional Studies, State and Federal' (1897) ; Stevens, C. E., (Sources of the Constitution' (1894); Sidgwick, H., dements of Politics' (1897) ; Stimson, F. j., (The Law of the Federal and State Constitution of the United States' (Bos¬ ton 1908) ; Story, J., Commentaries on the Constitution of the United States' (5th ed., 1891) ; Thorpe, F. N., Constitutional History of the American People, 1776-1850' (1898); id., 'Federal and State Constitutions' (1909) ; Tiedeman, C. G., 'Unwritten Constitution of the United States' (1890) ; Willoughby, W. W., Constitutional Law of the United States' (1910) ; id., 'The American Constitutional System' (1904) ; Wilson, Woodrow, Consti¬ tutional Government in the United States' (1908). *See Constitution, Framing of the; Constitution, Immutability of the; Consti¬ tutional Amendments, History of; Con¬ federation, Articles of; United States — Articles of Confederation; United States — The Federal Convention of 1787 ; United States — The Interpretation of the Consti¬ tution.*

CONSTITUTIONAL AMENDMENTS, History of. As shown in a preceding article (see Constitution, Framing of the), very few of the States liked the Constitution as a form of government at all, and fewer still were satisfied with it as an instrument. North Carolina had refused to ratify without amend¬ ments and a <(bill of rights" affixed — a declara¬ tion of the fundamental rights of human beings to which immense importance was attached by the mass at that time ; Massachusetts and New Hampshire ratified with an appended urgent recommendation of certain amendments; New

York first ratified subject to the right to secede if her amendments were not accepted within six years, and finally changed <(on condition® to (

The text of the Amendments is to be found with the body of the Constitution.

The First Amendment (Article I) was vio¬ lated by the government within a few years in the Sedition Act (see Alien and Sedition Acts), and had no effect in accomplishing its defeat, which was effected by a party revolu¬ tion. Nor has it prevented <(gag laws,® or ex¬ clusion from the mails of whatever has been thought obnoxious. Public opinion in these respects has been found more efficient than the Constitution.

General warrants were a principal grievance of the British customs laws, a fact which ex¬ plains Article IV.

<(Life or limb ® in Article V is a curious anachronism ; modern laws do not prescribe the rack as a punishment. Probably the drafters of this provision used a current phrase without stopping to analyze its meaning.

The provision of Article VI against chang¬ ing the venue was doubtless suggested by the attempts to take Americans to England for trial.

The intrepid jumble of possible and impossi¬ ble dangers of Articles VII-X, inclusive, remi¬ niscences of 17th-century persecutions and 18th- century customs laws, of the times of King John and those of George III, of grievances unthinkable except under foreign rule and of others likely enough under their own, of local provisions and world-wide provisions, is amus¬ ingly characteristic of the period and the peo¬ ple ; perhaps rather, any period and any people. The Amendments inspired the champions of a strong government with great weariness and disgust; but they are not all anachronisms or idle precautions. The Tenth especially (added by Massachusetts) has in practice restrained the action of the government greatly, especially in guiding the construction of the Supreme Court ; and certain provisions of the Fifth, Sixth and Seventh have been great public safeguards, by no means out of date even yet.

See Chisholm v. Georgia, for the cir¬ cumstances under which the Eleventh Amend¬ ment, put in force 8 Jan. 1798, was passed. Maryland had been sued by a private citizen, and submitted ; Georgia was sued, refused to plead and threatened with death any one who served a writ in the suit; and she and Virginia pressed through an amendment forbidding such suits by individuals against States, but not vice-versa.

The gist of Article XII is the naming of the candidates for President and Vice-Presi¬ dent separately; the lack of which provision brought about a discreditable intrigue, and re¬ sults political and personal by no means forgot¬ ten. (See Electoral System; Jefferson-Burr

Imbroglio). Before this, the highest candidate was President and the next highest Vice- President ; but now came an election which showed not merely the possibility of a tie, but the certainty of one, between the two candi¬ dates of the same party from mere party loyalty. Yet plain as this seems, the Amend¬ ment failed in the first Congress where it was introduced, passed the House 12 Dec. 1803, only by the Speaker's casting vote, was ratified by the bare three-fourths of the States necessary, and declared in force 25 Sept. 1804. New Hampshire, Massachusetts, Connecticut and Delaware (Federalist States), rejected it.

The Emancipation Proclamation had freed only the slaves within the States technically in revolt. In those where the Union forces alone had prevented it, as Maryland, or a powerful minority of Union men plus resolute Union commanders, as Missouri, and generally in the Border States, the slaves were still private property, nearly 1,000,000 in number. Move¬ ments to compensate the owners were abortive, partly because the owners would not listen to such proposals ; and the Thirteenth Amendment was introduced for entire emancipation without payment. Its phraseology is essentially that of the Ordinance of 1787 (q.v.), repeated in the Missouri Compromise and the Wilmot Promiso (q.v.). It passed the Senate April 1864, 38 to 6, and the House 15 June 95 to 66, but the latter was not the needed two-thirds. In the next session the House passed it, and it was ratified by 31 States, and proclaimed in force 18 Dec. 1865.

The Fourteenth Amendment, in part a re¬ phrasing of the Fifth, arose out of the first Civil Rights Bills (q.v.), which was pronounced non- enforceable as contrary to the decision of the Supreme Court in the Dred Scott Case (q.v.), that negroes were not citizens. As this deci¬ sion was law until distinctly reversed, the Amendment was drawn, the first clause clearing away that decision. The other sections were : (1) A bribe to the South to give the negro the vote ; (2) to give the negroes a

clear field by debarring the Confederate leaders from it; (3) obvious. It passed both houses in June 1866, by overwhelming votes, but a long struggle ensued over ratification. The old Confederate States rejected it, to which Congress retorted by the Reconstruction Act of 2 March 1867, constitut¬ ing provisional governments in those States till they had ratified the Amendment, and they did so. Maryland, Delaware and Kentucky also re¬ jected it; and New Jersey and Ohio were cap¬ tured by the Democrats and rescinded their ratifications, though it was doubtful whether this could be done. But finally 33 States ratified without them, and the Amendment was declared in force 28 July 1868.

The Fifteenth Amendment was practically a substitute for the second section of the Four¬ teenth, which was found valueless. In one re¬ spect it was weaker than the other, which pre¬ scribed a penalty for the offense, while this prescribed none ; but its specification of the negroes as the class not to be excluded, and their race or color or former slavery as not legal grounds for disfranchisement, gave it apparently a clearer legal footing. In fact, however, it has been found as little worth as the other. It passed both Houses in February 1869, by immense majorities, was ratified by 30

out of 37 States, and declared in force 30 March 1870. New York fell into the hands of the Democrats and rescinded its vote; a notice was filed in the State Department, which reported that the State ˆclaimed® to have re¬ scinded its ratification, but paid no further at¬ tention to it. It is more than doubtful if such action of a State has the least validity.

The Sixteenth Amendment was passed by both Houses of Congress and on 31 July 1909 was deposited in the office of the Secretary of Slate. On 3 Feb. 1913 it received one more than the required three-fourths of the votes of the States when Delaware and Wyoming voted to ratify the amendment, and on 25 Feb. 1913 it was declared in force. The purpose of the amendment was to obviate the necessity of dis¬ tributing direct taxes among the States in ac¬ cordance with their respective populations. There was some objection to the words "from whatever source derived® since many believed that these words might be construed into the conferring of power on the national govern¬ ment to tax State and municipal bonds and other like properties.

The Seventeenth Amendment, providing for the election of senators by the direct vote of the people, was introduced in Congress at the •request of more than 30 State legislatures and in response to a popular demand that had re¬ sulted from 40 years of agitation. It was passed in the House 13 April 1912 and in the Senate 12 June, having already been ratified by the legislatures of three States — Massa¬ chusetts (22 May), Arizona (3 June) and Min¬ nesota (10 Tune). On 9 May 1913 Wisconsin ratified the amendment, being the 36th State tc take such action, and the amendment was declared in force 31 May 1913.

The Eighteenth (Prohibition) Amendment was ratified 16 Jan. 1919 and became effective 16 Jan. 1920. Only three States refused to ratify. See Prohibition.

The Nineteenth (Woman Suffrage) Amend¬ ment was ratified 18 Aug. 1920 and was pro¬ claimed a part of the Constitution 26 Aug. 1920. See Woman Suffrage. See also Conventions, Constitutional; Initiative; Referendum.

Ratification of the Amendments. — I to X inclusive were declared in force 15 Dec. 1791. XI was declared in force 8 Jan. 1798. XII, regulating elections, was ratified by all the States except Connecticut, Delaware, Massa¬ chusetts and New Hampshire, which rejected it. It was declared in force 28 Sept. 1804. XIII, the emancipation amendment, was ratified by 31 of the 36 States; rejected by Delaware and Kentucky, not acted on by Texas; con¬ ditionally ratified by Alabama and Mississippi. Proclaimed 18 Dec. 1865. XIV, reconstruction amendment, was ratified by 23 Northern States; rejected by Delaware, Kentucky, Maryland and 10 Southern States, and not acted on by Cali¬ fornia. The 10 Southern States subsequently ratified under pressure. Proclaimed 28 July 1868. XV, negro citizenship amendment, was not acted on by Tennessee, rejected by Cali¬ fornia, Delaware, Kentucky, Maryland, New Jersey and Oregon; ratified by the remaining 30 States. New York rescinded its ratification, 5 Jan. 1870. Proclaimed 30 March 1870. XVI, the income tax

amendment, was ratified by all the States except Connecticut, Florida, Pennsyl¬ vania, Rhode Island, Utah and Virginia. It Vol. 7-37.

was declared in force 25 Feb. 1913. XVII, the amendment providing for the direct vote of United States Senators by the people, was ratified by all the States except Alabama, Dela¬ ware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Rhode Island, South Carolina, Utah and Virginia. It was declared in force 31 May 1913. XVIII. the prohibition amendment, was ratified by Mississippi 8 Jan. 1918. Fourteen States followed its example in 1918 and 30 States in 1919. Connecticut, New Jersey and Rhode Island did not ratify. XIX, the woman suffrage amendment, was ratified by 22 States in 1919 and by 15 States in 1920. Eight States ratified in regular session and 29 in special session. Nine States defeated ratification.

CONSTITUTIONAL CONVENTIONS.

See Conventions, Constitutional; Constitu¬ tion, Framing of the; United States — The Formation of State Constitutions ; United States — The Federal Convention of 1787; United States — State Constitutions.

CONSTITUTIONAL LAW. See Law,

Constitutional.

CONSTITUTIONAL MONARCHY. See

Monarchy.

CONSTITUTIONAL UNION PARTY,

in United States history, popularly known in its own time as the Bell-Everett party, from the names of its presidential candidates ; the name assumed by the remnant of the Southern Whigs in 1860. The platform consisted of a preamble antagonizing all platforms in general as local, and a resolution recognizing as the only right and duty of every citizen the support of (

CONSTITUTIONS, Fundamental. See

Colonial Government, Proprietary.

CONSTITUTIONS, State. See United States — The Formation of State Constitu¬ tions; United States — State Constitutions; Conventions, Constitutional.

CONSTRUCTIVE CONTRACT. See

Quasi-Contract.

CONSUBSTANTIAL, having the same substance or essence ; coessential. When the Arian controversy ran high in the Church, and with the view of settling it, Constantine was induced to summon the general council of Nice in 325 ; the council pronounced in favor of the Athanasian view that the Second Person of the Trinity is homoousios with the Father. The difference between the persons of the Father and the Son, however, was maintained.

CONSUBSTANTIATION, the doctrine that in the Holy Eucharist the real body and blood of Christ are present and are of the same substance with the bread and wine. The doctrine of Transubstantiation is that when the words of consecration are pronounced by the priest, the bread and wine are substantially changed into the body and blood of Christ, an

consequently cease to exist as bread and wine. The doctrine of Consubstantiation, on the con¬ trary, is that after consecration they continue to exist in their original form, but substantially conjoined with the body and blood of Christ.

This doctrine, generally ascribed to John of Paris, as its earliest advocate, has had few, if any, confessors. The term "Consubstantiation is often incorrectly used to designate Luther's doctrine of the sacramental conjunction with the bread and wine, which is a very different thing from that of the substantial conjunction. Luther taught that the bread and wine are pres¬ ent in the natural, but the body and blood in a supernatural, manner. The presence is not "con- substantial* ; for while the elements are masti¬ cated, swallowed, digested, etc., the body of Christ, according to Luther's teaching, is pres¬ ent only when the element is received by the communicant, as the words of distribution are repeated, and no longer. The presence of the elements is comprehensible, visible, tangible ; that of the body and blood incomprehensible, invisible, mysterious and inexplicable. The belief that the body and blood of Christ can be received in the same way as the bread and wine, the Lutheran Church designates as "Capernaitic-error,ˆ as the people of Caper¬ naum, in John vi, 52, seemed to have had such an impression. Consubstantiation is sometimes called Impanation, which defines the relation between Christ and the elements in the Eucharist as a hypostatic union such as exists between the divine and human natures in Christ. Con¬ sult Hagenbach, (History of Doctrines) (Vol. II), and for the Roman Catholic view consult Streber, ˆirchenlexikonP*

CONSUELO, which appeared from the hand of George Sand in 1842-43, a fantastic tale with a number of genuinely historical charac¬ ters, reflects the innumerable theories of social reform and the mystical, quasi-philosophical ideas then in the air. George Sand was at that time under the influence of the religious radical Lamennais, of the humanitarian revolutionary Pierre Leroux, of the Polish musician Chopin, of the Polish poet Mickiewicz and his Slavic mysticism. The action of

racy of art and humanity and the union of classes. The later history of Consuelo is con¬ tinued at equal length in the sequel, (La Com- tesse de Rudolstadt. }

Charles H. C. Wright, Professor of French Language and Literature, Harvard University.

CONSUL, the title given to the two chief magistrates of the ancient Roman Republic and to the three supreme magistrates of the first French Republic during the last five years of its existence. In present usage the term indicates an official who resides in a foreign seaport or other commercial centre as the representative of his home government and who is charged with the protection of his fellow-countrymen and the safeguarding of their interests.

The office of consul was created in Rome about 508 b.c., after the expulsion of the kings. The election to the consulship was annual, and only patricians were eligible until the Licinian laws opened the office to the plebeians.

In the history of France the title of consul appears after the fall of the Directory, when three consuls were appointed. The constitution of 13 Dec. 1799 gave to the first of these magis¬ trates the real power, the others having only an advisory voice in the government. Napoleon Bonaparte became First Consul. In 1802 he was confirmed in the consulship for life, and in 1804 he abolished it by the establishment of the Empire. The office of consul in the present signification of the term had its origin in the extensive trade relations of the Italian cities of the 12th century.

In 1780 the first United States consul was commissioned. The consular system was estab¬ lished by acts of Congress in 1790 and 1792. The consular posts of the United States are arranged by statute in three classes: (1) Those in which the incumbents receive a fixed salary and are not allowed to transact business ; (2) those to which a fixed salary is attached and business transactions permitted; (3) those in which the incumbents are compensated by fees collected in their offices and are allowed to transact business. There were in existence, 25 Oct. 1902, 315 consular posts. Among the responsibilities devolving upon United States consuls are the regulation of shipping, the issu¬ ing of passports and of certificates of births, deaths and marriages, the caring for disabled seamen and the ensuring of justice to native- born or naturalized American citizens. Consuls also send reports to the home government con¬ cerning foreign trade conditions. In countries where the government is unstable or despotic American consuls are vested with exceptional powers. They may exercise judicial functions over lawbreakers of their own nationality, such as fining, committing to prison, etc. Special powers and duties of consuls are determined by

treaty. Before entering upon his duties a con¬ sul must receive an exequatur from the govern¬ ment to which he is accredited.. No radical change has been made in the consular service of the United States since its establishment. President Cleveland by executive order in 1895 applied civil service principles to consular posts of a certain class. Of late there has been con¬ siderable agitation in favor of reorganizing the system.

Bibliography.— Schuyler, (American Diplo¬ macy and the Furtherance of Commerce) ; Straus, (Reform in the Consular Service) ; Warden, (Origin, Nature, and Progress of Con¬ sular Establishments.)

CONSULAR SERVICE OF THE UNITED STATES. The first consul of the United States was appointed 9 Dec. 1780, al¬ though the commissioners of the United States in Europe had exercised consular functions in addition to their diplomatic duties prior to that time. Five years aft'erward Congress declared by a joint resolution that it was expedient that the United States should appoint consuls abroad, and expressly authorized American ministers in Europe to exercise the powers of consuls- general in the countries to which they were accredited. The Constitution, adopted in 1787, conferred upon the President the power to nominate, and by and with the advice and consent of the Senate, to appoint consuls. While President Washington in pursuance of the authority given him by the Constitution appointed a number of consuls and vice-consuls, no detailed law regarding consuls was passed until 14 April 1792. That law, which was to carry into effect our consular treaty with France, did not create or even regulate a con¬ sular system, but merely recognized its existence by imposing upon it certain specified duties. The act of 1 May 1810 appropriated sal¬ aries for the consuls at Algiers, Tangier, Tunis and Tripoli, which for nearly 30 years were the only consular salaries provided by law. For the most part, the United States, like most other nations, started by appointing un¬ paid consuls from among American merchants residing abroad, or, if they were sent from America, by permitting them to enter into business as a means of ensuring support. Con¬ suls were also allowed to retain as compensation the fees collected for official services performed.

This so-called system was found to work badly for the interests of the government as well as the individual citizen, and as early as 1816 the Secretary of State, to whose dis¬ cretion the administration of the service was left, proposed to Congress to pay fixed salaries to the consuls at more important places, at least. Efforts in this direction were continued from time to time with the object of so provid¬ ing for the compensation of consuls that they could devote their time to their official duties, but nothing was accomplished until 1856, when Congress passed the law in pursuance of which the reorganization of the consular service upon substantially its present basis was effected. The aim of this act was to reduce the service to a regular system somewhat in line with the British consular service by providing for fixed salaries for the principal consuls, prohibiting those consuls from engaging in business and requiring them to remit to the Secretary of

the Treasury all fees collected by them for per¬ forming official services. The appointment of consular officers is now in the hands of the President and by executive order of 1906 under the Lodge Act passed in that year, all consular officers except clerks, consular agents and vice-consuls, must pass a qualifying examina¬ tion. The examining board consists normally of the Secretary of State, the Director of the Consular Service, the Chief of the Consular Bureau and the Chief Examiner of the Civil Service Commission.

Consular officers of the United States are divided into two classes, principal and subordi¬ nate. Principal officers are consuls-general and consuls. Subordinate officers are vice-consuls, consular agents, consular assistants, clerks, student interpreters and also interpreters. Con¬ suls-general perform the same duties as consuls, and in addition have general supervision over consuls within the limits of their jurisdiction. There are five consuls-general at large, who inspect every consulate at least once in two years. Like consuls, consuls-general are ap¬ pointed by the President and confirmed by the Senate. The senior vice-consular officers at a consulate fill the places and exercise, the func¬ tions of consuls-general and consuls, when those' officers are temporarily absent or relieved from duty. When the principal officers are present at their posts, they are subordinate to, and exercise their powers and perform their duties under, the direction of principal officers. They may be situated in a different city from their consulate. Consular agents are subordinate to principal consular officers, exercising their powers and performing their duties at ports or places different from those at which their principals are located. Their functions are not in all respects as extensive as those of principal officers, and they are not authorized to corre¬ spond with the Department of

State. There are 40 consular assistants provided for by law. They are appointed by the President, after examination, and can only be removed for cause. They are assigned from time to time to con¬ sulates with such duties as the Secretary of State may direct. Besides these there are clerks at a salary from $300 to $1,500 a year and a corps of student interpreters, 10 in China, 6 in Japan and 10 in Turkey. The salary of a student interpreter is $1,000, plus allowances for studying. When qualified, they may be ap¬ pointed interpreters at varying salaries. Con¬ sular officers qualify by taking a prescribed oath, and all except consular agents and con¬ sular clerks are required to file a bond to the United States for the faithful performance of their duties. The salaries of consuls-general and consuls range from $2,000 to $6,000 a year. Vice-consular officers receive no fixed salaries, but when in charge of a post they receive half as much as the principal officer normally holding it. Consular agents receive as compensation one-half of the official fees collected by them up to $1,000. Consular as¬ sistants receive salaries of $1,000 for the first three years' service, after which their salaries are gradually increased to $1,800 a year. All fees for unofficial and notarial work are re¬ tained as personal compensation by the officers collecting them.

The duties of consuls of the United States are varied, and include the shipment, discharge

and relief of seamen of American vessels ; ad¬ justment of differences between masters and crews; reclamation of deserters; protection of citizens of the United States ; settlement of estates of citizens who may die intestate in foreign countries ; issuance of bills of health certifying to the sanitary condition of the cargo, passengers and crew of vessels clearing from foreign ports for ports in the United States; issuing and viseing of passports; superintending the disinfection of merchandise exported to the United States from a district in which infec¬ tious diseases exist ; execution of landing cer¬ tificates ; and certification of invoices of merchandise valued at more than $100 exported to the United States. The latter duty is highly important for the protection of the customs revenue, and makes it necessary for consular officers to examine carefully each invoice be¬ fore certifying that the prices stated therein are correct. In case the merchandise is found to be undervalued, notice of the fact is sent to the collector of customs at the port in the United States to which the merchandise is destined.

	Salaried	*Compen¬ sated by fees*	*No.*	*compen¬ sation*	*Total*
Consuls-general .	*50*				*50*
Consuls .	*247*				*247*
Vice-consuls .	*338*				

338

Consular agents .

128

128

Consular assistants . . .

38

38

Student interpreters. . . .

20

20

Interpreters. . .

10

10

Total .

365

128

338

831

Consular officers are not permitted to solemnize marriages, but they may, when re¬ quested, be official witnesses of the ceremony of marriage where one of the parties is a citizen of the United States. In such cases they give each of the parties a certificate of the marriage, and forward a certificate thereof to the Department of State. Under section 4082 of the Revised Statutes marriages in the pres¬ ence of a consular officer of the United States in a foreign country, between persons who would be authorized to marry if residing in the District of Columbia, are declared to be valid and to have the same effect as if solemnized in the United States, but the opera¬ tion of this statute outside of the District of Columbia and the Territories is doubtful.

The exemptions and privileges of consular officers depend largely upon the treaties existing between the United States and the countries to which they are accredited. In the absence of treaties, consuls after receiving their exequaturs are regarded both as officers of the state which appoints and the state which receives them under the special protection of international law. They may claim inviolability of the official property and archives; exemption from military service and service on juries, and the right to place the arms of their government over their doors.

By virtue of treaties and Title XLVII of the Revised Statutes, consular officers in China, Siam, Turkey, Morocco, Maskat, Persia, Zan¬

zibar and Tripoli are invested with judicial powers. In Cnina, Turkey and Siam, consuls are empowered to arraign and try all citizens of the United States charged with offenses against law, committed in that country, and to sentence offenders. They also have jurisdic¬ tion in civil cases between American citizens. In the trial of cases between citizens of the United States and subjects of China or Siam, the consuls of the United States act in con¬ junction with the Chinese or Siamese officials. In case of disputes between Turkish subjects and citizens of the United States in Turkey, provision is made for the presence of the dragoman of an American consulate at the hearing. The treaties with Persia, Maskat, Morocco, Zanzibar and Tripoli give consular officers jurisdiction over

cases the parties to which are American citizens, and provide for the assistance of consuls in the trial by the foreign tribunal of cases in which one party is a citizen of the United States and the other a subject of the foreign power.

The duties of consular officers with respect to the development of our foreign trade are of comparatively recent origin, but, owing to in¬ creased competition among commercial nations, have become of special importance within the past few years. Every consular officer is now expected to have accurate knowledge of the conditions of trade and commerce of the place where he is located, and he is required to keep the Department of State fully informed regard¬ ing all matters of interest touching the indus¬ tries, trade, commerce and navigation of the country of his official residence. He must be alert and report promptly new markets for American products or manufactures, the con¬ struction of public works, changes in trans¬ portation rates and facilities, the opening up of new trade routes, changes in economic con¬ ditions within his district, improvements of old and development of new industries, including inventions or discoveries, development or de¬ cline of commercial and manufacturing centres, projects for great manufacturing or other in¬ dustrial enterprises, river and harbor improve¬ ments, hygienic and quarantine measures, fluctuations in rates of wrages, changes in tariff legislation, the enactment of patent, trade mark and copyright laws, and legislation preventing the adulteration of food, and all other informa¬ tion of value to the commercial and industrial interests of the United States. The information reported that may be of current interest is printed in a publication known as Daily Con¬ sular Reports, which has been issued daily since 1 Jan. 1898. Till 1903 they were known as Advance Sheets of Consular Reports. The reports are collected at the end of every month and printed in a periodical monthly, Monthly Consular Reports, established in 1880. More comprehensive reports are prepared annually under special instructions of the Department of State with the object of presenting a statement of the trade, not only of the United States with the rest of the world, but of the various countries with each other, and these reports are published under the title of Commercial Rela¬ tions. y From time to time, at the suggestion of individuals or firms seeking information as to conditions in foreign countries, special reports are obtained from consuls and are printed in separate form.

. The volume known as (Consular Regula¬ tions, > the latest edition of which was pub¬ lished in 1896, contains all the laws, treaties and regulations which govern consular officers in the performance of their duties. This is sup¬ plemented by the (Digest of Circular Instruc¬ tions to Consular Officers,) the latest edition of which appeared in 1908. Consult also Senate Report, No. 1202 (56th Congress, 1st Session).

CONSULATE (Fr. consulat) . The form of government in France from the overthrow of the Directory, 9 Nov. 1799 (18th Brumaire) to 18 May 1804, when the First Consul (Na¬ poleon Bonaparte) was made emperor. After the fall of the Directory the Council of Ancients and the Five Hundred appointed three consuls — Bonaparte, Roger Ducos and Sieyes. Sieyes and Ducos soon retired on pensions and were replaced by Cambaceres and Lebrun. On 24 Dec. 1799 Bonaparte became First Consul. The consuls were elected by the Senate for 10 years. The Senate itself was composed of 60 members appointed for life, and there were also a Tribunate of 100 members and a Legislative Assembly of 300 members. The powers of these chambers were greatly restricted while those of the First Consul were almost absolute, all ministers, councillors of state, military and naval officers and nearly all judges being ap¬ pointed by him. In May 1802 Bonaparte, who had already held a magnificent court at the Tuileries, was re-elected First Consul for 10 years, and in the following August he became First Consul for life. On 18 May 1804 Bona¬ parte was made emperor, having long enjoyed the prerogatives of the office in fact if not in name. (See France; Napoleon I). Consult Thiers, (Histoire du consulat et de l'empire) (Paris 1845-62), and the numerous lives of Napoleon.

CONSULTA, the committee of three mem¬ bers of the Council of State of the Netherlands from 1559 to 1567, during the regency of Mar¬ garet of Parma. The three were Barlaymont, Viglius and the Bishop of Arras.

CONSUMERS' LEAGUE, an organization intended <(to promote better conditions among the

workers® by encouraging the purchase of goods made and sold under proper conditions. The work of the organization is based upon the principle that the purchase of an article tends to create a demand for that article, and that in the stress of modern competition manufacturers and merchants are unable to improve the con¬ dition of their employees while there is a con¬ stant demand for cheap goods, <(regardless of how cheapness is brought about.® The move¬ ment had its origin in England in 1890 and the first consumers' league in the United States was organized in New York in 1891 ; its object was to investigate retail stores and to encourage the patronizing of those conforming to their standard of conditions. Similar leagues now exist in nearly all the larger cities and towns of the United States and in many in Canada. The standard for a <(fair house® demands : (1) Equal wages for women and men for equal work, wages to be paid by the week; (2) rea¬ sonable hours of employment according to local conditions, overtime to be paid for and a half¬ holiday in the summer; (3) retiring and lunch rooms to be separated and regulated according to the sanitary laws; (4) recognition of fidelity

and length of service and general considerate treatment.

The National Consumers' League was or¬ ganized in 1898 for the purpose of regulating conditions of manufacture rather than sale. The national organization is a federation of State leagues; the governing body is a council consisting of representatives from the State leagues. The council annually elects a president, two vice-presidents, two secretaries and a treas¬ urer; and these, with two representatives from each State league, constitute the executive com¬ mittee of the council. Any person living where there is no local or State league may join the national society by paying a yearly fee. The main lines of its work are enlisting the aid and interest of authorities in the enforcing of labor laws and furthering of necessary legisla¬ tion ; investigating conditions of labor and awarding the use of the league's label to manu¬ facturers conforming to their standard; educat¬ ing public opinion by lectures, correspondence and literature. The standard for establishments entitled to the label demands: (1) That all State factory laws be complied with ; (2) that the label be used only on goods made on the premises; (3) that no children under 16 be employed; (4) that no person work over 60 hours a week; (5) the league shall have the right of inspection. The national organization embraces leagues in all the States.

Bibliography. — Brooks, (The Consumers' League) ; Brooks, (Label of the Consumers' League) (in the American Economic Associa¬ tion's Publications, 3d series, Vol. I, 250-258) ; Kelley, (Aims of the Consumers' League) (in the American Journal of Sociology, Vol. V, 289) ; Lowell, Consumers' League) ; McVey, (Work and Problems of the Consumers' League) (in the American Journal of Sociol¬ ogy, Vol. VI, 764) ; and the reports of the National Consumers' League.

CONSUMPTION. There have been two meanings given by economists to the term con¬ sumption of wealth. By one group it has been made to include any utilization of wealth in which the wealth is used up or destroyed in the process. By another group it means only such utilization as gives direct satisfaction to a consumer. Under the first definition, coal is consumed when it is burned to make steam for the running of machinery as well as when it is burned to supply warmth for the comfort of the human body. Under the second defini¬ tion only the latter use of coal would be called consumption. They who hold to the first defi¬ nition are compelled to divide consumption into two kinds, namely, productive consumption and unproductive consumption. It is always ex¬ plained, however, that the term unproductive consumption does not mean useless or unneces¬ sary consumption. It means merely that wealth thus consumed, in contradistinction to that which is productively consumed, is not used up in the process of producing other wealth. It is used, rather, for the final purpose for which all _ wealth is produced, namely, the direct satisfaction of human desires or needs.

The tendency among recent writers is to use the term consumption in the narrower sense. By the consumption of wealth under this definition is meant the culmination of the whole economic process, namely, the satisfac-

tion of human desires. Wealth which is used up or worn out in the process of production is not itself

yielding consumers' satisfactions, di¬ rectly. It is helping to produce other things which will directly satisfy consumers and may therefore he said to be indirectly satisfying desires. By the consumption of wealth, under this narrower definition, is meant its utiliza¬ tion in the direct satisfaction of human desires. The physician's automobile which is used in his profession is being worn out, but it is not being consumed in the technical economic sense. But when it is used for his own enjoyment or that of his family it is being consumed. Again, a thing may be in the process of consumption even though it is being used up very slowly. A diamond which is used as an article of pleasure or adornment is in the process of con¬ sumption even though it may never be really worn out. A substantial piece of furniture, when used for direct satisfaction, is being con¬ sumed. While it is in a furniture store, the immediate purpose of the owner is to gain a profit from it rather than to enjoy it. There¬ fore it is not yet in the process of consumption. In short, the consumer of an article is the one whose desires it satisfies directly. The article begins being consumed whenever it begins satis¬ fying a consumer's desires directly, that is, when it has passed through all the channels of business and trade, where it was used for. the purpose of getting an income, and passes into the possession of someone for whose satisfac¬ tion it was designed.

Most textbook writers on economics have regarded the consumption of wealth as a de¬ partment of the subject, co-ordinate with such departments as production, exchange and dis¬ tribution. None of them, however, has given as much space to it as to these other depart¬ ments. The reason apparently has been the general opinion that consumption is essentially an individual matter with which the public has had little or no concern. Laws relating to consumption have been called sumptuary laws, and have generally been condemned, or only half-heartedly approved. There is a growing opinion, however, that consumption is quite as important, from its effects on national pros¬ perity, power and greatness, as any department of economics. Even the regulation of consump¬ tion, as in the case of laws regulating or pro¬ hibiting the use of alcoholic beverages, is be¬ coming popular. Probably no movement of the present day in America is quite so popular or so democratic as the prohibition movement.

The importance of the consumption of wealth is further emphasized by the consideration that as many and as dire calamities have overtaken nations and peoples because of their irrational habits of consumption as because of inefficient systems of production, exchange or distribu¬ tion. In fact, there is a very profound reaction of consumption upon all the other departments, particularly upon distribution. The standard of living of the laboring classes, which is a part of consumption, has much the same influence upon the price of their labor as that exercised by the cost of production upon the price of a material commodity. Again, the rate of the accumulation of capital, upon which so many things depend, is largely determined by the habits of consumption. The effect of luxury upon industry and general national strength is

*one of the largest of all questions. These illustrations are enough to show that the sub¬ ject of consumption deserves the most careful study and the most serious treatment which economists can give it. Systematic work on the principles of consumption has been done by Cuhel, (Zur Lehre von den Bedurfnissen * (Innsbruck 1907), and Brentano, (Versuch einer Theorie der Bediirfnisse) (Munich 1908). Examples of the application of the principles of consumption to the problems of progress are found in Patten, (Theory of Prosperity> (New York 1902), and Sombart, (Der moderne Kapitalismus) (Leipzig 1902). See Distribu¬ tion; Income; Wealth.*

Thomas N. Carver,

Professor of Political Economy, Harvard U niversity.

CONSUMPTION. See Tuberculosis.

CONTACT, in astronomy, a word used in describing eclipses of the sun and moon, and also the transits of the inferior planets. In a solar eclipse contact takes place at the instant when the limbs of the sun and moon just touch each other either exteriorly or interiorly; in a lunar eclipse, when the shadow of the earth just touches the limb of the moon; and in the case of a transit of Venus or Mercury, when the limb of the planet just touches the sun's limb either exteriorly or interiorly. The instant of interior contact and of exterior contact are distinguished by these names.

CONTACT ACTION. See Catalysis.

CONTACT METAMORPHISM. See

Metamorphism.

CONTAGION. Before the time when the microscope and other laboratory aids showed the actual causes of many disease processes in the human — and other animals — body, the word contagion was surrounded by much mys¬ tery. At the present time the term ((com- municableˆ is preferable. Thus communicable diseases are those which result from actual or remote contact with the host. There are a great many such communicable diseases. The actual contagium or causative factor is known for many, while for others it has yet to be definitely determined. In many instances where the actual contagium is known, the method of the transmission is still in doubt. Thus' in the group of exanthematous diseases such as measles, scarlet fever, smallpox, chickenpox, the actual contagion has not been demonstrated. For diphtheria, whooping cough, boils, carbuncles, tuberculosis, typhoid fever, cerebrospinal menin¬ gitis, gonorrhea, plague, cholera, pneumonia, erysipelas and influenza the actual causative agents are minute plants belonging to the group of bacteria. The contagium of syphilis, sleeping sickness, yaws, Aleppo boil and a group of related diseases are minute animalculae of the protozoa group. The contacts here are direct ; while malaria, which is also a communicable disease, is caused by a minute animal form of the protozoa group, which is usually transmitted by an intermediary host, such as the mosquito. Thus in malaria the process is as follows : The minute animal form causing it is found in the blood and other tissues of the sick individual. This is taken into the body of a biting mosquito, usually of a special type, Anopheles ; for the common chills and fever of the United States, the malarial parasite undergoes a series of

changes in its mosquito host and then is carried to a well individual through the bite of an infected mosquito. In former years much non-, sense was talked and taught by physicians about miasmas, and dangerous night air, and the harmfulness of dampness, etc. The dangers existed, not in a hypothetical miasm, but in real mosquitoes that usually flew and fed about dusk and which lived in wet, springy localities If there were no patients with the parasite, there would be no malarial plasmodia to be communicated. Hence malaria is stamped out either by getting rid of mosquitoes or isolating patients and preventing the mosquitoes from carrying away blood with the real cause.

Many communicable diseases are borne by the air and involve the respiratory tract. In¬ fluenza and pneumonia are among these. In epidemics breathing masks worn by the sick may prevent spread of contagions. Typhoid fever and cholera are usually communicated by means of the digestive canal. They are best eradicated by proper sanitation. They are pre¬ ventable. A community which has much typhoid fever is deficient in social intelligence. Such a community prefers corrupt politics to clean water supplies and deserves what it gets, the death of its young people. High per¬ centages of typhoid in communities is in direct proportion to the social enlightenment of the same communities.

In general it may be said that so-called dis¬ infectants, etc., which are used to prevent com¬ municable diseases are a relic of the dark ages. <(Cleanliness is next to godliness® is a good maxim, but should apply to spiritual cleanliness as well. The fight against gonorrhea and syphilis is a losing one. The moral tone of the race is still too infantile to stamp these scourges out in the community as yet. Certain restrictive measures are of some service, but a higher degree of sexual intelligence is needed to combat these two prevalent communicable diseases. So long as knowledge of the most important function of the human race is con¬ sidered improper, so long will gonorrhea and syphilis be widespread. When the community realizes that sex knowledge is the most import¬ ant kind of knowledge to have, then that com¬ munity will gain the ascendancy over the so- called venereal diseases, and those individuals who have grown away from their infantile sexuality will live.

There is a whole group of communicable diseases due to contagions from animals. Such are tape worm, hook worm, round worms, etc. Here the ova, or eggs, pass from the animal direct, through handling dirty animals, dogs particularly, or the fecal matter containing the ova is conveyed through water supplies, or through food contaminated by infected water. The old distinctions between contagion and in¬ fection are no longer tenable, hence the terms are used interchangeably, or better,

supplanted by the term communicable.

Smith Ely Jelliffe.

CONTARINI, k5n-ta-re'ne, the name of a noble family of Venice, one of the 12 that elected the first doge. The most important members were Domenico, doge of Venice from 1043 to 1071 or 1073. He rebuilt Grado, and reduced the city of Zara, which had revolted. During his reign the rebuilding of Saint Mark's

Church was undertaken. Jacopo, doge from 1075 to 1080. Under his reign the Venetians forced the city of Ancona to acknowledge their sovereignty over the Adriatic Sea. Andrea, doge from 1367 to 1382. The Genoese, under Pietro Doria, had conquered Chiozza in 1379, and threatened even Venice. Andrea Contarini reconquered Chiozza, captured the Genoese fleet and delivered the republic from its enemies (1380). Francesco, fran-ches'ko, doge from 1623 to 1625. Under him Venice, in al¬ liance with Louis XIII of France, the Duke of Savoy and the Protestant cantons of Switzerland, reconquered the Pays de Vaud in 1624, of which the Austrians had taken possession. Carlo, doge from 1655 to 1656. Under his reign Lazaro Mocenigo, admiral of the republic, in June 1655 gained a brilliant victory over the Turks in the Dar¬ danelles. Domenico, doge from 1659 to 1674. During his government Venice resisted for five years the attacks of the Turks on the island of Candia; but on 26 Sept. 1667, after a siege and defense of unexampled obstinacy, Fran¬ cesco Morosini surrendered the island. Am- brogio, am-brd'jd, from 1473 to 1477, was am¬ bassador of the Republic at the court of the King of Persia, Usun Kassan. The interesting description of his residence at this court first appeared at Venice in 1487, in Italian. Gas- paro, diplomatist, who served as Venetian Am¬ bassador to the Diet of Worms in 1521. From there he accompanied Charles V to the Nether¬ lands, England and Spain and negotiated a permanent peace between the Republic and Charles V in 1529. Pope Paul III conferred on him the cardinal's hat in 1535. In 1541 he was papal legate at the Diet of Ratisbon, where he distinguished himself by his moderation. After his return he was sent as legate to Bologna, where he died in 1542. Giovanni: b. Venice 1549; d. 1605; was one of the most distinguished painters of his age. He worked in the style of Titian, and was particularly skilful in paint¬ ing ceilings; for example, his (Resurrection) in the church of San Francesco di Paolo, in Venice. Vincenzo, ven-chen'zd: b. Venice 1577; d. 1617; a scholar whose reputation was in early life so great that the magistrates of Padua established a new chair of Latin and Greek eloquence only to retain the learned youth of 26 years of age in their city. He lec¬ tured there until 1614. At one time there were no less than 18 branches of the family; one of the most important was that of Contarini dallo Zaffo or di Giaffa who had been invested with the countship of Jaffa in Syria for their services to Caterina Cornaro, queen of Cyprus ; another was that of Contarini degli Scrigni, so called on account of their great wealth.

cont£, kon-ta', Nicolas Jacques, French inventor: d. Annon-sur-Orne, near Sees, 4 Aug. 1755 ; d. Paris, 6 Dec. 1805. He was at first a painter but afterward turned to the mechanical arts and when France was deprived through its war with England of its plumbago supply, he invented a substitute in the shape of a mixture of graphite and clay which was subsequently used for the manufacture of black lead pencils, known as <(crayons Conte.® This process was the foundation of all subsequent manufactures of pencils. After several suc¬ cessful experiments in the use of the balloon

for military purposes he was made director of the French Aerostatic Institute and chief of the aerostatic corps of the army. He accompanied the French army at the time of Napoleon's expedition to Egypt and erected works in Cairo for the manufacture of arms, ammunition, sur¬ gical instruments, bread and other necessaries. He also invented a barometer (1798) similar to Vidi's. In 1802 he instigated the foundation of the Society for the Encouragement of National Industry. When the results of the Egyptian expedition were ready to be published, Conte was commissioned to take complete charge of its production. He endeavored to construct an engraving machine for this purpose, but died before the work was well under way. Consult Jomard, (Conte, sa vie et ses travaux* (Paris

1852).

CONTEMPORANEITY OF GEO¬ LOGICAL STRATA. Formerly strata found partly with identical, partly with allied fossils, were held. to be exactly contemporary, though widely separated on the earth's surface ; now the .same facts are used to establish the con¬ trary conclusion. If each species came into existence at a certain spot on the earth's sur¬ face, from which it gradually spread in various directions, it cannot have reached a remote re¬ gion till some considerable time after its birth. Two strata, then, widely separated in the world, containing some species common to both, are contemporaneous in this sense, that they were formed while that species lived ; but the stratum near its birthplace is likely to be older than the one to which it spread after it had already multiplied greatly and rooted itself successively in all of the intervening regions, wherever a place appropriate for its habitation could be found.

CONTEMPT, a wilful disregard or dis¬ obedience of a public authority. The Consti¬ tution of the United States provides that each House of Congress may determine the rules of its proceedings, punish its members for dis¬ orderly behavior, and, with the concurrence of two-thirds, expel a member. The same pro¬ vision is substantially contained in the constitu¬ tions of the several States. The power of making rules carries with it that of enforcing them, and the power to attach persons who violate them, and to punish them for contempt. Courts of justice have an inherent power to punish all persons for contempt of their rules and orders, for disobedience of their process and for disturbing them in their proceedings. The penalty is fine or imprisonment or both. The guilty person may have these penalties re¬ mitted by "purging the contempt, i.e., by mak¬ ing pecuniary reparation for any damage resultant of his action, and by apologizing for his fault. The breach of the rules of conduct set down by the judiciary for certain persons, though committed out of court, is a contempt, also. The use of this jurisdiction of punish¬ ment for contempt in labor disputes has been given the name of "government by injunction* as an arbitrary method of dealing with offenses without trial by jury and the other safeguards of criminal law. Consult Rapajje, (Treatise on Contempt* (New York 1884) ; and Oswald, (Contempt of Court, Committal and Attach¬ ment and Arrest on Civil Process) (London*

1895).

CONTES BLEUS, kdnt' ble' (Blue Tales). The (Contes bleus) of Edouard Laboulaye are stories, mainly fairy tales, from various sources, including the invention of the author, which owe their charm not merely to the material of folk-lore that they contain and to the stamp of the popular imagination that it bears, but also and in larger measure to the alert, graceful and good-humored style in which they are told. For Laboulaye was really yery far from the naive popular imagination ***in which fairy tales were born, «and even in retelling authentic ones he slips in many a mischievous thrust at the weaknesses of poor human nature, many a satirical reflection on social and political insti¬ tutions, and often comes dangerously near pointing a moral. Indeed he distinctly recom¬ mends the reading of fairy tales for children for their moral value. "There is often more moral stuff in a fairy tale,*** *he says, "than in all the history of Rome. They were born of the wisdom of the race.* In proportion as he draws more on his own invention, the marvelous becomes the transparent mask of whimsical satire directed against the vices and foibles of men and informed by the love of free and liberal institutions of which Laboulaye was an ardent defender. By the nimbleness of the mind that plays about the most various themes and touches grave questions with a laugh, by the sparkling wit and the mordant irony, some of these tales might almost be taken for "contes philosophiques* of Voltaire — of a lesser, good-humored Voltaire, without the sneer.*

The (Contes bleus) appeared in three vol¬ umes: (Contes bleus) (1863); (Nouveaux

contes bleus) (1867) ; (Derniers contes bleus) (1883). They have been in part translated by Mary L. Booth under the title Laboulaye's (Fairy Book (New York 1866).*

Arthur G. Canfield,

Professor of Roman Languages, University of Michigan.

CONTES D'HOFFMANN, Les, opera by Offenbach (q.v.), first produced in Paris, 10 Feb. 1881: in New York, 14 Nov. 1907.

CONTES DE FˆES, kont' de fa' (Fairy Tales). The (Contes de Fees, or Fairy Tales, published in*

1697 under the name of "Perrault Fils, who was then only 10 years old, were written by his father, the Academician Charles Perrault, better known through his controversy with Boileau about the relative merits of the Ancients and Moderns. The stories were not original, but belonged to the universal folk¬ lore, as old as humanity itself ; to Perrault belongs the credit of having given to them a definite literary form, not entirely free from certain mannerisms of the time, yet simple, natural and well adapted to the subject and to the minds of children. Such stories as (Blue Beard, * (Puss in Boots,* and (The Sleeping Beauty) have become a part of the world litera¬ ture of childhood, and have been widely imitated everywhere.*

Published under the title (Contes de ma mere l'Oye, or Stories from Mother Goose, both stories and title have caused many specula¬ tions as to their origin. The most plausible theory about the origin of such stories is that the human mind in its infancy received the same impressions from the various phenomena*

of nature, and from its own feelings of hunger, fear, love, etc. The stories telling of such emotions were further modified by migrations to different countries and climes. (Mother Goose) has been said to represent many noted personalities, from the wife of Charlemagne to the Queen of Sheba, and even the Virgin Mary! She is more likely the personification of the ˆGrandmother® or the <(01d Nurse® giving free rein to her imagination for the entertainment of young children. The ((Fairies® who do such wonderful things in these stories are, as their name indicates (French: fee; Latin: fatum, fata, fate, destiny), the living representation of the many influences which affect our lives, favorably or otherwise. They are creations of the mind instinctively attracted and affected by the unusual, the mysterious and the unknown.

Perrault's (Fairy Tales) have been translated into all languages ; they have brought about the collection of many stories of folk-lore in all countries, and have been widely imitated, par¬ ticularly by the Brothers Grimm, Hans Ander¬ sen, etc., and in France by George Sand,

(Stories of a Grand Mother ; Ch. Nodier,*

(Evening Stories) ; and Daudet, etc.

Louis A. Loiseaux.

CONTESTED ELECTIONS. See Elec¬ tions.

CONTI, koii'te', the name of a distinguished French family, a younger branch of the Bour¬ bon house of Conde, deriving its title from the small town of Conti near Amiens. It sprang from Armand de Bourbon, Prince of Conti, brother of the great Conde (b. 1629; d. 1666). He took an active part in the troubles of the Fronde both for and against the court, and married the niece of Mazarin. His son, Fran¬ cois Louis (b. 1664; d. 1709) was brought up under the eyes of the great Conde, served with distinction under the Duke of Luxembourg, and was elected king of Poland by a number of the magnates, but declined the honor. The last of the house of Conti was Louis Francois Joseph, b. 1734; d. 1814.

CONTI, Augusto, Italian philosophical writer: b. San Miniato, Tuscany, 1822; d. 1905. He studied law at several Italian universities and practised in Florence until 1848, when he enlisted as a volunteer for service against Austria. Subsequently he practised law and taught philosophy at San Miniato, in 1855 was made professor of philosophy in Lucca, in 1863 professor of the history of philosophy in Pisa, and in 1864 professor of mental and moral philosophy in Florence. His published works include cEvidenza, amore e fede, o i criteri della filosofia (1862, and subsequent editions) ; (Storia della filosofia* (1864); (L'Armonia delle cose) (2 vols., 1878) ; (Filosofia ele¬ mental (1869; 9th ed., 1879); (Dio come ordinatore del mondo) (1871); CI1 vero nell' ordine) (1876, 1891). In these works Conti makes an earnest attempt to bring into agree¬ ment the teachings of different philosophical schools.*

CONTINENT. A definition of continent based on the origin and development of land masses is not

possible in the present state of our knowledge, and about all that can be done is to define a continent as a very large body of

land. Africa, North America, South America, Europe, Asia and Australia are such land areas, but since Europe and Asia form a single land mass, many physical geographers speak of the two as one continent — Eurasia. There is also probably a land area of continental size in the Antarctic regions.

Origin of Continents. — The solid earth, the lithosphere, is largely covered by water, the hydrosphere ; the proportion of land to water on the surface of the globe being about 1 to 2.63, making the land surface about 27.5 per cent of the total. The extreme height of the land above sea-level is about five miles (Mount Ever¬ est 29,000 feet), and the extreme depth of the ocean somewhat more ; the extreme relief of the lithosphere is therefore over 10 miles. Ac¬ cording to Lapparent the mean elevation of the continents is as follows: Europe 958 feet; Australia 1,118 feet; South America 1,702 feet; North America, 1,953 feet; Africa 2,007 feet; Asia 2,883 feet. The mean height of all land is estimated at a little over 2,000 feet, and the mean depth of the ocean at 12,000 to 15,000 feet. Therefore if the solid earth, the lithosphere, were free from inequalities, the hydrosphere . would cover it, perhaps to a depth of over two miles. Inequalities of surface have, however, existed since the earliest geological time of which we have knowledge. The oldest rock formations show traces of sedimentary origin, and therefore represent in part the waste of land areas from the action of streams and the waves of the ocean. So far as North America is concerned the position of the continent had been determined in Archaean time. What de¬ termined the position of this and other con¬ tinents is, however, still an unsolved problem, though there are several theories, each with some show of reasonableness.

The generally accepted theory is that when the crust of the molten earth had solidified and cooled enough to allow the condensation of aqueous vapor, it cooled and contracted un¬ equally, some parts cooling and contracting toward the centre more rapidly than others. Thus were formed areas of depression and ele¬ vation, the seas filling the former, and the higher parts of the latter projecting above the water as land. The water would hasten cooling under the depressions, and thus the general tendency would be to increase the area and elevation of the land and increase the depth, but decrease the area of the sea. Those who hold that the earth was never molten believe that the oceanic segments are heavier than the continental (a fact substantiated by actual in¬ vestigation), and that as a result, the continental blocks are forced aside and up by the settling of the heavier oceanic blocks.

Distribution and Form of Continents. — The distribution and form of continents show some curious features, and on these features theories of the origin of continents have been based. North and South America, for instance, are roughly triangular in shape, with the apex of the triangle at the south. Eurasia and Africa together form another roughly triangular land area tapering to the south, the Cape of Good Hope being the apex of the triangle. Owing to the lands tapering to the south, the northern hemisphere contains more land than the south¬ ern, and it is possible to divide the globe, by taking a north pole in t>hc English channel, into

two hemispheres, one nearly all land, and the other nearly all water.

Continents consist typically of a great in¬ terior basin bordered by mountain ranges, this form being shown by the continents of some¬ what regular outline, the irregular Eurasian continent being an exception. In each continent the greatest mountain system faces the greatest ocean. In North and South America these mountains are on the west, facing the Pacific, with the smaller Appalachian Mountains, the Venezuelan Mountains and Brazilian highlands facing the Atlantic. In Africa the greatest range is on the east, facing the Indian Ocean, in Australia the greatest range faces the Pacific, and in Asia the Himalayas face the Indian Ocean. Omitting the mountains of Eurasia, the mountain chains of the world have a northwest- southeast or northeast-southwest direction, and on this account the continents taper toward the south.

From the base of the mountains to the sea is a gentle slope or plain, and this plain extends frequently some distance beyond the shore, forming a continental platform or shelf. The outer edge of this

platform is usually at a depth of about 100 fathoms (600 feet) when the bottom slopes rather sharply — forming the continental slope — to the depths of the ocean. Off the coast of New Jersey the 100-fathom line is 110 miles from shore, while on the coast of California it is only about 10 miles from shore. Great Britain stands on such a shelf and is really part of the continent of Europe. In the same way the East India islands to Celebes arc part of Asia. New Zealand may be considered part of Australia.

Permanency of Continents. — It is one of the commonplaces of geology that the lands are continually changing; by weathering, by rivers and by the waves of the ocean the rocks are worn away and spread out as sediments on the sea. floor. In some parts of the world the land is apparently rising, in others sinking. The northern coast of Norway is rising five feet in 100 years, the coast of New Jersey and parts of the New England coast are sinking. At Boston the rate is about one foot in 100 years, and on the New Jersey coast two feet. Yet geologists, while admitting the instability of the lands, differ as to the permanency of continents. Lyell believed that neither continents nor oceans — so far as any particular part of the earth is concerned — are permanent. His views have been opposed by later geologists, who have thought that while continents may change form, certain parts of the earth have always been covered by oceans, while others have not ; the Atlantic and Pacific, for instance, were always oceans, while the continents, even if at times partly covered with water, have always been uplifts in the sea floor, or if not always, at least since Archaean times.

It is recognized, of course, that these uplifts have been under shallow, or epicontinental, seas many times. This is shown by the following facts. In the first place, chalk beds correspond¬ ing to the globigerine ooze that covers much of the ocean floor are found in the interior of continents ; in the second place, the study of fossils has shown that at times in past ages continents now separated by oceans had essen¬ tially the same fauna and flora. The evidence of deep-sea deposits shows that in Cretaceous

time a fairly deep sea covered much of Mexico and parts of Texas, New Mexico, Arkansas and Kansas, while another, or perhaps the same wide, deep sea covered southern Europe and northern Africa and extended across Asia to the Pacific. In Cretaceous time, therefore, the continental land masses did not have their present form and arrangement, and theories as to the origin of continents based upon present land forms are at best of doubtful value. The evidence of fossils indicates that in Permian time the Antarctic land mass was of far greater extent than now, and joined South Africa, Patagonia and Australia. Again in Cretaceous time the evidence indicates that Brazil, south central Africa, Madagascar and India were con¬ nected by land masses, so that the Atlantic and Indian oceans had not at all their present shape. There is some reason for believing that no longer ago than the beginning of the Glacial Period the Arctic lands were of far greater ex¬ tent than now, Asia, North America and Europe being connected. Thus, while it is fair to as¬ sume that the position of the continents was determined ages ago, there is nothing per¬ manent about their forms or the present dis¬ tribution of land and water on the earth. See Geography; Geology.

Bibliography. — Mill, (International Geog¬ raphy } (New York 1900) ; Suess, (Das Antlitz der Erde) (Leipzig 1885) ; English trans., (The Face of the Earth) (Oxford 1904-09) ; Dana, (Manual of Geology) (New York 1895) ; Neu- mayr, (Erdgeschichte) (Leipzig 1895) ; Penck, (Morphologie der Erdoberflache) (Leipzig

1894).

CONTINENTAL CONGRESS. See Con¬

gress, Continental.

CONTINENTAL DEPOSITS. See Ter¬

restrial Deposits.

CONTINENTAL MONEY. See Money,

Paper, Continental Money.

CONTINENTAL NAVY. During the summer and fall of 1775, the British attempts to subdue resistance in the colonies on land was supplemented by harrying their shipping and coasts by sea. Several merchant vessels were made prizes in violation of law. Glou¬ cester was fired on, and Bristol bombarded to obtain provisions. Most of the colonies equipped armed vessels for themselves and com¬ missioned privateers. On 5 October news came that two British transports were on the way to Quebec with military stores; and as our armies needed these worse than the British, Congress on the 13th appointed a board of three (Silas Deane, John Adams — afterward replaced by Christopher Gadsden — and John Langdon) to fit out two swift armed vessels and intercept these or any other store-ships. This board was the Navy Department of the Revolution for a time; it was turned into a marine committee, marine board, etc., with under boards called the Continental Naval Board, Board of Admiralty, etc. On 18 October Falmouth (now Portland) was bombarded and set on fire; and on the 30th two more and heavier vessels were author¬ ized. The naval committee was doubled and made general managers of naval matters, sub¬ ject to final decision by Congress, which ap¬ pointed the officers down to third lieutenant — the "patronage" question being as burning here as in the Continental army. The beginnings of

the American navy were curiously inauspicious for a nation of skilful and daring seamen, and for a body with so brilliant a subsequent record. The officers were largely incompetent, and the men mutinous. A brilliant exception was Captain Manly of the schooner Lee, who cap¬ tured several prizes, including a brig loaded with heavy guns, mortars and tools. Finally, on 25 Nov. 1775, Congress gave up the grisly pretense of being at loyal peace with Great Britain, and declared all ships of war employed against the colonies, and all supply tenders for them, lawful prize ; authorized privateering and colonial courts to try prizes ; adopted rules and regulations for a Continental navy; and on 13 December directed the marine committee to build and fit out five 32-gun frigates, five 28's and three 24's, by April next. These were esti¬ mated to cost $866,666.66, and were to be built at the leading colonial ports from Portsmouth to Baltimore, and elsewhere (Norfolk, Charles¬ ton, etc.), if thought advisable. Other vessels might be bought and equipped. On 22 Decem¬ ber Esek Hopkins was made commander-in¬ chief. Among the first lieutenants was John Paul Tones. On 9 November two battalions of marines were authorized. By January eight cruisers had been collected at Philadelphia, and Commodore Hopkins started on a cruise, but was detained six weeks by the ice, and only got clear 17 February. He had been instructed to ((annoy the enemy's ships upon the coasts of the Southern States® ; but finding nothing of Dun- more's squadron, sailed to New Providence in the Bahamas, where a quantity of British mil¬ itary supplies were stored, stormed the place, and carried off a quantity of stores and 80 cannon, besides the governor and some leading citizens as hostages. On his return he fell in with some armed vessels, which he captured, and the 20-gun frigate Glasgow, which, after a spirited fight, escaped. Congress held an in¬ quiry into Hopkins' conduct in June, decided that he had exceeded his instructions, censured him and finally dismissed him. This did not encourage enterprise, and naval service became unpopular. No new naval commander was ap¬ pointed, the President afterward being given that rank. The vessels, however, did some clever work, and captured many prizes ; but the greater part of this service was accomplished by privateers. At the. time of the Declaration of Independence our navy consisted of six regularly built war vessels and 19 merchantmen with naval armament, the whole with 422 guns. Against this the British had 78 men-of-war, with 2,078 guns.

Next in importance to the Bonhomnie Richard's fight with the Scrapis, the most cred¬ itable naval engagement of the war was Ben¬ edict Arnold's battle on Lake Champlain. The importance of the naval battles on this inland lake is hardly realizable now; but till the time of railroads the lake was the one route for a large invading expedition between Canada and New York or New England, enabling supplies to be transported where otherwise the moun¬ tains or the forests would have made it im¬ practicable. The English had 29 vessels with 89 guns ; four longboats with stores ; 697 men of the regular navy; and Indian allies. Arnold had 15 vastly inferior vessels, with 88 lighter guns, and about 750 men ignorant of naval service. Several of Arnold's vessels had to be

abandoned and destroyed; two were captured; but several were saved in spots the English could not reach, by Arnold's heroic risk of himself. The British loss was about 40, the American about 80. But the battle lost the British the campaign ; the struggle had been so severe that Sir Guy Carleton, the

commander, did not venture to assail Ticonderoga, and shortly after retired to winter quarters.

The most famous work done by the navy, however, resulted from commerce-destroying in British waters. Our fleets were nearly as much masters of the English Channel as the English were at the time of the Armada, though we never had more than three or four ships there at a time; for the English could not protect their own commerce. No other enemy ever disturbed the marine insurance rates, not even France across the channel; but in a short time now they rose to prohibitive rates, and the com¬ panies even refused to insure English bottoms at any premium, so that the Thames was crowded with French vessels. The alarm and fury of the English were shown not only in the execrations of (

Meantime Congress had ordered the con¬ struction of three 74-gun men-of-war, five large frigates and one or two smaller vessels; but as money ran short, they were never finished. At the end of 1778 the navy consisted of four 32- gun ships, two 28's, one 24, one 20, three 18's, one 12 and one 10 — 14 in all, with 332 guns; while England had on the American coast 89 ships with 2,576 guns. In 1779 the most notable events were the capture on 7 May of seven transports with about 50 guns and some 300 men, by a Boston squadron under Capt. J. B. Hopkins, son of the ex-commodore ; that of eight prizes worth over $1,000,000, in July; that in August, by two Continental vessels on a short cruise, of six prizes with 54 guns; and on

7 May, the same day as the first, a most bloody and desperate action of an hour between two 12-gun brigs, the United States Providence and the British Diligent, in which the latter lost

8 killed and 19 wounded out of a crew of 53,

or over half. In 1779 and 1780 Capt. John F. Williams won two brilliant victories in 14-gun and 18-gun Massachusetts State vessels. But on 13 Aug. 1779 a heavy disaster befell the waning little Continental navy. Three vessels, a 32, a 14 and a 12, accompanied a fleet of Massachusetts privateers to dislodge the Eng¬ lish from a fort near the mouth of the Penob¬ scot ; but, seven English war-ships coming up to reinforce the three already there, the privateers fled, and the Continental vessels had to be run up the river and destroyed. By the fall of Charleston four more — two 28's, a 24, and the celebrated 18-gun sloop Ranger — were captured or destroyed; another had been lost; and at the end of 1779 the navy had but six vessels left, so that it was very hard to run the English blockade. Officers and seamen were scarce also ; for the English dreaded the Amer¬ ican privateers and naval destroyers so much, few as they were, that they systematically re¬ fused to exchange prisoners, and connived at the destruction of the Americans in pestilential hulks or prisons. In October 1780 the Saratoga, after taking three prizes, which were recap¬ tured, foundered; and in 1781 the Trumbull was captured after a fight against superior force in which she was crippled. But the small rem¬ nant still won some victories. The Alliance on 28 May 1781 captured a 16-gun and a 14-gun brig; and early in 1782 the Deane captured four vessels with 48 guns. In April 1782 was fought a very brilliant action bv a privateer, one of the most remarkable of the war : the Pennsylvania State cruiser Hyder Ally, Lieut. Joshua Barney, having 16 6-pounder guns and 110 men, engaged the British sloop-of-war General Monk with 20 9-pounders and 136 men. Despite this enor¬ mous disparity of force — 96 pounds of metal against 180 pounds — the American vessel forced the British to strike in half an hour, with a loss of 20 killed and 33 wounded, against 4 killed and 11 wounded. Another remarkable contest was won by a private Philadelphia cruiser, the Congress, off the Southern coast. She had 20 guns, but was manned almost en¬ tirely by landsmen, seamen being unobtainable. On 6 Sept. 1781 she fell in with a British 16-gun sloop-of-war, the Savage, with her regular com¬ plement of seamen. In about an hour and a half, lying so close that the guns scorched the opposing gunners, and shot were thrown by hand, the British vessel was fairly shot to pieces, and forced to surrender, with a loss of 8 killed and 24 wounded, against 30 of both on the privateer. The last naval fight of the war was between the Alliance, Capt. John Barry, and a heavy English ship, which the former drove off during a run to Havana. The Con¬ tinental vessels lost during the Revolution num¬ bered 24, with 470 guns. The British loss was 102, with 2,622 guns. The American navy and the privateers together captured about 800 prizes from the British. British privateers did not capture a single Continental vessel ; Amer¬ ican privateers captured 16

English cruisers, with 226 guns. Consult Maclay, (History of the American Navy> (Vol. I, 1893) ; Cooper, (History of the Navy of the United States (1839). See Navy of the United States.*

CONTINENTAL SHELF, that part of the ocean bottom covered with shallow water, and extending from the littoral belt out

to the 100 fathom line. Beyond this line lies the continental slope, or edge of the continental block, merging into the abysmal seas. The sediments that accumulate on the shelf are often called shoal water deposits. Those that accumulate on the continental slope are termed aktian deposits, and this belt is sometimes called the aktian belt. The sedi¬ ments of the deep sea are termed abysmal de¬ posits.

CONTINENTAL SYSTEM, a plan de¬ vised by Napoleon to exclude Great Britain from all intercourse with the continent of Eu¬ rope and thus compelling her to acknowledge the maritime law as established at the Peace of Utrecht. The history of the continental system began with the famous decree of Berlin of 21 Nov. 1806, by which the British Islands were declared to be in a state of blockade; all com¬ merce, intercourse and correspondence were prohibited; every Briton found in France, or a country occupied by French troops, was de¬ clared a prisoner of war; all property belonging to Britons was accounted fair prize, and all trade in British goods was entirely prohibited. No vessel coming directly from Great Britain or British colonies, or which had been there since the publication of the edict, was to be admitted into any harbor, and all vessels at¬ tempting to avoid this edict by false declara¬ tions were to be confiscated, with all their goods, as British. The reasons assigned for this decree were, that Great Britain did not acknowledge the international law accepted by civilized nations, but treated every individual belonging to the country of the enemy as if found in arms ; made even the crews of mer¬ chantmen prisoners of war; extended the right of conquest over merchantment and private property, and the right of blockade over places and harbors not fortified ; over the mouths of rivers ; nay, over whole coasts and countries. But many of these measures had always been taken, in maritime ways, even by France her¬ self, as long as she had the means. One great reason for this and all the subsequent decrees of Napoleon was that he considered Great Britain his inveterate enemy and the enemy of the political doctrines wrhich took their rise from the Revolution.

Great Britain immediately directed reprisals against the Berlin decree, first by an order in council of 7 Jan. 1807, by which all neutral ves¬ sels were prohibited to sail from one port to another belonging to France, or one of her allies, or to a nation so much under her con¬ trol that British vessels could not have inter¬ course with it. Every neutral vessel which should violate this order was to be confiscated with her cargo. A second decree of 11 Nov. 1807 was much more oppressive to commerce. By this all harbors and places of France and her allies in Europe and the colonies, as like¬ wise every country with which Great Britain was at war, and from which the British flag was excluded, were subjected to the same restric¬ tions as if they were closely blockaded ; all com¬ merce in the manufactures and productions of such countries was prohibited, and vessels en¬ gaged in such commerce were to be confiscated, as also all those vessels whose certificates showed that they were built in the enemy's country. Another order in council declared th$

sale of vessels by the enemy to neutrals un¬ lawful, and the intended transfer of property void.

Hardly were these orders promulgated when France made counter- reprisals. By a decree of Milan of 17 Dec. 1807, aggravated by a decree of the Tuileries 11 Jan. 1808, every vessel, of whatsoever flag, which had been searched by a British vessel, and consented to be sent to Great Britain, or had paid any duty whatever to Great Britain, was to be declared denationalized, and to have become British property; and in every case such denationalized vessel, as also those which had broken the blockade declared against the Ionian Islands, or had sailed from a British harbor or British colony, or those of a country occupied by the British, or which were destined for any such ports, were declared good prize. By the Treaty of Tilsit (1807) Russia consented to close her ports to English commerce. In order the more effectually to annihilate the British commerce, the tariff of Trianon, re¬ specting colonial goods, was proclaimed 3 Aug. 1810. This was extended by another decree of

12 September of the same year, and both were followed by the decree of Fontainebleau, 18 October of the same year, directing the burning of all British goods. These decrees were to be executed with more or fewer modifications in all countries connected with France. The con¬ sequence was that the price of colonial goods rose enormously; a regular smuggling trade was carried on at different points ; for instance, at Heligoland, which was sometimes so crowded with persons concerned in this business that a ducat was paid for a barrel to sleep in ; thou¬ sands of substitutes for colonial goods, particu¬ larly for coffee and sugar, were invented, and a variety of manufactures grew up on the Con¬ tinent which were the germs of very extensive and flourishing branches of industry. The sys¬ tem was abolished immediately after the fall of Napoleon. But its continuance on the English side was one of the causes of the War of 1812. Consult Mahan, (The Influence of Sea Power on the French Revolution and Empire) (Bos¬ ton 1894) ; Thiers, (Histoire du consulat et de l'empire) (Paris 1845-62) ; Cime, (Etude sur les tarifs de douane et les traites de commerce) (Paris 1875) ; Adams, Henry, (History of the United States } (New York (1889-91).

CONTINENTALS, or CONTINENTAL ARMY, the army of the United States during the Revolution. In May 1775, after the battle of Lexington, the Provincial Congress of Massachusetts requested the Continental Con¬ gress to assume control of the forces which had gathered around Boston. Further outside pres¬ sure led the latter Congress in June to vote for raising a "Continental army® (the name "Con¬ tinental® in all these cases expresses the hope, long entertained, that Canada would join the revolt), and for a loan of $2,000,000 to support it. On the 15th George Washington was ap¬ pointed Gommander-in-chief ; then four major- generals were appointed, Artemas Ward, Charles Lee, Philip Schuyler and Israel Put¬ nam ; and an adjutant-general, Horatio Gates. Lee and Gates were bitterly opposed in Con¬ gress, and were only confirmed by Washington's influence, as men of approved military capacity. It is curious that Congress was right and Wash¬ ington wrong, and that Lee's treachery and

Gates' incompetence and intrigue nearly ruined the cause and Washington together. The brig¬ adiers appointed were general officers in colon¬ ial service, with two others; and the inferior colonial officers were confirmed in their rank and shortly given Continental commissions. For commissary-general was chosen Joseph Trumbull, son of the governor of Connecticut, Washington's right-hand man and adviser, who kept a great general store in Lebanon. There was a further reason for this. The food sur¬ plus of the country came mainly from three great valleys, — the Connecticut, the Hudson and the Delaware ; the last two were held by, or liable to raids from the British during most of the war, and the Connecticut Valley was the one rich farming country which the British could not molest. Hence the first two commis¬ sary-generals were both Connecticut merchants. Washington appointed his aide, Thomas Mifflin of Pennsylvania, quartermaster-general ; and Dr. Benjamin Church of Boston was made director of the army hospital. There was no paymaster- general till late in 1776, when William Palfrey of Boston was appointed. On 12 June 1776 Congress voted to appoint a "Board of War and Ordnance® of five members; in 1777 this was changed to a "Board of War,® to consist of three persons not members of Congress. This board has not left an enviable historical repu¬ tation ; but it lacked neither ability nor patriot¬ ism. In part its troubles were due to civilian misunderstanding of and contempt for military claims and feelings ; in part to the insistence by the States on their share of army patronage, as now of civil patronage, which drove some of the best generals from the service and con¬ tributed to Arnold's treason.

The army was constituted by taking into colonial pay the militia regiments of the vari¬ ous colonies, and enlisting others for a year. The number on the war office rolls during 1775 was 27,443, besides an estimate of 10,180 militia for a few months' service during 1776, 46,891 regulars, 16,700 militia as before. Had these all been in the field and good troops, and well equipped, they would have been fairly sufficient, though not what could or should have been raised; but half or more were on paper, the material was poor, the equipment insufficient and the whole system incompatible with effect¬ iveness. The term of enlistment was too short for the soldiers to learn their business ; the militia absolutely refused to submit to disci¬ pline, and their insubordination affected the regulars. Washington during the campaigns of 1776 urged upon Congress a plan for a perma¬ nent army; that body sent a committee to the camp at Harlem Heights, and drew up a scheme generally in accord with his views, which Con¬ gress adopted. The "armies® of different sec¬ tions were to be consolidated into one body, of 88 battalions with 750 men each, to be raised in the States according to population and re¬ sources ; besides a Canadian regiment to be called "Congress' Own.® The largest numbers, 15 battalions each, were to come from Massa¬ chusetts and Virginia. The men were to be enlisted for the war, with a bounty of 100 acres of land each at the end ; officers, higher

amounts ; colonels, 500 ; and $20 bounty for each recruit. The States were to enlist their quotas, arm and equip them ; and to appoint the officers from colonel down though Congress

was to commission them. But the plan worked slowly and poorly. Enlistments for the war were so few that a three years' term was sub¬ stituted ; to stimulate even these, Massachusetts began and other States continued the policy of greatly -increasing the bounties, and towns and counties bid still higher; but this rather made the process slower, men waiting to see how high the bids would go. Washington was shortly invested with dictatorial powers to re¬ move any officers under brigadier, and fill the vacancies at his discretion; and allowed to raise 16 extra battalions. This somewhat strength¬ ened his scanty lines, and enabled him in a slight degree to rectify the mischief done by the State patronage, give commissions to good otficers, and keep others from retiring. But even so, and despite incessant drafts from the militia, the total number of soldiers enrolled in 1777 was but 34,820 regulars and 10,100 militia; in 1778, 32,899 and 4,353; in 1779, 27,699 and 5,135; in 1780, when the Carolinas and Georgia were in British hands, and none of their troops were on the roll, 21,015 and 5,811 ; in 1781, when Cornwallis surrendered, 13,292 and 7,298. It would seem that if the British could have held out a little longer, or sent one more army to America, the Continental army would have melted into nothing without the country taking pains to keep it up.

The reason was not lack of men, nor any ruinous exhaustion of resources ; it was simple administrative anarchy (see Confederation, Articles of), which could not collect and dis¬ tribute the resources we possessed, and which left the soldiers half fed, less than half clothed, and for long periods unpaid. This was in¬ creased by a jealous dread of the army itself (see Cincinnati, Society of the), bred by historical experience which they had as yet no other to countervail ; they appreciated victories, but were not inclined to pinch themselves for daily supplies. In 1777 the soldiers' back pay was settled up in Continental money, at about 12 for one, though Massachusetts made good a part of the depreciation. Arrears steadily accumulated till the end of the war, though in 1778-79 a half-pay system for seven years was provided for the officers, and a gratuity of $80 for the men. In January 1781, the Pennsyl¬ vania regulars struck, and were pacified with difficulty and by certificates for their pay; the New Jersey troops followed suit; and Congress in alarm made requisition on the States for $879,342 to pay the arrears. About half the amount came in, and Massachusetts and New Hampshire sent gratuities to their men ; but the rest lagged. About this time the Articles of Confederation were adopted, making the con¬ sent of nine States necessary for appropria¬ tions ; Congress was even more helpless than before; and as the time of a general disband¬ ment drew near, the officers began to fear that it \yas intended to turn them off without paying them, and if they did not receive it while in the field they never would. Meantime Congress was debating the subject. The later Federalist party wished to fund the army dues as well as the other public debt, and give the army in¬ terest-bearing certificates ; the decentralizes wished to leave it to the States to settle each with their own troops. The officers, finding the half-pay project highly unpopular, wished to commute it tor a lump sum, in cash or securities.

About this time, 10 March 1783, an anonymous letter called a meeting of the officers in camp at Newburg, and an anonymous address sug¬ gested that if Congress refused justice, they should desert the country in a body, under Washington's lead. Washington denounced this call as seditious, but called a meeting himself, at which his influence kept patriotism upper¬ most ; but he wrote urgently to Congress, and it finally agreed to commute the half-pay into five years' full pay in certificates at 6 per cent in¬ terest. The States were very indignant at this, New England especially denouncing the whole scheme of half-pay: the Massachusetts legis¬ lature passed a resolution that it tended to ((raise and exalt some citizens in wealth and grandeur to the injury and oppression of others.® The soldiers were furloughed on three months' pay till the British should evacuate New York, when they were discharged. The number of troops nominally furnished by each State is as follows :

Massachusetts, 69,907; Connecticut, 31,939; Virginia, 26,678; Pennsylvania, 25,678; New York, 17,781 ; Maryland, 13,912; New Hamp¬ shire, 12,497; New Jersey, 10,726; North Caro¬ lina, 7,263; South Carolina, 6,417; Rhode Island, 5,908; Georgia, 2,679; Delaware, 2,386. Total, 231,791. Adjutant-generals: Horatio Gates of New York, Joseph Reed of Pennsylvania, Tim¬ othy Pickering of Massachusetts, Alexander Scammell of New Hampshire, Edward Hand of Pennsylvania.

Quartermaster-generals : Thomas Mifflin of Pennsylvania, Stephen Moylan of Pennsylvania, Mifflin again, Nathanael Greene of Rhode Island, Timothy Pickering of Massa¬ chusetts. Commissary-generals: Joseph Trum¬ bull of Connecticut, Jeremiah Wadsworth of Connecticut, Ephraim Blaine of Pennsylvania. Director-generals of hospitals : Benjamin Church of Massachusetts, John Morgan of Pennsyl¬ vania, William Shippen of Pennsylvania, John Cochran of New Jersey. Paymaster-generals: William Palfrey of Massachusetts, William Pierce of Georgia. Inspector-generals: Thomas Conway, Baron Steuben. Chief engineers : Louis L. Du Portail, Thaddeus Kosciusko. See Army of the United States.

CONTINGENT, a name often given to the quota of troops furnished by each member of a number of states composing a federation, or by each organization forming an army or navy.

CONTINUATION SCHOOLS, the term

applied to those systems of training which are adapted to people already at work in business or industry, especially for girls and boys be¬ tween the ages of 14 and 18. The original pur¬ pose of the schools was to provide that general education of which forced entrance into busi¬ ness at an early age deprived the workers. The development of the schools has been chiefly along the lines of substitution of further in¬ dustrial training in place of the general educa¬ tion and of day in place of night classes. The movement began in Germany where such schools in some form existed for many decades, their general and national character having been developed since 1870. They are voluntary — it is left entirely to the discretion of each local authority _ whether such a continuation school be established and the form, within rea¬ sonable limits, it may take. Two clauses in the Imperial Industrial Law of 1891 provide a limited measure of agreement. Clause 120 re-

quires employers of labor to grant to employees under 18 the necessary time to attend continua¬ tion classes in the daytime. Classes on Sunday are only permitted in exceptional cases. Clause 142 allows (but does not compel) a local au¬ thority to make attendance at a continuation school obligatory for all males under 18 not at¬ tending an approved secondary or trade school, and throws the responsibility for such attend¬ ance on the scholar's parent or employer, usually on the latter. Since 1891 the system has spread in all sections of Germany and become practically obligatory. Girls are brought within the scheme, but almost always for domestic training only. Apparently two distinct lines of thought control the authorities. On the one hand, it is held that teaching should be defi¬ nitely vocational — that is, specifically applied to the scholar's chosen calling. On the other, such a program of teaching is preferred as is calculated to produce a good citizen. The one demands technical skill, the other general efficiency. The former has moved in the direc¬ tion of elaborately-equipped- trade continuation school buildings. The latter is a very numerous class, especially in Prussia, and has hitherto been content with makeshift arrangements in elementary school buildings.

Two distinct types of buildings have been evolved. Examples of the first may be seen in the central continuation school at Bonn and in the central and northern continuation schools at Frankfort-on-Main. All erected within the last eight years, in none is there any trade teach¬ ing properly called. The first contains rooms for cookery and type-setting, the second a number of spare rooms in the basement eventu¬ ally to be utilized for workshops, and the third rooms for cookery. In Bonn boys and girls are taught in the same building; in Frankfort they are separated. There is ample provision for the teaching of applied drawing and ap¬ plied science ; but most significant in these three examples is the generous provision for recreation. There are large rooms, artistically decorated and well furnished, where concerts and dances are held and lectures given on Sun¬ days and in the evenings, as well as smaller rooms or alcoves for reading and games. In Munich, where trade-teaching is more con¬ spicuously developed, is less external evidence of this social side of school life, and the build¬ ings approximate very closely to the ordinary technical-school type. But Munich in pro¬ viding scattered district schools obviates as far as possible the long journeys and waste of time involved by a huge central building.

In England continuation schools, chiefly in the form of evening classes, have spread more and more. They are not obligatory. Owing probably to the lack of expert teachers, the system has not proved as satisfactory as de¬ sired, but its weak points will be improved in time. In the United States, the plan has been adopted in many cities with considerable suc¬ cess and is a hopeful feature of American edu¬ cation. It adapts itself largely to local needs and admits of varied forms. Another happy feature is the prominence attached to the teach¬ ing of foreigners chiefly in evenings as an in¬ tegral part of the course. The employers of large corporations, recognizing the value of further training, often provide such schools within their own establishments. Ireland has

a form of continuation school, which has made some headway since 1915, due to the Catholic Working Boys Technical Aid Association of Dublin which organizes social centres and con¬ tinuation classes throughout Ireland.

Bibliography.— Consult Pache, O., (Hand- buch des deutschen Fortbildungsschulwesens> (Wittenberg 1896-1902) ; Jones, A. J., Con¬ tinuation Schools in the United States y (Wash¬ ington 1907) ; Sadler, M. E., Continuation Schools in England and Elsewhere) (Manches¬ ter 1908) ; Ware, F., educational Foundations of Trade and Industry (New York 1901) ; Spranger, E., Che Significance of the Continu¬ ation School for the Educational System* (trans. by Porterfield in Educational Review, Vol. 42, No. 1) ; Kirschensteiner, G. M. A.,(The Schools and the Nation) (trans. by C. K. Ogden, London 1914).*

CONTINUITY OF STATE OF MAT¬ TER. See Critical Point.

CONTINUOUS VOYAGE. The doctrine of continuous voyage in international law was invented by Lord Stowell in the early part of the 19th century to meet the case of neutral vessels which, in the war between Great Britain and France, endeavored to evade the rule pro¬ hibiting neutrals from engaging in the enemy's carrying trade. This evasion was sought by interposing a neutral port between the point of departure and the forbidden destination. It being unlawful for neutral vessels to trade between a French colonial port and a home port in France they attempted to legalize the voyage by breaking it at a neutral port, usually in the United States. Lord Stowell held, however, that the two voyages were in effect one and the same, and therefore illegal, although each separate voyage was in itself legal. During the Crimean War the French prize courts extended the doctrine of continuous voyage to the car¬ riage of contraband and such cargoes, bound from one neutral port to

another, were con¬ demned whenever the evidence showed that the ultimate destination was in fact a port of the enemy. During the American Civil War the courts of the United States applied the doctrine on a large scale, likewise, to the carriage of contraband and blockade running. Thus British ships, with their cargoes, bound from England to the neutral ports of Nassau or Matamoras, were condemned whenever the evi¬ dence showed that the eventual destination was not a neutral port but in reality a port in the Confederacy. British writers on international law unanimously denied the legality of such an extension of the doctrine of continuous voyage and the British prize courts took the same view. Thus in the case of the Immina decided at the end of the 18th century, Lord Stowell refused to condemn a vessel bound from Dantzic to Emden, both neutral ports, notwithstanding the fact that Emden was situated only five miles from the frontier of Holland, a country with which England was then at war and although it was notorious that the goods were to be reforwarded from Emden to the enemy country. During the Boer War, .however, Great Britain for the first time abandoned her early attitude and undertook to apply the rule which her courts and text writers had formerly con¬ demned, and seized a number of German vessels bound for the neutral port of Lorenzo Marquez

in Delagoa Bay, on the ground that the real destination of the cargoes was enemy territory (The Boer Republics). During the Euro¬ pean War the doctrine of continuous voyage was applied by Great Britain on an ex¬ tensive scale to the carriage of goods be¬ tween the United States and the ports of various neutral countries adjacent to Germany and Austria. The Declaration of London sanctions the extension of the doctrine of continuous voyage to the transportation of absolute con¬ traband but forbids it in the case of conditional contraband, except where the belligerent has no sea board. Likewise it forbids the applica¬ tion of the rule to blockade running. Article 35 of the Declaration lays down the rule that conditional contraband is not liable to capture except when found on board a vessel bound for territory belonging to or occupied by the enemy, or for the armed forces of the enemy, and when it is not to be discharged at an inter¬ vening port. But the British order in council of 29 Oct. 1914 modified this provision so as to extend the rule of continuous voyage to the carriage of conditional contraband and also reversed the established rule by placing on the owner rather than upon the captor the burden of proving an innocent destination. The effect of the order in council was to obliterate the dis¬ tinction between absolute and conditional con¬ traband — a distinction which had already been largely abolished by putting on the list of absolute contraband many articles which were not so by their nature. The American and other neutral governments protested against the extension of the doc¬ trine of continuous voyage to the carriage of articles of conditional contraband between neutral ports and the establishment of presump¬ tions of hostile destination which, it declared, were based on suspicion rather than upon evi¬ dence. Cargoes of conditional contraband shipped from American ports to the ports of Denmark, Holland, Norway and Sweden, it was argued, could not lawfully be presumed to be intended for the use of the enemy. There was a large local demand in all these countries for such goods — a demand which had been largely increased by the cutting off of their European sources of supply on account of the war — and it was impossible to admit the right of a bellig¬ erent to determine what proportion of such shipments were intended for local consumption and what proportion was intended to be for¬ warded for the use of the enemy. If after such goods were delivered and became a part of the common stock of the neutral, they were sub¬ sequently resold and reforwarded to a bellig¬ erent, it was in consequence of a new destina¬ tion and the doctrine of continuous voyage did not apply.

To this argument the British government replied that it was unable to admit the conten¬ tion that if a belligerent was so circumstanced that his commerce could pass through adjacent neutral ports as easily as through ports in his own territory, his opponent had no right to intercept such commerce. The position of Great Britain was analogous to that of the United States during the Civil War; the enemy was flanked by neutral countries through whose ports a steady stream of supplies was pouring in for the use of the enemy, and following the practice of the United States during the Civil

War, Great Britain was endeavoring to cut off this supply by extending to its carriage the doctrine of continuous voyage, that is, it was endeavoring to prohibit neutrals from doing indirectly what they could not do directly. Under the circumstances the right of blockade and the right to capture contraband goods go¬ ing to the enemy would be largely illusory un¬ less the injured belligerent

were allowed to ap¬ ply the rule of continuous voyage to such traffic and seize cargoes whose ostensible destination was neutral territory but whose real destination was armed forces of the enemy. Manifestly the right of a belligerent to thus interfere with trade between neutral countries involves a serious encroachment on the rights of neutrals, but so long as the right of belligerents to block¬ ade the ports of the enemy and intercept con¬ traband trade between them and neutrals is admitted it would seem difficult to deny their right to apply a rule without which the weapons of blockade and contraband would in many cases be worthless. (See also Blockade; Con¬ traband; Search, Right of). Consult the authorities cited under Blockade; Contra¬ band; and Right of Search.

James W. Garner,

Professor of Political Science , University of Illinois.

CONTORNIATI, kon-tor-ne-a'te, ancient medals which have occupied the attention of antiquarians for a long time, and, on account of their rarity, are highly esteemed in cabinets. They are formed of a thin plate of metal (not of two different sorts, as is often supposed) with a flat impression. They differ from other ancient coins by having a furrow upon both their sides, where the others have a wreath of pearls. These hollowed lines (It. contorni) may have occasioned their name. Another charac¬ teristic of genuine contorniati is a cipher com¬ posed of the letters EP or PE, of which no satisfactory explanation has as yet been dis¬ covered, together with numerous impressed characters, and a great number of palm branches, the cavities of which are often filled with silver. They are also added by a second hand, and thereby are essentially distinguished from the "monograms,® so called in the lan¬ guage of the mint. They resemble the signa incusa (contremarques) on the Roman medals. All the contorniati are of bronze, and equal in size to the large bronze coins called medaglion- cini by the Italian collectors. Their form is various, their workmanship rude and their in¬ scriptions are frequently different from the usual curial style upon the ancient coins. From these circumstances we may conclude that they did not belong to the age of the Roman emperors whose image they bear, but to a later one. Eckel, in his masterly treatise on the contorniati, follows the opinion of Morelli and Mahudel, who consider them to have been made from the reign of Constantine the Great to that of Valentinian. It has been ascertained that they were not struck by public authority; and the ancients have transmitted no account of their destination, which must, therefore, be left to conjecture. The frequent representa¬ tions of race-grounds, palms, men shouting to the charioteers, and even the images of the emperors upon them, make it probable that they were distributed as tickets of admission or as certificates to successful competitors in

*the games at the circuses in Rome and Constan¬ tinople. Consult Smith, (Dictionary of Greek and Roman Antiquities.**

CONTOUR, kon'toor, the outline or de¬ fining line of any figure or body; also the hori¬ zontal outline of works of defense. When the conformation of the ground or works is de¬ scribed by contours or horizontal sections, these sections are taken at some fixed vertical interval from each other suited to the scale of the drawing or the subject in hand, and the dis¬ tances of the surface at each interval above or below some assumed plane of comparison (usually sea-level) are given in figures at the most convenient places on the map. The con¬ tour lines, that is, represent the shore lines that a rise in the ocean would cause it to assume. Of course, embayments of this shore line corre¬ spond to valleys that would be drowned, and promontories to ridges. Contour lines close together mean that a considerable rise in the sea-level would have a comparatively slight effect in pushing back the shore line, which must therefore be situated on very steep ground. As water always flows down hill by the steepest path, and as a line squarely across the contour lines will meet more of them in a given interval than one that meets them slantingly, it is clear that the lines by which the rain is carried off the ground meet all the contour lines at right angles, and that consequently the streams must do likewise. This relation between streams and contour lines, coupled with the fact that streams flow along the bottoms of valleys, and conse¬ quently pass through the inmost points of em¬ bayments in the contour lines, is of the utmost value to the topographer, who always bases his contouring of a region on its drainage.

Two contour lines cannot cross except where there is an overhanging cliff. A contour line cannot terminate; it must either be closed or run off the map. A closed contour line either encloses a hill-top or a depression, which in general has no stream leading from it. Such depressions are rare except in very dry climates, and even there usually contain a salt lake or marsh, so that confusion between hills and valleys is not likely to arise in reading the map.

It is possible to determine within fairly close limits whether of two points given on a. contour map one is visible from the other. This is one reason for the immense superiority of contour maps over all others in military operations.

The contour interval varies according to the scale and purpose of the map and the nature of the terrain. In the United States army, maps with a scale of 12 inches to the mile are sup¬ posed to have a contour interval of five feet; those with a scale of six inches to the mile have a contour interval of 10 feet; those with a scale of three inches to the mile have a contour interval of 20 feet, and those with a scale of one inch to the mile have a contour interval of 60 feet. This makes the distance between the contour lines dependent only on the mean slope of the ground and not on the scale of the map. In mountainous country, however, the contour intervals may have to be doubled or trebled to obtain a legible map. See Map; Surveying; and the map of a part of the Housatonic quad¬ rangle in Geological Survey, vol. 7 — 38

CONTRABAND. Contraband (from con¬ tra bannuni or bandum , contrary to the ban or edict), is a term applied to certain articles which international law allows a belligerent to seize and confiscate even when found on neutral vessels, and which are being transported for the use of the enemy. By means of a blockade (q.v.) a belligerent may cut off all neutral trade and intercourse with his enemy; through his power to capture contraband goods he may pre¬ vent neutrals from furnishing the enemy with such goods as by the law of nations are re¬ garded as contraband. These are the two prin¬ cipal weapons which international law places in the hands of belligerents for cutting off the over-sea commerce of their enemies, the effec¬ tiveness of each depending, of course, upon the sea power of the belligerent which employs them. Both may be resorted to at the same time, and in the hands of a nation which con¬ trols the seas they may become a means of reducing the enemy to starvation and thus com¬ pel him to surrender. International law, how¬ ever, allows the citizens or subjects of neutral powers to carry on at their risk contraband trade with either or all belligerents, subject to the rights of the injured belligerent to capture and confiscate all such articles as fall within the category of the contraband. Their govern¬ ment is not bound to prohibit them from engag¬ ing in such traffic; on the other hand, it is not their duty to intervene to protect them from losses which they may sustain from having their goods captured by one of the belligerents.

Different governments have held different views as to what articles properly fall within the category of contraband and the policy of the same state has not infrequently varied from time to time, sometimes quite inconsistently. Grotius, the first great writer on the law of nations, classified articles into three groups : first, absolute contraband, or those used exclu¬ sively for war purpose's; second, innocent goods, or those incapable of being used at all for mili¬ tary purposes ; and third, conditional contra¬ band, or those susceptible of being used both for purposes of peace and war. This classifica¬ tion has in practice been generally observed by belligerents, although there has been no agree¬ ment as to what articles fall in each class. The subject was discussed at the second Hague conference in 1907, but no decision was reached. It was again considered at the London Naval Conference of 1908-09 with more success, but the declaration adopted by the conference has not been ratified by any of the governments there represented. At the outbreak of the European War most of the maritime powers of Europe put the Declaration into effect with certain modifications, some of which related to the subject of contraband. The Dec¬ laration, although unratified, represents the nearest approach to an agreement among the maritime powers that has ever been reached. It enumerates a list of articles embracing such things as arms, munitions, armor plates, war¬ ships, military clothing and harness, pack and draft animals, etc., which are declared to be absolute contraband. In the second place it contains a list of articles declared to be condi¬ tional contraband, and embracing such things as food-stuffs, cloth, coin, vehicles, air-craft, fuel, barbed wire, horseshoes, field glasses, etc. ; and the third group embraces various articles

which are declared not to be contraband at all, such as raw cotton, wool, silk, flax, hemp, rub¬ ber, rosin, rawhides, metallic ores, paper, soap, agricultural machinery, precious stones, clocks, feathers, etc. These lists, however, are not considered as absolutely fixed, for article 23 of the Declaration allows belligerents to add other articles used "exclusively for war purposes® to the list of absolute contraband, and article 25 permits similar additions to be made to the list of conditional contraband. It does not, however, permit the placing on the list of absolute con¬ traband of articles which are susceptible of both innocent and warlike use nor does it allow belligerents to treat as contraband, either abso¬ lute or conditional, articles which are suscep¬ tible only of innocent use. The disregard of this rule by the entente allies during the Euro¬ pean War in treating cotton, air-craft, copper, rubber, glycerine, zinc, lead, wool, tin, castor oil, and various other commodities as absolute contraband evoked a protest from the German government and was the subject of complaint in the United States and other neutral countries.

The rule governing the liability of contra¬ band to capture varies according to whether the goods belong to the class of absolute or condi¬ tional contraband. Under the Declaration of London absolute contraband is liable to capture if it is destined to any place within the enemy country or the territory occupied by him ; on the other hand, conditional contraband is liable to capture only when destined for the use of the armed forces or for the government of the enemy state, but it is presumed to be destined, when the goods are consigned to the enemy authorities, to a government contractor or to a fortified place or a naval base within the enemy country. These and other rules of the Declara¬ tion are admittedly unsatisfactory. The pre¬ sumptions which it establishes in regard to hostile destination are vague ; nothing is gained by condemning conditional contraband goods destined to a government contractor and allow¬ ing those consigned to a private merchant to go free, since the latter can sell to the government as readily as the former may; again every important port is fortified, yet the existence of fortifications is no indication as to the ultimate use of the goods ; almost every place in this age of railways may serve as a "base® of supplies; finally nothing is gained by preventing an enemy from obtaining supplies from a "fortified® place, a "base® or from a government "contractor® when he may obtain them with equal readiness from private dealers, through the power of requisition. The penalty for carrying contra¬ band is the confiscation of the goods; likewise, the vessel carrying the goods may according to the Declaration of London be condemned if the contraband constitutes more than half the cargo. Whether the captor may sink the ship with its cargo if he cannot take it in to a home port was raised during the Russo-Japanese War in 1904 when the Russians sank the Knight Com¬ mander, a British vessel laden with contraband goods destined for Japan. The British govern¬ ment denied the legality of the act' and de¬ manded the payment of an indemnity by the Russian government. The sinking by a German cruiser during the European War of the American sailing vessel William P. Frye, laden with grain destined for England, evoked a protest from the government of the United

States. In consequence of treaty stipulations between the United States and Germany, the German government agreed to compensate .the owners of the vessel. But in the case of the Maria, a Dutch vessel carrying contraband to England and sunk by a German cruiser, the German government declined to make compen¬ sation to the owners of the ship, there being no treaty between Germany and the Netherlands similar to that between Germany and the United States. Many other neutral vessels laden with contraband have been sunk by German naval commanders.

Inasmuch as the majority of controversies between belligerents and neutrals are usually connected with trade in contraband and in view of the lack of agreement concerning what is and what is not contraband, it has been proposed to abolish the right of belligerents to inter¬ fere with such trade and to leave them merely the right of blockade. Such a proposal was made by the British delegation at the second Hague conference in 1907. The supporters of the British proposal pointed out that the right to interfere with trade between neutrals and belligerents is out of harmony with modern conditions ; that the number and variety of contraband articles have greatly increased; that the increased size of ships has made search on the high seas more and more difficult, thus necessitating the taking of them in to distant ports and subjecting shippers to ruinous delays; and that improved railway facilities have made it impossible to prevent contraband from reach¬ ing belligerents. As evidence of the growing dissatisfaction with the existing rules in respect to the right of belligerents over contraband trade, it may be remarked that the British proposal received the support of 26 of the 35 states which voted on the proposition, only five voting against it. Another proposal which has been widely approved is the abolition of condi¬ tional contraband and the substitution of a single list of articles, by general agreement, these to be liable to capture if consigned to any person or place in

the enemy country. See Continuous Voyage; Search, Right of; Blockade.

Bibliography.— In addition to the treatises cited under International Law, consult Atherly- Jones, (Commerce in War ; Bentwich, 'The Declaration of London) ; Cohen, (The Declaration of London* ; Kleen, (De la contre- bande de guerre* ; Pyke, Contraband of War* ; Von Ferneck, (Die Kriegskonterbande.**

James W. Garner.

CONTRABASS. See Double Bass.

CONTRACT. Of the positive rules obeyed by men, in a society which has reached the stage in which we live, the greater part are made by contract; the lesser only are made by imperative law. Indeed, the speculative and philosophical writers of the 18th century on sociology and politics, under the influence of Montesquieu and Rousseau, were filled with a notion of a "social contract® as the origin of law. Obedient to the impulse thus given, they assumed that the form of contract resting uppn. the mere consent of the parties was the original. The assumption was the outcome of their reasoning that social development began with a state of nature, in which innocence and simplicity prevailed, to a state of increasing complexity and sophistica-

tion. Accordingly the simpler forms were believed to pertain to the older and more natural order of society. The history of contract shows the truth to be exactly opposite. The ((cere- monial® contract, in which the failure to observe a mere technical formality was fatal to the obligation, is the real original. There is nothing in early times like the interposition of law to compel the fulfilment of a mere promise. The idea of the State intervening to enforce obligations resulting from one man's reliance on the word of another was of slow growth, and its realization was one of the latest fruits of civil¬ ization. Early law sanctioned only that prom¬ ise which was solemnized by a prescribed cere¬ monial ; and, when duly solemnized, a promise became a contract, which the law recognized and would enforce, even though obtained through duress or deception. Informal engage¬ ments the Roman lawyers called pacts, to dis¬ tinguish them from ˆtransactions with the copper and balance,® which alone were entitled to the name of ˆcontracts.® The distinction is observed in our law to this day. The delivery of a clod of earth is no longer an essential in the conveyance of land, but deeds and sealed instruments in general are still differentiated from other contracts; and the distinction is not merely verbal — it is radical, setting (

tracts, strictly speaking, is concerned only with promises or agreements which remain to be performed in whole or in part — in a word with executory contracts. The very definition of a contract, as ((an agreement which creates an obligation,® implies the exclusion of agreements all the conditions of which have been fulfilled and which have resulted in the creation of rights in rent. An obligation which has been per¬ formed is no longer an obligation. A more appropriate distinction than that between ex¬ ecuted and executory agreements would be one between contracts which create rights in rem, such as rights of possession and ownership enforcible against the whole world, and those which create rights in personam, enforcible only against the person obligated.

Law of Contracts. — Almost every con¬ ceivable human relation or right may be subject matter of a contract, though contracts contra¬ vening public policy would be absolutely void, and not merely voidable for their illegality. A person could not sell himself into slavery, nor make an enforcible agreement to commit a crime ; to do an act forbidden by statute, nor to do a civil wrong. The compounding of, or an agreement not to prosecute, a felony, or to procure legislation by corruption, to promote litigation (champerty), etc., would not be con¬ tracts ; but would be crimes. But an agreement would not be illegal even though the thing agreed to be done should be unwise, unreasonable or absurd. The essentials of a contract are (1) two or more parties, for a man cannot make a contract with himself, and an agreement be¬ tween two departments of the same corporation would be a nullity; (2) there must be a common intention, which must have been communicated from one party to the other; (3) what is agreed to must be possible and legal ; (4) the agreement must have been expressed in some manner, or must be inferable from the acts of the parties; (5) the agreement must either be evidenced by a solemn formality — the sealing and

acknowledgment of a bond or a deed; or there must be some fact which affords a motive for the making of it — in the language of the lawyers, ((a consideration moving.® All agree¬ ments spring from an offer and its acceptance. The acceptance must be unconditional, for, if it is conditional, the acceptance is, in effect, a new offer; the minds of the parties have not met and there has been no agreement. Acceptance must be contemporaneous with the offer, or the latter may be withdrawn at any time before it has been accepted. A bid at an auction, for instance, has been held not to bind the bidder until the hammer has fallen. A party making an offer by mail, however, cannot withdraw the same after the party of the other part has sent his acceptance by post ; though an offer by mail may be countermanded by telegraph or phone before it has been assented to. An offer made in an instrument under seal cannot be revoked even though not immediately accepted by the party to whom the tender is made. The con¬ sensus of the parties must be real. Absence of consent not merely avoids an agreement but renders it a nullity. There is no real consent when one of the two parties does not mean the same thing as the other, or when an unavoid¬ able mistake has been made — as where the object of an agreement does not exist, or where an agreement is made to buy a cargo (

5ye

CONTRACT

ex Peerless? there being two ships of that name, one of which was intended by the buyer and the other by the seller. Fraudulent misrepresenta¬ tion, of course, invalidates consent of the defrauded party and vitiates the agreement. Mere exaggerations of a vendor crying his wares are not necessarily fraudulent; repre¬ sentations are fraudulent in law only when

made recklessly, with knowledge of their falsity or without belief in their truth. To invalidate consent it must have been materially induced by the misrepresentations. Only where the utmost good faith is required, as where one party stands in a fiduciary relation to another, may even the innocent misrepresentation or non-disclosure of facts invalidate an agreement ab initio. When the consent of a party is ob¬ tained by undue influence no contract has been made. Threats of injury to or the withholding of property, when made by a person in a posi¬ tion to dictate, constitute undue influence — as, where a banker refuses to honor the check of a customer unless the latter accedes to a false or fraudulent claim; or a water company refuses service unless a promise is made to which it has no right. Consent is nugatory, of course, when given under duress, meaning a threat of bodily harm to the promisor or the restraint of his liberty. The matter agreed upon must be possible of performance as well as legal. An agreement to jump over the moon would not be a contract ; but a promise to build an aeroplane that could cross the Atlantic in four days would be, the performance of the promise being, con¬ ceivably, possible. A physical impossibility is not necessary ; a practical impossibility is sufficient to avoid an agreement — for instance, to recover a ring known to be lying at the bottom of the sea. An agree¬ ment which imports to have a legal effect un¬ known to the law is void. An agreement may be expressed either in writing or orally, or one may be inferred from a course of conduct. The latter is called an ((implied contract.® The intention of the parties must have been com¬ municated from one to the other. In an old case of the time of Edward IV it was said by the court in reference to an unexpressed accept¬ ance, <(your having it in your own mind is noth¬ ing, for it is trite law that the thought of a man is not triable, for even the devil himself does not know what the thought of a man is.® In a developed system of laws it is not necessary that the offer and acceptance be made by the parties face to face. They may be communi¬ cated by post or by telegraph or telephone, by messenger or other go-between. A contract made by mail need not be contained in its entirety in one letter and the answer thereto ; it may be the outcome of a long correspondence and may be made partly in writing and partly by word of mouth. A contract, unless it be a <(specialty,® need not follow any prescribed form, and it may be made through agents. Contracts are sometimes said to be <(implied in law.® The term is not happily chosen, for an examination of the cases shows that obligations by legal implication do not spring from contracts at all. For instance, when one receives money which should have been sent to another he is under obligation to turn it over to the person legally entitled thereto. To say that he is under an implied contract to pay is illogical, however, —

for, where is the contract? After all the re¬ quirements above enumerated have been satis¬ fied, something is still necessary to the making of a legal contract. Either some legally pre¬ scribed formality must be observed, as in the case of a sealed instrument; or, in respect to contracts not

under seal, there must be a con¬ sideration. A parole promise, for which no consideration has passed or is to pass, is a nudum pactum , and is unrecognized by the law. No action can be founded on the same. A pecuniary consideration, however, is not neces¬ sary to support a parole contract. Any benefit to the party promising or any loss or detriment to the promisee would be a sufficient considera¬ tion. The benefit need not flow from promisee to promisor; this or the detriment or loss suffered by the promisee may be to the advan¬ tage of a third partv and would still be regarded a good consideration. A promise to do or to forbear doing something would be a good con¬ sideration just as would be the deed or the forbearance itself. An offer to perform per¬ sonal services and acceptance of the offer with a promise to pay for the services would make a mutual contract. The confidence reposed in one who undertakes a service may be a suffi¬ cient consideration. Thus, one who was en¬ trusted with the removal of wine casks from one place to another, though without pay, was held to have violated a contract when he per¬ formed the task so negligently that damage resulted. On the other hand, the consideration must have some real value. Marriage has been held by our gallant judges to be the most valuable of all considerations ; it will give legal support to the most extravagant ante-nuptial promises. The contract of marriage is of any and all classes ; it may be ceremonial and formal or merely parole ; it is an executed contract in so far as it has resulted in the creation of the marital relation and the legal rights of each of the parties in the property of the other, and it is executory with respect to the obligation of the husband to protect, support and maintain, and of the wife to love, cherish and obey according to the ritual. Contracts to give are usually en- forcible only in certain rigidly defined cases; in England such contracts must be entered into by deed. Gifts and other contracts, the per¬ formance whereof is one-sided, are called unilateral.

Contracts may be considered as principal and accessory. Principal contracts may be subdi¬ vided, according to their objects, into classes as follows: (1) Alienatory, which includes, besides gifts, all agreements of barter and sale and conveyances of land; (2) permissive use, includ¬ ing loans and lettings for hire; (3) marriage; (4) servict, a very large and most important class, including care-taking by depositories, warehousemen, etc., doing work on material, transportation, professional and domestic serv¬ ice, agency and partnership; (5) negative service, somewhat grudgingly recognized by law as interfering with freedom, and including contracts to withhold competition and other restraints of trade; (6) aleatory, which class includes bets and stakes, not enforced under modern legal systems ; lotteries, tabooed in this and some other countries ; wager contracts or stock jobbing— -but it includes also annuities, bottomry, marine insurance and all other kinds

of insurance. Accessory contracts are those — like (1) suretyship; (2) indemnity; (3) pledge; (4) warranty; (5) ratification — which create rights intended to be merely auxiliary to other rights. A contract of suretyship must be in writing according to the Statute of Frauds. Contracts are discharged: (1) By mutual agreement; (2) by performance; (3) by mer¬ ger in, or substitution of, another agreement, also called novation ; (4) by operation of law, i.e., prescription, statutes of limitation or be¬ cause of the disability or legal incapacity (through infancy, lunacy, coverture, etc.) of one or more of the contracting parties. The right of action on a contract is assignable but the assignment must be in writing. Generally speaking, simple contracts as opposed to ˆspecialties® may be entirely informal, and need not be written down, either in whole or in part. The English (Statute of Frauds) passed ®for the prevention of many fraudulent practices, which are commonly endeavored to be upheld by perjury and subornation of perjury,® ren¬ ders void any contract for the sale of goods for the price of £10 and upwards, unless there be a part delivery of the goods, or part payment of the price, or some note or memorandum in writ¬ ing of the bargain made and signed by the parties or their agents. The same statute, though it does not avoid the contract, allows no action to be brought on it until it has been written down and signed : When it makes an executor personally liable; or guarantees the debt of another; or creates a liability in con¬ sideration of marriage; or relates to an interest in land ; or is not to be performed within a year. Another later English statute requires that the reacknowledgment of a debt that has been barred by the statutes of limitation must also be written and signed. The provisions of the (Statute of Frauds) have been adopted with variations in most of the States of the Union. A written memorandum signed by the parties or their agents is generally required in the cases following :

(1) Contracts by their terms not to be per¬ formed within a year from the making thereof. (2) A promise to answer for the debt, default or miscarriage of another person. (3) Con¬ tracts made in consideration of marriage, except mutual promises to marry. (4) Promise of an executor, or administrator, to pay debts of de¬ ceased out of his own property. (5) Contracts for the creation of any interest or estate in land, with the exception of leases for a short term, generally one year. (6) Contracts for the sale of goods above a certain value, unless a portion of the price is paid or part of the goods deliv¬ ered. The required value of the goods sold varies in different States from $30 to $200. In a number of the States no such provision exists. (7) In many of the States declarations or con¬ veyances of trust estates. (8) In many States representations as to the character, credit or responsibility of another person.

Partial performance of the contract is gen¬ erally held to dispense with the necessity for a writing.

Freedom of Contract. — The clauses of the State bills of rights, which prohibit the impair¬ ment or deprivation of life, liberty or property without due process of law, serve as a protection to the right to make contracts respecting per¬

sonal services or property; with reference to the exercise of Federal power this right is protected by the Fifth Amendment to the Constitution; while, as regards action by the States, Amend¬ ment XIV provides that (

Impairment of Contracts. — Article I, section X, paragraph 1 of the Constitution provided that no State ((shall pass any law impairing the obligation of contracts,® and most of the State constitutions contain a similar limitation. But there is a distinction between contractual obliga¬ tions and those that are not contractual which may be determined by the ordinary legal rules defining the validity of contracts. The right to hold public office and the privilege of the elec¬ tive franchise are not contractual obligations, and may be changed b}ˆ subsequent legislation. Marriage and the inchoate rights of property existing in either party by virtue of marriage are subject to retrospective legislation. The constitutional prohibition applies not only to private contracts but to contracts made by a State or under its authority, wherefore no State by legislation may impair the obligations of its contracts. But the power to legislate on a subject may not be contracted away since one legislature may not bind a succeeding legislature with regard to matters coming within the scope of general legislative power, though in some cases a grant of certain rights or privileges may be deemed irrepealable. Thus, holders of bank notes issued under State authority or holders of State bonds which by statute have been declared receivable in payment of public taxes are protected by constitutional provision against infringement of their rights through subsequent legislation which aims to modify or repeal the statute conferring such rights. The further issue of such notes or bonds might be prohib¬ ited, but those who have acquired them while

the statute was in force are possessed of so- called vested rights. Private individuals may not sue a State on its obligations. Charters granted to private corporations are contracts and, unless the right to alter, amend or repeal has been reserved to the State, the benefits accruing from such charters cannot be with¬ drawn or impaired by subsequent legislation (see Dartmouth College Case), though most States have constitutional or statutory pro¬ visions limiting the protection against subse¬ quent legislation usually afforded to such char¬ ters by their status as contractual obligations. The charters of public corporations may not be considered as contracts, and, being in the nature of legislation, are subject to modification or repeal at the legislative will, if no individual interests have been vested under them. Mc¬ Clain says that, in general, subsequent remedial legislation changing the general law relating to procedure does not impair the obligation of contracts already made; but if a contracting party be deprived by statute of any substantial relief for breach of contract by the other party, then such statute constitutes an impairment of the obligations of the contract and to that extent is prohibited. Hence, while the period of limi¬ tation within which actions on contracts may be brought is subject to the legislative change, such change cannot be applied to existing con¬ tracts if the parties thereto be deprived of a reasonable time within which to bring action for enforcing their rights under their contracts.

Bibliography. — Addison, C. G., (Treatise on the Law of Contracts) (8th ed., Boston 1888) ; Anson, Sir W. R., Principles of the English Law of Contract (7th ed., Oxford 1893) ; Ballantine, H. W., (Mutuality and Con¬ sideration (in Harvard Law Review, Vol. XXVIII, pp. 121-134, Cambridge, Mass., 1914) ; Cooley, T. M., (Treatise on Constitutional Lim- itations) (7th ed., Boston 1903), and (Treatise on the Law of Torts) (3d ed., Chicago 1907) ; Demarest, T. F. C., (The Obligation of Contract in Its Relation to the United States Constitution 5 (in Albany Law Review, Vol. LXVII, pp. 315— 329, Albany 1905) ; Egan, J. G., Protection to Contracts by Due Process of Law) (in Ameri¬ can Law Review, Vol. XXXVI, pp. 70-91, Saint Louis 1902) ; Freund, E.} Police Power) (Chi¬ cago 1904) ; Helm, C. F., (Treatment of the Fundamental Principles of the Law of Con¬ tract5 (New York 1914) ; Judson, F. H., Pib- erty of Contract under the Police Power5 (in (American Bar Association Reports,5 Vol. XIV, p. 231, 1891) ; McClain, Emlin, Umpairment of Contracts5 (in McLaughlin and Hart, (Cyclo¬ pedia of American Government,5 Vol. I, pp. 456-459, New York 1914) ; McKeag, E. C., (Mistake in Contract5 (New York 1905) ; Page, W. H., Paw of Contracts5 (Cincinnati 1905) ; Parsons, T., (The Law of Contracts5 (9th ed., Boston 1904) ; Trotter, W. F., (The Law of Contract during War5 (London 1914) ; Wat¬ kins, E., (When, under the Social Compact, Liberty of Contract May Be Limited5 (in Sewanee Review, Vol. XVIII, pp. 466-482, New York 1910) ; Willoughby, W. W., (Constitutional Law of the United States5 (New York 1910).

Stephen Pfeil.

CONTRACT LABOR. Previous to 1885, when on 26 February, the Contract Labor Law was passed by Congress, employers of large

bodies of laborers were accustomed to arrange with their agents abroad for the shipment to this country of large numbers of an ignorant, servile class of foreign laborers — a practice that had a most disastrous effect upon home labor. These ((assisted immigrants55 reduced our labor market to a level with themselves, for not only was their passage-money paid, but they were bound by an agreement to work for a specified time at wages below those paid to resident laborers. A remedy for these evils was sought in the passage of the act above mentioned, which had a three-fold design, viz.: (1) to pro¬ tect the interests of our own laboring classes; (2) to raise the standard of foreign immi¬ grants; and (3) to check the immigration to this country of those who were unable to pay their own passage.

The main provisions of the Act are as fol¬ lows : —

First. ((The prepayment of transportation, or the assistance or encouragement of migration of aliens or foreigners under contract to labor in the United States, is unlawful.55

Second. <(Such contracts made previous to their migration are void.55

Third. <(Every person or corporation guilty of unlawfully assisting or encouraging the im¬ migration of such laborers is subject to a penalty.55

Fourth. <(The master of any . vessel know¬ ingly bringing such laborers into the country is to be decreed guilty of a misdemeanor.55

Various amendments have been added to the original act, providing for the proper in¬ spection of vessels to ascertain violations of the law, if any; to prevent the landing of aliens that come within the prohibitions of the Act, or their deportation, if landed; forbidding the soliciting of immigration abroad by promises of employment in this country; and extending the penalties for violation of the Act so as to include any who may assist in bringing in pro¬ hibited aliens. On 3 March 1903, the prohibi¬ tions contained in the above act were extended to all forms of implied contracts, and made to coyer labor or service of any kind, whether skilled or unskilled.

The Contract Labor Law and its supple¬ mentary legislation have been declared consti¬ tutional under the clause giving to Congress the power ((to regulate commerce with foreign nations;55 but the statute has been held by the United States Supreme Court to be directed only against the importation of unskilled cheap labor and to be applied solely to the "assisted immigrant brought into the country under con¬ tract to perform manual labor or service.55 It is held, therefore, by amendatory legislation since 1885, that domestic servants, actors, artists, lecturers, singers,

ministers, professors and members of a family or relatives of resi¬ dents not of certain other excluded classes, as persons insane, diseased, convicts, or paupers, shall be exempt from the prohibitory provisions of the Act, and are entitled to admission.

The above laws have failed, however, fully to protect immigrants from southern Europe against the labor contractors known as padrones, who, taking advantage of the immigrants' ig¬ norance of our language and customs, have gained control of laborers of their own race and often make large fortunes by furnishing these laborers to American employers. Consult United

States Immigration Commission, immigration Legislation (1912).

CONTRACT NOTES, the same as bought and sold notes (q.v.).

CONTRACT SURGEONS. By virtue of the act of 2 Feb. 1901, the Surgeon-General of the United States Army, with the approval of the Secretary of War, may appoint as many civilian physicians as may be necessary as con¬ tract surgeons, at a compensation not greater than $150 per month. Contracts may be general or special. Special contracts do not require travel or the giving up of private practice, and are for medical services at arsenals and similar places, where the amount of work does not justify the appointment of a medical officer. A general contract obligates the surgeon to take station and change station as ordered. He re¬ ceives pay as stipulated in the contract and the allowances of a first lieutenant. Contract sur¬ geons on general duty for more than three months must pass an examination like that for admission to the Medical Reserve Corps. Con¬ tract surgeons have a similar degree of au¬ thority over Hospital Corps men to that of medical officers and are accorded the same respect. The policy of the Army at present is against the appointment of contract surgeons on general duty, and reserve medical officers are now taking their place in increasing the military medical establishment. Formerly the Army employed dentists known as contract dental surgeons; these are now known as acting dental surgeons. See Dental Corps.

CONTRACTILITY. See Muscles.

CONTRACTIONS, abbreviations em¬ ployed with the view of saving labor in writing, and also in former times with the yiew of sav¬ ing parchment in extending MS. copies of works and deeds. See Abbreviations.

CONTRAST. A term employed in psy¬ chology to denote an enhancement of a sensory experience which is induced by another sensory experience of the same modality. Contrast is alleged by some psychologists to occur also in feeling, and the term is occasionally loosely employed as a principle of explanation of cer¬ tain spatial perceptions.

The contrast-effect may be successive or simultaneous. In successive contrast the in¬ ducing precedes the induced sensation in time. For example, an orange is more sour after dessert than before, the odor of Bordeaux is stronger following the scent of cheese, a surf of constant temperature seems warm on a cold day and cold on a warm day, a room of medium illumination seems light on emerging from a dark room, and dark on entering from the bright out-of-doors. In simultaneous contrast, on the other hand, the effect is induced simul¬ taneously and it is reciprocal with the inducing sensation. If, for instance, a sub-liminal sweet is placed on one side and a supra-liminal salt on the other side of the tongue, then the sweet becomes liminal and the salt is enhanced. The best known instances of simultaneous contrast occur, however, in the field of vision. If from the same sheet of gray paper two narrow strips are cut and placed the one on a black, the other on a white background, then the former will appear much lighter and the latter much darker than the gray sheet (brightness-con¬

trast). If, again, the same gray strips are placed the one on a well-saturated blue, the other on a good red background, and a sheet of tissue paper laid over all, then the former strip will be seen as yellow of poor chroma, the latter as a washed-out green (color-contrast). Vivid effects of color-contrast may also be seen in shadows, as, for example, the purple or violet shadows on the sun-lit snow. The results of the experimental investigation of color-contrast have been formulated in the

following laws : (1) The contrast-effect is always in the direc¬ tion of the complementary color; blue induces yellow, red induces blue-green, black induces white. (2) Color-contrast is greatest when brightness-contrast has been eliminated. (3) The nearer together the contrasting surfaces, the greater is the contrast-effect. (4) The elimination of contours enhances the contrast- effect. (5) The more saturated the inducing color, the greater is the contrast-effect.

Two types of theory have been offered in explanation of contrast, the one physiological, the other "psychological.® Physiologically re¬ garded, it may be said in general that successive contrast is the result of adaptation to the induc¬ ing stimulus ; an orange is more sour after dessert because the taste bulbs having become adapted to sweet respond without compensation to sour. In smell, the odors which contrast are antagonistic so that adaptation to the one leaves the other as it were in bolder relief. In tem¬ perature, adaptation to an aerial cold seems to have correlated with it a "tuning® of the sense organs of warmth (in the area concerned) so that they respond to a stimulus of lower tem¬ perature; in the same way cold spots are "tuned® to a higher temperature of stimulus with adaptation to warmth. In vision, adaptation together with the negative after-image is suffi¬ cient to explain most cases of successive con¬ trast. Adaptation fails, however, to explain cases of simultaneous contrast; the effect of adapta¬ tion always requires an interval of time, whereas simultaneous contrast is immediate. The case of the sub-liminal sweet noted above may ultimately be explained by the fact that the sensory nerves connected with the taste bulbs radiate to the two sides of the tongue ; in the present state of our knowledge we can only guess that closely related areas of the cortex are thereby stimulated, and that attention to the sour facilitates the simultaneous arousal of the sweet. Simultaneous brightness and color- contrast has been most satisfactorily explained by Hering. This author supposes that the stimulation of a portion of the retina which in¬ volves an assimilation (or dissimilation) of a photo-chemical substance carries with it a simultaneous dissimilation (or assimilation) of the same substance in the contiguous unstimu¬ lated portion of the retina.

There are two "psychological® theories of importance. Helmholtz explained contrast as a deception of judgment. If, for instance, a gray strip on a green background appears reddish, it is because it is seen as if through a green haze and the mind unconsciously infers that if the strip is gray it must appear reddish in order to compensate for the green. Except for an occasional text-book of physiology this theory has long since been given up ; experiments may be devised which preclude the possibility of inference, and, furthermore, no explanation in

terms of the unconscious is satisfactory to science. Wundt, in his early books, brought contrast phenomena under his theory of rela¬ tivity. (See Weber's Law). He supposes that the effect results from the fact that we apper- ceive all sensory and affective experiences in relation to each other. As against this theory James has pointed out that the contrast-effect is directly experienced, and it cannot by any logic be made to depend upon an act of apperception. Wundt, however, now recognizes the physio¬ logical condition of contrast as a secondary principle of explanation.

The occurrence of contrast phenomena in feeling is doubtful. The opposition of affective qualities is not, as some authors assume, like that of color qualities. Pleasantness and un¬ pleasantness are opposites in the sense that they are mutually exclusive. A decrease of the one, therefore, does not mean an increase of the other, i.e., the change is in the direction of indifference, of no feeling at all. It is true that pleasantness and unpleasantness are logically opposed, but there is no experimental evidence of an enhancement of the one by the previous experience of the other.

In space perception the size of objects and length of lines often seem larger or smaller, longer or shorter by virtue of the presence of objects or lines whose size or length is logically opposed. The illusion is not due to a contrast- effect as is often alleged, but to some brain- habit or disposition which conditions the per¬ ception.

Bibliography. — Hoffding, H., (Outlines of Psychology } (London 1891) ; James, William, Principles of Psychology) (New York 1890) ; Ladd, G. T., and Woodworth, R. S., Physio¬ logical Psychology) (New York 1911) ; Titch- ener, E. B., Pxperimental Psychology) (New York 1901) ;

Wundt, W., Pectures on Human and Animal Psychology) (New York 1901) ; Physiologische Psychology (Leipzig 1910).

Harry P. Weld,

Assistant Professor of Psychology , Cornell

U niversity.

CONTRAT SOCIAL, kon'tra' so'se-al', a work by Jean Jacques Rousseau (q.v.), embody¬ ing his political ideas and defending the sov¬ ereignty of the people. It was published in 1762 and was one of the powerful influences affecting the leaders of the Revolution.

CONTRAVENTION, in French law, an act done in violation of a legal obligation or condition. It is most frequently applied in Scottish law to any act done by an heir of entail in opposition to the deed of entail, or to the action founded on a breach of law-burrows.

CONTRAYERVA, kon-tra-yer'va (Span. contrayerba, counter herb), the aromatic bitter¬ ish rootstock of Dorstenia contrayerva, a plant imported from tropical America, and used as a stimulant and tonic. The drug was once in much repute in low fevers, and was considered efficacious against snake-bites whence the name. See Dorstenia.

CONTRERAS, kon-tra'ras, Hernando de,

Spanish adventurer: b. Spain about 1520; d. Panama May 1550. He was the son of Rodrigo de Contreras (q.v.), governor of Nicaragua. After the fall of his father, and the confisca¬ tion of his property, Hernando and his brother, Pedro, with a number of dissatisfied officers,

arranged a plot to seize Peru and Panama, which the brothers claimed as inheritors of the estate of their grandfather, Pedrarias. Her¬ nando was to be king of the new realm, but was never proclaimed, as the failure of his attempt within two months made such a course impossible. Panama was captured 20 April 1550, after several Church dignitaries had been slain, and a large part of the royal treasure stored in the city was taken. Hernando took a considerable part of his force to pursue one of the royal officers, leaving Pedro in command at Panama. The citizens improved the oppor¬ tunity to retake the city, and Hernando was drowned shortly afterward. The other brother was never again heard of.

CONTRERAS, Juan Senen de, Spanish general: b. Madrid 1760; d. there 1826. He entered the Spanish army in youth, in 1778 took an active part in the Austrian campaign against the Turks, and in 1795 commanded in the War of Independence. While captain-general he gallantly but unsuccessfully defended Tarra¬ gona and was captured by the French. He was imprisoned in the castle of Bouillon on the Belgian frontier, but escaped in 1812, and two years later returned to Spain. His narrative of the siege of Tarragona formed the third volume of (Memoires relatifs aux revolutions de France et d'Espagne (1825).*

CONTRERAS, Rodrigo de, Spanish

cavalier: b. Segovia, Spain, about 1495; d. Peru sometime after 1557 ; the last date when he was known to be living. He was appointed governor of Nicaragua in 1531, and sent an ex¬ pedition into the interior, which discovered and explored Lake Nicaragua. The expedition had trouble with the adventurer, Robles, who tried to seize the newly discovered country, but was defeated. The administration of Contreras was turbulent and marked by constant disputes with the royal authorities and the dignitaries of the Church. Finally he was formally charged with various crimes and misdemeanors, found guilty, driven from the country, and all his property confiscated (1549). He vainly sought redress from the Spanish government, and finally re¬ turned to America, going to Peru, where he was not heard of after 1557. For the attempt of his sons to avenge their father's alleged wrongs, see Contreras, Hernando de.

CONTRERAS, Mexico, village about 12 miles southwest of the city of Mexico, the scene, 19-20 Aug. 1847, during the Mexican War, of an important battle between a Mexican force of 7,000 under General Valencia, supported by another of 12,000 under General Santa Anna, and a United States

force of 4,500 under General Scott. The Mexicans occupied a strong position on high ground and fought for a time with great gallantry, but, being attacked both in front and rear at daylight on the 20th, finally gave way and fled in confusion, after having lost in killed and captured over 1,500.

CONTRERAS, Battle of (Mexican name, Padierna) , in the Mexican War, 20 Aug. 1847. At Churubusco (q.v.), the main road south from the city of Mexico is joined from the southwest by another, running to the hills be¬ yond the hamlet of Contreras. This is about 12 miles from the city; a mile nearer the latter is the hamlet of Padierna. The road to Mexico City winds around the east flank of the ridge,

across the brook from Padierna and keeps on north, across four brooks to the important village of San Angel. The Mexican general, Valencia, with the ((Veterans of the North, ˆ forming the right of Santa Anna's army, had made his headquarters at San Angel on the 17th; and he decided to occupy and fortify Pelon Cuauhtitlan, two miles southwest, to block the road to the capital skirting it. Power¬ ful batteries were placed to command this and sweep the pedregal ; and some 7,000 men were concentrated about the ridge, and facing Auzaldo and San Geronimo. Santa Anna, ap¬ prehensive for his position on the main road, ordered Valencia to retire to Churubusco ; but Valencia refused. On the 19th, Scott, at San Augustin, ordered a road leveled to Padierna ; Twiggs and Pillow to check the enemy mean¬ while. A fierce running light with the Mexican troops ensued, and skirmishing continued. At 2.30 a.m. of the 20th, a dismal morning of cold, rain and fog, Smith and Riley moved southwest through the steep, gullied, slippery streets of San Geronimo, and, unperceived, gained posi¬ tions southwest of the ridge on the right flank of Valencia's lines. Meantime a strong diver¬ sion was made by an assault on Padierna and along the rocks. The battle was won by a single impetuous onslaught of Riley's troops against Valencia's main batteries on the ridge, when the ((Veterans of the Norths broke and scattered like sheep. The battle was over in 17 minutes, and the Mexican army a routed mob, in face of a force numbering but a fraction of their own. Shields, who had taken Smith's place at San Geronimo, marched rapidly to Auzaldo to cut off the retreat ; but a portion of the army escaped in wild flight toward Churu¬ busco along the San Angel road, while the rest plunged in disorder down the steep flanks of San Geronimo, leaving all impediments behind. No more brilliant victory was won in the war. Scott had not over 4,500 men in sight, to Valencia's 7,000, and Santa Anna's 12,000 within supporting distance ; and the natural and arti¬ ficial defenses should have made the Mexican positions impregnable. The latter lost 700 killed and wounded, and 813 prisoners, includ¬ ing 88 officers, four of them generals; 22 brass cannon, vast quantities of small arms and ammunition, and many hundreds of pack-mules and horses. The American loss was 60 killed and wounded. This route contributed mate¬ rially to the winning of Churubusco. Consult Wilcox, (History of the Mexican War ; Wright, (Life of Scott) ; Scott, Autobiog¬ raphyˆ*

CONTRIBUTION, in law, the right of one person to exact from another his pro rata share of a common loss, as where one of two sureties discharges the entire obligation, he is entitled to secure from his cosurety his share of the amount. (See Indemnity; Principal and Agent). In the law of war, contribution de¬ notes the levy of money or supplies imposed by an invader upon the citizens of the territory occupied. See Conquest, Right of; Taxa¬ tion; Tribute; War, and consult the authori¬ ties referred to under the last named.

CONTUMACY, kon'tu-ma-si, the offense of refusal or neglect of a party accused to ap¬ pear or answer to a charge preferred against him in a court of justice, chiefly known in

countries on the European continent. Actual contumacy is the refusal of a party actually before the court to obey some order of the court. Presumed contumacy is the act of re¬ fusing or declining to appear upon being cited. In civil causes a person in such case may be properly made liable to a decision against him for his neglect in not appearing to defend his rights ; but by an extension of the principle to criminal cases persons are often sentenced, in their absence, to punishment in contumaciam, i.e., they are regarded as charged with the offense, but not convicted thereof.

CONTUSIONS, lesions of the body result¬ ing from a blow struck by a blunt instrument without

breaking of the skin or fracture of a bone. Contusions may involve the skin alone, or may produce some change in the deeper tissues. In contusions there is, as a rule, some rupture of blood vessels. This results in the extravasation of blood, which, if small in amount, causes minute spots called petechiae. When elongated in stripes such haemorrhages are called vibices ; or, when irregular and small, ecchymoses. When the haemorrhage is large and collected in one place, they are termed haematonata. Contusions, if very severe, may result in gangrene, hence all large contusions need prompt medical attendance, but small con¬ tusions may be treated with hot w7ater in which there is some antiseptic, as a one-per-cent solu¬ tion of carbolic acid; and if carefully bandaged and kept from being infected, they usually re¬ cover quickly.

CONUS, a genus of gasteropodous mol- lusks, the type of the famly Conidce or cone- shells, so named from the form of the shell. They are found in the southern and tropical seas. The genus comprises several hundred species, some of them having very beautifully colored shells which are much prized by col¬ lectors. The rarest and finest of these is C. gloria-maris. All have a short, strong foot bearing a water-pore, two tentacles with eyes set on the outside at the centre and a long siphon. They live in holes in rocks and in the clefts of coral-reefs, and their food consists mainly of other mollusks. Some of the species have a poisonous bite.

CONVALLARIA, the lily-of-the-valley, the typical genus of the tribe Convallariince of the Liliacece, or lily family. The order has about 23 genera, and 215 species, widely dis¬ tributed. Nine of the genera are found in the American flora, among them : Asparagus, Clintonia, Polygonatum convallaria and Tril¬ lium. See Lily-of-the-Valley.

CONVECTION OF HEAT. See Heat.

CONVENT (Lat. conventus), primarily the community of monks or nuns occupying a mon¬ astery, priory or other establishment of a mo¬ nastic or semi-monastic character. But the word is generally used to designate rather the establishment itself, if it is simply a cloister and not a considerable monastery or an abbey. The parts of a properly equipped conventual estab¬ lishment are the church or chapel, including the choir, namely, that portion of the church in which the members assemble to recite or chant the psalms, etc., of the canonical hours ; the chapter-house, an apartment in which the inmates assemble to deliberate or discuss com-

munity affairs ; the cells, or separate quarters of the inmates; the refectory or dining-hall; the dormitory; the infirmary; the parlor for reception of visitors; the library; the treasury; the cloister, an enclosed space for recreation ; and the crypt, the convent's place of burial. The word cloister® is also used in the sense of convent : in that use cloister signifies a re¬ ligious house access to which is restricted by the laws of the Church. In its popular sense the word is applied to an establishment con¬ taining a sodality of nuns, the male religious being denominated monks and their establish¬ ments monasteries. Convents are generally classed as strictly enclosed and unenclosed, but these divisions often overlap in function and are not mutually exclusive. The former repre¬ sent the older type of convents to which women were attracted by a desire to save their own souls and those of others by prayer, seclusion and mortification, while the latter refers to those which are devoted to active work along educational or social lines for the relief of others. Routine is prescribed; the bishop of the diocese has the inspection of the convent under his charge. In most orders the nuns are divided into choir sisters, who have religious duties only, and lay sisters who perform the manual labor of the convent. The first convent in England yras erected at Folkestone in 630. The history of European convents follows the history of the monasteries. Consult Helyot, (Histoire des ordres religieux) (Paris 1792) ; Eckenstein, (Woman under MonasticisnP (Cambridge 1896) ; Steele, (The Convents of Great Britain (London 1902).

CONVENTICLE, a private assembly or meeting for the exercise of religion. The name was at first given to the private religious meetings of the early Church and then to a cabal of monks for the purpose of securing the election of a favorite as abbot. It was next applied as a term of reproach to the religious assemblies of Wickliffe, the meetings of the English and Scottish nonconformists, and afterward applied to meetings of petty sects and dissenters generally. In strict propriety the word denotes an unlawful assembly, and cannot therefore be justly applied to the legal assembling of persons in places of worship licensed according to law. The Conventicle Act of 1664 outlawed all assemblies for re¬ ligious purposes other than those of the Church of England. The penalty for repeated offenses was transportation.

CONVENTION, Political, an assemblage of delegates representing the members of a political party, whose leading function is to nominate the candidates of that party for elec¬ tive offices. In the early

years of the nation candidates were often nominated at mass meet¬ ings, but the growth of the country necessitated a change. Delegates were appointed by the local caucuses to confer with delegates from other caucuses in the city, county or district, with the object of making nominations for the next larger area. This method quickly gained favor and early in the 19th century Pennsyl¬ vania adopted the county convention and Massachusetts and other States both the county and Congressional conventions. The legislative caucus performed the functions of the State convention for many years because of the diffi¬

culties of travel and communication over so large an area; the legislative caucus method also was used in the nomination of national candidates, and, as the Congressional caucus, was used for more than 25 years to choose the party candidates for President and Vice-Presi¬ dent. During the campaigns of 1824 and 1828, owing to the failure of the Congressional nominating caucus, the factions of the Demo¬ cratic-Republican party held nominating con¬ ventions that were neither national nor sys¬ tematically representative, and the first nominat¬ ing convention that can be called national was held at Baltimore in 1831 by the Anti-Masonic party. Since that time the system has grad¬ ually developed into the present complicated but well-ordered system.

Minor Conventions. — • First in order of the nominating conventions is the local primary, caucus or primary convention, called together by the primary committee, and consisting of those voters affiliated with the party who re¬ side in ward, precinct or township. This primary makes nominations to local offices and selects delegates to the nominating convention of the county or district. The county conven¬ tion nominates candidates to county offices and sends delegates from among its members to a district convention which selects candidates for Congress and elects delegates to the State con¬ vention. In some States delegates to both district and State conventions are elected by the town primaries. The State convention nom¬ inates candidates for State offices and sends delegates-at-large to the national convention. In the Democratic party the State convention may select all the delegates and instruct them. The State convention formulates party policy within the State and decides questions of party regularity, though appeal may be made to the national convention. The basis of representa¬ tion in the State convention is the party vote at the preceding election — whether Presidential or gubernatorial, wThereas the membership of the national convention is not concerned with party strength.

Party Committees. — In early times the con¬ vention concerned itself only with the imme¬ diately succeeding campaign ; it had a chairman, secretary, treasurer and other necessary officers, but the organization was purely temporary and had no permanency; on adjournment the or¬ ganization lost its existence, and the next con¬ vention might be called either by the officers of the previous convention or by an informal self- appointed committee. Hence conventions adopted the plan of appointing permanent com¬ mittees to act in their behalf during the interval between conventions. The Democratic con¬ vention of 1848 was the first to appoint a national committee but the committee's value was not generally recognized until after the Civil War. The national committee is now composed of one member from each State and Territory (chosen for four years or until the next national convention) and though sub¬ ordinate to the convention exercises great authority — often possessing sufficient power and influence to control the convention and dominate its policies. It decides the place of meeting, arranges the seating of delegates, and, most important of all, selects the temporary chairman of the convention, who sounds the keynote of the campaign. It has then per-

formed its duties and on the opening of the convention is dissolved to make way for the appointment of a new committee, the members of which arc in harmony with the Presidential candidate. The chairman of the national com¬ mittee, chosen by the President, who is the nominal head of his party, is both nominally and actually the head of the organization and is in close touch with the candidates. When the convention closes the new national com¬ mittee organizes at once and is usually divided into subcommittees, such as the executive com¬ mittee, the finance committee, the committee on bureau of speakers, the committee on publicity to supervise the literature, press matter and distribution of public documents. Though not organically connected with State and local com¬ mittees, the national committee in effect, through its State member, directs the campaign in every minor division. There is also the national Con¬ gressional committee, the organization of which differs in the two largest parties. The Republi¬ can committee consists of one member from each State and Territory represented in Con¬ gress (provided that State has a representative in Congress) chosen in a joint caucus of the members of both Houses. The Democratic committee is chosen at separate caucuses of the two Houses, nine members being appointed by the Senate and one member being appointed for each State and Territory represented in Con¬ gress. If a State has no Democratic repre¬ sentative in Congress, a prominent Democrat of that commonwealth is appointed to the com¬ mittee. The Congressional committees have charge of the mid-term elections when the two parties endeavor to elect a majority in Congress either as an endorsement or a condemnation of the party which has previously elected the President. Subordinate to the national com¬ mittees are the State central or State executive committees, varying in their machinery accord¬ ing to the section of the country. Outside of New England, where the town committee holds the most important place, the county committee is almost universally the important one, but no district is too small to be used as a basis for party work, the Congressional, senatorial, judi¬ cial and school districts, and the city wards or precincts all having their share in the party organization. The State executive committee (comprising as few as 13 members, as in Indiana, or more than 100 members, as in Pennsylvania) may be named by the chief candidates of the party or may consist of representatives of Congressional or State senatorial districts and of counties.

The National Convention. — Both national conventions are composed of two delegates from each Congressional district and four delegates-at-large from each State. Thus a national convention contains twice as many delegates as there are members of the House and Senate combined. Both the largest parties admit delegates from the Territories, varying as to numbers and privileges of voting. The State organization determines the method of electing delegates to national conventions but the Re¬ publicans prescribe that delegates shall be chosen in the same way that Congressmen from the same districts are nominated — either at primary elections or district conventions. The Democratic delegates may be selected by the State convention as a whole, by the delegates

of each individual district or by each district at a district convention. Having assembled, the convention at its first session accepts the tem¬ porary officers nominated by the national com¬ mittee and upon the roll call by the temporary chairman, the delegates of each State and Ter¬ ritory select one of their number as a member of each of the four most important convention committees, by whom the permanent organiza¬ tion of the convention is effected. At the next session, on the acceptance of the report of the committee on credentials, the permanent chair¬ man, vice-presidents and other officials are elected and the rules adopted, usually as sug¬ gested by the committee on rules and order of business. Democratic national conventions have always required a two-thirds vote for the nomination of President or Vice-President, but the other parties require only a simple majority. The Democrats also employ the ((unit rule,55 under which a majority of the delegates from a State may cast the entire vote of the State even over the protest of the minority, whereas the Republicans allow delegates to vote as in¬ dividuals even though the State convention may have instructed the delegation to vote as a unit. The rules having been adopted, the com¬ mittee on resolutions then presents the platform which may or may not be amended by the con¬ vention before acceptance. The nomination of candidates is the next and most important busi¬ ness, the roll being called by States in alpha¬ betical order, whereupon the delegates selected to place the candidates in nomination make their formal speeches. The balloting continues until one candidate receives the vote required to nomi¬ nate, several days being consumed sometimes in reaching an agreement. Having completed the most important task for which they assembled, the delegates finish the work of the

convention by electing a new national committee which, as previously stated, takes full charge of the cam¬ paign and remains in office until the next na¬ tional convention has assembled. The direct primary (q.v.) has done much to rid the political parties of the obnoxious (

Bibliography. — Beard, C. A., American Government and Politics) (New York 1911) ; Becker, C., (The Unit Rule) (in American His¬ torical Review, Vol. V, pp. 64-82, 1899) ; Bryce, James, (The American Commonwealth 5 (rev. ed., New York 1914) ; Dallinger, F. W., dom¬ inations for Elective Office) (1897) ; Ford, H. J., (Rise and Growth of American Politics5 (New York 1898) ; Hart, A. B., (Actual Govern¬ ment (New York 1903) ; Jones, C. L., head¬ ings on Parties and Elections5 (New York 1912) ; McKee, T. H., (National Conventions and Platforms, 1789 to 1 905 5 (Baltimore 1906) ; Ogden, R., dew Powers of the National Com¬ mittee5 (in Atlantic Monthly, Vol. LXXXIX, pp. 76-81, 1902) ; Ostrogorski, M., democracy and the Organization of Political Parties5 (New York 1902) ; Reinsch, P. S., headings in American Federal Government5 (New York 1909) ; Stanwood, Edward, distory of the Presidency5 (Boston 1916) ; Woodburn, J. A., holitical Parties and Party Problems in the United States5 (2d ed., New York 1914).

CONVENTION OF 1787. See Constitu¬ tion, Framing of the.

CONVENTIONS, Constitutional, in the United States. Conventions for the purpose of framing constitutions originated in the United States during the early years of the Revolu¬ tion (1774— 76) and the development of the methods employed may be divided into three phases : first, the framing of constitutions by the regular legislative bodies under direct authorization of the people ; second, the per¬ formance of that function by a body separate and distinct from the regular legislature; and third, the submission of the proposed consti¬ tutions to popular approval before they be¬ come effective. The colonial legislative assem¬ blies actively participated in the movement leading up to the Revolution ; but as the royal governors (save in Rhode Island, Connecticut, Delaware and Pennsylvania) could adjourn, prorogue or dissolve these bodies, their replace¬ ment became necessary when the period of military opposition arrived. Hence provincial congresses or conventions sprang into existence during 1774— 75, but as these were only tem¬ porary organizations, Continental Congress recommended to New Hampshire (3 Nov.

1775) and to South Carolina (10 May

1776) that the people select representatives, who, if they deemed necessary, should establish a form of government to continue during the dispute with the mother country. Under this recommendation a number of constitutions were framed during 1776 to 1778. In eight instances (North and South Carolina, Georgia, Virginia, New Jersey and the continuation of the charters in Massachusetts, Rhode Island and Connecticut) the constitutions were adopted and promulgated by the legislative bodies without previous authority from or ratification by the people. In New Hampshire and Delaware in 1776, and in Georgia, New York and Vermont in 1777, the legislative bodies had been expressly authorized by popular vote to take such action, but the instru¬ ments enacted were not in any way submitted to the people. In Maryland, Pennsylvania and North Carolina in 1776, and in South Carolina in 1778, the legislatures which framed the con¬ stitutions received express authority from the people, and some time before enactment, copies were distributed so that the people might have an opportunity to object and suggest changes.

The principle that popular authority should be given before a constitution could be framed seems to have been well established and the feeling prevailed too that no constitution should be adopted until submitted to and approved by the people. Some of the first constitutions were informally submitted (Pennsylvania, Maryland, North and South Carolina), but the first instrument of government formally sub¬ jected to a referendum was the proposed Massachusetts constitution of 1778. The first constitutions framed by bodies separate and distinct from the regular legislatures — and the only ones so framed during the Revolutionary period — were those of New Hampshire and Massachusetts. In the former colony delegates were selected in 1778 and drafted a constitu¬ tion in 1779, but on submission to the people it was rejected, as were two constitutions pro¬ posed by the second convention in 1781 and 1782, but the third constitution submitted by the

second convention in 1783 was adopted. In 1777 a majority of the Massachusetts towns authorized the formation of a constitution by the general court, but the proposed instrument was rejected in 1778, largely because it had not been framed by a body appointed for that special purpose. Accordingly, a distinct con¬ vention was assembled and the constitution drafted by it was accepted in 1780.

Since 1784, with a few exceptions, constitu¬ tions have been framed or adopted by conven¬ tions chosen by the people for this special purpose. The Nebraska constitution of 1866, however, was framed by the territorial legis¬ lature and submitted to the people by that body. In Michigan the legislature provided for a special commission to prepare a new constitu¬ tion but in 1874, when the instrument as drafted was submitted to popular vote, it was rejected. In Rhode Island a constitution was prepared in a similar manner but it was rejected in 1898 and 1899. In 1911 the Indiana legislature drafted a new constitution but the courts en¬ joined the legislature from submitting it to the people. Though more than 200 conventions have been held not all have framed constitu¬ tions; the Massachusetts constitution of 1780 remained practically unchanged until the re¬ vision of 1917-18, though conventions were held in 1820-21 and 1853. Some States hold con¬ stitutional conventions more frequently than others; Virginia has held conventions in 1776, 1829-30, 1850-51, 1861, 1864, 1867-68 and 1901- 02; and in 1776-77, 1801, 1821, 1846, 1867ˆ68, 1894. and 1915 similar bodies met in New York; but in Minnesota no convention has assembled since the constitution was framed in 1857, and only two have been held in Indiana (1816 and 1850-51). The number of conventions in the Southern States is relatively larger owing to the secession conventions and the two sets of conventions called in these States during the Reconstruction period. For the history and characteristics of the State constitutions see United States — The Formation of State Constitutions; United States — State Con¬ stitutions of the; Constitution, Framing of the; Constitution of the United States; Constitutional Amendments, History of ; United States — The Federal Convention of

1787.

Constitutional conventions have been held in the various States in the following years, most of the instruments framed being adopted the same. or the succeeding year, but in some cases constitutions were framed by bodies other than regularly constituted cpnventions (the words <(not submitted® meaning that the constitution was put into operation without first submitting it to popular vote) :

Alabama: 1819; 1861 (not submitted; secession convention) ; 1865 (not submitted; Reconstruction convention); 1867;

1875; 1901.

Arizona: 1910.

Arkansas: 1836 (not submitted); 1861 (not submitted; secession convention); 1864 (not submitted; Reconstruction convention); 1864; 1868; 1874.

California; 1849; 1878-79.

Colorado: 1864 (rejected); 1865 (ratified but State not admitted); 1875-76.

Connecticut: Operated under colonial charter of 1662 until many years after Revolution; 1818.

Delaware: 1776 (not submitted); 1792 (not submitted);

1831 (not submitted); 1852-53 (rejected); 1897.

Florida: 1838—39 (not submitted); 1861 (not submitted; secession convention); 1865 (not submitted; Reconstruc¬ tion convention); 1868; 1885.

Georgia: 1776 (temporary constitution proclaimed by

Provincial Congress) ; 1776-77 (not submitted); 1788; 1789 (not submitted); 1795 (amendments, not submitted); 1798 (not submitted); 1833 (amendments, rejected); 1838; 1839 (amendments, rejected); 1861 (not submitted; secession convention); 1865 (not submitted; Reconstruction con¬ vention); 1867-68; 1877.

Idaho: 1889.

Illinois: 1818 (not submitted); 1847; 1862 (rejected);

1869-70.

Indiana: 1816 (not submitted); 1850-51 (revised in 1911 by legislature but injunction issued against its submission to people).

Iowa: 1844 (rejected); 1846; 1857 (Amendments of 1900 were held to be unconstitutionally proposed and adopted).

Kansas: 1855 (Topeka Convention); 1857 (Lecompton Convention); 1858 (Mineola- Leaven worth Convention); 1859 (Wyandotte Convention; constitution ratified 1859, effective 1861).

Kentucky: 1792 (not submitted); 1799 (not submitted); 1849-50 (not submitted); 1890 (constitution was changed by convention after its approval by people).

Louisiana: 1811-12; 1844-45; 1852; 1861 (not submitted; secession convention); 1864 (Reconstruction convention; government organized under this constitution not recog¬ nized by Congress); 1867-68; 1879; 1898; 1913.

Maine: 1819.

Maryland: 1776 (not submitted); 1850-51; 1861; 1867.

Massachusetts: 1777-78 (rejected, wherefore the State lived under its colonial charter until 1780); 1779-80; 1820-21 (amendments); 1853 (rejected); 1917-18.

Michigan: 1835; 1850; 1867 (rejected); 1873 (revision by a commission rejected m 1874); 1907-08.

Minnesota: 1857.

Mississippi: 1817; 1832; 1861 (not submitted; secession convention); 1865 (not submitted; Reconstruction con¬ vention); 1868 (rejected in 1868 but adopted in 1869); 1890 (not submitted).

Missouri: 1820; 1845-46 (rejected); 1861-63 (not sub¬ mitted, Union Convention); 1865; 1875.

Montana: 1889.

Nfbraska: 1866 (drafted by committee and adopted by voters but not accepted by Congress until 1867); 1875.

Nevada: 1863 (rejected); 1864.

New Hampshire: 1775-76 (not submitted); 1778-79 (rejected); 1781; 1782 (rejected); 1783; 1791-92; 1850 (amendments rejected); 1851; 1876; 1889; 1902; 1912.

New Jersey: 1776 (not submitted; Revolutionary Con¬ gress); 1844; constitutional commissions sat in 1873 and

1894.

New Mexico: 1889-90 (rejected); 1910.

New York: 1776-77 (not submitted); 1801 (five amend¬ ments promulgated without submission); 1821; 1846;

1867-68 (rejected); 1894; 1915 (rejected).

North Carolina: 1776 (not submitted); 1835 (amend¬ ments); 1861 (not submitted; secession convention); 1865 (not submitted; Reconstruction convention); 1866 (con¬ vention reassembled, proposed amendments rejected),

1868; 1875.

North Dakota: 1889. • _ .

Ohio: 1802 (not submitted); 1850-51; 1873-/4 (rejected); 1912 (34 out of 42 propositions adopted).

Oklahoma: 1905 (convention proposes new State to be called Sequoyah); 1907.

Oregon: 1857. ~

Pennsylvania: 1776 (not submitted; Revolutionary Con¬ gress); 1783-84 (council of censors met without action); 17g9_90 (proclaimed without submission); 1837-38; 1872—73.

Rhode Island: Operated under colonial charter of 1663 until 1842; 1824 (rejected); 1834 (abortive); 1841-42 (People's Convention); 1841-42 (charter government con¬ vention); 1842. . , , ,

South Carolina: 1776 (not submitted; promulgated by Revolutionary convention); 1777-78 (put into effect by legislature without submission); 1790 (not submitted), 1860-61 (not submitted; secession convention); 1865 (not submitted; Reconstruction convention); 1868; 1895.

South Dakota: 1889.

Tennessee: In 1772 the Watauga Association adopted a constitution and in 1784 a constitution was put into operation in the State of Franklin but was not ratified at convention of 1785; 1796 (not submitted); 1834; 1861 (secession convention); 1865 (Reconstruction conven¬ tion); 1870.

Texas: In 1827 a constitution was framed for Coahuila and Texas; in 1833 another was framed at San Felipe but never recognized by Mexico or put into operation; in 1835 a "Provisional Constitution" was framed; and in 1836 the constitution of the Republic of Texas; 1845; 1861 (seces¬ sion convention); 1866 (Reconstruction convention); 1868;

1875.

Utah: 1895.

Vermont: 1 777 (not submitted): 1786; 1793; 1799; 1806 and 1813 (meetings of council of censors, abortive); 1822 and 1828 (amendments referred to conventions by council of censors and all but one rejected); 1836; 1843; 1850; 1857; 1870; 1880 (amendments proposed by Senate, council of

censors having been abolished and adopted by people in 1883); 1890, 1900, 1910 and 1913 (amendments submitted but only 10 adopted at elections).

Virginia: 1776 (not submitted; Revolutionary convention meeting as a constitutional convention); 1829-30; 1850-51; 1861 (secession convention); 1861 (not submitted); 1864 (not submitted; Reconstruction convention); 1867-68;

1901-02.

Washington: 1889.

West Virginia: 1861-62; 1872.

Wisconsin: 1846 (rejected); 1847-48.

Wyoming: 1889.

Methods of Calling Conventions. — The

only provisions for calling conventions to be found in the earlier State constitutions were contained in those of Pennsylvania (1776), Vermont (1777), Georgia (1777), Massachu¬ setts (1778) and New Hampshire (1784). In Pennsylvania the people were to elect a council of censors every seventh year, on the consent of two-thirds of whom a convention might be called to amend such parts of the constitution as the council thought necessary, but any pro¬ posed amendments, additions or excisions should be promulgated <(at least six months before the day appointed for the election of such convention, for the previous consideration of the people, that they may have an opportunity of instructing their delegates on the subject.® Only one meeting of this council was held and in 1790, after the constitutional requirements had been ignored in calling the convention of 1789, the council was abolished. Vermont made the same provision but the members of the council of censors were to be elected in a different manner. The Vermont council had called several constitutional conventions before being abolished in 1870. The Georgia constitu¬ tion of 1777 provided that the legislature should call a convention if petitioned to do so by a majority of the voters of a majority of the counties, but the petitions must specify the desired amendments and in calling the conven¬ tion the legislature must do likewise. In Massa¬ chusetts the desirability of revising the con¬ stitution was to be voted upon in 1795 and if two-thirds of the votes cast favored such re¬ vision, the general court was to call a constitu¬ tional convention, but as the vote was adverse the State never afterward had a constitutional provision for calling conventions, though the State attorney-general contends that such a convention is not only legal but is expressly authorized by the State constitution (1917 Mass. House Doc. 1711, pp. 2-3). The New Hamp¬ shire constitution of 1784 provided for the calling of a convention within seven years upon a favorable popular vote and the constitution of 1792 contained a similar provision for a vote within each seven years thereafter. Seven of the Revolutionary constitutions which continued after 1784 made no provision for conventions and others recently adopted have omitted such provisions (Georgia, 1798; Connecticut, 1818; New York, 1822; Missouri, 1820; Rhode Island, 1842; Pennsylvania, 1790, 1838, 1873; Virginia, 1830, 1852, 1864; Vermont, 1870; Arkansas, 1868, 1874; Tennessee, 1834; Texas, 1868; Louisiana, 1845, 1851, 1864, 1868, 1879, 1898), though in States which possess no such con¬ stitutional authority it has been assumed that conventions may be called.

Of the State constitutions now in force, 12 (Massachusetts, Vermont, Connecticut, Rhode Island, New Jersey, Pennsylvania, Mississippi, Louisiana, Texas, Arkansas, Indiana, North

Dakota) make no provision whatever for calling conventions, but conventions may be called in these Slates by legislative action, and the legis¬ lature has power to determine whether the people shall have an opportunity to express their wishes by voting upon the subject. Judge Jameson calls attention to 27 conventions which have met without constitutional authority for their assembling (Arkansas, 1874; Connecticut, 1818; Georgia, 1833, 1839; Indiana, 1850;

Louisiana, 1852, 1879 ; Massachusetts, 1853 ; Missouri, 1845, 1861, 1865; New Jersey, 1844; New York, 1801, 1821, 1846; North Carolina, 1835; Pennsylvania, 1837, 1872; Rhode Island, 1824, 1834, 1841, 1842; South Carolina, 1790; Tennessee, 1870; Texas, 1876; Virginia, 1829, 1850) and since he wrote there have been at least three cases of the same character — Mississippi in 1890, Louisiana in 1898 and Con¬ necticut in 1902. To this list also should prob¬ ably be added the conventions of Delaware, 1791 and 1852; Maryland, 1850; Massachusetts, 1820 and 1917-18; and Indiana, 1918. Under another class of constitutions, such as those of Maine and Georgia, the legislature is em¬ powered to call conventions without first sub¬ mitting to popular vote the question whether a convention shall be held. Among the conven¬ tions thus called were those of Connecticut (1818), Rhode Island (1824, 1834, 1841, 1842), New Jersey (1844), Missouri (1861, 1865), Arkansas (1874), North Carolina (1875), Louisiana (1879), Mississippi (1890) and the secession and reconstruction conventions. On the other hand, several legislatures, though bound by no constitutional provisions, submit¬ ted the question to the people ; among such were the conventions of Massachusetts (1820, 1853), New York (1821, 1846), Virginia (1829, 1850), Maryland

(1850), North Carolina (1835), Pennsylvania (1837, 1872), Missouri (1845), Louisiana (1852, 1898), Tennessee (1870),

Texas (1875) and Connecticut (1902). A third plan, adopted by 32 States, requires popular approval before a convention can be called, but in 25 of these States (Alabama, California, Colorado, Delaware, Florida, Idaho, Illinois, Kansas, Kentucky, Minnesota, Missouri, Mon¬ tana, Nebraska, Nevada, North Carolina, Ore¬ gon, South Carolina, South Dakota, Tennessee, Utah, Virginia, Washington, West Virginia, Wisconsin and Wyoming) the legislatures have the power to decide the proper time when the question of holding a convention shall be sub¬ mitted to the people. Seven constitutions con¬ tain a provision that the question of calling a convention shall be voted upon by the people at regular intervals without reference to legis¬ lative action. New Hampshire requires a vote upon this question every 7 years ; Iowa every 10 years; Michigan every 16 years; Maryland, New York and Ohio every 20 years; and Okla¬ homa at least once every 20 years, though the legislature has discretionary power to submit the question more frequently. The legislatures of Iowa, Michigan, New York and Ohio may submit to the people the question of holding a convention at other times than those above specified. In States where the initiative and referendum are in vogue the legislatures have lost a large part of their control over the calling of conventions, since the people themselves may initiate and adopt a measure providing for the holding of a convention. These provisions have

been adopted in the following States : Oregon (1902), Oklahoma (1907), Missouri and Michi¬ gan (1908), Arkansas and Colorado (1910), Arizona and California (1911), Nevada, Ne¬ braska and Ohio (1912) and North Dakota (1914), and in 1913 Michigan broadened and simplified the provision inserted by the conven¬ tion of 1908. In Idaho, Maine, Montana, South Dakota, Utah and Washington also the people can initiate and adopt a measure providing for the holding of a convention and by referendum may veto any statute by which the legislature attempts to interfere with a convention.

In most cases legislative action is necessary after the people have voted in favor of a con¬ vention, since delegates must be elected and provision be made for the assembling of the convention, though in only eight States are such matters left entirely in the hands of the legislature ; some of the constitutions expressly limit the number of delegates and regulate their appointment, method of election, etc. In Michigan, New York and Missouri, however, the convention assembles as a matter of course without legislative action, the constitutions themselves containing provisions respecting ap¬ pointment and election of delegates and the assembling of the conventions. When Congress passes an act enabling a Territory to apply for admission as a State, such act contains a pro¬ vision for the number and election of delegates to a convention for the purpose of framing the new State constitution. But if the Territorial legislature itself take the initiative in calling such a convention, with the ultimate object of applying for admission into the Union, provision for delegates, etc., is usually made by the Terri¬ torial legislative act. Respecting a national convention, Article V of the Constitution of the United States provides that <(the Congress . . . on the application of the legislatures of two thirds of the several States, shall call a convention for proposing amendments,® thus imposing on that body no restrictions as to the conditions under which the convention shall be held.

Procedure of Constitutional Conventions.

— Conventions act under very few constitu¬ tional restrictions as regards their procedure, and in general have adopted their own rules, differing but slightly from those of other de¬ liberative bodies. Though possible, few con¬ ventions attempt to perform their functions as a body, but usually divide the work among committees. The method of transacting busi¬ ness mainly in committee of the whole, with a few small committees to handle minor details, is apt to prove unsatisfactory unless the plan of the constitution be quite complete before the meeting of the convention. The Federal convention of 1787 used the committee of the whole to a large extent, as did also the Penn¬ sylvania convention of 1789. Some of the earlier constitutions were framed by a small committee which had been given full power to prepare and report a draft of a constitution to the whole convention. This method was adopted by the Revolutionary conventions of Maryland, New Jersey, Pennsylvania and Virginia in 1776, by those of New York and Vermont in 1777, by the Massachusetts general court in 1778. the Massachusetts convention of 1779-80, the Ten¬ nessee convention of 1796 and the California convention of 1849. But the usual practice in

modern times is for the convention to appoint a number of committees among whom the sev¬ eral sections of the constitution are distributed for consideration and revision, after which such sections are reported to the convention in regular session or in committee of the whole. Ihe more important committees common to three of the most recent constitutional conven¬ tions were arrangement and phraseology, banks, corporations, counties and towns, educa¬ tion, suffrage, judiciary, bill of rights, legis¬ lature, methods of amendment, municipal gov¬ ernment, rules, taxation, submission and ad¬ dress, and miscellaneous. As a rule the mem¬ bers of these committees are appointed by the president of the convention. The Michigan convention of 1908 employed the following pro¬ cedure: After the convention had been or¬ ganized, 28 standing committees were author¬ ized, the members of which were appointed by the president. The various propositions sub¬ mitted by members were read and referred to the proper committee, on being reported by that committee were considered in committee of the whole and when reported by the latter were referred to a committee on arrangement and phraseology. When this last committee had reported upon the proposals, they were put upon their second reading and after this reading were voted upon ; if adopted the proposals were again referred to the committee on ar¬ rangement and phraseology, which, after har¬ monizing all the proposals adopted by the con¬ vention, reported the complete revision as agreed upon. The committee of the whole then considered this revision section by section and reported to the convention, which then passed the revision to its third reading and voted upon it by articles and as a whole. Thus four different opportunities were presented for the discussion and amendment of proposals, and the committee on arrangement and phrase¬ ology had the opportunity, to revise the lan¬ guage of each proposal after the committee of the whole had agreed upon it and before it was finally adopted ; and as revised the pro¬ posals were again sent to this committee to be consolidated into complete and final form.

Submission of Constitutions to Popular Vote. — Since 1840, with a few exceptions, the States have followed the practice of submitting constitutions to popular vote, but the practice can hardly be said to have become fixed, since only about one-half of the State constitutions containing provisions for conventions require that the constitutions framed by these conven¬ tions be submitted to the people (California, Colorado, Idaho, Illinois, Maryland, Michigan, Missouri, Montana, Nebraska, New Hampshire, New York, Ohio, Oklahoma, Utah, Washington, West Virginia, Wyoming). Prior to 1784 the only constitutions formally submitted to the people were those of Massachusetts and New Hampshire, though in Pennsylvania in 1790 and in some of the other States a plan was pursued which accomplished about the same purpose ; the Vermont constitution of 1786 (and also its later amendments to 1870) and the Georgia constitution of 1789 were ratified by special bodies chosen bv the people for that express purpose. Constitutions were submitted for popular approval by New Hampshire in 1792, Connecticut in 1818, Maine in 1819, New York in 1821 (bdnff the first State outside of New

England to submit a constitution to the direct vote of the people), Rhode Island in 1824 (this constitution being rejected), Virginia in 1829 (her second constitution), Georgia in 1833 and 1839, Tennessee in 1834, Michigan and North Carolina in 1835, Pennsylvania in 1837- 38 and Florida in 1839, but the conventions of Delaware in 1831, Mississippi in 1832 and Arkansas in 1836 did not submit their work to popular vote. Between 1840 and 1860 and from 1870 to 1890, almost without exception, the con¬ stitutions framed by conventions were submitted to the people for approval, but since 1890 the practice has been varied. Prior to 1890 there were 38 States, and since that time 10 others have been added to the Union (North Dakota, South Dakota, Montana and Washington in 1889; Idaho and Wyoming in 1890; Utah in 1896; Oklahoma in 1907; and New Mexico and Arizona in 1912). Of the 38 States 12 have held conventions to revise their fundamental laws (Mississippi, 1890; Kentucky, 1890; New York, 1894, 1915; South Carolina, 1895; Dela¬ ware, 1897; Louisiana, 1898, 1913; Alabama, 1901; Virginia, 1901-02; Michigan, 1907-08; Ohio, 1912; New Hampshire, 1889, 1902, 1912; Massachusetts, 1917-18), and in 1913 Vermont succeeded in modifying its constitution with the aid of a commission, while the amendments adopted in Oregon and California since 1902 are so numerous and fundamental as to amount virtually to revision. Four States unsuccess¬ fully attempted to revise their constitutions (Rhode Island, 1898, 1899; Connecticut, 1902, 1907; Indiana, 1912; New York, 1915), and referenda submitted to ascertain the popular desire regarding the calling of conventions were negatived in Maryland

(1907), Iowa (1900, 1910) and California, Indiana and South Da¬ kota (1914), but Illinois, Indiana, Massachu¬ setts, Nebraska and New Hampshire held con¬ ventions in 1917 and 1918.

Of the constitutions adopted since 1890 seven have been submitted without reservation — those of New York (1894), Utah (1895), Alabama (1901), Oklahoma (1907), Michigan (1908) and New Mexico and Arizona (19il), though the submission of the constitutions of Utah, Oklahoma, Arizona and New Mexico were required by the Congressional enabling acts. The constitutions of Mississippi (1890), South Carolina (1895), Delaware (1897), Louisiana (1898 and 1913) and Virginia (1902) were not submitted to the people in any man¬ ner (though in the case of Virginia the legis¬ lature, when calling the convention, required that its work should be submitted to the people) ; and the Kentucky constitution of 1891 was altered by the convention after the people had approved it. The Indiana legislature of 1911 drafted a new constitution, but its sub¬ mission to the people was enjoined by the courts, and in November 1914 the voters de¬ feated a proposal to summon' a convention to revise the constitution. Nevertheless the legis¬ lature defied the popular mandate by gassing the act of 1917 for a convention in 1918. In Ohio the constitution of 1851 was difficult of amendment or revision owing to the necessity of securing on referendum <(a majority of all the electors voting at said election.® Finally a convention was authorized and held in 1912 and at a special election in September of that year the convention submitted 42 separate prop-

ositions of which 34 were adopted. New Hamp¬ shire has no process of amending through the legislature, but every seven years submits a referendum in respect to the calling of a con¬ vention. The convention of 1889 submitted seven amendments of which five were adopted; the convention of 1902 submitted 10 amendments of which six were adopted ; and the convention of 1912 submitted 12 amendments of which only four were adopted. In Rhode Island any revision recommended must be approved by two successive legislatures. In 1898 a proposed revision made by a commission of 15 persons passed the legislature but was defeated at the polls ; with a few changes it was repassed and resubmitted in June 1899 but was rejected by a larger vote. In 1912 another commission of nine persons was appointed to recommend another revision and made its report in 1915, which after being approved by two assemblies was voted upon in 1917. The Connecticut constitution makes no provision for a conven¬ tion, but in 1901, after a referendum, the legis¬ lature summoned a convention, the work of which was rejected at the polls in June 1902. In 1905 the legislature submitted a revised con¬ stitution but this too was rejected in November 1907. In Vermont amendments have suffered at popular elections, two out of 23 submitted in 1880 being accepted, none of the nine offered in 1890 and none of the four offered in 1900 being passed, wherefore in 1908 a commission of five was appointed to propose amendments ; eight were proposed in January 1910 and after acceptance by two successive assemblies were passed by the voters in 1913. After Louisiana promulgated its constitution in 1898 every ses¬ sion of the legislature witnessed the introduc¬ tion of numerous amendments until in 1913, owing to the necessity of making new arrange¬ ments to fund the bonded debt of the State, a convention was called which added an article respecting the debt, incorporated previously adopted amendments into the constitution and promulgated it without referendum. In 1912 North Carolina appointed a commission which in 1913 proposed 14 amendments to a special session of the legislature but though that body accepted 10 of these they were rejected at the polls in November 1914, though the constitution was later amended in 1916.

In connection with the submission of consti¬ tutions to popular approval, some attempts have been made either to enlarge or reduce the elec¬ torate for the purpose of voting on such con¬ stitutional changes. The legislature alone ex¬ tended the electorate in New Jersey (1844) and Rhode Island (1841-42), but in 1821 this was

done in New York with the aid of the electorate itself, while in Massachusetts in 1780 the con¬ vention did the extending with the assent of both legislature and electorate. The conven¬ tions of Virginia (1830) and Illinois (1869) had only the assent of the legislature, and the following conventions acted on their own initia¬ tive: Louisiana (1845, 1852), Michigan (1835), Texas (1845), Virginia (1851), West Virginia (1863), Tennessee (1834), Kansas (1859) and Arkansas (1868), the Tennessee and Arkansas conventions reducing the electorate in some par¬ ticulars as

well as extending it in others. Elec¬ torates have been reduced also by oaths of al¬ legiance required by Reconstruction acts and

by the conventions of Maryland (1864), Mis¬ souri (1865) and New York (1867).

Constitutional Restrictions upon Conven¬ tions. — Generally speaking, the only restrictions upon constitutional conventions are those ex¬ pressly contained in the provisions of the State and Federal constitutions, or in the absence of such provisions, those implied in such constitu¬ tions and those implied fjom the limited func¬ tions of conventions. The existing constitu¬ tional organization is not affected by a constitu¬ tional convention since the latter acts under the restrictions either expressly or impliedly contained in the constitution in force at the time. Professor Dodd says that the convention ((is a regular organ of the State (although as a rule called only at long intervals) — neither sovereign nor subordinate to the legislature, but independent within its proper sphere. Under this view the legislature cannot bind the con¬ vention as to what shall be placed in the con¬ stitution or as to the exercise of its proper duties . . . [which are] simply to propose

a new constitution or to propose constitutional amendments to the people for approval ; or in States where the submission of constitutions is not required, to frame and adopt a constitution if they think proper. . . . [Hence] constitu¬

tional conventions should not be subject to con¬ trol by legislative acts.® The new constitution does not become effective until promulgated by the convention, if such be the provisions of the existing constitution, or until ratified by the people, if this action be required. As an organ of the State and as a legislative body a conven¬ tion must act in accordance with the provisions of the Federal Constitution regarding contracts, ex post facto laws and all other restrictions imposed upon the States by that instrument. If a State constitution provide for the revision or framing of the organic law of the State by the calling of a convention, then such conven¬ tion is impliedly restricted to that one act and the exercise of such powers only as are neces¬ sary to accomplish its object. If the State con¬ stitution should make no provision for a con¬ vention, then such convention acts under the existing constitution and accordingly the gov¬ ernmental departments cannot be superseded or replaced until the new constitution framed by the convention become effective. Hence it is to be presumed theoretically that a constitu¬ tional convention is assembled for a limited and definite purpose and neither can nor does usurp the regular legislative, executive or judicial powers of the existing organs of government. (Consult, however, Hoar, R. S., Constitutional Conventions, pp. 164-184). Yet this has not always been the case, particularly during the early Revolutionary and during the Civil War periods, notably in Missouri and the South¬ ern States, though in the former period, as previously stated, the conventions primarily were provisional governments and the work of framing constitutions was only incidental. Analogous conditions obtained in Missouri in 1861-63 and in some of the other Southern States, so that the conventions were probably justified in acting beyond the limits of their regular duties. Some of the Reconstruction conventions in 1865-68, which were called to frame organic laws and establish governments, not only performed these duties but arrogated*

to themselves all the powers and functions of

•

the regular legislatures. Similarly the conven¬ tions of 1890 in Mississippi, of 1895 in South Carolina, of 1898 in Louisiana and of 1901 in Alabama acted as though they possessed powers in excess of those connected with the framing of constitutions. In the South Carolina con¬ vention a motion was even made that there be no session of the legislature and that the con¬ vention should do its work. The legislative act for the Michigan convention of 1907-08 re¬ quired that the new constitution be submitted at the April election of 1908, but the convention decided upon the following November, and by mandamus proceedings compelled the Secretary of State to recognize the convention's suprem¬ acy. In 1867 and 1894 the New York conven¬ tion sat beyond the time fixed by the legislature, as did also the Alabama convention of 1901, but while the New York delegates received no extra compensation, the Alabama convention resolved that the pay of its

members should continue after the time allotted until the com¬ pletion of the work. But it would seem that a convention has no power to appropriate money, since in most cases the constitutions provide that money shall be paid from the State treas¬ ury only upon a legislative appropriation. In a number of cases such actions have been ques¬ tioned and have been held invalid by the courts, though other courts have upheld them.

Consult Ashley, R. L., (The American Fed¬ eral State) (New York 1908) ; Bryce, James, (The American Commonwealth (rev. ed., ib. 1914); Borgeaud, C., (Adoption and Amend¬ ment of Constitutions in Europe and America) (trans. by C. D. Hazen, ib. 1895) ; Binney, C. C., Restrictions upon Local and Special Legis¬ lation in State Constitutions) (Philadelphia 1894) ; Dealey, J. Q., (Our State Constitutions) (ib. 1907), (The Development of the State) (Boston 1909), and 'Growth of American State Constitutions * (ib. 1915) ; Davis, H., Ameri¬ can Constitutions * (Baltimore 1885) ; Dodd, W. F., Revision and Amendment of State Constitutions* (ib, 1910) ; Garner, J. W., Amendment of State Constitutions* (in American Political Science Review, Vol. I, pp. 213-247, 1907) ; Hoar, R. S., Constitutional Conventions, Their Nature, Powers and Limi¬ tations* (Boston 1917) ; Hitchcock, H., Ameri¬ can State Constitutions) (New York 1887) ; Holcombe, A. N., (State Government in the United States* (ib. 1916) ; Jameson, J. A., (Treatise on Constitutional Conventions, Their History, Powers and Modes of Procedure) (4th ed., Chicago 1887) ; Landon, J. S., (The Constitutional History and Government of the United States) (Boston 1900) ; Lobingier, C. S., (The People's Law, or Popular Participation in Law-making) (New York 1909) ; Lowell, A. L., Rublic Opinion and Popular Government* (ib. 1913) ; Morey, W. C., (First State Constitu¬ tions* (in Annals of the American Academy of Political and Social Science,* Pub. No. 98, pp. 201-232, Philadelphia 1893)'; McClure, W. M, 'State Constitution Making) (Nashville 1916) ; Oberholtzer, E. P., (The Referendum in America) (rev. ed., New York 1912) ; Phillips, J. B., Recent State Constitution-making) (1904) ; Schouler, James, Constitutional Studies, State and Federal > (New York 1897) ; Stimson F T., Raw of the Federal and State Constitutions of the United States* (ib. 1908); Thorpe, F. N., Constitutional History of the*

*United States, 1 765-1895 * (Chicago 1901). The text and digests of the State and Federal constitutions may be found in Hough, F. B., American Constitutions) (2 vols., Albany 1871) ; Newman, J. H. (ed.), (Digest of State Constitutions* (Columbus, Ohio, 1912) ; Poore, B. P., (The Federal and State Constitutions, Colonial Charters and Other Organic Laws of the United States) (Washington 1876) ; Thorpe, F. N., (The Federal and State Constitutions, Colonial Charters and Other Organic Laws of the States, Territories and Colonies,* issued as Rouse Document 397, 59th Congress, 2d ses¬ sion (7 vols., Washington 1909) ; and in the*

Irving E. Rines,

*Author of ' History of the United States .**

CONVENTIONS, Revolutionary. Where the legal governments of countries have be¬ come the very grievances against which people rebel, the latter have no organ of expression save tumultuous or representative popular assemblies. The latter are usually called con¬ ventions. Thus, in England, the convention parliament of 1399 deposed Richard II and gave the crown to Henry IV; that of 1660, after the downfall of Richard Cromwell, pro¬ claimed Charles II ; that of 1689, after the flight of James II, proclaimed him abdicated and William III king. These were simply parlia¬ ments, except that there was no royal authority to call them. In Massachusetts, the convention of May 1689, at the same time as that in Eng¬ land, superseded the Andros government by one of the people. That of South Carolina in 1718, to form a provisional government in place of the proprietary government, is another in¬ stance. Of a similar character was the conven¬ tion by which the first French Republic was declared in 1792, and under which the Revolu¬ tion was carried on till the establishment of the Directory in 1795. In all these cases, the con¬ ventions were administrative bodies, govern¬ ments pro tern. So during the Revolution, when the royal governors proclaimed the colonial assemblies dissolved, they were in the habit of reassembling as conventions, and they consti¬ tuted the provincial government until regular constitutions were in force, which in fact they themselves often framed and adopted. The later constitutional conventions, creatures of State law, and limited to the preparation of a plan of government to be afterward voted on, have nothing whatever in common with the above, and are in fact only enlarged consulting boards, representative enough to imply

fairly the entire public feeling. Of the first sort were the nullification convention in South Carolina in 1832 (see Compromise of 1833), and the secession conventions of 1860 and 1861. See Conventions, Constitutional; United States — State Constitutions; Virginia Conven¬ tions of the Revolution.

CONVERGENCE. Cases often occur where two animals of different groups, with a different ancestry and affinities, but with similar habits, so closely resemble each other that not only the ordinary observer, but the experienced naturalist, is deceived by their close resem¬ blance. A familiar example is the whale, which so resembles a fish that by many it is even supposed to be one. Now, the whale is a mam-

mal, bringing forth its young alive, and suck¬ ling it. The cetaceans form an order by them¬ selves. There are strong reasons for believing that they are the descendants of some group of land vertebrates which walked on all fours, but which, perhaps driven by competition, were forced to adopt marine life, and became won¬ derfully adapted to an aquatic life, during this process losing by disuse their hind limbs, while the fore legs became converted into fins. By adaptation to the same medium, a fish and a whale have a similar shape and a strong super¬ ficial resemblance. The same is the case with certain extinct whale-like lizards, such as the ichthyosaurs. These, with the plesiosaurs, are now supposed to have descended from some earlier four-footed terrestrial reptiles, which, becoming adapted to oceanic life, assumed a fish-like form.

Cases of convergence resulting from similar burrowing habits are seen in the Amphibia and reptiles. Certain amphibians (Concilia) and several extinct Carboniferous forms, have lost their limbs by disuse; they are worm-like, from adopting the habits of earthworms. Among the lizards the glass-snake (Ophiosaurus) and a few other forms have lost their legs in conse¬ quence of burrowing in the sand. There is a species (Bipes) in which a pair of legs are re¬ tained. Snakes have evidently descended from four-legged forms, the boas still retaining ves¬ tiges of the hind legs. It is not an easy matter to separate some of the legless lizards from small boas, owing to the convergence in their mode of life.

The thousands and tens of thousands of the boring larvae of insects, belonging to quite different groups, have strikingly similar forms owing to their similar habits ; thus the headless and apodous maggots of flies resemble those of ants, wasps and bees. Among jumping mam¬ mals, the kangaroo, the jerboa and jumping mice have similar large muscular hind legs, with a reduction in the number of toes, although they belong to different sub-classes or orders. The kangaroo is a marsupial and we have marsupial or kangaroo rats and mice which can be sepa¬ rated only by an expert from ordinary rodents. The koala mimics the bear, the pouched wea¬ sels look like genuine weasels, and so on.

A multitude of other examples can be cited to illustrate the effects of convergent habits, or the influence of similar conditions of life, or adaptation to such and such surroundings. It is most probable that many, if not the large majority, of the cases of mimicry among butter¬ flies and other insects generally attributed to the action of natural selection, are examples of convergence, resulting from exposure to simi¬ lar physical conditions of light, temperature, etc., which have produced similar styles of coloration, outlines in their wings, etc.

While convergence is not in itself a primary factor of organic evolution, use and disuse are such factors, and convergence in habits or modes of life, resulting in use or disuse ˆf parts, have had much to do with the evolution of such extremely specialized groups as the whales, the snakes, the plesiosaurs and ichthy¬ osaurs, as well as other minor groups of animals.

Convergence is of relatively rare occurrence in plants. However, the phenomenon of hetero-

spory in Pteridophytes is usually supposed to have originated separately in the several groups.

CONVERGENT SERIES. See Series.

CONVERSANO, kon-ver-sa'nd, Italy, a town in the province of Bari, on a hill, 20 miles southeast of the town of Bari and five miles from the Adriatic coast. It is the seat of a bishop, and has a .citadel, a handsome cathedral of the 13th century, several convents, among them San Benedetto, a diocesan seminary, a hos¬ pital and a castle which belonged to the family of Acquaviva. The district produces wine, oil, almonds, flax and cotton ; and a good trade is carried on in these articles. The foundation of the town is attributed to the Etruscans. Pop. 15,112. Consult Simeon, S., (I1 duomo di Con-versano) (Troni 1896).

CONVERSATION, the oral interchange of ideas among two or more persons. It may be formal or informal, in the latter sense differ¬ ing little in meaning from ((speech or talk.® In its formal sense it is sometimes spoken of as ((polite conversation,)) and it may cover a wfide range of topics. As an art, conversation may be said to have flourished in the courts and palaces of Italy from the Middle Ages onward, and in the salons of France during the 16th, 1 7th and 18th centuries. In England, in the 17th and 18th centuries, conversation was per¬ haps at its best. Some of the ((polite conversa¬ tion® of this period has been preserved in the form of ((table talk,® but some of this litera¬ ture might be better described as <(monologue.®

CONVERSE, Florence, American writer: b. New Orleans, 30 April 1871. She was grad¬ uated at Wellesley College in 1893, and was a member of the editorial staff of The Churchman (New York), 1900-08, when she joined the editorial staff of the Atlantic Monthly. Author of (Diana Victrix,5 a novel (1897) ; (The Burden of Christopher5 (1900) ; (Long Will,5 a romance (1903) ; (The House of Prayer 5 (1908) ; (A Masque of Sibyls) (1910) ; (The Children of Lights a novel (1912) ; (The Story of Wellesley,5 a history of Wellesley College (1915). She is also editor of the (Lit¬ tle Schoolmate Series,5 and has written short stories and poems which have appeared in the Atlantic Monthly, 1 he Century and other mag¬ azines.

CONVERSE, Frederick Shepherd, Ameri¬ can composer: b. Newton, Mass., 5 Jan. 1871. He was educated at Harvard University and at the Royal Academy of Music, Munich. From 1899 to 1901 he was instructor in harmony in the New England Conservatory of Music. At Harvard he was instructor in music in 1901-04, and assistant professor 1904—07. His composi¬ tions include (Sonata in A5 ; (Suite for Piano) ; (Festival of Pan5 (1904); (Night and Day5; (La belle dame sans mercP ; (Three Love Songs) ; (Two Songs for a Soprano Voice5 ; (Quartet in A Minor5 ; (Two Songs for Low Voice5 ; (Silent Noon5 ; (Laudate Dominum5 ; (The Pipe of Desire5 ; (The Sacrifice5 ; (Job,5 an oratorio; and (Ormazd,5 a symphonic poem.

CONVERSE, James Booth, American clergyman and author: b. Philadelphia, Pa., 8 April 1844; d.

Morristown, Tenn., 31 Oct. 1914. He was graduated at Princeton 1865 and at Union Theological Seminary, Va., 1870. He was ordained in the Presbyterian ministry in

1871. He edited the Christian Observer 1872- 79, and the Christian Patriot 1890-95. He pub¬ lished (A Summer Vacation Abroad) (1879) ; (The Bible and Land, an argument in favor of single tax (1889) ; (Uncle Sam's Bible, or Bible Teaching About Politics* (1899); (There Shall Be No Poor* (1906), and also hundreds of articles in newspapers and magazines.*

CONVERSION, (1) In theology, is origi¬ nally the acceptation of Christianity by heathens. It is also used generally for a change from one religion to another, or in a narrower sense for a complete change of attitude toward God, involving a deeper conviction of the ultimate religious and moral truths. Considerable dif¬ ference of opinion exists within the Christian Church as to the true nature and causes of conversion, especially in the sense last de¬ scribed. The difficulties hinge mainly on the extent of man's co-operation with Divine Grace, and the precise connection between conversion and repentance. In all cases of conversion the criterion of its validity is generally taken to be the resultant change of a man's character as manifested in his mode of life and thought, in the abstention from sin and in devotion to good works.

(2) In logic. — In the syllogistic method it is often necessary, in order to reduce the modes of the other figures to those of the first, to change the subject into attribute and the attri¬ bute into subject. This operation is called the conversion of propositions. In mathematical propositions the conversion is easily effected and the simplicity of the relations expressed renders evident the methods to be followed. The terms of an equation can be transposed without change, and the terms of an inequality by chang¬ ing the sign ; e. g., A . > B because B <. A and A 2 > B becomes B < A. In the qualita¬ tive propositions of logic the relations of the terms are more complex and the rules more precise. Here we have four kinds of proposi¬ tions — the universal affirmative A, the univer¬ sal negative E, the particular affirmative I and the particular negative O. How are these propositions converted? A may present two cases, it may express a definition in which the attribute has exactly the same extension as the subject and in this case the attribute can take the place of the subject without changing in any way the quantity of the proposition, e. g. All men are rational animals becomes all rational animals are men. This is an example of simple conversion. The universal affirmative A may also express the union of an attribute with a whole class of subjects without limiting this attribute to this class. In the conversion of such a proposition this indetermination of the attribute must be maintained e. g. All men are mortal is converted into Some mortals are men. A is here converted by limitation or per acci- dens. The universal negative E always ex¬ presses the exclusion of an attribute without limit from an entire class of subjects; after conversion, the proposition may consequently remain universal, thus, No man is a quadruped becomes by conversion No quadruped is man. Again we have here a case of simple conversion. The particular affirmative I expresses that an attribute belongs only to a part of the class named in the subject and in conversion this restriction must be maintained; thus. Some mammals live in water becomes some animals

that live in water are mammals. The particular negative O cannot be converted by this simple transposition, for the sense would be altered altogether; — thus Some man is not just cannot be converted into Some one just is not man and a fortiori we may not convert a particular nega¬ tive into a universal negative and say No one just is man. To convert a particular negative proposition therefore we must resort to a third mode of conversion and say, for example, Some one not just is not some one not man. This mode of conversion is known as contraposition. We have, therefore, three kinds of conversion, simple, in which the quantity of the proposition converted remains the same as that of the proposition to be converted, limited or per accidens, in which the universal proposition to be converted is changed into a particular propo¬ sition, and lastly conversion by contraposition. In all cases the quality of the proposition must remain the same. The Scholastics expressed the laws of conversion in the following mne¬ monic verses :

PEcI Simpliciter convertitur, EvA Per accid.

AltO per Contra. Sic fit conversio tota.

Consult Mill, J. S., (Logic) ; Keynes, J. N., (Formal Logic) (3d ed., 1894).

Conversion. — (3) In common law, the wrongful assumption of dominion over the goods of another or others. The term conver¬ sion does not apply to the wrongful assumption of ownership of money or chattels real. Un¬ authorized destruction, sale or the use of the personal property of another constitutes con¬ version. There may be conversion when there is no wrong motive, as where an agent of A sells property believing it to belong to B when it really belonged to C. The wrongful taking may amount to larceny, to trespass or to a crime. Formerly the action for conversion was trover, but this has been abolished by statute both in Great Britain and the United States. The action is now called conversion. Usually the amount of damages recoverable is the value of the goods or the plaintiff's interest where he owns only a part. The plaintiff may either sue to recover the goods or he may claim dam¬ ages. In the latter case title to the goods vests in the defendant if the judgment is satisfied. The courts are divided as to whether the de¬ fendant may mitigate his damages by a tender of the goods to the plaintiff. (4) In equity, an assumption that personal property has been con¬ verted into real property or vice-versa when the owner has shown in a proper manner that such was his intention. This is in accord with the well-known maxim that equity regards as done what ought to have been done. Likewise land may be converted into purchase money by a contract to sell made by the owner. Such intention, however, must be clearly expressed by the owner. The subject is of great import¬ ance on account of the radically different dis- postion of realty and personality under inher¬ itance and succession laws.

CONVERTER. See Steel, Bessemer Process.

CONVERTIBLE GOVERNMENT NOTES. See Currency.

CONVEYANCING, a term including both the science and the act of transferring titles to real estate from one person to another. In Hebrew times the modern form of transferring land was well known. In Rome property was

exchanged by ceremonial only until the reign of Justinian when a simple legal process was instituted. Sometimes the term is applied in a restricted sense to the cumbrous forms which the feudal system has rendered necessary for the transference and tenure of landed property. When left to shape itself by individual prac¬ tice, without legislative intervention, there were several causes rendering such conveyancing cumbrous and complex. The theory of the feu¬ dal tenures and hierachy remaining unchanged throughout the social revolution which had substantially abolished superiority and vassal- age, and brought land out of feudality into commerce, the feudal ceremonies of the Middle Ages were necessarily retained, and they were adapted to fictions and explanations to modern exigencies. It seems strange that not many years have passed since in Scotland, when a parcel of land was bought and sold, a party of men assembled on it and went through the old form of feudal investiture by the delivery of so much earth and stone from the superior bailiff to the vassal's attorney, who took instru¬ ments and had the whole recorded at length by a notary of the empire. In England, from the want of the general system of registration known in Scotland, the complexities of convey¬ ancing had become so inextricable, that one of the most approved forms of transference was a fictitious suit and judgment of possession called a fine and recovery. To these various sources of complexity must be added the timidity of conveyancers, who, afraid to commit themselves by attempting to abbreviate or reconstruct the forms which they find in existence, repeat them with additions from time to time as new cir¬ cumstances must be provided for. Consequently to keep conveyancing within rational bounds the legislature, both in England and the United States, has interfered from time to time, by sweeping away excrescences, and providing brief and simple forms. All instruments under seal are spoken of as deeds, but the term deed is usually understood as applying to convey¬ ances of land. Every person capable of holding lands (excepting idiots, persons of unsound minds and infants), seized of or entitled to any estate or interest in lands, may alien such estate or interest at pleasure, subject to the restric¬ tions and regulations prescribed by law. For a description of the method and procedure of modern conveyancing see Deed; Title-Deed; Title

Registration; Title Insurance. . Con¬ sult Brewster, Conveyance of Estates in Fee by Deed (Indianapolis 1904) ; Greenwood, (Manual of the Practices of Conveyancing* (London 1891) ; Hunter, (The Dominion Con- veyancer) (Toronto 1893).*

CONVEYER, a mechanism for conveying something, as loose material, from one place and depositing it at another place distinguished in mechanics from a carrier or elevator. Con¬ veyers may be divided into four general classes : those that operate with endless chains or belts; those that travel along cableways or on a trussed support; those that operate by gravity; those that use a reciprocating surface to throw mate¬ rial forward. These mechanisms have come into very extended use during the past 30 years, being employed in large excavating operations, and in handling coal, grain, cement, ore and similar material. Their manufacture is carried on by a score or more concerns in the United

States. One of the simplest and earliest forms of conveyer consists of a pair of endless chains, connected at intervals with cross-pieces or scrapers. These are used to pile up coal for storage. At the centre of what is to be the pile of coal a pole is erected, and to the top of this one end of the conveyer is attached, while the other end is located a little above the ground level, near a steam engine or other motive power. As coal is dumped within the space the scrapers convey it upward toward the pole, and as the lower end of the conveyer may be moved to any point in the circle about the pole, coal dumped anywhere in the circle may be smoothed up and pushed toward the centre, until all lies in a symmetrical pile.

A common form of conveyer consists of a sheet iron trough through which travels a linked belt or chain device having cross strips or scoops. Any loose material dropped in the trough is carried along by the scoops to the point where the linked belt bends for its return.

The Hunt conveyer consists of a series of sheet iron buckets or small cars, hung between parallel lines of flat links, that constitute chains. The buckets swing on trunnions or pivots placed above the centre of gravity, so that they always remain upright, no matter what is the inclination or route of the chains, until they reach a dumping or upsetting mechanism. The links have wheels that run on little tracks, so that the whole constitutes a miniature railway train. The cars or buckets will carry either liquid or dry material. This is called a noise¬ less conveyer, because the provisions for lubrication do away with all objectionable noise, the latter being a special nuisance with con¬ veyers of the scraper type. The driving wheel of the Hunt conveyer has a series of large pawls, that engage with pins on the links, and provide a slow, but steady and powerful motion. Capacity is obtained by the size of the buckets and not by speed.

Bucket conveyers, more or less similar to those just described, are commonly employed to supply large boiler plants with coal, and to carry away the ashes. In plants located by a waterway, such as that of the Arbuckle sugar refinery, the coal is hoisted in grub-buckets direct from the hold of a vessel, and dumped into the buckets of a conveyer, which trans¬ ports it to a large pocket or storage room located above the boilers. Thence the coal is fed through automatic stokers to the boilers. Running along below the boilers is another line of conveyer buckets that receive the ashes from the hoppers below the boilers and carry them out to a dumping place, which is often a large elevated hopper, from which the ash wagons can load by driving directly under it and opening a discharge gate. All large rail¬ way terminal stations have a coaling-house arranged somewhat on the plan described. The coal is conveyed to overhead storage by the conveyers and is dropped direct into the tenders as they come below. At the plant of the Phila¬ delphia and Reading railroad in Philadelphia monobar conveyers are employed, having a con¬ veying capacity of 120 tons of coal an hour, while the set used to carry away the ashes dumped by the locomotives has a capacity of 20 tons an hour. Nearly all this capacity is needed at times, as the plant is sometimes called upon to load as many as 12 locomotives at once. The monobar

conveyer referred to is of the scraper type, the scrapers being attached to a link-belt monobar chain, driven by equalizing gears. Bearing blocks are introduced to reduce the noise.

The Luther ore conveyer has met with con¬ siderable sale in Germany. This consists of a series of

rectangular sheet-iron pans, moving on roller bearings. It travels quite swiftly and is used for coal, ashes, sand, sugar, etc., as well as ore. When used for carrying coke, or any other material that tends to wear the metal pans, glass bottoms are employed, which give good satisfaction.

For lumber-mills and large wood-working plants a different style of conveyer is manu¬ factured. The Schroeder Lumber Company's works at Milwaukee, Wis., afford a good ex¬ ample, being equipped with a sort of traveling sidewalk, consisting of parallel planks attached at right angles to two malleable iron chain belts. At intervals a thick plank is inserted to keep in place the hard wood lumber that is piled on to this conveyer, which is really a strip of moving floor for transporting boards to another part of the works. For handling waste ends and kind¬ ling, a small type of conveyer is used, having hoppers at intervals. Into one set of hoppers the machines that cut up the hard wood drop the end-pieces, etc. Into another set of hoppers the trimmings of soft wood are dropped, and both hard and soft wood are carried up an incline and dumped into an enormous hopper, where the hard and soft wood are kept separate and may be withdrawn from below as wanted for kindling or other purposes.

A conveyer has been devised for loading box cars, the loose material being introduced by a spout at the centre of the car, and carried by the conveyer to the ends, in such a manner that the ends are loaded high up, avoiding waste. These are used on the Hocking Valley Rail¬ way.

The belt conveyer is simply a long endless belt, supported at intervals by rollers or idlers, so shaped that they curve up the edges of the belt, enabling it to carry along material with¬ out spilling off. The belts are sometimes made of leather, but more commonly of cotton duck, faced with rubber. Such conveyers are used in grain elevators, and for ashes, cement, chips, clay, coal, concrete, earth, ore, oyster shells, tailings and the like. The storage tanks of grain elevators employ belt conveyers almost exclusively, the modern circular tanks having a belt gallery that runs across the tops of the tanks and connects them. The belts thus dis¬ tribute the grain from the main elevator to the several tanks.

In handling ore, labor is often reduced by means of sorting conveyers, which are made to serve the purpose of sorting tables, at the same time that they serve to convey the ore. These travel slowly, and men stationed at the sides examine the ore as it passes, breaking any pieces deemed too large for the process to which the ore is to be subjected. The large stone-crushing plants very commonly employ belt conveyers, as being the best adapted for handling broken stone. While belt conveyers are used to some extent for handling coal and ashes, they are restricted in use to inclinations of about 20 degrees. For steeper work or direct elevation the bucket type of conveyer has to be employed. All the conveyers that operate with endless

chains or belts normally deposit the material at the point where the chains or belts are curved oyer rollers or sprockets for return. For depos¬ iting the material at points along the route, various forms of trippers are manufactured, according to the nature of the conveyer and of the material handled. For filling a conveyer en route there are also in use numerous styles of fillers, many of them being simply spouts lead¬ ing from hoppers, and others specially designed for the work they are to do.

The type of conveyer used on a cableway is radically different from the foregoing. A wheeled carrier is slung on a supporting rope, usually a steel wire rope, and from this carrier is hung the material to be conveyed. To the carrier is attached a rope, and a conveyer- engine at one end c>f the cableway pulls the load along to its destination. This is the system followed in coaling vessels at sea. The United States battleships are coaled in this manner dur¬ ing rough weather, the coal being readily car¬ ried aboard under these conditions at a rate of 20 tons an hour.

In excavating work, as the New York sub¬ way and the Chicago drainage canal, this type of conveyer is in constant use, owing to its economical construction and portability. The system is employed for handling sand, at glass works, etc.; for discharging cargo from a vessel to a shore where there is no wharf ; for carry¬ ing material over rivers or rough land, as in new sections of country, where there are no good roads ; for transporting the material used in building breakwaters and piers ; in the build¬ ing of dams and locks, and for a variety of purposes in connection with mines. A few con¬ veyers have been built for permanent use, in which an overhead truss or bridge with a rail takes the place of the cableway.

The transporter-crane is an enormous struc¬ ture resembling a gantry crane, having a large trussed

framework or steel tower, which sup¬ ports a long trussed arm that serves as a rail¬ way for a car or carrier that does the convey¬ ing. This is useful in loading and unloading vessels at docks, and can be used to pass the merchandise completely over low buildings or other obstructions.

A spiral chute is often used to deliver sacks of material to' a lower level by gravity. The inclination of the spiral invites friction which prevents the sacks from descending too rapidly. A perpendicular tube is sometimes used for a similar purpose by placing alternate inclines on the sides so that the sack or other object is thrown by gravity alternately to either side, and so descends at a sufficiently delayed speed to prevent its being damaged by the fall.

About 1910 a new type of conveyer appeared on the market, which permitted the transporta¬ tion of loose material, as ashes, broken stone, etc., around a right angle. Nearly all other conveyers are restricted to a straight line of operations, subject only to slight variation in grade, or sometimes to swinging in the arc of a circle. The Zimmer conveyer, and others of its type, is a rectangular trough of wood or iron, with an oscillating mechanism for moving, the bottom boards or sections of the trough. Power is applied to these bottom boards so as to reciprocate them slowly in a forward direc¬ tion with a quick return. The slow forward motion not only advances the material in the

trough, but raises it slightly, and before the material can fall the bottom is pulled down by a quick-acting spring to first position. The material is thus thrown forward by a series of slight jumps, so that it appears to move slowly onward in a mass, and may be made to turn a right-angled corner or any other shorter sharp angle. The Norton and Marcus conveyers em¬ ploy the sartie principle. See Excavator; Tel¬ pherage. Consult Zimmer, (Mechanical Hand¬ ling and Storing of Material (1916).*

*Charles H. Cochrane, Author of (Modern Industrial Progress .**

CONVICT LABOR. The introduction of industry into prison life, apart from its use to keep penitentiaries in good order and good repair, is a product of 19th century reforms. Isolated cases it is true occurred before. Mabil- lon, a Benedictine monk of the 1 7th century, urged a cellular system of imprisonment, labor in the cells and gardens where prisoners might rest after the day's work. In 1704 Pope Clement XI opened a prison at Rome, where the industrial feature proved successful in the case of boys. A famous prison built in Ghent in 1775 by Viscount Vilain XIV had a well-organized labor system, intended to benefit the prisoner and make him useful to the state. Two years afterward John Howard published his work on (Prison Reform. But in practice before the beginning of the 19th century, and well into it, labor was considered in a peno¬ logical bearing only as offering the possibility of severer punishment, an idea excellently typi¬ fied by the Roman system of punishing the city slave by sending him to the country tread-mill, or by the terrible toil of the galley slave in Italy and France. This penal point of view was fol¬ lowed by the fiscal interest of the state and to a certain degree intermixed with it; the state will save, and if possible, make money by means of its use of the time and strength of the convict. Then the disciplinary interest became predominant ; the convict will furnish us less trouble if we keep him at work. A fur¬ ther step is taken when the object of convict labor becomes moral and the prisoner is put to work to keep him from idleness, spring of so much vice, and to promote his ability to earn an honest livelihood upon his release. In the latest among these stages a distinct effort is made to furnish the convict with decent and pleasant work, and the old scheme of choosing the most revolting and dangerous, the most degrading and monotonous task has been done away with.*

Unfortunately the evolution hinted at has not been completed, and traces of each of the ideals mentioned may still be found in the various systems of Europe and the United States. ((At hard labor,® for example, is still felt to be a degrading and aggravating addition to the sentence of detention. As far as actual business management is concerned there are two methods of convict labor. In the first, where the <(product or profits of labor is shared by the state with private individuals or firms,® we may mention three divisions, sufficiently characterized by their common names : the contract system, the piece-price system and the lease system. The second general class, ((sys- tems under which convicts are worked wholly for the benefit of the state® or its parts, again

falls into three divisions, the public-account system, the state-use system and the ways and works system. Theoretically the piece-price system is best in the former class, as it keeps discipline in the hands of prison authorities and leaves business to the entrepeneur ; moreover it lacks the faults of the contract system, which to a degree interferes with regenerating influ¬ ences by the very monotony of highly special¬ ized and largely divided industries. In the second class, the public account system, by which goods were made in prison, under the control of regular prison officers, and were sold in a rather haphazard way, has bulked so largely in the public eye, by reason of the attacks made on it by the representatives of free labor (who overlook the fact that cheaper production is offset by slower production), that the other sub-classes have been overlooked. Of these systems the most popular is that which provides that all results of convict labor should be used by the state, and yet this as a system could equally well be attacked by labor unions, which naturally desire to supply state institu¬ tions as well as other sources of demand. Al¬ though it has but a limited field, the state-use system is growing; it is used in most of the northern States and is authorized by the Fed¬ eral government for the Fort Leavenworth penitentiary. Another system is the State farm system, under which, as in several southern and some northern States, large plantations are purchased to be operated by the State with con¬ vict labor, part of the products being used to maintain the prisoners and the unused portions being sold in the public markets. In the North many of these farms are adjacent to the prisons so that they may be worked by the inmates. The State farm system has been in vogue in Massachusetts many years, and in some of the southern States they are highly profitable to the State. In favor of the system it may be said that the prisoners can be kept in permanent places ; they are not exposed to public view ; they may be instructed in the ways of becoming self-supporting; they have healthful outdoor life; and the system does not arouse a great amount of public opposition.

The lease system calls for special notice. Its particular habitat is the South, where after the war a remodeling of the penitentiary system was demanded because of the addition of the negro factor to the problem, more than 90 per cent of convicts in most States being negroes. Both expense and the need of outdoor work on the part of the negro made impracticable the continued use of walled penitentiaries, which moreover would have been quite inadequate under new conditions. The lease system came into general use in the late forties, and felons were worked in coal and iron-mills, saw-mills and farms. A chief inspector had general charge, but the responsibility, which was scarcely more than nominal, was upon the lessee and his inspectors and physicians. In many States this system gave rise to horrible abuses. In Georgia it was abolished in 1897 and the State camp system put in its place. The death rate dropped from over 7 to 1.4 per cent in four years. Pay was allowed the prisoner who volunteered to do extra work, and the more brutal forms of corporal punishment abolished. But even in. Georgia the county chain gang, made up of minor offenders, under supervision of county

road commissioners, is still cruel and vicious. Worse than the county chain gang of Georgia, where only 45 per cent are hired to private individuals, is the system in other States. Ala¬ bama, notably by its contract law of 1901, which was declared unconstitutional in 1903 by a United States Circuit Court judge, made pos¬ sible the following scheme of peonage : A minor offender and often a perfectly innocent person is sentenced to a light fine which the constable offers to pay for a certain number of months' work. At the expiration of this period a new charge is trumped up, or the negro induced to attempt escape, he is again tried and sent to the convict camp or fined for the benefit of the constable and his backers. The universal dis¬ approval of this system in the South and the prompt action of the Federal authorities has led to the abolition of its worst features.

Bibliography. — 'Alexander, H., (The Con¬ vict Lease and the System of Contract Labor) (Nashville 1913) ; Boswell, H. V., 'Women and Prison Labor) (New York 1913) ; Brockway, Z. R., 'Fifty Years of Prison Service) (New York 1912) ; Cable, G. W., 'The Convict Lease System > (1883) ; Gemmill, W. N., 'Employ¬

ment and Compensation of Prisoners) (in Journal of the American Institute of Criminal Law and Criminology, Vol. VI, pp. 507-521, Chicago 1916) ; Hiller, E. T., 'Labor Unionism and Convict Labor) (in ibid., Vol. V, pp. 851— 879, 1915) ; Hardy, R. B., 'Digest of the Laws and Practices of

all the States of the Union in Reference to the Employment of Convicts (1911) ; Henderson, C. R., 'Outdoor Labor for Convicts* (Chicago 1907), and 'Penal and Reformatory Institutions) (Chicago 1910) ; Hicks, F. C., 'Convict Labor in the United States) (New York 1913) ; Lovely, Collis, 'The State Use System* (New York 1913) ; Whitin, S., 'Penal Servitude) (New York 1912) ; Wines, H., 'Punishment and Reforma- tion) (New York 1910) ; Wright, C. D., 'Some Ethical Phases of the Labor Question* (Boston 1902) ; 'Report on Prison Labor) (United States Industrial Commission, 1900) ; 'Special Report on Prison Labor* (Ohio State Bureau of Labor Statistics, 1910) ; 'Report on Com¬ petition of Penal Labor) (United States House of Representatives, Sub-committee No. 4, Committee on Labor, 1908).*

CONVOCATION, an assembly of the clergy of the Church of England, belonging either to the province of Canterbury or to that of York, to consult on ecclesiastical matters. In both provinces the Convocation consists of two houses, an upper and a lower. In the former sit the bishops and in the latter the deans and archdeacons, along with the proctors, who represent the inferior clergy and the chapters of cathedral churches. In the Con¬ vocation of the province of York the usual practice has always -been for all the members to sit in one house. Originally convocations were merelv ecclesiastical councils that had no special privileges or recognized political status, but gradually they came to assume their present form, being endowed with the right of. passing canons, of determining their own taxation, etc. When thus formed into an assembly, having certain political as well as ecclesiastical func¬ tions, there was only one Convocation for all England, and this lasted down to the beginning

*of the 14th century, when the clergy of the two provinces began to meet in separate Con¬ vocations. The archbishop of each province has the right of summoning Convocation, but he cannot do so without the royal consent, nor can Convocation pass any canons without the same authority; and from its judicial proceed¬ ings there lies an appeal to the sovereign in council. In 1664 the practice of granting sub¬ sidies to the Crown, in the exercise of the right of self-taxation enjoyed by the clergy, was discontinued, and since that time their functions have been mostly formal. In the reigns of William III and Queen Anne the Convocation of the province of Canterbury re¬ covered some degree of importance, but in 1717 that temporary influence was again lost, and from that year down to a recent period the practice was to prorogue the Convocation as soon as it had assembled. Since 1852, however, the Canterbury Convocation has met regularly two or three times a year for the transaction of business relating to the Church, and in 1861 it exercised its legislative power, the first time for a long series of years. On the opening of a new Parliament, a new Convocation is sum¬ moned. If the Crown desires to refer any question to Convocation, "letters of business** are issued, directing that question to be taken into consideration. Other bodies in touch with the work of Convocation are the House of Laymen and the Representative Church Coun¬ cil, which, however, are without constitutional status in the Church of England.*

The term Convocation is also applied to the legislative body of the University of Oxford, composed of all masters of arts, and has the power of acceptance or rejection of statutes passed by the Hebdomadal Council and the Congregation. Consult Trevor, 'The Convoca¬ tion of the Two Provinces : Their Origin, Con¬ stitution, and Forms of Proceeding) (London 1854) ; Lansbury, 'History of the Convocation of the Church of England (London 1842).*

CONVOLVULACEZE, kon-vol-vu-la'se-e, or BIND'WEEDS, an order of herbaceous or shrubby plants, usually twining, with plaited tubular corolla, imbricated calyx, alternate un¬ divided or lobed and pinnatifid leaves ; bell¬ shaped flowers, axillary or terminal ; five free stamens; and fruit with two or three cells. Many of the order contain a milky and resinous juice possessing purgative properties more or less drastic. Jalap is derived from the Ipomoca purga, and inhabitant of Mexico and the southern parts of the United States; and scammony (C. scammonia) is a resinous sub¬ stance possessed of nearly the same properties as jalap. Some species of the order have tuberous and fleshy roots containing a farina¬ ceous and saccharine principle which fits them for food for man and beast. Among these is Ipomcea batatas, the sweet potato, originally from India or South America., but now culti¬ vated in all countries where it can stand the climate. C. scoparius and floridus yield by distillation an essential oil called oil of rhodium, which has a bitter balsamic flavor. Their wood, when powdered, forms an agreeable snuff, and when burned is very fragrant. There arc. about 40 genera and 900 species widely distributed. The various species of Cuscuta, the dodders (q.v.) or bindweeds, which are parasitic on

other plants and lack leaves and green color entirely are often considered as belonging to the family.

CONVOLVULIN, kon-vol'vu-Hn, the pur¬ gative constituent of jalap (CsiHsoOia), obtained from the root by treatment with water and strong alcohol. The alcoholic extract is mixed with water, boiled with animal charcoal, fil¬ tered, evaporated and treated with ether as long as anything dissolves. Pure convolvulin is transparent and colorless, brittle at 21 2° F., fuses at a higher temperature to a clear liquid and is decomposed by strong heating. It is almost insoluble in water and quite so in ether, but soluble in alcohol. It has no taste or smell. In doses of two or three grains it is a powerful purgative, and in larger quantities is fatal to animals. By treatment with alkalis it is con¬ verted into convolvulic acid, and by acids into convolvulinol (C13H24O3) and glucose.

CONVOLVULUS, the typical genus of the natural order Convolvulacece (q.v.),or morning- glory family, formerly known as bindweeds. There are about 150 species widely distributed in temperate and tropical climates, some 15 of which are found throughout the southern and western United States.

CONVOY (Fr. convoy er, ((to accompany^), in nautical language, a fleet of merchantmen bound on a voyage to some particular port or general rendezvous under the protection of a ship or ships of war. The name is also given to the ship or ships appointed to conduct and defend them on their passage thither. It is used in a military sense for a wagon train under an escort of troops, and loosely for the escort itself.

CONVULSIONISTS, or CONVUL- SIONARIES, a sect of religious fanatics originating among the Jansenists of France about 1730. Three years previously a charitable and ascetic deacon of Paris, one Francis, died, and was buried in the cemetery of Saint Medard, in one of the suburbs of the capital. Reports of miracles wrought at his tomb spread among the people, and soon the cemetery was the scene of extraordinary manifestations. As the devotees approached the tomb many were seized with convulsions, or took to dancing and contortions, accompanied by shouts and other eccentric demonstrations. Some of their utter¬ ances were accounted as prophecies miraculously inspired by the venerated dead. Most of them were directed to the support of the Jansenist doctrines ; but some of the fanatics, by de¬ nouncing the throne, and predicting its down¬ fall as well as that of the Church, drew the attention of the government and the ecclesias¬ tical authorities. The cemetery was ordered to be closed ; but the same virtue that seemed to be possessed by the tomb was also inherent in earth surreptitiously obtained from it, and the manifestations continued. Imprisonment failed to stop them, but the fanaticism grad¬ ually died out in about 20 years. An account of this sect was published by P. F. Mathieu, in Paris in 1864, entitled (Histoire des miracles et des Convulsions-Saint Medard.) Consult also Carre de Montgerom,

CONVULSIONS. A convulsion is a vio¬ lent involuntary contraction or series of com tractions of the voluntary muscles. It occurs in many conditions, both functional and organic, namely, tetany, hysteria, epilepsy, tetanus (lock jaw), uraemia, eclampsia and chorea (Saint Vitus dance), occurring most frequently in infants. The convulsion may be local or gen¬ eral, tonic or clonic in character, and is due to a hypersensitive nervous system or relatively greater excitability of the brain and the un¬ developed power of inhibitory control. In children it may be reflexly due to teething, phimosis, rachitis, eating of indigestible articles of food, intestinal worms, injuries to the body, constipation, foreign bodies in the ear and nose, and fever from any cause or toxaemia of any kind. Convulsions at the time of birth may be due to cerebral haemorrhage following a forceps delivery, or brain tumor, brain abscess and hydrocephalus.

Uraemia is the result of kidney disease, as is also eclampsia which occurs during the preg¬ nant state. The convulsions are tonic and clonic in character, frequently occur without warning and in people apparently in perfect health the attack may come on at any time — the eyes become fixed at first and then roll from side to side, the convulsive movements first appear about the mouth, which begins to twitch and is drawn to one side, the entire face becoming distorted. They extend rapidly to the arms, the body, and then finally to the legs. The breathing is stertorous, the face congested and

flushed, the patient foams at the mouth and often bites his tongue. During the convulsion, which may last from a few seconds to a half hour, the patient is profoundly unconscious, and after the movements cease passes into a condition of coma which lasts for a longer or shorter period. The convulsions are frequently repeated.

Chorea occurs most frequently in children, and the convulsions or twitchings are of a clonic character and affect groups of muscles. The twitchings may be slight or very severe so as to interfere with speech, eating, locomo¬ tion and coherent voluntary bodily movements. It may affect one side of the body, as one arm and leg, when it is known as hemichorea, or it may affect both sides. The twitching move¬ ments are greatly exaggerated when the patient endeavors to perform a voluntary act. Con¬ sciousness is always present.

In epilepsy (q.v.) the convulsions resemble those described under uraemia. There seems to be a regular order of movements followed out, preceded by aura, the patient becomes un¬ conscious, froths at the mouth, bites his tongue, the pupils dilate and there is an involuntary passage of urine and faeces. The convulsions last a few minutes, and on recovery, the patient is left in a semi-comatose condition, complains of headache, and then falls off into a restless sleep. The attacks also frequently occur at night while asleep.

Hysteria shows a great variety of manifesta¬ tions. The convulsions may involve only the lower extremity or the head and neck. There is a condition known as hystero-epilepsy. There is no aura, the attacks are much prolonged and purposeful and tonic in character. The bladder and rectal functions are not disturbed. There is no complete loss of consciousness.

The patients seldom injure themselves, in fact they seem to protect themselves from injury.

In children the convulsions usually begin suddenly, although they may be preceded by a rolling of the eyes upward and sideways and by slight twitching of the muscles of the face. Unconsciousness soon supervenes, the eyes re¬ main fixed and staring, the head is thrown backward, and the entire body stiffens out only to be followed by clonic contractions. There is a series of contractions and relaxations. The face assumes different expressions or grimaces, the teeth become set, there is a frothing at the mouth and the color of the face becomes dusky and cyanotic. The breathing is labored and heavy, urine and faeces may be voided involun¬ tarily. After going through several convul¬ sions the child soon passes into a deep sleep and then awakens with an apparent interest in his surroundings. These convulsions usually indicate the approach of some disease or reflex irritation somewhere, and should be considered as a serious condition until the cause is dis¬ covered. The convulsion in the child is analo¬ gous to the chill in the adult, it precedes such diseases as pneumonia, cerebrospinal menin¬ gitis, grippe, intestinal disturbances, etc. A convulsion is a symptom and not a disease, and therefore it is never directly the cause of death.

As to treatment, it is of great importance to control the convulsion before trying to find out its cause. In children this is done by placing the child in a bath of hot water with mustard and keeping it there until the skin is reddened. If the convulsions persist, the child should be put under the influence of chloroform until the convulsive tendency has disappeared. When the convulsion is controlled, search is then made for the cause. If the digestive tract is found to be at fault, the child is given a dose of castor oil, and a high rectal enema of soapsuds is given as a matter of routine to empty the lower bowel. After the bowel is cleared and the child still shows a tendency toward con¬ vulsions, a rectal injection of 10 grains of sodium bromide and 3 grains of chloral hy¬ drate may be given for a child five years old. In very severe cases it is justifiable to give a hypodermic of morphia in proper dose. The room should be kept noiseless and an icebag placed to the head. It is always a good plan to examine the enema stool in search for intestinal parasites, foreign bodies or undigested particles or lumps oi food. A child who is very nervous and is easily excited by physical impressions should be kept very quiet. Genital abnormalities should be properly treated, a child with a tight or adherent prepuce when circumcised becomes free from convul¬ sions. Foreign bodies should be removed from the ears and nose. A child with rachitis should be built up, kept out of doors in the sun, and given the proper kind of food and tonics. Hy¬ drocephalus may be treated by tapping the ventricles of the

brain through the anterior fontanelle and so drain off some of the fluid or tap the spinal cord to drain it off that way and so relieve the . intra-cranial pressure. Anaemia and malnutrition should be treated if found to be the cause.

Convulsions due to tumors of the brain or brain abscess cannot be treated unless they be in a position accessible to the surgeon. Con¬ vulsions due to uraemia are very serious and

need very urgent treatment ; a mouth gag should be inserted into the mouth to prevent the patient from biting his tongue, blood letting is done from one of the veins at the bend of the elbow to lower the blood pressure and rid the system of a certain amount of toxins ; usually 500 c.c. is withdrawn at one time, hot packs are given or the electric baker is placed over the patient to induce profuse perspiration, pilocarpine one-tenth grain by hypo is some¬ times used but is not safe. In eclampsia the uterus is emptied as soon and as rapidly as possible, using ether and oxygen as anaesthetic ; chloroform should never be used. Ether and oxygen are used to control the convulsions until the time for operation. A mouth gag is the first thing to be placed in the mouth. Veratrum viride, 5 minims by hypo every one- half hour, is given to lower the blood pressure. Magnesium sulphate, a dram to the pint, is administered usually post-partum intra-venously and frequently repeated. In epilepsy the convul¬ sions usually do not last long. Prevent the patient from injuring and biting his tongue. Loosen all his clothing and see that he lies in a well-padded place and away from solid ob¬ jects. Chloroform is used if the convulsion is very severe. Epilepsy found to be due to depressed fracture of the skull is often cured of any future attacks when operated upon and a button of bone removed, the intra-cranial pressure being thus relieved. In chorea, the child should be kept as quiet as possible, free from all mental and physical strain. Its food should be easily digested and nourishing; ar¬ senic in the form of Fowler's solution is the best remedy. If traces of rheumatism are present it is combined with the salicylates. Bromides and chloral are given to quiet and control the spasmodic movements. Iron is also given as a tonic. In hysteria the best way to check the convulsion is by dashing a glass of cold water into the patient's face. A hypo of apomorphine, one-tenth grain, causes sickness of the stomach and immediately arrests the attack. A teaspoonful of aromatic spirits of ammonia may be given. Convulsions due to meningitis, tetanus, brain abscess and tumors of the brain are treated along general principles.

Henry H. Beinfield, M.D.

CONWAY, Hugh. See Fargus, Fred¬ erick John.

CONWAY, Moncure Daniel, American clergyman and author : b. Stafford County, Va., 17 March 1832; d. New York 1907. He was graduated at Dickinson College in 1849, entered the Methodist ministry in 1850, and later studied at the Harvard Divinity School. He had be¬ come imbued with rationalistic ideas and at¬ tempted to preach them on his return to Vir¬ ginia, but was obliged to leave the State. He became pastor of a Unitarian church in Wash¬ ington, D. C., but was obliged to leave this charge, owing to his opposition to slavery. He secured another pastorate in Cincinnati, and while there wrote several volumes and edited the Dial. In this periodical and later in The Commonwealth of Boston he earnestly advo¬ cated emancipation, and in 1863 went to Eng¬ land to explain the cause of the Civil War. From 1863 to 1884 he was minister at South Place Chapel in London, England, and again, 1892-97. He returned to America near the

close of the century and made his home in New York. His published books include (Tracts for To-day> (1857); (The Rejected Stone> (1861); fl862) ; testimonies Concerning Slavery' (1864) ; the Earthward Pilgrimage) (1870); (Sacred Anthology) (edited) (1872) ; (Idols and Ideals) (1874) ; travels in South Kensington ' (1875) ; Demonology and Devil Lore) (1879) ; the Wandering Jew' (1880) ; thomas Carlyle) (1881) ; (Emerson at Home and Abroad) (1882) ; (George Washington and Mount Ver¬ non' ; Dmitted Chapters of History Disclosed in the Life of Edmund Randolph (1887) ; Dine and Paling a novel (1887) ; (Life of Nathaniel Hawthorne) (1890); (Prisms of Air,' a novel (1891) ; Dife of Thomas Paine) (1892) ; (Barons of the Potomac and the Rap¬ pahannock (1892) ; (Centenary History of South Place ChapeP (1893); (Solomon and Solomonic Literature) (1899) ; (Autobiog¬

raphy } (1904) ; (My Pilgrimage to the Wise Men of the East' (1906) ; (Addresses and Reprints, 1850—1907 } (Boston 1909). He edited the (Works of Thomas Paine) (1893-96).

CONWAY, Robert Seymour, English classical philologist: b. Stoke Newington 1864. He was educated at Caius College, Cambridge. He was Fellow of Gonville and Caius Col¬ lege in 1888-94, classical lecturer in Newnham College in 1887-93, and professor of Latin, University College, Cardiff, Wales, in 1893- 1903, when he took the corresponding chair in Victoria University, Manchester. He wrote Werner's Law in Italy ' (1887) ; and (Virgil, an Inaugural Lecture) (1903), collaborated in the translation of (Brugmann's Comparative Grammar' (1888-95) ; (The Restored Pronun¬ ciation of Greek and Latin' (1896) ; (The Italic Dialects' (1897); (Dialectorum Italicarum Exempla' (1898) ; (The Pre-Hellenic Inscrip¬ tions of Praesos' (1903). He is a frequent contributor to classical periodicals.

CONWAY, Thomas, Irish soldier of fortune: b. Ireland, 27 Feb. 1733; d. about 1800. He was educated in France, and entering the army there became a colonel. He came to America in 1777 and offering his services to the Continental Congress was appointed brigadier- general and subsequently inspector-general, with the rank of major-general. He intrigued to have Washington superseded by General Gates, and he and his associates were known as ˆCon¬ way's Cabal." He resigned in 1778, went to France and was made governor of Pondicherry and the French settlements in Hindustan. In 1792 he was appointed commander of the Roy¬ alist forces in the south of France, but on the success of the Revolutionists fled from the country.

CONWAY, Sir William Martin, English art critic, explorer and mountaineer : b. Roches¬ ter, England, 1856. He was educated at Trinity College, Cambridge ; professor of art at Uni¬ versity College, Liverpool, 1885-88, and Slade professor of fine arts at Cambridge 1901-04. In 1892 he traveled extensively in the Himalayas and in the Alps in 1894; he explored the interior of Spitzbergen in 1896-97, and the Bolivian Andes in 1898, as well as the glaciers of Tierra del Fuego. Among the high peaks he has as¬ cended are one in the Himalayas of 23,000 feet, and Aconcagua, Illimani and Sorata in the

Andes. He was knighted in 1895, received a gold medal for mountain surveys at the Paris Exhibition in 1900, and the founder's medal of the Royal Geographical Society, 1905. He has published (Woodcutters of the Netherlands in the 15th Century' (1884) ; (The Artistic Devel¬ opment of Reynolds and Gainsborough' (1886) ; (Early Flemish Artists' (1887) ; (Lit- erary Remains of Albrecht Differ' (1889) ; Dawn of Art in the Ancient World' (1891) ; Dlimbers' Guides to .the AlpV (1890) ; (Climb¬ ing and Exploration in the Karakoram-Hima- layas' (1894) ; (The Alps from End to End' (1895); (The First Crossing of Spitzbergen' (1897) ; (With Ski and Sledge over Arctic Glaciers' (1898); (The Bolivian Andes' (1901); (Aconcagua and Tierra del Fuego' (1902) ; (Great Masters' (1904) ; (Early Voy¬ ages to Spitzbergen' (1904) ; (No Man's Land' (1906); (The Sport of Collecting' (1904); (The Crowd in Peace and War' (1915).

CONWAY, Ark., county-seat of Faulkner County, on the Saint Louis, Iron Mountain and Southern Railroad, about seven miles east of the bend" of the Arkansas River at Sevier and 25 miles northeast of Little Rock in an air line. The town has an extensive trade in cotton, lumber, flour and cotton-seed oil, cotton com¬ press, broom factory and excelsior works. It is lighted by electricity, and governed by a mayor and council. The educational advan¬ tages are among the best of any of the agricul¬ tural towns of the State. The Methodist Epis¬ copal Church South maintains Hendrix College, established in 1884. Arkansas State Normal School and Central Baptist College for Women are located there. The town was founded in 1871 and incorporated three years later. Pop.

(1920) 4,564.

CONWAY, N. H., town in Carroll County, famous for the beauty of its natural scenery, which makes its villages among the most popu¬ lar summer resorts in the White Mountain re¬ gion. The town lies along the Saco River, on the Boston and Maine Railroad, about 75 miles north by west of Portsmouth. There are ex¬ tensive granite quarries in the town and a few lumber mills. It contains a ribbon-peg factory, spool mill, box factory and canning interests. The waterworks are municipally owned. Pop. 3,413. Consult Eastman, (East of the White Hills.'

CONWAY, CONWY, or ABERCON- WAY, Wales, town and parliamentary bor¬ ough in the county

of Carnarvon, about 14 miles east-northeast of Bangor. It is pictur¬ esquely situated on the left bank of the Conway River, and is surrounded by an old wall still in good preservation, 12 feet thick, and fortified with towers and battlements. The old castle of Conway, erected toward the end of the 13th century by Edward I, is one of the most mag¬ nificent structures of the kind in England. It is one mile in circumference and was fenced with 21 round towers. Many parts of it are still entire, including the state hall, which is 130 feet long, 32 broad and 20 high. A suspen¬ sion bridge was thrown over the river in 1826, and in 1848 another bridge was built by Robert Stephenson for the accommodation of the Ches¬ ter and Holyhead Railway. It is a wrought-iron tubular bridge on the same principle as the Britannia bridge over the Menai Strait. Con-

way unites with Carnarvon, Bangor, Criccieth, Nevin and Pwllheli in returning one member to Parliament. Curfew is still rung in Conway. Pop. 5,242.

CONWAY, a river of Wales, rising from two head-streams, one in the southeast of the county of Carnarvon and the other in the south¬ west of the county of Denbigh, which unite about 15 miles south of Conway. At Conway it is half a mile broad at spring tides which rise here 21 to 24 feet. The united stream flows north, separates Carnarvon from Denbighshire, and falls into Beaumaris Bay after a course of from 25 to 30 miles. It is navigable to Llanrwst, or about 10 miles from its mouth. The Conway has been famous for its pearls since Roman times.

CONWAY CABAL, 1777-78, in American history : an intrigue headed by Horatio Gates, Charles Lee, Thomas Mifflin (then quarter¬ master-general) and James Lovell of Boston (Gates' confidant, and an unsparing contemner of Washington) ; with Thomas Conway as a tool. The prime object was to displace Wash¬ ington by Gates; and there were plenty of other ambitions which hoped to reap advancement in the overturn. It gained its momentum from that popular clamor for immediate success in the war. The faction endeavored to prove the superiority of Gates over Washington as com¬ mander by contrasting the victories of the former at Saratoga with the almost contem¬ poraneous reverses of the latter at Brandywine and Germantown. In November 1777 the Board of War was reconstituted: Gates was made president, with liberty to serve in the field at will — 'that is, put over Washington's head with power to supersede him ; Mifflin was made a member of the Board of War and shortly afterward Conway was made inspector-general over Washington's emphatic advice to the con¬ trary. A very petty series of letters maligning Washington was circulated, and other minor intrigues resulted. Then Gates undertook to send Lafayette on a senseless expedition to Canada, promising him abundant men and sup¬ plies ; but he so utterly failed of providing either and the scheme was so disapproved by the public that it pricked the Gates bubble. Con¬ way resigned conditionally ; Gates and Mifflin were removed from the Board of War and Gates was assigned to the forts on the Hudson, with emphatic warning to report to Washington. The adherents or helpers of the cabal dis¬ claimed all connection with it, and Conway shortly went to France. Consult Fiske, (The American Revolution (Vol. II, Boston 1893).

CONWELL, Russell Herman, American Baptist clergyman, university president and lec¬ turer: b. Worthington, Mass., 15 Feb. 1842. He studied law at the Yale and Albany Law schools, and was an officer in the Federal army in the Civil War. He was immigration officer of Minnesota in Germany in 1867—68 ; foreign correspondent, the New York Tribune and Bos¬ ton Traveler, 1868-70; and practised law in Boston 1870-79. He was ordained to the Bap¬ tist ministry in 1879; was pastor of Grace Baptist Church, Philadelphia, 1881-91 ; and has been pastor of the Baptist Temple since 1891. He founded Temple University in 1888 and is still its president. He founded the Samaritan Hospital in 1891. He has given his celebrated

lecture, ((Acres of Diamonds® over 5,000 times. He is a member of the Union League, Manu¬ facturer's Club, New England Society and Yale Alumni. Among the books he has pub¬ lished are (Life of Bayard Taylor) (1888) ;

(Why the Chinese Emigrate) (1874) ; (Woman and the Law) (1875) ; (Life of C. H. Spurgeon' (1893) ; (Acres of Diamonds' (1888) ; (Present Successful Opportunities) ;

CONY, or CONEY, an old name for the rabbit; used also in the English version of the Bible as a

translation of a Hebrew word prob¬ ably meaning the Hyrax syriacus , a rabbit-like animal common in Syria and Palestine, inhabit¬ ing clefts of rocks.

CONYBEARE, Frederick Cornwallis,

English Orientalist : b. 1856. He was educated at Tonbridge School and at University College, Oxford, of which he became scholar in 1875 and Fellow and praelector in 1881. He was made a Fellow of the British Academy in 1903, an officer of the French Academy in 1906, and honorary doctor of theology at Giessen in 1907. In his special field, Armenian language and lit¬ erature, he came to be recognized as probably the foremost authority of his time; but he wrote on religion and religious history. His pub¬ lished works include (Ancient Armenian Texts of Aristotle' (1892) ; (The Key of Truth, a Manual of the Paulician Church of Armenia' (1898); (Roman Catholicism in International Politics' (1901) ; (Rituale Armenorum' (1905) ; (01d Armenian Texts of Revelation' (1906); (Myth, Magic and Morals: a Study of Christian Origins' (1909) ; (New Testament Criticism' (1910) ; (The Historicity of Christ' (1914).

CONYBEARE, kun'i-ber, John, English prelate: b. Pinhoe, near Exeter, 31 Jan. 1692; d. Bath, 13 July 1755. He studied at Exeter Col¬ lege, Oxford, received orders, and was curate at Fetcham in 1717. He returned to Oxford in 1718, became successively tutor in his own col¬ lege, preacher to his majesty at Whitehall, rec¬ tor of Saint Clement's, Oxford, and in 1730 master of Exeter College. In 1732 he pub¬ lished his celebrated (Defense of Revealed Religion,' in answer to Tindal's (Christianity as Old 'as the Creation.' In that year also he was appointed dean of Christ Church; and in 1750 succeeded Butler as bishop of Bristol.

CONYBEARE, William John, English clergyman: b. England, 1 Aug. 1815; d. Wey- bridge, Surrey, 1857. He published Perver¬ sion,' a religious novel (1856) ; and (Essays Ecclesiastical and Social,' but is principally known for his joint authorship with Dean How- son of the popular (The Life and Epistles of Saint Paul' (1851).

CONYERS, Icon yerz, Ga., city and county- seat of Rockdale County, 30 miles southeast of Atlanta on the Georgia Railroad. Cotton grow¬ ing and granite quarrying are important indus¬ tries. The city also has a cotton factory, an oil mill, bottling works and a flouring mill. The city owns the waterworks. Pop. 1,919.

CONZE, kont'se, Alexander Christian Leo¬ pold, German archaeologist : b. Hanover 1831 ; d. 1914. He received his education at Gottingen and Berlin. From 1863 to 1869 he was professor of archaeology at Halle, from 1869 to 1877 at

*Vienna, and at Berlin from 1877 to 1887. He was made director of the Berlin M*useum and in 1887 became general secretary of the German Archaeological Institute. His published works include 'Reise auf den Inseln des thrazischen Meeres) (1860) ; 'Archaologische Untersuchun- gen in Samothrake> (2 vols., Vienna 1875-80) ; 'Beitrage zur Geschichte der griechischen Plastik> (2d ed., Halle 1869) ; (Die Ergebnisse der Ausgrabungen zu Pergamon) (Berlin 1880- 88) ; 'Die Arbeiten zu Pergamon, 1886-98) (Athens 1899) ; 'Die Kleinfunde aus Perga- mon) (Berlin 1902).*

COOCH BEHAR, kooch ba-har', or KUCH BEHAR, India, a native state and in political relation with the government of Bengal. ' It forms a level plain of triangular shape, inter¬ sected by numerous rivers which make a great part of it almost hopelessly waterlogged, and is entirely surrounded by British territory. The greater portion of the soil is fertile and well cultivated. Rice, jute and tobacco are the principal crops. The mean annual temperature is 78 degrees, and the rainfall 123 inches. It was at one time a part of the ancient kingdom of Kamarapu. British connection began in 1772. The chief town, Cooch Behar (pop. 11,000), contains some handsome public build¬ ings and a splendid new palace of the Ma¬ harajah, and has a population of 9,535. Area of state 1,307 square miles. Pop. 593,000.

COODIES, The, in the political history of the United States, a nickname applied to those members of the Federalist party in New York who favored the War of 1812. It was adopted from the fictitious

name, Abimelech Coody, assumed by the leader of the faction, Gulian C. Verplanck (q.v.) when writing in the public prints. Consult Hammond, 'The History of Political Parties in the State of New York) (4th ed., Cooperstown 1846).

COOK, Albert John, American naturalist: b. Owosso, Mich., 30 Aug. 1842 ; d. 29 Sept. 1916; graduated at Michigan Agricultural Col¬ lege 1862; professor of zoology and entomology there 1869-93, when he became professor of zoology in Pomona College, Claremont, Cal. In 1911 he was appointed State commissioner of horticulture for California. He was one of the first to make kerosene emulsion (1877), and to advocate and demonstrate the use of the arse- nites as a specific .against the codling month (1880). He published 'Injurious Insects of Michigan5 (1873) ; 'Manual of the Apiary) (1876; 14th ed., 1886); 'Silo and Silage 5 ; 'Maple Sugar and the Sugar Bush) ; (Birds of Michigan) ; California Citrus Culture5 (1913).

COOK, Albert Stanburrough, American scholar: b. Montville, N. J., 6 March 1853. He was graduated at Rutgers College 1872, and studied at Gottingen and Leipzig 1877-78, Lon¬ don and Jena 1881-82. He was professor of English in the University of California 1882-89, when he became professor of the same in Yale University. He organized the department of English at the Johns Hopkins University (1879— 81) ; brought the University of California into closer relations with the high schools of the State (1884-89) ; translated into English the first thoroughly scientific grammar of Old English; established a new standard of editing for Old English texts; laid a firm basis for the study of the Old Northumbrian dialect, the

modern Scotch and Northern English; was in¬ strumental in having the study of English texts, as distinct from reading and composition, made a national requirement for admission to college 1894; has specialized on the study of the Bible in English; has edited books on the criticism of poetry; was the first to edit a volume of Ginn's Athenaeum and Albion series and of Heath's Belles Lettres series, Old English division ; founded the Concordance Society in 1906, of which he has ever since been president, and edited Concordance to Gray5 (1908), 'Con¬ cordance to Beowulf5 (1910) ; was president of the Modern Language Association of America 1897; has .edited a series of 55 volumes, 'Yale Studies in English5 ; has established a probable date for the two chief Runic monuments of Great Britain ('The Date of the Ruthwell and Bewcastle Crosses,5 1912) ; has published a (Literary Middle English Reader5 (1915) ; a translation of Sievers' 'Old English Grammar5 (1885). His publications further include 'The Phonological Investigation of Old English5 (1888) ; 'The Bible and English Prose Style5 (1892) ; 'The Art of Poetry5 (1892) ; 'First Book in Old English5 (1894; 3d ed, 1903): 'The Artistic Ordering of Life5 (1898) ;

(Biblical Quotations in Old English Prose Writers5 (1904, 1913); 'Higher Study of Eng¬ lish5 (1906) ; Concordance to Beowulf5 (1910) and has founded two prizes in poetry, one at Yale University and the other at the University of California.

COOK, Sir Edward Tyas, English journal¬ ist : b. Brighton, 12 May 1857 ; d. London, Eng¬ land, 2 Oct. 1919. He was educated at Win¬ chester College and Oxford, and was subse¬ quently editor of the Pall Mall Gazette, 'West- minster Gazette5 and the London Daily News. He published 'Popular Handbook to the Na¬ tional Gallery5 ; 'Studies in Ruskin5 ; 'Popular Handbook to the Tate Gallery5 ; 'Life of Rus¬ kin5 (1911) ; 'Homes and Haunts of Ruskin5 (1912) ; 'Life of Florence Nightingale5 (1913). He was knighted in 1912.

COOK, Eliza, English writer of verse: b. Southwark 1818; d. Wimbledon, Surrey, 24 Sept. 1889. She began at an early age to con¬ tribute articles to various periodicals, and her first volume of verse, which appeared in 1840, was very successful. In 1849 she published 'Eliza Cook's Journal,5 which appeared weekly until 1854. She published 'New Echoes, and other Poems5 (1864), and in the same year received a pension from the Civil List. By their simplicity of theme and treatment her poems obtained a large measure of popularity in England and America. Her most familiar poem is 'The Old Arm Chair.5 A complete edition of her poetical works appeared in Lon¬ don in 1870 and in New York in 1882.

COOK, Francis Augustus, American naval officer: b. Northampton, Mass, 10 May 1843; d. 8 Oct. 1916; graduated, Annapolis 1863, and served for two years with Farragut in the West Gulf squadron. He became lieutenant-com¬ mander 1868; commander 1881 and captain in 1896. During the Spanish- American War he commanded the Brooklyn, the flagship of Com¬ modore Schley's flying squadron, which took so conspicuous a part in the battle of Santiago, 3 July 1898, when Cervera's fleet was destroyed. He was relieved of sea duty after the war and

received an appointment to the United States Naval Examining Board. He was retired in

1903.

COOK, Frederick Albert, American physi¬ cian and explorer : b. Callicoon Depot, Sullivan County, N. Y., 10 June 1865. He was gradu¬ ated at New York University 1890. He was surgeon of the Peary Arctic expedition 1891— 92, and of the Belgium Antarctic expedition 1897-99. He has received the decoration of the Order of Leopold, the gold medal of the Belgian Royal Society and the silver medal of the Belgian Royal Geographical Society. He claimed to have reached the North Pole on 21 April 1908. Upon his return in 1909 (

COOK, George Hammell, American geolo¬ gist : b. Hanover, N. J., 5 Jan. 1818; d. New Brunswick, N. J., 22 Sept. 1889. He graduated at Rensselaer Polytechnic Institute, Troy, N. Y., 1839, was senior professor there 1842-46, when he went to Rutgers College, remaining there until his death. At different periods of his service he taught chemistry, natural history, geology and agriculture. In 1864 he was elected vice-president of the college, and appointed State geologist the same year. He was instru¬ mental in developing the Onondaga salt deposits in New York. In 1880 he was made director of the New Jersey agricultural experiment sta¬ tion. His writings consist chiefly of special contributions to scientific journals, his annual reports as State geologist, and a (GeoJogy of New Jersey, published by that State in 1868. Neilson has published a biography of him.*

COOK, James, English navigator: b. Mar- ton, North Riding of Yorkshire, 27 Oct. 1728; d. Hawaii, 14 Feb. 1779. After a meagre educa¬ tion he was apprenticed to a shopkeeper at Staithes, a small town on the sea-coast. Here he acquired a taste for the occupation of a sailor, and at the commencement of the French War in 1755 entered the royal navy. In 1759

he was made master of the Mercury, which belonged to the squadron sent against Quebec, and performed the hazardous service of taking soundings in the river Saint Lawrence opposite the French encampment. He also made a chart of the river Saint Lawrence below Quebec in a very satisfactory manner. The charts and ob¬ servations which he made of the coasts of New¬ foundland and Labrador, published in 1776-78 and distinguished for their accuracy, introduced him to the notice of the Royal Society.

This organization appointed him in 1768 to the command of a vessel destined to convey to the Pacific Ocean persons employed by govern¬ ment to make observations on the transit of Venus. He left Plymouth on 26 Aug. 1768, touched at Madeira and Rio de Janeiro and doubled Cape Horn. The transit of Venus, 3 June 1769, was advantageously observed at Tahiti; the neighboring islands were explored, and Cook then sailed for New Zealand. Six months were employed in examining the shores of the islands; after which he took his depar¬ ture for Australia, the eastern coast of which he attentively surveyed as well as of New South Wales. On his return in 1771 he was raised to the rank of master and commander in the navy. An account of the voyage, drawn up by Dr. Hawkesworth, was speedily published, and a second expedition was planned to explore the Antarctic regions.

On this occasion two ships were employed the Resolution, of which Captain Cook had the command, and the Adventure , under Cap¬ tain Furneaux. After proceeding as far south as the latitude of 71 degrees, where a barrier of ice opposed any further progress, discover¬ ing the island of New Georgia in lat. 54° S., and visiting Tahiti and other places, encircling over 20,000 leagues, Captain Cook returned to Great Britain in 1775. The captain had taken such excellent precautions for his crew that only one man had died. He communicated to the Royal Society a paper describing the regulations and remedies which he had adopted and was chosen a fellow of that body, and his experiments were rewarded by the Copleian gold medal. Government rewarded him with the rank of post-captain in the navy, and the appointment of captain in Greenwich Hospital. The narra¬ tive of this voyage was drawn up by Captafn Cook himself, and was published at London in 1777. In July 1776 he sailed on an expedition to ascertain whether any communication existed between the Atlantic and Pacific oceans in the Arctic regions. In this voyage he again com¬ manded the Resolution, which was accompanied by the Discovery, and explored a considerable extent of the western coast of North America. He also discovered the Sandwich Islands, and to Hawaii, one of this group, he returned from his American survey to pass the winter of 1778. In February Captain Cook sailed . for Kam¬ chatka, but was compelled by an accident to put back to Hawaii. A boat having been stolen by one of the islanders, the captain went on shore to seize the king of Hawaii, and keen him as a hostage till the boat was restored. The people, however, were not disposed to submit to this insult; their resistance brought on hostilities, and in attempting to reach his boat Captain Cook and some of his attendants . became victims to the fury of the irritated islanders and were slain, 14 Feb. 1779. A complete ac-

count of this third voyage appeared in 1784. The first two volumes were by Captain Cook himself, and the third by Capt. James King. A medal in commemoration of him was struck by order of the Royal Society; his eulogy was pronounced in the Florentine Academy and was made a prize subject by one of the French scientific societies. Consult Kippis, (Life of Captain James Cook) (1788) ; Besant, (Captain Cook) (1890) ; Wharton, (Captain Cook's Journal During His First Voyage Round the World) (1897) ; Synge, (Captain Cook's Voyages Round the World) (1897); Kitson, (Captain James Cook) (1907).

COOK, John, Canadian clergyman and educator : b. Sanquhar, Scotland, 1805 ; d. Kingston, Ontario 1892. He was educated at Edinburgh University, was ordained to the Presbyterian ministry in 1835, and came to Canada in 1836, settling at Quebec. He aided in founding Queen's University, Kingston, and was acting principal there in 1857-60 and first chancellor 1877-80. He was also one of the founders of Morvin College, Quebec, in 1862; and became its first principal. He actively sup¬ ported Presbyterian union in Canada and in 1875 was the moderator of the first general assembly.

COOK, John Francis, American negro educator: b. about 1785; d. Washington, D. C., 1855. In 1834 he became head of the Colum¬ bian Institute, a free school for negro children. Cook stands forth the most conspicuous figure of his race during the first half of the 19th century. His leadership was manifested both in religious matters and in secular affairs. He was one of the organizers of Union Bethel Church in 1838; was organizer and first pastor in 1841 of the Fifteenth Street Presbyterian Church ; was one of the charter members of United Friendship Lodge of Odd Fellows. At his death the mantle of education fell to his two sons, who had gained their experience as his assistants at the Columbian Institute.

COOK, John Francis, American negro educator and civil administrator : b. Washing¬ ton, D. C., 21 Sept. 1833; d. 1910. His early years were spent without special incident. Jˆfter teaching for some years in the school established by his father, John Francis Cook, Sr. (q.v.), he taught for a brief period in New Orleans and until the outbreak of the Civil War. In 1867 he accepted a clerkship in the office of the collector of taxes in his native city. The next year he became a member of the board of aldermen and in 1868 was elected register of the city. In 1874 he was nominated to the collectorship of taxes by President Grant and confirmed by the Senate, a position held by him through the administrations of Grant, Hayes, Garfield and Arthur, until the accession of the Democratic party caused his resignation. In 1906 he was appointed a member of the local board of education. He also served as trustee of Howard University for 35 years.

COOK, Joseph, American lecturer and au¬ thor: b. Ticonderoga, N. Y., 26 Tan. 1838; d. there, 24 June 1901. He was graduated at Har¬ vard and Andover Theological Seminary, and after three years' preaching went to Europe in 1871, where he studied in Germany, and made a tour of the Mediterranean countries. In 1873

he began a series of "Monday Lectures® in Bos¬ ton, which, endeavoring to harmonize science and religion, and discussing social and political questions, became very popular; in 1880 he began an extended lecturing tour around the world. In 1883 he returned to Boston and re¬ sumed his Monday lectures. In 1888 he founded a religious monthly called Our Day. Besides his lectures, he published a number of works on such subjects as 'Biology* (1877); (Tran¬ scendentalismˆ (1877) ; 'Marriage* (1878) ;

(1900).

COOK, Melville Thurston, American bota¬ nist : b. Coffeen, Ill., 20 Sept. 1869. He was educated at De Pauw and Leland Stanford Junior universities, and took post-graduate work at the universities of Chicago and Ohio. In 1894ˆ95 he was principal of the Vandalia (Ill.) high school, in 1895—97 instructor, and in 1897-1904 professor of biology at De Pauw University. He was chief of the department of plant pathology and economic entomology at the Estacion Central Agronomica, Santiago de las. Vegas, Cuba, in 1904-06, and plant pa¬ thologist at the Delaware agricultural experi¬ ment station, Newark, N. J., 1907-11, and since the latter year has been professor of plant pathology at Rutgers College and State plant pathologist of New Jersey. He has published 'Diseases

of Tropical Plants (1902), and many contributions to botanical journals.*

COOK, Orator Fuller, American botanist : b. Clyde, N. Y., 28 May 1867. He was educated at Syracuse University, where he was in charge of the biology department in 1890-91. As agent of the New York Colonization Society he made explorations and investigations in Liberia in 1891-97, and he also served as professor of natural sciences in Liberia College during this same period and as president of the institution in 1896-97. In 1898 he became custodian and assistant curator of the United States National Museum. He had charge of plant importation by the LTnited States Department of Agricul¬ ture from 1898 to 1900, when he took up the investigation of tropical agriculture. In 1904 he became professor of botany at George Wash¬ ington University.. In 1915 he accompanied the Bingham expedition to Peru and investigated the plants used by the Incas. He is author of various articles and reports on Liberia and African colonization, Porto Rico, tropical agri¬ culture, botany, zoology and evolution.

COOK, Stanley Arthur, English Oriental¬ ist: b. King's Lynn, 12 April 1873. He was educated at Gonville and Caius College, Cam¬ bridge, of which he became fellow and lecturer in Hebrew and Syriac. In 1896-1903 he was on

the editorial staff of the ' Encyclopaedia Biblica> ; in 1902 .he became editor for the Palestine Exploration Fund; and he was the editorial adviser and a contributor on Old Testament and Semitic subjects to the '■Encyclopaedia Britannica. He contributed to the Jewish Quarterly , the Expositor, etc., and published 'Glossary of Aramaic Inscriptions1* (1898); (The Laws of Moses and the Code of Ham¬ murabi* (1903) ; 'Critical Notes oil Old Testa-*

inent History) (1907); (Religion of Ancient Palestine> (1908); (I Esdras> (1912); 'The Study of Religions) (1914).

COOK, Theodore Andrea, English journal¬ ist and author : b. Exmouth, Devonshire, 28 May 1867. He was educated at Wadham Col¬ lege, Oxford, and was on the editorial staff of the Saint James's Gazette, 1897-1900, and has been editor-in-chief of The Field since 1910. He has published (01d Touraine) ; ; 'The Spiral in Nature and ArC ; 'Turner's Water-Colors in the National Gallery) ; (01d Provence) ; 'Twenty-five Great Houses of France) ; (The Germans by Themselves ; (Kultur and Catastrophe * ; etc.*

COOK, Thomas, English excursion pro¬ moter: b. Melbourne, Derbyshire, 22 Nov. 1808; d. 19 Julv 1892. In the earlier portion of his career he was prominently identified with the temperance cause. Later he devoted himself to the work for which he became famous. On 5 July 1841 he began an excursion train between Leicester and Loughborough on the Midland Railway, England. This was the first publicly advertised excursion train in England. From this small beginning the enormous business of Thomas Cook & Son, Managers of Tours and Excursions (known as "Cook's Excursions") was subsequently evolved. To John Mason Cook, son of the founder (b. January 1834; d. 4 March 1899), the present scope of the busi¬ ness is mainly due. The existing firm is com¬ posed of the three grandsons of the founder. To such an extent has the (

COOK, Walter, American architect: b. New York, 23 July 1846 ; d. 26 March 1916; educated, Harvard University and studied arch¬ itecture at the Royal Polytechnic School, Munich, and the Bcole des Beaux-Arts, Paris. In 1877 he returned to New York, becoming in succession a member of the firm of Babb, Cook and Willard ; Babb, Cook and Welch ; and Cook and Welch. He was a member of the jury for the New York Public Library and for the University of California, becajne consulting architect for the board of estimate and appor¬ tionment, New York, and was a member of the New York art commission 1905-07. Among the buildings designed wholly or in part by him are the DeVinne Press building, office buildings for the New York Life Insurance Company, a residence for Andrew Carnegie, the Choir School at the cathedral of Saint John the Divine, the stadium and other buildings at the Pan-American Exposition, and a number of branch buildings for the New York Public Library. He was a member of the National Academy of Design and chevalier of the Legion of Honor.

COOK, William Wilson, American lawyer : b. Hillsdale, Mich., 16 April 1858. _ He was graduated at the University of Michigan 1880, and from its law department in 1882. He is general counsel for the Postal Telegraph Cable Company, the Commercial Cable Company and the Commercial Pacific Cable Company. He

has written 'Treatise on the Law of Stock and Stockholders as Applicable to Railroad, Banking, Insurance, etc., Corporations) (1887); 'Trusts: Their Character, Legality and Mode of Organization > (2d ed., 1888).

COOK, Mount, the highest peak of Austral¬ asia; is one of the southern Alps near the centre of the range, on the west side of the South Island of New Zealand. It is 12,349 feet high, is covered with perpetual snow (the snowline being 3,500 feet lower than in Switzerland), is difficult of access, and was scaled for the first time by the Rev. W. S. Green on 2 March 1882.

COOK INLET, Alaska, bay of the north Pacific Ocean, between the Alaskan and Kenai peninsulas, in lat. 59° and 61° 20′ N. and long. 149° and 154° W. In shape long, narrow and crooked, its length is about 200 miles and its greatest breadth 60 miles. Sudden storms, fogs and tidal rips, due to high tides along the broken coast line, make navigation at the north¬ ern extremity somewhat dangerous. From November to May the northern part is locked in ice. It contains several islands, Augustine Island, with its volcano, Mount Saint Augustine, in violent eruption during 1883, being the lar¬ gest. The coast scenery is grand, comprising active volcanoes, snow-clad mountains, glaciers and green hills. It was explored in 1778 by the navigator whose name it bears, in the hope of finding a passage to the Arctic Sea. It receives the waters of a number of rivers, chief of which is the Sushitna River, coming from the north. Coal is found on its shores, along which are a number of small towns. Seldovia is the port of call for steamships.

COOK ISLANDS, New Zealand, archipel¬ ago of small islands in Polynesia, consisting of the islands of Raratonga, Mangaia, Atiu, Aitu- taki, Mauke, Mitiaro and the Hervey group. They lie between 8° and 23° S. lat., 157° and 170° W. long. The total area is about 150 square miles. The soil is generally fertile but water is scarce. The chief products are copra, coffee, pearl-shell, fruit, hats and caps and lime- juice. The trade for 1914 was imports $511,160, including $336,095 from New Zealand; exports $435,075, including $350,380 to New Zealand. The inhabitants are Polynesians of the Tonga- fiti migration, and are all converts to Chris¬ tianity. The islands were discovered by James Cook in 1773-77 ; became a British protectorate in 1888, and in 1901 were annexed to the Dominion of New Zealand, with which there is monthly steam communication. Laws have been made since 1890 by a general legislature, and are administered by an executive council of which the Arikis, or native chiefs, are mem¬ bers. At Raratonga there is a British resident, whose approval is required for all enactments. The annual death-rate is higher than the birth¬ rate of the islands. Pop. 6,964.

COOK STRAIT, New Zealand, passage which separates North Island and South Is¬ land. Its greatest width is 90 miles. It was discovered by Captain Cook on his first voyage in 1769.

COOKE, George Frederick, English actor: b. Westminster, 17 April 1756; d. New York, 26 Feb. 1811. He made his first public appear¬ ance at Brentford in 1776; and in the period

between 1784 and 1800 became very popular in the English provinces and in Ireland, attaining a front rank in his profession. From 1801 to 1810 he played at Covent Garden both in comedy and in tragedy, and rivaled Kemble in the public favor. His best characters were Richard, Shylock, Iago, Sir Giles Overreach and Sir Pertinax MacSycophant. In 1810 he visited the United States and appeared before enthusiastic audiences in the chief cities. A monument marks his grave in Saint Paul's churchyard in New York city, erected in 1821 by Edmund Kean, who regarded Cooke as the greatest of actors. Consult Dunlap, (Memoirs of Cooke) (London 1813).

COOKE, George Willis, American Unita¬ rian clergyman and author : b. Comstock, Mich., 23 April 1848. He was educated at Olivet College, Michigan, studied for the Unitarian ministry at Meadville Theological School, and was ordained in 1872. He has since held Unita¬ rian pastorates in

Wisconsin, Michigan, Indiana and Massachusetts. After 1899 he devoted his time principally to lecturing and writing. Be¬ sides contributing much to the periodical press, including editorials to the Christian Socialist (he became a Socialist in 1902), he has pub¬ lished (Ralph Waldo Emerson, his Life and Writings) (1881) ; (Life of George Eliot)

(1883); (Poets and Problems) ; (The Clap¬ board Trees Parish, Dedham: a History) (1887) ; (A Guide Book to the Poetic and Dra¬ matic Works of Robert Browning) (1891) ;

the Riverside edition of the Works of Robert Browning (1899); (An Historical and Bio¬ graphical Introduction to The DiaP (1902) ; (The Poets of Transcendentalism5 (1902) ; bibliographies of Lowell and Emerson5 (1907) ; (Woman in the Progress of Civiliza¬ tion5 (1909) ; editor three volumes of Theo¬ dore Parker's Complete Works (1910).

COOKE, Grace MacGowan, American novelist: b. Grand Rapids, Ohio, 11 Sept. 1863. In 1897-98 she was president of the Tennessee Woman's Press Club. Her publications in¬ clude (Mistress Joy,5 with Annie Booth Mc¬ Kinney (1901); (Return: A Story of the Sea Islands,5 with Alice MacGowan (1903) ; (Hul- dah5 (1904) ; (A Gourd Fiddle5 (1904) ; (The Grapple5 (1905) ; (Their First Formal Call5 (1906); (Son Riley Rabbit and Little Girl5 (1907) ; (The Power and the Glory5 (1910) ; (The Doings of the Dollivers5 (1910) ; (The Joy Bringer5 (1912) ; (William and Bill5

(1914) ; (Sonny Bunny Rabbit and His Friends5 (1915).

COOKE, Jay, American capitalist, known as the (

his retirement from that firm he was engaged in a general banking business until 1861, when he united with his brother-in-law under the name of Jay Cooke & Company. From 1861— 65 his house acted as agent for the government in floating the Civil War bond issues to the extent of $2,500,000,000, including the 5-20 loan of $515,000,000 (February 1862), the 10-10 loan of $200,000,000 (March 1864), the 7-30 loan of $829,992,500 (June 1864 to March 1865), and others. These services he rendered to the nation for so small a commission there was practically no profit. A long period of success¬ ful operations followed the war, and then the firm became fiscal agents of the Northern Pacific Railway Company, advancing large sums of money on its bonds, but in the financial panic of 1873, being unable to realize a suffi¬ cient amount on the bonds to tide them over the trouble, on 18 September suspended busi¬ ness and eventually went into bankruptcy. The value of the bonds afterward greatly increased. Mr. Cooke not only regained his fortune, but paid his creditors both principal and interest, and the firm continued successfully. Consult Oberholtzer, E. P., (Jay Cooke, Financier of the Civil War5 (Philadelphia 1908).

COOKE, Joseph Parsons, American chem¬ ist : b. Boston, 1827 ; d. 1904. He was graduated at Harvard in 1844, and soon afterward was appointed to the chair of chemistry and mineralogy there. In this capacity he stimu¬ lated the study of chemistry at collegiate insti¬ tutions, urging laboratory instruction, which before his time had not been introduced into the undergraduate course of American col¬ leges. He introduced his pupil Theodore Wil¬ liam Richards to the study of atomic weights — a subject to which the latter made many signal contributions. The joint communication, by Cooke and Richards, on the relative values of the atomic weights of hydrogen and oxygen, was published in the Proceedings of the American Academy of Arts and Sciences5 for 1887. Cooke's other publications include (Chemical Problems and Reactions5 (1853) ;

(Elements of Chemical Physics5 (1860; 4th ed., 1886) ; (First Principles of Chemical Philos¬ ophy5 (1868; rev. ed., 1882); (The New Chemistry5 (1872, 1884) ;

(1888).

COOKE, Mordecai Cubitt, English bota¬ nist: b. Horning, Norfolk, 1825 ; d. 1912. When a boy he was successively a draper's assistant, clerk in a law office and later a school teacher. He secured a position in the Indian Museum in 1860, and was transferred thence to the Kew Botanical Gardens in 1880. In 1903 he was awarded the Victoria medal of honor by the Royal Horticultural Society, and the Lin- naean gold medal by the Linnaean Society. He published over 40 volumes, several of which deal with fungi, including (Manual of Botanic Terms5 (1862); (Handbook of British Fungi5 (1874) ;

(1907).

COOKE, Philip Saint George, American military officer: b. near Leesburg, Va., 13 June 1809; d. Detroit, Mich., 20 March 1895. He was graduated at West Point in 1827 and rose to the rank of brigadier-general. He was on the frontier for several years, and took part in the Black Hawk War of 1832. In the Mexi¬ can War he was in California in command of a battalion of Missouri volunteers and later commanded a regiment in the city of Mexico. After 1849 he was again on the frontier, took part in several expeditions against the Indians, commanded the Utah expedition of 1857—58 and was commander of the Department of Utah in 1860-61. In the Civil War he sided with the Union and greatly distinguished him¬ self in the Peninsular campaign. He was brevetted major-general at the close of the war, commanded the Department of the Platte in 1866-67, the Department of the Cumberland in 1869-70, and the Department of the Lakes, 1870-73, when he retired. He was the author of works on tactics and of (Scenes and Adven¬ tures in the Army' (1856) ; (Conquest of New Mexico and California) (1878) ; (New Cavalry Tactics' (1884).

COOKE, Richard Joseph, American Methodist Episcopal bishop: b. New York, 31 Jan. 1853. He was graduated at East Ten¬ nessee Wesleyan University in 1880. He . entered the ministry in 1873, became professor of New Testament exegesis and historical theology in Grant University, with which in¬ stitution he was connected until 1912. From 1891 to 1912 he was editor of the Methodist Advocate Journal, and book editor of the Methodist Episcopal Church. In 1912 he was chosen bishop of the Church. He was fraternal delegate from the Methodist Episcopal Church to the British and Irish Wesleyan conference, England and Ireland 1906. He has published 'Doctrine of the Resurrection ' (1884) ; Rea¬ sons for Church Creed) (1888); Christianity and Childhood) (1891) ; 'The Historic Episco- pate) (1896) ; 'History of Ritual of M. E. Church) (1900) ; Christ and the Critics) (1898) ; (Digest of Judicial Decisions of the General Conference of the M. E. Church'; Uncarnation and Recent Criticism' (1907) ;

(Freedom of Thought in Religious Teach¬ ings' (1913) and contributions to religious periodicals.

COOKE, Rose (Terry), American poet and story writer: b. West Hartford, Conn., 17 Feb. 1827; d. Pittsfield, Mass., 18 July 1892. She married Rollin H. Cooke in 1873. Her complete poems were published in 1888, Che Two Villages' being her best knowm poem. Her short stories treat of New England rural life, her most acceptable work appearing originally in the Atlantic Monthly and other periodicals. Her published books include 'Poems' (1860); 'Happy Dodd' (1878); 'Somebody's Neighbors' (1881) ; 'The Sphinx's Children and Other People's' (1886); Complete Poems' (1888); 'Stead¬ fast,' a novel (1889) ; 'Huckleberries,' a col¬ lection of short stories (1891).

COOKE, Sir William Fothergill, English electrician: b. Ealing, Middlesex, 1806; d. 25 June 1879. He served in the Indian army from 1826 to 1831 ; and, after studying medicine at Paris and Heidelberg, abandoned this for teleg- vol. 7 — 40

raphy, and in 1837 entered into partnership with Professor Wheatstone. After experi¬ ments on various railway lines, they patented the single needle apparatus in 1845. A dis¬ pute then ensued between the partners as to the part played by each in the achievement. In 1846 Cooke formed a company, which paid $600,000 for the partners' earlier patents. Wheatstone was knighted in 1868 and Cooke in 1869.

COOKERY, the art of preparing food for eating. The savage does little or no cooking; he lives on roots, fruits, insects and raw flesh, and when he cannot procure food, he twists his belt tighter and tighter ; the barbarian makes a fire and hunts and fishes, but still eats much of his food raw, or with the slight dis¬ integration of fibre given it by the motion of his body as he carries the food on his steed. Neither cares he for variety, nor has any pur¬ pose in eating other than to satisfy hunger. With the development of agriculture came an increase in food supplies, in the use of fire in cooking and an advance in civilization ; and with the development in man's social nature, eating ceased to be a mere grabbing game, and food was shared with friends, — and strangers also, for there were no public inns, — as an evidence of good will. Later, feasting was a part of all hospitality, and banquets in honor of the gods, of victory, or some special event, came to be considered the highest form of

social physical enjoyment. As the ancients in times of prosperity sought the rarest foods (500 nightingales' tongues were often made into one pie), and served them in the most costly manner (whole cities being ruined, it is said, where Xerxes was entertained for two meals), so history repeats itself, and some modern hosts spare no labor or expense in setting before their guests the most unique concoction their chef can prepare, as the highest expression of good will. But they often have no concern as to the nutritive effect of their offering. The thoughtful person feels that extravagant cook¬ ing and riotous feasting are not necessary to true hospitality, nor to the genuine enjoyment of food. He has learned that the true reasons for cooking food are :

First, to have the time and energy needed to digest and assimilate unprepared food, to use in getting a living while developing his men¬ tal and moral nature.

Second, to facilitate mastication and diges¬ tion, by softening hard and tough substances, changing starch into dextrin, sugar into cara¬ mel and connective tissue into gelatin, develop¬ ing improved flavors and odors, and having at least a part of the food warm.

Third, to destroy parasites and disease germs.

Fourth, to keep foods which are perishable that he may enjoy them when out of season.

The cooking of food includes . several im¬ portant processes, not always considered,, some of which call for the highest degree of intelli¬ gence; but too often cooking is regarded merely as a form of manual labor. Taking these in their natural order we have :

Selection. — This was once a question of mere environment ; food nearest at hand being the "Hobson's choice" of the sav¬ age, as it now is of the very poor in

many lands. Climate and non-intercourse with other nations limit choice, as invasion, travel and increased trading facilities extend it. From the limited, but not always scanty fare of the Pilgrims, to the cosmopolitan markets of the present day, is a wonderful advance, and the modern American often yields unwisely to their temptations. Appetite guides us safely in this choice of material, when it has not been impaired by too great indulgence in improper food. To select from this vast supply, food sound in texture, free from adulteration, sea¬ sonable, not exorbitant in price, adopted to in¬ dividual need, and suitable in quantity, needs no small amount of judgment in the buyer, w'ho often must also be the cook.

Separation. — The removal of the inedible from the edible portions of food is important, for the thoroughness with which it is done has much to do with making food palatable. Perhaps in no other part of the work has there been greater improvement over the primitive methods, as man's idea of what is inedible takes him farther and farther away from the savage, some of whose methods are too repulsive to bear allusion. Our forbears were entertained before the feast by the slaughtering of animals in their presence, but now the refined taste is offended by the sight of a fowl dressed for the table in his discarded feathers ; or a bit of hull in a supposed-to-be coreless apple, or food served in inedible scooped-out skins.

Combination. — The union of various ma¬ terials often produces a more palatable food than any one would give alone. Association, custom and appetite have much to do with de¬ ciding whether certain combinations are har¬ monious or otherwise. Saffron, tansy, asafetida, decayed fish powder and hosts of other strange flavorings do not appeal to us, although highly prized by other nations. Pies, supposed to be filled with delectable compounds, but out of which dwarfs sprang and danced, and black¬ birds sang, pleased our ancestors ; and surprise is still a pleasant element in cookery. But it is not pleasant to find the biscuit which was sup¬ posed to be sweet with the nutty flavor of the wheat redolent with alkali.

Literature is replete with legends of the ac¬ cidental discovery of the improved flavor found in a bit of the forbidden flesh on the altar, of fish rescued from burning seaweed, of bread made lighter with a portion of left-over dough, and many others which led to new ways of preparing food. The most

fanciful legend seems credible when we remember the many times in one's own experience when accident or necessity has led to new combinations. Scien¬ tific proportion, correct measurement, thorough mixing and sufficient judgment to allow for the <(total depravity of inanimate things® are needed to ensure uniform results. So to blend mate¬ rials that they will develop ((what ingenious cooks the relish call® is the fundamental prin¬ ciple of cookery, for (

The Belgians, Swiss and Austrians are said to have best acquired the art of retaining in a high degree in each food its full essence, aroma and properties, so that each dish has no odor

or flavor from another. It is said one of the Roman epicures had a separate cook and sepa¬ rate kitchen for each dish.

Too much time and thought are given to the making of new combinations merely to gratify the desire to excel one's neighbors in one's luncheon. This causes great nervous strain and physical fatigue, and imposes upon the guests a deal of unnecessary work for their digestive organs in the undoing of these combinations.

Manipulation. — For the manual part of cookery, tools and utensils are needed, which if wisely selected will not oblige one to say with Telemachus,

Lend me, I pray you, the sauce pans In which you boiled your beans. — Timocles.

That cook is fortunate who has the strength and endurance needed for the back-and arm- aching parts of the work, and still more fortu¬ nate if she possesses the deftness of hand and keen sense perception of the culinary artist ; for we cook by the senses of touch, smell and hearing, as truly as by sight and taste. And those for whom she cooks are happy indeed if she knows how to apply heat (see Methods) in the way that food will yield the greatest amount of nutriment in the shape best fitted for the body to assimilate it, as otherwise much food will be wasted in the cooking and wasted in the body.

Decoration. — This is the last step in the manual part of cookery, but an important one, for <(the imagination should be fed when we feed the body, they should both sit at the same table.® Those who labor with the larger muscles are usually sufficiently hungry to eat whatever is clean and wholesome ; but the non- hungry person, or one who works with the small muscles of the hands or eyes, needs the stimulus which the senses of sight, smell and taste send to the stomach, to arouse his sense of hunger. This class of persons increases as civilization advances. There are some foods which if one ate them blindfolded would satisfy the mouth and the stomach would not demur. The nose rebels at Camembert, but the mouth approves. The eye should not be pleased and the tongue offended, but all these <(gate tenders . of the stomach® should agree in ap¬ proval, if we would derive the best effect from our food. The tendency of the modern cook to make superfluity of garnishing conceal both merit and defect in material is to be deplored. Simplicity in design, harmonious blending of color and material, enhancing rather than dis¬ guising the individuality of each dish, with the least expenditure of money and labor, are most to be desired, and make of this indeed a fine art.

To take some meat that some one else has bought And then to dress it tolerably, is What any cook can do.

A perfect cook is quite another thing.

For there are many admirable arts,

And of all of these he must be thorough master,

Who would excel in this. He first must have A smattering of painting and indeed Many the sciences which he must learn Before he's fit to think of cookery. — Nichomachus.

Cookery as a Science. — But little thought

was given to this aspect of cookery by the ancients ; probably more among the Greeks than among other nations, for the Greeks wor¬ shipped Hygeia, the goddess of health, and lived on coarse foods,

barley bread, oil and

wine. \\ heat was called the “marrow of man*' and “running, fatigue, hunger and thirst** were their seasonings. Cookery attained a high de¬ gree of development during the Attic Age. The following quotations show that the Greeks understood the qualifications of a cook, and the effect of heat and water on food; and the third hints that our kitchen maids of to-day were not the first cooks who hurried up the fire with oil.

His mind must comprehend all facts and circumstances;

Where is the place and what the time for supper;

Who are the guests and who the entertainer;

What fish to buy and where to buy it. — Athenoeus.

Fish that are fat are pleasant to the palate, but heavy and difficult of digestion, therefore they are better cured or roasted, for by that process their fatty parts are got rid of. Oysters when boiled get rid of most of their saltness which they infuse into the water which boils them, and this water is apt to disorder the stomach; but roasted oysters have all their evil properties removed by the fire. — Mnesithus.

Placing all my pans upon the five, I soaked the ashes well with oil, to raise a rapid heat. — Archediu

The cook held the life and honor of his master in his hands, so common was poisoning by food ; honors and wealth were bestowed upon those who had ability, those from Sicily ranking highest.

It was not until chemistry had advanced to the position of an exact science, and had evolved methods of analysis for organic sub¬ stances, that the nature of food constituents, the changes in the nutritive value of food brought about by cooking, and what becomes of food in the body, could be determined.

Although vast strides have been made since Count Rumford, an American, who lived in Europe the latter part of the 18th century, taught the world how to cook and was the first to note the changes in the nutritive value of food on a large scale, the insight and method of the scientist, — the science of cookery is yet in its infancy.

The Agricultural Department in Washington has done a fine work along the lines of scien¬ tific analysis and experiment in food values, and its bulletins, issued frequently and free to any one on application, supply the latest and most reliable information. Investigations have also been made by many of the most civilized nations into the best way of preparing food for the army and the inmates of prisons and hospitals. Chefs gain their knowledge of the art of cookery by apprenticeship to noted chefs, taking a long and thorough training in every branch of the work. Training in the home, by “mother’s way,® is all the teaching many skilful housekeepers have received, but this, combined with judgment and faculty, has produced much good work.

During the last half of the 19th century, schools for instruction in cookery were opened in England, the agricultural colleges of the West, New York, Boston and other large cities. Here not only the art, but the scientific principles were taught, and the pupils included children from the mission schools, servants, housekeepers, young and old, college and medi¬ cal students and ladies of wealth and leisure. The first outgrowth of this beginning was the establishment of schools for training of teachers of cookery, and later cooking was made a part of the regular course in the public schools. Boston led in this part of the work, and now at the beginning of the 20th century,

there are but few States in the Union and but few European countries where cooking schools are not found in successful operation.

Literature. — Cooking and feasting have been the theme of brush and pen, of song and romance in

all countries, and from the earliest days of book-making, cookery has had quite a literature of its own. The names of Arch- estratus, Herodotus, Homer, Apicius, Lucullus and many others are associated in the minds of the student with the cookery and banquets of the Creeks and Romans. To attempt to enu¬ merate those who have helped in the develop¬ ment of modern Italian, French and English cookery would be to do injustice to many of whom limited space would prevent mention. If one were to ask for the catalogue of culinary literature in any large public library in America, it would be found to be quite a volume, so rapidly has the literature of cookery multiplied, since it has taken front rank among the arts and sciences.

It has been claimed that men are the only really good cooks, chiefly because they make it their business for life and strive to excel in the art, whereas women adopt it only as a means of support until marriage relieves them from its necessity. And Dr. Johnson said that "women could not write good cook books.® Perhaps men are better fitted to be chefs in hotels and large establishments, and to work with and manage a great body of men, and from having no other duties they have had ample time and means to give the subject more study. But when we recall the many worrten who have always prepared good, wholesome (if not fancy) food for their large families, — those who have catered to institutions, and those who have done fine work in teaching the science of cookery in schools and by their books and lectures, we question the statement. The Amer¬ ican cook book of the 20th century is not a mere compilation of untried and inaccurate recipes, it is not a record of only one person's experience, where much is left to judgment, nor of a style of living too extravagant for the average home; but it is an evolution from the best experience of all nations, a collection of exact formulae deduced from actual experiment, giving the results of the latest scientific research, and all presented in an entertaining way in the best literary style.

Evolution. — The evolution of cookery, as traced in food, would be something after this order ; The first foods were natural ; milk, wild fruits, and vegetables, flesh and fish, eggs and animal fats, honey and salt, oily seeds and beverages made from simple fermentation of fruit-juices and of milk. The second stage might be called one of cultivated and manufac¬ tured or combined foods : the cereals, grains and legumes were developed into bread, cakes, puddings and malted drinks, milk into butter and cheese ; intercourse with other nations brought a great variety of vegetables, fruits, con¬ diments and beverages. The present stage is one of refined foods. The refinement of flour and yeast, the concentration of the sapid prin¬ ciple in meat and its use in soups and sauces, the refinement of fruit and vegetable juices into sugar, and its increased use in fancy cakes, pastry, desserts and artistic confectionery, are typical of the most advanced and refined forms of cookery.

In tracing the evolution of cookery among different nations, we find it has had the cus¬ tomary rise and fall of all the arts ; increasing in variety, magnitude and indulgence with the growth and prosperity of each nation ; its na¬ tional characteristics always largely determined by climate and natural advantages, but varied by invasion, intermarriage of rulers and no¬ bility, and the advance of civilization. Persia with her fruits, sweets, wines and her lavish display modified the simplicity of the Greeks ; the luxury and extravagance of the Romans disappeared under the invasion of the Goths, who cared only for wild fruits, fowl, venison, horseflesh and curdled milk. During the Mid¬ dle Ages the best cooking was done in the monasteries. They had ample means and their many fast days incited them to the invention of many disguises. In Italy during the Renais¬ sance, cookery, with the other arts, became more refined, and France soon felt the influ¬ ence, through the Medici. She had early learned economy through necessity from famine and the exactions of her rulers ; her many revolutions compelled every peasant to learn to make something savory of weeds, acorns, snails, rats and other things which many nations reject. Modern French cookery dates from Louis XIV and attained great height under his successors. The nobility and even royalty spent much time concocting new dishes ; Richelieu made may¬ onnaise, and Bechamel the sauce bearing his name. The French made great use of meat es¬ sence as a dressing for meats, and it was con¬ sidered a great improvement over the oil of the south and the animal fats of the north. Large amounts of meat, poultry and game were often used solely to secure a small amount of glaze with which to dress an entree; this shows an extravagant as well as an economical side to French cookery. Under Napoleon French influence was widely extended and it is said he left a French chef in every land he invaded. There are more chefs from France in America than from any other country. Austria and Switzerland

rank next to France in excellence of home cookery. England's love for pork began with the Saxon invasion, and though condemned by some of her colonists, it is yet the mainstay of her laboring classes. The coarse tastes of the Danes were modified by the soups and stews of the Normans. Many of our culinary terms are of Norman origin, and the surnames Cook and Butler came from professionals in that time. After groaning for centuries under saddles and sirloins, England's tables became more simple, for after the Refor¬ mation rich cooking was considered popish. Although modified by the modern French, Eng¬ land is still the great meat-eating nation. ((The English do their culinary work at the table with their palate-scorching table sauces, but the French do theirs in their saucepans.® Scotland with her barren hills lacked vegetables, but mutton, game and fish were abundant ; her cock-a-leekie and haggis show the influence of France.

There are still a few distinctly American dishes, many of them borrowed from the In¬ dians, some made from native products, but a large number are but modifications of the cus¬ toms in the homes of the earliest settlers. The Yankee's love for pie may be traced to the mother country, and for the doughnut to Hol¬

land. The Dutch left a strong impress on New York and the Germans in the middle States. Extravagance in methods, great waste of fuel and material and the indigestibility of some of our national dishes have been our defects, but a large part of genuine American cookery will compare favorably with that of other nations. Within the last half century travel and wealth have changed our tastes in a measure, enabling many to have chefs from abroad who command very high salaries. We have gained much of value from China and Japan. France has done more than any other nation in teaching us economy and artistic effect, and the influence of Spain is apparent on our western coast and our new possessions. The advantage of this influx of foreign elements into our cui¬ sine has been greatest in cities and among trav¬ eled classes. In remote country places and everywhere among native laboring communities, there is need of knowledge of some of the economical foreign methods. Cooking teachers find it wise to accept some of the suggestions from their pupils of German and Italian parent¬ age, instead of insisting that our methods are always the best. No doubt many foreign na¬ tions would derive equal benefit and enjoyment from some of our dishes which are seldom seen there. Canvasback ducks, softshell crabs, strawberry shortcake, fish balls, pumpkin pie, prairie chicken, red-snapper, cranberries and oyster in many ways are eagerly welcomed by the returning traveler.

The cultivated American of colonial descent, while loyal to the virtues of succotash and the four B's of Boston, which are similar in nature and food value to the tortilla and frijoles of Mexico and the lentils of Egypt, is learning what to accept and what to reject from the solid puddings, pastry, bread and meats of England; the spicy cakes, sour vegetables, sausages and delicatessen supplies of Germany; the complex soups, sauces, entrees, souffles and artistic disguises of the French; the pungent Spanish puchera ; the savory Hungarian gou¬ lash and Turkish pilaf ; the Italian palenta, risotto and macaroni; the hors d'ceuvres of Russia and Scandinavia, and the curries and fruits of the tropics; and from them all he is beginning to evolve a simplicity and an indi¬ viduality which may be characterized as truly American. He prefers on his meat the sauce of its own juices; he insists on having no doubt as to the identity of his veal and chicken; he has accepted the piquancy of the green salad with its soothing oil in place of the sweets of the pudding and the sharpness of his mother's pickles. The nutty Vienna roll has taken the place of the half-baked raised biscuit, and he finds the bit of cheese which is the main food of the Swiss or Holland peasant, with the fruits and nuts of the savage, a good substitute 'for the soggy pie of his aristocratic ancestor.

Evolution of Methods of Cookery. — It is sufficient for our purpose here to consider foods merely as animal and vegetable, with albumen as the type of the former, and starch of the latter, albumen requiring a low and starch a high temperature. (See Food). Starch and albumen are frequently combined in natural food, and still more frequently in cooked food, but they must be digested by fluids of a dif¬ ferent nature, one an alkaline and the other an acid. Therefore, how to cook them that each

may best do its work in the body is the prob¬ lem of good cookery.

Heat. — Cooking means, to prepare by heat (Latin coquo), and in all its phases heat is the important factor. The heat of the sun causes plant food to grow and ripen ; the heat of the living animal prepares its flesh and products for the higher animal, man ; he applies artificial heat in cooking vegetable and animal foods, and after eating them, his own internal heat helps in the assimilation of the food into his body. The absence of heat sufficient to be called cold is essential to make many foods more palatable. Water is removed from some foods by concentration, and added to others for the solution of albumen and the hydration of starch. Air, for the expansion of various sub¬ stances the development of improved flavors and the dissipation of disagreeable odors is essential, and care should be taken that it be pure as possible.

Fuel. — Heat for cooking purposes was ob¬ tained first by drying foods in the sun. Many kinds of flesh, fish and fruit are still prepared in this way. Then came the burning of wood, oil, coal, gas, coal oil and alcohol ; the latest advance is the use of electricity, the expense of which has retarded its adoption, but its merits are great and its possibilities unlimited.

Heat is applied to food in two ways : through hot air, as in broiling, roasting and baking; and through hot liquids, as in boiling, frying and their variations.

Broiling or Grilling is cooking by close con¬ tact with the fire. The primitive way was on the coals : the smoke and ashes may have led the barbarian to wind the meat round a stick and hold it over the fire, much as the Turks do now with their strips of mutton or kabobs. To save personal attention the meat was suspended from a stick; later it was cooked on bars of wood or iron, called a gridiron, hence our word grilling, and was turned when partly cooked. The modern improvement of this time-honored method is the wire broiler, used over red-hot charcoal, or under the gas flame, and frequent turning has been found to be the secret of good broiling. Contact with the fire sears the fibres, with a slight loss of outside substance, but it seals the juices inside and gives the richest possible flavor. ((The gridiron is the thermometer of civilization.® Toasting is simply the broiling of bread and other cooked starchy foods, in order to develop dextrin. It sometimes develops charcoal. Pan-broiling is cooking in a very hot dry pan, with sometimes the merest film of grease to prevent too great loss of substance by adhesion. The quick sear¬ ing gives almost the same flavor as in direct broiling. It is a convenient way for the chafing dish and oil stove.

Put the anchovies in the heated pan and in a moment

They will begin to hiss and are done. — Ar che 'stratus ■

Roasting is a modification of broiling, at a lower temperature, adapted to large pieces of meat and poultry, which, on account of their thickness, are placed at a greater distance from the fire after the first searing. In early times the animal was dressed and hung at once over the fire ; when the fire was made in a hole, sticks were laid across on which the animal rested; we call it a barbecue. After fires were built on the hearthstones and cooking was done

inside, the meat was hung on a frame placed in front of the fire, and was turned and basted by the cook's attendants. This was the common way of cooking meat in the great baronial halls of England for many centuries and may still be seen in old country inns. The modern spit has its clock-work attachments, which turn the meat, dip up the gravy and pour it over at reg¬ ular intervals. In warm countries but little roasting is done ; and although once the only way in America, it is now seldom used except in hotels, and by those who have ranges with a special attachment for roasting, or who have revived the old custom on the hearth of their country kitchens; for there are many who still think the old Greek method greatly superior to the cooking of meat in the oven, which is com¬ monly called roasting.

Many are the ways and many the recipes For dressing a hare, but this is best of all.

To place before a set of hungry guests A slice of roasted meat fresh from the spit,

Hot, seasoned only with plain simple salt,

Not too much done. And do not you be vexed At seeing blood fresh trickling from the meat.

But eat it eagerly. All other ways

Are quite superfluous, such as when cooks pour

A lot of sticky, clammy sauce upon it. — Archestratus •

Baking is cooking by the heat radiating from a hot oven. The principle is the same as in roasting and

broiling, namely, a quick searing of the outer surface for the sake of the flavor and to retain the juices, then a lower tem¬ perature that the heat may reach the centre without burning the outside. If the oven is not hot, or water is used at first, the juices are drawn into the pan, enriching the gravy at the expense of the meat. Flesh which has tough connective tissue, cartilage and bone should be cooked a long time, and needs the solvent action of water, after the first browning. Baking renders watery vegetables drier and more savory, develops new flavors in fruits and grains and changes some of the sugar in the crust of cake into caramel and the starch in the outside of bread into dextrin. Some forms of baking are so nearly allied to stewing that it is impossible to make a strict division, but there is a great difference in the flavor developed by the two methods. In baking, the temperature is the important point, varying from 212° to 400° for different articles. The oven thermometer is the evolution of the old-time ((hand and try cake® methods. Baking was done first in the hot ashes, then in a hole in the ground — the primitive oven — where a fire was built on stones and after it had burned down to coals, food was laid in, either in clay pots, or wrapped in moist leaves, then covered with brush or leaves, and left to cook slowly for a long time. Bread-fruit in the South Sea Islands is baked in this way. Pounded and moistened grains made into a thin batter were spread on hot stones by a dextrous sweep of the hand, cooking almost instantly ; this was the first bread; the process may be seen now among the Arizona Indians in making piki. Some one found it better to cover the oven permanently and have an opening at one end; this was the beginning of the brick oven.

At the hearth fires, a covered utensil to stand near or over the coals, and later the Dutch oven, answered for daily use ; the great brick oven near the chimney soon followed, and here enough <(rye and Injun® bread, pies,

cookies, Indian meal pudding, and beans, were baked to last a large family through the week.

The kitchen range is an evolution of an American invention about the beginning of the 19th century. In many European countries they still use tile and brick stoves without ovens, all of the baking being done outside the home. In America there are ovens of every size and kind, from the tiny tin box for the gas burner or oil stove, the jacketed box of the Aladdin oven, which concentrates and utilizes all the heat from an oil lamp, the ventilated ovens of the coal and gas rangesj to the immense ovens of the large baking establishments, with their steam jets, revolving shelves and griddles and other contrivances for securing the right temperature and texture.

Frying is immersion in hot fat: from 345° to 400°. This is not boiling fat, as it is often called; it is the water in the food, or the fat, if new, which bubbles. Immersion implies depth enough to cover the articles, that the surface may be hardened before the fat can penetrate the food. A coating of egg and crumbs helps a moist surface to harden quickly and keep its shape. Some previously cooked foods are fried merely for the flavor and crisp¬ ness of the crust. Frying has been called the ((curse of American cookery,® but it is the wrong use of it that merits condemnation. Tough meat and flour mixtures rank with soda, put into cold lard and left to stew and sizzle until hard and soaked with burned grease, have been all too frequently a large part of the daily food on many American tables. It may have originated when it was so much an undertaking to ((fire up® the brick oven, and the drafts pre¬ vented the food in the Dutch oven from getting beyond the palest tint of brown. But there are indications that the boiler, the Scotch bowl, and the stew pan, are taking the place of the spider. When at its best frying is not to be recom¬ mended for those with weak digestion, its only merit being its quickness, but this is gained at the expense of time in the last stage of the work, digestion. But little frying would be done if everyone had to fry his food and inhale the odors. Frying probably originated where olive-oil was in common use, and oil is still the general frying medium in countries bordering on the Mediterranean. There it is usually done well, for vegetable oil may be heated with less acrid odor than from animal fats. When a pure vegetable oil without odor can be pro¬ cured at reasonable rates in America, and when housekeepers are willing to believe that it is more economical to fry in a large amount of fat at high temperature and drain the fried food thoroughly, than to let a smaller amount of fat be absorbed by the food, frying will be greatly improved. Sauteing is a French term meaning ((to toss,® or turn over. It is the common way to cook omelets, mushrooms and other foods which need merely to be browned on each side in a little fat, or stewed in hot butter and tossed

about until cooked. Griddle Baking, sometimes called frying, is cooking on a hot griddle, with no fat, if of soapstone, and but little if of iron. The griddle is shallow and would not hold fat. For waffles and fancy wafers the griddle is double and revolves over the fire.

Boiling and Simmering , terms often applied to cooking in water, regardless of temperature, so long as it is on the fire. At the sea-level,

water simmers, or bubbles gently below the sur¬ face at 185°, and boils, or bubbles all over the surface, at 212°. Density, weather and altitude vary the boiling temperature more or less, but it is easier to make some cooks understand this, than to convince them that water cannot be made any hotter after it once boils all over, at least not in the ordinary kettle. The scien¬ tifically trained cook knows that ((just a smile at one side of the meat® will cook it perfectly, and some of the foreign peasants seem to have known it intuitively, but the average cook in our kitchens piles on the coal until the water (

Stewing is only another form of simmering. In making a soup a large amount of water is used, and in making a stew a small amount. In both, the cooking is continued a long time at a gentle heat. Tough meats are improved in flavor by the union with vegetables, spices and other seasonings. In the soup they are re¬ moved, if it is to be clear, but in the stew they are retained. When dumplings of bis¬ cuit dough are cooked as a cover for the stew, or shortcake is served around the stew, it becomes a pot pie.

Fric as seeing , meaning ((to fry,® is a com¬ bination of frying with stewing, by which a flavor like that in frying, or pan broiling, is obtained.

Th.e term is sometimes used when no real browning is done, the simple warming, or stewing in butter at a low temperature, making it, according to some authorities, a fricassee. It is to be regretted that the desire for new names (thinking thereby to have a new dish) has almost obliterated the true meaning of many culinary terms ; there seems to be no standard for nomenclature.

Braising is a combination of frying, stew¬ ing and baking, with vegetables, etc., formerly done in a stew-pan having a hollow cover, in which coals were put for the final browning. It is a common way in foreign lands, where ovens are not much used and fuel scanty, only a little being needed for the slow fire for stewing, and each half-burned bit carefully put out by water and laid aside for another time. Braising is now done in an earthen dish called a casserole, and foods a la casserole are becom¬ ing very popular at hotels. It may be done in a granite pan with a tight cover and finished

in the oven. It is one of the most savory ways of cooking meat, game and poultry.

Smothering, or Pot-roasting, is done by quick searing of meat in a little of its own fat, in the stew pan or pot, then adding barely enough water to prevent burning, covering closely (formerly with a lid of dough when it was done in an iron pot before the fire), and cooking slowly in the steam of its own juices. It gives rich, undiluted gravy and very tender fibre ; the best way to cook tough lean meat free from bone.

Steaming. — Real steaming is done chiefly in factories, or large establishments, where the steam is confined in boilers and superheated, and then conveyed through pipes to the kettle containing the food. Owing to the expansive force of steam it cannot be confined in an ordi¬ nary kettle, and many of our canned fruits, soups and vegetables are more successfully done there, tharj they could be at home. But we cook some foods over, or surrounded by boiling water, and call it steaming. In the first way, the food is placed on a perforated pan, above the water, the moist steam surrounds it, and in condensing gives up its heat, which cooks the food. In the second way, a double or farina boiler is used (or a pail inside a common kettle), the heat is conveyed by the steam or boiling water through the metal, and thence to the food, which is less hot than the water, as the metal has absorbed some of the heat. Steaming makes tough meat tender and moist, and enables us to cook vegetables and gluti¬ nous foods without the constant attention needed, if cooked over the fire, or in a little water. The Romans had a kind of double boiler, also the chafing dish, which is one va¬ riety, combined

with a sauteing pan. Our grandmothers could cook a pot of hasty pud¬ ding without burning it ; but with the advent of many more glutinous foods and the knowl¬ edge that many foods containing milk and eggs need a low temperature, a great variety of steamers and double boilers have come into use. Our grandmothers lived in their kitchens ; it was but little work to ((watch the pot® while they spun or wove, and the great kettle of cider apple sauce seldom had even a hint of scorch¬ ing. But the modern housewife aims to spend as little time as possible in her kitchen. When we learn to think of it as a laboratory, it may tempt (although it may not require) a longer sojourn.

Cooking in water was probably the last to be discovered of the primitive methods, for it could not have been done until water-tight utensils were made; there were, first, baskets, made by plaiting grasses, twigs and rushes; then bowls or troughs were made by burning out hollow places in a log.. Stones were heated in the fire and plunged into the water in these baskets or troughs, and this cooked the food. Indians cook their acorn mush in this way, and the Alaskans use their canoes for boilers, heating the water with hot stones, when they boil the salmon for its oil. When clay was found, they learned to shape it into bowls, then into pots with three legs, and thus had a fire-proof as wrell as water-tight utensil ; and after this stewing came into general use. Jacob's savory venison was probably stewed. In spite of luxury, the old men in Greece pre¬ ferred the black broth made of cuttle-fish.

<(Rome was raised on gruel,® or pulse, made of barley and vegetables, and it is probable that stewing in some of its forms has been the method in most general use, among the masses of the people, who from limitation of means and of food supplies have learned its value. Stewing is not advisable, as commonly done in America, where a large amount of fire must be kept in one of our immense ranges especially for this purpose, but when it can be done over just the small amount of fire or gas needed, it is undoubtedly the most economical and nutri¬ tious way of cooking the cheaper kinds of meat, fish and poultry, and it is capable of many variations. But the average American man of moderate means does not take kindly to cheap meat. In this ((land of the free and equal,® he aims to have as nice a cut of steak as his rich employer, and his helpless helpmate probably knows no other way to cook meat save in the omnipresent frying-pan, and has no idea of the principles of the Norwegian cooker. Americans, with the best vegetables in the world, have much to learn about the cooking of them. Too much water and too little cooking are the American faults; just enough butter or oil to prevent burning, and then a slow stew¬ ing in their own juices, — saving them generally, instead of throwing them out in the water, — is the better way for many vegetables. Our beverages, our soups, our steamed puddings, our candy and many other foods, arc palatable or otherwise, according to our knowledge of cooking in water. A question asked b} a lady in the early days of cooking-schools shows the lamentable ignorance of many women on this important subject: <(How shall I know when the water boils?®

It is interesting to note that every primitive method has its counterpart now, not only among the barbarous people, but we find that persons of the highest civilization and refine¬ ment adopt some of them instinctively, when camping necessities suggest their use, or the satiated appetite craves simplicity. No foreign chef has produced anything finer than the trout cooked on a swinging birch bough before the camp door, a potato baked in hot ashes, scalded corn-meal baked on a board on the hearth, sweet corn roasted on hot stones, a planked shad, a Louisiana gumbo, a Brunswick stew, a Rhode Island clam-bake, or beans and pork baked in a bean-hole in the Maine woods.

Revolution. — Many thoughtful minds prophesy that the next step in the evolution of cookery will be one of ˆrevolution among the eaters themselves.® Already many have re¬ volted against meat and other animal foods, vegetarianism having made great advance in favor. Much of the laborious part of cooking has been taken from the home to the public kitchens and bakeries, or to the manufactory of prepared foods ready for the table. The over¬ taxed digestive organs are demanding relief, by a change to more simple living. A few persons are beginning to understand that the man of moderate means spends too large a portion of his earnings for his food ; that there is great waste of labor, fuel, heat, comfort, temper, health and morality in the cooking of food ; that intemperance in eating produces as direful results as intemperance in drinking; that (

Special directions for cooking fruits and nuts, for making breads, cake, pastries, etc., as well as for preparing the foods enumerated above, can be found in the numerous books and jour¬ nals devoted to cookery. Every precaution should be taken to ensure cleanliness in the cooking of food, not only because one wishes to avoid filth, but also because unclean methods make possible the transmission of disease. In the United States and in other countries there is a growing effort to secure cleanliness in markets, food factories, bakeries, hotels, restau¬ rants and other places where food is handled, prepared, sold and eaten. With this end in view legislation has been enacted in many places, providing for inspection and for punish¬ ment if the law is violated. See Nutrition of Man.

Bibliography. — Parloa, (New Cook-Book and Guide to Marketing and Cooking) (Bos¬ ton 1908) ; Colombie, (Traite pratique de cuisine bourgeoise) (Paris 1897) ; Filippine, international Cook Book) (New York 1906) ; Robinson and Hammel, (Lessons in Cooking through Preparation of Meals5 (Chicago 1912) ; and Hazlitt, (01d Cooking Books) (London 1902). Mary J. Lincoln.

Author of c School Kitchen Text Book .5

COOK'S EXCURSIONS. See Cook,

Thomas.

COOKS PEAK. The highest summit of Cooks range in the northern part of Luma County, New Mexico, 25 miles north, slightly east of Deming. A prominent landmark to travellers on the old Butterfield emigrant trail which crosses the range not far south. Consists of porphyry intruded in Palaeozoic and Mesozoic rocks. Important mining district on its east and north slopes. Altitude 8,408f4 feet.

COOK'S VOYAGES. See Cook, James.

COOKTOWN, Australia, town and port of Banks County, Queensland, at the mouth of the Endeavor River, 1,050 miles northwest of Brisbane, with which and with other ports it is connected by steamship service. It is connected by rail with Laura in the gold fields, 67 miles westward. It was here that Captain Cook beached the Endeavor in 1770 after he had gotten her off a reef outside, having thrown his guns overboard to keep the ship afloat. Search has failed to recover the guns, which have evidently been covered up by the strong coral growths of the vicinity. A monument to Captain Cook was unveiled in 1889. There are fine public buildings, an admirable hospital, churches, schools, etc. It is the main port for trade with New Guinea, and is the outlet for a sugar country and a rich mineral country. It has pearl fisheries, coffee and rice are grown nearby, tin and gold mined. Pop. 3,349.

C'OOLBRITH, Ina Donna, American li¬ brarian and poet : b. near Springfield, Ill., but while a young girl went to California, where she has since lived. She has been librarian of the Oakland Public Library (1874-94) ; Mer¬ cantile Library, San Francisco, 1898-1900; only woman member of Bohemian Club in latter city, 1900-06. She published (A Perfect Day and other Poems) (1881) ; (The Singer of the Sea; Songs from the Golden Gate) (1895) ; associated with Bret Harte in the Overland Monthly; contributor to leading journals East

and West; honorable member Athenian and California Writers' Clubs (Oakland) ; Bo¬ hemian, Browning, Century and Sequoia Clubs (San Francisco) ; Arts and Crafts (Carmel by the Sea) ; Pacific Short Story Club (San Jose) ; president of the Pacific Coast Women's Press Association; president of Panama- Pacific International Exposition Congress of Authors and Journalists 1915.

COOLEY, Leroy Clark, American phys¬ icist : b. Point Peninsula, N. Y., 7 Oct.

1833 ; d. Poughkeepsie, N. Y., 21 Sept. 1916. He was graduated at Union College 1858, taught physical science in New York State Normal College 1860-74, when he became pro¬ fessor of physics in Vassar College, remaining in this relation until 1907. He wrote several elementary text-books on natural philosophy, chemistry, etc., the most recent being begin¬ ner's Guide to Chemistry5 (1886) ; laboratory Studies in Chemistry5 (1894) ; (Student's

Manual of Physics5 (1897).

COOLEY, Mortimer Elwyn, American engineer : b. Canandaigua, N. Y., 28 March 1855. He was graduated from the United States Naval Academy in 1878; in 1881 became professor of mechanical engineering and in 1904 dean of the department of engineering at the University of Michigan ; was chief engineer in the United States navy during the Spanish- American War, and chief engineer officer of the Michigan Naval Brigade from 1895 to 1911. After 1900 he was known as an expert investigator and appraiser of public utilities through his work in appraising the railroads and public-service corporations of Michigan in 1900-01, 1903-05 and 1910-11, and through his municipal investigations in New York, Chicago, Boston and other cities. From 1907 to 1912 he was chairman of the Block Signal and Train Control Board of the Interstate Commerce Commission. He is a member of the Ameri¬ can Society of Mechanical Engineers and many other learned bodies.

COOLEY, Thomas McIntyre, Amer¬ ican jurist: b. Attica, N. Y., 6 Jan. 1824; d. Ann Arbor, Mich., 12 Sept. 1898. He was admitted to the bar in 1846 and became professor of law in the University of Michigan in 1859. He was elected justice of the Supreme Court of Michi¬ gan in 1864 and was chief justice of that State 1868-69, retiring from the bench in 1885. In 1881 he again became professor of law in the University of Michigan. His principal works are (A Treatise Upon Wrongs and Their Remedies5 (1878) ; (General Principles of Con¬ stitutional Law in the United States5 (1880) ; Commentaries on the Constitution of the United States5 (1873) ; (Law of Taxation5 (1876) ; (Michigan 5 in (American Common¬ wealth Series.5

COOLIDGE, Archibald Cary, American educator : b. Boston, Mass., 6 March 1866. He was educated at Harvard University, the Uni¬ versity of Berlin, the Lcole des Sciences Pol- itiques, Paris, and the University of Freiburg. He was acting secretary to the American lega¬ tion at Saint Petersburg in 1890-91 and secre¬ tary to the American legation at Vienna in 1893. In 1893-99 he was instructor in history at Har¬ vard, from 1899 to 1908 assistant professor and thereafter professor; in 1911 he also became

director of the university library. He was a member of the Taft party to the Philippine Is¬ lands in 1905-06, Harvard lecturer at various French universities in 1906-07 and delegate to the Pan-American Scientific Congress at Santi- ago, Chile, in 1908-09. In 1913-14 he was American exchange professor at the University of Berlin. He is the author of ***The United States as a World Power*** *(1908; French and German translations) ; (The Origins of the Triple Alliance* (1917).*

COOLIDGE, Calvin, American statesman : b. Plymouth, Vt., 4 July 1872. He was gradu¬ ated from Amherst College in 1895, the same year entered the law office of Hammond and Field, Northampton, Mass., was admitted to the bar, and began practice at Northampton in 1897. His public career began two years later with his election to the city council. He was city solicitor, 1900-01 ; clerk of courts, 1904 ; mem¬ ber, Massachusetts House of Representatives, 1907-08; mayor, Northampton, 1910—1 1 ; mem¬ ber, State senate, 1912-15 (president, 1914-15) ; lieutenant-governor, 1916—18 ; elected governor, 1918; re-elected, 1919, by the unprecedented plurality of 124,000 votes. In September 1919 Governor Coolidge was brought into national prominence by his determined stand against the unionization and strike of the Boston police. His message to President Samuel Gompers of the American Federation of Labor, asserting <(there is no right to strike against the public safety by anybody, anywhere, anytime,® was so universally applauded as a manifestation of moral courage that his friends began immediately to urge his nomination for the Presidency. His name was placed before the Republican National Conven¬ tion held at Chicago, June 1920, and he re¬ ceived 34 votes. When the nomination went to Senator Warren G. Harding of Ohio, Governor Coolidge was nominated for vice-president, re¬ ceiving 674J4 votes on the first ballot. He was elected 2 Nov. and took office 4 March 1921.,

COOLIDGE, Charles Allerton, American architect: b. Boston, Mass., 30 _ Nov. 1858. He was educated at Harvard University and the Massachusetts Institute of Technology, and was in the office of H. H. Richardson, architect, in Boston from 1882 until he became a member of the firm of Shepley, Rutan and Coolidge in 1886. From 1892 to 1900 he had charge of the Chicago office of the firm. Among the notable buildings planned by him are the Ames build¬ ing, South Terminal station and the new Har¬ vard Medical School buildings at Boston; the Chicago Public Library,

Chicago Art Institute, the Law School and Commons of Chicago Uni¬ versity and the new buildings for the Rocke¬ feller Institute, New York. He is chevalier of the Legion of Honor and member of the So¬ ciety of the Cincinnati.

COOLIDGE, Susan. See Woolsey, Sarah Chauncey.

COOLIDGE, Thomas Jefferson, Amer¬ ican merchant and diplomat ; b. Boston, Mass., 26 Aug. 1831; d. Boston, Mass., 17 Nov. 1920. He was graduated at Harvard in 1850, began business as an East India merchant, but later became closely identified with the New England cotton industry and large banking and railroad enterprises. He was president of the Chicago, Burlington and Quincy Railroad and overseer

of Harvard 1886-97 ; appointed Minister to France by President Cleveland 1892; and a member of the joint high commission to adjust disputes between the United States and Canada

1899.

COOLIE, a term commonly applied to un¬ skilled laborers from India and China. The first coolie emigrants appear to have been In¬ dians, brought from Calcutta, in India, to British Guiana, in 1839, soon after the aboli¬ tion of slavery in that colony. As free negroes were found to be insufficient to perform the work that had previously been done by slave labor and the whites could not endure hard labor in a tropical climate, the planters had to look for recruits from other places than Africa. The Chinese coolie traffic was publicly recog¬ nized in 1844 when the British colony of Guiana made provision for the encouragement of Chinese immigration. For a certain specified amount, generally about 17s a month, the coolies were bound for a term of years and after 10 years' service they were entitled to free passage back to their native country. The Chinese coolies were not entitled to this back- passage. To entice the skilled laborers to re¬ main inducements were offered them, and many did remain. The coolies employed in Guiana, chiefly from India, were in 1891 in number 105,463. The first attempt to use people from India as laborers proved unsuccess¬ ful. Various abuses existed almost from the beginning, in the treatment of the laborers. The transport ships were crowded so that few survived the passage ; the survivors were often sold, and many were sent, contrary to their agreement, to work in the foul guano pits in Peru, where huge numbers perished. The Chinese Passengers' Act of 1855 put an end to the more abominable phases of the traffic. No British ship was allowed to sail on more than a week's voyage with more than 20 coolies on board, unless her master had complied with cer¬ tain very stringent regulations. This ruling en¬ abled the Portuguese to gain almost entire control of the trade. The abuses which had crept in made the trade almost as bad as the trade in African slaves. The legislature of Jamaica, in 1869, passed a law requiring more humane treatment from employers toward their coolies. Macao, the Portuguese port at the mouth of the Canton River, China, sent large numbers of Chinese coolies to Cuba and Peru and under conditions little short of absolute slavery, even kidnapping was practised with impunity. In 1866 the matter was made sub¬ ject to an international conference and im- rovements were made by agreements signed y China, France and Great Britain. By this agreement, the legalized coolie trade between the West Indies and China was abolished. In 1904, under a convention drawn up between China and the United Kingdom, over 50,000 Chinese laborers were engaged at work in the gold mine's of Transvaal. To the Malay states and other parts of eastern Asia, there is an ex¬ tensive yearly migration of Chinese coolies not under contract.

The name is also applied to the Chinese immigrants to the United States. The Chinese Exclusion Act of 1888 and the stringent laws against contract laborers have greatly limited the numbers of Chinese in this

country. (See Chinese Immigration). Con¬ sult Hope, J. L. A., (In Quest of Coolies) (1872); Jenkins, E., (The Coolie; His Rights and His Wrongs) (1871) ; Grose, C. B., (The Labour Ordinances5 (Georgetown 1890) and reports of the commissions.

COOLING, Velocity of, a body isolated in air or other gas, or in vacuo, and surrounded by bodies colder than itself, loses heat, by radiation in the last mentioned case, and in the former case partly

by radiation and partly by convection. The rate at which its temperature decreases depends on a variety of circum¬ stances, — on the nature of its surface, for ex¬ ample. But, other things remaining the same, the velocity of cooling is proportional to the excess of the temperature of the body in ques¬ tion above that of its surroundings. This is Newton's Law of Cooling.

The law of cooling has been verified by Dulong and Petit experimentally. A copper ball was suspended in the midst of a metallic chamber, round the outside of which water was kept flowing, in order to maintain a constant temperature. The copper ball was heated be¬ fore being suspended in the chamber, and a thermometer was inserted in a hole in the ball, and so arranged that the stem, which was long, projected to the outside of the chamber and could be read there. The fall of the tempera¬ ture of the ball during equal intervals of time was noted, and it was found to become less and less as the temperature of the ball gradually approached that of the walls of the surround¬ ing chamber, the law of decrease being New¬ ton's as stated above.

The following example will illustrate practi¬ cally the meaning of this law : Suppose the temperature of the ball to be 20° higher than that of the enclosure at the beginning of the experiment, and that during the first five minutes it loses 1°, that is, one-twentieth or 5 per cent of the excess of temperature. Dur¬ ing the next five minutes it will lose 5 per cent of the excess that remains, that is, of 19°. It will therefore lose 0.95°, or the temperature of the ball will be 18.05° above that of the enclosure. At the end of the next five minutes the difference of temperatures of the ball and enclosure will be 17.15°, and so on.

COOLING SYSTEMS. See Internal Combustion Engine.

COOMASSIE, koo -mas'se, or KUMASSI,

Africa, capital of Ashanti, in West Africa. The houses, formed of stakes and wattle-work filled up with clay, and thatched with palm leaves, are often furnished with arcades and ornamented with painting and carved work. Coomassie was captured in 1874 by the British, and again in 1896. In 1900 they took entire possession and it is now the seat of the British resident. It has a fort and a market-place. It was made a railroad terminal in 1903 and carries on an active trade with central Africa. Pop. 24,000.

COOPER, Anthony Ashley. See Shaftes¬ bury.

COOPER, Str Astley Paston, English sur¬ geon : b. Brooke Hall, Norfolk, 23 Aug. 1768; d. London, 12 Feb. 1841. He studied medicine in Edinburgh and London and in 1792 he visited Paris, where he attended the lectures of Desault and Chopart. In 1 793 he was appointed

professor of anatomy at Surgeon's Hall; in 1802 he received the Copley medal of the Royal Society and in 1813 became professor of com¬ parative anatomy to the College of Surgeons, and in 1822 one of its court of examiners. In this year appeared his great work (On Dis¬ locations and Fractures of the Joints. ? Hav¬ ing performed a slight operation on George IV he was created a baronet in 1821, after which his practice largely increased. In 1827 he was elected president of the Royal College of Sur¬ geons. His (Lectures on the Principles and Practice of Surgery) appeared in 1824-27 ; his (Anatomy and Diseases of the Breast5 was published (1829-40), and (Anatomy of the Thyroid Gland) (1832). He was the first to attempt the tying of the carotid artery and the aorta. These operations were not successful in his hands, but pointed the way for further re¬ search. Consult his (Life and Correspondence) (2 vols., London 1843).

COOPER, Charles Alfred, English journal¬ ist : b. Hull, 16 Sept. 1829; d. 1916. From 1876 to 1905 he was editor of the Edinburgh Scots¬ man. He published (Seeking the Sun) (1891); Setters on South Africa) (1895); (An Editor's Retrospect (1896).

COOPER, Colin Campbell, American land¬ scape painter: b. Philadelphia, Pa., 1856. He studied at the Philadelphia Academy of the Fine Arts and the Julien and other academies of Paris. After a year as teacher in Drexel Institute, Philadelphia, he settled in New York. He was one of the first to give expression to the distinctive beauty of American cities, with their skyscrapers and manifold activities. A close observer, he reminds one, in his color and atmospheric effects, of the Impressionists. He also paints cathedrals and views of quaint German cities with feeling and charm. His best-known works are (Broad Street, New York5 (Cincinnati Museum) ; (The Flatiron Building) (Dallas, Tex.) ;

(Quebec CathedraP (Philadelphia Art Club) ; (Procession of Bruges 5 (1906; Lotos Club, New York) ;

(View of Pittsburgh 5 ; (Beauvais CathedraP (1912); (The Avenue) (1913); (Cathedral of Siena) (1913). He was awarded silver and gold medals at the Panama-Pacific Exposi¬ tion, San Francisco, in 1915 and has been the recipient of numerous other awards.

COOPER, Ellwood, American horticul¬ turist : b. Lancaster County, Pa., 24 May 1829. For 10 years he was engaged in business in Port-au-Prince, Hayti, but went to California in 1870 and devoted himself to fruit culture. He was the first manufacturer of olive oil in the United States, inventing special machinery for the purpose. He is also the inventor of machinery for hulling and pitting almonds, and for hulling and washing English walnuts. From 1885 to 1903 he was president of the California State Board of Horticulture, and for three years was president of Santa Barbara College. He has published Statistics of Trade with HaytP (1868) ; (Forest Culture and Eucalyptus Trees5 (1876) ; (Treatise on Olive Culture5 (1882).

COOPER, Emma Lampert, American artist, wife of Colin Campbell Cooper: b. Nunda, N. Y. ; d. 30 July 1920. Educated Wells College; studied . art under Harry Thompson in Paris, Kever in Holland and Chase in New York. Her prinicpal subjects are street scenes.

interiors and landscapes. For a time she taught painting in Rochester, N. Y. At the Chicago World's Fair (1893) she received a medal for her water color,

(Picardy Hillside5 (1897) ; (High Noon, Cape Ann'; (01d Kitchen in Gruyere, Switzerland ; (News of the Day5 ; (Canal at Lisieux.5

COOPER, Frederick Taber, American au¬ thor and editor: b. New York, 27 May 1864. He was educated at Harvard and Columbia uni¬ versities ; was assistant in Latin at Columbia 1891-94, associate professor of Latin and San¬ skrit at New York University 1895-1902, literary editor of the New York Commercial Advertiser 1898-1904, and editor of the Forum 1907-09. His writings include (History of the Nineteenth Century in Caricature 5 (with A. B. Maurice, 1904) ; (The Craftsmanship of Writing> (1911) ; (Some American Storytellers5 (1911) ; (Some English Storytellers 5 (1912) ; a translation

of Montessori's Pedagogical Anthropology> (1913) ; 'Thomas Alva Edison5 (1914).

COOPER, George Henry, American naval officer: b. Fort Diamond, N. Y., 27 July 1821; d. Brooklyn, N. Y., 17 Nov. 1891. He entered the navy in 1837, became captain in 1867, com¬ modore in 1874 and rear-admiral in 1881. He was on sea service for more than 25 years, and on shore or other duty for more than 18. In the Florida Seminole Indian War he served in co-operation with the army ; during the Mexican War he led an assault against Point Isabel, was captured at Monterey, and after being ex¬ changed took part in the attacks on Tabasco, Alvarado and Tuxpan ; during the Civil War he commanded, among other vessels, the monitor Sangamon, which was on picket duty inside the Charleston roads. He was commandant of the Norfolk navy yard (1867-69); of yard at Pensacola, Fla., 1874-78; and of the Brooklyn navy yard, and in command of the North Atlan¬ tic squadron from 1880 until his retirement, 27 July 1884.

COOPER, Henry Ernest, Hawaiian politi¬ cian : b. New Albany, Ind., 28 Aug. 1857. He was graduated at the Boston University Law School 1878; was admitted to the Suffolk County (Mass.) bar; and settled in Honolulu 1890. During the Hawaiian revolution of January 1893, he was chairman of the Committee of Safety, and on 17 Jan. 1893 read the proclama¬ tion abrogating monarchical government in the islands. He became a member of the advisory council in the provisional government; a Cir¬ cuit Court judge 1893-95; Minister of Foreign Affairs 1895-99; acting President of the republic, January to March 1898, and has served as head of the departments of justice, public instruction, and interior, and as attorney-general 1899-1900. He retired in 1900 and now practises law in Honolulu.

COOPER, James, American senator: b. Frederick County, Md., 8 May 1810; d. Camp Chase, Columbus, Ohio, 28 March 1863. He was graduated at Washington College, Pennsyl¬ vania, 1832, studied law and began practice at • Gettysburg, Pa. He was elected to Congress 1838 and 1840; to the State legislature 1843-48; was attorney-general of Pennsylvania 1848, and elected a United States senator 1849. Sub¬

sequently he settled in his native town, and when the Civil War broke out took command of the Maryland volunteers, organized them into regiments, and on 17 May 1861 was made a brigadier-general. He was in command of Camp Chase at the time of his death.

COOPER, James Fenimore: b. Burling¬ ton, N. J., 15 Sept. 1789; d. Cooperstown, N. Y., 14 Sept. 1851. His father, Judge William Cooper, removed in the year following the novelist's birth to recently acquired tracts of land, in the wilderness of central New York, about Otsego Lake, on the shore of which he had already fixed the site of the village of Cooperstown. Here he built the mansion called Otsego Hall, which his son acquired in after years, and in which he wrote the greater number of his works. Young Cooper received instruc¬ tion in the family of the Rev. Mr. Ellison, rector of Saint Peter's, Albany, and then entered Yale College at 13. He neglected his studies so per¬ sistently that he was expelled in his third year. In 1806 he went to sea in a merchantman, and served in the navy in London and at Gibraltar, receiving a midshipman's commission in January 1808. He served for a time on the Vesuvius and then with a construction party on Lake Ontario, where he saw a new aspect of frontier life and became familiar with the details of shipbuilding. In 1811 he resigned and married a daughter of John Peter De Lancey, who came of a conspicuous Tory family. Cooper's resignation from the navy on the eve of the War of 1812 was criticized as unpatriotic and influenced by his Tory connections. For the next nine years Cooper was engaged mainly in man¬ aging and improving his farm possessions, first near Cooperstown, then in Westchester, with no discovered or suspected bent toward literature. Chancing to read a book of fiction that aroused his dislike, he professed himself able to produce a better, and being held half jocularly to the task, wrote Precaution,5 published in 1820. It was only an indifferent novel, but it was praised by friends, and Cooper was drawn to give himself to authorship. In 1821 (The Spy) ap¬ peared, winning immediate popularity both in England and at home. Cooper's chance of suc¬ cess lay, not in graces of style, which he showed small disposition to cultivate, nor in imitation, but in his large knowledge of colonial and pioneer life and of the sea. In (The Spy5 he had utilized his acquaintance with many details of the Revolutionary struggle, and with West¬ chester as "the neutral ground.® His next work, 'The Pioneers) (1823), concerned itself with life and folk in the wilderness about Coopers¬ town, where he had been brought up, and which he introduced under the name of Templeton, as the centre of the action. It was the first of the (

characters, Uncas and Chingachgook, and still endures.

*Beginning with 1826, Cooper spent seven years in Europe, continuing his authorship, and supplying much needed knowledge of men and things. (The Prairie,) (The Red Rover, * (The Wept of Wish-ton-Wish) and (The Water Witch1* continued the series begun before he sailed. On account of distorted notions held abroad concerning the people of his country, Cooper wrote (Notions of the Americans; Picked up by a Traveling Bachelor1* ; but the book failed of its purpose, edifying Americans rather than enlightening Europeans. He wrote, besides, three novels, (The Bravo,1* (The Hei- denmauer1* and (The Headsman,1* dealing with continental scenes and characters, but their American bias tended to lessen his popularity. His manner of meddling with unpersonal mat¬ ters got him into some trouble at this time. He determined in consequence to write no more. Coming back to America, near the close of 1833, he found the general crudeness of taste and the greed of wealth more pronounced, after his foreign stay, and he did not spare his criti¬ cism. The result was greater unpopularity at home than he had incurred abroad. His com¬ bative temper prompted his putting out the satiric novel of (The Monikins1* (1835), which had small effect. In the three years following he published Sketches of Switzerland* and (Gleanings in Europe,* in which he gives his impressions of the Swiss, the French, the Eng¬ lish and the Italians, and renews his strictures on foreign and domestic faults. The result was increased bitterness and abuse. A dispute with the people of Cooperstown, over his rights in Myrtle Grove, on Otsego Lake, made matters worse, for the press*

of the State took sides against him, misrepresenting his motives and spirit in the case. Relief was at length secured from this sort of persecution; Cooper pursued the chief offenders for libel, and won his suits. In 1838 he published the two novels, home¬ ward Bound and home as Found,* and in the next year (The History of the Navy of the United States,* a work long had in contempla¬ tion, and received with fresh abuse from the press. The resulting trouble was settled, by a board of arbitration, in Cooper's favor. In 1840 he published (Mercedes of Castile,* and the famous (Pathfinder,* followed the next year by (The Deerslayer,* generally considered, with the preceding novel, the best of the Leather- Stocking Tales, which include, with these, (The Last of the Mohicans,* (The Prairie* and (The Pioneers.* Cooper's powers of description and portraiture were now at their best. In 1842 (The Two Admirals* and (Wing and Wing* appeared, and in 1843 (Wyandotte* and (Ned Myers,* the latter being the true story of a sailor comrade of earlier years. In 1844 Afloat*

and Ashore came out in two parts. Three anti¬ rent novels, (Satanstoe* (1845), and (The Chainbearer* and (The Redskins* (1846) fol¬ lowed; and in the last-named year (Lives of Distinguished American Naval Officers* ap¬ peared. (The Crater* (1847) ; (Jack Tier* and (Oak Openings* (1848) ; (The Sea Lions* (1849) and (The Ways of the Hour* (1850), all indifferent novels, complete the list of his more considerable works. His death was at Cooperstown, where he had lived mainly since 1833. Cooper was of a social temper until op¬*

position withdrew him from society. His judg¬ ments, except in matters of tact and policy, were generally acute and sound, and his integrity was heroic. His conceptions of the Indian character have been frequently disapproved, but were the fruit of deliberate study. In spite of the faults in style, he had splendid narrative ability and the power of creating characters which are clear and strong. Harvey Birch, Natty Bumppo, Long Tom Coffin and his In¬ dian personalities are very noteworthy. His par¬ ticular value to the literature of his country lies in the fact that he opened up the course of the novels concerning the origin and heart of America, and of novels of the prairies and the sea. Balzac and Hugo gave him enthusiastic praise. The standard biography is Lounsbury's in (American Men of Letters series, which also contains a full bibliography and an excel¬ lent criticism. (See Deerslayer, The; Last of the Mohicans, The; Pathfinder, The; Pilot, The; Spy, The). Consult also Clymer, (James Fenimore Cooper* (1901) ; Richardson, Ameri¬ can Literature* (Vol. II, New York 1887-88) ; Wendell, A Literary History of America* (ib. 1900) ; Brownell, American Prose Masters* (ib. 1909) ; Erskine, J., in (Leading American Novelists* (ib. 1910) ; Phillips, M. E., (James Fenimore Cooper* (ib. 1912) ; and essays by Mark Twain, T. W. Higginson and Brander Matthews. l A. Sherman,*

Professor of Literature, University of Nebraska.

COOPER, Lane, American educator: b. New Brunswick, N. J., 14 Dec. 1875. He re¬ ceived his education at Rutgers College, where he was graduated in 1896, studying later at the universities of Columbia, Yale, Berlin and Leipzig, and the College de France. In 1902 he began his connection with Cornell University, becoming instructor in English there in that year, assistant professor in 1906 and full pro¬ fessor in 1915. He has published (The Prose Poetry of Thomas De Quincey (1902) ; theo¬ ries of Style* (1907) ; literature for Engi¬ neers* (1909) ; (Manual of American Litera¬ ture* (1909) ; the Power of the Eye in Cole¬ ridge* (1910) ; Concordance to the Poems of Wordsworth* (1911) ; (Function of the Leader in Scholarship* (1911); Aristotle on the Art of Poetry* (1913) ; (Methods and Aims in the Study of Literature* (1915) ; A Concordance to Horace* (1916) ; (editor) the Greek Genius and Its Influence* (New Haven 1917) ; and con¬ tributions to philological and other periodicals.*

COOPER, Myles, English loyalist : b. Eng¬ land 1735; d. Edinburgh, Scotland, 1 Mav 1785. He was the second president of King's College, now Columbia University, New York. He studied at Oxford, became fellow of Queen's College in 1760, and in 1761 published a volume of miscellaneous verse of correct style, but full of artificiality and classical imitations. In 1762 he became assistant to Dr. Johnson, president of King's College, and after a year as professor of moral philosophy, Cooper, then 28, was elected president in May 1763, upon the resigna¬ tion of Johnson. Upon his accession the college had a faculty of four members. Both discipline and members rose during his administration, and a medical school was added. From 1767 to 1771 Cooper was in England, and after his return to America showed himself not only a typical high-churchman and Tory, but the mas-

ter of a trenchant ana sarcastic pen. He pub¬ lished cThe American Querist in 1774 and in the same year wrote (A Friendly Address to All Reasonable Americans on the Subject of Our Political Confusion,* a pamphlet answered by Alexander Hamilton, then an undergraduate at King's, and by Maj.-Gen. Charles Lee, who rivaled Cooper in virulence. His (What Think Ye of Congress Now?) (1775) urged that Americans were not bound by the decrees of Congress, as that body had transcended the powers granted to it. In the same year he was forced to leave New York, narrowly escaping ill-treatment at the hands of a mob. His de¬ parture from America he described in a poem in the Gentleman's Magazine for July 1776. In England he received a parish in Berkshire after a short residence at Oxford, where he preached in 1776 a sermon entitled (National Humiliation and Repentance Recommended, and the Causes of the Present Rebellion in America Assigned,* a violent attack on the English Whigs. During the last years of his life he was senior minister of the first Episcopal chapel in Edinburgh. John Trumbull, in (McFingal,> speaks of <(punster Cooper's reverend head,** and he seems to have been a wit of rather free and convivial habits. Among the men who were educated under him were Gouverneur Morris, Robert Livingston, Alexander Hamilton and John Jay. He was the prominent classical scholar of 18th century America.

COOPER, Peter, American manufacturer, inventor and philanthropist: b. New York, 12 Feb. 1791 ; d. there, 4 April 1883. His early education was of the scantiest description, and in boyhood he assisted his father in making hats, at 17 learning the trade of coachmaking. He subsequently invented a cloth-shearing machine and engaged in various occupations, finally settling upon the manufacture of glue, which he carried on for half a century. About 1830 he became interested in iron manufacture and in 1845 removed his iron business from New York to Trenton, N. J., and was the first to roll wrought iron beams for fire-proof structures. In 1830 he built from his own designs the first locomotive engine ever constructed in America. He was also interested in the canal system of his native State, and, at a later date, in tele¬ graphic communications, being president of sev¬ eral telegraph companies. He took an active share in the enterprise which resulted in laying the first Atlantic cable. In 1876 he was nom¬ inated for the presidency of the United States by the independent party, receiving nearly 100,000 votes at the autumn elections. In 1854 he established in New York the well-known Cooper Union (q.v.). He published 'Political and Financial Opinions with an Autobiography) (1877) ;• (Ideas for a Science of Good Govern- ment) (1883). Consult Carter, 'Peter Cooper) (in Century Magazine , New York 1883-84), and Raymond, (Peter Cooper) (ib. 1901).

COOPER, Philip Henry, American naval officer: b. Camden, N. Y., 1844; d. 1912. He was graduated from the United States Naval Academy in 1863, served on the Constellation in the same year, and took part in the battle of Mobile Bay. From 1867 to 1869 he was an instructor at the Naval Academy; in 1870-71 he was connected with the Tehuantepec survey¬ ing expedition, and was superintendent of the

Naval Academy from 1894 to 1898. He was commander of the Chicago during the Spanish-American War. He attained the grade of rear- admiral in 1902; and was commander-in-chief of the Asiatic station in 1904, in which year he retired.

COOPER, Susan Fenimore, American au¬ thor : b. Scarsdale, N. Y., 1813; d. Cooperstown, N. Y., 31 Dec. 1894. She was the daughter of James Fenimore Cooper, and during the last years of her father's life was his secretary and amanuensis. She was author of ' Rural Hours* (1850) ; ' Fields Old and New* (1854) ; 'The Shield: A Narrative> ; 'Mount Vernon to the Children of America) (1858); (Rhyme and Reason of Country Life* ; etc.

COOPER, Theodore, American engineer : b. Cooper's Plains, N. Y., 12 Jan. 1839; d. 24 Aug. 1919; graduated, Rensselaer Polytechnic Institute, Troy, N. Y., 1858, entered the United States navy as engineer officer 1861-72, and was assistant professor at the Naval Academy 1865- 68. In 1872 he assisted Capt. James B. Eads in the construction of the Saint Louis bridge, be¬ coming, after its

completion, engineer and su¬ perintendent in charge. Later he held important positions with the Delaware Bridge Company, Keystone Bridge Company and as assistant en¬ gineer in charge of the construction of the first New York elevated railroads. He was one of the five expert engineers appointed to deter¬ mine the Hudson River bridge span. Until his retirement he was consulting engineer for the New York Public Library and for the Quebec bridge. He was an authority on all matters re¬ lating to iron and steel construction. He pub¬ lished (General Specifications for Iron and Steel Highway Bridges and Viaducts) (1885; 7th ed., rev., 1909) and (American Railroad Bridges) (1889).

CO'OPER, Thomas, American physicist and politician: b. London, 22 Oct. 1759; d. South Carolina, 11 May 1840. He was educated at Oxford, studied law and medicine and was admitted to the bar. Entering into the political agitations of the period, he was sent by the democratic clubs of England to the affiliated clubs in France. In this latter country he took part with the Girondists, but perceiving their inevitable downfall escaped to England. Ed¬ mund Burke criticized with some severity the activities of Cooper and Watt in France, and provoked a caustic reply from the former, entitled (A Reply to Mr. Burke's Invective against Mr. Cooper and Mr. Watt (1792). Its circulation was prohibited by the British govern¬ ment. While in France he had learned the secret of making chlorine from common salt, and he now became a bleacher and calico printer in Manchester, but his business was unsuccess¬ ful. He next came to America, and uniting with the Democrats opposed with vivacity the administration of John Adams; For a violent newspaper attack on Adams in 1799, he was tried for a libel under the Sedition Act of 1800, and sentenced to six months' imprisonment and a fine of $400. The Democratic party coming into power, he transacted in 1806 the business of a land commissioner on the part of the State of Pennsylvania with such energy as to tri¬ umph over difficulties with the Connecticut claimants in Luzerne County, but being ap-*

pointed to the office of judge, became obnoxious to members of his own party, and was removed in 1811. He then successfully occupied the chair of chemistry in Dickinson College, in the University of Pennsylvania, and in Columbia College, S. C, of which last institution he be¬ came president in 1820, and in which he was also professor of chemistry and political econ¬ omy. On his retirement in 1834, the revision of the statutes of the State was confided to him, and he died in the performance of this duty. Cooper was alike eminent for the ver¬ satility of his talent and the extent of his knowledge. He published in 1794, in London, a volume of Unformation Concerning Amer¬ ica' ; in 1800 a collection of political essays; in 1812 a translation of the Unstitutes of Jus- tinian) ; in 1819 a work on (Medical Juris¬ prudence' ; in 1812-14 two of the five volumes entitled the (Emporium of Arts and Sciences' ;

COOPER, Thomas, English Chartist and poet : b. Leicester, 20 March 1805 ; d. Lincoln, 15 July 1892. While a shoemaker's apprentice he studied assiduously, and in 1827 became a schoolmaster and in 1829 a Methodist preacher. In 1841 he prominently identified himself with the Chartist movement as a leader, was editor of the Midland County Illuminator, and was arrested in the following year on a charge of sedition. During his subsequent imprisonment for two years in Stafford he wrote a Spenserian poem entitled (The Purgatory of Suicides' and some stories published under the title of (Wise Saws and Modern Instances.' He lectured much as a free-thinker in London and the provinces, but in 1855 he abandoned free-think¬ ing and began lecturing on Christian evidences. His autobiographv appeared in 1872, his Poeti¬ cal Works' in 1878 and his 'Thoughts at Four¬ score and Earlier' in 1885.

COOPER, Thomas Sidney, English land¬ scape and cattle painter : b. Canterbury, 26 Sept. 1803; d. there, 7 Feb. 1902. He studied at the Royal Academy School, went to France in 1827, and settled for three years in Brussels, where he learned much from Verboeckhoven. In 1833 he exhibited at the Academy, and in 1867 was elected Royal Academician. He ex¬ hibited at the Royal Academy 67 years suc¬ cessively. Among his works are (Mountains in Cumberland' (1841) ; (Ettrick Shepherds' (1842); (Cattle at Pasture' (1843); (Summer Evening' (1846) ; (Charge of the Household Brigade — Waterloo' (1847) ; (Fordwich Meadows — Sunset' (1850); 'Snowed up' (1867) ; (Milking Time in the Meadows'

(1869) ; Passing Shower' (1870) ; 'Children of the Mist' (1872) ; 'Monarch of the Meadows' (1873); 'There's no Place like Home' (1874); 'God's Acre' (1875); 'Mater¬ nal Affection' (1876) ; (A Cool Retreat' (1877) ; 'Isaac's Substitute' (1880) ; 'Summer Evening in the Marshes' (1880) ; 'On Deal Common' (1880) ; 'Scape Goat' (1881) ; 'Summer After¬ noon' (1882) ; 'A Sedgy Brook in the Meadows' (1883) ; 'In the Rob Roy Country' (1883). In 1882 he presented a gallery of art to his native town, and in 1890 published an autobiography entitled 'My Life.' His work is neat and highly finished in character, but conventional

and displays no sympathetic study of nature, but rather an excellent imitation.

COOPER CREEK, or BARCOO, called by the latter name chiefly in its upper course, the largest inland river in Australia. See Aus¬ tralia.

COOPER RIVER, a river of South Caro¬ lina, rising in the eastern part of Berkeley County, flowing across the county in a generally southerly course and emptying into Charleston Harbor. Although the river has a very short course, it is remarkable for its breadth. It forms, with the Ashley River, the peninsula upon which the city of Charleston -is situated. See South Carolina.

COOPER UNION, or COOPER INSTI¬ TUTE, an institute founded in New York in 1854 by Peter Cooper. Its object is to provide free schools of art and science and free reading rooms and library for the working classes. The founder chose the word "Union" because he hoped that other liberal persons would unite with him in providing the means for carrying into effect his benevolent intentions. The Cooper Union building was erected at the junc¬ tion of Third and Fourth avenues and cost $630,000. An endowment fund was created by the gift of $100,000 during Mr. Cooper's lifetime and another $100,000 was added by his will. The William Cooper memorial foundation was $340,-000. The fund has received additional gifts from time to time from Edward Cooper and . Abram S. Hewitt, and in 1899 Andrew Carnegie gave $300,000 and later $300,000 more. The in¬ crease of annual revenue amounting to $25,000 provided by the three donors last mentioned was intended for the purpose of establishing a day school and of enlarging the operations of the night classes by the addition of special instruction in chemical, electrical and thermo¬ dynamic knowledge. The expenditure made necessary by preparation for enlarging the work of the institute amounted to about $22,000 additional, which was contributed chiefly by Mr. Cooper and Mr. Hewitt. The courses in science include engineering, electricity, chemis¬ try, physics, astronomy and mechanical draw¬ ing; and those of art include architectural, industrial and ornamental and free-hand draw¬ ing, clay modeling and painting. Instruction is given in music, English literature, wood engrav¬ ing and pottery. The institute confers degrees in science and in civil, mechanical and electrical engineering. There are several scholarships. Additional advantiges are offered by lecture courses, a museum, an art gallery and a library of 39,481 volumes, with a reading room con¬ taining current numbers of nearly 500 maga¬ zines and newspapers. The institute is divided into the following departments : Night School of Science, Day School of Science, Naval Archi¬ tecture Class, Night Art Department, Woman's Art School, Stenography and Typewriting School, Telegraphy School, Elocution Class, Oratory and Debate Class. The annual budget approximates $205,000 ; the income-producing endowment to about $3,000,000, and the total value of the property in its control to over $4,000,000. The number of students in the several departments is about 4,000. The People's Institute, although holding its meetings in the Cooper Union building, is not a branch of the Cooper Institute.

COOPERAGE, the art of making vessels of pieces of wood bound together by hoops. Such vessels were in use among the Romans at the period of the Christian era. The upright pieces for the sides of a barrel or cask are called staves. The swelling at the middle of the barrel,, called the belly or bulge, is formed by skilfully shaping each stave broad in the middle and narrowed at the ends so as to form part of the required double conoid. A skilful cooper can work this curve so accurately that no further fitting or alterations shall be needed when the staves are put together. The staves are made to meet at their inner edges and by driving the hoops very hard, the inner part is compressed till the slight gaping outside is closed, and thus slight inaccuracies of fitting are remedied. The bulging shape of barrel and cask seems only a fashion. It has been sug¬ gested that the purpose is only to make more difficult the cooper's trade. During the last few years a strong effort has been made to introduce perfectly cylindrical casks in their place ; the room saved in packing cars, etc., being the strongest argument for the new shape, which could be made by much cheaper machinery besides.

There are several branches of cooperage. The wet or tight cooper makes vessels for hold¬ ing liquids.

The dry cooper does inferior work, such as barrels for containing dry goods, where an inferior degree of accuracy is sufficient. The white cooper makes churns, pails, etc., which for the most part have straight sides. The best work is made of oak, which must be thoroughly dried before being put together. Other woods employed are elm, pine, gum, beech and bass in the order named. In warm countries, the dry¬ ing of the sun is sufficient, and casks are there¬ fore mounted in summer only; but in the United States, artificial drying is commonly resorted to. The hoops are hammered down from the nar¬ row to the wide part of the cask, by means of a mallet striking a piece of wood held against the hoop. Iron hoops are sometimes put on hot, in order that their contraction on cooling may bind the work together. Most ingeniously constructed machinery is now generally used in barrel-making. Like most other processes of manufacture, the cooper's trade has changed in modern times, with the substitution of machinery for hand work. Barrel-making ma¬ chinery may be divided into machines for the manufacture of staves, machines for manufac¬ turing heads and machines for setting up and finishing the barrel. Consult Wagner, Cooper¬ age : A Treatise on Modern Shop-Methods and Practice > (Yonkers, N. Y., 1910) ; Newlin, ((Tests of Wooden Barrels,® in (Bulletin of the United States Department of Agriculture, No. 86) (1914). Statistical bulletins on tight and slack cooperage stock are compiled by the United States Census Bureau in co-operation with the Forest service of the Department of Agriculture and are published annually. Other bulletins from the Forest Service dealing with cooperage are issued from time to time.

CO-OPERATION, in modern parlance the association of people for the accomplishment of any desired end, especially the association of working people for the management of their industrial interests in store, workshop or other undertaking, and the equitable distribution of

profits. The advantages of co-operation consist in the lower prices paid for the ordinary arti¬ cles of life and of manufacture, the common use of capital, machines, buildings, water power and in common production. Instances of co-opera¬ tive industry have been discovered among Eng¬ lish miners and New England fishermen in the 17th century and among Greek sailors of the Levant. Co-operative societies established as early as 1777-95 are still in successful operation. The earliest in England was founded in 1794 at Mongewell, in Oxfordshire, by Shute Bar¬ rington, bishop of Durham. During the Owenite agitation, between 1820 and 1845, hundreds of co-operative societies rose up. Robert Owen (q.v.), failing to convert his brother manufac¬ turers to the innovations he had introduced for the benefit of his operatives in his New Lanark mills, appealed to the government to adopt measures that would alleviate the poverty of the laboring masses, but without success. He there¬ fore abandoned these efforts and turned to the task of establishing co-operative communities that would put his ideas into practice. One hundred and seventy shops had been organized under the Owen plan in 1830, but four years later most of these had ceased to exist.

The modern movement first took practical and permanent form with the formation of the Rochdale Society of Equitable Pioneers in 1844. The founders were 28 Lancashire weavers, nearly all Socialists of the Owen school and Chartists. The original capital was $140, slowly collected by subscription of two pence, and afterward three pence, a week. With this cap¬ ital they opened a store for supplying them¬ selves with provisions ; but at first they had only flour, butter, sugar and oatmeal to sell. They limited the interest on shares to 5 per cent, and divided the profits among members in propor¬ tion to their purchases. When it was proposed to take out a license for the sale of tea and coffee the members did not pledge or subscribe amounts, but ((promised to find" small amounts ranging from two pence to one pound, and the latter sum was actually the largest offered. A motion was made that members who would not trade with the store be paid off, but those who desired to see co-operation advance under the principle of freedom opposed the motion, and it was withdrawn. At the end of 13 years they had a membership of 1,850, a capital of $75,000 and their annual sales amounted to $400,000. This successful society with its organization and methods of conducting business became a model which was followed in many parts of England and abroad. In 1864 a wholesale society with annual sales amounting to over $200,000,000, with a membership of 1,512,399 and a capital of nearly $330,000,000 was established at Man¬ chester, and in 1869 a second at Glasgow. They work in harmony and are practically one institu¬ tion. The wholesale society is a federation of retail societies for the supply of goods to the various societies composing it, with purchasing and forwarding depots in England, the United States and on the Continent. It owns eight steamships. It has extensive productive works, boot and shoe factories, woolen cloth works, corn mills, etc. There is also a co-operative fire and life insurance society. Since the incep¬ tion of the co-operative stores in Great Britain a business of $4,500,000,000 has been transacted and $360,000,000 in dividends paid to their mem-

bers. The Woolwich Society is an organization of 10,000 men and women. They own six stores, the finest bakery in London, farms, stables, tailor shops, boot and shoe works, etc. One of the most notable examples of that kind of co-operation that includes profit-sharing is the South Metropolitan Gas Company, whose receipts are shared with 3,000 employees. The Leeds Co-operative Store is perhaps the most famous single experiment. It is evident that probably 1,000,000 families, or a sixth of the whole population of England, have their wants in whole or in part supplied by co-operative stores.

Building and loan associations (q.v.) are purely co-operative organizations, and existed in form in England as early as the latter part of the 18th century. The date generally as¬ signed for their beginnings in that country is 1836, for in that year Parliament adopted an act for their regulation. The Friendly societies are co-operative in reality, though not in name. In 1827 the first English paper for the propaganda of co-operation was established, entitled the Brighton Co-operator. In 1871 the Co-operative News was established as the organ of the societies. Since 1869 annual congresses of co¬ operative societies have been held throughout England. The Congress of 1902 had 1,100 dele¬ gates, with reports for 1901 from 1,604 societies, giving a membership of 1,919,555; a gain of $7,291,000 in shares, $2,574,474 in profits and $6,614,124 in investments. Nearly $45,000,000 was distributed to members during the year as cash dividends. The number of societies in 1912 was 1,557, with a membership of 2,661,799; the aggregate trade transacted $557,913,895, with profits of $60,122,405. In the Australian colo¬ nies co-operation has made a marked advance. There are many Friendly societies there. In 1873 the Co-operative Union was consolidated, with a regular constitution. It is governed by a board of 12 members, representing the six sections into which the union is divided. There were 48 additional societies not reporting. The movement for co-operation in Ireland has lately shown a decided progress. There are in the island 232 co-operative dairy or creamery so¬ cieties, 101 agricultural societies, 52 co-operative banks and 39 other organizations ; total mem¬ bership 40,000. Although in Great Britain co¬ operation has succeeded best in the form of distribution, that is, in co-operative stores for supplying the domestic wants of the workman's family, in continental Europe other phases of the movement have been more prominent.

In France co-operation began with the Revo¬ lution, and that nation is one of the few in which the state has stepped in to aid associative ventures of this kind. Building contracts have been awarded co-operative industries by the government, and M. Waldeck-Rousseau's known friendliness to the principle has awakened en¬ couragement among the members of the various societies. Co-operation in different modes of agriculture has achieved some success in France. In 1900 there were 2,500 co-operative societies, 1,489 being devoted to distribution. Two hun¬ dred and fifty workshops are operated according to this principle. Paris has a very large and successful society. In Germany and Italy the co-operative idea has led to the formation of many people's banks, furnishing mutual credit to workmen and also small tradesmen. The

People's Banks in Germany were founded by Schulze-Delitzsch, the probable date being 1851, Schulze-Delitzsch traveling through Germany, addressing large audiences and explaining his plan. He encountered the most determined opposition. Bismarck obstructed the move¬ ment. Yet these credit loan institutions spread, and Germany to-day possesses thou¬ sands of them. Schulze-Delitzsch himself organized 3,000. There are many through¬ out Europe. These banks charged in the beginning a high rate of interest — 12 to 14 per cent — though it has since become much lower, and only short-time loans are permitted The members of most of these credit loan insti¬ tutions hold but one share, the price of which is placed high, and this is paid in small instal¬ ments, the object being to encourage the inclina¬ tion to save. While these banks or loan associa¬ tions put the lender's interest foremost, Raiffeisen, another German, organized a co¬ operative bank in 1849 which placed the bor¬ rower's interest as the keystone of his system. The total membership of co-operative societies in Germany is about 2,000,000. Productive so¬ cieties to the number of 255 are engaged in a large variety of industries. There are 1,527 societies engaged in distribution. The spread of the co-operative idea has been especially remarkable in Switzerland and Denmark. In Switzerland in 1897 there were 2,223 co-opera¬ tive societies, 838 of which were co-operative dairies. These had grown in 1900 to 3,400 societies, 1,400 being dairies. There were 370 organizations for distribution. One-sixth of the population are co-operators. In Denmark there are

837 distributing societies and 1,052 co-opera¬ tive dairies producing an annual output of butter worth $34,000,000.

The agricultural societies were organized in five central bodies, their aims being to purchase provisions, to sell their own products at a profit, to protect their members against over¬ production, to diminish the cost of production and to improve and educate their members.

At the end of 1897 there were in the Nether¬ lands 697 societies, 253 of which were for ex¬ ploiting milk, butter, cheese and other products. In 1900 the total number of organizations had grown to 2,000. The co-operative societies of Belgium numbered 1,000, the dairies leading (227), and doing a business of $3,250,000. In Ghent there js an organization of 25,000 work¬ ingmen sharing the profits of stores and fac¬ tories conjointly owned. A vast baking system is carried on in the same way. Marked progress has been made in Italy, where the Church has taken an active interest in organizations for the benefit of the people. There are in that country 1,200 distributing societies with annual sales amounting to about $10,000,000; 1,737 co-opera¬ tive banks; 750 dairies and 513 productive labor societies.

In Hungary an interesting feature of co¬ operation is the share which the state takes in it, as a member adding 1,000,000 crowns to the capital. In that country there are 1,002 banks, many dairies and various other co-operative undertakings. Austria has 5,092 organizations, most of them being of the nature of credit societies. Figures for Russia are not available later than 1896; 1,442 societies were then in existence, 605 of which were banks. Even in Spain the movement is being felt, though the

number of its adherents is comparatively small.

In the United States co-operation has made comparatively slow progress. A co-operative store in Kingston, Mass., is said to be the oldest existing experiment on the Rochdale plan. It was organized in 1875; but its annual trade is small. There were various co-operative associa¬ tions formed in the late forties and the early fifties. A bulletin of the Department of Labor issued in 1896 states that (

Bibliography. — Adams and Sumner, 'Labor Problems) (New York 1905) ; Aves, ^©-opera¬ tive Industry) (London 1907) ; Bertrand, 'La co-operation); Fay, (Co-operation at Home and Abroad) (London 1908) ; Gilman, (Profit Shar¬ ing) (New York 1888) ; Greening, (The Co¬ operative Traveler Abroad) ; Grey, 'The Co-operative Movement) (1900) ; Hamilton, 'Savings Institutions) (New York 1902) ; Hag¬ gard, 'Rural Denmark) (London 1911) ; 'His¬ tory of Co-operation in the United States) (in the John Hopkins University Series, Baltimore 1888) ; Holyoake, 'History of Co-operation in

England) (2 vols., London 1885) ; id., 'The Co¬ operative Movement of To-day) (London 1891 ; 3d ed., 1903) ; 'History of the Rochdale Pio¬ neers) ; Jones, 'Co-operative Production) (Ox¬ ford 1894) ; Kautsky, 'Konsumvereins und Ar- beiterbewegung) (Vienna 1899) ; Lloyd, 'Labor Co-partnerships) (New York 1898) ; Mabilleau, 'La Co-operation) (Paris 1896) ; Myrick, 'How to Co-operate); Neville, 'Co-operation); Nou- vion, 'L'exposition d'economie sociale5 ; Op- penheim, 'Die Lieblungsgenossenschaft) 'Leip¬ zig 1896) ; Potter, 'The Co-operative Movement in Great Britain) (London 1891) ; Reihn, 'Das Konsumvereinwesen in Deutschland (Stuttgart 1902) ; 'Reports of the (English) Co-operative Congresses) (Manchester 1869 et seq.) ; Rocquigny, 'Les syndicats agricoles et leur oeuvre; Webb, 'Industrial Co-operation) (Man¬ chester 1904) ; Wolff, 'Peoples' Banks) ; Wright, 'Massachusetts Labor Report) (Boston 1895) ; id., 'Manual of Distributive Co-operation) (ib. 1885) ; and 'Report of the English Royal Com¬ mission on Labor) (London 1886), which re¬ views co-operation in all European countries.* *See Building and Loan Association ; Col¬ lectivism; Credit; Raiffeisen; Schulze- Delitzsch.*

CO-OPERATIVE BANKING. The idea of co-operative banking was conceived by Her¬ man Schulze-Delitzsch and was first put into practice in 1849 at Eilenburg, Prussia. It grew out of his effort to

rescue a number of car¬ penters and shoemakers from usury and to obtain money for them at fair terms upon their joint and several liability for buying the raw materials needed in their trades. The success of this venture led to various plans for people's banks and credit societies, based on co-opera¬ tion for encouraging thrift in their neighbor¬ hoods and for extending financial assistance to their members for productive or provident purposes.

What Co-operative Banking Means. —

Co-operation is the voluntary union of persons for utilizing their faculties or resources, or a part of them, under their own management in some economic enterprise carried on upon their common account with a view to their individual through their mutual benefit. A bank to be co-operative must be composed of mem¬ bers having this same aim and be so organized that they shall control its management, partici¬ pate in its profits and losses and have the exclusive use of its credit facilities. The bank may borrow and even receive deposits from out¬ siders, since these are ways of utilizing collec¬ tive credit for the members' benefit. But it can¬ not lend to outsiders, because if it should allow them to use its funds or resources, it would be extending benefit to persons who had no voice in the management nor responsibility for the losses. This would impair its co-operative char¬ acter and make its members simply a group of capitalists seeking profit for themselves without regard to the best interests of others. The bank, however, may invest in market securities to prevent its funds from lying idle.

The banks are formed either as joint-stock companies, or associations issuing shares, or as associations not issuing shares. The joint-stock company has the objection that its capital stock is a specified and fixed amount and that share investments therein cannot as a matter of law be

withdrawn at a member's will nor ordinarily be canceled and returned by the bank upon his expulsion or retirement. This violates one of the essentials of co-operation, which requires the relation between the parties to be volun¬ tary and dissolvable by either of them. More¬ over, it is prejudicial to members that desire to keep their money within reach in case of need, while it deters persons from joining who might wish to resort to the bank only for occasional or temporary purposes. These statutory objec¬ tions may, of course, be removed by contract. But the arrangement is not entirely satisfactory, and no co-operative bank has ever been formed as a joint-stock company except where the laws on associations were lacking or defective.

The associational co-operative banks are bodies incorporated under general laws which authorize licenses or charters to be granted upon filing articles of agreement and voluntary disso¬ lutions to be effected upon complying with a few cheap and simple formalities. The first law was that enacted by Prussia in 1867. From this law and many others enacted in Europe, it may be gathered that an association must have no limit for the number of members, except that it shall not be less than the minimum for incor¬ porators; and, if the association issues shares, no limit must be set for the number of these beyond the amount that may be held by one member. The shares may be paid at once or by periodic instalments and must be subject to withdrawal. So the fund thus obtained increases or decreases according to payments or withdrawals made on shares and to any change in the number of members or of outstanding shares. Hence it is variable ; and since it be¬ longs, not to the association itself, but to the contributing members and must be returned to them upon retirement or expulsion, it is alto¬ gether different from a fixed capital stock and is called ((share capital.® These are the points which distinguish an association from a joint- stock company.

The articles of agreement must set forth all the important facts of the organization and administration of the bank and the methods of managing it, besides showing the choice made among any alternative forms or features al¬ lowed by the law. The delimitation of area, qualifications as to membership and special terms for admission and expulsion are optional. Many a bank restricts its area, makes residence within that area, or some particular occupation, race or religion a condition of membership, and exacts fees on entrance and fines for with¬ drawals, defaults or derelictions. If shares are issued, only one kind is permitted and 10 per cent or so must be paid upon subscription. The articles must prescribe the par value and the manner of payment and the number of shares that

may be held by one member, and the vote required for a decision on questions determined bv more or by less than a majority. Plural voting may be allowed in a bank with shares, but in a bank without shares a member never has more than one vote. The member's liability must also be defined. This lasts for two years or more after retirement, and may be any one of three kinds.

In a bank without shares the liability may be unlimited, i.e., its creditor may hold members personally liable and sue all or any of them; or it may be contributory, i.e., the bank or its

receivers may levy equal assessments against all members and repeat the process down to the last one financially responsible, until all the bank's debts have been paid. A member who pays more than his equitable portion has the right of recovery against other members. In a bank with shares the liability may also be unlimited or contributory, but usually it is limited and runs in favor, not of its creditors, but only of the bank or its receivers ; they may call imme¬ diately all what yet remains unpaid on the share or assess any member on his share up to a specified multiple of its face value. In prac¬ tice, the assessments are rarely made except equally against all. A member of an unlimited-liability bank is forbidden to belong to any other bank. A ratio must be fixed at which assets, together with members' liabilities, shall be maintained to the bank's outstanding debts. If assets fall below this ratio, bankruptcy pro¬ ceedings must be instituted. The articles must specify the percentage of the profits to be annu¬ ally set aside for a reserve, and what shall be done with the reserve upon dissolution.

Administration. — The administration is composed entirely of members elected or sub¬ ject to removal by members at a meeting regu¬ larly held or for that purpose specially called. It consists of a board of directors, which selects the officers, usually from their number, and of a committee of supervisors, with power to set aside any act of the board and to suspend any director, officer or member. The size for these bodies varies under the different laws. No per¬ son may serve on both the board and the com¬ mittee at the same time. Nor may credit be extended to any director, supervisor or officer, or upon his endorsement, without the consent of the members. A bank may have a finance committee. Officers are selected for one year. Directors and supervisors may be elected for three years, but then it is so arranged that the terms of one-third of the board and of the committee expire annually. They may be re-elected. Salaries or compensation may or may not be allowed. Official inspection and a periodical making and publishing of reports are required. The business may be simply that of a loan and savings society or extend to commer¬ cial banking. It may include collective buying and selling for members. Loans must be amply secured., the endorsement of one or more mem¬ bers being the usual security. Real estate mort¬ gages are rarely taken, except to protect en¬ dangered claims. Rebates or dividends may be distributed, but at least a portion of the annual profits must be placed in the reserve. This fund is indivisible and, in the event of dissolu¬ tion, passes to the government or trustees to be held for some new bank in the same locality or for use in some public object of benefit to such locality. In a bank without shares, all the profits are turned over to the reserve.

Chief Purpose. — The chief purpose of co¬ operative banking is the organization of credit. This distinguishes it from the operations of loan and savings societies, the object of which is mainly to encourage thrift. Co-operative banks flourish only where their members are able to utilize in their own individual businesses the money and credit made available ; and they succeed best when each business has a produc¬ tive or creative character. In the cities the members are tradespeople, owners of shops

and stores, grocerymen, butchers, tailors, shoe¬ makers, fishermen with their own outfits, arti¬ sans and the like, together with skilled work¬ men and frugal and industrious persons seeking to save money or to strengthen their financial standing with a view to setting themselves up in business. They invariably adopt the share¬ issuing, dividend-paying, limited-liability form, of which there are two major types. The first is the Schulze-Delitzsch bank, in which the shares are large — sometimes even $1,000 apiece — and a member is allowed only one vote. Officers are paid for their service. The other is the Luzzatti bank, in which the shares are small — $10 or under — and plural voting is allowed with a maximum usually of 10 votes for a member. Service of officers is gratuitous. Both

have all ordinary banking powers and are called (

In the rural districts the co-operative banks admit to membership country-store merchants, blacksmiths, persons engaged in or connected with agricultural pursuits, school-teachers, priests, preachers, professors of agricultural colleges, agricultural government officials, agronomists and bankers along with the farm¬ ers. Often members not farmers are elected on their boards and committees. The banks, however, devote their funds exclusively to agriculture, and they combine to help one an¬ other. Differently from urban banks, their tendency is to become parts of a system having three degrees of organization. The first degree is a local rural co-operative bank or a group of associations centring around such bank. The second degree is the regional or provin¬ cial unions, each with a central bank and central commercial and industrial associations. The third degree is the federation, with a bank and associations having a national scope. Usu¬ ally the officers of the federation and its associa¬ tions are elected by the unions, the officers of each union and its associations are elected by the adherents composing its various local groups, and the officers of the latter are elected by their individual members. The banks of the federation and of the unions of this system have shares, pay dividends and limit the liability. But in many instances the local banks impose unlimited liability, issue no shares and put all profits into the indivisible reserves.

These are called Raiffeisen societies in honor of Frederick William Henry Raiffeisen, whose ideas and work for the Prussian peasantry led to the formation of the first society of the kind in 1862 at Anhausen, and to the inauguration in 1869 at Heddesdorf of the rural co-operative credit movement which now embraces all Ger¬ many. Besides the features already noted, a German Raiffeisen society confines its area to a rural section containing by preference not more than 2,000 inhabitants and so remains small. No entrance fees are charged. The members must profess some Christian faith and bind themselves to deposit all their savings with the society and use none but its facilities in then affairs. Directors, supervisors and officers, ex¬

cept the secretary-treasurer, must serve gratui¬ tously.

The powers of a Raiffeisen society comprise buying, selling and supplying various agricul¬ tural needs, as well as receiving deposits and extending credit. Loans are subject to recall on four weeks' notice, and on this condition may be granted at long term for acquiring farms. The borrowed money must be used only for a specific productive purpose. The society must join the federation and obligate itself to do no business with the outside world, except through the federation's banks and as¬ sociations. The affiliated society buys their shares and bonds with its excess funds. Thus it serves as a basic unit and financial support of the system in return for advantages obtained therefrom. It attracts members by enabling them to economize their resources.

Laws Enacted. — Following Massachusetts in 1909, laws were enacted on credit unions in New York in 1913; on credit unions in North Carolina in 1915; on co-operative banks and on credit unions in Oregon in 1915; on agricultural credit co-operative associations in the Philippine Islands in 1915 ; on credit unions in Rhode Island in 1914; on co-operative unions in South Carolina in 1915 ; on rural credit unions in Texas in 1913; on co-operative banks for per¬ sonal credit in Utah in 1915 ; and on co-opera¬ tive credit associations in Wisconsin in 1913. With the exception of the co-operative banks in Oregon, the associations authorized by these laws do not possess ordinary banking powers. None can carry out the principles and practices of either Schulze-Delitzsch, Luzzatti or Raffei- sen. They are all intended rather for encourag¬ ing thrift and for granting loans on security other than real estate than for organizing credit or for supporting co-operative systems.

Bibliography. — Cahill, J. R., (Report to Board of Agriculture and Fisheries on Agri¬ cultural Credit and Co-operation in Germany> (London 1913) ; Durand, L., (Le Credit Agri¬ cole en France a L'Etranger5 (Paris 1891) ; Fassbender, M., (F. W. Raiffeisen in seinem Leben, Denken und Wirken, etc.5 (Berlin 1902) ; Herrick and Ingalls, (How to Finance the Farmer5 (Ohio 1915), (Rural Credits) (2d ed., New York 1915) ; Lemcke, E., (Die En- twicklung der Raiffeisen-Organization in der Neuzeit5 (Karlsruhe 1913) ; Nicholson, Sir F. A., (Report on Land and Agricultural Credit to the Madras Presidency) (2 vols., Madras 1895) ; Thorwart, F., (Hermann Schulze-Delitzsch; Leben und Wirken } (Berlin 1913) ; Wolff, H. W., People's Banks5 (London 1893-96) ; Inter¬ national Institute of Agriculture, (Monographs on Rural Credit Syst.ems in Various Countries,5 (Monthly Bulletin of Economic and Social In¬ telligence5 (Rome 1910 et seq.).

Myron T. Herrick,

R. Ingalls.

COOPERIA, koo-pe'ri-a, a genus of plants of the Amaryllis family (Amaryllidacece) , so named in honor of Joseph Cooper, a curator of the Botanical Society of London. They are low herbs with coated bulbs and narrow grass-like leaves, with flowers somewhat resembling the atamasco lily. There are two known species in the United States, natives of the Southwest, and of Mexico. Drummond's Cooperia (C. Drum- mondii) grows on the prairies from Kansas

through Louisiana to Texas, New Mexico and Mexico. The flower is very fragant, and be¬ cause of its habit of blooming at night or in the early evening it is known as the evening star. The giant fairy-flower (C. pedunculata) is a favorite for cultivation, as it thrives well in ordinary garden soil, and if placed in a root- cellar in dry soil with an even temperature, will bloom again in the spring.

COOPERSTOWN, N. Y., village and

county-seat of Otsego County, at the outlet of Otsego Lake, and on the Delaware and Hud¬ son Railroad, 90 miles west of Albany. It is noted as having been the residence of James Fenimore Cooper, the novelist. It has Thanks¬ giving Hospital, a Union free school, knitting mills, national bank, a box factory and a cheese factory. This was once an old Indian town, but as early as 1769 was owned by George Croghan, and in 1785 was purchased by William Cooper, the father of James Fenimore Cooper. It is growing in popularity as a summer resort. It is in a hop-growing and farming region. Consult Halsev, cThe Old New York Frontier) (New York 1901). Pop. 2,725. See Cooper, James Fenimore.

CO-ORDINATES. See Geometry; Geom¬ etry, Cartesian ; Geometry, Elementary ; Geometry, Line; Geometry, Modern Analyt¬ ical.

CO-ORDINATION (Lat. "arranging in order,® "ranking together®), a physiological and psychological term, indicating the normal and harmonious operation of the muscles, especially the voluntary ones, in such actions as walking, motion of the arms and mastication. Co-ordina¬ tion is dependent on the perfect and complete action of the sensory nerves, more especially those of the muscular sense and of the semi¬ circular canals (See Ear), of the cerebellum and of the motor nerves and upon the healthy condition and proper interrelation of the muscles concerned. Its failure is usually due to affections of the brain or spinal column and is styled ataxia (q.v.).

COORG, koorg, or KOORG, British In¬ dia, province bounded by Mysore on the east and northeast and the districts of South Canara and Malabar on the west; area, 1,582 square miles. Its greatest length from north to south is 60 miles, and greatest breadth from east to west 40 miles. It has a rainfall of 133 inches annually. The country in general is extremely rugged and covered with forests, in some parts abounding in sandal and other valuable woods, but in others overrun with jungle, the resort of elephants and beasts of prey; climate is temper¬ ate and healthy; soil fertile and in many parts well cultivated, yielding in abundance rice of superior quality. Great numbers of cattle are reared. The growing of coffee is an important industry, the bulk of the product being exported to France. The manufactures are insignifi¬ cant. The province was added to the British dominions in 1834. The capital is Merkara. The old fortifications are interesting. High ram¬ parts and deep ditches are so arranged as to be most effective in checking the advance of an enemy. Pop. 174,976.

COORNHERT, korn'hert, Dirck Volckert- sen, Dutch poet and scholar: b. Amsterdam 1522; d. Gouda 1590. In 1562 he became sec¬ retary of the city of Haarlem and opposed the

Spanish power, until he was imprisoned for a short time, and on his release forced to flee to Cleves and Xanten. In 1572, when the Dutch successfully revolted against Spain, he was made state secretary of the States of Holland. He was a well-known theologian, vigorously opposing the orthodox Protestant party. By his poetical writings, as also by his elegant translations from Boccaccio and the classics, he earned the title of ((restorer of the Dutch language.® His poetical

works include Abra¬ hams rytgang} ((The Death of Abraham }), and ˆomedie van de blinde van Jericho > ((Comedy of the Blind Man of Jericho,)-> His prose works include (Zedekunst, dat is wellevens kunst) ((Ethics, that is, the Art of Right Living) which appeared in 1586, and deserves special mention. Consult Moorres, (D. V. Coornhert de Libertijn) (1887).*

COOS BAY, an indentation on the coast of Oregon in lat. 43° 45′ N. in Coos County. It extends into the land about 10 miles and is only one mile in width, thus making it a safe harbor. Marshfield and Empire City are on Coos Bay.

COOSA, koo'sa, RIVER, in Floyd County, in the northwestern part of Georgia, is formed by the junction of the Ostanaula and the Etowah rivers ; it flows southwest into Ala¬ bama and about eight miles north of Mont¬ gomery it unites with the Tallapoosa River and forms the Alabama. Its length is about 350 miles. It is navigable for boats of light draft from its mouth to Wetumpka and from Greens- port to Rome, Ga., and drains an area of 10,000 square miles.

COOSY, koo'se, or KUSI, a river of

India, rising in Nepal and flowing first south- southeast to the British frontier, and then nearly due south to the Ganges. It is very rapid and difficult to navigate. It is noted for its destruc¬ tive floods. Its total length is about 325 miles.

COOT, a strictly aquatic bird of the genus Fulica, sub-family Fulicince and family Rallidce, also called water-hens and crow-ducks. About 10 species are known, distributed throughout the world ; but mostly in South America, which has six. The American coot, F. americana , is abundant throughout North America, breeding wherever found and resident in the South. Its appropriate habitat is shallow reedy ponds, and sluggish streams. The nest is a disordered heap of reeds or similar material in or near the water, in a hollow of which 8 to 12 eggs, clay-colored, with brown spots, are deposited. The length of the bird is 14 to 16 inches, but the body is re¬ markably compressed, and the feet are nearly unique in the lobate webbing of the toes. The color is generally sooty slate, with the lower belly and some other parts white and the bill red at tip and base. The coot is much sought by gunner?, about the interior lakes. The Euro¬ pean coot (Fulica atra) is a closely similar bird, slaty in color, with a bare patch on its head, whence the name bald coot ; it is found through¬ out Europe and in Asia.

COOTE, Sir Eyre, British military officer: b. County Limerick, Ireland, 1726; d. Madras, 26 April 1783. He entered the army at an early age, and from 1754 to 1762 served in India. It was by his arguments that Clive was induced to risk the battle of Plassey, and for his serv¬ ices in this and other engagements, Coote was

in 1759 given the command of the newly raised 84th regiment. In this year he gained the great victory of Wandiwash; and his capture of Pondicherry in 1761 completed the downfall of the French in India. Coote returned to Eng¬ land, and was knighted in 1771. In 1779 he assumed the command-in-chief in India, with the rank of lieutenant-general, and in 1781 he routed Hyder Ali at Porto Novo.

COPAIBA, ko-pa'i-ba, the oleoresin of Copaiba Langsdorfii and other species of co¬ paiba. Of these at least 16 are known to give this drug, and seven are known to yield a prod¬ uct that is sent to the United States. Oleoresin copaiba comes mostly from Brazil and the West Indies ; it is found in special secretory passages in the wood from which it is obtained by deep gashes cut into the tree, much as turpentine is obtained from pine trees. The oleoresin flows in a steady stream, one tree often yielding as much as from 10 to 15 gallons. Copaiba as it comes into the market varies much in age and variety. The finer sort of Para copaiba is a thick liquid, clear, somewhat resembling Canada balsam. It may be darker, sometimes resembling sherry. It has a specific gravity of .92, does not mix with water, but is soluble in ether. Distilled with calcium hypo¬ chlorite it yields chloroform. Copaiba oil has a peculiar aromatic odor which is extremely disagreeable. The chemical composition of copaiba is extremely complex. It contains at least from 40 to 80 per cent of oil and a large amount of resin, which consists largely of copaivic acid (C20H30O2). Oxycopaivic acid and

metacopaivic acids are also found. The action of copaiba is largely exerted on the genito¬ urinary system, where it acts as a stimulant diuretic and irritant, and is particularly useful in diseases of the bladder, urethra and mucous membranes of the pelvis and of the kidneys. It may be used in bronchial affections also, but is rarely thus employed because of its disagreeable taste and because it very frequently causes an eruption. It is usually administered in gelatine capsules. Its chief commercial use is as a vehicle in oil painting and as a varnish.

COPAIS, ko-pa'is, formerly a lake of Greece, in Bceotia, fed mainly by the river Cephissus. In 1886 a French company under¬ took to drain off again the water, and after working for some time they were superseded by an English company. In 1894 the work was completed and about 60,000 acres of good soil was reclaimed. Consult Curtius, (Die Deich- bauten der Minyer.5 See Bceotia.

COPAL, a group of very hard resins de¬ rived from a great variety of plants both recent and fossil, the botanical names of which are not determined beyond doubt. Its chemical com¬ position is : Carbon 78 to 80.5, hydrogen 8.7 to 10.5 and oxygen 9 to 10.7 per cent. The harder sorts are chiefly derived from fossil sources. In the recent state the resins have been obtained from species of Hymencca verrucosa and Gui- bourtia from Africa, South America and the West Indies. Copal . occurs for the most part in irregular pieces. As found in nature all of the fossil gums are covered with a crust of oxidized gum, the result of fossilization. This must be removed by chipping or scraping, or by the aid of alkalis, to prepare the gum for market. The Zanzibar

and Angola varieties then have a characteristic "goose-flesh" appearance. Copal is without taste or odor; it has a conchoidal fracture, and a tendency to break into six-sided fragments. It is used in the manufacture of varnish, its particular value arising from its hardness, which is about 3 of the mineral scale. It can be dissolved in aniline oil. The softer varieties are of recent origin, and are known as "spirit copals" because soluble in alcohol or turpentine.

COPALCHI BARK, a bark resembling cas- carilla bark in its properties, and produced by a shrub of the same genus, Croton Pseudochina, a native of Mexico and of Central America. The bark comes to Europe in quills a foot or two in length, and has a thin corky epidermis. Copalchi bark is much used as a substitute for cinchona in Mexico, where it goes by the name of Quena blanca, and is imported, though not to a large extent, into Europe. It contains a minute proportion of a bitter alkaloid resem¬ bling quinine, and is somewhat weaker than cascarilla bark.

COPARCENARY, in law, partnership in inheritance; joint heirship in which each is en¬ titled to a distinct share of the benefits, while the property remains undivided. It commonly arises from the custom of dividing equally among coheiresses the property of a man who dies intestate ; but even in England, where the eldest son is usually sole heir, local custom may create coparcenary among male heirs.

COPE, Charles West, English painter: b. Leeds, 28 July 1811; d. Bournemouth, 21 Aug. 1890. He studied at the Royal Academy and in Italy, and first exhibited at the Academy in 1831. In 1843 he gained a prize of £300 for his pic¬ ture, (The First Trial by Jury) ; in 1844, by his fresco, the 'Meeting of Jacob and Rachel,) he secured the commission for one of six fres¬ coes for the House of Lords, producing accord¬ ingly (Edward the Black Prince Receiving the Order of the Garter. 5 Altogether he executed eight frescoes from English history of the 17th century for the House of Lords, while his other works were numerous, the subjects being his¬ torical, romantic or domestic. Of these some of the most important are (Nereids) (1836) ; Cot¬ ter's Saturday Night (1 843) ; 'Last Days of Wolsey) (1848) ; (King Lear) (1850) ; Hil¬ ton's Dream* (1850) ; 'Pilgrim Fathers) (1857) ; 'Evening Prayer* (1860) ; (Spring Flood) (1865); (Shylock and Jessica) (1867); (The Disciples at Emmaus) (1868); (Yes or No?' (1873) ; (Taming of the Shrew5 (1874) ; 'Anne Page and Slender * (1875) ; Selecting Pictures for the Royal Academy Exhibition) (1876) ; 'Bianca's Lovers5 (1877) ; and Car away Thoughts) (1881). His etchings have also been much admired. He also illustrated the de luxe editions of Gray's 'Elegy* (1847) ; Goldsmith's (Poetical Works5 (1845) ; Thomson's 'Seasons,* etc. He became A.R.A. in 1843 and R.A. in 1848. Consult Cope, C. H., (Reminiscences of C. W. Cope5 (London 1891).*

COPE, Edward Drinker, American zoolo¬ gist and palaeontologist : b. Philadelphia, Pa., 28 July 1840; d; there, 12 April 1897. Oliver Cope came to this country from Wiltshire, Eng¬ land, about 1687 and settled on Naaman's Creek in the northernmost part of the State of Dela¬ ware. Oliver's

grandson, Caleb, a member of the Society of Friends, was burgess of Lancas-

ter, Pa., in 1776, and incurred the indignation of his fellow-townsmen for offering the hospi¬ talities of his house to Captain (afterward Major) Andre and other British prisoners captured at Saint John's, Canada, by General Montgomery. Caleb's son, Thomas Pirn Cope, settled in Philadelphia, and established the Cope packet line, trading between that city and Liver¬ pool. Thomas Pirn Cope's son Alfred married Hannah Edge and was the father of the subject of this sketch.

During the first seven years of Edward's life he was educated at home, and gave early proofs of a restless inquisitiveness and an ac¬ curacy of reasoning on what he had observed, very rare in so young a child. At 13 he entered the Friends' School at Westtown, Chester County, Pa. As a young man of 18 he an¬ nounced to his family that he was to be a naturalist.

His father tried to make a farmer of him, and for this purpose gave him a farm near Coatesville, Pa. He learned much of the flora and fauna of this region, but revolted at the thought of settling down to this monotonous life. He longed to grapple with the larger problems of biology, and broadly hints this in a letter of 1858: (

((Such a work will be very useful to those who want to go to the bottom of natural history; it is an interesting study, too, to notice the modifi¬ cation in form, the degradations, substitu¬ tions, etc., among the internal organs and bones. The structure, forms and positions of the teeth, too, are interesting to notice, so invariably are they the index of the economy and the position in nature of the animal.®

In 1859 he published his first paper on the (Primary Division of the Salamandridae. > He became a member of the Academy of Natural Sciences of Philadelphia in 1861. He had had his wish to attend Leidy's lectures, and this same year he spent some time with Gill, Ken- nicott, Meek and Horatio Wood in the museums of the Smithsonian Institution at Washington. He greatly admired professors Henry, Baird and Arnold Guyot. He was astounded that Guyot believed in the resurrection of the body. He published 6 scientific papers in 1860; 9 in 1861; 13 in 1862; 4 in 1863; 5 in 1864; 10 in 1865; 11 in 1866. These were almost exclusively printed in the Proceedings of the Academy of Natural Sciences and were largely on herpe¬ tology. In 1866 he became a member of the American Philosophical Society, and thence¬ forward published largely in this society's pro¬ ceedings. Altogether, counting his editorials in the American Naturalist, and five posthumous publications, his life yielded 1,281 separate papers on scientific subjects. The following statement of his work is taken from Prof. Henry F. Osborn's article in Science for 7 May 1897.

As early as 1868 he laid the foundations for five great lines of research on the following subjects: Fishes, Amphibians, Reptiles, Mam¬ malia and Philosophy. He unconsciously fol¬ lowed Lamarck in ascribing to conscious effort the adaptive changes in species, and this at the age of 28. In 1869 he struck the kevnote of all his later evolution in the sentence, ˆIntelligent choice may be regarded as the originator of the fittest, while natural selection is the tribunal to

which all the results of accelerated growth are submitted.® He accepted the term Neo- Lamarckian as properly describing his position, which was that, while very many specific char¬ acters are adaptive, few generic characters are so, but these latter are the results of the accel¬ eration or retardation of one plan of develop¬ ment preordained by the Creator. As in the case of Huxley, Haeckel and many other naturalists of the last century, his career started in zoology, but led inevitably to paleontology, as it always must with a man of research so broad of view. Osborn says Cope's, work in ichthyology would alone have given him high rank among zoologists. Baur says no naturalist ever published so many papers on the taxonomy, morphology and palaeontology of the amphibia. His work on the Mammalia and Reptilia was immense. At the time of his death Cope had personally named and described 1,115 out of 3,200 known species of fossil vertebrates of North America, or 34.8 per cent.

He was elected professor of natural science at Haverford College in 1864; was made a member of the National Academy of Science in 1872 ; received the Bigsby gold medal from the Geological

Society of London in 1879; was elected to membership in the Imperial Society of Moscow in 1886; received the degree of Ph.D. from Heidelberg University on the occa¬ sion of the celebration of its 500th anniversary, and was elected professor of geology and paleontology at the University of Pennsylvania the same year. In 1891, on motion of Dr. Leidy, he was awarded the Hayden memorial medal. He was president of the American Society of Naturalists in 1895, and president-elect of the American Association for the Advancement of Science at the time of his death. For his titles and those of all of Professor Cope's publica¬ tions, consult Catalogue chronologique des pub¬ lications de E. D. Cope, Annales de la societe geologique de Belgique t. XXIX Bibliographic, Liege, 1902) ; and the Alphabetical C ross Ref¬ erence Catalogue of the Works of E. D. Cope) ; (Memorias y Revista de la Sociedad Antonia Alzate, > Mexico 1902; both by Dr. Persifor Frazer.

Persifor Frazer.

COPE, Henry Frederick, American author, editor and lecturer: b. London, England, 17 June 1870. He was educated at the Government Boy's School, Enfield, the Department of Sciences and Arts, South Kensington, London, and by private tutors. He came to the United States in 1891, studied theology at the Southern Baptist The¬ ological Seminary, and was ordained to the Baptist ministry in 1893. He subsequently held pastorates in Rochester, N. Y„ 1894—95 ; Plano, Ill., 1895-98; and Dillon, Mont., 1898-1903. In 1903 he was engaged in teaching and in special literary work in Chicago. For eight years he was religious editor of the Chicago Daily Tribune, and contributed weekly a column to a syndicate embracing the leading daily papers and was on the staff of The World To-Day, The Sunday School Lines, Service, the Country Gentleman, etc. He became assistant secretary in 1905, and in 1907 general secretary of the Religious Education So Jety, in which capacity he has visited and spoken in nearly all educa¬ tional institutions, visiting practically every State in the Union every year. He has been editor of Religious Education since its founda-

tion in 1906. He has edited (Adams Primer on Teaching) (1905);

COPE, Sir John, English general: d. 28 July 1760. Having been made a knight of the Bath, in 1742 he commanded the troops sent to the assistance of Maria Theresa. On the land¬ ing of Prince Charles Edward in 1745, Cope was appointed commander-in-chief of the gov¬ ernment forces in Scotland. After a fruitless march to the Highlands, he returned with his troops by sea to Dunbar, and on 21 September was totally defeated at Prestonpans by the Scottish troops under Charles Edward Stuart, the ((Young Pretender.)) His defeat is celebrated in the Jacobite song, (Hey, Johnnie Cope, are Ye Waukin' Yet?) In 1732 he headed a com¬ mittee which made a famous report on revenue funds and smuggling.

COPE, Thomas Pym, American merchant : b. Lancaster County, Pa., 26 Aug. 1768; d. Philadelphia, Pa., 22 Nov. 1854. He began im¬ porting goods in his own vessels in 1807, and in 1821 established the first line of packets between Philadelphia and Liverpool. He was held in great respect by his fellow-townsmen, who elected him to many places of trust and honor. During the yellow fever epidemic of 1793 he stayed in the city to aid its victims, and during the smallpox outbreak in 1797 carried food to the houses of those taken with the disease, and in other ways cared for them. He was an execu¬ tor of Stephen Girard's will; secured the estate of Lemon Hill as a park for the city; and was active in the construction of the Pennsylvania Railroad. The introduction of the Philadelphia water supply .from the Schuylkill, the comple¬ tion of the Chesapeake and Delaware Canal, the construction of the Pennsylvania Railroad and the establishment of the Mercantile Library were largely due to his efforts. In 1807, he was elected to the State legislature.

COPE, an article of ecclesiastical vesture in the Roman Catholic Church. It is a volumi¬ nous cloak reaching nearly to the feet, opening in front, and with a semi-circular cape or hood behind. It is usually of silk material, embroid¬ ered, or of cloth of gold. It is worn by the celebrant in certain functions, as processions and benediction. The cope is not, like the chasuble (q.v.), reserved to priestly use; it is worn also in solemn processions by the clerics who attend the celebrant, and by the cantors in church services. See Costume, Ecclesiastical.

COPECK (Russian, «a lance))), a Russian copper coin, so called from the impression of Saint

George bearing a lance. It is the oldest form of coin in Russia and superseded furs as

a medium of exchange. The coin is the hun¬ dredth part of a silver ruble, or about the eightieth part of a paper ruble. It varies in value from three-fifths to three-fourths of a cent. See Coins, Foreign, American Equiv¬ alent of.

COPELAND, Edwin Bingham, American botanist: b. Monroe, Wis., 30 Sept. 1873. He was graduated at Leland Stanford Junior Uni¬ versity in 1895, and also studied at the uni¬ versities of Leipzig, Halle, Wisconsin and Chi¬ cago. In 1897-98 he was assistant professor of botany at Indiana University and held the same position in the University of West Virginia in 1899-1900. In 1901-03 he was instructor in botany at Leland Stanford University, he was botanist to the Philippine government, 1903-08; superintendent of the Philippine Agricultural School 1908-09 and dean of the College of Agri¬ culture and professor of plant physiology in the University of the Philippines since 1909. He has written Philippine Agriculture) (1908) ; (The CocoanuD (1914); also some 100 articles on botanical research.

COPENHAGEN (ˆMerchants' Haven"), Denmark, the capital, situated on the shore of the island of Zealand, in the sound, which is here about 12 miles broad; an outlying portion, Christianshavn, stands at the north end of the island of Amager or Amak, which is sepa¬ rated from Zealand by a narrow arm of the sea. The channel forms a fine large harbor, which is bridged over at two points to connect Christianshavn and the main part of the city. The fortifications on the land side have been removed since 1863; so that the city has now practically incorporated the suburbs Osterbro, Norrebro, Vesterbro and Frederiksberg and occupying an area of 31 square miles. To counterbalance the expected injury to the city's commerce from the opening of the Baltic Canal, a great free port, free from customs dues, was constructed in 1890-94 to the north of the harbor. The business quarter stretches from the harbor in a northeasterly direction toward the principal and central square, Kongens Nytory, which forms the focus of the life of the city. Farther north and east of this point lies the aristocratic quarter, with the handsome Amalienborg Square and its royal and minis¬ terial palaces ; this district is bounded on the extreme north by the citadel and the adjoining public gardens and walks on the shores of the sound.

Among its few buildings of historical in¬ terest or intrinsic beauty, the Metropolitan cathedral church, known as Vor Frue Kirke, rebuilt after the bombardment in 1807, possesses statues of Christ and the apostles and a baptis¬ mal font, designed and in part executed by Thorwaldsen. Trinitatis-kirke is remarkable for its round tower, which is ascended by a winding causeway instead of steps. Holmens'- kirke contains interesting monuments to the great naval heroes, Juel and Tordenskjold. An English church, built at a cost of $49,000, was consecrated in 1887. The royal palace, called Christiansborg, was rebuilt between 1794 and 1828, but was never remarkable for architectural beauty. The principal part of the vast build¬ ing was destroyed by fire in 1884, when many precious works of art were destroyed. Happily most of the pictures in its great art gallery were

saved. The castle of Rosenborg (1616-24), where the regalia are kept, contains interesting collections of objects of art; and the palace of Charlottenborg (1624) is now used as an acad¬ emy of arts. Copenhagen is the centre, not only of Danish, but northern literature and art, and is the seat of a number of societies for the ad¬ vancement of these in all their branches, among which are the Royal Society, founded in 1742; and the Royal Society of Northern Antiquaries, founded in 1825. A magnificent national theatre was built in 1874. The royal library contains over 600,000 volumes, besides great treasures of Sanskrit and other MSS. The Museum of Northern Antiquities in Prindsens Palais is unrivaled in its kind, having been made what it is mainly by Worsaae. The Thorwaldsen Museum, opened in 1846, consists of works of art by that sculptor himself, and others left by him to the Danish nation, for which a sepa¬ rate building has been erected. There are statues of several of the Danish kings, of Tycho Brahe and of the poets. The city is governed by a body of magistrates nominated by the king, and a municipal council of 42 members. About 50 per cent of the trade of Denmark passes through Copenhagen. The chief exports are grain, rape-seed, butter, cheese, beef, cattle, wool, hides, bones and grain-spirit. Porcelain, pianos, clocks, watches, mathematical instruments, textiles, chemicals, sugar, beer and tobacco are manufactured. Copenhagen is the seat

of a United States consul-general.

About the middle of the 12th century Copen¬ hagen was but a fishing village, in the neighbor¬ hood of which Bishop Axel, or Absalon, built a castle. In 1254 the village obtained the privi¬ leges of a town, and in 1443 King Christopher made it the capital of the kingdom. It was several times attacked by the Hanseatic League ; was besieged by the Swedes in the 17th century; was bombarded by the English, Dutch and Swedes in 1700; suffered grievously by fire in 1728, 1794 and 1795; witnessed a great sea-fight in its roads on 2 April 1801, when the English, under Sir Hyde Parker, with Nelson as his second in command, destroyed the Danish fleet ; and (to prevent the Danish fleet from falling into the power of Napoleon), was bombarded by the English from the 2nd to the 5th of Sep¬ tember 1807, when great destruction was wrought, both in houses and public buildings, and hundreds of persons lost their lives. Pop. with suburbs, 559,398. Consult Copenhagen, the Capital of Denmark (1898); Nielsen, (Kobenhavns Histone og Beskrivelse* (6 vols.,*

1887-92).

COPENHAGEN, University of, founded in 1478, by Christian I ; destroyed during the civil wars; rebuilt by Christian III in 1539; destroyed by fire in 1728; rebuilt by Christian VI in 1732, and organized as at present in 1788. This is the only university in Denmark and one of the best in the northern part of Europe. It is supported partly by the govern¬ ment and partly by endowment; instruction is free to both sexes. In 1902 there were enrolled 3,000 pupils, and the library contained 400,000 volumes. It possesses also a large collection of Persian MSS., another of Northern MSS. Connected with the university, which has five faculties, are a surgical academy, an observa¬

tory, a botanical garden, a zoological museum and a polytechnic institution.

COPEPODA, an order of small Crustacea, characterized by the following aggregate of features: Animal consists of about 16 segments; limbs mostly two-branched ; no carapace ; de¬ velopment by the addition of new segments be¬ hind to a Nauplius larva. Except in the Branchiura, the simple eye of the Nauplius is the definite eye of the adult. Many widely different copepods are parasitic. The Branchi¬ ura are ectoparasites on various species of fish. The remaining copepods are divided into the Gymnoplea, in which the division between the front and hind portions of the body falls im¬ mediately in front of the genital openings, and behind the fifth thoracic feet, which are modi¬ fied in the male into a copulatory organ, and the Podoplea, where the boundary falls in front of the fifth thoracic segment. The phosphor¬ escence of the sea is largely due to certain small Gymnoplea. Certain of the Podoplea, forming the family Manstrillidae, have a very complicated development, for an amorphous parasitic stage intervenes between a free- swimming Nauplius and a likewise free-swim¬ ming adult. Consult the article on the Crustacea by Smith and Weldon in volume IV of (The Cambridge Natural History (London 1909) ; the article on the Crustacea by W. T. Caiman in Part VII ; third fascicle in Sir Ray Lankester's (A Treatise on Zoology* (London 1909) ; the article on the Crustacea in volume III of A. Sedgwick's (A Student's Text-Book of Zoology* (London 1909).*

*COPERNICAN SYSTEM, The, an epoch- making reversal of man's ideas as to the place of the earth in the universe and the motions of the heavenly bodies, the full details of which were completed by Nicolaus Copernicus, a Polish astronomer, in the year 1530. Prior to the work of Copernicus, it was universally held that our earth is a fixed and immovable body, situated at the centre of the universe, about which all heavenly bodies, including the sun and the fixed star, are in revolution. To account for the apparently complicated motions of the planets, which sometimes are moving eastward among the stars and sometimes are moving westward (or ˆretrograding**), it had been necessary to suppose that each planet is moving about the circumference of a- small circle (called the ((Epicycle**), the centre of which pursues a larger circular path about the sun. This older system, devised as early as 140 a.d. by Claudius Ptolemy (q.v.), an Egyptian as¬ tronomer, held its place as the true conception of the universe for upward of 14 centuries.*

In the Copernican system it was clearly shown that the diurnal motion of the stars (their rising and setting) could be accounted for by assuming that the earth rotates on an axis with a uniform angular velocity, and, further, that the complicated displacements of the planets among the stars could very nearly all be explained by the assumption that the earth and all of the other planets are revolving about the sun in circular orbits of which, how¬ ever, the sun does not occupy the exact centre. The true paths, however (as we now know), are ellipses, and not exact circles. (See Solar System). It

was therefore necessary for Copernicus to retain in his system a few small

Epicycles® to account tor certain small out¬ standing disagreements between the predicated and the observed motions.

So complete an overturning of man's con¬ ception of the place and importance of the earth naturally by no means met with im¬ mediate acceptance. It was, in fact, fully a century after the death of Copernicus (in 1543), before the reasonableness and simplicity of the new theory finally overcame the older, very artificial and complicated system of Ptolemy. At the present time many direct ob¬ servational proofs are available that the earth is revolving about the sun (see Parallax, Aberration, The Doppler Principle, etc.), so that the essential truth of the Copernican the¬ ory is no longer open to question.

COPERNICUS, or KOPPERNIGK, Nicolaus, Polish astronomer: b. Thorn, Poland, 19 Feb. 1473; d. Frauenburg, East Prussia, 24 May 1543. His father was a Pole and his mother a German. From a school at Thorn Copernicus went to Cracow, where he studied medicine, theology, mathematics and astronomy. The fame of Peurbach and Regiomontanus, the restorers of astronomy in Europe, excited his emulation. In 1496, at the age of 23, he went to Italy, and at Bologna resided two years, study¬ ing canon law and astronomy. In 1497, while in Italy, he was appointed a canon of the cathedral of Frauenburg. In 1500 he went to Rome, where he lectured on mathematics and as¬ tronomy. Subsequently he studied medicine at Padua, and canon law at Ferrara, where he graduated as doctor in this subject. He re¬ turned to Prussia in 1505, and lived for some years at Heilsberg, but his subsequent life was mostly spent at Frauenburg.

He now applied his whole strength to the study of astronomy, which at this time was dominated by the system of Claudius Ptolemy. Copernicus doubted whether the motions of the heavenly bodies could be so confused and so complicated as this hypothesis would make them. He found that some of the ancient Greeks had thought of the possibility of a motion of the earth. This induced him to examine the subject more fully, and he came to the following conclusions : That the sun was the centre of the system; that the earth was a planet like Mars and Venus; and that all the planets revolve round the sun in the following order: Mercury in 87 days, Venus in 224, the Earth in 365, Mars in one year and 321 days, Jupiter in 11 years and Saturn in 29 years. Although Copernicus knew that the planetary orbits are not circles having the sun in the centre, he was not able to determine exactly their form. This was reserved for Kepler, who completed what may be called the natural his¬ tory of the subject, and stated his three cele¬ brated laws m the end of the 16th century. Thus Copernicus stands, as it were, upon the boundary-line of a new era. He commences his labors at a time when the belief in the immo¬ bility of the earth is universal. He conceives the idea of its motion, and pursues it with un¬ wearied diligence, not for a few years, but through the greater part of his life, constantly comparing it with the appearances in the heavens. He at last confirms his idea, and thus becomes the founder of a new system of astronomy. All this he did a hundred years

before the invention of telescopes, with im¬ perfect wooden instruments on which the lines were often only marked with ink. His great countryman, Kepler, has described his character in the following words: (III, (De Orbium coelestium Revolutionibus, fibro vi (completed in 1530, although first published at Nuremberg 1543, folio; later editions appeared at Basel 1566, at Amsterdam 1617, at Warsaw in 1851, at Berlin in 1873), his system is developed.*

Besides his principal work, we have also by him a work on trigonometry, (De Lateribus et Angulis TriangulorumP The first biography of Copernicus was written by the mathematician Gassendi (1654), and for 200 years this work served as the basis of all subsequent biographies of the great astronomer; but in more recent times the labors of Prowe and others have helped us to a better acquaintance with the facts of his fife. Count Sierakowski erected a monument to his memory in Saint Anne's Church at Cracow, with this inscription : (Paris 1865) ; Bryant, (History of Astronomv (London 1907); Curtze, (Nicolaus Copernicus > (Berlin 1899) ; Czynski, (Kopernik et ses travaux) (Paris 1847) ; Flammarion, (Vie de Copernic> (ib. 1872) ; Gassendi, (Vita Nicolai*

CopernicP (The Hague 1652) ; Muller, (Nikolaus Copernicus, der Altmeister der neueren Astronomie) (Freiburg 1898) ; Prowe, (Nicolaus Copernicus) (3 vols., Berlin 1884), the standard biography; Wolf, (Geschichte der Astronomie) (Munich 1877) ; id., (Handbuch der Astronomie, ihrer Geschichte und Littera- tur> (2 vols., Zurich 1893).

COPHA, a racially and linguistically dis¬ tinct Indian family which formerly occupied extensive territory in California from far south to Mount Shasta in the north. The Copehan language was well developed and harmonious ; but their political and social systems were little, if any, in advance of those of the other Indian races of California. There was considerable difference between the language (dialectically) and customs of the Cophas of the south and those of the north of California. Even the people of the 20 or more important villages of Cophas differed dialectically. There were two distinct branches of the Cophas or Copehan family, known as the Patwin and the Wintun. The Government Agricultural Commission ap¬ pointed in the fifties to adjust the claims of the Indians and Mexicans overlooked a small section of the Cophas then living on what is now known as Warner's Ranch near Los Angeles, in southern California, and their lands were sold without a hearing. They re¬ fused to leave their home, but in May 1901 the Supreme Court confirmed the rights of the white claimants. In May 1903 they were moved by the government to a fertile tract of land

in the Valley of Pala, on the San Luis Rey, where they were subsequently joined by other members of the tribe.

COPHETUA, an African king of legend and ballad verse who married the beggar maid, Penelophon. Shakespeare in alluding to Co- phetua calls the maid Zenelophon. There is a well-known poem by Tennyson on the sub¬ ject, called the (Beggar Maid,} and the story is also told in Percy's

COPIAPO, ko-pe-a-po', or SAN FRAN¬ CISCO DE LA SELVA, Chile, the capital of the province of Atacama, centre of an im¬ portant mining district containing machine shops and smelting works. Silver and copper are the chief minerals obtained, but gold also is found. There is a railway connecting it with its port, Caldera. In 1819 and 1822 it was destroyed by earthquakes ; and in 1851 it was again seriously damaged. The principal points of interest are the parish church ; a bronze statue of Juan Godoy, the discoverer of the Chanarcillo silver mines ; and also a provincial high school, a mining school and a public library. Pop. about 12,000.

COPLAS DE MANRIQUE, kop'las de man-rek'e. This is the modest title of an elegiac poem by Jorge Manrique (1440-79), generallv considered the most eminently successful of the Spanish lyric poets of the 15th century. This success is due to the coplas, the more dis¬ tinctive title of which is (Coplas de Manrique por la muerte de su padre } (((Manrique's Couplets on the death of his father®). The elegy consists of about 500 lines divided into 42 coplas, or stanzas, in the old Spanish measure and manner, called redondillas con quebrados (quatrains with a short line in every third place). The poem was first published in 1492, 16 years after it was written, when Manrique's father, the Maestro de Santiago, died (1476), in whose honor it was composed. Spanish devotional poetry contains many ex¬ quisite gems, and the coplas are rightly placed among them. Grief for the death of his father has brought to the poet's mental vision a vista of the spiritual world, and a realization of the vanity of material things. The impression of many of the lines is ineffaceable. In 1833 appeared the remarkably fine English rendering by Longfellow, in which the versification, spirit and even wording of the original are fol¬ lowed as closely as possible. Besides its in¬ herent charm, Manrique's poem is noteworthy in its independence of the three dominating poetic influences of the day, the artificial court verse, the Italian influence and that of the Re¬ naissance.

There have been many editions of the Spanish text of the poem since the 1492 edi¬ tion, notably the Madrid edition of 1799 with a gloss, contained in Wroverbios de don Inigo Lopez de Mendoza, Marques de Santillana, y las coplas de don Jorge Manrique, todo con sus glosas, por D. Fermin Villapando) ; the critical edition published by R. Foulche Delbosc (Mad¬ rid 1902; Vol. XI of the (Biblioteca his- panicaQ; also translations into foreign lan¬ guages and commented versions. Many, if not all, of the coplas appear in annotated anthologies. (Cf. J. D. M. Ford's (A Spanish Anthology, > Boston 1901, pp. 43-59). The entire text of the poem will be found in

tologia de poetas liricos Castellanos ordenada por D. Marcelino Menendez y Pelayo) (Vol. Ill, pp. 100-116, Madrid 1892) ; and the greater part of Manrique's verse appears in the import¬ ant (Cancionero general > (1511).

James Geddes, Jr.

COPLEY, John Singleton, American painter: b. Boston, Mass., 3 July 1737; d. Lon¬ don, England, 9 Sept. 1815. He was of Irish parentage and received his early training in en¬ graving from his stepfather, Peter Pelham, a mezzotint engraver. In painting he was prac¬ tically self-taught. His talent for drawing developed at an early age, and in 1760 he sent anonymously to Benjamin West in England a portrait called (The Boy and the Flying Squirrel, } which, when exhibited, was highly . praised by the best English artists of the time. In 1769 he married the daughter of a wealthy Boston merchant, and became the recognized painter of Boston society. In 1774 he sailed for England, visited Italy and settled in Lon¬ don, where he rose rapidly in popularity as a portrait painter, within a few years being elected an associate member and full member of the Royal Academy. Some of his most cele¬ brated paintings are portraits of the English royal family; the (Death of Lord Chatham, > now in the London National Gallery; (Siege and Relief of Gibraltar, > in the council cham¬ ber of the Guildhall; (Major Pierson's Death on the Isle of Jersey > ; Surrender of Admiral De Winter to Lord Duncan > ; (Charles I De¬ manding the Five Impeached Members in the House of Commons' ; (The Red Cross Knight } ; (Mrs. Derby as Saint Cecilia. > His principal American portraits are those of Samuel Adams and John Hancock, in the Boston Art Museum ; Mrs. Ford, in the Boston Athenaeum ; Mrs. Thomas Boylston and others, in Harvard Memorial Hall; Lady Wentworth and Airs. Robert Harper, in the New York Public Li¬ brary; Robert Izard and his wife, painted in Rome, now in the Boston Art Museum ; the Copley Family and John Quincy Adams, in the Boston Art Aluseum. His son. Lord Chancellor Lyndhurst, made a notable collection of his father's works, which was dispersed at public sale in 1864. Consult Perkins, Wife of J. S. Copley (Boston 1873) ; Amory, Wife of J. S. Copley* (Boston 1882) ; Isham, (History of American Painting) (New York 1905).*

COPLEY, John Singleton (1772-1863).

See Lyndhurst, Baron.

COPPEE, kop-pa, Frangois Edouard Joachim, French poet and dramatist: b. Paris, 12 Jan. 1842; d. Paris, 23 May 1908. He was librarian of the Senate, and keeper of the records at the Comedie Frangaise 1878-84. He became a member of the French Academy in 1884, and an officer of the Legion of Honor in 1888. From 1880 to 1884 he was the dramatic critic of La Patrie. Coppee was an accom¬ plished artist and a skilled craftsman, although a trifle affected. His verse lacks true inspira¬ tion, but may be characterized as finished poet¬ ical prose. He is par excellence the poet of the humble classes. Chief among his plays are We passant) (1869) ; (Fais ce que tu dois (1871) ; (Le luthier de Cremone* (1877) ; (La guerre de cent ans* (with d'Artois) (1878) ; (Madame de Maintenon) (1881) ; (Severo Torclli* (1883); Wes Jacobites) (1885). An edition of*

his dramas in four volumes appeared (1873— 86). Among his poems may be named (Les intimites' (1868) ; (Poemes modemeU (1869) ; (Une idylle pendant le siege' (1875) ; (L'exilee' (1876); (1877) ; (Le naufrage' (1878). He has also published short stories in¬ cluding (Le coupable) (1896), and (La bonne souffrance' (1900) and a collection of essays (Mon franc parler) (1894). Consult Lescure, (F. Coppee, l'homme, la vie et l'ceuvre) (Paris 1889) ; Gaubert, 'Francois Coppee' (il.. 1906); Druilhet, (Un poete frangais : Frangois Coppee,' (Paris 1902) ; Delmont, (Trois illustres

con- quetes de la foi : Coppee, Brunetiere, Bourget'

(1905).

COPPENS, Charles, American clergyman and educator: b. Turnhout, Belgium, 24 May 1835. He was educated at the Jesuit College, Turnhout, and the Jesuit scholasticates at Saint Louis, Mo., and Fordham, N. Y. In 1853 he entered the Society of Jesus, was ordained to the priesthood in 1865, and at various times was professor of the classical languages, of philos¬ ophy and the history of philosophy in the Jesuit colleges at Saint Louis, Cincinnati, Detroit, Omaha and Chicago. From 1881 to 1884 he was president of Saint Mary's College, Kansas, and in 1908 was appointed professor of litera¬ ture at Saint Ignatius College (now Loyola University), Chicago. He is the author of (Introduction to English Rhetoric) (1885) ;

(Oratorical Composition' (1886); (Logic and Metaphysics' (1892); (Moral Philosophy' (1896) ; (Moral Principles and Medical Prac¬ tice' (1898) ; (The Living Church of the Living God' (1902) ; Systematic Study of the Cath¬ olic Religion' (1903); (Protestantism, How it was Brought About' (1907) ; (A Brief History of Philosophy' (1909) ; (Who are the Jesuits?' (1911). He is a contributor to (The Catholic Encyclopedia,' the American Ecclesiastical Re¬ view and various Catholic journals.

COPPER, a butterfly of the genus Chry- soplianns of the family Lyccenidce. They are small, have the upper side of the wings some tint of copper-red or orange, frequently glossed with purple ; the under side of the wings is marked with small spots and lines. The cater¬ pillars are slug-shaped, thickest in the middle and with small heads. The genus is distributed over the temperate regions of both continents, 13 species inhabiting North America.

COPPER, a metallic element occurring abundantly in nature, and widely used in the arts, both in the pure state, and as an essential constituent of many alloys. It has been known from the earliest times, and is frequently men¬ tioned by the ancient writers. Prehistoric weapons, tools and ornaments of copper, as well as domestic implements, remain in pro¬ fusion to this day; and it has been commonly asserted that copper was known and used be¬ fore iron, though some authorities consider the evidence of this to be inconclusive. The Romans obtained their best copper from Cyprus, an island in the Mediterranean Sea, and for this reason the metal was known as Cyprium cus, oi (

Physical Properties.— Copper is red in color and crystallizes in cubes, octahedra and other forms of the isometric system, twinned crystals being quite common. When in a finely

divided condition it has a specific gravity of about 8.36; but the specific gravity of native copper is 8.84, and that of hammered or elec¬ trically deposited copper is about 8.95. It melts at about 2000° F., and has a specific heat of about 0.093, and a coefficient of linear expan¬ sion of about 0.0000092, per Fahrenheit degree. Its tensile strength varies greatly, according to the physical condition of the metal. The fol¬ lowing data are commonly used in engineering practice, as corresponding to the tensile strength in pounds, per square inch of sectional area : Cast copper, 19,000; sheet copper, 30,000; cop¬ per bolts, 36,000 ; copper wire, 60,000. The ther¬ mal conductivity of copper, at ordinary tem¬ peratures, is about 0.74 times that of silver. The specific electrical resistance of hard-drawn copper is 1,620 ohms, and that of annealed cop¬ per is 1,584 ohms. A wire of the metal that is one metre long and one millimeter in diameter has a resistance of 0.0206 ohms if hard drawn, and 0.202 if annealed. These data are for the pure metal, at the temperature of freezing water. The electrical resistance of copper in¬ creases by about 0.388 of 1 per cent for each Centigrade degree of rise of temperature. The electrical resistance is also greatly increased by the presence of small percentages of iron, zinc, tin, phosphorus or arsenic, and hence great at¬ tention is paid to the purity of the copper that is intended for use in electrical conductors. Copper is very malleable and ductile, and may be drawn into small wire and hammered into exceedingly thin sheets. An alloy consisting of 11 parts of copper and 2 of zinc is even more malleable than copper itself, and may be ham¬ mered into foil comparable in appearance with gold-leaf, for which it is used as a substitute in certain kinds of work, under the name of <(Dutch metal." Copper becomes very soft and malleable when it is strongly heated and im¬ mediately immersed in cold water, its behavior under these circumstances being diametrically opposed to that of steel. It may be forged into any shape, but it will not bear more than a red heat, since it becomes brittle at higher tempera¬ tures. It does not oxidize readily under or¬ dinary conditions, but

becomes superficially tar¬ nished with a coating of carbonate that resists the subsequent action of the oxygen of the air. Copper often gives poor castings, apparently be¬ cause the molten metal absorbs gases, and these, when given off again at the moment of solidifi¬ cation, make the casting porous. The castings are said to be much more sound when a small quantity of phosphorus is added to the molten metal — usually in the form of phosphor-copper. The large copper cylinders that are used in calico-printing are cast in molds, and are sub¬ sequently hammered under a steam-hammer until the metal is sound, and then turned down in a lathe until the surface is true and free from defects.

Alloys. — Many alloys of copper are used in the arts, chiefly under the name of <(brasses" or ((bronzes." Originally a brass was defined as an alloy of copper and zinc, while a bronze was defined as an alloy of copper and tin. This con¬ vention is still retained in a general way, but the same names are applied also, and very com¬ monly, to numerous ternary alloys, containing copper, zinc and tin, which pass by insensible gradations from a true brass to a true bronze; so that (

regarded as very definite terms. Alloys of cop¬ per with aluminum are called "bronzes,® even when no tin is present. See Alloys ; Brass ; Bronze.

Chemistry. — The chemical symbol for cop¬ per is Cu {cuprum), and the atomic weight of the metal is 63.1 if H = l, and 63.6 if 0 = 16. Performs two distinct series of salts, known respectively as "cuprous® and "cupric® com¬ pounds. In the cupric series the metal is a dyad, while in the cuprous series it enters into the ordinary formulae as though it were a monad. (See Chemistry). Structural formulae have been given, however, which indicate that the metal is really a dyad in both cases. The cupric series of salts embraces those compounds that are most famil¬ iar in the arts. Cupric oxide (known also as copper monoxide, or black oxide) is formed when metallic copper is heated in the presence of air. It may occur as a brownish-black amor¬ phous powder, or in lustrous monoclinic crystals. Cupric oxide is used in the laboratory for effecting the combustion of organic substances, the oxide being intimately mixed with the body to be oxidized, and the whole raised to a red heat, at which temperature the cupric oxide readily gives up its oxygen to either hydrogen or carbon. Cupric oxide (the formula of which is CuO) is soluble in acids, and yields, with them, salts which crystallize well. If a solution of any of these salts be made alkaline by the addition of a caustic alkali, a light blue pre¬ cipitate of cupric hydrate, Cu(OH)2, is thrown down. Upon heating to 212° F., this parts with a molecule of water and becomes reduced to the black oxide, CuO. If cupric hydrate be pre¬ cipitated by adding the calculated quantity of sodium hydrate to a solution of copper sulphate, and the precipitate is mashed and dissolved in ammonium hydrate, a blue solution is obtained, which is sometimes called "cupro-ammonium hydroxin,® and which possesses the singular power of dissolving cellulose (q.v.) without chemical change. When pure cupric oxide is desired, it is most conveniently prepared by heating cupric nitrate to redness. Cupric nitrate is readily prepared by dissolving metallic copper in nitric acid. It crystallizes in large blue prisms, having the composition Cu(N03)2 + 6H20. Ordinary copper sulphate (cupric sul¬ phate, or "blue vitriol®) is manufactured in large quantities by dissolving scales of copper oxide (CuO) in sulphuric acid. It forms large blue triclinic crystals, which have the composition Q1SO4 + 5H20. The sulphate is used in calico- printing, and in the manufacture of various copper pigments such as Brunswick green and Scheele's green. Cupric chloride, CuCb, is formed bv dissolving cupric oxide in hydro¬ chloric acid, or by acting upon metallic copper by chlorine gas. It is soluble in alcohol or water, and forms acicular crystals having the formula CuCla + 2H20. Cupric sulphide, CuS, is the familiar black precipitate that is obtained when sulphuretted hydrogen gas is passed through an acid solution of a copper salt. (See Chemical Analysis). Copper carbonate, C11CO3, has not been prepared in the pure state, but a green precipitate having the formula CuC03 + Cu(OH)2 is thrown down when car¬ bonate of potassium or of sodium is added to a solution of a copper salt ; this precipitate be¬ ing identical in composition with the mineral

malachite. Cuprous oxide, CuaO, or red oxide of copper, occurs native in red octahedral crystals, and it may also be prepared artificially by heating a mixture composed of equivalent parts of cupric oxide and finely divided metallic copper, or (more conveniently) by heating a mixture of equal parts of cupric oxide and ammonium carbonate, (NFh)2C03, over a Bunsen burner, until all the ammonia

is expelled. It is a crystalline powder of a carmine color, melting at a strong red heat, and is used in glass manufacture for the production of a ruby color. The precipitation of this oxide from cer¬ tain test-solutions is used as a test for the presence of sugar in urine. (See Urinary Analysis). Cuprous oxide dissolves in various acids with the production of colorless salts, \chich are unstable, since they readily absorb oxygen and pass into the corresponding cupric salts. The most important cuprous salt is the chloride, which has the formula Cu2Ch, and is formed by heating metallic copper to dull red¬ ness in a current of hydrochloric acid gas, or by dissolving a mixture of cupric oxide and me¬ tallic copper in hot hydrochloric acid. It is a white crystalline powder, insoluble in water or alcohol, or in dilute nitric or sulphuric acids, but dissolving in ammonia, or in hot hydro¬ chloric acid. Its solution in either of these menstrua possesses the remarkable property of absorbing carbon monoxide gas. Copper may be detected in solution (1) b,y the formation of the black sulphide when a stream of sulphur¬ etted hydrogen gas is passed through the acid¬ ified solution ; (2) by the precipitation of the blue hydroxide, which blackens upon heating ; (3) by the deep blue color that its salts give upon the addition of ammonia; and (4) by the precipitation of a red film of metallic copper when a clean, bright fragment of iron is im¬ mersed in the solution.

Physiological Action. — In medicine, salts of copper are used as astringents and as antiseptics, copper sulphate being the favorite salt. The soluble salts of copper are all exceedingly poi¬ sonous, and since the metal is very widely used in the arts, copper poisoning is quite common. In acute poisoning the symptoms are those of an acute gastro-intestinal irritant. These usually develop in from 10 to 20 minutes, though they may be delayed as much as two or three hours. There is nausea and vomiting of bluish mate¬ rial, accompanied by a metallic taste in the mouth, and intense burning in the stomach, with great abdominal tenderness. If all the copper is ejected by the emesis, the patient usually re¬ covers. This is usually the case, but sometimes, when the dose is extremely large, vomiting is ineffectual. In addition to the symptoms already given, intense headache then develops, accom¬ panied by great prostration and cramps, with small, rapid pulse and collapse ; death some¬ times following in from 4 to 12 hours, but more commonly after two to four days or more:

Ores and Occurrence. — Native copper oc¬ curs in nature, and in the Lake Superior district (Michigan), forms the chief ore. Chalcocite (Cu2S), chalcopyrite (CuFeSz), bornite (Cu3FeS3), enargite (Cu-sAsSO, covellite (CuS), tetrahedrite (CusSUSt), azurite f2CuC03.Cu(0H)2], malachite [CuC03.Cu (OH)2], chrysacolla (CuSi03.2H20) and cuprite (Cu20), are all important ores.

Practically all our important copper deposits

are the result of heated waters related to vol¬ canic activity, lypical contact metamorphic de¬ posits are found in the Clifton-Morenci district of Arizona and in the limestone deposits of Bingham, Utah. Bisbee, Ariz., and Ely, Nev., are also classed with this type. The Butte, Mont., ores are typical vein deposits formed by hot waters. Globe, Bisbee and Clifton-Morenci all show typical replacement deposits in lime¬ stone. The Bingham camp in Utah is now noted for its enormous bodies of low grade dis¬ seminated ore in porphyry. The Globe, Miami and Ray districts of Arizona contain great dis¬ seminated deposits in Pre-Cambrian schists. The Lake Superior ores are chiefly native cop¬ per, occurring in the vesicular openings (amyg- dules) of lava flows, or replacing interbedded layers of conglomerate. As indicated above, one district may show several types of ore de¬ posit. See Ore Deposits.

The greatest copper producing locality in the United States, and therefore in the world, is the Butte district of Montana. The copper veins are confined to a comparatively small area lying north of Silverbow Creek, about two miles in length and one and one-half miles in width. Several of the mines now producing copper were opened as silver mines, the silver being replaced by copper at the depth of about 150 feet. This locality produced in 1916 349,- 500,000 pounds of copper, equivalent to 17.42 per cent of the entire output of the country. Inclusive of this amount the total production of this region since it was opened in 1868 has been 7,030,000,000 pounds — an output larger by more than 1,000,000,000 pounds than any other copper-yielding region known. The ore most common in this region, and which has supplied 75 per cent of the entire output, is chalcocite, or

copper glance — a sulphide, carrying 79.8 per cent of metallic copper. This ore was originally pyrite, and has been altered by hot descending waters containing copper sulphate. About 20 per cent of the Butte copper production has been from enargite, a sulpharsenate of copper, carry¬ ing 48.67 per cent of the metal. About 4 per cent has been recovered from bornite, an altered chalcocite, carrying 63.3 per cent of copper. The remainder has been gained from covellite, chalcopyrite and tetrahedrite.

Two other localities in the United States are eminent as producers of copper: the Keweenaw (Lake Superior) district of Michigan and the Bisbee district of Arizona. The former has a record of 6,029,777,236 pounds since its first production in 1845, practically all recovered as native copper. The Bisbee district began pro¬ duction in 1880, and its record stands at 2,219,- 556,000 pounds. Four other districts in Arizona have contributed to swell the grand total for the State to 5,767,698,935 pounds since the first mine within its borders was opened in 1873. The ores of Arizona are virtually the same as in Montana, the upper earth section being barren through having its copper leached away for a depth of about 250 feet and deposited in the veins of the 100-foot zone below. Chalcocite is the principal ore, altered in places to chal¬ copyrite, bornite, covellite and melaconite.

Smelting and Refining. — Mining the ore is but the preliminary step in the production of commercial copper. The crude ores must be smelted and the smelter product refined. The first treatment the ore receives after being

raised is concentration. This is a mechanical treatment with the object of eliminating as much as possible of the gangue or non-ore- bearing rock accompanying the ore. It makes use of the methods of hand-picking, wet and dry jigging tables and hydraulic separation. The ore then goes to the smelter.

The particular smelting process employed depends on the chemical constitution of the ore: that is, whether it is a sulphide, an oxide or native copper. With the sulphide ore the first operation is roasting, in order to oxidize the sulphur and iron present, and to volatilize the arsenic, bismuth and antimony. The roasted ore is then reduced in a blast furnace with anthracite coal, the product of this state being known as ffmatte.® This is again roasted and again passed through the blast furnace, the prod¬ uct being the impure copper known as (

The metallic copper of various forms as it comes from the reducing furnaces contains as impurities some if not all of the following named minerals : iron, nickel, cobalt, lead, zinc, tin, arsenic, antimony, bismuth, sulphur, sele¬ nium and tellurium, besides a percentage of sil¬ ver and gold. The object of the refining process is to remove to the utmost practicable limit all of these substances, and to turn out the metallic copper at least 99.8 per cent pure. The process of fire-refining is essentially an oxidizing proc¬ ess. It is, however, conducted at a degree of heat so high that such metallic impurities as arsenic, antimony and bismuth are volatilized. The other metals present are oxidized into dross and removed with the slag. The cuprous oxide (C20) held in solution in the metal, the only oxide of copper which is stable at the melting point of copper, is gradually reduced until only about one-half of 1 per cent re¬ mains, and this is left in the metal to make certain (that no other metallic impurities are present except in the form of harmless oxides. The furnace used in fire-refining is of the re¬ verberatory type. The more impure the metal the longer the treatment and the smaller the quantity which can be worked at one time. The ˆcharge® of solid copper, in the form of cakes, is placed in the furnace basin by hand or by mechanical appliances, and the first or melting fire is set in the fire-box. If the copper is relatively pure it melts quickly; if impure <(black® copper, it is milch slower and may be hastened with an air blast. When the melting is complete the fire is drawn and a new, oxidiz¬ ing fire built. As the slag forms it is constantly skimmed away and the clear metal exposed. Cuprous oxide is formed on the clear surface and is dissolved in the molten metal. The metallic impurities which have a stronger affin¬ ity for oxygen than has copper take up oxygen from the cuprous oxide and rise to the surface as slag. This operation is forwarded by forcing air into the molten metal through iron pipes dipping well down below the surface. These pipes melt off in the great heat, but the iron is oxidized and rises to form part of the slag.

When the slag ceases to form, the melted copper retains about 6 per cent of cuprous oxide in solution. This proportion of cuprous oxide is reduced by the process of ˆpoling,® which con¬ sists of forcing poles of green timber, butt end first, into the mass of melted copper, and feed¬ ing them in as they burn away. A state of ebullition is excited by the vapors arising from the scorching wood : the carbonic oxide and hydrogen set free seize upon the oxygen of the cuprous oxide and the charcoal aids in the reduction. This operation is continued until a microscopic examination determines that the cuprous oxide is reduced to the correct propor¬ tion — from .5 to .7 per cent. If the poling is carried too far the other impurities give up their oxygen and resume their metallic state, and the entire mass of the copper has to be reoxidized to the 6 per cent content, and the poling done over again. When the copper has reached the proper constitution it is cast into ingots, ingot- bars, wire-bars or cakes.

The electrolytic method of refining copper is generally preferred in the United States, and nearly three-fourths of the country's product is thus refined. This process is essentially electro¬ plating. The anodes are of cast copper, about three feet square and one inch thick and weigh¬ ing 475 pounds each. The cathodes are of pure electro-deposited copper, a little longer and wider than the anodes, and about one-sixteenth of an inch thick. The anodes are placed in the tank at from three to five inches apart; the longer distance for the more impure metal. A cathode is hung between each of two anodes and one at each end of the tank. The tanks are built of timber and lined with lead. They are two inches wider than the cathodes, allowing an inch of free electrolyte at each side. The tanks are usually about 10 feet long and hold from 20 to 30 pairs of anodes and cathodes, con¬ nected usually in multiple. Some few of the largest works, however, connect them in series. The electrolyte is a solution of copper sulphate in the proportion of 12 per cent, and acidulated with about 9 per cent of sulphuric acid. The copper content is held up to at least 3 per cent to prevent plating with arsenic where it is pre¬ sented in the anode. The free sulphuric acid in the bath is limited to 12 per cent to avoid de¬ composition. The temperature of the electrolyte is held between 105° and 140° F. by means of steam coils. A continuous circulation of the electrolyte is necessary to prevent irregular deposition. The current ranges from 12 to 34 amperes per square foot of anode. The lower figures are adopted where arsenic is present. The voltage varies in different plants from 60 to 180. The time required to deposit the pure metal from the anode is about 20 days.

In 1916 there were active in the United States 13 refineries, nine of which employed the electrolytic method and five the furnace process on Lake Superior copper — one employing both methods. Their combined output for the year was 2,259,387,315 pounds, of which 1,950,255,629 pounds were electrolytic ; 269,794,531 pounds were Lake, and 39,337,155 pounds were casting and pig copper. Of the total refined product about 370,000,000 pounds were of foreign origin. In addition to this primary copper, the refineries handled secondary copper, producing from this source 78,585,296 pounds of electrolytic and 25,838,511 pounds of casting copper. A part of

this also was foreign. Besides this output of metal the refineries also produced 55,622,345 pounds of blue vitriol, equivalent to 14,043,315 pounds of metallic copper.

Secondary Copper is the name given to the copper recovered by smelters and refineries from scrap metals, sweepings, skimmings and dross, as distinguished from the primary copper derived directly from ores. The production of secondary copper in the United States in 1916 was unprecedented, very large quantities of scrap from rolling mills and munition works finding their way to the secondary smelters. The record for the year shows a total of 140,- 000 short tons of copper and copper in alloys (exclusive of brass), and 300,000 short tons of brass containing about 70 per cent of copper, or about 210,000 tons — a grand total of 350,000 tons, valued at $196,320,000.

Commercial Copper. — • In the American markets copper appears in three grades : elec¬ trolytic, Lake and casting copper. Both electro¬ lytic and Lake grades test at least 99.8 pure. Electrolytic copper has a slightly higher degree of conductivity than Lake copper and greater endurance in bending and twisting tests, and is therefore preferred for electrical work. Cast¬ ing copper is a fire-refined blister copper, testing sometimes as low as 98.5 per cent pure. It is unsuitable for electrical purposes or for making brass wire and sheet brass, but is available for making copper or brass castings. The principal forms in which copper is marketed are ingots about 3 by 3 by 9 inches, weighing about 17 pounds; ingot-bars, about 3 by 3 by 27 inches, weighing about 50 pounds ; wire-bars, about Zy2 by 3ˆ4 by 33 and up to 60 inches, and weighing from 85 to 250 pounds; and cakes, in round ox square forms, ranging in diameter from 8 to 39 inches, and 14 by 17 inches up to 42

inches square, and from \l/2 to 8 inches in thickness. About one-third of the entire copper product of the country is used in making wire and elec¬ trical supplies and one-fourth in making brass.

Production. — The world's smelter produc¬ tion of copper for the year 1916 amounted to 3,106,995,660 pounds (estimated in part), an increase of more than 31 per cent over the pro¬ duction of 1915, and almost exactly double the production of 1906. Of the grand total, the United States smelters produced 1,927,850,548 pounds (62 per cent) ; Japan, 179,189,888 pounds (5.8 per cent) ; Chile, 157,474,578 pounds (5.1 per cent) ; Canada, 119,770,814 pounds (3.8 per cent) ; Mexico, 111,625,577 pounds (3.6 per cent); Spain and Portugal, 110,230,000 pounds (3.6 per cent).

In the United States the mine production in 1916 was 57,863,365 tons of copper ore, contain- ing 2,005,875,312 pounds of metallic copper — an average of nearly 35 pounds per ton of ore. Not all of this was recovered (in 1916) by the smelters, and this accounts for the variance with the figures given above for the United States under the world's production. In 1,011 mines copper was the principal product, and these mines produced a total of 1,977,724,784 pounds. In 837 other mines copper was recov¬ ered as a by-product to the amount of 28,150,528 pounds.

Among the States, Arizona maintained first rank with the unprecedented output of 721,- 833,169 pounds, more than 36 per cent of the output of the whole country, and an increase

of 60 per cent over her record yield of 1915. Montana held second rank, with 352,928,373 pounds. Michigan was third with 273,692,525 pounds; Utah fourth, with 240,275,222 pounds; Alaska fifth, with 119,854,839 pounds, and Ne¬ vada sixth, with 105,116,813 pounds. These five States with Alaska produced 93 per. cent of the total copper output of the United States in 1916. The price of copper for the year aver¬ aged 24.58 cents per pound — as compared with 17.50 cents in 1915. The total value of the country's production was $474,288,000.

Imports and Exports. — In 1916 the United States imported a total of 462,335,980 pounds of copper, of which 268,927,315 pounds was in unrefined blocks, bars and pigs; 9,451,388 pounds in clippings and old metal and 8,411,230 pounds in refined plates, bars and rods. The remainder was the calculated copper content of ores (124, 878,905 pounds), concentrates (32,753,874 pounds), and matte and regulus (17,155,075 pounds), brought in to be smelted and refined. These importations came chiefly from Chile (121,342,981 pounds), Mexico (95,916,592 pounds), Canada (91,110,410 pounds), and Peru (77,672,763 pounds). The exports amounted to 789,791,254 pounds, valued at $231,915,832. Of the whole, 336,829,464 pounds went to France; 184,564,740 pounds to the United Kingdom, and 113,764,478 pounds to Italy.

Bibliography.— Grennawalt, W. E., (The Hydrometallurgy of Copper' (New York 1912) ; Heath, G. L., (The Analysis of Copper and Its Ores and Alloys' (London 1916) ; Hof man, H. O., (Metallurgy of Copper' (New York 1914) ; Levy, D. M., (Modern Copper Smelting' (London 1912) ; Peters, E. D., Jr., 'Practice of Copper Smelting' (New York 1911) ; Wiard, E. S., (Theory and Practice of Ore Dressing' (New York 1915).

Richard Ferris,

Editorial Staff of The Americana.

COPPER, Discovery and Development.

Copper in a metallic form occurs, either alone or in connection with chemical combinations of the same metal, in many parts of the earth, notably in Peru, Chile and neighboring coun¬ tries, in Alaska, in parts of South Australia and more sparingly in Siberia, in Cornwall, in Ger¬ many, in several of the United States and else¬ where. In few localities has it been found in quantities as large, or under circumstances as favorable for large mining operations, as in the Lake Superior region. The attention of the early navigators to America, next to t.he finding of a northwest passage to Asia, was directed to the natural resources of the New World, and especially to its deposits of

valuable minerals.

Of early references to copper in North America that of Verrazzano in 1524 is among the first. He saw, on the coast of New Eng¬ land, headstones of that metal in the ears of the natives. In 1535 Jacques Cartier, on his second voyage to the Saint Lawrence River, was told by the Indians that native copper — cuyvre rouge — by them called «caignetdaze," came from the Northwest, from the region known to them as Saguenay, and they gave to their chief, Donnacona, when he sailed for Fiance with Cartier, a large knife of that metal.

In 1610, Champlain, on one of his excur¬ sions up the Saint Lawrence, is said to have been given a piece of copper a foot long, that was reported to have come from the bank of a

river near a great lake. (

On Champlain's map of 1632 we find in a lake northwest of Lake Huron an island marked ((where there is a mine of copper." This might have been either Michipicoten Island or Isle Royale.

Sagard, who published his (History of Can¬ ada' in 1636, wrote that Brusle, one of Cham¬ plain's interpreters, showed him a ((lingot" of copper which had come from a mine 80 or 100 leagues from the Hurons.

In 1660 Pierre Esprit Radisson, probably the first white man to explore the shores of Lake Superior, was led by an Indian companion to a place near the banks of a small stream that flows into the lake east of the Pictured Rocks, where he saw <(many pieces of copper uncov¬ ered," and was told that a mountain near by was (

In the Jesuit (Relations'1 of 1659-60 it is said that an Indian reported copper from Lake Superior in pieces as large as one's fist. In the delations' of 1666-68 Father Allouez reported pieces of true red copper from an island in Lake Superior, which, according to his description, was probably Isle Royale.

In the delations' of 1669-71 Father Dablon reports red copper from the Ontonagon River, concerning which he says opinions differed as to where it w-as actually found; and also from the end of Keweenaw Point — the latter place being an islet ((which appears to be six feet square, and is said to be all copper." This sounds like the report made to Radisson, ex¬ cept that no size was given to Radisson's islands, whose distance from the mainland cor¬ responds with that of Manitou Island. The Jesuit Fathers wˆere also assured by the Indians that in the interior to the south of Lake Su¬ perior (

With the exception of the "islet" referred to by Dablon which was possibly a piece of mass copper projecting out of the water at a shallow spot near the shore, all of the copper found as late even as the latter half of the 18th century appears to have been Afloat," that is, masses of smaller or larger size that had been transported from their original beds, generally by glacial action. Indeed it w?as this fact that probably explains the statement of Capt. Jonathan Carver in 1778 that the copper itself costs nothing.

The area of "floats copper appears to have extended much beyond the territory immediately tributary to Lake Superior, for in 1700 Le Sueur found pieces of it near the mouth of the Chippewa River and another about four leagues above the mouth of the Saint Croix River, in Wisconsin. In later years similar finds have been reported as far south as Indiana and Illi¬ nois. But while Lake Superior was supposed to be the source of this copper we do not find any evidence that any white man — except always Father Hennepin — had even seen anything that could be called a copper mine (sic), as early as the time of Charlevoix. The latter in his his¬ tory of New France, published in 1744, says (

Thus far the pieces of native copper found on Lake Superior were gathered on the edges of the islands and on the borders of the lake along the highways of navigation by canoe. It was not until

1765 that Alexander Henry, at¬ tracted by Indian reports of a large mass of copper, the one referred to by Dablon, visited the Ontonagon River and went up stream several miles above the junction of the east and west branches. He found, on a clay bank, at or near the edge of the stream, the copper mass, with some rock adhering to it through which ran small veins of copper. In 1771, revisiting the same place, he noticed also much copper bedded in stone, and left a party of miners there, "to make a trial on the hill, till we were better able to go to work on the solid rock.® They dug 40 feet into the clay bank and found frequent masses of copper. All went well dur¬ ing the winter, but when spring came, the clay thawed and caved in, and the party left. In re¬ cording the above facts, Henry added that "The copper ores of Lake Superior can never be prof¬ itably sought for but for local consumption. The country must be cultivated, and peopled, before they can deserve notice.® In a footnote to the above, having in mind the more roseate view then recently expressed by Alexander Mackenzie and earlier by Captain Carver, he adds, "The copper mines of Lake Superior have been more than once represented to the world in colors capable of deceiving fresh adventur¬ ers : and the statement in the text will not have been uselessly made, if it should at any time serve as a beacon to the unwary.® The fame of Henry's operations was probably spread abroad at the time, although his book was not published until 1809.

Henry's visit to the Ontonagon River marks the culmination of the efforts of two and a half centuries of search for the original source of the I.ake Superior native copper — its location in the rocks of volcanic origin that almost sur¬ round that inland sea. It also marks the begin¬ ning of an industry that in spite of Henry's warning has grown to be one of the most im¬ portant of the Northwest. Possibly the troubles that distracted the country during two wars, and

the boundary disputes in the region of the Great Lakes, rather than the adverse sentiment caused by Alexander Henry's failure, kept back the de¬ velopment of the copper district of Michigan, but the spirit of expansion which during the administration of Jefferson found expression in the expeditions of Lewis and Clark and of Pike later found an echo in Gov. Lewis Cass, at whose initiative and under whose personal lead¬ ership an expedition to the Northwest was effected in 1820, one of the objects of which was to investigate the copper "mines® of Lake Su¬ perior. Henry R. Schoolcraft accompanied this expedition as mineralogist. They visited the Ontonagon copper mass, which Schoolcraft recognized as having been removed from its original bed of "serpentine® rock; from which circumstance he inferred that there must be ex¬ tensive "mines® in the vicinity.

In 1832 Schoolcraft, this time with Dr. Douglas Houghton as geologist to the party, again visited the Ontonagon River and the famous copper mass. On the way thither Dr. Houghton found copper embedded in the trap rocks on the western side of Keweenaw Point, and expressed the opinion that the "trap rock formation was the original source of the masses of copper,® and that copper would probably not be found in that region in any other rock than trap, which Dr. Houghton at that time had seen only on Keweenaw Point.

During 1832 and 1833 Dr. Houghton visited the south shore of Lake Superior three times. Five years later he was appointed State geol¬ ogist of Michigan and before his death, in 1845, had carefully examined the copper-bearing for¬ mations, had ascertained their altitude and ex¬ tent, had located a number of copper veins and had given to the world enough information to attract at once a large body of prospectors. The interest thus stimulated in the Michigan copper district soon led to the opening of some of its most famous mines. The success of this new industry, as predicted by Captain Carver, was soon assured by the building of the canal at Sault Sainte Marie, which afforded the products of upper Michigan cheap transportation from the wilderness to market.

Geology. — The "trap® rocks that constitute the greater part of the Lake Superior copper¬ bearing formations are a series of old lava flows.. All around the western end of the lake through Michigan, Wisconsin and Minnesota, the trap beds extend for several miles in width, striking nearly parallel with the general trend of the shore line, and dipping always toward the lake, the dip being usually flatter near the shore than it is further back. Associated with these trap beds occur beds of reddish conglomerate or sandstone at different intervals, composed of the debris of the traps and associated more acid rocks.

On the extrusion and flow of lava which has been under pressure, the pent-up gases in it expand near the surface of the flow like the bubbles in a glass of champagne, and as the surface of the flow rapidly congeals, each gas bubble forms a cavity or amygdule. In the scoriaceous or amvgdaloidal

portions of the lava beds, which are thus characteristic of the upper surface of the bed, though sometimes found at the bottom — also in cavities caused by chemical changes or by fractures, and occasionally in the conglomerates — are frequently found the

deposits of native copper that characterize these formations. At different angles to the strike of these beds fissure veins of later age are found, several of which, notably the Cliff, Phoenix and Central, proved also to be rich in copper, which in the Cliff mine carried with it a large amount of silver. The copper occurs either in minute flakes, or in more compact bodies from the size of a pin head or less to masses of 500 tons or more in weight, of shapes rounded like a boulder or branching irregularly through the parent rock-mass. Large masses seldom occur in the conglomerates, but in these beds individ¬ ual boulders are often found entirely replaced by copper. In the early days of mining here it was the fissure veins that were sought and worked almost exclusively. They produced a large amount of mass in a small area of ground, and this could be made marketable without the expense of treatment in a stamp mill. By the time the fissure veins were begin¬ ning to show signs of exhaustion the amygda¬ loid deposits came more into notice and soon proved that while they were less rich than the veins, volume for volume, they were much more extensive, and, with the progress in mining methods, would probably prove profitable if worked on a large scale. The substitution of air drills for hand drills and of high explosives for black powder helped to confirm this promise. Meanwhile the discovery of the Calumet con¬ glomerate with its wealth of mineral had been made. As work on the fissure veins was grad¬ ually being abandoned, the mines were in popu¬ lar parlance grouped into two classes — amyg- daloids and conglomerates. To-day, however, it is apparent that all so-called amygdaloid cop¬ per deposits are not properly so named and a further division is possible. Throughout the formations, especially alopg the upper surfaces of conglomerate beds, planes of weakness have existed along which there has been more or less movement of the overlying formations. These planes of weakness not infrequently coincide with the amygdaloidal upper portions of the trap beds, both in strike and dip, and shearing movements along them have fractured the rock to so great an extent as to form a veritable breccia, in which copper was later deposited in workable quantities. Indeed the copper often occupies the interstices in these breccia beds, while the amygdules of the rock composing the breccia are entirely filled with minerals other than copper. In a case of this kind the term ˆamygdaloid® deposit, if not confusing, is at least inexact.

Exploration. — The greater part of the area underlain by the copper-bearing formations of Lake Superior rise to an elevation of from 400 to 700 feet above the lake. Several ridges stand out above this general plateau whose summits show naked rock, and even in the lower ground there are some exposures of rock in place, but over a large area there is a heavy covering of "drift® — sand, gravel and boulders — which completely conceals the rock surface and renders difficult a successful search for mineral. When mining operations began on Keweenaw Point the attention of the early prospectors was attracted by grooved stone hammers, some of which weighed as much as 30 pounds, generallv found on the ridges, in or by the side of' shallow excavations that showed copper embedded in the rock. These vol. 7 — 42

traces of crude mining by a former generation evidently served as a guide to the early white miners in locating the most prominent deposits. The ridges naturally consist of the hardest rock — the massive trap beds that have resisted erosion better than the softer amygdaloids. By following these ridges the early prospectors located the fissure veins, and with them some quasi fissure veins that ran parallel with the formation and contained large masses of cop¬ per, rough prongs of which projected above the rock surface. A "conformable vein® or an amygdaloid deposit thus located would be fol¬ lowed for miles, until perhaps it disappeared beneath a covering of drift. Sometimes a large block of cupriferous rock would be found, whose angularity indicated its probable nearness to the parent bed. Surmising the direction of the glacial movement the prospector would dig a series of trenches or costeans at right angles to the strike of the formation, on the side whence the glacial movement was supposed to have come. But here again in early days the fact was not recognized that Keweenaw Point had been the scene of glacial movements from at least two directions, and thus in one well-knoyvn instance explorations were vainly made in the wrong direction from the blocks of rich float-rock.

With the progress of geological investigation it was realized that the conglomerates inter- bedded with the traps and representing old sea beaches were more or less continuous around the ancient basin. Their character, it is true, does not remain constant from point to point, for this depends in a great measure upon the rocks that lay behind them during the process of their formation. They furnished reliable aid to correlation, however, and could be fol¬ lowed and recognized for long distances even across drift-covered areas. The lava beds, on the other hand, from their broad general simi¬ larity, usually were not safe guides. In some cases, however, even these could be identified over long distances by some marked peculiarity. If a workable copper deposit was known to exist near one of these conglomerates or near a recognizable trap bed, the latter was traced out and a pit or trench was then dug at a known distance from it equivalent to the distance of that bed from the copper-bearing bed at the place where the latter was last seen, allowance being made for ascertainable changes in the dip of the formation between the two places. In this way the Baltic lode of the Champion Mine was located about three miles from the Baltic Mine, although in the intervening dis¬ tance the strike of the formation had changed 34 degrees. By taking the great Greenstone ridge in Keweenaw County as a guide the posi¬ tion of the northward extension of the Kear- sarge amygdaloid bed was in a similar manner approximately ascertained about six miles from the nearest point at which it had been previously opened. While trenching was in progress to uncover this bed, the recognition of an isolated outcrop of its footwall — a very characteristic rock — pointed more exactly to the location of the amygdaloid. Exact calculations are not always possible, for the dip of the beds from younger to older may change — commonly does change — and can seldom be determined for any one place, in advance of mining. The diamond drill is often an important aid in cases

like the above, where the thickness of the drift- covering makes trenching impossible or too expensive.

Development. — A mere deposit of mineral or an isolated mass is not necessarily synonymous with a ˆmine,® as previously re¬ marked. As now frequently understood, a ˆmine® is a deposit sufficiently exploited to afford reasonable hopes that it can be worked at a profit. To ascertain whether a native de¬ posit of copper in Michigan will pay requires a good deal of time and the expenditure of a large amount of money. Shafts must be sunk, generally, in the lode to test the latter con¬ tinually in depth, and drifts must be driven from the surface, to show the lateral extent of the deposit, its uniformity and richness. If the rock mined carries from 1 to 2 per cent of fine copper, or from 20 to 40 pounds per ton, and the lode is 10 feet or more wide, the management knows that by mining on a large scale the costs can be brought down to a pay¬ ing basis with copper at about 12 cents a pound. Some mines with wide deposits can make a handsome profit at the last named price. In the exploratory stages of a mine these factors must be ascertained before a permanent and economical plant can safely be installed. By neglecting this precaution several notable fail¬ ures have been made and expensive plants erected only to be sold out later at a loss. In Michigan the copper deposits usually extend to great depths, some of the older mines being a mile deep vertically. Powerful hoisting engines and other machinery in proportion are ulti¬ mately necessary for this work. The permanent shaft can be sunk in the footwall so as to en¬ able the removal of the maximum of copper- rock without endangering the shaft. The per¬ centage of copper-rock that can be safely and cheaply mined often has an important bearing on the method of mining that is to be adopted. The shafts where possible follow the dip of the lode, thus avoiding the unnecessary mining of barren ground to reach the lode from the shaft, as would be the case if the latter were vertical. Shafts are now placed a thousand feet or more apart. The drifts from the shafts are driven along the lode from 85 to 150 feet apart, measured on the dip of the lode. From these shafts as starting points all of the lode matter possible is broken down from above by "stoping,® as far as the next higher level, by various methods ; sorted where possible, and the barren portions left in the mine or returned to it from the surface, as ˆfilling® to support the hanging wall. The amount thus discarded will vary according to the nature of the de¬ posit, up to 40 per cent of the total rock mined. In some cases the copper is so evenly dissemi¬ nated through the rock that sorting is im¬ practicable and all of the rock goes to the mill. The copper rock from the stopes is trammed by hand, or where the shafts are far enough apart, by mechanical power, to the nearest shaft, hoisted in the cars in a cage, or in skips of a capacity of two to eight tons, dumped on the surface in the upper part of the rock- house and

here sometimes sorted again, or all of it delivered to breakers, by which it is crushed to small sizes ; it is then transported to the stamp mill The larger masses of copper mixed with rock are placed under a heavy ham¬ mer by which the rock is beaten off ; the masses

are then sent directly to the smelter. After going through the breakers the fine rock falls into large bins and is drawn off into railroad cars for transportation. To save expenses as many operations as possible are performed by gravity. A constant effort also is made to in¬ troduce labor saving mechanical devices both underground and on the surface.

Stamping. — The crushed copper-rock from the mine in centre-dump railroad cars is taken to the stamp mill, which sooner or later forms part of the equipment of every permanent min¬ ing company. Nature seldom furnishes a place that combines all the essentials of a good stamp mill site. The principal of these are an abun¬ dant water supply, dumping-room for the waste products, sufficient elevation for handling the material by gravity through the different stages of the stamping process, accessibility by rail¬ road and storage room for fuel. The absence of any one of these essentials adds materially to the cost of construction or to that of subse¬ quent operation. Where possible, the side of a hill is selected near a body of water. A stream that will supply three and a half million gallons a day throughout the year is large enough for a one-head mill with a capacity to stamp from 500 to 700 tons of melaphyre or 300 tons of con¬ glomerate in 24 hours. If the stream can be dammed at an elevation sufficient to deliver its water by gravity at the mill about 40 feet above the point where the waste launders leave the latter, its water is utilized in that way. A dam built on a stream near the shore of Lake Su¬ perior, to serve two mills that have a daily stamping capacity of about 4,000 tons, cost about $250,000. To pump water from Lake Superior for a mill of nearly the same capacity costs be¬ tween one and one and a half cents per ton of rock stamped, to which must be added in¬ terest and maintenance charges on a pumping plant that would cost nearly $100,000. To obtain water from Lake Superior requires a tunnel under the lake or a large pipe leading from the shore to a crib far enough out in the lake to avoid being choked by stamp-sand and other obstructions. This distance is usually about 1,000 feet.

Where the stamp mill cannot be built low enough to enable the rock cars to run from grade into the space above the rock bins, the cars must be hauled up, one by one, by special haulage mechanism. Where the mill is built with the main lower floor but slightly elevated above the level of the dumping ground, the stamp- sand may eventually have to be carried long distances in launders and sometimes must also be lifted to the necessary height by immense sand wheels. Where mills have been built on the exposed shores of Lake Superior the waste sands are removed from time to time by storms, but jf built on bays or sheltered places, the heaping up of the sand is likely to give trouble unless the waste launders from the mill are sufficiently elevated above lake level.

The function of the stamp mill is to crush the rock fine enough to be able to separate it from the copper and to recover a maximum amount of the latter. The copper rock from the mine is dumped from the cars into the stor¬ age bin at the back of the mill, which is of sufficient capacity to provide against slight delays incident to transportation. From the bottom of the bin the rock runs over a feed

pan into the mortar of the steam stamp, into which also a stream of water is constantly flowing. Here the rock is crushed to a size small enough to be splashed by the downward action of the stamp-shoe through screens around the mortar. The larger lumps of cop¬ per are withdrawn from the bottom of the mor¬ tar through a tube against the force of a small stream of water which prevents the lighter material from discharging with them. The principle of the so-called hydraulic discharge is utilized in some form at several stages of the stamp mill process. The particles of rock and copper that pass through the screen around the mortar then go through a cylindrical revolv¬ ing screen or “trommel,® the oversize from which under a practice that is now going out of use is carried back to the stamp, or, under better practice, passes directly to a set of rolls that crushes it to a smaller size, thus liberating the included copper and increasing by so much the capacity of the stamp. The entire product from the screens and from the rolls then passes through launders to the classifiers and from these the coarser part of it goes to the jigs. In some cases there is placed under the launders near the stamp-head a box into which by apply¬ ing the principle of hydraulic discharge, the larger particles

of copper fall, the smaller par¬ ticles of copper and nearly all of the rock pass¬ ing on to the classifiers. A classifier is a part of the launder system, or a long box through which flows the stream of water from the heads, mixed with finely crushed rock and copper particles; in the bottom of the classifier at stated intervals are openings through which particles of copper and rock drop against a head of water at each opening that can be regulated so as to permit particles of different weight to fall out at the different openings, the heaviest through the first opening, the lightest through the last. On the jigs suc¬ cessively smaller particles of copper are caught on screens of from 10 to 16 mesh, through which gradually sift the very fine copper par¬ ticles ; above the copper caught on the screens accumulate particles of rock which include copper called "middlings.® The larger particles of waste rock are carried off gradually at the surface by the jigging motion and by the flow of the water, to the waste launder. The mid¬ dlings are taken off automatically through an air discharge in front of the jigs and are ground in a Chilian mill, whence they pass to the slime tanks. The fine material passing through the jig sieves goes directˆ to concen¬ trating tables. The finest particles of rock and of copper that flow through the classifiers from the heads go from these to the settling tanks, where the fine particles of copper with a cer¬ tain amount of rock material settle gradually to the bottom, and the overflow from the top of the tanks goes to the waste launders. The set¬ tlings are then treated on tables provided with elevated strips or "riffles® and by a quick re¬ peated jerky motion in the direction of their length the heavier particles of the pulp, namely, the copper, are gradually separated from the rock matter and collected at the end of the table in tanks or barrels. Middlings or material containing a good deal of rock and some cop¬ per from along the irregular line of demarca¬ tion between copper and rock are collected and retreated in the same way.

Smelting. — 1 he product of the mine that goes directly to the smelter is in the form of masses, often several tons in weight. This (

The impurities found with the product of the stamp mill are principally the "vein® rock, from which, owing to the intimate mixture of the copper and rock, the separation of the former has been incomplete, and incidental impurities, such as iron, sulphur, arsenic, with traces of nickel and of some of the rarer ele¬ ments. The function of the smelter is to remove the impurities and to leave the copper in a condition best fitted for the different uses to which it is to be put. These are principally : (1) For electrical purposes, as wire, where great conductivity is required; (2) for rolling into plates, where great tensile strength may be desired; and (3) for mixing with other metals to form alloys. The forms in which it leaves the smelter are indicative of these uses. They are respectively bars, cakes and ingots. When it is known that .07 of 1 per cent of arsenic in copper will reduce the conductivity of the latter to 75, and that arsenic is almost always present in copper ores, and to some extent also in native copper, the necessity of careful refining will be realized. Copper derived from copper ores generally contains enough impurities to render it unfit for electrical purposes unless it is refined electrolytically. For this purpose it is cast into plates called anodes. In the Lake Superior region the copper derived from the higher or younger formations of the copper¬ bearing series has generally been found to be pure enough on leaving the smelter to be used for wire (99.9 per cent fine and upwards), but the copper from the lower or older beds usually carries enough arsenic to render such a use impossible without further refinement. This copper, on the other hand, with the proper percentage of arsenic, is tougher and more desirable for some uses than the purer grade.

The mineral is treated first in a melting or reverberatory furnace, the flame passing from the fire-box over the copper under a low arched roof with a stream of air brought in from be¬ low. This is an oxidizing process and the slag that separates from the copper and is drawn off from the surface of the latter contains from 8 to 14 per cent of the metal, largely in the form of oxides, mixed with a large amount of the impurities. After the removal of the slag, charcoal is thrown on top of the melted copper and the liquid mass of the latter is agitated by

the insertion of green poles of hardwood ("poling®), the ignition of which and of the charcoal produces the carbon that takes up the oxygen in the copper, thus changing the action of the furnace from an oxidizing to a reducing process. This is often preceded by blowing a charge of air through the molten copper. By dipping small buttons of the metal in a trial ladle from time to time, if the copper sets with a level surface the process of "poling® is com¬ plete. If the reduction is overdone,

the charge must be reoxidized and again reduced. There¬ upon the copper is ladled or run out into moulds. The tendency of modern practice has been to increase the size of the melting furnace contingent upon the ability to keep the heat throughout of an even temperature. Some modern furnaces can take a charge of 100 tons at a heat. It has also been found advantageous instead of doing the refining in these large melting furnaces to run the copper from them into special refining furnaces. The fuel used in the melting furnace is soft coal.

The slag derived from the reverberatory furnace is broken up and eventually taken to a blast furnace, otherwise called a cupola, where the action is reducing, and here the slag is re¬ melted. This process is substantially the same as the process in the reverberatory furnace ex¬ cept that the copper being mixed with a large amount of slag, other substances such as lime¬ stone, iron or silica are added to form a proper mixture for fusing and for the proper separa¬ tion of the copper. The relative amounts of the several materials are ascertained in advance by analysis. All of the ingredients are mixed with anthracite coal, with or without coke, and to stimulate ignition a cold blast of air under compression is driven upwards through the mass. The copper falls out and is drawn off at the bottom of the furnace, containing even then a larger amount of impurities than the product of the first process; this copper should be refined separately. In practice the slag-copper is poured into ingots or ingot-bars, but never into wire bars. It is sometimes specially branded.

The slag that is finally rejected contains about .7 of 1 per cent of copper and is usually discharged into a stream of water which gran¬ ulates it and carries it away in launders.

Lucius L. Hubbard,

General Manager of Champion Copper Com¬ pany, Painesdale, Mich.

COPPER, Refining of. See Electro¬ chemical Industries.

COPPER AND BRASS INDUSTRY.

The Naugatuck River has its sources in the hills of northwestern Connecticut and flows southward about 40 miles to its junction with the Housatonic River at Derby, taking its course through a narrow, winding valley. From Torrington, at the head of the valley, to Derby there is a fall of about 600 feet, and wherever the valley broadens to give room for a village or a city there are water privileges, and the power is utilized for manufacturing purposes.

In this narrow valley, wdiich contains a large population, evidence of thrift and prosperity is everywhere seen in the neat, comfortable homes of the workingmen and the fine houses of their employers. This is the seat of the brass-rolling industry of America. Many large corporations

are here directly engaged in this business, pro¬ ducing about three-fourths of the total quantity of rolled brass manufactured in the United States, giving direct employment to 25,000 per¬ sons and indirectly to many thousands more. About one-half the total quantity of copper consumed in the rolling and wire mills of the United States is conveyed annually to the Naugatuck Valley for use in these manufac¬ turing establishments.

Here were found the men of foresight, energy and activity who could originate great enterprises and carry them to completion. They began the brass-rolling industry 70 years ago. Its development and progress with the growth of the country are due to the energy and ability of those who have conducted the business and furnished the necessary capital for its enlarge¬ ment. The causes that have led to the con¬ centration of this industry in the Naugatuck Valley are more complex. The cheap power afforded by the water privileges in the valley undoubtedly led to the establishment there of the first rolling-mills, which, as they increased in size and capacity, finally outgrew the water¬ power and are at the present day operated by steam or by steam and water-power together.

The mills originally established in the valley have enlarged and extended from time to time to keep pace with the growing demand for brass. According to the general law governing the concentration of kindred industries and trades in particular localities, new mills were started there, even after the water power had ceased to be a determining factor in the problem of location. Other advantages, such as the cheapness and accessibility of wood of the variety best suited for annealing purposes, were among the causes that held the trade in the valley. Then, too, there arose a race of work¬ men

skilled from generation to generation in the mixing, rolling and manipulation of brass; and as time went on and competition increased, the production of rolled metal becoming less profit¬ able, many of the rolling-mills began remanu¬ facturing their own metal. Other corporations were formed, some being direct offshoots from the brass mills, until the location became what it is to-day; a great centre for the reworking and consumption of metal. There are many reasons why it is desirable that a brass-mill should not be too far from the place where its product is chiefly consumed, and thus it happens that, while a few brass manufactories are operated in other parts of the country, the Naugatuck Valley still is and probably will remain the seat of the brass-rolling industry in America. Other enterprises, such as the rolling of iron and steel, thrive best where their raw material, their fuel and labor are cheapest and most accessible, transportation, labor and fuel being great factors in the cost of the product ; but the brass manufacturer, working a high- priced raw material, and bringing his finished product to the point of nicety in gauge and quality, finds the cost of labor, fuel and trans¬ portation factors of less importance relatively, and he is. governed largely by other considera¬ tions i.n his choice of locality. Therefore, while the shifting centres of the manufacture of iron and steel are marked throughout the country by abandoned furnaces, the seat of the brass¬ rolling industry remains to-day where it was established nearly a century ago, it being a

noteworthy fact that nearly all of the brass- mills outside of the State of Connecticut were constructed or arc operated by Connecticut men.

Israel Coe, a farmer of Connecticut, John Hungerford, of Connecticut, and Anson G. Phelps, a capitalist of New York, and founder of the house of Phelps, Dodge & Company, were pioneers in brass manufacturing in this country, and in 1834 they built a brass-mill at Wolcottville, now Torrington, Conn. Previous to 1830 brass was imported, or manufactured here in a very primitive way. As early as 1811 James G. Moffett of New York rolled brass in small quantities, using for power a sweep actuated by oxen. In 1802 the manufacture of gilt buttons was begun in Connecticut by Abel Porter & Company. At that time these buttons were articles of fashionable use. To obtain brass for this purpose the mixture was cast in ingots at Waterbury and taken to Bradley- ville, near Litchfield, Conn., where there was an iron-mill driven by water power; here it was broken down and rolled into strips, and returned in a rough state to the button factory in Waterbury, where it was rolled thinner by being passed between two rolls two inches in diameter, driven by horse power. The copper for brass-making was obtained from old boilers which had been used in distilleries and in sugar¬ making. This copper was cast into ingots and mixed with spelter, which was obtained from abroad. In 1808 Abel Porter & Company pur¬ chased the water power now owned by the Scovill Manufacturing Company at Waterbury, and soon afterward put in rolls suitable for breaking down and finishing brass. For a period of about 20 years they rolled brass, but it does not appear that their production was any more than enough to supply their own requirements. In 1830 the firm of Holmes, Hotchkiss, Brown & Elton established a mill and engaged in the manufacture of sheet brass at Waterbury. This was substantially the beginning of the sheet- brass business in America, although the metal, in small quantities, may have been occasionally supplied to consumers before that time by the firm of J. M. L. & W. H. Scovill and by Benedict & Coe, of Waterbury.

There was at that time also a demand for brass kettles, which were manufactured in Eng¬ land by a process known as the ˆbattery® process: that is, they were hammered into shape from metal blanks. The establishment of the mill at Torrington, at the head of the Naugatuck Valley, in 1834, was for the purpose of rolling brass for use in manufacturing these kettles and to supply the growing demand of the button factories. A small rolling-mill was built, with machinery imported from England, and Israel Holmes of Waterbury was engaged as manager of the mill. There was great diffi¬ culty in securing workmen competent to carry on the business. Mr. Holmes was sent to Eng¬ land and succeeded in procuring a few ex¬ perienced men. He afterward made another trip abroad for the same purpose, > but the English manufacturers, fearful of losing their American trade, endeavored, to prevent him from hiring their men, and it was with great difficulty and some danger to himself that he succeeded in embarking a colony of workmen and their families, about 30 persons in . all. These were landed at Philadelphia, taken in a schooner from there to Hartford, Conn., from

which place they proceeded on foot through the woods, a distance of 25 miles, to Torrington.

From this small beginning, and with no end of difficulty and discouragement, the enterprise continued to grow. Local competition arose, and in 1840 Edwin Hodges of West Torrington started a mill for the purpose of making brass kettles and also for drawing brass wire. This seems to have been the first brass wire-drawing establishment in this country. It was located in Cotton Hollow, in the town of Torrington. The enterprise was unsuccessful and the mill was soon closed, with the loss of all the capital invested. In 1841 the original enterprise at Torrington was made into a stock company, with a capital of $56,000. It was named The Wolcottville Brass Company, and the incor¬ porators were John Hungerford, Anson G. Phelps and Israel Coe. The records of this company for the first few years of its existence contain some interesting details. The copper used was imported from Chile, or was obtained in the form of old copper, which was collected from different places throughout the country. The price of copper was then 18J4 cents per pound. Spelter, which was imported, cost 846 cents per pound. The fuel used was mainly wood, but some Lehigh coal was procured, which cost, at Hartford, $8.43 per ton, to which was to be added the cost of transportation by teams from Hartford to Wolcottville. Fire¬ brick for the furnaces cost $60 per 1,000. The manufactured product, in the form of rolled and sheet brass, was valued at 26 to 30 cents per pound. It was taken by teams either to Waterbury or 25 miles across a hilly country to Hartford, and from there shipped on sloops to New York. Upon the site of the works occupied by the Wolcottville Brass Company are to-day the factories of the Coe branch of The American Brass Company. The name of Anson G. Phelps is perpetuated by the city of Ansonia, the Ansonia branch of The American Brass Company and the Ansonia Clock Com¬ pany, as well as by the firm of Phelps, Dodge & Company, Inc., which he founded ; and the name of Israel Holmes appeared in the title of the corporation of Holmes, Booth & Haydens, of Waterbury.

The decade from 1840 to 1850 saw the birth of many of the prominent brass manufacturing corporations of the present day. In 1843 a joint-stock company at Waterbury was organ¬ ized under the title of the Benedict & Burnham Manufacturing Company, with a paid-up capital of $100,000. Aaron Benedict was president and treasurer and John S. Mitchell secretary. Mr. Aaron Benedict continued at the head of the company until his death in 1873.

The Waterbury Brass Company began busi¬ ness in 1845 with a capital of $40,000. Among the incorporators were John P. Elton, Lyman W. Coe, Israel Holmes and Hobart V. Welton.

In 1849 the Naugatuck Railroad was com¬ pleted and the product of the valley mills was thereafter

shipped by rail to tidewater at Bridgeport.

In 1848 Thomas Wallace and his sons, John, William and Thomas, began the business of wire drawing at Birmingham, Conn. Their cash capital was $500. Their knowledge of their trade enabled them to increase their business and in a few years they built a factory at Ansonia, which has been greatly enlarged and

is now owned and operated by the Coe branch of The American Brass Company.

The Scovill Manufacturing Company of Waterbury succeeded the firm of J. M. L. & W. H. Scovill and was incorporated in 1850 with a capital of $200,000, which has since been increased to $5,000,000. They now manu¬ facture brass, German silver, etc., and are extensive remanufacturers of metal.

The Coe Brass Manufacturing Company of Torrington, Conn., was founded by Lyman W. Coe in 1863, and succeeded the Wolcottville Brass Company. Lyman W. Coe, the son of Israel Coe, was the president of the corporation, which began business with a capital of $100,000. Their capital has been increased from time to time and they are now merged in The American Brass Company.

In 1844 Anson G. Phelps purchased ex¬ tensive lands in the vicinity of what is now the city of Ansonia, which was founded by him and named in his honor. He constructed a dam across the Naugatuck River, a canal, large reservoirs for water power and built a mill for rolling copper. The firm of Phelps, Dodge & Company had for some years prior to 1844 operated a copper rolling-mill at Birmingham,. Conn. The water privilege at Ansonia is now owned and operated by the Ansonia Land and Water-Power Company and is the source of water power for the city of Ansonia. Mr. Phelps brought from the Wolcottville works J. H. Bartholomew and George P. Cowles, who managed the business at Ansonia under the name of the Ansonia Brass and Battery Com¬ pany, the term ˆbattery" being indicative of the process by which brass kettles were ham¬ mered from metal blanks. This method of making kettles was in use until 1851, when it gave place to a patented process for spinning kettles from circular blanks of metal. The business of the Ansonia Brass and Battery Com¬ pany was conducted by the firm of Phelps, Dodge & Company of New York. A brass- mill was built, and later a wire-mill. The com¬ pany afterward engaged in the manufacture of clocks. In 1869 this manufacturing enterprise was incorporated under the name of the An¬ sonia Brass and Copper Company. In 1877 the manufacture and sale of clocks had in¬ creased to such an extent that it was decided to form a new joint-stock corporation under the name of The Ansonia Clock Company, which began business on 1 Jan. 1878. The location of this company's business was transferred to Brooklyn, N. Y., where large factories were erected and are now in operation, producing clocks and watches which are marketed in every part of the world.

The American Brass Company, incorporated under a special charter from the State of Con¬ necticut, with a capital at present of $15,000,000, — – which may, under their charter, be increased to $20,000,000, — began business in January 1900. It is a merger of the Coe Brass Manufacturing Company, The Ansonia Brass & Copper Com¬ pany, The Benedict & Burnham Manufacturing Company. The Waterbury Brass Company, The Holmes, Booth & Haydens Company, The Chi¬ cago Brass Company.

Taking into account the capital employed and the magnitude of its operations in brass and copper this .company is the most important

brass manufacturing enterprise in the world and the largest single consumer of copper, giv¬ ing employment to about 15,000 persons.

During many years brass manufacturing was conducted on what would now be regarded as a very small- scale, and, although the methods pur¬ sued at the present day are substantially the same as at the beginning, great progress has been made in cheapening these methods and improving the quality of the articles manu¬ factured. It is stated that in the early forties it was customary for the manufacturers at Waterbury annually to appoint a committee to make the long journey to Baltimore

for the purpose of purchasing copper for the season's supply. At that time the purchase of 500,000 pounds of copper was sufficient for a year's supply for these manufacturers. At present that quantity would not supply the demand of the Naugatuck Valley for one day.

Copper and spelter being the metals from which brass is made, a brief account of the sources of supply from which these materials are obtained will throw some light upon the development of the business of brass and copper rolling. The first copper mine worked in the United States was the Simsbury mine at Granby, in Connecticut. The record of this mine extends back to the year 1705. It was worked until 1770, but was not profitable, and only a small quantity of ore was taken out. During the War of the Revolution it was used as a prison. About the year 1719, the Schuyler mine, near Belleville, N. J., was opened and became one of a number of small mines which were worked in that section of the country for a series of years following. The Gap mine, in Lancaster, Pa., was started in 1732. The production of copper from all these openings, however, was of very little commercial importance, and until the Lake Superior region became a source of sup¬ ply, the consumers of copper in the United States had to procure their raw material in Chile. It was brought to this country in the form of pigs, and refined near Boston, at Balti¬ more and at other points along the coast. In 1844 the Cliff mine, near Eagle River, Lake Superior, was opened, and in 1845 regular rec¬ ords of production were begun. The great development of the copper-mining industry at Lake Superior soon placed the United States in the front ranks of the copper-producing countries of the world, and the product of these mines, being of a qualitv much finer than the copper produced abroad, naturally took the place of the foreign product for home consump¬ tion. Copper production in the United States from 1845 to 1880 kept pace with home con¬ sumption, a comparatively small quantity being exported up to the last-named period, so that the record of the copper produced in the United States between the periods named will indicate the progress made in manufactures of brass and copper. Beginning in 1845 with a product of 100 tons (which was much less than the quantity required for home consumption), the record for periods of 10 years is as fol¬ lows: 1850, 650 tons; 1860, 7,200 tons; 1870, 12,600 tons; 1880, 27,000 tons; 1890, 130,000 tons; 1900, 303,000 tons. In 1917 production reached 970,000 tons, valued at $540,000,000.

Comparatively little fine copper was imported to the United States after 1860. In 1879 the

Lake Superior region furnished about 83 per cent of the total quantity of copper produced here, but after 1880 the opening of the copper¬ mining regions of Arizona and Montana in¬ creased the output largely beyond the quantity required for domestic use. A heavy exportation at once followed, and this country became one of the world's great sources of supply.

The Lake Superior district includes the first notable deposits of copper discovered on the American continent. This district was the greatest producer for half a century; the prod¬ uct is still very large, the Michigan output in 1915 being 158,000,000 pounds. The copper found there is remarkably pure, and is called Lake copper, being marketed without electro¬ lytic refining, as is necessary with most other coppers. The Rocky Mountain copper deposits became of commercial importance about 1868, when the Butte development got under way. Three great fields have opened up in the Rockies, outdistancing the great Lake deposits. In 1913 the Arizona production was 404,000,000 pounds, or the equivalent of the entire world's production in 1890. The same year Montana produced 286,000,000, or more than the United States total of 1890. The other large producing States in 1913 were Michigan, 158,000,000; Utah, 132,000,000; Nevada, 85,000,000; New Mexico, 50,000,000; California, 32,000,000; the year's total for the United States being 1,224,484,098 pounds. In 1917 Arizona produced about 710,000,000 pounds; Montana, 370,000,000 pounds; Michigan, 272,000,000 pounds; Utah, 240,000,000; Alaska, 145,000,000; Nevada, 103,-000,000; New Mexico, 100,000,000; Caliornia, 65,000,000; Tennessee, 21,000,000.

*As measured by districts, the Butte smelters, which began in 1868, have been the world's largest producers of copper, the entire product to 1915 being 6,177,800,000 pounds; the Lake Superior district, which has produced since 1845, yielded a total to 1915 of 5,360,995,000; next comes the Bisbee, Ariz., district, opened in 1880, with 1,710,300,000; and the Morenci-Met- calf district, also of Arizona, with 1,10*1,200,000. These are the four greatest copper districts of the world.*

The quantity of copper produced in the United States is reported by the United States Geological Survey to be as follows :

Refined copper produced by the regular re¬ fining companies from the smelters of the

United States .

Of foreign origin . .

Pounds,

1,387,705,532

246,498,925

1,634,204,488

Compared with 1914 . 1 , 533 ,781, 394

The consumption of new copper in the United States in 1915 is estimated to have been 1,043,461,982 pounds, to which may be added old copper from sundry sources such as old copper and brass, scrap, etc., estimated to be 392,274,000 pounds, making about 1,435,000,000 pounds of new and old copper available for use during the year. This estimate includes at least 150,000,000 pounds of copper produced by re¬ melting clean scrap accumulated in the process of manufacturing copper and brass articles. The apparent domestic consumption of new copper in 1914 was 640,445,000 pounds.

A fair estimate of the average price of cop¬ per in the United States from 1845 to 1859 is 20

cents per pound. From 1859 to 1876 the yearly average price of copper varied from 20f4 cents to 32 cents per pound, with the exception that in the years 1864 and 1865 the price was ad¬ vanced, so that in 1864 the average price of Lake Superior copper was 46f4 cents per pound and in 1865 36ˆ4 cents. After 1876 there was a gradual decline in the yearly average price, which was 18-Hs cents in 1877 and 11ˆ4 cents in 1887. In 1894 the price touched 9 cents per pound, which is the lowest point recorded.

In 1899 the increased demand for copper in the United States and abroad was the cause of a rapid advance in the price of the metal, which sold as high as 18 cents per pound. The large exports (159,000 tons in the year 1900), and the steady increase in the demand for home consumption, kept the price between 16 and 17 cents until December 1901.

In the fall of 1901 it became known that a considerable stock of unsold copper had ac¬ cumulated in the hands of one of the largest of the producing mining companies. Mean¬ while, owing to decreased consumption abroad, the exports of copper had fallen off at the rate of about 65,000 tons per annum (the total quantity exported in 1901 being about 95,366 tons). Toward the end of the year there was a sharp decline in the London market, followed by a series of reductions in the price of copper in New York, which, emanating from one source, brought the price, within a period of 30 days, from 16ˆ4 cents down to 11 cents per pound. The first effect of this action was to check consumption, but when it was known that copper could be bought for forward delivery at 11 cents per pound, the demand for manu¬ factured copper increased to such an extent that large buying of the raw material followed and the price of copper quickly advanced to \2l/2 cents. The average price of Lake copper during 1902 was 11ˆ4 cents, and in 1903 about 1 Zl/2. The average price obtained by the Lake Superior mines for copper during 30 years previous to 1903 was about 12ˆ4 cents. From 1903 to 1913 the average price of electrolytic copper was about 15 cents per pound. In 1916 and 1917 it was slightly above 27 cents per pound.

Since we became great exporters of copper, the price of this metal in the United States has been nearly at a parity with the price in Europe. With increased production the cost of mining has been greatly reduced, while im¬ provements in metallurgy and methods of elec¬ trolytic extraction have brought into the market great quantities of copper suitable for the finest work from sources which formerly furnished only coarse and ordinary grades of material. In former years the tariff upon

copper affected the price of the raw material in this country, often enabling the mining companies to obtain from the consumer at home a higher rate than that which ruled abroad. The price of copper in this country was sometimes sustained by arrangement between the mining companies, who would market the copper here at a fixed price and ship their surplus product abroad at a considerably lower rate. The American brass manufacturer was, therefore, usually con¬ fined to a home market for his product, and the statement that, in certain cases, he succeeded in taking large foreign contracts for brass, with the disadvantage of having to pay a higher price

than his competitor abroad, not only for his raw material but for his labor and supplies, is the best possible tribute to the excellent quality of his work. Ingot copper was admitted to this country, duty free, until the act of 30 July 1846, when a duty of 5 per cent was imposed. The act of 3 March 1857 restored copper to the free list. Subsequently duties were imposed upon copper : in 1861 of two cents per pound, and after that of from two and a half to five cents per pound. The McKinley Bill made the duty one and a quarter cents per pound, and at present ingot copper is on the free list.

The first refined spelter produced in this country was made in the year 1856, at Beth¬ lehem, Pa., from ores mined there, and it was sent to the government arsenal at Washington. Up to 1865 or 1866 the spelter used by brass manufacturers was imported from Germany and Belgium. In 1867 the Missouri Zinc Company, at Carondelet, Mo., began to make spelter from Wisconsin ores. The first year they made about 1,800 tons; the next year about 2,500 tons. This was used in the United States. In 1869 the first zinc ores were discovered in southwestern Mis¬ souri, and since then the development of the zinc industry has been constantly increasing. The output of the year 1903 was 157,900 short tons of metallic zinc or spelter. The production and consumption of spelter in the United States in 1914 and 1915 is estimated by the United States Geological Survey to be as follows :

• • • Short Tons Value*

1914 . 353,449 $36,414,000

1915 . 489,519 121,401,000

The apparent consumption of spelter was 299,125 short tons in 1914 and 354,382 short tons in 1915. The abnormal demand for high grade spelter in 1915, for use in the manufacture of brass for ammunition exported to Europe, caused an unprecedented advance in the price of the metal which ranged from 6 to 25 cents per pound. The average selling price for prime western spelter was about 12.4 cents per pound but sales of some of the higher grades were made at more than double that price. The number of retorts at zinc smelters increased from 115,114 at the close of 1914 to 156,658 at the close of 1915. And it is estimated that at the end of 1916 the spelter producing capacity of the country was about 900,000 tons. Ameri¬ can brass manufacturers have used domestic spelter almost exclusively for the past 30 years, the quality of the American product being superior to that of the foreign article. One of the finest grades of spelter is produced in New Jersey and is sold at a high price. At no time within the past 30 years has spelter been admit¬ ted to the United States free of duty. The duty under the McKinley Bill was one and a half cents per pound. Subsequently it was made one cent per pound and the duty at present is 15 per cent ad valorem.

On 13 Jan. 1801, Paul Revere, of Revolu¬ tionary fame, wrote to a friend in London, re¬ questing him to go down to Maidenhead, where rolling machinery was manufactured, and as¬ certain the price of a pair of rolls 9 inches in diameter and 20 inches long, for making sheet copper. Colonel Revere was a silversmith, and had previously corresponded with Benjamin Stoddard, Secretary of the Navy, upon the sub¬ ject of copper rolling. It is pof kno\yn whether

or not these rolls were procured at that tirriˆj but in January 1801, Colonel Revere purchased an old powder-mill at Canton, Mass., where he began the production of sheet copper. The business has been carried on continuously since that time, and is now incorporated under the name of the Revere Copper Company. Among the names of those originally connected with this enterprise are Joseph A. Revere, James Davis, John Revere and S. T. Snow; This company was finally consolidated with the

Taunton-New Bedford Copper Company,

In 1812 the Soho Copper Company was established in Belleville, N. J., where there is a good water power and water transportation by canal and the Passaic River. The originator of this enterprise was Harmon Hendricks, the son of Uriah Hendricks, who was an importer of copper and metals. Some of the buildings were of brick, roofed with tiles imported from Europe. The rolling-mill was of wood and contained one pair of breaking-down rolls, one pair of sheet rolls and one pair of bolt robs, all of which were imported from England. The plant and machinery cost $50,000, and were in¬ tended for the purpose of furnishing the United States government with heavy copper sheets for boilers and bolts for shipbuilding, during the War of 1812. This business has descended from father to son in a direct line, until it is now in the hands of the fourth and fifth generations, and is known as the <(Belleville Copper Rolling Mills,)) operated by Hendricks Brothers. In the year 1815 ingot copper sold for 18ˆ2 cents per pound and the price of copper sheets was 39 cents per pound.

The Gunpowder Copper Works were built in 1817 on the Gunpowder River, 10 miles from Baltimore, by Levi Hollingsworth. Water power was used in manufacturing. In 1866 the rolling-mill was transferred to Canton. It is now operated by the Baltimore Copper Smelt¬ ing & Rolling Company, who are engaged in smelting and in the manufacture of blue vitriol and sulphuric acid.

The manufacture of yellow metal for sheath¬ ing vessels was the subject of a patent by H. F. Muntz, of Birmingham, England, about the year 1840. This mixture, which contains a large percentage of spelter and can be rolled while hot, being cheaper than copper, naturally came largely into use for ship-sheathing. It was first made in this countrv by the Revere Copper Company, within a year or two after its produc¬ tion in England. Later, it was made by the Taunton Copper Manufacturing Company, the New Bedford Copper Company and the Bridge- water Iron Company. The decline of American ship-building, and legislation permitting Ameri¬ can vessels engaged in foreign trade to use the foreign metal without payment of duty, have greatly decreased the demand for yellow metal in the United States.

The causes that have tended to localize the manufacture of sheet brass do not affect the rolling of copper. The makers of sheet copper usually do not remanufacture their product. So that, while most of the brass-mills are lo¬ cated in Connecticut, the copper-mills are dis¬ tributed throughout the country: in Massachu¬ setts, Connecticut, New York, New Jersey,, Pennsylvania, Michigan and Illinois.

The manufacture of seamless tubes of brass and copper is an important part of the brass

business. These tubes are made in the Nauga¬ tuck Valley by The American Brass Company and also by the American Seamless Tube Com¬ pany of Boston, and by other manufacturers. Early in 1848, Joseph Cotton, Joseph H. Cotton, William E. Coffin, Holmes Hinckley and Daniel F. Child, all of Boston, despatched to England an engineer, Joseph Fox, to learn how to make seamless brass tubes, paying a large sum to Messrs. Green and Alston, the English pat¬ entees, for the instruction of Mr. Fox, and the right to make tubes by their process in the United States. Previous to that time all copper and brass tubes for use in locomotive and marine boilers and for the hundreds of other uses to which tubes were put, were brazed : that is, made of strips of metal put in a rounded form and their edges brazed together. In 1850 the gentlemen before named organized a cor¬ poration called the American Tube Works, of Boston, and began the manufacture of seamless drawn brass tubes. Such tubes have taken the place of the brazed tubes in all cases where steam or other high pressures are involved.

There are no public records correctly show¬ ing the present condition of the brass and copper industry in America. Figures can only be obtained by personal application to the manu¬ facturers. The following details, showing the state of the business in the year 1903, are taken from information furnished by 20 of the largest corporations, and include the entire business of the country in rolled brass, copper, tube and wire. In a few instances, where in¬ formation was refused, an estimate of the busi¬ ness has been made, b.ut this does not exceed 13 per cent of the total.

The nominal capital invested was $17,000,000, but the amount of the actual investment was about $29,000,000.

The average number of persons employed was 16,000.

The annual consumption of copper was 300,000,000 pounds.

The annual consumption of spelter was 43,500,000 pounds.

The value of the annual product was

$73,700,000.

If the foregoing figures were doubled they would fall short of the amount invested and the extent of the industry in the year 1915. The increased volume of business is mainly supplied by extension of previously existing plants, but some corporations of more recent origin have come into prominence, notably the Buffalo Cop¬ per and Brass Rolling Mills of Buffalo, N. Y.

Brass founders or manufacturers of articles of cast brass are not included in the foregoing, figures. That is a separate branch of business, and it is carried on by a great number of foundries in the United States, consuming a large quantity of ingot copper and of old metal. _ Many manufacturing concerns, also, have their own foundries, where metal is cast, to be used in their various departments.

Early in the year 1915 it became evident that a large quantity of copper and spelter would be required, by the mills of the United States, for use in the manufacture of ammunition for the warring nations of Europe, and the price o£ these metals rapidly advanced until, in 1916. copper was quoted at 34 cents per pound and spelter at from 18 to 30 cents according to the quality of the metal and the time of delivery,

the highest price being paid for immediate re¬ quirements. Brass rolling-mills running day and night were unable to supply the demand for brass; existing mills increased their facili¬ ties; new mills were started; old and disused mills were put in operation ; wages were ad¬ vanced ; labor became scarce and serious strikes occurred, for the first time in the history of the business. Brass rolling became very profitable and the shares of corporations engaged in that business doubled in value within a year.

In brass rolling-mills the copper is received in the form of ingots and the spelter in the form of plates which are broken when required for use. The copper is melted in crucibles and the spelter is then added in the proportion required, the standard mixture being about two parts copper to one part spelter. This mixture and those containing a higher percentage of copper are rolled and worked when cold. The combination of 60 pounds of copper with 40 pounds of spelter is known as yellow metal and is usually rolled while hot into sheets and rods. The melted brass is poured from the crucibles into sectional molds from which when cooled it is taken in the form of slabs, approximately of the width required for the finished product. These slabs are then reduced and elongated by passing through rolls of chilled iron. Frequent annealing is required between the successive passes and the oxide forming upon the surface of the metal in the process of annealing is removed by baths of dilute sulphuric acid. Brass rods are drawn from round bars by successive passes through dies on draw-benches. Brass wire is produced by drawing the metal through a succession of dies by means of re¬ volving drums on which the wire is coiled. Seamless brass and copper tubes are usually cast in hollow form round a core and finished on draw-benches by drawing through dies over mandrels. Another process consists of piercing a bar of metal by a steel mandrel over which the metal is drawn by the action of conical rolls revolving at a high speed; the shell thus formed is then drawn into a tube in the ordi¬ nary manner. Brass rods and tubes of intricate shape are formed by a process of extrusion by means of which the metal, after being heated to a temperature of about 1,000° F., is placed in a cylindrical container at one end of which is the die and, upon pressure being applied at the opposite end by means of a hydraulic ram, the metal, which is in plastic condition, is forced through the die, issuing therefrom as rods or tubes of the required section and of a length governed by the quantity of metal placed in the container. In this way metallic sections are produced in complex designs with re-entering angles which it would be impossible to roll or draw. An admixture of brass and nickel pro¬ duces the white metal known as German silver, used in the manufacture of

spoons, forks and other articles which, when plated, have the ap¬ pearance of silverware. Sheet copper and copper rods are rolled at a red heat from cast plates and bars and, when a fine surface is required, they are finished by cold rolling or drawing. In the rolling of brass and copper the accumulation of clean scrap metal is re¬ melted and used.

Alfred A. Cowles,

Late Vice-President of The American Brass Company.

COPPER CLIFF, Canada, a town in the Sudbury district of Ontario, on the Sault Sainte Marie section of the Canadian Pacific Railway four miles west of Sudbury. The neighbor¬ hood is rich in copper and nickel. An electric railway now connects with Sudbury. Pop.

3,082.

COPPERAS, the commercial name for fer¬ rous sulphate, or green vitriol. (See Iron). Its formula is FeS047H20. Copperas occurs native, as the mineral melanterite (q.v.), com¬ monly in connection with deposits of pyrites, from which it is derived by oxidation.

COPPER, or ATNA, RIVER, a stream in Alaska, rising in the neighborhood of Mount Wrangell, flowing in a generally southerly direc¬ tion west of that mountain, and emptying into the Gulf of Alaska about 30 miles west of Chilkat. The length of the river is a little over 300 miles. Its name is due to the alleged fact that its waters hold copper in solution. Its basin has an area of about 23,000 square miles. Its course reveals a reverse topography, for though it originates in a mountainous region, its upper course lies through a broad plain, while its lower course carries it through the Chugach Mountains. Consult Mendenhall, (Geology of the Central Copper River Region, Alaska) (in United States Geological Survey, House Document No. 197, Washington 1905).

C'OPPERFIELD, David. See David Cop-

PERFIELD.

COPPERHEAD (Ancistrodon contortrix) , the most widely distributed, and in many places the most abundant of the venomous snakes occurring in the eastern United States. It belongs to the family Crotalidce (q.v.), but with the water moccasin belongs to a genus (Ancis¬ trodon), distinguished from the rattlesnakes by the absence of rattles, while the copperhead is peculiar in the presence of a small additional plate between the eye and nostril. The copper¬ head seldom exceeds a length of three feet. It is brown, with a series of dark blotches on the back, and the triangular head is a bronzy red, from which circumstance it takes its name, while the white color of the interior of the mouth has given rise to another of its names, that of cottonmouth, also applied to the water moccasin. It is sometimes called the red viper. Like other poisonous snakes the copperhead has been exterminated in the thickly settled parts of the northern States, but is still abundant in unsettled regions and in the South. It is par¬ tial both to the neighborhood of water and to dry rocky hills and, owing to its activity, its silent approach and its irascible temper, is justly feared by man and the lower animals, in¬ cluding non-venomous snakes. Some of the lat¬ ter, as the blacksnake, will, however, attack and eat it. The customary food of the copperhead consists of small birds and mammals. About seven or eight young are produced at a time, this snake being viviparous ; it is said that when preg¬ nant a large number of females will sometimes twine themselves together, whence the epithet ˆcontortrix.® As a poisonous snake the copper¬ head, as well as many harmless American snakes, is sometimes called an adder or viper, though in common with all related poisonous serpents of North America, it differs from the true vipers in the presence of the preorbital sensory pit. In

England adder is the name applied to the only native venomous serpent, the Pelias bents.

COPPERHEADS, a name applied in 1862 and throughout the Civil War to members of the Democratic party in the northern States who violently opposed the prosecution of the War. They

were not necessarily in sympathy with the South, but in all events they held that the Confederacy could never be conquered, and that the attempt to coerce the seceding States was hopeless and illegal. The name was gen¬ erally indicative of a treacherous character, and was a reference to the habit of the copperhead snake, which strikes without warning. Another explanation of the name is that it came from the button cut out of a copper cent, on which was the head of the Goddess of Liberty, worn by the opponents of the war. The most prom¬ inent and obnoxious of the copperheads was Clement L. Yallandigham (q.v.).

COPPERMINE RIVER, in Canada, near Coppermine Mountain. It has its source in Point Lake and flows into Coronation Gulf, an arm of the Arctic Ocean, near Duke of York's Archipelago, lat. 68° N., long. 116° W. Its length is about 325 miles; but the large number of waterfalls along its course render it useless for any travel except by light canoes.

COPPICE. See Copse.

COPPIN, Fanny Muriel Jackson, Ameri-

ican negro educator: b. Washington, D. C., 1846; d. Philadelphia, 21 Jan. 1913. She was born in slavery and her freedom was purchased by an aunt when Fanny was about 12 years of age. At 15 she went to Newport, entered the service of the Calvert family, and in her spare time managed to acquire the rudiments of an education. Later she entered Oberlin College, and was the first colored woman in the United States to graduate from a recognized college. She taught a class in the preparatory depart¬ ment at Oberlin with conspicuous success and soon after the outbreak of the Civil War was called to the Institute for Colored Youth in Philadelphia,ˆ of which she became director in 1869. For 35 years her career in Philadelphia was one of intense activity, acknowledged ability as an educator and distinction as a leader in every good cause for the promotion of the betterment of the colored people of her city and the country at large. She organized the Colored Woman's Exchange, and an Indus¬ trial School as part of the Institute. In 1888 she visited England to attend the Missionary Congress and there most eloquently pleaded her cause. In 1881 she married the Rev. Levi J. Coppin, who in 1900 was elected bishop and assigned to work in South Africa. She re¬ signed her connection with the Institute in Phil¬ adelphia and set about founding the Bethel Institute at Cape Town. The last months of her life were spent in preparing for the press her (Reminiscences of School Life and Notes on Teaching. >

COPPINGER, John Joseph, American military officer: b. Ireland, 11 Oct. 1834; d. 1909. After obtaining a military education in Ireland he went to Rome, serving in the papal army as aide-de-camp. He came to the United States in 1861 and was given a commission in the Union army, rising to the rank of briga¬ dier-general in the regular army in 1895. In the

war with Spain, as major-general of volun¬ teers, he commanded the 4th Army Corps in Porto Rico. He married Alice, daughter of the late James G. Blaine (q.v.). He was re¬ tired in 1898.

COPRA, the dried kernel of the cocoanut, from which the oil has not yet been expressed, a considerable article of commerce in some tropical regions. Samoa and the Fiji Islands export more than 10,000 tons annually, Tahiti about 2,000 and Ceylon 3,000 tons. From it cocoanut oil and cocoa butter are manufactured, and the residuum after expression is an excel¬ lent fodder, with many of the nutritive prop¬ erties of cottonseed-oil cake. Copra, either sun-dried or kiln-dried, contains 50-65 per cent of oil, while hot air dried may run as much as 74 per cent.

COPROLITES, the term originally ap¬ plied to the fossil excrements of extinct ani¬ mals, especially fishes and reptiles, found most abundantly in the lias, greensand and Suffolk crag. They consist chiefly of phosphates of calcium (from 50 to 75 per cent) and magne¬ sium, and the carbonates of the same metals, and organic matter, and as the fertilizing prop¬ erties of these are well known, coprolites have been largely used as a manure. For this pur¬ pose they are reduced to powder and used as ground bones, or treated with sulphuric acid, so as as to form superphosphate of lime. To the scientist these remains have a definite value as indicating the prey of the animal in question and the nature of its intestinal structure.

COPSE, kops, a cultivated wood, where the trees are cut periodically, before they attain timber size, each succeeding crop b£ing cut from the stumps of the first growth. A copse or coppice is sometimes used as an ornamental growth, where large trees would not be desir¬ able, but their chief use is as a source of profit. When cultivated under the rules of scientific forestry, they may be made a very valuable adjunct to the farm lands. The practice is not common in America, where the idea of profit from woodland is that the land must be allowed to grow up to timber, and then be entirely denuded. In Europe, particularly in England, the most valuable tree thus employed is the oak, which is cut at intervals varying, according to soil and climate, from 12 to 30 years; and after paying all expenses it often yields from $150 to $250 per acre in bark used for tan¬ ning and in wood convertible into wheel-spokes, or applicable to other purposes. The stems, cut over near the ground, are carefully dressed and rounded, so as to prevent them from rot¬ ting; in a short time a number of shoots appear, all of which are thinned away except three or four of the most promising, which are left to grow till they again become fit for another cutting. When plantations are exten¬ sive, the method usually followed is not to allow all the copse to come to maturity at the same time, but to divide it into a number of sections and to cut one of them annually, so as to yield a revenue with as much regularity, and not infrequently to as large an amount as an equal quantity of land under cultivation. For instance, a copse of 100 acres, on the assump¬ tion that it may be profitably cut after 20 years' growth, is divided into 20 sections of five acres each. By cutting only one of these sections

annually a perpetual succession of cuttings is obtained, yielding, on the most moderate cal¬ culation, a clear income of at least $500 per annum. The proprietors of man> of the rocky glens of Great Britain, by pursuing this method, have materially increased the value of their estates. The other kinds of wood commonly used for copse are chestnut, which, from its durability, even when partly inserted in the ground, is valuable for posts, etc. ; ash, pre¬ ferred for all purposes where strength and elasticity are required; and hazel, admirably adapted for barrel hoops, and in great demand for crates in the vicinity of potteries. The wil¬ low, well known for its uses in baskef-making, being cut down regularly after every year's growth, scarcely falls under the head of copse. In some continental countries the copse is the source of the whole fuel supply.

COPTIC LANGUAGES, the language for¬ merly spoken by the Copts or Egyptian Chris¬ tians and regarded as the direct descendant of the ancient sacred language of the Egyptians. As such it has afforded to Champollion, Dr. Young and others the key to the interpretation of the Egyptian hieroglyphic inscriptions. At the time of the introduction of Christianity among the Copts the hieroglyphic, hieratic and demotic modes of writing previously in use in Egypt were abandoned, and the Greek alphabet was adopted, with the addition of six charac¬ ters of the demotic alphabet, which were re¬ tained because the equivalents to them were wanting in the Greek alphabet. These six let¬ ters represented kh, h, f, the English j and two forms of sh. By the time that this change was made the Coptic language was no longer the same with the ancient sacred language, but had adopted a number of words from the ver¬ nacular language which was spoken in Egypt alongside of the former, besides a large number of others from the Greek, the Latin, the Arabic and other sources. It still remained, however, essentially Egyptian. The Coptic language is monosyllabic in character. All its radical forms are monosyllables, and whenever a polysyllabic word is met with it may be at once affirmed that the word is either a derivative or a com¬ pound. As a rule the radicals are capable of certain modifications of form, which always express a modification also of the sense. The meaning of the radical monosyllables is in fact changed by the juxtaposition of other monosyl¬ lables, which are the usual signs of genders, numbers, persons, moods and tenses. The feminine is sometimes formed by a modification of the vowel of the masculine. In the Coptic root syllables there are often final consonants which do not form part of the root. These are called paragogic letters, and can only be ex¬ plained as instances of the caprice of pronun¬ ciation, or as being originally part of the root both in spelling and pronunciation, although in course of time they have been dropped so far as the pronunciation is concerned. According to the German philologist, Schwartze, the Coptic may be taken as forming a family of languages analogous to the Semitic in its gram¬ mar, and allied to the Indo-European languages in its roots. This opinion is supported by vari¬ ous other philologists, such as Bunsen, Meier and Botticher, but it is contested by others, among them Pott, Ewald, Wenrich and Renan.

The Coptic language is divided into three dialects — the Theban, which was spoken in Upper Egypt, and. which is the best preserved of the three; the Memphitic, or Coptic, strictly so called, which was spoken in Lower Egypt ; and the Bashmuric, which was spoken in the Delta. Of the last the literary remains are very scanty, but it is that which comes nearest to the hieroglyphic language of the ancient Egyptians. After the Arabian conquest of Egypt the Coptic language gradually ceased to be spoken, and as early as the 10th century it was no longer in use in Lower Egypt, except in their church liturgies ; in Upper Egypt, how¬ ever, it maintained itself for some centuries longer, but here also it was at last obliged to give way to the Arabic. The theological writ¬ ings in use among the Coptic Christians, how¬ ever, are still written in the Coptic language, but an Arabic translation always accompanies them. In the schools the children learn the Gospels and the epistles of the New Testament in Coptic as well as Arabic, but they are no longer taught the former language grammati¬ cally. In the various libraries of Europe there are numerous Coptic manuscripts, but most of them are of little interest. The Coptic litera ture is almost entirely of a religious character, the works written in it comprising portions of the Old Testament, the Acts, sermons and homilies, martyrologies, etc. Translations of the Pentateuch and some other books of the Old Testament and of the Gospels into Coptic have been published at Rome. One of the most valuable discoveries of Coptic literature — prac¬ tically the whole library of the old Coptic monas¬ tery of Saint Michael in the Egyptian Fayyum, was acquired by the late J. Pierpont Morgan in 1911, and placed by him in the J. Pierpont Mor¬ gan Library in New York city. It consisted of 50 volumes, and these are being edited for pub¬ lication by Professor Hyoernat of the Catholic University of Washington. The larger part consists of manuscripts of books of the Bible of the 2d century of our era, and the remainder of liturgical books and treatises by the old monks of Alexandria. These are the oldest manuscripts known, and the fine bindings are the choicest and oldest existing in any library. Materials for the study of the Coptic language will be found in the grammars of Schwartze (Berlin 1850), Uhlemann (Leipzig 1854), and Stern (Leipzig 1880), and the dictionaries of Peyron (Turin 1835, still considered the best) and Parthey (Berlin 1844). Consult Loret, (Manuel de la langue egyptienneP

COPTINE, a colorless alkaloid which is said to have been found together with ber- berine in the root of Coptis trifolia. Coptine dissolves in sulphuric acid, the solution becom¬ ing purple-red when heated; it gives a crys¬ talline precipitate with a solution of mercuric potassium iodide.

COPTIS, a genus of low herbs of the crow¬ foot family (Ramin culacece .) It comprises about nine species occurring in the cooler parts of the northern temperate zone. Four species are found in America, three of them on the Pacific Coast. C. trifolia , gold-thread or canker- root, grows in damp woods and bogs from Nawfoundland to Maryland, and westward and north to Minnesota, British Columbia and Alaska. Its common name of canker-root is

given to it because of its use in household medicine as a cure for cankerous affections of the mouth in children. A yellow dye is ex¬ tracted from the slender yellow root stock. C. teeta is used in India as a tonic.

COPTS, a name given to the schismatic Christians of Egypt who are of the Mono- physite sect, similar in belief with the Jacobites of Asia. The Monophysites and Jacobites are followers of Dioscurus, patriarch of Alexan¬ dria, who was deposed by the Council of Chal- cedon in 451, because he maintained there was only one nature in Christ. The Copts were of pure Egyptian blood, and at first were more numerous than their adversaries, the Melkites, who were Greeks in origin and believers in Christ as taught by the Church. Officials who were considered orthodox were sent from Con¬ stantinople to govern Egypt, and many of the Copts fled to Upper Egypt and some went to the Arabs. So incensed were they with their rulers that when an opportunity occurred, they betrayed their country to the Saracens, who drove the Greeks and Romans out of the land. But the Copts soon' found that their privileges would be of little avail, and their wealth, numbers and respectability rapidly de¬ clined, and though rarely intermarrying with their conquerors, and preserving their features, manners and religion unaltered, they soon lost their language, which had resisted the influence of a Grecian court for so many ages. In per¬ son and features the Copts differ much from the other natives of Egypt, and are evidently a distinct race. According to the younger Champollion they are the result of a mixture of all the different races that have ruled over Egypt. Reduced by a long course of oppression and misrule to a state of almost degradation, their number and national character have de¬ clined; their number was estimated in 1907 at 706,322. Their costume resembles that of the Moslems, but they are in the habit of wearing a black turban for distinction's sake. They also commonly wear a black or dark-colored outer robe. In their general customs there is

little to distinguish them from the other inhabitants of the country. They are chiefly employed as clerks, secretaries, etc. The women go out with veiled faces, like the other females of the coun¬ try. They have numerous schools for their male children, but very few of the females are taught to read. In doctrine they agree almost wholly with the Roman Catholic Church, ex¬ cept on the one point which caused the sepa¬ ration, — the two natures in Christ. They cele¬ brate mass in the old Coptic language, as with them now the Arabic is the common tongue. Their supreme head is the Monophysite patriarch of Alexandria, who is chosen from among the monks ; then come the bishops, priests, deacons, inferior clergy and monks. The priests may be married according to the Eastern discipline, and as they receive but little by way of support from their congregations, they are generally engaged in the ordinary occupations of the place in which they live. (See Jacobite Christians ; Melchites). They have four seasons of fasting, all of which are scrupulously observed. Their Lent begins nine days earlier than that observed by the Roman Catholic Church. The doctrine of the sacra¬ ments does not vary from that of the Latin

Church, but they have a peculiar ritual in the administration of the sacrament of extreme unction, which they give with the sacrament of penance, even when there is no bodily illness, to heal the disease of the soul. The curious custom exists of blessing the bathing water stored in large tanks ; and to appease or please the Mohammedans, they have adopted circum¬ cision. Within recent years a large body of the Copts made corporate reunion with the Roman Catholic Church, and there is a Catholic Vicar Apostolic of the Coptic rite for the Copts of Egypt.

The Coptic language flourished from the 3d to the 16th century, but is now extinct as a vernacular. It is of great linguistic im¬ portance because of its descent from the Ancient Egyptian. Its literature is of little importance; it borrowed extensively from Greek and Latin but is free from any ad¬ mixture of Arabic. It was divided into five principal dialects — the Sahidic and Achmimic in Upper Egypt, the Boheiric and Memphitic in Lower Egypt, and the Fayumic, or so-called Bashmuric in Central Egypt. The Sahidic is the liturgical dialect of the Coptic Church and in it is contained by far the greater amount of the Coptic literature extant.

Bibliography. — Kircher, (Prodromus Cop- tus sive ˆEgyptiacus) (Rome 1636) ; (Lingua .Egyptiaca Restituta) (ib. 1644) ; Loret, (Manuel de la langue egyptienne) (Paris 1892) ; Rosellini, (Elementa Linguae Egyptiacae sive Copticae) (Rome 1837) ; Peyron, rammatica Linguae Copticae) (Turin 1841) ; id., (Lexicon Linguae Copticae' (ib. 1835) ; Schwartze, (Koptische Grammatik) (Berlin 1850) ; Stern, (Koptische Grammatik) (Leipzig 1880) ; Steindorff, (Kop tische Grammatik) (Berlin 1894) ; Strzygowski, J., (Hellenistische und koptische Kunst in Alexandria) (Vienna 1902) ; Tattam, (Com¬ pendious Grammar of the Egyptian Language) (London 1830; 2d ed., 1863); id., (Lexicon Egyptiaco-LatinunV (Oxford 1835) ; Parthey, (Vocabularium Coptico-Latinum et Latino- CopticunP (Berlin 1844) ; Uhlemann, (Linguae Copticae Grammatica (Leipzig 1853) and (introduc¬ tion by J. Strzygowski to R. Haupt's (Katalog 5> (Halle 1905).*

COPY (Lat. copia, ˆabundance®). (1) In ancient times, when the art of printing in its improved form was unknown, the copyist was a much esteemed person, and manuscript was multiplied by the laborious process of writing by hand. Some of the Roman slaves were copyists. From the early centuries of Chris¬ tianity through the Middle Ages, and until the art of printing became popular, there were in each monastery certain monks who were copyists. Their whole time was occupied with transcribing manuscripts of the ancient classics, the writings of the fathers and doctors; but their chief care was the making of copies of the Bible. Often days were spent upon ornament¬ ing an initial letter or in decorating the names of the Deity. The preservation of the Bible in its present form, and of ancient classics in general, is due to the faithful work of the old copyists. Copies of books in those days were of great value, often they were carried under guard from place to place when the owner was traveling, and the copy of the Bible was usually chained in the parish church.

(2) The matter, whether in print or manuscript, sent to the printer to be set up in type. (3) An exact reproduction of a work of art made by one otheV than the original artist ; a copy made by the original artist is called a replica; a copy of statue or other piece of sculpture, taken from a mold, is called a cast.

COPYHOLD, in English and Irish law, a tenure of estate by copy of court roll, or a tenure for which the tenant has nothing to show except the rolls made by the steward of the lord's court. Copyhold property cannot be now created, for the foundation on which it rests is, that the property has been possessed time out of mind, by copy of court roll, and that the tenements are within the manor. The method of conveyance of such property is by surrender and admittance, i.e., the holder surrenders it to the lord of the manor, whose steward, on receiving a fee, transfers the copyhold to the person in question, who again swears fealty. The heirs must pay the fee of admittance in order to retain the property. Copyhold land may be converted into freehold by agreement between the lord and the occupants ; and the lord or tenant may, by paying a fixed sum or an annual rent (the amount to be fixed by com¬ missioners), compel the enfranchisement of the copyhold. Copvhold does not exist in the United States. Consult Scriven, (Treatise on Copyhold, Customary Freehold, > etc. (7th ed.,

1896).

COPYING, a term in general use for a great many different processes, which may be described generally as the reproduction, usually either on an enlarged or reduced scale, of any drawing, map or other work of art. A few of the methods employed may be shortly described. If the copy is to be the same size as the original, the easiest way is to trace it. A piece of trac¬ ing-paper is put over the drawing, and the principal lines gone over with pencil. The back of the tracing is then rubbed with black lead or ruddle, and put on the paper on which the copy is to be made ; the traced lines are gone over with a hard point, and thus indicated on the paper. Guided by the traced lines, the copy can then be drawn in. When the copy is required of a different size from the original, the sim¬ plest way is to sketch it by hand and eye but where more mechanical accuracy is required, the method of squares is very useful. The original is covered with squares of any convenient size by pencil lines or threads or by tracing paper ruled off in squares ; a piece of paper for the copy is prepared with a corresponding number of squares, of a smaller or larger size, accord¬ ing as the copy is wanted smaller or larger. These squares must bear the same proportion to the squares on the original as the copy is to bear to the original. It is then a compara¬ tively easy matter to copy in each square the part of the original -in the corresponding square. To avoid confusion if the squares are small, it is well to number them along each side of the drawing. Any drawing consisting principally of straight lines, such as a plan, can be con¬ veniently reduced by constructing a scale to suit the reduced size required. The lines of the original are measured by its scale, and the same proportion of the smaller scale gives the neces¬ sary measurement. The pantograph is another means of making a reduction or enlargement,

blit is very seldom used now. It is only ac¬ curate in a general way. Perhaps the simplest and most exact method is to get the original photographed to the required size; the copy can then be traced on to clean paper as already described.

The copying of letters and other docu¬ ments for commercial purposes is usually done by means of the ordinary copying-press, which is so familiar in every counting-house as to need no detailed description. A letter written with specially prepared ink is transferred to another piece of paper by means of damp and pressure. Common ink thickened with a little sugar will serve as copying ink. Many modifi¬ cations of this arrangement have been devised for producing a number of copies of circulars, etc., from one written copy, and are known as '^graphs.® A document written with the ink prepared for the purpose is transferred by pres¬ sure with the hand to a gelatinous slab, from which as many as 50 or 60 copies, more or less distinct, can be retransferred by rubbing with the hand. A very useful method of manifold writing is largely employed in telegraphic news work, and for duplicating invoices by retail tradesmen. Carbonized paper is put between two, three or more sheets of thin paper, and thus whatever is written on the top sheet with a hard pencil is duplicated on the others. When an indefinite number of copies or any drawing or other subject is required, there are many printing processes which may be em¬ ployed. Letters or circulars, if written with lithographic ink, can be transferred to stone, and any number printed. Engineers' or archi¬ tects' drawings, or any other drawing executed in line, can be very successfully reproduced in any size by the photo-lithographic process, which depends on the action of light on citrate of iron and prussiate of potash. (See Pho¬ tography). If required for block or letterpress printing, then any of the zincotpye processes

may be employed. By this process, also, plates to reprint steel-engravings can be produced from any printed engraving. For reproducing drawings executed otherwise than in line, pho¬ tographs from nature, or paintings, there are many other processes.

COPYING MACHINE, any one of a

number of contrivances by which one or more copies of a letter or other document may be made. Perhaps the best known is the copying- press. The letter is written with ((copying ink,® a writing fluid containing some gummy sub¬ stance which prevents the ink from soaking into the paper. A sheet of bibulous tissue paper moistened with water to a certain degree is laid on the face of the writing, a sheet of oiled paper is laid on the tissue paper and the letter is placed between boards and put into a press, the platen of which is screwed down tightly. A few seconds' contact of the damp tissue paper with the writing transfers sufficient of the ink from the original to the tissue to make a perfect copy. A number of letters simi¬ larly treated may be copied by one operation of the press, and by the use of very thin. tissue and longer impression three or four good copies of a letter may be taken. Among copying processes are many that are perhaps rather methods of reproduction in bulk instead of copying in a more limited way, being somewhat

akin to printing. Among these are lithography (q.v.) and the mimeographic process. The mimeograph consists of a stylus, moving over a sheet of tissue paper, coated on one side with some sensitive material. This paper is placed on a steel plate, upon the surface of which are cut intersecting corrugations. When the stylus is moved over the paper, it presses the latter down on the corrugations and these pierce the paper along the line of writing. The paper is then placed on a perforated cylinder; ink is forced through the perforations of the cylinder and paper is fed to the cylinder, as in any small printing press. The ink coming through the perforated line on the special paper makes a print on the sheets of paper fed to the cylinder and an indefinite number of copies may be struck off. The paper film is also adapted so that it may be placed on an ordinary typewriter, the ink ribbon of the latter is removed and the stencil is cut by the type bars operated in the ordinary manner. The stencil is then placed on the printing cylinder and copies made in the manner described above for the stencil cut by the stylus.

COPYRIGHT, the exclusive right of prop¬ erty in any intellectual production ; the protec¬ tion afforded by the law for a limited number of years to the originator of any written or printed composition or work of art, or to his heirs and assigns, whereby persons unauthorized are prevented from multiplying and selling copies, or, in case of dramatic works, from representing them on the stage. Such rights were claimed by authors before the introduction of printing. After the invention of the printing press, the right to publish books became the subject of licenses and patents. In Chambers' (Domestic Annals of Scotland, } under date of 9 Nov. 1699, may be seen a warrant of the Privy Council authorizing George Mossman, stationer in Edinburgh, —

— "to print and sell the works of the' learned Mr. George Buchanan, in one volume in folio, or by parts in lesser vol¬ umes, and forbidding all others to print, import, or sell the whole or any part of the said Mr. George Buchanan's works in any volume or character, for the space of 19 years."

Similar privileges were granted in England; but all such monopolies were regarded with suspicion by common lawyers. The common law affords a certain measure of protection to works unpublished or published only for a limited pur¬ pose. The writer of a letter, for example, trans¬ fers his property in it to the receiver; but the receiver has no right to print it for sale or dis¬ tribution without the writer's consent. The copyright in published works is the creation of statute; the first copyright act was passed in 1709; and by virtue of its provisions authors acquired the sole liberty of printing their books during a term of 14 years from first publication, and, if the author should be living at the end of that time, during a further term of 14 years.

While this act was in force, Thomson sold the copyright of his poems to Millar, a London bookseller. Millar claimed the right to prevent the issue of reprints by Donaldson (of Edin¬ burgh) and others, even after the statutory term had expired, on the ground that an author had, at common law, the sole right of printing his works. Out of this dispute arose the famous cases of Millar v. Taylor, and Donaldson v. Beckett, which led to a remarkable difference of

opinion among the judges. The House of Lords decided that if any common-law right existed it had been taken away by statute.

At the union with Ireland, the copyright act was extended to that country, and the trade in cheap editions printed in Dublin and secretly imported into Great Britain came to an end. In 1814 the term of copyright was extended to 28 years, and the residue of the author's life if he were living at the end of the term. The impetus given to literature at the beginning of the 19th century, and especially the popularity attained by the works of Scott and Byron, greatly increased the market value of copy¬ right, and ultimately led to further legislation in the interest of authors and publishers. The basis of the existing law is the copyright act of 1842, commonly known as Talfourd's Act, or Lord Mahon's Act. Macaulay's speech in the House of Commons on the second reading of this measure is one of his most successful parliamentary efforts. In Great Britain the term of copyright in a book is 42 years, or the life of the author and seven years, which¬ ever of the two terms is the longer. No copy¬ right can be enjoyed in seditious or immoral publications, or in books first published out of the United Kingdom. Articles contributed to encyclopaedias and periodicals and books pub¬ lished in parts or series belong to the proprietor ; but he may not publish them separately without the writer's consent, and after 28 years the copy¬ right reverts to the author. Dramas and mu¬ sical pieces, if first published in book-form, are subject to the same rules as books; but if they are performed in public before appearing in print the author retains the sole right of permit¬ ting them to be presented during the term of copyright; and this right is distinct from the copyright he acquires if his drama or piece is published as a book. By an act of 1882 the proprietor of a piece of music, desiring to re¬ serve the right of performance, must give notice to that effect on the cover. Verses may not be taken from a copyright work and set to music for sale, without permission. A novel may be dramatized without the author's permission ; but if copies of the drama are published containing passages borrowed in substance from the novel, the author of the adaptation is liable to an ac¬ tion. The right to dramatize can be exercised only with precautions which must greatly re¬ strict it in practice.

Copyright in engravings, maps, etc., is se¬ cured by several acts ; the term is 28 years. Each plate and print must bear the name of the proprietor. Copyright in paintings, draw¬ ings and photographs is secured to the artist during his life and seven years after, by an act ©f 1862. In 1874 the Canadian Copyright Act enabled a British author to obtain copyright in Canada for 28 years, provided his < work be published in the colony. This right is concur¬ rent with and in addition to

the rights given by the Imperial Act of 1842.

Prior to the enactment of the first Federal Copyright Law, the various States of the Union had individual copyright laws, having in view the same general purposes, expressed in the Federal Act, that is, to secure to authors or publishers of new books the copyright of such books, and for the encouragement of literature and genius, which laws, generally speaking, fol¬ lowed a resolution of the United States Con¬

gress passed 2 May 1783, recommending that the several States secure to the authors and publishers of books and publications the ex¬ clusive benefits derived from the sale of such publications for a limited period. By virtue of the authority of the Constitution of the United States 17 Sept. 1787, Art. 1, Sec. 8: ((The Con¬ gress shall have power to promote the progress of science and useful arts, by securing for limited times to authors and individuals, ex¬ clusive right to their respective writings and discoveries. w

The act of 1790 made it possible to secure copyright protection for copies of maps, charts and books, and by an act of 29 April 1902, the benefits of copyright were extended to the arts of designing, engraving and etching, historical and other prints, and there have been many subsequent acts enlarging the scope of the copy¬ right act, and providing for reciprocal pro¬ tection of copyright matter, with various foreign countries.

Under the authority of the Constitution, as above mentioned, Congress, on 4 March 1909, passed an act to amend and consolidate the pre¬ vious acts respecting copyright. This act of 1909 was amended 24 Aug. 1912, 2 March 1913, 28 March 1914, which acts are now in force, and upon complying with their various provisions, the exclusive right to print, reprint, publish, copy and vend the copyright work, to translate the copyrighted work into other languages, or dialects, to make other versions of it if it be a literary work, and to dramatize it if it be a non-dramatic work; to convert it into a novel or other non-dramatic work if it be a drama, to arrange it or adapt it if it be a musical work; to complete, execute and finish it if it be a model or a design for a work of art; to deliver or authorize the delivery of the copyrighted work in public for profit, if it be a lecture, sermon, address or similar production ; to per¬ form or present the copyrighted work pub¬ licly, if it be a drama, or if it be a dramatic work, and not reproduced in copies for sale; to vend any manuscript, or any record whatso¬ ever thereof ; to make or to procure the making of any transcription or record thereof by or from which, in whole or in part, it may in any manner or by any method be exhibited, per¬ formed, represented, produced or reproduced; and to exhibit, perform, represent, produce or reproduce it in any manner or by any method whatsoever, and to perform the copyright work publicly for profit if it be a musical composi¬ tion, and for the purpose of public performance for profit ; or to print, reprint, publish, copy and vend any arrangement or setting of it or of the melody of it in any system of notation or any form of record, in which the thought of an author may be recorded, and from which it may be read or reproduced.

Books, including composite and cyclop-edia works, directories, gazetteers and other composi¬ tions, periodicals, newspapers, lectures, sermons, addresses (prepared for oral delivery), dramatic or drhmatico-musical compositions, maps, works of art, models or designs for works of art, reproductions of a work of art, drawings or plastic works of a scientific or technical char¬ acter, photographs, prints and pictorial illus¬ trations, motion picture photoplays, motion pictures other than photoplays, are by acts of 1909, 24 Aug. 1912, 2 March 1913 and 28

March 1914, made the subject matter of copy¬ right protection.

Prior copyright laws required samples of the object upon which copyright protection was sought, to be marked with copyright notice and filed with the Librarian of Congress, before publication. The present Copyright Act of 1909 permits publication of the matter for which copyright is claimed prior to filing with the Register of Copyrights at Washington, D. C. No copyright is valid unless "Notice® of the claim is placed in some manner upon the article or object in which copyright protection is sought. Publication by a person entitled to the benefits of the act, with the copyright notice thereon, "secures® to such person the copyright, and the notice must be affixed to each copy published or

offered for sale in the United States by the proprietor, or with his authority, except in case of books seeking "ad interim® protection. The copyright proprietor may obtain registration of his claim to copyright, after publication with the notice of the claim thereon, by filing promptly with the Register of Copyrights two complete copies of the best edition then published, except in the case where the work is by an author who is a citizen or a subject of a foreign state or nation and has published in a foreign country, in which case one complete copy of the best edition then published in the foreign country may tbe filed. Should the copyright proprietor after publication with notice fail to file the necessary copies with the Register promptly, the Register may, at any time after publication of the work, upon actual notice, require the copies to be deposited, and if the demand is made and not complied with within three months from any part of the United States except an outlying territorial possession of the United States, or within six months from any outlying territorial possession of the United States, or from any foreign country, the proprietor of the copyright will be liable to a fine of $100 and to pay to the Library of Congress twice the amount of the retail price of the best edition of the work, and the copyright shall become void.

Books, including composite and cyclopedic works, directories, gazetteers and other com¬ pilations, periodicals, which include newspapers, except the original text of a book of foreign origin, or in foreign language other than Eng¬ lish, must be printed from type set within the limits of the United States, or from plates made within the limits of the United States, and if the text is produced by a lithograph process or photoengraving process, the processes must be performed within the limits of the United States, and the printing and binding must be done in the United States. These requirements extend to illustrations in books and illustrations produced by lithographic process or photoen¬ graving process and to separate lithographs or photoengravings, except where the subjects represented are located in a foreign country, and illustrate a scientific work, or reproduce a work of art. These requirements do not apply to works in raised characters for the use of the blind, or to books of foreign origin in other than the English language.

Upon filing application for copyright a fee of $1 is required, for which the Register makes an entry of the copyright and issues to the proprietor or claimant a certificate of registra¬ tion under seal. Where the copyright protec¬

tion is sought on photographs, and where no certificate is required or demanded by the ap¬ plicant, a fee of 50 cents is charged.

Copyright protection endures for 28 years from the date of first publication, and a renewal term of 28 years may be had upon application for an extension made within one year prior to the expiration of the original term of copyright, and this right of renewal not only applies to the author himself, but to the widow, widower or children of the author, if the author be de¬ ceased, or if such author, widow, widower or children be not living, then to the author's executors, and in the absence of a will, the next of kin to the author is entitled to the re¬ newal and extension of a copyright under the same provisions as to filing application for renewal that characterizes the original applica¬ tion.

If the owner of a copyright has complied with all of the requirements of the law, in obtaining the copyright and has a certificate of registration, he may bring suit for infringement of the copyright, the remedy being in the way of an injunction restraining such infringement and damages which have been suffered by the copyright proprietor due to the infringement, as well as all profits which the infringer shall have made, for such infringement, or in lieu of actual damages and profits, the court may assess such damages as it may think the infringement warrants.

No action for copyright infringement can be maintained until the copyright protection is com¬ pleted by the insurance of a certificate of regis¬ tration, and the claimant must have marked or given notice of claim of copyright in the manner prescribed by the law.

The notice of copyright required, if the work be a printed literary, musical or dramatic work, is "Copyright® or abbreviated "Copr.® ac¬ companied by the name of the copyright pro¬ prietor, and the notice must include also the year in which the copyright was secured by publication, or when it was first published. Certain subject matter of copyright productions, maps, works of art, models or designs for works of art, reproductions of work of art, drawings or plastic works of a scientific character, photo¬ graphs, prints and pictorial illustrations, may be marked with the letter "C® enclosed within a circle, thus — (c) — accompanied by the initials, monograms, mark or symbol of

the copyright proprietor, provided that on some accessible portion of such copies of the margin, back, per¬ manent base, pedestal or of the substance on which such copy shall be mounted, the name of the copyright proprietor appear, except in cases where a copyright subsisted when the act of 1909 went into force, or 1 July 1909, in which cases the notices prescribed by prior acts are sufficient.

What is called "ad interim® copyright pro¬ tection may be obtained for a book published abroad in the English language or before publi¬ cation in this country by deposit of one complete copy of the foreign edition in the copyright office in the United States at Washington, not later than 30 days after its publication abroad, with request for reservation of the name and nationality of the author and of the copyright proprietor and of the date of publication of the book, and such protection will endure for 30 days after the deposit in the American office,

and if an authorized edition of such book is published within the United States within the 30-day period, and the copyright act is otherwise complied with, the protection will be extended to endure for the full term provided by the copyright act.

Copyrights secured under the provisions of the copyright act may be assigned, granted or mortgaged by an instrument in writing signed by the proprietor of the copyright, or may be bequeathed by will, but where an assignment is made, it must be recorded in the copyright office within three months after its execution in the United States or within six months after its execution outside of the limits of the United States, otherwise it will be void as against any subsequent purchaser or mortgagee for valuable consideration without notice, whose assignment has been duly recorded. Under the copyright act, original jurisdiction is given the District Courts of the United States and the District Court of any territory and the Supreme Court of the District of Columbia and the District Courts of Alaska, Hawaii, Porto Rico and the Courts of First Instance of the Philippine Islands. Where the article to be copyrighted comes properly under the head of ((Label® or ftPrint® which comprises artistic matter, for use upon merchandise or for advertising merchan¬ dise, it is registrable in the United States Patent Office by complying with certain rules and regulations made by the Commissioner of Patents, but the label or print must have upon it, when first published, the copyright notice as prescribed by the copyright act. The authority for this Patent Office registration is contained in the act of 18 June 1874, relating to the regis¬ tration of prints and labels, and section 3 of the act is not repealed by the copyright act of 4 March 1909, or any acts in the interim between 18 June 1874 and 1909, and it provides that no prints or labels designed for use on any other articles of manufacture shall be entered under the copyright law, but may be registered in the Patent Office.

Until 1891, copvright could be acquired only by a 'citizen of, or permanent residence in, the United States. British and other authors had much reason to complain of this state of the law, and American authors were injured by having to compete with cheap, unauthorized re¬ prints of foreign works, but this condition no longer exists, and there is in most instances a very good understanding between the United States and foreign nations in copyright matters.

Foreign Works. — There was at one time an understanding that the American publisher who first placed a British work on the market ob¬ tained copyright by courtesy ; and considerable sums were paid for ((advance sheets® in order to obtain this advantage, but the <(courtesy of the trade® came to be disregarded. In Decem¬ ber 1887, the convention of Bern brought nearly all the states of Europe into copyright relations with one another. This was the most important step ever taken in the history of the world's literary dealings, for it secured an al¬ most universal recognition of the rights of authors.

The rights of citizens or subjects of foreign nations to copyright in the United States may be extended by presidential proclamations, and now Americans can secure copyright in all foreign countries with which we have reciprocal vol. 7 — 43

copyright arrangements, and in consequence a citizen or subject of a foreign state or nation may obtain copyright protection upon copyright- able matter when such alien is domiciled within the

United States and his work is published for the first time in the United States, or, as just suggested, when the foreign state or nation of which such author or proprietor is a citizen or a subject grants, either by treaty, convention, agreement or law, to citizens of the United States the benefits of copyright on substantially the same basis as to its own citizens, or copy¬ right protection substantially equal to the pro¬ tection secured to such foreign author under the United States act, by treaty, or when such foreign state or nation is a party to an inter¬ national agreement which provides for reciproc¬ ity in the granting of copyright, by the term of which agreement the United States may, at its pleasure, become a party thereto.

Presidential proclamations have been issued upon this basis permitting citizens or subjects of the following foreign states and nations to obtain copyright protection in the United

States : Canada, Great Britain and British pos¬ sessions, France, Belgium, Germany, Luxem¬ burg, Sweden, Switzerland, Italy, Greece,

Tunis, Hungary, Denmark, Portugal, Spain,

Netherlands and possessions, Norway, Japan,

China, Korea, Austria, Mexico, Costa Rica, Cuba, Guatemala, Salvador, Honduras, Nicara¬ gua, Argentine Republic, Brazil, Dominican Re¬ public, Panama, Ecuador, Bolivia and New Zea¬ land. For an American citizen to secure copy¬ right in Great Britain the title should be entered at Stationers' Hall. London, the fee for which is five shillings sterling, and five shillings addi¬ tional if a certified copy of entry is required. The work must be published in Great Britain or in her dominions simultaneously with its publication in the United States, and five copies of the publication are required, one for the British Museum and four on demand of the Company of Stationers for four other libraries. Copyright may be secured in France by a foreigner by depositing two copies of the publi¬ cation at the Ministry of the Interior at Paris. No fee or entry title is required. To secure copyright in Belgium a foreigner may register his work at the Department of Agriculture, In¬ dustry and Public Works at Brussels. The term is the life of the author and 50 years after death except in cases of foreign authors, then the term is limited not to exceed that granted in the home country. In Switzerland register of title at the Department of Commerce and Industry at Bern is optional, not obliga¬ tory; fee two francs. If registered, deposit of one copy is required. The term is the life of the author and 30 years after death. Works published by corporate body 30 years from pub¬ lication. Photographs five years from registra¬ tion. Copyright in Canada is to be registered with the Minister of Agriculture at Ottawa ; fee $1 for registry and 50 cents for certificate, and the work must be published in Canada and two copies deposited. The term is 28 years with renewal of 14 years or 42 years in all.

In Greece the period during which an author can hold a copyright is restricted to 15 years. The Swiss grant copyright during the life of the author or his heirs during 30 years from the date of publication of his work. In Brazil, the term of copyright is 50 years from publica-

tion. In Venezuela the copyright is perpetual. In Holland the copyright lasts 50 years after publication. In Hungary and Portugal, copy¬ right endures for the life of the author and 50 years after his death. In Germany and Austria copyright endures during the life of the author and during 30 years after his death. The dura¬ tion of copyright in Italy is regulated in a peculiar manner. It endures for the life of the author and 40 years after his death, or for 80 years after the publication of the work, the term of years being divided into two periods of 40 years each. If the author dies within the first period of 40 years the remainder of the term is enjoyed by his heirs or assigns. The second period of 40 years begins at the death of the author, if he has died after the first period of 40 years has elapsed; or if he has died before them, at the end of the first period of 40 years. During the second period any one is at liberty to republish the work on payment to the owner of the copyright of a royalty of 5 per cent on the price, which must be marked on the book. France, Norway, Sweden and Denmark accord a copyright during the life of the author and 50 years after his death. Russia not only gives copyrights for life and 50 years after death, but also for 10 additional years if an edition of the work is published within five years from the end of the first copyright term. The law of

Spain accords a copyright during the life of the author and for 80 years there¬ after. In Mexico copyright is perpetual.

Consult Drone, (The Law of Property in Intellectual Production } ; Putnam, (The Ques¬ tion of Copyright) ; United States Copyright Law of 4 March 1909, and Copyright Laws of the World.

Revised by Titian W. Johnson, of the Washington Bar.

*COPYRIGHT, Canadian. The double re¬ lation of Canada, as at the same time a self- governing nation, and also a part of the British Empire, produces some slight complications in its copyright law. By the British North Amer¬ ica Act of 1865, constituting the Dominion, the power of copyright legislation was assigned to the Federal authority. The Canadian Parlia¬ ment passed a Domestic Copyright Act in 1875, revised it in 1886 and amended it in 1889 by an act which was suspended by the Imperial Parlia¬ ment, pending discussion of the protection of British authors. Finally in 1895 a Canadian act satisfactory to both British authors and the Canadian printers and publishers was agreed on and passed. The Imperial Copyright Act of 1842 applies generally to Canada, subject to the present Canadian legislation. The British Copy¬ right Act of 1911 applies only to such of the Dominions as adopt it by legislative enactment, and this has not been done in Canada. The importation of foreign reprints of British copy¬ right works was formerly permitted on payment of a 12*4 per cent royalty duty collected through the Canadian Customs, but since this has been dropped from the tariff, it has been held (re Morang vs. Publishers' Syndicate, 32 Ont. Rep.) that the prohibition of such importation con¬ tained in the Imperial Act applies once more to Canada in favor of the properly registered British copyright holder. The point is not, how¬ ever, free from dispute.*

The difficulties have chiefly arisen from the importation into Canada from the United States of reprints of British works sold at low prices, and which it has been practically almost im¬ possible to restrain. When these were so im¬ ported by American publishers under agreement with the British author, the Canadian printer and publisher saw themselves constantly de¬ prived of business which they considered should be theirs, as no reciprocity was permitted them by the United States. Their mouthpiece was the Canadian Copyright Association and their agitation was- continuous. The refusal of the United States to enter the Bern Convention was an important incident in the history of the trouble, although more recent United States legislation protects the British author to a cer¬ tain extent. The Canadian author also has found it necessary to watch copyright legisla¬ tion and raise some complaints. At present any author domiciled in the Empire, or in any country having an international copyright treaty with the United Kingdom, may obtain copyright in Canada for 28 years (renewable for 14 years by the author, his widow or children) of any book, map, chart, musical composition or any original painting, drawing, statue, sculpture or photograph, any print or engraving of an origi¬ nal design, or any translation of a literary work; but no exclusive right can be obtained to illustrate a piece of scenery or an object. The work must be printed and published, reprinted and republished or produced or reproduced in Canada. The copyright lapses with the expira¬ tion of foreign copyright. British copyrighted works may be copyrighted when printed and published, or reprinted or republished in Canada, and may also be imported notwithstanding Canadian copyright. Works published in sep¬ arate articles of a periodical may be temporarily copyrighted but the complete work must also be registered when published. Anonymous works may be registered in the publisher's name. The registration is granted on delivery of three copies of the work at the Department of Agri¬ culture (Copyright Branch), Ottawa, imme¬ diately on publication in Canada, and the issued work is to bear copyright notice in due form. A copy must also be sent to the Library of Parliament, Ottawa, and one to the British Museum, London. An interim copyright may be obtained, but becomes void unless the work is printed in Canada within one month after first publication elsewhere. All communications are addressed to <(The Minister of Agriculture (Copyright Branch), Ottawa,)} from whom copies of the act and regulations may be ob¬ tained on request.

Any publication of an original manuscript without consent of author or proprietor entrains liability for damages, unless the work be already printed in Canada or elsewhere. If the copy¬ right edition is out of print the minister may, after a complaint made to the proprietor, and his neglecting to provide a remedy, grant li¬ censes to others to publish, and may fix the royalty.

Foreign magazines and newspapers, contain¬ ing British copyright works, may be imported, if the

publication is with the author's consent, or under the copyright law of the country from which they come. Volumes of collections con¬ taining in part literary matter or music copy-

COQUELIN –

lighted in Canada cannot be imported except from the United Kingdom.

William Douw Eighth all,

Fellow Royal Society, Canada.

COQUELIN, kok-lan, Renoit Constant,

French actor: b. Boulogne, 23 Jan. 1841; d. b ranee, 26 Jan. 1909. He is known as Coquelin Aine, to distinguish him from his younger brother, Coquelin Cadet. He early gave promise of great dramatic ability. He was admitted to the Paris Conservatoire in 1859, the following year took the second prize for comedy, and made his debut on the stage of the Theatre Frangais, 7 Dec. 1860, as Gros-Rene in (Le depit amoureuxP Later he appeared with great success in (Le Mariage de Figaro, } (Le malade imaginaireC (Le misanthrope, }

1903).

COQUELIN, Ernest Alexandre Honore,

French actor; brother of Benoit Coquelin: b. Boulogne, 16 May 1848; d. Suresnes, 8 Feb. 1909. He was educated at the high school of his native city and was for a time in the employ of the Northern Railway, but following in the footsteps of his brother went to Paris in 1864 and entered the Conservatoire, to make a career upon the stage. He was graduated three years later with the first prize in comedy and made his debut at the Odeon. In 1868 he became associated with his brother at the Theatre Frangais, and continued there until 1875, play-

ing in all the well-known classical comedies. He took an engagement at the Varietes in 1875, but returned to the Theatre Frangais in the following year, shortly after becoming a member of the company. He created the parts in (Le sphinx, > (Denise) and ^'HeritiereS M. Coquelin, Cadet, as he was called, to distinguish him from his greater brother, was the author of numerous monologues, to the success of which he owed most of his reputation, and his rendering of them gained him great popularity in Paris. Under the nom-de-plume of Pirouette he pub¬ lished (Le livre des convalescents) (1880) ; (Le monologue moderne (1881);*

COQUELIN, Jean, French actor: b. 1 Dec. 1865. He is a son of B. C. Coquelin (q.v.), and adopting his father's roles appeared at the Comedie Frangaise for the first time, 20 Nov. 1890. In 1897 at the Porte-Saint-Martin he created the role of Ragueneau in (Cyrano de Bergerac. Other famous roles were Lubin in (Thermidor) ; Verdelet in (Le gendre de M. Poirier* and Talleyrand in (Plus que reine)*

(1899).

COQUEREL, ko'krel', Athanase Josue,

French Protestant clergyman: b. Amsterdam, 16 June 1820; d. Fismes, Marne, France, 24 July 1875. He was a son of A. L. C. Coquerel, and was the author of (Jean Calas et sa famille> (1858) 'Libres etudes (1867); (Des Beaux- Arts en Italie) (1857), etc. He was widely known as an eloquent preacher, and was long a leader of the liberal Protestant party in France. Consult Stroehlin, (Athanase Coquerel, fils) (2 vols., Paris 1886).*

*COQUILLA NUT (Sp. coquillo, ((little coconut**), the seed of the piassava or piassaba palm, Attalea funifera, one of the coconut group, a native of Brazil. The nuts are three * or four inches long, oval, of a rich brown color and very hard, and are used in turnery for making umbrella handles, etc. They are known as vegetable ivory. The imports of the United States, which were valued at about $1,000,000 in 1913 and amounted to in the neighborhood of 30,000,000 pounds,*

are mainly from Ecuador, Colombia and Panama. Vegetable ivory is coming into increased use. See Attalea.

COQUIMBO, ko-kem'bo, Chile, a province situated in the northern part of the republic, between the provinces of Atacama and Acon¬ cagua. Area 14,098 square miles. It is divided into the departments of Serena, Elqui, Co- quimbo, Ulapel, Ovalle and Combarbala. The principal towns are La Serena, the capital (pop. 17,578) ; Coquimbo, the principal seaport of the province, which is one-half hour by rail from the capital, and has 12,106 inhabitants; Ovalle (5,500) ; Elqui (2,500) ; Illapel and Com¬ barbala. Gold, silver, copper, iron, quicksilver, lapis lazuli and lime are found. There are four large copper-smelting establishments, and sev¬ eral others for silver and gold ore. Natural pasturage is abundant. Agricultural products in excess of the needs of the province are ex¬ ported in considerable quantities. Vineyards are located near the mountain range and wines and brandies are produced. Two lines of rail¬ way belonging to the government and one

belonging to a private company are in operation ; the total length of the government lines being about 200 miles. There are telegraph and tele¬ phone services throughout the province, and at La Serena and Coquimbo are offices of the submarine cable. There is also a wireless sta¬ tion at Coquimbo. Pop. 183,787.

COQUIMBO, Chile, a seaport. See Co¬ quimbo, a province.

COQUIMBO. See Burrowing Owl.

COQUINA, ko-ke'na, a porous rock found in Florida, where it is used for building pur¬ poses. It is composed of the broken shells of sea animals and coral cemented together.

COR ANGLAIS, kor an-gla' (Fr. "English horn®), a wind instrument of the reed kind, similar to the oboe, and possessing a compass of like extent but of lower pitch. Its compass is from E in the bass to B flat above the treble staff. In Bach's works it appears as the Oboe di Caccia. Its effective wailing tone has caused it to be used by modern operatic composers.

CORACIIFORMES, an order of birds com¬ prising a somewhat miscellaneous group, for¬ merly designated as "picarian.® Nearly all are arboreal, and are characterized by comparatively short and weak legs, and by usually nesting in holes. They include the rollers, niotmots, todies, kingfishers, bee-eaters, hornbills, etc. (Coracice) ; the owls (Striges) ; the nightjars (Caprimulgi) ; the swifts (Cypseli) ; the mouse-birds (Colii) ; the trogons (Trogones) and the woodpeckers (Pici). See Ornithology.

CORACLE, kor'a~kl, or CURRACH (Ir. curach; W. corvee), a kind of ancient boat, con¬ structed with a frame or body of wicker-work, and still in use among Welsh fishermen and on the Irish lakes. It is covered by skins, oil-cloth, etc., which are removed when out of use. It is of an oval form, and generally contains but one man, who, on reaching the shore, shoulders his coracle, and deposits if in a place of safety, or carries it perhaps where he may again make use of it. Caesar (De Bello Civili, i, 54) de¬ scribes coracles which he made after the British model for use in Spain. The coracle or currach is mentioned in the lives of Saint Patrick, Saint Columba and in accounts of travels made by Scots and Piets.

CORACOID, kor'a-koid (Gr. "crow- shaped,® that is, like a crow's bill), an import¬ ant paired-bone in the breast-girdle, forming, along with the scapula, the articulation for the forelimb, and always lying ventrally. In the lower fishes the entire girdle is cartilaginous. In the bony fishes distinct coracoids first appear. They are well seen in Amphibia and in all reptiles except snakes, and are very large and strong in birds; but they become mere processes of the scapula in mammals. They very often exhibit a special anterior portion known as the precoracoid.

CORAL AND CORAL ISLANDS, the

solid support or skeleton of the coral polyps. (See Polyps). It was formerly supposed that the coral

was a calcified portion of the soft parts of the animal, but this has been disproved. Recently Bourne has proved by examination that the skeleton is formed as a secretion by certain cells and that there is no deposition of crystalline carbonate of lime in the actual cells. The calcareous septa or partitions are

deposited by the soft septa of the animal in the radial chambers. The coral particles begin to be deposited in the embryo polyp before it becomes fixed to the bottom. In the very young polyp of the Mediterranean Astroides, as soon as it becomes stationary 12 calcareous parti¬ tions are deposited, and these enlarge and finally become jointed to the external walls (theca) of the coral, forming a groundwork or pedestal, on which the young polyp rests, as if on a limestone foundation. If isolated needles or rods of lime are distributed beneath the outer layers of the polyp-stock, the latter be¬ comes horny or leathery and more or less flexible, as in the alcyonarian polyps. The en¬ tire skeletal mass is called the corallium or coral-stock. In the common red coral (Coral- Hum rubrum) of the Mediterranean, the solid unjointed coral-stock has a thin cortical layer of spicules in which the polyps are retractile.

Coral-like masses, encrusting reefs, are also formed by the animals of the hydroid millepore, which may be distinguished by the multitude of minute cells or openings, much smaller than those of any genuine coral polyp. See Mille¬ pore.

The simpler, most primitive corals, are cup¬ shaped, forming a single calicle or corallite, con¬ taining but one polyp, as in the early Paleozoic cup-corals, and the existing species of Flabel- lum, Caryophyllia and Deltocyathus, which live buried in the mud in deep cold water in all seas, from Greenland to the tropics.

Microscopic Structure of Coral. — There are two kinds. In the aporose or poreless corals such as Flabellum, Astraea and the like, the coral-stock is throughout its mass solid and stony. In the perforate kinds, such as Madre- pora, all parts of the corallium, including the connecting ccenenchym, or common calcareous stock or stem, has a structure like a meshwork, consisting of delicate rods of carbonate of lime so united as to leave interstices, which in the living coral are traversed by a network of inter¬ lacing tubes, representing the coenosarc.

Rate of Growth of Corals. — Little is known regarding the rapidity of growth in corals. A specimen of Moeandrina labyrinthica , measur¬ ing a foot in diameter and four inches thick in the most convex part, was taken from a block of concrete at Fort Jefferson, Tortugas, which had been in the water only 20 years. Hunt calculated that the average growth of a Mceandrina observed by him at Key West was half an inch a year. Verrill states that a Madrepora found growing on the wreck of the ship Severn grew to a height of 16 feet in 64 years, or at the rate of four inches a year. See Polyp.

Coral Islands. — The reef-building corals are the Madrepora and Mceandrina, the latter dome shaped and massive. They are confined to waters in which through the coldest winter months the temperature does not fall below 68° F\, though usually the water is warmer than this, the mean annual temperature of the north Pacific being about 73.5° F., and of the south Pacific 70° F. Coral reefs are abundant in the West Indies and occur on the coast of Brazil as far south as Cape Frio, but still more so on the central Pacific. None occur on the western coast of Europe and Africa and the two Amer¬ icas. In depth reef-building species do not oc¬ cur below 15 to 20 fathoms. Coral reefs are

divided into fringing, barrier and circular reefs, or atolls. Fringing reefs encrust the shores on which they grow. Barrier reefs have a lagoon between the reef and the main land. A fringing reef may ultimately become a bar¬ rier reef either by a sinking of the land and the successive upbuilding of the seaward face of the reef, or by gradual dying of the coral polyps next to the land where they do not get enough fresh water and food, the stony skele¬ ton being redissolved while the outer part of the reef continues to grow. Atolls are roughly circular, with a central lagoon, with or without central islands. Contrary to the views of Darwin and Dana, it has been found by A. Agassiz that modern coral reefs form as a rule but a thin crust, those of Florida not more than from 50 to 75 feet in

thickness; yet Tertiary reefs and those geologically older may be much thicker. According to Darwin and Dana atolls were supposed to have been formed on sub¬ marine banks oyer a subsiding sea-bottom, first starting as a fringing reef about an island or slightly submerged peak. After they had grown to the surface, the inner face of the reef could not get food, and ceased to grow. As the island or peak gradually sank, the outer face of the reef grew up in a ring. Owing to the observation of Semper, Agassiz and others, it is now evident that atolls may be deposited under any conditions, whether the sea-bottom be stationary, rising or subsiding. We will, however, have to hold on to the Dar¬ win subsidence theory to account for coral reefs over about 100 feet in thickness, since corals do not grow at greater depths than this. From his prolonged explorations in the West Indies and the Pacific Ocean, A. Agassiz concludes that the barrier reefs of Fiji, the Hawaiian Is¬ lands and the West Indies usually flank vol¬ canic islands and are underlaid by volcanic rocks. Those of New Caledonia, Australia, Florida, Honduras and the Bahamas are under¬ laid by outliers of the adjoining land-masses, which crop out as islands and islets in the outer edge of the barrier reefs. Some of the barrier reefs of the Society, Fiji and of the Carolines, show that the wide and deep lagoons, separating them from the main islands, have been formed by erosion, from a broad, fringing reef-flat, as explained above.

The reef-flats and outer reefs flanking ele¬ vated islands are partly barrier and partly fringing reefs. We may, says Agassiz, trace the passage of elevated plateaus like Guam, Tonga and some of the Fiji islands, which are partly volcanic and partly limestone, to atolls where only a small islet or a larger island of either limestone or volcanic rock is left to indicate its origin. Atolls also may be formed upon the denuded rim of a submerged volcanic crater, as in certain of the Fijis (Totoya and Trombia), and as in some of the volcanoes east of Tonga.

As to the origin of atolls by subsidence, we really have few data to support the Darwinian theory. Agassiz claims that throughout the Pacific, Indian Ocean and West Indies ((the most positive evidence exists of a moderate, re¬ cent elevation of the coral reefs." This is shown by the ridges, pinnacles and undermined masses of modern or Tertiary limestones formed recently beneath the sea, but now above sea-level, proving very recent uplift. The

existence of honeycombed pinnacles of lime¬ stone within the lagoons of atolls, as shoals, islands or islets, shows the extent of the solvent action of the sea upon land areas having for¬ merly a greater extension than at the present day. The Maldivian plateau with its thousands of small atolls, rings or lagoon reefs, rising from a depth varying from 20 to 30 fathoms, is overwhelming testimony, says Agassiz, that atolls may rise from a plateau of suitable depth, wherever and however it may have been formed, and whatever may be its geological structure. In the regions examined by Agassiz the modern reef-rock is of every moderate thickness, being within the limit of depth at which reef-builders begin to grow and within which the land rims of atolls or of barrier reefs are affected by mechanical causes.

Why no coral reefs exist on the western coasts of the two Americas, and their absence at other points, is explained by Agassiz as due to the steepness of their shores and to the absence or to the crumbling nature of their sub¬ marine foundations or platforms. Coral reefs also cannot grow off the steep cliff-surfaces of elevated, coraliferous limestone islands.

The proof of the supposed great thickness of coral reefs, to account for which Darwin in¬ voked subsidence, will be ascertained by boring. Thus far the evidence tends to show that the coral beds are not continuous. At Honolulu they contained several beds of volcanic ash, etc. In the Fiji Islands, shell limestones were in- terstratified with coral rock. The great areas of subsidences postulated by Darwin and by Dana have been shown to be areas of elevation. The deepest depressions or <(deeps" in the Pacific, judging by the Challenger maps, are in regions where there are no coral reefs or atolls.

Bibliography. — The literature of the sub¬ ject is extensive. The classic works are J. D. Dana's magnificent folio in the series of reports of the Wilkes Exploring Expedition, and his more popular volume, (Corals and Coral Is- lands) (revised edition, New York 1890) ; and Darwin's Structure and Distribution of Coral Islands) (London, 3d ed., with notes by Bonney, New York 1899). Murray's papers of corals and reef-structures in the (Proceedings) of the Royal Society of Edinburgh, Vols. X (1880) and XVII (1891) are highly important. The Agassizs, father and son, directed much atten¬ tion to this subject, and Alexander Agassiz in particular has added greatly to information in

his (Visit to the Great Barrier Reef of Aus¬ tralia' (Cambridge, Mass., 1898). The illus¬ trated works of Saville Kent on the Australian reefs should also be remembered, as well as Heilprin's on those of Bermuda. For structure and classification consult Bourne's account of the Anthozoa in Lankester's (Treatise on Zo¬ ology' (London 1900) ; and for fossil corals consult Zittell-Eastman, (Text-book of Palaeon¬ tology' (New York 1900), and the great Mon¬ ographic des polypiers fossils des terrains paleozoiques' of Milne-Edwards and Haime, issued in Paris in 1851 ; also Hickson, ((Coelen- terata" (in Cambridge Natural History, Vol. I, London 1906). See Barrier Reef, The Great.

CORAL FISHES, a name given to several fishes of different genera belonging to the Chcetodonitdce. They are found in all tropical

seas, especially about coral reefs, and are all brilliantly colored. The most important is the Holacanthns imperator, the ((emperor of Japan,® which measures about 15 inches in length and is the most esteemed of all the Indo-Pacific fishes.

CORAL ISLANDS. See Coral.

CORAL SEA, part of the Pacific Ocean northeast of Australia and between it and the New Hebrides. It extends between the parallel of 25° S. and Torres Strait. The numerous coral islands fringing the northeast of Australia and other islands washed by this sea give it its name. In 1874 the Challenger, when making soundings in these waters, found the Coral Sea, in some places, to be 14,700 feet deep. The coral growths of the great barrier reef lie along its western boundary.

CORAL SNAKE, a small venomous colu- broid snake of the same family (Elapidce) as the cobra. The typical genus (Elaps) is a strictly American one. The usual color is rich red with black and yellow transverse bands, making these among the most brilliantly colored of snakes. Owing to the position of the poison- fangs and the small size of the mouth they are, although venomous, usually unable to injure man. One species, the harlequin or bead snake (E . fulzrius), occurs in the southern United States as far north at least as Virginia. It is a beautiful snake, about two feet or more long, and is less feared than it should be. Most of the remaining species, including the typical E. corallinus, are confined to tropical South Amer¬ ica and the West Indies.

CORAL TREE, leguminous plants of the genus Erytlirina, which has about 50 species. They are shrubs or trees with trifoliolate leaves and racemes of scarlet flowers. The long pods enclose bright red seeds. They are mostly tropi¬ cal, natives of America, Africa and India. One species (E. herbacea) is common throughout the southeastern United States, and two more are found in Florida. The plants are much culti¬ vated in greenhouses. An Indian species (E . indica) is said to have been stolen by Krishna, the Hindu deity, from the gardens of paradise. This is a spiny plant, and is planted for hedges. This species and E. caffra (the kaffir-boom of Africa) furnish soft light wood valuable for industrial purposes.

CORALLINE, kor'a-lin, a term popularly applied to sea-weeds with rigid calcareous fronds and also to certain of the zoophytes. The coral¬ line algae are mostly purple and gradually grow paler and whiter as the season advances. Their habitat is commonly pebbly rocks, to which they cling fast. Corallina officinalis has been em¬ ployed as a vermifuge.

CORALLINE, or PiEONINE, an orange- red color prepared by the action of ammonia, at about 300° F., upon rosolic acid, or upon the washed residue of the action of a mixture of sulphuric, oxalic and carbolic acids. It dif¬ fers from magenta in both its tint and its per¬ manency, not being affected by light or by alkalis ; but, on the other hand, fabrics dyed with it are readily turned yellow by acids. It is insoluble in water, but dissolves in alcohol with a very rich color. This solution, mixed with soda and a large quantity of water, and tartaric acid added, is employed for dyeing silk.

It is also printed upon cotton by means of albumen. The use of this dye has been much restricted on account of its alleged poisonous properties.

CORAM, Thomas, English philanthropist : b. Lyme Regis, Dorsetshire, about 1668; d. Lon¬ don, 29 March 1751. He was bred a seaman, and rose to be a merchant captain. In 1694 he settled in Taunton, Mass., and engaged in benevolent work of various kinds. A few years after he returned to sea, and settled in London, after suffering shipwreck off Cuxhaven in 1719. In London he interested himself in the settle¬ ment of Georgia, and in planting English artisans in Nova Scotia; but soon began his long agitation for the foundation of a foundling hospital in London, which was at length opened in 1740. Coram's portrait was painted by Hogarth, a warm patron of his scheme. More thoughtful for others than for himself, Coram fell into poverty, from which he was relieved in 1745 by an annuity contributed by his friends.

CORANACH, kor'a-nak, or CORONACH,

a dirge or lamentation for the dead formerly customary among the Celts of Scotland and Ireland. The coranach is commonly known in Ireland as the caoine (Br. keen), a song of mourning for the dead. This funeral song, or dirge, was usually sung by professionals who had power to improvise and who told of the pedigree, worth, deeds and death of the de¬ ceased. In Scotland the weird, mournful notes of the bagpipes added sadness. The custom of having the caoine or coranach at wakes and funerals has fallen into disuse in both Ireland and Scotland. Frequent mention of the custom may be found in the writings of Sir Walter Scott, Lover, Davis and other writers. Consult Crocker, Crofton, Researches in the South of Ireland) ; Jamieson, c Etymological Dictionary of the Scottish Language) (revised by Long- muir and Donaldson, Vol. I, p. 494, under <(Coranich,® Paisley 1879).

CORANDAGOS, ko-ran-da'gos, IS¬ LANDS, Philippines, group of islands lying off the northeastern coast of Palawan. The group consists of two islands, Corandagas and Da- langamen, and three islets. The inhabitants, of Malayan race, are mostly engaged in fishing and in the search for edible birds' nests. Pop. about

300.

CORATO, kd-ra'to, Italy, city in Apulia, about 50 miles southeast of Foggia. The mod¬ ern city is of little importance, the chief indus¬ tries being cattle raising and the manufacture of leather and tartar. Near the city are the ruins of the famous Castel del Monte, built by Frederick II, which is one of the most beautiful of the architectural remains of the Middle Ages in Italy. The general plan is a vast octagon, with eight hexagonal towers. The windows are pointed and round arched, and the vaulted halls are supported by triple shafts of marble. It is the chief attraction of the city. Pop. 45,307.

CORBAN, kor' ban, a term used by the Jews to signify a thing given to the Deity. (Lev. ii, 4, 12, 13, etc.) Such an object was sacred and set apart from profane use. It often was used to designate an oblation to God and has reference to a Talmudic formula, by which, under pretense of dedicating a thing to God, a person might prohibit the use of it by

another person. Thus a son might declare his property as corban and avoid the obligation of using it for the support or need of a parent. This interpretation was rebuked (Matt, xv, 5 and Mark vii, 11), and also by some of the more tolerant and wiser rabbis.

CORBEIL, kor'ba'ye, France, a town in northern France, in the department of Seine-et- Oise, at the junction of the Essenne with the Seine, 18 miles south-southeast of Paris. It has various manufactures, chiefly of paper, clocks, cotton and linen ; and there are large grain-mills and a copper-foundry in the town. Pop. 10,746.

CORBEL, kor'bel, in architecture, a piece of stone, wood or iron projecting from the ver¬ tical face of a wall, to support some superin¬ cumbent object. Corbels are of a great variety of forms, and are ornamented in many ways. They are of frequent occurrence in pointed architecture, forming the supports of the beams of floors and of roofs, the machicolations of a fortress, the labels of doors and windows, etc. A cornice supported by a series of corbels is styled a corbel table. Similar contrivances are the bracket and cantilever (qq.v.).

CORBETT, Julian Stafford, English law¬ yer and author: b. Surrey, 12 Nov. 1854. He was educated at Marlborough and Trinity Col¬ lege, Cambridge, and was called to the bar in the Middle Temple in 1877. He practised his profession until 1882 and has since given his attention to literary pursuits. He has published (A Business in Great Waters' ; lives of Monk and Drake in 'English Men of Action ' series; (Drake and the Tudor Navy' ; (The Successors of Drake' ; (England in the Mediterranean' ; 'England in the Seven Years' War' ; 'The Campaign of Trafalgar) ; (Somc Principles of Maritime Strategy ' ; (The Spencer Papers. '

CORBETT, Lee Cleveland, American hor¬ ticulturist : b. Watkins, N. Y., 21 Oct. 1867. He was educated at Cornell University, where from 1891 to 1893 he was assistant horticulturist. He was professor of horticulture and forestry at the South Dakota Agricultural College in 1893-95 and at the West Virginia University from 1895 to 1901, and then he became horticul¬ turist in the United States Department of Agri¬ culture. His publications include (Garden Farm¬ ing' (1913) ; intensive Agriculture' (1913) ; and the following experiment station bulletins : Pruning' (1903) ; 'Cranberry Culture' (1903) ; (The School "Garden' (1904); (Tomatoes' (1905) ; 'Raspberries' (1905) ; 'Beans' (1907) ; 'Cabbages' (1911); (Ice Houses' (1911); (Tomato Growing as Club Work in the North and West' (1913).

CORBIE STEPS, CORBEL STEPS, or CROW STEPS, steps into which the sides of gables from the eaves to the apex are broken. They form a common feature in Scottish archi¬ tecture, into which they were probably intro¬ duced from France. They are also to be seen in many old houses in Holland, Flanders and Germany, where they are even more general, especially in the north.

CORBIN, Caroline Fairfield, American writer: b. Pomfret, Conn., 9 Nov. 1835; mar¬ ried C. K. Corbin of Chicago, 1861. She has published (Our Bible Class and the Good that Came of It' (1860) ; 'Rebecca, or Woman's Se¬ cret' (1866) ; 'His Marriage Vow' (1874) ;

'Belle and the Boys' (1879); 'Letters from a Chimney Corner' (1886) ; 'A Woman's Philos¬ ophy of Love' (1892).

CORBIN, Henry Clark, American soldier : b. Clermont County, Ohio, 15 Sept. 1842; d. New York, 8 Sept. 1909. He studied law, and entered the Union army as second lieutenant in the 83d Ohio Volunteer Infantry, 28 July 1862; but before the organization was com¬ pleted he was assigned to the 79th Ohio Volun¬ teer Infantry, serving therein as second and first lieutenant, respectively, until 14 Nov. 1863, when he was appointed major of the 14th U. S. Colored Infantry. In the following year (4 March 1864) he was promoted to lieutenant- colonel, and 23 Sept. 1865, made colonel of the 14th United States Colored Infantry. He was honorably discharged from the volunteer service 26 March 1866, with the brevet of brigadier- general, which honorary rank was bestowed upon him in recognition of meritorious services. In 1866, upon the muster-out of the volunteer army, and upon the recommendation of his mili¬ tary commanders, he was commissioned (11 May 1866) second lieutenant in the regular army. He was appointed to a captaincy of the line 31 Dec. 1866, and from that year to 1876 he was continually in command of his company on the Western frontier in campaigns against hostile Indians.

He was appointed to the adjutant-general's department 16 Tune 1880, and served therein nine years in the grade of major, seven years in the grade of lieutenant-colonel and two years in the grade of colonel ; and was, when ap¬ pointed brigadier-general and adjutant-general of the army (25 Feb. 1898), the senior in the corps ; having served on the staffs of Generals Hunt, Schofield, Terry, Crook, Miles (with whom he participated in the Sioux Indian cam¬ paign), McCook, Ruger, Merritt, and in 1891 conducted a successful campaign against the Moqui Indians in Arizona Territory.

During the Spanish-American War, General Corbin was brought into close relations with President McKinley and was by him consulted upon all questions of policy relating to military affairs; and in addition to his duties as adjutant- general of the army he superintended the or¬ ganization of 250,000 soldiers, and within six months the muster-out of 100,000. Subsequently 35,000 additional volunteer forces were mus¬ tered, equipped and made effective for the Philippine service, and they in turn disbanded — the regular army having been increased during this period to three-fold its former strength. In recognition of his services and of the part which he took in the war, the Congress of the United States conferred upon him the rank of major-general and adjutant-general in the army of the United States. He was in command of the Division of the Philippines in 1904—06, when he was made a lieutenant-general, and retired.

CORBIN, John, American dramatic critic writer, son of Caroline F. Corbin (q.v.) : b. Chicago, Ill., 2 May 1870. He was educated at Harvard University, and at Balliol College, Oxford. From 1897 to 1900 he was assistant editor of Harper's Magazine; was member of the editorial staff of the Encyclopedia Britan- nica 1900-02; in 1902 he wrote the dramatic notices of the New York Times, and in 1905-08 those of the New York Sun, From 1908 to 1910

he was literary manager of the New Theatre, during the short life of which his efforts con¬ tributed much toward notably artistic produc¬ tions. Since 1912 he is secretary of the Drama Society. Besides magazine stories and articles on the drama, he is author of (The Elizabethan Hamlet) (1895) ; (Schoolboy Life in England' (1898) ; (An American at Oxford' (1902) ;

CORBIN, Ky., city in Whitley County, 80 miles southeast of Lexington, on the Louisville and Nashville Railroad. It contains large rail¬ road repair shops, a wood working factory and some coal mines. The waterworks are the property of the municipality. A Catholic acad¬ emy is the principal educational institution. Pop. (1920) 3,406.

CORBOULD, kor'bold, Edward Henry,

English water-color painter : b. London, 5 Dec. 1815; d. 18 Jan. 1905. He was a member of the

Institute of Painters in Water Colors and was teacher of drawing and painting to the chil¬ dren of Queen Victoria, 1851-72, who acquired many of his more noteworthy productions, which were chiefly water colors. He also at¬ tained celebrity as a book illustrator.

CORCHORUS, kor'ko-rus, a genus of the linden family (Tiliacece) . There are about 35 species, mostly herbs or small shrubs, natives of Europe and Asia, and diffused in warm and tropical regions. The leaves of C. olitorious are used in Egypt and adjacent countries as a pot herb. From the fact that the Jews thus employ them they are sometimes called Jews' mallow. More important, however, is C. cap- sularis, which has long been cultivated for its fibre in China for Chinese hemp, also in India and other Eastern countries for making fish lines and nets, gunny bags, rice bags and <(tat," a coarse kind of linen-like cloth. This and the former species have much more recently been used to furnish jute (q.v.). The negroes in the West Indies use C. siliquosus to make coarse brooms, and an infusion of its leaves as a sub¬ stitute for tea. The Japanese shrub, errone¬ ously called C. japonicus by gardeners, is a com¬ mon garden plant on account of its pretty double yellow flowers.

CORCORAN, William Wilson, American banker and philanthropist : b. Georgetown, D. C., 27 Dec. 1798; d. Washington, D. C., 24 Feb. 1888. He was educated at Georgetown College and established himself in the banking busi¬ ness in Washington in 1837. He became very wealthy and was widely known for his charities and gifts to the public. In 1847 he gave the Oak Grove Cemetery property to Georgetown, founded the Louise Home for Indigent Women in Washington in 1870, and gave to the city of Washington the famous art collection known as the Corcoran Art Gallery. This he endowed munificently and it is now housed in a marble building designed by Ernest Flagg and erected 1894—97. The collection contains fine specimens of early American painters, an admirable col¬ lection of Barye bronzes and the well-known (Greek Slave' by Hiram Powers. A free school of art is connected with the institution and biennial exhibitions of contemporary

American painting contribute greatly to its usefulness. Consult Henderson, (The Art Treasures of Washington.'

CORCORAN ART GALLERY. See Cor¬

coran, William Wilson.

CORCYRA, kor-sira. See Corfu.

CORD-GRASS, or MARSH-GRASS

(Spartina), a genus of perennial grasses con¬ taining several species, widely dispersed in America, Europe and Africa. They are often maritime; with creeping rootstocks, simple stems and long tough leaves. The spikelets carry one flower, which has unequal glumes. Fresh-water cord-grass (S. michauxiana) is found along river banks, lake shores and brackish coast marshes over the northern part of the United States. It is grown for binding sand and river banks, and when cut early makes fair but coarse hay. It has been used successfully for making twine and paper. It is also used for thatch. Fox-grass (S. patens) is rather slender and somewhat wiry, and is abundant on salt marshes; with black grass (J uncus gerardi) it furnishes most of the salt hay these meadows produce. It is used for packing glassware, etc. Creek-sedge, thatch, or salt marsh-grass (N. glabra) grows along ditches and creeks of the Atlantic and Pacific coasts. It flowers from July to October, and is used for making ropes. When young it is eaten by stock.

CORDAGE. This is the general name for all manufactures of string, twine, cord, lines, rope, hawsers and cables made of twisted fibres. Fibres are first combed out or drawn into par¬ allel position, and then a few are twisted to¬ gether forming yarn or thread. Two or more yarns twisted together oppositely form a strand. Two or three small strands twisted form string or twine. A thick string is termed a cord, and three or more cords laid together form a rope. There is no fixed and accepted definition of the terms cord and rope, however. Some manufacturers use the word rope for all diameters of an inch or more, and some begin at the half inch. The public speak of a half¬ inch clothes line, and the mariner calls small ropes lines. It therefore appears that small ropes are called cords and lines indiscrimi¬ nately. The manner of twisting the cords to form a rope determines the lay. Three ropes are laid together to form a hawser and three hawsers a cable. The commoi lay consists of three strands or cords, but a shroud-laid rope has a core about which three other strands are laid. Binder twine is made with a right-hand twist, but rope-yarn requires both right-hand and

left-hand twists. Ropes have to be lubri cated to keep them from wearing out by their own internal friction, and also to keep out the moisture which would invite rot. . Sometimes tallow or graphite with fish-oil is used, but tar is the cheap and common lubricant. In making tarred rope the yarn is unwound from bobbins to coppers, and in its travel dipped in hot tar, being then passed between rollers to squeeze out the excess of tar and spread it uniformly. Where nine-thread and larger yarn is used the tarring is usually deferred, being applied in the completed rope. Wire ropes are not a part of the cordage industry. (See Telpherage) . Al¬ though rope-making constituted one of th° most important branches of business fiom the*

earliest days of the American colonies, like almost all the local manufactures, it was many years before it began to develop sufficient strength to entitle it to be regarded as an in¬ dustry. The first rope-walk in America was constructed at Boston by John Harrison in 1642, just 12 years after the town had been founded, and prior to this time, all such prod¬ ucts that had been required in the making of rigging and tackle were either brought direct from England by the captains of the various vessels, or were imported into this country for sale. In fact, it was not until the Boston ship¬ builders had commenced the construction of the 160-ton Trial that the several advantages to be derived from a local rope-walk were fully appreciated, and it was at their instigation that Harrison, a Salisbury rope-maker, was invited to come to Boston, where he set up his "rope- field, M 10 feet 10 inches wide, on the land ad¬ joining his house on Purchase street, at the foot of Summer street. At this time such work was done out of doors. Posts large enough to permit of the making of the largest sizes of rope then in use were firmly fixed in the ground in open fields, and upon these the cords were suspended and the ropes made.

Harrison's coming to Boston had been largely due to the fact that he was assured that he should have a monopoly of the business for a term of 21 years, and when, at the end of that time, the town officials gave permission to a John Heyman to "set up posts,® the fact that the latter was restrained in business to the "libertie onely to make fishing lines,® did not prevent the older rope-maker from protesting , against what he considered the invasion of his rights. Accordingly Heyman's license was re¬ voked, and Harrison had everything his own way up to the day of his death.

With the "original® rope-maker dead, how¬ ever, the business began to extend its influence into other parts of the town. Rope-walks mul¬ tiplied in number most rapidly in the West and North Ends, until there were finally no less than 14 of them. In 1793, an additional impetus was given to the- business by the action of the general court in granting a bounty for Ameri¬ can-made rope. On 30 July 1794, the date of the great fire, seven rope-walks were destroyed, and the selectmen, who had been flooded with protests from citizens who objected to this busi¬ ness being carried on in the heart of the town, refused to grant further licenses except upon the low lands west of the Common. As the result, six large rope walks were immediately constructed at that point. They ranged from 20 to 24 feet in width and were each about 900 feet in length. Destroyed by fire in 1806, five of them were rebuilt, only to be burned again in 1819. During the first year of the mayoralty of the elder Quincy, the walks were removed still further out of town for the purpose of improving the neighborhood around the Com¬ mon, but by the latter part of the 18th century the industry had assumed such proportions that it was generally admitted that "the men em¬ ployed in this work outnumbered any other class of mechanics in Boston.® At this time the work in the rope-walks was performed by hand, the method having been described by Longfel¬ low in his poem, (The Ropewalk. > The twist¬ ing of the fibres was accomplished by a man who walked backward down the "walk,® spin¬

ning from the hemp which was strung around his waist. The twist was imparted to the rope by a wheel, which was at first turned by a boy, although this purpose was afterward attained by the use of horse, or even water power.

It was not to Boston alone that the early industry of rope-making was confined, however. Nantucket, in the old days of her prosperity, had three large rope-walks, all of which long ago disappeared; there was one at Castine, Me., one at Portland, Me., and several in other parts of the country, including one on Broadway, New York. In 1810 there were 173 rope-walks in the United States.

The large business which is now conducted on the Pacific Coast was instituted by A. L. Tubbs of California, sometime in the fifties, who purchased the machinery of one of the old Boston plants and shipped it to California, where two or three large factories now stand as monuments to his enterprise.

Prior to about 1850, nearly all the spun yarns used in the making of cordage were imported by the American manufacturers. As such yarns were the product of Russian serf labor, they could be brought to this country and sold for less money than similar yarns could be produced in America, so it was not until the introduction of improved machinery reduced the cost of local manufacture that the impor¬ tation of this raw material ceased.

The modern factory system began to take the place of the more crude and primitive methods of making rope soon after 1830, and from that time until 1850 the conflict between the two modes of manufacture was waged with considerable bitterness. By the new system it was possible to spin a rope several thousand feet long upon an upright apparatus that occu¬ pied but a few feet square, the necessary twist being imparted by a rapidly rotating machinery which was not unlike that which is used in cot¬ ton and woolen mills. At the same time, while its cost was cheaper, the factory-made product was not an entire success. There were pur¬ poses for which the rope made by the rope- walk method was far superior, and the makers of the old-fashioned article used the words "patent cordage® to disparage the factory-made product. As time passed, however, the inven¬ tion of improved machinery tended to put an end to such rivalry. The most important in¬ ventions are those of John Good, of New York. It was his spreaders and breakers that did away with the use of lappers, and his nipper and regulator on spinning-machines that gave such universal satisfaction until the perfection of the "preparation machinery® evolved methods that superseded his process.

The rope-forming machine has a gage-plate through which the threads pass, a capstan on which the first cord is twisted, a right-and-left- hand screw to guide the cord back and forth on the winding-reel, and the necessary driving mechanism. It delivers accurately twisted strands or cords which go to the laying machine. This draws in the cords, with a ten¬ sion-regulating device, twists them by means of a capstan, and winds them on a large reel. Ropes are commonly marketed in coils of 1,200 feet length. A 10,000 foot rope has been made without a single splice.

Cotton is used for making string, and some cord and rope. It makes a neat white string

that can be readily dyed. It is a useful mate¬ rial for bands, as in cotton spinning, but cotton rope costs more and is less durable than hemp. The great bulk of the manufacture in the cord¬ age industry is of either imported Manila fibre or sisal (Mexican hemp). The Manila hemp is from the herb Musa textilis of the banana family. Sisal is from the Agava Ixtli, of Yuca¬ tan and Mexico. The best hemp fibres are 6 to 12 feet long, and test ropes of inches diameter have been made to withstand a tensile strain of 50,000 pounds. The twisting has to be done scientifically not to weaken the fibre. In modern practice the strands are often flat¬ tened so that they will lie closely in the rope or cable.

It was the invention of the self-binding har¬ vester that played an important part in further¬ ing the interests of the industry, and, about 1878, the mills of the country began to increase their size and output to a noticeable degree. Among the most prominent factories started prior to or during that period, one may mention the establishments of Sewall, Day & Company, of Boston; the Pearson Cordage Company, of Boston; J. Nickerson & Company, of Boston; Weaver, Filter & Company, of Philadelphia, afterward, as at the present time, Edwin H. Filter & Company; the Plymouth Cordage Com¬ pany, of Plymouth, Mass. ; the Hingham Cord¬ age Company, of Hingham, Mass.; the New Bedford Cordage Company, of New Bedford, Mass.; Baumgardner, Woodward & Company, of Philadelphia ; J. T. Donnell & Company, of Bath, Me. ; William Wall & Sons, of New York; Lawrence Waterbury & Company, of New York; Tucker, Carter & Company, of New York; the Elizabethport Steam Cordage Com¬ pany, of New York; Thomas Jackson & Sons, of Easton, Pa.; J. Rinek's Sons, of Easton, Pa.; and John Bonte's Sons, of Cincinnati.

As may be seen from the above list, the cordage industry, even in those comparatively recent times,

was largely confined to towns either on the coast or in close proximity to the seaports, for those were the days when the great demand for cordage was for export pur¬ poses, or for the direct use of ships temporarily located at the American ports. Later, such fac¬ tors as the decline in American shipping; the substitution of wire for hemp standing rigging, and the increased demand for binder twine, so altered the conditions of the industry that the location of factories became a matter of second¬ ary importance. Thus, they began to multiply in the interior, especially in the Middle West, such cities as Akron, Peoria, Xenia and Miamis- burg, becoming a new centre for the industry.

In 1843 the total quantity of manila hemp that was manufactured in the United States amounted to only 27,820 bales, or 7,511,400 pounds. To realize the ridiculously small pro¬ portions of such a product, it is only necessary to remember that any one of several of the large mills in this country could now manufac¬ ture the same quantity of hemp in less than 50 days, by running day and night, or that a similar quantity of hemp could now be brought direct from Manila in about the same length of time by the use of two steamers. So rap¬ idly did the industry expand, however, that, by 1863 it had increased in size to no less than five times, while the period of the Civil War cre¬ ated such a demand for cordage that the fac¬

tories in the North were utterly unable to comply with it. The profits of one Eastern factory alone, during that period, amounted to more than $500,000 a year, and this was no exceptional case, for everywhere manufacturers were fairly inundated with orders that they simply could not fill. It was about 1860 that the first sisal hemp was imported into the United States. Purely an experiment in the beginning, less than 200 tons having been used during the first year, the product was so favor¬ ably received by the trade that it soon became one of the great factors in the cordage industry, a fact which fully accounts for the rapid in¬ crease in importations from the paltry 200 tons to the amount of our present imports, a quantity that is greatly in excess of 80,000 tons.

During these years no action had ever been taken to regulate the price of cordage. Busi¬ ness had extended until the American product was accounted a factor in almost every part of the world. To meet these ever-widening de¬ mands, factories had increased,- both in number and in the importance of their output, but no effort had been made to fix the price of the product. As the result certain abuses had come to prevail among the firms engaged in the busi¬ ness, and it was to meet this situation and better, if possible, the condition of affairs, that the first meeting of the cordage manufacturers was held early in 1861. The result of this meet¬ ing was an agreement, which wras perfected and signed, on 23 February. Thereafter weekly meetings were held by the manufacturers, at which trade conditions were not only discussed, but any complaints were considered, and regu¬ lations were effected respecting the standard of prices. From time to time the agreement of 1861 was amended, and in July 1874 a complete revision was adopted, the manufacturers pledg¬ ing themselves, <(as men of honor and integrity,® faithfully to observe all its provisions. In April 1875 a still stronger agreement was made, but as complaints about underselling were still made, and as, in the absence of any specified penalty, it was necessary to accept any reason¬ able excuses, the manufacturers finally decided to adopt what has since been known as the <(pool system.® According to this system, which went into operation 1 Jan. 1878, the business of the country was divided among the various manufacturers in what was deemed just propor¬ tions. When the business of either of these concerns in any one month exceeded the pro¬ portion which had been assigned to it, it was compelled to pay a certain amount per pound on the excess to the treasurer of the (

In January 1880 the amount of the pool was reduced, by stages, from 2 to 54 of a cent per pound, and in January 1881 it was abolished altogether. By 1882 conditions had become so unsatisfactory that it was found necessary to re-establish it and, on 28 June, new propor¬ tions were agreed upon. These remained in force for a period of three years, when the new con¬ cerns that had been formed were taken into the

"pool,® and after much labor, a new adjust¬ ment of proportions was accepted in July 1885, remaining in existence until April 1887, when it was broken up.

The history of the National Cordage Com¬ pany, the next attempt to associate the various cordage

manufacturers, dates from 1 Aug 1887, when four of the leading New York con¬ cerns formed themselves into a "trust.® Their aim was to control the price of manila and sisal hemp, but the effort was a failure. In January 1890, an attempt was made to compel other manufacturers to join their organization. As none of those who complied with these de¬ mands knew the terms which had been made with his neighbor, a condition of distrust was engendered which finally, 4 May 1893, drove the corporation into the hands of a receiver, in spite of the fact that it had paid 8 per cent dividends on its preferred stock since 1891, and from 9 to 10 per cent on its common, the last dividend being declared on both only three days before the failure.

As the result of the reorganization the United States Cordage Company was formed, but as this corporation was also unsuccessful in its schemes to monopolize the purchase of raw material, the factories which had been pur¬ chased by the National Cordage Company went back into the market. Some of them were re¬ purchased by their former owners or their rep¬ resentatives ; others went into new hands.

An unusual factor in the cordage trade was represented by the binder twine situation. In the beginning, when there was considerable doubt as to the success of the twine, the cordage houses made it for the manufacture of har¬ vesting machinery at a profit of several cents a pound. When the market position of this produce was established, the harvest-machine makers began to manufacture their own twine, and while this was done at a third of its orig¬ inal cost, the loss of these contracts was a seri¬ ous setback to the cordage industry. According to the United States census of manufactures for 1914, the total number of establishments engaged in the manufacture of cordage and twines was 103. Their output for that year amounted to 487,443,356 pounds of rope and binder twine, valued at $43,085,517 ; cotton rope, 13,244,198 pounds, valued at $2,539,906; and other twine, 105,249,677 pounds, valued at $13,- 996,522 — a total value of $59,621,945.

The output of twine, other than binder twine, was valued at $13,996,522, an increase of 56.7 per cent since 1909. This value comprises that of twine made from cotton, jute, hemp, flax and other materials. The output of cotton twine in 1914 was 17,927,286 pounds, valued at $3,472,056, representing a decrease of 12.2 per cent in quantity and 1.3 per cent in value as compared with the 1909 figures. Of jute twine the 1914 production — 55 282, 159 pounds,, valued at $5,268,357 — showed an increase during the five-year period amounting to 55.7 per cent, in quantity and 106 per cent in value. Hemp twine showed an increase of 16.3 per cent in quantity and 45.1 per cent in value, and flax twine an increase of 33.3 per cent in quantity and 26.6 per cent in value. The output of other twines, including those made from mixed materials, increased 110.7 per cent in quantity and 179.9 per cent in value.*

Of the total value of products in 1(>14,

$83,228,424, that of rope and binder twine rep¬ resented 54.8 per cent. Exclusive of cotton rope the output of these products increased from 411,443,281 pounds valued at $30,918,693, in 1909, to 487,443,356 pounds, valued at $43,085,517, in 1914, or by 18.5 per cent in quantity and 39.4 per cent in value.

The production of cotton rope and twine, above given, does not represent the entire out¬ put of these commodities, a considerable quan¬ tity having been made by establishments classi¬ fied in the cotton manufacturing industries. The combined production of ropes and twines from cotton and cotton yarns amounted in 1914 to 49,972,017 pounds, valued at $9,695,310, repre¬ senting a decrease of 14.6 per cent in quantity and 4.1 per cent in value as compared with the 1909 output. The aggregate production of ropes and twines of all kinds, in all industries, however,ˆ increased during the five-year period from 525,340,375 pounds, valued at $46,446,575, to 624,737,764 pounds, valued at $63,305,293, or by 18.9 per cent in quantity and 36.3 per cent in value. The materials represented by the 1914 total comprised Manila hemp. New Zealand hemp, Hennequin (sisal from Mexico and Cuba), sisal (from Africa, the Bahamas, Hawaii and Java) and all other hard fibres taken as a group. The soft fibres comprised jute, jute butts, flax and flax tow, hemp and hemp tow and others.

CORDAITALES (from the genus Corda- ites, named in honor of A. J. Corda), an extinct great group of naked seeded and primitive gymnospermous plants, resembling in certain respects the cycads and cycadeoids, ginkgo, especially the yews among conifers, and the araucarias. The Cordaitaleans are

the most ancient of well-known seed-plants. They must have evolved in the Silurian or earlier; in the Devonian they formed the world's first great forests ; throughout the Carboniferous they remained cosmopolitan elements of climax forests; while in the Permian they declined, and the record closes in the Lias. In North America large and finely silicified trunks occur in Canada, Ohio, Indiana, Oklahoma and elsewhere. Some of the sections of petri¬ fied trunks from the Black Shale (upper De¬ vonian) of Indiana are two or more feet in diameter by 20 feet long, and indicate stately forest trees from 100 to 150 feet high. In portions of the Cordaitcs shale of New Brunswick the leaves often occur packed in layers like those of modern forests. The group appears to have culminated in the upper Car¬ boniferous coal-swamp forests. There the stems and leaves with a great variety of stam- inate fruits and seeds are especially abundant. The most noteworthy Cordaitalean specimens are the silicified leaves, stems and fruits with microscopic structure preserved from the "black flints® of the Coal Measures of Grande Croix, France. Study of this material, together with various trunks, casts and imprints, has revealed nearly all the critically important structures of these long-extinct plants.

The Cordaitales were mostly tall and rather slender trees with columnar trunks which only branched freely near their summits. The leaves were usually large and spirally inserted. In foliage and habitus various forms were much like Dammar a, the New Zealand Kauri pine

(Fig. 1) ; but some of the types must have greatly resembled Araucaria imbricata (q.v.). The larger species even as far back as the Devonian vied in size with both of these mod¬ ern climax forest makers. Some of the strap- leafed types must have had the appearance of the screw pine. Large leafed forms like that of figure 2 branched less freely or were simply columnar. The leaves are of linear to broadly elliptical form, and vary rather more than in the modern conifers. Smaller species are no more than 10 centimeters long; but a leaf length of two metres with a width of 20 centimeters is sometimes reached.

On the basis of the leaf forms Grand 'Eury

Fig. 1 — Dorycordaites as first restored by Renault. Numerous catkin-like inflorescenes are interspersed among the lanceolate leaves. The usual habitus was much taller. Bark not shown. X i on-

divided the group into the genera Cordaites, Dory- and Poa-Cordaites. The first of these divisions (cf. Fig. 3) includes mainly very large spatulate and blunt-end leaves, the second large lanceolate and sharply pointed leaf types, and the third grass-like forms. The genus Cordaites, as first used, may include any of these. Isolated stems have usually been described as Cordai- oxylon, or often as Araucarioxylon , because of the structural similarity to the wood of modern Araucarias. Branches can be called Cordai- cladus, and the large isolated pith casts, look¬ ing like piles of coins, were long only known as Artisia or Sternbcrgia. Staminate fruits are named Cordaiantlnis, and the seeds Cordaicar-

pus. On the basis of wood structure classifica¬ tion is likewise provisional, since studies of entire stems are seldom or never possible to carry out. Three more or less overlapping divisions are also distinguished by Scott. (1)

Fig. 2 — Large leaf simple-stemmed Cordaitalean with prolonged fertile axis. X iV From Dawson.

The Poroxylese were far the most fern-like. The stems were slender, only a few centimeters in diameter. They had long internodes and a double leaf trace bundle as in Lyginopteris, from which they mainly differ in their lack of centrifugal primary xylem. The petioles are known, and the bi- lateral seeds called Rhabdo- carpas appear to belong here. (2) The Pityeae include Pitys (with three species from the lower Carboniferous of southern Scotland), Archceo pitys of the Waverlv shale of Kentucky, and Callixylon. A very fine stem of the latter from the Indiana Devonian is called Callixylon Oweni, and a related species is Russian. This

Fig. 3 — Cordaites lingulatus. Group of attached leaves. After Grand 'Eury. (Reduced.)

group is only known from the pith and wood. The trees reached large size, but still retained

mesarch strands of primary xylem traversing the medulla next the secondary wood. They are thus of great interest as forms intermediate

between the fern-like Poroxyleac and typical Cordaiteans. (3) The Cordaiteae are the most advanced type and the greatest forest makers. Some species reached 150 feet in height and three feet in diameter. The stems still more closely resemble Araucaria in structure, the elements of the wood all being radially ar¬ ranged. No distinction between primary and secondary wood appears in the transverse sec¬ tion. The strands of ((old cryptogamic wood,® characteristic of the preceding divisions, are lost. In the radial section narrow spiral elements of the protoxylem next the broad discoid pith are succeeded by wider spiral tracheides, many rows of scalariform elements, and lastly the pitted tracheides forming the bulk of the wood. The pits of this wood are generally in two or more densely crowded rows. Their alternation tends to produce hexagonal outlines, though isolated pits retain their circular form. The pore is usually an oblique slit, and the crossed slits of appressed facing pits are highly charac¬ teristic. The medullary rays are thin, mostly one cell thick. The secondary wood is thus quite indistinguishable from that of Araucaria. The phloem is radial, the cortex parenchyma¬ tous and provided with secretory sacs. The outgoing leaf traces are double, as in Araucaria, Ginkgo and various primitive gymnospermous forms. There was a thick bark, recalling that of Araucaria. As in that modern type there are diarch roots with spiral protoxylem and the scalariform tracheides, followed by the secon¬ dary pitted wood. Triarch and tetrarch roots of similar structure are known. The very large cycad-like pith of all these stems appears to owe its discoid structure to tension during growth; but this feature may be seen in various modern plants such as the hickory and the walnut. Growth rings of the discontinuous or Arau- carian type may occur. Amongst forms struc¬ turally antecedent to the three foregoing groups, and more fern and cycad-like may be mentioned the stems classed as the Calamopitycce with petioles known as Kalymma. Well-conserved forms of these occur in the Waverly of Ken¬ tucky at the close of Devonian time. The leaves of the Cordaitaleans are conspicuously parallel veined with repeated dichotomy in all but the narrowest grass-like forms. Anatomi¬ cally they are very similar to the single pinnules of either the cycads or the cycadeoids. As in the latter the structure is well known from silicified specimens. The bundles are usually described as of the mesarch type, but the cen¬ trifugal xylem may fail. Each is surrounded by a strong sheath, usually connected with heavily developed hypodermal sclerenchyma. Intervening strands of the latter tissue may give to the leaf secondary venation.

Fructification. — The knowledge of the floral morphology of the Cordaitales now con¬ stitutes one of the most interesting chapters of paleobotany. It largely rests on the labors of Grand 'Eury and Renault, the latter having been so fortunate as to find silicified strobili of both sexes of certain species preserved in astonishing detail in the siliceous fragments or nodules of Grande Croix. Both male and female flowers, as well as seeds, have often been found directly attached to the leafy stems or branches (Figs. 4, 5, 7). The numerous flowers are borne in more or less catkin-like male and

female inflorescences. Such recall those of Gnetaleans or even angiospcrms. The floral order is usually spiral but may be distichous. No amphisporanriate flowers are known, al¬ though one form, Cordianthus Penjoni, sug¬ gests that such may have occurred. The usual condition indicates either monoecism or dioecism. The staminate flower is about a centimeter long and consists of a thick axis covered by spirally arranged bracts with interspersed fertile fila¬ ments bearing erect tufts of sporangia (Fig. 5).

Fig. 4 — Cordaianthus Fitcairnice. Branch of monoecious form bearing leaves and leaf scars with an ovuliferous inflorescence on the right, and on the left an inflorescence consisting of small staminate strobili. After Grand 'Eury.

Or, as Renault says, (

The pollen grains which have been found both in place and actually in the pollen cham¬ bers of the macrospores are large and contain

A B

Fig. 5 — Cordaites angulostrialus from the French Stephanien. A, branch with male inflorescence, slightly reduced; B, single bud with protruding anthers, enlarged from Grand 'Eury.

a highly interesting group of prothallial cells. This group is theoretical^ a transition stage between Pteridophytes and Spermatophytes. An extraordinary instance is recorded. In a seed of Cordianthus Grand 'euryi the outer integu¬ ment is partly broken away, the nucellus being left standing free. In its upper end the pollen chamber contains the pollen grains as in Ginkgo and the cycads. An actual stage in pollination is thus seen. It is of fundamental importance

086

CORDAY D'ARMANS

that the pollen grains found in the micellar canal are larger than those in the sporangia,' and their group of internal cells more devel¬ oped; while grains found free in the matrix exhibit an intermediate condition. Evidently

the pollen grains continued to grow after their discharge from the anther, and especially after entrance into the pollen chamber. Such a con¬ dition is one of the most readily thinkable later stages in the evolution of heterospory and seeds from asexual spore-producing dioeecious free prothalli. The presence of free swimming

spermatozoids is surmised.

The seed-bearing spikes are of varied form ; in some, solitary ovules accompanied by a few bracts are inserted directly on the axis (Fig. 6) ;

in others this arrangement ap¬ pears to be compounded, the lateral catkins each containing several ovules and in their younger stages much resem¬ bling the staminate forms.

The ovule was thus borne on a short axillary shoot as in Taxus or Ginkgo. In such forms basal stamens may earlier have been present, forming a Tumboa-Yikc fruit (Fig. 5). While homology

with other gymnosperms is not very close, it is evident that this open type of inflorescence was capable of undergoing change in the direction of modern forms of compaction and reduction. Undoubted

Cordaitean seeds (those found attached) are mostly cordate, and flat or platyspermic. The winged seeds about a centi¬ metre long called Samaropsis

, (Fig. 7), were attributed by Grand 'Fury to the genus

pIG 6 _ Cor- Dorycordaites, seen in the

daianthus spica- restoration Fig. 1. Others tus Lesquer- reach five or more centimetres

mafic, showing in length, and owing to their involucrate nut- size, heavy angles, and thick

lets distichously testa, are also fossils of strik- to subalternate- • ,• _ , .1

ly borne on both mg conservation. But there is

sides of a thick no gap either of structure or rigid stem. In- Gf form separating such seeds

emb?acingSCathe from the larger radiosym- nutlets indis- metric types abundant in the tinct. From the Palaeozoic. In general the Cor-

Pittst^n?81 Penna. daitean testa is more or less One half natural distinctly triple-layered, if the size- sclerotestal tissue separating

the outer fleshy sarcotesta from the inner flesh be called a layer. The chalazal bundle may give off

branches into both the inner border of the sarcotesta and the nuceleus. In a form called Cycadino carpus angnstodunen- sis the archegonia are plainly present, but em¬ bryonic structures have never been observed in such seeds. They are scarcely separable from those of the quasi-ferns and greatly resemble the seeds of modern cycads. . The seeds of the cycadeoids, owing to reduction, present a far less visible similarity.

The Cordaitales derive a unique significance from their age and primitive characters, so manifestly important in our conception of the manner and course of plant evolution. Botan¬

ists have been inclined to believe that the Cor- daitalean and Cycadalean groups had a common filicalean ancestry, and that from the Cordaitales have been derived the Ginkgoales, the Conifer- ales and probably the Gnetales. Some would

Fig. 7 — Samaropsis Pitcairn ice. Fragment of an ovulate inflorescence from Westphalia with the seeds in groups and borne on elongated stems. Natural size. After Carruthers.

go further and place the Cordaitales in a posi¬ tion ancestral to angiosperms as well. Opinion is about equally divided between a Cordaitalean and an Equisetalean derivation of Araucaria. Recent investigation calls these theories of descent more in question. It is now recognized that fossil types are seldom the true antecedents of later forms. Most fossil plants represent terminal climax constituents in the floras of the past; while the extent of homoplasy and parallelism yet remains to be measured. Cer¬ tainly increasing knowledge of the Cordaiteans will show them to be more varied than as yet conceived, and in any case their discovery must be regarded as one of the great triumphs of palseobotany.

Bibliography. — Dawson, (Fossil Plants of the Devonian and Upper Silurian Formations of Canada) (1871) ; Dawson, (Acadian Geol¬ ogy i Grand 'Eury, <(Flore Carbonifere de la Loire et du Centre de la France,® (in Mem. Inst, de France, Tome XXIV, 1877) ; Lesque- reux, (Second Geological Survey of Penn¬ sylvania* (Report P, 1880) ; Brongniart, (Recherches sur les graines fossiles silicifiees* (1881) ; Renault, (Course de botanique fossile> (1881); Scott, (Studies in Fossil Botany> (1903) ; Stopes, <(On Leaves of Cordaites® (in New Phytologist, Vol. II, Nos. 4, 5, 1903) ; Zalessky, <(Dadoxylon Tchihatcheffi Goeppert Sp® (in (Memoires Comite Geologique> New Ser. Liv. 68, Petrograd 1911) ; Elkins and Wieland, (Cordaitean Wood from the Indiana Black Shale * (in American Journal of Science , Vol. XXXVIII, 1914) ; Scott and Jeffrey, (On Fossil Plants, showing structure from the base of the Waverley Shale of Kentucky * (1914) ; Wieland, (American Fossil Cycads> (Vol. II,*

1916).

G. R. Wieland,

Lecturer in Paleobotany, Yale University.

CORDAY D'ARMANS, kor-da dar-man, Marie Anne Charlotte, French revolutionist: b. Saint Saturnin, near Seez, Normandy, 27 July 1768; d. Paris, 17 July 1793. She had passed her early years in a convent and had read Plutarch, Rousseau, Raynal and Voltaire. Her lover was accused by Marat as a con¬ spirator against the republic, and assassinated by villains hired for that purpose. This excited

Charlotte Cor day to revenge. History had in¬ spired her with a deep-rooted hatred against all oppressors, and she determined to free her country from Marat. Having left home, she entered Paris 11 July 1793, and obtained an interview with Marat on the pretext of dis¬ closing Girondists' plots. In the Ami du Penple of that morning Marat had asked for 200,000 heads, and Charlotte told him she could give him those of the Girondists at Caen. The as¬ semblies at Calvados were the first subjects of conversation, and Marat heard with eagerness the names of those who were present at them. (< All these,® he exclaimed, "shall be guillotined.® At these words Charlotte plunged her dagger into his bosom, and he called out ((A mot ! mon amp ; when some attendants rushed in and

seized her. On the morning of 17 July she appeared before the revolutionary tribunal with a dignified air, and her replies were firm and poble. She spoke of her deed as a duty which she owed her country. Being condemned to death she was guillotined the same day, retain¬ ing her presence of mind to the last. Her remarkable beauty, and her lofty bearing on her way to the guillotine, sent a thrill even through the hearts of her executioners. One young German enthusiast, Adam Lux, a deputy from the city of Mentz, on witnessing the execution, conceived a romantic passion for her, and when her head fell, he cried with a voice hoarse with emotion : ((1866) ; Vatel, 'Charlotte Corday et les Girondins> (Paris 1872) ; 'Bibliographic des femmes celebres) (3 vols., Turin and Rome 1892-1905).

CORDELIA, the youngest daughter of Lear in Shakespeare's tragedy, (King LearP

CORDELIERS, kor-da-le-a. 1. Another name for the Franciscan friars in general, but given, in France, to the branch of the order usually known as Franciscan Friars Minor (O. F. M.). After the death of Saint Francis in 1226, the next minister-general of the order relaxed somewhat the rigor of the. rule of poverty as taught and practised by Saint Fran¬ cis. This relaxation caused a division in the order, a number of the friars adopting the modified rule were called Conventuals (O. M. C.), and those adhering to the original ob¬ servances were called Observantines, and later, Friars Minor. In France the name Cordeliers was given to them on account of their girdle. The Cordeliers or Friars Minor are in several places in the United States. (See Francis¬ cans). 2. A political club during the first French revolution, which received the name of Cordeliers from the fact that its members met in the chapel of the old convent of the Fran¬ ciscan friars situated near the Rue de l'ficoje de Medicine and the Rue de l'Observance, in

the centre of the quarter of Paris known as the Cordeliers' district. The club of the Cordeliers became the focus of the wildest agitators, while at the same time it was constantly quarreling with the Jacobin Club. The leading events of the reign of terror may be traced to the conflict of the two clubs, and chiefly to the influence of the Cordeliers, of whom Marat and Danton were the ruling spirits. Anacharsis Clootz was also one of the members. At the time the club was in its zenith, Camille Des¬ moulins edited a popular journal in connection with it, under the name of Le vieux Cordelier, without, however, identifying himself completely with the politics of the formidable club. They were the first to demand a republic, insisting on (

CORDIER, kor-dya, Henri, American ed¬ ucator: b. New Orleans, La., 8 Aug. 1849. He was educated in Paris ; has been success¬ ively secretary of the Chinese Educational Mis¬ sion, professor at the School of Political Sciences, Paris, and at the School of Oriental Languages, Paris. He is a member of the Council of the Asiatic Society and honorary member of the Royal Asiatic Society, is presi¬ dent of the Societe de Bibliographic, member of the Institut de France and Chinese mandarin. He has published Catalogue of the Library of the North China Branch of the Royal Asiatic Society) (1872) ; 'Narrative of Recent Events in Tong-king > (1875); (Bibliotheca Sinica :

Dictionnaire bibliographique des ouvrages rela- tifs a l'Empire Chinois) (2 vols., 1881-85; Suppl., 2 vols., 1895 ; 2d ed., 4 vols., 1904-08) ; 'Les voyages en Asie au XIVe siecle du bien- heureux frere Odoric de Pordenone) (1891) ; 'Histoire des relations de la Chine avec les Puissances Occidentales> (3 vols., 1902) ; ^'Ex¬ pedition de Chine de 1857-58 > (1905) ; ^'Expe¬ dition de Cbine de I860' (1906) ; 'La Chine en France au XVIII siecle* (1910) ; (Bibliotheca Indo-Sinica' (1913—) . Lie edited the third edition of Yule, 'The Book of Ser Marco Polo> (2 vols., 1903), and the same author's 'Cathay and the Way Thither* (1913). Since 1890 he has edited Tsnng Pao, a review of Oriental affairs.*

CORDIERITE, a name formerly given to the mineral iolite (q.v.), in honor of Cordier, a French geologist.

CORDILLERAS, a name from the Span¬ ish for a mountain chain or ridge, formerly applied to any lofty and straight areas of land, but now specifically to chains, ranges or ridges of mountains, and especially to such of these elevations as are long and continuous. It is used particularly in physical geography, al¬ though in geology also it is sometimes applied to mountain systems at or near the coasts or borders of continents. The name was first given by the Spaniards to the chains of the Andes in South America, and was afterward extended to their northern continuation through Central America and Mexico, and finally to the

entire mountain systems stretching up the west¬ ern coast of the United States, British Colum¬ bia and Alaska, and spreading eastward to include the Rocky Mountains (q.v.). This por¬ tion of the continent geographers have come to call the Cordilleran region of North America, designating the corresponding elevations of South America under the old name of Andes. This region covers in the United States the whole western mountain portion of the country, including the Sierra Nevada, the Coast Range, the Cascade Range, and extending to and em¬ bracing the Rocky Mountains, as well as all the ranges lying between them and the moun¬ tains of the western coast. Included within this Cordilleran region are mountain systems many of whose lesser chains, in length and elevation, equal some of the famous ranges of Europe.

CORDITE, a smokeless powder employed by the English government. It was invented in 1889 by Sir Frederick Abel and Prof. James Dewar, and originally consisted of a mixture of nitro-glycerine 58 parts, nitrocellulose 37, vaseline 5, but on account of the erosion of the bore caused by the high percentage of nitro¬ glycerine and the danger of exudation of the nitro-glycerine and consequent detonation, the present proportions are more nearly 15 parts of nitro-glycerine, 80 of nitrocellulose and 5 of vaseline. This demanded an increase in the capacity of the gun chambers. This was done gradually, so that guns of earlier design could be used till they wore out.

The nitrocellulose is a mixture of various cellulose nitrates, insoluble and soluble. At the Royal Gunpowder Works at Waltham Abbey it is required that the nitrocellulose used shall not contain more than 12 per cent of soluble cellu¬ lose nitrate, or 0.6 per cent of mineral im¬ purities, nor less than 12.5 per cent of nitrogen. It is made by intimately mixing the ingredients in a mechanical kneading-machine with the aid of acetone, by which the whole is converted into a gelatinous mass which is then squirted into cords by means of a ((stuff press,)y a machine similar to those used in forming macaroni. The cords vary in diameter from 0.01 inch to 0.65 inch. The former are chopped into short lengths for use in pistols, the latter for use in 12-inch guns. The cords for small-arm car¬ tridges are 0.0375 inch in diameter. The cords are heated in drying houses to drive off the acetone, leaving them in the form of an amber- colored, translucent, flexible mass.

Cordite is made up into charges bv re ling the cords on bobbins, and then spinning these strands into larger cords, thus obtaining the desired length, volume and weight. See Ex¬ plosives; Nitrocellulose; Smokeless Powders.

c6rdoba, kor'dd-va, Fernando Fernan¬ dez de, Spanish general and statesman : b. Madrid 1792; d. 1883. He entered the military service in 1810, and was rapidly promoted dur¬ ing the war with Napoleon. In 1847 he officiated for a short time as Minister of War, and was appointed inspecting general of the infantry. On 8 March 1850 he was made captain-general of New Castile; in the following year to the same position in Cuba, and in 1853 general-in¬ chief of the cavalry. Immediately after the outbreak of the revolution of 1854, he was called upon by the queen to form a new cabinet.

This he declined, but he ordered his soldiers to fire upon the insurgents, and when the latter proved victorious, he fled to France. In 1856 he returned to Spain, and was reinstated in his position of general, and 10 years later was active in the revolution which drove Queen Isabella from the throne. He was captain- general of Cuba for the second time in 1870.

c6rdoba, Francisco Hernandez de,

Spanish soldier and explorer. See Hernandez de Cordoba, Francisco.

C6RDOBA, Jose Maria, South American general: b. Antioquia, Colombia, about 1797; d. 17 Oct. 1829. At the age of 15 he left his father, who belonged to the Spanish party, and joined a band of guerrillas, among whom he soon became noted for his intrepidity in their contests with the Spaniards. At the battle of Boyaca, 8 Aug. 1819, he won the rank of colonel. Not long after he was appointed general, and_ distinguished himself at the battle of Ayacucho, " after which he was made general of division on the field. In September 1828 he became head of the War Department of the republic of Co¬ lombia, under Bolivar, but, a year afterward, revolted against him. He found but few ad¬ herents, however, and being attacked, 17 Octo¬ ber, by a force greatly superior to his own, was slain with the most of his followers.

C6RDOBA, Luis Fernandez de, Spanish general: b. Cadiz 1799; d. Lisbon, 29 April 1840. He took a prominent part in the move¬ ment of 1820 as a constitutionalist, and in that of 7 July 1822 as an absolutist. He officiated afterward on diplomatic missions abroad, and eventually deserting the forlorn cause of Don Carlos, espoused that of Christina and Isabel, took a distinguished part in the battle of Men- digorria, was appointed commander-in-chief of the Christinos as successor of Valdez, but un¬ able to finish the war, was driven from office after the movement of 1836, and fled to France, whence he soon returned to Spain. He now conspired wflth the party of Narvaez against Espartero, but retired to Portugal when the latter came into power.

c6rdoba, Pedro de, Spanish Dominican missionary : b. 1483 ; d. Santo Domingo, 28 June 1525. He was vicar of the first Dominican colony in Hispaniola in 1510, preached against Indian slavery and endeavored to have laws framed for the protection of the Indians. His efforts in behalf of the Indians were successful to the extent that he drew the attention of the Spanish court to the evils going on in the government of the Spanish colonies in the New World ; but the influence of the adventurers who swarmed into the country shortly after the discovery of America and the cupidity of the representatives of the Crown and of the land holders finally brought his work to naught ; and the Indians in Hispaniola and neighboring islands soon became practically extinct.

C6RDOBA, or CORDOVA, Argentine Republic, a province next in size to that of Buenos Aires, bounded on the north by San¬ tiago del Estero, on the east by Santa Fe, on the south by Buenos Aires and the territorial government of Pampa Central, and on the west by the provinces of San Luis, La Rioja and Catamarca. Area 54,000 square miles. Its northwestern portion is mountainous, and rich

in minerals. Copper, silver, gold, lime, marble, graphite and salt are found. The central and eastern regions lie in a great plain watered by the rivers Cuarto, Segundo, Primero, Dulce, etc., with the lake called Mar Chiquita ; and here agricultural and grazing industries are car¬ ried on. Cattle, horses and mules are bred in the south; wheat and fruits are raised along the river courses; there are large flocks of sheep and goats in the centre and north. Be¬ sides wheat and fruits, the principal crops are maize, lucern, barley, sweet potatoes and white potatoe*s. Of the total productions, about one- half, in value, are pastoral, one-third agricul¬ tural. The mining industry is as yet compara¬ tively undeveloped. Manufactures are flour, lime and cement, bricks, hides and leather, beer, wine and alcohol, boots and shoes, cut wood, vermicelli, gold embroideries, butter and cheese, cut stone, belts, candles and soap, arti¬ ficial ice, etc. Principal railway centres are the capital city, Cordoba (q.v.), Villa Maria and Villa Nueva. Under the constitution of the republic dated 25 Sept. 1860 the province has its own constitution, <(framed upon the basis of a republican representative system of govern¬ ment, and in harmony with the principles, declarations, and guaranties of the national con¬ stitution® ; said provincial constitution relating to <(the administration of justice, the administra¬ tion of the local government, and primary instruction. Upon these conditions the federal government guarantees to each province the practice and enjoyment of its own constitu¬ tions.® The provinces have their own local institutions and laws ; ((they elect their govern¬ ors, legislators, and provincial functionaries of all classes, without the intervention of the fed¬ eral. government.® The province is represented in the national legislature by two senators, elected by the provincial legislature, and by deputies elected directly by the people. Each province is for this purpose considered as an electoral district, and the election is by a plurality of votes in the proportion of one deputy to each 20,000 inhabitants, or fraction of that number not less than 10,000. ˆPopula¬ tion of the province approximately 625,000.

C6RDOBA, Argentine Republic, the cap¬ ital of the province of the same name, situated on the right bank of the Rio Primero, 432 miles from Buenos Aires, at the junction of five railways. It is one of the progressive inland cities, having adopted many of the mod¬ ern improvements, such as electric light, running water, street railways, sewers and excellent pavements. Its university, founded in 1813; astronomical observatory, established 1871 ; Na¬ tional Academy of Science; National Meteoro¬ logical Institute ; national college, normal schools and elementary schools, have made it well known as an educational centre. Railway communica¬ tion with Buenos Aires was established in 1869. The first national fair wras held here in 1871. A score of newspapers and reviews are pub¬ lished in the city. In size it is the third city of the republic. There are fine public buildings and private residences, and attractive parks. It was founded in 1583, and its university is in point of age second only to that at Lima among the South American universities. Pop. 100,000.

C6RDOBA, Mexico, a town on the Mexi¬ can Railway, 66 miles west of Vera Cruz, in a vol. 7 — 44

fruitful valley 3,045 feet above the sea. It has manufactories of woolen and cotton goods and is surrounded by rich coffee plantations. Pop.

9,000.

c6rdoba, Spain, a town and capital of the province of Cordoba, situated on the Guadal¬ quivir, in Lower Andalusia. It is built on a gentle declivity of a chain of mountains, forms an oblong quadrangle and is surrounded with walls and lofty towers. A part of the town is of Roman, a part of Moorish origin; many of the buildings are in ruins, and a number of gardens occupy a great part of the inhabited space. The streets are narrow, crooked and dirty; the plaza mayor, the principal market¬ place, however, is distinguished for its size, its regularity and the beauty of the colonnade by which it is surrounded. The remains of the residence of the Moorish kings now form a part of the archbishop's palace. The cathedral is a splendid building, originally a mosque, erected in the 8th century by King Abd-er-Rahman I. The mosque of Cordoba is, in the words of Gautier, <(a monument unique in the world, and novel even for travellers who have had the fortune to admire the wonders of Moorish architecture at Granada or Seville.® It is 370 feet in length, 425 in breadth and has a bell tower 300 feet high. It was at one time the second largest sacred building of Islam, and is the most magnificent Mohammedan temple in Europe. It is surrounded by a wall supported by strong buttresses. Other points of interest are the Campo Santo, the site of Christian martyrdoms, and the chapel of the Hospital del Cardinal, once part of a mosque. From the 9th to the 12th centuries Cordoba was a great centre of trade; the leather exclusively manu¬ factured there

(cordovan) was exported in all directions. At what period the Romans laid the foundation of the town (Colonia Patricia, after¬ ward Corduba) is not known. In 572 it was conquered by the Goths. During the reign of the dynasty of the Ommiades it was the capital of Arabian Spain ; and afterward it became the residence of the powerful caliphs of the West, the sacred city of the Moors and the centre of Mohammedan worship and of Arabian splendor and science. At that time the city is said to have been about 15 miles in circuit and to have possessed a population of 1,000,000. In 1236 it fell an easy prey to Ferdinand III of Castile. In 1808 it was pillaged by the French, who cap¬ tured it again under Soult in 1810. Pop. 65,200. The province of Cordoba includes the fertile and beautiful valley of the Guadalquivir and the snow-capped mountains of Sierra Morena. The area of the province is 5,298 square miles and the population about 460,000.

CORDON, in a military sense, troops so disposed as to preserve an uninterrupted line of communication, to protect, for instance, a country from hostile invasion; also a similar line intended to protect a place from contagious diseases. In the latter sense it is called a cordon sanitaire. The word ˆcordon® also means, in fortification, the coping of the escarp or inner wall of the ditch. It is usually rounded in front and projects one- foot over the masonry.

In horticulture, cordon is a term applied to a system of training fruit trees. The trees are dwarfed bv training and pruning to one or two stems which extend horizontally or

obliquely, and from which the fruit-bearing spurs are developed. The objects sought are economy of space and increased size and im¬ proved quality of fruit. The system is in little use in America, where land is cheap, but in Europe it is very popular. It is best adapted to such trees as pears and apples, which naturally bear their fruits upon spurs.

CORDON BLEU, kor'don' ble, a knight of the ancient French Order of the Holy Ghost, at one time the most aristocratic order in the kingdom, whose decoration was attached to a blue ribbon or baldric. The knights frequently met in club form, and were noted for their excellent dinners, whence the term came to be applied to a cook of superior skill.

CORDON GRAND, gron, a term applied to a member of any grade of the French Legion of Honor, because the cross of the order is always suspended from a broad ribbon.

CORDOVA, Francisco Hernandez de,

Spanish navigator : b. in the latter part of the 15th century; d. Cuba 1517. He was the dis¬ coverer of Yucatan, which he visited in 1517, and had several encounters with the natives. He lost some of his men, and two were taken prisoners and carried up the country. Shortly after his return to Cuba he died; but the account he gave of his discoveries led to a new expedi¬ tion under Juan de Grijalva, to whom was subsequently assigned the honor of the discovery.

CORDOVA Y FIGUEROA, Pedro de,

Chilean historian : b. Concepcion 1692; d, there after 1770. He served in the Chilean army in Araucania and was alcalde of his native place about 1740. He wrote a (Historia de Chile,) which includes an account of the settlement of the country up to 1717. In 1739, by order of President Velasco, he founded Los Angeles, the capital of Araucania. The manuscript of the work was preserved at Madrid. It has been published in the (Coleccion de historiadores de Chile.5

CORDOVA, Ala., town in Walker County, 30 miles north of West Birmingham, on the Saint Louis, San Francisco and Southern rail¬ roads. The principal industries are the manu¬ facture of cotton and coal-mining. The Cor¬ dova bank has resources of about $50,000; and there is a school accommodating 500. The gov¬ ernment is in the hands of a mayor and aider- man. Pop. 3,000.

CORDOVA. See Cordoba.

CORDOVAN, a fine leather which took its name from the Spanish city of Cordova, where it was

manufactured in large quantities. It was also called cordwain. The modern application of the term is to a grain leather from the best and strongest portions of a horsehide and used for heavy boots, as for walking or hunting.

CORDUROY, a ribbed cotton fabric, woven with a pile which is cut so as to leave the sur¬ face ridged in the direction of the warp. See Fustian; Velvet.

CORDWOOD, wood, especially firewood, cut in lengths of 4 feet and piled in an oblong stack 8 feet long and 4 feet high. The cubical content of 128 feet is the standard for deter¬ mining the prices of sale or of labor on the material.

CORDYCEPS, kor'di-seps, a genus of its fungi, some of which are found parasitic on other fungi, while others are remarkable for growing on the larvae of insects, which they latterly kill. It grows very freely over a wide area, and in different countries 28 species have been found.

COREA, ko-re'a. See Korea.

COREAL, ko-ra-al', Francisco, the name affixed to the (Voyage aux Indes occidentals,5 which was issued in Paris 1727. Its author as¬ serted that he was born in Carthagena, Spain, in 1648 and had traveled extensively through Florida, Mexico and South America. The book abounds in errors and is probably a compila¬ tion. The work passed through several edi¬ tions, one of the most important of these being published in Brussels in 1736.

COREGONUS, ko-reg'6-nus, a genus of abdominal fishes, family Salmonida. The teeth are very small or wanting, the scales large and the height or front of the first dorsal as great or greater than its breadth. The genus is common in European waters and unusually large varieties are found in the rivers of Siberia. The best-known American representa¬ tive is Coregonus clilpeiformis, the whitefish. They inhabit clear lakes.

CORELLI, Marie, English novelist: b. Italy 1864. In infancy she was adopted by Charles Mackay, the poet. She was educated in London, and on beginning her literary career adopted as a pen name that which subsequently became her legal name. She has published (A Romance of Two Worlds) (1886); 'Ven- detta> (1886); 'Thelma5 (1887); (1889) ; 'Wormwood5 ; 'The Soul of Lilith5 (1892) ; 'Barabbas5 (1893) ; 'The Silence of the Maharajah5 (1895) ; 'The Sorrows of Satan5 (1895) ; 'Cameos5 (1896) ; 'The Mighty Atom5 (1896); 'The Murder of Delicia5 (1896); 'Ziska5 (1897); 'Jane5 (1897); 'The Master Christian5 (1900); 'Bov5 (1900); 'Temporal Power5 (1902); 'God's Good Man5 (1904); 'The Treasure of Heaven5 (1906); 'Holy Orders5 (1908); 'The Devil's Motor5 (1910) ; 'The Life Everlasting5 (1911) ; 'In¬ nocent, Her Fancy and His Fact5 (1914).

CORENTYN, ko-ren-tin', a river of South America, separating British and Dutch Guiana, and flowing into the Atlantic. It has a course of about 400 miles, and is navigable below the Great Cataracts in lat. 4° 20′ N.

COREOPSIS, ko -r§-op'sis, a genus of annual and perennial herbs of the family Asteracece. Nearly all the species are natives of eastern North America. They have showy, generally yellow, flowers in heads, and are widely cultivated in gardens. They are of easiest culture, being grown from seeds sown in a hot-bed and transplanted to any ordinary gar¬ den soil where they will blossom freely with little attention beyond keeping the ground free from weeds.

COREY, William Ellis, American capital¬ ist : b. Braddock, Pa., 4 May 1866. He was educated at Duff's College, Pittsburgh. When 16 years old, he entered the chemical laboratory of the Edgar Thomson Steel Works, and five years later he went into the Homestead Steel Works, wrhere, in 1889, he became superin-

tendent of the plate mill, in 1893 superintendent of the armor-plate department, and in 1897 gen¬ eral manager. From 1901 to 1903 he was pres¬ ident of the Carnegie Steel Company and from the latter year to 1911 president of the United States Steel Corporation. He was one of the circle of men

associated with Andrew Carnegie in the development of his great steel industries.

CORFE CASTLE, a castle in Dorsetshire, England, now in ruins, standing a little north of a small town, to which it gives its name, and with which it is connected by a bridge of four arches. It was built by King Edgar in the 10th century and at its gates his son Edward the Martyr was murdered in 979. It was the occa¬ sional residence of King John, and was for some time the prison of Edward II. During the great civil war it was heroically defended against the parliamentarian forces by Lady Bankes. It was subsequently taken by Fairfax through the treachery of an officer of the garri¬ son, when it was demolished, 1646. Consult Bond, T., (History and Description of Corfe Castle) (London and Bournemouth 1883).

CORFIELD, William Henry, English sanitarian : b. Shrewsbury, England, 14 Dec. 1843 ; d. Marstrand, Sweden, 26 Aug. 1903. He was educated at University College, London, and in the medical schools of Paris and Lyons, and was the first professor of hygiene appointed in University College, London. He published (A Digest of Facts Relating to the Treatment and Utilization of Sewage) (1870) ; (Lectures on Water Supply, Sewerage and Sewage Util¬ ization J (1875) ; (Laws of Health) (9th ed.) ; (Dwelling Houses: Their Sanitary Construction and Arrangements (4th ed., 1898) ; (Disease and Defective House Sanitation (1896).*

CORFU, kor-foo' (anciently Corcyra), Greece, island in the Mediterranean, the most northerly and the largest of the Ionian Islands, at the mouth of the Adriatic, near the coast of Albania, about 40 miles long, and from 15 to 20 wide; square miles, 431. The surface rises in the north at one point to the height of 3,000 feet, but the south portion is low. The scen¬ ery is beautiful, the climate pleasant and healthful, save for malaria in the centre and in the s,outh, and the soil is fertile. Oranges, citrons, grapes, honey, wax, olives and oil are abundant. Salt is also produced in some quan¬ tity. The ancient name of the island was Dre- pane. A Corinthian colony settled in the island in the 8th century b.c., taking it from the Illyrian inhabitants. Corcyra's quarrel with Corinth was one of the immediate causes of the Pelo¬ ponnesian War. The Venetians possessed Corfu from 1386 to 1797, making it a Christian bul¬ wark against the Turks. The British held it from 1815 to 1864. Pop. 99,571. Corfu, the capital, is finely situated on the eastern coast on a promontory which terminates in a huge isolated rock crowned by the citadel ; the streets are Italian in style. The chief edifices are the cathedral, government palace and Ionian Academy. There is a good harbor and consider¬ able trade. It is the seat of a Greek archbishop and of a Catholic bishop. Consult Riemann,

CORIANDER, a plant, Coriandrum sati¬ vum, of the parsley family, native of southern

Europe but sometimes established as a weed in North America. It is an annual with finely divided leaves and small white flowers. It is commonly cultivated for the "seeds® ' (fruits), which are used in flavoring pastries, confec¬ tionery and liquors.

CORIGLIANO CALABRO, ko-re-lya/no ka-laffiro, Italy, city in the province of Cosenza, four miles from the Gulf of Taranto and 70 miles southwest of Taranto. It has a .castle and an aqueduct, and markets a high quality of manna from the ash trees of the surrounding country, as well as some oil. It was destroyed in 1806 by the French. Pop. 16,338.

CORINNA, Greek lyric poetess of Ta- nagra, in Bceotia. She was contemporary with Pindar, whom she is said to have conquered five times at musical contests, and therefore her image crowned with the chaplet of victory was placed in the gymnasium of Tanagra. Accord¬ ing to Pausanias, who relates this fact, she was so beautiful that her charms may have in¬ fluenced in some degree the opinion of the judges. Of the numerous poems which the ancients ascribed to her, only a few fragments have come down to us. Her poems were all in the Bceotian dialect. They have been collected by Bergk in (Poetae Lyrici GraecP (4th ed., 1878), and by Schneidewin in (Delectus Poe- tarum Graecorum (-839). Madame de StaT has given the name of Corinne to the heroine of one of her novels. In 1907 a papyrus was found of the 2d century a.d. on which were con¬ siderable remains of two poems attributed to Corinna. Consult (The Year's Work in Clas¬ sical Studies) (for 1907) ; Edmonds, (New Fragments of Corinna) (1910).*

CORINNE. (Corinne (1806) was the crowning point of Madame de Stael's literary career. In it her ideals find their most com¬ plete expression. By it, pre-eminently, and by her Germany,* in the words of Faguet, "she sowed the century with fertile ideas and gave French poetry as it were a new*

soul.® It is a book of self-interpretation. The heroine is herself, and is the only living character in a story whose plot, though easy and graceful, is of no special value. Corinne, of mingled Italian and English blood, has gone from England to Rome to seek psychic emancipation in a freer artistic life than English conventions admitted. With admirable art the spirit of the two nations is contrasted, unreckoning idealism with self- satisfied calculation, passion with cant, nature with respectability, fame with wealth and ease. To Corinne as to Coleridge, all thoughts, pas¬ sions, delights are but ministers of love. Glory without love is only ((the bright shroud of happiness,® conscious intellectual superiority rather a hardship than a boon. Yet a vision of happiness seemed always beckoning her on ; and this vision made of (Corinne, for a whole generation of romantic spirits, a breviary of generous passion and of ideal love, none the less because the heroine dies at last, abandoning her dignity to her love, a victim to social con¬ ventionality. Here a new range of emotions gained recognition in the evolution of fiction. The artistic and musical novels of the next generation, the Teverino's and the Consuelo's, had in (Corinne* their inspiration and exemplar. It showed, too, as no novel before it had done,*

how description of nature might be made to reflect and interpret the psychic moods of its characters. There are four English trans¬ lations.

Benjamin W. Wells,

CORINTH, Greece, a celebrated city upon the isthmus of the same name. It was re¬ nowned among the cities of Greece, commanded by its advantageous position a most important transit trade, and possessed all the splendor which wealth and luxury could create ; while its citadel, the Acrocorinthus, rendered it one of the strongest fortresses of Greece. Only a few ruins remain to attest its ancient magnifi¬ cence. Of the three ancient harbors the western harbor, Lechaeum, on the Gulf of Corinth, is choked with sand, as is the eastern harbor, Kekhries (ancient Cenchreae), on the Saronic Gulf. These were anciently the chief harbors of Corinth. The shallow harbor Schoenos, now Kalamaki, at the eastern entrance of the canal across the isthmus, is used to some extent. There is still a wretched village on the site of ancient Corinth. The American School of Classical studies at Athens began excavations in 1896 on the site of ancient Corinth. Few works of art were found, but the sites of the theatre, the fountains of Pirene and Glauce, the road to Lechaeum, the Propylaea and the Agora were determined. In this way a basis was furnished for identifying the topography of the ancient city from the detailed description given by Pausanias. New Corinth (Nea Korinthos) stands about three miles to the northeast on the coast of the gulf, on the rail¬ way from Athens to Patras. It is a small town built since 1858, is the capital of the eparchy of Argolis and Corinth, and the seat of an arch¬ bishop. It has a harbor and custom-house. Oil, corn, currants, honey and silk are among its principal exports. The Corinth Ship Canal was opened in 1893, and has greatly aided the prosperity of the city. Pop. 5,340.

In ancient Corinth great exchange of Asiatic and Italian goods took place. The duty paid on these goods afforded a great revenue to the state ; and the citizens accumulated such wealth, that Corinth became one of the most magnifi¬ cent, but at the same time most voluptuous, cities of Greece. Aphrodite was the goddess of the city, and courtesans were her priestesses, to whom recourse was often had, that they might implore the protection of the goddess in times of public danger; and a certain number of new priestesses were consecrated to her at the com¬ mencement of important enterprises. Lais and several other females of the same profession were distinguished by their great accomplish¬ ments and beauty, and the high price which they set on their charms ; hence the old proverb, Non cuivis homini contingit adire Corinthum, that is, <(It isn't everyone that can afford to go to Corinth.® The virtuous women celebrated a feast to Aphrodite apart from the others.*

The mythical Sisyphus was the founder of the .TEolian dynasty, which is represented as the first that ruled in Corinth. It was conquered by the Heraclidse, and Corinth was subsequently ruled by an oligarchy called the Bacchidae, in whose time the colonies of Syracuse and Cor- cyra were founded. This was overthrown by Cypselus in 657 b.c. Periander was the next ruler. Corinth took a prominent part in the

development of Greek colonization and was long a great naval power. In the sequel Corinth be¬ came the head of the Achaean League, and was conquered and destroyed by the Consul Mum- mius, 146 b.c. Julius Caesar, about a hundred years later, rebuilt it ; but its commerce could not be restored; the productions of the East now took the road to Rome. A Christian com¬ munity sprang up in the city under Paul's minis¬ trations, and to it he addressed two letters. The Venetians received the place from a Greek em¬ peror; Mohammed II took it from them in 1458; the Venetians recovered it in 1687, and fortified the Acrocorinthus again ; but the Turks, under Ali Comourgi, celebrated in Byron's (Siege of Corinth, > took it anew in 1715, and retained it until Greece became in¬ dependent. It was reduced to ashes during the Revolutionary War, and again ruined by an earthquake in 1858. Against any enemy invad¬ ing the Morea from the north, Corinth and its citadel were formerly of the highest military importance, and as a fortified post it continued of importance to modern times. But by the present Greek government it has been neglected. Consult Curtius, E., (ib. 1896). For a popular account, consult Richardson, in the Century Magazine (New York 1899) and Cooley, in Records of the Past (Vol. I, Wash¬ ington 1902).

CORINTH, N. Y., a town in the Adiron¬ dack Mountains, 17 miles from Saratoga on the Hudson River. The Adirondack branch of the Delaware and Hudson Railroad connects with the town. The principal industries are the manufacture of paper and pulp, gloves and shirts. There are three schools, a national bank and a town-hall. Pop. 3,500.

CORINTH, Advance on (30 April-30 May 1862), and Battle of (3-4 Oct. 1862). Corinth, Miss., an important strategical point, was early occupied by the Confederates. It was the objective point of General Halleck's cam¬ paign, for which, early in April 1862, he was concentrating Grant's and Buell's armies at Pittsburg Landing, on the Tennessee River. On 3 April Gen. A. Sidney Johnston marched from Corinth with 40,000 men to strike and crush Grant before Buell could join him; sur¬ prised him on the morning of the sixth, at Shiloh; and after a severe fight drove him back to the river, where he was joined by Buell's advance division. Johnston was killed during the battle, and was succeeded' by General Beau¬ regard. Grant and Buell renewed the battle on the seventh; Beauregard was defeated, and led his army back to Corinth, having lost 10,000 men. General Halleck joined the army at Shiloh, 11 April, assumed command, drew rein¬ forcements from every direction, and at the end of the month had 110,000 men. Grant was second in command. On 30 April the movement began on Corinth, 27 miles distant, held by Beauregard with about 50,000 men, his army having been reinforced. Early in May Halleck began to throw up elaborate works. It was a siege from start to finish, the army entrenching from the Tennessee River to Corinth. On 9 May occurred an engagement in which the

Union loss was about 180 killed and wounded; the Confederate loss about 160. Halleck con¬ tinued his slow approaches, gradually gaining ground, and 28 May he was within a mile of Beauregard's main line. On the morning of the 30th it was discovered that Beau¬ regard had made a clean retreat. At Baldwyn, 31 miles from Corinth, he remained until 7 June, when he fell back to Tupelo, 52 miles from Corinth. Halleck occupied Corinth on 30 May, and Gen. Gordon Granger's cavalry, sup¬ ported by 50,000 infantry, followed Beauregard as far as Baldwyn and Guntown, and here the campaign for Corinth ended. The loss of Corinth was followed by the fall of Fort Pillow and Memphis and the opening of the Mississippi down to Vicksburg.

On 1 Oct. 1862, General Grant, in command of the Union army operating in West Tennessee and northern Mississippi, had about 48,000 effective men. Gen. Earl Van Dorn, command¬ ing the Confederates in Mississippi, believing that a successful attack on Corinth would expel Grant from West Tennessee, concentrated Lovell's division of his own army, with the two divisions of Gen. Sterling Price's army at Rip¬ ley, 30 miles southwest of Corinth, 28 Septem¬ ber. Next day he marched north, and arrived at 10 o'clock on the morning of 3 October, three miles northwest of Corinth, where he formed his army for attack. He had about 22,000 men. Rosecrans had been warned, and had made dis¬ positions for the attack. In a severe action that day Van Dorn gained two miles of ground and captured two guns. The main works defending the town were close to it, and consisted of a series of heavily armed redoubts, connected by rifle-pits or breastworks. By 9 o'clock that night Rosecrans had formed his lines for the next morning's battle. It was after 9 o'clock

of a still, intensely hot day, before Van Dorn attacked. The battle, which was fought with fury on both sides, did not exceed an hour in duration, and by noon Van Dorn's army, Lovell's division covering the rear, was in full retreat, from one of the most sanguinary fields of the war. Gen. Sterling Price, in his report, says : ((The history of this war contains no bloodier page, perhaps, than that which will record this fiercely contested battle. w At night Van Dorn halted at Chewalla, six miles from the field, next morning hastening his march for Pocahontas to retire by the way he had come. After fighting at Davis' Bridge over Hatchie River, in which he inflicted upon the Federals a loss of 539 killed and wounded, and himself lost 127 killed and wounded, 420 prisoners, and four guns, Van Dorn crossed the Hatchie at Crum's Mill, six miles south, and took the road to Ripley, thence to Holly Springs.

The Union loss at Corinth was 355 killed, 1,841 wounded and 324 missing; an aggregate of 2,520. Rosecrans says he buried 1,423 Con¬ federates, but the Confederate reports show a loss of 505 killed, 2,150 wounded and 2,183 miss¬ ing; an aggregate of 4,838. Deducting the loss at Davis' Bridge (127 killed and wounded, and 420 prisoners), the Confederate loss at Corinth was 2,528 killed and wounded and 1,763 missing. Consult (Official Records) (Vols. X and XVII) ; Grant, (Personal Memoirs ; Sherman,*

*regardˆ (Vol. II) ; Force, (From Fort Henry to Corinth.**

E. A. Carman.

CORINTH, Gulf of, a beautiful inlet of the Mediterranean, about 80 miles long, between the Peloponnesus and northern Greece, having the Isthmus of Corinth closing it in on the east. It is better known as the Gulf of Lepanto. See Lepanto, Battle of.

CORINTH, Isthmus of, an isthmus con¬ necting the Morea (Peloponnesus) with north¬ ern Greece. It varies in width from four to eight miles. A canal, about four miles long, was constructed across the isthmus in 1882-93, which enables vessels to sail from the Archipelago to the Adriatic without rounding Cape Matapan. See Canals; Ship Canals.

CORINTHIAN ORDER, that order of Grecian architecture of which the most char¬ acteristic feature is the capital of the column, which is adorned with beautifully carved acanthus leaves, but varies considerably in minor details. The column is generally fluted, with a fillet between the flutings, and stands upon a base. The entablature is variously decorated, especially the cornice; the frieze may be quite plain, or sculptured with foliage and animals. The Corinthian order was not very common in Greece before the time of Alexander the Great. Among the Romans it was much employed.

CORINTHIANS, Epistles of Paul to the.

These New Testament letters form only a part of the correspondence known to have passed between the apostle Paul and the church of Corinth. The circumstances that called them forth and dictated their contents were of crucial importance in the early life of that church and the letters can be studied to best advantage in the light of these circumstances. It was prob¬ ably early in the year 50 a.d. that Paul the missionarv and apostle arrived in Corinth, the largest, wealthiest and most dissolute city of Greece and the capital of the Roman province of Achaia. Here the missionary efforts of Paul and his companions soon resulted in the for¬ mation of a flourishing Christian church in whose membership all classes of this truly cos¬ mopolitan city were represented, although the majority were of lowly station (cf. Acts xviii, 1 ff. ; 1 Cor. i, 26 f.). Paul remained with the infant church about a year and a half, leaving in the fall of 51 a.d. soon after the arrival of the new proconsul Gallio (Acts xviii, 12-18). Some time after Paul's departure Apollos,. an eloquent Alexandrian Jewish-Christian visited Corinth and lent his effective aid in building up the church there (Acts xviii, 24; xix, 1). After Apollos' return to Ephesus, the church of Corinth began to be disturbed by various troubles, all due generally to the fact that the membership was quite varied in character, com¬ prising many whose experience of Christianity was brief or only superficial. Party-strife broke out (1 Cor. i, 11 ff.), Paul's apostolic authority was even questioned by some (1 Cor. iv), and one or more cases of immorality had occurred with no censure from the church as a whole (1 Cor. v). In addition confusion of thought regarding various matters of Christian faith and practice was becoming apparent. Meanwhile Paul was at Ephesus (52-54 a.d.) busily en¬ gaged in developing a large and far-reaching

missionary movement from that metropolis as a centre.

While engaged in this work, and apparently all unmindful of the troubles developing in the Corinthian church, Paul sent Titus, one of his most trusted assistants, from Ephesus to Corinth to lay before the church there his plan to collect from his Gentile churches a substan¬ tial offering for the poor Christian brethren of the old mother-church of Jerusalem (2 Cor. viii, 6, 10 f., 16 ff. ; ix, 1 ff.). Titus was well received at Corinth and the church readily promised to contribute to the proposed collec¬ tion. It is likely, however, that Titus noticed that all was not well with the church and so reported to Paul on his return to Ephesus. This moved Paul to write a letter, now lost, to the Corinthian church in which he urged them to take prompt measures in regard to the case or cases of immorality in their midst (cf. 1 Cor. v, 9). The effect of the letter was, however, to arouse a spirit of bitter hostility against Paul on the part of the guilty ones and their friends, who now began to spread malicious reports concerning Paul amongst the member¬ ship of the church, many of whom had been converted after Paul's departure and therefore had had no personal contact with him. This letter was written sometime in 53 a.d., upwards of two years after Paul had left Corinth.^_

All unaware of the extent of the disaffection toward himself Paul had also arranged to have Timothy, one of his missionary co-workers, call at Corinth in the course of an extended visita¬ tion of the churches of Macedonia and Achaia (cf. 1 Cor. xvi, 10 f.). But before Timothy arrived at Corinth a deputation of leading mem¬ bers of the church there, bearing with them also a letter from some portion of the membership of the church, had left Corinth for Ephesus to inform Paul of the whole situation and get the benefit of his counsel (1 Cor. xvi, 17 ff. ; vii, 1). On the basis of all the information he now pos¬ sessed from these and other sources (cf. 1 Cor. i, 11) Paul wrote the letter now known as the First Epistle to the Corinthians (in reality the second letter he is known to have written this church) in which he sought to deal fully with all the more important problems then facing the church of Corinth. In all probability Paul sent this letter by the deputation on their return. The date of the letter can be fixed approx¬ imately as late in the year 53 a.d. When Paul wrote 1 Corinthians he felt that he possessed the confidence and affection of the church- membership as a whole, although he was aware that the attitude of some was not cordial and that it was necessary to speak plainly in rebuk¬ ing certain errors in which the church as a whole shared. Like most of Paul's letters this is a letter, not a treatise, a message directed toward a concrete situation, dealing with the actual problems of the day and intended to be read and understood by the plain, and not especially learned people of the church as then constituted. Read as such a message it is full of living interest, but if read as an abstract doctrinal treatise it cannot fail of being mis¬ understood.

After the usual introductory section (i, 1-9) Paul first devotes his attention to the party- strife in the church (i, 10-iv, 21). In dealing with this he points out that the church is the church of Christ, not of Paul or of Peter or of

any other individual, and being founded upon the message of the Cross it is not based on a theory emanating from mere human wisdom ; hence all party-strife and boasting is entirely out of place. His argument throughout w;as in¬ tended to counteract the tendency, evidently present in the church, to view the Christian faith as the product of human wisdom or theory and not as something revealed to man in his ignorance to save him. Paul passes next to advice and rebuke in reference to the offenses against Christian morality of which some had been guilty (v-vi). Then, in answer probably to written questions brought by the delegation, he discusses various aspects of the question of marriage (vii, 1-40) and also the important question as to how a Christian should regard the eating of meat that had been, in one way or another, offered to an idol (viii, 1-xi, 1). Paul's argument here involved reference to several related questions, especially the ex¬ pediency of yielding one's rights in considera¬ tion of others less firmly established in the faith. Then Paul takes up the large question of the proper order and behavior in the public services of the church, criticizing the church's conduct in three particulars, (1) that some of the women prayed in public with head unveiled (xi, 2-16), (2) that there was unbecoming dis¬ order in the observance of the Lord's Supper (xi, 17-34), and (3) that there was an unwise and unedifying use of their various spiritual gifts (xii, 1-xiv, 40). The beautiful description of love as the way (ch. xiii) is an integral part of this discussion. Finally, the mooted question of the nature of the resurrection body is taken up and

answered at length (ch. xv). The re¬ mainder of the letter is devoted to information as to his plans and other personal matters.

It is possible that it was while Paul was writing this splendid letter that Timothy arrived in Corinth only to find that the opposition to Paul in the church there had reached a violent stage. For the moment it seemed as though the church had turned completely against him and that his influence over it was entirely lost. Timothy could do nothing and returned to Paul with a most discouraging report, reaching Ephesus after 1 Corinthians had been sent. Apparently also the return of the delegation with the message contained in 1 Corinthians was, for the moment at least, of no effect. In consequence of Timothy's report Paul at once made a hasty, but painful and ineffectual visit to his rebellious church, returning to Ephesus in great sorrow and anxiety, although not alto¬ gether hopeless (2 Cor. xii, 14, xiii, If.). He now had recourse to Titus, whose earlier mis¬ sion to Corinth had been so successful, sending him with a letter, written in great sorrow of remonstrance and appeal. The greater part of this letter is probably preserved in the latter portion of the so-called Second Epistle to the Corinthians, namely in 2 Cor. x-xiii, 10. Such seems to be the only satisfactory solution of the remarkable difference between 2 Cor. i-ix, so full of joyful confidence and thankfulness, and chapters x-xiii, so full of pain, anxiety, apology and explanation. It is this sorrowful letter that is referred to in 2 Cor. ii, 3 f. and vii, 8-12. It was written probably early in 54 a.d. about the time of the disturbance in Ephesus caused by Demetrius (cf. Acts xix, 21-40). In this brief letter Paul first replied to the charge that

he was weak and forceless (x, 1-18), then de¬ fended himself for his apparent self-glorifica¬ tion, pleading his special relation to them and showing that in reality he was only glorying in his weakness for it was in reality God's power and not his own that he had in him (xi, 1-xii, 10). He was compelled thus to speak (xi, 11-18) and when he should come to them again, the third time, they would know how strong his position was (xii, 19-xiii, 10).

Soon after Titus' departure for Corinth with this message Paul closed his work in Ephesus (June 54 a.d.) in order to make a tour of his Macedonian churches and then to pay a visit to Corinth in case conditions there became more favorable. It was probably at Philippi that Titus rejoined Paul, who had been anxiously impatient to hear from him (cf. 2 Cor. ii, 12), and brought the cheering and comforting news that the church of Corinth had repented of its errors and dis¬ loyalty and was fully prepared to follow the Apostle's advice and would be glad to see him again. Out of great joy and thankfulness Paul now wrote his fourth letter to the Corinthians, which we possess as 2 Cor. i-ix. The greater part of this letter (chs. i-vii) is devoted to the happy subject of the reconciliation that had been brought about through the efforts of Titus. These chapters do not reveal any carefully worked out plan. They are profoundly emo¬ tional and personal rather than deliberately didactic. For example, the thread of thought at ii, 13 is suddenly broken off, as the full signifi¬ cance of Titus' success impressed itself on Paul, not to be resumed until vii, 5. But in spite of this lack of logical sequence these chapters are among the richest in spiritual truth of all the Pauline letters. Here the heart of the great apostle is laid bare and the depth and sincerity of his spiritual experience is disclosed.. The latter part of the letter (chs. viii and ix) is devoted to urging the Corinthians to contribute promptly and heartily to the collection for the poor saints in Jerusalem. They had promised to do this the year previous and now, as he was sending Titus back to them with this letter, he urges them to have it all ready for him (Paul) to take it with him to Jerusalem as soon as possible after his expected visit to Corinth, which expectation was realized as we learn from Acts xx, 2.

It should be said that the view adopted above as to the composite character of 2 Corinthians is not as yet generally accepted although it is receiving increasing support. To the writer it is the only theory that satisfactorily, explains the references in 2 Cor. ii, 3 f. and vii, 8—12 to a sorrowful letter and also the marked differ¬ ence in tone between 2 Cor. i-ix and x-xiii.

Bibliography. — Commentaries: German, Meyer's by A. Plummer, New York 1911, 1915). Consult also Moffatt, J.,

(Introduction to the Literature of the New Testament (New York 1911) ; Rendall, G. H., (The Epistles of Saint Paul to the Corinthians' (New York 1909).

Edward E. Nourse,

Professor cf Biblical Theology, Hartford Theological Seminary.

CORINTHIANS, Third Epistle of the,

an apocryphal epistle or letter, which like one said to have been sent from the Corinthians to Saint Paul, were both in Armenian. Apocry¬ phal letters or epistles made their appearance at a very early period after the death of the apostles. See Apocrypha.

CORINTO, ko-ren'to, Nicaragua, in the department of Chinandega, and the principal port of entry on the Pacific coast of the re¬ public. A railroad, owned and operated by the government, connects it with Momotombo, at the head of Lake Managua, a distance of 58 miles. There are four regular lines of steam¬ ships which touch at Corinto, carrying pas¬ sengers, mail and general cargo, and navigating the Pacific from North to South America. Owing to the intense heat and unhealthfulness of the place, very few people live there, except the government employees, steamship agents, and those employed on the railway and wharves. A ˆconvention of peace and obliga¬ tory arbitration" was signed here 20 Jan. 1902, by plenipotentiaries of the governments of Nicaragua, Costa Rica, Salvador and Honduras. It is the residence of a United States vice- consul.

CORIOLANUS, Gaius Marcius, Roman hero, called Coriolanus because the city of Corioli, the capital of the kingdom of the Volsci, was taken almost solely by his exertions. Coriolanus became very unpopular when, dur¬ ing the famine which prevailed in Rome 490 b.c., he proposed to distribute the provisions obtained from Sicily among the plebeians only on condition that they would agree that the tribuneship should be abolished. Banished for this cause, Coriolanus, resolving to revenge him¬ self upon his country, went to the Volsci and prevailed upon them to go to war with Rome before the expiration of the truce. He himself was joined with Attius Tullius in the command of their army, which immediately made itself master of the cities of Latium, and the Volscian camp was pitched in sight of Rome before troops could be raised for the defense of the city. The envoys sent by the Senate returned with the answer, that Rome could purchase peace only by the surrender of the territory taken from the Volsci. A company of Roman matrons., headed by Veturia, the mother, and Volumnia, the wife of Coriolanus, at length subdued his resolution and he withdrew his army, and lived among the Volsci until his death. On the spot where he yielded to his mother's words a temple was dedicated to Fortuna Muliebris and Valeria was its first priestess. Shakespeare, in his play of (Corio¬ lanus,' calls the hero's wife Virgilia, his mother Volumnia and the Volscian leader Tullus Aufi- dius. Consult Smith, < Dictionary of Greek and Roman Biography and Mythology.'

CORIOLANUS, probably the latest of Shakespeare's Roman plays, dates from about 1609. Like (Julius Caesar' and (Antony and Cleopatra,' its plot is derived from Sir Thomas

North's translation of Plutarch's 'Lives* (first published in 1579), of which it makes on the whole an even closer use than the other two plays. About 550 lines of North's (Life of Coriolanus) are woven into the drama, often — as in the case of the hero's great speech to Aufidius at Antium (IV, v, 71 ff.) and Volum- nia's appeal for Rome (V, iii, 94 ff.) — with only the slightest verbal change. If the ac¬ cepted date, as given above, is correct, 'Corio- lanus) may be presumed to be the last of all Shakespeare's tragedies. It was not printed before the appearance of the first folio in 1623, and there occupies the first place in the group of tragedies, a position analogous to that of 'The Tempest* at the head of the comedies. It is one of the longest of Shakespeare's plays (only 'Richard III, > 'Hamlet,* and 'Cym- beline* cover a greater number of pages in the folio), and it is one of the most thoughtful. Without essentially changing Plutarch's story, Shakespeare has vastly elaborated the basic theme of the conflict between plebeian and patrician, with the result that this play remains his most ambitious effort at interpreting social theory. Like Plutarch, and like the Eliza¬ bethans generally, Shakespeare sympathizes with the claims of the aristocrat in the common¬ wealth, but he here reflects more justly than elsewhere both the force and weakness of democracy. This aspect of

the play has naturally tempted discussion. In one of his most characteristic and provocative essays ('Characters of Shakespeare's Plays, 1817) William Hazlitt expounded*

Tucker Brooke,

Assistant Professor of English, Yale University.

CORK, First Earl of. See Boyle, Richard.

CORK, Ireland, a maritime county, province of Munster, having Saint George's Channel south, County Limerick north, Kerry west, Waterford and Tipperary east. Extreme length, east to west, 110 miles; extreme breadth, 70 miles ; area, 2,890 square miles. The coast is indented with numerous bays and inlets, of which the more important are the bays of Bantry, Dunmanus, Long Island, and Clona- kilty, Kinsale and Cork harbors, and is serrated with headlands and promontories. Off the coast lie the islands of Clear, Whiddy, Dursey, Bear and several smaller. The county is watered by the Bandon, Lee and Blackwater, and numerous smaller streams. The county is rich in coal, limestone and sandstone, and some iron is mined. Pop. about 400,000. •

CORK, Ireland, city, capital of the county of Cork, situated on the river Lee, 15 miles from the sea and 165 miles southwest of Dublin. Besides an upper harbor at the city itself, and quays extending over four miles in length, there is a lower harbor at Queenstown, 11 miles

below. The entrance, deep and narrow, is strongly fortified on each side. Cork is the third city in Ireland, and exports great quan¬ tities of grain, butter, bacon, eggs and live stock. The principal industries are tanning, distilling, brewing and the making of tweeds and linens. There are also iron foundries and yards for the building of iron ships. The prin¬ cipal buildings are the Protestant and Roman Catholic cathedrals, exchange, custom-house, chamber of commerce, courthouse, Queen's College, etc. There is a naval dockyard at Haulbowline, an island within Cork harbor. Cork dates from a religious settlement in 622 and from a Danish trading settlement of the 11th century. Pop. municipal borough, 80,124; parliamentary borough, 104,496.

CORK, the external bark of a species of oak (Quercus saber) which grows in Spain, Portugal, France, Italy, Tunis, Algeria and Morocco, and is distinguished by the cellular texture of its bark, and the leaves being ever¬ green, oblong, somewhat oval, downy under¬ neath and waved. The area over which the culture extends is about as follows : Portugal, 600,000 hectares ; Spain, 300,000 ha. ; Italy, 80,000 ha. ; France and her African possessions, 661,000 ha., of which 426,000 are in Algiers and 82,000 in Tunis. The cork oak grows in forests in the company mostly of firs and evergreen oaks, but in a part of Tunis there are forests consisting entirely of cork oaks. The bark of these Tunisian forests is said to be of an extraordinarily excellent kind. France, Great Britain, Germany and the United States re¬ ceive about 85 per cent of the total production of cork. Germany, Russia and the United States have no prohibitory duties on importa¬ tion of cork and cork goods, and admit the material free or with only a trifling impost. Great Britain also permits of the free entry of cork and draws most of its supplies from France, Spain and Portugal. The last named takes the chief place in cork productions, pro¬ ducing nearly one-half of the total growth of the bark — about 450,000 quartels out of the million produced. The greater part of this — perhaps three-fourths — is the crude bark, while the remainder is in manufactured stoppers. Spain exports only manufactured wares. In the collecting of cork it is customary to slit it with a knife at certain distances, in a perpendicular direction from the top of the tree-trunk to the bottom ; and to make two incisions across, one near the top and the other near the bottom of the trunk. For the purpose of stripping off the bark, a curved knife with a handle at each end is used. Sometimes it is stripped in pieces the whole length, and sometimes in shorter pieces, cross cuts being made at certain intervals. In some instances, after the perpendicular and transverse incisions are made, the cork is left upon the trees until, by the growth of the new bark beneath, it becomes sufficiently loose to be removed by the hand. After the pieces are de¬ tached, they are soaked in water, and when nearly dry are placed over a fire of coals, which blackens their external surface. By the latter operation they are rendered smooth, and all the smaller blemishes are thereby concealed; the larger holes and cracks are filled up by the in¬ troduction of soot and dirt. They are next loaded with weights to make them even, and subsequently are dried and stacked, or packed in

bales for exportation. In the course of eight or nine years the same tree will yield another supply of cork. The quality of the cork im¬ proves with each successive stripping; and the trees continue to live and thrive under the operation for 150 years and upwards. The tree is an evergreen species of oak. It reaches the height of about 30 feet. .The outer layer of bark by annual additions from within gradually becomes a thick soft homogeneous mass, possessing those compressible and elastic properties upon which the economic value of the material chiefly depends. The first stripping takes place when the trees are from 15 to 20 years of age. This first yield is woody in tex¬ ture, and is useful only as a tanning substance, or for forming rustic work in ferneries, etc.

The uses of cork were well known to the ancients, and were nearly the same as those to which it is applied by us. Its elasticity renders it peculiarly serviceable for the stopping of ves¬ sels of different kinds, and thus preventing either the liquids therein contained from run¬ ning out, or the external air from passing in. The use of cork for stopping glass bottles is generally considered to have been introduced about the 15th century.

The practice of employing this substance for jackets to assist in swimming is very ancient; and it has been applied in various ways toward the preservation of life when endangered by shipwreck. The cork jacket, used to preserve the lives of persons in danger of drowning, may be constructed as follows : Pieces of cork about three inches long by two inches wide, and the usual thickness of the bark, are enclosed be¬ tween two pieces of strong cloth or canvas, and formed like a jacket without sleeves; the pieces of cloth are sewed together round each piece of cork, to keep them in their proper situation ; the lower part of the jacket about the hips is made wide enough to give freedom to the thighs in swimming; and the whole is made sufficiently large to fit a stout man, and is secured to the body by two or three strong straps sewed far back on each side, and tied before ; the straps being thus placed to enable any wearer to tighten it to his own convenience.

The floats of nets used for fishing are fre¬ quently made of cork. Pieces fastened together make buoys, which afford direction for vessels in harbors, rivers and other places. In some parts of Spain it is customary to line the walls of houses with cork, which renders them warm and prevents the admission of moisture. On ac¬ count of its lightness cork is used in making artificial legs; and from its being impervious to water it is sometimes placed between the soles of shoes to keep out moisture.

In the cutting of corks (when they are made by hand, and not, as is now generally the case, by machinery), the only tool employed is a very broad, thin and sharp knife; and as the cork tends very much to blunt this, it is sharpened on a board by one whet or stroke on each side after every cut, and now and then upon a common whetstone. The corks for bottles are cut length¬ wise of the bark, and consequently the pores lie across. Bungs and corks of large size are cut in a contrary direction : the pores in these are therefore downward — a circumstance which .renders them much more defective in excluding air than the others. The parings of cork are used for making Spanish black, and largely in

the manufacture of linoleum and similar goods. The United States imports unmanufactured cork annually to the value of over $3,000,000, and manufactured cork to the value of $2,500,000 approximately.

CORKITE, a lead ore of minor importance consisting of phosphate and arsenate of lead and ferric sulphate. It occurs in ores of Beaver County, Utah.

CORLEONE, kor-la-6'na, Sicily, town in the province of Palermo, and 22 miles south of the city of Palermo, near the source of the Belici. It is well built, has several churches and convents, a prison, royal college and some other public edifices. The inhabitants are prin¬ cipally engaged in agriculture. The ancient Korliun was founded by the Saracens and colonized with Lombards by Frederick II in 1237. Pop. 19,072.

CORLISS, George Henry, American in¬ ventor: b. Easton, N. Y., 2 June 1817; d. Provi¬ dence, R. I., 21 Feb. 1888. The construction of stationary steam engines was revolutionized by his improvements and a single engine made by him moved all the machinery in the centennial Exposition of 1876.

CORLISS ENGINE. See Steam and Steam Engine.

CORM, or CORMUS, in botany, the dilated base of the stems of some plants, as the crocus, cyclamen, etc. It is commonly called bulb or root tuber, but is actually neither.

CORMON, kor-mon, Fernand, French painter : b. Paris, 22 Dec. 1845. He studied under Cabanel, Fromentin and others, and in 1875 he received the Prix de Salon; in 1887 a medal of honor at the Salon of that year ; in 1889 the Grand prize at the Paris Exposition, and became an officer in the Legion of Honor. His best-known works are (The Stone Age (1884) ; (The Victors of Salamis* (1887) ; other works of his are (Cain* (1880), and (The Raising of the Daughter of Jairus.* A series of archaeological paintings representative of human development from prehistoric times gave him celebrity, and his portraits have given him a high reputation in that branch of art.*

*CORMORAN, a Cornish giant in the nurs¬ ery tale (Jack, the Giant-killer.**

CORN (from French come, from At. cornu, a horn, from its horny nature), a hard¬ ened and thickened portion of cuticle produced by pressure. Corns are generally found on the outside of the toes, but sometimes between them, on the sides of the foot, or even on the ball. They gradually penetrate deeper into the parts, and sometimes occasion extreme pain. No part of the human body, probably, has been injured so much by our injudicious mode of dress as the feet, which have become, in general, de¬ formed. To this general deformity of the foot belong the corns, produced by the absurd forms of our shoes and boots. They appear at first as small dark points in the hardened skin, and in this state stimulants or escharotics, as nitrate of silver (lunar caustic), are recom¬ mended. The corn is to be wet and rubbed with a pencil of the caustic every evening. It is well to have the skin previously softened. If the corn has attained a large size removal by a cutting or ligature will be proper. In all cases

of cutting corns very great precaution is to be observed. The feet ought always to be bathed previously. Mortification has, in many in¬ stances, resulted from the neglect of this pre¬ caution, and from cutting too deep. An effi¬ cacious remedy for corns is the application of glacial acetic acid night and morning. This acid has a peculiarly destructive effect on the epidermis, of which corns are a hypertrophy. Salicylic acid is also an excellent application. A simple and generally very efficacious means of alleviating the pain caused by corns and remov¬ ing the cause for their growth is the applica¬ tion of a thick adhesive plaster, in the centre of which a hole has been made for the reception of the projecting part.

CORN, grain, such as wheat and barley; maize, or Indian corn ; also the plants that yield grain ; breadstuff. This is a generic term for all kinds of grain used for making bread, and is applied specifically to the principal breadstuff ; in England to wheat, in the United States to Indian corn or maize, and in Scotland frequently to oats. The word is Anglo-Saxon, and occurs in similar forms in the other Teutonic tongues. The words seem to have been used in ancient times as at present, having a different meaning in different countries.

Indian corn, also called maize, is an endo- gen which grows luxuriantly in warm temperate climates. It belongs to the tribe of Phalaridcc of the order of Graminece, or grasses. It is known in botanical science by the name Zea mays. The flowers are moncecious ; the male flowers forming a loose panicle at the top of the culm; the female flowers in axillary spikes, en¬ closed in large, tough spathes, from which only the extremely long styles — in the common spe¬ cies six to eight inches in length — hang out like tufts of feathers or silken tassels. The grains are large, roundish, compressed, naked and arranged in parallel rows along the upright axis of the spike. The long parallel-veined leaves and the stalks are often used as fodder. The common Indian corn is generally believed to be a native of the warmer parts of America, where it was cultivated by the aborigines before the discovery by Columbus ; but a representation of the plant found in an ancient Chinese book in the royal library in Paris, and the alleged dis¬ covery of some grains of it in the cellars of aflcient houses in Athens, have led some to sup¬ pose that it is a native also of the East, and has, from a very early period, been cultivated there, and even that it is the ˆcorn® of Scrip¬ ture; although, on this supposition, it is not easy to account for the subsequent neglect of it until after the discovery of America, since which the spread of its cultivation in the Old World has taken place with a rapidity

such as might be expected from its . great productiveness and other valuable qualities. Columbus himself took it to Spain. When first introduced into Europe, many supposed it was brought from Asia, and it was frequently known as Turkey corn, Tur¬ key wheat.

Sweet corn is any one of the starch corns, flint, dent or flour corn, that has lost its faculty of converting sugars into starches. It is grown chiefly as a_ vegetable for table use, although the stover is often harvested as forage for stock. Its culture is most extensive in the vicinity of large cities, where it is grown as a

truck crop and in certain regions where it is grown as a canning crop. The principal can¬ ning variety is a late corn, Stowell Evergeen. Country Gentleman is also used to a large ex¬ tent among the canners. In Maine, a corn known as Clark's is used for canning. Hickox and Trucker's Favorite are the principal can¬ ning varieties in other regions. In the su¬ burban truck gardens the custom is either to plant early and late corn, or one high-class variety every two weeks. Cory, Crosby, Quincy Market, Country Gentleman and Sto¬ well Evergreen are often planted in the order named. According to the latest census the number of farms growing sweet corn in the United States was 48,514, the number of acres 178,224, the value of the product $5,936,419. New York had 6,584 farms producing sweet corn to the value of $942,023. Pennsylvania was second with 4,896 farms. Illinois had the second place in number of acres, with 19,976 acres and second in value of product, which was valued at $558,746. Ohio, Maryland and New Jersey are next in importance. The corn¬ canning industry flourishes in Illinois, Indiana, Iowa, Maine, Maryland, New York and Ohio.

In 1915 the amount of Indian corn produced in the United States was 3,054,535,000 bushels (final estimate, 1 c December), and in 1914 it was 2,672,804,000 bushels. Argentina in 1914 produced 204,562,000; Mexico, 190,000,000; Ru¬ mania, 110,230,000; Italy, 105,006,000 bushels. Estimate for the maize crop of the world, 4,- 000,000,000 to 4,500,000,000 bushels.

CORN CLUBS, organizations promoted in 1916 in the rural districts of the United States, for the purpose of arousing interest in the scientific culture of corn and other agricultural products among the country boys and girls ; and to supply wholesome recreational activity for the members. These clubs were founded in connection with the general movement for rural recreation.

CORN-COCKLE (Agrostemma githago), a plant of the pink family (Silenacecz) . It is an annual, pubescent, often branching herb, from one to three feet tall, distinguished by its large purple flower. Though a native of Europe and western Asia, it is now found in most temperate regions, frequenting grain-fields and waste places. When its seeds become mixed with those of the grain, and are ground with them, it is said to effect and render the grain unwholesome ; thus it requires to be sep¬ arated from the grain by a special kind of sieve. In Germany the seed when ripe and dried is called schwartz-kiimmel (black cumin), and is sold for medicinal and domestic purposes.

CORN-CRAKE (that is, <(corn crow,® be¬ cause of its cry), the common name in England of a small rail (Crex pratensis) which fre¬ quents meadow lands throughout Europe ; also called landrail. The name crake is applied to various other birds of the family Rallidac, which differ from the typical rails in having a shorter beak. In the United States the common rail (Porsana Carolina) and allied species are occasionally so called. They are secretive birds, abundant in reedy swamps, and are much sought by gunners in the fall of the year.

CORN CULTURE. The profitable pro¬ duction of corn depends upon: (1) fertility of

soil; (2) conditions of climate; (3) quality of seed; (4) methods of cultivation.

Fertility of soil is the first and most im¬ portant of these conditions. Three elements, nitrogen, phosphorus and potassium, are im¬ portant constituents of soil fertility, and the ones which are frequently lacking in quantity in the soil's composition, or become quickly exhausted by continuous cropping without prop¬ er rotation of crops or application of manures. In those regions where corn is most extensively grown, as in the Mississippi Valley of the United States, the fertility of the virgin soils seemed almost unlimited to the pioneer farmers, who in many instances grew crop after crop of

corn, selling the product off the land without apparently diminishing the productiveness of the soil. However, after a half century of such practice, it has been found that the soil has been exhausted by this system of farming. The depleted soils are found to have an insufficient supply of the important elements necessary to render them fertile, and it has become neces¬ sary to resupply them directly in the form of commercial fertilizers, or indirectly, through the use of barnyard or other like manures, or by the growing of green manure crops.

Methods of Restoring or Maintaining the Fertility. — There are several methods which are practised with economical results in the corn belt of restoring exhausted corn lands to a fertile condition, and of keeping up the fer¬ tility of such soil under cultivation. It will be impossible to treat of many of them in detail here, so that only a few of the principal plans will be outlined.

Commercial Fertilizers. — The use of com¬ mercial fertilizers for corn land is limited to those soils which are lacking in one or mote constituents of plant food which can be bought in the market, either alone or in combination, at a reasonable cost, usually, nitrogen, phos¬ phorus, potassium or lime. Their general use is limited from the fact that the cost of supply¬ ing plant food in this way is so great that the returns in crops like corn do not usually justify the outlay. Nitrogen, phosphorus and potas¬ sium now bring a high price per pound, when purchased in artificial fertilizers. From the fact that a large quantity of these constituents are removed in a crop of corn it can be seen that it would be unprofitable to use them for the growing of a crop without having as a basis a soil naturally sufficiently supplied with one or more of these elements. In some cases it may be advisable to apply one or more of these constituents to correct some unusual soil con¬ dition, but the large areas which are naturally rich in ajl necessary elements of plant food for corn, and adapted in all conditions for growing corn, preclude their general use for this pur¬ pose by the corn growers of the United States.

Barnyard Manure. — Barnyard manure con¬ tains a large supply of plant food, and when applied to the soil not only increases its fer¬ tility but improves the mechanical condition, or tilth, as well. The large amount of straw and vegetable matter in its composition, when de¬ composed and assimilated by the soil, improves its condition for corn crops. In fact it has come to be a generally followed practice among our most progressive farmers to feed the corn crop to live stock, carefully conserving the manure for application to the soil. In such cases, the

best plan seems to be to compost the manure, and after it has become well-rotted, to spread it on the field while the soil is frozen in winter, plowing it under to a good depth in the spring. This practice can be followed only where local conditions permit. On soils that leach or are carried off by rains it is necessary to apply the manure at the times when it will not be washed off the soil by winter or spring rains, or wasted from other causes. In such cases, the manure may be spread on grass lands or pastures in the spring or summer, the field being plowed for corn the following autumn or spring. About 10 tons of well-rotted manure per acre is considered a sufficient application for ordinary corn land.

Green Manure Crops.— The most import¬ ant method of maintaining the soil's fertility is by the use of green manure crops, such as clover, cowpeas, soy beans and alfalfa. These crops add to the supply of nitrogen in the soil under favorable conditions and when plowed under improve its tilth. When harvested they con¬ stitute a valuable feed for live stock. The addi¬ tion to the plant food supply of the soil by the growth of leguminous crops is accomplished in two ways : Firstly, by the presence and growth of certain organisms peculiar to these crops, inducing the development of root tuber¬ cles. These organisms have the power of draw¬ ing upon the free and unavailable nitrogen of the atmosphere and converting it into an avail¬ able and useful condition for plant food. Sec¬ ondly, from the fact that these crops root deeply as a rule, drawing upon plant food in the soil, which is not in position for use by ordinary crops. This food is assimilated by the plants, so that when the crop is plowed under the de¬ composition of the roots and stems leaves this plant food where it can be gotten at and used by corn or other plants.

Cowpeas and soy beans are leguminous crops, introduced into this country recently from Asia, and are coming to be grown on a large scale as green manure crops for the prep¬ aration of the land for corn.

In summing up the important points as re¬ gards the condition of the soil for corn, it may be said

that continuous cropping without rota- ' tion or manuring seems inadvisable, and results in the exhaustion of the fertility of the land to such an extent as to render it an expensive process to bring it back to a state of productive¬ ness. Commercial fertilizers are expensive agents for maintaining the food supply for corn, and cannot be successfully used except for local or peculiar conditions or for the correction of some unusual occurrence, as the acidity of cer¬ tain bog soils, or the small alkaline areas in the fields in certain sections of the Middle West. The most successful and profitable plan adapted to most conditions seems to be a rotation of corn with some legume, preferably one which can be used to supplement corn as a ration for live stock, and the feeding of all crops followed by the return to the soil of the plant food in the shape of composted manure.

Climate. — • Zea mays originated in all proba¬ bility in Mexico. From Mexico it was carried north by the Indians by means of barter and trade, so that when the early explorers of Amer¬ ica visited the section now included in the United States they found considerable areas un¬ der a crude system of corn cultivation by the

Indian tribes. Upon the development of the vast sections of the Mississippi Valley corn became the principal crop, and is now recog¬ nized as the leading American cereal. From America this crop has been carried to all con¬ tinents of the world, and is grown to a greater or less extent in most of the leading countries, especially in those in which the climate and soil conditions are similar to those of our Missis¬ sippi Valley region. Corn flourishes best in those sections having an annual rainfall of about 30 inches, or an artificial supply by irri¬ gation, and a season of about 120 days for the maturing of the larger types. The crop seems to reach its best development in the temperate regions, where a part of the season, the time of greatest growth, has warm days and nights. Under such conditions the plants grow with great rapidity. Corn readily responds to cli¬ matic conditions ; namely, by taking a late variety to a region of short seasons, an early variety can be developed by selection, and vice- versa. For this reason, we have races of corn which vary greatly in their characteristics, due to the adaptation to climatic conditions. It is not a good policy suddenly to remove a race suited to a peculiar set of conditions to very different conditions. Under such circumstances the crop may fail to mature, or may develop some quality detrimental to its value. It is probable that by selection races may be im¬ proved for any given corn region, and that by continued breeding and selection, these races may be further improved without resource to the importation of seed from other sections. However, it seems that there are certain con¬ ditions in which corn naturally reaches its highest and fullest development, and it is prob¬ able that in those sections most advance will be made in the permanent improvement of corn. It may be advisable for corn-growing sections not specially suited for corn growing occasion¬ ally to secure a small supply of breeding seed from the best corn regions, which after a few years' growth will have become suited to the new conditions and may have a better type than those which have been grown in the less favor¬ able localities.

One of the important things which has been neglected for the most part, in so far as climatic conditions are concerned in corn cul¬ ture, is the systematic comparison of different races from different regions, in order to find those races which are the best naturally suited to local conditions. It is probable that before breeding is begun, it would be advisable to make such a test in order to determine the best breed¬ ing stock for permanent improvement.

Quality of Seed . — There are a number of races of dent corn (Zea indentata) which for the most part are the result of the selection of sports or striking variations. The individuals of these races are not uniform, and from the fact that corn is normally cross fertilized, a pure race frequently becomes mixed with other races. In fact there are practically no pure races under general cultivation, and owing to the difficulty of maintaining the pure type, little attention has been given to systematically breed¬ ing these races. As a rule the seed corn used for planting the crop of the world is subject to little, if any, intelligent selection of seed ears. Considerable fraud has been practised by un¬ scrupulous seed dealers in the past, who, in

order to humbug the public, bought up ordinary corn, gave it a fancy name, advertised it widely without careful tests and, through extravagant claims for its productiveness, obtained a wide sale,

with consequent loss to the farmers buying the seed, but with considerable financial gain to themselves.

Pioneer Corn Breeders. — Previous to 1900, little was done in the way of the systematic improvement of corn. A few men early in the last century realized the value of carefully selected seed, and began to select their corn with reference to some type particularly desir¬ able to them. One of these men was James Learning, of Wilmington, Ohio, who began the selection of the ordinary yellow corn of the Miami Valley for larger and heavier ears. His idea was to secure ears with small cobs, deep grains well filled over the tips and butts, which would mature under his conditions of soil and climate. In order to get early maturity he nat¬ urally selected a rather tapering type of ear. This seed was carefully preserved during the winter, and all irregular kernels, such as tip and base kernels, were discarded before plant¬ ing. Mr. Learning began this work about 1825, and continued the selection of this type of seed for more than half a century, keeping the race as pure as possible. Some of the pioneers of Illinois, Iowa and other Western States car¬ ried seed of this race with them from Ohio to their new homes. It was found that under the very favorable conditions of the Mississippi Valley this race improved in size of ear, depth of kernel and productiveness. Naturally, it was carried over a large territory and during the past few years has been the subject of con¬ siderable attention by corn breeders who have effected further and marked improvement in the feeding quality and yielding power. The Improved Learning strains of to-day bear little resemblance to the original Ohio stock, and are living evidences of the possibilities in careful selection of seed corn.

Another pioneer in the work of the improve¬ ment of corn and the establishment of new races was James Riley, of Thorntown, Ind. Mr. Riley began the selection of the ordinary white corn of his community about the middle of the last century. He was convinced that by the selection of large, well-developed ears for seed, and the weeding out of barren stalks before pollination, a large-eared, uniform type of corn could be secured. By persistent planting of such seed ears in isolated fields, preventing mixture with other types, he achieved success in this work, and produced a race called the Boone County White, which stands foremost among all races of white corn grown in the corn belt. Other races were produced by Mr. Riley, among them a yellow type, which he called Riley's Favorite. The production of this race is interesting because it illustrates the de¬ velopment of new types by crossing, and fixing of type of the hybrid by selection. He crossed a large and late Southern race of yellow corn on a small, early maturing, Northern yellow race, his aim being to secure a new race having a medium or large ear and early maturity. He accomplished this object successfully, and the Riley's Favorite is now largely grown in north¬ ern parts of the corn belt.

Improved Races are Most Productive. — The results of these systems of selection are

CORN

1 Wedge-shaped kernel. A desirable type

2 Square kernel. Undesirable type

3 Round kernel. Most undesirable type

4 Well-filled butt of ear. A desirable type

5 Medium-filled butt of ear. An undesirable type

6 Poorly-filled butt of ear. Most undesirable type

7 Cylindrical ear with straight rows of uniform kernels

8 Cylindrical ear with straight rows of uniform kernels

9 Nos. 7, 8 and 9 illustrate a desirable kind of selection

of uniform ears

10 Well-filled tip of ear. A desirable type

11 Partly uncovered tip. Undesirable type

12 Most undesirable type of tip of ear, poorly filled with

irregular and small kernels

shown by the comparative tests of races of corn at the Illinois and other State agricultural ex¬ periment stations. It has been found that during a series of 10 years' tests of comparative yields per acre, the Learning and Boone County White varieties of corn have consistently and on the average for 10 years outyielded all other races. In fact, it has been shown that under widely different conditions these two races have yielded more than double the amount of the ordinary types of corn. It has further been shown that corn, growlers who have selected these races for feeding purposes have naturally selected the types which were most beneficial for feeding purposes, and have developed strains which have a chemical composition better suited for feeding than the ordinary races of corn now grown in any region.

The benefits of improved seed corn are that larger returns are secured with the same effort required to produce ordinary and smaller yields. It does not cost any more to grow a race of high yielding power, possessing a desirable pro¬ portion of protein for feeding purposes, or of oil and starch for manufacturing purposes, than to grow the ordinary types of corn. Taking into account the great area devoted to com in the United States, even a slight increase in yield per acre, or a small improvement in qual¬ ity, means an enormous increase in the profit from breeding. The past few years have dem¬ onstrated the practicability of such improvement beyond a doubt, and the results obtained on the farms and by experiment stations have attracted world-wide attention.

Corn Breeders' Association. — The organ¬ ization of the Illinois Seed Corn Breeders' Association, in June 1900, marked the beginning of a widespread attempt to put corn breeding on a similar basis to that of live stock breeding. In fact, it has been found that corn breeding follows the same general laws as the breeding of animals. In other -words, corn can be bred like cattle. This organization was founded by a few men, extensive growers of corn, and in most cases, noted breeders of live stock, who resolved to begin a careful selection of their own seed for planting, and if favorable results were obtained to offer such seed for general planting in regions suited to the development of the races they selected for breeding. All seed sent out by members of the Association was carefully inspected by an officer of the State Experiment Station, tested for vitality, and ex¬ amined for uniformity, trueness to type and freedom from mixture with other types of corn. All seed sold was sent out in the ear so that the man who purchased the seed could see for him¬ self the type and character of the seed sent to him. The success of the plan was so great that other States at once followed the lead of this organization, and at present Iowa, Kansas, Ne¬ braska, Indiana and Maryland have corn breed¬ ers' associations, comprised of men who are systematically selecting their corn, for the most part in co-operation with the State Experiment Station. By means of such organized efforts, States have appropriated large sums of. money for further experiments in corn breeding and culture so that progress is being made in this work at a rapid rate and valuable results are obtained of wide application and importance.

Some Standard Races of Corn. — The Illinois Seed Corn Breeders' Association recog¬

nizes eight distinct races of corn, which are the basis for the development of many strains pro¬ duced by individual breeders. These races, date of beginning selection, originators and place of origin are as follows :

Boone County White, 1876, James Riley, Thorntown, Ind.

Silver Mine, 1890, J. H. Beagley, Sibley, III. White Superior, 1880, P. R. Sperry, Mon¬ mouth, Ill.

Learning, 1826, J. S. Learning, Wilmington, Ohio.

Reid's Yellow Dent, 1846, J. L. Reid, Dela- van, Ill.

Golden Eagle, 1871, H. B. Perry, Toulon,

Riley's Favorite, 1885, James Riley, Thorn- town, Ind.

Pride of the North, about 1890, F. A. War¬ ner, Sibley, Ill.

From the growing of these races under widely varying conditions, and the effect of selection by individuals having different types in mind, a great many strains have been devel¬ oped, which in time will probably come to be recognized as distinct races. New races will probably spring up as a result of the selection of naturally prepotent individuals whose pro¬ jective efficiency is great enough to impress distinct characteristics upon the offspring and create new and dominant types. An illustra¬ tion of this method of origin of new and domi¬ nant races from striking individuals is found in the history of the Silver Mine race. Accord¬ ing to the statement of the originator it sprung from a single ear, which was of such perfection that it attracted this grower's attention among an exhibit of several thousand ears of corn. This ear was carefully planted in an isolated patch and the crop carefully harvested and planted the next season in isolated fields. From this source the seed was obtained for the first general distribution, which has been followed by breeding experiments, and breeders taking up the race for continued improvement by selection.

One further result of the organization of corn breeders' associations has been the hold¬ ing of exhibits of samples of corn selected by men who compete for certain prizes. In several instances the number of samples brought to¬ gether in such exhibits has exceeded several thousand, and in one or two instances the number of samples of 10 ears each has reached 10,000. The effect of such exhibits has been to awaken a wide general interest in improved types of corn and the methods and standards for judging these samples. During the past 10 years score cards and standards of per¬ fection have been devised, which by continued revision have been developed to a state of great usefulness. The use of the score card is to compare, on a uniform basis, individual samples of a given race of corn. Owing to the fact that in the production of races for different purposes, and for different conditions, characteristic dif¬ ferences in shape, size and other qualities have been developed, it has become necessary to have a standard for each of the established races.

In order to show some of the characteristics which go to make up a type, which are con¬ sidered in the study of a race, the following table of characteristics of seven leading races of corn is presented.

NAMES OF VARIETIES.

Reid's Yel¬ low Dent

Golden

Eagle

Riley's

Favorite

Learning

Boone

County

Silver

Mine

White

Superior

Ear:

Shape

Slowly ta¬ pering

Slowly

tapering

Slowly

tapering

Tapering

Cylindrical

Cylindrical

Slowly

tapering

Length

10 inches

9 inches

9 inches

10 inches

10 inches

9 inches

10 inches

Circumference

7 inches

7 inches

7 inches

7 inches

7? inches

7 inches

7 inches

Kernel :

Condition

Firm

upright

Loose

upright

Firm

upright

Firm

upright

Firm

upright

Firm

upright

Firm

upright

Color

Light yellow

Deep yellow

Deep yellow

Deep yellow

Pearl white

Cream

white

Starch

white

Indentation

Medium

smooth

Very

rough

Rough

Rough

Rough

Very

rough

Medium

rough

Shape

Long wedge

Broad

wedge

Medium

wedge

Medium

wedge

Medium

wedge

Broad

wedge

Very broad wedge

Rows:

Number

18-24

16-20

16-20

16-24

16-22

16-20

18-20

Space

N arrow

Medium

Medium

Medium

Medium

Narrow

Medium

Arrangement

Pairs

Distinct

Pairs

Pairs

Pairs

Pairs

Pairs

Butts:

Filling out

Deeply

rounded,

compressed

Moderately

rounded,

compressed

Moderately

rounded,

compressed

Moderately

rounded,

compressed

expanded

Moderately

rounded,

compressed

Moderately

rounded

Shallow

rounded,

depressed

Tip:

Filling out

Regular rows of kernels

Regular rows of kernels

Regular rows of kernels

Irregular rows of kernels

Regular rows of kernels

Regular rows of kernels

Regular rows of kernels

Shank:

Size

Small

Small

Small

Medium

Medium

Small

Medium

Cob:

Size

Color

Medium Deep red

Small Deep red

Small Deep red

Medium Deep red

Medium

White

Small

White

Medium

White

Per cent of corn

88

90

90

88

Vitality of Seed. — One of the most im¬ portant factors entering into the production of the corn crop is the vitality of seed. In planting the ears in individual rows or plats, one of the most notable facts which strike the observer is the great irregularity of size of plants in the different rows. One row, for instance, will be on the average a foot higher than the adjoining row and so on throughout the entire field. This irregularity in growth and finally in productive¬ ness was not shown in the seed ears, because in most cases the seed ears were so carefully selected for uniformity that they were absolutely alike to the casual observer. This difference in vigor of growth is due, in great measure at least, to differences in the vitality of the seed. This vitality means the life of the seed, which is affected by age, storage, heredity and many other factors. The degree of vitality by the seed ear can be partially measured before the seed is used for planting. No absolute measure can be made of the value of the seed ear, but a comparatively accurate idea may be gained of the vitality by means of the germination test. We believe that the kernels in the individual ear are considerably alike in composition and in vitality, in fact in all general characteristics. It has been found that there is a slight variation between the individual kernels in the ear, but that this variation is not as great as the varia¬ tion between different ears ; so that by testing the vitality of the individual ears the most vigor¬ ous may be picked out for planting the breeding

field. This test can be made by taking out three kernels from near the tip, three from near the middle and three from near the butt of every ear. In cases where possible, it is more desirable to shell off two rows of kernels from each ear and test all of the kernels in each row. The kernels should be planted in moist sand, point down, or laid between layers of moist cloth. In this moist condition, and under a temperature of about 70° F., 95 per cent of the kernels should sprout inside of three days, and should have sprouts one inch long at the end of five days. If the seed germinates more slowly than this standard it is an indication of weak¬ ened vitality. In other words, the time required for germination is the indication of the degree of vitality. Weak seed of slow germination should be discarded, as it results in a poor stand, the most frequent cause of loss of profits to the grower.

Effect of Methods of Storing Seed Corn. —

The usual practice among corn growers is to select the seed corn out of the general crib, in the spring just before time for planting. In some instances, especially during years unfavor¬ able for the maturing of the corn crop, it has been found that such seed was weak in vitality and only a partial stand was secured. In fact, it has been found that seed corn containing a high per cent of moisture is most easily affected by cold weather, while well-dried seed is capable of withstanding cold with the least possible loss of vitality. The amount of moisture in seed

varies with the conditions of maturity, imma¬ ture seed containing an unusually large amount of water, while fully matured seed contains a low per cent of moisture. The dryness of the seed when harvested does not always indicate the amount of water contained, as corn absorbs moisture from humid atmospheres, and imparts it to dry air.

Methods of Cultivation. — The methods of corn cultivation vary with the conditions of soil and climate. No definite rules can be laid down for all conditions, in fact, every corn grower must determine for himself the best methods suited to his 'peculiar conditions. However, there are certain general principles of plant growth which hold true under all conditions, and it will be the object of this discussion to point out the practical application of some of these principles.

Methods of Preparing the Seed Bed. —

The methods of preparing the seed bed for corn can best be illustrated by the results of an experiment to test this point, conducted by the Illinois Agricultural Experiment Station, dur¬ ing the

season of 1903. The experiment resulted as follows :

EFFECT OF PREPARING THE SEED BED. (Yield in bushels per acre.)

Trial

No.

Field

Field

Field

Aver¬

age

*A. Plow, *drag, let lie,*

1

65.3

71.3

49.9

disc, harrow, plant . .

2

72.1

77.3

Ave.

68.7

74.3

49.9

64.3

B. Plow, let lie, har-

1

77.4

96.6

43.0

row, plant .

2

70.0

74.0

Ave.

73.7

85.3

43.0

67.3

C. Disc, plow, drag.

1

72.7

134.7

46.2

disc, harrow, plant . .

2

69.4

73.3

Ave.

71.1

104.0

46.2

73.8

- *By drag is meant the implement made of boards or timbers which is used for smoothing the surface of the seed bed and to crush lumps of earth.*

This table and general experience goes to show that in the ordinary season it pays to disc or stir the land before plowing, plowing to a depth depending upon the nature of the soil, and keeping the land stirred until the time of plant¬ ing. This constant stirring of the soil breaks up the capillarity and prevents the escape of soil moisture, at the same time getting the seed bed in good mechanical condition for the recep¬ tion of the seed.

Conservation of Soil Moisture. — In the

first place it is necessary to supply the corn crop with a large supply of water for growth. It has been estimated, by careful experiments, that for every pound of dry matter produced the plant uses 300 or more pounds of water. When one considers the great yield of the corn crop in large areas and the necessary amount of water to produce this yield, it can easily be seen how important the conservation of soil moisture be¬ comes. The moisture in the soil escapes by capillarity and bv drainage. In order to prevent the loss by capillarity, it is necessary to break up the soil condition which conduces to capil¬ lary action. This is practically accomplished by plowing and continued stirring of the surface of the plowed land during dry periods, or by the use of the disc or cultivator. The loss of water by washing or drainage is prevented as far as possible by bringing the land into such

condition as readily to take up and hold the rainfall and all moisture that falls upon it. This latter plan is accomplished by sub-soiling, deep plowing at the proper season, growing of such crops as clover, cowpeas, etc., in the rotation, and the addition of humus to the soil, as by plowing under

corn stalks, straw, barn¬ yard manure, or other means. When the soil is in good condition and rich in plant food, it is probably in the best possible condition to retain the soil moisture for the use of the crop.

Thickness of Planting. — The thickness of planting best suited to give the most profitable results will depend upon the race of corn, the nature of the soil, the character of climate, the purpose for which the crop is produced and other factors. However, if vield alone is con¬ sidered, the following table gives the most reliable data yet obtained on this point :

EFFECT OF THICKNESS OF PLANTING. (Yield in bushels per acre.)

No. stalks per hill

Field

1

Field

2

Field

3

Field

4

Field

5

Average

1 .

28.7

41.5

42.6

55.5

36.3

40.9

2 .

55.0

79.9

67.3

72.8

53.3

65.7

3 .

67.4

88.8

86.6

86.2

59.6

77.7

4 .

73.1

82.8

90.4

88.4

53.0

77.5

5 .

84.5

89. 1

98.8

90.2

53.0

83.1

This table indicates that which has been found to be true under general conditions that four to five stalks on good corn land with ordinary seed will give the largest yield, but where machinery is not used in harvesting it is probably more desirable to leave three stalks. With three stalks bearing large ears, less diffi¬ culty and expense will be found in harvesting than with more stalks producing small ears.

Hills v. Drills. — There are two general sys¬ tems of arranging the seed in the row generally followed, first grouping from two to five kernels in hills some distance apart, second, drilling the seed one seed in a place, along the row closely together. The practice of drilling seed corn was the early method of planting employed by pioneer farmers. In the new countries, which were comparatively free from noxious weeds, it was not found necessary or practi¬ cable to cultivate the corn fields as carefully as is now the case in the more fully developed sections. The farmers wished to secure the largest possible yield, and so drilled their seed corn in such a manner as to secure an unusually large number of stalks in the row. As a result large yields of small ears were obtained. Upon the further development of these communities, foreign weeds were introduced and with the lessened fertility of the soil, due to continuous cropping, more careful methods of cultivation became necessary. Consequently, the corn for the most part came to be planted in hills, ad¬ mitting of cross cultivation, and frequent stirring of the soil keeping the surface com¬ paratively level. In tests of the two systems, equal numbers of stalks being retained in the hilled and drilled rows, there has been found to be little difference in the yield per acre.

Lister v. Planter. — In some sections, par¬ ticularly in the States of Kansas and Nebraska, the seed corn is planted with listers. A lister is a plow and planter combined, which opens a

furrow, drills the seed corn in this furrow and covers the seed at the same time. It is there¬ fore the means of planting large areas in a com¬ paratively . short time and at a small expense. From the extensive use of the lister in these regions, with apparently good results, the prac¬ tice has spread to other States where it is now under trial. Experience has suggested certain modifications of the original simple plan, one of which is to plow the land earlv in the spring, and when ready to plant, use the lister instead of the ordinary methods of preparation of the seed bed and planter. Another method is to open up furrows through the fields with the lister, very early in the spring, without planting, then later list again, opening new furrows be¬ tween the first ones in which the seed is drilled. It has been found that in these older districts this method is not as successful as the plowing of the land and thorough preparation of the seed bed. It corresponds to planting the seed in a dead furrow. Where it is necessary to plant the seed deep in the ground to get moisture for germination, it is probable that this system may be valuable. On sandy soils it will probably suc¬ ceed, while in the heavier clay or clay loam soils it does not give the best results.

Root Injury During Cultivation. — The vital principle of cultivation of the growing corn plant is that the plants be allowed to grow undisturbed and without competition of other plants, with sufficient stirring of the surface soil to prevent the rapid evaporation of soil moisture. In an experiment with pruning or cutting off the roots of the corn plant at the Illinois Agricultural Experiment Station strik¬ ing results followed such injury.

EFFECT OF ROOT PRUNING ON CORN. AVERAGE OF THREE YEARS' TESTS.

(Yield in bushels per acre.)

Plants not pruned . 62

Plants pruned two inches deep . 60

Plants pruned four inches deep . 45

Plants pruned six inches deep . 30

It can be readily seen without further ex¬ planation that injury to the roots interferes in the plant's development and reduces the yield.

Depths and Systems of Cultivation. — The cultivation of the growing crop presents many problems differing according to the conditions of soil and climate. The general results of four years of tests of different methods of cultiva¬ tion, indicating in a general way the effect of different systems in the corn belt, is epitomized in the following table. There was found in these experiments a close correlation between the theory of cultivation and the results ob¬ tained by following out the methods suggested by the foregoing discussion.

EFFECT OF DIFFERENT SYSTEMS OF CULTIVATION.

AVERAGE OF FOUR YEARS' TESTS.

(Yield in bushels per acre.)

Method

Weeds allowed to grow . . . ' 58

Weeds cut with hoe and a loose mulch made with hoe

frequent cultivation . 96

Two inches deep cultivation (small shovels) . 90

Four inches deep cultivation (small shovels) . 91

Six inches deep cultivation (small shovels) . .• • • • 84

Six inches deep cultivation (large shovels) . . 87

Gopher or blade cultivator . 88

Deep early and shallow late . 85

Shallow early and deep late . 89

Mulched with grass . 92

The results of the above trials indicate that all competition with weeds must be prevented, from the fact that they live upon the same ele¬ ments of fertility as the corn plants, and in this way reduce the yield of the corn crop. Deep cultivation injures the roots of the corn plant and reduces the yield. Shallow, frequent culti¬ vation, removing the weeds, -keeping a soil mulch on the surface of the soil, gives the best results. This conclusion agrees in general with the facts of ordinary practice in well-drained and fertile soils. In very weedy fields, un¬ drained and in poor condition, it may be neces¬ sary to cultivate deeply in order to destroy the weeds, open the soil to the air and sunshine and allow the excessive water to drain off.

In summing up the important facts of culti¬ vation, the following points should be empha¬ sized :

1. The preparation of the seed bed should be such as to best conserve soil moisture, and ob¬ tain the most favorable mechanical soil condi¬ tion.

2. The cultivation of the growing crop should be such as to avoid all root injury, maintaining a loose

surface soil mulch, and preventing the presence of all weeds or competing plants.

3. The method of planting and caring for the crop will depend upon local conditions to such an extent that it is necessary for every grower to make a thorough study of his pecu¬ liar conditions of soil and climate in relation to his methods of cultivation.

4. The conditions of growth for the corn crop are moisture, heat, light and plant food. The supplying of the conditions in the most favorable manner to the corn plants is the business of the grower and will have the largest profitable returns. Corn is more easily pro¬ tected from its animal and insect enemies than most of the important crops. Of those insects that attack the roots and larvae all are gotten rid of by rotation. Fall plowing disposes in great part of the cutworm. For ear rot the sole remedy appears to be the gathering up and burning of all affected material. Consult Mont¬ gomery, (Corn Crops) (New York 1913) ; Bow¬ man and Crossley, (Corn> (Waterloo, Iowa,

1911).

CpRN INSECT-PESTS. The principal

enemies of corn are the bollworm (q.v.), chinch-bug, cut-worms and certain caterpillars which bore in the stalks. In the Central and Southern States, notably in Kentucky and in southern Illinois, the cotton-boll worm in cer¬ tain years has attacked the corn in the ear, eat¬ ing the silk and afterward devouring the ter¬ minal kernels, hiding within the husk. Whole fields have thus suffered in these States, where there are two broods of the worm, the early and also the late corn faring the worst.

Cut-worms.— These caterpillars are the most insidious pests in fields when the young corn begins to sprout. One species out of many is called the corn cut-worm. It is the young of the Clandestine moth (Noctua clandestine!) . While the fully grown caterpillar has not been described, the young are more or less distinctly marked above with pale and dark stripes, and are uniformly paler below. When first hatched they feed on the corn, descending, when half- grown, into the ground on the approach of severe frosts, and reappearing in the spring, and

then beginning to grow again, attaining their full size and pupating before the middle of July, often much earlier, so that in the New Eng¬ land States the moth is seen from the middle of June to the middle or end of August, during which time it lays its eggs. Remedies : before planting, the seed corn should be soaked in cop¬ peras water, and late in the autumn corn land should be plowed deeply, so as to turn up the half-grown worms, and expose them to the winter cold and to the attacks of insect-eating birds. Cut-worms may be trapped into holes made by a stake in corn-hills. Riley advises dropping between the rows of corn at nightfall bundles of fresh-cut grass or clover, etc., which has been sprinkled with Paris-green or London- purple solution.

The spindle-worm is a caterpillar nearly an inch long, smooth and naked, with the head and last segment of the body black. It bores into the stalk before the corn spindles and makes the leaves wither. The ravages of this worm begin while the cornstalk is young and before the spindle rises much above the tuft of leaves containing it. On examination a small hole may be seen in the side of the leafy stalk, near the ground, penetrating into the soft centre of the stalk. The obvious remedy is to cut open the stalk, and on finding the worm to pull up all the infested plants. The worms turn into an owlet-moth (Achatodes ze

The stalk-borer is a caterpillar of a pale livid hue, with light stripes along the body; it some¬ times bores into the cob of growing corn. It occurs in the central and western States in June and July, the moth (Gortyna nitela) flying late in August and early in September. The young worm hatches about the first of July and imme¬ diately begins to bore into the stalk, but is not noticed till the plant is destroyed. It may be detected on a close examination about the first of July, its hole being at quite a distance from the ground.

The corn-weevil (S phenophorus zece) punc¬ tures large holes in young corn near the base of the stalk before it has spindled, and some¬ times destroys whole fields of young corn. This weevil has

been destructive in Tioga County, N. Y. It pierces the young corn in numerous places, so that each blade has from one to eight holes, the size of a pin or larger; when very numerous every stalk is killed. The weevils occur about an inch under ground, hanging to the young stalks with much tenacity. This weevil (q.v.) or snout-beetle is a rather large insect, its body long, narrow, nearly cylindrical, black, with coarse gray dots or punctures; its beak is nearly a third as long as the body, curved down, the tip triangular.

The corn-maggot is the larva of a fly (An- thomyia zece) which gnaws seed corn after it is planted; the maggot is like the onion-maggot, a footless, white, cylindrical worm, the head, end¬ ing in two black hooks, the jaws. This insect sometimes so abounds as nearly to ruin entire fields of corn, gnawing into the seed and caus¬ ing it to rot. When fully fed and ready to transform it contracts, forming a barrel-shaped brown pupa-case within which lies the pupa or chrysalis; the fly, similar to the house-fly, but smaller, appears a week after. The seed should be soaked, before planting, in gas- tar or cop¬ peras water.

Wire-worms, the larvae or slender hard- vol. 7 — 45

&

skinned grubs of snapping-beetles (Elates) often ruin to a lamentable degree the roots of corn. They are hard to eradicate, but may be caught by placing slices of potato, turnip or apple in the beds and examining the undersides every morning. Another insect destructive to corn is the chinch-bug- (q.v.) which punctures the leaves, sucking the sap. It appears early in June, and there is a summer and winter brood, the adults hibernating in the stubble. (See Wheat-insect Pests). Several caterpillars live at the expense of corn, among them being the larva of the io moth, a great green worm, with poisonous spines, also the fuzzy larva of a moth (Arctia arge). Other pests are the larvae of many beetles, the corn root-worm, which is the larva of a beetle, and is only serious in land which has been planted in corn for several years, and the root-louse, an aphid.

CORN LAWS, regulations of the grain- trade and breadstuffs, a former system of legis¬ lation in England, part of the general economic policy of the country, laying duties on importa¬ tions of various kinds of grain; affecting the internal corn trade and speculative dealings ; the assize of bread; the export of corn; the conflict between arable and pasture land ; and the dan¬ gers of rural depopulation. The system of corn laws thus covered a much wider field than is indicated by import duties, these being but part of a much wider system dealing with allied questions of more importance, and which under changing circumstances are of recurrent in¬ terest. The corn laws originated in the reign of Edward III, and ended only with the repeal of the import duties in 1846, their repeal being only part of a great movement in the direction of free trade. As affecting the interests of the consumer, the earliest corn laws were intended to prevent the exaction of monopoly prices and to check speculation. Export of corn was reg¬ ulated to secure cheapness and plenty at home ; the bounty was defended on the same ground; the duties on imports were remitted or released in dear years, and sometimes bounties were given on imports. Up to 1815 the corn laws had little effect on prices, but after that year they raised to some extent the average price, and increased fluctuations beyond what would otherwise have been the case. The producers interested in the corn laws were the landowners, the farmers and the laborers. In the Tudor period direct legislation was attempted to re¬ strict sheep farming and to promote corn¬ growing. From the 17th century the belief was general that the best sign of national progress was a rise in rent, and it was supposed that anything that raised rent increased prog¬ ress. These views were held by unbiased, impartial writers. Corn laws _ that raised rents were also supposed to benefit the nation. At the close of the 18th century the interests of landlords and consumers began to be opposed and the divergence increased till the repeal. The farmers suffered from the greater fluctua¬ tions, but there was great progress in agricul¬ ture owing to other causes. Wages were low, and especially during the Napoleonic wars, while rents rose greatly, real wages fell. The low wages can only be partly ascribed to the effect of the corn laws. Studied from the point of view of the interests of the state and of general public policy, the early corn laws in¬ volved the same idea as the usury laws. The

governmental power in regulating foreign trade in corn gave rise to constitutional struggle. Exports were encouraged to promote the mer¬ cantile marine and in that way naval power. The revenue from the import duties was con¬ sidered of secondary importance till just before the repeal. Stress was laid on the advantages of a large rural population and of national independence as regards food supplies. The duties were essentially protective and must be regarded as part of a wider system. The repeal was only part of the general movement toward greater freedom of trade, which began with the petition of the merchants in 1820, and was not completed till 1860. Preferences were granted by the British colonies, also as part of the general policy. At the time of the repeal there was much exaggeration as to the past effects of the corn laws on prices, and also as regards the monopolistic spirit of the land- owners. Although the landowners had been the dominant political class for centuries, the greater part of the corn laws had been designed in the interest of the nation as under¬ stood at the time. In the 19th century the only part of the system that remained effective was the protective import duties ; they had become hurtful to the consumer and trade in general, and if retained would have done still more harm. The whole history of the corn laws is a good example of the negative argument for free trade. Protection to agriculture could only be restored by reverting to old ideas which would now be still more difficult of accomplish¬ ment, as conditions have become so much more complex. The best means of securing a suffi¬ cient and steady supply of breadstuffs has always been a subject of great diversity of opinion, and the practice of governments has varied much at different times. The theory urged by Adam Smith, and now adopted in Great Britain and generally followed in the United States, is that the government should do absolutely nothing in the matter, on the ground that farmers and merchants, if un¬ checked, will always form correct views of their own interest, and that their interest will co¬ incide with that of the community. This theory is supported by a large view of the facts. In ancient times famines were much more frequent than they are now, because commerce was more restricted,, less regular and extensive, and sub¬ ject to more frequent obstructions. A free com¬ munication between different countries, by which the abundance of the one may be brought to supply the want of the other, has proved the best security against the want of necessaries and even of comforts and luxuries.

The Athenians had laws prohibiting the ex¬ portation of corn and requiring merchants who loaded their vessels with it in foreign ports to bring their cargoes to Athens. The public pro¬ vision and distribution of corn was an import¬ ant branch of administration at Rome, and very intimately connected with the public tran¬ quillity. The regulation of the supply of corn and the trade in the article have been a fruitful subject of legislation in modern Europe. But it is to be observed that the public solicitude and current of legislation take this direction only in populous countries, or at least those in which the population presses hard upon the means of domestic production of breadstuffs; for countries of which the staple export is corn

need to take no measures for securing a supply. In agricultural countries the object of solicitude is to supply the want of arts and manufactures, as in populous and highly improved countries it is to supply the want of food.

But the laws directed to this object have been very various, and some of them contradic¬ tory; for as in Athens so in England, at one period the laws prohibited the exportation of corn; whereas at another period, and for a very long one in the latter country, a bounty was given on the exportation ; and both these laws had the same object, namely, the adequate and steady supply of the article. (See Corner; Free Trade). Consult Nicholson, J. S., (History of the English Corn Laws1 (London 1904) ; Mc¬ Carthy, (The Epoch of Reform — 1830-50) (London 1882) ; Platt, (History of the British Corn Laws} (London 1845) ; (British Statutes) (16 vols., London 1882-1900) ; Hensard, Par¬ liamentary Debates1* (London 1815-46).*

CORN-SALAD, called also lamb's lettuce, a genus of the valerian family (V alerianacece) . There are about 50 species natives of the north¬ ern hemisphere, most abundant in the Mediter¬ ranean region. Between 10 and 15 species occur in the western parts of the United States, some of which are natives. The plant is an humble annual weed, which is used as a spring salad, especially in France and Germany. The com¬ monest species is V. olitoria , which is natural¬ ized in the United States, and often called fetticus, white pot-herb and milk-grass. It is found in waste places and moist ground from April to July. Corn-salad is cultivated in much the same way as spinach, and is much used for the same purpose as ergot (q.v.).

CORN-SMUT, a hemibasidial parasitic fun¬ gus (Ustilago zees), affecting the corn. It causes

extensive malformation of the ears, but rarely injures any large part of the crop. As an agricultural scourge corn smut has an un¬ savory reputation. In medicine it has been used for much the same purpose as ergot (q.v.), but its physiological action is very slight.

CORN SNAKE, a handsome colubrine ser¬ pent (Coluber guttatus) of the Southern States, also called red chicken snake, scarlet racer, house-snake and mouse snake. It is a near ally of the blacksnakes (q.v.) and has in general the size, habits and temperament of those vig¬ orous reptiles. Its ground color is pale red. < (On the back is a series of large crimson sad¬ dles narrowly bordered with black . . . On

each side of the body is a smaller series of similar blotches, and beneath this a yet smaller series.® The abdomen is white with large black squares and the lips are whitish. Although it climbs trees in search of young birds, catches ground birds and sometimes raids the poultry- yard, it feeds chiefly on small rodents and takes its name from being so frequently seen in cornfields, where mice gather to feed on the grain. On the whole, therefore, it is beneficial and ought not to be killed except when it per¬ sistently threatens the farmer's chickens. Con¬ sult Ditmars, (The Reptile Book (New York*

1907).

CORNACEiE, kor-na'se-e, the dogwood family, a family of plants allied to the Umbelli- ferse (q.v.), and containing about 16 genera and 85 species, chiefly natives of the north temperate zone. Some species produced edible fruits;

some are valuable for the medicinal virtues of their bark, and others are cultivated as orna¬ mental plants. See Dogwood; Tupelo.

CORNARO, kor-na'ro, Ludovico, Venetian nobleman: b. 1467; d. Padua 1566. From the 25th to the 40th year of his age he was afflicted with a disordered stomach, with the gout and with slow fevers, till at length he gave up the use of medicine and accustomed himself to extreme frugality in his diet. The beneficial effects of this he relates in his book entitled (Discorsi della vita sobria ((The Advantages of a Temperate Life*) (1558, the English trans¬ lation of which has passed through over 30 editions). Cornaro's precepts are not appli¬ cable in their full extent to every constitution; but his general rules will always be correct. His diseases vanished and gave place to a vigor¬ ous health and tranquillity of spirits, to which he had hitherto been an entire stranger. He wrote three additional treatises on the same subject. In his work upon the (Birth and Death of ManR composed a few years before his death, he says of himself, ((I am now as healthy as any person of 25 years of age. I write daily seven or eight hours, and the rest of the time I occupy in walking, conversing and occasionally in attending concerts. I am happy and relish everything that I eat. My imagina¬ tion is lively, my memory tenacious; my judg¬ ment good, and what is most remarkable in a person of my advanced age, my voice is strong and harmonious.®*

CORNBURY, Edward Hyde, 'Lord, 3d Earl of Clarendon, English colonial governor; b. 1661 ; d. London, 1 April 1723. He was the son of the 2d Earl of Clarendon and sat in Parliament for Wiltshire from 1685 to 1695 and for Christchurch from 1695 to 1701. He was one of the first officers of his household troops to desert from the service of King James II to the Prince of Orange in 1688. In return he was made governor of New York, where he arrived 3 May 1702. He was confirmed in his office by Queen Anne, and in the same year was also made first royal governor of New Jersey. His rapaciousness, bigotry, incapacity for adminis¬ tration and dissolute habits made him very unpopular. In New York the people became exasperated by his fraudulent appropriation of public funds and his attempts to control the legislature. The legislatures of both colonies finally passed lists of grievances which resulted in Cornbury's removal from office in 1708. He was at once thrown into prison in New York by his creditors and remained there until he be¬ came Earl of Clarendon in 1709, when he was enabled to pay his debts and return to England. He was made a privy councillor in 1711 and envoy to Holland in 1714. In Smiths (History of the Late Province of New York) (New York 1830) he is spoken of as follows: ((We never had a governor so universally detested, nor one who so richly deserves the public ab¬ horrence.® Consult Wilson, (Memorial History of New York> (New York 1893) and Gordon, (History of New Jersey } (Trenton 1834).

CORNCRACKER STATE, a nickname of Kentucky, whose people are often called (

CORNEA (Lat. «horny,» "hornlike®), the transparent concavo-convex disc which forms the anterior fifth of the globe of the eye, fitted

accurately into the sclerotic or fibrous coat forming the posterior four-fifths of the organ. It is a segment of a smaller sphere than the sclerotic, and is from seven to seven and a half lines in diameter; the greatest diameter being the transverse. Its anterior convex surface is covered by a continuation of the conjunctival epithelium, and its posterior concave surface is lined also with delicate pavement epithelium, which is in contact with the aqueous humor, and supposed by some to be concerned in the secretion of this fluid. The degree of convexity varies, being usually greatest in children and near-sighted persons. Its circumference is de¬ scribed as fitting into the sclerotic like a watch crystal into its frame. Its principal thickness, which is nearly the same at all points, is made up of about 60 layers of soft indistinct fibres, continuous with and similar to those of the sclerotic, connected together by delicate areolar tissue ; these may be separated by maceration. Behind the cornea proper is an elastic trans¬ parent lamina called the membrane of De- mours, which serves to maintain the corneal curvature. No vessels have been traced beyond the very edge of the cornea, which receives its nutriment in the form of lymph. A superficial and a deep series of vessels surround the cor¬ nea, anastomosing freely around its margin; the superficial vessels are continuous with those of the conjunctiva, and the deep with the short ciliary arteries. In diseased conditions both sets of vessels may be prolonged into its sub¬ stance. No nerves have been traced into the cornea. Its diseases are many, frequent and dangerous to vision; from its exposed situation, it is liable to suffer from blows, cuts and the introduction of foreign substances. It is often inflamed in various ophthalmic diseases, result¬ ing in opacity, ulceration, increased vascularity, softening and rupture from gangrene; these affections are tedious and difficult to cure, are often painful and generally leave the patient with more or less obstruction of the power of vision, if they do not destroy the eye itself. In old persons, the circumference of the cornea often presents a whitish zone, a line or two wide, the result of the deposition of fat, and not interfering with vision. The convexity of the cornea in aquatic and amphibious animals is slight, and sometimes almost lacking.

CORNEILLE, kor-na-ye, Pierre, French dramatist: b. Rouen, 6 June 1606; d. Paris, 1 Oct. 1684. He began his dramatic career with comedy. His first piece was ; (La Veuve) ; (La Galerie du Palais) ; (La Suivante) ; (La Place Royale> ; (L'Illusion Comique, which had great success. Being more natural and more vigorous in style than the dramas which then held the stage, they announced the approach of a reformer endowed with talents of a higher order, and as such he was recognized even by his rivals. His(Medea,) produced in 1635, and imitated from Seneca, was the first indication of his talent for tragedy. His next work was (Le Cid,* which raised his fame at one bound to its highest pinnacle. It has been translated into numerous languages, but scarcely bears out its reputation. The popu¬ larity of the play was unbounded. But its ene¬ mies were stimulated by the hatred of Cardinal Richelieu for its author. Corneille had been appointed as one of five authors to whom Riche*

lieu entrusted the writing out of plays from plots furnished by himself, but he had been guilty of condemning the plot of a comedy com¬ mitted to him, and the offense was unpardon¬ able. Richelieu stimulated Chapelain to write a critique on behalf of the Academy. The critique was moderate, and while condemning the plot, admitted freely the merits of the author. It is printed in some editions of Corneille's works under the title, (Sentiments de l'Academie Franqaise sur la Tragi-Comedie du Cid.5

Among other accusations brought against Corneille was want of originality. This led to his selecting as his next subject Horace (not the poet, but the Horatius of early Roman his¬ tory), which is perhaps the work in which he shows the greatest invention, and is one of the most admired of his productions. It appeared in 1639; the same year appeared (Cinna,5 which, according to Voltaire, was the chef-d'&uvre of Corneille; and in 1640 the (Polyeucte,) which other critics have styled the most original, the most touching and the most sublime work of the author, the chef-d'mwre at once of Chris¬ tian tragedy and of the French theatre. There is one flaw in this work which its admirers do not seem to have noticed. The poet so far mis¬ takes the spirit of the Christian religion as to

make Polyeucte, a convert under the Roman Empire, bringing martyrdom upon himself by rushing in to interrupt the Pagan sacrifices and overthrow the altar on which the priest is sacri¬ ficing.

From this time the success of Corneille as a dramatist steadily declined and many of his numerous works, in spite of the fame of their author, never acquired celebrity. On the merits of others the utmost diversity of opinion has prevailed, the same work being the subject of extravagant eulogy and unqualified condemna¬ tion. (Rodogune,5 (Heraclius,5 was his own favorite production. Some critics speak highly of it; others condemn it as showing marked indications of decline. From 1653-59 he gave up writing for the stage and employed himself with preparing a poetical translation of the (De Imitatione Christi.5 In the latter year he was induced to return to the drama and persevered 15 years amid declining success in producing pieces generally inferior to his earlier works. (1662) are the best works of this period. (Tite et Berenice5 (1670) was a rival production to the Berenice5 of Racine, the subject being pre¬ scribed to both poets by the Princess Henriette; but Racine's poem was a success, that of Cor¬ neille a failure. His last pieces, (Pulcherie5 (1672), (Surena5 (1674), were the weakest as well as the last. He had been chosen a member of the Academie Frangaise in 1647, and was dean of the Academie when he died in 1684. Besides his dramas he wrote some minor poetry, elegies, sonnets, epistles, etc., under the title of (Poesies Diverses,5 and also in prose three dis¬ courses, (Sur le Poeme dramatique5 ; (Sur la tragedie5 ; and (Sur les trois unites.5 Voltaire has remarked that Corneille was the first dramatist who made the sentiment of admira- ■»

tion the basis of tragedy instead of terror or

pity. , ,

The admirers of Corneille gave him the strongest praise for the quality, sublimity. This is a quality not easily defined, and in straining after it it is only too easy to fall into faults very much opposed to sublimity. The faults found with Corneille in his weaker productions are precisely such as might be produced by such an effort, declamation, inflatation, abuses of sen¬ tences and great words. His versification is less accurate and polished than that of Racine, as when he began to write the language was less formed, and his own taste in this respect probably less fastidious. There may also be observed in Corneille's delineation of character a straining after a heroic ideal, rather than a true and profound analysis of the real springs of human sentiment and emotion, in which alone an inexhaustible fund of dramatic action is to be found. He was, like Racine, strongly impressed with religious convictions, and ex¬ tremely scrupulous in his writings. He had a high idea of .his own powers, but was deficient in social tact and in conversational ability to such an extent that it is said he did not always express himself grammatically. When re¬ proached for his carelessness in cultivating the graces of society, he would reply, ((Je suis tou- jours Pierre Corneille.55 The best edition of Corneille is that by Marty-Laveaux (12 vols., 1862-68). Consult Le Verdier and Pelay, ˆAdditions a la bibliographic Cornelienne' (1908) ; Picot, (Bibliographic Cornelienne5 (Paris 1865). Consult also Brunetiere, ˆpoques du theatre franˆais5 (ib. 1892) ; Faguet, (Propos de Theatre5 (3 vols., Paris 1906) ; Guizot, (Corneille et son temps5 (7th ed., ib. 1880) ; Huszar, (Pierre Corneille et le theatre espagnol5 (ib. 1903) ; Canfield, Cor¬ neille and Racine in England5 (New York 1904) j Lanson, Corneille5 (Paris 1898) ; Lemaitre, Corneille et la poetique d'Aristote5 (ib. 1888) ; Raab, (Pierre Corneille in deutschen Uebersetzungen5 (Heidelberg 1911) ; Wendt, < Pierre Corneille und Jean Rotrou5 (Leipzig

1911).

CORNEILLE, Thomas, French dramatist,

brother of the preceding: b. Rouen, 20 Aug. 1625; d. Andelys, 8 Dec. 1709. He lived in the most friendly union with his brother till the death of the latter. They had married two sis¬ ters, lived in the same house without any divi¬ sion of means, and were remarkable for the conformity of their tastes. His first comedy, (Les engagements du hasard,5 appeared in 1647 and was successful. The number of his dra¬ matic works is 42; yet most of them are now little known. His comedies, however, at the time of their appearance were received with greater interest, if possible, than those of the great Corneille, in imitation of whom Thomas applied himself to tragedy; and his (Timocrate5 (1656) was received with such continual ap¬ plause that the actors, weary of repeating it, entreated the audience, from the stage, to per¬ mit the representation of something else, other¬ wise they should forget all their other pieces. Since that time it has not been brought upon the boards at all.

Camma,5 in 1661, produced an equal sensation. The spectators thronged in such numbers to witness the representation that scarcely room enough was left for the perform-

ers. His best tragedy is (Ariane> (1672). (Le Comte d'Essex) (1678) has also retained some celebrity, although marred by the ignorance it displays of English manners and history. ^'InconnuC a heroic comedy, appeared in 1675. In 1677 he versified (Le Festin de Pierre) at the request of the widow of Moliere, and until recently, when the prose of Moliere superseded it, it was always represented in his version. He was a dramatist of the second rank, laborious but wanting in originality, yet not without con¬ siderable resources. In 1685 he succeeded his brother in the French Academy by a unanimous vote. His (Works) were edited by Thierry (Paris 1881). Consult Reynier, (Thomas Cor¬ neille, sa vie et son theatre* (Paris 1893) and Alfred de Vigny, fragments inedits de critique sur Pierre et Thomas Corneille) (1905).

CORNEL (Lat. cornu, horn, from the hard, horn-like wood), a shrub belonging to the genus Cornus, about 20 distinct species, native of north latitude, temperate climate. Flowers generally small, four parted, ovary inferior, and two- or three-celled; fruit fleshy and edible in some species, especially those in Europe. The so- called "flowers* are really clusters of flowers surrounded by large bracts. The cornelian cherry (Cornus mas), of Europe, which is there the only member of the genus known as the cornel, bears small greenish flowers; the fruit is acid and edible. The dogwood of the eastern part of the United States is the Cornus florida, a small tree which in May and June is covered with large white or pale pink flowers; the wood of which has a fine fibre and is very hard. The bark is sometimes used as a tonic. C. canadensis, the dwarf cornel or builchberry, of woods in the northern part of the United States, is a low herb which bears a close cluster of flowers that ripen into red, fleshy but scarcely edible berries. In North America there are about 18 well-known species. See Dogwood.

CORNELIA, Roman matron, the daughter of Scipio Africanus the elder. She married Tiberius Sempronius Gracchus, censor 169 b.c., by whom she was the mother of the two trib¬ unes, Tiberius and Caius. Left a widow with a young family of 12 children, she devoted her¬ self entirely to their education. Only three of her family survived their childhood, her daugh¬ ter, married to Scipio Africanus the younger, and her two sons. Cornelia was highly edu¬ cated and united the severe virtues of the old Roman matron with the refinement which then began to prevail in the upper class society of Rome. She bore the death of her sons with magnanimity, and afterward retired to Mise- num, where she spent the remainder of her life. She exercised unbounded hospitality, and was constantly surrounded by men of letters. The Roman people erected a statue to her with the inscription: "Cornelia, Mother of the Gracchi,* the base of which, with the inscription, is now in the Capitoline Museum at Rome.

CORNELIAN, or CARNELIAN (Fr.

cornaline, from Lat. cornu, "horn"), a precious stone varying from a light and fleshy red, opaque and semi-transparent, with and without veins, to a brilliant transparency and color approaching the ruby, from which they are, however, known by sure distinctive marks. It consists of silica along with minute quantities of the oxides of iron, aluminum, and some¬

times of other metals, and is actually a variety of chalcedony. It is much used for seals, brace¬ lets, necklaces and other articles of minute gem sculpture ; appended to watches, ornaments now in little use. It was known to the Romans, as we learn from Pliny, by the name of sarda, from being found originally in Sardinia. The number of the cornelians that were engraved by the ancients and have reached our times is very considerable and nearly equal to that of all the other kinds of gems with which we are acquainted. Pliny thinks they were clarified by being steeped in the honey of Corsica. The national collection at Paris and the British Museum of London have many beautiful en¬ graved cornelians. Many of the latter were found in the field of Cannae in Apulia, where Hannibal defeated the Romans.

CORNELIS, kor-na'Hs, Cornelius, Dutch painter: b. Haarlem 1562; d. 1638. He studied with Peter Hirtsens the younger, and afterward worked at Antwerp under Peter Porbus and Giles Conguet. In

1583 he returned to Haar¬ lem, where his great painting — the (Company of Arquebusiers > — established his reputation. Deschamps called it a collection of figures sketched by the (

CORNELIUS, a centurion of the Italic cohort, whose conversion at Caesarea is related in Acts x. His name would indicate that he was either a member of the distinguished gens Cornelia, or a descendant of one of its freedmen. He is reckoned by Julian the Apos¬ tate as one of the few persons of distinction who embraced Christianity. The cohort in which he was centurion was probably Cohors II Italica civium Romanoruni, which a recently discovered inscription proves to have been sta¬ tioned in Syria before 69 a.d. The description of Cornelius as "a religious man, and fearing God . . .* would indicate that he was one of the <(proselytes of the gate* who worshipped the one true God and observed in great part the Mosaic law, but who were not formally affiliated to the Jews by circumcision. That he was not a full proselyte is attested by the opposition that developed to his admission to the Christian Church. His baptism is an important event in Christian history as he was the first uncircum¬ cised Gentile admitted to the new Church with¬ out the obligation of* submitting to the cere¬ monial laws of the Jews. Disapproval of his admission by the Jewish Christians of Jerusalem is narrated in Acts xi, 2, 3, and the cessation of that opposition through the influence of Peter

in xi, 4-18, the matter being finally settled at the Council of Jerusalem (Acts xv). Consult Baronius,

1896).

CORNELIUS, Pope and martyr. He suc¬ ceeded Fabian on 4 June 251 and according to the Liberian catalogue resigned after 2 years, 3 months and 10 days. Fabian, his predecessor, had suffered martyrdom in the persecution of Decius in January 250. By March of the fol¬ lowing year rivals had appeared against the emperor and his absence from Rome caused the persecution to slacken ; 16 bishops assembled in Rome and Cornelius was elected. A few weeks later the Roman priest, Novatian, made himself anti-pope, being more acceptable to those who opposed Cornelius because of the latter's leniency toward the lapsi. In October 251 Cornelius convened a numerous council at Rome, which confirmed his election. He did not enjoy his honor long, for he was banished by Gallus to Centumcellae (Civita Vecchia), where he died, or, according to some accounts, suffered martyrdom, 14 Sept. 253. Ten of Saint Cyprian's letters are directed to Cor¬ nelius and there are extant two genuine letters of Cornelius to Saint Cyprian. Besides these Cornelius wrote a long letter to Fabian concern¬ ing the character and conduct of Novatian, considerable extracts from which are preserved in Eusebius, (Historia Ecclesiastical Consult Benson, (Cyprian } (London 1897) ; Mercati, (D'alcuni nuovi sussidi per la critica del testo di S. Cipriano) (Rome 1899), and (Acta Sanc- torunP for 14 September.

CORNELIUS, kor-na'le-oos, Karl Sebas¬ tian, German physicist : b. Ronshausen, Lower Hesse, 1819 ; d. 1896. He studied at Gottingen and at Marburg, giving special attention to the exact sciences. After 1851 and until his death he was professor of physics and physiography at Halle. He published (Die Lehre von der Elektricitat und dem Magnetismus) (1855); ˆheorie des Sehens und raumlichen Vorstellens vom physikalischen, physiologischen, und psy- chologischen Standpunkte aus betrachtet) (1861); (Meteorologie) (1864); (Ueber die Bedeutung des Kausalprinzips in der Natur- wissenschaft) (1867) ; (Ueber die Entstehung der Welt) (1870) ; (Ueber die Wechselwirkung zwischen Leib und Seele) (1880) ; (Grundriss der physikalischen Geographic } (6th ed., 1886) ; (Abhandlungen zur Naturwissenschaft und Psychologies (1887).

CORNELIUS, Peter, German composer; b. Mayence, 24 Dec. 1824; d. 26 Oct. 1874. He studied for the stage but meeting with little success, devoted himself to music. He was intimate with Liszt who brought out his opera, (The Barber of Bagdad, s at Weimar in 1858. Cornelius removed to Vienna and there wrote his second opera, (The CidP which was produced at Weimar in 1865. He became a great admirer of Wagner, and was for a time a professor at the Munich Konigliche Musik- schule. He began the opera in 1869, and it was finished from sketches after his death by his pupil, C. Hoffbauer. (The Barber of Bagdad* is his masterpiece. It was re¬ scored by Mottl and Levi and produced in Munich in 1885. It had a great success and is

to-day in the repertoire of every German opera house. It was produced in New York in 1890. Other works by Cornelius are his 69 songs for one voice and 7 duets. He wrote brilliantly on music and was also a poet of distinctive merit. His music is noted for its nobility, power of characterization and tone refinement. His complete works were issued by Breitkopf and Plartel (5 vols., 1905), and his literary works and letters (4 vols., 1905). Consult Istel, E., (Peter Cornelius) (Leipzig 1904), and Sul- ger-Gebing, E., (Peter Cornelius als Mensch und Dichter) (Munich 1908).

*CORNELIUS, Peter Von, German painter: b. Diisseldorf, 23 Sept. 1783; d. 7 March 1867. He early exhibited a taste for art, and accus¬ tomed himself to copy from memory the works of Raphael and other masters. He thus ac¬ quired an early proficiency, and at 19 was entrusted with the painting of the cupola of the church of Neuss, near Diisseldorf. It was executed in chiaroscuro, in figures of colossal size, and showed already the grandeur of con¬ ception by which he was afterward distin¬ guished. He soon after removed to Frankfort, where in 1810 he commenced a series of designs illustrative of Goethe's (Faust. * In 1811 he went to Rome, where, with Overbeck, Veit and other associates, he projected the formation of a new school of German art, and especially the revival of fresco painting, in imitation of Michelangelo and Raphael. Bartholdy, the Prussian consul-general, commissioned some members of this school to paint his villa. Cor¬ nelius executed two frescoes for this purpose — (Joseph Interpreting the Chief Butler's Dream* and (Joseph Recognizing His Brethren.* He afterward began a series of frescoes from the (Divina Commedia) for the Marquis Massini, but left it unfinished in consequence of receiv- in a commission to execute the frescoes in the Glyptothek, then newly erected at Munich. The designs for the villa of Massini, though never painted, were engraved by Schoefer, and an¬ other series, illustrative of the (Niebelungen Lied,* were engraved by Amsler and Lips.*

*Before leaving Rome (1819) Cornelius had been appointed director of the Academy at Diisseldorf. His first work was to reorganize the Academy, and then to give his whole atten¬ tion to the painting of the Glyptothek. which demanded a constant residence at Munich. He resigned the directorship after a short time, and received in 1825 that of the Academy of Munich. Simultaneously with the Glyptothek he under¬ took the painting with frescoes of the Ludwigs- Kirche. In these two great works he was assisted by his Munich pupils. Many of the cartoons prepared by him were painted under his superintendence by Zimmermann, Schott- hauer and others. In the Glyptothek two large halls were entrusted to him to decorate. In the one, called the Hall of Heroes, he gave a repre¬ sentation on a colossal scale of the leading events of the Iliad ; in the other, named the Hall of the Gods, he symbolized the Grecian mythology. In the Ludwigs-Kirche the greatest painting in size and importance was the (Last Judgment, * of which one critic says that it is without a rival among contemporary paintings, another that it is enough to say of it that in it Michelangelo is both imitated and dis¬ regarded. Cornelius also painted at Munich the Pinakothek, a picture gallery for which, with*

the assistance of his pupils, he executed an ex¬ tensive series of frescoes representing the his¬ tory of painting. In 1841 he was invited to Berlin by Frederick William IV, who entrusted him with the painting of the royal mausoleum or Campo Santo. The most celebrated cartoon in this series is the (Four Riders of the Apoca¬ lypse.) The series consists of 12 paintings, which have been engraved. He was admitted a foreign member of the Institute of France in 1838 and a member of the Academy of Berlin in 1841. His advice and assistance were widely sought and he executed or superintended vari¬ ous works besides those enumerated.

On his merits as an artist there are the widest diversities of opinion according to the sympathies of those by whom he is appreciated. Cornelius was a true representative of modern German thought in its highest phases. He in¬ troduced into art a metaphysical and subjective element which in the hands of so competent an interpreter could not but be productive of great results, but which is equally open to the severest criticism. That he was the founder of a school and threw new life into German art the mere enumeration of his great undertakings is suffi¬ cient to prove. Even his admirers, however, admit certain faults in his execution, and it would seem that in aiming at grandeur he too often failed to be natural. In seeking to de¬ velop his leading idea he subordinates details to an extent which amounts to sacrificing them, and that idea is often admittedly recondite,

and requires learning and study to appreciate it. Still his admirers insist that his merits are such in the grandeur and beauty of his designs and the elevation of the tone of his execution as to overbear all faults of detail ; but there are not wanting detractors who say that his excellences, whatever they may be, do not belong to the region of art, and that it is necessary to go out¬ side of it into that of metaphysics to be able to appreciate them. Consult Dohme, (Kunst und Kiinstler des neunzehnten Jahrhunderts) (Leip¬ zig 1883) ; Eckert, (Kunstlermonographien5 (Bielefeld 1906) ; Grimm, (Neun Essais) (Ber¬ lin 1865) ; Koch, (Peter Von Cornelius) (Stutt¬ gart 1905) ; Von Wolzogen, (Peter von Cor- nelius) (Berlin 1867) ; Riegel, (Cornelius, der Meister der deutschen MalereP (ib. 1870) ; Forster, (Peter von Cornelius: ein Gedenken- buch) (1874) ; Muther, (History of Modern Painting5 (Vol. I, English trans., London 1895).

CORNELIUS NEPOS. See Nepos.

CORNELL, Alonzo Barton, American capitalist and politician : b. Ithaca, N. Y., 22 Jan. 1832; d. 15 Oct. 1904. He was a son of Ezra Cornell (q.v.), and his early life was spent as a telegraph operator and manager in Cleveland and New York. He was defeated as Republican candidate for lieutenant-governor in 1868; was chairman of the New York State Republican Committee 1870-78; surveyor of customs, New York, 1869-73; speaker of the assembly 1873 ; and naval officer of the port of New York 1876-78. During Cornell's occu¬ pancy of the latter office, President Hayes issued his famous order requiring office holders to refrain from politics. In spite of this warning, Mr. Cornell, as chairman of the State commit¬ tee, called the Rochester convention to order, and as a consequence lost his office, Julv 1878. In 1879 he was elected governor by the Repub¬

licans, and served until 1 Jan. 1883, since which time he devoted himself to the care of his large financial interests. He wrote (True and Firm: Biography of Ezra Cornell, Founder of the Cornell University: a Filial Tribute5

(1884).

CORNELL, Ezra, Ame rican capitalist and philanthropist : b. Westchester Landing, N. Y., 11 Jan. 1807; d. Ithaca, N. Y., 9 Dec. 1874. He was of Quaker parentage and in 1819 removed with his father, a potter by trade, to De Ruyter, N. Y. His early education was scanty, and for a time he assisted his father in farming and in making pottery, meanwhile teaching in a dis¬ trict school. He also learned the .trade of car¬ penter, worked as a mechanic at Homer, N. Y., and from 1826 to 1838 was manager of a flour mill at Ithaca. He was afterward engaged in a lumber business with his brother, but in 1842, when telegraph lines were first being put in operation, he became interested in the construc¬ tion of a telegraph line from Baltimore to Washington. He invented a machine for lay¬ ing the wires underground and was placed in charge of the work. This method failed, owing to defective insulation, and Cornell's suggestion that the wires should be strung on poles was adopted. He then devoted himself to telegraph line construction and the organization of tele¬ graph companies, and was one of the founders of the Western Union Telegraph Company in 1855. He accumulated a large fortune and in 1858 retired to a farm at Ithaca, N. Y. He was a member of the first Republican National Con¬ vention of 1856, was a member of the State assembly in 1862-63, and of the State senate 1864—67. He is best known as the founder of Cornell University, which he liberally endowed and for which he secured special legislation at Albany. He also founded a public library at Ithaca. Consult (The Life of Ezra Cornell,5 by his son, Alonzo Barton Cornell (New York

1884).

CORNELL COLLEGE, a coeducational institution in Mount Vernon, Iowa ; organized as a college in 1857, under the auspices of the Methodist Episcopal Church. It includes an academic department and a department of civil engineering. The degrees are B.A., B.S. and B.S. in C.E. The enrolment is about 750 and the faculty numbers 41. Besides the college proper, the organization includes an academy, a conservatory of music, a school of art and a school of oratory. The principal buildings of the college are the library and college, science, chapel, Bowman and conservatory halls. The endowment amounts to about $900,000 and the annual income to about $90,000. The library contains about 39,000 volumes.

CORNELL UNIVERSITY, at Ithaca, N. Y., owes its origin primarily to the Land Grant Act of 1862, ((donating public lands to the several States and Territories which may provide colleges for the

benefit of agriculture and the mechanic arts.55 Under this act New York received as its portion 989,920 acres of land. The institution established was named in honor of Ezra Cornell (q.v.), who offered to give $500,000 with which to erect its build¬ ings (the terms of the land grant forbidding the use of its proceeds for that particular pur¬ pose), on condition that it should be located at Ithaca. The university was incorporated in

1865. The number of students (412) who regis¬ tered at the opening was highly satisfactory. The liberality of the charter, which guarded against possible control or undue influence by any religious denomination; the nature of the entrance requirements; the promise of oppor¬ tunities to pursue lines of study not found in other schools then existing; the location, free from the distractions of a large city — these and other features combined to attract students to the new school. Yet, encouraging as was the beginning the university for the next four years had much difficulty in maintaining its existence. The State's land scrip, which was expected to bring not less than $10 an acre, was being sold for only 50. cents an acre, when Ezra Cornell, believing that the land would increase in value, purchased all the scrip, which had not been otherwise disposed of, and bought over 500,000 acres of excellent timber lands in Wisconsin, which before his death he transferred, with full title and control, to the university. But not before 1882 were any of these lands sold for amounts sufficient materially to aid the institu¬ tion ; then the sum of $2,320,000 was realized from the sale of 140,000 acres. Later other lands were sold at fair prices, making in all from the land grant lands a net profit of about

$6,000,000.

Besides Ezra Cornell's endowment, the uni¬ versity received large gifts from Henry W. Sage, for a women's dormitory, a chapel, a library building and a book endowment fund, a school of philosophy, a museum of archaeology, etc., all generously endowed ; a donation from John McGraw for a building devoted to mu¬ seums and scientific laboratories; from Hiram Sibley for a college of mechanical engineering and mechanic arts; from Andrew D. White a priceless historical library; from Dean Sage a fund for supplying the college pulpit, etc. The university is also indebted to A. S. Barnes for a Christian Association building; to William H. Sage for the chapel enlargement and organ, the purchase of the great Zarncke library, a stone bridge, and in conjunction with Dean Sage, an endowed infirmary for sick students ; to Dean Sage for Stimson Hall; to John D. Rockefeller for Rockefeller Hall of Physics; to Willard Fiske for a library fund of about a half million dollars ; to Oliver H. Payne for the Cornell Medical College in New York city, and to others for valuable gifts. The total property valuation of Cornell University in 1915 was $22,786,051.73. The total invested funds were $14,051,115.33; total income for 1915, $3,139,530.38, of which $202,632.06 represented benefactions. Grounds, buildings, equipment and other property of the university in 1915 were $8,534,157.48. The library comprises 460,000 volumes. In all 16,698 degrees had been granted and there were about 14,500 living graduates.

The broad scope and many-sidedness of the university are based on Ezra Cornell's proposi¬ tion, ((I would found an institution where any person can find instruction in any subject, w in which the more specific purpose of the national donors was absorbed and included. Since pro¬ vision was made for women in the early 70's they have formed from 10 to 15 per cent of the student body, though in recent years the number both absolutely and relatively has decreased. The university annually grants free tuition to 600 students of New York State, apportioned

by assembly districts; also to New York State students in agriculture, and to New York State students in veterinary medicine.

Cornell University occupies in the United States a middle ground between the institutions of private or chiefly private foundations, with independent corporate existence, and the State universities supported and controlled by the States. The government of the State of New York is represented in Cornell University by ex officio members on the board of trustees. Its constitution has undergone many changes, as well of internal arrangement as of outward expansion. Its present organization is as fol¬ lows: 1. Graduate department. 2. College of Arts and Sciences. 3. College of Law. 4. Col¬ lege of Medicine. 5. New York State Vet¬ erinary College. 6. College of Agriculture. 7. College of Architecture. 8. College of Civil Engineering. 9. Sibley College of Mechanical Engineering and Mechanic Arts.

The graduate department has charge of the graduate studies of the other departments. Courses leading to the degrees of A.M. and Ph.D. are pursued in this department ; and 16 graduate

scholarships of the value of $200 and free tuition each, 23 fellowships of $400 and free tuition each, and 2 of $500 and free tuition each are annually granted to graduate students, besides one traveling fellowship in architecture of the annual value of $1,000, good for two years. The College of Arts and Sciences allows elective courses in science and the classics and leads to the A.B. degree B. Chem. The College of Law has the usual law courses and grants the degree of LL.B. The College of Civil Engineering provides instruction in all depart¬ ments of that subject, and particularly in some of the more advanced developments of the science. Special instruction is given in bridge engineering, railroad engineering, sanitary, municipal, hydraulic and geodetic engineering.

The Sibley College includes eight depart¬ ments : mechanical engineering, experimental engineering, electrical engineering, machine design, mechanic arts or shop-work, marine en¬ gineering, naval architecture and railway me¬ chanical engineering. Courses of study are four years in length, and the degree of mechan¬ ical engineer is conferred upon those who successfully complete the respective courses. The laboratories, museums, shops and other parts of the college are very completely furnished and equipped. Hiram Sibley con¬ tinued making additions to his first donations, and in 1885 the trustees of the university organized the college under the name by which it is now known. Mr. Sibley's gifts amounted to $160,000, and $150,000 additional have been contributed by his son, Hiram W. Sibley. The College of Architecture gives the usual course in this subject, both in theory and practice and confers the degree of B.Arch. The College of Agriculture gives extended and practical courses. An experiment station established by the Federal government is connected with this department. In 1904 the New York State legis¬ lature established a State College of Agricul¬ ture at Cornell, and appropriated $250,000 for buildings therefor. The College of Medicine (established in 1898) has a two years' course in Ithaca, and a full four-year course in New York.

The entrance requirements to all cqurses are

CORNELL UNIVERSITY

1 College of Agriculture

2 Residential Halls

0 w*

**

/

CORNER

CORNETO

713

substantially the same as those of other first- class universities. In 1914 the total number of students in attendance was 5,094, and of this number the College of Arts and Sciences had about 1,223 and Sibley 887. There were 700 mem¬ bers of the faculty, some of whom were en¬ gaged in university extension work. The sum¬ mer school has always had a large attendance. See Summer Schools.

The campus is admired for its beauty and extent, and the group of buildings which belong to the university are models of architecture. The library, with its famous Fisk Dante collec¬ tion and the Andrew D. White French Revolu¬ tion collection; the laboratories, halls and dormitories; the classrooms, and other features of the university all present special advantages and attractions.

CORNER, a commercial term used in Eng¬ land and the United States to signify the con¬ trol of so large a supply of an industrial or commercial product or of so much of a stock that the market value of the commodity held is tremendously advanced, and those who have made contracts to deliver the stock or com¬ modity in question must buy at the prices set by the pool. So the actual difference between the manoeuvre of the corner-man and the nor¬ mal effort to bull prices by controlling supply is that the corner is based upon knowledge of contracts made for future delivery by those who are not in present possession of the stock. In stock exchange parlance a "corner" is procured where

somebody succeeds in buying for further delivery more property of a given kind than is possible for the seller to deliver before the day of the maturity of the contract. The term is used in boards of trade, etc., to desig¬ nate the condition arising when a much greater quantity of any given commodity is sold for future delivery within a given period than can be purchased in the market. The buyers, who are called in the slang of the exchange "longs," then insist on delivery, and by these means suc¬ ceed in running up prices to a fictitious point, bv which deals are run out between the dealers, or by exchanges, or, where the person insists upon it, by actual delivery. A very large majority of these transactions are no doubt merely speculative, but many of them are actu¬ ally purchases for manufacturers and exporters. Successful corners depend then not only on a thorough understanding of where the control of the commodity in question lies, lest another holder at the critical moment be able to under¬ sell the would-be corner-man, but on the will¬ ingness of the buyer to keep his contracts at no matter what cost. In other words, if the corner-man is too greedy and demands too high a price, buyers may smash the corner by refusing to keep their contracts, a procedure with a certain amount of poetic justice in it, at least when the members of the corner have gained control of the supply which they are to rebuy from the contractors. Legally defined, a "corner" is the securing of such control of the immediate supply of any product as to enable those operating the corner to advance arbitrarily the price of the product. It is created or¬ dinarily by operations on boards of trade or stock exchanges, and by dealings in options and fixtures. A "corner" when accomplished bv a confederation to raise or depress, prices and operqfe on the market is a conspiracy il the

means employed are unlawful. Cereals and cot¬ ton because of the large amount of future trading done in them, are favorite fields for the corner-man; but the exact amount of a year s crop and the thorough location of such holdings make the manoeuvre particularly dan¬ gerous. Typical "corners" of ancient history include: Joseph's buying and storing the corn of Egypt, so that "all countries came to Joseph to buy corn" (Gen. xli, 57) ; and the Athenian corner in grain, orated against by Lysias (d. . 380 b.c.). Many of the worst financial panics in the United States have been the results of attempts, usually unsuccessful, to corner the gold market. The greatest of these was that which culminated in Black Friday, 24 Sept. 1869, through the operations of lay Gould and James Fisk, Jr. Consult Boutwell, G. L., (The Mint Bill and the Crime of 1873 J and (Black Friday (Chaps. 34—35 in Vol. 2, (Reminiscences of Sixty Years in Public Affairs,* New York 1902) ; and Lysias, (Against the Grain Dealers* ; also of allied interest*

1892).

CORNET (Fr. "little horn"), formerly a reed wind instrument of the oboe class ; but the name cornet or cornet-a-pistons is now given to a brass musical instrument with a cup-shaped mouthpiece, which has a very agreeable tone, and is much used in orchestras and military bands, and sometimes with organ in church music. The cornet is intermediate in character between the French horn, the trumpet and the bugle. Its characteristic feature is its three pistons, which may be pressed down by the fingers singly or together, so as greatly to increase its compass. The first lowers the pitch by a tone, the second by a semitone, the third by three semitones. Its range is from C1 to C3. In brass bands it takes the soprano and contralto parts. The name was also applied to the stop or series of pipes in an organ, intended to imitate the tone of an obsolete wind instrument which has been superseded by the oboe.

From its military use the term cornet was transferred to a cavalry troop, because it was accompanied by a cornet player, and then to the color officer of this troop, the cornet of cavalry corresponding to the infantry ensign. This title of the English army was abolished in 1871, the rank of sub-lieutenant taking its place.

CORNETO, kor-na'to, or CORNETO TARQUINIA, Italy, a picturesque, mediaeval- looking town, situated 12 miles north of Civita Vecchia, three miles from the Mediterranean, on the Marta River. Corneto is the seat of an episcopal see. It rose out of the ruins of the Etruscan city of Tarquinii, whose remains, within a mile and a half of Corneto, are among the most important for the student of Etruscan history. It seems to have been destroyed by the Saracens. The Necropolis of Tarquinii, the most important relic of the ancient city, is on the same hill as the modern city and extends into the neighboring plain. It covers about 16 square miles. The painted tombs, of which some 20 are specially interesting, were known in the 18th century; but it is mainly since 1842 that they have been examined ; valuable new discoveries were made during excavations in 1881-82. Pop. about

7,000. Consult Dennis,

(Cities and Cemeteries of Etruria) (London 1907) ; Dasti, Eotizie di Tarquinia e Corneto^ (Rome 1878) ; and the periodical Notizie degii Scavi (1906-07).

CORNFLOWER, or BLUEBOTTLE

(Centaurea cyanus). A plant of the Compositae family, indigenous to Europe. It develops long slender, branched stems, from 12 to 30 inches high, and with a flower about one and one-half inches in diameter. It is a hardy plant and is popular in American flower gardens. There are many varieties and the color ranges from deep blue to white.

CORNHILL, London, one of the prin¬ cipal streets of the city, once a corn market. In mediaeval times two of its attractions were the Tun, a round house used as a temporary prison, and the Standard, a water conduit and also a point of measurement.

CORNICE (It. «cornice»), LA COR- NICHE, or CORNICE ROAD, a famous highway between France and Italy, skirting the Mediterranean from Nice to Genoa. The word cornice means literally ^shelf,® in allusion to the fact that for miles the road is cut in the face of the cliffs. The modern road was begun by the French and finished by the Sardinian government after the fall of Napoleon.

CORNICE, in architecture, the uppermost of the three parts of an entablature, composed of the projected moldings of the roof. The Egyptian form was a high cavetto or fillet above a round bend. Three styles are known in Greek architecture : The Doric cornice consists of a Doric cyma, the corona projecting considerably, and containing the ends of the roofing boards, a second cyma and an erect bell molding. The Ionic cornice shows a fillet either with dentals or quite plain, above which are a wave molding and the corona, terminating in a slab and erect bell molding. The Corinthian cornice differs from the Ionic in having small consols, com¬ posed of volutes and acanthus leaves. In Gothic architecture the cornices are often elaborately adorned with animals or with human figures. In Romanesque buildings, an arcaded cornice was developed, resting on corbels without arches or moldings. The Renaissance revived the classic type. It is used now as a projection on the top of a wall, which is used to throw off the rain water from the roof.

CORNING, Erastus, American capitalist: b. Norwich, Conn., 14 Dec. 1794; d. Albany, N. Y., 9 April 1872. He became a prominent iron merchant in Albany, N. Y., subsequently engaged in the banking business, and applied much of his time and means to the development of the railroad system of New York State. He effected the consolidation of various roads into the New York Central Railroad, and was its president 12 years ; was State senator 1842-45 ; member of Congress 1857-59 and 1861-63; mem¬ ber of the Peace Congress in 1861, regent of the University of New York in 1833, and vice- chancellor of the board.

CORNING, James Leonard, American physician : b. Stamford, Conn., 26 Aug. 1855. He studied at the universities of Heidelberg and Wurzburg in Germany, and was graduated at the latter. He has an international reputation as an expert neurologist, and as the discoverer of spinal anaesthesia (1885). He was the first

to inject liquid paraffin into the tissues, there to solidify; he also demonstrated that the ac¬ tion of stimulants, sedatives and certain other medicinal substances may be increased if the subject remains in compressed air. As con¬ sulting neurologist he served various New York hospitals and, besides his contributions to the medical press, wrote (Carotid Compression (1882); (Brain Rest) (1883); (Local Anaes- thesia> (1886) ; (Hysteria and Epilepsy } (1888) ; (Treatise on Headache and Neuralgia-* (1888); Eain in Its Neuro-Pathological and Neuro-Therapeutic Relations) (1894); Ex¬ perimental Researches Regarding the State of the Mind in Vertigo } (1895). Under the pseu¬ donym of Roland Champion he wrote a romance entitled (Princess Ahmedee) (1900).

CORNING, Iowa, city and county-seat of Adams Cotyity, 75 miles east of Council Bluffs, on the Burlington Route. It has manufactories of brick and tile and extensive interests in agriculture and

stock-raising. The chief buildings are the public library and the Masonic Temple. The waterworks are the property of the municipality and the government is vested in a mayor and council. The city was incorporated in 1871. Pop. (1920) 1,840.

CORNING, N. Y., city and county-seat of Steuben County. It is situated on the Che¬ mung River, the Erie and the Delaware, Lack¬ awanna and Western railroads. Among the more prominent buildings are the city hall, free academy, public library. Corning Hospital, courthouse, city club and Saint Alary's Orphan Asylum. Corning has extensive manufactures of cut and flint glass, railway supplies, pneu¬ matic drills, air compressors, terra-cotta goods, building and paving brick, lumber, sash and blinds, etc. The United States census of manu¬ factures for 1914 recorded 58 industrial estab¬ lishments of factory grade in the city, employ¬ ing 2,482 persons ; of whom 2,203 were wage earners, receiving annually $1,473,000 in wages. The capital invested aggregated $4,992,000, and the year's output was valued at $3,954,000; of this, $2, 921,000 was the value added by manu¬ facture. Corning was incorporated as a city in 1890. Under the revised charter of 1905 the mayor holds office for two years and the council is elected. The waterworks are owned by the city. Pop. (1920) 15,820.

CORNISH, Charles John, English nat¬ uralist : b. Salcombe House, Devonshire, 28 Sept. 1858; d. 30 Jan. 1906. He was educated at the Charterhouse and Hertford College, Ox¬ ford, and for many years was a regular con¬ tributor to The Spectator and Country Life on natural history and outdoor life. His pub¬ lished books include (The New Forest) (1894) ; (The Isle of Wight) (1895) ; (Life at the Zoo} (1895); (1896) ; Eights with an Old Gunner) (1897) ; (Animals of To-day) (1899) ; (The Naturalist on the

Thames) (1902).

CORNISH LITERATURE. The ancient

language of Cornwall formed with Welsh and Breton the Cymric or southern division of the Celtic Languages (see Celtic Languages; Celtic Literatures) and more closely resem¬ bled the Breton than the Welsh. It was gener¬ ally spoken until the time of Queen Elizabeth.

Its decay dates from the Reformation, and was due to the failure of the Church of England to translate the Book of Common Prayer and the Bible into the language of the province. After 1678 it ceased to be used in public worship. Dolly Pentreath of Mousehole (1676- 1771) is reputed to have been the last person to have spoken it wholly; but words and phrases have come down which are still in use. Its vo¬ cabulary dates probably from the 13th century; and the sacred dramas that survive are not earlier than the 14th century. Consult Norris, (Ancient Cornish Drama) (1859); Stokes, (Mystery of Creation) (1864); (Glossary of Cormac5 (1864); edition of (Life of Saint Meriasek' (1872) ; Jago, (Ancient Language of Cornwall 5 (1882) ; (English-Cornish Dictionary5 (1887) ; Williams, (Lexicon Cornu-Britanni- cutrP (1865) and supplementary to the last named, Loth's (Remarques et corrections5 (1902) ; Jenner,

CORNSTALK, chief of the Shawnee In¬ dians: b. about 1720; d. 1777. He was a man of high abilities and dignity of character. He first appears as heading the Greenbriar massacre of July 1763,ˆ in Pontiac's war; next in a far higher role, as commanding the Indian forces at the bloody and hard-fought battle of Point Pleasant, 10 Oct. 1774, in Dunmore's war. (See Colonial Wars). He had opposed the war, being convinced that it meant ultimately swifter ruin for the Indians; but once embarked, he fought with a skill and resolution that ex¬ cited the admiration of his enemies. After the defeat he was in favor of carrying on the war to the end ; but finding his head men and sub¬ chiefs determined on giving up, he went him¬ self to make the best terms he could. His ora¬ tory was said by the Virginians to equal Patrick Henry's. Early in 1777 he came with his son and two other Indians to the garrison at Point Pleasant, to tell them that, although he wished to keep the peace, his tribe was re¬ solved on war, and if so, he must join them. The party were held as hostages ; but one ot a company of rangers being killed by Indians near by, the rest and their captain rushed to the fort and butchered the four, Cornstalk rising to meet his fate without a word.

CORNUS. See Cornel; Dogwood; Tu¬ pelo.

CORNWALL, Duke of, a hereditary title of the eldest son of the sovereign of Great Britain. Cornwall is a royal duchy, the revenues of which belong to the Prince of Wales for the time being. The title of Prince of Wales is conferred by special creation, that of Duke of Cornwall descends by inheritance. The duke¬ dom of Cornwall was created for the Black Prince in 1337.

CORNWALL, Barry. See Procter, Bryan Waller.

CORNWALL, Henry Bedinger, American chemist: b. Southport, Conn., 29 July 1844; d. 1 April 1917; graduated at Columbia 1864, and from its school of mines 1867, becoming assist¬ ant in the latter 1865-73, save for two years' study at the mining school in Freiberg, Germany. In 1873 he was appointed professor of applied chemistry and mineralogy at Princeton Univer¬ sity, and in 1910 became emeritus professor.

With Caswell, he translated Plattner's ˆManual of Qualitative and Quantitative Analysis with the Blow-pipe5 (1875), and wrote (Manual of Blow-pipe Analysis, with a System of Determi¬ native Mineralogy5 (1882), and many scientific papers that appeared in the special journals of his profession.

CORNWALL, Canada, port of entry, and capital of the three united counties of Stormont, Dundas and Glengarry in Ontario, and is sit¬ uated at the intersection of the main line of the Grand Trunk Railway with the Ottawa and New York Railway. It has admirable shipping facilities, and is 67 miles west of Montreal, 56 miles from Ottawa and 50 miles from the Adirondacks. It has eight churches, Anglican, Roman Catholic, Presbyterian, Methodist, and one Salvation Army barracks. There are three hospitals, six schools, a commercial college and numerous banks and public buildings. It has large textile industries, paper, pulp, flour and planing mills, machine shops and foundries, and manufactories of pottery and agricultural im¬ plements. Building stone is quarried in the neighborhood. The city is in a rich agricultural section and has a large trade. The United States is represented by a consular agent. It has weekly newspapers and is lighted by gas and electricity. Pop. 6,598.

CORNWALL (Lat. Cornu Gallic u, ((horn of Gaul,55 that is, the remotest land inhabited by Celts), England, a maritime country, forming the southwestern extremity of the island. Its form is irregularly triangular. Its area is 1,357 square miles. The northwestern coast-line is broken by a number of shallow bays. The south coast is much more broken, and is marked both by bolder promontories and deeper bays. At Land's End, between these two coasts, ter¬ minate the hills of the Devonian range. The rivers of Cornwall are numerous but short. Among them are the Fowey, the Camel, the Inny, the Attery, the Lynner, etc. The climate, owing to the elevation and exposure of the surface, is very variable. The soil, consisting of decomposed slate, admits of easy drainage, but requires much manure. In many of the more elevated districts much of the land is almost barren. Nearly 70 per cent of the total area is under cultivation, a large amount of grain being grown, and much land being devoted to market¬ gardening for London consumption. Cattle, sheep and horses are reared. The mines of copper and tin, famous for many centuries, and known to the Phoenicians, still constitute the richest treasures of the county, though the value of both has greatly diminished. The chief mining district is in the southwest part of the county. Several mines exceed 350 fathoms in depth. In the once productive Botallack copper mine, situated a few miles north of Land's End, the workings are on the very verge of the cliff, and, descending beneath the sea, are carried far beyond low-water mark. The Dolcoath mine, near Camborne, is the chief tin mine, and there are other important tin mines in the same local¬ ity. The production of copper has greatly de¬ creased in recent times. China-clay is an im¬ portant mineral product. Owing to depression in the mining industry, there has been con¬ siderable emigration to the silver mines of Nevada, and to other mining centres. There are few manufactures, but the fisheries, par-

ticularly of pilchard and mackerel, are valuable. The dukedom of Cornwall is always held by the eldest son of the sovereign, to which valuable estates are attached. At the time of the Roman conquest Cornwall was occupied chiefly by tribes of Cimbri and Damnonii, and became included in

the province of Britannia Prima. After the Romans withdrew the natives regained their independence and retained it till the time of Athelstane, when they were subdued by the Saxons. Their Celtic origin is fully established by the abundance of rude monuments spread over the country, and consisting chiefly of un¬ wrought stones placed erect, singly or in circles, with others laid across. It is divided for par¬ liamentary purposes into six divisions, each returning one member. Pop. 328,098. Consult Boase, (Bibliotheca Cornubiensis) (1874-78).

CORNWALL, or CORNWALL-ON- THE-HUDSON, N. Y., village in Orange County on the west shore of the Hudson River, at the foot of Storm King Mountain, 52 miles north of New York by rail. The beauty of the adjacent scenery and the proximity to New York city, which can be reached in less than two hours by the Erie or the West Shore rail¬ roads, make it a favorite summer resort. A carpet mill gives employment to a fourth part of the inhabitants. Idlewild Park and Storm King Mountain are among the prominent points of interest. It was settled about 1684, became a precinct in 1764, a township in 1778 and was incorporated in 1885. From the original town¬ ship have since been taken Highlands, Bloom¬ ing Grove and Monroe, besides parts of Chester and Hamptonburg. Consult Beach, ˆCornwall (Newburgh 1873) ; Eager, (History of Orange County* (Newburgh 1847). Pop. (1920) 1,755.*

CORNWALL CANAL. See Canadian Canals.

CORNWALLIS, Caroline Frances, Eng¬ lish author: b. Kent, 12 July 1786; d. Lidwells, Kent, 8 Jan. 1858. She acquired a thorough knowledge of Latin and Greek, and making herself conversant with nearly every study which occupies thoughtful men, from an early age, carried on a correspondence with many eminent persons. Her refusal to accept the hand of the Italian historian, Sismondi, did not forfeit his friendship, and she lived much in Italy. Her first work, Philosophical Theories and Philosophical Experience, by a Pariah (1842)., was the first of a series of 20 (Small BooLs on Great Subjects, * the said subjects in¬ cluding the Connection of Physiology and In¬ tellectual Science) ; (Ragged Schools> ; Crim¬ inal Law* ; Creek Philosophy,* and the (His¬ tory and Influence of Christian Opinions.* Twenty-two volumes of this series appeared between 1842-54, all the most important of which were written by herself. She also pub¬ lished in 1847 Pericles, a Tale of Athens,* and her < Letters and Remains* appeared in 1864.*

CORNWALLIS, Charles, 1st Marquis and 2d Earl, English general : b. London, 31 Dec. 1738; d. Ghazipur, Benares, India, 5 Oct. 1805. He was educated at Eton and Cambridge, and entering the army served in 1761 in a campaign of the Seven Years' War as aide-de-camp to the Marquis of Granby. After passing through all the various promotions he obtained the rank of general. He represented the borough of

Eye in Parliament from 1760 until the death of his father in 1762, when he succeeded as Earl Cornwallis. In 1770 he was made governor of the Tower. In Parliament he generally sup¬ ported the ministry, but exercised an inde¬ pendent judgment on several important ques¬ tions. In particular he was opposed to the policy which brought on the American war; but though offered a special leave of absence from the king sailed with his regiment when it was ordered to America in 1776. He served with distinction under Generals Howe and Clinton in the campaigns of 1776-79 in New York and the Southern States, and in 1780 was left in independent command in South Carolina, with 4,000 men. He defeated General Gates at Camden 16 Aug. 1780, and General Greene at Guilford 15 March 1781. He then invaded Virginia, but after moving his forces according to successive and contrary instructions from Sir Henry Clinton, he was besieged in York- town, where he had entrenched himself, and compelled to surrender on 19 Oct. 1781. In 1786 Lord Cornwallis was sent to India with the double appointment of commander-in-chief and governor-general ; and not long after the government of Bengal declared war against the Sultan of Mysore for an attack upon the Rajah of Travancore, the ally of the British. The first campaign was indecisive; but in March 1791, he invaded Mysore, captured Bangalore; and in the year after besieged the city of Seringapatam, and obliged the sultan, Tippoo Sahib, to sue for peace, and surrender a large portion of his dominions. On the conclusion of the war Lord Cornwallis returned to Great Britain, and in 1792 was created marquis, ap¬ pointed master-general of the ordnance, and admitted a member of the privy council. In 1798, at the time of the rebellion, he was ap¬ pointed lord-lieutenant of Ireland, which office he filled until 1801, conducting himself with great firmness and judgment. In the same year he was sent as plenipotentiary to France, where he signed the Peace of Amiens. In 1804 he was again appointed governor-general of India. Consult Marshall,

CORNWALLIS, Edward, English soldier and colonial administrator: b. 1712. He entered the army, and was present at the battles of Fontenoy and Prestonpans. He was the first governor of Nova Scotia, 1749-52, and the founder of Halifax. He sat in the House of Commons for Eye, 1749, and for Westminster, 1753. He was subsequently governor of Gibraltar.

CORNWALLIS, Kinahan, American law¬ yer, editor, novelist, poet: b. London, England, 24 Dec. 1839; d. 15 Aug. 1917. Educated for the ministry of the Church of England, also at Col¬ legiate Institution, Liverpool ; later he studied at the School of Medicine, Liverpool, and Trin¬ ity College, but was then appointed to a British government post in Australia, and resided two years at Melbourne. He then returned to London and published there 10 volumes of his travels, novels and poems; was appointed to a post in British Columbia, resigned his British appointment, and soon afterward went

to Washington as correspondent of the New York Herald with the newly arrived first Japanese Embassy to the United States, on an American warship. Then he went to the British provinces, and met the Prince of Wales on his arrival, and as the Herald's correspond¬ ent accompanied him everywhere till his de¬ parture for England in October. In No¬ vember 1860 he published in New York and London his book of the tour (Royalty in the New World; or The Prince of Wales in America.5 He became Charles Reade's agent in America. Mr. Cornwallis remained on the Herald as financial editor and editorial writer nearly 10 years, and meanwhile bought and edited the old Knickerbocker Magazine. When he left the Herald he also bought and then edited The Albion, a weekly newspaper. In 1880 he established The IV all Street Daily In¬ vestigator, which he thereafter owned and edited for 25 years, at the same time practising law, having been naturalized, and admitted to the New York bar in May 1863. He had published the following books in London prior to 1860: (An Australian Poem — Yarra Yarra5 ; Two Journeys to Japan5 (2 vols.) ; (A Pan¬ orama of the New World5 (2 vols.) ; (The New Eldorado, or British Columbia) ; all the result of travel; also three novels — (Howard Plunkett, or Adrift in Life5 (2 vols.) ; (Wreck and Ruin, or Modern Society> (3 vols.) ; and the (Gittens Family: A Medley.5 In 1861 appeared his 'Pilgrims of Fashion) ; and 'Adrift with a Vengeance) ; and (A Marvellous Coincidence5 followed. Then came two de¬ scriptive poems of one volume each embodying the history of America from the time of the Norsemen to the Civil War; viz., (The Song of America and Columbus5 ; and 'The Conquest of Mexico and Peru,5 to which a third volume was added later — 'The War .for the. Union, or The Duel Between North and South.5 (The History of Constructive Contempt of Court5 while other publications on law and many maga¬ zine and newspaper articles and poems were also published by him here and in British peri¬ odicals. He was the oldest in membership in the Saint George's Society of New York.

CORO, ko'ro, or SANTA ANA DE CORO, Venezuela, town in the state of Fal¬ con, near the Gulf of Coro, an inlet of the Gulf of Maracaibo, two and a fourth miles from the Caribbean Sea, on which is its port, Vela de Coro, about seven miles distant by railway. The trade was once considerable, but has now much fallen off; as is also the town since 1578, when the seat of government was transferred from it to Caracas. Coro contains several churches, interesting for their antiquity, though they either have been rebuilt or lie in ruins. La Vela, its port, has a good harbor and a trade with the Dutch West Indies and is the residence of a United States consular agent. Coro, one of the oldest cities in Venezuela, was settled by Juan de Ampues in 1527 and for a time was the Spanish capital of Venezuela. It was created the first bishopric of Venezuela in 1531, but subsequently the see was removed. It was the objective point of Miranda's first descent upon Venezuela in 1805, when he Jed an abortive expedition against the Spanish in the hope of precipitating the revolution of the Spanish-American colonies. Pop. 9,000.

COROADOS, ko-ro-a'doz, Indians of Brazil, the name being derived from their tonsures, just as the name Botocudo is applied to other aborigines of the same country who wear botogues or labrets. It is an arbitrary collective title for ethnic fragments whose tribal names have been lost. Tribes thus designated are found at the present day in some of the southern states of Brazil, especially in Parana, Rio Grande do Sul, Sao Paulo and Matto Grosso ; but only a few thousands remain in scattered groups, evidently representing differ¬ ent stages in development, though in a general way

the Indians of the upper Parana and upper Paraguay region may be classified as true aborigines, ((the nearest representatives, and probably the direct descendants, of that primitive race whose osseous remains have been found in Lagoa Santa caves and Santa Catarina shell mounds.55 Consult Keane, (Man, Past and Present5 ; Porter, 'Native Races.5

COROLLA, ko-rol'a, the inner whorl of two series of floral envelopes, occurring in the more highly developed plants, the outer being the calyx. In all cases its divisions, which are called petals, alternate with those of the calyx. They are generally colored — that is, they are some other color than green. The corolla is, as a rule, larger than the calyx. When the petals of a corolla are all distinct, they are said to be polypetalous, and this is the normal type. When they cohere continuously by their margins they are called monopetalous, or, better, gamo- petalous, meaning that the petals are joined. The petals of a corolla are really only modifica¬ tions of leaves. The corolla merely assists reproduction by shading the productive organs from injury, and, in some cases, by secreting honey attracts bees and other insects to aid in their fertilization.

COROLLARY (Lat. ((crown,55 or "gar- land,55 and in a derived sense "gift55 ; hence something given or granted), in logic, a proposi¬ tion the truth of which appears so clearly from the proof of another as not to require separate demonstration.

COROMANDEL COAST, the east coast of the Indian Peninsula, between Calimere Point and the mouths of the Kistna. It is open, sandy and has no secure harbors ; the surf, continually beating on it, renders landing diffi¬ cult, often dangerous, and it is commonly ac¬ complished in native boats of a peculiar con¬ struction. A violent monsoon accompanied by hurricanes blows from the middle of October well into April.

CORON, ko-ron', Philippines. See Penon de Coron.

CORONA, Cal., city in Riverside County, 50 miles southeast of Los Angeles, on the Santa Fe and the Pacific Electric railroads. It contains a city hall, high school, Carnegie library, the Woman's Improvement Club and a fine circular boulevard. It has extensive interests in citrus fruits, alfalfa milling, clay products and crushed stone. Great quantities of citrus fruits are shipped from Corona. Pop. (1920) 4,129.

CORONA. The crown of victory, termed corona, of the ancient Greeks and Romans, was what we, in this day, term a wreath. These coronas come under the following classes : Those

dedicated to the victors in peaceful contests and those voted for military achievement.

The crown or garland of the victor in the Olympian and the Pythian games was of laurel, that of the winner in the Nemean contests con¬ sisted of oak leaves, that of the Isthmian games was made from the pine tree.

The Roman coronas were mostly military and termed ˆtriumphal.® The most important were : Celestial crown, similar to the Eastern crown (see below), but having each ray sur¬

i. Celestial Crown. 2. Corona Radiata — Antique or Eastern Crown. 3. Naval Crown (British). 4. Corona Vallaris. 5. Corona Muralis. 6. Corona Triumphalis. 7. Corona Laurea. 8. Corona Graminea or Obsidianalis. 9. Corona Myrtea Ovalis. io. Corona Civica.

mounted by a small star. Civic crown (corona civica), composed of acorns and oak leaves, given as reward for saving a citizen's life in battle. Eastern crown, often termed antique crown (corona radiata, usually carries, above the gold circle, eight rays), is the Roman crown of apotheosis, but Great Britain has used it to honor successful statesmen in India and her Eastern dependencies, hence the term Eastern. Laurel crown (corona laurea), originally a

martial crown, became a wreath of honor and distinction on civic occasions, and was composed of laurel leaves on their stem. Myrtle crown (corona myrtea), composed of myrtle leaves (myrtle was

dedicated to Venus), was awarded to conquerors and used in wedding ceremonies, also placed upon the heads of the dead. Mural crown (corona muralis) was a circle of gold surmounted by pinnacles or battlements given for great prowess in scaling a wall and attack¬ ing the town within. Naval crown (corona navalis or rostrata) was a circle of gold sur¬ mounted by prows (rostra) of boats awarded to victorious sea warriors (the British nation also uses a naval crown composed of a gold rim surmounted by four ships' sterns and four sails alternating). Obsidianal crown (corona ob¬ sidianalis or graminea) , composed of herbs or grass, awarded to a general who delivered a town from a state of siege. Olive crown (corona oleagina), composed of olive leaves, was a crown of martial victory, the olive tree being dedicated to Minerva. Triumphal crown (corona triumphalis) , composed of single laurel leaves closely compact. Vailary crown (corona vallaris or castrensis), composed of a circle surmounted by palisadoes, was the honor con¬ ferred on the first warrior to pass the enemy trenched wall (vallum) or fence and enter the foe's camp or fortress (castrum) .

Among the ancient religious ceremonial crowns were the coronce funebres or sepulchres, funeral chaplets of leaves and flowers ; the corona convivialis, worn at banquets, etc., and the corona natalis, suspended over the door where a birth had taken place (at Athens olive for a boy, wool for a girl). The nuptial crown (corona nuptialis) was composed of flowers (verbena preferred) plucked by the bride herself. See Crowns and Coronets.

Clement Webber Coumbe.

CORONA (a crown), in astronomy, a halo or luminous circle round one of the heavenly bodies ; specifically the portion of the aureola observed during total eclipses of the sun, which lies outside the chromosphere or region of colored prominences. (See Halo). In botany the corona is an appendage of the corolla in some flowers, coming as it were between the corolla and the stamens, well seen in the cup of the daffodil. In architecture it is the lower member of the projecting part of a cornice.

CORONA AUSTRALIS (the southern crown), one of Ptolemy's southern constella¬ tions, containing 49 naked-eye stars, varying from the third to the seventh magnitude.

CORONA BOREALIS (the northern crown), one of Ptolemy's northern constella¬ tions, situated near Hercules, and containing about 30 stars visible with the naked eye ; a, known as Gemma, is of the second magni¬ tude, the chief of a curved row of seven stars of the third, fourth and fifth magnitudes. In 1866 a new star of the second magnitude ap¬ peared in the constellation, but soon after be¬ came invisible save with a glass.

CORONACH. See Coranach.

CORONADO, ko-ro-na'do, Francisco Vas- quez de, Spanish explorer: b. Salamanca, Spain, about 1500; d. Mexico after 1542. He came to the New World about 1535, and by marrying the daughter of Estrada, the royal

treasurer for New Spain, was appointed gov¬ ernor of the province of New Galicia. On the arrival in Culiacan of Alvar Nunez, Cabega de Vaca, from his extraordinary journey from Florida in the year 1536, when he brought news of the existence of half-civilized tribes far to the north, living in populous cities, acquainted with the arts, and possessing quantities of gold, silver and precious stones, an expedition was sent out under Marco de Niza, in 1539, to ex¬ plore the regions referred to. The result tended to strengthen the belief in the existence of great wealth among the nations far to the north, and a second expedition was fitted out under Coro¬ nado, which departed from Culiacan, on the Pacific Coast, in April 1540. He passed up the entire length of what is now the Mexican state of Sonora to the river Gila. Crossing this he penetrated the country beyond, to the Little Colorado (called by him Rio del Lino), and paid a visit to the famed cities of Cibola men¬ tioned by Cabega de Vaca and De Niza. In the kingdom were seven cities, but he declares that there was no truth in the reports of his predecessors regarding their wealth. "All was quite the contrary, 0) he adds, "saving only the names of the cities and great houses of stoned From Cibola, Coronado traveled eastward, visit¬ ing several towns occupied by a similar people to those he had met, which are recognized in the existing villages of the present Pueblo In¬ dians. He proceeded eastward to what he

calls the (

CORONATION, the ceremonial rite of placing a crown on the head of a monarch as a symbol of his assumption of rule. The prac¬ tice is one of great antiquity and in most coun¬ tries has been followed in some form or other. Accompanying the crowning has been the an¬ ointing with oil, a custom that was followed in the dedication of the Hebrew kings, and is significant of consecration to the will of God. In England before the Norman Conquest the term employed was more "hallowing® than "coronation.® Egferth, Prince of Mercia, was "hallowed king® by Offa, his father, in 785; and the essential form of words employed has. been altered little in the 12 centuries that have inter¬

vened; but various.parts of the service employed in later times have been shortened and some omitted altogether. Thus the ceremonial, in the earlier days of the English monarchy performed at Kingston-on-Thames or Winchester, is in essentials the same as that now performed at Westminster. The recognition of the king as rightful lord is followed by a sermon, the anointing, the presentation of the ring as the symbol of kingly dignity and of the sceptre as the symbol of kingly power, the crowning, the presentation of the Bible, the enthronization, the homage. The service is one in which the religion of the nation is asserted; the covenant is one between God, the king and his people. In addition to anointing, the kings prior to the Reformation were signed on the head with chrism or sacred oil; and touching for the kings evil or scrofula was practised until the accession of the House of Hanover in 1714.

The ancient Scottish coronation stone — the Stone of Destiny — forms part of the corona¬ tion chair at Westminster. It was brought from Scone, where the Scottish kings were crowned, by Edward I in 1296. It is traditionally be¬ lieved to have been the stone which Jacob used for a pillow, to have been brought to Ireland and from Tara, the site of the Irish coronations, to Scone; but the unimaginative Skene says that from its geological composition it must have been quarried from rocks near Scone.

There have been variations in the oath taken from time to time. The declaration which was introduced in 1678 under the excitement pro¬ duced by the so-called Popish Plot continued almost unabated down to the time of the last coronation, that of George V, 22 June 1911. That oath, aimed at securing a Protestant sov¬ ereign and the safeguarding of the Protestant Succession, expressly repudiated two cherished

doctrines of the Roman Catholic Church — in¬ vocation of the Virgin Mary and the saints and transubstantiation. Subscription to this oath was given as the reason by George III and George IV why they would not consent to Catholic emancipation. King Edward VII wished to be relieved from that part of the oath which was offensive to his Catholic sub¬ jects; but an attempt at emendation before his coronation fell through. The subject was again brought up before the crowning of George V, and by the Accession Oath Act of 1910 the objectionable phrases were withdrawn, and the king simply pledges himself as,a "faithful mem¬ ber of the Protestant Reformed Church of England,® to secure the Protestant succession "according to law.®

In honor of Charlemagne, the emperors of Germany were always crowned at Aix-la- Chapelle, in the church which he founded. Thirty emperors were crowned there, and until 1793 the regalia and robes were preserved there. The kings of France were crowned at Rheims and their queen consorts at the church of Saint Denys, near Paris; those of Spain, at Toledo or Madrid; of Poland, at Guezna; of Hungary, at Pressburg; of Scotland, at Scone; and the native kings of Ireland, at Tara. The recent kings of Denmark have been crowned at Fredericksburg; those of Sweden at Upsala, and the emperors of Russia, at the Kremlin, Mos¬ cow. Consult Johnston, W. F., 'The Corona¬ tion of a King; or, Ceremonies, Pageants and Chronicles of the Coronations of All Ages)

(London 1902) ; and Perkins, Jocelyn, 'The Coronation Book; or, the Hallowing of the Sovereigns of England' (London 1911).

CORONATION CHAIR, the ancient throne in Westminster Abbey used at the coro¬ nation of English kings since Edward I. Be¬ neath the seat is the Lia Fail, or Stone of Destiny, on which Scotland's kings were crowned. The stone is said to have been used by Jacob as a pillow, and to have been in Tara, the residence of the high kings of Ireland, after the 5th century b.c. It was brought to Scotland many centuries later and thence to England by Edward I. Celtic tradition has it that political supremacy goes to the people in whose territory the stone rests.

CORONATION GULF, an inlet on the northern coast of British America into which empty the waters of the Coppermine River. It is north of the Arctic circle and included be¬ tween long. 107° and 116°

W. Bathurst Inlet is an extension toward the southeast. It is con¬ nected with other Arctic channels by Dease Strait on the northeast and Dolphin and Union Strait on the northwest. It is studded with islands.

COR'ONEA, kor-6-ne'a, a small town of Boeotia (q.v.), southwest of Lake Copias, where in 447 b.c. the Boeotians defeated the Athenians and became the leading state of Greece; and in 394 Agesilaus defeated the allied Greeks. The town is now in ruins.

CORONEL, Chile, a .port in the province of Concepcion, on the Araucobai River, import¬ ant on account of its coal mines. The customs receipts average about 700,000 pesos per annum. It is a coaling station. Pop. 5,258.

CORONEL, Battle of. A naval engage¬ ment fought 1 Nov. 1914 off the coast of Chile between a British squadron under Rear- Adrn. Sir Christopher Cradock (q.v.) and the German Pacific squadron commanded by Ad¬ miral von Spee. Cradock's four vessels — two armored cruisers, one light cruiser and an armed liner — were no match in regard to speed and range for the German squadron of five vessels. The Good Hope, Monmouth and Otranto were sunk; only the light cruiser Glas¬ gow escaped. Admiral Cradock went down with 1,650 officers and men. On 8 Dec. 1914 four vessels of von Spee's squadron were de¬ stroyed by the British off the Falkland Islands, and the fifth, the Dresden, was sunk off Juan Fernandez on 14 March 1915. See War, Euro¬ pean — Naval Operations.

CORONER, a functionary whose name coroner, or crowner, implies that he has prin¬ cipally to do with pleas of the Crowm or in which at least the Crown is concerned. His office is very ancient, mention being made of it in 925 a.d. His office in England was peculiarly

a county institution. In Alfred's time lie was appointed by the king, but since Edward I's time the office has been elective. His duties originally had to do with inquiries into fires and cases of wreckage and of sudden death, but now his court is a court of record in which, after sight of the body of one who has died in prison, or so suddenly that suspicions of violence may be excited, a jury summoned for the purpose pronounce a decision as to the cause of death. The proceedings under the auspices of the cor¬ oner prepare the way for a criminal prosecu¬ tion. He also officiates as a sheriff's substitute when the sheriff himself is interested in a suit and cannot therefore act in it himself. In the United States the coroner is an elective county officer. His duties are similar to those of a coroner in England. Generally he

has no right to inquire into the cause or origin of a fire ex¬ cept when death has resulted from it, but by statute in some States he has the power and duty to investigate the causes and origins of fires which appear to be of incendiary origin. Consult c Encyclopedia of the Laws of England ' (Vol. Ill, London 1897) ; Binmore, (Instruc¬ tions for Sheriffs, Coroners and Constables' (2d ed., Chicago 1894) ; Smith; B. D., (Powers, etc., of Coroners' (2d ed., Albany 1897) ; Jarvis, (Office and Duties of Coroners with Forms and Precedents' (5th ed., London 1888) ; Boys, treatise on Coroners' (Toronto 1893).

CORONETS. See Crowns and Coronets.

CORONIS, (1) in Greek mythology, the daughter of King Phoroneus, whom Neptune loved, and who was changed into a crow by Athena whom she had begged for protection from Poseidon; (2) the daughter of Phelegyas and the mother of Asclepius.

CORONIUM, a hypothetical chemical ele¬ ment, supposed (by some astronomers) to exist in the sun. The evidence in favor of its exist¬ ence consists in certain bright lines that are seen in the spectrum of the solar corona at the time of a total eclipse, and which are not known to be due to any recognized terrestrial element. On account of the great height above the sun's surface to which the matter that gives these lines extends, coronium has been assumed to be far lighter than hydrogen, which is the lightest known terrestrial element. Certain French and Italian scientists have reported the discovery of coronium in terrestrial volcanic gases ; but their results need confirmation, and the existence of the supposed element, even in the solar atmosphere, has not yet been demon¬ strated. A line not very remote from the coro¬ nium line has been found in the spectrum of the aurora, so that certain scientists suppose that the upper layers of the earth's atmosphere contain a new element, geocoronium, much lighter than hydrogen.

I'

l !

.

.

\

^-7

■ ′ *j*

■

.

, ■

,

■

<

‘

.

c:

, ■

,

■

<

‘

.

c:

d

I \

1

§ I

I

%

A

I

I

THE

AMERICANA

JT

I&ˆor

URIVEESAL

JQoWEDGEj

In Thirty Volumes

1922

CORPORATION

NEW YORK CHICAGO

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY ALBANY NEW YORK

JAN 1 8 1922

©RU65431?

/

PARTIAL LIST OF CONTRIBUTORS TO VOLUME VIII

ALLEN, EDWARD E., M.D.

Director of Perkins Institution and Massachusetts School for the Blind

. DEAF-BLIND, THE

BARNES, HARRY E., Ph.D.

Professor of History, Clark University

DEMOCRACY, HISTORY OF

BEVAN, WILSON LLOYD, Ph.D.

Editor, “The Churchman,” New York City.

DE CIVITATE DEI

BOGART, ERNEST L., Ph.D.

Professor of Economics, University of Illinois

DEBTS, PUBLIC

BOTHNE, GISLE, A.B.

Head of the Department of Scandinavian Languages and Literature, University of Minnesota

DANISH LANGUAGE DANISH LITERATURE

BRADY, CYRUS TOWNSEND, LL.D.*

Author of “ Stephen Decatur,” “ American Fights and Fighters,” *etc.*

DECATUR, STEPHEN

BRAUN, WILLIAM A.

DAUTHENDEY, MAX

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

DeQUINCEY, THOMAS

BROOKE, TUCKER, M.A., Litt.B.

Assistant Professor of English., Yale University

CYMBELINE

BRYAN, WILLIAM JENNINGS, LL.D.

Formerly Secretary of State of the United States

DEMOCRATIC PARTY, THE

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

CUBA, AMERICAN DIPLOMATIC RELATIONS WITH

CARMAN, E. A.*

General, U. S. Army

CUMBERLAND GAP *

DALLAS, GA., BATTLE LINES AT DALTON, GA., MILITARY OPERATIONS DEEP BOTTOM, VA., BATTLES AT

CARRINGTON, CAMPBELL

Lawyer, New York City

COURT

CHAMBERLAIN, CHARLES JOSEPH, Ph.D.

Professor of Cytology and Morphology, University of Chicago

CYTOLOGY

CHANDLER, FRANK W., Ph.D.

0

Professor of English and _ Comparative Literature, University of Cincinnati

COUNT OF MONTE CRISTO, THE

COCHRANE, CHARLES H.

Author of “ Modem Industrial Progress ”

COTTON MACHINERY

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

DARIO RUBEN

COUMBE, CLEMENT W.

Technical Art Expert

COSTUME, ECCLESIASTICAL CROSSES AND CRUCIFIXES CROWNS AND CORONETS DAGGERS

DECORATIVE ARTS, MINOR DELFT FAIENCE DERBY PORCELAIN

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell Univer¬ sity

DEDUCTION DESCARTES, RENE

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

DAVID COPPERFIELD

CUTLER, FRANCES W., M.A.

Instructor in English, Vassar College

COTTER'S SATURDAY NIGHT

DARTON, NELSON H.

United States Geological Survey

CRATER MOUND, ARIZONA

DEARBORN, GEORGE VAN NESS, M.D., Ph.D.

Medical Corps, United States Army

DENTISTRY, PUBLIC

DE FOREST, LEE, S.B., Ph.D.

Vice-President De Forest Radio Telephone and Telegraph Co., New York

DE FOREST WIRELESS TELEGRAPH SYSTEM, THE

DELAND, THORNDIKE

Secretary of the Denver Chamber of Commerce

DENVER, COLORADO

* Deceased. V

Contributors to Volume VIII — Continued

DODD, WILLIAM E., Ph.D.

Professor of History, University of Chicago

DAVIS, JEFFERSON

DOLE, NATHAN HASKELL, A.B.

Editor of Tolstoi's Collected Works

CRIME AND PUNISHMENT DEAD SOULS DECAMERON, THE

DUNN, WALDO H., Litt.D.

Professor of English Languages and Literature, The College of Wooster

DeQUINCEY'S autobiographic SKETCHES

ELLWOOD, CHARLES A., Ph.D.

Professor of Sociology, University of Missouri

DEMOCRACY, THE NATURE OF

FAIRLIE, JOHN A., Ph.D.

Professor of Political Science, University of Illinois

COUNTY GOVERNMENT IN THE UNITED STATES

GAUSS, CHRISTIAN, Litt.D.

Professor of Modem Languages, Princeton Uni¬ versity

DAWN, THE

GILBERT, JESSE B.

Associate Secretary of the Greater Dayton Asso¬ ciation

DAYTON, OHIO

GRIFFIS, WILLIAM ELLIOT, D.D., L.H.D.

Author of " The Mikado's Empire," " China's Story," *etc.*

DELFSHAVEN

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

DEATH'S JEST BOOK

HAMLIN, ALFRED D. F., A.M., L.H.D.

Professor of the History of Architecture, Columbia University

DECORATIVE ART

HAUHART, WILLIAM F., Ph.D.

Assistant Professor of German, University of Michi¬ gan

DEHMEL, RICHARD

INGERSOLL, ERNEST

Naturalist and Author

CROSS-FERTILIZATION IN ANIMALS AND MAN

CRUSTACEA DEEP SEA LIFE

ISAACS, ABRAM S., Ph.D.

Professor of Semitic Languages, New York Uni¬ versity

CYRILLIC ALPHABET DAVID DECALOGUE

* Deceased.

ISAACS, EDITH J. R.

DAISY MILLER

DAS KATCHEN VON HEILBRONN DEBIT AND CREDIT

ISAACS, LEWIS M., Ph.B., LL.D.

Musical Critic and Composer

DAUGHTER OF THE REGIMENT, THE

JELLIFFE, SMITH ELY, M.D., Ph.D.

Adjunct Professor of Diseases of Mind and Nervous System, PostGraduate Hospital and Medical School; Professor of Psychiatry, Fordham Uni¬ versity, New York

CROUP

DEMENTIA PRECOX

KLEIN, HENRI F.

Editorial Staff of The Americana

DAYLIGHT SAVING

LEONARD, GARDNER COTRELL*

Director of Intercollegiate Bureau of Academic Costume

COSTUME, ACADEMIC

MACLAY, JAMES, Ph.D.

Professor of Mathematics, Columbia University

CURVES OF DOUBLE CURVATURE

McCRAE, NELSON GLENN, Ph.D.

Anthon Professor of Latin Language and Literature, Columbia University

DE RERUM NATURA

McDonnell, John b.

Editorial Staff of The Americana

CURIA ROMANA DENMARK

MAXWELL, GRANT S.

Secretary of Dallas Chamber of Commerce and Manufacturers' Association

DALLAS, TEXAS

MOSES, ALFRED J., Ph.D.

Professor of Mineralogy, Columbia University

CRYSTALLOGRAPHY

PARMELEE, MAURICE, A.B., Ph.D.

Author of “ The Science of Human Behavior,’ “ Criminology,” *etc.*

CRIMINOLOGY

PFEIL, STEPHEN *

Late editor Philadelphia ** Press”

COUNSELLOR AT LAW CRIMINAL LAW

PEARSON, RAYMOND A., LL.D.

President of Iowa State College and Assistant Sec¬ retary, United States Department of Agriculture. Assisted by M. Mortensen, Professor of Dairy Industry, Iowa State College, and E. B. Reid, Chief of Division of Publications, United States Department of Agriculture

DAIRY INDUSTRY, AMERICAN

Contributors to Volume VIII — Concluded

PETROVITCH, W. M., Ph.D.

Chief Slavonic Division, New York Public Library

CROATIA-SLAVONIA

DALMATIA

PRINZ, HERMANN, D.D.S., M.D.

Professor of Materia Medica and Therapeutics, School of Dentistry, University of Pennsylvania

DENTISTRY

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers Insurance Company, Hartford, Conn.

CRITICAL POINT

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Author of “ Austria-Hungary and the Polyglot Empire,” *etc.*

CZECH LITERATURE

SCHMIDT, NATHANIEL, A.M.

Professor of Semitic Languages and Literatures, Cornell University

DANIEL

DANIEL, BOOK OF

SCOTT, CHARLOTTE ANGAS, D.Sc.

Professor of Mathematics, Bryn Mawr College

CURVES, HIGHER PLANE

SCOTT, WILLIAM AMASA, Ph.D., LL.D.

Director of School of Commerce, University of Wis¬ consin

CURRENCY

SHUMWAY, DANIEL B., Ph.D.

Professor of German Philology, University of Penn¬ sylvania

DER ARME HEINRICH

STOCKING, WILLIAM A., M.S.A.

Professor of Dairy Bacteriology, New York State College of Agriculture

DAIRY PRODUCTS

TOWNSEND, CHARLES HASKINS, Sc.D.

Director New York Aquarium; formerly in charge of the Deep-Sea Investigations on the U. S. S. “ Albatross ”

DEEP-SEA EXPLORATION

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Uni¬ versity

COWPER, WILLIAM DEFOE, DANIEL

TURNER, WLLIAM LAIRD

Teacher of Jacquard Designing, Philadelphia Textile School

DAMASK

VAN DOREN, CARL, Ph.D.

Associate Professor of English, Columbia University

DEERSLAYER, THE

VEAZIE, WALTER, Ph.D.

Department of Philosophy, Columbia University

CRITIQUE OF PURE REASON

WALSH, JAMES J., Ph.D., M.D., LL.D., Litt.D., Sc.D.

Author of “ The Thirteenth the Greatest of Cen¬ turies,” *etc.*

CRUvSADES, THE

WATKINS, JAMES L.

Cotton Statistician, New York City

COTTON CULTIVATION IN THE UNITED STATES

COTTON CULTIVATION IN OTHER COUNTRIES

COTTON MANUFACTURES IN THE UNITED STATES

COTTONSEED OIL INDUSTRY

WEBBER, HERBERT JOHN, B.S., M.A., Ph.D.

CROSS FERTILIZATION IN PLANTS

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature,” *etc.*

CYRANO DE BERGERAC

DEMI-MONDE

DER GRUNE HEINRICH

WIELAND, G. R., Ph.D.

Paleontologist, Yale University

CYCADALES

CYCADOPHYTA

WILCOX, MARRION, A.M., LL.B.

Co-editor “ Encyclopedia of Latin America ”

CUBA

DABAIBA

DEMARCATION, LINE OF

WILGUS, HORACE L,, B.S., M.S.

Professor of Law, University of Michigan

CORPORATIONS, HISTORY OF CORPORATIONS, LEGAL CHARACTER¬ ISTICS OF

WOLFF, SAMUEL LEE, Ph.D.

Instructor in English, Columbia University

DAPHNIS AND CHLOE

WRIGHT, HERBERT F., Ph.D.

Division of International Law, Carnegie Endow¬ ment for International Peace

DELAET, JOHAN

WRIGHT, JOHN DUTTON, M.A.

Author of “ Educational Needs of the Deaf ”

DEAF, THE

WRIGHT, WILLIAM E.

Editor, Middletown, Del., “ Transcript ”

DELAWARE

* Deceased.

KEY TO PRONUNCIATION.

a far, father

a fate, hate

a or a at, fat a air, care

a ado, sofa

a all, fall

ch choose, church

e eel, we

h Span, h, as in canon (can’yon),

pihon (pen’yon)

ng mingle, singing

nk bank, ink

6 no, open

o or 6 not, on 6 corn, nor

6 atom, symbol

e or e bed, end

book, look

her, over: also Fr. e , as in de; eu, as in neuf ; and ocu, as in boeuf, coeur; Ger. o (or oe), as in okonomie.

oi

oil, soil ; also Ger. eu, as in beutel

6 or oo fool, rule

e befall, elope

e agent, trident

ff off, trough

g gas, get

gw anguish, guava

h hat, hot

h or h Ger. ch, as in nicht , wacht hw what

I file, ice

i or i him, it

i between e and i, mostly in

Oriental final syllables, as, Ferid-ud-din

j gem, genius

kw quaint, quite

n Fr. nasal m or n, as in embon¬

point, Jean, temps

ou or ow allow, bowsprit s satisfy, sauce

sh show, sure

th thick, thin

fh father, thither

u mute, use

u or u but, us u pull, put

ii between u and e, as in Fr. sur,

Ger. Miiller

v of, very

y (consonantal) yes, young

z pleasant, rose

zh azure, pleasure

‘(prime), ” (secondary) accents, to indicate syllabic stress

COROT, ko-ro, Jean-Baptiste-Camille,

French landscape painter: b. Paris, 28 July 1796; d. there, 22 Feb. 1875. Against the wishes of his family he studied art, first under Michallon, next under Victor Bertin, and then passed a year or two in Italy. In 1827 he first exhibited in the Salon, but it was not till nearly 20 years afterward that his genius in landscape painting was generally recognized. The last 25 years of his life were spent in affluent circum¬ stances (his professional income being im¬ mense, and his father’s death having brought him a large fortune) and in the happiness en¬ gendered by success. In 1867 he was made an officer of the Legion of Honor. Skilful as a figure-painter, it was in landscape that Corot excelled. He was a diligent student of nature, whose aspect he idealized on canvas with no profusion of color, but in sober tints of brown, pale-green and silver-grays. He was pre-emi¬ nently successful in painting scenes in the faint lights of dawn and twilight, behind a trans¬ parent veil of mist, the early rays glinting through dense foliage, mirrored in sparkling water. There is a sameness in Corot’s work which forbids him the very highest rank, but within his own province he was inimitable. Among his works may be mentioned (Danse des nymphes) (1851) ; Martyrdom of Saint Se¬ bastian (1853) ;

(Morning) (1855) ; (Evening) (1855); <Sunset) (1857); <Orpheus> (1861); <Rest) (1861); (Solitude) (1866); landscape with Figures) (1870) ; Pleasures of Evening) (1875); and (Danse des amours.* The Bos¬ ton Art Museum contains his (Dante and VirgiP ; the Metropolitan Museum in New York his (Ville d'Avray,* and there are various other works by him in public and private Amer¬ ican galleries. Consult Blanc, (Les artistes de mon temps) (1879); Bigot, Ch., (Peintres frangais contemporains ; Corot) (Paris 1888); Claretie, Jules, cPeintres et sculpteurs contem¬ porains: Corot) (ib. 1884); Moore, Geo., Hngres and Corot in Modern Painting) (Lon¬ don 1893) ; Geoffroy, A., (Corot and Millet* (New York 1903) ; Gensel, (Corot and Troyon) (Bielefeld 1906) ; Meynell, (Corot and his Friends* (New York 1910) ; Rousseau, Ca¬ mille Corot) (ib. 1884) ; Robaut, Alfred, (L'oeuvre de Corot, catalogue raisonne et illustre precede de l'histoire de Corot et de ses ceuvres) (Paris 1905) ; Roger-Miles, (Les artistes celebres* (ib. 1891) ; Thomson, D. C., (Life of Corot) (London 1892) ; Stranahan, (History of French Painting) (1899) ; Muther, (History of Modern Painting) (London 1907) ;

Van Dyke, 'Modern French Masters) (New York 1896).

COROZAL, Porto Rico, a municipal dis¬ trict of the department of Bayamon about 16 miles (direct) southwest of San Juan. It was much damaged by a hurricane in 1899. Pop.

11,508.

COROZO-NUT. See Vegetable Ivory.

CORPORAL, in the army, a non-commis¬ sioned officer with rank under that of a ser¬ geant. He has charge of small bodies of men, places and relieves sentinels, *etc.* In the British army there are also soldiers distinguished by the designation of lance-corporal, who are pri¬ vates acting as corporals but receiving only privates' pay. In the British household cavalry the sergeants are called corporals of horse and the sergeants-major, corporals major. This is a survival of the organization of the 16th and 17th century cavalry. In the United States army a corporal is the lowest non-commis¬ sioned officer. His especial duty is to place and relieve sentinels. The corporal wears two chevrons on his sleeve as a mark of his rank, the lance-corporal one only. A ship's corporal is an officer who has the charge of setting and

relieving the watches and sentries and in gen¬ eral assists the master of arms.

CORPORAL, the linen cloth laid on the altar, on which the sacred vessels are set during the consecration of the elements of bread and wine in the Mass or Holy Communion. It is to be distinguished from the veil, which is used to cover the chalice and paten, and the palla or pall (q.v.). Both corporal and palla must be blessed and when not in use are carried in the burse, a square pocket of cardboard covered with silk; none except those in holy orders being allowed to touch them when they are in use.

CORPORAL, The Little. A term of affection applied to Napoleon Bonaparte by the soldiers of his Grande Armee, who always remembered that he began his career as a sons-lieutenant in Corsica.

CORPORAL PUNISHMENT, punish¬ ment applied to the body of the offender. In its connection with civil government it technically includes flogging, imprisonment and the death penalty, but in common parlance its meaning is more restricted and refers only to flogging or whipping of the body. Various extreme and cruel methods of punishment once in vogue have been discontinued in Christian nations, but

are still practised in Oriental countries and among uncivilized races. The practice is sup¬ ported by the argument that whipping which produces stinging but transient pain, without mangling the body and without such public dis¬ grace as to destroy the sense of shame, is an effi¬ cient corrective for those cruel or brutal or intractable offenders, such as wife-and child-beaters and <(white slavers,® who are insensible to the punishment of confinement or other ordinary penalties. Corporal punishment at the hands of public officers as a punishment for crime is usually inflicted by flogging in prison or at the public whipping post. It still survives in Eng¬ land and in some American States as a means of discipline of convicts confined in prisons. Corporal punishment was once considered indis¬ pensable in

school discipline and was very severe in form in the schools of Europe before the advent of the Innovators (q.v.). Since that period its moral and even its immediate prac¬ tical benefits have been increasingly questioned, and its practice has gradually lessened. Ameri¬ can schools have gone farther in this respect than those of Europe. This form of punish¬ ment is forbidden by the school law of New Jersey, and to a greater or less degree is re¬ stricted in many municipalities of the other States. See Bastinado; Cang; Flogging; Torture.

Bibliography. — Mann, (School Punish¬ ment ; Painter, ‘History of Education> ; Rein, (Outlines of Pedagogics) ; White, ‘School Management ; Wines, F. H., Punishment and Reformation* (New York 1910) ; Saleilles, individualization of Punishment (translated from the second French edition by R. S. Jastrow, Boston 1911) ; Ives, (History of Penal Methods* (New York 1914).

CORPORAL TRIM, a servant of Uncle Toby in Sterne’s (Tristram Shandyt He is an old soldier and performs his duties in strictest military fashion.

CORPORATE EXISTENCE, Tests of.

See Corporations, Legal.

CORPORATE FUNDS. See Corpora¬ tions, Legal.

CORPORATE LIABILITIES. See Cor¬ porations, Legal.

CORPORATE RIGHTS. See Corpora¬ tions, Legal.

CORPORATION NUMBERS. See Cor¬ porations, Legal.

CORPORATION SCHOOLS. See

Schools — Corporation, and National Asso¬ ciation of Corporation Schools, The.

CORPORATIONS, History of.— The

origin of corporations is lost in antiquity. The word “corporation® comes from Latin corporo, from a Sanskrit root signifying <(to form into a body.® <(This masterpiece of juristic ingenuity is usually attributed to the Romans.® Yet they are said to have existed in Greece (594 b.c.), in Phoenicia (900 b.c.) and possibly in Babylonia (2200 b.c.) .

A recent definition is : A corporation is “an association of persons to whom the sov¬ ereign has offered a franchise to become an artificial juridical person with a name of its own under which they can act and contract, sue and be sued, and who have accepted the

offer and effected an organization in substantial conformity with its terms.® The prominent ideas are : association , franchise and person, — so related that the association <(is converted by the franchise® into a new person, characterized by unity and continuity. ((Groups® of persons or things are as old as human history. Wolf-pack, deer-herd, bee-swarm, must have been among the most vivid of man’s pre-human ex¬ periences. Hunting-pack, totem-group, family-group, war-host were the earliest and most important of human experiences. <(Man did not make society. Society made man.® The primitive fundamental personal conception is ((our® or “we,® in which ((my® and “I® are included but not distinguished. The <(group® is the <(entity,® which includes the individual, as a part of “it.® The family was a permanent body, with perpetual succession, including both the living and the dead, forming one individual¬ ity, distinct from its members. Radin says this is the datum to begin with, and its corporate character was “much more clearly apprehended than the conception of detached individuals.® Primitive society was organized along three lines: (1) Kinship, natural, involuntary, as tribe, clan, family; (2) Totemistic-, artificial, as phratry, age-grade, *etc.* ; (3) Ceremonial, quasi¬ voluntary, conventional, as secret societies, *etc.* All these were continuous units with distinctive names, usually with religious significance. In Solon’s times (c. 594 b.c.) there were (< demos ,® <(phratries,® “orgeones,® (<gens® and <(clans.® So, too, as early as the 8th century b.c., there were many “clanless® people, who were organ¬ ized for Dionysos worship, on the model of the existing corporate bodies, such as clan, phratry, *etc.* The Greek terms were ((thiasos® — band of initiated religious followers; <(orgeones®

— a fraternity of worshippers and celebrants; “eranos,® — a festal band of collecta; (<koinon®

— things had in common ; and “synods® — a meeting together. The first three were used disjunctively and last two collectively, but inter¬ changeably. In Latin, collegium, a group of colleagues, is the oldest term ; corpus, a whole composed of parts, is next in frequency of use, and interchangeable with collegium. Sod ales, a group of companions, was used for official brotherhoods. Universitas, a later term, signi¬ fied “turned into one, all together, collectively.®

In all these words there is the idea of a unity in the possession of something, as, e.g., a religious rite or a slave. In the earliest history the “outward sign of all corporate organization was community of rites,® carrying with it the idea of continuity and permanency of associa¬ tion. Societas, on the other hand, was used for a temporary association. This idea of per¬ manence persists throughout corporate history. With Ulpian (220 a.d.), “whether the individ¬ uals all remain, or are all changed, the corpora¬ tion remains,® or Bracton (1260 a.d.), a cor¬ poration is as a flock of sheep, “always the same flock, though the sheep successively de¬ part® ; or Blackstone (1765), “all the individual members that have existed, or that shall ever exist, are but one person in the law, a person that never dies, as the river Thames is the same river though the parts are changing every instant.® In 1691 it was said that “the whole frame and essence® of a corporation consist in the franchises which constitute this body politic. Comyns (c. 1740) says “A corporation is a

franchise created by the King.® A franchise, by Blackstone (1765) and Finch (1613) is <(a branch of the King’s prerogative existing in the hands of the subject.® Our Supreme Court (1887) says, <(A franchise is a right, privilege or power of public concern, which is not to be exercised by private individuals … but should be reserved for public control … Corporate capacity is a franchise.® The Continental doc¬ trine is the same. No corporation can be created without authority from the sovereign or state. This probably comes from the Roman law. Greek and Roman corporations originally were mere voluntary associations. They early became centres, of political conspiracy and required regulation. Solon (c. 600 b.c.) and the

XII Tables (450 b.c.) permitted agreements not contrary to law. The Bacchanalian sacra were forbidden to be secretly celebrated by more than two men and three women, together, by a Senatus Consultum (186 b.c.). In 64 b.c. boister¬ ous game celebrating colleges were dissolved. The Clodian law (58 b.c.) permitted them but the Licinian law (55 b.c.) again forbade them. Julius Cassar abolished political

collegia in Rome, and Augustus (7 a.d.) required all in Italy affecting the public to be sanctioned by emperor or Senate; Trajan extended this to the prov¬ inces (98-117 a.d.) , and by the time of Gaius (c. 150 a.d.) and Marcian (c. 215 a.d.), unless a collegium is specifically authorized it is illicit, and its assemblies seditious.

The Carolingians prohibited guilds, unless authorized, on the Continent, while the Canon¬ ists, especially Innocent IV (1243-54 a.d.), evolved the doctrine that the corporation must be the creature of the state. As Maitland says: ((Into its nostrils the state must breathe the breath of fictitious life, for otherwise it would be no animated body, but individualistic dust.® These views found their way into English law by 1376, when ((None but the King can make a corporation,® which is still the rule. Although this (<right to be a corporation® in recent times is now extended to all who comply with a few general provisions, and not by special grant to only a few persons, this has not changed the legal nature of the grant. The effect of such a grant is to convert the group of persons to whom the grant is made into ((a legal or juristic person,® for the purposes specified, and give them a different legal status from what they otherwise would have. <(Persona i® signified the mask an actor wore to indicate his part in a play, and in law a ((person® is a subject of legal rights and obligations, and could be applied to either human beings or things. Amos says this idea had been applied to corporations long be¬ fore Justinian (527-65 a.d.), but Pollock and Maitland say it is not so plainly written in the Roman law books that the Glossators (1 100—1250) or Bracton's master, Azo (c. 1230), grasped it. This corporate personality is often said to be invisible, incorporeal, intangible, im¬ mortal, existing only in contemplation of law,, a mystical body not found in the world of sense, an impalpable and intangible creation of human thought, a figure of speech, an abstraction, a fiction, a mere name.

On the other hand it is said it <(is no fiction, no symbol, no piece of State's machinery, no collective name for individuals, but a living organism, with body and members, and a will of its own, as visible as an army, and as real

as any aggregate of men, a corpus corporatum, a body made up of several bodies.® These are different sides of the same thing. A natural person is a natural organism, a physical body and a legal conception. A corporation is a conventional organism, a physical body and a legal conception. From the earliest times Greek and Roman corporations are

found in possession of property, stated to be that of the corpus, and not of the members jointly. When they died no action de commune dividendo arose. In Rome what the corporation owed the mem¬ bers did not owe, nor the reverse ; the agent or slave of .the corporation was not that of the members ; its property was liable for its debts, but not for theirs, nor theirs for its; a member could be its debtor or creditor. What the greater part did was done by all ; it took three persons to make a corporation but if reduced to one person, the corporation continued (stet nomen universitas) ; it was doubtful if a mu¬ nicipal body could be guilty of deceit (municipes dolo facere non possunt) ; a slave of the corpo¬ ration could be required to testify against the members for he does not belong to them but to it (nec plurium servus corporis) ; and a municipality stood in the place of a person (personae vice fungitur). Such is the summary of the Digest provisions (c. 528 a.d.). These were not wholly clear to Middle Age lawyers. The churchmen knew Saint Paul's (<We are baptized to form one Body.® Church was lit-rally <(the Lord's house,® but ecclcsia was the assembly of its members. Universitas signified a group, or association. From the 2d century church property had been under the control of the bishop. Early form books of the 7th cen¬ tury suggested grants could be <(to the church, built in honor of Saint Paul, to the monastery called X, where A is abbot.® Gradually legists began to draw distinctions between universitas and other co-owners. The Canonists caught the idea and applied it to the church : <(The Ecclesia is an Universitas, and the Universitas is a persona .® This was fully worked out by Innocent IV (1243-54) and Bartolus (1314-57).

These general ideas were worked out anew in England. The course of development was through (1) church; (2) municipality; (3) guild; (4) regulated company; and (5) stock corporation. The Saxon who built a kitchen and ((God-house® on his land thought he owned one as much as the other, although it was gradually realized that the pastor and his flock had some interests in the latter. Grants were usually made : <(To Saint Andrew and thy Church,® at, *etc.* ; ((Saint Paul holds land,® *etc.* ; (<M holds of Saint Peter® ; <(Canons of L. hold® ; <(The Church, the Abbey, or the Abbot of Ely holds,® etc., had the same meaning. As these saints retired the rector, abbots and bishops seemed to become owners, but yet not in their own right but as representatives of the Church, and as a succession of rectors, abbots, etc., so one could sue for the lands his predecessor had possessed. So, too, there were groups, such as ((canons of H.,® or <(dean and chapter,® ((master and brethren,® owning lands, who administered in meetings by resolutions, and who could sue and be sued. Such was being done before 1200 A.D.

Roman municipia were numerous over the Western world in the 1st century a.d., even in England. They were modeled after Rome, with

magistrates, senate, assembly and “citizens,® and were centres of local self-government. The Saxon invaders frequently used them for camps, but there seems to be no continuity of organiza¬ tion. The “burh® — the fort on the hill, sur¬ rounded by hedge or wall, at a cross roads or river ford, where defense was needed, a natural place for trade, an asylum for the tribe and administrative centre for a district, — with all sorts of persons and all kinds of tenure, with a reeve to collect dues, rents, fines, — was the land community on its way to corporate exist¬ ence. As early as the 10th century it had pleas of life, liberty and land, and numerous local customs, and there was such a place in nearly every shire in Domesday survey, upon which a separate or special return was made. From Norman times, the “farm® of the borough had been rendered by the sheriff of the county. But the king was willing to accept a “composi¬ tion,® and the “burgesses,® wishing to have the amount fixed, raised money to buy a “charter® granting this privilege and confirming their customs. In 1130 Lincoln did this, and perhaps this had been done much earlier. In 1 161—89 Henry II delivered “my borough of Cam¬ bridge® to “my burgesses of Cambridge,® to render same “farm® as before. John, in 1201, did the same to them and “their heirs, to hold in inheritance of us.® Edward II (1313) con¬ firmed them to them and “their heirs and suc¬ cessors® ; and in 1382 Richard II confirmed a plea saying that the borough of Cambridge was “one body and one community incorporate in itself.® After this numerous confirmations of the charters were made until finally in 1605 James I by charter declared the borough of Cambridge “shall be made and shall be one body corporate and politic in deed, fact and name by the name of the mayor, bailiffs and burgesses of the borough of Cambridge.® As early as 1311 a borough is called a “corps®; in 1346 the “Commonalty of London® can sue “as a single person,® and by 1391 they were “as perpetual as men of religion,® while by 1430 “the Commonalty and bailiffs of Ipswich are by this name a person and an entire corps.® That the minority should

be bound by the will of the majority probably was taken from the church's doctrine of the major pars in church assemblies and the original practice of the Teutonic town-meeting. The franchises of the boroughs were various privileges of jurisdic¬ tion, tenure, official, self-government, taxation, by-laws, mercantile trading, etc., as well as providing in their own way for the "farm® of the borough.

"Gild® (geld) signifies worship, feast, con¬ tribution. Roman trade gilds, — collegia opifi-cum, — attributed to Numa (c. 700 b.c.) were numerous, — 44 kinds were known to exist in Imperial Rome, — 'and included weavers, fullers, dyers, shoemakers, doctors, teachers, painters, flute players, smiths, goldsmiths and tanners. Smiths are the only ones mentioned in the Roman inscriptions in England. Although they existed in nearly every municipality of the empire, it is doubtful if they survived the barbarian invasion, and became continuous with the Middle Age gilds. They are mentioned about 800 a.d. in the Carolingian Capitularies, as Conspirations. They existed before the Norman conquest, in England, and soon after¬ ward were widely spread trade organizations

supervising the trade, conditions, processes, prices, material, tools, labor, hours, wages, ap¬ prentices, workmanship, weights and measures, in the trading towns. There were religious, merchant and craft, — the members being bound together by social, religious, commercial or other mutual interests. They were closely identified, perhaps officially, with the towns, and were organized in a similar way with governors and associates, wardens, aldermen, assistants, and held periodical meetings for feasts, admis¬ sion of members, electing officers and passing or revising ordinances. It was once supposed that the grant to citizens of a town to have a "gild merchant® was equivalent to incorporating the town. While the "gild merchant® finally broke up into, or was displaced by, many craft gilds in the 15th and 16th centuries, the "or¬ ganization® was largely adopted by the regulated companies.

Company (cum, panis), a bread breaking to¬ gether, has much of the idea of the gild. In the 13th century gilds or companies for carry¬ ing on -foreign trade sought recognition. The Brotherhood of Saint Thomas a Becket was founded in 1216 or 1248 by John of Brabant, as a gild of English Merchant Traders, and after¬ ward as the Merchant Adventurers, with a monopoly of trading in wools and woolen goods, received additional grants in 1407, 1505 and 1564. In 1282 a gild of German traders ob¬ tained an exclusive right to trade in London. In

1391 Richard II granted to the communitas of English merchants trading in Prussia the ight to meet, elect a governor to rule over the traders, do justice and settle disputes between them. Henry IV, during the next 20 years, gave similar privileges to many other companies, and in 1490 Henry VII made the English merchants at Pisa a corporation. While it was not till about 1600 that English companies were incor¬ porated in England, they had long before had substantially the powers of such under their gild organization. The members, instead of trading with a ioint stock, traded separately on their own individual capital, subject to the regulations of the gild or corporation ; hence the name regulated company. The great trad¬ ing and colonizing corporations of the 16th and 17th centuries were of this kind.

The joint stock plan was the result of a combination between this regulated company and the continental idea of a joint stock. There were stringent laws against usury. Perhaps to evade these, the device of commenda, — similar to that of the Babylonian law, was resorted t& all over Europe in the Middle Ages. Two parties, one with money and one without, to¬ gether undertook to engage in trade and share profits ; the one with money stayed at home but let his partner have the money to trade on abroad, the latter to have one-fourth of the profits after the expenses were paid. Later both would contribute the funds and one do the trading, and still later several might con¬ tribute the money, and the others do the trad¬ ing; this differed from the Societas, in which each was supposed to be the agent of the others. In the commenda, only the active parties were liable. As early as 1346, various parties loaned money to Genoa, for conquest purposes, and she gave the shareholders an interest in the conquered lands. In 1407 the bank of Genoa took over the state loans, and issued a con-

solidated stock divided into shares, to those who had put up the money, and these were given the right to do a banking business (1408), and later (1453) to administer the colonies. In the 15th and 16th centuries these ideas began to be utilized in England for foreign trade. The Genoese Cabots probably were instrumental in introducing them. The Russia Company was incorporated with a joint stock, and shares, in 1553, as were many others soon afterward, in¬ cluding the

Levant (1581), East India (1600), Hudson's Bay (1670), Royal Africa (1672). At first joint stocks were only for particular trans¬ actions, and it was not till 1657 that the East India Company had a permanent joint stock. In 1694, the group of persons who loaned money to the government was incorporated as the Bank of England, with a joint stock, based upon the <(credit fund® of the state, upon which it was to pay interest, and which the bank could use as a basis of credit for doing an ordinary banking business. It seemed possible to ex¬ tend this idea to trading purposes, so the South Sea Company was incorporated in 1711 to take over the floating debt of the state (£9,000,000), on which 6 per cent interest was paid, issue shares therefor, and use this as a ((credit fund® to borrow money for trading with Peru. Later the English debt had increased to £31,000,000 by 1720. The Bank of England and the South Sea Company bid against one another for the privilege of acquiring this as a credit fund for enlarging their business, — the latter by a bid of £7,000,000 bonus, and accepting 5 per cent interest, and bribes, secured the privilege. The shares immediately rose enormously in value, and wild speculation began. In 1692, stock quotations began to be published ; stock ex¬ changes developed; stock jobbing began; all sorts of schemes, — for <(perpetual motion,® to <(import jackasses from Spain,® an ((undertaking to be revealed,® were promoted; unincor¬ porated stock companies, as well as incorporated ones with ill-defined purposes, arose on every hand, — a water company went to dealing in forfeited lands, — a banking partnership bought a charter of 1691 to make hollow sword blades. All this speculation led to the panic of 1720. To meet this the Bubble Act of 1720 was passed, forbidding the creation of joint stock companies, or transferable shares, unless they were incorporated, but making no adequate provision for the regulation of those incor¬ porated. This was repealed in 1825, and the Crown was authorized to incorporate com¬ panies, making the members individually liable for the corporate debts. In 1834 such joint stock companies were to sue and be sued in the name of an officer. In 1844, a general act was passed enabling companies to be formed by a ˆCertificate of Incorporation® without special charter from king or Parliament, but with in¬ dividual membership liable to creditors if the corporation's property was insufficient to meet its obligations. In 1855, 1856. laws enabled the formation of companies under Act of 1844, with limited liability, of members, and in 1862 these acts were superseded by the <(Companies Act,® which with the amendments made since is the basis of existing English Corporation Law.

The colonial charter to Raleigh (1589) and to Virginia (1609-12) were

for joint stock corporations, as was the Plymouth (1623), and Massachusetts Bay (1628), the seat of the latter

being transferred to America. The grants to colonial proprietors, 1621 (New Scotland), 1629 (Carolina), 1632 (Maryland), 1634 (New Albion), 1681 (Pennsylvania), contained clauses broad enough to authorize the proprietors to create corporations, and in 1682, Penn incor¬ porated the Free Society of Traders. Similar powers were conferred upon the royal gov¬ ernors, but when Governor Seymour incorpo¬ rated Annapolis (1708), the legislature pro¬ tested. Other governors disclaimed such power. The concessions to the proprietors in Carolina and New Jersey (1665) authorized the legisla¬ tures to create municipal corporations. There was much doubt about the power of the legis¬ latures in other colonies to do so. Harvard College was authorized by an Act of 1642, but without an incorporating clause, which was not inserted till 1650, and then not published with the other laws. In 1652 a water company with quasi-corporate powers was authorized by the Massachusetts legislature. In 1649 the English Parliament incorporated the President and So¬ ciety for the Propagation of the Gospel in New England; in 1701 the Society for the Propagation of the Gospel in Foreign Parts, and in 1709 the Society for the Propagation of Christian Knowledge. In 1693 William and Mary College in Virginia was chartered by the English sovereigns. The Bubble Act of 1720 was ex¬ tended to the colonies in 1741, but without ap¬ parent effect. The constitutions of Pennsylvania (1776) and Vermont (1786, 1793), conferred power to create corporations on the legislatures, and when Governor Livingston of New Jersey undertook to incorporate a Baptist church in 1778, the legislature objected and he acquiesced. In 1781 the Congress of the Confederation in¬ corporated the United States Bank, although the Articles of Confederation were silent as to such power. So it became the rule that the power to create corporations was vested in the legislature, and not in the executive side of our governments, State and National. According to Davis, there were 335 charters granted in the United States to the year 1800; by United States, 2; Maine, 23; New Hampshire, 32; Ver¬ mont, 20; New York, 28; New Jersey, 13; Pennsylvania, 23 ; Delaware, 3 ; Maryland, 21 ; Virginia, 22; North Carolina, 11; South Caro¬ lina, 10; Georgia, 1. Of these 34 were banking; 33 insurance ; 75 inland navigation ; 73 toll-bridge ; 72 turnpike ; 32 water supply ; 4 dock ; 8 manufacturing and 5 miscellaneous. Since that time, nearly every enterprise requiring large capital, and many others, are carried on by cor¬ porations. <(They engage in commerce; build and sail ships; cover our navigable streams

with steamers ; construct houses ; bring the products of earth and sea to market ; light our streets and buildings ; open and work mines ; carry water into our cities; build railroads and cross mountains and deserts with them ; erect churches, colleges, lyceums and theatres ; set up manufactories, and keep the spindle and shuttle in motion ; establish banks for savings ; insure against accidents on land and sea ; give policies on life; make money exchanges in all parts of the world; publish newspapers and books, and send news by lightning across the continent and under the ocean. Indeed there is nothing which is lawful to be done to feed and clothe our people, to beautify and adorn their dwellings, to relieve the sick, to help the

needy and to enrich and ennoble humanity which is not to a great extent done through the instrumentality of corporations.®

In recent years there has been not only wonderful growth in the number and size of separate corporations, but also an extraordinary tendency to combine, into authorized consoli¬ dations, or unauthorized ((trusts.® About 1900, it was estimated that the capital of great cor¬ porations formed in one or other of these ways was in the great industrial enterprises as fol¬ lows : Railway consolidations, $9,000,000,000; in¬ dustrial (manufacturing), $7,000,000,000; street railroads, $1,800,000,000; municipal service, $2,- 700,000,000; telegraph and telephone, $280,- 000,000; or a total of nearly $21,000,000,000, or about one-fifth of the total wealth of the United States. Very recently, too, there has been a great increase in corporation formation ; corporations (having over $1,000,000 capital stock) were formed in the United States, with nearly $895,000,000 capital stock in 1914; with $426,000,000 in 1915; and $2,708,000,000 in 1916; and those (30,000 in number) with over $100,000 in 1916 had $3,529,000,000 capital. Similar, but not so great, increase in corporate activity has characterized other great commercial countries.

Bibliography. — History: Baldwin, S. E., (Freedom of Incorporation (in (Modern Polit¬ ical Institutions,* Boston 1898) ; id.; (History of the

Laws of Private Corporations in the Col¬ onies and States* (ib., 1909) ; Davis, J. P., (Corporations : A Study of Origin and De¬ velopment (New York 1905) ; Davis, J. S., (Essays in the Earlier History of American Corporations) (Harvard University Press, 2 vols., 1917) ; Evans, F., (The Evolution of the English Joint Stock Trading Company) (in Columbia Law Review, Vol. VIII, pp. 339, 461, 1908) ; Lasky, H. J., (The Early History of Cor¬ porations in England) (in Harvard Law Re¬ view, p. 561, 1917) ; Radin, Max, legislation of Greeks and Romans on Corporations* (Colum¬ bia University Press, 1909) ; Scott, W. R., Con¬ stitution and Finance of English and Irish Joint Stock Companies to 1720) (3 vols., Cambridge, England, 1910-12) ; Williston, S., (History of the Law of Business Corporations before 1800) (in Harvard Law Review, pp. 105, 149; 3 select Essays in (Anglo-American Legal History,* p. 195). Theory of Corporate Existence: Can-field, G. F., (Scope of the Corporate Entity Theory) (in Columbia Law Review, 1917) ; Freund, E., (Legal Nature of Corporations> (University of Chicago Studies in Political Sci¬ ence, 1897) ; Gierke, O., (Political Theories of the Middle Ages,* translated by Maitland (Cam¬ bridge, England, 1913) ; Machen, A. W., Jr., Corporate Personality* (in Harvard Law Re-viezv, Vol. XXIV, pp. 253, 347, 1911) ; Maitland, F. W., (The Unincorporated Body1* ; (The Body Politic) ; (Moral Personality *(three collected papers, Cambridge University Press, pp. 271 — 320, 1911) ; Pollock, Sir F., (Has the Common Law Received the Fiction Theory of Corpora¬ tion) (in Law Quarterly Review, Vol. XXVII, p. 219, 1911) ; Smith, H. A., (The Persona Ficta* (in Jnridicial Review, Vol. XXVI, p. 59,

1914).

Horace L. Wilgus,

Professor of Law, University of Michigan.

CORPORATIONS, Legal. Character¬

istics, In general ihe legal status of a cor¬

poration is that of a person, with a name in which to do business, own or convey property, sue and be sued. It is normally managed by a board of trustees or directors, and officers, such as president, secretary, treasurer, *etc.* Its powers are those given at its creation. Its existence continues notwithstanding the death, withdrawal or

insolvency of its members, or the transfer of shares, if it has a capital stock divided into shares. Its rights and obligations are its own, and not those of its members. Its creditors must look to it and to its property alone for payment, and not to its members, un¬ less they have not paid for shares, or have wrongfully appropriated its property.

Classes. — Corporations are : Aggregate, created with a capacity to have more than one member at a time; or Sole, with capacity to have only one member at a time. Reduction to one member does not make an aggregate a sole corporation. Either may be : Ecclesiastical composed of ecclesiastical persons, for ecclesi¬ astical purposes, and subject to ecclesiastical jurisdiction; or Lay, for temporal purposes, as ((maior or communaltie, baylifes and burgesses,® and other business, social and literary purposes. In the United States, where there is no estab¬ lished church, church organizations, when in¬ corporated, are Religious Corporations, and really lay corporations to manage the church business, without, and subject to no, ecclesias¬ tical jurisdiction, except under the agreement of membership. Lay corporations are Elee¬ mosynary (or charitable) — for the distribution of the alms of the donor or founder, as in the case of hospitals, colleges, etc.; and Civil, — for other purposes.

Civil corporations are : Public, — for gov¬ ernmental purposes, as the State, municipal cor¬ porations, etc.; Quasi-public (more properly, Public Service corporations), — for private gain but also to perform some public function as railroad, telegraph, etc., companies ; and Private, — for advancing the interests of individuals in their private capacities. They are ((not-for- profit,® — i.e., for the benefit of other than the members, as colleges, *etc.* ; and for <(profit,® — either pecuniary or otherwise. These are non¬ stock, — i.e., without capital stock and for some benefit other than pecuniary, as a literary so¬ ciety, or college fraternity; and stock (or moneyed), — for pecuniary profit by way of dividends on a capital stock. These classes are not mutually exclusive, — some corporations are within two or more of them.

In England, lay corporations are: Trading and N ontrading. They may be ˆchartered,® by the king; or ((Statutory,® formed under acts of Parliament. These are usually called com¬ panies. The Non-trading are Municipal, for local government, or Eleemosynary, for chari¬ table and benevolent purposes. Companies under the Companies Acts may be limited by shares, limited by guarantee and unlimited, according to the liability of the members. Other associa¬ tions, resembling corporations, but without full corporate powers, or a ((personal status,® sepa¬ rate from the members exist both in England and the

United States. They are : public, as counties, . townships, parishes, school districts, *etc.* ; territorial units for governmental purposes, or institutions, such as asylums, penitentiaries, State universities, etc., controlled by boards, with quasi-corporate powers; or private, such

as miners' federations, labor unions, etc., stock exchanges, boards of trade, partnerships, syndi¬ cates, cost-book mining companies, joint-stock companies, trusts and partnership associations limited.

Joint stock companies are similar to corpora¬ tions, but unless excluded by contract or statute, there is an unlimited individual liability of the members for the acts of the managers. The capital stock is usually divided into transferable shares, represented by certificates, and an owner is not an agent of the company unless he is so appointed. Recently ((Trusts® have been organ¬ ized for business purposes, with the legal title and power of managing the property vested in trustees, subject to the trust deed, the beneficial interest being represented by transferable trust certificates. In the absence of notice and agree¬ ment to the contrary the trustee is liable to third parties as an owner, and to the beneficiary for breach of trust. Partnership Associations, Limited, are created under statutes of Pennsyl¬ vania, Ohio, Michigan, etc., with powers very like corporations, with a capital stock, trans¬ ferable shares and limited liability of members; the property is held and conveyed, and suits, by or against, are in the association name ; they are not corporations for suits in the Federal courts, as a citizen of the creating State, without alleging and proving that no member is a co¬ citizen of the other party. The New York joint stock companies and some of the English insur¬ ance companies are similar.

Continental Systems. — Corporations are <(Juristic Persons® in the Continental law, fol¬ lowing the Roman. However, associations similar to those noted above exist. They are provided for in the Civil and Commercial codes. The general term is ˆAssociations® (Societas, Genossenschaft) , which includes both. Juristic persons are Public, as the state itself (Fiscus) ; Charitable (Stiftung or Founda¬ tion), the

property, rather than its owners or managers, being personified. There are Trad¬ ing, or Non-trading partnerships, syndicates, joint adventures, for profit, and associations for a common enterprise not for profit. The mem¬ bers are co-owners, but not partners. . The Trading or Mercantile (provided for in the Commercial codes) are: Societe en nom Col-lectif (offene Handelsgesellschaft) , equivalent to our general partnership, but considered a juristic person in the Italian and Japanese law, so that death or withdrawal of a member does not dissolve, as it does in English, French or German law. Societe en Commandite (Kom-manditgesellschaft), with members with limited, and others, usually the managers, with un¬ limited, liability, corresponding to the English and American special or limited partnerships. Societe Anonyme (Aktiengesellschaft), or joint stock corporation with transferable shares, limited liability of members, and managed by directors elected by shareholders. Societe commandite par actions (Kommanditgesell - schaft auf Aktien), a combination partnership and corporation, with shares, shareholders with limited liability, and managing partners with unlimited liability.

Tests of Corporate Existence. — The line of demarcation between an incorporated and an unincorporated body is not sharply defined. There is no universally accepted mark of a ˆjuristic person,® which excludes associations

not such. The American courts have suggested these tests in the creating State: (1) There can be no valid corporation without legislative authority; (2) when the legislative intent is clear, that will control in the creating State ; (3) when this is not clear, resort must be had to powers conferred, and which, in order to make a corporation, must merge and vest the rights and liabilities of the individuals into one distinct, artificial existence. The courts of other States, however, will come to their own conclusions, from the powers conferred, and will not be bound by the legislative or judicial declarations of the creating State.

Creation of Corporations. — Coke said the essentials are: Lawful authority; persons to be incorporated; name; place; apt words. Law¬ ful authority may be either by common law ; act of Parliament; king’s charter; prescription; to which may be added, implication and consoli¬ dation. By the common law, kings, bishops, parsons, vicars, deans, governors and officers generally are held to be corporations sole, C(by the universal assent of the people from remote ages,® and from necessity in order that they may carry out their official functions.

For the same reason, the English <(Parliament,® the <(United States® and the separate States, are held to be corporations aggregate, but the <(British Empire,® the ((United Kingdom® and the ((Church of England,® are not. The king is the state. Australia, however, is considered a corporation sole. By legislative act — in 1523 Parliament incorporated the ((Colledge of Phy-sitians,® and the king ((in Parliament® has al¬ ways claimed the power to erect corporations, as well as <(without® Parliament. Like power inheres in the United States Congress, and in the State legislature, without express constitu¬ tional provision, and may be exercised by special or general act, if constitutions do not forbid. The colonial and State legislatures, in our early history, acted by special acts only. The Roman legislature acted either way. In 1597 a general law was passed for the incorporation of hos¬ pitals in England, and from 1844 to the present, various ((Companies Acts® have been passed for the incorporation of companies by simple acts of registration. Public service corporations are usually provided for by special acts, embody¬ ing however various ((general clauses,® and monopoly or eminent-domain power, for juris¬ diction contrary to the common law can be con¬ ferred only by Parliament, if to be exercised within the United Kingdom. On the continent, corporations are formed under the general provisions of the civil and commercial codes, but the legislatures of the several States may act otherwise. In 1778 Protestant churches were allowed freely to incorporate in South Carolina. In 1784 churches were incorporated in New York under general laws; in Delaware in 1787 ; in Pennsylvania in 1791 ; canal com¬ panies in North Carolina in 1795. . In 1808 Massachusetts regulated manufacturing com¬ panies by general law, and in 1811 New York, by general law, provided for their incorporation. In 1838 the Florida constitution directed the legislature to ((pass a general law for the in¬ corporation of all churches,® and forbade their creation by special act. In 1845 Louisiana made a similar provision for all corporations ((except for political or municipal purposes.® New York (1846) made similar provisions, while

Ohio (1851) said ((The general assembly shall pass no special act

conferring corporate powers. Corporations may be formed under general laws; but all such laws may from time to time be altered or repealed.® One or the other of these provisions now exists in nearly all the State constitutions, put there to secure equality of privilege, uniformity of powers and to pre¬ vent fraud, corruption and loss of time, incident to special legislation. There is no such limita¬ tion in the Federal Constitution, so Congress may act either by special or general act. In the manufacturing act of 1808, Massachusetts reserved the right to amend or repeal it. After the decision of the Dartmouth College Case in 1819, holding that an accepted corporate charter constituted a contract, the obligation of which could not be impaired by subsequent State legis¬ lation, State constitutions and incorporation laws usually provide that corporation charters shall be subject to repeal or amendment. The inhibition in the United States Constitution, against impairing the obligation of contracts, is on the States only. The United States govern¬ ment is one of express powers, and such as are necessarily implied therefrom, and so Congress (except in the Territories and District of Co¬ lumbia, where it has a general legislative power), can create corporations only to carry out some of these express or implied powers. King's charter — ((Anciently, a gild, either re¬ ligious or secular could not legally be set up without the King's license,® and in 1179 many <(adulterine gilds® were amerced by Henry II. Bracton (c. 1260) said it was the exclusive pre¬ rogative of the king to grant franchises. How¬ ever, as late as 1523, the Pope incorporated religious bodies in England. The bishops of Durham (a county Palatine) claiming jura regalia from the Conquest, incorporated the <(Barkers and Tanners® at Gateshead, and granted charters to-the city in 1565, 1602 and 1780. In 1376 it was held that only by the king could new corporations be created, though he could license another, as the chancellor of Oxford University, to create corporations to operate in Oxford. The Tudor sovereigns in¬ corporated many <(rotten boroughs,® for political reasons. Henry VII granted charters to John and Sebastian Cabot in 1496, 1498 and from then to Victoria many great trading and colonizing companies have been incorporated by the English sovereigns.

In the United States, in colonial times, the king chartered corporations, e.g., William and Mary College (1693). Governor Andros of New York (1675, fisheries), William Penn (1682, trading), and Lord Baltimore, exercised such authority, but since the American Revolu¬ tion the power is vested exclusively in the legislature, and not in the chief executive. Prescription ■ — A body which has claimed and exercised unquestioned, corporate powers so long as to raise a

presumption that a charter existed, but lost by the lapse and accidents of time, is said to exist by prescription, which is sufficient until the contrary is proved. Implica¬ tion — Coke says <(of ancient times the inhab¬ itants or burgesses of a ville or burg were incorporated when the king granted to them to have a merchant gild.® The king's charter to the <(men of Dale and their successors,® or an act of Parliament granting an estate in fee to the <(Conservators of the river Tone, and their

successors® made them a corporation. Con¬ solidation — this is now only by express legis¬ lative authority whereby two or more corpora¬ tions unite to form a third, although in 1377 it was said one corporation could be so united to another as to succeed to its rights.

Persons to be incorporated. — Coke says these may be either natural or artificial, but where the statute says ((Three or more persons may incor¬ porate,® natural persons only are meant; how¬ ever, in most of the States statutes authorize the consolidation, merger or amalgamation of two or more corporations into another, or the holding of shares in another. Sometimes incorporators are required to be citizens or inhabitants of the State, but not usually. A person incapable of contracting probably cannot be an incorporator, but incompetent persons may succeed to the ownership of shares. In the Roman and Con¬ tinental law, a ((bunch of property,® — a <(foundation,® or an ˆinheritance® might be incorporated, but in the English and American law it seems persons only can be incorporated, although possibly an ((image of an Indian God® may be, under the English law. Persons become mem¬ bers only by consent, in complying with the charter and by-laws, in non-stock corporations ; but by the ownership of shares in stock cor¬ porations, either by original subscription, pur¬ chase from a former owner, or by operation of law. Subscriptions may be either: (1) to com¬ missioners appointed to open books for that purpose; (2) in the incorporation paper, under general laws; (3) on a preliminary subscription paper; (4) agreement with a promoter; (5) contract with the corporation after it is formed; (6) underwriting; (7) application, allotment and notice. (1) and (2) are statutory and effective at once by force of the statute if it is followed. In (3) the corporation is not yet in existence, and if the paper reads: <(We the undersigned hereby subscribe the shares set opposite our names,® there are four theories in the American courts: (a) A mere offer to the future corporation, revocable by withdrawal, death or insolvency, anv time before the cor¬ poration comes into existence and accepts; (b) A binding contract as soon as all the stock

agreed upon is subscribed, the mutual subscrip¬ tions being considerations for one another, and since the group of subscribers is the same after, as before, incorporation, they then can enforce it in the corporation name. This accords with the intention and purpose of the parties. Only a few courts so hold however, the majority fol¬ lowing rule (a) ; (c) Only an offer to the future, corporation, but a contract among the subscribers, as soon as the subscription is com¬ plete. This recognizes the right of revocation as to the corporation, but not as to the sub¬ scribers. The result is not clear; (d) A bind¬ ing agreement if, before incorporation, the sub¬ scribers have relied on the subscriptions to pay for property for the future corporation, and they cannot be placed in statu quo. (4) Sub¬ scriptions to promoters, before incorporation, are generally held to be enforceable by the cor¬ poration, when it comes into existence against either the subscriber, or the trustee; In (5) there is no difficulty about parties or considera¬ tion, and the subscription may be either oral or in writing; (6) An underwriter agrees to take the stock not subscribed by the public, for a commission, or at a discount from the price

to the public. The purpose is to guarantee the taking of the stock within a specified time; (7) Application, allotment and notice is the Eng¬ lish method, where application is made to the promoters, who allot part or all the shares ap¬ plied for, the contract being completed when the notice of allotment is dispatched. The effect of a completed subscription contract is to make the subscriber a member, whether or not he has paid, received a certificate or been registered as owner. He impliedly agrees to pay, upon call, the amount stated.

Name. — The early authorities said a name is of the very essence of the corporate institu¬ tion, the knot of their combination without which corporate acts could not be performed. It is usually given by charter, but may be ac¬ quired by user. General laws require the name to be stated in the incorporation paper, and it must not be the same as another in the same jurisdiction. It may be protected as a trade mark, and its unfair use may be enjoined. A change of name

does not change the identity of the corporation.

Place. — An old authority says : “There must be a place certain where to fix and bottome the corporation,® for ((without a place no incorpora¬ tion can be made.® General laws require the location of the “principal office,® or <(place of business® to be stated in the incorporation paper. Places within and without the incor¬ porating state may be stated.

Proper words. — (<But not restrained to any certain and legal and prescript form of words.® Any, indicating an intention to incorporate, as “incorporate,® “found,® “erect,® “create,® “form,® or others, will do.

Incorporation. — Acceptance of all (not part of) the terms offered by the lawful authority by the persons to whom made is essential. Promoters usually have the papers prepared, and secure the acceptance by the persons to be incorporated ; they stand in a fiduciary relation both toward such persons, and the corporation, if formed, and are liable for unfair dealing, to both. In a special act, or a charter from the king, the terms, conditions and forms of or¬ ganization are set forth, and may be accepted formally by resolution, or informally by acting under them. A contract then results between the corporation and the state, constitutionally exempt from subsequent amendment or repeal, unless such right is reserved.

Charter. — The document containing the grants is called the charter. If a special act, after acceptance it is not only a contract, but also a law of that state, which every citizen thereof is bound to know. When the act is general, then the details of any proposed corporation must be set out in an “Incorporation Paper® (usually prepared by the promoters), often called Certificate of Incorporation, Articles of Association, Memorandum of Asso¬ ciation, *etc.* The general law usually requires the purposes, name, place, capital stock, amount subscribed, number of shares, names of. incor¬ porators or subscribers, to be stated in this incorporation paper, which must be signed, and acknowledged in a specified way by a certain number of incorporators, and then filed, re¬ corded or registered in designated public offices. Other provisions as to organization, powers, voting, meetings, transfers of shares, reports, amendments, dissolution and winding up are

usually found in the general laws. These and the incorporation paper,

executed as required, become the charter, and have the effect both of a law and a contract, as under a special act.

Compliance with Conditions. — Substantial compliance with the conditions precedent of the general law makes a de jure corporation, i.e., one invulnerable against the direct attack by the State. What are conditions precedent and what conditions subsequent are difficult to de¬ termine. Are the things to be done by the in¬ corporators, or by the corporation? If the former, they are conditions precedent; if the latter, subsequent. In most States, a certain number of incorporators, written articles stating everything specified, executed in the precise way indicated, and filed as directed, are conditions precedent to de jure corporate existence.

De Facto Corporations. — In the United States, failure in some of these particulars does not make the effort abortive entirely. A good faith effort to organize under a valid law, colorable compliance therewith and corporate user, — although some condition has not been complied with, — results in a corporation de facto, valid as to all the world except the state in a direct attack for non-compliance with such condition. In a majority of the States it ac¬ quires a corporate status, and the members escape individual liability, as in a de jure cor¬ poration. Some deny this, in eminent domain proceedings by it, or to enforce preliminary subscriptions, or in suits against the members by persons not estopped by dealing with it as a corporation. De facto existence is not recog¬ nized in England or on the Continent.

Some courts go further and say that when¬ ever a group of persons hold themselves out as a corporation, and thereby induce others to deal with them as such, it and they are estopped to deny the corporate existence, if it would be inequitable to do so. Some say estoppel arises only on matter of fact and not of law; others that there is estoppel only when there is de facto existence ; and others deny the doctrine entirely.

Commencement of Corporate Existence.

— Some statutes read “upon filing the incor¬ poration paper the corporation shall be deemed to be in existence,® before stock is subscribed or organization effected. They require the in¬ corporators after filing the incorporation paper to take subscriptions, and when the requisite amount is subscribed to call a meeting of the subscribers to organize. Only an inchoate ex¬ istence seems possible until there are stock¬ holders and organization. The weight of authority so holds, but there is authority to the contrary.

Where to Incorporate. — Arizona, Delaware, District of Columbia, Maine, New Jersey (for¬ merly), Porto Rico, South Dakota and West Virginia have more liberal incorporation laws, and lower fees, than many other States. Busi¬ ness men dislike divulging business secrets, mak¬ ing reports and being hampered in their opera¬ tions, and so prefer incorporating in the “liberal States.® To answer “where,® various matters are to be considered, requiring careful attention and comparison by a competent attorney.

Corporate Rights. — “By incorporation it ac¬ quires jus persona ?, and is capable of all civil rights of having and doing.® So run the old authorities, and so was the Roman law. “No

freeman, ought to be disseized,® (<No person shall be deprived of life, liberty or property,® and <(No State shall deny to any person the equal protection of the law,® all include cor¬ porations; and generally the word person in statutes includes corporations, if the subject matter permits.

Of course a corporation has no body to be assaulted, beaten, imprisoned, hung or electro¬ cuted, although old cases discussed the situation when it lost its head by the death or imprison¬ ment of the dean of a chapter. It cannot (<eat, drink or be merry,® marry, have children, heirs, brothers or sisters, although ((to-morrow it may die.® It has no sex, race or color, but whether it is it or they has been discussed. It may have a good will, good or bad reputation and be slandered, libeled or maliciously prosecuted. It may be a <(respectable and responsible person,® but not a <(colored person,® or a ((rogue or vagabond.® In England and Germany it may be an alien enemy if incorporated, domiciled or controlled by agents, in the hostile state. The inferior courts of the United States have held otherwise if only incorporated in the hostile state.

In the United States a corporation is a citizen of the incorporating State, regardless of the citizenship, domicile or residence of its mem¬ bers, for suits in the Federal courts, and an inhabitant of the district in

which it has its principal place of business. It can do business and have agents in other States, and sue and be sued there.

On the other hand, it is not a citizen of the incorporating State, within the meaning of the clause <(the citizens of each State shall be en¬ titled to all the privileges and immunities of citizens in the several States.® Nor can it, nor its officers for it, refuse to produce its books and papers in evidence, because they would incriminate it It has, however, whatever other rights are given it by its charter. And in gen¬ eral, a corporation has the same rights to sue either at law or in equity to protect or vindicate its rights as a natural person has.

Corporate Liabilities. — Corporations are subject to the general duties and obligations im¬ posed upon other persons by the law, and are liable for breaches thereof. In the Roman law, Ulpian (ad edictum, 198-217 a.d.) said: <(just as the praetor allowed an action on behalf of a municipality, he thought the edict should allow actions against one.®

Torts. — Corporations are now held liable for torts both in England and America. Such liability was of slow growth due to the <(artificial personality® theory, current in the Middle Ages. In 1234 Gregory IX authorized the excommunication of ecclesiastical corpora¬ tions, but in 1245 Innocent IV forbade such <(as the innocent may … be caught by a sentence of this kind.® In 1348, in England, ((The cor¬ poration is invisible, incorporeal, … Trespass does not lie against it, for capias nor exigent , lies not against a commonality,75 and in 1356 ((Nor can they commit treason, or be outlawed or excommunicated, for they have no souls.® This was frequently repeated (Coke 1600; Blackstone 1765) until down into the 19th cen¬ tury and corporations were thought not to be liable for torts or crimes of misfeasance. How¬ ever, they were held in England for forcible disseizin (1357), and trespass (1371, 1430,

1454) ; negligence (Massachusetts 1810) ; con¬ version (England 1812) ; nuisance (Pennsyl¬ vania 1818) ; trespass to land (Delaware 1839) ; assault and battery (Florida 1842) ; deceit (Ohio 1846); false imprisonment (England 1851) ; malicious prosecution (Connecticut 1853) ; but denied in England until 1890 or 1904; libel (England and United States 1858); but only since 1880 for slander ; exemplary damages (Illinois 1858) ; and tort in an ultra vires transaction (United States 1858).

Crimes. — Corporations were punished very early for delinquencies. The liberties of Lon¬ don were seized in 1245, for a false judgment by its magistrates, in 1264, for joining the barons against the king, in 1284, because the mayor, being bribed, connived at the bakers making their penny loaves six ounces too light, and many others, to the quo warranto in 1683, for extortion in tolls and the publication of a seditious libel. In 1811 a corporation was in¬ dicted for not repairing a bridge in England, and in 1812 in Massachusetts ; in 1846, in Eng¬ land for disobeying e court's order, and ob¬ structing a highway, followed by New Jersey in 1852; in 1876 for criminal libel in Missouri; in 1879 for Sabbath-breaking in West Virginia; in 1892 for keeping a disorderly house in New Jersey; in 1900 for criminal negligence, in not maintaining a bridge, causing death and equiv¬ alent to manslaughter by Canada Supreme Court. The United States courts refuse to go so far. Corporations, however, are generally held criminally liable for violations of pure food, anti-rebate, anti-trust and revenue laws, as well as for public nuisances. They are not yet held liable for higher felonies, — the req¬ uisite criminal intent supposed to be impossible and the punishments provided inapplicable.

Powers. — In England corporations char¬ tered by the king have a general capacity to do anything not forbidden, while one created by an act of Parliament has only a special capacity to do what is expressed, — (<only that and nothing more.® Yet both have the incidental power of succession, to contract, grant, sue in its name, purchase propertv, have a seal and make by¬ laws. The doctrine of special capacities has obtained in the United States from the begin¬ ning, and for all corporations. This has led to the doctrine of ultra vires , beginning in 1804 in the United States, and in 1846 in England, based on four principles: (1) a corporation has no powers except those granted by its charter ;'

(2) whoever deals with it must know these;

(3) stockholders should not be subjected to risks not contemplated; and (4) the state is interested that the powers shall not be exceeded. An entirely executed contract will not be dis¬ turbed at the suit of either party; so, too, a wholly executory contract will not be enforced, or damages allowed for its breach by either party. In England, in many States, and by the Federal courts, an ultra vires act is legally void, because of incapacity of the corporation ; in many other States, void because illegal as against public policy; but in New York and others valid and enforceable whenever it would be inequitable not to do so. When such contract is executed by one party but not by the other, the decisions divide : those holding it is void will allow no suit

on the contract, but permit recovery in quasi contract or tort for benefits conferred if unjust to refuse; while

the New York courts would then permit re¬ covery on the contract. If the public is in¬ juriously affected by the ultra vires act, the State may dissolve the corporation in quo war¬ ranto proceedings. In the United States a business corporation may borrow money and give a note, secured by mortgage upon its prop¬ erty. In England the power is not so broad. There is no implied power to form a partner¬ ship, or become a guarantor or surety, for the accommodation of another. It may acquire its own shares to secure payment of a debt not otherwise collectible, but not for speculative purposes, to discriminate among its own share¬ holders, or defraud creditors. A corporation may acquire the shares of other corporations, but not for the purpose of controlling them. Investment, insurance and charitable corpora¬ tions in some cases are held to have an implied power to invest in the shares of other com¬ panies. Many States by statute permit one cor¬ poration to hold stock in another. A corpora¬ tion may now act as trustee, although the old cases said it had no conscience to be coerced by the chancellor. Statutes now generally allow the incorporation of trust companies with power to act as guardians, executors or administrators.

Landholding. — At common law, a cor¬ poration could acquire land as an individual, but this deprived the feudal overlord of his feudal relief, wardship and marriage fees, for corporations did not die, or have children. So in 1217, a gift to a religious house <(is to be utterly void and that land is to accrue to the lord of that fee,® if he enters within a year, or the next higher lord within six months there¬ after, and so on to the king. When the Franciscan friars came to England under a vow of absolute poverty, dominion was sinful. Their need of food and shelter was supplied by a benefactor conveying his property to another for their use (ad oeps), as Richard le Mulines did at Oxford in 1225. The clerics caught the idea, and uses , enforced by the chancellor, en¬ abled the corporations practically to evade the

mortmain acts of 1217 and 1279. Uses were devisable but legal estates were not. So in 1391, another mortmain act, extending to lay corporations as well as ecclesiastical, and in¬ cluding uses was passed. In 1535 the Statute of Uses carried the legal estate to the holder of the use and made it a legal estate. In 1541 the first statute of wills enabled a man to devise land to any one. This seemed to repeal the mortmain statutes, if the land was devised to a corporation, so in 1543 the wills act was amended allowing devises to any one, except corporations. Thereafter the mortmain laws which still exist in England prevent a corpora¬ tion from taking or holding land either by deed or will, unless expressly authorized by its charter.

Mortmain statutes do not exist in the United States, and statutes of wills do not generally forbid devises to corporations. However, under the doctrine of special capacity, a corporation has power to acquire only such land as is reasonably necessary for its purposes. More is held ultra vires. What is the effect? Under the mortmain policy the overlord could escheat it to himself, but neither the grantor, his heirs, nor the grantee corporation could repudiate the executed grant. There is no overlord here, — but the State may bring quo warranto proceed¬

ings against the offending corporation for its ultra vires act, — yet the title remains in the corporation and the land continues assets of the dissolved corporation by the weight of authority. Some cases hold otherwise. A limitation in a statute of wills against devising has a different effect from a limitation in the corporate charter to take and hold land. A devise contrary to the statute is void, passes no title, the heirs inherit, and the corporation gets nothing. If there is no limit on the power to devise, but only in the corporation's power to take or hold, a devise to it will be good, — but the State may dissolve the corporation for taking or holding. Such is the weight of authority, but there are several decisions to the contrary. A corporation may take an estate in fee, for life, for years, or at will, in common, remainder or reversion, but not dower, curtesy or joint tenancy.

Corporate Funds. — All the title, legal and equitable, belongs to the corporation, and not to the members, in equity, or as tenants in common, and this is true if the membership is reduced to one person. He does not own and cannot replevin the property. A conveyance by persons of their own property to the corporation for all of its stock is a real conveyance subject to a stamp tax (if there is one), and afterward the property can be taxed to the corporation and the shares to their owners. A member has an equitable right to have the funds applied

only to the corporate purposes. In business cor¬ porations, the funds are represented by a capital stock, divided into shares ; the authority for this, or to increase or decrease the same, must come from the State. The amount is stated in the incorporation paper; it is raised by subscription, to be paid as called for; it is the basis of corporation credit. If the net property of the corporation exceeds this capital stock, there is a surplus ; if less, a deficit. The market value of all the shares may be more or less than either the property or capital stock.

Shares are generally required to have a par value, — $10 or $100, — but in New York, Dela¬ ware and Maryland may, by statute, be created without par value. Shares may be created with a preference as to dividends at incorporation, but afterward only by unanimous consent or statutory authority. In the absence of statutory inhibition, shares may be issued at a discount, valid between the corporation and the sub¬ scriber, but not as against the creditor who has relied upon the par value of the outstanding stock; if he cannot get paid otherwise he may compel the balance of the par value to be paid. New York holds otherwise. Even if the statute says ((all fictitious issue of stock is void,® the subscription at a discount is not void, the sub¬ scriber becomes a shareholder, — but he can be compelled to pay the Miscount® for the pro¬ tection of innocent creditors. Stock may be issued for such property as the corporation needs at a fair valuation, determined by the directors, and if in good faith and with reason¬ able judgment it will not be disturbed; exces¬ sive overvaluation is evidence of fraud, unless satisfactorily explained; a court of equity may require, for the protection of creditors, the difference between the reasonable value and that at which it was taken to be made good. Stock may be issued for patents, trade-marks, copy¬ rights, formulas, good will and services, if

reasonably valued, in most States, but not in all. New York allows the payment for con¬ struction work at the actual value of stock with¬ out reference to par value, and generally when a corporation is in failing circumstances, in a good faith effort to resuscitate it, shares

may be issued as a bonus to ((sweeten bonds® without liability to subsequent creditors.

In 26 States there are <(blue sky laws® (q.v.), forbidding corporations or dealers to offer cor¬ porate securities,— =• stock or bonds, — for sale as a continuous transaction, without first report¬ ing to and securing a license from the State securities commission. In many States similar provisions exist as to public service corpora¬ tions, which are required to get authority from public service commissions.

Corporate Action. — Since a corporation is one person made up of other persons, an or¬ ganization of some kind is necessary in order that <(they® may manage <(it,® — for it can act only through agents or organs provided in its constitution. These are duly assembled meet¬ ings of the members, or directors, officers, agents, servants, — the last two not being parts of the organization. To be valid, a meeting must be called by proper authority, notified as required, and attended by a quorum. These usually are regulated by by-laws. If not, notice must be personal, — and all notified. At com¬ mon law, a quorum of members, — being a fluctuating body, — 'Consists of those who come, though only one or two ; but of directors, — being a fixed body, — a majority is required. These should be fixed by by-laws.

Voting may be by show of hands, polling, viva voce or ballot, and, at common law, was by persons and not by shares, although now, in stockholders' meeting, usually by shares; in directors' meeting not. A majority vote of the quorum controls. Voting by proxy is now usual among shareholders, but should be authorized by statute, charter or by-law provision. Direct¬ ors cannot, unless expressly authorized, vote by proxy. Some States have authorized share¬ holders to cumulate their votes for directors.

Seal. — The old authorities said a corpora¬ tion <(acts and speaks only by its common seal.® This was the <(visible sign of the invisible body,® by which its will was made known, and the only authentic evidence of it. Exceptions allowed were in trivial matters, as driving out trespass¬ ing cattle; doing what the corporation was appointed to do ; buying and using goods. A seal according to Coke is <(an impression on wax,® and this <(magic of the wafer® yet exists in England, except as to corporations under Companies Acts (1908), which may con¬ tract in writing, by parole and without a seal wherever an individual may do so. Such has been the general rule in the United States since 1813 and 1827.

Members. — Their rights are Collective — (1) to elect directors, and sometimes officers; (2) amend the charter; (3) control the issue, in¬ crease and decrease of stock; (4) make and amend by-laws; (5) investigate management; (6) check ultra vires acts ; (7) admit members ;

(8) remove members or officers for just cause;

(9) dissolve the corporation, — all to be done in duly notified meeting; and Individual — (1) to have notice of meetings; (2) vote; (3) in¬ spect books; (4) enjoin changes in the enter¬ prise; (5) sue in equity for corporate wrongs

on behalf of all, when directors wrongfully re¬ fuse; (6) have a certificate of stock, if any; (7) transfer same; (8) be registered as owner; participate in (9) profits, (10) issue of new stock and (11) in assets on dissolution.

Notice, — actual, necessary at common law ; must conform to statute, charter or by-law, and if meeting is special, must state the purpose. Rules, same for shareholders' and directors' meetings.

Voting, — at common law by persons , not by shares, unless authorized by statute, char¬ ter or by-law. Directors vote only as indi¬ viduals, not by shares or proxy. Shareholders may vote by proxy, if statute, charter or by-law allows, and perhaps such right may now be implied from the usual custom. Proxies are revocable, unless coupled with an interest. Voting trusts among shareholders are allowed in some States, in others not. If a corporation has 20 members each having one share, 11 votes could control; if these 11 form a trust to cast their 11 votes as a unit, to be determined by a majority of the 11, i.e., 6, — then the corporation is, or may be, controlled by 6 votes, instead of a majority; which is contrary to public policy by one view, but not by the weight of authority if not for some illegal purpose. Some States by statute allow cumulative voting; that is, if a member has one vote for each of five directors, he may vote all five for one and no more, or three for one, and two for another, and possibly thereby secure representation on the board.

Inspect hooks, — at common law only when a controversy existed between shareholder and the corporation, or among shareholders. The right is now usually broader, based upon the idea of co-ownership, but is usually regulated by statute, charter or by-laws. Enjoin ultra vires

acts, on the theory that a member has an equitable interest in having the corporate funds applied to the corporate purposes only, and there is no other adequate remedy.

Certificate, — not necessary, but the usual and convenient evidence of membership, and when the shareholder is entitled to, he can compel its issue, or treat refusal as a conversion and sue for damages. It is not negotiable and a bonafide purchaser does not take it dis¬ charged of previous equities, unless the owner is estopped.

Transfer, — usually by endorsement, and de¬ livery of the certificate for the purpose of trans¬ ferring title. After endorsement in blank, it will pass by delivery, but a thief, or one getting his title from the thief, cannot pass good title so as to divest the real owner, if he was not negligent some way. In England the transfer is usually by a separate instrument.

Registration, — by weight of American au¬ thority, is not necessary to give transferee title, both legal and equitable. Some hold only equi¬ table title passes by delivery of certificate with¬ out registration, and a few that registration is necessary to pass any title. Usually registration is for the convenience of the corporation in keeping track of its membership, giving notices and paying dividends — and in the absence of notice, corporation is not liable for following the register in these particulars. The rightful owner may demand and compel registration, or sue for damages for refusal. Corporation may demand reasonable proof of shareholder's right. In England and on the Continent registration is

generally necessary to confer complete rights of membership.

Dividends, — are properly declared and paid only when there are profits or a surplus, but this may be from earnings or increase in value of property. Current obligations, interest and taxes should be paid first ; sinking fund to meet outstanding funded securities when due, and depreciation, should be provided for, but are not legally required.

When proper conditions exist, whether a dividend shall be declared and paid rests in the sound discretion of directors, and may be either cash or stock ; if cash the money is paid out to shareholders ; if stock the money is kept by the corporation, but the stock to an equal amount is issued to the shareholders, in which case there must be authority to increase the stock. A dividend is declared by resolution of directors, and when notified to shareholders, becomes irrevocable, and makes the shareholder a creditor of the corporation, for his part of the dividend, whether then due or not, and when the dividend fund is actually or con¬ structively set aside, the shareholders then be¬ come not only creditors but the equitable owners of it. The owner of the stock at the time it is declared is the owner of the dividend, without reference to when the profits, were earned, or time of payment, or name on the register, al¬ though the corporation will be protected if it pays the registered owner, without notice of the real owner. Of course the parties may stipulate as to who shall be entitled to the divi¬ dend, and when sold on the stock exchange its rules apply. Shares may have a preference in dividends if originally created as preferred and common. ((Seven per cent, preferred® entitles the holder to receive 7 per cent before the com¬ mon receives anything, but only out of profits ; also, cumulative, i.e., to receive when profits are sufficient, what was unpaid up to 7 per cent for back years, although some courts hold this is not so unless expressly stated to be cumu¬ lative. By weight of authority, preferred shares are not entitled to participate in profits beyond their preference, but Pennsylvania holds that preference stock participates equally with the common after it has received the same as the preferred. Even if the preferred is guaranteed, it is entitled, not to interest, but to dividends out of profits only. Efforts to make preferred shareholders creditors, on equality with other creditors, in reference to the capital have failed, • — and their stock is postponed to creditors' claims.

Participation, — proportionally, in issue of new stock, at its par value, whatever may be the market value, is a right incident to existing stock, of which the shareholder cannot be de¬ prived without his consent. Participation in assets is considered below.

Directors. — Though elected by shareholders, or members, directors receive their authority from the State, and their judgment is not sub¬ ject to control of members. They are clothed with the business powers only, — advisability of corporate action, selection of inferior officers and agents, application of funds, declaration and payment of dividends. These duties are fiduciary toward the corporation and sharehold¬ ers and directors must act with reasonable skill and diligence, — that of any ordinarily prudent man in his own affairs

according to some authorities — but since they get no pay, ac¬

cording to other authorities, only the or¬ dinary care of a gratuitous bailee is required. To some extent they are general agents, man¬ datories and trustees, but, in good faith, by the weight of authority, they may deal with the corporation itself, though some authorities hold the corporations may object, if it acts promptly. Dealings between corporations having the same directors, or a majority of the same, are subject to similar rules. Slight evidence of unfairness or overreaching will enable the corporation to impeach the transaction.

Officers. — President, secretary, treasurer, — with the power incident to such officers in deliberative assemblies generally, and no others, without others are conferred expressly, or im¬ pliedly by ((holding out,® — are customary. The secretary is usually made custodian of the cor¬ porate seal, and the president, general manager. For performing the official functions incident to their offices they are not entitled to pay, but for other service they are. There is no right of re¬ moval during term of office, by shareholders, unless statute, charter or by-law so provides. For gross misconduct, or fraud, a court of equity on proper application and showing may remove.

Creditors. — The corporation and its prop¬ erty only are liable to creditors; the members are not, unless they have not paid for their stock, or wrongfully received the corporate property, or by statute. The corporation has the. same power, within its charter, to manage and control its property, without interference by creditors as would an individual, and as he may, so may the corporation, prefer creditors, by the weight of authority. Some States hold otherwise, and the present United States bank¬ ruptcy law now forbids preference made within four months of bankruptcy. Some permit the corporation to prefer its own officers as credit¬ ors, if there is no actual fraud. Perhaps the weight of authority is the other way however. Creditors of course may complain of the dis¬ position of the corporate property for the pur¬ pose of defrauding them, and have all the or¬ dinary rights at law and in equity, against the corporation, and its property, they would have against an individual, but in the case of a public service corporation its property cannot be taken on execution so as to prevent the performance of the public duties. Resort must then be had to the sequestration of earnings by receivership or otherwise.

It is often said that the corporate assets are a trust fund for the protection of creditors. Assets here include the corporate property,

what is owing to it by others whether by mem¬ bers for unpaid stock or issued for overvalued property, or otherwise, or by others including claims for wrongs done to the corporation by the wrongful disposition or negligent dissipa¬ tion of its funds. A receiver, in a court of equity, or a creditor by a creditor's bill, after an unsatisfied judgment against the corporation, can reach all the foregoing, so far as necessary to pay the creditors. This, however, is not a trust fund in the sense that the corporation has the legal, and the creditors have the equitable, title, before the court has taken possession of the property on behalf of creditors. Only such creditors as have relied upon the outstanding stock or property can complain. Creditors who become such before the unpaid stock was issued

or after its property had been wrongfully dis¬ sipated cannot complain if they had or ought to have, knowledge of it. One dealing with a corporation has a right to assume all its stock will be paid in if necessary, that the officers will not negligently or wilfully dissipate the funds, and the shareholders will not divide them, with¬ out providing for creditors, and a creditor is not obliged to prove intentional fraud, in complaining of them. Several States impose a statutory liability on the members, — equal to the stock in some cases, or in pro¬ portion to debts, or for labor debts, for the benefit of creditors. It is, in general, secondary, enforceable only after corporate property is exhausted. Debts here usually means contract debts and not damages for torts. Several States also make officers liable for debts, if they fail to make certain reports at certain times.

State and Corporation. — The grant of a franchise, whether by special or general law, when accepted, makes a contract within "No State shall pass any law impairing the obliga¬ tion of contracts,® and hence the legislature can neither amend nor repeal it without consent of grantees, or unless there is a reservation of power to do so. The Federal Congress is not expressly so limited, but it and the States "shall not deprive any person (which includes corpo¬ rations) of life, liberty or property without due process of law.® The English

Parliament and Continental legislatures are not so limited. Before a material amendment can become a part of a charter, it must be accepted, even if the power to amend is reserved, because persons against their will cannot be forced to exercise corporate functions they do not want, but if the power to amend is reserved they may be required to accept, or be dissolved. Material amendments require unanimous assent of the stockholders, unless there are express provi¬ sions to the contrary in the original agreement ; immaterial may be accepted by a majority. Directors have no authority to accept. The courts are not in harmony as to what is, and what is not, material ; adding banking powers to an insurance company would be material, but adding accident insurance to life insurance would not be so, by some authorities. If the power to repeal has been reserved in unqualified terms, it may be exercised at any time, and for any or no reason.

The State has the ordinary legislative powers — eminent domain, police and taxing — over cor¬ porations, that it has over individuals. Any cor¬ porate property, rights, privileges or franchises may be taken for public use upon making com¬ pensation. When the public safety, health or morals require, the State may impose burdens and the cost of complying upon a corporation without making compensation ; it may also regu¬ late rates for public service, if rates imposed al¬ low a reasonable compensation for the service rendered. Taxes can be imposed as upon indi¬ viduals, but not so as to deprive the corporation of the equal protection of the laws. Corpora¬ tions, however, have a primary franchise, — the right to be a corporation, and many have secondary franchises, — as to operate a street railway in city streets, — which may be taxed. Methods of valuation are difficult, arbitrary and more or less unjust, when the “good-will® of partnerships and individuals is not taxes; for the value of the corporate franchises is usually

fixed at the difference between the market value of the shares, and the assessed value of the other property. This would seem to include primary and secondary franchises, and good¬ will. Such methods of valuation have been generally sustained, though the good-will of partnerships and individuals is not taxed at all. In addition to this, and on top of it, the State may, and often does, tax the shares to their owners at their market value. This is legal, though unfair. The Federal government may tax corporations as it may individuals, but the States may not, without express permission, tax Federal corporations.

Corporations are subject to the ordinary jurisdiction of the courts, and in addition to an extraordinary jurisdiction under the pre¬ rogative writs of quo warranto, to dissolve a pretended corporation, or a valid one for mis¬ behavior ; scire facias to dissolve an existing corporation for violation of its charter, — judg¬ ment in both the foregoing is or may be ouster; mandamus, to compel the performance of a definite duty, when the ordinary legal remedy is inadequate ; and injunction in equity, to prevent public injury where quo warranto is not ade¬ quate, but not for merely ultra vires acts in a suit by the State. A member, however, may enjoin such acts.

National Government and Corporations. —

The Federal government has no express, but an implied, power to create corporations where-ever necessary or desirable to carry out any of its express powers, as banks under currency power, railroads under interstate commerce power, manufacturing company to supply army or navy (armor plate, etc.). While the Federal Congress might make the exercise of such power exclusive in it, until it has done so, the States have and exercise a concurrent power to create corporations for carrying on any of these purposes. Except in the Territories' and in the District of Columbia, Congress probably cannot create corporations for other purposes than those stated or implied in its express powers, to operate in the States, against their consent, although because the National banks and the Pacific railways incorporated by Con¬ gress do a local business, it has been argued that Congress can give such capacity, if not the legal right, to do such business. Under the "commerce power,® Congress has not only in¬ corporated railroad companies to build and operate interstate railroads, but also a canal corporation with authority to construct a canal in a foreign country. Congress has provided for regulation of corporations, whether created by it or by the States, so far as they engage in interstate and foreign commerce by the Inter¬ state Commerce Commission, the Federal Trade Commission, the Federal Anti-trust Act, Em¬ ployer's Liability, Child Labor Laws, etc., and the banks by the National Bank and the Federal Reserve Banks, acts.

Foreign Corporations. — "A corporation ex¬ ists and must dwell only in the state of its crea¬ tion, and cannot migrate to another state,® according to the Supreme Court of the United States. Yet it may through its agents do busi¬ ness in another State, have a domicile, hold meetings, be taxed, sue and be sued and served with process there, so as to justify a personal judgment there, with the same effect as against a natural person actually there. Yet the cor-

poration is considered as being a citizen of the State creating it, even though it has been re¬ quired to file its incorporation papers in the other state and authorized to do business there, and is declared to be a <(domestic® corporation by that State, — it is nevertheless a different corporation from the one in the State where it was incorporated, although it may have the same members, officers, offices, capital, stock and powers. So too, if corporations of two or more States are authorized and do consolidate into one, with one membership, stock, officers, powers and place of business, there are as many different corporations as there are States, each tracing its life to the legislation of the State originally creating it, and subject there to its laws. The States of the Union are foreign to one another, and the corporation of one State, although it has corporate capacity, has no legal right to do business in any other State without its consent for it is not a citizen under the <(privileges and immunities® clause of the Constitution. It may be excluded or discrimi¬ nated against, when it seeks entry into another State, although after it is within the jurisdic¬ tion of such State, it cannot be denied the equal protection of the laws; this, however, gives no right to enter, or stay after entry, if the license is revoked. The States, however, cannot so exclude corporations of other States engaged in interstate or foreign com¬ merce, from carrying on such or unreasonably hamper them therein. Notwithstanding these undoubted powers of the States, there exists a Comity® between the States, whereby, in the absence of express provision or a public policy to the contrary, the corporations of any State or foreign country are permitted to exercise their corporate powers in another, and its courts are open for the protection and vindication of their rights therein. Many of the States require the corporation to file its articles of incorpora¬ tion and appoint a resident agent upon whom service of summons may be made in the State where it seeks to do business. Sometimes pen¬ alties are provided. The courts are in hopeless conflict as to the effect of non-compliance with such statutes. Some say a contract so made is void, and can be enforced by neither party; others that it is enforceable by either, — only the State can enforce the penalty if there is one; still

others that the corporation cannot enforce any contract until compliance.

Continental theories vary; one is that the corporation can have a personal status only in the creating state, not elsewhere; another is that personal status of an individual is always a matter of law, and there is no more difficulty in recognizing the personal status of a corporation than of an individual, and since the status of the latter is recognized as of right, the former ought to be also ; another says that corporations have both civil and functional capacities ; so far as the civil status of an individual is recog¬ nized in a foreign state, likewise that of a cor¬ poration should also be, but its functional capacity should be recognized only by express permission.

Dissolution and Winding up. — Corpora¬ tions may be dissolved: (1) By lapse of charter period; (2) repeal of charter; (3) judgment of ouster in quo warranto or scire facias; (4) sur¬ render accepted by the state; (5) death of all the members in a non-stock corporation. In¬

solvency or reduction to one member does not itself work a dissolution with us, as it did not at Rome. In England under Companies Acts, if membership is reduced below two (private companies), or seven in other companies, it is a cause for winding up. Similar provisions exist in some of the Continental codes.

The common law had no adequate method of winding up the affairs of a dissolved corpora¬ tion, and looked upon the situation as that of a dead man without administrator or heirs; per¬ sonal property went to the king as bona vacan¬ tia; real property reverted to the grantor or his heirs; all claims in favor of or against the corporation were ended. In the absence of pro¬ visions to the contrary, such seems yet to be the English law, and formerly was in the United States, although here it was often said to have grown up in reference to the English ecclesias¬ tical corporations, it was unsuited to our condi¬ tions and was unjust. In 1855 the United States Supreme Court so vigorously assailed this view, that since then, even in the absence of statute, courts of equity have at suit of cred¬ itors or shareholders entertained suits to wind up the affairs of a dissolved business corpora¬ tion, usually by appointing a receiver, to collect all the claims owed to the corporation, convert all its property, both real and personal, into money, pay the corporate debts and distribute the balance to the shareholders. The courts, however, are not yet in accord as to what shall be done with the unexecuted contracts of the corporation ; some

say no damage can be had for their breach by dissolution; others that there can be, if the dissolution was voluntary on the part of the corporation.

Until recently, in the United States, the com¬ mon law rules have been applied to the dissolu¬ tion of non-stock and charitable corporations. Recent cases have taken a different view, but the United States Supreme Court applied the common law doctrine to the dissolution of the Mormon Church in 1890. In many States the matter is fully covered by statute, and under the English Companies Acts, there are elaborate provisions for the appointment of an official liquidator, with powers and duties similar to those of a receiver under the equitable proced¬ ure in this country. On the Continent, the directors are usually made liquidators under the Commercial codes, with similar powers. See Charter; Dartmouth College Case; Con¬ tract; Franchise.

Bibliography. — Statutes: Stimson, F. J., (American Statute Law) (Vol. II, Boston 1892) ; Dill, J. B., Statutory and Case Law of Private Companies > (New Jersey Law, 1st ed., 1898; 4th ed., 1902; latest ed., 1910); Glynne-Jones, A., Companies Acts, 1862-1900) (Lon¬ don 1902) ; Overland, M. U., Statutory Corpo¬ ration Law) (New York 1905) ; (English Con¬ solidated Companies Act of 1908) ; Commer¬ cial Laws of the World) (by countries, Vols. I-XXXIV, Amer. ed., Boston 1912-14) ; Par¬ ker, J. S., <The Law of New Jersey Corpora¬ tions* . (2 vols., Chicago 1911); id., Corpora¬ tion Statutes, Forms and Precedents* (19th ed. of (American Corporation Legal Manual,* New York 1917). Promoters: Alger, A. M., Caw of Promoters* (Boston 1897) ; Dewing, A., Corporation Promoting and Reorganization (Cambridge, Mass., 1914) ; Ehrich. M. W., Caw of Promoters) (Albany 1916). Incorporation

and Organization: Palmer, F. B., (Company Precedents* (1st ed., 1877 ; 10th and 11th ed., London 1907-12) ; Conyngton, Thomas, Man¬ ual of Corporate Organization* (1st ed., 1904; 3d ed., New York 1904) ; Frost, T. G., ‘Treatise on Incorporation and Organization of

Corporations) (1st ed., 1905; 4th ed., Boston 1913); Fletcher, W. M., Corporation Forms* (Chicago 1913). Corporation Finance: Poor, H. V., ‘Railroad ManuaP (Annual, New York) ; Wood, W. A., ‘Modern Business Corporations) (1st ed., 1906; 2d ed., Indianapolis 1917) ; Bentley, H. C. ‘Corporate Finance and Accounting* (New York 1908) ; Mead, E. S., ‘Corporation Finance* (New York and London 1912) ; Ger-sternberg, C. W., ‘Materials of Corporation Finance) (1st ed., 1914; 2d ed., New York 1915) ; Walker, W. H., ‘Corporation Finance* (ib. 1917). Textbooks on the Law of Corporations: Angell, J. K., and Ames, S., ‘Law of Private Corporations* (11th ed., Boston 1882) ; Grant, James, ‘Practical Treatise on the Law of Corporations) (London 1850) ; Morawetz, V., ‘Law of Private Corporations) (1st ed., 1882; 2d ed., 2 vols., Boston 1886) ; Cook, W. W., ‘Treatise on Law of Corporations) (7th ed., 5 vols., Bos¬ ton 1913) ; Hamilton, W. F., ‘Company Law* (2d ed., London 1901 ; Canadian ed., Toronto 1911) ; Thompson, S. D., ‘Commentaries on the Law of Private Corporations* (2d ed., 8 vols., Indianapolis 1908-15) ; Clark, W. L., and Mar¬ shall, W. L., ‘Private Corporations* (3 vols., Saint Paul 1901 ; 4th vol. by Helliwell, ib. 1908) ; Carr, C. T., ‘General Principles of the Law of Corporations) (Cambridge, England, 1905) ; Machen, A. W., Jr., ‘Treatise on the Modern Law of Private Corporations) (2 vols., Boston 1908) ; Halsbury, Earl, ‘Laws of Eng¬ land* (Vol. V, <Companies) ; Vol. VIII, ‘Corpo-lations*, London 1910) ; Fletcher, W. M., ‘Cyclo¬ pedia — Corporations) (8 vols., Chicago 1918). Federal Incorporation: Wilgus, H. L., ‘A Na¬ tional Incorporation Law1* (in Michigan Law Review, February and April 1904) ; Heisler, R. C., ‘Federal Incorporation (Boston 1913). Combination, Consolidation and Reorganization: Dewing, A., ‘Corporate Promotion and Reor¬ ganization *(Cambridge, Mass., 1914) ; Stetson, F. L., et alii, ‘Some Legal Phases of Corporate Financing, Reorganization and Regulation* (New York 1917). Foreign Corporations: Beale, J. H., ‘Law of Foreign Corporations) (Boston 1904) ; Young, E. H., ‘Foreign Com¬ panies and Other Corporations1* (Cambridge, Mass., 1912) ; Henderson, G. C., ‘Position of Foreign Corporations in American Constitu¬ tional Law1* (ib. 1918). Ultra Vires: Reese, R. A., ‘The True Doctrine of Ultra Vires) (Chicago 1897). Trusts and Corporations: Carr, C. T., ‘Collective Ownership) (Cambridge, England, 1907) ; Sears, J. H., ‘Trust Estates as Business Companies) (Saint Louis 1912) ; Wil¬ gus, H. L., ‘Corporations and Express Trusts as Business Organizations) (in Michigan Law Review, Vol. XIII, December 1914; January 1915) ; Wrightington, S. R., ‘The Law of Unin¬ corporated Associations and Similar Relations) (Boston 1917). Selected Cases: Keener, W. A., ‘Selection of Cases on Law of Private Corporations) (2 vols., New York 1899) ; Warren, E. H., ‘Select Cases and Other Authorities on the Law

of Private Corporations* (Cambridge, Mass., 1916) ; Burnett, D. F., ‘Cases on the Law of Private Corporations) (Boston 1917).

Abridgments, Digests and Encyclopcedias : Eng¬ lish— Fisher (1870); Mews (1897 to the pres¬ ent) ; ‘Encyclopedia of the Laws of England* (1897); Halsbury’s ‘Laws of England* (1910). American — ‘American Digest* (Century ed., Vol. XII; Decennial ed., Vol. V; 2d Decennial and annuals to date) ; ‘Cyclopedia of Law* (1904) ; ‘Corpus Juris* (14 vols. issued 1918; others in preparation, New York).

Horace L. Wilgus,

Professor of Law, University of Michigan.

CORPORATIONS, Political Contribu¬ tions by. See Corrupt Practices Act.

CORPS, kor (Fr. “body**), a word often used in military and political language. The term is applied to various kinds of divisions of troops ; the corps d’armee is a military unit consisting in from two to four divisions (the German Heeresabtheilung ; our field army. See Army Organization) ; corps de garde ; a guard¬ house ; also the body which occupies it.

In political use, corps legislatif was used from 1857 to 1870 of the lower house of the French legislature; its members were elected for six years. Corps diplomatique refers to a nation’s entire body of ambassadors, ministers and other diplomatic officers.

CORPSE (Lat. corpus, “body,** through Fr. corps), a dead body, usually animal, and in most common usage applied only to the human body. To the human corpse there can be no property rights, save in the rare case of dis¬ position by regular will of one’s body. Ques¬ tions as to disposition of a corpse must be heard by an ecclesiastical court in England, by the usual civil courts in the United States and else¬ where if Church and state be independent. Prior right to a dead body naturally goes to the nearest of kin,* marriage ties ranking above those of blood. Burial expenses come under the general head of property rights in that they take precedence over any claims against de¬ ceased or his estate. Privileges of the corpse extend still further; pagan superstition, which identified to a certain degree body and soul and long established Christian belief in the resur¬ rection of the body, combine with the law’s view, to make mutilation of the buried body, or body-snatching, (as digging up the corpse for anatomical or other

purposes is called), detested and criminal. Both practices are still widely exercised and public opinion seems less severe than formerly. See Burial; Cremation; Mausoleum; Mummy.

CORPULENCE. See Obesity.

CORPUS CHRISTI, Tex., city and county-seat of Nueces County; on Corpus Christi Bay, at the mouth of the Nueces River, and on the Mexican National and the San An¬ tonio and Aransas Pass and the Saint Louis, Brownsville and Mexico railroads, 140 miles south of San Antonio. Corpus Christi has regu¬ lar steamboat connections with New Orleans.

It is the stockraising and farming centre of the county and has an extensive fish and oyster- , packing business, several daily and weekly newspapers, a Catholic convent, several churches, a national bank and an assessed property valuation of $2,000,000. It is a popular health resort. In 1909 it adopted the commis¬ sion form of government. The city owns its waterworks. Gen. Zachary Taylor encamped

here during the Mexican War, and his en¬ trenchments are still preserved. Pop. 8,222.

CORPUS CHRISTI, Festival of, a holiday instituted by the Roman Catholic Churdi in honor of the mystery of the Eucharist, ob¬ served on the first Thursday after Trinity Sun¬ day. Its observance began in the diocese of Liege while the archdeacon of that diocese was James Pantaleon, who afterward became Pope Urban IV. In 1264 Urban composed a bull ordering throughout the Church the celebration of the festival on the Thursday following the first Sunday after Pentecost: the bull seems not to have been promulgated save, perhaps in the city of Rome, for though the festival was duly observed by the Pope and his court, no proof ex¬ ists of its celebration on that year or after for a long time in other parts. The proximate occa¬ sion of Urban's act was the reported occur¬ rence of a miracle at Bolsena in the Papal do¬ minion, when a priest in saying the mass acci¬ dentally spilled out of

the chalice some drops of the sacramental species of wine and tried to cover it up with a linen cloth : forthwith the cloth was covered with red spots in the form of the sacred host. The bull of Urban was revived at the Council of Vienne, 1311, by Clement V. The procession of the Host in con¬ nection with the festival was instituted by Pope John XXII and succeeding pontiffs down to the Council of Trent were zealous for the observance of the holiday. The Council of Trent declared the institution to be a triumph over heresy regarding the doctrine of the Eucharist. At the Reformation it was one of the first holidays abolished by Luther. The procession is eliminated even by Catholic com¬ munities in places where there is strong division of religious sentiment.

CORPUS CHRISTI COLLEGE, Cam¬ bridge, England, sometimes called Benet Col¬ lege, was founded in 1352 by the united guilds of Corpus Christi and the Blessed Virgin, two fraternities which used to meet for prayers at Saint Benedict Church and Saint Mary's re¬ spectively. The endowments of the college were considerably increased by Archbishop Parker, who also bequeathed to it his valuable collection of manuscripts. It consists (1914-15) of a master and 14 fellows, besides 19 scholars. The college has the patronage of 10 livings. The college has a wonderful collec¬ tion of plate and the Lewis collection of printed books. Christopher Marlowe and John Fletcher were members of Corpus Christi.

CORPUS CHRISTI COLLEGE, Oxford, England, a comparatively small college founded in 1516 by Richard Fox, bishop of Winchester and lord privy seal, under a license from Henry VIII. It consists (1915-16) of a president, 14 fellows, 32 scholars, 4 exhibitioners, 2 chaplains and 82 undergraduates. Three of the fellowships are annexed to two professorships, the pro¬ fessors occupying the position of honorary fel¬ lows, being elected by boards appointed by university statute. The college has the patron¬ age of 16 livings. It counts some famous men among its members, notably Udall, author of (Ralph Royster Doyster) ; Richard Hooker; Keble, the hymnologist ; Thomas Arnold, master of Rugby, and Chief Justice Coleridge.

CORPUS DELICTI (literally «the body of the crime or offense®) , in Scottish law, those

external marks, facts or circumstances which accompany a crime, and

without the proof of which the crime is not supposed to be estab¬ lished. Thus the corpus delicti of homicide is establishing the fact that the person has died of violence, not merely that he has died. Ac¬ cording to German law no crime can be estab¬ lished unless the corpus delicti is clearly present, and self-accusation or confession without this does not empower a court to convict. Consult authorities cited under Criminal Law.

CORPUS DOCTRINE (Lat. «body of doctrine®), in German ecclesiastical history, the name given to each of several collections of the¬ ological writings promulgated by various Ger¬ man Protestant churches during the 16th cen¬ tury. Among the most important of these collections were the (Corpus MisnicunP or ˆhilippicunP (1559), enforced by the elector of Saxony, containing the Apostles', Nicene and Athanasian creeds, the Augsburg Confes¬ sion and Melanchthon's (Loci Communes* ; the Pomeranian of 1561; that of Nuremberg of 1573; and the Hamburg (1560), Brunswick (1563), Pomeranian (1564), Prussian (1567), Brunswick-Wolfenbiittel (1569), Saxon (1570, called Corpus Thuringicum) ; and others of a Lutheran character. These were all superseded in 1580 by the (Formula Concordiae. *

CORPUS JURIS CANONICI, the body of laws for government of the Church enacted by popes, councils and synods or drawn from the writings of the fathers, and the whole approved and promulgated by the holy see. There were numerous collections of canons made and published both in the East and the West prior to the time of Gratian, the Camal-dolese monk, professor of theology in the Uni¬ versity of Bologna, who in 1139 compiled the Decretum, called also Decretum Gratianij which constitutes the first part of the body of the canon law. It is the first methodized general collection of Church laws from the time of Constantine to the year of its publication, and is in three books, treating, the first, of ecclesi¬ astical persons and offices ; the second, of cases arising under the several canons, decretals and other authoritative rules; and the third, of the sacraments and rites of the Church. The second part of the Corpus Juris Canonici is the Decretals of Gregory IX, promulgated in 1234. This book contains all decretal epistles of popes from 1139 to the date of its publication. It is followed by the Liber Sextus, 1298, promulgated by Bonifacius VIII; by the Clementinae or con¬ stitutions of Clement V, 1317 ; finally the Extravagantes, revised in 1563, contain all decretals promulgated to that date. With the Extravagantes ends the systematic compilation of matter of canon law. In the reign of Henry VIII the English Parliament ordered a revision of the Corpus Juris Canonici to make it con¬ form to the new order of things brought about by the law of the king's

supremacy in matters of religion : meanwhile the old system was to hold so far as might consist with the new order. But no revision has been made, and hence, with a few reserves, the Corpus Juris Canonici is law for the Church of England. For the Cor¬ pus Juris Civilis see Civil Law ; see also Canon Law.

CORPUSCLE, in anatomy, a small, usually microscopic, body regarded by itself and defined

by some qualifying term ; as, blood corpuscles (see Blood) ; the Malpighian corpuscles of the kidney and of the spleen ; the tactile corpuscles, otherwise known as Meissner's, Wagner's and palpation corpuscles, found in certain papillae of the skin of the hand and foot, the gustators or taste corpuscles of the papillae of the tongue, *etc.* See Pacinian Corpuscles.

CORPUSCULAR PHILOSOPHY, a

name sometimes applied to the atomic philosophy taught by Leucippus and Democritus (qq.v.) According to their doctrine matter is eternal, and everything in the whole universe, including the soul itself, is produced by a special arrange¬ ment and aggregation of minute indivisible bodies or particles called <(atoms.55 These atoms are of various sizes and shapes, and, in some forms of the theory, of different quali¬ ties; and it is on these primary differences, combined with the endless varieties of position and figure, that distinctions between things are based. Change is but a rearrangement of atoms caused by their unceasing primary motions. This philosophy was elaborated and developed by Epicurus (q.v.) and other thinkers and received its grandest expression in the great poem of Lucretius (q.v.) (De Rerum Natura5 ((On the Nature of Things5). It may be re¬ garded as an ancient form of the modern atomic theory (q.v.), which, however, differs from it in being, not a philosophy of the uni¬ verse, but merely a hypothesis concerning the physical constitution of matter, adopted in order to give convenient expression to scientific facts and to aid in scientific advance.

CORPUSCULAR (or EMISSION) THEORY OF LIGHT, the older theory, which explained the phenomena of light by supposing that a luminous body emits excessively minute elastic particles of matter, ˆcorpuscles,55 as they were called, which, striking the eye, produce the sensation of light. See Electron Theory; Light.

CORRAL, kor-ral', Ramon, Mexican states¬ man : b. Alamos, in the state of Sonora, 10 Jan. 1854. When 21 years of age he had established and successfully conducted two newspapers, El Fantasma and La Voz cle Alamos, but in 1875 abandoned the newspaper field, later writ¬ ing a history of the state of Sonora. He was subsequently elected to the Sonora legislature, and later secretary of the state, in the latter capacity rendering invaluable service in the preparation of various important laws. Later he had much to do with the revision of the penal code of the federal district. He repre¬ sented the state of Sonora in the federal Con¬ gress for a considerable period; in 1887 was elected lieutenant-governor of Sonora, exercis¬ ing practically all the powers of the governor, by designation of that official ; from 1891-95 was secretarjr of the same state; and later was unanimously elected governor. On 15 Sept. 1900 Mr. Corral became governor of the federal district ; became secretary of government 16 Jan. 1903; and in 1904 was elected to the vice¬ presidency of the republic.

CORRASION, mechanical wear by wind, running water or moving ice, producing actual abrasion of a rock mass, as contrasted with corrosion, a chemical process of weathering.

CORREA, kor-ra'a, DE SERRA, Jose Francisco, Portuguese scholar: b. Serpa, Alem-tejo, 6 June 1750; d. Caldas, Rainha, 11 Sept. 1823. He was educated in Rome and Naples, was admitted to holy orders and soon after his return to Portugal ii 1777 was made perpetual secretary of the academy recently instituted at Lisbon. He collected cabinets of natural his¬ tory, especially of botany, established a labora¬ tory for scientific research and prepared for the press numerous unpublished documents re¬ lating to the history of Portugal. Accused before the Inquisition, he escaped to Paris in 1786, but was permitted to return to Portugal after the death of Pedro III, where 'he took up residence with Lafoes. At Paris he had been intimately associated with the naturalist Broussonet, and became the host of the latter when he fled in disguise from the reign of terror to Lisbon. Endangered by the detection of Broussonet, he took refuge first in Gibraltar and then in London. He lived in Paris in learned society and pursuits from the Peace of Amiens till 1813, when he came to the United States, where

he continued his scientific studies, and in 1816 became Minister plenipotentiary of Portugal. He was recalled to Portugal on the promulgation of the Constitution of 1820, and made Minister of Finance. His most important writings are treatises on the physiology of plants and a collection of unedited memorials of Portuguese history (in 4 vols., 1790-1816).

CORREGGIO, kor-red'jo, Antonio Allegri,

Italian painter, frequently called Antonio da Correggio, from the place of his birth : b. Cor¬ reggio 1494; d. there, 5 March 1534. He was intended for a learned profession, but nature had designed him for an artist. It has not been ascertained how much he was indebted to his first instructor, who was probably his uncle, Lorenzo Allegri. Three qualities will always be admired in him — grace, harmony and a skilful management of the pencil. There is a peculiar grace in the movements of his figures and a loveliness in their expression which takes pos¬ session of the soul. These attitudes and move¬ ments could not be executed by any artist without his masterly skill in foreshortening, which not only gives greater variety to a piece, but is also favorable to gracefulness. Avoiding all roughness and hardness, Correggio delights by mild and almost effeminate beauties. He strove to obtain this object also by harmony of coloring, of which he may be called the creator. He is unrivaled in the chiaroscuro ; in the grace and rounding of his figures and in the faculty of giving them the appearance of advancing and retiring, which is the distinguishing excel¬ lence of the Lombard school, of which he may be considered the head. In his drapery, he calculated with extreme accuracy all the effects of the chiaroscuro. He possessed the power of passing, by the most graceful transition, from the bright colors to the half tints. It was his object to make the principal figure prominent, that the eye, after gazing till it was satisfied on the bright colors, might repose with pleasure on the softer masses. He made a skilful use of this art in his 'Night5. (la Notte), which is to be seen in the gallery in Dresden, where there are seven pictures in which his progress in the art may be recognized. Among his best pic¬ tures, besides the (Night, 5 are the (St. Jerome,5

whicn has kindled the admiration of sev¬ eral distinguished painters to such a degree as to render them unjust toward Raphael; the (Penitent Magdalene) ; the altar-pieces of Saint Francis, Saint George and Saint Sebastian; (Christ in the Garden of Olives* ; (Cupid* ; the fresco painting in Parma ; and, above all, the paintings on the ceiling of the cathedral in the same city. In 1520 he was married to Girolama Merlini, who appears to have inspired several of his most charming Madonnas. Of his four children, a son and daughter survived; the former, Pomponio, was a painter, but vastly inferior to his father. The story of his extreme poverty, and of his death in consequence of it, has been long since disproved, yet Oehlen-schlager has made it the subject of one of his best tragedies in German and Danish. Consult Meyer, (Correggio,* Heaton's translation (Lon¬ don 1876) ; Landon, (Vie et oeuvres de Cor¬ reggio J (Paris 1803-20) ; Morelli, (Critical Studies of Italian Painters) (Vol. II, 1893) ; Ricci, (Antonio Allegri da Correggio) (London 1896) ; Thode, <(Correggio,** in (Kunstler-Monographien) (Bielefeld 1898). Consult also the monographs by Sturge Moore (London 1896) and Gronau (Stuttgart and Leipzig 1907) ; and Berenson, (Studies in Italian Art* (London

1901).

CORREGGIO, Italy, city in the province of Regio nell' Emilia, about 25 miles northwest of Modena. In the Piazza is a statue of the painter Antonio Allegri, known as Correggio, who was born here in 1494. The modern town has none of the importance of the mediaeval city, which was the capital of the principality belonging to the duchy of Modena, and the princely castle still remains. Its importance in history is due to its having been the birthplace of the painter Correggio. Pop. 16,996.

CORREGIDOR, kor-re'ji-dor, Philippines, an island lying in the entrance to Manila Bay and forming a part of the inner line of defense of the city of Manila; length, east and west, four miles ; average width, one mile ; area, two square miles. It rises on the west coast to a height of 649 feet above the sea ; on the highest elevation is the semaphore station of the port of Manila, from which the approach of vessels is signaled. There are also four lighthouses on the island. The island is ex¬ posed to ocean storms, and this makes the cul¬ tivation of the soil unprofitable; a few crops are raised in the sheltered localities. The chief industries are trade and fishing. San Jose is the only town. Its fixed population is about 500. The island was strongly fortified by the

Span¬ iards in the 18th century, but the defenses were not well kept up. When Admiral Dewey en¬ tered Manila Bay 1 May 1898 he steamed past this island, which was supposed to be very strongly fortified and to be the base of opera¬ tions for the mines and torpedoes in the bay. The forts have been strengthened by the United States government, which established a military station here in 1900.

CORREGIDOR, ko-ra-he-dor', in Spain, the principal magistrate of a town, appointed by the king. In Portugal the corregidor has administrative but not governing powers.

CORRESPONDENCE SCHOOLS, edu¬ cational institutions that supply, in place of classroom work, such instruction by mail as

may prove a most valuable substitute to those unable to attend the regular colleges or schools ; and the statement has been made that, since the establishment of the correspondence system in the mining districts of Pennsylvania, many thousands of the men have secured through it such an education in the theory involved in their trades as to fit them for much higher positions than they could ever have attained without such education. The University Extension movement in England (1868) undoubtedly called attention to the latent possibilities in the plan and method developed in the United States about 15 years later, when the Correspondence University was founded at Ithaca, N. Y. Important service is ascribed to the correspondence method in con¬ nection with the Chautauqua ((universal educa¬ tion,** idea. Its most concrete manifestation, however, is to be sought in the achievements of the International Correspondence Schools at Scranton, Pa. Organized in 1891, these schools extended their usefulness and increased the enrolment very rapidly, until the latter embraced students in nearly every part of the world; the professions or branches taught ranging from architecture to advertising, from chemistry to window-trimming. Each school is in charge of a principal, who has under him assistant prin¬ cipals and a large force of examiners. See Education Supplimental.

CORRESPONDENCE TEACHING. See

Home Education; University Extension; Correspondence Schools ; Education Supple¬ mental.

CORREZE, kor-raz', an inland department of south-central France. It is named from the river Correze. Area, 2,273 square miles ; capital,

Tulle. The surface is mountainous, especially to the north and east. The soil is far from fer¬ tile, except in a few of the valleys. Heaths occupy a great extent of surface and agriculture is in a very backward state. Hay is abundant and large crops of beet-root are grown, besides maize, barley, hemp, flax, etc., in moderate quantities. Minerals are plentiful, but little worked. The only manufactory of note is that of firearms at Tulle, employing about 1,000 hands. The trade is principally in horses, cattle, wood, nut-oil, beeswax, leather, straw-paper, iron, *etc.* The department is divided into 3 arrondissements, 29 cantons and 287 communes. It forms the diocese of Tulle. Pop. 309,646.

CORRIB, Lough, Ioh kor'rib, a large lake, the second in size in Ireland, between Galway and Mayo, about 23 miles in length and varying from 2 to 6 miles in breadth, and composed of two expansions, united by a narrow channel, about half a mile wide at its narrowest part, across which is a ferry. It is about three miles distant from the sea at Galway, where it is only 14 feet above sea-level. It is separated from Lough Mask by a narrow isthmus, through which there is a subterranean channel. Corrib contains many islands and near it are prehistoric stone-circles/ To the west are mountains 3,000 feet high. On its sides are metamorphic rock, carboniferous limestone and marble.

CORRIDOR (Italian and Spanish, <(that which runs**) , in architecture, a gallery or long aisle leading to several chambers at a distance from each other, sometimes wholly enclosed, sometimes open on one side. In fortification, corridor signifies the same as covert-way.

CORRIENTES, kor-re-en'tes, Argentina, a province bounded by Paraguay on the north, by the territory of Misiones on the northeast and the republic of Uruguay on the southeast, by Entre Rios on the south and the province of Santa Fe and the territory of Chaco on the west. Area, 48,357 square miles. The Parana River forms its boundary on the west and north; the Uruguay River on the east; and there are other streams and lakes. Thus the soil is abundantly watered and well adapted to agriculture. Sugarcane, tobacco, cotton, wheat and maize

are grown extensively; the value of the cattle and horses, however, is much greater than that of the crops, the proportion being about six to one. Its chief industries are shipbuilding, meat-curing and foundries. A railway runs diagonally through the province from the capital, Corrientes, in the northwest, to the southeastern towns on the frontier of Uruguay. The city was founded in 1588, and occupied a place of considerable prominence in the revolutionary movements during the latter half of the 19th century. Pop. about 277,000.

CORRIENTES, Argentina, the capital city of the province of the same name. It is situated on the left bank of the Parana River, and for many years has been an active port for both steamers and sailing vessels. It has several plazas, hospitals for men and women, a national college, a normal school, a theatre and a library. The natural-history museum was at one time managed by the naturalist Bonpland. The city is the centre of a fertile district and has considerable trade in lumber and oranges. At several private shipyards near the city vessels are built of the wood brought from El Chaco, which is remarkably durable. There are also meat-curing establishments and a foundry. The city, founded in 1588, occupied a place of considerable prominence in the revo¬ lutionary movements during the latter half of the 19th century. Pop. 23,904.

CORRIEVRECKIN, kor-ri-vrek'in, a noted strait and whirlpool on the west coast of Scot¬ land, between the islands of Jura and Scarba. The breadth of the strait is about one mile, and because of the noise of the water rushing through it during storms the passage is terrify¬ ing, though not very dangerous.

CORRIGAN, Michael Augustine, Ameri¬ can Roman Catholic prelate: b. Newark, N. J., 13 Aug. 1839; d. New York, 5 May 1902. He made his elementary studies in a private school in Newark and at the age of 14 was sent to Saint Mary's College, Wilmington, Del. In the spring of 1859 he was graduated from Mount Saint Mary's Emmitsburg, and in the fall of the same year entered the American College in Rome. He was the first student from the United States who asked for admission to this now famous college. At Rome in 1863 he was or¬ dained a priest for the diocese of Newark, United States, but remained in Rome another year for further study. He began his duties in the Newark diocese (1864) and was soon ap¬ pointed by his bishop as professor of dogmatic theology and sacred Scripture at Seton Hall Seminary, South Orange, N. J. As vacancies occurred in the seminary he was promoted until in 1868 he was made president of the institution. In 1873 he was elevated to the office of bishop of Newark, remaining at

the head of this diocese for seven years. In its management his executive ability proved to be equal to his charity. He introduced religious communities, founded charitable insti¬ tutions and greatly stimulated the religious life of his diocese. The number of organized parishes increased, and in 1880 he was called to the position of coadjutor of Cardinal McCloskey, archbishop of New York. In October 1880 he received the papal bulls appointing him arch¬ bishop of Petra and coadjutor to the archbishop of New York, with the right of succession. Upon the death of Cardinal McCloskey, Arch¬ bishop Corrigan became archbishop of New York, and the pallium was conferred upon him 4 March 1881. This charge he retained until his death. During the years he was at the head the diocese became one of the largest and most effective in the world. He became known through his many activities as one of the most prominent Roman Catholics in the United States. He was untiring and unobtrusive ; a scholar of high attainments and spiritual power. Consult Mooney, J. A., (Michael Augustine Corrigan; A Memorial > (New York 1902).

CORROBOREE, kor-6b-6-re' or kor-ob'6-re, the Australian name for a gathering of natives, either for religious or festive pur¬ poses. The characteristic feature of these assemblages is a peculiar dance to which the name corroboree is also applied. The gather¬ ings are held on moonlight nights and generally last the whole night through. The men dance while the music is supplied by the women. The words accompanving the songs are made to suit the occasion. This ceremonial is the only great national institution in the primitive life of these people. Consult Roth, (Ethnological Studies among the Northwest-Central Queensland Aborigines) (1897).

CORRODENTIA, a group of primitive in¬ sects allied to the orthoptera, discovered by Burmeister. The corrodentia, as recognized by Brauer, comprise the families Termitidce, Psocidce and the group Mallophaqa, or biting-lice. It is not, however, a very natural assem¬ blage of families and by Packard the corroden¬ tia form a suborder of his order Platyptera, including the stone-flies (Perlidce), the Psocidce, Empidce and T ermitidce , or white ants (q.v.). Kellogg includes the Psocidce and Atropidce, or book-lice, and considers the family to be closely related to the Mallophaga in that both possess a peculiar hard plate in the pharynx. In all except the Psocidce the body is flattened and the head extended horizontally. The prothorax is large, broad and more or less square, while the chest-pieces (sterna) are large and broad, and there are 8 to 11 segments in the abdomen.

CORRODI, kor-rd'de, August, Swiss poet: b. Zurich, 27 Feb. 1826; d. there, 16 Aug. 1885. He studied theology but became a painter and from 1862-81 taught drawing in Winterthur. His first volume of ˆongs* (1853) exhibited graceful versification and deep sympathy with nature, while his songs and dramatic composi¬ tions in local dialect, (Dur und Moll : Aus Natur und Leben> (1855) ; (Waldleben) (1857) ; (Der Herr Professor* (an idyll, 1858) ; (Der Herr Vikari* ; (De Herr Dokter> (1860, dramatized by the author in 1872), had extraordinary suc¬ cess. Most of his works are distinguished by a fine, droll sense of humor. He illustrated

several of his own books. He translated several of Burns' songs into the Swiss-German dialect and published (Shakespeare : Life Wisdom from His Works. } His works are numerous and possess much merit.

CORROSION. See Corrasion.

CORROSIVE SUBLIMATE, also called mercuric chloride, HgCh, bichloride of mercury, perchloride of mercury; prepared by heating mercuric sulphate with dry sodium chloride ; the mercuric chloride sublimes as a white trans¬ parent crystalline mass, having a specific gravity of about 5.43. It is soluble in about 20 parts of cold water and very soluble in alcohol and ether. It precipitates albumen, hence white of egg is an antidote. It is very poisonous, and is used to preserve both animal and vegetable substances. It is used in pharmacy as Liquor hydrargyri perchloridi, and as Lotio hydrargyri flava when mixed with lime. Corrosive sub¬ limate is a powerful irritant and is used ex¬ ternally in skin diseases. It is administered internally in syphilis, usually in conjunction with iodide of potassium. It is also much in use by surgeons in an antiseptic spray and as a cleansing agent for sterilizing their operating instruments. When used as an antiseptic wash for wounds or sores one part of the salt is usually dissolved in from 2,000 to 5,000 parts of water.

CORROSIVES (Lat. corrodere, (<to eat away})), in surgery, rnedicines which corrode whatever part of the body they are applied to; such are

glacial acetic acid, burned alum, white precipitate of mercury, white vitriol, red pre¬ cipitate of mercury, butter of antimony, *etc.*

CORRUGATED IRON, sheet iron formed with parallel ridges and furrows, so that the cross-section is a continuous waved line. Flat sheet metal tends to buckle and get out of shape with every change in temperature. The corru¬ gations, made in one direction, give it greatly increased stiffness and adapt it to numerous purposes for which it would otherwise be less suitable. The sheet metal is corrugated by passing between ridged rollers, whose ridges are opposed like the teeth of gear-wheels. It comes out in the commercial form, and is fre¬ quently subjected to a process of coating with zinc, to protect it from oxidation, and is then known as galvanized corrugated iron.

An important use of corrugated iron is for the flues of large steam boilers. For this purpose mechanism has been devised for form¬ ing the metal into annular corrugated flue pipes which present greatly increased resistance to collapse over the plain form. The heating sur¬ face is materially increased by the corrugations. Later, a flue was manufactured with spiral cor¬ rugations, giving increased strength. This ma¬ terial has also found an extensive use in the construction of cheap partitions, walls and roofs of temporary structures, and for buildings where utility is more valued than ornament.

CORRUPT PRACTICES ACTS. The

effort to eliminate dishonest, irregular and criminal methods of influencing public elec¬ tions has resulted in the enactment of various laws to supplement the common law against bribery and corruption (see Bribe). Such acts enumerate and define the corrupt or illegal practices and fix penalties for the same; they

usually include bribery. in any form, treating, undue influence, intimidation, personation of voters or aiding and abetting in the same, the making of false election returns, the solicita¬ tion of candidates for campaign contributions — save by political committees — the contributing of campaign funds to other than authorized agents, the making or receiving of campaign contributions under an assumed name, the ren¬ dering of a false declaration of election ex¬ penses, *etc.* Many laws forbid the acceptance of campaign contributions from certain sources, especially from corporations and from assess¬ ments levied on officeholders in the civil service.

British Acts. — Statutes to prevent bribery and corruption have been passed in 1729, 1809, 1827, 1842, 1854, 1868 and 1883. The most important of these are the Corrupt Practices Prevention Act of 1854 (which repealed all previous legislation and dealt especially with the practice of electoral bribery), the Parlia¬ mentary Elections Act of 1868 and the Corrupt and Illegal Practices Prevention Act of 1883, which incorporated the act of 1854. The act of 1883 defines and fixes the penalties for the criminal offenses classed as corrupt practices, which consist of bribery of seven different vari¬ eties, treating, undue influence and personation, all of which are punishable by fine or imprison¬ ment and by loss of political rights for seven years. If a candidate for a seat in Parliament be found guilty by a trial court of committing or consenting to corrupt practices, his election is void and he is forever debarred from repre¬ senting the district in Parliament; but should only his agent be proved guilty of corrupt prac¬ tices, the candidate, though personally innocent, may not be elected for the same constituency for a period of seven years. The sections of the act relating to illegal practices as distin¬ guished from ˆcorrupt® practices are intended to limit election expenses. For boroughs of 2,000 voters the maximum expenditure is fixed at £350 while £650 is allowed for counties with the same number of voters with an extra allow¬ ance for each additional thousand in the district. The legal expenditures are enumerated, such as printing and meeting halls, etc., and the number of paid agents is limited. Within 35 days after the election the candidate's agent must file a statement of expenses, certified by the candi¬ date. The corrupt practices law applies equally to parliamentary, municipal, county and parish council elections, and the punishments provided for minor officials correspond with those im¬ posed on parliamentary candidates ; a municipal candidate personally guilty of corrupt practice is forever incapable of holding office, but if guilty merely through acts of his agents he is incapacitated only for three years.

United States Acts. — The Federal govern¬ ment has legislated less regarding corrupt prac¬ tices than the States, since the latter control most of the election machinery. In 1907 Con¬ gress passed an act forbidding corporations to contribute to campaign funds in Federal elec¬ tions; on 25 June 1910 an act was approved providing for publicity of political contributions, requiring each political committee to file a finan¬ cial statement within 30 days after a national election, and on 19 Aug. 1911 an act amending this act was approved extending its provisions to individual candidates as well as to commit¬ tees. Candidates for the House of Representa-

tives are allowed to expend a maximum of $5,000 and for the Senate of $10,000. The can¬ didates for the lower house must file with the clerk not less than 10 nor more than 15 days prior to the election (whether it be a primary election, a nominating convention or a general election) a preliminary itemized statement of receipts and their sources and of expenditures and their objects, besides the more complete statement to be filed within 30 days after the election. The act provided that senatorial can¬ didates must file with the secretary of the Senate (not less than five nor more than 10 days prior to the day on which the State legis¬ lature first ballotted for such candidate) a simi¬ lar itemized statement of receipts and expendi¬ tures, but since 1913, when the Seventeenth Amendment to the Constitution, providing for direct election of Senators, was declared in force, senatorial candidates follow the practice of the Representatives.

All the States and Territories have enacted corrupt practices acts of some sort. The earlier laws related chiefly to bribery, betting on elec¬ tions, etc., but the latest laws so carefully regu¬ late expenditures by party candidates and com¬ mittees and define legal and illegal practices with such particularity that few loopholes exist for ((honest graft,® the most tempting oppor¬ tunity for evading the law being furnished by the allowances for (<necessary personal ex¬ penses® (comprising expenditures for traveling, stationery, postage, express, telephone and tele¬ graph services, etc.), which need not be in¬ cluded in the financial statement. Hence only slight limitations are imposed on the candidates.

New York was the first State to legislate against corrupt practices at elections, passing an act in 1890 requiring candidates to file itemized statements of expenditures on pain of imprison¬ ment and loss of office. As the operations of political committees were not restrained by this law, the defect was remedied by a supplementary law providing that within 20 days after the election the treasurer of such committee shall file an itemized statement giving amounts of contributions with names of donors and details of all expenditures over $5 with the objects and names of persons to whom payment was made. Bribery, personation, illegal registration, the use of false naturalization papers and the aiding of another to do so are punishable by imprisonment not exceeding five years, while giving a bribe also disqualifies for holding office and receiving a bribe

disfranchises for five years. Illegal primary voting is a misdemeanor as is making a false declaration of party affilia¬ tion. The amounts that candidates for various offices may spend are carefully listed, graded and defined, as are also the legitimate expenses that may be incurred by all others connected with the elections. In 1909 New York also prohibited all corporations, save political asso¬ ciations, to make campaign contributions or to expend money for any political purpose what¬ soever, and an officer, stockholder or agent of any corporation guilty of such practice may be imprisoned for one year and fined a sum not exceeding $1,000. Candidates may not be so¬ licited for contributions nor are judicial candi¬ dates allowed to donate. The influencing of voters by promising employment or office was first prohibited by Massachusetts, which State also forbids the publication of unsigned political

advertisements, the subsidizing of newspapers to favor a particular candidate, the contributing of funds to political parties by certain corpora¬ tions and the payment of naturalization fees by political committees.

Several States prohibit electioneering on election day and the giving away of liquor within a certain distance of the polling places, and a few States now bear a part of the election expenses. Oregon limits the amount to be expended on an election and pays part of the expenses of informing voters about candidates and parties. In 1909 Colorado provided that only the State and the candidates should pay the expenses of electing State, district and county officers at general elections. Each politi¬ cal party receives from the State 25 cents for every vote cast for governor by that party in the preceding election, the money being paid to the State chairman who is bonded to guaran¬ tee the legitimate use of such funds and also to vouch that one-half of the sum received by him is distributed among the county chairmen. Candidates may personally contribute a sum regulated in accordance with the amount of the prospective salary or fees. Other persons or corporations contributing to any party candidate or committee or receiving such contributions are guilty of felony. In 1915 Nevada limited the expenditures of any party to $15,000 during one campaign. In the same year Kansas pro¬ hibited a candidate from spending more than 10 per cent of the office salary for the first year, his expenses not including travel. This State also forbids any candidate or organization to provide conveyances to take voters to the polls. California penalizes frauds in connection with initiative, referendum and recall petitions, mak¬ ing such practice a felony punishable by

im¬ prisonment from one to 15 years. Most of the States require the publication of financial state¬ ments at specified intervals before election day and complete sworn statements within a certain time after election, various penalties being imposed for failure to comply. Nebraska re¬ quires not only the itemized statement to be issued 15 days before election but also daily reports thereafter until election of all con¬ tributions over $25. In 1911 Indiana provided that candidates must conduct their financial operations through apolitical agents® to prevent the irresponsible distribution of political funds. South Dakota requires a secretary for each political committee who must receive all con¬ tributions, transfer them to the treasurer and approve all vouchers before the latter officer may expend the funds. Most States require that these statements be open to public inspec¬ tion. See Ballot ; Bribe ; Elections ; Lobby ; United States — The New Democracy and the Spoils System.

Bibliography. — Alysworth, L. E., Corrupt Practices) and (Campaign Expenditures* (in American Political Science Review, Vol. Ill, pp. 50-56, 382, 1909) ; Brooks, R. C., Corrup¬ tion in American Politics and Life* (New York 1910) ; Fox, G. L., Corrupt Practices and Election Laws in the United States since 1890) (in Proceedings of the American Politi¬ cal Science Association,* Vol. 11, pp. 171-186, 1905); Hoyt, A. E. (ed.), <The Cor¬ rupt Practices Acts of New York* (New York 1906) ; Jones, C. L., (Readings on Parties and Elections> (New York 1912) ;

Lowrie, S. G., (Corrupt Practices at Elec¬ tion (Madison, Wis., 1911) ; Lowell, A.

L. , Government of England) (rev. ed., New York 1912) ; Mattison and Macaskie, (The Law Relating to Corrupt and Illegal Practices) (3d ed., London 1892) ; North American Review, V ols. CLXXX, pp. 166-185 (1905) and CLXXXIX, pp. 35-42 (1909) ; Peterson, H. J., Gorrupt Practices Legislation in Iowa} (Iowa City 1912) ; Reinsch, P. S., (Readings on Amer¬ ican State Government (Boston 1911) ; Roby, F. S., (Vote Buying) (in New England Maga¬ zine, Vol. LI, pp. 29-33,

March 1914) ; Schaffner,

M. A., Gorrupt Practices at Elections) (Madi¬ son, Wis., 1906) ; Stimson, F. J., (Popular Law-making) (New York 1910) ; Seton-Watson, R. W., Gorruption and Reform in Hungary: a Study of Electoral Practice) (London 1911) ; and the guides to periodical literature under the titles Bribery, Campaign Funds, Elections, Po¬ litical Corruption, *etc.*

CORRUPTION OF BLOOD, in law, the incapacity to inherit, or pass an inherit¬ ance, in consequence of an attainder to which the party has been subject. In the United States it was abolished by the Federal Con¬ stitution. See Attainder; Forfeiture.

CORRY, Pa., city in Erie County, about 26 miles southeast of Erie, on the Erie, the Philadelphia and Erie and the. Western New York and Pennsylvania railroads. It was settled in 1860, and developed rapidly because of the petroleum deposits which underlie the city and vicinity. It has varied manufactures of iron wares, flour and feed mills, brick works and manufactures of tram locomotives, station¬ ary, gas and steam engines, leather goods, cor¬ sets, furniture, radiators, shovels, wrenches, brushes, toys, *etc.* It has also extensive dairy¬ ing interests. It has several mineral springs, and is the location of the State fish hatchery. The city adopted the commission form of gov¬ ernment in December 1913. Pop. (1920) 7,228.

CORSAC, kor'sak, or ADIVE (Vulpes corsac), a species of fox or dog found in Cen¬ tral Asia, Siberia and Mongolia, sometimes called the steppe-fox. Its color varies from reddish-yellow in summer to a whitish tinge in winter. The Kirghiz hunt the corsac for its soft, thick, warm fur. About 50,000 pelts come to market annually. It is gregarious, prowls by day, burrows and lives on birds and eggs. The corsac stands captivity well and is often seen in zoological gardens. It is much like the American kit-fox (q.v.) in its habits.

CORSAIR, kor'sar (Fr., in origin identical with ((courser)) or "cruiser®), a term employed to denote pirates or their vessels. By the princes of the coast of Barbary the corsairs of their states were commissioned to attack the merchant ships of foreign nations, and they became the scourge of the Mediterranean. See Barbary Powers.

CORSAIR, The, a poem by Lord Byron, published in 1814. The romantic adventures of the hero are continued in Gara.*

CORSE, kors, John Murray, American mil¬ itary officer: b. Pittsburgh,

Pa., 25 April 1835; d. Winchester, Mass., 27 April 1893. He was a cadet at West Point for two years, and in 1860 became a lawyer, but enlisted in the Union army at the outbreak of the Civil War. He was a brigadier-general in 1864; commanded a division

in Georgia, and upon the advance of the Con¬ federates against Allatoona, Sherman helio-graphed him, “Hold the fort for I am coming,® which inspired Ira D. Sankey to compose the famous hymn beginning with these words. Gen¬ eral Corse repulsed the enemy and accompanied Sherman on the march to the sea. After the war he was successively collector of internal revenue in Chicago and postmaster of Boston.

CORSET, an article of dress worn gen¬ erally by women for the purpose of keeping the form erect and trim. It is usually made of two thicknesses of white jean, stiffened by whale¬ bone or steels, closed in the front by heavier steels and laced at the back. It was in use in Germany in the Middle Ages, and was intro¬ duced into France about the time of the Revolu¬ tion. At an early age it was in use in Great Britain and Ireland, at least in the 18th cen¬ tury, and was worn by little girls as a support for the body. The styles of corsets have changed with the styles of dress, the modern tendency being to emphasize the natural figure. Corset manufacture in the United States has increased rapidly since 1899.

CORSICA (Fr. Corse), an island in the Mediterranean belonging to France. It is sep¬ arated from the island of Sardinia, on the south, by the Strait of Bonifacio, about 10 miles wide, and its shortest distance from the mainland is 50 miles. It is distant from France about 100 miles. It is somewhat irregular in shape, but tolerably compact, except toward the north, where it terminates in a long and narrow tongue of land about 22 miles long by about six miles broad. Greatest length, north to south, 110 miles; greatest breadth, near its centre, 53 miles ; area, 3,367 square miles. The east coast is remarkable for its uniformity, presenting a line which is broken in only one or two places by comparatively small indentations. To this the west coast presents a striking contrast, a number of deep bays following each other in rapid and almost uninterrupted succession. Of these the most important, proceeding north to south, are the gulfs of Saint Fiorenzo, Calvi, Porto, Liscia, Ajaccio and Valinco. The interior is traversed by a mountain chain, which has its principal direction north to south, but throws out several lateral branches, particularly to the northwest. The highest summits are near the centre of the island, including Monte

Cinto, 8,881 feet, and Monte Rotondo, 8,612, while others exceed considerably 7,000 feet and the greater part of the year are covered with snow. The mountain masses are chiefly composed of granite and porphyry, and appear to be generally overlaid by extensive beds of limestone. From the east and west sides of the chain numerous streams descend to the opposite sides of the coast. They are mere torrents, . short and rapid, and altogether unfit for navigation. The largest are the Golo and Tavignano. Along the river mouths large quantities of debris^ and alluvium have accumulated which, preventing the egress of the waters, have gradually formed on the east coast a series of lagoons and morasses and made that part of the island very unhealthy; but with this exception the climate is one of the finest in Europe. The heat is sometimes exces¬ sive, but the sky is generally clear and the air bracing. The summits of its many lofty moun¬ tains are covered with pines, evergreen oaks, cork-trees, beeches and chestnuts. In other

parts the hillsides are overgrown with dense thickets of cistus, myrtles, arbutus and other shrubs. Numerous valleys lie between the lofty ridges, and sometimes plains of considerable extent occur, the soil of which is generally fertile and well adapted for the growth of all the ordinary cereals. Agriculture is in a back¬ ward state, and the island produces scarcely a sufficient amount for local consumption. Large tracts of land are uncultivated ; the farming implements in use are of the crudest form. The slopes are covered with vineyards, and the olive trees appear to be indigenous. The mulberry, orange and citron succeed well, particularly in the lower valleys near the coast. One of the most valuable productions of the more elevated districts is the chestnut, on which, at least during the winter months, the poorer inhabitants prin¬ cipally subsist. Among domestic animals, the first place for usefulness and numbers is due to mules and goats. The principal wild animals are the boar and the fox. Deer are numerous and all the smaller game and wild fowl are common ; eagles, vultures and numerous other birds of prey frequent the mountains, and fish abound. The principal source of mineral reve¬ nue is derived from

quarries of fine granite, porphyry and marble. Neither manufactures nor trade have made much progress. The chief exports are wine, brandy, olive-oil, chestnuts, fruit and fish. The inhabitants have the reputa¬ tion of being haughty in temper, passionate and revengeful. Corsica is one of the coun¬ tries in which the vendetta obtains, the taking of private vengeance for the blood of a rela¬ tive, of which a striking picture is to be found in Merimee's <Colomba.)

From the Phoenicians, its first colonists, the island took the name of Cyrnos; and from the Romans that of Corsica. On the decline of the Roman empire it was seized by the Goths and passed from them to the Saracens. In 1481 it fell under the dominion of the Genoese, who retained it, with some interruption, till 1755, when a great part of it was wrested from them and made independent by the celebrated Gen¬ eral Paoli. France, claiming it on a pretended cession by the Genoese, obtained forcible pos-sion of it in 1768, after the inhabitants had distinguished themselves by a long and valiant resistance. At the time of the French revolu¬ tion, Paoli, who had taken refuge in England, returned to his native land, and unfurling the banner of the death's head (the old Corsican arms), he summoned his countrymen to strike for their independence. With the assistance of the British, who landed 18 Feb. 1794, he reduced Bastia in May and Calvi in August. Corsica was constituted a kingdom under the government of a viceroy (General Elliot) ; the constitution and laws of Great Britain were adopted, and a parliament such as Ireland had was established. But a large part of the people were averse to the British, whom they regarded as heretics, and the French party again ap¬ peared on the island in October 1796, under General Gentili. Sickness had reduced consid¬ erably the effective force of the British, and their position was rendered still more critical by the French occupation of the neighboring city of Leghorn, and in consequence they evacuated Corsica. In 1814 it was again in British occu¬ pation. Since 1815 the island has formed a French department. For administrative pur¬

poses the department is divided into five arrondissements — Ajaccio (the capital), Bastia, Calvi, Corte and Sartene, subdivided into 62 cantons and 364 communes. The most dis¬ tinguished individuals to whom Corsica has given birth are Paoli and Napoleon. Pop. 288,820. Consult Caird, (The History of Cor¬ sica > (1899).

CORSICANA, kor-si-ka'na, Tex., city, county-seat of Navarro County; on the Houston and Texas and the Saint Louis Southwestern railroads, 180 miles northeast of Austin. The city is the seat of the State

Orphans' Home and the Odd Fellows' Widows and Orphans' Home, a Carnegie library, sanitaria, a fine courthouse, Federal and high school buildings, a natatorium and an Elks' home. Corsicana is a progressive manufacturing centre, having among its in¬ dustries large cotton mills, gins and com¬ presses, sheet-metal works, broom, harness, candy, overall and soda water factories, cottonseed-oil mills, brickyards, flour mills, a grain elevator, foundry and machine shops, planing mills, *etc.* It is also the seat of an extensive oil industry, there being in its vicinity a number of wells, oil machinery factories and two large refineries. The sewage system is owned by the city. It also has street railways, waterworks, daily and weekly newspapers and three national banks. Pop. (1920) 11,356.

CORSINI (kor-se'ne) FAMILY, a famous Florentine family, known since the 13th century. (1) Andre, Saint: b. Florence, 30 Nov. 1302; d. Fiesole, 6 Jan. 1373. He early entered a monastery in Florence, where he remained for 40 years; he was then made bishop of Fiesole and sent as a papal legate to Bologna, where he was successful in making peace between fac¬ tions and putting an end to civil war. (2) Lorenzo became Pope as Clement XII (q.v.). He restored the Corsini Palace in Rome now containing the interesting Corsene Gallery. (3) Tommaso, Italian politician: b. Rome, 5 Nov. 1767 ; d. there 1856. He was a supporter of Pope Pius IX and was made senator (chief magistrate) of Rome; when the Pope fled from Rome, Corsini went to Florence for a time, but later returned to Rome. (4) His brother Neri: b. 1771 ; d. 1845, was a member of the council in Tuscany under the grand dukes Ferdinand III and Leopold II. (5) Neri, Italian poli¬ tician: b. Florence, 13 Aug. 1805; d. 1 Dec. 1859. He was the younger son of Thomas Corsini and became one of the leaders of the Liberal party in Tuscany. In 1848 he was Minister of War and Foreign Affairs; later the Grand Duke Leopold II offered him the first place in the ministry and he immediately proposed to establish the constitution. The duke, however, would not consent to this and went into exile. The provisional government then organized sent Corsini to London to represent Tuscany there.

CORSNED, kors'ned, or MORSEL OF EXECRATION, a form of trial or purgation formerly made use of in England. See Ordeal.

CORSO, an Italian term first applied to races of riderless horses, then to the long lines of gaily decorated carriages driven through the principal streets of the cities, and afterward to the most fashionable carriage-drive in the city. The Corso at Rome, stretching from the Piazza del Popolo to the Capitol, and dividing the city

into two equal parts, is nearly 3,500 paces in length, and is enclosed by high and mostly splendid edifices ; but its breadth is not propor¬ tionate; so that in most parts not above three carriages can go abreast. The higher class of citizens take the air in carriages, which form a very long row-This evening promenade, which in all large Italian cities is splendid, and is imi¬ tated in very small towns (although it may have only a few coaches), attracts great num¬ bers of spectators on foot. The carnival is the gayest of the festivals, and at this time the Corso appears in its greatest splendor. Goethe has written a description of the Roman carnival and the Corso. See Carnival.

CORSSEN, kors'sen, Wilhelm Paul, Ger¬ man philologist: b. Bremen, 20 Jan. 1820; d. Berlin, 18 June 1875. After studies in philol¬ ogy at Berlin, and two years spent in teaching at Stettin, he was called in 1846 to lecture at Schulpforta, where he remained till 1866, when ill health compelled him to retire. His earliest important work is his treatise, (t)ber Aus-sprache Vokalismus und Betonung der lateinischen Sprache) (1858-59), for which he re¬ ceived the prize offered by the Royal Prussian Academy of Sciences for the best work on that subject. It was followed by (Kritische Beitrage zur lateinische Formenlehreˆ (1863) ; (Kritische Nachtrage* (1866) ; (t)ber die Sprache der Etrusker) (2 vols., Leipzig 1874— 75), in which he labors with great ingenuity and vast learning to prove against the world that the Etruscan language was cognate with that of the Romans. His arguments were vio¬ lently opposed by the classical students every¬ where, especially by Wilhelm Deecke, (Corssen und die Sprache der Etrusker, eine Kritik) (Stuttgart 1875).

CORT, kort, Cornelius, Dutch engraver: b. Hoorn 1536; d. Rome 1578. In his youth he worked for a printseller at Antwerp. He then went to Venice, where he was warmly welcomed by Titian, some of whose pictures he was employed to engrave. Cort finally settled at Rome and established a school of engraving there, and it is said had Agustino Carracci for a pupil. He made the first engraving of the transfiguration > by Raphael, and about 150 prints from the other Italian and

Flemish mas¬ ters, including the two Zucchari, Miziano, the miniature painter Clovio and Michelangelo. His work was not superseded until the advent of Goltzius. This number, considering the shortness of the engraver's life, and the size and fine style of the plates, betokens a consider¬ able amount of industry; but although he had a complete mastery of the graver, he is re¬ proached with deficiency in discriminating deli¬ cate shades and relative distances, or the nice varieties of expression. Consult Longhi, (Cal-cographia) (Milan 1830), and Bartsch, (Anleitung zur Kupferstichpunde> (Vienna 1821).

CORT, Frans de, Flemish poet: b. Ant¬ werp, 21 June 1834; d. near Brussels, 18 Jan. 1878. As singer of the quiet joys of home life and conjugal happiness he has few peers in any literature. He was at first associated with the publication Grondivet, and was later appointed editor of the Schelde (1858). He was secre¬ tary to the general auditor of the military court at Brussels from 1861 until his death. His original homely lyrics appeared in (Liederen)

(1857-59); (Zing-Zang) (1866); and a second volume of (Liederen) (1868). He also trans¬ lated into Flemish verse (The Finest Songs of Robert Burns) (1862) ; as well as those of Jasmin and German verse. After 1861 he con¬ ducted the periodical De Toekomst. In 1869 he edited the posthumous poems of Dautzen-berg, his fatherin-law.

CORT, Henry, English inventor: b. Lan¬ caster 1740; d. 1800. Having at an early age conceived the idea of making England independ¬ ent of foreign countries for the supply of iron, he established himself as an iron merchant at Gosport, Hampshire, and afterward erected iron works at Fontley, near that town, where he expended large sums in perfecting his processes for puddling and rolling iron. His experi¬ ments were successful, in spite of the most disheartening opposition of the most powerful iron masters of England. He took into part¬ nership Adam Jellicoe, chief clerk in the office of the paymaster of the navy, but after his part¬ ner's death the navy board seized his iron works for claims against Jellicoe, involving Cort in law suits, and eventually in total ruin. After his death, the members of his family received insignificant pensions from the government. To him England owes its success in the manufac¬ ture of pig-iron. In 1740 the production amounted to 48,000 tons, while in 1913 it had increased to 15,997,328 tons. He is now com¬ monly styled <(the father of the iron trade,® though Dud Dudley, whose (Metallum Martis} was printed in 1665, has a much better claim to the title.

CORTE, Corsica, the capital of an arrondissement, at the confluence of the Tavignano and Restonica, 52 miles northeast of Ajaccio by rail, picturesquely situated among the mountains and protected by a commanding citadel which has sustained many notable sieges. Corte was the seat of Paoli's reform government. A university founded by that patriot bears his name ; a communal college, an ancient palace, from which Paoli ruled, and an old Franciscan monastery which served as the parliament house in 1765, and the house in which Paoli lived also remain. There are monuments to Paoli, Gen¬ eral Gaffori and General Casanova, Duke of Padua. Marble is quarried extensively in the neighborhood ; lumber, wine, oil and cheese are the staple products. Pop. 5,211.

CORTELYOU, George Bruce, American cabinet officer: b. New York, 26 July 1862. He was graduated from the Hempstead, Long Is¬ land, Institute, 1879, and the State Normal School, Westfield, Mass., 1882. Between 1883 and 1885 he was a general law and verbatim reporter in New York; and a teacher 1885 to 1889, when he entered the public service. He was private secretary to various Federal officials in New York 1889-95; was appointed stenog¬ rapher to the President November 1895; exec¬ utive clerk February 1896; assistant secretary 1898 and became secretary to President Mc¬ Kinley 1 May 1900. President Roosevelt con¬ tinued him in this office until 1903 when he became Secretary of Commerce and Labor. On 6 March 1905 he became Postmaster-General and on 4 March 1907, Secretary of the Treasury. In 1909 he became president of the Consolidated Gas Company.

CORTERREAL, kor-ta-ra-al', Gasper, Portuguese navigator : b. about 1450 ; d. about 1502. In 1500 he was appointed by the king of Portugal to command an expedition to explore the northern coasts of North America. He sailed from the Tagus in 1500 with two ships, ranged the shores of the country afterward called Canada and freighted his ships with 57 Indians, whom on his return he sold as slaves ; and the name Labrador (laborer), afterward transferred to a

more northern region, is a memorial of his visit. Soon after he set sail from Lisbon on a second voyage to the same regions, but never returned. His brother Miguel, who sailed in search of him in 1502, was never afterward heard from. King Manuel sent an expedition to learn their fate but in vain. Consult Harrisse, (Les Corterreal et leurs voyages au noveau monde) (Paris 1883).

CORTES, or CORTEZ, kor-tas', Her¬ nando, Hernan, or Fernando, Spanish con¬ queror of Mexico : b. Medellin, Estremadura, 1485; d. Castillejo de la Castra, near Seville, 2 Dec. 1547. He entered the University of Salamanca, but his penchant for the fair sex soon led to his expulsion and the same cause led to his resolution to leave Spain and try his fortune in the New World. He went to the West Indies in 1504, where Velasquez, governor of Cuba, gave him the command of a fleet, which was sent on a voyage of discovery. Cortes quitted Santiago de Cuba 18 Nov. 1518, with 11 vessels, about 700 Spaniards, 18 horses and 10 small field-pieces, and landed on the Mexican coast. The sight of the horses on which the Spaniards were mounted; the mov¬ able fortresses in which they had crossed the ocean; the iron which covered them; the noise of the cannon; — all these objects alarmed the natives ; and the adventurer by his address gained over the Totonacs and Tlaxcalans, who were his faithful allies to the last. To keep in check another tribe he built a fort and a few houses, which formed the nucleus of the city of Vera Cruz, and in order to prevent the desertion of his soldiers, and to give them the courage of despair, he caused his little fleet to be destroyed. Cortes entered the city of Mexico 18 Nov 1519. Montezuma, the sov¬ ereign of the country, received him as his master; and the inhabitants, it is said, thought him a god and a child of the sun. He destroyed the idols in the temples, to whom human sacri¬ fices were offered, and placed in their room images of the Virgin and of the saints. In the meantime he made continual progress toward getting possession of the country, forming alliances with several caciques, enemies to Montezuma, and assuring himself of the others by force or stratagem. On a general of Monte¬ zuma attacking the Spaniards, in obedience to a secret order, Cortes repaired to the Imperial palace, had the commander and his officers burned alive, and forced the emperor, while in chains, to acknowledge publicly the sovereignty of Charles V. The unhappy monarch added to this homage a present of a large quantity of pure gold, and a number of precious stones. But the jealousy of Velasquez was so much excited by the deeds of his representative, that he sent an army numbering about 1,400 against him. Cortes, with a force not more than 250 strong, advanced to meet it, gained over the

soldiers who bore arms against him, and with their assistance again made war with the Mexicans, who had also revolted against their own emperor, Montezuma, whom they accused of treachery. After Montezuma, who had hoped to restore tranquillity by showing himself to the multitude, had fallen a victim to their rage, Guatimozin, his nephew and son-in-law, was acknowledged as emperor by the Mexicans, and gained some advantage over the Spaniards. He defended his capital during three months, but could not withstand the Spanish artillery. Cor¬ tes again took possession of Mexico, and in 1521 the emperor, the empress, the ministers and the whole court were in his power. The unhappy Guatimozin was subjected to tortures to make him disclose the place where his treas¬ ures were concealed, and was afterward exe¬ cuted with a great number of his nobles. The court of Madrid now became jealous of the power of Cortes, who had been some time before appointed captain-general and governor of Mexico. Commissioners were sent to inspect and control his measures ; his property was seized; his dependents were imprisoned, and he repaired to Spain. He was received with much distinction, and returned to Mexico with an increase of titles, but a diminution of power. A viceroy had charge of the civil administration, and Cortes was entrusted only with the military command and the privilege of prosecuting his discoveries. The division of powers proved a constant source of dissension ; and though he discovered the peninsula of California in 1533, most of his enterprises were frustrated, his life embittered and he returned again to Spain, where he was coldly received and neglected. He followed Charles V in his unfortunate ex¬ pedition against Algiers in 1541 and gave signal proofs of his valor, yet the monarch continued to refuse him admission to the court. It is said that one day, having forced his way through a crowd round the carriage of his king, and put his foot on the step to obtain an audience Charles coldly inquired who he was. (<I am a man,® replied Cortes, <(who has gained you more provinces than your father left you towns.® He passed the remainder of his days in solitude, leaving a character eminent for bravery and ability, but infamous for perfidy and cruelty. Consult Antonio de Solis, (Historia de la conquista de Mejico) (Madrid 1684; and a popular edition in 5 volumes, Paris 1827) ; MacNutt, F. A., (Fernando Cortes and the Conquest of Mexico 1485— 1547> (New York 1909) ; id., ‘Letters of Cortes to Charles V, Translated and Edited, with Biographical In¬ troduction and Notes> (2 vols., New York 1908) ; Ober, (Hernando Cortez* (New York 1905) ; Prescott, ‘Conquest of Mexico) ; Helps, A., ‘Life of Cortez) (London 1871).

CORTES, Jose Domingo, Chilean jour¬ nalist and historical writer: b.

about 1830; d. 1882. After some years spent in journalism he was for a time an attache at Brussels, and sub¬ sequently a government director of libraries in Bolivia. He was a prolific author and among his works are (Diccionario biografico americano) ; (Poetas americanos* ; (Historia de Bolivia) ; (Estadistica bibliografia de Bolivia, * and ‘Republica de Mejico) (1872).

CORTES, kor’tes, the old assembly of the “estates® in Spain and Portugal, the represents-

tives chosen by the “estates® to assist in the making and administering of the laws of Spain and Portugal. In Spain the cortes of Castile, which was composed of the higher nobility, the superior ecclesiastics, the knights of the orders of Saint James, Calatrava and Alcantara and the representatives of certain cities held the first rank during the time of the united Spanish monarchy. In early times the king was very dependent upon the cortes ; indeed, they were invested with the power .of making war and fre¬ quently exercised it in opposition to the throne. In the original constitution of Aragon the form of government was very remarkable, a supreme judge, called the justicia, selected from persons of the second class, presided over the admin¬ istration of the government. He decided all questions and disputes between the king and his subjects, and confined the royal power within the constitutional limits. King Ferdinand of Aragon and Isabella of Castile succeeded in rendering themselves independent of the “es¬ tates® (las cortes) ; and afterward, when the Castilians dared to resist an unconstitutional tax at a meeting convoked at Toledo by Charles in 1538 the king abolished this assembly of the “estates.® After this neither the clergy nor nobility were assembled. Deputies from 18 cities were sometimes, however, convened, but this only in case subsidies were to be granted. Philip II restrained the liberties of the Ara¬ gonese in 1591. After the Spanish war of suc¬ cession Philip V deprived those provinces which had adhered to the Austrian party of the privi¬ leges that still remained to them. From that time the cortes were convened only to pay hom¬ age to the king

or the Prince of Asturias, or when a question respecting the succession to the throne was to be determined. But when Napoleon attempted to extend his influence over Spain he convoked (15 June 1808) a junto of the cortes at Bayonne. In their last session, 7 June 1812, a new constitution was adopted by them. The ninth article regulated the powers and duties of the cortes, and provided that they should consist of 25 archbishops, 25 nobles and 122 representatives of the people. Napoleon afterward attempted, by offering to restore the cortes to their ancient importance, to gain over the Spanish nobility, and through them the people, but failed. The constitution of 1826 was suppressed; but it was restored by Dom Miguel in 1842. The constitution of the Republic (21 Aug. 1911) provides for a cortes consisting of two bodies, an upper and a lower house. The former is chosen by the municipalities and the latter by the people; and the two jointly elect the president for a term of-four years. The Portuguese cortes is coeval with the monarchy. In 1143 the assembly at Lamego was asked to confirm the elevation of Alphonso I to the throne, and replied: “We resolve that he shall be king during his life, and his children after him.® The general prosperity of the country made the people less interested in the cortes, their representatives ; and the kings, elated with success, paid attention to them only when in need of money. Dom Pedro formulated a new constitution in 1826, called the cortes together and abdicated in favor of his daughter, Maria da Gloria. In 1828 Dom Miguel assembled the cortes, in order to be acknowledged by them, and to give his usurpation an appearance of legitimacy. Consult Colmeiro, (Cortes de los

antiguos reinos de Leon y de Castilla) (Madrid 1883-84) ; Desdevises du Dezert, (L’Espagne de l’ancien regime* (Paris 1897-99) ; Muro y Martinez, (Constituciones de Espana* (Madrid 1881); Prescott, (Ferdinand and Isabella) ; Stephens, (Portugal* (in the (Stories of the Nations Series*). See Portugal; Spain.

CORTEX, that portion of an organ usually situated on the outside. Thus the cortex of the brain is the external gray portion in which most of the nerve cells are located.

CORTHELL, Elmer Lawrence, American engineer: b. South Abington (now Whitman), Mass., 30 Sept. 1840; d. Albany, N. Y., 16 May *1916. He was educated at Phillips Exeter Academy and at Brown University. In his second year at Brown University the Rebellion broke out and he enlisted in the First Regiment, Rhode Island Light Artillery, rising from private to captain during the war. Then he re-entered Brown, obtaining successfully*

the degrees of B.A., M.A., and in 1894 Sc.D. He took up engineering work, mainly in the Mis¬ sissippi Valley. After engaging in railroad and bridge construction requiring great skill, he was associated in 1875 with James B. Eads in build¬ ing the jetties at the mouth of the Mississippi River. Among the. many engineering projects in which he participated were the planning with Captain Eads of the ship railway across the Isthmus of Tehuantepec; the building of sev¬ eral large bridges over the Missouri, Ohio and other rivers ; the opening of the Amazon River and the designing of the harbor works at Tam¬ pico, which raised that port to the first rank in Mexico and which he considered his greatest feat. He was consulting engineer of the De¬ partment of Public Works in the Argentine government from 1900 to 1902, represented that country and the United States in various en¬ gineering and navigation congresses of an in¬ ternational character, and was a member of the advisory board of consulting engineers for the New York barge canal. Besides being president of the American Institute of Consulting En¬ gineers and of the Society of Civil Engineers he belonged to almost every engineering society of importance in the world and to various patriotic organizations. Consult (History of the Mississippi Jetties1 (1880) ; (Report on Brussels Navigation Congress) (1898) ; (Maritime Com¬ merce of the World) (1898) ; (Some Ports of the World* (1901) ; (Argentine, Past, Present and Future > (1903) ; (Allowable Pressure on Deep Foundations * (1907) ; Engineering and Commercial Conditions and Problems in Latin America) (1911).

CORTINA, Juan Nepomucena, na-po-moo-cha'na kor-te'na, Mexican adventurer : b. 1830. He took an active part in the Mexican war, organizing a band of independent guerrillas, which later became a part of the national army, and with their commander took part in many of the battles of that contest. After the war he became a general in some of the revolutionary risings, and in 1859 set himself up as an inde¬ pendent ruler along the border line between the United States and Mexico, where he held sway from 1859 until 1863. He became an ad¬ herent of the unfortunate Maximilian, and after his execution again joined the national party, and received his office from President Juarez. In 1876 he was arrested and General Diaz

ordered his execution, but he was shut up in a military prison instead. No record of his death appears.

CORTISSOZ, Ellen Mackay Hutchinson,

American journalist and author: b. New York. She is on the literary staff of the New York Tribune , with which her husband, Royal Cortissoz, is also connected as a literary and art editor. She is the author of (Songs and Lyrics) (1881), and with E. C. Stedman edited the (Library of American Literature> (11 vols.,

1888-94).

CORTLAND, N. Y., city, county-seat of • Cortland County; situated on the Tioughnioga River and the Lackawanna, the Lehigh Valley and the Erie railroads, about 38 miles northwest of Binghamton. It is a farming and manu¬ facturing trade centre, and has several wire-works, foundries, machine shops and manufac¬ tories of carriages, stoves, harness, furniture, cash registers, corundum wheels, motor trucks, piano cases, wall paper and steel ware. The United States census of manufactures for 1914 recorded for the city 59 industrial establish¬ ments of factory grade, employing 2,752 per¬ sons; of which number 2,459 were wage earners, receiving annually $1,474,000 in wages. The capital invested aggregated $5,577,000, and the year's output was valued at $6,438,000 ; of this, $879,000 was the value added by manufacture. The city has electric lights and railways, sev¬ eral churches, a State Normal school, daily and weekly newspapers and three national banks. The government, under a charter of 1900, is vested in a mayor, a municipal council and ad¬ ministrative boards and officials appointed by the executive, the appointments, except the board of education, being subject to the consent of the council. First settled in 1792, Cortland was included in the township of Homer until set off as Cortlandville in 1829. The water¬ works are owned by the city. Pop. 13,000.

CORTONA, kor-to-na, Pietro di, properly PIETRO BERETTINI, Italian painter and architect: b. Cortona, 1 Nov. 1596; d. Rome, 16 May 1669. Pope Urban VIII employed him to decorate a chapel in the church of Saint Bibiena and also to execute the frescoes of the grand salon of the Barberini Palace. Many churches of Rome were decorated by him ; and at Florence he adorned the Pitti Palace for the Grand Duke Ferdinand II. His easel pictures, although of less value are in great estimation. As an architect he did some important work in

church restoration.

CORTONA, Italy, city in the province of Arezzo, northwest of Lake Trasimeno, about 70 miles southeast of Florence. It is one of the oldest cities in Italy, and has, in a good state of preservation, a number of the old Roman buildings. It has well-preserved cyclopean walls, built more than 3,000 years ago, 8,500 feet in circumference, the ruins of the old Roman baths, a museum of Etruscan antiquities, in¬ cluding a remarkable candelabrum with 16 lights, assembled by the Etruscan Academy, founded in 1726; the cathedral of Santa Maria, containing paintings by Luca Signorelli, who was born here in 1441, as was Pietro Berettini in 1596. The ancient Cortona, called <(Kyrtonia® by Polybius, was the strongest of the 12 cities of the Etruscan League. As a Roman colony it lost its importance, but in the 11th century

again prospered. It sided mostly with the Ghibellines, came into the possession of the Casale family in the 14th century, in 1409 was given by the last of the house to Ladislaus of Naples, and by him in 1412 to Florence. Con¬ sult Della Celia, (Cortona Antica) (Cortona 1900). Pop. 29,659.

CORUMBA, ko-room'ba, Brazil, town of the state of Matto Grosso. It is situated on the Paraguay River, near the Bolivian border, and has the largest trade of any place in the state. The receipts at its custom-house average annually $621,270. The principal products of Matto Grosso, mate, cattle, beef, hides, skins, rubber, etc., are shipped from this point. Here also is located the important arsenal of Ladario. Pop. 10,000.

CORUNA, ko-roo'na, La, Spain, seaport in the province of the same name in Galicia, on the northwest coast, on a peninsula at the en¬ trance of the Bay of Coruna. It consists of an upper and a lower town, the former built on the eastern side of a small peninsula, and the latter on the isthmus connecting the peninsula with the mainland. The harbor, which is well protected, is deep, spacious, and safe, and many improve¬ ments have lately been made. Coruna is the centre of an extensive commerce, the exports comprising live stock, fruits, vegetables, wine, hams, sardines, leather, peat, etc., while the principal imports are sugar, hides, coal, oil and manufactured articles. There is also an im¬ portant coastwise trade. The city has a large variety of manufactures, including cigars, linen goods, canvas, cordage, lumber, barrels, paper, *etc.* There is a large government tobacco fac¬ tory. There is a lighthouse 92 feet high, called the Tower

of Hercules, and supposed to be of Carthaginian construction and to have been re¬ modeled in Trajan's time. Pop. 45,650. The chronicled history of Coruna dates from the Roman occupation. In the Middle Ages, it was called Caronium. It was part of the emirate of Cordoba for some time, and suffered severely in the reconquest. The Portuguese captured the town in 1370. Here in 1386 John of Gaunt landed to urge the claims of his wife, Doha Constanza, to the Castilian crown, and in 1554 Philip II sailed from the port to marry Queen Mary of England. Coruna was the point of departure of the ((Invincible Armada® in 1588, and in the following year it was taken by Drake and Norris and nearly destroyed. The harbor was the scene of English naval victories over the French in 1747 and 1805. Coruna is famous for the repulse, on 16 Jan. 1809, of the French under Marshal Soult, by Sir John Moore, who succeeded in withstanding the French attempt to stop the English embarkation, but lost his life in the battle. The engagement took place on the heights of Elvina. In 1823 the city fell into the hands of the French. In 1836 it was captured by the Carlists. The result of the Spanish-American War in 1898 was disastrous to Coruna's trade with Cuba and Porto Rico. The province of La Coruna contains another excellent harbor especially adapted for a naval station, namely Ferrol. It has many mineral springs which have been little exploited. The sea-fisheries are the prime industry. Pop.

631,000.

CORUNDUM, or ADAMANTINE SPAR,

a native oxide of aluminum, A1203, crystallizing

in the rhombohedral system, and also occurring massive. Its hardness is nine, and its specific gravity about four. It is adamantine or vitreous in lustre, and very variable in color. Three varieties are commonly recognized. Of these the first is known as sapphire, and includes those specimens that are used as gems (q.v.). The typical sapphire (q.v.) is blue, the red kind being known as (<oriental ruby,® the yellow as ((oriental topaz,® the green as ((oriental emerald,® and the purple or violet as ((oriental amethyst.® The colors of these gems are due to the pres¬ ence of traces of certain metallic oxides. The second principal

variety of the mineral is that which is known in the arts simply as ((corundum,® and is used as an abrasive (q.v.). It in¬ cludes the less transparent varieties of blue, brown, black, gray or white colors. It is either crystallized or granular, or in masses showing distinct parting. The third variety, ((emery,® is not pure, but is an intimate mixture of corun¬ dum with magnetite or hematite. It has long been one of the most important abrasives (q.v.), but it is now being superseded by the greatly superior pure corundum. This usually occurs in crystalline rocks such as granite, gneiss, nepheline-syenite, granular limestone, also chlo¬ rite and mica-slate. Sapphire and ruby (qq.v.) are usually in alluvial deposits and in the beds of rivers. The Canadian corundum deposits, discovered a few years ago, are the largest and most important known. Corundum is also found in many other localities, notably in North Carolina, Georgia, Montana and India. The commercially valuable deposits in the United States occur chiefly as segregations in ultra basic igneous rock (dunite) in North Carolina and Georgia, while the Canadian deposits occur as pegmatite dikes (q.v.).

CORVALLIS, Ore., town and county-seat of Benton County, situated in the western part of the State on the Willamette River and on the Southern Pacific and the Oregon Central and Eastern railroads. It also has steamboat service for two-thirds of the year, and as the centre of an agricultural district has considerable ex¬ port trade, particularly in wheat. It has saw¬ mills, planing-mills, a carriage factory, flour¬ mills, woolen mills, brick and tile factories, and other manufacturing industries. Dairying, stock raising and the raising of fruit and berries are important occupations. It is the seat of the State Agricultural College. Pop. (1920) 5,752.

CORVEE, kor-va (Fr., from Lat. cura vice, ((care of the road®), the obligation of the inhabitants of a certain district to do certain labor for the feudal lord or the sovereign gratis or for pay. Corvee originally meant compul¬ sory labor on roads, bridges, etc., but it is ap¬ plied also to other feudal services. In some parts of Germany they still exist. In Prussia they were abolished under Hardenberg's ad¬ ministration. In France the first revolution extirpated this relic of the feudal times.

CORVETTE, a term applied to a flush-deck vessel, ship-or bark-rigged, having only one tier of guns, usually not more than 26, either on the upper or main deck, ranking between a brig and a frigate. The term is no longer used.

CORVEY, kor-va', or KORVEI, a formerly renowned Benedictine abbey near Hoxter in the Prussian province of Westphalia, founded in 816; an early centre of German civilization.

Wittekind, the historiographer of the convent, Bruno, known afterward as Pope Gregory IV, and many other learned men were educated here. To its library belonged the only manu¬ scripts of the first six books of the (Annals of Tacitus) discovered here in 1514. In 1793 it was made a bishopric by Pius VI. Its territory then embraced about 22 square miles, with 10,000 inhabitants. In the first quarter of the 19ih century Corvey passed in quick succession into the possession of the House of Orange, of Westphalia, of Prussia, and of the Duke of Ratibor, to whom it now belongs. The church of the abbey or castle of Corvey is built in the Gothic style, magnificently adorned in the interior and contains a number of monuments of successive dynasties, and has a rich and exten¬ sive library; but the ancient collection of the Benedictines is no longer in existence. Certain brief (Annales Corbeienses) from 648 to 1148 are printed in the (Monumenta Germanise His¬ torical Consult Wigand, (Geschichte der Abtei Korvey) (Hoxter 1819).

CORVIDAE, kor'vi-de, a family of pas¬ serine birds containing the crows and their allies, closely related to the blackbirds (Icteridce), starlings (Starnidce) , birds of paradise (Para - diseidce) and larks (Alaudidce) . The bill is generally strong, more or less compressed; the upper mandible to a certain extent curved, the tip notched; the nostrils are covered with stiff bristle-like feathers pointing forward; there are 12 retrices in the tail and 10 primary wing feathers. Most ornithologists now recognize three sub-family divisions, the Fregiiince or choughs, the Garrulincc, or jays and magpies, and the Corvinoe, or crows, of which the last two are represented in North America by numerous species. About 150 species, dis¬ tributed in upward of 35 genera, are found in all parts of the world except a few islands of the south Pacific region. Callceas and its allies of the New Zealand islands are sometimes in¬ cluded as a fourth sub-family.

CORVINUS, kor-vl'nus, Matthias. See

Matthias I. Corvinus.

CORVO, the westernmost island of the Azores (q.v.) or Western Islands and the near¬ est European point to America. First men¬ tioned in (The Book of the Spanish Friar) written about 1350, of

which a translation by Sir Clement Markham was issued by the Hak¬ luyt Society in 1912. It appears on Atlante Mediceo map attributed to 1351. The name sig¬ nifies Sea Crow. The island is an extinct vol¬ canic crater uplifted about 300 feet above the sea. It is about six miles long and_ three miles wide with population of about 950. Consult Babcock, W. H., Geographical Review) (Vol. V, pp. 66-72, 18 Jan. 1918).

CORVUS, Marcus Valerius, Roman gen¬ eral : b. about 371 b.c. ; d. about 270 b.c. He was twice a dictator, six times a consul and occu¬ pied the curule chair 21 times. He distinguished himself in the first Samnite war, and, according to the legends, was assisted in killing a gigantic Gaul in single combat by a raven, which picked out the eyes of his antagonist.

CORWIN, Edward Tanjore, American clergyman : b. New York, 12 July 1834; d. North Branch, N. J., 22 June 1914. He was graduated at the College of the City of New York (1853), and at the New Brunswick, N. J., Theological

Seminary of the Reformed Dutch Church. He held New Jersey pastorates at Paramus 1857-63, and Millstone 1863-88, when he became rector of Hertzog Hall, New Brunswick. In 1897-98 he was in Holland as special agent of the Synod of the Reformed Church collecting from the Archives of the Classis of Amsterdam and else¬ where the so-called ((Amsterdam Correspond¬ ence** of the Colonial American Dutch churches with the Classis of Amsterdam. From 1899 to 1907 he lived in New Brunswick, N. J., and at North Branch, N. J., from 1907 until his death. He has published (Manual and Record of the Church of Paramus) (1858); Manual of the Reformed Protestant Dutch Church in North America-* (1859); (The Millstone CentenniaP (1866) ; (The Corwin Genealogy in the United States* (1872) ; (Ecclesiastical Records of New York State) (1905) and many articles and ad¬ dresses published in papers, pamphlets and magazines on historical and biblical subjects.

CORWIN, Thomas, American statesman and orator: b. Bourbon County, Ky., 29 July 1794; d. Washington, D. C., 18 Dec. 1865. He was admitted to the bar at Lebanon, Ohio, in 1817, and elected to the Ohio legislature in 1821. He became a member of Congress in 1831 ; was governor of Ohio 1840-42; United States senator 1845-50 ;. Secretary of the Treasury 1850-53 ; member of Congress 1859-61, and United States Minister to Mexico 1861-64. He was an eloquent orator and one of his most famous speeches was delivered in the Senate 11 Feb. 1847, in opposition to the Mexican War. Con¬ sult Russel, (Thomas Corwin* (Cincinnati 1882), and Morrow, J., (Life and Speeches of Thomas Corwin * (Cincinnati 1896).

CORY, Charles Barney, American natural¬ ist : b. Boston, Mass., 31 Jan. 1857. He is a director in many important corporations, but best and most widely known as an expert verte¬ brate zoologist. He is an honorary curator _of the Field Columbian Museum, Chicago, and a Fellow of the Linnsean and Zoological societies of London, England. His published works in¬ clude (A Naturalist in the Magdalen Islands1* (1878) ; (Birds of the Bahama Islands) (1880) ; 'Southern Rambles: Florida* (1881); 'The Beautiful and Curious Birds of the World* (1883) ; (Birds of Haiti and San Domingo* (1884—86) ; (Birds of Eastern North America* ; (How to Know the Ducks, Geese, and Swans of North America* ; (How to Know the Shore Birds of North America* ; (The Birds of the West Indies* ; 'Key to the Water Birds of Florida* ; 'Key to the Birds of Eastern North America* ; 'Hunting and Fishing in Florida* ; Montezuma's Castle, and other Weird Tales* (1899); (Dr. Wandermann* ; 'The Birds of Illinois and Wisconsin* (1909) ; Mammals of Illinois and Wisconsin* (1912) ; description of Twenty-eight New Species and Subspecies of Neotropical Birds* (1913).

CORYAT, Thomas, English traveler: b. Odcombe, Somerset, 1577; d. Surat, India, De¬ cember 1617. He published in 1611 some of his traveling experiences, 'Coryat's Crudities,* etc., a curious book, to which quizzical verses in various ancient and modern languages, written by Ben Jonson, Donne and other authors, are appended. The latter were afterward published separately under the title of (Odcombian Ban¬ quet,* with an advertisement reflecting satiri¬

cally upon Coryat, who was a butt of the wits with whom he associated in London. In a second volume, however, entitled 'Cramb, or Colwort Twice Sodden,* published the same year, he protested that the verses were appended to the former without his consent. In his first journey, which occupied five months in 1608, he traveled nearly

2,000 miles in Europe, about one-half of which distance he walked. He de¬ parted on his second journey in 1612, explored the Levant, resided for a time at Constantinople, examined the vestiges of Troy, visited as many of the sites of the seven churches of Asia Minor as he could discover, and reached India with the intention of proceeding thence through China, the plains of Tartary and Ethiopia, and of <(casting his eyes upon many other places.**

CORYBANTES, beings mentioned in Greek mythology which were said to have sprung from Corybas, son of Cybele and Iasion, who appointed them to perform religious serv¬ ice for his mother, the goddess Cybele, in Crete and Phrygia. They engaged in wild re¬ ligious dances to the accompaniment of the music of flutes, cymbals, *etc.* There were also Corybantes who were regarded as a class of deities resembling the Cabeiri, and of whom little is known. According to ancient traditions, they were descendants of Hephaestus (Vulcan). The name is sometimes given to the priests of Cybele, as it was said they imitated the dance of the Corybantes. Consult Frazer, ‘Adonis, Attis, Osiris* (London 1907, in part IV of (The Golden Bough*).

CORYDALIS, or ALDER-FLY, one of

our largest insects, whose net-veined wings ex¬ pand nearly six inches. It is a member of the neuropterous family SialididcB, and is named Corydalis cornutus in allusion to the enormously long horn-like mandibles of the male, used as claspers in the act of pairing, those of the female being large, but short, broad and toothed. The larva is called in the northern States dobson or hellgramite, and among the Missis¬ sippi fishermen it is known as crawler ; it is much esteemed as bait. The larva lives for nearly three years under stones in brooks ; is nearly three inches long, with six legs and big jaws, and along each side of the hind-body is a series of long filamentary appendages, at the base of which are short bushy or spongy gills. It breathes by the spiracle during its later larval life, when it lives out of the water. It trans¬ forms into a chrysalis in the earth on the banks of brooks. The female lays from 2,000 to 3,000 eggs in a mass. Though very ferocious in ap¬ pearance, the insect, which sometimes alights on one’s dress, is entirely harmless. Consult Davis, ‘Aquatic Insects in New York State* (Albany 1903) ; Howard, ‘The Insect Book* (New York 1901) ; Kellog, (American Insects* (New York 1908) ; Miall, (The Natural History of Aquatic Insects* (London 1895).

CORYDON, Ind, town and county-seat of Harrison County, 25 miles southwest of Louis¬ ville, on the Louisville, New Albany and Corydon Railroad, and on Indian Creek. It contains a sulphur spring which

attracts a great number of vacationists and valetudinarians. From 1813 to 1816 Corydon was the capital of the Terri¬ tory, and of the State from 1816 to 1825. The old capitol building still stands. Morgan's

raiders attacked a small Federal force here in 1863. Pop. (1920) 1,785.

CORYDON, Iowa, town and county-seat of Wayne County, situated in the southern part of the State, 81 miles south of Des Moines, on the Keokuk and Western and the Chicago, Rock Island and Pacific railroads. Corydon is essen¬ tially an agricultural town and exports a large amount of timothy seed. The electric-light plant, sewer and waterworks are under munic¬ ipal ownership and control. Pop. (1920) 1,807.

CORYMB, in botany, a form of indefinite inflorescence, in which the flower-stalks, though springing from different parts of the main axis, have their lengths such that their tops form a flat or nearly flat surface. Examples are meadow-sweet, hawthorn, candytuf, *etc.*

CORYMBUS, in ancient sculpture, the wreath of ivy-leaves, berries or garlands with which vases were encircled. The term is also applied to that style of dressing the hair among the Grecian women, in which it was tied in a knot on the top of the head. The Venus de' Medici represents the simplest form of this head dress.

CORYPH2ENA, kor-i-fe'na, a genus of fishes of the family Coryphcenidce, related to the mackerels. The body is elongated, compressed and covered with small scales, and the dorsal fin extends the whole length of the back, or nearly so. The dolphin of the ancients is the C. hippuris. All the species, natives of the seas of warm climates, are very rapid in their mo¬ tions, and very voracious. They are of brilliant colors and are objects of admiration to every voyager.

CORYPH.7EUS, kor-i-fe'us, the leader of the chorus in the ancient

dramas. His func¬ tions, however, were often as wide as those of our stage-manager, conductor and ballet-master. The name is now applied to the leaders of the different parts in operatic choruses, or the prin¬ cipal dancers in the corps de ballet. By exten¬ sion it is also applied to those eminent in the arts or sciences.

CORYPHODON, k6-rif'6-don, a fossil ungulate of the extinct order Amblypoda (q.v.), found in the Lower Eocene sediments of Europe and America. The feet were short and post-like, somewhat like those of elephants, while the head resembled rather that of a hippopotamus with large flaring front teeth covered by a broad fleshy muzzle, and the skeleton had many archaic and peculiar char¬ acters. The coryphodon was the largest land animal of its time, intermediate in size between the tapir and rhinoceros. A mounted skeleton has been erected in the American Museum of Natural History, New York.

CORYZA (Gr. nopv£af ˆcatarrh®), a cold in the head. See Cold.

COS, or KOS, island belonging to Greece; situated off the southwest coast of Asia Minor, in the yEgean Sea; length about 25 miles; area about 110 square miles. It is noted as the birthplace of Hippocrates and Ptolemy II, surnamed Philadelphus, and it claims the honor of being the birthplace of the Greek artist, Apelles. The surface rises partly into rugged hills, but a considerable portion is fertile and well culti¬ vated, yielding grapes, oranges, olives, pome¬ granates, *etc.* The modern town of Cos is well

built, and contains a large quadrangular for¬ tress erected by the Knights of Rhodes in the 14th century. The harbor is now so filled up that only small vessels can enter. In the Iliad we find mention of this island as one of the allies of the Greeks. Later it was annexed to the Dorian Hcxapolis. It changed hands many times until its capture by the Turks in 1523. In 1912 it was captured by the Italians but restored in the same year to the Turks with the other Hfgean Islands. During the Balkan War, a movement was pushed for the union of Cos with the Greek kingdom. By the Treaty of London 30 May 1913, the final disposition of the /Egean Islands was left to the Powers. The Italian occupation of Cos continued till the sign¬ ing of the Peace Treaty with Turkey, when Italy ceded Cos to Greece. In Cos was manu¬ factured a fine, semi-transparent kind of silk, much valued by the ancients. Pop. about 10,000.

COSALITE, an important bismuth ore con¬ taining 42 per cent of that

metal with formula Pb-BbSs. Occurs in Colorado, Utah and Wash¬ ington.

COSCINOMANCY, or COSKIN—

OMANCY, a kind of divination effected by means of a sieve, which was either suspended or fixed on the point of a pair of shears. The diviner then uttered a certain formula, and repeated the names of any persons susoected of a crime. If the sieve moved at the mention of any name, that person was considered guilty.

CO.SEGUINA, ko-se-gwe'na, a volcano in the western part of Nicaragua on a peninsula south of the Gulf of Fonseca. The mountain is cone-shaped and 4,000 feet high. It is remark¬ able on account of the eruption of 1835, begin¬ ning 20 January and lasting three days. The country within 100 miles was darkened by the cloud of ashes, and ashes were carried as far as Jamaica and Mexico. It is now quiescent.

COSEL, or KOSEL, Silesia, capital of a district of the province on the Oder, at the confluence of the Klodnitz, 25 miles southeast of Oppeln. It is a garrison town, has a castle, and was formerly surrounded by walls, the site of which has been converted into boulevards. A fine monument commemorates the unsuccess¬ ful siege by the French in 1807. The town manufactures celluloid, lumber, flour, malt, beer, bricks and refined petroleum. It was the capital of a former duchy in the 14th century. Pop.

7,832.

COSELEY, koz'li, England, town in Staf¬ fordshire, within the parliamentary boundaries of the borough of Wolverhampton, eight miles northwest of Birmingham. There are iron foundries, nail, hook, chain and screw works, stove-grate manufactories, cement works, malt¬ ing establishments and brick-fields. There are extensive iron and coal mines in the district. Pop. 22,834.

COSENZA, ko-sent'sa (anciently, Cosen-tia), Italy, city of the southern part, capital of the province of Cosenza (Calabria Citeriore), situated on seven small hills, at the foot of the Apennines, where the Busento joins the Crati, 150 miles southeast of Naples. The metro¬ politan is the only church within the walls; but there are three parish churches in the suburbs. The cathedral, of the 13th century which has been restored, contains the tombs of Louis III

COSHOCTON

of Anjou and Isabella, consort of Philip III of France. In the public gardens are a figure of Liberty by Giuseppe Pacchioni, erected to those who took part in the Calabrian rebellion of 1844, and busts of Garibaldi, Cavour and Mazzini. It contains one technical school, two academies of science and fine arts and one col¬ lege. The environs are beautiful, populous and well cultivated, producing abundance of corn, fruit, oil, wine and silk. It manufactures faience, iron and steel ware. This town was anciently the capital of the Brutii, and a place of consequence in the Second Punic War. It is supposedly the burial place of Alaric, king of the Visigoths. Cosenza has frequently suffered from earthquakes, particularly in the years 1638, 1783, 1854 and 1870. Pop. about 20,000.

COSHOCTON, ko-shok'ton, Ohio, city and county-seat of Coshocton County, situated on the Muskingum River, on the Ohio Canal and on the Pennsylvania, the Pittsburgh, Chicago, Cincinnati and Saint Louis and the Wheeling and Lake Erie railroads, 69 miles northeast of Columbus. The city has four large advertising and sign manufactories employing about 1,000 hands, machine-shops, pipe works, automobile, carriage, furniture and glass factories, pot¬ teries, flour-mills, iron and steel works and a paper-mill. There is an abundant supply of gas, iron and coal nearby. There are three banks, with a combined capital of $225,000. There are four public schools, and an excellent public library, and 10 church edifices. Settled in 1811, Coshocton became a borough in 1848, and a city in 1902. Municipal affairs are ad¬ ministered by a mayor and council of seven members, elected biennially. The city owns and operates its waterworks. Here after a long struggle, Colonel Boquet concluded a treaty with the Delaware Indians in 1765. Pop. 10,847.

COSMATI FAMILY, a family of archi¬ tects and sculptors who flourished in Rome from the last half of the 12th century to the beginning of the 14th, who are known prin¬ cipally through their inscriptions. The more prominent members of the family were Lorenzo (2d half of 12th century), Cosma (about 1210— 35), Luca (1231-35), Jacopo (1231-93), Giovanni (1296 and 1303), Adeodato (1294). They won their fame by their decorative archi¬ tectural work, known as Cosmati or Roman work, distinguished by the use of mosaic and colored marbles. Among their best works are the entrance to the cathedral of Civita Castel-lana, the cloisters of the Lateran and the

abbey-house of Saint Pool; the door of Saint Saba; choir-screen in Saint Lorenzo fuori le Mura ; tombs in Santa Maria sopra Minerva, in Santa Maria Maggiore and in Santa Balbina ; the chapel of the Sancta Sanctorum in the Lateran; the marble altar at Saint Cesareo and the mag¬ nificent cloisters at Saint Paolo fuori le Mura. A large number of unsigned works bv members and pupils of the same family are to be found in Rome. They are mainly minor pieces : baldacchini, candlesticks, tombs, etc., all remark¬ able for their exquisite sculpture and beautifully decorative mosaics. Gothic lines predominate in their style, but the defects of the execution of detail were offset by the beauty of their mate¬ rials. Consult Boito, (Architettura del medio evo) (Milan 1880) ; Muntz, E., (Etudes sur l'histoire des arts a Rome pendant le moyen

age> (Rome 1881) ; Frothingham, (Monuments of Christian Rome) (New York 1908) ; Clausse, G., (Les Monuments du Christianisme au moyen age} (Vol. II, Chap. XXII, Paris 1893).

COSMETICS (Gr. noa/ir/Tiiidg from noo/uelv , ((to decorate®), means for preserving or increas¬ ing the beauty of the human body. Such means are used by the most savage as well as the most civilized nations. Cosmetics consist of perfumed waters, oils, salves and powders and are applied to various parts of the body, the face, hair, teeth and hands. Their purposes are to add or change color, to remove blemishes, whiten teeth, perfume the breath or deodorize any offensive natural odors and stimulate growth of hair. Most of the powder prepara¬ tions for the skin are injurious for they often contain poisonous substances and clog the pores of the skin, thus interfering with its natural functions. Excessive use of creams serves to enlarge the pores of the skin and make it wrinkle early. Manicuring and hair-dressing belong to the cosmetic art. Cosmetic surgery is practised to remove positive disfigurements, such as birthmarks, moles, harelip, superfluous hairs, *etc.* Consult Peisse, G. W. S., (Des odeurs, des parfums, et des cosmetiques> (Paris 1856; Eng. trans., Philadelphia 1857) ; Hirzel, ˆoillettenchemie? (Leipzig 1874) ; Roller, Thomas, (Cosmetics: a Handbook of the Manufacture, Employment and Testing of All Cosmetic Materials and Specialties) (trans. from the German by Chas. Salter, London

1911).

COSMIC DUST. See Dust.

COSMICAL GEOLOGY, or COS¬ MOGONY, that branch of geology that treats of the origin of the earth and its relations to the rest of the solar system and to the universe in general. See Cosmogony, and the section on Cosmogony in the article on Geology.

COSMOGONY. From the Greek noc/j,oy6via} meaning creation of the world. It is authenti¬ cated by Philolaiis and Plutarch that Pythagoras himself used the word *cooy*or, to denote the order of the world, to which is added yevia, origin ; the word Koagoyovta being first used as the title of a work by Parmenides (born 544 b.c.) who was the revered teacher of Plato. The term is now used to designate theories in regard to the origin and development of the solar and stellar systems, and the universe in general.

From the earliest ages the subject of cos¬ mogony has been considered so important for human thought that, by way of poetry and al¬ legory, it usually enters into the religious teachings of the different peoples, as the Greeks, the Hebrews, Egyptians, Persians and Hindus ; in fact, it is almost as prevalent among primitive races as mythology and folklore, with which, in early literature, it is usually con¬ nected. The cosmogony of the Book of Gene¬ sis may be considered the most advanced de¬ velopment of Hebrew thought, as modified by the learning of the Chaldeans and Egyptians.

Among the Greeks cosmogony was first treated by the poets in a very primitive man¬ ner, and afterward developed into more of a science by the natural philosophers, — such as Thales, Anaximenes, Anaximander, Xeno¬ phanes, Parmenides, Empedocles, Anaxagoras, Plato and Aristotle. The highly artistic doc-

trine set forth in Plato's (Timaeus probably represents the highest development of Greek thought on this subject, though from a mod¬ ern point of view the theories of the school of Atomists, founded by Leucippus and Democri¬ tus, are the most interesting because they pre¬ dicted the development of vortices such as we find among the spiral or whirlpool nebulae, disclosed by modern astronomical observations. Thus the Greeks were the first to attempt to explain the origin and motions of the heavenly bodies, and how these motions originated; and we shall therefore pass over the other early writings, and notice only the cosmogony of the Greek Atomists, since this alone approaches the requirements of modern astronomy.

In his (Outlines of the History of Greek Philosophy, > the late Prof. Edouard Zeller, of the University of Berlin, summarizes the views of the Atomistic School thus: <(On account of their weight, all the atoms from eternity move downward in infinite space ; but according to the Atomists, the larger and therefore heavier atoms fall more quickly than the smaller and lighter, and strike against them ; thus the smaller are impelled upwards, and from the collision of these two motions, from the con¬ cussion and rebound of the atoms, a whirling movement is produced. In consequence of this, on the one hand the homogeneous atoms are brought together ; on the other, through the entanglement of variously shaped atoms, com¬ plexes of atoms, or worlds, segregated and eternally sundered, are formed. As motion has no beginning, and the mass of atoms and of empty space has no limits, there must always have been innumerable multitudes of such worlds existing under the most various condi¬ tions, and having the most various forms. Of these innumerable worlds our world is one.® (Cf. Zeller's <Outlines,) p. 79).

The theory of the Atomists here set forth is erroneous in ascribing the collisions to the more rapid fall of the heavier atoms ; yet this accorded with the teachings of physics coming down from the time of Aristotle. This falla¬ cious doctrine was first overthrown by Galileo's discovery of the true law of accelerative force, under which heavy and light bodies fall with the same velocity. Leaving out of account this

defect in physical theory, the Greek explana¬ tion of the origin of vortices is clear and is the first attempt of scientific character at explain¬ ing the motions of rotation and revolution noticed among the heavenly bodies.

DEVELOPMENT OF THE SOLAR SYSTEM.

Laplace's Nebular Hypothesis. — Not long after Galileo's invention of the telescope in 1610, and its application to the heavens by his immediate successors, it was found that the Sun and Mars were rotating on their axes, that Jupiter had equatorial belts and a system of four satellites whirling about that great planet, and that the planet Saturn was surrounded by the system of rings. The rotation of the earth on its axis had been taught by Aristarchus of Samos (who flourished about 27 0 b.c.), and was fully established by the great work of Coper¬ nicus, published in 1543. Similar rotatory mo¬ tion of the other planets was now proved by the telescopic discoveries of Galileo. So many motions of rotation and of revolution naturally increased the complexity of the system of the

world; and when philosophers began to cast about for the cause of these things, Kepler suspected that the rotation of the sun had some influence on the orbital motions of the planets. In fact, he thought that subtle spirits emanating from the surface of the sun had impressed themselves on the motions of the planets, so that they were carried around tangentially in the same direction. This is the earliest hint of the theory afterward developed by Kant and Laplace under the name of the ((nebular hy¬ pothesis.® The term nebulae designates patches of luminous matter occurring in the sky and differing from the stars in that they present large surfaces of varying brilliancy instead of small definite points of light.

We shall not go into the details of the early history of the nebular hypothesis, beyond re¬ marking that in various forms it was imper¬ fectly outlined by Emanuel Swedenborg (1688-1772) ; more satisfactorily treated by Thomas Wright (1711-86), of Durham, England; Im¬ manuel Kant (1724-1804), of Konigsberg, Prus¬ sia ; and finally put on a much more scientific basis by the telescopic explorations of Sir Wil¬ liam Herschel (1738-1822), and the mathe¬ matical genius and dynamical judgment of the great French astronomer Laplace (1749-1827). Swedenborg's Cosmogony was the

earliest, 1734. Wright's work dates from 1750; Kant's from 1755, and he acknowledges his indebted¬ ness to Wright; Herschel's from 1791, after years of mature observations on nebulae; while Laplace's theory of 1796 was the outcome of a quarter of a century of profound study of the mechanics of the solar system.

On account of the great mathematical pres¬ tige of the illustrious author of the (Mecanique Celeste, J it was natural that Laplace's theory should be the one most generally ac¬ cepted by men of science. According to this view the matter now constituting the sun and planets was originally diffused into an oblate planetary nebula. Sir William Herschel had recently observed and catalogued great num¬ bers of planetary nebulae throughout the side¬ real universe. To account for the motions of the planets close to one fundamental plane and in nearly circular orbits, Laplace conceived that the primordial nebula had been endowed with a rapid motion of rotation; and when thus rendered very oblate by the effects of centrifu¬ gal force, had detached or thrown off succes¬ sive rings of vapor from the equatorial por¬ tion of the mass, which was supposed to be at high temperature and kept in equilibrium under the pressure and attraction of its parts. These rings of vapor were imagined to have condensed into the planets, which therefore re¬ volve in nearly circular orbits. The satellites were explained in the same way, by the con¬ densation of rings of vapor imagined to have been thrown off from the several planets, as they cooled and contracted and accelerated cor¬ respondingly their velocity of axial rotation.

In very brief outline this is the celebrated nebular hypothesis of Laplace, which has ex¬ erted so great an influence on philosophic thought for more than 100 years. In some form or other it enters into all the books on astronomy, as giving the best available explana¬ tion of the origin of the solar system; but it will be shown below that the (<hypothesis of de¬ tachment® postulated by Laplace is entirely er-

roneous, and will have to be supplanted by a very different theory.

Before considering certain grave errors in the theory of Laplace, it may be remarked that Sir Isaac Newton had given much thought to the motions of the planets and satellites, espec-cially remarking on the beautiful, orderly and symmetrical arrangement of the solar system ; but he was unable to explain the orderly move¬ ments of these bodies, except by supposing that they had been set revolving in their orbits by the immediate hand of the Deity. Laplace's theory had the great advantage, from a scien¬ tific point of view, that for a teleological it substituted a mechanical explanation of the motions of the planets, in harmony with Herschel's observations of the nebulae. Notwith¬ standing the fundamental error involved in the theory of detachment, the nebular hypothesis as a whole has guided our thought pretty much up to the present time. Yet the difficulties en¬ countered by the theory of Laplace have steadily increased, and of late years became so overwhelming that the old conceptions of rings detached by rotation have had to be entirely abandoned.

As the solar system was held to have re¬ sulted from the condensation of a globular or planetary nebula, the subject of the nebular hypothesis is closely connected historically with the gravitational theory of the sun's heat. For a long time it was assumed by investigators that the sun was originally expanded into a nebula filling the planetary orbits, and rotating in equilibrium under the hydrostatic pressure and attraction of its parts. In order to keep this figure of equilibrium the temperature would have had to be enormous, and such a temperature really could not be maintained, owing to the extreme tenuity of the hypothetical nebula. For when the nebula extended to Neptune's orbit the average density would be 260,000,000 times less than that of atmospheric air at sea-level ; and such a tenuous medium could exert no hydrostatic pressure from the centre outwards, for detaching the planets by increase of centrifugal force under accelerating rotation, as imagined by Laplace. This criticism against Laplace's theory was urged by Kirk¬ wood and Peirce over 40 years ago, and such an objection is valid and convincing; but as there was no other suggested way in which the planetary bodies could be started revolving in their nearly circular orbits, it was not doubted that such detachment had occurred.

In 1861 the French physicist, Babinet, pointed out a fatal weakness of Laplace's theory which is now usually known as ((Babinet's criterion.'® It is based on the mechanical prin¬ ciple of the conservation of areas, so much ap¬ plied by Laplace and other investigators since Newton's proof of the constancy of the areas described by any system of particles contract¬ ing and accelerating its rotation under central forces. It readily follows from this principle that whatever changes may take place in the system, its whole quantity of rotation must re¬ main constant ; by this is meant that if the mass of each particle of the system is multiplied by the square of its distance from the central axis of rotation and also by its angular velocity, and if all the products thus obtained for the par¬ ticles are added together, the sum will remain forever constant. Now it is possible to obtain

a quite approximate value for this sum de¬ rived from the actual system as we see it to¬ day, for the masses of its various parts, their distances from the central axis, and their ob¬ served angular velocities of motion are all known. Having found this quantity, we may proceed to test the Laplacian hypothesis in a great variety of ways, many of which lead to necessary assumptions which are not only quite incredible, but in some cases impossible.

For example, we may readily determine the period of rotation of the solar nebula when it extended outward to each of the planets suc¬ cessively ; by so doing we obtain the results given in the following table :

Table showing the application of Babinet's cri¬ terion to the planets and satellites, when the Sun and planets are expanded to fill the orbits of the bodies revolving around them

Planet

Observed period of planet

Time of the sun’s rotation calculated by Babinet’s criterion

Mercury .

Venus .

The earth .

0.24085 yrs. 0.61237 “

1 . 00000 “

479 yrs. 1673 “

3192 “

Mars .

1 . 88085

U

7424 “

Ceres .

4.60345

U

24487 “

Jupiter .

11.86

u

86560 “

Saturn .

29.46

u

290962 “

Uranus .

84.02

u

1176765 “

Neptune .

164.78

u

2888533 “

It will at once be noticed how greatly the num¬ bers of the third column exceed those of the second. Should we suppose that Neptune, for example, could have been formed in this way it would be necessary to assume that the period of its ring was diminished from nearly 3,000,000 to but 165 years, notwithstanding that we can recognize no imaginable cause which could produce this diminution.

Babinet’s criterion furnishes us with several other tests, some of them even more conclusive than this, of the impossibility of the material from which the planets are formed having been abandoned by the original nebula in the form of rings. If, overlooking these, we admit that a ring were abandoned, it can be shown that so far from the material of the ring ultimately being gathered into a single mass, the tidal ac¬ tion of the central portion of the cloud would separate and scatter it, so that a ring would not even start to gather into a planet. But further than this, it can be shown that even if the greater part of the ring could be gathered into a single planet, it would be quite impossible for this mass to gather to itself the remaining parts of the ring.

We have thus considered the Laplacian hy¬ pothesis somewhat fully because of its historical importance and because for so long a time it was regarded as furnishing a very probable out¬ line of the successive steps by which our solar system developed from the original nebula into its present form. It should not be overlooked, however, that much less importance was as¬ cribed to this theory by its originator than by his followers, who, attracted by its completeness and seeming simplicity, raised it almost to the position of a proved and fundamental doctrine,

Laplace himself, a master of rigorous mathe¬ matical deduction, could not have been deceived as to the weakness of its foundation. Indeed, he put it forth as a speculation merely, which (in his own words) was advanced ((with that distrust which everything ought to inspire that is not a result of observation or of calculation.ˆ

Modern Hypotheses. — In all modern hy¬ potheses as to the development of the solar system it is recognized at the outset that the original nebula must have been of a very het¬ erogeneous structure. Its material in the begin¬ ning may have been arranged in a more or less spiral form, the curved branches extending outward from a common centre, and thus re¬ sembling the thousands of spiral nebulae seen in the sky, but whether this be so or not, it is assumed that there existed here and there throughout the cloud many smaller clouds, or knots, of the nebulous material, denser than the nebula immediately surrounding them. The original nebula is supposed to have been a great cloud, composed of meteorites or meteoric particles, cosmic dust, gases, and probably some matter in a radiant condition ; in short, to have had exactly the same constitution as we believe is possessed by the same class of nebulae, which we see in the sky. The whole meteoric cloud thus constitutes a Resisting Medium , through which its separate particles and the denser clouds within it must necessarily move. The question concerning what such a heterogeneous cloud will develop into as it shrinks together under its own gravitation has recently received a great deal of attention from certain astron¬ omers. The result of a most thorough mathe¬ matical analysis is to indicate that the outcome must be a solar system more or less closely resembling our own. The analysis has been applied, not only to a broad outline of the de¬ velopment of the system as a whole, but also to the separate planet-satellite systems, the rings of Saturn, the retrograde or apparently too rapid motions of certain satellites, and even to the reason for the present situations and rotations of the planets, for all of which it seems to account in a satisfactory manner. The principal contributions to this subject will be found by the reader as follows: Thomas C. Chamberlain and F. R. Moulton, (Year-book No. V of the Carnegie Institution of Washing¬ ton ; The Astrophysical

Journal (Vol. XXII, 1905) ; See, T. J. J., (Evolution of the Stellar System > (Vol. II, Lynn, Mass.), and numerous papers in the Astronomische N achrichten and the Journal of the American Philosophical So¬ ciety. By the former authors, the new theory is called the Planetesimal Theory, the separate particles of the original nebula, being called Planetesimals ; by the latter it is named the Capture Theory, attention being thus drawn to the fact that the lesser bodies of the completed system, instead of having originally formed a part of the central body and having afterward separated from it, were actually drawn nearer to this body from without, and so in a sense <(captured.® In the present article we can only indicate in briefest outline the successive steps of the development which the original nebula will undergo.

In the first place, any separate particle or any cloud of particles in the original nebula will (unless there is no motion at all) find itself moving, not in empty space, but in a re¬

sisting medium. It can readily be shown by mathematics that the certain effect of this re¬ sistance will be to cause the particle to fall con¬ tinually nearer the centre of the whole, gather¬ ing up and adding to itself much of the material through which it moves, until finally, if the re¬ sisting medium extends quite to the centre, the particle or cloud will fall onto the central mass and become a part of it. Thus the central mass will continually grow by the absorption of a great part of the cloud around it, nor will this action cease until the resisting material has been quite completely swept away.

There will thus come a time when the nebula has been replaced by a dense, central, nebulous mass, around which a greater or less number of smaller clouds or swarms are re¬ volving in a region which still contains a con¬ siderable amount of resisting material. And these smaller clouds will all move around the central cloud in the same direction, which will be that of the general rotation of the original nebula as a whole, for it can be shown that such bodies as began to move in a contrary direction, when the resistance was high, must have been speedily brought down upon the central mass. Investigation shows that a sec¬ ond effect of a resisting medium must be to diminish the eccentricity (or increase the roundness), of the paths in which the bodies are moving. Thus the lesser clouds must steadily drop nearer the centre, their orbits at the same time becoming continually rounder, until they attain a region which has been swept clear, or nearly so, of resisting material. The contraction of each

smaller cloud into a planet with a possible system of satellites is explained by an exactly similar course of reasoning.

It is thus from the lesser clouds, or portions of greater condensation in the original nebula, that the planets have originated, and each has acquired a greater or less size according as its cloud in passing through the resisting medium has gathered up and added to itself a greater or less amount of this material. It can be shown that in whatever manner a small cloud may have been originally rotating, the effect of its colli¬ sions with the scattered particles among which it moves will be to give it a forward rotation ; that is, one in the same direction as its own motion around the central mass. And the more collisions it has sustained, and hence the larger it has grown, the more rapid should we ex¬ pect its rotation to become. This is in accord¬ ance with what is observed in the solar system, where Jupiter and Saturn rotate in less than half the time of the small planets.. A similar investigation shows that all satellites formed near the smaller clouds while the system was still young should have small and rounded orbits, and their motion should be direct, but that there may also be more distant satellites moving in a retrograde direction in orbits which are highly eccentric.

The Origin of Spiral Nebulas. — A theory has been advanced, and quite fully developed from a mathematical standpoint, to account for the existence of spiral nebulae in general, and in particular for that of the original solar nebula, which is thus supposed to have had a spiral form. It is supposed that these nebulae were caused by the close approach, or even by the actual collision, of two suns, for it can be shown that if such a close approach occurs the

enormous gravitational attraction may tear one or both of these bodies apart into a roughly two-branched cloud, whose arms under the pull of the passing body may be drawn into curves strikingly similar to the outlines of cer¬ tain of the well-known spiral nebulae. But there are grave and apparently insuperable objections to the hypothesis. In the first place, where the stars are most thickly gathered together (that is, in the direction of the Milky Way), almost none of these nebulae are found. It is here that the so-called New Stars predominate, but spiral nebulae are almost wholly confined to outside regions where the stars are few and the proba¬ bility of a collision, or even of a near approach, of two suns is almost infinitely small. More¬ over it is certain that the spiral nebulae seen in the sky are of enormous size. Though the spectroscope shows that they are moving through space with speeds which range from 200 to 700 miles a second, they are so distant that even these great nations have not dis¬ placed them appreciably on the sky (except possibly in one instance), even when measures which are separated by many years are com¬ pared. In many cases they must have thou¬ sands of times the extent of our solar system. Indeed, some astronomers believe that these nebulae, so far from being true nebulae, are, in reality, clusters of almost infinitely distant stars.

It is not indeed unlikely that any rotating nebula would as it contracted assume a more or less spiral form, and this may with some probability be assumed to have been the form of the prototype of the solar system. But the assumption of this, or of any other definite form, for the original nebula in no way affects the modern theory of the development of the solar system which has just been discussed.

The Earth-Moon System. — In the general process of evolution above described there are several local and minor modifications which must be made the subject of special inquiry. The system of our earth and moon, for ex¬ ample, is wholly unlike that of any of the other planet-satellite systems, for while in these the moons are all minute bodies in comparison with the planet, our own moon is comparable in size with the earth and is indeed so large that it is perhaps better to regard

these bodies as forming a sort of double-earth system than a planet attended by a satellite. It is uncertain whether the earth and moon originally formed a single body which afterward separated into two, or whether they separately condensed from neigh¬ boring clouds of the original nebula, the moon later being drawn nearer to the earth and its orbit rounded by the action of the resisting medium. The former theory has been very fully investigated both by Poincare and Darwin, and though the methods of attack in the two cases were wholly different, the results are in re¬ markable agreement. By the former astrono¬ mer the development of a rotating, tenuous mass, or cloud, was examined: it was shown mathematically that if the velocity of rotation exceeded a certain limit, two separate centres of condensation would appear within the rotat¬ ing mass. As these separated the mass would take a pear-shaped form : the constriction around the neck of the pear increasing, there would finally result two bodies almost in con¬ tact revolving about their common centre of gravity. At this time the length of the month

must have been equal to the time of rotation of the earth; it has since been greatly length¬ ened by the enormous bodily tides which the two closely adjacent, plastic masses must have raised in each other, for it can be demon¬ strated that the effect of these tides is to rap¬ idly push the two bodies apart and also to reduce the speed of rotation of each of them. The original energy of rotation of the moon being much less than that of the earth, its relative rotation was thus completely destroyed, so that now it turns always the same face toward us. In the same manner the relative rotation of Mercury with reference to the sun has been destroyed by the bodily tides produced on the planet while it was still in a nebulous or plastic condition.

Double-star Systems. — Whether the earth and moon originally formed one body which afterward separated into two through excess of rotation, followed by the action of bodily tides, is subject to grave doubt, but there is but little doubt that the evolution of double-star systems has taken place in substantial accordance with this theory. For here are numerous examples of two suns of approximately equal mass re¬ volving about one another with their surfaces almost in contact, and it is most significant that in every such known case the spectrum of the system is that of the very early types of stars. The densities of these pairs are also very low, and on the whole it cannot be doubted that they represent a very early stage of the system's development. When we pass to a consideration of the wider (visual), double-star systems it is found that the circularity of the orbits has disappeared

and that the stars have aged to later spectral types. It can be shown mathe¬ matically that the continued effect of tidal action is not only to push the bodies farther apart but also to increase the eccentricities (that is, to diminish the roundness), of the orbits.

We have thus apparently found a true and satisfactory account of the genesis and develop¬ ment of many of the double-star systems. But it should be added that there are many ex¬ amples of pairs of stars which are drifting through space together, and which therefore belong to one system, but which are separated by distances so vast that it is quite inconceivable that any form of tidal action could have been effective in pushing them apart from a single body. The periods of such pairs are doubtless to be reckoned in tens, or even in hundreds, of thousands of years. It is reasonable to suppose that the common motion observed in these cases is merely the original motion of the nebula from which they, and perhaps other stars of the same stream, were a part. But when this explanation is to be replaced by that one which, as we have seen, accounts so fully for the development of closer pairs, we are not able to say.

Development of the Stars. — It is uni¬ versally believed by astronomers that the stars have developed from nebulae, but the exact mode of this development, and especially a knowledge of precisely what is taking place in certain phases of the nebulae, is very uncertain. Roughly speaking, the known nebulae can be divided into four great classes: (1) The vastly extended, faintly shining, very irregular, nebu¬ lous clouds, of which the nebula in Orion is a well-known example; (2) the small, round,

planetary nebulae, which frequently have a con¬ densed nucleus in the centre; (3) the hazy, nebulous stars ; and (4) the great host of Spiral nebulae, which far exceed in number all others combined. It is a remarkable fact, thus far quite unexplained, that while the first three classes are most numerous in the neighborhood of the Milky Way, the spiral nebulae are almost wholly wanting in this region but are found by tens of thousands in the most vacant areas of the sky.

It is probable that the first class of nebulae represent the simplest form of inorganic sub¬ stance known to us. Whether these inconceiv¬ ably extended and tenuous clouds can under their own gravity become denser clouds, from which ultimately even stars may develop, we do not know. It is believed by some astronomers that certain of them, as, for example, the faint nebulosity in the Pleiades and the nebulous streams, are made up of inconceivably small particles, or ions, which have been repelled from hot stars, and thus are in a sense a dis¬ integrated product, rejected in the course of the general stellar evolution. The spiral nebulae are of such great size that it is doubtful whether the smallest of them visible to us could develop into a solar system more or less closely re¬ sembling our own. It seems more probable that from these a star stream, or even a star cluster, containing multitudes of stars, will eventually be produced.

All observation leads us to the conclusion that the majority of the nebulae are of a hetero¬ geneous structure; that is, that they are very far from being of a uniform density through¬ out their extent. It is not unreasonable to sup¬ pose that much of their material may condense into solid bodies, or meteoric particles, before the general development has proceeded far toward a condensation into many separate star centres. But this possibility has no important bearing upon the general history of the sys¬ tem's development. And whether the nebula is of so great extent that it develops into a mul¬ titude of suns or whether it is so very small that there results but one, the fact that the growth of each sun takes place in a resisting medium leads us to the conclusion that some of the nebulous matter will escape being drawn into the centre but will be left revolving around the central sun. Accordingly, it appears to us very probable that a vast number of the stars have worlds revolving around them and that our solar system is not unique in this respect.

T. J. J. See,

Revised by Eric Doolittle, Professor of As¬ tronomy and Director of the Flower Astro¬ nomical Observatory.

COSMORAMA, a species of picturesque exhibition, consisting of 8 or 10 colored draw¬ ings, executed in body colors, laid horizontally around a semi-circular table, and reflected in mirrors placed diagonally opposite to them. The spectator looks at them through convex lenses placed immediately in front of each mir¬ ror. The exhibition takes place by lamplight only, and the lamps are so placed as not to be reflected in the fields of the mirror. The views exhibited are generally copies made from en¬ graved views, such as those of

Piranesi, De Non, Le Bruyer and other artists. The pictures

are thus seen not only enlarged but in per¬ spective.

COSMOS, about 20 species of annual and perennial herbs of the natural order Compositce. They are natives mostly of Mexico, whence sev¬ eral have been introduced into gardens for their bright flower-heads, which appear in late sum¬ mer and during the autumn. They are rather tall plants with opposite pinnate, entire, or lobed leaves, and typically, red or purple flow¬ ers (yellow in one species), but in horticultural varieties white and other colors. Their long flower-stems make the plants useful for bou¬ quets. Cosmos is especially popular in the United States because it is easily grown from seeds started in hotbeds, and because it thrives upon almost any garden soil and with the most ordinary care. The cultivated forms are de¬ rived mostly from C. sulphurous and C. bipin-natus, the former of which often exceeds eight feet in height, the latter rarely more than four feet. The flowers are often more than two and a half inches in diameter. C. diversifolius, sometimes called black cosmos, is widely known as a Dahlia, or a Bidens , ana seems to be upon the border line between these genera. Probably no plant introduced into ornamental cultivation during the closing years of the 19th century offers such possibilities of improvement as cosmos. Since 1885, when there were few dis¬ tinct varieties, so much improvement has been wrought that plant breeders are very hopeful. Comparing the typical species of chrysanthe¬ mum with its improved varieties will give an idea of what may possibly be accomplished with cosmos.

COSMOS. In the four volumes of Cos¬ mos,) Alexander von Humboldt laid the foun¬ dations of modern physical geography and meteorology in their larger aspects. Begun in 1843, when the author was already 74, the work represented the slowly matured results of ex¬ plorations made between 1799 and 1804 on the Atlantic, in Teneriffe, South America, Mexico and the United States, supplemented by exten¬ sive though rapid journeys in Russia and Si¬ beria in 1829. It happily united the philosophic, though often vague generalizing of the 18th century with the 19th's demand for precision in detail and showed the author supreme in his day as co-ordinator of the great facts of plastic geography, climatology, terrestrial magnetism, the distribution of volcanoes, plants, animals and races, and a genial investigator into social and linguistic origins. The purpose of the book was, Humboldt said, <(to comprehend the phe¬ nomena of physical objects in their general con¬ nection and to represent nature as one great whole

moved and animated by internal forces.® Volume I (1845) gives, after a nobly conceived introduction of the study, a general review of natural phenomena; Vol. II (1847) incite¬ ments to the study of nature and a history of the physical sciences; Vol. Ill (1850, III and IV of the English translation) the results of observations of cosmic phenomena; Vol. IV (1858, Vol. V of the English translation) those of telluric phenomena. Parts of an un¬ finished fifth volume appeared in 1862. The style of <Cosmos) is at times labored. One feels that Humboldt is not quite expressing his own conception of the dignity of his theme; but his descriptions of South American scenes

are often powerful and his imaginative gener¬ alizations illuminating. The successive volumes of <Cosmos) were translated on their appear¬ ance into most European languages. A Ger¬ man edition commemorating the Humboldt cen¬ tenary was issued in Philadelphia in 1869. The influence of <Cosmos) not alone on scientific thought but on the popular attitude toward science has been very great. Consult Stoddard, R. H., (Life Travels and Books of Alexander von Humboldt) (1860).

Benjamin W. Wells.

COSORYX, a genus of antelope-deer (see Ruminants; Fossils) allied to Merycodus (q.v.), but with antlers of two equal tines. It is found fossil in the Miocene bad lands of the western United States, and is thought to be ancestral to the modern pronghorn antelope.

COSQUIN, ko-skan, Emmanuel, a French folklorist: b. at Vitry-le-Frangois in 1841. His (Contes Populaires de Lorraine) (1886) is his most important contribution to letters on ac¬ count of its bearing on folklore. He has contributed many articles to Le Franqais, a Catholic and conservative journal; and has translated into French the works of Joseph Fessler: (La Vraie et la Fausse Inf allibilite des Papes) (1873), and (Le Concile du Vatican*

(1877).

COSSA, kos'sa, Francesco, Italian painter: fl. 1470. He lived first in Ferrara, and is considered one of the founders of the Ferrarese School of Painting; after 1470 he lived in Bologna, where he and his contemporary, Ercole Roberti, are said to have been the founders of the Bolognese School. His works include (Madonna with Saint* (at Bologna), and frescoes in the Schifanoja Palace at Ferrara, which are remarkable alike for their fidelity to nature and their splendid studies of costume. The Berlin Museum and the Johnston collec¬ tion, Philadelphia, have representative pictures by him. Consult Berenson, (North Italian Painters of the Renaissance) (New York

1907).

COSSA, Luigi, an Italian writer on political economy: b. at Milan in 1831; d. 1896. He was graduated from the University of Pavia in 1853 as a doctor of law, and continued his studies in economics at Vienna and Leipzig, and, in 1858, became professor of political economy at his Alma Mater, and later at Milan. He is the author of (Guida alio studio del l'economia politica) (3d Ital. ed., 1890; Eng. trans. 1893), (Primi elementi di economia politica) (10th ed., 1895, 3 vols., of which the third volume, (Taxation,* was translated into English in 1888).

COSSA, Pietro, an Italian dramatic poet: b. at Rome in 1834; d. at Leghorn 1881. He went to South America following the political events in 1840; but, returning to Rome, he taught Italian literature at one of the technical schools. A series of dramas having for their themes the stories of ancient and modern Rome comprises his main success in literature. These are (Nerone* (1871) ; {Plauto il suo Secolo > (1876); (Messalina* (1876); Cleo¬ patra* (1879); (Borgia* ^ (1878) ; Cecilia'

(Giorgione's mistress), (1878). His best play is the (Nerone,* an English version of which by F. E. Trollope, appeared at Rome in 1881. His (Teatro Poetico,* in seven volumes, was

published at Turin (1877-85), and a volume of lyrics in 1876. Consult Trevisani, (P. Cossa) (1885), and Arcari, (Di P. Cossa e del dramma in Italia-* (1899); Mazzoni, (L'Ottocento* (Milan) ; Franchetti, in (Nuova Antologia* (1881); (Works* (Turin 1887).

COSSACKS, tribes in southeast Russia, who, under the empire, paid no taxes, but per¬ formed instead the duty of soldiers. Nearly all of them belong to the Graeco-Roman Church, to which they are strongly attached, and to the observances of which they are particularly at¬ tentive. They must be divided into two princi¬ pal classes, both on account of their descent and their present condition — the Cossacks of Little Russia and those of the D'on. Both classes, and especially those of the Don, have collateral branches, distributed as Cossacks of the Azov, of the Danube, of the Black Sea, of the Caucasus, of the Ural, of O.renberg, of Siberia, of the Chinese frontiers and of As¬ trakhan. Writers are not agreed as to the origin of this people and of their name, but they are believed to be of mixed Caucasian and Tartar race. In personal appearance the Cossacks bear a close resemblance to the

Russians, but are of a more slender make, and have features which are decidedly more handsome and expressive. Gen¬ erally speaking, they are better educated than their Russian fellow subjects.

Originally their government formed a kind of democracy, at the head of which was a chief or hetman of their own choice; while under him was a long series of officers, with jurisdic¬ tions of greater or less extent, partly civil and partly military, all so arranged as to be able on any emergency to furnish the largest military array on the shortest notice. The democratic part of the constitution gradually disappeared under Russian domination. The title of chief hetman became vested in the heir-apparent to the throne, and all the subordinate hetmans and other officers were appointed by the Crown. Care, however, was taken not to interfere with any arrangements which foster the military spirit of the Cossacks. Each Cossack was lia¬ ble to military service from the age of 18 to 50 and was obliged to furnish his own horse. They furnished the empire with one of the most valu¬ able elements in its national army, forming a first-class irregular cavalry and rendering ex¬ cellent service as scouts and skirmishers. In 1570 they built their principal ((stanitza** and rendezvous, called Tcherkask, on the Don, not far above its mouth. As it was rendered un¬ healthful by the overflowing of the island on which it stood, New Tcherkask was founded in 1895 some miles from the old city to which nearly all the inhabitants removed. This forms the capital of the country of the Don Cossacks, which constitutes a government of Russia, and has an area of 63,532 square miles and a population estimated in 1912 at 3,591,000, 98 per cent of whom are Cossacks. It has a mili¬ tary organization of its own.

Service began at the age of 18 and lasted 17 years. All Cossacks able to serve belonged, with¬ out age limit, to the reserve forces of the “National Defense.** Their war strength was said to be about 5,000 officers and 175,000 men, with more than 170,000 horses, and a reserve force of over 300,000 officers and men in case of emergency. About 88 per cent are Chris¬ tians out of the whole population living on land

assigned to the Cossacks. The non-Christian element is principally composed of Mohamme¬ dans. The Cossack lands cover an area of about 229,000 square miles. Their principal industry is agriculture and the breeding of horses and cattle. They are also greatly inter¬ ested in the fisheries of the Don, Ural and Cas¬ pian, the vine-culture of the Caucasians and the bee-keeping of various districts.

The Don Cossacks have a regular history from 1554. In 1792 the Cossacks of the Cuban or Black Sea (Chernomorski) were formed; and other Cossack lines were subsequently es¬ tablished on the lower Volga, on the Terke, on the Ural River, in western Siberia, in the Transvaikal territory, in the government of Irkutsk, on the Amur, *etc.* The present military organization dates from Peter the Great; and their adoption of a thoroughly settled life, with its modern characteristics, is largely due to the government of that monarch and of Catherine II assisted by the ordinances of Nicholas I in 1835, of Alexander II in 1875 and of Alexan¬ der III.

The name Cossacks (Kazaku) is a name signifying the original character of these people, who were “freebooters® according to the Turk¬ ish idea. The name Kazak was given by the Byzantine Emperor Constantine VII, Porphyro-gentius, to the Circassians and is still in use (for the same people) among the Georgians. Consult Khoroschin and Von Stein’s (Die Russ-ischen Kosakenheere) (in Petermann’s ‘Mitteilungen)) ; Gogol’s (Taras Bulba) ; and Byron’s <Mazeppa) (1820).

COSSACKS, kos-saks, The, a story by Tolstoi, published 1852. It is a series of pic¬ turesque studies on the life of the Cossacks of the Terek, rather than a romance. The story is particularly interesting as showing the first germs of the altruistic philosophy which Count Tolstoi has developed into a vigorous system of self-renunciation.

COSSE, kos -sa’, Charles de, Comte de Brissac, French marshal: b. Anjou about 1505; d. Paris, 31 Dec. 1563. He served with success in the Neapolitan and Piedmontese wars and distinguished himself as colonel in the battle of Perpignan in 1541. He rose to the rank of grand master of artillery of France; and subse¬ quently obtained the office of governor of Pied¬ mont, and the baton of marshal of France in 1550. He afterward returned to France as gov¬ ernor of Picardy, and rendered that province important services.

COSSIO, kos ‘syo, Aluigi, Italian clergyman and educator: b. Cividale

del Friuli 1874. He was educated at the Seminary of Udine and at the universities of Padua and Freiburg. He also studied at Tubingen, Stuttgart and Fribourg, Switzerland. He was ordained to the priest¬ hood in 1897 ; served at various times as missionar}ˆ to his countrymen in different parts of Europe, librarian of Saint Bede's College, Man¬ chester, England, and Dante Society lecturer at Victoria University, Manchester. He was also successively professor of Christian archae¬ ology and the history of art at Upholland Col¬ lege, England, lecturer before the Dante soci¬ eties of Dublin, Liverpool, Manchester and Queen's College, London, and official of the Sacred Congregation of the Consistory, Rome. He later was appointed auditor of the Apostolic

Delegation to the United States at Washington, D. C. For purposes of literary research he visited the universities of Berlin, Bonn, Copen¬ hagen, Kiel, Lund, Munich and Upsala. He has written (Cardinal Cajetan>; (The Vita Nuova of Dante) ; 'The Archaeology of Art in Dante) ; (The Doctrine of Art in Dante 5 ; 'Art in Dante and his Artistic Preparation ; 'The Laudi MS. of Manchester ; 'VirgiP ; (St. Peter in Rome' ; an edition of Dante. He contributed to 'The Catholic Encyclopedia, } the Antiquary, II Gior-nale dantesco and other periodicals.

COST ACCOUNTING. See Accounting.

COSTA, Alfonso Augusto, Portuguese statesman : b. Ceia, Guarda, 1871. He studied at Coimbra, receiving his doctor's degree in 1895, and in the following year became pro¬ fessor of law. Known as an eloquent speaker, he affiliated himself with the Republican party and was elected by a great majority deputy to the Cortes, in spite of the machinations of gov¬ ernment agents, 26 Nov. 1899. The ministry annulled his election on a futile pretext, but in the new elections, 18 Feb. 1900, he was again triumphantly elected. In the Cortes he was received as a recognized enemy of the monarchi¬ cal regime, and he soon gave more than ample proof of his enmity by introducing, amid great protest, a resolution in the Cortes in which he proposed the abolition of the monarchy. After the fall of the ministry he failed to be reelected, but threw himself enthusiastically into the preparations for the revolution which established the Republic in 1910. Under the new regime he became Minister of Justice, and in January 1913, Minister of Finance and Pre¬ mier. The exiled Royalists in July 1913 made an attempt on his life, but he escaped with slight injuries; another plot to kill him in September 1913 was also frustrated. In March 1916 he

became Minister of Finance in the Almeida Cabinet. Dr. Costa, more than any other one man, typifies the spirit of the new Republic of Portugal. He has written (Direito civil > (1896) ; ‘Economia politica) (1896-98) ; ‘Organizagao judiciara) (1897-1901).

COSTA, kos’ta, Isaac da, Dutch poet and theologian: b. Amsterdam, 14 Jan. 1798; d. 28 April 1860. He studied at Leyden, receiving the degree of Ph.D. in 1821. By parentage he was a Portuguese Jew, but he embraced Chris¬ tianity in 1822 and became a professor and director of the Free Scotch Church Seminary. He was called to the Institute of Amsterdam in 1840, and soon acquired a high reputation both for his poetic and theological works. Poetry he continued to write up till 1857, when his last poem, the (Battle of Nieuwpoort,* was pub¬ lished. Among his theological works are a Refutation of Strauss> ; Rife of Jesus> ; a ‘History of the Destinies of the People of Israel* (translated into English and German) ; ‘Considerations on the Spirit of the AgeP The more noteworthy of his volumes of verse are ‘Prometheus* (1820) ; ‘Poems) (1821-22) ; ‘Festive Songs) (1828); ‘Hagai0 (1840). His poems were collected and published by Hase-broek (1861-62).

COSTA, Lorenzo, Italian painter: b. Fer¬ rara about 1460; d. Mantua, 5 March 1535. He studied with Cosimo Tura at his birthplace and was influenced at first by Ercole Roberti

and Francesco Cossa. He was employed to decorate the choir of the church of San Do¬ menico in Ferrara, and was invited to the ducal court, where he painted a number of portraits of princes and nobles. Shortly afterward we find him at Ravenna, at Bologna, under the patronage of the Bentivoglio family, and there began his connection with Francia, with whom he worked as copainter. Here he executed a (St. Sebastian Pierced by Arrows,* a (Virgin, > a (Saint James, *a (Saint Jerome.) At Mantua, whither he was invited by Francesco Gonzaga, he painted the greater number of the pictures in the palace, then being restored by that prince. He left behind him a reputation for keenness of observation, correctness in design and great simplicity and grandeur in*

form, together with harmonious grouping. Other works include Hsabella d'Este Crowned by the Muse) (Louvre) and (The Dead Christ (Berlin Mu¬ seum). The young Correggio, who accompanied him to Mantua, was his principal pupil. Consult Morellis, Utalian Painters: Critical Studies of their Works) (translated by Constance Jocelyn Ffoulkes, London 1892-93) ; Berenson, (North Italian Painters of the Renaissance* (New York 1907) ; Gardner, (The Painters of Fer¬ rara* (London 1911).

COSTA-CABRAL, Antonio Bernardo da,

Count of Thomar, Portuguese statesman: b. Fornas d'Algostra, province of Beira, 9 May 1803; d. San Juan de Flor, 1 Sept. 1889. He received his education at the University of Coimbra. He became judge of the Supreme Court in Oporto and in Lisbon, and in 1835 was elected to the Chamber of Deputies, where he was at first one of the leaders of the Radicals and then of the Conservative party. He was chosen Prime Minister 7 March 1838, but re¬ linquished this position two months afterward. In 1841, however, he was reinstated. His op¬ pression and misgovernment resulted in his being driven from power 17 May 1846. In 1849, however, he was reappointed Prime Minister, but only to inaugurate a still more stringent dictatorship. Impoverishing the people by his unscrupulous system of expenditure, contract¬ ing new loans and imposing new taxes, the outcry against him became so irresistible that his own brother Sylva, a member of his cabinet as Minister of Justice, would not any longer serve under him, and became leader of the opposition in the Cortes, which body was now determined on his overthrow. In the mean¬ time, however, Saldanha set on foot a revolu¬ tion at Cintra, which spread rapidly over the whole kingdom, and put an end to Costa-Cabral's administration 26 Feb. 1851. Saldanha became Prime Minister of Portugal and Costa-Cabral fled to England. He was Ambassador to Brazil 1859-61. In 1862 he became a member of the Council of State and president of the Superior Administrative Court.

COSTA RICA. Physiography, Political Divisions and Population.— Costa Rica, a re¬ public of Central America, is bounded by Nica¬ ragua, the Caribbean Sea, Panama and the Pacific Ocean ; area about 22,000 square miles. The republic is divided into seven provinces and these are subdivided into cantones, and the cantones into districts. Each canton has a municipal organization elected by the people ;

but the political chiefs of the cantons and the governors of the provinces are appointed by the president of the republic. The

provinces are San Jose, Alajuela, Cartago, Heredia, Guanacaste, Puntarenas and Limon. The mountains do not form a continuous chain, but are divided into two main groups, that of the northwest and that of the southeast, the former including the volcanoes Irazu (11,200 feet), Turialba (11,000 feet), Barba (9,335 feet) and Poas (8,675 feet). Eruptions occurred in 1723, 1726, 1821, 1847, 1864 and 1866. The southeast¬ ern or Talmanca group, in which there are no signs of recent volcanic activity, includes the Buena Vista (10,800 feet), Chirripo Grande (11,850 feet) and Pico Blanco (9,650 feet). A transverse system, the Cordillera de Dota, below Cartago, renders communication between the northern and southern sections of the country exceedingly difficult. More than one-half of the area of Costa Rica lies between 2,900 and 6,825 feet above the sea and is covered with virgin forests, the vegetation be¬ ing so dense that it is almost impossible to penetrate the interior of these regions save by way of the rivers. From the coast to a height of 2,900 feet are tropical forests and savannas ; above 6,800 or 6,900 feet, approxi¬ mately, are the regions of oaks and chaparrales, extending up to 9,800 feet; and subalpine or subandine flora characterize the regions be¬ tween 9,800 feet and the tops of the highest mountains. The climate in general is healthful, fevers occurring only in regions of less than 150 feet elevation; but it varies greatly accord¬ ing to altitude. The coast lands and regions below 3,000 feet have a high temperature, rang¬ ing from 70° to 80° F., and in consequence a torrid climate. The temperate zone lies between 3,000 and 7,500 feet and is very healthful with a mean temperature of about 62° F. Winds blow continually and are a great cause of dis¬ comfort in the dry season, December to May. The annual rainfall averages about 100 inches. The tapir, deer, puma, jaguar, armadillo, iguana and many varieties of monkeys are found in the forests, a few species being peculiar to Costa Rica, while the rest belong as well to South or North America or both. Of avifauna there are 725 known species: of reptilia and batrachia over 130 species; and the species of fish are especially varied owing to the circumstance that those of the Pacific are almost wholfy different from those of Carib¬ bean waters. The flora is essentially tropical. There are mahogany, cedar, brazilwood, fistic oak and ebony in the forests. Coffee, bananas, maize and sugarcane are commonly cultivated. Rubber also is found.

On 31 Dec. 1915 the official estimated popula¬ tion was given as follows :

San Jos6…

Alajuela… .

Heredia ….

Catargo …

Guanacaste Puntarenas Limon .

430,701

131,332 101,783 46,162 64,659 40 , 806 22 , 203 23,756

The population in 1826 was 61,846, and mainly by increase of the families whose an¬ cestors came from Galicia or Catalonia before

COSTA RICA

1 National Theatre at San Jose

2 A Country Church — Native Costa Ricans in Foreground

the date just mentioned, it had grown by 1915 to 430,701. In marked contrast with the other Central American states, Costa Rica's popula¬ tion, in the larger towns of the uplands, is almost entirely white. Only 3,500 Indians re¬ mained in 1916. The negroes (some 25,000 British West Indians) live near the coasts.

The obligation and ˆtraditional® policy of Costa Rica is to solve its own problems and to avoid complications with other countries. The frontier line with Colombia (Panama) was to a certain extent determined by the award of the President of the French Republic as arbitrator, 11 Sept. 1900. President Loubet's decision ex¬ tended the Colombian frontier to Punta Car-reta on the Caribbean coast, thus depriving Costa Rica of extensive territory to which she laid claim. But there is still contention between the interested countries in regard to the inter¬ pretation of the terms of the award; and it is with this qualification that the estimate of area in the first paragraph is offered. Pre¬ vious estimates have varied between 23,000 and 34,000 square miles. On 20 Jan. 1902, a ((Convention of Peace and Obligatory Arbitration® was signed at the Port of Corinto, Nicaragua, by plenipotentiaries of Costa Rica, Nicaragua, Honduras and Salvador.

History. — An account of the Spanish settle¬ ments at the beginning of the 16th century is given in the article Central America. The Spanish Crown in 1540 established the province of Costa Rica; in 1560 and 1573 defined its frontiers; in 1562 appointed Juan Vasquez de Coronado military governor of Costa Rica and Veragua. The city of Cartago, until 1823 the capital, was founded by Coronado, but it was a city only in name. During the first century of the existence of the province no headway was made. The Indian tribes were the most intractable of their kind; white settlers were few. A brief period of comparative prosperity began when Captain-General Sandoval, in 1638-39, made a new port at Matina and opened a road from it to the capital. The value of cacao plantations near the road increased, and the eastern coast, as well as the Gulf of Nicoya, was visited by trading ships. But the bucca¬ neers swooped down upon the coast as soon as there was anything of value to be seized, and Indians completed the

work of destruction. This wretched state of things continued through¬ out the 18th century. One hundred years ago Costa Rica was described as the most be¬ nighted, woeful province in the whole Spanish empire. Its colonists, ignorant and indigent, <(clothed with the bark of trees,® had been reduced to this condition of misery through being cut off from communication with the outside world for generation after generation and by century-long ravages of pirates from Europe and marauding bands of Indians from the Mosquito coast. But to-day the republic holds a leading position among Latin-American nations in regard to public instruction, and (ex¬ cept for the apparently chronic dislocation of the public finances) it can no longer be called a very poor country. Every Costa Rican who cares to do so can own valuable property of some sort, and the foreign commerce of the country is far from being contemptible. The change may be described in a few words.

Less than four months after proclaiming that Spanish control was at an end (15 Sept. 1821),

Costa Rica with the other weak Central Ameri¬ can states was drawn into a union with the Yturbide empire of Mexico. This dependence lasted until 1824, and then followed the experi¬ mental union of the Central American countries. But genuine independence began after 1830. Even in that time of extreme poverty the state acknowledged and declared that it could not postpone and would not shirk its duty to pro¬ vide for the education of the people.

During the first half of the 19th century commerce received a new impulse through the discovery of gold in the mountains near the Gulf of Nicoya, and the extension of coffee culture. Several of the Presidents holding office since 1824 have been eminently patriotic and far-seeing men, under whose guidance the graduates of Costa Rican schools have begun to appropriate some of the natural resources of the land, with little aid from immigration, though not without the aid of foreign capital. Immigration up to the present time has been small.

In 1907 Costa Rica and all the other Central American states sent delegates to a conference in session at Washington, D. C., from 14 No¬ vember to 20 December. This conference decided,, among other things (see Central America), to establish a Central American Court of Justice and a Central American <(pedagogical institute,® both to be located in Costa Rica. The delegates expressed the opinion that each republic

should have the right to maintain, at the proposed normal college, not more than 200 students of both sexes and they agreed to send not less than 20 students of each sex. On 20 March 1910 Costa Rica and Panama signed a protocol setting forth the basis of fact for the arbitration of their boundary dispute by Chief Justice Fuller. In May, Ricardo Jimenez was inaugurated as President of the Republic. An earthquake wrecked a large part of the city of Cartago, including the new Palace of Peace. The estimated loss of life was 1,800. In 1913 the President in his message stated that the govern¬ ment was particularly solicitous for the advance¬ ment of education. Although more than one-eighth of the total revenue of the state had been expended for schools and colleges in the pre¬ ceding year, Congress was asked to increase the inheritance tax for the benefit of the School of Arts and Crafts and the hospital fund. Among the measures passed by the Congress was a law limiting the armed force of the President (the regular army) to 1,000 men in time of peace and 5,000 in time of public danger from insurrection, *etc.* President Alfredo Gon¬ zales Flores, chosen for the term 1914 to 1918, was kpown to be the moving force responsible for legislation in favor of agriculturists and in defense of the rights and privileges of working¬ men which engaged the attention of the Con¬ gress in 1915 and 1916. Costa Rica brought action in March 1916 against Nicaragua for the violation of her rights under the canal treaty with the United States, and the Central American Court of Justice, on 5 May, gave decision in her favor. General. Federico Tinoco, after a bloodless revolution in January 1917, overthrew the Gonzalez government and pro¬ claimed himself provisional President of Nica¬ ragua. By instructions from Washington, the American Minister to Costa Rica issued the

following statement to the people of Costa Rica 2 Feb. 1917:

“The government of the United States has viewed the recent overthrow of the established government of Costa Rica with the greatest concern, and considers that illegal acts of this character tend to disturb the peace of Central America and to disrupt the unity of the American continent. In view of this policy in regard to the assumption of power through illegal methods, clearly enunciated by it on several occasions during the past four years, the government of the United States desires to set forth, in emphatic and distinct manner, its present position in regard to the actual situa¬ tion in Costa Rica, which is that it will not give recognition or support to any government which may be established, unless it is thoroughly proven that it is elected by legal and constitutional means.”

In 1921 Costa Rica joined the Central Ameri¬ can Union.

Government. — The legislative branch of the government consists of a single house, called the Constitutional Congress ; its 43 deputies, who are chosen, one for every 15,000 inhabit¬ ants, for a term of four years, assemble each year for a 60 days’ session which may be extended for 30 days. One-half of the depu¬ ties retire every two years. The term of the President, in whom is vested the chief executive power, is four years. Congress annually ap¬ points three presidential substitutes called designados. Administrative departments in charge of secretaries or ministers appointed by the President are six in number. An assistant secretary (subsecretario) assigned to an import¬ ant bureau (for example, public instruction) re¬ ports directly to the Constitutional Congress. Tudges also hold office for terms of four years. The main tribunals are the Supreme Court of Justice (11 justices) and two Appellate Courts (three magistrates each). Subordinate courts are established in the provinces. In the chief towns of each canton the alcaldes are judges of petty offenses.

Education and Religion. — Elementary in¬ struction of both sexes is by constitutional mandate compulsory and at the government’s expense. The most recent statistics available (1915) show that about 35,000 children were enrolled as pupils in 419 elementary schools, controlled by local educational juntas for whose support the government had made a special loan and imposed certain taxes. In

these schools there were 1,489 teachers. Higher edu¬ cation is provided at several provincial insti¬ tutes, and at the Liceo and Colegio Superior de Senoritas — Toth of the latter in the capital. There are schools of law and medicine, a national museum, a national library, the Univer¬ sity of Santo Tomas and the Physico-Geographical and Meteorological Institution. The government has made a practice of defraying the expenses of a number of young men who are sent as students to European universities. Dr. Claxton, Commissioner of Education, De¬ partment of Interior, government of the United States, writes : <(In Costa Rica, which has made greater advance in respect to primary education than any other one of the Central American states, a very important movement in rural education has been started by the establishment of schools which are furnished with gardens, orchards, and fields, and which provide for rural industries carried on under a special pro¬ gram of instruction.® (Report for year ended 30 June 1915). By executive decree of 14 Jan. 1915 rules for the newly-established Normal School at Heredia were promulgated.

The Roman Catholic is the religion of the state, but there is entire religious liberty under the constitution. The bishop of San Jose is a suffragan of the archbishop of Guatemala.

Spanish is spoken everywhere throughout the country, even in the Indian districts.

Industry, Agriculture and Commerce. — Coffee raising was for a long time regarded as the most profitable form of agriculture in Costa Rica, and the decline in the price of coffee brought on the financial crisis soon after the beginning of the present century. Coffee in¬ voiced at the American consular agency at Puntarenas for the United States during 1916 amounted to 7,718,057 pounds, valued at $939,543. The systematic cultivation of bananas has in¬ creased during recent years to such a degree that it has become Costa Rica's leading indus¬ try. Indian corn, rice and cocoa grow readily. The live stock consisted of 33,000 cattle, 52,000 horses, 63,000 pigs, besides mules, sheep and goats. Because of the great number of peasant proprietors agriculture is advancing and both the economic situation and political stability of the country are on a sound basis. Until the year 1915 cattle were never exported from Costa Rica, but were extensively imported from Nica¬ ragua at the rate of from 20,000 to 30,000 head annually. During the year 1915, however, 3,151 head of cattle, valued at over $100,000, were exported to the Canal Zone, Panama, for the United States military forces stationed there. Owing to the scarcity of cattle in

this district it is not likely that they will continue to be exported to any extent. Prices of milk, butter, cheese and beef are much higher in Costa Rica than in the United States, and large quantities are imported annually. The cultivation of cacao is increasing in Costa Rica. In 1915 1,272,905 pounds, valued at $174,809, were exported. The Congress of Costa Rica, in 1917, provided for the payment of bounties to the growers of hemp, sisal and similar plants. This bounty, according to the Revista Economica, is to be in the form of 6 per cent treasury bonds, at the rate of 30 colon (colon =“46.5 cents) for each hectare (2.47 acres) of land planted in a fibre crop. The total amount of bounties is not to exceed 500,000 colones, and 100,000 colones more is appropriated for machinery. The bounty will be divided into three parts, the first to be deliv¬ ered when the fibre is planted, the second part two years later and the third when the plants are ready to be cut. When the planter has cultivated his fibre crops for 10 years after receiving the first bounty, and has marketed his crops during this time, the mortgage which he has given on his property for the proper use of the bounty money will be canceled by the government. When owners of plantations rep¬ resenting 200 hectares of land or more wish to establish a common fibre factory the govern¬ ment will grant them a loan in treasury bonds for two-thirds of the cost of the installation, taking a mortgage for the amount of the loan payable in 10 years at 8 per cent with amortiza¬ tion of 10 per cent. In 1914 the imports were valued at $7,551,679, while the exports surpassed this figure by $3,310,069. In 1915 the imports were valued at $4,478,782 and the exports at $9,971,582. Exports in the last normal year before the European War, 1913, showed the following distribution : To the United States, $5,297,146; to Great Britain, $4,364,436; to Ger-COSTA RICA

many, $509,804; to France, $96,665. In the same year Costa Rica imported from the United States goods valued at $4,515,871 ; from Ger¬ many, $1,355,417 ; from Great Britain, $1,303,187 ; from France, $391,681. The following table shows the value of the leading exports for the last two years and the principal countries of destination, according to the customs statistics :

Exports and countries of destination

1914

Bananas .

$4,725,754 3,281,012 1,444,742 84,507 9,898 39,192 25,253 4,663, 360 467,269 3,533,895 483,124 888,599 888,599 110,780 50,207 39,584

United States .

Great Britain .

Cacao .

United States .

Great Britain .

Central America .

Coffee .

United States .

Great Britain .

Germany .

Gold and silver .

United States .

Hides (cattle) .

United States .

Germany .

Spain .

Rubber . - .

12,134

11,148

221

123,814

81,711

13,299

10,184

48,510

9,786

2,934

3,302

28,388

21,971

6,277

United States .

Germany .

Timber .

Cedar .

United States .

Germany .

Chile.. .

Mahogany .

United States .

Great Britain .

Cocobolo .

United States .

Germany .

1915

$4,427,566

3,087,826

1,339,740

174,809

66,897

101,674

4,355

3,730,307

547,982

2,877,932

55,955

805,897

805,897

151,064

90,069

38,232

49,488

48,192

49,372

16,908

13,700

14,080

3,911

8,370

7,977

7,970

Small establishments for the manufacture of saddles, harness, shoes, hats, clothing, cigars, cigarettes, candles, soap, beer, alcoholic liquors, carbonated waters, etc., exist in various parts of the country. There are officially enumerated 3,296 factories and industries in the Republic, including coffee-drying establishments, starch, broom and woodwork factories.

Mining and Manufactures. — From mines near the Gulf of Nicoya the exports of gold and silver bullion in a single year were $792,847. In 1913 gold and silver to the amount of $1,021,437 was mined and exported, and to the amount of $805,897 in 1915. The production of one of the three principal auriferous districts has exceeded the sum of $10,000,000 ; and in view of the circumstance that this sum has been produced by the crudest mining and metal¬ lurgical methods, the reward which would fol¬ low the proper application of capital

sufficient to operate on a large and modern scale is sur¬ misable. There are deposits of iron, nickel and manganese in several cantones. One manganese mine is in operation in Costa Rica. It began shipping in May 1916, and is now sending out about 300 tons a month, all in bags. It is making preparations to install an equipment of docks, furnaces, etc., with a capacity of 3,000 to 5,000 tons a month. An oil company has acquired rights to oil lands in Limon, Guanacaste and Puntarenas.

There are verv few manufacturing estab¬ lishments in the Republic. Among these few are the National Foundry at San Jose and the National Liquor Factory.

Banking and Finances. — The gold standard was adopted in 1896; in 1900 gold certificates were redeemed and gold put into circulation. The unit is the colon. The gold coins are 2, 5, 10 and 20 colones; the silver coins 5, 10, 25 and 50 centimos. The principal banks are the Banco Anglo-Costarricense, established 1863, the Banco de Costa Rica, established 1877, and the Banco Commercial (1908). In addition to these three banks the government has estab¬ lished, as a temporary measure to cover the deficit of revenues and assist their merchants and farmers over the crisis which the Euro¬ pean War intensified, the Banco Internacional, with a restricted issue of bank notes to the extent of 4,000,000 colons (or colones), secured by a new issue of 2,000,000 colones, 6 per cent interior bonds, in conjunction with 2,000,000 colones, exterior refunding bonds, which in 1915 were in escrow in a New York bank.

The unit of the monetary system, the colon, is divided into 100 centimos and is used only in Costa Rica. Its weight is 0.7780 grammes of .900-fine gold, or, say, 0.7002 grammes of pure gold, which gives it a par value of $0.46536, currency of the United States. The par value of $1.00, currency of the United States, is 2.14887 Costa Rican colones. Under normal conditions, the commercial rate of exchange in Costa Rica for sight draft on New York fluctuates between 2.13 and 2.18 colones per $1.00 currency of the United States. ((The cir¬ culation consists of banknotes, backed by gold and other assets of the issuing banks. Foreign gold coins are legal tender in Costa Rica at the following rates: American dollar = 2.l5 colones; French franc = 0.4125 colones; German mark = 0.51 colones; English sovereign = 10.45 colones. The situation in Costa Rica has been complicated by the failure, in February 1915, of the Banco Comercial de Costa Rica [of Limon, not the Banco Comercial of San Jose]. In order to facilitate

the circulation of the notes issued by the new bank mentioned above, the government has decreed that all obligations which are to be liquidated in colones, or in other agreed-upon moneys, shall enjoy the privilege of a moratorium until one year after the signing of European peace, unless the cred¬ itors are willing to accept payment in bills of the Banco Internacional de Costa Rica.® ((Latin American Monetary Systems*)• One of the results of the Pan-American Financial Conference held at Washington in 1915 was noted, as follows : Costa Rica arranged with New York bankers for a credit of $500,000, making New York exchange available in transac¬ tions between the two countries.

National Debt. — The total debt in 1915 was $19,000,000, of which about $8,000,000 was English credit, $7,000,000 was French credit and $4,000,000 scattered. The economic prob¬ lems of the government were acknowledged in the inaugural message of President Esquivel, 2 May 1902, to be (<grave and complicated.® The total foreign debt in 1901 was £2,080,000; it was contracted in England in 1871 and 1872. In March 1901 Costa Rican bonds to the value of 642,300 colones were incinerated, having been issued in 1897 and 1899, and subsequently re¬ deemed. The revenue of the government is derived from custom-house duties, the liquor monopoly, tobacco, stamped paper, postoffice,, etc.,, the export duty on coffee having been abol-

ished 1 Sept. 1901. The government revenue in 1915 was $2,945,517 and the expenditures for the same year amounted to $4,257,511. In 1917 the estimated income was $3,937,700 and the expenditure $4,407,200.

Weights and Measures. — The libra =1.043 pounds; manzana=lH acres; centaro = 4.2631 gallons; fanega=ll bushels. The metric sys¬ tem was established by law, 10 July 1884, but has not entirely displaced old weights and measures.

Transportation and Communication. —

The Costa Rica Railway runs from Limon to the cities of the central uplands, and has several branch lines; the Pacific Railway connects San Jose with a good harbor on the western coast. In all, there were, in 1916 in Costa Rica, 693 kilometers (433 miles) of railways, of which 134 kilometers (84 miles) were owned by the gov¬ ernment. The lines are the Northern Railway Company, 225 kilometers (140 miles), and the Costa Rica Railway, 334 kilometers (208 miles). As the latter is leased to the Northern they together form a system of 348 miles under one management. The rapid growth of the banana trade has called into being railway lines in the coast regions. The Northern Railway has an exten¬ sion down the coast southward from Bananito River, near Port Limon, with short branches running into the fruit districts. A line was also being extended northward in 1917. Be¬ tween Limon and New Orleans and Mobile there is direct communication by steamship lines several times each week. Between Limon and New York steamers run weekly. There is a regular service between ports of the Central American coast, from Colon to Belize. Sailings to Jamaica, Cuba and England are fortnightly. French and Italian steamers call at Limon once a month. On the Pacific Coast there are three regular lines touching at Puntarenas : the Pacific Mail and the Chilean and British lines. There are (1915) 147 telegraph offices and 1,600 miles of wire and 640 miles of tele¬ phone lines. Wireless telegraphy with 300 miles radius is in operation at Limon, and there is a small station at Colorado, at the mouth of the San Juan River.

Army. — All male citizens between the ages of 18 and 50 may be called upon to do military service ; the standing army, however, and

the militia together numbered 36,946 and consisted of 3 brigades, 1 battalion, 3 companies and 135 unclassified soldiers (1917). Supplementing land forces are two government-owned motor launches used principally for revenue purposes.

Bibliography. — Alfaro, R. J., (Limites entre Panama y Costa Rica) (Panama 1913) ; Ander¬ son, L., (E1 Laudo Loubet: contribucion al Estudio de la cuestion de Limites entre Costa Rica y Panama5 (San Jose 1911) ; Crosby, J. T., (Latin American Monetary Systems and Exchange Conditions) (New York 1915) ; financial Conference, Proceedings of the First Pan American) (Washington 1915) ; James, W., 'The Mulberry Tree5 (Chapters 13 and 14, London 1913) ; Pan American Union, 'Costa Rica5 (Washington 1914) ; Perigny, M. de, (Costa Rica) (in Bulletin de la Societe de Geographie Commerciale, Tome xxxii, Paris 1910) ; Shepherd, W. R., (Latin America) (New York 1914) ; Barrantes, F. M., 'Elementos de la Historia de Costa Rica) (1892) ; Palmer. F..

'Central America and its Problems) (New York 1910) ; Vose, E. N., (Costa Rica) (New York 1913,).

John Hubert Cornyn, Editorial Staff of The Americana.

COSTER, kos'ter, or KOSTER, Laurens Janszoon, a reputed Dutch inventor of printing by movable types. By many he is regarded as a predecessor of Gutenberg, by some as a mythi¬ cal personage. The first account of the inven¬ tion which has any historical value appeared in 1499 in a book called 'The Chronicle of Cologne.5 The author says that printing was invented in that city; he asserts, however, that the art was prefigured by the method used for printing certain schoolbooks or Donatuses in Holland. The next statement of importance in connection with the controversy is that of Hadrianus Junius, in his 'Batavia5 (1588) to the effect that about 1460 Laurentius Joannes, surnamed ZEdituus or Custos (literally sacris¬ tan, Coster), who lived in Haarlem, fashioned the bark of a beech-tree into letters, which he impressed upon paper. He then made a num¬ ber of wooden letters and invented an ink thicker and more viscid than the common sort, and afterward made, by the addition of his let¬ ters, explanations for pictures engraved on wood; and eventually printed books. Among these was an edition of the (Speculum Salutis.5 He subsequently changed the wooden letters for others of lead, and these again for letters of tin. An assistant, who was a member of the Gutenberg family, stole the types and appli¬ ances, going first to

Amsterdam, thence to Cologne, and finally sojourning at Mainz, where he published various books. This statement has been scoffed at as an invention or based on mere hearsay; but in recent years the trend of opin¬ ion has been in favor of the Dutch claims. There are no specimens extant that can with absolute certainty be ascribed to a printer called Coster. Coster's claim was disproved by Van der Linde, who proved that Coster was a tav¬ ern-keeper and was confused with Lauren Janszoon, a wine merchant and town officer. He asserts that Coster's claim to the invention was made by Gerritt Thomoszoon in 1550. Many fragments of books, however, have been discovered, believed to be printed much before the date of Gutenberg's earliest work. These are known as Costernian, and their number is being gradually added to since the attention of librarians has been called to their importance. They are printed in a variety of types of Dutch design. All are without any name, date or place, and nearly all were discovered in the bindings of the 1 5th century manuscripts or printed books. Consult Van der Linde, 'De Haarlemsche Costerlegende) (1870), translated into English by Hessels as (The Haarlem Leg¬ end of the Invention of Printing) (1871) ; De Vinne, (Invention of Printing5 (1876) ; Hes¬ sels, 'Haarlem the Birthplace of Printing5 (1887); Morley, 'English Writers5 (Vol. VI, London 1890) ; also Wysz, 'Zentralbatt fur Bibliotekswesen5 (1888).

COSTMARY, or MINT GERANIUM, a

species (Chrysanthemum balsamita) of the genus Chrysanthemum , of the thistle family (Composite?) . The plant is a native of Italy, whence it was introduced into England in 1568, and cultivated for its fragrant leaves, which

were used in ale and various aromatic drinks ; and also as a salad. In America the plant grows wild from Nova Scotia to Ohio, having escaped from gardens. Another common name is alecost or alecoast. The name is popularly supposed to mean ((the fragrant plant of the Virgin Mary,® but recent authorities incline to derive it from the Latin mare, the sea.

COSTUME (ˆcustom®; and especially usage, habit or appearance in dress, etc.), a term now restricted to external dress and its modes. The history of costume is an exceed¬ ingly difficult one to trace in any accurate detail, owing to the difficulty of interpreting the vague and scanty notices on the subject which we can collect from the earlier writers. The most interesting and profitable thing will be to at¬ tempt to work out certain general lines of development, leaving minute questions to anti¬ quarians who have made a special study of the subject, as far as anything can be accurately known about it. It must be observed that our earliest indications on the subject come from warm or semi-tropical countries ; thus elimi¬ nating as far as possible the factor in the devel¬ opment of clothes -which originates in the necessity of protection against the weather. Considerations of modesty, which may be re¬ garded as the outgrowth either of specifically Christian or of other highly civilized conditions, according to the point of view, appear only in a rudimentary form. The development in early times is regulated largely by the desire to make the dress tell something of the position or rank of the wearer. Thus the earliest distinction as to the amount of clothing prescribed by cus¬ tom seems to have been that the wearing of many clothes was a mark of rank, while the lower classes were content with a very scanty covering. This would follow since the nobles had in those days very slight need for active exertion; while practical considerations would dictate the minimizing of the garments which might hamper those whose employments re¬ quired free movement of the limbs.

The early Egyptians seem to have worn little besides an apron or loin-cloth ; under the later dynasty it was extended into a long skirt, which was combined with the jacket that had been sometimes worn to form

a complete garment. The women wore the calasiris, a shirt with short sleeves or none at all. Light and frequently transparent materials seem to have been most commonly used. For a headdress, both sexes wore what is known as the sphinx-cap. Here, as elsewhere, however, ordinarily people paid very little attention to dress ; kings, priests and other officials were distinguished by elaborate vestures. Under the Ptolemies Greek costume was generally introduced. The Assyrians cov¬ ered more of the body than the Egyptians and used heavier stuffs — cotton, linen, wool and possibly silk, introduced from China. They wore a long shirt with short sleeves, and con¬ fined at the waist. For the upper classes this was bright-colored and ornamented with heavy fringes. Sandals were worn. The king was distinguished by a purple mantle and a white cylindrical cap. The Persian costume was gen¬ erally tight-fitting, consisting mainly of a short coat and trousers (which seem to have origi¬ nated very early in Central Asia), often made of leather. When they conquered the Medes, they adopted very generally the dress of the

latter, which was loose and usually woolen. The leather breeches remained in use among the lower classes.

The Greek costume was characterized by great simplicity and fell into graceful folds. The principal parts of it were an undergarment called the chiton and a sort of cloak known as himation, which, when folded over the shoul¬ ders, ultimately originated a separate garment, the diploidion. Men wore the chlamys, a short cloak for the more active occupations to which the peplos of the women partly corresponded. White was the usual (though not, as formerly believed, the exclusive) color of Greek gar¬ ments ; the material was most usually woolen among the Dorians and linen with the Ionians. Silk was introduced rather late from Asia and employed to make the semi-transparent robes for which the island of Cos was famous. Orien¬ tal luxury increased as time went on, until in the Byzantine period, while clothes retained much the same shape, costly material and rich ornamentation distinguished them.

The Romans also commonly wore but two garments, and the hardy, vigorous life of their early days tended to keep these simple. They wore a woolen tunic for the house, only one at first, until the increase of luxury brought in the custom of wearing two or three in cold weather. Women also wore an outer robe known as the stola, similar to the Greek chiton. For appear¬ ance in public there was for men the toga, a large, loose, white cloak adopted by all citizens for outdoor

wear, and a somewhat similar gar¬ ment called palla for women. While, however, men had a uniform manner of wearing the toga, women draped their robes in many graceful shapes at will. Shorter, more practical over-garments, such as the lacerna and the sagum or soldier's cloak, were worn by those engaged in more active occupations. The torque, or cord of gold fastened around the neck, was a fashion introduced from Gaul after the conquest.

The history of fashion in the Christian era may be divided into four periods :

First Period. — In the first, down to 486, the Gallic, Roman and Byzantine elements were combining to form a new costume. In the sec¬ ond, 486 to 1300, this underwent many changes. The nobles vied with each other in introducing new fashions, though the middle class were far slower in adopting innovations, and the peas¬ antry kept the traditional form almost unaltered down to the time of the Crusades. The third is the Renaissance period of transition, leading down to the fourth or modern era.

With the Roman conquest of Gaul came the introduction among the conquerors of the braccce or breeches of the Gauls, first adopted for campaign wear by the Roman soldiers. As the empire went toward its . end, extravagance in dress was unbounded among the wealthier classes. The women wore a sleeveless outside tunic confined at the waist by beautiful bands and on the shoulders by jeweled clasps. They delighted in wearing tunics of bright colors held in such a way that at least some portion of each tunic was revealed and brought into contrast with the others. A bright transparent veil sparkling with green and silver spangles fell from the head and a short mantle hung from the shoulders. A sort of cornet or strophium fastened the veil to the head, and jeweled gar¬ ters bound at the knee drawers of fine linen.

Sumptuary laws were passed relating to the style of shoe to be worn by each class; but similar laws relating to the variety of jewels had little effect, since the general love for orna¬ ments was too strong to be regulated.

Second Period. — During the Merovingian era (486-751) in France no important modifica¬ tion of the general scheme of clothing came in. The ruder element introduced by the rough Franks graduallv softened beneath the enervat¬ ing, refining influence of Roman fashions. The Frankish women who had been content with their simple costume of a black robe, a tight-fitting mantle and a cap were transformed to Merovingian ladies delighting in gay, trailing tunics of delicate tissues exquisitely embroid¬ ered. Their arms were still bare according to the ancient Teutonic fashion. Their hair fell in long braids and was ornamented with fillets and flowing veils. As France acquired unity, the influence of both Roman and barbaric in¬ vasion visibly faded away. From the ancient shapeless tunic developed the gown, fitting closely to the waist and hips and having the skirt full and flowing. This was the general principle of form from the accession of the Capet dynasty (987) down to the Renaissance.

Men's dress underwent little change down to the 12th century. The costume of the Frankish men of Charlemagne's time may be described as the approximate model. It consisted of two tunics, the outer one of wool or silk varying in length from the hips to the knees, according to the prevailing style. These were covered by a blue mantle, fastened on the right side with a clasp, and often highly ornamented and trimmed with beautiful furs and gold fringes. Head coverings of diverse and increasingly ex¬ travagant styles were among the first distinc¬ tive modifications; and these were sometimes combined (as also in the development of ac¬ ademic costume) with a hood or cape falling over the shoulders.

Each century saw its own modification of these general types. It was a growing fashion in the 9th century for women's outer robes to stop at the knee and show a full sweep of the contrasting tunic beneath. In the 10th and 11th centuries the robe was belted by a rich girdle both above and below the waist. In the 11th century, too, the long train, in vain anathema¬ tized by the Church, became extremely popular. Sleeves reached the limit of absurdity in the dress of both sexes. At

various periods the leg-of-mutton sleeve was worn, and in the be¬ ginning of the 15th century the outer sleeve widened at the wrist until it swept the ground. Commercial relations with the East were im¬ proved through the Crusades, and new varieties of costly fabrics were introduced. The splendor displayed in armor and military appointments affected the customs of the women. Ladies of noble birth emblazoned their close-fitting gowns and surcoats. Even the dress of the middle classes, many of whom were dependents of the nobles and wore livery colors and armorial badges, acquired a heraldic character. The hel¬ mets, decked with scarfs and mantlings, sug¬ gested many grotesque varieties of feminine headgear, both in the 14th and 15th centuries. As the mantles of the knights but partly con¬ cealed their armor, so a surcoat worn by ladies only half concealed the beautiful decorated gown beneath. This surcoat was a jacket of

varying shape ; at one period it was only a coat without sleeves or sides; later a loose, flowing skirt was added to it, which in the 16th century stopped at the knee. The hip-girdle, of exquisite workmanship, which showed through the open¬ ings of the surcoat, was a counterpart of the military belt worn by the knights.

The end of the 14th century was marked by the excess to which the more fanciful devices of the period were carried. Robes were more fan¬ tastically cut along the edges, and decked with trailing ribbons, accompanied by a trailing tail to the hood. The pointed toes of shoes were often two or three times the length of the foot. The odd parti-colored gowns of the women blazed with heraldic impalements and quarter-ings. During the 13th, 14th and 1 5th centuries there was great confusion about those garments which we know as stockings and trousers. One garment sometimes reaches the waist, even cov¬ ering the feet. At others there were two arti¬ cles, the nether stocks (Fr. bas de chausses) came to the thigh or knee and were continued by the trunk-hose or upper hose (Fr. liaut de chausses). About 1600 the word breeches came into use to indicate the trunk-hose, and the term hose was confined to stockings.

Third Period. — This epoch was the transi¬ tion from the mediaeval to the modern style of dress. Speaking generally, up to the 14th cen¬ tury, long dress prevailed, loose and flowing, and offering a welcome contrast to the tight-fitting armor of the knight. About 1350 the costume of the men began to change, with the introduction of the doublet, a short jacket pad¬ ded at the shoulders, plaited a few inches

below the waist and fastened with a belt. The nether stocks, now entirely exposed to view, were attached to the trunk-hose. Long, loose robes with immense drooping sleeves were indeed worn throughout the 15th century, but only by professional men or nobles on occasions of state. In women's dress the tendency appeared to cut the figure into sections instead of keeping to the girded gown. A bodice reached to the hips. The dress was somewhat shortened, and thus a step was taken toward the short hooped petti¬ coat. During the Renaissance Period full forms became more and more popular, and petticoats and skirts spread into the form of a bell, which year by year increased in circumference.

Fourth Period. — A more distinct transition between ancient and modern dress took place in the 16th century. Men wore for show a short cloak wdiich hung from the shoulders. The doublet was made with rather tightly fitting sleeves; beneath it was a sleeveless jerkin fitting the body and, like the modern waistcoat, so cut as to allow the beautifully embroidered shirt to be seen. The short skirt of the doublet was gored to fit the bulging trunk-hose padded with hair, while the lower hose were plain and tight, so that the figure looked broad and full above and narrow below. In this century began the wearing of the top of the nether garments loose, or slashed, with pieces of different colors set in. The arms and shoulders of the doublet or jacket were similarly trimmed. Boots were worn loose, with the upper part falling down. Ruffs, or ruffled collars, and velvet bonnets with feathers came into use.

In England the Tudor Period was charac¬ terized by great extravagance. The chronicler Hall describes several of Henry VIII's superb

dresses, among them a <(frocke® or coat of velvet embroidered all over with gold, the sleeves and breast cut and lined with cloth of gold and tied together ((with great buttons of diamonds, rubies and Orient pearls.® The cloaks and mantles were of corresponding magnificence. The shirts were pinched or plaited and em¬ broidered with gold, silver or silk. The shoes and buskins were of the German fashion, very broad at the toe, and of velvet and satin, slashed and puffed. A plain russet coat and a loose kind of kersey breeches, with stockings of the same piece, constituted the ordinary dress of middle-class men. The London apprentices wore blue cloaks in summer and gowns of the same color in winter, as badges of servitude; for this was a period of domestic distinctions, relics of feudalism. The women wore long woolen gowns, worsted kirtles (hereafter called petticoats) and white caps and aprons. About this time white underlinen came into general wear.

In Elizabeth's time the men's huge trunk-hose, ((stuffed with hair like woolsacks,® were made of silk, velvet, satin or damask. The doublets were very costly, quilted and stuffed, <(slashed, fagged, pinched, and laced.® The cloaks were of Spanish, French or Dutch cuts; of 'cloth, silk, velvet or taffeta; of all colors; trimmed with gold, silver, silk-lace and glass bugles ; equally superb inside and out. Hats now began to supersede the bonnets of the former era. They were for the most part made of felted wool, dyed. Those of beaver were exceedingly expensive.

The most conspicuous features of women's dress in the reign of Elizabeth were the farthin¬ gale and the ruff. The former consisted of an extravagant expansion of the lower garments by means of cane or whalebone. It was the predecessor of the hoop, which in its turn was succeeded by the crinoline. The widely ex¬ tended ruff of fine linen, like a huge frill, is familiar from the pictures of Elizabeth and Mary of Scotland. The extravagance of the ruff reached such a point that it was anathema¬ tized from the pulpit, together with the ex¬ tremely low cutting of the bodice ; and the fancies of women's costume were denounced in a sermon preached before James I, at Whitehall, as ((her

French, her Spanish, and her foolish fashions.®

England was slower than France, but ahead of Spain, in abandoning the farthingale and the ruff. In the beginning of the reign of Charles I dress was little changed; the ruff, of thinner make, stood farther away from the throat and looked like a framework of gauze, but the skirts were not so wide. In the middle of the 17th century there came a revolution against the entire system of padding, whalebone, starch and wire, and for about 50 years the upper classes followed the canons of beauty and grace. In¬ stead of the ruff, the Van Dyck collar, made of rich point-lace, was worn hanging down on the shoulder and held by a cord and tassel at the neck. Long breeches, fringed and pointed, met the ruffled tops of the boots; an embroidered sword-belt, worn over the right shoulder, held a Spanish rapier. In the flapping beaver hat hung a plume of feathers fastened by a jewel. Ladies' dresses were still made with skirt and bodice, the bodice defining but not cramping

the figure, and the skirt hanging full and gracefully.

During the latter half of the 17th century, France, more than ever, gave the law to Europe in dress, and the typical style of the period is known as that of Louis XIV — although, for accuracy, a distinction must be made between the gay and brilliant and the sombre parts of his reign, in the latter of which a tendency toward sober plainness not unlike that of the English Puritans was felt. The result of long struggles with inconveniences of dress was a nearer approach to the modern masculine dress of three pieces, coat, waistcoat and trousers. The richly laced and embroidered doublet was long and loose, and had large puffed-out sleeves reaching a little below the elbow. The rest of the arm was covered by the full sleeves of the shirt. The long, loose, sleeveless waistcoat showed beneath the doublet, and the wide, ruffled breeches were fastened at the knees with bunches of ribbon. The doublet had buttons and buttonholes for its entire length, thus be¬ coming a coat. Instead of the lace collar the long, square-ended cravat was worn. In the early part of the 18th century this dress became more exact in shape and sober in tone. The doublet, now a coat, fitted the body. The absurd wide <(petticoat breeches® were exchanged for close-fitting garments tied below the knee. The broad-brimmed hats were turned up on two sides, later on three, and edged with feathers or ribbons. Wigs, which had been some time in use, were worn still longer than before, hang¬ ing down in front or flowing upon the shoulder. The coats of the 18th century were of velvet, silk,

satin or broadcloth and of fanciful colors. Hogarth's favorite color was sky-blue, Reynolds' deep crimson, and Goldsmith rejoiced in plum-color. Meanwhile women's dress had also be¬ come more stiff and formal. Long bodices were tightly laced over very stiff corsets ; overdresses were bunched up in the neck and on the hips ; and the hoop-skirt, as outrageous as the farth¬ ingale of the 16th century, was generally worn. About the middle of the century the sacque came into style — a loose gown, resembling the mantle of antiquity, which was looped over the hoop-skirt and furbelows or left trailing behind. Heavy towering headdresses replaced the simple ringlets of the previous century. Small muffs, flowing veils and fans were important acces¬ sories. Muffs were carried for a time by men.

The formalities of the 18th century received a severe blow from the general tendency of the French Revolution toward simplicity. In the 10 years from 1790 to 1800 a more complete change was effected in dress by the spontaneous action of the people than had taken place in any previous period in the century. The change began in France, partly to mark contempt for old court usages, and partly in imitation of cer¬ tain classes in England, whose costume the French mistook for that of the nation generally. It consisted of a round hat, a short coat, a light waistcoat and pantaloons reaching to the ankles and fastened by buttons. A handerchief was tied loosely around the neck, with the ends long and hanging down, and showing the shirt collar above. The short hair d la Titus was un¬ powdered, and the shoes were tied with strings in place of the buckles which had before been universal. This comparatively simple form of dress found many admirers in England and soon

became common among the young men. The abandonment of hair-powder followed the im¬ position of a tax on its use, and with the giving up of wigs and powder came the fall of the cocked hat. Pantaloons which fitted closely to the legs remained in general use until about 1814, when the wearing of looser trousers, already introduced into the army, became fashionable, though many elderly persons still held to knee-breeches against all innovations. The general simplifying of dress subsequent to 1815 was not allowed to pass without a last effort to retain the elaborate fashions of the preceding period. The macaroni of the 18th century was now succeeded by the

dandy, who prided himself on his starched collars, his trouser-straps, and the flashy bunch of seals which dangled from his watch-chain. The period covered by the Regency in England was indeed the heyday of this kind of dandyism ; but even later it characterized not a few leading public personages.

The end of the 18th century witnessed a signal change in the style of women's dress. The gown no longer consisted of two dresses, an under and an outer one. The formal styles which had prevailed throughout the century and brought into use stiff materials such as solid damasks, velvets, satins and silks, were replaced by the fashion of the short-waisted clinging gown made of muslin and soft silk. This ˆEmpire® mode characterized the dress of the first quarter of the 19th century. Large, loose, warm coats and cloaks were used for outdoor wear. Elaborate hats, turbans and caps were worn on all occasions. In the twenties there was another revolution. Skirts were shortened and trimmed with flowers, puffs and ruchings ; sleeves became fuller, and the waist came nearer its natural position. Then the sleeves began to widen and stiffen, and the hats grew larger and more cumbrous. From these wide skirts the crinoline was evolved in 1854. In the seventies the skirt became narrower again, worn with a polonaise of a different color. Meanwhile the size and shape of the sleeve was not constant for more than a year.

But it would be both impossible and profit¬ less to follow the minute variations of changing fashion. To return to general principles, it is safe to say that neutrality is becoming more and more the basis of costume, at least for men. Extravagance in dress, especially among the Anglo-Saxon nations, has become a note of bad taste ; and man's dress, which was formerly characterized by gorgeous display, is little more than a uniform which, with certain variations prescribed by etiquette, adapts itself to different functions and amusements. As a result of the general modern abandonment of formality, and the opening of new employments for women, together with their invasion of the realm of athletic sports, the simplicity which character¬ izes the masculine dress has come to exist more and more also in the feminine. Fashion is forced nowadays to accommodate itself, to some extent at least, to health and convenience ; and only the artist and the antiquarian will be. found to regret that the picturesque costumes of bygone days are to be seen only among the peasantry of distant and isolated lands.

Bibliography. — Racinet, (Le costume historique) (1888) is the best general work.

Ferrario, (U costume antico e moderno) (22 vols., Milan 1815-34) is also valuable. For the pre-Christian period, consult especially Layard, (Monuments of Nineveh) (1850) ; Hope, (Cos¬ tume of the Ancients > (1841); Evans, Chap¬ ters on Greek Dress) (1893). For later de¬ velopments, Hefner-Alteneck, (Trachten, Kunst-werke, und Gerathschaften vom friihen Mittelalter bis Ende des 18ten Jahrhunderts5 (1879— 89) ; Jacquemin, Hconographie methodique du costume du IVe au XIXe siecle) (1876) ; Lacroix, (Manners, Customs and Dress of the Middle Ages and the Renaissance, and the Eighteenth Century, Its Institutions, Customs, Costumes > (Eng. trans. 1877, 1887) ; Chevig-nard and Duplessis, Costumes historiques des XVIe, XVIIe, et XVIIIe siecles> (1867); Planche, Cyclopaedia of Costume) (1876— 79) and (History of British Costume) (1874) ; Fairholt, Costume in England y (1885) ; Earle, Costume of Colonial Times) (1895); (Two Centuries of Costume in America) (2 vols., New York 1904) ; Pauquet, (Modes et costumes historiques } (1862-64) ; Rosenberg, Ceschichte des Kostiims* (Berlin 1905) ; Von Heyden, (Die Tracht der Kulturvolker Europas bis zum Beginn des 19. Jahrhunderts) (1889) ; Quincke, ˆandbuch der Kostiime) (1896).

COSTUME, Academic. — The use of caps, gowns and hoods in the United States has been continuous since Colonial times. Columbia Col¬ lege continued the custom of Kings College in the city of New York which had transplanted to American soil many of the regulations of Oxford and Cambridge. The code, however, was modified and lost much of the high color so noticeable in Great Britain. The University of Pennsylvania, New York University, Trinity College (Hartford, Conn.), Saint John's (An¬ napolis, Aid.), University of the South (Sewanee, Tenn.), and Hobart also had codes in force before 1880. There was, however, no system discernible and few persons knew the distinguishing marks of the costumes for the various degrees. Few hoods were in use and some of them were worn by clergymen and by the congregations were supposed to be articles of ecclesiastical rather than academic costume. In fact, there is an intimate connection between the two as the mediaeval universities were maintained by clerics and the forms of caps, gowns and hoods were merely the mediaeval forms of clothing, retained and made regulation for the clergy when the lay community changed to more modern dress. Caps were a necessity in the cold churches ; copes and capes with hoods attached were needed for warmth, and the hood was selected by the university men as the article to be made distinctive for the various degrees by color, trimming and lining. As the British universities passed from the control of the ecclesiastics, the costumes took on

brighter colors, the dress or convocation robes for the doctors being of scarlet cloth, about the same color as the hunting coats and the old army uniforms.

The use of scarlet for dress use in doctors' gowns and for doctors' hoods is about the only tendency toward uniformity to be found in the British usage, all the codes of the British, Irish and Colonial universities being purely empirical. The codes of Oxford, Cambridge, Edinburgh and McGill (Alontreal) are given herewith.

o

bo

aJ

o

• rH

o

o

g

<

Q

d

c3

Oh

M-l

o

g

d

+->

+s

• 1— I

d

53

Ph

> eH

d

<u

b

d

d

/

COSTUME, ACADEMIC

49

UNIVERSITY OF OXFORD.

B.A.

Gown. Black stuff.

Hood. Black stuff, trimmed with white fur.

Litt.B.

Gown. Black stuff.

Hood. Black stuff, lined and one inch border blue silk.

M.A.

Gown. Black silk.

Hood. Black silk, lined with crimson silk.

B.D.

Gown. Black silk.

Hood. Black silk, lined with glossy black silk.

D.D.

Gown. Black silk.

Hood. Scarlet cloth, lined with black silk.

B.C.L.

Gown. Black silk.

Hood. Blue silk, trimmed with white fur.

D.C.L.

Gown. Black silk.

Hood. Scarlet cloth, lined with crimson silk.

M.B.

Gown. Black silk.

Hood. Blue silk, trimmed with white fur.

M.D.

Gown. Black silk.

Hood. Scarlet cloth, lined with crimson silk.

Mus.B.

Gown. Black silk.

Hood. Blue silk, trimmed with white fur.

Mus.D.

Gown. Black silk.

Hood. White silk in bro¬ cade, lined with crimson silk.

Sc.D. and Litt.D.

Gown. Black silk.

Hood. Scarlet cloth, lined with gray silk.

Doctors of Divinity, Civil Law, Medicine, Science, and Letters are entitled to wear a scarlet cloth gown, faced and lined with the color of the lining of the hood of their respective faculties. Doctors of Music for full dress wear gown of white silk in brocade faced and lined with

crimson silk.

UNIVERSITY OF CAMBRIDGE.

B.A.

Gown. Black stuff.

Hood. Black stuff, trimmed with white fur.

M.A.

Gown. Black silk.

Hood. Black silk, lined with white silk.

B.D.

Gown. Black silk.

Hood. Black silk, lined with black silk.

D.D.

Gown. Black silk.

Hood. Scarlet cloth, , lined with pink silk.

LL.B.

Gown. Black silk.

Hood. Black silk, trimmed with white fur.

LL.M.

Gown. Black silk.

Hood. Black silk, lined with white fur.

LL.D.

Gown. Black silk.

Hood. Scarlet cloth, lined with pink silk.

M.B.

Gown. Black silk.

Hood. Black silk, trimmed with white fur.

M.D.

Gown. Black silk.

Hood. Scarlet cloth, trimmed with pink silk.

Mus.B.

Gown. Black silk.

Hood. Black stuff, trimmed with white fur.

Mus.D.

Gown. Black silk.

Hood. Red puce silk, lined with white silk.

Doctors of Divinity, Laws, Medicine and Music are entitled to wear scarlet gowns, faced and lined with the color of the lining of the hood of their respective faculties.

UNIVERSITY OF EDINBURGH.

M.A.

Gown. Black silk.

Hood. Black silk, lined with white silk.

B.D.

Gown. Black silk.

Hood. Black silk, lined with purple silk, bor¬ dered with fur.

D.D.

Gown. Black silk.

Hood. Black cloth, lined with purple silk.

LL.B.

Gown. Black silk.

Hood. Black silk, lined with blue silk, edged with white fur.

LL.D.

Gown. Black silk.

Hood. Black cloth, lined with blue silk.

M.B. and M.S.

Gown. Black silk.

Hood. Black silk, lined with crimson silk, edged with white fur.

M.D.

Gown. Black silk.

Hood. Black cloth, lined with crimson silk.

B.Sc.

Gown. Black silk.

Hood. Black silk, lined with lemon-yellow silk, edged with white fur.

D.Sc.

Gown. Black silk.

Hood. Black silk, lined with lemon-yellow silk.

Pull dress gowns for doctors of the University of Edinburgh are made of superfine scarlet cloth, loose sleeves, lined with rich silk of the color of the lining of the hood of the graduate's degree.

MCGILL UNIVERSITY.

Undergraduates shall wear a plain black stuff gown, not falling below the knee, with round sleeve cut above elbow.

Bachelor of Arts. — Black stuff gown, falling below knee, with full sleeve cut to elbow and terminating in a point (similar to that of the Cambridge B.A.); hood, black silk, lined with pale blue silk and edged with white fur.

Bachelor of Science. — The same gown as Bachelor of Arts; hood, black silk, lined with yellow silk and edged with white fur.

Bachelor of Civil Law. — The same gown as Bachelors of Arts; hood, black silk, lined with French gray silk and edged with white fur.

Bachelor of Architecture. — The same gown as Bachelors of Arts; hood, black silk, lined with white silk and edged with white fur.

Bachelor of Music. — The same gown as Bachelors of Arts; hood, black silk, lined with pale mauve silk, and edged with white fur.

Master of Arts. — Black gown of stuff or silk, falling below knee, with long sleeve with semi-circular cut at the bottom (similar to that of the Cambridge M.A.); hood, black silk, lined with pale blue silk.

Master of Science. — The same gown as Masters of Arts; hood, black silk, lined with yellow silk.

Doctor of Medicine. — The same gown as Masters of Arts; hood, scarlet cloth, lined with dark blue silk.

Doctor in Dental Science. — The same gown as Masters of Arts; hood, scarlet cloth, lined with pink silk.

Doctor of Laws. — The same gown as Masters of Arts; hood, scarlet cloth, lined with white silk.

Doctor of Literature. — The same gown as Masters of Arts; hood, scarlet cloth, lined with pale blue silk.

Doctor of Science. — The same gown as Masters of Arts; hood, scarlet cloth, lined with yellow silk.

Doctor of Music. — The same gown as Masters of Arts; hood, scarlet cloth, lined with pale mauve silk.

Doctor of Philosophy. — The same gown as Masters of Arts; hood, scarlet cloth, lined with pale green silk.

Doctor of Civil Law. — The same gown as Masters of Arts; hood, scarlet cloth, lined with French gray silk.

Doctors of Laws, Doctors of Civil Law, Doctors of Litera¬ ture, Doctors of Science, Doctors of Philosophy and Doctors of Music shall be entitled to wear for full dress a robe of scarlet cloth (similar in pattern to that of the Cambridge LL.D.) faced with silk of the same color as the lining of their respective hoods.

All hoods shall be in pattern similar to that of the Masters of Arts of Cambridge University.

Undergraduates and graduates shall wear the ordinary black trencher with black tassel, but Doctors of Laws, Doctors of Civil Law, Doctors of Literature, Doctors of Science, Doctors of Philosophy and Doctors of Music shall wear for full dress a black velvet hat with gold cord, simdar to that worn by Doctors of Laws of Cambridge University.

The idea of a well-defined system for the American colleges and universities arose about 1893 after there had become evident a decided movement toward the use of academic costume by senior classes, trustees and faculties outside of the institutions named in the opening par¬ agraph of this article. The College of Bryn Mawr opened with caps, gowns and hoods for faculty and students in 1885, the faculty of Harvard had equipped for her 250th anniver¬ sary in 1886, the trustees of Yale about the same time, the seniors of Williams in 1883, the seniors of Wellesley for Tree Day in 1884, the Yale, Union and Amherst seniors in 1891, seniors of Harvard, Dartmouth, University of Syracuse and several others in 1892, the facul¬ ties of Brown and The University of Chicago, seniors of the University of Vermont, Dickin¬ son, Wesleyan, Tufts, Hampden-Sidney, Wells, Lafayette, Mount Holyoke, Elmira, Colby and many others in 1893. The movement was essentially a student movement to provide a senior badge and to improve the commencement week exercises, take the place of the archaic <(dress suit® or Swallow-tail® and revive the traditions of a continuing and related university life. It was

approved particularly by the

students on account of its being uniform which overcame all differences of dress and made for democracy. It was seen that the gowns aided grace and overcame awkwardness in speaking and that the general effect was to make uni¬ versity functions more characteristic, interest¬ ing and impressive to all beholders. It was dis¬ covered that on account of the improved ap¬ pearance of all wearing academic costume, and the increased interest aroused by the dignity of the ceremonies that there was better attendance on the part of trustees, faculties, alumni, students and friends of the colleges and uni¬ versities.

Realizing that there must be an intelligible system adaptable to all institutions if the many

as in the linings of the hoods of Princeton, Columbia, University of Pennsylvania, Johns Hopkins, Cornell, University of California, University of Illinois, University of Michigan, Northwestern, University of Pittsburgh, Tulane and many others. In order to make variations in combining the same two colors when used by various institutions, one color is used as the field and the second as the chevron ; another institution reverses by using the second color as the field and the first as the chevron. Then one is used above the other in the hood lining, the dividing line being on the line of a chevron (parti-per-chevron). Sometimes two or three chevrons of the first color are set on the field of the second color and then two or three chevrons

American colleges were ever to enjoy the full advantages of academic costume, an inter¬ collegiate commission was formed in 1893 and there was prepared a tentative draft of a uniform code for caps, gowns and hoods for the various degrees, designed so as to show in the hoods

also the sources of the degrees by use of the college colors. Col. John J. McCook of the Princeton trustees, President Seth Low and Bishop Potter of the Columbia trustees, Rev. Charles Ray Palmer of the Yale trustees and Chancellor MacCracken of New York Uni¬ versity were the most active members of this commission, and the writer of this article was called in as a technical adviser. He prepared colored sketches; made up experimental hoods and gowns ; and solved the problem of satisfactorily combining two colors in a hood lining by the adaptation of the heraldic chevron

of the second color on the field of the first color. A few zones are set on fields of other colors.

The Intercollegiate system makes the follow¬ ing distinctions in the gowns, hoods and caps.

GOWNS.

Undergraduate. — Of black stuff, open or closed in front, round or pointed sleeve.

Bachelors. — Of black stuff, open or closed in front, long pointed sleeve.

Masters. — Of silk preferably, open front, long closed sleeve with slit in upper part for arm.

Doctors. — Of silk preferably, open front, round bell sleeve; faced down the fronts and barred on the sleeves with black velvet or velvet wholly or in part of the color designated for the trimming of the hood for the doctorate held.

Presidents, Chancellors and Deans may wear the gowns trimmed with gold braid and may wear other marks of office not inconsistent with the Code.

Members of the Governing Body (Trustees , etc.) may wear the doctor’s gown during tenure of office.

. . — . . ˆ - ■’• ■ -’»•’ - - - •-.. wm «i.ˆlljl’.’,.ˆW v.ˆ”

I

\

.

COSTUME, ACADEMIC

51

HOODS.

Hoods should be of material similar to the gowns, are of distinctive shapes or lengths for Bachelor, Master or Doctor ; are lined with silk showing the official colors of the institution that conferred the degree or with which the wearer is connected and are trimmed in proper widths with velvet distinctive of the degrees as follows:

Arts and Letters . White

Theology and Divinity, . Scarlet

Laws . Purple

Philosophy . Blue

Science … Gold yellow

Pine Arts . Brcwn

Medicine . Green

Music . Pink

Pharmacy . Olive

Dentistry . Lilac

Forestry . Russet .

Engineering . Orange

Veterinary science . Grey

Library science . Lemon

Pedagogy . Light blue

Commerce and Accountancy . Drab

Physical education . Sage green

Humanics . Crimson

Oiatory . Silver gray

Public health . Salmon pink

Agriculture . Maize

Economics . Copper

CAPS.

The Oxford cap, of stuff or broadcloth, is worn for all degrees, but the doctorate is entitled to a tassel of gold or part gold and the doctor's cap may be of velvet.

Official Colors. — The official colors for the hood linings of some of the leading institutions of the United States are as follows :

Allegheny . Navy blue, old gold chevron

Amherst . Purple, white chevron

Boston . Scarlet, white chevron

Bowdoin . White

Brown . Brown

Bryn Mawr . Maize, white chevron

Carnegie Institute of Technology . Carnegie Tartan

Catholic University . Papal yellow, white zone

Colgate . Maroon

College of the City of New York . Lavender

Colorado College . Black, old gold chevron

Columbia . Light blue, white chevron

Cornell . Cornelian, two white chevrons

Dartmouth . Green

DePauw . Old gold

Drake . White, azure chevron

Fordham . Maroon

Georgetown . Gray, blue chevron

George Washington . Dark blue, buff chevron

Georgia School of Technology . Old gold, white chevron

Goucher . Dark blue, gold yellow chevron

Hamilton . Blue, buff chevron

Harvard . Crimson

Holy Cross . Purple

Hunter . Lavender, white chevron

Indiana . White, red chevron

James Millikin . Presbyterian blue, white chevron

Johns Hopkins . Black, gold chevron

Lafayette . Maroon, white chevron

Leland Stanford Jr . Cardinal

Louisiana State… .Purple above old gold, parti-per-chevron

Massachusetts Institute of Technology,

Bright red, silver-gray chevron

Miami . Bright red, white chevron

Mount Holyoke . Light blue

New York . Violet

Northwestern . Purple, gold yellow chevron

Oberlin . Red, gold yellow chevron

Ohio State . Scarlet, silver gray chevron

Pennsylvania State College . Navy blue, white chevron

Princeton . Orange, black chevron

Purdue . Black, two old gold chevrons

Radcliffe . Crimson, white chevron

Rensselaer Polytechnic Institute . . White, bright red chevron

Rutgers . Scarlet

Simmons . Dark blue, gold chevron

Smith . White, gold chevron

State College for Teachers (Albany, N. Y.),

Purple, wide gold yellow chevron

Saint Lawrence . Bright red, dark brown chevron

Saint Louis . White, wide blue chevron

Stevens Institute of Technology . Gray, scarlet chevron

Syracuse . Orange

Temple . White, cherry red chevron

Tufts . . Brown, light blue chevron

Tulane . Olive green, light blue chevron

Union… Garnet

University of Alabama …. Oxford crimson, white chevron

University of California . Gold, blue chevron

University of Chicago . Maroon

University of Cincinnati . . Bright red, two black chevrons

University of Illinois …. Navy blue, two orange chevrons

University of Kansas . Dark blue, red chevron

University of Kentucky. .White above blue, parti-per-chevron

University of Maine . Light blue

University of Michigan . Maize, azure blue chevron

University of Minnesota . Old gold, maroon chevron

University of Missouri . Old gold, two black chevrons

University of Nebraska,

Scarlet above cream-white, parti-per-chevron University of North Carolina. .Light blue, two white chevrons

University of Oklahoma . Cream, crimson chevron

University of Oregon …. Lemon yellow, dark green chevron

University of Pennsylvania . Red, blue chevron

University of Pittsburgh… . Navy blue, gold-yellow chevron

University of Rochester . Dandelion-yellow

University of Southern California . Gold yellow

University of Tennessee . White, orange chevron

University of Texas. .White above orange, parti-per-chevron

University of Virginia . Navy blue, orange chevron

University of Washington,

Purple above gold, parti-per-chevron

University of Wisconsin . Cardinal

Vassar . Rose, gray chevron

Washington (Saint Louis, Mo.) . . Myrtle green, red chevron

Wellesley . Dark blue

Wesleyan . Cardinal, wide black chevron

Western Reserve . White, scarlet chevron

West Virginia . . Old gold above dark blue, parti-per-chevron Wheaton (Mass.),

White above blue, parti-per-chevron, reversed

Whitman . Blue, maize chevron

Williams . Royal purple

Winthrop … . .Garnet, gold chevron

Wooster (College of) . Old gold, black chevron

Yale . Blue

The commission offered its code to all higher institutions of learning and it was soon officially adopted by the leading universities and colleges and generally understood to be in effect throughout the country. The Intercollegiate Bureau of Academic Costume was established at Albany, N. Y., and did the work of register¬ ing the official colors in their official arrange¬ ments as the various institutions adopted them. It has required much labor to keep distinct the hood linings of more than 700 institutions that use the Intercollegiate System in the United States, Philippines, Porto Rico, Turkey, Syria and Canada. Degrees from French, German and Swiss universities held by residents of America are also shown by characteristic linings duly registered after suitable official action.

Correct and differing shades of the same colors have to be registered and gown makers are con¬ fronted with the problem of keeping the colors the same through the passing years which can only be done by having considerable quantities woven to order of each color, as recorded by the Intercollegiate Bureau at Albany, N. Y. This bureau is working under a charter granted in 1902 by the Regents of the University of the State of New York and has for its object (<to establish and maintain a library relating to the universities, professional, technical and ad¬ vanced schools and colleges of the world, par¬ ticularly as to their membership and their cere¬ monial and other public appearances, including their gowns, hoods, caps, robes, badges, banners, arms and other regalia used on such occasions ; to maintain a register of statutes, codes and usages, designs and descriptions of the articles of academic costume and regalia with their cor¬ rect colors, materials, qualities, sizes, propor¬ tions and the arrangement thereof ; to promote

social intercourse among members of univer¬ sities and colleges and to disseminate informa¬ tion on the subjects above mentioned.®

The bureau aims to keep from confusion the distinctive details of symbolic academic costume and to aid without charge all institutions with any information in its possession. It invites correspondence.

The use of hoods by graduating classes has been increasing in recent years and candidates who are known as eligible, often don the hoods for the baccalaureate sermon or at a special ceremony at the beginning of commencement week known as <(Hi Juvenes® when the names of those who have passed the final examinations are read off. The hoods, with their aesthetic brightening of the otherwise rather sombre costumes and their appeal to college spirit by the display of the college colors, thus yield their significance during the full period of commence¬ ment time.

Bibliography. — Calthrop, Dion Clayton, (English Costume) (Vol. II, p. 142, London 1906) ; (Costumes of the Members of the Uni¬ versity of

Oxford) (24 plates, Oxford) ; Cos¬ tumes of the University of Cambridge) (24 plates, Cambridge) ; Fairholt, F. W., Costume in England } (London 1860) ; La Croix, Paul, (Manners, Customs and Dress during the Mid¬ dle Ages> (London 1877) ; Leonard, Gardner C., Che Cap and Gown in America > (Albany, N. Y., 1896) ; Wells, J., (Oxford and its Colleges) (London 1898) ; Wells, J., Che Oxford Degree Ceremony > (Oxford 1906) ; Wood, T. W., ecclesiastical and Academical Colours* (London 1876) ; Wood, T. W., Che Degrees, Gowns and Hoods of British, Colonial, Indian and American Universities and Colleges) (London).

Gardner Cotrell Leonard, Director of Intercollegiate Bureau of Academic Costume.

COSTUME, Ecclesiastical. Hebrew. —

The vestments of the Levitical priesthood briefly enumerated were as follows: (1) Drauh ers or “breeches® of linen. (2) Tunic of linen concerning which Josephus informs us that it reached to the feet, fitted close to the body and was furnished with tight sleeves. It was girded to the breast, a little above the level of the elbow. (3) Girdle. A strip of linen four fingers broad, Josephus says, but, according to Maimonides, three fingers broad by 32 cubits in length. This was wound several times round the body, the ends tied over the breast, leaving the extremities hanging down to the feet ; in offi¬ ciating over a sacrifice or other ceremony the priest threw it over his shoulder to afford more freedom of action. Elaborate embroidered decoration was done in scarlet, purple and blue threads in the form of flower motifs. (4) Priest’s Cap. This was of turban form which Josephus describes as “a cap, not brought to a conic form nor encircling the whole head but still covering more than half of it, and is termed mesnaemphtlies ,® These are all of the sacerdotal vestments, accofding to Mosaic law, of the Jewish priest. The high-priest’s vest¬ ments now follow: (5) The “robe of the ephod® consisting of a blue tunic that reached to the feet, according to some authorities, but only to the knees, according to others. This was woven in a single piece having an aperture for insert¬ ing the head. Golden bells and pomegranate

motifs were suspended from the hem alter¬ nately. (6) The Ephod. This was the most important part of the high-priest’s equipment. The Book of Exodus tells us it was of gold, blue, purple and scarlet; Josephus says it “was woven to the depth of a cubit of several colors, and it also had sleeves, nor did it appear to be made at all differently

from a short coat.® It appears probable that this vestment was com¬ posed of two pieces, Macalister says, front and back buttoned together with two onyx stones, one on each shoulder, set in bezels or “ouches® and engraved with the names of the 12 tribes, six on one and six on the other. Round the waist was passed a girdle which was made of materials similar to the ephod and em¬ broidered elaborately with colored threads. (7) The Breast Plate. This was a rectangular piece of cloth the same as the ephod and folded to make a perfect square of about nine inches on each side. Twelve stones were fixed in this in gold settings, arranged in four rows of three each. Each had the name of one of the tribes engraved on it. The stones are said to have been carnelian, peridot, emerald, ruby, lapis-lazuli, onyx, sapphire, banded agate, amethyst, topaz, beryl and jasper. This was attached to the ephod by two plaited or twisted gold chains or rods which fastened to the bezels on the shoulders of the ephod and whose other ends were attached to gold rings on the two upper corners of the breastplate and below by two cords or ribbons passing from two rings in the lower corners to the sides of the ephod above the embroidered girdle. (8) The Mitre. The high-priest’s mitre appears to have differed from the headdress of the priest only in having a gold plate set in blue lace and in having the inscription “Holy to Jehovah.®

Vestments of the Roman Church. — The vestments worn by the priests of the Western Church at the Eucharistic ceremony (sometimes termed “sacred vestments®) during the papacy of Innocent III (about 1200) were alb, girdle, amice, stole, maniple, dalmatic, chasuble, sandals, pall, stockings, subcingulum, mitre, gloves, ring, staff, tunicle, orale. The “rational® was in use in the 12th century. In ecclesiology the term vestments has, at times, included church furniture in old inventories of the Church. (1) Alb. A long gown usually of linen but frequently of silk, or cloth of gold is mentioned sometimes, or even velvet. As its name implies, it was originally white but is often red, blue or black. Early in the 11th century the alb had a round gold plate just above the lower hem on either side as an orna¬ ment; sometimes in the same period we find rows of small gold plates ranged round the lower edge ; these are, respectively, the albce sigillatce and albce bullatce. Ordinarily, es¬ pecially in later years, the ornamentation is embroidery in small patches, termed apparels, sewn on various parts of the vestment. Such were located as follows : Two rectangular ones just above the lower hem, one in front, one be¬ hind; another on the back and one on the breast; a small patch was on each cuff and a narrow strip bordering the orifice for the head. Early examples show two narrow strips running down the front and the back. Early cuff-ap¬ parels encircled the entire wrist to become, later, small patches

appearing above the back of the hand. Albs have to be worn plain at

times (on Good Friday, for instance). The alb used to be made so long as to need draw¬ ing in and hanging over the girdle. (2) Girdle. This secures the alb and is a narrow band (called also cingulum) , usually of cotton with a tassel at each end. Some bore colored embroid¬ ery. The girdle is about four yards long. As the alb is drawn in and over the girdle the latter is not seen in mediaeval monuments. (3) The Amice; called also humerale and anamola-dium. This was a creation of the Middle Ages and intended at first to act as hood; it is still so worn in some places in France from All Saints Day till Easter. It is the first vestment to be put on. The amice was rectangular (36 inches by 25) and has strings at each end long enough to go round the body and cross over the breast. Embroidery (orphreys) ran along one of the long sides. In its position around the neck it is worn like a collar above the other vestments, but leaving the throat uncovered. In the middle of the upper edge is a small cross. The amice was made of linen. (4) The Stole. Spelled also stola. This is a narrow strip, 9 or 10 inches long, of embroidered work two or three inches wide. It was at first of even width from one extremity to the other but, about the 13th or 14th century, it assumed a wider square panel at each end in which crosses and other decorations were embroidered. This immediate change in width is modified in modern stoles by a gradual increase. The stole is worn between the alb and chasuble, crossing over the breast and secured there by the alb girdle, but at present only during mass officiation. Deacons wear the stole over the left shoulder and under the right arm; bishops wear it between the alb and tunicle hanging down on either side of the breast. In ancient times the stole was made so long as to reach almost to the feet, thus showing both ends below the chasuble of the priest or the still lower dalmatic of the bishop. It was of intensely rich decoration, sometimes made of gold thread with very little silk. In Anglo-Saxon days little silver bells, apparently, were attached to the extremities of the stole. (5) The Maniple. This vestment is of similar form to the stole and was worn, at first over the fingers of the left hand, later, for convenience, it was

suspended from the left wrist, in which latter case it* is often buttoned or sewn on to avoid its slipping off. Its length varies from three feet to three feet three inches and its width is about three inches. (6) The Dalmatic. This appears to have originated about the 9th century. It is split open a short distance on both sides and the slits decorated with fringe (the deacon's dalmatic is fringed only on the left side). Perpendicular bands or horizontal orphreys ornament the dalmatic, which was white up to the 12th century, then the entire vestment became elaborately embroidered. (7) The Chasuble. The last vestment to be put on before celebrat¬ ing mass. It was made from different ma¬ terials, velvet, silk or cloth of gold, most fre¬ quently. For a time in the early mediaeval period a hood was sewn to the ordinary chasuble when used in processions, but it soon was dis¬ placed by the cope. The early chasuble was constructed of a semi-circular piece of cloth with a notch for the neck cut out in the centre. The two straight edges were then sewn to¬ gether producing a vestment of truncated cone form. This form created an impediment to

upward movement of the arms of an officiating priest, so it was made of an oval piece and an open space cut in the centre for the head, this left the length of the vestment in front and be¬ hind with the short sides covering the upper parts of the arms. In modern Roman chasubles we find rather large semi-circular portions cut out from the front sides, thus allowing the hands to be brought together without disar¬ ranging the draping of the vestment. At times we find another form appearing in the Middle Ages being cut elliptical and pointed at the ex¬ tremities, the (<vesica piscis® shape, leaving the front and back ends in blunt points. Decora¬ tion of the chasuble varies. Some were plain (earlier examples always), others had embroid¬ ered (orphrey) ornament consisting of strips which were sewn on the edge or crosswise on front and back. The less elaborate (edge) decoration is found mostly on parish priests' vestments, while the extensive front and back embroidery is found more on the monuments of bishops, abbots and other richer dignitaries. The Latin cross is often on early chasubles back and front, and the modern vestment retains it on the back. The chasuble surmounts all other vestments. (8) The Sandals. - The Roman sandal consisted of a sole secured to the foot by leather thongs. Some monastic orders re¬ tain this form, but the colder Northern regions necessitated a change for better foot protection. In order to maintain the tradition in the North¬ ern churches "fenestration® or open-work pat¬ terns were cut into the upper of a shoe, displaying the bare surface of the foot. These pseudo-sandals disappeared in the 14th century, giving way to shoes reaching above

the ankles and the “fenestration® was represented by lavish embroidery with jewel and gold spangle decoration. (9) The Pall. Spelled also pallium. This vestment signifies jurisdiction and belongs to the vestments of the Pope. By him it is granted to patriarch primates and metropolitans, also at times as a mark of honor to bishops. “The pallium is woven of white wool, encircling the upper part the shoulders, and having the bands hanging down before and behind. It is double on the left side and single on the right. It has four purple crosses, to wit, in the front, and at the back, and at the two sides. It is fastened with three golden pins.® (Durandi Rationale) . This was the early mediaeval form, the shoulder yoke being at right angles with the perpendicular arms and forming a T (or tau cross) ; later the loop droops in front and rear forming a V. The plain early palls were fastened by pins, but with the richly ornamented chasuble loops had to be provided; later the pall has been left unsecured. The tails of palls vary as to length, being from the 11th to 14th cen¬ turies very long, then being shortened more and more, till at present only a little over a foot long. A small lead button is sewn into the tails to keep them from riding up. Earliest illustrations of palls show a single cross at each tail end; modern palls bcJi$t of no less than three crosses on each tail, four on the shoulder band, worked in black. (10) The Stockings. Called often buskins. These were, apparently, at first a papal vestment solely, as the bishops wore sandals. The episcopal wardrobe in¬ cluded, however, the caligee by the time of Ivo of Chartres. From a condition of simplicity they took on enrichments in the Middle Ages.

(11) The Sub cingulum. This vestment has be¬ come almost obsolete. It is a purtenance of the Pope exclusively and is formed like a girdle, passes round the alb and having on the left side a maniple-like appendage. This would ap¬ pear to have been the 14th century form. (12) The Rational. This has also become almost obsolete but was worn early in the Middle Ages by the bishops in imitation of the Jewish high-priest’s breastplate. It was a wooden brooch covered with enameled metal and fastened on the breast of the chasuble. Few are

mentioned in the inventories of cathedrals and we have little description concerning their form, which varied and was probably similar to the usual morse. It seems to have disappeared before the 15th century. (13) The Mitre. A covering for the head on solemn ceremonies by cardinals, bishops and the abbots of some monasteries by special privilege, also by the canons of certain churches. A characteristic of the mitre is its upper section dividing itself into two peaks ; but illustrations of the 13th century would lead us to suppose that the bishop's headdress was closed above. The early double-pointed mitre was very low. In the 14th century it grew more pointed and enriched, then attaining its greatest perfection of form and decoration. The ornamentation grew to be most costly and elegant, the edges assumed crockets, the apex ended in a jeweled cross. From the end of the 15th century to the middle of the 18th century mitres kept growing higher and wider. There are three kinds or qualities of mitres, viz.: (1) The Simplex; (2) the Aurifrigiata; (3) the Pretiosa. Woodward thus defines them: <(The Simplex is made of plain white linen, or white silk damask, with red fillets {inf nice). The orphreyed mitre , mitra aurifrigiata , is composed of silk damask, or cloth of silver or gold, but without plates of metal or any jewels except seed pearls. The precious mitre, mitra pretiosa, is adorned with jewels (properly uncut) and , the precious metals.® Dr. Rock says of the mitre: ((Except when made from hard gold beaten into thin plates, or of cloth of gold, its color was invariably white, and all the old mitres known still in existence have a white ground.® Early Italian painters depicted mitres in colors, chiefly red and crimson. Lee says (<the plain mitre (or Simplex) is used for proces¬ sions.® He states that the Church used the pretiosa mitre over a century after the Refor¬ mation ; ((it was so in the American Church, at all events, for Bishop Seabury's mitre is still (1877) preserved in the library of Trinity Col¬ lege, New York.® Two pendants, termed in-fulce, hang down from the back of the mitre, terminating usually in a gold fringe. (14) The Episcopal Gloves; called also chirothecce and manicce. These do not get special mention till the time of Honorius of Autun. They were jeweled and richly embroidered, sometimes studded with pearls, in the Middle Ages, and frequently a largeˆ stone was set in the back. Cahier says : <(It was customary that the gloves destined for ecclesiastical ceremonies had to be made without seams (sewing) which necessi¬ tated knitting.® Some authorities say they were made of silk or linen. (15) The Episcopal Ring. This is but one of a number of rings worn formerly by bishops; it was worn on the third finger of the right hand above the second joint and was usually held in that position by

a plain guard ring. The ring consists of a circlet and precious stone set en cabochon (carbuncle), never cut; and the circlet was large enough to pass over the gloved finger. A sapphire was considered most appropriate but the emerald or the ruby figured often in episco¬ pal rings. (16) The Pastoral Staff. Termed sometimes baculus. A badge of episcopal dig¬ nity since early in the Middle Ages. It had the form of a crutch (the tau or cross potent , T, of heraldry) till the 12th century, when it assumed the shepherd's crook form in the Western Church ; the Greek Church retains the tau form in its pateressa to this day. Since the volute end appeared it has assumed many forms and its decoration has changed with the periods and styles. A favored form in early days was the serpent staff, the termination of the volute taking the shape of a serpent's head; frequently also dragon forms appear; the loop often en¬ closes the Lamb. Immediately beneath the crook is a protruding member often of knob form — it is frequently called a knop — evi¬ dently intended to afford a better grasp on the staff. In the Gothic period these knops often take on beautiful architectural forms (tabernacles) of intricate carved work in lantern shape. While the Greek staff is short and only reaches to the hand (as symbolic of support), the Roman staff ranges from five to seven feet long. A cloth or scarf is attached to the shaft of the staff, apparently for the purpose of keeping the hand's moisture from tarnishing it. It is variously termed orarium, sudarium, infula, *etc.* (17) The Tunicle. A small and short kind of dalmatic used by sub¬ deacons and bishops. The first tunicles appear about 820; they are of wool or silk. Passing like other vestments from the plain to the en¬ riched, the early plain tunicles soon gave way to embroidered ornament in a strip across the subdeacon's breast, then spreading out over the entire surface. (18) The Orale. This is now called the fanon. Dr. Rock thus describes it : <(An oblong piece of white silk gauze of some length, striped across its width with narrow bars, alternately gold, blue and red. It is cast upon the head of the Pope like a hood and its two ends are wrapped, one over the right and the other over the left shoulder, and thus kept till the holy father is clad in the chasuble® (as described later in The Pope's Investiture), when the fanon is thrown back and made to hang smoothly and gracefully round the shoulders like a tippet or wide collar. (19) The Pectoral Cross (see Crosses). This is a late introduction appearing first in the pages of Durandus and Innocent III (end of 12th cen¬ tury), and apparently then for the Pope's ex¬ clusive use. Dr. Rock finds a pectoral cross on an ordinary bishop in the 16th century.

Other Vestments. — Besides the so-called ((sacred® vestments used at the ceremonies of the Holy Eucharist, as enumerated above, we have

the following garments of the ecclesiastics : Almuce. Some writers declare the almuce or amess is separate from the amice (see above) and thus describe it : <(An ecclesiastical garment covering the head and shoulders, worn by canons while chanting the office in choir in cold weather. It is often confounded with the amice. It was commonly of blue cloth lined with fur. When the fashion of wearing the cap or biretta came in the almuce assumed the shape more

of a tippet or hood, the tipper part being thrown back from the head and allowed to hang down. In England, before the Reformation the almuce was worn by parish priests (parsons) as well as by canons. Biretta. Spelled also beretta. A square cap having three or four projecting corners rising from the crown. A tassel or tuft appears in the centre where these corners come together. The priest wears it on ap¬ proaching the altar to say mass, those officiating in the choir and others. The biretta of a cardinal is red; that of bishops is often purple; other clerics wear a blue one. Doctors of Di¬ vinity have the privilege of being allowed to wear a biretta, and in France, Germany and Spain it is worn generally by the clergy. Ca¬ lotte; the clerical skull cap. Camauro. This is the cap belonging to the Pope and worn on extra-liturgical occasions. It is made up of red velvet and white fur. Cassock. Frequently called after the French term, soutane. It is the outer garment of every order of clergy and consists of a long coat reaching to the feet; the clerical frock. It is confined at the waist by a broad sash called the ceinture and has an upright collar. In the Roman Church priests wear a black cassock; bishops, purple; cardi¬ nals, scarlet ; popes, white. In the English Church black is usual with all the clergy, but bishops sometimes wear violet. Cassocks are worn in the choirs as well as surplices. Chimere. The upper robe of a bishop. It is purple for Roman prelates, black for English clergy. The latter have added lawn sleeves. Cope. Called often by the Latin name, cappa. While the pallium and pluviale are termed cope by some writers, others say this is a choral, not Eu¬ charistic, vestment. It is a large semi-circular cloak of silk or other material, stiff with gold and embroidered enrichment. In front it is held together by a morse or

clasp, and is worn by the priest above the alb or surplice. The decoration (orphreys) consists of twro broad bands from neck to bottom of the garment; a hood is behind, ((originally designed to be drawn over the head in wet weather, … hence the term pluviale? Mantelletta, A sleeveless vest¬ ment of silk or wool, open in front, but fast¬ ened, and reaching to near the knees. It has openings for the arms, and a wide collar round the neck. Cardinals, bishops, abbots wear it. It covers the rochet , so that bishops do not wear it except outside their dioceses, the rochet un¬ covered being a sign of jurisdiction. Cardinals' mantellettas are in three colors (red, violet and rose), that of the bishop of one color. Mozetta. This is a papal garment but worn, with the Pope's privilege, by cardinals, bishops, abbots, *etc.* ; it is worn by EngJish canons. It is a short vestment open in front (but may be buttoned over the breast) and covers the shoulders; it has a small hood behind. Painters generally depict bishops wearing the mozetta as it is part of their state costume when not officiating in sacred ceremonies. As the mozetta exposes the rochet, cardinals, bishops and other .dignitaries do not wear it outside their jurisdiction unless it is over the mantelletta. The Pope has no less, than five different mozettas. Of red satin during the heated season, except on vigils, ember days, masses of the dead and other penitential ceremonies, then it is of red serge or camlet. The rest of the year he wears a red velvet mozetta, except on penitential or

sorrowful occasions, as Advent, Septuagesima, Lent, Vigils, etc., when his mozetta is of red woolen cloth. His mozetta from Holy Satur¬ day to Sunday in Low Week is of white damask. Four mozettas belong to the cardinals ; red or purple silk, violet silk, rose-colored silk, violet serge. Rochet. A linen or lawn vestment, similar to the surplice but sleeveless or of less ample sleeves, worn by bishops, abbots and at times by canons. It reaches only to the knees. The uncovered rochet is sign of jurisdiction. English bishops wear the rochet beneath the chimere. Scapular. The hood and cloak of the monastic orders. This term is also used by the Catholic Church to designate two small pieces of cloth worn over the shoulders under the ordinary garb, connected by cords and reach¬ ing almost to the feet. The scapular of the Holy Trinity is of linen with a red and blue cross; the scapular of the Servites is of black woolen material; that of the Immaculate Con¬ ception of light blue cloth; that of the Passion in red. Surplice. A long, loose vestment worn over the cassock in choir and in the adminis¬ tration of the Sacrament. It is one of the most modern of ecclesiastical garments, and is com¬ posed of white linen with wide sleeves. Pugin calls it an enlarged alb. The surplice is some¬ times termed cotta, but

others term the sleeve¬ less or short-sleeved short surplice a cotta. The Greek Church has a vestment termed omo-pliorion which consists of a long woolen band enriched with embroidered crosses.

Papal Vestments. — In the ceremonies of the Pope's investiture he wears the tiara or triple-crowned head-piece. Up to the time of Boniface VIII (end of 13th century) the Pope was decorated with a single crown ; he added a second crown. Benedict XII (alDOut 1334) added the third crown. The three crowns have been claimed to refer to the Trinity, also to his power over Heaven, earth and purgatory; others affirm they denote temporal power over the Roman states, spiritual power over the souls of men, and ruler over the kings and potentates of Christendom. It has been termed regum, paplis mitra, phrygium, *etc.* The cap is of thin metal or cloth of gold and silver, the crowns are of foliated gold adorned with pearls, and sometimes set with jewels. It is only worn on the most solemn ceremonies. Above an alb of fine linen, of which the lower border is dec¬ orated with narrow lace, the Pope wears a stole embroidered with gold. An ample mantle covers the pontiff's body; it is termed a pluviale, fastened in front by a magnificent clasp (agrafe) enriched with pearls. The pearls are arranged in a triangle, while in the formale (mentioned above) of the cardinals they are in a perpendicular line. It is a souvenir of the rational (breastplate) of the Jewish high priest. In celebrating mass the Pope never wears the tiara but a mitre, the same as that of a bishop. But what is termed the mitra pretiosa differs from that of a bishop in being decorated in front with a plate of gold, reminder of the mitre of the high priest of Mosaic law. Be¬ sides a white soutane (cassock) and rochet (see above) the Pope is clothed with an amice and an alb drawn in at the loins. The cardinal-deacon now hands him the pectoral cross, en¬ riched with sapphires, and the fation, which later covers the shoulders and part of the breast. The stole, of which the two ends hang down,

is then covered over by the sub-diaconal tunic. The pontiff is lastly dressed in a chasuble on which the fanon is lowered, and on this last

is placed a pall. In reception, in his apartment, when not giving audience, the Pope is clothed in a white cassock (this w'hite cassock has been wrorn by the popes since early centuries). The shoulders are covered with a soprana or kind of cape with short sleeves, also of white. The pectoral cross never appears. In the indoor costume the Pope wears a hat of red silk bordered with gold. Generally, he wears a rochet of lace over which is a red mozetta, bordered with ermine, and a stole. On the vigil of Quasimodo the head of the Pope is covered with a white calotte (skull cap). His footcovering of cloth has on its upper part a cross embroidered in gold. The Pope's ring is conferred in conclave and is adorned with a representation of Saint Peter fishing and the pontiffs sign manual. On the death of the Pope the ring is broken ; his successor always receives a new ring.

Costume of the Monastic Orders. — The

characteristics of the outer robes of the dif¬ ferent orders of monks are as follows : Bene¬ dictines, all black. Branches of same : Camaldo-lites, black; Carthusians, white habit, sandaled feet ; but wore long black cloak and hood out of boundaries; Vallombrosans, pale ash color or light gray habit; Cistercians and Trappists, white habit and cowl; Olivetans, white habit; Oratorians, black habit ; Basilians, black habit. Branches of the Augustinians : Premonstraten-sions, habit brown or black, white cloak ; Servites, habit black, leather girdle, and cape ; Trinitarians, white habit with blue or red cross on breast; Briggitines, black habit; Order of Mercy, white habit. Mendicant Orders: Fran¬ ciscans are generally barefooted or sandaled, their habit, originally gray, changed (after two centuries) to dark brown with knotted cord around waist. Branches of Franciscans: Ca¬ puchins, dark brown habit with long pointed hood, termed capuche ; Poor Clares (nuns), gray or brown habit and cord, black veil ; Observants, gray habit and cord ; Cordeliers, brown habit and cord; Minimes, brown habit, short scapulary with rounded ends and cord of Saint Francis. Dominican Order, white habit under long black cloak with hood. Carmelites, dark brown habit, long scapulary, white mantle — the Scalzi branch is barefooted. Jesuits, black habit, straight black cassock, square black cap (biretta). Paulists, black cassock and biretta.

Bibliography. — Bar, J. C., (Recueil de tous les Costumes des Ordres religieux et militaires) (Paris 1778); Barbier, de Montault Xavier, (Le Costume et les Usages ecclesiastiques selon la Tradition romaine) (Paris 1899) ; Beck, E., (Ecclesiastical Dress in Art,* (in (Burlington MagP London 1905-06) ; Bloxam, M. H., Church Vestments) (London 1882) ; Braun, J., <Die liturgische Kleidung in den ersten fiinf JahrhunderteiP (Freiburg im Breisgau 1898) ; id., (Die liturgische

Gewandung im Occident und Orient nach Ursprung und Entwickelung, Ver-wendung, und Symbolic (ib., 1907) ; Bumpus, J. W., (A Dictionary of Ecclesiastical Terms) (London 1911) ; Crepon, T., (Costume ecclesiastique) (in (Le Correspondant,* Paris 1901); Dolby, A., (Church Vestments ; their Origin, Use find Ornament practically illustrated) (London

1868); Goldsmith, E. E., (Sacred Symbols in Art* (New York 1912) ; Lee, F. G., (A Glossary of Liturgical and Ecclesiastical Terms) (Lon¬ don 1877) ; .Macalister, R. A. S., Ecclesiastical Vestments; their History and Development } (London 1896) ; Nainfa. Rev. J. A., (Costume of Prelates of the Catholic Church according to Rome Etiquette) (Baltimore 1909) ; Perugini, G., and Helyot, P., (Album ou Collection com¬ plete et historique des Costumes de la Cour de Rome, des Ordres monastiques, religieux et militaires, et des Congregations seculaires des deux Sexes) (Paris 1862) ; Pugin, A. N. W.,

(Glossary of Ecclesiastical Ornament and Costume) (London 1868) ; Wietz, F. K., (Abbildun-gen sammtlicher geistlichen Orden mannlichen und weiblichen Geschlechts in der katholischen Kirche) (Prague 1821) ; Woodward, J., (A Treatise on Ecclesiastical Heraldry) (Edin¬ burgh 1893).

Clement W. Coumbe.

COSTUS, or COSTUS ARABICUS, an

aromatic much esteemed by the ancients, is the dried root of Aplotaxis auriculata, a composite plant, and is not derived from the plant Costus arabicus, as was at one time supposed. It is a native of the moist open slopes surrounding the valley of Cashmere. The roots are there burned as incense. They have a strong, aromatic, pun¬ gent odor, and are employed in protecting bales of shawls from moths. It is also used in India as a hair wash, as a stimulant in cholera and as a stimulating ointment.

COT, kot, Pierre Auguste, French painter: b. Bedarieux, 17 Feb. 1838; d. Paris, 18 Aug. 1883. He studied under Cogniet, Cabanel and Bouguereau. Among his works are (Spring Time) (Brooklyn Museum) ; <Prometheus) ; ˆoreille’ ; (The Swing* ; and (The Storm,* often called (Paul and Virginia) (in the Metro¬ politan Museum, New York).

COTABATO, ko-ta-ba’to1, Philippines, a province in the southern part of the island of Mindanao ; area, including dependent islands, 8,344

square miles. The chief river is the Grande River of Mindanao, known also as the Pulangui, the largest river of the Philippines. The province is the most fertile in the island, and rice, sugarcane, cotton, coffee, tobacco, corn and vegetables are raised for home consumption. The gutta-percha trade is quite large and is controlled by Chinese. The first United States military station was established in 1899, and in 1903 the province was placed under civil gov¬ ernment. Pop. 4,150.

COTE, kd -ta , Aureole Suzor, Canadian artist : b. Arthabaska, Quebec province, 1870. He was educated at the Commercial Academy, Arthabaska, and as a youth was employed in Montreal in the decoration of the walls of churches and public buildings. He went to Paris in 1891, where he studied under Bonnat and Lefebvre, and won the grand prize for the competitive picture. (The Death of Archimedes) in 1898. Jle began exhibiting in the Salon in 1894. In 1907 he returned to Canada, and was commissioned by the Dominion government to execute panel decorations and illustrations for the Parliament buildings at Ottawa. (The Land¬ ing of Jacques Cartier in Canada) and (The Landing of Champlain at Quebec* are two of the best known of his historical pieces; his por¬ trait. of Sir Wilfrid Laurier in the Parliament

buildings is a good example of his skill in portraiture; and in sculpture, his (Habitant Drawing Wood.*

COTE D'OR, kot-ddr, France, a depart¬ ment formed of part of the old province of Burgundy; area, 3,392 square miles. The sur-lace is in general rather elevated and is traversed by a chain of hills forming the con¬ necting link between the Cevennes and the Vosges. A great part of the department is covered with forests. The valleys and plains are fertile and there is good pasture land; but vine culture is by far the most important branch of industry. The wines of the department are

celebrated. Cote d'Or is watered by the Seine, which rises in the northwest, and by several of its branches ; by the Saone and by Arroux, a tributary of the Loire. The climate is temper¬ ate ; iron, coal, marble, gypsum and lithographic stones are found, the first in large quantities. Cote d'Or is divided into four arrondissements, 36 cantons and 717 communes. Capital, Dijon. Pop. 350,044.

COTE-D'OR (hill, or hillside of gold), a chain of mountains in France which separates the basin of the Saone from the basins of the Seine and Loire, and connects the Cevennes with the Vosges. The name has special refer¬ ence to a small chain in Burgundy, so called from the abundance of excellent wine which they yield. Their height varies from 1,400 to 1,800 feet. The chain runs from north-northeast to south-southwest and is about 150 miles long, beginning at the plateau of Langres and extend¬ ing to the sources of the Bourbince and the Dheune.

COTES, kots, Roger, English mathemati¬ cian: b. Burbage, Leicestershire, 10 July 1682; d. Cambridge, England, 5 June 1716. He was educated at Trinity College, Cambridge, and in 1706 became first Plumian professor of astron¬ omy and natural philosophy in his university. In 1713 there appeared a new edition of New¬ ton's ˆrincipia,* thoroughly revised by the author with the assistance of Cotes, and con¬ taining an able defense of Newton's system from the pen of the latter. Cotes published only one independent work, an essay entitled (Logometria) (1713) ; but after his death there appeared a volume entitled (Harmonia Men-surarum) (1722). His name is still given to a theorem discovered by him relative to the circle. The correspondence of Newton and Cotes was published in 1850. Newton is re¬ ported to have said: ((Had Cotes lived we might have known something. ®

COTES, Sara Jeannette Duncan, Cana¬ dian author: b. Brantford, Ontario, Canada, 1862. She entered journalism as a correspond¬ ent for several Canadian and American news¬ papers at the Cotton Centennial in New Orleans in 1884-85 ; served on the staff of the Washing¬ ton Post, Toronto Globe and Montreal Star; married in 1891 Everard C. Cotes, Simla, _ whom she accompanied to India. Her books include (A Social Departure } (1890); (An American Girl in London) ; (A Daughter of To-day) ; (Vernon's Aunt, an Oriental Story* ; ˆhe Simple Adventure of a Mem Sahib} ; (His Honor and a Lady) ; (A Voyage of Consolation) (1898) ; (The Path of a Star> (1899) ; (On the Other Side of the Latch* (1901) ; (Those De¬ lightful Americans) (1902) ; (Cinderella of

Canada) (1908) ; (The Consort* (1912) ; (Her Royal Happiness) (1915).

COTES-DU-NORD, kot'du-nor', France, a maritime department in the north, forming part of ancient Brittany; capital, Saint Brieuc; area, 2,786 square miles. The coast extends about 150 miles; the herring, pilchar and mack¬ erel fishing is actively pursued. One of the main branches of industry is the rearing of cattle and horses; and in manufacturing, the spinning of flax and hemp and the weaving of linen and sail-cloth. Among the minerals are iron, lead and granite. Pop. 605,523.

COTGRAVE, Randle, English lexicog¬ rapher : b. Cheshire ; d. probably 1634. He was secretary to William Cecil Lord Burghley, to whom he dedicated the French-English diction¬ ary by which alone he is remembered. This work appeared in 1611, and is important not only as being the first of its kind, but as a valuable source of material for the elucidation of the philology of the English and French languages. It was remarkably accurate and reliable for its time, and has been several times reissued. Of Cotgrave's life very little is known.

COTHURNUS, ko-ther'nus-. See Buskin.

COTIDAL, ko-tl'dal, having the tides at the same moment of time. Cotidal lines are imaginary lines marked on the surface of the globe, indicating where the tides are in the same state at the same time.

COTILLON, ko-til'yon, a lively dance of French origin performed by eight persons to¬ gether, res'embling the quadrille which super¬ seded it. The name is now given to a dance which often winds up a ball, and which is danced with any number of dancers and with a great variety of figures, the pairs of dancers following in this the leading pair, and partners being successively changed. Consult Grove, <Dancing) (in the (<Badminton Library,** Lon¬ don and Boston 1895).

COTIN, ko -tan, Charles, French author: b. Paris 1604; d. there, January 1682. He is indebted for his notoriety, in a great measure, to the satires of Boileau. Among his poems are some which rise above mediocrity. It has often been supposed that Boileau introduced the name of Cotin into his satires because it fur¬ nished a convenient rhyme, and Moore refers to this in his <Life of Byron. *Unluckily his follies drew upon him a new enemy in Moliere, who, in his (Femmes*

Savantes, introduced him on the stage and exposed him to ridicule under the name Trissotin, which Moliere at first wrote ˆTricotin.** His knowledge of Oriental and classic languages was extensive and he was a member of the literary circle of the Hotel Rambouillet. He was an abbe and a successful preacher. His ((Euvres Melees* appeared in 1659 and his <CEuvres Galantes) in 1663.

COTINGIDZE, an extensive family of passerine birds, the cotingas allied to flycatchers, and inhabiting the forests of tropical America. They are of moderate or small size; frequent tall trees in most cases; and feed on insects, snails, etc., and also largely on berries and other small fruits. The plumage is ordinarily plain, rufous, green or gray, the females being nearly always dull, although many of the males are very brilliant, and some species are extraor:

dinary among forest-birds in being pure white. The cotingas include some celebrated South American species, as the bill-bird, umbrella-bird and cock-of-the-rock.

COTNER UNIVERSITY, located at Bethany, Neb., was founded in 1889 under the auspices of the Disciples of Christ. It was named in honor of one of its most liberal patrons. The first building was erected on a prairie farm about five miles from Lincoln (q.v.), and the college was called Cotner. By the sale of lots a fund was obtained for the school, and the village of Bethany, which has grown up around the university, has a popula¬ tion of about 1,200. In 1915-16 there were connected with the school 27 professors and instructors, and, in the college department, 256 students. The library contained about 5,000 volumes ; the grounds and buildings were valued at $134,000. The school has the following de¬ partments : College of Liberal Arts, embracing all branches of a university course, leading to A.B. and A.M. degrees; Normal College, for training teachers, leading to first grade and life professional certificates; Biblical College, for training preachers and mission workers ; Acad¬ emy, corresponding to the regular four years' high school course ; School of Art, School of Music, School of Expression, Commercial School and School of Home Economics.

COTO, the reddish-brown, aromatic and slightly bitter bark from various South Ameri¬ can sources, one of which seems to be Pali-courea densiflora, order Rubiacece. It contains the substance Cotoine, C14H12O4, ‘which has been used in the treatment of intestinal disorders.

COTONEASTER, ko-to-ne-as’ter, a genus of plants of the natural family Rosacea. They are closely related, to Crataegus, but the fruit consists of bony carpels, each containing two similar ovules. There are some 20 species, mostly natives of Europe and western Asia. The plant is a shrub or small tree, some of the species being evergreen. It has been intro¬ duced and cultivated in the United States and England as an ornamental shrub, having bright red fruit which remains throughout the winter. The evergreen or fire-thorn (C. pyracantha) is a species which has escaped from cultivation and is found wild among the thickets about Philadelphia and Washington. Several species, among which are C. microphylla and C. rotundi-folia, come from India, and are especially used for covering walls and rock-work. The seeds of these are said to contain prussic acid. Cotoneasters thrive in any good, well-drained garden soil not too shadily situated.

COTOPAXI, ko-to>-pa’he or ko-to-paks’i, the most remarkable volcanic mountain of the Andes, in Ecuador, about 60 miles northeast of Chimborazo ; lat. 0° 43’ S., long. 78° 40’ W. Its upper portion, a perfect cone 4,400 feet in height and perpetually snow-covered save near the crater, shows conspicuously. This covering of snow conceals from the eye of the observer the inequalities of the ground. No point or mass of rock penetrates the coating of snow and ice, or breaks the exact regularity of the conical figure. The crater is surrounded by a small circular wall, which, when viewed through a telescope, appears like a parapet. Its

height above the sea is 19,550 feet. The valley at its foot, however, is itself 9,000 feet above the sea. Remarkable eruptions, spreading de¬ struction over the surrounding plains, took place in 1698, 1738, 1742, 1744, 1766, 1803 and 1877. In 1698 the eruption destroyed the city of Tacunga, with three-fourths of its inhabitants, and other settlements. In 1744 its roarings were heard as far as Honda, on the Magdalena, 600 miles distant. With respect to the explosion of 1803, Humboldt observes: ((At the port of Guayaquil, 52 leagues distant in a straight line from the crater, we heard day and night the noise of this volcano, like continued discharges of a battery; and we distinguished these tre¬ mendous sounds even on the Pacific Ocean.® A similar

eruption took place in 1885. Part of a neighboring village was overwhelmed ; and at Guayaquil a sound was heard like the incessant discharges of heavy artillery, shaking the earth and causing doors and windows to rattle. Hum¬ boldt found it difficult to ascend the mountain as far as the limit of perpetual snow, and he pronounced it impossible to reach the summit. It has been ascended, however, at least twice, on the latter occasion by Mr. Whymper in 1880, who remained 24 hours on the top. He reports that more or less smoke and steam are always issuing from the crater. The most recent vio¬ lent eruption occurred in 1903.

COTS WOLD. See Sheep, Domestic.

COTTA, kot'ta, Johann Friedrich, Baron Cottendorf, German publisher : b. Stuttgart, 27 April 1764; d. there, 29 Dec. 1832. He began business at Tubingen, but in 1811 removed to Stuttgart. He was the publisher for many great writers in Germany, including Goethe, Schiller, Wieland, Richter, Uhland, Fichte, Hegel, the Humboldts and others. He published Schiller's <Horen) (1795) and the Allgemeine Zeitung at Augsburg (1798). In politics he bent his efforts toward social reform, especially toward the im¬ provement of his estates and the abolishment of serfdom.

COTTAGE, originally a small house with no land attached to it. Such erections were dis¬ couraged by old English law. No one was allowed to erect a cottage unless four acres of freehold land were attached to it; and no more than one family was to inhabit it. It had usually no second story, and was built of brick or stone, very rarely of wood. Recently the term has been extended to mean country houses of mod¬ erate extent, and especially summer residences of well-to-do families.

COTTER, Joseph B., American Roman Catholic prelate : b. Liverpool, England, 1844 ; d. Winona, Minn., 1909. He came to the United States in 1850, studied theology at Saint John's University, Collegeville, Minn., was ordained priest 1871, and was pastor of Saint Thomas' Church, Winona, Minn., 1871-89, when he was consecrated first bishop of the Roman Catholic see of Winona. He was a pronounced advocate of total abstinence, and was three times presi¬ dent of the Catholic Total Abstinence Union of America.

COTTER'S SATURDAY NIGHT, The.

This poem, written while Burns was farming and composing poetry at Mossgiel, in 1785, depicts ((the lowly train® of life that the poet best knew. Although in origin and form the poem is a hybrid — the plan

and title suggested

by Fergusson's ˆFarmer's Ingle) ; the scene and sentiment reminiscent of Gray and Goldsmith ; the form a medley of English and Scottish idiom in Spenserian stanza — the inspiration and spirit are native. The poet's brother tells us that <(the Cotter is an exact copy of my father in his manners, his family devotions, and exhortations.® It is with genuine affection that Burns has pictured the home-coming of <(the toil-worn Cotter® and his bairns, the welcome to the ((neebor-lad,® (<the cheerful supper,® the family worship around the ingle. This homely realism, this sincerity of feeling, have given to the poem not only its instant popularity, but its enduring place in English literature. Modern readers may find both forced sentimentality and artificial poetry in those stanzas in which Burns wholly abandons his native idiom, and with it his poetic instinct, for stilted eulogy of simple love and piety, and rhetorical scorn of betraying villainy and religion's pomp. But no one can fail to feel, in the scene itself and in the final stanzas, that truest love of country that is love of man. It is this humanity that has made Burns not only «the patriot-bard,® but the poet of democracy, and (The Cotter's Saturday Night } not only a Scottish interior, but an idyl of the people. Consult Cambridge History of English Literature) (Vol. XI, Chap. 10) and dictionary of National Biography.*

Frances W. Cutler.

COTTET, ko'ta', Charles, French landscape and genre painter: b. Puy, Haute-Loire, 1863. He studied under Maillard at the Academie Julien and under Roll. He at first joined the Impressionists and later helped to found the Societe Nationale des Beaux-Arts. He is known chiefly as a painter of Breton subjects. A cycle of 10 landscapes, entitled (The Country of the Sea) (1905), several of which are now in the Luxembourg, attracted wide attention. He also painted many Venetian, Egyptian, Algerian and Spanish subjects. There are also a few Icelandic landscapes by him. His paintings in¬ clude (The Port of Camaret, *and others in the Luxembourg Museum; (Going to Church in*

Brittany) (Vienna) ; (A Moonlight Night (Philadelphia) ; (Breton Women in Mourning) (Cincinnati). *He is represented also in Buf¬ falo and Providence, and is an officer of the Legion of Honor.

COTTIER TENURE, a system of tenure according to which laborers rent small portions of land directly from the owner, or from a farmer, often giving personal service as part of the rent, and holding by annual tenancy. Later the <(cottiers® was used to denote peasant farmers whose rent was determined by com¬ petition. Ireland was the chief representative of this system. The same class was called <(crofter® in the west of Scotland. The enact¬ ments of land laws by Parliament has changed the situation and alleviated the resulting evil conditions to some degree. See Irish Land Laws.

COTTIN, kot-tan, Marie (called also Sophie) Risteau, better known as Madame Cottin, French novelist: b. Paris, 22 March 1770; d. 25 Aug. 1807. In 1790 she married M. Cottin, a banker of Bordeaux, who died in 1793, and thenceforth she followed literature. Her best-known work is (Elizabeth, ou les exiles de Siberie* which was imitated by Xavier de

Maistre in (La jeune Siberienne.* It was translated into English by G. R. Lockwood (New York 1869) ; other novels are (Claire d'Albe* ; <Malvina) ; (Amelie* ; and (Mathilde.* Consult Saint-Beuve, (Causeries du Lundi* (Vol. XII) ; and Kavanaugh, Julia, (French Women of Letters) (Leipzig 1862).

COTTLE, Joseph, English bookseller and author: b. 1770; d. Bristol, 7 June 1853. The earliest poems of Southey and Coleridge were published by him, and these two poets in later life expressed their appreciation of his assist¬ ance and kindness to them. He also published Coleridge's periodical, The Watchman , and the (Lyrical Ballads of Coleridge and Wordsworth) (1798). He then retired from business. His own works include (Malvern Hills 5 ; (J°hn the BaptisC ; (Alfred, an Epic* ; (The Messiah.) Cottle's poems, and those by his brother, Amos, are satirized in Byron's ˆEnglish Bards and Scotch Reviewers.* A prose work, (Early Recollections,* chiefly relating to Samuel Taylor Coleridge (1837), is marked by glaring bad taste, though it has some value as containing many details of the early life of the poet. A second edition appeared (1847), entitled Rem¬ iniscences of Coleridge and Southey. *

COTTON, Charles, English poet and trans¬ lator : b. Beresford Hall,

Staffordshire, 28 April 1630; d. Westminster, February 1687. In 1658 he inherited his father's estates, near the river Dove, on the banks of which he built a fishing house, in which he entertained for years his friend Izaak Walton. His works are numerous and nearly all in verse, including (Scarronides, or Virgil Travestie) (1664-70), being the first and fourth books of Virgil's (.2Eneid,* in rather indelicate burlesque ; and a translation of Mon¬ taigne's (Essays) (1685), his best work. After the death of Cotton a volume was published, entitled (Poems on Several Occasions.* He also translated (Horace, *a tragedy of Cor¬ neille (1671) ; but the work by which he will be best remembered is the part which he added to the fifth edition of Walton's Complete Angler — (Instructions How to Angle for a Trout and Grayling in a Clear Stream.*

COTTON, Charles Stanhope, American naval officer: b. Milwaukee, Wis., 15 Feb. 1843; d. Nice, 19 Feb. 1909. He entered the Naval Academy 1858, served on the frigate Saint Law¬ rence , which captured the Confederate privateer Petrel, in July 1861; on the flagship Minnesota 1861-63 ; took part in the battle between the Monitor and Merrirnac 8-9 March 1862; and served during the battle of Mobile Bay and subsequent operations to the surrender of Fort Morgan. He was promoted commander, 25 April 1877, and was on the Asiatic station 1880-83 ; captain 28 May 1892, and commanded the flagship Philadelphia on the Pacific station 1894-97. During the war with Spain he com¬ manded the auxiliary cruiser Harvard. In 1900 he became rear-admiral and from 1903 com¬ manded the European squadron.

COTTON, John, American Puritan clergy¬ man : b. Derby, England, 4 Dec. 1585; d. Bos¬ ton, Mass., 23 Dec. 1652. He was educated at Trinity College, Cambridge, and was after¬ ward Fellow of Emmanuel and employed as lecturer and tutor. About 1612 he became vicar of Saint Botolph's Church in Boston, Lincoln¬ shire, where he remained 20 years, noted as a

preacher and controversialist, and inclining in his doctrines and practices toward the Puritan worship. He was at length informed against for not kneeling at the sacrament and cited to appear before Archbishop Laud in the high com¬ mission court. Upon this he sought safety in flight, arriving in Boston 4 Sept. 1633. In October he was ordained on a day of fasting, by imposition of hands by the minister and two elders, teacher of the church in Boston and colleague with Mr. Wilson the pastor. In this connection he remained over 19 years, with such influence and standing that he has been called the patriarch of New England. His reputation for learning was very high, and, as was fre¬ quent among the ministers of that time, was sustained by the accumulation of obscure and professional knowledge. He was a critic in Greek, wrote Latin with elegance, and could discourse in Hebrew, and spent 12 hours a day in reading, his favorite author being Calvin. His pulpit eloquence was famous for its sim¬ plicity and plainness, and his discourses were exceedingly effectual in exciting attention to religion. His publications were numerous, con¬ sisting of sermons and controversial works upon most of the subjects discussed in his time. The most important are those published in the course of his controversy with Roger Williams, (The Bloody Tenent Washed and Made White in the Blood of the Lamb5 (1647), etc., and (The Keys to the Kingdom of Heaven and the Power Thereof,5 on the nature of church government. He maintained that the church is constituted of elders and brethren; that the elders are en¬ trusted with the government to the extent of admissions and excommunications, yet that there is so much liberty left among the brethren that nothing of common concern can be imposed upon them without their consent. Against Wil¬ liams he defended the interference of the civil power in religious matters for the support of the truth, maintaining the duty, for the good of the church and of the people, of putting away those who, after repeated admonitions, persist in re¬ jecting fundamental points of doctrine or wor¬ ship. A tablet, with a Latin inscription by Ed¬ ward Everett, was erected in Saint Botolph's Church in 1857, in honor of Cotton, chiefly by contributions from his descendants in Boston, Mass. He published 50 volumes, among the most important of which are (A Brief Exposi¬ tion upon Ecclesiastes5 ; (A Brief Exposition upon Canticles5 ; (A Treatise Concerning Pre¬ destination,5 and the famous catechism entitled ˆSpiritual Milk for Babes,5 *etc.* A part of his controversy with Roger Williams may be found in the Publications of the Narragansett Club (Vols. I and II, Providence 1866-67). Consult

Cotton, Mather, (Magnalia5 (1702) ; McClure, <Life of John Cotton5 (1846) ; Tyler, (History of American Literature5 (1878) ; Norton, (Abel Being Dead, Yet Speaketh : or the Life and Death of that Deservedly Famous Man, John Cotton5 (London 1658; Boston 1834).

COTTON, Sir Robert Bruce, English antiquarian : b. Denton, Huntingdonshire, 22 Jan. 1571; d. London, 6 May 1631. He was educated at Westminster School under the famous Camden; and later at Cambridge. He settled in London, devoting his time to anti¬ quarian pursuits, and employing himself es¬ pecially in collecting ancient deeds, charters,

letters and other manuscripts of various kinds, illustrative of the history of England. He was one of the earliest members of the Antiquarian Society; and not only promoted the general objects of that learned association, but also assisted, with his literary treasures as well as with his purse, Camden and other writers on British archaeology. He sat in Parliament under James I and in the first and third Parlia¬ ments of Charles Ps reign, his sympathy being against the growing power of the king. In 1629 he was falsely accused of having written an obnoxious political tract, and was thrown into the Tower; yet although he succeeded in establishing his innocence, his library was se¬ questrated, and his death seems to have been partly due to his being deprived of the company of his books. Among his works may be men¬ tioned, (Power of the Peeres and Comons of Parliament in Point of Judicature5 (1640) ; (Cottoni Postuma — Choice Pieces of that Re¬ nowned Antiquary5 (1672) ; (Divers Short

Pieces Exposed to Publick Light by J. Howell5 (1679); (Speech before the Privy Council touching the Alteration of Coyn5 (published in Shaw, (Select Tracts and Documents,5 1896). Consult Kiffis, (Robert Bruce Cotton5 (in (Biographia Brittanica,5 London 1797) ; D'Ewes, (Autobiography5 (2 vols., ib., 1845) ; Nichols, Progresses of James I5 (4 vols., ib. 1828) ; Gardner, (History of England5 (ib. 1883-84). See Cottonian Library.

COTTON. This important vegetable fibre is readily distinguished from all other commer¬ cial fibres by its spiral twist, a character that renders it especially valuable for spinning. The widespread distribution of the plant, its adapt¬ ability to a great variety of soils and climates, and its comparative cheapness, all tend to make it one of the great staples of agricultural pro¬ duction, and it is probably used by more people and for a wider range of purposes than any other

fibre. The country in which cotton was first used has not been definitely determined. It had long been known in India before the con¬ quest of that country by Alexander. The writ¬ ings of Herodotus and Pliny tell us that the excellence of its fibre was known to the Greeks and Romans. Columbus found*it in use by the natives of the New World and in the conquests of Mexico and Peru cotton cloth was found to be in use. Ancient Peruvian tombs have yielded mummy cloths of cotton but those obtained from Egyptian tombs appear to be linen, although it is probable that cotton was known in that country from quite early times. While the principal commericial value attaches to the beautiful fibre that surrounds the seeds, the seeds themselves have important uses aside from that of producing a new crop. The stems and roots are also of value and the so-called by-products now utilized add fully 20 per cent to the value of the commercial cotton crop.

Botany, Commercial Classification, *etc.* — The cotton of commerce is a product of plants of the genus Gossypium, a member of the Mal-vacece or Mallow family of plants. There have been many attempts to classify and limit the species of Gossypium, but no two authorities agree. In a recent widely known catalogue of plants, about 50 species are recognized, and probably four or five times as many names combined or rejected. While this list of names

is quite large there are only five or six species whose product enters into commerce and the bulk of the production is the product of two species, G. herbaceum, which furnishes the Upland cottons, and G. barbadense , the source of the Sea Island cotton. All the species are of tropical origin. They are small trees, shrubs or herbaceous plants, enduring for one, two or more years, dependent upon the species. There has been much discussion re¬ garding the origin of the many varieties of cotton grown in this country, but by almost common consent they are all attributed to the two species mentioned above or to some of their numerous hybrids. The Sea Island cotton is undoubtedly indigenous to America and was the type observed by Columbus, but the evidence for the American origin of the species to which the Upland cottons are referred is less conclu¬ sive. These two classes of cotton differ mate¬ rially in their seed characteristics. The Sea Island has a small black seed from which the lint separates readily, while the Upland cottons have large seeds which are greenish in color and surrounded by a short dense fuzz beneath the longer and more valuable lint. Both of the species are perennial in climates without frost, but in cultivation they are treated as an¬ nuals. The plants are shrubby, 3 to 10 feet high, more or less branched and bear large, alternate 3-to 5-lobed leaves which when held to the light show numerous pellucid dots. The flowers, which resemble to a degree those of the hollyhock, mallow and hibiscus, are white when newly open in the varieties of Upland cotton, turning red with age, and a creamy yel¬ low in the Sea Island, with a purplish spot at the base of the petals. The flowers are usually single in the axils of the leaves except in those varieties designated “cluster types® in which a number are produced together. Surrounding this conspicuous flower are three or more heart-shaped, fringed or deeply cut bracts which con¬ stitute the so-called “squares.® The indenta¬ tions of the squares are deeper and more numer¬ ous in the Sea Island varieties than in the Upland forms. The capsules within the squares are the “bolls.® They are 3-to 5-celled and contain the seed covered with the white or slightly tawny lint. The bolls of Sea Island cottons are uniformly smaller and more sharply pointed, contain fewer and smaller seeds and longer lint than the Upland bolls. The lint of the Sea Island cotton

is from one and one-half to two and a half inches in length, while the Upland cotton of the G. herbaceum type seldom exceeds one and a half inches in length and much of it is shorter. There are numer¬ ous hybrids between these two types as is shown by the character of the seed and lint. The Sea Island cotton flourishes along the coast region of South Carolina, Georgia and Florida, and also in Egypt, the famous Egyptian cotton being a development from American Sea Is¬ land cotton seed sent to Egypt a number of years ago. The varieties of Sea Island cotton furnish the finest and most valuable fibre, but their production is restricted by the soil and climatic requirements of the plants. The Up¬ land varieties, while not furnishing so fine a quality of fibre, are grown over a much wider territory and the total production far exceeds that of the Sea Island. In India there is a perennial species to which the name G.

arboreum is given. It is a small tree and grows about the temples, but is not cultivated to any considerable extent. It produces a fine silky staple, but its former high value is now believed to have been overrated. This cotton usually called Nurma, from its growing about temples, is also known as Deo cotton. From South America are received a number of varieties of cotton that have usually been attributed to G. peruvianum. They have a short, strong, curly fibre somewhat resembling wool and their smooth black seeds adhere in an oval mass, on which account they are called kidney cottons. The plant which produces this cotton is a small short-lived tree and like the Nurma cotton of India will not mature in the United States.

When considered commercially the fibre pro¬ duced by the seed is the most valuable product of the cotton plant. Viewed under a good mi¬ croscope it appears to be an irregular, flattened, twisted tube, the edges of which are somewhat thickened and corrugated. This twist distin¬ guishes cotton from all other fibres and it is to this character that its superior value for spin¬ ning is due. The fibre of some of the wild species of cotton does not possess this twist and such as do not are of little value. If not thoroughly matured the fibre is more flattened, less twisted and thinner walled. Such fibres, if abundant in a sample, depreciate its value as they curl up, do not spin well nor dye evenly. Among the leading commercial types of cotton the fibre varies from one-half inch to two inches or more in length and is exceedingly fine, the extreme diameter measurements being 0.0084 to 0.0064 inch, the longest and finest fibre being of the Sea Island types. The commercial grad¬ ing of cotton is. as follows : Samples, the aver¬ age fibre of which is under 0.98 inch (25 milli¬ meters) in length are

called “short staple® ; those between 0.98 and 1.17 inches (25 to 30 mil¬ limeters) are called “medium® and from 1.18 to 1.57 inches (30 to 40 millimeters) are called “long staple.® Those exceeding 1.58 (40 milli¬ meters) are “extra long.® The “long® and “extra long® fibre produced in the United States are all from Sea Island varieties and their hybrids, the shorter ones being usually Upland cottons of the G. herbaceum type. Other classi¬ fications adopted by the New York Cotton Ex¬ change are : What are known as “full grades® are designated by the words “fair,® “middling fair,® “good middling,® “middling,® “low mid¬ dling,® “good ordinary® and “ordinary.®

To designate qualities of staple a half grade above the grades mentioned, the prefix “strictly® is used. Quarter grades between the half grade and the next higher full grade are re¬ ferred to as “barley® prefixed to the full grade term and the quarter grade below the half grade is designated by the prefix “fully® to the full grade below. As examples a staple graded as “barley middling® is a quarter grade below middling, “strict low middling® is a half grade between middling and low middling and “fully low middling® is the quarter grade between the last and low middling, a full grade. This class¬ ification is generally adopted in this country, while for Europe that of Liverpool is followed. This differs from that of the New York Ex¬ change in being somewhat higher in the low grades and lower in the high grades. These classifications are based not only upon the length of staple, but its fineness, color, freedom

from dirt, etc., and are more or less subject to differences in judgment, although little varia¬ tion will be noticed in determining the quality of a sample when presented for sale.

Like every crop of wide cultivation many varieties of cotton have been produced and named. Some of these achieved a wide repu¬ tation for some superior quality, flourished for a time and then disappeared. In 1880 the cen¬ sus report named 58 well-known varieties, but in less than 15 years only six were still in common cultivation. In 1896, in a publication of the United States Department of Agriculture, more than

130 varieties were described, but within half a dozen years many of them had disappeared from seedsmen's lists. While par¬ ticular varieties may cease of cultivation in a short time, the general type remains and types of cotton can now be readily recognized that have been in cultivation for more than half a century. The well-known tendency of the plant to vary is responsible for the production of so many varieties. There is perhaps no cultivated plant that responds so quickly to changed condi¬ tions of soil, climate and cultivation as the cotton plant, and to this can be ascribed the improvement and deterioration of many vari¬ eties. The most successful planters keep up the quality of their crop by continued selection of seed and for a crop that depends so much on the quality of the staple this is one of the most important considerations. The practice of planting seed purchased from gins and mills does more to depreciate the quality of the lint than any other factor.

Bibliography.— Balls, (The Cotton Plant in Egypt) (London 1912) ; Brooks, (The Story of Cotton and the Development of the Cotton States} (Chicago 1911) ; Burkett, <Cotton) (New York 1906) ; Dana, (Cotton from Seed to Loom) (London 1878) ; Dunstan, (Papers and Reports on Cotton Cultivation (ib. 1911) ; Henry, (Le coton dans l'Afrique Occidentale Frangaise) (Paris 1906) ; Hohnel, (Ueber die Baumwolle) (Vienna 1893) ; Lecompte, (Le coton : monographic, culture, histoire economique) (Paris 1900); Mallet, (Cotton: The Chemical, Geological and Meteorological Con¬ ditions for its Successful Cultivation (London 1862) ; Miller, (American Cotton System } (Austin, Tex., 1909) ; Monie, (The Cotton Fibre: Its Structure) (Manchester 1890); Passon, (Die Kultur der Baumwollstaude) (Stuttgart 1910) ; Roux, (La production du coton en Egypte) (Paris 1908) ; Supf, (German Colonial Reports, 1900-1908) (Berlin 1909) ; Todaro, (Relazione sulla cultura dei cotoni in Italia . . P (Rome 1878) ; Tompkins, (Cotton, Cotton Oil, Cotton Planting, Harvesting ... > (Charlotte, N. C., 1901) ; Watkins, J. L., (King Cotton (New York 1908) ; Zimmermann, (Anleitung fur die Baumwollkultur in den Kolonien (Berlin 1910).

COTTON CULTIVATION IN THE UNITED STATES. From the time its seeds are planted until it reaches the consumer in its variously manufactured forms cotton em¬ ploys more human beings than any other prod¬ uct or industry. This is not surprising when we consider that 2,500,000 farmers and laborers produce the crops of the United States, about 1,500,000 the crops of other countries, and that about 1,750,000 wage earners throughout

the world are employed in its manufacture, to say nothing of the many thousands who manipu¬ late the crop from the time it leaves the pro¬ ducer until it reaches the mill and the consumer.

Cotton Area. — The cotton producing region of the United States embraces nearly all of the territory lying south of the 37th degree of lati¬ tude, and covers 25 degrees of longitude and 10 degrees of latitude. A line drawn from Nor¬ folk County, Va., to Presidio County, Tex. — more than 1,300 miles — would indicate the eastern and western limits of the cotton area, and a line from Osage County, Okla., to the mouth of the Rio Grande in Texas — about 500 miles — the northern and southern limits. Cotton is cultivated in only eight counties in the extreme southeastern cor¬ ner of Virginia, while in North Carolina its cultivation extends from the coast to the mountain ranges of the western part of the State. In South Carolina it is cultivated in every countv, a: d the same may be said of Alabama, and of Georgia — except as to four mountain counties on the northern border. In all Mississippi only two counties on the Gulf Coast may be excepted. The cotton growing section of Florida extends from its western boundary almost to the Atlantic Ocean, and as far south as Sumter County, and in Tennessee it embraces all of the territory lying west of the Tennessee River, and includes a half-dozen counties in the southern central section and three counties in the extreme southeast corner of the State. In Missouri 8 or 10 counties in the extreme southeast and lying along the Arkansas State line cultivate cotton to a limited extent, and all of the counties in Arkansas ex¬ cept the four mountain counties in the ex¬ treme northwest. All of the Louisiana parishes grow cotton except one in the southwest, and eight in the southeast section bordering the Gulf and lying adjacent to the mouth of the Mis¬ sissippi. Of the 250 counties in Texas all cul¬ tivate cotton except 38 located in the Pan Handle and the extreme west, and in Oklahoma all except nine lying along the Kansas border. Outside of what is known as the great cotton belt cotton is cultivated to a limited extent in Fulton County, Ky. ; Eddy County, N. Mex. ; Yuma, and Manicopa counties, Ariz. ; Imperial, and Riverside counties, Cal.

Geographical Divisions. — Geographically the cotton States may be divided as follows : Atlantic States — consisting of Virginia, North Carolina, South Carolina, Georgia and Florida; Middle Gulf States — Alabama, Mississippi, Louisiana, Arkansas, Tennessee and Missouri; Southwestern States — Texas and Oklahoma. Of the total area devoted to cotton the Atlantic States cultivate about 27 per cent, the Middle Gulf States about 33 per cent and the South¬ western States 40 per cent. The largest area ever devoted to cotton was 37,406,000 acres planted in 1914.

Limits of Area. — But this by no means represents the limit of the tillable area that might be put in cotton. Of the total cultivated area in the 10 principal cotton States only an average of 44.5 per cent is planted in cotton, about 41 per cent in corn, about 12.5 per cent in wheat, oats and hay, and the remainder in miscellaneous crops. Texas could double its present cotton area without encroaching upon other crops, and likewise Oklahoma could

greatly increase its cotton area. Besides there Temperature. — The average maximum and are large areas in southern California, Arizona, minimum temperatures for the northern, middle Nevada, New Mexico, Utah, Kansas and Ken-and southern sections are as follows:

Maximum and Minimum Temperature

Maximum

Section

Apl.

op

Northern .

72.6

Middle .

72.0

Southern .

78.0

Minimum .

Northern .

49.8

Middle .

54.8

Southern .

tucky suitable for cotton culture. In addition to this there are in nine of the principal cotton States (not including Florida and Tennessee) nearly 31,000,000 acres in swamp and overflow lands, about 17,000,000 acres of which, if re¬ claimed, would be suitable for cotton growing.

Climate. — Considering its climate and soil there is no such extensive area anywhere in the world so favorably adapted to cotton pro¬ duction as the Southern States. The plant is essentially a sun plant and thrives in a warm and even hot atmosphere if sufficiently moist. As it requires from six to seven months of favorable weather for full development there should be an absence of killing frost from early in the spring to late in the fall. The tem¬ perature should be high, and the daily range of comparative uniformity during the early grow-

May

June

July

Aug.

Sept.

Oct.

Nov.

op

op

op

op

op

op

op

80.1

87.2

89.9

87.0

81.3

72.0

60.0

79.8

86.3

88.8

87.3

82.8

73.7

64.3

83.6

89.0

91.1

90.0

86.0

78.8

69.8

57.5

65.4

69.0

67.3

61.2

50.9

39.6

61.9

69. 1

72.2

71.7

67.0

56.6

46.9

67.2

73.6

75.6

74.2

70.5

62.9

53.3

Rainfall. —

■The

rainfall

varies

from

month

to month and from season to season, the average precipitation in some of the States even differing considerably. Texas, for in¬ stance, makes its crops with an average rain¬ fall during the season of less than three inches, while the crops of Louisiana are made with an average of about five inches. The following is the average monthly rainfall for 10 years (1904-13) in the 10 orincipal States, from April to No¬ vember, inclusive (inches) : North Carolina, 4.27; South Carolina, 4.15; Georgia, 3.94; Ala¬ bama, 4.10; Mississippi, 4.36; Louisiana, 5.02; Arkansas, 4.23; Tennessee, 3.89; Texas, 2.88; Oklahoma, 3.29. The following is the 10-year average monthly rainfall during the growing and maturing season in each of the geographical divisions :

Average Monthly Rainfall (Inches)

Section Apt.

Atlantic States . 3.41

Gulf States . 5.38

Southwestern States . 3.32

All States . 4.38

May

June

July

Aug.

Sept.

Oct.

Nov.

3.68

5.18

5.65

5.82

3.81

2.86

2.23

5.18

4.50

5.48

4.19

4.08

2.67

3.00

4.32

3.56

3.04

2.58

2.78

2.77

2.28

4.55

4.52

5.04

4.12

3.74

2.75

2.63

ing period. It should increase from the time the seed is planted until about the first to the middle of August. By this time the plant should have attained its full vegetable growth. After this date a decreasing temperature with a greater range between day and night are favorable to the production of a full crop, as this checks the vegetable growth and induces the plant to convert its accumulated food material into fruit. During the earlier period, say in April and May, there should be frequent showers rather than heavy or continu¬ ous rains, and the best seasons are when those showers occur at night, permitting, with a suffi¬ cient and well-distributed rainfall, the greatest amount of sunshine. There should be an abundance of rain in July and August. Gen¬ erally the normal rainfall in the South in¬ creases from the spring to the middle of sum¬ mer when it decreases, the climate during the autumn being remarkable dry and bracing. Such conditions are essential to successful cot¬ ton production, and the Southern States are highly favored with just such conditions.

Frost. — ‘In the cotton States heavy frosts generally cease by the middle of April, and as most of the cotton is planted from 1 April, to 10 May, except in the extreme southern section where killing frosts are of rare occurrence, there is ample time for the seed to germinate and appear above ground without serious damage. The average date of killing frosts in the autumn in the northern section of the cotton belt is about 1 November, and in the southern section about 15

November.

The monthly average for the entire season in the Atlantic States is 4.08 inches, in the Middle Gulf States 4.31 inches, in the Southwestern States. 3.08 inches and for all States 3.97 inches.

Soil. — Within the limits of the cotton belt, wherever climatic conditions are favorable, cot¬ ton may be produced on almost any character of soil. It is grown on light sandy soilsˆ on loams, on heavy clay and bottom lands, the yield varying with the different types. On light sandy soils, unless well fertilized the yield is small ; on clay and bottom lands the yield is good, unless the rainfall happens to be excessive, when the plants develop too much stalk and limb at the expense of fruit. The fine prairie lands of Texas are high in yield, but are often subject to prolonged droughts, while the Delta lands of the Mississippi, the most fertile in the South, are liable to overflow. Perhaps the safest soils for the cotton plant are the medium grades of loam. Without considering their chemical composition, the soils of the cotton belt may be classified as follows : pine levels and pine hills, metamorphic or Piedmont region, alluvial lands, oak and hickory region, black prairie lands, bluff and brown loam table lands, red loam lands, valley lands and sand hills. The pine levels and pine hills, which produce about 18ˆ4 per cent of the cotton ‘crop, extend all along the Atlantic and Gulf coasts from Vir¬ ginia to the Trinity River in Texas, the width of which varies from 50 to more than 150 miles. The metamorphic or Piedmont region, produc¬ ing about 17 per cent of the crop, lies along the border of the pine hills region and extends

through North and South Carolina, Georgia and well into Alabama. The prairie lands, which generally produce the largest proportion of the crop, or nearly 21 per cent, including the black prairies of Alabama, Mississippi and Texas, the coast prairies of Louisiana and Texas, the gray silt prairies of Arkansas and the red loam prairies of western Texas. The oak and hickory lands upon which about 14ˆ4 per

cent of the crop is made extends over east¬ ern Texas and northwestern Louisiana and southeastern Arkansas to the Mississippi bot¬ tom lands. Four counties in western Alabama and three in northeastern Mississippi are in¬ cluded in this region. The alluvial lands, yield¬ ing nearly 15 per cent of the crop, cover extensive areas in all of the Southern States and in al¬ most every region in each State. The bluff and brown loam table lands lying east of the Mis¬ sissippi Delta extend all the way from the mouth of the Ohio River to Baton Rouge, La. These lands produce about 7 per cent of the crop. The valley region of the Ten¬ nessee River in Alabama and Tennessee, and the valleys of the Coosa River and its tribu¬ taries in Alabama and Georgia, make about 3 per cent of the crop, while the red loam lands in the northern half of Arkansas and in south¬ eastern Oklahoma make about 2*/2 per cent.

Land Tenure. — According to the United States census of 1910, there were 1,714,149 farms that cultivated 32,043,838 acres in cotton and which produced 10,649,268 bales (501.7 lbs. to the bale), each farm averaging 18.7 acres and producing 6.2 bales to the farm. In the 10 principal cotton growing States there were 2,196,768 farmers, 1,421,991 whites and 774,777 negroes, or 65 per cent whites and 35 per cent negroes. This would indicate that about 65 per cent of the cotton crop is produced by white labor. This proportion however has in¬ creased since 1910, due to the cultivation of new lands in Texas and Oklahoma, so that the proportion of the crop now made by white labor is approximately 70 per cent. Farm tenure is divided into three general classes, *viz.* : Owners and managers for owners, cash-tenants and share-tenants. Owners and managers constitute about 44 per cent, share-tenants about 38ˆ4 per cent and cash-tenants about 17ˆ4 per cent. As between land owners and managers, and tenants, land tenure is apportioned between the two races about as follows : white owners and managers 36.2 per cent, white tenants 28.5 per cent, negro owners and managers 7.2 per cent and negro tenants 28.1 per cent. Landowners and managers operate upon practically a cash basis — so far as labor is concerned — while cash tenants pay a money rent and supply themselves.

Share System. — The share system is based upon the practice of the landowner taking for rent a share of the crop, the share depending upon whether the land is cultivated mostly in corn or cotton, and to what extent the owner supplies the tenant wdth the necessities for mak¬ ing the crop. Some share-tenants furnish themselves with everything and pay one-fourth of the crop for the use of the land. Others look to the landowner to furnish the fertilizers, pay blacksmith accounts, keep of stock, etc., in which case one-half the crop is given

for the use of the land. Another class of share tenants are those who furnish nothing but their labor,

the landowner taking two-thirds of the crop to cover land rent and expenses.

Cultivation. — The methods of cultivating cotton differ somewhat in the different sections according to the character of the soil. A di¬ versity of methods and a diversity of imple¬ ments may be observed even in the same locality and when the same kind of soil is cultivated. The farmers in the pine hills prac¬ tise shallow culture, while those of the prairie lands believe in deep culture; in the one case single-horse plows are used, in the other heavy double-horse plows. In some sections most of the cultivation is done with hand hoes, and in others with two-horse cultivators. On alluvial soils when the crop is laid by the land is. gen¬ erally left almost level, on most other soils in ridges or beds. In the southern part of Texas preparation for the crop begins 1 December, in many other regions plowing begins as near the time for planting as possible. In the east¬ ern section commercial fertilizers are in gen¬ eral use, in many other sections none at all are used. On many farms crop rotation is followed, but the great bulk of the cotton crop is grown on the cotton lands of the previous year. After the final picking and before plowing for the new crop begins the old stalks or stubble must be disposed of. On some farms they are knocked down, allowed to decay and are turned under the soil with other vegetable matter. On other farms when the stalks are unusually large and the season is late they are knocked down and burned. Some farmers attach a drag chain to the mule and plow so arranged that the stalks may be drawn under the plow, broken up and turned under. The more progressive farmers use a stalk cutter usually attached to a cultivator. It is generally conceded that in pre¬ paring for a cotton crop the lands should be broken up as early as possible after the crop has been gathered, the earlier the better, so that all vegetation may be turned under while green and sappy, and so that the soil may be disintegrated and the insects killed by the winter freezes. The plowing may be done in the fall or during the winter, or sometimes it cannot be done until spring. It all depends upon whether the old crop is early or late, whether the yield is light or heavy, or upon weather conditions. It often happens during February, or even in March, that picking the last of the old crop and plow¬ ing for the new one are going on at the same time in the same field. However, if possible, the land should be thoroughly broken up with a two-horse team, using a plow that will turn the soil 8 to 12 inches deep, the depth being

governed by the character of the soil.

Bedding Up . — After breaking up the land the next thing to be done is to bed it up. For this purpose a one-horse turning plow should be used, the bed being formed by turning a furrow along one side of the field and another on the opposite side, running parallel to it and so close that the two furrows may lap. This may be repeated to build up the beds to the proper height. The beds are spaced at varying distances, on thin lands 2ˆ4 feet apart, on rich alluvial lands as in Mississippi Delta where the plants grow 6 to 10 feet high, at 6 feet. The average distance is about 4 feet. It is not an uncommon practice, where cotton follows cot¬ ton, not to break up the land at all, but to form the beds upon the alley left between the beds

COTTON

1 Picking Cotton from a Field in Georgia 2 Hauling Cotton from the Field to the Gin House

3 A Cotton Field showing Squares, Blooms, and Bolls

COTTON

1 Weighing Cotton in the Field after the Day's Picking 2 Weighing Baskets of Cotton after the Day's Picking

3 Picking Cotton from a Field in Georgia

COTTON

1 Scene at a Cotton Compress, Opelousas, La

2 Cotton Compress, Alexandria, La,

1 Flat-car Train in Arkansas Loaded with Cotton 2 A Modern Gin Plant, Oklahoma

3 A Modern Gin Plant, Arkansas

of the previous crop. Sometimes fertilizers are dropped into the alley before the bedding be¬ gins. After bedding up is completed the next step is <(bursting out the middles,® or plowing out the alley with a ((middle burster.® This plow not only cleans out the alley but throws the soil upon either side of the bed making it more compact and leaving a good drainage trench.

Fertilizing. — Many varieties of fertilizers are used in cultivating cotton. Barn-yard manure, cotton seed composted with stable man¬ ure and acid phosphate, and cotton seed meal mixed with acids are used to a limited extent, but the commercial fertilizers that contain available phosphoric acid, nitrogen or potash are in general use. Some of the cheap ferti¬ lizers contain only a small per cent of plant food, while the higher grades of <(complete fertilizers® contain a very large per cent. Fertilizers should be carefully selected and de¬ termined by analysis, for what may benefit one character of soil may be injurious to another. In the northern section of the cotton belt where the season is shortest a fertilizer should be selected that will force maturity, and such fertilizers should also be used in the boll weevil infested territory. The quantity to be applied to the acre is a matter of judgment, dependent upon the quality of the fertilizer and the char¬ acter of the soil. Some lands may require a half ton to produce the best results, others much less. The average quantity applied to the acre in all the cotton States is about 400 pounds. Some farmers still adhere to the old method of applying the fertilizer, using a tin tube 5 or 6 feet long with a funnel at the upper end. The funnel

is fed by hand from a bag filled with the fertilizer and suspended from the shoulder, the end of the tube being inserted in the soil where the fertilizer is to be dropped. Home-made fertilizers are generally broad¬ casted and harrowed in before the land is bedded up. The up-to-date farmer puts in his fertilizer with a machine, consisting of a hopper mounted on a frame something like that of a wheel-barrow. The fertilizer is evenly dis¬ tributed from the movable bottom of the hopper which alternately opens and closes by the revo¬ lutions of the wheel. Two shoes attached to the rear of the machine cover up the fertilizer.

Seed Selection. — The seed to be planted should be carefully selected and reserved from the first pickings of the bottom or middle fruit of the plant, never from the last picking, or top crop. It would be far better if the seed could be taken from selected plants or rows of plants of prolific yield. Unfortunately too little at¬ tention is paid to seed selection, the common practice being to take the required number of bushels of seed promiscuously just as they come from the gin, or to buy them from a neighbor¬ ing oil mill. There are any number of varieties of seed. Among the favorite early varieties are Cherry Cluster, Dickson, Drake Cluster, King and Welborn Pet; of the medium (date) varieties, Bates Big Boll, Boyd Prolific, Her-long, Peterkin and Petite Gulf; and of the late varieties Allen, Cook, Mammoth Prolific, Peeler and Texas Storm Proof. The seed are now planted almost entirely with machines, except where the stands are irregular and broken, when replanting is done by hand and with the use of the hoe. A few farmers still adhere to vol. 8 — 5

the old method of opening the top of the bed with a light bull tongue plow, dropping in the seed by hand and covering them with a block or board drawn over the bed. The machine planter now used is so arranged as to open the drill, drop the seed and cover them. It not only economises the seed, distributes them more uni¬ formly, but ensures a better stand while facil¬ itating cultivation. Some of these machines also distribute fertilizers along with the seed, but this is not considered the most advisable method of fertilizing.

Date of Planting. — ‘The date of planting varies according to latitude and local condi¬ tions. There are a group of some thirty-odd counties in south Texas bordering the Gulf, be¬ tween the eastern and western limits of the State, and a few other counties in the extreme southern section of the Gulf States, that begin planting as early as 1 March, and continue until the middle of the month. The tier of counties lying just

above these, averaging about five from south to north, and stretching across the belt from the Atlantic Ocean almost to the Rio Grande River, begin planting about 15 March and continue until 1 April. In the next tier of counties, covering the middle section and ex¬ tending from the Atlantic to the western limit of the Texas cotton fields, the average date of planting is from 1 April to 15 April. The most northern tier of counties, extending from the Atlantic to the Pan Handle in Texas, begin planting about 15 April and sometimes continue until the middle of May.

Chopping Out. — With favorable weather the seed ought to germinate within a week. As soon as the plants have formed three or four leaves and have attained a few inches in height, they should be thinned or chopped out to a stand. This is done with the hoe, the distance left between the plants depending on the char¬ acter of the soil and the usual size of the plants when full grown. On the fertile lands of Mis¬ sissippi, Louisiana and Texas, where the plants grow 6 or 8 feet high, as much as 2 and some¬ times 3 feet are left between the plants. On the poorest lands the distance is usually 8 to 12 inches, and on good soils 12 to 15 inches. Chopping to a stand is usually done in May, unless the season is late. If the season is un¬ favorable and the seed have come up so ir¬ regularly as to necessitate replanting, the chopping out to a stand may go on until the middle of June and even later. After the thinning out process a turning or shovel plow is used to bar off the soil from each side of the bed and kill the young grass. A” sweep is then run through the alley or trench between the beds throwing the soil back upon the bed and close up to the plants. Following this at dif¬ ferent intervals the crop should have at least three hoeings and three to four plowings. The soil must be continually and industriously dis¬ turbed, not only to keep down grass and weeds, but to conserve moisture. This cultivation should be kept up until the crop is finally <(laid by,® which is usually during the first half of July if the season is favorable. The different stages of cultivation may be summarized as follows: Breaking up and plowing in January, February and March ; planting the seed in April ; chopping out in May ; cultivating with plow and hoe in June flaying by the crop in July and August; picking in September, Oc-L

tober, November and December. During the process of cultivation the plant has developed stalk and limb, squares have appeared, de¬ veloped into blossoms and the young fruit or bolls have formed.

Blooms and Bolls. — The first blooms ap¬ pear about 15 May in southwest Texas, 20 May in central Texas, Louisiana and southwest Georgia; 1 June in the Mississippi bottoms, south Arkansas and middle Georgia; 10 June, in the pine hills of South Carolina, middle Alabama and central Georgia; 20 June, in northwest Louisiana, middle Arkansas, north¬ west Georgia and southern North Carolina; 4 July, in north Arkansas and north Texas; 10 July in northeast North Carolina; 25 July in western Tennessee and Oklahoma. The first bolls open about 15 May in south Texas; 25 June in middle Texas; 1 July in south Louisi¬ ana; 10-15 July in central Louisiana, south Georgia, the pine hills of South Carolina ; 1 August northwest Louisiana, south Arkansas, coast of North Carolina; 1 September, Pied¬ mont region, North Carolina, Texas prairies; 15 September, north Arkansas and Oklahoma.

Picking. — The ingenuity of man has not yet overcome the difficulties of picking cotton by machinery. In recent years a number of machines for this purpose have been invented and tested, but so far none has proved success¬ ful. If the plants were of more uniform height, and if the fruit ripened all at once, success might be attained. But the plant varies in height from 2*4 or 3 feet to 8 or 10 feet, and the fruit ripens continuously from August to mid-winter. Even when the fields are ready for the first picking the plants are filled with young tender bolls of all stages of growth that are likely to be irreparably damaged by a machine. So that hand picking goes on as in centuries past, and there is not yet in sight the promise of relief from the most tedious and expensive process connected with cotton culture. Picking, unless the crop is unusually late, begins in south Texas and the southermost counties of Georgia and the Gulf States in July and August, and at later dates in the three other divisions corresponding in variation to the dates of planting assigned to each, as given elsewhere. Before the season is over the fields are picked over three or four times, and even oftener. However, they should be kept clean of open cotton to avoid injury by unfavorable weather and loss by wind storms blowing the cotton to the ground. The hands, men, women and children — and often every available one in the community is employed — go into the field as soon as the dew is off of the plant, each taking a row of cotton and picking the lint from the bolls until the sack strapped across the shoulder is filled. The cotton is emptied into large baskets and the

baskets when filled are weighed and each hand credited with the day's picking. The cotton is then hauled in wagons to the bins or to the plantation gin-house. Many small farmers and tenants never store the seed cotton but haul it to the public gins where it is weighed and sold to the ginner, the price paid being about one-third of that paid for the lint after it is ginned. The price paid for picking is by the 100 pounds, and varies from time to time and in different sec¬ tions, being governed by the supply of labor and the market price of cotton. In Georgia 50

to 60 cents may be the ruling price while in Texas during the same season it may be $1 or more. Expert hands pick from 250 to 300 pounds a day, but the average for the whole country will hardly exceed 125 pounds per hand. There is a record of a 16-year-old Texas girl picking 603 pounds in one day, and of two Oklahoma boys averaging 1,100 pounds a day. The records of the United States Depart¬ ment of Agriculture, in an investigation of the comparative efficency of white and negro labor in the cotton fields, show that in 152 counties, with a negro population amounting to 75 per cent of the whole, the average pick¬ ing per day was 111 pounds, whereas in 192 counties with a white population constituting 75 per cent of the whole, the average was 148 pounds. Higher prices are paid in Texas and Oklahoma for picking than elsewhere, due to the greater scarcity of labor. In recent years the ruling price for the whole cotton belt has been from 60 to 70 cents per hundred, but in 1917 the average was about $1.00 per hundred, due to the increased cost of labor. As indi¬ cating the vast sum expended for this item it cost the farmers of the South approximately $162,100,000 to pick the record crop of 1914.

Bolly Cotton. — After the fields have been cleaned of all cotton that can be picked by hand, there is always found on the plants a number of partially opened bolls the maturity of which has been prevented by frost. Until recently all such cotton was considered worth¬ less. But the high price paid for the staple since 1905 has led to the invention of machinery for utilizing the unmatured bolls. These machines thrash out the seed cotton from the bolls, after the latter have been well dried, and the seed cotton is then passed to the gin and treated as the hand-picked cotton. The lint thus obtained is classed as <(bolly cotton,® and being of an inferior grade and staple sells for much less than hand-picked cotton. Its production is on the increase, but as yet is confined to Texas and Oklahoma, where the winter rainfall is much less than in the other States, and the high winds assist in drying out the frost-bitten bolls.

Yield. — The yield of a field of cotton de¬ pends upon a number of contingencies, among which may be mentioned the preparation of the soil, the care taken in the selection of seed, the proper use of fertilizers where the soil needs fertilization, the kind of cultivation the crop receives, the absence or presence of plant diseases and of insects, the character of the soil, and above all the weather. A good yield, or such as the land is capable of producing, may not be expected with slip-shod prepara¬ tion and cultivation, nor with insufficient nor misapplied fertilizers. Diseases of the plant, such as root rot, anthracnose, blight and shed¬ ding of the fruit sometimes greatly reduce the yield. Some insects, such as cut worms, cater¬ pillars, boll worms, are at times very destruc¬ tive, while the boll weevil, ever present when the fields once become infested, has under favorable conditions for its propagation de¬ stroyed as much as one-half the crop. An¬ other pest, said to be just as destructive as the boll weevil, is the pink boll worm which has just made its appearance in the extreme southeastern counties of Texas. It is sup¬ posed to have been introduced from Mexico,

into which country it was introduced in 1911 from Egypt, which is said to be its original habitat. Adverse weather, such as to give the crop a late start, or droughts in August, or early October frosts may materially affect the yield. The average yield per acre for 10 years (1906 to 1915, inclusive) in each State, begin¬ ning with Virginia and going westward, is as follows (in pounds) : Virginia 228.4, North Carolina 243.5, South Carolina 224.1, Georgia 194.2, Florida 123.1, Alabama 173.6, Mississippi 192, Louisiana 174.3, Texas 170, Arkansas 190.9, Tennessee 197, Missouri 286.6, Oklahoma 174.4, California 482, and for all States 186.3 pounds.. The higher yield in the Atlantic States is due to a more liberal use of ferti¬ lizers and to a more general practice of inten¬ sive culture. There are records of occasional extraordinary yields in some sections, for in¬ stance, 15,100 pounds of seed cotton on five acres of well-fertilized pine-wood land in Wayne County, N. C. ; 10 bales on four acres in Marion County, S. C. ; 12 bales on four acres in Pamlico County, N. C. ; and five bales, weighing

500 pounds each, on one acre of highly fertilized sandy soil in Washington County, N. C.

Ginning. — Cotton ginning in recent years has become a distinct business. The ginneries are divided into three general classes, namely, those conducted exclusively for the public, those conducted exclusively for the plantation and those conducted for both the public and the plantation. The plantation ginneries constitute about 17 per cent of the whole. The modern up-to-date automatic ginnery practically does away with labor, and yields from 5 to 10 times as much lint cotton per day as was pos¬ sible by the old method. A four-gin establish¬ ment of 40 saws each when in constant opera-

An Old Time Gin House and Screw Press

tion will turn out 40 to 60 bales of cotton per day. Of the 24,418 active ginneries in 1914, 21,045 used steam power, 1,069 water power, 1,922 gasoline power, 342 electric power and 40 animal power. During this year cotton was ginned in 897 counties. The competition of the ginneries is so sharp that charges for ginning have been considerably reduced. It used to be

$1 per hundred or $5 a bale. Now it is about $2 a bale where the ginner furnishes the bag¬ ging and ties, or $1 a bale where the farmer furnishes both, the farmer taking all the lint • and seed. Formerly the farmer furnished the bagging and ties and the ginner got all of the seed for ginning, now the ginner when the seed is taken also furnishes bagging and ties. It has become a very general practice, and this obtains particularly among small farmers and tenants, to sell the whole crop (in the seed) to the ginneries, the ginner paying one-third the market value of cotton. Before running it through the gin the seed cotton should be thoroughly aired and dried, then stored so that the lint may absorb some of the oil in the seed, though this practice is not generally resorted to. It should then be passed through the ˆwhipperˆ to beat out the dust, sand and other trash, and thence to the gin which separates the lint from the seed. In ordinary seasons the lint cotton as it comes from the gin ought to weigh about 33ˆ3 per cent of the weight of the seed cotton. In other words one-third should be lint and two-thirds seed, or 1,500 pounds of seed cotton should turn out a 500-

pound bale of lint. But this depends upon whether the crop is early or late, whether the rainfall has been deficient or excessive, and also upon the fertility of the soil. Sometimes the proportion falls below and sometimes exceeds 33bS pounds. Better seed selection, and improved methods of ginning, have now increased this proportion to about 35 per cent. After being ginned the lint cotton is passed into the press and packed in bales averaging each about 500 pounds gross weight, that is, including the bag¬ ging and ties, each bale being covered with six yards of bagging weighing 2^2 pounds to the yard, and bound with six iron or steel ties weighing about seven pounds. The average or standard size bale is 24x54 inches. Though 500 pounds is the accepted average weight of a bale, the weight differs in nearly all of the States. In the Carolinas the average gross weight (i.e., including bagging and ties) is about 478 pounds, in Georgia 491, in Alabama, Mississippi and Louisiana 506, in Arkansas, Ten¬ nessee and Oklahoma 510, while in Texas it is about 520 pounds, the bales averaging heavier going from East to West. The average gross weight for all States is about 505 pounds.

Since the advent of the boll weevil cotton is not only planted earlier, but earlier maturing varieties are used. This has almost doubled the amount of cotton ginned in July and Au¬ gust, as compared with former years, and has led to fixing upon 1 August as the beginning of the commercial crop year instead of 1 Sep¬ tember as heretofore. The average proportion of the crops of the past four years picked and ginned in July and August is 4.8 per cent; to 25 September, 22.6 per cent; to 1 November, 63.7 per cent; to 1 December, 84.8 per cent; to 1 January, 93.5 per cent; the remaining 6.5 per cent being ginned within the next two or three months.

Cost of Production. — It is impossible to ascertain with any degree of accuracy the cost of production. So much depends upon the quality of the soil, the thrift of the farmer, the efficiency of labor, the character ‘of the season, the freedom of the crop from plant diseases

and insect depredations, the price realized for the crop, that the cost

will vary from year to year, and vary even in fields on the same plan¬ tation. Two elaborate investigations of the subject made by the United States Department of Agriculture will serve to illustrate the wide difference in cost, and also the increased cost in recent years. The results of the first inves¬ tigation made in 1896 show that the average total cost of cultivation per acre was $15.42, and the average total return $19.03, leaving a net profit of $3.61 per acre. The average yield per acre was 255.6 pounds of lint, and the aver¬ age price 6.7 cents per pound. The average cost of production in all States was 5.27 cents per pound. To produce a bale of 500 pounds the cost was $30.15. The results of the investi¬ gation in 1910 indicated that the average total cost per acre was approximately $20.35, and the yield of lint per acre 247 pounds, making the average cost of production in all States 8.30 cents per pound. The cost in 1910 was 32 per cent greater than that of 1896. In comparing the various items of cost this is readily ac¬ counted for. For instance the cost of plowing increased from $4.12 to $6.36, picking from $3.37 to $4.67, and rent of land from $2.88 to $3.56 per acre. The average cost in all States of the chief items in 1910 were : rent $3.56, preparation of the land $2.17, fertilizers $2.46, seed 51 cents, planting 50 cents, cultivation $4.19, picking $4.67, ginning $1.61, miscellane¬ ous 68 cents ; total per acre $20.35. The esti¬ mated cost per pound in the different States was : North Carolina 8.22 cents, South Carolina 8.07 cents, Georgia 8.48 cents, Alabama 7.92 cents, Louisiana 8.09 cents, Texas 8.59 cents, Arkansas 8.20 cents, Tennessee 8.19 cents, Ok¬ lahoma 8.44 cents and all States 8.30 cents. The Watkins Statistical Bureau of New York City in January 1918 concluded an exhaustive inves¬ tigation of the cost of cotton production in 1917. In their introductory remarks they say: <(that the cost of producing a pound of cotton varies from year to year. Not only so, but it varies in each State, in each county, and indeed the cultivated fields on the same planta¬

tion may produce varied results.® As evidence of the very wide variation at different periods, the cost as ascertained by the United States Department of Agriculture in 1896 and in 1910 are cited, the first being 5.27 a pound in the former and 8.30 cents in the latter season, as compared with 11.28 cents in 1917, as esti¬ mated by the Watkins Bureau. The average cost of production and the net profit per acre as estimated by this authority are as follows : Virginia, cost $50, profit $39.75; North Carolina, cost $46.41, profit $34.61 ; South Carolina, cost $46.94, profit $48.20; Georgia, cost $37.15, profit $33.31; Florida, cost $26.81, profit $26.29; Ala¬ bama, cost $30.34, profit $22.47 ; Mississippi, cost $33.10, profit $30.17; Louisiana, cost

$34.42, profit $46.63; Texas, cost $28.11, profit $25.88; Arkansas, cost $38.89, profit $35.51 ; Tennessee, cost $30.71, profit $22.73; Missouri, cost $39.08, profit $34.29; Oklahoma, cost $29.20, profit $26.82; California, cost $52.72, profit $70.40; Arizona, cost $94.42, profit $63.20; New Mexico, cost $31, profit $40.25; average cost for all States, $34.76, and average net profit per acre

$31.55.

The net cost of producing a pound of cotton in each State is estimated as follows : Virginia, 13.10 cents; North Carolina, 13.08 cents; South Carolina, 9.85 cents; Georgia, 11.33 cents; Florida (partly long staple Sea Island), 17.74 cents; Alabama, 12.99 cents; Mississippi, 11.42 cents; Louisiana, 9.94 cents; Texas, 11.07 cents; Arkansas, 11.42 cents; Tennessee, 12.14 cents; Missouri, 12.35 cents; Oklahoma, 10.21 cents; California, 9.70 cents; Arizona, 41.74 cents (high cost due to high cost of irrigation) ; New Mexico, 7.11 cents; net cost per pound for all States, 11.28 cents. The extraordinary profits per acre are due to the very high prices obtained by the farmer for his lint cotton, and its by-product the seed, the former averaging 2 lYz cents a pound, and the latter $1 per bushel — prices the like of which have not been realized since 1870.

Marketing. — Cotton is the most marketable of all farm products. Non-perishable, and put up in conveniently handled bales, always in

Cotton Received at, Exported from, and Stocks at United States Ports

In thousands of bales

Ports

Receipts

Exports

Stocks July 31

1916-17

1915-16

1914-15

1916-17

1915-16

1914-15

1916-17

1915-16

1914-15

Galveston .

2,641

2,425

4,002

1,601

1,693

2 ,967

103,000

63,171

114,537

New Orleans .

1,541

1,414

1,810

1,037

1,256

1,538

163,000

105,803

139,172

Mobile .

113

163

167

76

82

90

8,000

14,052

12,477

Savannah .

908

1,043

1,760

453

453

1,270

62,000

66 , 306

63,756

Charleston .

174

264

406

19

85

261

6,000

21 ,927

43,211

Wilmington .

88

221

279

81

171

203

48 , 000

56,549

34,903

Norfolk .

544

681

646

108

82

75

59,000

34,348

47,693

Baltimore .

128

57

82

170

168

67

26,000

2,000

1,000

New York .

38

*34

*30

786

747

482

59,000

105,375

236,189

Boston .

103

89

88

155

101

111

9,000

10,698

14,112

Philadelphia .

26

6

11

43

26

35

3,000

1 , 125

725

Pensacola .

37

70

87

37

65

87

1,000

5,298

40

Brunswick .

154

151

217

113

113

199

24,000

2,136

284

Other ports .

42

1 ,009

984

Newport Newsf .

13

76

145

1

Port Arthurf .

279

59

57

163

Pacific ports f .

519

653

468

589

15,000

35,567

14,236

Texas ports f .

2

331

512

266

10 i 000

8,906

13,847

Jacksonville .

57

43

33

1,027

Georgetown .

1

2

Total .

7,407

7,783

10,802

5,533

6,051

8,369

596,000

534,288

736,345

* Net receipts only. Gross receipts at New York 1915-16, 1,630,000, 1914-15, 1,728,000 bales, f Export included in other ports.

N. B. — The apparent discrepancy between receipts, exports and stocks at some of the ports is accounted for by the fact that they not only reship cotton to interior points, but coastwise to other United States ports.

I

1 Vertical cross section of elevator, feeding, plain gin flue and platform 2 Cross section of Huller gin 3 Vertical cross section of condenser and press

demand, it finds a ready sale anywhere and at any time. But the old time method of con¬ signing the crop to a commission merchant to be sold at the discretion of the planter is no longer followed except by a few large planters. Railroads traverse so much of the cotton territory that markets are convenient, and buyers are always on hand to pay cash for every bale offered for sale, thereby saving the farmer the cost of freight, cartage, storage, insurance and commissions for selling. If the cotton is carried to market and the price is not satisfactory it may be stored in a warehouse, weighed, marked for identification and a receipt issued for it that may be negotiated at any local bank at a reasonable rate of interest. In marketing his crop the farmer now has the advantage of selling it according to the grades established by the government. Heretofore, the grading was done by the buyer and the farmer knew little or nothing of the grades or their values. The cotton mills of the South are now consuming about 23 per cent of the total production, a considerable proportion of which is bought by the mills from farmers in the locality where it is produced. The re¬ mainder of the crop is nearly all marketed at interior points and from thence, after being compressed into smaller bales, is shipped either to Northern mills, or to the seaboard and through inland ports to various foreign desti¬ nations. In the general distribution of the crop about 23 per cent is taken by Southern mills, 20.5 per cent by Northern mills, and 56.5 exported. The largest amount of cotton ex¬ ported in any year was in 1911-12, when 11,- 070,000 bales were taken by foreign countries. Of this Great Britain took 39 per cent, Ger¬ many 28.5 per cent, France 11 per cent, Italy 6 per cent, Japan 4 per cent, Spain 3 per cent and various other countries the remaining 8.5 per cent.

Grades. — The cotton grown in this country may be divided into three kinds : long staple sea island, long staple upland and short staple upland. The long staple sea island of South Carolina ranges from l3/$ to 2ˆ4 inches in length, is silky, fine, strong and clean and is used in making doubled or ply yarns from 150s to 400s ; the Florida and Georgia sea island ranges from 1 14 to 1 Y\ inches, is silky and clean, and is spun into lower grade sea island yarns from 150s to 200s. The grades of sea-island are extra fine, fine, medium fine, good medium, medium, common and ordinary. The long staple upland, such as the Allen, Peeler, benders or the bottom land cottons of Mississippi and its tributaries, as well as those classed as Gulf or New Orleans, is from 1 to 1 54 inches in length, and is used in making yarns from 50s to 70s; the shorter staple up¬ land ranges from Va to 1 inch, is easily manipu¬ lated and is suitable for weft or filling yarns from 30s to 40s. To classify cotton with the view to determine its market and spinnable value requires long practice and skilful use of hand and eye. The points to be determined are the grade, the staple, the color, the amount of sand and trash, the amount of dampness and whether or not the cotton is even running. When these are determined from samples drawn from each bale, the cotton is classified under one or the other of the nine standard grades established by the government. These

grades consist of middling as the basis, and above this in the order named, strict middling, good middling, strict good middling and mid' dling fair; below middling in the order named, strict low middling, low middling, strict good ordinary and good ordinary. These grades have been universally adopted in this country and now form the basis of all sales of cotton.

Cotton Exchanges. — The marketing and financing of the enormous crops of recent years have been greatly facilitated by the cotton ex¬ changes. These exchanges bring together cot¬ ton dealers from all parts of the world, afford¬ ing the foreign spinner and merchant the oppor¬ tunity of buying cotton on short notice for future delivery. They give the domestic spinner and merchant, and the planter as well, the opportunity to purchase a contract or (< hedge® as an .insurance against market fluc¬ tuations that otherwise might result in loss. The manufacturer who has an order for the future delivery of goods may buy on the Ex¬ change at a definite time and price a contract

for the amount of cotton required to fill that order ; the Southern merchant who has on hand a certain amount of cotton for which there is no immediate demand may sell on the Exchange a contract for a like amount, and hold his cot¬ ton until there is a demand for it ; the planter whose cotton is not yet ready for delivery, seeing the market continually advancing, may sell on the Exchange a contract for a portion or all of his crop. In each case the transaction is an insurance against loss. Thus the Ex¬ changes dispense with the old and costly custom of consigning and selling the crop through

commission houses, and through its agency a very large proportion of the crop is sold at home and abroad at a minimum of expense to the producer.

The Cotton Exchange, Liverpool

Cotton Futures Act. — The Act of Congress, known as the Cotton Futures Act, became a law 18 Aug. 1914, and went into _ effect six months later, 18 Feb. 1915. The object of the Act is to regulate trading on the cotton ex¬ changes in cotton for future delivery, by levy¬ ing a prohibitive tax on such trading except where certain specified conditions are complied with. These conditions were determined with the view to correcting existing abuses, and are imposed upon parties to future contracts in order to equalize their privileges, and also to protect the rights of cotton owners, inasmuch as future contracts made on the exchanges control to a considerable extent the price of spot cotton in the Southern markets.

The first administrative duty imposed by the Act was the establishment of new official standards for cotton throughout the United States. On 15 Dec. 1914 the Secretary of Agri¬ culture, therefore, established and promulgated new standards for nine grades of cotton — middling fair, strict good middling, good mid¬ dling, strict middling, middling, strict low mid¬ dling, low middling, strict good ordinary and good ordinary. Under the Cotton Futures Act the official cotton standards for the different grades are practically compulsory upon the ex¬ changes in the United States, and they were compelled to adopt them in order to avoid exces¬ sive taxation, therefore the New York and New Orleans exchanges adopted the official stand¬ ards for all transactions subsequent to 18 Feb. 1915. The use of the standards for other ex¬ changes in the United States is optional ; but 21 of such exchanges or similar organizations have adopted the standards and are making their quotations in conformity therewith.

Another duty imposed by this Act is the in¬ vestigation and designation of bonafide spot

markets within the meaning of the Act. Thir¬ teen cities have been named as such thus far, and ten of these are being used in establishing commercial differences for the settlement of future contracts, as required by the Act. By carefully prepared rules governing the making of price quotations, by frequent visits to the spot exchanges, and by telegraphic and mail reports from each exchange, it is undertaken to have the differences of the 10 designated markets accurately represent the true commer¬ cial values of the various grades, the average of which may be taken as a satisfactory basis for the settlement of future contracts.

Another important administrative _ duty under the Act is the settlement of disputes when they arise, as to the length of staple, grade or quality of any cotton tendered in set¬ tlement of a future contract, the Act requiring that future trading shall be on the basis of the official cotton standards. For the settlement of these disputes 12 expert cotton classers or ˆexaminers® have been designated to act in these disputes, and their conclusions as to the grade, length of staple or quality are the basis of the formal findings of the Secretary of Agri¬ culture, which are prima facie evidence in the United States courts as to the true grade, length of staple or quality, and tenderability of any cotton covered thereby.

Sea-Island Cotton. — Unless we except the small production of the West Indies, the cot¬ ton grown on the Sea Islands of South Caro¬ lina is the finest and most valuable in the world. The plant is larger and of a more vigorous growth than the upland plant, is less subject to disease and shedding of forms and bolls, and withstands adverse weather much better. There are over 5,000 farms on these islands, cultivated mostly by negro labor, many of which are owned by negroes. The farms are small, and the cultivation of the cotton so ex¬ pensive that few farmers plant more than 100 acres. In preparing the land for cultivation the old stalks and weeds are knocked down and burned. The land is rarely ever broken up broadcast, but early in February two furrows are run with a single-horse turning plow in the old alleys, making a trench seven or eight inches deep. The trench is fertilized with about 20 cart loads of marsh mud and 1,000 to 1,400 pounds of cotton seed to the acre ; or stable manure with composts of marsh mud and rushes are applied. Recently commercial fertilizers have come in general use, especially among the negro farmers who do not like the care and labor of making composts. One of the best fertilizers used consists of 250 pounds of acid phosphate, 200 pounds of kainit and 200 pounds of calcined marl per acre. After apply¬ ing the manure the land is listed by using a hoe and pulling the soil on to the manure from the sides and tops of the old beds, or by covering the manured trenches with two furrows of a turning plow. A heavy roller is then run over the ground and the beds are afterward built up by lapping in two more furrows on a side with either a single or double-horse turning plow. The land is now ready for planting which is usually done the first 10 days in April. The seed are planted by three hands ; the first one using a hoe opens holes 12 to 18 inches apart in the top of the bed, and the second hand

follows dropping 8 or 10 seed in each hole, the third hand following and covering the seed with a hoe. About a bushel of seed to the acre is used. The seed come up in 8 to 12 days, and from the second week in April to the first week in May the plants are thinned out to a stand. The crop receives two hoeings in May, the plows then break out the

middles between the beds, and they are followed by hoe hands who draw up the loose soil around the young plants. Cultivation with the hoe goes on con¬ tinually until the last of July, by which time with one plowing in July and one in August to keep down the grass between the rows, the crop is laid by. The first blooms appear about the middle of June, and the bolls begin opening the latter part of August when the plants are four or five feet high. Picking be¬ gins from the last week in August to the sec¬ ond week in September, and is completed by the middle of December. When the cotton has been picked it is sun-dried and run through a ˆwhipper® machine to knock out the dust and sand. A roller gin is always used in ginning sea-island cotton, as the saw gin cuts up and tears the fibre. The average yield per acre is about 125 pounds. The cost of production is just about twice that of upland cotton, all the items of expense, except rent, being much higher. The crop is not only more expensively fertilized, but it is much more difficult to pick owing to the smallness of the bolls and the tenacity with which the cotton adheres to the pods. In 1914 sea-island cotton was cultivated in two counties in South Carolina, 15 in Florida and 22 in Georgia. Climatic and soil conditions discourage its cultivation very far from the coast, as the fibre looses its lustre, strength and length, and to retain these characteristics the inland planters find it necessary to obtain fresh seed from the sea islands every two or three years. The largest crop ever produced was in 1905, when South Carolina made 13,714 bales, Florida 33,635 and Georgia 76,440 ; total 123,789. The average weight of bales is about 355 pounds in South Carolina, 375 in Florida and 407 in Georgia.

Long Staple Upland. — The long staple upland cotton such as Allen, Peeler and benders, until recent years was produced al¬ most exclusively in the Mississippi Delta. The advent of the boll weevil which was found to be particularly destructive to this variety, on account of its late maturity, has induced the cultivation of the early maturing varieties of uplands, and the long staples for which there is always a great demand have been introduced in other sections of the cotton belt not infested with the weevil. Before the weevil spread over the Delta lands the total annual production of long staple was between 300,000 and 400,000 bales. At the present time the production in this section has been reduced fully one-half. In addition to the Delta lands in western Mis¬ sissippi, eastern Arkansas, northeastern Louisi¬ ana and western Tennessee, which produce long staple, in recent years this variety has been cultivated on the Red River or its tributaries in southwestern Arkansas and northeastern Texas, and in the counties of Darlington, Ches¬ terfield and Marlboro in South Carolina, and a few sections in North Carolina, and a group of counties lying along the

Savannah River in Georgia and South Carolina and a few isolated

localities in other States. The total production in all sections in 1914 was a little in excess of 400,000 bales. The yield per acre of long staple is somewhat less than that of upland and the cost of production is greater, but this is more than offset by the price which is three to five cents higher than ordinary upland. Another variety of long staple cotton is cultivated in the Salt River Valley of Arizona from imported Egyptian seed. The staple is 1ˆ2 inches or more and is said to be superior to most of the Egyptian cotton used in this country.

Linters. — The increase in production of linters during recent years is noteworthy. From 114,544 bales in 1899, the output of this product increased to 1,300,163 bales in 1916. The 1915 linter product even exceeded that of the pre¬ ceding year by nearly 112,239 bales, although the cotton crop of 1915 was very much smaller than that of 1914. This increase in linter pro¬ duction is due to some extent to closer delinting of the seed for the better separation of the meat from the hulls, but more especially to the high prices obtained for the fibre, which is used extensively in the manufacture of gun¬ cotton and smokeless powder. Many mills now obtain considerably more than 100 pounds of linters per ton of seed treated, whereas in earlier years 50 pounds per ton was a high yield.

The total quantity of bleached cotton fibre consumed in the United States during the calendar year 1915 in the manufacture of ex¬ plosives was 121,331,385 pounds, equivalent to 244,003 bales of 500 pounds each net weight. During the three months ending 31 March 1916 there were consumed in this industry 144,988 bales and during the three months end¬ ing 30 June 1916 142,725 bales. The increased use of cotton fibre in this industry is striking, the quantity consumed during the first half of 1916 being considerably in excess of the total for 1915. The quantity of prepared cotton held on 30 June 1916 by the manufacturers of ex¬ plosives was 11,447,422 pounds, equivalent to 22,895 bales of 500 pounds each. This quantity compares with 28,933 bales on 31 March 1916 and 30,483 bales on 31 Dec. 1915. The loss in bleaching cotton for nitrating purposes varies considerably, depending on the condition of the raw fibre, some stock being quite clean and some very trashy. From the information at hand it would appear that the loss in preparing linters from the wrapped and iron bound bales to the purified fibre as used in nitration is from 30 to 40 per cent. Based on an average loss of 35 per cent the gross weight of cotton fibre used in the manufacture of explosives was 375,000

equivalent 500 pound bales in 1915, 223,000 bales for the first and 220,000 for the second quarter of 1916.

Sea-island cotton, of which 91,844 running bales were ginned in 1915, represented in that year less than 1 per cent of the total cotton produced. All this cotton was grown in Georgia, Florida and South Carolina, the first-named State producing 57,572 bales, or more than three-fifths of the total.

Although cotton is grown in 18 States, the combined product of four — Texas, Georgia, South Carolina and Alabama — represented nearly two-thirds of the total crop of 1915.

Texas alone produced 3,227,480 bales, or more than one-fourth of the total crop of 1915.

The next greatest production was that of Georgia, 1,908,673 bales, or more than one-sixth of the total. Other States producing large crops were South Carolina, with 1,133,919 bales; Alabama, 1,020,839 bales; Mississippi, 953,965 bales; Arkansas, 816,002 bales; North Carolina, 699,494 bales ; and Oklahoma, 639,626 bales.

Production by States. — The amount of cotton ginned in each State for the past 10 years, according to the United States census, is as follows, the running bales or the weights of bales as they are turned out at the gin being reduced to bales of the uniform gross weight of 500 pounds to the bale :

Bibliography. — True, (The Cotton Plant> (in United States Department of Agriculture, Office of Experiment Stations, Bulletin 33, Washington 1896) ; Montgomery, (The Cotton Manufacture of the United States of America Contrasted and Compared with That of Great Britain> (1840) ; Young, T. M., (American Cotton Industry* (1902) ; Miller, (American Cotton System* (Austin, Tex., 1909) ; Brooks, (The Story of Cotton and the Development of the Cotton States* (Chicago 1911) ; Taylor, (Cotton Weaving and Designing* (New York 1906) ; Peake, (Cotton from the Raw Material to the Finished Product* (New York 1911)'; the annual Statistical Abstract of the United

COTTON CROPS OF EACH STATE, IN BALES OF 500 POUNDS, GROSS WEIGHT.

State

1916-17

1915-16

1914-15

1913-14

1912-13

1911-12

1910-11

1909-10

Virginia .

27,127

15,809

25,222

23 , 490

24,398

29,891

14,815

10,095

N. Carolina. .

654,603

699,494

930,631

792,545

865,653

1,075,826

706,142

600,606

S. Carolina …

931,830

1,133,919

1,533,810

1,377,814

1,182,128

1,648,712

1 , 163 , 501

1.099,955

Georgia .

1,820,939

1,908,673

2,718,037

2,316,601

1,776,546

2,768,627

1,767,202

1,804,014

Florida .

41 , 449

47,831

81,255

58,695

52,760

83 , 388

58,949

54,011

Alabama .

533,402

1 ,020,839

1,751,375

1,495,485

1,342,275

1,716,534

1,194,250

1,024,350

Mississippi…

811,974

953,965

1,245,535

1,310,743

1,046,418

1,203,545

1,262, 680

1,083,215

Louisiana ….

443,182

341,063

449,458

443,821

376,096

384,597

245 , 648

253,412

Texas .

3,725,700

3,227,480

4,592,112

3,944,970

4,880,210

4,256,427

3,049,409

2,522,811

Arkansas .

1,134,033

816,002

1,016,170

1,072,846

792,048

939 , 302

821,233

713,463

Tennessee… .

382,422

303 , 420

383,517

379,471

276,546

449,737

331,947

246 , 630

Missouri .

62 , 699

47 , 999

81,752

67,105

55,691

96,808

59 , 633

45,141

Oklahoma ….

823,526

639,626

1,262,176

840,387

1,021,250

1,022,092

923,063

544,954

All others ….

55,303

35,700

63 , 880

32,513

11,402

17,215

10,144

2,292

United States

11,449,930

11,191,820

16,134,930

14,156,468

13,703,421

15,692,701

11,608,616

10,004,949

Statistical Summary. — The following table is a statistical summary of the cotton crops of the United States in 10-year periods from 1800 to 1900 — annually since the latter year — and shows the area harvested since 1870 (the gov¬ ernment collected no acreage statistics prior to this date), the production in running bales, the value of the crop (not including seed), the domestic consumption, the number of bales exported, the amount of stocks carried over at the close of the season (not including mill stocks), the average net weight of bales and the average price of middling uplands :

States) ; and Scherer, (Cotton as a World Power* (New York 1916).

James L. Watkins, Cotton Statistician, New York City.

COTTON CULTIVATION IN OTHER COUNTRIES. East India. — Next to the United States East India is the largest cotton producing country in the world. The plant is cultivated to a greater or less extent in nearly every presidency or province, extending from the North West Frontier province in the ex¬ treme north to the Madras presidency in the extreme south, and from the Bombay presidency

COTTON STATISTICAL SUMMARY, 1800 TO 1915.

\rea

Production

Value of

harvested

running

crop in

Year

acres

bales

dollars

1910 .

_ 35,994,000

11,363,915

$1,146,102,000

1915 .

_ 31,412,000

11,068,173

628,000,000

1914 .

_ 36,832,000

15,905,840

591,130,000

1913 .

_ 37,089,000

13,982,811

885,350,000

1912 .

_ 34,283.000

13,488,539

786,800,000

1911 .

_ 36,045,000

15,553,073

749,890,000

1910 .

_ 32 , 403 , 000

11,568,334

809,710,000

1909 .

_ 32,044,000

10,072,731

688,350,000

1908 . :

_ 32,444,000

13,086,005

588,810,000

1907 .

_ 31,311,000

11,057,822

613,630,000

1906 .

_ 31,374,000

12,983,201

640,310,000

1905 .

_ 26,117,153

10,495,105

556,830,000

1904 .

_ 30,053,739

13,451,337

561,100,000

1903 .

_ 28,016,893

9,819,969

576,500,000

1902 .

_ 27,114,103

10,588,250

421,688,000

1901 .

_ 27,220,414

9,582,520

438,015,000

1900 .

_ 25,758,139

10,102,102

494,568,000

1890 .

_ 20,809,000

8,652,597

430,380,000

1880 .

_ 15,475,000

6,605,750

356,525,000

1870 .

_ 9,985,000

4,352,317

299,850,000

1860 .

…. No Data

3,849,469

238,706,000

1850 .

u a

2,454,442

123,557,000

1840 .

u u

1,634,954

61,196,000

1830 .

U (t

1,038,847

34,365,000

1820 .

U i(

647,482

25,737,000

1810 .

u u

269,360

12,401,000

1800 .

u • u

210,526

21,120,000

Domestic

con¬

sumption

Exports

Stocks on hand

Average

net

Average price of middling

running

running

close of

weight

per lb.,

bales

bales

the year

of bales

New York

7,658,207

5,739,009

2,724,800

490

18.41

7,278,529

6,191,110

1,670,570

480

11.2

6,009,207

8,544,563

1,784,919

485

7.3

5,884,733

8,914,839

896,617

484

12.5

5,786,330

8,800,966

870,280

486

11.5

5,367,583

10,681,758

906 , 239

483

9.6

4,704,978

7,781,414

832 , 840

480

14.0

4,798,953

6,339,028

506 , 808

475

14.3

5,240,719

8,574,024

576,488

484

9.2

4,539,090

7,573,349

641,874

480

11.5

4,984,936

8,503,265

497 , 829

489

10.0

4,909,279

6,763,041

668 , 668

482

10.9

4,445,650

8,768,125

657,747

478

8.7

3,963,981

6,109,755

111,799

480

12.2

4,160,961

6,765,953

162,040

481

8.2

3,988,501

6,715,793

163,586

489

8.1

3,588,501

6,639,931

239 , 324

480

9.3

2,632,023

5 , 783 , 101

228,684

473

8.6

1,938,937

4,589,346

218,043

460

11.3

1 , 1 10,196

3,169,009

144,290

442

17.0

843,740

3,127,568

83,127

477

13.0

485,614

1,988,710

128,304

416

12.1

297,288

1,313,500

72,479

394

9.5

182,142

773,000

119,000

341

9.7

142,200

449,257

No Data

278

14.3

57,239

208,950

U U

297

15.5

39,474

91,716

u u

228

44.0

on the western coast to the farthest confines of Assam and Burmah where they unite with China and Siam in the East. The sections of India where the bulk of the crop is raised em¬ brace four principal cotton regions : the valley of the Ganges, the Deccan, western India and southern India.

Although the area devoted to cotton in re¬ cent years is immense — 25,000,000 acres in 1914, or more than two-thirds of the American area — yet the yield per acre is barely one-third of the average yield in the Southern States, that of India being 80-85 pounds compared with 185— 190 pounds in this country. There are plenty of good cotton lands throughout the empire, but their fertility is exhausted from many cen¬ turies of cultivation. Fertilizers are never used and cotton is cultivated pretty much as it was a thousand years ago in the most primitive man¬ ner. Both the soil and climatic conditions in the several cotton-growing provinces vary more than in any other cotton country of importance. In some sections the rainfall is abundant, while in others it is so light as to necessitate irriga¬ tion. Nor are the seasons uniform, but vary considerably in the different sections ; for in¬ stance, while cotton is being harvested in the northern provinces, in the extreme south the seed are being planted, and such is the variance of the seasons that cotton picking is going on somewhere in almost every month of the year. Thus, in the Bengals and Sindh the usual date of planting is from the middle to the end of June; picking begins in September and Octo¬ ber and ends in December and January. In the Coompta and Dharwar districts planting time is from the middle to the end of August, while picking begins in February and March and ends in May and June. In the extreme South — the Madras presidency — planting be¬ gins in October and November which picking begins in April and usually ends during the month of June.

The native cottons of India have a very short, coarse fibre, from one-half to three-quarters of an inch staple, and are used in the manufacture of very low counts of yarn. There are, however, some varieties such as Hing-hunghat from the Central provinces, Oomras from Berars in central India, Dhollerars from the Bombay presidency

and Tinnevellys from the Madras presidency, the staples of which run from three-quarters to one and one-eighth inches and are used in turning out counts or numbers of yarn 24s and below, usually for weft or filling.

Although India has for centuries produced large quantities of cotton, from which the most beautiful and delicate fabrics were woven and sent to all parts of the world, it was not until the cotton famine brought about by the Civil War, 1861-65, that its raw product began to assume commercial importance. Prior to this period the average annual exports of raw cot¬ ton amounted to about 600,000 bales of 500 pounds ; since then the exports have gradually increased until now fully 2,000,000 bales (of 500 pounds) are shipped annually from Bom¬ bay and other ports to foreign countries. In the distribution of the crop Great Britain takes about 2J4 per cent, Japan and China 24 per cent, *the continent of Europe 31 per cent, domestic manufacturing establishments 35 per cent and domestic hand machines 7ˆ4 per cent.

The following table will give an idea of the progress made in the cotton industry in British India 1870-1907. (The largely reduced acreage in 1915 was the result of the European War) :

cotton production (000’s omitted).

Domestic

consump-Exports

Area

In 500

Yield

tion (500

(500 lb.

Year

planted

lb. bales per acre

lb. bales)

bales)

1916-17 _

21.212

3,418

80

1,723

1 ,328

1915-16 _

17,976

3,025

85

1,786

1,973

1914-15 _

24,632

4,186

85

1,648

1,762

1913-14 _

25,020

4,052

81

1,723

2,845

1912-13 _

22,028

3,688

84

1,677

1,717

1911-12… .

21,615

2,630

59

1,640

1,462.

1900-01 ….

14,231

2,163

76

1,412

1,430

1895-96 _

16,362

2,078

64

1,457

1,158

1890-91 ….

16,546

2,580

78

1,274

1,048

1885-86… .

13,562

1,675

62

858

958

1880-81 ….

11,205

1,342

60

633

1,038

1875-76… .

11,675

1,305

56

490

1,045

1870-71 _

1,274

425

1,180

Note. — The Indian government's figures (converted into 500 lb. bales) have been used in the above table. It is a recognized fact, however, that the government's crop esti¬ mates are usually much smaller than the combined exports and domestic consumption. The East India bale averages about 400 pounds, but for comparative purposes they have been converted into bales of 500 pounds.

Egypt. — -As is true of East India and other Eastern countries, cotton was grown in Egypt at a time antedating all historical records. It is now cultivated all along the Nile, from the Soudan to the Delta of this wonderful stream, but the rainfall is so light that no crops can be grown without irrigation, and the Nile is the only source of water supply. Irrigation works known as the ˆBarrageˆ a few miles north of Cairo were completed in 1863. In 1898 the gov¬ ernment began the construction of two great dams across the Nile, one near Assuam and the other at Assiout. They were completed by 1906 and as a result the cotton acreage has increased by about 25 per cent. The area in the Delta country, however, has about reached its limit, and any increase hereafter must be looked for in the Soudan and the Upper Nile country. For hundreds of years a low grade cotton had been produced from the native plant and used in domestic manufactures, but a great impetus was given to the industry in 1821, when a new variety of seed was introduced from Abyssinia, and, again, cotton culture was still more greatly stimulated by the cotton famine caused by the American Civil War.

Egyptian cotton has a long, strong, silky staple from one and one-eighth to one and five-eighth inches in length, and in quality and value ranks next to our better grades of Sea Island which range from one and one-half to two and one-half inches in length. The best known varieties of Egyptian are classified as Mitafifi, Abassi, Joannovich, Ashmouni, Nubari, Sakellaridis and Afif Assil. About 18 per cent of the cotton area is devoted to the Mitafifi variety, 19}4 per cent to Ashmouni, which is grown in Upper Egypt, 9 per cent to Nubari, about 46 per cent to Sakellaridis, and 7j4 per cent to other varieties. The Sakellaridis, grown in Lower Egypt, is of recent origin and is con¬ sidered almost as valuable as Sea Island. It is described as very clean and white, very lustrous, free from neps, the staple being fully one and five-eighths inches in length. Egyptian cotton is especially adapted for making sewing thread, fine underwear and hosiery, and for mercerising and other processes that give a

high silky finish to cloths. Its capacity for taking dyes makes it valuable for mixing with silk and for filling sateens, India linens and similar highly finished goods. The brown color of the Mitafifi adapts it for use without dyeing in making balbriggan underwear and lace curtains in which the ecru shade is desired.

Preparations for planting the crop begin in February and March, and planting is carried on during March and April. Picking begins in September and is usually completed during the early part of December. To prevent the hibernation of boll-worms the law requires all cotton plants to be removed from the land be¬ fore 1 January. Ginning is usually done at ginning establishments at interior towns, most of which are owned by cotton merchants and large exporting houses. The bales are packed by hydraulic pressure and average about 750 pounds each, but before being exported are rebaled and steam compressed at Alexandria.

As there are no cotton manufacturing es¬ tablishments in Egypt practically the whole of the crop is exported. In the distribution of the crop for consumption in normal times Great Britain takes about 38.5 per cent, the United States 22 per cent, Germany 11 per cent, France 8.5 per cent, Russia 7.5 per cent, Austria 3.5 per cent, Switzerland 2.5 per cent and various other countries the remaining 6.5 per cent.

In the decade 1870-80 the crop averaged about 430.000 bales (500 lbs.) annually, in the decade 1880-90 the average increased to about 560,000. Since the latter period the crops have increased as more lands were brought under irrigation. By a government decree the cotton area in 1915 was considerably reduced on ac¬ count of the European War. The following table will show the progress of the industry since the completion of the irrigation works.

COTTON STATISTICS FOR EGYPT, 1895-1915.

Production

Average

Acres Bales per acre

Year planted (500 lbs.) (lbs.)

1917-18 . 1,677,000 No data .

1916-17 . 1,655,000 1,158,000 350

1915-16 . 1,186,000 1,092,000 460

1914-15 . 1,822,000 1,384,000 380

1913-14 . 1,789,000 1,496,000 418

1912-13 . 1,787,000 1,492,000 417

1911-12 . 1,776,000 1,463,000 412

1910-11 . 1,664,000 1,506,000 453

1905-06 . 1,626,000 1,181,000 363

1900-01 . 1,277,000 1,077,000 422

1895_96 . 1,015,000 1,041,000 513

Russia. — Cotton production in the Trans-Caspia and the Trans-Caucasia has attained great importance since the occupation of that territory by Russia, so that now instead of de¬ pending upon the United States for its supply of cotton its own domains supply its mills with fully 60 per cent of the needed raw ma¬ terial. The great bulk of the crop is grown in Turkestan.

Cotton is grown in most of the river valleys, but its cultivation is limited to localities adapted to irrigation, as the climate is dry, very hot, with mild winters, and scarcely any rainfall during the crop-growing season. Some of the irrigation works were built centuries ago, but the Russian government has offered such en¬ couragement to cotton culture that over 2,000,- 000 acres have been brought under irriga¬ tion, with the probability of this being consid¬ erably increased. Experiments have been made with a number of imported seeds, but the Up¬ land American have given the best results and a

large proportion of the present growth is either of American varieties, or varieties de¬ veloped from this seed. The staple is about an inch in length, of a smooth good color and clean. The indigenous varieties are about an inch staple, of good color, but rough. In 1890 the cotton crop of Asiatic Russia so far as known had never exceeded 150,000 bales (of 500 lbs.), but in 25 years, owing to the build¬ ing of irrigation works and the extraordinary duty imposed upon foreign cotton (amounting to $2.06 per 36.1 pounds), the production in¬ creased to 1,387,000 bales, or 825 per cent. Rus¬ sian cotton manufacturers are said to believe that it is possible to meet the full requirements of the Russian industry with cotton of domes¬ tic production, and that produced by countries under Russia's economic influence. Recent sur¬ veys have shown that enormous areas of land well suited for cotton could be irrigated in the lower basin of the Amu-Daria River.

The average weight of bales in central Asia is about 300 pounds, and in the Caucasus 350 pounds. The ginning and baling is performed practically in 'the same manner as in America. The bales are covered with heavy jute wrapper, held in place by four wires, thus guaranteeing the proper protection of the bales.

The following table shows the area planted in cotton and the production (reduced to bales of 500 lbs.) for four seasons in each of the provinces of central Asia and Trans-Caucasia:

RUSSIAN COTTON ACREAGE AND PRODUCTION (000's OMITTED).

Provinces Central Asia

Acreage

- s - : , - 1

Production (500 lb. bales)

1915-16

1914-15

1913-14

1912-13

1915-16

1914-15

1913-14

1912-13

Ferghana .

908

776

739

722

668

591

549

502

Samarkhand .

150

96

85

77

112

93

69

58

Sir-Dari a .

200

199

182

183

104

93

81

70

Bokhara .

273

178

178

} 221

/ 187

171

105

89

Khiva .

120

70

70

\ 101

92

50

38

Trans-Caspia .

155

152

123

89

90

82

63

70

Total .

1,806

1,471

1,377

1,292

1,262

1,122

917

827

Trans-Caucasia

Erivan .

97

108

102

109

45

52

50

50

Elizabethpol .

129

143

135

144

43

48

47

48

Baku .

52

75

54

64

29

32

12

10

Tiflis .

13

15

13

14

6

7

4

4

Kutais .

5

5

5

7

2

2

1

1

Total .

296

346

309

338

125

141

114

113

Grand total .

2,102

1,817

1,686

1,630

1,387

1,141

1,031

940

China.— There are no records showing how largely cotton has been cultivated in China, but it is known that about 1300 a.d. the native fibre began to be extensively used. Since that period its growth and manufacture have reached im¬ mense proportions. The Chinese keep no sta¬ tistics whatever, and it was not until very recently that any information could be obtained as to the amount of cotton produced. About 1895 the crop of China (including its de¬ pendency, Korea) was estimated at 1,600,000 bales of 400 pounds each. Recently, the Min¬ istry of Agriculture of the Republic has esti¬ mated -the annual production for the years 1909, 1910 and 1911 at 4,181,333 bales of 500 pounds each. The suppression of the opium trade, the rapid development of the cotton mill industry and high prices for the raw material have undoubtedly stimulated production in re¬ cent years.

The Chinese method of cultivation is very primitive. After the ground is plowed in March the seed are sown broadcast, and in¬ consequence the plants grow up thickly and are so poorly developed that the bolls are small and the yield light. Some planting is done in hills or ridges, but this is carried on only to a lim¬ ited extent. The staple of the Chinese cotton is short, averaging from one-half to three-fourths of an inch, is rough, but very clean. There are no extensive farms, most of the cotton being grown on patches and small tracts of one or two acres. The old Hindu churcka is generally used for separating the seed from the lint, and the spindle and hand loom for domestic manu¬ factures, though modern cotton factories are now consuming more than a ‘half million bales.

In 1906 the exports of cotton from China amounted to 205,000 bales (of 500 lbs.), in 1910 to 333,000 bales, and in 1915 to 142,000. The great bulk of the exports are shipped to Japan. An estimate from a reliable source places the amount of Chinese cotton from the crop of 1914 which entered into commercial channels at 1,750,000 bales of 500 pounds each.

Brazil. — Cotton is indigenous to the country, but its cultivation received comparatively little attention until the shortage caused by the American Civil War greatly increased the de¬ mand for all kinds

of cotton. Fields of cotton, such as are to be seen in the United States and other countries, are unknown in Brazil. In the preparation of the soil all the planter has to do is to clean the land and plant the seed at the proper season. There is no breaking up the land, no preparation of the soil, no laying out of furrows and no cultivation except an occa¬ sional chopping out of weeds with the hoe. As a rule cotton is grown by the small farmer, who has little or no capital, in the most primi¬ tive and haphazard manner in connection with other crops. Several varieties are cultivated, the native tree cotton, which grows 7 to 10 feet high and bears well for two or three years, also several kinds of shrub cotton bearing only once a year. One of the latter varieties is from American seed. The lint is separated from the seed with the common hand roller gin, though the saw gin is used in some sections. A rude hand screw is used for packing the cotton in bales averaging about 280 pounds each. The staple of Brazilian cotton is from 1 to 1 inches, is harsh, wiry, clean, creamy colored,

and is good for making warp yarns for sizing. The principal states in which cotton is grown are Pernambuco, Ceara, Parahyba, Alagoas and Maranhao. The states of largest production are Pernambuco and Parahyba. In 1859-60 the cotton crop of Brazil amounted to about 70,000 bales, and in 1893-94 to 300,000. The crop of 1910—1 1 was 280,000 bales of 500 pounds each, that of 1912-13, 315,000, and that of 1914, the largest crop on record, 440,000. The larges) amount of cotton exported in any one year was 346,000 bales in 1872. In recent years the ex¬ ports have greatly decreased, owing to the in¬ creased consumption by domestic mills, which now consume about 80 per cent of the cotton crop. The possibilities of cotton production are said to be very great — in fact, that there is a sufficient amount of available land to produce 40,000,000 bales, allowing a yield of only 100 pounds to the acre.

Mexico. — Cotton is indigenous to this country, and though it was of the first import¬ ance before the Spanish conquest, there is now less cotton produced than under the Aztec monarchy, notwithstanding the fact that modern spinning mills not only consume all of the native product, but draw upon the United States for additional supplies. Cotton is grown in all the states along the two oceans and in the interior states of Chihuahua, Coahuila, Durango and Nuevo Leon. The famous Laguna district in Coahuila, with its rich alluvial deposits along the Nazas River from which the lands are irri¬ gated, produces the largest crop. In this district it is the custom to replant every seventh year, though some planters gather cotton from plants 10 to 20

years old. The staple of Mexican cotton is about one inch in length and of a superior quality, particularly that of Vera Cruz, but the finest cotton, one and one-half inch staple, is grown at Acapulco in the state of Guerrero. The normal crop of Mexico is about 200,000 bales of 500 pounds each, but owing to the revolutionary uprisings in recent years the production has been gradually decreasing. The crop of 1913-14 is estimated at 150, 000 bales, that of 1914-15 at 125,000, and that of 1915-16 at only 100,000. It has been officially stated that Mexico contains at least 8,000,- 000 acres that are particularly adapted to cotton culture.

Peru. — In Peru, as to nearly all Central and South American countries, the cotton plant is indigenous. The principal producing districts are located near the coast, and are irrigated by canals connected with the waters of the Andes. The soil is very fertile and yields from 325 to 500 pounds of clean cotton to the acre. The plant is perennial, growing from 10 to 15 feet high, and under favorable conditions will bear two crops for a number of years. Plants have been known to yield for 30 years, though the average fruit-bearing period is seven or eight years. The fibre is long, from 1J4 to 1ˆ4 inches, strong, rough, spiral shaped and admirably suited for mixing with wool, giving strength, lustre and finish to goods in which it is used, and is especially adapted for underwear and hosiery. While the production of cotton is comparatively small, it has increased rapidly in recent years. In 1892 the crop amounted to only 36,500 bales of 500 pounds each, and in 1809 to 107,316 bales. The production in 1913-14 was

176,000 bales, in 1914-15 152,000, and in 1915-16 160,000. The domestic mills consume about 12,000 bales annually in the manufacture of a coarse grade of cloth.

Turkey. — The principal cotton-growing regions of Turkey are on the Cicilian Plains in Adana, the Aidin district in Smyrna and other districts in Armenia, Palestine and Mesopo¬ tamia. During the cotton famine period, 1860-65, high prices stimulated production and as much as 240,000 bales (weight of bales un¬ known) were exported in

1865. Following the decline in prices the crops produced from 1870 to 1895 were small and of little commercial im¬ portance. A new impetus was given to cotton culture after 1895 and by 1912 the production reached 200,000 bales. The crop of 1914 — 15 was 195,000 bales, and that of 1915-16, 155,000. The largest crop, about 100,000 bales, is produced in Adana. (The weight of the bales differs so much in the various districts that no uniform weight can be given. The above figures are therefore in running bales).

Persia. — The cotton plant is said to be in¬ digenous to this country, and thrives in almost any section where the soil is favorable and suffi¬ cient water can be procured for irrigation. The method of cultivation is of the simplest, and has continued almost unchanged from early times. Planting begins early in April and continues during the month. Harvesting begins the latter part of September and is finished by No¬ vember. The lint is separated from the seed with the ancient hand-roller machine, while the bales are pressed by the feet and hands into packages varying from 100 to 220 pounds. The staple is a bright creamy color, strong and from f to 1XV inches in length. The product of the central, southern and south¬ eastern provinces is exported mostly to India, and that of the north, northwest and northeast to Russia. The latest available statistics place the Persian crop at 140,000 bales.

Bibliography. — Hohnel, (t)ber die Baumwolle) (Vienna 1893) ; Schulze-Gaevernitz,(Der Grosstrieb: ein wirtschaftlicher und socialer Fortschritt : eine Studie auf dem Gebiete der Baumwollindustrie) (1892, translated into Eng¬ lish as (The Cotton Trade in England and on the Continent); Supf, (German Colonial Re¬ ports, 1900-08) (Berlin 1909) ; Passon, (Die Kultur der Baumwollstande) (Stuttgart 1910) ; Zimmerman, (Anleitung fur die Baumwollkultur in den Kolonien) (Berlin 1910) ; Banks, (A Short Sketch of the Cotton Trade of Preston for the Last Sixty-seven Years) (1835) ; Wheeler, (Manchester: Its Political, Social and Commercial History, Ancient and Modern* (1836) ; Ashworth, Cotton, Its Cultivation, Manufacture and Uses) (Manchester 1858) ; Mallet, (Cotton: The Chemical, Geological and Meteoroligical Conditions for Its Successful Cultivation (London 1862) ; Ellison, (Cotton Trade of Great Britain (London 1898) ; Chap¬ man, (The Lancashire Cotton Industry) (1904) ; (Cotton Industry and Trade) (1905) ; Besso, (The Cotton' Industry in Switzerland, Vorarl-berg and Italy) (1910) ; Todaro, (Relazione sulla cultura dei contoni in ItalieURome 1878) ; Lecompte, (Le coton: monographic sur culture, histoire economique* (Paris 1900) ; Henry, (Le coton dans l'Afrique Occidentale Frangaise* (Paris 1906) ; Roux. (La production du coton

en Egypte* (Paris 1908), and the census reports of the various countries.

James L. Watkins, Cotton Statistician, New York City.

COTTON EXCHANGES. See Cotton Growing in the United States.

COTTON FAMINE, the destitution

caused by the outbreak of the American Civil War (1861-65) in the English cotton manufac¬ turing districts, especially in Lancashire. The cotton supply failed on account of the blockade of the Southern ports of the United States, and in consequence the mill-owners finally closed their mills entirely, nearly 2,000,000 of people being reduced to great distress. A Cot¬ ton District Relief Fund was started, and a Relief Act passed by Parliament, by which loans were granted to the guardians of the poor for the purpose of instituting relief works. In 1863, in the midst of the war, three shiploads of provisions and supplies were sent to England from New York. Gradually the difficulties were overcome, and by June 1865 the distress was at an end, greatly increased supplies of cotton having been received from Brazil, Egypt, India and elsewhere.

COTTON GINNING. See Cotton Grow¬ ing in the United States.

COTTON-GRASS, a genus (Eriophornm) of the sedge family (Cyperacece) . About 10 species are distributed in bogs and moist places throughout the northern hemisphere. The fruit of the cotton-grass is clothed at the base with a silky or cotton-like substance, which has been employed in making paper and candle-wicking, also used for stuffing pillows. The plant was formerly used for medicinal purposes.

COTTON-GUM (Nyssa aqaatica) belongs to the natural order Cornacece. Besides this species there are three others, natives of east¬ ern North America. It is a large tree, which sometimes reaches the height of 100 feet, with a circumference of four feet, abounding in deep swamps and ponds from Florida to south¬ ern Virginia and westward to Texas, Missouri and Illinois. The wood of N. aquatica is soft, though hard to split, and of a light brown, nearly white color. It is also called tupelo-gum.

COTTON INSECTS. The cotton worm and boll-worm are the chief enemies of the cotton plant in the United States ; in other countries different insects prey upon it. Vari¬ ous caterpillars and other insects

attack this plant wherever it is grown. In Egypt a noctuid larva, in Greece various kinds of cut-worms, in India a small tineid boll-worm (Depressaria) , while in Australia a red-bug, allied to the cot-ton-stainer (Dysdercus suturellus) affects it. This insect, by sucking the buds, causes the bolls to blast or become diminutive, and also stains the cotton fibre by its excrement.

The cotton worm is by far the most serious pest. It is the larva of a noctuid buff moth (Aletia xylina), which often feeds in vast num¬ bers on the leaves of the cotton-plant. Ala¬ bama argillacea is a semi-looper caterpillar, has a loping gait; is slightly hairy, green, dotted with black along a subdorsal yellowish line, with black dots beneath. The insect, as shown by Riley, ((never hibernates in either of the first three states of egg, larva, or chrysalis, and it survives the winter in the moth or imago state

only in the southern portion of the cotton belt/' (<The moth,® he adds, ((hibernates principally under the shelter of rank wire-grass in the more heavily timbered portions of the South, and begins laying its eggs (400 to 500 in number) on the ratoon cotton when this is only an inch or two high.® The localities where it hiber¬ nates, and where, consequently, the earliest worms appear, seem to be more common in the western part of the cotton belt (Texas) than in the Atlantic cotton States. It is inferred that from this region the moths emigrate east and north, laying their eggs later than the original Texan brood, as in Alabama and Georgia. The recently hatched worms of different sizes were found late in March on ratoon cotton in south¬ ern Georgia and Florida, and in late seasons from the middle of April to the middle of May, though they do not attract the attention of planters until the middle or last of June. In midsummer the period from hatching to the time when the moth lays her eggs is less than three weeks, but in spring and late autumn twice that time may be required. There are thus in the northern cotton States at least three (<crops® or broods of caterpillars in a season, while in Texas there are at least seven annual genera¬ tions. The first generation is only local, but in Texas, says Riley, <(the third generation of worms may become, under favorable conditions, not only widespread, but disastrous, and the moths produced from them so numerous that they acquire the migrating habit. This genera¬ tion appears in southern Texas during the latter part of June, and in southern Alabama and Georgia somewhat later,® and this is the first brood which attracts general attention. When the worms are very abundant and the cotton well ((ragged,® the moths, driven by need of food and with favoring winds, migrate to dis¬ tant points, and thus spread late in summer, having been seen as far north as Massachusetts and the Great Lakes.

Another insect, destroying great numbers of cotton buds, is the boll-worm, the caterpillar of another noctuid moth (Heliothis armigera) , well known for its injuries to tomato and tobacco plants and to corn in the ear. The adult is a tawny, yellowish moth, about an inch and three-quarters across the wings, which may be seen toward evening, in summer and autumn, hovering over the cotton blooms, and

depositing a single egg in each flower ; the egg is hatched in three or four days, and the worm eats its way into the centre of the boll, causing its pre¬ mature fall ; the insect instinctively leaves the boll when it is about to fall and enters another, and finally attacks the nearly matured bolls, rendering the cotton rotten and useless. The caterpillars have 16 feet, and creep with a grad¬ ual motion, unlike the true cotton worm; they vary much in color, some being green, others brown, but all more or less spotted with black, and having a few short hairs. A single moth will lay 500 eggs, and as three broods are pro¬ duced in a year, a whole field will be very soon infested with them.

These are the greatest enemies on the cotton plantations, and the same remedies are effectual in both. The natural enemies of the cotton worms are numerous and abound in pro¬ portion as the worms are abundant. Certain kinds of ants are most efficacious in reducing their numbers, as well as ground beetles, bugs

and ichneumon flics (q.v.). The general and most practical remedies against this trouble¬ some pest are the insecticides, especially Paris green and kerosene emulsions. The dry prep¬ aration is one pound of the green to from 20 to 35 pounds of cheap flour, or, instead of flour, land plaster (gypsum) or cottonseed meal. The best preparation of Paris green consists of one pound to 40 gallons of water. London pur¬ ple may be applied dry, using two pounds to 18 of flour, *etc.* ; or wet, one-half a pound to 50 or 55 gallons of water.

A fine spray of kerosene oil applied to the leaves will kill all the worms in a remarkably short time, but as petroleum in any form in¬ jures the plant, the oil must be so diluted as to injure only the worm and not affect, the plant. The use of milk as a diluent has been suggested.

In recent years the pink cotton boll-worm, long a pest in Egypt, has invaded the United States via Mexico, where it got a footing in 1911. In the latter country it is destroying from 50 to 75 per cent of the crop. It reached the country in two shipments of Egyptian cot¬ ton seed. Every lot of seed contained the eggs of the pink boll-worm, and in two years the pest had spread throughout Mexico. It is also present in about 3,000 acres of cotton land in Galveston and Harrison counties, Tex., where the State and Federal governments are now engaged in its extermination. The Congress ap¬ propriated $500,000 for the work. The method of extermination is radical. First the cotton

stalks in the entire field are cut by a machine which covers about 22 acres per day. Then a rake goes over the field and places the stalks in rough piles. Next come handworkers who gather each little boll and piece of cotton and all other vegetation and put it on the pile. The whole is then burned, leaving a field cleared utterly of all vegetable and animal life. The moth which is the parent of the pink boll-worm is fragile and can fly no great distance. It is chiefly in the seed that it is transported, and the eggs can exist there for months. The worm damages the crop in many ways. In the field bolls fall to the ground and 50 per cent of the crop may be lost in this way. The grade of cotton is also damaged and the insect stains what cotton is produced. In addition oil pro¬ duction is lessened and the cotton seed is rendered unfit for planting and germinates poorly. Consult Journal of Agricultural Re¬ search for 4 June 1917, issued by the United States government; also Riley, (Report IV) of the United States Entomological Commis¬ sion (1885) ; and Bulletin 18 of the Entomologi¬ cal Division of the United States Department of Agriculture (1898). For cotton-boll weevil, see Weevil.

COTTON MACHINERY. Ginning ma¬ chinery is always located at or near a railway station in a cotton-growing territory. The earliest cotton gin probably dates back to the days when the market price of animal skins be¬ came so great that man had to look around for a cheaper substitute for clothes. A primitive machine called the churka is an early gin. It is used to-day by the Hindus and Chinese. It consists of two plain rollers mounted on a frame and revolved in contact. Between these rollers the cotton is drawn and torn from the seed.

In most parts of the cotton belt of the

United States the saw-gin which Eli Whitney invented in 1794 is still the machine used to gin cotton. The purpose of the machine is to separate the seeds from the fibres of the cotton. Evolution has done comparatively little to change its three essential elements, the saws, ribs and brush. These have been retained in nearly all modifications intended to meet mod¬ ern ideas, methods, means and material of con¬ struction, and improve the quality and quantity of the staple of the cotton, but thus far no machine has been invented which can excel the saw-gin in capacity. The cotton gin consists principally of a hopper in which the raw cotton is thrown. A blower-case and a rotary brush serve to guide the cotton against a cylinder which has needle-like teeth, or, in later con¬ struction, saw-teeth. These teeth catch the cotton fibre and withdraw it through openings too narrow for the seeds to follow. A seed-bar and screen remove the seeds, the dust is blown out and the separated or ginned cotton is ready to be baled. As the fibres of the cotton were found to be injured by the action of the saws, the McCarthy roller gin was introduced. It consists of a leather-covered roller to which a knife is tightly held tangentially and a moving blade that moves up and down in a plane just behind and parallel to the fixed knife. As the cotton is drawn between the rollers and the knife the seeds are forced loose by the moving blade. It works well, but its limited capacity has prevented its general introduction.

Until about 1875 the average ginning plant consisted of one gin stand having a gang of 60, 70 or 80 saws, capable of turning out from 8 to 10 500-pound bales of cotton in a day. The isolated cotton plantations did not require a greater capacity than this size of plant, and each planter did his own ginning. But after the development of the Southwest with its large areas capable of raising cotton and the large number of small farms located close together, system gins were erected at railroad stations capable of ginning for the entire neighborhood. The competition of the gins with each other required a perfection of machinery never at¬ tempted in the older portions of the cotton belt. As the development of the Southwest increased its competition with the Southeast, this latter section adopted the methods which had grown up in the former. Small plantation gins were not rebuilt as they wore out or burned, but larger gins owned by a company of planters or merchants were built at the railway stations. Thus the entire cotton handling business under¬ went a revolution, until, for economy, speed and efficiency, it ranks with the latest

machinery for handling grain crops.

The constant danger of fire which hangs over all cotton gins has caused the separation of the different buildings which go to make a complete establishment. The gin building proper is only large enough for the machinery which does the ginning ; no cotton is in the building except that which is undergoing the process of ginning. The seed house in which the seed is stored is usually located on a near-by spur of the railway. Further to avoid the risk of fire and to ensure better running of the machinery, the gins are located on a low plat¬ form three feet high. The floor of the building is brick or cement and the building is made of brick, stone or sheet iron.

The line shaft is carried directly under the gins where all of its journals are in sight; it can be easily oiled and hot-boxes instantly de¬ tected. At the end of the row of gins a higher platform is built to surround the press. Bales are taken out on this platform and can be thrown into the wagons thence without further expenditure of labor. After the mechanical processes of carrying by the exhaust fan and dropping the cotton into each gin, blowing it from the gins to the presses and its packing there by a steam tramper, the operation of put¬ ting on the bagging and tying the hoops is the first manual labor necessary after the feeding from the wagon into the telescope.

The principal machines used in a modern cotton ginning establishment, in the order in which they are used, are the telescope, the elevator, the exhaust fan, the feeder, the gin, the seed conveyer, the flue, the condenser and the press.

The telescope is an extensible tube which hangs from the inlet cotton pipe; it is counter¬ balanced and so arranged that its tube can be pulled down and kept close to the pile of cotton as it decreases in size. A pneumatic elevator is the apparatus generally used to distribute cotton to the gins. In a system using four gins each valve is open a fourth of the time and closed three-fourths. When the first air valve in the first chute is open a vacuum is formed in the chute, the outside air, carrying with it the cotton, rushes in from the telescope. The air is drawn through the screen into the fan, while the cotton strikes against the screen with enough force to take out a large part of dirt and dust, no cotton being ever allowed to get into the blades of the fan on account of the danger of fire. By shifting the valves another chute is opened and the stream of cotton and air is deflected to the second chute, and the cotton in the first dropped from the screen and into the

feeder below.

The feeder, which is over the gin, has for its object the cleaning of the seed cotton, break¬ ing up the lumps and then feeding the locks evenly and regularly into the gin. A slowly moving apron receives the cotton from the elevator and carries it to the picker wheel. This wheel, revolving with great rapidity, picks up the locks of cotton and throws them against the screen. The particles of dirt and trash go through this screen and are carried away by a helical conveyer. The cotton is rubbed over the screen and thrown on an inclined apron, which carries it into the roll boxes of the gins.

The flue which conducts the cotton from the gins is made of sheet metal and shaped like a long funnel with the larger end near the con¬ denser, which is located at the end of a flue and acts as a collector of the bunches of cotton that fly through the flue like snow and makes them into a bat or sheet of cotton. This bat of cotton drops down an incline into the press.

The press used in the square bale system of gins consists of two boxes mounted together on a turntable. Cotton from the condenser is allowed to drop into the first box and when enough cotton has been forced into it by the steam tramper, the turntable is revolved and the other box comes in its place. The loaded box comes into position over a ram where it receives the final pressure. This ram is oper¬ ated by a large direct-acting steam cylinder, a

COTTON

1 Steamer Natchez Discharging 4,000 Bales of Cotton at New Orleans

3 Cotton Scene at a Country Town

2 Cotton Market, Waco, Texas

aa *4«f

S. « £\ “S’

1 Modern warp-yarn spinning equipment

2 Weaving-room equipped with Northrup automatic looms

COTTON MACHINERY

1 Gin

2 Press

3 A Ginnery

hydraulic ram, or a screw which is raised and lowered by a revolving nut. The bales turned out by this square press usually weigh 500 pounds gross, and average 28 x 56 x 42 inches in size and thus have a density per cubic foot of about 14 pounds. They are usually shipped from the gin house to some concentrating point where they are assorted and compressed, and their size is reduced to 28 x 56 x 18 inches, giv¬ ing them a density of 30 or more pounds per cubic foot. They are then ready to be shipped to the cotton mills.

The large compressers which do this pressing are enormous machines weighing in some cases as much as 200,000 pounds, and are operated either by direct-acting steam cylinders coupled to the jaws of the press by multiplying levers, or the jaws of the press are brought together by a large link moved by hydraulic rams sitting directly over the press. The capacity of this press ranges from 800 to 1,200 bales in 10 hours. The bales while in the press are recovered and their bands are shortened to suit the reduced bulk.

Early in the present century the American Cotton Company developed a cylindrical bale, which permitted the cotton to be compressed more tightly and therefore to occupy less space in a freight car. A bat or layer of cotton is formed, rolled down very hard and wound up on itself, or rolled together under pressure and tension so that it forms a cylinder and tends to hold itself together. The square bale when compressed to more than 60 pounds to the foot required heavier bands or else it was apt to burst ; but the cylindrical bale makes use of the cotton itself to hold it in place. It is simply wound up very tightly and tied, taking very readily a pressure of 35 to 40 pounds to the cubic foot. This bale is made in a bat-forming and condensing machine, and is usually made smaller and hence considerably lighter than the so-called square bale. This cylindrical bale has the advantage that it arrives at the cotton mill conveniently protected by bagging hav¬ ing neither wires nor hoops, and there is less tear and waste; it is also cheaper to manufacture.

Carding and Combing Machinery. — The

first machine to which the cotton goes in a fac¬ tory is the bale-breaker, on which the cotton is opened and beaten. In modern practice there is less beating of cotton and more dependence on air suction to remove the dirt. Automatic feeders are now used with breakers. The breaker-lapper, after cleaning the cotton stock, converts it into a lap or roll, after which it may go to a finishing lapper. The carding machine was invented by Lewis Paul and im¬ proved by Arkwright. Modern machines are usually of the revolving flat card type. The main cylinder of about 50 inches diameter bears card-clothing or a surface of points resembling a very fine wire brush. This clothing may have from 40,000 to 90,000 points per square foot. Above and opposed to this cylinder is an end¬ less apron called a top flat, which also bears card-clothing. The cylinder and flats moving oppositely comb out or card, or render parallel, the fibres of cotton that come into the machine in the form of a lap, and the top flat removes all knots and snarls. This lap is taken up by the licker-in, a toothed cylinder that feeds or supplies the carding machine. After passing

the cards the cotton is received by the doffer or doffing cylinder.

A recent French invention is the Roth aspirator, which is applied to combers as a sub¬ stitute for the doffer or doffing combs. It is a perforated tube with a suction draft and does the work without any harsh handling of the cotton fibres. The Whitin and high-speed comber has 8 heads, takes laps 12 inches wide and has devices for reducing vibration. It runs normally at 135 nips per minute.

The cotton comes from the doffer as a fleecy strand termed a sliver. It is deposited in cans and may go to a sliver-lap machine and be formed into a lap about 15 inches in diame¬ ter and 10 or 12 inches wide. This lap may go to the ribbon lap machine, which doubles four laps into one, the object being to obtain greater evenness from the repeated doublings and drawings out, and paralleling of the fibres. The laps from the ribbon lap machine are placed on the comber, which doubles eight to one. A combed sliver yarn gets 640 extra doublings and is smoother and more lustrous as a result.

Drawing, Roving and Twisting. — The drawing frame receives the sliver, and by pass¬ ing it between series of rolls at increasing speeds draws it out finer. These machines have been highly developed and are truly automatic. When the drawn slivers are slightly twisted they are termed roves or rovings. Roving machinery includes slubbers,

intermediates, fine roving frames and jack-frames. The product of the roving machine is usually delivered on bobbins and may then be termed yarn.

The Spinning Frame. — This is the machine that made Richard Arkwright famous, it being a development of the spinning jenny invented by James Hargreaves. Many other machines in the cotton industry are based on the same operating principles as the modern spin¬ ning frame. It draws out the fibres and twists the cotton yarn hard and firm and winds it on bobbins. The modern frame first passes the roving through a series of rolls that permit a variation in twist. When drawn to the required density and twist the yarn passes to the bobbins, mounted on rows of spindles that stand upright and rotate on either side of the frame. Frames run from about 112 to 352 spindles each, the 240-spindle frame being now popular. After being spun, the yarn is doubled and twisted to form thread. It may be twisted wet or dry; in wet twisting the yarn is drawn from a creel through a trough of water. In modern twist frames a wide range of twist combinations is possible for making all kinds of thread. With a builder-motion the bobbins may be wound straight, taper-top or for warp or filling. While in the yarn it is often desir¬ able to bleach, dye or mercerize the cotton.

The mule-spinner or spinning-mule, invented by Samuel Crompton, is in less use than form¬ erly. It is a combination of the drawing-rollers and jenny used in the early history of modern machine weaving. It has a carriage that travels away from the drawing rollers as the threads are twisted and comes back as the thread is wound on the bobbins. While the mule draws, stretches and twists at one operation, it is not as satisfactory as the later and more highly developed frames. The ring-spinner or ring-frame is a spinning machine in which a metal loop revolves around each spindle to carry the

thread. Spoolers and quillers are machines for winding the yarn on either spools or quills — the modern quill being simply a paper tube. See Spinning.

Weaving Looms. — These are made in al¬ most infinite variety for various purposes. The heavy-pattern loom, the wide loom and the end-cam loom are perhaps the most common. For fancy weaving the dobby loom is generally em¬ ployed. There are also special gingham looms and looms for light and heavy duck weaving, and two-, four- and six-box fancy looms. See Textiles; Weaving.

Testing Machinery. — A typical form of yarn-examining machine consists of a light hand-reel, in which a black card may be fitted to carry the wound yarn or thread. A moving guide spaces the yarn so that every strand is well separated. When wound the card of yarn may be placed under a microscope, or in the reflectorscope, which is a small box with a dark background, a mirror and an easily posi¬ tioned microscope. To test yarn for dampness the conditioning oven is employed. A sample of yarn is hung on the scale of the oven and heated. As the moisture is dried out the re¬ duced weight is registered on the scale. For strength-testing, an upright frame is provided with grips in which a number of leas of thread or yarn may be broken at one operation. If four leas are strained by the reel at one time, and the dial shows they break at 88 pounds, it follows that their average strength is 22 pounds. A single-thread recording tester is also manu¬ factured. The operator can run through a sample, breaking it a dozen times, and follow this with other samples, and withdraw a card on which are recorded the breaking strains of each break of each sample. The average strength as well as the greatest weakness of a lot of thread is thus readily obtained. There are several forms of twist-testing machines and some record the contraction resulting from the twisting.

Bibliography. — Barker, A. F., <Textiles) (New York 1913) ; Miller, (American Cotton System* (Austin, Tex. 1909) ; Peake, cCotton from the Raw Material to the Finished Product (New York 1911) ; and trade papers in the textile industry.

Charles H. Cochrane, Author of (Modern Industrial Progress .*

COTTON MANUFACTURES IN THE UNITED STATES. Although cotton man¬ ufacturing is one of the oldest of the factory industries in the United States it had made but little progress until the embargo was laid upon foreign commerce during Jefferson's and Madi¬ son's administrations. It resulted in a remark¬ able development of the industry. Like all other industries it has had its periods of de¬ pression, but since that time there has not been a single decade — not excepting the Civil War period — when cotton manufacturing has not shown a substantial growth.

No statistics of the industry were collected until the taking of the Federal census in 1839. That . census showed 1,240 establishments at work, giving employment to 72,119 persons and turning out products valued at $46,350,000. The next census, 1849, returned 1,049 establishments, employing 92,286 persons, with manufactured products valued at $61,869,000, while to the

census following, 1859, there were returned 1,091 establishments giving employment to 122,028 persons and making wares valued at $115,682,000. Similar statistics collected decen¬ nially by the census (also for 1914), and in¬ cluding the capital employed, are as follows :

Census 1869:

Number of establishments . 956

Persons employed in the industry . 135,369

Capital employed . $140,706,291

V alue of products . $177,489,739

Census 1879:

Number of establishments . 756

Persons employed in the industry . 172,544

Capital employed . $208 , 280 , 346

Value of products … $192,090, 110

Census 1889:

Number of establishments . 905

Persons employed in the industry . 218,876

Capital employed . $354 , 020 , 843

Value of products . $267,981 ,724

Census 1899:

Number of establishments . 1 , 055

Persons employed in the industry . 308,237

Capital employed . $46 7,240,157

Value of products . $339,200,320

Census 1909:

Number of establishments . 1 ,324

Persons employed in the industry . 387,771

Capital employed . $822 , 237 , 529

Value of products . $628,391 ,813

Census 1914:

Number of establishments . 1 ,325

Persons employed in the industry . 797,315

Capital employed . $899,764,682

Value of products . $701,300,933

In addition to the value of the products in 1914, cotton goods to the value of $6,538,000 were produced by establishments engaged pri¬ marily in other lines of industry.

As measured by the amount of capital em¬ ployed, and as indicating the progress made, the percentage increase in each decennial period is as follows : 1869-79, 48 per cent ; 1879-89, 70 per cent ; 1889-99, 32 per cent ; 1899-1909, 76 per cent, and for six-year period 1909-14 9j4 per cent.

The number of spindles engaged in the pro¬ duction of yarn is another and more accurate method of measuring the growth of the cotton industry. Thus, taking the same decennial periods as above, and the seven-year period 1909-15, the following figures indicate the progress made in the United States, as well as in the cotton-growing States, New England and all other States.

All other

United States Cotton States New England States

1869-70 7,132,000 328,000 5,498,000 1,306,000

1879-80 10,653,000 561,000 8,632,000 1,460,000

1889-90 14,384,000 1,570,000 10,934,000 1,880,000

1899-00 19,472,000 4,368,000 13,171,000 1,933,000

1909-10 28,018,000 10,429,000 15,592,000 1,997,000

1915-16 32,806,000 13,382,000 17,474,000 1,950,000

1916-17 33,889,000 14,156,000 17,761,000 1,972,000

Beginning with 1869 the increase in the num¬ ber of spindles the first decade, 1869-79, was 3,521,000 or 49.4 per cent; the second, 1879-ˆ89, 3,731,000 or 35 per cent; the third, 1889-99, 5,088,000 or 34.4 per cent ; the fourth, 1899-1909, 8,546,000 or 44 per cent, and for the pe¬ riod 1909—15, 4,788,000 or 17 per cent. In addi¬ tion to the above number of spindles, there were approximately 500,000 that used raw cot¬ ton mixed with other fibres in the manufacture of woolen goods, hosiery and knit goods.

The above figures show that within the past 16 years, or since 1900, the number of spindles in the United States has increased 14,417,000 or 77.4 per cent. But the most striking feature in

the progress of this industry is the remarkable increase in the number

of spindles in the cotton¬ growing States. In 1900 these States operated only 4,368,000 spindles, as compared with 13,- 171,000 in the New England States and 1,933,000 in all other States. By 1916 they had added 9,788,000 spindles, an increase of 224 per cent, compared with 4,590,000 for New England, an increase of about 34.8 per cent, while in all other States there was an increase of only 17,000 spindles or less than 1 per cent.

The following table gives the number of mills, the number of spindles operated, and the quantity of domestic and foreign cotton con¬ sumed in each State, and the United States, during the season 1915-16.

great strength. Rough Peruvian cotton is used for mixing with wool in making woolen tex¬ tiles, while the Indian, Chinese and other im¬ ported cottons are, to a limited extent, used for mixing with American upland for making the cheaper grade of goods.

The very short staple fibre delinted from the seed by the cotton-oil mills, and known as Winters,® is used for various purposes, such as upholstering and in the manufacture of mat¬ tresses, comforts, batting, cushions, wadding and pads; for mixing with shoddy and for making low grade yarns, wrapping twine, cheap rope, lamp and candle wicks; for making ab¬ sorbent cotton ; and in the manufacture of gun cotton, nitre powder and writing paper. The

Mills, Spindles and Consumption of Domestic and Foreign Cotton, 1915-16.

Number of bales consumed

State

Number

of

Number of spindles

Domestic

mills

Lint

Lintars

Foreign

Alabama .

60

1,111,660

346,185

6,032

48

Connecticut .

98

1,343,573

124,755

28,661

19,827

Georgia .

148

2,259,855

789,255

17,602

8,534

Illinois .

27

56,568

12,914

10,070

93

Indiana .

13

86,044

18,469

7,200

40

Kentucky .

14

87,944

25,569

873

Louisiana .

4

59,563

1,090,006

30,508

188,751

630

Maine .

19

179

4,783

Maryland .

27

147,009

85 , 503

883

11

Massachusetts .

Mississinni .

308

19

10,896,774

123,794

1,274,297

35,542

58,960

188,591

New Hampshire .

27

1,455,282

282,157

12,509

New Jersey .

70

479,873

42 , 590

54,488

20,074

New York .

147

906,911

235,068

18,532

3,680

North Carolina .

325

3,988,098

1,061,150

6,272

6,138

Pennsylvania .

296

249,053

43,744

41,448

5,459

Rhndp Island .

148

2,552,765

234,014

45,219

South Carolina .

162

4,735,193

914,506

4,706

26

Tennessee .

22

319,148

98,627

25,566

80

Texas .

25

116,012

59,063

9,705

118

V prm on t. .

3

135,864

12,922

901

Virginia .

14

506,166

112,395

1

All other States .

United States:

122

93,728

52,634

589,109

863

1916 .

2,098

32,805,883

6,080,618

880,916

316,995

1910 .

1,324

29,188,945

4,798,953

177,211

155,774

All of the New England States — except Vermont — the two Carolinas, Georgia and Alabama operated more than 1,000,000 spindles, Massachusetts being in the lead, followed in the order named by South Carolina, North Carolina, Rhode Island, Georgia, New Hamp¬ shire, Connecticut, Maine and Alabama. Massa¬ chusetts is also the largest consumer of raw cotton, North Carolina coming next, followed by South Carolina, Georgia and Alabama. As indicated by the increase in spindles, the largest increase in the annual consumption of

cotton is in the cotton-growing States, the increase since 1910 amounting to 1,338,000 bales, or about 60 per cent, while the increase in New England since 1910 is 483,000 bales or about 24 per cent.

All of the cotton consumed in the United States is of domestic growth — except from 250,000 to 300,000 bales imported from other countries. Nearly 84 per cent of the foreign cotton is Egyptian, the remainder coming from China, Peru, East India and Mexico. The Egyptian cotton is used mainly for mercerizing and making highly finished cloths, balbriggan underwear, and lace curtains, sewing threads, and similar goods requiring a long fibre and

unprecedented consumption of Winters® in 1915-lb, amounting to 880,916 bales, or an increase of nearly 114 per cent over the previous year, is explained through the great quantity of ex¬ plosives manufactured for the Allied nations engaged in the European War.

The cotton manufacturing establishments in the United States turn out a great variety of products. Indeed, American ingenuity is con¬ stantly finding new uses for cotton, the most wonderful of all fibres. A classification of the cotton mill products for 1915 shows that of the 2,098 establishments in the United States, 1,069 of them manufactured almost every known variety of yarns from the coarsest to the finest, many of these also manufacturing cotton goods. The number of establishments making the dif¬ ferent kinds of wares may be classified as fol¬ lows : 296 manufacturing sheeting, shirting and drills, 107 colored cotton goods, 97 print cloths, 89 fancy white goods, 86 duck, 86 cotton twine, 81 fine white goods, 81 cotton cordage, 76 cotton webbing, 73 cotton braid, 65 cotton towels, 59 converters' goods, 57 cotton batting, 57 cotton tape, 54 ticking, 52 satteens, 43 cotton uphol¬ stery goods, 42 ginghams, 39 cotton felts, 36 cotton lace, 33 cotton flannel, 31 shoe laces, 31

denims, 30 cotton damask, 30 cotton bagging, 29 cotton plush, 23 cotton hammocks, 22 bed spreads, 19 cotton hair clothes, 17 cotton wicks, 16 cotton comforts, 16 absorbent cotton, 13 mosquito netting, 12 shade cloths, 11 cottonades, 11 tire fabrics, 10 book cloths, 8 crinoline, 6 cotton blankets. Besides these 1,893 establish¬ ments were engaged in the manufacture of hosiery and various kinds of knit goods.

According to the latest census statistics (1914) the total capital employed in cotton manufactures amounted to $899,765,000, of which $358,856,000 was invested in the cotton States, and $540,908,000 in all other States. The total value of all goods manufactured was $701,301,000 the products of the Southern mills representing $283,189,000 in value, and those of all other States $418,111,000.

The value of the cotton goods of domestic manufacture exported during the fiscal year 1914 amounted to $51,467,000, which was an increase of $27,067,000, or nearly 121 per cent since 1900. More than one-half of the value of the exports in 1914 is accounted for by the ex¬ ports of bleached, unbleached and colored cloths, amounting to 414,860,000 square yards and valued at $28,845,000. Of the 199,887,000 square yards of unbleached cloths exported more than two-thirds went to China, the other countries in the order of the amount taken being Aden, India, Chile, Cuba, Philippine Is¬ lands, San Salvador, British East Africa, Turkey, Canada, Bolivia and Columbia. Of

the colored cloths exported the largest quan¬ tity went to the Philippine Islands, and large quantities also to the West Indies, Central and South America and Canada. Of the other cot¬ ton goods exported Canada was the largest cus¬ tomer, taking very large proportions of the clothing and other wearing apparel, and of the various other manufactures of cotton. In this connection it is worthy of notice that the value of imported cotton goods in 1914 amounted to $69,411,000, or $17,944,000 more than the value of the cotton goods exported. The largest con¬ tributor to this trade was Great Britain, its imports being valued at $23,853,000, those of Germany at $17,618,000, France at $14,836,000, Switzerland at $10,335,000, Japan at $1,007,000, and

all other countries at $1,759,000.

The value of cotton manufactures exported from the United States in the three years of war (1914-17) is one-half as much as in the 20 years before the war. A recent compilation shows that the value of cotton cloths alone exported in the fiscal year ended 30 June 1917 is nearly three times as much, knit goods seven times as much and cotton yarn eight times as much as in the fiscal year 1914. The quantity of cotton cloths exported in the fiscal year 1917 exceeds that of any earlier year except the fiscal year 1906, when the demand of China at the close of the Russo-Japanese War was ex¬ ceptionally heavy. Even in cotton laces, of which the export value has been extremely small, the total for 1917 exceeds $1,000,000

THE world's COTTON MILLS. Compiled from the latest available statistics

< Country

Number of mills

Number of spindles

Number of looms

Number of bales consumed

Number of persons employed

Great Britain .

2,008

59,811,222

808 , 796

3,973,729

655,000

United States .

2,098

32,840,730

719,358

7,278,529

797,315

Canada .

67

1,396,937

32,211

195,992

18,794

Germany .

372

10,162,872

230,200

1,979,958

375,000

Russia . .

99

7,665,654

213,179

1,400, 000

370,000

Russia, Poland .

38

1,322,257

31,000

325,000

50 , 000

Russia, Finland .

6

236,890

5,741

30 , 000

6 , 850

France .

430

7,400,000

108,000

1,120,000

160,570

Austria-Hungary .

160

4,941,320

170,000

842,591

175,000

Switzerland .

. 64

1,407,110

21 ,874

110,000

21,000

Italy .

480

4,600,000

140,000

850 , 000

170,000

Spain .

263

2,250,000

55 , 000

435 , 000

75,000

Portugal .

35

428 , 000

12,000

80 , 000

28,000

Belgium .

53

1,775,000

24,000

250,000

11,000

Holland .

65

606,646

39 , 800

105,000

25 , 000

Sweden .

49

461,764

12,442

120,000

11,810

Norway .

13

84,530

2,717

15,260

2,888

Denmark .

5

88 , 700

4,350

27,500

1,150

Bulgaria .

5

19,539

350

5,000

632

Turkey* .

10

71,574

73,898

40 , 800 23,250

2,054

3,503

Greece .

19

1,160

Egypt .

1

20,000

525

7,000

550

Asia Minor .

7

41 ,000 6,848,744

47 , 400 2,102,632

3,030

263,346

East India .

272

108,009

China .

34

1,029,218

3,162,832

4,755

30,068

525,000

1,616,312

Japan .

161

119,751

Indo-China . .

5

700,000

500

27,000

3,000

Philippines .

2

7,740

352

1,560

300

Brazil .

171

1,520,000

5 , 000

330,000

106,200

Argentina .

6

9,000

5,000

52,250

20,000

5,000

19,000

1,200

400

1,750

941

200

1,600

454

Chile .

3

Peru .

7

12,600

3,520

Colombia .

Ecuador .

9

4

2,591

Venezuela .

4

500

6,216

1,800

Guatemala .

1

8,000

250

2,000

550

Mexico .

139

762,149

27,019

160,000

34,500

Total .

7,165

151,854,576

2,813,647

24,048,849

3,198,238

* Includes Cyprus, one mill with 1,574 spindles.

COTTON MANUFACTURES IN THE UNITED STATES

83

EXPORTS FROM THE UNITED STATES OF COTTON GOODS OF DOMESTIC MANUFACTURE.

(000’s omitted)

Twelve months ending June —

Cotton Goods

1914

1915

1916

1917

Quantity,

yards

Value

dollars

Quantity

yards

Value,

dollars

Quantity,

yards

Value,

dollars

Quantity,

yards

Value,

dollars

Unbleached cloths .

199,887

13,838

157,742

12,292

176,341

17,486

155,223

16,007

Bleached cloths .

42,105

3,393

53,138

3,854

76,496

5 , 986

101,786

10,524

Colored cloths .

172,868

11,614

186,064

12,536

297,782

22,942

424,800

44,800

Knit goods .

2,547

13,080

20,861

17,708

Other clothing .

8,221

16,470

13,365

1 3 , 098

Yarn .

716

1,866

5*276

5,210

Other manufactures .

6,572

8,939

22,264

31 ,376

Cotton waste .

4,567

2 , 935

3 i 872

*49,931

5 , 940

Total .

414,860

51,468

396,944

71,972

550,619

112,052

681,809

134,279

Cloths,

Value, all

Cloths,

Value, all

Cloths,

Value, all

Cloths,

Value, all

Europe

yards

goods

yards

goods

yards

goods

yards

goods

United Kingdom .

2,387

$396

14,701

$2,979

23,687

$6, 171

5,607

$2,245

Germany .

185

22

11

1

Other Europe .

1,416

137

12,203

1,452

32,407

3,424

America

Canada .

21,805

2 , 045

25,461

2,329

55,477

5,755

76,941

9,976

Mexico .

4,053

406

6,334

521

40,448

2,874

71,253

7,425

Central America f .

36,593

2,217

30,986

1,817

43,658

2,785

69,115

5,436

Cuba .

23,599

1,590

40,684

2,672

60,639

4,362

56,390

5,538

Haiti .

22,850

1,694

10,627

758

27,544

2,048

24,811

2,316

Other West Indiest .

28,350

1,739

31,810

1,940

35,739

2,371

44,267

4,211

Brazil .

567

73

423

42

1,764

226

5,414

800

Chile .

10,253

723

6,781

455

12,211

852

25,032

2,500

Colombia .

14,571

757

14,557

711

33,562

1,877

32,140

2,581

Other South America .

16,222

1,239

14,011

998

44,184

3,729

102,868

10,769

Asia and Oceania

China § .

89,156

6,096

17,053

1,195

12,332

936

4,123

380

British India .

13,996

988

14,493

981

14,887

1,165

6,977

699

British Australasia .

8,034

922

7,589

908

15,701

1,784

13,964

1,819

Aden .

17,739

1,018

29,532

1,477

20,692

1,011

17,131

1,131

Other Asia, etc .

8,220

723

2,103

200

2,601

271

8,419

1,225

Philippine Islands ….

86,149

5,537

106,759

6,633

73,084

4,872

Africa…

8,684

518

10*818

594

-c

.

ˆPounds f Including Panama. J Including Bermuda. § Including Hong Kong. ˆ Not separately given.

against less than one-quarter of a million in 1914. Cotton wearing apparel, which prior to the war was about $10,000,000 per annum, was in the fiscal year 1917 over $30,000,000. This increase in value of cotton goods exported is not merely due to higher prices. Of cotton cloths alone, for example, the exports for the fiscal year ended 30 June 1917 are about 700,- 000,000 yards against 397,000,000 in 1915, and in the other classes of cotton manufactures there has been a gain in quantity as well as in value. In May 1917, the latest month for which details are available, the quantity of cotton cloths exported is 63,000,000 yards, against 44,000,000 in 1915. Cotton yarn also shows a large in¬ crease in exportation since the beginning of the war, having amounted in 1917 to over $5,000,000 against $716,000 in 1914. This increase has been chiefly to our neighbors at the north and south. To Canada the exports of cotton cloths alone in the fiscal year 1917 is over 75,000,000 yards against 20,000,000 in the year before the war; to Central America, 63,000,000 yards against 37,000,000 in 1914, and to South America 170,000,000 yards against 42,000,000 in 1914. To the Orient, which formerly was our best market for cotton cloths, there is a distinct fall off, due to the fact that Japan is now manufacturing cotton goods largely for her Oriental neigh¬ bors. The quantity of cotton cloths exported

from the United States to Asia in 1914 (the year before the War) was 125,000,000 yards and in 1917 but 38,000,000 yards. Even in the Phil¬ ippines, which have been our largest customer in recent years for cotton goods, the total for the fiscal year 1917 is but 83,000,000 yards against 106,000,000 yards in the fiscal year 1915. The Philippines still take more cotton cloths from the United States than does any other country, though the values are less than those of Canada, which took in the fiscal year 1917 cottons of a higher price than those of many other countries, presumably utilizing them for war

purposes. This is also true of the limited quantity of American cotton cloths taken by Great Britain. The marked fall off in the value of our ex¬ ports of cotton goods to the Orient is illus¬ trated by a comparison of figures of recent years with those at intervals since 1900. In the fiscal year 1916 the exports of cotton goods of all kinds to Asia were but $3,911,000 against $9,016,000 in 1914, $7,501,000 in 1910 and $31,- 352,000 in 1905. On the other hand the exports to Oceania show a large gain since 1900, having been in 1916 $9,455,000, in 1914 $8,730,000, in 1910 $4,187,000, and in 1900 $1,296,000. To South America the increase since the War is very large, the total for 1916 of cotton goods of all kinds being $15,336,000 against $3,785,000 in 1914, $3,347,000 in 1910 and $2,069,000 in 1900.

INTO UNITED

STATES.

Cloths, imported from —

1917

1916

1915

1914

France, sq. yds .

1 , 124,540

1,179,787

2,495,188

13,872,228

t Germany, sq. yds. .

$357,194

$332,677

$555,423

$3,704,545

62

110,729

867,123

3,813,167

Switzerland, sq. yds.

$38

$21,486

$183, 730

$837,937

2,364,316

4,209,755

3,812,836

2,157,844

United Kingdom, sq. yds .

$400,431

$671,936

$601 ,303

$373,531

59,813,670

43,275,068

36,602, 763

38,945,578

$12,810,984

$7,393,949

$5,564,934

$6,529,466

Other Europe, sq. yds .

933, 149

464,976

1,202,275

1,019,085

$188,348

$69,757

$171,986

$188,834

Other countries, sq. yds .

8,964,382

3,706,071

1,818,234

1,825,427

$1,072,825

$356,451

$208 , 945

$211,488

Embroideries, etc., from—

France .

$4,073,883

$4,963,120

$4,142,311

$8,058,399

Germany .

8,528

627,880

3,317,037

5,903,754

Switzerland .

3,030,971

6,796,509

6,190,329

9 , 295 , 500

United Kingdom .

6,621,009

7,500,749

6,096.393

9,173,768

Other Europe .

999,513

478 , 908

496,195

687,976

Other countries .

1,563,266

786,226

558,001

746,425

Knit Goods, from —

Germany . *. .

41,391

1,125,054

3,788,087

5,267,274

Other countries .

364,696

288,171

361,340

404,589

To North America the total for 1916 is $39,- 970,000 against $20,459,000 in 1914, $12,485,000 in 1910 and $7,001,000 in 1900. The increase to Europe in 1916 and 1917 is very large, but occurs chiefly in knit goods and in a less degree in cotton cloths. The total of all cotton manu¬ factures to Europe in 1916 was $35,536,000 against $3,614,000 in 1914, $1,996,000 in 1910 and $1,507,000 in 1900. Of this large total of $35,- 536,000 to Europe in 1916, $12,936,000 was knit goods, $7,287,000 cotton cloths and $708,000 other cotton clothing. Details of distribution by grand divisions in 1917 are not yet available.

James L. Watkins, Cotton Statistician , New York City.

COTTON PRODUCTION OF THE WORLD. The ever increasing demand for cotton is not due alone to the fact that it sup¬ plies the world with the cheapest possible cloth¬ ing, nor yet to the fact that 250,000,000 of the earth's inhabitants need cheap clothing to hide their nakedness, but largely to the additional fact that there are innumerable other uses to which cotton is adapted and for which there is

no substitute. As might be expected, this con¬ tinually increasing demand has stimulated its production throughout the world, until now it is cultivated on a larger scale than ever before. The following table, compiled from the most trustworthy authorities, gives the production in each country from 1910 to 1915, inclusive. The figures for the first 10 countries represent bales of 500 pounds each, those for all other coun¬ tries running bales, the weights varying in each. The reduced crop of 1915 is partly due to the European War, as in East India and Egypt, where by government decree the average in 1915 was considerably reduced.

COTTON STATE, a nickname for Ala¬ bama.

COTTON WHIGS, or CONSCIENCE WHIGS. See Wpiigs.

COTTON-WORM. See Cotton Insects.

COTTONIAN LIBRARY, a valuable col¬ lection of ancient manuscripts, books and coins, begun by Sir R. Cotton (q.v.), and much augmented by his son and grandson. His grandson, Sir John, wishing to make the library

OF THE WORLD

(In Thousands of Bales).

Country

1915-16

1914-15

United States .

11,191

16,135

East India .

4,013

4, 186

China .

1 , 945

1,750

Russia .

1,435

1,126

Egypt .

1,178

1,384

Brazil .

282

440

Persia .

140

127

Turkey .

155

120

Mexico .

100

125

Peru .

160

103

Indo-China .

103

103

Japan-Korea .

101

128

Dutch East Indies .

30

30

Greece .

30

30

Columbia* .

11

8

Haiti .

9

9

British West Indies . .

6

7

Argentina .

5

5

Cyprus .

3

9

Italy .

3

a

Africa

East and Central .

39

55

Sudan .

24

20

West .

21

28

French .

2

2

South .

Philippine Islands .

6

6

Total . 20,992 25,939

1913-14

1912-13

1911-12

1910-11

14,157

13,704

15,693

11,609

4,920

3,753

3,342

3,670

1,200

1,074

625

775

1,030

917

939

981

1,496

1,492

1,463

1,506

420

315

275

280

140

137

120

117

130

115

124

105

200

200

200

147

110

110

100

95

90

34

34

15

105

47

47

32

45

45

45

45

30

30

30

15

10

10

10

10

9

11

11

10

8

8

8

9

5

5

2

2

10

8

7

1

3

3

3

3

41

48

38

34

20

21

20

97

30

28

28

14

1

3

2

10

5

5

5

6

6

6 .

24,216

22,129

23,177

19,588

* Includes the crop of Venezuela.

COTTONMOUSE — COTTONSEED OIL INDUSTRY

a public one, an act of Parliament was passed in 1700 for this purpose; in 1707 another act authorized the purchase of Cotton House and library on behalf of the queen and her suc¬ cessors; and in 1730 it was deposited in a house in Westminster. The next year a fire broke out there, whereby 114 volumes of manuscripts were burned, lost or entirely defaced, and 98 rendered imperfect. A great number of the injured volumes were effectively restored, so that the library consists of nearly 900 volumes. Nearly 200 are state papers of the greatest value covering the diplomatic relations of Europe from the reign of Edward III to James I. It was then removed to a new build¬ ing in Westminster, and in 1757 finally removed to the British Museum. In addition to manu¬ scripts, it contains many valuable coins and antiquities.

COTTONMOUSE, a small field mouse (Peromyscus gossypinus) , a native to the south¬ ern portions of the United States, and destruc¬ tive to cotton plants. It is dark brown in color, with grayish feet. Its habits are like those of the white-footed deermouse (q.v.), common in the North.

COTTONMOUTH, a common name in the southern States for the moccasin (Ankistrodon piscivorus), so called because of the whitish streak along the lips. The name is also some¬ times applied to the copperhead snake (q.v.).

COTTONSEED OIL INDUSTRY.

More than 2,000 years ago the Hindus mas¬ tered the uses of the cotton fibre, demonstrat¬ ing its remarkable adaptability for spinning into fabrics to cover the nakedness of the savage or adorn the dress of the nobleman. But it remained for the practical genius of America to discover many other wonderful properties of the cotton plant; that its seed furnished an invaluable food for man and beast, and, when combined with other chemical ingredients, a most excellent fertilizer; that its stalks may be ground into pulp for making the finest kind of writing paper; that the ashes from the hulls of the seed yield a good grade of potash, and that even the root itself may be utilized for dye¬ stuffs.

History of Cotton Oil. — To Dr. Otto, a Moravian, of Bethlehem, Pa., belongs the honor of making the first cotton oil ever produced in the

United States. He began experimenting in oil from cotton seed and other vegetable seed about the year 1768. Samples of the oils ob¬ tained were sent to his friend Dr. Bond, of Philadelphia, and on 20 Sept. 1768 they were presented to the American Philosophical So¬ ciety with the statement from Dr. Otto that one bushel and a half of cotton seed would yield nine pints of oil. Some 15 years later, 1783, it is said that the London Society for the Encouragement of Arts, Manufactures and Commerce called attention to the possible value of this oil.

It is of record in the United States Patent Office that on 2 March 1799, one C. Whiting obtained a patent for a ((process for extracting oil from cotton seed.-** All of the records relat¬ ing to this patent are supposed to have been destroyed by fire. Sir William Dunbar, an extensive cotton planter of Natchez, Miss., wrhen the Mississippi territory was under Brit¬ ish dominion, had some knowledge of cotton

oil, for in ordering a cotton screw press from Philadelphia in 1801, he wrote his correspond¬ ent: (<I shall endeavor to indemnify myself for the cost by making cottonseed oil. It will probably be of a grade between drying and fat oils, resembling that made from linseed in color and tenacity, but less drying. Where,® he asked, <(can a market be found for such an oil?® Whatever kowledge Sir William may have had of cotton oil he made no practical use of it, but it is an interesting coincidence that 32 years later Natchez was one of the first places to attempt the manufacture of cotton oil.

The very first machine for hulling cotton seed was invented by J. Lineback, of Salem, N. C, and patented 31 March 1814. The records relating to this patent were also de¬ stroyed by fire, the only reference to it being contained in the index volumes, where it is referred to as <(a cotton hulling machine.® Meanwhile, it appears that Egyptian cotton seed was introduced into Europe and the manu¬ facture and refining of cotton oil was begun and carried on to some extent in England and France.

So far as the United States is concerned, the first step in a practical direction to manufac¬ ture of cotton oil was made by Francis Follet of Petersburg, Va., to whom belongs the distinc¬ tion of having constructed the first cotton oil mill in this country. On 21 Jan. 1829, he ob¬ tained a patent for a ((machine for hulling and husking cotton seeds and separating the hulls from the kernels,® and the same year con¬ structed and put into operation a mill that was pronounced by

competent judges from different parts of the Union as ((second in importance, to the South, to the cotton gin only.® In Decem¬ ber 1829 Mr. Follet obtained a patent for im¬ provements in his machine, meanwhile having formed a partnership with Mr. Smith, also of Petersburg. In an advertisement (1829) Messrs. Follet and Smith claimed that one of their two-or three-horse-power machines would hull and clean at one and the same operation from 20 to 25 bushels of seed per hour, which would yield one-third its measure, or 55 per cent of its weight in kernel from seed of fairly good quality; that one bushel of kernel would yield two gallons of oil, and perhaps one or two quarts more, equal to flaxseed oil if well expressed, and leaving 35 pounds of oil cake. It was claimed that because of its cheapness and aptitude for almost every purpose the oil would supersede all others in use, while the oil cake was a highly nutritious fpod for cattle, and these products would become important articles of export.

Commercial Extension. — As rude and im¬ perfect as was the beginning in the manufac¬ ture of cotton oil, Follet and Smith succeeded in demonstrating that oil for commercial pur¬ poses could be extracted from the cotton seed, so long neglected and considered more or less of a nuisance. They sold their patent rights for most of the Southern States to A. Plum¬ mer & Co. which resulted in the construction, about the year 1833, of several more mills, viz., one near Raleigh, N. C. ; one at Natchez, Miss.; one at Florence, Ga., and another at Mobile, Ala. The most pretentious and extensive of these mills was the one at Natchez, capable of turning out 1,000 to 2,000 gallons of oil per day. A New Orleans trade journal in 1836 noted the

arrival in that city <(by the steamer Lamplighter, from Arkansas,® of 20 barrels of cottonseed oil and 20 tons of cotton-oil cake, no doubt the product of the Natchez mill. As to how long the mills of this period continued in operation is unknown, but there is every reason for be¬ lieving they had but a brief existence.

But there were a few men in the South fully alive to the great importance of utilizing this wasted wealth, prominent among whom were Dr. Edward J. Coxe and William Wilber of New Orleans. Dr. Coxe undertook to demon¬ strate that the planters were throwing away the seed of three-million-bale crop, that might be made to yield them millions of dollars an¬ nually; that 100 pounds of seed would produce two gallons of oil, 48 pounds of oil cake and 6% pounds of soap stock, and that if only one-half the seed was used the value of seed prod¬ ucts would amount to $38,820,000. He also stated that as regards the oil, for dietetic or medicinal purposes, few could detect the least difference between it and the far-famed olive oil of Italy, and eaten with salad or rice it had the same flavor and taste of the best produc¬ tions of Plaignol, Avigdor or Sue.

The oils experimented with at this time were chiefly made by Air. Wilber of New Or¬ leans. He exhibited a specimen of his oil at the annual exhibition of the American Institute, held at New York in October 1853, for which he was awarded a silver medal. In 1854 Alessrs. Wilber & Co. constructed a mill in New Orleans and began making oil with a huller patented by Air. Wilber the year following. From time to time Air. Wilber improved upon his original machine and in a few years had so perfected it that the seed were pressed into oil without any handling except for the shape of cakes. This machine was so constructed that the seed was taken from the bin, introduced into the crushing apparatus, and thence the crushed material passed through the pressing machines to take off what was called <(cold pressed oil® ; thence the partially formed cake passed into the heating and reducing apparatus, where it was prepared for a subsequent pressing for suitable machinery which extracted the re¬ maining oil in the crushed material producing (<hot pressed® oil. From the last pressing machinery the oil cake passed under a knife and was cut into shapes convenient for handling. And so by this new process, it may be said, that the rough seed was introduced at one end of the machinery and came out of the other in the shape of oil and cake.

In 1855, through the enterprise of Alessrs. Kendall and Klapp, the Union Oil Company was organized and a large mill was built at Providence, R. I. The same year Alessrs. Alar-tin and Aldige put up a mill at New Orleans, and a few months following another was built in the same city by A. A. Alaginnis. About the same time two mills were erected at Alemphis, one at Saint Louis, and a little later another at Brooklyn, N. Y. The seed for the New Or¬ leans, Alemphis and Saint Louis mills was obtained by water transportation from the plan¬ tations along the banks of the Mississippi, the steamboat lines carrying the seed at very low rates on return trips when other freight was scarce; the Providence and Brooklyn mills ob¬ tained their seed from New Orleans and other Southern ports through sailing vessels. The

seed was purchased at ton rates, the price vary¬ ing from $8 to $10, and was delivered in sacks furnished by the mills and containing from 80 to 100 pounds each.

When cotton oil mills were first built in the South the planters, who had previously allowed their seed to rot about the gin houses, were suddenly seized with the idea that their seed was a very valuable article of trade, and that the demand would far exceed the supply. Alany, therefore, began to house and take care of the seed, and as plentiful as was the supply, the mills were obliged to pay $10 a ton for all they consumed. By and by, when the planters had figured out the quantity of seed produced in each bale, and the magnitude of the cotton crop, they put down the price, and in 1860 more seed was offered at $5 a ton than the mills could possibly consume during the year.

New Machines. — From 1855 to 1870 a dozen patents were granted for hulling ma¬ chines, four for processes for extracting oil from the seed, five for cleansing the seed and two for delinting the fibre. Of these only four proved to be useful inventions, namely: the huller patented by William R. Fee, of Cincin¬ nati, August 1857; another by F. A. Wells of Memphis, Tenn., October 1869; and two delint¬ ing gins, one by W. F. Pratt, of Bridgewater, Mass., June 1869, and . the other by G. W. Grader, of Memphis, August 1869.

The hulling machine invented by William R. Fee attracted considerable attention, as it introduced the new principle of cutting the hulls in two instead of crushing them. All the machinery hitherto employed in decorticating the seed subjected them to a grinding action which so packed the hulls, fibres and kernel together that it

was impossible to separate them in the process of screening without waste. When grooved cylinders were used, the grooves sometimes became so choked up as to necessi¬ tate separating the parts for cleaning, and it was found impossible to hull seed that were the least damp. This defective mode of hulling rendered the subsequent screening imperfect and occasioned .a ruinous loss of oil, much of which was absorbed by the porous hulls and fibres of cotton. There was also an additional waste in the fragments of kernel screened out with the hulls. The Fee huller corrected all these faults. A single huller was capable of hulling three tons of seed per hour, which was claimed to be 24 times the capacity of any other huller. It was also claimed that by cut¬ ting instead of crushing, or grinding the seed, 30 per cent more oil was made from a given quantity of seed, and that it would also hull seed completely drenched with water. This huller, and also an hydraulic press, also in¬ vented by Mr. Fee, were in use at the mills in New Orleans, Memphis, Saint Louis, and at one or two places in Texas, and at Dayton and Cin¬ cinnati, Ohio, in 1860. Several of them had been tested and satisfactorily used as early as 1856. No little credit is due to Paul Adige of New Orleans, who about this period visited the important oil mills in Europe, including those at Marseilles, France, where he obtained much valuable and practical knowledge of extracting and refining cottonseed oil.

Market. — The best quality of crude oil found a market among oil refiners, who by a very simple process removed all mechanical

impurities, and destroyed the coloring matter so as to produce an oil of a rich olive color, sweet and agreeable to the taste. It was found to be an admirable substitute for olive oil, and when flavored by an addition of olive could not be distinguished from the genuine article. This gradually found its way to the tables of private families and first-class hotels. The chief consumers, however, of the oil made from 1855 to 1870 were the soap manufacturers. From the crude oil they produced almost every grade of soap, irom the cheapest family to the purest white castile, and the finest and most highly perfumed toilet soaps. The surreptitious use and mixture of the cotton oil with other oils brought it into disrepute and only small quantities under its true name found a ready market, except to the soap manufacturers.

Growth of the Industry. — The census re¬ turns of 1860 show seven mills in operation, three in Louisiana and one in each of the States of Missouri, New York, Rhode Island and Tennessee. They employed 183 persons who received $76,356 in wages, had $351,000 capital invested, paid out $358,000 for raw material and turned out products valued at $741,000. About 50,000 tons of seed were used, which yielded at the rate of 30 gallons per ton, and about 1,500,000 gallons of crude oil. Of the seven mills built prior to 1860 only three survived the Civil War, the one at New Or¬ leans, the one at Saint Louis and the other at Providence, R. I. But no sooner was the war ended and the cotton planters began producing sufficient seed than the attention of enterprising capitalists was turned to cotton oil making as a profitable investment, and the industry again revived. So far as the mechanical process was concerned, about the only difficulty encountered at this time was the lint, or short fibres adhering to the seed as it came from the plantation gin house. This trouble was soon obviated by the delinting machines invented by Wm. F. Pratt, of Bridgewater, Mass., and Geo. W. Grader, of Memphis, already referred to. These ma¬ chines were entirely distinct from the ordinary gin, taking the seed after the plantation ginning, stripping them of the short downy fibre, and thus preparing them for a more perfect sep¬ aration of the hulls from the kernel. The delinting gin was constructed somewhat on the principle of the common saw gin, and consisted of a

series of circular saws and a fluted roll, the roll serving as it revolved to turn the seed over and over, thus causing all parts of them to be acted upon by very fine teeth saws.

In the meantime various improvements were made in the detail workings of the ma¬ chinery used for making cotton oil, which re¬ sulted in greatly increasing its capacity and cheapening the cost of making the oil. The capacity of the first huller in use was about one-third of a ton per hour; that of the hullers of the 1855-60 period about three tons per hour, and of the improved hullers of 1870-94 a still greater capacity. The presses used in 1855-60 had a capacity of about three tons per 24 hours, the more modern press 15 tons or more in the same time.

It having been clearly demonstrated that there was a demand for cotton seed products, and that the industry was a profitable one, mills began to increase. So that from three mills in 1865 with an invested capital of. $225,000.

the number in 1870, just five years after tjie Civil War, increased to 26 with a capital of $1,225,350; the number of hands employed was 664 and the wages paid was $292,032 ; the value of raw material $1,333,631 and the value of products $2,205,610. The quantity of oil pro¬ duced was 2,490,883 gallons, valued at $1,547,218.

But as important as had been the improve¬ ments made in the cotton oil machinery at this time, of still greater importance were the dis¬ coveries of the value of the oil as a food product in various forms. In the beginning, or about the time the Follet and Smith mill was built in Petersburg, Va. (1829), it was first used, in an experimental way, as a paint oil, as an illuminant and lubricant, and then as food for stock. But now it was to find its way into the markets as a food product of great value.

The first use made of cotton oil as a food product was about the year 1855, when it was mixed with lard to temper it for consumption in cold climates. But this was done surrep¬ titiously, just as afterward was done when it was used for mixing with other food. About the same time it was tested as a salad oil and was found to equal in purity the best olive oil. These experiments and tests were so satisfac¬ tory that the demand for it to mix with lard and olive oil steadily increased.

Sometime between 1865 and 1870 a French¬ man, Hypolite Mige, at the request of the French government, one authority says of Napoleon III himself, was induced to make the experiments that led to the discovery of a substitute for butter that was cheap enough to reach the poorer classes, and would also keep better than butter, and thus be adapted for the use of the navy. In 1873 he took out the first patent in the United States for artificial butter, and this was followed by nearly 50 other patents relating to the manufacture of oleomargarine, or some similar product of artificial butter. One of these patents was a combination of <(swine fat, cotton seed oil, slippery elm bark and beef stearin,® and this led to a large con¬ sumption of cotton oil for making artificial butter.

The surreptitious mixture of the oil with lard and its use in the manufacture of artificial butter brought down upon the industry the combined opposition of the lard manufacturers and dairymen of the whole country, who sought by legislation to tax it out of existence. One result of the attempt to bring cotton oil into popular disrepute, and destroy its commercial value, was to subject it to careful and most searching analyses by the most eminent chem¬ ists in the world. Their verdict was uniformly in favor of the oil ; not only that it was not harmful, but on the contrary a food product of the greatest value, being pure, nutritious and healthful. Its intrinsic merits became so well established that at one of the meetings of the Baltimore Grocers' Exchange (1887) the ˆCom¬ mittee on Cotton Seed Oil® reported its su¬ periority in every respect to hog's, lard for cooking purposes — it was cleaner, did not be¬ come rancid in any season and was more health¬ ful and nutritious, and entirely free from any odor or unpleasant taste, besides going one-half further in cooking and costing less in the pro¬ portion of 7 to 12. ˆ

About the year 1871 the American oil began to find its way into the Mediterranean ports for

mixture with olive oil. Soon afterward the French and other European countries began using it for packing sardines, and it came into use for the same purpose on the coast of Maine.

A story is told of a Marseilles oil merchant who ordered a shipment of cotton oil from a New Orleans mill to mix with olive oil, the olive crop being short that season. He mixed the two oils in proportions of about one-half each, labeled it (<pure olive oil® and exported it to South America where he had a good trade. The adulteration was not detected, so the next season he ordered a much larger consignment of cotton oil from New Orleans, and this time mixed the oils in proportions of about three-fourths cotton and one-fourth olive, again ex¬ porting it to his South American customers as (<pure olive.® No complaint being made, another order for a larger consignment followed. This time only a very small quantity of olive was mixed with the cotton oil, and as before was labeled <(pure olive® and exported. Still no complaint was heard; on the contrary, his South American trade grew so rapidly, and he prospered so, that he actually proposed a co¬ partnership with the New Orleans mill, he to furnish the (<pure olive® labels and packages from Marseilles, and the New Orleans mill to do the exporting.

No wonder, with the varied uses now found for cotton oil, the growing demand for it at home and abroad, the well-known fact that the mills were making handsome profits, that the industry should have grown so rapidly since 1870. In 1880 the number of mills had in¬ creased to 45, and the capital invested to more than three times what it was in 1870. The fol¬ lowing table from the census of 1880 will show to what proportions the industry had grown to that date :

in all of the States except Louisiana and Mis¬ sissippi, where the industry has been greatly affected on account of the destruction of the cotton crops by boll weevils. There has also been a slight decrease in the number of mills operated in Arkansas and South Carolina. Texas shows an increase of 37 mills as com¬ pared with 1909; Oklahoma 21; Alabama 15; Georgia 10. All of the States, with the excep¬ tion of Mississippi, show an increase in the quantity of seed crushed.

Value of Product. — The total value of crude cotton seed products

manufactured in 1915 amounted to $180,260,000, compared with $107,528,000 in 1909, $69,311,000 in 1904 and $42,412,000 in 1899. Compared with 1909, all the States show an increase excepting Louisiana. The average value of products per ton of seed crushed was $17.11 in 1899, $20.72 in 1904, $28.10 in 1909 and $42.89 in 1915. The average value of oil produced in 1914 was 41.9 cents per gallon ; of cake and meal $25.30 per ton ; of hulls $7.99 per ton; and of linters 2.3 cents per pound. Since the outbreak of the European War the price of linters has increased three¬ fold due to its importance in the manufacture of guncotton and other high explosives. The extraordinary demand for this short-fibre cotton has resulted in a readjustment of the delinter gins so that almost every particle of fibre is stripped from the seed, many mills even running the seed through the delinter gins a second time. In 1915 the average production of linters per ton of seed was slightly more than 100 pounds, in 1914 74 pounds, 67 pounds in 1913 and 1912, and 57 pounds in 1911. Not many years ago 30 pounds to the ton of seed was considered a good average. In 1914 oil represented 51.9 per cent of the value of crude products ; meal and cake, 36 per cent ; hulls, 7.2 per cent ; linters, 4.9 per cent. The estimated quantity of seed

NUMBER OF MILLS, CAPITAL INVESTED, VALUE OF PRODUCTS, 1880.

No.

Hands

Capital

Wages

Cost of raw

Value of

State

mills

employed

invested *

paid

material

products

Alabama .

. 2

150

$82 , 000

$42 , 500

$158,000

$247,982

Arkansas .

. 4

237

275,000

79,400

378,000

590 , 000

Connecticut .

. 1

2 , 800

500

575

Louisiana .

. 12

1,352

1,557,500

422,165

2,280,910

3,739,465

Mississippi .

. 8

440

450,000

94,860

371,080

560,363

Missouri .

. 2

55

80,000

18,750

80,000

140,000

Ohio .

. 1

45

150,000

7,450

400,000

435 , 000

Rhode Island .

. 1

32

125,000

14,899

415,870

485,085

T ennessee .

. 9

644

935,000

163,340

812,000

1,225,000

Texas .

. 4

511

202 , 000

36,272

192,441

276,450

Virginia .

. 1

8

3,000

1,200

2,500

8,000

Total .

. 45

3,474

$3,862,300

$880,836

$5,091,251

$7,690,930

At the fifth annual convention of the Cotton Seed Crushers' Association, held in Chicago in June 1883, it was stated that there were 101 cotton oil mills in the United States, 85 of which were then in active operation throughout the year. In 1884 this number in¬ creased to 130, and 10 years later there were just twice this number, distributed among the States as follows : Alabama 20, Arkansas 8, Georgia 37, Louisiana 19, Mississippi 24, North Carolina 17, South Carolina 28, Tennessee 18 and Texas 89.

Between 1899 and 1914 the number of mills increased from 357 to 872, or 144.3 per cent, and the quantity of seed crushed from 2,479,386 tons to 4,847,628 tons, or 95.5 per cent. The number of active mills has increased since 1909

produced from the crop of 1915 was 4,992,000 tons, of which the mills took 4,202,000 tons, or 84 per cent, leaving 790,000 tons, or 16 per cent, for planting, export, feeding and other purposes. This is by far the greatest percentage of seed ever taken from any crop, the average in recent 3rears being about 75 per cent.

Present Process. — The present process of extracting the oil from the cotton seed is a rather complicated one in its preparatory stages, but is simplified to the last degree by the em¬ ployment of machinery at

each and every step. The seed, on reaching the mill, is first screened to remove sand, dirt, bolls and foreign sub¬ stances, and finally a draft of air is used to complete the cleaning process. The seed is now ready for the linters, which machines are an

elaboration of the ordinary cotton-gin ; and whatever staple remains upon the seed is stripped off in passing through them. From the linters the seed passes to the huller, a high¬ speed cutting-machine, which cuts it up most thoroughly. The hulls, by screens and beaters, are now separated from the meats, which latter are, by screw-conveyers, conducted to bins con¬ tiguous to roller-crushers, and as fast as re¬ quired are passed through the crushers, where the mass is reduced to a uniform consistency, and is known to millmen as <(uncooked meal.® The first step is cooking this meal, which is done in steam-jacketed kettles. When heated to a proper degree the meal is drawn from the kettles, formed into cakes, enveloped in camel's-hair cloth and placed in boxes of an hydraulic press, when by the application of proper pressure the crude oil is speedily extracted. The solid residue remaining in the press-box is the decorticated cottonseed oil cake of commerce.

In the practical methods by which these mills are supplied and operated all the improve¬ ments of modern industrial enterprise have been laid under tribute. In the distribution of the oil product, tank-cars on the railroads and tank-steamers on the high seas are used for trans¬ portation in bulk. The diversity of the indus¬ try requires factories other than the crude-oil mills, as refineries, lard and. cottolene plants, soap factories, cotton-ginneries, cotton com¬ pressors and fertilizer-mixing establishments. The supply for all these is derived directly from the crude-oil mills, which in their turn are operated immediately from the raw material, in providing which there has grown up a most important branch of the agricultural system of the South.

New Uses. — One of the chief factors in the remarkable growth of the cotton oil indus¬ try has been the continuous discovery of new uses for its crude products, oil, cake and meal, linters and hulls. The uses found for each and products manufactured from each may be classified as follows :

LINTERS.

Batting, wadding, absorbent cotton, mixing with shoddy, mixing with wool in hat making, mixing with lamb's wool for fleece-lined under¬ wear, felt.

Stuffing material for — Pads, cushions, com¬ forts, horse collars, mattresses, upholstery.

Low-grade yarns — Lamp and candle wicks, twine, rope, carpets.

Cellulose — Writing paper, guncotton, nitro¬ cellulose, or pyrocellulose, smokeless powder.

Pyroxlin-Varnishes — Coating for metals, artificial leather, waterproofing.

Plastics — Celluloid, collodion, varnishes, artificial silk, photographic films.

•«*

HULLS.

Feed, fertilizer, fuel, packing, household utensils, bran-cattle feed.

Fibre — Stuffing for horse collars, basis for explosives, paper stock, pressed paper products.

MEATS.

Cake and meal — Fertilizer, dyestuffs. Feed for cattle, poultry, horses and mules, swine, sheep.

Flour — Bread, cake, cracker.

Crude oil — Refined oil — 'Prime summer yellow oil — cosmetics, animal compound lard, cooking oil, salad oil.

Hydrogenated oil — Lard substitutes, syn¬ thetic stearin, vegetable compound lard.

Cold pressed oil — Wihter oil — Salad oil, setting olives, packing sardines, winter white oil. Stearin — oleomargarine. Emulsion for medical purposes, substitute for sweet oil, deodorized oil.

Off-grade summer yellow oil — Soap, miners' oil, hydrogenated oil.

Foots — Acidulated foots or black grease, washing powder, soap.

Glycerin — Nitroglycerin.

Fat acids — Candle pitch — Stearin acid— Candles, washing powder, soap. Distilled fat acids — Stearin pitch or cotton oil pitch. Roofing tar — Composition roofing, linoleums, insulating materials, oilcloth, waterproofing, cheap-paint base, cotton rubber. Artificial leather — Upholstering, bookbinding.

Oleic acid — Soap, washing powder, fulling ware.

Present Statistics. — The last census re¬ port (1914) shows that there were 882 establish¬ ments engaged in the manufacture of cotton¬ seed products ; that they employed 27,047 per¬ sons, who received in salaries and wages $14,409,000; that the capital invested was $118,-073,000; that the cost of materials was $180,976,000 and the total value of products $212,127,000; and that the value added by manu-

NUMBER OF MILLS, SEED CRUSHED AND VALUE OF PRODUCTS IN EACH STATE, 1914.

State

No. of mills

Seed

crushed,

tons

Crude cottonseed products (000’s omitted)

Oil,

gallons

Meal and cake, tons

Hulls,

tons

Linters

lbs.

Total

value

Alabama .

86

428

17,627

201

119

27,537

$14,487

Arkansas .

43

313

1 1 , 597

137

89

22,102

8,893

Georgia .

155

865

33,389

405

252

55,707

30,138

Louisiana .

32

161

5,911

77

39

11,907

4,364

Mississiopi .

69

506

21,312

232

139

35,652

16,697

North Carolina .

63

329

14,602

149

95

17,259

11,865

Oklahoma .

60

255

8,292

119

73

20,753

7,543

South Carolina .

98

418

18,979

190

116

23,782

15,045

Tennessee .

23

267

10,860

118

79

19,826

9,097

Texas .

229

1 . 191

41,350

539

367

92,970

34,188

Other States .

14

114

4,412

51

34

6,625

3,718

90

COTTONTAIL — COUCAL

QUANTITY OF COTTON SEED PRODUCED, CRUSHED AND QUANTITIES AND VALUE OF PRODUCTS.

Cottonseed (000’s omitted)

Cottonseed products (000’s omitted)

United States

No. of mills

Produced,

tons

Crushed,

tons

Oil,

gallons

Meal and cake, tons

Hulls,

tons

Linters,

bales

Value of products

1915 .

844

4,992

4,202

167,110

1,923

1,220

890

$180,260

1914 .

882

7,186

5,780

229,260

2,648

1,677

820

156,036

1913 .

870

6,305

4,848

193,330

2,220

1,400

660—

159,670

1912 .

85-7

6,104

4,579

185,750

1,999

1,540

583

132,230

1911 .

839

6,997

4,921

201,650

2,150

1,642

533

131,340

1910 .

810

5,175

4,106

167,970

1,792

1,375

380

142,710

1909 .

817

4,462

3,269

131,000

1,326

1,189

297

107,528

1908 .

5,904

4,952

5,913

3,670

2,565

3,844

146,790

103,050

153,760

1,492

1,043

1,786

1,330

927

330

86,090

1907 .

256

65 , 980

1906 .

1,593

307

94,380

EXPORTS OF COTTON SEED AND COTTON-OIL PRODUCTS.

Year

Cottonseed,

tons

Cottonseed Products

Price of seed per ton

Oil,

gallons

Meal and cake, tons

1915 .

1,238

3,157

8,171

12,024

32,030

6,612

12,466

25,813

14,239

8,814

35,537,328

42,448,870

25,728,411

42,031,052

53,262,796

30,069,459

29,860,667

51,087,329

41,019,991

41,880,304

528,961 739,533 399,987 564,046 646,845 402 , 298 320,044 616,875 464,644 670,484

$33.60 17.90 22.40 19.20 17 .10 25.80 27.95 15.70 17.50 13.76

1914 .

1913 .

1912 .

1911 .

1910 .

1909 .

1908 .

1907 .

1906 .

facture (or the value of products less the cost of materials) was $31,151,000.

James L. Watkins, Cotton Statistician , New York City.

COTTONTAIL. See Rabbit.

COTTONWOOD, species of Populus trees belonging to the willow family (Sali - cacecc). There are two very common species in North America, P. deltoides and P. candi-cans. Besides these there are some 15 others, which occur under the names of poplar and aspen. The cottonwoods are large trees found along the banks of rivers nearly throughout North America. The wood is soft and weak, of a dark brown color and weighs about 24 pounds to the cubic foot. It is also known by the names of Carolina poplar and necklace poplar.

COTTONY CUSHION SCALE. See

Scale Insects.

COTTRELL, Frederick Gardner, Ameri¬ can chemist: b. Oakland, Cal., 10 Jan. 1877. He was educated at the universities of California, Berlin

and Leipzig, from 1897 to 1900 taught chemistry at the Oakland High School, and between 1902 and 1911 was instructor and as¬ sistant professor in the department of physical chemistry at the University of California. In 1911 he became chief physical chemist of the United States Bureau of Mines, and chief chemist in 1914. He has written (Der Restrom bei galvanischer Polarization betrachtet als DiffusionsproblenP (1903).

COTYLEDONS, kot-T-le'donz, the seed-leaves of the embryo plant, which serve it as

organs of nutrition until the young vegetable is established in the soil and develops its true leaves. In flowering plants there are two kinds of embryos — • one in which there is ' only a single cotyledon, and the other in which there are two cotyledons. This difference, being as¬ sociated with several others of an important character, serves as the basis for the primary division of phanerogamic, or, more accurately, of angiospermous plants into monocotyledons and dicotyledons. The lower class of plants producing spores or cellular embryos having no cotyledons are called acotyledonous. On germi¬ nation the cotyledons either serve as foliage-leaves or remain underground as fleshy lobes.

COTYLOSAURIA, kot-i-lo-sa'ri-a, the most ancient of reptiles, from which, as is claimed by the American naturalist, E. D. Cope (q.v.), and his adherents, sprang the saurian and snake-like species of later ages. Their remains are among the characteristic fossils of the Carboniferous and Permian Ages. They are characterized by Williston as primitive rep¬ tiles with notochordal vertebrae; imperforate temporal region ; persistent intercentra ; two coracoids ; plate-like pelvis ; with all or most of the amphibian skull-elements; short legs and short neck; phalangeal formula primarily

2, 3, 4, 5, 3(4).

COUCAL, koo'kal, or LARK-HEELED CUCKOO (Centropus) , a genus of common bush-birds in Africa, India and through the Malayan Archipelago to Australia. The hind toe is prolonged into a very long spur. The 35 known species constitute the sub-family Cen-

tropodince of the cuckoo family (Cuculidce). One species is held in religious veneration in Madagascar.

COUCH. See Quiller-Couch, Arthur Thomas.

COUCH, Darius Nash, American soldier: b. South East, Putnam County, N. Y., 23 July 1822; d. Norwalk, Conn., 12 Feb. 1897. He was graduated at West Point 1846, served in the Mexican and Seminole wars, and resigned from the army in 1855 to engage in business. During the Civil War he was commissioned brigadier-general 1861 ; commanded a division in the battles of Williamsburg, Fair Oaks and Mal¬ vern Hill; promoted major-general July 1862, and took part in Pope's retreat and the battle of Antietam. At Fredericksburg and Chancel-lorsville he commanded the Second Army Corps; organized the Pennsylvania militia to resist Lee's invasion 1863, and took part in the battle of Nashville and the North Carolina operations 1864-65. In 1865 he was unsuccess¬ ful as the Democratic candidate for governor of Massachusetts; and was collector of the port of Boston 1866-67. He removed to Con¬ necticut soon after, and was adjutant-general of that State 1883-84.

COUCH-GRASS (a corruption of quitch-grass and quick-grass), a perennial grass (Agropyron repens) and one of the most com¬ mon and troublesome weeds of agriculture. When it first appears above ground its blade is readily eaten by sheep. In arable land, under any tolerable management, the seeds are never allowed to ripen, and the propagation is effected by the numerous joints of the long trailing rootstock, each joint sending forth a shoot which becomes a new plant. The proper time # for extirpating it is in summer, when the land is undergoing a pure fallow, or, where fallow is not used, when the land is being prepared for a root-crop. The most effectual means are a deep ploughing, going below the roots of the plant, a diligent use of the roller, grubber and ordinary harrows, and careful hand-picking. The rootstock may be used as food for various domestic animals, or, when prepared, as a med¬ icine. The root is pulled up by the Germans and cut into small fragments and sold largely to venders of patent medicines. It has a large amount of gum which renders it somewhat demulcent, but its medical properties are nil, although enormous quantities of it are used in the United States by

manufacturers of quack medicines.

COUCY, koo'se, Raoul, ra-ool, or Renaud, re-no, Chatelain de, French chevalier; hero of a tragic story often celebrated in ancient bal¬ lads and songs, sometimes in connection with other names than his. He became Chatelain of Coucy in 1186, took part in the Third Cru¬ sade (1189-91) and was killed by the Saracens about 1203. His work consists of about 16 songs, in the troubadour style. They were pub¬ lished by Fath as (Die Lieder des Castellan von Coucy } (Heidelberg 1883). He was in love with Gabrielle de Vergy, lady of Aubert de Fayel, and dying in the Holy Land, he directed his faithful squire to enclose his heart in a casket and carry it to the Lady of Fayel. He was surprised by the lord of the castle, who found out on what mission he came. Burning with rage, and determined on revenge he

ordered the heart to be served at table. The unhappy woman, having eaten, was told the nature of this horrible meal, whereupon she refused all sustenance, and died of voluntary starvation. Uhland has made this story the subject of a fine ballad. The story is first told in verse by Jakemon Sakesep (at the end of the 13th century). There is a modern version by Crapelet (Paris 1829) and an English romance on the same subject in Ritson's, Eng¬ lish Metrical Romances (Vol. Ill, 1885).

COUDER, koo'da', Louis Charles Auguste,

French painter : b. Paris, 1 April 1790; d. there, 23 June 1873. He studied in Paris under David, and later in Munich. Among his works are (Caesar on the Ides of March) ; (The Battle of Lawfeld) ; (The Opening of the States-General, 1789) ; and (The Siege of YorktowiP ; the last three are at Versailles. In 1820, he decorated the Rotunda of the Louvre with frescoes which were unsuccessful. His decora¬ tions of several Parisian churches and his later pictures are decided improvements. As a mem¬ ber of the conseil superieur at the Ecole des Beaux-Arts he wrote some critical works on art. Consult Breton, Jules, (Nos peintres du siecleP

COUDERSPORT, Pa, town and county-seat of Porter County in the northern part of the State, 110 miles southeast of Erie, on the Allegheny River and on the Coudersport and Pennsylvania Railroad. It contains a public library and a hospital. It has a foundry, a tannery, a flour mill and manufactures of fur¬ niture, rubber goods, mangle rollers, condensed milk, barrel headings, *etc.* Pop. 3,100.

COUDERT, koo-der, Frederic Rene,

American lawyer: b. New York, 1832; d. Wash¬ ington, D. C, 20 Dec. 1903. He was graduated at Columbia College in 1850, and admitted to the New York bar in 1853. In 1877 he was a dele¬ gate of the New York Chamber of Commerce to the Antwerp Congress, which was held for the purpose of establishing a universal system of general average. In 1892 he was appointed one of the counsel on the part of the United States before the Bering Sea Tribunal of Arbi¬ tration in Paris, and was specially complimented by Baron de Courcel, president of the tribunal, for his argument on the necessity of putting a stop to pelagic sealing. On 1 Jan. 1896, Presi¬ dent Cleveland appointed him a member of the Venezuela Boundary Commission. He had a world-wide reputation as an advocate and au¬ thority on international law, and several times declined appointment to the bench of the United States Supreme Court. He was the legal representative of the French government in the United States for many years. He re¬ ceived the cross of the Legion of Honor and also decorations from Italy and Venezuela. His publications include (International Law, the Rights of Ships* (1895) and (Addresses, His¬ torical-Political-Sociological * (1905) .

COUES, kowz, Elliott, American natural¬ ist: b. Portsmouth, N. H, 9 Sept. 1842; d. Balti¬ more, 26 Dec. 1899. In 1861 he was graduated from Columbia University, Washington, D. C., and the year following entered the United States army as a medical cadet. His thorough work as assistant surgeon in the army, 1863-81, attracted attention, and for that and other serv¬ ices he was brevetted captain. For some years

he continued to practice surgery or teach its science; but he also continued to pursue the study of zoology, begun while in the university. In 1873 he was appointed surgeon and naturalist for the United States commission which defined the northern boundary. For three years he remained connected with this commission, and in addition gave some assistance to the Smith¬ sonian Institution. In 1877 he was called by the Columbian University to take charge of a de¬ partment of anatomy, and later was appointed by the Virginia Agricultural and Mechanical College as professor of biology. He was asso¬ ciate editor of (The American NaturalisU and other periodicals; and edited, for the Century Dictionary, the departments of comparative an¬ atomy, biology and zoology. He was one of the founders of the American Ornithologists' Union, and an active member of many scientific societies in Europe and America. He was pres¬ ident of the board of control of the American branch of the Theosophical Society of India. His last years were given chiefly to the Smith¬ sonian Institution. He has left a large number of valuable works on mammalogy and orni¬ thology, some of which are (Key to North American Birds) (1872) ; (Field Ornithology > (1874) ; (New Key to North American Birds y ; (Birds of the Northwest (1874) ; (Fur Bearing Animals) (1877) ; (Birds of the Colorado Val-leyJ (1878) ; (New England Bird Life) (1881) ; (Check List of North American Birds > (1884) ; (Biogen } (1884) ; (The Daemon of Darwin)

(1884) ; (Our Native Birds.* He edited the ˆJournals* of Lewis and Clark in connection with his investigations regarding the early ex¬ ploration of the trans-Mississippi region.

COUGAR, koo-gar', the great American cat (Felts concolor), which ranges from Hudson Bay to Cape Horn, a remarkable distance for any wild animal. It was formerly called pan¬ ther by the settlers of the Eastern States ; but in the West it is usually ((mountain-lion)) or ˆpuma,® the latter name said to be of Peruvian origin. ˆCougar® comes from a native Brazilian name. The cougar is from six to eight feet long from the tip of the nose to the tip of the tail. The cubs are apt to be spotted and marked; but this wears off with the advent of maturity; and, after the first year, the animal is a uniform reddish, tawny color, deepening in tone toward the spine, paler around the eyes, and whitish on the throat, legs and under por¬ tion. The color is so much like the hide of the Virginia deer that at a distance hunters

have been known to mistake a cougar for a deer. This is one of the creature's great advantages as a beast of prey. He may be mistaken by his intended victims for an animal of their own kind, and thus is enabled to get into their midst 'before his identity is disclosed. In South America he is sometimes called, on this account, ((false deer.® The head of the cougar is rounded, and the face is extremely intelligent, but crafty in general expression. The facial muscles can be drawn into as ferocious an ex¬ pression as that of any of the great jungle felines of the Old World. It is said to be more cowardly and less dangerous than the other large carnivores ; and it is asserted by author¬ ities in good standing that it generally flees from man except in defense of the young, when the female becomes desperately brave. The

puma will prowl about lone camps and logging-huts from curiosity or hunger, but rarely ven¬ tures on offensive warfare with humanity. This imputation of cowardice is denied by certain people, notably J. Hampden Porter, who says <(there is no need to argue the question whether or not pumas will kill men; that has been affirm¬ atively settled by facts® ; and Theodore Roose¬ velt says, in his Ulunting Trips of a Ranch¬ man } : ((When hungry, a cougar will attack anything it can master.®

Though plentiful a century ago, in the east¬ ern United States, the cougar is met with rarely, if at all at the present time, east of the Alleghanies. It may still be found in the Appala¬ chian ranges and in the wilder parts of the Mid¬ dle West. It is so troublesome to ranchmen that, especially in southern California, western Oregon and various other districts, a constant war, tending toward extermination, is waged upon the species by owners of cattle and sheep. In common with all cats, large and small, the cougar hunts preferably at night. Merriam says that it creeps to leeward of its intended vic¬ tim ; and, with noiseless tread and crouching form, passes over fallen trees and ragged ledges or through tangled thickets, until, if unobserved, within 30 or 40 feet of its quarry. Then it springs upon the back of the victim, plants its long claws in the quivering flesh, and with its sharp teeth despatches its prey. Deer, rabbits, ground-squirrels, ground-nesting birds, and even porcupines form part of its food. It will even catch and eat fish. But best of all it likes the flesh of young ponies, or even of full-grown horses, — a delicacy unknown to its bill-of-fare before the advent of the white race. When it has killed its quarry, the cougar drags it away .to eat what appetite demands in the seclusion of its chosen covert; and, when its meal is fin¬ ished, lies down besides the

bloody remnant of its feast, and sleeps. This habit of napping when gorged has procured many a cougar its death at the hands of hunters, who track it by the blood and body of its victim.

The cry of the cougar is said to be one that will carry terror to the stoutest heart, — (<a cry that can be likened only to a scream of de¬ moniac laughter,® in the male ; and in the female, to <(the wail of a child in agony.® These cries, never heard by day or in captivity, are doubted by some as being so terrible as, height¬ ened by the darkness and the silence of the night, they seem to the lonely hunter. In win¬ ter cougars congregate in the valleys of the western mountain regions and raid corrals for sheep and cattle, doing much damage. These depredations are so extensive and constant in Mexico as to be a serious menace to the busi¬ ness success of the ranchmen.

When very young the cubs are playful and kittenish, and may be readily tamed. Indeed, many experiments of this sort have been tried, and the records of such afford interesting read¬ ing. But with maturity they develop treacher¬ ous qualities which usually render them unsafe for human society. Cougars are often hunted with dogs, and any sort of dog, it is said, will do to scent them. They are not, however, crea¬ tures of the chase for sport, as are lions and tigers ; ‘but are usually hunted as vermin. When pursued by dogs they take to trees, and are kept there until the hunters come up, when they are easily shot. On the plains of South Amer-

ica they are frequently caught with lassoes by the mounted cattle-herders.

The cougar was held in religious veneration by the Indians of California, as was the tiger by certain sects in India; hence the red men did not dare to kill the beast, and it multiplied accordingly. Among the Zunis it is regarded as the chief ˆprey-god.®

COUGH, in physiology, a deep inspiration of air, followed by a sudden, violent and sonor¬ ous expiration, in a great measure involuntary, and excited by irritation of the air-passages, due to the presence of some foreign material or irritation of the nerves distributed to the respi¬ ratory organs. The organs of respiration are so constructed that every foreign substance, ex¬ cept atmospheric air, stimulates them. The smallest drop of water entering the windpipe is sufficient to produce a violent coughing, by which the organs labor to expel the irritating substance. A similar effect is produced by in¬ haling smoke, dust, *etc.* The sudden expulsion of air from the lungs is produced by the violent contraction of the diaphragm and the muscles of the breast and ribs. The contraction of the muscles is due to impressions reaching them by their motor nerves, such impressions coming from the nerve-centre in the medulla, thrown into activity by stimuli received from the irri¬ tated sensory nerves of the air-passages. The sensation of obstruction or irritation, which gives rise to cough, though sometimes perceived in the chest, especially near the pit of the stomach, is very often confined to the trachea, or windpipe, and especially to its aperture in the throat, termed the glottis. Of the various irri¬ tations which give rise to cough, some occur within the cavity of the chest; others are ex¬ ternal to that cavity; some exist even in the viscera of the pelvis. Of those causes of cough which take place within the chest, the disorders of the lungs themselves are the most common, especially the inflammation of the mucous mem¬ branes. Here the cough may be a dry one, that is, without expectoration, and this occurs in the early stage of the affection, or a loose cough attended by expectoration, as in the later stage. In the former case it is due to the dry inflamed mucous membrane being

very irritable, so that the cough is excited even by the coldness of the inspired air. In the latter case the presence of the defluxion causes the cough and thus ex¬ cites its expulsion.

Pleurisy, or inflammation of the serous mem¬ brane which covers the lung and lines the interior of the chest, also gives rise to cough, this disease being almost invariably accompanied by inflammation of the outer layer of the tissue of the lung. It may be simple, but is very fre¬ quently associated with tuberculosis. Another common cause of cough which has its seat in the chest is inflammation of the lungs. In this disease there is inflammation of the tissue of the lungs, with exudation of fibrin, which solidifies the lungs and shuts up the air-cells. Much constitutional disturbance accompanies it. In the progress of the disease the exuded mate¬ rial softens, and, being swept up the air-tubes, irritates the passages and brings on the cough by which it is expelled. In such a case the cough is desirable rather than the reverse, since it is nature's method of sweeping out the foreign substance from the air-cells and tubes. Another frequent origin of cough is the rupture of some

of the blood vessels of the lungs, and the con¬ sequent effusion of blood into the cells, which is expelled by the cough that its irritation excites, constituting what is technically termed haemop¬ tysis, or spitting of blood. Cough is also excited by the existence of tubercles in the lungs, one of the most frequent causes of consumption; and by cancer and growths in the lungs.

Then the irritation may arise at the back part of the throat, no disorder being present in the windpipe, bronchial tubes or lungs. Thus a long uvula, by tickling the back of the throat, may be the cause of a most persistent dry cough, coming on specially when the person lies down. Enlarged tonsils, a chronically thick condition of the mucous membrane of the back of the throat, small growths or polypi in this neighbor¬ hood or in the box of the windpipe, may main¬ tain a most troublesome cough. Direct irrita¬ tion of the nerves connected with respiration, as by the pressure of a tumor, the pressure, for example, of an aneurism in the chest on one of the nerves of the larynx, may excite spas¬ modic cough of a suffocative kind. Again, cough is very often excited by reflex irritation, the seat of the irritation being a long way from the air-passages. Where a cough is excited by disorders of parts external to the cavity of the chest, it is generally dry, as the irritating cause is external, and not any obstructing matter in the lungs themselves. Disorders of the viscera of the abdomen, especially of

those which lie in contact with the diaphragm (the muscular curtain separating the cavities of the belly and chest), frequently induce a cough. A short, dry cough invariably attends inflammation of the liver, whether acute or chronic, and accom¬ panies the various tubercular and other obstruc¬ tions in that organ. Hence inflammation of the liver is not infrequently mistaken for inflam¬ mation of the lungs; and in some of the chronic diseases of the liver the cough is occasionally complained of as the most urgent symptom. The presence of pain in the right side, shooting up to the top of the shoulder, the dryness of the cough, and pain, enlargement, hardness or uneasiness on pressure below the ribs of that side, will afford the best means of distinguishing whether a disease of the liver is the origin of the cough. Disorders of the stomach are also often accompanied with a cough of the same dry and teasing nature. A short cough is, therefore, a frequent symptom of indigestion. In short, there is scarcely any one of the viscera in the cavity of the abdomen the irritation of which, in a state of disease, has not excited cough. Disorders of the spleen, pancreas, and even the kidneys, have all given rise to this symptom ; and external tumors attached to them have had the same effect. Any distension of the abdomen, which, by its pressure upward, impedes the descent of the diaphragm, and con¬ sequently the expansion of the lungs, occasions cough. The variety of causes from which coughs may arise must convince every reader of the absurdity of attempting to cure all kinds of cough by the same remedy. The treatment can be satisfactorily indicated only when the real cause is ascertained. When a long uvula is the cause a small piece may be snipped off ; when it is a relaxed condition of throat, or a similar state of the box of the windpipe, local applica¬ tions, paints directly applied by a brush, or inhalations, are the suitable remedies. One of

the commonest coughs attends slight swelling and irritability about the larynx. To relieve this warm poultices should be applied to the front of the neck, or a piece of flannel sprinkled with turpentine should be placed over the larynx on the neck. In bronchitis and inflammation of the lungs the treatment of the cough resolves itself

into the treatment of the special disease, and so with the cough due to diseases of distant organs. Often soothing remedies must be given to allay the excitability of the irritated nerves. Certain coughs are purely psychogenic in origin and are to be grouped with the psychoneuroses.

COUIY. See Tree-porcupine.

COULANGES, koo-lanzh', Numa Denis Fustel de, French historical writer: b. Paris, 18 March 1830; d. Passy, near Paris, 12 Sept. 1889. After filling professors' chairs succes¬ sively at Amiens, Paris and Strassburg, he was transferred in 1875 to the £cole Normale at Paris, and became a member of the Institute in the same year. In 1880 he became director of the Ecole Normale. His earlier writings, (Memoire sur Tile de Chio) (1857); (Polybe, ou la Grece conquise par les Romains) (1858) had hardly prepared the reading public for the altogether exceptional importance of his brilliant book, (La cite antique) (1864; 17th ed., 1885), which threw a flood of fresh light on the social and religious institutions of antiquity. The work was crowned by the French Academy, as was also his profoundly luminous (Histoire des institutions politiques de l'ancienne France> (1874-92) ; while (La Gaule romaine) (1888-91) and (La monarchic franque) (1888-91), received the Reynaud prize. For biography consult Guiraud (Paris 1896).

COULOMB, koo-len', Charles Augustin

de, French scientist and inventor: b. Angou-leme, France, 14 June 1736; d. Paris, 23 Aug. 1806. He is famous for his experiments on friction, and the invention of the torsion balance for measuring the force of magnetic and electrical attraction. In early life he en¬ tered the engineers' corps and served some time at Martinique. In 1777 he gained an Academy prize by a work on magnetic needles, and again two years later by his (Theory of Simple Ma¬ chines. J Coulomb was a member of the French Academy, and in 1784 was made intendant-gen- eral of the waters and fountains of France. During the Revolution he took part in the in¬ vestigations attending the introduction of a metric system of weights and measures by th-e new government, being a member of the com¬ mission of 12 appointed under the provision of the law of 7 April 1795. His name has been given to the unit of electrical quantity.

COULOMB, the unit of quantity in measur¬ ing electric currents. It is the quantity pro¬ duced by a current of one ampere in one second. It takes its name from its discoverer, Charles Coulomb (q.v.).

COULOMETER, in electricity, an instru¬ ment for determining the quantity of electric current which is passing through an electric cir¬ cuit. In other words it is a measure of current efficiency. Several forms of coulometer have been proposed and many tests made with them. Three distinct principles have been employed; the iodine and the iron coulometers depend upon

the chemical changes taking place as the result of the current; the copper and the silver cou¬ lometers depend upon the weight of a metallic deposit made by the current ; the oxy-hydrogen gas coulometer depends upon the dissociation of water by the current. The last named was the earliest and is the simplest to operate. The figure shows this gas coulometer to the left con¬ nected with a battery which is being tested. A circular vessel has two wires let through its bot¬ tom, which bear inside two electrodes of plat¬ inum foil as shown; water slightly acidulated with sulphuric acid is poured into the vessel, and two tubes which have been filled with water are placed over each electrode. On the poles of the battery being connected with the exterior ends of the wires by means of binding-screws, water will be decomposed and hydrogen will appear in one tube and oxygen in the other. It will be found, as represented in the figure, that more than twice the quantity of water is dis¬ placed in the hydrogen tube than in the oxygen tube. Two volumes exactly of hydrogen and one volume of oxygen are the proper proportions to form water; but some of the liberal oxygen in the form of ozone is dissolved by the water. One of the drawbacks of this type of instru¬ ment is that it requires a certain minimum strength of current before it begins to operate.

An improved form of the oxy-hydrogen coulom¬ eter is the Walter-Neuman single-tube in¬ strument. Instead of separating the two gases, it allows both to flow into the one tube, which is placed upright and graduated. The upper part, which is quite long, is about five-eighths of an inch in diameter and has a stop-cock valve at the top. This is used when the gases are taken to an eudiometer for more accurate measurement. The lower end of the tube is ex¬ panded into an oblong bulb of considerable content as compared with the smaller tube. The electrodes have each an area of one square inch and are set in the bottom of the bulb. A leveling tube is attached to ensure accurate reading. The advantages claimed for the gas coulometer are that it may be read instantly at the close of the test and that it has a smaller margin of error in that the amount of gas by which the measurements are made is so much larger pro¬ portionally than the metallic deposits or volu¬ metric changes which must be relied on in the other instruments.

The so-called (<silver coulometer, w however, has the largest acceptance among scientific men, although the records show an almost endless

series of disagreements as to extreme accuracy in the results obtained by its use by different operators. It was formally adopted by the International Electrical Congress, held in Chi¬ cago in 1893, as the most dependable of all the coulometers, and that congress fixed upon the deposition of silver as the official measure of the efficiency of an electric current, making the international ampere ((that unvarying volume of current which, when passed through a standard aqueous solution of silver nitrate, shall deposit metallic silver at the rate of 0.001118 of a gramme per second.®

In the approved form of the silver coulometer the cathode is a small platinum bowl, and the anode is a circular silver plate. The latter is smaller in diameter than the bowl, and is riv¬ eted to a silver rod by which it is raised out of the bowl or lowered into it. The platinum bowl is set upon a clean copper plate which is connected with the appropriate pole of the bat¬ tery to be tested. The other pole is electrically connected with the silver rod. Before begin¬ ning the test the bowl is washed scrupulously clean of metallic silver with nitric acid, and then with water and with absolute alcohol. It is then dried at a temperature of 320° F. and accurately weighed. The bowl is then nearly filled with a neutral solution of nitrate of silver in distilled water — 15 parts nitrate to 85 parts water. The silver plate is wrapped with a piece of filter paper in such a way that no sediment falling from it during the operation can fall into the bowl. The current is then turned on and the exact time noted. It is allowed to run not less than half an hour. When it is turned off the time is again noted. The silver plate is raised out of the liquid and the latter poured out. The deposit in the bowl is then washed with distilled water and left to soak in it for six hours at least. It is then rinsed with dis¬ tilled water, and then with absolute alcohol and dried at 320°, after which it is allowed to cool in the drier, and then again weighed. The dif¬ ference between the two weights will show the amount of silver deposited. This weight, in grammes, divided by the number of seconds during which the operation is continued, and then by the constant 0.001118, gives the number of coulombs of current in the circuit tested. A modification of this apparatus makes use of a porous cup set within the platinum bowl and containing a bed of granulated metallic silver upon which the silver plate is set down firmly. The porous cup effectively prevents the passing of any of the ((slime55 which accumulates among the silver granules, and which, being metallic silver, would tend to vitiate the test. Consult United States Bureau of Standards, Pulletin 35 (Washington 1905), and bulletin 85 (1911).

COULTER, kol’ter, John Lee, American statistician : b. Mallory, Minn., 16 April 1881. He was educated at the universities of North Dakota, Wisconsin and Minnesota and at Iowa State College. Between 1907 and 1909 he was an instructor at Iowa State College, the Uni¬ versity of Wisconsin and the University of Min¬ nesota, where he also served for two years as assistant professor of rural economics. From 1910 to 1912 he was expert special agent of the United States Census Bureau, and during the same period he also lectured at George Wash-: ington University. He is dean of the West Vir¬

ginia College of Agriculture and director of the Experiment Station. He has written Eco¬ nomic History of the Red River Valley of the North) (1910) ; (Cooperation among Farmers) (1911) ; (The Problem of Rural Credit5 (1913), and many articles to current periodicals on economic and agricultural subjects.

COULTER, John Merle, American botan¬ ist: b. Ningpo, China, 20 Nov. 1851 He was graduated at Hanover College, Ind., 1870; was appointed botanist of the United States Geologi¬ cal Survey in the Rocky Mountains 1872-73 ; professor of the natural sciences, Hanover Col¬ lege, 1874-79, and professor of biology in Wa¬ bash College 1879-91. He was president of the University of Indiana 1891-93 ; president of Lake Forest University 1893-96, when he was elected professor and head of the department of botany in the University of Chicago. Among his many publications are (Manual of Rocky Mountain Botany) (1885); (Botany of Western Texas; Manual of the Phanerograms and Pteridophytes) (1891-94) ; Preliminary Revision of the North American Species of Cactus, etc.5 (1894); (Morphology of Spermatophytes5 (with Chamberlain, 1901) ; Plant Relations> (1899) ; Plant Structures5 (1899); Plant Studies5 (1902), the last three being excellent introduc¬ tory manuals for use in schools; Elementary Studies in Botany5 (1913) ; Eundamentals of Plant Breeding5 (1914) ; (The Evolution of Sex in Plants) (1914). He is editor of the Botanical Gazette.

COULTER, Stanley, American biologist: b. Ningpo, China, 2 June 1853. He was edu¬ cated at Hanover College. In 1887 he was appointed professor of biology and director of the biological laboratory at Purdue University and in 1907 dean of the School of Science. In 1902 he became a member of the State Board of Forestry. He wrote Eorest Trees of In¬ diana5 (1892) ; Elora of Indiana5 (1899) ; also 11 pamphlets upon nature study, 45 pamphlets of scientific studies and reports and 70 other titles, and (A Key to the Genera of the Native Forest Trees and Shrubs of Indiana5 (1907).

COUMARIN, or CUMARIN, a compound of the aromatic series, having the formula

CH:CH

CdHsOs, or CoH4 <C | and occurring in

O — CO

nature in the Tonka bean (the fruit of Coumay-rouna odorata, or

Dipteryx odorata), in small white crystals, between the seed-coating and the kernel ; also in woodruff (Asperula odor¬ ata), in the leaves and flowers of sweet-scented vernal grass (Anthoxanthum odoratum) , and in other plants. It is obtained from the Tonka bean by extraction with strong alcohol, and may also be prepared synthetically by heating sodium-salicylanhydrid with acetic anhydrid, or by heating phenol with malic and sulphuric acids. It crystallizes in colorless triclinic plates, which melt at 159° F. Coumarin is scarcely soluble in cold water, but dissolves somewhat in hot water, and freely in alcohol. It has an agreeable, aromatic odor and a burning taste. Melted with solid caustic potash, it yields acetate and salicylate of potassium. The pe¬ culiar odor of Swiss schabzieger cheese is due to the coumarin existing in the melilot that is

used in its manufacture. The <(Maiwein® (or May-wine) of the Germans is prepared by steeping woodruff in white wine, and owes its pleasant aroma to the coumarin that that herb contains. Indeed, the woodruff is often dis¬ pensed with, and the Maiwein prepared by the direct addition of an alcoholic solution of pure coumarin.

COUMOUNDOUROS, koo-moon-du'ros.

See Kumundoros, Alexander.

COUNCIL (Lat. concilum), an assembly met for deliberation, or to give advice. The term as used in an ecclesiastical sense specially applies to certain assemblies of the Roman Catholic Church. These may be classed as ecumenical, provincial or patriarchial councils and synods; but the last is not usually included among councils. An ecumenical or general council is one in which the bishops and others entitled to vote are convoked from the whole world to deliberate on the state of the Church or to meet an emergency, as the rise of a new heresy. The decrees of such a council, having received papal confirmation, are binding. A council might be ecumenical in its convocation, yet if its decrees did not receive the papal con¬ firmation they would not be binding, and the council would not be considered of ecumenical

authority. Or a council might not be ecumen¬ ical in its convocation, but its decrees being accepted and receiving the papal confirmation, it is then classed as ecumenical. The First Council of Constantinople was originally a coun¬ cil of the East, but ultimately its decrees on faith were accepted in the West and received the confirmation of the Pope. Patriarchial councils represent a whole patriarchate; national coun¬ cils, a nation ; and primatial councils, provinces -subject to a primate. (See Patriarchs). Pro¬ vincial councils are of a province and are known usually by the name of the metropolitan see. (See Metropolitan). Diocesan councils, usually termed synods, are composed of the clergy of the diocese and are presided over by the bishop or vicar-general or a representative of the bishop.

Ecumenical councils are convoked by the Pope, and are under his presidency or that of his legate. In the early ages of Christianity councils were sometimes convoked by emperors, but only by permission or by request of the Pope. The dangers and difficulties of traveling in those times made it necessary to have the protection of the civil powers, and hence the real part which the emperor took in convok¬ ing the council was to promise it immunity from those who might wish to influence or retard its deliberations. The patriarch, metro¬ politan or bishop convokes the council within his jurisdiction. The membership of councils not ecumenical consists of the local clergy, as in a diocese, or the suffragan bishops of a prov¬ ince or patriarchate. Certain rules regulating representation are observed. In the early ages (and even as late as 1598), laymen were some¬ times invited to attend provincial councils. They were permitted to present complaints and give advice, but it is very doubtful if they ever took any part in the voting. In two instances at least women attended. (See Hilda, Saint). Ecumenical councils are composed of patriarchs, archbishops and bishops and such

other ecclesiastics as may be invited for specified reasons, as theologians, one at least for each archbishop or bishop. (The Council of Trent gave procurators — priests and deacons — of absent bishops a right to vote. The Vatican council did not even admit to the council hall such procurators). In matters of faith the Holy Scriptures and the traditions of the Church are the guide, while in lighter matters human reason and expediency are consulted. In the former, ecumenical councils are held to be infallible, but in other matters of discipline, etc., the latest council decides questions. Car¬ dinals, even if not bishops or abbots, generals of regular orders, mitred abbots of whole or¬ ders, may be members with right to vote. The rule has always

prevailed that no royal repre¬ sentative may be present at any council except a general one in which ((faith, reformation and peace® are in question.

The presidency of a council does not confer an ex officio right to vote or to take part in the deliberations, such right depending upon the hierarchical rank of the one presiding.

Usually bishops take their places according to the rank of their sees. At the Vatican coun¬ cil they were arranged according to their hierarchical rank, — first the Pope, then the cardi¬ nals, patriarchs, primates, archbishops, bishops, abbots and generals of orders. The voting is generally by single vote, but at Constance the vote was by nations. At Basel the members were divided into four deputations which met separately. Decrees passed by three deputa¬ tions were accepted by all. At Trent much of the matter to be debated was first considered by commissions. (See Counter-Reformation). The proceedings of the Vatican council, not yet finished, were conducted in a somewhat similar manner.

Church historians usually regard the assem¬ bly of the apostles in Jerusalem described in the Acts of the Apostles as the first example of a general council of the Church; yet that as¬ sembly is not entered in the list of the 20 general councils. From the times immediately subsequent to the epoch of the apostles, the fathers always on occasion of controversy over questions of faith or of discipline appeal to the tradition of the apostolic doctrine and govern¬ ment as preserved in the churches founded by the several apostles or authentically derived thence, to the churches scattered over the world. Not till peace was assured to the Christian body by Constantine was it deemed prudent to hold a general assembly of the Church's pas¬ tors, the bishops ; though in various provinces of the empire ■ — in Gaul and Spain, in Mesopo¬ tamia, in Africa, synods or councils were held even in the times of persecution. But in the year 325 there assembled at Nicsea in Bithynia, at the call of the emperor, the first or Nicene council. As this council and many which fol¬ lowed were in their membership predominantly Eastern, so in later councils Western bishops predominated ; and for some time the decrees of these predominantly Eastern, or predominantly Western, councils were not accepted by both sections; but in time many of them received a tacit acceptance as expressing the teaching of the whole Church Catholic; while the decrees of other Eastern and other Western churches are ignored on one side or the other.

The general or ecumenical councils of the

Church, as reckoned by Roman Catholic his¬

torians, are as follows :

A.D.

1. Council of Nice (Niccza) . 325

2. First Council of Constantinople . 381

3. Council of Ephesus . 431

4. Council of Cnalcedon . 451

5. Second Council of Constantinople . 553

6. Third Council of Constantinople . 680

7. Second Council of Nice . 787

8. Fourth Council of Constantinople . 869

9. First Council of Lateran . 1123

10. Second Council of Lateran . 1139

11. Third Council of Lateran . 1179

12. Fourth Council of Lateran . 1215

13. First Council of Lyons . 1245

14. Second Council of Lyons … . . 1274

15. Council of Vienne . 1311

16. Council of Constance . 1414-1418

17. Council of Basel . 1431-1438

Council of Basel continued in Council of Ferrara-Florence . 1438-1442

18. Fifth Council of Lateran . 1512-1517

19. Council of Trent . 1545-1563

20. Council of the Vatican (not finished) . 1869

Of these councils the Greek Church ac¬ knowledges the first seven. See separate oc-counts of the different ecumenical councils.

Among religious bodies of the Protestant faith the word council is applied to assemblies lacking the authoritative form of the Roman Catholic councils. In the Baptist and Congre¬ gational denominations it is customary to use the term council in relation t9 gatherings called on matters of local or restricted interest or in connection with ordinations or other church functions. A national council in these denom¬ inations is advisory in its nature. The Pan-Presbyterian Alliance is in the nature of a coun¬ cil of churches following the Presbyterian form of organization and holding the Reformed faith. The Evangelical Alliance (q.v.) is broad and inclusive in its constituent elements and in the themes considered. In the systematic nature of their organizations and the authoritative character of their decisions the councils of the Roman Catholic Church are more nearly related to the permanent governing bodies of evangeli¬ cal sects charged with the regulation of faith, order and discipline — such as the general and diocesan conventions of the Protestant Episco¬ pal Church, the general assemblies and synods of the Presbyterian Church, the general con¬ ferences of the Methodist Church, *etc.*

In its use as a term relating to civil gov¬ ernment, the word council signifies a body of men selected to advise a sovereign or other ruler. The body exercising such functions in Great Britain is known as the privy council (q.v.). In colonial times there existed in Amer¬ ica councils modeled on the English privy coun¬ cil and originally intended as the executive bod¬ ies of the various provinces, in conferences with the respective governors. Such a body was called the executive council or legislative coun¬ cil, or simply the council, and besides Rs execu¬ tive functions bore much the same relation to the popular assembly that the senate does to the house in the States. As

the legislatures developed into the form in which we now know them, the upper house kept the name council till long after the Revolution; in South Caro¬ lina till 1790; in Delaware till 1792; in Georgia till 1793 and in Vermont till 1836. The Terri¬ tories have retained the name, and it is used in some States for a body like that in the old provinces, the executive council of the governor. The great history of the councils from the vol. 8 — 7

Apostolic Age to the Council of Trent is by C. J. Hefele, assisted in the latter part by A. Knofler and Cardinal Hergenrother (9 vols., Freiburg 1855-90). Consult also Mansi's collec¬ tion of canons and other acts of the councils (31 vols., Florence and Venice 1759-98) ; Per-cival, (Canons and Dogmatic Decrees } (New York 1900).

COUNCIL OF BLOOD, The, a court created in the Netherlands by the Duke of Alva, its object being to put down all agitation caused by the religious and political tyranny of Philip II, Its first session was held 20 Sept. 1567, and in less than three months it had put to death 1,800 persons, among them the counts of Eg-mont and of Hoorn. See Alva.

COUNCIL BLUFFS, I owa, city and county-seat of Pottawattamie County, situated on the left bank of the Missouri, opposite Omaha, Neb., at the junction of several rail¬ roads, chief of which are the Union Pacific; Chicago and Northwestern; Chicago, Milwau¬ kee and Saint Paul ; Chicago, Burlington and Quincy; Chicago, Rock Island and Pacific; and the Illinois Central. The name is said to have been derived from a council held here in 1804 between the Indians and the explorers Lewis and Clark. In April 1847 the Mormons, who had been violently expelled from this place, became the pioneers of the new Mormon settle¬ ment of Utah. The city is well laid out, with brick-paved streets, and lies to a great extent on a plain underlying high bluffs. Electric lines connect it with Lake Manawa, a beautiful sum¬ mer resort three miles south of the city, and with Fairmount and other parks. Council Bluffs is the seat of the Iowa School for the Deaf, and has a fine public library building. Railroad and wagon bridges over the Missouri and electric lines connect it with Omaha, with which city there is extensive traffic. Council Bluffs is one of the great agricultural-implement trade centres of the world and also has a large trade in fruit and produce. There are eight large grain elevators. The city government is vested in a mayor, elected for two years, and a city council. Pop. (1920) 36,162.

COUNCIL OF THE ELDERS (conseil des anciens). See Directory.

COUNCIL OF FIVE HUNDRED (con¬ seil des cinqcents). See Directory.

COUNCIL GROVE, Kan., city and county-seat of Morris County, situated on the Neosho River, and on the Missouri, Kansas and Texas and the Missouri Pacific railroads, about 50 miles from Topeka. It is the centre of rich grazing country, and its principal business is connected with stock raising. The city is sit¬ uated on the old Santa Fe trail, and contains a public library. It was settled in 1847 and is one of the oldest towns in the State. It adopted the commission form of government in 1911. Pop. 3,000.

COUNCIL OF THE INDIES, The, a

tribunal to which, in conjunction with the Casa de Contratacion, or India House, at Seville, the administration of the Spanish colonies was as¬ signed by King Ferdinand. It was the business of these two tribunals to further the progress of discovery, watch over the infant settle¬ ments and adjust the disputes which grew up in them. Eventually the India House was sub-

ordinated to the council, the powers of the latter having been greatly extended in the reign of Charles V.

COUNCIL OF TEN, a secret tribunal in the old republic of Venice, instituted in 1310, after the conspiracy of Tiepolo. It was first composed of 10 members who wore black cos¬ tumes ; later six more, who wore red, were added. This council was founded to protect the interests of the state, and it had power to punish its enemies. All its processes were secret, and through its means some of the most wicked and bloodiest crimes were committed. At first established temporarily, it was pro¬ longed from year to year until 1335 it was declared perpetual. It went down with the republic in 1797. The archives of the council extending from 1315 to the end of the republic throw great light on the history, political, ecclesiastical and economic, from that period to the end of the republic. Consult Brown, (Studies in Venetian

History* (2 vols., London

1907).

COUNCIL OF TRENT. See Trent,

Council of.

COUNCIL OF WAR, an assembly of officers of high rank called to consult with the commander-in-chief of an army or admiral of a fleet on matters of supreme importance. The commandant of a garrison will accept or gen¬ erally solicit the advice of such a council before surrendering to an enemy.

COUNCILLORS, City. See City Coun¬ cils, American.

COUNCILMAN, William Thomas, Ameri¬ can physician: b. Pikesville, Md., 2 Jan. 1854. He was educated at the University of Maryland, and at Vienna and Leipzig, was for some time associate professor of pathology in Johns Hop¬ kins University and has been Shattuck pro¬ fessor of pathological anatomy at Harvard University since 1892. He has given much at¬ tention to the study of smallpox and has recently announced his important discovery of the probable etiology of smallpox. He has published (A Contribution to the Study of Inflammation (1879) ; (On the Etiology of Malaria) (1884) ; (Syphilis of the Lungs) (1890); (Pathology) (1902); (Pathology: A Manual for Teachers and Students* (1912) ; (Disease and its Causes* (1913) ; besides mono¬ graphs on dysentery, cerebrospinal meningitis, diphtheria, smallpox, and other papers.

COUNSEL, in the United States a term applied indiscriminately to all members of the legal profession retained in a cause ; as, the counsel for the defendant. In the United King¬ dom the word has a limited and specific use, ((lawyers,® as the term is understood in Amer¬ ica, being classified as advocates, attorneys, barristers, counsellors, proctors, serjean'ts, so¬ licitors (qq.v.), *etc.* The function of the coun¬ sellor, or more usually barrister, is the pleading of cases in court from the data furnished to him by the attorney or solicitor in the form termed a brief (q.v.). King's counsel (ab¬ breviated K.C.) are barristers appointed counsel to the Crown by the lord chancellor. They have the privilege of wearing silk gowns instead of the stuff gowns worn by ordinary barristers, of whom the king's counsel takes precedence,

pleading cases from within the bar, while the utter or outer barristers plead beyond the bar.

COUNSELLOR AT LAW. In the United States a counsellor at law is a lawyer author¬ ized to follow his profession and practice in the superior courts of record. The special function of a counsellor at law is to give advice as to the legal aspect of judicial proceedings, to try causes, argue motions or appeals, or conduct any other legal business that takes him into the presence of the courts. A distinction is made between counsellors and attorneys-at- law ; this, however, was never strictly observed in this country, and now the two designations are used interchangeably, or in combination, in all the States but one — the title of a practising lawyer in this country being ordinarily, ((Attor¬ ney and Counsellor at Law.® In England, not only has the distinction in titles been preserved, but a variety of designations has been applied to members of the legal profession, according to the courts in which they practised and of which they were officers, or according to their special functions. Practitioners in the common law courts at Westminster, and also country lawyers enrolled in the Courts Leet and other inferior tribunals in the shires and boroughs, were called attorneys ; practitioners in the Court of Chancery were known as solicitors, while those practising in the Admiralty and Ecclesiastical Courts and other tribunals where the civil and canon law was administered were called proctors. The titles solicitor and proctor are sometimes used by lawyers in the United States when they appear in equity suits or proceedings in the Admiralty and Probate Courts, but this is a matter of fancy and has no specific legal or customary ˆauction. These distinctive appellatives have been obliterated to some extent in England. According to the Judicature Act of 1873, whereby the King's Bench, Common Pleas, Exchequer, Chancery, Admiralty and Probate and Divorce Courts were consolidated, practitioners theretofore designated solicitors in chancery or proctors were to be called solicitors of the Supreme Court. Only a barrister, however, may prac¬ tise as counsel in the trial and advocacy of causes in the superior courts. The initiation of law suits, the drawing of ordinary pleadings, the preparation of evidence and briefs, and attendance to all preliminaries up to the actual trial or argument in open court, are functions of attorneys or solicitors. A person qualified to become a barrister may waive a call to the bar and be licensed to practise, ((under the bar,® as a conveyancer or special pleader. The sim¬ plification of pleadings by the modern practice acts has effected a decline in the demand for specialists, however, and this work now gen¬ erally falls to junior barristers. The highest rank among barristers is that of king's (or queen's) counsel. When engaged with

other barristers in a case these counsel lead the trial, and they give opinions on questions of law submitted to them ; in which respect their office is somewhat like that of the jurisconsults of Rome and of Continental Europe. Sergeants-at-law rank after king's or queen's counsel and, while the order of sergeants still exists, no new appointments are being made, so that this title will, and is probably intended to, be¬ come extinct. In the Admiralty and Ecclesias-

tical Courts among <(the civilians and canonists,® as Blackstone rather contemptuously calls them — the title corresponding to that of barrister-at-law is advocate. Counsellors, barristers, ad¬ vocates, attorneys, solicitors and proctors, all alike, are officers of the courts in which they are enrolled and subject to the discipline of these tribunals. While they are not officers ad¬ ministering a public trust, strictly speaking, but rather officers exercising a privilege or franchise, they are, nevertheless, regarded as officers of the state with obligations to the pub¬ lic no less significant than their obligations to their clients.

Education for the bar has been regarded in all times and under all juristical systems as a severely practical matter. Cicero's definition of a jurisconsult — as a person ((skilled in the laws and in the usages current among private citizens, and in giving opinions, bringing ac¬ tions and taking security® — still holds good. Nor is the manner in which such skill was acquired in ancient Rome without its modern parallel. Every jurisconsult had in his train a number of pupils, who followed their master to the courts, listened while he was advising his clients or delivering opinions, and obtained their knowledge of legal procedure by practice, and of the usages current among merchants and other private citizens by actual contact with men and affairs. We may be sure a great deal of ((sea law® was picked up by the budding jurisconsults of Rome from the Rhodian and othˆr mariners who beached their ships on the strand at Ostia. In later days, when Ulpian and the other learned jurists, whom the Emperor Justinian commissioned to codify the jus civilis, had evolved a science of jurisprudence, they compiled the <Institutes) as a compendium espe¬ cially designed for the instruction of students in the principles of law. With the revival of learning, after the Dark Ages, the Roman, or

<(civil,® law became one of the subjects of study at the universities. The University of Bologna, in particular, where Irnerius in the second half of the 11th century introduced, and lectured on, the (Corpus Juris Civilis,) became famous as a seat of the higher education in juristic lore. The interest there aroused spread all over Europe. The emancipation of the human mind and, also, the development of the modern state were due in no small measure to this influence. One effect, however, was the arrest of the de¬ velopment of the body of customary Teutonic law into an independent system. In Germany the jus civilis became supreme and the doctors and practitioners of law there knew little but what they had learned from the Pandects. In England the propagation of the Roman law, civil and canonical, was strenuously resisted and successfully combated by the judges and practitioners in the king's courts. The Inns of Court, not the universities, became the schools for the education of lawyers in the common law, as they still are. These inns — they are really colleges — maintained by the four ancient law societies, are known as the Inner and Middle Temple, Lincoln's Inn and Gray's Inn. To each of these there are attached one or more Chancery Inns, which have the character of preparatory schools. To be ad¬ mitted to practise as a barrister one must be a member of one of the law societies, and have followed a prescribed course of study at one

of the Inns of Court. The method of instruc¬ tion was by moots or disputations, and lectures or readings by barristers. The call to the bar proceeds not from the courts but the superior order of benchers, who are the custodians of the property of the societies and directors of their affairs, and who control the discipline of the profession. The inns, however, are sub¬ ject to the visitorial powers of the judges of the superior courts. At the present time the chancery inns are used merely as chambers by barristers, to which the latter, unless they be king's or queen's counsel, are expected to admit pupils. A university training in the liberal arts or sciences is not a prerequisite to entrance as a pupil into a barrister's chambers or as a student to the Inns of Court. Until its dispersal in 1858 the College of Advocates in Doctors' Commons stood in somewhat simi¬ lar relation to advocates in the admiralty and ecclesiastical courts of England that th-e Inns of Courts did to barristers. Advocates, however, were graduates of the universities, where they were instructed in civil and canon law.

The qualification and admission to practice of attorneys and solicitors in England, as of attorneys and counsellors in the United States, are under the direction of the courts. Usually students of law in England

who do not aspire to become barristers begin by entering as ar¬ ticled clerks in the service of attorneys or solicitors, and a legal education there as here is obtained mainly by practical experience. In Canada the regulation of admissions to the bar rests with the Law Society of the Dominion. No person has the privilege of practising law who has not been duly admitted to the bar, and all proceedings or judgments obtained in an action brought bv one unauthorized to repre¬ sent litigants as an attorney or counsellor at law are ipso-facto invalidated. In courts not of record a license to practise is not necessary, though there are some exceptions to this rule. Any person, however, may appear in his own behalf in any court. In this country admission to the bar is regarded a judicial act and the right to admit, generally speaking, is vested in the courts exclusively. In the exercise of the police power of the States, however, legis¬ latures have assumed the making of regulations, which are held binding on the courts. This has been denied in several weighty opinions, how¬ ever, wherein such legislative intervention is held to conflict with the constitutional powers of the judiciary. Applicants for admission to practise in the Federal courts are required to show that they are attorneys or counsellors at law duly authorized to practise in the Supreme Court of the State where they were domiciled at the time of their admission. Good character and fair professional standing, of course, are essentials. An applicant for admission to prac¬ tise in the State courts must possess the requisite ability and legal training, to test which he must submit to examination by the court itself, or by examiners appointed for that purpose. Courses of study, periods of preparation and other conditions are prescribed by rules made, usually by the Supreme Court of the State. If the unit of judicial organization is the county, as is the case in Pennsylvania where the highest court of original jurisdiction is the Common Pleas Court in each county, the rules of ad¬ mission are established by this tribunal. But

even in Pennsylvania the Supreme Court grants admissions to practise at its own bar, and this privilege carries with it the right to practise at the bar of any county in the State. The rules governing admissions usually require that the applicant have studied law at a recognized law school, or in the office of a practising attorney, for a minimum term of two years. Where the period of study is spent in a lawyer's office the term is in many cases extended to three years, and the student is required to file a cer¬ tificate of entry when his service in his mentor's law office begins. In some States students must pass a regents' examination in the liberal arts and obtain and file a regents' certificate of pro¬ ficiency before they take their examination for admission to the bar. In New York the regents' examination must be taken within three months after the beginning of the student's term of service in a law office. In some jurisdictions proof that the applicant has pursued classical studies to some extent, shortens the ordinarily required period of service in a law office. Dur¬ ing his law clerkship the applicant must have been actually engaged in assisting in business the attorney he serves, and have studied under the control and personal direction of his pre¬ ceptor. Every important university in the United States now has a law department and in many States the graduates of recognized law schools, who have received the degree of "Bachelor of Laws,® are admitted to practise at the bar without examination. This courtesy is frequently extended also to attorneys or counsellors admitted to practise in the superior courts of other States ; but this rule of comity, once universal, is meeting with growing dis¬ favor. New jersey takes the exceptional posi¬ tion among the States of distinguishing between attorneys and counsellors. Only counsellors have the privilege of practising in the Supreme and Chancery courts, and no one can become a counsellor until he has been admitted and has practised as attorney for three years.

The suspension or disbarment of counsellors or attorneys-at-law, like their admission, is in the control of the courts and under their regu¬ lation. Suspension or disbarment, being judi¬ cial acts, cannot be accomplished by arbitrary procedure. There must be a sufficient cause for action and the preferment of charges and a hearing are indispensable. The conviction of an attorney or counsellor of a crime involving moral turpitude is, of course, a ground for disbarment, but suspension or disbarment may follow misconduct which is merely unprofes¬ sional and does not constitute an indictable offense. The

legal profession itself assumes disciplinary powers over its members and al¬ most every county bar association maintains a complaint committee, to which charges made against members of the local bar are referred for investigation and eventual prosecution. A long step forward was taken in professional self-discipline when the Alabama State Bar Association in 1898 adopted a (Code of Legal Ethics. > This was reprinted with obvious ap¬ proval in 118 Georgia Reports. On 27 Aug. 1908, finally, the American Bar Association at its annual meeting approved and adopted a (Canon of Ethics* in 31 articles, of which the following is an epitome: (1) It is the duty of counsel to maintain toward the court a re¬ spectful attitude; (2) Members of the bar

should prevent political considerations from outweighing fitness in the selection of judges; (3) Counsel should not exert influence on the court by marked attentions, unusual hospitality, etc., toward judges, which are uncalled for by the personal relations of the parties; (4) A lawyer assigned as counsel to an indigent pris¬ oner should not ask to be excused for trivial reasons, but protect the interests thus commit¬ ted to him to the best of his ability; (5) It is a right of a lawyer to undertake the defense of a person accused of crime, regardless of his private opinions as to the guilt of the party; the primary duty of a public prosecutor is not to convict but to see that justice is done; (6) A lawyer must disclose at the time of his retainer all circumstances of his private rela¬ tions to the parties, and any interest or con¬ nection he has with the controversy, such as might influence a client in the selection of counsel. To represent opposing interests, ex¬ cept by the express consent of all parties, is unprofessional; (7) Lawyers jointly prosecut¬ ing or defending a cause and failing to agree must state their differences to their clients and leave the matter to the latters' decision. The suggestion of a client to call in other counsel is no ground for offense ; (8) Lawyers should endeavor to obtain full knowledge of the facts of a case before advising thereon and are bound to give candid opinions of the merits and of the probable results of contemplated litigation ; (9) A lawyer should not communicate on a subject of controversy with an opposing party who is represented by counsel, nor should he in any manner mislead a party not so repre¬ sented; (10) A lawyer must not acquire any pecuniary or other beneficial interest in the subject matter of a litigation in which he is taking part; (11) When money or trust prop¬ erty comes into the hands of an attorney the fact should be promptly reported to his client; the same must not be commingled with the attorney's private property or used by him ; (12) Lawyers should avoid making charges for services which overestimate their value, as

well as such as underestimate the same ; a client's ability to pay does not justify excessive charges, though a client's poverty may require a smaller fee to be demanded; (13) Contingent fees, when sanctioned by law, should be under su¬ pervision of the court; (14) Controversies with clients concerning compensation should be avoided and suits to recover the same resorted to only to prevent injustice, imposition and fraud; (15) It is not the duty of a lawyer to do unscrupulously whatever may enable him to win a client's case : it is improper for a lawyer to assert in argument his personal belief in the innocence of a client or the justice of his cause. No fear of judicial disfavor or public unpopu¬ larity should deter a lawyer from the full dis¬ charge of his duty, but the great trust of a lawyer is to be performed within, not without, the bounds of the law. No violation of law, no fraud or chicane, is demanded of him for any client, however powerful or influential. The lawyer must obey the dictates of his own con¬ science; (16) A lawyer must restrain and pre¬ vent his client from doing things which he himself ought not to do; (17) Ill-feeling be¬ tween litigants should not influence counsel in the conduct of a case. All personalities between counsel should be scrupulously avoided;

(18) Adverse witnesses and suitors should be treated with fairness and consideration; a lawyer must never minister to the malevolence of a client; (19) When a lawyer is a witness, except with regard to merely formal matters, he should leave the trial to other counsel ; (20) Newspaper discussion by lawyers of pend¬ ing litigation is condemned; (21) Punctuality is a prime duty of a lawyer; (22) Conduct before a court must be characterized by candor and fairness. To knowingly misquote docu¬ ments or the oral testimony of witnesses, or the language or argument of opposing counsel, is unprofessional and dishonorable. So also is the getting before a jury, in the form of argu¬ ment, testimony that would be excluded as objectionable; (23) Fawning or flattery of a jury, or pretended solicitude for their personal comfort, is unprofessional. So also is con¬ versation with jurors privately about a case either before, during or after the trial; (24, 25, 26) Condemn refusal to extend professional

courtesies to opposing counsel when no harm can be done thereby to a client's interest ; con¬ demn the taking of technical advantage of the trustfulness of opposing counsel, the repudia¬ tion of unwritten agreements with regard to the incidents of a legal proceeding and other sharp practices ; (27) The publication of ordinary

business cards is not improper, but solicitation of business by circular or advertising, or through touters, or by inspiring newspaper comment, which magnifies the importance of the services of the advertiser or of the cases in which he is engaged, are denounced as un¬ professional ; (28) Stirring up litigation di¬

rectly or through agents is not only unprofes¬ sional but indictable at common law; (29) Law¬ yers should expose corrupt or dishonorable conduct in the profession and accept employ¬ ment unhesitatingly against an attorney who has wronged his client; (30) A lawyer must decline to conduct a cause or make a defense the purpose whereof is merely to harass the opposing party or work oppression; (31) No lawyer is obligated to act either as adviser or advocate for every person who may wish to become his client. Consult (Corpus Juris> (Vol. VI, p. 556, under title <(Attorney and Client,® §§ 1-121) ; Carter, (Ethics of the Legal Profession (1915) ; Costigan, G. P., Jr., (Cases and Other Authorities on Legal Ethics > (Saint Paul 1917) ; Loftie, W. J., (Inns of Court and Chancery* (London 1895) ; Home, G., and Headlam, C., (The Inns of Court) (London

1909).

Stephen Pfeil.

COUNT (Lat. comes) appears to have been first used, as a title of dignity, under the reign of Constantine. During the existence of the republic the inferior officers as tribuni, prcefecti, scribce, medici, haruspices, accensi prce cones, who accompanied the proconsules and proprce-tores into their provincial governments, were known as the comites or coliors of their pro¬ vincial. On the establishment of the imperial government the name was applied to the court and household of the prince; and Dio (53) mentions a council of senators selected by Augustus as his comites. On the first distribu¬ tion of his dominions, and the foundation of the new capital by Constantine, 10 out of 35 provincial generals received the title of comes .

After the fall of the Roman power the title was retained by the conquerors; and under Charlemagne it denoted equally a military or civil employment. About the end of the 15th century, in Germany, and under the last princes of the Morovingian race in France, the title appears to have become hereditary in families. The institutions of the ancient German tribes may have contributed much to the establishment of this class of nobles. In early times, before the existence of the Latin comites, the Ger¬ mans had officers chosen, at least in some tribes, by the people. These were a kind of inferior judges. After the Franks became the ruling nation they made a change in their character. The king now appointed them, and they exer¬ cised jurisdiction over certain districts in the king's name, with the title of grafen. These ancient officers are perhaps as fairly entitled as the comites to be considered the root of the subsequent counts. The German title graf cor¬ responds to the title <(count® in other countries of Europe. These grafen superintended the administration of justice, the police and the taxes. After the time of the Carlovingian dy¬ nasty different classes of counts or grafen were formed; thus pfalzgrafen, or comites Palatii, the judges of the court who decided whether a case should be brought before the king; mark-grafen, counts of the frontiers ; holzgrafen, counts of the forest, that is, .inspectors, *etc.* These royal officers soon usurped power which did not belong to them, and treated the people so badly that the emperors and kings were obliged to go themselves into the provinces and hold courts, or to send particular officers for this purpose, called sendgrafen. The sheriffs in England were originally the deputies of the English counts or earls, who correspond to the German grafen. The wife of an earl has been called <(countess® from very early times. Their Latin title is still vice-comes. Their English title, derived from <(shire® and ((gerefa,® has the same origin with the German graf. (See Sheriff). In the 12th century the division of counties on the continent of Europe was abolished, and thus the counts lost their jurisdiction, except on their own possessions. In point of rank, the English earls are considered as corresponding to the continental counts. In Italy a large num¬ ber of landed counts were created, but they are no longer recognized by the government. In Spain the title is still of value owing to the existence of primogeniture. In the Russian mon¬ archy the title of graf bore little social prestige. In present times, the Japanese use the word to translate a similar rank in their country. (See County; Earl; Titles of Honor). Consult Sel-den, (Titles of Honor) (London 1672) ; Luchaire, (Essai sur l'origine de la noblesse en France au moyen age* (Paris 1902) ; Brunner, Deutsche Rechtsgeschichte) (Vol. II, Leipzig

1892).

COUNT OF MONTE CRISTO, The.

A typical novel of the romantic period in France was (The Count of Monte Cristo,* by Alexan¬ dre Dumas, written from 1841 to 1845 with the assistance of two minor collaborators, Auguste Maquet and P. A. Fiorentino. It was begun before and completed after the. equally famous (Three Musketeers,* from which it differs in being more melodramatic and intense, less natural and humorous. The protagonist, Ed¬ mond Dantes, bears the earmarks of the roman-

tic hero of the Byronic poems, although he is not so sentimental, being endowed with an active passion that sets him wrestling with superhuman difficulties instead of brooding over them in sick despair. Dantes is the victim of unscrupulous enemies, a gloomy giant outraged by society. Unjustly confined within the dun¬ geons of the Chateau d'lf, he learns from a fellow prisoner the arts and sciences, and the secret of a buried treasure. When his com¬ panion dies, Dantes, assuming the role of the corpse, is flung into the sea and swims to free¬ dom. He recovers the lost treasure, and, as the possessor of immense wealth, proceeds to work out his elaborate schemes for mysteriously rewarding those who have been his benefactors, and wreaking vengeance upon those who are responsible for his misfortunes. He is ruthless in his pursuit of these enemies, insinuating himself unsuspected into their good graces, and leading them on by diverse paths to destruction. Fernand, who had married Dantes' sweetheart, is brought to suicide ; Danglars, who had per¬ mitted the father of Dantes to die of starvation, is forced into bankruptcy and social disgrace ; and de Villefort, who had treacherously secured the imprisonment of Dantes, is publicly humili¬ ated, and when his criminal wife slays herself and her son, he goes raving mad. With his thirst for revenge thus slaked, Dantes turns for solace to the fair Haydee, daughter of Ali Pacha, ruler of the Greeks.

Duels, poisonings, sleeping potions that in¬ duce the semblance of death, documents written with invisible ink, secret passages, luxuriously furnished grottoes, disguisings, and all the other paraphernalia of hectic romance are mustered here for duty. Villainy and virtue are extreme ; demons and angels rub shoulders. Slaves, ban¬ dits, bankers, soldiers, sailors, priests throng the pages, every one of which yields its thrill.

In power of improvisation, Dumas vies with Walter Scott; and in wildness of imagination far surpasses him. The intricate plot of the novel is woven with consummate skill, and, theatric as are its scenes and personages, they win at least that temporary, suspension of dis¬ belief which Coleridge would exact of all ro¬ mance. Indeed, in many matters of detail, Dumas has taken care to arouse in his reader, not only the pleasure of surprise, but that also of recognition. Thus, in his account of the ingenuity of the Abbe Faria in fashioning vari¬ ous articles for use in the dungeon, he has torn realistic leaves from (Robinson Crusoe. } Feat¬ ures of the intrigue he drew from Peuchet's (Police devoilee) after his publishers had asked an exciting story in the style of Eugene Sue's (Mysteries of Parish The Roman scenes he completed before it occurred to him to develop fully the incidents connected with Marseilles and the Chateau d'lf, now so auspiciously setting the story in motion. The location of the buried treasure and the title he hit upon during a visit, in 1842, to Elba, off the coast of which he noticed the rocky island of Monte Cristo. Translations and dramatizations of the romance have appeared in every modern language.

Frank W. Chandler.

COUNT OF PRESIDENTIAL VOTES.

See Electors, United States Presidential.

COUNT ROBERT OF PARIS, a novel by Sir Walter Scott, published in 1831. The

scene is laid in Constantinople during the reign of Alexius Comnenus (1080-1118). Many his¬ torical facts are altered for artistic effect.

COUNTER-IRRITATION, the produc¬ tion of an artificial inflammation in order to relieve another in some other part of the body. The principal counter-irritants are dealt with in the article on blister (q.v.).

COUNTER REFORMATION, a move¬ ment that assumed importance in the Roman Catholic Church in the 16th century, and lasted from 1560 in the pontificate of Pope Pius IV to 1648, the end of the Thirty Years' War. Before the Protestant Reformation the synods and provincial councils of the Church had always considered and acted upon points requir¬ ing reform. Luther, as a Catholic priest, em¬ phasized the urgent need for further reforms of abuses which were creeping into the Church. When he seceded and became a Protestant, the reformation movement in the Catholic Church continued, growing in its formidable aspect to a more or less definite and avowed attempt to counteract the Protestant Reformation. It was an inevitable outcome of the very conditions that produced the great schism. Among those who shared the widespread discontent with existing abuses in the Church and who longed for a return to its apostolic purity and sim¬ plicity, there were many who remained loyal to the parent communion and believed in the pos¬ sibility of an internal reform. There were others whose piety and sincerity of motive were more questionable, but who from wise policy advocated an amendment of life and doctrine, perceiving that moral and not physical force was required to keep wavering adherents within the Church's pale and to regain those who had broken away. The Council of Trent was one of the most prominent of the factors in the problem counteracting the spread of the Re¬ formed faith. Conciliatory measures which were originally intended were abandoned after the fifth session and attention was concentrated on the reaffirmation of doctrines questioned by the Protestants and on regulations for the puri¬ fication of the Church. Although Macaulay's estimate of the Jesuits' share in the Counter-Reformation is exaggerated, the devotion and zeal of Loyola and his followers undoubtedly played a large part in the abatement of ecclesi¬ astical scandals and abuses. The Jesuits per¬ ceived that in an age of intellectual ferment and inquiry the Church must control the education of the better classes if she would retain her spiritual influence with them, and in the per¬ fectly organized Society of Jesus they offered her an instrument fitted for the task. The rep¬ resentative and punitive features of the Coun¬ ter-Reformation as illustrated by the work of the Inquisition (especially in Spain and in the Netherlands), and by force of arms, banish¬ ment, confiscation and other political penalties, are familiar, being more frequently dwelt upon than the changes taking place within the Church. Consult Pennington, A. R., (History of the Counter-Reformation) (London 1900) ; Ward, A., (History of the Counter-Reformation (New York 1889) ; Wiedemann, (Geschichte der Reformation und Gegenreformation) (Enns, 5 vols., 1879-86).

COUNTERFEITING, the making of imi¬ tations or counterfeits of money, either paper or

coin, — in an extended sense including some de¬ grees of forgery and other cases of fraudulent imitation, as spurious trade-marks or dies. This is a crime heavily punishable by statute, and the United States government has legislated at con¬ siderable length for its suppression. The pun¬ ishment prescribed for imitating United States paper money is a fine of not over $5,000 and imprisonment at hard labor not exceeding 15 years ; for counterfeiting coin, the penalty is a fine not over $5,000 and imprisonment at hard labor not exceeding 10 years; for minor coins of five cents and less, $1,000 fine and five years' imprisonment is the maximum. For having counterfeit money or counterfeit tools in pos¬ session, or for counterfeiting post office locks, or for altering or reusing revenue stamps, sim¬ ilar penalties are prescribed by statute. The United States laws on the subject may be found in the Revised Statutes, §§ 5413 et seq.

For the suppression of counterfeiting and enforcement of the laws on the subject, the United States has been divided into 10 secret-service districts, in each of which officials are constantly working to detect passers of coun¬ terfeit money and ferret out those who are engaged in its manufacture.

The paper money of the United States has been rendered very difficult of imitation by reason of the high character of the workman¬ ship employed. The paper used includes colored silk threads, and as the manufacture of such paper for other purposes is prohibited, the counterfeiter must either control a paper mill, involving a very heavy investment, or must steal some government paper, or imitate the colored threads with colored lines written or printed. Pen-written lines are the usual form of imita¬ tion of these, commercial paper being employed, the nearest to the government paper that the counterfeiter can buy. The engraving of the plates is of such high quality that there are usually not a dozen men in the country, outside of those engaged on the goverment notes, who are capable of executing good imitations, and these men are known to the secret-service, which keeps an eye on them and their associates. The printing is done in colored inks in order to prevent reproduction of the plates by pho¬

tography, which would be comparatively easy if printed in black. These conditions, combined with excellent work by the secret-service, have almost stopped the counterfeiting of United States paper money, and the temptation to counterfeit is still further reduced by the gov¬ ernment's policy of changing the designs of the notes frequently and withdrawing the old paper from circulation, rendering it certain that a high-class counterfeit would be driven out of circulation in a short time.

The success of counterfeiters is not so much due to the cleverness of their work as it is due to the ignorance and carelessness of the general public. A man who is not familiar with the distinctive earmarks on the genuine money of the land cannot be expected to detect the coun¬ terfeit presentment of them when they face him on spurious money; so that every man ought to make himself familiar with these distinctive earmarks of real money — and he must do so if he would successfully protect himself against the skilful imitations and the cunning devices of the shrewd counterfeiters who infest the

land and prey upon this species of popular ignorance.

Steel-engraving is a fine art, about which the general public knows next to nothing; and yet the possibility of detecting counterfeit paper money unerringly is bound up in the engraved features of its make-up. Of course, it is not contended that everyone must become a master of the engraver's art before he can successfully detect counterfeit money; but it is contended that he must make himself so familiar with the distinctive features of the genuine machine¬ engraving on the national currency that he can distinguish it from spurious and imperfect imi¬ tations of it. Nor is it a very difficult task. It can be done by anyone who will take the trouble incident to a proper study of the subject. The work executed by the government, as well as that which is executed by the banknote com¬ panies, possesses great beauty in its art and exact perfection in its execution and finish. It is mathematically and geometrically exact in all its parts, while the spurious work of imitating counterfeiters is necessarily imperfect in these respects.

This is due to the fact that the former is done by machinery, while the latter is done by hand; and to the further fact that hand-engrav¬ ing, even when aided by simple machinery, can never approach the beauty, exactness and gen¬ eral perfection of machine-engraving. And yet although these very designs have bound up in them the chief

safeguards which the govern¬ ment has thrown around our national currency to protect it against being successfully counter¬ feited, not one man in any 10 met upon the streets of our cities, much less among the rustic tillers of the soil, is familiar with either the character or the object of these beautiful de¬ signs which are found upon our national cur¬ rency. This fact is very aptly illustrated by the tests which are applied by different persons to determine whether a suspected note is spurious or genuine: one looks carefully for pen-holes; another scans it for signs of wear, and another scrutinizes the vignettes, while others examine the paper, — not knowing that all of these evi¬ dences may be counterfeited successfully or imi¬ tated so perfectly as to deceive almost anyone; but very few, if any, apply those real tests which involve the only truly and unmistakably distinc¬ tive features of genuine notes. Hence, the alarming success of counterfeiters in passing their spurious products is not so much due to the fact that the excellence of their imitations of these distinctive features of genuine notes is prone to deceive the intelligent observer as it is due to the fact that the general public is igno¬ rant concerning the construction, purpose, char¬ acter and distinctive features of that difference which distinguishes the genuine from the spuri¬ ous. Everything on the average national cur¬ rency note, except the fine lines of engraving, may be successfully counterfeited; but these fine lines defy all impostors. All of the circles, ovals, squares and parallels, as well as the geo¬ metrical lathe-work upon which the denomina¬ tions are usually placed, are composed entirely of a perfect network of finely engraved lines which cross each other at such angles or ap¬ proach each other at such distances as to pro¬ duce the desired effect. These finely engraved lines constitute the chief, the distinguishing feature of the government's money-engraving,

and they cannot be successfully counter¬ feited.

It will be noticed in all genuine work that these fine lines can be traced by the use of a lens, throughout the figures, — not a line being broken, not a line losing itself in another line and not a line showing any irregularity what¬ ever in its course, in its uniformity of curve and width or in its degree of shading. These lines may be either white upon a background of black, green or red ; or they may be black, green or red upon a background of white ; but they are always exact, always even and always uni¬ form. They are made by a geometrical lathe which was invented by one A§a Spencer and introduced to the public about 1818.

This lathe is a perfect wonder; it produces patterns of almost every conceivable variety in form and figure; but this same fine quality of the lines clings to them in whatever form they may appear. So that, when it is remembered that this uniformity and uniqueness of execu¬ tion is impossible in hand-engraving, the spuri¬ ous note falls all to pieces under this test. The striking difference between the genuine and the spurious is very natural from the simple fact that the one is mathematical and exact, while the other is mechanical and necessarily varied. The lathe does not engrave directly upon the note-plate, while the counterfeit engraver does. The lathe engraves upon a piece of soft steel one-eighth of an inch thick. After this piece of soft steel has been properly engraved by the lathe, the piece of engraved steel is hardened by a peculiar process; then (by means of a powerful machine called a transfer press) a cyl¬ inder of soft steel is rolled over the hardened piece of engraved steel in such a manner that the engraving is transferred to the cylinder, which is then hardened; and, from this hardened cylinder the designs are transferred to the note-plate by means of the transfer press. In this way the work is not only exact — mathematic¬ ally exact and artistically perfect — but it is always uniform; for this cylinder acts as a perpetual model from which any number of plates can be transferred — each being an exact facsimile of all the others taken from that same cylinder. Hence all United States notes of any one series are exactly alike in every respect — except the numbers and the signatures. And right there is where the counterfeiter falls down before the practised eye. He must do his engraving directly upon the note-plate — which imposes many insuperable difficulties; the lines cannot be made as perfect as they are

in this lathe work, and the general effect of the print¬ ing is inartistic in comparison with the impres¬ sions taken from lathe-made plates. Even to the naked eye the appearance is more or less dull and sunken, or scratchy; and the figures are sure to be lighter or darker in spots, as the lines are heavier or lighter in places. The use of the lens in such cases discloses the fact that the lines are often broken, varied or irregular, either in size or course. Besides, it being im¬ possible for any hand-engraver to produce two dies exactly alike, it happens that the spurious dies are not only not exact reproductions of the genuine lathe-made dies, but no two of the spurious dies are exactly alike; so that com¬ parison, under the lens, between the dies on a suspected note (if it be spurious) and a gen¬ uine note brings out this difference so clearly

that very little skill is required to detect and read it.

All the government dies used in printing any given series are exactly the same — all being transferred from the same cylinder, and they must therefore be exactly the same in every respect. This impossibility of making two dies separately and independently exactly alike by the hand-engraving process not only prevents the counterfeit dies from being like the genuine, but it also prevents any two counterfeit dies from being exactly alike, since the plates must be separately and independently engraved. But besides this absence of exactness in the repro¬ duction of the dies, there is another notable feature of difference which is conspicuous for its presence in the genuine and for its absence from the spurious note; and that is the beauti¬ ful clear-cut, raised impressions produced by the correct and uniform lines of the lathe-work which the counterfeiter cannot reproduce to save his life.

This machine work is therefore the safest earmark there is for detection purposes ; but it must be used intelligently. In examining this work on any suspected note, it is a pretty safe way for the examiner to begin at the centre of the curvilinear figures and then gradually fol¬ low the lines around the circles, one within an¬ other, carefully searching for any special de¬ fects and for the discovery of any irregularity not patent to the naked eye. And he should also make careful and minute comparisons be¬ tween the general designs on the genuine note and those on the suspected one.

Sometimes the whole face of a note (except the vignettes and dies) are tinted a pale red or some other color ; but examination under a lens

discloses the fact that this tint is composed of fine crossed or looped lines running clear across the face of the note. This is another species of machine work which is but poorly imitated by the most expert counterfeit engraver who has to depend upon his hands. This work, when genuine, shows the lines to be perfect in execution and in shading, while the spurious note bears evidence of imperfection in both re¬ spects.

Parallel lines also afford a check. They are made by a parallel-ruling machine, which is governed by an index to regulate the width of the lines, and they are mathematically exact. They are always uniform, always regular and always exactly parallel — conditions which do not obtain when the counterfeiter undertakes to reproduce them by the process of hand-engrav¬ ing. These parallel lines are used in shading the letters and figures on the genuine notes into a perfectly even pale gray. They are also used to represent a clear sky or water; but crossed lines are used to represent cloudy or heavy skies. In genuine work these lines can always be counted, while such is not always the case with counterfeit notes, as the lines on them are often broken, blurred and irregular.

Some people rely on the vignettes as reliable earmarks for detection purposes; but they make a mistake in doing so. The vignettes are the most artistic part of the whole note, and they are mostly hand-engraved, even on the genuine notes ; so they may be almost perfectly imitated or reproduced — but that is not often the case. The vignettes on the national currency are made by the very finest artists in the country,

COUNTERMARK

and they are beyond the successful imitation or reproduction of any one but an artist of the first water; and, since the salaries which such artists can command at legitimate work are too satisfactory for them to resort to the rather risky business of counterfeiting themselves or lending their talents to others engaged in that hazardous outlawry, these would-be imitations are made by rather inferior artists and are nec¬ essarily imperfect in many respects. Real vig¬ nettes have this advantage over spurious ones : They are never made but once, and are there¬ fore uniform and always exactly the same. They are transferred to the cylinder, just as the lathe-work is, and then transferred (by use of the transfer press) from the cylinder to the note-plate, thus using one model all the time ; but such is not possible with the spurious vignettes. They must be reproduced, and exact reproduction is very difficult, if not impossible. But, it being noticed that counterfeiters get along better in reproducing outdoor scenes than they do in reproducing portraits, the govern¬ ment has very wisely mingled its vignette work — making them consist of outdoor scenes, his¬ torical pictures, portraits and allegorical figures, which it not only becomes difficult for counter¬ feiters to imitate, but which furnishes a some¬ what graduated scale of difficulties for them to surmount.

The engraving test is the best possible ear¬ mark in the detection of counterfeits, for two very good and sufficient reasons : In the first place, the above-noted differences will always appear as long as counterfeiters have to rely upon hand-engraving while the government uses machine-engraving; and, in the second place, these counterfeiters will always have to rely upon hand-engraving, because machines for the purpose are too bulky and too expensive for them to handle, — considerations which will always place machine-engraving beyond their reach. If a man has $75,000 to $150,000 capital (the cost of a proper outfit of machinery for this work), he would hardly risk its investment in an illegitimate enterprise which might be swooped down upon at any moment by govern¬ ment officers and utterly destroyed, with the leg¬ acy of a long sentence in the penitentiary added. Hence, it may be pretty safely assumed that all the engraving done upon spurious note-plates will always be done by hand, and that

this test can always be applied.

Coin is more easily counterfeited. The gov¬ ernment mints it by subjecting blanks of metal to heavy pressure between dies. The cheap imitator casts them under slight pressure in a base metal. The maker of a better grade of * counterfeit coin cuts out or casts a blank or disc of the required size, and compresses it between dies in an ordinary stamping-press. To make a really good imitation of gold coin requires a very wide knowledge of alloys, pos¬ sessed by very few men, and principally for this reason counterfeit gold coins are scarce. The imitation of silver is much easier, as there are in the market numerous metals, used in the manufacture of tableware, etc., that closely sim¬ ulate silver. Their principal basis is lead, and it is by the softness of the mixture and its increased weight that counterfeit silver is most easily detected. It does not require an expert to distinguish the average counterfeit silver coin from the genuine, as a simple balancing on

a scale with a good coin shows the difference in weight, a shave with a penknife exhibits the softness of the metal, and ringing the coin pro¬ duces a dull sound as compared with the ring of silver.

Counterfeits made in real silver have been circulated since the value of the metal deterio¬ rated, and these, if well made, are very difficult of detection. The government's principal safe¬ guard against them is obtained by watching all purchasers of silver, and following up those who do not seem to have good reason for requiring it. The imitations of five-cent pieces in the real metal are not difficult for a skilled mechanic, and the statement has been widely circulated that they were once actually man¬ ufactured by convicts while serving sentence in a prison of one of the larger States, where nickel-plating was carried on in the workshop. The more common imitation of the five-cent piece, however, is simple lead, cast in a mold, and, while easy of detection, it secures circu¬ lation because the passers handle it without examination. This is the most usual form of counterfeiting carried on to-day, and a flood of bad nickels is liable to break out anywhere as the result of some misguided man's efforts. As soon as they attract attention in a locality the secret-service men concentrate their action, and usually find the base of supplies within a few months, unless the counterfeiters take the alarm and fly, destroying their apparatus.

The most elusive counterfeiter the United States secret-service men

were ever called on to unearth was a New Jersey mechanic skilled in photography and the use of the pen and brush. For many years he patiently imitated $20 green¬ backs by hand, making about one a week, and then going to some New York saloon to change it. His work was very artistic, and he could surely have made more money by legitimately employing his talent in the trades. He was finally caught passing a note, and sentenced, the almost invariable fate of every persistent counterfeiter.

COUNTERMARK, in numismatics, the name given to those stamps or impressions which are found on ancient coins or medals, and have been given since their first impress. These countermarks or stamps are o.ften exe¬ cuted without any care, and frequently obliterate the most interesting portion of the original in¬ scription. There have been various opinions respecting the cause of these countermarks ; some antiquaries thinking that they were to indicate an augmentation of the value of the money upon which they were stamped; others, that they were vouchers for workmen ; and, again, that they were only struck upon money taken or received from foreign enemies. Dur¬ ing the long war with revolutionary France Britain stamped millions of Spanish dollars with small, oval countermarks of the head of George III upon the neck of the Spanish monarch. Many of them were completely re¬ stamped or countermarked in the mint, but the new impression sometimes failed to obliterate the old entirely.

COUNTERPOINT (from Lat. punctum contra punctum , point against point) in music, is the art of combining melodies, or more cor¬ rectly of adding melody to melody. The origin of the word is more nearly approached when

to a given theme the melody added is called its counterpoint. In former times musical sounds were represented by dots or points placed on the lines, and the added part or parts were written by placing the proper points under or against each other — punctum contra punctum. Some authorities use the word counterpoint simply as an equivalent of harmony, by others it is employed to denote the

art of composition generally. It is preferable to apply this term now to that branch of the art which, a musical thought being given, teaches the development of it, according to the laws of the art, by ex¬ tension or embellishment, by transposition, repetition or imitation throughout the different parts. Contrary motion, augmentation and diminution, the latter two referring to the time-value of the notes, are also other devices of counterpoint. It thus stands related to har¬ mony as literary composition stands to gram¬ mar. Simple counterpoint is the art of adding a part or parts to a given melody in notes all of equal time value, as in plain-song or ecclesias¬ tical style. Florid counterpoint is when the notes of the added parts are of less time value (say two crochets or four quavers against a minim) than those in the melody or subject, as it is called. In double counterpoint, the sub¬ ject may start in the bass and be repeated in the upper part, or vice-versa. It becomes triple or quadruple when two or three parts are added with the harmony inverted, further, counter¬ point is divided into the free and strict styles, the former, which is of the florid order, allow¬ ing many licenses as to discords, etc., not per¬ mitted in the dignified slow movement of the strict style. The fugue (q.v.) may be classed among the highest developed forms of the art of counterpoint. It has been said that the art was known as far back as the 4th or 5th century; others again ascribe its invention to Guido d'Arezzo in the 11th century, or Adam de la Hale two centuries later. It was not until the 17th or 18th century that the art attained its maturity under the fostering care of Palestrina, J. Sebastian and Emmanuel Bach, Handel, Haydn and Mozart. Beethoven's avowed aim in his later works to make every part sing, and not to be mere harmonic padding, well illustrates the object of counterpoint, while among the greatest contrapuntalists and inno¬ vators of modern times are Wagner and Brahms who by their intensive utilization of overtones practically extended the field of counterpoint and harmony. Numerous treatises on counter¬ point exist; among the best modern authorities are Prout, Richter, Riemann and Jadassohn. See Harmony.

COUNTERSIGN, in military affairs, a watchword used to prevent unauthorized per¬ sons passing a line of sentries, whose orders are to stop any one unable to give it. It is fixed each day by the commanding officer, but may be changed at any moment if necessary, and is communicated only to those entitled to know it. The parole is a similar watchword given only to those entitled to inspect guards and to their commanders. Countersigns are usually names of battles ; paroles are names of distinguished military persons. To give a countersign or parole other than that received, or to make a countersign or parole known to one not en¬ titled to receive it, is in

time of war punishable by death, or such other punishment as a court-

martial may determine, according to the 7th Article of War, United States Army.

COUNTING-OUT GAMES. See Games.

COUNTRY-or CONTRADANCE, a

dance in which as many couples can take part as there is space to accommodate them ; the gentlemen being ranged at the commencement on one side, and the ladies on the other. The dancers are constantly changing places, leading one another back and forward, up and down, parting and uniting again. <(Sir Roger de Coverley® is the best-known example. The oldest collection of country dances was pub¬ lished in 1651 under the title (The English Dancing Master. y In the 18th century it was introduced into France, where it was first known as ((Anglaise.® It was also known as the ((Contredance.® Under this name it spread to Germany.

COUNTY, in the United States, an ad¬ ministrative subdivision of each State, inter¬ mediate between the body as a whole and the town, parish or municipality In the North (ex¬ cept the wild northern parts of Maine and New Hampshire), and the thickly settled States of the central West, it is an aggregation of actual towns, there being no county land which is not a part of some town. In the South and the more sparsely settled Western States, the town is a piece cut from the county, the greater part of which may be entirely unorganized, except as divided by the State into artificial sections for administrative convenience or the saving of future boundary disputes ; townships (as also in Aroostook County, Me.), military districts as in Georgia, <(wards® as in Louisiana, ((beats® as in Mississippi, *etc.* The relations of the county to the political and social life of the community also vary widely in different sec¬ tions, owing to historic development. In New England it is of less consequence than any¬ where else in the United States : a mere arti¬ ficial group of towns, which might be regrouped at any time with little disturbance. Here it has three commissioners, who act as its attorneys and representatives, as well as executive offi¬ cers, apportion the taxes among the towns, care for highways, *etc.* The old militia regi¬ ment, of which the town train-bands were com¬ panies, has disappeared ; the County Court has been replaced by sessions of the State Superior Court on circuit; there are, as of old, a sheriff, courthouse, and jail, a Probate Court, registry of

deeds, *etc.* The representative system here is not based in the least on the counties, but on the towns in general, singly for the lower house in the State, and grouped into <(senatorial districts® for the upper. Hence there is but lan¬ guid interest in county matters, and no feeling of county unity. But in the Middle and South¬ ern States the county is a much more integral part of daily life; it is the basis of representa¬ tion, and often the real unit of growth and settlement. In the Middle States the towns were the original centres of settlement, as in New England, but they have not reduced the coun¬ ties to insignificance ; on the contrary, the county-seat is usually the chief centre of busi¬ ness and political interest, and the coveted spot at which to edit a newspaper sure of the largest circulation — in New England the county-seat has no advantages as such to make it a news¬ paper focus, and frequently is an insignificant

Example /. — Subject , with Simple Counterpoint.

$

Tenor, octave lower.

£

Bass.

Response in the Tenor.

I

J -

2— ZZ

2 =

Theme led hy the Bass.

Wm

First

5 = - , -

if

\

—

2_ ML

‘ “*l* — ‘) ‘ g

z

–

- = - ” - 1 — m - 1 -

$

Tenor.

Theme in the Alto.

m

‘M

Bass.

First Counterpoint

Counterpoint

Second

Soprano.

a -r ± r—

— - -

- .Ji - « — : «

■

iU

‘ p -

- 1 -

■£T -

- 1 - ^ -

Response in the Sopr

ano.

*£ —

Tenor.

＝*-＝ - M-m-

»L— J — J

- ” - ^

First Counte

11

■

— -L f - = rr - j — : — = — r~3

*M =

Bast.

j-* — a 1

r — - -

Second Counter

J-J - - -1

point.

- - ■ - =1

i . u - >- — w—

*»Uy -■=

COUNTY ASSESSOR — COUNTY DEMOCRACY

place where none is published — and the county meetings of the town boards of supervisors de¬ termine the important actions of the county population. In the South, generally, the county was originally not only the most important, but almost the one subordinate unit of settle¬ ment, owing to the paucity of towns due to the plantation system. The county regiment, in¬ stead of being made up of town companies, was divided into district bands for convenience of drill and assemblage; the local management was mainly by county instead of town officers ; the magistracies were mostly self-perpetuating, in the hands of a few leading families, instead of being elective or even appointive. The very settlements intended for towns often did not grow into such, but spread into disconnected plantations, and became counties; as James City County and Charles City County, Va. In South Carolina there were two systems — the county in the low country, the district in the Piedmont region ; after the war the district system was extended over the whole State; in 1868 it was abolished and the whole State divided into counties. But these are purely artificial crea¬ tions, and not even created with good judgment; they are of immense size, nearly double those in Massachusetts or Connecticut, and treble those in Virginia or Kentucky ; Charleston County is larger than Rhode Island. They have no courts, being grouped into judicial circuits. The real subdivision seems likely to take place within them. In Louisiana the corresponding divisions are called parishes instead of counties. The institution was brought from England by the first settlers : the county there was an old tribal settlement, sometimes a whole kingdom as in Kent, the

counties or shires being gradually fused into the kingdom. The shires are there¬ fore not divisions made in the kingdom, but small governments whose coalescence made the state. The name <(county® was given them after the Norman Conquest, from their likeness to the counts' governments on the continent. At first here the English organization was copied: there were courts called quarter-sessions, jus¬ tices of the peace with extensive powers, lieu¬ tenants, coroners or <(crowners,® *etc.* Virginia had the county in 1634, Maryland in 1638, Mas¬ sachusetts in 1643. Consult Fiske, (Civil Gov¬ ernment in the United States> (1890) ; Pollock and Maitland, (History of English Law> (Bos¬ ton 1899).

COUNTY ASSESSOR, a public official generally elected by popular vote for terms of two or four years in southern and western States, to value all property liable to taxation. They prepare lists of owners and descriptions with valuations of property, supervising and equalizing such assessments where the original assessment is made by town officers. In Wis¬ consin and Indiana a county officer is appointed to superintend and instruct the town assess¬ ors. In Illinois and Ohio similar duties are performed by one of the other county officers. In Kansas town assessors have been superseded by county assessors who make the original assessment. See Taxation.

COUNTY BUDGETS. See Budgets, American; Appropriations, American System of.

COUNTY COMMISSIONERS, officials appointed on boards, usually consisting of from

three to seven members, to deal with specified matters of administration in each county, of approximately half of the States in the Union. County Courts or board of supervisors perform like duties in other States. The duties of county commissioners, generally, are to control public finances, superintend county roads and other public works, and poor relief. Some county commission boards supervise police, township and other county officers and possess a limited ordinance power. In western and southern States they often license peddlers, saloons and other businesses, and establish county precincts and polling places. Experience indi¬ cates that more efficient administration is exer¬ cised by small boards of county commissioners compared to large boards of supervisors. The combination of taxing and spending facilities, however, always creates criticsm, and caused Indiana to establish a county council in 1899 to control the boards of

county commissioners. See County Council.

COUNTY COUNCIL, a body of officials, comprising a specified number elected from each district and by the county, to control revenue and expenditure. The first county councils in the United States were established in Indiana in 1899, each to consist of seven memoers, four elected by districts and three at large. They are empowered to borrow money and issue bonds, and make appropriations for county ex¬ penses, the boards of county commissioners (q.v.) being the executive authority to carry out orders.

County councils in England and Wales date from 1888 when these territorial divisions were, for various purposes, divided into 63 counties with elective administrative bodies known as county councils. The new adminis¬ trative counties were given the same boundaries to correspond as closely as possible with the 52 historical shires or counties, but seven of the latter, Sussex, Suffolk, Hampshire, Cambridge¬ shire, Northamptonshire, Lincolnshire, York¬ shire, were subdivided into two or more ad¬ ministrative counties, and London County was created. The population of the different ad¬ ministrative counties vary from London County with 5,000,000 inhabitants to Rutland with less than 25,000. The same administrative type of organization practically governs each. Since their institution considerable improvement has been effected in local government throughout England and Wales. See Great Britain — Gov¬ ernment; London.

COUNTY DEMOCRACY, New York,

founded 1880 and lasting till 1890, represented a <(better citizenship® movement started in New York city and county, with the object of re¬ forming Democratic organization and curbing the power of Tammany Hall. In 1881 their delegates defeated the Tammany representatives at the State convention ; in 1884 they elected Mayor Grace; in 1886 Tammany united with County Democracy to defeat Henry George and elect Mr. Hewitt mayor, withdrawing its sup¬ port when he asserted independence of its control. In 1888 Mr. Hewitt was defeated for re-election, and in 1890 County Democracy, uniting with other reform associations, ceased as an independent organization. See New York City.

COUNTY GOVERNMENT IN THE UNITED STATES

COUNTY GOVERNMENT IN THE UNITED STATES. Local administration in the United States is not regulated by any legis¬ lation of the national government, but is de¬ termined by each of the 48 States acting inde¬ pendently. Under these conditions there are inevitably countless variations in the organiza¬ tion and powers of the local authorities in the different States; and an account of the system of local administration requires an elaborate study of the constitutions and laws of all the States. At the same time such an examination discloses certain important insti¬ tutions resembling each other throughout the Union; and other features which are similar in closely related groups of States. These con¬ ditions are due to the historical origin of American institutions in those of England, to the constant intercourse between the various States, and to the conscious and unconscious imitation and adaption by each State of the institutions and practices of other States.

Among the districts of local administration in the United States, the most common is the county. Every State is divided into districts called counties, except in the State of Louisi¬ ana, where the corresponding district is known as the parish ; and with a great deal of variation in the powers and organization of the county authorities, there are yet important features in common which mark county administration as fundamentally similar throughout the United States.

The American county occupies a distinctly different position in the general plan of public administration from the chief local districts in European countries. The name county indi¬ cates its historical connection with the county in England, from which the American county has developed. But in its functions and general importance the American county now differs widely from the English county; while it is even less like the provinces, departments, circles or other local districts in the countries of con¬ tinental Europe.

Historical. — To understand the develop¬ ment of the county in the United States, it is necessary to note the system of county adminis¬ tration in England in the 17th century, when the English colonies in America were estab¬ lished. At that time the important county offi¬ cials in England were the lord lieutenant, the sheriff, the coroner and justices of the peace. All but the coroner were appointed by the

Crown; but after the decline of the active con¬ trol by the Privy Council, the local administra¬ tion in practice was highly decentralized. The lord lieutenant was head of the militia system. The sheriff was the chief conservator of the peace and executive agent of the judicial courts. But local administration was mainly looked after by the justices of the peace, the justices in each county forming collectively a quarterly court of criminal jurisdiction, which also acted as the fiscal and administrative authority for county affairs.

In the American colonies counties were organized with similar officials, appointed by the colonial governors. But during the colonial period, and especially about the end of the 17th. century, important changes were made in some of the colonies. In New York and Penn¬ sylvania locally elected county boards were es¬ tablished, which gradually acquired the fiscal

and administrative powers of the justices of the peace. In Pennsylvania the sheriffs were made locally elective in 1705. Some new county officers and additional county functions also de¬ veloped; the county treasurer appearing first in Massachusetts; local prosecuting attorneys in Connecticut; and in most of the colonies county recorders were provided to keep public records of documents relating to land titles.

At the same time the importance of the county was affected by the development of town government in New England and to some ex¬ tent in the middle colonies from New York to Pennsylvania. But in the southern colonies the county was the main unit of local adminis¬ tration.

From the establishment of State govern¬ ments in 1776 until the middle of the 19th cen¬ tury important changes in county administra¬ tion, as well as in other features of State and local administration, were gradually introduced, both in the seaboard States and in the new States organized in the interior. The main re¬ sults of these changes were to establish a radi¬ cally democratic and decentralized system. The electoral franchise was extended to include all male citizens. County officials were made locally elective ; and the number of such offi¬ cials was largely increased. In most of the States an elective county board took over the administrative functions of the justices of the peace; while the sheriffs, prosecuting attorneys, county treasurers, county clerks, county re¬ corders and the justices of the peace all became elective officials.

Since the Civil War there have been few general and permanent changes in the legal principles of county administration. But with the growth of the United States there have been important developments in the functions of the county and in the methods of administration. The county system has been extended through¬ out the country; and the increase of population and the general tendency toward the expan- tion of public activities have added much to the scope of county administration.

General Characteristics. — A county is one of the civil divisions of a State for judicial and political purposes; and at the same time is a district of a quasi-corporate character for pur¬ poses of local administration. Generally the State legislature has power to establish counties ; and in the North Atlantic group of States this power is not limited. But the constitutions of most of the States now impose various re¬ strictions, — as to minimum area and population and requiring the consent of the voters. In most of the States the organization of new counties and changes in county boundaries are now seldom made; but in some of the newer States the creation of new counties and read¬ justment of boundaries are still not infrequent.

There are about 3,000 counties in the United States. Most of the larger States have from 60 to 100 counties each. At one extreme Texas has 245 counties; at the other Rhode Island has five and Delaware three.

In area and population the counties show great differences ; but for the most part Ameri¬ can counties are much smaller both in area and population than counties in England, depart¬ ments in France, and provinces in Prussia, Belgium, Italy or Spain. Nearly two-thirds of the counties contain from 300 to 900 square

miles; and the most usual areas are from 400 to 650 square miles. More than half the coun¬ ties have a population of 10,000 to 30,000; but in the North Atlantic States more than half the counties have over 50,000 population, while in the Southern States and still more in the States west of the arid plains many counties have less than 10,000

population.

Nine-tenths of the counties are mainly rural in character ; but most counties contain urban communities, a considerable number have im¬ portant cities, and the most important counties are those where the largest cities are located, — as New York city (which includes five counties), Chicago, Philadelphia, Saint Louis, Boston, Baltimore, San Francisco and Denver. In most of these cases the county administration is partly absorbed in that of the city.

The comparatively small area and popula¬ tion of most counties in the United States necessarily makes them less important for some branches of public administration than the counties, departments and provinces in Euro¬ pean countries. On the other hand the highly decentralized methods of administration fol¬ lowed in the States of the American Union adds greatly to the number of officials locally elected by counties. Not only local county authorities, but even the principal local agents of the central government are elected within each county, and are subject to little or no effective supervision by the central government of the States. The national government has no supervision or control whatever over county or other locally elected officials.

Powers and Functions. — There are wide variations between the States in the relative importance of the county as an administrative district ; and the powers and public functions of counties and county officials are far from uniform in all the States. But it is possible to note certain common factors and to call at¬ tention to some of the most important dif¬ ferences.

Very little in the way of legislative power, even in local matters, has been conferred in counties on the United States. They are con¬ sidered in judicial decisions as primarily agents and instrumentalities of the State to carry out its governmental functions. The county officials thus act almost entirely under the provisions of statutes passed by the State legislatures, which define their duties and enumerate their powers in minute detail. Important questions are, however, often submitted to a popular referendum of the whole body of electors in the county, — such as the location of the county seat, loans for public buildings or public works, and the prohibition or licensing of places for the sale of intoxicating liquors, under <(local option)} laws. In 1909 a more general grant of local legislative power was made to the county authorities by the legislature of the State of Michigan. In 1911 California adopted a home rule constitutional amendment authorizing counties to frame and adopt their own charters of local governments.

But if the legislative power of the counties is small, its administrative functions are numerous ; and locally elected county officials are entrusted with the execution of the most important State laws.

In all the States the county is primarily a district for the administration of justice.

Courts of general criminal and civil jurisdiction are held at intervals in every county. The judges of these courts are usually elected (or in some States appointed) for a larger district than a single county; but a number of the more populous counties form each a judicial district for such courts; while more frequently county judges with a limited jurisdiction are locally elected. In any case the administrative officers of such courts (clerks, sheriffs and prosecuting attorneys) are, for the most part, elected within each county. In connection with the adminis¬ tration of Justice, courthouses and jails are maintained in each county. The county is also to a slight extent a police district, the sheriff acting as conservator of the peace; but no system of organized and disciplined county police has been developed in any of the States. In nearly every State the county is the district for the public record of land documents, and for the probate of wills, the administration of estates and supervision of orphans.

Except in some of the New England States, counties have to do with the construction and maintenance of the more important roads and bridges, and sometimes have charge of other local public works. But even the construction of main highways has until recently been done for the most part in a primitive way ; and in the States where high class roads have been built, the work has generally been done by State authority.

In all the States outside of New England (and in New Hampshire) the county is a dis¬ trict for the administration of poor relief. Pub¬ lic almshouses or poorhouses are maintained; and in the more populous counties there are other charitable institutions. But such special¬ ized institutions as hospitals for the insane, and schools for the deaf and dumb, are for the most part maintained directly by the State governments.

Outside of New England the county is a dis¬ trict for school purposes. In the most im¬ portant group of States, covering the central region from New York and New Jersey west to Kansas and Nebraska, county school officers supervise the local school officials in the rural districts.

In many of the Southern and West¬ ern States the county is the main unit for local school administration.

In many States the county is also a district for the administration of health and sanitation laws.

In connection with these functions and also as agents for both State and smaller districts, the county in all but the New England States is a district of considerable importance in finance administration. It levies taxes and ex¬ pends the proceeds for the different purposes noted above. In most States county officials act also as agents for the collection of State reve¬ nues; and frequently also for the collection of revenues of smaller local districts. In the States of the South and the far West, property is assessed for taxation by county officials; and in many other States county officers have some supervision over local assessments.

The numerous list of officials elected in each county makes the county an important election district; and it is also a unit for the canvass of votes for officials elected in larger districts, such as members of Congress and State officers. The position of the county as an election district is

indicated by the importance of the county com¬ mittee in the political party organizations in many of the States.

Measured by the number of functions and by the relative importance of the county in comparison with smaller local districts, the county is of most importance in the Southern States and the Mountain and Pacific Coast States. By these tests the county is relatively of least importance in the New England States, where on one hand the judicial administration is more highly centralized, while on the other hand the towns are local districts of importance.

But if a quantitive standard of the intensity of county administration is applied, the relative positions are somewhat different. Judged by the

per capita rate of expenditure, the county is of much the greatest importance in the States from the Rocky Mountains westward. Second rank is taken by the populous Middle Atlantic and North Central States, where indeed the largest aggregate county expenditures are made. By this standard of per capita expenditure the Southern States fall in the third rank. Of the New England States — in Massachusetts, New Hampshire and Maine, county finances are of some importance, but in the others they are negligible.

Until recently county finances were compara¬ tively unimportant, but have notably increased since 1900. County taxation hardly doubled in the 30 years from 1870 to 1902, but in the next decade to 1913, had again doubled; and during this period county revenues and expenditures gained at about the same rate as those of the central State governments.

Nearly half of the total county receipts and expenditures are trust and agency funds, mostly taxes collected for the State and for other local authorities. County revenues and expenditures are about the same as those of the State govern¬ ments ; but both State and county finances are on a much smaller scale than those of the National government or cities.

The main source of county revenue is from the general property tax. There are numerous fees, which yield a considerable sum, as do also State subventions for schools and roads ; and loans for roads and public buildings are be¬ coming more important.

Next to general expenses, county payments for schools are the most important, — made up largely in the Southern and far Western States; in other States school expenses are mainly borne by other local districts. Next in import¬ ance are expenses for highways and for public charities, — the latter being the largest item in the Middle Atlantic and some of the North Central States. In the New England States, the expenses of judicial administration are rela¬ tively of most importance.

County Organization. — No well-defined principle seems to have been followed in the organization of county administration, except that popular election has been extended to all classes of county officials indiscriminately. There is no authority with important powers of local legislation corresponding to the councils general of France, the county councils of Eng¬ land or the local diets in Prussia. In all but two States (Rhode Island and Georgia) there is a county board which usually levies local taxes and has general supervision over the local ad¬

ministration, though by no means an effective

control over the elective officials. In two-thirds of the States these county boards are composed of three to five members, usually called com¬ missioners and elected at large. In some States, however, the county boards are larger and in¬ clude from 15 to 50 members elected by the townships and cities. Such boards of super¬ visors are found in New York, New Jersey, Michigan, Wisconsin and Illinois; and there are somewhat similar bodies in Louisiana under the title of police juries. In some States there are intermediate types. In a few of the South¬ ern States (Kentucky, Tennessee, Arkansas) the fiscal and administrative business of the county is still performed by the local justices of the peace sitting as a County Court, these justices being now elected in subdivisions of the county. But these larger bodies have, as a rule, but little more legislative power than the small boards of commissioners; and their size make them unwieldy for administrative busi¬ ness. An important exception is found in the recent legislation of Michigan, where the boards of supervisors have been given a broad and general grant of local legislative powers.

In a few States the powers of taxation and appropriations are placed in a body distinct from the county board, as in Indiana, where there has been established (in 1899) in each county a county council of seven members in addition to the board of three county commis¬ sioners ; while somewhat similar results have been secured in other ways in some of the smaller New England States. In Cook County, Illinois, and some New Jersey counties the presi¬ dent or chairman of the county board has some special powers. In Georgia the ordinary is the chief county officer. But this separation of powers is as yet exceptional.

Besides the county board there are a consid¬ erable number of other county officials, most of them chosen by popular election. These elective officers are largely independent within their own sphere ; and there is no effective supervision either by the county board or by any one of the officials being clearly recognized as the chief executive officer of the county.

The sheriff is the oldest of the county offi¬ cers ; but he has lost much of the power and dignity of the English sheriff. He still retains some relics of former authority as chief con¬ servator of the peace; but for the most part is now a ministerial officer of the judicial courts, to execute their warrants and decrees. The public prosecutor has now become one of the principal county officials in some of the States; and

in counties containing large cities, such as New York, Chicago, Philadelphia and Saint Louis, the importance of this office is more fully realized. In several' cases it has been a stepping stone to the governorship of a State. The office of county treasurer is usually one of the most lucrative ; and is important as the financial agent not only of county funds, but also as the collector of State revenues and sometimes also the revenues of local districts within the county.

Other elective county officials of less import¬ ance are the county clerks, court clerks, record¬ ers of deeds, auditors, assessors, school com¬ missioners, surveyors and coroners. The titles of some of these officials vary in the different States. In the New England States there are comparatively few county officers ; and in Rhode

Island there are only two — the sheriff and clerk of court — both of whom are chosen by the general assembly. On the other hand, there are in some States additional elective officials, besides those named above; and in most of the States there are also a number of appointed officials, such as poor commissioners, road su¬ perintendents and health officers.

County officers in the United States are usually elected for terms varying from two to six years. In the older States east of the Mis¬ sissippi River, the terms of different officers often vary and overlap. West of the Mississippi most of the States have a uniform term of two years for county officers, and all terms expire at the same time.

In most counties the subordinate staff is small, and subject to change with the frequent changes of the elective officers. In the more populous counties, the number of deputies, clerks and other employees is larger and of more importance ; but in most cases they remain under the patronage and spoils system. The merit system of civil service has been applied to some extent only in a number of the larger New York and New Jersey counties and a few isolated counties in other States.

There is some State administrative super¬ vision over county school officers ; and more recently in about half the States over the as¬ sessment and collection of State revenues by county officials, and in a number of States over county road officers in the construction of State-aid roads. But there is no effective State con¬ trol over sheriffs and prosecuting attorneys; and no general system of State supervision.

There can be no doubt that county govern¬ ment in the United States lacks systematic organization, and that there are too many elec¬ tive offices. The numerous list of positions and the slight importance of many of them makes impossible any real knowledge or discussion on the part of the voters of the merits and demerits of candidates. Elections, especially in the more populous counties, are usually determined by the success of one party ticket, and the effective choice is thus made in selecting the party can¬ didates. This has tended to strengthen the influence of party machines and bosses ; and in many cases county offices have been filled by politicians of the lower types. In rural coun¬ ties a popular candidate may more often secure his election on personal grounds ; and there have been some important cases of successful independent candidates in populous counties. But as a rule, comparatively little public atten¬ tion is paid to the election of county officials. The short terms promote frequent changes and prevent efficient management in the offices, many of which are purely administrative and with no political functions. At the same time the duties of the county officials are of no little importance; and as their importance is steadily increasing, there is little serious need for de¬ cided changes in the organization of the county administration.

During the last few years there has been increased attention to the county government, especially in States containing large cities ; and proposals for important changes in organization have been urged, notably in New York, New Jersey, Illinois and California. In the latter State several counties have adopted home rule charters making important changes. Under the

Los Angeles County charter, the only elective officers are the supervisors, sheriff, district at¬ torney and justices of the peace. Other county officers are appointed by the supervisors and constables are appointed by the sheriff, all from civil service lists.

To Summarize. — The county in the United States has developed from the English county, but the organization of the county administra¬ tion has been thoroughly decentralized and in fact disorganized by the

radical extension of popular elections for all classes of officials. Most of the 3,000 counties are smaller in size and social importance than the principal districts of local administration in European countries ; and the field for administrative action is neces¬ sarily less important in some respects. But the decentralized system of State administration adds to the number of locally elected and ap¬ pointed officials in the counties. The adminis¬ tration of justice, roads and bridges and poor relief are the principal branches of county ad¬ ministration ; while there is some county super¬ vision of public instruction in most States, and the county is the main local unit for school pur¬ poses in some of the Southern and far Western States.

The principal county authority is the locally elected county board, organized in various ways, with administrative and taxing powers, but with little local legislative authority. Among the numerous other elective officials are the sheriff, prosecuting attorney and treasurer; but there is no clearly defined chief executive, and the county administration should be more syste¬ matically organized to meet the increasing im¬ portance of the functions exercised. There should also be more effective State supervision over the county officials who act primarily as agents for the enforcement of general State laws. Many counties are too small in area; and in the larger States there is need for local districts larger than the county.

Bibliography. — Fairlie, John A., (Local Government in Counties, Towns and Villages) (Chaps. 4-7) ; Annals American Academy of Social and Political Science (May 1913) ; American Political Science Association Pro¬ ceedings (1911, pp. 61-121, 1913, pp. 281-291); Publications of the Short Ballot Organization ; United States Census Reports on Wealth, Debt and Taxation; Gilberton, H. S., (The County.*

John A. Fairlie,

Professor of Political Science, University of Illinois.

COUNTY-SEAT, the village, town or city in every county selected as headquarters for the county administration and containing the court¬ house, including offices for the prominent offi¬ cials and the jail. The most prominent building is frequently selected as the county courthouse in scattered farming communities. The legisla¬ tures usually select the county-seats and can change them, but west of the Alleghanies, in about half of the States, a local popular vote under constitutional provisions is required for the purpose. As county-seat the location as¬ sumes importance, being the principal — al¬ though not necessarily the largest — community in the county, concentrating

there the public business ; and in newly settled regions or terri¬ tories there is frequently great rivalry to secure this selection, while efforts are sometimes made to have a chosen location changed.

COUNTY TRAINING SCHOOLS. See

Teachers, Professional Training of.

COUP, koo (Fr. “a stroke®), a word used in certain phrases which have become almost universally current. Coup d’etat (stroke of state) means an arbitrary encroachment sud¬ denly effected by the governing authorities upon the constitution of a state, altering or setting aside the prerogatives of other parts of the body politic. The term is applied particularly to the procedure whereby Louis Napoleon placed him¬ self as virtual dictator at the head of govern¬ ment in France, 2 Dec. 1851. Coup de main (a stroke of the hand) means a sudden and successful attack; coup d’ceil (a stroke of the eye), a quick comprehensive view of a compli¬ cated matter; coup de theatre , a trick of the stage, or any striking dramatic effect ; and coup de grace, the merciful blow that puts a victim out of pain; hence a decisive or finishing stroke. In Canada the word is used to designate a war custom of the Plains Indians. The first warrior to touch an enemy or his body was credited with a coup or deed of honor. On the number of coups, the social rank of the individual depended. Consult Grinnell, ((The Coup® (in American Anthropologist, 1911).

COUPE, koo-,pa, a four-wheeled carriage carrying two persons inside, with a seat for the driver outside. The same name is applied to a compartment of a railway carriage in contin¬ ental Europe.

COUPER, koo’per, William, American sculptor: b. Norfolk, Va., 20 Sept. 1853. He studied at the Cooper Institute, New York, and the Royal Academy at Munich. In 1875 he re¬ moved to Florence and entered the studio of Thomas Ball. In 1897 he returned to America and established himself in New York. His art is modern Italian in manner, but its beauty and technique are somewhat marred by

overelaborate detail and neglect of powerful lines and planes. His management of drapery is especially good. Among his works are ‘Mother’s Love) ; (The Falconer5 ; ‘Beauty’s Wreath for Valor’s Brow5 ; the marble statue of Moses on the Ap¬ pellate Courthouse, New York; (Te Deum Laudamus,5 and several peculiarly sympathetic and exquisitely executed angels for funeral monuments. His portraits include the heroic bronze bust of Prof. Thomas Eggleston, Colum¬ bia University, New York, and that of Presi¬ dent McKinley. He won the competition for the monument to Colonel Hawkins, at Pittsburgh, Pa. Consult Taft, (History of American Sculpture5 (New York 1903).

COUPLAND, William Chatterton, Eng¬ lish philosophical writer : b. London, 2 Dec. 1838; d. 7 Jan. 1915. He was educated at Man¬ chester New College and the University of Ber¬ lin, and held Unitarian pastorates at Bridgewater 1864-68, and at Kensington 1870-72. He was professor of mental and moral science at Bedford College for Women, London, 1881-86; first secretary of the English Goethe Society 1886-90; and has since lectured on philosophical themes. He has published ‘Incentives to the Higher Life5 (1866) ; translation of Hartmann’s ‘Philosophy of the Unconscious5 (1884) ; ‘The Spirit of Goethe’s Faust5 (1885) ; ‘Elements of Moral Science Applied to Teaching5 (1889); <Gain of Life and Other Essays5 (1890) ;

‘Thoughts and Aspirations of the Ages5 (ed¬ ited, 1895).

COUPON, koo’pon (from Fr.’ couper, to cut), a warrant or certificate for the periodical payment of interest on bonds issued for any term of years. The interest being payable in different cases quarterly, half-yearly or yearly, as many coupons are attached to each bond as represent the total number of such payments as are to be made, with the date of payment printed on each. When a payment of interest becomes due at any particular date the holder of the bond detaches the corresponding coupon and presents it for payment at the specified banking house or office. The term is also ap¬ plied to one of a series of tickets which bind the issuer to make certain payments, perform some service, or give value for certain amounts at different periods, in consideration of money received. Each interest or dividend coupon constitutes in law a separate claim or demand and may be separately enforced. The advan¬ tage of the coupon lies in the fact that corporate coupons are of a negotiable or quasi-negotiable character facilitating their transfer. See Nego¬ tiable Instruments.

COUPON BALLOT. See Ballot.

COURBET, koor'ba', Gustave, French painter: b. Ornans, 10 June 1819; d. near Vevey, Switzerland, 31 Dec. 1877. In 1839 he was sent to study law in Paris, but all the bent of his nature was turned toward art. He studied at the studio of Steuben and Hesse, but he preferred to work independently. He made himself acquainted with the Flemish, Floren¬ tine and Venetian schools; but amid all he was careful to preserve — as he phrases it — his "own intelligent and independent individuality.55 His first works were literary subjects, but he soon became interested in portraying live sub¬ jects. At this time he painted 'The Man with a Pipe,5 and his own portrait with a dog. These subjects, treated broadly, were not accepted by the Salon ; but were welcomed enthusiastically by the Realists. Courbet became the chief leader of this sect. He despised his critics, and even went so far as to exhibit independently. In 1841 he took to landscape work, painting in the for¬ ests of Fontainebleau. In 1844 he began to exhibit at the Salon; and his works created a great sensation when shown in the Salon of 1850. Among the pictures of this period are 'After Dinner at Ornans,5 'The Stone-Break¬ ers,5 'Peasants of Flazey.5 His hunting scenes and animal subjects and marines are especially vigorous and spirited. But he is often coarse and lacks spirituality throughout. After the revolution of 1870 he was appointed director of the fine arts. His radicalism in painting led him to attempt to promote political and social re¬ form, to which end he wrote essays and disser¬ tations. When Napoleon offered him the cross of the Legion of Honor, he openly refused it, and this heightened his popularty among the people. In the following year he joined the Commune, and was responsible for the destruc¬ tion of the Vendome Column (16 May). For this act, in the following September, he was sentenced to six months' imprisonment and a fine was imposed for its restoration, his pictures being sold in 1877 toward that purpose. On his release he retired to Vevey. Several of his pic¬ tures arc owned in the United States, four of

them being contained in the Boston Art Mu¬ seum. The various provincial museums of France possess many of his paintings, as do

likewise the collections of Frankfort, Cologne, Vienna, Amsterdam, The Hague, Copenhagen and Munich. Consult for biography and critF cism, Estignard (Paris 1874) ; D'Ideville (ib, 1878) ; Van Dyke, (Modern French Masters) ; Man?, <G. Courbet1 (in Gazette d'es Beaux - Arts, Paris 1878) ; Muther, (History of Modern Painting1 (Vol. II, London 1896, 1907) ; Zola, (Mes Haines1 (Paris 1879).

COURBEVOIE, koor-be-vwa', France, town in the department of the Seine, on the left bank of the Seine, in the northwest suburbs of Paris, In 1883 a bronze group, the (Monument de la defense de Paris,1 by E. Barrias, was erected here, It contains numerous handsome villas ; extensive barracks built by Louis XV for the Swiss regiment, and manufactures of white-lead, carriages, brandy and drugs. Pop. 23,765.

COURCELLE, koor-sel, Daniel de Remy, ra-mi, governor of Canada, 1665-72. The Mo¬ hawk Indians annoyed the colony by constant attacks, for which the governor sought to pun¬ ish them by leading an expedition against their encampments. In the winter of 1666 he marched with 300 or 400 men from Quebec to the Mohawk Valley by way of Lakes Champlain and George, but gained nothing as the extreme severity of the season decimated his force. The next year with a much larger force, and under more favorable conditions, he had greater suc¬ cess and succeeded in destroying several strong¬ holds of the Indians. This invasion of English territory caused much alarm in the New York colony, and Governor Nicolls protested vehe¬ mently. Consult Parkman, (Old Regime in Canada.1

C'OUREURS DE BOIS, koo'rer' de bwa, or rangers of the woods. During the French regime, numbers of the adventurous youth of Canada, and even soldiers of the regular gar¬ rison, subjected to the vexatious restrictions of a paternal government, took to the woods and lived the free life of the Indians, trading with and frequently marrying among them. This drain on tihe resources of the colony called for the strongest inhibitions from the representa¬ tives of Church and State, and amnesties were offered to couriers de bois to return and engage in agriculture, but few availed themselves of these offers. They were, however, always loyal to the French interest, and their alliances with the Indians gave them great ascendency over the savages and kept them friendly to the French power.

COURIER, koo'ri-er, a bearer of special dispatches, whether public ar private. The employment of couriers is of great antiquity. There was a very complete organization of them in the ancient empire of Persia. They were also used by the Greeks and Romans. In the Mid¬ dle Ages each sovereign employed a staff of couriers, while the nobility in

France and Eng¬ land also engaged professional runners called Haquais11 in France and ((running footmen11 in England. In Germany and Spain toward the middle of the 15th century the couriers were given permission to carry unofficial letters. Couriers who act as guides to and attendants on travelers are common on the continent of Europe, and are useful to those having much vol. 8 — 8

baggage or unacquainted with the foreign languages and moneys. Their special duty is to make all arrangements for journeys, and to relieve their employers as far as possible of anxiety about passports, exchange of money, hotel negotiations and the like. The ability to speak several languages is therefore one of the many important qualifications of a good courier,

COURIER DE MERE, koo-re-a de m§.=-ra, Paul Louis, French Hellenist: b. Paris, 4 Jan. 1772; d. near Veretz, Touraine, 10 April 1825. He was a pupil in the artillery school at Chalons and served in the army 1792-1809. In 1813 he made an elegant translation of (Daphnis and Chloe,1 an ancient romance by Longos, discovered by him at Florence ; he also trans¬ lated (The Luciad, or the Ass of Lucius of Patras,1 published with the Greek text (1818). His numerous pamphlets, especially his (Le pamphlets des pamphlets1 (1824), are master¬ pieces of style, of marvelous conciseness and noteworthy documents for the history of the ancient political and ecclesiastical contentions. He was assassinated shortly after the publica¬ tion of this paper. His ((Euvres completes1 were published in four volumes, with an essay on his life by Armand Carrel (Paris 1830; new ed., 1890). Consult Gaschet, (La jeunesse de Paul-Louis Courier, etude sur sa vie et ses oeuvres de 1772 a 1812. 1 The same author has also published a critique of his style. Consult also Schwab, (Vie politique de P.-L. Courier1 (Mercure de France 1909) ; Sainte-Beuve, (Causeries du Lundi1 (Vol. VI, 1857-72).

COURLAND, Duke of. See Biren, Ernest John.

COURLAND, or KURLAND, Latvia, a province on the Baltic, bounded north by Livo¬ nia and the Gulf of Riga, west by the Baltic, south by Kovno and east by Vitebsk ; area, 10,535 square miles. In the neighborhood of Mitau, the capital, the surface is diversified by hills of very moderate height ; but elsewhere, and particularly toward the coast, it is flat and contains extensive sandy tracts. About two-fifths of the whole province is occupied by forests ; and there are many small lakes. The principal rivers are the Aa and the Windau; the latter is

connected with the Niemen by a canal. Agriculture and cattle-raising form the chief occupations of the inhabitants, but many are engaged in fishing. The industrial establish¬ ments include distilleries, breweries and fac¬ tories for tobacco, metals, wool and leather. Letts form the largest constituent element in the population, there being also Germans, Jews, Russians and Poles. The climate is moist, and the winters very cold. The prevailing religion is Lutheran. Courland was anciently a part of Livonia, and, like the latter, was conquered in the 13th century by the knights of the Teutonic order. It was subsequently united with Sem-gall, and, under the name of the Duchy of Courland, the two provinces became a fief of Poland. The duchy, however, was governed by its hereditary dukes till 1737. The 6th duke, Frederick William, espoused in 1710 Anna Ivanowana, Princess of Russia, who, after his death, maintained possession of the duchy; but the government of it was entrusted to Prince Ferdinand, brother of the deceased duke. On the death of Ferdinand in 1737 the Estates, in consequence of the influence of the Empress

of Russia, elected to succeed him her favorite and grand chamberlain, Ernest Tohn Biren, who was exiled to Siberia in 1740. In. 1762 the Emperor Peter of Russia recalled Biren, who, after some contention with Prince Charles, son of the king of Poland, who had been placed over the duchy in his absence, was declared by the Estates the only legitimate duke. In 1769 he transferred the duchy to his son, at whose death the Estates of Courland solicited a union with the Russian Empire. Catharine consented, and, by an edict of April 1795, secured to the inhabitants all the privileges which they had enjoyed under their princes and all the rights of her other subjects. In 1818 the Emperor Alexander confirmed the charter of the nobility of Courland, which declared the peasants free, and regulated their relations to their former lords. Libau is the chief commercial city. During the Great European War, a large part of the province was in German occupation, and was the base of attacks against Riga. After the war it was included in Latvia. Pop. 749,100.

COURNOT, koor-no', Antoine Augustin,

French economist and mathematician: b. Gray 1801 ; d. Paris 1877. He was appointed pro¬ fessor at the Faculte de Lyon in 1834; was made director of the normal school at Grenoble in 1835, and of that of Dijon in 1854. He did important work in philosophy in relation to the adjustment of rational processes to inani¬ mate nature and the resultant insufficiency of the former as a means for the analysis of vital phenomena. Cournot's fame, however, is founded principally on his mathematical re¬ searches relative to the theory of probabilities, which he sought to apply both to natural philos¬ ophy and to political economy. He simplified the theory of the equilibrium of supply and demand and discovered the theory of monopoly price now generally held by economists, and elucidated many other economic theories in regard to public finance. His greatest service, perhaps, was his application to the problems of statistics of the mathematical theory of prob¬ abilities. He is the author of (Traite de 1'enchainement des idees fondamentales dans les sciences et dans l'histoire) (1861); Prin¬ cipe de la theorie de la richesse) (1863) ; (Des institutions destruction publique) (1864) ; Considerations sur la marche des idees et des evenements dans les temps modernes) (1872) ; (Materialisme, vitalisme, rationalisme,* *etc.* (1875) ; (Revue sommaire des doctrines economiques) (1877).

COURSER, a bird of the genus Cursorius, belonging to the family Glareolidce of the order Charadriiformes (waders), closely allied to the plovers, characterized by a decurved bill as long as the head, arched mandibles compressed toward the extremities, basal oval nostrils with an oblong lateral opening and long whitish legs with three separated front toes, the middle one longest and armed with a serrated claw. They are found chiefly in Africa and Asia, on arid inland tracts, along which they run with great swiftness. One of the species, called the black-bellied courser (C. temminckii) , is eight inches long, and generally of a cream-colored brown, varied by a ferruginous head and breast, and black on the quills and middle of the body. One of the best-known species is the cream-colored courser, or swift-foot (C . gallicus),

found almost exclusively in the East, although it has been seen as an occasional visitor in western Europe.

COURSING, a kind of sport. in which hares are hunted by greyhounds, which follow the game by sight instead of by scent. Coursing is a very

old sport, but in modern times it has been considerably modified in various ways, mainly through the influence of the English coursing clubs, which began to be formed in the latter half of the 18th century, one promi¬ nent club, the Swaffham, being founded in 1776. These clubs in 1858 formed a central body called the National Coursing Club, which now controls the whole sport. In 1882 the (Greyhound Stud Book,* a genealogical record, was started, and dogs without pedigrees, or not entered in that book, are not now allowed to compete. Meetings are held in various locali¬ ties, at which dogs are entered for a variety of stakes, as horses are at a race-meeting. The <(blue ribbon® of the coursing year in England is the Waterloo Cup, run in the Altcar meadows, near Liverpool, for which 64 dogs compete.

This pastime has become immensely popular in the western United States, and under the supervision and control of the American Cours¬ ing Board large meets annually take place in the open country of the two Dakotas, Kansas, Nebraska, Iowa and Minnesota, where hares are plentiful. The contests take place in prac¬ tically the same way as in England and under similar rules. The greyhounds are sent out, two in each leash, in the care of a <(slipper,)) who lets the dogs slip upon orders from the judge, when a hare has been sighted. The judge follows the dogs, and gives <(points® to each according to the cleverness of its individual work. It may so happen that the dog which actually kills the hare may not be adjudged victor, because the other dog may have made the most points during the course. The follow¬ ing is the scale of marks: (1) For speed, ac¬ cording to the degree of superiority shown, one, two or three points. (2) For the <(go by® (the starting of a greyhound a clear length behind its opponent, passing him in a straightaway run and obtaining a clear length's lead), two or three points. (3) The <(turn® (a sharp turn of not less than a right angle in the hare's course when pressed by a dog), one point. (4) (<The wrench,® a change of less than a right angle in a hare's course when pressed, half a point. (5) ((The kill,® two points or less. (6) <(The trip,® an unsuccessful effort which throws the hare off its legs ; or the getting so close to the hare as to snatch the hare and lose hold, one point, more or less, in the judge's discretion. One course will often traverse three miles' before a kill is made. The cavalcade of sightseers is kept in a line behind the coursing hare and hounds by the steward. Consult Macpherson, H. A., (Coursing the Hare) ((Fur and Feather Series*); Earl of Suffolk, (The Encyclopedia of Sports and Games) (London 1911).

COURT, koor, Antoine, French Protestant clergyman : b. Villeneuve-de-Berg, Ardiche,

France, 17 May 1696; d. Lausanne, Switzerland, 15 June 1760. He was one of the most promi¬ nent Protestant leaders of his time and is commonly regarded as the restorer of the Re¬ formed Church in France and the founder of

the <(Church of the Desert. 11 At the age of 17 he began to address secret assemblies of per¬ secuted Calvinists. Impressed by the fact that the only way to maintain the religion was by organization rather than by the inspiration of zealots, he devoted his life to the building up of regular churches in the various small com¬ munities. To this end he summoned a synod of all the preachers in the Cevennes and lower Languedoc at Monoblet. A regular church sys¬ tem and rules were agreed upon. Pierre Cortley received ordination at Zurich, and by him Court was likewise ordained. Persecutions broke out again in 1724, and Court fled to Lausanne (1730). There he labored incessantly for the founding of a college, of which he was the director and chief pillar for the rest of his life. From this college emanated the pastors of the Reformed Church of France. Court collected documents for a study of Protestantism in France, but his work was not completed and the materials are still preserved at Geneva. His best work is the (Histoire des troubles des Cevennes ou de la guerre des Camisards) (1760). His son was Antoine Court de Gebelin (q.v.). Consult Hugues, (Antoine Court) (1872) ; Baird, (The Huguenots and the Revo¬ cation of the Edict of Nantes) (1895) ; Peyrat, Napoleon, (Histoire des pasteurs du desert1 (1842; Eng. trails., 1852); Haag, E. and E., (La France protestante1 (Vol. IV, new ed.,

1884).

COURT. Although the word “court11 is still used as descriptive of the household of a reigning monarch and in connection with the official functions of royalty, it is now almost ex¬ clusively used in the United States and Euro¬ pean countries in connection with judicial trib¬ unals. The objects and powers of these judicial tribunals called courts in English-speaking countries, and probably in all lands where such institutions are free and independent of the executive, are: (1) The preservation of per¬ sonal liberty, the enforcement of the criminal and penal laws, and the punishment of all in¬ fractions thereof, and the conservation of the public peace, order and safety; (2) the preser¬ vation of property rights, the adjudication of disputes and

controversies between individuals, corporations and states, and the determination of all kinds of legal actions commonly known as civil suits.

The establishment of law courts, the growth and gradual increase of their jurisdiction and power has marked, step by step, the advance of civilization, the increase of personal liberty, the rights of individuals to enjoy and to hold prop¬ erty, and to maintain suits for the preservation and enforcement of their civil liberties and the free and unrestrained enjoyment of their personal and real property. Almost every gain in these directions made by the courts of Great Britain in the increase of their authority and jurisdiction represented the acquirement by in¬ dividuals of increased liberty and the enjoy¬ ment of their property rights, coupled with the curtailing of the prerogatives of the king, springing from the acquisition bv the people of some great charter enlarging their liberties.

English Courts. — In very early days in England and in many of the European coun¬ tries, all of the power and jurisdiction now held by the law courts was vested in and exer¬ cised by the king or the executive ruler, com¬

monly described as the throne. This was also true in the primitive administration of law among the ancients. Such judicial powers were exercised by the executive in early Rome and were delegated to many of the subordinate offi¬ cers. In the states of Greece the king or chief magistrate was not alone a military leader, but was also the chief judicial officer, as is the case now in Oriental autocracies where the sovereign appoints deputies to act as judges subject to his right of review on appeal. This is the system in vogue at the present time in Persia and Turkey, where the deputies of the shah and the sultan respectively govern the various states and administer the laws. The early English kings held almost absolute judicial power; they were to all intents and purposes courts of law. The sole executive and judicial authority over whatever law there was, free from the will of the king, vested in his person and was exercised by him to such an extent that individual ownership and personal liberties were subordinated to his absolute whim and caprice. As a legal fiction the king was con¬ sidered, even after the courts had assumed a large measure of independence, the head of the court, and in such sense the king is so treated purely as a matter of fiction at the present time in England, for in that country and throughout Great Britain all writs run in the name of the king. That the administration of justice was one of the

prerogatives of the English king in early times is clearly shown by the fact that the king himself sat on circuit even as late as the rule of Edward IV. Regular courts had then been established but authority was still vested in the king to participate personally in the busi¬ ness of the courts. King James I exercised what has been frequently termed the last judi¬ cial act of an English monarch when he settled the controversies between the courts of law and the Court of Chancery.

The first step toward the separation of the executive and judicial powers as jointly vested in the king came when King John was com¬ pelled to sign the Magna Charta, or Great Char¬ ter, in 1215. By the Great Charter the incon¬ venience caused by the court following the king's person was remedied, as far as private litigation was concerned, by the provision that communia placita — common pleas — should be held at some fixed place, and it was in this way that the Court of Common Pleas was estab¬ lished in England and that the independence of the courts became a vested right of the people.

John Richard Green, in his 1 History of the English People,1 after commenting on the vagueness of some of the provisions of the Great Charter says: "But all vagueness. ceases when the Charter passes on to deal with the rights of Englishmen at large, their right to justice, to security of person and property, and to good government. 11 He also writes : "A memorable article that lies at the base of our whole judicial system ran, (No. freeman shall be seized, or imprisoned or dispossessed, or outlawed, or in any way brought to ruin;. we will not go against any man or send against him, save by legal judgment of his peers, or by the law of the land.1 11

Another section of the Great Charter reads as follows : "To no man will we sell or deny, or delay, right or justice.11

In summing up the beneficial effects of the

Great Charter, Mr. Green writes : <(The great reforms of the past are now formally recog¬ nized; judges of assize were to hold their cir¬ cuits four times in the year, and the king's court was no longer to follow the king on his wanderings over the realm, but to sit in a fixed placed

During the reign of Edward I judicial re¬ forms of great importance were brought about. The King's Court was divided into three dis¬ tinct tribunals: (1) The Court of Exchequer, which took cognizance of all cases in which the royal revenues were concerned. (2) The Court of Common Pleas, for the trial of suits be¬ tween private persons. (3) The Court of King's Bench, which had jurisdiction in all matters that affected the sovereign as well as in pleas to the Crown, or criminal cases that were expressly reserved for his decision. Each of these courts was provided with a distinct staff of judges.

Another judicial reform of even greater im¬ portance was the establishment, in the reign of Edward I, of an equitable jurisdiction, side by side with that of the common law. By this measure was brought into existence the equity side of the court, and by it the courts were enabled to give more adequate relief in many cases of injustice. The king, in whom, as above stated, the judicial power vested, dele¬ gated his judicial authority to the several courts of law by means of a <(writ.>:> No case could be instituted in a court of law except by the purchase of the proper writ. The common-law courts acquired jurisdiction in each par¬ ticular case by virtue of the writ, which could only be issued in cases already pro¬ vided for and found in the registry of writs, or by the statute of Westminster II. By a narrow construction of the statute of Westminster II, the writs issued by the clerks failed to give proper redress, and often, because of technicali¬ ties, no redress at all. Perhaps it was not always intended that they should give complete remedy because that meant simply a residuum of judicial power remaining with the king, not as yet delegated to any of the courts. Hence, applications for relief were allowed to be made to the king, or what amounted to the same thing, to his chancellor. The litigant would go to the chancellor and say, ((The Courts tell me that the writ issued by your clerk does not suit my case. Your clerk says he has no other writ to sell me. Writ or no writ, I appeal to you for justice.® This was in substance the peti¬ tion addressed' to the chancellor, who, besides being the keeper of the king's seal and his

sec¬ retary, was also known as the keeper of the king's conscience, and in constant attendance upon his person. Ways and means were devised for granting relief in cases where the common-law writs had failed. In this way grew up a form of relief and a system that has evolved during the centuries into what is now known as the equity jurisprudence. After the estab¬ lishment of parliamentary government, the courts took their law from the legislative enact¬ ment, and their jurisdiction was constantly widened and increased by the many legislative acts that were adopted from time to time.

The judges of all the courts were appointed by the king and could be removed by him at will, until during the reign of William III (1701), it was enacted that the commissions of

the judges should be quamdiu se bene gesserint instead of durante bene placito, as formerly, and they could be removed only by an address to both Houses of Parliament. The chancellor, who presided over the equity jurisdiction, be¬ came subject to removal by the king at pleasure, his office being by political tenure.

It will accordingly be seen that it was not until the tenure of judicial office was made in¬ dependent of the king and the separation of the judiciary from the executive was made effec¬ tual, that the independence and power of the courts of law and equity were firmly estab¬ lished; and it was not until these reforms were brought about that the courts were organ¬ ized and firmly established under the system which prevailed for two centuries prior thereto and so continued until modified by the Judica¬ ture Act of 1873.

Prior to the Judicature Act of 1873, the superior courts of England consisted of the common-law courts ; namely, the Court of King's Bench (called Queen's Bench in the reign of a queen), the Court of Common Pleas and the Court of Exchequer. These three courts were of about the same importance and rank, although the Court of King's Bench was looked upon as having a pre-eminence, because the chief justice thereof was styled the Lord Chief Justice of England. In addition to these common-law courts, there was, on the equity side, the High Court of Chancery. Other courts were the Admiralty, Probate and Divorce Courts, and the London Court of Bankruptcy. There was also a court known as the Judicial Committee of the Privy Council, and the Court for the Consideration of Crown Cases Reserved. The House of Lords exercised the highest ap¬ pellate jurisdiction.

By the Judicature Act of 1873, which went into effect in 1875, there was established the Supreme Court of Judicature, consisting of two permanent divisions ; one division, under the name of the High Court of Justice, has and exercises original jurisdiction in proceedings formerly brought in the common law, equity, admiralty, probate, divorce and bankruptcy courts hereinbefore mentioned. This court also exercises certain appellate jurisdiction from inferior courts. This act, which created a Supreme Court of Judicature, provided for the administration of law and equity concurrently. Every court has power to grant whatever form of relief the nature of the case may require, whether legal or equitable.

The High Court of Justice is divided into sections named after the old courts ; namely, the Court of Chancery, the King's Bench, the Court of Exchequer and the Probate, Divorce and Admiralty Division. The Chancery Division's main work is the equity business, but its powers are not confined to any particular subject mat¬ ter. The King's Bench Division tries civil cases, wi.tb or without a jury, exercises criminal jurisdiction and has appellate jurisdiction from County Courts and magistrates. The Probate, Divorce and Admiralty Division decides as to the validity of wills, grants divorces and man¬ ages the admiralty business.

The Chancery Division consists of five jus¬ tices, with the Lord Chancellor as president; the King's Bench Division consists of 14 jus¬ tices and the Lord Chief Justice as president; and the Probate, Divorce and Admiralty Dj-

vision consists of two judges. The criminal jurisdiction of the court is exercised entirely by the King's Bench Division.

The other division of the Supreme Court of Judicature was established under the name of the Court of Appeal. The Court of Appeal has appellate jurisdiction, with such original juris¬ diction as may be deemed necessary to dispose of cases on appeal. It consists of four ex offi¬ cio judges and five ordinary judges, appointed by letters patent. The Court of Appeal is the superior court of record and the highest court of appeal except the House of Lords. In hear¬ ing ecclesiastical appeals the court is composed of judges and assessors, the latter being arch¬ bishops or bishops of the Church of England.

In addition to these high courts of England there are many inferior courts of criminal and civil jurisdiction. The lowest of criminal courts is that of a Justice of the Peace, sitting singly; sometimes the Justices of the Peace, two or more sitting at tfie same time, constitute a Court of Petty Sessions and may dispose in a summary way of minor offenses. Justices at the Court of Quarter Sessions are commis¬ sioned to determine felonies and other offenses, not including treason, murder, forgery and big¬ amy. These and other more serious offenses are reserved for the superior courts. The Assize Courts, so called, sit in general in each county twice a year. Sometimes several counties are united together for the Assize Court. In Lon¬ don there is a high criminal court known as the Central Criminal Court, and there are many inferior criminal courts known as Police Courts. The Court of King's Bench has general super¬ vision over all criminal jurisdiction and all criminal courts.

There are a number of civil courts of in¬ ferior jurisdiction, in which small claims may be litigated. These are the County Courts and the Borough Courts of Record. The County Courts are of ancient origin, but have been reconstituted and changed from time to time. Their practice and jurisdiction is now regulated by the County Courts Act of 1888.

The civil courts at the present time are the County Courts, the

Borough Courts of Record, the High Court of Justice, the Court of Appeal, the House of Lords and the Judicial Committee of the Privy Council.

The Judicial Committee of the Privy Council hears appeals in ecclesiastical matters and also from the colonies.

The House of Lords : Appeal still lies to the House of Lords, to the judicial body known by this name, not to the legislative assembly.

The criminal courts now are the Magistrate Courts, the Borough Courts of Quarter Ses¬ sions, the Assizes, the Central Criminal Court, the King's Bench Division of the High Court of Justice and the Court for the Consideration of Crown Cases Reserved.

The Court for the Consideration of Crown Cases Reserved is at present the only criminal court of appeal. It deals only with points of law submitted to it by the judge who presided at the trial.

Courts in the United States. — The judicial system of the United States, like the govern¬ ment, is of two kinds. It consists of the Fed¬ eral courts, provided for by the Federal Consti¬ tution and created and deriving their powers frotm Congress, and of the courts of the several

States, created by the States and provided with laws by the legislatures of the several States. All of these courts follow the common law, except where it has been repealed or statutory laws provided in the place of the common law. The judges of the Federal courts, including those of the Supreme Court of the United States, are appointed by the President, with the consent of the Senate. The judges of the Fed¬ eral courts hold office during good behavior, their appointment being for life. The Supreme Court of the United States, while having orig¬ inal jurisdiction in certain specified cases, is the highest court of appeal. The Federal courts are usually spoken of as the ((United States Courts.®

Federal Courts. — The Federal courts at present are the District Courts, the Circuit Courts of Appeals, the Court of Claims, the Court of Custom Appeals and the Supreme Court of the United States.

The United States is divided into judicial districts, which districts comprise a State or Territory or a portion of a State, it being necessary to divide the largest States into sev¬ eral districts. By the Judicial

Code of 1911, each district is provided with a District Court, for which. there is appointed at least one judge, who is called a District Judge and who receives a salary of $6,000 a year. These District Courts exercise equity, common law, criminal, admi¬ ralty and bankruptcy jurisdiction. Their juris¬ diction covers suits when the matter in contro¬ versy exceeds $3,000 and arises under the Con¬ stitution or the laws of the United States, or under treaties, or between citizens of different States, or between citizens of a State and for¬ eign states, or citizens of foreign states ; all suits brought by the United States; all crimes and offenses under the laws of the United States ; admiralty and maritime causes ; all prizes brought to the United States ; all cases under the internal revenue, custom and tonnage laws, under the postal laws, under patent, copy¬ right and trade-mark laws ; all cases under the interstate commerce laws, immigration laws and bankruptcy proceedings, and suits against trusts and monopolies. District Courts existed prior to 1911, but they were of limited jurisdiction. By the Act of 1911, the District Courts, then constituted, became the court of original juris¬ diction in the respective districts.

The other Federal courts are the Court of Claims, the courts of the District of Columbia, the Territorial Courts and the Court of Cus¬ tom Appeals. The Supreme Court of the Dis¬ trict of Columbia has jurisdiction correspond¬ ing to that of the State courts and similar to that of the Federal District Court. It consists of a chief justice and associate justices. The District of Columbia has a Court of Appeals.

The Court of Claims consists of five judges and has authority to hear and determine all claims against the United States, founded upon any law of Congress or regulation of the execu¬ tive department, or upon any contract, express or implied, entered into with or by the govern¬ ment. It can also be called upon to determine claims which may be referred to it by Congress, also all set-offs, counterclaims, claims of dam¬ age or other demand whatsoever on the part of the government against any persons making claims against the government in that court.

The Court of Custom Appeals consists of

five judges and has jurisdiction on appeal as to the laws and regulations of customs revenues and duties.

The Territories of the United States, in¬ cluding Porto Rico and all the Territories ac¬ quired by the United States as the result of the Spanish-American War, have been provided with a court, usually called the District Court, with general jurisdiction similar to the State courts. Most of the Territories are also pro¬ vided with a Supreme Court, which exercises appellate jurisdiction, although, for some of the Territories, provision is made for an appeal to one of the Circuit Courts of Appeals.

In 1910 there was established the Commerce Court to hear appeals in cases affecting the in¬ terstate commerce laws. This court was abol¬ ished in 1913.

Circuit Courts of Appeals. — The United States is divided into nine judicial circuits. Each circuit comprises several States. In 1891 there was established in each circuit a new court called the Circuit Court of Appeals. These nine new courts were given only appellate jurisdic¬ tion. There had existed prior thereto in each circuit a Circuit Court which exercised an ex¬ tensive original jurisdiction and also an inter¬ mediary appellate jurisdiction over the then ex¬ isting District Courts. The Circuit Courts of Appeals were established for the purpose of re¬ lieving the Supreme Court of the United States, in which court there was such an accumulation of appeals that a case could not be heard for years, and for the purpose of expediting the determination of cases, thereby more speedily rendering justice to litigants. These courts have admirably accomplished the double purpose which caused their creation.

All appellate jurisdiction was finally taken from the original Circuit Courts, thereby re¬ moving a source of delay in the determination of cases, and in 1911 the Circuit Courts were abolished, and the District Courts, then consti¬ tuted, were given the original jurisdiction pos¬ sessed by the Circuit Courts.

A Circuit Court of Appeals consists of three judges, two of whom constitute a quorum. There are appointed by the President circuit judges for each circuit, who receive $7,000 a year. Most of the circuits have three circuit judges, but provision is made by the statute for

district judges also to sit on the bench of the Circuit Court of Appeals ; it being expressly provided, however, that no district judge can hear in the Circuit Court of Appeals any case which he decided in the District Court.

The Chief Justice and associate justices of the Supreme Court are each assigned to a cir¬ cuit and are competent to sit as judges of the Circuit Court of Appeals. This right is rarely, if ever, exercised by the Supreme Court justices.

The Circuit Courts of Appeals exercise ap¬ pellate jurisdiction from the district and other courts.

The decision of the Circuit Court of Appeals is final in all cases where jurisdiction is de¬ pendent upon diversity of citizenship, in patent, copyright, revenue, criminal and admiralty cases. By the making of their decisions final, relief was afforded the Supreme Court in a constantly increasing number of cases. . In or¬ der, however, that full and complete justice may be done, whenever special cases arise, requir¬ ing further and special consideration, provi¬

sion was made by Congress for a hearing of any such cases by the Supreme Court ; it being provided that the Circuit Court of Appeals may certify any question of law concerning which it desires the instruction of the Supreme Court. The Supreme Court may order any case to be certified to it by the Circuit Court of Appeals for review and determination.

The jurisdiction of the Supreme Court in constitutional cases has not been disturbed. An appeal, therefore, can be taken direct to the Supreme Court from the District Court in any case involving the construction of the Constitu¬ tion of the United States, in any case in which the constitutionality of any law of the United States, or the validity or construction of any treaty is involved, and in any case in which the constitution or law of a State is claimed to be in contravention of the Constitution of the United States.

As the Federal as well as the State courts are the outgrowth of the English system of judicial tribunals, drawing their precedents from the common law, and being in a measure, so far as practice and precedents are concerned, a continuation of the English colonial courts, prior to the Revolutionary War, they have an equity and common-law side.

State Courts. — The several States of the Union have a system of courts similar in many respects to the Federal courts and those of Eng¬ land. Each State has a court of last resort, which hears and determines all questions of law and equity on appeal from the trial court. The highest court in most of the States is named the Supreme Court, although in many of the States, like New York, for instance, the court of last resort is the Court of Appeals, the Supreme Courts in the State of New York being trial courts, similar in jurisdiction to the Superior or Circuit "Courts in many of the States. The judges of these State courts are elected for a term of years by popular vote, like other officers. The State courts have a separate criminal and civil jurisdiction, and the court of final appeal in each State settles all questions on appeal except where a violation of the Constitution of the United States is set up.

Each county in the separate States has its probate and other minor courts, and disposes of crimes and civil actions committed within the county. The counties and towns in each county have justices of the peace and minor courts of limited jurisdiction, like those of the English system, which dispose of minor offenses and de¬ termine civil actions. The justices of the peace are usually committing magistrates, who issue warrants of arrest, hold preliminary hearings and commit offenders to await the action of the grand jury or the disposition of their cases by courts higher in criminal jurisdiction.

In the large cities and towns there are many police magistrates and justices of the peace to perform the same duties. In some towns and cities the magistrates and police justices are elected, and in others they are appointed by the mayor, as is the case in New York. There are also in each city minor courts which hear and determine civil actions.

Where a prisoner is held by a magistrate for trial, and is subsequently indicted, he or she is placed on trial on the indictment found, in a court of record of criminal jurisdiction, and, upon conviction, appeals in capital cases directly

to the court of last resort. The decision of the court of last resort is final unless an infraction off the Constitution of the United States is alleged, and the case is then taken to the Su¬ preme Court of the United States. In case the Supreme Court of the Unified States finds that a constitutional right has been violated, it orders a new trial of the prisoner. In the event of a decision adverse to the prisoner the sentence imposed by the trial court is carried out.

A similar rule follows in cases of civil suit where the final appeal is taken to the Supreme Court of the United States. Such appeals from the State courts to the Supreme Court of the United States usually go up on a writ of error.

There are, however, in many of the State courts intermediary courts of appeal, as, for instance, in the State of New York there is the Appellate Division of the Supreme Court, which disposes of many appeals, and from whose de¬ cision there is no absolute right to appeal, except in those cases provided for in the Code of Civil Procedure of the State of New York. For instance, an appeal may be taken as a matter of right to the Court of Appeals where there is directly involved the construction of the constitution of the State of New York or that of the United States, or where one or more of the justices of the Appellate Division dissents from the decision of the court.

New York Courts. — In the State of New York the trial courts for civil actions are the Supreme Courts ; the Court of Claims ; the County Courts in each county, except New York; the Surrogates' Courts in each county; the City Court of the City of New York and the City Courts of certain other cities ; Courts of Justices of the Peace in each town and in certain cities and villages (none in New York city) ; the Municipal Courts of the City of New York and of several other cities.

The trial courts for criminal matters in the State of New York are the Courts of General Sessions, for capital cases and other felonies and also misdemeanors ; the Courts of Special Sessions, for cases of misdemeanors and such cases as are specially directed to be tried in such courts; County Courts, with both criminal and civil jurisdiction;

Magistrates' Courts and Courts of Justices of the Peace.

As the city of New York, second to London, is, probably, the home of more courts than any other city in the world, a brief resume of the courts of the city of New York may not be out of place here. The borough of Manhattan, of the city of New York, contains the largest judicial system of the metropolis ; the same system is carried out in the other boroughs of the city, the number of parts in the courts in those boroughs being, however, considerably less in number.

There are 18 Trial Terms and eight Special Terms of the Supreme Court sitting in the borough of Manhattan ; all these parts, with the exception of one (Trial Term, Part I, Criminal Term) sit or are housed in the County Courthouse, known also as the Supreme Court¬ house. The two parts of the Surrogate's Court sit in the Hall of Records.

The jurisdiction of the Supreme Court of the State of New York in law and equity in¬ cludes ((all the jurisdiction which was possessed and exercised by the Supreme Court of the Col¬ ony of New York, at any time, and by the

Court of Chancery in England on the 4th day of July, 1776; with the exceptions, additions and limitations, created and imposed by the Constitution and laws of the State. Subject to these exceptions and limitations, the Supreme Court of the State has all the power and au¬ thority of each of these courts, and exercises the same in like manner.® Certain courts, known as the Courts of Common Pleas, the Superior Courts and the Courts of Oyer and Terminer, the latter a criminal court, were abolished 31 Dec. 1895, and their jurisdiction transferred to the Supreme Court.

Special terms for the hearing of litigated, non-enumerated motions (Special Term, Part I) and for ex parte business (Special Term, Part II) are held in the County Courthouse in the borough of Manhattan every court day in the year.

Special Terms for the hearing of equity cases and enumerated motions are held each month in all or several of the special parts,, beginning on the first Monday of each month, except in the months of July, August and Sep¬ tember.

Trial Terms, for the trial of jury cases, are held in all or in nearly all of the trial parts at the County Courthouse, each month, begin¬ ning on the first Monday of each month, except in the months of July, August

and September. Trial Term, Part I, for the trial of criminal cases is held at the Criminal Courts Building.

The Appellate Division of the Supreme Court. — This court holds its sessions in the Appellate Division Courthouse. There is but one term each year ; this term usually begins on the first Monday in October and lasts through the month of June, with short re¬ cesses. Its jurisdiction is appellate and is final, except in cases duly certified by it to the Court of Appeals.

The Appellate Term of the Supreme Court sits in the County Courthouse. It is presided over by three justices of the Supreme Court who are designated for that purpose by the justices of the Appellate Division sitting in the First Department. This court hears appeals from judgments and orders of the City Court of the City of New York and of the Municipal Court of the City of New York, Borough of Manhattan. An appeal may be taken to the Appellate Division from a decision of the Ap¬ pellate Term if the justices of the Appellate Term or a justice of the Appellate Division in the same department allows the appeal.

Surrogate's Court. — The Surrogate's Court for the borough of Manhattan, county of New York, has two parts or terms, a Trial Term and a Special Term. All contested probate proceed¬ ings must be disposed of at the Trial Term. Motions may be heard at the Special Term. The court has the power to take proof of wills, to admit wills to probate and to revoke pro¬ bate; to grant and revoke letters testamentary and of administration, to direct and control the conduct and settle the accounts of exeditors and administrators; to administer justice in all mat¬ ters relating to the affairs of descedents, accord¬ ing to statutory provisions.

City Court. — The City Court of the City of New York holds its sessions in the brown stone building, known as No. 32 Chambers street, borough of Manhattan, city of New York. The jurisdiction, in general, of this court is

limited to the sum of $2,000. Process of this court must be served within the boundaries of the old city of New York. Like the Supreme Court, it has a number of Trial and Special Terms. The court was formerly known as the Marine Court and still has jurisdiction in cer¬ tain specified causes of action known as marine causes (Code, sec. 317).

The Municipal Court of the City of New York corresponds to a court of a Justice of the Peace in other sections of the State of New York; it has, however, no criminal jurisdiction. It has jurisdiction, with certain exceptions, of actions where the amount claimed in the sum¬ mons does not exceed $1,000, exclusive of in¬ terest and costs ; also of summary proceedings authorized by the Code of Civil Procedure to recover the possession of real property situated wholly or partly within the district where the application is made. The city of New York, that is the Greater New York, is divided into 24 districts, in each of which a session of the court is held. Nine of the districts are within the borough of Manhattan, and in this borough the courts sit every court day during 10 months of the year; during the months of July and August the court is held only on such days as the justice presiding in each district designates.

The criminal courts in the borough of Man¬ hattan, city of New York, are as follows: Trial Term, Part I, of the Supreme Court; the Court of General Sessions of the Peace ; the Court of Special Sessions of the Peace ; the Children's Court of the City of New York; and the City Magistrates' Court.

The first named court, namely, Trial Term, Part I, of the Supreme Court, has jurisdiction to try all crimes and misdemeanors triable within the county of New York and to deliver the jails of the county, according to law, of all prisoners therein. The court sits in the Crimi¬ nal Court Building. It has, apparently, become the custom to send to this court for trial cases which are considered of great importance or which are expected to take a long time for the trial.

The Court of General Sessions sits in the Criminal Courthouse; it is divided into six parts; there are seven judges, who sit in rota¬ tion and who are called Judges of the Court of General Sessions. The six parts have co-or¬ dinate jurisdiction. Each part may be held each month

and continue as long as the public interest may require. This court has power to hear, determine and punish all crimes which are triable in the county of New York, in¬ cluding crimes punishable by death or impris¬ onment for life. Every person convicted in this court of a capital offense has an absolute right of appeal.

The Court of Special Sessions holds its ses¬ sions in the Criminal Court Building. There are six parts and 11 justices. Three justices sit in each part. There are no jury trials in this court. The accused, when he appears be¬ fore the committing magistrate, has the right to elect whether he shall be tried in this court or in the Court of General Sessions ; if he elects to be tried in this court, his election must be in writing and jury trial must be expressly waived. Part VI of this court is known as the circuit part and sits in whatever county of the Greater New York city the press of business may require. The Court of Special Sessions

has in the first instance exclusive jurisdiction of all misdemeanors committed within the county, except libel.

The Children's Court of the City of New York. — This court is presided over by five judges, one sitting in each of the five counties or boroughs of the city of New York. In the borough of Manhattan the court is held every day in the week, with the exception of Sundays and legal holidays.

City Magistrates' Courts. — These courts are presided over by 42 magistrates ; they are di¬ vided into two boards, one for the boroughs of Manhattan and the Bronx, the other for the boroughs of Brooklyn, Queens and Richmond. The magistrates are appointed by the mayor. Twenty-three reside in the boroughs of Man¬ hattan and the Bronx. Twelve parts sit in the borough of Manhattan. These courts have ju¬ risdiction to summarily punish those charged with petty offenses and to commit or hold oth¬ ers to await the action of the grand jury. Parts of this court are known as the Women's Night Court, the Men's Night Court, the Domestic Relations Court, the Traffic Court and the Mu¬ nicipal Term Court. Special matters are re¬ ferred to the various parts.

Supreme Court of the United States. — The Supreme Court of the United States, cre¬ ated in 1789 after much discussion and consid¬ eration and after many attacks had been made upon its proposed jurisdiction, now consists of nine justices, including the Chief Justice. The Chief Justice and the associate justices are ap¬ pointed by the

President, with the concurrence of the Senate. The justices are appointed for life and receive a salary of $14,500 a year, with the exception of the Chief Justice, who is paid $15,000 a year. The justices have a retiring pension of the same amount upon reaching the age of 70 years. The Court has original juris¬ diction in all cases affecting ambassadors, other public ministers and consuls, and those actions in which a State is a party. It has appellate jurisdiction, which is final, and from its de¬ cisions there is no appeal. It even has the power to declare void acts of Congress, or of the States, which it finds in conflict with the Federal Constitution. This great court has al¬ ways upheld the national character of the Fed¬ eral government, and has, while indicating the national policy, carefully guarded the reserved rights of the several States. Its decisions have not been confined to narrow questions of com¬ mercial law, but have interpreted the Constitu¬ tion and established the welfare of the nation. Within the great powers exercised by it, it re¬ stricts congressional acts to constitutional lim¬ its. Its jurisdiction extends over sovereign States as well as over the humblest of its citi¬ zens. It has power to annul the statutes of any State in the Union whenever any such statute violates the Constitution and is in vio¬ lence to civil right, the contracts, the currency or the intercourse of the people.

Hampton L. Carson, in his < History of the United States Supreme Court, > says: (<The establishment of the Supreme Court of the United States was the crowning marvel of the wonders wrought by the statesmanship of America. In truth the creation of the Supreme Court with its appellate powers was the great¬ est conception of the Constitution. It embodied the loftiest ideas of moral and legal power,

and although its prototype existed in the su¬ perior courts of the various States, yet the majestic proportions to which the structure was carried became sublime. No product of gov¬ ernment, either here, or elsewhere, has ever approached it in grandeur. Within its appro¬ priate sphere it is absolute in authority. From its mandates there is no appeal. Its decree is law. In dignity and moral influence it out¬ ranks all other judicial tribunals of the world. No court of either ancient or modern time was ever invested with such high prerogatives.®

The third article of the Federal Constitution provides for the establishment of the Federal courts. It embodies in three sections the sys¬ tem from which has been developed the great¬ est and wisest judicial system the world has ever known.

Section 1 vests the judicial power of the United States in one Supreme Court, and in such inferior courts as Congress may from time to time ordain and establish, and regu¬ lates the tenor of office of all Federal judges, prescribing their good behavior and guarantee¬ ing their compensation against diminution.

Section 2 provides that the judicial power shall extend to all cases in law and equity aris¬ ing under the Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority, to all cases affecting ambassadors, other public min¬ isters and consuls, to all cases of .admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to contro¬ versies between two or more States, between a State and citizens of another State, between citizens of different States, between citizens of the same State claiming lands under grants of different States, and between a State, or the citizens thereof, and foreign states, citizens or subjects. It also provides that in all cases affect¬ ing ambassadors, other public ministers and consuls and those in which a State shall be a party, the Supreme Court shall have original jurisdiction. In all other cases before men¬ tioned the Supreme Court shall have appellate jurisdiction both as to law and fact, with such exceptions and under such regulations as the Congress shall make. Section 2 also provides that the trial of all crimes, except in cases of impeachment, shall be by

jury and that such trials shall be held in the State where the said crime shall have been committed ; but when not committed within any State, the trial shall be at such place or places as the Congress may, as by law, direct.

Section 3 provides: 1. Treason against the United States shall consist in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act or on confession in open court. 2. The Congress shall have power to declare the punishment of trea¬ son, but no attainder of treason shall work corruption of blood or forfeiture, except dur¬ ing the life of the person attainted.

Before the adoption of the Constitution the great importance of such a court as the Supreme Court of the United States was discussed. As early as May 1783, Alexander Flamilton called attention to the grievous defect in the Articles of Confederation in failing to provide a Federal court of last resort, especially for the settle¬

ment of matters involving foreign nations. In the Federalist he wrote : ((Laws are a dead let¬ ter without courts which found and define their true meaning and operation. The treaties of the United States, to have any force at all, must be considered as part of the law of the land. Their true import, as far as respects individuals must, .like all other laws, be ascertained by judicial determination. To produce uniformity in these determinations they ought to be submit¬ ted as a last resort to one supreme tribunal, and this tribunal ought to be instituted under the same authorities which form the treaties them¬ selves.®

James Madison and other statesmen of that day held practically the same view. It was from such ideas as these expressed by Mr. Hamilton and concurred in by his contemporaries that the Supreme Court of the United States took its rise, and when the main business of the Consti¬ tutional Convention was begun, 28 May 1787, a provision for the creation of a national judi¬ ciary was suggested, among a series of 15 resolutions relating to the adoption of the Con¬ stitution, commonly known as the Virginia plan. The clause relating to the judiciary pro¬ vided as follows: ((That a national judiciary be established, to consist of one or more su¬ preme tribunals, and of inferior tribunals to be chosen by the national legislature. The judges to hold their office during good behavior, and to receive punctually, at stated times, fixed com¬ pensation for their services, in which no in¬ crease or

diminution shall be made so as to affect persons actually in office at the time of such increase or diminution; that the jurisdic¬ tion of the inferior tribunals shall be to hear and determine, in the first instance, and the supreme tribunal in the dernier ressort, all piracies and felonies on the high seas, captures from an enemy, cases in which foreigners or citizens of other States applying to such juris¬ diction may be interested, or which respect the collection of the national revenues, the impeach¬ ment of any national officers and questions which may involve the national peace or honor.®

A resolution that a national judiciary be established was unanimously passed by the con¬ vention, which was made up chiefly of lawyers and four judges. Then followed a vigorous and protracted discussion as to the formation and the method of selecting the various judges. John Rutledge was against establishing any national tribunal except a single supreme one, and he contended that the State tribunals might and ought to be left in all cases to decide in the first instance as to the right of appeal to the supreme national tribunal. He contended that to do otherwise was making an unnecessary encroachment on the jurisdiction of the States. He was supported in these con¬ tentions by Roger Sherman. After the various plans and suggestions had been fully discussed, the convention committed to the people of the United States, on 17 Sept. I787, the Constitution, containing the article (3) relative to the forma¬ tion of the Federal judiciary.

The first Congress to meet after the ratifica¬ tion of the Constitution, which was summoned to meet in New York, as the seat of government, on 4 March 1789, did not convene until the beginning of April, and after the counting of votes it declared Washington President-elect. His inauguration followed on 30 April, but

there was no Federal judge to administer the oath required by the Constitution, and this serv¬ ice was performed by Robert R. Livingston, the first chancellor of the State of New York, under the constitution of that State of 1777. Having had its attention called in this striking manner to the fact that the new Federal gov¬ ernment was without a single judge, Congress, the day after its organization, began the pre¬ liminary work for the establishment of a judi¬ ciary by appointing a committee, of which Oliver Ellsworth, one of. the framers of the Constitution, and afterward Chief Justice of the Supreme Court, was chairman. The judicial act which set in operation the Supreme Court of the United States, and the other courts of the United States, was the work of Ellsworth. It was approved by Washington, 24 Sept.

1789.

The first section of this act provides that the Supreme Court of the United States shall consist of a Chief Justice and five associate justices (now increased to eight), any four of whom shall constitute a quorum, and shall hold annually, at the seat of government, two ses¬ sions, the one commencing the first Monday of February and the other the first Monday of August. The Senate promptly confirmed Wash¬ ington's appointment of John Jay, of New York, to be the Chief Justice of the Supreme Court. Washington appointed and the Senate confirmed, as associate justices, John Rutledge, of South Carolina; William Cushing, of Mas¬ sachusetts ; Robert H. Harrison, of Maryland ; James Wilson, of Pennsylvania, and John Blair, of Virginia. Of these. Jay, Cushing and Harri¬ son had served as chief justices in their own States ; Rutledge, Wilson and Blair as members of the convention that framed the Constitution. Harrison declined to serve and his place was afterward filled by the appointment of James Iredell, of North Carolina.

The first Monday of February, — it was the first day of the month — 1790, being the day fixed for the opening session of the Supreme Court of the United States, in the city of New York, which was then the capital of the Fed¬ eral government, Chief Justice Jay and Jus¬ tices Cushing and Wilson appeared in the court room, which had been

provided at the Ex¬ change, Federal Hall being occupied by Con¬ gress. A quorum was not present and the court adjourned to the following day, when, Justice Blair having arrived with Edmund Randolph, the first Attorney-General, the Supreme Court of the United States was open for its first ses¬ sion. Chief Justice Jay wore on that occasion a robe of black silk with salmon-colored fac¬ ings on the front and sleeves. This robe was, according to family tradition, the academic gown of a Doctor of Laws of the University of Dublin, which had recently conferred this de¬ gree upon the new chief justice. The associate justices wore the ordinary black robes which have since been used by all the members of the court. Richard Wenman was appointed ˆcrier,® and made proclamation that the Supreme Court was open. John Tucker, of Massachusetts, was appointed first clerk of the court. After a seal had been adopted, the roll of attorneys and counsellors was opened. The first name on the roll of counsellors was that of Elias Boudinot, of New Jersey, a Revolutionary patriot, who was conspicuous in the Continental Congress

and later in the first Congress of the United States.

After holding a few formal sessions the court adjourned for lack of business, 10 Feb¬ ruary. In 1791 the Supreme Court was removed to Philadelphia, then the seat of the Federal government, where it continued to sit during term time for 10 years, the court room being on the second floor of the City Hall, at the corner of Fifth and Chestnut streets. In 1801 the court was removed to ‘Washington, where it has remained ever since. On the day of the first meeting of the Supreme Court of the United .States in the city of Washington, 4 Feb. 1801, John Marshall sat as Chief Justice for the first time.

Chief Justices. — Since 1790 the Supreme Court of the United States has had only nine chief justices, namely: John Jay, of New York; John Rutledge, of South Carolina; Oli¬ ver Ellsworth, of Connecticut; John Marshall, of Virginia; Roger B. Taney, of Maryland; Salmon P. Chase of Ohio; Morrison R. Waite, of Ohio; Melville W. Fuller, of Illinois, and Edward D. White of Louisiana, who is the present Chief Justice.

The Supreme Court (q.v.) at present con¬ sists of Chief Justice Edward D. White, of Louisiana, and Associate Justices Joseph Mc¬ Kenna, Oliver Wendell Holmes, William R. Day, Willis Van Devanter, Mahlon Pitney, James Clark McReynolds, Louis D. Brandeis and John H. Clarke.

Campbell Carrington.

COURT, Presentation at, a formal pres¬ entation to the sovereign of Great Britain of persons whose official, social or intellectual standing entitles them to that honor. It takes place either at Saint James' Palace, at a levee, intended for gentlemen only, or at Buckingham Palace, a drawing-room, where both ladies and gentlemen appear. The days when levees and drawing-rooms are to be held are always an¬ nounced some time beforehand. It is difficult in the present day to define exactly who may and who may not be entitled to be presented. Members of families of the nobility and landed gentry, diplomats, members of the House of Commons, persons holding high offices under the Crown, judges, magistrates, Church digni¬ taries, officers in the army and navy, persons who have attained eminence of any kind, for¬ eign ambassadors, members of their staffs and strangers of distinction, and the wives and daughters of the same classes, form the larger number of those presented at levees and draw¬ ing-rooms. Persons are often presented on en¬ tering on some office or attaining some dignity. Any one who has been once presented is entitled to appear at any future levee or drawing-room without a new presentation. The whole arrange¬ ments connected with presentations are under the supervision of the lord chamberlain, in whose office in Saint James' Palace information is given to all persons wishing to be presented. The names of ladies and gentlemen desiring presentation, and of the ladies, noblemen and gentlemen who are to present them, have to be submitted to the sovereign for approval and there is a strict exclusion of persons of dam¬ aged reputation, whatever their rank. Court dress or official uniform must be worn. A British subject who has been presented at Saint

James' may on any after occasion claim to be presented by the British Minister at any for¬ eign court. For information as to court dress both for ladies and gentlemen, court etiquette, court mourning, etc., consult Armytage, Hon. Mrs., (01d Court Customs and Modern Court Rule* (London 1883).

COURT OF APPEALS. See Court; United States Courts.

COURT OF APPEALS IN CASES OF CAPTURE (1780-87), the chief Federal court prior to the establishment of the Supreme Court, which in a sense grew out of it. From the nature of the revolt against Great Britain, the colonies were very loath to erect any new plenary power to decide their mutual disputes, which would also create new disputes between it and themselves. The first clash of jurisdic¬ tions came on the question of naval prizes. As early as the autumn of 1775 cruisers were cap¬ turing British vessels off the Eastern coast, part under commission from Massachusetts, part from the Continental Congress (see Conti¬ nental Navy) ; and Washington, conducting the siege of Boston, was appealed to for deter¬ mination of conflicting claims, there being neither provincial nor Federal courts for trial and condemnation of captures. On 11 Novem¬ ber he suggested to Congress to establish such a court ; on the 25th it recommended to the colonies to erect them, reserving an appeal to itself or such persons as it appointed. The act, however, provided neither court, procedure nor method of enforcement, did not define the source or limits of its jurisdiction and had the same defects as the entire Confederation pro¬ ceedings. (See Confederation, Articles of). Washington criticized it on the first ground. Nor would Congress take original jurisdiction, but only appellate. Several appeals were re¬ ferred to special committees; then, on 30 Jan. 1777, a special committee on revision of prize methods reported in favor of the creation of a standing committee of five to hear all such appeals. This was appointed, and the following March three more were added, but it was too large, and was shortly reduced to five again, with three as a competent quorum. But Wash¬ ington's suggestion was evidently the right one, and on 5 Aug. 1777 it was moved to consider the establishment of a permanent court. This was discussed for over two years, and not finally acted on till 15 Jan. 1780. Meantime a case had come up which forced some new method on them. Four Connecticut men in the fall of 1778 had been captured by the British and compelled to help navigate the sloop Active toward New York, then in British hands; they recaptured it from the British crew, and were steering it for a patriot port when a Pennsylvania privateer captured them and claimed the sloop as prize. A Pennsylvania jury gave the Connecticut men one-fourth of the prize, and divided the rest between the privateers and the State of Pennsylvania. The Connecticut men appealed to Congress, which reversed the decision; the Pennsylvania judge refused to admit its authority, and ordered the sloop and cargo sold and the proceeds divided. (It should be said that the State admiralty act prohibited appeal or rehearings). The commit¬ tee thereupon refused to hear any

more cases till its jurisdiction was settled. Congress re¬

solved that such cases could not be left to self-interested State decision, but that it would not prejudice the Union by resort to force; and the Connecticut men only obtained their rights many years later through the Supreme Court. After futile conferences with State legislative committees, an act was passed establishing a Federal “Court of Appeals in Cases of Capture, » to hold sessions first in Philadelphia, and then anywhere they pleased between Hartford, Conn., and Williamsburg, Va. But like all other enact¬ ments of the time, it was shorn of its needful powers : it could not fine or imprison for dis¬ obedience, the State courts were not to execute its decrees and no marshal was appointed. No tenure, either of definite time or good behavior, was assigned to the judges. Three of these were appointed, but one of them died soon after, and the other two performed the duties for two years, when another resigned and two others were chosen. But the cases were grad¬ ually decided after the war, and on 23 Dec. 1784 the docket was reported empty. The judges were still retained, but their salaries were abol¬ ished, except for a per diem allowance when in actual service. About this time the States began to constitute courts of appeal, to take matters out of the hands of the Federal court. The defeated parties, however, insisted on ap¬ peals to the latter, and on 27 June 1786 Congress resolved that these should be heard. The last session of the court was on 16 May 1787 at Philadelphia, while the Convention of 1787 (see Constitution, Framing of) was framing the Supreme Court. Consult Carson, (The Supreme Court of the United States: Its History)

(1892).

COURT BARON, in England, a court composed of the freeholders of a manor, pre¬ sided over by the lord of the manor or his steward. Its business was to administer the laws or custom of the manor and to admit ten¬ ants who bad acquired copyholds (q.v.) by inheritance or purchase and had to pay a fine to the lord of the manor. The institution still exists for the conducting of this latter business, but is presided over by the steward of the manor; and its proceedings are carefully re¬ corded. Consult Pollock and Maitland, (History of English Law) (2d ed., London 1899) ; Gur-don, (Historv of Court Baron and Court Leet) (Selden Society 1731).

COURT CEREMONIAL, certain forms of international etiquette or usage, which have arisen in Europe during modern times. No independent state can actually have precedence of another; but as the weaker seek the pro¬ tection and friendship of the more powerful, there arises a priority of rank. The origin of elaborate formalities is to be traced to the Eastern nations, who for ages have practised various forms expressing reverence for exalted personages. By a gradual establishment of dignities, rank and acts of respect to states, their rulers and representatives, (in contra¬ distinction to the internal etiquette of a state) an international ceremonial has been formed, that has been the source of confusion and war, to its observance far more considera¬ tion being often paid than to the fulfilment of the most sacred contracts. Louis XIV carried this folly further, perhaps, than any one

before or after him. To this international ceremonial belong:

1. Titles of rulers. Accident made the im¬ perial and regal titles the highest, and thus con¬ ferred advantages apart from the power of the princes. After Charlemagne, the emperors of the Romans were considered as the sovereigns of Christendom, maintained the highest rank and even asserted the dependence of the kings on themselves. For this reason several kings in the Middle Ages, to demonstrate their inde¬ pendence, likewise gave their crowns the title of ˆimperial.® England, for example, in all its public acts, is still styled the ((imperial crown.® The kings of France received from the Turks and Africans a title equivalent to emperor of France. In progress of time the kings were less willing to concede to the imperial title, of itself, superiority to the royal.

2. Acknowledgment of the titles and rank of rulers. Formerly the popes and emperors arrogated the right of granting these dignities; but the principle was afterward established that every people could grant to its rulers at pleasure a title, the recognition of which rests on the pleasure of other powers and on treaties. Some titles were therefore never recognized, or not till after the lapse of considerable

time. This was the case with the royal title of Prus¬ sia, the imperial title of Russia, the new titles of German princes, *etc.*

3. Marks of respect conformable to the rank and titles of sovereigns. To the (< royal® pre¬ rogatives, so called (conceded, however, to various states which were neither kingdoms nor empires, such as Venice, the Netherlands, Switzerland and the electorates), pertained the right of sending ambassadors of the first class, *etc.* In connection with this there is a much contested point, namely, that of precedence or priority of rank, that is, of the right of as¬ suming the more honorable station on any occasion, either personally, at meetings of the princes themselves, or of their ambassadors, at formal assemblies, etc., or by writing, as in the form and signature of state papers. There is never a want of grounds for supporting a claim to precedence.

As the councils in the Middle Ages afforded the most frequent occasion of such controver¬ sies, the popes often intervened. Of the several arrangements of the rank of the European powers which emanated from the popes, the principal is the one promulgated in 1504 by Julius II, through his master of ceremonies, in which the European nations followed in this order: (1) the Emperor of the Romans (Em¬ peror of Germany) ; (2) +.he King of Rome ; (3) the King of France; (4) the King of Spain; (5) of Aragon; (6) of Portugal; (7) of Eng¬ land; (8) of Sicily; (9) of Scotland; (10) of Hungary; (11) of Navarre; (12) of Cyprus; (13) of Bohemia; (14) of Poland; (15) of Denmark; (16) Republic of Venice; (17) Duke of Bretagne; (18) Duke of Burgundy; (19) Elector of Bavaria; (20) of Saxony; (21) of Brandenburg; (22) Archduke of Aus¬ tria; (23) Duke of Savoy; (24) Grand-Duke of Florence; (25) Duke of Milan; (26) Duke of Bavaria; (27) of Lorraine. This order of rank was not, indeed, universally received, but it contained a fruitful germ of future quarrels; some states, which were benefited by the ar¬ rangement, insisting upon its adoption, and

others, from opposite reasons, refusing to acknowledge it. To support their claims for precedence the candidates sometimes relied on the length of time which had elapsed since their families became independent, or since the intro¬ duction of Christianity into their dominions ; sometimes on the form of government, the number of crowns, the titles, achievements, extent of possessions, etc., pertaining to each. But no definite rules have been established by which states are designated as being the first, second, third, fourth, etc., rank. Rulers of equal dignity, when they make visits, concede to each other

the precedence at home ; in other cases, where the precedence is not settled, they or their ambassadors take turns till a compro¬ mise is effected in some way. In Great Britain and France far less ceremonial is observed, in the official style, than in Germany. Emperors and kings mutually style each other ˆbrother,® while they call princes of less degree ((cousin.® The *we,® by which monarchs style themselves, is used either from an assumption of state or from a feeling of modesty, on the supposition that <(I® would sound despotical, while ((we)) seems to include the whole administration, *etc.* The French Revolution destroyed the too elab¬ orate ceremonial of the French court; it was revived to a degree by Napoleon, and still fur¬ ther after the Bourbon Restoration, but dis¬ appeared entirely on the establishment of the Third Republic. In England court ceremonial was considerably abridged under Victoria, but was restored under Edward VII and continued by George V.

COURT OF CHANCERY. See Court;

English Courts.

COURT OF CLAIMS. See Court;

United States Courts.

COURT DE GEBˆLIN, koor de je-be- lan, Antoine, French scholar, only son of Antoine Court (q.v.) : b. Nimes, 25 Jan. 1725; d. Paris, 10 May 1784. After receiving a good education he became pastor of the Reformed Church, but his natural tendency and ambition caused him to abandon the calling for literary pursuits. After his father's death he went to Paris to gather materials for a comprehensive study of the languages and mythologies of the ancient world. This long research finally ap¬ peared in nine volumes, still unfinished in 1784. He continued to work for the Protestant cause, publishing in 1760 a work entitled <Les Tou-lousaines, ou lettres historiques et apolo-getiques en faveur de la religion reformee,) and he founded at Paris an agency for stirring up sympathy for the sufferings of his co¬ religionists. He supported the idea of the in¬ dependence of America and the liberal political opinions of Quesnay. Bad investments of money impoverished his old age. Consult Dardier, . Charles, (Court de Gebelin> (Nimes

1890).

COURT OF HIGH COMMISSION, a

court which was established in Queen Eliza¬ beth's reign, and exercised powers like those which during the reign of Henry VIII had been entrusted to Lord Cromwell. The judges had the power of arresting suspected persons, im¬ prisoning, torturing them and causing them to accuse their confederates or their friends. They could impose new articles of faith and impose them on recalcitrant consciences by compulsion

of the severest and most odious kind. It was abolished for abuse of power in 1641.

COURT OF HONOR, a court of chivalry, of which the lord high constable was judge, for the purpose of settling such disputes as had commonly been settled by duels. It was a con¬ tinuation of what in the time of Henry IV was called curia militaris, military court. Sugges¬ tions have been made from time to time for the establishment of courts of honor, but the law has made provisions for settling larger affairs of offense against honor, such as libel, slander, etc., and the need of special court is not appar¬ ent. See Duel.

COURT OF LIONS. See Alhambra.

COURT OF LOVE (Fr. cour d' amour), in mediaeval France and Germany, a tribunal composed of ladies illustrious for their birth and talent, whose jurisdiction, recognized only by courtesy and opinion, extended over all ques¬ tions of gallantry. Such courts-existed from the 12th to the 14th century, while the roman¬ tic notions of love which characterized the ages of chivalry were predominant. The decisions were made according to a code of 31 articles, which have been preserved in a manuscript entitled (De Arte Amatoria et Reprobatione Amoris^ written by Andre, royal chaplain of France, about 1170. Some of the troubadours were often present to celebrate the proceedings in verse, and the songs of these minstrels were not unfrequently reviewed and judged by the tribunals. Among the ladies who presided were the Countess De Die, called the Sappho of the Middle Ages; Queen Eleanor of Guienne and her daughter, Marie de

Fauce, Countess of Champagne, and Laura de Sade, celebrated by Petrarch. There was such a court in Provence in the days of the Troubadors. The following case was submitted to their judgment : A lady listened to one admirer, squeezed the hand of a second and touched with her toe the foot of a third. With which of these three was she in love? King Rene of Anjou attempted in vain to revive the courts of love, and the last imita¬ tion of them was held at Ruerl at the instance of Cardinal Richelieu, to judge a question of gallantry, which had been raised in the Hotel de Rambouillet. Consult Meray, (La vie au temps des cours d'amour) (Paris 1876), and Reynouard, (Choix de poesies originales des troubadours) (Vol. II, ib. 1817).

COURT-MARTIAL. See Law, Military.

COURT-PLASTER, so called because originally applied by ladies of the court as patches on the face; black, flesh-colored or transparent silk varnished over with a solution of isinglass, which is often perfumed with ben¬ zoin. It is used for covering slight wounds.

COURT OF PRIVATE LAND CLAIMS.

See Courts ; United States Courts.

COURT OF SPECIAL SESSIONS. See

Court; United States Courts.

COURTENAY, koort'na or kert'na, Ed¬ ward Henry, American mathematician : b. Maryland 1803; d. Charlottesville, Va., 21 Dec. 1853. He was graduated at West Point in 1821, and was professor of philosophy there 1821-34, and professor of mathematics at the University of Pennsylvania 1834-36. After several years devoted to civil engineering he was professor of mathematics in the University of Virginia

1843—53. He was an engineer in the construc¬ tion of Fort Independence in Boston harbor 1837-41, and was chief engineer of the dry-dock work in the Brooklyn Navy Yard. He pub¬ lished (Treatise on Differential and Integral Calculus> and (Calculus of Variations.) He translated and edited the (Elementary Treatise on Mechanics of BoucharlaH (1883).

COURTESY, or CURTSEY, the estate

to which by common law a man is entitled on the death of his wife in the lands or tenements of which she had possession in fee simple or in tail during their coverture, provided they have had lawful issue born alive, which might have been capable of inheriting the estate. The ori¬ gin of this custom and its name is English in England, but the same law existed also in Nor¬ mandy and still holds in Scotland. In the United States the law differs in various States, but has generally been supplanted by other laws.

COURTESY TITLE, a title assumed by or given to any person by common consent as an act of courtesy or respect, not of absolute right. See Titles of Honor.

COURTHOPE, kort'hop, William John,

English scholar: b. 17 July 1842. He was edu¬ cated at Harrow and Oxford, was first civil service commissioner in 1892 and professor of poetry at Oxford 1895-1901. He is author of (Ludibria Lunse) (1869) ; (Paradise of Birds) (1870) ; (Life of Addison) (1882) ; (History of English Poetry) (6 vols., 1895-1909) ; Wife in Poetry) ; (Law in Taste) (1901) ; (The Longest Reign. > He was appointed C.B. in 1892, and both Durham and Edinburgh conferred hon¬ orary degrees on him. In 1906 he became Fel¬ low of the British Academy of Letters and of the Royal Society of Literature in - 1907. He was editor of the last five volumes of the standard edition of Pope (10 vols., 1871-89), which was begun with Whitwell as editor.

COURTIS, Stuart Appleton, American educator: b. Wyandotte, Mich., 15 May 1874; educated at Detroit Business University, Mas¬ sachusetts Institute of Technology, University of Chicago and Columbia University. He was head of the department of science and mathe¬ matics in the ((Liggett School® Home and Day School, Detroit, from 1898 to 1914, when he became superintendent of educational research in the Detroit public schools. At the same time he held the position of director of the depart¬ ment of measurements for the University of Oklahoma from 1913. He is the originator of Courtis' Standard tests,® a system for the measurement of the efficiency of school work. He was a member of the Hanus Committee on School Inquiry held in New York in 1911. He is well known as a lecturer and contributor to magazines.

COURTIS' TESTS. For several years Stuart Appleton Courtis (q.v.), in the discharge of his duties as head of the department of science and mathematics in the Detroit Home and Day School, made use of comparativetests for purposes of supervision. During this time a

gradual evolution of these tests took place; and they finally assumed the shape of an attempt to apply scientific methods to the teaching of the fundamentals in reading, writing, arithmetic and English subjects so as to make possible rapid and reliable measurements of the effects of

teaching through testing work practicable under classroom conditions. After considerable com¬ parative investigation along experimental lines, ((Series A,® the first of the Courtis' Tests, was published and 18,000 copies were sold at cost or given away as a preliminary to a compara¬ tive investigation to determine standard scores. Failure after failure met these attempts to con¬ trol individual variation; but a test of 5,000 children in Detroit and 33,000 in New York schools for the Hanus Committee on School Inquiry provided the necessary scope and op¬ portunity for the standardization of the tests in 1911. The result of these tests shows that ((the supreme factor in education is the variation of the natural abilities of children.® Courtis came to the conclusion, therefore, that ((new educational methods that would give each child a chance to develop in his own way and along his own lines would have to be invented.® He experimented along the same lines in the Boston schools in 1912. In October and again in March 20,000 children were tested and several experi¬ mental methods of giving assistance to indi¬ viduals were put into practice in the schools tested. These original tests were applied prin¬ cipally to the teaching of arithmetic; but as it was found that this was not a broad enough basis on which to work, other tests were applied to the teaching of reading and writing.

The Courtis' Tests are divided as follows: (1) Diagnostic. To make evident the actual conditions existing in schools, classes and indi¬ viduals that the weaker points may be noted, cause determined and remedies devised. (2) Scientific. To discover the natural laws of men¬ tal developments operative in school work. (3) Experimental. To make possible control experi¬ ments that will settle all questions of educational procedure upon a fact basis, through scientific

determination of the efficiency of different methods. (4) Supervisory. To secure the in¬ formation needed in setting standards for the guidance of teachers and schools and in deter¬ mining whether or not standards already set are being attained. The Courtis tests have been defined as (<a correspondence course in educa¬ tional measurements.® By means of printed tests, folders of instruction, records and graphic sheets superintendents and teachers are enabled to carry on experimental work with a minimum of effort. The tests (<aim to secure information for the formation of reasonable aims in terms of objective standards; to measure the efficiency of methods designed to produce desired results ; to obtain knowledge of the factors and natural laws of teaching and learning; and to enable comparisons of school with school, or teacher with teacher, to be made upon a scientific, im¬ personal, objective basis.® The Courtis tests differ from those of Binet (q.v.) in that they are more scientific, more carefully worked out by means of cooperation; and that there is but one set of tests for children of all ages. The giving of exactly the same tests under identical conditions to all persons examined is an essen¬ tial feature of the method and distinguishes it from previous methods. The standardized tests cover arithmetic, writing, dictation, reading, spelling, punctuation, reproduction and the com¬ parison of all the work done by the pupil. Con¬ sult Courtis, S. A., (Manual of Instructions for Giving and Scoring the Courtis' Standard Tests) (Detroit 1914) ; (Better Teaching in

Arithmetic (Detroit 1913) ; (Teachers' Man¬ ual) (Yonkers 1914).

COURTMANS, kcor-man', Joanna Desi-deria Berchmans, Flemish poet and novelist : b. Ou, degem, East Flanders, 6 Sept. 1811; d. Maldegem, 6 Sept. 1890. She was married in 1836. Besides dramas and poems, she wrote 22 volumes of stories. She excelled particularly in her descriptions of the life of the common peo¬ ple. The most notable of her tales are (Het geschenk van den jager,> which won the Flem¬ ish literature prize in 1864; (De zwarte Hoeve) (2d ed., 1866) ; (De Koewachter) (1873) ; (De Hoogmoedige) (1882).

COURTNEY, Leonard Henry, 1 st Baron Courtney of Penwith, English writer and politician: b. Penzance, Cornwall, 6 July 1832; d. London, 11 May 1918. The son of a banker, he was educated at Cambridge University and became a barrister in 1858. He engaged in literary and journalistic work, dealing mainly with economic, historical and statistical topics. Elected to Parliament as a Liberal in 1877, Courtney successively held the under-secretary¬ ships of the Home Department

and Colonial Office, and in 1882 was made Financial Secretary of the Treasury. His political career was char¬ acterized by a peculiar opposition to nearly all popular causes. He opposed Home Rule, the first annexation of the Transvaal and Redistri¬ bution. In 1886 he went over to the Unionist side and became deputy-speaker in the Com¬ mons. He broke out into opposition again by advocating the evacuation of Egypt, and later denounced the South African War, which lost him his seat in the 1900 election. He received his peerage from the Liberal government in 1906. On the European War question he advo¬ cated peace by negotiation. He left no heir to the title.

COURTNEY, William Leonard, English author: b. Poona, India, 5 Jan. 1850. He was educated at Oxford, became editor of the Fortnightly Review in 1894 and has served on the editorial staff of the Daily Telegraph. He has published <The Metaphysics of John Stuart MilP (1879) ; (Studies on Philosophy* (1882) ; Constructive Ethics) (1886) ; (Studies New

and Old* (1888) ; (Life of John Stuart MilP (1889) ; (Studies at Leisure* (1892) ; (Kit Mar¬ lowe, } a play (1893) ; (The Idea of Tragedy > (1900) ; (Undine* (1902) ; (The Feminine Note in Fiction * (1904) ; (The Literary Man's Bible > (1907) ; (The Literary Man's New TestamenP (1915), *etc.*

COURTOIS, koor-twa', Bernard, French

chemist: b. Dijon 1777; d. Paris, 27 Sept. 1838. He was trained in pharmacy and entered Fourcroy's laboratory in the Lcole polytech¬ nique. He had to join the army in 1799, but after his discharge resumed his chemical work with Thenard and Seguin. In conjunction with the latter he discovered morphine in opium, but nothing was published on the subject till Seguin's paper long after, and Courtois' share has consequently been overlooked. In 1804 he began work on nitrate of sodium, the process consisting in decomposing nitrate of calcium by the carbonate of sodium obtained from kelp. In the course of his operations he observed that the iron vessels were corroded if the liquors from which the sodium salts had been crystallized were kept in them for a time. In-

vestigˆtirig the cause of this, he found that on distilling the liquors with sulphuric acid a body with a splendid purple vapor was liberated. He examined it and ascertained some of its prop¬ erties ; for instance, its formation of a detonat¬ ing compound with ammonia, and then gave a specimen of it to Clement, who read a paper on it, and ultimately resigned the investigation to Gay Lussac. This was the first discovery of iodine. In 1815 his nitre manufacture was ruined, and thereafter he had a precarious livelihood by making various chemical products.

COURTOIS, Gustave Claude Etienne,

French painter: b. Pusey, 18 March 1852. He studied at Paris as a pupil of Gerome; first exhibited in the Salon in 1876 ; won the first-class medal at the Paris Exposition of 1889. His works include (The Death of Archimedes) ; (Narcisse) (in the Luxembourg) ; (Dante and Virgil in HelP ; (Bayadere> ; (The Burial of Atala) ; and a number of portraits. At the Saint Louis Exposition in 1904 he exhibited ‘Adam and Eve in Eden} ; (Cupid Feasting) and a portrait of *Mme.* G. From 1880-90 he was. the most fashionable portrait painter in Paris.

COURTOIS, Jacques (It. Jacopo Cortese), surnamed le Bourguignon (It. II. Borgonone), French painter: b. Saint Hippolyte, Doubs, 1621 ; d. Rome, 14 Nov. 1676. He was a pupil of his father, Jean Courtois, but went to Italy in 1636 and served three years with the Spanish army in Lombardy. He then studied at Bo¬ logna, Florence, Siena and Rome, where he came under the influence of Guido Reni and Francesco Albani in Bologna, and Pieter de Laar in Rome. He was especially eminent in battle-pieces. His wife dying of poison, which he was suspected of having administered, he took the habit of a lay brother of the Jesuits, with whom, though he still practised his art, he remained till his death. His brother William (d. 1679) was also an eminent painter who excelled in historical pieces, and assisted Jacques in some of his works. His pictures are to be found in nearly all of the galleries of Europe.

COURTRAI, koor-tra, Belgium, a fortified town in the province of West Flanders, on the Lys River, 26 miles south of Ghent. It is well built, having handsome and spacious streets and a fine Grande Place, with several other squares. Its manufactures are table linens, lace — which is celebrated for its beauty of design and ex¬ quisite workmanship — cambrics, cotton goods, etc., and it has extensive bleaching and dyeing

works. Here, in 1302, took place the <(battle of spurs® between the French and Flemings. It was in German occupation during the Great European War. Pop. 35,872.

COURTSHIP OF MILES STANDISH, The, the title of a poem by Longfellow. It is written in hexameter measure and was first published in 1858.

COUSIN, koo-zan, Jean, The Elder, French artist: b. Soucy, near Sens, France, 1501 ; d. Sens about 1590. He is generally re¬ garded as the earliest French historical painter. He chiefly painted on glass, but his Wast Judg¬ ment, } painted on canvass for the convent of the Minims at Vincennes, is esteemed an ex¬ cellent work. In 1540 he designed the festive decorations for the entry of Emperor Charles V

•

at Paris. Noteworthy among his sculptured works are the tomb of Admiral Chabot (Louvre) and the sculptures formerly in the chapel of Pagny (Burgundy). A large number of wood cuts have also been credited to him. He was the author of (Livre de perspective) (1560) and Wivre de portraiture) (1571). His son, Jean the Younger, also an artist: b. Sens about 1522; d. 1594. He designed the glass windows and possibly the sculptures of the castle of Fleurigny at Sens. The glasses in the church of Saint-Gervais, Paris, are also attrib¬ uted to him. He painted five portraits of the Bouvyer family. He wrote a book on the (True Science of Portraiture) and a 'Book of Fortune) containing 200 drawings. Consult Firmin-Didot, 'Etude sur Jean Cousin> (1872) ; Roy, (Les deux Jehan Cousin) (in Mem. de la Societe Archeol. de Sens, Vol. XXIV, 1909) ; Dimier, Wrench Painting in the Six¬ teenth Century) (1904) ; id., 'Bulletin de l'art ancien et moderne) (1909).

COUSIN, Victor, French philosopher: b. Paris, 28 Nov. 1792; d. Cannes, 13 Jan. 1867. He founded a school of eclectic philosophy, combining the doctrines of the Scotch school of Reid and Stewart, based on sensation, with those of Schelling and Hegel, which rest on the opposite principle of idealism or intuition. He was not an original thinker but possessed in a high degree the faculty of clear exposition, and for that reason his lectures and his writings enjoyed a great popularity. He rendered a memorable service both to philosophy and

lit¬ erature by his translation of <Plato) (1840). Besides his ‘Fragments philosophiques> (1826) and other works on that theme, he is the author of a few biographical sketches, mostly of char¬ acters related to the spiritual and intellectual movements of the 17th century as (Jacqueline PascaP ; (Mme. de Longueville) ; (Mme. de HauteforD ; Wrench Society in the 1 7th Cen¬ tury.) As a lecturer and philosophical writer Cousin was distinguished by a rare combination of eloquence, enthusiasm and, as already stated, clearness of exposition. He possessed a beauty of style such as no modern or ancient philoso¬ pher excepting Plato has equaled. He rendered a very valuable service to his native land in the part he took in the organization of primary instruction. In 1831, under a commission from the French government, he visited Germany to study educational methods there, and the Wap-port sur l’Etat de l’lnstruction Publique) pub¬ lished on his return had powerful influence on subsequent legislation. Consult Janet, ‘Vic-tor Cousin et son QEuvre) (1885) ; Simon, Jules, ‘Victor Cousin) (1887); Taine, Wes Philoso¬ phies Classiques du XIXe Siecle) (1888) ; Saint-Hilaire, B, ‘Victor Cousin, sa vie, sa Cor¬ respondence* (1895).

COUSIN MICHEL, me’Hel, a nickname sometimes applied to a German, as John Bull is to an Englishman, or Brother Jonathan to an American.

COUSINS, Samuel, English engraver: b. Exeter, 9 May 1801 ; d. 7 May 1887. He was early apprenticed to the mezzotint engraver, S. W. Reynolds. He first brought himself into notice by his engraving of Lawrence’s Wady Acland and her Children,) in 1826. In 1835 he was elected A.R.A., and in 1855 became the first Royal Academician engraver. These were

followed by many portraits and pictures after Reynolds, Lawrence, Gainsborough, J. E. Mil¬ lais, Wilkie, Landseer and others. Of his numerous works the following may be men¬ tioned: (Pope Pius VIP (1827), after Law¬ rence; Wolton Abbey in the Olden Time) (1837), after Landseer; (Queen Victoria) (1838), after Chalon ; (The Maid and the Magpie-* (1862), after Landseer; Wes or No* (1873), after Millais; Simplicity* (1874), after Reynolds; Wherry Ripe* (1881), and (Pomona* (1882), after Millais. Consult his biography by A. Whitman (London 1904).

COUSTOU, koo'stoo', Guillaume, The

Elder, French sculptor: b. Lyons, 25 April 1678; d. Paris, 20 Feb. 1746. He studied under his father and spent several years in Rome, where he assisted Pierre Legros. Besides work done in collaboration with his brother, he modeled the kneeling statue of Louis XIII in Notre Dame, (Ocean and Mediterranean* and the vigorous and spirited marble groups of the (Horses of Marly* at the entrance to the Champs Elysees. He was a brother of Nicolas Coustou (q.v.) whom he succeeded as director of the Academy of Fine Arts. The monument of the Cardinal Dubois, in the church of Saint Roch, is much esteemed.

COUSTOU, Guillaume, The Younger, French sculptor: b. Paris 1716; d. there 1777. He was eldest son of the preceding, and on him Jose Ph }l during his stay in Paris, con¬ ferred with his own hands the order of Saint Michael. The statues of Venus and Mars, larger than life, which he made in 1769 for the king of Prussia, gained universal admiration. His monument of the Dauphin and Dauphiness, parents of Louis XVI, in the cathedral of Sens, bears the character of majestic simplicity. Con¬ sult Lady Dilke, Wrench Architects and Sculp¬ tors of the 18th Century* (1900) ; and Wes Coustou* (in Gazette des Beaux-Arts, Vol. I,

1901).

COUSTOU, Nicolas, French sculptor: b. Lyons, 9 Jan. 1658; d. Paris, 1 May 1733. He studied with his father, Franqois, a wood carver, and later at Paris. He then spent three years in Rome, and then returned to Paris, where he was appointed rector of the Academy in 1720 and chancellor in 1733. He is admired for his ability in grouping and delicacy of de¬ sign, although a tendency to an affected refine¬ ment, then becoming common, is observable in his works. His works include decorations for the palaces of Versailles, Trianon and Marly, in which he was assisted by his brother, Guillaume ; Wnion of the Seine and the Marne* ; (Daphne Pursued by Apollo,* in the Garden of the Tuileries; statues of Julius Caesar and of Louis XIV in the Louvre, and the (Descent from the Cross,* in the Notre Dame in Paris, which is particularly valued. The younger brother was a worthy disciple of the elder.

COUTHON, koo-ton, Georges, French revolutionist: b. Orcet 1756; d. Paris, 28 July 1794. Immediately previous to the Revolution he had made himself conspicuous as a Liberal in the provincial assembly at

Auvergne, and had gained considerable popularity by the gratuitous assistance he offered the poor. Some time after the Revolution he was chosen a member of the National Assembly, where he soon forfeited

his character for, mildness and amiability, and allying himself with Robespierre, aided and abetted the latter in all his atrocities. He was appointed on the Committee of Public Safety and sent against the insurgent city of Lyons. The lives of the citizens were spared, although property was destroyed. On his return to Paris he established with Robespierre and Saint Just a supreme tribunal. ‘On the downfall of Robes¬ pierre’s party Couthon shared, along with him and Saint Just, the decree of arrest pronounced by the Convention on 9th Thermidor. The same day he and his compeers were seized in the Hotel de Ville, where, in the scuffle that ensued, Couthon was nearly trampled to death, but survived sufficiently to be guillotined next day, Consule Mege, Correspondence de Couthon* (Paris 1872) ; Aulard, Wes orateurs de la legislative et de la convention* (Paris 1885-86) ; Morse, Stephens, (The French Revolu¬ tion* (New York 1891).

COUTURE, koo-tiir, Thomas, French his¬ torical and genre painter: b. Senlis, 21 Dec. 1815; d. Villiers-le-Bel, near Paris, 30 March 1879. He studied under Gros and Delaroche ; he was a disciple of neither. In 1837 he was awarded the Prix de Rome, and in 1845 his picture (The Thirst for Gold* (Toulouse Mu¬ seum, replica in Amsterdam) attracted consid¬ erable attention. His best picture is Wes Romains de la Decadence* (1847), now in the Louvre, which obtained a first class medal and created a noteworthy sensation. Among other works are (Une veuve* ; We trouvere* (1844) ; (Joconde* (1847) ; and (The Volunteers of 1793,* now in the Boston Museum of Fine Arts. Under Napoleon III he became court painter, but not being gallant never gained much popu¬ larity. His pictures were purchased mostly by foreigners, especially Americans. He also painted the frescoes in the chapel of the Virgin, Saint-Eustache, Paris, and, during this last pe¬ riod, many portraits of which there are frequent examples in the museums of southern France. His art is rich in color and clear in line. Among his pupils were Fuerbach, Victor Muller, Puvis de Chavannes, Manet and many lesser artists of countries other than France. His book, (Conversations on Art Methods,* was translated by Stewart and published in New York in 1879. Consult Healey, Wouture* in Van Dyck’s (Modern French Masters* (New York 1896) ; Claretie, (Peintres et sculpteurs contemporains*^ (Paris 1873) ; Flat, (Un peintre

assimilateur* (in Revue Politique et Litteraire, Paris 1913).

COUVADE, koo-vad', a curious custom prevalent in ancient as well as modern times among primitive races in all parts of the world. After the birth of a child the father takes to bed, and receives all the delicate food and care¬ ful nursing which, among civilized peoples, is given to the mother. This custom was observed, according to Diodorus, among the Corsicans ; and Strabo states that it existed among the Iberians. Many travelers from Marco Polo downward have met with similar custom among the Chinese, the Dyaks of Borneo, the negroes and especially among the aboriginal tribes of North and South America. The Indians explain it by saying that descent is directly from the father, while anthropologists suggest that it is a ceremony by which the father proclaims his

relation to the new-born child. Tylor at first explained the usage as a symbol of a direct physical bond between the male parent and the child. Thus the father refrained from eating flesh of certain animals for a period before the birth of the child, in the belief that food directly influenced character. The theory which seems most plausible is that the couvade was simply an evidence of the belief in sympathetic magic. Consult Ripley, (The Races of Europe> (1899) ; McGee, (The Seri Indians) (17th Report American Bureau of Ethnology) ; Tylor, Re¬ searches into the Early History of Mankind) (pp. 291ff) ; id., (On a Method of Investigating the Development of Institutions } (in Journal of the Anthropological Institute , Vol. XVIII, pp. 254ff, 1889); Ploss, 'Das Weib> (1897).

COVARIANT. See Invariants.

COVELLITE, a copper ore consisting of the indigo-blue sulphate of that metal, contain¬ ing 66.4 per cent of copper. It is one of the minor ores in the Anaconda mines, near Butte, Momt., also at Ely, Nev.

COVENANT, in law , an agreement between two or more persons, entered into by deed, whereby one of the parties promises the per¬

formance or non-performance of certain acts, or that a given state of things does or shall, or dioes not or shall not, exist. It differs from an express assumpsit in that it must be by deed. Affirmative covenants are those in which the covenanter declares that something has already been done, or shall be done in the future. Such covenants do not operate to deprive covenantees of rights enjoyed independently of the cove¬ nants. Auxiliary covenants are those which do not relate directly to the principal matter of con¬ tract between the parties, but to something connected with it. Collateral covenants are those which are entered into in connection with the grant of something, but which do not relate immediately to the thing granted. Concurrent covenants are those which are to be performed simultaneously. Declaratory covenants are those which serve to limit or direct uses. Dependent covenants are those in which the obligation to perform by one is made to depend upon the performance by the other. Covenants for title are those covenants in a deed conveying land, which are inserted for the purpose of securing to the grantee and covenantee the benefit of the title which the grantor and covenantor professes to convey. A real covenant is one which at early common law bound the covenantor's heirs to the extent to which they inherited real estate. They are now of slight importance, and the term is now used in contradistinction to personal covenants which do not run with the land. An inherent covenant is another name for real. When a covenant relates to an act already done, it is called executed; where the performance is future it is called executory. An action of covenant might be instituted for breaking cove¬ nant. The doctrine of "warrandice® in Scottish law fills the place of covenant to some extent. Those in common use are five in number in England, — of seisin, of rights to convey, for quiet enjoyment , against encumbrances and for further assurance, — and are held to run with the land. There is besides in the United States, wThere most of the classes of covenants are en¬ forced, a covenant of warranty which is more commonly used than any of the others. The

covenants of seisin, against encumbrances, and right to convey, are generally held to be in prcesenti and not assignable. Consult Sims. 'Treatise on Covenants) (Chicago 1901) ; Goodeve, 'Law of Real Property) (5th ed., Lon¬ don 1906) ; Hamilton, 'Law of Covenant (London).

COVENANT, a term in theology derived from the Hebrew berith, bond, "fetter,® probably introduced into Canaan during the Babylonian occupation ; in Greek, the corresponding word is 6ia6i/ K7jt diatheke, meaning will, testament. Not all of the old meanings

are included in the English word “covenant,® which “applies to a contract between two parties acting freely, while both the Hebrew and the Greek words may be used of anything binding upon the two parties to any transaction, whether the terms are ac¬ cepted voluntarily or imposed by one of the parties or by another.® In Old Testament his¬ tory, a covenant was usually an agreement be¬ tween clans or tribes for the securing of peace and safety; as defining the relation of suzerain to his subjects, the bond between God and his people. Ceremonies such as animal sacrifice attended the making of a covenant. Religion was a covenant with Yahweh, to which the latter was also bound to be faithful. The provisions and sanctions of the covenant are summarized in the laws of Israel. In the course of prophetic history, the covenant became the animating bond of union between Yahweh and his people— the promise of the restoration of the kingdom founded by David is such a covenant. In the New Testament the word is translated by the words “testament® and “covenant.® In the federal theology of Johannes Cocceius, this conception of covenant assumed primary im¬ portance. In Scottish history the covenant is the articles of faith of the dissenters. See Covenanters.

COVENANT OF LIBERTY OF WOR¬ SHIP, the first Covenant subscribed to in Scot¬ land (3 Dec. 1557) in which the signers peti¬ tioned the government for liberty of worship. Two years later a second covenant was signed (31 May) for the “mutual assistance of all the subscribers thereto in defense of their religious rights.® Finally civil war broke out. French troops were invited to Scotland by the Papal party; and the “congregation® called in the aid of Elizabeth of England. The French troops were withdrawn from Scotland in 1560, and the Scottish Parliament, being left at liberty and free from pressure on the part of the royal family and favored nobles, decreed that the Presbyterian should be the Established Church of Scotland. In 1638, all the preceding cove¬ nants were summed up in the National Covenant, which was subscribed to all over Scotland. See Lords of the Congregation and also Congregation.

COVENANTERS, in Scottish history, the name given to the party which struggled for religious liberty from 1637 on to the Revolution. They were so called because they bound them¬ selves in a series of covenants to maintain the Presbyterian doctrines. The first oath was signed in the winter of 1557, on the second com¬ ing of Knox to Scotland; another signed by King James, and called the King’s Covenant, was signed in 1581. It was drawn up by John Craig to offset the growing predominance of

Catholicism, which it denounced. It was again subscribed to in 1590 and 1596.

After the union of the crowns of Scotland and England (1603), as the Stuarts favored the Episcopal churches, whose hierarchical form seemed fitted to promote their despotic views, the dangers which threatened Presbyterianism brought its followers in Scotland to a closer union ; and when, in 1637, the new liturgy, modeled after the English, was ordered to be introduced into their churches, disturbances arose, which ended in the forming of a new Covenant the following year. This was called the National Covenant. The subscription of it began in the Gray friars' Church, Edinburgh, 28 Feb. 1638. Copies were circulated through¬ out the country for general signature, many of which are still extant. The Covenant, with the confession of faith which it embodied, was rati¬ fied by the General Assembly at Glasgow, 21 Nov. 1638, and by the Scottish Parliament in 1640. In 1642 the English Parliament applied to the Scots for aid in the Civil War in the reign of Charles I and the application was pressed more earnestly in the following year. The Covenanters, who were then masters of Scotland, demanded that the English Parlia¬ ment should take the Covenant, and assimilate the doctrine and discipline of the churches of the two nations. In consequence of this stipula¬ tion, 25 Sept. 1643, both Houses of Parliament met at Saint Margaret's Church, Westminster, along with the Assembly of Divines and the Scottish commissioners, to take the Covenant, which had been modified by the Assembly. After prayers and sermons, all present held up their hands in testimony of assent to it; and afterward, in their several Houses, subscribed it on a Parliament roll. The House of Com¬ mons ordered it to be taken by all persons in their respective parishes next Lord's Day.

Both covenants were signed by Charles II on his landing in Scotland in 1650, and again at his coronation at Scone, 1 Jan. 1651. The covenan¬ ters were now the supreme power in Scotland, but their supremacy was undermined by the victory at Dunbar in 1651, and

vanished when Charles was restored in 1660.

In 1661 the Covenant was burned by the hangman, and in 1662 abjured by act of Parlia¬ ment, in both England and Scotland. Op¬ pressive measures were inaugurated against the Covenanters who, outraged, finally in 1665 took up arms in defense of the Presbyterian form of church government. The Presbyterian ministers who refused to acknowledge the bishops were ejected from their parishes and drew around them crowds of their people on the hillsides, or any lonely spot, to attend their ministrations. These meetings, called ((conventicles," were denounced as seditious, and to frequent them, or to hold communication with those frequenting them, was forbidden on pain of death. The unwarrantable severity with which the recusants were treated provoked them to take up arms in defense of their opinions. The first outbreaks took place in the hill country on the borders of Ayr and Lanark shires. Here at Drumclog, a farm near Loudon Hill, a conventicle was attacked by a body of dragoons under Graham of Claver-house, but were successful in defeating their assailants (1679). The murder of Archbishop Sharp on Magus Moor, and this defeat, alarmed

the government, who sent a large body of troops to put down the insurgents, who had increased in number rapidly. The two armies met at Bothwell Bridge, where the Covenanters were totally defeated (22 June 1679). In conse¬ quence of the rebellious protests called the San¬ quhar Declaration, put forth in 1680 by Cam¬ eron, Cargill and others, as representing the more irreconcilable of the Covenanters (known as Cameronians), and a subsequent proclama¬ tion in 1684, the government proceeded to more severe measures. An oath was now required of all who would free themselves of suspicion of complicity with the Covenanters; and the dragoons who were sent out to hunt down the rebels were empowered to kill anyone who refused to take the oath. During this t(killing-time," as it was called, the sufferings of the Covenanters were extreme ; but, notwithstand¬ ing the great numbers who were put to death, their fanatic spirit seemed only to grow stronger. Even after the accession of William some of the extreme Covenanters refused to ac¬ knowledge him owing to his acceptance of episcopacy in England, and these formed the earliest dissenting sect in Scotland. The latest covenant was that drawn up in 1912 by the Scottish Presbyterians of Ulster who were op¬ posed to the Irish Home Rule Bill of Mr. Asquith, on the ground that it might endanger Protestantism. Consult Gardiner, S. B., (Con¬ stitutional Documents of the Puritan Revolu¬ tion' (London 1897) ; id., (History

of England' (1883-84); Grub, G., (Ecclesiastical History of Scotland' (Edinburgh 1861); Macpherson, ˆHistory of the Church of Scotland' (Paisley

1901).

COVENT GARDEN (corrupted from Convent Garden, originally the garden of the Abbot of Westminster), is a spacious square in London, celebrated for a great market of fruit, vegetables and flowers. The square was formed about 1631 from the designs of Inigo Jones, and has the arcade or piazza on the north and north¬ east side, Tavistock Row on the south, and the church of Saint Paul's on the west. In the 17th century Covent Garden was a very fashion¬ able quarter of the town. The scene of one of Dryden's plays is laid here, and frequent allu¬ sions are made to the place in plays of Charles II's time. The market, now so famous, appears to have originated about 1656 in a few wooden sheds and stalls. The first theatre erected here was built in 1733. It was burned in 1808, re¬ built from a design by Smirke, burned in 1856, and since wholly rebuilt. Covent Garden mar¬ ket is for a stranger one of the sights of Lon¬ don, and is seen to greatest advantage about 3 o'clock on a summer morning.

COVENTRY, England, city in the county of Warwick, 85 miles northwest of London, on the Sherbourne. It is one of the oldest cities in England, formerly a walled town. A Benedic¬ tine monastery was founded here in 1044 by Earl Leofric and Lady Godiva (q.v.), his wife. Many of the buildings, the cathedral among them, were destroyed by Henry VIII. Parlia¬ ments were convened here by the earlier monarchs of England, several of whom occa¬ sionally resided in the city. Pageants and pro¬ cessions were popular in the old days, and they still have many admirers. Some of the houses and a few of the narrow and irregular streets

of the 15th and 16th centuries are in existence. Coventry has now

several fine churches. Its boundaries have been extended because of the expansion of its industries. Its chief manufactures are bicycles, tricycles, rib¬ bons, artificial silk, watches, sewing machines, naval ordnance, motors and fringes. The city owns its own gas, electrical and water plants'; it has public baths, an excellent system of sewer¬ age, libraries, a technical school and other public institutions. The city sends one member to Parliament. Pop. 106,377. Consult Dormer, cHistory of Coventry) (New York 1898) ; and Fretton, (Antiquarian Losses in Coventry P (in Archaeological Journal, Vol. XXXVI, London

1880).

COVENTRY, R. I., town in Kent County, situated on the Pawtucket River, 13 miles southwest of Providence, and on the New York, New Haven and Hartford Railroad. The chief industries are the manufacture of cotton and wool and dyeing, bleaching and mercerizing. There is also some agricultural interest. Coventry was taken from Warwick and incor¬ porated in 1871. The town is noted as the home of Gen. Nathanael Greene (q.v.) Pop.

5,848.

COVENTRY PLAYS, The, a series of 42 old plays exhibiting the characteristics of both the old English Morality and Mystery plays. Three complete sets of such dramas have de¬ scended to modern times: the (Chester, > the (Towneley) and the (Coventry } mysteries; and from these we derive nearly all our knowledge of the early English drama. Coventry was formerly famous for the performance of its Corpus Christi plays by the Gray Friars. These plays contained the story of the New Testa¬ ment, composed in Old English rhythm. One manuscript is preserved in the British Museum in the Cotton Library. The earliest record of their performance is in 1392, the latest in 1589. The Coventry plays were published in a volume by the Shakespeare Society in 1841, under such titles as (The Creation,* (The Fall of Man,* (Noah's Flood, > (The Birth of Christ, *Adora¬ tion of the Magi,* (Last Supper,* (The Pilgrim of Emmaiis,* (The Resurrectionˆ (The Ascen¬ sion,) doomsday.* Consult Morley, (English Writers) (Vol. IV, London 1887 et seq.).

COVERDALE, Miles, English bishop and reformer: b. probably at Coverdale, Yorkshire, 1488; d. 19 Feb. 1568. He was educated at

Cambridge, entered the convent of the Augustine friars, was ordained a priest at Norwich in 1514, and entered the convent of Austin friars at Cambridge where he fell under the influence of Robert Barnes who became prior about 1523. He also became a friend to Cromwell at this period. He was led some years afterward to embrace and preach the reformed doctrines, and, having gone abroad, is said to have assisted Tyndale in translating the Pentateuch. In 1535 his own translation of the Scriptures appeared, with a dedication to Henry VIII, being the first printed English version of the entire Bible. No name of publisher or place of publication appear on the imperfect copies which now exist. It was probably printed by Nicolson in folio and quarto in 1537, and by Froschouer at Zurich in 1550. It appears possible that Jacob van Meteren was its promoter who engaged Coverdale to do the translation for him. Many of the copies have the preface (<out of Douche and Latyn.** Coverdale's work occupied a long period of time. In the dedication to Edward VI he says (<I was boldened in God 16 years ago to labour faithfully in the same.® The basis of the translations are supposed to have been the Vulgate, the Latin of Pagninus, Luther, the Zurich or German-Swiss and Tyndale's Pentateuch and New Testament. The New Testament is based chiefly on Tyndale and is much better than the old. In 1538 he was en¬ gaged in superintending at Paris the printing of a revised English version, the greater part of the impression of which was seized and destroyed by the ecclesiastical authorities. The printing presses and types, however, escaped the inquisitors, and being brought over to Eng¬ land, enabled Cranmer's, or the Great Bible, to be printed by Grafton and Whitchurch. The Prayer-book version of the Psalms is from the Great Bible. After the execution of his patron Cromwell (1540), Coverdale went abroad. Hav¬ ing returned in 1548 he was made almoner to Queen Catharine Parr. In 1549 he assisted Whitchurch in the second volume of the daraphrase of Erasmus.* In 1551, during the reign of Edward VI, he was appointed bishop of Exeter, but was ejected on the accession of Mary, and thrown into prison. After two years' confinement he was liberated, and pro¬ ceeded first to Denmark, and subsequently to Geneva, where he assisted in preparing the Geneva Bible (1560), the favorite Bible of the Puritans. On the accession of Elizabeth he re¬ turned to England, but his recently acquired views on ecclesiastical ceremonies prevented his being restored to his see of Exeter. He was, however, made rector of Saint Magnus, Lon¬ don Bridge. In 1563 he obtained the degree of D.D. from the University of Cambridge. The third centenary of the publication of his Bible was celebrated by the clergy throughout the churches of England 4 Oct. 1835. His writings are numerous. Consult (Memorials of Miles Coverdale) (1838), which contains a bibliog¬ raphy; Fry, (The Bible

by Coverdale) (London 1867) ; Hoare, (The Evolution of the English Bible) (ib. 2d ed., 1902) ; Pollard, (Records of the English Bible) (Oxford 1911). Biog¬ raphies are in the Parker Society editions of Coverdale's pieces, an index to which may be found in Gough's (General Index to the Parker Society.* Consult also dictionary of Na¬ tional Biography* (Vol. XII).

COVERED WAY, in fortification, a space of ground 30 feet broad, on the outer edge of the ditch, above the counterscarp and next the glacis, ranging round the works of a fortifica¬ tion. It affords a safe communication round all the works, facilitates sallies and retreats and the reception of reinforcements, and its parapet protects the fortifications in its rear.

COyERLEY, Sir Roger de. (1) The

name given by Addison to a fictitious character whose adventures were related in the (Spec¬ tator ; (2) a Scotch air and dance, known to the Americans as (The Virginia Reel.*

COVERTURE, kuv'er-tur, a legal term applied to the position of a woman during mar¬ riage because she is under the cover or pro¬ tection of her husband. See Law of Husband and Wife.

COVILHAO, ko-vel-youri, Portugal, town in the modern district of Castello Branco, and formerly in the province of Beira, on the south¬ east slope of the Serra da Estrella, some 25 miles southwest of Guarda. In the neighborhood there are noted sulphurous baths. The town contains dyeworks and important cloth fac¬ tories. Pop. about 16,000.

COVILLE, Frederick Vernon, American botanist : b. Preston, N. Y., 23 March 1867. He was educated at Cornell University and was in¬ structor in botany there 1887-88, and assistant botanist in the United States Department of Agriculture 1888-93. Since the last named year lie has been chief botanist of that department, as well as curator of the United States Na¬ tional Herbarium. He has published (Botany of the

Death Valley Expedition ; (Our Public Grazing Lands) ; Experiments in Blueberry Culture' ; (The Formation of Leafmold' and many other papers relating to systematic, geo¬ graphic and economic botany.

COVINGTON, Ga., city and county-seat of Newton County, 40 miles east of Atlanta, on the Georgia and the Central of Georgia rail¬ roads. It is the seat of Emory College (Metho¬ dist) and has a public library, courthouse, *etc.* Its cotton interests are extensive and it has also cotton and oil mills, ice plant, fertilizer works and marble yards. The city owns the electric plant and the waterworks. Pop. 2,886.

COVINGTON, Ind., the county-seat of Fountain County, situated in the northwestern part of the State, on the Wabash River, the Wabash and Erie Canal, and the Cleveland, Cincinnati, Chicago and Saint Louis and the Wabash railroads, 72 miles northwest of Indian¬ apolis. It exports live stock and agricultural produce, and has several iron foundries. There is a canning factory, and the city has a Carnegie library and municipal waterworks and electric-light plant. Pop. 2,069.

COVINGTON, Ky., city and county-seat of Kenton County, on the Ohio River opposite Cincinnati, with which it is connected by a handsome suspension bridge, 2,250 feet long, and costing $2,000,000. It is the northern ter¬ minus of the Kentucky Central Railroad and is also on the Louisville, Cincinnati and Lexington Railroad. It is a residence town for Cincinnati business men and is the see of a Roman Catho¬ lic bishop. Covington occupies an area of about Sy4 square miles on a beautiful plain partly surrounded by hills and resembles Cin¬ cinnati in its general arrangement. The city has many fine residences, a public library, city hall, race track, and a Federal building note¬ worthy as a specimen of modern Gothic; and among charitable institutions, a hospital for contagious diseases, Catholic and Protestant orphan asylums and a home for aged women. Covington is an important centre of Ro¬ man Catholic influence, the cathedral, a type of flamboyant Gothic, being one of the finest ecclesiastical structures in the State. Connected with this denomination there are also a Bene¬ dictine priory, a convent, a hospital, foundling asylum, Notre Dame Academy and La Saldette Academy. The facilities for transportation, both by rail and water, placing the city in com¬ munication with a wide territory possessing valuable natural advantages, have contributed

to the city's commercial importance. Its in¬ dustrial interests are also important and include extensive pork-packing establishments, distill¬

eries, breweries, cotton factory, ironworks and manufactures of vinegar, furniture, stoves, tin¬ ware, bricks, tile, pottery, rope, contractors' ma¬ chinery, metal signs, automobile trucks, X-ray machines, circus tents, pianos, cordage, *etc.* The United States census of manufactures for 1914 reported in the city 161 industrial establishments of factory grade, employing 3,736 persons, of whom 3,199 were wage earners, receiving an¬ nually a total of $1,815,000 in wages. The capital invested aggregated $7,778,000, and the year's output was valued at $8,205,000: of this, $5,475,000 was the value added by manufacture. Covington has adopted the commission form of government. There are municipal waterworks, built in 1887, furnishing an abundant supply of water drawn from the Ohio River at a distance of about 13 miles above the city. Its annual budget approximates $660,000, the main items of expense being $108,000 for schools, $111,000 for interest on debt, $47,000 for police depart¬ ment, $35,000 for fire department, $55,000 for street expenditures and $15,000 for public library fund. Settled in 1812 and laid out three years later, Covington was chartered as a city in 1834. Pop. (1920) 57,121.

COVINGTON, Tenn., county -seat o f Tip-ton County, 37 miles northeast of Memphis, on the Illinois Central Railroad. It has an export trade in the agricultural products of the sur¬ rounding region, and has cotton-mills, a cot¬ ton compress and sawmills. It is a shipping point for cotton and oil. The waterworks and electric-light plant are owned by the city. Pop.

(1920) 3,410.

COVODE, John, American congressman : b. Westmoreland County, Pa., 17 March 1808; d. 11 Jan. 1871. He was a farmer's lad of Dutch blood, and became a coal dealer, a woolen manufacturer and a railroad owner. He entered public life as a Whig, served two terms in the legislature, was sent to Congress in 1854 by the Anti-Masons (see Anti-Masonry), and reelected 1856 as a Republican, serving by regular re-elections till 1863. In 1859 he was appointed chairman of the special committee to investigate President Buchanan's conduct in' forcing through the Lecompton Bill (see title below, and Lecompton Constitution), and his report was valuable ammunition for the Repub¬ lican party. He was a member of the com¬ mittee on the conduct of the war. After John¬ son's accession he was sent South to aid in that President's reconstruction policy, but was re¬ called for lack of sympathy with it. In 1868 he was again elected to Congress, and was a

strong opponent of Johnson. In 1869 he was chairman of the Republican State Committee of Pennsylvania. He was an eager, impulsive man, with the friendships and the enmities natural to such a temperament, but respected for his entire honesty. See Covode Investiga¬ tion.

COVODE INVESTIGATION, 1860. President Buchanan, in the struggle to have Congress validate the Lecompton constitution (q.v.), was urged by the party organs to save the unity of the Democratic partv, which was menaced with irremediable division, by using

the patronage at his disposal to bring the hesi¬ tating members into the ranks. In the debates at the opening of the 36th Congress 1859-60, two anti-Lecompton Democrats alleged that he had attempted to use corrupt influence with them. On 5 March 1860 John Covode (q.v.) moved the appointment of a committee to in¬ quire whether the President or any other official had attempted, by money, patronage or other improper means, to influence legislation or the execution of the laws, *etc.* In spite of Demo¬ cratic objection that only insinuations and no specific charges were made, the rules were sus¬ pended by 117 to 45, and the resolution adopted; an investigating committee of five was ap¬ pointed, with Covode at the head. Buchanan sent in a message of protest 28 March, object¬ ing on the ground that the President could only be indicted by impeachment, and that this was an indictment ; and that such a method was in¬ consistent with the dignity of the office. The protest was declared unfounded by 88 to 40. On 16 June the committee reported, the Re¬ publican members declaring that the mass of evidence collected was proof of corrupt use of patronage, and Covode later alleged that they found also direct bribery, as evidenced by bank¬ books. The Democratic members declared the allegations unsupported. No action was recom¬ mended to the House by the majority report, and none was taken. On 22 June Buchanan sent a second message protesting against the rejection of his first, and saying that on such views no man of honor and principle could accept the presidency. The House appointed another committee to report on this

at the next session. Consult (Report of the Committee) (Washington 1860) ; Buchanan's Autobiog¬ raphyˆ with his defense; Curtis, (Life of Buchanan) (1883), for another defense.

COW, the female of bovine animals, of which the male is called an ox (q.v.) or a bull. By a familiar process of extension the term has been applied to various other large herbivo¬ rous animals, and to the elephant, and even to female seals and whales.

COWAGE. See Cowitch.

COWBANE, or WATER-HEMLOCK

(Cicuta virosa), a perennial, umbelliferous, aquatic plant, producing an erect, hollow, much-branched, striated stem three or foui feet high, furnished with dissected leaves. It is highly poisonous, containing cicutine, an alkaloid re¬ sembling conia (q.v.), C. maculata is the spotted cowbane of the United States.

COWBERRY, a name sometimes used for the single species (C. palustre) of the genus Comarum, of the rose family (Rosacea) . It is known also as marsh cinquefoil and purple marshlocks. It is a stout green herb with large and showy purple flowers. It grows in swamps and peat-bogs from Labrador to New Jersey, Alaska and California. It is also indigenous in Europe and Asia. It received the name of cowberry because it was thought, when rubbed on the milk-pan, to thicken the milk. The name is also applied to the cranberry (q.v.).

COWBIRD, a bird (Molothrus ater) of the family Icteridce (q.v.), abundant throughout North America except in the far north, and notorious because of its habit of escaping the

drudgery of domestic cares after the fashion of the European cuckoo. Closely related to the bobolink or reed-bird, the cowbird lacks the acute tail feathers and rich spring plumage of that species, while its general build, and par¬ ticularly its stout beak, are even more finch-like. The male is from seven and a half to eight inches long and iridescent black with a brown head and the female slightly smaller and nearly uniform dull brown. The cowbird takes its name from the habit of associating in flocks with cattle in the fields, apparently for the pur¬ pose of securing the flies which frequent the cattle or the other insects which are disturbed by their movements. They are migratory and gregarious, never separating in pairs, but appar¬ ently quite promiscuous in their sexual rela¬ tions. Nests are never built,

but, like the Euro¬ pean cuckoo, the eggs are stealthily introduced into the nests of other birds, preferably those of smaller size, such as warblers, finches and vireos, of which a great many species are vic¬ timized. Apparently the cowbird exercises lit¬ tle choice, but drops its eggs into any suitable nest that happens to be convenient ; and, owing to its abundance, an astonishingly large number of nests are thus invaded. Some of the smaller warblers, notably the yellow warbler (Dendroica cestiva) and the redstart (Setophaga ruticilla), endeavor to circumvent the intruder by building a second story to the nest, enclosing between the two floors the egg of the cowbird and even sacrificing one or more of their own. Nests with three cowbird's eggs thus enclosed in as many compartments have been found. Although but a single egg is deposited at a time, as many as three or four will sometimes be found in a single nest, in which cases they have probably been dropped by different females. The alien eggs, which are white or grayish and speckled with brown, and are about .84 by .65 of an inch, hatch before those rightfully belonging to the nest, and, once the young cowbird has hatched, its demands for food so claim the attention of its foster-parents that the latter's own eggs or young are neglected and usually perish. Al¬ though chiefly insectivorous, berries and seeds are sometimes eaten by the cowbird.

In the warm parts of America a number of related species occur, which, having similar hab¬ its, are also known as cowbirds. A most re¬ markable relation exists between two South American species.

Molothrus hadius, one of those in question, has the unusual habit of seizing and utilizing for the purpose of incubating its own eggs the nests of weaker birds, whose eggs arc destroyed. The second species (M. rufoaxillaris) is regu¬ larly and perhaps exclusively parasitic on the former. Consult Bendire, (The Cowbirds, ˆ (in Report of the National Museum for 1893, Washington 1895).

COWBOYS, in the American Revolution, a band of American Tories who infested the neutral ground of Westchester County, N. Y., robbed the Whigs and Loyalists and made a specialty of stealing cattle. A similar band of marauders on the British side received the name of ˆSkinners.® The word cowboys is now used to designate the men who have charge of the cattle on the vast ranges in the west and south-

west of the United States. They are well mounted and usually wear a fanciful costume. They are bold and adventurous and necessarily have to encounter many dangers. A number of them were enlisted in two regiments of cavalry for the war with Spain, and, under the popular name of ((Rough Riders," greatly distinguished themselves in the early part of the campaign against Santiago, in Cuba.

COW-PARSNIP, or GIANT PARSLEY, popular names for several species of the genus Heracleum of the family Apiacece. They are coarse perennial herbs three to six feet tall, with large attractive leaves, for which the plants are valued in ornamental gardening, especially close to water and in wet soil. They should not be allowed to produce seed, because they are likely to become troublesome as weeds. Several of the species, of which there are about 60 widely distributed in temperate climates, are used as stock-feed, particularly in Europe, and have been suggested as desirable to plant for this purpose, because they produce an abun¬ dance of leaves very early in the spring. H. panaces is usually so recommended. It often attains heights exceeding eight feet and bears numerous leaves two or more feet long. One species, H. lanatum, is widely distributed in North America and furnishes edible stems which in Alaska are called wild celery.

COW-PILOT, (pomacentrus saxatilis), a small fish, so called in Bermuda because it is believed always to accompany the cowfish (ostracium) . It is one of the demoiselles and is also called ftmojarra."

COW-PLANT, a perennial plant of the family Asclepiadacece, milkweed family, which has acquired a celebrity from the repeated state¬ ment that its juice is used as milk and that its leaves are boiled to supply the want of cream. This arises from the appearance of the juice, which is white and viscid and contains the poi¬ sonous principles characteristic of the milkweed family. In parts of the United States cow-plant is a common name for Rhododendron maxi¬ mum.

COW-TREE, a name given to a number of trees of different families, the milky juice of which is used as a substitute for milk. A large tree (Brosimum galactodendron) belonging to the family Moracecr, emits, when pierced, a highly nutritious milky juice with an agreeable creamy odor and taste recalling that of cow's milk, but which is slightly viscid and soon be¬ comes yellow, gradually thickening into a some¬ what cheesy consistency. It grows on the Cor¬ dilleras of the

coast of Venezuela, where it is called palo de vaca, or drbol de leche. The negroes and other lean natives of the region fatten on its milk. The cow-tree or hya-hva of Demerara is Taberncemontana utilis, a tree be¬ longing to the Asclepiadacece. In this family the milky juice is usually acrid and poisonous and even that of the other species of the same genus is of a sharp and burning taste. In this case, however, the juice is agreeable and whole¬ some, although somewhat sticky, owing to the large proportion of caoutchouc.

COW-WHEAT, the common name for the hemiparasitic scrophulariaceous genus Melam-pyrum, of which there are several species,

COWELL, Edward Byles, English Sans¬ krit scholar: b. Ipswich, Suffolk, 23 Jan. 1826; d. Cambridge, 9 Feb. 1903. He was educated at Oxford and was for some years principal of the Sanskrit College, Calcutta. Since 1867 he was professor of Sanskrit in Cambridge Uni¬ versity and was ranked as the foremost Eng¬ lish Orientalist of his day. His association with Edward Fitz Gerald of Omar Khayyam fame makes him an important figure in English liter¬ ary history. He published (The Prakrit Gram¬ mar of Vararuci in Sanskrit and English ' (1854) ; (The Black Yajur Veda) (Books 1-2 with Roer, 1856-64) ; (The Kaushitaki Upanishad, in Sanskrit and English' (1861) ; (The Maitri Upanisad, in Sanskrit and English' (1863) ; (The Kusumanjali, or Hindu Proof of the Existence of a Supreme Being, in Sanskrit and English' (1864) ; (The Aphorisms of San-dilya' (translated from the Sanskrit, 1878) ; (The Sarva-Darsana-Samgraha,' translated from the Sanskrit (with Gough, 1882) ; (The Divyavandna' (with Neil, 1886) ; (The Buddha-carita,' by Asvagosha in Sanskrit and English, 1892-94). He left unfinished the translations of (The Jataka; or Stories of Buddha's Former Births' (7 vols., 1895-1913), of which the sixth volume was published in 1907, translated by him in conjunction with Rouse. His (Life and Letters' were edited by George Cowell, his kinsman (Oxford 1904).

COWEN, Sir Frederic Hymen, English

musical composer and conductor : b. Kingston, Jamaica, 29 Jan. 1852. He was brought to England when very young, and studied music under Sir Julius Benedict and Sir John Goss. His cantata, (The Rose Maiden,' produced in 1870, was followed in 1876 by another, (The Corsair,' and Pauline,' an opera. His other works include (Saint Ursula' (1881), a cantata; (The Sleeping Beauty' (1885), also a

cantata; (Ruth (1887), an oratorio; (Song of Thanks¬ giving' (1888); (St. John's Eve' (1889), a cantata; (Thorgrim' (1890), an opera; (The Water Lily' (1893), a cantata; (Signa' (1892), an opera; (Harold' (1895), an opera; (The Transfiguration' (1895), a cantata; (The Dream of Endymion' (1897) ; (Ode to the Passions' (1898) ; (Coronation Ode' (1902) ; (John Gilpin,' a cantata (1904) ; (The Veil' (1910). He has also composed six sym¬ phonies, the chief being No. 3 (the Scandina¬ vian), No. 4 (the Welsh), and No. 6 (the Idyl¬ lic). Overtures, dances, suites, songs and duets, pianoforte pieces, etc., make up the rest of his musical productions. In 1888 he con¬ ducted the concerts at the Melbourne Centennial Exhibition, and from 1888 till 1892 was conduc¬ tor of the Philharmonic Society, and was re¬ elected in 1900. In 1896 he succeeded Sir Charles Halle as conductor of the Manchester concerts, Liverpool Philharmonic Society, Brad¬ ford Festival Choral Society, *etc.* He was knighted in 1911, and has published his remi¬ niscences, (My Art and My Friends' (1913).

COWES, kowz, West, England, seaport in Hampshire, on the north coast of the Isle of Wight, at the mouth of the river Medina. It is divided into East and West Cowes, a steam ferry across the river furnishing connection. The public buildings include the castle, an old block fort of the time of Henry VIII, now used by the Royal Yacht Squadron as their

club-house and the Royal London Yacht branch club-house. Cowes is now principally known as a yachting port, and is considered the best place for building, fitting out and laying up that class of vessels. Besides the building and re¬ pairing of yachts and other vessels, the indus¬ tries include sail and rope making, *etc.* Cowes is the customs port for the Isle of Wight. The harbor, though small, is well sheltered and perfectly safe. There is good steamer service to Portsmouth and Southampton. The yacht¬ ing season commences about the middle of May and extends to the beginning of November. Regattas are held annually. Cowes is much resorted to as a bathing place. Pop. 9,635.

COWHAGE. See Cowitch.

COWITCH, COWAGE, or COWHAGE,

a plant (Stizolobium pruriens) belonging to the pea family (Papilionaceoe) . It is a twin¬ ing annual with large racemes of dark-colored flowers, which in India appear in the rainy season. The food, shaped like the letter S, is covered with delicate bristle-like spines, which are easily detached and, sticking in the skin, produce an intolerable itching. In India these spines are mixed with syrup and used as a vermi¬ fuge, the spines acting mechanically. When young the pods are cooked and eaten like string-beans. A plant of the same genus, growing in the West Indies, has the same char¬ acteristics. The negroes of the Southern States apply the name cowitch to the poison ivy (Rhus toxicodendron) .

COWL (Sax. cugle; Lat. cucullus). See Costumes, Ecclesiastical.

COWLES, Alfred Abernethy, American manufacturer: b. Torrington, Conn., 28 Sept. 1845; d. 8 Dec. 1916. He was educated at Mid¬ dletown, Conn., and at Paris, France; became president of the Ansonia Clock Company; the Coronet Phosphate Company; Terraceia Estates, Inc. ; and vice-president of the American Brass Company. He was also president of the An¬ sonia Brass and Copper Company; the Ansonia Land and Water Power Company; the Birming¬ ham Water Power Company; the Pebbledale Phosphate Company. He was author of the article ((Copper and Brass" (in (One Hundred Years of American Commerce,' edited by C. M. Depew) ; (<Copper and Brass Industry* (in the Encyclopedia Americana'); and (Semitones,' a book of poems (1907).

COWLES, William Lyman, American educator: b. Belchertown, Mass., 1856. He was educated at Amherst College, where he was instructor in Latin, 1880-83. Since 1894 he has been full professor of Latin there In the study of classical archaeology he traveled exten¬ sively throughout the Italian Peninsula. His publications include, besides articles for periodi¬ cals, an annotated edition of the (Adelphae of Terence) (1896) ; Selections from Catullus' (1900) ; and Selections from Ennius, Catullus, Tibullus, and Propertius, with Parallel Passages from Horace, Ovid, and Martial ' (1909).

COWLEY, Abraham, English poet: b. London 1618; d. Chertsey, Surrey, 28 July 1667. He so early, imbibed a taste for po-etry that in 1633, while yet at school, he published a collec¬ tion of verses, entitled Poetical Blossoms.' In 1637 he was elected a scholar of Trinity College, Cambridge, where he soon obtained

great literary distinction, and published in 1638 a pastoral comedy, entitled (Love's Riddle, } and another in Latin, called (Naufragium Joculare,' acted before the university by the members of Trinity College. He was ejected from Cambridge as a Royalist and removed to Saint John's College, Oxford, where he published a satirical poem entitled the (Puritan and the Papist.' He engaged actively in the royal cause, and when the queen was obliged to quit England Cowley accompanied her. In 1656 he returned to England, where he now published an edition of his poems, containing Mis¬ cellanies,' (The Mistress,' (Pindarique Odes,' and the never-finished epic, (Davideis' (on the history of King David). He again visited France, and resumed his functions of agent in the royal cause on the death of Cromwell. On the Restoration he returned with the other Royalists. By the interest of the Duke of Buckingham and the Earl of Saint Albans he obtained the lease of a farm at Chertsey whither he retired in 1665. In 1660 Cowley took part in founding the Royal Society; in 1661 he published a Proposition for the Advancement of Experimental Philosophy;' and a (Discourse by Way of Vision Concern¬ ing the Government of Oliver Cromwell,' which is pronounced by Bishop Hurd one of the best of the author's prose works. He published two books of a Latin poem on plants in 1662 ; he afterward added four more books, and the whole, together with other pieces, was published in 1678 under the title of Poemata Latina.' A poem on the (Civil War' appeared in 1679; his (Select Works,' with preface and notes by Bishop Hurd, were published in 1772-77. Cowley was extremely popular in his day, and his style, both in prose and verse, has been highly com¬ mended by critics ; but his poems have failed to maintain their ancient popularity. The wit for which they were once celebrated has become obsolete, and he is now little read ; but Charles Lamb speaks highly of him as a poet, and Hazlitt as a prose writer. Good modern editions are (Complete Works' (ed. Grosart. London 1880-81) ; Poems' (ed. A. R. Waller, Cambridge 1905) ; Essays, Plays, etc.' (Waller, ib. 1906). Consult Johnson, Eives of the Poets.'

COWPEA (Vigna sinensis). It belongs to the natural order Leguminosece, family Fabacece, and is native of southeastern Asia, the Malay Archipelago and central Africa. It is closely related to the asparagus bean and the catjang, the other cultivated species of the genus. It was introduced into the LInited States in the 18th century, and is most largely grown in the southern States, where it is known as the corn¬ field or black-eye pea. Its habits of growth vary from a bush type in the northern States to a vine where it has a longer period of growth. Numerous varieties are on the market. Whippoorwill, Black,

Clay, and Unknown are favorites. They are often grown on poor soils, but such should be enriched either with barn¬ yard manure or phosphatic fertilizers. The seed is sown broadcast or drilled, at the rate of from one-half to one and a half bushels per acre.

Uses and Feeding Value. — It is grown for food, hay, silage, soiling, grazing and soil reno¬ vation, having marked powers of enriching the

soil in nitrogen like clover (q.v.). Its average percentage composition is :

1

c

_c

a s

+->

<D

U

o

o) i

<u ci

ˆ is

|8

<v

c5

u

CL.

^ a *

^ <-£ <D

W $

m

<

£

Cowpea green .

2.4

7.1

0.4

4.8

1.7

83.6

Cowpea vine silage …

2.7

7.6

1.5

6.0

2.9

79.3

Cowpea hay .

16.6

42.2

2.2

20. 1

7.5

10.7

Cowpea seed .

20.8

55.7

1.4

4. 1

3.2

14.8

The average digestibility

per cent is :

G

Protein

Nitroge

free

extract

Ether

extract

Crude

fibre

Dry

matter

Cowpea green .

74

84

59

57

76

Cowoea vine silage…

57

72

63

52

60

Cowpea hay .

65

71

50

43

59

Cowpea seeds are eaten by man, either green, shelled and cooked like garden peas or shell-beans, or dried for winter use. They are often fed to stock. Some find difficulty in curing cowpea hay satisfactorily, but this is overcome with experience. The silage is somewhat similar to the green crop in composition. When used for soiling the amount consumed and time of feeding can be regulated, thus avoiding bloat¬ ing, which is liable to occur when pasturing. Sheep are usually turned on the pasture before the plants are in bloom, cattle about the time the plants come into bloom; while for swine, the peas are allowed to reach full size. An acre will pasture 15 or 20 pigs for several weeks. The manure more than compensates for the vines eaten. Turkeys and chickens eat the ripe peas and do well on them. The plants are sometimes cut down by the cowpea wilt. The September brood of the boll-worm and the weevil (Bruchis sinensis) also give trouble to the plants. Consult Smith, ˆowpeasC Farmers' Bulletin No. 89; Farmers' Bulletin No. 318; United States Department of Agri¬ culture and Bureau of Plant Industry, Bulletin No. 229.

COWPENS, S. C., post village in Spar¬ tanburg County, near the border of North Caro¬ lina, 'with a population of about 1,100. Near here a signal victory was gained by American forces commanded by Gen. Daniel Morgan, over a British division under Colonel Tarleton, 17 Jan. 1781. This engagement is sometimes called the ((Bennington of the South,® for its decisive¬ ness. See Cowpens, Battle of.

COWPENS, Battle of, in the American Revolution, 17 Jan. 1781. At the end of 1780 Cornwallis held South Carolina with a little over 3,000 men, having lost 1,100 with Ferguson two months before, at King's Mountain. Wait¬ ing for reinforcements, he lay at Winnsborough, north of the centre, within supporting distance of Fort Motte and Orangeburg in the centre, Charleston and Georgetown on the coast, and Augusta and Ninety-Six in the west. In December Greene came down with only 2,000 men, but with a wonderful group of subordinate

leaders fit for separate commands. With 1,100 men he occupied Cheraw Hill in the northeast, and kept Cornwallis in alarm for his communi¬ cations with the coast; 900 under Daniel Morgan, part militia, part regulars, he sent to join hands with the victors of King's Mountain if possible, and alarm Cornwallis for the western posts. Cornwallis moved north into North Carolina to force a like movement

on Greene, and sent Tarleton after Morgan. The latter took post in a pasture ground called the Cowpens, near the northern boundary, a few miles southwest of King's Mountain, and just west of Broad River. A long slope led up to a low rise; then came a depression, succeeded 150 yards farther on by another rise; and in rear of this was the river, cutting off retreat. This move of Morgan's was in violation of all military rules, but he was a man of genius and used to militia ; he said that he could ask but one thing better, and that was to have them entirely surrounded by the enemy, so they could not run — the river was cheaper than regulars to shoot them down. Tarleton came in sight on the morning of 17 Jan. 1781, and Morgan placed his militia 150 yards in front of the first hill, with injunctions to fire at least two volleys at close range before breaking; on the hill, the famous First Maryland regulars, with some fine Virginians; on the second hill, his cavalry under Col. William Washington, a second cousin of George. As the British closed, the militia did not break; they were under Col. Andrew Pickens, and fired many more than the two volleys, with destructive effect Finally forced back, they retired to the left around the hills to the river bank, in rear of the cavalry, to re-form. The British left stretched around to flank the right of the American regulars, who drew back to face them; the British thought them retreating, and hurried forward in some disorder. Just then Colonel Washing¬ ton's cavalry charged around the two hills to the left, coming up to the militia's old position and taking the British in rear, with the river on their flank; the militia rushed around the hills to the right, taking them in flank on the left ; and the Continental regulars, only 30 yards off, poured in a withering fire and charged bayonet. Hannibal himself never wrought out a finer piece of tactics, or caught an enemy in a deadlier trap. Most of the British troops threw down their arms ; the remnant fled with Tarleton, who barely escaped being cut down by Colonel Washington's sabre. Of the 1,100, 270 were killed and wounded, and 600 taken prisoners, with two field-pieces and 1,000 small arms. The Americans lost 12 killed and 62 wounded. Nearly a third of Cornwallis' army, including all his light troops, were annihilated at a blow.

COWPER, William, English poet; b. Great Berkhampstead, Hertfordshire, 26 Nov. 1731 ; d. East Dereham, Norfolk, 25 April 1800. The eldest surviving child of the Rev. John Cowper (pronounced Cooper) and Anne Donne (d. 1737), he was well connected on both sides, but inherited weakness of mind and body, and was unfortunate in the influences that surrounded his childhood. At 10 he entered Westminster School. Here he formed friendships with bright youths like the future poet, Robert Lloyd, Warren Hastings, Impev, Churchill

and Colmar and showed fondness for athletics and literary

studies ; but he also displayed some morbidity, particularly in religious matters. After eight years at Westminster, and a few months at home, he was articled for three years to a London solicitor. Later he described these and the following 12 years as ((misspent," meaning that he thought little about the state of his soul and enjoyed visiting the three attractive daugh¬ ters of his uncle, Ashley Cowper. In 1752 he took chambers in the Middle Temple. He was called to the bar in 1754, but made few efforts to secure clients, his conduct being partly explained by the fact that in 1753 he was afflicted with a sort of mental dejection that for many months paralyzed his energies. Finally, after he had received consolation from George Herbert's poetry and had had his ((hard heart" softened by prayer, a visit to the sea¬ shore completed a temporary cure.

In 1756 his father died; the same year his suit for the hand of his cousin, Theodora Cowper, was rejected by his uncle. She re¬ mained true to him, and shortly after her death the love poems he wrote her were published (1825). Cowper does not appear to have been inconsolable. There is evidence of a shadowy love affair in 1758, and he had previously been attending the weekly dinners of the ((Nonsense Club,® with Lloyd and other old schoolmates, and had done some translating and written a few essays for periodicals. In 1759 he bought a suite of chambers in the Inner Temple and was made a commissioner of bankrupts; but he spent more than his income. In his pecuniary stress he obtained from his cousin, Major Cowper, the gift of the patent office of clerk of the journals of the House of Lords. But his kinsman's right to bestow the post being ques¬ tioned, it was decided that Cowper's fitness must be tested by an examination. He broke down in his preparation for this, and, as the ordeal drew near, he grew more and more despondent. Finally he made four vain attempts to commit suicide (November 1763). The idea of his securing the office had to be abandoned, and a few weeks later he was placed in the private asylum kept at Saint Albans by the poet-physician, Dr. Nathaniel Cotton.

After about five months he began to mend, and arguments with his

younger brother, the Rev. John Cowper, tended to dispel the belief that he had committed the unpardonable sin. He continued at the asylum, however, until June 1765, when he removed to Huntingdon, resolv¬ ing to break away forever from his former life. He became practically a recluse, but he had already acquired the urbanity which was to be so marked a characteristic of his poetry and his correspondence.

In Huntingdon Cowper began his famous friendship with the family of the Rev. Mr. Unwin, particularly with the latter's pious wife (Mary Cawthorne) and his son, later the Rev. William Cawthorne Unwin. They . soon, took Cowper as a boarder, and at last his religious aspirations were apparently in a fair way of being satisfied. Every day was spent in attend¬ ing church twice, in singing hymns and pray¬ ing, and in reading and conversing on evangeli¬ cal topics. Withal, the friends seem to have been cheerful, not outwardly morbid.

In the summer of 1767 the elder Unwin fell from his horse and died in consequence. Then John Newton (q.v.), curate of Olney,

persuaded Mrs. Unwin and Cowper to remove to that town, which has since been associated with the poet's memory. They took a house called <(Orchard Side,® and Cowper found con¬ genial employment in assisting Newton in his work among the poor and in writing hymns. In 1770, on the death of his brother John, Cowper wrote (Adelphi,' an account of that clergy¬ man's conversion to evangelical tenets (pub¬ lished 1802). Two years later he and Mrs. Unwin became engaged, but all thoughts of marriage were soon dispelled by Cowper's third derangement, which began in January 1773, and lasted until May 1774. After a terrible dream in February 1773, he seems never to have been able to believe for long that there was any hope of his salvation. Yet, when he had out¬ wardly recovered, he strove manfully not to exert a depressing influence on others, and he took much innocent pleasure in taming hares, keeping a garden, building his summer-house, and describing to correspondents such local events as the Olney fire of 1777. In 1799 New¬ ton published the (Olney Hymns,) of which 68, including (Oh for a Closer Walk with God' and (God Moves in a Mysterious Way, ' were by Cowper. Later in the same year Newton accepted a rectory in London. Whether his intense nature had oppressed Cowper's mild genius is a moot point. It is at least certain that the latter's literary career really com¬ menced after his friend Newton left Olney.

Under the encouragement of Mrs. Unwin, Cowper began to write steadily upon a series of didactic, semi-satiric poems — (Progress of Error, ' truth,' table Talk, 5 and Expostu¬ lation (December 1780-February 1781) . New¬ ton acted as a friendly critic and secured a publisher for the volume, which, with the addi¬ tion of <Hope,) (Charity, > (Conversation,) and (Retirement^ and some shorter pieces, includ¬ ing translations of the Latin poems of Cowper's old schoolmaster at Westminster, Vincent Bourne, finally appeared in February 1782, and was moderately successful. Time has shown, not only that it contained many apt passages of observation and reflection, but that it heralded a departure, not too violent, from the over¬ polished style and somewhat metallic versifica¬ tion of Pope.

Meanwhile, the poet had made the acquaint¬ ance of a baronet's widow, Lady Austen, who was visiting near Olney. The intimacy, which Mrs. Unwin shared, became too intense to last more than a couple of years ; but, whatever Lady Austen's disappointments, we owe to it two of Cowper's best poems — the humorous ballad of (John Gilpin) (November 1782), based on a story she told Cowper to dispel his melancholy, and (The Task,' his great discur¬ sive poem in blank verse, which, beginning with Lady Austen's theme, the sofa, broadened out into reflections upon life and descriptions of nature unrivaled in their day and in respect to realistic fidelity and homely charm not clearlv surpassed since. the Task' was probably begun in Tuly 1783, and was finally published in Tune 1785,' along with <Tohn Gilpin' (which had already been circulated in periodicals), the admirable <Epistle to Joseph Hill,' and tiro¬ cinium,' a satire upon current education (1782-84). Cowper had meanwhile begun his translation of the Iliad in blank verse and had written some of his shorter poems, e.g., the

Poplar Field.) All this time, with the exception of three days in May 1785, he believed firmly that God had given him over, and that it was his duty not to pray, since that would imply a questioning of the righteousness of the divine decree.

(The Task,* helped by the vogue of ‘John Gilpinˆ attained success. Cowper became the chief poet of the day, and secured a popularity which lasted well into the next century. His relatives began to pay more attention to him, and in Lady Hesketh, sister of his sweetheart Theodora, and the Rev. John Johnson, of Nor¬ folk, he found supporters during the trying years that were in store for him. His income was increased, and with Lady Hesketh’s aid he and Mrs. Unwin removed from Olney to the neighboring Weston in November 1786. Shortly afterward they were shocked by William Unwin’s sudden death. Then Cowper suffered his fourth derangement, which lasted from January to June 1787. He recovered rather speedily and worked away at Homer, wrote excellent short poems, and resumed his cor¬ respondence, but was all the while subject to hallucinations and melancholia. In September 1788, he began translating the Odyssey, and the complete Homer, including the ‘Batracho-myomachiaR was published by subscription in July 1791, with a success which time has not ratified. Posterity much prefers the pathetic lines (On the Receipt of My Mother’s Picture out of Norfolk, } written in the spring of 1790. After the Homer Cowper, having been assured by a demented schoolmaster-friend named Teedon that heaven was willing, undertook to edit an elaborate edition of his favorite, Milton. The scheme came to little, but it was the occa¬ sion of his forming a warm friendship with his future biographer, William Hayley. to whom he paid a visit in August 1792, accompanied by Mrs. Unwin, who had been partly incapacitated by paralysis. Then Mrs. Unwin’s health sank steadily, and Cowper, in a sad state himself, became in his turn the indefatigable nurse. The lines (My Mary* commemorate the melancholy situation. In January 1794, Cowper himself was seized with his old complaint and sank into a stupor, from which he practically never ral¬ lied. He did not appreciate the fact that he had been granted a pension of £300 by the govern¬ ment. Mrs. Unwin also grew worse, and but for the ministrations of Lady Hesketh, Hayley and John Johnson, the last six years of Cowper’s life would be a stretch of unrelieved gloom. In July 1795, Johnson removed the two invalids to Norfolk. They settled finally at East Dereham, where on 17 Dec. 1796, Mrs. Unwin died, the event scarcely producing an emotion in the man who loved her. Cowper continued in his state of dejection, though he could still work at the revision of his Homer. His only important original composition during the period was the poignantly pathetic (Cast¬ awayˆ written 20 March 1799. He still per¬ sisted in believing that God had forsaken him, and in this dreadful belief he died on 25 April 1800. He was buried in East Dereham Church beside Mrs. Unwin.

Cowper's importance as a precursor of Wordsworth, and the positive excellence of many of his descriptive and satiric passages and of his humorous and pathetic shorter poems are generally acknowledged. He is a classic, and,

if his range of work were sufficiently taken into account — his heroic odes, his familiar verse, his humorous ballads, his poems of domestic affection, his verses on animals (in which he is almost unrivaled), his reflective lyrics, his satires and his faithful descriptions of quiet life and English nature — he would be un¬ grudgingly pronounced a great classic. As a correspondent his supremacy is generally al¬ lowed.

To his works enumerated above should be added the unpleasant satire ' Anti-Thelyphthora (1781), (Poems from the French of *Mme.* de la Mothe Guyon, etc.* (1801), and (Latin and Italian Poems of Milton* (1808). The first edition of Hayley's biography, with letters, ap¬ peared in 1803. In 1835 Rev. T. S. Grimshawe edited the life and letters in eight volumes. Southey's life and edition of the works in 15 volumes (1834-37, 1853-54) is the standard. Of the poems there are numerous editions, among the best being those of Bruce ('Aldine,* 1863), Benham ('Globe,* 1870), and Milford ((Oxford) 1905) ; The Poems of William Cow¬ per *(by J. C. Bailey, 1905). Thomas Wright, author of 'The Town of Cowper) (1886), and of the best biography (1892), has edited the fullest collection of the letters (4 vols., 1904). (See John Gilpin; Task, The.) For criticism, consult Goldwin Smith's ' Cowper* ('English Men of Letters,) 1880) ; *Ste.* Beuve's 'Causeries* (Vol. XI), and Leslie Stephen's 'Hours in a Library* (III) ; Gearey, Caroline, 'Cowper and Mary Unwin) (1900) and 'A Concordance to the Poetic Works of William Cowper) by John Neave (1887).

William P. Trent,

Professor of English Literature , Columbia U niversity.

COWPER'S GLANDS, two glands dis¬ covered by an English anatomist, William Cow¬ per, situated in male mammals behind the an¬ terior portion of the membrane of the urethra. They secrete mucus and are active in the gen¬ erative function, corresponding to Bartholini's glands in the female.

COWPOX, also known as variola, is an infectious disease of cattle characterized by fever, falling off in the milk yield and the ap¬ pearance of pustules on the teats and udder. The disease ordinarily

runs a harmless course and is quite prevalent, especially in the eastern part of the United States. It is not transmitted except by contact. A similar disease affects horses and sheep. As should be well known, the virus obtained from the pustules of cow-pox is used jn vaccinating man against small¬ pox. This virus produces a' mild form of the disease, from which man recovers in a few weeks and is then claimed to be immune.

The disease appears in four to seven days after natural infection, or may evince itself in two or three days as the result of artificial in¬ oculation. The attack causes a slight rise in temperature, which is soon followed by the ap¬ pearance of reddened, inflamed areas, prin¬ cipally upon the teats and udder. These areas expand into nodules containing at first a pale serous fluid and later pus as the disease runs its course. The typical pox pustule is next present. The total duration of the disease covers about 20 days. The fallen scabs and crusts retain their contagious properties and

Fhotograph by J. Horace McFarland Co.

tend to spread the disease if fresh cattle are brought in contact with them. In herds that receive careful attention the usual treatment consists of the application of softening and disinfecting agents to such vesicles upon the teats as may have become ruptured by the hands of the milker. Carbolized vaseline or iodoform ointment is well suited for this work. In more persistent cases the use of a milking tube is desirable in order to prevent the re¬ peated opening of the pustules during the operation of milking. Washing the sores twice daily with a weak solution of zinc chloride {2l/2 per cent solution) checks the in¬ flammation and cleanses and heals the parts by its germicidal action. When the udder is hard, swollen and painful, it is well to support it by a bandage and foment frequently with hot water. Milk from affected herds should not be given young children, as in the raw state it exercises a deleterious action on the alimentary canal. (See Smallpox ;

Vaccination). Consult (Abridged Agricultural Records) (Vol. Ill, Washington 1912) ; and Wilcox and Smith, (Farmer's Cyclopedia of Live Stock > (New York 1912) ; (Farmers Bulletins) (Washington, D. C).

COWRY, a mollusk of the genus Cyprcea, a gastropod, comprising nearly 200 species -with beautifully colored shells. The cowries are mostly confined to the tropics, especially of the Old World, none occurring on the coast of South America. They live in reefs and under rocks at low water and feed on various polyps. The money cowry is Cyprcea moneta. See Wampum.

COWSLIP, a popular name for several dis¬ tinct species of plants, both American and European. The English cowslip is Primula officinalis, of the family Primulacecc. It is a stemless perennial herb with a rosette of oval or oblong soft leaves, from among which arise numerous scapes 6 to 10 inches tall and bearing six or eight bright yellow, fragrant flowers in a close umbel which leans to one side. The plant has long been a general favorite in gardens where it usually receives little attention beyond an occasional stirring of the soil to remove weeds and the application of the usual winter mulch of stable manure. Several improved varieties have been produced in divers colors. The plant most widely known in America as cowslip is Caltha palustris, the marsh marigold, a member of the family Ranunculacece. This is a succulent perennial herb common in wet ground from the Carolinas to the Arctic regions. It has strong fibrous roots, hollow branching stems one to two feet tall, heart-shaped or kidney-shaped leaves and brilliant yellow flowers resembling buttercup, by which name the plant is sometimes called. It is often cultivated for ornament in marshy ground and has. developed some improved double-flowered varieties. Its leaves and young stems are often used as a pot-herb in early spring. The American cow¬ slip or shooting-star is Dodecatheon meadia of the family Primulacecc. It is a stemless peren¬ nial with fibrous roots, spatulate-oblong leaves in a dense rosette from which the scape rises to a height of 9 to 18 inches or more, bearing at its summit several or many pendant pink, white or lilac flowers with reflexed petals and prominent anthers and pistils. Each flower

of the cluster resembles the solitary flowers of cyclamen. Other species of the same genus are also known by the name, and like it are planted in hardy flower borders like the English cowslip.

COX, David, English landscape painter: b. Birmingham, 29 April 1783;

d. Harbourne, near Birmingham, 7 June 1859. He was for several years engaged as scene-painter for various pro¬ vincial and London theatres, and during a con¬ siderable portion of his early life he had to teach his art for a subsistence. His travels in Wales (1805) furnished him with material for numbers of his paintings. In 1816 he was made a member of the Society of Painters and Water-Colorists and in the following year pub¬ lished a treatise on landscape Painting and Effect in Water Colors.5 He removed to Harbourne near Birmingham in 1841. His works are chiefly of English landscape, and in water colors, in which he especially excelled, being ranked by some critics as the first of Eng¬ lish water-colorists. At the age of 56 he began the study of oil-painting under Muller and be¬ came very skilful in the art. Cox ranks as the greatest of the successors of Constable (q.v.). His colors are light and fresh, and his treat¬ ment of light and shade is most skilful. He excels in small productions. The British Mu¬ seum and the South Kensington Museum possess some of his water colors and drawings, but the best of his works are in the Birmingham Art Gallery and in private collections. An exhibition of his paintings was held in Manchester 1887. Well-known pictures by him are (Washing Day5 (1843) ; (The Vale of Clwyd) (1846) ; (Peace and War5 (1846) ; (The Summit of the Moun¬ tain (1853). His son, David Cox (1809-85), was likewise a water-colorist of some distinc¬ tion. Consult Hall, (Biography of David Cox) (London 1881) ; Solly, (Memoir of David Cox5 (ib. 1875) ; Baldry (in (Masters of English Landscape Painting,5 ed. by Charles Holmes, New York 1903).

COX, Sir George William, English clergy¬ man and historical writer: b. Benares, Hindu¬ stan, 10 Jan. 1827 ; d. Walmer, England, 9 Feb. 1902. He was educated at Rugby and Trinity College, Oxford, and took orders in 1850. From 1850 till 1851 he was curate of Salcombe Regis, Devon; from 1854 till 1857, of Saint Paul's, Exeter, and in 1881 became vicar of Bekesborne, Kent. From 1881 till 1897 he was rector of Scrayingham, Yorkshire. He succeeded his uncle in the baronetcy in 1877. In 1891 he was chosen bishop of Natal by the friends of Bishop Colenso (q.v.) but the archbishops and bishops of England refused him consecration. He pub¬ lished (Poems Legendary and HistoricaP (with the historian Freeman, 1850) ; fLife of Saint Boniface> (1853); (Tales from Greek Mythol¬ ogy5 (1861); (The Tale of the Great Persian War, from Herodotus5 (1861) ; (Tales of the Gods and Heroes5 (1862) ; (Tales of Thebes and Argos5 (1864) ; (A Manual of Mythology5 (1867) ; (Tales of Ancient Greece5 (1868) ; (The Mythology of the Aryan Nations5 (1870) ; (Latin and Teutonic Christendom5 (1870) ; (History of Greece5 (1874) ; (The Crusades5 (1874) ; (Tbe Greeks and Persians' (1876) ; <The Athenian Empire5 (1876) ; A General History

of Greece5 (1876); (History of the Establishment of British Rule in India5 (1881) ; < Introduction to Science of Comparative Mytho-140

logy and Folk Lore) (1881) ; (Short Historical Anecdotes) (1882) ; (Lives of Greek Statesmen) (1885-86) ; (Concise History of England and the English People) (1886) ; (Life of John William Colenso, Bishop of Natal,* perhaps his most important work (1888) ; The Church of England and the Teaching of Bishop Colenso*

(1888).

COX, Isaac Joslin, American educator: b. West Creek, Ocean County, N. J., 19 Nov. 1873. He was educated at Dartmouth College and at the universities of Texas, Chicago, Wisconsin, and Pennsylvania. Between 1896 and 1906 he was instructor and vice-principal at San Antonio Academy and instructor in history at the Uni¬ versity of Cincinnati, where he was afterward assistant professor. In 1911-12 he was Shaw lecturer at Johns Hopkins University. He has published (The Journeys of La Salle and his Companions) (2 vols., 1905) ; (The Early Ex¬ ploration of Louisiana* (1906) ; (The Indian as a Diplomatic Factor in the History of the Old Northwest* (1910). He is actively engaged on a series of frontier studies covering the early relations between Spain and the United States.

COX, Jacob Dolson, American statesman and soldier: b. Montreal, 27 Oct. 1828; d. Mag¬ nolia, Mass., 4 Aug. 1900. He was graduated at Oberlin in 1851 and became a lawyer; but upon the outbreak of the Civil War was made brigadier-general of Ohio Volunteers. In 1862 he became major-general of the United States Volunteers, and in 1864 commanded a division at Nashville. At the close of the war he re¬ signed his command and entered the practice of law in Cincinnati. He was elected governor of Ohio in 1865, and in 1869 became Secretary of the Interior in President Grant's Cabinet until 1870 when he resigned. In 1873 he became presi¬ dent of the Wabash Railroad and removed to Toledo to take charge of his new work. He was representative to Congress from October 1877 to March 1879. The University of North Carolina and Davison University, Ohio, conferred on him the degree of LL.D. He has published Atlanta' ; (The March to the Sea) ; (Franklin and Nashville) ; (The Battle of Franklin.*

COX, James M., American journalist and statesman: b. Jacksonburg, Ohio, 31 March 1870. After a public-school education he was

employed in a printers office, taught a country school, became a newspaper reporter, and was for a time on the editorial staff of the Cincinnati Enquirer. In 1898 he became proprietor of the Dayton Daily News and in 1903 of the Springfield Press-Republic. From 1909 to 1913 he was a member of Congress. He was governor of Ohio from 1913 to 1921. He was the candidate of the Democratic party for the Presidency in 1920.

COX, Kenyon, American painter: b. War¬ ren, Ohio, 27 Oct. 1856; d. New York, 17 March 1919. He studied in Cincinnati and in Pennsyl¬ vania Academy of Design and (1877 to 1882) in Paris under Duran and Gerome. In 1883 he set¬ tled in New York and painted subjects of many kinds, including portrait, landscape and ideal figure compositions, and also illustrated and wrote on art subjects. He was known principally as a mural-painter, having executed important decorative work in the Librarv of Congress at Washington, D. C., in the State capitols of Minnesota, Iowa and Wisconsin, in

county courthouses at Newark, N. J., and Wilkes-Barre, Pa., in the Public Library at Winona, Minn., and in other public buildings. He modeled a statue of ((Greek Science® for the front of the Brooklyn Institute of Arts and Sciences. He received various awards and medals, including the Medal of Honor for Mural Painting of the Architectural League in 1910. He is represented by pictures in the National Gallery of Art at Washington, D. C., the Metro¬ politan Museum, New York, the Cincinnati Mu¬ seum and other public collections. He received the degree of M.A. from Yale University and of Litt.D. from Oberlin and Dartmouth. He was a member of the Society of American Artists from 1882, becoming its vice-president at the time of its union with the National Academy of Design in 1906. He was also a member of the American Academy of Arts and Letters, the National Academy of Design, the Architectural League of New York and presi¬ dent of the Mural Painters. He published six volumes of criticism on art, (01d Masters and New* ; (Painters and Sculptors) ; (The Classic Point of View* ; (Artist and Public) ;

(Winslow Homer * ; and Concerning Painting) (1917), besides numerous reviews and maga¬ zine articles.

GOX, Louise Howland King, American artist: b. San Francisco, Cal., 23 June 1865. She was a pupil of the National Academy of Design, and of Kenyon Cox (q.v.), whom she married 30 June 1892. In 1896 she won the third Hall-garten prize of the National Academy of Design, and in

1900 was awarded a bronze medal at the Paris Exposition. She was also awarded a silver medal at the Pan-American Exposition, Buffalo 1901; the Julia A. Shaw Memorial Prize, Society of America Artists, 1903; and a silver medal, Louisiana Purchase Exposition, Saint Louis 1904. She was a member of the Society of American Artists before its union with The National Academy of Design and is an Associate of the Academy. She is repre¬ sented in the National Gallery of Art (Evans Gift), Washington, D. C.

COX, Palmer, American artist and writer for young people : b. Granby, Quebec, 28 April 1840. Since 1875 his home has been in New York. His works are both written and illus¬ trated by himself. He is best known by his (Brownie Books,* a very popular series contain¬ ing humorous pictures and verse for children. Other productions are (Hans Von Petter's Trip to Gotham* (1878); (How Columbus Found America) (1878); (Queer People) (1888), *etc.* His (Brownies in Fairyland,* a cantata in two acts, and- (Palmer Cox's Brownies,' a spectacular play in three acts, were produced for several years, on the stage, throughout the United States and Canada.

COX, Samuel Hanson, American Presby¬ terian clergyman : b. Rahway, N. J., 25 Aug. 1793; d. Bronxville, N. Y., 2 Oct. 1880. He undertook to study for the legal profession, but abandoned it for theology and was ordained to the Presbyterian ministry in 1817. From 1817 to 1821 he held a pastorate at Mendham, N. J., and in the latter year removed to New York, holding two pastorates there until 1834. His prominence as a leader of the anti-slavery movement made him unpopular and on one occasion his house and church were sacked. He

helped to found the University of the City of New York, now New York University; in 1334-37 served as professor of pastoral theology at Auburn, and in the latter year became pastor of the First Presbyterian Church of Brooklyn. He also served as professor of church history at the Union Theological Seminary. His voice failed in 1854, and he resigned his pastorate and his chair at the seminary, and removed to Owego, N. Y. He was a noted orator and is well remembered for a

speech at Exeter Hall in 1833, in which he took the British government to task for the continuance of slavery in America. He wrote (Quakerism not Christianity } (1833) and (Interviews, Memorable and UsefuP

(1853).

COX, Samuel Sullivan, American states¬ man and author : b. Zanesville, Ohio, 30 Sept. 1824; d. New York, 10 Sept. 1889. He was graduated at Brown University in 1846 and was later admitted to the bar, but forsook the law in 1853 to become editor of the Ohio Statesman at Columbus. For one year he was secretary of legation in Peru. He was a Democratic member of Congress from Ohio 1857-65; and from New York 1869-85, and 1886-89. He was also for a short time Minister to Turkey. He was popularly known as the ˆletter-carriers' friend® in reference to legislation proposed by him for increase in their salary and the con¬ cession to them of a vacation with pay. A statue of him was erected by the letter-carriers in Astor Place, New York. A glowing piece of descriptive writing published in the Statesman during his editorship won him the nickname <(Sun set,® which clung to him through life. He was a popular lecturer and published (Eight Years in Congress* (1865) ; (Why We Laugh *(1876); diversions of a Diplomat in Turkey* (1887); (A Buckeye Abroad* ; (Arctic Sunbeams) ; (Orient Sunbeams* ; (Search for Win¬ ter Sunbeams) ; dree Land and Free Traded *etc.*

COXALGIA, or COXITIS, a term form¬ erly applied to a disease of the hip-joint. It is characterized by inflammation, sometimes ac¬ companied by suppuration, which leads to stiff¬ ness of the joint and its final destruction by necrosis.

COXCIE, kok'se, or COCXIE, Michel,

Flemish painter and engraver : b. Mechlin 1499 ; d. there, 10 March 1582. He was a pupil of Bernard van Orley, and traveled to Rome, where he remained several years, attracted by the works of Raphael, with whom he was prob¬ ably personally acquainted. Here he executed several paintings in fresco, and many other pieces. He also painted the (History of Cupid and Psyche,* in the style of Raphael, which was engraved on 32 copperplates. In the Imperial Gallery of Vienna we find a Madonna with the Infant Jesus by him. He was the first Fleming to attempt lifesize frescoes in the style of the Roman school. He was appointed court painter by Philip II of Spain and

commissioned to copy the altar-piece of the brothers Van Eyck (q.v.) in Ghent. He possesses a cold, but clearly defined style. There are some good examples of his painting in the Escorial and in the museums of Brussels, Antwerp, Madrid, Vienna and Prague. His works are rare, even in the Netherlands.

COXE, Arthur Cleveland, American Prot¬ estant Episcopal prelate and author : b. Mendham, N. J., 10 May 1818; d. Clifton Springs, N. Y., 20 July 1896. He was a son of S. II. Cox (q.v.), but adopted an older spelling of his surname. He took orders in the Episcopal Church in 1841 ; and after holding rectorships at Hartford, Conn., Baltimore, Md., and New York was consecrated bishop of western New York in 1865. In 1872 he visited Haiti to establish churches and ordain clergy. He also founded the Christian Literature Company of whose publications he edited a series of Ante-Nicene fathers. He was a vigorous, powerful prose writer, and his (Christian Ballads) (1840) was long popular. His other works include (Athanasian and Other Poems) (1842) ; (Saul, a Mystery, and Other Poems) (1845) ; (Thoughts on the Services) ; Umpressions of England) (1865); (The Criterion) (1866); (Apollos, or the Way of God> (1873) ; (Institutes of Chris¬ tian History *(1887) ; (The Pascal,* a collection of Eastern poems (1889).

COXE, Tench, American economist : b. Philadelphia, Pa., 22 May 1755; d there, 17 July 1824. At first a Royalist he became a Whig, was a member of the Annapolis Convention 1786; the Continental Congress 1788; Assistant Secretary of the Treasury 1790; Commissioner of the Revenue 1792— 97 ; and purveyor of public supplies 1803-12. He early devoted much at¬ tention to political economy, and his writings and ideas on this subject constitute his chief claim to remembrance. He favored the prohibi¬ tion of the coasting trade to foreign shipping; the importation of foreign goods only in ships of the country producing them ; the special en¬ couragement of manufactures; and the exemp¬ tion of raw materials from tariff duties. He urged the South to take up cotton-raising, is sometimes called the father of the American cotton industry, and is said to have been the first to attempt to bring an Arkwright machine to the United States. His publications are (Inquiry into the Principles on Which a Com¬ mercial System for the United States Should be Founded) (1787) ; Examination of Lord Shef¬ field's Observations on the Commerce of the American States) (1792) ; (View of the United States of America* (1794) ; (Thoughts on

Naval Power and the Encouragement of Com¬ merce® (1806) ; (Memoir on Cultivation, Trade, and Manufacture of Cotton * (1809) ; State¬ ment of the Arts and Manufactures of the United States for the Year 1810) (1814), the first extended attempt to make an industrial census of the country.

COXE, William, English historian and traveler: b. London, 7 March 1747; d. Bemerton, Wiltshire, 16 June 1828. He was educated at King's College, Cambridge, and in 1771 took the curacy of Denham, but soon resigned to become the tutor of several young noblemen. With them he spent many years in travel. He pub¬ lished an account of his travels through Swit¬ zerland (1779), and through Poland, Russia, Sweden and Denmark (1784-92), which have been translated into almost all the languages of Europe. In 1786 he became a vicar again. He was made prebend of Salisbury in 1791 and archdeacon of Wiltshire in 1804. As historian he brought himself into notice by his (Memoirs of Sir Robert Walpole* (1798), followed by

those of Horatio, Lord Walpole (1802). He then published his '■History ot the House of Austria from 1218 to 1792) (1807) ; afterward ' Memoirs of the Kings of Spain of the House of Bourbon, from 1700 to 1788 > (1813); 'Life of Gay) (published separately from his Fables,

1897).

COXSWAIN, or COCKSWAIN, a minor officer on board of a ship, who takes charge of a boat and the boats' crew in the absence of superior officers. The term also designates the helmsman of a racing crew.

COYOTE, kl'6-te or koi'6-te, prairie wolf (Cams latrans), native to the western United States, and before the advent of civilization nu¬ merous as far east as the extent of the prairies of the Mississippi Valley, where it was called the red wolf in distinction from the large

gray or timber wolf (q.v.). At present it is abundant from the dry plains of Texas, Nebraska and Manitoba, westward to the Pacific coast, south of central British Columbia, and also in Mex¬ ico. Throughout this wide range it supports itself easily in spite of civilization, and at night its long-drawn cry, more like a bark than a howl, may be heard for long distances ; and, owing to its predatory habits, this wailing call inspires terror in its possible victims and rouses the anger of the western ranchman whose flocks and herds are apt to suffer from the inroads of the barking wolf, as the coyote is sometimes called.

Coyotes are smaller than other wolves, being about the size of setter dogs, and, although they often travel in packs, as do other wolves, they are cowardly where man is concerned, and confine their raids to the brute creation. Their fur is soft, reddish or tawny-gray in color, sometimes slightly tipped with black. The tail is bushy, the ears upright and the slender muz¬ zle very pointed. The coyotes live in hollows among rocks, or in deserted burrows, whence they usually issue at dusk, to hunt. Their food is chiefly gophers, mice, ground-nesting birds, prairie-dogs and other small animals, their dep¬ redations on sheep-folds and cattle-ranches being mainly reserved for winter. In former days they were persistent enemies of the prong¬ horns. They are fleet footed, cunning in avoid¬ ing snares and adapt themselves readily to varying conditions, — hence they increase rather than diminish in the more isolated regions where they are found. They were well known to the Western Indians and formed the basis of some breeds of their dogs. Many tales of American Indian folklore in these tribes are concerned with them. Consult Elliott, (Synopsis of Mammals) (1901) ; Ingersoll, ’Wild Neighbors)

(1897).

COYPEL, kwa’pel, a celebrated family of French artists (1) Noel: b. 25 Dec. 1628; d. Paris, 24 Dec. 1707. After he had embellished, by the royal command, the old Louvre with his paintings (from the cartoons of Lebrun), and had in like manner adorned the Tuileries, the Trianon and the Hotel des Invalides, he was appointed a director of the French Academy in Rome. His four pictures for the Council Hall at Versailles — Solon, Trajan, Severus and Ptolemy Philadelphus — excited the admiration of connoisseurs. His chief works are the Mar¬ tyrdom of Saint Tames) (in the church of Notre Dame), (Cain Murdering His Brother) (in

the Academy), the ’Trinity and the Conception of the Holy Virgin) (in the Hotel des Invali¬ des). Coypel had a rich imagination, drew cor¬ rectly, understood expression and was an agree¬ able colorist. He wrote a ’Dialogue sur le colons,* published by Caresme (Paris 1741).

(2) Antoine, his son, b. Paris, 12 April 1661 ; d. there, 7 Jan. 1722. At the age of 20 he was elected member of the Academy; in 1707 he became professor there and president in 1714. He was made painter to the king in 1716, and painted a great number of pictures for the royal palaces and the churches of Pans. Among his best works are 12 subjects from the vEneid, a portrait of Moliere and ’Athalie chassee du Temple.) The designs of the ’Histoire numismatique du regne de Louis XIV* are mostly his. His collected lectures were published under the title ’Discours sur la peinture) (Paris 1721). His pictures are to be found in nearly all of the museums of his provinces.

(3) Noel-Nicolas : b. Paris, 18 Nov. 1690; d.

there, 14 Dec. 1734. He excelled in pastel paint¬ ing. His best-known pictures are ’Triomphe de Galathee* and paintings in the chapel of the Virgin at the church of Saint Saviour. He be¬ came a member of the Academy in 1720, pro¬ fessor and court-painter in 1731. (4) Charles —

Antoine, etcher, painter and dramatist, son of Antoine (q.v.) : b. Paris, 11 July 1694; d. there, 14 June 1752. He studied with his father. At court his dramas made him very popular, espe¬ cially ’Les folies de Cardenio* (1724). His 25 pictures from the history of Don Quixote (at the palace of Compiegne) were very well known. He painted in pastel and also numerous portraits. The principal illustrations of the ’Comedies de Moliere) are also the work of this versatile artist. In 1715 he became a member of the Royal Academy; professor in 1720, chief court-painter in 1747 and director of the Academy in the same year; and later chief painter to the Duke of Orleans who became his pupil. Con¬ sult Caylus, ’Vie des peintres) (Paris 1910).

COYPU, koi-poo’, or NUTRIA, an aquatic rodent (Myopotamus coy pa), native to South America. It is known colloquially as the nutria, or otter, in the countries where it is found, and its pelt furnishes the fur commercially mis¬ named as ”otter.)) It is dull brown, has a gray muzzle and red incisors. Its nostrils are so set that it can breathe when all immersed except the tip of its nose. It is somewhat smaller than the beaver, and has a slender, rat-like tail. It is distinctly aquatic, dwelling

in ponds, and bur¬ rowing into the banks, or building platform-nests among the reeds on the shore. Owing to the threatened extermination -of the coypu local laws have been enacted for its protection as a valuable fur-bearing animal, and it has been saved by these and by a smaller demand for its pelt. Its call is like the moan of a human crea¬ ture in pain; and when a female and her family of eight or nine take to the water they become very noisy, as well as playful. Consult Hud¬ son, 'The Naturalist on the La Plata) (1892).

COYSEVOX, kwas'voks', Antoine, French sculptor: b. Lyons, 29 Sept. 1640; d. Paris, 10 Oct. 1720. He studied with Lerambert was admitted to the Royal Academy in 1676, was employed by Louis XIV in decorating Versailles and the palace at Marly. Among his best works are an equestrian statue of Louis XIV;

the statue of Cardinal Mazarin ; the tomb of Colbert; the group of (Castor and Pollux ;> the (Sitting Venus C the (Nymph of the Shell p the (Hamadryad p the (Faun with the Flute p (Pegasus and Mercury,* and many portrait busts and statues of the most famous men of the day, including Mazarin, Richelieu, Conde, Fenelon, Racine, Charles Le Brun and Maria Theresa of Spain. He carved also a number of memorials.

CO YUVOS, ko-yoo'voz, natives of the Cuyos islands, Philippines (q.v.). They are of Tagbanua stock of the civilized branch known as Silanganen and speak the Tagbanua lan¬ guage. They are Christians. See Tagbanuas

COZENS, John Robert, English water-color painter: b. 1752; d. 1799. He was in¬ structed by his father, Alexander Cozens, who was one of the two natural sons of Peter the Great by a woman of Deptford. In 1776 he visited Switzerland, with Payne Knight, and in 1783 returned from an extended tour in Italy with William Beckford, who commissioned many of the washed drawings which he then executed. Among his English subjects are some fine studies of trees made in Windsor Forest. The date of his death has been usually stated as 1799,

but there is reason to believe that he was alive after 1801. In his treatment of out-of-door scenery he is a forerunner of the Impressionists. Turner and Constable have learned much from him. (Hannibal Crossing the Alps* was the most famous of his pictures in his day, but it cannot be located. .

COZUMEL, ko-soo-mal', an island in the Caribbean Sea, off the coast of Yucatan, in lat. 20° 34' N. ; long. 86° 44' W. It is 30 miles long, by about 8 miles broad, and is low and covered with trees. It is fertile and abounds in fruit and cattle. Numerous interesting remains of ancient buildings have been discovered on it. When visited in 1518 by Juan de Grijalva it contained a numerous population, and was much resorted to as a place of peculiar sanctity by the Indians of the neighboring continent.

CRAB, the name applied to any of the brachyurous or short-tailed decapod Crustacea, comprising numerous forms, which, with the exception of a very few freshwater species, are inhabitants of the ocean. In the crabs the abdomen is folded under the chest (cephalothorax), while the antennae are short and small. The group includes among others the spider-crabs (Ply as , Libinia, etc.), which have a some¬ what spherical body with long sprawling legs. The shore-crabs are represented by the species Cancer, which are among the largest of the order. They have a broad shell or carapace, without a prominent beak, or rostrum. There are nine gills on each side. Of the two species on the New England and Canadian coast, C. irroratus is the more common, and often used for food, and C. borealis is less abundant. A fossil species (C . proavitus) has been detected by Packard in a collection from the Miocene Tertiary green-sand beds of Gay Head, Martha's Vineyard. It appears to have been the source from which the two existing species arose by divergent evolution. Allied to Cancer is the mud-crab (Panopcens) .

The soft-shelled crab of the markets is Calli-nectes sapidus ; it is so called from being cap¬ tured soon after molting, when its shell is still

soft. The fiddler-crabs (Gelasimns) , so abun¬ dant on our shores, dig holes near high-tide mark, closing the entrance with their larger claw. The oyster-crab is soft-shelled from living within the shell of bivalves. (See Com¬ mensalism). The land-crabs of the tropics live away from the sea, only going to it to lay their eggs in the water during the spawning season. Most crabs are flesh eaters. They are very active and are remarkable for their gait, running sideways rather than straight

ahead. The rear pair of limbs are generally expanded at the extremities into a blade tor swimming. Their development is accomplished by metamor¬ phosis through several successive stages or molts. (See Crustacea). They vary in size from the giant crab of Japan, which is about 18 inches long and 12 inches across the disc, but often has legs over 3 feet in length, to the little pea crabs often found in oysters. The crab forms an article of food for many kinds of fish and is used as human food in various parts of the world. Crabs are generally caught in wicker traps, baited with meat ; they are also taken with shallow hooped nets which are baited and hauled rapidly at intervals. The crabs are kept for market in floating pens, and are shipped alive packed in seaweed. (See also Hermit-crab; Palm or Robber-crab; and the various groups and species above mentioned). Consult Caiman, “Crustacea® (in Lankester’s (Treatise on Zoology,* London 1909) ; Caiman, cThe Life of Crustacea) (New York 1911). For fossil forms and history con¬ sult Ortmann, (Das System der Decapoden-krebsen) (in Zoologische Jahrbucher, Vol. IX, Jena 1896) ; Zitte.1, ˆTextbook of Paleontology* (Vol. I, London and New York 1900).

CRAB-APPLE, a plant of the genus Pyrus belonging to the apple family (Fomacece) . The genus comprises about 15 species, natives of the temperate zone of the northern hemisphere. The term crab-apple is applied rather vaguely to any sour or uncultivated species of the apple family, but strictly it belongs to the varieties of baccata. The species best known in America is P. angustifolia, the narrow-leaved crab-apple, which is a small tree, reaching 30 feet in height, with a diameter of 10 inches. It grows in thickets from New Jersey to Illinois and Kansas, and south to Florida and Louisiana. The American crab-apple, P. coronaria, grows to the height of 25 feet, and has a diameter of 12 inches. The wood is soft, and of a reddish-brown color. In both trees the wood weighs about 44 pounds to the cubic foot. The Ameri¬ can crab-apple grows from Ontario west to Michigan, and as far south as South Carolina. Its fruit is about one and a quarter inches in diameter, greenish-yellow, very fragrant and externally acid. This tree is known also as the sweet-scented crab-apple. Other ‘species grow farther south and west ; one species, P. loensis, known as the western crab-apple, resembling the American crab-apple, is found from Minnesota eastward through Wisconsin and Illinois, and extends south and west through Kentucky to Louisiana and Indian Territory. The cultivated crab-apple requires about the same treatment as the true apple. See Apple.

CRAB-EATING DOG, a fox-dog (Canis cancrivorus) , native to eastern South America from Guiana to northern Argentina, but said

to be quite unknown on the pampas. It is somewhat smaller than the colpeo of the extreme south, and less handsome in color. In this respect it is subject to great variation, rang¬ ing from black, with bright red cn the legs, to dull gray with very little black on the back, but the tip of the tail is always black. It is a forest or jungle-dwelling animal, feeding upon rodents and birds and upon crustaceans, whence its English and Latin name. It does much damage to poultry in the inhabited districts; when hunting in the woods it follows its prey by scent, but in the open it is said to hunt by sight.

CRAB-EATING ICHNEUMON, Ik-nu'-

mon , a mungoose (Herpestes urva or cancrivorus), native to southern Asia from the slopes of the Himalayas to southern China and Assam. It is said to be partially aquatic in habits and to live on frogs and especially on crabs, whence its name. It is, however, little known scientifically.

CRAB-EATING RACCOON, a kind of

raccoon (q.v.) native to South America (Pro - cyon cancrivorus) , considerably larger than the northern raccoon and having shorter fur and proportionately much larger teeth. It is found from Panama to Colombia and Guiana. The darker sort, found farther south, has often been considered as a distinct species, and called the black-footed raccoon. In habits, these South American raccoons are much like their northern relatives.

CRAB GRASS, or FINGER GRASS (Syn-therisma sanguinalis) , belongs to the family Poacet e, or grass family. It is a very common annual grass found throughout the United States and thriving in warm weather. It has erect or decumbent stems which often grow two or three feet high and bear from 4 to 15 erect or spreading spikes, which carry the flowers and fruit. It is cultivated in the south¬ ern States for hay and pasturage. The hay is easily injured if wet while curing. Its value is similar to that of Bermuda grass. It was intro¬ duced from

Europe, where it is a weed, al¬ though it is cultivated on sandy land in Bohemia, the fruit being used for porridge. In the northern parts of the United States, owing to its strong roots it is difficult to eradicate and is regarded as a bad weed.

CRAB ISLAND, West Indies. See Vieques.

CRAB-LOUSE (Phthirius inguinalis), a wingless insect of the family Pediculidce or suc¬ torial lice, which is usually classified under the Hemiptera. It is different in shape from the other lice, having a short and broad crab-like appearance. It is whitish, with the thick legs and claws reddish, and is nearly one-tenth of an inch in length. The crab-louse infests the pubic regions* of the human body, sometimes occurring among the hairs of the arm-pits, or even of the eye-brows. The insect attaches its eggs in great numbers to the hairs, as may easily be seen with an ordinary reading-glass ; and the young half burrow beneath the skin, clinging tenaciously. The itch or disease called phthiri-asis is due to the attacks of this repulsive pest, when occurring in great numbers. The virul¬ ence of the disease in ancient writings was prob¬ ably exaggerated. Sharp suggests that in the cases of disease attributed to this insect the patient was suffering from some other disease,

but being in a neglected and filthy condition was horribly infested with these disgusting crea¬ tures. Red precipitate, and any oily or greasy applications, together with frequent use of car¬ bolic acid soap are efficient remedies.

CRAB-SPIDER, a small spider of the family Thomisidce, so-called on account of its laterally bent legs and side-wise progression. The body is much depressed and the ocelli ar¬ ranged in two parallel transverse rows. The Thomisus vulgaris and other species are com¬ mon in the United States. They spin no webs except for the support of the cocoon, but pursue their prey which, owing to their flat bodies, they are enabled to seek in crevices. The claws or talons of this spider are very large and strong : sometimes they are removed, set in gold, and used as toothpicks, being supposed to have medicinal properties as prophylactic of tooth¬ ache. The name is also applied to the bird-catching spider (q.v.).

CRABB, George, English lawyer and philo¬ logist: b. Palgrave, England, 8 Dec. 1778; d. Hammersmith, England, 4 Dec. 1854. He studied in Germany, and on his return to England pub¬ lished a series

of German textbooks which were long in use. In 1829 he was admitted to the bar. He was the author of (Dictionarv of English Synonyms y (1816; 10th ed., 1849) ; (An Historical Dictionary } (1825) ; (Mythology of All Nations) (1847); (A Technological Dictionary) ; (A History of the English Law) ; (A Digest and Index of All the Statutes at Large, > (4 vols., 1841—47) ; (A Technical Dictionary of Terms Used in Science and Art* ; and (A Dic¬ tionary of General Knowledge.)

CRABBE, George, English poet: b. Alde-burgh, Suffolk, 24 Dec. 1754; d. Trowbridge, Wiltshire, 3 Feb. 1832. He early showed a passion for reading. After a short time at school he was apprenticed to a village doctor and afterward to a surgeon. He contri¬ buted verse to Wheble's Magazine after 1772. He continued his medical studies in London and returned to his native place to practise his pro¬ fession. He abandoned the profession in 1780 and went to London to pursue a literary career. In that year he published <The Candidate,* but its failure disheartened him and he called upon Burke, who took him under his protection and helped to publish (The Library *(1781). At Burke's direction he entered the Anglican minis¬ try, was chaplain to the Duke of Rutland, held several other church livings, the last of which was Trowbridge, where he remained from 1814 until his death. Among his best-known poems are (The Village* (1783) (The Newspaper* (1785); (The Parish Register* (1807); (The Boroughs (1810) ; (Tales in Verse) (1812) and (Tales of the HalP (1819). Crabbe was popular in his time, being praised by Dr. John¬ son, Scott, Byron and Wordsworth. His reputa¬ tion has declined greatly since his day, but he is still important for his realism and tragic por¬ trayal of the lives of the people in old East Anglia. (See Parish Register, The). Con¬ sult (Works, *with memoir by his son (8 vols., London 1835; 1 vol., 1901); Ainger, A., (Crabbe* (New York 1902) ; Huehon, R„ (George Crabbe and His Times *(1907) ; and Courthope's essay in Ward, (English Poets* (London 1884).

CRABETH, kra'bet, Dirk and Wouter, two famous Dutch glass painters of the 16th cen¬ tury: b. Gouda. Both traveled in Italy, Wouter

especially being influenced by Raphael, and then each established a glass factory at Gouda. Wouter's paintings are found in France and Italy, but the best work of both brothers is in the Saint Janskerk in Gouda, where Dirk painted seven windows, of which (Driving the Traders from the Temple,) (The Baptism by John) and (The Last Supper 5 are the finest, and show more brilliant coloring than those of Wouter. The others are (The Sacrifice by Elijah before the Priests of BaaP ; (Washing the Disciples feet5 ; (Queen of Sheba before Solomon) and (The Sacrilege of Heliodorus.5 Wouter died about 1581, 20 years before his brother. His work was of wider range than Dirk's, including some portraits and archer groups in the Museum of Gouda, and excelled it in drawing and in treatment of lights. Por¬ traits of the brothers, who were bitterly jealous of each other, are in the Saint Janskerk. Wouter's grandson Wouter was an historical painter. Consult Westlake, (History of Design in Painted Glass5 (Vol. IV, London 1894).

CRABTREE, Charlotte (best known by her stage name Lotta), American actress: b. New York 1847. She made her first appearance on the stage when six years old in an amateur performance. At the age of 10 she played the part of Gertrude in the (Loan of a Lover5 at Petaluma. In 1863 she appeared in New York in spectacular plays at Ntolo's Garden, and first gained a reputation in John Brougham's (Little Nell and the Marchioness.5 She soon became a favorite with the American public in pro¬ nounced comedy, playing parts especially written for her. Her chief successes have been as (Topsy,5 (Sam Willoughby,5 (Firefly,5 Mu¬ sette,5 (Zip,5 (Bob,5 (The Little Detective,5 and (Nitouche.5 She retired from the stage in 1891, having acquired a fortune. Consult Welch, in McKay and Wingate's (Famous American Actors of To-Dav5 (New York 1896) ; and Clapp and Edgett, (Players of the Present5 (in Dunlap Society Publications, ib. 1899).

CRACKER. See Biscuit.

CRACKER INDUSTRY, The. There is, perhaps, no branch of American enterprise that has enjoyed more phenomenal development dur¬ ing the past few years than the cracker, or bis¬ cuit, industry, for certainly there is no other single avenue of commercial endeavor that is. so far reaching in its source of supply, or which brings its perfected product into so many homes.

While we have derived the name (<biscuit,55 from the French, it originally came from the Latin, having been a word that was used to signify that the bread eaten by the Roman soldiers was sent twice to

the oven. Thus, its actual meaning, <(twice baked.55 Just how, or when it first came to be used in France, nobody can tell, but it reached the United States via England sometime about the middle of the 19th century. Prior to that time such a title had never been applied to the product of our bak¬ eries, although in Europe almost every article of food in the form of a sweet, flavored cake had long been known as a biscuit.

It was in the latter part of the 18th century that some bakers in the United States began to produce crackers. They were crude arti-vol. 8 — 10

cles of food, made of plain and unsweetened dough, always unflavored, but crisp. The re¬ ception which this product received, however, was so favorable that their use in this country not only continued to increase but there was an ever-widening demand from abroad, where the name <(cracker,55 was dropped, all such products promptly being absorbed into the generic title, “biscuit.55 The name ((cracker55 was retained in America, however, until within the past few years, when the term “biscuit55 has been adopted in some cases as a more sweeping classification.

So far as we have any authentic record, the first cracker bakery in the United States was that of Theodore Pearson, at Newburyport. Mass. Beginning business in 1792, his specialty was a large cracker which was known both as <(pilot55 and as (<ship55 bread. It was a large, round, clumsy, crisp affair, but it met the demands of the merchant marine who were glad to purchase any article of food that could be depended upon to keep for a longer period than ordinary bread.

Pearson’s first great business rival was Joshua Bent, who erected an oven for cracker baking at Milton, Mass., in 1801. It was a comparatively small affair, being operated only three days in each week by Bent himself, as¬ sisted by other members of his family. During the other three days the product of the oven was sold throughout the country from a wagon. Insignificant as this beginning was it was the foundation of the manufacture of the celebrated Bent’s water-cracker, another product of the American baker that has attained an interna¬ tional reputation. To-day the cracker is made as it always has been, of unleavened dough (flour, water and a little salt). Later ma¬ chinery was substituted for the old hand process, by which the dough was not only mixed and kneaded by hand, but each cracker was even rolled out and shaped separately before being

placed, one at a time, on the long-handled sheet-iron shovel or peel, by which they were trans¬ ferred to the floor of the oval-shaped tile oven which was then in use. So far as the use of raised or fermented dough in the making of crackers is concerned, it has been only within the past half century that its practicability has been developed to any considerable degree.

It was in 1805 that Artemas Kennedy es¬ tablished his bakery at Menotomy, now Arling¬ ton, Mass. A few years later he removed to Westford, and, afterward, to Milton. The elder Kennedy died in 1832, but, in 1834, one of his sons, Jason Kennedy, inaugurated a similar enterprise at Charlestown, and, in 1840, a cousin who had been Jason's foreman, and who was also named Artemas Kennedy, went into business for himself at Cambridgeport, Mass. It was in this manner that the name of Kennedy became associated with the cracker industry of America.

The first cracker bakery in Boston was started by Richard Austin, in Ann street, about 1830. In 1843 he was succeeded by his brother, Thomas, and the business was continued with¬ out interruptions, but under various titles, until 1885, when it again passed into the hands of the Austins, bv being purchased by J. W. Austin, a descendant of the founder of the house. At later dates other firms of prominence were estab¬ lished throughout New England, among them

Thurston, Hall & Company, of Cambridgeport, Mass.; John S. Carr, of Springfield, Mass.; C. D. Boss, of New London, Conn.; Parks & Savage, of Hartford, Conn., and the New Haven Baking Company, of New Haven, Conn.

The business of cracker baking in New York was introduced about 1825, when Ephraim Treadwell founded the establish¬ ment which is now conducting its operations under the name of Treadwell & Harris. Dur¬ ing the next 25 years several other firms en¬ tered the same business, but, although some of them attained considerable distinction in their time, all have now passed out of ex¬ istence. Among them were the firms of Rob¬ ert Spier, Erastus Titus, John T. Wilson, C. T. Goodwin, J. Parr and J. Bruen.

It was in 1850 that Garrett B. and Edwin O. Brinckerhoff started their business on Madi¬ son street, New York. In 1857 they removed to Elizabeth street, where the Brinckerhoff branch of the consolidated company is still located. About 1860 Belcher & Larrabee established their bakery at Albany, N. Y., and in 1871 the firm name was changed to that of E. J. Larrabee & Company. In 1870 John Holmes, an English¬ man, entered the services of this house, and he remained with this firm until 1877, when he entered into a partnership agreement with G. H. Coutts, under the firm name of Holmes & Coutts, opening a house which soon won both fame and fortune by its production of goods that were unlike any that had heretofore been made by American bakers. In fact, their success was so great that, a few years later, J. R. Van-derveer and D. M. Holmes erected another factory in New York, in which they also pro¬ duced a high grade of goods that soon brought them more than national recognition.

It is, of course, impossible, within the limits of so brief a review, to present anything like an adequate list of the many bakeries that sprang into existence in every part of the country as soon as the success of the New England and New York bakers had become generally known. To tell the story of the cracker industry, how¬ ever, it is imperative that a few of the most important of these establishments should be mentioned, among them being the firms of Hetfield & Ducker, of Brooklyn ; Walter G. Wilson and A. J. Medler & Company, of Phila¬ delphia; James Beatty, J. D. Mason and J. R. Skillman, of Baltimore; Haste & Harris, of Detroit, Mich.; the Margaret

Bakery of New Orleans, La.; C. L. Woodman, D. F. Bremner and the Dake Bakery of Chicago ; Garneau, Dozier & Company, later Dozier & Weyl, of Saint Louis, Mo., and S. S. Marvin & Company, of Pittsburgh, Pa.

The interval between 1840 and 1865 rep¬ resents the most important period in the his¬ tory of the cracker industry, for it was dur¬ ing this time that the mechanical processes employed in the making of these goods un¬ derwent a development that was as remark¬ able as it was rapid. Prior to 1840, the use of machinery in the cracker-making business was practically unknown. Even at that late date, the dough was still worked up and put into the oven one piece at a time, all being done by hand. As the demand for crackers continued to increase, however, so slow a proc¬ ess was a serious drawback to the progress of the industry, and it was to improve these condi¬

tions that a machine was finally invented which took the dough, after it had been prepared by hand, and rolled it into a thin sheet which, as it passed over a sort of endless belt, or apron, was cut into the required shapes by a stamp which rose and fell automatically. This inven¬ tion, as manufactured, was crude enough, and yet, so far as its principle was concerned, it was very similar, except in the matter of size and capacity, to the most improved cracker¬ making machines of the present day.

Great as the demand for this kind of food had become, the discovery of gold in 1849 gave additional stimulus to the trade, for, among all the articles of food that were known at that time, not one was more suited to the purposes of the pioneer and the gold-hunter than the ordinary cracker. If this demand was to be met, therefore, it was necessary that a more rapid process should be devised, so, to cope with this emergency, the manufacturers began to turn the machines, which had formerly been turned by hand, first by horse power, and, finally, by steam power. By these means the capacity of the various plants was increased sufficiently to meet all requirements until the War of the Rebellion, in 1861, gave the second great impetus to the industry, for no sooner had war been declared than the demand for the cracker, then known as ((hard bread,® began to increase to such an extent that it was absolutely impossible for the manu¬ facturers to keep pace with their orders. Crackers were needed, however, both for the army and for the navy, and it was to meet this imperative demand for food that the mechanical reel oven was invented. This contrivance, which practically revolutionized the cracker trade, consisted of an

arrangement of long iron pans, which revolved, one over the other, with an aotiion not dissimilar to that of the Ferris wheel. The pans, which were located in the large oven-chamber, were capable of handling so large a product that the capacity of a single oven was increased from six bar¬ rels to 25 or 30 barrels of flour a day, and practically the only change that has been made in this method of baking is in the gradual in¬ crease of the size of the reels, some of those that are used at this time having a daily ca¬ pacity as great as 50, or even more, barrels of flour per oven.

The increase in the variety of goods pro¬ duced by American bakers did not begin to become apparent until after the introduction of the machine method of baking. Prior to 1840, or even for some years after that date, there were only five kinds of crackers that were known to the general trade, and the few exceptions were products that were of purely local invention and sale. The standard crack¬ ers, in this period, were the old-fashioned ˆpilot-bread,® the original hard cold-water crackers made by the Bents, the soft or butter cracker, and the square and round soda bis¬ cuit. The last three varieties differed from the older cracker both in the fact that they were products from a fermented dough, and that they contained shortening, either of butter or lard. Of these crackers, the most popular varieties for ordinary use were those that had been pro¬ duced by the process of fermentation, as they were of lighter and softer texture than the old type of hard cracker.

The sweetened, or fancy, cracker more

lamiliarly known as ˆbiscuit,® is an English in¬ vention which was placed upon the market sometime later than 1855. Among the English firms that sent their goods to the American market were Huntley & Palmer, and Peak, Frean & Company, but the products of both houses were sold so widely that they soon found it necessary to establish distributing agencies in every large city of the country. As all the important grocery houses in the United States wrere selling these goods, and as every¬ body who could afford such luxuries were buy¬

ing them, it did not take long for the domestic manufacturers to recognize the fact that this was an avenue of trade that must not remain closed to the bakers of this country. Belcher & Larrabee of Albany was the first firm to take steps in this matter, but as early as 1865 they sent to England for the cutters and machines necessary to the undertaking, and their attempt to produce these sweetened and fancy biscuit was so successful that other firms soon fol¬ lowed their example, with the result that this branch of the cracker manufacture has gradu¬ ally extended until it has become one of the greatest sources of profit to the trade. In fact, so popular did the new biscuit become that the firms of H. J. McCollum of New York, and Denio & Roberts of Boston, then the most prominent makers of bakers' supplies in Amer¬ ica, began the manufacture of all necessary ap¬ pliances for the new industry, so that they were soon able to equip all domestic plants with all machinery needed to enable them to rival the operations of the best bakeries of England. As the result, the importation of English goods not only decreased to a marked degree, but, en¬ couraged by their success in this country, several American firms, including Holmes & Coutts, the Wilsons of Philadelphia, and F. A. Kennedy, began to introduce their high-class unsweetened goods to the European market.

In 1890, in accordance with the (<consolidation® idea which was then sweeping the country, the largest plants in the United States were formed into three large companies. The first, the New York Biscuit Company, included nearly all the cracker interests in New York and the New England States, its factory in New York city being the largest and most complete in this country. The American Bis¬ cuit Company represented chiefly the West and South, while the United States Baking Company had large factories in Ohio, Indiana and Penn¬ sylvania. These three concerns, which then represented an aggregate capital of $25,000,000, and an annual consumption of flour which ap¬ proximated 1,400,000 barrels, were again ab¬ sorbed, in 1898, under the one title of the National Biscuit Company. With a capital of $55,000,000, and with bakeries in all the principal American cities, this company has not only revolutionized the methods of cracker-making but has introduced many novel ideas, not only in the form of new varieties of crackers, or biscuit, but in the matter of air-tight packages, and other inventions which have added greatly to the commercial value of this product of our national industry. Consult (The Cracker-baker, Devoted to the interests of the Cracker and Biscuit trade of the World) (Vols. I-V, New York 1912-15).

CRACKING PETROLEUM. The process

in petroleum distillation known as <(cracking®

is the subjecting of certain distillation products to a degree of heat so far above their boiling points that they are decomposed into component parts whose boiling points are lower. It is accomplished in an ordinary fire-still by con¬ densing vapors arising from the boiling petro¬ leum upon the cool dome of the still, whence they drop into the superheated oil below, where they are broken up into lighter oils and instantly vaporized, passing over into the condenser. As ordinarily carried on the process aims to in¬ crease the yield of illuminating oil (kerosene) by thus cracking the heavier oils which distil over immediately after the kerosene vapors have ceased, that is, above the temperature of 625° F. When this temperature is reached the fire under the still is subdued, and the distilla¬ tion continued slowly up to 700°, during which period the heavier oils dripping back are cracked into gasoline and kerosene. The additional amount of kerosene obtained from the oil is from 18 to 28 per cent.

The cracking process has more recently been invoked to secure a larger amount of gasoline from crude oil, and from kerosene, to meet the enormous demand for motor fuel. Several processes were invented, or at least patented, almost simultaneously. The Burton process in extensive operation in the United States keeps the entire contents of the still and also of the condenser under a pressure of 60 to 75 pounds to the square inch, through the manipulation of a valve, which is opened occasionally to avoid the liquefaction of the gases in the tubes. The syrupy residue of the distillation is distilled at atmospheric pressure, and its distillate returned to the cracking still. Some crude oils by this process are made to yield as much as 60 per cent in crude gasoline distillate. This is im¬ mediately available for use in marine motors, but requires deodorizing for use in automobiles.

The Hall process (American), patented in 1913, found a warm reception in England and on the Continent, and many large plants are us¬ ing it. The raw material in this process is common gas oil, and the gasoline yield reaches 70 per cent of ((motor spirit® as it is called, hav¬ ing from 18 to 31 per cent more power than ordinary standard gasoline.

In the Rittman process the petroleum vapor is passed into a tube heated to 850° F., under very heavy pressures, ranging up to 500 pounds to the square inch. This vapor is then con¬ densed under pressure, and the resulting liquid distilled for gasoline. The yield is

from 60 to 70 per cent of the original bulk of the oil, in small quantities.

Other processes first subject the oil to great heat under heavy pressure, and then distil it ; or take the vapors of boiling oil through iron tubes containing a red-hot sponge of some metal ; or vary the operation either in the heat and pres¬ sure in the still, or in a decomposer, or by some other manipulation, the essential features being heat and pressure. All of these processes are successful in some degree in securing an in¬ creased yield of the sought-for gasoline. Con¬ sult Bacon, R. F., and Hamor, W. A., (The American Petroleum Industry) (New York

1916).

CRACKLIN, or CRACKLE WARE. See

Ceramics.

CRACOW (Ger. Krakau, Polish Krakov, Lat. Cracovia or Carodunum), a city of Galicia,

Poland, capital of the former Polish republic of Cracow. It stands on the left bank of the Vistula, across which it is connected since 1850 by the Franz-Joseph bridge with Podgorze. Cracow consists of the inner city, whose ram¬ parts have long been demolished, and seven suburbs — Piasek and Kleparz in the north, Wesola east, Stradom and Kasimierz south and Wawel and Novi Sviat in the west. What re¬ mains of the old fortifications are the Florian gate and a tower dating from 1498. According to tradition Cracow was founded a.d. 700 by the Polish duke Krak (Cracus), and built with the spoils taken from the Franks. It was the Polish capital from 1320 to 1609, when Sigismund III moved his court to Warsaw, though Cracow re¬ mained the coronation site till 1764. Charles XII captured the city in 1702; it was

taken and retaken several times by the Russians and other confederates. Formerly a wealthy city (it had joined the Hanseatic League in 1430), Cracow became gradually impoverished until, in 1787, its population had fallen below 10,000. The Russians, who had captured it in 1768, were expelled by Kosciusko in March 1794, but it surrendered to the Prussians three months later and was handed over to Austria in 1795, when Poland was dismembered for the third time. Together with western Galicia it formed part of the duchy of Warsaw 1809 to 1814. The Congress of Vienna made Cracow a republic in June 1815, with independence and neutrality guaranteed by Prussia, Austria and Russia. The constitution vested the legislative power in a house of representatives and a senate of eight members and a president. In consequence of repeated breaches of the constitution by the no¬ bility, the three guarantory powers sent a commission of inquiry to Cracow in 1829. Part of the population joined the Polish revolution in 1830, which led to a Russian occupation of the republic, which was restored and reorganized in 1833. Renewed disorders brought about mili¬ tary occupation in 1836 and again in 1838 till 1841. Cracow became the headquarters of the insurrection in February 1846 and in a few days was seized by Russian and Austrian troops. On 6 Nov. 1846 the Treaty of Vienna (1815) was abrogated and Cracow was annexed to Aus¬ tria despite the protest of England and France. In 1849 it was incorporated with the Crown land of Galicia. A great fire on 18 July 1850 laid most of the city in ashes. Violent anti-clerical riots broke out in 1869 owing to the discovery of a nun having been secluded in a convent cell for 21 years.

There are in Cracow 40 churches, numerous chapels, 25 monasteries and cloisters and 7 syna¬ gogues. Until 1060 it was the seat of an arch¬ bishop; since then of a bishop. The cathedral was erected in 1320-59 and enlarged during the 16th and 17th centuries. It contains the tombs of Polish kings, bishops and national heroes, in¬ cluding Sobieski, Poniatowsky and Kosciusko. Some fine marble statues are by Thorwaldsen. Other churches have historical relics and works of art dating back to the 12th century. The Krolevski castle, founded 1265, is used as a bar¬ racks and military hospital. The arsenal (1257) is now a museum and art gallery. The new uni-‘ versity (1881-87) is a magnificent block of buildings and contains treasures of art, litera¬ ture and scientific research. The old university

(1364) was a renowned centre of learning dur¬ ing the Middle Ages and boasted over 8,000 students. It has considerably revived in the last 100 years and is now conducted in the Polish language. There are

numerous schools and academies, a high school for women, a con¬ servatoire and a horticultural training college. The population is about 170,000.

During the European War the Russians reached as far as the outer line of the defenses of Cracow, which was surrounded by a triple line of fortifications consisting of 30 forts. The Russian advance on Cracow in November 1914 Game after the conquest of Galicia in September. An indecisive battle in December 1914 enabled the Austrians to check the enemy and close the gate to Silesia. It was in and around Cracow that the great Austro-German concentration took place early in 1915 for the Dunajec-Biala drive of General Mackensen, which culminated in the reconquest of nearly the whole of Galicia. See Poland; War, European — Eastern Front.

CRACOW, University of. See Cracow.

CRADDOCK, Charles Egbert. See Mur—

free, Mary Noailles.

CRADLE, (1) an infant's bed or cot, usu¬ ally oscillating on rockers or suspended in such a way as to admit of a swinging motion. (2) In surgery, it is applied to the case in which a broken limb is laid after being set. (3)_In engraving, a steel tool shaped like a currycomb, with sharp teeth used in laying mezzotint grounds. (4) As a nautical term, a cradle is the basket run on a line and carrying to land per¬ sons from a wrecked vessel; and the frame supporting a ship hauled over a marine railway. (5) The frameworks sustaining heavy guns in transportation are also called cradles. (6) In agricultural use the cradle consists of a sort of broad scythe for cutting grain. It is furnished with a set of long parallel fingers for catching the grain and laying it in swaths. (7) The cradle or rocker employed in placer-mining con¬ sists of a box agitated by hand and used for washing out gold-bearing earth.

CRADLE OF LIBERTY, a name by which Faneuil Hall, in Boston, is known. During the Revolution it was the favorite meeting-place of the American patriots. The name is also sometimes applied to the city of Boston.

CRADOCK, Sir Christopher, British rear-admiral : b. 1862 ; d. 1 Nov. 1914. He served in the Sudan in 1881 and in China 1900. During the South African war he acted as transport service officer. Early in August 1914, after the outbreak of the war, Cradock was sent with a

small squadron to protect the southern trade routes. He began by sweeping the North Atlantic, sailed through the West Indies to the coasts of Venezuela and Brazil, touched at the Falkland Islands, and toward the end of Octo¬ ber he was cruising up the Chilean coast in the Pacific. The object of Cradock's mission was to seek the German Pacific squadron of Admiral von Spee, which had sailed from Kiao-Chau early in August. It was known to the British Admiralty that Cradock's squadron of slow and old vessels was no match for the German squadron of new and swift vessels of superior gun range. Reinforcements were daily expected from Britain or the ' Mediterranean, but for some unknown reasons these were not forth-149

coming. The surgeon of Cradock's flagship, the Good Hope , wrote on 25 Oct. 1914: <(We think the Admiralty have forgotten their trade-route squadron 10,000 miles from London town. Five German cruisers against us. What's the betting on the field? Pi*ay to your Penates we may prevent them concentrating.® At 4 in the afternoon on 1 November the German squadron was sighted off Coronel. In the battle that en¬ sued the Good Hope and the Monmouth were sunk, and Cradock went down with his ship. On 8 Dec. 1914 Von Spee's squadron was destroyed off the Falkland Islands by a British squadron under Admiral Sturdee. In June 1916 Mr. Winston Churchill, then First Lord of the Admiralty, stated that ((the ships which composed Admiral Cradock's command bore no relation to Admiral von Spee's squadron at the other side of the world, and were never intended to be matched against it.® See War, European — Naval Operations.

CRAFTS, James Mason, American chem¬ ist: b. Boston, 8 March 1839; d. 20 June 1917. He was educated at the Lawrence Scientific School, Harvard. In 1859 he went to Germany and studied at the Academy of Mines of Frei¬ berg and at the University of Heidelberg. At the latter institution he acted for some time as private assistant to Bunsen. In 1861 he went to Paris, and there met Charles Friedel, -with whom he later carried out some of his most brilliant re¬ searches. In 1865 he returned to the United States, and, after devoting some time to -mining, became professor of chemistry and dean of the faculty at Cornell University, .where he remained until 1870. During the following four years he was professor of chemistry at the Massachusetts Institute of Technology. In 1874 he joined Frie¬ del in Paris, and devoted himself exclusively to scientific research. His

investigations were chiefly in the field of organic chemistry. He invented a new hydrogen thermometer; meas¬ ured the densities of iodine at very high tem¬ peratures. His most important achievement was the discovery, with Friedel, of one of the most fruitful synthetic methods in organic chemistry. Hundreds of new carbon compounds have been brought into existence by this method. In rec¬ ognition of his services to science, the French government made him a chevalier of the Legion of Honor (1885), and the British Association for the Advancement of Science made him one of its corresponding members. In 1891 he again returned to this country, and from 1892 to 1897 was professor of organic chemistry at the Massachusetts Institute of Technology. In 1898 he became president of the Institute, and in the same year Harvard conferred upon him the honorary degree of doctor of laws. In 1900 he resigned the presidency of the. institute, and again turned to research work in organic and physical chemistry. His latest work concerned questions of thermometry and catalysis in con¬ centrated solutions. The numerous results of his work were published in various scientific periodicals. He published < Qualitative Analyst (1869, and several later editions).

CRAFTS, Wilbur Fisk, clergyman and author: b. Fryeburg, Me., 12 Jan. 1850. He was graduated at Wesleyan University in 1869, and Boston University School of Theology in 1872; preached as a Methodist minister from 1867 to 1879, a Congregationalist min¬ ister from 1880 to 1883, since which date he

has been a Presbyterian clergyman. Later he engaged in literary work. He is secretary of the American Sabbath Union, and prominent in reform work; since 1895 he has been superin¬ tendent of a bureau of lectures, literature and law, The International Reform Bureau, which he founded in that year. Its headquarters are in Washington where it undertakes agitation in favor of Congressional legislation against vari¬ ous forms of vice. Fie is author of (The Sab¬ bath for Man) ; Successful Men of To-day) ; (That Boy and Girl of Yours) ; Unternational-ism) ; Prohibition Hand Book) (1911), *etc.*

CRAG MARTIN, or ROCK SWALLOW.

A swallow closely allied to the bank swallow, which is found from Portugal eastward to China in the breeding season, migrating to the tropics for the winter. It frequents mountains and rocky river banks among hills, but does not ascend to Alpine regions. It builds in niches of the rocks a large open-topped nest of mud, occasionally placing this on the timbers of buildings or among ruins, and lays, profusely speckled eggs. The general color of the adult bird is a light ashy brown above, the lower parts being creamy buff, and the tail feathers are dark brown, the central and other pairs be¬ ing conspicuously spotted with white. Consult Sharpe and Wyatt, (Monograph of the Hirun-dinidae) (London 1885-94).

CRAIG, Charles Franklin, American army officer and bacteriologist : b. Danbury, Conn., 4 July 1872. He was graduated from the Yale Medical School in 1894, was appointed acting assistant surgeon in the United Spates army in 1898, and in 1908 became captain and assistant surgeon. Thereafter as biologist and bacteriol¬ ogist he served in army hospitals at Chickamauga Park, Ga., Fortress Monroe, Havana, the Presidio, Cal., and Manila. In 1896-97 he was a member of the Army Board for the Study of Tropical Diseases; after 1909 he was assist¬ ant curator of the Army Medical Museum in Washington, at the same time acting as in¬ structor in clinical microscopy and bacteriology at the Army Medical School in Washington ; and in 1910 —1 1 he was also assistant professor of bacteriology in the medical department of George Washington LTniversity. He has written (The Aestivo-Autumnal Malarial Fevers* (1901) ; (The Malarial Fevers and the Blood of Protozoa of Man* (1909) ; (The Parasitic Amoebae of Man* (1911) ; also <(Malarial Fevers® (in Osier's (Modern Medicine,* 1907) ; ((Parasitic Disease® (in Hare's (Modern Treat¬ ment, } 1911).

CRAIG, Edward Gordon, English actor and author: b. near London, 16 Jan. 1872. He is the son of Ellen Terry. He played his first part in a London theatre when only six years old, and appeared again in Chicago when he was 13; but his regular debut was made in 1889 under Sir Henry Irving, his mother appearing in the same performance. He continued with Irving till 1897, when he left the stage and devoted him¬ self to the study of drawing and wood engrav¬ ing. In 1900 he began a series of operatic and theatrical productions in which he put in prac¬ tice some novel ideas in regard to scenery and the mechanical details of stage management. His success with these innovations led him to devote his time wholly to the art of production, and in 1913 he founded a school in Florence,

Italy, for the dissemination of his theories of theatrical art. He published, besides numerous magazine articles, (The Art of the Theatre5 (1905); (On the Art of the Theatre5 (1911); (Toward a New Theatre5 (1913).

CRAIG, Frank, English artist: b. Abbey Wood, Kent, 27 Feb. 1874. He was educated at Merchant Taylor's School, studied art at Cook's life class, the Lambeth School of Art and the Royal Academy Schools. He began as a painter of modern English life and contemporary his¬ tory, such as the Boer War, and as an illustrator for Kipling's poems and for the London Graphic. He has illustrated also for Scribner's Magazine, Harper's, the Cosmopolitan and Hearst's Maga¬ zine. In 1905 he joined the new Pre-Raphaelite movement, and thereafter painted historical pic¬ tures full of expressive figures and quaint cos¬ tumes, in their general color scheme often re¬ sembling Gobelin tapestries. Good examples are (The Heretic) (1906, National Gallery, Lon¬ don) ; (The Maid5 (1907, Luxembourg) ; and (The Meetinghouse of Nonconformists5 (1908) ; (Goblin Market5 (New Zealand Academy). Among his more recent works are the curiously characteristic portraits of Sir John Jardine and Maj. Gen. Douglas Scott (1910). A good example of his early style is (The Communion on the Veit5 (1900, Durban Museum, South Africa). He was awarded a medal at the Barcelona Exhibition of 1911 and also at the Carnegie Institute, Pittsburgh, in the same year.

CRAIG, James Alexander, American Se¬ mitic scholar : b. Fitzroy Harbour, Ontario, 5 March 1855. He was graduated at McGill Uni¬ versity, Montreal, 1880, and took his Ph.D. de¬ gree at Leipzig 1886. He was instructor and professor of Biblical languages in Lane Theo¬ logical Seminary, 1886-90; professor of Old Testament literature and exegesis, Oberlin Theological Seminary, 1891 ; and, from 1893 to 1912 was professor of Semitic languages and Hellenistic Greek in the University of Michigan. He has published (Inscriptions of Salmanassar, King of Assyria, 859-826 b.c.5 (1887) ; (Hebrew Word Manual5 (1890) ; (Assyrian and Baby¬ lonian Religious Texts5 (1895-97) ; Astronom¬ ical-Astrological Texts of the Babylonians5 (1899). He edited the Semitic Series of Hand¬ books and translated and edited Winckler's <Geschichte Babylonians.5 He has also contrib¬ uted articles to many philological journals.

CRAIG, Sir James Henry, English soldier and administrator: b. Gibraltar 1748; d. London, 12 Jan. 1812. He entered the army in 1763, be¬ came captain of the 47th Foot in 1771, came to America in 1774, was wounded at Bunker Hill, was transferred with the 47th to Canada, and distinguished himself in the early part of Burgoyne's advance upon Saratoga. Made major of the 82d, he sailed for Nova Scotia; in 1781 fought in North Carolina; and was promoted successively lieutenant-colonel of the 82d and colonel of the 16th. In 1794 he became adjutant-general to the army in the Netherlands and was promoted major-general. On the conclusion of the war in the Netherlands, he was appointed to command a force to co-operate with the army from India in the capture of the Dutch colony at the Cape of Good Hope. The colony sur¬ rendered to him 14 Sept. 1795. He was governor at the Cape in 1795-97, and from 1797 to 1802 was in India. Having been promoted lieutenant-general in 1801, he commanded the troops in Italy and Sicily in 1805-06, operating in con¬ junction with the Russians against the French. In 1807 he was made local general in America, and captain-general and governor-general of Canada. The French were not well disposed toward the British government, and there were perpetual contentions in the assembly. Craig dismissed two assemblies and he suppressed Le Canadien newspaper. He resigned the gov¬ ernment in October 1811, and in 1812 was pro¬ moted general.

CRAIG, John, Scottish preacher of the Reformation: b. Aberdeenshire 1512; d. Edin¬ burgh, 12 Dec. 1600. He was educated at Saint Andrews, entered the Dominican Order, but soon fell under the suspicion of heresy and was cast into prison. On his release (1536) he traveled on the Continent, and after sometime was, through Cardinal Pole's influence, made novice master in the Dominican convent at Bologna and later was rector. While here Calvin's Unstitutes5 fell in his way and con¬ verted him to Protestant doctrines. He was brought before the Inquisition and sentenced to be burned — a fate from which he was saved by the mob, on the death of Pope Paul IV, breaking open the prisons of Rome. Craig escaped to Vienna and obtained favor at the court of Maximilian II, but the Pope demanded his surrender as one condemned for heresy. The emperor, however, instead of complying with the request, gave Craig a safe-conduct out of Germany. He now returned to Scotland (1560) and was appointed the colleague of John Knox in the parish church of Edinburgh. Thinking the marriage of Queen Mary and Bothwell contrary to the word of God, he boldly refused to proclaim the banns, but after¬ ward yielded under protest. In 1572 Craig was sent to Forfarshire until 1579, when he was ap¬ pointed chaplain to King James VI. He now took a leading part in the affairs of the Church, was the compiler of

part of the (Second Book of Discipline,5 and the writer of the national covenant signed in 1580 by the king and his household. He was a man of great conscien¬ tiousness and was not slow to oppose the pro¬ ceedings of the court when he deemed them contrary to Scripture and to speak wholesome but unpleasant truths to majesty itself. Con¬ sult the black-letter facsimile reprint of Craig's (Catechisms5 (Edinburgh 1885), with introduc¬ tion by T. Graves Law.

CRAIG, Katherine L., American educator: she was educated in the Colorado public schools and at Missouri Valley College. She was elected superintendent of public instruction of Colorado in 1904, reelected 1906, and became field secretary of the Colorado Women's College in 1909. She codified and annotated the school laws of Colorado; compiled Arbor Day, Wash¬ ington and Lincoln Day and Flag Day books for use in the public schools and takes an active part in all movements for the political and educational progress of Colorado. She also published (Primary Geography5 and a novel (Judge Greyburn and Kathlene Lee.5 She is a contributor to (Teachers and Pupils' Cyclo¬ pedia5 ; (New Students' Reference Work5 and the Woman's Athencenm.

CRAIGHILL, krag'il, William Price, Amer¬ ican military engineer: b. Charlestown, Va., 1

July 1833; d. 18 Jan. 1909. He was graduated at West Point 1853; superintended the building of Fort Sumter 1854-55; built the defenses of Pittsburgh 1863; and on 13 March 1865 was brevetted lieutenant-colonel for faithful and meritorious services. Later he was employed on the defenses of New York and Baltimore, and in the improvement of navigation of south¬ ern rivers. He became brigadier-general and chief of engineers 10 May 1895, and was retired 1897. His publications include an (Army Officer's Pocket Companion5 (1862) ; and a translation of Dufour's (Cours de tactique)

(1863).

CRAIGIE, Pearl Mary Teresa Richards

(((John Oliver Hobbes55), English novelist and dramatist: b. Boston, Mass., 3 Nov. 1867; d. London, England, 13 Aug. 1906. She was edu¬ cated in Paris and London, married R. W. Craigie in England in 1887 and was divorced from him in 1895. Her vivid and picturesque style, acuteness of observation and caustic humor made her a favorite with discerning readers. Her writings include (Some Emo¬ tions and a Moral5 (1891) ; (The Sinner's Comedy5 (1892) ; (A Study in Temptations) (1893) ; (A Bundle of Life) (1894) ; (Journeys End in Lovers Meeting5 ; (The Gods, Some Mortals and Lord Wickenham5 (1895) ; (The Herb Moon5 (1896) ; (School for Saints5 (1897); (Osbern and Ursyne,5 a blank verse tragedy (1899) ; (The Ambassador,5 a play (1898) ; (The Serious Wooing5 (1901) ; (Love and the Soul Hunters5 (1902) ; (Robert Orange5 (1902) ; (The Flute of Pan,5 a drama (1905) ; (The Dream and the Business5 (1906).

CRAIK, crak, Dinah Maria, best known as ((Miss Mulock,55 English novelist: b. Stoke-upon-Trent, 20 April 1826; d. Shortlands, Kent, 12 Oct. 1887. In her 23d year she published her first novel, (The Ogilvies.5 This was followed by (Olive 5 (1850) ; and (Agatha'^ Husband5 (1853) ; but it was with the story of (John Halifax, Gentleman5 (1857) that she gained and retained her reputation as a novelist. This work has had an extraordinary popularity, hav¬ ing been translated into French, German, Italian, Greek and Russian. She published in all about 20 stories, among which were (A Life for a Life5 (1859) ; (Mistress and Maid5 (1863) ; (A Noble Life5 (1866); (Hannah5 (1871); (The Little Lame Prince5 (1874), *etc.* Besides these she was the author of a great number of essays on various subjects, such as (Sermons Out of Church5 (1875); (Plain Speaking5 (1882). She published a volume of poems in 1859, reissued with additions in (Poems of Thirty Years5 (1881). Among these (Douglas, Tender and True5 and (Philip My King5 have been widely popular. In 1864 she was married to George Lillie Craik, a nephew of the pro¬ fessor of the same name. The chief char¬ acteristic of her literary work was its refined optimism, and its success with the public was largely due to simplicity of diction.

CRAIK, George Lillie, Scottish miscellane¬ ous writer: b. Fifeshire 1798; d. Belfast, Ire¬ land, 25 June 1866. He removed to London in 1826, became a contributor to the Penny Cyclo¬ paedia in the departments of history and biog¬ raphy, but. his first independent work of any importance was his (Pursuit of Knowledge under

Difficulties.5 This was succeeded by his

(Romance of the Peerage5; (Spenser and his Poetry5; (History of Literature and Learning-in England5 ; (History of British Commerce5 ; (English of Shakespeare5; (Bacon, His Writ¬ ings and Philosophy, 5 *etc.* In 1849 he was appointed professor of English literature in Queen's College, Belfast, an appointment which he held till his death.

CRAIK, Georgianna Marian. See May, Georgiana Marian.

CRAIK, Sir Henry, Scottish educationist : b. Glasgow, 18 Oct. 1846. He was educated at Glasgow University and Balliol College, Oxford, and was secretary of the Scotch Education De¬ partment 1885-1904. He was created K.C.B. in 1897 and has represented Glasgow and Aberdeen Universities in the House of Commons since 1906. He is the author of (Life of Jonathan Swift5 (1882) ; (The State and Education5 (1883) ; (A Century of Scottish History5 (1901) ; (Impression of India5 (1908).

CRAIK, James, American physician : b. Scotland 1731; d. Fairfax County, Va., 6 Feb. 1814. He came to Virginia early in life, and on 7 March 1754 was commissioned as an army surgeon. In 1755 he was a surgeon in Braddock's army and took part in the memorable action on the Monongahela. After serving through the French war in the Virginia regi¬ ment he settled as a physician near Mount Vernon, and finally at Alexandria. During the Revolution he was in the medical department. He took a prominent part in the disclosure of the plot to remove Washington from command during the winter at Valley Forge and was present at the surrender of Lord Cornwallis at Yorktown. He was Washington's family phy¬ sician, and ever associated with him on terms of the closest friendship, attending him in his last illness, and being affectionately mentioned in Washington's will as (<my compatriot in arms and old and intimate friend55 to whom he be¬ queathed his tambour secretary and the cir¬ cular chair, (Can appendage of my study.55

CRAILSHEIM, or KRAILSHEIM, krils'-

him, Germany, town of Wurttemberg, on the Jagst, 47 miles northeast of Stuttgart. It con¬ tains three handsome churches, a town hall, ex¬ tensive tanneries, machine shops, lumber yards, *etc.* It has also a large trade in cattle and farm products. It was incorporated in 1338, was ceded to Prussia in 1791, to Bavaria in 1806 and to Wiirttemburg four

years later. Pop. 6,100.

CRAIOVA, or KRAJOVA, kra-yo'va, Rumania, capital of the province of Doljiu, on the river Jiu, 112 miles west of Bucharest. It is the chief commercial centre west of Buchar¬ est and has a very extensive trade in the live stock and agricultural produce of the surround¬ ing fertile district. It has rope and carriage factories, tanneries, military and commercial academies and several churches. It is the head¬ quarters of the First Army Corps, In Roman days it was known as Costra Nova and in the Middle Ages was the capital of Lower Wallachia. Pop. 45,700.

CRAKE, or CORN CRAKE, English name for the landrail (Crex Crex), formed in imitation of its cry ((crake, crake,55 which is heard everywhere in valleys and low grounds in Great Britain and Ireland in early summer. It is reddish-brown in color, with streaks of a

ORALLY

darker brown along the middle of its feathers. The under parts of its body are of a light brown.

CRALLE, Richard K., American author : b. South Carolina; d. Virginia, 10 June 1864. He was a relative of John C. Calhoun (q.v.), who employed him as his confidential clerk and amanuensis when he was Secretary of State. He had previously been an editor and Swedenborgian clergyman in Washington. He pub¬ lished (Works of John C. Calhoun, with a Memoir) (6 vols., New York 1853-56) and several polemical works on New-church doc¬ trines.

CRAM, Ralph Adams, American architect and author: b. Hampton Falls, N. H., 16 Dec. 1863. He was educated at Exeter, N. H., and Westford, Mass. He has practised as an archi¬ tect since 1889. As senior member of the firm of Cram & Ferguson he helped to plan some of the most notable academic and ecclesiastical buildings in the United States. Among these are Graduate College and Cleveland Tower, Princeton University; Rice Institute, Houston, Tex. ; Saint Alban's Cathedral, Toronto, Can¬ ada; Saint Thomas's Church, New York; Calvary Church, Pittsburgh ; Euclid Avenue Presbyterian Church, Cleveland, Ohio. He became consulting architect for the cathedral of Saint John the Divine, New York, and, in 1914, professor in Massachusetts Institute of Tech¬ nology. His writings include (Church Build¬ ingˆ (1901) ; (The Ruined Abbeys of Great Britain) (1905); Umpressions of Japanese Architecture and the Allied Arts) (1906) ; (The Gothic Quest) (1907).

CRAM, William Everett, American author : b. Hampton Falls, N. H., 22 June 1871. He is a brother of Ralph Adams Cram (q.v.). He has written (Little Beasts of Field and Wood) (1899) ; (More Little Beasts > (1901) ; and, in collaboration with Witmer Stone, (American Animals; Guide to the Mammals of North America North of Mexico) (1902) ; (More Little Beasts of Field and Wood) (1912).

CRAMBE. See Sea-kale.

CRAMP, Charles Henry, American ship¬ builder: b. Philadelphia, Pa., 9 May 1828; d. there, 6 June 1913. He was graduated at the Central High School of his native city, and entered the shipyards of his father, William Cramp. He soon established the prestige of the firm of William Cramp & Sons, which he in¬ corporated and of which he

became president. Their shipyards in Philadelphia are the most extensive in the United States, executing con¬ tracts for the governments of the United States, Russia, Japan, Argentina, Chile, etc., and exer¬ cising a great influence upon modern naval development. He built ironclads and monitors for the United States government in the Civil War and assisted in the reconstruction of the United States navy and the re-establishment of the United States merchant marine. The de¬ stroyed battleship Maine was built at the Cramp yards, in whose 31 acres of ground nearly 6,000 workmen are employed. Consult Buell, Mem¬ oirs of C. H. Cramp) (New York 1906).

CRAMP, acute, painful sensations usually located in a voluntary muscle. It is a form of local clonic spasm in the muscle and may be due to one of several causes, the most im¬

portant of which, however are over-exertion with consequent tire and cold, or it may result from organic disease. Cramps occurring in hol¬ low viscera where there is much involuntary muscular tissue are usually termed colic (q.v.). The muscles most often affected are those of the extremities, especially those of the lower extremities. In the cramps which result from occupation, neuroses, such as occur in telegra¬ phers, typewriters, violinists, musicians, etc., the upper extremities are involved. These cramp-like pains are distinctly of mental origin. The treatment of general forms of cramp is by means of warmth, massage; bromides and cam¬ phor are sometimes useful. Sudden putting of the muscle on vigorous stretch oftimes will relieve cramp. Cramps attacking swimmers are particularly difficult to handle, but if the pres¬ ence of mind of the swimmer is not lost, turn¬ ing on the back and floating may prevent drowning.

CRAMPTON, Charles Albert, American

chemist: b. Davenport, Iowa, 18 Feb. 1858; d. Washington, D. C., 26 July 1915. He was graduated at the University of Michigan in 1882; was assistant chemist in the United States Department of Agriculture 1883-90 ; and after 1890 chief chemist of the Internal Revenue Bureau. In 1910 he became chief of the division of food and drug products. He carried out a number of investigations in agricultural chem¬ istry and published memoirs and reports on special topics of the chemistry of food and agricultural products, including the composi¬ tion of plant tissues, the composition of butter and other fats, *etc.* His writings include (Record of Experiments at Des Lignes

Experi¬ ment Station, Baldwin, La., 1888) (1889) ; tak¬ ing Powders) (Part V of Food and Food Adul¬ terations, Washington 1889).

CRAMPTON, Henry Edward, American

zoologist: b. New York, 5 Jan. 1875. He was educated at the College of the City of New York and at Columbia College, where he was an assistant in biology in 1893-95, and to which, after one year as instructor in the Massachusetts Institute of Technology, he returned to be fellow, lecturer and instructor in zoology; ad¬ junct professor in 1901-04, and thereafter pro¬ fessor. He was a member of scientific expedi¬ tions to the islands of the South Pacific Ocean in 1906, 1907, 1908, 1909, and to British Guiana and the interior of Brazil in 1911, and to the Bahamas and Porto Rico 1912-15. In 1909 he was made curator of invertebrate zoology at the American Museum of Natural History, New York. He has published (The Doctrine of Evolution) (1911) ; also various monographs on evolution, embryology, experimental zoology and travel.

CRAMPTON, Thomas Russell, English en¬ gineer: b. Broadstairs, Kent, 6 Aug. 1816; d. London, 19 March 1888. His engineering train¬ ing was received under such men as the elder Brunei, Sir Daniel Gooch and John and George Rennie. Between 1842 and 1848 he made many improvements in locomotive machinery. In 1843 he designed and patented the engine which bears his name. (<The characteristic features of the Crampton engine are a long boiler, outside cylinders set in the middle of the engine's length, and large driving wheels placed quite in the rear of the driving box." In 1851 he laid the

first practical submarine cable between Dover and Calais, his best piece of professional work. Among other works carried out either wholly or in part by him were the Berlin waterworks ; the Smyrna railway ; and the Varna railway. He also invented a rotary dust-fuel furnace, and an automatic hydraulic tunnel-boring machine. The outside fire-box shells on many modern engines are still known as Crampton's.

CRAMPTON'S GAP, Battle of. See

South Mountain, Battles of.

CRANACH, kra'naH, KRANACH, or KRONACH, Lucas, The Elder, German painter and engraver, founder of the Sax¬ on school: b. Kronach, Ger., 1472; d. Wei¬ mar, 16 Oct. 1553. His family name is said to have been Muller, and the name by which he afterward called himself is said to have been taken from his birth¬ place. In 1504 he became court painter to Frederick the Wise, Elector of Saxony, and in 1508 he was ennobled. In 1509 he traveled through the Netherlands and at Malines painted the portrait of the future Emperor Charles V, then a child of nine years. In 1519 he was elected chairman of the town council ; he be¬ came burgomaster in 1537 and again in 1540. He was the intimate friend of Luther, of whom he painted various portraits, several of them still extant. After the death of the Elector Frederick he still remained attached to the Saxon court, for he received as much favor from Frederick's successors — John the Constant and John Frederick the Magnanimous. Cranach's por¬ trait of the latter is contained in the New York Metropolitan Museum. After the battle of Miihlberg, in 1547, in which John Frederick was taken prisoner by the troops of Charles V. Cranach showed his attachment for his master by following him from prison to prison until in 1552 he was set at liberty, when he returned with Cranach at his side to Weimar. He en¬ graved both on copper and wood, and also illuminated manuscripts, and was remarkable for his rapidity of execution. His smaller cuts are by far superior in drawing and detail. He devoted many of his engravings to subjects of value to the Reformation. His work was original, realistic and rich in its nationalism. He painted a large number of Madonnas, per¬ haps the most celebrated of which are to be seen in the cathedral of Glogau and the Pinakothek of Munich. Another favorite subject with him was Christ blessing the little children, a good specimen of which is in the Baring collection in London. Perhaps the most beautiful of his paintings on this subject is contained in the city church of Naumburg. Of his larger re¬ ligious paintings, good examples are the Car¬ riage of Saint Catharine> in the cathedral of Erfurt, and his last great work in the town church at Weimar, "The Crucifixion,5 depicting the object of the Reformation, and introducing the figures of Luther and Cranach himself. He excels in portrait painting, but although these show a mastery of detail, they lack the great strength and spirit of the German masters. They have a dry uniformity, a false idea of elegance, which, added to his desire to amuse, heighten the comic effect. Among the best are Cardinal Albrecht of Mainz as Saint Jerome5 in the Berlin Museum ; (John Frederick of

Saxony,5 and an (Unknown Female 5 in the

National Gallery, London. He painted many miniatures, as in the album of the University of Wittenberg, now at Halle, and especially in John Frederick's (Book of Tourneys5 now at Coburg, a work of 144 pictures. Consult Heller, <Das Leben und die Werke Lucas Cranachs5 (2d ed., 1844) ; Schuchardt, (Lucas Cranach des alteren Leben und Werke5 (1851-61) ; Dodgson in (Bibliotheque des bibliographies critiques5 (Paris) ; Fleschig, (Tafelbilder Lucas Cranaches die Al¬ teren; Cranach Studien5 (Leipzig 1900) ; and the monographs by Warnecke (Gorlitz 1879) ; Lin-dau (Leipzig 1883) ; and Michaelson (ib. 1902).

CRANACH, Lucas, The Younger, Ger¬ man painter: b. 4 Oct. 15 15; d. 25 Jan. 1586; sec¬ ond son and a pupil of Lucas Cranach, whose manner he copied so faithfully that many of his father's works are assigned to the son. More¬ over, each used a similar mark, a crowned ser¬ pent with wings. According to Schuchardt, the son varied his mark by showing the wings of the serpent folded instead of erect, as in the pictures signed by the father. His (Crucifixion 5 and (The Lord's Vineyard,5 symbolical of the progress of the Reformation, are in the Stadt Kirche at Wittenberg. Other pictures of his may be found in Dresden, Berlin and Munich.

CRANBERRY, several trailing species of the family V acciniacece genus Oxy coccus. One of these species, O. marcrocarpus, is exten¬ sively cultivated in the United States for its acid fruit which ripens in the autumn and may be kept until spring, and which finds an im¬ portant culinary use in the making of sauce, pies, etc., but is never eaten as a dessert fruit. The crop of 1909 was reported to be 987,500 bushels, produced mainly in Massachusetts, New Jersey and Wisconsin, the balance being made up from smaller areas in the northern States. Though one of the species (O . cxy coccus) is a native of Europe as well as America, it has not developed European horticultural varieties. In¬ deed, in Europe the cranberry is cultivated to a much smaller extent than in America.

The two species from which the cultivated varieties have been derived are 0. oxycoccus, the smaller cranberry, and O. macrocarpus, the larger cranberry. Both are natives of northern swamps and marshes, especially such as are rich in peat; the latter species is confined to North America. Both are trailing vines bear¬ ing small evergreen leaves, inconspicuous flowers and globular or pyriform red fruits

borne on slender curved stalks, which suggested the name crane-berry — the neck of a crane. The American species is cultivated almost ex¬ clusively and has developed the larger number of horticultural varieties, but the smaller cran¬ berry is considered by many to produce finer flavored fruits. The general types of berries are globular, bell-shaped and bugle-shaped, with numerous varieties in each class.

Commercially, cranberries are grown in low, wet ground, though they are sometimes raised upon drier soils. The land selected must be drained, so that standing water will be at least a foot below the surface of the soil during summer; it must be retentive of moisture, since the plants quickly suffer in dry seasons; it must be level in order to be readily flooded in very dry weather, in winter, and when insects are seriously troublesome; it must be situated where injury from frosts will be as little as pos-

sible. Late spring frosts injure the blossoms; early autumn ones, the fruit. Further, there must be sufficient water to quickly flood the field. Bogs in which sphagnum moss grows upon a peat or muck soil are preferred and are con¬ sidered specially promising if plants related to the cranberry grow naturally upon the land. Draining the bog and clearing it of trees, brush, roots, moss, etc., is followed by the digging of permanent open ditches two to four feet deep. These spread the water and remove it in times of flooding, *etc.* After the land is prepared it is usually covered with a few inches of sand to keep down weeds and thus reduce the cost of maintenance. In this sand cuttings six or eight inches long are set at intervals of from 12 to 15 inches apart each way. Beyond the re¬ moval of weeds no cultivation is generally given. The third or fourth year a full crop may be ex¬ pected; 50 barrels being a good yield, though four times that amount has been obtained. When the beds become too full of vines they are mown or burned over to start a fresh growth and every fourth or fifth year a fresh covering of an inch or so of sand is given. Sanding is not practised in some localities. The cost of preparing and planting a bed as above indicated varies from $300 to $500 an acre. Harvesting is

done by hand when highest grades are picked ; by raking and combing for the less choice.

Several diseases and insects attack the cran¬ berry. Of the former the most serious is prob¬ ably the scald, which appears most frequently in hot muggy seasons as a soft reddish-brown spot on the fruit, which quickly swells and gets hard, but later shrivels and either drops off or remains attached to the vine. The leaves are also more or less affected. Spraying with bor-deaux mixture is found to be the most satis¬ factory method of treatment. It is usually most easily done while the bed is flooded. Red galls are often troublesome upon the leaves. This is controlled by burning the beds over in the autumn to kill the spores of the fungus. A large and conspicuous distortion and redden¬ ing of the green parts may sometimes prove destructive. The leading insect enemies are two caterpillars, one of which attacks the foliage, the other the fruit. The former, known as the black-headed fireworm, may be controlled by the application of kerosene or Paris green. The latter, a kind of span-worm, may be destroyed by spraying with an arsenite when the leaves are falling and the fruit is setting. Generally, perhaps, the beds are flooded to destroy these and other insect pests.

Several other plants bear the name cranberry. Among the best known are V actinium vitis-idcea, known as low bush cranberry, wolf-berry, mountain cranberry and cowberry. It is a native of Europe and America and is often found in the markets, but is not cultivated. Its fruits reach American markets not only from the northern United States and eastern Canada, but often from Norway, Sweden, Denmark and Germany. The high-bush, high cranberry or cranberrv-bush is a shrub, a species of Vibur¬ num, which attains a height of 12 feet and bears scarlet berries which persist during win¬ ter. The fruit is scarcely edible. This plant is the original species from which the snowball has been developed. In both forms it is a very attractive and popular ornamental shrub.

Bibliography. — Bailey, (Standard Cyclo¬ pedia of Horticulture) (New York 1914) ; White, (Cranberry Culture* (New York) ; Webb, (Cape Cod Cranberries* ; Special Bulletin K, New Jersey Experiment Station, Unsects Injuriously Affecting Cranberries * ; Proceed¬ ings of the American Cranberry Growers' As¬ sociation.)

CRANBROOK, Gathorne Gathorne-Hardy, 1st Earl, English statesman: b. Brad¬ ford, 1 Oct. 1814; d. Hemsted Park, 30 Oct 1906. In 1865 he defeated Mr. Gladstone in the celebrated Oxford University election ;

in 1878 he was raised to the peerage as Viscount Cran-brook. He was Under-Secretary of State for the Home Department (1858-59), president of the Poor-law Board (1866-67), Home Secretary (1867-68), War Secretary (1874— 78), Secre¬ tary of State for India (1878-80) and Lord President of the Council (1885, 1886-92).

CRANBROOK, Canada, town of British Columbia, in the Kootenay Valley between the Selkirk and Rocky mountains, on the Canadian Pacific Railroad, 35 miles west of Fernie. It contains the provincial buildings, a high school, manual training school, several primary schools and churches. It has extensive agricultrual and mining interests and is an important trade cen¬ tre. Its manufactures include brick yards, min¬ eral water works, iron foundries, planing mills and sash and door factories. Pop. 3,090.

CRANCH, Christopher Pearse, American artist and poet: b. Alexandria, Va., 8 March 1813; d. Cambridge, Mass., 20 Jan. 1892. He was a son of William Cranch (q.v.). He stud¬ ied at Columbian University, Washington, D. C. ; was graduated at the Harvard Divinity School 1835 ; preached in Unitarian pulpits for a few years, and then gave himself up entirely to painting and poetry. He studied in Italy 1846-48, 1853-63, when he returned to America and was elected a member of the National Academy, but exhibited nothing after 1871. He was an intimate friend of Lowell and Longfellow; a man of versatile if not commanding talent; and one whose friendship was highly cherished by the few favored with it. Some of the best known of his paintings are (Val de Moline, Amalfi, Italy * (1869) ; (Venice* (1870) ; and (Venetian Fishing Boats) (1871). His well-known poem (Thought* appeared in The Dial (1840). His published works include <Poems) (1844) ; <The Last of the Huggermuggers) (1856) ; <Kobboltozo) (1857) ; a blank verse translation of the <Hineid* (1872) ; (Satan: a Libretto* (1874) ; (The Bird and the Bell, and Other Poerps* (1875; 2d ed., 1890) ; (Ariel and Caliban) (1887).

CRANCH, William, American jurist: b. Weymouth, Mass., 17 July 1769; d. Washing¬ ton, D. C., 1 Sent. 1855. He was graduated at Harvard in 1787 ; admitted to the bar in 1790; appointed an associate judge of the United States Circuit Court for the District of Columbia in 1801 ; and chief justice of that court in 1805. He held this office till his death, and during a period of over half a century had only two decisions overruled by the Supreme Court. His reports of cases decided in the Circuit Court (1801-41) were published in six volumes: and those of the United States .Su¬ preme Court (1801-15) in nine volumes, with supplementary issues in 1835.

CRANDALL, Charles Henry, American writer: b. Greenwich, N. Y., 19 June 1858. He was for five years on the staff of the New York Tribune, and in book form has published 'The Season; a Social History of New York) (1883) ; Representative Sonnets) (edited, 1891) ; (Wayside Music) (1893) ; 'The Chords of Life' (1898) ; (Songs from Sky Meadows' (1909), the last three being volumes of poems. Mr. Crandall was selected to read the poem at the dedication of the Battle Monument at Sara¬ toga (where Burgoyne surrendered). He con¬ tributes essays on social subjects and country life, poems, etc., to leading periodicals.

CRANDALL, Charles Lee, American civil engineer: b. Bridgewater, N. Y., 20 July 1850; d. 25 Aug. 1917. Graduated from Cornell Uni¬ versity in 1872 he was connected with that insti¬ tution as instructor and professor of engineer¬ ing after 1874. He published 'Tables for Com¬ putation of Railway and Other Earthwork' (1886); Rotes on Descriptive Geometry' (1888) ; Rotes on Shades, Shadows and Per¬ spective' ; (The Transition Curve' (1893); 'Textbook on Geodesy and Least Squares' (1907); (Field Book for Railroad Surveying' (1909) ; and is joint author of Railroad Con¬ struction' (1913).

CRANDALL, Prudence. See Philleo,

Prudence Crandall.

CRANE, Bruce, American landscape artist: b. New York, 17 Oct. 1857. He studied art in New York city and in Paris, France, and made his first exhibition of pictures at the National Academy of Design in 1879. He gained the Webb and the Saltus prizes; was awarded the bronze medal of the Paris Exposition in 1900; the silver medal of the Pan-American Exposi¬ tion in 1901 ; the silver medal of the Carolina Exposition, the gold medal of the National Academy and the gold medal of the Louisiana Exposition in 1904; and the silver medal of the Panama-Pacific Exposition in 1915. He was elected a member of the National Academy of Design in 1901. Among his notable pictures are (The Hills' in the National Academy; 'March' in the Brooklyn Museum;

’Autumn Uplands’ in the Metropolitan Museum; and (Springtime’ in the Peabody Institute, Balti¬ more.

• CRANE, Frank, journalist and author: b. Urbana, Ill., 12 May 1861. He studied at the Illinois Wesleyan University and was ordained to the Methodist Episcopal ministry in 1882. He received from his alma mater the honorary degree of Ph.B. in 1892 and D.D. from Nebraska Wesleyan University in 1894. He held the pastorates of two Chicago Methodist Epis¬ copal churches 1896-1903; and of the Union Congregational Church, Worcester, Mass., from 1904 until in 1909 he resigned to devote himself to journalism. As editorial writer for The Associated Newspapers, the syndicate of. 40 newspapers in the leading cities of the nation, and as a contributor to leading magazines, his essays treating with the daily problems of life are written in a popular vein and are marked by versatility, shrewd and kindly philosophy. Collected in book form these essays are widely read throughout America and the English-speaking world under the’ following titles: ’The Religion of To-Morrow’ (1899) ; (Vision’

(1907) ; (The Song of the Infinite’ (1909) ; ’Human Confessions’ (1911); (God and De¬ mocracy’ (1911); Tame and Lovely’ (1912); ’Footnotes to Life’ (1913) ; ’War and World Government’ (1915) ; ’Just Human’ (1915) ; ’Adventures in Common Sense’ (1916) ; ’The Looking Glass’ (1917) ; ’Christmas and the Year Round’ (1917) ; ’Lighted Windows’

(1918).

CRANE, Frank, American illustrator and cartoonist: b. Rahway, N. J., 1856; d. New Rochelle, N. Y., 26 Oct. 1917. He was a de¬ scendant of Sir Peter Crane, and his ancestors founded the town of Crane’s Ford, now Cran¬ ford, N. J. Crane was graduated from the New York Academy of Design, and became successively cartoonist and art editor of the New York World, and later art editor of the Philadelphia Press. He was subsequently con¬ nected with the New York papers, the Times, Herald and Tribune, and the Boston Herald. He was a cousin of Mr. Stephen Crane, the author. Among his humorous creations are ”Uncle Dick’s Contraptions” ; ”Muggsy” and ”Willie Westinghouse Smith.” He also wrote several boys’ stories.

CRANE, Ichabod, the country school¬ master in Irving’s ’Legend of

Sleepy Hollow,' in the 'Sketch Book' who was frightened away from the Hollow by his adventure with the Galloping Hessian.

CRANE, Stephen, American novelist and poet: b. Newark, N. J., 1 Nov. 1870; d. Baden-weiler, Germany, 5 June 1900. After receiving his education at Lafayette College and at Syracuse University, he began as a reporter and newspaper writer; was correspondent for the New York Journal in the Greco-Turkish War 1897 and in Cuba for the Spanish-American War. 'The Black Riders and Other Lines' (1895), a collection of verse, was his earliest volume, followed by his 'Red Badge of Cour¬ age' (1896), which excited a widespread interest in its author and seemed to presage a career of more than ordinary brilliancy. His later works are 'Maggie: a Girl of the Streets' (1896); 'George's Mother' (1896) ; 'The Little Regi¬ ment' (1897) ; The Third Violet' (1897) ; 'The Open Boat' (1898) ; The Eternal Patience' (1898) ; 'Whilomville Stories' (1900) ; 'Wounds in the Rain' (1900) ; 'Great Battles of the World' (1901). In 1903 appeared 'O'Ruddy' written in collaboration with Robert Barr.

CRANE, Thomas Frederick, American scholar: b. New York, 12 July 1844. Graduated A.B. at Princeton College in 1864 and became a professor of the Romance languages at Cornell University on its opening in 1868. For 13 years, 1896 to 1909, he was dean of the College of Arts and Sciences and of the university fac¬ ulty, and in 1899 and 1912 was acting president. He retired under the provision of the Carnegie Foundation in 1909. He has contributed to periodicals articles on Folk Lore and Me¬ diaeval Latin Fiction, and has written the fol¬ lowing works : 'Tableaux de la Revolution Frangaise' (1884) ; 'Le Romantisme Frangais' (1886) ; 'La Societe Frangaise au dix-septieme siecle (1889) ; 'Boileau's les Heros de Roman'

(1902)

(1907)

(1891)

'Rotrou's Saint Genest and Vanceslas' 'Chansons populaires de la France' 'Italian Popular Tales' (1885) ; 'The

Exempla or Illustrative Stories from the Ser¬ mons of Jacques de Vitry) (1890).

CRANE, Walter, English artist and writer: b. Liverpool, 15 Aug. 1845; d. 14 March 1915. He became apprentice to W. J. Linton, the well-known wood engraver, in 1859, and soon began to illustrate books. In 1888 he became first president of the Arts and Crafts Society. In the following year he became associate of the Royal Society of Painters in Water Colors, and from 1893 till 1896 was director of design in the Manchester Municipal School of Art. His principal publications were (Picture Books'

(1865—76) ; 'Baby's Opera' (1877) ; 'Grimm's Household Stories' (1882) ; 'The First of May' (1883); 'The Sirens Three: a Poem' (1885); flora's Feast) (1889) ; (Queen Summer'

(1891); Renascence' (1891); (Claims of Decorative Art' (1892) ; 'Decorative Illustra¬ tions of Books' (1896); 'Spenser's Faerie Queene' (1895-97); and 'Shepherd's Calendar' (1897) ; (The Bases of Design' (1898) ; 'Line and Form' (1900) ; 'Don Quixote' (1900) ; 'A Masque of Days' (1901); (An Artist's Remi-niscenses' (1907) ; (India Impressions' (1907), *etc.* Among his pictures are Renascence of Venus' (1877) ; 'Fate of Persephone' (1878) ; 'Europa' (1881) ; 'The Bridge of Life' (1884) ; 'Freedom' (1885) ; 'La Belle Dame Sans Merci,' (England's Emblem' (1895) ; (The Rain¬ bow and the Wave' (1896) ; (Britannia's

Vision' (1897); the 'World's Conquerors' (1898) ; (Mask of the Four Seasons' (1905) and Rrometheus Unbound.' Mr. Crane be¬ longed essentially to the imaginative and poetic school so prominent among recent artists. He was identified with the Socialist movement as lecturer, writer and artist.

CRANE, William Henry, American actor : b. Leicester, Mass., 30 April 1845. He was educated in the Boston schools. In 1863, after some amateur experience, he made his debut at Utica, N. Y., with the Holman Opera Com¬ pany, taking the part of the notary in Doni¬ zetti's (Daughter of the Regiment.' In 1870 he became a member of the Alice Oates Com¬ pany, with which he remained for four years. In 1874 he played at Hooley's Theatre in Chi¬ cago, filling the leading comedy roles, and later he acted in San Francisco. Returning East, he made his first marked success with Stuart Rob¬ son (1877), at the

Park Theatre, New York, in Grover's farcical play, (Our Boarding House.' Among their other successes were those in the (Comedy of Errors' and 'The Henrietta' (1889), after which he separated from Mr. Rob¬ son. His subsequent plays include 'The Sena¬ tor' ; 'The American Minister' ; 'On Proba¬ tion' ; (A Fool of Fortune' ; 'A Virginia Court¬ ship' ; (David Harum' (1900); 'Business is Business' (1905) ; 'She Stoops to Conquer' (1906-07) ; Rather and the Boys' (1907) ; (The Senator Keeps House' (1911) ; and a revival of Bronson Howard's 'Henrietta,' rewritten and produced as (The New Henrietta' (1914).

CRANE, Winthrop Murray, American paper manufacturer: b. Dalton, Mass., 27 April 1853; d. Dalton, Mass., 2 Oct. 1920. He was lieutenant-governor of Massachusetts 1897-99, and governor of the State 1900-02. In 1901 he declined the Secretaryship of the Treasury. In 1904, upon the dedth of Senator Hoar, he was appointed to the Senate, in 1905 elected to fill

his unexpired term, and in 1907 for the full term ending in 1913, when he retired from public life.

CRANE, a large wading-bird of the exten¬ sive and cosmopolitan family Gruidcc. Cranes are often confused with herons, but really are related to the rails. The typical and most widely known species is probably the common crane (Grus communis) of Europe and northern Asia, which has long figured in literature and legendary history. Cranes are large birds, the biggest, as for example our whooping crane, holding its head, when erect, nearly as high as that of a man; but this height is mainly owing to the long neck which eminently fit them for living in marshes and situations subject to inundations, where they usually seek their food. This is principally of vegetable matter, consisting of the seeds of various plants or grains plundered from grounds recently plowed or sown. They also devour insects, worms, frogs, lizards, reptiles, small fiˆh and the spawn of various aquatic animals. They build their nests among bushes or on tussocks in the marshes, constructing them of rushes, reeds, etc., surmounted by some soft material. They lay but two eggs, which are buff, gray or greenish in ground-color and vari¬ ously marked with darker spots. These birds are said to mate for life.

The cranes annually migrate and perform journeys astonishing for their great length and hazardous character, transporting themselves from the tropical heat of southern India and central Africa to the icy

waters of Lapland and Siberia and from Arctic America to the tropics. They are remarkable for making numerous circles and evolutions in the air when setting out on their journeys, and generally form two lines meeting in an angle forward, led by one of the strongest of their number, whose trum¬ pet-like voice is heard as if directing their advance, when the flock is far above the clouds and entirely out of sight. To this call-note of the leader the flock frequently respond by a united clangor, which, at such a distance, does not produce an unpleasant effect. From the sagacity with which these birds vary their flight, according to the states of the atmosphere, they have, from the earliest ages, been popularly regarded as indicators of events; and their manoeuvres were attentively watched and inter¬ preted by the augurs and aruspices among the Romans — a circumstance Which, together with their general harmlessness and apparent gravity of demeanor, led to their being held in a sort of veneration, even by some civilized nations. When obliged to take wing -from the ground, cranes rise with considerable difficulty, striking quickly with their wings and trailing their feet along and near the ground until they have gained a sufficient elevation to commence wheel¬ ing in circles, which grow wider and wider until they have soared to the highest regions of the air. When their flight is high and silent, it is regarded as an indication of continued fine weather; they fly low and are noisy in cloudy, wet or stormy weather. Against approaching storms the cranes, like various other birds of lofty flight, readily guard by ascending above the level of the clouds and the atmospheric currents whiclh bear them.

The North American cranes are three, the whooping or great white crane (Grus Ameri-

The Demoiselle Crane (Grus virgo) The Crested Crane (Balearica pavcnina)

cana), pure white, with wing quills black and the top of the head dull red; the little brown crane (G . Canadensis) , comparatively small and dull gray in plumage ; and the sandhill crane (G. Mexicana) . The first of these is almost extinct, even in the far northwest, and the second is growing rare in its subarctic summer home ; but the larger, grayish sandhill crane is still fairly common in the Mississippi Valley and Gulf States. The genus contains many foreign species, some of which are celebrated, as the graceful ((dcmoiselle® of southern Europe and eastward; the crowned crane of northeast Africa, whose head bears a spreading tuft of feathers and bristles larger than the head itself ; the two-wattled cranes of South Africa; the <(native companion® of Australia, and the national crane of Japan, called there ((tan-cho,® whose gray, black and white plumage and stately attitudes are familiar to us in the paintings and decorative designs of Japanese artists. Many of them are of large size and handsome plumage, although none wear bright colors. It is an ancient family, represented in fossils from the Miocene period onward. Con¬ sult Tegetmeier, (Natural Hi stop" of the Cranes) (London 1861) ; Evans, (Birds) (New York 1900).

CRANE, a hoisting and transporting ma¬ chine, consisting essentially of a central post on which is mounted rigidly a crosswise arm or jib ; together with a winding apparatus and a device for rotating the entire structure upon a pivot or on a circular track. The jib is com¬ monly supported at or near its outer end by a strut footed against the lower part of the post or by a tie to the topi of the post. The jib is usually so arranged as to carry a traveler, by which the load may be transported toward or away from the post as the case may be. The crane differs

from the derrick in that the latter has a boom hinged to the post instead of a jib rigidly at¬ tached. In the derrick-crane the jib and the post form one continuous structure, either curved or cranked, and this is hinged to the revolving base.

Cranes are of very many types, and the largest ones are quite individual in character and construction, as they are erected for par¬ ticular uses. They may, however, be grouped into three general classes : Fixed cranes, port¬ able cranes, and traveler cranes. Each of these classes is susceptive of subdivisions, depending upon their peculiarities of structure and the power used to operate them.

Fixed cranes, as their name implies, are built to operate in the place where erected, within a fixed radius. This class includes the common foundry or quarry crane, suitable for lifting and moving loads up to 10 or 15 tons, and often operated by hand; the whip cranes used in warehouses and commercial establishments, lift¬ ing up to five tons and operated by hand or electricity; the wall crane, built like a bracket pivoted against the face of a wall ; and wharf cranes, erected substantially at the waterside — and often far inland— for loading and unload¬ ing the cargoes of vessels and of railroad trains. Some of these are of great power, lifting up to 100 tons. They are operated variously by steam or electricity or pneumati-callv with water or oil.

Portable cranes are also known as ˆbalance cranes® because of the heavy weights which are

placed on the <ctail® of the smaller sizes to counterbalance the load. They are mounted on a truck with wheels to run on a track. This type is in common use by railroads for remov¬ ing wreckage, and in bridge building and simi¬ lar work. Instead of the counterbalancing weights, it is usual to mount the hoisting engine and machinery on the tail of the crane. For railroad work, the post and jib are commonly in one piece, and demountable for convenience in transportation. The operating power is steam or electricity. Frequently the machinery is so arranged as to make the crane self-pro¬ pelling, and it is then called a locomotive crane.

Traveling cranes are of two general types: the overhead gauntry crane and the gauntry crane which runs on the ground. In the former a bridge-like structure runs on elevated tracks placed lengthwise of a yard or building, and on this bridge a traveler runs transversely, thus covering the entire space within the tracks. In small installations the

motive power is often a chain worked by hand, but these cranes have been greatly elaborated, and electricity is gen¬ erally used, though there are instances of the employment of compressed air and also pneu¬ matic installations. In very large plants the traveler frequently carries a cargo in which the operator sits, controlling every motion from a switchboard. Some of these cranes employed in shipbuilding yards and locomotive works are of great power, handling a load of 100 tons with ease and speed. The gauntry cranes, which run on tracks laid on the ground, partake of the type seen in the portable crane in some cases, mounted on an elevated gauntry, the base of which is fitted with trucks to run on the tracks. Another type resembles the overhead traveler crane. Combination structures are numerous and various, including the cantilever crane, in which the jib is extended on both sides of the post into a long trussed arm of the cantilever type; the bridge crane, in which one end of the long jib is supported on a track running on an elevated rail, with a traveler running on this bridge arm; the Titan crane, often built upon a float for harbor use, with its long arm sup¬ ported by several guys from the top of the tall mast; and the coal and ore <(tips® for raising and emptying1 whole cars, operated generally by hydraulic power. For the multitude of specific details of construction and operation of these indispensable machines, consult Boettcher, A., (Cranes) (Tolhausen's translation and addi¬ tions, London 1908) ; Hill, C. W., (Electric Crane Construction) (London 1911) ; Marks, E. C. R., (The Construction of Cranes and Other Lifting Machinery) (Manchester 1904) ; Wilda, H., (Cranes and Hoists: Their Con¬ struction and Calculation* (Salter's translation, London 1913).

CRANEFLY, or DADDY-LONG-LEGS,

species of Tipula, etc., of the dipterous family Tipulidce. These flies are very common and known by their large size and long sprawling legs. They can usually be distinguished from midges and mosquitoes by their size, and always by a V-shaped mark on the back of the thorax. The antennae are rather long and slender, and the hind-body long, slender and cylindrical. They possess a distinct ovipositor, with two pairs of long, horny, pointed valves. The larva is a footless grub, like a maggot, which lives under stones in brooks or in damp soil ; its head

is distinct, and in this respect the larva is more primitive and generalized than are those of most flies. It breathes by a pair of spiracles situated at the extremity of the body. There are many species of craneflies in the United States.

CRANE'S-BILL, the common name, of Geranium , the typical genus of the geranium family, Geraniacece, so named because of the long slender beak of the fruit of the plant. The genus has about 175 species, which are widely distributed throughout the temperate regions of the world, of which 16 are found in North America. The plants are mostly useless weeds, although some of them have very showy flowers. Other common names of American species are alum-root, herb robert, red robin, *etc.* See Geranium.

CRANEY ISLAND, an island in Norfolk County, Va., near the mouth of the James River. Here is situated a lighthouse 50 feet in height, standing on an iron pier, lat. 36° 53′ 28″ N. ; long. 76° 2T W. There are government powrder magazines on the island.

CRANEY ISLAND, Battle of, 22 June 1813, in the War of 1812, a British fiasco. The island is at the mouth of Elizabeth River, Vir¬ ginia, where it opens into Hampton Roads and lies close to the shore at the west, separated by a shallow strait and opposite a tidal creek. To guard the entrance to Norfolk, Portsmouth and the navy yard, a battery of seven guns had been placed on the island, with about 700 men, and 15 or 20 gunboats were anchored across the river channel. Admiral Warren ordered Sir Sydney Beckwith with 800 men to land on the mainland and take the island in rear, while Captain Pechell with 700 in barges landed on the island from the northwest, out of range of the gunboats. Beckwith came to the rear of the island, found the creek and strait too deep to risk fording — or according to Warren's report, the island was too strongly fortified to attack — and re-embarked without an effort, 40 men deserting. Pechell's boats grounded in shoal water some hundreds of feet from the island; the seamen sounded and found deep mud below ; three of the barges were sunk by the American guns, and the American troops waded out to musket-range and fired at the marines, killing three and wounding 16, while 20 deserted to the Americans. The remaining boats took in their comrades and retired. There were no American losses.

CRANFORD. Not exactly a novel, Mrs. Elizabeth Gaskell's (Cranford)

was first pub¬ lished as a series of ˆsketches from life® in Household Words , a periodical which Dickens was editing. When the series came to an end in 1853 the sketches were collected and issued as a book. Mrs. Gaskell wrote with her mem¬ ory upon Knutsford (renamed Cranford), a little country town in Cheshire, England, where she passed her childhood, where she later vis¬ ited, and where she was married. And yet, though she drew freely from her recollections, her art required that she make many altera¬ tions in incident and character. Her Cranford is a town given over mostly to spinsters, who somehow manage to live in a genteel manner on small incomes inherited from a father or a mother dead long ago. A widow may be re¬ ceived into the society, but it is with some sus¬ picion ; and a retired army officer is welcome,

provided he brings no wife. Rarely are there any marriages except among servants and shop¬ keepers. Mr. Hoggins, the doctor, manages to take Lady Glenmire, a newcomer, to the altar, but their conduct is frowned upon by the chaste ladies, one of whom, on retiring, always rolls a ball under her bed as a sure and easy means of detecting whether by chance a man lies con¬ cealed there to frighten her with <(a great fierce face.® The most exciting amusements are visits to the shops, little select parties at tea or at cards, and an occasional exhibition of a travel¬ ing juggler in the assembly rooms. A cow falls into a lime-pit and loses all her hair, and her feminine owner dresses her in ((a flannel waist¬ coat and flannel drawers® to keep away the winter's cold. The literary lady cultivates her mind with the works of Dr. Johnson, and con¬ tends that <Rasselas) far surpasses in humor anything in Mr. Dickens's <Pickwick,) then just appearing in monthly numbers. There are, of course, no children, but the younger members of the besit society find something to do in chasing sunbeams from a new carpet in order that it may not fade. If (Cranford > has a cen¬ tral figure, it is Miss Matty Jenkyms, who should have married in youth Thomas Holbrook, Esq., and been made happy long ago. Both live into old age and die unmarried. It is a romance of subdued but rare pathos.

Mrs. Gaskell wrote novels of wider sweep than (Cranford. > Her (Mary Bartonˆ for example, dealing with the conflict between labor and capital, between the manufacturer and the operatives in his mill, made a profound im¬ pression upon the Europe of her day. But this and other novels, like (North and Souths have lost the greater part of their interest because they are intimately bound up with social conditions which no longer exist and which the world is anxious to

forget. <Cranford) likewise depicts a state of society which has very few resemblances to anything that may be seen at present; but it is a society upon which intrude none of man's darker passions — no greed or avarice or distrust or treachery. Over a woman's world as it once was, with its small duties, anxieties, fears, moderate pleasures and respectable poverty, Mrs. Gaskell throws the glamour of her own delightful personality. Hers was a delicate humor, a true but not in¬ sistent pathos and a charming style.

Wilbur L. Cross,

Professor of English, Yale University.

CRANGANORE, kran -ga-nor' (Coran - galur), India, a town in Hindustan, in the presi¬ dency of Madras, on the Malabar coast, lying north of a small bay, 16 miles north of Cochin! It has much historic interest, especially as one of the earliest seats of Christianity in India. Syrian Christians are said to have been set¬ tled here since 345. It was formerly possessed by the Portuguese and later by the Dutch. Pop.

10,000.

CRANIAL NERVES, 12 important pairs of nerve branches which have their origin close to the brain stem and are connected with some of the most important functions of the body. The first or olfactory, the second or optic, the fifth or trigeminal, and the eighth or auditory, are largely sensory in their function, whereas the third or oculomotor, fourth or trochlear,- sixth or abducens, seventh or facial, the ninth or

glosso-pharyngeal, tenth or vagus, eleventh or spinal accessory and twelfth or hypoglossal are largely motor in their function. The sensory nerves originate in ganglia situated outside of the nervous axis, whereas the origin of the mo¬ tor nerves is found in the medulla.

The first or olfactory nerve originates in the mucous membrane of the nose and sends its fibres backward into the brain, where percep¬ tions of smell are located. The second or optic nerve originates in the ganglion cells of the retina and then passes by an extremely compli¬ cated series of tracks to the occipital area of the brain. Here sight memories are stored and destruction of this portion of the brain results in forms of sensory aphasia or of various types of partial blindness. The fifth nerve is a mixed nerve, containing both sensory and motor fibres. The sensory fibres originate largely from the Gasserian ganglion and the fibres are distrib¬ uted over the surface of the face, neck and head, conveying sense* impressions of touch. Branches also go to the teeth and toothache is usually an affection of these branches of the fifth nerve. The motor portion of the nerve originates in the medulla and is distributed to a number of the muscles of the jaw and throat. The eighth nerve originates in the organ of Corti in the ear and passes by a very compli¬ cated series of fibre tracks into the temporal lobe, where sense impressions of hearing are stored. The ninth, tenth and eleventh nerves are mixed, containing both motor and sensory fibres, the sensory fibres innervating the pharynx, tonsils, oesophagus, stomach, mucous membrane of the larynx, the motor fibres being distributed to the various muscles of the tongue, pharynx, larynx, heart and lungs. The tenth nerve is of particular interest in that it is the great nerve of the heart and lungs, being the chief inhibitory or regulatory nerve of the heart. Of the purely motor nerves the third or oculomotor is distributed to a number of mus¬ cles of the eye. The fourth innervates the mus¬ cles of the eye, as does also the sixth. The seventh innervates the muscles of the face, and in facial palsy this nerve is affected. The twelfth nerve is exclusively motor, originates in the medulla and is distributed to the muscles of the tongue and associated muscles at the base of the skull. The cranial nerves are continuous with the spinal nerves, but are more highly specialized. Consult ((Cranial Nerves® in Buck, (Reference Handbook of the Medical Sciences,* Vol. Ill) ; also Jelliffe and White, ‘Diseases of the Nervous System* (2d ed., Philadelphia

1917).

CRANK, in mechanics, is a fundamental form of the lever. The word means primarily a bend, the simple form of crank being a bend of an axle for turning it. On a windlass the crank is the cross-piece that joins the axle with the handle. In a steam-engine the crank may take the form shown in the diagram at 1, in which the broad end of the crank is keyed fast to a rotating shaft and the smaller end is loosely bolted to

a connecting rod. for pro¬ ducing reciprocating motion. Sometimes the crank takes the form of a wheel, when it is termed a wheel-crank, as at 2. Here, the other end of the connecting rod shows connection with a piston. The double crank shown as 3 is employed where the crank interrupts the

axle lengthwise. B and B are the cranks and A the connecting rod. A three-throw crank is constituted by three of these double cranks on one axle. When there are two or more cranks on one axle they are placed oppositely so as to balance. The one theoretical difficulty with a single crank is that it has two dead centres in every revolution, the dead centre being a point at which if stopped the parts are so in line that neither a push nor a pull on the connecting-rod will start rotation. With a three-throw crank the dead centres are so timed that one crank

is always in working. position. The crank is the simplest device known for altering reciprocating (or back and forth) motion into rotary mo¬ tion, or vice-versa, as it has few parts and nothing to get out of order, while the recipro¬ cating part slows up and starts again with the most desirable speed ratio, obviating all shocks in the machine. A crank-pin is the pin or bolt that joins the crank proper to the connecting rod. A bell-crank is a bent lever somewhat re¬ sembling an engine crank, for changing the di¬ rection of motion of a wire that pulls a mechan¬ ically operated bell.

CRANMER, Thomas, English prelate and reformer: b. Aslacton, Nottinghamshire, 2 July 1489; d. Oxford, 21 March 1556. He was edu¬ cated at Cambridge and in 1523 was chosen reader of theological lectures in his college and examiner of candidates for degrees in divinity. In the course of conversation on the meditated divorce of Henry VIII from Catharine of Ara¬ gon Cranmer remarked that the question of its propriety might be better decided by consulting learned divines and members of the universities than by an appeal to the Pope. The opinion thus delivered gained the favor of the king and Cranmer was sent for, made a king's chaplain and commanded to write a treatise on the sub¬ ject of the divorce. In 1530 he was sent abroad with others to collect the opinions of the di¬ vines and canonists of France, Italy and Ger¬ many on the validity of the king's marriage. At Rome he presented his treatise to the Pope and afterward proceeded to Germany, where he obtained for his opinions the sanction of a great number of German divines and civilians, and

formed intimate connections with the rising party of the Protestants which probably influ¬ enced his future conduct greatly. In January 1533 he was announced as the new archbishop of Canterbury, and on 30 March he was conse¬ crated at Westminster. Soon after, he set the papal authority at defiance by declaring invalid the marriage between Henry and Catharine and confirming the king's marriage with Anne Boleyn. Next year an act of Parliament was passed for abolishing the Pope's supremacy and declaring the king chief head of the Church of England The new or revised English transla¬ tion of the Bible, now appointed to be placed in

churches, received the name of (Cranmer' s Bible. >

On the death of Henry, in 1547, the arch¬ bishop was left one of the executors of his will, and member of the regency appointed to gov¬ ern the kingdom during the minority of Edward VI. He proceeded to model the Church of England according to the notions of Zwinglius, rather than those of Luther. By his instru¬ mentality the liturgy was drawn up and estab¬ lished by act of Parliament, and articles of re¬ ligion were compiled, the validity of which was enforced by royal authority and for which in¬ fallibility was claimed. The exclusion of the Princess Mary from the crown, by the will of her brother, was a measure in which Cranmer joined the partisans of Lady Jane Grey, ap¬ parently in opposition to his own judgment. With others who had been most active in her elevation, he was sent to the Tower on the ac¬ cession of Mary. He was tried for treason, and being condemned was sentenced to death, but was spared by the queen, though he lost his po¬ sition as archbishop of Canterbury. In March 1554 he was sent to Oxford with Ridley and Latimer, and after being kept in prison for nearly a year and a half they were formally tried. Cranmer's trial took place before a papal commissioner, on the charges of blas¬ phemy, perjury, incontinence and heresy, and he was sentenced to be degraded and deprived of office. After this, promises were made, which induced him to sign a recantation of his al¬ leged errors. He was placed on a scaffold in Saint Mary's Church, the day he was to

suffer, there to listen to a declaration of his faults and heresies. Instead of confessing the justness of his sentence and submitting to it in silence, or imploring mercy, he calmly acknowledged that the fear of death had made him belie his con¬ science ; and declared that nothing could af¬ ford him consolation but the prospect of ex¬ tenuating his guilt by encountering, as a Prot¬ estant penitent, with firmness and resignation, the fiery torments which awaited him. He was immediately hurried to the stake, where he kept his right hand, with which he had signed his recantation, extended in the flames, that it might be consumed before the rest of his body, exclaiming from time to time, ((That unworthy hand.® His principal writings were edited by Jenkyns, (Remains of Archbishop Cranmer5 (Oxford 1833) ; and by Cox, for the Parker Society, under the titles, (Writings and Dis¬ putations Relative to the Lord's Supper5 (Cam¬ bridge 1844) and Miscellaneous Writings and Letters5 (ib. 1846). Consult Strype, Memo¬ rials of Thomas Cranmer5 (Oxford 1848-54) ; and his (Ecclesiastical Memorials5 (ib. 1882) ; Nichols, (Narrative of the Reformation,5 Cam¬ den Society, from the papers of John Foxe; and Brewer and Gairdner, (Calendars of Let¬ ters and Papers, Foreign and Domestic, of the Reign of Henry VIII5 (ib. 1862-80) ; Todd, (Life5 (1861) ; Hook, (Thomas Cranmer5 (in (Lives of the Archbishops,5 1868) ; Lingard, (History of England5 (Vol. V) ; Froude, (History of England5 (Vols. I-VI) ; Green, (History of the English People5 (Vol. II, 1879) ; Mason, (Thomas Cranmer5 (1898) ; Pollard, (T. Cranmer and the English Reformation, 1489-18565 (London 1904) ; Foxe, (Acts and Monuments5 (ib. 1877) ; Burnet, (History of the Reformation5 (New York 1842).

CRANNOG, a fortified lake dwelling. See Lake Dwellings.

CRANSTON, Earl, American Methodist bishop: b. Athens, Ohio, 27 June 1840. He was graduated at Ohio University 1861 ; served in the cavalry during the Civil War, rising to the rank of captain, 1862-64. He entered the Meth¬ odist Episcopal ministry, 1867; was publishing agent of the Church 1884-96, when he was elected a bishop. During 1898-1900 he visited China, Japan and Korea in discharge of his episcopal duties. He was commissioner from his Church for uniting all Methodist missions in Japan into one Japanese Methodist Church in 1907 ; presided at the Methodist Episcopal Con¬ ferences in Germany, Sweden, Denmark, Nor¬ way, Finland and Italy in 1909; chairman of Commission on Finance and Commission on Federation of Methodist Churches for his de¬ nomination ; became senior bishop of the Church in 1912.

CRANSTON, R. I», town in Providence County, on the New York, New Haven and Hartford Railroad. Cranston was originally a part of Providence, but was incorporated as a separate township in 1754. The villages that were included in the town were consolidated under a city charter in 1910. The chief indus¬ tries are market gardening, brewing, dairying and the manufacture of cotton and print goods, tubing and wire. The government is adminis¬ tered by a mayor and city council. It receives its water supply from Providence. The town is the site of the State prison and of reform schools for boys and girls. Pop. (1920) 29,407.

CRANTARA, kran'ta-ra (Gael, crann, a beam + tair, reproach, disgrace), a fiery cross which formed the rallying symbol in the High¬ lands of Scotland on any sudden emergency, so called because the neglect of the symbol im¬ plied infamy. The Highlanders appear to have borrowed it from the ancient Scandinavians, of whose use of it Olaus Magnus gives a particu¬ lar account. As late as the insurrection in 1745 the crantara was circulated in Scotland, and on one occasion it passed through the district of Breadalbane, a tract of 32 miles, in three hours. After Charles Edward had marched into Eng¬ land, two of the king's frigates threatened the coast with a descent. The crantara was sent through the district of Appin by Alexander Stuart of Invernahyle (who related the circum¬ stance to Sir Walter Scott), and in a few hours a sufficient force was collected to render the at¬ tempt of the English hopeless.

CRAPAUD, kra-po', Jean, or Johnny, a

nickname applied to Frenchmen, as that of John Bull is similarly applied to Englishmen. It has its origin from the popular belief that all Frenchmen were frog eaters, ((crapaud55 mean¬ ing a (<frog or toad.55

CRAPE, a light, transparent stuff, like gauze, made of raw silk, gummed and twisted on the mill, woven without crossing and much used in mourning. Crapes are either craped (that is, crisped) or smooth. The silk destined for the first is more twisted than that for the second, it being the greater or less degree of twisting, especially of the warp, which pro¬ duces the crisping given to it when taken out of the loom, steeped in clear water and nibbed with a piece of wax for the purpose. Crapes are all dyed raw. This stuff came origi-

nally from Bologna, where tradition says it was made in the 7th century; but till of late years Lyons has had the chief manufacture of it. It is now manufactured in various parts of Great Britain. The crape brought from China is of a more substantial fabric. A woolen imitation is craped by machine rollers.

CRAPPIE, krap'T, a widely distributed American sunfish (P onioxys annularis) with a confusing number of local names, such as "bachelor,® "Campbellite,® "new-light,® "tin-mouth® or "paper-mouth,® etc., in the central Mississippi Valley, and "sac-a-lait® and "chin¬ quapin® in the Gulf States, where it is especially numerous. It is silvery olive in color, mottled with dark green on the upper part of the body, with vertical bars on the high fins. It may readily be distinguished from its congener, the calico bass, by the fact that its dorsal fin has not more than six spines. It will take a min¬ now-bait with the avidity of a black bass, but will not make so keen a fight. Its range has lately been very widely extended by the efforts of the United States Fish Commission. Consult Jordan and Evermann, (Food and Game Fishes of America) (1902). See Sunfish.

CRASHAW, Richard, English poet: b. London about 1613; d. 25 Aug. 1649. He was educated at the Charterhouse and at Cambridge. In 1637 he became a Fellow of Peterhouse, and having been admitted -to orders, was noted as an eloquent and powerful preacher. In 1634 a volume of Latin poems, under the title of (Epi-grammata Sacra,* had been published anony¬ mously by him at Cambridge. In 1644 he was ejected from his fellowship by the Parliamen¬ tarians for refusing to take the Covenant, and proceeded to Paris, where he became a convert to the Roman Catholic faith. Through the in¬ fluence of Cowley, he was introduced to Queen Henrietta Maria, who recommended him to Car¬ dinal Palotto at Rome. The cardinal afterward made him a canon in the church of Loretto. Iri 1634 he published a volume of Latin poems. A collection of poems by him, entitled (Steps to the Temple, Sacred Poems, with other De¬ lights of the Muses,* was published in 1646; and a posthumous volume 1652, (Carmen Deo Nostro.* Gilfillan published some of Craw-shaw's poems in his edition of cBritish Poets) ; and an edition by Grosart was published in 1872 (with supplement in 1888) ; and Waller, A. R., (Poems* (in the Cambridge English Classics, *1908). Consult Coleridge,*

(Literary Recollections > (1836) ; Gosse, Seventeenth-Century Studies.

CRASSULACEiE, kras-u-la'se-e, a family of plants of the order Rosales. It contains 15 genera and upward of 500 species, widely dis¬ tributed throughout the world. The petals are persistent, the calyx is free and the fruit con¬ sists of distinct carpels. The Crassnlacece are herbs or shrubs, mostly fleshy or succulent. The best-known species of the family are the orpine or live-forever (Sedum tclephium) and various stonecrops. The family is particularly rich in tropical species, which are known for the beauty of their flowers, and are cultivated in hothouses and used for bedding out in warm, dry locations.

CRASSUS, Lucius Licinius, Roman orator: b. 140 b.c. ; d. 91 b.c. He is introduced by

Cicero, in his treatise (De Oratore,* as the representative of that writer's own opinions on the subject of oratory. In 95 b.c. he was elected consul, with Quintus Mucius Scaevala (who had been his colleague in all his previous offices). He was unfortunate as a legislator, inasmuch as the law proposed by him, to compel all who were not citizens to depart from Rome, was a main cause of the Social War. He became censor in 92 b.c., when he closed all the schools of the rhetors, on the ground that their in¬ fluence on the minds of the young was bad. He was distinguished for his love of the arts ; and his mansion upon the Palatium is cited, both for its architecture and for the statuary and paintings with which it was adorned, as having been one of the most noteworthy build¬ ings in ancient Rome. Consult the Introduction to Wilkin's edition of Cicero's (De Oratore) (2d ed., Oxford 1888).

CRASSUS, Marcus Licinius, Roman trium¬ vir, surnamed Dives: b. about 115 b.c.; d. 53 b.c. When Sulla landed in Italy, 83 b.c., Crassus joined him and rendered him important services, for which he was rewarded with dona¬ tions of confiscated property, besides being al¬ lowed to purchase confiscated estates at an al¬ most nominal value. He was exceedingly fond of wealth, and also skilful and by no means scrupulous in the ways and means of accumu¬ lating it. In 71 b.c. he was created praetor, and took the command against Spartacus and the revolted slaves. Spartacus was defeated and slain, along with a great number of his followers, and 6,000 captured slaves were cruci¬ fied along the road between Rome and Capua. In 70 b.c. Crassus was

elected consul, having Pompey as his colleague ; was censor in 65 and with Caesar and Pompey made up the first triumvirate in 55. In this year he obtained the province of Syria, and professed to make prep¬ arations of war against the Parthians, which he used as a ruse to gain more money. In 54 b.c. he undertook a campaign, after which he returned to Syria. In the following year he set out again and was defeated at the river Bi-lechas by the Parthians. Retreating to the town of Carrhae, he was slain at a conference with the Parthian general.

CRATAEGUS, genus of plants placed by American botanists in the apple family (Poma - cece). The genus includes about 50 species, natives of the north temperate zone, Mexico and the Andes of parts of Central America. The name is from the Greek, meaning “strong,® and the plants are so called from the toughness of their wood. Twenty or more of the genus are found in North America. They are all large shrubs or small trees, more or less thorny ; hence the name thorn, which is generally ap¬ plied to them. The best-known American spe¬ cies is C. crus-galli or cockspur thorn, a shrub or small tree with a maximum height of 30 feet, the thorns numerous and slender, which blossoms in May and June in thickets from western Quebec westward to Manitoba and southward to Florida and Texas. The wood is heavy, weighing about 45 pounds to the cubic foot. The hawthorn, hedge-thorn, May-bush or quickset is C. oxyacantha. The scarlet thorn, haw or red haw is C. coccinea. It is a small tree, reaching 30 feet high, growing in the same region as C. crus-galli. The wood is hard, of

a reddish brown color and weighs about 53 pounds per cubic foot. The azaroles (C. azaro-lus), natives of the Levant, are occasionally cultivated for their fruit, which is about the size of the Siberian crab, and is used either for dessert or for pies. C. orientalis (or odoratis-simo) and C. tanacetifolia have also fruit of considerable size. The latter is much eaten in Armenia. C. mexicana has a large fruit, like a small apple, but not eatable. It is, however, very ornamental. The wood of most of the species much resembles that of the hawthorn. It is common to graft the rarer species on the hawthorn.

CRATER (Gr. K-parrjpˆ bowl), the open¬ ing on the tops or sides of volcanic mountains, through which the lava and ashes are ejected. The crater of Httna, like many of the most ancient volcanoes, does not retain the bowl-like shape to which the name owes its origin ; that of Vesuvius, however, preserves the typical form. Variations in the form of the crater are due to varying violence of the eruption. The more powerful eruptions tear off the mountain top and produce the hollowed cup. The craters of the Hawaiian volcanoes are usually large, that of Kilauea being about 2ˆ4 miles in diameter and filled with a lake of molten rock. Such large craters are known as calderas.

CRATER, one of Ptolemy's constellations, near the autumnal equinox. It is sometimes considered a part of the constellation Hydra, and contains 35 stars visible to the naked eye, the two largest being of the fourth magnitude.

CRATER LAKE, in general, a term ap¬ plied to any lake occupying the crater of an extinct or dormant volcano. In the United States the name is given to a small lake in the Cascade Mountains, in Oregon, remarkable for its wall of nearly perpendicular rock, from 1,000 to 2,000 feet high. The lake is about six miles in diameter and the water is nearly 2,000 feet in depth. A small cone within the main crater forms Wizard Island. The region about Crater Lake has been set aside as a national park.

CRATER LAKE NATIONAL PARK,

a government reservation created by act of Congress approved 22 May 1902. It is situated in southwestern Oregon, about 60 miles from the California boundary, on the crest of the Cascade Mountains. Measuring approximately 18 miles north and south by 13ˆ4 miles east and west, it has an area of 159,360 acres and in¬ cludes the wreck of Mount Mazama, whose sides now form the bowl containing the lake that gives the park its name. The accepted explanation of such geological and topograph¬ ical conditions as are observed at present is that plutonic forces destroyed the mountain's crest, leaving a vast crater which gradually filled with clear spring water to its present depth of 2,001 feet, on all sides of which the walls of the crater still rise to heights ranging from 500 to nearly 2,000 feet. The surface of the lake, 6,177 feet above sea-level, has an area of 20T4 square miles. A movement was started by W. G. Steel 16 Aug. 1885 for the creation of a national park at this point. Until then the lake was but little known, even among the residents of southern Oregon, although its dis¬ covery occurred 12 June 1853; and Mr. Steel's plan <(was successful,® he writes, <(only after

17 years of strenuous labor.® The lake was first stocked with fish (rainbow trout) in 1888. A survey for a road entirely around the lake and close to the rim wherever possible was made under the direction of the Secretary of War, and a report submitted to Congress esti¬ mated the total cost at approximately $700,000. Of that amount an appropriation was made of $125,000 for use during the season of 1913, $85,000 for 1914 and $50,000 for 1915. Under these appropriations grading proceeded steadily ; besides a portion of the rim road, roads from the Klamath, Medford and Pinnacles entrances were constructed; and the official report for 1915 contained the statement that a line of auto¬ mobile stages, maintained by the Crater Lake Company from Medford, on the main line of the Southern Pacific Railway, and from Chilo-quin, on the northerly extension of the Southern Pacific from Klamath Falls, or the Crater Lake cut-off, was rendering satisfactory service in transportation of visitors (11,371 at the close of September 1915, as against 7,096 at the same time in 1914). During the season of 1915 Crater Lake Lodge, located on the rim of the lake, nearly 1,000 feet above the water, was opened to the public ; and to this building addi¬ tions were made in 1916. By that time the lake had become abundantly supplied with large rainbow trout, the largest taken weighing six or seven pounds. The park, according to the superintendent's enumera'tion, abounds in black and brown bear, black-tailed deer, cougar, lynx, timber-wolves, coyotes, pine marten, squirrels of several varieties, ringtail grouse, the com¬ mon pheasant, Clark crow, *etc.* During 1915 private telephone lines were purchased and lines required for the improvement of that service were constructed; progress was also made in connection with the proposed tourist village. It is evident that Klamath and Modoc Indians, who fancied that the lake held the throne of the god Liao, were not insensible to the mystery and wonder of the scene, which received its most striking characterizations — as ((The sea of Silence® and <(A sea of sapphire set around by a compact circle of the great grizzly rock of Yosemite® — at the hands of Joaquin Miller. The government's purpose in the creation of such parks is stated in the article National Parks and Monuments.

CRATER MOUND, Arizona. This feature in the plains 25 miles due west of Winslow, Ariz., formerly known as Coon Butte, is one of the most remarkable natural wonders in existence. It consists of a crater 600 feet deep and 400 feet in diameter surrounded by a rim 100 to 150 feet high. This rim consists of loose

Sopai sandstone .red

■ ■n — ■■■ — a 4000

f*«t

Section through Crater Mound, Arizona Plateau

fragments of rock and sand from the hole. The walls of the hole are limestone (Kaibab) and sandstone (Coconino), more or less upbent and shattered. The relations are shown in the figure. The cause of this extraordinary hole is one of the perplexing questions over which scientists speculate. It has been suggested that

the crater was caused by impact of a large meteor, a view sustained by the occurrence of many small masses of meteoric iron in the vicinity, but a mining company organized to find and work the large mass of iron pre¬ sumably buried in the hole obtained no evidence of its existence. A detailed survey with mag¬ netic needle hung to swing vertically also failed to indicate the presence of a body of metallic iron. A plausible suggestion is that the hole was caused by explosion of volcanic steam accumulating in the porous sandstone under the dense limestone and finally reaching the limit of tension. Many conspicuous volcanic features occur in the general neighborhool but not in the immediate vicinity of the hole. Closely similar craters due to explosion are known in the Southwest, in Mexico and other parts of the world.

N. H. Darton,

United States Geological Survey.

CRATERUS, Macedonian general : d. 321 b.c. After the death of Alexander the Great he received, together with Antipater, the gov¬ ernment of Macedonia and Greece. He assisted Antipater in the Lamian War, and also against the 2Etolians and Perdiccas, and fell in a battle against Eumenes.

CRATES, kra'tez, OF ATHENS, Greek comic poet : flourished about 450 b.c., and con¬ temporary with Cratinus. Eminent as an actor, he often performed the principal parts in the plays of Cratinus. As a comic poet he was the first Athenian who ventured to follow the ex¬ ample of Epicharmus so far as to bring drunken characters on the stage. Aristotle in his <Poetics) bears testimony to the excellence of his works. Little, however, is really known of them. Meineke, who has made a careful analy¬ sis of the statements of ancient writers on the subject, gives the titles of 14 ascribed to him. Fragments of eight of these are still extant. Consult Kock, (Comicorum Atticorum Fragmenta) (Leipzig 1880).

CRATES OF MALLOS, Greek gram¬ marian : flourished about 150 b.c.

He founded the celebrated Pergamene school of grammar, and became the great rival of Aristarchus, of the Alexandrian school. From his work on Homer he is said to have been called Opˆpocos. He wrote commentaries on Hesiod, Euripides and Aristophanes. Only a few fragments of his works are preserved. Under him the cata¬ logue of the Pergamene Library was enlarged and catalogued. Later grammarians based their works on his study of the Attic dialect. About 167 b.c. he was sent as an ambassador to Rome, where he introduced the study of formal grammar. Consult Suetonius, (De Grammati-cus) (Vol. 2) ; Wachsmuth, (De Cratete Mal-lota) (Leipzig 1860) ; Susemihl, (Geschichte der griechischen Litteratur in der Alexan-drinerzeiL (Vol. II, ib. 1892) ; Sandys, (A History of Classical Scholarship) (Vol. I, 2d ed., Cambridge 1906).

CRATES OF THEBES, Greek cynic philosopher : flourished about 320 b.c. He was born at Thebes and inherited a large property. This he renounced early and removed to Athens, where he became the pupil of Diogenes, and afterward one of the most eminent in that school of philosophers. According to Diogenes Laertius, he lived a cynic of the straitest sort.

He was the teacher of Zeno, the founder of stoicism, and thus formed the connecting link between cynicism and stoicism.

CRATINUS, kra-ti'nus, Greek comic poet: b. about 520 b.c.; d. 422 b.c. The (Archi-lochoi,* supposed to have been his earliest pro¬ duction, was not exhibited till he was upward of 70 years of age ; but he lived to achieve much for his profession, and at the advanced age of 97 died at the height of his fame, having just triumphed over Aristophanes himself. He found the Greek comedy a mere plaything, em¬ ployed to excite merriment and laughter, and at once converted it into a terrible weapon for the chastisement of public and private vice. Horace particularly commends the public spirit and the impartial justice with which he exer¬ cised his censorship over the morals of his age. The uniform testimony of ancient writers places Cratinus in the first rank as a comic poet. His great rival, Aristophanes, was fully aware of his power. In the (Knights) he compares him to a torrent carrying everything before it. According to the best authorities he wrote but 21 dramas, 9 of which were successful in the Dionysiac contest. Not a single one of his dramas is no.w extant; only a few fragments remain to attest the excellence of his admired productions.. The 400 fragments of his works then known were collected by Kock, (Comicorum Atticorum Fragmenta) (Vol. I, Leipzig 1880). In the

(Axyrhynchus Papyri) (Vol. IV, 1904) appeared the newly found argument of a play ˆDionysalexander,* of which nine fragments had been known, though they did not reveal the plot. Consult Korte, (Hermes > (1904) ; and Morgan, (Addresses and Essays> (25-33, New York 1910).

CRATINUS, Greek poet of the middle com¬ edy, contemporary with Plato, the philosopher, and sometimes confounded with his elder and more celebrated namesake preceding. He flourished in the middle of the 4th century b.c. Eight plays are ascribed to him. Consult Meineke, (Fragmenta Com. GraecorunP (Vol. I, pp. 411-114; Vol. Ill, pp. 374-379).

CRATIPPUS, kra-tip'us, Greek historian, contemporary with Thucydides. He continued the work of the great historian, and brought it down, according to Plutarch, to the time of Conon. The well-known words of Dionysius : ((He wrote what Thucydides left unwritten, w evidently show that Cratippus not only con¬ tinued the history of Thucydides, but also sup¬ plied whatever omissions he thought he found in it. He has gained in importance in recent times because of an historical fragment dis¬ covered by Grenfell and Hunt and published by them in (Oxyrhynchus Papyri* (V, 1907-08). The fragment has come to be known as the Hellenica Oxyrhynchia. Consult Hunt, in (The Year's Work in Classical Studies> (London 1908). The present tendency is to ascribe the work rather to some one other than Cratippus. Consult also Walker, (The Hellenica Oxyrhyn¬ chia : Its Authorship and Authority* (Oxford

1913).

CRATIPPUS, Greek peripatetic philoso¬ pher: b. Mitylene about 75 b.c. He appears to have been held in the highest estimation by the great men of his age. Cicero calls him the prince of all the philosophers whom he had known. Pompey visited him after his defeat

at Pharsalia, and received at his hands the consolations of philosophy ; and Brutus went to Athens, to which city Cratippus had latterly betaken himself, to listen to his prelections, even while making preparations to meet Oc¬ tavius and Antony. Nothing that he wrote has survived.

CRAVEN, Alfred Wingate, American civil engineer: b. Washington, D. C, 20 Oct. 1810; d. Chiswick, England, 29 March 1879. He was graduated at Columbia College in 1829, and was largely employed in railroad construction and management. His most important work was in New York, in connection with its sewer¬ age, it supply of Croton water and the im¬ provement of Fourth avenue. From the organ¬ ization of the Croton water board, in 1849, till 1868 he was its engineer, and planned and supervised the construction of the great works of that period. Among these were the Central Park Reservoir completed in 1867, the reser¬ voir at Boyd's Corners and the survey of the Croton Valley. The establishment of the sew¬ erage system of New York is largely due to his endeavors. He was a founder, director many years and president, 1869-71, of the American Society of Civil Engineers.

CRAVEN, Elijah Richardson, American Presbyterian clergyman : b. Washington, D. C., 28 March 1824; d. 1908. He was graduated at Princeton 1842, and from its Theological Sem¬ inary 1848. Ordained in the Presbyterian ministry 1850, he held pastorates at Somerville and Newark, N. J., 1850-87, when he became secretary of the Presbyterian Board of Publica¬ tion and Sabbath-school Work, remaining in this relation till 1904. He was the American editor of Lange's Commentary on the Book of Revelation.*

CRAVEN, Pauline de la Ferronays

(Madame Augustus), French religious novel¬ ist: b. Paris 1820; d. there, 1 April 1891. Her father was at one time French Ambassador to Berlin. In 1834 she married an Englishman named Craven, a descendant of the Margravine of Anspach. She traveled extensively and lived much in England. Her principal literary works include articles on English politics and bio¬ graphical sketches of Sister Nathalie Narishkin and of Lady Georgiana Fullerton, and 'Reminiscences) of England and Italy. She is best known for her (Family Memoirs* and 'The Story of a Sister,* a picture of a noble Roman Catholic family and the slow passing away of a simple-minded and deeply religious woman ; and other fictions are as well known in

Eng¬ lish translations as in their original French. The best of her novels are (Anne Severing (The Enigma's Answer) and 'Fleurange,* in all of whidh she is an ardent advocate of Roman Catholicism. Consult Bishop, Mary, 'Memoir of Mrs. Craven) (London 1894) ; Smith, J. F. A., (The Life of Mrs. Augustus Craven) (Niirnberg 1910).

CRAVEN, Thomas Tingey, American naval officer : b. Washington, D. C., 30 Dec. 1808; d. Boston, Mass., 23 Aug. 1887. He joined the navy in 1822; was promoted captain in June 1861, and the same year was given command of the Brooklyn, with which vessel he took part in the capture of New Orleans and the later ac¬ tions on the Mississippi. In 1862 he was placed in command of the Niagara, and during the re¬

mainder of the war he served along the coasts of England and France. He was promoted rear-admiral in October 1866; retired in Decem¬ ber 1869.

CRAVEN, Tunis Augustus Macdonough,

American naval officer: b. Portsmouth, N. H., 11 Jan. 1813; d. 5 Aug. 1864. He entered the navy in 1829; in 1857 surveyed the Isthmus of Darien; coasted about Cuba to intercept slave ships, and in the Civil War had part in pre¬ venting the capture of the fort on Key West. Given the rank of commander, he joined Farragut's fleet off Mobile, commanding the monitor Tecumseh. In the battle of Mobile Bay the Tecumseh was sunk by running upon a torpedo, and Craven and almost ail his crew lost their lives.

CRAWFISH. See Crayfish. .

CRAWFORD, Coe Isaac, American states¬ man : b. Voiney, Iowa, 14 Jan. 1858. He was graduated in 1882 from the law department of the University of Iowa, practised law for one year in that State and for 15 years in Pierre, S. D. ; was a member of the Dakota territorial legislature in 1889, and upon the admission of South Dakota into the Union in that year became a member of the first State senate. He was attorney-general in 1892-96; and, after removal to Huron, S. D., in 1897, was attorney for the Chicago and Northwestern Railway Company until 1903. In 1907 he was elected governor of South Dakota on the Republican ticket and in the following year United States* Senator for the term expiring 3 March 1915.

CRAWFORD, Francis Marion, American novelist: b. Bagni di Lucca, Italy, 2 Aug. 1854; d. Sorrento, Italy, 9 April 1909. He was edu¬ cated

at Trinity College, Cambridge, and after¬ ward studied Sanskrit and other subjects on the European continent. In 1879-80 he was editor of the Allahabad Indian Herald and for nearly 20 years subsequently resided mainly in Italy. His novels and other writings include (Mr. Isaacs* (1882); ‘Doctor Claudius* (1883) ;

(A Roman Singer) (1884) ; ‘An American Pol¬ itician (1884); ‘Zoroaster* (1885); ‘A Tale of a Lonely Parish) (1886) ; ‘Marzio’s Crucifix) (1887); <Saracinesca) (1887); ‘Paul Pat-off* (1887); ‘With the Immortals) (1888); ‘Greifenstein* (1889) ; ‘Sant’ Ilario) (1889) ; (A Cigarette-maker’s Romance) (1890) ; ‘The Witch of Prague* (1891); ‘Khaled* (1891); (The Three Fates* (1892); <The Children of the King* (1892) ; ‘Don Orsino* (1892) ; ‘Marion Darche* (1893); ‘Pietro Ghisleri* (1893); (The Novel: What Is It?* (1893); ‘Katharine Lauderdale* (1894) ; (Love in Idle¬ ness* (1894); <The Ralstons* (1895); ‘Con¬ stantinople* (1895); (Casa Braccio* (1895); ‘Taquisara* (1896); ‘A Rose of Yesterday* (1897); ‘Corleone* (1897); (Ave, Roma Im¬ mortals* (1898) ; ‘ In the Palace of the King* (1898); (Via Crucis* (1899); <The Rulers of the South* (1900); Marietta* (1900); ‘Ce¬ cilia* (1902); ‘Man Overboard* (1903); ‘Gleanings from Venetian History* (1905) ; ‘Whosoever Shall Offend* (1904) ; ‘Fair Mar¬ garet* (1905) ; ‘Prima Donna* (1908) ; ‘The White Sister* (1909). As a novelist Crawford is characterized by excellence in the depicting of character and general carefulness in the handling and collection of his materials. The Saracinesca series, stories of modem Rome, is

generally regarded as his most important per¬ formance. He had the beguiling gift of the born storyteller who has also ‘become an ac¬ complished master in the art of fiction. In¬ genious plots, a varied company of interesting dramatis personae faithfully studied and freshly portrayed, picturesque settings and behind all the attractive personality of an intelligent and cultivated man of the world — these character¬ istics explain and justify the delight with which an immense audience, American and European, welcomed the annual appearance of one of the long series of his novels. In his historical works he betrays a gift of conjuring up the life of the Italian past in a manner that makes the spirit and the facts of history as entertainˆ ing as a romance. Several of his novels have been translated into German, and he himself produced French versions of (Zoroaster) and (Marzio’s Crucifix. } In recognition of his merits as a writer the French Academy be¬ stowed on him the Monbrun prize and a gold medal.

CRAWFORD, George Washington, Amer¬ ican lawyer : b. Columbia County, Ga., 22 Dec. 1798; d. 22 July 1872. He wras graduated at Princeton 1820; was attorney-general of Geor¬ gia 1827-31 ; a member of the State legislature 1837-42, and Whig representative in Congress 1843. He was elected governor of Georgia 1843, and reelected 1845. He was Secretary of War in President Taylor’s Cabinet 1849-50, resigning upon the death of the President.

CRAWFORD, John Martin, American physician and surgeon : b. Herrick, Pa., 18 Oct. 1845. He was graduated from Lafayette Col¬ lege 1871 ; from Pulte Medical College, Cincin¬ nati, 1878; from Miami Medical College 1881; he was professor of physiology, microscopy and of physical diagnosis in the Pulte Medical Col¬ lege 1881-89. He was consul-general of the United States to Russia 1889-95 ; commissioner of the World’s Fair 1892-93. He made the first complete English translation of (The KalevalaC the national epic of Finland (1888). He also edited and translated from manuscript a five-volume edition of (The Industries of Russia. > He introduced into Russia the American system of governmental crop reports. He is president of the Ohio chapter of Phi Beta Kappa ; president of the American National Bank,

Cincinnati; president of the Cincinnati Discount Company, and director in several industrial and manu¬ facturing corporations ; lecturer on the Finns and their ancient literature, and on Russia and on Russian folklore. He received the unusual honor of election to honorary membership in the Finnish Literary Society at Helsingfors, Finland. He is an active member of the Lit¬ erary Society of Cincinnati, established in 1848. In 1899 he received the degree of LL.D. from Ohio University.

CRAWFORD, John Wallace («Captain Jack®,) American author: b. County Donegal, Ireland, 4 March 1847; d. Woodhaven, N. Y., 28 Feb. 1917. He served in the 48th Pennsyl¬ vania Volunteers in the Civil War, and while lying wounded in a hospital at West Phila¬ delphia was taught to read and write by a Sister of Charity. As a scout he served under Gen¬ eral Crook in the Sitting Bull campaign in 1876 and later against the Apaches in New Mexico. In 1886 he retired from the army,

was a miner and ranchman in New Mexico for many years, went to the Klondike in 1898, re¬ maining there two winters, and finally became a public lecturer. Besides many poems, several songs and more than 100 short stories, ((Captain Jack® is author of (The Poet Scout — a Book of Song and Story > (1885) ; (Campfire Sparks* (1888) ; ˆat,* a drama (1900) ; (Colonel Bob,* a drama, with Marie Madison (1909) ; (Whar' the Hand o' God is Seen and Other Poems *

(1911).

CRAWFORD, Mary Caroline, American author : b. Boston, Mass., 5 May 1874. She was educated at Radcliffe College, and besides contributing editorially and otherwise to various New York and Boston journals, was literary editor of the Boston Budget 1898-1902. In 1907-08 she was secretary of the Women's Trade Union League; she then became sec¬ retary of the Ford Hall meetings. She has published (The Romance of Old New England Roof Trees) (1902) ; (The Ro¬ mance of Old New England Churches * (1903) ; (The College Girl of America* (1905) ; (Among Old New England Inns) (1907) ; (St. Botolph's Town* (1908) ; (01d Boston Days and Ways* (1909); (Romantic Days in Old Boston* (1910) ; (Goethe and his Women

Friends) (1911; 2d ed., 1913) ; (Romantic Days in the Early Republic*

(1912) ; (The Romance of the American Theatre) (1913) ; (Social Life in Old New England* (1914).

CRAWFORD, Samuel Wylie, Federal general: b. Franklin County,' Pa., 8 Nov. 1829; d. Philadelphia, Pa., 3 Nov. 1892. He graduated at the University of Pennsylvania in 1846; was licensed to practice medicine in 1850; served as assistant surgeon in the United States army in Texas, New Mexico and Kansas, 1851-60; com¬ manded a battery at the bombardment of Fort Sumter in April 1861 ; became major of the 13th Infantry in August 1861, and on 25 April 1862 was appointed brigadier-general of vol¬ unteers, commanding a brigade in the army of the Potomac. He served throughout the Shen¬ andoah Valley campaign (q.v.), distinguished himself at Winchester, Cedar Mountain, South Mountain and Antietam, and, on the wounding of General Mansfield, was placed in charge of a division. He commanded the Pennsylvania reserves at Gettysburg, being brevetted colonel for gallant conduct ; was engaged in all the battles of the army of the Potomac and was present at Lee's surrender. He was brevetted major-general of volunteers 1 Aug. 1864 for conspicuous gallantry in various battles ; was brevetted brigadier-general of the regular army for conduct at Five Forks, and major-general for meritorious services throughout the war ; and on 15 June 1866 was mustered out of the volunteer service. He became colonel of the 16th Infantry, 22 Feb. 1869, but in March was transferred to the 2d Infantry, of which he remained in command until 19 Feb. 1873, when he retired because of disability resulting from old wounds.

CRAWFORD, Thomas, American sculp¬ tor: b. New York, 22 March 1814; d. London, England, 16 Oct. 1857. He went to Rome, where he studied under Thorvaldsen. He passed much of his life in Rome. His most famous works comprise (Orpheus and Cerberus *; (Adam and Eve* ; <Hebe and Ganymede * ;

(Mercury and Psyche y ; and (Dancing Jenny.) His statue of the ‘Genius of America) is placed on the dome of the capitol at Washington, and for the State of Virginia he made the eques¬ trian statue of Washington, at Richmond. Other works are the bust of Beethoven, now in Symphony Hall, Boston; (The Indian } (New York Historical Society) ; <Flora) (Metropoli¬ tan Museum, New York). Crawford executed many bas-reliefs, and 87 of his plaster casts were presented by his wife to the commis¬ sioners of Central Park, who arranged them in a building for public exhibition. They have since been destroyed by fire. Consult Taft, Lorado, ‘History of American Sculpture* (New York 1903), and Tuckerman, (Book of the Artist* (ib. 1867).

CRAWFORD, William, American soldier: b. Berkeley County, Va., 1732; d. Wyandot County, Ohio, 11 June 1782. He was a sur¬ veyor by profession, and an associate of Wash¬ ington, who trusted him greatly. He served with the Virginia riflemen through Braddoc.k’s campaign; was promoted captain on Washing¬ ton’s recommendation in 1761, and served through the Pontiac War 1763-64. When the Revolution broke out he joined Washington with a company of Virginians; was at the bat¬ tles of Long Island, Trenton and Princeton; on frontier duty 1778, and was colonel when he resigned in 1781. In May 1782, at Washing¬ ton’s request, he commanded an expedition against the Wyandot and Delaware Indians on the Sandusky River. They met the Indians 4 June, and in the engagement which followed Crawford was captured and subsequently tor¬ tured by his captors before being burned at the stake. Consult Roosevelt, (Winning of the West) (Vol. II, 1889) ; Butterfield, Expedition Against Sandusky* (1873) ; Hill, N. N., ‘Crawford’s Campaign * (in Magazine of Western History , Chicago 1885.)

CRAWFORD, William Harris, American statesman : b. Amherst County, Va., 24 Feb. 1772; d. Albert County, Ga., 15 Sept. 1834. In 1783 he settled in Georgia, was admitted to the bar in 1798 and entered on practice in Lexing¬ ton. He was elected to the State senate in 1802 and to the United States Senate to fill a vacancy in 1807 (fighting two duels during the canvas’s) ; was reelected for a full term in 1811; was chosen president of the Senate pro tern, in 1812. Refusing the Secretaryship of War, he was appointed Minister to France in 1813. Two years later he became Secretary of War, and the

next year Secretary of the Treasury and held the latter office till March 1825. He was urged as a candidate for the Presidency several times, received the nomination in 1824, and in the election had 41 electoral votes. No choice for President having been reached, the election was decided in the House of Representatives, but meanwhile Crawford had been stricken with paralysis, which precluded his effectual candi¬ dacy. He never recovered wholly, although he still remained active politically, serving as judge of the northern circuit of Georgia from 1827 until his death.

CRAWFORD, William Henry, American educator: b. Wilton Centre, Ill., 6 Oct. 1855. He was graduated at Northwestern University 1884, and from Garrett Biblical Institute. After five years' pastoral work in the Methodist

ministry he became professor of the history of theology in Gammon Theological Seminary 1889-93. In 1893 he was elected president of Allegheny College, Meadville, Pa. He was one of the judges to select the names for the Hall of Fame in New York. His publications include (Life of Savonarola* (1906) ; (The Church and the Slums) (1908); and 'Thoburn and India* (1909).

CRAWFORD NOTCH, the picturesque pass in the White Mountains, New Hampshire, between Mounts Webster and Wiley, at an ele¬ vation of about 2,000 feet above the Saco River, which flows through the notch.

CRAWFORDSVILLE, Ind., city and county-seat of Montgomery County, on Sugar Creek and the Chicago, Cleveland, Cincinnati and Saint Louis and the Vandalia and Monon Route railroads, 44 miles west of Indianapolis. It is the trade centre of an extensive agricul¬ tural region, with annual dealings of $3,500,000. It is the seat of Wabash College and contains a fine courthouse, a community house for women, a country club and a Carnegie library. The city is the home of five insurance companies, has manufactures of matches, paving bricks, burial furnishings, flour, foundry products, lumber, metal polish, barbed wire, *etc.* Settled in 1822, Crawfordsville was incorporated in 1865 and is governed under a charter of that date, which provides for a mayor, elected every four years, and a city council. The electric-light plant is owned by the city. Crawfordsville was the home of Gen. Lew Wallace, author of Ten Hur,* to whom a monument has been erected. Pop. (1920) 10,139.

CRAWFURD, Oswald John Frederick,

English author: b. London, 18 March 1834; d. Montreux, 31 Jan. 1909. He was educated at Eton and Oxford and after serving as a clerk in the Foreign Office was English consul at Oporto, Portugal, 1867-91. Poet, novelist, es¬ sayist and anthologist, among his works are ‘Travels in Portugal, by John Latouche) ; ‘Round the Calendar in Portugal*; ‘Portugal: Old and New* ; ‘British Comic Dramatists* ; ‘Lyrical Verse from Elizabeth to Victoria) ; ‘Four Poets) (1899) ; ‘Two Masques, *a book of verse; and the novels, ‘The World We Live In5 ; ‘Beyond the Seas) ; ‘Sylvia Arden* ; ‘The New Order.*

CRAWLEY, Edmund Albern, Baptist

educationist: b. 1799; d. 1880. He was graduated at King’s College, Windsor, Nova Scotia, and was called to the bar. Later he entered the Baptist ministry; in 1837 was a candidate for a chair in Dalhousie College, Halifax, but his claims were rejected by the dominant Presbyterian ele¬ ment on the board of that institution ; and thereafter he became one of the founders and first principal of Queen’s (afterward Acadia) College, Wolfville, established by the Baptist community of Nova Scotia.

CRAWSHAW, kra’sha. William Henry,

American educator: b. Newburgh, N. Y., 6 Nov. 1861. He was graduated at Colgate University, Hamilton, N. Y., 1887, and was elected pro¬ fessor of English literature there the same year. Since 1897 he has also been dean of the college faculty. He received the degree of A.M. from Colgate University, 1889; Litt.D., University of Rochester, 1909; and that of LL.D. from Syra-

CRAYER

cuse University, 1910; studied at Oxford Uni¬ versity, England, 1900-01 ; traveled in Eng¬ land, Scotland, Holland, Belgium, France, Ger¬ many, Switzerland, Italy, Spain, North Africa; .member National Institute of Social Science; acting president of Colgate University, 1897— 99, 1907, 1908; president pro tempore, 1908-09. He has published (The Interpretation of Literature* (1896) ; (The Literary Interpreta¬ tion of Life* (1900) ; and an edition of Dry-den's (Palamon and Arcite* (1898) ; (The Mak¬ ing of English Literature* (1907).

CRAYER, krl'yer, Gaspar, Flemish painter: b. Antwerp 1582; d. 1669. He was a pupil of Raphael Coxcie, and became, by the study of nature, one of the greatest historical and por¬ trait painters. At the Spanish court in Brussels he painted the portrait of the Cardinal Ferdi¬ nand, brother of the king, and received a pen¬ sion. He established himself in Ghent, where he constantly executed works for the court, labor¬ ing with industry and perseverance till his 86th year. The city of Ghent alone had 21 altar-pieces by him. In Flanders and Brabant are many of his works and some of his pictures are in the public collections at Vienna and Munich. His paintings are praised for fidelity to nature, excellent drawings and a coloring approaching the manner of Vandyke. He main¬ tained a certain excellence in composition and execution, in spite of his great productivity. He was strongly influenced by his friend Ru¬ bens. Among the best known are (The Four Crowned Martyrs* (Lille Museum) ; six pic¬ tures representing the entrance of the Cardinal infant (Ghent) ; (Alexander and Diogenes* (Metropolitan Museum, New York) ; (The Miraculous Draught of Fishes,* (Adoration of the Shepherds* (Brussels Museum) ; decapi¬ tation of St. John the Baptist* (Ghent Cathe¬ dral) ; <Martyrdom of St. Blasius* (1668, Ghent Museum). His most important pupil was Jan van Cleve. Consult Maeterlinck, in (Bulletin de la Societe d'Histoire et d'Arche-ologie de Gand* (Ghent 1900).

CRAYFISH, or CRAWFISH (Fr. ecre-visse, so not connected with (<fish**), a fresh¬ water crustacean of the family Astacidcc, order Decapoda. They are known by their large size, lobster-like shape, the abdomen being as long as the cephalothorax, and ending in a broad

tail-fin. The first pair of legs end in large claws (chelae), not so large in proportion as those of the lobster, and those of each leg are nearly equal in size. Crayfish attain a length ‘of three to six inches and live in streams or ditches, sometimes abounding in great numbers. They dig holes in the banks, from a few inches to a yard in depth, probably, like the lobster, using their big claws for this purpose. They lie at the mouth of their burrow with their claws extended ready to seize any passing in¬ sects, snails, tadpoles or frogs, and sometimes larger animals, and, like the lobster, they will not refuse carrion and occasionally feed on suc¬ culent roots. The European crayfish spawns in the early spring, the eggs hatching in May and June. As in all freshwater Crustacea the young are hatched in the form of the parent, there being no metamorphosis, — in other words, development is direct. As in the lobster, if an antenna or leg is lost it is gradually renewed, growing at every molt. For some time after

they are hatched the young adhere by the hooked end of their claws to the swimmerets of the mother, and are carried about under cover of her abdomen. During this period the young crayfish are very sluggish, and take no food, being nourished by the food-yolk still persisting in the front part of the body. The European crayfish molts eight times in the course of the first year and five times during its second year; in the third year only twice, that is, in July and September. At a greater age than this the females moult only once and the males twice a year.

The crayfish of the Old World belong to the genus Astacus, while those of North America east of the Sierra Nevada belong to the genus Cambarus, the latter differing by the absence of gills on the fifth or last pair of legs. An interesting feature in geographical distribution is the occurrence of half a dozen species of the European genus Astacus in the streams draining the Pacific Coast from British Columbia to California. East of the Rocky Mountains, from the Great Lakes to Guatemala, there occur be¬ tween 30 and 40 species of Cambarus. These extend to eastern New York west of the Hud¬ son River, and a single species (C. bartoni) occurs under stones in certain lakes of northern Maine as also in Lake Champlain and the Great Lakes, extending southward to Kentucky and the District of Columbia.

The presence of the Eurasian Astacus on the Pacific Coast indicates their gradual migration from eastern Asia, at a time when Bering Strait was dry land. In certain characters the Amur-land and Japanese Astaci differ from the Ponto-caspian and the west American Astaci and approach the Cambari of eastern North Amer¬ ica. This is also

paralleled in the distribution of many plants and insects.

The family to which the crayfish belongs dates as far back as the Jurassic Period, and in Europe Astaci first appear in the Upper Cretacean. In North America fossil Astaci (Cam¬ barus primeeves) occur in the Lower Tertiary beds of the western border of Wyoming. Cope discovered fossil Astaci in the late Pliocene beds of Idaho. Astacus probably originated in western America, since it is found fossil throughout the Tertiary.

Cra3ˆfishes are of no little economic import¬ ance from the fact that in the course of their extensive fossorial operations they undermine dams, and it is supposed that the inundations of the Mississippi River and the breaks in the levees may be due largely to the mining habits of these animals. For the blind crayfish see Cave-dwelling Animals. Consult Fisher, (<Crayfish as Crop Destroyers** in Wear Book of the United States Department of Agricul¬ ture* (Washington 1912) ; Huxley, (The Cray¬ fish* (London 1887) ; Hagen, (<Monograph of the North American Astacidae** (in the (Illus¬ trated Catalogue of the Museum of Compara¬ tive Zoology,* No. Ill, Cambridge 1870) ; ((Revision of the Astacidae** (in (Memoirs of the Museum of Comparative Zoology,* Vol. X, No. 4, Cambridge, Mass., 1885) ; and for habits and uses, Rathbun, Wishing Industries of the United States* (1884) ; Sterle, (The Crayfish of Missouri* (Cincinnati 1902).

CRAYON, Geoffrey, a pseudonym of Washington Irving (q.v.).

CRAYON, a colored pencil consisting of a cylinder of fine pipe-clay colored with a pig¬ ment. Black crayons are colored with plum¬ bago or made of Italian black chalk. A white crayon is a cylinder of chalk, common in Europe and America. Red chalk is found in France. It is made from an ochery clay, i.e., one containing much iron oxide. The holder is a porte-crayon. Crayons are said to have been made in France in 1422. It is hard to say how long ago charcoal, chalk and ocherous earths were used. Colored crayons are used _for pastel-drawing and are quicker and softer in effect than oils or water colors. Their dis¬ advantage lies in their delicacy ; they smudge so easily that it is practically impossible to use them for sketching, and they must be kept under glass. In lithography, a crayon is a composition formed as a pencil and used for drawing upon lithographic stones. It is of a soapy nature, consisting of soap, wax, resins and lampblack, melted, and sometimes burned, together. Pastel is made by mixing chalk and coloring materials with gum water in order to form a paste. The vegetable colors used arc tumeric, litmus, saffron and sap green, but should in every case be free from acid, as the latter reacts on the chalk. Vienna white, puri¬ fied chalk, is also used by artists. Briangon chalk and French chalk are popular names for soapstone, which is very different from chalk in its composition, being a silicate of magnesia.

CRAZY HORSE, a leader of the Southern Sioux, who refused to be confined to the reservations and who made war against the Crows, the Mandan and the whites. He and Sitting Bull were the two foremost leaders of the Sioux War which broke out in 1875. This Indian outbreak was due to several causes, chief of which was the occupancy of the Black Hills by the whites. General Reynolds that same winter surprised the camp of Crazy Horse, but the band succeeded in retreating with com¬ paratively small loss, in a storm. A little later Crazy Horse with a strong band of Sioux and Cheyenne compelled the forces of General Crook to retreat. He then strengthened his band by Indians from the different reservations, which were filled with a seething unrest by his agents. Others from the reservations joined Sitting Bull in Dakota. The forces of the two leaders joined, and under the leadership of Sitting Bull they annihilated the forces of General Custer at the battle of the Little Big¬ horn River in Montana (25 June 1876). For over a year the united bands held the country in terror. The following winter Gen. Nelson A. Miles marched against them,

whereupon the two Indian bands separated. General Macken¬ zie followed Crazy Horse and defeated his band on the Tongue River, and Miles followed the retreating Indians to the Bighorn Moun¬ tains, where he can scarcely be said to have won any victory over them, thanks to the skilful management of Crazy Horse, even though he used artillery against them effectively. How¬ ever, the pressure on the Indians from all sides became so great that Crazy Horse with 2.000 warriors surrendered the following spring. Suspected of attempting to stir up more trouble he was arrested (7 Sept. 1877). In attempting to escape he was shot by the guard. Consult Hodge, (Handbook of American Indians*

(Washington 1910) ; Miles, (Personal Recollec¬ tions) (1896).

CRAZY-WEED, a common name in the prairie States for species of vetch (Astragalus) of the pea family. They are herbs with purple or yellowish purple flowers, growing on the prairies from Nebraska and Colorado south¬ ward to Texas and New Mexico. They receive the name of crazy-weed from the effect they have upon cattle when eaten by them. Another common name is loco-weed, from which arises a local term for an insanely acting person, who is said to be locoed. The same common names are applied to Oxytropis lamberti, which grows northward from Minnesota to British Colum¬ bia and south to Texas and New Mexico.

CREAM NUT. See Brazil Nut.

CREAM OF TARTAR, a white, crystal¬ line compound of tartaric acid (q.v.) and potassium. Tartaric acid is dibasic, its molecule containing two atoms of hydrogen that are replaceable by metals. Cream of tartar is the substance that is formed when only one of these typical hydrogen atoms is replaced by potassium ; and it is therefore known to chem¬ ists as hydrogen potassium tartrate, or acid potassium tartrate, to distinguish it from the normal potassium tartrate, in which both of the typical hydrogen atoms of the acid are replaced by potassium. Cream of tartar is obtained from argol (q.v.), which forms about vats or casks in which wine is undergoing fermentation. The argol is dissolved in hot water and the solution decolorized by albumin or animal charcoal, the cream of tartar being then extracted bv evap¬ oration and crystallization, and purified by recrystallization. Cream of tartar is soluble in water, but it does not dissolve as freely as the other familiar compounds of potassium. It con¬ stitutes the chief commercial source of tartaric acid and its compounds, and is used in

medicine to some extent. The best baking powders consist of cream of tartar mixed with sodium bicarbonate in the proportion of the relative molecular weights of the two substances. These salts do not act upon each other when dry, but when they are moistened they combine to produce the normal tartrate of potassium and sodium, with the formation of water and the liberation of carbon dioxide gas. The formula of cream of tartar is KH5C406, and that of sodium bicarbonate is HNaCOs. The reaction that occurs is represented by the equation HNaCOs + KH3C406 = H20 + C02-FKNaH4C40«, the last formula on the right being that of the normal tartrate of sodium and potassium. The carbon dioxide gas that is liberated in the re¬ action is retained by the dough or batter with which the baking powder is mixed and serves to make it porous, or ˆlight.®

CREAMERIES, Co-operative. See Dairy

Industry.

CREAMERY. See Dairy Industry.

CREASOTE, a variant spelling of creo¬ sote (q.v.).

CREASY, Sir Edward Shepherd, English historian: b. Bexley, Kent, 12 Sept. 1812; d. London, 27 Jan. 1878. He was educated at Eton and Cambridge. He became Fellow of King's College, , Cambridge, in 1834; was called to the bar at Lincoln's Inn in 1837. He was for about 20 years a member of the home circuit.

In 1840 he was appointed professor of history at the London University, and in 1860 was knighted and made chief justice of Ceylon. His principal works are (The Rise and Prog¬ ress of the British Constitution } (1834) ; (The Fifteen Decisive Battles of the World> (1851), a book famous in both England and America. Less known, though still of considerable merit, are his (Imperial and Colonial Constitutions of the Britannic Empire) ; a (History of the Otto¬ man Turks) (1854-56) ; a ˆHistorical and Critical Account of the Several Invasions of England) ; (The Old Love and the New,* a novel; and a (History of England) (1869-70).

CREATINE, kre'a-tln, or KREATINE, a

crystalline, nitrogenous substance having the formula C4H9N3O2 + H20, and known to chem¬ ists as ((methyl guanido acetic acid.® It exists in the muscular flesh of mammals, birds, rep¬ tiles and fishes, and also, in smaller quantities, in brain-tissue and in urine. It may be ex¬ tracted by chopping up lean muscular flesh (freed from fat), rubbing it with water at about 140° F. and removing the water by pressure. The liquid so obtained is heated on a water bath to coagulate the albumin and then strained. Sub-acetate of lead is added to the filtrate so long as it gives a precipitate, excess of lead is removed by sulphuretted hydrogen and the filtrate is concentrated on a water bath. Crystals of creatine then separate out, the yield being larger if two or three volumes of alcohol are added. The crystals are re¬ dissolved, decolorized by filtration through ani¬ mal charcoal and purified by recrystallization. Creatine crystallizes in monoclinic prisms con¬ taining one molecule of water. Its aqueous solution has a bitter taste and is strongly al¬ kaline to litmus. With silver nitrate it gives a white precipitate, which is soluble in caustic potash. If a small quantity of silver nitrate is added to a saturated solution of creatine, to¬ gether with just sufficient caustic potash to dis¬ solve the precipitate formed, the solution pres¬ ently solidifies to a transparent gelatinous mass, which, when heated, deposits metallic silver. Creatine is dissolved by strong acids, losing one molecule of water and becoming converted into creatinine. It is also decomposed by boiling

with baryta water, yielding sarcosine (C3H7NO2) and urea (CH4N2O). Creatine may be pre¬ pared synthetically by allowing an alcoholic or aqueous solution of sarcosine and cyanamide, CN.NH2, to evaporate spontaneously, crystals of creatine separating out as the evaporation proceeds. See also Creatinine.

CREATININE, or KREATININE, a

crystalline substance having the chemical form¬ ula C4H7N3O, and closely allied to creatine (q.v.), from which substance it may be ob¬ tained by the removal of one molecule of water by the action of mineral acids or dehydrating agents. It may also be prepared directly from human urine, though, according to Johnson, slight differences exist between the substances obtained from creatine and from urine; for example, both reduce Fehling's solution, but the creatinine prepared directly from urine has a reducing power about 20 per cent greater than that prepared from creatine. Differences in solubility are also said to exist. Creatinine crystallizes in prisms, which may be anhvdrous or may contain two molecules of water. It

is very soluble in hot water, its solution being neutral to litmus according to some authorities, but alkaline according to others. It forms well-crystallized salts with acids, and in alkaline solution it slowly takes up water and becomes transformed into creatine. Physiologically, creatinine is to be regarded as a derivative from creatine; for, according to Carpenter, <(the latter predominates in the juice of flesh, almost to the exclusion of the former, while the former predominates in the urine, almost to the exclusion of the latter.®

CREATION (Lat. creatio, from creare, to create), The. Creation is the act of creating or bringing into existence, also something created or caused to exist ; specifically, the act of bringing into existence the universe, likewise the universe itself. The Old Testament account of the creation contained in Genesis i-ii, 4 (first clause), is received by those who accept the literal authority of the Bible. Genesis ii, 4-7 (second clause), contains, according to many of the later biblical critics, another and quite distinct narrative of the creation. According to the first and generally accepted account, God created the heaven and the earth in the course of six — or, including the rest-day, seven — suc¬ cessive days. On the first day he created light, and called the light day and the darkness night ; on the second day he made the firmament and divided the waters ; on the third day appeared the dry land, while the waters were gathered together in seas, and plants

began to grow upon the earth ; on the fourth day the lights were set in the firmament ; on the fifth day God created aquatic and bird life; on the sixth day he made land animals and created man. On the seventh day God rested from his work, and from this part of the account came the institution of the Sabbath, as having been hallowed for man by the example and decree of God himself. Vari¬ ous attempts have been made to bring this nar¬ rative into harmony with the discoveries and speculations of modern scientific and philo¬ sophical thought ; but at the present time there appears to be a feeling, as well among scholars as among people at large, that such endeavors can only be unprofitable; while the record of primitive theorizing upon the origin of the world may well be left to tell its own story, however variously interpreted, to the modern mind.

Other ancient cosmogonies have long en¬ gaged the attention of students, and in the different early accounts of creation brought to light from the literary and monumental re¬ mains of antiquity much valuable material has been found for the study of comparative records bearing upon history and religion. Among the old cosmogonies, that contained in the Baby¬ lonian and Assyrian legend of creation is espe¬ cially interesting, from the points of resemblance between itself and the account above given from the book of Genesis. The two are variously regarded by specialists, some treating them as independent variants of one original tradition or myth, while others hold that the narrative of Genesis is a borrowing from the Babylonian .legend.

It is now more than 30 years since the learned world was startled bv the announce¬ ment that Assyriologists had discovered a remarkable version of the history of the crea¬ tion, which closely resembled the main narra-

tive of Genesis, and appeared to be based upon the archetype from which one of the earliest editors or writers of the Hexateuch drew many of his statements. The credit of the discovery of the cuneiform creation records in the British Museum belongs, undoubtedly, to Sir Henry Rawlinson. L. W. King, of the British Mu¬ seum, has continued

and completed, as far as is possible, up to the present time, the work begun by Rawlinson. As the result of his labors we are able to form a connected idea of the whole of the Babylonian story of the creation. For¬ merly only 21 tablets and fragments inscribed with portions of the legend were known, but now no less than 49 separate tablets and frag¬ ments have been identified as containing por¬ tions of the cuneiform texts of the creation series, and the details of the story can now be followed consecutively.

The great Babylonian poem of creation was divided into seven sections, or tablets, and the whole work was known by the title (Enuma Elish,* which also forms the opening words of the text. It contained 994 lines. Each of the seven sections contained, on an average, 140 lines, and each section was intended to describe the events of one May® of creation. It is diffi¬ cult not to think that such artificial divisions of the legend indicate that we are dealing with a comparatively late recension of it, and this may well be the case when we remember that the oldest copies of it which we possess date from the reign of Assurbanipal (668-626 b.c.) ; no one who takes the trouble to read the seven tablets and who is familiar with ancient cos¬ mogonies and theogonies will have the slightest doubt that the original form of the Babylonian and Assyrian history of creation is many thou¬ sands of years old. It is very probable that the Semitic Babylonians were only the borrowers and not the inventors of this remarkable work.

At the beginning of all things, according to the legend, Apsu and Tiamat were water deities and typified chaos ; to these were born Lahmu and Lahamu, and later appeared Anshar and Kishar, and still later Anu and other gods came into being. One of the fragments of the first tablet mentions the birth of Nudimmud (Ea), and shows that Marduk, who is made to take the leading part in the later tablets of creation, was supposed to be in existence, like Mummu and Gaga. In the earlier episodes of the crea¬ tion story, it is Ea and not Marduk who is the hero, and it was Apsu, a god of chaos, who re¬ belled against the gods. Apsu disliked the new order of things and the creation of the universe for the simple reason that the beings who formed members of the new world disturbed his peace and rest ; as soon as he had made up his mind as to what was likely to happen, he called Mummu, his minister, and with him went to Tiamat and took counsel with her, and com¬ plained that (<he could get rest neither by day nor by night.® The putting of the house of the world into order by the gods destroyed his peace of mind. Of the conflict which took place between Ea and Apsu and his ally Mummu we know little, but that the great god did not succeed in inflicting a decisive defeat on

Apsu and his allies is clear from the fact that, later' Anshar found it necessary to exhort Marduk to do battle with Tiamat. Marduk slew her and split her body into halves. The actual account of the creation of the world by Marduk begins

toward the end of the fourth tablet, where it is said that one-half of the body of Tiamat formed a covering for heaven, and that Marduk, having formed E-shara, made the great trinity of Anu, Bel and Ea to dwell therein.

In the fifth tablet we hear of the fixing of the constellations of the zodiac, the founding of the year, etc., and it seems as if this section contained an account of the creation of vegeta¬ tion. The sixth tablet told the story of the cre¬ ation of man, and it seems as if Marduk made man with the view both of punishing the gods and of providing a creature who should at all times worship him. Marduk, or Bel, instructed Ea to cut off his (Marduk's) head, and the man was formed out of the blood which flowed from the god's body. Marduk is made to tell Ea that he intends to create man from his own blood and from the ((bone® which he will create. The Assyrian word for <(bone® is issimtu, which is the exact equivalent of the Hebrew esem- ((bone,® which occurs in Genesis ii, 23, in connec¬ tion with the account of the creation of woman.

The creation of man was the final act of creation, and when this was accomplished, the gods assembled in their council chamber in Upshukkinaku, with Marduk at their head, and they sung to him a hymn of praise, the text of which forms the seventh section of the creation story and contains 50 addresses to the god. How Marduk managed to survive his decapita¬ tion is not told us, and we can only surmise that he met the gods in their council chamber in some sort of spiritual body. The parallels which may be drawn between parts of this legend and the book of Genesis are taken by many scholars to prove that the Jews borrowed large portions of their religious literature from their kinsmen, the Babylonians, and that the seven days of creation were imagined long be¬ fore the days of Abraham. Consult Johns, C. H. W., (A short bibliography of works on the Babylonian stories of creation and the flood) (Manchester, England, 1913) ; Ball, Sir R. S., (The Earth's Beginning) (New York 1902) ; Bergson, H., (Creative Evolution > (New York 1911) ; Hastings, H. L., (Was Moses Mistaken? or Creation and Evolution > (Boston 1895) ; Muss-Arnolt, W., (The cuneiform account of the Creation and the Deluge > (Chicago 1894) ; Gridley, A. L., (The first chapter of Genesis

as the rock foundation for science and religion1* (Boston 1913).

CREATION OF MAN. See Man, Chris¬ tian Anthropology.

CREATIONISM. (1) In theology, the doctrine that a soul is specially created for each human foetus as soon as it is formed in the womb; opposed to Traducianism, which teaches that the souls of children as well as their bodies are begotten by reproduction from the substance of the parents ; and to Infusion-ism, which holds that souls are pre-existent, and that a soul is divinely infused into each human foetus as soon as it is formed by gen¬ eration. Many theologians, however, regard the mode of the soul's coming into being as a part of the mystery which envelops the whole subject of the existence and transmission of life. (2) a term for that theory of the origin of man which is opposed to evolutionism (see Evolution) ; the doctrine of the creation of all

tilings by the Creator's fiat, and not through evolutionary processes.

CREBILLON, kra-be-yon, Claude Prosper Jolyot de, French novelist: b. Paris, 14 Feb. 1707 ; d. there, 12 April 1777. He was the younger son of Prosper Jolyot de Crebillon (q.v.), and succeeded as an author in an age of licentiousness. For his theological allusions in his novels, especially concerning the papal bull <Unigenitus,) he was imprisoned in the Bastile anid banished from Paris for five years. By the subtleties with which he excuses licentious principles, Crebillon contributed to diffuse a general corruption of manners, before confined to the higher circles of Parisian society. His own morals, however, appear to have been the opposite of those which he portrayed, and we are told of his cheerfulness, his rectitude of principle and his blameless life. He married Lady Stafford, an English woman, to whom he displayed a fidelity remarkable at this decadent period. Of his works the best are (Lettres de la Marquise* (1732); (Tanzai et Neadame* (less licentious, but full of now unintelligible allusions) ; (Les egarements du cceur et de 1'esprit* (1736); (Le Sopha* (1745). It is still a disputed point whether he was the author of the (Lettres de la Marquise de

Pompadour. > Consult Amanton, C. H., (Particularites sur les deux Crebillon * (Paris 1835).

CREBILLON, Prosper Joylot de, French dramatist: b. Dijon, France, 15 Feb. 1674; d. Paris, 17 June 1762. His first piece, (La Mort des Enfants de Brute, * was rejected by the players. His Hdomenee* was brought upon the stage in 1705. The faults of the play were overlooked in consideration of the youth of the author and the promising talent which it dis¬ played, and his talents after the appearance of his ˆtree,* in 1707, were loudly applauded. A taste for unnatural declamation had been ex¬ cited by Corneille's tragedy, ˆodogune,* and this manner was carried to excess by Crebillon in the 'Antree.* In 1709 appeared his (Electre,) which is as declamatory and as intricate as his earlier plays ; yet it suited the taste of the age. His chef-d' oeuvre, at least according to La Harpe, is his <Rhadamiste> (1711). In eight days the <Rhadamiste) passed through two editions, and Paris and Versailles vied with each other in admiring it. Crebillon had been told that his talent lay in the terrible, and thought, therefore, that he could not exert him¬ self too much in scenes of horror. (Xerxes *(1714) exceeded in this respect all that he had before written, but soon disappeared from the stage. (Semiramis) (1717) was severely cen¬ sured, but (Pyrrhus } appeared in 1726 and met with a good reception, contrary to the expecta¬ tion of the author, who, in this work, had ab¬ stained from the frightful and the shocking. When Madame de Pompadour wished to humble Voltaire, Crebillon was thought of as a fit instrument for her purpose. The king gave him the office of censor of the police, a yearly pension of 1,000 francs, and an appointment in the library. Thus freed from pecuniary anxiety, he finished his (Catilineˆ which was repre¬ sented in 1749 with all the pomp that the court theatre could display. To make some atone¬ ment to the character of Cicero, thought to have been wronged in his (Catiline,* he wrote at 76 the triumvirate, or the Death of Cicero, * which was brought upon the stage in his 81st

year. The defects of this piece were over¬ looked, from respect to the age of the author. In general Crebillon shows none of the true elevation of the tragic art, but only an imita¬ tion, sometimes a happy one, of the manner struck out by Corneille. He was a man of a proud and independent character, disdained to flatter the great, and passed much of his life in a condition bordering on poverty. In 1731 he became a member of the Academy. His w'orks were edited best by Didot (1812). There is a Life by the Abbe de la Porte, and a fine essay by Brunetiere in (Epoques de theatre frangais.* Consult Dutrait, (Etude sur Crebil¬ lon * (1895) ; Amaton, C. H., (Particularites sur les

deux Crebillon) (1835).

CR&CHE, krash (Fr. <(crib,® <(manger®), a sort of public nursery where, for a small pay¬ ment or, as in America, usually for nothing, the children of women who have to go out to work are fed, nursed and taken care of during the work hours of the day.

CRECY-EN-PONTHIEU, kra-se on pon-tyey, or CRESSY, a village in the French de¬ partment of Somme, on the Maye, 12 miles north of Abbeville. Crecy has a 15th century church and is celebrated on account of the bril¬ liant victory obtained here, 26 Aug. 1346, by Edward III, with 40;000 English soldiers, over a French army amounting, according to Frois¬ sart, to 100,000 men under the command of the Count of Alengon. In this great battle perished the flower of the French chivalry, as well as the blind king of Bohemia, who was fighting on the side of France. The Black Prince dis¬ tinguished himself greatly, bore the brunt of the fight, and gained his spurs. After this battle, tradition says, the Black Prince assumed the crest of the slain king of Bohemia, which con¬ sisted of three ostrich feathers with the motto Ich dien, <(I serve,® but this is more than doubt¬ ful. The battle of Crecy was one of the first in which cannon were used by English troops. Pop. about 1,400. Consult .George, (Battles of English History* (New York 1895) ; and Oman, (History of the Art of War* (London

1898).

CREDENCE, a small table placed near the altar or communion table, at its south side, on which the bread and wine intended for conse¬ cration are placed in readiness. In this con¬ nection it is used especially in the Roman Catholic and Episcopal churches. In the Greek Church this is called the trapeza protheseos, or simply prothesis, but is always placed north of the altar, usually in a structural side-chapel. It was sometimes used in the English Church. The word is generally used to denote a small side table or buffet, on which dishes were placed or kept before meals.

CREDI, kra'de, Lorenzo, Italian artist: b. Florence 1459; d. there, 12 Jan. 1537. He was a fellow pupil of Leonardo da Vinci in the school of Verocchio, and so closely followed his style that some of his copies of Leonardo's works are scarcely to be distinguished from the orig¬ inals. His (Holy Families, *of which he painted a great number for private collections, are gracefully designed and highly finished. His most esteemed*

works are a (Madonna and Child with Saints Julian and Nicholas,) now in the Louvre, and the <Nativity) at Florence. Two very fine works are the (Annunciation and

the <Venus> in the Uffizi. The Metropolitan Museum has a (Madonna Adoring the Christ Child' ; and the Boston Art Museum a beauti¬ ful boy's head. He did some sculpture also, being designated by Verocchio to complete his statue of Colleoni.

CREDIT, Economic and Public. In

political economy the term credit is used to sig¬ nify (1) the ability of a person to secure a sum of money or its equivalent on a promise to pay the same sum or its equivalent at some fu¬ ture date; (2) claims for future payment of money or its equivalent. It implies confidence of the creditor in the debtor; and the credit system implies general confidence in people's ability to meet their obligations. Credit may also rest upon the fact that a person possesses readily salable commodities, and the extent of credit may depend in large degree on the vol¬ ume of such merchandise, though at times per¬ sonal characteristics greatly influence the line of credit extended or allowed. In a mercantile community credit is used more extensively than in an agricultural community since mercantile capital can be converted into cash more readily than agricultural.

The chief function of credit is the transfer-ing of capital from those who own it to per¬ sons who presumably expect to make a profit that exceeds the interest on the loan or in the case of goods sold on time (a disguised loan transaction) an excess of price usually exacted in credit sales. Thus while itself not a pro¬ ductive agent, credit increases the productive power of capital. The modern credit system does not rest on good faith alone but its development through efficient credit institu¬ tions and its extensive use in commercial trans¬ actions are made possible by means of bonds, drafts, checks, promissory notes, etc., which have been standardized through the intermedi¬ ation of a credit institution such as a bank. Thus the secondary function of credit

is to per¬ mit the exchange of commodities without the intervention of coin money. By means of a credit system a comparatively small stock of money can be made to do duty for carrying on a number of different transactions, but it is indispensible for every good system of credit that money be instantly available when required. When credit media of exchange are used, business may be violently disturbed by any doubt cast upon the general solvency of busi¬ ness men, whereupon occurs a sudden contrac¬ tion of the medium of exchange, with the resultant inability of producers to sell their commodities and a depression in prices. See Crises, Economic.

Public credit is the confidence which men entertain in the ability and disposition of a nation to fulfil its engagements with its cred¬ itors, or, in other words, the ability of public bodies to buy supplies or to contract to buy them. As more generally used the term means the borrowing capacity and rate at which money can be secured for the public service. The term is also applied to the general credit of the indi¬ viduals in a nation. The credit of the govern¬ ment does not always flourish or decline at the same time as private credit, yet there is some corresnondence between the two, as general individual confidence can rarely if ever persist in the midst of distrust of the government, and

a firm confidence in the government tends to promote a corresponding confidence among citizens. A government is usually supposed not to possess complete public confidence if its se¬ curities sell at less than par, though in times of emergency the strongest government might be compelled to accept unfavorable terms for a loan, either by paying exorbitant interest or accept¬ ing less than the face value of the obligation in payment. See Debts, Public; Debtor and Creditor, Laws of.

Bibliography. — Blanton, B. H., (Credit, Its Principles and Practice’ (New York 1915) ; Church, F. P., (Modern Credit Methods’

(Detroit 1912) ; Dunbar, C. F., (Chapters in the History and Theory of Banking) (New York 1892) ; Fisher, E. D., (Relation between Fixed and Fluid Credit’ (Boston 1913) ; Haggerty, J. E., (Mercantile Credit) (New York 1913) ; Howe, R. H., (The Evolution of Banking’ (Chicago 1915) ; Ingle, William, (Credit, Ref¬ ormatioˆ (in Annals of the American Acad¬ emy of Political and Social Science, Vol. LXIII, pp. 97-104, Philadelphia 1916) ; Johnson, J. F., (Money and Currency’ (Boston 1905) ; Kinley, D., (Money’ (New York 1904) ; Laughlin, J.

L., Principles of Money' (Chicago 1903) and (Credit' (Chicago 1903) ; MacLeod, H. D., (Theory of Credit' (2d ed., London 1897) ; Mitchell, W. C., (Business Cycles' (Berkeley, Cal., 1913) ; Page, E. D., Character and Credit' (New York 1904) ; Pendergast, W. A., (Credit and Its Uses' (New York 1906) ; Taylor, W. G. L., (The Credit System' (New York 1913) ; Veblen, T. B., (The Theory of Business Enterprise' (New York 1904).

CREDIT, Instruments of. See Banks and Banking — Commercial Paper.

CREDIT, Letter of, an order given by bankers or others at one place to enable a per¬ son to receive money from their agent or agents at another place ; when it is an order on more than one person or firm it is known as a cir¬ cular letter of credit.

CREDIT FONCIER, kra'de' foii'sya', in France and other continental countries, a mode of raising money on land, the peculiarity of which is that the advance must not exceed one-half of the value of the property pledged or hypothecated, and that the repayment of the loan is by an annuity, which includes the inter¬ est and part of the principal, terminable at a certain date. Several companies have been es¬ tablished by the government with the privilege of making loans. The movement was initiated b}' L. Wolowski and was accepted by govern¬ ment decree in 1852. Its name became the ((Banque Fonciere of Paris." Similar institu¬ tions at Nevers and Marseilles were amalga¬ mated into one under the title of <(Credit Fon¬ der de France." Consult Wolowski, L., (De la Mobilisation du Credit fonder' (in Revue Wo¬ lowski, Vol. X, p. 241, 1839) ; Josseau, Chonsky and Delanoy, (Des Institutions de credit fonder et agricole dans les principaux Etats de l'Eu-rope' (1851) ; Girault, A., (Le Credit foncier et ses privileges'. (Paris 1889, in Bulletin de la Societe de legislation comparee, 1891, pp. 232-237).

CREDIT INSURANCE. See Insurance, Credit.

CREDIT MOBILIER, kra-de mo-be'lya (Fr. kra-de mo-be-lea), a large company, in¬ corporated under the name of Societe generate du Credit Mobilier, in France in 1852, and sanc¬ tioned by the then existing government. Its objects were (1) To take in hand and originate trading enterprises of all kinds, on the principle of limited liability. (2) To supersede or buy up trading companies ; and to substitute scrip and shares of its own for the shares and bonds of the company. It had at the time of its formation a capital of 60,000,000 francs, and did a very extensive business. In 1855 the directors proposed to issue bonds to the amount of 240,000,000 francs, but financiers feared so large an amount of paper currency, and the issue was forbidden by the government. The prosperity of the companj' declined after this, and the management changed in 1871.

CREDIT MOBILIER OF AMERICA,

the source of the most tremendous legislative scandal in American history. The national gov¬ ernment in 1864 had chartered a ((Union Pacific Railroad,® with $100,000,000 capital, to complete a transcontinental line west from the Missouri River; and offered to assist it by a loan of $16,000 to $48,000 a mile according to location, over $60,000,000 in all, and a land grant of 20,- 000,000 acres, worth $50,000,000 to $100,000,000. Even this offer attracted no subscribers ; it meant building 1,750 miles of road through desert and mountain, at enormous cost of freightage for supplies, with frequent bloody encounters with Indians, and no probable early business to pay dividends. Then a House committee, of which Oakes Ames (q.v.) was a member and probably advised the plan, added an authorization to the railroad to issue its own bonds dollar for dollar with the government's, the former to be first mortgage and the latter second; the bonds might be issued 100 miles in advance of con¬ struction. In other words, the government assumed all the risk. Still the stock had no marketable value on its own basis as an invest¬ ment, but only through the government's offers in excess of probable cost, which made it worth while for capitalists to take up the stock and earn these offers. Mr. Ames, chief of the enterprise, and a few associates, knew that this cost would not be much more than half the government's loan and gift together. To gain possession of the balance; it was decided to form the stockholders of the Union Pacific into a duplicate corporation under another name, as a construction company, to which the railroad company should turn over its bonds and stocks as payment for work and supplies. Thus the Union Pacific would be stripped of everything but its roadbed and equipment, while its double would pay business rates and pocket the remainder. Besides Mr. Ames, the chief managers were Thomas C. Durant, vice-president of the Union Pacific (John A.

Dix being president), Cornelius S. Bushnell and John B. Alley. They and their associates bought up a moribund Philadelphia concern called the ˆPennsylvania Fiscal Agency,® chartered in 1859 and organized as a loan and contract company in 1863, and rebap¬ tized it the ˆCredit Mobilier of America,® oddly, as its French prototype was bankrupt and not in good savor. The Union Pacific stockholders took the same amount of stock in it as in the road. The history of the details by which it accomplished the objects of its being cannot

be given here. In 1866 the government extended its offer to such mileage as the Central Pacific should build east from its California lines, and the two companies began a race to secure the benefits. Probably the Central Pacific gained as much profit as the Credit Mobilier, but that was legitimately earned for its stockholders ; and even the Credit Mobilier's action would have been less obnoxious but for the collusion of gov¬ ernment directors and public representatives. The net result was that the nation paid $94,650,287.28, and the Credit Mobilier $50,720,- 958.94, leaving a profit of $43,929,328.34, count¬ ing at par the stock and bonds with which the Credit Mobilier paid itself ; on the statement of the trustees, they realized only $23,366,319.81 in cash. But this was certainly much understated; and even so, it was all gained in two years, to December 1868. But the rise of Credit Mobilier stock in a few months from five cents on the dollar to three or four hundred and then out of the market, the payment of over 500 per cent a year dividends, the knowledge that there was only one place they could come from, and the inference that the government trustees must be incompetent or worse, aroused suspicious excitement. Then the promoters began to quarrel bitterly over the division of spoils, and to sue each other, and one of them came within an ace of exposing the whole, and outsiders demanded a share as the price of silence or assistance. The Credit Mobilier needed addi¬ tional legislation, and procured it by <(special legal expenses® ; and in the latter part of 1867 the suit of an outsider, H. S. McComb, to obtain stock to which he alleged a claim, laid the mine for the final explosion. Representa¬ tive Elihu B. Washburne of Illinois had moved an investigation and the fixing of transportation rates, and in alarm Mr. Ames (also a repre¬ sentative) came to Washington with 343 shares of stock, then commanding 100 per cent pre¬ mium, but which he sold to congressmen and leading government officials at par. In a phrase that became classic, he afterward said that he had put the stock Svhere it would do the most good.® McComb asserted his right to 375 shares, and to quiet him Mr. Ames, in Febru¬ ary, 1868, told him the names of the public men to whom he had <(sold® the stock.

McComb bided his time, and in the presidential campaign of 1872 published those names, or what he alleged to be those ; but he added others, or was misinformed, as some of the accused had per¬ fectly clean hands. The list was shocking: the Vice-President of the United States (Colfax), the Vice-President-elect (Wilson), the speaker of the House (Blaine), and many other emi¬ nent names. When the third session of the 42d Congress opened in December 1872, the speaker descended to the floor and demanded a com¬ mittee of investigation containing a majority of his political opponents ; which was appointed, with Luke P. Poland of Vermont as chairman. It made a report 18 Feb. 1873, which proved that the speaker had been offered the stock but had refused to touch it, as had Conkling, Bayard, Boutwell and others. Some had taken it but returned it when lawsuits were threatened, without retaining the dividends; some kept it and justified it openly as a business investment; some kept it and the dividends till investigation was imminent and possibly kept the dividends altogether, a few kept both and attempted to

deny or explain away the ownership. The report recommended the expulsion of Oakes Ames for using the stock, to influence the votes of members of Congress; and of James Brooks, a government director of the Union Pacific, for using his position to obtain stock for himself or his family. The vote on the report was deferred for a week, and the House merely censured both, who by a strange coincidence died shortly after, only a week apart. In the Senate, an investigating committee recom¬ mended the expulsion of Senator Pomeroy of Kansas, but no action was taken upon it. Con¬ sult Crawford, (The Credit Mobilier of Amer¬ ica* (1880) ; Hazard, same title (1881), paper before the Rhode Island Historical Society; Scribner's Magazine , (The Credit Mobilier) (March 1874).

CREDITORS. See Corporations, Legal.

CREDITS. See Banks and Banking — The Functions of Banks; World's Systems and International Banking.

CREE (kre) INDIANS, a tribe of North American Indians of Algonquian stock, living on several reservations in Manitoba and Assiniboia, near Lake Winnipeg and the Saskatchewan River. The tribe numbers about 10,000. They are on friendly terms with the Assiniboin, but until brought under governmental control were constantly at war with the Sioux and Blackfeet. Their bands are commonly grouped in two main divisions: Plain and Wood Crees. After obtaining firearms, they began to harass weaker Athabascan tribes, as far as the Great Slave Lake and the Rocky Mountains, but retired to their present position. (See Algonquian). Con¬ sult Skinner, (Notes on the Eastern Cree and Northern Saulteaux> (American Museum of Natural History, 1911).

CREECH, Thomas, English classical scholar: b. Blandford, Dorsetshire, 1659; d. Ox¬ ford, June 1700. He was educated at Wadham College, Oxford, elected Fellow of All Saints College in 1683, and was head master of Sher¬ borne School from 1694-96. He returned to Oxford, and in a fit of melancholy committed suicide. He owes his fame almost exclusively to his translation of Lucretius, the poetical merit of which is not very great, although, in the versification of the argumentative and mechan¬ ical parts, considerable skill is exhibited. As an editor of Lucretius, he is chiefly valuable for his explanation of the Epicurean philosophy, for which, however, he was largely indebted to Gassendi. He translated also the elegies of Ovid, two eclogues of Virgil, some of Plutarch's 'Hives,* Theocritus, thirteenth satire of Juvenal, *etc.*

CREED. See Creeds and Confessions.

CREEDE, Colo., town and county-seat of Mineral County, on the Denver and Rio Grande Railroad; 35 miles northwest of Del Norte, and 165 miles southwest of Denver. It is in a narrow gulch on Willow Creek, high up among the mountains, and is engaged exclu¬ sively in mining, having been formerly noted for its highly productive silver mines. Since 1903, however, the mining of lead and zinc has been more profitable. Wagon Wheel Gap, Hot Springs and Antelope Springs are of scenic

interest and make the region attractive for students. It is named after N. C. Creede, who staked the first claims here in 1889. Nearly de¬ stroyed by fire in 1892, it was rebuilt and has public schools, weekly newspapers and a na¬ tional bank. Pop. 741.

CREEDMOOR, a rifle range belonging to the State of New York, located near Queen's station on the Long Island Railroad, just within

the boundaries of Greater New York. Each regiment of the 1st and 2d brigades of the National Guard is required to practise at Creedmoor at stated times. The range extends over 85 acres, has 30 targets and can be used at any distance from 50 to 1,200 yards. The range was founded as a private enterprise by the National Rifle Association and was later acquired by the State. Creedmoor village is the seat of a State insane asylum. Pop. 600.

CREEDS AND CONFESSIONS (Lat.

credo, <(I believe®; confessio (<I confess®), for¬ mularies of religious doctrine, rules, symbols or testimonies of faith for public use, setting forth with authority articles of belief which are re¬ garded by the different Christian sects as nec¬ essary for salvation.

Of these formularies, the earliest is the Apostles' Creed which developed from the con¬ fession of Peter, Matthew xvi, 16, and from the baptismal invocation which determined the trinitarian order and arrangement. Out of the controversies which arose over differences of opinion on doctrinal points came the creeds of ecumenical councils of bishops ; the Nicene Creed, a.d. 325 ; and the Creed of Chalcedon, a.d. 451. Between these two, about 430, ap¬ peared the Athanasian Creed, attributed tO' Athanasius, bishop of Alexandria (d. 372). The early existence of the Apostles' Creed is inferred from a passage in the work (Against Heresies, *written by Saint Irenaeus, who died about 202, being then 60 or perhaps 80 years old. The order in which the topics of the Apostles' Creed occur in the passage gives force to the conjecture based on its phraseology. Irenaeus says of the Christians of his day: <(A11 teach one and the same God the Father, and believe the same ceconomy of the incarna¬ tion of the Son of God, and know the same gift of the Spirit, and meditate on the same precepts, and maintain the same form of con¬ stitution with respect to the Church, and look for the same coming of the Lord, and wait for the same salvation of the whole man — that is, of the soul and body.* Rufinus, who lived in the latter half of the 4th century, gives us the "symbol® of the apostles as it was received by the Roman Church of his time ; it is shorter than the form that is now current, but it con¬ tains nearly, all the articles of the now existing creed and in the same words and the same order. In 870 the Eastern or Greek Church under Photius, archbishop of Constantinople, separated from the Western or Mother Church of Rome, over the insertion of filioque — and the Son — in the Creed, two and half centuries before at the Council of Toledo, Spain, held in 589. The doctrinal system of the Greek Church underwent no further change, but the Reformation called forth a number of con¬ fessions or doctrinal manifestoes against Prot¬ estantism and some against the Church of Rome; namely, the

Confessions of Gennadius,

a.d. 1453 ; the answers of the Patriarch Jere¬ miah to the Lutherans, a.d. 1576; the Confes¬ sions of Metrophanes Critopulos, a.d. 1625 ; the Confession of Cyril Lucar, a.d. 1631 ; the Ortho¬ dox Confession of Mogilas, a.d. 1643; and the Confession of Dositheus, a.d. 1672. Other Eastern Christian sects with slight differences of creeds comprise Nestorians, Jacobites, Copts, Armenians. In 1517 Luther's protest over abuses in Church practice initiated both the Protestant Reformation and the Catholic Counter-Reformation and almost contempo¬ raneous with the Tridentine standards of the Council of Trent 1545-63 confirming points of Catholic doctrine, from 1530 to 1577 appeared numerous Protestant Evangelical Confessions of Faith. The first of them, the Augsburg Con¬ fession ("Confessio Augustana®) drawn up by Melanchthon and presented to the Emperor Charles V at Augsburg in 1530, is the most authoritative exposition of the Lutheran tenets ; it was added to, explained or modified by other similar documents, as the (Apologia Confes-sionis Augustanae) (also by Melanchthon), a defense of the Confession of Augsburg; the Smalkald Articles (1536), drawn up by Luther; and the Formula of Concord, designed to recon¬ cile differences among the Lutherans and to check a movement toward Calvinism. The chief confessions of faith formulated by the "Re¬ formed,® as distinguished from the followers of Luther are the (Confessio Tetrapolitana> (confession of the four towns, namely, Strassburg, Constance, Meiningen and Landau), and two or three other confessions. These all pre¬ ceded the Calvinian Confessions, but they con¬ tain tenets near allied to those of Calvinism and Presbyterianism. Then came the confessions drawn up by John Calvin or under his influ¬ ence, the first of these, (Consensus Tigurinus) (the Zurich agreement), drawn up by Calvin himself, was designed to bring the followers of Zwingli and of Calvin into one communion; the others were the Gallic (or French), the Belgic (or Dutch), and a second Helvetic (or Swiss) confession. These were followed about 50 years after the latest of them, by the cele¬ brated Decrees of the Synod of Dordrecht (1619). The Articles of the Protestant Epis¬ copal or Church of England's faith were, when first promulgated (1552), 42 in number, but later that number was reduced to 39. In 1646 was published the Westminster Confession of Faith by

the Presbyterian divines of England, Scotland and New England, which in the year 1903 underwent amendment by vote of the Presbyterian churches of the United States. (See Canon Law; Christian Doctrine, Development of; Christology; Reformation; Counter-Reformation; and separate articles on different creeds and confessions). For further creeds of modern evangelical denomi¬ nations consult Schaff, P., (Creeds of Christen¬ dom, > (3 vols., New York 1877) ; also Curtis, W. A., (A history of creeds and confessions of faith in Christendom and beyond, with historical tables) (Edinburgh 1911); Briggs, C. A., (The fundamental Christian faith ; the origin, history and interpretation of the Apostles' and Nicene creeds) (New York 1913) ; Dix, M., (The Creed : a full and sufficient statement of the Christian faith) (New York 1905) ; Skrine, J. H.. (Creed and the Creeds, their function in religion > (London 1911).

CREEKS (named for the same reason as or in translation from their Algonquin name, Muskoki, "creeks,® from their many-rivered land), a once powerful confederacy of Gulf In¬ dians, the strongest Indian power south of New York, except the Cherokees. They occu¬ pied a large part of Georgia and Alabama, and formed the largest section of the Muskhogean stock. The Muskogi were the dominant tribe, and their language the lingua franca of the confederacy; others at the outset were the Coosa, Kasihta, Kawita (Coweta), etc.; later came in the Alibamu, Hitchiti, Kosati, Yamasi (Yemassee), Yuchi or Uchee, Natchez and others, and a band of Shawanoes had been in¬ corporated by desire or force. The Seminoles ("wanderers®) of Florida had broken away from them. They numbered probably 30,000 at their highest. Lying between the English spheres in Georgia, the Spanish in Florida, and the French at Mobile, and in Louisiana, each power bid for their support, and they shifted from side to side; but the destruction of the French power and the cession of Florida 1763-83, left the English supreme. In 1763 they had 5,860 warriors and 50 towns ; the latter of log houses plastered outside with clay, and as with all the Southern tribes, built in an oblong with a space in the centre for public ceremonials, like the classic forum or agora. Their head chief was called mico, besides whom they had a war chief ; no chiefs seem ever to have been deposed, but new ones added, and at last they became so burdensome that their number was limited to 500. In the Revolution the Creeks took the English side, and after it many Southern Tories took refuge among them and kept them stirred up to hostility; Congress had determined on war, but in 1790 the chiefs were induced to visit New York, and made peace for both Upper and Lower Creeks and Seminoles. This did not prevent attempted raids on

Nashville and Knoxville 1792-93. A number of treaties were made with them involving cessions of land in the years after 1786; and from 1800 on, a number of them settled in Louisiana, and later in Texas, where they remained on a reserva¬ tion till reunited with the others in 1872. In the War of 1812 the English induced one sec¬ tion of them to rise against the Americans, and they perpetrated the massacre of Fort Mimms, 30 Aug. 1813; but American vengeance fell on innocent and guilty alike, and the main fighting force was finally defeated and slaughtered out at Horseshoe Bend, 29 March 1814. Over 2,000 warriors had been killed and their lands rav¬ aged and towns burnt, and they submitted. This gave an impetus to the Georgian impatience to have Congress fulfil its promises of buying up the Indian titles and deporting the tribes; but the obstinate refusal of the tribes to consent led to trickery and violence to obtain the result. (See Cherokee; Cherokee Nation v. Georgia). The party of consent made a treaty 12 Feb. 1825, ceding all their Georgia and part of their Ala¬ bama lands for equivalent lands in Indian Terri¬ tory and $400,000 in cash; it was made through their chief, William McIntosh, who was at once put to death according to their law. But by a treaty of 24 Jan. 1826, at Indian Springs, the complying party ceded most of their Georgia • lands, and by 1828 the other section had been bought over to ratify it. In 1836 some of the Creeks joined the United States forces against

the Seminoles, but others began raiding Georgia and Alabama villages. Scott reduced them, and the government at once began deporting them to the Arkansas ; 24,594 were removed, and 744 left behind. The government tried to Chris¬ tianize and civilize them, but they fiercely re¬ fused either missionaries or schools; especially Christianity, which to them was a badge of their negro slaves. In 1857 they numbered 14,888. In the Civil War they divided, and after three battles the Confederate section drove the other into Kansas, where many perished, and 1,000 entered the United States army. After the war they were forced to cede 3,000,000 acres of land, for $975,000. Their government is the same as that of the Cherokees. The num¬ ber in 1915 was 6,873 of Indian blood. The en¬ tire "nation,® white, negro and Indian, num¬ bered in 1915, 18,776. At that date the total area of the Creek Nation was 3,079,095 acres, of which 16,016 acres were reserved for town sites, railroad rights of way and other purposes ; 2,997,114 acres were allotted to 18,172 citizens and freedmen; and 63,470 acres were sold. The tribal affairs of the Creek Nation, wTith the ex¬ ception of the completion of equalization pay¬ ments had been disposed of, and the former nation was incorporated in the United States.

CREELMAN, George Christie, Canadian educator : b. Collingwood, Ontario, 9 May 1869. He was educated at the Collegiate Institute, Col¬ lingwood, the universities of Toronto, Cornell and Wisconsin, and Michigan Agricultural Col¬ lege. He was assistant professor of biology at Mississippi Agricultural College 1889-92, and held the professorship from 1892-97. He was superintendent of the Farmers' Institutes of Ontario from 1897-1904, and since the latter year has been president of the Ontario Agri¬ cultural College, Guelph.

CREELMAN, James, American war corre¬ spondent and journalist: b. Montreal, Canada, 12 Nov. 1859; d. 12 Feb. 1915. He entered the service of the New York Herald in 1877 ; was an editorial writer and correspondent 1877-89; editor of the London edition 1890, and of the Paris edition 1891-92, when he became editor of the New York Evening Telegram. He repre¬ sented the New York World in the China-Japanese War of 1894; the New York Journal in the Graeco-Turkish War 1897, the Spanish-American War 1898, where his gallant conduct met with wide and well-deserved recognition, and the Philippine insurrection 1899. He was a volunteer aide on General

Lawton's staff in the Philippines. From 1900 to 1906 he was a special and editorial writer on the New York World, and from 1906 to 1910 was associate editor of Pearson s Magazine. He was a member of the New York board of Education (1911-12), and president of the Municipal Civil Service Com¬ mission (1911-13) ; and during the following years covered important political assignments for the Evening Mail and the New York American. He has published (On the Great Highway ' (1901) an account of his travels as a correspondent; (Eagle Blood' (1902), a novel.

CREEPER, a local name of a variety of small birds. The term is usually distinguished by prefixes, but most frequently used for the tree-creepers (Certhiidce) . With the one excep¬ tion all of the 12 or 14 species and 5 genera are confined to the Old World, those of Africa and

Australia being less typical than the north tem¬ perate Certhia. The common or brown creeper (Certhia familiaris) has a slender curved bill, strong feet with short tarsi, 12 stiff, acuminate tail feathers, and brown plumage streaked with white. In a number of varieties it occurs in temperate North America and Europe, breed¬ ing mostly to the north. It is a common little bird in open woodlands. Encircling trees spirally from the base upward, it clings to the bark in the manner of woodpeckers by means of the feet, aided by the stiff tail feathers, and picks insects and their eggs from the crevices with its sharp bill and slender exsertile tongue.

CREFELD. See Krefeld.

CREIGHTON, kra'ton, James Edwin,

Canadian-American philosopher, teacher and writer: b. Pictou, N. S., 8 April 1861, graduated from Dalhousie College 1877, and studied phi¬ losophy at Cornell University and at the uni¬ versities of Leipzig and Berlin; Ph.D. Cornell University 1892, LL.D. Queens University 1903; Sage professor of logic and meta¬ physics in Cornell University since 1895; editor The Philosophical Review and American editor (Kant-Studien.' He was the first president of the American Philosophical Society, which was organized in 1902. He has published (An Introductory Logic ' (1898), been a frequent contributor to philosophical journals, and made important translations from the German.

CREIGHTON, Louise von Glehn, Eng¬ lish historian: b. Sydenham, England, 7 July 1850. In 1872 she was married to Rev. Mandell Creighton (q.v.), then rector of Embleton, Northumberland, but subsequently bishop of Peterborough 1891-97, and bishop of London 1897-1901. She is the author of lives of the Black Prince, Sir Walter Raleigh and the Duke of Marlborough, in Longman's (Historical Biog¬ raphies ' ; (England a Continental Power' ;

(Social History of England' ; Government of England) ; (First History of England' ; (First History of France' ; (Heroes of European His¬ tory' ; and edited her husband's (Life and Letters.'

CREIGHTON, Mandell, English Angli¬ can prelate and historian: b. Carlisle, 5 July 1843; d. Fulham, London, 14 Jan. 1901. He was educated at Merton College, Oxford; ordained deacon in 1870, and priest in 1873. He was vicar of Embleton, Northumberland, 1874-84, and in the latter year was elected to the Dixie professorship of ecclesiastical history at Cam¬ bridge, being the first occupant of the chair. In 1885 he became canon residentiary of Wor¬ cester Cathedral, but in 1891, on his appoint¬ ment as bishop of Peterborough vacated both that post and his professorship. He also became Privy Councillor. In 1897, he was appointed bishop of London. The most important of his numerous historical works is his <History of the Papacy During the Reformation' (1882-94). Other publications of his include Primer of Roman Historv' (1875) ; (Life of Simon de Montfort' (1876) ; (The Age of Elizabeth' (1876) ; (The Tudors and the Reformation' (1876); (Cardinal Wolsey' (1884); ˆCarlisle' (1889) ; (The Early Renaissance in England' (1895) ; (The English National Character' (1896) ; (Story of Some English Shires'

(1897); Persecution and Tolerance'; (Counsels for Church People' ; (Historical Essays and

Reviews > (1902). He founded the < English Historical Review } in 1886, and acted as editor till 1891. At the 250th anniversary of Harvard University in 1886, he represented Emmanuel College,

Cambridge. Consult his wife's *Life and Letters of Mandell Creighton) (2 vols., London 1903, new ed., 1913).

CREIZENACH, kri'tse-naH, Theodor Adolf, German poet and literary historian : b. Mainz, 16 April 1818; d. 5 Dec. 1877. He was educated at Giessen, Gottingen and Heidelberg, and was prominent among the Jews in Frank¬ fort until his conversion to Christianity in 1854. After that time he taught in the public schools in Frankfort, becoming professor of history and literature at the gymnasium in 1863. He wrote poems published in two volumes (1838 and 1848) and edited the letters of Goethe and Marianne von Willemer.

CREMA, kra'ma, Italy, episcopal city in Lombardy, province Cremona, in a beautiful plain on the left bank of the Serio, 25 miles east of Milan. It was founded about 570 by the Lombards, and was destroyed in 1159 by Fred¬ erick Barbarossa, for taking part with the Guelfs. It was rebuilt in 1185. It is now a well-built town, enclosed by a brick wall and a ditch, and containing an old castle, a cathedral dating from the middle of the 14th century, a picture gallery and several educational institu¬ tions. Chief products of the district are wine, fruit, flax, hemp, rice and cheese; lace, silk and linen goods are manufactured here, which are famous throughout Europe. Pop. 11,411.

CREMATION OF THE DEAD, the prac¬ tice of disposing of the bodies of the dead by reducing them to ashes, instead of by burial. The custom is of ancient origin, and has been revived in modern times. In Greece burial was practised through the 5th century b.c., but with the spread of belief in a future life and the need of purification by fire, cremation became common. It was the Roman custom also, and only with Christianity did earth-burial become the rule in European civilization. Within the last few decades the conviction has spread that a more rapid and sanitary method of disposal must be substituted for burial, especially in the great centres of population. To find enough land for burial purposes is be¬ coming a more and more difficult matter. If 4,000 corpses are crowded into an acre, and a mortality rate of 15 per 1,000 be assumed, then nearly four acres per 1,000,000 population are required annually to bury the dead. A computa¬ tion of population, death rate and space re¬ quired for burial will show that unless the cus¬ tom is changed, much of the available space in the vicinity of all large cities will eventually be required for burial purposes. The sanitary objections to burial are of still greater import¬ ance than the economic difficulties. Eminent scientists advocate that while cremation remain optional for ordinary cases, it should be made obligatory when death is due to such transmis¬ sible diseases as

smallpox, diphtheria, scarlet fever, typhoid fever and tuberculosis. In cases of epidemics and after battles, when large num¬ bers of bodies are to be disposed of at once, cremation is deemed especially advisable. It is also pointed out by the advocates of crema¬ tion that where burial is resorted to, even though the cemetery be located at a distance vol. 8 — 12

from dwellings, there must be contamination of the water and the air, because they are the only means of carrying off the products of dissolu¬ tion. In these days of reaching out for streams to supply reservoirs for cities and towns, it becomes a difficult problem to ensure protection of the water supply from burials in the same watershed.

An objection to cremation, in the minds of some, is that trace of the dead is obliterated from the sight of the living. Aside from this sentimental objection, the chief argument against cremation is the medic.o-legal one, that with the burning of the body possible traces of crime are obliterated. Frederick L. Hoffman, in a paper on (Cremation as a Life Insurance Problem) (Sanitarian for January 1901), calls atten¬ tion to this phase of the subject and points out that 64 of the 528 persons cremated at Saint Louis, Mo., in 1895-99 died from accidents, violence or suicide. In view of the number of murders, by poison or otherwise, that are ‘com¬ mitted to obtain insurance money, it is recom¬ mended that very special precautions be taken to ascertain the exact cause of death before issuing a permit for cremation. In 1873 there was a strong agitation in New York, more or less echoed in other parts of the United States, in favor of cremation, and the newspapers pub¬ lished numerous opinions of eminent physicians and others to the effect that burial grounds were an injury to the health of the living, especially in populous sections. There was a similar movement in the leading countries of Europe about the same time. In 1876 Dr. F. Julius LeMoyne established the first crematory in the United States, at Washington, Pa., the first incineration being that of the body of Baron de Palin, in December of that year. This was a semi-private institution, the first thrown open to the general public in this coun¬ try being the Fresh Pond crematory, operated by the United States Cremation-Company of New York. Others were built in leading cities, there being a total of 24 at the close of the year

1900.

There are now crematories at the following places: Ancon, Panama; Baltimore, Md. : Bos¬ ton, Mass. ; Buffalo, N. Y. ; Cambridge, Mass. ; Chicago, Ill. ; Cincinnati, Ohio ; Cleveland, Ohio ; Davenport, Iowa ; Denver, Colo. ; Detroit, Mich.; Fort Wayne, Ind. ; Fresno, Cal.; Hono¬ lulu, Hawaii ; Indianapolis, Ind. ; Lancaster, Pa. ; Linden, N. J. ; Los Angeles, Cal. ; Middletown, Conn. ; Milwaukee, Wis. ; Minneapolis, Minn.; Montreal, Canada; New York, N. Y. ; North Bergen, N. J.; Oakland, Cal.; Omaha, Neb.; Pasadena, Cal.; Philadelphia, Pa.; Pitts¬ burgh, Pa. ; Portland, Ore. ; Rochester, N. Y. ; Sacramento, Cal.; San Diego, Cal.; San Fran¬ cisco, Cal. ; Seattle, Wash. ; Spokane, Wash. ; Springfield, Mass. ; Saint Louis, Mo. ; Saint Paul, Minn.; Tacoma, Wash.; Troy, N. Y. ; Vancouver, B. C. ; Washington, D. C. ; Wash¬ ington, Pa. ; Waterville, N. Y.

The total number of cremations, distributed among these 45 crematories, had risen to 86,- 006 at the end of 1913, the last year for which statistics are available. The total for the year 1913 alone reached 10,183.

In the earlier furnaces body and coffin were burned separately, but in the latest furnaces the remains are incinerated in the casket, with¬ out handling, as received. A chapel is connected

with the crematorium, where services may be held if desired. The casket is then lowered into the incinerating room, and, after metal handles and name plate are removed, introduced into the retort. The heat is so intense that after a few hours only the ashes of the bones remain, all else, including the structure of the casket, having disappeared in light ash or gaseous products. Screws and nails are re¬ moved by a magnet, and about four pounds of pure ash remain. This is placed in a metallic receptacle, labeled and sealed.

Bibliography. — A chapter on cremation, treating the subject from the sanitary and economic standpoint, is contained in Baker, (Municipal Engineering and Sanitation) (New York 1901) ; Cobb, (Quarter Century of Cre¬ mation in North America } (Boston 1901), in¬ cludes a complete history and statistics of the movement in the United States, with brief sup¬ plementary matter and tables for Europe. The book also contains a full bibliography of the subject. Freeman, (Crematoria in Great Britain and Abroad } (London 1906), contains descrip¬ tions with diagrams and illustrations of some of the principal crematoria of

the world. An introductory chapter contains an historical sketch. The Sunny Side, an undertakers' trade publication, contains a department devoted to cremation news and propaganda.

CREMAZIE, kra'ma'ze,' Octave, French-Canadian poet-bookseller: b. Quebec, 16 April 1827; d. Havre 1879. He was educated at the Seminary of Quebec and became associated with his brothers in a bookselling business, which, however, was unsuccessful, and in 1862 financial involvements led him to seek refuge in France, and he lived there under an assumed name. His poems, which are inspired by an intense religious and patriotic sentiment, began to be published in 1854. His complete works were published in Montreal in 1882. He has been called ((the father of French-Canadian poetry.®

CREMER, kra'mer, Jacobus Jan, Dutch novelist : b. Arnheim, 1 Sept. 1827 ; d. The Hague, 5 June 1880. He was a painter, but forsook the pencil for the pen. His series of (Stories of Betuwe) (a rural district) are specimens of idiomatic expression, faithful portraiture and unsophisticated humor. The same traits distinguish all his works, (Daniel Sils > (1856) ; (Anna Rooze) (1867); (Doctor Helmond and His Wife) (1869), etc.; but he is at his best amid rural scenes. He published a volume of (Poems) (1873). For biography consult Brinks, J., cGeschiedenis der Noord-Nederlan- desche Lettered (1887-89).

CREMER, William Randal, English advo¬ cate of international peace: b. Fareham 1838; d. 1908. He was prominent in English trade-unions in 1860-70. In 1885, as a Liberal, he entered the House of Commons, to which he was reelected in 1886, 1892, 1900 and 1906. To further the cause of universal peace he founded in 1887 the Inter-Parliamentary Conferences which have met since 1888 at frequent intervals. He visited the United States repeatedly in the interest of an Anglo-American treaty of arbi¬ tration and in support of the International Arbitration League, of which he was secretary for 37 years, he journeyed through all Europe. He also edited the Arbitrator , a monthly de¬ voted to the cause of peace. The Nobel peace

prize, whch was awarded to him in 1903, he gave as an endowment to the International Ar¬ bitration League.

CREMIEUX, kra-me-e, Isaac Moise,

French jurist and politician: b. Nimes, 30 April 1796; d. Passy, 10 Feb. 1880. He became an ad¬ vocate in Paris in 1830; in 1842 entered the Chamber, and in 1848 was a member of the provisional government. Imprisoned at the coup d'etat, he subsequently confined himself to professional work till 1870, when he was a member of the government of national de¬ fense. He was made a senator in 1876, and was the founder of the Alliance Israelite Uni-verselle.

CREMNITZ. See Kremnitz.

CREMONA, kra-mo'na, Italy, city and capital of province of same name, on a plain on the left bank of the Po, 47 miles south of Milan. It is surrounded by walls and wet ditches, and defended by a citadel. It has broad but irregular streets and attractive public squares, and a bridge 3,100 feet long over the Po. The most remarkable edifice is the cathe¬ dral, begun in 1107 and completed about 1491. It exhibits little harmony of parts, but has a venerable and imposing appearance, and its in¬ terior decorations are of the most costly de¬ scription. Others of its 44 (formerly 87) churches are the richly decorated 16th century San Pietro al Po ; San Agostino e Giacomo in Braida, with paintings by Perugino ; Sant' Agata ; Santa Margherita. Also noteworthy are the city hall, and the 13th century Palazzo de' Gonfalonieri, and the Palazzo Reale, with natural history and other collections. Close by, and connected with the cathedral, is the Tor-azzo, a Gothic clock tower, 397 feet high, built of brick and having 490 steps to the bell-story. Cremona has a seminary, a lyceum, a gym¬ nasium, a school of industrial art, a school for voice culture, a technical school, two theatres, a library of 100,000 volumes and a chamber of commerce. The town markets grain, flax, cheese, etc., and manufactures linen, wool, ma¬ chinery, silk, earthenware, colors and mustard, the latter of which is much esteemed in Italy. It was at one time celebrated for its violins. Their manufacture was almost wholly confined, for nearly 100 years, to a family of the name of Arnati. Antonius Stradivarius and Joseph Guarnerius were also celebrated violin-makers of Cremona. A memorial tablet marks the house where Stradivarius made his violins. Cremona was also famous for its painters, Boccaccio, the founder of the Cremona School, Melone,

Bembo, the three Campis and Sofo-nisba d'Angussola, whose five sisters also prac¬ tised the art.

Cremona was colonized by the Romans 219 b.c. and again 190 b.c., and became a populous and flourishing town. In the war between Vi-tellius and Vespasian it was plundered and burned by the troops of the latter, but was sub¬ sequently rebuilt by Vespasian. After the fall of the empire it eventually fell under the do¬ minion of the Visconti of Milan. In 1796 it was taken possession of by the French, and was included in the Cis-Alnine Republic, and afterward, from 1800 to 1814, in the kingdom of Italy under Napoleon. Consult Robaloth, (Cremona e sua provincia) (Milan 1859) ;

(Guida di Cremona) (Cremona 1904). Pop.

40,436.

CRENELLE, an opening in an embattled parapet ; a loophole or embrasure through which to shoot. It is sometimes used to desig¬ nate a battlement.

CRENIC ACID, a vegetable acid having the formula Ci-HioOs, said to exist in vegetable mold, and in marshes, peat bogs and the de¬ posits thrown down by ferruginous waters. It is pale yellow in color, and uncrystallizable.

CREODONTA, kre-6-don'ta, an extinct suborder of the carnivora (q.v.), distinguished by many primitive characters, and especially by the fact that the scaphoid and lunar bones of the wrist are separate instead of united into a single bone as in modern carnivora. In all modern land carnivores the last premolar tooth in the upper jaw and first true molar in the lower jaw are enlarged and pe¬ culiarly adapted to cutting flesh (hence called ((carnassials®), working against each other like a pair of shears. This is also the case with one group of the

Creodonta, from which the modern carnivora are descended. But in most creodonts there is no specialized carnassial, or it is developed from other teeth; these groups evolved on lines similar to the true carnivora, but have left no descendants. One group, the arctocyons, resembled the bears, with omnivo¬ rous teeth, plantigrade feet, and large com¬ pressed claws. Another group (Mesonyx , Pach-ycena, etc.) resembled rather the hyenas, with large strong teeth fitted for bone-crushing and digitigrade feet. Others had the teeth more especially adapted to cutting flesh, the first upper and second lower molar being developed into carnassials in Oxycena and Patriofelis, the second upper and third lower molar in Hyceno-don. Besides these larger forms from the size of a polar bear to that of a prairie wolf, there was a great variety of smaller creodonts, some more or less transitional to the primates, others to the insectivores. The early creodonts ap¬ pear to represent most nearly the central stock from which most, if not all, of the modern mammals are descended (see Condylarthra) . Creodonts were the dominant carnivora of the Eocene epoch, and a few survived into the Oligocene, when their place was taken by the true carnivora of more modern type. The evolution in the creodonts and true carnivores of carnassials of remarkably similar form, out of different pairs of teeth originally much less alike, is an excellent instance of ˆconvergence® in evolution.

CREOLE, a person born in America or the West India Islands, of pure European blood; as a Spanish creole. The term is sometimes ap¬ plied, but wrongly, to any person born within tropical latitudes, of whatsoever color. In South and Central America the creoles enjoy high social privileges, and a creole nobility long existed in Venezuela. They are sallow, finely formed and dark-eyed. Creole dialects are an interesting example of broken-down grammar. By English writers it has sometimes been used to mean a mestizo or mulatto; but it cannot properly be applied to any person of mixed race, non-Latin stock or non-European birth. Consult Thomas, (Theory and Practice of Creole Grammar) (1869).

CREOLE CASE, 1841-42, one of the land¬ marks of the anti-slavery struggle. On 27 Oct. 1841 the brig Creole sailed from Hampton Roads to New Orleans with 130 slaves; on 17 Novem¬ ber 17 of them rose and overpowered the crew, killed one of the owners, and ran the vessel into the English port of Nassau. The authori¬ ties, as wont, imprisoned those directly charged with mutiny and murder, and let the rest go. Webster, then Secretary of State, demanded from England the surrender of the whole, as being legal property of a State under

the Con¬ stitution, engaged on a legal voyage (Coastwise Slave-trade Act of 2 March 1807), and covered by the United States flag on the high seas. This was Calhoun's exact theory. The English gov¬ ernment refused, but a new extradition treaty was agreed on (9 Aug. 1842). In the House, 21 March 1842, Joshua R. Giddings (q.v.) pre¬ sented a set of resolutions which formulated the position of the political anti-slavery party to the end. They were, that the States have exclu¬ sive jurisdiction over slavery in their own terri¬ tory; that the Federal government has exclu¬ sive jurisdiction over the high seas ; that slavery, as an abridgement of the natural rights of man, can exist only by edict of a municipality and within its power of enforcement (this was Judge Curtis's argument in the Dred Scott case) ; that a vessel on the high seas has passed from municipal to national jurisdiction, so that Virginia law ceased to apply to the Creole when it left Virginia territory; that the negroes in resuming their natural rights violated no Federal law, and ex hypothesi no State law; and that attempts to re-enslave them were violations of the Constitution and laws, the rights of the free States and national honor. The resolutions roused a storm. John Minor Botts (q.v.) of Virginia moved a counter resolution that no good citizen, and especially no national repre¬ sentative, should provoke contention over a question on which diplomatic negotiations were pending, and which might plunge the whole civilized world into war; and that Giddings' resolutions justified mutiny and murder. He asked a suspension of the rules to give it pre¬ cedence of Giddings'. Giddings' colleague adopted it and moved the previous question ; and after a two days' wrangle on points of order the resolution was passed without debate, 125 to 69. Giddings at once resigned; his con¬ stituency immediately reelected him by an over¬ whelming majority, and instructed him to push his resolutions to a vote. As this would ((put the Democratic party in a hole,® in current slang • — the first two clauses being their pet tenets, and the others only obvious inferences from them — they evaded it by abolishing ((resolution day® for the rest of the session, devoting the day to other business when it came around. His resolutions expressed the basis of one phase of the constitutional anti-slavery agitation. Con¬ sult Giddings, (History of the Rebellion* (New York 1864). The statute of 1807 regulating the coastwise slave trade is in 2 U. S. Statutes at Large, 426.

CREOLE STATE, Louisiana, where the direct descendants of the original French and Spanish colonists form an important element in the social fabric.

CREOLIN, a mixture of cresols and creosols and other allied substances derived from

the destructive distillation of wood, once used very widely in watery emulsion as antiseptics.

CREON, kre'on, in Greek legend, the son of Menceceus and brother of Jocasta. After the death of her husband, Laius, Creon seized the crown of Thebes and offered Jocasta and the kingdom to anyone who should free the city from the sphinx. This CEdipus succeeded in doing, unconsciously becoming the husband of his own mother. In the legend of the war against Thebes, Creon, the king, is said to have forbidden any one to bury the bodies of Eteocles and Polynices the sons and successors of CEdipus, and their sister, Antigone, was con¬ demned to death for disobeying this order. Creon's son, Plaemon, the betrothed of Antigone, killed himself on her body. The story is told in the plays of Sophocles (q.v.), (CEdipus Rex) ; (CEdipus at Colonnus) and (Antigone.)

CREOSOTE (Greek ˆmeat-preserver®), a product of the destructive distillation of wood or coal especially the former. Wood-tar creosote, when freshly prepared, is an oily, transparent liquid, colorless, and of indefinite composition, containing many different chemical substances, chiefly belonging to the aromatic series. It was discovered by Reichenbach in 1832, and for a considerable time was confused with carbolic acid. It has a strong, smoky smell, burns with a sooty flame and refracts light powerfully. It has been greatly used as an antiseptic, both in dentistry and general surgery, and also for the preservation of meat, from which circumstance it derives its name. Its preservative action is so marked that meat will not decay after it has been treated superficially with a 1 per cent solution. Coal-tar creosote is obtained in« the distillation of coal-tar, and is usually under¬ stood to include that portion of the distillate which comes over at temperatures between 400° and 760° F., although different temperature limits are used by different distillers. Coal-tar creosote (technically known as ((creosote oil®) is used for the preservation of timber. For this purpose the timber to be treated is placed in an air-tight cylindrical iron tank, from which the air is exhausted by means

of an air-oump. The creosote is then introduced at a temperature slightly higher than 212° F., and the temperature and vacuum are both maintained until the mois¬ ture of the wood has been entirely vaporized, and the wood itself impregnated with the oil.

Creosote is also used for fuel, for softening pitch and as an antiseptic application for the treatment of certain diseases of cattle and sheep. It is but slightly soluble in water, though it mixes readily with alcohol, ether and many other organic fluids.

For medical purposes ˆcreosote is a mixture of phenols, chiefly guaiacol and creosol, ob¬ tained during the distillation of wood tar, pre¬ ferably of that from the beech.® In its phys¬ iological action, being a mixture of phenols, it naturally resembles carbolic acid very closely. It is now widely used as a stimulant to digestion and as a tonic in tuberculosis and other wasting diseases. . The vapor is of service when inhaled, in diminishing the mixed infections that occur in many cases, of tuberculosis. Creosote is not specific for this disease. It is very widely em¬ ployed in bronchitis and is of service in nausea and as an intestinal antiseptic. Poisoning by creosote resembles that of carbolic acid (q.v.).

CRERAR, John, American philanthropist : b. New York 1827 ; d. Chicago, 19 Oct. 1889. He entered mercantile life and accumulated a fortune, removing to Chicago in 1862, and add¬ ing to his wealth by railway financiering. He readily bestowed large sums upon charitable undertakings, and in his will left $2,500,000 to found the John Crerar Public Library, from which sensational novels and skeptical works should be excluded; $100,000 for a statue of Abraham Lincoln; and $1,000,000 to charitable and religious organizations.

CRERAR, Thomas Alexander, Canadian statesman : b. Molesworth, Ontario, 17 Oct. 1876. While a boy his parents settled at Russell, Mani¬ toba, as homesteaders. He was educated at Portage la Prairie, helped on his father's farm till he was 19, then taught school for five years ; later attended Manitoba College ; and farmed for several years. He entered pub¬ lic life as a member of the Russell council. He is not a politician ; but he showed remarkable business ability in organizing the Grain-Growers' Grain Company (now the United Grain Growers, Ltd.), formed to give farmers better selling facilities on the Winnipeg ex¬ change, and of which he is chairman. In Octo¬ ber 1917 he joined, as one of the Western Liberal representatives, the Union ministry of Sir Robert Borden, and was given the portfolio of

agriculture.

CRESAP, Michael, American trader and Indian fighter: b. Allegheny County, Md., 29 June 1742; d. New York, N. Y., 18 Oct. 1775. His father, Thomas, emigrated from Yorkshire, England, settled in western Maryland, and was a member of the Ohio company in 1752. His son married a Miss Whitehead, of Philadelphia, while yet a. minor, became a merchant, removed to the Ohio in the spring of 1774, and estab¬ lished a settlement below Wheeling. He took command of the pioneers, who prepared for an Indian war, and, after Dr. Connolly had warned him of a general Indian war, made a declaration of hostilities on 26 April and defeated a party of Indians in a skirmish on the river. Another party of whites treacherously massacred the family of the chief Logan on Yellow Creek. Logan, who had been friendly to the English, accused Cresap, as the leader of the white men in that region, of committing the crime, and through a pathetic speech, attributed to Logan and preserved in Jefferson's (Notes, > the deed attached to his memory, until his son-in-law, J. J. Jacob, and later Brantz Mayer, proved that he was in Maryland at the time of the occurrence. Governor Dunmore gave him the commission of captain of the Hampshire County militia in Virginia. After the conclusion of the Dunmore expedition he returned to Maryland, but again went to Ohio the following spring, and penetrated almost to the Kentucky wilder¬ ness. On his return he learned that he had been commissioned by the Continental Congress as captain of a company of Maryland riflemen. He went with his company to Boston and joined the army of Washington, but, having been afflicted with his final illness before he took the command, and finding himself growing worse, he left for home, and died on the way, in New York,, where he was buried with mili¬ tary honors in . Trinity churchyard. Consult Jacob, J. J., (Biographical Sketch of Captain

M. Cresap) (1826; new ed., with notes, by Brantz Mayer, Cincinnati 1866), and Mayer, Brantz, (Tagah-jute, or Logan the Indian and Captain Cresap) (New York 1867).

CRESCENDO, or CRES (Italian), a musical term signifying that the notes of the passage oyer which it is placed are to be per¬ formed with constantly increasing volume of tone. The ancient Romans, as we learn from a passage in Cicero, were aware of its beauty, and practised it continually. Crescendo passages are frequently marked <C signifying piano to forte and fortissimo ; the corresponding mark “> diminuendo, marking the transition from forte to piano.

CRESCENT (Lat. crescens, growing), an emblem representing the moon in her state of increase. The Egyptians and the Greeks decorated their moon-goddesses, Isis and Selene, with the crescent, which announced the return¬ ing light of the moon. Athenian citizens of illustrious birth wore crescents of ivory and silver upon their buskins ; and the same mark of distinction was granted to the patricians and senators of Rome. It was used by the Romans as an emblem of the eternity of empire. Hence it was found on medals of many cities, particu¬ larly of Byzantium, as capital of the Eastern Empire, whence it is supposed to have been borrowed by the Ottomans. Since their estab¬ lishment in Europe it has been the universal emblem of their empire. It is frequently seen on churches in Russia, generally surmounted by the cross, indicating the Byzantine origin of the Russian Church. During the Crusades, particularly, the crescent was the distinguishing symbol of the Mussulmans, as the cross was representative of the Christians. The word is also applied to a Turkish musical instrument in¬ troduced into the German military bands at the time of the Turkish wars and now in general use in military bands. It consists of a staff surmounted by a cap and supporting several crescent-shaped brass plates on each of which little bells are hung. The instrument is played by being jingled in time to the music. In heraldry, the crescent is used both as a bearing or charge ; and as a difference or mark of cadency. In the latter cases, it designates the second son and those that descend from him.

CRESCENT CITY, a name by which New Orleans is widely known because the older por¬ tion is built around a semi-circular bend of the Mississippi. Now the city has spread around another bend farther up stream, and is nearly S-shaped.

CRESCENTIA. See Calabash-Tree.

CRESCENTINI, kresh-en-te’ne, Girolamo, Italian singer: b. Urbino, 2 Feb. 1766; d. Naples, 24 April 1846. He was styled the Italian Orpheus, because of his exquisite mezzo-soprano. After studying with Gibelli at Bologna, he made his debut at. Rome in 1783, and then toured through the principal cities of France, England and Italy.

Napoleon awarded him the Iron Crown in 1805, and was his patron (1806-12). Leaving Paris in 1816, he became a professor of voice culture at Naples. His treatise on vocalization was published in both French and Italian.

CRESCENTIUS, kre-sen'shi-us, John, Ro¬ man patriot; d. 998 a.d. He was a leader of

the party in Rome opposed to the rule of the emperor in the 10th century. From 985 to 996 his rule in Rome was practically undisputed, and he was recognized as Patricius by the Byzantine empress. In 996 Otto III came to Rome, and overthrew the rule of Crescentius temporarily, but the latter resumed his position when the em¬ peror left the city, drove the Pope, Gregory V, from Rome, and supported the anti-Pope, John XVI. Otto, however, finally defeated Crescen¬ tius in 998 and had him beheaded. Consult Gregorovius, Tome in the Middle Ages* (Vol. Ill, London 1895).

CRESCENZI, kresh-ent'se, PIETRO, or PETRUS DE CRESCENTIIS, Italian writer on agriculture: b. Bologna 1230; d. 1307. At the age of 70 he was made senator, and he now car¬ ried into execution his principles of agriculture on an estate near Bologna, in the cultivation of which he passed the remainder of his life. He has left a work on agriculture entitled (Opus Ruralium Commodorumd a remarkable monu¬ ment of his time, of which it is far in advance. This work was written originally, in Latin. There exists an Italian translation (1478), es¬ teemed very highly on account of the purity of the language, which has given rise to the opin¬ ion that Crescenzi wrote in his native tongue. His principles are simple, founded upon experi¬ ence and free from many prejudices which con¬ tinued to prevail in Europe for centuries after. His wrork was translated into several European languages, particularly for Charles V of France, in a splendid manuscript (1373), still extant; and no sooner was the art of printing invented than copies of this wTork were greatly multiplied. The oldest known edition, now very rare, ap¬ peared at Augsburg in 1471. The genus Crescentia was named by Linnaeus in honor of the famous author, who was probably the first since the days of the Romans to point out the high value of agricultural science.

CRESCIMBENI, kresh-im-ba'ne, Giovanni Maria, Italian scholar and poet : b. Macerata, 9 Oct. 1663; d. 8 March 1728. In the Jesuits' college at Macerata he wrote at 13 a tragedy — <Daris.) He was one of the 14 poets associated with Christine of Sweden in founding the

Academy of Arcadia, of which he was the first president (1690). In 1698 appeared his Hstoria della volgar PoesiaP a work of vast industry, but destitute of method and criticism. He next published his {Trattato della Bellezza della volgar Poesia > (1700), which passed in a short time through three editions, and like the earlier work was first made capable of being under¬ stood and enjoyed by the (Commentafio intorno alia Storia della volgar Poesia) (1702).

CRESCO, Iowa, the county-seat of Howard County, situated in the northeastern part of the State, about 150 miles northeast of Des Moines, on the Chicago, Milwaukee and Saint Paul Rail¬ road. It maintains a hospital, has extensive dairying and livestock interests, and manufac¬ tures machinery, cupolas, telephone condensers, electrical supplies, steel corn cribs, lightning rods, furniture, stump pullers, tow, flour, brick and tile. A ((Farmers' Alliance" store is suc¬ cessfully operated here. . The town is. governed by a mayor and council and owns its water¬ works. Pop. (1920) 3,195.

CRESOL, kre'sol, an aromatic compound having the formula CeH* (CHa) OH, which may

be regarded as derived from phenol by the sub¬ stitution of methyl (CH3) for one of the hydro¬ gen atoms in the benzene nucleus. Like all di¬ substitution benzene compounds, cresol exists in three isomeric modifications, known respectively as orthocresol, metacresol and paracresol. (See Aromatic Compounds). All three occur in coal-tar, though the ortho-and para-compounds are present in much larger quantity than the meta-compounds. The ortho-and meta-com¬ pounds readily yield nitroso-derivatives, and are used in the manufacture of coal-tar colors. Orthocresol melts at 90°, and boils at 370° ; metacresol is liquid at ordinary temperatures and boils at 394° ; and paracresol melts at 99° and boils at 392° ; all these temperatures being on the Fahrenheit scale.

CRESPI, Giuseppe Maria, Italian painter, surnamed Lo Spagnuolo : b. Bologna 1665 ; d. there, 16 July 1747. His first work was the (Combat

of Hercules with Antaeus.* From this time he had continual employment. He painted for Cardinal Ottoboni the (Seven Sacraments,* now in the-Dresden gallery ; several pieces for Prince Eugene of Savoy, for the Elector of the Palatinate, for the Grand Duke of Tuscany, and for Cardinal Lambertini, his patron, who afterward, when Pope Benedict XIV, conferred on him the honor of knighthood.

CRESS, various plants of the family Brassicacece. The cultivated ones are all used as salads, for which their pungent foliage especially recommends them. The common or garden cress or peppergrass (Lepidium sativum) is generally found in gardens as a spring annual. The seeds may be sown as soon as the soil can be worked and the fresh herbage cut for use in about three weeks. Successive sowings should be made every three or four days. The plant resembles watercress in flavor, and makes an excellent garnish. Virginia cress (L. virqini-cum) is a similar species and has been grown and used like the preceding. Winter or upland cress (Barbarea barbarea) is an annual, com¬ mon in fields in Europe and America and some¬ times cultivated for winter use, as is also its close relative (B . verna) which is called early winter or American cress. Watercress (Radic - ula nasturtium-aquaticum) is a perennial aqua¬ tic herb common in cool brooks and yielding an important winter salad where the streams do not freeze. Though it does best in gravelly bot¬ tomed shallow streams, it may be cultivated in any moist ground, or under greenhouse benches if well supplied with water. Indian cress, which is a species of Tropceolum, is commonly known as nasturtium, a popular garden flower whose foliage, flower buds and blossoms are used as salads, and its immature fruits as a substitute for capers. Several other species of Brassicacece are called cress in various parts of the world.

CRESSET, (1) a bowl-shaped article made of incombustible material, used to contain a light, and hung from above or suspended on a pole or placed as beacon on a watch tower or on some prominent place. The cresset-light was formerly the flame from a coil of pitched rope, and in more modern times oil and wick were used. The large lanthorn of ancient days when suspended from the end of a long pole and carried on a man’s shoulder was called a cresset. A stone containing bowl-shaped hollows which are sometimes used as cressets is called a cres¬

set-stone. (2) An iron frame used by coopers who make barrels by hand.

CRESSEY, George Croswell, American clergyman : b. Buxton, Me., 1 April 1856.ˆ He was graduated at Bowdoin College in 1875 and received the degree of M.A. from this institu¬ tion in 1878. He studied for a time at Leipzig, receiving there the degree of Ph.D. in 1880. He was graduated at Andover Theological Semi¬ nary in 1884 and entered the Unitarian minis¬ try; held pastorates at Bangor, Me., Salem, Mass., Northampton, Mass., and Portland, Ore. In 1907 he was called to the pastorate of the Effra Reformed Church, London, England, in which relation he remained until 1913, when he returned to America and became minister of the Church of the Redeemer, New Brighton, N. Y. He is author of (The Essential Man* (1895) ; < Mental Evolution* (1894) ; Philoso¬ phy of Religion* (1892) ; (The Doctrine of Immortality in Liberal Thought* (1897) ; (Soul-Power* (1899) ; (Outline of Unitarian Belief* (1905) ; (A Talk with Young People on Liberal Religious Thought* (1912).

CRESSIDA, in Greek legend a daughter of Calchas, the Trojan priest. She is also known as Briseis, and her fame rests upon the legend of her amour with Troilus. The original story of Troilus and Cressida was ascribed to Lol-lius, a historiographer of Urbino. It was writ¬ ten in Latin and translated by Chaucer. Cres¬ sida was faithless to Troilus and became mis¬ tress to Diomede.

CRESSOL. See Cresol.

CRESSON, Elliott, American philanthro¬ pist: b. 2 March 1796; d. 20 Feb. 1854. He was a successful merchant in Philadelphia, where he resided all his life, and a member of the So¬ ciety of Friends. He engaged in establishing the first African colony of liberated slaves in the territory of Bassa Cove, and was agent of the National Colonization Society. He every¬ where recommended his measures with the eloquence of sincere conviction, and met with much favor and success. He sailed to England in 1840, where he spent some years in advocat¬ ing the project of colonization. His time and labor were contributed without pay, and by his will he distributed his estate to a great variety of charities, mostly to institutions already estab¬ lished, but a bequest of a landed estate of over $30,000 was to establish a home for aged, in¬ firm or invalid merchants or gentlemen, unable to procure the comforts appropriate to their condition in life.

CRESSON, Pa., village in Cambria County, situated among the Alleghany Mountains at an elevation of 3,000 feet and 75 miles east of Pittsburgh, on the Pennsylvania Railroad. Its fine scenery and the magnesia springs in the vicinity make it a popular summer resort. It has an academy and hotel, lumber, coal and coke yards, and a

brewery. Pop. of township

(1920) 2,170.

CREST (Lat. crista, tuft or comb), the rising on the defensive armor of the head, also the ornament frequently affixed to the helmet, such as a plume or tuft of feathers, a bunch of horse-hair, *etc.* Warriors have always been in the habit of adorning, their persons ; and the helmet, from its conspicuousness, is very natu¬ rally chosen as the place of one of the principal

Cl

CRETACEOUS FORMATIONS

1 Inoceramus concentricus

2 Exogyra columba

3 Inoceramus Cripsi. The hinge, showing ligamentary pits

Ptychodus latissimus Caprina adversa. The lesser shell: interior

6 Coeloptychium incisum. Fiom

the side, from above, and from below

7 Scale of Ktenoid

8 Hippurites Toucasianus

9 Caprina adversa

10 Hesperornis regalis

11 Ananchytes ovata

12 Turrillites cateratus *

13 Head of Mosas urus Hof—

manni

14 Tooth

15 Crioceras Duvali

- •

ornaments. The crests of the earlier Greeks were of horse-hair; afterward plumes, especially red ones, were adopted. In the Middle Ages, when rank and honors became hereditary, and particular heraldic devices were appropriated to particular families, the crest became a dis¬ tinguishing hereditary mark of honor. It de¬ notes in heraldry a figure placed upon a wreath, coronet or cap of maintenance, above both hel¬ met and shield; as for instance, the crest of a bishop is the mitre. The crest is considered a greater criterion of nobility than the armor generally. It is commonly a piece of the arms, rests on a wreath .of the principal metal and color of the coat of arms, color and metal alter¬ nating, or on a cap of maintenance. Consult Fairbairn, cBook of Crests of the Families of Great Britain and Ireland) (Edinburgh 1892).

CRESTING, in architecture, is an orna¬ mental finishing in stone, tiles or metal in the wall or ridge of a building, such as the cresting at Exeter Cathedral, where the ridge is orna¬ mented with a small range of leaden fleurs-de- lis.

CRESTON, Iowa, city and county-seat of Union County, about 200 miles west of Bur¬ lington, on the Chicago, Burlington and Quincy Railroad. It was first settled in 1869 ; became a borough in 1871, and a city in 1881. The pres¬ ent form of government is by State enactment under a charter of 1870, revised in 1890, which provides for a mayor, chosen biennially, and a council of 10 members. Five aldermen are elected each spring. The city has three banks, with a combined capital of $250,000; 15 churches, public and parish schools, a government build¬ ing, costing $100,000, and a railroad depot, cost¬ ing $75,000. It is a trade centre for the sur¬ rounding country

and has machine shops, brick¬ yards, broom and cigar factories, wagon works, planing mills and a cold storage plant. Pop.

(1920) 8,034.

CRESWICK, Thomas, English landscape painter: b. Sheffield, 5 Feb. 1811; d. Bayswater, 28 Dec. 1869. He studied drawing at Birming¬ ham under John Vincent Barber and early showed artistic talent. His first pictures were admitted into the Academy exhibition when he was only in his 17th year, and his success was afterward continuous. He was elected an asso¬ ciate of the Royal Academy in 1842 and R.A. in 1851. Among his works are cEngland} ; (London Road a Hundred Years Ago1* ; (The Weald of KenL ; (A Roughish Road) ; (On the Clyde) ; (Sunshine and Showers. ‘ Cres-wick’s landscapes are pleasing and attractive, and display much delicate and finished detail. He was also known as an etcher. His works were collected for the London International Exhibition of 1873, and a ‘catalogue compiled by T. O. Barlow, R.A. Consult Ruskin, Mod¬ ern Painters } ; Hammerton, (Etching and Etchers. >

CRETACEOUS, a name applied by geolo¬ gists to the latest period of the Mesozoic Era, and to the system of rocks then formed. It follows the Jurassic and precedes the Tertiary. The name comes from the Latin for chalk and in the type localities the formation is usually characterized by white, soft chalk, but some¬ times, more especially in Italy and the south of France, this chalk is replaced by compact, solid limestones. In England and France the

Cretaceous rocks consist chiefly of carbonate of lime, but usually abound with silica, in the shape of nodules, plates and veins, and with iron pyrites in nodules and radiated cylinders. The organic remains in the chalk are, with few exceptions, eminently marine, and from the fine texture of the substance in which they have been embedded are usually well preserved. They embrace seaweeds, sponges, corals, echinoderms, mollusks, Crustacea, fishes and reptiles. Deep-sea dredgings in the Atlantic have re¬ vealed the fact that a fine, white, organic ooze, resembling the chalk, is still in process of formation in the oceanic abysses at the present day. In America, the system is divided into Lower or Comanchean, and Upper or Creta¬ ceous. Some writers give Comanchean the rank of a period, making it co-ordinate with Juras¬ sic, and restrict the term Cretaceous to the Upper

Cretaceous as above defined. During Lower Cretaceous the continent of North America was not very different in outline from now, except that the Gulf of Mexico was ex¬ panded, and that the Pacific still covered the site of much of the present Coast Ranges. During Upper Cretaceous time, a great arm of the sea encroached on the land, finally extend¬ ing from the Gulf of Mexico to the Arctic. In this a great thickness of marine sediments was laid down. At the same time much of the Atlantic and Gulf Coastal Plain was under water. Toward the close of the period (Lara¬ mie Epoch) the interior sea again retreated leaving a large area of low swamp, in which much coal was formed. The period, and the Mesozoic Era as well, were brought to a close by folding which produced the Rocky Moun¬ tains. The Andes were probably folded at the same time.

Life of the Cretaceous. — The great groups of reptiles which developed during Triassic and Jurassic (q.v.) reached their climax in Cretaceous, and Dinosaurs, Pterosaurs, Moso-saurs, Ichthyosaurs and Plesiosaurs all became extinct at the close. The Ammonite Cephalopods also died out completely. The most notable addition was the development of the modern types of flowering plants, which became dominant before the close of the period.

CRETE, or CANDIA (called in the most ancient times Id.ca, from Mount Ida, afterward Creta, whence the Turkish name Kirid), one of the most important islands of the kingdom of Greece ; situated in the Mediterranean, 81 miles from the southern extremity of the. Morea, and 230 from the African coast; is 160 miles long, 7 to 35 broad, and contains 3,326 square miles. A high chain of mountains covered with forests runs through the whole length of the island, in two ranges. On the northern side it declines moderately to a fertile coast, provided with good harbors ; on the south side, steeply to a rocky shore, with few roadsteads, and reaches its greatest height in the lofty Psiloriti (the ancient Ida), 8,060 feet high, and always cov¬ ered with snow. Numerous springs give fer¬ tility to most of the valleys, in which, and on the declivities of the mountains, is seen a luxurious vegetation. The air is mild; the summer is cooled by the north winds ; the win¬ ter is distinguished only by showers of rain. Earthquakes, however, are not infrequent. Agri¬ culture is at a very low stage, and education

and the amenities of civilized life are almost entirely absent. The principal products of the island are olive oil, wheat, oranges, lemons, silk, grapes, wine, valonia, carobs and honey. The inhabitants (estimated at 1,200,000 in ancient times, or 900,000 in the time of the Venetians) are now 344,000, of whom about a third are Mohammedans. Soap is extensively manufactured, and the exports comprise olive oil, soap, wool, carobs, cheese, fruits, valonia, acorns, *etc.* Most of the harbors are silted up. The capital is Candia or Megalokastron ; Canea is the most important place of trade.

Greek mythology made Crete the scene of many of the adventures of the gods and heroes. Here Saturn is said to have reigned and after¬ ward Minos.

Archaeological exploration and excavation in modern times have revealed that a Neolithic period of evolution from about 10,000 to 3315 b.c. was followed by the Minoan or 2Egean period of civilization, which existed contem¬ poraneously with the first dynasty of Egypt, from 3315 to 1450 b.c., and reached its culmi¬ nating point in Crete. Minoan towns and palaces have been uncovered in different parts of the island, which recall the skill attributed to Daedalus (q.v.). They exhibit architecture and engineering of a high order, unsurpassed for domestic conveniences in modern times. At Cnossus in the ruined palace of Minos (q.v., whence Minoan), the thalassocratic king of the eastern Mediterranean, in the Hagia Triada and its shrine near Phaestus, in the palace at Phaestus, in the uncovered ruined towns at Palaikastro, Gourni and Zakro, in the shrine and Dictaean cavern, the legendary birthplace of the Cretan Zeus, near Psychro, and in the ruins on the neighboring islets of Pseira and Mochlos, the finds include archives of clay tablets in great quantities inscribed with the early forms of Minoan pictographic and linear script, polychrome decorated pottery, lifelike ivory and clay figures, mural paintings reveal¬ ing the customs of the period, enormous deco¬ rated storehouse jars, stone and bronze votive figures and objects of cult, sarcophagi, *etc.* While at Cnossus, also, have been unearthed the foundations of what are acknowledged to be the traditional labyrinthine prison of the Minotaur (q.v.) or bull of Minos, the incestu¬ ous monster for whose gratification Athens was compelled to send an annual tribute of seven noble maidens and seven boys until Theseus (q.v.) killed the beast, probably during an in¬

vasion of the island which consummated the catastrophe that overwhelmed this early Cretan culture.

The island figures little in Greek history, and took no part in the wars with the Persians. It possessed a number of independent towns often at war with each other, but ready to combine against a stranger. Crete was conquered by the Romans 67 b.c. In the year 823 it passed from the Roman emperors of the East to the Sara¬ cens, who built the capital, Candia, on the ruins of Heraclea, but were expelled again in 961 by the Greeks. The Byzantine sovereign sold the island to the Venetians in 1204, who forti¬ fied most of the cities, won the good will of their new subjects by a mild government, and repelled all the assaults of the Genoese and Turks till the middle of the 1 7th century. About this time the attacks of the Turks became more

determined. They landed a large force in 1645, which soon took Canea and Retimo, and be¬ sieged the capital with vigor. The siege, the longest in modern history, lasted over 20 years : To assist the Venetians volunteers from all parts of Europe poured in. The Christians, after having exhausted all means of defense, were compelled to surrender to the Turks 27 Sept. 1669. At the time of the capitulation the garrison consisted of only 2,500 soldiers ; 30,985 Christians and 118,754 Turks were killed or wounded during the siege. Having obtained pos¬ session of the capital, the Turks now endeav¬ ored to expel the Venetian? from the strong¬ holds which remained to them on the island, and before the expiration of the 1 7 th century they had been successful in their efforts.

Three pashas, at Candia, Canea and Retimo, now governed the island. On account of the feuds of these pashas the inhabitants of the western mountains succeeded in forming a gov¬ ernment of their own, under Turkish protec¬ tion. As the compacts made with them by the Turks were not always observed, they were wont in such cases to take up arms, and though they were often defeated they were never en¬ tirely subdued. The pashas having demanded hostages of them in 1821, they joined the Greek insurgents.

Had the mountaineers been armed when the Turks made their first descent on the island, it would probably have been impossible for the invaders to have maintained themselves in Can¬ dia, but as it was the island remained under Turkish rule. In 1868 a formidable insurrec¬ tion, fomented by Greece, was with difficulty suppressed by the Turks, after a tedious con¬ flict. In consequence of this revolt the Turks

granted to the Cretans a certain degree of autonomy, but Turkish bad faith produced an¬ other revolt nine years later. At that time a new constitution of a parliamentary character was inaugurated, but many of its provisions were annulled in 1889. In 1896 there was again a rising against the Turks, in which, as before, the Greeks took part, one result being the outbreak of war between Greece and Turkey. The Greek troops landed on the island were withdrawn at the instance of the Great Powers, who undertook to secure an autonomous gov¬ ernment under Turkish suzerainty and to cause the Turkish troops to be withdrawn. On 6 Sept. 1898 the Mohammedans of Candia rose against the Christians, and the fighting resulted in the death of many of the latter, including some British sailors. The leading powers at once demanded the complete withdrawal of the Turkish troops who had abetted the rebels, and ultimately, on 11 October, the-Sultan complied with their demand, the troops being soon after withdrawn. Shortly afterward Prince George of Greece was appointed high commissioner or governor of the island. A national assembly met and formed a constitution providing for the creation of a legislature and guaranteeing freedom of religion to all inhabitants. Although order was restored, popular sentiment con¬ tinued to be increasingly in favor of annexation to Greece, and in 1904 the High Commissioner attempted to gain the consent of the Powers to such a step but without success. There were revolts against the high commissioner's arbi¬ trary policy in 1904 and 1905; in the latter year a revolutionary assembly proclaimed the union

of the island with Greece, and this was fol¬ lowed by a similar proclamation on the part of the regular Chamber. The Powers inter¬ vened, and after some desultory fighting the insurgents laid down their arms in November 1905. In 1906 Prince George resigned the high commissionership of Crete and returned to Athens, but the designation of his successor was accorded by the protecting powers to King George of Greece as a satisfaction to Greek national sentiment. This arrangement lasted six years, but by no means satisfied any of the parties directly interested. The over¬ whelming majority of Greeks in

the Cretan Assembly persisted in treating their island as an integral part of the Greek kingdom, while the government at Athens, out of deference to the four protecting Powers, was obliged to re¬ spect Crete as a shadowy vassal of Turkey. The six years were marked by almost constant political unrest on the island. A renewed proclamation of union with Greece in 1908, the exclusion of Mohammedan deputies who refused to take an oath of allegiance to King George in 1910 and the election of delegates to represent Crete in the National Assembly which revised the constitution of the Greek kingdom in 1912 provoked in each case re¬ peated intervention of the Powers. It was a Cretan leader, Eleutherios Venizelos, who in 1910 became Premier of Greece and organized the Balkan League that prepared to wage war against Turkey. A popular uprising in March 1912 put an end to the government that had been forced upon the island by the protecting Powers, and erected in its stead a provisional government, the reception of whose delegates at Athens in October 1912 was one of the ex¬ cuses for the outbreak of the Balkan War. In that war the Cretans fought shoulder to shoulder with their fellow Greeks of the Greek kingdom, and by the Treaty of London (31 May 1913) Turkey renounced all sovereignty over the island. The union of Crete with Greece was formally recognized by the other Balkan states by the Treaty of Bucharest (10 Aug. 1913). Consult Hock, (Greta* (1823-29) ; Pashley, (Travels in Crete *(Cambridge 1837) ; Spratt, (Travels and Researches in Crete* (Lon¬ don 1865) ; Stillman, (The Cretan Insurrection of 1866-68* (New York 1874) ; Mitchell, (The Greek, the Cretan, and the Turk* (London 1897) ; Freese, (Short Popular History of Crete) (ib. 1897) ; Howes, (Crete the Forerunner of Greece* (ib. 1907) ; Nevor-Batteje, (Camping in Crete) (ib. 1914).

CRETE, Neb., city in Saline County in the southeastern part of the State, 20 miles south¬ west of Lincoln, on the Chicago, Burlington and Quincy and the Missouri Pacific railroads, and on the Big Blue River. It is the seat of Doane College (Congregational), established in 1872, which has a well-equipped observatory. It has a public library and several industries, including flour mills, a creamery and a voting-booth fac¬ tory. Settled in 1867, Crete was incorporated as a village in 1871 and is at present governed under a revised charter of 1886. The council consists of the mayor and representatives from the city wards. The city owns and operates its waterworks and electric-light plant. Pop.

2,404.

CRETIN, kra-tan’, Joseph, American eccle¬ siastic . b. Lyons, France, 1800; d. 22 Feb. 1857.

He was ordained a priest in 1838 and was assigned a charge in his own diocese. His great desire was to work in the foreign mis¬ sions, and when the opportunity to go to Amer¬ ica presented itself he at once accepted. He was somewhat disappointed when he found him¬ self among civilized people in Iowa instead of among Indians. He was made vicar-general of Dubuque, a position which he held until 1851, when he was appointed bishop for the new diocese of Saint Paul. He found only nine priests in his diocese, but new parishes were soon opened, schools established, the orphans and the sick received attention and provisions were made for the Indian tribes, the Ojibways, the Winnebagoes. In three years he increased the number of churches from 1 to 29, and to these added 35 stations. Consult Clark, (Lives of Deceased Bishops of the United States.*

CRETINISM. This is a broad general term applied to a combination of physical and mental changes which, in the young, result from loss or diminution of the thyroid functions. Such a loss may occur sporadically (Sporadic cretinism) from causes to be enumerated, where the picture is analogous to that seen in the adult from removal of the thyroid, cachexia thyreopriva adult orum : or in many occur as a localized or endemic degeneration affecting the thyroids of a large number of individuals, causing a hypothyreosis which may show a number of tendencies. The chief of these are goitre, goitrous heart and endemic cretinism.

These four fairly well-separated conditions may be discussed to advantage under the head of cretinism. The historical chapters on cretin¬ ism are full of interest. The disorders were known in early days. Pliny has left indubitable evidence of their presence in early Roman times. Vogt in his admirable monograph in the Lewan-dowsky, (Handbuch der Neurologie) tells of Marco Polo’s descriptions of certain types he had seen in his Asiatic travels. During the past two centuries the disorders here included under the term have been observed through the world. In certain lands, especially certain mountainous districts of Switzerland, northern Italy, etc., the disease is very widely distributed — endemic cretinism — while in other regions it occurs rarely — sporadic cases. In the United States it is not frequent. It has been observed in California, in Vermont, and the writer has seen such patients in New York State (Adirondacks). In certain regions it has been a veri¬ table plague. Thus in Switzerland,

between the years 1875-84, 7 per cent of the. recruits in the army showed some form of cretinoid degenera¬ tion. In 10 years 2,500 men were lost to the Swiss army from this cause alone. Certain val¬ leys, especially those of Berne and Wallis, are thickly populated with individuals showing cretinoid degeneration. In the school years 1899-1904, of 336,000 children fit for school 15,000 had one or another type of cretinism. Similar conditions existed in Styria, in Austria, and in certain Italian provinces.

So far as the etiology is concerned, it seems certain that the conditions are due to a defect of the thyroid substance — diminution or loss of the thyroid hormones. There are certain limi¬ tations which must be discussed in their respec¬ tive paragraphs.

Sporadic Cretinism. — Infantile Myxedema. The clinical picture in an extreme case — i.e.,

fully developed, in contrast to the many irregu¬ lar or incomplete forms — is that of a normally born child who, about the end of the first or the beginning of the second year, begins to show the characteristic changes in development. The little patients fall behind in their normal bony development. This is due to a defect in the de¬ velopment of the long bones. The epiphyses fail to lay down bone even after 20 to 35 years and in 20-year-old cretins the anterior fontanelle may still remain open. There is a proportionate loss in bone substance through¬ out ; thus a characteristic dwarfism results save perhaps in the development of the skull which becomes larger in proportion to the rest of the body. The sphenoid, however, fails to develop and therefore gives the peculiar characteristic nose to the cretin. Dental deficiencies go hand in hand with the bony defect. Jn severe athy-roid cretins the teeth do not develop for a num¬ ber of years, and the first or milk teeth may persist far beyond the normal period. The bony defects show in a high palate arch, with large adenoids and tonsils, and a chronic hypertrophic rhinitis causes the child to snore and sniffle, often with copious excretions from the nose.

A fairly constant finding is that of umbilical hernia. The abdomen is usually puffy, the navel sunken. The skin is myxedematous in the young, but becomes atrophic in later years, the supraclavicular and facial swelling remaining for many years.

The facial habitus is characteristic. The hair line begins low, the nose is sunken, the zygo¬ matic arches prominent, the eyelids swollen, the face puffy, the tongue enlarged and often pro¬ truding between the swollen lips, in the mild cases giving one the impression of a child whose whole countenance is puffed up with crying.

There is usually an enlargement of the liver. Respiration is unusually slow in the severe athyreoses. The genital organs show marked changes. The labia are small, the external not covering the internal ones. The uterus and ovaries are usually small, and the mammary glands are atrophic or hypoplastic. The penis is apt to be small, the testicles undescended, and small. Genital hair and that in the arm pits is absent or scanty. In boys the puberal changes in the voice are lacking.

Nervous system defects are present with the others and apparently

conditioned by the endo¬ crinous gland insufficiencies. These show at vital levels in the deficiencies of the sensory and motor nerves, and at psychical levels in va¬ rious grades of stupidity, mental weakness (moron), imbecility, or even idiocy — these words being used according to the arbitrary scaling of the Binet-Simon tests.

Thus smell is at times defective. The eye¬ sight is poor, hearing is frequently disturbed and with it speech, so that many patients are deaf and dumb. The vestibular function is fre¬ quently involved, so that these patients balance badly, often showing unsteady gait, wobbling of the head and nystagmus. Some sporadic cretins may show little disease of the nervous system.

Cretinoid Degeneration. — Mention has been made of the widespread character of this type of degeneration related to defective or ab¬ sent thyroid secretions. The statistical study of the conditions, particularly in Switzerland, in France and in Italy (Bircher), has shown that

goitre, goitrous heart, endemic cretinism, en¬ demic deaf and dumbness and endemic feeble¬ mindedness are closely allied. The cretins are almost all goitrous, or nearly always have goi¬ trous parents. Exophthalmic goitre (hyperfunc¬ tion) is rare with goitre, but very frequent with goitrous heart conditions. (See Goitre). The causes of the hypothyroidism are not definitely settled, but there seems to be a constant relation between it and certain factors in certain waters, so that goitrous springs are known. Just what the noxious element may be is still conjectural, but it apparently is related to mineral constitu¬ ents found in certain geological formations, no¬ tably in the Trias and Tertiary. The disease is absent in regions fed from waters of crystalline formation. Through Bircher's suggestion of supplying a goitrous region in Rupperwill from Jura water supplies, in an adjacent valley, the disease disappeared. Similar results followed in the town of Asp. Animals may be made goi¬ trous from drinking water from certain springs. They also develop goitrous hearts and are de¬ layed in their development. The thyroid shows degenerative changes. The agent passes through a Berkefeld filter, but is modified and made non-active by being heated to 70° C. It does not dialyze and is not thought to be an organ¬ ized plant or animal substance, but is of a col¬ loidal nature. An hypothesis which had the au¬ thority of Bircher behind it was that the dis¬ ease was of an infectious nature.

Endemic Cretinism. — Here there is a richer and much more variable picture than obtains for sporadic cretinism. Whereas a typical habitus

is described, there are many anomalies and variations. The head is usually broad (but may be small and flat, instead of large and broad), at times very large. The nose is usu¬ ally wide spreading and flat, the eyes wide apart. The neck is short and thick, the features swol¬ len, the facial expression, especially of the prognathism, is one of moroseness or stolidity. The bones are shortened, various anomalies as scoliosis, ankyloses, etc., being present. Great variation in dwarfism is observed. Certain cre¬ tins are under three feet six inches, but full cretins have been observed of seven feet in height. As a rule they die young, but Kocher reports cretins 70 and even 100 years of age.

The general co-ordination of these patients is poor. They are usually short, clumsy, un¬ elastic' with badly developed masculature. The skin is loose, lax, amemic, marked with folds and wrinkles, giving a peculiar appearance of old age. The lips are swollen, the tongue is enlarged and not infrequently protruding. The breasts are flat or badly developed, the abdomen flat or pendulous. Short ~ stumpy fingers and toes give an ugly appearance to the extremities and contribute to clumsiness. The entire activ¬ ity is apt to be heavy and awkward, although a few athletes and acrobats may be found among cretins.

The changes in the bones have been men¬ tioned in the paragraphs on sporadic cretinism. The skin has a peculiar cachexia. It is swollen and flabby, whitish or yellowish, folded and soggy. The general appearance of old age is striking. The hair and nails are badly devel¬ oped, both breaking easily. Thick, underlying fatty masses are unevenly distributed, usually in the neck, back, upper chest regions, occasionallv over the hands. Variable states of tension occur

in these fatty masses; at times they are hard, again like empty sacks. The mucous membranes are also pale and gray, often folded but look different from a typical anaemia.

The sexual organ changes have been touched upon in the description of sporadic cretinism. They are characteristically infantile. Menstrua¬ tion is scanty, wanting or develops very late. Fecundation may take place, but the results are either miscarriages, dead children, various mon¬ sters, *etc.* The secondary sexual characters are all delayed in their development.

The majority (63 per cent, Ewald) of cre¬ tins show a swollen thyroid, but it is not an over-functioning one, nor do they all show athyreosis or hypothyreosis.

Most of the internal organs show reduction in activity. Digestion is usually slow, constipa¬ tion is marked. The metabolism is modified as already indicated. The urinary secretions are apt to be diminished and of high specific gravity.

Mentally cretins show marked variability. A few are practically normal, but most show a characteristic combination of mental traits, in contrast with many other mental defective states. The feeble-mindcdness is accompanied by great slowness of all reactions, marked re¬ tardation of motion, apathy and indolence. This indolence is a marked feature. Many cretins will lie in the sun all day long, and in the hos¬ pital or other institutions will lie around and do nothing for weeks or months. In the milder grades there is often great shyness which makes them unapproachable and serves to make them appear more feeble-minded than they really are. It is with the greatest difficulty that they can be trained to the simplest of performances. With many, in spite of the marked general stolidity of their average mood, they may show great excitement and emotional outbreaks.

They are very negligent, love to sit still, but many show much variability in this respect. As noted the great majority suffer from impair¬ ment of the chief sensory tracts. Hearing seems to suffer most.

The defect in hearing is asso¬ ciated with speech defects. Taste and smell are also involved. They take little interest in their food or drink and therefore show little interest in hunger, which is marked. The sense of sight is frequently diminished. It is highly probable that the receptors and conduction paths are less involved than the perception areas in this dimi¬ nution in sensory intake. The hearing seems to be affected primarily as to its receptor and con¬ duction paths. Pain, touch and thermal sensi¬ bilities are all dulled. Motility is extremely re¬ tarded. The reflexes are active (50 per cent). The' field of vision is reduced in many, although the fundus is usually normal (Hitschmann) .

Aberrant and abortive types are to be ex¬ pected. In the former one may find patients with striking development of one or more fea¬ tures, in the latter a very great shading off to almost normal states, i.e., endemic goitre with mild mental signs.

Endemic Deafmutism. — This combination is extremely frequent where endemic cretinism is present (29 per cent, Scholz).. It may con¬ stitute one of the aberrant types just mentioned with striking development of single features, or it may be associated with all the grades of a complete cretin picture. According to the studies of Kocher, the loss of hearing is due to

a bony defect which has destroyed the possibil¬ ity of normal cochlear development. Bad hear¬ ing is reported at 32 per cent among cretins in Scholz's investigations.

The changes found in the brain which may account for the feeble-mindedness have been variable. Meningeal inflammation and mild grades of hydrocephalus have been found by Scholz and Zingerle. The brain is often sym¬ metrical, small or single lobes are diminished in size. Often the brain's development is ar¬ rested at an infantile stage, the pallium or the ganglia being involved alone or together. The cerebellum is often imperfectly developed, which fact stands in correlation with the marked inco-ordination and possibly in relation with de¬ fective labyrinthine development.

The ear difficulties have been protean. Pe¬ ripheral, conducting and central mechanisms have been found at fault; at all .events they all seem secondary to the developmental anomalies induced by the action of the poisonous substance on the thyroid. The speech defects usually go hand in hand with those of hearing, but this is not universal. The

cortical developmental de¬ fect is sufficiently explanatory for most of the cases.

Therapy. — Many contradictions may be found in the literature concerning the use of thyroid substance in cretinoid degeneration. Among the best reported results arc those of v. Wagner who obtained a diminution in the myxedematous swelling of the skin, rapid de¬ velopment of the genitals, diminution in size of the tongue, disappearance of the umbilical .her¬ nia, development of new hair, hastening of den¬ tition, closure of the fontanelles, increase in bony development. The psyche was less hope¬ fully modified, but there was a diminution in the apathy and slight increase in intellectual ca¬ pacity.

Early therapy is naturally the main, feature. According to v. Wagner, small doses of iodine in addition seemed to stimulate the thyroid ac¬ tivities still further. Magnus Levy, v. Eysselt and others also report excellent results, complete cure resulting in some patients still in their teens.

A widespread state experiment carried out by v. Kiftscheras in Styria treated 1,011 cretins. A large number were neglected by the parents, i.e., treatment was not kept up. In 2.4, per cent the thyroid tablets could not be well borne. All idiots and severe grades of deafness and dumb¬ ness were left alone. Of 440 of the cases 10.2 per cent showed slight increase in bony devel¬ opment, 4 per cent showed definite change, 85 per cent showed an increase well above the average. The increase in bony growth was marked with the younger individuals, but also persisted into the third decade.

A careful revision of 6 77 cases showred 42 8 per cent marked improvement, 48 per cent some definite improvement, 8.6 per cent no improve¬ ment.

Iodothyrine has also been utilized. One gram contains three milligrammes of active substance representing the iodine content of one gram of fresh sheep’s thyroid. It would seem that the iodine content is not the only factor in the ac¬ tivity of the thyroid substance and it is not as yet definitely demonstrated what the combina¬ tion is that is effective. The result of the use of implanting of glandular substance would be

the ideal therapy and experiments directed to this end have been attempted since 1889 when Bircher was one of the first to attempt it. The gland has been implanted in different portions of the body — the neck, under the breast, in the spleen, even in the bony substance. As a rule, however, the implantation has not been as suc¬ cessful as was hoped, the gland itself under¬ going retrograde changes. Furthermore it would appear from the studies by Enderle and Borst that thyroids from other animals possi¬ bly are not the best things to use as the bio¬ chemical composition of the human and animal types varies so widely as to render degeneration of the implanted gland likely. Implantation of human glands has not been successfully brought about as yet, but with the newer work on or¬ ganic transplantation as inaugurated through the researches of Carrel it would seem that this technical difficulty might be overcome in the very near future.

One is ˆcompelled, therefore, to resort in most cases to the dried or liquid preparations of the. thyroid itself or to such biochemical products as laboratory research has provided through the utilization of the glandular substance itself or that portion of it which presents its chief hor¬ mone activity.

The general results of thyroid medication in typical cases is fairly constant. Especially is it of value in the aberrant and minor forms of the disease of which one of the most chronic of symptoms is the persistent anaemia. This may be in part overcome by the simultaneous use of small doses of arsenic, which have been recommended by a number of experimenters. Alcohol and morphine work disadvantageousˆ' and should be carefully avoided. The use of small doses of sodium bicarbonate and bismuth work advantageously in diarrhoeal states.

Thyroid medication for the sporadic cases varies somewhat from its use in the endemic cases. In the sporadic cases of the light or mild type the action is quite similar to that seen in the endemic ones, but as a rule, sporadic cases by reason of their longer involvement and the less rapid development of the symptoms, the more hidden or obscure nature of the same, with their great mixture of syndromes, make such cases less responsive to the therapy. Nev¬ ertheless, many of them respond very kindly to it, the same dosage being utilized. Consult

Bircher, F., (Pathogenese der kretinischen Degeneration* (Berlin 1908) ; Haugardy and Langstein, (Jahrbuch fiir Kinderheilkunde) (1908, 61); Falta, (Erkrankungen der Blut-driise) (1913) ; Jelliffe and White, (Diseases of the Nervous System > (1917).

Smith Ely Jelliffe.

CRETONNE, kre-ton', a thick, firm cotton cloth with various textures of surface, printed on one side or on both with pictorial and other patterns, and used for curtains and for up¬ holstering. Unlike chintz, it is hardly ever glazed. It takes its name from its manufacturer.

CREUSA, kre-u'sa, the name of several celebrated women of Greek antiquity. (1) Daughter of Erechtheus, who, before she was married to Xuthus, gave birth to Ion, the fruit of an amour with Apollo. To her second hus¬ band she bore Achseus. (2) The wife of Jason and the daughter of King Creon (q.v.) of Cor¬ inth, She was burned to death with her father

by the magical poisoned diadem and robe given her as bridal gifts by Medea. Consult the <Medea) of Euripides. (3) The daughter of Priam and Hecuba, wife of ˆEneas and mother of Ascanius. In the tumult of the conflagration of Troy, when iEneas fled with the images of his gods, with his father and son, he lost her, and after he had sought her for a long time in vain her spirit appeared to him, saying that the mother of the gods had taken her to herself because she was not willing that she should leave Phrygia. Consult Virgil, (ˆEneid) (II,

730-794).

CREUSE, krez, a department of central France; capital, Gueret ; area, 2,164 square miles. It is named from the river Creuse, which rises in it and traverses it diagonally in a northwest direction. The surface is generally rugged and the soil is thin, rocky and by no means fertile. Coal is the only mineral worked. Many cattle, and notably fine cavalry horses, come from Creuse. The chief manufacturers are carpets and tapestry. Thousands of the inhabitants migrate to other parts of France in March each year in search of work and return about Christmas. The department is divided into four arrondissements. Pop. 266,188.

CREUSOT, kre-zo', Le, town in east-central France, in the department of Saone-et- Loire, 236 miles south of Paris. Situated in the midst of a

district rich in coal and iron, it owes its importance to the establishment here in 1837 of the great iron works of Schneider & Com¬ pany, which rank among the largest in the world. Steel rails, armor plate and ordnance, engineering material of all descriptions and electrical machinery are all produced by this firm, which in normal times employs 15,000 men.

CREUTZ, kroiz, Gustaf Philipp, Graf von, Swedish poet and statesman: b. Finland 1731; d. 30 Oct. 1785. He was a member of the learned and elegant circle which surrounded the queen of Sweden, Louisa Ulrica, sister of Frederick the Great. His (Atis og Camilla,) an erotic poem in five cantos (1761), and his (Letter to Daphne) are considered as master¬ pieces in Swedish poetry. He was appointed Minister to Madrid, and at a later period to Paris, where he remained 20 years and became particularly acquainted with Marmontel and Gretry. On 3 April 1783 he signed with Dr. Franklin a treaty of amity between the United States and Sweden. His works and those of his friend Gyllenborg are published together under the title (Vitterhets Arbeten of Creutz og Gyllenborg) (1796).

CREUZER, k roit'ser, Ueorg Friedrich,

German philologist and archaeologist : b. Mar¬ burg, 10 March 1771 ; d. Heidelberg, 16 Feb. 1858. He studied at Marburg and Jena, and in 1802 became professor of philology at Heidel¬ berg. In 1807 the professorship of ancient his¬ tory was also conferred on him, and he held both chairs till his resignation in 1845. His works treat of mythological subjects and classi¬ cal history, the most important of them being (Die historische Kunst der Griechen) (1803) ; v Dionysus > (1808) ; (Symbolik und Mythologie der alten Volker, besonders der Griechen) (1810-12); and an edition of Plotinus (1835). His symbolical theory of mythology gave rise to considerable controversy with Hermann,

Voss and others. With G. H. Moser, he edited several of the works of Cicero. A collection of his writings was published in 1854 under the

title (Opuscula SelectaP Consult Stark, Fried¬ rich Creuzer, sein Bildungsgang und seine bleibende Bedeutung) (Heidelberg 1875) ; and Sandys, (A History of Classical Scholarship) (Vol. Ill, Cambridge 1908).

CREVALLE. See Cavally.

CREVASSE, kre-vas', a breach in an em¬ bankment of any kind, made to protect lands from inundation, has from the earliest histori¬ cal ages been of importance. How to guard against crevasses is a matter studied in all countries where their occurrence is a menace to public safety. Lands may be reclaimed from water by means other than embankments, dams, dykes or levees (see Drainage). The levees and dykes of all places are under a system of supervision for prevention of crevasses and other dangers. The levees along the Mississippi, begun in 1717, have been at various times and in certain places rendered ineffective by cre¬ vasses, — the water breaking through the levee in weak places where soil has become soft, or through holes made by the crawfish. The guards know the need of repairing at once any openings, however small, and the crawfish is regarded as an enemy. In 1882 the damages reported as caused by crevasses and floods were $27,000,000. Towns and farms were inundated and some lives were lost. In the years inter¬ vening between 1882 and 1892, damages reported amounted to $77,000,000 ; and in 1892, $7,000,000. When floods occur, as in 1897 and 1903, the dangers from crevasses increase. Two great crevasses occurred in 1903 during the floods. The damages amounted to millions. In addi¬ tion to the danger of the water breaking through, there is that of self-protection, the people in the lower towns being tempted to let the waters above them escape from the chan¬ nel. (See Floods; Levee). Cracks in glacial ice, due usually to unequal rate of motion, are known as crevasses. See Glacier.

CREVAUX, kra-vo, Jules Nicolas, French explorer : b. Lorquin, Lorraine, 1 April 1847 ; d. 24 April 1882. He took part in the Franco-Prussian War, and was later made a surgeon in the navy. In 1876 he turned his attention to the exploration of South America; he first crossed the Tumachumac Mountains; then ex¬ plored the valley of the Oyapok and its tribu¬ taries and several tributaries of the Amazon. In 1880 he crossed the cordilleras of the Andes and reached the Orinoco by the Guaviare River, a tributary never before explored. He returned to France for a short time, but in 1882 started on another expedition, intending to explore the upper part of Paraguay and some of the south¬ ern tributaries of the Amazon ; when he arrived at Buenos Aires he became interested in a plan for the exploration of the Gran Chaco and the Pilcomayo River, and joined an expedition for that

purpose. He and all but two of his com¬ panions were murdered by the Tobas Indians on the banks of the Pilcomayo. An account of his explorations was published under the title (Voyages dans l'Amerique du Sud) (1883). A work published by the Geographical Society of Paris and entitled (Fleuves de l'Amerique du Sud) (1883) is based on his researches.

CREVECCEUR, krav'ker, Jean Hector Saint Jean de, French agriculturist: b. Caen, France, 1731; d. Sarcelles, near Paris, 1813. He emigrated to America in 1754 and for some years lived on a farm near New York. In 1780 he was arrested by the English as a suspected spy and was confined for several months. He then went to Europe but returned in 1783 and was for a long period French consul at New York, where he enjoyed the friendship of Washington and Franklin. At London he pub¬ lished in English Fetters from an American Farmer) (1782), which he translated into

French under the title (Lettres d'un cultivateur Americain) (1784). He wrote also (Voyage dans la haute Peimsylvanie et dans l'etat de New York) (1801). His works were trans¬ lated into English and Dutch and have been greatly admired for the beauty of their style. Consult Tyler, (Literary History of the Ameri¬ can Revolution) (1897).

CREVILLENTE, kra-vel-yan'ta, Spain, city in the province of Alicante, about 20 miles southwest of the city of Alicante. It is pic¬ turesquely situated at the foot of the hills, some 10 miles from the boundary of Murcia, and has an imposing town hall and a castle, formerly the possession of the Count of Altamira. Weav¬ ing and agriculture are the principal industries. Crevillente is supposed to have been founded by the Romans. Pop. 10,452.

CREW, Henry, American physicist: b. Richmond, Ohio, 4 June 1859. He was grad¬ uated at Princeton in 1882; after five years as instructor in physics at Haverford College, Pa., and astronomer in the Lick Observatory, was elected Fayerweather professor of physics in Northwestern University 1892; past president of the American Physical Society; member of the National Academy of Sciences; joint trans¬ lator, with de Salvio, of Galileo's (Two New Sciences) (1914). He has written (Elements of Physics* (1899) ; (Principles of Mechanics) (1908); ˆGeneral Physics) (1908, 1911); is as¬ sistant editor of the Astrophysical Journal, and has contributed important papers to the Ameri¬ can Journal of Science and Philosophical Mag¬ azine.

CREW, of a ship : collective name for all the persons employed therein, but usually limited to designate petty officers and seamen only. In men-of-war, the entire crew are di¬ vided into five groups: (1) Commissioned and warrant officers; (2) chief petty officers; (3) first-class working petty officers ; (4) second-class working petty officers; (5) able seamen, ordinary seamen, landsmen and boys. In the very largest war-steamers now afloat, there are upward of 152 different ranks, grades or offi¬ ces among the crew, excluding officers and mariners. In sea-going passenger and freight steamers, the number of hands is relatively greater than in sailing vessels, owing to the various duties relating to the machinery; a steamer of 1,000 tons will have as many as 60 or 70 hands, if bound for a long voyage.

CREWE, Robert Offley Ashburton Crewe-Milnes, Marquis of, English statesman : b. London, 12 Jan. 1858. He was educated at Trinity College, Cambridge, was assistant pri¬ vate secretary to the Secretary for Foreign

Affairs in 1883-84, lord in waiting to the queen in 1886 and lord lieutenant of Ireland in 1892-95. In 1905-08 he was lord president of the council; in 1908 and 1912-15 lord privy seal, and Secretary of State for the Colonies 1908-10. In 1910-15 he was Secretary of State for India. In the latter year he again became president of the council. Besides several articles on Ireland, he is the author of a volume of (Stray Verses) 1889-90 ; 2d ed., 1893).

CREWE, England, a town in Cheshire, 21 miles southeast from Chester, an important station on the London and Northwestern Rail¬ way, 158 miles northwest of London. It is quite a new town, having been as recently as 1842 an obscure village wdth about 200 inhabitants. The first portion of it was built by the railway company for the accommodation of its work¬ men. The railway works comprise forges, rolling-mills, locomotive and carriage works, rail works, Bessemer steel works, etc., and give employment to about 7,000 persons. It is one of the most important railway centres in the world, at which from 9,000 to 10,000 workmen are employed. The town

gives its name to one of the parliamentary divisions of Cheshire. Pop. 44,960.

CREWEL-WORK, work executed with the needle, and consisting of designs sewed in colored silk or woolen threads on a basis of unbleached cotton or linen, toweling or the like. It is a kind of Embroidering. See Embroidery.

CREYTON, kra'ton, Paul, a pseudonym sometimes used by John Townsend Trowbridge in the earlier portion of his literary career.

CRIBBAGE, a card game of an essentially skilful nature, played mostly by two persons, though three or four can be arranged for; with an ordinary pack of cards. Court cards and tens rank equal, all others according to their <(pips,® aice counting one. The game is to win 61 points. The scores are kept on a tally, each side of which is perforated with six groups of 10 holes each. Each player scores the points he makes by inserting a peg into the hole his count entitles him to, on the board. The cards being shuffled and cut, the dealer, from the undermost half of the cards, deals five to each player, beginning with his adversary. The re¬ maining cards are placed face down on the cards already on the table. Both players then inspect the face values of their five cards and select two each to be thrown out. In this selec¬ tion each is guided by the remaining cards he holds, and by the fact that whether or no, in the subsequent stage of the game (hereafter explained) he or his adversary will have the benefit of counting to his score the ((thrown-out® cards. The non-dealer then cuts the cards left on the table again and the top card is turned face upward. From that moment, for that hand, this ((turned-up® card forms, with the four cards ˆthrown out,® what is known as <(the crib,® which the dealer in each game, after counting the points made off the cards in his hand, is entitled to add to his game. This turn¬ up card also is counted in the play of both play¬ ers with the cards in their hand. In the ordi¬ nary course the non-dealer begins the game by laying a card down, face upward, on the table, of which he calls out the value. The opposing player has at once to determine how he can best utilize the card so played. There are several

objects to be attained. You can so play as to ensure scoring yourself, or to prevent your opponents playing a next card, which will make all the pips played count 15 (for which he would score two points) or you can secure, or pre¬ vent, two or three tens being played in suc¬ cession; or a sequence of three or four cards; or a flush, that is, three

cards of the same suit; with a variety of other possibilities only to be learned by practice or close study of rules too intricate to be given here. When all the cards have been played, each player's hand, together with the turn-up, is counted for 15, *etc.* Then the crib or <(thrown-out® cards and ((tum-up® are counted for 15, and added to the score of the player entitled to it for that time. If neither party has scored 61 points, there is another simi¬ lar deal and the game proceeds until one or the other does score 61. For rules and full par¬ ticulars consult Cady, (Cribbage) (New York 1897) ; (Piquet and Cribbage) (London 1883) ; 'Foster's Complete Hoyle5 (New York 1909) ; Spalding's 'Home Library5 (1910).

CRICHTON, kri'ton, James, surnamed The Admirable, Scottish nobleman: b. Perth¬ shire, Scotland, 19 Aug. 1560; d. Mantua, Italy, 3 July 1583. His father was a lord of session and through his mother he was of royal de¬ scent. He was one of the young men selected to be fellow-students of the young king, James VI, at Saint Andrew's University. He then went to France, where he continued his studies, and also, as he adhered to the Roman Catholic Church, took part in the war carried on by Henry III against the Huguenots. The beauty of his person, the strength and agility he dis¬ played, joined to his multifarious accomplish¬ ments and surprising capacity for eloquent talk, made him the admiration of all. About 1580 he went to Italy, visiting Venice, where he was introduced to the Doge and Senate, created astonishment at Venice and Padua by his bril¬ liant off-hand discourses on philosophy, theology and other high themes and his challenge to dis¬ putation in any of several languages and on either side of the controversy. He next went to Mantua and was appointed tutor to the son of a duke. Attacked in the streets one night by a party of men armed and masked, he overcame them by his superior skill, and recognized his pupil, to whom he at once loyally presented his sword. The young prince immediately ran him through with it. The authority for this account is the Venetian publisher Aldus Manutius, with whom Crichton had associated. W. H. Ains¬ worth wrote a romance founded on the story of Crichton in 1837. Consult Tytler, P. F., 'The Life of James Crichton5 (London 1819; 2d ed., 1823) ; Crichton, Douglas, (The Admirable Crichton: the Real Character5 (ib. 1909); Whibley, (Essays in Biography5 (ib. 1913).

CRICKET, the name applied to orthop¬ terous insects of the family Gryllidce, allied to the grasshoppers. Their bodies are somewhat flattened, though in some forms more or less cylindrical, while the abdomen ends in a pair of long, slender stylets. The tarsi have three seg¬ ments, the ocelli may or may not be present, and the ovispositor forms a nearly cylindrical needle with a slightly expanded tip. They

are active leapers, the hind femora or thighs being enlarged. The males produce a shrilling sound made by raising the upper or fore wings and

rubbing them on the hind wings. The noise is due to the clear drumhead-like area in the mid¬ dle of the fore wings forming a resonant sur¬ face ; on the hind wings is a raised toothed ridge which rubs on the drumhead above it. 1 he females are silent. They are dull blackish brown. The European house-cricket (Gryllus doniesticus) has been introduced into New York. It prefers the warmth of the hearth, while our native species live in the open air, the males beginning to sing at the opening of the summer season, which in southern New Eng¬ land is about the 10th of June. See Mole-cricket; Tree-cricket.

CRICKET, a well-known game, commonly called the national game of England, played in the United States, Great Britain, Australia and India, the players being arranged in two con¬ testing sides of 11 each. Strutt, one of the best English authorities on ancient sport, ad¬ duces some evidence to show that <(club-ball,® played in the 14th century, may have been the parent of cricket, but both ((cat-and-dog® (men¬ tion of which occurs in the 16th century) and ˆstool-ball® (frequently referred to in the 17th century) have a closer affinity. It is stated in Russell's (History of Guildford) that cricket was played in that town in the middle of the 16th century, but for 50 years subsequently no trace has been found.

Cricket stands pre-eminent in England among the many outdoor pastimes pursued dur¬ ing the summer months. Cricket is not solely an affair of skill ; chance is also a factor to a very large extent. Conditions of ground and weather exert such a remarkable influence on the game that in many cases a side which ap¬ parently possessed little hope of success has come out of a match victorious. Also a mistake in the field, or an act of carelessness on the part of a batsman, may change the character of the whole game. To excel at cricket it is necessary that the study of the game should begin early; and at nearly

all schools a cricket ((coach® or tutor is engaged.

Cricket may be played either single-wicket or double-wicket, but it is now so rarely played in the former manner that we can safely con¬ fine our attention to the latter. For a double¬ wicket match game 11 players on a side are necessary, and after the captains have tossed to settle who shall go to the bat first, the loser places his field and the winner sends in two of his surest, safest batters to defend the wickets and to make runs. The disposition of the field depends upon the style of bowling, whether it be fast, medium pace or slow and the follow¬ ing diagram will give a pretty clear idea of how the fielders are placed and what dangers the batsman has to guard against. A distance of 22 yards separates the wickets, and by this scale the relative position of the players may easily be estimated. The field having been duly placed, the batsmen having taken their stand, the empire calls ((play,® and the bowler sends down his first ball. After five balls have been delivered from one wicket the umpire calls (<over,® and the whole field changes about till the position of the men bears the same relation to the other wicket that it did to the one first bowled against. These <(overs® continue to be bowled from alternate ends by different bowl¬ ers until the whole 11 players have tried their

hand at the bat and been disposed of. Runs are made by the batsman driving the ball far enough away to give him time to change places with the other batter before the ball returns ; each change constitutes a run. Six is the largest number of runs that can be made from a single hit, that being what is allowed when the ball is driven clear out of the grounds. The business of the bowler is to try in every possible way to knock down the wickets in front of which the batsman stands, or else to tempt him into hit¬ ting the ball up into the air so that it may be caught on the fly by one of the fielders. Be¬ sides being bowled or caught out, a batter may be ((run out,® that is, have his wickets knocked down by the ball while he is busy making a run, or he may be (<stumped out,® which is to have the same thing happen when he incautiously steps out of his ground to hit at a ball. The ball comes to the batter on the first bounce and the bowler's skill is shown in varying the pitch, speed and direction of the ball so that the bat¬ ter may become bewildered and fail to defend his wickets. The best kind of bowling is what is known as ((bowling with a break,® the pecu¬ liarity of which consists in that the ball after striking the ground does not continue straight on, but swerves sharply to the right or left like a (<cut® tennis ball.

DISPOSITION OF THE FIELD IN CRICKET.

S, striker; 1, bowler; 2, wicket-keeper; 3, long stop;

4, short slip; 5, point; 6, long slip; 7, long on; 8, long off;

9, cover-point; 10, mid-wicket on; 11, leg; U. umpire.

The great point in batting is to play with a straight bat, that is, as far as possible to swing the bat at right angles to the ground, the advan¬ tage thereby gained being that the wickets are more completely covered and there is less lia¬ bility of giving a catch. Next in importance is to play forward, that is, to meet the ball as far forward as safety allows and not wait for it to come upon one. Thirdly, it should be the bat¬ ter's aim to play low ; in other words, to hit as many ((grounders,® or (<daisy-cutters,® as possi¬ ble, for they are harder to field and give no chance for a catch. Two whole days at least are required for a first-class two-innings match. In Canada there are clubs in almost every city, town and village. In the United States the two chief homes of cricket are in Philadelphia and Boston, although there are good clubs in New York, Detroit and elsewhere and also at some of the larger colleges. Consult Grace, <Cricket) (1891) ; Daft, (Kings of Cricket5 (1893) ; Ran-jitsinhji, (Jubilee Book of Cricket5 (1897) ; and Read, (Annals of Cricket5 (1897) ; Knight, fThe Complete Cricketer5 (1906).

CRICKET FROG, a small frog (Acris gryllus; northern species arc variety crepitans) ,

abundant throughout the warmer parts of the United States, east of the plains, and noted for its rattling cricket-like cries in spring. It is about an inch long, brownish, with a blackish triangular patch

between the eyes, the borders of which are light-colored, continued as a dor¬ sal band to the rear end of the body; throat in spring yellow and legs barred; but all these colors change with surroundings, as the species possesses the power of metachrosis in a high degree. ((The note of this species,® says Cope, (<may be exactly imitated by striking two mar¬ bles together, first slowly, then faster and faster, for a succession of about 20 or 30 beats. The noise cannot be heard at a very great distance … it keeps on the high grass in and around marshy places, seldom if ever ascending trees or bushes. When pursued it leaps with pro¬ digious agility and hides under water.® Their eggs are deposited in April, in little masses at¬ tached to the blades of coarse grass. A short time afterward all the great numbers which make the marshes so noisy in April and May die off, so that until the eggs hatch and the young (<peepers® develop late in August, the spe¬ cies is practically extinct. Consult Abbott, (Notes on the Habits of the Savannah Cricket Frog,' in American Naturalist (Philadelphia 1882) and Dickerson, (The Frog Book) (New York 1906).

CRICKET ON THE HEARTH, a simple story by Charles Dickens, published 1845. It has been adapted for the stage and used by Joseph Jefferson.

CRIDGE, Edward, Canadian bishop: b. England 1817; d. 6 May 1913. He was gradu¬ ated at Cambridge University; was appointed chaplain to the Hudson's Bay Company at Vic¬ toria, B. C., in 1855 ; and was first inspector of schools for Vancouver Island. His trial and condemnation for ecclesiastical offenses, before a court presided over by his bishop, Bishop Hills, had as its sequel his secession from the Anglican Church and appointment as first bishop of the Reformed Episcopal Church in British Columbia. In his last years he was af¬ flicted with blindness.

CRILE, George W., American surgeon : b. Chile, Ohio, 11 Nov. 1864. He was graduated at Ohio Northern University in 1884 and re¬ ceived the degree of M.D. at Wooster ip 1887, studied also in Vienna, London and Paris. He was lecturer on the principles and practice of surgery at Wooster University from 1889-1900, when he became professor of clinical surgery at Western Reserve University. In 1913 he was granted an honorary fellowship in the Royal College of Surgeons. His work, (On the Blood Pressure in Surgery' (1903), is especially important. He published also (Surgical Shock) (1897) ; (Surgery of the Respiratory System' (1900) ; (Certain Problems Relating to Surgi¬ cal Operations' (1901) ; (Hemorrhage and

Transfusion (1909) ; 'Surgical Anemia and Resuscitation' (1914).

CRILLON, kre-yon, Louis des Balbes de Berton de, French soldier: b. Murs, Provence, 1541 ; d. Avignon, 2 Dec. 1615. In his first cam¬ paign, as aide-de-camp to the Duke of Guise (1557-58), he contributed much to the conquest of Calais. He subsequently distinguished him¬ self in the battles of Dreux (1562), Jarnac and Moncontour (both in 1569), against the Hugue¬

nots. In the famous naval battle of Lepanto fought in 1571 Crillon displayed prodigies of valor and, though wounded, was appointed to carry the tidings of the great victory to the Pope and the king of France. The massacre of Saint Bartholomew (1572), the preparations of which had been carefully concealed from Crillon, was loudly reprobated by him. He fought heroically for Henry IV against the League and distinguished himself at the battle of Ivry (1590), and at the sieges of Paris and Laon. After the peace with Savoy, Crillon re¬ tired to Avignon. Consult Montrond, (Histoire du brave Crillon) (Lille, 5th ed., 1874).

CRILLY, Daniel, Irish journalist: b. 14 Dec. 1857. He edited the United Irishman, Liv¬ erpool 1876, and joined the staff of the Nation, Dublin 1880. He represented North Mayo in Parliament 1885-1900 and has published (In the Byways with Young Ireland' (1888) ; 'The "Felon" Literature of Ireland' (1889); (Tlie Celt at Westminster' (1892); 'Pencillings on Parnassus' (1899) ; 'In the Footsteps of John MitcheP (1900-01).

CRIME, a word signifying in its legal ac¬ ceptation any act to which the law attaches a penalty or punishment, without any reference to its moral turpitude. The common-law division of crimes was into treason (q.v.), felony (q.v.) and misdemeanor (q.v.). At present treason is usually classed as a felony and the distinction between felonies and misdemeanors hinges upon the degree of punishment prescribed for the crime, a felony being punishable by loss of life or by incarceration in a State prison for at least a year and by the deprivation of civil rights, and a misdemeanor being punishable by a fine or by imprisonment in a workhouse or by both. To constitute a crime, there must first be an act, since a mere opinion or intention, however wrong from a moral or religious point of view, if not carried into an act, cannot be treated as a crime, although the criminality of the act when done, may be partially or entirely dependent upon the intention of the actor. The true and only reason for making any given act a crime is the public injury that would result from its frequent perpetration. Each individual instance constituting an individual injury, fre¬ quent

repetition would make it a social injury. Society accordingly takes the most efficient measures for its prevention, by appealing to the fears of mankind. The crime is first accurately defined and the requisite punishment attached to it and then government itself becomes a party to the prosecution of the offender, in or¬ der to ensure the carrying into effect of the pen¬ alty; for the certainty of punishment is even more effectual in preventing crimes than any degree of severity with a probability of escape. But while the only legitimate object of punish¬ ment is to protect society against a repetition of crimes, humanity dictates that the reforma¬ tion of the offender should also, if possible, be effected. But as government has no concern with men, except as members of society, it is obvious that their moral improvement can never be made the primary object of punishment. Self-protection is at once the foundation and the end of the power exercised by society in punishing its members. In preventing the repe¬ tition of crimes, punishment is designed to op¬ erate both upon the individual offender and

upon Ur-community at large. Upon the of¬ fender himself it operates by physically dis¬ abling him from repeating the offense, or by dissuading him from it through the recollection of past suffering, or by both of these means together. Upon the community at large, it op¬ erates only by the terror of example. Conse¬ quently it follows that the mode and measure¬ ment of punishment are to be determined, not so much by the abstract nature of the offense as by its liability to frequent repetition, and also that no act should be punished at all, the repe¬ tition of which does not injuriously affect the temporal welfare of society. Insanity, infancy, coercion or duress may excuse an act otherwise criminal in the degree that they destroy the vol¬ untary nature of the act, which is therefore performed by the agent without specific crim¬ inal intent. See Criminology ; Finger Prints.

CRIME AND PUNISHMENT (Prestu-pleniye i Nakazaniye). Dostoyevsky's greatest masterpiece in fiction, (Crime and Punishment, > is the psychological study of a murderer. A law-student in the University of Petersburg has written for a periodical an article on crime. This has turned his attention to the subject, and as he has not been informed that the article was accepted, and as the small pittance that his mother and sister have been in the habit of sending him has inexplicably ceased coming, he is reduced to such straits that he has been obliged to pawn some of his pos¬ sessions and is deeply in debt. The notion enters his head of murdering Alena Ivanovna, a disreputable old woman who lends money on pledges and is reputed to be as rich as a Jew. He dwells on the plan until it obsesses him. He argues that if great conquerors, like Na¬ poleon and Alexander the Great, who had suc¬ ceeded in winning fame and glory by their colossal crimes, were justified by their success, it would not be wrong for him to rid the world of a hard and evil usurer, and then, by taking the thousands of rubles which he should find in her possession, to pursue his career without the sordid cares that are blocking his way. He takes a hatchet, which he fastens by a loop to the inside of his cloak, and wrapping up a chip and a piece of iron as a pretended pledge, he goes to her apartment. Everything favors the accomplishment of his scheme. He finds the suspicious old woman

alone, and while she is untying the knot around the package, he strikes her on the head and kills her. He hastily ran¬ sacks the inner room ; he fails to find the great sums of money which are hidden about, but picks up a few pieces of jewelry and a pocket-book stuffed with banknotes. While he is at work, the old woman's half-sister enters the outer room. He strikes her down also, and then, hearing steps, he for the first time thinks to bolt the door. Persons try to enter. They ring and knock, and suspecting something is wrong, go to find the janitor. Raskolnikof manages to escape. In order not to meet the two visitors coming back with the janitor, he steps into a room just vacated by two painters and there accidentally drops one of the jewel-cases. Undetected he leaves the house. Reaching his room he regards his booty, insignificant as it is, with a sort of horror. He goes to a deserted house and buries it all under a large stone. Returning to his room he dis¬ covers blood on his boots and on his clothing. vol. 8—13

He tries to get rid of all such incriminating evidence. He cannot, however, eliminate his conscience. His crime haunts him night and day. He becomes ill, and his friends cannot understand his actions, which are those of a crazy man. He is constantly impelled to visit the police-station and to revisit the scene of his crime. He is as yet safe from suspicion, since one of the two painters, who had left the apartment-house just about the time of the murder, has confessed to being the perpetrator. The examining-magistrate, who had read Raskolnikof's article, now published, and has a high idea of the young man's abilities, has gathered from his wild talk that he is the criminal : he advises him to confess and bear his punishment like a man ; he intimates that his sentence will be mitigated by such action. In the meantime Roskolnikof has confessed his crime to Sonya, a girl of the town, the victim of cruel circumstances. He had met her through chance acquaintance with her father, an official degraded by drink, and had become greatly interested in her. Raskolnikof, finally, yields to Sonya's earnest entreaties, goes to the police station and is sentenced to eight years of hard labor in Siberia. The young girl accom¬ panies him, and by her utter devotion brings him back to sanity and to complete repentance.

There are subordinate threads of plot, in¬ volving Raskolnikof's mother and sister and a wealthy roue, named Svidriga'ilof, who in spite of his rascalities has the saving grace of a generous spirit : he is a character worthy of Dickens. The episode of his suicide is depicted with startling power. So is the tragic end of Sonya's father. The scene of his funeral reaches the highest degree of pathos, mingled with a

touch of sardonic humor. One of the most famous episodes in the story shows Sonya reading the New Testament to her unhappy friend: the prostitute and the murderer make a picture which haunts the memory by its realism and its dramatic poetry.

The power of the novel consists of the exhaustive analysis of the motives and reac¬ tions of a man who is on the verge of insanity and yet who is shown to be responsible for his deeds. Dostoyevsky had in his own life made a first-hand acquaintance with the lives of the poorest and most degraded people. He under¬ stood, as few have, their trials and temptations and he deploys before the reader a remarkable series of scenes in a style evidently greatly in¬ fluenced by Charles Dickens as well as by Gogol, ((the Father of Russian Realism.® The descriptions of the murder, of the meeting of Raskolnikof and Marmeladof at the low traktir, where the drunkard tells his life-story, of the funeral-dinner given by Marmeladof's widow and the dramatic appearance of Sonya among the queer persons present, who draw back from her as from the plague, and of the life of the exiles in Siberia, which Dostoyevsky knew at first-hand — all these and many more are por¬ trayed with a masterly pen. The beautiful and touching epilogue where Raskolnikof comes to himself lifts the tale from a wholly sordid, depressing, gloomy and pessimistic tragedy into the serene light of optimism: it fully repays for the long pages of hypochondriacal psycho¬ logical analysis, which however microscopic and scientific are yet morbid and unwholesome.

(Crime and Punishment* was regarded as

the greatest literary event of the year 1866. It made a vast impression. It is said that it was immediately followed by a murder com¬ mitted by a student at Moscow in almost pre¬ cisely the same way as that described by Dos¬ toyevsky. He himself remarked that he seemed (<to be like a criminal who had committed some terrible deed that weighed on his conscience. }) It was anonymously translated into English from the French version and published in Lon don in 1885, and in New York the following year. It forms the third volume of the com¬ plete works of Feodor Dostoyevsky from the Russian by Constance Garnett. It has been carefully analyzed by the Vicomte de Vogue in his (Russian Novelists) (Boston 1887) and by William Lyon Phelps in his (Essays on Russian Literature > (New York 1916).

Nathan Haskell Dole.

CRIMEA, kri-me'a or kri-me'a, The (Fr. Crimee; German, Krim; ancient Chersonesus Taurica), a peninsula forming the most south¬ erly portion of the Russian government of Taurida on the north side of the Black Sea, separated from the mainland on the north by the Isthmus of Perekop, over three miles across, the Kertch Strait on the east separating the Black Sea from the Sea of Azov. It has a maximum length, east to west, of 200 miles, and a breadth of 130 miles from north to south, and is estimated to have an area of 9,700 square miles. It is washed on three sides by the Black Sea. The northern part of the peninsula is a continuation of the Russian steppes, with saline stretches, cold in winter and hot and dry in summer, with a disagreeable prevalence of dust storms. The southern littoral, sheltered by the Yaila-dagh or Alpine Meadow Moun¬ tains, is known as the Russian Riviera, has a climate Mediterranean in character, in which peaches, pomegranates, almonds and apricots grow to perfection. Here are the palatial resi¬ dences of the Russian nobility, and Livadia, one of the tsar's palaces. The forests are of limited extent and seldom contain magnificent timber.

Among domestic animals the first place is due to the sheep, of which there are large numbers of fine-wooled breeds; horned cattle, horses and camels are also reared in large numbers. Of mineral productions the principal is salt, which is obtained from lakes in the saline tracts al¬ ready referred to, in large quantities, and fur¬ nishes the material of an active trade, chiefly with the interior, by land transport. Other

minerals are porphyry, ironstone and limestone. Fishing, shipbuilding, flour-milling, tanneries and soap manufacture are the principal indus¬ tries. The Crimea is now included in the Russian government of Taurida. The chief towns are Simferopol (pop. 81,859) and Sebas¬ topol (pop. 61,849) and the population is esti¬ mated at 855,000, the majority Turkish-speaking Tartars.

The history of the Crimea extends over 24 centuries, commencing with the earliest annals of Greece. It figures in Greek fable as Cim¬ meria. Greek settlements were made on the shores of the Crimea in early times ; cities were built, one of them Theodosia, which still retains its name. The Bosporus finally became a de¬ pendency of Rome, and after the fall of the empire the settlements in the Crimea appear to have had a very precarious existence, at one

time placing themselves under the protection of the Byzantine emperors, at another becoming the tributaries of some marauding adventurer and at another claiming to be their own masters. The time when some offshoot of the Turks first arrived in the Crimea is not well ascertained, but in the 7th century the greater part of it was in the hands of a Turkish tribe called Khazars, and had, in consequence, changed its name to that of Khazaria. In like manner its southern coast, where the Goths had established them¬ selves, was called Gothia. The Crimea formed only a minute portion of the territories of which the Khazars had made themselves masters. Their capital was seated near the mouths of the Volga, probably not far from the present As¬ trakhan, and their sovereigns, called khazars or khans, lived in a state of splendor which the monarchs of western Europe have seldom equaled. In the 10th century the Russians and Pichengues come upon the scene, and before the end of it the power of the khans is almost broken. The Russian conquests were made chiefly in the north ; the Pichengues, on the contrary, make their incursions on the south ; and the Crimea, though still retaining the name of Khazaria, was obliged to receive them as its masters. The Pichengues, after maintaining their footing for above a century and a half, were forced to give way to the Comanes, who themselves were, in fact, fleeing before a race much more powerful than either. This was the Mongol Tartars, headed by the celebrated con¬ queror Genghis-Khan. The Crimea having been included in his conquests, passed, on his death, to his grandson, Batu-Khan, and in 1240 was incorporated in the great empire of the Golden Horde. Batu-Khan was the founder of Baktschi Serai, which continued long to be its capital. Mengli Timur, the second in succession from Batu-Khan, having granted the Crimea to a nephew, to be held as a

dependency of the grand khanate, it took the name of Crim, or Little Tartary, from which that which it now bears is evidently derived. Previous to this time the Genoese had frequently visited its shores as traders, but they now applied to the under-khan for permission to form a perma¬ nent settlement. This was granted, and in con¬ sequence in 1280 they founded Kaffa, which is still known by its ancient name of Theodosia. The great object of the Genoese in making this settlement was to exercise a control over the extensive and lucrative trade which was then carried on with the East, by way of the Caspian Sea and the Volga, and thence, after a short land carriage, down the Tanais or Don into the Sea of Azov. This trade and a large busi¬ ness in slaves so increased the importance of this settlement that the Genoese, who had come as simple traders, began to aspire to be masters. The jealousy of their great rivals, the Vene¬ tians, was excited, and open hostilities were carried on, each party contending for an ex¬ clusive monopoly of the whole trade of the Black Sea. In this contest the Genoese gained the advantage, and they continued to followr it up by forming permanent settlements and erecting strong fortifications. In this way they obtained possession of Soldaia, now Soudak, in 1365, and about the same time made themselves masters of Cembalo, which afterward exchanged its name for that of Balaklava. The old castles at both these places are Genoese. While Genoa

was thus a rising power, the khans were rapidly declining. To complete their downfall, the ter¬ rible Timur appeared, and early in the 1 5th century the great empire of Kaptschak or the Golden Horde was broken up into fragments. Early in the 15th century the Crimea thus be¬ came an independent khanate, and continued so to exist under the line of Gherai, descended from Genghis-Khan, for a succession of reigns. The Genoese in the meantime were growing in power, and succeeded, by interfering in a disputed suc¬ cession, in gaining complete ascendency over the khanate. The Tartars invited the interfer¬ ence of Turkey, and 1475 an Osman fleet appeared in the Bay of Kaffa. The Genoese offered an ineffectual resistance ; and Kaffa, along with all their other settlements, was soon in the possession of the invaders and the Crimea became a province of the Ottoman Empire. The Turks, not satisfied with the Crimea, extended their conquests far into Russia and provoked Russians reprisals, and soon Russia turned to the Crimea as a possible and valuable maritime province. In 1736 a Russian army of 50,000 men broke through the Isthmus of Perekop and made its way into Crimea itself. But the terri¬ ble climate forced the speedy return of less than half of the army, all that was left. The contest for the Crimea, thus begun, was steadily per¬ sisted in ; and the conquest was virtually com¬ pleted by the troops of Prince Dolgorouki in 1771. In 1783 the Crimea was united to the Russian Empire.

The Crimean War. — The progress of Rus¬ sia in this direction naturally held out to her more tempting objects of ambition and it was generally believed by the western powers of Europe, who were jealous of the growth of her gigantic power and particularly by England, of whose policy, in consequence of her possessions in the East, the preservation of the Turkish Empire had become a primary object, that she aimed at the dismemberment of that empire and the conquest of Constantinople itself. Among other indications of aggressive tenden¬ cies, the great naval arsenal of Sebastopol, oc¬ cupying the most commanding position in the Black Sea, at the extremity of the Crimean peninsula, begun by Catharine II in 1786, was completed on a scale of which the world has yet seen few examples and provided to

an un¬ limited extent with all the means both of of¬ fensive and of defensive warfare. One main object of this arsenal undoubtedly was to hold out a standing menace against Turkey and make her destruction certain whenever an opportune period for striking the final blow should have arrived. The Emperor Nicholas I, one of the ablest as well as most ambitious of the tsars who have ever swayed the Russian sceptre, had satisfied himself that this period was actually at hand. In February 1852 the Porte had given a decision on a dispute between the Latin and Greek churches, the former protected by France, the latter by Russia, as to the protection of the holy places in Palestine, which was deemed fa¬ vorable to Russia. A new demand, however, was made by this power, which in November claimed, in virtue of the Treatv of Kainardji, a protectorate over the Greek Church through¬ out the Turkish Empire. After complicated ne¬ gotiations, the Porte, under pressure from France, vacillated toward the side of the Latins, and on 22 December delivered the key of the

church of Bethlehem to the Latin patriarch. The diplomacy of England, France, Russia, Aus¬ tria, Prussia and Turkey exhausted itself in ne¬ gotiations over this dispute and at length, in May 1853, Prince Menschikoff delivered an ultima¬ tum to the Porte, which being rejected, the Rus¬ sian troops, which had been advanced to the Pruth at the close of the previous year, crossed it and occupied the Danubian principalities. The Porte declared war on 23 Oct. 1853; France on the 27th and England 28 March 1854. On 26 Jan. 1855 the allies were joined by Sardinia. Happily the common danger had dissipated all the misunderstandings which had arisen between Great Britain and France. Nicholas had selected the Danubian principalities as the scene of war¬ fare and here the allied army was first con¬ veyed ; but after remaining inactive for some time at Varna and suffering great losses through cholera, it was determined that the Crimea should be made the great battlefield. Accord¬ ingly, in the beginning of September 1854, the combined fleets of Great Britain and France, forming up till then, if efficiency as well as vastness are considered, the mightiest arma¬ ment ever conveyed by sea, appeared off the west coast of the Crimea, about 30 miles north of Sebastopol. The disembarkation having been completed on the 16th, the army began to move southward on the 19th and early on the 20th approached the banks of the Alma. Here the Russian army was found occupying a position which Prince Menschikoff, its commander, be¬ lieved to be unassailable. After a sharp strug¬ gle the Russians were forced to give way at every point, leaving the allies in possession of a victory which is destined to hold an honorable place in military

annals. Two days after the allied army continued its march for Sebastopol, the real object of attack; but for strategical reasons, instead of proceeding directly to the north side of the fortress, made a circuit which brought it considerably to the south, in the vicinity of Balaklava. This small harbor, near which the British were stationed, furnished them with facilities for landing the munitions of war, while the same object was gained, per¬ haps more advantageously, by the French at Kamiesch Bay. It has been alleged that an as¬ sault upon Sebastopol, had it been made imme¬ diately after the victory of the Alma, would probably have been successful. The defenses were, toward the sea, justly deemed all but im¬ pregnable, but those on the land side, from which the tsar had never dreamed of the pos¬ sibility of an attack, were very incomplete. The allies, however, doubting the success of an as¬ sault, resolved to proceed in more regular form ; and thus commenced one of the most remark¬ able sieges of modern times. The greatest skill, courage and perseverance appear to have been displayed both by the besiegers and the be¬ sieged. The latter were, however, in almost every respect the more favorably situated. The commissariat arrangements of the allies were deplorable; cholera decimated their ranks. Their munitions of war were almost unbound¬ ed ; the northern side of the harbor was never invested, so that their communication with the country always remained open ; and, contrary to the rule established in regard to siege opera¬ tions, the number of troops within the town nearly equaled, and at one time greatly ex¬ ceeded, the number of those who were attempt-196

ing to take it. The consequence was that not only were defensive works constructed rapidly while the siege made comparatively little prog¬ ress ; but the besieged, who had also the assist¬ ance of an army without the walls, were able to assume the aggressive. On 25 October took place the famous battle of Balaklava, distin¬ guished by the heroic charge of the Light Bri¬ gade, when, in consequence of the misinterpre¬ tation of an order, 600 cavalry rode headlong against the Russian army. On 5 November fol¬ lowed the battle of Inkermann, in which an overwhelming force of Russians was gallantly repulsed. Both Great Britain and France now became more alive to the magnitude of the struggle in which they were engaged. While the siege continued, other important positions in the Crimea were occupied and the possession of Eupatoria on the west, and of Kertch on the east, both seriously threatened the communica¬ tions of the Russians and furnished the means of destroying a large portion of their supplies. The peninsula was thus virtually conquered and a successful issue of the siege began to be con¬ fidently anticipated. At an early period the Rus¬ sians, by sinking a number of large ships across the mouth of the harbor, had rid themselves of the danger of an attack by sea. The remainder of the fleet within the harbor was still available for defense and from its powers of locomotion enabling it to change its position so as to meet emergencies, was able greatly to retard the be¬ siegers. Decided progress, however, continued to be made. On 7 June 1855 the Mamelon, a commanding height, was taken ; and on 8 Sep¬ tember the flag of the allies waved on the tower of the Malakoff. The Russians on the night of the above day, aware that further defense was impossible, withdrew to the northern side of the harbor, after sinking their ships and blowing up the defenses of the town, which was now taken possession of by the allies. There is no reason to doubt that in another campaign the Russians might have been driven entirely out of the Crimea; but overtures of peace were made and they gladly availed themselves of them. A treaty of peace was concluded at Paris on 30 March 1856 by which the independence of the Ottoman Empire was guaranteed and her ad¬ mission to the society (concert) of European powers declared by the other contracting par¬ ties, namely, Great Britain, Austria, France, Prussia, Russia and Sardinia; the Christians in Turkey to remain under the protection of the Sultan, who, by a firman, allowed them religious liberty; Russia renounced her protectorate over the Danubian principalities ; the Black Sea was neutralized; the navigation of the Danube was to be free to all nations.

The total casual¬ ties in the Crimean War have been estimated at half a million; the costs — Great Britain, £69,- 000,000; France, £93,000,000; Russia, £142,- 000,000. Taking advantage of the Franco-Ger¬ man War, Russia, on 31 Oct. 1870, denounced the Treaty of Paris so far as it related to the neutralization of the Black Sea, and in a con¬ ference held in London in January 1871 this part of the treaty was given up, while the remainder of the treaty was confirmed. Con¬ sult (Antiquites du Bosphore Crimmerien) (Saint Petersburg 1854) ; Beaulieu, (The Em¬ pire of Czars and Russians* (New York 1893) ; Telfer, J. B., (The Crimea and Trans-caucasia) (1872) ; Wood, E., (The Crimea in

1854 and 1894* (1895). Crimean War: King-lake, (The Invasion of the Crimea) (1863-87), and Hamley, (The War in the Crimea) (1891) ; Russell, (The War in the Crimea) (1855-56).

CRIMEAN WAR. See Crimea, The.

CRIMINAL CONVERSATION, the

technical term for adultery with another man's wife. It is no defense to an action by the hus¬ band, in such a case, that the wife freely as¬ sented to the defendant's solicitation, for the husband does not sue for a wrong done to her, but to himself. The gist of the action is the shame which has been inflicted upon him and the hazard to which he is subject of maintaining spurious issue. It is therefore quite distinct from the wrong of enticing the wife away from her husband, although, like seduction, it is looked upon as a personal injury to the husband. He may condone the wife's offense, and thus lose his right to secure a divorce, without affecting his right to damages against the paramour. It has been judicially declared that the law will not hold a party remediless for an injury of this kind because, through the exercise of Christian virtue, the influence of family interest, or for any other reason, he forgives an erring wife and trusts in her reformation and promise of future good conduct. He may forgive the wife without forgiving the author of the wrong done him. See Adultery.

CRIMINAL LAW. A definition of crim¬ inal law as that part of the law which relates to crimes and their punishment requires an ex¬ planatory definition of the term ®crime.® A definition of a crime as an act or omission for which legal punishment may be inflicted upon the person in default would be too broad for practical purposes ; for law in its very nature is coercive and all coercion at some stage in¬

volves the possibility of punishment. Calling crimes ˆwrongs** does not help matters. There are many acts and omissions which would not be accounted criminal, though they are con¬ sidered wrongs, which result in injury to per¬ sons or property and are done in negligence and even with malice. The criminal law, therefore, in one of its most important aspects, is the law which defines crimes. Secondly, the function of the criminal law is to provide for the punish¬ ment of crimes. Thirdly, the criminal law prescribes the procedure whereby responsibility for crime is legally determined and the penalty admeasured and inflicted. Crimes may be either attacks on public order, abuses or obstructions of public authority, or acts injurious to the public good; or they may be attacks on the persons or property of individuals, or rights annexed to persons or property. In primitive communities, the law did not greatly concern itself with the redress of private wrongs. It was left to the injured individuals and their kinsmen to wreak vengeance on the offender and get what satisfaction they could through retaliation. The fear of private vengeance, indeed, was the only really efficient check upon crimes of violence. The earliest English method of criminal procedure, if it can be called so, was merely regulative of the right of summary execution accorded to one who catches a wrongdoer on his premises flagrante delicto; a thief might reclaim his life by paying wer, and, if he had obtained sanctuary in a church or in a demesne of the king, or of a bishop or

a lord, and should be killed there during the prescribed days of grace, the slayer was obliged to pay a fine to the protector whose sanctuary had been violated. The privilege given to com¬ pose a feud by the payment of wer-gild to the avengers of a wrong was, in effect, a recog¬ nition of the right to redress by acts of violence a wrong done by the violent act of another. The idea that wrongdoing might injure not merely the individual directly affected but also the state was not grasped until much later times. During almost the whole Saxon period of English history crimes continued to be re¬ garded as acts of war, and blood feuds and private warfare characterized a normal condi¬ tion of society. The object of the law-maker was to reconcile antagonists upon established terms of peace rather than to put down violence by orderly legal process. The conception of the (<King's Peace® as a state opposed to the state of private war began to gain currency, however, in the time of Alfred, although the laws of that king made liberal exceptions. A man could fight with or for his lord, for in¬ stance, and a lord could defend his vassal by force of arms without being answerable for a breach of the peace. But offenses against in¬ dividuals, even homicide, involving serious menace to the general welfare, were still treated as merely private injuries to be compensated by damages. The foundation for a more en¬ lightened system was being laid, nevertheless, and even while these barbarous institutions per¬ sisted, by laws ordering the local organization of the country by shires or counties, hundreds and parishes, for the purpose of police and the administration of justice. All men were bound to combine themselves in associations of 10, each of whom was a surety for the good be¬ havior of the rest; and were likewise bound to produce any of their number charged with any offense or, failing in this, to make good any mischief he had done. This was the institution of ((frank-pledge.® The Hundred Courts and County Courts corresponded with the local police organization, but in criminal matters the sheriff's tourn was simply the County Court held for a particular hundred. The court con¬ sisted of the parish priest, the reeve and four men from each township, also all lords of land and public officers of the vicinity, — for the County Court was the <(Folkmoot® or general assembly of the people. But a representative

body of 12 appears to have been constituted as a judicial committee of the court. Accusa¬ tions might be made by this committee, the prototype of the grand jury, or by members of the Folkmoot, or by private accusers. The guilt or innocence was decided by compurga¬ tion, or by ordeal if the accused was not ((oath-worthy.® Whether the compurgators examined witnesses before they <(dared® to swear is. un¬ certain, but h is inconceivable that an inquisition into the facts should not have preceded the verdict. By the time of the Norman Conquest the killings and burnings in private wars and blood feuds had become almost extinct; the introduction of trial by battle in the reign of William the Conqueror, therefore, was an ap¬ parent reversion. Indeed, the language of the royal carta by which this was instituted shows that it was so intended, and that trial by battle was merely private war under regulations. By William and his immediate successors the super¬

visory powers of the King's Court were greatly increased and its concurrent jurisdiction was exercised more stringently and frequently until, ultimately, the King's Assizes practically dis¬ placed the County Court in the exercise of the more important part of its criminal jurisdiction. Criminal actions up to the time of Edward I (reigned 1272-1307) were instituted by <(appeals® to the County Courts and proceeded from pri¬ vate initiative, not from the Crown; this was so even in regard to such serious offenses as homicide, arson and rape. In form the crim¬ inal appeal was a wager of combat, the appellor offering to ((prove by his body® the justice of his cause and the appellee likewise undertaking ((by his body® to defend himself against the accusation. If the appellee succeeded in defend¬ ing himself until the stars came out, he was acquitted; if defeated, he was hanged. But it was left to the viscount and coroners to de¬ termine whether the appellee (<ought to have the country,® meaning, probably, an inquisition by the judicial committee of the County Court (grand jury?) and a determination of the facts on the testimony of witnesses by petit jurors or compurgators.

Neither the ancient laws, decreed on the sole authority of the kings, nor the earlier acts of Parliament yield much to those who go to them in search of definitions of crimes. Their administrative and regulative provisions assume a knowledge on the part of the law officers of what characterizes a criminal offense and dis¬ tinguishes it from a trespass. The forms of procedure devised by the courts, however, are more helpful to a historical study of the de¬ velopment of the criminal law. From a number of forms of appeals given by Bracton in his (Leges

AngliseP it appears that in his day the idea of a crime being an infraction of public order as well as an invasion of private rights had been definitely accepted. The appellor was required to allege that at the time of the injury suffered, whether abiding at home or traveling on the king's highway, he was <(in the peace of the lord king,® that the defendant ((came with his force against the peace,® in felony and in ((premeditated assault.® Violence, felonious¬ ness, malice and premeditation have in all times been considered necessary constituents of any serious criminal act. Returning to Bracton we find that, if the injury inflicted was a wound, the appellor must describe it with exactitude and state upon what part of his body it was received; also the kind of weapon with which it was inflicted. It seems that only with weapons that cut and pierced could an assault be made that would be accounted felonious. If one were injured from a blow with a bludgeon or the bare fist, such as would ordinarily cause merely a bruise or a welt, unless bones were broken, it was regarded a (<minor and lighter® offense, answerable in a civil action though even such lesser wrongs would ˆappertain to the crown, for sometimes they are against the peace.® An appeal for mayhem would lie only for injuries that would disable the appellor ((for fighting.® Certain crimes, as homicide and arson, were ˆinexpiable,® subjecting the perpetrator to cap¬ ital punishment, or to mutilation in the case of rape. Killings or fires resulting from acci¬ dent or negligence, and not caused with malicious design, were not so punished. Bracton says ((against such (offenders) a civil action

lies.® Thus early (Bracton's bqok was written about 1258) did the law clearly recognize the distinction between ˆfelonies® and ((misdemeanors,® which has subsisted to this day. Thus early was (<intent® estimated at its true value as an element of criminality. Not for the first time in English history, however, was such recognition then accorded to these principles. The Saxon laws directed a less compensation to be made for accidentally causing a death than where the killing was an act of volition ; and in the laws of the Norman, Henry I, son of the Conqueror, there is a general provision that <(one who does amiss unknowingly is free of guilt.® The common-law crimes against private proprietary rights were those involving destruction of property, as arson, and those depriving the owner of its possession, as theft. The former was a capital crime and the latter, the perpetrator being of the age of puberty, and the property taken being above a few shillings in value, was also punishable with death. The malicious burning of a domicile, strictly speaking, is an injury to the person of the owner, being regarded as an attack on his life. The commission of larceny in the night (burglary), or with accompanying violence to the person of the victim (robbery') were ag¬ gravated forms of the offense, justifying the summary killing of the offender. Land, under the feudal system, being held in tenure of the king or lord, and not owned, was not susceptible to theft ; anyhow, a thief could not conveniently carry away an earldom or even a farm. But this insusceptibility of real estate to appropria¬ tion by larcenous taking was extended to the appurtenances thereof. So, while it would be a larceny to steal a sheep from the fold or an apple from the tree, these things being chat¬ tels, one might carry away any part of a house, or even jack up and remove the entire structure, without committing a theft at common law. The principal crimes against the government mentioned in the early laws were : plotting against the king's life or the harboring of exiles who plot ; plotting against a lord, fighting in the king's house or breaking the king's peace in tumult and riot ; also contempt and disobedience of lawful authority, especially by public officers, possibly the basis of the law of impeachment for malfeasance. Breach of the oath of fealty to the sovereign and making head against him with force of arms was treason and rebellion, severely punished when unsuccessful. Of crimes against public justice, perjury is several times mentioned, and of offenses against the police power "coining® is attended to at a very early date. Usury originally was an offense under the canon law of

which the ecclesiastical courts took cognizance exclusively, until a compromise was made between the king and the bishops and embodied in act of Parliament (15 Edward III, Chap. 5), the usurers dead belonging to the king and alive to the bishops. Usury was finally7 declared a thing unlawful (by 37 Henry VIII, Chap. 9), repealed in the time of Ed¬ ward VI but revived in 1570 (by 13 Elizabeth, Chap. 8). The law of 25 Edward III, St. 5, Chap. 1, is still the standard act on which law of treason is based. In fact, by the end of the reign of this monarch (1377), we find the criminal law of England practically complete, in outline, with respect to its substantive pro¬ visions as well as with respect to the organiza¬

tion of the courts and their procedure. The King's Bench had obtained a much more than supervisory jurisdiction over the County Court and when the king's judges came into a shire their jurisdiction in criminal cases was prac¬ tically exclusive. The County Courts, no longer the Folkmoot, were composed of selected county magistrates. Twenty-three of these were told off to form a grand inquest, or jury, of which 12 would constitute a quorum, while the whole body would be the custodian of the rolls — custos rotulorum. Shakespeare shows his wTis-dom of the law when he permits Robert Shallow, Esq., in the county of Gloucester to call himself <(justice of peace and coram, aye, and cust-alorum ,® titles which the popular wit of a later age has further travestied and trans¬ muted into ((high cockalorum.® Criminal prose¬ cutions by private appeal continued in vogue, however, long after the institution of grand juries and pleas of the crown. In 1482 the judges of all the benches unanimously directed that one indicted for murder <(shall not be prosecuted at the King's suit for a year and a day® ; every indictment was to be stayed until the suitor had his opportunity to prosecute his appeal to trial by battle. This remarkable piece of judicial legislation was repealed by statute (3 Henry VII, Chap. 1) which provided .that because "the party is often slow . and at the end of the year all is forgotten,® indictments for murder shall be tried at once, but acquittal was no bar to a private suitor's appeal. This form of action, however, fell out of use, though an appeal for murder was insti¬ tuted as late as 1818. Nothing came of it, the appellor declining to fight, and in the following year (59 George III, Chap. 46) private prose¬ cutions of criminal offenses were definitively abolished. When an accusation presented by the officers of the crown has been endorsed by the grand jury a ((true bill® it becomes an indict¬ ment. A majority of not less than 12 jurors is necessary to a finding, hence the practice of drawing 23 men to the grand jury, so that 12 may be the smallest possible majority. The

indictment derived its preciseness of form from the appeal, on which it is modeled. Any vari¬ ance between the statement made by the ap¬ pellor to the coroner and that made to the judges was fatal. The same strictness of rule applies to the indictment. The requisites of an indictment at common law were : the venue, which was important as showing whether an action was brought in the proper jurisdiction; the statement, which sets out all the ingredients of the offense charged ; the conclusion which was merely a form, of no importance whatso¬ ever, and is now generally omitted. In other respects a modern indictment does not differ greatly from one of the earliest times. A his¬ tory of the criminal law in England leads through a maze of refinements in special plead¬ ing and of capricious and casual legislation. The many definitions of crimes, made at vari¬ ous times within the five or more centuries past, naturally were not always consistent, while the subtleties and technicalities of the special pleaders were often ridiculous. Many of the rules of pleading were, in effect, legislative acts as Chief Justice Coke's specification of the three degrees of criminal intent that must be set forth in various forms, as of absolute certitude,

reasonable assurance, and betwixt and between. Practically the same in effect as an act of Parliament, also, was Sir Matthew Hale's doctrine that with respect to theft, one who carries stolen property from place to place goes on stealing it in each place he takes it to, so that he may be indicted in every county to which he conveys it. The ancient theory of trial by the vicinage was carried so far that, if a man received a fatal wound in one county and died in another, the slayer was indictable in neither. This defect was remedied by the statute of 2 & 3 Edward VI (Chap. 24, 1548) ; but many other and quite as serious abuses were permitted to continue. There was no limitation of time in which a criminal action could be instituted. Eugene Aram was con¬ victed and executed 20 years after the murder of Clarke and Sir James Fitzjames Stephen, when a young barrister, held a brief as prose¬ cutor where the offense charged was the ab¬ straction of leaves from a parish register 60 years previously. An early instance of the ap¬ plication of the (<higher law® is a case, cited by Hale in his <(Pleas of the Crown,® of a man indicted for a murder in 1672. The person killed was caught in the act of adultery with the slayer's wife, and it was resolved by the whole court that this was manslaughter. The accused had (<benefit of clergy® and, though he was branded in the hand, the court directed the executioner to (<burn him gently, because there could be no greater provocation than his.5' Beginning with the 19th century in England and even earlier in America the rigors of the substantive law relating to crimes and penal¬ ties and the intricacies of criminal procedure became the subjects of ameliorative action and simplifying regulation, by legislative enactment and, in less degree, by judicial rulings. But until quite recently the unwritten law covered : principles relating to extenuation and justifica¬ tion of criminal acts ; the definition of murder, manslaughter, assault, theft, including larceny by trustees and bailees, and by fraud; forgery; perjury and libel; and the whole law of pro¬ cedure. To some extent, this unwritten law has been reduced to statutory form, particularly since the middle of the last century, but systematic codification has been carried out in only a few places and hesitatingly. The (Penal Code* and (Code of Criminal Procedure/ prepared by David Dudley Field and others under commis¬ sion from the New York legislature,

lay neglected for a generation before they were adopted. These have since found acceptance in other States ; and in still other States and also in the Federal Congress, more or less sys¬ tematic revisions of the statutes relating to crimes and procedure have taken place. The (Draft Criminal Code* prepared by Sir James Fitzjames Stephen in 1878 and introduced in the British Parliament the following year, after revision by a commission consisting of Lord Blackburn, Justice Barry, Lord Justice Lush and the author, has been gathering dust in committee ever since. In his draft the substan¬ tive law and procedure are treated as an insep¬ arable unit, because of the interrelation of the two parts. The division of the whole body of criminal law into substantive and remedial law or procedure is natural, however, and in accord¬ ance with the plan followed by all modem codi¬ fiers and analytical writers from Bcccarria and

Bentham to the end of the alphabet. Thomas Erskine Holland would divide the substantive criminal law itself into two parts. The first and more general part should deal with (1) the nature of criminal acts; (2) responsi¬ bility of the wrongdoer on the ground of intention or negligence; (3) facts neg¬ ativing responsibility, as non-age, compulsion, idiocy, lunacy or drunkenness; (4) facts in justification of acts otherwise criminal, as con¬ sent of the injured party, self-defense, provo¬ cation, lawful authority or the public welfare; (5) a list of punishments, hard labor, whipping, loss of civic rights, liability to police super¬ vision or pecuniary fine; (6) the period of time which would bar prosecution; (7) aiding and abetting crime; (8) criminal attempts; cumu¬ lative punishments. The distinction between felonies and misdemeanors, now become mean¬ ingless, might be superseded by a distinction between indictable offenses and others. In the second and more special part should be con¬ tained a classification of criminal acts and the penalties provided for each. Criminal acts are divided into offenses committed directly against the state or the community in general, and offenses the mischief of which is directed primarily against particular individuals. The state or community in general may be injured by (1) acts tending to interrupt its friendly relations with other powers, under which head would be included our Federal laws against ˆfilibustering® and the like; (2) acts tending to subvert the government, as treason and rebel¬ lion ; (3) acts tending to the subversion of the liberties of the citizens; (4) riots and other offenses against public order; (5) abuses of official position ; (6) resistance or disobedience to lawful authority; (7) obstruction to the course of justice by perjury or the falsification of documents, or by the rescue or harboring of defenders; (8) offenses relating to the coin¬ age

or to weights and measures; (9) acts injurious to public morality, as bigamy or adultery; (10) acts injurious to the public health, such as non-compliance with ordinances to prevent the spread of epidemics or the main¬ tenance of nuisances. The wrongful acts primarily affecting individuals may be classified as follows : Violence to the person in various degrees of homicide, or by wounding, rape, assault or imprisonment; (2) defamation of character, libel, etc.; (3) offenses against family rights, such as the abduction of children; (4) offenses against possession and ownership, such as theft or embezzlement or the wilful destruction of property, as by arson; (5) forgery and breaches of contract of a kind likely to cause social inconvenience; (6) fraud¬ ulent misrepresentation and swindling. The rules whereby the machinery of courts is set in motion for the punishment of offenders, and classified under the head of criminal procedure, usually are of two specie's. The more solemn proceedings for the trial of serious crimes have been described in the historic part of this article. A simpler form of proceeding is by summary process before a minor magistrate or even an administrative or police official. This method is applicable only to trifling transgres¬ sions, unless the accused should consent to this manner of disposal in a matter of greater con¬ sequence. Many of the offenses over which minor magistrates exercise summary jurisdic-200

tion consist in the breach of statutory regula¬ tions to prevent petty nuisances, or of ordi¬ nances passed by municipalities or other public bodies, under legislative authority, or to enforce the execution of administrative measures of public importance. Among the latter are pro¬ visions subjecting parents to fines for not sending their children to school, numerous punitive ordinances for violations of regulations of boards of health, of traffic rules made by the police, building regulations, *etc.* These make an increasingly important part of our legal system and are too characteristic of modem tendencies to be passed over even in a neces¬ sarily brief survey of the penal law. They defy classification and a bare allusion to them, in order to round out this article, must suffice. See Criminology; Burglary; Bigamy; Juris¬ diction; Homicide; Counterfeiting; Perjury; Libel; Rape; Malicious Mischief; Treason; Penology.

Bibliography. — Archbold, J. F., (Pleading, Evidence and Practice in

Criminal Cases* (23d ed., London 1905) ; Bentham, Jeremy, (Civil and Penal Legislation (London 1802) ; (Rationale of Judicial Evidence) (London 1827) ; Bracton, Henry de, (De Legibus Angliae) (ed. & transl. by Sir Travers Twiss, Rolls Series, London 1879-83) ; Clark, E. C., (Analysis of Criminal Liability *(Cambridge 1880) ; Clark, W. L., Jr., (Criminal Procedure) (2d ed. by Mikell, Saint 'Paul 1918) ; Hale, Sir Matthew, (Pleas of the Crown* (printed by order of Par¬ liament, London 1680; 1st American ed., Phila¬ delphia 1847) ; Haynes, J. F., (Students' Lead¬ ing Cases) (London 1878) ; Holland, T. E., (Elements of Jurisprudence* (11th ed. Oxford 1910) ; Holmes, O. W., Jr., (The Common Law* (Boston 1881) ; Kent, James, Commentaries on American Law* (12th ed. by O. W. Holmes, Jr., Boston 1884) ; May, J. Wilder, Caw of Crimes) (3d ed., Boston 1905) ; Mikell, W. E., (Illustrative Cases in Criminal Law) (Saint Paul 1915) ; Shirley, Walter S., 'Leading Cases in Criminal Law) (ed. by Warburton, London 1892) ; Stephen, J. Fitzjames, (History of the Criminal Law) (London 1893) ; (Digest of the Criminal Law5 (London 1878) ; Stephen, John H., Commentaries on the Law of England* (founded partly on 'Blackstone,* 15th ed., London 1908) ; Stubbs, W., (Select Charters of English Constitutional History* (London 1870) ; Thorpe, Benjamin, (Ancient Laws and Institutes of England> (Record Commission, London 1840).

Stephen Pfeil.

CRIMINAL SOCIETIES. See Socities, Criminal.

CRIMINOLOGY is the scientific study of crime and the criminal. It is not one of the fundamental sciences, but is a hybrid product of several sciences. Zoology, anthropology, his¬ tory and sociology furnish the facts for a de¬ scription of the nature, origin and evolution of crime. Meteorology, demography and the special social sciences, such as economics, poli¬ tics, etc., contribute to the analysis of the environmental causes of crime. Anatomy, physiology, psychology and psychiatry furnish the facts and methods for the study of the traits and types of criminals. Comparative jurisprudence and law contribute to the study of the penal treatment of the crime and the criminal.

The subject matter of criminological science may be grouped into the following principal branches :

(1) Theory of the nature and evolution of crime; (2) criminal sociology; (3) criminal anthropology; (4) criminal psychology; (5)

criminal jurisprudence; (6) penology.

The study of criminology has great socio¬ logical significance and practical value. It fur¬ nishes one of the most striking illustrations of the relation between the individual and society and of the conflict between individuals and social interests. Punishment of the criminal is the most drastic form of social repression, and criminology is essentially a study of social control Consequently, criminology and ethics are closely related, and the study of crime and the criminal involves the discussion of numer¬ ous ethical problems of great social importance and scientific interest.

Equivalents of crime are to be found among animals. The mammals and birds share many of the instincts and feelings possessed by man. In each of these animal species habits and cus¬ toms arise which in the long run aid the sur¬ vival of the species. Acts which are contrary to these habits and customs will usually be injurious to the species, and therefore are re¬ acted against by members of the species. The study of the primitive peoples has shown that violations of customs constituted some if not all of the primitive crimes. In most cases the laws of the higher stages of social evolution have developed out of the customs of the community, and even down to the present day changes in the laws are determined mainly by changes in the customs. Other forces which have influenced greatly the evolution of crime have been magical practices, religious beliefs, public opinion and moral ideas. Some of the primitive crimes were treason, witchcraft, sac¬ rilege, incest, poisoning, breaches of the hunting rules, *etc.* These offenses were punished some¬ times through private vengeance, in other cases by means of penalties inflicted by the primitive community, such as death, banishment, *etc.* As civilization developed, government as an organ¬ ized mechanism of social control came into being. The written law now specifies the acts which are to be stigmatized and punished as criminal, and thus gives formal expression to the customs and beliefs of the civilized com¬ munity. Private vengeance has been gradually eliminated, and the government now exercises its police powers by imposing the penalties pre¬ scribed by the law through an elaborate system of courts, prisons, *etc.* Thus a crime in a civ¬ ilized community may be defined as an act which is forbidden and punished by law, which is almost always immoral according to the prevailing ethical standard, which is usually harmful to society, which it is ordinarily feas¬ ible to repress by penal measures, and whose repression is necessary or is supposed to be necessary to the preservation of the existing social order.

Cosmic and Social Factors in Crime. —

The forces in the environment which give rise to criminal conduct are numerous and complex. Climate, season and the weather have a good deal of influence upon crime. Many statistics have accumulated which indicate several definite correlations • between these telluric conditions and the extent and character of crime. As a

general thing, crimes against the person increase with a rise in temperature. Crimes against property, on the contrary, usually decrease with a warmer temperature and increase as the tem¬ perature falls. Atmospheric pressure, winds, humidity and other meteorological factors also have a discernible effect upon criminal conduct. But all of these factors have perhaps an even greater indirect influence, namely, through their influence upon industrial and social conditions. Economic activities are determined to a large extent by climatic and seasonal factors, and these activities determine in turn wage rates, unemployment and other occupational condi¬ tions. The struggle for existence for mankind has assumed, to a large extent, an economic form. It has become a struggle to obtain the commodities needed and desired within the system of production based upon the division of labor and exchange. Most of the criminal activity, therefore, arises out of the economic struggle, while all of it is conditioned by the economic environment.' The influence of eco¬ nomic forces upon criminality may be studied in at least four ways. In the first place, fluctua¬ tions in the extent of crime may be correlated with economic changes. In the second place, the economic crimes, namely, the crimes in which economic motives are predominant, may be studied. In the third place, the economic status of criminals, namely, their position with respect to the distribution of wealth and occu¬ pations, may be studied. In the fourth place, professional criminality may be studied.

The results from such study are varied and complicated and sometimes rather conflicting. A few of the outstanding facts, however, may be summarized. As a general rule, crimes against property increase with a rise in prices or with a fall in wages. Changes in prices and wages affect materially the economic welfare of the vast majority of the population. So that there is, apparently a causal relation be¬ tween economic welfare and crimes against property. The analysis of statistics of crimes shows that the so-called economic crimes, in which economic factors predominate, constitute from two to three-fifths of the total number of crimes. Furthermore, economic factors play a part in the causation of many of the other crimes. The analysis of statistics

of criminals shows that a disproportionately large number of criminals come from the poorer classes and from the occupations of the poorer classes. The study of the careers of professional criminals reveals the fact that it is economic pressure early in life in the form of a struggle for sub¬ sistence or for a higher standard of living, and resulting usually in inadequate intellectual and moral training and association with bad com¬ panions, which leads many of these professional criminals into their first crimes.

But the economic forces are not the only factors of the social environment which in¬ fluence criminality. Political conditions have much influence upon crime. Inefficient and corrupt government encourages greatly the in¬ crease of crime. Honest and efficient govern¬ ment discourages crime, especially if it adopts and carries out successfully far-reaching meas¬ ures which remove some of the economic and other causes of crime. In fact, according to those who take the socialistic point of view, the extent of crime depends very largely upon

the nature of the political organization of society.

Religion, science, art, the press, education and many other features of our modern civili¬ zation have their influence either for or against crime as the case may be. A rapid increase of population tends to increase criminality by accentuating the economic pressure. In fact, some criminologists have believed that the ad¬ vance of civilization in general has increased crime. Comparative statistics of crime have furnished some evidence that this is true. If so, it is probably due to the facts that human life has become much more complex and that ethical standards have risen, thus resulting in stigmatizing many more acts as criminal. But this apparent increase is probably due in part to the fact that the law is being enforced much more rigorously now than it was in the past. The modern forces of criminality are to be witnessed in an accentuated form in the cities. Criminal statistics reveal a great preponder¬ ance of crime in the cities as compared with the rural communities. The urban concentra¬ tion of population has created new conditions in which more regulations are necessary to har¬ monize the conduct of individuals with each other. Much of urban criminality is due to violations of ordinances with respect to tene¬ ments, factories, sanitation, etc., which are unnecessary in rural communities. The com¬ plexity of the urban environment makes it difficult for social groups to function normally. Persons weak in mind or character find it par¬ ticularly difficult to adjust themselves in the

city. Furthermore, many kinds of crime can be committed only or best in cities, such as pickpocketing, some kinds of burglary, black¬ mail, embezzlement, forgery, fraud of various kinds, *etc.* It is also more feasible for the crimi¬ nal to live and hide himself in the city than in the country. Most of these forces which accen¬ tuate urban criminality also increase urban vice.

Individual Factors in Crime. — Many of the causes of criminality are to be found within the criminals themselves. Lombroso gave excessive weight to these traits. As a result of his anatomical and physiological studies, he formulated his theory of the ((born criminal.® He found certain malformations of the skeleton and of the viscera and several abnormalities in the physiological processes unusually prevalent among the criminals he examined, and arrived at the conclusion that they constituted the traits of a distinct biological and anthropological type which is prone to become criminal. He also concluded as a result of a study of the equivalents of crime among animals and among primitive men and of the traits and conduct of children, that this con¬ genital criminal type is to a large extent an atavistic type.

Lombroso seems to have been rather igno¬ rant of the modern science of biology, and especially of the theory of heredity. Biologists recognize that atavism, or reversion, takes place when there reappears in an individual a trait of an earlier type, provided that this reappear¬ ance is due to hereditary forces. That is to say, if primitive traits which have long remained dormant reassert themselves in the germ plasm at the time of conception, there is a true case of reversion. But a perusal of Lombroso's writings shows that many of the

criminal traits which he calls atavistic are not hereditary in their origin, but are cases of arrested development either before or after birth. In other cases he characterizes as atavistic certain habits which have been trans¬ mitted by social agencies. In fact, Lombroso's exposition of his theory of the born criminal indicates that he probably believed in the he¬ reditary transmission of acquired traits, though he nowhere explicitly states his opinion on this point. But he again and again speaks as if habits, or the effects of habits, are transmitted by hereditary means. The consensus of opinion among biologists to-day is that no acquired traits can be transmitted by hereditary means. It is obvious that there can be no ˆbom® crim¬ inal in the literal sense of that term. No per¬ son is a criminal in the strict legal sense until he has committed a criminal act, and no one could commit such an act until several years after birth. Furthermore, no person is predes¬ tined from birth to become a criminal on ac¬ count of his congenital traits, because crimi¬ nality depends in part upon environment and social status.

So that the theory of the born criminal must be relegated to the limbo of discarded theories, and it is futile to attempt to identify a criminal type solely by means of anatomical and physio¬ logical traits. The study of these external, physical traits is of significance only when correlated with the internal traits, namely, the mental traits.

The physical basis of mind is neural. All of the mental phenomena, namely, the instinctive, the affective and the intellectual phenomena, take place through the agency of the nervous system. The instincts function, in the first place, because stimuli from sense organs pass over nerve fibres to the central nerve cells which constitute the centres for the instincts in the central nervous system. These centres are probably located mainly in the spinal cord, the medulla and the cerebellum. The instincts func¬ tion in the second place, because impulses are sent out from these centres and travel over nerve fibres to the muscles which perform the instinc¬ tive acts. Feelings are possible only where nerve fibres are present, and probably arise mainly as a result of stimulation of the sympathetic nervous system. The intelligence is localized in the association areas of the cortex of the brain. Consequently, inherited variations in the ner¬ vous system may give rise to exceptional strength or exceptional weakness of some of the instincts and feelings. In similar fashion, use or disuse may lead

to acquired variations which may in turn result in the accentuation or inhibition of instincts and feelings. It is doubt¬ less true that some persons are born with traits which make them, peculiarly disposed to com¬ mit crimes if their environment is conducive to criminal conduct, and a portion of the crim¬ inal class is recruited from this group. Thus abnormal variations may take place in sensory, motor or central nerve centres which make cer¬ tain instincts stronger or weaker. Or varia¬ tions may take place in sensory or central nerve centres, or in some of the viscera, which change the feelings in such a fashion as to lead to criminal conduct. Or variations may take place in the cortex of the brain which weakens the intelligence. Some of these variations are hereditary. But many of the anatomical and

physiological traits which are abnormal from the time of birth are more likely" to be due to irregularities in the development previous to birth, such as are due to pressure on the brain, ill-nutrition, *etc.* Sometimes these abnormali¬ ties do not appear until later in life, but are due to 'congenital weaknesses which constitute a diathesis or predisposition for acquiring these abnormalities. These abnormal and pathological traits result in abnormal conduct of all kinds. The excessive strength or weakness of some of the instincts furnishes a powerful impulse toward crime, or removes a powerful restraint which acts upon most persons. In similar fashion, the excessive strength or weakness of some of the feelings furnishes a powerful impulse toward some kinds of criminal con¬ duct, such as crimes of passion, or removes the restraint from certain other kinds of criminal conduct. The weakness of the intelligence makes it difficult or impossible for the ament or feeble-minded person to understand the nature of or the justification for the regulations and restrictions imposed upon him by society. Owing to these abnormalities, the individual does not succeed in adjusting or adapting him¬ self to social life, or, at any rate, to the life of the society to which he belongs. Recent investi¬ gations indicate that «n all probability a mini¬ mum of 5 per cent of criminals are aments, and that there are probably at least 10 times as many aments proportionally among the crim¬ inals as there are in the population at large. It is even more difficult to estimate the number of psychopathic criminals. Among these are the demented, the insane and the neurotic crim¬ inals. Dementia precox characterizes some of the younger criminals. Manic-depressive insan¬ ity and paranoia are more or less prevalent among the insane criminals. Epilepsy char¬ acterizes some criminals. Hysteria, neuras¬ thenia and psychasthenia are other neuroses which are found among criminals probably much less frequently than

epilepsy. Bad habits, such as alcoholism and drug habits, excessive suggestibility, mental conflicts and repressions, etc., are other abnormal traits which give rise to criminality or at least aggravate it.

There is obviously no hard and fast line between the different criminal groups. On the contrary, there is an almost infinite degree of gradation between the different types. This extensive gradation is due, on the o'ne hand, to the large amount of variation in the traits of individual criminals, and, on the other hand, to the great variety of circumstances, under which crimes are committed. However, the following is an accurate and useful classification of the principal types of criminals: (1) The criminal ament or feeble-minded criminal ; (2) The psy¬ chopathic criminal; (3) The professional crim¬ inal; (4) The occasional criminal, (a). The accidental criminal, (b) The criminal by pas¬ sion: (5) The evolutive criminal; (6) The political criminal. The distinctions of age and of sex are of importance in the study of the criminal. The criminal traits of the young are of significance not only for their own sake, but also because of the light their study throws upon the corresponding traits of adults. Many criminal careers begin in childhood or early youth. And even when a criminal career begins after maturity has been attained, the experiences and influences of early youth frequently aid

in explaining the later criminality. Criminal statistics indicate that criminals are astonish¬ ingly precocious. The criminality seems to be higher relatively at about the time maturity is reached than at any other age period. Further¬ more, there is some reason to believe that juvenile crime has been increasing rapidly in civilized countries during the last few decades. Consequently, it is important to study poverty, parentage and home life, education, recreation, immigration, etc., in relation to juvenile crim¬ inality. Criminal statistics indicate a great pre¬ ponderance of male over female criminality. In fact, in some civilized countries there is from four to six times as much male criminality as there is female criminality. But this difference is in part misleading. In the first place, woman is favored in the repression and treatment of crime, thus lowering somewhat the statistics of her criminality. In the second place, there are many more extra-judicial female crimes than there are extra-judicial male crimes, because many female crimes are crimes of complicity which are more difficult to detect than overt crimes. In the third place, prostitution serves in a measure as a female equivalent of crime. In so far as female criminality is actually less than male criminality, it is not due to any ap¬ preciable moral difference between the sexes. It is due in part to the physical disabilities of woman which restrain her from committing certain kinds of crime. But it is due mainly to the fact that woman is very largely shielded from criminality by her secluded life in the home. Consequently, it is to be expected that as woman's position becomes more like that of man her criminality will increase, and the avail¬ able statistics seem to indicate that her crimi¬ nality is increasing as she is attaining a greater degree of economic independence. Criminal law and procedure, the fundamental objects of punishment, penal responsibility, the principle of the individualization of punishment, the indeterminate sentence, suspension of sentence, probation, etc., are described under the title, Criminal Law.

Modern Treatment of the Criminal. —

The statistical method is very useful in crim¬ inological research and

is ancillary to all of the other, criminological methods. It is of utility in the study and analysis of most of the causes and conditions of crime and has great value for measuring the effects of the different kinds of penal treatment. Lffifortunately governments have not usually collected as many or as reliable criminal statistics as would be desirable. Especially true is this in the United States. In some of the States scarcely any of these statistics are gathered, while there is no adequate system of collecting and publishing statistics of crime as a national problem. So far as we can judge from the statistics available in the leading civilized nations there has been an increase of crime during the past few decades. It is, therefore, concluded by seme per¬ sons that civilization has had a harmful effect. However, this conclusion is not • necessarily justified. Owing to the great increase in the complexity of human life due to the progress of civilization, the category of criminal acts has been greatly extended so that it is possible to commit a much greater variety of crimes now than has been possible in the past. Further¬ more, owing to the increase in the efficiency of

government, many of the old criminal laws are enforced now much more rigidly than in the past. The apparent increase of crime in modern times in civilized countries is doubtless due in part to these two factors, and may be entirely due to them. The most drastic form of penal treatment is death. Capital punishment was much used in the past. It is little used to-day in civilized countries. Owing to the modern humanitarian movement, which has enhanced greatly the value of human life in the popular estimation, there is much opposition to the death penalty, and it will probably disappear entirety in course of time. Imprisonment is the character¬ istic modern penalty. It very largely superseded transportation during the 18th century. At first prison life was usually congregate and no work was provided. The physical conditions were very unsanitary and the moral atmosphere very corrupting. During the 19th century the phys¬ ical conditions were much improved. Cellular confinement was introduced and in many prisons was made solitary. Hard labor was usually imposed. But even after these changes were effected, prison life was far from bene¬ ficial for the inmates on account of its rigid and artificial character. During the latter half of the 19th century the idea of reformation be¬ came prevalent in prison reform and resulted in the construction of reformatories and reform schools for the younger criminals in which these criminals could be educated and trained as well as punished. This idea is being extended more and more to other classes of criminals and is pervading the management of prisons in gen¬ eral.

The ideal of penal treatment now is to develop a system of penal institutions in which a suitable place will be provided for each type of criminal. Such a system will include recep¬ tion and observation prisons, reformatories, in¬ dustrial and farm colonies, asylums and peniten¬ tiaries for incorrigibles. In this system the principle of the individualization of punish¬ ment would be applied, and the data and scien¬ tific principles of criminology would be fully utilized. Crime can never be entirety abolished, but it can be prevented to a certain extent. The •program for the prevention of crime is included very largely in the program for the prevention of poverty and other social evils which give rise to crime. Criminology can aid greatly in the prevention of crime by revealing how these social evils give rise to crime.

Bibliography. — Aschaffenburg, (Crime and its Repression (Boston 1913) ; Baer, (Der Verbrecher in anthropologischer Beziehung* ; Boies, 'The Science of Penology* ; Bonger, Criminal' ity and Economic Conditions* ; Colajanni, 'La sociologia criminale) ; Corre, 'Les criminels) ; Ferrero, 'Criminal Man according to the Classification of Cesare Lombroso* ; Fomasari di Verce, 'La criminalita e lc vicende econo¬ mic!ˆ ; Ellis, Havelock, 'The Criminal } ; Ferri, 'Criminal Sociologv> ; Garofalo, <Criminology) ; Hall, 'Crime in its Relation to Social Progress) ; Healy, 'The Individual Delinquent ; Van Kan, 'Les causes economiques de la criminality ; Kauffmann, 'Die Psychologie des Verbrechens) ; Kurella, 'Naturgeschichte des Verbrechers* ; Laurent, 'Le crimineP ; Lombroso, C., 'Crime: Its Causes and Remedies) (1911) ; id., 'L'uomo delinquente) ; Marro, U caracteji dei delin-quentP ; Maxwell, 'Le concept social du crime) ; Parmelee, M., 'Criminology* ; Sommer. 'Krim-204

inalpsychologie und Straf rechtliche Psycho-pathologie auf naturwissenchaftlicher Grund-lage) ; Tarde, (Pcnal Philosophie) ; Wulffen, (Psychologie des VerbrechersP

Maurice Parmelee,

Author of (The Science of Human Behavior' ;

(Criminology' , *etc.*

CRIMP, an agent who for a commission supplies ships with seamen, the term being applied especially to low characters who decoy sailors by treating them, advancing money to them, and giving them goods on credit, till they have them in their power, frequently getting them shipped off in a drunken state after all their money is spent. They also keep an out¬ look for emigrants, and take them to low lodg¬ inghouses, in which they themselves are inter¬ ested. There are laws protecting seamen from the extortion of crimps and their dealings with masters of vessels, but these are unable to reach a very large proportion of cases.

CRINOID, kri'noid, or SEALILY, a

stalked echinoderm usually fixed to the sea bot¬ tom by a jointed stem so as to present a flower¬ like form. The body is more or less cup¬ shaped, with 5 to 40 jointed flexible arms subdivided into branches, and bearing pinnules, all made up of minute bony plates, which in some of the larger fossil species numbered over 150,000. The arms may be absent in the blas-toids (Pentremites) and certain cystideans, but the pinnules remain. There are not now many existing species, the greater number (nearly 1,000) having become extinct. A typical crinoid is Pentacrinus, which lives attached to rocks in the West Indies at all depths from 20 to 3,000 fathoms ; it is about a foot high, the arms much subdivided, the joints of the stem five-sided. In one fossil species the stalk was more than 50 feet long. In geologic times crinoids often grew in dense forest-like masses. A curious little living crinoid is a slender simple form about two inches high, which lives at the depth of from 100 to 1,000 fathoms on the coast of Norway and in the Straits of Florida in the cold water under the tepid Gulf Stream. It is a sur¬ vivor of a genus of the Cretaceous Period. A north Atlantic shoal-water form is the Antedon (Comatula) , which in its early youth is fixed to the bottom by a stalk, but which becomes free when mature ; it also inhabits the Mediterranean Sea. The existing crinoids, more than 200 spe¬ cies, are merely the remnants from a much larger assemblage of fossil forms, which begin to appear in the rocks of the Cambrian, culmi¬ nate in the early Palaeozoic and decline toward the end of that period. At first small and deli¬ cate, they became larger and coarser in the later rocks. They flourished in greatest numbers about palaeozoic coral reefs in shallower water than at present. The most famous American fossil crinoid beds are those of the Subcarboniferous limestones of Burlington, Iowa and Crawfordsville, Ind. Thick beds of crinoidal limestones were deposited in various parts of the world at various periods and under favorable conditions from the Ordovician to the Jurassic Period, those of the Carboniferous and of the upper Muschelkalk, the lower beds form¬

ing the so-called Trochitenkalk, being especially characteristic, and consisting almost wholly of stems of Encrinus liliformis, the ((stone lily.® Crinoids are divided into three classes. The

oldest, most generalized and primitive appears to be the class Cystoidea. These were more or less spherical in form, either with imper¬ fectly developed arms, or without, and stalked or not. About 250 species are known. They date from the Cambrian Period, culminated in the Ordovician and Silurian Periods, then sud¬ denly diminished in numbers, finally disappear¬ ing before the close of the Permian. The sec¬ ond class is the Blastoidea , or bud-shaped crinoids, represented by Pentremites , which were short-stemmed or entirely stemless. The arms are short, recumbent and appear as if soldered to the calyx or body. These have not yet been detected in strata lower than the Silurian and the type became most numerous in the Subcarboniferous limestones of the United States. Upward of 120 species have been recog¬ nized. The third class is Crinoidea proper. The three classes are arranged under the sub-branch, Pelmatozoa. New species are constantly being found, notably in the waters of the Philippines, Africa and the Hawaiian Islands, and a few along the Atlantic Coast of the United States. Consult Clark, A. H., (A Monograph of Exist¬ ing Crinoids ‘ (United States National Museum Bulletin 82, Washington 1915) ; Proceedings of the United States National Museum, Vols. 34 onward: Zittel, K. A. von (Eastman’s trans.), (Textbook of Palaeontology* (London 1900-02).

CRINOLINE (Fr., from Lat. crinis, hair), properly a kind of fabric made chiefly of horse hair, but generally applied to a kind of petti¬ coat supported by steel hoops, and intended to distend or give a certain set to the skirt of a lady’s dress. Hooped skirts are by no means a new invention of fashion, a somewhat similar monstrosity, supported by whalebone, being wrorn in the time of Queen Elizabeth and James I, and the fashion being again introduced in the time of George II. The earlier hooped petti¬ coats were called fardingales or farthingales. The crinoline proper came in about 1856, and was wˆorn by women of all ranks, and some¬ times reached portentous dimensions, so as to be not only very inconvenient to the wearer and all coming in contact with her, but also the cause of accidents from fire, *etc.* The immense bell-shaped crinolines fell into disuse about 1866. Crinoline wire was for years a leading branch in the steel trade. A horse-hair and cot¬ ton fabric used as a material for making ladies’ bonnets is also called

crinoline.

CRINUM, kri’num, a genus of bulbous-rooted herbs of the family Ainaryllidacece. The numerous and widely distributed species are characterized by rather broad, usually persistent leaves, and umbels of few to many funnel-shaped flowers, often deliciously fragrant. The flowers are usually pure white, with bands of purple or red, or tinted throughout with one of these colors. Several species are uddely popular as greenhouse specimens and in the warm South and California as outdoor subjects on lawns. C. americanum, the Florida swˆamp lilv, is com¬ mon in wet ground in the Gulf States. C. longifolium and C. moorei are somewˆhat hardy, the former as far north as Washington, the latter not quite so far. Both these species blos¬ som continuously through the summer; the others generally have a short season of bloom. More than 20 species with manv horticultural

1 Metacrinus angulatus ? Pentacrinus Maclearanus 3 Pentacrinus Wyville-Thompsonli

4, 5, 6 Sections of No. 3 showing forma tion of structure

7, 8 Sections of No. 2 showing forma¬ tion of structure

varieties are cultivated in American gardens and greenhouses. They differ widely in their de¬ mands as to cultivation, for an account of which, and also for a description of the popular species, consult Bailey, (Cyclopedia of American Horti¬ culture > (1914).

CRIPPLE CREEK, Colo., city and county-seat of Teller County, on the Florence and Crip¬ ple Creek and the Midland Terminal railroads, 50 miles west of Colorado Springs. It is the trade centre for the Cripple Creek mining district, in which the output of gold from 1890 to 1916 was $301,000,000. The town has several cyanide mills, smelters and other mining industries, a national bank and daily and weekly newspapers. It was founded in 1890, and was nearly de¬ stroyed by fire in 1896. Several great labor strikes have taken place here. The Roosevelt Drainage tunnel opened in 1910 has greatly in¬ creased mine values by unwatering the field which covers an area of nearly six miles, one-tenth of which alone has been developed. Pop.

(1920) 2,325.

CRIPPLED CHILDREN. See Children, Defective.

CRISES, Economic. Crises are periods of financial or commercial and industrial depres¬ sion or disturbance, distinguished by sudden and general efforts to liquidate, by scaling down of prices, by restriction of credit and by wide¬ spread failures, insolvencies and bankruptcies. The wwds crisis and panic are used inter¬ changeably, though the former is the more nearly correct term denominating the period during which industry changes from a state of prosperity to one of depression. The word panic more fittingly describes a briefer period, or an acute phase not always appearing in crises, during which the morale and judgment of the business community are seriously upset by fear of impending trouble. Lord Overstone has de¬ scribed the sequence of phenomena known as a (<business cycle® as follows : <(State of quies¬ cence, improvement, growing confidence, pros¬ perity, excitement, overtrading, convulsions, pressure, stagnation, distress, ending again in quiescence.® The period of expansion of busi¬ ness, accompanied by increased activity in pro¬ duction and commerce, known as ftgood times,® is followed by a period during which, owing to rapidly advancing prices of materials and labor, some enterprises find their profits con¬ siderably reduced. Accordingly they contract their operations, dispense with a portion of their workmen, restrict their purchases of raw materials and thus affect adversely the industries supplying the materials and encroach upon the ability of the workmen to continue their former scale of living. There is a consequent decline in the demand for general commodities and the curtailment extends in ever-widening circles until the whole business system is affected. One or two failures may force other houses to sus¬ pend and general disaster follows, panic rules and total collapse seems imminent. The re¬ covery is slow, a period of stagnation or depres¬ sion follows, during which business is at its lowest ebb, and before confidence is completely restored, considerable time has elapsed. Busi¬ ness then begins to improve and expand, prices begin to soar, activity increases, and another period of prosperity is at hand, good times pre¬ vailing until again checked by a new crisis. A

depression of business need not constitute a crisis but may be only a period during which business and commercial activities are below the normal standards ; a depression may exist independently, but usually follows a crisis.

Many reasons have been advanced for crises but the actuating causes are never twice alike, one crisis being caused by the failure of some great firm or firms, another by war, another by monetary legislation, another by stock market speculation, another by bad harvests, another

by over-expansion of world commerce, another by a change of a nation's political policies, which may cause investors to become timid and reluctant to loan their capital to enterprises that may not receive the protection through na¬ tional economic policies considered necessary and adequate to their stability and success. A century or two ago local distress might have, been caused by crop failures or some other calamities, and panic might have been induced by such wild-cat adventures as the South Sea and the Mississippi Bubbles (qq.v. See also Law, John), but these events had not the far-reaching effects characterizing modern indus¬ trial disturbances and, therefore, we may say that crises are practically 19th century phe¬ nomena. Some assert that capital forms more rapidly than fields wherein to invest it safely and profitably and as profits decrease capitalists are liable to make investments of an unusual or hazardous nature, resulting in the total loss or destruction of capital and the consequent gen¬ eral alarm and crisis. A theory advanced by Ricardo and elaborated by Rodbertus is the (<iron law of wages,® under which the laborer does not receive all he produces either in the commodity produced, in a commodity of corre¬ sponding value which he may need, or in an equivalent wage, but receives a sum so small as to place him under the necessity of continuing his work of reproduction in order that he may not starve, thereby maintaining the supply of labor. The capitalist takes the difference be¬ tween the laborer's wages and the selling price of the commodity and, being unable to spend the total amount and anxious to increase his power or the earning capacity of his surplus wealth, converts it into capital through investment. Thus capital increases more rapidly than the laborer's ability to purchase, resulting in a so-called over-production, though the Socialists insist that this actually is an under-consump¬ tion. Ultimately this results in an industrial disaster.

Much space is devoted by economists to the subject of credit and its abuses as a cause of crises. The extensive obligations contracted during normal times to conduct business enter¬ prises are based largely on physical assets and partly on the faith of the lender in the ability, character and integrity of the borrower. Such obligations are usually of indefinite maturity, though the loans are mostly for a short time only, and the borrower may be called upon to liquidate his indebtedness quickly. Good times may mean easy money and the unwary capital¬ ist may loan his money to inexperienced, inca¬ pable, oversanguine or speculative investors. One of the results of easy money is the ten¬ dency of those in charge of business enterprises, on obtaining a loan, to divert the funds to other than immediate actual requirements. During periods of depression production is curtailed

and often discontinued entirely, wherefore stocks of goods become depleted. On the re¬ turn of confidence and the renewal of activity, through the resumption of buying by the public, the manufacturing plants experience difficulty in filling orders and their owners or managers therefore borrow money or cut down their working capital to remodel and extend their plants or to purchase extra equipment or for some other form of fixed asset. Often large sums are invested merely in anticipation of future increase in demand and production, mills and railroads being excellent examples of such preparations for future prosperity. Usually this work is carried too far ; the means of produc¬ tion outstrip the demand for goods ; the ratio between current assets and liabilities is reduced; and such enterprises, with impaired working capital, are liable to insolvency when trade de¬ pression sets in. In order to prevent the dis¬ ruption of industry through the over-extension of credit there must be some means to safeguard the granting of short time or indefinite credits and an emergency currency that will allow a large portion of these loans to be liquidated safely within the brief period of a panic. The usual safeguards are the credit reports of the mercantile associations, the registry of com¬ mercial paper and the demand for audits by certified public accountants. The facilities for quick liquidation have been extended by the Federal Reserve system of banks. See Credit; Currency; Banks and Banking — Federal Reserve System.

Crises have been confined practically to western Europe and to the more advanced American countries. In the United States the most notable crises have been those of 1819, 1837, 1854, 1857, 1873, 1884, 1893 and 1907. These were nearly coincident with crises occurring in England, and the crises of 1836-39, 1857 and 1873 may be called international in extent. Prior to and during the War of 1812 there had been much wild-cat banking and the country was launched on a paper money era, the banks being unable to secure specie sufficient to redeem even a small portion of their paper. In 1814 Congress refused a charter to a proposed national bank and people began to lose faith in banks and to withdraw their money. Banks in the South ceased to redeem their notes and on 28 Aug. 1814 the Philadelphia banks suspended specie payments, followed by others in the North and in Ohio, until every bank in the seaboard States had taken similar action. But by threats and legislation the State and Federal govern¬ ments compelled these banks to resume specie

payments wffiich the majority had done by the latter part of 1817. Meanwhile in 1816 Con¬ gress had established a bank of the United States to regulate the currency. On the con¬ clusion of the war foreign trade began to re¬ vive which required vast sums of money; in 1814, while the blockade was in force, the im¬ ports were valued at $12,965,000 and exports at $6,927,441, but in 1815 these figures had risen to $113,041,274 and $52,557,753 respectively and in 1816 to $147,103,000 and $81,920,452. Furthermore, during the blockade, when com¬ merce was practically at a standstill, the mer¬ chants transferred their capital to manufactur¬ ing establishments and when the lifting of the blockade resulted in a vast influx of foreign made goods, protection wras demanded for thr

industries, resulting in the enactment of a protective tariff in 1816 (amended in 1818). Meanwhile in 1815 a commercial convention had been concluded with Great Britain, under the terms of wffiich each country was to regulate, as it saw fit, its trade with British North American and West Indian possessions. In retaliation for a supposed discrimination against them in American regulations, the merchants of Nova Scotia and New Brunswick secured the passage of the ((Plaster of Paris** Act which prevented the transportation of this article in American vessels to the place of consumption. Great Britain then excluded American ships from the West Indies and as these acts ren¬ dered idle 100,000 tons of American shipping, the shipping interests were prostrate, all allied trades languished, and thousands of mechanics were thrown out of work. In 1811 steam¬ boats had been introduced on Western waters and capital and enterprise turned to the task of opening the West. Owing to the ease with which people could secure paper money from the wild-cat banks, there was widespread speculation in lands, the record of public land sales being 270,000 acres in 1813, 1,120,000 in 1815, 2,160,000 in 1817, 5,470,000 in 1819 and 820,000 in 1820. Everyone hastened to plunge into debt, expecting to become rich thereby, but when the banks began to contract their dis¬ counts and currency began to be reduced, the debtors were unable to meet their obligations and general bankruptcy followed with its attend¬ ant hardships in all circles. There was a gen¬ eral depression in business. Many blamed the tariff but the greatest outcry was against the banks, both State and National, and accordingly there was a wave of anti-banking excitement throughout the country. But this soon subsided, the States enacted stay laws, prohibited im¬ prisonment for debts less than certain amounts, passed acts against usury, and conditions be¬ came about normal in 1821. ‘

In 1832 President Jackson became convinced that the Bank of the United States was using its funds insidiously and ordered the govern¬ ment funds deposited therein to be withdrawn. Since $9,891,767 in public money was on deposit, the bank was compelled to curtail its loans and could not use any of the public deposits for the benefit of the commercial community. As a result money became scarce, discounts rose rapidly and in 1833 many business houses failed. Jackson's quarrel with the bank resulted, in 1834, in its failure to secure a renewal of its charter, and its career as a national institution was practically ended. Almost simultaneously the national debt was paid off and the treasury began to have a surplus, wherefore a bill was passed in 1836 providing that all but $5,000,000 of the money in the treasury on 1 Jan. 1837 should be deposited with the several States in proportion to their representation in Congress, and in order to safeguard the deposits the Secretary of the Treasury was to select the State banks for depositories. The effect of this distribution of surplus revenue among the States was the formation of new banks with nominal capital and the flooding of the country with paper money. In 1837 there were more than 600 such banks with an aggregate capital of $291,000,000, of which $149,000,000 was in cir¬ culating notes and $127,000,000 in deposits, while their total loans and discounts amounted to

$525,000,000. Wild speculation occurred, es¬ pecially in land, millions of acres being bought and held for a rise. Prior to 1834 the annual sales of land never exceeded $4,000,000 but in 1834 the receipts were $4,887,000, in 1835, $14,- 757,000 and in 1836, $24,800,000. But this con¬ sisted not of specie but only of credit on the books of the banks that held government de¬ posits. Early in 1837 the banks began to call their loans, to curtail their accommodations and to increase rates of interest. Owing to the crisis in England specie ceased to be imported, whereupon the price of money rose. To make matters worse the wheat crops of the eastern States had been seriously damaged by a scourge of the Hessian fly, wherefore the price of wheat and flour rose rapidly, until early in 1837 wheat brought $2.25 per bushel and flour $12.50 per barrel, which caused several flour riots. Furthermore an abnormally large cotton crop the previous year was accompanied by a pro¬ portionate slump in prices and a consequent de¬ preciation in the credit of those connected with the cotton industry. Soon three great cotton firms in New Orleans failed with liabilities of $2,500,000, to be followed immediately by three New York firms with liabilities of $9,000,000. By the first week in April the failures in New York numbered 98 with liabilities of over $60,- 000,000 and two weeks later they numbered 168. Real estate, and railroad, canal and other stocks depreciated in value and thousands of workmen were deprived of employment. Prior to this time President Jackson had caused the <(Specie Circular® to be issued, requiring all public land agents to accept nothing but specie in payment. This compelled the banks to redeem in specie practically their entire circulation, and as the contingency caught them unprepared, on 9 May 1837 they suspended specie payments and not until two years had passed did the last of the banks resume. Before that, however, Con¬ gress had enacted a bankruptcy law and the States had passed statutes of limitations and similar measures, so that some order began to appear out of the chaos. The most important result of the suspension was the establishment of the independent treasury system in 1840. Moreover, from 1837 to 1842 the number of banks of the country was reduced by nearly 100, circulation and deposits were cut in two, and the banks in general exercised more caution.

In 1854 came a stringency in the money mar¬ ket and hard times began to press upon the country. Trade was more sluggish than at any time since 1837. Money was hard to obtain and the very best paper sold at 10 and 12 per cent, some going as high as 1 per cent per month. The export of specie from the country was large. These conditions brought on a panic in Wall street in September 1854 which was fol¬ lowed in November by financial disasters in the West and South and the suspension of many banks and bankers. This monetary panic and the subsequent depression were only a precursor of the panic of 1857. After a few minor fail¬ ures the Ohio Life Insurance and Trust Com¬ pany of Cincinnati failed on 24 Aug. 1857 with liabilities of over $7,000,000. This created a panic in Wall street and many brokers and bankers were unable to meet their obligations. On 25 September the Bank of Pennsylvania at Philadelphia suspended payments, to be fol¬ lowed soon by banks in almost every section

of the country. Early in October the Illinois Central Railroad made an assignment, the New York and Erie Railroad Company protested its notes and the Michigan Central suspended payment on its floating debt. The prices of commodities rapidly declined, factories and workshops suspended and thousand lacked em¬ ployment. Armies of workingmen, desperate in their fear of starvation and poverty, paraded the streets of cities, rioting occurred in many places, and the militia was called upon to restore order. In 1857 there were in the United States and British provinces 6,022 failures, with liabilities of $282,335,000, and during the first three months of 1858 there were 1.540 failures, with liabilities of $31,733,000. The causes of the panic have been attributed to various circumstances, such as the reduction of the tariff, the speculation en¬ gendered by the influx of gold from California (which caused the belief to prevail that no undertaking was too stupendous for the fortu¬ nate nation to undertake), the enormous exten¬ sion of railway lines, the expansion of bank loans and circulation, the export of specie, the increased importations of merchandise, and un¬ due extension of credit. During 1858 the de¬ pression continued unabated but at the opening of 185£ good times seemed to have returned. The South was prosperous, general crops were bounteous and prices were high, but in June 1859 a killing frost laid low the crops of wheat, grain, potatoes, vegetables and fruit in New York, Pennsylvania, Ohio, Indiana and Illinois. Nevertheless by 1860 another season of pros¬ perity seemed at hand, only to be stifled by the Civil War.

In the spring of 1873 occurred a sharp re¬ versal of previously

prosperous business condi¬ tions. In anticipation of profits, a speculative spirit had been aroused which produced an over¬ production in every branch of industry, a gen¬ eral glut of the market and a ruinous decline in prices. Money gradually became tight, dis¬ count rates advanced rapidly, and by September little money could be borrowed at any price. After the downfall of a few smaller concerns, the panic broke forth on 18 September when Jay Cooke & Co., of Philadelphia, suspended, as a result of which stocks slumped on the ex¬ changes and a score of brokerage houses, banks and banking firms were forced to the wall. Suspension of payments occurred first at New York but extended to all the larger cities and continued until 1 November. The panic in the <(Street® was of short duration but its effects were apparent in commercial and industrial cir¬ cles for months, thousands of establishments being handicapped or completely prostrated by the lack of available funds to conduct their busi¬ ness. Between 1873 and 1876 the mercantile failures were $775,000,000 and the defaults by railways up to 1 Jan. 1879 amounted to nearly $800,000,000. The number of bankruptcies up to 1878 was 10,478, while the depression follow¬ ing the panic was even more fatal to productive industries. Between 1873 and 1879 these fail¬ ures numbered 47,000 and the money loss was $1,200,000,000. It is estimated that 3,000,000 men were thrown out of work. The depression ex¬ tended to many parts of the world.

In 1883-84 another period of panic and de¬ pression began. The gigantic speculation in railroads reached its zenith about 1880 and a retrograde movement set in. President A. T.

Hadley in his (Railroad Transportation, } says that of the 29,000 miles of road constructed in 1880-82 only a third was justified by existing business, another third might be profitable some time in the future, and of the remainder some were built to put money into the hands of the builders as distinct from the owners, some were built to increase the power of existing systems, where they were not needed, and some were built to sell as a blackmailing scheme against other roads. During 1883 there Avere a few small commercial failures and on 1 Jan. 1884 the New York and New England Railroad went into the hands of a receiver. During 1884 and 1885, 41 railway corporations, holding 19,000 miles of track, were placed under receivership and 37 smaller railroad properties were sold under foreclosure. Moreover in the spring of 1884 a decline in the prices of agricultural prod¬ ucts occurred. Owing to a great increase in the world's wheat crops, the price fell below that of 1878, resulting in stagnation of interior trade, because farmers held their produce for more favorable market conditions. Hence railway freight traffic was greatly diminished, thereby reducing railway stock dividends, and conse¬ quently investors hesitated to embark in railroad enterprises of great magnitude. In May 1884 came the failure of the National Marine Bank of New York, the president of which was asso¬ ciated with the firm of Grant and Ward, which failed shortly afterward with liabilities of $17,000,000. Several other banks and banking houses failed, the total liabilities of the wrecked concerns being about $240,000,000. While the panic centred in New York, there were numer¬ ous failures in other cities, 11 national banks and about 130 other banks and private bankers being counted in the list. There was no suspen¬ sion of specie payment during the panic and this, together with bounteous crops, tended to im¬ prove conditions, the general distrust dimin¬ ished, credit circulation was re-established and the discount rates resumed their normal level.

For some time prior to 1894 the foreign financial situation had been much upset and in 1890 the firm of Baring Brothers of London failed with home liabilities of over $100,000,000. Consequently English holders of American securities dumped them into our market and gold began to How toward London ; this export of gold was further enhanced by high rates of exchange in foreign financial centres and heavy imports of merchandise in 1891. Early in 1892 conditions changed and owing to our enormous exports of wheat a considerable

portion of the gold returned, thus restoring our depleted gold reserve. But for various causes the price of wheat suffered a serious decline, English in¬ vestors became alarmed at the condition of the United States treasury and currency, and, fear¬ ing that we might enact a free coinage silver law, again sold their American securities with the result that, owing to exports of gold, the reserve had fallen to $114,231,883 in May 1892 and was likely to fall below the legal limit of $100,000,000: The Secretary of the Treasury then discontinued the payment of debts in gold and began to hoard it, and the year passed with¬ out much further financial trouble. But prices and cost of living had been advancing without any compensatory increase in wages. The work¬ ingmen were in a relatively worse condition than before and struck for higher wages, several

disastrous clashes occurring in 1892, especially at Homestead, Pa., in the Cceur d'Alene mining region of Idaho and in the Erie and Lehigh Valley Railroad Yards at Buffalo. In November 1892 Cleveland was elected President on a plat¬ form calling for a parity between gold and sil¬ ver coins, and creditors feared that the govern¬ ment either could not or would not redeem its legal tender notes in gold coin, there being only $100,982,410 in the gold reserve when Cleveland assumed office, and barely $25,000,000 in other forms of money. Hence, according to Lauck, the widespread apprehension as to the fixity of the gold standard of payments, together with general industrial unrest, caused the panic of 1893. On 20 Feb. 1893, before Cleveland as¬ sumed office, the Philadelphia and Reading Railway, with $40,000,000 capital and $125,000,- 000 debt, went into bankruptcy; on 5 May came the failure of the National Cordage Company with $20,000,000 capital and $10,000,000 liabili¬ ties, these failures causing a heavy slump in the stock market. On 26 June the government of British India suspended the free coinage of silver and the price of silver dropped in three days from 82 to 67 cents per ounce. In July the Erie Railroad failed and the Milwaukee Bank suspended, causing runs on banks, particu¬ larly in New York. In August the House of Representatives voted to repeal the Sherman Silver Purchase Law, but though this helped to restore confidence, the Senate failed to act until 30 October (Cleveland signing the bill 1 November), when it was too late to stem the tide of disaster. In December 1893 the Comp¬ troller of the Currency announced the failure during the year of 158 national banks, 172 State banks, 177 private banks, 47 savings banks, 13 loan and trust companies and 6 mort¬ gage companies, though a few of these after¬ ward resumed business. In 1894 156 railway companies, operating nearly 39,000

miles of track, were in the hands of receivers, the total capitalization of these companies being about $2,500,000,000, or one-fourth the railway capi¬ talization of the country. Commercial failures increased from 10,344 in 1892, with liabilities of $114,000,000, to 15,242 in 1893, with liabilities of $346,000,000. The problem of the unemployed became acute and relief committees were organ¬ ized in many cities; numerous demonstrations by the unemployed occurred, the most spectacu¬ lar being the march to Washington in April 1894 of the ((industrial army® under J. S. Coxey to demand help from the government. In the same month 130,000 miners stopped work, fol¬ lowed later by 25,000 more; in June to July occurred the Pullman boycott in Chicago ; other strikes took place at ‘New Bedford, Fall River and New York; and in January 1895 the employees of the Brooklyn Electric Railway system went on strike. Agricultural disaster also overtook the country in 1894, a drought ruining the corn crops of Iowa, Kansas and Nebraska, reducing the yield to one-fourth that of 1893. The wheat crops were larger, but so were European wheat crops, and as there was no market either abroad or at home the price of wheat declined to its lowest mark, 49 cents per bushel, and similar declines were ex¬ perienced in the prices of corn, oats, rye and barley. In August 1894 the Gorman-Wilson Tariff Bill became law, the treasury reserve was kept intact during the next two years by

the sale of gold bonds, and the public began to regain its confidence in the government and the stability of business institutions, which was further enhanced by the election of McKinley in 1896 on a protective platform and by the enactment of the Dingley tariff in 1897.

The crisis of 1907 has been called a <(rich man’s panic® and the “panic of undigested securities.® Under the fostering protection of the high tariffs came the organization of numer¬ ous consolidated corporations known as trusts, of which, according to one authority, 225 sprang into existence during 1899 to 1903. An era of prosperity set in but in 1906 the life insurance scandals and the subsequent investiga¬ tions and legislation tended to throw discredit on some of

the business methods in vogue. In spite of these revelations, the year 1906 was the most prosperous the country had known, crops being abundant, wages high, iron and steel production enormous, freight business beyond capacity, dividends earned on non-paying stocks and money plentiful for promoting any kind of speculative enterprise. By the end of the year, however, affairs began to take a down¬ ward turn, due in part to the Lawson articles, in part to the prosecution of corporate interests by the Federal government under Roosevelt, in part to instability of the banking and currency system, in part to over-speculation and over¬ expansion of business enterprises and various other causes, resulting in March 1907 in a gen¬ eral unloading of speculative securities. Values continued to decline, producing a temporary stringency in August 1907, which was followed by the financial crisis of October, when several banking institutions of New York and Brooklyn suspended, to be followed by others in various sections of the country. In spite of the inabil¬ ity of business men to obtain adequate financial accommodations, the number of failures was surprisingly small. The government aided the banks by depositing money, the clearing houses issued certificates, the importations of gold increased and confidence slowly returned, the normal level being reached again late in 1908, though the effects were apparent for a much longer time, even as late as 1912-13.

Bibliography. — Belgram, H., and Levy, L. E., ‘The Causes of Business Depression (Phil¬ adelphia 1914) ; Babson, R. W., (Business

Barometers) (6th ed., Wellesley Hills, Mass., 1913) ; Burton, T. E., financial Crises and Periods of Industrial and Commercial Depres¬ sion (New York 1902) ; Carpenter, (The Panic of 1907) (in Journal of Political Economy, V ol. XXIV, pp. 230-35, 382-99, Chicago 1916) ; Co-nant, C. A., ‘History of Modern Banks of Issue) (rev. ed., New York 1915) ; Dunbar, C. F., (Economic Essays) (New York 1904) ; Ed¬ wards, Adolph, (The Roosevelt Panic of 1907) (New York 1907) ; England, M. T., Promotion as the Cause of Panics) (in Quarterly Journal of Economics, Vol. XXIX, pp. 748-67, Cam¬ bridge, Mass., 1915) ; Fisher, Irving, and Brown, H. G., (The Purchasing Power of Money) (New York 1911); Fourtner, Samuel, (The Cause of Our Financial Panics) (Seattle 1908) ; Harris, R. S., Practical Banking* (Boston 1915) ; Hull, G. H., Undustrial Depressions) (New York 1911) ; Hyndman, H. M., Com¬ mercial Crises of the Nineteenth Century* (London 1892) ; Johnson, J. F., (The Crisis and Panic of 1907 > (Boston 1908) ; Jackson,

C. C., (Six Industrial Crises) (Boston 1913) ; Jones, E. D., 'Economic Crises) (New York 1900) ; Juglar, C., (A Brief History of Panics) (New York 1893) ; Lauck, W. J., Causes of the panics of 1893 J (Boston 1907) ; Michell, W. C., (Business Cycles* (Berkeley, Cal., 1913) ; Noyes, A. D., Commercial Panics *(in Atlantic Monthly, Vol. XCVIII, pp. 433 — 45, Boston 1906) and Che Year After the Panic of 1907 J (in Quarterly Journal of Economics, Vol. XXIII, pp. 185-212, Cambridge, Mass., 1909) ; Patterson, E. M., Che Theories Advanced in Explanation of Economic Crises) (in (Annals of the American Academy of Political and So¬ cial Science,* Vol. LIX, pp. 133ˆ47, Philadel¬ phia 1915) ; Philbrick, F. S., Che Mercantile Conditions of the Panic of 1893* (in (Univer¬ sity of Nebraska Studies, *Vol. II, No. 4, Lin¬ coln 1902) ; Robertson, D. H., 'A Study of the Industrial Fluctuation* (London 1915) ; Rynar, I., (On the Crises of 1837, 1847 and 1857 J (in 'University of Nebraska Studies, *Vol. V, No. 2, Lincoln 1905) ; Rodbertus, J. K., (Overpro¬ duction and Crises* (English trans., London 1898) ; Schuckers, J. W., Che Black Crime of 1893) (Chicago 1900) ; Sprague, O. M. W., Che Crisis of 1914 in the United States) (in American Economic Review, Vol. V, pp. 499-533, Princeton, N. J., 1915), and 'History of Crises under the National Banking System* (Senate Doc. 538,* 61st Cong., 2d sess., being part of the report of the National Monetary Commission) ; Swanson, W. W., Che Crisis of 1860 and the First Issue of Clearing House Certificates* (in Journal of Political Economy, Vol. XVI, pp. 65-75, 212-226, Chicago 1908) ; Taylor, W. G. L., Che Kinetic Theory of Economic Crises) (in 'University of Nebraska Studies, *Vol. IV, No. 1, Lincoln 1904) ; Van-derlip, F. A., et al., 'Lessons of the Financial Crisis* (in 'Annals of the American Academy of Political and Social Science, * Vol. XXXI, pp. 301-469) ; Veblen, T. B., Che Theory of Busi¬ ness Enterprise) (New York 1904).

Irving E. Rines.

CRISFIELD, Md., city in Somerset County, 100, miles southeast of Baltimore, on the New York, Philadelphia and Norfolk Railroad, on Chesapeake Bay. It was incorporated in 1910. It has a marine hospital. Oyster and crab-fish¬ ing are chief industries. There is steamship com¬ munication with Baltimore. Pop. (1920) 4,116.

CRISIS, in medicine the turning-point in a disease at which a decided change for the better or the worse takes place. In regular fevers the crisis takes place in certain days, which are called critical days (the 7th, 14th and 21st) ; sometimes, however, a little sooner or later, according to the climate and the constitution of the patient. The word crisis is also figuratively used for a decisive point in any important affair or business, for instance, in politics and com¬ merce. See Crises,

Economic.

CRISIS, The, the general name given to a series of political articles by Thomas Paine. These are 13 in number, exclusive of a Crisis Extraordinary > and a ‘Supernumerary Crisis. > The first and most famous, published in the ‘Pennsylvania Journal,* 19 Dec. 1776, began with the famous sentence, “These are the times that try men’s souls.® “It was written during the retreat of Washington across the Delaware, and by order of the commander was read to

groups of his dispirited and suffering soldiers. Its opening sentence was adopted as the watch¬ word of the movement on Trenton, a few days after its publication, and is believed to have inspired much of the courage which won that victory.® The 13th, published 19 April 1783, bears the title, (Thoughts on the Peace, and the Probable Advantages thereof.* It opens with the words, ”The times that tried men’s souls are over.® The pamphlets throughout exhibit political acumen and the common-sense for which Paine was remarkable. As historical evi¬ dence of the underlying forces in a unique struggle, and as a monument to patriotism, they possess great and lasting value.

CRISP, Charles Frederick, American jurist: b. Sheffield, England, 24 Jan. 1845; d. Atlanta, Ga., 23 Oct. 1896. He came to the United States when a child ; served in the Con¬ federate army 1861-64; was admitted to the bar in 1866; was solicitor-general of Georgia from 1872 to 1877; and judge of the Supreme Court 1877-82. He resigned the last office to accept a nomination for Congress, of which body he was a member until his death. From 1891 until 1895 he was speaker of the House.

CRISPI, Francesco, Italian statesman: b. Ribera, Sicily, 4 Oct. 1819; d. 11 Aug. 1901. He studied law at the University of Palermo, taking the degree of doctor of laws at the age of 18 and settled at Naples in 1846. He took part in the Sicilian revolution at Palermo (1848), but when the Bourbon government was reinstated he fled to Piedmont, where he en¬ gaged in journalism for various radical papers and in

private studies. He must have been in bad financial straits, for he actually con¬ descended to apply for the wretched position of communal secretary to Verolengo, a small village of Piedmont, which he was denied. He was offered a position in journalistic work on a journal supported by Cavour, but his adverse principles made him refuse the post. In 1853 he became implicated in Mazzini's attempt to raise an insurrection in Lombardy and he was consequently exiled. He thereupon went to Malta and thence to France and London, where he made the personal acquaintance of Mazzini, to whom he became devoted. Both conspired for the freedom of Sicily. After the war of 1859 Crispi returned to Italy, set moving his plans for insurrection and in 1860 assisted Gari¬ baldi in the expedition of the Thousand for the deliverance of the two Sicilies. Palermo fell, and Crispi was at once made Minister of In¬ terior and Finance in the provisional govern¬ ment. Italy's immediate annexation of the Sicilies caused Crispi to resign. He was sent to the Italian Parliament as first representative from Palermo, where he immediately made him¬ self conspicuous, first as the leader of the radical Left and then as an exponent of monarchical constitutionalism. It was at this time that he wrote to Mazzini his article of faith : "The monarchy unites us ; the republic would divide us.® In 1876 he became Minister of the Interior. In the following year he visited the European countries and came to know their leading representatives. In Decem¬ ber 1877 he became Minister of the Interior in the Depretis Cabinet, and during this time as¬ sisted in securing the establishment of a unified monarchy under Humbert I of Italy. He was,

however, denounced and removed from office on a charge of bigamy. His acquittal did not win public opinion to his favor, and it was not until 1887 that he resumed his office. In July 1887 he became Premier and head of Foreign Affairs, on the death of Depretis. As an earnest supporter of the Triple Alliance, he became a friend of Bismarck. The pending Franco-Italian commercial treaty was broken off. His vigorous policy reformed the courts and secured the adoption of commercial and sanitary laws. But he was overthrown in February 1891, and the succeeding cabinet found him an effective opponent in the Chamber of Deputies. In 1893 he was recalled to office and immediately en¬ tered upon a resolute suppression of disorders, and reorganization of public financial adminis¬ tration on the lines suggested by Sonnino. The radical leader, Cavalotti, became his bitter op¬ ponent, resorting to all sorts of underhand methods of ruining the reputation of Crispi. Several attempts were made on his life ; but popular favor retained him in office, until, on the defeat of the Italians in Abyssinia, he

resigned, to be succeeded by the Rudini Cabinet, which was in sympathy writh Cavalotti. Charges were brought against him for swindling public money, but the Chamber refused to prosecute on discovery that the ground for the accusation was the irregular handling of a sum for the use of secret service. Crispi's resignation from Parliament was soon annulled by his over¬ whelming re-election in 1898. His failing eye¬ sight caused him to withdraw from politics temporarily, but with a successful operation, he again wrote articles in behalf of the Triple Alliance and remained an important public figure to the last. Crispi's greatness is no longer disputed. His splendid, vigorous persistence brought Italy to the point of taking its place among the Powers of Europe and gained for that country a trust and confidence which it had never before enjoyed. Consult Stillman, W. J., 'Francesco CrispP (London 1899) ; a translation of his memoirs by.Agnetti (London

1912) ; Crispi, T. P., 'Francesco Crispi* (Milan

1913) .

CRISTOBAL, city of the Canal Zone, comprises that part of the city of Colon, Panama, lying within the boundaries of the Canal Zone and upon lands purchased in other transactions by the United States. Its govern¬ ment is entirely separate from that of ColonT The docks of the Panama Railroad line of steamers are located here, and here also are the offices of the resident engineer of the At¬ lantic Division of the canal and the head¬ quarters of the Canal Commissary Department. The city is the site also of the great cold-storage plant of the Canal Commission and the shops of the Panama Railroad. The establishment at Cristobal in 1915 of a branch of the Commer¬ cial National Bank of Washington, D. C., marked an important advance in the commercial possibilities of both cities. The old De Lesseps mansions are on Cristobal Point, where also stands the statue of Columbus and the Indian Maiden, presented by the Empress Eugenie to the city at the time of the French occupancy. The new terminal docks of the canal, affording docking facilities for 20 10,000-ton vessels at once, are an extension of the Point. More than three-fourths of the former shipping trade

°J . *hc °ld city of Colon has gone over to Cristobal.

CRITIAS, krit'i-as, Greek orator : d. 404 bc. He was a pupil both of Socrates and of

Gorgias of Leontini. He was one of the 30

tyrants set over Athens by the Spartans. He applied himself with great success to the culture of eloquence, and Cicero cites him among the public speakers of that day. Banished from Athens for some cause that is not known, he retired to Thessaly, where he incited an insur¬ rection among the Penestae or serfs. Subse¬ quently to this he visited Sparta and wrote a

treatise on the laws and institutions of that

republic. Returning to Athens with Lysan-der, 404 b.c., he was appointed one of the famous 30, his pride of birth and hatred of demagogues having pointed him out as a fit per¬ son for that office. After a cruel and oppres¬ sive use of the power thus conferred upon him, he fell in battle against Thrasybulus and his followers. Plato, who was a relation of his, has made him one of the interlocutors in his cTimseus and Critias.* He wrote tragic and elegiac poetry, fragments of which are restored in Bergk, (Poetae lyrici GraecL (Vol. II, Leipzig 1900) ; and fragments of his historical work are preserved in Muller, (Fragmenta Histori-corum Graecorum > (Vol. II, Paris 1863-83).

CRITICAL ANGLE. See Light.

CRITICAL POINT (or CRITICAL STATE), in physics a state or condition at which the physical properties of a given sub¬ stance undergo some important and more or less hidden modification. The term is seldom ap¬ plied to a state or condition at which an easily visible change (such as freezing) takes place, but is usually reserved, by common usage (though not of necessity nor by any formal agreement), for limiting conditions of a less obvious nature. For example, the temperature (ranging, for different samples of the metal, from 690° C. to 870° C.) at which iron ceases to be susceptible of magnetization, is

called the <(critical temperature® of iron with respect to magnetism. At or near this same temperature the iron also undergoes important changes in its thermal and electrical properties.

The term (<critical point® is most familiarly applied to the state that a gas is in when any further rise in temperature would preclude the possibility of liquefying it by pressure alone. It was long known that reduction of tempera¬ ture facilitates the liquefaction of a gas, but it was nevertheless believed that a sufficient pres¬ sure would effect the liquefaction at any tem¬ perature whatever. Dr. Thomas Andrews, in the Bakerian Lecture for 1869, entitled (On the Continuity of the Gaseous and Liquid States of Matter* (see Philosophical Transactions> for 1869, Pt. II, p. 575), showed that this view is erroneous, and that there exists for every gas a definite temperature above which it is im¬ possible to liquefy the gas by the application of pressure. The temperature so defined is called the (<critical temperature®; and the vapor ten¬ sion that a liquefied gas exerts at its critical temperature is called the (<critical pressure® of the gas. Similarly, the volume occupied by a unit mass of a gas that is at its critical temperature and is subjected to its critical pressure is called the <(critical volume® of the gas. The critical constants of the various gases and liquids have

not yet been determined with as much precision as could be desired, though good values have been obtained in a number of cases. Generally speaking, the critical temperatures are best de¬ termined. The critical pressures come next in order of accuracy, but as the experimental de¬ termination of the critical volume of a gas is exceedingly difficult, few of the critical volumes are known with any approach to precision. The accompanying table gives some of the values of the critical constants of gases. The critical temperatures are given on the Centigrade scale, and the critical pressures in atmospheres.

CRITICAL TEMPERATURES AND PRESSURES.

Critical Critical temperature pressure Substance (Centigrade) (atmos.)

Above

Mercury .

. +1,0000

Unknown

Aniline .

_ +425.6

52

Water .

_ +365

200

Acetic acid .

_ +321.6

57

Benzol … .

_ +288

48

Chloroform .

_ +260

55

Carbon disulphide .

_ +274

76

Methyl alcohol .

_ +237

73

Ethyl alcohol .

+237

64

Sulphur dioxide .

_ +157

79

Chlorine .

_ +140

93

Ammonia (NHs) .

. +131

113

Cyanogen . .

_ +124

62

Sulphuretted hydrogen .

_ +100.1

91

Hydrochloric acid gas .

. +51.5

90

Acetylene .

_ +35 . 2

61

Carbon dioxide .

_ +31.37

72.9

Methane .

. —88

52

Oxygen .

_ —118.4

50.4

Argon .

_ —119

51

Carbon monoxide .

_ —140

• 35.7

Air .

_ —140.5

39.1

Nitrogen .

_ —146.2

34

Hydrogen .

_ —241

14

One important and curious fact that follows from the existence of a critical point is that the gaseous and liquid states of a given substance may be regarded as continuous with each other, inasmuch as it is possible to cause a substance to pass from one of these states to the other by a continuous process, and without any abrupt change of condition such as is apparent when ordinary condensation takes place. For exam¬ ple, if we heat a cubic foot of carbon dioxide gas up to 50° C., we can then compress it all that we please without producing the least sign of liquefaction ; because the critical temperature of this gas is 31° C., and hence liquefaction cannot be induced at any temperature higher than 31° C. Let us now compress it at this

temperature until its pressure is (say) 150 at¬ mospheres. It is still a gas, for the reason just given. Finally we cool the gas, still constantly maintaining its pressure at 150 atmospheres, until its temperature becomes 15° C. There can be no doubt that it has now become liquid, and in fact actual experiment proves this to be the case. If the temperature had been maintained at 15° C. throughout it would not have been possible to compress the gas into the liquid con¬ dition without a visible, discontinuous passage from the one state to the other; but by the proc¬ ess described above it is possible to convert the substance from the gaseous state into the liquid state in such a manner that the transition is imperceptible to the senses, and is not accom¬ panied by any sudden change of density. (For further discussion of the theoretical principles involved in the consideration of the critical state, see Molecular Theory; Thf.rmopy-212

namics). Consult also Maxwell, (Theory of Heat) ; Preston, (Theory of Heat) ; and modern books on thermodynamics.

A. D. Risteen.

CRITICISM, the expression of a judgment concerning any subject; specifically the formu¬ lating of opinions based upon certain principles, in matters of art, literature, philosophy, *etc.* Certain canons apply in a general way to all criticism, but each branch has its own particular methods and standards. In its narrow sense, the art of criticism is confined to the study of the beauties or defects of some particular work; in its broadest aspect it includes the establish¬ ment as well as the application of principles, for the determination of which it must be largely indebted to philosophy. Aristotle was the first writer to develop a philosophy of criticism, ap¬ plying it to the study of rhetoric and poetry. In connection with the truth that poetry deals more with (<universals55 and history with ((particulars,55 he assigns a higher rank to the former and brings out a fundamental distinction point¬ ing to the crucial test for any high performance in art or literature. A work cannot permanently contribute inspiration and enjoyment, without possessing those elements which arise from the essentially and universally human, as contrasted with individual or temporary, characteristics. The Augustan Age produced one critic that the world of letters could ill spare. To Horace the art of criticism owes

much of permanent value and perennial charm. In the 3d century ap¬ peared Longinus, whose refreshing enthusiasm for the beauty of letters places him above the mechanical student of forms and rules. Cicero and Quintilian have recorded observations on style that have been of permanent service. The traditions of culture, forgotten or dormant dur¬ ing the Middle Ages, and revived by the leaders of the Italian renaissance and the humanists, for a long time produced little that was broad, fundamental or independent in criticism. In France, Boileau, Voltaire, Corneille, Diderot and others led the way; and Germany is in¬ debted to Lessing for a remarkable impulse given to this province of intellectual effort. Goethe, Kant, Schiller and Schlegel and his brother continued the work. The critical method was effectively applied to history, phi¬ lology and science. Without, however, dwell- - ing upon the array of profound and brilliant scholarship displayed in these departments of criticism, but confining the outlook to the field of literature and art, there may be noted among French writers, Taine, Sainte-Beuve and more recently Brunetiere; in England, — Pope, Sidney, Dryden, Coleridge, Hazlitt, Macaulay, Ruskin, Carlyle, Pater, Matthew Arnold and Saintsbury; and in America, — Emerson, Ripley, Child, Ticknor, Longfellow, Lowell, Curtis and Stedman. Modern conditions have opened wider paths to criticism. The Greek and Roman critics had only their own work to study. To-day we have the dramas, the epics, the novels of many nations and ages. The study of comparative literature, now possible, opens up opportunities for tracing those influences which affected the literatures of all Europe, and affords the student the chance of building up from varying yet in¬ terrelated sources a standard of criticism. The differences due to national character and indi¬ vidual genius will teach him the limitations of

hard and fast formal rules, while his faith in the fundamental canons of great art can only be made firmer by such comparative study.

Criticism will be found of use as a method of judgment for the reader, rather than an in¬ spiring guide to the past. It is thus a rational study of fitting construction and adequate ex¬ pression. As the art of judgment concerning the fairest flowering of the human spirit, criti¬ cism has one of the highest judicial functions; as the art of interpretation, admitting individual intuition and inspiring teaching, it has a crea¬ tive function of wide and lofty worth.

Bibliography. — Arnold, (Essays in Criti¬ cism J ; Butcher, (The Poetics of Aristotle) (London 1898) ; Boileau, (L’art poetique5 (1674) ;

Coleridge, (Literary Criticism5 (Ox¬ ford 1908) ; Gayley and Scott, ˆIntroduction to the Methods and Materials of Literary Criti¬ cism5 (2 vols., Boston 1899) ; Dowden, liter¬ ary Criticism in France5 ; Frye, (Dryden and the Critical Canons of the 17th Century5 (1907); Howells, (Criticism and Fiction5; Karnes, (Elements of Criticism5 ; Poe, (The Poetic Principle5 ; Pope, (Essay on Criticism5 ; Saintsbury, (History of Criticism5 (3 vols., London 1902-04) ; Thery, (Histoire des opin¬ ions litteraires5 (Paris 1849) ; Wylie, (Studies in the Evolution of English Criticism5 ; Hame-lins, (Die Kritik in der englischen Litteratur5 (Berlin 1897). Also Walter Pater's works, passim ; and the critical writings of Sante-Beuve, Taine, Brunetiere and Anatole France.

CRITIQUE OF PURE REASON, The.

Kant's (Critique of Pure Reason5 (Kritik der reinen Vernunft) has commanded the at¬ tention of professional philosophers to an ex¬ tent attained by no other modern work. Though a clumsy, unintelligible and technical writer, Kant long stood at the centre of aca¬ demical philosophy — a position which he still enjoys in Germany — and this Critique is the portal to his system.

In the background are certain moral and re¬ ligious problems of God, Freedom and Immor¬ tality to which the (Critique5 is a destructive metaphysical prolegomenon. He is here examin¬ ing into the possibilities of metaphysical knowl¬ edge by a criticism of the nature of knowledge in general and would show through this criti¬ cism that the ideas of a soul, an ordered uni¬ verse and God can have no metaphysical foun¬ dation and are not subject to either metaphysi¬ cal proof or refutation. Their place as objects of belief and their development as moral pos¬ tulates were accordingly made secure. The ob¬ jects of these ideas of soul, cosmos and God are not given us in experience ; and the proof of their existence, if it is to be found, must be by way of some knowledge transcending ex¬ perience ; so his. quest is to find how. knowledge a priori is possible.

Kant introduced what he called the Coper-nican revolution in philosophy. Philosophy had conceived the mind as that which is impressed with the form of objects and the order of na¬ ture. Kant reversed the point of view, making the mind supply form to its perceptions and structure to its universe. His peculiar contribu¬ tion to epistemology lies in this recognition of the mind as active in experience.

All knowledge begins with experience, but the mind only knows what it can produce ac-

cording to its own ideas ; so that, although the object is the occasion for the experience, the mind must reproduce this in knowledge and supply the form which it here takes. Experi¬ ence, considered from the point of view of the object, is a chaos of particulars. In so far as it has unity this must be supplied by the mind. As a compound, experience can never give uni¬ versality and necessity. If we find universality and necessity in knowledge, it must come a priori.

There -are three stages in knowledge : per¬ ception, judgment and reason. We get experi¬ ence through sense perception; we think these various perceptions under conceptions, that is, make judgments about them, and finally we tie all our experience together under the “ideas® of a simple soul, an ordered and absolute uni¬ verse and a first cause.

The mind perceives the manifold of sense under the forms of time and space. These are known through a priori intuitions for of them we may have universal and necessary proposi¬ tions, such as those of geometry, which could not be arrived at through a summation of par¬ ticulars. They supply unity to the internal and external sense respectively. Space and time have accordingly (<transcendental ideality,® i.e., considered as to their origin in the act of know¬ ing, they are ideal, being supplied by the mind.

The matter of perception is the sensation without form. The object, as perceived, is a phenomenon, but behind the phenomenon is something occasioning its being perceived. Al¬ though this thing in itself, or “noumenon,® must remain unknown to us, for our minds can¬ not reproduce it except according to their own conditions, it is not to be looked on as a mere dialectical by-product, for Kant needed the con¬ ception of noumenon in his moral philosophy.

The second part of the (Critique J takes up the question of the synthesis of the understand¬ ing. The act of judgment, A is B, is a syn¬ thesis. B may be thought of as a part of, a cause of, or a quality of A, *etc.* These various relations in which experience is thought, such as whole and part, cause and effect, substance and attribute, are the

“categories® or forms of synthesis of the understanding. Kant deduced them from the classification of propositions given in formal logic. Their significance lies in the conception which they give of knowl¬ edge as a structure, constituted by the mind, and not an accumulation, as, for example, the general conception of universal causal relation among phenomena, is a result of the mind im¬ posing its own law of unity on the manifold, and thus constituting an organized world. The application of these laws of the understanding, however, is only to the world of phenomena be¬ yond which their reign does not extend.

Reason cannot remain satisfied . with the manifold given by the understanding in thought and must think this under absolute and uncon¬ ditioned forms which it supplies in the “ideas® : “the unity of the thinking subject®; “the abso¬ lute unity of the series of the conditions of phenomena® ; “the absolute unity of the condi¬ tion of all objects of thought in general,® or, in other words, the simple soul, the cosmos and God. The objects of these ideas of pure, rea¬ son cannot be presented in possible experience and we can only possess a “problematical con¬ ception® of them. We are led to these ideas by

a “necessary procedure of reason,® but the at¬ tempts of the orthodox metaphysics to estab¬ lish their objective reality are shown to be il¬ logical and contradictory, thought here running out into certain antinomies. These ideas ex¬ press the utmost possibility of synthesis, the vanishing points in the perspective of human experience. As such they are of use in experi¬ ence, but not for gaining knowledge of the na¬ ture of reality through reason pure and simple.

The influence of the (Critique) in the history of philosophy has been multiform and is to-day a factor to be reckoned with. The limitation of our knowledge to phenomena comes down in the French positivists and Herbert Spencer; for German idealism the laws of the under¬ standing become the most important features in the structure of reality; and further conse¬ quences by way of Kantian ethics are, perhaps, even more far-reaching.

There are two English translations of the (Critique of Pure Reason* : one by Max Miiller (2d ed., London 1896), and the other by J. M. D. Meiklejohn (London 1854 and re¬ prints). The former is much the better. The great commentary in English is E. Caird’s (Critical Philosophy of Kant* (2 vols., London 1889). Four representative German interpre¬ tations are those of Kuno Fischer, H. Vaihin-ger, Erich Adickes and Cohen.

Walter B. Veazie,

Department of Philosophy, Columbia Univer¬ sity.

CRITO, kri'td, Greek philosopher. He was a friend and disciple of Socrates, whom he is said to have supported with his fortune. He made every arrangement for the escape of his master from prison and used every argument which ingenuity or affection could suggest to induce him to save his life by fleeing from his persecutors. His eloquence was, however, in vain and Socrates drank the fatal cup. Crito is a prominent interlocutor in one of Plato's dialogues, which is named after him. He was himself a voluminous writer on philosophical subjects, but all his writings have perished.

CR1TOLAUS. (1) A celebrated Achaean demagogue, who incited his countrymen to in¬ surrection against the Romans. He command¬ ed the Achaean army at the ba,ttle of Scarphaea, 146 b.c., and when overthrown by Metellus, either committed suicide or perished in the marshes of the coast. He was the immediate cause of the war which terminated in the de¬ struction of Corinth and put an end to the po¬ litical existence of Greece. (2) A peripatetic philosopher, a native of Phaselis, a Greek col¬ ony in Lycia who studied philosophy at Athens under Aristo of Ceos, whom he succeeded as head of the Peripatetic School. In 155 b.c. he was sent with Carneades on a political mission to Rome. His philosophy attracted great atten¬ tion at Romel. He was a noted rhetorician and orator. A Critolaus is mentioned by Plutarch, as the author of a work on Epeirus ; and Gel-lius also speaks of an historical writer of this name.

CRITTENDEN, George Bibb, American military officer: b. Russellville, Kv., 20 March 1812; d. Dansville, Ky., 27 Nov. 1880. He was graduated at the United States Military Acad¬ emy in 1832 and served as an officer in the Mex¬ ican War, rising to the rank of lieutenant-col¬ onel. He joined the Confederacy at the out-

break of the Civil War, became a major-gen¬ eral and suffered defeat

at Mill Spring, Ky., in 1862. He was kept under arrest in consequence and resigned his commission the following year. He served as a volunteer later and from 1867-71 was State librarian of Kentucky.

CRITTENDEN, John Jordan, American legislator: b. Woodford County, Ky., 10 Sept. 1787; d. near Frankfort, Ky., 26 July 1863. He was graduated at William and Mary College in 1807 ; in 1816 became a member of the State legislature; in 1817 was elected to the United States Senate; United States district attorney from 1827-29. He was subsequently reelected twice to the United States Senate. In 1848 he became governor of Kentucky. He was again Attorney-General under President Fillmore and in 1855 was sent a fourth time to the Senate. In the Senate he urged unsuccessfully his fa¬ mous compromise. After 1861 he served for one year in the House, and in that body also strove for the! supremacy of the Constitution. Through his influence the State remained loyal to the Union in the Civil War. (See Critten¬ den Compromise). Consult the biography by his daughter, Mrs. Chapman Coleman (2 vols., Philadelphia 1871).

CRITTENDEN, Thomas Leonidas, Ameri¬ can military officer: b. Russellville, Ky., 15 May 1819 ; d. Annandale, N. Y., 23 Oct. 1893. He was a son of J. J. Crittenden (q.v.) and was educated for the law. In 1842 he became State attorney for Kentucky; served as an officer in the Mexican War and in 1849 was appointed consul at Liverpool. On the outbreak of the Civil War he became brigadier-general of vol¬ unteers and in 1862 was promoted to major-general. He distinguished himself at Shiloh, Stone River and Chickamauga. He was placed ot the retired list in 1881.

CRITTENDEN COMPROMISE, 1860-61 : the last desperate effort of the Southern Union party to avert secession and war, by perma¬ nently crystallizing the free and slave commu¬ nities as they stood ; dividing the boundaries on the line of the Missouri Compromise and engag¬ ing the Federal power to uphold slavery to the full, where it existed. In the session of Con¬ gress after Lincoln's election, the Constitutional Union party (q.v.) having broken down, John J. Crittenden of Kentucky, a leading Unionist senator, introduced a proposition for a consti¬ tutional amendment, in substance as follows : (1) Slavery to be abolished in all national ter¬ ritory north of 36° 3(X and recognized and pro¬ tected south of it, the people to decide the status on its becoming a State ; (2) not to be abolished in forts or other Federal territory in slave States; (3) nor in the District of Columbia while it existed in Maryland and Virginia, nor at all without consent of the inhabitants and compensation, nor slaveholders forbidden to bring their slaves thither; (4) the interstate slave-trade never to be

prohibited; (5) the United States to pay for all fugitive slaves res¬ cued by violence and sue the county of rescue, which could sue the individuals; (6) no future amendment ever to affect these provisions, nor Art. I, § 2, If 3, nor Art. IV, § 2, If 3 of the Constitution ; nor to give Congress power to abolish slavery in a slave State. Four resolu¬ tions were appended, declaring the Fugitive Slave Act constitutional, urging the repeal of

the State personal-liberty laws, promising the modification of two specially obnoxious features of the Fugitive Slave Law and the rigorous suppression of the outside slave-trade. The legislatures of Virginia, Kentucky, Tennessee and New Jersey instructed their delegates to the Peace Conference of 1861 to support it. In Congress, Crittenden continued to press it during the session. It was lost in the House 14 Jan. 1861, 113 to 80; in the Senate 2 March, 20 to 19.

CRITTENTON, Charles Nelson, Ameri¬ can philanthropist: b. Adams, Jefferson County, N. Y., 1833; d. San Francisco, Cal., 16 Nov. 1909. He engaged in the drug business in New York in 1861 ; but after 1882, when his five-year-old daughter Florence died, he devoted his time and wealth to the establishment of Florence Crittenton Homes for homeless and unfortunate girls and their infant children. In 1895 the National Florence Crittenton Mission was incorporated to carry on this work. Of these mission homes 75 were organized in Mr. Crittenton's lifetime in all the larger cities of the United States and in Marseilles, Tokio, Shanghai, Mexico City, *etc.* The drug-manu¬ facturing company which bore his name was one of the first profit-sharing concerns in the United States. He was an active member of the Prohibition party.

CROATAN, or CROATOAN, «The L<pst Colony.® (For Raleigh's attempt to colonize Roanoke Island, see Roanoke Colony). In 1587 he abandoned the effort and incorporated a company to settle on Chesapeake Bay, entitled ((The Governor and Assistants of the City of Raleigh in Virginia.® A colony of about 140 persons was left there. Raleigh's attempts to rescue them were unsuccessful and the fate of the colonists was unknown till Indians told the settlers at Jamestown. They had accepted the friendly invitation of the Croatan Indians to live among them and remained there probably till not long before the Jamestown settlement in 1607, doubtless intermarrying considerably; then the priests or medicine-men had urged (<Powhatan® to kill them — probably from jeal¬ ousy of the influence their superior intelligence gave them — and all had been murdered except four men and two boys saved by one of the chiefs to work his copper-mines, and

a Cycling maid® saved probably for a wife, who may have been Virginia Dare. The latter escaped up the Chowan and her ultimate fate is unknown; the boys seem to have died or been killed; but the men were taken westward with the small tribe to somewhere around the Neuse or the Cape Fear River in North Carolina. They or their predecessors taught the natives to build two-story stone houses, make roads, use improved agricultural methods, *etc.* The Huguenots found these Indians there in 1709 and noted their farms and roads and their gray eyes, dif¬ ferent from those of any other Indians;, and the protest of a chief of some mixed-blood In¬ dians from Robeson County, N. C., over a murder in 1864, led to an investigation which has instilled a belief that they are the descend¬ ants of the Croatan tribe and the colonists. The State has officially recognized them as “Croatan Indians,® and their language is said to contain many English words. However this may be, the actual fate of the “lost colony®

rests on evidence it is absurd to discredit and on which in fact we base unquestioned con¬ clusions as to all other early Virginian history. Consult William Strachey, <Travaille into Virginia) (Hakluyt Soc., Vol. VI) ; Hamilton Mc¬ Millan, < Raleigh's Lost Colony > (1888); chart reprinted in Brown's (Genesis of the United States, > where on the Neuse (apparently) is marked a place at which remained ((four men clothed, >) who had <(come from Roanoke.®

CROATIA - SLAVONIA, kro-a'shl-a (Hn/atska-Slavonija) , former Hungarian crownland bounded north by Styriaˆ and Hungary, from which it is separated by the riv¬ ers Drave and the Danube; in the south it is divided from Serbia and Bosnia by the Una and the Save, southwest by Dalmatia, Istria and the Adriatic and northwest by Kraina and Styria. Total area 16,421 square miles. Pop. (census of 1910), 2,621,954. The country is agricultural, 82 per cent of the population being engaged in agricultural pursuits. It is most picturesque (especially ((Zagorje®), in the Karst district, fir, beech and oak forests cover the land, as also rich pastures and good vineyards. The lowlands of Slavonia, Syrmia. (Srem) and especially Frushka Gora are arable and most fertile. There grow all kinds of cereals, pota¬ toes, hay, grapes of good quality, apples, prunes, nuts and, near the coast, figs, oranges and other tropical and semi-tropical fruits. The moun¬ tains form a continuation of the Julian Alps and are very rich in coal, marble and mineral wells containing sulphur, copper and iron; in the north a small branch of the Carnic Alps forms the watershed between the principal riv¬ ers, the Save and the Drave.

Climate. — Considering the situation of Croatia-Slavonia the climate is rather moderate and the country could be divided into three parts: (1) The narrow strip of land above the sea with mild winters, warm autumns and dry summers; (2) the level land Slavonia with very hot summers and severe winters and (3) the Zagorje (western Croatia) with prolonged and severe winters and short summers which are often tempered by the northeastern wind called Bora.

Industries. — The manufacture of wine con¬ stitutes one of the chief industries of the coun¬ try and the peasantry use wine freely as their

principal beverage. Vineyards are most nu¬ merous in Syrmia, but they are frequent also in the coastland. In the western part, however, they have been devastated by phylloxera. Oak and beech forests are abundant, especially in Slavonia where there are even virgin forests, and form the principal wealth of the country. The timber is of excellent quality and is used in various industries, even in shipbuilding. The surplus of the production is exported mostly to France. Great quantities of acorns furnish good food to numerous herds of pigs which are exported. Horses of two races, the Hun¬ garian in the plains and the Bosniana in the mountains, oxen, pigs and sheep are the prin¬ cipal domestic animals. Silkworms have been cultivated to an appreciable degree only since the reign of Maria Theresa, but the silk in¬ dustry is still in its infancy. The same could be said of the industries of glass, paper, chem¬ icals and tobacco. Hemp and flax are woven by the peasants, of which they manufacture their own clothes with much originality in de¬

sign and shape. Owing to the lack of native capital the commerce is in a deplorable state. It is practically controlled by Germans, Mag¬ yars and Jews. The principal articles of ex¬ port are: Timbers, wine, cereals, plums, plum-brandy, horned animals, wax, honey, *etc.* The principal ways of communication are the Drave, the Save and partly the Danube, but there are also railways (about 1,000 miles in all) con¬ necting the country with the Adriatic and Bos¬ nia.

Education. — Education is compulsory for all children between the ages of 11 and 12. There are elementary schools in great numbers all over the country; 21 high schools and sec¬ ondary schools with an aggregate staff of 320 professors and about 6,500 students. At Zag¬ reb there are, besides the university, schools of arts and crafts, commercial academies, acad¬ emy of forestry and normal school of rural economy, music schools, high schools for girls, the Normal Teachers' Institute and the Nau¬ tical School.

Language and Literature. — The language and literature of the Croatians and Slovenians is Serbian (see Serbia) in its quintessence. However, there are some dialectic differences. The literature of the Croats and the Sloven¬ ians is consequently only a branch of the Ser¬ bian and it is hard to establish the borders in that field. The Croatians and the Slovenians use in their written language the Latin alpha¬ bet, modified somewhat by means of certain diacritics, while the Serbians, like the Russians, remained faithful to their Cyrillic alphabet, de¬ rived from the Greek characters, by the so-called Slav apostles, saints

Cyrill and Metho¬ dius, and modified by Vuk Stefanovich Karad¬ zic.

History. — The Croatians are virtually the trans-Danubian Serbians, having the same ethnographic characteristics and speaking ab¬ solutely the same language as the Serbians in Shumadia, Montenegro, Bosnia-Herzegovina, etc., with the exception of some slight dialectic differences, due chiefly to foreign influences. The inhabitants are chiefly Serbo-Croats and Slovenians (ftSlovcnci))) with some admixtures of other races (Magyars, Germans, Gypsies, Jews, etc.), and they belong to the Catholic Church, represented by the archbishop of Zag¬ reb (Agrain), and the Orthodox Church, rep¬ resented by the patriarch of Karlovci. It is not certain when and from where the Croats came to inhabit the Adriatic littoral, nor is it possible to establish the exact frontiers of their original state. Their primitive abode must have been on the slopes of the Carpathians and the provinces to which the}'- immigrated were situ¬ ated around the cities of Clissa, Trannona and were divided into 11 counties, ruled by counts, and one principality consisting of three coun¬ ties, ruled by a ban (or prince). The Croa¬ tians, like their brothers, the Serbians, were pagan and the cultured Catholic priests, who were then numerous in Dalmatia, energetically spread Christianity among them ; but it was only in the 9th century that, with the aid of the Byzantine Emperor Heraclius, they were bap¬ tized in any considerable numbers. Their first metropolitan had his palace in Spalato. But when the ever-growing state of the Franks spread its authority over the Croatian lands and Louis, the ban of the Croatians of Save,

endeavored to resist their dominion with his army, Borna, the ban of the Dalmatian Croatians, aided the Franks and frustrated the pa¬ triotic plans of his northern brother. Ban Louis's successors (Ratimir, Mutimir and Bral-sav, 872-882) fought bitter battles against the Moravians, while the Dalmatian Croatians were engaged in a secular struggle against the Ve¬ netian Republic. Borna's successors extended their territory in Istria, the Velebit Mountains and in Gorica and (in 910) Ban Tomislav as¬ sumed the title of king. But it was only under

King Zvonimir that Croatia grew to any ‘con¬ siderable size, for he took possession of Naret-na and part of Bosnia. No sooner had the Cro¬ atians succeeded in forming a powerful state than their leaders, torn by their vices and in¬ ordinate desire for power, started a state of anarchy which was followed by numerous civil wars. The Hungarians took advantage of the disaster and their King Koloman found the country an easy prey and had himself crowned king of Croatia and Dalmatia. He granted to the Croatians a sort of constitution which still more humiliated them and made their own na¬ tive dynasties, their bans, almost slavish vassals of the Hungarian Crown. When the Turks conquered Bulgaria, Serbia and Bosnia, the principal objective of their expansion was the level land of Hungary, but they found bitter resistance in Croatia under the celebrated Nik¬ ola Zrinski, who perished in the siege of Siget. The Austrian court utilized the opportunity to subjugate Croatia with the result that a fierce insurrection of the peasantry broke out during the reign of Emperor Maximilian II. In the course of the 16th and 17th centuries the Croa¬ tian lands were called <(reliquise rellquiarum® and, for the purpose of making the Croatians better fitted for resistance to the Turks, the Aus¬ trian government nominated a king of Croatia, Dalmatia and Slavonia. A wholesale Germanization of the Croatians and the Slovenes was practised for over three centuries, but the national spirit was kept alive, as in Serbia, by means of the cherished traditions and especially by the exuberant and enchanting national poetry about Royal Prince Marko, the Battle of Kossove, etc., which rapidly spread from Serbia and Montenegro through¬ out the Serbian-speaking lands of the Hapsburg Crown. It was only in the beginning of the last century, when Napoleon, by virtue of the treaties of Pressburg (1805) and Schon-brunn (1809) won the united Dalmatia, a large part of Croatia, Istria, Gorica, Gradiska, Ca-rinthia and Carniola, giving them the collective name of <(Illyrian Provinces^ and organizing them under a single administration, that the Serbo-Croatian people inhabiting those lands realized that their language, traditions and as¬ pirations were absolutely identical and that they formed one and the same nation. Unfortu¬ nately, when those provinces were taken from France at the Congress of Vienna (1815) and restored to the Hapsburgs, the national spirit and language were once more condemned and prosecuted. The Serbo-Croatians resented sharply the ever-growing Germanization and Magyarization and, when the Magyars passed certain laws in their Parliament in 1848, where¬ by the autonomy of Croatia was virtually an¬ nulled, and when the whole of Hungary re¬ volted against the court of Vienna, ban of Cro¬

atia, Jellachich, upon advice from Austria, im¬ mediately declared war on the Hungarian Rev¬ olutionary Cabinet and, with his army of 40,000 men, largely contributed in suppressing that in¬ surrection. The Serbians in Hungary, who also rose against their Magyar oppressors, now de¬ manded their long-promised autonomy, which they finally obtained in the so-called (<Voyvo-dina® dukedom, comprising Syrmia (Srem), Bachka and the Banat, only to be shortly after¬ ward suppressed by the Austrian government. The Croatians were treated in like manner, for they were abandoned entirely to the mercy of the revengeful Magyars and a reactionary pol¬ icy of the blackest type was started. When, however, the Austrian government collapsed (in 1859) and the necessity of Serbo-Croatian help was again keenly felt, several Serbo-Croa¬ tian deputations were kindly received in Vienna and the just demands of the people were grant¬ ed. The Serbo-Croatian language was rein¬ troduced in the national schools and the local administration and, in 1868, a treaty between the Serbo-Croatians and the Hungarians was concluded whereby the former secured com¬ plete independence in their national aspirations. But the notorious Ban Khnen Hedewary (1883-1903) eluded most of the treaty stipulations and executions of most notable Croatians in Agram (1907) and Vienna (1908) accelerated the for¬ mation of the Serbo-Croatian coalition which complicated more than any other event the dif¬ ficult South Slavonic problem in Austria-Hun¬ gary. The struggle of the Slovenes (or Slo¬ venians) against their German oppressors re¬ sulted first in their literary emancipation, which was started by their patriot Blaiweiss (1843) and then in their political development which secured for them an overwhelming majority both in their home Diet and their municipal government. Croatia-Slavonia is now included in the Republic of Jugoslavia.

Government. — The administration of Croa¬ tia under Hungary was controlled by 8 county councils and 70 district councils. The supreme authority was vested in the autonomous govern¬ ment in Zagreb (Agram), whose chief was the ban. The whole constitutional life of the na¬ tion was regulated by the Royal Constitution for¬ mulated in the Croatia-Hungarian Agreement of 1868, by which the political relation between Croatia-Slavonia and Hungary was determined. At the head of the provincial government in Agram stood the ban who was appointed by the Hungarian Prime Minister, subject to the approval of the king. The local government consisted of three ministries, Interior, Worship and Education and Justice.- The Croatian Diet sent 40 delegates to the Hungarian Lower House and 3 to the Upper House. The parlia¬ mentary responsibilities of the ban and the heads of the districts were defined in a special law. All other matters came under

the juris¬ diction of the joint Cabinet in Budapest. The financial relations between Croatia and Hungary were regulated by a special agreement whereby Croatia received 44 per cent of her income for the defraying of her autonomous expenses, the remaining 56 per cent being reserved for the joint treasury to meet all joint expenses, for defense, *etc.*

Bibliography.— Banik, Juraj, <Slobodne a kralovske mesto Zvolen Opis historichke-topo- grafichlcy> (Saint Martin 1891) ; De Montbel,

Guy, <La condition politique de la Croatie-slavonie dans la monarchic austro-hongroise) (Paris 1910) ; Ellinek and Pliverich, (Das rechtliche Verhaltniss Kroatiens zu UnganP (Zagreb) ; Farlati, Danilo, (Illyricum Sacrum* (Venice 1751-1801) ; Francev, (Einige Bemer-kungen zur Geschichte des Schrifttums in Kroatien' (Archiv. fiir Slavische Philologie, Berlin 1914) ; Klun, (Slovency, Ocerk istorii ih slo-vensnosti) (Russkaya Besyeda, Moscow 1859); Leger, Louis, (Serbes, Creates, et Bulgares: etudes, historiques, politiques et litteraires) (Paris 1913) ; Lopashich, (Spomenici Hrvatskie Krajine* (Zagreb 1884-1915) ; Lucii, Joannis, (De regno Dalmatiae et Croatiae, libri sex} (Amsterdam 1666) ; Lyubich, (Pregled Hrvat-skee PovjestP (Fiume 1864); Radonich, J., (Politichki i kulturni razvoj moderne Hrvatske) (Letopis Matice Srpske, Novi Sad 1914) ; (Rad Jugloslovenske Akademi je Zanonosti i unjetnosti AgranP (Zagreb) ; Seton-Watson, R. W., (Absolutism in Croatia) (London 1912) ; and (T'he Southern Slav Question and the Hapsburg Monarchy* (London 1911) ; Shulek, (Hrvatski Ustav ili konstitucija godine* (1882) ; Shurmin, Djuro, (Povjest Knjiz-hev- nosti hrvatske i srpske* (Zagreb 1898) ; Smir¬ nov, (Ocherk istorii horvatskago gosudarstva do ptochinoniya yevo ugorkoy koronye) (Ka¬ zan 1879) ; Svear, (Ogledalo Illiriuma) (Zagreb 1839-42) ; Tkalchich, J., (Hrvatska Povyes-nitza* (Zagreb 1861).

W. M. Petrovitch,

Chief Slavonic Division , New York Public Library.

CROCHET, kro-sha/, a species of knitting performed with a small hook of ivory, steel or wood, the material used being woolen, cotton or silk thread.

CROCIDOLITE, kro-sld‘6-lit (Gr. ((thread-stone**) a mineral of the amphibole group com¬ posed of long, delicate fibres and also occurring massive and earthy, and then called abriacha-nite. It has the formula NaFe(Si03)2.FeSi0», part of the iron being frequently replaced by magnesium and calcium and part of the sodium by hydrogen. The mineral has a hardness of 4 and a specific gravity of about 3.25. The fibrous varieties have a silky lustre and vary from blue to green. Crocidolite occurs in Griqualand West, Africa, in the Vosges Mountains of France and Germany, in Greenland, in Ontario and in Rhode Island. The South African va¬ rieties are often altered by oxidation of the iron and by infiltration of silica, until they are of a brown or yellow color and exhibit a cha¬ toyant lustre. Specimens of this kind are known as ˆtiger-eye,® and, when polished, are used in the manufacture of umbrella handles and other ornamental articles.

CROCIN, C44H70O2S, a coloring matter ob¬ tained from the fruit of Gardenia grandiflora, Chinese yellow pods, hwang-chi, which is largely used in China for dyeing silk, wool and other fabrics yellow. The color is extracted from the pods by a complex process and forms a red powder, which is soluble in water and in spirit. By dilute acids it is decomposed into crocetin, which dyes a fine yellow. Crocin has been identified with a body obtained from saffron.

CROCKER Charles, American capitalist : b. Troy, N. Y., 16 Sept. 1822; d. Monterey, Cal.,

14 Aug. 1888. He received a common school education and went to California in 1849, where he opened a store. In 1860 he was elected to the State legislature. With Leland Stanford, Mark Hopkins and Collis P. Huntington, he projected and completed the Union Pacific Railroad system.

CROCKER, Francis Bacon, American electrician: b. New York, 4 July 1861; d, there, 9 July 1920. He was graduated at Columbia University in 1882 ; for seven years was elec¬ trical engineer, became vice-president of the Crocker-Wheeler Electric Company in 1888 and professor of electrical engineering in Colum¬ bia University in 1889. He took a .prominent part in the national and international standard¬ ization of electrical apparatus. He was presi¬ dent of the American

Institute of Electrical Engineers in 1897-98, of the New York Elec¬ trical Society in 1892-95; and author of Prac¬ tical Management of Dynamos and Motors* (1892) ; (Electric Lighting) (2 vols., 1896-1901; 8th ed., 1908) ; (Electric Motors* (1910), *etc.* The honorary degree of master of science was conferred upon him by Columbia Universitv in

1914.

CROCKET, a Gothic architectural orna¬ ment projecting boldly, usually in imitation of curved and bent foliage, but sometimes of ani¬ mals, placed on the angles or the sides of the pinnacles, canopies, gables, *etc.* The name is also given to one of the terminal snags on a stag's horn. This ornament is probably derived originally from the corner volutes of the Cor¬ inthian type of capital with the acanthus leaves curled up under them.

CROCKETT, David, an American pioneer : b. Limestone, Greene County, Tenn., 17 Aug. 1786; d. Alamo, Tex., 6 March 1836. He spent a number of years in hunting and pioneer work in western Tennessee, and finally settled in Franklin County in 1811. He served in the Creek War under Jackson; and in 1821 and 18231 was elected to the Tennessee legislature. In 1826 and 1828 he was elected to Congress ; was defeated for re-election in 1830 because of his outspoken opposition to Jackson's Indian bill ; but was again a successful candidate in 1832. In Washington, although his eccentricities of dress and manner excited comment, he was always popular on account of his shrewd com¬ mon sense and homely wit ; although generally favoring Jackson's policy, he was entirely inde¬ pendent and refused to vote to please any party leader. At the end of his congressional term, he joined the Texans in their war against Mex¬ ico, and in 1836 was one of the force of 140 which defended Alamo, and, as one of the six survivors who surrendered, was shot by order of Santa Anna. He was unlettered and prob¬ ably dictated the following works, of which he is the acknowledged author: (A Narrative of the Life of David Crockett* (1834) ; (A Tour to the North and Down East) ; (Exploits and Ad¬ ventures in Texas* ; Sketches and Eccentricities> (1847). The best popular biography is by E. S. Ellis (Philadelphia 1884).

CROCKETT, Samuel Rutherford, Scot¬ tish novelist ; b. Little Duchrae, Galloway, 24 Sept. 1860; d. Avignon, France, 18 April 1914. He was educated at Edinburgh and Oxford, and entering the ministry of the Free Church of Scotland in 1886 was for several years pastor

at Penicuik. A volume of verse, (Dulce Cor,* and (The Stickit Minister,) his first novel (1893), showed literature to be his vocation. He produced in rapid succession a series of novels, about 50 .in all, making his native Gallo¬ way country on the Scottish border his special field. He was one of the leaders of the (<Kail-yard School,® with Ian Maclaren and James M. Barrie. His later works include (The Raiders) (1894); (The Lilac Sunbonnet) (1894); (Mad Sir Uchtred) (1894) ; (Bog Myrtle and Peat) (1895) ; (The Men of the Moss Hags* (1895) ; (Sweetheart Travelers) (1896) ; (Cleg Kelly * (1896) ; (Lad's Love) (1897) ; <Lochinvar)

(1897) ; (The Standard Bearer) (1898) ; (The Black Douglas* (1899) ; (Kit Kennedy *(1899) ; (Joan of the Sword Hand* (1900) ; (The Stickit Minister's Wooing) (1900) ; (Love Idylls* (1901) ; (The Dark o' the Moon* (1902); (Raiderland) (1904); (Maid Margaret *(1905); (Sir Toady Crusoe) (1905); (The Cherry Ribbon) (1906); (White Plumes of Navarre) (1906) ; (Little Esson) (1907) ; (Deep Moat Grange* (1908) ; (Men of the Mountain* (1909) ; (Dew of their Youth) (1910) ; (Love in Pernicketty Town) (1911) ; (The Moss Troop¬ ers (1912) ; (Sandy's Love Affair* (1913).

CROCODILE, a huge reptile of the genus Crocodilus and order Crocodilia, distinguished from the other genera of the family by having the enlarged fourth lower tooth fitted into an emargination, and not a pit, in the upper jaw, the dorsal head and trunk plates not united and the nasal bones not entering the nasal canal as a septum. The bones of the head have a peculiar corroded and pitted appearance, the skin is marked into transverse rows of hard quadrate areas and in addition protected dorsally by large keeled bony scutes, and the tail is provided with a partly double crest. Although fitted for ter¬ restrial locomotion, the feet are as well adapted for aquatic life by being webbed. More re¬ markable adaptations for life beneath the waters are valves on the snout for closing the nostrils and external ear openings, and especially the arrangement by which the glottis fits into the internal nares, enabling the crocodile to breathe while the mouth

is open and to hold a struggling animal beneath the surface until it drowns. A crocodile's stomach is constructed much like a bird's gizzard and is a receptacle for stones and other hard substances by which the food is ground. About 10 living species are known, all of which are strictly aquatic animals ; three are American, an equal number African and the re¬ mainder distributed through the Indo-Malayan and North Australian regions.

The only species which enters the United States is C. americanus , which is of rare occur¬ rence in southern Florida, where it has been known to exist since 1875, but more common in the West Indies, Central and South America. Little has been written of its habits. It may be readily distinguished from the very much more abundant alligator by the longer, more slender snout with a median ridge, besides the generic characters mentioned above. The extreme length appears to be about 14 feet. Unlike the alligator it enters brackish and salt water. The African crocodile (C. vulgaris) is the longest and best known. It ranges throughout the con¬ tinent and swarms in the waters of Madagascar and of the upper Nile, but has been extermi¬

nated in lower Egypt. Like the alligator, the crocodile is essentially a. scavenger, but attacks, drowns and devours various animals which enter the water in which it lives, not excepting full grown cattle, or even man, especially after nightfall. It is said that, like the tiger, the crocodile acquires a taste for and prefers human flesh. The Mugger, or crocodile of the Ganges, is C. palustris. It is the object of religious worship by the natives. Crocodiles construct dens in the river banks above the water level, which they enter by means of long burrows opening beneath the water; they are used as retreats in case of danger, and in which to devour their prey. Numerous eggs are de¬ posited in a hole or nest in dry earth, the mother remaining near to guard them, a point in which as, indeed, in most of its habits the crocodile resembles our well-known alligator (q.v.). In one of its associates, however, it is unique. A species of leech (Limnatis nilotica) infests the great saurian's mouth, which is said to be habit¬ ually entered by a plover-like bird for the pur¬ pose of feeding upon the parasites. It is not clear to just what species of bird this habit is to be attributed, but most ornithologists con¬ sider it to be Pluvianus a> gyp tins. The Egyp¬ tian crocodile was anciently the object of elab¬ orate worship, possibly, as was suggested by Eusebius, because it appeared in greatest num¬ bers at the time of the flooding of the Nile; hence it was connected with the fertility of the soil, was cared for by the priests, and in many cases embalmed after death.

CROCODILE-BIRD, an African plover, credited since the days of Herodotus with entering the open mouths of basking crocodiles to feed on the bits of food clinging to the reptiles' teeth, or possibly to pick out parasites. Two noisy plovers common along African riverbanks, and both called <(zic-zac** from their cries, are said to indulge in this dangerous performance, but the name ctocodile-bird be¬ longs more properly to only one of them — the crested, spur-winged plover (Hoploptenus spinosus) of the Nile Valley. There is good evi¬ dence that this bird does actually enter the mouth of crocodiles, which welcome the bird's attentions. Consult Lydekker, (Royal Natural History* (Vol. IV).

CROCODILES, Fossil. Crocodiles are a very ancient group of reptiles and were much more abundant and widespread in former geo¬ logical periods, when the climate was more trop¬ ical than it is to-day. They have changed com¬ paratively little in external appearance from the beginning of the Age of Reptiles until now, and the bony plates over the head and back were from the first characteristic of them. The most ancient crocodilian animals were the Belo-dontia (see Belodon) of the Triassic Period, partly intermediate between crocodiles and dinosaurs and with many archaic characters. I'n the succeeding Jurassic Period flourish primitive marine and freshwater crocodiles (Teleosau - rus, Bemissartia, Goniopholis) , in which the vertebrae were biconcave instead of convexo-concave, as in true, crocodiles. In the later Cretaceous and Tertiary periods true crocodiles were abundant, their range extending much farther north than it does now. They are found in the New Jersey green sands, in the Bad Lands of western United States and Canada,

CROCODILIA

and in various parts of northern and central Europe, and their distribution was probably world-wide and not restricted, as now, to tropi¬ cal or sub-tropical regions.

CROCODILIA, a sub-class of reptiles characterized by the possession of four well-developed, approximately equal legs, long tails, fixed quadrate bones, teeth firmly implanted in alveolae and restricted to the jaws, solid vertebrae, cervical and thoracic ribs with distinct tubercular end capitula, compound abdominal ribs, simple pubic bones and the separateness of the two pubic bones and ischia. There is a strong quadratojugal arch in the skull. The cloaca is longitudinal and the copulatory organ of the male is single and anterior. The heart is almost perfectly divided into four chambers; the limbs, head and body-walls receive arterial blood, while that which goes into the viscera is mostly venous. The existing Crocodilia are divided into gavials (q.v.), with long and slender snout and a large number of approximately equal teeth, and crocodiles ' and alligators (qq.v.), with a relatively blunt snout and unequal teeth. For the differences between alligators and croco¬ diles, see the articles on these animals.

CROCOITE, native chromate of lead, PbCrCh. Crocoite crystallizes in prismatic forms belonging to the monoclinic system, and also occurs in granular and columnar forms. It is scarlet red in color and translucent, with an adamantine lustre. It has a hardness of from 2.5 to 3 and a specific gravity of about 6. It was in this mineral that Vauquelin discovered the element chromium in 1797. Crocoite occurs in the Ural Mountains, also in Brazil, and in small quantities in Hungary, the island of Luzon and in Maricopa County, Ariz. Tas¬ mania is by far the most important locality, having produced many specimens which rank among the finest mineral specimens known.

CROCUS, in mythology, a youth who was enamored of the nymph Smilax and changed into the flower which was named after him. According to another tradition he was meta¬ morphosed by his friend Hermes, who had killed him in a game of discus. Consult Ovid, Metam. IV, 283.

CROCUS, a genus of perennial herbs of the family Iridacece. It includes about 70 spe¬ cies characterized by corms, showy, long, funnel-shaped, erect, sometimes fragrant flowers of siix nearly equal segments, three stamens and a three-celled ovary containing numerous nearly globular seeds. They blossom in autumn or early spring, the spring species being most widely known, and valued for their diversely colored flowers, the ease with which they are cultivated, and the cheapness of the corms, com¬ monly called bulbs. The corms are planted about three inches deep in any good garden soil in autumn, and allowed to remain for several years, when, owing to the formation of the new corms above the old ones, the plants are in danger of becoming uncovered. The little corms which have been developed by the old ones are separated, stored in a dry place until autumn and replanted. They are often planted in lawns, but must there be frequently renewed, because in two or three years the grass chokes them. C. sativus yields the formerly well-known dye, saffron, which was prepared from the dried stamens. This coloring-matter

has been largely replaced by aniline dyes. About 30 species are cultivated in American gardens and greenhouses. Consult Bailey, (Cyclopedia of American Horticulture' (New York 1914).

CROCUS, or COLCOTHUR, a polishing

powder composed of oxide of iron and pre¬ pared by calcining ferrous sulphate. Crocus is purplish in color and differs from rouge chiefly in its comparative coarseness. (Formerly called ((crocus of Mars" or "crocus Martis astringens").

CROES, John James Robertson, American civil engineer: b. Richmond, Va., 5 Nov. 1834; d. 1906. He was graduated at the College of Saint James, Maryland, in 1854; and was en¬ gaged as civil engineer, principally in hydraulic and sanitary work, after 1856. He was engaged in the waterwork construction in New York, Brooklyn and Washington; became an expert on the problem of water-supply, sewerage, waterworks and water power valuation, irriga¬ tion and rapid transit in cities ; and wrote nu¬ merous articles on engineering subjects. He was treasurer in 1877-87 and president in 1901 of the American Society of Civil Engineers. He was editorial writer for the Sanitary Engi¬ neer 1880-90.

CRCESUS, kre'sus, king of Lydia of the Mermnadae line. He succeeded his father, Alyattes, 560 b.c. The territory governed by him included

nearly all of Asia Minor, which he had conquered. His riches, obtained chiefly from mines and the gold dust of the river Pactolus, were greater than those of any king before him, so that his wealth became prover¬ bial. Proud of his treasures, he carried his love of splendor to extravagance and thought himself the happiest of men. His capital, Sardis, became the brilliant centre of arts and letters. The legend says that, vain of his wealth, he asked the philosopher Solon what he thought of his good fortune. ((I pronounce no man fortunate until his death," was the sage's reply. Subsequently Croesus was made prisoner by Cyrus, king of Persia. When seated on the funeral pyre and about to be burned to death, he recalled the words of Solon, and thrice repeated his name. Cyrus demanded an explanation. Croesus gave it, and Cyrus not only spared his life but also took him into his favor and protection. At the death of Cyrus he recommended Croesus to the favor of Cambyses. Consult Horo and Wells, (A Commentary on Herodotus) (Vol. I, pp. 99-100, Oxford 1912) ; Jebb, <Bacchylides) (Lon¬ don 1905).

CROFFUT, William Augustus, American prose writer and poet : b. Redding, Conn., 29 Jan. 1835; d. Washington, D. C, 31 July 1915. Engaged in journalism from 1852 and con¬ nected editorially with leading newspapers, he was widely known as correspondent and humorist, and as one of the earliest shorthand reporters. He received the degree of Ph.D. from Union College; was executive officer of the United States Geological Survey, 1888-94; wrote opening ode of Chicago Exposition, 1893. He published (War History of ConnecticuU (1867) ; <A Helping Hand' (1868); (Bourbon Ballads' (1880); (A MidSummer Lark' (1882); (Deseret,' a comic opera — Mormon theme — music by Dudley Buck (1882) ; (The Varnlcr-

hilts } (1886) ; (The Prophecy and Other Poems) (1893) ; (The Folks Next Door) (1902) ; (Fifty Years in Camp and Field* (1909) ; and many pamphlets.

CROFTERS, a term applied in Scotland to a species of small farmers, the occupiers of small pieces of land, from which they derive their

livelihood, or great part of it, by cultiva¬ tion or rearing and grazing cattle. Their origin can be traced to the fact that the chiefs of the clans came to be regarded as proprietors of the land. The followers of the chieftains settled on the land, paying rent in lieu of per¬ sonal services. Crofters are numerous in the Highlands and Western Islands of Scotland, and they live for the most part in townships, each with his own piece of arable land, but with a joint tenancy in mountain pasture. From some districts, in recent times, they have been summarily removed to make room for sheep farms and deer forests, so that they are now chiefty congregated on the seashore, where they are able to maintain themselves in part by fish¬ ing, and generally eke out a precarious exist¬ ence. They have often complained of many grievances, such as high rents, want of compen¬ sation for disturbance, small holdings, excessive local rates and want of harbors and railways. In the early 19th century measures for relief were undertaken. A parliamentary commission was appointed in 1883 to investigate their con¬ ditions. Under the Crofters Act (1886) some of these hardships have been removed, and great reductions of rent granted. This act is applicable only to the counties of Argyle, Sutherland, Inverness, Caithness, Ross and Cromarty, and Orkney and Shetland, where there are estimated to be 40,000 families of the crofter class. There are crofters to some extent also in other counties, but generally these seem to be in more favorable circumstances. (See Scotland). Consult Dalriad, {The Crofter in History > (Edinburgh 1888) ; Guernier, (Les crofters ecossais* (Paris 1897).

CROFTS, Ernest, English painter: b. Yorkshire, 15 Sept. 1847; d. 19 March 1911. He studied art at London and Diisseldorf, and first exhibited at the Royal Academy in 1874. He became a Royal Academician in 1896. He attained celebrity as a painter of historic battle scenes. His works include (Napoleon atLigny* (1875) ; (The Morning of Waterloo> (1876) ; (Cromwell at Marston Moor) (1877) ; (Wel¬ lington's March from Quatre Bras* (1878) ; (The Evening of Waterloo) (1879) ; (Napoleon Leaving Moscow) (1887) ; (The Execution of Charles P (1890) ; (The Conspirators' Last Stand at Holbeach House) (1896).

CROGHAN, kro'gan, George, American military officer: b. near Louisville, Ky., 15 Nov. 1791; d. New Orleans, 8 Jan. 1849. He was graduated at William and Mary College in 1810, and greatly distinguished himself at the defense of Fort Meigs and Fort Stephenson in 1813, receiving a gold medal from Congress. In 1814 he became lieutenant-colonel but resigned in 1817 and was appointed postmaster at New Orleans in 1824. He became inspector-general with the rank of colonel in 1825, joined General Taylor's forces in Mexico in 1846 and

took part in the battle of Monterey.

CROKER, B. M. (Sheppard), English novelist ; d. London, Eng., 21 Oct. 1920. She

was married to Lieut.-Col. John Croker, and spent 14 years in India and Burma. Her writ¬ ings include (Pretty Miss Neville) (1883) ; (Some One Else) (1884) ; <A Bird of Passage* (1886); (Diana Barrington) (1888); (Two Masters* (1890) ; (A Family Likeness* (1892) ;

(Village Tales and Jungle Tragedies* (1894) ; (Married or Single) (1895) ; (The Real Lady Hilda* (1895) ; (In the Kingdom of Kerry* (1896) ; (Beyond the Pale* ; (1897) ; (Miss Bal-maine's PasP (1898); 'Terence* (1899); (A State Secret* (1901); <Angel> (1901); 'The Spanish Necklace * (1907) ; (Katherine the

Arrogant* (1910); (In Old Madras* (1913); 'Lismore* (1914).

CROKER, John Wilson, Irish miscel¬ laneous writer: b. Galway, 20 Dec. 1780; d. Hampton, 10 Aug. 1857. He was educated at Trinity College, Dublin, and entered Lincoln's Inn as a student in 1850, being admitted to the Irish bar two years later. His capacity for satire revealed itself in (Familiar Epistles,* a clever satire on the Irish stage, and 'An Inter¬ cepted Letter from Canton.* His (Songs of Trafalgar* spread his fame as a poet. In 1808 he issued (State of Ireland, Past and Present, *a pamphlet on Catholic emancipation, which brought him before the notice of the politicians; and in the same year he was elected member of Parliament for Downpatrick. In. 1809 he be¬ came Secretary to the Admiralty, a post which he held for more* than 20 years. He was one of the founders of the Quarterly Review, and contributed many violent political articles, as well as many personal and abusive criticisms, notably of Keats' 'Endymion.* He was cari¬ catured by Disraeli in 'Coningsby.* Macaulay's review of Croker's edition of Boswell's (Life of Johnson* and the latter's counterblast on Macaulay's 'History of England) are among the celebrities of literary duels. He was a Tory politician of intense fervor, permanently resigning his seat in Parliament because of the passage of the Reform Bill of 1832. He pub¬ lished also 'Stories from the History of Eng¬ land for Children) (1817) and a poem, (The Battle of Talavera) (1809), which received much praise. Consult Jennings, (Diaries and Correspondence of Croker) (London 1884).

CROKER, Richard, American politician: b. Clonakilty, Ireland, 24 Nov. 1843. When two years of age he came to America with his parents and received his early education in the public schools of New York city. Associating himself with Tammany Hall, he became promi¬ nent in politics during the scandal of the Tweed ring, whose schemes he vigorously opposed. In 1868-70 he was alderman; 1873-76, coroner; 1883-87, city fire commissioner; 1889-90, city chamberlain; also being the recognized leader of Tammany Hall 1884-1903. In the latter year he retired to a country life in England and Ireland, as a recreation interesting himself in horseracing. In 1907 he won both the English and the Irish "Derby® with his racehorse Orby. In 1908 he was made a freeman of the city of Dublin. Consult Lewis, 'Richard Croker* (New York 1901).

CROLL, krol, James, Scottish geologist : b. Little Whitefield, Perthshire, 1821 ; d. Perth, 15 Dec. 1890. He received the ordinary educa¬ tion of a peasant's son and then studied philos¬ ophy and physical science and published a treatise

on 'Physical Cause of the Change of Climate During the Glacial PeriocP (1864). In 1859 he was appointed keeper of the museum in the institution known as Anderson's University, Glasgow, a position which he occupied till his appointment to a minor post in the Geological Survey of Scotland in 1867. His writings in¬ clude 'The Philosophy of Theism5 (1857) ; 'Climate and Time in their Geological Rela¬ tions J (1875), perhaps his ablest work; dis¬ cussions on Climate and Cosmology) (1886) ; 'Stellar Evolution5 (1889) ; 'The Philosophical Basis of Evolution5 (1890). Consult Irons, T. C., 'Autobiographical Sketch of James Croll, with Memoir of His Life and Work5 (London

1896).

CROLLIUS, Oswald, German chemist: b. Wetter, Oberhessen, about

1580; d. 1609. He is remembered as author of a Latin work entitled ‘Basilica Chymica,5 which appeared at Frankfort in 1609 and went through 18 editions, was translated into French, into German and by Richard Russell into English under the title of ‘Royal and Practical Chymistry) (London 1670). This is a remarkable mixture of specu¬ lative ideas about the action of chemical sub¬ stances in different diseases and practical skill in the preparation of the substances themselves. Crollius was obviously quite familiar with the details of the processes he described, although they sometimes would, sometimes would not, yield the bodies he intended, and although he was of course ignorant of the true composition of many of them. By his manipulative skill he discovered new preparations, which he intro¬ duced into medicine, and which still remain, and this practical ability seems to have given weight to his therapeutic theories.

CROLY, kro’li, Jane Cunningham (“Jennie June”), American author and journalist: b. Market Harborough, England, 19 Dec. 1831 ; d. New York, 23 Dec. 1901. She removed to New York in 1841, and in 1856 married D. G. Croly. She was editor of Demorest’s Magazine 1860-87, and of The Cycle and The Home-maker. She was one of the founders of “Sorosis55 and its president for 14 years ; founded the New York Women’s Press Club in 1889 and in 1892 became professor of jour¬ nalism and literature in the Rutgers’ Women’s College; and was one of the most active pro¬ moters of the Federation of Women’s Clubs. She published ‘Talks on Women’s Topics5 (1863) ; ‘For Better or Worse) (1875) ; ‘Three Manuals for Work) (1885-89) ; ‘History of the Women’s Club Movement in America’ (1900), *etc.* Consult ‘Memories of Jane Cun¬ ningham Croly, “Jennie June” 5 (New York

1904).

CROMARTY, kro’mer-te, Scotland, a former county in the north, consisting of 14 detached portions scattered over the county of Ross, with which county it is now entirely in¬ corporated. The total area was about 220,800 acres. This singularly awkward county was formed at the request of an earl of Cromarty, who desired that one county might contain all his lands wherever situated.

CROMARTY FIRTH, a long, narrow inlet of the sea running into the united county of Ross and Cromarty in a southwesterly di¬ rection, and having a length of about 18 miles and an average breadth of two to five miles.

and from 5 to 40 fathoms deep. Its entrance from the Moray Firth, between two bluff-wooded headlands called the Sutors of Cro¬ marty, is about a mile wide, with 30 to 40 fathoms of water. Being completely landlocked it affords excellent shelter for shipping and is often crowded in stormy weather. At its upper end it receives the river Conan, and this portion of the firth is shallow, several square miles of mud-flats being laid bare at low water. On its shores are the towns of Cromarty, Invergordon and Dingwall.

CROME, John, English landscape painter: b. Norwich, 22 Dec. 1768; d. there, 22 April 1821. His school education was very scanty, but after some struggle and a long apprentice¬ ship to a sign painter he succeeded in getting established as a drawing-master. He studied the Dutch masters, his favorite being Hobbema, but his distinguishing characteristic is his genu¬ ine English realism. He paid great attention to detail, and though this is sometimes exag¬ gerated in his work, there is always a mastery of feeling for light and out-of-doors which give great force and individuality. In 1805 he founded the Norwich Society of Artists, of which he became president as well as chief con¬ tributor to its annual exhibitions. Some of his pictures are ‘Household Heath5 ; ‘View of Chapel Fields, Norwich5 ; ‘Carrow Abbey5 ; and ‘Clump of Trees5 ; the ‘Oak at Poring-lane5 (in the National Gallery) ; the ‘Willow5 ; ‘Hautbois Common5 (in the Metropolitan Mu¬ seum) ; and ‘The Old Oak5 (also in New York). His visit to Paris enabled him to catch the livelier note in his ‘Fishmarket at Boulogne5 and ‘Boulevard des Italiens, Paris5 (Keswick Hall, near Norwich). He excelled in depicting the scenery of his native county, and especially in his handling of trees ; and his high place among British landscape painters is now uni¬ versally acknowledged. He also practised etch¬ ing with great success. His etchings were published posthumously under the title of ‘Nor¬ folk Picturesque Scenery5 (1834, 1838, 1850). Consult his biography by Turner (Norwich 1838) ; Wodderspoon (ib. 1858) ; Hardie, in the Connoisseur * (London 1904) ; VanDyck, ‘Old English Masters5 (New York 1902) ; Dickes, ‘The Norwich School of Painting5 (London 1905) ; Binyon, ‘J. Crome and J. S. Cotman5 (ib. 1906) ; Theobald, ‘John Crome’s Etchings5 (ib. 1906). He is sometimes called. “Old Crome,55 to distinguish him from his son, J. Berney Crome, also an artist (q.v.).

CROME, John Berney, English landscape painter: b. Norwich 1794; d. 1842. He was the son and pupil of John Crome (q.v.), and is called “Young Crome,55 to distinguish him from his father. In 1819 he became president of the Norwich Society of Artists. His pictures are

mostly river and coast scenes of England, France, Holland and Italy. He imitated his father's style so closely that much confusion of authorship has resulted, especially in 'Yarmouth Water Frolic,5 which was for a long time con¬ sidered the masterpiece of the elder Crome. Toward the end of his life he painted inferior subjects. Consult Dickes, W. F., 'The Norwich School of Painting5 (London 1905).

CROMER, Evelyn Baring, 1st Earl, English statesman and diplomatist : b. Cromer Hall, Norfolk, 26 Feb. 1841 ; d, London, 29 Jan.

1917. He was educated at the Ordnance School, Carshalton, and at the Royal Military Academy of Woolwich. He joined the Royal Artillery in 1858, became aide-de-camp to Sir Henry Storks, high commissioner of the Ionian Islands, in 1861, and acted as secretary during the inquiry into the Jamaica outbreak in 1865. He came to New York in 1864 to study the Civil War, went to the front with the Federal troops and succeeded in reaching the Union lines before Petersburg. He was gazetted captain in 1870, and in 1872 became private secretary to his cousin, Lord Northbrook, viceroy of India, where he remained until 1876, when he was gazetted major and was appointed British com¬ missioner of the Egyptian public debt office. He was mainly responsible for the report of the commission of inquiry of 1878, into the financial methods of the Khedive Ismail, and on the latter's enforced abdication in 1879, Major Baring became British controller-general of Egyptian finances and practical director of the dual control. He was transferred to India in 1880, where he became financial member of the council of the governor-general of India. He remained there till 1883, leaving an un¬ mistakable mark on the financial system of India, and in the same year became British agent and consul-general in Egypt and a minis¬ ter plenipotentiary in the diplomatic service. He was created first Baron Cromer in 1892, vis¬ count in 1898 and earl in 1901. His record was made in Egypt, where he found the country bankrupt and the people ground down by heavy taxation. He bolstered up the country's credit, reduced taxation to a minimum, removed dis¬ honest officials by the thousand, abolished

forced labor, built schools and hospitals and introduced modern sanitation methods. His biggest single work was to build the country's irrigation system, considered for years the model of the world. This greatly increased the country's prosperity, by securing the natives three crops a year. He saw to it that the peasants and small farmers received propor¬ tionately the same benefit as the owners of huge estates. He also reformed the army, increased trade and greatly extended railway, postal and telegraph facilities. His efficient administration won for him the title of (<Maker of Modern Egypt.® He resigned in 1907 because of ill health and received a grant of $250,000 from Parliament in recognition of his services in Egypt. In 1908 he published, in two volumes,

(Modern Egypt,) in which he gave an impartial account of events in Egypt and the Sudan since 1876, and dealt with the results to Egypt of the British occupation of the country. In 1911 he was active in securing Unionist support for the Parliament Bill, so as to prevent the creation of new peers. He wrote several articles on the European War, and in July 1916 was appointed chairman of a commission to investigate the Dardanelles campaign. His publications, besides those already noted, include (Staff College Essays* ; (Paraphrases and Translations from the Greek* ; (The War Game* ; (Ancient and Modern Imperialism* (1910) ; Political and Literary Essays) (1908-13) ; (Abbas IP (1915). See Egypt.

CROMLECH, krom'lek, the name given to a kind of ancient sepulchral monument, num¬ bers of which have been found in all parts of

the British Islands, as well as on the continent of Europe, in Asia and in America. A cromlech consists of three or more columns of unhewn stone supporting a large tabular block so as to form with it a rectangular chamber, beneath the floor of which is generally found a sepul¬ chral chamber or cist enclosing a skeleton, with arms, stone implements and other ancient relics. Sometimes the cromlech was encircled by a ring of standing stones, as is seen in the case of the Standing-stones of Stennis, in Ork¬ ney; and sometimes it was itself buried beneath a large mound of earth. Among the most re¬ markable cromlechs in England are those known as Kit's Coty House, near Aylesford, in Kent, consisting of three upright stones with a very large flat one above them; the cromlech of Chun Quoit, in Cornwall, the capstone of which is calculated to weigh 20 tons ; and two crom¬ lechs standing beside each other at Plas Newydd in Anglesey. Among cromlechs in Scotland we may mention one near Craigmaddie House,

Stirlingshire, known as the Auld Wives' Lifts, remarkable for being a complete cromlech con¬ sisting of three stones only; and a partially ruined one at Bonnington Mains,, near Edin¬ burgh, called the Witch's Stone, the capstone of which measures llf4 feet long and 10p2 feet in greatest breadth. The term cromlech is supposed by Prof. Daniel Wilson to be derived from cromadh (Gaelic) or cromen (Welsh), signifying a roof or vault, and clack or lech, a stone, and would therefore mean the suspended or vaulted stone. See Dolmen.

CROMMELIN, krom-me-lan', May de la Cherois, sha-rwa', Irish novelist: b. in Ireland, the descendant of a Huguenot founder of the Ulster linen trade. She has traveled extensively and is the author of (Queenie) ; (My Love, She's but a Lassie* ; (A Jewel of a GirP ; (Miss Daisy Dimity* ; (Orange Lily) ; (Joy* ; (In the West Country* ; (Brown Eyes) ; Gob¬ lin Gold) ; (Violet Vivian, M. F. HP ; (For the Sake of the Family* ; (Love Knots* ; (Bay Ronald) ; (Dust Before the Wind) ; (Over the Andes) ; (Half Round the World for a Hus¬ band* ; (Divil-May-Care) ; <Kinsali) ; (Bet-tina) ; (The Luck of a Lowland Laddie* ; (A Woman Derelict* ; (Crimson Lilies* ; Partners. Three) ; (The White Lady* ; (Lovers on the Green) ; (Pink Lotus. * Her novels have circu¬ lated extensively in the United States.

CROMPTON, Samuel, English inventor: b. Firwood, near Bolton, 3 Dec. 1753 ; d. Bolton, 26 June 1827. He early displayed a turn for mechanics, and when only 21 years of age in¬ vented the machine for spinning cotton which is now constantly associated with his name, and was called a mule, from its combining the prin¬ ciples of Hargreave's spinning jenny and Ark¬ wright's roller-frame, both of which had been invented a few years previously. The mule shared in the odium excited among the Lan¬ cashire hand weavers against these machines, and. for a time Crompton was obliged to take his invention to pieces and conceal it from view. He afterward refitted it and brought it again into work, but was unfortunately unable to secure a patent for it. Various improvements were introduced from time to time on the mule, but the original principle, as devised by Cromp¬ ton, remained the same. In 1812 the sum of £5,000 was voted to him bv Parliament. This

was almost all the remuneration which he ever received for an invention which contributed so essentially to the development of the greatness of Great Britain as a manufacturing nation. Consult French, (Life and Times of Crompton > (London 1860).

CROMWELL, Bartlett Jefferson, Ameri¬ can naval officer: b. Georgia, 9 Feb. 1840; d. 24 Tune 1917. He was at the Naval Academy 1857-61, the first midshipman from Nebraska. He served on the Quaker City , and Conemaugh with the south Atlantic blockading squadron 1861-63 ; and with the east Gulf squadron 1863-65. He was commissioned commander 24 Oct. 1874; was inspector of ordnance 1878; on duty at Portsmouth navy yard 1882-85 ; League Island navy yard 1886ˆ89 ; and promoted captain in March 1889. At the conclusion of the Spanish-American War he was ordered to Havana to receive the surrender of the naval station there. He became a rear-admiral 3 March 1899. In 1901 he was appointed to the command of the United States fleet in South American waters, and later in the same year to the command of the European station. He retired 9 Feb. 1902, having reached the age limit of 62 years.

CROMWELL, Henry, English soldier: b. Huntingdon, England, 20 Jan. 1628; d. Soham, Cambridgeshire, 23 March 1674. He was the fourth son of Oliver Cromwell, under whom he served as colonel in Ireland in 1649. He sat in Parliament in 1653, and was lord-deputy of Ireland 1655-57 and lord-lieutenant 1657-59, his rule being conservative and popular. His tolera¬ tion of the Royalists was rewarded by the approval of Charles II and the confirmation of his Irish estates under the Act of Settlement. After 1659 he lived in retirement as a farmer on his estate at Spenway Abbey in Cambridge¬ shire.

CROMWELL, Oliver, lord-protector of England: b. Huntingdon, 25 April 1599; d. London, 3 Sept. 1658. He was the second son of Robert Cromwell and Elizabeth Steward. His father was a younger son of Sir Henry Cromwell, knighted by Queen Elizabeth ; and Sir Henry again was a son of Sir Richard Williams, a nephew of Thomas Cromwell, Earl of Essex, whose name he took. He entered Sidney Sussex College, Cambridge, 23 April

1616, but left on the death of his father in

1617. In 1620, at the age of 21, he married Elizabeth, daughter of Sir James Bourchier, and settled on his estate at Huntingdon. In 1628 he was a member of Parliament for Hunt¬ ingdon and distinguished himself by his zeal against (<popery.® On the dissolution, in 1629, he returned to Huntingdon ; in 1631 he went with his family to a grazing-farm he had taken at Saint Ives; and in 1636 to Ely, where he had inherited a property.

The storm was already at hand which was to shake England to its foundations. The arbi¬ trary measures of Charles I were so stoutly resisted that he endeavored to rule without a Parliament; but at length the king was com¬ pelled, by the state of affairs in Scotland, to summon a Parliament (1640). Cromwell, now a member for Cambridge, and others were so loud in their complaints of abuses in Church and state that Charles prorogued the Parliament, but six months after was obliged to reassemble it. In this Parliament, called the Long Parlia¬

ment (from November 1640 to April 1653), Cromwell first attracted notice chiefly by his rustic and slovenly dress and by the vehemence of his oratory.

On the breaking out of the great Civil War in 1642, being appointed captain, he raised a troop of horse (the ((Ironsides®) composed of zealous Puritans. He was present at Edgehill (23 Oct. 1642) ; his first military exploit was to capture the magazine of Cambridge along with the university plate. He then routed the Royalists and made himself master of their supplies. He laid the foundation of his mili¬ tary fame by the relief of Gainsborough (28 July 1643), and in October 1643 he was assailed by a greatly superior Royalist force at Winceby, but defeated it. In this action he had a horse killed under him, and was himself struck down while in the act of rising. On 2 July 1644 the battle of Marston Moor was gained by the par¬ liamentary army — a result mainly brought about by Cromwell and his Ironsides. His rig¬ orous discipline of his regiment of Ironsides was designed to fit <(men of religion to oppose men of honour.® Cromwell also bor.e a dis¬ tinguished part in the second battle of New¬ bury (27 Oct. 1644) under the Earl of Man¬ chester.

The Independent party, led by Cromwell and his friends, were for pursuing the war with the utmost vigor, and in order that they might

have their way determined to get the entire control of the army. In order to accomplish this, they procured the passing of the Self-denying Ordinance, prohibiting members of either house of Parliament from holding any military command on the ground that vices and corruptions had crept into the army, that it re¬ quired to be remodeled and a stricter discipline maintained. Thomas Fairfax was made lord-general in place of Essex, while Cromwell was placed under him, with the rank of lieutenant-general. Cromwell now introduced into the whole army the excellent discipline in which he had already trained a part of it, and gained the decisive battle of Naseby (14 June 1645), in which the king was routed with great loss. The spirit in the army, which the officers, and especially Cromwell, excited by their sermons and prayers, had now risen to fanaticism ; though at the same time good order and moral¬ ity were so well maintained that profanity, drunkenness, robbery, and the like offenses, hardly ever occurred. After Naseby no time was lost by the parliamentary leaders in fol¬ lowing up their success. Leicester was retaken, Taunton relieved, Bridgewater stormed, Bristol, held by Prince Rupert, was besieged and sur¬ rendered, Devizes was stormed, Winchester sur¬ rendered, Dartmouth was stormed, and finally Sir Jacob Astley was defeated at Stow-on-the-Wold, 21 March 1646.

The Royalists were completely crushed. Charles took refuge with the Scottish army (5 May 1646), but was soon given up by them to the Parliament, on which occasion Cromwell was one of the commissioners. When Parlia¬ ment, in which the Presbyterian element pre¬ dominated, wished to disband the army, the soldiers, headed by the Independents, appointed a council of officers and a body of subalterns and privates called Adjutators (misspelt agita¬ tors), who declared to the Parliament that they would not lay down their arms till the freedom

of the nation was established. Some of the soldiers conducted themselves so boldly that Parliament ordered their arrest ; on which occa¬ sion Cromwell not not only supported the House, but deplored the seditious temper of the troops, which he said had even put his own life in dan¬ ger. Cromwell seems at this time to have con¬ templated the restoration of the king, and, supported by Fairfax and others, even entered into a treat}- with him ; but he soon discovered that Charles was not to be trusted and that the king's success would be his destruction. Fight¬ ing now took place with the Royalist party in Wales, but Cromwell soon finished the strug¬ gle in this quarter; after which he proceeded against the Scots, who had raised a strong army ((to deliver the king from sectaries.® As Fairfax, from Presbyterian scruples, de¬ clined the command of the expedition against Scotland, Cromwell undertook it. With a much inferior force he defeated the Scots in a three days' action at Preston (17-19 Aug. 1648) and marched on to Edinburgh.

Now followed the tragedy of the king's execution, 29 Jan. 1649. Cromwell's name stood third in order in the death-warrant, and though he may have been impelled to the step by force of circumstances and by his knowl¬ edge of the king's faithlessness, there is no reason to suppose that he regretted the share he took in the death of the king, or thought that he was unjustly punished. Affairs in Ire¬ land now demanded his presence, and having been appointed lord-lieutenant and commander-in-chief, he joined the troops there in August 1649. He took Drogheda by storm (September 1649), where he gave orders that nothing should be spared. Most of the cities opened their gates without resistance, and within six months the Royalist party in Ireland was wholly crushed.

Resigning the command to Ireton, he now undertook, at the request of the Parliament, a similar expedition against Scotland, where Prince Charles, afterward Charles II, had been proclaimed king. The victory at Dunbar, 3 Sept, 1650, rid Cromwell of the menace in that direction. Meanwhile, however, Prince Charles had collected new forces; but Cromwell, by skilful marches near Stirling, cut him off from his points of support, when, contrary to his expectation, the prince entered England and threatened the metropolis itself. Cromwell hastened from the Scottish troops into England. Charles was totally defeated at Worcester, 3 Sept. 1651, and this victory, which Cromwell called the

crowning mercy of God, gave the commonwealth party full power over the three nations.

Cromwell already exerted a weighty in¬ fluence on the supreme direction of public affairs. He succeeded in restoring the conti¬ nental relations of England, which had been almost entirely dissolved, and regulated them so as to promote the interests of commerce. The Navigation Act, from which may be dated the rise of the naval power of England, was framed upon his suggestion and passed in 1651. Meanwhile the Long Parliament, aiming to establish its own power, was growing more and more unpopular in consequence of its un¬ disguised tyranny, the war which it had pro¬ voked with the Dutch and its treatment of the prisoners taken at Worcester, some of whom

were put to death in prison and others sold for slaves in the colonies. Cromwell now spoke openly to his friends of the ambition, the god¬ lessness and injustice of the Parliament. En¬ couraged by their support, he, with five or six files of soldiers, dispersed that body 20 April 1653. He then summoned a council of state consisting mainly of his principal officers, which finally chose a Parliament of persons selected from the three kingdoms, which, from Praise-God Barebone or Barbone, one of the principal characters in it, by trade a leather seller, was nicknamed Praise-God Barebone's Parliament, another name being the Little Parliament. Cromwell opened the session with a speech, in which he said that the day was come on which the saints were to commence their reign upon earth. Fifteen months after, a new annual Parliament was chosen; but after five months Cromwell prevailed on this body to place the charge of the commonwealth in his hands. The chief power now devolving again upon the council of officers (12 Dec. 1653), they declared Oliver Cromwell sole governor of the common¬ wealth, under the title of liord-protector.

The new protector behaved with dignity and firmness. With the aid of General Lambert he formed a constitution called the Instrument of Government, by which the Protector with his council was invested with the power of peace and war, and was to summon a Parliament once every three years ; the supreme legislative au¬ thority was declared to be and to reside in the lord-protector and Parliament; all commissions, patents, writs, processes, etc., were to run in the name of the lord-protector; all the forces of the kingdom were to be under the protector and Parliament during the sitting of the latter, but in the intervals of Parliament, under him and his council alone. In case of his death the council were immediately to choose a new protector; but no

protector after him was to command the army. Cromwell treated Ireland with great severity. Apart from that, his polit¬ ical administration was masterly and adapted to the circumstances of his situation. He established large magazines of provisions; the pay of the soldiers was regularly delivered to them a month in advance ; yet the public reve¬ nues were strictly and economically managed, without any additional imposts. He appointed for judges the most upright and distinguished men. He never interfered with the proceedings of the courts of justice. Every man had lib¬ erty of conscience — a principle for which the protector was a lifelong contender. In other things, too, Cromwell, as his own correct judg¬ ment prompted, would have governed with mild¬ ness and justice, and promoted the arts and sciences, but was obliged to maintain his power, as he had acquired it, by a severity often amounting to tyranny. He cultivated the friendliest relations with the Protestant powers, Holland, Sweden and Denmark, and concluded an advantageous commercial treaty with Por¬ tugal. The skilful and fortunate conduct of the war with Spain, from 1655 to 1658, in which Jamaica and Dunkirk were taken, made the new Parliament, from which Cromwell had carefully excluded all Republicans, so obsequi¬ ous, that they at last offered him the title of king. Some individuals opposed the measure so resolutely that Cromwell, fearing the fate of Caesar, declined the title. Parliament gave

him the title of “Highness,® and the right of appointing his successor ; and he was a second time solemnly invested by the Speaker with the ensigns of his office (26 June 1657). He died at Whitehall, whither he had been brought from his favorite residence, Hampton Court, and was buried in King Henry VII’s Chapel, in West¬ minster Abbey. Most of the European courts went into mourning for him, even that of Ver¬ sailles. After the Restoration his body was taken up and hanged at Tyburn, the head being fixed on a pole at Westminster Abbey, and the rest of the remains buried under the gallows.

Cromwell was great as a soldier — one of the greatest leaders of cavalry in history; his “crowning mercy® at Worcester has been re¬ garded as the prototype of Sedan ; but he was greater as a statesman and civil administrator. His task after his elevation to the protectorate was one of unexampled difficulty. Beset on the one hand by royalist plotters and on the other by republican revolutionaries, he who had humbled and stamped out one tyranny was, by the ironical pressure of events, impelled to set up a more complete absolutism in its place. His foreign policy redounded to the glory of England. “His greatness at home,® said Clar¬ endon, “was a mere shadow of his greatness abroad.® Even in the England drunk with the excesses of the Restoration this side of his rule . was remembered. “It is strange,® records Pepys in his diary, eight years after Cromwell’s death, “how everyone do nowadays reflect upon Oliver and commend him, what brave things he did, and made all the neighbour princes fear him.®

In his personal habits, Cromwell was abste¬ mious, temperate, indefatigably industrious and exact in his official duties. His exterior inspired neither love nor confidence ; his figure had neither dignity nor grace ; his voice was harsh ; in his public speeches he expressed himself with force and fire, but without method or taste. On the other hand, he possessed extraordinary penetration and knowledge of human nature ; no one knew so well as he the art of winning men and using them to his purposes. He de¬ vised the boldest plans with a quickness equaled only by the decision and intrepidity with which he executed them. No obstacle deterred him; and he was never at a loss

for expedients. Cool and reserved, but full of great projects, he patiently waited for the favorable moment, and failed not to make use of it. In his religious views he was an upright and tolerant Calvinist. In his family life he was irreproachable.

Bibliography. — Carlyle, (Letters and Speeches of Oliver Cromwell) (1845) ; Foster, Statesmen of the Commonwealth y (1840) ; Guizot, (Life of Cromwell > (1851) ; Gardiner, <The Great Civil War> (1893) ; Constitutional Documents of the Puritan Revolution y (1899) ;

(History of the Commonwealth and Protectorate) (1894-1901); Cromwell's Place in His¬ tory } (1897), and diver CromwelP (1901) ; Harrison, Cliver Cromwell) (1888) ; Firth,

(Oliver Cromwell and the Rule of the Puritans in England* (1900) and (The Last Four Years of the Protectorate) (1909) ; Johnstone, Cliver CromwelP (1912) ; Marshall, (Through Great Britain and Ireland with CromwelP (New York 1912) ; Morley, diver Crom¬ welP (1900); Roosevelt, diver CromwelP (1900). George Edwin Rines.

CROMWELL, Oliver, English biographer: b. 1742; d. Cheshunt, Hertfordshire, 31 May 1821. He was the great-grandson of Henry Cromwell, son of the protector, and the last of his known descendants. He succeeded to the estate of "Theobalds,® which descended to him through the children of Richard Cromwell, eldest son of the protector. He wrote the (Memoirs of the Protector, Oliver Cromwell, and his Sons, Richard and Henry, illustrated by Original Letters and other Family Papers)

(1820).

CROMWELL, Richard, lord-protector of England : b : Huntingdon, 4 Oct. 1626 ; d. Ches¬ hunt, Hertfordshire, 12 July 1712. He was the third son of Oliver Cromwell, and by the deaths of his two older brothers, Robert and Oliver, became his father's heir. He was amiable and popular but weak, devoted to field sports and fond of pleasure. He lived for some time in comparative privacy, and was called to succeed his father in the protectorate in September 1658. Scarcely had he entered on his office, when the forces of anarchy, both parliamentary

and military, broke loose, and he found himself utterly unable to restrain them. It was prob¬ ably with little reluctance that he quitted White¬ hall in April 1659, and retired into private life. After the Restoration he lived for a time abroad under the name of Clark, but he re¬ turned to England about 1680, passed the re¬ mainder of his life at Cheshunt, and was buried in the church at Hursley, Hampshire.

CROMWELL, Thomas, Earl of Sussex, English statesman ; b. Putney, Surrey, about 1485; d. 28 July 1540. In his youth he went to the Continent, and was successively common soldier, clerk and trader. In 1514 Wolsey made him collector of the revenues of his see of York, and nine years later he entered Parlia¬ ment, where his ability soon attracted attention. In 1524 he became a member of Gray's Inn, and Wolsey now employed him in the work of sup¬ pressing the smaller monasteries. On his master's disgrace in 1529 Cromwell defended him with great spirit in the House of Com¬ mons, and effectually opposed the articles of treason brought against Wolsey. After the cardinal's death Cromwell was taken into the king's service. ' He was the ready instrument in compassing the royal purposes, by the estab¬ lishment of the royal supremacy in spiritual things, humbling the power of the nobles, and thus making the king an absolute monarch. Honors rained upon him. He was knighted and made a privy councillor; in 1533 he was appointed Chancellor of the Exchequer, and 1534 king's secretary and Master of the Rolls. On the abolition of the Pope's supremacy in 1534 he was created king's vicar-general, and used all his influence to promote the reforma¬ tion. In 1535 he was commissioned to hold a general visitation of all the monasteries in England, in order to suppress them. In this office he acted with great severity and injustice. He became lord-keeper of the privy seal and was elevated to the House of Lords with the title of Baron Cromwell of Oakham. In 1539 he became lord high chamberlain, and the following year Earl of Essex. He at length fell into disgrace with the king for the part he took in promoting his marriage with Anne of Cleves. Her person proved disagreeable to

CRONJE

Henry, who fell in love with Catherine Howard, and partly in consequence Cromwell was arrested at the council table on a charge of treason, committed to the Tower, and a bill of attainder — his own favorite, engine of tyranny — was passed against him. After piteous ap¬ peals for mercy, which were disregarded by the king, Cromwell was beheaded on Tower Hill, declaring that he died in the faith of the Catholic Church.

Owing to the rigorous suppression of the monasteries, Cromwell has been called (<Malleus monachorum,55 ((the hammer of the monks.55 The Protestant reformation in England was greatly advanced by him ; the Church of Eng¬ land as a state-controlled institution has con¬ tinued to exist much as he left it. He ordered that a copy of the Bible should be placed in every church, and an edition of the Bible is named after him. One of his enactments, for which posterity owes him gratitude, was that parish registers of marriages, births and deaths should be regularly kept. Cromwell is not with¬ out his apologists — the chief of whom is Froude; his persecutions, which involved men like Sir Thomas More and Bishop Fisher, were undertaken from no religious motive, but like all his measures, from a desire to retain the king's favor as a means to his own aggrandize¬ ment. Consult Drayton, (Historie of the Life and Death of Lord Cromwell) (1609) ; Gairdner, J., (The English Church in the 16th Century) (London 1902) ; Merriman, (Life and Letters of Thomas Cromwell5 (1902).

CRONJE, kron'ye, Pietrus Arnoldus, Boer military commander : b. near Pretoria 1835 ; d. 4 Feb. 1911. He was prominent in all the his¬ tory of the South African republic. Bred to farm life, he entered politics, refused office after the British annexation in 1877, commanded at the siege of Potchefstroom, became a mem¬ ber of the Transvaal executive government, and forced the surrender of Sir John Willoughby's forces after the Jameson raid in 1896. During the great war with England Cronje was ap¬ pointed to the command in the western theatre of war, and laid siege to Kimberley. He op¬ posed the British column under Lord Methuen, on whom he inflicted a severe defeat at Magersfontein. After the relief of Kimberley he was surrounded at Paardeberg in the Orange Free State, and after a stubborn resistance with an inferior force surrendered to Lord Roberts, 27 Feb. 1900. He was sent as a prisoner of war to Saint Helena,

returning to the Transvaal on the conclusion of peace. He visited the United States in 1905.

CRONSTADT. See Kronstadt.

CRONUS, kro'nus, in ancient Greek mythol¬ ogy, a son of Uranus and Ge (Heaven and Earth), and youngest of the Titans. He re¬ ceived the government of the world after Uranus was deprived of it, and was in turn deposed by Zeus. Cronus was considered by the Romans as identical with their Satumus. See Saturn.

CROOK, George, American military offi¬ cer: b. near Dayton, Ohio, 8 Sept. 1828; d. Chicago, Ill , 1 March 1890. He was graduated at West Point in 1852, and rose to the rank of major-general. In the Civil War he greatly distinguished himself at South Mountain, An-

tietam, Chickamauga and Appomattox, and after the war achieved celebrity in campaigns against the Indians as commander of the dis¬ tricts of Idaho and Arizona. From 1888 until his death he commanded the military division of the Missouri.

CROOK, Isaac, American clergyman; b. Crossenville, Ohio, 10 Dec. 1833 ; d. 20 Feb. 1916. In 1859 he was graduated from Ohio Wesleyan University, and, having been ordained in 1864 to the Methodist Episcopal ministry, he held pastorates in Ohio, Illinois, Michigan, Min¬ nesota and Kentucky. He was president of the University of the Pacific in 1891-92 and of Ohio University in 1896-98, and chancellor of Nebraska Wesleyan University in 1892-96. After serving four years as pastor at Ironton, Ohio, he was presiding elder of the Chillicothe district from 1902 to 1908. He published (Character Sketch of Hon. C. C White, of Crete, Nebraska* (1896) ; (Life of Jonathan Edwards) (1903) ; (J°hn Knox, the Scotch and Scotch-Irish* (1905); (Earnest Expectation

(1905); (The Great Five) (1907); and numer¬ ous contributions to newspapers and magazines.

CROOKED ISLAND, one of the Bahamas, in lat. 22° 15' N., long. 74° W. Area about 176 square miles. The chief product is salt. Pop.

1,541.

CROOKED LAKE. See Keuka Lake.

CROOKER, Joseph Henry, American Unitarian clergyman : b. Foxcroft, Me., 8 Dec. 1850. He was graduated at Ypsilanti (Mich.) Union Seminary in 1870, and was a Baptist pastor for five years, when he entered the Unitarian ministry. He has received the following honorary degrees : S.T.D. Saint Lawrence University, 1900; D.D. University of Nashville, 1901. He was very successful as a pastor at Madison, Wis., 1881-91 ; Helena, Mont., 1891-97 ; and Ann Arbor, Mich., 1897 ; Roslindale Unitarian Church, Boston, Mass., 1905-12 ; Redlands, Cal., 1912-13. Called to London in 1903 to preach the anniversary ser¬ mon before the British and Foreign Unitarian Association he gave an address that year at Amsterdam, Holland, before the International Liberal Congress. In 1914 he was called abroad to preach and lecture in London, Cambridge, Oxford and Liverpool. Among his publica¬ tions are Uˆsus Brought Back) (1889) ; (Different New Testament Views of Jesus5 (1890) ; (The New Bible and Its New Uses) (1893) ; Growth of Christianity) (1897) ; (Plea for Sincerity 5 (1898) ; (Problems in American Society5 (1899) ; (The Supremacy of Kindness5 (1899) ; (The Menace to America5 (1900) ; (Religious Freedom in American Education5 (1903) ; (The Supremacy of Jesus5 (1904) ; (The Church of To-day5 (1908) — issued simul¬ taneously by three denominations; <The Church of To-morrow5 (1911) ; 'Shall I Drink?5 (1914).. 'The Unitarian Church5 (1902), has had a circulation of over 100,000 copies ; it was reprinted in Great Britain, and translated into Hungarian, Finnish and Japanese.

CROOKES, Sir William, English physi¬ cist: b. London, 17 June 1832; d. London, 4 April 1919. In 1854 he became superintendent of the meteorological section of the Radcliffe Observa¬ tory, Oxford, and in 1855 professor of chemis¬ try at the Chester Training College. In 1859

he. founded the Chemical News. In 1863 the Royal Society elected him a Fellow, and since then, many scientific bodies have con¬ ferred distinctions on him. He was knighted in 1897, and presided over the 1898 meeting of the British Association at Bristol. Professor Crookes

made his name famous by his im¬ portant researches and inventions in connection with molecular physics, radiant matter and high vacua. One of his earliest works was (Select Methods of Chemical Analysis) (1871). He published valuable works on such widely sep¬ arated subjects as sanitation, spiritualism, beet¬ root-sugar manufacture, dyeing and calico printing, besides translations on chemistry. In 1907 he was awarded the Nobel prize in chemis¬ try jointly with Edouard Buchner of Germany; and in 1910 the Order of Merit was conferred on him.

CROOKES TUBE, a tube containing a gas at very low pressure, such as was used by Sir William Crookes (q.v. ; then not yet knighted) in his researches on electrical dis¬ charges in high vacua about 1875, and such as is nowadays employed in the production of X-rays. In its present form it consists of a glass bulb with a tube for exhausting it, sealed when the vacuum has attained the desired point, one or more concave cathodes, a target of plati¬ num set obliquely at the focus of the cathode or cathodes, a ring-shaped anode between each cathode and its target. See Electron ; Ether ; Molecular Theory; Radiation; X-Rays.

CROOKSTON, Minn., city and county-seat of Polk County, on Red Lake River, and on the Great Northern and Northern Pacific railroads, 300 miles northwest of Saint Paul. Crookston was first settled in 1877 by Colonel Crooks, became a borough in 1880 and a city in 1882. It is a commercial centre of a fertile agricultural region and carries on a large busi¬ ness in lumber, wheat and live stock. It manu¬ factures lumber, farm machinery, gas engines, castings, sashes and doors, leather goods, furni¬ ture, wagons, biscuits, *etc.* It has four banks, with a combined capital of $225,000, and an annual business of $10,000,000. The city has a fine courthouse and municipal buildings, two Roman Catholic and 12 Protestant churches, a fine high school, two large business colleges, a gymnasium and a public library. The city government is administered under a charter which provides for a mayor and a council of 11 members, elected annually. Pop. 7,559.

CROP, a term coming to be widely used, particularly in the oil fields of Oklahoma, as the equivalent of the term outcrop.

CROPS. See Agricultural Chemistry ; Farm Crops ; Irrigation.

CROPSEY, Jasper Francis, American artist: b. Rossville, N. Y., 18 Feb. 1823; d. Hast¬ ings, N. Y., 22 June 1900. At first he studied architecture but he abandoned this in order to study painting, and in 1847 visited Italy. He finally devoted himself to landscape painting,

and his third picture, a view of Greenwood Lake in New Jersey, procured his election as an associate of the American Academy of De¬ sign, of which in 1850 he became a full member. He belonged to the so-called (<Hudson River School® and painted mostly views of local scenery and English views of similar type. In

1847 ill health compelled him to visit Europe, where he spent three years in dose study of his art. Among his most successful produc¬ tions after his return to America were the (Sibyl's Temple y ; (American Harvesting* ; (Peacc) ; (War* ; and (Niagara Falls) (Brook¬ lyn Museum.) Consult Isham, (History of American Painting) (New York 1905).

CROQUET, kro-ka', to the most scientific form of which the name Roque is given in America, an open-air game played with balls, mallets and arches, either upon a closely mowed lawn or a specially prepared court. The game is substantially a revival of the old game of pall mall, which gave its name to the well-known London street. France introduced this game into Ireland and thence into England early in the 17th century, and during the 18th century it was largely neglected, but came again into favor about 1850 and w;as later superseded in popularity by tennis. When first introduced into the United States croquet wras a simple game destitute of all opportunity for skill, but it has so developed that it is now considered by experts to be as scientific as billiards. The court upon which the most improved form of this game is now played has a hard rolled and lightly sanded surface composed of either loam or clay, the nature of this material being deter¬ mined by the character of the native soil upon which the ground is built. The regulation size for the court is 36 feet by 72 feet, the angles of the rectangle being cut off by eight-foot corner pieces. This space is enclosed by heavy timbers 4x6 inches, which are securely spiked together about the ground and which not only serve to confine the balls to the court, but are invaluable in driving the balls to some desired position in another part of the ground, and are of even more value in making carom shots as on a billiard table. A player frequently finds his ball in such a position upon commencing his turn of play that he has noit a straight shot for either ball or his arch, and at such times a carom shot is resorted to to strike or capture one of the wired balls. In order to facilitate carom or bank shots and to ensure as great accuracy as possible, use is made of rubber cushions similar to those used upon billiard tables, fitted to the inside of the border timbers, so that surprising accuracy in making caroms is attained. The balls used upon these courts are made of the finest quality of

vulcanized rubber and are somewhat expensive. These are very carefully made and must conform to a regulation size of three and one-quarter inches. The wickets, 10 in number, are made of three-eighths or seven-sixteenths inch finest steel rod and are arched at the top, so as to leave, when bent, a distance between wires of three and one-half inches in all of the arches except the centre or <(cage,® as it is called, where only three and three-eighths inches is left. It can readily be seen that a ball having a diameter of three and one-quarter inches must be almost directly in front of, and in close proximity to, a wdeket of three and one-half or three and three eighths inches in width in order to suc¬ cessfully pass through. To ensure rigidity and to prevent spreading, the wickets after they are bent are driven into heavy wooden blocks 4 x 8 x 18 inches, across the top of which steel plates, properly drilled to fit the arches, have

been bolted. The blocks are then buried under the ground, so that the arch stands between eight and nine inches above the surface. The stakes, which are located at the starting and turning points in the game, are one and one-half inches high and one inch in diameter. The mallets, which range in price from $5 to $20, are very carefully made, usually to order. Their dimensions and weights vary according to individual taste, but the average sizes are : length of handle, 10 inches; length of head, 7ˆ4 inches ; diameter of head, 2 or 2p* inches. The average weight is about two pounds. The ends or faces of the mallet heads are protected by heavy steel or brass ferules, and the faces themselves are made of either ivory or vulcan¬ ized rubber, in the one end, and soft rubber in the other, the latter being used for making certain shots which are impossible with the hard end.

While the old game croquet was, and, in fact, is still played by any number of persons up to eight, roque as played to-day contemplates the participation of but two players in a game, each of whom uses two balls, playing them as partners against the opposing two of the adver¬ sary. The object of the game is to play by stroke of the mallet through all of the arches, with both balls in order, by any number of turns or plays, and finally putting both partner balls out by making them strike successively the home stake. The player who succeeds in doing this first is the winner. While advancement of one's own balls is of course of primary importance, hardly less important is the ability to retard the progress of one's opponent. This is often done by shooting the next playing ball into or behind an arch, so that upon the opponent's beginning his turn, but little chance for him to advance presents itself.

Croquet tournaments are held at stated in¬ tervals at Wimbledon, England, and attract considerable attention in that country, but al¬ though challenges have been sent to the United States by some of the representative players of England, international matches have never been arranged, owing largely to the difficulty of uni¬ fying certain differences in play. The greatest of these is possibly the fact that the Englishmen play upon grass, while in the United States all championships are contested for upon dirt or clay courts.

The principal clubs of the United States are federated into the National Roque Associa¬ tion of America, which was organized in New York in 1882, under the name of the National American Croquet

Association, which name was subsequently changed to the present one. The headquarters of the association are at Norwich, Conn., where there are first-class courts and a spacious and attractive club-house, in which on the Tuesday following the third Monday in August the association holds its annual meet¬ ings. During the remainder of the week the annual championship contests are held to deter¬ mine the champion for the next year. There are more than two dozen clubs comprising the National Association. The rules for the game will be found in the (Official Roque Guide, > Group xi, No. 271, of Spalding's Athletic Library (New York, annually), and in which a plan of the court is reproduced. See also Lillie, (Croquet Up-to-Date) (New York 1900).

CROSBY, Frances Jane Van Alstyne,

American hymn writer: b. Southeast, N. Y., 24 March 1820; d. Bridgeport, Conn., 12 Feb. 1915. She became blind at the age of six months; entered the New York Institute for the Blind 1839, and was a teacher of English and history there 1847-58, when she married Alexander Van Alstyne, a blind music teacher. She has written more than 3,000 hymns, many of which have become perennially popular, and powerful aids in evangelistic work. Publica¬ tions: (The Blind Girl, and Other Poems* (1844) ; (Monterey, and Other Poems* (1849) ; (A Wreath of Columbia's Flowers* (1858) ; (Bells at Evening, and Other Poems* (1898). Of her hymns perhaps the best known are (Safe in the Arms of Jesus,* and (Jesus the Water of Life Will Give.* Most of the popu¬ lar ones are included in Moody and Sankey's (Gospel Hymns,* and Sankey's (Sacred Songs and Solos.* Among her songs may be men¬ tioned (There's Music in the Air* and (Hazel Dell.* Consult her ˆMemoirs of Eighty Years*

(1906).

CROSBY, Howard, American Presby¬ terian clergyman and scholar: b. New York, 27 Feb. 1826; d. there, 29 March 1891. He was graduated at the University of the City of New York in 1844, and six years later became pro¬ fessor of Greek there and subsequently held the same chair in Rutgers College. In 1863 he was made pastor of the Fourth Avenue Presby¬ terian Church in New York and thereafter was frequently a delegate to the Presbyterian Gen¬ eral Assembly and was once its moderator. He was chancellor of the University of New York

1870-81, and a member of the American committee of revisers of the New Testament. He published (Lands of the Moslem* (1850) ; an edition of the (CEdipus Tyrannus* (1851); (Life of Jesus* (1871); Commentary on the New Testament* (1885); (Bible View of the Jewish Church* (1888) ; <The Seven Churches of Asia* (1890), and other biblical criticisms.

CROSBY, John Schuyler, American soldier: b. Watervliet, Albany County, N. Y., 19 Sept. 1839; d. 1914. He was a lineal descend¬ ant of the Schuylers of the Revolutionary period. He was graduated at New York Uni¬ versity and was appointed second lieutenant of the First Artillery in 1861. He was personal aide-de-camp to Gen. Phil Sheridan for five years during and following the Civil War, and was brevetted several times for gallantry in getting dispatches through to Admiral Farragut and others, retiring from the army in 1871 as colonel. He became adjutant-general of the ex¬ peditions against hostile Indians by Generals Sheridan, Custer and other's, and did much for peace in the disturbed West, representing the government in many conferences with Indians. In 1876 he was awarded a gold medal by Con¬ gress for saving life at sea. He was appointed consul at Florence, Italy, that same year, was territorial governor of Montana 1881-83, and first assistant postmaster-general of the United States 1883-85. He also served as school com¬ missioner of the city of New York.

CROSBY, Peirce, American naval officer: b. near Chester, Pa., 16 Jan. 1823; d. Washing¬ ton, D. C., 15 June 1899. He entered the navy as midshipman in 1838, and during the Mexi¬ can War served on the Decatur and Petrel. In

tne spring and summer of 1861 he served in Chesapeake Bay. The next year he commanded the gunboat Pino la and joining Farragut's Gulf squadron, cooperated with the Itasca in break¬ ing through the chain barrier across the Missis¬ sippi at forts Jackson and Saint Philip; partici pated in the capture of New Orleans, and in the bombardment, passage and repassage of the Vicksburg batteries ; commanded the Metacomet (1864—65), blockading Galveston, Tex., and participated

in the attack on Mobile. After the war he was commandant at various navy yards ; became commodore in 1874, and rear-admiral in 1882. He commanded the south Atlantic station in 1882 and Asiatic station 1883, and was retired at his own request in October 1883.

CROSBY, William Otis, American geol¬ ogist: b. Decatur, Washington County, Ohio, 14 Jan. 1850. He was graduated at the Massa¬ chusetts Institute of Technology in 1876, with the degree of B. Sc., and was a member of its faculty from 1877 to 1907, when he retired. He is consulting geologist of the Metropolitan Water Board of Massachusetts and of the New York board of water supply, and of the United States Reclamation Service. He has made in¬ vestigations in connection with engineering projects in the United States, Mexico, Alaska and Spain. He is chiefly engaged at present in original research, is a Fellow of the American Academy of Arts and Sciences, of the Geological Society of America, the Seismological Society of America; member of the American Institute of Mining Engineers and the Boston Society of Natural History. His publications include Con¬ tributions to the Geology of Eastern Massa¬ chusetts } (1880) ; (Common Minerals and

Rocks) (1881); (Guide to Mineralogy) (1886); (Tables for the Determination of Common Minerals > (1887) ; (Guide to Dynamical Geology and Petrography) (1892) ; (Geology of the

Boston Basin) (1893-94) ; also more than 100 other contributions to geologic literature.

CROSIER, the pastoral staff of a bishop, symbol of his authority over his flock and of his guard over them to save them from ravage by the wolves. It is curved or crooked at the top and pointed at the lower end ; and a medi¬ aeval hexameter verse indicates the significations of the staff, its crook and its sharpened lower end : Curva trahit quos dextra regit, pars ulti¬ ma pungit — the crooked end gathers in (the lambs or sheep) that the right hand with the staff guides, the lowest part pierces — kills the wolf. The bishop of Rome alone of all bishops bears no crosier. Another and earlier form was the ˆtau® or <(T,® giving the shape of a small cross, a symbol of the bishop's authority. The tau often ended in the head of a lion as an emblem of power; the crook often impales a serpent or a dragon, symbol of the triumph oyer evil. Abbots were privileged to carry the crosier as early as the 5th century. The <(pannisel-lum® or silk veil hanging to the staff has long disappeared from those of bishops. Consult Barrand and Martin, (Le baton pastoral } (Paris 1856) ; Lind, (t)ber den Krummstab) (Vienna

1863).

CROSMAN, Henrietta, American actress: b. Wheeling, W. Va., 2 Sept. 1870. In 1897 she was married to Maurice Campbell. She went on the stage in 1889, in Bartley Campbell's (White Slave } Company, she was a member of

Augustin Daly's company in 1890, and in 1892-94 was Charles Frohman's leading woman. Her career as a star began under the management of her husband, Maurice Campbell, in Bronson Howard's (One of Our Girls) ; and on 9 Oct. 1900 she produced Hazleton's (Mistress NelP at the New York Bijou Theatre, where it ran for over 100 performances. She appeared as Rosalind in (As You Like It) in 1902, which ran for eight weeks at the Republic Theatre, New York. After this she appeared in many popular successes, including (The Sword of the King) (1902) ; (Sweet Kitty Bellairs)

(1903); (AlL-of-a-Sudden Peggy> (1906-07); <Sham) (1909) ; <Anti-Matrimony) (1910) ; <The Real Thing) (1912).

CROSS, Charles Robert, American physi¬ cist: b. Troy, N. Y., 29 March 1848. He was graduated at the Massachusetts Institute of Technology 1870, became an instructor in its physical department, from 1876 Thayer pro¬ fessor of physics, and from 1877 director of the Rogers laboratory. In 1882, at his in¬ stance, the institute established the first course leading to a degree in electrical engineering in this country and one of the first in the world, of vhich he was in charge for 20 years. Most of his scientific papers have been published in the Proceedings of the American Academy of Arts and Sciences. He is the author of the textbooks (Course in Elementary Physics) (1873) ; and (Lecture Notes on Mechanics and Optics) (1884) ; (Notes on Mechanics* (1911).

CROSS, (Charles) Whitman, American geologist : b. Amherst, Mass., 1 Sept. 1854. He was educated at Amherst College and at the University of Leipzig. In the United States Geological Survey he was assistant geologist in 1880-88, geologist after 1888, and chief of the section on petrology in 1903-06. In 1911 he became treasurer of the National Academy of Sciences. He is author, with three others, of the important Quantitative Classification of Igneous Rocks } (1903), a new system with new nomenclature. He also prepared a number of geological

survey bulletins and in 1902 pub¬ lished (The Development of Systematic Petrog¬ raphy in the Nineteenth Century.) He is a member of the Geological Society of America.

CROSS, Mrs. George Frederick, Aus¬ tralian novelist. See Cambridge, Ada.

CROSS, Mary Ann Evans. See Eliot, George.

CROSS, Wilbur Lucius, American educator : b. Mansfield, Conn., 10 April 1862. He was graduated at Yale 1885; was instructor in English in the Sheffield Scientific School 1894—97; and has been professor there from 1897. He has published development of the English NoveP (1899), and Life and Times of Laurence Sterne) (1909), besides an edition of Sterne's works (1904), and editions of (Mac¬ beth) (1900), (Silas MarneU (1903), Stephen¬ son's (Travels with a Donkey) (1909), and (Robinson Crusoe) (1911). Since 1911, he has been editor of The Yale Review, which under his editorship at once took a high place among contemporary periodicals. He is also a con¬ tributor of literary criticisms to various maga¬ zines.

CROSS, a common instrument of capital punishment among the ancients ; esteemed so

dishonorable that only slaves and malefactors of the lowest class were subjected to it by the Romans. It was customary to proclaim the name and offense of the person crucified, or to affix a tablet {album) to the cross on which they were inscribed. Malefactors were some¬ times fastened on a simple upright stake, and so left to die, or they were impaled upon it, but very generally a cross-piece was added to the stake, to which the arms of the criminal were tied, or to which his hands were nailed. The cross was erected outside the gates of towns, but in places of frequent resort. The person crucified often lived for days upon the cross. The death of Christ by crucifixion led Chris¬ tians to regard the cross with peculiar feelings of reverence. From the early days of the Church it was a usual emblem of Christian faith and

hope, and the first Christians were wont to show great respect to its representations, with Saint Paul ((glorying in the cross of our Lord Jesus Christ.® The gestural sign of the cross was in general use among them, so that in the 2d century Tertullian writes: <(At every step and movement, when we go in or out, when we dress or put on our shoes, at the bath, at the table, when the lights are brought, when we go to bed, when we sit down, whatever it is that occupies us, we mark the forehead with the sign of the cross.® He tells us that the Chris¬ tians were reproached with worshipping the cross. In the Catholic Church blessings and benedictions are always accompanied with the sign of the cross. The Church has an annual festival commemorative of the finding by Saint Helena, mother of Constantine, of the cross upon which Christ died. Another festival is that of the Exaltation of the Cross, to com¬ memorate a miraculous appearance of a cross in the heavens in 317 at the moment when Con¬ stantine was ordering his army for an attack on that of his rival, the Emperor Maxentius. On Good Friday is practised the usage of the <(Adoration of the Cross,® when the faithful humbly and reverently by kissing the crucifix express their devotion and gratitude to the author of their redemption. In church pro¬ cessions the cross or the crucifix is always borne in the forefront, its bearer, the crucifer, having on his right and left an acolyte bearing a lighted torch or candles. See Crosses and Crucifixes and consult the authorities there re¬ ferred to.

CROSS, The Southern. See Orders, Royal, and Decorations of Honor — Brazil.

CROSS, Victoria. See Victoria Cross.

CROSS-EXAMINATION, the questioning of a witness by the party or the counsel of the party against whom he has been called to testify. The object is to test the correctness of the testi¬ mony given. For this reason, the inquiry is limited to matters drawn out on the direct examination of witnesses. Leading questions are permitted in cross, but not in direct, exam¬ ination. The questions asked in cross-examina¬ tion must be confined to material and relevant matters, but the determination as to the rele¬ vancy rests with the court. The right of this form of examination should be exercised im¬ mediately after the principal examination, but in some cases it is allowed later. (See Evidence; Due Process of Law). Consult Wellman, <Art of Cross-Examination (New York 1910).

CROSS-FERTILIZATION is a term used mainly by .botanists and

horticulturists and, in a strict sense, applies to the fertilization of the ovules of one seedling plant by pollen from another seedling plant. In a rather loose way, it is sometimes used to refer to the cross¬ pollination of a flower with pollen from a dif¬ ferent flower on the same plant, but its use in this sense is erroneous, as the act of cross¬ pollination in this case does not give cross-fer¬ tilization, or cross-fecundation. ((Cross-fer- tilization® as used by Darwin in his classical work on this subject, to quote his words, ((always means a cross between distinct plants which were raised from seed and not from cuttings or bulbs.® Plants raised from cuttings or bulbs may possibly have been derived from the same seedling, and flowers fecundated with pollen from different plants thus derived would not be cross-fertilized.

In animals and man cross-fertilization means the crossing of different races or miscegenation in opposition to inbreeding. Here close or self-fertilization, such as occurs commonly in plants, is impossible in most higher animals, as in general only the lower animals are herma¬ phrodite, having both male and female organs, while this phenomenon is common in plants. In animals and man, therefore, cross-fertiliza¬ tion has a somewhat different meaning than when used in reference to plants. In plants, however, as in animals, if individuals of dif¬ ferent races or species are bred together, they are said to be cross-fertilized, in contradistinc¬ tion to self-fertilized.

cross-fertilization in plants.

Methods by Which Cross-Fertilization is Accomplished. — While a knowledge of the sex distinction of animals dates from the dawn of human history, the sexuality of plants remained unknown until about two centuries ago. Experi¬ mental proof of the sexuality of plants was published for the first time by Camerarius in 1691, and only after this discovery was the function of pollen known and its necessity in seed formation recognized. The first recorded hybrid was made by Thomas Fairchild about 1711, and very careful studies of plant hybrids were published by Koelreuter in 1760. With all this accumulating knowledge of the sexuality and crossing of plants, it is surprising that the true meaning and significance of the flower and its various adaptations to secure cross-fertiliza¬ tion was not perceived until Christian Conrad Sprengel completed his researches and in 1793 published his now classical work entitled, (The Secret of Nature Discovered in the Form and Fertilization of Flowers.* Sprengel discovered the principal facts connected with the cross¬ pollination of flowers by insects. He recognizes the true significance of honey and of bright-colored flowers, that they were but means to attract insects to

the flowers and that the in¬ sects carried pollen from one plant to another and aided in securing cross-fertilization. He, however, failed to recognize that the plant derived any benefit from the cross-fertilization. It was left for Charles Darwin, the great English naturalist, to point out that certain species of flowers are entirely dependent for fertilization on the transfer of the pollen from one plant to another and that self-fertilization is in the majority of cases actually injurious,

resulting in loss of vigor in the progeny. The transfer of pollen in cross-fertilized plants is generally accomplished through the agency of the wind, water, insects or birds, and the various devices that have been adopted by the plant to secure crossing form an interesting and inexhaustible field for study and observa¬ tion.

Wind-fertilized or anemophilous, flowers are those so modified as to depend upon the wind to secure cross-fertilization by carrying the pollen of one plant to the stigmas of another. Anemophilous plants are characterized by having dry and powdery pollen, which is very abun¬ dant and light and easily carried by the wind. In most cases also the pistils are large and feathery, with large, sticky stigmas, presenting an abundant surface to catch the pollen floating in the air. In wind-fertilized plants there is a great opportunity for loss of pollen and it thus becomes necessary that an abundant supply should be formed. The various pine-trees, of which there are large forests in some parts of America, are wind-fertilized and form enor¬ mous masses of pollen. In this case, the pollen grains are provided with two lateral wing-like extensions which are supposed to be of service in making the pollen lighter and easier to blow about. Several instances are recorded where the decks of vessels at sea have been covered by a rain of pollen which, in some cases, must have been carried a distance of some 400 miles. Corn, or maize, forms a familiar example of a wind-fertilized plant. The pollen is produced in great abundance in the stamens of the tassel, which forms the upper part of the stalk. When the pollen is mature the stamens protrude from the flower and the slightest jarring

of the plant by the wind causes the pollen to fall in a cloud, and as the plants are grown near to¬ gether, some grains are almost certain to lodge on the pistils, or silks, of the ear of another plant. The silks are long and are covered with numerous stigmatic hairs so that the opportunity for plants to catch floating pollen and be cross-fertilized, in an ordinary field where numerous plants are grown, is very great. Experiments prove that cross-pollination is so universal that it is very difficult to keep varieties of corn pure. If different varieties are grown near each other cross-fertilization is cer¬ tain to occur and impure seed results. Vilmorin found by careful experiments that plants of different varieties have to be separated by at least 1,000 feet to prevent cross-fertilization, and this distance is by no means sufficient if strong winds blow over one field of corn in such a direction as to carry the pollen from it toward another field of corn. Nevertheless it is well known that a number of plants must be planted near together to ensure thorough pollination. Plants standing alone at a distance from other corn plants seldom produce well-filled ears. The flowers of wind-fertilized plants are usually green, or greenish, inconspicuous, and have no odor or nectar. The flowers are ordinarily regular in form and they frequently appear be¬ fore the leaves, though this is by no means universal.

Water-fertilized, or hydrophilous, plants, are those in which the pollen is transferred through the agency of water, and are not very common. Following Delphino, they may be divided into two types : the first type includes Zostera, Posi-

donia, etc., and the Floridece, where the pollen is of the same specific gravity as water, and is carried here and there by water currents; the second type includes such plants as Ruppia and V allisneria, in which the pollen is lighter than water, or is borne on a floating raft formed by the loosened flower. The peduncles of the fe¬ male flowers elongate and bring them to the surface of the water where their position allows the stigma to be pollinated by the floating pollen.

By far the greatest number of plants that require cross-fertilization depend upon insects as pollen carriers, and these plants have been termed entomophilous. Such plants are character¬ ized by the large size, showy colors and mark¬ ings of their flowers and their odor, which serve to advertise the nectar and nourishing pollen that the flower contains and thus attract insects to the flower. The insects in passing from flower to flower in search of nectar and pollen become useful to the plant by incidentally trans¬ ferring pollen from one

flower to the stigmas of other flowers, thus causing cross-fertilization. Flowers have in many cases become adapted to certain insects and have stamens and pistils de¬ veloped in the position best suited to ensure pollination when these insects visit the flowers for nectar or pollen. Many insects depend wholly, or in large part, on the nectar and pollen of flowers as food, and such insects usually visit only one kind of flower during the day and therefore carry but one kind of pollen. They work systematically, passing from one flower to another, and clearly do an enormous amount of crossing and waste less pollen than the wdnd or water. Some insects, like certain beetles, have smooth bodies and carry but little pollen, but many beetles, and all bees, moths, butter¬ flies, etc., have their bodies, wings and limbs roughened with hairs and scales, and these col¬ lect and retain a large quantity of pollen ready to be left on the sticky stigmatic surface of the pistil of the flower when the insect rubs against it. The nectar glands of the flower are usually located in such a position that the insect in get¬ ting to them to suck the nectar must enter the flower in the best wray to ensure cross-pollina¬ tion. Insects are greatly attracted by odors, and the flowers of many plants have a strong scent which serves to make them more attractive. The evening primrose (CEnot'hera) , which opens early in the evening and is fertilized by night-fljflng moths, has a very strong odor, and the same is true of many night-fertilized flowers, such as the honeysuckle (Lonicerci caprifolium) , night-blooming Cereus, *etc.* Night-blooming flowers which are fertilized by insects are usu¬ ally white and generally more sweet-scented than day-blooming flowers. Some flowers, such as the Stapelias, are purplish or brownish, re¬ semble deca)'ed flesh in appearance and are car¬ rion-scented to attract carrion flies. Certain in¬ sects are attracted by certain colors more than others. The favorite color of the honey-bee, for instance, is said to be deep bluish-violet, while pure blue and violet are pleasine. Yellow is less sought, but is not avoided, while red is dis¬ liked and shunned. Kerner states that in the Vienna Botanical Gardens . the honey-bees in great numbers visit the bluish-violet flowers of Monarda fistulosa , and the blue flowers of the hyssop (Hysopus officinalis), but avoid the scar¬ let flowers of the Monarda didyma. Experi¬ ments, however, tend to show that color

does not necessarily attract insects ; flowers rich in nectar are the most attractive. In some plants the involucre is highly colored and takes the place of the colored parts of the flower. Such is the case in some Euphorbias such as snow-on-the-mountain, which is nearly white, and the poinsefcta (E . pulcherrima) , in which the involucre is red. In a large number of cases the petals of large flowered species show spots or lines on the main part of the flower of different color from the main ground color of the petals. These are usually known as nectar guides and are believed to be of serv¬ ice in aiding insects to find the nectar.

One of the most interesting and instructive modifications to secure cross-fertilization is the formation on different plants of flowers with different lengths of stamens and styles. Sprengel noted that some plants in Hottonia bear only flowers whose anthers are included in the tube, but whose style is exserted ; while other plants bear only flowers having short styles and long stamens, longer than the flowing tube. He was, however, unable to suggest any reason for such variations. Some plants, such as Lythrum, reg¬ ularly show these different lengths of stamen and style. Darwin subjected the peculiar sexual relations of these plants which he called di¬ morphic and trimorphic, to most careful and extensive research, crossing the different forms back and forth in various ways. The results of these researches are summarized below.

In dimorphic plants, such as Primula and Linum , two forms exist in about equal number and usually growing together. In one form the plants have flowers with a long style extending considerably beyond the short stamens, while in the other form, the position is reversed, the style being short and the stamens long. In the long-styled form the stigma is rough and fur¬ nished with long papillae, and the pollen grains are small, while in the short-styled form the pa¬ pillae oi the stigma are short and the pollen grains are larger (Fig. 3). In the trimorphic hetero-stvled plants of Lythrum salicaria three lengths of styles are formed, long-styled, mid-styled and short-styled (Fig. 1). In each form the stamens exist in groups of two lengths corre¬ sponding to the two other lengths in which the styles occur in other plants. The longest sta¬ mens produce the largest pollen grains, the short¬ est stamens produce the smallest grains. When insects visit the dimorphic and trimorphic flowers, their organs become dusted with the pollen at certain heights. When they later visit other plants with other lengths of styles, this pollen will be at the exact position and height to best cause cross-fertilization. In such cross¬ ing a pistil always receives

pollen from stamens of corresponding heights and the size of the pollen grain is thus proportional to the length of the style which its tube must traverse. Such crossing Darwin called legitimate. When a pis¬ til of a dimorphic or trimorphic flower is crossed with pollen from stamens of different heights he termed it illegitimate fertilization. By very careful experiments Darwin found that only seeds produced as a ’result of legitimate crossing give completely normal and fertile plants. Illegitimate crossing leads to the produc¬ tion of progeny with all degrees of diminished sterility or even complete barrenness and give offspring which have all the characters of hy¬ brids produced by the union of different species.

Aside from the classes above mentioned a few plants are specially adapted to cross-ferti¬ lization by small birds and snails, but such plants are few in number and their modifications are similar to those adopted by plants which are fer¬ tilized by insects.

Fig. 1. — Trimorphic flower of Lythrum salicaria L; a, long-styled flower; b, mid-styled flower; c, short-styled

flower; with one-third of calyx, corolla, and stamens

removed in each case. (After Muller.)

Prepotent Pollen. — The great majority of plants that have devices to secure cross-pollina¬ tion also have some modification that ensures self-fertilization. This in a way would seem to have been developed as a safeguard to ensure seed development should cross-pollination fail to take place. In most cases the self-pollination takes place before or about the same time as the cross-pollination, and it would seem that in such cases where the plants are not self-sterile that a large majority of self-sterilized seeds would be formed. However, it has been found in many cases that the pollen of a different plant of the same race or species or in some cases of a different race will be prepotent over the plant’s own pollen. In one instance, Darwin selected two flowers which had only recently opened on a plant of a variety of cabbage known as ((Ragged Jack,® and abundantly polli¬ nated them with pollen from the same plant. After an interval of two or three hours pollen of a different variety, known as (<Early Barnes,® was dusted on the stigmas of the same flowers. Under the circumstances it would seem that little effect could be expected from the pollen of the Barnes

cabbage, yet three out of the 15 plants raised from the seed formed by the above two flowers showed plainly that they were hybrids.

A similar experiment was carried out by the writer with cotton. A bud of Sea-Island cotton (Gossypium barbadense) was covered with a manila paper bag before it had opened. Early in the morning, when the flowers of cotton nor¬ mally open and are pollinated, the bag was re¬ moved and the stigma abundantly dusted with pollen from the same flower, after which the bag was replaced. Cotton is abundantly self-fertilized, about 5 to 15 per cent of the flowers being normally cross-fertilized under the most favorable circumstances, so that this capsule should have set the normal number of seeds without further pollination. After four hours the bag was removed and the same stigma dusted with pollen of upland cotton (G . herbaceum), which belongs to a different but nearly related species. The seed of this Sea-Island cap¬ sule gave five plants, of which three were clearly hybrids.

The prepotency of pollen can be easily ob¬ served where different / races or varieties are concerned, but in cases where the pollen of a different plant of the same race or species is prepotent over the plant's own pollen, as is not infrequently the case, the fact is not so easy to prove. Darwin demonstrated prepotency in a number of cases of this kind, using as his guide the superiority of seedlings raised from cross-fertilized seed to those resulting from self-fer¬ tilization, which after a few experiments can be used as a fairly safe index.

Generation. ten Generations.

Fig. 2. — Diagram showing the mean heights of cross-and self-fertilized plants of Ipomcea purpurea in ten genera¬ tions, the mean height of the crossed plants being taken as 100; on the right hand are shown the mean heights of the cross-and self-fertilized plants of the ten genera¬ tions taken together. (After Darwin.)

Benefits of Cross-fertilization. — The bene¬ fit derived from cross-fertilization in the case of plants was first clearly brought forward through the classical treatise of Charles Dar¬ win on <(thc Effects of Cross-and Self-ferti¬ lization in the Vegetable Kingdom. ® Sprengel at times apparently foresaw this law, but he seems never to have grasped its full signifcance. In one place he states (Cit appears that nature has not willed that one flower should be fertilized by its own pollen,® yet he failed to realize that this carrying of pollen from one flower to an¬ other was of any service to the plants them¬ selves. Knight, Koelreuter and Herbert plainly had the main features of this law in mind, but did not recognize it as of sufficient importance to give it special attention. Darwin carried on extensive experiments to demonstrate the effect of cross-and self-fertilization in various plants and his conclusions are generally accepted to-day. His general plan of experimenting was to grow cross-and self-fertilized seed of the same plant in the same pot on opposite sides, with a parti¬ tion between them. They were carefully watched and as often as one on each side germinated at the same time they were transplanted to an¬ other pot and again placed on opposite sides of a superficial partition.

The increased vigor and productiveness due to cross-fertilization may be illustrated by Dar¬

win's experiments with morning-glory (Ipo-nuza purpurea. The experiments were carried to the tenth generation and in each generation the height of the cross-fertilized plants greatly exceeded that of the self-fertilized plants (Fig. 2). The ratios between the average heights of cross-and self-fertilized plants in the different generations were as follows :

1st generation, as 100 to 76.

2nd generation, as 100 to 79.

3rd generation, as 100 to 68.

4th generation, as 100 to 86.

5th generation, as 100 to 75.

6th generation, as 100 to 72.

7th generation, as 100 to 81.

8th generation, as 100 to 85.

9th generation, as 100 to 79.

10th generation, as 100 to 54.

The average ratio of height during the 10 generations was 100 to 77. The same vigor and superiority of the cross-fertilized plants was also shown in all other features, such as the number of capsules and seed, constitutional vigor, etc., in fully as marked a proportion as was shown in increased height. Similar superiority of cross-fertilized over self-fertilized plants has been demonstrated to occur in Mimulus, Digi¬ talis, V erbascum, Papaver, and many other plants, and the rule may be considered a fairly general one. However, the evidence available at present does not tell nearly so much in favor of the advantages of cross-fertilization as did that of Darwin's time.

Darwin's experiment with the common gar¬ den pea, however, form an exception of some interest. Here the average height of the cross-fertilized plants was 34.62 inches and that of the self-fertilized plants 39.68 inches, or in the pro¬ portion of 100 to 115. The pea, however, is a plant that is normally self-fertilized, crossing rarely occurring. The plant has therefore be¬ come adapted to self-fertilization, and does not lose vigor as a result. The lack of vigor shown by the cross-fertilized progeny would indicate that such plants which are normally self-ferti¬ lized may have assumed this habit through some benefit derived from the self-fertilization and would thus be injured as a result of crossing. Wheat, barley and oats, among the cereals, are almost wholly self-fertilized, crossing very sel¬ dom occurring. As a result of experiments con¬ ducted by Professor Hays, of the Minnesota Agricultural Experiment Station, it has been shown that the artificial crossing in wheat of individuals of the same race, or of different races, almost invariably results in decreased fer¬ tility as a whole, although as a result of crossing distinct races, certain individuals with increased fertility can be selected.

It has been said by Nsegeli that <(the conse¬ quences of fertilization reach their optimum when a certain mean difference in the origin of the sexual cells is attained® ; and by Fritz Muller, that (<every plant requires, for the pro¬ duction of the strongest possible and most pro¬ lific progeny, a certain amount of difference between the male and female elements which unite. Fertility is diminished as well when this degree is too low (in relatives too closely re¬ lated) as when it is too high (in those too little related).® Darwin says; (<The offspring from the union of distinct individuals, especially if

their progenitors have been subjected to very different conditions, have an immense advan¬ tage in height, weight, constitutional vigor, and fertility over the self-fertilized offspring from one of the same parents.®

Attention has been called by Willis to three factors in the gain resulting from cross-fertiliza¬ tion, namely, a, fertility of mother plant ; b, vigor of offspring; and c, fertility of offspring. The relative value of these factors varies with different plants. In the carnation, for instance, factor a of cross-fertilized plants was 9 per cent greater than in self-fertilized plants, b was 16 per cent greater, and c was 54 per cent greater; in tobacco, factor a was 33 per cent less than in self-fertilized plants, but factor b was 28 per cent greater, and factor c 3 per cent greater. Even when the fertility of the mother-plant is greatly reduced by hybridizing with a distinct species and the hybrids them¬ selves are sterile or very unfertile they never¬ theless often show extraordinary vigor, that is,

with corn and practically the same results ob¬ tained. McCluer states that : <(The corn grown from the crossed seed was in nearly all cases clearly increased in size as a result of crossing,® and that ((nearly all the corn grown a second year from the crosses is smaller than that grown the first year, though most of it is yet larger than the average size of the parent varieties.®

In maize, the loss of vigor caused by close inbreeding was found in experiments conducted by the writer, in conjunction with Mr. C. P. Hartley, to be very marked. Seeds of Hickory King, a race grown commonly in the Eastern States, produced by inbreeding with pollen of the same stalk, yielded the next year at the rate per 100 stalks of 46 ears, weighing 9 Vj, pounds. Seeds of the same race, in every way compara¬ ble, but produced by crossing different seedlings, yielded under the same conditions at the rate per 100 stalks of 82 ears, weighing 27ˆ4 pounds. In attempting to fix hybrids of Hickory King

Pig. 3. — Primula elation ; a-e, long-styled flower; f-j, short-styled flower; b and g, pollen grains dry; e and h, pollen

grains moist; d and i, stigmas; e and j, stigmatic papillae. (After Muller).

b is often greater in hybrids than in pure-bred plants, but factors a and c show usually less.

In plant breeding the importance of the in¬ creased vigor resulting from cross-fertilization is very great. In cases where there is no par¬ ticular object in keeping the varieties pure, a marked increase in yield may be obtained by using crossed seed. The practical value of this fact is indicated by results obtained at the Illi¬ nois Experiment Station by Morrow and Gard¬ ner in crossing various races of corn. Of 15 cross-bred corns tested, 12 gave a decided in¬ crease in yield over that of the parent sorts, ranging from 2 to 86 per cent in individual cases. In three cases a decrease in yield of from 8 to 20 per cent resulted. In the 15 cases taken together an average increase in yield of about 16 per cent was secured. In some cases the cross-bred corns were grown to the second generation without crossing and showed a decidedly larger yield than the parent varieties. A number of crossing experiments of a similar nature had previously been made by McCluer

crossed with Cuzco or Peruvian corn, some ears were inbred with pollen from the stalks bear¬ ing them, while others were pollinated from other hybrid seedlings of the same parentage. The hybrids of the second generation, where the seed was inbred with pollen from the same stalk, showed great loss of vigor, being small in stature and almost totally sterile ; while those produced from seed which was inbred with pollen from a different seedling were much more vigorous and productive, seeming to have lost but little by this process of inbreeding. In the majority of cases crossing distinct sorts improves the vigor and results in greatly in¬ creased yield. By selecting varieties which have increased yields uniformly when crossed and crossing these for seed corn, it seems cer¬ tain that the average yield can be greatly in¬ creased. Securing seed corn from a cross of any two races desired is not a difficult or ex¬ pensive process, being easily accomplished bv planting the two desired sorts in alternate rows and

removing the tassels, as soon as thev ap-CROSS-FERTILIZATION IN ANIMALS AND MAN

pear, from the one to be used as the female parent. The ears that form on the rows from which the tassels have been removed will have been crossed with pollen from the variety from which the tassels have not been removed. The seed corn should therefore be selected from the ears produced on the detasseled rows. The field planted to the two varieties, as above de¬ scribed, to secure crossed seed should be some¬ what isolated from other cornfields, and should be of sufficient size to produce the necessary quantity of seed. The only extra expense in¬ curred in producing seed corn in this way is the cost of detasseling the alternate rows, as ears will form on both as usual.

Shull, East, Emerson and others have more recently demonstrated this same principle and the effect produced in crossing diverse types has been related to the fact that the crosses possess a larger number of favorable growth factors.

The increased vigor and fruitfulness which almost invariably result from crossing closely related sorts of varieties is a principle of the utmost importance in our common agricultural practices, for there is a great need for more vigorous forage plants, timber and shade trees, vegetables, etc., and more prolific grains and fruits.

Self-sterile Plants. — • Some plants have be¬ come so completely modified for cross-fertiliza¬ tion that they are sterile to their own pollen and will not set seed unless cross-fertilized. Of our wild plants this has been found to be the case in a number of instances. Koelreuter and Gartner long ago found that some plants, namely, V erbascum phccniccum, V. nigrum and Lobelia fulgens, under certain conditions were sterile to their own pollen, but would set seed abundantly when crossed with pollen of other species. Fritz Muller proved by careful-experi¬ ment that Eschscholtzia calif ornica, Abutilon Darvuinii and a species of begonia were sterile to their own pollen, whether fertilized with pol¬ len from the same flower or from different flowers on the same plant, but were perfectly fertile when cross-pollinated with pollen from other plants. Darwin found that these plants in England were also largely self-sterile, but that under certain conditions the

degree of fertility with their own pollen could be greatly increased. The same phenomenon of self¬ sterility and necessity for cross-pollination is shown by some of our important cultivated plants. Mr. M. B. Waite has demonstrated that many of the varieties of pears, such as Bartlett, Anjou, etc., are largely self-sterile, producing few or no fruits when pollinated only with pollen of the same variety. In the case of varieties of pears and fruits of this kind that are propagated altogether by budding, as is well known, all of the various trees of the variety that exist are simply parts of the same in¬ dividual, so that pollinating flowers on one Bartlett pear-tree with pollen from another Bartlett pear-tree is in effect the same as pol¬ linating one flower on a plant with pollen from a different flower on the same plant and is what we recognize as self-fertilization. Mr. Waite and others have shown that when such sterile varieties are pollinated from a different horti¬ cultural variety, which in reality is simply a different individual of the same species, they

are rendered perfectly fertile. This discovery has proved of great practical value, as many pear orchards were planted with trees of a single variety like the Bartlett and were found for some unknown cause to be very unfruitful. Waite's discovery showed the true cause of this lack of fruitfulness and at the same time pointed out the natural and simple remedy of cross-fertilization. All that remained to be done in such barren orchards was to bud some of the trees over with buds of varieties which had by experiment been found to produce a good percentage of fertility in crossing on the variety concerned. Since Waite's discovery of the reason for the barrenness of certain varieties of pears many experiments have been conducted by different investigators. It is now known as a result of experiments by Waite, Waugh, Beach and others that many varieties of plum and apple are largely sterile and require cross¬ pollination for complete fruitfulness.

The pineapple, also, as shown by the writer's studies is an interesting example of a self-sterile plant. Ordinarily the pineapple is wholly seedless, yet the flowers are so arranged that they are abundantly fertilized with their own pollen. The self-sterility is so perfect that even under these circumstances seeds set so rarely that few growers and consumers have ever seen seeds. In experiments in crossing various varieties it was found that when certain varieties were crossed seeds were formed in abundance, showing that cross-fertilization is necessary to ensure the development of perfect seeds. The explanation for the setting of such few seeds in cultivation normally is probably to be found in the fact that the proper insect pollinators are not present,

and the flowers are therefore not cross-fertilized. See Fertili¬ zation in Plants ; Fertilization in Flowers.

Bibliography. — Allen, Grant, (On the Colors of Flowers) (London 1882) ; Bailey, L. H., (Plant Breeding* (New York 1895) ; Church, A. H., (Floral Mechanisms (Oxford 1908) ; Darwin, (Various Contrivances by which Orchids are Fertilized by Insects) (London 1877) ; (Effect of Cross and Self-fertilization in the Vegetable Kingdom* (London 1878) ; dif¬ ferent Forms of Flowers on Plants of the Same Species) (London 1880) ; (The Variation of Animals and Plants under Domestication) (London 1892) ; Henslow, (Origin of Floral Structures* (1893) ; Knuth, P., (Handbook of Flower Pollination) (tr. by J. R. A. Davis, Oxford 1906-09) ; Lubbock, (British Wild Flowers Considered in Relation to Insects) (London 1882) ; Miles, (Stock Breeding> (1888) ; Muller, (The Fertilization of Flowers* (London 1883) ; Swingle and Webber, (Hybrids and Their Utilization in Plant Breeding) (Year¬ book U. S. Department of Agriculture, Wash¬ ington 1897) ; Waite, (The Pollination of Pear Flowers) (Bull. 5 Div. Veg. Pathology, U. S. Department of Agriculture, Washington 1895) ; and Wallace, (Darwinism * (London 1889).

Herbert J. Webber,

Dean of the Graduate School of Tropical Agri¬ culture, and Director of the Citrus. Experi¬ ment Station, University of California.

CROSS-FERTILIZATION IN ANI¬ MALS AND IN MAN. In animals and man, cross-fertilization means the crossing of in¬ dividuals of different races or breeds in con-

tradistinction to in-and-inbreeding which is generally regarded as leading to evil results. Inbreeding, interbreeding or close breeding, which means the breeding together of closely related animals at rather distant or long in¬ tervals, seldom or never results in evil effect. It is the continuous in-and-inbreeding of closely related individuals, generation after genera¬ tion, without ‘intermission, that is believed

by some to result in delicacy of constitution, pre¬ disposition to disease, lack of fecundity, *etc.* It must be admitted that breeders who have used in-and-inbreeding the most have done so as a means to an end, and not because they believe pri¬ marily in any beneficial result of in-and-in¬ breeding in itself. This is the surest and best way to render a character prepotent — i.e., to isolate pure Mendelian characteristics. (See Heredity). It is used, therefore, as a means of strengthening the transmitting power or prepotency of a character, which otherwise in most instances would be lost. Miles states that (<From a careful examination of the pedigrees … that may be found in the herd-books and breeding-registers, representing the practice of breeders of acknowledged reputation, it will be found that in-and-inbreeding has only been re¬ sorted to in the case of some favorite animal or animals that were superior in certain respects to the average members of the herd or family which they represent, and the object has evi¬ dently been to secure in the offspring a pre¬ dominance of their most highly valued char¬ acters.® In most instances the older original character is more strongly hereditary, and it is only by in-and-inbreeding that a new character can be rendered stable and prepotent and pre¬ vented from being swamped and lost. In regard to the belief that in-and-inbreeding leads to sterility and predisposition to disease, a careful consideration of the evidence at command leaves the student in doubt as to the conclusion to be drawn. The facts seem to indicate that close breeding or in-and-inbreeding may be very detrimental in some cases, as it tends to per¬ petuate any constitutional defects that may have been produced by other agencies; therefore the best animals, free from constitutional weakness or disease should be selected as mates. When used judiciously, in-and-inbreeding forms an important means of securing improvements and is the only known means of fixing and render¬ ing slight variations hereditary.

The majority of our various breeds of cattle have been brought up and improved as a result of very close inbreeding. As an illustration, the famous shorthorn bull, Favorite, was bred to his daughter, granddaughter and great-grand¬ daughter, and the product of the last union was matched with the bull Wellington, having 62.5 per cent of the blood of Favorite. Clarissa, the offspring of the last union, was bred with the bull Lancaster, having 68.75 per cent of the blood of Favorite and gave very valuable off¬ spring. The majority of our best breeds of animals have been very closely in-and-inbred without noticeable deterioration in any direc¬ tion except possibly in fecundity. Darwin says that ((Although by careful selection of the best animals, close interbreeding may be long carried on with cattle, yet the good effects of a cross between almost any two breeds is at once

shown by the greater size and vigor of the

offspring; and authorities agree that Crossing distinct breeds certainly improves cattle for the butcher.) ®

In the case of man, where families have in¬ terbred very closely, as has sometimes occurred, there is said to be a great gain in vigor as a result of intermarriage with a distinctly differ¬ ent family, a fact long recognized and acted upon in the seeking of American heiresses in marriage by scions of ancient European families of distinction. The hardihood and general vigor of the Americans as a nation is commonly attrib¬ uted to the great intermixture of peoples of many different nationalities; and the whole human race, apparently from the beginning has acted on this principle by the almost universal practice of exogamy. This is the rule, held all but sacred among savages everywhere, that a man or woman must not marry one of his or her own group (clan, gens or phratry) but must intermarry with an individual of some other of the minor divisions of the tribe. The theory is that all members of each such minor divisions are children of the same (ancestral) mother. The world-wide prohibition of, and repulsion against, marriage within certain degrees of consanguinity, minister to the same end. Inter¬ racial marriage, or miscegenation, the marriage of individuals of distinct races, as a whole, results very disastrously both as to physical and mental characteristics. The result of such a union is a hybrid, frequently sterile, mainly intermediate in characters between the two races, and usually in large measure a social outcast. Such half-breeds or hybrids are in general inferior to the pure parental races, par¬ ticularly in physical vigor, though mentally they may be equal or possibly superior. In crosses, for instance, of the negro and white races, the offspring commonly' show a tendency toward sterility and are in general weak in constitution.

In conclusion it may be stated that injury re¬ sults on the one hand from too close inbreed¬ ing and on the other hand from crossing races too distinct ; but that the crossing of slightly distinct strains, and of individuals reared under different conditions, is beneficial. See Breeding ; Exogamy ; Heredity ; Mendel's Law.

Bibliography. — Bateson, William, Men¬ del's Principles of Heredity) (Cambridge 1913) ; Castle, W. E., (Mendel's Law of Heredity 5 (ib. 1903) ; id., (Genetics and Eugenics) ; Morgan, Thomas H., (The Mechanism of Mendelian Heredity* (New York 1915) ; De Vries, Hugo, (The Mutation Theory* (Chicago 1909-10) ; id., (Species and

Varieties, their Origin by Mutation) (ib. 1905) ; Babcock and Clausen, ‘Genetics in Relation to Agriculture) (New York 1918) ; Pearson, Karl, various art¬ icles in Biometrika; Weismann, (The Evolution Theory *(English translation, 1906) ; Darwin, Charles, (Animals and Plants under Domestica¬ tion ; Davenport, C. B., (Heredity in Relation to Eugenics* (New York 1911) ; The Journal of Heredity (Washington, D. C., 1910).

Ernest Ingersoll.

CROSS-FOX, a peculiarly marked northern variety of the American red fox. It has a dark line along the back, and crossing this a stripe on the withers. This gives its name. Its rarity and beauty make its skin more valuable than is the pelt of the ordinary fox.

CROSS KEYS, Va., post village in Rock¬ ingham County, 20 miles northeast of Staunton, where a battle took place 8 June 1862, between the Union and Confederate forces. The en¬ gagement was a strategic success for the Con¬ federates, in that it checked the pursuit by Fre¬ mont and prevented his joining with General Shields for a combined attack.

CROSS KEYS, Battle of. On the morning of 8 June 1862 General Fremont, with 10,500 men and 44 guns marched from Harrisonburg, Va., following Gen. ˆStonewallˆ Jackson, who had been pursued up the Shenandoah Valley, and who had now fallen back in the di¬ rection of Port Republic. Fremont’s cavalry drove in Jackson’s, and when eight miles be¬ yond Harrisonburg Cluseret’s brigade, in ad¬ vance, came upon General Ewell’s division of about 5,000 men and 16 guns, at Cross Keys, and Fremont formed for attack. Cluseret’s brigade, with artillery, was on and near the road ; Stahel’s and Bohlen’s were sent on the left ; Milroy’s and Schenck’s on the right. Eight batteries were put on the line and opened a spirited fire. Stahel was now ordered to at¬ tack Ewell’s right and, going forward, met with some success, but when his two left regiments were ascending a gentle slope and -had ap¬ proached within a few feet of its summit, Ewell’s men opened with an unexpected and severe fire, and the regiments were repulsed

with great loss. Part of Ewell's line pursued, but was checked and driven back by Stahel's right regiment, which was concealed in the woods. Bohlen's brigade was now ordered forward, but under conflicting orders it was misdirected, and for the most part remained as support to the batteries. Re-enforcing his own right, Ewell advanced beyond Fremont's left, got an enfilad¬ ing fire on his batteries, which, not properly supported, were withdrawn, the infantry fol¬ lowing a full mile. Meanwhile on the right Milroy and Schenck had made some progress, and were preparing to make a determined attack on Ewell's left, when Fremont ordered them to fall back and re-enforce his left, but by this time his left had been forced back, and the entire line fell back at 6 p.m. to organize for a renewal of the battle in the morning. During the night and early in the morning Ewell with¬ drew, under Jackson's order, to join in an at¬ tack on General Shields, who was nearing Port Republic by way of Luray Valley. Fremont fol¬ lowed Ewell to the south fork of the Shenan¬ doah, to find that he had burned the bridge behind him and joined Jackson. He was an idle spectator of the battle of Port Republic, 9 June, in which his comrades were defeated, and the day following he returned to Harri¬ sonburg. The Union loss at Cross Keys was 558 killed and wounded and 127 missing. The Con¬ federate loss was 273 killed and wounded and 15 missing. Consult (Official Record) (Vol. XII).

CROSS IN MYTHOLOGY. See Nature Worship ; Mexican Mythology ; Swastika.

CROSS VINE. See Btgnonia.

CROSSBILL, a bird of the genus Loxia be¬ longing to the finch family (Fringillida ?) and unique from the character of the bill the two mandibles of which are twisted awry so that they cross. This peculiarity has given rise to a well-known and pretty legend to the effect that

the crossed beaks is a mark of the bird's pity in having attempted to draw the nails which held Jesus' hands and feet to the cross, and that the red plumage of some species is the dye of his blood. This singular structure, having the appearance of a deformity, is in reality a won¬ derfully efficient mechanism for tearing asunder and extracting the seeds of pine cones on which these birds largely feed. Two species belong to the North American fauna, the red cross¬ bill (L. curvirostra) and the white-winged crossbill (L. leucoptera) . Both are birds of the northern pine and spruce forests, breeding within the United States,

which they do in the very early spring, and only in the extreme northern States and the higher mountains. They are better known as irregular winter wan¬ derers, which appear in flocks usually contain¬ ing both species, remain in a neighborhood until they have devoured all of the seeds of conifers which are to be found, and then leave. Closely related species are found in Europe and Asia.

CROSSBOWS. Called also arbalests. The main elements that compose the crossbow are the arbricr or stock and the short, powerful bow mounted on the stock at right angles. At

German seventeenth century crossbow.

the bow end is a ˆstirrup® or loop of iron. The bowstring, when at tension, is released by a trigger. For its discharge the weapon is held

up to the shoulder as with the modern gun. The bow, in its early stages, when drawn by hand, was built up of a number of layers of whalebone, usually. To bend the bow the stir¬ rup end was placed on the ground and, to hold the weapon firm, one foot was placed in it thus releasing the hands to pull the bowstring (made of sinew) back to a notch in the stock. For firing, the butt end was held up to the shoulder as with our modern guns. When, later, the more powerful bow of steel was used, the neces¬ sity for a mechanical power arose and the pied de biche (hind's foot) or ((goat's foot,® with its double lever purchase was used. Still fur¬ ther fortifying the bow brought forth the de¬ tachable ((wheel and rachet® (eric) or ((winder,® in which a cogwheel, turned by a handcrank, acted on a movable rachet which engaged the bowstring. Another device was the detachable roller-purchase (d toiir), in which a drum turned by a crank (moulinet) wound a long cord working on a system of fixed and free pulleys to draw up the bowstring. The crossbow d jalct or <(prodd® had the bow bent by a lever fixed to the stock. It was used, in the 16th century, for discharging stones, lead bullets, etc., for birdshooting (fowling). A ((barrelled® crossbow (set by hand) had a half tube super¬ imposing a groove in the stock for the passage of the projectile (bolt), and the bowstring found free passage between the half barrel and the groove below it. It was much used in the 17th century. The-projectile used for the cross¬ bow was termed a bolt or quarrel and usually had a pyramidal head (termed pile), the feather¬ ing was done with wood — sometimes inserted diagonally to cause rotating in its passage.

Crossbows date back to the 4th century and manuscripts of the 10th century mention this arm ; but, apparently, it was then used for sport only. Richard I of England and Philip Augustus of France (12th century) armed some of their crusaders with crossbows. This arm became obsolete (giving place to the longbow) in England in the 13th century, but was con¬ tinued in use on the Continent. In the 14th century the French had. 6,000 Genoese arbales-tiers (crossbow men) at the battle of Cregy. We read of the use of the crossbow as late as

1572.

CROSSES AND CRUCIFIXES. The

cross as a symbol dates back to an unknown antiquity. It was recognized in all countries throughout the world at all times. Before the

Five Egyptian planet symbols.

present era the Buddhists, Brahmans and Druids utilized the device. Seymour tells us : ((The Druids considered that the long arm of the cross symbolized the way of life, the short arms the three conditions of the spirit world, equivalent to heaven, purgatory and hell.® With the ancient Egyptians the cross was a reverenced symbol. Their ankh (crux ansata or handled cross) renresented life, and a per¬ pendicular shaft with several arms at right angles (Nile cross) appears to have had some reference to fertility or crops. Five of their

planet symbols (see illustration) were repre¬ sented by a cross attached to a circle or part of a circle. Prescott says that when the first Europeans arrived in Mexico, to their surprise, they found ((the cross, the sacred emblem of their own faith, raised as an object of worship

in the temples of Anahuac.® To the Christian the cross and the crucifix represent the Savior, also his Faith, and the Church. Crosses, ac¬ cording to their utilization, may be classified as : Ecclesiastical, heraldic and architectural.

In Ireland great monoliths beautifully carved into elaborate crosses are found. They date from the early Celtic Christian period and they are freely inscribed with Runic inscriptions — hence these crosses are vulgarly termed (<Runic® crosses. A beautiful specimen of these monuments is in the Metropolitan Museum of Art, New York city. In some of the religious orders, the official insignia consist of a cross ; also with many orders of chivalry, with the military, as well as with some civil orders. Con¬ stantine the Great adopted as his standard

Sacred monogram crosses (according to Schoenmurk's " Der Krusifixus

(labarum) .the two first letters in the Greek word, Christ. This combination in many varied forms is known as the ((Sacred

Monogram® or ((labarum of Constantine.®

In architecture the cross is a very favorite form for finials. It is found in stone, wood and

CROSSES

Courtesy Gorham Co., New York

Processional cross

Altar cross

*

n

s’

•

/V.

,

iron, on gables, steeples, *etc.* Many very beauti¬ ful forms, are to be seen on the older churches.

Ecclesiastical Crosses. — The principal forms of crosses used in the Catholic Church are : Crux immissa or capitata (f), or Latin cross.

1. Processional cross. 2. Rood cross. 3. Cross of the order St. James of France.

The Greek (+) cross. Crux decussata (X), (so termed because it was the figure for the Latin decus, 10) or Saint Andrew's cross. Crux commissa (T) or tau cross (its form is that of the Greek T, tan), dedicated to Saint Anthony. The earliest location of the Christian cross was crowning the ciborium (altar bald¬ achin), where it is still in some Romanesque basilicas. At times it hung from the top of the ciborium ; but with the omission, later, of the altar baldachin, the cross was placed in the centre of the altar (see Altar), or was dis¬ played on the rear wall. In the Constantinople Council (680) the bleeding Lamb, heretofore figuring on the symbolic crucifix, was forbidden, and the dying Savior's image on the cross was ordered to take its place, thus originating the present form of crucifix to be displayed to the public.

Reliquary Crosses. — In the very early days of the Church, already, relics of the saints were being enshrined. The different churches emu¬ lated one another in obtaining relics of greater

distinction than others, and in enshrining them in reliquaries each more elaborate and rich in gems and workmanship than the others. Noth¬ ing was more natural than that the altar cross should itself become a container of holy relics.

Rood Crosses. — Between the ‘nave and the choir of large churches, or between the nave and chancel of small churches, were lofts or beams since very early days. Codin (15th century), in his history of Constantinople, tells of a cross of gold which stood over the Jube of Saint Sophia’s; it was enriched with precious stones and was provided with sconces for lights. Every jube or rood loft became embellished with its rich rood cross. Anastasius mentions (8th century) such a cross in the middle of the church of Saint Peter the Apostle, at Rome, made of pure silver weighing 72 pounds. Both the Greek and Latin churches all had such roods until quite recent times. In Flanders were many up to the period of the present war, notably one at Louvain. They were usually constructed of wood (carved oak, mostly). Facing the nave, the four ends of the crucifix contained emblems of the four Evangelists, enclosed in quarterf oils ; toward the choir faced the four ˆdoctors” Saints Jerome, Ambrose, Augustine and Gregory). At the foot of the cross are found the Blessed Lady and Saint John on pedestals. The entire structure was gilded and painted.

Processional or Station Crosses. — In the Middle Ages, on certain religious processions, the altar cross was carried in advance of the clergy and, at some fixed places called stations, the procession stopped. The cross was then lowered to receive the devout kisses of the populace. From this act arose the special pro¬ cessional cross (crux stationalis) which was mounted on the end of a staff and carried aloft. These crosses often were furnished with two lighted torches for night processions. On the arms were, frequently, the Greek letters Alpha and Omega (first and last letters of the alpha¬ bet), one on each arm, to signify ((the Beginning and the End.” Lastly, these crosses received the image of the crucified Savior, also medal¬ lion decoration with bas-relief representations of scenes taken from the Old and New Testa¬ ments, often chased or painted. The medallions

1. Pectoral cross. 2. Stone steeple cross, St. Peter’s, Montrouge. 3. Papal cross.

of these elaborate, often richly bejewelled, pro¬ cessional crosses, were termed mancusa.

Pectoral Crosses. — A ritualistic cross worn by bishops suspended round the neck by a chain hangs, as the name implies, on the breast. This

pectoral cross acted as insignia of authority over a diocese, hence ((when any bishop enters the diocese of another he wears the cross con¬ cealed.® (Pugin).

Reliquary crosses of small size were made for use of the general public as amulets, and were extremely popular in the Middle Ages. They were termed encolpia. Cardinals and archbishops, for hierarchical distinction, are empowered to use a Latin cross furnished with two arms (patibula) or traverses. A special, distinctive three-barred cross is dedicated, solely, for the use of the Pope. These two styles of cross are known respectively as patri¬ archal and papal crosses.

Heraldic Crosses. — It is said that the knight Crusaders, in their armor and with their faces hidden by helmets, would have been unrecogniz¬ able by their followers had they not adopted different kinds of crosses to attach to their persons. This condition is generally referred to as the origin of the numerous kinds of crosses used in heraldry. There are no less than 300 different devices and forms known among the crosses of heraldry, and each has its own blazon or titular description. When a cross in heraldry is mentioned without any further

blazon it Heraldry.

implies the

Greek

cross.

See

Market

crosses are

crosses

which

were

erected in the markets or trading places to re¬ mind people so to deal with their customers as to be Christ-like. Most market-towns in Eng¬ land and Scotland formerly had their crosses, and many of them are still in existence. Some of the chief are those of Bristol, Chichester, Cheddar, Edinburgh, Malfmesbury and Win¬ chester.

Crucifix, a cross bearing the figure of Christ. It cannot be said at what time this emblem of the Christian faith began to be used, either by the Christian Church or by individual Christians. A general feeling of repugnance toward the in¬ strument of punishment which, among the Romans, was reserved only for the most in¬ famous class of criminals, would for a long time prevent the early Christians from rep¬ resenting Christ upon the cross, and this feel¬ ing would have to be conquered before the crucifix could come into use in public wor¬ ship. There are certain remains which would seem to show that crucifixes existed in the be¬ ginning of the 3d century; but it is probable that all these were merely tokens of individual piety. It is certain that the most ancient cruci¬ fixes known to exist belong to this class. Such,

for example, is that painted in the Syriac evan¬ gelistary of the year 582, contained in the Laurentian Library at Florence ; and such also is the pectoral cross of the superiors of Monza, which is said to have been a gift of Pope Greg¬ ory the Great to Theodolinda, who founded the cathedral. Crucifixes appear to have been first used in public worship toward the end of the 6th century. The most ancient example known of a crucifix used for this purpose is one which, on the testimony of Saint Gregory of Tours, was painted in a church at Narbonne. For more than 100 years after this period they were still

Suppedaneum crucifix found in catacomb of Pope Julius.

rare, and it was not till after the Trullan Coun¬ cil, held at Constantinople in 692, which or¬ dained that historic painting should be preferred to emblems or symbolical figures, that the images of Christ crucified began to multiply. As to the manner of representing Christ on the cross it appears to be unquestionable that, as a rule, the figures on the most ancient cruci¬ fixes Were engraved on gold, silver

or iron crosses. On the pectoral cross of Monza, how¬ ever, the figures are enameled on a gold cross. At a later period they were painted on wood, and it is only in the 9th century, in the ponti-

CAPTIONS OF HERALDIC CROSSES.

(1) Cross aiguisee or urd6e. (2) Cross ancr6e. (3) Cross avellane. (4) Barbed cross. (5) Baton cross or cross potent. (6) Cross bezant6e. (7) Cross blunted. (8) Bordered cross. (9) Cross botonn£e or trefl^e. (10) Cross botonn6e patt£e. (11) Cross cabled. (12) Cross Calvary, cross of Christ or cross of the Passion. (13) Cross catoosed. (14) Cross chappie or cross double fitch6e. (15) Cross chequey. (16) Cross clech6e. (17) Cross commisse, tau cross or cross of St. Anthony. (18) Cross compon6e counter compon6e. (19) Cross corded. (20) Cross couped or humett6e. (21) Cross crescented. (22) Cross counter quartered. (23) Cross coursie voided. (24) Cross crenell6e or cross bretessed. (25) Cross crosslet or cross crosell. (26) Cross crosslet crossed. (27) Cross crosslet double crossed. (28) Cross crowned. (29) Cross crosslet fi tehee. (30) Cross crosslet in saltier or cross of St. Julian. (31) Cross crosslet patt6e. (32) Cross double parted. (33) Cross double parted flory. (34) Cross double parted voided. (35) Cross double portante or cross patriarchal. (36) Cross engrailed. (37) Cross ermin£e. (38) Cross 6toile. (39) Cross fer de moline pierced lozengy in the field. (40) Cross fitch6e. (41) Cross furchee. (42) Cross fusil. (43) Cross fusil at each end. (44) Cross fusily. (45) Cross gemelle or cross potent crossed. (46) Cross of St. George. (47) Cross globical patt6e. (48) Cross indented. (49) Cross of Jerusalem. (50) Long cross. (51) Cross Lorraine voided. (52) Cross of Malta. (53) Cross mascle. (54) Cross mascley or cross of mascles. (55) Cross masculy. (56) Cross miller. (57) Cross moline. (58) Pall cross. (59) Cross patonce. (60) Patriarchal or double cross. (61) Cross patt6e or form£e. (62) Cross patt6e blemished or concaved. (63) Cross patt6e botonn6e or cross Toulouse. (64) Cross patt6e crenell6e. (65) Cross patt6e fitchee of all four. (66) Cross pattee double rebated. (67) Cross pattee entire. (68) Cross patt6e fimbriated. (69) Cross patt6e fitchee. (70) Cross patt6e moline. (71) Cross pom-metee or pommel6e. (72) Cross of four pomels. (73) Cross potent rebated, same as swastika. (74) Cross quaterfoil. (75) Cross saltire or saltier. (76) Cross saltire voided. (77) Cross surmounted of another. (78) Cross und6e or wavy. (79) Papal cross.

241

HERALDIC CROSSES

(Sec description on preceding page)

vol. 8 — 16

ficate of Leo III, that the figure of Christ ap¬ pears carved upon the cross in bas-relief. Although there can be no doubt that Christ, in accordance with the Roman custom of repre¬ sentation, was crucified naked, all the most ancient crucifixes, almost without exception, represent him as clothed with a tunic reaching down to the feet. This practice lasted down to the 8th century, when it began to be modified, the body of Christ being no longer covered above the loins ; and at length it became the custom to represent Christ, as in the crucifixes of the present day, entirely naked with the exception of a cloth about the loins. Another point in which the ancient crucifixes differ from modern ones is as to whether Christ is repre¬ sented dead or alive. Until the 11th century he is represented alive ; since that period he has been represented as dead. The first example of Christ being represented as dead is furnished

1. Altar cross. 2. Stone Alpha-Omega cross. 3. Stone gable cross, St. Urban's church, Unterlimburg. 4. Two Russian crosses, with Suppedaneum.

by a manuscript in the Laurentian Library at Florence, belonging to about the year 1059. In the earlier crucifixes, also, the number of nails by which Christ is fixed to the cross is four, one through each hand and each foot, while in the more modern ones there are only three nails, one foot being laid above the other and a single nail driven through both.

Seymour says : ((In the 8th and 9th centuries the feet (of the crucified Saviour) are fastened with nails, the hands outstretched as in the act of benediction or prayer, yet generally free. At times this is reversed, the hands are fastened and the feet, woundless, are supported on the suppedaneum d* In the Greek and Russian churches a form of suppedaneum is represented as oblique. The reason given is the legend that one foot of the Crucified One, when suffering, was drawn higher than the other. (<The name sudarium has been given to the little cloth at¬

tached to the crucifix in several countries be¬ cause of its primitive employment having been to save the metal of the crucifix from the per¬ spiration of the hands of its carrier. }) (Cahier). Many crucifixes bear also the inscription put upon the cross by the order of Pilate, but this is always found in an abbreviated form, both in ancient and modem times. In the Latin Church it is frequently omitted, but the Greek Church has adhered more strictly to this prac¬ tice. Various accessories are also sometimes found in crucifixes, such as figures of the sun and moon, the lamb, of the Virgin Mary and Saint John, of the two soldiers — one presenting the vinegar for Christ to drink, the other with the lance with which he pierced the side of Christ ; emblematical figures representing the four evangelists ; angels in a posture of adora¬ tion and certain saints.

Bibliography. — Beck, Egerton, (Prelatial Crosses in Heraldry and Ornament* (in Burl¬ ington Magazine, London 1914) ; Biedermann, von, (Die Kreuze in der Heraldik* (Dresden 1875) ; Bingham, Joseph, (Antiquities of the Christian Church > (London 1846) ; Brock, Mourant, (La Croix paienne et chretienne* (Paris 1881) ; Bunson, E. von, (Das Symbol des Kreuzes bei alien Nationen und die Entstehung des Kreuz-symbols der christlichen Kirche' (Berlin 1876) ; Butcher, E. L., (Early Forms of the Cross from Egyptian Tombs) (in (Ancient Egypt, *pt. Ill, London 1916) ; Buttgenbach, (Die Geschichte des Kreuzes vor und nach Golgotha* (Aix-la-Chapelle 1897) ; Clark, Richard H., (The Cross viewed in the Light of Legend, Tradition, Prophecy and His¬ tory } (in American Catholic Quarterly Review, Philadelphia 1904) ; Engles, (Die Kreuzigung Christi in der bildenden Kunst* (Luxemburg

1900) ; Forrer and Muller, (Kreuz und Kreuz¬ igung Christi in ihre Kunstentwickelung) (Strassburg 1893) ; Fulda, (Das Kreuz und die Kreuzigung) (Breslau 1848) ; Hoppenot, J., <Le Crucifix dans. l'histoire et dans l'art, dans 1'ame des Saints et dans notre vie) (Lille

1901) ; Martigny, Joseph Alexandre, <Dictionnaire des antiquites chretiennes — article Croix> (Paris 1865) ; Mortillet, G. de, (Le Signe de la croix avant le Christianisme) (Paris 1866) ; Seymour, Rev. William Wood, (The Cross in Tradition, History and Art* (New York 1898) ; Schoenmark, (Kruzifixus in der bildenden Kunst) (Strassburg 1908) ; Stevens, William O., (The Cross in the Life and Literature of the Anglo-Saxons) (New York 1904) ; Stockbauer, (Kunstgeschichte des Kreuzes* (Schaffhausen 1870) ; Tyack, Rev. George S., (The Cross in Ritual, Architecture and Art* (London, n. d.) ; Ward, Henry Dana, (History of the Cross; the Pagan Origin and Idolatrous Adoption and Worship of the Image) (London 1871).

Clement W. Coumbe.

CROSS WELL, Edwin, American journal¬ ist: b. Catskill, N. Y., 29 May 1797; d. Prince¬ ton, N. J., 13 June 1871. His able management of his father's paper, the Catskill Recorder, led Martin Van Buren and other prominent Demo¬ crats to invite him to become editor of the Albany Argus, and also State printer 1824. Dur¬ ing his 30 years' control he made it one of the most influential Democratic papers in America, and as a member of the political group known as the a Albany Regency,** he preserved order in

the party ranks through the columns of his paper. He was a great antagonist of Thurlow Weed. His articles were regarded as authorita¬ tive and were widely copied. Subsequently he found himself opposed to Van Buren and other early friends, and leaving journalism (1854) went into business in New York.

CROSWELL, Harry, American writer and clergyman: b. West Hartford, Conn., 16 June 1778; d. New Haven, Conn., 13 March 1858. He first came into notice as a Federalist editor of The Balance, a newspaper published in Hud¬ son* N-.Y. (1802), his bitter and sarcastic edi¬ torials involving him in numerous libel suits. Alexander Hamilton's last, and one of his fin¬ est, forensic efforts, was made in defense of Croswell in a suit caused by an article on Jef¬ ferson. He entered the Episcopal ministry in 1814, became rector of Trinity Church, New Haven, Conn., 1815, and remained there until his death. He published (Young Churchman's Guide* (1838); (Family Prayer) (1843); (Memoir of Rev. W. Croswell) (1853) ; 'Guide to the Holy Sacrament* (1857).

CROTALARIA, kro-ta-la'ri-a, or RAT¬ TLE-BOX, a genus of annual and perennial herbs and some shrubby plants of the natural order Leguminosce. The numerous species are widely distributed in the tropical and temperate zones, in the former of which some of the tail growing straight-stemmed species yield a tex¬ tile fibre. The most important of these species are C. juncea, which yields the Sunn hemp

of India, and C. tenuifolia, by some botanists con¬ sidered a variety of the preceding species, which yields Jubblepore hemp. These plants are grown thickly in order to produce attenuated stems with long strands of fibre. If sown thinly they branch freely. Several American species are reputed to cause trouble (crotalism) to horses which eat them too freely. A few species are cultivated for ornament both out of doors and in greenhouses. The most popular outdoor species is probably C. retusa, a hardy annual herb about one and a half feet tall and bearing racemes of yellow and purple rather fragrant flowers during summer.

CROTALIDiE, kro-tal'i-de, a family of poisonous snakes, the rattlesnakes or pit-vipers. It is now reduced in classification to the rank of a sub-family (Crotalince) of the viper family (Viperidce) , differing from typical vipers by the presence of a deep pit, of unknown func¬ tion, between the eye and the nose, and by the possession by most species of tail-rattler. The group is exclusively American, and includes the rattlesnakes, copperheads and moccasins (qq.v.).

CROTHERS, Samuel McChord, American clergyman and essayist: b. Oswego, Ill., 7 June 1857. He was graduated at Princeton in 1874 and from the Union Theological Seminary. After holding several charges in the West, he entered the Unitarian ministry and removed to Brattleboro, Vt., in 1882. In 1894 he was called to the First Parish of Cambridge, Mass., where he became also one of the preachers to Harvard University. His essays are humorous and shrewd, and he is happiest when dealing with the intellectual weakness and frailties of the time. His works include 'The Gentle Reader) (1903) ; 'The Pardoner's Wallet) (1905) ; 'The Endless Life) (1905) ; 'By the Christmas Fire) (1908); 'Among Friends) (1910); 'Humanly

Speaking* (1912) ; 'Three Lords of Destiny* (1913); 'Meditations on Votes for Women)

(1914).

CROTON, a genus of plants of the family Enphorbiacece, consisting of about 600 species in the warmer parts of the world, chiefly in America. Several are natives of the United States. C. tiglium, an Asiatic species, is the croton-oil plant or physic nut, which yields the powerful purgative croton oil. C. eleuteria, cascarilla or sweetwood, found in the Bahamas, and C. cascarilla, yield cascarilla bark. The

plants commonly cultivated in hothouses under the name Croton belong to the related genus Codiceum.

CROTON AQUEDUCT and CROTON DAM, an aqueduct and dam for many years the only means of water supply for the city of New York. The waters of Croton Lake, an artificial body of water formed by damming the Croton River, were first conveyed to the city in 1842, by what is known as the old aqueduct, and a new aqueduct was opened in 1890. The old aqueduct was of masonry lined with brick, and had a cross-section area of 53 34 square feet, and a nominal capacity of 72,000,000 gallons per day. On occasions it has actually delivered 95,000,000 gallons in 24 hours. (See Aqueducts). The new aqueduct has a cross-section area of 155.57 square feet, and a flow capacity of 300,000,000 gallons per day. It passes in its lower course under the northern part of Manhattan Island rising at 135th street, where a gatehouse is con¬ structed from which the water is distributed through 12 lines of 48-inch iron pipe, four of which enter the reservoir in Central Park. Throughout its entire length this great tunnel was blasted out of solid rock, with the exception of three or four spots where “blow-offs® were constructed with the object of rapidly emptying the aqueduct — which here meets the surface — for the purpose of examination, repair or cleans¬ ing. The tunnel is lined throughout with brick, and in one or two places where the rock has been found imperfect and a leakage is possible an iron lining has been added.

As early as 1881 the question arose of pro¬ viding a large water-supply for the future needs of the city, and a new dam across the Croton River was ultimately decided on, the contract for the Structure being awarded 26 Aug. 1892, the work to be completed 1 July 1899. It was not finished, however, until 1906. In 1901 the dam was about half completed and a modifica¬ tion of the design at that time involved doing away with the proposed earthen section of the dam and building the whole of masonry, except a low embankment at the south end. The dam crosses the valley about three and a fourth miles above the mouth of the Croton. The first step in its construction was the cutting through solid rock of a canal 1,100 feet long and 125 feet wide to turn aside the river. The foundation pit for the dam was finished in September 1897. The excavation reached about 75 feet below the country level at the centre of the valley to bed¬ rock, and involved the removal of 1,821,400 cubic yards of earth and 400,250 cubic yards of rock. The dam is 1,168 feet long and 294 feet high, from its foundation, and 210 feet above the former level of the river, the width at the base being 206 feet, from which the structure tapers to 22 feet at the top. At the north end

of the dam is a spillway or overflow, 1,000 feet long, built in continuity with the dam and nearly at right angles to it, reaching up the val¬ ley. The waste from this spillway is discharged into a channel 50 feet wide at its upper end and 125 feet at the lower end, cut into the solid rock. At the southern end the masonry of the old aqueduct runs through the dam. At the time of its construction this was the largest and most expensive dam ever constructed on this continent and its height was second only to that of the Shoshone irrigation dam (324 feet), which, however, contains less than half the mass of the Croton dam. The steam and machinery equipment equaled that of an ordinary railroad, for besides die many hoists and derricks, there were used several miles of tracks and 11 loco¬ motives of the dinky type and 282 cars in haul¬ ing earth and stone, besides 39 steam boilers and 51 hoisting engines. The new dam increased the storage capacity of the city water supply by 30,000,000,000 gallons. The old Croton dam im¬ pounded 2,000,000,000 gallons in a lake 5ˆ2 miles long and covering 500 acres. This old dam now lies 30 feet below the level of the new lake. The new dam forms a lake 19ˆ miles long covering 3,425 acres. The watershed of the Croton River Valley has an area of about 340 square miles. In this area there are a dozen or more reserve dams auxiliary to the Croton dam, and these impound a total of 67,952,000,000 gallons, making the capacity of the Croton sys¬ tem close to 100,000,000,000 gallons. The in¬ take from the large new reservoir is from the upper gatehouse where there are 22 gates each supplied with charcoal-filters through which the water must pass before it is turned into the aqueducts. These intakes have a capacity of 400,000,000 gallons a day.

CROTON BUG. See Cockroach.

CROTON OIL, a fixed oil expressed from the seed of Croton Tiglium. (See Croton). The seeds have been used in medicine for a great many years. The oil is a thick, viscid, pale yellowish or brownish-yellow liquid, hav¬ ing a slight fatty odor and an acrid burning taste. Its solubility is like that of similar fixed oils. Its composition is extremely

complex, but the active principle is chiefly a glyceride of cro-tonoleic acid ; this makes it an extremely power¬ ful irritant, and administered to the skin it causes vesication and pustulation. Given in¬ ternally it is a very active, drastic purgative and is used practically only in obstinate cases of constipation and for the insane, who refuse to take internal medication. It should be adminis¬ tered very sparingly, as five drops have been known to cause severe poisoning.

CROTON RIVER, river in New York which rises in Dutchess County, runs south through Putnam County and southwest through Westchester County, emptying into the Hudson at Croton Point, 32 miles north of New York. Its length is nearly 60 miles. It supplies the city with water through the Croton aqueduct (q.v.). The area of the Croton watershed is about 362 square miles above the new Croton dam. Within this area are about 30 lakes and ponds, many of which are utilized as natural storage basins. Along the course of the river the following reservoirs are situated : the Boyd's Corners, the Middle Branch, the East Branch, the Titicus, the Carmel and the new Croton.

For many 3'ears New York (i.e., the present Borough of Manhattan) was dependent chiefly upon this source for its water supply. For an account of the city's enlarged water-supply sys¬ tem see Croton Aqueduct.

CROTONA, Italy, a Greek republic in Magna Graecia or South Italy, founded about 700 b.c. Livy gives the circumference of the city of Crotona at 12 miles. This city was famous for producing the strongest athletes, among them the celebrated Milo. It is still more celebrated as the city where Pythagoras settled between 540 and 530 b.c., and where he taught. Milo was one of his disciples. After the destruction of Sybaris (510 B.c.) the Pythagoreans were expelled. The city was cap¬ tured by Dionysius the Elder of Syracuse and later by Agathocles and in the war between Pyrrhus and the Romans was plundered and nearly destroyed. It suffered severely in the Second Punic War, and was for three years the winter quarters of Hannibal. Under the Romans Crotona was notorious for its luxury and dissoluteness. Crotona is the modern Cotrone, and the ruins of the ancient town are still to be seen above Capo della Colonna. Pop. (commune) about 9,000.

CROTOPHAGA, kro-tof'a-ga, a genus of birds, the typical one of the sub-family Croto-phagince. The bill is greatly compressed, and the ridge of the upper mandible keeled. The species are found in South

America. C. ani is the ani or anno so called by the Latin races of South America, the razor-billed blackbird of Jamaica, called also the savannah bird and the great blackbird. It feeds on small lizards, in¬ sects and seeds. It lives in flocks, and when one individual is slain the rest gather again almost at the same spot. Several females are said to use the same nest.

CROUCH, Frederick Nicholls, English

musician: b. London, 31 July 1808; d. Baltimore, Md., 10 Aug. 1896. He played the violoncello in Queen Adelaide's private band and later was principal violinist at Drury Lane Theatre. In partnership with others he established a large rolling mill for the manufacture of zinc, and patented the engraving process known as zincog¬ raphy. He composed 100 songs, including the famous (Kathleen MavourneenP In 1849 Crouch visited New York and played in the orchestra at Astor Place Opera House; taught music in Portland, Me., 1850-56. He fought on the Confederate side in the Civil War. He also composed two operas, <Sir Roger de Coverley) and (The Fifth of November 1670. >

CROUP, a term popularly used for a num¬ ber of conditions, which have been more specifi¬ cally defined. It is in reality a symptom present in a large number of diseases or disorders of the larynx, which are spasmodic or inflamma¬ tory. Croup occurs mostly in children and is characterized by the peculiar strident sound, sometimes a distinct cough, which accompanies inspiration or expiration due to interference with the passage of. air through the vocal cords because of spasm, inflammation or growth af¬ fecting the larynx, vocal cords or adjacent tis¬ sues. The term has been popularly used to denote a diphtheritic laryngitis (acute mem¬ branous laryngitis), which however, belongs distinctly to that disease. (See Diphtheria). It is also used generally for acute catarrhal

spasm of the larynx (catarrhal croup, false croup, spasmodic croup, laryngitis stridulosa). This is common to childhood and may follow a slight coryza, dietetic disturbances or sometimes comes on without

any apparent premonitory symptoms. The attack comes on suddenly and usually at night. The respiration is obstructed and consequently labored with a peculiar stri¬ dent inspiration and there may be extreme cyanosis. There is a loud metallic cough. The pulse is small and rapid and there is usually a marked rise in temperature. The attack lasts several hours when the child gradually becomes easier and falls asleep. The attack may be re¬ peated several successive nights after which a slight catarrh remains for a week or two and then disappears. The most effective means of treatment is by the use of steam inhalations with warmth and rest in bed. Occasionally in more severe cases other means of treatment may also be used. Although the attacks are fre¬ quently very alarming fatality is extremely rare. Attention should be given to certain prophy¬ lactic measures in the child disposed to this form of attack. Exposure should be avoided but the child should not be kept in too warm an atmosphere or one deprived of some amount of moisture. The condition of the tonsils and adenoids should be ascertained as these will often be found enlarged. There is also an acute simple laryngitis which is more serious but less frequent than laryngitis stridulosa. It is often associated with infectious diseases of childhood or with coryza or inflammation of some adjacent portion of the respiratory tract. Recovery is usual in a few days or two weeks. Sometimes the inflammatory process extends to the bron¬ chial tubes or even develops into bronchopneu¬ monia. A laryngospasm, known as laryngis¬ mus stridulus (cerebral croup), occurs chiefly in infants under 18 months of age who are rachitic or have a tendency to convulsions. It manifests itself in a sudden attack of apnoea followed by a protracted crowing inspiration and ending in crying and fretfulness with per¬ haps a general convulsion.

This form especially marks the psychogenic origin of croup, which is not absent likewise from the more general conditions already de¬ scribed. They call attention to the presence of a neurotic diathesis which determines such a mode of response by which the infant seeks to express the lack of conformity between its individual power seeking and the demands of environment. Diphtheritic laryngitis represents such a reaction upon the level of physicochemi¬ cal activity and has therefore found its place among the distinctly infectious conditions. Laryngitis stridulus also manifests disturbance of the vegetative nervous functions. In all of these forms the psychogenic factor finds its separate mode of control. This is further em¬ phasized by the fact that as the tendency toward these forms of reaction diminish, thumb-suck¬ ing, enuresis or other psychoneurotic manifesta¬ tions become substituted for these more acute symptoms.

Smith Ely Jelliffe.

CROW. The crow family (Corvida?) , order Passeres, comprises birds that have a strong bill, compressed toward the points, and covered at the base with stiff, bristly feathers, which advance so far as to conceal the nostrils. The

plumage is dense, soft and lustrous, generally dark, but sometimes of gay colors. They are very omnivorous, and remarkable for their in¬ telligence. The family, widely diffused over the world, includes the common crow, type of the Corvidcz; and the raven, the fish crow, the rook, the jay and the magpie. The common crow of North America, Corvus americanus (Audubon), is about 20 inches long, and the wings about 12 inches. It is remarkable for its gregarious and predatory habits. The bill is straight, convex and compressed. The nostrils are placed at the base of the bill, and are pantalous ; the tongue short, and bifid at the tip; the toes are separated almost to the base, and the middle one is the longest; the wings sub-elon¬ gated and acute, and the tail composed of 12 feathers. They pair in March ; the old repair their nests, the young frame new ones; but they are such thieves that while the one is fetching materials the other must keep watch to prevent the rising fabric from being plundered by their neighbors. As soon as the nest is finished and the eggs produced (five, bluish green, with dark blotches), the male takes upon himself the care of providing for his mate, which he con¬ tinues during the whole period., of incubation. They frequent the same rookeries for years, but allow no intruders into their community. They are omnivorous and feed largely upon insects and small animals of all kinds, as well as on grain and seeds, whence they have sometimes been supposed injurious to the farmer; but they amply repay him for what they take by destroy¬ ing the vermin in his fields. The fish crow (Corvus ossifragus) is a closely similar but somewhat smaller species, chiefly maritime in the eastern United States, but found for a con¬ siderable distance along river valleys. Less social than the common crow, it often associates with that bird, so that it is very commonly over¬ looked. In India there is a hooded crow, also of the genus Corvus.

CROW-BLACKBIRD, the name of cer¬ tain American birds of the genus Quiscalus, family Icteridce or hang-nests. The great crow-blackbird, or grackle, Q. major, found in the Southern States, Mexico and the West Indies, is 16 inches long, and of a glossy black plumage. The female is of a light brown above and whitish beneath. The purple grackle, lesser or common crow-blackbird, Q. quiscula, is similar in color to the preceding, but smaller. They reach the Middle States of the United States from the South in flocks in the latter part of March,

and build in April in swamp-bushes and trees. In their first arrival they feed upon in¬ sects, but afterward commit great ravages upon the young corn. In November they fly south again.

CROW INDIANS or CROWS, or AB-SORUQUE or ASAROKA, a tribe of the

Sioux division of the North American Indians. They are named after a species of hawk, not after the bird commonly called the crow. They belong to the linguistic stock included under the name Siouan Indians and are of the same family as the Dakotas. After 1750 they remained at peace with both their neighbors and the whites, frequently furnishing troops against hostile tribes. In language and customs they resemble the Hidasta. Their society is founded on a clan system with maternal descent, combined

with social usages dependent on the father's clan. They had a series of ungraded military societies, and a strange ceremony of planting the sacred tobacco. It was common for them to be engaged at war with other tribes of the same family. When the explorers Lewis and Clark visited the Crows, they found the tribe divided into four groups or <(bands." Brown located them on the Yellowstone River in 1817, and in 1842 they were reported by the govern¬ ment agents as inhabiting the land around the head waters of the Yellowstone. They were then 4,000 in number. Later they were re¬ moved to a reservation in Montana. Pop. 2,287. Consult Curtis, (The North American Indian' (Vol. IX, Cambridge 1909) ; Lowie, (Social Life of the Crow Indians' (New York 1912) ; id., Societies of the Crow, Hidasta and Man-dan Indians' (ib. 1913).

CROWBERRY (Empetrum) , a genus of low-growing evergreen shrubs of the family Empetracece. The few species are character¬ ized by small, crowded, evergreen leaves, incon¬ spicuous blossoms, and globular, usually black, edible berries, with 6 to 10 bony seeds in a slightly acid, very juicy pulp. They are natives of cold, northern climates (one in South America) , and are sometimes used for making

a fermented beverage. As dessert fruit they have little value, but they are eaten in northern Europe, where they are regarded as a scorbutic and diuretic. Crows are especially fond of them, hence the name. The plants are often used for ornament in rockeries where the soil is moist and peaty or sandy.

CROWE, Eyre, English historical and genre painter : b. London, 3 Oct. 1824 ; d. there, 12 Dec. 1910. He studied painting in the atelier of Paul Delaroche in Paris, and went with that artist to Rome in 1844. Acting as amanuensis to William M. Thackeray, he visited the United States in 1852-53. He was elected an associate of the Royal Academy in 1876, and an academi¬ cian in 1888. Among his paintings are Gold¬ smith's Mourners) (1863) ; (Blue Coat Subjects) (1872); (French Savants in Egypt' (1875); (The RehearsaP (1876); (Sanctuary' ; (Prayer' ; and (Bridal Procession at St. Maclou, Rouen> (1877) ; (School Treat) (1878) ; (Blue Coat Boys Returning from Their Holiday' ; (Marat: 13 July 1793> ; (The Queen of the Majr) (1879) ; (Queen Eleanor's Tomb> and <Forfeits) in 1880; (Sandwiches } and (Sir

Roger de Coverley and the Spectator at West¬ minster Abbey' (1881) ; (How Happy Could I Be with Either P and (The Defense of London in 1643,' exhibited in 1882; (01d Porch, Eves-hanP (1884). He published (With Thackeray in America) (1893) ; and (Haunts and Homes of Thackeray' (1897).

CROWE, Sir Joseph Archer, English his¬ torian of art and miscellaneous writer : b. Lon¬ don, 20 Oct.. 1825; d. Baden, 6 Sept. 1896. He was long eminent as a journalist, and for a time served in the British diplomatic service. His celebrity rests mainly on the histories of paint¬ ing in Italy (1864-71), the most important work on this subject, written in collaboration with G. B. Cavalcaselle (q.v.). He also published other volumes on art subjects.

CROWE, William, English clergyman and poet: b. Midgham, Berkshire, 1745; d. Bath,

Somerset, 9 Feb. 1829. He was the author of (Lewesdon Hill, > a descriptive poem, praised by Wordsworth, Coleridge and Moore (1788) ; (Treatise on English Versification' (1827), *etc.*

CROWELL, Edward Payson, American educator: b. Essex, Mass., 1830; d. Amherst, Mass., 1911. He was graduated at Amherst Col¬ lege 1853; was tutor there 1855—56 ; professor of German 1858-64; and

of the Latin language and literature 1858 till his death. He edited many Latin classics, such as (De Senectute' and (De Amicitia' of Cicero (1871), the (De Officiis' of Cicero (1873), and his (De Oratore) (1879) ; Selections from the Latin Poets, Catullus, Ti¬ bullus, Propertius, etc.' (1882), and with Rich¬ ardson, translated Herman Bender's (Brief His¬ tory of Roman Literature' (1880) ; and wrote (A Clue to the Prose Writings of the Silver Age' (1897).

CROWELL, John Franklin, American economist: b. York, Pa., 1 Nov. 1857. He was graduated at Yale in 1883, and studied also at Columbia and at the University of Berlin. He was principal of Schuylkill Seminary, Fred¬ ericksburg, Pa., for several years; president of Trinity College, N. C. (1887-94) ; head of the department of economics and sociology at Smith College (1895-97) ; and in 1900-04 an expert for the United States Industrial Commission, writing one of the 19 volumes issued. He was also expert on internal commerce for the Bureau of Statistics in the Treasury Department. In 1906 he became editor of the Wall Street Jour¬ nal, New York, and in 1910-11 was president of the American Civic Alliance. He is now an executive officer of the New York Chamber of Commerce. He has published (Taxation in the American Colonies' ; <The Logical Process of Social Development' ; (Trusts and Competi¬ tion' (1915) ; (The Distribution of Farm Pro¬ duce in the United States' ; (Report to the War Department on Deepening the Mississippi River' (1903) ; and many contributions to the Monthly Summary of Commerce and Finance of the United States.

CROWFIELD, Christopher, a pseudonym sometimes used by Harriet Beecher Stowe.

CROWFOOT, or BUTTERCUP, common names of the genus Ranunculus, the typical genus of the natural order Ranunculacece or crowfoot family. The genus has over 200 species, widely distributed in the temperate regions of the world, and on the mountain-tops of the tropics. The plants of the genus are both aquatic and terrestrial, and are generally classed as useless weeds. The name buttercup is popularly applied in the United States to those species with large flowers and divided leaves. The buttercup is called <(crazy" by the rustics of central England, who believe that its smell will cause madness.

CROWLAND, or CROYLAND, England, town in the county of Lincoln, eight miles north¬ east of Peterborough; pop. about 2,800. It is in the Fen country, and consists of four prin¬ cipal streets, at the intersection of which is a very curious ancient triangular bridge. On one of the

wings of this is a dilapidated statue, at¬ tributed to the 9th century, and supposed to be that either of Alfred or Ethelbald, king of Mercia. The only other remarkable edifice is the ruined abbey of Crowland founded in 714

and rebuilt about 1112, the north aisle of which forms the parish church. Ingulphus, to whom a history of the abbey of Crowland, first pub¬ lished at London in 1596, afterward at Oxford in 1684, has erroneously been attributed, was abbot of Crowland from 1075 till 1109. Pop.

2,683.

CROWLEY, La., town and county-seat of Acadia Parish, on the Southern Pacific and Louisiana Western railroads, about 135 miles northwest of New Orleans, and 45 miles from the Gulf. It is the centre of a rice district, and nearby are oil fields. Rice-milling is the prin¬ cipal industry. A rice-growing experiment sta¬ tion was established here under State and Federal control. Settled about 1887, Crowley was incorporated two years later and grew rapidly. The government is administered by a mayor, elected biennially, and a council. The town contains an Odd Fellows' Home and owns the electric plant, sewerage system and water¬ works. Pop. (1920) 6,108.

CROWN, an official or symbolical orna¬ ment worn on the head, now the symbol of royalty. At first it had no regal significance and was nothing more than a garland of leaves or flowers bestowed on athletes. Later it was made of gold and was bestowed on citizens deserving well of their country.

In the Middle Ages crowns became exclu¬ sively appropriated to the royal and imperial dignity ; the coronets of nobles were only borne in their coats of arms. It is, however, with the eastern diadem rather than with the classic corona that the crown as a symbol of royalty is

connected ; indeed, it was only introduced as such a symbol by Alexander the Great, who followed the Persian usage. The English crown has been gradually built up from the plain circlet with points. This form was elaborated and jeweled, and finally arched in with jeweled bands (diadems) surmounted by the cross and mound. As at present existing the crown of England is a gold circle, adorned with pearls and precious stones, and bearing alternately four crosses, pattees and four fleurs-de-lis. From the top of the crosses rise imperial arches, closing under a mound and cross. The w'hole covers a crimson velvet cap with an ermine border. The Scottish crown consists of a jeweled and enameled circle of gold, support¬ ing 10 fleurs-de-lis and 10 crosses fleury in alternation. Each of the crosses is adorned with a diamond and pearls, and from them rise four gold arches, closing under a mound, which bears a pearl-bedecked cross pattee. The royal crown of France is a circle ornamented with eight fleurs-de-lis, from which rise as many quarter-circles closing under a double fleur-de-lis. The Austrian crown is a sort of cleft tiara.

2. The term crown is used figuratively for the royal power, in contradistinction either to the person of the monarch or to the body of the nation, with its representatives, interests, *etc.* Thus, in modern times, the word crown is used to express the rights and prerogatives of the monarch considered as a part of the state, which includes all powers — the legislative, judicial, *etc.* Thus the Crown domains are distinguished from the state or national domains.

3. In architecture, crown denotes the upper¬ most member of a cornice; the corona; also a sort of ornamental structure surmounting a

tower and formed by flying buttresses meeting together at top.

4. In English money, the crown is a coin, worth five shillings, or $1.22.

See Crowns and Coronets ; Corona ; Wreaths.

CROWN COLONIES. British colonies are officially divided into three classes ; those coming under this head are colonies which were ceded or conquered, and where the Crown, i.e., the home government, has the entire control of legislation and of the officials, such as Gibraltar. A special department of the Colonial office in London deals with the administrative and po¬ litical work of the Crown colonies and pro¬ tectorates.

CROWN-GALL, a disease of many fruit and forest trees usually caused by Bacterium tumifaciens, which obtains entrance usually at the juncture of the roots and the trunk (the crown), but sometimes appears upon the roots. In young trees the galls are often half an inch in diameter, colored like the roots or darker, soft and composed of apparently unorganized tissue, but in old trees they frequently show concentric rings and may become several inches in diameter. In Europe, America and New Zealand, where this disease is known, con¬ siderable damage has been reported, even whole orchards being destroyed by the fungus. The only remedy thought to be of service is the annual removal of the galls and the cover¬ ing of the wounds with thickened Bordeaux mixture.

CROWN GLASS, very hard and clear, made almost entirely of sand and alkali and a little lime, without lead or any metallic oxide except a very small quantity of manganese, and sometimes of cobalt. The original balloon is flattened, crown-shaped. A steel rod tipped with molten glass is now attached opposite to the blowpipe which latter is then removed. By rapidly revolving the rod on a horizontal axis opposite the large opening of the glass furnace, the mass of glass softens and spreads out into a disc, thick at the centre and thinning toward the edges. The limit of the diameter of these discs is about four feet. Crown glass is used in connection with flint-glass for optical instru¬ ments, in order to destroy the disagreeable effect of the aberration of colors. This important discovery by Dollond, who turned it to admir¬ able account in the achromatic telescope, was carried to the highest perfection by Reichenbach. This glass is much used for windows, especially for art work, where its peculiarly brilliant surface makes it most acceptable. See Glass, Varieties of.

CROWN LANDS, English, territories in the British Isles formerly the private property of the sovereign. Since George III, however, every British monarch has on accession sur¬ rendered the Crown lands to be disposed of by Parliament. The income from them, like the other revenues of the state, are now devoted to the public service. The administration thereof is in the hands of the commissioners of woods, forests and land revenues. The produce for 1915-16 amounted to $3,912,720, of which sum $2,750,000 was paid into the Exchequer. Before the Norman conquest (1066) all the so-called folk-land gradually became terra regis or king’s land. The confiscations of WiL

liam the Conqueror greatly increased these terrains, but their redistribution among the king's followers so reduced them again that an Act of Resumption was passed under Henry III, and during the reign of Edward II an act was in force prohibiting the alienation of Crown lands. The Wars of the Roses and the confisca¬ tions of Henry VIII enlarged the possessions by forfeiture and seizure, but the necessities of James I and Charles I compelled the disposal of the whole estates. These were partially re¬ covered at the Restoration by the sales being declared void. An important constitutional effect was produced by the wholesale granting away of the Crown lands ; being thus deprived of a private income, the monarch had perforce to apply to Parliament and the nation for his income, which was not infrequently granted only on condition of good government. The extravagance of William III led to an act being passed in the reign of Queen Anne (1702-14) by which further alienation was greatly checked, but in 1800 the act was declared not to apply to the private property of the sovereign acquired by purchase or inheritance from any person other than a sovereign of England. In 1910 the Civil List of the king was fixed (after the usual surrender of hereditary revenues, i.e., the Crown lands) at $2,350,000.

CROWN POINT, a town in Essex County, N. Y., on the west shore of Lake Champlain, on the Barge Canal and on the Delaware and Hudson Railroad, 110 miles northeast cf Albany. It has a large park, a library and chapel and a memorial lighthouse erected to Samuel de Champlain. The town manufactures building materials, sashes and doors and has spar mills, grain elevators and a creamery. Crown Point was first visited by Champlain, who fought and defeated the Iroquois there. In 1714 it became an important English trading station. This place, because of its location near a narrowing of the lake, was called Pointe a la Chevelure (Scalp Point) by the French, Crown Point by the English. In 1726 the French es¬ tablished a post opposite, on the east side of the lake; they withdrew in fear of Massachu¬ setts. In 1631, the governor of Canada built a fort there, which they called Fort Frederic. In 1755 at the opening of the final contest, an expedition against Fort Frederic was planned by Governor Shirley of Massachusetts, and led forward by Sir William Johnson; but it got no farther than Fort Edward, and ended in the bloody drawn battle of Lake George (q.v.). In 1756 the French built Ticonderoga farther

down, on the isthmus between Lake Champlain and Lake George; this left Crown Point a second instead of first line of defense, but the two were the chief French frontier posts through the war. In 1756 an expedition from Albany against them was undertaken, but came to nothing; in 1757 Maj. Robert Rogers' rangers attacked them, in numerous raiding parties. In 1759 they were captured by Amherst, Crown Point being abandoned as soon as Ticon¬ deroga was taken. Both posts were kept up by the British, and at the outbreak of the Revo¬ lutionary War were the first thought of the colonists, to open the route to Canada and seize the stores they contained. On 10 May, while Arnold and Ethan Allen took Ticonderoga, Seth Warner captured Crown Point, with over 200

cannon and a quantity of ammunition. The present village of Crown Point is several miles below the point and the old fort. The grounds containing the ruins of Fort Frederic and Crown Point were presented to New York State for a public park in 1910.

CROWN POINT, Ind., the county-seat of Lake County, in the northwestern corner of the State, on the Erie and the Pittsburgh, Cincinnati, Chicago and Saint Louis railroads, about 40 miles southeast from Chicago and 15 miles south of Lake Michigan. Among the note¬ worthy features are the county jail and almshouse, the juvenile home for delinquents and the Carnegie library. The town has grain elevators, wagon works, ironworks and a shirt factory. Pop. (1920) 3,232.

CROWNINSHIELD, Arent Schuyler, American naval officer : b. Seneca Falls, N. Y., 14 March 1843 ; d. 27 May 1908. He was gradu¬ ated at the United States Naval Academy in 1863, and participated in both attacks on Fort Fisher in the Civil War. Later he rose to the rank of captain. During the war with Spain he was a member of the Board of Strategy. In 1900 he was chief of the Bureau of Navigation, with the rank of rear-admiral ; commander European squadron 1902-03 ; a member of the Board of Naval Strategy, and retired 20 March

1903.

CROWNINSHIELD, Frederic, American

artist: b. Boston, Mass., 27 Nov. 1845; d. 13 Sept. 1918. Graduated at Harvard 1866 ; spent 11 years in Europe studying art under Row-

botham, Couture and Cabanel, his first ex¬ hibited work appearing in the Paris Salon of 1878. He was instructor in the Boston Museum of Fine Arts 1879-85, after which he removed to New York, where he was president of the Fine Arts Federation from 1900 to 1909. In 1911 he was appointed director of the American Acad¬ emy in Rome. He was a member of the Na¬ tional Society of Mural Painters. He devoted himself largely to mural painting and stained glass work. His -water colors are greatly ad¬ mired and sought for by collectors. He pub¬ lished (Mural Painting* (1887) ; (Pictoris Car-mina, a Painter's Songs 2 (illustrated by himself, 1900) ; (A Painter's Moods* (1903) ; (Tales in Metre* (1903) ; (Under the Laurel* (1907) ;

(Villa Mirafiore* (1912).

CROWNS AND CORONETS. Crowns may be divided into three classes ; they may be either emblems of royalty, insignia of office or authority, or decorations of honor. The insignia of royalty adorning the heads of the ancient Eastern kings (Assyrian, Babylonian, etc.), which in English works usually are termed crowns, were ribbons or bands of linen or silk (sometimes of thin gold) worn round the head and passing over the temples. These were the diadema. The cidaris of the ancient Persian monarchs was in the form of the Phrygian cap (our cap of Liberty) later copied for the crowns of the old Doges of Venice. The ancient Greeks' crowns of honor were wreaths made from vegetable growths entwined. The Roman Caesars changed the wreaths as insignia into a circlet or ring of metal. . Perhaps the earliest of actual crowns, according to present definition of the term, were those of the Nile kings. The pshent combination of Upper and Lower Nile kingdoms was a true crown as dif-CROWNS AND CORONETS

ferentiated from the wreath or cap of honor. (See Fig. 1). In the 10th century we find the Byzantium emperor with a closed crown (arched over).

Historic Crowns. — A number of regal and imperial crowns of old historic interest are still preserved. The Austrian Imperial Crown (Fig. 2) dates back to 1602 (Rudolf II). The Hun¬ garian (Stephan's crown) also belongs to the Austrian Empire's regalia; it dates back to the

Fig. 1

I. Red crown of Lower Nile. 2. White crown of Upper Nile. 3. Pschent or united crowns of double kingdom.

11th century. The Bohemian crown (<(Crown of Wenceslaus®) is of the 14th century. The crown of Lombardy or ((Iron Crown® dates from the 8th century; it was lost to Austria in 1866, when it was returned to Italy. Most noted of all is the crown of the Holy Roman Empire of Germany.

Descriptions. — The crown of the Holy Ro¬ man Empire is of fine gold. It is in the Hof-burg in Vienna, and was used by Pope Leo III in crowning Charlemagne at Saint Peter's, Rome, in 800 a.d. This crown consists of eight flat plates rounded at the top and rivetted to an inner frame of two iron octagonal rings. Four plates are studded with pearls and polished, but uncut, precious stones (most are pierced, show¬ ing they originate from a pre-Christian neck¬ lace probably). The other four plates show gorgeous enamel pictures depicting symbolic

Fig. 2 — Present imperial Austrian crown.

and allegoric subjects. The arch (diadem) was added by Conrad III in 1147. It weighs seven pounds. The Saint Stephen's crown, known also as the Corona Sancta or Holy Crown oi Hungary (recently used at the coronation of Charles I), was sent (1072) by Michael Ducas, emperor of the Eastern Empire, to Geisa, the 1st Duke of Hungary. Its Byzantine style shows its origin. King Stephen (canonized as saint on account of Pope Sylvester II giving him the

title of (< Apostolic King®) was crowned with this ((Holy Crown.® It is preserved in the castle at Buda-Pesth and consists of a cap of gold surrounded by a circlet of six plaques hinged together. The edge of these plaques is surmounted by five arched and four triangular plates of gold open-work, decorated with im¬ brication (scale) pattern, the openings in the metal being filled in with a green enamel (plique d jour). In the centre, above a plaque, is an arched-shaped plate depicting, in enamel, an artistic ((Christ enthroned.® The plaques form¬ ing the circlet show large polished precious stones set in enamel surroundings and, alter¬ nately, the Archangels Michael and Gabriel, Saints Come, Damian, Demetrius and George, two Greek princes and a king. Two diadems (arches), supporting a plain cross bottone in the apex, are decorated with enamel medallion figures of Saints John, Bartholomew, Thomas, James, Peter and Philip, Paul and Andrew. The cross leans to one side, whether by acci¬ dent or with occult intent is unknown. Three kataseistas (pendant chains) of flat rubies are suspended from the lower edge of the cir¬ clet, two at the sides and one behind after Eastern ancient style. This crown has been used in the coronation of over 50 Hun¬ garian kings. The Bohemian crown, or crown of Wenceslaus, consists of four plates in fleur-de-lis form fastened together by hinges and studded with uncut precious stones. Two arches support a cross and a cap of crimson velvet lines the inside. It is of Byzantine work¬ manship The (<Iron Crown® or crown of Lom¬ bardy, preserved in the cathedral at Monza, is of uncertain origin. The ancient monarchs of Lombardy were crowned with this <(Corona Ferrea,® and Napoleon I, with his own hands, crowned himself with this crown. Charlemagne, as king of the Lombards, was inducted with this circlet. Its name is derived from the

fact that it contains, in its make-up, a narrow wrought iron band, which tradition says was forged from one of the nails taken from the cross on which our Saviour was crucified. The golden circlet to which the iron band acts as interior frame is composed of six plaques about two and one-half inches wide and hinged together. Each plaque has as decoration a setting of jewels surrounded by floral blooms and foliage of chased and enamel work. The diameter of the jewel is but six inches.

English Crowns. — Early Anglo-Saxon crowns consisted of a circlet of gold with up¬ right spikes or points bearing a ball or <(pearl® above. The English kings since Charles II have two royal crowns. One is known as the official Saint Edward's crown and the other is the one used at the coronation ceremony and known as the State or Imperial crown. Saint Edward's crown has two arches (diadems), a circlet with four crosses-patte, four fleur-de-lis alternating. It is composed of gold, enameled and has a few jewels. The present coronation crown of England is of silver or platinum frame closely encrusted with precious stones, some with his¬ toric records, taken from former state crowns. The crown of the present king (George V) differs from that of his father (Edward VII) only in having one of the great Cullinan dia¬ monds (((Star of Africa®) in the circlet. The «State Crown of India,® made for the corona¬ tion of George Vr at Delhi, contains over

6,170 diamonds as well as other precious stones. The bandeau or circlet supports eight arches rising from four fleur-de-lis and four crosses-patte alternating. The arches support a mound

1. Prince of Wales' coronet 2. Ducal coronet

Fig. 3 — English coronets.

with cross-patte. The upper and lower borders of the circlet consist of diamonds ; between these are 16 large clusters, four of emeralds and diamonds alternating with four of sapphires and diamonds, while between each are eight large brilliant clusters, the whole of these being di¬ vided by trefoils. The centrepiece contains a 34-carat Indian diamond of great beauty. The eight arches are formed of 48 large brilliants separated by diamond foliation and enclosed with outer bands of diamonds; their fleur-de- lis and cross-patte bases are of diamonds surrounding magnificent Indian rubies.

English Coronets. — Modern English coro¬ nets formerly enclosed a velvet cap with a tas¬ sel above of bullion ; but these caps are now often omitted in practice. Lodge describes the coronet forms thus : The Prince of Wales' coro¬ net has ((cap of velvet, turned up with ermine and having a tassel of gold.® (This authority's illustrations do not follow his rules strictly, as our illustrations show. Fig. 3). ((Over it is

worn a circlet of gold enriched with jewels; above its upper rim rise four fleur-de-lis and four crosses-patte alternately; from them an arched diadem of gold crosses the head and is finished at top with a ball surmounted by a cross-patte. … It is, in fact, the same as the imperial crown, with the difference of hav¬ ing but one diadem.® Ducal coronet. _ (<The duke's cap is of crimson velvet, lined with er¬ mine, having a gold tassel on the top. His coronet, worn over the cap, is a circlet of gold enriched with jewels, and set around with eight golden strawberry leaves rising from its upper rim.® Marquis' coronet. <(His cap and coronet resemble the duke's, differenced only by four

of the strawberry leaves on the rim being ex¬ changed for as many golden balls.® Earl's coronet. <(His cap is the same as the duke's. His coronet is a circlet of gold enriched with jewels, from which rise eight points surmounted by as many balls of gold, and between them eight small strawberry leaves close to the upper rim of the circlet.® Viscount's coronet. <(His cap is the same as a duke's. His coronet is a circlet of gold enriched with jewels the upper rim of which is surmounted by 16 balls set close together.® Baron's coronet. <(His coronet is differentiated from that of a viscount by hav¬ ing only six balls upon its rim.®

French Crowns and Coronets. — King. A circlet surmounted by eight fleur-de-lis from which arise four arches (diadems) that support a double fleur-de-lis. (Fig. 4). Duke. A circlet surmounted by eight leaves (fleurons). Mar¬ quis. A circlet bearing four leaves (fleurons) ,

Fig. 4 — French royal crown.

a point between each surmounted by a triple pearl cluster. Count. A circlet bearing 16 pearls. Baron. A plain circlet having a cord of pearls wound around it diagonally (tortil) and displaying three windings. Vidame. A circlet surmounted by four crosses patte. Vis¬ count. A circlet surmounted by four large pearls. (Fig. 5).

Fig. 5 — frenck crowns and coronets.

1. Ducal coronet. 2. Marquis' coronet. 3, Count's coronet. 4. Baron's coronet. 5. Vidame 's coronet. 6. Viscount's coronet.

CROWNS

1 The Crown of St. Stephen Used at the Recent Coronation of King Charles of Hungary

2 The Famous Iron Crown of Lombardy

3 The Crown of Mercedes of Spain

~

> i 1

German Crowns and Coronets. — King. 1 he new German king's crown bears close similarity to the crowns of the

crown prince and the archduke. But the

crown prince of the Empire and of Prus¬

sia has a crown similar to the imperial crown (four arches surmounting a mound), the

circlet of eight plates alternating four eagles and four crosses as decoration. (Fig. 6). The German king's (modern) crown has no lining (Futter), whereas the crown prince's and arch¬ duke s has. Electors without sovereign rights bear a coronet with ermine circlet and but one arch (diadem). The ducal coronet has a circlet of ermine and is lined to the top of the arches. The coronet of the prince (Fiirst) not of royal blood shows two crossed arches on a circlet of ermine; often, however, a crown or gold circlet with leaves (like the noble coronet) took the place of the ermine, surmounted with an er¬ mine tail. Count. The last-mentioned coronet, but without the ermine tail, was attribute of a count. The modern count's coronet displays nine pearls. The baron's coronet displays seven and that of the untitled noble, five. (Fig. 7).

The Crown in Heraldry.— Unless otherwise stated, the crown in heraldic blazon refers al¬ ways to a ducal coronet (see Fig. 3). Animals, chiefly as supporters, often carry a coronet on their necks. In such cases*they are blazoned as gorged,, as a hind gorged and chained.

Votive Crowns. — Early Christian kings frequently dedicated their crowns to the Church. From this arose the cult of devoting imitation - crowns to churches to be suspended by chains attached to their upper rim. Such gifts to the Church were known as donaria and the crowns are known as votive crowns. Later, these crowns were often used for illuminating purposes by suspending other chains from the lower rim to support a lamp. Many of these votive crowns of ancient date exist,

but the most noted are the eight massive Gothic gold crowns discovered (1858) buried at Guarazar (Spain). They are beautiful products of the art of the Visigoths and were consecrated in some church in the second half of the 7th cen¬ tury, as an inscription on one of them proves. The largest of these crowns displays an in-

Fig. 6 — Present imperial German crown.

scription that it was' the gi fit of the Gothic king Reccesvinthus, whose reign commenced in 649 and who died 672. (Fig. 8). The four-inch¬

wide gold circlet is set with 30 Oriental sap¬ phires of great beauty, separated by 30 large pearls. Suspended from the lower band by 24

Fig. 7 — GERMAN CROWNS AND CORONETS.

1. Modern king's crown. 2. Archduke's crown. 3. Elector's coronet. 4. Ducal coronet. 5. Coronet of a prince (Furst) of nobility, not royalty. 6. Coronet of the Er-laucht (highness) degree of nobility. 7. Count's coronet. 8. Baron's coronet. 9. Coronet of the lower degree of nobility (Adelskrone) .

small gold chains are large golden letters in cloisonne enamel and set with jewels. They are arranged to form the words : ((Reccesvinthus Rex Offeret® (dedicated by Reccesvinthus, the king). A pendant of gold and pearls, from which is suspended a pear-shaped red sapphire, acts as drop-piece to each letter. Four elaborately wrought chains support the circlet, falling from a double gold floral piece contain¬ ing 12 sapphire pendants. The whole structure is held up by a gold loop passed through finely worked rock-crystal ornament. Other votive crowns are extant, such as those of the princes Agilulph and Theodolind, from the Monza treasure, *etc.*

Corona Lucis. — It was the cult of early Christian monarchs dedicating crowns to the Church and, later, the_ utilizing of these circlets as a point of suspension for lamps, that led to the coronal or corona lucis

— the crowndight.

During the Middle Ages these crown-lights were suspended from the church roof or vault to hold tapers. Some of these were most elab¬ orate and of great dimensions. Several are

Fig. 8 — The gold crown of Reccesvinthus, Gothic king

from 649 to 674.

still extant. (See Chandeliers). Our illus¬ tration (Fig. 9), taken from an old manuscript, displays two votive crowns in a church, a corona lucis between them. See also Corona.

Fig. 9 — Coronae, from an ancient manuscript.

Bibliography. — Note on the Imperial Crown of King Edward VII (Connoisseur,* Vol. VI, pp. 31-32, London 1903) ; (The Royal Crowns of England from the Norman Conquest to the Crown of King George V* (Windsor Maga¬ zine, Vol. XXXIV, 1911, London) ; (The King's Coronation (London 1911, illustrated) ; Jones, Wm., Crowns and Coronations: a History of Regalia* (new ed., London 1902) ; die Kroninsignien des Koenigreiches Boeh-

men) (compiled by Karl Chytel, A. Podlaha, K. Urba, Prague 1912) ; (Topographie der historischcn und lcunst Denkmaele im Koenigreiche) (Boehmen, Vol. III).

Clement Webber Coumbe.

CROWTHER, krother, Samuel Adjai,

Anglican bishop: b. Ochugu, east of the king¬ dom of Dahomey, about 1809; d. Africa, 31 Dec. 1891. He was the first negro bishop of the Church of England. He was carried into slav¬ ery in 1821, but was freed, with a large com¬ pany of his countrymen, by a British man-of-war in 1822; was placed in the mission school at Bathurst and was the first student enrolled in the Fourah Bay College where he subse¬ quently became an instructor. He finished his education in England, where he took orders in the English Church in 1843, became a mission¬ ary at Akessa and accompanied the first and second Niger expeditions, publishing a narra¬ tive of the latter. In 1864 he was ordained bishop of the Niger and filled that place with honor. He published a dictionary and gram¬ mar of the Yoruba language (1852) ; a primer (1860), a grammar of Nupe, and a translation of part of the New Testament into the Yoruba. Consult (Good Out of EviP (London 1852), and (The Slave Boy Who Became Bishop of the Niger) (1888), and a biography by Page (New York 1889).

CROYDON, England, municipal and par¬ liamentary borough in county Surrey, 10 miles south of the heart of London, of which it is practically a suburb ; near the sources of the Wandle and not far from the Banstead Downs; on the London and Brighton Railroad. It is a place of ancient origin, but its recent rapid increase is due to the overflow of Lon¬ don. The municipal borough includes South Norwood and Thornton Heath. It has im¬ portant corn and cattle markets and boot and shoe manufactures. It returns one member to Parliament. Of special interest are the re¬ mains of the ancient palace, long a residence of the archbishops of Canterbury. Pop’. 169,551.

CROZAT, kro’za’, a prominent French family of financiers and art collectors. Pierre, b. 1661 ; d. 1740, was treasurer to the king and his various acquisitions included 19,000 original drawings, 2,000 engravings, 400 paintings, 1,382 intaglios and cameos and a library of 20,000 volumes. At his death, the collections passed to his nephews, Louis-Frangois, Joseph-Antoine and Louis-Antoine, who added many beautiful things. The collection of pictures was finally acquired by Catherine II of Russia. Between 1729 and 1742 a finely illustrated catalogue of the collection was published under the title of Cabinet Crozat.* Consult Mariette, descrip¬ tion sommaire des Collections de M. Crozat*

(1741).

CROZER THEOLOGICAL SEMINARY,

Upland, Pa. (post office, Chester, Pa.). Founded in 1867 by the heirs of John P. Cro-zer. The school is on a large campus and en¬ dowed with buildings and invested funds to the amount of a million dollars. It has a faculty of 12 professors and instructors and a library of about 30,000 volumes. It is under Baptist auspices.

CROZET ISLANDS, a group of four, in the southern portion of the Indian Ocean, be-

tv/een Kerguelen and Prince Edward islands. I hey are all of volcanic origin and the most easterly of them, called East Island, has pre¬ cipitous cliffs on the coast and in the interior lofty peaks, exceeding 4,000 feet. The largest called Possession Island, visited by the Chal¬ lenger expedition in 1873-74, is believed to be about 20 miles long by 10 abroad. The total area is about 200 square miles. They have no permanent population, but are visited by sealion hunters and war vessels. They were both re¬ cently annexed to France. Consult Roth, ‘Crozet’s Voyage to Tasmania) (London 1891).

CROZIER, kro’zher, John Beattie, English philosophical writer: b. Galt, Ontario, 23 April 1849. He was educated at Toronto University, and in 1872 began the practice of medicine in London. He has written (Religion of the Fu-ture> (1880) ; ‘Civilization and Progress) (1885) ; ‘Lord Randolph Churchill, a Study in English Democracy) (1887); ‘History of In¬ tellectual Development (1887-1901); ‘My Inner Life) (1898); ‘The Wheel of Wealth (1906); ‘Sociology Applied to Practical Poli¬ tics* (1911).

CROZIER, William, American military officer: b. Carrollton, Ohio, 19 Feb. 1855. He was graduated at the United States Military Academy in 1876; served for three years in the West, taking part in the campaigns against the Sioux and Bannock Indians ; was instructor of mathematics at the Military Academy in 1879— 84, when he entered the ordnance department; and was commissioned captain in 1890. He in¬ vented a

wire-wrapped rifle, and with General Buffington, a disappearing gun carriage. He took part in the Spanish-American War; and was appointed chief of ordnance with the rank of brigadier-general in November 1901 ; and re¬ appointed in 1905, 1909 and 1913, the detail being for four years. In 1912-13 he was de¬ tailed as president of the Army War College. He is the author of several of the series of 'Notes on the Construction of Ordnance,* which are the textbooks of the Department for the instruction and guidance of its officers. He is of international reputation in all matters con¬ nected with his department of military science.

CRUCIBLE, a vessel used in chemistry and the arts for containing substances that are to be subjected to high temperatures. A good crucible should be capable of withstanding great and sudden changes of temperature without fracture or disintegration; it should not be at¬ tacked by the substance it is to contain ; and it should be infusible at the temperatures to which it is exposed. Numerous materials are used in the manufacture of crucibles, each having its own peculiar advantages and disadvantages. Platinum is an ideal material for many purposes, but it is exceedingly expensive and it cannot be used for the fusion of metals. Nickel is sometimes used instead on account of its cheap¬ ness. Clay, or a mixture of clay with sand, graphite, or old broken crucibles, is a favorite material, and Hessian crucibles, composed of equal parts of clay and sand, are in very, general use. Hessian crucibles are commonly triangular in shape and coarse in texture. They are porous, they fracture easily from sudden changes in temperature, and they will not with¬ stand the action of litharge ; but they are cheap, and will not fuse at any temperature that is

attained in ordinary operations. The clay that is used in the manufacture of crucibles should be "weathered®. for some months, by exposure to air in a moist condition,, in order to effect the decomposition or elimination of certain impurities, such as pyrites, that would be prej¬ udicial to the finished vessel. Graphite is used to a considerable extent in the manufacture of crucibles, especially for those that are to be used for melting metals. Lime crucibles, cut from blocks of well-burned lime, are practically infusible, but they will not stand exposure to air for any length of time, since they absorb mois¬ ture, becoming converted into calcium hydrate, and then disintegrate. Magnesia crucibles are also practically infusible, and are not affected by exposure to the air. A mixture of equal parts of magnesia and bauxite (q.v.) makes excellent crucibles. Alumina (oxide of alumi¬ num) is also highly recommended as a material for crucibles, as it will

withstand sudden changes of temperature quite well, is practically infusible for all ordinary purposes, and is not attacked even by melted sodium. Carborundum is also used.

CRUCIFERiE, kroo-sif'e-re. See Brassicace^e.

CRUCIFIX. See Crosses and Crucifixes.

CRUCIFIXION. The history of cruci¬ fixion as a mode of punishment for crime must be studied as a part of the Roman system of jurisprudence rather than of any Eastern system, Asiatic or Grecian. Greece and Asia had indeed from very early times occasionally resorted to it ; but the practice did not become universal. The Hebrews, for example, adopted or accepted it only under Roman compulsion : under their own system, before Palestine be¬ came Roman territory, they inflicted the death penalty by stoning. At Rome, however, from the period of the Republic until the 4th century (when Constantine, in memory of the Passion of Jesus Christ, abolished this form of punish¬ ment) it was customarily inflicted upon slaves found guilty, of denouncing their masters. Provincial brigands might also be crucified, but the crucifixion of a Roman citizen was never permitted by law.

In art, the cross upon which Christ was nailed has been usually represented as one formed with the vertical staff or post extend¬ ing noticeably above the horizontal beam ; and this harmonizes not only with the description in Matt, xxvii, 37 • — that "they set up over His head His accusation written® — but also with the traditions transmitted to posterity by the earliest Christian Fathers. It seems to us that the choice of the T form by certain piodern painters lacks justification. Certainly the oldest known works of Christian artists indicate the general acceptance of the so-called immisa or Latin form of that symbol which, from the time of the sacrificial death onward, the faith¬ ful regarded as an emblem of divine approval of Christian virtues; and there is no good rea¬ son for supposing that the continuity of interest in the symbol of the Passion was ever wholly broken. Artistic representation and reproduc¬ tion of the sacred theme, however, appear to have been frowned upon until, in the 6th cen¬ tury, the carving of crucifixes began, and, in the 8th, the crucifixion was represented in mosaic. The latter was made for the oratory

that Pope John VII built in the Vatican (a.d. 705), and it exemplifies the artistic treat¬ ment of its theme — especially by clothing the figure of Christ — noted throughout the first period, which extended from the 6th century to the 12th or 13th. It has been well said that in this early period <(The Crucified is shown adhering to the cross, not hanging forward from it : He is alive and shows no signs of physical suffering; He is clad in a long, flow¬ ing, sleeveless tunic which reaches the knees. The head is erect, and surrounded by a nimbus, and bears a royal crown.® We see Christ not suffering but triumphing gloriously on the cross. ((Moreover Christian art for a long time objected to stripping Christ of His garments, and the traditional tunic remained till the 9th century or even later.® But presently realism begins to transform Christian art; the tunic becomes a shorter garment, reaching from waist to knees ; the head droops and is crowned with thorns; the arms are bent back; the body is contorted; the face is wrung with agony; blood flows from the wounds. Usually, but with conspicuous exceptions, realism prevailed during the second period (12th or 13th century onward), and often the living and triumphant Christ gives place to a Christ dead, in all the humiliation of His Passion. The older inter¬ pretation, with derivatives in the second period, may be exemplified as follows : Wholly serene, unmoved, superior to suffering are the 8th cen¬ tury representation in ivory in the Museum of Cividale and the fresco, also of the 8th cen¬ tury, in the church of Santa Maria Antiqua in Rome. Giorgione ((Christ with the Cross5) and Rubens ((Descent from the Cross5) dwell upon His beauty — the former upon the beauty of the face; the latter of the naked body. Tintoretto ((The Crucifixion,5 church of San Cassiano, Venice) represents the Saviour as a robust man who evidently is able to endure anything unflinchingly, almost defiantly, thanks to physical courage.

CRUDEN, kroo'den, Alexander, Scottish biblical scholar: b. Aberdeen, 31 May 1700; d. Islington, 1 Nov. 1770. He was educated at Aberdeen at Marischal College, with a view to the Church, but having exhibited decided symptoms of insanity, he was placed in con¬ finement. On his release in 1722 he went to London, where he was employed as tutor in several families. Previous to 1732 he opened a bookseller's shop under the Royal Exchange, and in 1735 was appointed bookseller to Queen Caroline. His great work appeared in 1737, under the title of

(A Complete Concordance of the Holy Scriptures of the Old and New Tes¬ tament*5 In a pecuniary point of view it was not at first successful, and the embarrassments to which it reduced the author caused a return of a mental malady, which occasioned his being sent by his friends to a lunatic asylum. After his release he instituted an action of damages against those who had confined him, and pub¬ lished an account of his confinement under a whimsical title. He then acted as corrector for the press, and began to believe that he was divinely commissioned to correct the manners of the world. He styled himself (Alexander the Corrector,5 and went about exhorting the people to keep the Sabbath. He also petitioned the king for the honor of knighthood and Par¬

liament to constitute him by act <(the Corrector of the People.55 In 1753 he was again placed in confinement, and again, on being liberated, published an account of his case. Of Cruden's great work, the Concordance, three editions appeared during his life. The pains which he took with it were prodigious, constructing it anew from the foundation, without availing himself of the la*bors of his predecessors, and verifying personally the accuracy of each quo¬ tation and reference. The best edition is by Alexander Chalmers (London 1812; 10th ed., 1824, with a memoir). He was also the author of (A Scripture Dictionary, or Guide to the Holy Scriptures5 ; and (The History and Excellency of the Scriptures.5

CRUELTY, in law, any wilful and malicious conduct which may be dangerous to the health or life of another ; a malicious act causing great pain. Within the past 100 years many statutes have been passed, both in Great Britain and the United States, to protect the helpless, particu¬ larly lunatics, children and domestic animals. The term is important in law also in connection with divorce. Parents who are guilty of cruelty to children may be punished by law or their children taken away from them and put in the care of others. While cruelty to domestic ani¬ mals, except when it amounts to a nuisance, is not a criminal offense at common law, many statutes provide severe punishment for persons guilty of this crime. The earlier laws on the subject were enacted more for the protection of the animals as chattels than for humane principles, but through the influence of philan¬ thropic societies this was remedied not only in the United States but also in Great Britain and other parts of Europe as well. The punishment in the United States is usually by fine or im¬ prisonment. By a statute passed in England in 1900, the same protection is given to wild ani¬ mals in captivity as to domestic animals. See Divorce.

CRUICKSHANK, kruk’shank, Ernest Alexander, Canadian historical and military writer: b. Welland County, Ontario, 1854. He was educated at Upper Canada College, early acquiring an extensive acquaintance with sev¬ eral modern languages. For a few years he was engaged in newspaper work in the United States, but he returned to Fort Erie, Ontario, became warden of Welland County in 1886, police magistrate at Niagara Falls, Ontario, 1893, and was in 1908 military archivist at Ot¬ tawa. In 1899-1904 he was lieutenant-colonel commanding the 44th regiment of militia, and afterward was appointed a district commanding officer. In 1907 he was elected a Fellow of the Royal Society of Canada. His principal publi¬ cations are (Battle of Lundy’s Lane5 (1889; 3d ed., 1894) ; (Battle of Queenston Heights5

(1891) ; (Battlefields of the Niagara Peninsula5 (1891); (A Century of Municipal History5 (1892-93) ; (Battle of Fort George5 (1896) ; documentary History of the Campaigns on the Niagara Frontier in 1812-145 (9 vols., 1896—

1910).

CRUIKSHANK. George, English illus¬ trator and caricaturist: b. London, 27 Sept. 1792 ; d. there, 1 Feb. 1878. Family necessities compelled him when still a child to produce what he could, and the want of careful prelimi¬ nary study at his outset in art affected his

CRUISER

productions through a great part of his career. Hence his defects were chiefly those of taste and these have operated to his being popularly ranked somewhat lower as an artist than his merits deserve. For his drawing was always faithful, precise and felicitous, his facility amazing and his invention inexhaustible. The catalogue of his productions prepared by the keeper of the prints in the British Museum com¬ prises 5,500 articles, many of them recalling Rembrandt's work by their richness in light and shade. The earliest of his drawings known is dated 1799, when he was only seven years of age, and when 15 he was comparatively distin¬ guished. His first occupation was designing illustrations for children's books and popular songs. He contributed also to The Scourge and The Meteor and at about the same time sketches referring to the trial of Queen Caroline. In 1837 Cruikshank commenced in (Bentley's Miscellany) his famous series of etchings on steel illustrative of Dickens' (Oliver Twisty full of pathos, humor and tragic power; the illustra¬ tions for the (Waverly Novels,5 and 15 plates for (Don Quixote.5 Having connected himself with the temperance movement he produced the (Bottle, 5 a powerful series of designs, char¬ acterized, from its subject and the artist's object, by inevitable vulgarity, but pregnant with genius and high moral teaching. In 1830 he tried, to paint and while he could not handle his tools well, he nevertheless displayed here as elsewhere his keen sense of caricature. Of these efforts the best are two: <Cinderella) in the South Kensington Museum and (The Wor¬ ship of Bacchus 5 (National Gallery). In spite of his genius, industry and homely mode of life he never succeeded in acquiring a competency and was compelled in extreme old age to depend on the aid of his admirers. His true life-work consisted in illustrating the costume, manners and vices of the people for a period of con¬ siderably more than half a century. Consult Stephens, (A Memoir of Cruikshank) (London 1891) ; Bates, (George Cruikshank (1878) ; Jerrold, <Life of George Cruikshank (1897) ; (Cruikshank's Water Colors) (1903) ; Cohn, bibliographical Catalogue of the Printed Works Illustrated by George Cruikshank (New York 1914) and a biography by W. H. Chesson (1912).

CRUISER, an armed vessel the prime func¬ tion of which is to gather information and to prevent the enemy from doing likewise, though it may incidentally protect the commerce of its own country or inflict damage on that of another. These vessels are generally built for fast sailing and are well manned. The cruiser rates technically just below the battleship and above the destroyer and gunboat. The battle cruiser carries guns of the largest size, but fewer of them and less armor than the battle¬ ship. The weight thus dispensed with enables it to be faster than the battleship. It can thus both gain information of the enemy before the battle and take part in the battle. The armored and protected cruisers, though still useful, are obsolescent stages in the development of the battle cruiser. An armored cruiser has side or vertical armor and horizontal or deck armor. A protected cruiser has horizontal or deck armor only. A scout cruiser is of mod¬ erate size, with almost no armor, lightly armed,

but of tremendous speed. They are used for reconnaissance. Sometimes in war, merchant steamships of great speed are armed to assist a navy and such vessels are then called auxil¬ iary cruisers. In the Spanish American War cruisers of this class performed services of great importance to the United States Navy. Similar boats, known as commerce-destroyers, have been used by the Germans in the Euro¬ pean War. See United States Navy, The; Warship.

CRUMMELL, Alexander, American col¬ ored Episcopal clergyman: b. New York, 3 March 1819; d. Point Pleasant, N. J., 9 Sept. 1898. His father was a native African and his mother a free woman. He received his edu¬ cation at the Oneida Institute and in 1839 applied for admission to the General Theological Seminary. His request was refused owing to the intense prejudice against the higher educa¬ tion of the negroes. He accordingly went to England in 1849 and graduated at Cambridge University in 1853. He engaged in missionary work in Liberia 1853-73, when he went to Wash¬ ington, D. C., and founded Saint Luke's Church, of which he was rector until 1895. In 1897 he organized the American Negro Academy in New York. He published (The English Language in Liberia5 (1861) ; (The Future of Africa5 (2d ed., 1862) ; (The Negro Race Not Under a Curse5 (1863) ; (The Greatness of Christ, and Other Sermons5 (1882) ; (Africa and America5

(1891).

CRUSADE, Children's. See Crusades.

CRUSADES (Portug. cruzado, ((marked with the cross55), the military expeditions which were sent out by the Christian peoples of the West from the end of the 11th till the latter half of the 13th century for the conquest of Palestine. From the earliest times pilgrims had gone to what, because of Christ's life therein, was called the Holy Land. In 637 Palestine fell into the hands of the Mohammedans, but, though several churches were turned into mosques, Christians were allowed full liberty to come and go to the holy places in Jerusalem for nearly four centuries. In 969 the Fatimite dynasty extended its rule over Egypt and Palestine and with this change of rulers there came an end of the cordial relations. The in¬ sults, and even injuries, that Christian pilgrims suffered aroused bitter feeling in the West. Finally Pope Silvester II (999-1003), one of the best known of the mediaeval popes and famous for his very practical character, issued a call for volunteers for the purpose of freeing the Holy Land. His summons met with no success. In 1073 Palestine came under the con¬ trol of the Seljukian Turks and the conditions there became even worse than before for the Christians. Pope Gregory VII (Hildebrand), in 1074, asked the Western nations for help for their suffering brethren in the East and even suggested to the German emperor, Henry IV, that it would be easy to raise an army of 50,000 for the rescue of the Holy. Land from the hands of unbelievers. The idea of the crusades that had thus been incubating in West¬ ern minds for nearly a century did not come to fruition until 1095, when the awful state of affairs that Christian pilgrims had to encounter in the Holy Land became unbearable. Peter of Amiens, surnamcd the Hermit, saw the terrible

situation while on a pilgrimage to the Holy Sepulchre and succeeded in arousing the interest of Pope Urban II and obtained permission to preach a crusade.

The first great cause of the crusades, then, was the earnest desire to free the Holy Land. It seemed to the mediaeval Christians to be a question of the maintenance of their religious honor that the infidel should not be allowed to occupy the holy places. Other causes conspired for their occurrence just at this period. It was felt by Western rulers, and especially by the popes, that unless the Turks were repressed in the East, they would gradually acquire irre¬ sistible power and eventually invade the West, with hope of success. For the lower classes in the West, on the other hand, life had become almost intolerable because of the oppression of the nobles, the frequent wars and the almost servile duties that feudalism enjoined. As an addition to other causes of dissatisfaction, the harvest had practically failed in the West for several years and the year 1095 proved to be a particularly bad year for farmers and many of those dependent on the land and its products suffered-severely from famine. These material difficulties predisposed the people to risk all in the hope of betterment. There was little chance to rise in the West and the vague opportunities of distant war seemed to promise much. Be¬ sides, the spirit of chivalry had come in and many of the nobles devoted themselves to the cause with the idea that they would thus win favor of the heavenly queen, the mother of the Lord, whose life had been lived in Palestine and whom they had chosen for their patroness. De¬ votion to the Blessed Virgin also caused women to urge their husbands, brothers and other male relatives to join in the holy war for the Chris¬ tian possession of her home. It needed only the intimation of authority to precipitate an Eastern expedition and that came very naturally from the popes as the acknowledged spiritual heads of Christendom. Pope Urban II, having heard Peter of Amiens' story of Christian suf¬ fering in the Holy Land, summoned a council to meet at Piacenza and gave Peter the oppor¬ tunity to address the multitude, which assembled in such numbers that he had to talk in the open air. In the following November 1095, ambassa¬ dors from all the nations were present at a council at Clermont, where Peter's words had so much power that with one voice the multi¬ tude called out <(God wishes it,® and this became the slogan of the crusade.

First Crusade. — In 1096, a number of armed bodies set out in different divisions. Many of these hosts were unamenable to military dis¬ cipline, and, being unprovided with even the necessaries for such an expedition, were prac¬ tically completely destroyed in the different countries through which they had to pass before reaching Constantinople, which had been chosen for their place of meeting. Only a few strag¬ glers found their way home again or succeeded in maintaining themselves for a time until the arrival of the more regularly organized bodies of troops which set out the next year. With this body were most of the distinguished men whose names are associated with this first great chivalric effort to redeem the Holy Land from the infidel. At the head of nearly 100,000 men were Godfrey of Bouillon, duke of Lower Lor¬ raine; Hugh of Vermandois, brother to Philip,

king of France; Baldwin, brother of Godfrey; Robert II of Flanders; Robert II of Normandy, brother of William II, king of England; Ray¬ mond of Toulouse; Bohemond of Tarentum, son of Robert Guiscard; Tancred of Apulia, cousin of Bohemond ; and other heroes. Tancred is the hero of whom so many poets have sung. He was what Chaucer called ((the type of the very gentle perfect knight.® It is this first crusade that has formed the subject of Tasso's Jerusa¬ lem Delivered, > and the poem owed not little of its interest to the fact that it was written while the victory at Lepanto was fresh in the mind of the poet and still well remembered by his readers, for, while the crusades are considered to end with the last quarter of the 13th century, the gathering of the naval force that overcame the Turks under Don John of Austria was really the result of the crusading spirit.

The various armies of the First Crusade gath¬ ered at Constantinople about Christmas 1096. Here they were delayed for some time by the diplomacy of the Greek emperor, who wished to be assured that the immense forces which had come partly as the result of his own request for aid would not prove the ruin of his tottering empire. About Pentecost, 1097, the Crusaders crossed over to Asia by the Strait of Gallipoli, and their first conquest was the town of Nicea in June 1097. Shortly after this, on 4 July, the Crusaders met an Eastern army in pitched battle for the first time, at Dorylseum, and routed and put it to flight. The crusading army now marched through Asia Minor until they reached Antioch. They would probably have been long delayed in the siege of this town but for treach¬ ery which threw it into their hands in June 1098. The citadel, however, remained in possession of the Turkish garrison. Before they captured it, they themselves had to

stand siege in Antioch from a Turkish army which surrounded the town soon after its capture. After three weeks of siege the Crusaders were reduced to a very pitiable condition, but on 28 June they made a vigorous sortie and succeeded, in spite of their famished and exhausted condition, in completely routing the Turkish besiegers. The Crusaders remained nearly a year in the neighborhood of Antioch and only in May 1099 was the march against Jerusalem begun. The siege of the city was commenced early, in June, Finally, after six weeks of a fierce siege, the city was captured by a two days' storming, on 15 July. Godfrey of Bouillon was chosen king of Jerusalem, but humbly refused to wear the king's crown on the spot where the Saviour of the world had worn a crown of thorns. He accepted as his designa¬ tion instead of king that of Defender of the Holy Sepulchre, After scarcely a year of sov¬ ereignty, however, he died in 1100 and was suc¬ ceeded by his brother Baldwin. Baldwin had separated from the main army of the Crusaders while it was in camp in the neighborhood of Antioch and had proceeded to Edessa, This city was in possession of a Christian prince, who was able to maintain himself only with diffi¬ culty against the Mohammedans, Baldwin con-eluded a treaty by which he agreed to aid this prince against the Mohammedans on condition that he himself should be his successor on his death. This treaty was made in February 1098, and, as the Prince of Edessa was killed soon after in a popular insurrection, Baldwin asserted effectually his claims to succeed him and soon

made himself ruler of an extensive territory stretching even beyond the Armenian Moun¬ tains and the plain of Mesopotamia. He was accordingly his brother's natural successor as the ruler in Palestine.

Second Crusade. — In 1144 the Saracens re¬ captured Edessa. This produced great conster¬ nation throughout Europe, because it was feared that the other acquisitions made by the Chris¬ tians during the First Crusade would also fall once more into the hands of the infidels. As a result, Pope Eugenius III called upon Saint Ber¬ nard of Clairvaux to preach the Second Crusade. The two leaders of the expedition were the German emperor, Conrad III, and the king of France, Louis VII. They collected about 140,- 000 men and in 1147 led them to the East. Not¬ withstanding the enthusiasm with which this crusade had been entered upon, for it is recorded that after Bernard's sermon, it happened more than once, that enough crosses not having been provided for all those who wished to assume the cross, that is, to promise to go on the cru¬ sade, Bernard had to cut up his garments in order to supply them, the army failed of its purpose of recapturing Edessa, and indeed only served by its presence still further to weaken the already almost tottering kingdom of Jerusalem. The crusading armies returned to Europe in 1149 and it was nearly 50 years before any other attempt was made to diminish the domina¬ tion of the Saracens.

Third Crusade. — In 1187, Saladin took Jeru¬ salem from the Christians and the zeal of the West blazed out once more. The three principal monarchs of Europe, Frederick Barbarossa, em¬ peror of Germany, Philip Augustus, king of France, and Richard Cceur de Lion, of England, offered to lead their armies in person against the Saracens. Frederick's army succeeded in reach¬ ing the Holy Land only after having overcome an immense Turkish army at Philomelium, 7 May 1190. Not long after his victory Barbarossa was drowned in the river Kalykadnos and this took all the spirit out of his troops. His son Frederick led the army to the siege of Acre, but after his death, in January 1191, the German army abandoned the expedition. Philip and Richard agreed to unite their forces at Messina, in Sicily. Here they

stayed until the spring of 1191. Philip reached the Holy Land on the day before Easter and joined the other Crusaders before Acre. Richard's fleet was dispersed by a violent storm and his wife and mother were detained as prisoners on the island of Cyprus, to which their vessel had been driven, by Isaac Comnenus, the heartless, despotic ruler of the island. On Richard's arrival from Rhodes, where his vessel had been compelled to put in, he succeeded in taking Isaac and his daughter prisoners and had himself proclaimed king of Cyprus. 'Twas not until the beginning of June that he joined the French at Acre. Owing to jealousies between the two monarchs, the French king abandoned the expedition shortly after the fall of Acre. Richard succeeded in many won¬ derful exploits against the Saracens, but was not able to accomplish much in regaining territory. He did not succeed in recapturing Jerusalem, and, though he defeated Saladin at Azoof and captured Jaffa, he at last despaired of the cap¬ ture of Jerusalem and made a truce with Saladin by which the seacoast from Tyre to Jaffa re¬ mained in the possession of the Crusaders, and vol. 8 — 17

Christians were allowed full liberty to visit the Holy Sepulchre.

The Fourth Crusade was due to the zeal of Pope Innocent III. Its chief promoters were Godfrey of Champagne, Baldwin, Count of Flan¬ ders, and Dandolo, the old Doge of Venice, The Marquis of Monteferrat was chosen leader of the expedition. The Crusaders assembled at Venice and were induced by Dandolo to attack Zara in Dalmatia, a town which had formerly belonged to the Venetians but which had re¬ nounced its allegiance. This was contrary to the wish of the Pope, who excommunicated the Crusaders for their failure to fulfil their vow of proceeding to the Holy Land, News now came to the Crusaders' camp that there was a revolution in Constantinople and their aid was asked for one of the claimants to the throne, Dandolo seems to have been mainly responsible for encouraging the Crusaders to accept the invitation to proceed to Constantinople, and as a result the crusade was entirely diverted from its original purpose. In 1203, Constantinople was taken by the Crusaders, who established therein a Latin empire.

Children's Crusade. — The failure of so many expeditions to the Holy Land proved very discouraging and people began to wonder if there was not some cardinal fault in the make¬ up of the parties that went on the Crusade. It began to be said that the Holy Land would never be captured, except by those who were innocent. Accordingly, when

Stephen, a French peasant boy, in June 1212, began to preach a children's crusade, he made many converts to his opinion that possibly children might accom¬ plish what adults had failed in. Some 30,000 French children are said to have taken part in the expedition. A like movement began in Germany and soon proved to have almost as great a following. Over 20,000 German chil¬ dren crossed the Alps into Italy. Both expedi¬ tions, as might have been expected, came to grief. The French children were tempted on board vessels by designing slave merchants in Marseilles, and many of them were sold into slavery. Many of the German children lost their lives through the hardships they had to endure on the march. Some were lost at sea and some settled down here and there through¬ out Italy.

These expeditions represent a phase of that tendency to psychic contagion that sometimes comes over even intelligent people in an in¬ explicable way, and it is from this standpoint that they have been very much discussed in recent years. The Children's Crusade corre¬ sponds to the witch baiting of more modern times, or to some of the many spiritual mani¬ festations of older periods. Some doubts have been thrown on phases of the history of the Children's Crusade, as for instance the fate of the French children, but there seems good reason to believe the account given here to be correct. Consult Winkelmann, (Geschichte Kai¬ ser Frederichs IP and Rohricht's article in (Sy-bels Histor. Zeitschrift,* (1876). In English there is the popular account by Gray, (The Children's Crusade) (New York 1871), and in French, Des Essards, (La croisade des enfants* (Paris 1875).

Fifth Crusade. — After an interlude of five years, after the Children's Crusade, a Hungarian expedition went to Egypt and captured Dami-

etta. There was so much disaffection among the Crusaders themselves, however, that the expedition had to be abandoned. This is some¬ times spoken of as the Fifth Crusade. What is more usually called the Fifth Crusade was led by Frederick II of Germany and owed its inception to Pope Honorius II and to Pope Gregory IX. A pestilence broke out in the army just as it was ready to sail and this de¬ layed the expedition. Frederick seems to have lost heart after this and retired to Pozzuoli, near Naples, thus incurring the displeasure of Pope Gregory IX, who put him under a ban of excommunication. The next year, nevertheless, Frederick went to the Holy Land and without giving battle succeeded by negotiation with the Sultan in securing for himself the kingdom of Judea, only on condition, however, of tolerating in this kingdom the Mohammedan religion. He was crowned king and concluded a truce with the Sultan for 10 years ; but this was soon broken.

The Sixth and Seventh crusades were led by Saint Louis IX of France. He considered that the centre of the Moslem dominion was in Egypt and he resolved to strike his blow there. He laid siege to Damietta and captured the city in June 1249. In his march up the Nile, how¬ ever, his army became involved in the mazes of swamp and streams of the river and was defeated. Forced to retreat, it was overtaken by the army of the Sultan, where resistance was hopeless, and the king and his whole army had to surrender. Louis's ransom was the city of Damietta. After waiting for a time for reinforcements, he returned home. Twenty years later the saintly king undertook the Seventh Crusade. He landed his army in 1270 on the northern coast of Africa and after a large number of his knights had perished, he himself died before Tunis. Peace was con¬ cluded and the French Crusaders returned home. About the same time an English army under Prince Edward, afterward Edward I, proceeded to Syria. Finding that little could be accom¬ plished, they concluded a truce for 10 years and then returned to England. For about 20 years after this, the remnants of the Latin kingdom in Palestine succeeded in maintaining themselves independent. Acre was captured by the Sultan of Egypt in 1291, just 100 years after it had been originally taken by Richard Coeur de Lion, and this obliterated the last remnant of the kingdom that had been founded by the Crusaders.

The results and significance of the crusades for western Europe, and

indeed, for the civilized world of all after times, are out of all propor¬ tion to the little that was accomplished in Palestine. The result of the intercommunica¬ tion of nations caused by a series of joint en¬ terprises could scarcely fail to bring with it broadening of views and the intellectual de¬ velopment consequent upon friction of minds trained so differently. In merely material prog¬ ress, the most noteworthy effect was upon com¬ merce. The use of many Eastern luxuries was introduced into Europe, and as a result the cities of Italy especially acquired commercial import¬ ance. The commercial spirit thus aroused and the impetus of the later crusades gave rise to the Hanseatic League, which marks the first great step in modem commercial progress. In every branch of art and knowledge the effect of the

crusades soon became evident. There has been in recent times a renewed interest in the 13th century. There are some who do not hesitate to say that the 13th is one of the greatest of centuries because of what it rep¬ resents of accomplishment in the arts and of development of the human mind as well as the rise of human liberty. Nearly all of the move¬ ments that led up to such accomplishment can be traced to the crusades. In the East, the Europeans had come in contact with Arabian philosophy and Arabian mathematics, and the consequence was an interest in these subjects that spread very widely and that eventually gave rise to the university and even to the develop¬ ment of such advanced physical science as was taught by Albertus Magnus and Roger Bacon. The interest of the Crusaders in Byzantine architecture and arts led to the development of a taste that soon created a demand that must be satisfied. Gothic architecture has been traced to Eastern influences. The other great arts of the 13th century, statuary, stained glass work¬ ing, book illumination, metal working in its various forms and needlework, all owe their inspiration to Eastern sources. That they were developed quite beyond the models that had been sent by Europeans is due to the fact that the generations following the crusades had tra¬ ditions of accomplishment that led them to raise their genius to the highest possible point of accomplishment. Great political benefits in the crusades must not be overlooked. Many of the nobility lost their lives and many more lost their fortunes and their power, and as a con¬ sequence government became more centralized and national. This was especially true in France, and as a consequence peace was easier to maintain. The honors conferred on many of the Crusaders gave them opportunities to rise such as they would not otherwise have had. The distribution of wealth brought about by the heavy expenses that were incurred gave

opportunities for many of the poorer classes' to enter into industrial and commercial occupa¬ tions. The very independence of mind that had been acquired by the distant expeditions created a spirit of enterprise and made men much more ready to try far-off adventures and even com¬ mercial speculations, than was the case before. Undoubtedly to the crusaders is owed more of what is distinctive in modern Europe than to any other connected series of human events.

Bibliography. — The literature of the cru¬ sades is very extensive, and only a few of the principal titles can be given. The most im¬ portant collection of sources is the (Recueil des historiens des croisades,* of which 15 volumes have been published (Paris -1841 et seq.). Con¬ sult also Bongars, (Gesta Dei per Francos) (Hanover 1611) ; Villehardouin and De Join-ville, (Chronicles of the Crusades) (1908) ; Brehier, (L'Eglise et l'Orient au Moyen Age> (Paris 1907).

James J. Walsh,

Author of cThe Thirteenth, the Greatest of Cen¬ turies, J *etc.*

CRUSHING AND GRINDING MA¬ CHINERY. This article describes the class of crushers and grinders used to break up and reduce rock, stone, ore pigments, etc., to frag¬ ments or to powder.

Crushing machines are used for purposes of

»5&

coarse reduction. They consist of various forms of “stamps® or stamp-mills, crushing rolls, gyratory crushers, etc., and are employed to reduce metal ores for subsequent treatment by the processes of amalgamation and concen¬ tration ; for stone-breaking as for road-metal, and for crushing coal and coke.

For preliminary crushing, that is, for pre¬ paring material for finer crushing by various forms of stamps, rolls and rotary mills such as those described in detail under the title Mining and Milling Machinery, the types of machines usually employed are the jaw crushers and the gyratory crushers. Of the former, the “Blake,® the “Dodge,® and the “Buchanan® crushers are among the most familiar and extensively used types.

Sectional Side View

Fig. 1.

Fig. 1 illustrates a vertical section and a top view of a “Buchanan® stone crusher. It consists of a cast steel frame carrying two steel jaws, one fixed and one movable, which are arranged to form a V-shaped opening. The movable or swing jaw is hinged at the top and is connected with suitable mechanism by which it is alternately pushed forward and backward, to and from the fixed jaw, thus alternately reducing and enlarging the V-shaped opening. The material to be crushed is introduced at the top of the opening, and is reduced by the reciprocating motion of the swing jaw to a size fine enough to allow it to pass through the smaller outlet at the bottom of the opening. The adjustment to crush fine or coarse is made by means of removable steel liners placed be¬ tween the planed surfaces of the frame and the main toggle block. The stroke is adjusted by means of jaw liners of steel placed between

the top of the main toggle bearing and the bottom of the steel lugs cast on the frame so that the angle of the toggle can be increased for lengthening the stroke, or it may be flattened to diminish the same. For increasing the stroke one or more liners are added, and by this means a variation of about 50 per cent is ob¬ tained in the throw of the jaw. The receiving openings of these crushers range in size from l/2 x 3 inches to 24 x 30 inches; their weight ranges from 160 to 60,000 pounds; they require from 4 to 65 horse power to operate them at 250 revolutions per minute, and are capable of re¬ ducing the rock supplied to them into fragments ranging from 1 to 3 inches in size at a rate ranging from 4 to 35 tons per hour, according to the size of the machines. The capacity of a rock breaker depends on the distance between the jaws, and the number of revolutions of the power wheel. The amount of product is also affected by the kind of rock, the hard, brittle variety will go through faster than the sand-

RELATIVE HARDNESS OF ELEMENTS AND ORES

Element or Ore

Hardness

Diamond .

Brittle .

10

Iron. .

Malleable .

4 to 5

Platinum .

Malleable .

4 to 4.5

Arsenic .

Brittle .

3.5

Antimony .

Brittle .

3 to 3.5

Gold … .’ .

Malleable .

2 . 5 to 3

Silver .

Malleable .

2 . 5 to 3

Copper .

Malleable .

2 . 5 to 3

Bismuth

Brittle .

2 to 2 . 5

Sulphur …

Brittle .

1 . 5 to 2

T.ead .

Brittle .

1.5

Graphite

Inelastic .

1 to 2

Corundum .

Brittle to tough …

9

Beryl .

Brittle .

7 . 5 to 8

Wolfram .

Brittle .

7 . 2 to 7 . 5

Quartz .

Brittle to tough …

7

Garnet .

Friable to tough . .

6.5 to 7.5

Tron Pyrit.e

Brittle .

6 to 6 . 5

Mflcynpf.ir Iron Ore

Brittle .

5 . 5 to 6 . 5

Copper Pyrites

Brittle .

3 . 5 to 4

Mispiclcel

Brittle .

5 . 5 to 6

Horn hi end e .

Brittle .

5 to 6

Fluor Spar .

Brittle .

4

Magnetic Pyrit.ft .

Brittle .

3 . 5 to 4

Dolomite .

Brittle .

3 . 5 to 4

Spathic Tron

Brittle .

3 . 5 to 4

Malachite .

Brittle .

3 . 5 to 4

Mica .

Laminated .

2 . 2 to 5

Gray Copper .

Rather Brittle .

3 to 4

Cerrusit.e

Very Brittle .

3 to 3.5

PTeaw Soar

Brittle .

2 to 2 . 5

Gopper Glance

Brittle .

2 . 5 to 3 . 5

Galena .

Brittle .

2 . 5 to 3

Ruby Silver Ore

Brittle .

2 . 5 to 2 . 75

Silver Glance

Malleable .

2.5

Syl van i t.e .

Brittle .

1 . 5 to 2

Talc

Inelastic .

1 to 1 . 5

stones and other tough rock. The accompany¬ ing table of “Relative Hardness of Elements and Ores® will serve to give a general idea of the relative powers required to crush them. It is important to note, however, that the power required will depend very much on the relative proportions of the mineral to the gangue matter; for example, galena may occur in a quartz gangue, and if the proportion of galena is very large, the hardness of the ore will be near the scale for galena as shown in the table ; but, if the proportion is very small, the hardness of the ore will be near the scale for quartz.

Compounds of the heavy metals, such as gold, silver, copper, lead, etc., are soft, their hardness rarely exceeding 2.5 to 3; while that

of the compounds of the arsenides and oxides of iron, nickel and cobalt are relatively hard, ranging from 6 to 6.5. Most of the sulphides, carbonates, sulphates and phosphates are soft. The conspicuously hard minerals are found chiefly among the oxides and silicates. The weights of the various ores differ within very wide limits. A spongy dry quartz containing

Top

She//

Hopper

Gyratory Shaft

Counter

Shaft

Fig. 2.

very little metallic sulphurets is naturally much lighter than a wet dense quartz heavily charged ith galena. Broken quartz sent to the mill generally ranges from 15 to 22 cubic feet per ton, and a convenient size of truck for handling the same is one having a capacity of about half a ton.

Gyratory Crushers. — In these machines, the crushing elements consist of an inverted hollow frustrum of a cone within which an upright frustrum of a solid cone is given a gyratory motion by a vertical shaft connected with a counter shaft operated by a suitable propelling mechanism. The vertical shaft is hinged at the top, and the material dumped into the hopper is crushed in the annular space between the walls of the two cones until it is fine enough to pass down and out of the openings at the bot-

Fig. 3.

tom. The McCully and the Austin gyratory crushers are among the best representatives of this _ class of machines. Fig. 2 illustrates a vertical cross section of the Austin crusher. These machines are adapted to produce a much finer grade of crushed material than those of the jaw crusher type.

Crushing rolls are made in a great variety

of forms, and are used for the production of a much finer grade of crushed material than that obtained by the use of the machines already described. In some of them the rolls are

equipped with removable steel teeth. Such ma¬ chines are used by the smelters for the coarse crushing of slag shells from slag cars and pots. Other forms have corrugated rolls, while the coal crushers and the

coke crushers and sizers have rolls equipped with teeth of special design adapted for the crushing and sizing of the product according to the sizes demanded by the

Fig. 5.

industrial and commercial trades. Coal crushers are described in detail under the title Coal Mining Machinery, while Fig. 3 illustrates a “Jeffrey® coke crusher and sizer. It is equipped with a feed hopper the form of which may be arranged to suit any required condition, and the rolls are made in segments with re¬ movable teeth, as shown by Fig. 4, or of inter¬ changeable tooth rings, as shown in Fig. 5.

An external view of a set of plain crushing rolls is given in the article under the title Mining and Milling Machinery, together with a general description of the same, but Fig. 6,

showing a sectional view of a (<Humphreys® crushing rolls, is introduced here to convey a more detailed idea of the internal arrangement of the principal parts of these machines. Va¬ rious forms of roll crushers are also used for crushing sugarcane and other fibrous mate¬ rials.

Other forms of crushers in common use are the <(coffee mills,® which, while resembling the gyratory crushers, yet differ from them in that the vertical shaft has only a simple rotary mo¬ tion without gyration ; the (<edge runner® crush¬ ers consisting of a vertical axle which carries a number of radial arms with heavy metal wheels attached to their outer ends. The rota¬ tion of the vertical axle causes these wheels to travel in a circular track on the bottom of a metal trough containing the material to be crushed; and sausage mills consisting of a longitudinal shaft carrying radial teeth which intermesh with similar teeth projecting from the inside of the cylindrical containing shell.

Grinding and pulverising machines are used in many processes to reduce the products of

the crushers. They are commonly known as mills, and are necessarily of a different char¬ acter and of lighter construction than the crush¬ ing machines.

In the simple mill-stone mill, two stones set vertically one above the other, one fixed and the other rotated by a vertical shaft, are placed face to face. Usually the upper stone is the movable one, and has a central hole into which the material to be ground is fed. As this stone is revolved, the material is ground between the stones and passes out through grooves in their faces to the edge, where it is caught by a suit¬ able receiver.

The best representatives of the ore-grinding machines are the ˆHuntington® and the (<Chilian® mills. Fig. 7 shows a partly

sectional de¬ tailed view of a Huntington mill. The ore and water fed into the mill at the hopper is thrown against the ring-die by the rotating rollers and scrapers, where it is crushed by the centrifugal force of the rollers to any desired degree of fineness, and then discharged through the screens in the form of a fine pulp suitable for concentration.

Fig. 8 illustrates a ((Davis® Chilian mill. It consists of a heavy cast iron pan with an annu¬ lar die. The periphery of the pan is provided with screens. A vertical driving shaft is jour-

Fig. 8.

naled in the centre of the pan and is driven from below by bevel gears on a countershaft connected with the driving pulley. Three crush¬ ing rolls are driven from the vertical shaft by axle bearings so designed as to allow the roll¬ ers to swing in a vertical plane. The material to be crushed is delivered into a central hopper carried on the driving shaft, and is distributed by suitable spouts in front of each roll. Scrap¬ ers are provided to prevent packing, and ensure proper circulation for the screens.

Other forms of machines used for fine grinding are the <(pebble mills,® <(tube mills,® and (<ball mills.® Of these, there are two principal types — those in which metallic balls of hard¬ ened steel, comparatively large in size, travel around a fixed track, and those in which the balls revolve loosely in a rotating drum. In

Fig. 9.

the former the material is ground between the rotating balls and the path on which they travel, and in the latter, by the constant movement and fall of the balls which arc fed into the mill

with the material. In many forms of these machines pebbles of flint are substituted for the balls of hardened steel.

Fig. 9 illustrates the general form of a peb¬ ble mill. The principal dimensions are as fol¬ lows : The size of the cylinders range from

30 x 19 inches to 6 x 8 feet ; the charge, taking sand as the unit of measure, ranges from 120 to 4,000 pounds ; and the size of pulleys range from 24 x 4 inches to 36 x 12 inches in diam¬ eter. These machines require 1 to 18 horse¬ power to drive them in dry-grinding, and from one-half to nine horse-power, in wet-grinding at cylinder speeds ranging from 44 to 13 revo¬ lutions per minute.

Fig. 10 illustrates a tube mill of the ordinary type. The general principle of grinding em¬ ployed is similar to that of the pebble mills, but with the difference that the material to be ground in the tube mill is fed at one end, and delivered as a finished product at the other end, its fineness being regulated simply by the speed at which the material is fed into the machine. As every particle of the material must pass under the grinding action of the entire charge of pebbles, a thorough and uniform grinding is the result, and the use of sieves is unneces¬ sary.

Fig. 11 shows a vertical cross-section of an «Abbe» ball mill.

Jar-mills, consisting of porcelain jars in which pebbles are rotated together with the material to be ground, are extensively used for the grinding of paints, ink and other chemical compounds. They are composed of one or more grinding jars. Fig. 12 shows a machine of the single jar type. Its outside dimensions are about 12 x 13 inches ; it uses a charge of porce-

Fig. ll.

lain balls weighing about 22 pounds ; and is capable of grinding up to 15 pounds at a charge, when running at 50 revolutions per minute.

Impact pulverizing machines are represented by the “Max® mills and various forms of <(Raymond® pulverizers. The principle employed is

that of percussion, the working device consist¬ ing of a vertical shaft attached to a carrier pro¬ vided with hardened steel beaters. As the material is fed into the mill it is thrown by cen¬ trifugal force against a hard iron plate, the particles at the same time being thrown into violent contact with each other. Equipped with vacuum air separators they are extensively and economically used for the reduction of all kinds of dry colors and chemicals, and for the threshing, cleaning and separating of tobacco stems.

The mechanical apparatus required to effec¬ tively apply this system of air separation should be capable of satisfying the following condi¬ tions : (1) To expand and rarify the air so that the coarser particles will fall out of the current and allow it to deliver the impalpable powder at the discharge spout. (2) When a large out¬ put of the finely ground material is required per hour, the apparatus should be capable of using an amount of air sufficient to lift the total weight of the charge of raw material. (3) When using a large volume of air, sufficient room should be provided for its expansion and rarefaction so as to obtain a current light enough to carry away the impalpable powder

only. (4) The apparatus should be so con¬ structed that the coarse particles will fall out of the light air current gravity into the con¬ tracted portion of the separator where the blast is stronger, and thus pass out through the tail¬ ing spout or into the pulverizer to be re¬ ground, without being accompanied by any of the fine powder. (5) The air space within the apparatus should approach as near as possible to a perfect vacuum.

As the fineness of the product depends upon the size of the separator, almost any limit of grinding is readily obtained by making the apparatus of sufficient size to produce the proper relative expansion and rarefaction of the air. When it is desired that the finished product should be an extremely fine powder, the use of the large-sized separators will give the best results; but, for products of medium grades of fineness, and large output, the smaller ma¬ chines with fan and dust collector attachments are the most effective.

Fig. 13 illustrates a Raymond impact pul¬ verizer and vacuum separating plant as erected for the cleaning and separating of tobacco stems. The material is fed to the machine bv the operator in a manner similar to the feeding

of a threshing machine. The perforations of the screen surrounding the pulverizing cylinder vary in size in proportion to the fineness de¬ sired. As the stems come in contact with the rapidly revolving beaters, the particles of the leaf are liberated therefrom, and passing through the screens with the stems are caught by the air current and drawn up into the sepa¬ rator, which expands the air so that all the light pieces of stems drop back and are discharged through the opening at the bottom into the drag elevator. The particles of leaf drop into the centre cone of the separator and discharge from the spout, while the dust is carried through the fan into the dust collector and discharged therefrom.

Arrastra Machinery. — Arrastra plants are employed for the reduction of metallic ores into a fine pulp which is subsequently treated by the patio or some other process and the pure metal separated from the accompanying impuri¬ ties. The bottom of the arrastra is paved with stone 10 x 10 inches square, made of the best granite and set vertically to the depth of about three feet in the ground. The outside is con¬ structed of flat stones which project from 18 to 30 inches above the floor. Line shafts driven by engine power extend over this floor and operate poles or arms which revolve and move the ˆdragging stones® over the granite floor and thus accomplish the reduction of the ore fed into the arrastra to a fine pulp. These

stones are made of the best granite, and range in weight from 11,000 to 25,000 pounds. The ore is first prepared by being passed through the jaw-crushers of a primary crushing plant. From these machines it

passes through a set of crushing rolls and is dropped automatically into revolving screens which separate the fine pulp from the coarser grindings. The last-named material is sent back and passed again through the crushing rolls until all of the pulp is fine enough to be finally treated in the arrastra. Each arrastra requires about six horse-power for its operation, and range in crushing capacity from 6 to 10 tons each, per 24 hours, according to the character of the ore.

For other forms of crushing and grinding machinery, and their special application, see articles under the titles Brick Making Ma¬ chinery, Coal Mining Machinery and Min¬ ing and Milling Machinery.

CRUSIUS, kroo-ze-us, Otto, German phi¬ lologist : b. Hanover, 20 Dec. 1857. He has been a professor in the University of Heidelberg and at Miinchen (1903). He has written among other works (Musiktheorie und Musikge-schichteC (Zur griechischen Religionsgeschicte> (1886) ; (Untersuchungen zu den Mimiamben des IIerondas) (1892) ; and has also edited (Philologus; Herondas) (1901); (Fabeln des Babrius) (1897); (Griechische LyrikeU (1897).

CRUST OF THE EARTH, a term for¬ merly in much use to indicate the solid shell of the earth that covered the supposed molten interior. More recently it has come to be be¬ lieved that the earth is probably solid through¬ out, and the term Crust has lost its original significance, and is not much used by scientists, though it is still widely retained popularly for what is more properly called the lithosphere. For the conditions that obtain in the lithosphere see Rock Flow age; Rock Cleavage; Faults; Joints; Mountains; also Geology, Geognosy .

CRUSTACEA, krus-ta'she-a, a primary group (phylum) of animals represented by the barnacle, lobster, crayfish, shrimp and crab. Crustacea differ from other arthropod animals. The body consists of about 20 segments which in the more specialized forms are grouped into two regions, the head-thorax (cephalothorax) and hind-body or abdomen. The segments of the cephalothorax are fused together so that the limits between the segments are lost, and the whole mass is protected by the shield or cara¬ pace. The skin is thick and rendered solid by the deposition of lime (carbonate and phos¬ phate), so that the integument forms a dense crust, hence the name Crustacea. They differ from trilobites and king crabs in having two pairs of antennae, while they breathe by means of gills attached to the legs. Like the other marine arthropods named, , they have legs which are divided into two divisions, an outer (exopodite) and an inner (endopodite) . Crus¬ tacea differ also from the Pateeopoda (trilo¬ bites, merostomes

and arachnids) in the high degree of specialization of their appendages, there being three to six kinds, with correspond¬ ing functions, while in the trilobites, so far as we know, the single pair of antennae are suc¬ ceeded by numerous (over 20) pairs of legs, all of the same shape and functions. In the head-thorax, besides the antennae, there is on each side of the mouth a pair of mandibles,

each with a palpus, two pairs of maxillae or accessory jaws, which are flat, divided into lobes, and of unequal size; three pairs of foot-jaws (maxillipedes), which differ from the max¬ illae in having gills like those on the five follow¬ ing pairs of legs. There are thus 13 pairs of cephalothoracic appendages, indicating that there are 13 corresponding segments ; these, with the seven abdominal segments, indicate that there are 20 segments in a typical crustacean. There are six pairs of swimming legs (swimmerets), the last very broad in the lobster and shrimp, with the telson forming the ˆtail-fin.®

The Crustacea as a rule respire by gills. These, as in the lobster and crab, are com¬ posed of a series of little filaments into which the blood flows to be aerated. The filaments branch out from a common stalk which grows out of the basal joint of the five pairs of legs and the three pairs of foot-jaws. These gills are folded up toward the back, and are contained in a sort of chamber made in part by the carapace. In shrimps, lobsters and crabs the sea-water passing into the cavity between the body and the free edge of the carapace is afterward scooped out through an opening or passage on each side of the head by the movements of mem¬ branous flaps called ˆgill-bailers.® The diges¬ tive organs are well developed, especially the fore stomach, in the hinder part of which are several very large calcareous teeth for crushing the food, serving, when closed together, as a strainer through which the partly digested food presses into the long slender straight intes¬ tine, which ends in the telson. The liver is very large, as in all marine arthropods, or in such terrestrial types as the scorpions and spiders, which are derived from the king crabs. The brain of the higher Crustacea is very com¬ plex, corresponding with the

complicated reflex movements of an animal composed of so many segments, and bearing such a complicated series of appendages devoted to so great a variety of functions. The eyes are usually compound or many-faceted, and are mounted on freely mov¬ able stalks. The ear is a sac in the basal joint of the smaller or second pair of antennae. The organs of smell are usually well developed, as Crustacea mainly depend on this sense in find¬ ing their food. These consist of minute delicate sensory rods on the smaller antennae. The hairs fringing the mouth-parts and legs are often deli¬ cate tactile organs. The green glands in the head function as kidneys, and open out at the base of the larger antennae.

With only a single known exception (Squill a), Crustacea carry their eggs about attached to the swimming or other legs. The eggs of some crabs (Neptunns) are minute and excessively numerous, their number amount¬ ing to millions, w'hile the lobster may produce from 20,000 to 80,000 eggs. Crustacea pass through a well-marked metamorphosis, nearly all (except the amphipods and isopods) hatching from the egg as a larva called (<nauplius,® which has an oval non-segmented body, with three pairs of appendages, by which it swims about at the surface of the sea. After a series of molts, at each of which new segments with their appendages arise, it finally reaches matu¬ rity. The shrimps and crabs hatch in a more advanced larval stage called <(zoea,® the nauplius stage being partly suppressed and thrust back into the embryo period. The zoea has a head

and abdomen, but no thorax : this, however, is developed later, and after a series of molts the parent form is attained.

The process of molting is a precarious one, not infrequently resulting in death. The crust being too solid to admit of a continuous growth, and increase in size being rapid, frequent sheddings of the skin are necessary. In the lobster, the old skin being detached from the under cellular layer by the secretion of the new cuticle beneath, ruptures between the thorax and abdo¬ men, and the lobster draws itself out of the rent, shedding not onlv the entire skin and every hair, but also the lining of the mouth, throat and fore stomach, and likewise the out¬ let of the intestine. In about three weeks after the casting of the shell the new one becomes solid and hard. In the crayfish the old skin is loosened and pushed away from the cellular layer beneath by the growth of temporary, short stiff hairs, which disappear after the skin is shed.

The Crustacea are a very ancient type. The earliest remains are found in the Cambrian rocks, but are very scanty compared with the trilobites. They comprise traces of barnacles, Ostracoda or small shelled forms, Phyllocarida, and an obscure form supposed to be allied to the modern freshwater Apus. In the Devonian Period shelled phyllopods (Estheria) appeared, and in the Carboniferous arose an order (Syn - cardia), represented by an ancient form (Anas - pides) still living in a lake in Tasmania. From this group the existing Schizopoda or opossum shrimps (Mysis), the Squilla, and the ordinary shrimps and crabs, are supposed to have de¬ scended. Isopoda also appeared as early as the Devonian. A shrimp-like Crustacean occurs in the Devonian, and true crabs date from the Jurassic.

The Crustacea are divided into 11 orders, the Branchiopoda, Phyllopoda, Ostracoda, Copepoda, Cirrepedia or barnacles, Arthrostraca, Cumacea, Phyllocarida, Syncarida, Schizopoda, Stomatopoda and Dccapoda. More than 5,000 species are known. See Barnacle; Crab; Fish Lice; Hermit Crab; Shrimp.

Bibliography. — In addition to general text¬ books, consult Huxley, (The Crayfish) (London 1880) ; Kingsley, (Crustaceaˆ in Standard Natural History (Vol. II, Boston 1884) ; Stebbing, (A History of Crustacea) (London 1893) ; Smith and Weldon,' (Crustacea, > in Cambridge Natural History (Vol. IV, London 1909); Cai¬ man, (Life of Crustacea* (New York 1911).

Ernest Ingersoll.

CRUTCHED FRIARS. See Orders, Re¬ ligious.

CRUVEILHIER, krii'va'li-a', Jean, French anatomist: b. Limoges, 9 Feb. 1791; d. Jussac, 6 March 1874. He obtained in 1824 the chair of pathological anatomy in Montpellier and in 1826 in Paris. He published an important work (Essai sur l'anatomie pathologique en general* (1816); and an expansion of this in five vol¬ umes. . His other works include (Anatomie De¬ scriptive } (in 3 vols., 1833-38) ; (Anatomie du systeme nerveux de l'homme) (1845).

CRUZ, kroos, Cano y Olmedilla, Ramon Francisco de la, Spanish dramatic poet: b. Madrid 1731 ; d. 1799. He rescued the native Spanish drama from an inundation of French influence. A marvelously prolific writer, he

Fig. 1 Harvest Bug 2 Hedgehog Tick 3 Cheese-Mite 4 Itch Animal 5 Bear Animalcule 6 Linguarulina 7 Sea-Spider 8 Land-Crab 9 Frog-Crab 10 Spider-Crab 11 Wooly-Crab 12 Purse-Crab

14 Plated Lobster 15 Spiny Lobster 16 Crayfish 17 Prawn 18 Squill, or Mantis Shrimp 19 Freshwater Shrimp 20 Hermit Screw 21 Caprella 22 Isopod 23 Wood-Louse 24 Sphaeroma

25 Fish-Louse 26 Icne 27 Limulus, or King Crab 28 Trilobite 29 Apus, or Shield-Shrimp 30 Water-Flea 31 Cypria 32 Cyclops

13 Albunea

produced some 500 pieces in all departments of dramatic composition. Classical drama, comedy, farce, zarzuela and a mixture of classical drama, more especially of the French school; and he translated and adapted plays from Italian and French. But he gradually learned to trust him¬ self. So prolific was he, so devotedly did he work and so endless were his literary and dramatic resources that he has been called the Lope de Vega of the 18th century. He worked for all the theatres of Madrid; and often a week or less was for him sufficient time in which to write a play or zarzuela. This work he kept up constantly for 30 years. The years following his death it was the custom to belittle his work; but the critics of to-day are finding, in his dramas, the mirror held up to the Spanish life of the 18th century, and they are beginning to understand what De la Cruz meant when he said of himself: °Truth dictates and I write® ; for his works are a vast and rich treasury of information relating to the life and customs of the age in which he lived and which he knew thoroughly. In rescu¬ ing

Spanish drama from foreign influence and in developing the zarzuela, or musical comedy, and the sainete and other short and especially Spanish plays, he led the way for the modern renaissance of the Spanish drama. Consult Cotarelo y Mori, (Ramon de la Cruz y sus obras) (Madrid 1899).

CRUZ, San Juan de la (Saint John of the Cross), Spanish mystic and poet : b. Fontiveros, Old Castile, 1542; d. Ubeda, 14 Dec. 1601. He was a Carmelite friar. His real name was Juan de Yepes y Alvarez. He became an ardent sup¬ porter of Santa Teresa who was attempting to reform the order of Carmel. In this work he found himself constantly in trouble and finally he died in exile. His prose writings on the inner life won for him the title <(The Ecstatic Doctor® ; famous among them is (The Soul's Darksome Night. } In form and spirit his poetry is noble, deep and inspired by profound feeling; but he is often so mystical that it is difficult to understand him. The great beauty and har¬ mony of his prose won for him many admirers ; and the strong religious fervor of his works, probably more than anything else, led to canon¬ ization in 1726. His (Obras espirituales) stand in the fore-rank of the Spanish mystics. Probably no other Spanish mystical writings have such sustained lofty expression. This and various of his other works have been trans¬ lated into French and have been printed and re¬ printed in many forms. Among his other not¬ able works are (Noehe oscura del Alma* and (Subida del Monte Carmela.* Consult Domin¬ guez Berruetc, M., (E1 misticismo de San Juan de la Cruz en sus poesias* (Madrid 1894). Flis complete spiritual Works> were first published in 1619, and in a 12th edition in 1703.

CRUZ Y GOYENECHE, kroos-e-go-ya- na'cha, Luis de la, Chilean military officer: b. Concepcion, 25 Aug. 1768; d. near Valparaiso, 14 Oct. 1828. He explored the Andes in 1806, discovering several important mountain passes, which are described in a report published in the Angelis collection at Buenos Aires in 1835. He bore a leading part in the revolution _ against Spain, commanding a regiment and falling into the hands of the enemy, but was liberated in 1817. He next became a political leader of the

young republic, serving for a time as acting President of Chile. He was invested by Peru with the dignity of grand marshal. Shortly be¬ fore his death he was appointed Minister of Marine.

CRYOLITE, kri'd-Ht (Gr. (<ice-stone,® in allusion to its translucent whiteness), a native fluoride of aluminum and sodium, having the

formula 3NaF.AlF3. It crystallizes in the mono¬ clinic system, and also occurs massive. It is transparent or translucent, and the purer varie¬ ties are colorless or white. Its lustre is vitreous, and it has a hardness of 2.5 and a specific grav¬ ity of about 3. The best-known deposit of cryo¬ lite is in West Greenland, whence large quanti¬ ties of it have been taken for use in the prepara¬ tion of metallic aluminum. Less important de¬ posits are also known in the Urals, and in El Paso County, Colo. Cryolite is also used in the manufacture of alum, soda and certain kinds of glass, notably the so-called ((milk-glass,® or hot-cast porcelain, which is composed of cryo¬ lite, silica and oxide of zinc. The only com¬ mercial supply of cryolite is the great mine at Ivigtut, where two grades are produced, known to the trade as <(white cryolite® and <(black cryolite.® The discoloration of the latter is due to its large admixture of fluorite. In recent years only the black cryolite has been imported into the United States. The importations for 1916 amounted to 3,857 tons, valued at $42.84 per ton, as compared with 3,949 tons valued at $21 per ton for 1915. The latter price is about the average for the last 10 years, the increased price for 1916 being due to the greatly ad¬ vanced rates for ocean tonnage caused by the war. An excellent description of the cryolite mine at Ivigtut may be found in The Mining Magazine (London) for April 1916. Consult also United States Geological Survey, (Mineral Resources of the United States, 1916) (Part II).

CRYOPHORUS, kri-of‘6-rus (Gr. ((ice-bearing®), a simple instrument devised by Wol¬ laston for illustrating the freezing of water by rapid evaporation. The instrument consists of a bent tube of glass, provided with a bulb at each end. A small quantity of water is placed in it, and boiled until the air is entirely ex¬ pelled and replaced by steam. The tube is then hermetically sealed. In using the instrument, the water is brought into one of the bulbs, and the other, containing only water-vapor, is placed in a freezing mixture. The vapor condenses rapidly in the chilled bulb, and a correspond¬ ingly rapid evaporation is induced in the other one. The formation of vapor, however, is at¬ tended by the absorption of large quantities of heat; and the water in the free end of the ap¬ paratus, being the chief source from which this heat is obtained, presently becomes chilled to such a degree that it freezes.

CRYPT, in architecture, a cell or vault constructed underground. The galleries of the catacombs and the catacombs themselves were known by this name in the early Christian era. The underground tombs of the Christian martyrs were so called where the early Chris¬ tians met to perform their devotions, for fear of persecution. Hence crypt came to signify a church underground, or the lower story of a church, which may be set apart for monumental purposes, or used as a chapel. It

came to oc¬ cupy the entire space under the choir; and often

the part of the church above it was elevated and approached by flights of stairs, in order to give height to the crypt. The crypt is not common in churches built after the Norman period and when found in those of the Gothic period is usually much older than the structure above them. The position of a crypt is generally beneath the choir, but occasionally, as at Glas¬ gow Cathedral, beneath the transept also. The largest crypt in England is that at Canterbury Cathedral. Crypts rarely occur as a feature of a parish church. The larger crypt at Glasgow Cathedral is entirely above ground and at one time was used by itself as a church. In Ger¬ many, these underground chapels are numerous — the ones at Gottingen, Strassburg and Naum-berg are fine examples of architecture. The most remarkable crypt in Italy is that of Saint Mark's, Venice, which is in the shape of a Greek cross. Short columns support low arches on which the floor above rests. Other Italian crypts are at Brescia, Fiesole, Modena, Milan, Pavia, Verona, Florence; and a particularly fine one at Assisi. A good example of Norman crypt is to be seen at the church of the Holy Trinity at Caen, France. In this country there are notable crypts at Saint-Chapelle, Paris, and at Saint Gervase, Rouen. Later churches abolished the necessity for this form of chapel.

CRYPTIDINE, krlp'ti-dln (CiiHuN), a base homologous with quinoline, obtained in the preparation of that body, and also found in the less volatile parts of coal-tar. Its boiling-point is about 525° F., but it has not yet been pre¬ pared perfectly free from its lower homologues. It forms a double salt with platinum.

CRYPTO-CALVINISTS, name given to Melanchthon and those who agreed with him in wishing to unite the Lutherans and Calvinists, and especially in his supposed leaning toward the Calvinistic view of the Lord's Supper as shown in the difference between the original and the altered Augsburg Confession (q.v.). The former said (<The body and blood of Christ are truly present in the Lord's Supper in the form of bread and wine and are there distributed and received by the

communicant; therefore the op¬ posite doctrine is rejected.® In the latter the last clause is omitted. Luther did not approve the alteration, but tolerated Melanchthon's change of doctrine. Many, however, called him a Crypto-Calvinist. The truth seems to have been that he did not consider that either opinion was a sufficient bar to communion with Christ and therefore thought that both of them ought to be allowed. The controversy was becoming violent before his death, but afterward it broke out with great virulence, and continued with alternate success for 50 years, during which time frequent attempts were made to suppress the Calvinistic opinions by imprisoning their leading advocates and at last, in 1611, by the execution of Chancellor Nicolas Crell. The term has also been applied to the Missouri Lutherans because of their acceptance of the doctrine of uncondi¬ tional election. Consult Richard, c Philip Melanchthon) (New York 1898).

CRYPTOBRANCHIDiE, krip"to-bran'ki-de (Gr. <(with hidden gills®), a family of urodele Amphibia (q.v.) most nearly related, according to Cope, to the Amblystomidce. There are no gills in the adult, but a single pore-like branchial fissure may persist on each side. Respiration is

pulmonary, but the inspirations occur only at intervals of several minutes. The vertebrae are biconcave but, like the remainder of the skele¬ ton except the cartilaginous carpi and tarsi, are well ossified. There is no ethmoid bone, and the internal ear is separated from the brain by membrane only. A maxillary bone is devel¬ oped, and teeth are borne on the margins of both jaws, as well as on the vomers, but not on the parasphenoid. The eyes are very small and devoid of lids; two pairs of limbs with four and five digits respectively are always present, and the tail is permanently provided with a fin. Two genera are known: Mcgalobatrarhus, which has no branchial opening and contains only the giant salamander of eastern Asia, and Cryptobranchus, which contains the American hellbenders (q.v.).

CRYPTOGAMOUS PLANTS or CRYP¬ TOGAMS (from Gr. npyirTog, hidden + yagog, marriage), all plants below the Phanerogams or flowering plants. The names were first used by Linnaeus, who may thus have indicated his conviction that all plants possess sexuality, as most of them do. For a long time the vegetable kingdom was divided into two groups, as fol¬ lows : (1) Phanerogamia, with stamens, ovules, seeds and embryos. (2) Cryptogamia, without stamens, ovules, seeds and embryos, and with spores. These distinctions, although long

since acknowledged to be unscientific, are still main¬ tained, especially in popular usage. The Crypto¬ gams, instead of being a single group co-ordi¬ nate with the Phanerogams, include several such groups, namely, Algae and Fungi (Thallo - phytes) ; Mossworts (Bryophytes) ; Fernworts (Pteridophytes) . The Bryophytes and Pteridophytes are more closely related to one another and to the Phanerogams than to the very heterogeneous assemblage of the Thallophytes, the green members of which are known as algae, while those without chlorophyll are mostly called fungi. For more detailed accounts of the cryptogams, see the articles on the special groups just mentioned.

CRYPTOGRAMS. See Cipher Writing.

CRYPTOMERIA, krip-td-me'ri-a (Gr. <(with hidden parts,® its seeds being concealed in bracts), a beautiful tall-growing conifer, known also as the Japanese Cedar. The tree grows in the mountainous regions of China and Japan, and many varieties are cultivated. It was in¬ troduced into Europe in 1844, and is now widely cultivated. It is closely allied to the Sequoia (q.v.).

CRYPTURI, krip-tu'ri (Gr. (<hidden tail,® because of the rudimentary tail), an order of birds, sometimes called the Tinami or Tinami-formes, from their native name tinamou, gen¬ erally regarded as Ratitce (q.v.) but placed among the Carinatce (q.v.) by those who regard the presence of a keeled sternum as of greater classificatory value than the desmognathous pal¬ ate. Besides the characters just mentioned, which are combined in no other known birds, other remarkable osteological features are the complete union of the vomer and palatine bones, the single articular head of the quadrate, the rudimentary tail skeleton (pygostyle), the os¬ trich-like pelvis and legs (but not feet), and the well-developed clavicles, all but the last being ratite characters. The quill feathers of the tail are 10 or 12 in number and completely

hidden beneath the coverts ; the wings, which are very short and concave, have 10 primary and from 13 to 16 secondary quills; contour feathers are of the ordinary type found in flying birds, with the aftershaft rudimentary or absent. There are three long anterior toes with claws like a pheasant's, and the hallux is short and elevated, or, very rarely, absent; in fact the feet are of a strictly gallinaceous type. About 9 or 10 genera and 70 species are known, all but six of which are South American, occurring es¬ pecially in Argentina and Brazil. See Tinamous.

CRYSTAL. The term crystal, derived from a Greek word signifying a hard crust, or more specifically ice, was applied by the Greeks at least 400 b.c. to a material which they supposed to be a hard, durable form of frozen water. This substance is the colorless, transparent variety of quartz still called rock crystal and this belief as to its nature lasted into the 16th century. The angular forms and the smooth, even surfaces of this substance were observed by the ancients, but were regarded either as acci¬ dents or as shapes (<pleasing to the gods.® The polyhedral solids obtained by the evaporation of solutions were also thought to be ice and therefore called crystal, although the error was earlier realized, for not only was crystallization recommended by Geber in the 8th century as a means of purification but the shapes of the crystals were to some extent recognized as characterizing the salt.

The secondary meaning of polyhedral form, solids bounded by plane faces, was therefore associated with the original meaning of frozen water and clear ice-like appearance and by a natural association of ideas other minerals, such as beryl, diamond, garnet and pyrite, which were observed to occur frequently in angular forms, were spoken of as crystal-like, or crystalline, and when, toward the close of the 18th century, the study of the shapes was first systematically undertaken, Rome de l'lsle called the new science crystallography (q.v.). That is, the word crystal no longer meant the trans¬ parent, ice-like substance, rock crystal, but an individual solid of any substance, whether transparent or opaque, provided this solid was bounded by plane faces at definite angles, and was formed as a result of the solidification of

the substance.

This definition however is not fundamental and does not touch the essential nature of a crystal and while still held to by some authori¬ ties it can only be consistently maintained by the creation of some new term to include all individuals possessing that character which dis¬ tinguishes crystals from all other bodies, namely, homogeneity of internal structure. The limi¬ tation to plane faced solids was due to the fact that external form was long the only character studied and even this character is a direct con¬ sequence of a regular internal structure, and, although it is a striking proof of this, it is often dependent upon comparatively minor conditions at the time of solidification.

All individual solids formed at the solidifi¬ cation of a substance, whether they are com¬ pletely bounded by planes or partially bounded by planes or lack such boundaries and are of a shape determined by the space in which they formed exhibit equally well phenomena which prove the regular internal structure. For in¬

stance, characters such as transmission of light, the conductivity of heat, the cohesion, the elasticity or the rate of solubility are always alike in parallel directions, and, generally speak¬ ing, unlike in directions which are not parallel. Or if alike in more than one direction these directions will (whatever the boundary of the individual) bear the same relations.

The general usage now is to include the faceless and partially faced individuals, either with or without a modifying term, under the term crystal, one suggestion being to distinguish them as anhedral or faceless crystals, and the following definition of Fock expresses this tend¬ ency : A crystal is ((a homogeneous solid body of definite chemical composition, whose physical properties are the same in parallel directions, but are generally different in directions not parallel.® The outward sign is the form, but its destruction does not rob the fragments of their perfect internal structure, whereas the most perfect model is not a crystal, because it lacks the internal physical characteristics.

A further modification of the definition will be needed if the doubly refracting liquids de¬ scribed by Lehmann are admitted to be assem¬ blages of liquid crystals. There is no definite limit between solid and liquid. In some of the softer solids one layer may be made to glide

over another by pressure as in calcite and ice, other solid crystals are pliable, iodide of silver at 146° C. will flow like a thick liquid yet re¬ tain many crystal properties and certain organic substances which possess the mobility of oil or water and yet show double refraction dichroism, interference figures and even poly¬ hedral form are difficult to exclude. The def¬ initions thus far limit crystals to solids ; whether this limit will be sufficiently removed to in¬ clude the so-called (<liquid crystals® is still in doubt.

The External Form of Crystals. — Although some differences between the shapes of crystals of different substances had been noticed and these differences utilized in descriptions of minerals and salts, the general belief, as late as the 16th century, was that the shapes in which any one substance occurred were neither con¬ stant nor related to each other.

In 1669 Nicolas Steno, a Danish anatomist, announced that the angles between correspond¬ ing faces of different quartz crystals were con¬ stant no matter how much the crystals varied in shape. This constancy of angles was stated by Guglielmini in 1704 to be general, in that every salt had its peculiar crystals, the angles of which were constant even when the crystals were imperfect and broken.

That in addition to the constancy of angles between corresponding faces there was an in¬ timate relation between the very different shapes often assumed by crystals of the same substance was first shown clearly by Rome de l'lsle, who, continuing the method of Linnaeus, measured and made wooden models of different crystals and in 1783 described over 400 regular forms. As a result of his comparisons de l'lsle found that differently shaped crystals of any one substance always formed a series and that all the members of such a scries could be derived by <(modifying® one so-called ((primitive form,® the shape and angles of which varied with the substance, by particular methods, such as re¬ placing each edge by one plane or by two planes,

or each solid angle by one, three, four or six planes.

Rene Just Haiiy, either as the result of an independent discovery or in view of the fact that Torbern Bergmann in 1773 had shown that calcite could be cleaved or broken into little six¬ faced fragments with constant angles and that these rhombohedral fragments could be built together again into the different observed shapes of calcite, assumed this property of cleav¬ age to be general and instead of the arbitrarily chosen primitive form of de l'lsle he chose for each substance a primitive form the faces of which were parallel to directions of cleavage, or if no cleavage was found or cleavage only in one direction, he assumed a shape determined by striations or other markings or by analogy be-t tween the shapes of the crystals of other sub¬ stances which did show cleava?ge.

More important than this however he laid the foundation for the great law of ((simple mathematical ratio® by showing that the angles made by the secondary planes were not arbi¬ trary, but always fulfilled certain conditions, and were not simply grouped in the same way at each corresponding edge or angle but were at exactly those angles which would result if upon the primitive form little ˆintegrant molecules® of shapes determined by cleavage were built up in successive layers, each successive layer regu¬ larly diminishing from the subtraction of one or more rows, always some simple rational number, never to his knowledge exceeding four.

Professor Weiss of Berlin in 1809 discarded Haiiy's hypothesis of decreted rows and substi¬ tuted the conception of imaginary axes <(around which the crystal is uniformly disposed.® He divided all crystals into groups dependent upon, the relative inclinations of the axes. The primi¬ tive forms of Haiiy he constructed by planes intersecting all the axes or parallel to one or to two of them. If a primitive form cut three axes at distances a, b and c from the centre, then all secondary forms could be constructed by taking points along each of the axes at twice, three times and four times, etc., the lengths a, b and c, and constructing planes in the same way as before. That is, the intercepts of any secondary face in terms of a, b and c were rational, such as 2a : b: 3c or a : 3b : 2c.

Symmetry, or the repetition of equal angles or similarly grouped faces,

was made a crystal character by de l'lsle in his statement, ((Every face has an opposite parallel face.® In any de l'lsle or Haiiy series each form was derived by equivalent changes of each similar edge or angle of the primitive form, therefore without change of symmetry, that is <(All crystals of any one substance are of the same grade of symmetry.® Hessel in 1830, Gadolin in 1864, and von Lang in 1867 considered the possible varieties of symmetry of polyhedrons when limited by the law of rational parameters. Each obtained 32 types or classes.

It may be said then briefly that, with respect to external form, the crystals of any one sub¬ stance will have the same symmetry, which will be one of the 32 types, that the angles be¬ tween corresponding faces will be constant, and that the possible shapes will constitute a series in which the positions of the faces are not arbitrary, but fulfil certain conditions (the law of rational parameters).

The methods by which angles are measured

and symmetry symbols and constants deter¬ mined are described in brief in the article on Crystallography.

The Dependence of Physical Behavior upon Direction in Crystals as Evidence of Regular Internal Structure. — The physical behavior of a crystal varies in the direction in which the test is applied. Like effects are ob¬ tained in directions which are parallel in the crystal and, generally, unlike effects are pro¬ duced in directions not parallel, and like effects are obtained in directions symmetrically related in the crystal form. All this may be interpreted as similar molecular arrangement in directions giving like effects and differing arrangement in directions giving unlike effect.

These facts were suggested toward the close of the 17th century by the results of the studies of calcite made by Bartholin and Huyghens, which may be summed briefly as follows : A ray of light transmitted through calcite in any direction, except one, is split into two rays usually following different paths so that an object viewed through calcite appears double.

The divergence of these paths (roughly shown by the distance apart of the images) varies with the direction. In one direction, which is also the direction of the principal axis of geometric symmetry, there is single refraction only, and in a'11 directions equally inclined to this

direction of single refraction the double refraction (shown by the distance apart of the images) is the same.

If polarized light, in which the vibration direction is known, is transmitted through crys¬ tals, many proofs of the dependence of the effects upon the direction and upon symmetry can be obtained, the regularly varying indices of refraction, the vibration directions of the transmitted light, the differences in absorption and color — in fact, by these effects the sym¬ metry can be accurately judged.

Even with very primitive apparatus Brewster and others obtained before 1820 the so-called ˆinterference figures,® color rings of various shapes crossed by dark bands, and Brewster was able to classify nearly all those substances to which Haiiy had assigned primitive forms® and to correct several errors in classification made by the latter. Furthermore, these results were obtained in particular crystallographic directions and the distribution of color and shape of the figures were symmetrical to the planes and axes of geometrical symmetry of the crystals.

A striking proof of the dependence of opti¬ cal behavior upon direction and of a relation between this and crystalline form is shown when polarized light is transmitted through quartz crystals in the direction of the prism axis. In this direction and in' this direction only in all such crystals the emerging ray is polarized in a different plane from the entering ray, or, as it is usually stated, quartz crystals rotate the plane of polarization a definite number of degrees, dependent upon the thickness. But when crys¬ tals of quartz which show the less common faces are examined it is seen by the arrange¬ ment of these faces that there are two sorts of crystals, the faces of which are relatively like the right and left hand, and Herschel and Brewster in 1821 showed that the plane of polar¬ ization was turned to the right by the one sort of quartz crystal and to the left by the other.

The dependence of physical behavior upon

CRYSTALS

/¥ i\A

& .jl

No 1.

No. 9.

No. 7.

No. 11.

No. 8

No 21.

1, 2 Combinations of Hexahedron and Octahedron

3 Combination of Hexahedron and Dodecahedron

4 Combination of Octahedron and Dodecahedron

5, 6, 7, 8 and 9 Various combinations of regular systems

10 Derivation of Tetrahedron from an Octahedron

11 Trigonal Dodecahedron

12 Deltohedron

13 Hexoctahedron

14 Pentagonal Dodecahedron

15 Dyakisdodecahedron or Diploid

16 Tetragonal Deuteropyramid

17 Ditetragonal Pyramid

18 Tetragonal Combinations

19 Triclinic

20 Rhombic Pyramids

21 Twin Crystals

direction in crystals is not limited to optical phenomena, for instance, spheres of quartz when uniformly heated expand with regularly varying inequality into ellipsoids of rotation, the direction of the principal symmetry axis of the crystal being the axis of rotation. A sphere of glass or opal would have expanded as a sphere.

A very remarkable instance of dependence upon direction and its connection with external form is shown by crystals in which there are different groupings of planes about the opposite ends of certain axes. These axes are not only C(polar® in the sense mentioned, but when the crystal is heated, one end of the axis becomes negatively electrified and the other end posi¬ tively. This fact was observed in tourmaline crystals as early as 1762 by yEpinus and the same property is shown by calamine, boracite, quartz and other minerals and always with re¬ spect to an axis which shows different grouping of planes at the two ends.

That the cohesion of crystals varies with the direction and is equally strong parallel to all geometrically equivalent directions is indi¬ cated by several characters. For instance, the directions of least cohesion are frequently shown by the (<cleavage® already mentioned under Hairy's discoveries and described in a separate article.

The inequality of the cohesion, except in par¬ allel and similar directions, may also be shown by the variations in hardness and by the cracks developed by punching or pressing with a coni¬ cal point, and it is especially shown in the <(un-building® of the crystal, which takes place under the action of a solvent. Solution proceeds with different velocities in different directions in the crystal and if stopped at an early stage the crys¬ tal faces are found to be pitted by little angular cavities, the faces of which belong to forms in the same series as the crystal, and not only that but the shapes vary on different faces of the crystal and conform in this and in their shape to the symmetry of the class to which the crystal belongs.

Other characters could be instanced, elas¬ ticity, heat conductivity, electrical and magnetic characters and so on, but these are discussed

more at length in the article Physical Crystal¬ lography. All observations lead to the same conclusions, that most of the physical characters are dependent upon direction and intimately connected with the external form, or a more exact statement is that the physical characters and the external form are both results of the same cause, a ((regular internal structure,® which in turn is dependent upon the chemical composition as described in the article on Chemical Crystallography.

THE HOMOGENEOUS INTERNAL STRUCTURE OF CRYS¬ TALS.

That there exist in crystals some homoge¬ neous internal structure has been sufficiently illustrated. The further consideration subdi¬ vides into (a) the kinds of homogeneous crystal structure possible, (b) the nature of the struc¬ tural unit.

The Possible Varieties of Homogeneous Crystal Structure. — The discussion is simpli¬ fied by the method of Seeber (1824) who sub¬ stituted for the molecules their centres of gravity. It is then only necessary to consider from a geometric standpoint those types of

homogeneous repetition of points in space which conform to the law of rational parameters, and their agreement with the 32 varieties of crystal symmetry already theorized from a considera¬ tion of external form.

Such an arrangements of points is called a space lattice in which each point is in a similar position with respect to those surrounding it, Frankenheim in 1842 and Bravais more exactly in 1848 showed that there were 14 different types of space lattice, in each of which the units were parallel and similarly orientated. Each conforms to the symmetry of one of the 32 classes and in each planes through any three points conform to the law of rational para¬ meters.

The broader principle of homogeneity of Wiener (1869), that regular arrangement of atoms consists in every atom having the re¬ maining atoms arranged about it in the same manner, and the method of movements used by Jordan in discussing the possible types of regular repetition in space were applied by Sohncke to the consideration of crystal struc¬ ture.

Sixty-five regular point systems were ob¬ tained, each consisting of two or more identical Bravais space lattices the one thrust within the other, not coincident with it, but either moved parallel to some axis or

rotated 180 degrees, 120 degrees, 90 degrees or 60 degrees around this axis, or with both motions.

Finally, von Federow, Schonfliess and Barlow (1890-94) showed that other arrange¬ ments of points not identical but similar could be added which ((faced the opposite way,® that is, were like the mirror repetitions of the pre¬ ceding groupings. In this way 165 types were added, making in all some 230 <(space groups® or types of homogeneous crystal structure each with the symmetry of some one of the 32 crys¬ tal classes and for the first time representing all these crystal classes.

The Nature of the Structural Units. — Haiiy in 1784 advanced the theory that crystals were built up of little parallelopipeda constant in shape in any one substance but differing in different substances and closely fitted together without interstices.

From that date until comparatively recently, the view has been widely held that the struc¬ tural unit of the space lattice was an aggre¬ gation of chemical molecules called the physical molecule, and that for instance polymorphic sub¬ stances were due to differences in number of chemical molecules constituting the physical molecule.

This view is definitely abandoned as a re¬ sult of the increasing knowledge as to the close relations which exist (see Chemical Crystal¬ lography) between the crystal structure and the composition. Whether the unit is the chemical molecule in which the position of the atoms is definitely fixed or whether the chemical mole¬ cule is not present in the crystallized compound and the unit is merely a group of atoms in equilibrium is not yet quite agreed upon, but later researches indicate that each atom consti¬ tutes a point in a space lattice, fixed under one set of conditions and of definite volume but susceptible of change under changed conditions giving different structures and therewith new physical characters. For instance, Bragg's re¬ searches indicate that for halite, NaCl, the

structure is composed of two intersecting face-centred cubic spaced lattices, the sodium atoms on one, the chlorine atoms on the other, while for fluorite, CaF2, the calcium atoms are ar¬ ranged on a face centred cubic lattice and the fluorine atoms are at the centres of the small cubes.

Various theories as to the shapes and rela¬ tive volumes of the different atoms exist, some of which assume close packing, others the exist¬ ence of interstices, some base the volume on the atomic weight, others on the valence, and each succeeds in explaining many peculiarities of structure.

Experimental Proof of the Existence of a Regular Internal Structure. — Light rays are diffracted by ruled (<gratings® when the inter¬ vals between the parallel rulings are of the order of the wave length of light used. Thus sodium light with wave length of .000589 milli¬ meters is diffracted by a ruling of 700 lines per millimeters, that is, with intervals of .00143 millimeters.

Dr. Laue of Zurich conceived the idea of using a crystal as a diffraction grating for X-rays, the waves of which were believed to be very much shorter than those of light and in 1912 by passing a pencil of X-rays through a crystal plate obtained upon a photographic plate not only a strong spot due to the original pencil but a series of other isolated spots which were always arranged in conformity with the sym¬ metry of the crystal and evidently due to re¬ flection from different sets of net planes.

W. L. Bragg showed that for any set of parallel net planes the reflections were obtained only for particular angles of incidence which corresponded to particular intervals between successive planes such that the crests of the reflected waves from each plane agreed, that is, to intervals of 1, 2, 3, etc., wave lengths, where¬ as for other intervals the different reflected waves tended to neutralize each other. Hence it followed that from the angles and the wave lengths the intervals could be calculated.

The device for measuring these intervals is called an X-ray spectral photometer. A fine pencil of X-rays is directed upon the crystal and the latter is revolved, at certain angles a pencil of rays is reflected into an ionization chamber and its presence being made known by the

connected electroscope, the angle is re¬ corded.

Variations in intensity indicate furthermore variation in spacing between similar net planes or lack of similarity between net planes uni¬ formly spaced.

Crystal Growth. — - Many strange views have been held as to the causes of crystallization, such as <(intense cold,® (<divine fire,® <(the influence of the stars from which the six-rayed snow crys¬ tals come,® ((the influence of a particular salt,® and the ((motions of organic molecules, espe¬ cially those derived from the remains of ani¬ mals and plants.®

Later theories involved the idea of an em¬ bryonic period during which the forming crys¬ tal lacked characteristic shape. This was based on the study of the crystallization of sulphur from solution in carbon disulphide during which there were observed tiny globules called ((glob-ulites,® which according to Vogelsang's the¬ ory are liquid spheroids or ellipsoids with a definite internal molecular movement, which

renders them capable of mutual attraction. These group themselves in definite forms, some¬ times in rows, like strings of beads, <(margar-ites,® and again in needle-like or conical forms, ((longulites.® From these develop "crystalloids® of characteristic shape, often doubly refracting, and so on to the complete crystal.

It was found, however, that the globules were carbon disulphide supersaturated with sul¬ phur and prevented from crystallizing by the viscous Canada balsam and moreover that from pure solutions the minutest crystals are the same shapes as the larger ones, as, for instance, when very minute, perfectly formed crystals are obtained by suddenly diminishing the solu¬ bility by the addition of another liquid.

It appears from the researches of Miers that there are two distinct varieties of crystalliza¬ tion possible in any cooling fused mass or any evaporating solution, "labile® or spontaneous crystallization and ((metastable® or induced crys¬ tallization requiring the presence of ((germs,® that is, minute crystals of the substance or a related substance. In studying the phenomena he made use of the fact that the refractive in¬ dices of solution or fusions varied directly as the saturation and were highest just preceding spontaneous

crystallization.

Labile crystallization occurs only with super¬ saturation or undercooling but in the interval between this and normal saturation or the melt¬ ing temperature crystals will form by inocula¬ tion of the mass with crystal “germs.® This has been experimentally proved both by induc¬ ing crystallization by stirring in an open vessel and by failure to induce crystallization either if the substance was new and its germs were not in the room or if the air was excluded as in a sealed tube. In all instances, however, <(labile® crystallization occurred.

The germ presumably is an assemblage of parallel molecules, therefore possesses a larger attractive force than the surrounding particles, and if this force exceeds the internal friction will draw to itself and orientate other particles.

Frequently the growth, as observed on a plate of glass on the microscope stage, is rela¬ tively rapid in one direction, suggesting a pointed rod pushing its way rapidly into the richer solution, but thickening slowly, because of the impoverished zone surrounding it. As this zone is gradually enriched by the currents, secondary offshoots form and grow in import¬ ant crystal directions and these in turn send off tertiary offshoots and so on, the tendency being to the creation of skeleton outlines of crystals. As the concentration of the solution decreases the process becomes slower, the hollow places fill and the complete crystals result.

It is sometimes claimed, as showing an analogy between crystal growth and the growth of an organism, that every species of crystal has a definite limit of growth, and that when this is passed new crystal individuals are formed and the old individual grows no further. Exact measurements show that the large crystals do continue to grow, although with the larger sur¬ face the growth is less evident. Moreover, if the cooling or evaporation is made sufficiently slow no new crystals are formed, but all the material deposits on the already formed crystals.

Why a substance should vary in the occurring. faces of its crystals is not understood. Rapid formation often results in simple forms

and slow formation in complex forms. Foreign material in small amounts, if it crystallize with the substance, may cause the development of unusual faces and the simple presence of large amounts of foreign material may have a similar effect.

In conclusion, it may be said the study of crystals is no longer a simple study of external form, but involves questions of the highest in¬ terest to the physicist, chemist and geologist. The purely geometric portion, both as relating to varieties of regular structure and to the laws governing the association of faces in the ex¬ ternal form, is well advanced, possibly nearly completed. But many facts remain to be ex¬ plained as to origin, growth, habit, nature of molecules and molecular forces and the rela¬ tions between chemical constitution and struc¬ ture. See Crystalline; Crystallography; Chemical Crystallography ; Geometrical Crystallography ; Physical Crystallog¬ raphy ; Mineralogy.

Bibliography. — Baumhauer, H., (Die neuere Entwickelung der Krystallographie) ; Bragg, W. H. and W. L., (X-Rays and Crystal Structure> (London 1915) ; Goldschmidt, V., (Uber das Wesen der Kristalle Ostwalds, Annalen der Naturphilosphie (Bd. 9) ; Lehmann, O., (Flussige Kristalle) (Leipzig 1904) ; Miers, H. A. and Isaac F., (On Crystal Growth) (Proceedings Royal Society, London, 79, 322, 1907, and Journal Chemical So¬ ciety, London, 891, 413, 1906) ; Schonflies, A., (Krystallsysteme und Krystallstructur) (Leip¬ zig 1891) ; Sohnke, L., (Entwickelung einer Theorie der Krystallstructur) (Leipzig 1879) ; Story-Maskelyne and Others, (Report Commit¬ tee of British Association for Advancement Science > (1901) ; Tutton, A. E. H., (Crystals > (London 1917).

Alfred J. Moses,

Professor of Mineralogy, Columbia University.

CRYSTAL FALLS, Mich., city and county-seat of Iron County, 205 miles north of Mil¬ waukee, on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul rail¬ roads. It contains a high school and court¬ house. Lumbering and iron mining are the chief industries. It received its city charter in 1899 under which the government is vested in a mayor and council. The electric plant and waterworks are municipally owned. Pop.

3,775.

CRYSTAL PALACE, a building at Syden¬ ham, England, about seven miles from London. The material in this building was at one time used in the Crystal Palace erected for the World's Fair which was held at Hyde Park, and was formally opened by Queen Victoria, 25 Feb. 1851. The original building was designed by Sir Joseph Paxton; the materials comoosing it were glass, iron and wood. It cost £1,450,000, and every department of art and science was represented. Its area was nearly 21 acres. In 1854, when the building was about to be de¬ molished, a company formed to purchase it tore down the original and removed the ma¬ terial to Sydenham in Kent, about eight miles from London. The new edifice was patterned after the World's Fair building. The grounds around the present Crystal Palace are in area about 200 acres, and are beautifully laid out. This palace was opened by Queen Victoria, 10

June 1854. The name of Crystal Palace was also given to a large building erected in 1853 in New York. The site was on Sixth avenue, between 40th and 42d streets. It was a favorite place for large exhibitions, but in 1858 it was destroyed by fire. The locality is now Bryant Park.

CRYSTALLINE. The term crystalline, like the term crystal, because of the fact that the external form of crystals was long regarded as the most essential character, has been and still is used with different meanings. Any product of solidification in which there is a regular orderly arrangement of the molecules is said to possess a crystalline structure whether the individuals of this product are bounded by planes at characteristic angles or not, and such a substance is said to be crystalline as opposed to amorphous. <(Granite mountains are moun¬ tains of crystals, each particle being crystalline in nature and structure.® But some authorities use the term to imply an imperfect grade of crystallization especially applicable to aggrega¬ tions in which the individuals while possessing perfectly the regular internal structure show no regular external form. While this is of some convenience in descriptions of such material as marble, no sharp distinction can be drawn.

CRYSTALLO-CHEMICAL ANALYSIS.

Professor von Federow published in the Zeitschrift f. Krystallographie (38, 321-490; 50, 513-575) a method by which it is claimed if a few measurable crystals of any one of the over 10,000 recorded substances be subjected to a short, goniometrical measurement on the two- . circle goniometer, occupying at most two or three hours and possibly only a few minutes, a reference to the tables will identify the sub¬ stance of which the crystal is composed. To test this out samples were sent of many well-crystallized substances, some of which had only been investigated previously by one authority and in every one of these cases the substance, often an organic compound of considerable complexity, was identified.

While the fact that each chemical compound, unless isometric, possesses its own characteristic series of angles is well established, the orienta¬ tion or setting up of the crystals has hitherto been to a great extent arbitrary; for instance, in an orthorhombic crystal any one of three set ups could be chosen and in the monoclinic and triclinic any number are possible. To under¬ stand von Federow's method requires a study of his theory of (<parallelohedral® structure. The work involves the determining of a <(correct setting® based upon the crystal structure, as de¬ termined chiefly by graphic methods, on the assumption that the most densely packed planes of the space lattice correspond to the best developed crystal faces.

Thereafter the task is to measure five or fewer characteristic angles and compare these with von Federow's tabulation for over 10,000 substances, the angles for a triclinic crystal being, for instance, 1, between two prism faces;

2 and 3, between basal pinacoid and prism faces;

4, between basal pinacoid and pyramid; 5, be¬ tween pyramid face and one of prism faces. The entire tables are unpublished as yet.

CRYSTALLOGRAPHY. Crystallography is broadly divided into ((geometrical or morpho¬ logical crystallography,® ((physical crystallog-

raphy® and (<chemical crystallography.” In a narrower sense and as a natural result of the fact that the geometrical relations were first studied the term crystallography is restricted to a study of the relations between the bounding faces of crystals and in that sense it is used here, separate articles being devoted to the other divisions.

The tasks in consideration of crystal form in elementary work are determinations of ((system,” recognition of type symbols, approxi¬ mate angle measurements and interpretation of crystal descriptions, and in more advanced work are exaot measurements of angles, projection and delineation, determination of indices and elements and calculation of theoretical angles from elements and indices.

As developed in the article on Crystals (q.v.) the individual solids which result from the solidification of a chemical element or com¬ pound possess a regular internal structure but may be completely bounded by plane surfaces or partially bounded by plane surfaces or lack all plane boundaries.

These planes are not at haphazard positions with respect to each other, but at positions de¬ pendent upon the regular internal structure and are found to obey certain laws.

Law of Constancy of Interfacial Angles. — In all crystals of the same substance the angles between corresponding faces are constant. A corollary to this law is that aside from the crystals of the isometric system the crystals of each chemical substance have a separate and . definite set of angles.

The Law of Symmetry. — Different crystals of the same substance often show unequal num¬ bers of faces, different angles and notably differ¬ ent shapes, but there is in practically every crystal some repetition or recurrence of equal angles or similarly grouped faces, although such faces often are unequally distant from the cen¬ tre, unequal in size and different in shape, and are comparatively rarely equal. Crystals may be regarded as possessing grades of symmetry in the sense of symmetry of direction with repetition of equal angles and crystals obey the law that all crystals of any one substance are of the same grade of symmetry.

The Law of Simple Mathematical Ratio. — If the bounding planes or

faces of crystals are defined in position by referring them to co¬ ordinate axes after the manner of analytical geometry, the axes being chosen by rules later stated, a simple and very important relation is found to exist between all true crystal faces of crystals of any one substance which may be expressed as follows:

If the relative intercepts of all the faces are reduced so that the same term in each is unity then in all crystals of the same chemical sub¬ stance, if the intercepts of any face are divided, term by term, by the corresponding intercepts of any other face, the quotients will be simple numbers or simple fractions or infinity.

ELEMENTARY DETERMINATION OF SYSTEM, TYPE SYMBOLS AND APPROXIMATE ANGLES.

Finding the System of a Crystal. — The

following rules quickly determine the ˆsystem” of a crystal, without the need of a complete determination of symmetry or any consideration of ˆcrystal” axes.

Approximate measurements are usually needed.

Essential Condition

More than one axis of threefold symmetry.

One axis of four-fold symmetry, or composite symmetry and one only.

One axis of threefold symmetry, and one only.

One axis of six-fold symmetry.

More than one axis of twofold sym¬ metry but no axis of higher sym¬ metry (or one axis and two planes of symmetry).

One axis of twofold symmetry only, or one plane of symmetry only or both.

Without axes or plane of symmetry.

System

Isometric.

Tetragonal.

Hexagonal.

Rhombohedral divi- • sion.

Hexagonal division, Orthorhombic.

Monoclinic.

Triclinic.

An axis of symmetry in a crystal is a direc¬ tion rather than a line through specific points.

If the entire crys¬ tal is revolved (or assumed to revolve) about this direction there must be one or more repetitions, that is, positions at which all the faces are parallel to the previous positions of other faces.

According to the number of repetitions during a complete revolution the axis is known as twofold, threefold, four¬ fold or six-fold. No other varieties exist.

In Fig. 1 there is an axis of threefold geo¬ metric symmetry perpendicular to the plane of

the page and through the centre of the drawing, and in Fig. 2 a similarly placed four-fold axis.

A plane of symmetry holds a definite angular re¬ lation to a crystal rather than a fix¬ ed position in the crystal, and with respect to it the crystal faces are in pairs, the angle between each pair be¬ ing bisected by the plane of symmetry. Thus, in the crystals shown in Figs. 1 and 2 there are planes of symmetry parallel to each of the dot and dash lines

and each perpendicular to the plane of the paper.

The system may be also determined from the relations between co-ordinate axes chosen in the following order :

First, axes of symmetry.

Second, lines perpendicular to planes of symmetry.

Third, lines in a plane of symmetry parallel to edges or faces.

Fourth, lines parallel or equally inclined to several faces of the crystal.

The six systems may then be defined in terms of axes, each including all crystals which are, by the given rules, referred to a particular set of axes :

The Triclinic System. — Three non-inter- changeable axes at oblique angles to each other.

1 he Monoclinic System. — Three non-inter- changeable axes, two of which are oblique to each other, the third is at right angles to the other two..

1 he Orthorhombic System. — Three axes at right angles but not interchangeable.

The Tetragonal System. — Three axes at right angles, of which two are interchangeable.

d he Hexagonal System. — Four axes, three of which lie in one plane at 60 degrees to each other and are interchangeable, the fourth is at right angles to the other three.

d he Isometric System. — Three interchange¬ able axes at right angles to each other.

Crystal Faces and Their Symbols. — The position in space of any crystal face, CDE, Fig. 3) is absolutely determined if the numerical values of its intercepts, OA, OB and OC, on the chosen axes are known, and if these are stated as relative distances, for instance,

OA: OB: 00 = 0.7:1:1.46,

these intercepts are independent of the absolute position of the face and represent any face

parallel to it, that is, any face in the same angular position

The relative inter¬ cepts for any face are simple numbers only in the case of isometric crystals but, as stated previously, there is a simple relation between the intercepts of differ¬ ent faces. The symbols which are used are therefore not the rela¬ tive intercepts them¬ selves

but simpler ex¬ pressions from which these intercepts may be derived, and a crystal description states usually the relative intercepts of some

chosen face, hereafter spoken of as parameters, and expresses the other faces by simpler sym¬ bols; for instance, the Miller indices or the Weiss coefficients.

The Miller indices of any face are those

numbers which divided term by term into the parameters give as quotients the intercepts of the face, and the Weiss coefficients of any face are those numbers which multiplied term by term into the parameters give as products the intercepts of the face. The common bounding faces almost without exception have very simple indices or coefficients, usually 0, 1, 2, 3 or 4. Somewhat larger numbers result for the smaller and less common faces.

The Seven Type Faces and Type Symbols in any Symmetry Class. In each symmetry class there are seven typically different positions in which a crystal face may occur with respect to the chosen crystallographic axes. These posi¬ tions may be expressed in the Miller indices and the Weiss coefficients by letters, usually h, k and / in the Miller and m and n in the Weiss.

Since the numerical values are not needed the determination is merely by parallelism or non-parallelism, equality or inequality. These type symbols may be determined as follows in models and large crystals : Place a straight

edge or pencil in contact with a face and, keep¬ ing it in contact, turn the straight edge until its relation to each axis has been noted.

If the straight edge while in contact with the face can be turned into a position parallel to the axis, the face is parallel to the axis, the corresponding Miller index is 0 and the cor¬ responding Weiss coefficient is oo.

If two intercepts of the face are equal, the corresponding indices (or coefficients) are ex¬ pressed by the same letter.

If all intercepts are unlike all three letters are used, the order depending upon the conven¬ tion used in the symmetry class.

Experience proves that well-developed faces upon crystals of the same substance occur at particular angles dependent upon the struc¬ ture and that these angles yield intercepts conforming to the law of simple mathematical ratio.

Crystal “Forms® or Groups of Equiva¬ lent Faces. — The word “form® is used in crystallography with a special meaning. A form may be one face or two faces or as many as 48 faces and is not necessarily a closed form. The faces of a “form® always make the same angles with the crystallographic axes. Their symbols are therefore variants of one symbol. They are sometimes closely alike in size and shape and usually they have similar markings and lustre. The assemblage of these faces, that is, the form, must satisfy the symmetry of the crystal.

Form symbols are not mathematical expres¬ sions for the form but for some one face of the form. In the Miller indices, for instance, { 121 | signifies a form to which the face (121) be¬ longs, | J conventionally being reserved for form, ( ) for faces.

A crystal may be bounded entirely by faces of one form. More frequently the bound¬ ing faces belong to two or more different forms.

The Classes of Symmetry and the Crystal Systems. — As discussed in the article on Crystals, solids bounded by planes so arranged as to conform to the law of simple mathemat¬ ical ratio are limited to 32 types or classes. All crystals of any one substance are limited to one class.

These classes are conveniently grouped in the older divisions called systems, each of which consists of the crystals of these classes which can be referred to a similar arrangement of co-ordinate axes.

Thirty-one of the classes have known ex¬ amples. In one class in the hexagonal system no example has yet been found. Nearly all the important minerals crystallize in 10 or 11 of the 32 classes.

The determination of symmetry elements by geometric relations alone is not conclusive. The symmetry is really that of the internal structure and hence manifests itself also in the phys¬ ical characters, often thereby proving a lower grade of symmetry than evidenced by shape alone.

Triclinic System (Two Classes). — Re¬ ferred to three axes oblique to each other and not interchangeable.

1. Unsymmetrical Class. — Each form a single face. Example : Calcium thiosulphate, CaS203.6H20.

2. Pinacoida1 Class. — Symmetrical to the

centre only. Each form consists of two parallel faces. Example : Axinite. Fig. 4.

Monoclinic System (Three Classes). —

Referred to three non-interchangeable axes, two oblique (at angle /?) to each other, the third at right angles to the other two.

3. Sphenoidal class. — With one axis of two¬ fold symmetry. Example: Tartaric acid, H2C4H4O6.

4. Domal Class. — With one plane of sym¬ metry. Example : Clinohedrite, H2ZnCaSi04.

5. Prismatic Class. — With one plane and one twofold axis at right angles to the plane. Example : Pyroxene, RSi03.

The crystallographic description of a mono¬ clinic crystal would include the parameters, the angle between the oblique axes and the symbols, for_ instance, the pyroxene crystal, Fig. 5,

4 : b : <S=1.092: 1:0.589; P =74° 10′ 9″.

Occurring forms show the three pinacoids, a, b and c , the unit prism m {110} , the nega¬ tive unit hemi-pyramid (> {111} and the positive hemi-pyramid v { 221 }

Orthorhombic System. (Three Classes). — Referred to three non-interchangeable axes at right angles to each other.

6. Class of the Rhombic Bisphenoid. — With three axes of twofold symmetry at 90 degrees to each other. Example : Epsomite, MgSO*. 7H20.

7. Hemimorphic Class. — With two planes of symmetry at 90 degrees to each other, intersect¬ ing in an axis of twofold symmetry. Example : Calamine, Zn(0H)2Si03.

8. Bipyramidal Class. — Three planes at right angles to each other, their intersections being axes of twofold symmetry. Example :

Chrysoberyl, BeAUO*.

The description of an orthorhombic crystal would include parameters, and indicesof occurring forms. For instance, the crystal of chrysoberyl, Fig. 6.

Parameters o : 6: <5= 0.470: 1: 0.580. Forms: unit pyra¬ mid p. {Ill}, unit prism m { 110}, prism n { 120 } , pyra¬ mid t { 121 } , brachydome d

i 011 1

Tetragonal System (Seven Classes). —

Referred to three axes at right angles, two of which are interchangeable with each other. The intercepts of a face upon the interchangeable axes are always simple or infinite multiples of each other.

9. Bisphenoidal Class.— One twofold axis, Example : Ca2AL>Si07.

10. Pyramidal Class. — One four-fold axis. Example : Wulfenite, Pb MoCh.

11. Scalenoliedral Class. — Three twofold axes at right angles. Two planes through one axis and midway between the others. Exam¬ ple : Chalcopyrite, CuFeS*.

12. Trapezohedral Class. — One four-fold axis at 90 degrees to four twofold axes. Ex¬ ample : NiS04.6H20.

13. Class of Tetragonal Bipyramid. — One four-fold axis and one plane perpendicular to it. Example: Scheelite, CaWCh.

14. Class of the Ditetragenal Pyramid. — Four planes intersecting in a four-fold axes. Example: Iodosuccinimid, C4H4O2NI.

15. Class of the Ditetragonal Bipyramid. —

One four-fold axis, four planes intersecting in it, and one plane and four t axes per¬ pendicular to it. Example: Rutile, Ti02, Fig. 7, shows

a rutile crystal, $<5=0.644$, with unit first and second order pyramids p {111} and d { 101 } , with first and second order prisms m {110} and a {100}

The Hexagonal System. Rhombohedral Divison (Seven Classes). — Referred to four axes, one a threefold symmetry axis, the others interchangeable at right angles thereto and at 60 degrees to each other.

16. Class of Trigonal Pyramid. — With the threefold axis. Example : Sodium periodate, NaI04. 3H20.

17. Rhombohedral Class. — With threefold axis and centre. Example : Phenacite, Be2Si04.

18. Class of Trigonal Trapezohedron. — With threefold axis and three twofold axes of sym¬ metry at 90 degrees thereto. Example : Quartz.

19. Class of Trigonal Bipyramid. — With threefold axis and one plane of symmetry at 90 degrees thereto. No example known.

20. Class of the Ditrigonal Pyramid. — With threefold axis and three planes through this at 60 degrees to each other. Example : Tourma¬ line, RisB2(Si05)4.

21. Scalenoliedral Class. — With threefold axis and three planes intersecting at 60 degrees to each other, and three twofold axes diagonal to the planes. Example : Calcite, CaCOs.

The most important class in the hexagonal system.

Fig 8 is a crystal of calcite, c~ 0.854 showing the rhombohedron e [1012] , and the

first order prism j 1010 j .

22. Class of Ditrigonal Pyramid. The three¬ fold axis, three planes at 60 degrees and one at 90 degrees to the three. Example : Benitoite, BaTiSisCV

Hexagonal System. Hexagonal Division (Five Classes). — Referred to four axes, one a six-fold symmetry axis, the other three inter¬ changeable, at right angles thereto and at 60 degrees to each other and interchangeable.

23. Class of Hexagonal Pyramid. — With the

six-fold axis only. Example: Nephelite,

NaAlSiCh (nearly).

24. Class of Hexagonal Trapezohedron. — With six-fold axis and six twofold axes of symmetry at 90 degrees thereto. Example : Ba (SbO) 2 (CiILOb) 2.KN 03.

25. Class of Hexagonal Bipyramid. — With six-fold axis and a plane of symmetry at 90 degrees thereto. Example: Apatite, Ca5Cl.F

(poo*

26. Class of Dihexagonal Pyramid. — With six-fold axis and six planes of symmetry at 30 degrees to each other intersecting therein. Ex¬ ample : Greenockite, CdS.

27. Class of Dihexagonal Bipyramid. — With six-fold axis, six planes of symmetry at 30 de¬ grees to each other intersecting therein, and one plane and six axes perpendicular thereto. Example: Beryl, Be3Al2 (SiOs)6. Fig. 9 shows a beryl crystal with 6 — 0.499 and the forms

prism of first order m, jioloj, basal pinacoid c | 0001 1 pyramid of first order p j loll j and pyra¬ mid of second order e j 1 12 1 j

Isometric System. (Five Classes). — Re¬ ferred to three interchangeable axes at right angles to each other. The symmetry axes are either three cubic at right angles to cube faces, four octahedral, through opposite corners of a cube, or six dodecahedral, through centres of opposite edges of a cube.

28. Class of Tetartoid. — With the three cubic and four octahedral axes. Example : Barium nitrate, Ba(N03)2.

29. Class of Gyroid. — With the three cubic, four octahedral and six dodecahedral axes. Ex¬ ample : Sylvite, KC1.

30. Class of Diploid. — With the three cubic and four octahedral axes and three (cubic) planes. Example : Pyrite, FeS2.

31. Hextetrahedral Class. — With the three

cubic and four octahedral axes and six planes (dodecahedral). Example: Tetrahedrite,

Cu8Sb2S7.

32. Hexoctahedral Class. — With all the axes and planes of the preceding, that is, three cubic, four octahedral and six dodecahedral axes and with three cubic and six dodecahedral planes. Example: Garnet, R3” R2”’ (SiCh)3.

Typical crystals of pyrite tetrahedrite and garnet are shown in Figs. 10, 11, 12, in which the forms are the cube a | 1 00 j , octa¬ hedron p | 1 1 1 1 , dodecahedron d j 1 10 j , trapezo-hedron n {211 j, pyritohedron e | 2 10 1 , delto-hedron r { 221 j , and tristetrahedron o { 31 1 j .

The Grouping of Crystals. — Crystals are frequently grouped, sometimes in parallel posi¬ tion, when many little crystals may unite to one large crystal, sometimes in twin positions as if one individual had been revolved 180 degrees with respect to the other about some ˆtwin® axis, or as .if two individuals had developed sym¬ metrically with reference to a so-called twin plane. The twin-plane is always a possible crys¬ tal face, usually with simple indices, and the twin-axis is a crystal edge or is normal to a possible crystal face. The twinning law is de¬ fined by the twin-plane or twin-axis.

Frequently there is a repetition of the twin¬ ning, a third individual occurring reversed upon the second, a fourth upon the third, and this may result in many thin lamellae, ((polysyn-thetic® twinning, or in circular forms which often suggest a higher symmetry. Twins may usually be recognized by the presence of re¬ entrant angles or by striations as in the plagioclases.

Even when not grouped in parallel or sym¬ metrical positions, there may be some degree of regularity as parallel or radiating and whether showing plane faces or not the indi¬ viduals may be distinguished as to their shape by such terms as : columnar, banded, fibrous, foliated, lamellar and granular.

Crystal Habit. — The prevailing shape or <(habit® of the crystals of a substance is fairly constant, under one set of conditions, but with different conditions at formation the <(habit® usually is different. The reasons are not under¬ stood. Terms used to express habit are pris¬ matic, or tabular, conveying a general idea of the shape or more specifically cubic, octahedral, pyramidal, implying that the usually dominant form is the cube, octahedron or pyramid re¬ spectively.

Imperfections of Crystals. — The perfect crystal completely bounded by smooth plane faces is difficult to find. Unless formed while in a non-hindering medium they will not be com¬ pletely bounded and the faces are often marked by parallel <(grooves® called ˆstriations® or less frequently by etched figures and secondary

growth, or they may be replaced wholly or in part by so-called vicinal planes which are faces of flattened pyramids nearly coincident with the true face. Occasionally the faces are curved from strain or partial resolution or the union of many smaller crystals and lack of homogeneity may be indicated by various phe¬ nomena, such as opalescence, zonal structure, “phantoms,® variation in color or visible solid liquid or gaseous inclusions.

The Measurement of Crystal Angles. — In the simpler tasks of determining symmetry, system and type symbols, approximate meas¬ urements within one or two degrees with a contact goniometer often suffice. This instru¬ ment in its better forms consists of a brass pro¬ tractor with detachable arms which can be slid upon a pivot until of the most convenient length for the particular crystal.

In measuring the arms are detached, set at an angle a little less than the angle to be meas¬ ured, clamped loosely and one of the arms placed in perfect contact with one crystal face. The other arm then nearly touches the second face and, while holding between the eye and the light, is brought into perfect parallelism with the second face by a gentle pressure with the forefinger.

The arms are then replaced on the arc and the angle is read.

For the more exact work of determining parameters and angles and the numerical values of indices some form of “reflection® goniometer is almost universally used by which the angles between smooth bright faces are measured to minutes or closer. The goniometers may be one, two or three circle and may vary consid¬ erably in details of construction. In the one-circle goniometer the crystal is attached by wax to a carrier and adjusted so that the edge be¬ tween the two faces coincides with the axis about which the crystal is free to turn. Light is directed through a so-called collimator fixed in position at right angles to the axis of ro¬ tation and falling upon any face parallel to this axis it is reflected in the same plane and for some position of rotation is reflected to the reading telescope. Further rotation brings a second face to the position of reflection and the difference between the two readings is the supplement of the angle between the two faces.

In the two-circle goniometer there are the same crystal carrier, collimator and reading telescope but the circle which bears the crystal

carrier in turn revolves about an axis perpen¬ dicular to its own. The crystal is mounted with some chosen face parallel to the circle which bears the carrier and this face for all positions of this circle and one position of the other circle sends a reflection to the reading telescope. By rotation of the two circles re¬ flections are obtained for each face and from the readings co-ordinate angles are obtained corresponding to the longitude and colatitude of a place.

The principal advantage of the two-circle goniometer is that only one adjustment of the crystal is necessary, while with the one-circle goniometer there must be a separate adjust¬ ment of the crystal for each zone.

The three-circle goniometer combines the advantages of the one-circle and the two-circle in that the zones are obtained by two of the

circles and measured on the third without fur¬ ther adjustments.

The Projection of Crystals. — The faces and zones of a crystal are most conveniently studied in some form of projection in which each face is represented by a point (or line) in a position determined by the measured angles. Such projections may be regarded as maps made to scale, from which both graphically and by calculation all the relations of symmetry, in¬ dices, constants and angles may be determined, the methods being at once simple and accu¬ rate.

The most used projections are the stereo¬ graphic and the gnomonic, both of which assume that the crystal is surrounded by a sphere, the centres of the sphere and the crystal coinciding, and that radii are drawn from the centre perpendicularly to each face of the crys¬ tal, piercing the surface of the sphere in definite points or poles. The “projections® are projec¬ tions of the imaginary sphere and its face poles upon planes, the stereographic being a projection upon the equator by lines drawn from each face pole to the south pole, while the gnomonic is a projection upon a plane tangent at the north pole by prolonged radii. Naturally the construc¬ tion proceeds at once from the measured angles to the projection by simple and accurate methods which have been developed.

After the projection has been made, the zones obtained and the elemental faces assumed, the method of procedure varies. A simple order would be :

1. Determining graphically and by zonal re¬ lations the indices of all

faces.

2. Calculation of the axial elements from the relations between the measured angles.

3. Calculation of the theoretical angles cor¬ responding to the determined indices and ele¬ ments.

These can only be glanced at.

Zonal and Graphic Determination of In¬ dices. — All edges between faces of a zone are parallel and there must be some radius in the surrounding sphere parallel to them. There must also be three indices corresponding to the point at which it cuts the sphere. These are called zone indices and may be derived from the indices, of any two faces of the zone by cross multiplication. For instance, if a zone contains the two faces (133) and (311), the values of the zone indices [uvw] are obtained as follows :

l

3

3 3 13

XXX

113 1

u = 3— 3 = 0

v = 9 — 1 = 8 or [uvw] = [088] = [01 1] w = l — 9 = 8

The indices of a face in two zones result from a similar cross multiplication of the two sets of zone indices, and very, rapid calculations can be made, more especially if one of the known faces in each zone is either (001), (010) or (100), for then the ratio of the two indices, which are zero for this face, is constant for all the other faces of the zone.

For instance (Fig. 13) an unknown face h lies in a zone with (010) and (305) and also in a zone with (100) and (111).

To substitute in hkl we have therefore

From first zone, 3, -, 5.

From second zone, -, 1, 1,

Remembering these are ratios and combining by

CSABA — CTENOPHORA

277

inspection the indices of the face h must be (355). Similarly the indices of the face b must be (335) and of k must be (Oil) and e (131),

It will usually happen that only the indices of a few faces can be obtained directly by zonal equations, certain factors being lacking, but

many graphical devices exist by which a fresh start can be made and zonal solutions again obtained.

Calculations of Axial Elements and Theo¬ retical Angles. — The formulae of spherical trigonometry and special formulae in terms of the determined indices and measured interfacial angles are most used. For instance, in the

Orthorhombic system for the ratio d : b : c, if b is taken as unity the simplest formulae are :

o — tan (1 00) A (MO) ; c = -^- tan (001) A (okl).

Similar but somewhat more complex for¬ mulae exist for the (hkl) angles.

Similarly in the monoclinic system for the

values of /? and of d : b : c, b being taken as unity

3 = (100) A (001),

„ cos (001) (hk 0)

COS/ = cos (010) (hkOY

Simple formulae for a and c are

„ _ h cot (010) A (hk 0)

a k sin /?

, l tan (001) A (Okl)

C k sin ft

Crystal Drawing. — The usual crystal draw¬ ing is a Elinographicˆ projection, such as Figs. 4 to 12, in which the crystal is projected upon a vertical plane by parallel rays oblique to the plane of projection. The eye is assumed at an infinite distance a little to the right and above the centre of the crystal.

The figures obtained in this way have an appearance of solidity, all parallel edges are parallel and all points in a given line remain the proper proportionate distances apart.

The work consists chiefly of two stages, first finding the projection of the crystal axes cut off at the parameter lengths ; second, finding the direction of the projection of any edges from the indices of the intersecting planes.

The dominant forms are drawn and then the minor modifying planes, either in ideal sym¬ metry or so as to indicate the relative develop¬ ment of faces and forms. The details cannot

be given here. See Chemical Crystallog¬ raphy; Crystal; Crystallo-Chemical Analy¬ sis; Geometrical Crystallography; Physical Crystallography ; Mineralogy.

Bibliography. — Standard textbooks in crystallography usually contain good presenta¬ tions of Geometrical Crystallography. Some of the special treatises are Bayley, W. S., Elemen¬ tary Crystallography0 (New York 1910) ; Hil¬ ton, H., Mathematical Crystallography) (Ox¬ ford 1903) ; Lewis, W. J. A., (A Treatise on Crystallography } (Cambridge, England, 1899) ; Linck, G., (Grundriss der Kristallographie) (3d ed., Jena 1913) ; Reeks, M., (Hints for Crystal Drawing) (London 1908) ; Tutton, A. E. H., Crystallography and Practical Crystal Meas¬ urement (London 1911) ; Viola, C. M., (Grundziige der Kristallographie) (Leipzig 1906) ; Walker, T. L., Crystallography J (New York

1914).

Alfred J. Moses,

Professor of Mineralogy, Columbia University.

CSABA, chob'o, or BEKES-CSABA (ba'- kash), Hungary, a market town near White Koros, with which it is connected by canal, in the county of Bekes, about 105 miles southeast of Budapest. The trade is chiefly in grain, wine, hemp, flour and cattle. The Lutheran religion predominates. Pop. 42,599.

CSOMA DE KOROS, cho'mo de ke'rish, Alexander (Hungarian Sandor), Transylvanian traveler and philologist: b. Koros, 4 April 1784; d Darjeeling, India, 11 April 1842. He was educated first at the college of Nagy-Enyed and subsequently at Gottingen, where he specialized in Oriental languages. He was in early life seized with the desire to investigate the origin of the Magyar race. He went, in 1820, to the East for that purpose. He visited Egypt and Persia and spent several years in a Buddhist monastery in Tibet, diligently studying the Tibe¬ tan language and literature, imagining he rec¬ ognized resemblances between the Tibetan and Magyar. He next lived some years in Calcutta, studying Sanskrit, and compiled his dictionary of Tibetan and English,) and a (Grammar of Tibetan.* He catalogued the Tibetan books and wrote a number of articles in the' Asiatic Re¬ searches. Once more he set out on his old-time search to find the home of the early Magyars and bent his way toward the western confines of China, but died on the way. Con¬ sult Duka, Th.,(Life and works of A. C. de Koros) (London 1885).

CSONGRAD, chon'grad, Hungary, a mar¬ ket town, capital of a county of the same name, at the junction of the Koros with the Theiss, 72 miles southeast of Budapest. The' surrounding country is very flat and has excellent pastures. The chief occupations are cattle-raising, agricul¬ ture, wine-making and fishing. Pop. 28,310, mostly Magyars.

CTENOID, ten'oid (Gr. «comb-like»), ap¬ plied to the scales of fishes when jagged or pectinated on the edge like the teeth of a comb, as in the perch, flounder and turbot.

CTENOPHORA, ten'6'for-a, a phylum of animals, sometimes grouped under the Coelen-terata (q.v.) but distinguished from them by the absence of stinging cells and the presence of a . third germinal layer. They also possess comb-like bands of cilia which serve them for

locomotion, instead of the umbrella and ten¬ tacles of the ccelentarates. In almost all cases two long and contractile tentacles are present, establishing the double bilateral symmetry which is characteristic of the group. There is a sense-organ of equilibrium at the end of the body opposite the mouth. The digestive tube has other openings to the exterior than the mouth, but these do not appear to function as an anus. The body is transparent and gelatinous and is usually pear-shaped. The Venus' girdle belongs to the group which appears to be remotely applied to the Turbellaria.

CTESIAS, te'shi-as, Greek historian and physician: fl. about 400 b.c. In 415 he was cap¬ tured by the Persians and lived for 17 years at the court of Persia, where he wrote his (History of Persia* with the view of correcting the errors prevalent among his countrymen about that country. According to Diodorus his work is derived from the official history of the Per¬ sians, written according to the law of the country. His work was written in the Ionic dialect and contained 23 books. Of this work all that remains is an abridgment in Photius and the fragments contained in Diodorus and other historians. His writings are particularly valued for the light they throw on the history of East¬ ern nations. An edition of Ctesias, with an introductory essay on his life and writings, was published by Bahr (1824), and by C. Muller in an appendix to Dindorf, ˆHerodotus* (Paris 1844). Consult Gilmore's edition of the frag¬ ments of the (PersikaP with notes and intro¬ duction (1888) ; Blum, (Herodotus and Ctesias *(Heidelberg 1836), and Wachsmuth, (Einleitung in das Studium der alten Geschichte* (Leipzig

1895).

CTESIBIUS, te-sib'i-us, Greek mechanician. He flourished under Ptolemy Philadelphus and Euergetes, at Alexandria, about 250 b.c., and was famous for his inventions in mechanics. We owe to him and his pupil, Hero Alexandrinus, the pump, the bent siphon and also the discovery of the elastic force of air and its application as a motive power. His work on hydraulic machines is lost.

CTESIPHON, tesTfon, or TAK-I- KESRA, Asia, a city of Babylonia, on the east bank of the Tigris and opposite Seleucia, the common winter residence of the Parthian kings, and finally the capital of the Parthian

kingdom. It was conquered by the Romans in 115 a.d. and destroyed by the Arabs under Omar in 637. Its ruins still attest its former magnificence. The two places Ctesiphon and Seleucia are known as the Arab town, El-Meda'in.

CUAJINIQUILAPA, kwa-He-ne-ke la'pa, Guatemala, the chief town of the eastern de¬ partment of Santa Rosa, 35 miles southeast of the city of Guatemala. Its altitude above the level of the sea is 3,254 feet. Pop. 3,062.

CUAUTLA MORELOS, kwa-oot'la, da tno-ra'los, Mexico, the chief town of the district of Morelos, in the state of Morelos. It is about 26 miles from Cuernavaca, the capital of the state and 85ˆ4 miles from the City of Mexico, with which it is connected by railway. The sur¬ rounding country is a fertile sugar-producing district. Cuautla is historically interesting be¬ cause it occupies the site of an old Indian town, and, furthermore, in the war of independence

the famous patriot leader Jose Maria Morelos y Pavon was besieged here. It is well known as a health resort on account of its hot sulphur springs. Pop. 7,000.

CUBA. An island in the West Indies, is separated from the United States by the Strait of Florida, and from Mexico by the Yucatan Channel, and commands the entrances of the Gulf of Mexico. Extending east and west from the 74th to the 85th meridian, it constitutes the most important part of the northern barrier of the Carribean Sea, and guards the Windward Passage, the natural route for commerce between the Atlantic Ocean and the <(Ameiican Mediterranean, ** which is equivalent to saying that it guards the route of commerce between the Atlantic and Pacific oceans, via the Isthmus of Panama. Its eastern point, Cape Maisi, lies directly south of New York city; its western point, Cape San Antonio, nearly south of Cin¬ cinnati. But the length of the island, 730 miles, is somewhat greater than that statement would indicate, for Cuba curves Hike a bird's tongue, ** as the Spaniards used to say, from lat. 19° 40' N. in the province of Oriente up to lat. 23° 13' N., the most northerly provinces being those of Matanzas and Havana. In its upward curve the coast-line attains a point that is only 96ˆ4 miles distant from Key West; thence it falls away again until but 130 miles separate it from the mainland of Mexico. Its width decreases gradually from 100 mfles in the east to less than 25 near the line between the two western provinces, Pinar del Rio and Havana. Its total area, including the Isle

of Pines and the cayos or keys (more than 1,000 islets that form an irregular border along the northern and southern coasts) is estimated at 44,164 square miles. Thus it is larger than Vir¬ ginia ; smaller than Pennsylvania.

Physical Features. — Nature has provided unusual facilities for making the most of Cuba's favorable situation upon a great and permanent marine highway. The coast-line is 2,000 miles long, or much more than that if we take into account all its indentations. Capacious harbors, quite evenly distributed along the north coast, are Baracoa, Nipe, Gibara, Nuevitas, Sagua la Grande, Matanzas, Havana, Cabanas and Bahia Honda; and, on the south coast, Cienfuegos, Trinidad, Manzanillo, Santiago de Cuba and Guantanamo. Besides these there are scores of fairly safe roadsteads and harbors of moderate size. Therefore no plantation on the narrow island can be very far away from some port at which supplies may be received and from which produce may be shipped. The mountains of Cuba occur in three distinct groups. In the westernmost province, Pinar del Rio, the Guani-guanico Range (Sierra de los Organos; greatest altitude, 2,532 feet), extends from Cape San Antonio to the boundary-line of Havana prov¬ ince, and thence continued in lower discon¬ nected hills which give a bold outline to the northern coast of the four central provinces, it becomes the chief feature of the impressive landscapes around Sagua de Tanamo and Bara¬ coa, far away in the east. The Guamuhaya group occupies but a limited area in the south¬ ern part of Santa Clara province, between the cities of Cienfuegos and Trinidad. Its highest summit, El Poterillo, is 2,900 feet. While the foregoing are of no great height, but owe their

Rock

iam/

Git-StIRRCP CAjVa Great Hauror Cay

Florida

Ten Thousand* Islands

Harbor I.’

. KLKUTHERA Pt.

Berry

rrknt 1.

“Nassau,

Providence

0 ramie Cay

William I. Billy I. *

LlTT-Ef**

San Salvador

Cistern Cayˆ

South Right

Devils Pt

‘Columbus Ft.

Wat lino

Green

Whale Poiut

BEAT

Xpxuma I

XT\ ISLAM)

Tropic

Tropic of Cancer

Cancer

LONG \ ISLAND

Little Ex cm a

.* x&m

i lunajaj ogfo

Turtle Cove

Bahia/

Flaminc-o Ca1

Ociba^

0 JUMENTOS ISLANDS

*-L]W TinalAfl V V, Ta

•5(Y. . Tact

.» 7 W^^Wv^Talacios^1

I o^V. ^Il™dun£<”< S

Consolation &

| j’ San /] I inarcdel

is/ JuaiT^San Luis vs ^Jahifre^yfr^ | a CnlonTn^<ir*^

FoBTCiRi-

J Agra monte” * v^— . 1 Jagiicyc\Al.,’|’ Gran-lc Y IU

_ Murza ,

‘4“”^ $ E,’,sena,l,.%‘

.[.i banoUc ˆ Bnm y

„ * Vafin do - ~

ˆMatahay d,reS Peni&-SDu

-AYOS DEL HaMBRE

Racoon

“ntua-Q,

ˆPZulueti

YfPlacetas

‘aoatiˆ

5 Prlelo 7ˆ-

\ ”'k’ ˆ

cRnnˆ-huˆsi Vl”s» n Ferna ndo„C,ˆ

\ o Tu.‘

‘WWiSoeO’ Moron \

.Muquin

Great Ra

EnM’iuuta de Cortez

’ -Va zones nv _ 4

Sierra

oJiquimus

Gnfa

C AN A l| AC A Dili LS)

Cayos7JV«v-; 1 de San Felipe .

CaYOS Dt LOS 1 N DoS I

Fernanda i

Suncti /£r

Spli-i’Lus/jcu

{W

Guasinnd h

T’e hallos0 I-n Mered

jCiego de Avila Espinosa1

Triiiiriat

Casildas

Banco de los, o Jakdinillo^

n # \> < * >‘1

yD > tl V. y ’ * > <^> AP

rUuamtu^v n:S

Puerto Padres*^iL.^V c° •

El Yeso Q Masio Dominguez o C&ntlmp’oru,

Salvador’s-,

iSfSfVTj. CcspecleiS^ o^MY‘“ * Emb9 Nue\ > Rr^FloricIa’\i > (0^a > 0| 1’1 ‘ ® !V eriendiP

* fcCama s u e yK

Rlneou Grandfco rv_i-‘

vC. J’v*a Vista Herm

q < ~* Cigarrerao f |

.. Y H‘° ^/..Cuntraiiiaatre,

rO I

-lllta del MacurijcsClLarrapata F* Suuˆ

El Jorul.ˆg CaraiiaciiL

R.ina Alta

Dolor eEˆ

ˆta. de Guanal

o Barclay

lo8e° Canario’

TubTuuos

Qucmado o‘

ia

Tacajo / j:> .ty

llcr reraP T B<j ff Jc ftda J* ‘> =o °^rvd1”

dCueto AMajarl ,^e ^

Si*. /.UW l eJto\ o’ ‘?’

E.J® N (E. oCarmcu

^T>J t’Uavftle \ ^ ,

^■v”1 , t*‘Y ‘

San0 l^s,

Antonia San.

La Dupucyit

C. .DE PlEDKA? < v Cayo de Caballones

San |(Lnrcnzoj

ˆ Pablo’

San Bwnardt

n “V _J. Gam boaS\|

iliiha Ensenadaj Alejandro

aCaNavabo\

]ˆlHIlzanilIaˆˆˆ«

Campechuclarˆ

San Ramuu,ˆ6 jibacoa

Jlj:

°.OV •

Laberinto de. <V« Dole .Leu’uas*’

■

Bland

* Arroyo CUBA

Pulmarn

■YY. Santa Buecito

El (‘huno

p.,Q A’-O-

Coloradil

Rancherifty Cabo Cruzt

Little Cayman

(Bn.)

Poiut

Statute !\liles, -59 = 1. Inch.

0 5 10 25 50

Rand McNally's New II sd4 Map of Cuba. Copyright by Rand McNally ii Co.

Longitude West

.

ftjtfactiveness rather to beauty or oddity of out¬ line; the luxuriance of the foliage on their slopes; and the exquisite charm of the valleys they enclose, Oil the southern coast of Oriente province is a range that, in majesty, rivals and pfobabiy surpasses any mountains of the North American continent, east of the Mississippi. This is the Sierra M&estra (including the Sierra del Cobre and Macaca group). Rising precipi¬ tously above the' •Caribbean Sea, this cyclopean wall extends through two degrees of longitude, from Cape Cruz to the city of Santiago, in a nearly straight east and west line. The altitudes of three widely separated peaks are given as follows : The Cerro del Oro, 3,300 feet ; La Gran Piedra, 5,200 feet; and Pico Tarquino, 8,600 feet. From this it will be seen that all the northern parts of the island, and the southern coast as far west as Cape Cruz, are either mountainous or at least well above sea-level. But a long stretch of coast on the Caribbean Sea, especially the southern portion of Santa Clara and Matanzas provinces, is comparatively lowlying and swampy. The great Zapata swamp is formed where the gradual southern slope reaches the Caribbean level. Beyond the limits of the Zapata is an archipelago of islets, the so-called ˆGardens® or ((Little Gardens® (Jardinillos), crowding the shallow waters be¬ tween Cuba and the Isle of Pines.

Cuba's agricultural wealth is due to the fer¬ tility and depth of the soil that covers the pre-Tertiary sedimentary rocks forming the base of the island's structure. Above the diorites, basalts and serpentines, the granitoid rocks, the primary and secondary sandstones, limestones and conglomerates, is a great sheet of late Teritary limestone. This white sheet or crust, of remarkable thickness, was formed as a de¬ posit of <(organically derived oceanic material,® says Dr. Robert T. Hill ; and he adds : ((The island was reclaimed from the sea by a great mountain-making movement in late Tertiary time, succeeding the deposition of these lime¬ stones. In later epochs, Pliocene and Pleisto¬ cene, the island underwent a series of epeiro-genic subsidences and elevations which affected the coastal borders, producing the wave-cut cliffs and a margin of elevated reef rock which bor¬ ders the coast in many places.® About two-thirds of the entire area of Cuba is covered with soils derived from this organic limestone

— soils whose colors, red and black, are not at all sug¬ gestive of their origin. In quality, in depth and in the proportion they sustain to less productive districts of the island, these calcareous soils are probably unrivaled. It is quite certain that they have no rival in any land whose situation is equally favorable for easy and cheap transpor¬ tation of produce to foreign markets. A differ¬ ent type of soil, also valuable in agriculture, is the clay and gravel resulting from the decom¬ position of Tertiary igenous rocks. This occurs in parts of the provinces of Oriente, Santa Clara and Matanzas. Approximately one-half of the island has been cleared, but between 13,- 000,000 and 15,000,000 acres are still covered with forests. The climate also favors vegeta¬ tion, for the air is moist and injurious extremes of temperature are unknown. At Havana the thermometer averages 77° F. for the year, or 82° F. in the months of July and August, and 72° F. in December and January. At Santiago the average temperature for a year is somewhat

higher — about 80° F. ; on the other hand, towns located in the interior at an elevation of 200 or 300 feet above sea-level have an agreeable cli¬ mate, the temperature averaging not more than 74° F. Rain falls most abundantly between the end of April and the beginning of November. The largest river is the Cauto, which flows westward through Oriente province and empties into the Gulf of Guacanayabo. Many smaller streams make their way from the mountains to both the southern and northern coasts ; not a few have carved out subterranean passages through the white limestone, and thus, in ages long past, caverns of remarkable beauty have been formed. Even to-day in the western provinces, a number of streams disappear from view in some underground channel long before the sea is reached.

Population and Political Divisions. — The

number of inhabitants, according to the census taken in 1907, was 2,048,980. In 1913 it was given as 2,382,990; in 1916 as 2,627,536.

The area and population of the six provinces of Cuba are (1916) as follows:

Area

(in square

Provinces miles) Population

Havana (including Isle of Pines) . 3,174 651, 266

Pinar del Rio . 5,212 257,781

Matanzas . 3,260 270,513

Santa Clara . 8,266 569,416

Camagiiey . 10,076 154,567

Oriente . 14,227 567,988

Total . 44,215 2,471,531

Natural Resources. — In the mountainous eastern province deposits of copper, iron, man¬ ganese, mercury, zinc, silver, antimony, lead, etc., exist, and some of the mines have been worked on an extensive scale. The copper mines at Cobre, near the city of Santiago, were opened in 1524, and ranked as the greatest copper mines in the world until the deposits of this metal in the United States were developed. Iron ore of excellent quality outcrops on the slopes of the Sierra Maestra Range. Especially worthy of mention, in the province of Oriente, are the hematite and magnetite mines at Dai¬ quiri and other points farther toward the east and north. Large deposits of silver have been found in the provinces of Camagiiey, Oriente and Santa Clara, and every province contains mines of asphaltum. Cedar, mahogany, pine, lignum-vitae, ebony, rosewood, logwood, and other dyewoods, are valuable products of the forests for export. For the use of the Cubans themselves the royal palm stands unrivaled. There are many less familiar trees, not only the characteristic flora of the other West Ind;an islands of Central America and Florida, but plant-forms that have developed quite dis¬ tinctive characteristics in the depths of these forests whose borders have only been touched by the inexpert native lumber¬ man. More than 3,350 native plants were catalogued

before an exhaustive study of the subject could be undertaken. All kinds of tropi¬ cal fruits grow luxuriantly, many of them with¬ out cultivation. In point of value the banana heads the list. Cocoanuts, oranges., lemons, limes and pineapples are grown for shipment. in larger or smaller quantities to correspond with the demand in foreign markets, the supply being practically unlimited. The anon, mango,

rose-apple, pomegranate, sapote, tamarind, fig, citron, guava, aguacate (alligator pear), mamey and guanabana are abundant. The cultivation of grapes was forbidden by the Spaniards in the interest of the wine merchants of the Peninsula. Coffee culture was at one time a flourishing industry; and since the compara¬ tively small amount still grown in the eastern end of the island is of excellent quality coffee may prove one of the minor sources of Cuban wealth in the future. Cotton grows freely in Cuba. Its cultivation on a commercial scale, abandoned after the liberation of the slaves, was resumed experimentally in the province of Oriente in 1902-03. In all parts of the island grasses grow rankly, and forage is abundant throughout the year. Other conditions favor¬ able to cattle-raising are the mildness of the winters, the streams of fresh water and the ready access to important markets on the Atlantic coast. Before the insurrection there were two and one-half millions of cattle in Cuba ; at its conclusion not more than 75,000. The promotion of this industry was encouraged by the Palma administration in 1902-03, and undertaken largely by American capitalists.

History. — A score of years after the dis¬ covery of America, the town of Baracoa was founded by Spaniards under the leadership of Velasquez. Next, in rapid succession, came Trinidad, Sancti Spiritus, Puerto Principe and Santiago, dating from 1514 to 1515. In the year last mentioned Velasquez founded the orig¬ inal town of Havana (San Cristobal de la Habana) on the south coast; but in 1519 the present site on the north coast was chosen, and to it the settlers of the older town were trans¬ ferred. So important did this new Havana ap¬ pear to be that the first governor of Cuba called it “The Key of the New World.® Burnt by the bucaneers in 1528, it was rebuilt and sur¬ rounded with fortifications by De Soto. Again captured and sacked by pirates in 1556, it was again fortified, more strongly, by direction of the Spanish Crown. Morro Castle was begun before 1600. During the 16th century the value of Cuba in Spanish eyes was precisely what the words ((Key of the New World® expressed. At its ports expeditions were fitted out for con¬ quest and exploration of the mainland; but there was no thought of obtaining revenues from the island itself except by the discovery of the precious metals, the futile search for which was never quite abandoned. When the first plants of sugarcane were imported from the Canary Islands to start an industry more remunerative than mining, it became necessary to import slave-labor

from Africa. The In¬ dians had been nearly exterminated — not en¬ tirely so, as is commonly asserted, for the aboriginal strain can still be detected in the physiognomy of some Cubans. English, French and Dutch pirates continued to ravage the coasts during the next century. Cuban cities of that time, with their old-fashioned defen¬ sive works, were like the walled towns of mediaeval Europe. An attack of the Dutch fleet upon the capital was repulsed in 1628; in 1762, however, a force of English and American co¬ lonial troops, under Lord Albemarle, took Ha¬ vana, which they held until, by the terms of the Treaty of Paris of 1763, Spain regained pos¬ session. A period of moderate prosperity and exceptionally good government followed. Las

Casas, who came out as captain-general in 1790, worked earnestly and wisely to promote Cuba's interests; the Cubans, for their part, evinced their appreciation of such considerate treatment by a chivalrous display in Spain's time of need. Havana learned, in 1808, that the Spanish dy¬ nasty had been overthrown by Napoleon; there¬ upon her citizens declared war against Napo¬ leon. And when Spain was losing one after another of her American colonies, Cuba re¬ mained loyal. But prosperity brought long years of suffering to the <(ever-faithful island,® and the mother country as well. The result was inevitable. When the long-sought treasures of Cuba were at last brought forth, not from the gold mines but from fertile soil, Spain sought to make the treasure all her own, as she had monopolized the precious metals three centuries before. With a few exceptions, the high Span¬ ish officials sent to Cuba were simply belated conqnistadorcs, lacking the personal valor, but possessing the acquisitive talent of the adven¬ turers who first exploited Mexico and Peru. The decree of 1825 placed the lives and for¬ tunes of all Cubans at the disposal of the captains-general. Conspiracies, insurrections, fili¬ bustering expeditions from the United States, called forth by oppressive measures, and in turn furnishing a poor justification of repressive measures, are the main incidents of the story of the following 70 years marked by the con¬ spiracy of 1829, the rising of the blacks in 1844, the Lopez expeditions in 1849, 1850 and 1851, the revolts in 1855, the Ten Years' War (1868 — 78) and the revolution of 1895. About 200 Americans took part in the ill-starred expedition of 1851, and of those who surrendered after Lopez's defeat many were shot. Captain-Gen¬ eral Taco (1836) set native Cubans against resident Spaniards by impolitic discrimination, intensifying that antagonism between the two elements of the white population which to-day makes political controversies rancorous. The cause of the revolutionary movements between 1849 and 1855 was the cruelty of a

military commission in 1848, more than 3,000 persons being tortured, imprisoned, banished or exe¬ cuted at that time for real or supposed com¬ plicity in a plot. The cry of outraged patriot¬ ism, the “Grito de Yara,® was heard 10 Oct. 1868. During a part, at least, of the Ten Years’ War, the aim of the Spaniards was, as Captain-General Valamaseda wrote, to con¬ vert the island into a desert. Spain sent 257,- 000 men against the insurgents and lost 208,000 of them, according to official reports. The cost of the war, excluding the value of property de¬ stroyed, was $300,000,000. Midway in this strug¬ gle the Virginhis, a vessel whose American register had been fraudulently obtained, was captured by a Spanish warship, taken into the harbor of Santiago and about 50 of her officers and men were shot without civil trial. The Treaty of Zanjon (1878) restored the old op¬ pressive conditions ; moreover the cost of the war had made a new burden for the island to bear, while vexatious restrictions hampered its commercial relations with other countries. “Underground Cuba® gathered force for a final effort. In February 1895 the flame of insur¬ rection was kindled and, in the course of three years, the whole island was again laid waste. Throughout the last century the government of the LTnited States manifested an interest in

CUBA

1 View of Havana from Cabanas

2 Central Park and Opera House, Havana

V-

- H 1 1 1 llll Him I

Cuba's fate. In 1823, Monroe being President, a dispatch was sent by the Secretary of State to the American Minister at Madrid, in which the Secretary (Mr. Adams) called particular attention to the commanding position which Cuba occupies with reference to the Gulf of Mexico and the Caribbean Sea, and expressed the opinion that there was no other foreign ter¬ ritory which could compare with it in the sum of the national interests of the United States. In 1825 and 1826 Colombia, being then at war with Spain and designing to invade Cuba and Porto Rico, refrained from this projected at¬ tack on the strength of a protest from the Uni¬ ted States — a protest in the interests of the slave-power. The new Spanish-American states ((always marched under the standard of universal emancipation.® Martin Van Buren said in 1829 : (<It is the interest of the south¬ ern section of the Union that no attempt should be made in Cuba to throw off the yoke of Spanish dependence.® Webster, in 1848, de¬ clared that Cuban emancipation (<would strike a death blow at the existence of slavery in the United States.® Thus for 20 years the South¬ ern slave-owners insisted that the status of Cuba and Porto Rico should not be changed. The annexation idea came to the front in 1848. A proposition for the purchase of the island was made by President Polk, through his Sec¬ retary of State, Mr. Buchanan, who wrote to the American Minister authorizing the latter to offer $100,000,000 to Spain as compensation for the surrender of a colony which was, as we have seen, a particularly troublesome possession just then. The strategic value of Cuba was dwelt upon in this correspondence, and the fear was expressed that the island might fall into Great Britain's hands, in which event that nation would exercise supreme control over the Gulf of Mexico. The offer was declined by Spain. Both England and France were warned in 1852 that the United States would not admit the claim of any other power to intervene in a dispute of which Cuba was the subject. In Feb¬ ruary 1854 the cargo of an American steamer, the Black Warrior , was seized unjustifiably in Havana. It seemed for a time that war, and the acquisition of Cuba by force, might ensue; but reparation was offered by Spain, and was accepted. President Grant intimated in 1875 that ((mediation and intervention® might be¬ come necessary to put an end to the long strug¬ gle then in progress.

The revolution of 1895 falls naturally into three periods: First, that of Capt.-Gen. Mar¬ tinez Campos, whose fair fighting utterly failed to prevent the spread of the revolutionary movement from the eastern to the western provinces ; second, that of Captain-General Weyler, who inaugurated the policy of recon¬ centration ; third, that of Captain-General Blanco — including the events from Weyler's recall to the destruction of the Maine. Fighting fairly and like a gentleman, Campos was fairly beaten by men who developed positive genius in guerrilla warfare — Gomez and Antonio Maceo, who knew how to win by skilful eva¬ sion, by opportune attack, and, above all, by making an ally of every peasant and living on the country. Maceo crossed both trochas and reached Pinar del Rio province, thus carrying revolt from one end of the island to the other. Among the hills of the Sierra de Jos Orangos

he maintained his band of followers and defied all efforts to dislodge him up to the close of the year 1896. Then he risked his life once too often and was killed. Campos failing to check the insurrection, Weyler was sent to crush it. The reasoning of the latter was strictly logical. He learned that Cuban peasants supplied the rebels with food, with information in regard to the movements of Spanish columns and with ammunition, bought, stolen or brought to the coast by filibusters. He did not shrink, then, from the extreme cruelty involved in the re¬ moval of the country folk from their homes to garrisoned cities, where, as ((reconcentrados,® they should become quite harmless. On 21 Oct. 1896, his proclamation was issued. Thousands of Cuban families were pent in towns or zones under surveillance of a Spanish garrison ; and as time went on they died of starvation and fever.

United States and Cuba. — When Spain's Prime Minister, Canovas del Castillo, was as¬ sassinated, 8 Aug. 1897, the prop of Weyler's Cuban policy was withdrawn. His successor, General Blanco, took to Cuba a policy of com¬ promise. Autonomy was offered; and, for the rescue of the reconcentrados, the suggestion was made that charitable people in the United States might forward supplies to be distributed by the American consuls in Cuba. The pro¬ posal of autonomy was rejected with emphasis. General Blanco's emissary who brought the message was shot by an insurgent commander. And when it became known that an appeal for contributions to feed starving Cuba had been made in the United States, formidable riots in Havana expressed resentment of the proffered relief, which was regarded as the entering wedge of the dreaded intervention. For the protection of American interests the Atlantic squadron was ordered to make its headquarters at the Dry

Tortugas, within six hours' sail from the Cuban capital; and on 25 January the battleship Maine was sent to Havana harbor.. The Spanish government sent the cruiser Viz¬ caya to New York harbor soon afterward. On 9 Feb. 1898, a letter addressed to Senor Canalejas by Senor Dupuy de Lome, Spanish Minister to the United States, was published in the news¬ papers of the latter country. Its cynical tone and insulting characterization of President Mc¬ Kinley were resented, and Senor de Lome re¬ signed his office. One week later the Maine was destroyed ((by the explosion of a submarine mine,® — to quote from the report of the court of inquiry — ((which caused the partial explo¬ sion of two or more of her forward magazines.® The court was unable to obtain evidence fixing the responsibility upon any person or persons; before the official investigation was made, how¬ ever, public opinion in the United States had rightly or wrongly assigned the responsibility, and war with Spain seemed inevitable. On 8 March, the House of Representatives passed a bill appropriating $50,000,000 for national de¬ fense. Senator Redfield Proctor's statement of his personal observations in Cuba, read to the Senate 17 March, did not make for peace. It confirmed previous reports which had excited pity and indignation. Diplomatic representa¬ tives of the six great European powers called at the White House 7 April to present a joint note, a ˆpressing appeal® for (<the maintenance of peace. w President McKinley's reply was con-282

‘dilatory, but the resolve he had formed was ex¬ pressed in his message of 11 April ; *In the frame <o£ hlimanity, in the name pf civilization, in behalf of endangered American interests, which give us the right and the duty to speak jand act, the war in Cuba must stop.® The war in Cuba had, indeed, stopped or halted The gueen regent of Spain had directed General Blanco to proclaim a suspension of hostilities, in order to prepare and facilitate the restoration of peace; and the President’s message con-duded with the statement that he had received official information of this circumstance. The text of General Blanco’s proclamation had been published, and the orders of General Weyler revoked. It was asserted that the reeoncentra-dos Were to be permitted to return to their homes ; that the sum of $600,000 had been voted for their relief ; and that public works had been undertaken for the purpose of giving em¬ ployment to the poor. Spain had offered to submit to arbitration the disputes which might arise in the matter of the Maine. President McKinley called attention to all these things, and requested that they should be given full weight in the deliberations of Congress. But the «full weight® of such programs had been ascertained. The reports of American con¬ suls in Cuba accompanying the message de¬ scribed conditions which it seemed impossible to reform without forcible intervention. The famous joint resolutions of 19 April recogniz¬ ing <(the independence of the people of Cuba, demanding that the government of Spain relin¬ quish its authority and government in the island of Cuba, and withdraw its land and naval forces from Cuba and Cuban waters, and di¬ recting the President of the United States to use the land and naval forces of the United States to carry these resolutions into effect, concluded with the words : ((The United States hereby disclaims any disposition or intention to exercise sovereignty, jurisdiction, or control over said island, except for the pacification thereof, and asserts its determination when that is accomplished to leave the government and control of the island to its people.®

The Spanish-American War began on 21 April 1898; Admiral Cervera’s fleet was de¬ stroyed off Santiago 3 July; the formal sur¬ render of Santiago took place on 17 July. In the protocol suspending hostilities which was signed on 12 Aug. 1898, it was provided that Spain should relinquish all claim of sovereignty over and title to Cuba, and that Cuba should be immediately evacuated. The evacuation pro¬ ceeded gradually ; the last of the Spanish troops leaving 1 Jan. 1899. The

participation of the revolutionary army in these events has two noteworthy features : A force of about 3,000 Cubans, led by Gen. Calixto Garcia, joined the American troops as Aserraderos and served through the Santiago campaign, forming a part of the line about the city. Later, the retiring Spanish army was closely followed, outside of the chief cities, by the Cuban army, which took charge of the towns and country, maintaining order and performing police duty; and, when finally disbanded, dispersing peacefully among the people. The treaty of Paris, signed 10 Dec. 1898, provided for the temporary occupation of the island by the United States. By an order dated at Headquarters of the Army, Washing¬ ton, 13 Dec. 1898, a division known as the Di¬

vision of Cuba was created, under command -of Maj.-Geh. John R. Brooke. The authority of military governor of the island was exercised by General Brooke firorrl 28 Dec. 1898, until 20 Dec. 1899* whefr he was succeeded by Maj.-Gerl. Leonard Wood, who continued in office until 20 May 1902. During the entire period of American occupation (18 July 1898 to 20 May 1902), the total revenues were $57*197,140.80; amount in hands of the treasurer at the close of business* 19 May 1902* $635,170.29. The lat¬ ter SUM Was paid to the republic of Cuba; the fOrMer was expended for maintenance of the government ($2,780,781.16), justice and public instruction ($11,108,187.46), sanitation ($9,706,- 258.20), public buildings, works, ports and har¬ bors ($5,833,607.90), charities and hospitals ($4,- 124,986.60), barracks and quarters ($2,525,483- .78), *etc.* A comparatively small amount was used for the pay of the army; very large sums de¬ voted to works ot public utility, in the interests of the Cuban people. Cuban imports during this period amounted to $225,437,135, the largest items being foodstuffs, animals and animal products, cotton, silk, vegetable fibres, wool, etc., ana metals and metal manufactures. From the United States came 43 per cent of imports, while the rest of the world supplied 57 per cent. Cuban exports amounted to $180,609,067, the United States taking 75 per cent. The articles exported to the United States were tobacco and its manufactures, $45,400,670; sugar and mo¬ lasses, $77,648,819; wood, unmanufactured, $1,751,451; iron and manganese ore, $2,587,715; fruits and nuts, $2,547,392; all other articles, $5,479,092. Thorough sanitary measures were adopted; the death-rate of the island was low¬ ered ; the causes of yellow fever were discov¬ ered, and that disease nearly exterminated. Es¬ pecially successful were the efforts to beautify Havana and improve its sanitary condition. That city became one of the most attractive in Latin America. The reforms extended to

the prisons, hospitals and asylums. A general sys¬ tem of free schools was established throughout the island and, in many practical ways, Cuba was prepared for self-government. A constitu¬ tional convention, the members of which were elected 15 Sept. 1900, met in the city of Havana the following November. The constitution of Cuba was adopted 21 Feb. 1901, and an appendix thereto (the C(Platt Amendment®) 12 June 1901. A form of government was thus provided which, in its main features, resembled that of the United States. The appendix, however, curtails Cuban independence. Its eight articles follow ;

1. The government of Cuba shall never enter into any treaty or other compact with any foreign power or powers which will impair or tend to impair the independence of Cuba, nor in any way authorize or permit any foreign power or powers to obtain by colonization or for naval or military purposes, or otherwise, lodgment or control over any portion of said island. 2. That said government shall not assume or contract any public debt to pay the interest upon which, and to make reasonable sinking-fund provision for the ulti¬ mate discharge of which the ordinary revenues of the Island of Cuba, after defraying the current expenses of the govern¬ ment, shall be inadequate. 3. That the government of Cuba consents that the United States may exercise the right to intervene for the preservation of Cuban independence, the maintenance of a government adequate for the protection of life, property, and individual liberty, and for discharging the obligations with respect to Cuba imposed by the Treaty of Paris on the United States, now to be assumed and under¬ taken by the government of Cuba. 4. That all the acts of the United States in Cuba during the military occupancy-of said island shall be ratified and held as valid, and all rights: legally acquired by virtue of said acts shˆll be maintained and protected. 5. That the government qf Cuba will exe-

cute, and, as far as necessary, extend the plans already devised, or other plans to be mutually agreed upon, for the sanitation of the cities of the island, to the end that a recur¬ rence of epidemic and infectious diseases may be prevented, thereby assuring protection to the people and commerce of Cuba, as well as to the commerce of the southern ports of the United States and the people residing therein. 6. The

Island of Pines shall be omitted from the boundaries of Cuba specified in the constitution, the title of ownership thereof being left to future adjustment by treaty. 7. To enable the United States to maintain the independence of Cuba, and to protect the people thereof, as well as for its own defense, the Cuban government will sell or lease to the United States the lands necessary for coaling or naval stations, at certain specified points, to be agreed upon with the President of the United States. 8. The government of Cuba will embody the foregoing provisions in a permanent treaty with the United States.

The convention adopted the foregoing articles reluctantly, after considerable delay, and relying upon representations made to cer¬ tain delegates by President McKinley, Sena¬ tor Platt and other officials at Washington, that the tariff on Cuban products sent to the United States would be reduced, as a proper concession in view of the surrender by Cuba of such valuable privileges. The Congress of Cuba (elected 31 Dec. 1901 and 24 Feb. 1902) was convened in Havana 5 May 1902, to ex¬ amine into the credentials of its own members and to count and ratify the electoral vote. At 12 o'clock noon, 20 May 1902, fhe Republic of Cuba was established; Tomas Estrada Palma being President and Luis Estevez Romero Vice-President. The transfer was made in the re¬ ception hall of the palace of the military gov¬ ernor. A salute of 45 guns was fired while the document of transfer* and President Palma's reply were being read; the troops of the 7th United States Cavalry, formed in the plaza before the palace, presented arms ; the band played the American national air, and the Amer¬ ican flag was lowered. Next the Cuban flag was hoisted and greeted with the national salute of 21 guns by the U. S. S. Brooklyn; the Cuban national air was played; the American troops saluted the Cuban flag and then immediately embarked.

Cuba Independent. — There remained on the island, at Santiago, Cienfuegos and Havana, small forces of artillery, for the preservation and care of the coast defenses and to avoid leaving the island entirely defenseless against external attack, pending such arrangements for naval stations as were contemplated. Though the failure to secure tariff concessions from the United States as promptly as was expected increased the difficulty of their financial prob¬ lems, the people of Cuba have a fair record for the first year of their independence. An intelli¬ gent effort was made to keep the most important industries moving along in the usual way and to preserve order throughout the island, the single conspicuous exception being the strike of tobacco workers in Havana (November 1902). From the first the balance in the treas¬ ury showed a tendency to increase. The com¬ pletion of the central railway, connecting Santa Clara with Santiago, and the

western with the eastern provinces for the first time by a con¬ tinuous line of railway transportation, gave a new impetus to industrial development in 1903. The treaty of reciprocity between the United States and Cuba, having been approved by the Senate of the United States, 17 March 1903, and by the Cuban Senate, 28 March 1903, was submitted to and accepted by the House of Representatives at Washington, convened in

extraordinary session 9 Nov. 1903. Violent dis¬ putes between the Cuban Liberals and Moder¬ ates, culminating in the insurrection of 1906 which the Palma government was unable to sup¬ press, led to the second American intervention. A census of the island was taken and fresh elec¬ tions were held in 1907 ; and in January 1909 the American troops were again withdrawn. On 16 March 1912 the hull of the battleship Maine, having been raised by American en¬ gineers, was towed three miles outside of Havana harbor and sunk. On 20 May 1913 Gen. Maria Garcia Menocal (Conservative) was inaugurated as President and Dr. Enrique Jose Varona as Vice-President. In 1915 the Cuban delegation to the Pan-American Financial Con¬ ference reported most favorably in respect to the important and very close commercial and financial relations between the United States and Cuba, so essential to the latter's well-being and political stability. This favorable condition <(obviously is due in great measure to the bene¬ ficial operation of the reciprocity treaty entered into between the two countries in the year 1903, as may be seen by the statistics showing the increase in the reciprocal trade relations since the treaty was put into effect.® (Memorandum submitted by the Cuban delegation, page 384). Again, in the group conference report, page 379 : <(So clearly has it been recognized that these special relations (which were established by the reciprocity treaty) existed between Cuba and the United States that many measures are already in force for promoting intimate com¬ mercial and financial relations which in the case of other countries are only in the preliminary stage. From the beginning the national loans of Cuba were taken by American bankers and are still held largely in the United States. The means of transportation and other public utili¬ ties have also been, to a large extent, established and are now operated by American capital.® (For the expansion of Cuba's trade with the United States, and a summary dated 1 May 1916 of the island's whole foreign trade, see under Commerce). On 11 Feb. 1917 two com¬ panies of soldiers encamped just outside Havana mutinied, and on 12 February, three days before the date set for the new presidential election, nearly the entire force of government troops in Ciego de Avila, Santiago de Cuba and other towns in the eastern

part of the island revolted and took possession forcibly of those districts. The Cuban government met the crisis with energy and had the moral support of the government of the United States; accordingly the revolt was suppressed in less than two months (before the middle of April 1917).

Government. — Executive powers are con¬ ferred upon the President, who is assisted by a cabinet of nine officers, the Secretaries of State, of Justice, of Government, of the Treasury, of Public Works, of Agriculture, Commerce and Labor, of Public Instruction and the Fine Arts, and of Health and Charities and of the Execu¬ tive Department. The Cuban Assembly, on 11 July 1917, approved a measure passed by the Senate creating the Cabinet office of War and Marine. Both President and Vice-President are elected indirectly, by an electoral college, for the term of four years; and they cannot serve more than two consecutive terms. The legislature or National Congress is composed of the Senate (24 members) and the House of

Representatives (83 members). Senators are elected indirectly for eight-year terms, four senators for each province, and the Senate is renewed by halves every four years. Represen¬ tatives are elected by popular vote for four-year terms, at the rate of one representative for every 25,000 inhabitants. Every male citizen 21 years of age or over has the right of suffrage. The House is renewed by halves every two years. Congress meets twice each year, on the first Monday of April and November, and the regular sessions last 40 days or more. The judiciary consists of a National Supreme Court, six superior courts, courts of first instance and minor courts. Justices of the Supreme Court are appointed by the President with advice and consent of the Senate.

Education. — The census returns of 1907 show that there were then in Cuba 31 per cent of illiterates. This good showing was the result of the establishment of the present ele¬ mentary and secondary school systems, by which each municipality was required to have a school board and every town to have schools, at which the attendance of all pupils within school age should be obligatory. On 30 June 1915 there were 2,686 school buildings, 4,931 teachers and 289,692 pupils in Cuba with an average attendance of 183,947. There are six secondary schools or ˆinstitutes® maintained by the government, one in each province. Annexed to each of these is, with the one exception of the province of Havana, a special school of land surveying. Attached to the Institute of Havana are schools of commerce, navigation, stenog¬ raphy and typewriting and other special branches of learning. In these various institutes there were over 2,000 students in the fiscal year 1915-16. The University of Havana has three faculties : liberal arts and sciences, medicine and pharmacy and law. In the fiscal year 1915-16 there were in attendance at the University 1,432 students. Very liberal provisions have been made by the government for the mainte¬ nance of the elementary and secondary schools of the nation. The Department of Public In¬ struction and Fine Arts is divided into two sections, one having charge of the elementary schools and primary education and the other directing the normal and high schools, the National University, the School of Arts and Crafts, the School of Painting and Sculpture, the National Conservatory of Music and Dec¬ lamation, the National Astronomical Observa¬ tory and the national and other public libraries. The establishment of normal schools in the provinces was authorized by law in 1915.

Army and Navy. — The regular army and rural guard together have 444 officers and 11,000 men. The navy, according to the Official Bulle¬ tin of the Treasury Department (Havana, Jan¬ uary 1916) has 18 vessels — the Cuba (2,055 tons), P atria (1,200), Hatuey (538), Baire (500), Yara (339), 10 de Octobre (208), 24 de Febrero (208), 20 de Mayo (141), Enrique Villuendas (132) and nine other boats of less than 100 tons.

Agriculture. — The staple products of Cuba include tobacco, sugar, coffee, cocoa, potatoes, tropical fruits and cereals. As early as the 16th century the sugar industry was established under the special protection of Spanish sovereigns, but at the beginning of the 20th century, after more than 300 years had passed, only about 7 per

cent of the area of the island was devoted to the sugar crop. In other words, about 2,000,000 acres out of the total 28,000,000 acres. During the 17th and 18th centuries the annual output was about 28,000 tons. This increased to 75,000 tons in the first quarter of the 19th century, to 200,000 tons in 1840, and to nearly 300,000 tons in 1850. The increase is significant, for it was directly occasioned by the withdrawal of an annual allowance of $1,000,000 that Spain made to the Cuban administration out of the revenues from Mexico. The loss of Mexico to the Spanish Crown closing that source of income, Cuba was thrown upon her own resources, with the result that she turned her attention more earnestly to the development of this profitable form of agriculture. The period 1853-68, in which the amounts produced increased from 322,000 to 749,000 tons, was in a restricted sense Cuba's Golden Age. Not until 1891 was a greater amount obtained. The million mark was passed in 1894 and 1895.

The insurrection beginning in 1895 reduced the crop of the following year to 225,221 tons, and the continuance of hostilities in 1897 and 1898 forced the output of those years down to 212,051 and 300,000 tons, respectively. With the restoration of peace in 1898, a new era of development began ; and though four years passed before the injuries to mills and fields could be fully repaired, the conditions at the beginning of 1903 justified the hope that the prosperity of the best years before 1896 would be regained. In the year 1840 the output of beet-sugar for the world was but 50,000 tons, principally grown in France. From that date the production of this competing industry in¬ creased so rapidly that in 1894 it was 3,841,000 tons, and naturally this enormous addition to the world's supply caused a reduction in the price of cane-sugar which seemed ruinous, and indeed proved to be

ruinous to the planters of many sugar-growing countries. But in Cuba the problem of producing sugar at a profit, despite the constant tendency toward lower prices, has always been met. It was solved in the great crisis of 1884, and in more recent years whenever presented. In 1902-03 improve¬ ments in agricultural methods, machinery and management effected a reduction of the cost of the standard grade on some of the larger estates to much less than two cents a pound. Such results could not have been achieved unless the soil and climate were in the highest degree favorable to the growth of sugarcane. Yet large districts in which the soil is equally good had never been touched by the plow. In the fiscal year 1912-13 the sugar crop of Cuba was 2,443,986 tons. This had been in¬ creased in 1915-16 to 3,007,915 tons. The value of sugar products exported from Cuba to the United States in 1915 was $193,476,972 ; and in 1916, $266,743,554, exclusive of molasses and confectionery which, in 1916, were valued at $4,338,429. In this latter year the total Cuban sugar crop was valued at over $360,000,000. Cuba produced 696,067 gallons of rum in 1915 and 420,517 in the following year. An addi¬ tional cane product was alcohol, of which the output was 649,722 gallons in 1914, and 2,021,116 gallons in 1915.

Soil and climate are also favorable to the production of valuable tobacco. The area in which the characteristic Cuban leaf can be

grown is, however, much more restricted. The systematic cultivation of tobacco was not begun in Cuba until 1580, though the indigenous plant had been grown by the natives before the first voyage of Columbus in 1492. Early in the last century the leaf grown in the Vuelta Abajo district (an area of about 90 miles in length by 10 in width, situated in the province of Pinar del Rio) won recognition the world over on account of its excellence ; and as the profits of this industry, wherever it could be carried on advantageously, were much greater than those of sugar-making, no effort was spared to extend the area of production into other parts of. the island. At least 10,000 tobacco plantations were in operation before the year 1880, but all experiments demonstrated the inferiority of the soil for this use outside of the Vuelta Abajo. Before the revolution of 1895, the production of leaf-tobacco in the island was about 560,000 bales (averaging 50 kilos each) in a year. Of this amount about 260,000 bales were harvested in Pinar del Rio province, about 70,000 bales in the province of Havana, 130,000 bales in the province of Santa Clara and 100,000 bales in the province of Santiago (Oriente). Only the 260,000 bales from Vuelta Abajo were of the finest quality, the other components of the annual crop being known as the Partido leaf, the Remedios leaf and the Gibara or Mayari — in the main coarser and cheaper grades. The amount of soil avail¬ able for the production of first-class tobacco being thus limited, the conditions under which it had to be grown were also not at all favor¬ able to either great or cheap production before the year 1903. First-class tobacco lands of the Vuelta Abajo were held at an exceedingly high price, and large rentals were demanded. Irri¬ gation and constant care in most sections were absolutely necessary; efficient labor was scarce, and untrained laborers were not employed lest their blundering should ruin the product of the best fields. The average cost of production per caballeria (33.17 acres) painstaking investiga¬ tion showed to be in that part of the island between $8,000 and $9,000; and the conclusion is that the production of tobacco in Cuba before 1903 was much more expensive than in any other part of the world. For this reason, and in view of the failure to secure good results out¬ side of a few small districts, it appeared that the tobacco industry was destined, as com¬

pared with the cultivation of sugar, to play a secondary role, though still an important one, in the commercial development of Cuba. During seasons of moderate prosperity it fur¬ nished employment for about 80,000 persons. The value of its product exported to the United States annually, before the insurgents laid waste the Vuelta Abajo and Partido dis¬ tricts, was between $9,000,000 and $13,000,000. The transfer in 1902-03 of large interests to American capitalists led to the introduction of modern labor-saving devices and economical methods. Formerly growers made the mistake of collecting seeds from inferior third-growth plants, and the result was seen in a gradual degeneration of the plants and diminution of their leaves. To check this degeneration, strong fertilizers had occasionally been used in such large quantities that the leaves, while regaining their lost size, lost much of their fine quality. This was done even after it became a matter

of common knowledge that the crops could be improved by scientific selection of seeds. For work in the fields, antiquated wooden plows were still used in 1902; and the tobacco land was cultivated in small farms, an arrangement that seemed necessary to those who employed only the primitive methods of destroying in¬ sects and ignored the spraying machine. So long as the old methods prevailed, a native family could not take care of more than a small field; moreover, the labor of the entire family was required, for work went on day and night. Every leaf had to be examined fre¬ quently and kept free from tobacco caterpillars. The wife and children aided the adult male laborer, taking turns throughout the 24 hours. In such details as these, improvements were made by the new management, not without opposition. The early attempts to introduce reforms in the established methods of handling the leaf in the manufactories was one cause of the strike of operatives and the riots in Havana (November 1902). Leaf tobacco to the value of $15,232,231 was exported from Cuba in the fiscal year 1914-15; and to the value of $16,156,004 during the following year. Of this latter $12,536,808 worth went to the United States, which, in 1915, took 63.26 and in 1916 63.55 per cent of Cuban tobacco exported. Leaf tobacco valued at $15,661,332 and cigars and cigarettes at $3,618,868 went from Cuba to the United States in 1916. Of this the greater part was shipped from Havana, which exported leaf tobacco to the United States valued at $15,627,894, and cigars and cigarettes at the total output of

$3,618,868.

Commerce. — The value of Cuban foreign commerce in 1914 was $296,555,000, and in 1915 $409,739,996; one explanation of these large figures being that the area of the land devoted to sugar crops was so increased that the crop grown in 1914 and available for exportation amounted to 2,500,000 tons. The chief products exported by Cuba are sugar and its products (73.4 per cent of total in 1914); tobacco — leaf and manufactures (15.3 per cent of total) ; fruits, coffee, cocoa, *etc.* (2 per cent) ; minerals (1.9 per cent) ; other articles (7.4 per cent). The principal articles imported by Cuba are foodstuffs (39.3 per cent of the total in 1914) ; textiles, *etc.* (13.5 per cent of total) ; instru¬ ments, machinery, *etc.* (9.9 per cent) ; drugs, chemicals, perfumes, *etc.* (6.6 per cent) ; all other articles (30.7 per cent). The island ex¬ ports practically all it produces and imports nearly everything it consumes. Conditions are not favorable to manufacturing, and excepting cigars, but little is done. There is one small sugar refinery, the product of which is sold in the home market, but the rest of the product is exported raw. Cuba's imports from the United States in 1915 were valued at $104,723,- 108; from the other American countries, $8,- 022,586; from Germany, $799,903; from Spain, $10,807,435; from France, $5,197,110; from Great Britain, $15,287,998; from other European countries, $6,203,081 ; from all other countries, $4,397,012. In the same year Cuba exported to the United States goods valued at $206,164,414; to the other American countries, $3,356,875 ; Spain, $8,021,230; France, $1,135,404; Great Britain, $33,033,016; other European countries, $1,864,769; to all other countries, $716,048. The value of Cuba's imports was $155,448,233, and

of her exports, $254,291,763, making the total for foreign commerce, as above stated, $409,- 739,996. Cuba's trade with the United States alone had expanded from $66,000,000 in the closing year of the last century to $310,887,522 in 1915, under exceptional conditions, created by the European War, which also affect bank¬ ing relations.

Cuba's total foreign trade for the period of June 1915 to July 1916 amounted to $537,- 825,000. Exports aggregated $336,801,000 and imports $201,024,000, the balance of trade in Cuba's favor being $135,777,000. In 1916 Cuba imported gold, silver and platinum to the value of $13,036,638; chemical products, $8,248,171; textiles, $28,612,074 (cotton and cotton goods, $9,242,562) ; paper and paper goods, $3,870,- 470; wood and wood products, $6,431,060; animals and animal products, $10, 150,580 ; ma¬ chinery and instruments, $37,574,493 ; foodstuffs, $64,540,000 ; metals of all kinds, $14,244,395 ; stone, earth and ceramics, $7,902,711; miscel¬ laneous, $10,815,286. Goods to the value of $10,815,286 were admitted free of duty. Cuban currency imports were $14,563,631 in 1915, and in the following year $32,316,594. In 1916 the value of imports from the United States was $185,337,194 out of a total of $248,278,279; and of exports $250,090,418 out of a total of $356,- 571,350. In the same year the principal exports were valued as follows : Animals and animal products, $3,364,738; sugar and sugar products, $271,081,983; fruits, grains and vegetables, $3,- 164,828; mineral products, $11 ,398,979 ; tobacco products, $25,887,513; miscellaneous products, $4,631,447 ; currency, $34,781,640. Total com¬ merce, $605,068,234.

Banking and Finance. — Some of the prin¬ cipal banks of 'Havana are Banco de Cuba, Banco Nacional de Cuba, Bank of Nova Scotia, Fidelity and Deposit Company of Maryland, La Nacional, The Royal Bank of Canada, The Trust Company of Cuba, and the Banco de la Habana with which The National City Bank of New York had made certain arrange¬ ments. Cuba has adopted a system of coin¬ age founded on a parity with the American gold dollar, and the new monetary law de¬ clares money of the United States to be legal tender in Cuba. As a matter of fact, currency of the United States has long been employed in commerce as a supplement to the gold money of Spain and France. The new unit created in 1915 is the gold peso, worth exactly one dollar (gold of the United States), and the law provides for pieces of

$20, $10, $5, $4, $2 and $1, together with silver pieces of one peso, two-fifths, one-fifth and tenths (10 centavos), and also subsidiary coins down to one centavo or one cent. Cuba has no paper money. The law establishing the new currency provides that only coins of the Republic of Cuba and the national currency of the United States shall be legal tender in future ; but this, of course, does not affect the validity of out¬ standing contracts. As intimated above, the American-Cuban trade, which had increased somewhat less than threefold (or to $182,000,- 000) before the European War, made its fur¬ ther advance in 1915 under exceptional condi¬ tions. These are explained as follows : In the past a large part of the island's banking busi¬ ness was carried on through Cuban banks with London, Paris and Hamburg, from which blank

credits were obtained and used in Cuba for the movement of crops and advances made to planters. But the European War changed this state of affairs, and Cuba applied to American banks for the credits that Europe could no longer grant. The banks of the United States facilitated the granting of those credits to Cuba by means of loans secured by warehouse deposits of sugar, the price of which had ad¬ vanced in comparison with prices of the two previous years, or by shipments of that product to the United States. The budget of 1914-15 was, by executive decree, continued in force for 1915-16 and for 1916—17. It showed esti¬ mated receipts $41,820,580 and expenses $40,- 262,905. The principal items of this estimated income were customs revenue, $29,100,000; consular fees, $670,000, distributed as follows for expenditure: Home Affairs, $11,044,249; Finance, $2,861,018; Instruction, $5,196,420; Pub¬ lic Works, $5,101,665. The exterior debt at the commencement of 1915 was given as $57,420,000, the interior debt being $10,408,000.

Transportation and Communication. — The aggregate extent of the Cuban railways was 2,359 miles in 1916. The four systems in Cuba are the United Railways of Habana, 705 miles ; the Cuba Railroad, 589 miles ; the Cuban Cen¬ tral Railway, 349 miles; and the Western Rail¬ way of Habana, 147 miles. Railways connect the principal towns and seaports of the island ; and the principal sugar properties have their own private railways connecting with the main lines. Others were under construction in 1917. Among the more important steamship lines entering Cuban harbors in 1917 were the New York and Cuba Mail S. S. Co. (American) with bi-weekly service between Havana and New York, bi-monthly passenger service to Guantanamo and Santiago, weekly freight serv¬ ice to the same ports, and weekly service to

Mexico; the United Fruit Co. (American), with weekly passenger and freight vessels be¬ tween Havana and New York, New Orleans and Boston; the <(P. and O.® Line (American), with daily, except Sunday, passenger and freight connections with Key West; the Mun¬ son Line (American), with weekly freight serv¬ ice to Mobile and frequent freight connections between important ports of the United States and Cuba; the United S. S. Co. (American), with bi-weekly freight service from Galveston to Havana; the American and Cuban S. S. Line, with fortnightly freight service between New York and Cuba; the Herrera Line (Cuban), with fortnightly service, Santiago to Porto Rico ; the Royal Mail Steam Packet Co. (English) ; the General Transatlantic Line (French), with monthly passenger and freight service, France to Havana; and the Trans¬ atlantic Company of Spain, with monthly service to Spanish north coast ports via New York, and a monthly service to the south of Spain and Mediterranean ports. There were, in

1915, 658 post and 226 telegraph offices; and telephone service was supplied in 114 cities and towns. A commission to report upon a plan for the nationalization of the railway lines was nominated by presidential decree on 16 Feb.

1916.

Bibliography. — The Americas (New York, published monthly, 1914-17) ; (Anuario Esta-distico de la Republica de Cuba> (Havana 1915) ; Aspinall, A. E., (The Pocket Guide to

the West Indies > (Chicago and New York

1914) ; Atkins, J. B., (The War in Cuba) (Lon¬ don 1899) ; Caldwell, R. G., (Lopez Expeditions to Cuba, 1848 — 1851 J (Princeton Univ. Press

1915) ; <Censo de la Republica de Cuba, 1907) (Washington 1908) ; Colombo, C., (Columbus in Cuba' (Boston 1900) ; (Proceedings of the First Pan American Financial Conference) (Wash¬ ington 1915) ; Griffin, A. P. C., (List of Books relating to Cuba) (Washington 1898) ; Hender¬ son, J. B., Jr., (Cruise of the Thomas Barrera) (New York 1916) ; Hill, R. T., <Cuba and Porto Rico, etcP (New York 1898) ; Insular Affairs, Bureau of, (Acts of Congress, Treaties and Proclamations Relating to Cuba,> *etc.* (Wash¬ ington 1809) ; Lindsay, F., (Cuba and Her Peo¬ ple of To-day* (Boston 1911) ; Medina, J. T., (La Imprenta en la Habana) (Santiago de Chile 1904) ; Pan American Union, (Cuba> (Washing¬ ton 1914) ; Robinson, A. G.,(Cuba Old and New) (New York 1915) ; Verrill, A. H., (Cuba Past and Present* (New York 1914) ; Wilcox, M., (A Short History of the War with Spain* (New York 1898); Wood, L, <The Military Government of Cuba) (Am. Acad, of Pol. and Soc. Science, Publ. 369, Philadelphia 1903) ; Wright, I. A., (The Early History of Cuba) (London 1917).

Marrion Wilcox.

CUBA — AMERICAN DIPLOMATIC RELATIONS WITH. Cuba, lying athwart the Gulf between the arms of Florida and Yuca¬ tan, has had an important relation to the United States. Its return to Spain in 1763, one year after its capture by an Anglo-American expedi¬ tion against Havana, was opposed by the Eng¬ lish colonists. In the Revolution it was a strategic point for Spanish fleets which regained the Floridas, and later it was the centre of Spanish rule and the Floridas. In 1803 in the debate on Louisiana in the American Congress, its strategic position in controlling the com¬ merce of the Mississippi was considered. In 1807, after Napoleon jumped the Pyrenees and claimed the right to rule Spanish America, the possible destiny of the island attracted the attention of Jefferson, who, while he contem¬ plated the possibility of future annexation, de¬ clined an offer of annexation. Both Madison and Monroe, following the policy of Jefferson, declared that the United States would not wish to see the island fall into the hands of any European nation which might use it as a ful¬ crum against American commerce. Its destiny was a subject of consideration in connection with the events which gave rise to the Monroe Doctrine, and in connection with the later rivalry and jealousy between England and the United States in their advance around the Car¬ ibbean. In 1819 to 1826 the American govern¬ ment was apprehensive of British plans to occupy Cuba, first (1819) to counteract the American annexation of Florida, and later (1823 and 1825), to prevent French occupation. In February 1822, Mr. Forsyth, the American Minister at Madrid, suggested to Spain that by recognition of Mexico and Colombia and a liberal system of commerce she might be able to

obtain a guarantee of Cuba by the United States, Mexico and Colombia ; and the plan of guarantee was considered in 1823 both in Wash¬ ington and at London. In 1822, when Cuban representatives visited Washington to request annexation in case of a strike for independence,

the American government, by advice of Secret tary Adams, acted upon a policy of strict moral duty to Spain. In 1825 the American govern¬ ment took steps to prevent a proposed Colombian-Mexican expedition to set Cuba free, and at the same time was apprehensive of the pur¬ pose of a French fleet in Cuban waters. Secre¬ tary Clay declared that the United States could not consent to the occupation of the island by any European power except Spain. Considera¬ tion of its destinies was a great object of the Panama mission. American policy for two decades after 1825 practically guaranteed to Spain the possession of Cuba on condition that she would not cede it to France or England. From 1836 to 1840 the American government feared that Spain in order to replenish her de¬ pleted treasury would sell the island to England or France. Even until 1860 there were fears that England, through her influence in Cuba, and by her treaties to suppress the slave trade, or on account of British debts due to British citizens, would obtain a hold on the island which would ripen into possession. After 1840 American influence partly supplanted that of England in Cuba because of the similar interest of Southern and Cuban slave holders. In 1840 and in 1843 the American government officially assured Spain that, in case of any attempt to wrest the territory from her she could rely on the military and naval forces of the United States to aid in preserving or in recovering it.

American extension to California, resulting in plans and in negotiations for isthmian transit routes across Tehuantepec and Central America attracted American attention to Cuba as a con¬ trolling position for the protection of these routes and as a station for steamer lines con¬ necting therewith. From 1848 to the opening of the Civil War, Cuba was continually a sub¬ ject of international dispute or negotiation. The American government, under Southern and commercial influence, persisted in unsuccessful diplomatic efforts to acquire the island, and, although not responsible for the filibustering expeditions of 1849-51, was almost drawn into a policy of forcible annexation by the excite¬ ment resulting from the seizure of the Ameri¬ can vessel, Black Warrior , by the Havana officials for violation of port regulations, and by the famous Ostend Manifesto of 1854, issued as a recommendation by a conference of the American

Ministers to Spain, France and Eng¬ land to consider the conditions of Cuba. In 1852 it declined to enter into a joint, tripartite, self-denying agreement, proposed by England and France on suggestion of Spain, against any attempt at exclusive control of the island by either of the contracting parties. Although Marcy repudiated the Ostend Manifesto, the question of annexation by purchase was a promi¬ nent administration object until it was lost by Southern secession.

At the beginning of the American Civil War the government at Washington warned Spain that Cuba must not be made a base for enter¬ prises endangering the American Union. Dur¬ ing the war, although it felt the need of har¬ bors in the West Indies, it assured Spain that under new conditions resulting from secession, there was no desire for Cuba. The de facto government of the Southern Confederacy also disclaimed any designs upon the island. At the close of the war, the abolition of slavery termi-

nated Southern agitation for the acquisition of the island.

Later, inconvenienced by the Cuban revolt of 1868-78, which expected to obtain American aid through the Cuban Junta in New York and sought recognition at Washington, the Grant administration unsuccessfully offered mediation on a basis of independence, later contemplated a policy of recognition of the insurgents which Secretary Fish prevented and finally (in 1875) took steps toward intervention by inviting the views of various European powers. In 1873, the Virginius episode, a culmination of a series of irritating affairs, almost precipitated war. After the pacification of Cuba in 1878, the American government urged Spain to establish a more liberal government by independence or autonomy, to adopt a more liberal commercial policy and to secure better protection of Ameri¬ can property and persons in Cuba. In 1884 and 1886 it obtained agreements to end discrimina¬ tion and retaliatory duties, but officials in Cuba found excuses to violate them.

In 1891 it negotiated with Spain a reciprocity schedule for Cuba,

which considerably increased American commerce, although the execution of the agreement was obstructed by the Spanish authorities in Cuba. In the Cuban insurrection of 1895-98 the American government, embar¬ rassed both by Cuban activities in the United States and the Spanish treatment of American citizens in Cuba, gave warning that American forbearance had limits, later offered mediation, and finally (after the destruction of the Maine in Havana harbor) actively intervened (1898) to terminate Spanish rule with its intolerable conditions in Cuba. After the withdrawal of Spanish forces and officials from Cuba the American government assumed control through a military governor, who inaugurated a series of useful improvements and aided in the estab¬ lishment (1902) of a new independent Cuban government under a constitution defining future political relations with the United States, on the basis of the Platt Amendment, which provided for American intervention for certain control of financial obligations and foreign relation and for the preservation of Cuban independence and order. The Washington government also negotiated a reciprocity commercial treaty which was ratified in 1903. Later, during a post-election insurrection of 1906, it intervened, assumed control, established a provisional gov¬ ernment for the restoration of order, and (in 1909) inaugurated the new independent Cuban government. During the insurrection of 1912, it sent a fleet to Key West to be ready for emer¬ gencies, but found that the Cuban government was able to control the situation.

Bibliography. — Callahan, J. M., (Cuba and International Relations) (1899) ; Chadwick, F. E., (Relations of the United States with Spain5 (1910) ; Hart, A. B., foundations of American Foreign Policy5 (1901) ; Hart, A. B., (The Monroe Doctrine5 (1916) ; Latane, J. H., diplomatic Relations of the United States and Spanish America5 (1900) ; Moore, J. B., (Inter¬ national Law Digest5 (1906).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

CUBA, N. Y., town in Allegany County, on the Erie and Pennsylvania railroads (Rochester branch). The principal industries are the

manufacture of cheese, butcher knives, stable equipments, flour and pulleys. Borden's con¬ densing plant is also located here. There are two banks, whose combined resources amount to $1,600,000; a modern high school, and six rural schools. Cuba Lake, about two miles

north at an elevation of nearly 2,000 feet, at¬ tracts many summer visitors. Pop. (1920) 1,611.

CUBE, in geometry, a solid contained by six equal square sides. The content of a cube is found by multiplying the superficial area of one of the sides by the height ; or, in other words, by multiplying the number that expresses the length of one of the edges by itself, and the product thus found by that number again, and this is called the cube of the number. A cube is generated by the motion of a square plane along a line equal to one of its sides, and at right angles to it; whence it follows that the planes of all sections parallel to the base are squares equal to the base, and consequently to one another.

CUBE, or CUBIC NUMBER, in arith¬ metic, the result of taking any number thrice as a factor; thus 64 is a cube number, and arises by multiplying 4 by 4 and the result again by 4.

CUBEB, the unripe fruit of Piper cubeba, a climbing perennial with smooth stem and alter¬ nate lance-shaped, bright green, shining leaves. It is a native of the West Indies, being exten¬ sively cultivated in Java and Sumatra. It was introduced into medicine by the Hindus and Arabians, who employed it widely as a condi¬ ment also. Cubebs contain about 14 per cent of volatile oil, a small amount of an indifferent substance termed cubebin, and cubebic acid. It also contains a small amount of resin. A mix¬ ture of oils, resins and acids comprises the oleorosin of cubebs that is used in medicine. It is an active spice somewhat related to pepper, its botanical ally, but the taste is more pleasant and less pungent. It is used as a local stimu¬ lant in indigestion and as a flavoring vehicle in mixtures and gargles. It is valuable, particu¬ larly in diseases of the mucous membrane, es¬ pecially of the bronchi, of the bladder and of the urethra. Cubebs are very frequently smoked in cigarettes, in which form they have a pleasant stimulating effect on the mucous membrane of the bronchi and larynx.

CUBIC EQUATIONS, equations in which the highest exponent of a given quantity in any term is 3. Every such equation of one unknown quantity can be reduced to the form x3 ■+ px + g — 0, where x is the variable and p and q are constants. Every equation of this ‘form has three roots, all of which may be real, or one may be real and two imaginary. The solution of cubic equations was accomplished first by Tartazlin and Cardan. An equation containing any number of variables in which the greatest sum of the exponents of the variables in any term is 3 is called a cubic equation. Thus x2y + 5y3 + 6 — 0 and xyz + z2 — 0 are cubic equations in x, y, and x, y, z, respectively.

CUBISM, the name given to a movement in painting founded by the Spanish post-impres¬ sionist Pablo Picasso (b. Malaga 1881). It has been said that cubists see and depict natural ob¬ jects as if composed of innumerable cubes. They have often done so, it is true, but that is far from being an essential in practice. The defensible position held by the more thoughtful

tnetnbefs of this group is that their movement tends toward the integral, the deep, the com¬ plete realization of painting; and the cube of course, by virtue of its third dimension, symbol¬ izes such depth or entirety as distinguished from flat surfaces with their two dimensions. Reasoning cubists say that the beauty of a work resides essentially in the work itself, not in that which is only the pretext for the work. Naturally ardent advocates of this revolution¬ ary movement have occasionally become over-enthusiastic — as when they declare that ((dans le present, le cubisme est la pienture meme.. (cubism is at present painting itself), and that they see in it the only conception at present possible of the pictorial art. But this move¬ ment, like others, undergoes transformation, the still newer forms — futurism (q.v.), etc., claim¬ ing supremacy in the interpretation of (<young® painting and <(young® sculpture. See also France — French Art.

CUBITT, Sir William, English civil engi¬ neer: b. Dilham, Norfolk, 1785; d. 13 Oct. 1861. He was a miller, cabinet-maker and millwright until 1812, when he became chief engineer in Messrs. Ransome's works at Ipswich. In 1823 he joined the Institution of Civil Engineers, and, removing to London, was afterward engaged in most of the public undertakings of his day. The improvement of the Severn and of Boulogne port, the Bute docks at Cardiff and the water¬ works for Berlin are among his works. He also invented the treadmill, and constructed the Southeastern Railwaj^; and for his services in connection with the erection of the Great Ex¬ hibition buildings he was knighted in 1851. From 1850-51 he was president of the Institu¬ tion of Civil Engineers.

CUCHIA, a teleost fish of the rivers and estuaries of India and Burma,

growing to two feet in length. It is the sole representative of the family Amphipnoida, and is remarkable for having on each side of the neck a respiratory air-sac, connected with organs resembling the lungs of serpents. When in the water this amphibious fish constantly rises to the surface to breathe air, and is frequently found lying in the grass of the riverbank as if for enjoyment. It is one snake-headed, or walking-fish tribe (Ophiocephalida) .

CUCHULLIN. See Tain bo Cuailgne.

CUCKOO, formerly spelled cuckow, the English name of a common bird, so called from the note of the male, and now generally applied to all related birds of the family Cuculida'. The cuckoo of Europe, the Cuculus canorus of ornithologists, perhaps occupies more space in general literature than any other bird, on ac¬ count of the interest which attaches to its re¬ markable habit of nest parasitism, and the equally remarkable but unfounded superstitions which have collected about what is to many per¬ sons its mysterious life. It is a common sum¬ mer bird throughout Europe, retiring in winter to equatorial Africa, its southward migration beginning immediately after the close of the breeding season. During April, May and June the loud ((cuck-oo® of the males is one of the most familiar of country sounds; but it \yanes with the breeding season. The eggs are inva¬ riably laid in the nests of other birds, the hedge sparrow (Accentor modularis) and other sim¬ ilar small species being the victims. The female VOi.. 8 — 19

cuckoo is said to deposit her egg on the ground, from which it is then conveyed in the' beak to the nest selected, the rightful contents of which are often cast out. A curious circumstance, the reason for which is not fully understood, is that the cuckoo egg is often of the same color as the eggs of its hosts which remain in the nest. The young cuckoo secures the exclusive attention of its foster parents by working itself beneath any eggs or other young birds in the nest, raising them on its back, and tumbling them over the edge of the nest.

The true cuckoos are represented in North America by three or four species of the genus Coccygus, of which two, the yellow-billed cuckoo (C . americanns) and the black-billed cuckoo (C . erythrophthalmus) are the best known and most widely distributed, the former ranging, with its Western variety, throughout the United States, the West Indies, and much of the British provinces, the latter being chiefly Eastern and migrating in winter far into South America. Both species

have the bill strongly curved, stout and somewhat flattened at the base, the feet large, with very short metatarsi, the wings long and the tail long and wedge-shaped. Both are of a plain, uniform, bronzy olive-gray above and white, or nearly so, below. They are readily discriminated by the entirely blue-black bill and the absence of bold mark¬ ings on the tail feathers of the one species, and the partly yellow bill and broad white margins of the tail of the other. In habits the two species differ but little, and except in the man¬ ner of deposition of their eggs, not much from the European cuckoo. Both build nests, which are mere loose platforms of twigs placed in thickets and trees, and lay a considerable but variable number of pale green eggs at long and irregular intervals, with the result that the same nest frequently contains freshly deposited eggs along with young birds. Besides the family taint, which the manner of nesting and oviposi-tion suggest, both species occasionally appear to fall into the parasitic habit and place an egg in another bird's nest; it seems that not infre¬ quently the yellow-billed species, which is the chief offender, selects her black-billed relative as the recipient of these parental courtesies. In the Northern States the cuckoos are late arrivals from the South, not appearing until the fully leaved trees and bushes afford them the con¬ cealment which their retiring tastes demand. Their presence is soon known by the oft-re¬ peated loud cow-cow-cow, etc., the frequent utterance of which, upon the approach of storms, has gained for them the name of rain-crow. As destroyers of hairy caterpillars, which most birds pass untouched, the cuckoos deserve the esteem of horticulturists. Though subsisting largely on caterpillars they also eat other insects and occasionally fruits. The ground cuckoo or chaparral cock and the anis or Savannah blackbird are also American. The number of exotic species of cuckoo is very great, and many of them are interesting and handsome birds which are frequently exhibited in zoological gardens. See Cuculidˆe.

CUCKOO BEE, a bee of the genus Sphecodes, commensal (q.v.) with the Andrena, Halictus and other solitary bees, which burrow in the ground. In their slender, smooth and gaily colored bodies the Cuckoo bees resemble

wasps. The females do not sting severely. Al¬ though their eggs are laid in the cells of their hosts, and the larvae feed upon the pollen stored for the young of their hosts, they are quite different in shape, the head being smaller, and the body more cylindrical. The young as well as the adults of both host and commensal may live together harmoniously, the adults of both kinds reaching maturity at the same time.

CUCKOO FLIES, a species of the hymen-opterous family Chrysididce, which, cuckoo-like, live at the expense of various solitary bees and wasps, but, unlike the usual custom of the cuckoo bees (q.v.), actually devour the young of their hosts. They may be seen in hot days briskly flying about and alighting on posts and trees, darting their ovipositor into holes in search of the cells or nests of other Hymenoptera, in which to lay their eggs. They feed on the pollen stored up by the host when hatching as maggots. More often they are known to fasten on the back of the larva of their host, suck its blood and thus destroy it ; they also ap¬ pear to destroy the eggs of their host. Although the chrysis lays from 6 to 10 eggs, all but one shrivel up. Chapman has noticed the young larva seize with its mouth-parts a fold of the skin of the helpless larva of the wasp (Odynerus) and suck it, without inflicting any visible wound. It spins its cocoon inside that of its host, remaining there until the following spring. Cleptes is supposed to prey on sawflies, probably laying its eggs in the cocoons of the latter.

CUCKOO-FLOWER, or LADY'S SMOCK (Cardamine pratensis), a common and pretty meadow-plant, order Cruciferce, with pale lilac or white flowers. C. pratensis is found in swamps and wet meadows from Lab¬ rador to northern New Jersey, in Minnesota and west to the Pacific coast of British Amer¬ ica. It is common in England, and throughout northern Europe and Asia. It blossoms in April or May, presenting a very pleasing appearance. It possesses antiscorbutic properties. The name is also given to the ragged-robin (Lychnis flos-cuculi) of the pink family.

CUCKOO-SPIT, a froth found on plants. It is a secretion of the larvae of small homop-terous insects, of the family Cercopidce. It serves the purpose of concealing the larva from its enemies.

CUCUJO, coo-coo'hd, or CUCUYO, a luminous beetle of the click-beetle family Elateridce, which, in the West Indies, Mexico and northern South America, is often used as an ornament in the hair or upon the dress of women. The Indians capture them by waving about

in the air a stick to which they have at¬ tached a coal, to the light of which the beetles are attracted, when they may be caught in nets. The Indians keep them in cages of wire-netting, feed them each evening upon pieces of crushed sugarcane, and bathe them twice daily in tepid water. In this condition they are offered for sale in large numbers in the shops and street-markets of Vera Cruz and other tropical cities. The principal species (Pyrophorns noctilucus) is from one and three-quarters to two inches in length, and has no beauty by daylight, being rusty brown or blackish ; but when belted and attached to a pin in the hair by a delicate chain

it glows at night like an immense gem. See Fireflies.

CUCULIDiE, ku-ku'li-de, the cuckoo fam¬ ily, the typical one of the order Coccygomorphce. The toes are paired, the first and fourth being directed backward, and the second and third forward ; the metatarsi are scutellate and the palate is desmognathous ; the wings are variable in size and have 10 primary quill feathers ; the tail is usually long and wedge-shaped, with 10, or rarely 8, quill feathers. The family is a large one and comprises upward of 40 genera and nearly 200 species, which are especially numerous in Africa and India. Much uncer¬ tainty prevails among ornithologists in regard to the number and arrangement of the sub¬ families. Shelly, in the British Museum Cata¬ logue, recognizes six : Cuculince , containing the typical tree cuckoos; Centro podince, semiter¬ restrial birds of Africa, India, etc., commonly known as coucals ; Phcenicophdince, also mostly of semi-terrestrial habits and in¬ cluding the curious genus Coua, peculiar to Madagascar, some similar genera of the In¬ dian and Indo-Malayan region, and the so-called rain birds (q.v).) of the West Indies; N eomorphinee or Saurotherince , the true ground cuckoos, comprising the American chaparral cocks, and related East Indian forms; Diplopterince, comprising a few little-known birds of South America, and finally the Croto-phagince, a small group of remarkable typical American cuckoos, represented by the Savannah blackbird. Sometimes the American tree cuckoos are separated as a distinct sub-family, the Coccygince. See Cuckoo; Coccygomorphce.

CUCULIFORMES, an order of birds, characterized especially by zygodactylous feet. They comprise two suborders: (1) Cnculi, the cuckoos and plaintain eaters (Musophagidee) ; and (2) Psittaci, the parrots, macaws, lories, *etc.* See Ornithology.

CUCUMBER (Cncumis sativus and its con¬ geners), an annual trailing

or climbing vine of the natural order Cncurbitacece, cultivated for its unripe fruits which are used as a salad and for making pickles. The plant is a native of southern Asia where it has been cultivated since early historic time. The vine is more or less prickly, bears three-lobed or angled leaves which closely re¬ semble those of the muskmelon, and generally spiny fruits which may become smooth as they mature. The fruits are solid and contain numer¬ ous boat-shaped flattened seeds embedded in a somewhat watery pulp, which in the imma¬ ture fruits is the part esteemed. Small-fruited varieties and little fruits of large varieties are popularly known as gherkins and are generally preferred for pickles. They are covered with strong brine until needed for use, when, after soaking in pure water to remove the salt, they are put in vinegar, which they soon absorb. There is a great range in size of fruits in the various varieties, some being only about two inches long, and others more than 12 inches by 3 in diameter. Perhaps the most popular group of varieties is the white spine.

Cucumbers thrive best in warm soils well exposed to the sun. They do not produce well upon heavy clays or very light sands. The land must be well drained, in good tilth and fairly rich. For earliest crop the seeds are

often sown in hotbeds on inverted sods, and the plants set in the field as soon as danger of frost has passed, a sowing of seed being made about the same time to serve as a second crop. Usually only two or three plants are allowed to remain in the hills which are made about four by six feet apart. Since the cucumber-beetle is very actively destructive while the plants are small, six or eight plants should be allowed to remain in the hills until the vines are able to resist attack. Cultivation should be very thor¬ ough until the plants begin to run, when it should be confined to the space not occupied by vines. Often, in making the hills, a forkful of well-rotted manure is mixed with the soil to give the plants a little start.

Of the numerous diseases that attack the plants the one usually seen earliest in the season is damping-off (Pythinm debaryanum), which

appears while the seedlings are small. Infested plants quickly become yellow, and wilt and die. It may be prevented by early spraying with a standard fungicide (q.v.) which should be ap¬ plied to the whole hill and to the under sides of the leaves. Wilt disease caused by Bacillus tracheiphilus is an internal trouble that cannot be combated. The bacteria are spread by in¬ sects which inoculate healthy vines by biting or puncturing them. The bacteria multiply in the water-vessels of the vines and impede or stop the flow of water, the leaves wilt and finally shrivel, and the plant dies. It is believed that prevention of the attacks of insects by covering the plants with wire netting until they begin to run will postpone the time of the attack of the bacillus, so that a partial crop may be ob¬ tained. Usually the vines die just before the crop is ready to gather, the whole field being attacked. In greenhouses the most common disease is powdery mildew (Erysiphe cicho-raccarum) . It appears as white patches on the leaves which become yellow, brown, then die. Often the whole plant is involved. Evaporated (not burned) sulphur and spraying as above will control this pest.

The most important insect enemies of the cucumber are the cucumber-beetles (Diabrotica) and the squash-bug (Anasa tristis). The beetles are striped or spotted yellow and black, or green and black, are about a third of an inch long, very active in taking flight, and feed mostly upon the under sides of the leaves and the soft stems of seedlings. The larvae burrow in the roots, and if numerous, they often kill the plants. During the heat of the day the adults generally hide below the surface of the hill. A liberal use of tobacco-dust upon the hills as soon as the plants peep through the soil is the popular remedy. But since remedies are not entirely satisfactory, the plants are fre¬ quently covered with netting until they are about to begin running.

The squash-bug is a dull-gray insect about three-quarters of an inch long. It sucks the juices of the plants. There is no known satis¬ factory remedy for it, but the destruction of the vines as soon as they have fruited or plow¬ ing them under is helpful toward its extermi¬ nation. Hand-picking is sometimes resorted to, as is also the destruction of the eggs, which are conspicuously laid on the under sides of the leaves. The cucumber is frequently grown in greenhouses, especially in spring after the main winter crops are out. The plants are started in

pots, transplanted to the benches when well established, trained on trellises close to the roof, kept at a rather high temperature, and allowed to suffer no check. The white-spine class is most popular for

this purpose in Amer¬ ica, but the long English forcing varieties are by many considered superior in quality.

CUCUMBER BEETLE. See Melons.

CUCUMBER-TREE, a popular name for two trees which bear cucumber-like fruits. One of these is Averrhoa bilimbi , known also as blimbing and bilimbi, which belongs to the family Oxalidacece. It attains a height of 8 to 15 feet, has pinnate leaves, red flowers in long racemes, and green fruits with acid pulp. It is a native of India and China, is sometimes grown under glass for ornament, and is widely culti¬ vated for food in the warm parts of South America. The other tree is Magnolia acuminata of the family Magnoliacece. It is found from New York to Illinois and southward to Ar¬ kansas and the Gulf States. It often attains a height of 90 feet, bears oval or oblong leaves, greenish-yellow flowers two or three inches long in late spring, and cylindrical pink, bitter fruits three or four inches long. The timber is useful for boatbuilding. M. macrophylla is often called large-leaved cucumber-tree. It is smaller than the preceding, more spreading, has fragant flowers and broader and pinker fruits.

CUCURCITACEZE, the gourd or melon family of plants. They are large herbaceous plants, annual or perennial, with alternate leaves usually palmately veined and scabrous and un-sexual flowers. The corolla is monopetalous, regular and with five lobes, often plaited longi¬ tudinally; and the petals, usually either yellow, white or green, are deeply veined. The fruit is fleshy and more or less succulent. The general habit is climbing or trailing, by means of ten¬ drils. The family contains 96 genera and some 600 species, and abounds in useful or remarkable plants, including the melon, cucumber, colocynth, *etc.* They are natives of both hemispheres, chiefly within the tropics. The annuals, however, easily submit to the summer of colder climates and hence are common in northern gardens. Eight genera, comprising about 65 species, are found in America. The principal American genera are Cucurbita, Micrampelis, Cyclanthera and Sicyos.

. CUCUTA, koo’koo-ta, or SAN JOSE DE CUCUTA, Colombia, a city of the department of Santander, near the Venezuelan frontier. It is a place of recent origin which had begun to grow very rapidly when it was destroyed by an earth¬ quake 18 May 1875. Rebuilt soon afterward, it is to-day the handsomest, and commercially the most active, town in the department. It is an important coffee centre. A railway connects it with the Zulia River, which is navigable by small steamers. Pop. about 20,000.

CUDAHY, kud'a-hi, Wis., city in Milwau¬ kee County, five miles south of Milwaukee, on the Chicago and Northwestern Railroad and on Lake Michigan. The manufactures of the city include rubber goods, machinery, vinegar and gloves, and there are foundries and a meat¬ packing establishment. Pop. (1920) 6,725.

CUDBEAR. See Archil.

CUDDAPAH, kud'da-pa, India, a district and town in the presidency of Madras. The

district has an area of 8,722 square miles, and is transversed north to south by the Eastern Ghauts, and watered by the Pennar and its aifluents. The heat is intense in April and May. Soda is found in the hills to the southwest, and is used by the natives in place of soap. Salt and saltpetre likewise abound, and are easily procurable. On the plain round Cuddapah haematite and fusiform iron ores are found. On the banks of the Pennar, about seven miles northeast of the town of Cuddapah, are dia¬ mond mines, which have been worked for sev¬ eral hundred years, and in which gems of con¬ siderable value have been found. The mines have not recently proved profitable. Nearly a fifth of the district is under grain cultivation. Cotton is likewise grown. The town lies on a small river of same name, an effluent of the Pennar, 140 miles northwest of Madras. It exports indigo and cotton, and manufactures a kind of coarse cloth. Cuddapah was formerly the capital of an independent state. Pop. 17,807. Pop. of the district 1,354,291.

CUDWEED, one of the popular names of many small weeds of the genera Gnaphalium and Anaphalis, of the Composite. The leaves and stems are covered with a white cottony down, and the flowers are composed of dry scales, and may be kept for a long time. They are also known as everlasting flowers. The genus Gnaphalium has about 120 widely dis¬ tributed species, and the cudweeds belong prop¬ erly to this genus alone. G. polycephalum, com¬ mon in old fields and open woods, blossoming in October and November, has some repute

in household medicine.

CUDWORTH, Ralph, English clergyman and philosopher: b. Aller, Somerset, 1617; d. Cambridge, 26 June 1688. He was educated at Emmanuel College, Cambridge, and became an eminent tutor. He was subsequently appointed rector of North Cadbury, Somerset, and in 1642 published a (Discourse Concerning the True Nature of the Lord's Supper,5 and (The Union of Christ and the Church Shadowed, or in a Shadow. > The first of these productions, which maintained that the Lord's Supper is a feast upon a sacrifice, produced considerable contro¬ versy long after the author's death. In 1644 he was chosen master of Clare Hall, and in the following year was made regius professor of Hebrew. In 1654 he was chosen master of Christ's College, Cambridge, where he spent the remainder of his days. In 1678 he published his grand work, entitled (The True Intellectual System of the Universe, the First Part, Wherein All the Reason and Philosophy of Atheism is Confuted, and Its Impossibility Demonstrated.5 It is a work of great power and erudition, although the attachment of the author to the Platonism of the Alexandrian school has led him to advance some opinions which border on incomprehensibility and mys¬ ticism. It champions the innate character of moral ideas which are held to cognize the objective reality of good and evil with the same accuracy which characterizes our geometrical knowledge. Selections appear in Selby-Bigge's f British Moralists5 (1897). Consult Martineau, (Types of Ethical Theory5 (Vol. II, Oxford 1898) ; Lowrey, (Thc Philosophy of Ralph Cud-wortfP (New York 1885) ; Birch. Wife,5 in the edition of Cudworth's works (1743; reprinted

1820), and the preface to Mosheim's Latin translation of Cudworth's works (1733) ; Seth, (English Philosophers and Schools of Philoso¬ phy5 (1912).

CUENCA, koo-en'ka, Ecuador, capital of the province of Azuay, and in size the third city of the republic, Quito being first and Guayaquil second. It is situated in the canton of Cuenca, 8,640 feet above the level of the sea ; the mean annual temperature is one degree higher than that of the national capital, though it lies 189 miles farther toward the south. As a centre of literary and artistic life, and the birthplace of celebrated authors, it is called (<the Athens of Ecuador.55 Civil, military and eccle¬ siastical authorities are the governor, town council, bishop, commanding-general of the district, superior court of justice, judge of com¬ merce and chief of police.

Principal institu¬ tions are the town hall, cathedral, seven churches, and several convents, orphan asylum, hospital, prison, library, parks, the university (with faculties of law, medicine, philosophy and science), lyceum for younger scholars, athe¬ naeum, and a school of fine arts, giving instruc¬ tion in drawing, painting, architecture, music and the history of the arts. It is the centre of a fertile grain, cotton, sugar and cochineal pro¬ ducing region, and rich metal deposits are worked in the neighborhood. The most import¬ ant manufactures are pottery, hats and wool¬ ens, and a considerable trade in preserved fruits, cheese and grain is carried on. Cuenca was founded in 1557, on the site of the old native village Tumibamba, and in 1786 was cre¬ ated an episcopal see. There are numerous interesting Aztec remains in the vicinity. The mountain of Tarqui on the south was chosen in 1742 for determining the meridian line of La Condamine, Bouguer and Godin. At the base of the mountain occurred the battle of Tarqui in 1828 between the Colombian and Peruvian forces. Peruvian bark is an important product. Pop. 30,000.

CUENCA (anciently Conca), Spain, (1) city in New Castile, capital of a province of same name, 125 miles by rail east by south of Madrid; pop. 11,721. It is a bishop's see, and contains a fine Gothic cathedral. It was built by the Moors and stands on a high and craggy hill, about 3,400 feet above sea-level, between the rivers Jucar and Huescar, which makes it naturally strong. Here the painter, Salmeron. and the famous Jesuit, Molina, were born. (2) The north and east part of the province is mountainous, and fit only for sheep pasture; the other parts are fertile, producing corn, hemp, fruit, *etc.* Area, 6,636 square miles. Pop. over 260,000.

CUERNAVACA, kwar-na-va'ka, Mexico, the capital city of the state of Morelos and the chief town of the district of Cuernavaca. It is siuated on the river Tepeyte, about 46 miles south of the City of Mexico. The Palace of Cortes, where the state legislature meets, is one of its noteworthy buildings ; also the meterolog-ical observatorv and the public library. It con¬ tains a church built by Cortes, an agricultural academy, a theatre with a capacity for 2,000 spectators, a hospital and a literary institute. The city is the centre of a fertile district and has extensive sugar refineries and distilleries. Near by are the ruins of an Aztec temple, 400

feet high, composed of five terraces. It was an old Indian village at the advent of the Span¬ iards and become a favorite residence of Cortes. In 1863 Maximilian made it his residence. It bears many marks of his royal favor, especially in its public gardens. As a health resort it is frequented by those who cannot stand the excessive altitude of Mexico City. Pop. 12,776.

CUERO, kwa'ro, Tex., town and county-seat of Dewitt county, 105 miles by rail east-southeast of San Antonio, on the San Antonio and Aransas Pass and the Southern Pacific rail¬ roads, and on the Guadalupe river. It is in a rich agricultural belt, producing corn, rice, truck and cotton, carries on a large trade in turkeys and cattle, and has cotton gins and com¬ presses, a cotton mill, cottonseed-oil mills, ma¬ chine shops, turkey-dressing plants and a cream¬ ery. The waterworks and sewerage system are owned by the town. Pop. (1920) 3,671.

CUESTA, kwa'sta, a low ridge with a steep slope on one side and a gentle slope on the other, controlled by the inclination of the rock beds, the gentle slope corresponding to the dip of the beds and being called the dip slope, the steeper descent being known as the scarp or escarpment slope. As the inclination of the beds grows steeper the dip and scarp slopes become more nearly alike, and the ridge is known as a hogback, a ridge produced by the upturned edge of a hard layer of rock.

CUEVA, Juan de la, hoo-an'da la kwa'va, Spanish poet: b. Seville about 1550; d. 1609. Little is known about his life. He spent sev¬ eral years in Mexico where he was a sort of private secretary to his brother Claudio, one of the principal officers of the Inquisition. He also lived for sometime in the Canary Islands. When in Spain he made his home in Seville, which had already become a great literary and dramatic centre. But in 1606 he went to Cuenca. A poet attempting all forms, he excelled most as a dramatist, and is one of the founders of Spanish national drama, and one of the most influential of the predecessors of Lope de Vega. He was one of the most successful and popular dramatists of his day; but it is as an innovator that he is of most interest to the student of Spanish literature. He influenced Guillen Castro y Belvis, who, in his turn, influenced the literature of France and England. Cueva intro¬ duced the historical drama; he made use of the old romances, turning them into dramas; and he forecast the

Comedia de capa y espada. He used, in the drama, material forms not before employed in it. With a free hand he attempted to reform the drama; and in a measure, he was successful. He also introduced the libertine type which Castro exploited so successfully afterward. In a volume of (Works5 (1582), he published a number of lyric poems, sonnets, songs and elegies, including the (Lament of Venus Over Adonis.1* His greatest epic is (The Conquest of Betica* (1603). He wrote four tragedies, one of them on (The Sack of Rome* by the Constable Bourbon; and 10 comedies, one of the best being (The Aged Lover.* Con¬ sult Mendez Pidal, R., (L' Epopee Castillane a travers la litterature espagnole* (Paris 1910) ; Ochoa, E. de, (Tesoro del teatro espanel* (Vol. I, Paris 1838) ; Walberg, E., <Juan de la Cueva et son Exemplar Poetico* (Paris 1910).

CUFFEE, PAUL, American negro sailor and philanthropist: b. Westport, Mass., 1759; d. 7 Sept. 1818. His father was an African-born Massachusetts slave, who purchased his free¬ dom, bought a farm of 100 acres and brought up in respectability a family of 10 children ; his mother, a Nantucket Indian. At 16 he was a sailor on a whaling vessel, and in 1806 an expe¬ rienced navigator, owning considerable landed property, houses, stores, a ship, two brigs and several smaller craft. He built a schoolhouse, hired a teacher and opened at his own expense the only public school in the neighborhood of his native town. In 1811 he sailed for Sierra Leone in his ship, the Traveler, with a colored crew, won favor there with both whites and blacks, and instituted the Friendly Society of Sierra Leone. In London he was warmly received by Wilberforce and Clarkson, and com¬ missioned by the African Institution to carry goods to Sierra Leone. He died while carry¬ ing out his plans for colonizing that country.

CUFIC WRITING, the written characters of which the Arabians now make use, and which we meet in printed works, namely, the Neskhi characters are an invention of the 4th century of the Hegira. Before this time the, Cufic characters, so called from the town of Cufa, or Kufa, where they are said to have been invented, were in use. These, old characters have so much resemblance to the ancient Syriac writing, the Estrangelo, that it hardly admits of a doubt that the Arabians borrowed them from the inhabitants of Syria. Historical traditions confirm this supposition. The Cufic characters, and perhaps others at an earlier date which essentially resembled them, were prob¬ ably first introduced among the Arabians a short time before Mohammed. Although we are at present ignorant of the characters which were previously in use among them, and al¬ though the

imperfect accounts of the Mussulman writers throw very little light upon the subject, yet it is scarcely credible that the Arabians re¬ mained destitute of a written character until the 6th century of the Christian era. We find the transition of the Cufic to the Neskhi on the ruins of Chilminar. The influence which the school of Cufa exerted on Islamism caused the use of the character which proceeded from it; and when the others had fallen into oblivion, Cufic writing was the name commonly applied to all kinds of Arabic writing previous to the change made by Ebn Mokla. A knowledge of it is important on account of the many monu¬ ments in which it is preserved ; especially the coins inscribed with Cufic characters and made in the first centuries of the Hegira.

In connection with these coins are to be con¬ sidered the small pieces of glass which were introduced, particularly in Sicily, under the dominion of the Mohammedans, instead of money, or perhaps under the sanction of public authority became used as standards of the weight of coins.

CUIRASS, kwe-ras'. Defensive armor pro¬ tecting the body from neck to hips. The word undoubtedly is derived from the French word cuir (leather), probably from the fact that, at the time of its coining, the piece of armor was made of cuir bouilli (leather hardened by boiling or steeping in oil) ; a method practised in several periods. When the cuirass is made

up of two parts (front and rear) the fore part is known as the breastplate, plastron, pectoral, or (rarely) mamelliere ; the rear por¬ tion is termed dossiere. Perhaps the earliest body armor was the jazeran, a jacket of linen, or other strong material, to which were attached scales of bronze or leather. They appear to have originated among the Eastern nations. In the Heroic Age of Greece the cuirass was made of bronze and was worn over a linen tunic. It, apparently, consisted of a breast¬ plate with arm and neck protection composed of lames (strips). From ancient descriptions it was often highly ornamented with repousse (embossing by hammer) work and

sometimes inlaid with gold. About 400 b.c. the Greeks adopted a lighter tunic defense (used by the Egyptians and Asiatics) made of layers or folds of linen glued together. The early cuirasses were moulded to the figure and had straps of leather (lambrequins) hanging from the lower edge to afford protection to the lower part of the body. These straps were often studded with metal plaques. Etruscan cui¬ rasses were (like the Grecian) made up of a breastplate (plastron) and back piece (dossiere) but the overlapping shoulder-guards, as Etrus¬ can pottery discloses, tend to meet in front, thus differing from the Greek method. They also appear to have worn cuirasses made up of metal discs or plates (scales) or strips sewn on to a padded ground.

The heavily armed troops of the Romans wore a laminated cuirass made up of about seven steel lames encircling the trunk. Each lame was in two parts joined in the centre of the front and back with clasps and hinges, respectively. Four or more curved lames passed over the shoulders, being joined to the corselet at its upper lame front and rear, and moving freely on their pivots at each end. Fixed to the lower edge of the bottom body lame but one, in front, hung three or four lames vertically to protect the middle of the lower part of the body. The body lames were attached to a tightly fitting leather jacket or waistcoat. This armored garment opened in front. Two layers of leather with notched edges attached to the lowest lame and the lambrequins hung below. In the Republican period the Roman cuirass or lorica (termed also thorax) followed the Greek style with a plastron and dossiere held together by straps at the sides and having broad straps passing over the shoulders. These latter fastened to a ring on the breastplate, with permanent attachment to the dossiere below the shoulder-blades. The lorica was, usually, of bronze and modeled to the configuration of the body’s surface. Straps passed over the shoulders above, while below were two bands of leather, the nether one longer and extending below the upper. And the lambrequins hanged over these, often studded with metal plates, and with a plaited or curled fringe. A tunic was worn under the lorica. The officer of the Imperial period wore the same style of lorica modeled to the figure but it was shorter, few reaching below the waist. The scaled cuirass (squamata) was a favorite among the leaders as was also the laminated cuirass. The mediaeval period styles and forms of the cuirass will be found under title Plate Armor.

In the (<half armor® time (early 17th century),

when firearms made armor ineffective, only the cavalry retained the cuirass, wearing it over a buff coat. By the reign of Charles I of Eng¬ land these troops were called cuirassiers. Lancers wore a breastplate, close helmets, gor¬ get, pauldrons (shoulder protection), *etc.* Arquebusiers wore a back and breastplate as did also the pikemen and musketeers.

In modern times, despite the weight, cui¬ rasses were carried in the German army in 1888, but for parade and show. In France the cui¬ rassiers have existed to this day. And the royal bodyguard (((Horse Guards®) of England still wears a bright, plain steel cuirass and helmet on parade.

Bibliography. — Ashdown, C. H., (British and Foreign Arms and Armour) (London 1909) ; Demmin, A., (An Illustrated History of Arms and Armour) (London 1877) ; Hewitt, J., (Ancient Armour and Weapons in Europe) (Oxford 1855-60).

Clement W. Coumbe.

CUIRASSIER, kwe-ras'ser, a cavalryman wearing the cuirass and helmet. The cuirassier represents the horse soldiers of the 16th and 17th centuries, who wore similar armor. The French and German armies have each 12 regi¬ ments of cuirassiers, and the Russian army four. Napoleon Ill's bodyguard, called Les Cent-Gardes, wore cuirasses of aluminum, as do the British Life Guards and Royal Horse Guards on parade. See Cavalry.

CUITLAHUATZIN, kwet'-la-wat-sen', Aztec ruler: b. 1470; d. October 1520. He was the younger brother of Montezuma, and after the latter's death succeeded to the throne, but lived only a few weeks. He was a prisoner in the hands of the Spaniards with his brother, but succeeded in escaping or was released. He organized an active resistance to the invaders and in one of the attacks upon them Monte¬ zuma was killed. The warfare he instituted re¬ sulted in the defeat of the Spaniards for the time being, and their retreat to the coast. He was succeeded by his cousin Guatemotzin, the last of the Aztec (q.v.) rulers.

CULBERSON, Charles A., United States senator for Texas: b. Dadeville, Tallapoosa County, Ala., 10 June 1855. In 1856 his parents removed to Texas. Charles A. Culberson was graduated at the Virginia Military Institute, Lexington, in 1874. He prepared for a legal career under his father's tuition, completed his law studies in 1876— 77 at the University of Virginia. In 1890, and again in 1892, he was elected

attorney-general of Texas, and in 1894 and in 1896, governor of the State. He was chosen United States senator in 1899, and again for the terms beginning 1905, 1911, 1917.

CULDEES, kool'dez, members of an order of monks or an imitation of such an order, in the British Isles and particularly in Gaelic Scot¬ land, of which mention begins to occur in mediaeval annals and other writings in the 11th century. The name Culdee, in the Scottish Gaelic, Cuilteach, believed to be equivalent to gille-De in that dialect and to ceile-De in the Gaelic of Ireland, is by some philologists derived from, the Latin Cultor Dei; all three words, Scottish, Irish and Latin, meaning servant, or worshipper, of God. The Culdees seem to have been immediate successors or continuators of the communities of monks established among

the Piets and Scots of North Britain and the Western Isles by Irish missionaries in the 6th century. They were attached to cathedral or collegiate churches, living in monastic fashion, but without monastic rule. They gradually de¬ cayed, became indolent, did away with their vows of celibacy, squandered church property and finally disappeared. The most loyal mem¬ bers were probably absorbed by the larger monastic sects. Some like Dunkeld and Abernethy were superseded by regular canons ; Brechin and Dunblane were extinguished at the introduction of cathedral chapters, while Monifieth passed into the hands of laymen. Before the Reformation, Saint Andrew too disappeared. At York was their only English establishment. In Ireland, their seats were at Clones, Devenish and Scattery Islands. Consult Reeves, (The Culdees> (in Transactions of Royal Irish Academy, Dublin 1864) ; Lanigan, (Ecclesiastical History of Ireland* (Dublin 1822) ; Innes, C., (Scotland in the Middle Ages) (Edinburgh 1860) ; Skene, W. F., (Celtic Scotland> (3 vols., Edinburgh 1876-80) ; Beveridge, W., (Makers of the Scottish Church* (New York 1908).

CULEBRA, koo-la-bra, ISLAND. See

Virgin Islands.

CULEX, a short pastoral poem of 414 hex¬ ameter lines in Latin, dealing with a goatherd who is awakened by che sting of a gnat, which he kills only to find that the gnat had saved his life by awakening him in time to flee from a snake. At night the shade of the gnat re¬ proaches the goatherd for his base ingratitude and the latter in atonement erects a tomb and performs .the customary funeral rites for the gnat. Modern scholars disagree with the ancients who ascribe such a poem to Virgil. Consult Jackson, (The Authorship of the Culex) (in the Classical Quarterly, Vol. V, 1911).

CULIACAn ROSALES, koo'-lya-kan' rd-zal'es, Mexico, capital of the state of Sinaloa, and chief town of the district of Culiacan. It is situated about 887 miles from the city of Mexico, and is an important commercial centre, with fine public buildings, including a cathedral, government palace, and mint. It is an episcopal see. A railroad 37 miles long connects it with the seaport town of Altata. It has cotton-mills and other industrial establishments. It was founded in 1599 with the name San Miguel. Pop. 13,527.

CULICIDZE, ku-lis'i-de, the mosquitoes (q.v.), a family of nematocerous diptera.

CULILAWAN (koo'le-la'wan) BARK, the aromatic pungent bark of the Cinnamomum culilazmn , a tree of the Moluccas; useful in indigestion, diarrhoea, *etc.* Called also clove-bark.

CULIN, Stewart, American anthropologist: b. Philadelphia, Pa., 13 July 1858. He was edu¬ cated at a Friends' School and afterward at Nazareth Hall. Leaving this school at the age of 17, he engaged in business, but was soon persuaded to take up anthropological research. In 1883 he became secretary of the Numis¬ matic and Antiquarian Society of Phila¬ delphia and began a study of the Chinese in America, and wrote a report on their games. He made numerous scientific ex¬ peditions to Korea, Japan, China and India and

among American Indian tribes. He became curator of the Museum of Science and Art of the University of Pennsylvania in 1889, and one of the foremost anthropologists of America. In 1892 he was appointed director of the Museum. In this capacity he represented Pennsylvania University at the Colombian His¬ torical Exposition in Madrid, where he was at the same time secretary of the United States Commission. In 1888 he organized the Oriental Club in Philadelphia; in 1897 he became presi¬ dent of the American FolkLore Society; and vice-

president of the anthropology section of the American Association in 1901. He has been elected honorary member of the Swedish Span¬ ish, Italian and Mexican Anthropological So¬ cieties. He has written (Korean Games) (1896) ; (Mancala, the National Game of Africa* (1894) ; (American Indian Games)

(1905).

CULINARY. See Cookery.

CULLEN, Paul, Cardinal, Irish Roman Catholic prelate : b. near Ballytore, County Kildare, 27 April 1803 ; d. Dublin, 24 Oct. 1878. He was ordained priest in 1829, and filled in succession the offices of vice-rector and rector of the Irish College in Rome, and rector of the Propaganda College. During the period of Mazzini's power in Rome in 1848, Cullen saved the property of his college by placing it under American protection. At the close of 1849 he unexpectedly found himself nominated to the archbishopric of Armagh and primacy of Ire¬ land. His vigorous denunciations of Fenianism made him many enemies. He also forbade the clergy to take an active part in politics, and advo¬ cated papal infallibility. At the Synod of Thurles in 1851, principally by Cullen's per¬ suasion, the establishment of a Roman Catholic university in Ireland was recommended, but his quarrel with Dr. Newman, its head, wrecked the scheme. Translated to Dublin in 1852, he was created a cardinal priest in 1866, the first Irishman who had reached that rank. One of the majority at the Vatican council, he long en¬ joyed the familiar friendship of Pope Pius IX.

CULLERA, koo-lya'ra, Spain, a fortified town in the province of Valencia, and 25 miles south by east of Valencia, on the Jucar River near its entrance into the Mediterranean. Its natural position makes it a place of military im¬ portance, and though its fortifications have been repeatedly dismantled, they are now in an efficient state. Its streets are irregular but level, and among the noteworthv features are a ruined castle and the chapel of the Virgen de Cullera. Fishing, agriculture and stock raising are the principal industries. The city is the centre of a considerable trade in grain, rice, oranges, wine, *etc.* Cullera was of great mili¬ tary importance under the Moors, by whom it was strongly fortified, and successfully with¬ stood attacks of the Christian armies in 1234 and 1235, though later it was taken by James I of Aragon. Pop. 13,556.

CULLODEN, or DRUMMOSSIE MOOR, a heath in Scotland, four miles east of Inverness. It is celebrated for a victory obtained 27 April 1746, by the Duke of Cumberland over Prince Charles Edward Stuart (the Pretender) and his adherents. The battle of Culloden was the last battle fought on British soil, and the termination of the attempts of the Stuart family

to recover the throne of England. A monu¬ mental cairn and green mounds have been raised where the fiercest of the fight raged, and where many of the slain are buried. The Culloden Papers were discovered at Culloden House, the family seat of Duncan Forbes a mile to the north. They cover the years 1625 — 1748, and were published in London in 1815. Consult William Augustus, Duke of Cumber¬ land, (Authentic Account of the Battle of Culloden) (London 1746).

CULLOM, Shelby Moore, American sena¬ tor: b. Wayne County, Ky., 22 Nov. 1829; d. 28 Jan. 1914. In 1853 he went to Springfield, Ill., to study law, was admitted to the bar and settled in practice there. He was in the Illinois House of Representatives 1856, 1860, 1872, 1874, and its speaker in 1861 and 1873. He was. elected to Congress 1865-71. At the Republican national convention, 1872, he nominated Gen. U. S. Grant. He was governor of Illinois 1877-83, when he was elected to the United States Senate, and reelected 1888, 1894, 1900 and 1907. He was chairman of the Senate committee which reported the Interstate Commerce Bill, and a member of the commission appointed to prepare a system of laws for the Hawaiian Islands. His report on the regulation of rail¬ road corporations by national legislation, pre¬ sented to the Senate, 18 Jan. 1886, has taken its place as a permanent contribution to economic literature. He wrote (Fifty Years of Public Service > (Chicago 1911).

CULLUM, George Washington, Ameri¬ can military officer: b. New York, 25 Feb. 1809; d. there, 28 Feb. 1892. He was graduated from West Point in 1833; and was engaged for the next 28 years in engineering labors and in instructing at West Point, in practical military engineering. During the Civil War he was chief of staff to the

general-in-chief 1861-64, and su¬ perintendent of the Military Acadamy 1864-66. He was made chief engineer of the Department of the Missouri in 1861, superintended engineer¬ ing work on the Western rivers and was chief engineer at the siege of Corinth. From that time he was a member of the board of engi¬ neers for fortifications, until he was placed on the retired list in 1874. At the time of his retirement he was colonel and brevet major-general in the regular army. Besides numerous military memoirs and reports, he published (Military Bridges with India-rubber Pontoons> (1849) ; (Register of Officers of the U. S. Mili¬ tary Academy from 1802 to 1850> (1850) ; a translation of Duparc's (Elements of Military Art and History,* with notes, *etc.* (1863) ; a (Biographical Register of the Officers and Graduates of the U. S. Military Academy* (1868) (revised edition 1879) ; Campaigns of the War of 1812 Criticised) (1880). He bequeathed $250,000 for the erection of a memo¬ rial hall on the grounds of the Military Acad¬ emy, and $40,000 for furnishing it with military busts, paintings and other appropriate objects and for the continuance of his (Biographical Register. 5

CULM, a term used in the United States to designate waste anthracite coal, but in some parts of England for anthracite in general. At one time disposal of the culm heaps surrounding the shafts of the mines in Pennsylvania became a serious problem, until its use as fuel was

made possible, either by burning it in special grates, or by pressing it into briquettes (q.v.). In England the culm is sometimes made up into balls, with one-third of its bulk of wet clay. This mixture burns without flame, and gives a steady heat suitable for cooking. In botany culm is the straw or hollow stem of the grasses.

CULMINATION, an astronomical term, signifying the passage of a star across the meridian. The star is then at the highest point (culmen) of its course; hence the name. The sun culminates at mid-day, or 12 o'clock, appar¬ ent solar time — which seldom agrees exactly with mean time, as shown by a watch or clock. The full moon culminates at midnight. The term is interchangeable with transit.

CULP, Julia, Dutch contralto singer:, b. Groningen, 6 Oct. 1881. Her earliest musical education was on the violin, and in this study she acquired such proficiency that she made sev¬ eral successful tours in her native country. When 14 years of age she abandoned the violin and undertook voice-culture at Amsterdam and Berlin. In 1901 she made her debut as a singer at Madgeburg in a concert with Busoni.

She at once established her reputation as a ((lieder singer® and added to her fame during her sub¬ sequent tours of Austria, Belgium, France, Italy, Spain and Russia. By 1913 she had become the foremost lieder singer in the world and in that year visited America. She returned the following year and appeared in numerous recitals with great success. She possesses a remarkable voice of which she is at all times perfect master. To this as well as her musical knowledge is due her pre-eminence as a lieder singer.

CULPEPPER, John, English colonial leader in the provinces of North and South Car¬ olina. He was a refugee from the southern or Clarendon colony, and in 1678 was the head of an insurrection in the northern or Albemarle colony in favor of popular liberty. The insur¬ gents later sent Culpepper to England to nego¬ tiate a compromise. He was indicted for high treason, but through the influence of Shaftes¬ bury was acquitted on the ground that no regu¬ lar government had existed in Albemarle. He returned to Carolina, and in 1680 laid out the city of Charleston, reducing the paths, streets and squares to comparative regularity, and enclosing, the town site with a line of fortifications.

CULPEPPER, or COLEPEPPER,

Thomas, American royal governor: b. England; d. there 1719. He was one of King Charles II's favorites, who received from that monarch a grant of the entire territory of Virginia for a period of 31 years from 1673, a grant so as¬ tounding in character that, in the opinion of at least one historian, nothing but the very deed itself, still extant, could be accepted as evidence of the fact. He was governor of Virginia 1682-83, and two years later relinquished most of his Virginia grant, retaining only a portion called Northern Neck, and securing, instead of the remainder, an annual pension of £600 for 20 years. His whole career was actuated by the meanest rapacity, an example of which may be seen in his trying to swindle the colonists by paying the public wages in light coin, on which he had himself put an arbitrary value. In 1683 he returned to England, was tried and convicted

of corruption and deprived of his commission. His daughter Catherine married Baron Fair¬ fax to whom the great estate descended. Con¬ sult Doyle, (English Colonies in America) (Vol. I, 1882).

CULPER, local name in Africa for a fish resembling a perch, but of uncertain classifica¬ tion, which inhabits the Zambesi Valley. It burrows in the mud and thus survives droughts, and is exhumed both by animals and the native negroes for food, but is not thought palatable by the white colonists.

CULPRIT FAY, The, a poem by Joseph Rodman Drake (q.v.). It relates the love of a fairy for a mortal, and the punishment of the offense.

CULVERIN, in early times, any small gun, the name being derived from the serpent-shaped handles cast on the piece. In the 16th century and later the name was used with reference to the heavier cannon, like the 18-pounder. Vari¬ ations of the name were whole culver or culver, referring to the heavier guns, demi-culverin to the smaller.

CULVERT, an artificial channel for carry¬ ing a small stream underneath a canal or the embankment of a roadway or railway. For very small streams vitrified clay pipe or cast-iron pipe is used for culverts. For streams of larger size stone box culverts are employed, consisting of two parallel masonry walls cov¬ ered over with stone flagging and having a paved bottom. Where stone is scarce, box cul¬ verts are sometimes built of timber, and some¬ times, instead of stone flagging, a roof of iron beams embedded in a concrete slab is employed. Large culverts are usually built with parallel masonry side walls, supporting a stone or brick roof arch. With the increased use of concrete in railway engineering this material is increas¬ ingly used, both in the form of plain arches and various forms of reinforced concrete structures. A culvert, besides the passageway for the water, has wing walls at one or both ends to hold the embankment in place and protect it from the rush of the flowing water in times of freshet. For full technical description of culvert con¬ struction consult Baker, (Treatise on Masonry Construction (10th ed., New York 1912) ; and also in (American Railway Engineering and Maintenance of Ways, Bulletin 105 > (Chicago 1908) ; and Merriman, American Civil Engi¬ neer's Pocket-Booˆ (2d ed., New York 1913).

CUMZE, ku'me, a very ancient city in Cam¬ pania, and the oldest colony of the Greeks in Italy was founded about 1030 b.c., according to ancient authorities, by colonists from Chalcis in Euboea and from Cyme in Asia Minor. Strabo tells us that it was the oldest of all Greek settlements in either Italy or Sicily. They soon spread out, and

founded Zancle in Sicily (better known as Messina), and Naples. Its wealth and prowess invited a joint attack in 524 b.c. by the Etruscans of Capua, the Dau-nians of Nola and the Aurunci of Mons Massi-cus, which resulted in a victory for Cumae. In 420 b.c., Cumae was taken by the Campians and became Oscan in character. With the Campians, it came under the power of Rome (345 b.c.) and lost its identity. During the Second Punic War, it resisted the attacks of Hannibal. Thenceforth it remained a quiet suburb where

the politicians of Rome had their villas. Its strong fortifications made it an important mili¬ tary factor, but it was finally destroyed by the Neapolitans in 1205 a.d. All that remains of the city are some ruins of an amphitheatre, of a small temple and masses of masonry, evidently of Roman construction. Considerable remains of the ancient fortifications are visible, and underneath the Acropolis are numerous crypts. The common belief of the inhabitants made Cumae the home of the Cumaean sibyl, a most renowned ancient prophetess ; and one of these caverns was supposedly her seat. The extensive cemeteries of the city have proved of great interest to archaeologists who have unearthed Greek, Samite and Roman graves and many important objects, which establish the fact that some sort of pre-Greek settlement existed there. Consult Beloch, J., <Campanien) (Breslau 1890) ; Pellegrini, G., (Monumenti dei LinceP (Vol. XIII, 1903) ; Patroni, G., Atti del con-gresso di scienze storiche) (Vol. V, 1904).

CUMANA, koo-ma-nii', Venezuela, capital of the new state of Sucre, which formerly con¬ stituted a section of the state of Bermudez. It was founded by Gonzales Ocampo in 1520, under the name of Nueva Toledo, and near Nueva Cordoba, founded in 1523 by Jacomo Castellon. It is situated on the banks of the Manzanares River, one mile from the southern coast of the Gulf of Cariaco. The city is celebrated as being the first permanent settlement of Europeans on that coast. Being situated on ground of volcanic formation, the city is subject to fre¬ quent earthquakes. The surrounding country is fertile, producing especially fine grapes, pine¬ apples and other fruits, and such tropical plants as coffee and cacao. A railroad connects the city with the gulf. It has a college and is the seat of a United States consular agent. It is an important commercial centre, its trade being promoted by an excellent roadstead and harbor, which are dominated by the fort of San Antonio on a hill overlooking the town. The exports are cacao, sugar, coconuts, tobacco, pearls and hides. The suburbs of San Francisco, Guay-querias and Serritos have an aggregate popu¬ lation equal to that of Cumana, which has 12,- 225 inhabitants.

CUMARIN. See Coumarin.

CUMBERLAND, Richard, English drama¬ tist and essayist: b. Cambridge, 19 Feb. 1732; d. Tunbridge Wells, 7 May 1811. He was gradu¬ ated at Trinity College, Cambridge, in 1750, and two years afterward was elected Fellow. He was appointed private secretary to the Earl of Halifax, became Ulster secretary during Hali¬ fax's term as lord lieutenant of Ireland. In 1775 he obtained a post in the Board of Trade and retired to Tunbridge Wells, where he de¬ voted himself to literature. His comedies, (The West Indian* ; (The Wheel of Fortune> ; (The Jew) and (The Fashionable Lover,* are an epitome of the culture of the time; as are his essays, collected under the title of (The Ob¬ server. } He wrote novels, tracts, religious and didactic poems, not now important; Anec¬ dotes of Eminent Painters in Spain.) His plays, though popular in their day, have not sur¬ vived. His (Memoirs *appeared in 1807, but are considered untrustworthy. Consult Paston, George, (Little Memoirs of the - Eighteenth Century* (London 1901).

CUMBERLAND, England, the extreme northwest county. It has 75 miles of coast and an area of 1,520 square miles. A little more than half of the county is cultivated, the rest is covered by mountain and lake. The highest peaks of the Cumbrian Mountains are in the lake region, whence valleys radiate in all direc¬ tions, gradually ending in a flat coastal .belt. The chief rivers are the Eden and Derwent. Mineral wealth abounds, chiefly coal, iron and lead. Dairy farming and domestic manu¬ factures are carried on. The chief towns are Carlisle, the capital, Whitehaven, Brampton, Workington, Maryport and Millom. Consult Ferguson, (History of Cumberland) (London 1890) and Wilson (editor), (The Victoria His¬ tory of Cumberland) (Westminster 1901). Pop. 265,780.

CUMBERLAND, Md., city and the county-seat of Allegany County, 150 miles southeast of Pittsburgh; 178 miles northwest of Baltimore; 152 miles northwest of Washington, D. C., is picturesquely located on the Potomac River, 632 feet above tide water. It is also on the main line of the Baltimore and Ohio Railroad, the Western Maryland Railway, the

Pennsylvania Railroad and other interurban railways and is at the head waters of the Chesapeake and Ohio Canal, which extends thence to George¬ town, D. C. Cumberland is situated 11 miles from the noted Cumberland and George's Creek bituminous coal regions and is the shipping point for large quantities of this coal, con¬ sidered the finest in the world for steaming purposes. Its manufactures are also consider¬ able ; they include large glass works, brick works, cement works, steel works, iron found¬ ries, dye works, tanneries and numerous other enterprises. Here are located large rolling mills for the rerolling of steel rails and other ma¬ terials of railway supplies, as well as large rail¬ way car and repair shops, and large capital is invested in mercantile interests. Fort Cumber¬ land was built in the winter of the years 1754 — 55 at the beginning of the French and Indian War; on the site of the fort, Cumberland was laid out in 1785. It was incorporated in 1815 and became a city in 1850. The government of Cumberland is now by commission, composed of a mayor and four councilmen. This was the first city in Maryland to adopt this form. The proximity of Cumberland to Pittsburgh, Balti¬ more and Washington led to much speculation as to the influence which this radical step would have on the government of those cities. Yet after six years' experience in which many im¬ portant undertakings were carried to a suc¬ cessful conclusion, such as a new gravity water supply, costing $750,000 which furnishes abun¬ dance of the purest drinking water in the world to its entire population. A new sewerage and conduit system, paving of over 40 miles of street without any appreciable raise in tax rate has proven this form a success in this instance. Pop. (1920) 29,837.

CUMBERLAND, R. I., town in Provi¬ dence County, six miles north of the city of Providence, on the New York, New Haven and Hartford Railroad and on the Blackstone River. It has extensive manufactures of cotton goods, silk, clothes, horseshoes and iron ware, and in the vicinity are valuable granite quarries, and the ((mineral pocket of New England,® contain¬

ing deposits of coal, iron, copper and gold. Among its buildings and historic points of in¬ terest are the Elder Ballou Meeting House, built about 1740; the Catholic (non-sectarian) As¬ sociation Institute ; the Cistercian T rappist monastery ; the grave of William Blackstone, the first white settler in Rhode Island, who built <(Study Hall® as a residence about 1635 ; and the Nine Men's Misery cairn, the graves of nine victims of early Indian wars. Named after William Augustus, Duke of Cumberland, the town was incorporated in 1747. Pop.

10,107.

CUMBERLAND, Army of the, in the

American Civil War, a name applied to one of the principal Federal armies, which prior to 30 Oct. 1862, had been known as the Army of the Ohio. On this date Gen. W. S. Rosecrans as¬ sumed command and a new army of the Ohio was formed. The Army of the Cumberland continued under the command of General Rose¬ crans until October 1863, when Gen. George H. Thomas became commander. At the beginning of 1864 the 11th and 12th corps, which had been added in 1863, were consolidated into the 20th corps.

CUMBERLAND GAP, on the dividing line of Virginia and Kentucky on the north, and Ten¬ nessee on the south, is the main gateway of the Cumberland Mountains, between eastern Ken¬ tucky and East Tennessee. Early in the Civil War it was occupied by the Confederates and remained in their possession until 18 June 1862, when, in view of a concentration of the Con¬ federates at Chattanooga, which was threatened by the advance of Gen. O. M. Mitchell from Huntsville and Bridgeport, Ala., it was evacu¬ ated, and was occupied by Gen. Geo. W. Mor¬ gan, who, with a division of 8,000 men, had been operating against it for nearly two months. Morgan fortified it, established magazines and an arsenal, from which thousands of arms, with ammunition, were distributed to the Union men of East Tennessee, and remained in possession until 17 Sept. 1862. Then Gen. E. Kirby Smith, having crossed the mountains south and de¬ feated General Nelson at Richmond, Ky. (29 and 30 August), thus cutting off communication from the north, while Gen. C. L. Stevenson with a division of 9,000 men was pressing him in front, Morgan, short of provisions and forage, and not prepared for a siege, blew up his arsenal and magazines, set fire to his storehouses, and at night, 17 September, started on a march of 200 miles through an almost unbroken wilderness to Greenup, on the Ohio River. He reached there 3 October without the loss of a gun or a wagon, and with the loss of only 80 men, although pur¬ sued some distance by Stevenson, and harassed much of the way by Morgan's cavalry. Bragg retreated through the Gap, after the failure of his Kentucky campaign, and. it remained in Confederate possession a year. General Burn¬ side entered Knoxville, 3 Sept. 1863, and find¬ ing the Gap occupied by Gen. John W. Frazer, with a brigade of 2,300 men, ordered General Shackleford with a cavalry brigade to approach it from the south and co-operate with Colonel DeCourcy, who, with a division of new troops, had been ordered to march on it from the north. Shackleford reached the south end of the Gap on the 7th and communicated with

De Courcy, who had arrived on the north side, and both summoned Frazer to surrender, who

refused. Burnside led an infantry brigade from Knoxville, joined Shackleford on the morning of the 9th and at his demand Frazer surrendered his force of over 2,000 men, with 12 guns and a large supply of ammunition. The Gap re¬ mained in Union possession to the close of the war. Consult (Official Records, > (Vol. XXX); The Century Company's (Battles and Leaders of the Civil War* (Vol. III).

E. A. Carman.

CUMBERLAND MOUNTAINS, or CUMBERLAND PLATEAU, that portion of the Appalachian group which ranges along the southwest border of Virginia and the southeast of Kentucky, and passes across the State of Tennessee into the northeastern part of Ala¬ bama. The region is bounded on the east by a bold escarpment overlying the Great, or Ap¬ palachian Valley. On the east, next to the es¬ carpment, the rocks are somewhat folded, but farther west the sediments are practically flat, and the area is more truly a deeply dissected plateau than a definite range of mountains. The region is also bounded on the west by a less marked escarpment. The ridges are rocky and little cultivated, but the valleys are fertile. These mountains lie west of the range of the granite and metamorphic rocks, which compose the mountains on the western borders of North Carolina and the northern part of Georgia. They are upon the range of the great coal for¬ mation of the Middle States, and essentially composed of the same groups of stratified rocks as those of the Alleghany Mountains, Chestnut Ridge and Laurel Hill in Pennsylvania. The Tennessee River and its branches drain a por¬ tion of the eastern slope.

CUMBERLAND PRESBYTERIANS.

See Presbyterianism.

CUMBERLAND RIVER, river of Ken¬ tucky and Tennessee, rising in

the Cumberland plateau, in eastern Kentucky, near the Virginia line. It flows at first generally northwest and then southwest through southern Kentucky and enters Tennessee in long. 85° 30’ west. It then flows, in a very tortuous course, southwest, west and then generally northwest, through northern Tennessee, re-entering Kentucky nearly at 88° west. From this point it approxi¬ mately parallels the Tennessee River, to its con¬ fluence with the Ohio River at Smithland, about 12 miles east of Paducah, Ky. Its total length is 688 miles, and its basin area is about 18,000 square miles. It is navigable for steamboats to Nashville, 193 miles, and for vessels of three-feet draught 325 miles farther, to Burnside, Ky., which is commonly considered the head of navi¬ gation.

CUMBERLAND ROAD, The, or GREAT NATIONAL PIKE, originally, a road planned from the Maryland frontier at Cumberland, Md., to connect vvith the State roads and run to Saint Louis (then just fallen into United States hands by the Louisiana Purchase) ; to open up the West to immigrants, and provide for mili¬ tary and postal transportation. It was to be built at national expense from the sales of pub¬ lic lands, as a fair counterpoise to the seaboard States’ ability to pay their expenses by levying customs duties ; and pushed forward by sections as settlement advanced. Henry Clay was its most conspicuous projector and advocate, and a monument to commemorate his services to it

has been erected on its course near Wheeling, W. Va. The bill for the first section passed Congress, 29 March 1806; it authorized the President (Jefferson) to appoint three com¬ missioners to lay out the road from Cumber¬ land to the Ohio River (Wheeling), and ap¬ propriated $30,000 for expenses. At the same time another was passed to lay out one through Georgia, on the New Orleans route; and others followed in swift succession for two decades. This policy of roads, soon supplemented by canals, became the great battle-ground for the strict-construction party, who fought the whole policy of internal improvements as unconsti¬ tutional ; and the Cumberland Road with its constant call for improvements and repairs aroused ever fresh resistance. Finally in 1822, Monroe, although he had signed two annual bills of the kind, vetoed a third; and for the time the improvements and new roads came to a standstill. With John Quincy Adams, who was in thorough sympathy with Clay’s policy, as with eveiy other to increase the national wealth and power, the system started up afresh; and the Cumberland Road was pushed forward through Ohio and Indiana. On the accession of Jackson, a strict-

constructionist, the vetoes began and the roads stopped; with Van Buren the latter commenced again, and by 1840 the road had advanced to Vandalia, Ill. By this time the railroads had become so decisively the coming transportation system that no more was built ; the last act in its favor was passed 25 May 1838. It was admirably constructed, mac¬ adamized, with stone bridges and iron mile¬ posts and toll-gates ; and the total amount ex¬ pended on it by the United States was $6,821,- 246. The name ˆCumberland Road® in current use was extended to take in the section from Cumberland through Frederick to Baltimore, built largely by Maryland banks, which were rechartered in 1816 on condition of com¬ pleting it. It was a most profitable specu¬ lation, the tolls yielding them sometimes as high as 20 per cent, though finally sinking to 2 or 3 per cent. The portion built by the national government was acquired in 1878 by the coun¬ ties of Alleghany and Garrett, which made it a free road. The whole road from Baltimore to Vandalia is about 800 miles long. Consult Hul- bert, (The Cumberland Road) (1903) ; Rideing, (The Old National Pike> (Harper's Magazine, Vol. LIX, 1879).

CUMBERLAND UNIVERSITY, coedu¬ cational institution located at Lebanon, Tenn. It was first opened to students in September

1842, and a charter was procured in December

1843. As at first organized, the University was composed of a College of Liberal Arts and a Preparatory School. The Law School was opened in 1847. Its growth from the start was remarkable, and in 1858 it was considered the second in size among the law schools of the country. The Theological School was estab¬ lished in 1852, but was discontinued in 1909. The School of Engineering was established in 1852, and the-School of Music in 1903. When the Civil War began the university had 481 students, buildings and apparatus valued at $50,000, and an endowment of $100,000. Dur¬ ing the war the buildings were burned, ap¬ paratus and library were destroyed, the endow¬ ment rendered worthless. In January 1866, the

University was reopened without buildings, en¬ dowment or apparatus. Since that time it has had a steady growth; its buildings are large and commodious ; its libraries, general and depart¬ mental, number 20,000 volumes. Since 1897 it has been a coeducational institution. The total enrolment in 1915 was 416 students, and there were 28 instructors. The buildings and land of the university together with furnishings and equipment are valued at $247,000 and the pro¬ ductive endowment is $90,000. The institution is under the auspices of the Presbyterian Church.

CUMBRIAN MOUNTAINS, a range of mountains, England, occupying part of the counties of Cumberland, Westmoreland and North Lancashire, about 37 miles long and 35 miles broad. The mountains rise with steep ac¬ clivities, enclosing in some parts narrow but well-cultivated valleys, with numerous pic¬ turesque lakes, this being the English <(Lake Country,® so much frequented by tourists. There are 25 mountain tops upward of 1,500 feet high, the highest being Scafell Pike, which measures 3,210 feet and is the loftiest peak in England. The deep valleys between the moun¬ tains contain 14 lakes, 1 to 10 miles long. The largest is Windermere. Many eminent per¬ sons have lived in this district, among them Wordsworth, Southey, Coleridge, De Quincey, Arnold and Harriet Martineau. The heavy rainfall of the region is utilized by the con¬ version of one of the lakes Thirlmere, into a reservoir for the water supply of Manchester.

CUMIN, kum'm, Oil of, the expressed product of a long-known umbelliferous plant, grown in Egypt and Ethiopia, and largely culti¬ vated in Sicily and Malta, whence it is brought to this country. Cumin seeds, when distilled with water, yield a pale-yellow limpid oil of dis¬ agreeable odor and harsh taste, consisting of an oil called cuminol, hydride of cumyl, or cuminic aldehyde (C10H12O), and cymene or cymol (C10H14). Cymene is methyl-isopropyl benzol. Cuminol and cymol can only be partially separated by distillation, cymol being the more volatile, but cuminol is better removed by caus¬ ing it to combine with hydropotassic sulphite. When pure, cuminol is a colorless liquid, lighter than water, boiling about 446° F. The other constituent, cymol (C10H14), is a colorless, strongly refracting, lemon-smelling fluid, which has a specific gravity of 0.85, and boils about 347° F. It is insoluble in water, but dissolves in alcohol, ether and oils.

CUMINUM, cu'mTn-um, the fruit of Cu-minum cyminum, an umbelliferous plant closely related to caraway, with which it is allied in properties and uses. See Cumin, Oil of.

CUMMING, Alfred, American territorial governor: b. Augusta, Ga.,

1802; d. 1873. When the Mormons under Brigham Young dis¬ puted the authority of the Federal government, President Buchanan, in 1857, sent Cumming to Utah as governor with a force of' 2,500 men. He at once declared the territory to be in a state of revolt, to which Young- replied by a proclamation forbidding the army to enter the territory. It was not until 1858 that Cumming regularly assumed office, in which he was sup¬ ported by the troops for nearly two years. Cumming held the position until 1861. See Utah, History.

CUMMINGS, Amos Jay, American jour¬ nalist: b. Conkling, N. Y., 15 May 1841; d. Baltimore, Md., 2. May 1902. At the age of 12 he entered a printing office as an apprentice, and was accustomed to say that he had set type in nearly every State in the Union. He was with Walker in the last invasion of Nicaragua; was a sergeant-major in the 26th New Jersey Infantry during the Civil War; and received the congressional medal of honor for gallantry on the battlefield. In 1863 he entered the service of the New York Tribune under Gree¬ ley, and later was on the staff of the New York Express and the Sun successively. From 1887 until his death he was a Democratic representa¬ tive in Congress from New York city districts. He was the author of a series of letters, which attracted much attention, written from Florida and California to the Sun, over the signature ((Ziska.®

CUMMINGS, Charles Amos, American architect: b. Boston, 26 June 1833; d. 1905. He was educated in the Boston schools and at the Rensselaer Polytechnic Institute, Troy, N. Y., and till his retirement practised his profession in his native city. He published a valuable (History of Architecture in Italy from the Time of Constantine to the Dawn of the Renaissance) (1901), and collaborated with W. P. P. Longfellow (q.v.) in (A Cyclopaedia of Works of Architecture in Greece, Italy and the Levant)

(1897).

CUMMINGS, Thomas Seir, American miniature painter: b. Bath, England, 1804; d. Hackensack, N. J., 1894. He came to New York early in life and studied there with Henry In¬ man. He painted miniatures in water color, and many of his sitters were well-known con¬ temporaries of the artist. In 1826 he helped to found the National Academy of Design, was its treasurer for many years and one of its early vice-presidents. He also wrote an account of its history,

entitled (Historic Annals of the National Academy from its Foundation to 1865 } (Philadelphia 1865). His later life was spent in Connecticut and Hackensack, N. J.

CUMMINS, Albert Baird, American lawyer and statesman: b. Carmichaels, Pa., 15 Feb. 1850. He received an academic education at Waynesburg, Pa., was admitted to bar and set¬ tled in practice at Des Moines, Iowa. The honorary degree of LL.D. was conferred on him by Waynesburg College in 1903 and by Cornell College, Iowa, in 1904. From 1896 to 1900 he was a member of the Republican Na¬ tional Committee, in 1901 was elected governor of Iowa, in 1903 was reelected and, again for his third term in 1906. In 1908 he was elected to the United States Senate to fill the vacancy caused by the death of Senator William Boyd Allison, and was reelected for the terms 1909-15 and 1915-21. While governor of Iowa he made a thorough study of matters relating to the regulation of railroad and other corpora¬ tions, and to him was largely due the passage by the Senate of various important measures relating to trusts and railroads.

CUMMINS, George David, American cler¬ gyman : b. Kent County, Del., 11 Dec. 1822; d. Lutherville, Md., 26 June 1876. He was gradu¬ ated at Dickinson College, Pa., 1841 ; ordained to the Episcopal ministry, 6 July 1847, and was successively rector at Norfolk, Va., Richmond,

Va., Washington, D. C., Baltimore, Md., and Chicago, Ill., until consecrated assistant bishop of Kentucky, 15 Nov. 1866. In November 1873 he resigned his office and withdrew from the Church, preliminary to taking steps to form a new sect, uThe Reformed Episcopal Church,® of which he ˆwas made the presiding bishop December 1873. He was formally deposed from the Protestant Episcopal ministry, 24 June 1874. See Reformed Episcopal Church. Con¬ sult the (Memoir) by his wife (New York

1878).

CUMMINS, Maria Susanna, American nov¬ elist : b. Salem, Mass., 9 April 1827 ; d. Dor¬ chester, Mass., 1 Oct. 1866. Her novel, <The Lamplighter) (1853) had enormous success and was translated into foreign languages ; it is still remembered for the idyllic charm and tender¬ ness of its first few chapters, but the rest is commonplace. Her other books are (Mabel Vaughn) (1857) ; (E1 Fureidis) (1860) ;

(Haunted Hearts* (1863).

CUMNOR HALL, a ruined manor house near Oxford, England, the ((Cumnor Place® of Scott's (Kenilworth. *Meikle's musical ballad of (Cumnor Hall,* a lament for Amy Robsart, furnished Scott, as is supposed, with the motive of (Kenilworth. *

CUMONT, ku'mon', Franz Valery Marie,

Belgian Orientalist : b. Alost, East Flanders, 3 Jan. 1868. He studied at the universities of Ghent, Bonn, Berlin, Vienna and Paris; from 1892 to 1910 he was professor in the University of Ghent, and from 1899 to 1912 curator of the Royal Museum at Brussels. In 1913 he was made an associate of the French Academy of Inscriptions. He was Hibbert lecturer at Ox¬ ford in 1901 and 1906. His principal works are on the Eastern cults that took root in Rome about the beginning of the Christian era : they include (Textes et monuments relatifs aux myseres de Mithra* (1894-1901), translated as (The Mysteries of Mithras) by McCormack (Chicago and London 1903) ; (Catalogus Codi-cum Astrologorum Grsecorum* (1898 et seq.) ; (Studia Pontica) (1901-11, with Anderson) ; (Les religions orientales dans le paganisme romain*

(1906; 2d ed., 1909; Eng. trans., 1911)*, (Recherches sur le Manicheisme* (1908—12) ; c Astrology and Religion in Antiquity * (1912).

CUMULATIVE VOTING, the system by which every voter is entitled to as many votes as there are persons to be elected, and may give them all to one candidate, or may distribute them among the candidates, as he thinks fit. The practice was first introduced into Great Britain in 1870, and used in the election of school boards, and later in parliamentary elec¬ tions. Although the general adoption of the system has been urged as a desirable reform it has not had much success. The States of Illinois and Michigan have used the method in some elections, and its legality was questioned. The Supreme Court of the latter State declared it constitutional. See Minority and Propor¬ tional Representation.

CUNARD, Sir Samuel, English ship¬ owner: b. Halifax, Nova Scotia, 21 Nov. 1787; d. London, 28 April 1865. Becoming early a successful merchant and ship-owner, he went to England in 1838, and joined with George Burns and David MTver in founding (1839) the

British and North American Royal Mail Steam Packet Company. The first passage was that of the Britannia in 1840. This small venture de¬ veloped into the present great commercial enter¬ prise known as the Cunard line of ocean steamers plying between England and America. He was knighted in 1859.

CUNAXA, ku-naks'a, Mesopotamia, east of the Euphrates, about 60 miles north of the site of the ancient city of Babylon. Famous in his¬ tory for the defeat of the younger Cyrus, 401 b.c. See Xenophon.

CUNDINAMARCA, koon-de-na-mar'-ka, Colombia, a department once of extensive area, but now reduced with ill-defined boundaries to about 8,046 square miles. It consists of an ele¬ vated plateau transversed by the eastern Cor¬ dillera of the Andes, and cut by many rivers. Its capital is Bogota, also the capital of the republic. Its soil is fertile and tobacco is ex¬ tensively cultivated. It is also rich in minerals and good grazing country. Pop. 713,968.

CUNDURANGO, kun-du-ran'go, the bark and wood of a vine growing in Ecuador, South America, supposed at one time to be a specific for cancer.

CUNEIFORM WRITING is so called be¬ cause its characters consist of

strokes of the shape of a wedge (Latin, cunens) ; and for a like reason it is also known as arrowheaded but less widely; it is a mode of writing used in early times, and till the downfall of the Babylonian and Assyrian empires, in the region of the Euphrates and Tigris and in contiguous coun¬ tries northward and eastward of those empires, as Armenia, Persia, Media, Susiana. It was an outgrowth of a primitive hieroglyphy most probably originating among the peoples of that part of western Asia and not derived from Egypt. For an account of the archaeological researches in Babylonia and Assyria see the arti¬ cle Babylonia, where the invention of cunei¬ form writing is credited to the Accadian popu¬ lation of Chaldaea, from whom it passed to a Semitic people, their conquerors, later known as Babylonians and Assyrians. Before the con¬ quest the cuneiform writing of the Accadians had been adapted by them not only to ideo¬ graphic representation — representation of ob¬ jects or notions, as the sign $ denotes dollar

or as in astronomy the trident stands for

the planet Neptune • — but also to representation of sounds. This was a step in the direction of alphabetic writing, but the cuneiform system never reached that development, and its highest achievement was the production of a syllabary — a catalogue of the syllables of the language. The transition from the ideographic to the pho¬ netic use was a long step toward perfection as it immensely simplified the problem of writing by reducing to a comparatively small number of different characters the infinity of emblems required for ideographic representation. It was

as though a sign, as , originally, let us

suppose, the ideograph for tree, were made to stand for the syllable ta, to, *etc.* : in that case all words beginning with the syllable ta or to would be represented by a form of expression

having that sign for its first element, and not by an independent

arbitrary form.

The cuneiform writings found among the ruins of the Assyrian, Babylonian and other ancient cities of western Asia were either im¬ pressed with a stylus on tablets of moist clay then kiln-baked or were incised with a chisel on monuments of stone. The wedge either stands upright, or inclined at an angle, or lies hori¬ zontal, or two wedges form an angle coming together at their points, or at their bases. A few examples will give an idea of the manner of combining them for the expression of ideas :

•< * V' •< <*

ˆ o o o <$> #•

In its stage of highest development the cunei¬ form writing was exceedingly complex and clumsy, and the fact that it was made to serve so well as it did the needs of the Babylonians and Assyrians as a means of literary expression, as the vehicle of laws and as a means of his¬ torical record, gives striking demonstration of man's invincible effort to develop his intellec¬ tual and moral powers. It was a very simple thing to make the ideograph speak to the ear as well as to the eye — to represent, for example, the sun (utu) by an ideograph and then to make that symbol stand for the syllable ut in all situations ; but it was a beginning, and out of it was constructed as efficient a mechanism as was allowed by the refractoriness of the material of construction. But the cuneiform writing never gave any indications of a tend¬ ency toward an alphabetic system.

The results of archaeological exploration in those countries of western Asia are justly re¬ garded as among the most valuable of modern historical research. They put us in possession of much of the literature and early history of peoples whose record seemed already lost past recovery as far back as the time of Herod¬ otus (5th century b.c.) or at least of Berosus (3d century b.c.) of whose writings only some fragments have come down to us: our knowl¬ edge of the history of those great empires, beyond a few incidental notices in the Bible, was drawn mainly or wholly from those two his¬ torians ; but now, thanks to the researches of our contemporaries, we have with regard to many points of Assyrian and Babylonian his¬ tory fuller and more authentic information than we possess regarding the history of ancient Greece and Rome.

No one document of the thousands that have been unearthed in the course of those explora¬ tions surpasses or even equals in interest the

code of King Khammurabi (the Amraphel of Genesis xiv, 9, <(King of Shinar® or Elam, called also in the Scripture Shusham, and by the Greeks and Latins Susiana, from the name of the capital city Susa). This code, discovered at the site of ancient Susa in 1901, afterward translated by the Dominican friar Schiel, who was the Assyriologist of Monsieur de Morgan's exploring expedition, and published in 1903 by order of the French Minister of Public Instruc¬ tion, is inscribed on a great monolith of granite ; it dates from 2200 b.c. It consisted originally of about 3,000 lines of writing in 49 columns,

five of which are effaced ; but the rest of the inscription of a very beautiful type is still plainly legible. The code begins with a law relating to witchcraft or sorcery, and touches all grades of social and domestic life, even determining the wages of workmen and laborers from the lowest to the highest. Very curious is the law regarding enchantments or sorcery. The person on whom the spell of enchantment has been laid must plunge into the Euphrates : if he sinks and drowns, his house goes to the sorcerer; but if he floats the sorcerer forfeits his life and his house. . Proof of the general use of writing in Khammurabi's dominions is seen in the requirement of written testimony in lawsuits and in business transactions. The code commands that land be kept in cultiva¬ tion ; uncultivated and unimproved land is taxed at the same rate as neighboring cultivated land. The farmer whose crop is seriously dam¬ aged by storm is excused from paying interest on money loaned him. He through whose neg¬ lect the irrigation canals and ditches cause damages must make good the loss. The wine¬ shop keeper — usually, it would appear, a woman — is required to <(seize and drive to the palace® riotous persons who resort to her place : failing to do this she incurs the penalty of death. The defamer of an honest woman, be she wife or <(votary,® is to be branded on the forehead. A man was permitted to divorce his childless wife. If a man divorces his wife without cause he must allow her alimony and custody of her children, also a share in his estate equal to a son's portion. Here are some points at which Khammurabi's code touches * matters which were afterward made the subject of Hebrew legislation. Says the Elamite king : ((If a man strike another in a quarrel and cause him a wound and he shall swear (I did not strike him knowingly) he shall answer for the doctor.® The Hebrew law (Deut. xxi, 19) pre¬ scribes as penalty for one who smites another with stone or fist so that the injured man keepeth his bed, that the smiter shall (<pay for the loss of his time and shall cause him to be thoroughly healed.® The Hebrew law punished with death <(him that smiteth his father or his mother® ; the punishment

decreed by Kham¬ murabi for the same offense was loss of the hands.

The word <(cuneiform® is traced first to Thomas Hyde in 1700, professor of Hebrew at Oxford, and has passed into most modern lan¬ guages. It is called Keilschrift or wedge-script, by the Germans, and Mismari or nail¬ writing by the Arabs.

CUNENE, koo-na'ne, a river of South Africa, rising in about lat. 13° S. and entering the Atlantic in lat. 17° 20' S. It flows at first in a southerly direction and afterward in a westerly direction. In its lower course it forms the boundary between the Portuguese and Ger¬ man territories in that region. At the mouth are sandbanks, and father up several cataracts.

CUNLIFFE, John William, American educator: b. Bolton, Lancashire, England, 20 Jan. 1865. He was educated at the University of London and at Owens College, Manchester. He taught English literature at McGill Univer¬ sity, Montreal, from 1899 to 1906, at Columbia University in 1906, and at the University of Wisconsin until 1912. He then became pro-

fessor of English and associate director of the school of journalism, Columbia University. He wrote (The Influence of Seneca on Elizabethan Drama5 (1907) ; edited Gascoigne's (Supposes and Jocasta5 (1906), and a complete edition of Gascoigne (1907-10; in (Cambridge English Classics5), and (Eastward Hoe5 in volume II of Gayley's Representative English Comedies5 (1913) ; and contributed to volumes III and V of the (Cambridge History of English Litera¬ ture5 on (A Mirror for Magistrates,5 Gas¬ coigne, and early tragedy. Other works are (Writing of Today5 (1915) and (Poems of the Great War5 (1917). He is joint editor of a revised edition of the Warner Library (1917— 18), and contributes to philological journals.

CUNLIFFE-OWEN, (Philip) Frederick,

American editor, son of the late Sir Philip Cunliffe-Owen, K.C.B. : b.

London, England, 30 Jan. 1855. Since 1889 he has been one of the editors of the New York Tribune; is vice-president of the Pilgrims' Society of America, and director of Saint George's Society, New York. He is grand officer (with star) of the Order of Charles III of Spain; Osmanieh, Tur¬ key; and commander of the Order of the Crown of Italy; commander of the Legion of Honor of France, and of Orange-Nassau, King¬ dom of the Netherlands. He is a contributor to the Nineteenth Century, Fortnightly Review, the North American Review, and is author of a series of letters, signed Ex-Attache, Fontenoy, Veteran Diplomat.

CUNNER, or CHOGSET (Tantogolabrus adspersus) , one of the commonest of shore fishes on rocky ledges along the New England coast, and found from Virginia to Newfound¬ land. It rarely attains a length of one foot, and is of a brownish-blue color with yellowish reflec¬ tions ; the teeth are strong and sharp. Although an excellent panfish and a great favorite with the boy angler, its great numbers and its bold¬ ness render it a great pest to the professional fisherman, whose bait it continually strips from the hooks.

CUNNINGHAM, Allan, Scottish poet and miscellaneous writer : b. Keir, Dumfriesshire, 7 Dec. 1784; d. London, 30 Oct. 1842. When a youth he served as an apprentice to a stone¬ mason. His spare time was given to song and the collection of traditions. In 1810 he con¬ tributed to R. H. Cromek's Remains of Niths-dale and Galloway Song.5 The ballads in these collections, though purporting to be ancient popular songs, were Cunningham's own com¬ positions. Later he became a reporter in Lon¬ don, and wrote (Sir Marmaduke Maxwell,5 a dramatic poem, and (Lord Roldan5 and Raul Jones,5 interesting but rather theatrical ro¬ mances. He became one of the best-known writers for the London Magazine. He subse¬ quently obtained a situation in Chantrey's studio as foreman, or confidential manager, and this office he held till the sculptor's death. Other works are (Traditional Tales of the Peasantry5 (1822) ; (The Songs of Scotland, Ancient and Modern5 (1825) ; Rives of the Most Eminent Painters, Sculptors and Architects5 (1829—33) . He will be longest remembered for his song, (A Wet Sheet and a Flowing Sea.5 Consult Hogg, Rife5 with selections from works (London

1875).

CUNNINGHAM, John Francis, Roman Catholic bishop: b. Irremore, County Kerry, Ireland, July 1842; d. 1919. He was graduated at Saint

Benedict's College, Atchison, Kan., 1860; studied theology in Milwaukee, Wis., and was ordained priest at Leavenworth, Kan., 1865. He was pastor at Fort Scott, Kan., 1865-68; Lawrence 1868-76; Topeka 1876-82; rector of Leavenworth Cathedral 1882-98, and was conse¬ crated bishop of Concordia, Kan., 21 Sept. 1898.

CUNNINGHAME-GRAHAM, Robert Bontine, Scottish writer : b. 1852. He was educated at Harrow and sat in the House of Commons for North Lanarkshire as a Socialist, 1886-92. He has published Rather Archangel of Scotland and other Essays5 (1896) ; (Journey in Morocco5 (1898) ; (Thirteen Stories5 (1900) ; (A Vanished Arcadia5 (1901) ; (Hernando de Soto5 (1903) ; (His People5 (1906) ; (A Hatch¬ ment5 (1913) ; Rife of Bomal Diaz del Cas¬ tillo5 (1915) ; Rrought Forward5 (1917).

CUNNINGHAMIA, a genus of the Coni-ferce so named in honor of the botanists and travelers I. and A. Cunningham. The species C. sinensis is a tall and handsome tree, native of China and Cochin-China, with leathery leaves somewhat resembling those of the Araucaria (q.v.). It is too tender for the ordinary tem¬ perate climate, but is used in favorable localities as an ornamental tree, though never seen in its full beauty except in its native country, as the transplanted specimens must be small enough to be protected from the slightest frost. It is therefore known generally as a house-plant.

CUORE, ku-6're, (<a book for boys,55 by Edmondo de Amicis, which, as he says in the brief preface to the story, is dedicated to the boys between 9 and 13 years of age in the elementary schools, and might well be entitled : ((Story of a school year written by a third grade pupil in an Italian elementary school,55 — ˆmeaning that the child noted the incidents and his father wrote the book, conforming, however, both in matter and manner, to the spirit of his little boy's version. The story which first ap¬ peared in 1886 had an extraordinary success, 785 editions (of a thousand each) having ap¬ peared up to 1917, a literary event hitherto un¬ paralleled in Italy. Moreover, outside of Italy the success of the book was likewise very not¬ able, no less than 22 translations of it appear¬ ing in the various world languages. As the name Cuore (Heart) indicates, the mainspring of what is told of the daily events of school life or in the stories supplementing them has its origin in the noblest and finest of sentiments that spring spontaneously from the heart, re¬ vealing that personality toward which sympathy is immediately attracted and which throughout life possesses a charm second to no other. The difference between Mantegazza's book for boys, (Testa5 (Head) and (Cuore5 of de Amicis, both of which aim to edify, is that in the

former, which reminds the English reader of the ((Rolla55 books, the reader is conscious of the author's object, while in the latter he is not. Therein lies much of its success. In (Cuore5 the author extols love for one another, fraternity, equality and solidarity, all sterling democratic virtues, yet that in itself and for itself is not the pur¬ pose of the book, as A. Maurizio and Italian Socialists of his class attempt unsuccessfully to prove, implying that (Cuore5 is a work defend-304

ing the privileges of the humble bourgeois class. <Cuore) is the work of a sincere patriot uphold¬ ing the traditional humanitarian virtues.

James Geddes, Jr.

CUP, Divination by, a mode of foretelling events, in use among the ancient Egyptians, and still surviving in some of the rural districts of England and Scotland. In the East, one method was to put small pieces of gold, silver and precious stones engraved with mystic characters into a cup of water, then to invoke the infernal powers, who replied by some signs in the cup. By the moidern method, a person's fortune is foretold by the disposition of the sediment in his teacup after pouring out the last of the liquid.

CUP-AND-SAUCER LIMPET, shells of the gasteropod genera Calyptrcea and Crucibulum, so called from having in the middle of the inside of the shell a cup-like process, the shell proper constituting the "saucer.® Hipponyx is another form. Crucibulum striatum occurs off shore on our coast.

CUP-SPONGE. The cup-sponge of Tur¬ key (Spongia adriatica) , also called the Levant toilet-sponge, is one of the finest sponges brought from the Mediterranean Sea. It is of the branch Despmospongice. See Sponge.

CUPID, in Roman mythology, the god of love, similar to the Greek Eros, the son of Mercury and Venus. He is usually represented as a winged infant, naked, armed with a bow, and a quiver full of arrows. Sometimes he was represented with a helmet, a spear and a buck¬ ler, intimating that even Mars himself owns the superiority of love. His power was generally shown by his riding on the back of a lion, or on a dolphin, or breaking to pieces the thunder¬ bolts of Jupiter. He was

supposedly capable of all sorts of mischief and is so represented in modern works of art. The (Cupid Frescoes) at Pompeii are among the best examples of this portraiture. Consult Mau-Kelsey, (Pompeii: Its Life and Art> (pp. 331-338, New York 1902). See Eros.

CUPOLA, in architecture, a hemispherical semi-elliptical roof, built of stone, timber, metal or glass. The ancient cupolas were hemispheri¬ cal and were used with great effect by the Romans. The greater part of modern cupolas are semi-elliptical, cut through their shortest diameter. Of ancient cupolas, the finest is that of the Rotunda or Pantheon at Rome, erected under Augustus, and still perfect; of modern construction, some of the handsomest are those of Saint Peter's at Rome, of Saint Paul's, Lon¬ don, the Hotel des Invalides, Paris, Santa Maria da Fiori at Florence, Saint Sophia at Constan¬ tinople and the national capitol at Washington, D. C. The term is also applied to any small structure rising above the roof, not necessarily spherical, but of any shape. It is distinguished from "dome® in that it may be used either of the interior or exterior structure, generally the former. When the outer roof differs in shape from the inner roof it is proper to call the latter a cupola.

CUPPLES, Samuel, American manufac¬ turer: b. Harrisburg, Pa., 13 Sept. 1831. At the age of 12 he was employed in a grocery store in Pittsburgh, but removed to Cincinnati in 1846, where he entered a woodenware es¬

tablishment. In 1851 he was sent to Saint Louis to establish a branch house there, which as the house of Samuel Cupples & Company became widely known. In 1883 this was reorganized as the Samuel Cupples Woodware Company, of which its original founder is still president. It is the largest business of its kind in the world, its trade equaling in amount that of all other woodenware houses in the United States. He has taken a warm interest in education and has done very much to sustain the school system of Missouri. He was the original promoter of the Saint Louis Manual Training School and his gifts to educational institutions have amounted to several millions. Cupples Station (q.v.) is one of his most beneficent enterprises for the good of Saint Louis.

CUPPLES STATION, a railway junction in Saint Louis established by Samuel Cupples (q.v.) and others. An extensive system of rail¬ road warehouses has the basements traversed by railroad tracks. Merchants are thus enabled to receive and reship goods with the expense of

handling them reduced to a minimum, the ex¬ pense and delay of cartage being eliminated from the problem. This vast property was presented by Samuel Cupples and his partner, R. S. Brookings, to Washington University, this institution collecting all rentals therefrom.

CUPRITE, ku'-prit, native cuprous oxide, Cu20. It is the richest of the copper ores and occurs earthy, massive and granular, and also in beautiful isometric crystals which in the variety chalcotrichite are elongated into capil¬ lary crystals. Usually it is translucent, of ada¬ mantine lustre and very dark cochineal-red color. Its hardness is 3.5 to 4 and specific gravity about 6. Among its many important localities are Chessy in France, Cornwall in England, South Australia and Chile and in the United States at Bisbee and Morenci in Arizona.

CUR, a dog of any kind not highly valued, and in this way often particularly appropriated to dogs of mongrel breed. Naturalists use the term cur as the common designation of many races, of which the terrier may be considered as the type.

CURA, koo'ra, also CIUDAD DE CURA,

Venezuela, city situated 56 miles west of Caracas and a short distance from Lake Valencia, in the old state of Miranda (now separated into the states of Rivas, Guarico and Miranda). It was founded in 1730 by Juan Bolivar y Villegas. The site of Cura is 1,600 feet above sea-level at the foot of a steep hill ; an extensive valley, watered by two streams, outspreads before it. A record of its temperature shows as the maxi¬ mum 87° F. ; minimum 72° ; mean annual 79° F. Owing to its proximity to the llanos of the Guarico and the surrounding agricultural and • grazing districts, with their plantations of sugarcane, coffee, cacao, cotton, indigo, etc., as well as herds of cattle, Cura is a thriving little place. It suffered considerably in the War of Independence. In 1900 it was visited by a destructive earthquake. Pop. about 12,000.

CURAQAO, koo-ra-sa'o or ku'ra-so\ Dutch West Indies, an island in the Caribbean Sea, 46 miles north of the coast of Venezuela, be¬ tween lat. 12° 3' and 12° 24' N., and long. 68° 47' and 60° 16' W., stretching northwest to southeast, 36 miles long and 8 miles broad;

CURAQAO —

capital W ilhelmstad. Its surface is generally nat, except for the hills in the southwest, whose highest elevation is 1,200 feet. Streams are few

and the rainfall light. The chief minerals are iron and copper (but the mines are not de¬ veloped), and salt. The cocoa-palm, banana and three varieties of the orange — from one of which varieties the far-famed Curasao liqueur is made — grow abundantly. Sugar, tobacco and corn are raised. Curasao was settled by the Spaniards early in the 16th century; it was taken in 1632 by the Dutch ; and was captured by the British in 1798, but restored at the Peace of Amiens. It was taken again by the British in 1806, and finally ceded to Holland at the general peace in 1814. The island of Curasao, together with the adjacent Dutch islands of Bonaire, Aruba, a part of Saint Martin, Saint Eustatius and Saba form a separate colony (area, 436 square miles) officially called Curasao, administered by a governor, assisted by a council of four members and a colonial council of eight members. The members are nominated by the sovereign. Pop. colony, 54,- 469; of the island of Curagao 32,585.

CURAQAO, or CURAQOA. The genuine Dutch liqueur of this name, so much esteemed for its taste and aroma, is prepared from a peculiar kind of bitter oranges growing in Curagao, which fall from the tree before they are ripe, and which have an extremely persistent aromatic odor and taste. The rind of the orange is macerated, the white pulpy matter scraped off, and the yellow part, along with yellow fresh oranges, steeped in strong alcohol for 24 hours. The liquor is distilled and recti¬ fied, about half being collected, and this is mixed with a syrup made of fine white sugar.

To this is added a certain quantity of curagao infusion, which is a stronger alcoholic extract of the peel containing sugar, and then a certain proportion of water. The fluid is clarified and allowed to settle. The finest quality has a deep yellow color, which is sometimes improved by a few drops of tartaric acid.

CURARI, koo-ra’ri, CURARE, OURARI,

etc., an arrow poison widely used by the natives of South America. Its exact composition is un¬ known, but it is certain that the juice of some species of Strychnos is always present. No species of Strychnos that is now known, how¬ ever, has the same physiological action that curari has. Its method of preparation is kept secret and it is probably true that each tribe has its own method of preparing the poison. The physiological action of curari is unique.

It is a type of pure motor paralysant, affecting the motor end organs in voluntary muscles. In death by poisoning from curari, the muscles of respiration becoming paralyzed, asphyxia re¬ sults. Therapeutically,

curari. is of secondary service. Its varying composition and uncertain strength make it dangerous, and theoretically it would be indicated only in motor disorders, of the voluntary muscles such as convulsive tics, torticollis, hydrophobia, etc.. In the treatment of poisoning, artificial respiration is the best procedure.

CURASSOW, ku-ras'o, a bird of the sub¬ family Cracince and family Cracidce of the Galliformes, related to the guan (q.v.) and mound-bird (q.v.). The name is derived from the supposed origin of those first

known to Europeans from the island of Curagao. The curassows are exclusively birds of tropical America and are especially abundant in the forests east of the Andes. They are large, sometimes equaling the turkey in size, with handsome plumage and in some varieties crested head. Usually the trachea of the males forms a loop within the sternum, as in certain cranes, and this renders possible the clear ring¬ ing voices of these birds. They are chiefly arboreal, but also scratch on the ground for their food, which consists largely of nuts, ber¬ ries and tender leaves. Most species also nest in trees and, as the young are precocious, a curious sight is presented by their scrambling among the branches while still in the down. Being highly prized for food, some of the species have been domesticated The genus Crax has a soft cere and crested head; there are about 10 species in Central and South America. The N othocrax has no cere, and the lores, or spaces between the eyes and beak, are naked. Mitua is similar, but the lores are feathered ; M. mitu is a beautiful blue-black species of Brazil and adjoining countries to the north. Pauxis contains the well-known P. galeata of zoological gardens, in which the frontal region of the head bears a large, deep blue knob. It is a native of the extreme northern parts of South America. Interesting accounts of these birds will be found in Bates, (Naturalist on the River Amazon) (1863).

CURB, a disease in horses consisting of strain of the straight ligament which runs down the back of the hock. It is most common in animals with straight small hocks and sickle hams. Like other strains it occurs from sudden and violent exertion, often proceeding in the lighter breeds from leaping or galloping in heavy ground, and in the heavier, from the effort of keeping back a load while going down a steep incline. Swelling appears on the outer and back part of the joint,

about five or six inches below the point of the hock, generally causing lameness, most apparent in trotting, and, in slight cases, usually decreases after the ani¬ mal has been out for 10 minutes. Fomentations must first be used to allay the irritation and inflammation, and a high-heeled shoe put in. When heat and tenderness disappear, cold appli¬ cations will be advisable; after which, the en¬ largement still continuing, a blister may be necessary. From the first all work must be for¬ bidden.

CURBINA. See Drumfish.

CURCULIO, ker-ku'li-o, an insect-enemy of the plum. See paragraph Insects , under Plum.

CURCULIONIDiE, ker-ku-li-5n'i-de, the snout-beetles, or weevils (q.v.). One of the most extensive families of coleopterous insects. They belong to the section Phynchophora and all the species have a curious snout-like head.

CURCUMA, ker'ku-ma, a genus of the Marantacecu, the gingerwort and cardamom order. The corm is about as thick as the thumb, and is divided into several parts. The leaves which are about a foot long are lanceo¬ late in form and sheathing. Curcuma longa is a turmeric plant, the tuberous rhizomes of which furnish the substance called turmeric (q.v.). This plant is extensively cultivated in

southern Asia. C. amada, a native of Bengal, is the mango-ginger, which has qualities resem¬ bling ginger. From the colorless rhizomes of C. leucorhiza is prepared a kind of arrowroot. C. zedoaria yields a tonic medicine, and is also used as a food.

CURD. See Cheese.

CURES, ku'rez, an ancient town of the Sabines, 25 miles northeast of Rome, near the Tiber, the birthplace of Titus Tatius and of Numa, whence the Romans, after the people of Cures united with them, came

to be called Quirites. The Lombards destroyed the town toward the close of the 6th century. It stood not far from the modern Corresi.

CURFEW, ker'fu, also CURFEU, from the French couvrir, to cover, and feu, fire. The ringing of a bell at nightfall, originally de¬ signed as a signal to the inhabitants to cover their fires, extinguish lights and retire to rest. The practice is said to have been instituted by William the Conqueror, in all probability as a safeguard against fire, but the English in early days regarded the curfew as a badge of servi¬ tude. Originally the hour set for the ringing of the curfew bell was 8 o'clock, but it was also rung at 9 o'clock. The bell in each village or community which tolled the curfew became known as the curfew-bell. In certain parts of rural England the custom is still kept of ring¬ ing a bell at 9 o'clock.

The curfew bell was introduced into the United States early in the century, but without regularity of practice. About 1880 Col. Alexan¬ der Hogeland, who has been called (<the father of the curfew-law,® introduced an ordinance in Omaha, Neb., compelling youths to absent themselves from steamboat landings, railroad stations and low variety shows. The curfew ordinance, somewhat changed and modified, was adopted in 1894 at Lincoln, Neb. The term curfew-law has since been given to all laws intended to keep young people off the streets after a certain hour, generally 9 o'clock at night. In 1894 at the National Convention of the Bo}rs' and Girls' Home Employment Asso¬ ciation in Indianapolis, the adoption of curfew ordinances was urged in view of the great increase in crime among children. Since that time the law has been generally enforced in over 3,000 cities and towns in this country. The officials of many of these towns report a de¬ crease of 80 per cent in the arrest of boys and young men, under the provisions of the law, and former objections to the curfew have ceased. In 1898, a concensus of opinion was taken in 300 towns where the curfew law was in oper¬ ation and all reports showed that there was a decided improvement in the youth morally and socially.

The curfew law, in general use, provides that all children under 15 years of age shall not be on the streets at night after 9 p.m. in summer and 8 p.m. in winter, without the writ¬ ten consent of their parents or guardians. The law has been endorsed by city officials, com¬ mercial associations, school boards and boards of trade in various sections of the country. The enforcement of the law has largely reduced the number of commitments to reform schools as is illustrated at the State Reform School at Boonville, Mo. During two years prior to the adoption of the curfew ordinance at Kansas

City, Mo., 47 boys were sent to the reform school while for two years after the adoption of the law only 17 boys were committed from Kansas City. The ordinance has been recog¬ nized as a crime-reducer, child protector and home builder. Benjamin Harrison called the curfew-law, ((the most important municipal regu¬ lation for the protection of the children of American homes, from the vices of the street, of the present century.®

CURI-CANCHA, koo-re-kan'cha, the splen¬ did Temple of the Sun, built by the Incas in Cuzco (q.v.), Peru, on the site now occupied by the church of San Domingo.

CURIA, a certain political division of the Roman people, said to have been established by Romulus; also the place of assembly for each of these divisions. According to Livy, Romulus divided Rome into 30 curise, and assigned to each a separate place of meeting. In early times only the members of the curiae were in possession of the full citizenship of Rome. The curiae were probably territorial divisions, including groups qf related families. They had political functions and religious functions of various sorts. Consult Botsford, (The Roman Assemblies) (New York 1909).

CURIA REGIS (Lat. "King's Court®), in English history, the name applied at different times to three distinct judicial bodies: (1) the feudal assembly of the tenants-in-chief ; (2) the Privy Council, organized under Henry I; (3) the Court of King's Bench, founded in 1178. The first of these bodies constituted the Magnum Concilium or "Great Council of the Realm,® and combined the characters of the Saxon witan and the Norman feudal court. Its consent was necessary for the imposition of extraordinary taxes and the enactment of new laws ; also, the king was supposed to consult its advice on general questions of state policy. In those days no distinction was recognized be¬ tween the various functions of government — legislative, executive, judicial, financial, ecclesi¬ astic or military; hence all royal measures of national importance were undertaken itt the presence and with the consent of the Council. In course of time an inner council arose, the nucleus of which was provided in the royal household, and gradually took shape under Henry I as the Curia Regis proper. This was the beginning of the House of Lords, and was practically a committee of the parent body, which had grown too unwieldy. While legisla¬ tive powers remained with the council, the committee supervised legislation generally, and was composed of high court officials appointed by the Crown. It comprised what may be re¬

garded as the Privy Council, a bureau of ad¬ ministration, and a high court of justice, and in the course of centuries gave birth to all the administrative institutions of the United King¬ dom as each was severed from the parent body and became an independent unit. In the reign of Henry I the Curia, presided over by the Great Justiciar, began to confine its opera¬ tions mainly to judicial work, and its members were called justices, who sat in the Court of Exchequer. Every baron (lord) of this court was also a justice of the Curia, and from this connection arose the system of judicial circuits. Judicial administration was extended and de¬ veloped by the Curia until it became part of the

regular judicial machinery under Henry II. Up to that time the Curia moved with the king from place to place and held its sittings wher¬ ever the royal court happened to be located. In 1178, however, a separate committee of five judges was created to be fixed in one spot and determine criminal cases, and is to-day known as the Court of King's Bench. The separation of the Court of Common Pleas from the Curia was effected by Magna Charta (1215). The three bodies were completely separated with a distinct staff of justices for each, under Henry III. Another offshoot from the Curia Regis is the Court of Equity; while the Court of Ex¬ chequer, formerly the financial committee of the Curia under the Chancellor, is now part of the Supreme Court of Judicature. On the accession of the Tudors the Privy Council of the Curia was organized into the Star Chamber (1486), a distinctly illegal court in which the king s ministers sat as judges and conducted trials vvithout juries, inflicting torture, mutila¬ tion, imprisonment and fines contrary to law. This unsavory institution, which was abolished in 1641, was the direct ancestor, strange to say, of the modern ˆCabinet.®

CURIA ROMANA, strictly, the authorities which administer the Papal Primacy, the ensem¬ ble of departments which assist the Sovereign Pontiff in the government of the Roman Cath¬ olic Church. It includes the tribunals, the offices of Curia and the Roman congregations. (See Congregations, Roman). The tribunals of the Curia are three in number : the Sacred Penitentiaria, the Rota and the Apostolic Segnatura.

The Sacred Penitentiaria consists of the cardinal chief penitentiary, a regent, a theo¬ logian, datary, canonist, corrector, sealer, copy¬ ist, secretary, surrogate and archivist. It is formed of the cardinal penitentiary, the theo¬ logian, the datary, the corrector, the sealer and the canonist, the secretary also taking part in it, but without a vote. The other members are only consulted, the decision being left to the cardinal penitentiary. The constitution. ((Sapi-enti consilio® of Pius X confined the competency of the penitentiary to internal jurisdiction, it being granted powers to grant graces of all kinds in all internal

matters- — absolutions, dis¬ pensations, commutations, ratifications in matter of impediments, condonations and matters of conscience submitted to the judgment of the Holy See. It is also empowered to judge of the use and concession of Indulgences, except that the doctrinal questions regarding the same are reserved to the Holy Office.

The Rota has competence in all contentious cases that must come before the Holy See and require a judicial investigation with proof, ex¬ cept the so-called major cases. It therefore tries in the first instance the cases, including criminal cases, which the Pope, either motu pro-prio or at the request of the contesting parties, calls up for his own judgment and commits to the Rota. It decides these cases even in the second or third instance. It is also the court of appeal for cases already tried judicially in episcopal tribunals of first instance. It also decides in the last instance cases tried by any inferior tribunal of second or further instance. The Rota is composed of the auditors, ranking as prelates, appointed by the Pope; they must hold a doctorate in theology or canon law and are automatically retired on attaining the age of

70. They form a college of which the oldest is dean. Each auditor chooses an assistant. Other officers are a promotor of justice, de¬ fender of the bond in matrimonial cases, and in cases relating to religious ordination, three notaries, selected by the college of auditors. The auditors decide by a majority vote and the sentence not only gives the conclusion arrived at but the reasons therefor.

The Apostolic Segnatura consists of Cardi¬ nals (number not specified in Code), appointed by the Pope, one of whom is its Prefect. It has a secretary, a notary, consultors and* a few minor officials. The Segnatura is a genuine tri¬ bunal, with jurisdiction in the following cases: accusation of suspicion against an auditor of the Rota ; accusation of violation of secrecy by an auditor of the Rota; petition for nullification of a decision of the Rota that has become a res judi¬ cata; decision of competency in certain juris¬ dictional controversies.

The offices of Curia are five in number : The Secretariate of State; the Apostolic Chan¬ cery ; the Apostolic Dataria ; the Apostolic Camera and the Secretariate of Briefs.

The Cardinal Secretary of State is the ex¬ clusive channel through which must pass all communications carried on between the Holy See and foreign powers. He is the Pope’s prime minister — not of course

in the sense which the word bears in countries where the Minister is more powerful than the sovereign, so that the former's <(advice® overrides the lat¬ ter's initiative — but in the proper sense of the term a faithful agent executing the intentions of his master, whom he serves to the best of his ability. He carries on the negotiations, in which the Pontiff is perpetually engaged, which have for their object to secure the liberties, extend the limits and promote the welfare of the Church. Under him are placed the nuncios and other diplomatic agents of the Holy See, and to him they make their reports. The officials under him consist of several Minutanti , writers in cipher, an archivist, subarchivist, *etc.* Being in close and permanent relations with the Pope he represents the principle of the Pontifical Gov¬ ernment; his influence is consequently felt in all ways in acts emanating directly from the Pope ; he directs all important political meas¬ ures, puts in force the decisions relative to the other organic institutions of the Church, and transmits the instructions by which the func¬ tionaries of the Curia are guided.

The Apostolic Chancery takes its name from civil law and from the imperial chanceries, and in its essence is of very ancient origin. Since the Constitution of Pius X it has been reduced to a forwarding office (Ufficio di Spedizione) with a small personnel. It comprises the cardi¬ nal who presides, the regent, the college of apostolic prothonotaries, a notary, secretary and archivist, a protocolist and four amanu¬ enses. At present the Chancery is charged only with the expedition of bulls for consistorial benefices, the establishment of new dioceses and new chapters and other important affairs of the Church.

The Dataria consists of a cardinal and datary, sub-datary, cashier, reviser, and writer of bulls, and minor officials. Formerly the Dataria was commissioned to grant many papal indults and graces, but since 1908 has only to investigate the fitness of candidates for con-

sistorial benefices, which are reserved to the Holy See, to write and to dispatch the Apostolic letters for the collation of those benefices, to dispense from the conditions required in regard to them and to

provide for the pensions or for the execution of the charges imposed by the Pope when conferring those benefices.

The Apostolic Camera administers the prop¬ erty of the Holy See during a vacancy of the latter. The cardinal-camerlengo presides over the Camera and is governed by the rules of the Constitution (Vacante sede apostolica) of 25 Dec. 1906.

The Secretariate of Briefs consists of the secretary and two office assistants. The secre¬ tary is a prelate whose duty it is to write the Pontifical briefs addressed to emperors, kings, civil princes or other exalted personages. He also prepares the allocutions which the Pope pronounces at Consistories, and the Encyclicals or apostolic letters addressed to the bishops and to the faithful.

In addition to the above the Curia comprises certain commissions of cardinals, such as the commissions for biblical studies, for historical studies, for the administration of the funds of the Holy See or of the Peterspence, for the interpretation of the Code of Canon Law, etc.; also the Pontifical Family. (See Congrega¬ tions, Roman; Papacy; Rota Rom ana). Consult Haskins, (The Sources of the History of the Papal Penitentiary } (in American Jour¬ nal of Theology LIX, 1905) ; Chonet, (La sacree penitencerie Apostolique) (Lyons 1904) ; Chiari, (Memoria giuridico-storica sulla Dataria Cancellaria) (Rome 1900) ; Trombetta, (De juribus et privilegiis praelatorum Romance Curiae* (Sorrento 1906). A good popular ac¬ count is that by Benedetto Ojetti in (The Catholic Encyclopedia) (Vol. XIII, New York 1912). John B. McDonnell,

Fditoriai Staff of The Americana.

CURIATII. See Horatii.

CURICtf, koo-re-ko', Chile, a province ly¬ ing between Colchagua and Talca. Area 2,915 square miles. It is divided into the departments of Curico and Vichiquen. Its capital city, also called Curico, has two commercial banks, sev¬ eral tanneries and other industrial establish¬ ments. It is 114 miles south of Santiago, with which it is connected by railroad. It has con¬ siderable trade with Argentina through the Planchon Pass. It was settled in 1743, though not on its present site. The port of Llico is on the Lake of Vichiquen. Numerous irrigating canals are derived from the Teno and Lontue, which unite to form the Mataquito River. Cereals, vegetables, wine, cattle, timber and fruits are among the products; there are also a few copper, silver and gold mines in the Cordillera and the coast range of hills, and the annual

output of salt from the estuaries of the lakes of Vichiquen, Boyeruca and Bucalemu exceeds 25,000 tons. The State Central Railroad crosses the province. Pop. (province) 108,120; (city) 18,313.

CURIE, ku-re', Pierre and Marie, distin¬ guished physicists, the former French and the latter Polish, of whom a writer in the Scientific American has said that <fthey afford an example of a most interesting collaboration, since it con¬ cerns a husband and wife, both of high scien¬ tific attainments, who aided one another with

their efforts and knowledge in the arduous path that finally led to the production of pure ra¬ dium.® M. Curie was born in 1859; d. Paris, 19 April 1906, and at the age of 20 years began to make independent scientific researches. In 1895 he received his appointment as professor of physics and chemistry, having discharged the duties of chef de travaux up to that time : and the future husband and wife met as teacher and pupil. Marie Sklodowska (born at Warsaw, November 1868) completed the usual course of study at the Warsaw gymnasium about 1884; afterward worked in the laboratory of physics of the Industrial Museum ; in 1891 went to Paris and obtained a licentiate's degree in the mathe¬ matical sciences (1893), taking a degree in phys¬ ical and chemical sciences two years later. Be¬ fore M. Pierre Curie married her she had be¬ come instructor in physics at the high school of Sevres. She entered the path marked out by her husband, and together they continued their experiments in the laboratory of the school of physics and chemistry. Toward the end of 1898 Professor and *Mme.* Curie positively con¬ firmed what they had previously announced with respect to a new and strongly radioactive sub¬ stance derived from pitchblende. In the first place they found an element to which they gave the name polonium; then their collaboration was rewarded by the discovery of radium (q.v.). In 1903 they were awarded the Nobel prize in physics jointly with A. H. Becquerel (q.v.). In 1904 M. Curie was made professor of physics at the Sorbonne and in 1905 a mem¬ ber of the Institute of France. His memoirs were published mostly in the (Comptes rendus* of the French Academy. In 1908 *Mme.* Curie was appointed chief professor of physics in the University of Paris. In 1910 she was awarded the Albert medal of the Royal Society of Arts (England), and in 1911 she received the Nobel prize for chemistry. She wrote (Recherches sur les proprietes magnetiques des aciers trempes* and (Recherches sur les substances radioactives* (Eng. trans., 2d ed., New York 1904). •

CURIO (clipped from curiosity), term still popularly used, though

somewhat obsolete, to describe any kind of object of curiosity, espe¬ cially such as would belong to cabinet col¬ lections, on account of antiquity, rarity or intrinsic interest, in such domains as pottery, porcelain, enamels, metal work, ivories, wood carving, arms, _ clocks, fans, watches, snuff¬ boxes, musical instruments and the like.

CURITIBA, koo-re-te'-ba, Brazil, the capi¬ tal of the state of Parana, situated on a plateau 3,000 feet above sea-level. It is about 80 miles west of the port of Paranagua. A railroad buibt in 1885 connects the city writh the ocean. A line of steamships running directly between Paranagua and Hamburg, Germany, is sub¬ sidized by the state. It manufactures coarse woolens and has considerable trade in mate and exports corn beef and tobacco. Pop. about

10,000.

CURLEW, ker'lu, shore birds of the genus Numenius, belonging to the snipe family (charadriidce). In this genus the bill is long, slender and accurate, and the toes are rather short, thick and margined. Most of the species are of large size for the family and about 15 are found throughout the world.

The long-billed curlew (N. longirostris) is the largest species, its total length sometimes exceeding two feet. It is found throughout temperate North America, but is rare in the New England States. In the interior it is com¬ mon throughout the Mississippi Valley, where, as well as in the south Atlantic States, it breeds, laying three or four eggs on the ground in meadows or prairies. Like other species its principal food consists of worms, crustaceans and insects, but vegetable matter is also eaten. The Hudsonian curlew (N . hudsonicus) is smaller, with the bill scarcely more than one-half as long and the color of a less rufous tone than the last. It is more a bird of the North, breeding in the Arctic regions and migrating through the United States. The common cur¬ lew, Eskimo curlew, or dough-bird of

gunners (N . borealis), is still smaller, having a total length of 12 to 15 inches and a bill of only 2 or 3 inches. This bird is remarkable for its extensive migratory movements in the spring and fall. Like the Hudsonian curlew it breeds in high northern latitudes, but winters still farther south in tropical America. During the migrations it abounds along the eastern sea¬ board of the United States. Consult Elliot,

(North American Shore Birds 5 (1895).

CURLEWIS, Mrs. H. R. (Ethel Turner), Anglo-Australian novelist: b. Doncaster, Eng¬ land, 24 Jan. 1872. She was brought to Aus¬ tralia when nine years of age, was educated there and began to write in 1890. She was mar¬ ried in 1896 to H. R. Curlewis, a lawyer, and she and her husband live in Sydney.

CURLEY, Michael Joseph, American Roman Catholic prelate: b. Golden Island, Athlone, Ireland, 12 Oct. 1879. He received the degree of bachelor of arts from the Royal University of Ireland in 1900. The next year he received the degree of bachelor of divinity at the University of the Propaganda, Rome, and the degree of S.T.L. from the same insti¬ tution two years later. He was ordained to the Roman Catholic priesthood in 1904, in which year he came to the United States, serving 10 years as a missionary in Florida. On 3 April 1914 he was appointed bishop of Saint Augus¬ tine, Fla., by Pius X and was consecrated the 30 June following. On 25 July 1921 Pope Benedict XV appointed Bishop Curley arch¬ bishop of Baltimore. Archbishop Curley is es¬ pecially interested in higher education. He is also an excellent linguist, speaking fluently sev¬ eral modern languages and also Latin and Greek.

CURLING, a Scottish game played on the ice, with large smooth stones of a hemispher¬ ical form, with an iron or wooden handle at the top, which the players slide from one mark to another. The space within which the stones move is called the “rink® (32-42 yards long and 10 yards wide), and the hole or mark at each end the “tee.® The number of players upon a rink is 8 or 16 — 8 when the players use 2 stones each, weighing not more than 44 pounds nor less than 32 pounds with¬ out handles, and not of greater circumfer¬ ence than 36 inches, nor of greater or less height than one-eighth of the longest diam-ter, and 16 when they use 1 stone each. The object of the player is to lay his stone as near to the mark as possible, to guard that of his

partner which has been well laid before, or to strike off that of his

antagonist. When the stones on both sides have been all played, the stone nearest the tee counts one, and if the sec¬ ond, third, fourth belong to the same side, each counts one more. No stone is counted unless it reaches the mark called “hog score® ; and if it passes out of the rink it is discounted also. One player on each side, called the “skip,® takes charge of the sweeping of the ice. The game is also played for individual points, no part¬ ners or sides being taken. The stones are usu¬ ally polished to facilitate their speed. A set of matches is called “bonspiel.® The game is a very old one of Scottish origin and very pop¬ ular in northern countries. . International and interstate matches are played and trophies are awarded. There are various clubs devoted to the sport, the oldest being in Scotland. Eng¬ land, Ireland, Newfoundland, Russia, New Zealand, Switzerland and the United States have associate clubs. In 1867 the Grand Na¬ tional Curling Club was organized. Consult Ramsay, <An Account of the Game of Curling5 (Edinburgh 1811) ; and Spalding’s Annual Athletic Manual.

CURLY-GRASS, a common name for a fern (Schizoea pusilla), the typical genus of the climbing fern family. The plant is rare, being occasionally found in wet soil in the pine bar¬ rens of New Jersey and in Nova Scotia. The climbing fern family has 16 genera, of wide geographical distribution, the two American genera being Scliizcea , as above, and Lyg odium, represented by the Hartford fern.

CURRAN, Charles Courtney, American artist: b. Hartford, Ky., 13 Feb. 1861. He studied art in Cincinnati, the New York Art Students’ League and the Academie Julien in Paris, France, receiving an honorable mention in the Salon of 1890. He has been awarded several of the prizes of the National Academy of Design and received medals at the World’s Columbian Exposition and the Cotton States In¬ ternational Exposition and medals at the expo¬ sitions of Paris (1900), Buffalo (1901) and Saint Louis (1904). He was elected to the Na¬ tional Academy of Design in 1904. There are pictures by him at Vassar College, in the Na¬ tional Gallery, Washington, D. C., the Pennsyl¬ vania Academy and the museums of Columbus, Richmond, Ind., Toledo and Buffalo. He has a wide range of subjects, but prefers to paint beautiful female nudes in idyllic surroundings. His color is delicate, his draftsmanship sure and minute. Among his noteworthy paintings are (Perfume of the Roses5 ; (The Breezy Day5 ; (Wild Asters on the Mountain Side5 ; Wictoria5 ; ˆune5 ; (In the Garden5; (The Lanterns.5

CURRAN, John Philpot, Irish orator: b. Newmarket, near Cork, 24 July 1750; d. Lon¬ don, 14 Oct. 1817. He was designed for the Church and educated at Trinity College, Dub¬ lin, after which he went to London

and studied at one of the inns of court. His youth was rollicking and dissipated. . He was called to the Irish bar in 1775, and in 1783 was chosen a member of the Irish House of Commons. Slow in gaining a practice, partly because of the known hostility of some of the judges to the young barrister, he attained lasting celebrity by

his skilful conduct as defending counsel in a great series of state trials in the last decade of the 18th century, associated with political troubles. For this work he was singularly well adapted, his knowledge of the Irish peasantry lending a peculiar relish to his cross-examina¬ tions. His wit and virulence made him ene¬ mies if they gained him friends, and as a con¬ sequence he was a party to no fewer than five duels, none of them with serious results. A Protestant himself, he fought strenuously for the removal of Catholic disabilities and opposed, with all the eloquence at his command, the Act of Union. On the accession of Fox to power in 1806, he was appointed master of the rolls in Ireland, retiring on pension in 1814. The attachment of the Irish patriot Emmet for his daughter Sarah is commemorated in Moore's poem, (<She is far from the land where her young Hero sleeps. Curran possessed tal¬ ents of the highest order : his wit, his drollery, his eloquence, his pathos, were irresistible ; and the splendid and daring style of his oratory formed a striking contrast with his personal ap¬ pearance, which was mean and diminutive. Consult Davis, (Life of Curran) (1846) ; Phil¬ lips, < Curran and His Contemporaries) (1850).

CURRANT, originally, the small black, seedless raisins popularly used in cookery, and so named from the Greek city of Corinth, where they first became commercially important ; by extension, various species of the genus Ribes and their fruits. The former belongs to the genus Vitis (see Grape Culture) of the natural order Vitacece or Ampclidcce ; the latter of the Saxifragacece. Only the thornless species of the latter genus which bear grape-like clusters of smooth fruits are called currants; the spiny species are known as gooseberries.

The most widely cultivated species is un¬ questionably the red currant (R . rub rum) which has developed several white horticultural varieties as well as numerous red ones which are commercially important, both in the fresh state and when manufactured into jelly. The black currant (R. nigrum) is next in importance as a fruit but is less popular in America be¬ cause of its peculiar flavor, less prolific habit and smaller range of usefulness. The first is a native of the north temperate zone, the second of Europe and Siberia. The American black currant (R . floridum or americanum) resembles the common black currant but, though some¬ times found in gardens, is little esteemed. The flowering currant (R. aureum), an American species, has

produced several horticultural va¬ rieties but is not cultivated for its fruit, which ripens very unevenly, but for its bright yellow sweet-scented flowers which appear in the spring. Several other species are grown for ornament, the most notable of which is the red-flowered currant (R. sanguincum) which is found on the Pacific Coast from British Colum¬ bia to South America. It has developed several varieties which are all attractive in flower but which bear rather dry, bitter berries errone¬ ously reputed poisonous. Only the first three species are economically important, and that only in the North or in the higher altitudes of the South, where the hot summers injure the bushes. In the dry plains region they succeed only under specially favorable conditions such as irrigation and partial shade, *etc.* Several

unrelated species of plants are called currant, but compared with the above are unimportant.

The currant thrives best in cool, rather hu¬ mid climates, upon well-drained but moist strong clayey loams, and with less attention to cultivation, pruning, etc., than any other small fruit. However, it will respond liberally to good treatment and deserves better attention than it usually receives. The plants are gen¬ erally propagated by means of hard wood cut¬ tings which are transplanted to the field when one or two years old. The usual distances for planting are four by six feet, upon land well prepared by plowing and harrowing. The bushes are cultivated until midsummer, when a cover crop is sown to be plowed under the* following spring. Annually, two or three new stems should be allowed to grow, preferably from below ground, at the centre of the bush, and when this wood has borne fruit twice (that is, when three years old) should be cut out, since younger wood is more productive and less likely to become infested with insects and disease. On this account, training to the tree form is not recommended. A plantation should continue to be commercially profitable fQr 6 or 10 years after coming into bearing and should yield 100 bushels an acre if properly cared for. Yields of 250 bushels have been reported. Individual plants in gardens should produce from two to four pounds.

Of the many insects that attack the plant, the currant sawfly or currant worm (Ncmatus ribesii) is the best known. It is a European four-winged fly somewhat larger than a large housefly, which lays its eggs upon the midribs of the under sides of the leaves, particularly those near the ground, in early spring. The green, black-dotted worms frequently do con¬ siderable damage before their presence is sus¬ pected. Spraying with arsenites or hellebore as soon as the leaves

appear and at intervals of about a week is a positive remedy. As a result of neglect, however, the bushes are frequently defoliated. A long-horned beetle (Psenocorus supernotatus) lays its eggs upon the shoots and branches into which the larvae burrow and emerge as adults during late spring of the fol¬ lowing year. When troublesome the bushes should be heavily pruned during the winter and the prunings burned. This treatment will also destroy other species of borer, the adult of which is a moth (Sesia tipuliformis) . No prac¬ ticable remedy has been discovered for the cur¬ rant fly (Epochra canadensis) which sometimes is seriously troublesome, since its attacks the fruit, which ripens prematurely from the pres¬ ence of larvae beneath the skin.

All leaf diseases of the currant, the best known of which are anthracnose (Glceosporium ribis) and leaf spot (Septoria ribis), may be controlled by thorough spraying with a stand¬ ard fungicide (q.v.). The former of these dis¬ eases is characterized by small black spots on the upper surfaces of the leaves and white ones beneath ; the latter has black-centred white spots. The leaves fall prematurely in each case. The currant tubercle, a disease which attacks the whole plant, has become locally destructive in some of the Eastern States. The leaves wilt, the fruit colors prematurely, the clusters be¬ come small and few, and both foliage and fruit shrivel and fall. The plant soon dies. No remedy is known except prompt digging and

burning. No diseased plants should be used for propagation because the disease seems to per¬ meate the whole plant. Consult Card, (Bush Fruits) (latest ed., New York 1911) ; Bailey, ‘Cyclopedia of American Horticulture) (4 vols., ib. 1910).

CURRANT INSECT-PESTS. See Cur¬

rant.

CURRENCY, a popular term sometimes used as synonymous with the phrase medium of exchange but more commonly confined to the paper elements of the medium. If used in the broader sense, two kinds should be distin¬ guished, metallic and paper.

Metallic Currency may be classified on the basis of its form as bullion and coin. Bullion is a name applied to uncurrent coins and to gold and silver bars or ingots. The metal in these may be pure, that is, without alloy, or standard, that is, mixed with the amount of other metals prescribed by law for coins. For example, a law approved 18 Jan. 1837 prescribed <(that the standard for both gold and silver coins of the United States shall hereafter be such that of 1,000 parts by weight 900 shall be of pure metal and 100 of alloy; and the alloy of the silver coins shall be of copper ; and the alloy of the gold coins shall be of copper and silver, provided that the silver does not exceed one-half of the whole alloy.® These gold and silver bars are chiefly used as material for the manu¬ facture of coin or in the payment of balances between banks, especially those located in differ¬ ent countries. The latter is their chief use as currency. They may, however, and doubtless sometimes are, used in payments between indi¬ viduals and between individuals and banks.

Coins are stamped pieces of metal in form, size, weight and design of the stamp, calculated to fit them for use as hand-to-hand money. The

form found to be most serviceable is that of a flat, circular disc with a milled edge. The circular form and the milled edge make clip¬ ping difficult and loss of weight from wear and tear easily observable. The flat sides present a surface well adapted to receive a stamp. In order that the sizes and weights of the coins may be convenient, gold, silver, nickel or some kind of an amalgam and copper are used in their manufacture in all countries in which commerce is well developed, gold for those of highest denominations, silver for those denom¬ inations next lowest, nickel or amalgam for those next and copper for those of the lowest denominations.

The denominations found most convenient are those based upon the so-called decimal sys¬ tem. According to this the coin of lowest de¬ nomination is usually one-one-hundredth part of the unit coin and the other subdivisions are one-twentieth, one-tenth, one-fourth or one-fifth and one-half of the unit. The other de¬ nominations are the unit and multiples of 5, 10 and 20 times the unit. For example, in the United States the unit coin is the dollar and the subdivisions are 1, 5, 10, 25 and 50 cent pieces, and the multiples are 5, 10 and 20 dollar pieces. The 1 cent piece is made of copper, the 5 cent piece of nickel, the 10, 25 and 50 cent pieces and the dollar of silver, and the 5, 10 and 20 dollar pieces of gold.

The only noteworthy exception to the deci¬ mal system among the nations of the present

day is England. She has preserved the original system which was in operation in European countries before the decimal system was adopted. The old system was derived from the system of weight at the time in use. As it is preserved in England the unit called the pound sterling is subdivided into 20 parts called shil¬ lings and these again into 12 parts called pence, and these again into four parts called farthings. The denominations of the coins are the farthing, half-penny, penny, sixpence, florin or two-shil¬ ling piece, half-crown or two and one-half shilling piece, the crown, half sovereign, sov¬ ereign, two and five-sovereign pieces. The farthing, half-penny and penny are made of copper, the sixpence, florin, half crown and crown of silver, and the half sovereign, sov¬ ereign, two and five-sovereign pieces of gold.

The stamps put upon coins are designed to indicate their denominations, to make counter¬ feiting difficult, and to serve artistic and com¬ memorative purposes. The names given to them frequently

have historical as well as practical significance. From the point of view of their relation to each other, coins may be classified as standard or subsidiary. Standard coins are those made of the standard of value, which in most countries at the present time is gold, and which are coined for individuals who bring to the mint metal of the proper standard. A small charge called seniorage may be made or the entire expense of the coinage may be borne by the government. Subsidiary coins are those which are made redeemable on demand in standard coins. They are usually also made legal tender only for relatively small payments ; coined on government account and in limited quantities, and the amount of the standard metal for which they are redeemable exceeds in market value that of the amount of the metal of which they are made.

It is only by thus making some coins subsid¬ iary to others which are standard that a cur¬ rency consisting of coins made of different metals can be maintained. Otherwise, since the relative values of the different metals are con¬ stantly changing it will always be found profit¬ able to melt down certain of the coins for sale as bullion or to ship them abroad, where they always pass at their bullion value. For example, suppose at the time a coinage system is estab¬ lished 300 grains of silver is exactly equivalent in value on the bullion market to 20 grains of gold, and that accordingly coins containing each 20 grains of gold and legal tender for one dol¬ lar, and others each containing 150 grains of silver and legal tender for half a dollar are freely coined at the mints for individuals bring¬ ing metal of the proper standard. Soon the relative value of gold and silver on the bullion market changes so that 20 grains of gold are equivalent in value to 400 grains of silver. Then it will be profitable to melt down the gold coins for sale as bullion or to use them in for¬ eign payments at their bullion value and at home to use two silver half dollars in making a dollar payment instead of a gold dollar. This condition is prevented by making the silver coins subsidiary. They can then only be ob¬ tained by purchase from the government at the rate of two silver half dollars for a gold dollar. Since the government at any time will give back a gold dollar for two silver half dollars, there will be no reason for anyone’s refusing

to take two silver half dollars for a dollar's worth of goods. The government protects itself from the danger and expense of an exces¬ sive volume of redemptions of silver coins by itself monopolizing their manufacture and by limiting the amount strictly to the need for them as a circulating medium.

Certain coins, notably the silver dollar of the United States and the five-franc piece of the states of the Latin Monetary Union, occupy a somewhat anomalous position, being neither subsidiary in the strict sense of that term nor standard but midway between the two.

Paper Currency is distinguished by the element of credit which is its dominant charac¬ teristic. It may be defined as a record of an obligation to pay made in a form suitable for monetary purposes. It may be the obligation of a government, of a bank or of some other kind of a private corporation or even of a private person. The obligation is always ex¬ pressed in terms of the standard value of the nation in which it is issued. The form may be that of a promise to pay or that of an order to pay. If the former, the notes recording the promise are usually issued in denominations suitable for use as hand-to-hand money and are made payable to bearer on demand.

Papier currency will circulate wherever the credit of the party which issues it is known or believed to be good, provided its form is suit¬ able for commercial purposes, and it may circu¬ late at a discount even when the credit of the issuing party is not of the best. Within the territory in which it circulates the extent of its use, which is now greater than that of any other form of currency, is due to its superior convenience and safety and to the economy of its use. For large payments it is more con¬ venient and economical than coin and for pay¬ ments between people located in different places and for the use of travelers and for nearly all payments by mail or express it is safer as well as more convenient and economical. The most widely used kinds of paper money are circulated through the agency of governments and banks.

Government Currency, as the former kind may be called, consists of notes issued by gov¬ ernments in denominations suitable for mone¬ tary purposes, payable to bearer on demand and usually, though not always, non-interest-bearing. They may be convertible or

inconvertible, that is, redeemable in coin on demand or not so redeemable. In the latter case the obligation of the government to redeem them is unques¬ tioned, since it is usually expressly stated in the form of a promise, but the time of redemption is left for future determination. The form of the two kinds of notes may be identical, in which case the only difference between them is that in the one case the government actually re¬ deems its promise to pay on demand and in the other it does not.

In order to aid in the circulation of incon¬ vertible government notes they are usually made legal tender, — that is, their tender in the pay¬ ment of debts is declared by law to constitute a legal fulfilment of the obligation; — and they are made receivable for taxes and most, if not all, other public dues. The fact of their incon¬ vertibility, however, renders them inferior to the. metallic elements of the currency, all of which are freely interchangeable, and the stand¬ ard coins of which have a market value as

bullion, identical or identical less a small seniorage charge, with their value as coin. They, therefore, depreciate, that is, they are exchange¬ able on the money market for something less than the amount of coin which is indicated in the promise to pay which they record. The amount of depreciation depends upon subjective influences. It is a fairly accurate expression of the combined judgment of the people regarding the credit of the government and the time at which it is likely to redeem the promises it has expressed on the notes. It is, therefore, subject to wide, sudden and frequent fluctuations. On account of their depreciation inconvertible gov¬ ernment notes take the place of coin in the circulating medium since the latter can more profitably be sold as bullion or exchanged for notes on the money market at their discounted value, and the former being legal tender may be used in all payments. Since everyone must receive and pay out these depreciated notes, they necessarily quote prices in terms of them, and* consequently all prices rise to the extent of the depreciation of the notes and thereafter fluctuate in accordance with the amount of their depreciation. On account of the subjective and consequent erratic character of these fluctua¬ tions all business becomes highly speculative, calculations based on a study of cost, demand and supply and the other factors upon which sound business depends become untrustworthy and everybody is forced to gamble in order to live. The circulation of such notes, therefore, constitutes a national calamity.

Convertible Government Notes may be merely representatives of coin, as is the case of the silver and gold certificates of the United States, in which corresponding amounts of coin are kept in the vaults of the Treasury, or they may be only partially covered by coin, as in the case of the greenbacks of the United States, in which a reserve of from $100,0000,000 to $150,- 000,000 of gold coin is kept for the redemption of $346,000,000 and some thousands of dollars of notes.

Bank Currency may be in the form of notes or of what is called deposit currency. Bank notes are promises of banks to pay to bearer on demand issued in denominations suitable for use as hand-to-hand money. They are usually convertible but sometimes inconvertible, in which case in essentials they resemble incon¬ vertible government notes. Since the circulation of bank notes depends primarily upon the credit of the bank which issues them, many devices have been employed to secure their safety. Among these the most noteworthy are the as¬ sets, special security and safety fund devices. According to the assets system noteholders are given a first lien upon all the assets of the bank and the quantity issued is usually limited to a percentage of the assets. According to the special security system the bank of issue is required to purchase certain specified securities, such as government bonds, real estate mort¬ gages or commercial paper, and to mortgage them to the noteholders as security. According to the safety fund system a special fund of cash or securities or both, contributed pro rata by all the issuing banks in the system, is set aside, usually under government control and super¬ vision, out of which the notes of any failed bank may be paid. . Two or more of these systems may be combined,

Deposit Currency is operated in the follow¬ ing manner : The customers of a bank trade cash, checks and drafts on other banks and interest-bearing promissory notes or bills ot exchange due in the future for credit balances on a so-called checking account. By the use of orders upon the bank called checks they may have a part or all of their balances transferred to the credit of other customers of the bank

or to that of customers of another bank, or they may acquire so-called drafts on banks in other places which enable them to transfer their credit balances to those places for similar use. By similar arrangements between banks this machinery operates in such a way that ex¬ changes between people in the same town, in different towns and even in different countries are affected by the process of debiting and crediting these checking accounts. The greater part of the exchanges of the commercial world are now-a-days effected in this way. Deposit currency and bank notes based on general assets or on commercial paper possess the especial merit of elasticity, that is, they automatically fluctuate in volume in accordance with the needs of commerce. This is due to the fact that they are created by the sale of notes or bills of exchange representing needs for currency and disappear by return to the banks of issue when said notes or bills of exchange mature. Consult Dodd, (History of Money in the British Empire and in the United States) (London 1911) ;

(Reform of the Currency > (pub. by the Acad¬ emy of Political Science, New York 1911) ; Hepburn, A. B., (History of Coinage and Cur¬ rency in the United States) (ib. 1903) ; Sumner, (A History of American Currency* (ib. 1878).

William A. Scott,

Director of School of Commerce, University of

Wisconsin.

CURRENCY BILL of 1900 (15 Febru¬ ary), the culmination of the many years' struggle between United States parties over the standard of value ; ending in the complete victory of the gold party, 46 to 29 in the Senate on the adoption of the bill. The provisions are: The unit of value to be the gold dollar of 25.8 grains, 9-10 fine; all United States money to be maintained at a parity with it and all govern¬ ment paper-money to be redeemable in gold. A redemption fund of $150,000,000 to be set apart not to fall below $100,000,000, and if necessary replenished by sale of bonds at not over 3 per cent. As fast as silver dollars are coined, an equal amount of treasury notes to be re¬ placed by silver certificates; gold certificates on certain conditions to be issued against the gold in the treasury. No United States or treasury notes to be of less than $10, nor silver certifi¬ cates of more than $10. The bonded debt may be refunded in 30-year 2 per cent gold bonds, at not less than par. Any national bank may issue circulating notes up to its paid-up capital by depositing an equal amount of national bonds.

CURRENT, a flow or stream of a body of water, more or less rapid, by which vessels are compelled to alter or modify their course or velocity, or both, according to the set or drift of the current. Rivers have currents varying in strength, chiefly according to the inclination of the bed down which they flow.

The technical language in which the flow of water and its channels are known and described

is as follows : The bed is the watercourse, having a bottom and two sides or shores. When the latter are described as right-or left-hand, going down stream is assumed. The transverse section is a vertical plane at right angles to the course of the current. The perimeter is the length of this section in the bed. The longi¬ tudinal section or profile is a curve whose abscissa is proportional to the distance up or downstream from a given point and whose ordi¬ nate is proportional to the depth. The slope or declivity is the mean angle of inclination of the surface of the water to the horizon. The fall is the difference in the height at any two points of determinate distance apart, as, for instance, eight inches to the mile. The line of current is the direction of maximum velocity. The mid-channel is the deepest part of the bed. The velocity is greater at the surface than at the bed. The surface is higher in the current than at the shore when the river is rising, lower than at shore when the river is falling. The direction is the set of the current ; the rate is the drift of the current. For electric current, see Electricity. See also Ocean Currents.

CURRENT EFFICIENCY. See Fara¬ day's Laws.

CURRENT METER, an instrument for measuring the velocity of the flow in rivers and streams. The current meter used by the United States Geological Survey consists of two essen¬ tial parts: (1) a wheel which is so arranged that the flowing water shall turn it steadily, and (2) a device for recording the number of such revolutions. The earlier forms of meters were mounted on floats and measured only the sur¬ face velocity. This was soon proved inade¬ quate, and was improved so that measurement at any depth may be made. The current meters in present use are of two distinct types, direct-action meters and differential-action meters, the classification depending on whether in revolv¬ ing the wheel the water does or does not exert a force which tends to retard the wheel's mo¬ tion. In the direct-action type the wheel carries vanes (either flat or warped) set on a horizontal axis and revolving by the direct pressure of the moving water against the

vanes. In this form of meter the friction increases as the velocity decreases. In the differential meter the wheel is made up of a series of cups at the extremities of short spokes. This wheel re¬ volves on a vertical axis. The pressure of the current of water on the concave side of the cup is greater than on the convex side in the proportion of 100 to 38. The wheel revolves slower than the direct-action wheel and the friction increases with the velocity, but is over¬ come by the increased motive power developed by the velocity. The current meter is usually equipped with a tail which holds it steady in the current. It may be attached rigidly to rods from an overhead bridge or hung by a cable. In the latter case weights are attached below to hold it in position. In high velocities or deep streams guy wires are attached. The recording mechanism is on the bridge or on shore, connection being made by an electric cable, and the record is made by electricity supplied by a battery. The true relation be¬ tween the revolutions of the meter wheel and any velocity of a stream must be established individually for each meter before it is used.

This testing is called rating. A current meter is rated by drawing it through still water at a uniform speed and noting the number of revo¬ lutions as to time and distance, from which the number of revolutions per second is computed. Many such experimental runs are made with each meter at different speeds and the results are so recorded as to be quickly available in computing current velocities from any record that individual meter may make.

CURRENT RIVER, a river of Missouri, rising among the Ozark Mountains in the southern central part of the State, flowing southeast and south into the Black River in Arkansas ; length about 250 miles.

CURRENTS, Ocean. See Ocean Cur¬

rents.

CURRICULUM, the term applied to a course of study, or collectively to that of any type of educational institutions, as the college curriculum,

the high-school curriculum, the common-school curriculum, *etc.* The historical basis of the modern educational curriculum is found in the Seven Liberal Arts of the Middle Ages, which developed from Greek philosophical speculation and educational practices. As long as the idea of the symbolical perfection of this organization of studies and of human knowledge prevailed there was no modification of the form of the curriculum, though the content of these terms was modified from time to time. All lower education was included in the subject of the trivium, i.e., grammar, rhetoric and dialectic, which represented so many approaches to the Latin language. This was based on the work of the ((singing school,® which furnished to the child the school arts (reading and writing), with a modicum of arithmetic. The curriculum of higher education included the subject of the quadrivium, i.e., arithmetic, geometry (mathe¬ matics and geography), astronomy (natural sciences) and music (aesthetic, etc.). The elab¬ oration of the curriculum under the influences of the early universities and of the Renaissance consisted chiefly in the addition of the subjects of medicine and law, both common and civil, and in the change in the content of the subject of the quadrivium. These changes can be fol¬ lowed in the successive papal ndes and univer¬ sity regulations which prescribed the books that should be read in the several subjects. From the time of the Renaissance to the close of the 18th century there was no modification in the organization of the educational curriculum and little in the content. From that time, however, the changes have been numerous and radical, and the old idea of the historical and logical perfection of the traditional curriculum has largely disappeared. In the United States, where conditions permitted these changes with less opposition than in the more conservative societies, very extensive changes have occurred, and an almost chaotic condition has ensued. These changes have consisted primarily in the addition of new subjects to each of the stages of the curriculum, due to the great development of knowledge, especially scientific, during the 19th century. The curriculum of the elementary school has expanded in content from the three fundamental school arts until it now embraces from 12 to 15 subjects in half that many spheres of intellectual interests, and in time, from three or four years to eight and nine; the secondary

curriculum has undergone no expansion in time, perhaps a diminution, owing to the encroach¬ ment of both the lower and the higher curricula, but has added so great a number of subjects that it deals in a preliminary way with almost all those included within the curriculum of college and university. The problem of curricu¬ lum is

twofold — That of content and that of organization. This twofold problem is now and long has been the chief topic of educational dis¬ cussion in the United States. The matter has received extended study by American educators and has formed the subject of two important reports by committees appointed by the National Education Association. . Consult Reports of the National Education Association5 (Washington 1865 et seq.) ; Proceedings of the National Ed¬ ucation Association) ; Payne, Public Elemen¬ tary School Curriculum 5 (Boston 1905) ; Hen¬ derson, (Textbook in the Principles of Educa¬ tion (New York 1910) ; Ruediger, Principles of Education (Boston 1910) ; Cubberley,

(Changing Conceptions of Education (Boston

1909).

CURRIE, Sir Arthur William, Canadian

soldier: b. Napperton, Middlesex County, On¬ tario, 5 Dec. 1875. He was educated at Strath-roy Collegiate Institute, and migrated to British Columbia in 1893, where for a time he taught school at Sydney and afterward engaged in real estate business in Victoria. Always keenly in¬ terested in military affairs, he served for 14 years with the 5th regiment of Canadian Gar¬ rison Artillery, and afterward became lieutenant-colonel of a Highland regiment, the 50th, of Victoria. He was elected president of the Rifle Club of British Columbia in 1907. On the out¬ break of the Great War in August 1914 he immediately volunteered for active service, and went overseas as a brigadier. He has taken a distinguished part in many of the stiffest battles of the war — The second battle of Ypres, Saint Julien, Courcelette. Thiepval and Vimy Ridge. In September 1915 he was appointed to the command of the 2d Canadian Division; and it was said of his division that it never lost a trench. He has been repeatedly mentioned in dispatches ; was created C.B. and awarded the Legion of Honor and the Croix de Comman-deur in 1915. On 3 June 1917 he was created K.C.M.G. He was appointed to succeed Sir Julian Byng in command of all the Canadian forces at the front, and was shortly thereafter raised to the rank of lieutenant-general.

CURRIE, Lady Mary Montgomerie Lamb Singleton (((Violet Fane®), English poet and miscellaneous writer: b. Littlehamp-ton, Sussex, 24 Feb. 1843; d. Harrogate, 13 Oct. 1905. She was married in 1864 to Henry Syden¬ ham Singleton, who died in 1893, and in 1894 to the

1st Baron Currie. Her books, published under her pseudonym, are Prom Dawn to Noon) (1872) ; ˆDenzil Place) (1875) ; (The Queen of the Fairies5 (1876) ; (Edwin and An¬ gelina Papers) (1878) ; Collected Verses) (1880) ; (Sophy, or the Adventures of a Sav¬ age5 (1881) ; (Thro' Love and War5 (1886) ; (Autumn Songs5 (1889) ; <Helen Davenant5 (1889); (Under Cross and Crescent5 (1896); Petwixt the Seas) (1900) ; Two Moods of a Map (1901) ; (Collected Essays5 (1902).

CURRIER, Charles Warren, American Catholic prelate : b. Saint Thomas, Danish West

Indies (now Virgin Islands, U. S. A.), 22 March 1857 ; d. 23 Sept. 1918. He was educated in Holland ; was ordained to the priesthood in 1880 ; and served successively as missionary in South America and in the United States. He was also lecturer, pastor, professor of Latin, assistant, etc., at the Bureau of Catholic Indian Missions, Washington, D. C., 1905 to 1913. In 1913 he was consecrated bishop of Matanzas, Cuba, resigned in 1915 and was made titular bishop of Hetalonia. He represented the United States government at several inter¬ national congresses of Americanists. He is a member of the American Oriental Society and the Spanish American Athenaeum. He has pub¬ lished Carmel in America) (1890) ; (History of Religious Orders > (1894) ; (Dimitrios and Irene) (1893) ; (The Rose of Alhama) (1895) ; (Cuba, What Shall We Do with It?> (1898) ; (Lands of the Southern Cross) (1911). He is a contributor to the Catholic Encyclopedia,' the American Ecclesiastical Review, *etc.*

CURRY, Jabez Lamar Monroe, American educator and diplomat : b. Lincoln County, Ga., 5 June 1825; d. Asheville, N. C., 12 Feb. 1903. He was graduated at the University of Georgia in 1843 and at Harvard Law School in 1845. He served in the Alabama legislature from 1847 to 1855 and in Congress from 1857 to 1861, and then became a member of the Confederate Congress. He became a Baptist minister; served in the Confederate army; was president of Howard College 1866-68; and in 1881 was appointed general agent of the Peabody

Educa¬ tional Fund and later also of the Slater Edu¬ cational Funds. He was Minister to Spain 1885-89, and special ambassador from the United States at the coronation of King Alfonso XIII of Spain, 17 May 1902. He published (Con¬ stitutional Government in Spain' (1889) ; '^Wil¬ liam Ewart Gladstone: a Study) (1891); (The Southern States of the American Union ' (1894) ; difficulties, Complications, and Limita¬ tions Connected with the Education of the •Negro' (1895) ; (Civil History of the Govern¬ ment of the Confederate States, with some Personal Reminiscences.)

CURRY, Samuel Silas, American educator: b. Chatata, Tenn., 1847. He was graduated at Grant University 1872. He received the degrees of A.M. and Ph.D. at Boston University. He has gained wide reputation as a teacher of speaking and of the voice. He has been con¬ nected as a teacher with Boston University, Harvard University, Newton Theological Insti¬ tution and Yale Divinity School, and has lectured and given short courses in many other universi¬ ties. He is the founder and head of the School of Expression, Boston, Mass. His publications are (Mind and Voice) ; foundations of Ex¬ pression (1908) ; (Province of Expression (1891); Classics for Vocal Expression) ; (Vocal and Literary Interpretation of the Bible' (1903) ; (Lessons in Vocal Expression (1895) ; (Imagination and Dramatic Instinct' (1896) ; frowning and the Dramatic Monologue) ; (Little Classics for Oral English' (1912) ; /Spoken English> (1913) ; Che Smile> (1915) ; (How to Add Ten Years to Your Life) (1915) ; (Bell.>

CURRY NORMAL AND INDUSTRIAL INSTITUTE, institution for the training of colored youths, founded in 1889 at Urbana, Ohio,

by E. W. B. Curry. The institute includes a Bible school and normal, literary, commercial, music and industrial departments. The exten¬ sion work is conducted through a race con¬ ference and a social settlement. There is an average of 10 instructors and officers in the faculty. The real estate and equipment are valued at $50,000 and the annual income to about $7,000. In 1913 the institute received a gift of $2,000 from Martha Fouse, a former slave. The institute depends for its support upon gifts from the general public. The library contains about 5,000 volumes. Since the founda¬ tion of the institute over 2,000 students have been assisted in obtaining an education.

CURRY POWDER and CURRY PASTE,

compound condiment added to cooked dishes of meat and rice to

render them piquant and appetizing. So generally is curry powder em¬ ployed in East Indian cookery that it has been called the ((salt of the Orient.” The substances that commonly form the bases of these powders are turmeric, fenugreek and sago. To these ginger, black and Cayenne pepper, coriander, caraway and many other spices are added in varying quantities, or omitted, according to the locality. Such curry powders as contain the pulverized leaves of Murraya kcenigia are used not only as aromatic stomachic stimulants, but as remedies for dyspepsia, diarrhoea and even dysentery. The basis of many curry pastes is tamarind.

CURSE OF SCOTLAND, The, in cards, a term applied to the nine of diamonds. Its origin is unknown. Among the many explana¬ tions offered are the following: (1) The nine of diamonds is the <(pope” in the game of Pope Joan, and hence the symbol of Antichrist to the Reformers. (2) It is the chief card in comette, which game ruined many families in Scotland. (3) It goes back to the nine lozenges ‘on the Dalrymple arms, the Earl of Stair having been responsible for the massacre of Glencoe. (4) Tradition says that the Duke of Cumberland, while drunk and gambling on the night before the battle of Culloden, wrote across the face of this card the order that no quarter was to be given on the morrow.

CURSORES, ker’so’rez, or RUNNERS,

the Ratitce (q.v.).

CURTESY, in law, the life interest which the surviving husband has in the inheritable estate of the wife. Originally curtesy attached, as dower still does in most of the United States, to all estates of inheritance of which the wife was seized at any time during the marriage. But it is now generally, though not invariably, limited to such lands as she is seized of at her death ; and she may therefore, in most States, by alienating the land during her lifetime or by last will and testament, defeat her husband’s claims as tenant by the curtesy. See Blackstone, Commentaries on the Laws of England’; Pollock and Maitland, (History of English Law’ (Boston 1899) ; Tiffany, Caw of Real Property.*

CURTILAGE, the enclosed space of ground and buildings immediately surrounding or lying near a dwelling and used for its convenient occupation. The term is of feudal origin and originally meant a castle and outbuildings en¬ closed in a stone wall for defense. There is no exact limit to the area which may be in-

eluded under the term, and it is a matter of proof in each case as to what is set apart for the use of any particular dwelling. The law has always given the curtilage greater protec¬ tion than outside property, and this idea pre¬ vails to-day, as in most jurisdictions breaking and entering curtilage is burglary, and setting fire to any building in it constitutes arson. See Arson ; Burglary ; Real Property.

CURTIN, Andrew Gregg, American politi¬ cian : b. Bellefonte, Pa., 22 April 1815; d. there, 7 Oct. 1894. He studied law at Dickinson Col¬ lege, and was admitted to the bar in 1839. Entering politics, he became secretary of the Commonwealth of Pennsylvania in 1854, gov¬ ernor in 1860 and again in 1863, being one of the most noted <(war governorsˆ of the Civil War period. In 1869 he was appointed Minister to Russia. In 1873 he left the Republican party, and from 1881 to 1887 sat in Congress as a Democrat. Consult Egle, W. H., (Life and Times of Andrew Gregg Curtin } (Philadelphia

1896).

CURTIN, Jeremiah, American linguist and antiquarian : b. Milwaukee, Wis., 1838 ; d. Bur¬ lington, Vt., 14 Dec. 1906. He prepared for Harvard and was graduated there in 1863. At the university he became an excellent linguist. In 1864 he entered the diplomatic service, be¬ coming secretary of legation for the United States at Saint Petersburg, where he remained until 1870. During his stay in Russia he made a study of Slavonic and allied languages. This knowledge he turned to account in his transla¬ tions of Tolstoy, Zagoskin and Sienkiewicz, be¬ ing the first to introduce the latter to the Eng¬ lish-speaking world. From 1883 to 1891 he was connected with the Bureau of Ethnology of the Smithsonian Institution. Afterward he made independent researches concerning the North American Indians. He was reputed to have known 70 languages, 12 more than the redoubtable Cardinal Mezzofanti. By his trans¬ lations from the Russian, Polish, Czech and other languages he added enormously to our knowledge of foreign literature. Besides his translations he wrote (Myths and Folklore of Ireland) (1906) ; (Tales of the Fairies and the Ghost World) ; (Myths and Folk-Tales of the Russians, Western Slavs, and Magyars > (1894) ; (Hero Tales of Ireland) (1894) ; (Creation

Myths of Primitive America) (1898) ; (The Mongols) (1907) ; {The Mongols in Russia) (1908) ; (A Journey in Southern Russia (1909); (Myths of the Medocs) (1912).

CURTIS, Alfred A., American Catholic prelate: b. Somerset County, Md., 4 July 1831; d. 11 July 1908. When only 21 years old he was ordained in the Episcopal ministry and for several years labored in Baltimore and western Maryland, finally returning to Baltimore. Later he resigned his ministerial duties, entered the Catholic Church, took a theological course, was ordained priest by Archbishop Bayley, 17 Dec. 1874, and stationed at Baltimore Cathedral till 14 Nov. 1886, when he was consecrated bishop of Wilmington, Del. He resigned in 1896 and in 1898 became vicar-general of Baltimore.

CURTIS, Benjamin Robbins, American jurist: b. Watertown, Mass., 4 Nov. 1809; d. Newport, R. I., 15 Sept. 1874. He was graduated at Harvard 1829 ; was admitted to the bar 1832, and rose rapidly to the height of

his profession in Boston, Mass. He was ap¬ pointed to the United States Supreme Court 1851, and in the famous Dred Scott case made a powerful argument dissenting from the court's decision. Resigning in 1857, he was a member of the State legislature for two years ; and in 1868 one of the counsel for the defense in the impeachment trial of Andrew Johnson. His writings include (Reports of Cases in the Circuit Courts of the United States > (1854) ; (Decisions of the Supreme Court of the United States, with notes and a digesU ; jurisdiction, Practice, and Peculiar Jurisdiction of the Courts of the United States } 0880). Consult (Memoir and Writings of Benjamin R. Curtis* (Boston 1880), the first volume of which, con¬ taining the memoir, is written by his brother, G. T. Curtis.

CURTIS, Carlton Clarence, American botanist : b. Syracuse, N. Y., 26 Aug. 1864. He was educated at Syracuse and Columbia uni¬ versities and also studied at the universities of Cambridge and Leipzig; In 1892-94 he was principal of the Fayette Union School, New York, in 1894-96 instructor in natural science at the Brooklyn Polytechnic Institute, from 1898 to 1908 tutor in botany at Columbia, and thereafter associate professor. Besides con¬ tributions on professional topics to botanical journals, he is author of (TextBook of General Botany* (1897); and (Nature and Develop¬ ment of Plants) (1907; 3d ed., 1915).

CURTIS, Charles, American statesman : b. North Topeka, Kan., 25 Jan. 1860. His mother was a full-blooded member of the Kaw tribe of Indians. He was educated in the common schools, and after studying law was admitted to the bar in 1881. In 1884 and again in 1886 he was county attorney of Shawnee County. From 1893 to 1897 he served in Congress from the Fourth Kansas District and from 1897 to 1907 represented the First District of the State. He resigned from the House in 1907 upon his election to the United States Senate to fill the unexpired term of J. R. Burton, resigned, and was the first Indian to hold such office. He was a candidate for re-election in 1912, but was de¬ feated. He was elected, however, for the term 1915-21.

CURTIS, Cyrus Hermann Kotzschmar,

American publisher: b. Portland, Me., 18 June 1850. He was educated in the public schools and in 1876 removed to Philadelphia, where he be¬ came publisher of the Tribune and Farmer. He later established the Ladies' Home Journal and made it one of the most successful periodi¬ cals in the United States. The Curtis Publish¬ ing Company, of which he became head, pub¬ lished, in addition to the Ladies' Home Journal, the Country Gentleman and the Saturday Evening Post, the latter established by Ben¬ jamin Franklin in 1728. Under Mr. Curtis's management the Saturday Evening Post attained a larger circulation than had hitherto been reached by any American periodical. In 1913 he took over the interest of A. S. Ochs in the Philadelphia Public Ledger.

CURTIS, Edward, American medical scien¬ tist: b. Providence, R. I., 4 June 1838. He is a brother of G. W. Curtis (q.v.). He was graduated at Harvard in 1859, and took his medical degree at the University of Pennsyl¬ vania in 1864. He was an army surgeon during

the Civil War and from 1866 was a member of the faculty of the College of Physicians and Surgeons in New York. He made a specialty of microscopic study and the camera in connec¬ tion with diagnosis, and published a (Manual of General Medicinal Technology) (1883) ; (Months and Moods: A Fifteen-Year Calen¬ dar (1903) ; (Nature and Health> (1906).

CURTIS, George Carroll, American geo¬ graphic sculptor: b. Abington, Mass., 15 July 1872. He was educated at Harvard University, where he was for a time an assistant in the geological department. Later he became as¬ sistant field geologist of the United States Geo¬ logical Survey. He was the first to apply aerial perspective to topographical models ; this he did in models of Boston and vicinity, and of the city of Washington as it existed and as it would appear if a proposed development were carried out. A member of the expedition to the West Indian eruptions, he was the first to visit the crater of La Soufriere and discovered the new summit of Mount Pelee. He also spent a year among the coral islands of the south Pacific and in 1916-11 made a special study of the Atlantic coast from Maine to Newfoundland, and in 1913 made a tour of the world studying volcanoes. Besides his special geological and topographical articles, he is author and illus¬ trator of (A Description of the Topographical Model of Metropolitan Boston) (1900).

CURTIS, George William, American essayist and journalist: b. Providence, R. I., 24 Feb. 1824; d. New Brighton, Staten Island, N. Y., 31 Aug. 1892. At 18 he spent some months at Brook Farm (q.v.) and a few years later visited the Old World, the results of his travels appearing in (Nile Notes of a HowadjP (1851) ; and (The Howadji in Syria* (1852). He was an early sympathizer with the abolition movement and as the editor of Harper's Weekly for nearly a generation exercised a measurable influence over the more thoughful of his countrymen. At an earlier period he was editor of Putnam's Magazine, which did not prove a financial success, and for many years thereafter he devoted the proceeds of his lecture tours to paying off ihe obligations incurred in relation to that enterprise. From 1854 till

not long before his death he edited the <(Easy Chair® department of Harper's Magazine, and it is by his ((Easy Chair® essays that he is likely to be longest remembered. In these are displayed a gentle persuasiveness of argument and a fund of humor which made them very attractive read¬ ing, while the style was at all times polished and graceful. In them he touched upon the varied topics of the day, the lighter as well as the more serious, and since his death' several small volumes of selections from the»m have been published. He was one of the leaders of the Republican party at its outset and in his later years was conspicuous as an advocate of civil service reform and of independent action in politics. He declined offers of diplomatic service abroad. A short time before his death he was made chancellor of the University of New York. As a lecturer and orator he was very popular, and several of his political speeches and orations upon special occasions take high rank among specimens of American oratory. Besides the volumes already named he published Cotus Eating) (1852) ; (The

Potiphar Papers* (1853) ; <Prue and P (1856) ; (Trumps* (1862). These are more or less ephemeral in their nature, (Prue and P being the only work among them which interests the present generation. His (Orations and Ad¬ dresseˆ edited by C. E. Norton, appeared in 3 vols., 1893-94. (See Essays from the Easy Chair). Consult Cary, Edward, (George Wil¬ liam Curtis* (Boston 1894).

CURTIS, John Ticknor, American lawyer, author and publisher: b. Watertown, Mass., 28 Nov. 1812; d. New York, 28 March 1894. He was graduated from Harvard in 1832, admitted to the bar (Boston, Mass.) in 1836 and prac¬ tised in Worcester, Mass., and Boston. From 1840 he sat three years in the lower house of the Massachusetts legislature, after which he devoted himself entirely to law and literature. One of his earliest literary productions was a pamphlet advocating State compensation for the destruction by a mob of the Ursuline Convent in Charlestown, Mass. His ability as a patent lawyer gained him the patronage of many dis¬ tinguished inventors. In 1850 he visited Eng¬ land, where he met the prominent men of the time. On his return he strongly supported the compromise measures of 1850, and in 1857 par¬ ticipated in the famous Dred Scott case in the Supreme Court of the United States, claiming the power of Congress to prohibit slavery. lie migrated to New York in 1862, and was engaged in active practice up to his 80th year. He never held any official position beyond his legislative experience of three years in Massachusetts, though he was more than once offered the nomination

to a seat on the bench in New York city, and by Daniel Webster the post of Min¬ ister to England. Besides many contributions to the press he published a number of authori¬ tative works on law and constitutional history, the more celebrated ones being a (Digest of Admiralty Decisions in England and America) ; a (Treatise on the Rights and Duties of Mer¬ chant Steamers) ; (Origin, Foundation and Adoption of the Constitution (1854-58) ; Commentaries on the Jurisdiction, Practice and Peculiar Jurisprudence of the Courts of the United States) (1854) ; (A Discourse on the Nature of the American Union, as the principal controversy involved in the late Civil War> (1875) ; (Life of Daniel Webster) (1869) ; (Life of James Buchanan (1883) ; (Treatise on the Law of Patents> (1849) ; (Treatise on the Law of Copyright* (1847) ; (J°hn Chambers: a Tale of the Civil War in America) ; (John Charaxes> ; Creation or Evolution.*

CURTIS, Mattoon Monroe, American educator: b. Rome, N. Y., 19 Oct. 1858. He was graduated at Hamilton College, New York, 1880, and from the Union Theological Seminary 1883. He was pastor of a Presbyterian church at Cleveland, Ohio, 1885-88, and in 1891 was elected Handy professor of philosophy in the Western Reserve University. He has published Cocke's Ethics) (1890) ; (Philosophy and Physical Science) (1892) ; (Philosophy in America* (1896) ; Cant and Edwards* (1805), *etc.*

CURTIS, Olin Alfred, American theo¬ logian: b. Frankfort, Me., 10 Dec. 1850; d. 9 Tan. 1918. He was educated at Lawrence College and Boston University, and at Leipzig,

Erlangen, Marburg and Edinburgh. He served as pastor of Methodist Episcopal churches in Janesville, Wis., 1880-83, Milwaukee 1883-86, and Chicago 1888-89; from 1889 to 1895 was professor of systematic theology at Boston Uni¬ versity, and in 1896 accepted the corresponding chair of Drew Theological Seminary. Pro¬ fessor Curtis came to be recognized as perhaps the most distinguished Methodist theologian of his generation. Besides many theological papers, his publications include (Elective Course of Lectures in Systematic

Theology'' (1901), and (The Christian Faith Personally Given in a System of Doctrine' (1905), a work of great importance.

CURTIS, Samuel Ryan, American soldier: b. near Champlain, N. Y., 3 Feb. 1807 ; d. Coun¬ cil Bluffs, Iowa, 26 Dec. 1866. He was gradu¬ ated at West Point 1831, but resigned to become a civil engineer. He studied law, was admitted to the bar and practised from 1843-45. He served as colonel in the Mexican War, and was a Republican congressman from his State 1857-61. He was commissioned a brigadier-general 17 May 1861 ; defeated Generals Price and McCulloch in a decisive engagement at Pea Ridge, Ark., and was promoted major-general 21 March 1862. He subsequently commanded the departments of Missouri (1862-63), of Kan¬ sas (1864-65), and of the Northwest (1865) ; and, becoming United States commissioner in 1865, negotiated treaties with several Indian tribes.

CURTIS, William Eleroy, American jour¬ nalist: b. Akron, Ohio, 5 Nov. 1850; d. 1911. He was graduated at Western Reserve Univer¬ sity in 1871. From 1873 to 1887 he was on the staff of the Chicago InterOcean, and by se¬ curing interviews with the James brothers, during their contest with Pinkerton's detectives, and in investigating the Ku-Klux-Klan of the South gained a national reputation. He was Washington correspondent of the Chicago Record in 1887-1901, when he became asso¬ ciated with the Chicago Record-Herald. He was a commissioner of the United States to the Central and South American republics in 1885, and executive officer of the International American Conference of 1889-90. He has writ¬ ten (Children of the Sun' (1882) ; (Capitals of Spanish America' (1888) ; (The Land of the Nihilist' (1888); (Japan Sketches'; Vene¬

zuela' (1891); (Life of Zachariah Chandler'; (The Yankees of the East' (1896) ; (To-day in France and Germany' (1897) ; (Between the Andes and the Ocean' (1900) ; (The True Thomas Jefferson' (1901) ; (Denmark, Sweden, and Norway' (1902) ; (The Turk and His Lost Provinces' (1902) ; (The True Abraham Lin¬ coln' (1903) ; (ToLday in Syria and Palestine' (1904) ; (Modern India' (1905) ; (Egypt, Burma, and British Malaysia' (1905), *etc.* He was .director of the Bureau of American Repub¬ lics 1890-93, and chief of the Latin-American department and historical section of the World's Columbian Exposition 1891-93.

CURTISS, Glenn Hammond, American aviator: b. Hammondsport, N. Y., 21 May 1878. He began life as a newsboy, but was early inter¬ ested in mechanics. In 1906 at Ormond Beach, Fla., he established the world's record for the fastest mile ever traveled on a motor cycle,

making a mile in 26 2/5 seconds. From 1907 to 1909 he was the director of the Aerial Experi¬

ment Association of America. He won the Scien¬ tific American cup in an aeroplane competition at Hammondsport, N. Y. (1908), obtained the international cup in the aeroplane contest at Rheims in 1909, and won a $10,000 prize offered by the New York World in a record-breaking flight from Albany to New York 1910. In 1913 he was awarded a medal by the Smithsonian Institution. Besides making a large number of flights in America and in Europe, Curtiss became actively engaged in the commercial side of aviation, being secretary and treasurer of the Curtiss Exhibition Company of New York and president of the Curtiss Aeroplane Company at Hammondsport, N. Y. With the exception of the Wright brothers, none other has done so much as he for aviation in America. He is part author of (The Curtiss Aviation Book' (1912).

CURTISS, Samuel Ives, American Congregationalist clergyman : b. Union, Conn., 5 Feb. 1844; d. London, England, 22 Sept. 1904. He was graduated at Amherst College 1867, and the Union Theological Seminary 1870; and was pastor of the American chapel in Leipzig 1874—78. In 1878 he was appointed professor of biblical literature in Chicago Theological Seminary, but changed later to the chair of Old Testament literature and interpretation. His publications include a translation of Bickell's ˆOutlines of Hebrew Grammar' (1877) ; (The Levitical Priests' (1877) ; translations of Delitzsch's (01d Testament History of Redemption' (1881) ; (Franz Delitzsch' (1890) ; (Ezekiel and His Times' (in (The Bible as Literature' (1896) ; (A Plea for a More Thorough Study of the Semitic Languages in America' (1879) ; (Moses and Ingersoll' (1881); and (Primitive Semitic Religions To-Day' (1902), his special study.

CURTIUS, koor'tsl-oos, Ernst, German Hellenist: b. Liibeck, 2 Sept.. 1814; d. Berlin, 12 July 1896. He was educated at Gottingen, Bonn and Berlin, and in 1844 was appointed professor at Berlin and preceptor of the Crown Prince Frederick William, afterward Frederick III. In 1856 he succeeded Hermann as pro¬ fessor at Gottingen, and 1868 was called again to Berlin University. From 1853 Curtius was a member of the Royal Academy of Sciences, and from 1871-93 he was continuously secretary of the philologico-historical section of that insti¬ tution. Under Imperial commission in 1874 he ne¬ gotiated with the Greek government in regard to the German excavations at Olympia, begun by him in the following year. He is one of the greatest

scholars of modern Germany. Of his works, which mostly relate to Greek antiquities, the best known is his (History of Greece' (1857-61), translated into English by A. W. Ward (1868-73). Other works by him are (De Portibus Athenarum' (1842) ; UClassische Studien' (1840) ; Unscriptiones Atticse XII' (1848); (01ympia' (1852); (Die Ionier' (1855) ; (Peloponnesos' (1851-52) ; (Lectures and Addresses' in three volumes (1895). Con¬ sult Gurlitt, (Erinnerungen an Ernst Curtius' (Berlin 1902) ; Grimm, (Ernst Curtius : Ein Brief an seine Freunde' in the Deutsche Rundschau Vol. LXXXVIII, Berlin '1896) ; Curtius, F., (Ernst Curtius: Ein Lebensbild in Briefen' (Berlin 1903).

CURTIUS, Georg, German philologist and author: b. Liibeck, 16 April 1820; d. Herms-

dorf, 12 Aug. 188 He was a brother of Ernst Curtius (q.v.), and in 1849 went to Prague as professor of classical philology, re¬ moving five years later to the corresponding chair at Kiel. In 1861 he became professor in Leipzig University and held this post till his death. He was the teacher of many of the foremost philologists of the day. His earliest work was (De Nominum Graecorum Forma-11006* (1842) ; and among many important later ones are (Grundziige der griechischen Etymol-ogie* (1858-62), his chef d' oeuvre translated into English by Wilkins and England; (Zur Chronologie der Indogermanischen Sprachforschung* (1867) ; cDas Verbum der griechischen Sprache) (1873 and 1876) ; and (Griechische Schulgrammatik* (1852), the last two having been translated for English students; (Sprach-vergleichung, Beitrage zur griechischen und lateinischen Grammatik> (1846); and in his (Studien zur griechischen und lateinischen Grammatik) (1868-78) he published not only his own studies, but those of his pupils and others. Consult Sandys, (A History of Classical Schol¬ arship* (Vol. Ill, Cambridge 1908) ; and Plat-ner, (Tlie Topography and Monuments of Ancient Rome) (2d ed., Boston 1911).

CURTIUS, ker'shi-us, Mettus, Roman leg¬ endary hero, who, according to tradition, sacri¬ ficed himself for the good of his country.

In 362 b.c. it is said a chasm opened in the Roman forum, from which issued pestilential vapors. The oracle declared that the chasm would close whenever that which constituted the glory of Rome should be thrown into it. Curtius asked if any thing in Rome was more precious than arms and valor; and being answered in the negative, arrayed himself in armor, mounted a horse splendidly equipped, solemnly devoted himself to death in presence of the Roman peo¬ ple and sprang into the abyss, which instantly closed over him. The lacus Curtius, which marked the spot, has been discovered by the modern archaeologist. An altar was erected on the spot and a regular sacrifice offered there.

CURTIUS, Rufus Quintus, Roman his¬ torian. He wrote the history of Alexander the Great in 10 books, the first two of which are lost. The exact period in which he flourished is not known ; for though his style would indi¬ cate that he lived in one of the best periods of the Latin language, no writer of any earlier date than the 12th century has made any men¬ tion of his work. His information is inaccu¬ rate and the book is, on the whole, unreliable. The style is generally polished and elegant. Modern editions are by Vogel (Leipzig 1884) ; Dosson (Paris 1887) ; Hedicke (1908). An English translation by Crosby was published in New York and London (1858). Consult Dosson, S., (Etude sur Quinte Curce, sa vie et ses oeuvres J (1887) ; Steele, in Proceedings of the American Philological Association (Vols. XLIII, LI-LIV, 1912) ; and the English edition by Heitland and Raven (Cambridge 1889).

CURTIUS, koor'tse-oos, Theodor, German chemist : b. Duisberg, 27 May 1857. He studied at Leipzig, Heidelberg and Munich ; in 1886 was lecturer at the University of Erlangen ; in 1889 became professor of chemistry at Kiel ; in 1897 he went to Bonn, but on the death of Vic¬ tor Meyer, in the same year, accepted the pro¬ fessorship of chemistry at the University of

Heidelberg. He investigated the diazo-com- pounds of the fats and discovered hydrazine and hydrazoic acid, both compounds of nitro¬ gen.

CURULE MAGISTRATES were the highest dignitaries of the Roman state and dis¬ tinguished from all others by enjoying the privilege of sitting on ivory chairs (sellce curules) when engaged in their public functions. The curule magistrates were the consuls, prae¬ tors, censors and chief aediles, who, to distin¬ guish them from the plebeian

aediles, were called curule.

CURVES, Higher Plane. A curve can be looked upon in many ways ; geometrically as the intersection of two surfaces, as the locus of a moving point, or envelope of a moving line ; analytically as a representation of an equation in point-or line-co-ordinates, and therefore as yielding a singly infinite system of points or lines. But if this view be adopted, the (<curve)) must not necessarily be regarded as identical with the system of points ; for most curves (not all) have tangents, hence a curve yields also a system of lines, of equal importance with the system of points : a defini¬ tion that lays stress on one system to the ex¬ clusion of the other is incomplete. This was recognized by Pliicker ((Theorie der algebraischen CurvenL 1839, p. 200), in his state¬ ment of the dual generation of a curve: (<If a point continually moves along a straight line, while the line continually rotates about the point, one and the same curve is enveloped by the line and described by the point.® Clifford ((Math. Papers, J pp. 40-42) treats the true curve as an undefined entity, of which the as¬ semblages of points and lines are two distinct manifestations. The present tendency is to¬ ward this view, at least as regards an algebraic curve — a curve whose equation, whether in point-or line-co-ordinates, is algebraic. A curve whose Cartesian equation cannot be re¬ duced to an algebraic form, e.g., $y = \sin x$, is non-algebraic or transcendental. It is conven¬ ient to treat first of algebraic curves.

If x, y satisfy an algebraic equation

dy

f(x, y) = 0, it can be shown that — has a defi-

. df df mte value | = — – : —

ox dy t

(

, df

unless both

dx

and

dl

dy

vanish. There is therefore a tangent,

y - y =(* -*) % %+ < f-><=°:

in homogeneous co-ordinates

Xjf + Yjf 0.

dx dy dz

The co-ordinates of the tangent are :

r r of df df …. . r

= -r- : — :-r-~ ; the elimination of x, y, z dx dy dz

from these equations and f(x, y, z) = 0 gives an algebraic equation $ U, v, 0 “0, the line equation (tangential equation) of the curve. Thus the curve has two equations, both alge¬ braic, a point equation of degree tn, a line equa¬ tion of degree n ; these two numbers m, n, the order and class of the curve, are the number of points that lie on an arbitrary line, the num-

ber of tangents that pass through an arbitrary point ; they belong respectively to the point sys¬ tem and the line system, not to the curve itself. A number that is more intimately associated with the curve is the genus, p, to be defined later.

An algebraic curve cannot break off ; the tangent cannot suffer a sudden change in di¬ rection ; no finite part of the curve can coin¬ cide with a straight line. Thus the normal character of an arc of an algebraic curve ex¬ presses gradual and continuous change of posi¬ tion (motion of point), gradual and continuous change of direction (motion of tangent), as stated by Pliicker.

The number of terms in the equation f(x, y, £)=0 is y2 (m + 1) (m + 2) ; the num¬ ber of disposable constants is therefore K (m + 1) (m + 2) — 1, i.e., }4w(m + 3).

Hence passage through j4m(m + 3) arbitrary points determines the curve ; while if the curve ‘passes through y2m(m + 3) — q arbitrary points, the coefficients can be expressed linearly in terms of q parameters, and the curve has q degrees of freedom. If the points are not arbi¬ trary, the curve may have mobility greater than q, or it may break up into curves of lower order. The theory is really that of the inter¬ sections of curves. Two curves of orders m, m’ intersect in mm’ points, for the elimination of z from the equations produces an equation of degree mm for x :y. The ma intersections of two w-ics, u, v, do not determine an m-ic (although m2> y2m(m~{-3)), for all curves u + kv — 0 pass through the points ; the m 3 points impose precisely)4w(w + 3) — 1 condi¬ tions. Similarly, the mm intersections of Cm and Cmi do not impose independent conditions on all curves ; e. g., the 20 intersections of C* and Cs impose 14 conditions on a quartic, 17 on a quintic, 19 on a sextic, but 20 on all higher curves. The most convenient statement is : the quartic excess is 6, the quintic excess is 3, the sextic excess is 1 (Macaulay). The first notice of theorems of this character is due to Maclaurin (1720) ; the first explanation was given by Euler and Cramer (1748-50). From these has arisen the whole modern theory of groups of points on a curve (geometry on a curve). (Scott, <Bull. Am. Math. Soc.,* 2d series, v. 4, pp. 260-273; 1897-98).

The fundamental theorem is the Cayley-Bacharach theorem (1843,

1886) ; a C„ through all except £(/ + m — n — 1) (/ + m — n — 2) of the intersections of Cl and Cm will pass through the remainder unless these lie on a curve of order / + m — n — 3. In particular if (l — n), precisely i(m — 1) (m — 2) of the intersections of a fixed Cm by a variable C„ are a consequence of the rest if n > m — 3; but if n4 m — 3, fewer than £(ra — 1) (m — 2) are a consequence. Thus no matter what the order of the cutting curve, the number of the in¬ duced intersections can never exceed %(m- — 1) (m — 2). This number, which limits the inter¬ connection of points on the curve of order m, is called the genus of the curve, and is usually denoted by p. The genus of a quartic, e. g., is 3 ; 3 points on a quartic follow from 5 intersec¬ tions with a conic, or from 9, 13, 17 intersec¬ tions with a cubic, quartic or quintic, and so on.

If a curve has multiple points, corresponding theorems hold and preserve their significance,

provided the cutting curve is an adjoint curve, that is, a curve with a multiple point of order k — 1 where the fixed curve has a multiple point of order k. The genus, the number p which limits the interconnection, is in this case Y(m — 1) (m — 2) — is k(k — 1). (Macaulay, (Proc. Lond. Math. Soc.,* v. 26, pp. 495-544; 1895; Hardcastle, F., (Report on Point-Groups,* in progress in Proc. of the Brit. Assoc. ; Brill-Noether Bericht, (Die Entwicklung der Theorie der algebraischen Functionen in alterer und neuerer Zeit* (1894).

Multiple points arise when two or more points of the system occupy the same position in the plane ; according to the number of points that coincide, the point is double, triple, *etc.* Double points (dps) are nodes or cusps; a node is the coincidence of two non-consecutive points, a cusp is the coincidence of two consecu¬ tive points ; similarly double tangents are either bitangents or inflexional tangents. The cusp and inflexional tangent are also called sta¬ tionary point and line, on account of the effect of the singularity on the motion of the point and line by which the curve is described.

The coincidence of two points at P causes an arbitrary line through P to meet the curve in two points there ; hence if P be taken as origin, the . terms . of the first degree in the equation will vanish. The conditions for a double point at x, y, z are therefore the vanish-

r r df df

lng of f’ 5? dy

ˆ in homogeneous co-ordinates,

of

df, df df\

dx dy dzj ‘

Two lines can be found to meet

the curve in more than two points at P; these are the tangents ; they are given by the terms of degree 2 equated to zero. Similarly the condi¬ tions for a &-point are the vanishing of the

_ If

i&(£ + l) derivates - - - (a--p + y = k — 1),

dxfldyftdzT

and there are k tangents, lines which meet the curve in more than k points.

If the tangents at a dp are distinct, the point is a node, formed by the crossing of two simple branches, real or imaginary accord¬ ing as the tangents are real or imaginary. In this last case, the point is detached from the main body of the curve, and is called an isolated point, or acnode, the visible crossing being called a node, or crunode. If the tangents are coincident, and meet the curve in precisely three points, the point is a cusp; if the coin¬ cident tangents meet the curve in more than three points, the singularity is complex.

Elimination of x:yz from 0 ˆ — 0,∼ = 0

ox dy dz

gives a condition, D — 0, to be satisfied by the equation of any curve that has a dp. Hence a general locus of order m has no point-singularities, and a general envelope of class n has no line-singularities. But a general en¬ velope has point-singularities and a general locus has line-singularities ; for the direction of

a tangent, given by the value of is unax

changed if ˆ2 = 0, i-e- > ˆ

3V *a*V_ 2 ay df df

dxdy dx dy

dx 1

a*/ (df\ 2 = dy2 \dxj

0-

This condition, and / — 0, are only two equa¬ tions, and consequently no condition is imposed on the locus by the existence of line-singulari¬ ties.

If a curve of order m, class w, has v nodes, * cusps, t bitangents, a inflexional tangents, these numbers are connected by Pliicker's equations. The tangent at x, y, z is

ox dy

+ Z

df

dz

this passes through x , y , z' if x, y, z lie on

the curve x' + y' + z> |^=0, the polar of x', dx oy dz

, zr with respect to . Since this curve, i/~0, is of order m — 1, it meets / in m(m — 1) points; two of these lie at every node, three at every cusp; hence the number of tangents from x\ y', z is

n = m(rn — 1) — 2v — 3*... (1)

Similarly from the line-equation,

m — n(n — 1) — 2r — 3*... (1')

The condition that the tangent at x, y, z be stationary becomes in homogeneous co-ordinates

a2/ a2/ a2/

dx2 dx dy dx dz

a2/ a2/ a2/

dx dy dy 2 dy dz

d2f a2/ a2/

dx dz dy dz dz2

the point of contact must lie on this curve, H(f)— 0, the Hessian of f, of order 3(w — 2). At a node on /, H has a node with the same tangents ; at a cusp, H has a triple point, com¬ posed of two branches touching the cuspidal tangent with one branch cutting it ; the num¬ bers of intersections are 6 and 8. Hence

i = 3m{m — 2) — 6v — 8/c, … (2)

and reciprocally

ac = 3 n(n — 2) — 6r — 8a… . (2’)

Any one of these four equations can be ob¬ tained algebraically from the others. From these we can find also (3 and 3’) expressions for r in terms of tn, v} /c, and for v in terms of n, r, i.

These six are Pliicker’s equations; three only are independent. It must not however be supposed that we can choose any three of the numbers arbitrarily. There is a limit to the number of dps that a proper curve can have; v -j-k. > b(m — 1) (ra • — 2). For if the curve had one more, a curve of order m — 2 could be passed through the dps and m — 3 other points on the curve; but this would have with f inter¬ sections in number 2[b(m — l)(m — 2)T* 1]4” m — 3; i.e., w(m — 2)+l, which is impossible. A curve can actually have this number of dps; it is then called rational (or unicursal), be¬ cause the co-ordinates of any point can be ex¬ pressed rationally in terms of a parameter, as follows : The dps and m — 3 other points on f determine (m — 2)-ics with one degree of freedom, a system u-\~kv — 0. Of the m (m — 2) intersections of one of these with *, all except one are at the fixed points ; the co-ordinates of the one remaining variable in¬ tersection are therefore given rationally in terms of the parameter k by* = 0, u + kv — 0. vol. 8 — 21

If the curve has not this number of dps, let it have <5 (—>’ «) ; the number b{m — 1)

(m — 2) — <1, which has already been given as the genus, was originally called the deficiency of the curve (Cayley).* From Pliicker’s equations we find

b (m — 1)(m — 2) — v — = i (n — 1) (n — 2) — r — i,

i.e., the point deficiency and the line deficiency are equal; the deficiency (or genus) does not belong specially to the point system or the line system. In particular, if the curve is rational qua locus, it is rational qua envelope. If we introduce p for the genus, the equations assume a convenient form,

»+ K=2m-- 2 (p — 1), m-f- i = 2n-- 2 (p — 1), m(m — 3) — 2 (v-- a)=2 (p — 1) =n (n — 3) — 2(r-f i).

There are other limitations on these num¬ bers, but the theory is not complete. Clebsch proved (Crelle, v. 64, p. 51 ; 1864) that the num¬ ber of cusps on a rational curve cannot exceed f (w — 2) ; the more general question as to the maximum number of cusps for a curve of assigned order awaits solution.

So far the singularities have been supposed to be simple. A multiple point of order higher than the second is, in a certain sense, equivalent to a number of simple singularities. If the tangents at a £-point are distinct, the point arises from the crossing of k branches; these cause bk (k — 1) intersections, nodes by the geometrical definition. It can be shown that such a point reduces the class of the curve, the number of inflexions, and the genus, by 2 X bk(k — 1), 6Xbk(k — 1), bk(k — 1) respec¬ tively. Thus not only is the point explained geometrically by bk(k — 1) nodes, but as re¬ gards Pliicker's equations it is equivalent to these nodes. Nevertheless the point cannot be replaced by these nodes for all purposes, e.g., as regards the number of conditions; the £-point imposes bk(k~\~l) conditions, whereas the nodes would impose f k(k — 1), ile., bk (k + 1) + k (k — 1). It is an important fact that this equivalence does hold as regards the conditions imposed on adjoint curves; the pres¬ ence of the (k — 1) -point on the adjoint im¬ poses bk(k — 1) conditions, equal to the num¬ ber that would be imposed on the adjoint by bk(k — 1) separate nodes on /.

If the tangents are not distinct, the matter may become very complicated. The multiple point immediately revealed by the equation may be but one of a series of multiple points indefi¬ nitely close together, and the singularity then involves also multiple tangents. The determi¬ nation of the point-and line-components, the ((analysis of higher singularities,® has received much attention. If the singularities are re¬ garded as singularities of the equation, the question is properly considered from the alge¬ braic standpoint. At an ordinary point of the curve, y can be expanded in an ascending series of positive integral powers of x, provided x = 0 is not the tangent ; at a £-point the process is not directly applicable, it requires some modifi¬ cations, and then leads to k expansions, with exponents either integral or fractional. An ex¬ pansion with fractional exponents, whose L.C.D. is q, is accompanied by the q — 1 conjugate

♦During the last 30 years the whole theory of plane algebraic curves has been modified in important points by the influence of the theory of functions; in particular, this has shown the significance of the genus.

expansions, thus forming a cycle of order q (Puiseux). The integral expansion is a cycle, $<7=1$, and the &-point is represented by a num¬ ber of cycles of orders qi, q2, qz, … where $2<7$ = &. The number of cusps in a cycle is q — 1 ; this agrees with the known facts about the simple cusp (y = x2, y = — x2), and is ac¬ cepted as the algebraic definition of cusps. The algebraic definition of a node is indirect; v is determined so that 2v 3k shall be equal to twice the total number of intersections of all the branches (the discriminantal index of the singularity) ; it is proved that this definition yields always a positive integral value for v. (Chrystal, (Algebraˆ v. 2, 1889, pp. 359-371; Harkness and Morley, (Treatise on the Theory of Functions,5 1893, pp. 127-151; Brill-Noether Bericht, pp. 367-402 for full references; (Die Entwicklung der Theorie der algebraischer Functionen in alterer und neuerer Zeit) 1894).

The process as outlined above, dealing with the expansions as a whole, simply enumerates the components, algebraically defined, of a sin¬ gularity; it affords no clue to the structure. This structure can however be put in evidence by means of the critical exponents of the ex¬ pansions, those in whose denominators a new factor appears. These show that the dps are combined into certain multiple points, and thus they lead to an algebraic description of the sin¬ gularity. (Smith, H. J. S., (Proc. Lond. Math. Soc.,5 v. 6, pp. 153-182; 1876; Halphen, (Mem. pres, a l'Ac. des Sc. de Paris,5 v. 26, 1877; Zeuthen, (Math. Ann.,5 v. 10, pp. 210-220, 1876). A different treatment of the expansions, due to Noether, gives a clearer idea of the structure.

By a geometrical process, depending on the simplest Cremona transformation (see below), it is possible not only to enumerate the multiple points and lines contained in any singularity, but also to construct a penultimate form to indicate the arrangement of these components. (Scott, (Am. J. Math.,5 v. 14, pp. 301-325; v. 15, pp. 221-243; 1892-93).

The various processes lead to the following conclusions as to the content of a complex sin¬ gularity. The point-equation by its lowest terms gives the order, k, of the singularity ; the line-equation gives the class, /. If the singu¬ larity has all its tangents coincident (if it has not, it can be broken up into simpler ones) then order + class = number of intersections with the tangent at the point, and thus the

class is known without reference to the line-equation. Coincident tangents may lead to other multiple points, or to chains of multiple points, con¬ tained in the singularity; if the total number of dps in these is h, the singularity has h latent double points. It has also latent double lines, h' in number, and it has been proved that h' = h. The singularity of order k, class l, ex¬ cess h (supposed irreducible), involves \k(k — \) + h dps, of which k — 1 are cusps, and i/(/ — 1) + h dls, of which / — 1 are inflexional tangents. The singularity is equivalent to those components as regards Pliicker's equations and as regards the genus ; but not in the number of conditions imposed on the curve.

It is obvious that the multiple points of a curve cannot always be chosen arbitrarily. A sextic, e.g., can have 10 dps ; but these, chosen arbitrarily, would impose 30 conditions, whereas 27 determine the sextic. The 27 conditions cannot be imposed by 9 dps arbitrarily chosen,

for these would determine only the reducible sextic v2 = 0, where v is the cubic through the 9. If the 9 admit of a proper sextic, u =0, they allow one degree of freedom, for all curves u~\~kv2 = 0 satisfy the conditions. Hence the 9 are not arbitrary. The theorems of geometry on a curve, and linear systems of curves, lead to general results of this character, but there are evidently many special theorems as to the posi¬ tion of singularities to be formulated for curves of specified order or class.

By means of a birational transformation, either of the whole plane or of the one curve, it is possible to change any curve into one, in general of different order, with no point-singu¬ larities except simple nodes. Let P, (x, y, z) become P\ (x', y' , z') (represented on a second plane for distinctness), where x' , y', z are given by

x':y':z' = <pi(x, y, z):<p2(x, y, z):<pz (x, y, z); then corresponding to any point P of the first plane II there is one point P* of the second plane IV ; but the converse does not hold. The oo 2 straight lines of II', lx'--my'--nz'~ 0, corre¬ spond to the co 2 transformation-curves in II, l<pi + m<pi + n<P 3=0, of order o\ to a single point P' of IV, given as the intersection of two lines, there correspond in II all the k variable inter sections of two ˆ 's, Pi, P2,..., Pk ; the corre¬ spondence of the two planes is said to be ((/c-to-one,® (k , 1). Since the V s may have fixed points, simple or multiple, Ai, A2,... of orders pl, p2, ... , k may be less than ff2.

If k— 1, i.e., if one point of II corresponds to one point of IV, the equations of transformation are reversible ; not only is IV expressed ration¬ ally in terms-of II by these equations, but also II is expressed rationally in terms of IV by x:y:z — fi (x’, y’, z’):f2(x’, y’, z’) : (x\ y\ z’),

the reverted equations, which are of the same order o . The transformation is a birational transformation of the plane, usually called a Cremona transformation. In the simplest Cre¬ mona transformation the ps are conics through three fixed points; the equations of transforma¬ tion are therefore of the second degree; this is a reversible quadratic transformation. An im¬ portant theorem is that every Cremona trans¬ formation can be accomplished by a succession of these reversible quadratic transformations.

If «>1, the equations cannot be reverted; the transformation is not birational for the whole plane. But if Pi trace a curve F, P’ traces the corresponding curve F’ ; the points P2…P trace some curve, / (different from F), the com¬ panion curve of F. If we ignore all of II ex¬ cept F, that is, if we confine ourselves to the two curves F, F’, the correspondence becomes one-to-one; with the help of the equation F = 0 the equations of transformation can be reverted,, and the transformation becomes birational. Such a birational transformation of a curve is called a Riemann transformation. Thus a Riemann transformation is birational for the one curve only, while a Cremona transforma¬ tion is birational for the whole plane, and there¬ fore for every curve in the plane.

The importance of transformation is due to its effect on singularities. The fixed points Ai, A2, Az, … in II have no correspondents in II, but a point close to Ai in a determinate direction has a determinate correspondent, and if a point describes a small circuit about Ai, the corresponding point in IV describes a curve a*’,

rational and of order pi ; this is a fundamental curve of the second plane. If F passes k times through Ai, F' cuts in k points; if the k directions through Ai are distinct these points are all separate, and thus the multiple point on F is dissipated. If any of the k tangents at Ai coincide, F' has contact with ap, or it may have a multiple point on a / but of a less complex character than the original at Ai; and by repetitions of the process the singularity is made to disappear.

But new singularities may arise, due to fun¬ damental curves in the first plane. Such funda¬ mental curves might be defined by means of the reverted equations of transformation ; but as it is not usually convenient actually to form these (at least in the case of a Riemann transforma¬ tion), it is simpler to adopt an independent definition. An irreducible curve P that meets the transformation curves <j> only at their fixed points is a fundamental curve of the system ; all points on such a curve, /3, correspond to a single point B' of IF, or, more precisely, to points close to B' in different directions. If then F meets p in h points, Ff has at B' a multiple point of order h.

Finally, new multiple points, in general only simple nodes, arise on F' owing to the passage of F through associated points of the first plane (intersections of two 0's). Such passages are indicated by intersections of F with its com¬ panion curve /; hence they are in general in¬ evitable.

By either transformation, Cremona or Rie¬ mann, the multiple points on the given curve can be dissipated, whether the tangents are distinct or coincident. A Cremona transforma¬ tion-system, however, always has fundamental curves, whose number is equal to that of the fundamental points (Bertini, (Palermo Rendi-contiR v. 3, pp. 5-21, 1889) ; hence when F is transformed, new multiple points, possibly of high order, will arise unless the Cremona system is specially chosen. A Riemann transformation-system, on the contrary, need not have any fundamental curves, hence in general the new multiple points that arise will be simple nodes. A Riemann transformation, however, requires the elimination of x: y: z from the equations of transformation, of degree <r, together with F — 0, of degree m;

whereas a Cremona trans¬ formation is accomplished by the direct substi¬ tution of y, z'), iM*', y,

for x, y, z. (Salmon, (Higher Plane Curves,) chap. 8 in the German translation by Fiedler; also references at end; Scott, (Quart. Jour.R v. 29, pp. 329-381, 1898; v. 32, pp. 209-239, 1900).

When a curve is subjected to a birational transformation of either kind, Cremona or Rie¬ mann, the induced points of a group of inter¬ sections transform into the induced points of the transformed group; this affords one proof (Bertini) of the important theorem that two curves which are birationally connected are of the same genus. The converse is not true; curves of the same genus cannot necessarily be birationally transformed into one another. A curve of genus p depends in general on 3 (p — 1) characteristic constants, the so-called moduli ; if these are equal for two curves, then the two are birationally equivalent. (Clebsch-Linde- mann (Vorlesungen fiber GeometrieR 1876, pp.

709-720).

Closely connected with this is the trans¬

formation of a curve into itself. This however is more conveniently considered as an inde¬ pendent theory, that of correspondence of points on a curve. (Cayley, (Proc. Lond. Math. Soc.R 1865-66; no. 385, v. 6, Coll. Papers; c Phil. Trans.,) 1867-68; no. 407, v. 6, Coll. Papers; Brill, (Math. Ann.R v. 36, pp. 321-360, 1890; Brill-Noether Bericht, pp. 530—53 1) .

An entirely distinct class of investigations deals with the form of curves (topology, analy¬ sis situs). The method employed is usually variation of the coefficients, by which the curve is derived from a known reducible curve of the same order. In this manner Klein proved ((Math. Ann.R v. 10, pp. 199-209, 1876) that the numbers of the real singularities are con¬ nected by the relation

$$m + I + 2T' = n + K + 2Af,$$

where I, K, T', A' are the numbers of real inflexions and cusps, isolated tangents and iso¬ lated points, on a curve of order m, class n. Hence if the curve has no point-singularities, I + 2Tr — m (m — 2), from

which it follows, since i — 3m(m — >2), that not more than one-third of the inflexions of a non-singular locus can be real. Klein's relation has been proved algebraically by Brill ((Math. Ann.R v. 16, pp. 348-408, 1880), and extended to complex singu¬ larities. There is no corresponding restriction on the bitangents ; all may be real.

Topological theorems relate in general to the nature, number and arrangement of the dis¬ tinct parts (circuits) of a curve. The first divi¬ sion of circuits, due to von Staudt, is into odd and even, for the number of real intersections with an arbitrary line is always odd or always even. An odd circuit necessarily extends through infinity. Simple examples are the oval and the infinite branch of a bipartite cubic y2= =(x — a) (x — b) (x — c) ; but circuits may be much more complex. Let the minimum num¬ ber of real intersections with a straight line be called the index of the circuit. Zeuthen showed ((Math. Ann.R v. 7, p. 426, 1874) that a quartic may have a circuit of index 2, with two nodes; Cayley showed ((Phil. Mag.R v. 29, 1865; no. 361, v. 5, Coll. Papers) that a sextic may have a circuit of index 2, without multiple points. It has been proved (Scott, (Trans. Am. Math. Soc.R v. 3, pp. 388-398, 1902) that for every order m there exists a curve (/> = 0 or 1), composed of a single circuit of index m — 2, or nt — 4, m — 6, down to 0 or 1, according as m is even or odd ; any such circuit of index k can be produced by a simple process of linking from k odd circuits. The Zeuthen quartic circuit finds its place in this category; it is due to the linking of two odd circuits ; but the non-singu¬ lar sextic circuit is entirely different in char¬ acter, and a general theory of such circuits is still to be suggested.*

The possible number of circuits is p + 1. (Harnack, (Math. Ann., 5 v. 10, pp. 189-198, 1876) ; for every order m there exist curves with this maximum number of circuits, and with every smaller number.

The question of arrangement has been con-

*For connection with symmetric Riemann surfaces con¬ sult Klein, 'Math. Ann', v. 7, pp. 558-566, 1874; v. 10, pp. 415, 416, 1876; iiber Riemann's 'Theorie der algebraischen Functionen und Ihrer Integrate, ' 1882; pp. 60-69 in F. Hardcastle's translation, 'Lectures on Mathematics' 'The Evans¬ ton Colloquium' 1894, pp. 30-32; Harkness and Morley, 'Treatise on the Theory of Functions,' pp. 274-276.

sidercd only with reference to circuits that can be projected into the finite circuits, the so-called ovals. Hilbert ((Math. Ann.,) v. 38, pp. 115-138, 1891) discussed curves with “nested ovals, whose simplest type is the annular quartic, com¬ posed of one oval inside another; the number of nested branches cannot exceed £(m — 2) or i(m — 3), according as m is even or odd; more¬ over, non-singular curves with the maximum number of circuits and the maximum number of nested ovals do exist.

Hilbert draws attention to the arrangement of the 11 ovals of a non-singular sextic (/> = =J10); he states that one of these must lie inside another (p. 118). It appears highly probable (V. Ragsdale, (Bull. Am. Math. Soc.,* v. 11, p. 464, 1905) that this unproved theorem of Hilbert’s is the simplest case of a general law in accordance with which at least i(<7 — 1)

(q — 2) of the circuits of a non-singular curve of order 2q must lie inside some of the remain¬ ing q2 + i(q— 1) (q — 2).

Thus as regards circuits the only question completely solved is that of the possible number; their nature, their arrangement as regards one another, or as regards the straight lines of the plane (on which depends the answer to the inquiry whether all the even circuits can be projected simultaneously into the finite), have been hardly touched upon, though there must be many interesting results awaiting discovery.

Although the general theory of polars be¬ longs properly to the theory of algebraic forms, it supplies convenient expression for some geo¬ metrical facts. The first polar of x, y, z is the curve of order m — 1, J/ = 0, where A

d d d

denotes the operator x’rr- --y’ r- +2’ r-‘ A

dx dy dz

second operation with A produces the second polar, A2f = * 0, of order m — 2, and so on; thus any point has m — 1 polars, of which the last two are the polar conic and polar line. The polar conic of a dp is simply the pair of tan¬ gents ; the polar conic of an inflexion consists of the inflexional tangent together with another line which does not pass through the inflexion ; thus in both cases the polar conic has a dp. It is easily proved that if the polar conic of B has a dp A, the first polar of A has a dp B. This suggests three derived curves : the locus of points A, the Steinerian, of order 3(m — 2)2; the locus of points B, the Hessian, of order 3(m — 2); the envelope of the line AB, the Cayleyan. Thus, e.g., the curve by which the points of inflexion are determined, the Hessian, is geometrically defined; every point is in a known geometrical relation to /. On the other hand, though it is known that a curve of order (m — 2) (m2 — 9) can be passed through the points of contact of the bitangents., no geometri¬ cal definition of* any such curve has yet been formulated. The curve is of course not unique ; what is needed is a geometrical definition of some one curve that shall meet f only at these points of contact, and at the multiple points, in such a manner as to account for the whole number of intersections. (Cayley, (Coll. Papers, > v. 11, pp. 471, 473).

The metric properties of a curve are im¬ portant in particular questions, though not in the general theory. The curve has m points at infinity; at each of these there is a tangent, which is an asymptote unless it lies entirely at

infinity. Consequently for every noil-repeated direction to infinity there is an asymptote ; for a repeated direction there may or may not be asymptotes. A twofold direction, e.g., may be accounted for either by contact with the straight line at infinity, with no asymptote, or by a dp at infinity, with two asymptotes, dis¬ tinct or coincident. A branch that has a real asymptote is called hyperbolic ; a branch that has contact with the straight line at infinity, whether at a single point or at a multiple point, is called parabolic.

The curve has n imaginary tangents from each of the circular points; these by their inter¬ sections determine the n2 foci, of which n are real (Pliicker's definition, 1833) ; but the num¬ ber of foci is diminished if the curve passes through the circular points or touches the straight line at infinity.

There is a theory of diameters; these are the polars of points at infinity. The polar line of a point at infinity is the locus of the mean centre of the m intersections of the curve with chords through the point (proved by Newton for cubics) ; this property of a diametral line is analogous to the bisection property of a diam¬ eter of a conic. The other polars (curvilinear diameters) also can be explained in terms of the segments of the chords. (Salmon, H. P. C., chap. 4).

The first enumeration of varieties of a curve of any order beyond the second is Newton's 'Enumeratio linearum tertii ordinis) (1706). He proves that all the 72 varieties (it should be 78) can be obtained by projection from the five types of cubic with an inflexional tangent at infinity (divergent parabolas), bipartite, uni-partite, crunodal, acnodal and cuspidal. Simi¬ larly when once the distinct types of a curve of any order have been enumerated, the varie¬ ties can be obtained at once. There are 144 types of quartic (R. Gentry, (On the forms of plane quartic curves,* 1896) ; the number for higher curves, even for quintics, must be very-great. It does not appear that any special purpose would be served directly by the enumera¬ tion of these, though there are matters of in¬ terest on which this might throw light. For example, the theory of the inflexional tangents of a cubic has. been thoroughly worked out; suitably taken in threes they determine three inflexions on a straight line; the three tangents and this line form a framework for the curve. As regards quartics, a closely corresponding theory is that of the bitangents; suitably taken in fours, these determine sets of eight points on the quartic, each set lying on a conic ; the curve is conveniently referred to the four bi¬ tangents and the conic. What is the generaliza¬ tion of this? Even for the quintic, this is as yet unknown.

A more profitable classification of curves is according to their genus, and the values of the 3(p — 1) characteristic constants, or moduli. Rational (/> = 0), elliptic (/> = 1), and hyper-elliptic curves (which include among others all curves with p~2) have been extensively treated.

(Clebsch-Lindemann, pp. 883-903, 903-915, 915— 923; also 711-712, 717-720; Loria, <11 passato ed il presente delle principali teorie geome-triche, * 2d edition, 1896, pp. 76-79 for refer¬ ences).

Investigations on special classes of algebraic

‘curves are too numerous to mention; in par¬ ticular, bicircular quartics and cartesians (with nodes, or cusps, at the circular points) have a literature to themselves. The Steiner curve, or deltoid (hypocycloid with three cusps), is perhaps the most interesting individual among algebraic curves, on account of its geometrical properties. (Loria, (I1 passatoF etc., pp. 61-76).

If a curve has an equation that cannot be expressed in finite algebraic form it is said to be transcendental. Algebraic and transcend¬ ental curves, however, are by no means as widely separated as this would suggest; e.g., the equation r = sin b& represents curves which are algebraic when b is rational, transcendental for all other values of b. Thus the algebraic curves of the series bear to the whole series the relation that is borne by rational numbers to all numbers; they are isolated members, whose number is insignificant. The same is probably true of all algebraic curves ; they are isolated members of transcendental families. It is not surprising, therefore, that there is as yet no general theory of transcendental curves. Results proved for algebraic curves by means of the whole equation (e.g., Pliicker’s equations) are not applicable to transcendental curves, which from one point of view are of infinite order; while results that depend only on a small arc are in general applicable. Such knowledge as we have of transcendental curves is obtained from metric investigations of special curves.

Among these special curves, one of the most important divisions is that of roulettes. A roulette is traced by a point attached to a curve, which itself rolls without sliding on a fixed curve. A point on the circumference of a circle which rolls on a straight line traces a cycloid ; if the circle rolls in or on a circle the roulette is an epicycloid or hypocycloid. If the point is not on the circumference of the rolling circle, the curve is a trochoid, epitrochoid or hypo-trochoid. The epicycloid or hypocycloid is algebraic if the radii of the two circles are com¬ mensurable. An important theorem, due to Descartes, is that the normal to a roulette at any point passes through the corresponding point of contact of the rolling curve with the fixed curve.

Some of the best known of the transcend¬ ental curves are the spiral of Archimedes, r = a&; the hyperbolic spiral, r^^a; the logarithmic spiral, r = a&, which cuts all its radii vectores at a constant angle; the logarith¬ mic curve, y = ax, or x = in log y, which is note¬ worthy on account of the curious discontinuity of the negative branch (Salmon, H. P. C., chap.

7) ; the catenary, y = — (* *j* e

)

the form as¬

sumed by a chain hanging from two points of sup—

C-fiv /£ 2 - y2 _

port; the tractrix, x = c log — — - — — yj ci — y»

which cuts all the tangents to the catenary orthogonally; this curve is of special interest on account of the use made of it by Beltrami ((Saggio d'interpretazione della geometria non-euclidea,* 1868). (For detailed references con¬ sult Loria, (Spezielle algebraische und transscen-dente ebene Kurven,* trans. by Schiitte, 1902).

All the curves hitherto mentioned have tan¬ gents, which vary continuously from point to

point ; but there are curves, graphical repre¬ sentations of certain functions, which differ in this respect. A curve may have a tangent at every point, which yet may not vary contin¬ uously; e.g., <(polygonal lines," y = J f(x)dx,

where f(x) is a certain arithmetic function; such a curve is composed of a number of seg¬ ments of straight lines. (Grave, (Compte-rendusF v. 127, pp. 1005-1007, 1898).

There are curves which are continuous, and yet have no definite tangents ; the classic ex—

n = °°

ample, due to Weierstrass, is y = ˆbn cos an Xtt,

n = 0

(Wiener, <Crelle,) v. 90, pp. 221-252, 1881). The explanation of the impossibility of assign¬ ing the tangent at any point is that in any finite interval the curve makes an infinity of oscilla¬ tions.

Another possible deviation from the natural idea of a curve was discovered by Peano ((Math. Ann.,> v. 36, pp. 157-160, 1890). He shows that it is possible to construct functions <H0» (0 of a single variable such that the points x = i > (t), y — <j > {t) occupy all positions inside a given square; thus a curve can cover a plane area. (For detailed discussion of such curves, consult E. H. Moore, (On Certain Crinkly Curves, } trans., Am. Math. Soc., v. 1, pp. 72—

90, 1900).

These examples show clearly that the most general idea of a curve is far removed from the comparatively simple idea first presented in analytical geometry. The definition at present accepted of a plane curve without multiple points, due to Jordan and Hurwitz, has been thus expressed in English (by Osgood) : <(A set of points which can be referred in a one-to-one manner and continuously to the points of a segment of a right line, inclusive of the ex¬ tremities of the segment, if the curve is not closed, and to the points of the circumference of a circle if the curve is closed.” (Hurwitz, (Verhandlungen des ersten internationalen Mathematiker-Kongresses in Zurich,) 1897, pp.

102, 103).

Charlotte Angas Scott, Professor of Mathematics , Bryn Mawr College.

(In French, courbes gauches; in German, Curven doppelter Krummung) . A curve whose points do not all lie in a plane is variously called space curve, twisted curve, tortuous curve or curve of double curvature. The sig¬ nificance of the last-named designation be¬ comes apparent in the description of the ele¬ ments which enter the theory of the curve. There are two ways of regarding the curve : first, as given immediately and in all its ex¬ tent by the intersection of two surfaces — a purely geometric conception ; second, as arising kinematically through the continuous move¬ ment of a point. The first conception leads to the analytical formulation of a curve as the locus of points whose Cartesian co-ordinates satisfy two equations, the equations of the in¬ tersecting surfaces

(l) y > M* > y, ^) = o.

The second conception leads to the expression of the Cartesian co-ordinates .r, y, z as func-

tions of a variable magnitude u called the parameter :

(2) X — <j>(u), y — x{u), z =

a form of representation called the parametric representation of the curve. To the continuous succession of values of u corresponds the con¬ tinuous succession of points of the curve.

It is known that not every curve in space is the complete intersection of two surfaces, and therefore (1) and (2) are not always equiva¬ lent forms. In fact, when the three equations (2), defining a curve, are transformed to the two equations (1), the latter often furnish curve branches in addition to the original curve. The parametric representation is, in many im¬ portant respects, preferable to the first form, and such equations and formulas as are here¬ after used will have reference to this form.

The subject matter may be conveniently di¬ vided into four parts : first, the determining elements of an infinitely small portion of the curve in the neighborhood of any point P of the curve ; second, the character of the curve as a whole and the associated curves and sur¬ faces ; third, special curves and their derivation from given properties; fourth, classification, miscellaneous matters and the literature of the subject.

1. The Elements of the Curve at a Point.

— The consideration of two points, of three points and of four points of the curve conducts immediately to fundamental elements.

The tangent at P is the limiting position as¬ sumed by the right line through P and a neigh¬ boring point Pi of the curve as Pi moves along the curve toward coincidence with P. It is convenient to say that the tangent at P is the right line through P and Pi, Pi being infinitely near or consecutive to P , but it must be remem¬ bered that this and similar expressions which will be used further on are only abbreviations and figures of speech.

The single infinity of lines through P per¬ pendicular to the tangent are normals to the curve and define the normal plane of the curve at P. Every plane through the tangent is a tangent plane at P. A plane

passing through P and two neighboring points of the curve assumes in general a limiting position at P as the two neighboring points move along the curve toward coincidence with P. This is the plane of osculation at P and may be described as the plane determined by three consecutive points P, Pi, P2. It is the tangent plane at P wdiich has the closest contact with the curve.

The plane through the tangent perpendicular to the plane of osculation is called the plane of rectification at P. The normal plane, the plane of osculation and the plane of rectification are mutually at right angles and constitute the principal planes of the curve at P. Their in¬ tersections are three lines through P : the tan¬ gent, which is the intersection of the plane of osculation and the plane of rectification ; the principal normal, which is the intersection of the normal plane and the plane of osculation ; the binomial, the intersection of the normal plane and the plane of rectification. The three lines form a configuration called the principal triedral at P.

Of importance in the theory is the circle of curvature, namely, the limit circle defined by the fixed point P and two variable points Pi,

P2 as the variable points move along the curve" toward coincidence with P. It is referred to as the circle through three consecutive points P, Pi, P2 and obviously lies in the plane of osculation at P. Its centre, radius and the reciprocal of the radius are called respectively the centre of curvature, the radius of curvature and the curvature of the curve at P. Relative to the name, curve of double curvature, the cur¬ vature here described is properly first curva¬ ture, but it is customary to omit the word "firsts The second curvature, to be noted shortly, is usually referred to as torsion.

Four points not in a plane determine one sphere. Through P and three variable points of the curve a sphere may be passed, which, when the variable points come into coincidence with P, becomes the sphere of osculation at P. It will be subsequently seen that its centre and the centre of first curvature are on a line paral¬ lel to the binormal at P.

The further development of the theory will employ the methods of the differential geom¬ etry in preference to limit processes. The ele¬ ments already defined, when taken in pairs, give rise to new elements. The normal planes at the consecutive points P and Pi intersect in a line passing through the centre of curvature of P and parallel to the binormal of P. It is called the axis of curvature of the curve at P. The

planes of rectification at P, Pi intersect in the line of rectification at P. This line passes through P, makes an angle with the binormal of P and is perpendicular to the principal nor¬ mals of P and Pi. The planes of osculation at P, Pi intersect in the tangent of the curve. The principal normals at P and Pi do not intersect, nor do the binormals of P and Pi. The con¬ secutive tangents do intersect in a point of the curve.

The Two Curvatures, or Curvature and Torsion. — As a point moves on the curve, the tangent continually changes its direction, as does also the plane of osculation : the first marks the tendency of the curve to depart from a right line, and the second the tendency to depart from a plane. Measures of these tendencies at a point P are defined as follows: If PPi be an infinitely small arc of length ds, and d e the in¬ finitely small angle between the tangents at P and Pi; and dr the infinitely small angle between the planes of osculation at P and Pi or, what is the same thing, the angle between the binomials

of P and Pi; then the ratio ~ is called the

as

curvature of the curve at P, and the ratio ˆ

ds

is called the torsion of the curve at P. The angles de and dr are called respectively angle of contingence, and angle of-torsion at P. This point of view of curvature leads at once to the circle of curvature previously described. The dc

ratio — has the same value for the curve and ds

the circle at P, and if R designates the radius of the circle, there results curvature at a point

1 de

= R ~~ds’ °^er hand, there is no circle

of torsion connected with the curve, and it is only by analogy that the term radius of

torsion , T, is defined to be the reciprocal of the torsion. Expressed in equational form, torsion

. >. • , 1 dr

at a point = — = —

T ds

A third curvature is sometimes regarded, but merely as a convenience. It is the limiting ratio oi the infinitely small angle d n between the principal normals at P and Pi to the arc ds. It is in a sense the resultant of the other two cur¬ vatures, and has received the name of entire curvature. The angle dn is called the angle of entire curvature. Entire curvature is not an independent curvature, for, as will shortly be seen, its angle di c is a function of the other two through the equation diP = de* + dT*m

Before clothing the foregoing definitions in analytical garb, it is necessary to adopt conven¬ tions as to the signs of directions and to com¬ plete the notation. Of the two directions on a curve, that is taken as positive which corre¬ sponds to increasing values of u. The positive direction of the tangent is taken to coincide with the positive direction of the curve, and the di¬ rection cosines of the angles the positive tangent makes with the positive directions of the co-ordi¬ nate axes x, y z are designated by «i, A, yx, re¬ spectively. The positive direction of the princi¬ pal normal is the direction from P toward the centre of curvature, and its direction cosines are designated by a2, A* y2. The positive direction of the binormal is so taken that it is directed with respect to the positive tangent and positive principal normal as the positive z axis is di¬ rected to the positive x axis and positive y axis. Its direction cosines are represented by a3, /3a, y*.

A table conveniently exhibits these relations :

y

z

Tangent .

«i

A

7i

Principal normal .

a2

A

72

Binormal .

a3

A

7s

In the elements of solid analytic geometry, it is shown that the determinant of the nine di¬

rection cosines equals 1, *i.e.*

fli A 7 1

<h A y2 a3 A 7a

and that each constituent is equal to its co¬ factor. For example, a2 = y iA — 7s A-It is also a theorem of the elements of analytic geome¬ try of space, that if a straight line varies its direction infinitely little, say by an angle dw, and if l, m, n are the direction cosines of the first position, and l + dl, m + dtn , n~\~dn are the direction cosines of the second position, that dzs/^dC + dnC-Cdn2. It has immediate applica¬ tion in the two curvatures.

Taking over from the calculus the value of dp and differentiating,

(3) ds2 = dx2Jrdy2Jrdz2,

ds d2s = dx d2x-\~dy d2y~\~dz d2z.

The analytical side of the foregoing develop¬ ment is now easily formulated. All equations which follow and which contain the variables x, y, z and their differentials dx, dy , dz, d2x, d2y, d2z, ds, d2s may be expressed in terms of the parameter u and its differential du by means

of equations (2), the equatio'ns resulting from their differentiation, and equations (3).

One has immediately from the definitions of the elements at the point P(x, y, z; u)

(4)

dx r. dy dz

ai = = d? A = &*

hence, for the equations of the tangent, £ — x v — y C — z

(5)

dz

dx dy and for the normal plane,

(6) (f — x)dx + (v — y)dy -f (C — z)dz = 0.

The symbols £, v, C represent here and sub¬ sequently the current co-ordinates of the points of line, plane, *etc.*

In determining the constants L, M, N, Q so that the plane LC + Mv + AC + Q — 0 passes through the point x, y, z, and the infinitely near points x~\~dx, y+dy, z~\~dz, and x+2Ar+ d2x, y--2dy--d2y, z--2dz--d2z, one obtains (£ — x) (dy d2z — dz d2y) + (v — y) (dz d2x — dx d2z)

+ (C —z) (dxd2y — dy d2x= 0, or, in putting for convenience

(7) A=dy d2z — dz d2y, B=dz d2x — dx d2z,

C=dx d2y — dy d2x,

the equation of the plane of osculation in the form

(8) A(Z — x) + B(v — y) +C(C — z)=0.

This at once gives

A B

(9) at = v A: -

\A42 + B2 + O

VA2 + B2 + C2

C

\JA2 + B2 + C 2’

and for the equations of the binormal

(10) v-y

From the determinant of the direction co¬ sines one has

(110 Oj = 7iA — 73 A. A = ai7a— «a7i,

7i— Aa3 — Aai»

and hence, by virtue of (4) and (9),

Bdz — Cdy „ Cdx — Adz

(11)

ds\/A2 + B2 + C2

Ady — Bdx

, A —

dsV A2 + B2 + C2’

7*:

dsˆf A2 + B2 + C2‘

The equation of the plane of rectification is (12) (Z—x) a,- f (v—y) AT

(C —z) 72 = 0,

and the equations of the principal normal are

(,3) = =

(h A 72

Applying to curvature the theorem relative to the infinitely small change in direction of a right line, one has de2 = da\2 + dA2 + dyi2, whence, in differentiating (4) and employing (3) in the reduction,

1 de2 A2 + B2 + C2

(14) (curvature) ~

and also

. , Bdz — Cdy JO Cdx — Adz

(15) da > = dsl , dik = —s

Ady — Bdx

ds 6

dyi =

ds 3

A comparison of (11), (14) and (15) gives

/ * f\ i ~t dai n p dfii _ p d yi

(16) P’=R~df’ r‘-RJ7

When the arc s is the independent variable, that is, when u — s, equations (14) and (16) take simple forms,

c u

R2 “

d2x d2y ds 2 ds 2

o _ R d2y

d2z . ‘~Ts2 ’

y2 = R

d2z

ds 2

Applying the same process to torsion dT2 — da32 + d(3 32 + dy32, and a differentiation of (9) gives

Bdz — Cdy Ad3x -f-Bd3y + Cd3z

V A2 + B2-h C2 A2 + B2 + C2 Cdx — Adz Ad3x + Bd3y + Cd3z
V-42 + B2+ C2 A2 + B2 + C2 Ady — Bdx A d3x + Bd3y -fi-Cd3z yj
A2 + B2 + C2 A2 + B2 + C2

A d3x --Bd3y + Cd3z

of a determinant, is

da3 — -

(17) d/3, = -

dy3 = - whence

(18) torsion _ A* + B2 + C2

The radical V A 2 -f-B2 + C2 is to be taken

throughout with positive sign. The numera¬ tor in the value of torsion, written in the form

dx dy ds

d2x d2y d2s , and its evanish-d3x d3y d3s

ment for all values of u is the necessary and sufficient condition that the space curve is in reality a plane curve. If it vanishes only for isolated values of u, the planes of osculation at the corresponding points are stationary, that is, the plane of osculation does not tend to change in passing to the consecutive point. Curvature and therefore R are always taken positive. This, however, is not the case with torsion; its sign may be positive or negative and is deter¬ mined without ambiguity in the foregoing equa¬ tion. A space curve is said to have a right (left) twist at P if it appears to an observer, standing at P on the plane of osculation (either side) and looking in the direction of the centre of curvature, to rise from left (right) to right (left) through P. The above formula, with this definition of twist, associates right twist with positive torsion and left twist with negative torsion.

The Frenet Equations. — These are nine very important equations in which the quotients of the differentials of the direction cosines of the lines of the principal triedral divided by ds, are expressed in terms of the direction cosines and R and T. Six of these equations are already at hand : from (16)

, ˆ ˆ da i a2 d j3 2

ds R ds R

from (11), (17) and (18)

df3 3 A

dyi

ds

2 y ■

R

. *A. da3 a<i* ^ o / .

dT = T’ d7 = t’ ^

dyz _

ds ~ T

from (IT) by differentiation, with substitutions from (19) and (20),

. . dxh ai_ fp_ dfi 2 /5i_ fh_

ds iF T’ ds~ R T’

dyi

ds

A

R

y 3

The equations were also given later by Serret and are sometimes called by his name. They are particularly used in the differentiation of equations, and are of importance in questions relating to the determination of curves with assigned properties.

2. The Curve and Its Associated Curves and Surfaces. — There are four ruled surfaces on which the space curve lies and a fifth ruled surface on which it does not lie, to all of which surfaces it sustains special relations. The tan¬ gents at all the points of the curve constitute the tangential surface of the curve. This surface consists of two sheets with the space curve as a sharp edge. A normal plane at P intersects the two sheets of the surface in a curve which has P as a cusp point. The space curve is the locus of intersections of consecutive tangents and is called the edge of regression of the tan¬ gential surface. The surface is a developable surface,1 namely, one which could be supposed laid down in a plane without stretching. To the space curve there is an infinity of involutes all lying in the tangential surface. One may imagine a string stretched on the curve and so unwound that the part continually being freed from the curve remains tangent to the curve; each point of the string will describe an involute on the tangential surface to which the space curve is an evolute.

The locus of the binormals of the curve is called the surface of the binormals. It is a non-developable or skew surface.1 The infinitely small arc element is perpendicular to the bi¬ normals at its extremities, whence it follows that the space curve is the line of striction1 of its binormal surface.

The locus of the principal normals is a skew surface and is called the surface of the principal normals. The space curve is an orthogonal trajectory of the right lines of the surface and is also an asymptotic1 line of the surface. This latter property follows from the fact that the planes of osculation of the curve are tangent planes to the surface at the points of the curve.

The locus of the lines of rectification is a developable surface and is called the surface of rectification of the curve. It owes its name to the circumstance that when it is developed in a plane, the space curve is transformed into a straight line. From this it follows that a space curve is a geodesic1 on its surface of recti¬ fication. That the space curve

passes into a straight line when the surface of rectification is developed in a plane is readily established from the Frenet equations (21). The angle between two consecutive planes of rectification, dt c, vanishes in the development of the surface, or dr.2 = dai2 T d(3i2 -j- dy32 = 0. Writing (21) in the form da2 = — aˆe — a3dr, d(32— … , dy2 = = … , squaring and adding, there results de2 + dr2 — 0, or de = 0, dr = 0. As the angle of contingence is zero, the consecutive tangents of the developed curve coincide, and the curve is a straight line.

The fifth ruled surface is the locus of the axes of curvature. It is a developable surface, not containing the curve, but containing the curve of centres of curvature and also the curve of centres of the osculating spheres. The surface bears the name of polar surface, or evolute surface. The axis of curvature is some¬ times called polar axis and hence the name polar surface. To the space curve as an involute there

is an infinity of evolute curves all lying on the polar surface, and hence the name evolute surface. If one imagined-a string stretched freely on the polar surface with one extremity at P of the space curve, the part of the string on the surface would lie in one of the evolutes of the space curve. Further, if two strings were supposed joined at P, each lying on an evolute, and the two strings then unwound from the polar surface, the point P would describe the space curve, and the angle between the strings at P would remain constant in the mo¬ tion. The polar surface is the common surface of rectification of all the evolutes, and these curves are, accordingly, geodesics of the surface.

The curve of centres of curvature is the in¬ tersection of the polar surface and the prin¬ cipal normal surface. Its equations are (22) £ = x + Rat, v = y + Rfc, C = z + Ryt.

Those of the axis of curvature are

£ = * + Ra2 + m3, rj = y -f-Rfo + v/J,,

£ = z + Ry* + vyh

for u constant and v variable. If u is regarded as variable as well as v, the equations define the polar surface. Two consecutive axes of curvature, say the axes of P and Pi, intersect in a point of the edge of regression of the sur¬ face, but the point as a point on the first axis is equidistant from P, Ph P2, and as lying on the second axis is equidistant from Pi, P2, P 3, and is therefore equidistant from P, Pi, P2, P», or is the centre of the osculating sphere at P. The edge of regression of the polar surface is the locus of the centres of the osculating spheres of the space curve. Analytically treated the problem gives for the equations of the locus of centres of the osculating spheres :

(23) Zˆx + Ra, — V C = 2 + Ry j

y + Rfi* — ˆ

dR

dr

y«,

and for the radius, r, of the sphere

(24)

There is a complete reciprocity between a space curve and the edge of regression of its polar surface when, and only when, the space curve is a curve of constant curvature, i.e., R — constant. Equations (23) reduce to (22), showing that the curve on the polar surface becomes the locus of the centres of curvature of the space curve. Some of the relations be¬ tween the two curves when R = constant are here stated: Each is the locus of the centres of curvature of the other with the same con¬ stant curvature; the tangent of the one is the axis of curvature of the other; the correspond¬ ing plane of osculation of the one is the normal plane of the other; corresponding planes of rectification are parallel; angle of contingence of the ope equals angle of torsion of the other. The last two properties hold also when R is not constant.

If a space curve is spherical, its polar surface will be a cone with vertex at the centre of the sphere, and the polar edge of regression reduces to a point, the centre of the sphere. G G are, accordingly, constants for all values of u, and their differentials are zero. The differen¬

tiation furnishes Rdr 4-d

(£)-«

as the neces¬

sary and sufficient condition for a spherical curve.

Spherical Depiction. — Each point of the space curve is co-ordinated with a point on the surface of a unit sphere in a definite manner. Assume a sphere of radius one with centre at the origin of axes, and draw a radius to a point p of the surface parallel to the positive direction of the tangent at the point P of the curve. The point p is the spherical image or picture of P with respect to the tangent, and the picture of all the points of the space curve is a curve called the spherical indicatrix of the space curve with respect to the tangent. Simi¬ larly, there are spherical images with respect to the principal normal, binormal, *etc.* Such depictions lead to problems concerning the deter¬ mination of curves with given spherical images.

Intrinsic Equations. — A space curve is com¬ pletely determined as to its form, though not as to its position in space, when curvature and torsion are given in terms of the arc s of the curve. Two equations of this character are called the intrinsic equations of the curve. To pass from the intrinsic equations R~f(s), T—g(s) to the parameter representation re¬ quires the integration of a differential equation of the Riccati form. A discussion of the prob¬ lem is given in Darboux, Vol. I, and in Scheffer, Vol. I (see paragraph on literature of subject). Curvature and torsion do not change in value when the curve is moved about hi space, nor do the successive derivatives of curvature and tor¬ sion with respect to s change in value. These quantities and all functions of them are called differential invariants with respect fo all move¬ ments of the curve in space.

3. Special Curves. — The curve of constant

curvature, ˆ = constant, has already been

spoken of. It is obvious that in the devel¬ opment of the tangential surface in a plane, the curve transforms into a circle. Any curve of this class of radius of curvature R is given by the equations

no,

RJpdd,

vdO ,

in which A, g, v are any three functions of that satisfy the two equations,

(25) A* + ˆ + v* = l,

dA

no

$$+$$

$$(\%)' + (\%)' =$$

0

1.

Direct differentiation of the equations of the curve will show that
A = alf *i* = 31(v—yu and d0 = de.

1

The curve of constant torsion ˆ — constant

is defined by the equations

=T j W - v!) y=Tf We - *%) ieZ=TJW>- 4)de'

where A, g, v are functions of 0 satisfying the conditions (25). Again, direct differentiation of the equations shows A=a3, /*=/?», ^~y», and dd—dr. Examples of curves of constant tor¬ sion are furnished by the asymptotic curves of surfaces of constant negative (Gauss) curva¬ ture.1 This theorem was established by Enneper, Gottinger Nachrichten, 1870,

The curves in which the ratio of curvature

r .

and torsion is constant,-ˆ — constant, are helices,

namely, curves on cylindrical surfaces that intersect all the right-line generators of the sur¬ face under a constant angle. Such a curve is a general helix. When, however, both curva¬ ture and torsion are constant, the curve becomes the ordinary helix, i. e., the helix on a right cir¬ cular cylinder. A helix passes into a straight line when the cylindrical surface is developed in a plane. The cylindrical surface is its surface of rectification, and the right-line generators are the lines of rectification. The helix is, accordingly, a geodesic of the cylindrical sur¬ face, and this property itself could be taken as the definition of a helix. The principal normals are all parallel to a plane perpendicular to the generators of the cylindrical surface. The original sources on the subject of the helix are Puiseux, Journ. de Math. (Vol. VII, 1842) ; Bertrand, Journ. de Math. (Vol. XIII, 1848).

Bertrand found that if a curve is of such a character that there exists between its curva¬ ture and torsion a linear relation with constant

coefficients, -f- ˆ= =1, there is one, and only

one, other curve which has the same principal normals as the first. The length on a principal normal between corresponding points of the curves is constant. The associated curves are called Bertrand curves. The theorem suffers exception when the curvature and torsion are both constant, namely, in the case of the ordi¬ nary helix. Here there is an infinity of Bert¬ rand curves, all helices on the common principal normal surface. Bertrand, Journ. de Math. (Vol. XV, 1850) ; J. A. Serret, Journ. de Math. (Vol. XVI, 1851).

The ordinary helix holds, relative to space curves, a position somewhat similar to that held by a circle relative to plane curves. The circle is the curve of constant curvature (tor¬ sion =0), and the ordinary helix is the curve of constant curvature and constant torsion. At a point of a plane curve, one circle may be passed having contact of the second order with the curve, or, as one may say, the circle and curve have three consecutive points in common, and, in general, no

more than three points. It is the circle of osculation of the curve. Through three consecutive points, P, Pi, Pi of a space curve a single infinity of ordinary helices may be passed, but in general they will not have more than the three points in common with the curve. All elements that depend on three consecutive points are common elements of the curves, viz., tangent, plane of osculation, principal normal, circle of curvature, at P. Among the helices is one whose principal normal at Pi coincides with the principal normal of the space curve at the same point. This helix has the same tor¬ sion and curvature as the space curve at P, and is called the osculating helix of the space curve at the point P.

The length of a finite portion of a curve de¬ fined by equations (2) rests upon the evaluation of a definite integral. If on the arc lying between M and P points are marked in suc¬ cession proceeding from M toward P, viz., M, Qi, Qi,…Qn — i ,P, and the chords MQi,QiQi,… Qn — i ,P are drawn, there will be formed an

inscribed polygon, the length of which will vary with the number of inscribed points and their position. But if fhe number of sides of the polygon be indefinitely increased, and each side be indefinitely diminished, the length of the polygon will approach a definite limiting value. This definite limiting value is defined to be the arc length from M to P. If M corresponds to the parameter value u = iio, and P to the general value u, the arc length s is the definite integral

Whence by differentiation the linear element of arc is

dvJ = dx 2 -f-dy2 -f-dz2

The foregoing theory of the space curve con¬ tains implicitly the assumption that the arc element ds is not zero ; an assumption which holds for all real curves. In dropping the con¬ dition that ds may not be zero, one is led to certain imaginary curves defined by the dif¬ ferential equation

: ©’+ ©’+ ©-■

These curves are called minimal curves and are either minimal right lines or minimal twisted curves with tangents that are minimal right lines. The right lines

x = ai--biU, y = aiJrbiU, 2 = az~-bzii satisfy the above differential equation when bj + bf + bz2ˆ.

The values of the constants bi, bi , bz, taken subject to this condition, furnish a single in¬ finity of minimal right lines lying on an imagi¬ nary cbne with vertices at the points (alf a2, a*) . The intersection of the cone by the plane of infinity is the imaginary circle at infinity. The minimal lines through any point of space are the lines joining the point to the points of the imaginary circle at infinity. The twisted mini¬ mal curves are all represented by the equations

x = \(\— u2)f" (u) + uf'(u)— *(w), y = -j(1 + «2)"* («0 —iuf' (u) + if (u), z = uf" (u) — f' (u).

The accents indicate differentiation with respect

to u ; i = V — 1 ; and f (u) is a function of the complex imaginary variable u. f(u) is restricted only in that its third derivative must not be zero. Elements of the curve which do not essentially rest on ds can be obtained in the usual way, viz., tangent, plane of osculation, *etc.* As the plane of osculation contains two consecutive tangents, it touches the imaginary circle at infinity. The tangential surface of the minimal curve accordingly circumscribes the circle at infinity. Inversely, a minimal curve can be defined as the edge of regression of a developable surface circumscribing the imagi¬ nary circle at infinity. The introduction of the minimal right lines and the imaginary circle at infinity enables one to express certain metric relations in projective form. The minimal curves find very elegant application in the theory of minimal surfaces (real). See Sur¬ faces, Theory of.

The point P, to which all the developments have been attached, is supposed to be an ordi¬ nary point of the curve. A point is ordinary

when this point and points on the curve in its immediate vicinity can be represented by the same three equations of form (2), each point corresponding to a single value of u. The three functions <K«), x(,u), i>{u) i must be developable in power series at the point, and the three first derivatives must not be simultaneously zero. As an example of a singularity it is obvious that these conditions are not satisfied by a point at which the curve intersects itself. The singu¬ larities of a twisted curve are discussed in Cayley, ‘Collected Works) Vol. I, 8; Fine, Amcr. Jour, of Math., 8: Staude, Amer. Jour. Math., 17.

4. Classification and Literature. — Curves are divided into algebraic and transcendental curves, according as their equations are or are not algebraic. The order of a space curve is the number of points of intersection (real or imaginary) of the space curve by an arbitrary plane. The rank of the curve is the number of tangents intersected by an arbitrary straight line, i.e., it is the order of the tangential sur¬ face of the curve. The class of the curve is the number of planes of osculation that pass through an arbitrary point of space. At pres¬ ent there is no known system of elements which suffice to characterize the general space curve. There is no proper curve of the sec¬ ond order; there is one family of curves of the third order; there are two families of curves of the fourth order, a fact which puts in evi¬ dence that the order of a curve does not in itself suffice to characterize space curves. When to order is added the number of apparent double points, viz., the number of chords which can be drawn through an arbitrary point of space, a differentiation is effected, but this again fails in the case of curves of the ninth order. Cayley established formulas for the space curve corresponding to the Pliicker for¬ mulas for plane curves. Consult Cayley, Col¬ lected Mathematical Papers,’ Vol. I, p. 207.

The first systematic treatment of space curves was given by Clairaut in 1751, ‘Traite de courbes a double courbureP Among the older sources not hitherto mentioned are Lan-cret, ‘Memoires presentes … a l’Academie des sciences) (1806) ; de Saint-Venant, (Jour¬ nal de l’Lcole Polytechnique. ’ The more im¬ portant treatises and texts that give more or less complete representations of the theory are Bianchi, ‘Lezioni di geom. diff. (Pisa, 1885-86, translated into German by Lukat, Leipzig 1889) ; Darboux, ‘Legons sur la theorie gen¬ erate des surfaces) (Paris 1887-96) ; Hoppe, ‘Lehrbuch d. anal. Geom.’ (Leipzig 1880) ; Joachimsthal, ‘Anwendung der Differential-und Integralrechnung auf die allgemeine Theorie der Flachen und der Linien doppelter Kriim-mung> (Leipzig 1890) ; Laurent, ‘Traite d’ analyse,’ 2, 7 (Paris) ; Salmon, /Geometry of Three Dimensions) ; Salmon-Fiedler, ‘Anal. Geom. des Raumes’ (Leipzig 1880) ; Scheffers, ‘Anwendung der Differential und Integralrech¬ nung auf die

Geometrie) (Leipzig 1902) ; Schell, (Allgemeine Theorie der Curven. dop¬ pelter Krummung in rein geometrischer Dar-stellung) (Leipzig 1898).

James Maclay,

Professor of Mathematics, Columbia University.

CURWEN, ker'wen, John, English musical educator: b. Heckmondwike, Yorkshire, 14 Nov. 1816; d. Heaton Mersey, Lancashire, 26 May 1880. He became a minister of the Independent body, being in 1844 elected pastor at Plaistow, Essex. Here he developed and promoted the Tonic Sol-fa method, and brought the system still more before public attention by the pub¬ lication of his 'Grammar of Vocal Music' and 'Lessons in MuskP in 'Cassell's Popular Edu¬ cator.) In 1853 he established the Tonic Sol-fa Association, and in 1862 the Tonic Sol-fa Col¬ lege. He published, among other works con¬ nected with the system, the 'Child's Own Hymn-Book' ; 'New Standard Course on the Tonic Sol-fa Method' ; 'How to Observe Harmony.'

CURWEN, John Spencer, English musical writer : b. Plaistow, Essex, 30 Sept. 1847. He is a son of John Curwen (q.v.), and has been editor of the Musical Herald from 1866. He was educated at the Royal Academy of Music, becoming president of the Tonic Sol-fa Col¬ lege in 1880, and has traveled much in Europe and America investigating the subject of music in schools. He has published 'Studies in Worship Music' ; 'Memorials of John Curwen' ; 'The Boy's Voice' ; 'School Music Abroad' ; 'Music at the Queen's Accession.'

CURWOOD, James Oliver, American author: b. Owosso, Mich., 12 June 1878. On his father's side he is a descendant of Captain Marryat, the novelist. He studied at the Uni¬ versity of Michigan; entered the journalistic field as assistant editor of the News-Tribune of Detroit, later becoming editor. In 1907 he re¬ signed in order to devote himself exclusively to literary work. He is one of the foremost authorities on matters pertaining to thp North¬ land of Canada. Each year he spends several months in the north, traveling far from civil¬ ization. He is the only American ever em¬ ployed by the Dominion Government as a writer on exploration. His published works include '.The Courage of Captain Plum' (1908) ; 'The Wolf Hunters' (1908); 'The Great Lakes' (1909); 'The Gold Hunters' (1909); 'The Danger Trail' (1910) ; 'The Honor of the Big Snows' (1911) ; 'Philip Steele, of

the Royal Mounted' (1911) ; 'The Valley of Silent Men' (1911) ; 'Flower of the North' (1912) ; 'Iso-bel' (1913); 'Kazan' (1914); 'God's Country and the Woman' (1915) ; 'The Hunted Woman' (1916) ; 'The Grizzly King' (1917) ; 'Baree, Son of Kazan' (1917) ; 'The Courage of Marge O'Doone' (1918).

CURZOLA, koor-dzo'la, Jugoslavia, the most beautiful of the Dalmatian islands, in the Adriatic, stretching west to east about 25 miles, with an average breadth of four miles, lat. 43° N. and long. 17° E., area, 107 square miles. It is covered in many places with magnificent tim¬ ber. The fisheries are very productive. It pro¬ duces grain, wine and olives. The inhabitants are engaged chiefly in boatbuilding, seafaring and fishing. There are several good harbors. Pop. 29,908. The principal towns are Curzola, of 2,157 inhabitants, and Blatta with 6,837 in¬ habitants. The island came under Austrian rule in 1815 and in 1918 was added to Jugoslavia.

CURZON, George Nathaniel (Earl Cur-zon of Kedleston), English statesman and ad¬ ministrator: b. Kedleston, 11 Jan. 1859. He was educated at Eton and Balliol College, Oxford;

became assistant private secretary to the Mar¬ quis of Salisbury in 1885 and next year was elected member of Parliament for the South-port division of Lancashire, which he repre¬ sented till 1898. He was under-secretary for India in 1892 and in 1895 became under-secretary of state for foreign affairs. In 1899 he was appointed viceroy of India, and at the same time created a peer (in the Irish peerage) by the style of Baron Curzon of Kedleston. His object in accepting an Irish peerage was that he might be eligible to sit in the House of Commons during the lifetime of his father, Baron Scarsdale. His reign as viceroy of India was characterized by great vigor and he carried some important reforms ; but the partition of Bengal aroused considerable hos¬ tility among the natives. He was brought into conflict with Lord Kitchener, then commander-in-chief in India, on a question affecting the civil control of military affairs, and as his views were not supported by the home government, he resigned 20 Aug. 1905. He was one of the

leaders of the House of Lords in defending that House against the attacks of the Liberal party, but assisted materially in reconciling the majority of the peers to accepting the pro¬ visions of the Parliament Act (1912). In June 1915 he joined the Asquith coalition ministry as Lord Privy Seal. He holds a distinguished place as a geographer and author; was elected chancellor of Oxford University in 1907 ; was president of the Royal Geographical Society, 1911-14; and was created Earl Curzon in 1911. He married Mary Victoria, daughter of L. Z. Leiter, Chicago, in 1895, who died in 190G He is the author of (Russia in Central Asia* (1889) ; (Persia and the Persian Question)

(1892); (Problems of the Far East* (1894); (Lord Curzon in India) (1906) ; Principles and Methods of University Reform* (1909) ; Mod¬ ern Parliamentary Eloquence) (1913) ; (War Poems and Other Translations) (1915) ; Sub¬ jects of the Day) (1915). ,

CUSA, koo'sa, or CUSANUS, Nikolaus (originally NIKOLAS CHRYPFFS, or KREBS), German ecclesiastic : b. Kues, near Treves, 1401; d. Todi, Italy, 11 Aug. 1464. He was educated at Deventer by the Brethren of the Common Life and at the University of Padua. As archdeacon of Liege he took the anti-papal side at the Council of Basel ; but ultimately altered his views and became bishop of Brixen in Tyrol, cardinal and papal legate to Constantinople. He exposed the false Isidorian decretals, denounced perverted scholasti¬ cism in (De Docta Ignorantia*, taught that the earth went round the sun and the plurality of worlds, and in his pantheistic tendencies wras a precursor of Giordano Bruno. His most im¬ portant works have been translated into German by F. A. Scharpff (Freiburg 1862) who also published the first part of a biography (Mainz 1842) and subsequently Per Kardinal und Bis-chof Nikolaus von Cusa) (Tubingen 1871). Consult also Falkenburg, (Grundziige der Philosophic des Nikolaus von Cusa) (Breslau 1890) ; Schanz, (Cardinal Nikolaus von Cusa als Mathematiker* (Rothweil 1872) ; Hoffding, (History of Modern Philosophy (Vol. I, New York 1900).

CUSACK, Mary Frances, Irish writer; better known as the Nun of Kenmare: b.

Dublin, 6 May 1820; d. 7 June 1899. Originally a Protestant, she became a Roman Catholic and joined the Poor Clares, one of the sisterhoods of Saint Francis, and for 23 years conducted a convent of the order at Kenmare. When in 1884 she established the Sisters of Peace, an order similar to the Poor Clares but with a wider range, not

only did Leo XIII sanction the work, but she received the hearty support of Christians, both Catholic and Protestant. She visited the United States in 1886. Among her many published books are (Student's History of Ireland) ; (Woman's Work in Modern Society) ; (The Pilgrim's Way to Heaven? ; 'Jesus and Jerusalem * ; lives of Saint Patrick, Daniel O'Connell, *etc.* Consult (The Nun of Kenmare: An Autobiography * (1888).

CUSACK, Thomas F., American Roman Catholic bishop: b. New York, 22 Feb. 1862; d. Albany, N. Y., 12 July 1918. His early years were spent in the East Side of New York and it was in that section that he spent most of his priestly career. He attended the public schools, and then attended the College of Saint Francis Xavier, where he received his preliminary training. He received his theo¬ logical course at Saint Joseph's Seminary, Troy, N. Y. On 30 May 1885 he was ordained to the priesthood by the late Bishop McNierney of Albany. His first assignment was to Saint Teresa's, Rutgers street, New York. After five years as assistant there he wasjpromoted to the pastorate of Saint Peter's, Rosedale. In 1897 he resigned his pastorate to organize the New York Apostolate. On becoming superior of that band of missionary priests he was again designated assistant at Saint Teresa's. On 9 March 1904 he was appointed auxiliary bishop of New York and on 25 April of the same year he was consecrated titular bishop of Themiscyra by Cardinal Farley. At the same time he was appointed irremovable rector of Saint Stephen's, New York. Here he remained until his appointment to the see of Albany, which was made 5 July 1915. One of his first acts as Bishop of Albany was to organize a band of missionaries to preach the faith in the outlying regions of the diocese where the Catholic Church was seldom heard of. He was the leading spirit in the organiz¬ ing of the Catholic State Charities Society. During the Spanish-American War he was auxiliary chaplain at Chickamauga, where he worked night and day among the sick and was highly commended by the officers in charge. After the entry of America in the World War he placed the resources of his dio¬ cese at the disposal of the government, these included several hospitals, homes and a large country inn with 70 acres of land suitable for a convalescent hospital.

CUSCATLAN, koos-kat-lan', Salvador, a department bounded on the north by the de¬ partments of Chalatenango and Cabanas, on the east by the same departments and San Vicente ; on the south by San Vicente and La Paz, and on the west by the department of San Sal¬ vador. The greater part of its surface is cov¬ ered by lofty mountain ranges separated by narrow valleys; toward the north and north¬ east, however, near the Cuezalapa and Lempa rivers, there are

comparatively level districts. The department was formed in 1835, and was

originally much more extensive than it is at present (that is, 1,078 square miles), including until 1855 all of the Chalatenango region, and until 1875 a portion of what is now Cabanas. It is an agricultural country, the chief products being coffee, sugar, indigo, rice, tobacco, starch, cheese and cereals. Twice each year the people gather from all parts, in Cojutepeque at the Feast of Saint John, 29 August, and at Suchitoto, 8 December, to exchange native prod¬ ucts for foreign merchandise. The capital, Cojutepeque (pop. about 8,000), is situated near the summit of an extinct volcano, 2,614 feet above sea-level. Its streets are narrow and crooked, but the suburbs are beautiful. It has a town-hall, hospital, public school, four churches, public baths, *etc.* There are 17 towns in the department, the more important being Suchitoto, San Pedro, Perulapan, Tenancingo, San Rafael and Guayabal. Pop. 72,000.

CUSCO-BARK, kooz'ko, or CUZCO-BARK, the bark of Cinchona pubescens, which comes from Cuzco, in South America, and is exported from Arequipa. It contains a pe¬ culiar alkaloid which resembles cinchonine in its physical qualities, but differs from it in its chemical properties.

CUSCUS, kus'kus, a marsupial native to the islands of the Australian group and New Guinea. It is generally about the size of a house cat ; has a small head, large eyes and a dense coat of fur, often pure white irregularly flecked with black, though this is variable. There are several distinct species. The food of all seems to be generally leaves and fruit, to¬ gether with birds and other small animals. They frequent only forests of large trees, often swinging themselves from bough to bough by their long prehensile tails. They belong to the family of the phalangers (q.v.) ; and the genus Cuscns or Phalanger, as it is also known, embraces a number of species, differing in habi¬ tat and color. The best-known species perhaps is Cuscus orientalis.

CUSCUTACEˆ. See Dodder.

CUSH, kush, in the Old Testament, the eldest son of Ham, also a country frequently mentioned. Cush, as a country, appears to be African in most passages, and it is generally believed that the country intended can be no other than the region in Africa, south of Egypt, in ancient times designated more or less loosely as Ethiopia, and corresponding to the modern Nubia and northern Abyssinia. That it ad¬ joined Egypt is shown by the passage in Ezekiel which states that the desolation of Egypt is to extend “from the tower of Syene unto the bor¬ der of Cush.® In a number of passages, also, Cush, or its inhabitants, is mentioned in con¬ nection with Egypt. Cushites, for example, came out of Egypt with Shishak against Jeru¬ salem. In other places again it is evident that the name Cush must be understood as referring to some part of Arabia. That several localities should be called by the same name may be ex¬ plained by the frequent migrations of the early nations, who would give their own name to the countries into which they successively arrived. Some critics believe that in Gen. x, Cush, the brother of Mizraim, and Cush, the father of the Babylonian Nimrod, are two different per¬ sons, and that the name for the second Cush represents Kashshu, an old name for Babylonia.

CUSHEW-BIRD, kush’o-, another name for the galeate curassow. See Curassow.

CUSHING, Caleb, American jurist and diplomatist: b. Salisbury, Mass., 17 Jan. 1800; d. Newburyport, Mass., 2 Jan. 1879. His in¬ tellectual abilities manifested themselves early. He entered Harvard College at 13 and was graduated in 1817. He then studied law, was admitted to the bar at 22 and soon acquired an extensive practice, standing with Rufus Choate (q.v.) at the head of the Essex bar. He was a member of Congress 1835-43, and in the last-named year, having left the Whig party, was appointed by President Tyler first United States commissioner to China. He filled the post brilliantly, making a treaty so full and clear as to detail that it was the leading authority in settling disputes until 1860, when foreigners were allowed to enter Peking. He was an enthusiastic supporter of the Mexican War, raising a regiment and accompanying it to Mexico, for which he was promoted to the rank of brigadier-general. He was Attorney-General of the United States 1853-57, and was president of the Democratic convention in Charleston, S. C, in April 1860. During the Civil War period he was several times employed on con¬ fidential missions by

President Lincoln and the heads of departments, and in 1868 was sent to Bogota to settle a diplomatic difficulty, which he did successfully. In 1866 he was member of a commission to revise and codify the laws of Congress ; he was appointed counsel before the Geneva Arbitration Tribune 1871-72; and was Minister to Spain 1874— 77. His legal deci¬ sions were distinguished both for sagacity and professional erudition. He filled a large place in the political history of his time. He pub¬ lished (Practical Principles of Political Econ¬ omy) (1826) ; (History of Newburyport)

(1826) ; (Historical and Political Review of the Late Revolution in France) (1833) ; 'Reminis¬ cences of Spain) (1833) ; 'Growth and Terri¬ torial Progress of the United States) (1839) ; 'Life of William Henry Harrison) (1840) ; 'The Treaty of Washington) (1873).

CUSHING, Frank Hamilton, American ethnologist: b. Northeast, Pa., 22 July 1857; d. Washington, D. C., 10 April 1900. He became interested in Indian relics, and when 19 years old was made curator of the ethnological ex¬ hibit at the Centennial Exposition in Philadel¬ phia. Accompanying Powell's New Mexico ex¬ pedition, he settled among the Zuni Indians for the purpose of study. In 1881 he conducted' ex¬ cavations in Arizona, and in 1895 discovered archaeological remains in Florida. He con¬ ducted the Pepper-Hearst expedition to the Gulf coast of Florida in 1896 and published 'Report on the Ancient Key Dwellers of Florida.) In 1897 he became connected with the United States Bureau of Ethnology. Among his works are 'The Nation of the Willows) (1882) ; 'My Adventures in Zuni) (1883) ; 'Manual Concepts) (1892) ; 'Zuni Folk Tales) (1902); 'Studies of Ancient Pue¬ blo Keramic Art, as Illustrative of Zuni Cul¬ ture Growth) (1884) ; 'Zuni Breadstuff)

(1885).

CUSHING, Harry Alonzo, American edu¬ cator: b. Lynn, Mass., 15 Sept. 1870. He was graduated at Amherst College 1891, and took graduate studies at Columbia University 1894-

96. He was admitted to the bar in 1901, and has since practised in New York. He was lecturer in history and constitutional law at Columbia 1903-07 and from 4 Feb. 1907 to 1909 professor of law. He has published (History of the Transition from Provincial to Com¬ monwealth Government in Massachusetts 5 (1896); (Voting Trusts, a Chapter in Recent Corporate History 5 (1915).

CUSHING, Harvey (Williams), American surgeon : b. Cleveland, Ohio, 8 April 1869. He was educated at Yale and Harvard universities, and in 1895 took up the practice of surgery. From 1902 to 1911 he was associate professor of surgery at Johns Hopkins University and in the latter year he became professor of sur¬ gery at Harvard. With Dr. George W. Crile he made an important contribution to the study of blood pressure in surgery. In 1913 he re¬ ceived an honorary fellowship from the Royal College of Surgeons. He is author of (Dr. Garth, the Kit-kat Poet, 1661-17185 (1906) and (The Pituitary Body and its Disorders) (1912).

CUSHING, Luther Stearns, American lawyer: b. Lunenburg, Mass., 22 June 1803; d. Boston, 22 June 1856. He was the only graduate of the Harvard Law School in 1826. He was clerk of the Massachusetts house of representatives 1832-44, and reported the de¬ cisions of the State Supreme Court 1850-56, preparing 12 volumes of law reports for those years. He was lecturer on Roman law at the Harvard Law School 1848-56, but is best known for his (Manual of Parliamentary Practice5 (1844), which immediately became an authority in parliamentary assemblies throughout the English-speaking world, and remained so for half a century. Other of his works are (Trea¬ tise on Trustee Process5 (1837) ; (Treatise on Remedial Law5 (1837) ; (Reports of Contro¬ verted Election Cases in Massachusetts5 (1852) ; (Introduction Cases in Massachusetts5 (1852) ; (Introduction to the Study of Roman Civil Lawr) (1854) ; (Lex Parliamentaria Americana5 (1856), and translations of several legal works from the French and German.

•

CUSHING, Thomas, American statesman: b. Boston, Mass., 24 March 1725 ; d. there, 28 Feb. 1788. He was graduated from Harvard 1744; was elected speaker of the Massachusetts assembly 1766-74, and was a member of the First and Second Continental Congresses 1774-75, being defeated for re-election because he opposed a declaration of independence. In Eng¬ land, he was accused of being the leader of the

American Revolution and Dr. Johnson accused him of aiming at an American crown. In 1783 he was lieutenant-governor of Massachusetts, and a member of the convention which ratified the Federal Constitution 1788. John Adams describes him as being exceedingly useful to the patriot leaders in obtaining valuable secret information.

CUSHING, William, American jurist: b.

Scituate, Mass., 1 March 1732; d. there, 13 Sept. 1810. He was graduated at Harvard in 1751,, became judge of probate in Maine in 1768, judge of the Massachusetts Superior Court in 1772 and chief justice in 1777. Washington appointed him associate justice of the Supreme Court of the United States in 1789, and in 1796 offered him the post of chief justice, which he declined.

He was one of the founders of the American Academy of Arts and Sciences in 1780.

CUSHING, William Barker, American naval officer: d. Delafield, Wis., 4 Nov. 1842; d. Washington, D. C., 17 Dec. 1874. He entered the navy as a volunteer officer in 1861, and was promoted to a lieutenancy in the following year. His greatest exploit was performed in October 1864. For some time previous nothing had been able to cope with the Confederate ram Albe¬ marle. She had successfully encountered a strong fleet of Federal gunboats and fought for several hours without sustaining material dam¬ age. Cushing volunteered to destroy the ram, and on the night of 27 October accomplished the feat. For this he received the thanks of Con¬ gress, and was made a lieutenant-commander, becoming a commander in 1872. See Plymouth, N. C., Engagement at.

CUSHING, William Henry, Canadian statesman : b. Kenilworth, Ontario, 1852. He was educated in the public schools ; after work¬ ing on a farm for some years he went west to Calgary in 1883 and engaged in business, later becoming the head of an important manufactur¬ ing concern and the owner of extensive timber limits in British Columbia and elsewhere. In 1905 he was elected Liberal member for Cal¬ gary in the Alberta legislature ; and in the same year, when the government of Alberta was organized with Alexander C. Rutherford as Premier, Cushing became Minister of Public Works, retaining that position until 1910. He was the first Canadian to make ownership of telephones a part of government policy.

CUSHMAN, Allerton Seward, American chemist : b. Rome, Italy, 2 June 1867. He was educated at the Worcester Polytechnic Institute, at Freiberg and at Heidelberg, Harvard and Johns Hopkins universities. He was associate professor of chemistry at Bryn Mawr College in 1900-01, associate director of the Office of Public Roads, United States Department of Agriculture, for eight years, and then in 1910 founded and became director of the Institute of Industrial Research. He is author of (The Corrosion and Preservation of Iron and Steel5 (1910) and of the following bulletins: (The Useful Properties of Clay5 (19(M) ; (The Decompositions of the Feldspars5 (1907) ; (The Use of Feldspathic Rocks as Fertilizers5 (1907) ; and also a bulletin of the Institute of Industrial Research, (The Preservation of the Exterior of Wooden Buildings5 (1911).

CUSHMAN, Charlotte Saunders, Amer¬ ican actress: b. Boston, 23 July 1816; d. there, 18 Feb. 1876. She appeared first in opera in 1834, and as Lady Macbeth in 1835. Miss Cush¬ man played sometimes in high_comedy, but her name is identified with tragic parts. In 1844 she accompanied Macready on a tour through the northern States and afterward appeared in London, where she was well received in a range of characters that included Lady Macbeth, Rosalind, Meg Merrilies and Romeo — her sister Susan (1822-59) playing Juliet. In later years she acted with great success in many cities in the United States and was also prominent as a dramatic reader. In 1856 she went to Rome, where she lived for many years. At her last appearance on the stage in 1874, she was pre¬ sented with a laurel wreath by a body of

eminent citizens with William Cullen Bryant as spokesman. Consult Stebbins, (Charlotte Cush¬ man: Her Letters and Memories of her Life) (Boston 1878) ; Clement, (Charlotte Cushman) (ib. 1880) ; Cook, (Hours with the Players* (London 1881) ; Price, W. T., (A Life of Char¬ lotte Cushman] (New York 1894) ; Clapp, H. A., (Reminiscences of a Dramatic Critic) (Boston 1902). She retired from the stage in

1875.

CUSHMAN, Robert, American colonist: b. Kent County, England, about 1580; d. England 1625. He was one of the Pilgrims who accom¬ panied John Carver to Leyden in Holland. In 1617 he and Carver went to London and en¬ deavored to secure a charter to settle in Amer¬ ica and enjoy the privilege of absolute freedom of worship which the king finally in 1619 granted. In 1620 Carver and Cushman made arrangements for vessels to transport the Pil¬ grim colony at Leyden to America. Cushman remained in England as the colonists' financial agent and to forward supplies,. In July 1621 he sailed for America with his son Thomas, in the ship Fortune, and arrived at New Plymouth 21 November. In 1623, with Edward Winslow, he obtained from Lord Sheffield a grant of ter¬ ritory on Cape Ann and with a new band of devout colonists made the first permanent settle¬ ment within the limits of Massachusetts Bay colony. During his brief visit to the Plymouth settlement in December 1621, he preached a sermon on (<The Sin and the Danger of Self-love0, the first sermon delivered in America that was printed (London 1622). The original edi¬ tion is of great rarity, only three copies being known to exist. The Charles Deane copy sold at auction in 1898 for $1,000. Reprints of it were published at Boston in 1724, 1780, 1870; at Plymouth 1788 and New York 1858.

CUSINS, Sir William George, English composer : b. London 1835 ; d. 1893. As a lad of 10 he sang in the Royal Chapel, and develop¬ ing musical abilities, he was sent to Brussels, where he studied under the leading masters. He secured one of the most valuable scholar¬ ships in the Royal Academy of Music before he was 16 years of age, at which time he became, organist to the queen. At the age of 32 he took charge of the Philharmonic Society, succeeding Sterndale Bennett, and took an important part in the musical development of England, being knighted for such service in 1892. His works include a Concerto in A Minor; a cantata; (Gideon, > an oratorio; and a number of songs.

CUSK, kusk, Brosrne brosnie, a fish belong¬ ing to the cod family or Gadidce (Cuvier), characterized by an elongated body, a single dor¬ sal fin extending. the whole length of the back, fleshy ventral fins and one barbel at the chin.

CUSPARIA BARK, the bark of the Galipea Cusparia, and some other species, also called Angostura bark.

cusso, cus'o*, Hagenia abyssinica, a small Abyssinian tree of the rose family (Rosacece) , having pinnate leaves and dioecious flowers,

which are imported into Europe and used as an anthelmintic.

CUST, Lionel, English art writer: b. Lon¬ don, 25 Jan. 1859. He was educated at Eton and Trinity College, Cambridge. Since 1901 he has been surveyor of the king's pictures and

works of art. Among his published works are : (Artists Represented in Department of Prints and Drawings in British Museum) (1893-96) ; (Albrecht Diirer) (1897) ; (History of the So¬ ciety of DilettantP (1898) ; (Sir Anthony Van DyckJ (1900) ; Wan Dyck's ˆChatsworth0 Sketch Book* (1901) ; (Portraits of Mary Queen of Scots* (1903) ; (The Bridgewater House Gallery* (1904) ; (The Royal Collection of Paintings, Buckingham Palace) (1905) ; (Eton College Portraits) (1909) ; (Notes on Pictures in the Royal Collections) (1911).

CUSTARD-APPLE, a common East In¬ dian name for the fruit of certain species of the Anonacece, some of them the most delicious of the tropical fruits. The common custard-apple (Anona reticulata) , a native of tropical America, is a large greenish or dark-brown fruit. The trees grows to considerable size. The alligator-pear, sour-sop and sweet-sop are mem¬ bers of the genus. The chief North American representative is the papaw (Asimina or Uvaria triloba). This tree grows to a height of 45 feet in favorable locations, the stem being sometimes 10 inches in diameter. The wood is soft, light and weak, weighing about 24 pounds to the cubic foot. The fruit is a fleshy berry, three to seven inches long, sweet, and edible when ripe, in October. The tree grows along streams from Ontario, through western New York and New Jersey near Pennsylvania, south to Florida and west to Texas and Michigan.

CUSTER, Elizabeth Bacon, American writer: b. Monroe, Mich., about 1844. In Feb¬ ruary 1864 she was married to George A. Cus¬ ter (q.v.). She accompanied him in many of his campaigns on the frontier. She is author of (Boots and Saddles, or Life in Dakota with General Custer) (1885) ; (Tenting on the Plains, or General Custer in Kansas and Texas> (1887) ; following the Guidon) (1891), *etc.*

CUSTER, George Armstrong, American general: b. New Rumley, Ohio, 5 Dec. 1839; d. 25 June 1876. He was graduated at West Point, 1861, was made second lieutenant and his first day at the front was at Bull Run, on Kearny's staff. He then went on W. F. Smith's, in charge of balloon reconnaissances ; then, for daring courage and endurance, was appointed on McClellan's, and captured the first colors taken by the

Army of the Potomac. In 1863 he went on Pleasonton's staff ; shortly after, for dashing gallantry, was appointed brigadier-gen¬ eral of volunteers, commanding a Michigan cavalry brigade. He made it famous, and foiled Stuart at Gettysburg, for which he was brevetted major in the regular army. In 1864 his brigade was assigned to Sheridan's corps, and he was noted as one of the most brilliant offi¬ cers in the Virginia campaigns, winning steady promotions ; brevet lieutenant-colonel for Yel¬ low Tavern, brevet colonel for Winchester. On 9 October, in command of the Third Division, he won the splendid victory of Woodstock; on the 19th, at Cedar Creek, he contributed largely to the Confederate defeat made permanently fa¬ miliar by ((Sheridan's Ride,0 and was brevetted major-general of volunteers. In the spring of 1865 his division by itself won the battle of Waynesboro, capturing 1,600 prisoners and 11 guns ; and followed it up by annihilating Early's command, and capturing all the rest of his ar¬ tillery and his baggage. He fought at Five

Forks and Dinwiddie CourtHouse, and was brevctted brigadier-general United States army. After the surrender at Appomattox he was brevetted major-general United States Army, and appointed major-general of volunteers. As¬ signed to duty in Texas, then appointed chief of cavalry till mustered out of the volunteer service, he asked permission to accept Juarez's offer of the chief command of Mexican cavalry against Maximilian ; refused leave of absence, he took the lieutenancy of the Seventh cav¬ alry, and joined it at Fort Riley, Kan., Novem¬ ber 1866, under Hancock, who was succeeded by Sheridan in the summer of 1867. Custer shortly after saw his first Indian service ; and closed a campaign against the Cheyennes in 1868 by the crushing victory of the Washita (q.v.), where 103 Indian warriors were killed, and the tribe forced to return to their reserva¬ tion. He was stationed in Kentucky 1871-73. In the spring of 1873 he was sent to Dakota to make head against an Indian insurrection of the first order, organized by Sitting Bull and Crazy Horse, and comprising not only the Sioux but a mass of other tribes in Dakota, Montana, Wyoming, *etc.* He fought a number of battles, and opened up the Black Hills country. In

the spring of 1876 Sheridan made ready for a de¬ cisive blow, sending three divisions under Crook, Terry and Gibbon to unite and crush Sitting Bull on the Yellowstone. Terry and Gibbon united without discovering the Indian army; Crazy Horse's band repulsed Crook, and after a sharp skirmish the whole Indian force of 5,000 or 6,000 moved to the Little Big Horn. They were discovered by Terry's scouts, and Terry sent Custer in advance, with his cavalry regi¬ ment of 600 men in 11 companies, to bar their escape east ; he was to wait for the main body at the junction of the Big Horn and Little Big Horn 26 June. Custer arrived there the night of the 24th ; his scouts discovered the Indian village the next morning; from imperfect infor¬ mation he supposed that they were only the 1,200 or 1,500 Pawnees he had known were marching to join Sitting Bull, and he resolved to sur¬ round and capture them all. The Indians were on a ridge west of the Little Big Horn ; Custer kept five companies, 260 men in all, for a direct attack on the centre, gave four to Major Reno to assail their left (south), and two to Captain Benteen to make a southern detour of two miles and come on their right rear, cutting off their retreat. The Indians had broken up their tents and were about to retreat, when they discovered how weak was the assailing force. The three divisions forded the river, and Custer rode for the heart of the Indian line. A rise across the stream masked the enemy, many hundreds of whom lay in a ravine between it and the higher ridge beyond; and as Custer swept down, the savages rode against him and swarmed around to his rear. Outnumbered 20 to 1, the heroic band still fought their way up to the ridge, and a small number with their general reached it; then a fresh band of 1,000 Cheyennes rose up, under Rain-in-the-Face, and not a soul was left alive. Meantime Reno had been repulsed and had taken refuge across the creek ; and Ben¬ teen never reached the neighborhood of the fight; but rejoined Reno at a bluff on the east, where they held the Indians at bay till Terry arrived next morning. The bodies of the slain division were left as they lay, all horribly muti¬

lated, except Custer's. Forty-two Indians were killed. The battlefield has been marked with a small marble monument where each man fell. Custer wrote (My Life on the Plains) (1874). His life has been written by Whit¬ taker (1876). The general's wife, Elizabeth B. Custer, who accompanied him on his campaigns on the frontier published, (Boots and Saddles, or Life with General Custer in Dakota} (1885) ; (Tenting on the Plains* (1887) ; following the Guidon* (1891).

CUSTER MASSACRE. See Custer, George Armstrong.

CUSTINE, kiis-ten', Astolphe, Marquis de, French novelist and writer of travels: b. Niederwiller, Meurthe, France, 18 March 1790; d. near Pau, France, 29 Sept. 1857. He traveled in the British Isles, Switzerland and southern Italy (1811-22), and afterward in Spain and Russia. He published (Memoires et voyages* (1830) ; (La Russie en 1839) (1843) ; a tragedy,

(Beatrice Cenci) ; and some romances, among them (Aloysius, or the Monk of St. Bernard) ; (Romuald, or the Vocation.* His (Letters to Varnhagen von Ense and Rachel Varnhagen von Ense) appeared in 1870.

CUSTIS, George Washington Parke,

American writer: b. Mount Airy, Md., 30 April 1781 ; d. Arlington House, Fairfax County, Va.,

10 Oct. 1857. He was a grandson of Martha Washington, his father being her son by her first husband. His daughter, Mary Randolph Custis, married Robert E. Lee, the Confederate general. He was adopted by George Washing¬ ton, and wrote (Recollections of George Wash¬ ington (1860), and several plays and orations.

CUSTOM is the legal term applied to un¬ written law established by common consent and uniform practice from time immemorial. Some¬ thing which, by its universality and antiquity, . acquired the force and effect of law in the par¬ ticular place or country in respect to the sub¬ ject matter to which it relates; in other words such a usage as by common consent and uni¬ form practice has become the law of the place or of the subject matter to which it has rela¬ tion and which is therefore ruled as law by the court. Three axioms are founded on these definitions: (a) That custom is introduced by the people, under which name we understand the action or assemblage of persons of all de¬ scriptions of that country where they are col¬ lected. (b) That it derives its authority from express or tacit consent of the ruler, (c) That once introduced it has the force of law. Cus¬ toms are general when as such they con¬ stitute a part of the common law and extend to the whole country, while particular customs are those which are confined* to a particular district. As a rule, when a contract is made in relation to another, about which there is a well-established custom, it is presumed that such custom forms part of the contract and may be always referred to for the purpose of showing the intention of the parties in all those particulars which are not expressed in the contract. If, however, the meaning of the contract is certain and beyond doubt, no evidence of usage will be admitted to vary or contradict it. In order

to give validity to a custom it must be certain, reasonable in itself, commencing from time immemorial, and con¬ tinued without interruption. And a custom

which is unreasonable, uncertain, and which savors loo much of arbitrary power, is void; consequently where a custom is opposed to a well-settled rule of law, and is calculated and intended to violate such law, the custom will not be allowed to have any effect. The true office of a usage or custom with respect to con¬ tracts is to interpret the otherwise indeter¬ minate intention of parties, and to ascertain the nature and extent of their engagements arising not from their express stipulation, but from mere implications and presumptions and acts of a doubtful or equivocal character, or to ascertain the true meaning of words in an in¬ strument where those words have various senses ; and custom or usage is sometimes ad¬ missible to add new terms not expressed in or covered by the writing. See Customary Law ; Contracts.

CUSTOM-HOUSE, an establishment where commodities are entered for importation or exportation ; where duties, bounties or draw¬ backs, payable or receivable upon such importa¬ tion or exportation, are paid or received, and where ships are entered and cleared. In the United States, the custom-house of each port is under the direction of a collector of the port appointed by the President with the advice and consent of the Senate. He is responsible to the Secretary of the Treasury. The principal cus¬ tom-house of the United States is in New York. Although import duties are one of the chief sources of revenue there is no separate bureau of customs as there is in the case of internal revenue. Supervision by the govern¬ ment of importations begins in the country of origin, where the value of the shipment is certified before United States consular officers. The customs regulations prescribe the methods of entry of goods, of valuation and classifica¬ tion, in order that the proper tariff rates may be levied at the port of entry. At the custom¬ house are collected the duties and storage, and warehouse space is provided for such goods as the

importer does not wish to use at once, and on which dues are consequently deferred. The country for customs purposes is divided into districts in each of which is located a port of entry. The staff at the larger of these ports of entry comprises a collector, appraiser, naval officer, surveyor, gaugers and inspectors. In the smaller ports more than one office is often filled by one official.

The general customs procedure requires that each vessel carry a full manifest, or description of her cargo, giving names of the ports of origin and of the consignees. Revenue officers inspect this manifest before the vessel docks, and it is at once delivered to the collector of the port, who next issues a permit to transfer the cargo. The cargo is unloaded in presence of the collector or his representatives and the consignees must now present a detailed invoice which must state the value of the goods. The gross amount of the duty is now computed from this invoice and when it is paid, the consignees may remove the merchandise with the exception of those packages which are kept for examination. The appraisers now make a valuation according to those goods examined and they furnish the collector with sufficient data to enable the latter to determine the rate of duty to which the goods are subject. If the importer has paid too little or too much an vol. 8 — 22

adjustment is made by his paying the additional sum, or in case he paid too much he receives a refund. If dissatisfaction is expressed at the appraisal a reappraisal may be ordered. Appeals from the second decision may be taken to the board of general appraisers, and in cer¬ tain cases to the United States Court of Cus¬ toms Appeals. Fines, penalties and forfeitures may be imposed for undervaluation, or in gen¬ eral for any attempt to evade the payment of duties according to the schedules fixed by law. In general the customs officials of the United States have little discretionary power compared with those of other countries. However, the customs regulations in the United States pro¬ vide greater remedies for errors or unjust ex¬ actions of any kind. See Customs Duties; Tariff Administration.

CUSTOMARY LAW is that law which has for its basis — usage, and therefore may be abrogated by usage. It derives its whole au¬ thority from the silent assent of those who are affected by it. A usage cannot be sustained in opposition to well-established principles of law. To sustain a usage under such circum¬ stances would be extremely pernicious in its consequences, and would render vague and un¬ certain all the rules of law. A mere custom or usage is therefore without force in opposi¬ tion to a positive law. Thus a usage for

factors to pledge the goods of their principals is void, being against a general rule of law. So the usage for a master of a vessel to sell the cargo without necessity when the vessel is stranded; so of a custom, different from the law in a cer¬ tain place, to re-enter for a forfeiture incurred by the non-payment of rent. And it is held that the custom and understanding of the mer¬ chants in a particular trade cannot be admitted to prove that the barter or exchange of a prom¬ issory note, endorsed without recourse, for cot¬ ton or any other species of merchandise, carries with it no implied warranty of the past or fu¬ ture solvency of the maker of the note. So where a transaction is within the statute against usury, the usage of trade as to such transaction cannot be received in evidence to show that it is not usurious. Known and settled usages, however, are respected by courts and juries, unless such usages are against the laws or policy of the country. Usage is evidence of the construction given to the law, and when it is established and uniform it regulates the acts and duties of those who act within its limits. Usage is a matter of fact, and not of opinion. A usage of trade must therefore be proved by instances, and cannot be supported by evidence of opinion merely. It is proved by witnesses testifying of its existence and uniformity from their personal knowledge obtained by observa¬ tion. • Customary or Common law was intro¬ duced into the United States based on English common law, which in its most comprehensive sense embraces general customs pervading the whole realm, particular customs prevailing only in certain places and particular laws which by degrees have been incorporated into the com¬ mon law to a certain extent. In its more ordi¬ nary acceptation, however, the common law includes only general customs and particular laws, and not customs of particular places. In this manner in England Christianity was early recognized as a part of the customary or common law of the land, when a lord chief

justice ruled that ((Christianity is parcel of the laws of England” and to cast obloquy upon its precepts is to speak in subversion of the law. Such restriction, however, was not’ intended to consider as reprehensible honest, sincere and conscientious disputes between

learned men upon particular controverted points incident to its doctrines. In the United States an inter¬ mediate ground is maintained ; the one best supported by both reason and authority is that acts conducive to the subversion of the Chris¬ tian faith or which are calculated to bring into contempt or ridicule its tenets and symbols, and contumelious attacks upon its laws and institutions, are temporal offenses ; not because Christianity is a part of the law, but for the reason that such acts tend to a breach of the law and so jeopardize the public welfare. See Customs. *

CUSTOMS COURT. See United States

Customs Court.

CUSTOMS DISTRICT. See District.

CUSTOMS DUTIES, the portion of a state's revenue derived from a tax on imports. In some countries, customs duties are imposed on certain exports also. The origin of the term is connected with the long conflict between the Crown and Parliament as to the right of taxa¬ tion, although the practice it signifies goes back to the days of Greece and Rome. To meet the claims made by the House of Commons to the exclusive right to vote all supplies, it used to be maintained that there were certain duties on exports and imports to which the Crown had acquired a right by custom (although it is certain that customs duties existed in England prior to the Norman Conquest), and after the power of Parliament over this branch of taxa¬ tion had been fully established it retained its old name. This tax, which originally was a sort of premium of insurance for protection from robbery, after the ex-cise came in force was always applicable distinctively to goods changing place. There were customs not only upon things leaving and things entering the British dominions, but also upon commodities transferred from one part of the country to another. In Scotland the duty on commodities imported into any town from a foreign country was called the great custom ; and the duty charged by a burghal corporation on com¬ modities coming within its walls from the country districts was called the small or petty customs. After 1707 the Scottish customs duties became the same as those of England. At present the term customs duties applies in the United Kingdom solely to the tax levied on commodities imported from abroad.

The tax on imports was, of old, a -simple percentage, familiarly known as <(tunnage and poundage," from the method to which it was levied on the tun of wine, or the pound ad valorem of other merchandise. These were subsidies granted first to the Crown, and then for the

maintenance of the authority and dignity of the state. Thus they were a species of pub¬ lic revenue ; and many complications arose by the additions and alterations of successive gov¬ ernments. The belief also arose that customs duties might be utilized for fostering domestic industries and discouraging foreign competition. Frequently the duties were such as to act as a

prohibition to importation, and they always added greatly to the selling price.

In 1825 the laws of the British ‘customs were consolidated into about half a dozen statutes. Some idea of the confused and cumbersome condition of the customs system before that year may be gathered from the fact that the number of acts repealed then was 443. A long list of customs duties remained until the free-trade legislation of 1846. One by one articles of food were exempted; and at present the whole British customs revenue is derived from spirits, wine, tobacco, coffee, tea and certain dried fruits. In modern times taxes upon ex¬ ports have been discarded by most states, al¬ though several states of Latin-America are dependent on them for the bulk of their revenue. In the United States the number of dutiable articles is large, of the total imports the dutiable have about double the value of the free goods. The dutiable articles come under 386 paragraphs, which are again classed under schedules lettered from A to N. The free list comprises 271 paragraphs. For a dis¬ cussion of the relative effects of a tariff for revenue and a protective tariff, specific and ad valorem duties, American practice contrasted with European, see Free Trade; Protection; Tariff; Taxation.

CUSTOZZA, koos-tot’sa, Italy, a village in the province of Verona, about 10 miles south¬ west of the city of Verona. It is noted as be¬ ing the place where the Italians were twice defeated by the Austrians in 1848 and 1866. In 1879 a monument was erected to the fallen. Consult Mathes von Bilabruck, (Taktische Studien fiber die Schlacht von Custozza im Jahre 1866) (Vienna 1891).

CUT GLASS. See Glass, Varieties of; Glass, Ornamentation of.

CUT-WORM, the caterpillar of an owlet moth of the tribe of Noctucc, and group Agro-tididce; and, loosely, many other grubs and worms living in the ground. It stays by day about the roots of plants, and comes forth at night to cut off their tender stems and leaves. Some of the moths fly by day, others only at night; the wings are nearly

horizontal when closed; the thorax smooth and slightly convex; the antennae of the males generally with two rows of tooth-like points on the under side ; the fore legs are often spiny. They destroy whole fields of vegetables, and also asters, balsams and other ornamental plants. The caterpillars vary in length from one to two inches, and are dark ashy gray, with brown head, and a pale dorsal stripe, with minute . black dots ; the chrysalis is a shining dark brown, and the moth appears from 20 July to the middle of August. The chrysalis is transformed in the ground, without a cocoon. The only effectual way to prevent their depredations is to open the earth daily at the foot of the growing plants and kill the worms, which are easily found. It is said that a manure of sea mud will protect a garden from these worms; some cultivators protect their cabbage plants by wrapping a walnut leaf or paper cone firmly around the root, secured by an earth embankment.

CUTANEOUS SENSATIONS. Those sensations experienced from the excitement k solely of the organs of the skin. Although

psychologists have been in wide disagreement as to the seat of many specific sensations, it seems now to be definitely decided that sensa¬ tions of the skin are only four in number: pres¬ sure, warmth, cold and pain. Other experiences formerly classified with these, as hardness, dry¬ ness, smoothness, etc., are regarded as being composite in character, including muscular sen¬ sations, and partaking more of the character of perceptions.

In the study of cutaneous sensations the method employed is an ((explo ration® of the skin with various instruments, such as a pointed bit of wood or cork, a knitting needle, a fine broom splint or a bit of horse hair. When the skin is touched gently at different places in a small area, it is found that at .some points the sensation of pressure is acute, at others dull. In the latter instance it is believed that the sensation is not from the point touched, but from some neighboring point. In the same way the skin is explored with hot and cold instru¬ ments and with sharp-pointed needles. It is found that there are many

areas of the skin which are entirely insensible to the prick of a needle which at other points is exquisitely pain¬ ful. An interesting fact is that in some areas of the skin sensations of cold are excited by the touch of a warm object. These are called <(paradox sensations.® They are attributed to special nerve structures which always respond with the same sensation regardless of the ex¬ citing agency. It has been found that children generally have a much more delicate and accu¬ rate sense of touch than adults have. This is ascribed to the probable fact that the nerve structure conveying these sensations is complete in the child, and as there is a much smaller skin surface in the child, the nerve ends are, of course, closer together. Consult Angell, J. R., (Psychology (New York 1908) ; Harvey, N. A., (Physiological Psychology) (Ypsilanti, Mich., 1911) ; Ladd, G. T., (Elements of Physiological Psychology* (New York 1900) ; Scripture, E. W., (Thinking, Feeling, Doing) (New York 1907) ; Wundt, W. M., Principles of Physio¬ logical Psychology * (Titchener's translation, New York 1910).

CUTCH, kuch, India, a principality con¬ trolled by Bombay, lying to the south of Sind, area, about 7,616 square miles, between the marshy tracts of the Rann of Cutch and the Gulf of Cutch. During the monsoon it is wholly inundated by water, the vast salt morass of the Rann separating it on the north and east from Sind and the Guicowar's dominions. It has a feudal system of government, the ruling power being confined to the dynasty of Jharija Rajput, of which there are about 200 members. About one-third of the inhabitants are Moham¬ medans, the rest Hindus of various castes. Chief town is Bhuj. Pop. about 525,000.

CUTCH (Malay, katchu, catechu), a com¬ mercial substance obtained from the acacia catechu and the bark of mangrove trees. . Cutch is used in tanning and as a preservative for nets and sails. The wood is chipped, boiled and the cutch thus extracted. Large quantities are produced on the island of Borneo.

CUTCH, Gulf of, an inlet on the north border of the Arabian Sea, extending into the west coast of India about 100 miles, and form¬ ing an outlet for the salt marshes of Cutch in

India. It is about 30 miles wide and 100 miles long and connects at its upper end with the Little Rann (or Runn) of Cutch, and through this with the great western Rann.

CUTCH GUNDAVA, Baluchistan, a divi¬ sion occupying a northeast projection, in a great measure separated from the rest of the country by the mountain range of Hala. The area is a desert, with an annual rainfall of but three inches, but the soil under irrigation yields bountiful crops of grain and cotton. The sum¬ mer winds are extremely hot and unendurable. Area, 10,000 square miles. Pop. 120,000.

CUTHBERT BEDE. See Bradley, Ed¬ ward.

CUTHBERT, Saint, English anchoret, cenobite and bishop : b. about 633 ; d. Fame, Northumbria, 20 March 687. He is one of the three most eminent saints of the Church in England, the other two being Saint Edmund of Edmundsbury, and Saint Thomas a Becket, archbishop of Canterbury. The time and place and even the country of his birth are unknown, but the most trustworthy historians say he lived from 635 to 687. In his youth he entered the monastery of Melrose (the first Melrose), at that time within the limits of Northumbria, and after making his religious profession there was successively prior of that abbey, prior of Lindisfarne, bishop of Hexham and bishop of Lindisfarne, with intervals in which he withdrew from conversation with all men and lived a recluse hermit on the island of Fame. The fame of his sanctity, religious zeal and miracles was great in his lifetime ; but grew steadily greater after his death, and many churches in England were dedicated to him. It is said that his body was found incorrupt when his tomb was opened 11 years after burial. When Norse corsairs threatened Lindisfarne in 875, the monks of Lindisfarne bore the remains to a place of safety inland, and for a time the body had no fixed resting place until deposited at Durham, where, enclosed in a splendid shrine, it re¬ mained till the Reformation, an object of veneration and the supposed instrument of in¬ cessant miracles.- At the Reformation the shrine, with its costly ornamentation, went to increase the king's treasure, and the body of Cuthbert was buried under the pavement of the Durham Cathedral. The coffin was lifted in 1827 and the body, or rather the skeleton, of the saint, was found wrapped in five robes of em¬ broidered silk; there were three coffins, one within another, namely, an outermost one, made in 1541, within that another, believed to date from 1104, and then the cista, in which the relics were deposited when the body was dis¬ interred in 698. His feast is observed on 20 March. His life has twice been written by the Venerable Bede and still earlier by a monk of Lindisfarne. Beside these are modern works, by Raine (Durham 1828) ; Eyre (London 1849; 3d ed., 1887), and Fryer (London 1880).

CUTHBERT, Ga., the county-seat of Ran¬ dolph County, on the Central of Georgia and the Georgia, Florida and Alabama railroads. The town is the trading centre of a fruit-grow¬ ing and cotton-raising region, and has two col¬ leges, the Andrew Female College, opened in 1854, and the Bethel Military College for men. Other industries are farming, fertilizer manu¬ facture, grist-milling, cotton-oil and gin-making.

The city owns its waterworks and electric-light plant. Pop. about 3,000.

CUTICLE (Lat. cuticula, diminutive of cutis, “skin®), a thin, white, pellucid, insensible membrane, covering and protecting the true skin, with which it is connected by the hairs, exhaling and inhaling vessels and the rete mucosum. See Skin ; Anatomy.

CUTLASS (Fr. coutelas, “small knife® or “sword®), a short sword used by seamen. The blade was usually about 27 inches long, an inch wide and had a bowl-shaped guard on the hilt. It is a very effectual weapon in close contest; on account of its shortness it can be handled easily, and yet is long enough for defense.

CUTLASS-FISH. See Scabbard-fish.

CUTLER, Manasseh, American Congrega¬ tional clergyman : b. Killingly, Conn., 3 May 1742; d. Hamilton, Mass., 28 July 1823. He was graduated at Yale in 1765, became a lawyer in 1767, and Congregational minister in 1771 at Hamlet Parish, Ipswich, now the town of Hamilton, Mass., and a chaplain in the Revolu¬ tionary army in 1776. After the war he helped form the Ohio Company, which settled Marietta in 1788, and had a leading part also in the formation of the State of Ohio, being credited with drafting the noted “Ordinance® of 1787. He was a member of Congress from Massa¬ chusetts 1800-05. He was also a botanist of distinction, describing 350 species of plants native of New England. Consult Cutler, W. P. and J. P., (Life Journals, and Correspondence of Manasseh Cutler*

(Cincinnati 1888).

CUTLER, Timothy, American clergyyman : b. Charlestown, Mass., 1683 ; d. Boston, August 1765. He was graduated at Harvard in 1701 ; was a Congregational pastor at Stamford, Conn., 1710-19, when he became rector of Yale College. In 1722, convinced of the non-validity of Congregational ordination, he became a be¬ liever in Episcopacy, and was dismissed by the trustees of Yale. Going to England, he was ordained by the bishop of Norwich in 1723, re¬ ceived the degree of D.D. from both Oxford and Cambridge and was appointed a missionary of the Society for the Propagation of the Gos¬ pel. Taking charge of Christ Church, Boston, Mass., 1723, he remained it's rector until his death. He was throughout his later life one of the most influential of the colonial clergy. Some of his letters appear in Nichols, illus¬ trations of the Literary History of the Eigh¬ teenth Century* (London 1817-58).

CUTLERY. Cutlery broadly considered may include any article with a cutting edge. From a trade and makers definition, it com¬ prises only pocket knives, table knives, razors and scissors. These are four distinct and separate trades, and although all four are often carried on by one firm, many manufacturers confine themselves to one branch only. Pocket knives generally include all kinds of spring knives, hunting knives, etc., and table knives include carvers, butchers' and cooks' knives. In each of the four divisions of the cutlery trade, the process of manufacture is somewhat similar.

Pocket Knives. — In olden times the same man made the blades, ground and finished, and fitted them to the handles, which he also made. With the development of the factory system,

each branch became divided into three separate trades, viz., forgers, grinders and sutlers or hafters. Taking the process of manufacture in spring knives as typical of all branches, and as followed in Sheffield, England, and elsewhere in the old established way and carried on by those firms who have maintained a reputation for quality, many methods have been introduced in different countries to substitute various machine processes for producing blades other than forging by hand, but nothing quite to equal the hand-forged article has been produced. The steel, which should be converted from the finest brands of Swedish iron, is melted, cast into ingots, then hammered into bars and rolled in strips of width and thickness suitable for the sizes of blades required. The blade maker or forger takes one of these strips,

cuts it into convenient lengths, heats to a warm red a por¬ tion of one end, sufficient for a blade, in a clean fire of small coke, roughly hammers out the required blade and chops off from the string of steel just enough for this and the tang (i.e., the part of the blade by which it is fastened into the haft). This process is called mooding, the workmen making as many moods as required for the quantity ordered, or for his day's work. He then reheats these moods separately, and with a hammer on the various bosses fixed in his anvil, or stithy, works the tang into the re¬ quired shape ; the other end, the cutting portion of the blade, is then reheated, the nail mark put in on a boss for that purpose fixed in the anvil, the sides hammered flat, and edge of blade as thin as possible. This is all done at one heat, and is called smithing. It is this hammering from hot to cold that imparts the lasting cutting qualities, provided the blades are made of good steel. The blades then go to the grinder, who "lays on® the tangs, i.e., he grinds off the rough surface on that part on which the name is put ; this is done by the marker with a punch used either by hand or in a fly. The blades then go back to the forger to be hardened and tempered. Each blade is heated separately and dipped in water, after which it is of a whitish gray color, having shaled — i.e., a thin outer surface has peeled off. The blade is now quite brittle, and requires tempering; this is done by slowly heating on a steel plate over the same fire as used for forg¬ ing. The degree of temper required is judged by the color and goes from a light straw to tawny yellow, reddish brown or blue according to the different styles of blades and purposes for which they are used, pen blades being gen¬ erally left a straw color, and pockets a reddish brown. The blades are now ready for the grinder. This man sits on a horsing, — a kind of wooden saddle, — partly under and in front of which between his legs runs a stone in a trough with sufficient water in the bottom to just catch the surface of the stone and keep it constantly wet. Grindstones vary in diameter according to the class of work to be done, and run from about 14 inches for small pen blades, to five feet for carvers, but the grinding of each is restricted to its separate trade. The blades are set in (put into handles) in the rough ground state. In some cases in jack knives the grinder also finishes the blades, but generally this is done by others after the blades have been fixed in the hafts by cutlers The cutler is given the necessary parts, blades, springs, scales

and covering, and works these into the knife. Springs are filed out of sheet steel, except in the case of primers and large jack knives, for which they are often forged by a spring forger; another separate trade for the workman. The spring forger also makes some kinds of scales, viz., those used for large pruning and sporting knives, and various articles other than blades that are put into knives. Generally the scales are made by scale makers, another sub¬ sidiary trade, and the covering of stag, ivory, pearl, horn, bone or wood of various kinds comes from the cutters of these several ma¬ terials. The cutler works to templates, or as he calls them (<fit ting things.® This is the most complex and ingenious of the three branches in the trade; he has to bore and file each spring to his measure, harden, temper and finish the same, bore tang of blades, and fit to measure and finish the edges — fit to measure plate and bore the scales, put on the covering after the necessary preparing, then nail the several parts together and get up the haft. This is done by different degrees of filing, and grinding on glazers (wooden wheels bound with leather and dressed with glue and emery of various grades). Stag is finished on brushes, the smooth cover¬ ings on buffs or dollies. The buffs are wheels similar to glazers, with softer leather, dressed with oil and rotten-stone or rouge, and the dol¬ lies are made with layers of cotton cloth be¬ tween side plates, and dressed as buffs. The cutler having made up the various parts into knives, the blades, being unfinished, have to go back to the grinder or finisher to be either glazed or polished, as required. For this, handles are wrapped up in paper or anything else that will keep them clean, and the blades left open — not more than one at each end at once. The pocket blades are whitened, i.e., re¬ ground on a harder stone than that used for grinding, then glazed, first on a rough and then on a finer glazer, and buffed to give a brighter finish, — if required polished they go from the fine glazer to a small wooden wheel bound with leather and dressed with crocus, and which runs much slower than grindstones or glazers. With pen blades of any quality the sides are lapped instead of glazed, i.e., the wheel on which this is done is bound with lead (run on in a mold) instead of leather; by this means a truer and better cutting edge is secured. The cheaper qualities of pen blades are finished on the glazers, either leather bound, or made of

wood, without any covering, but blades so finished are inferior to those that are lapped. If polished the pen blades go from the lap to the polish as in the case of pocket blades. After finishing, the blades are wiped and greased, joints cleaned, and the knives then go to the whetter, who rubs the edges on a hone (oil stone) to remove the rough edge left by finishing. This is often done by women or girls, but the better work is always done by men. The whetter rubs the blade backwards and forwards on his stone at a slight angle so as to leave a thin white line called the kennel along the edge on either side of the blade. The knives are then wiped by women, joints oiled, wrapped up and put in boxes, and are ready for market.

Table Knives. — The process of making these is similar to that of spring knives ; though the workmen employed are entirely different. The trade comprises three branches of men,

forgers, grinders and cutlers, as in spring knives. The men in one line of the cutlery trade never work at any other of the sections, i.e., spring knife men in any of the three branches do not work at table knives, razors or scissors in the same branch; that is to say, a blade forger in the spring knife section does not make table blades, razors or scissors. The bet¬ ter table knives are made from shear steel, and are hand forged; this is too expensive for the greater part of the trade, so cast steel is used and forged with machines called goff hammers ; cheaper blades still are filed out of sheet steel. The table knife requires a different edge from a pocket knife, which has a smooth stiff edge, but for cutting soft substances such as meat, a thin rough edge is wanted. This is only ob¬ tained in perfection from shear steel, and though cast steel may answer fairly well for table knives, it is not satisfactory for carvers. Shear steel is made by welding together several lengths of blister steel (i.e., iron simply con¬ verted into steel). When these come from the converting furnace they are cut into shorter lengths about three and one-half feet long, and will be about three and one-half inches wide by one and one-half inches thick. Six of these are put together in a clamp at one end; the other end heated, worked into a bar under a steam hammer; the same is done with the other end, and the whole reduced by hammering to a bar about one and one-half inches by one inch; this is called single shear. For double shear the same bar is bent over, bringing the two ends to¬ gether, and put through the same process of hammering again. The bars are then rolled to the sizes required for forging. The forgers work double handed, one called the striker, the other the maker. They stand opposite each other, hammering at the same blade at the same time,

striking alternately, the maker holding the blade with one hand, and using a hammer in the other, the striker using a two-handed ham¬ mer. When the maker is finishing each blade (smithing it) the striker will be hardening and tempering. In hand-forged blades, the cutting part of the blade only is made of steel ; the tang (that part which goes in the handle) and the bolster (the thick part of blade where it joins the handle) are of iron, which is welded on to the steel by the forgers in process of making. The blades first being mooded (rough forged) iron for tang and bolster welded on, tanged, smithed, hardened and tempered, the table knife grinder grinds and finishes the blades right out before they are set in the haft by the cutler. After the handles are on and finished the blades are buffed again to remove scratches, and whetted on a dry, fine sandstone. In a cheaper but less effective way this whetting is done on dry grindstones.

Razors. — These are made of cast steel of fine and hard quality, but not as tough as that used for spring knives, as they are required to stand no bending strain. They are mostly hand forged, but many are now stamped in dies under power hammers, which process is found more satisfactory for razors required to be hollow-ground, as they can be stamped hollow ; but for flat sides, of which large quantities are made, the hand forging is more effective. The grind¬ ing of razors is done in the same manner as of spring knives, the blade being finished (glazed or polished) and etched if required, before

%

the fitter, called the setter-in, puts them in hafts. The hollow-grinding of razors is quite a fine art. Until a few years ago this was done on stones of various sizes down to some of not more than one-half inch in diameter. Emery wheels are now almost universally used for this purpose. Quite a variety of patent machines are now used for hollow-grinding. Razors are whetted on finer and harder stones than spring knives, and afterward stropped, wiped and done up in cases ready for use.

Scissors. — The best are hand forged, but good ones are also made from blanks stamped out of sheets of cast steel and moulded in dies. This is becoming the general process, and, pro¬ vided the material is good, the result gives all that is required. In large sizes of scissors only the cutting edge is made of steel, which is Welded on to iron ; these

are called <(shot scissors.® In common and cheaper qualities the blanks are cast, i.e., the metal is run into molds. The other processes of grinding, finishing and fitting scissors are somewhat similar to those described for knives.

The four trades described constitute what is technically included under the term of cutlery, but there are certain side lines to some of them which also come under that heading, for instance, some spring knife manufacturers will also make tea pruners, farriers' knives and some kinds of surgical knives ; in other in¬ stances, each of these may be carried on as separate trades, but all will be included under the title of cutlery. See Hardware.

American Practice. — While the processes of the manufacture of cutlery in the United States are generally the same as in England, a very much larger part of the work is done by machinery. For nearly all grades of knives and razors the forging is done with a trip ham¬ mer, and, a relatively higher quality of steel being used, the results are comparable in ex¬ cellence with the best hand-forged English blades. For cheap knives, the blades with tangs attached are blanked out of sheet steel and given their proper shape with dies in a hydraulic or other form of heavy power press, the opera¬ tion being continuous, as the long strips of steel are fed into the machines in constant succes¬ sion. Even the hardening and tempering are done automatically at the rate of 1,400 to 1,800 per hour. Most of the grinding also is done on automatic machines, and far more accurately than by handwork however skilled. The handles are formed and finished without hand labor, leaving only the assembling of the parts to the handworker.

Some razor blades are hand-forged but the large majority are moulded in dies in heavy presses with a very great saving of time. By the use of heated presses the quality of the metal is preserved even more perfectly than in hand-forging.

In 1914, as determined by the special census of manufactures in that year there were in the United States 27 establishments, with 3,832 em¬ ployees making table cutlery; 28 establishments, with 1,620 hands making plain and safety razors; 29 establishments, with 1,925 hands mak¬ ing shears and scissors ; and 32 establishments, with 3,894 hands making pocket knives. Their combined capital was $22,670,000, and their yearly output was valued at $16,996,000. Upon the outbreak of the European War the

American cutlery trade experienced an enor¬ mously increased demand. Not only had a large proportion of the local trade in cheap cutlery been in the hands of German manufac¬ turers, but these concerns had also had a practi¬ cal monopoly of the cheap cutlery trade of Latin America. This was entirely cut off, and the demand shifted in part to American makers, and in part to English houses. As the war pro¬ ceeded the cutlery factories of England were drained of many of their workers so that more and more of the demand has come upon Ameri¬ can manufacturers. In 1917 these cutlery plants were doing from 30 to 50 per cent more work than in 1914, and supplying not only Latin America but also Australia. A comparison of the figures for the imports and exports of cut¬ lery of the United States for the two years 1914 and 1917 indicate the great change which has taken place in this industry. In 1914 there were imported into the United States (chiefly from Germany, but in part from England, 16,- 297,764 pocket knives, valued at $1,288,037; razors to the value of $457,460 ; scissors and shears, 594,017 dozen, valued at $759,487 ; and other cutlery valued at $355,535 — a total value of $2,860,519. In that year the exports were valued at $1,147,995. In 1917 the imports were 52,936 pocket knives; 23,710 razors; and 83,614 scissors and shears — a total value of $283,206. The exports for 1917 were razors to the value of $2,505,117; table cutlery to the value of $627,031 ; and other cutlery to the value of $2,769,483 — a total of $5,901,631. Consult Lloyd, G. I. H., (The Cutlery Trades* (London 1913) ; and Reports of the United States Bureau of Foreign and Domestic Commerce (Wash¬ ington, monthly).

CUTLIPS, a fish, one of the suckers (Lagochila lacera) of the lower Mississippi Valley, whose mouth has a lower lip divided into two lobes, so that the fish is sometimes known by the names, <(harelip,® ˆrabbit-mouth,® (<May-sucker,® *etc.* Its upper surface is olive-brown in color, while the under parts are silvery. A long fissure concealed by the cheek entirely divides the lower and upper lips at the angles of the mouth. This fish whose appear¬ ance is most singular has no great commercial value.

CUTTACK, kut-tak', India. (1) An exec¬ utive district in the lieutenant-governorship of Bengal, province of Orissa ; area 3,633 square miles. On the coast is extensively manufactured the best and whitest salt made in India. Pop. 1,937,671. (2) The capital of the district of

Cuttack, on the Mahanuddy River, 220 miles south of Calcutta, is

chiefly noted for filigree-work in gold and silver. A canal extends to False Point. It is the seat of Ravenshaw Col¬ lege. Pop. about 50,000.
(3) The Cuttack

Mehals or tributary states of Orissa, a group of about 20 small native states in the northwestern part of Orissa. They are subject to 21 rajahs, tributary to Great Britain and have an area of 14,387 square miles. Pop. 1,696,710, principally hill-men of various tribes.

CUTTAGE, the propagation of plants by means of slips or cuttings which are detached parts of roots, stems, leaves, *etc.* This form of asexual or bud-propagation is found in na¬ ture among willows, poplars and many other trees and shrubs, especially such as are readily

broken by wind and drop their twigs and branches into streams and ponds with muddy shores. Artificially, it is one of the oldest meth¬ ods known and is of wide importance, ranking with graftage (q.v.) and seedage. The advan¬ tages of cuttage are that, with the rare excep¬ tions due to bud variation, plants may be prop¬ agated true to variety or species in very great number, and the cost of production of the kinds commonly so propagated is small when com¬ pared with certain other methods such as divi¬ sion and layerage, in which cases roots are developed before the removal of the parts which become new individuals. An idea of the scope of this practice may be obtained from the fact that, except in the production of new varieties which are obtained by means of seeds, the great majority of florists' perennial plants such as roses, carnations, violets, chrysanthemums, are so obtained, as are also many fruit plants such as gooseberries, currants, grapes and pineapples, though in the last instance other methods are also used to a large extent.

The methods for making the cuttings ˆstrike** root are very various. Some species such as currant and gooseberry will soon produce roots if plunged in moist soil out of doors ; others must be grown under glass, often with extra degrees of heat in the soil (bottom heat), in

propagating boxes (glass-covered frames upon the greenhouse benches), and other devices, as well as specially favorable soils, *etc.* The meth¬ ods of making the cuttings also differ widely with the species of plant and the part used, as the following classification will show :

Roots or Rootstocks

Short, under glass, Dracaena.

Long, in open air, Blackberry.

By tuber cuttings, Potatoes.

CUTTINGS.

Stem

Growing wood, Soft-Fuchsia. Hard-Rubber plant.

Ripened wood. Long, in open air,

Currant. Short, under glass.

Yew.

Leaf

Entire, laid flat on surface,

Begonia.

Divided,

Begonia, Rex

Bulb Scales,

Lily.

As a general rule, to secure the best success with cuttings, a well-drained, sandy soil is necessary, and, in most cases, it is desirable to have bottom heat. Consult Fuller, (The Propagation of Plants) (New York 1887) ; Bailey, (The Nur¬ sery-Book-* (New York 1896) ; id. article ((Cuttage** ; { Cyclopaedia of American Horticulture) (New York 1900-02).

CUTTER, Ephraim, American physician: b. Woburn, Mass., 1 Sept. 1832; d. West Fal¬ mouth, Mass., 25 April 1917. He was graduated at Yale University in 1852; practised medicine in his native city till 1875, in Cambridge and Boston till 1881, when he removed to New York and began practice there. He has invented a large number of surgical instruments ; con¬ tributed over 400 articles to literature on scien¬ tific subjects, including microscopic medicine, laryngology, chronic diseases and general medi¬ cine; and became a member of the Massachu¬ setts Medical Society in 1856, and of the Amer¬ ican Medical Association in 1871. He was a pioneer of American laryngology; he studied the morphology of raw beef from 1854 and discovered the tuberculosis cattle test in 1894.

CUTTER, George Burton, Canadian edu¬ cator: b. Amherst, Nova Scotia, 11 April 1874. He graduated B.A. at Acadia University, Wolfville, Nova Scotia, in 1896 and at Yale in 1897 (B.D. 1903). Ordained to the Baptist ministry in 1897, he held pastorates

successively at Mon¬ trose, New Haven, Conn., Corning, N. Y., and Columbus, Ohio. In 1910 he was appointed president of Acadia University, Wolfville, Nova Scotia, holding at the same time the chair of psychology of religion and pedagogy. He is the author of (The Psychology of Alcoholism* (1907) ; Psychological Phenomena of Christianity) (1908) ; (Three Thousand Years of Mental Healing) (1911).

CUTTER, George Washington, American poet: b. Massachusetts 1801; d. Washington, D. C., 24 Dec. 1865. He practised law in Ken¬ tucky until 1845 ; served as a captain in the Mexican War; became active in politics, and received a treasury clerkship. His poems are nearly all included in (Buena Vista, and Other Poems) (1848) ; (Song of Steam, and Other Poems) (1857); Poems, National and Patri¬ otic (1857).

CUTTER, a name given to two kinds of small vessels. The first is one of the supple¬ mentary small-boats of a man-of-war equipped for both rowing and sailing. The cutters used by yachtsmen and by pilots, and revenue cutters are built with especial reference to speed, and have a single mast, and a ˆsingle-stick® straight¬ running bowsprit that may be housed in-board in dirty weather. They are much like the sloop in rig. The hull of the cutter is very deep and narrow, being almost V-shaped, with an almost perpendicular rise from the floor to the bul¬ warks, and a keel heavily loaded with lead. In heavy weather, working to windward, the cut¬ ter shows to best advantage. (See Yachts and Yachting). A light sleigh with a single seat is called a cutter in some parts of the coun¬ try. A revenue cutter is a light armed govern¬ ment vessel commissioned for the prevention of smuggling and the enforcement of cus¬ toms regulations. See Revenue Cutter Ser¬ vice, United States.

CUTTING, Mary Stewart Doubleday,

American author: b. New York, 27 June 1851. Early in life she had verses published in Lip-pincotfs Magazine. She married Charles Weed Cutting in 1875, wrote verse occasionally and finally drifted into the short-story field about 1894. She has published (Little Stories of Married Life> (1902; 2d ed„ 1909) ; Peart of Lynn? (1904); Pittle Stories of Courtship> (1905); (More Stories of Married Life) (1906); (The Suburban WhirP (1907); (The Wayfarers* (1909); (Just for Two* (1909); (The Unforeseen* (1910) ; (The Lovers of Sanna* (1912) ; Pefractory Husband* (1913) ; (The Blossoming Rod* (1914).

CUTTING, R(obert) Fulton, American financier : b. New York, June 1852. He received his education at Columbia University, where he

was graduated in 1871. Becoming interested in social problems and political reforms he was, in 1892, made president of the Association for Improving the Condition of the Poor and, in 1899, of the New York Trade School Associa¬ tion. A member of the Citizens' Union and of the Bureau of Municipal Research, he con¬ tributed large sums to the political reform

work of both these bodies. He is chairman of the board of the City and Suburban Homes Company, trustee of the American Exchange National Bank, the Mexican Telegraph Com¬ pany, and the American Museum of Natural History. He wrote (The Church and Society) (1912), the Kennedy lectures before the School of Philanthropy, New York.

CUTTING, Starr Willard, American edu¬ cator: b. West Brattleboro, Vt., 14 Oct 1858. In 1881 he was graduated at Williams College and from 1881 to 1886 served as principal of the academy at Deerfield, Mass. He next prose¬ cuted his studies at the universities of Leipzig, Geneva and Johns Hopkins, and became con¬ nected with the faculty of Chicago University. In 1906 he was made head of the department of Germanic languages and literatures at the latter institution. He published <Der Konjunktiv bei Hartmann von Aue> (1894); (The Modern German Relatives (<Das® and <(Was® > (1904) ; 'Robert Wesselhoeft, Jena Burschenschafter, German Revolutionary and American Citizen > (1911), and editions of German school texts.

CUTTING, a detached part of a plant used for propagation. Cuttings may consist of the growing wood of the stem, as in Verbena and the tea roses ; of the ripened wood, as with the grape, the willow and most deciduous trees; of the rootstock, as with Arum ; the root, in the case of the blackberry; the leaf, for example in Begonia ; or bulb-scales, as with the lily. Propagation by cuttings is resorted to for many different reasons. In many plants seeds are bard to get, or when they are obtained, propa¬ gation by seeds is long and expensive, while propagation by cuttings is quick and cheap. For example, the potato rarely sets seed. Again, the willow will propagate itself under the most

untoward circumstances by means of cuttings, while seedlings are of course much more tender. Furthermore, seedlings of hybrid varieties or of seed or bud sports will not in general breed true, and it is the rule among cuttings to be accurate reproductions of the parent plant. Moist sand is generally the most favorable medium in which to plant cuttings. Consult Lindley, (Theory and Practice of Horticulture* ; Burbidge, (The Propagation and Improvement of Cultivated Plants) ; Henderson, P., Prac¬ tical Floriculture. *

CUTTLE, Captain, a character in Dickens' (Dombey and Son.* He is a retired merchant-captain with a hook in place of a right hand. He received and cared for Florence Dombey. His favorite expression, ((When found, make a note of® was adopted as the motto of (Notes and Queries.*

CUTTLE-BONE, the dorsal plate of Sepia officinalis, formerly employed in medicine as an absorbent, but now used for polishing wood, painting, varnishing, etc., for pounce and tooth-powder and to supply cage birds with lime and salts.

CUTTLEFISH, a common name for the Cephalopods, but originally applied to a member of the genus Sepia. In the United States it is restricted to the octopods (q.v.). The cuttle¬ fish proper, S. officinalis, measures from 6 to 10 inches in length, and its color varies from pale-gray to dark-brown or neutral tints. The body is oval, flattened from above downward, and contained in a tough muscular sac (mantle),

which expands along the whole of either mar¬ gin into a narrow fin. The integument consists of a single layer of cells, lying upon connective tissue, in which are embedded <(chromatophores,® or cells charged with various colored pigment-granules. By expansion of the cell the pigment is diffused,, and by its contraction concentrated, hence the rapid flashes of changing color for which the Cephalopoda as a whole are so remarkable.

The head is broad, with a complex cartilage which protects the central nervous system, and the eyes bright green. The front of the head is occupied entirely by the mouth, and the bases of the arms, of which there are 10, 8 having suckers on the extremity in 4 longitudinal rows. The two remaining arms, known as ((tentacles,® occupy the interspaces between the ven¬ tral arms and those next to them. They are twice as long as the others, and can be with¬ drawn into pockets situated beneath the eyes and carried in this position when not in use.

The mouth, situated in the centre of the roots of the arms, is surrounded by a lip with seven prominent angles, which bear small suckers in some species.

On the lower side, between the muscular sac and the body proper which contains the viscera, is a hollow space, the ((branchial® or <(mantle-cavity,® containing the siphon, the intestines, kidneys, genital organs and gills. Respiration is carried on by rhythmic contractions of the man¬ tle, in consequence of which water enters at either side, passes over the gills, and is ex¬ pelled by the siphon ; this takes place about 70 times in a minute. On the dorsal side of the animal, immediately beneath the integument, is a closed sac which contains the cuttle-bone. Speaking generally, this may be said to be of an elongated spoon or boat shape ; it consists of a horny lamina. Lying parallel to the terminal portion of the intestine is the <(ink-bag,® a hol¬ low gland opening near the anus, and furnishing a deep-brown fluid, which is ejected by the ani¬ mal when alarmed in order to conceal its retreat. The pigment known as ((sepia® is prepared from it. The heart is situated posteriorly, and con¬ sists of a pear-shaped sac which receives on either side a vein from the gills, dilated just before its termination into a muscular contrac¬ tile antechamber or auricle.

The nervous system consists of the three pairs of ganglia common to the mollusks, concen¬ trated round the oesophagus.

Of the sense organs the eyes are the most conspicuous. They occupy depressions in the head cartilage.

The ears are a pair of small closed vesicles, embedded in the head-cartilage, and supplied by nerves which, though apparently springing from the pedal ganglia, really have their origin in the cerebral. A ciliated pit, usually consid¬ ered olfactory, lies behind each eye. The sexes are separate. The testis and ovary are both single and situated in the hinder part of the body; the latter lies in the visceral sac or pericardium above described, the former in an almost closed diverticulum of it. The eggs have a tough capsule, with a projection at one end and a kind of handle at the other by which they are attached in bunches to a twig of sea¬ weed or other similar substance.

Cuttlefish are found in littoral regions or in moderately deep water; ordinarily they rest

horizontally on or near the bottom, the fins gently undulating, the tentacles retracted, and the arms depressed. Progression may take place by means of the fins with considerable rapidity in either direction, the funnel being turned so that the stream of water issuing from it assists in propulsion ; rapid darts backward when the animal is alarmed are brought about either by the sudden ejection of water through the siphon, or by spreading out and reuniting the arms. See Cephalopoda; Squid.

CUTTY STOOL, the stool of repentance, a seat formerly set apart in Scottish kirks, on which offenders against chastity were exhibited before the congregation and submitted to the minister's rebukes before they were readmitted to church privileges.

CUTTYHUNK, Mass., the most southerly island in Buzzard's Bay. It was on this island that Bartholomew Gosnold landed, on 25 May 1602, and there established the first settle¬ ment of white men in that part of the world. He named the island after Queen Elizabeth, calling it Elizabeth Isle. The settlement did not continue a full month before it was aban¬ doned, the colonists returning to England. It is now used chiefly as a place of summer re¬ sort. The United States Life-Saving Station was established there in 1889 and the house of the Massachusetts Humane Society in 1847. The site of Gosnold's fort was identified in 1797. The literature of the subject is now con¬ siderable. The publication in England of the ˆjournalists® of the voyage helped to pave the way for the later successful plantations of Pilgrims and Puritans. In celebration of the 300th anniversary of the initial settlement of white men in New England, a tower, built of pebbles and cement, with tablet in honor of Gosnold, was reared and dedicated with oratory and song in 1903, the speakers being Charles Francis Adams, Rev. Dr. Leonard, and William Elliot Griffis, whose lecture in Boston on Gosnold, in 1902, suggested the carrying out of the project. Consult New England Magazine (Boston 1897).

CUVIER, kii-ve-a, Georges Chretien Leo¬ pold Dagobert, Baron de, French naturalist and the founder of the science of comparative anatomy: b. Montbeliard, France, 23 Aug. 1769; d. Paris, 13 May

1832. After finishing his edu¬ cation at Stuttgart he accepted the situation of tutor in a Protestant family in Normandy. The Abbe Texier, whom the troubles of the time had driven into exile from the capital, intro¬ duced him by letter to Jussieu and Geoff roy Saint-Hilaire. Several memoirs, written about this time, and transmitted to the latter, estab¬ lished his reputation and procured his admission to two or three of the learned societies in Paris. In 1800 he was appointed successor to Daubenton as professor of natural history at the Col¬ lege de France, and in 1802 succeeded Mertrud in the chair of comparative anatomy at the Garden of Plants. From that time he devoted himself steadily to the studies which have im¬ mortalized his name. Cuvier's 'Lessons in Comparative Anatomy) (1801-05) and the 'Ani¬ mal Kingdom 5 (1817), in which the whole

animal kingdom is arranged according to the organization of the beings of which it consists, have raised him to the pinnacle of scientific fame, and established him as the first naturalist

of his time in the world after Linnaeus, the cele¬ brated Swedish botanist. His numerous mem¬ oirs and works on these subjects show a master¬ mind in the study of zoology ; and extending the principles laid down in his comparative anatomy to the study of palaeontology, he was enabled to render immense service to geology. Starting from the law that there is a correlation of forms in organized beings ■ — that all the parts of each individual have mutual relations with each other, tending to produce one end, that of the existence of the being — that each living being has in its nature its own proper functions, and ought therefore to have forms appropriated for that function ; and that consequently the analogous parts of all animals have received modifications of form which en¬ able them to be recognized — he was able to ascertain from the inspection of a single fossil bone, not only the family to which it ought to belong, but the genus to which it must be re¬ ferred. Even the very species of animal was thus identified, and the restoration of its exter¬ nal form as it might have lived and died be¬ came in his hands an object of certainty and precision. His (Animal Kingdom5 has been frequently translated, and forms the basis of all arrangements followed at the present time. Cu¬ vier filled many offices of great importance in the state ; particularly those connected with edu¬ cational institutions. Napoleon treated him with much consideration; Louis XVIII and Charles X advanced him to honor ; and Louis Philippe raised him to the rank of a peer of the realm. Consult Candolle, (Notice sur la vie et les ouvrages de G. Cuvier5 ; Lee, (Memoirs of Baron Cuvier5 (1833) ; Lomenie, (G.

Cuvier, par un homme de rien5 (1841) ; Florens, (Cu-vier; Histoire de les travaux5 (1845) ; de Blairville, (Cuvier et Geoffroy Saint-Hilaire5

(1890).

CUVILLIER-FLEURY, ku've-ya' fle're', Alfred Auguste, French author: b. Paris, 18 March 1802; d. there, 18 Oct. 1887. He was educated in the College Louis-le-Grand, be¬ came private secretary to Louis Bonaparte, ex-king of Holland, in 1819; tutor to the Duke of Aumale in 1827, and entered the staff of the Journal des Debats in 1834. He was made a mem¬ ber of the Academy in 1866. Among his works are (Voyages et voyageurs5 (1854) ; (Etudes, historiques et litteraires5 (1854J, (Nouvelles etudes5 (1855); (Dernieres etudes historiques et litteraires5 (1859) ; (Historiens, poetes et romanciers5 (1863) ; (Etudes et portraits5 (1865). Consult the biography by the Due d'Aumale in (Le livre du centenaire des debats,5 and Bertin's edition (1900) of his (Journal intime.5

CUXHAVEN, kooks'ha-fen, Germany, large seaport at the mouth of the river Elbe, in a detached portion of territory belonging to Hamburg. The old harbor is one of the safest on the coast, has been much improved in re¬ cent years, and is often resorted to in cases of danger. Many passengers for foreign parts em¬ bark at Cuxhaven, which is annually rising to greater importance. Here vessels generally take pilots to go up the river to. Hamburg and other places. These pilots are privileged, and by their statutes are compelled always to keep pilot-vessels out at sea, with men ready to conduct any vessel which may demand assistance. It is

a free port, being outside the Zollverein, and the Hamburg-American Steamship Company have made it the point of arrival and departure of their mail service. Pop. 14,888.

CUYABA, koo-ya-ba', Brazil, the capital of the state of Matto Grosso,

situated on the Cuyaba River, a part of the Paraguay River system. It has broad, well-paved streets and contains barracks, an arsenal and a military hospital. It was founded early in the 18L* cen¬ tury by adventurers from Sao Paulo, in search of gold. The climate being somewhat more healthful than that of other portions of the state, it has retained a moderate degree of pros¬ perity since the mining industry terminated. A military arsenal and barracks are located here. From Rio de Janeiro in a direct line the dis¬ tance to Cuyaba is about 840 miles, but only one-third of the railroad has been completed which is to connect Cuyaba with the coast, through Sao Paulo. At the present time trans¬ portation is mainly by way of the Paraguay and La Plata rivers to Buenos Aires or Monte¬ video ; thence by the Atlantic to the national capital — a total distance of about 3,720 miles. Pop. 14,507. See Matto Grosso.

CUYAHOGA (ke'a-ho'ga) FALLS, Ohio, village of Summit County, on the Baltimore and Ohio and the Cleveland, Akron and Co¬ lumbus railroads, and the Cuyahoga River, 33 miles southeast of Cleveland. It has a public library, paper-bag works, wire nail factory, machine shops, rubber factory, flour mills, sewer pipe works, *etc.* The municipality owns the water supply system and the electric-light¬ ing plant. Pop. (1920) 10,200.

CUYLER, John, American surgeon : b.'

Georgia, about 1810; d. Morristown, N. J., 26 April 1884. He entered the army as assistant surgeon in 1834, being among the first to pass the rigid examination instituted in 1833. He was actively engaged in the Creek War of 1838, and the Seminole War of 1840, and served with distinction during the Mexican War, re¬ ceiving promotion as major and surgeon on 16 Feb. 1847. From 1848 to 1855 he served at West Point. As senior medical officer at Fort Monroe, during the first years of the Civil War, his services were invaluable in organizing the medical department of the armies congre¬ gated there. He served afterward as medical inspector and acting medical inspector-general. He served on examining boards, and sought to uphold a high professional standard among army surgeons. He was promoted lieutenant-colonel and medical inspector in 1862, brevetted brigadier-general on 13 March 1865, and promoted colonel in 1876. After the war he was medical director of important departments until his retirement, 30 June 1882.

CUYLER, Theodore Ledyard, American clergyman: b. Aurora, N. Y., 10 Jan. 1822; d. Brooklyn, N. Y., 26 Feb. 1909. He was grad¬ uated at Princeton College in 1841 and at Princeton Theological Seminary in

1846. From 1860 to 1890 he was pastor of Lafayette Avenue Presbyterian Church in Brooklyn, resigning to devote his time to literary and reform work. Dr. Cuyler's reputation as a preacher and writer was international. He wrote (Newly Enlisted > ; Christianity in the Home) ; Cedar Christian* (1863) ; (The Empty Crib) (1868) ; (Heart Life* (1871) ; (From the Nile to Nor¬

way J (1881) ; (Stirring the Eagle's Nest)

(1890); (Beulah Land*; (Mountain Tops with Jesus) ; Cur Christmas Tides) (1904), *etc.* Besides his published volumes he wrote some 3,000 articles in magazines, many of these hav¬ ing been reprinted in England. Tn 1902 he pub¬ lished his (Recollections of a Long Life.*

CUYO, koo'yo, Philippines, a town and the capital of the province of Paragua, situated on the southwestern coast of the island of Cuyo, Cuyos group. The town is well built, and has an important trade. It is protected by a fort built on a land spit near the town. Pop. 8,500.

CUYOS ISLANDS, Philippines, a group of 47 islands lying south of the island of Mindoro, and east of Palawan ; total area, 63 square miles. The most important island of the group is Cuyo, 8 miles long; area, 20 square miles. The islands, with the exception of Cuyo, are infertile, and there is but little manufacture; the chief industries are the gathering and preparation of edible birds' nests and trepang, and the cultivation of rice and coconut oil. By the Civil Government Act of 1902, these islands were made a part of the province of Paragua, Palawan.

CUYP, koip, or KUYP, Albert, Dutch artist: b. Dordrecht 1620; d. there 1691. He was a son of Jacob Cuyp (q.v.) and excelled in the painting of cattle, grazing or reposing, moonlights, wintry landscapes, still waters with ships, horse-markets, hunts, camps and cav¬ alry fights, and in rendering effects of warm golden sunlight he is without a rival. During his lifetime and long after, Albert's pictures, though in many respects equal to those of Claude, were held in little estimation. He is best represented in London — the National Gal¬ lery, Buckingham Palace, Bridgewater House, Wallace Collection, Dulwich College have speci¬ mens of his art, and a fine cattle piece is to be found in the Metropolitan Museum of New York. Consult Wiirzbach, (Niederlandisches Kiinstler-Lexikon) (Leipzig 1906), and De Groot, (Beschreibung und Verzeichniss der Werke hollandischer Maler) (ib. 1908).

CUYP, the name of a family of Dutch artists: (1) Jacob Gerritsz, Dutch painter,

commonly called the Old Cuyp; b. Dordrecht 1575; d. 1651. Jacob Cuyp's representation of cows and sheep, battles and encampments, are clever, but his fame, rests principally on his ex¬ cellent portraits which can be found at Berlin, Cologne, Frankfort, Amsterdam, Stockholm and Metz. His coloring is warm and tran¬ sparent; his manner free and spirited. His portrayals of peasant groups are excellent. He was fond of introducing pet animals into his portraits. In one portrait of a family group, now in the Rothschild collection, an out-of- doors scene is represented with cows grazing here and there.* These animals are depicted with the greatest accuracy. Cuyp was one of the four founders of the Guild of Saint Luke at Dordrecht. (2) Benjamin Gerritsz, half-brother of the preceding: b. Dordrecht 1612; d. 1652. In 1631 he became a member of the Guild. He painted historical and mythological scenes, in the Italian manner, with great force, crudity of color, but excellent in design and grouping. Some of his pictures are (Angels at the Tomb of Christ) (Stockholm) ; Adora¬ tion of the Shepherds* (Berlin) ; <Episode in

the History of Cambyses* (Paris). (3) Albert, the nephew of the former and the best known of this family: b. Dordrecht 1620; d. there 1691. He studied with his father and at first imitated him, but later developed a style of his own. In 1658, he married a wealthy widow, Cornelia Bosman, by whom he had one daughter. He sart in the high court of the province of Dord-wyck, where he had considerable property, and was even considered as a candidate for the regency of Dordrecht in 1672. It is from this locality that his inspiration comes — every mood of nature is sensitively depicted in his many canvasses ; there are clear blue skies, pleasant meadows, quiet restful cows and horses; the people and costumes of the time — handled with sincere appreciation and fine skill in light and shade and perspective, and a homely, pleas¬ ant realism. Examples of his animal pictures are to be found at Rotterdam, Amsterdam, Petrograd and Brussels; of his

portraits the best are at Buckingham Palace, Bridgewater Gallery, Louvre and Dresden museums. An excellent night picture is the (Night on the Banks of a River) in the Grosvenor collection. Other well-known works are (View of Dord¬ recht* ; (Riders with Boy and Herdsman*

(National Gallery); (Huntsman*; (Piper with Cows* (Louvre). He painted a few allegori¬ cal subjects also, but these do not equal his other works in charm and facility. Consult Wiirzbach, (Niederlandisches Kiinstler-Lexi- kon* (Leipzig 1906) and De Groot, (Beschreibung und Verzeichniss der Werke hollandischer Maler* (ib. 1908). John Smith's (Catalogue raisonne* enumerates his works (9 vols., 1840).

CUYPERS, Peter, koi'pes, Dutch architect : b. Roermond 1827 ; d. 1903. He received his education at the Antwerp Academy. Becom¬ ing prominent in his chosen field he was com¬ missioned to build the Royal Museum, Amster¬ dam, to restore the cathedral of Mainz and to construct several important churches. The foremost of these are Saint Jacob's, The Hague, Saint Barbara's, Breda, Saint Catharine's, Eind¬ hoven the Sacred Heart, Amsterdam, and Saint Boniface's, Leeuwarden. He wrote (Der Dom zu Mainz, Baugeschichtliche Skizze* (1878).

CUYUNA RANGE. See Iron Ore Dis¬ tricts.

CUYUNI, koo-yoo'ne, a river of South America, rises in Venezuela, flows first north, then east, through British Guiana, and into the Mazaruni. It has numerous rapids and falls ; the lowest is 30 miles above the mouth. It is navigable for about 500 miles. Among its tributaries is the gold-bearing Yurauri.

CUZCO, kooz'ko, Peru, department in the southeastern part of the republic, bounded by the province of Loreto on the north, by Bolivia on the northeast and east, by Puno and Arequipa on the south, and by Apurimac, Ayacu-cho, and Junin on the west. Its area is 156,317 square miles. Within its limits are found nearly all varieties of temperature, with the corresponding products. The fertile valleys of the Vilcamayo enjoy an Italian climate; toward the Bolivian frontier there are vast tropical forests, abounding in all the productions of the torrid zone; on the slopes of the Andes are plains covered with pasture or crops of cereals ; and still higher up on the table-lands and peaks

are large flocks of vicunas and alpacas. In general, the easterly regions have the char¬ acteristics of the upper Amazon country, while the southwest is extremely mountainous, with beautiful and healthful elevated plains or val¬ leys, like that in which the city of Cuzco is situated. Pop. of the department, 438,646.

CUZCO, Peru, the most famous ancient city of South America. Situated in lat. 13° 31' S., and Ion. 73° 3' W., Cuzco is at an elevation of 11,380 feet above the sea (compare Mount Washington, 6,288 feet, and Mont Blanc, 15,779 feet), and its climate is temperate; but in winter snow often falls. It was the chief town of the Inca tribe (q.v.). The writings left by Spanish conquerors and early chroniclers, upon which subsequent accounts have been based, not only preserved the Indian myths but also added some fanciful details in regard to the place, the inhabitants and their institutions. According to such myths and accounts, the founder of the city was Manco Capac, son of the sun-god; Strong walls, we are told, surrounded it, and in its midst was a great square, from which started four roads binding together the ((empire of the four quarters of the world** (in the native tongue, (<Tahuantinsuyu**), the first road leading to Puitu, the modern Quito, the second over the Andes, the third to Chile and the fourth to the ocean. The temple of the sun, with the sur¬ rounding dwellings for priests and virgins of the sun, occupied a district of the city called ((The Golden.** Five mighty walls enclosed that sacred place. The temple itself was circular in form. Its chief hall, dedicated to the sun-god, contained an image of the sun made of beaten gold; the door-posts were of gold; all the walls were covered with discs of the same metal ; and the mummies of the Incas ranged beside the god were decked out with golden ornaments. A door encased in silver led to a chapel dedicated to the moon-goddess, sister and wife of the sun-god. Here the images and furnishings were of the white metal, and the mummies of the wives of the Incas were decorated with silver. A part of the site of the temple is now occupied by the church of S. Domingo. The Sacsahuaman fortress overlooked the city from a hill 250 metres high. It had a triple wall, built of enor¬ mous stones. Through deep ravines on either side of the Sacsahuaman hill flow the little rivers of Huatanay and Rodadero, the former passing beneath the houses on the west side of the square, down through the centre of a broad street, where it is crossed by numerous stone bridges, and eventually uniting with the Roda¬ dero. The main part of the old city was built between these two rivers ; and even to-day the houses there commonly show the massive masonry of the Inca architecture in their lower portions, though having a modern superstruc¬ ture. Now, as formerly, the streets run at right angles. The government established by the Incas,

though in form a despotic theocracy, was relatively mild and patriarchal. Nowhere and never have there been chiefs of state so suc¬ cessful in monopolizing all power, all initiative. Accordingly, when the Spanish conqueror Pizarro captured Inca Atahualpa, the people were incapable of effective resistance. Atahualpa's successors were Huascar and Manco. The former was slain ; the latter was induced by promises of friendship to lead the Spaniards into Cuzco (15 Nov. 1533). An enormous booty

was obtained by despoiling the temples and palaces. Besides gold and silver, the common soldiers received 200 slaves each, and the sacred sun-maidens were treated as a part of the loot. In 1536 the last of the Incas, Manco, besieged the city unsuccessfully. It remained the prin¬ cipal Spanish stronghold for a long time, though Pizarro founded Ciudad de los Reyes (Lima) 6 Jan. 1535. Extremely interesting are the remnants of the fortifications, temple, etc., some of which are constructed of huge masses of rock (one piece 16 feet in height; others 10 and 12 feet) of irregular shape, yet made to fit exactly one into the other with minute accuracy, as in mosaics. Such works, con¬ structed before 1370, are scarcely surpassed by any in the world in respect to their solidity and the skilful workmanship they attest. Among the public buildings are the Cabildo, the univer¬ sity, library and museum, *etc.* The city has suffered from lack of means of transportation and communication. Only in the last few years has an effort been made to connect it by rail¬ road with the Titicaca region. It is regularly built and contains several handsome buildings, prominent among which are the cathedral, in the Corinthian style, and the convent of San Domingo. There are also hospitals, a univer¬ sity founded in 1692, a national college and a museum. It has shrunken in trade as in popula¬ tion. Gold and silver work, leather, sugar, cot¬ ton, linen and wool are produced to a limited extent. The inhabitants at the time of the con¬ quest numbered perhaps 100,000; a century ago about 50,000; at present about 20,000.

CYANAMIDE. See Electro-chemical Industries.

CYANE, The. See Constitution, The.

CYANIC ACID is a thin, colorless liquid, stable only below 32° F., having an extremely pungent odor, somewhat resembling acetic acid, and a vapor irritating to the eyes ; the liquid acid is blistering to the skin. It was discovered in 1824 by F. Wohler. Cyanic acid is prepared by heating anhydrous cyanuric acid nearly to redness in a current of carbonic acid gas (CO_2). The resulting vapors of cyanic acid are con¬ ducted into a condenser surrounded by a freez¬ ing mixture. Cyanic acid dissolves in ice-water without decomposing until a certain degree of concentration is reached. Kept at a tempera¬ ture of 32° cyanic acid changes rapidly (in the course of an hour) into insoluble cyanuric acid ($C_3N_3O_3H_3$) . At a higher temperature the trans¬ formation is explosive with the formation of “cyamelide,® the exact composition of which is not known, but it seems to be the same as that of cyanuric acid. Cyanic acid unites with alkalis to form cyanates. Prominent among these are potassium cyanate, useful as a reagent ; and ammonium cyanate, interesting chiefly be¬ cause it was the source of the first synthetic pro¬ duction of an organic substance from inorganic materials.

CYANIDE INDUSTRY, The. The prod¬ ucts of the cyanide industry reported for 1914 comprise sodium cyanide, yellow prussiate of potash, metallocyanides, yellow prussiate of soda, trisalytes and potassium cyanide. Reports were received from six establishments recently that manufactured cyanides, not including cya¬ nide blues, the total production for the year being 16,450,225 pounds, valued at $2,398,674. This

output comprised 3,204,684 pounds of yellow prussiate of potash, valued at $451,092, and 13,- 245,541 pounds of other cyanides, designated as sodium cyanide, metallocyanides, yellow prus¬ siate of soda, trisalytes and potassium cyanide, valued at $1,947,582, the cyanides being named in the order of their importance in respect to quantity produced. While the production of the yellow prussiate has decreased by about 9 per cent since 1909, the output of other cyanides in¬ creased by 35 per cent. Of the six establish¬ ments reported in 1914, two were located in New Jersey and one each in Massachusetts, New York, Ohio and Pennsylvania.

In addition, recently, 1,239,382 pounds of cyanide blues (iron ferrocyanides) reported as Prussian blue, valued at $387,077, were returned by 15 establishments engaged primarily in the manufacture

of paints and pigments. Of these establishments, six were located in New York, four in New Jersey, four in Illinois and one in Massachusetts.

CYANIDE PRACTICE, a term used to cover generally the diverse applications of the process of securing the precious metals from their ores through the use of potassium cyanide. While the process follows certain basic lines, the applications of it vary almost with every mine in which it has been put into practice. This article can give only the general outline of the process, and the interested reader must be referred to the voluminous mass of periodical literature to be found in the current mining magazines and the books suggested below. It should be noted in passing that cyanidation in the extraction of gold from ores has practically superseded the former processes of smelting, pan-amalgamation, bromination, chlorination and in large measure plate-amalgamation, as the most thorough as well as economical method. In a number of plants, however, cvsnidation has been abandoned for the newer method of flota¬ tion (q.v.).

The cyanide process is based on the fact that water containing only a very small percentage of potassium cyanide dissolves gold and silver, and that these metals may be recovered from this solution by precipitation with metallic zinc. In the treatment of gold and silver ores by this process the first operation is the crushing of the ore to such a degree of fineness that the cyanide solution may reach every particle of the precious metal present. Until very recently this crushing was done by stamp mills, and this is still the practice at many mines. The crushed material from the stamps was then separated into <(slime® (the finer) and “sand® (the coarser). The slime was treated by agitation with the cyanide solution in a stirring apparatus, and the sand in a percolator. In the percola¬ tion process a much stronger solution of cyan¬ ide was required, and a much longer time was consumed. The approved practice in the more progressive mines at present is to use the stamps only for the coarser crushing and to reduce this crushed material to the utmost fine¬ ness by further grinding in a tube-mill with quartz pebbles. It is required in some plants that the powder shall all pass a 150-mesh screen. In many plants a solution of cyanide is fed into the material during the crushing. In this case it is usual to pass the crushed material over amalgamating plates of copper as it comes from the stamps ; the mercury on the plates seizes the

coarser particles of gold at a considerable sav¬ ing of time and expense.

In the case of ordinary stamp-milled material the separation of the fine and the coarse is made by water jets playing upward from the bottom of the V-shaped separator box. These jets are not strong enough to prevent the coarse material from sinking to the point of the V, but produce sufficient current to carry away the slime over the top of the box and into the collecting vat. This preparation is preliminary to the process¬ ing with cyanide, but without such preparation the cyanide process is only a partial success.

The cyanide process proper consists of three operations: (1) Dissolving the precious metal ;

(2) precipitating the metal from the solution;

(3) smelting the precipitates. In the first opera¬ tion, if <(sand® is to be treated by percolation, the material is filled into a tank and some lime or other alkali is scattered over the top and washed inter the mass with water, which is then drained away. Then a ((strong® cyanide solution, carrying one-fourth of 1 per cent of potassium cyanide, is run into the tank from the bottom and this is allowed to stand for a sufficient period — varying from 6 to 12 hours, according to the kind of ore and its degree of fineness. This solution is then drawn off and a weaker solution run in : and this is repeated several times, the proportion of cyanide being less each time, down to a proportion of one-tenth of 1 per cent, the last (<washing® being with clear water. The entire operation requires from four to eight days.

In the treatment of slime, after it is carried over into the collecting tank it is allowed to settle partially, lime being added, after which it is allowed to settle completely. It is then mechanically agitated with more or less of the cyanide solution, according to the proposed after treatment. In what is known as the ˆdecantation® process about four tons of the cyanide solution are used to one ton of slime. After agitation (in one of a dozen different -ways) the slime is left to settle, and then three tons of the clear cyanide solution containing probably three-fourths of the gold and silver present in the slime are decanted. Three tons of new or <(barren® cyanide solution are then added and

agitated with the slime, which is again settled and again three tons of solution are drawn off. This procedure is repeated until 97 or 98 per cent of the gold and silver has been recovered. The alternative method of extracting the gold-laden solution is the filtra¬ tion process. There are numerous variations of the filter, the ultimate object sought being to get the last drop possible of the gold-bearing cyanide solution out of the slime. Each type has its advocates, and none seems superior to the others.

Having secured by one means or another the solution containing the precious metals, the next step is precipitation. This is accomplished by passing the liquid upward through a mass of zinc which has been finely divided so as to present a large area of surface. This is secured by reducing the zinc to thin and narrow shav¬ ings or threads, or even to dust : the latter, however, has a dangerous tendency to explode. An improved form is known as ˆatomized zinc,® and this in some cases is mixed with atomized lead, or the zinc is alloyed with lead before atomizing. The double cyanide of gold

(or silver) and potassium is apparently decom¬ posed, the zinc taking the place of the precious metals in the combination. These metals in a finely divided condition fall to the bottom of the zinc-box, or adhere lightly to the zinc particles, from which they may be brushed.

This sedimentary deposit from the zinc-box contains, besides the gold and silver, a percent¬ age of zinc, and perhaps also some lead, copper and iron and a variety of insoluble metallic salts. It is treated with weak sulphuric acid, which removes the zinc and several other im¬ purities. Or the precipitate may be roasted in a reverbatory furnace. In some plants both the roasting and the sulphuric acid treatment are applied. It is then mixed with a flux and smelted in a graphite crucible, preferably lined with clay. In some plants an oxidizer such as fluorspar or manganese dioxide is also added. When the smelting is complete the metal is cast as bullion — generally from 900 to 950 parts fine. The slag consists principally of silicate of zinc, and frequently contains enough gold to pay for working it over. See Gold Mining.

The cyanide process was first employed on a commercial scale in 1889 at the Crown Mines at Karangahake, New Zealand. In that year the world's consumption of cyanide amounted to about 50 tons. By 1905 the mining industry was consuming 10,000 tons annually. Previous to the outbreak of the war in Europe the larger part of the world's supply

of cyanide was pro¬ duced in Germany. The complete elimination of this source threw a large burden upon American manufacturers of cyanides, but the demand has been met, the principal raw material used being the refuse beet pulp of the beet sugar industry.

Bibliography. — Bain, H. F., (More Recent Cyanide Practice> (San Francisco 1910) ; Ber-newitz, M. W., (Cyanide Practice 1910 to 1913 J (San Francisco 1913) ; Clennell, J. E., (The Cyanide Handbook (New York 1915) ; Mc-Farren, H. W., (Cyanide Practice) (New York 1912) ; Megraw, H. A., (Details of Cyanide Practice) (New York 1914) ; Thomson, F. A.,

(Stamp Milling and Cyaniding) (New York

1915).

CYANIDE PROCESS. See Gold Mining.

CYANIDES. See Hydrocyanic Acid.

CYANIN, sl'a-nin, or ANTHOCYA-NINE, the blue coloring-matter of certain flowers, as the violet and corn-flower. It is red in the presence of acids. It occurs in buds and other parts exposed to the light and has been considered a protection against injurious rays of light.

CYANITE, a native aluminum silicate, AhSiCh, identical in composition with silliman-ite and andalusite but very different in its phys¬ ical properties. Its hardness varies on differ¬ ent faces from 4 to 7. Its specific gravity is 3.56 to 3.67. It is triclinic, the crystals usually being long-bladed, transparent or translucent, and of a beautiful sky-blue color in the centre. Stout crystals of grass-green color occur in North Carolina. The finest specimens come from Faido, Switzerland, occurring in par-agonite schist. Cyanite abounds throughout the New England and Middle Atlantic States.

CYANOGEN, sl-an'6-jen, a colorless, poisonous gas which liquefies at — 4° F. and at

— 30° F. becomes crystalline. It burns with a peach-blossom-colored flame, forming C02 and nitrogen ; water dissolves four volumes and alcohol 23 volumes of the gas. It is very pois¬ onous and smells like prussic acid. It poly¬ merizes when heated. Cyanogen gas passed into strong aqueous hydrochloric acid is con¬ verted into oxamide. Hydrogen converts cyan¬ ogen into hydrocyanic acid, HCN. A solution of cyanogen in water turns dark and deposits azulmic acid, C4H5N5O, and the solution con¬ tains hydrocyanic acid, urea and oxalate and formate of ammonia. Cyanogen dissolves in an aqueous solution of potash, forming cyanide and isocyanate of potassium. It may be regarded as the nitril of oxalic acid. Dry ammonia gas and cyanogen combine, forming hydrazulmin, GNeHo. Small quantities of cyanogen are formed during the distillation of coal. It can also be made by heating metallic cyanides or C202(NH2)2, or by the passing of induction sparks between carbon poles in an atmosphere of nitrogen.

CYANOMETER, si-a-nom'e-ter (ftmeas-urer of blue®), the name of an instrument in¬ vented by Saussure for ascertaining the inten¬ sity of color in the sky. It consists of a circular piece of metal of pasteboard; with a band, divided by radii into 51 portions, each of which is_painted with a shade of blue, beginning with the deepest, not distinguishable from black, and decreasing gradually to the lightest, not dis¬ tinguishable from white. It is used in the open air, and the observer holding it up between himself and that part of the air whose color he wishes to ascertain, and in such a position as to secure its being strongly illuminated with¬ out receiving the direct rays of the sun, turns it gradually round on its own plane till he per¬ ceives an exact similarity between the tint of the instrument and the tint of the sky. The number of that particular tint as marked on the instrument marks the intensity of color in the sky at that particular period.

CYANOPHYCEzE, si"an-6-fi'se-e (Gr. Mark blue®), the lowest group (blue-green) of Algae (q.v.). They are closely allied to the Bacteria (q.v.), and together with them are known as Schizophytes. They do not appear to possess a nucleus. Their color is caused by the diffusion of phycocyan, a blue pigment, through¬ out their cell-contents. In this group no sexual reproduction has been observed, the only repro¬ ductive means known to exist in it consisting of spores and hormogonia of a non-sexual character.

They may be either one-celled, filamentous, or of the nature of loose aggregates of cellsin, a gelatinous matrix. Oscillatoria is one of the unbranded filamentous forms. Some of the filamentous forms contain cells known as hetero¬ cysts, which lose their protoplasmic contents and become fixed to the sheath of the filament. The growth of the remaining cells forces the filament out of its sheath and produces what is known as false branching. Vegetative re¬ production may take place by the breaking off of a part of a filament. Nostoc forms balls of jelly containing twisted filaments.

The blue-green algae may grow on moist spots on the pond, salt marshes or even in springs the temperature of which is near the boiling point, but their favorite situation is

shallow, warm, fresh water, as in lakes, or even reservoirs, where they often cause a dis¬ gusting stench in warm weather. Copper sul¬ phate is the best treatment. The Red Sea re¬ ceives its color from one of the Cyanophyceae. Consult Cooke, (British Fresh Water Algae> (London 1881-83) ; id., introduction to FreshWater Algae J (ib. 1902) ; Wolle, (FreshWater Algae of the United States } (Bethlehem, Pa.,

1887).

CYANOSE, si'a-nos, or CHALCAN-THITE, kal-kan'thit, native sulphate of copper (CuSCh, 5H20), met with generally in stal-actitic or reniform masses, but sometimes in well-defined crystals. It is dark-blue, trans¬ lucent, vitreous, brittle, readily soluble in water and with a most disagreeable metallic taste. Its hardness is 2.5, its specific weight 2.2-2. 3. It has a conchoidal fracture. It is found in Chile, Cornwall and elsewhere. It crystallizes in the monoclinic series.

CYANOSIS, si-a-no'sis, a condition of diminished oxidation in the blood, causing lividity of the skin, blueness of the lips and symp¬ toms of weakness and fainting. It may be a permanent affection, such as is seen in b.lue babies, in whom the venous blood obtains access to the arteries without passing through the lungs to be oxidized; or it may be a tem¬ porary condition due to choking, to excessive coughing as in false croup or in true diph¬ theria. It also results as a temporary condi¬ tion in poisoning by means of a number of the newer drugs used for headaches and vague pains, such as acetanilid and the like. It may also result from coal-gas poisoning and a large variety of other

forms of poisoning. Removal of the source, if possible, fresh air, oxygen, artificial respiration, are useful in the treat¬ ment of the condition. The congenital varieties are unmodifiable.

CYANOTRICHITE. See Lettsomite.

CYANURIC ACID (from <(cyanogen® and <(uric®), an organic acid having-the formula

COH N N

CjNsOsHa or || | and obtained by the

HOC COH

dry distillation of uric acid. It is a polymer of cyanic acid, CNOH, and may be obtained, along with another polymer of unknown molecular weight called cyamelide, by the spontaneous polymerization of cyanic acid. To obtain it in this way, potassium cyanide, CNOK, is treated with hydrochloric acid in the presence of ether and water, the mixture being well shaken. Potassium chloride and cyanic acid are formed, the latter polymerizing at once into the two com¬ pounds mentioned above, the cyanuric aciM that is formed being taken up by the ether, from which it mav afterward be recovered by evaporation. Cyanuric acid forms colorless ef¬ florescent crystals which contain two molecules of water when deposited from solution in water. The hydrous crystals have the form of rhombic prisms ; but anhydrous crystals, octahe¬ dral in form, are also known. Cyanuric acid dissolves in hot nitric, hydrochloric or sul-CYATHEA — C YCADALES

phuric acid, there being no decomposition unless the action is prolonged. When heated it be¬ comes converted into cyanic acid, this reaction being one of the tests that are employed for its detection.

CYATHEA, a genus of arborescent ferns, family Cyatheacece , characterized by having the spores, which are borne on the back of the frond, enclosed in a cup-shaped indusium. There are many species scattered over the tropical re¬ gions of the world. C. medullaris is a fine New Zealand species of comparatively hardy char¬ acter. The soft, pulpy, medullary substance in the centre of the trunk is an article of food somewhat resembling sago. This species and C. dealbata, from the same country, are culti¬ vated as ornamental plants. C. arborea is a West Indian species.

CYATHOMETER, an apparatus for deter¬ mining the level and volume* of liquids in closed vessels. It is adapted to bottles and to stationary or movable vessels and is designed especially to prevent fraud in the retail trade in valuable liquids.

CYBELE, sib’e-le, a goddess of Asia Minor, like Isis, the symbol of the moon, and what is nearly connected with this, of the fruitfulness of the earth, for which reason she is con¬ founded with Rhea, whose

worship originated in Crete, and in whom personified nature was revered. According to Diodorus, Cybele was the daughter of the Phrygian king Maeon and his wife, Dindyma. At her birth her father, vexed that the child was not a boy, exposed her upon Mount Cybelus, where she was nursed by lions and panthers and afterward found and brought up by the wives of the herdsmen. She invented fifes and drums, with which she cured the diseases of beasts and children, became inti¬ mate with Marsyas and fell violently in love with Attis. She was afterward recognized and received by her parents. Her father discover¬ ing her love for Attis had him seized and exe¬ cuted, and left his body unburied. The grief of Cybele on this occasion deranged her un¬ derstanding and she began a long search for Attis. In art her original statue was nothing but a dark quadrangular stone. Afterward she was represented as a matron, with a mural crowm on her head in reference to the im¬ proved condition of men arising from agricul¬ ture and their union into cities. A common attribute of the goddess is the veil about her head, which refers to the mysterious and in¬ comprehensible in nature. In her right hand she often holds a staff, as an emblem of her power, and in her left a Phrygian drum. Some¬ times a few ears of corn stand near her. The sun also is sometimes represented in her right hand, and the crescent of the moon in her left. We sometimes see her in a chariot drawn by lions ; or else she sits upon a lion, and, as omni¬ potent nature, she holds a thunderbolt; or a lion lies near her. These symbols are all representa¬ tions of her dominion and of the introduction of civilization by her means in the period of bar¬ barism. Her cult was centralized at Phrygia, whence it found its way into Greece, as early as the latter half of the 6th century b.c., and was introduced at Rome in 204 b.c. To the Romans she was known as the Great Idaean Mother of the Gods. Under the Roman em¬

pire, it became one of the three most important Roman cults and was of the last pagan wor¬ ships to give way before Christianity. Consult Farnell, (Cults of the Greek States) (Vol. Ill, Oxford 1907).

CYCADACEZE. See Cycadales.

C YCADALES, sik-a-da'lez (from Cycas = Neo Lat. nom. pi. of Gr. nvKaq-t the orig¬ inal name of the African cocoa-palm), a greater group of tropic to sub-tropic naked-seeded or gymnospermous plants, the cycads. The large pith of the thick palm-like trunk of certain species of the genus Cycas is the source of the sago starch of commerce, whence the common name, ((sago palm.® The existing forms are only an ornate remnant of an ancient and varied alliance,

the nearest living relative being the <(Ginkgo,® or maidenhair tree.

At least two distinct Cycadalean types are recognizable ; the cycads proper include all extant forms and have only a short fossil record, while the cycadeoids, now wholly extinct, were cosmopolitan throughout all of Mesozoic time. The first group is comprised within the order Cycadaceae, to which all cycadaceous types were until recent years supposed to belong. The second group may be arbitrarily brought within the order Bennettitacece, with far the broader relationships and an immensely varied history. But it appears that variants of both groups go back to the Carboniferous.

I. Cycadaceae. — The cycads are a primitive megaphyllous and composite type with wood structure like conifers (and Cordaites) , certain frond and other characters of ferns, and the outward habit of palms. As in the latter, the stem elongates by the slow growth of a terminal bud, with the unfolding of successive crowns of leaves or fronds spirally arranged in close order. As the leaves wilt down, there is formed from their bases an outer more or less persistent armor, which gives the stem its very character¬ istic appearance. For trunk-forming plants, the cycads are mostly small or even pygmic. They include tuberous to columnar sparse-branched forms, and vary in size from under¬ ground trunks a few centimeters in diameter, with fronds no more than a decimeter long, to moderately tall forest forms.

It was once suggested that Cycas (see Fig. 2), in which the so-called carpellary leaves alternate with the foliage leaves in armor for¬ mation, grew taller than forms bearing cones only. But such is not the fact. The Australian Macrozamia Hopei reaches a height of 60 feet, or nearly double that of any Cycas, and the Mexican Dion spinulosum is nearly as tall. Both these are columnar, rather than branched types. The most robust trunks may reach a meter in diameter, and the longest fronds a length of four meters. Several Central Ameri¬ can and Peruvian species are epiphytic. Most of the cycads branch one or more times after reaching a certain age, and all are handsome and easily grown greenhouse plants. The Japanese gardeners display examples of their native species Cycas revoluta, upward of 300 years old, and as freely branched as screw pines. A pot-type is shown in Fig. 3. One of the most interesting of all species is the Cuban Microcycas calocoma, a slender stemmed forest form about 30 feet high, also branched in a manner recalling the habitus of the screw pines. The

cycads are widely dispersed in tropical and sub¬ tropical regions, though seldom abundant. Zamia floridana (Fig. 1) locally known as the <(coontie,® occurs in thickly set clumps as under¬ brush in the open pine woods of south Florida, while Z. pumila is found more sparsely among the denser forest growths of the hammocks.

the cortex supports primarily the primitive outer investiture or armor of old foliar bases, which is quite persistent in some forms, but in others is more or less rapidly excised by the formation of successive layers of periderm, at first arising within the leaf-bases, and then in the cortex itself with the casting off of thin

Fig. 3. — Branching in Cycads. (a), Cycas revoluta, pot-trained in Japan; (b), Encephalartos, greenhouse branching.

The fern-like and subterranean stemmed Stangeria paradoxa is abundant both in the open grassy veldt and in the bush of Zululand. Simi¬ larly the low-growing Macrozamia spiralis and Bowenia serrulata ■ together form a moderately close undergrowth in the Eucalyptus bush of southeastern Australia. Along the eastern mountain slopes of the Mexican state of Vera Cruz, the tall Dion spinulosum is in places the only large plant and may be said to form a cycad forest. But as a rule, the cycads now play a rather inconspicuous role in forest facies. (See Geographic Distribution) . The stem consists finally in a thin zone of wood, cam-

Fig. 4. — Encephalartos, growing in rocky clefts, Lado near Uganda border. — Globular branched trunk type recall¬ ing the cycadeoids. Note the two large seed cones.

bium and bast, enclosing a large medulla and enveloped by a thick

cortex, this being in the main the arrangement in all the gymnosperms and the dicotyls. But there is this difference;

bark. Moreover, in Cycas, Macrozamia and Encephalartos the woody cylinder does not as in the other genera remain single. After a time the primary cambium becomes inactive, and there successively arise in the cortex secondary cambiums of diminishing power and regularity. From these are produced the so-called “anoma¬ lous wood zones,® rarely increasing to a dozen and finding no parallel amongst modern plants. The principal features of this second or polyxy-lic trunk type are shown in Fig. 2, together with a medullar system of anastpmosing cauline bun¬ dles. These also occur in the pith of Enceph¬ alartos. Both pith and cortex are traversed by anastomosing mucilage canals. The cortical bundle system is a complex one, varying greatly in the several genera, and including <(girdle leaf traces® (cf. g, Fig. 5) of a primitive, partly concentric structure. The leaf traces are always double and the two branches may nearly girdle the stem. They are most nearly direct in their course from the woody cylinder through the cortex to the leaf base in Zamia and Stangeria. Complexity of the leaf traces begins even in the cotyledonary plate, but is partly a result of the thickness of cortex.

The cycads, unlike all vascular cryptogams, send down a primary root which continues as a taproot. In the case of such subterranean trunks as those of certain species of Zamia (Fig. 1), the taproot remains prominent, and its lateral branches are relatively small, the trunk assuming a carrot-like form. But in most genera the root system comes to be quite fila¬ mentous, being largely made up of freely branching adventitious roots. In Cycas the rootlets come to the surface as a felt-like mass and bear numerous coraloid tubercles, recalling the nitrogen fixing tubercles of legumes. The leaves or fronds are usually of two kinds, scale

Fig. 1, -.ˆamia floridana, Miami, Florida, middle of November. (1, to right) ovulate plant with enlarged view of cone section of the same showing seeds, megasporophyll bearing two seeds, and pinnule; (2) summit of staminate plant bearing five cones ; (3) microsporophyll with enlarged view of triple group forming sorus. The entire plant is shown about one-tenth natural size. The staminate plant is about one-third Fig. 2. Cycas revoluta, both columnar and branched stems. Ryugeji Temple garden, near Fjiri, Japan

CYCADALES

EXTREME TYPES OF CYCADEOIDS

1 A Petrified Cycadeoidea from the Black Hills, weight over 300 pounds

2 Restoration of Climbing or Procumbent, Flowering Wielandiella from the Rhaet of Skone, by Nathorst. Both

figures are about one-sixth natural size

and foliage. There are also the fertile or carpellary leaves of Cycas. All appear in terminal rosettes in the order named, scale, foliage, and when present, carpellary leaves. The scale leaves are dry and aborted foliage leaves, and are present in all but certain species of Macrozamia. The elliptical to acuminate foliage leaves are bipinnate in Bowenia, and pinnate in all the other genera. Prefoliation is direct in Dion and Macrozamia. In Cycas the rachis is straight, but the pinnules are circinnately rolled like those of ferns. Conversely in several other genera the pinnules lie straight along the once deflected rachis. The pinnules vary from broad forms of papery thinness in some Zamias to leathery and hard spinose types like Encephalartos. They vary much in size and form and are of dichotomous venation, except in Cycas, which has a single mid-vein. Those of Stangeria are very fern-like, and Cycas Micho-litzii is bilobately dichotomous, signally recall¬ ing the fossil Ginkgoid leaves, especially of the Rhatic. The anatomical structure is much as in certain conifers and the extinct Cordaites.

Fructification. — The living cycads are all dioecious. The microsporophylls are always organized into cones which may vary from a few centimeters long to enormous forms ex¬ ceeding in size the very largest ears of Indian corn, and bearing as many as 600 microsporo¬ phylls, these being the most massive to be seen in seed plants. In number the staminate cones

Fig. 5. — Macrozamia Fraseri. Transverse section of trunk X i- (From Worsdell). p, periderm in successively formed layers; w, wall of one of the leaf bases; l, leaf base; c, cortex; g, girdle leaf traces; a”, isolated bundle of a 3d anomalous wood zone; a’, 2d anomalous wood zone; a, 1st anomalous wood zone; n, normal wood (xylem dark, phloem light); m, medulla; m’, medullary bundle.

vary from a few, or even a single subterminal cone, to over 100 laterally borne cones in the vol. 8 — 23

Australian Macrozamia Moorei. The sporangia are borne on the under side of the sporophyll and are structurally much like those of Angiop - teris among the Marattiacece. In certain genera there is an obscure grouping into sori. (See Fig. 1). The ovules, which are the largest known in the vegetable kingdom, are in the genus Cycas, doubtless the most primitive type among recent phanerogams, borne on the margins of modified leaves, emergent in regular series like the ordinary foliage leaves. In the other genera the megasporophylls each bear but a single pair of ovules, and are organized into terminalˆ sub¬ terminal or lateral cones. These are of striking size in all the genera, and reach a length of nearly a meter with a weight of 90 pounds in some Australian Macrozamias. In various forms following development of a single cone, the stem is prolonged from a new lateral bud as a sympode. But cones truly lateral occur in both Macrozamia and Bowenia, often in some number. The seeds are often of large size. In Cycas, especially, the free seeds look much like large plums ; but in cone-bearing forms there are strong appression faces. The seed coat is amphivascular — that is, with a mid¬ stone separating an inner and outer bundle system. Cycas is platyspermic, and the other genera have radio-symmetric seeds. There are from one to three cotyledons. Testal structures are closely analogous to those of Ginkgo and the Cordaitales. Even stronger is the resem¬ blance to the seeds of the Paleozoic quasi-ferns, or Cycadofilices, if, as seems necessary, the apical testal division seen in these ancient seeds is regarded as primitive. The seeds of cycads, like those of Ginkgo, are edible. They even form for a considerable part of the year the main food of some of the native Australians - — although it is said that as freshly gathered the seeds contain a poisonous principle. This is removed by maceration and drying.

Fecundation. — Among the various primitive characters of the cycads going to prove their descent from homosporous tree-ferns, easily the most recondite is the occurrence of motile multiciliate male cells of the coiled type, charac¬ teristic of all the Pteridophytes except the club mosses. These spermatozoids were doubtless common to all the cycadales and are present in Ginkgo, but are not known in any other phanerogams. The pollen grains are first drawn through the micropylar tube into the pollen chamber (by suction), after which the pollen tube ruptures the exine and enters the nucellar tissue, where it may branch. Meanwhile the spermatozoids (Figs. 6, 7) form from the gen¬ erative cells and, after the rupture of the pollen tube, swim actively to the archegonium through a liquid medium, afforded in part by the tube and probably also by extrusion from the egg¬ cell. The

mature spermatozoids are the largest known in any plant (or animal), at least in Zamia floridana. In this species they are visible to the naked eye, and have been studied alive in sugar solutions. They are of nearly spherical top-shape, with a ciliferous spiral running from the apex to the middle region, and motion is mainly by means of their cilia, but there is also amoeboid motion of the spiral end (see Figs. 6 and 7). From this most primitive form of fecundation known in flowering plants it seems evident that not until the later stages of plant

evolution did the pollen tube begin to serve as a direct means of transfer of the male cells as in other phanerogams.

Fig. 6. — Zamia floridana DC. End of mature pollen tube after for¬ mation of the cilia of the two spermato zoids and just before these pull apart to swim free to the archegonia.

X 50. (From Webber).

Classification and Geographic Distribution.

— The living cycads include a few over 100 species divided into two families, the Cycadece, with the single genus Cycas, and the Z amice, including the other genera. The species are nearly equally divided between the New and Old World thermal tropics. There are four indi¬ genous Occidental genera : Zamia, with nearly 40 species, ranges over the mainland from Florida, where two species occur, to Brazil, and also over the West Indies; Ceratozamia, with six species, and Dion, with three, are mainly Mexican and Central American ; while the monotypic Microcycas is Cuban. In the Orient five genera occur : Cycas, with over 20 species, is the most notable, and ranges over Australia, the East Indies and Japan; Macro zamia, with 12 species, and the monotypic Bowenia are both strictly Australasian ; while Encephalartos, with 20 species, and the monotypic Stangeria are African. This represents a peculiarly balanced distribution. No genus is common to both the Orient and Occident. Mexico, Africa and Aus¬ tralia are the main centres of present day cycads ; . and while Cycas is the only eastern form extending into the northern, Zamia is the only western form known to extend into the southern hemisphere. There is, however, no reason to believe the species are now under¬ going restriction. The eastern Andine base is the portion of the cycad habitat least known.

Fossil Cycadaceae. — As in the case of vari¬ ous unique types in the existing flora, the pres¬ ent isolation of the cycads is connected with a past history of great extent. The living forms are only two lateral branches of a varied cycadalean group. The Cycadeae are ancient, characteristic leaves of the Cycas type having already been present in the Carboniferous limestone. Undoubted petrified Cycas seeds occur in

the Cretaceous of Vancouver Island. The Zamiae were already present in the Jurassic. But they are always scantily present. Modern looking cycads appear to occur as

Fig. 7. — Zamia Jioridana DC. Mature spermatozoid while swim¬ ming free. X 100. (From Webber).

certainly as anywhere in the upper Cretaceous (Atane Beds) of Greenland. Since Cretaceous time the northern limit of the Cycads has slowly retreated from the Arctic area to its present position. A species recalling the African Encephalartos was left behind in the lower Miocene of southern Europe. However, none of the fossil forms referable to the cycads have the importance attaching to the wholly extinct cycadeoid group, the Bennettitaceae. Nearly all the abundant vegetation of the Mesozoic, for¬ merly supposed to fall within the Cycads, is being gradually relegated to this group, and to an account of its discovery and features we now turn.

II. Bennettitaceae. — The record of the dis¬ covery and segregation o.f this extinct group from the cycads proper now forms one of the most interesting chapters of palaeontologic re¬ search. The cycad, or more exactly speaking, the cycadophytan type of foliage, characterizes the vegetation of mid-geologic time. Of all fossil plants yielded by the Mesozoic rocks, over 30 per cent are cycadalean. So universally and in such variety of species do the leaf imprints occur that the Mesozoic is often spoken of as the <(age of cycads.® But the actual proportion of cycad and cycad-like plants in the Mesozoic floras can only be surmised. The recovered record consists largely in xerophyllous, low¬ land or swamp types, and it has not yet been ascertained whether there was a distinct cycadeous element in the contemporaneous upland and plateau vegetation ; although it is probable that there was, and there is evidence that both cycads and cycadeoids were notable constitu¬ ents in the Mesozoic vegetation of the Arctic areas. Probably the species ran into the thou¬ sands. At any rate, the dominance of cycadeous plants in the fossil floras preceding the advent of recognizable angiosperms in the lower Cre¬ taceous has long been regarded as a fact of deep evolutionary interest ; though it is only within the past 25 years that much headway has been made in the study of the extensive fossil material at hand. Previously the knowl¬ edge of the fossil cycads rested mainly on such facts as could be gleaned from the study of dissociated leaves and occasional stem

imprints. The few petrified forms more accurately studied had not resulted in restorations, and it was naturally supposed that the extinct types were closely allied to modern forms. The names of the leaf genera, Zamitcs, Otozamites, Cycadites, Stangeritcs, etc., etc., indicate this supposed affinity. But it is now known that even the xerophyllous types, which are the more readily conserved because of form and habitat, often bore, despite their strictly cycad-like leaves, flowers and fruits very unlike the oones of existing cycads. (See Fig. 8). American re¬ searches have mainly contributed to this result. Especially the discovery of the remarkable silicified trunks of the Black Hills of South Dakota has given to the cycadeoids a tran¬ scendent interest from both the palaeontologic and the botanic viewpoint. These trunks are not, however, unique to North America. They belong mainly to the genus Cycadeoidea and the family Cycadeoideae, established nearly a cen¬ tury since by the English geologist Buckland. Various silicified stems with a heavy armor of leaf bases notably simulating the recent cycads just described had been encountered in thq

so-called (<dirt bed® of the oolite formation of the Isle of Portland. This lies just above the limestone there quarried. As the black earth of the ((dirt bed® is stripped away, the cycadeoids, with more or less crushed terminal buds, are encountered quite in the original soil in which they grew. The stems are still being found and have been known to the quarrymen as <(crow's nests® for several centuries, going back even to the time when the materials for the construc¬ tion of Saint Paul's of London were quarried. Owing partly to the checked type of conserva¬ tion, the Buckland specimens received little further study, and it was not until 50 years later that William Carruthers described an Isle of Wight trunk bearing ovulate cones.

Fig. 8. — Types of Cycadeoid fossilization. Above (1,2), imprints of associated fronds and fruits, from the Gondwanas, India. Below (3), surface of petrified Black Hills trunk showing similar ovulate cone. Cf. Fig. 10.

Certain Italian specimens had yielded incomplete results, and a splendid Galician trunk in the Zwinger Museum at Dresden, discovered as early as 1753, remained unstudied. Neither did an interesting series of American trunks from the (<iron ore® beds of Maryland, first noted about 1860, receive merited attention. In fact, the ovulate cone being the most aberrant cyca¬ deoid feature, with the foliage uncertain, the relationship to the cycad-leafed plants of the Mesozoic was obscured rather than cleared ; and so the subject rested until the attention of American palaeontologists was directed to the Black Hills of South Dakota and a little later to the Freeze Out Hills of Wyoming. Begin¬ ning with the species Cycadeoidea dacotensis (Macbride 1893) nearly a score of valid species have been described from silicified types, often

bearing conserved crowns of young leaves and the flower buds in various stages of growth. In one instance, that of the monocarpic Cyca¬ deoidea Dartoni, perhaps the most remarkable fossil plant ever recovered, fully 500 of the mature ovulate cones are embedded in the armor. Over half are complete and show the seeds with the finely conserved dicotyledonous embryos. For a full account consult references, Wieland, (American Fossil Cycads) (Vol. II). About the lower Cretaceous Black Hills rim and in the Freeze Out Hills upwards of 1,000 of the silicified cycadeoid trunks have been secured. These are now mainly included in the collections of the State University of Iowa, Yale University and the United States National Museum. The Yale collection includes a unique series of branched trunks and is unrivalled in extent and the variety of types included. These specimens have permitted the preparation of a unique series of polished surfaces and thin sections from which alone critical study is pos¬ sible. These great accessions of new material have made possible a redintegration of the actual plant type represented by the genus Cycadeoidea, now probably the best known of all extinct plants. Obviously Cycadeoidea itself is a highly specialized form ; but aside from its striking features it possesses an extreme interest as affording the indispensable structural key to the study of the cycadeoid casts and imprints. Moreover, the wider knowledge of this pre¬ viously unknown group of plants for the first time brings within the range of scientific dis¬ cussion the origin of the angiosperms. Curiously enough while some of the trunks of Cycadcoi-dea weigh nearly 1,000 pounds, certain related forms like the Wielandiella of Nathorst had much branched stems little thicker than a lead pencil. (See plate). In brief, these dissimilar but related forms together with the principal extinct cycadaceous plants are the cycadeoids , classified as the Bennettitacese. It is next in order to consider Cycadeoidea as the key to the group.

Organization of Cycadeoidea. — In the

Mesozoic forests in which they grow, the ma¬ ture trunks of Cycadeoidea, with their foliage, would have appeared to a beholder to differ little from modern cycads. Some of the low branched Dakotan trunks must have greatly resembled the Uganda Encephalartos of Fig. 4. Only when in full fruit would essential differ¬ ences have appeared to the eye. Vegetatively, the more copious fern-like chaff or ramentum borne by the leaf bases forms the chief outer peculiarity. As in the cycad trunk, the diver¬ gence from other gymnosperms is mainly due to the retention of the old leaf bases, the heavy .underlying corticaL parenchyma and the pres¬ ence of a relatively enormous medulla or pith. The woody cylinder is thus relatively reduced ; it is also of

somewhat simple structure and usually without growth rings. There is, how¬ ever, a tendency to the formation of growth rings in some of the silicified trunks, with de¬ velopment of a woody cylinder as heavy as in Cordaites and a correspondent reduction of both the medulla and cortical region ; it being noteworthy that these variant features are par¬ alleled by the existing Dion. In its simplest form the woody cylinder of the Cycadeoids (and cycads) consists in a regularly aligned lat¬ tice of anastomosing collateral bundles. The

meshes are formed by the leaf gaps. Each cylinder bundle is divided into a conspicuous xylem and phloem region separated by a well-marked cambium. The xylem or secondary wood tracheids are interspersed by occasional

manner as in the fossil forms, where the petiolar bundles are more simply aligned. In cycads the petioles have a prominent median ridge with pinnule insertion in two lateral fur¬ rows; but most fossil forms appear to have

Fig. 9. — Section through summit of petrified (Cycadeoidea) trunk from Black Hills, cutting crown of young fronds, with single frond embedded in fine chaff or ramentum (several times enlarged). The pinnules of the (once pinnate) fronds are still folded, back to face, in two ranks.

parenchyma cells. The ((medullary rays® are abundant, deep and made up of sheets of oblong to squarish cells, often two cells thick. Next the pith, the spiral protoxylem first arises as more or less isolated strands, soon merging into the main body of scalariform secondary wood. While the scalariform pits of the mid-region of the tracheids tend to break up into a radial circular pitting of the Araucarioxlylon type, it may be said that in nearly all the species the main body of wood is characteristically scalar¬ iform. Only in one species is the circular* pit¬ ting found to form a thin outer zone next to the cambium. Essentially this same variation is found in the wood of modern cycads, except that in the latter there is more development of pitted wood. The cycadeoids thus appear to have been a primitive scalariform type, while the cycads seem to advance toward a pitted condition. But this difference is partly the result of post-Cretaceous change. In both groups the phloem region agrees in a regular alternation of thin and thick walled elements. From the cylinder meshes, or leaf gaps, arise the leaf traces which are single and pass out directly to the leaf bases.

The leaves of the cycadeoids are in venation reminiscent of the Cordaites. As in that group and the cycads the bundles are mesarch. The inverted omega bundle pattern of the latter, as seen in the transverse petiolar sections, is some¬ what unique, but varies in much the same

had a more or less pronounced median furrow, on the sides of which the pinnules were obliquely inserted. Prefoliation of the fossil types was direct, with pinnule growth some¬ what preceding rachidal elongation as in the existing Macrozamia spirali. See Fig. 9.

The flowers of a number of species of Cyca¬ deoidea are known in various stages of growth from initial or minute forms a few millimeters in diameter to the mature ovulate cones or fruits. All the strobili, whatever the stage of growth, indicate more or less clearly an amphisporangiate condition; but there is conclu¬ sive evidence for both bisexual and monoecious species, with a probability that certain others were dioecious. Briefly, the flower is a short lateral axillary shoot, always invested in a husk of hairy bracts (cf. figures 11-13). At the centre is an immature ovulate cone, envel¬ oped by a staminate disc. The buds vary from a few centimeters long by a half centimeter in diameter, to forms 5 to 10 centimeters in di¬ ameter. (Fig. 11). The marvelously perfect silicification of the flowers is due to the pro¬ tected position in which they grew packed in amongst the old leaf bases ; but even so, the fossilization of such delicate organs as sta¬ mens and pollen must be regarded as fortui¬ tous. In species where the peduncles elongated no fruits were left behind. The great number of fruits borne by various mature trunks is a striking feature, indicating in several of the

species monocarpy, or fruit growth for a sin¬ gle season only, followed by sterility and death. The stamens are as in the far more reduced amphisporangiate flower of Tumboa, united into a campanulate disc, hypogynously in¬ serted. The border of the campanula rises to nearly the height of the immature central cone and then splits into discrete sporophylls. Each of these then sends up two wing-like spurs and at the same time the rachidal tips turn inward and downward along the surface of the cone — that is, the component fronds of the flower-

Fig. 10. — Sections through petrified seed cones of Cycadeoidea. A, the transverse section shows the bract husk in solid black, with the interior mass of seed stems also in black. B, longitudinal section of cone, showing staminate collar (s) , receptacle bearing the mass of seed stems and sterile scales, and outer seed zone. About natural size.

bud are of deflexed or conduplicate prefloration. The sporophyll spurs rise closely appressed each to each, forming instead of a rounded summit a spired dome inside the bract husk. The outer surface is toward the apex quite tomentose. Each stamen is once pinnate with the pinnules reduced and bearing two lateral rows of pendent bivalvate synangia, varying from a few to 10 or 12 to the row. As densely packed in the flower-bud, the syn¬ angia show strong appression faces (Figs. 12, 13), but are of essentially the same structure as in the existing tree ferns of the genus Marattxa. The sporangia in two facing rows of 10 or 12 each resting in the synangial valves are often filled choke-full of well-conserved pollen. The grains are much like those of ex¬ isting cycads, though tending to reach a slight¬ ly larger size.. It is noteworthy that some of the discs are considerably reduced and that re¬ lated forms of the Mexican Liassic have a nearly simple campanula. See series of Figs.

11-14.

The mature ovulate cone (Fig. 10) is of in¬ verted pear shape and consists in a flattened to conical receptacle, bearing a closely interlocked series of sterile and fertile scales. At the pe¬ riphery all the scales are sterile, but in all the central parts of the cone, as so clearly seen in the transverse sections, the fertile scales are so distributed that each is surrounded by some regular number, as from five to six, or five to seven of the more flattened infertile scales. Each megasporophyll bears a single erect and terminal seed, generally from the size of a

small grain of rye to a large grain of wheat, while the infertile scales rise about and over¬ top this seed, so that their expanded ends come

Fig. 11. — Longitudinal section of amphisporangiate flower bud of Cycadeoidea (middle figure), with transverse sections of the same cut on levels a, b. The latter are about twice natural size. See text also Fig. 12.

to surround the micropylar tubes in a series of interlocking rosettes. The seeds are radiosper-mic, five to six angled like those of Palaeozoic rather than Mesozoic times, exalbuminous or

nearly so, and dicotyledonous. The testa is rather reduced, triple-layered with a middle stone one or two cells thick and non-vascular. These are the only known fossil dicotyledonous seeds, but the embryos are conserved in beautiful detail. In form and testal structure, including peculiarities of the micropylar tube, the Cycadeoidea seed presents certain striking approxi-

Fig. 12. — Cycadeoidea dacotensis Macbride. Portion of a transverse section through unexpanded microsporophylls of a bisporangiate strobilus, cutting a rachis and adjacent synangia. In the central synangium the outer covering of heavy walled prismatic cells is seen to be followed by a thin walled layer from one to several cells thick, to which adhere the sporangial loculi closely ranged in two rows — one on each side of the synan¬ gium. Each loculus is usually delimited by a thin band of collapsed cells with adherent pollen grains, and each row of loculi is bounded on the inner side by well-defined tissue a single cell in thickness, except between the angles of adjacent loculi where there is a thickness of several cells. Thus is formed the two opposed inner walls of the two valves into which the synangium splits in dehiscing. Cut more obliquely the two inner walls . present a striate appearance. The tips of the three synangia on the left side of the figure are cut very obliquely, and comparison with the other synangia hence shows the position of the dehiscence slit in the outer wall. At the lower left-hand corner of the figure a portion of a transversely cut rachis is marked by an arrow. X about 25. Cf. next figure.

mations to the seeds of Gnetum gnemon and G. africanum, as proved by Emily M. Berridge and Mrs. Thoday.

The Williamsonian Tribe. — The boundaries of fossil groups are always obscure, or at least inferential. They change as discovery pro¬ ceeds ; but they are never settled. So, coexist¬ ent with the Cycadeoidea, and without sharp

demarcation, stands the related and far greater group of dissociated fossil remains conveniently termed the Williamsonian Tribe. This tribe, taking the term in its very broadest sense, thus designates that

dominant and. varied but im¬ perfectly known assemblage of Mesozoic plants, to which the silicified cycadeoids afford the structural key. These are, too, the proangio-sperms, as they were with much foresight called by the French palaeobotanist .Saporta. Obviously, accessions of petrified forms are few; but the discovery of related casts and im¬ prints is only begun. The latter are in a sense the more important, since they in the end af¬ ford the chief evidence for the variety and ex¬ tent of extinct cycadophytan vegetation. The first attempt at the reconstitution of a William¬ sonian eycadeoid was that of Zamites , or, as now called, Williamsonia gigas, by the Eng¬ lish palaeobotanist, W. C. Williamson (1870). But his conclusions, based on the casts and imprints of stems, leaves and fruits* from the Yorkshire coast, failed to convince contempo¬ rary botanists. With Cycadeoidea understood, it is found, however, that the Williamson res¬ toration only lacked completeness. By far the best-known member *of the Williamsonian tribe is the Wielandiella from the Rhatic of Sweden, as skilfully studied and restored by A. G. Nathorst, and shown in the plate. This plant had a much branched, scandent or de¬ cumbent habit and bore very small perfect flowers with reduced discs. Because of great age and plastic features Wielandiella must be regarded as the most important cycadeoid; but unfortunately the stem structure remains un¬ known. The Pterophyllmn Fayoli of the French Carboniferous is one of the oldest and handsomest of the leaf forms; while the In¬ dian (and cosmopolitan) Dictyozamites had the significant feature of net-venation. The Williamsonians leave behind approximately the record of emergence and extinction indicated in the appended table. In order to keep the form simple (and more nearly correct), vari¬ ous types doubtless related, such for instance as the Carboniferous to Permian Plagiozamites , are omitted.

William¬ sonian Tribe

Trias

Rhaet

Jura

Cretaceous

L.

M.

U.

L.

M.

U.

Pterophyllum. .

*

Zamites .

X

Podozamites…

X

Dioonites .

A nomozamiles

X

Nilssonia .

X

*

(?)

(?)

Glossozamites. .

Sewardia .

X

Otozamites ….

X

Sphenozamites .

Ptilophyllum . .

X

Dictyozamites .

X

Wielandiella…

As far as fossil preservation goes, Pterophyllum and Zamites are the representative ancient lines, with Sphenozamites as a relative merely characterized by oddity of leaf form. And these old lines pass on to add their quota to the great Williamsonian group of the Rhsetic, the period of most rapid evolution. Culmina-

tion occurs in the lower Jura; while extinction begins in the middle Jura and progresses stead¬ ily to the upper Cretaceous, where the Cycadeoideas also find their final representation in both Europe and America.*

Cycadeoid Relationships. — In comparing the stem and leaf structure of cycads and cycadeoids it is seen that the distinct differences generally have the nature of singularities ac¬ centuated by separation in time. The existing cycads go to the Jurassic. Then, doubtless, they still retained their ramentum and various older features. The main gap is due to the or¬ ganization of the sporophylls into cones in the cycads, into flowers in the cycadeoids ; and that this severance djd not occur later than the Per¬ mian is an inference resting not merely on the general evidence, but on the cognate fact that the coniferous types also underwent much similar change in that age. The fossil trunks

Fig. 13. — Cycadeoidea dacutensis Macbride. Longitudi¬ nal section (in the narrow direction) through a synangium, showing attachment to the sporophyll, the several layers of the synangial wall, its dehiscence, the attachment of the sporangia, and the median sulcus between them. The basal buttressing of the outer wall is characteristic. Pollen grains shown en¬ larged. X 37.

differ from the modern in four lesser, although distinct features, either of which affords a basis of separation. Firstly, in the cycadeoids the single heavy leaf trace of horseshoe section arises from the lower angle of the leaf gap and passes directly out to the leaf base, while in the cycads the trace is double. In them, the two strands sometimes nearly girdle the trunk, although such girdle leaf traces are less in evi¬ dence in Zamia and Stangeria. Secondly,

* Cycads, it has been said, “are to the vegetable kingdom what Dinosaurs are to the animal, each representing the culmination in Mesozoic times of the ruling dynasties in the life of their age.” They are more. As the boundaries of the Williamsonian Tribe are extended,

many climatic and paleophyte factors must come into view; while the bearing on the evolution of modem types is incomparably clearer than in the case of ancient reptiles, where the myology always remains partly doubtful, and the mode of repro¬ duction wholly obscure.

while these ((girdle traces® may have a concen¬ tric structure, the only cycadeoid cortical traces which are concentric pertain to peduncles. Thirdly, there are sometimes found in the cycad pith vascular cone domes due to the nearly or

Fig. 14. — Views of the amphisperangiate flewer bud of Cycadeoidea colossalis. Partly diagrammatic (to left); but on the right the transversely cut summit, with longitudinal section of young seed cone (A), and microsporophylls (B). Nat. size.

incipiently terminal position of the enormous cones. As the vegetative axis reasserts itself the peduncle bundle strands and cylinder are grown, round by the main woody cylinder. No parallel can arise in the cycadeoids-, where the peduncles are all lateral, as indeed they are in most cycads. Fourthly, peduncular centrifugal wood, the remnant of the old cryptogamic wood, and still present in some modern cycads, is entirely lost in the cycadeoids, notwithstand¬ ing their greater age. In fructification the cy¬ cads and cycadeoids at first sight appear utterly dissimilar. But on closer consideration im¬ portant reciprocal relationships appear. There is an Indian form suggesting a staminate whorl, rather than a disc ; while there is no question of the strobilar nature of the ovulate fruit, whether to be regarded as a cone, or as an inflorescence made up of secondary axes of sterile scales clustered about a central seed stem, somewhat after the manner of the Pandanus cone. Furthermore, diffuse strobilar types, or those with more leafy sporophylls, are in evidence in Mesozoic times in both conifer¬ ous and other gymnospermous types. Also, it appears that in gymnosperms there are dis¬ tinct gradations from carpellary leaves to cone scales, and that there is no impassable hiatus between cones, whorls of fertile leaves and discs. In cycads the microsporophylls are re¬ duced to cone-scales, while the magasporo-phylls are in the carpellary stage. In the cyca¬ deoids exactly the opposite, or complementary course of change went on ; the seed is simple stalked (as in Araucaria), and the microsporophyll is frond-like. It has, too, that curious eared feature, which also appears primitively significant. Just as in various cycad cones both types of sporophylls have an eared

or diceratoid character, so in the Cycadeoidea microsporophvll the same feature recurs; and the further fact is there learned for the first time that the position or insertion of the spore in the so-called dorsal or ventral position may depend on the mode of prefloration and reduc¬ tion. Thus, owing solely to the manner in which the sporophylls of Cycadeoidea are or-360

CYCADOFILICES

ganized into a disc, the synangia reach inser¬ tion on the superior surface, although of cer¬ tain derivation from pendent Marattioid types. And this evidence bears directly on the origin of* the ovuliferous scale of conifers. It can be readily seen that reduction of an eared megasporophyll, preflorately deflexed, must lead to a complex ovuliferous scale simulating that of the modern conifers. Finally, in the article on Araucaria it was pointed out that a certain parallel with Cycadeoidea exists. Aside from cycads, Araucaria must be considered the nearest relative, despite the floral parallel seen in the Tumboa disc and the seeds of Gnetum. Fundamentally important is the fact that with the splitting up of the scalariform pits and loss of tracheidal end walls, vessels could arise, and that with medullar decrease and the develop¬ ment of storage tissue, essentially dicotyled¬ onous wood structures like those seen in Magnolia , Drimys and Trochodendron would be reached. Taken in conjunction with the floral plan, simulating that of Liriodendron and other Magnoliaceae, there is indicated a possible, if not even a probable, mode of angiosperm derivation. Narrow indeed must have been the gap between upland and espe¬ cially boreal cycadeoids and the -true precursor or pro-angiosperms in early Mesozoic times. The only alternative hypothesis to angiosperm derivation from within or near to the cycadeoid stock, is a far-reaching homoplasy and paral¬ lelism continuing throughout all post-Palseozoic time. See Cycadophyta; Paleobotany.

Bibliography. — The record of discovery and investigation of the Cycadales, existing and fossil, is to be found mainly in the scien¬ tific writings of Buckland, von Mohl, Solms-Miguel, Lignier, Zeiller, Fliche, Nathorst, Scott, Worsdell, Stopes, Seward, Ikeno, Web¬ ber, Ward, Chamberlain and Wieland. The titles are given with essential completeness in the bibliography appended to Wieland's Amer¬ ican Fossil Cycads > (Carnegie Institution of Washington Publication No. 34, Vol. I, 1906; Vol. II, 1916). For a still more recent account consult Seward's (Fossil Plants) (Vol. Ill, Cambridge, England, 1917).

G. R. Wieland, Yale University.

CYCADOFILICES. See Pteridosperm m.

CYCADOPHYTA, a term of convenience for all cycad-leafed plants,

introduced by A. G. Nathorst. The great majority of such plants are extinct and of unknown fructification, but so far as discovered they are naked seeded or gymnospermous. The apposed gymnosperm group Coniferophyta is now also used for the living and fossil plants with foliage like that of pines, araucarias, *etc.* See Cycadales ; Paleobotany.

Perforce any group of plants mainly fossil is homogeneous or natural only with respect to its foliage, the flowers and fruits of extinct forms being seldom determinable with certainty. The Cycadophytes thus include frond types ex¬ tending from those with pinnules like the exist¬ ing Zarnia Wallisii a foot and a half long by a foot in breadth to very narrow linear forms. The double bifurcate condition in Cycas Micho-litzii suggests easy transition toward Ginkgo (q.v.). There may be a single midrib as in Cycas, but the appearance is often very fern¬

like with parallel to dichotomous lateral veins. Venation is mainly dichotomous, with easy transition into typical netted venation such as that of the Jurassic Dictyozamites. An inter¬ esting intermediate form, cosmopolitan in the later Mesozoic, is the genus Ctenis. As now used, the Cycadophyta are not restricted to the pinnate, or even bipinnate fronds like Bowenia of the Malaysian region. Many of the species had simple blades sparsely inserted on slender stems after the manner of dicotyls. Such may be arbitrarily included because their relation¬ ship to forms with decided cycad foliage has been proved. (See description of Cycadeoidea and W ielandiella in Cycadales). Theoretically the Cycadophytan blade of the Stangerites, or the Taeniopleris type, must approach primitive dicotyl blades like those of the early Magnolias (Liriodendropsis) . In the latter there is gradual increase in size of the sparsely set parallel veins with gradual invasion of the finer marginal net. That is, the actual vein bulk remains much the same, but the dis¬ tribution of the veins as a supporting frame¬ work is different and stronger — meeting the needs of varied environments and of lofty trees growing in the open.

A fairly searching, though necessarily alter¬ native classification of the Cycadophyta taken as a vast complex of forms extending back to the Carboniferous Age, and constantly being added to in the course of paleontologic dis¬ covery, is the following:

I. Cycadales (Cycads)

(A) Zamia, Microcycas, Ceratozamia, Dioon.

(B) Encephalartos, Stangeria, Macrozamia, Bowenia.

Cycas

Pseudocycas Cycadites Stangerites

Podozamites Plagiozamites Sphenozamites

II. Hemicycadales (Cycadeoids)

Cycadeoidea Fittonia, *etc.* Amphibennettites, *etc.*

Williamsonia

Zamites

Ptilophyllum

Otozamites

Pterophyllum

Glossozamites

Dictyozamites

Cycadolepis

Wielandiella

Williamsoniella

Anomozamites

Taeniopteris

Ctenis

Pseudoctenis Ptilozamites M acrotaeniopter is

. R. Wieland. Yale University.

Pericycadeoidaceae

(Pericycadeoids)

Apocycadeoidaceae

(Hemicycadeoids)

Cycadeoideae (a petrified series)

Williamsoniae (The Williamsonian tribe)

Microflorae

Holophytae

Cycadaceae

(incertae sedis)

Zamiae

Cycadeae

Pseudocycadeae

CYCADS. See Cycadales.

CYCLADES, sik'la-dez, or KYKLADES,

the ancient and likewise the modern name given to the principal group of islands in the Grecian Archipelago, now belonging to the kingdom of Greece and formed into a separate province. The largest islands of the group are Andros, Paros, Myconus, Tenos, Naxos, Melos and Thera or Santorin. They are situated be¬ tween lat. 36° and 38° N. and long. 24° and 26° 30' E. They are generally mountainous and evidently of volcanic formation. They produce southern fruits and large quantities of marble, limestone, slate, gneiss, marble and eruptive rocks. Wine, brandy, hides and to¬ bacco are exported. Hermopoljs is the princi¬ pal trade centre and capital. Pop. about 130,-

378.

CYCLAMEN, sik'la-men, a genus of per¬ ennial herbs of the natural order Primulacece. There are about a dozen species, mostly na¬ tives of the Caucasus and the Mediterranean region, and characterized by flattish turnip-like tubers or corms, long-stemmed, more or less rounded or heart-shaped leaves and solitary, single flowers with reflexed petals of great range of color. The best-known species grown in America is C. latifolium, popularly known as C. persicum. It has produced a very large number of horticultural varieties, including some double forms, and is probably the most satisfactory window gardening plant, because of the profusion of its blossoms during many months and also because of the simplicity of its culture. The seeds are sown in early win¬ ter and kept steadily growing until the follow¬ ing winter, when they should commence to blossom; that is, in from 12 to

15 months. The roots must not be allowed to dry up like other bulb roots. The plants do not stand the heat of American summers and are therefore less popular as garden flowers than in Europe. The name sow-bread is sometimes given to the spe¬ cies chiefly cultivated in the United States, be¬ cause swine are fond of the acrid tubers. The root is a drastic cathartic and is occasionally used in medicine.

CYCLE (Gr. kvkTios, Lat. cyclus, a circle) is used for every uniformly returning succes¬ sion of the same events. On such successions or cycles of years rests all chronology, particu¬ larly the calendar. A period of 28 years is called a solar cycle and serves to show the day of the week falling on the first day of January in every year. The lunar cycle is a period of 19 years, after which the new moon falls again on the same day of the month. Besides these two cycles, which are indispensable for the cal¬ culations of the calendar, there are some others, several of them known by the names of periods. In China a cycle covers a period of 60 years ; hence the poet, Moore, may have had in mind a definite length of time when he used the ex¬ pression, ((A cycle of Cathay.®

CYCLE. See Internal Combustion En¬ gine.

CYCLOID, the curve traced by any given point in the circumference of a circle which is rolled in its own plane upon a straight line. The rolling circle is called the generating circle and the chosen point the tracing point. The straight line is called the base of the cycloid,

and the two points on the base where the curve begins and ends are the cusps. The cycloid is commonly illustrated by reference to a wagon-wheel moving along a perfectly smooth road.

B E

A D C

Fig. 1. — ABC, the cycloid traced by the point B of the cir¬ cle DXBY as it is rolled along the base A.DC. The points A and C are the cusps of the cycloid and the point B at its centre, the vertex. The line BE is the tangent of the cycloid at its vertex.

Each point in the outer circumference of the tire of the wheel describes a cycloid during its transit from contact with the road at one point (or cusp) to the position where it is again in contact with the road. The base of the cycloid is obviously equal to the circumference of the generating circle, as it is measured off there¬ with. The length of the cycloid curve is four times the diameter of the generating circle. The area included between the cycloid and its base is three times the area of its generating circle. If the cycloid be inverted, so that its concave side is uppermost, a ball under the impulse of gravity alone, rolling down the curve from any point in the curve, will reach the lowest point, or vertex, in the same time that it would if started at any other point in the curve. For this reason the cycloid is called the isochronal or isochronous curve. It is also known as the curve of swiftest descent, because the rolling ball will reach the vertex in less time by fol¬ lowing the cycloid than if it moved along any other path, even a straight line. The involute of a semi-cycloid, starting from the vertex, is a similar cycloid (Fig. 2). This fact coupled

HM traced by the point L cn the supposed cord wrap¬ ped around the evolute KH. The involute is similar to the cycloids whose common cusp is at H, their gen¬ erating circles being equal.

with the isochronal character of the curve, led the horologists to adapt the cycloid to the clock, aiming by means of a pendulum swinging always in the same time, no matter what the length of the arc, to gain a timekeeping device that would not vary. The plan failed through unavoidable friction. The curve of the cycloid is now chiefly of use in the arts in the shaping of the teeth of cogwheels, the cycloid exhibit¬ ing less friction than any other form.

Several other curves are usually grouped with the cycloid as if related to it. Construe-

tively they are, mathematically they are not. The epicycloid is the curve traced by a point in the circumference of a circle which is rolled around on the outer side of a fixed circle. The hypocycloid is the curve traced by a point in the circumference of a circle rolling around on the inner side of a fixed curve. It is evident that the functions of these two curves cannot resemble or bear any relation to those of the cycloid. The curves known as ˆtrochoids® are more nearly related, as they are assumed to be generated by points connected with the generat¬ ing circle of the cycloid. The prolate trochoid is traced by a point in a radius of the generating circle of the cycloid. The curtate trochoid is traced by a point outside of the generating circle supposed to be on one of the radii extended. (See Epicycloid; Hypocycloid; Trochoid). Consult Proctor, R. A., (Treatise on the Cycloid, and All Forms of Cycloidal Curves > (London 1878).

CYCLOID FISHES, an order of fishes, according to the arrangement of Agassiz, hav¬ ing smooth, round or oval scales, as the salmon and herring. The scales are formed of con¬ centric layers, not covered with enamel and not spinous on the margins ; they are generally im¬ bricated, but are sometimes placed side by side without overlapping. It corresponds roughly to the modern Physostomi, consisting of those fishes which retain the duct from the air-bladder to the oesophagus.

CYCLOMETER, an invention for measur¬ ing and recording the distance traveled by wheeled vehicles, extensively used in cycling. Its most important application is in railroading. The apparatus is connected with the wheels of a car, and by recording the number of revolu¬ tions tells on a sheet of paper inside the car the number of miles traveled. It is purely auto¬ matic, and in addition, by an attachment of extreme beauty and ingenuity, every inequality in the roadbed of a railroad is detected and located.

CYCLONE (Gr. ˆwhirling,® ((revolving))), a term originally applied to the violent rotatory tempests of the tropical and sub-tropical regions, called in the West Indies hurricanes; in Senegal, tornadoes ; at the Cape of Good Hope, trovados; in the Chinese Sea, typhoons ; and on the west coast of Central America, papagallos. The diameter of

rotation of such storms is from 200 to 300 miles and sometimes exceeds 500, and the velocity of the wind, according to Humboldt, is sometimes as much as from 200 to 300 miles an hour. The centre of the storm often advances 30 miles an hour. Since the discovery of the rotatory course of winds even at a distance from the tropics the term cyclone has, however, been applied to any system of winds blowing round a centre of low pressure, and a cyclone is distinguished from an anti¬ cyclone, which is a system of winds with a centre of high pressure. These two systems are always in proximity to each other, though their centres may be, and usually are, very wide apart. In the cyclone there is a gradual rise of barometric pressure from the centre to the circumference, in the anti-cyclone a gradual fall; in consequence of this the tendency of the winds in a cyclone is toward the centre, in an anti-cyclone it is from the centre; a cyclonic system travels in a certain direction from the region where it

originates till it is dissipated or destroyed; an anti-cyclonic system generally remains in the region where it is formed, its centre only shift¬ ing about within comparatively narrow limits; the isobaric lines of a cyclone, especially near the centre, are almost circular, those of the anti-cyclone extremely irregular, and the at¬ mospheric gradient (that is, the rate of increase or decrease of pressure) is usually greater in the former than in the latter. While the general tendency of cyclonic winds is toward the centre of the cyclone, their actual course is not directly toward that space, but spirally round it, the lines of rotation being nearly the same as those of the isobaric curves. The direction of rota¬ tion is stated in (Buys-Ballot's Law of the Winds, } which in one of its forms is: <(Stand with your back to the wind, and the barometer is lower, in the northern hemisphere, on your left hand than on your right; in the southern hemisphere, on your right hand than on your left.® This is due to the rotation of the earth, which has a greater linear velocity at the equator than at the poles, so that the centrifu¬ gal flow of dense, dry air to the equator has a westward motion, while the northward flow of light, moist air is deflected to the east. There are important differences in the weather accom¬ panying cyclones and anti-cyclones, but these are so much modified by local circumstances that it is impossible to enter upon them here. Almost the only general observation that can be made on this head is that the air in a region over which an anti-cyclone hovers, especially near the centre, is very dry, and either clear or almost free from clouds. The great cyclonic area of the United States is the central Missis¬ sippi Valley, notably in Kansas. Cyclones are less common apparently on the east side of the river and less violent, but occur with some

frequency as far east as the Alleghanies. See Meteorology.

CYCLOPAEDIA. See Encyclopaedia.

CYCLOPEAN WORKS, in ancient archi¬ tecture, masonry constructed with large blocks of stone unhewn and uncemented, said to be the works of a fabulous race of giants, the Cyclopes (q.v.). Some of these works were the walls of Argos, Tiryns and Mycenae. Similar walls are to be found in various parts of Greece, Italy and Sicily, at Persepolis and elsewhere in Asia, and at Cuzco, Peru. The earliest form consists of huge piles of rock, irregularly hewn, the spaces filled up with smaller stones. Later, the stones were hewn to fit one another, and polygonal masonry developed. Consult Petit-Radel, (Recherches sur les monuments cyclo-peens) (Paris 1841) ; Middleton, (Grecian Re¬ mains in Italy J (London 1812).

CYCLOPES, sl'klo-pez, a race of giants in the mythology of Greece. The earlier mythol¬ ogy of Hesiod makes them the sons of Uranus and Ge (Heaven and Earth). They belonged to the Titans, were three in number — Argcs, Steropes and Brontes — and had only one eye, situated in the middle of their forehead. They were cast into Tartarus by their father, and again by Cronus, but being released by Zeus provided him with thunderbolts, and became his ministers. They were slain by Apollo for hav¬ ing furnished Zeus with thunderbolts to kill Asclepius. Wholly different from these are the sons of Neptune, of whom Polyphemus (q.v.)

was the chief. They are described in the (Odyssey > (ix, 106 et seq.) as uncouth, one-eyed giants, supporting themselves by the breed¬ ing of cattle. According to Homer they resided on the west side of Sicily. A later tradition describes the Cyclopes as the servants and as¬ sistants of Hephaistus (Vulcan), engaged in making the armor and metal ornaments for gods and heroes. _ The name Cyclopes is also given to a Thracian tribe of giants, who according to tradition built the stone works known as cyclopean (q.v.). They were named from their king, Cyclops.

CYCLOPS, sl'klops, a genus of small fresh¬ water crustaceans, type of a family, Cyclopidce, in the order Copepoda (q.v.). They are popu¬ larly included under the wide title of ((water-fleas.® Various species are common as active swimmers in freshwater pools or slow-flowing brooks, and a few forms have been recorded from the sea. The head-region is not distinct from the first ring of the thorax; there is a pear-shaped segmented body and a long ab¬ domen ; both pairs of antennae are long, and in the male the anterior pair form claspers. There is no heart, the fifth pair of limbs is rudimentary and the second antennae are without an exopodite. The average length of the commonest species is from two to three millimeters; the males are generally smaller than the females. A very marked feature, to which the name refers, is the single medium eye, usually bright crimson and sparkling like a gem ; and not less noticeable are the two large egg-bags carried by the females. They eat both animal and vegetable matter, and are very prolific.

CYCLORAMA, a painted conspectus of a scene arranged in a circular room, so as to afford the eye a single comprehensive view. Battles have been thus presented in the United States in the form of circular panoramas, as that of Gettysburg. See Panorama.

CYCLOSTOMI, sl-klos'to-me (Gr. <(round-mouthed®), one of the five primary divisions or classes of the craniate V ertebrata, also called A gnat ha, Marsipobranchii, *etc.* Excluding the doubtful extinct ostracoderms, the cyclostomes have an imperfect, embryonic brain case, no lower jaw, no paired limbs or their supporting girdles, no ribs

and no scales. They have a large number of gill pouches, which have a skeleton not homologous with that of the true fishes. The nostril is single, and the rudiments of the pineal and parietal eyes are remarkably perfect. There is no trace of a swim-bladder. The mouth is armed with a peculiar rasping apparatus. The skeleton is purely cartilaginous and the notochord persists in living forms. There are many remarkable structural special¬ izations in the representatives of the three or four subdivisions, and the peculiarities of the living forms are such as to indicate that they are survivals of a once extensive group of fish¬ like animals ; but only a single species of fossil can be referred to here with any certainty. The following may be indicated as orders : Cyclice, with the vertebral column well developed and, like other parts of the internal skeleton, ossified ; no external skeleton and no paired limbs ; the tail provided with a large diphycercal fin supported by rays; the skull a cartilaginous capsule, with prominent ear sacs, and a large median nasal sac with a circle of cirri about

its orifice ; this group is represented by a single species (Palceospondylus gunni), from the De¬ vonian rocks of Scotland; Hyperoartia, having the internal skeleton entirely unossified, with a persistent notochord and no vertebrae ; body eel-like with a caudal fin ; the mouth a suctorial disc, with the rasping end of a piston-like tongue appearing at its centre; the nasal sac median and its diverticulum not penetrating the palate ; and seven pairs of pouch-like gill slits, which communicate with a common respiratory tube distinct from the oesophagus; represented by the single family P etromyzontidce , with the principal genera Petromyzon (lamprey, q.v.), Lampetra, Mordacia and Geotria; and Hyper-otretia, like the last in the characters enumer¬ ated except that the nasal diverticulum (hy¬ pophysis) perforates the palate and opens into the mouth and there is no separate internal respiratory tube. There are two families of this group, the Bdellostomidce, with 6 to 14 gill pouches on each side opening separately at the surface ; and the Myxinidce , with the single genus Myxine (hag fishes, q.v.), in which the six pairs of gill pouches have a single common external opening on each side. To these Pro¬ fessor Cope has added the great extinct group Ostracophori (q.v.).

CYDIAS, sid'i-as, Greek painter: b. the island of Cythnus, one of the Cyclades. Hor-tensius, the orator, purchased his painting of the Argonauts for 144,000 sesterces (nearly $7,200). This same piece was afterward transferred by Agrippa to the portico of Neptune at Rome.

CYDNUS, a river of Cilicia, rising in the Taurus and flowing through Tarsus into the Mediterranean Sea. The mouth of the Cydnus is often choked with sand and other alluvial deposits. It was on this river that Cleopatra made her voyage to meet Antony.

CYDONIA (named, it is believed, from a place called Kydon, in the island of Crete, of which this fruit is a native) ; a genus of fruit trees, order Pomacece. It has leafy calyx lobes and many-seeded cells in its fruit. C. vulgaris is the quince; C. japonica is an ornamental shrub. See Quince.

CYGNUS, sig'nus (<(the Swan®), one of Ptolemy's northern constellations. It includes the double star Albiero or (3 Cygni, the com¬ ponents of which are differently colored, one of them being orange and the other blue. The motions of the double star, 61 Cygni, have been carefully observed, and it has been esti¬ mated that the pair together weigh about one-third as much as our sun. It is nine light-years away from us, and so is the nearest star to us except a Centauri. A new star, at present of the 15th magnitude, was discovered by Schmidt at Athens in 1876.

CYLINDER. A cylindrical surface is a ruled surface generated by a line moving while parallel to a given line. A cylinder is the solid intercepted by a closed cylindrical surface and two parallel planes. A circular cylinder is formed by two parallel circular surfaces, called the superior base and the inferior base, and a convex surface terminated by them. There is a distinction between rectangular cylinders and oblique cylinders. In the first case, the axis, that is, the straight line joining the centres of the two opposite bases, is perpendicular to them ;

in the second, the axis forms an oblique angle with each base. The cubic contents of a cylin¬ der are equal to the product of the base by the altitude, or the perpendicular distance between the bases. Archimedes found that the volume of a sphere inscribed in an equilateral cylinder, that is, of a sphere whose diameter is equal to the

height and also to the diameter of the base of the cylinder, is equal to two-thirds of the cubic contents of the cylinder. A right circular cylinder may be generated by the revolution of a rectangle about one of its sides.

CYLINDER SNAKE, one of a family of small burrowing snakes (Ilysiidce) allied to the Typhlopidce and shield snakes, and retaining vestiges of pelvis and hind limbs, the latter showing in claw-like spurs protruding between the scales on each side of the vent. The form is cylindrical, the scales small, polished and hardly larger on the belly than elsewhere, and the colors bright. The few species are scattered over the Malay Islands and Indo-China, where the common ((red snaked reaches a length of two and one-half feet, and occur in Ceylon and South America. A beautiful species in tropical South America is one of those called <(coral snake,® and is coral red with black rings. On account of its beauty, perfectly harmless na¬ ture, and <(for cooling purposes® this snake is said to be sometimes worn as a necklace by the native women.

CYLINDRICAL LENS. See Lens.

CYLON, an Athenian leader, the son-in-law of Theagenes of Megara, who, with the intent to make himself tyrant of Athens, occupied the Acropolis, and being reduced by a blockade, was put to death by Megacles, in violation of his oath to spare him. A war with Megara resulted.

CYMA, si'ma, in architecture, a wavy mold¬ ing the profile of which is made up of a curve of contrary flexure, either concave at top and convex at bottom or the reverse. In the first case it is called a cyma recta ; in the second a cyma reversa. It is a member of the cornice, standing below the abacus or corona. See Molding.

CYMBALS, among the ancients, musical in¬ struments, consisting of two hollow basins of brass, which emitted a ringing sound when struck together. The instruments which are now used in military music, and have been bor¬ rowed from the East, have taken their rise from these. In the modern orchestra there are three ways of using them : the most common is to hold the pair one in each hand and strike them so that they graze slightly, obtaining ex¬ cellent effects in piano and pianissimo ; (2) to strike a single one with the drumstick after the manner of a gong; (3) to use a roll with the drumsticks, which is rather rare. They were used in the worship of Cybele, Bacchus, Juno and other deities.

CYMBELINE, sim'be-lin or sim'be-lm, or CUNOBELINUS, British king of the 1st cen¬ tury: d. about 43 a.d. Not much is known of his career. He was, as is shown by his coins, the son of King Tasciovanus, who ruled in Verulamium. Suetonius calls him rex Britan-norum. He was doubtless one of those kings who became close friends and dependents of Augustus. In later years he became involved in troubles with his son Adminius, whom he ex¬

pelled from Britain, and who, having sought help from Gaius, instigated the expedition that was sent against Britain under Aulus Plautius. Cunobelinus died at this time and his sons Caractacus and Togodumnuqs inherited his kingdom.. Shakespeare's play of (Cymbeline* was written about 1609. A few statements about Cymbeline and his sons the dramatist took from Holinshed's (Chronicle, *but the story of Imogen forms the ninth novel of the second day of Boccaccio's (Decameron.* These two stories Shakespeare has interwoven, and the atmosphere of the two is not dissimilar. Con¬ sult Evans, J., <Coins of the Ancient Britons) ; Rhys, (Celtic Britain* ; Mommsen, Bomische Geschichte* (Vol. 5).

CYMBELINE. <The Tragedy of Cymbeline) is the last play in the Shakespeare folio of 1623. Its classification there among the tragedies is surprising, since the editors of the folio made no other such positive error of defi¬ nition. One would expect to find this play in the list of comedies beside (The Winter's Tale,* which in style and structure it most closely resembles. It is likely that the early editors were influenced by the title, which associates (Cymbeline* with the two tragedies based on early British history, (King Lear* and Mac¬ beth.* In fact, however, the play is ill named, for its eponymous hero is dramatically less im¬ portant than either Postumus, Iachimo or Pisanio, to say nothing of Imogen, and the vital portion of the story belongs not to history or even fable, but to pure fiction. From Holins¬ hed's account (first printed, 1578) of the authentic King Cymbeline, or Cunobelinus, and his sons Shakespeare adapted certain points in his drama, and from another passage in Holinshed he derived the outline of the battle in Act V; but the real kernel of the play — the story of Imogen, Postumus, Iachimo and Pisanio — is totally unhistoric. It is a refashioning of one of the imaginative tales in Boccaccio's (Decameron* (ii, 9). Current folk lore and fairy tales, again, offered a third source of inspiration, from which the dramatist drew in his treatment of the wicked stepmother and the romantic adventures of the disguised Imogen (Fidele). Much of the play's charm is due to the ((Gothic® diversity of atmosphere and inci¬ dent which it acquires

from the masterly blend¬ ing of these varied elements. Testimony of language, metre and feeling connects (Cymbe¬ line* with (The Winter's Tale) and (The Tempest) in the latest group of Shakespeare's works, and points to 1610 as probably the date of composition. External evidence for this date is present in a manuscript book of notes on plays _ witnessed by Dr. Simon Forman, who died in 1611. He gives a detailed analysis of the plot of (Cymbeline}* which it appears from the dates of other entries in his book that he must have seen acted either in 1610 or in 1611. Recently it has been suggested that the play may have been influenced in its structure and atmosphere by the Bhilaster* of Beaumont and Fletcher. Consult Thorndike, A. PL, (Tho Influence of Beaumont and Fletcher on Shakes¬ peare) (1901), and the arguments advanced

against the suggestion in C. M. Gayley's Beau¬ mont, the Dramatist (1914, pp. 386-395).

In 1633 <Cymbeline) was performed before King Charles I, and, as Sir Henry Herbert

records, was (<well liked by the king.® It was rewritten at least four times to adapt it to the changing taste of later days. Garrick's version was extremely popular both in England and in colonial America, where it was performed (e.g., at Philadelphia) as early as 1767. Garrick, Kemble, Kean and Macready — four great actors of strikingly different personality — were all successively famous in the part of Postumus, and they carried the play triumphantly through the period between the. middle of the 18th and the middle of the 19th century. In 1857 Henry Irving played Pisanio to the Imogen of Helen Faucit ; 40 years later, in 1896, he played Iachimo to Ellen Terry's Imogen. The two actresses just named are the most distinguished recorded interpreters of Imogen, the greatest role in the play; and Miss Faucit (Lady Mar¬ tin) contributed also the finest literary discus¬ sion of the part ((On Some of Shakespeare's Female Characters, } 1885). Hazlitt's praise of Imogen is well known : ((Of all Shakespeare's women she is perhaps the most tender and the most artless.®

Tucker Brooke,

Assistant Professor of English , Yale University.

CYME, an ancient city of 2Eolia, which, although styled by Strabo the largest and noblest of JEolian cities, is of little historical importance. The father of Hesiod lived here before he migrated to Ascara in Boeotia.

CYME, sim, in botany, a mode of definite inflorescence in which the principal axis termi¬ nates in a flower and a number of secondary axes rise from the primary, each of these ter¬ minating in a flower, while from these secon¬ dary axes others may rise terminating in the same way and so on. All the flower-stalks rise to nearly the same height, so that they resemble a compressed panicle. The central or terminal flowers bear first.

CYMRI, kim'ri, or KYMRY, a branch of the Celtic family of nations which appears to have succeeded the Gaels in the great migration of the Celts westward, and to have driven the Gaelic branch to the west (into Ireland and the Isle of Man) and to the north (into the High¬ lands of Scotland), while they themselves occu¬ pied the southern parts of Great Britain. At a later period (during the 5th and subsequent centuries) they were themselves driven out of the Lowlands of Great Britain by the invasions of German tribes and compelled to take refuge in the mountainous regions of Wales, Cornwall and the northwest of England. A part of them also crossed over into Gaul and settled in Brit¬ tany. Wales may now be regarded as the chief seat of the Cymri (a name. which the Welsh still give to themselves), as it is still the chief place where the Cymric. dialect of the Celtic language is spoken. A variety of this dialect, called the Cornish, was at one time spoken also in Corn¬ wall, and another variety called the Armor-ican, is still spoken in some parts of Brittany. On account of the similarity of the name the Cymri have been identified both with the .Cimbri and the Cimmerii, but the identification in both cases, especially the latter, is doubtful. The origin of the name is unknown. See Wales.

CYNZEGIRUS, sm-e-jl'rus, Athenian hero, son of Euphorion and brother of 2Eschylus. The story is told that at the battle of Marathon he lost his hands in attempting to prevent a

Persian ship from being pushed off, and then seized the gunwale with his teeth.

CYNARA, a small genus of the family Asteraceae, in many respects like the thistle. The two best-known species are the artichoke (C . scolymus) and the cardoon (C. carduncu-his.) Both are hardy perennials, found wild in southern Europe and northern Africa. The flowers are sometimes used to curdle milk. See Artichoke; Cardoon.

CYNEWULF, km'e-woolf, Anglo-Saxon religious poet. His name is only known from runes in the poems attributed to him, namely : (Elene) (Helena), the legend of the discovery of the true cross; (Juliana,) the story of the martyr of that name; and <Crist) (Christ), a long poem incomplete at the beginning, the (Fates of the Apostles) and (Andreas, or the Legend of Saint Andrew.) The name Cyne¬ wulf also occurs as the solution of one of the metrical riddles in the Anglo-Saxon collection. Other poems, the (Andreas,) the (Wanderer,* the (Seafarer,* etc., have been ascribed to him without sufficient grounds. In the epilogue to Elene, there is an account of his life, which may or may not be authentic. Cynewulf prob¬ ably lived in the first half of the 8th century. From his poems we may gather that he spent the earlier part of his life as a wandering minstrel, devoting the latter to the composition of the religious poems connected with his name. Editions and translations of his works are by Gollancz, (Christ } (London 1892) ; and Cook (Boston 1900) ; Strunk, (Juliana) (ib. 1905) ; Root, (The Legend of Saint Andrew * (New York 1899); Hall, L. H., <The Elene: Trans, into. English Prose) (ib. 1904) ;

ˆLegend of Saint Juliana) (Princeton 1906) ; and translation into English prose complete, by C. W. Kennedy, (The Poems of Cynewulf* (New York 1910). Consult also Grein,

(Bibliothek der angelsachsischen Poesie) (re¬ vised by Wiilker, Gottingen 1883-98).

CYNICS, a school of philosophers founded by Antisthenes, a pupil of Socrates, at Athens about 380 b.c. Opinions differ as to the origin

of the name. It is possible that it may have

been derived from the gymnasium called Cyno-sarges (q.v.), where Aristippus first delivered his lectures; or from the Greek word for dog (Kvuv) , either as a term of contempt for their uncivilized habits, or from their adoption of the dog as a common symbol. This phi¬ losophy was a development of the eudaimonistic teaching of Socrates, i.e., that happiness or well-being is the necessary result of virtue alone. Virtue was insight, or the knowledge of the good. One-sided interpretations of this theory led on the one hand to the Cynic phi¬

losophy, the precursor of the Stoic, and on the other to the Cyrenaic (q.v.), which was superseded by the Epicurean. The doctrine of virtue as taught by Antisthenes declares it to be the only intelligent conduct of life, not be¬ cause of the results it brings about, but through itself. This virtue is in itself happi¬ ness, and to acquire it man must be unfettered by social or political events. It is attainable through freedom from wants and the curtailing of all desires, except the most fundamental and necessary. Therefore all . things must be put to the test of natural and not human institu¬ tions to determine their worth. The Cynics

forced themselves to despise all the good things of civilization and recognized none of its laws and morals. They soon degenerated and their philosophy lost its idealism in an animalism which they mistook for naturalness. They be¬ lieved that there was one and only one God, but this monotheism was not clearly defined nor deeply felt. It was rather a logical out¬ growth of the desire for simplicity. They had some respect for mental training, as the only thing which would free men from the slavery of ignorance and false standards. However, this philosophy is interesting as a mark of the disposition of the time ; an indication of the disintegration of Greek society into individuals. Its very cosmopolitanism was negative; it con¬ sisted of denial of allegiance to any civilized community rather than a belief in world-citizenship. To the Cynic philosophy, despite its obscurity of thought and its incomplete vision, we owe two great ideas : the responsi¬ bility of the individual as a moral unit ; and the supremacy of the power of the will. On these, with better insight and maturer psy¬ chology, the Stoics built their saner philosophy. Besides the founder, the most famous of the Cynics were Diogenes of Sinope (412-323 b.c.), Crates of Thebes (about 328 b.c.) with his wife, Hipparchia, Menippus (about 6o b.c.) and Zeno (qq.v.) ; and in the later Roman period, Demetrius, CEnomaus and Demonax. (See Socrates; Cyrenaics; Stoics; Epicureans). Consult Windelband, (History of Philosophy } (English trans. by Tufts, London and New York 1910) ; Heinze, M., (Der Eudamonismus in der griechischen Philosophic J (Leipzig 1883) ;

Zeller, E., (Socrates and the Socratic Schools y (English trans. by Reichel 1877) ; Gomperz, (Greek Thinkers } (English trans. 1905) ; Caird, E., (Evolution of Theology in the Greek Philosophers* (1904) ; Mulloch, F. W., (Fragmenta philosophorum Graecorum * (Paris 1867).

Rose Boochever,

Editorial Staff of The Americana.

CYNIPIDiE, the gall-flies (q.v.), a family of insects belonging to the order Hymenoptera, the suborder Petiolata and section Parasitica. They are a kind of small flies remarkable for their extremely minute head and large, elevated thorax. The females are provided with an ovipositor by which they make holes where they deposit their eggs in different parts of plants, thus producing those excrescences which are known as galls.

CYN'OCEPHALUS, sii-no-sef'a-lus (Gr. Moghead**) a genus of monkeys including the various species of baboon (q.v).

CYNODICTIS, si-no-dik'tis, a genus of primitive Canidce (see Dogs, Fossil) of the Oligocene Epoch in Europe and America, a collateral ancestor of the modern dog family. It was of weasel-like proportions, with long tail, small brain, civet-like teeth and other primitive characters. Most of the species were small.

CYNODON DACTYLON, CAPRIOLA DACTYLON, BERMUDA or BAHAMA GRASS, a low, creeping, perennial grass found in most warm and tropical countries, where from its drought-resisting capacity it is used as a common pasture grass. It has delicate leaves and upright, leafy flowering branches which

bear three to seven slender divergent spikes. Three of the four species are Australian. In the United States it is dispersed from Pennsyl¬ vania to Florida and westward to Texas and California, being hardy from . Philadelphia southward. It grows freely on poor, sandy soils, but the leaves are short ; on good soil it will grow one or two feet high. It will grow on almost any soil, if not too wet. Its rootstock runs readily, thus making it a valuable grass for binding drifting sands and for holding embankments liable to wash. Being insensible to heat and drought it soon makes a fine sod equally useful for grazing or for a lawn. It is also used for hay and is in bloom from April to October. It will not grow in the shade and it is easily injured by low tempera¬ tures, turning brown with the first frosts. It rarely bears seed, except in the

extreme South¬ ern States. The usual method of propagation is to chop up the roots, sow them broadcast and plow in, shallow. Once introduced it is hard to get rid of, but it has been eradicated by constantly plowing the land every week or so, or growing oats, followed by cowpeas in rows, which could be cultivated. Its rhizome is used in medicine as a substitute for sarsa¬ parilla. The plant is a favorite food of the wild goat, hence the name Capriola.

CYNOGLOSSUM, hound's-tongue, a genus of plants of the family Boraginacece consisting of about 50 species of coarse herbs of wide dis¬ tribution in temperate climates. The flowers form scorpioid racemes, as in the allied comfrey and forget-me-not, and are of a reddish color. Seven species are found in America, the best known being hound's-tongue, C. officinale. This species is found in waste places from Quebec to Minnesota, and south to Kansas and North Carolina. It has a disagreeable smell like that of mice, and was at one time used as a remedy for scrofula. It is a troublesome weed, native in Europe and Asia. Another well-known species is C. virginicum, wild comfrey, which grows from New Brunswick south to Florida, and west to Louisiana and Kansas.

CYNOMORIUM, a genus of parasitic flowering plants, the best-known representative of which is Cynomorium coccineum, a fungus¬ like plant, found in the Mediterranean region. It was long known as Fungus melitensis, and enjoyed the highest reputation as a styptic, besides being used as an astringent in dysen¬ tery and other maladies. These uses, however, depended on the doctrine of signatures alone, its scarlet color and blood-like juice being in¬ terpreted as providential indications of its curative destination for all injuries or diseases accompanied by bleeding. It was jealously guarded by the Knights of Malta.

CYNOSARGES, si-no -sar'jez, in ancient Athens, originally the name of a sanctuary of Hercules and a gymnasium in the east of the city, afterward extended to the suburb of Athens surrounding the gymnasium for the use of those who were not of pure Athenian blood. It was in this gymnasium that Antisthenes, the founder of the Cynics, taught. Consult Weller, (Athens and Its Monuments.*

CYNOSCEPHAL.7E, sin-os-sef'a-le (Gr. signifying dogs' heads), the name of a range of hills near Scotussa in Thessaly, memorable for two battles fought there in ancient times.

The first was 364 b.c., between the Thebans and Alexander of Pherae, in which Pelopidas was slain; and the second, 197 b.c., in which the last Philip of Macedon was defeated by the Roman consul Flaminius.

CYNOSURE, sin'd-or si'nd-shur, or CYNOSURA, an old name for the constellation of the Little Bear or Ursa Minor, which con¬ tains the pole star in the tip of the tail. Cyno¬ sure, in a figurative sense, is hence used as equivalent to something which attracts general attention or draws all eyes toward it, as the pole star attracts the attention of the mariner. The word literally means dog's tail.

CYNOSURUS, a genus of grasses. See Dog's-tail Grass.

CYNTHIA, the moon; a surname of Ar¬ temis or Diana, the moon goddess. In mythol¬ ogy Mount Cynthus, on the island of Delos, is said to have been the birthplace of Diana.

CYNTHIANA, Ky., city, county-seat of Harrison County, on the south fork of the South Licking River and on the Louisville and Nashville Railroad, 33 miles northeast of Lex¬ ington. It is a trade centre for farming and stock raising, and is the seat of Harrison Fe¬ male College. It has carriage, plow and cigar factories, distilleries (noted for their Bourbon whisky), good schools, public library, two na¬ tional banks and several newspapers. During the Civil War, Gen. John Morgan with 1,800 men captured Cynthiana and defeated the Union cavalry of about 500 men under General Hob¬ son. On the following day (12 June 1864) the Union army sent reinforcements to the number of 5,400 men under General Burbridge which defeated Morgan's army. The Union army lost 414 men, the Confederates about 600. Pop.

(1920) 3,857.

CYNTHIUS, surname of Apollo, the sun god, from Mount Cynthus, on the island of Delos, at the foot of which he had a temple, and on

which he was born. Diana, his sister, is called Cynthia.

CYPERACE2E, si-pe-ra'se-e, a family of monocotyledonous grass-like plants including more than 2,000 species. These herbaceous plants generally grow in moist places on the margins of lakes and streams, with a cylindrical or triangular culm with or without joints; the leaves are sheathing. The family comprises the genera Carcx, Scirpus, Cyperus, Schoenus and others.

CYPERUS, si-pe'rus, a genus of perennial herbs of the family Cyperacece (q.v.). The numerous species, which are natives of trop¬ ical and temperate climates, are characterized by having rootstocks or tubers, grass-like leaves, simple stems sparsely leafy below, perfect flow¬ ers in small compressed spikes which are ar¬ ranged in compound umbels with numerous more or less attenuated bracts, the form of the inflorescence having suggested the popular names umbrella plant and umbrella palm, which are perhaps most frequently given to C. alter-nifolius. This species is a very popular window garden and greenhouse plant, native of Mada¬ gascar. It is readily propagated by means of seed or by division of the larger plants, and is easily cultivated in any good potting soil kept moist. It does best in a moist atmosphere. Many of the species are troublesome weeds in

cultivated fields; some are useful for food, their underground parts being starchy and mucilagi¬ nous ; the tubers of others are used in per¬ fumery. The chufa (C. esculentus) is valued in the Southern States for its tubers, upon which swine thrive well. Papyrus (q.v.) is the prod¬ uct of C. papyrus. Some species have been used in medicine but are now rarely employed.

CY-PRˆS, se 'pra (Old Norman French for <(as near as possible"), the principle in the American and English law whereby a gift legal in form, which cannot be administered exactly as the testator specified, or which is not defi¬ nitely specified, may be applied (<as nearly as possible," according to the intention of the donor. Cy-pres is a doctrine of the early com¬ mon law, by which, if gifts were made for charitable uses that were illegal or contrary to public policy or that were impossible to be car¬ ried into effect, the king, as general supervisor of charities, or the chancellor acting for him, could devote them to such other charitable pur¬ poses, (< cy-pres or as near as possible" as in¬ tended in the original gift. This power does not exist in the United States; the majority of cases wherein the cy-pres doctrine is applied comes under charitable bequests on gifts for the

advancement of education. In the United States it is held that the equity courts cannot make valid charities which are uncertain, but where charitable trusts have once been in part administered as directed by the testator, such action will prevent the trust from being de¬ feated by change of circumstances. Where only a general charitable intention is expressed, as, relief of the poor, aid for the injured, under the cy-pres doctrine the court may direct the disposal of the gift to some form of charity ((as nearly as possible" like that mentioned or indicated by the testamentary gift of the tes¬ tator. The laws based on the cy-pres doctrine vary in different States. For instance, in the case affecting a Universalist Convention of Ala¬ bama, it was ruled that the doctrine of cy-pres is not recognized in Alabama, as being based on the prerogative power of the king of Eng¬ land, recognized and administered by the Eng¬ lish Court of Chancery with reference to trusts. The doctrine of cy-pres is recognized in New Jersey but cannot be applied where the donor himself has directed what disposition shall be made of the trust property in the event of a failure of the charitable use to which he has directed it to be devoted. In a case affecting the Presbytery of Jersey City, N. J., a trust, which is declared for public worship and in¬ struction for the benefit of an indefinite num¬ ber of persons according to the Presbyterian faith and polity, is enforceable either exactly or, under the doctrine of cy-pres, approximately. For further ways in which the cy-pres doctrine is applied compare Estate; Fee-Tail.

CYPRESS, the popular name for members of the genus Cupressus and for certain species of the related genera, Taxodium and Chamcecyparis. There are about a dozen species of Cupressus, which are trees or sometimes shrubs with small aromatic, evergreen opposite leaves and tiny monoecious solitary flowers, the pistil¬ late developing into almost globular cones con¬ taining numerous seeds which mature the sec¬ ond season. The best-known species is prob¬ ably the common European cypress (C. semper -

virens) which has been introduced into the United States. It is a stately

tree of about 80 feet, of remarkable longevity, and of wide utility principally on account of its remarkably durable wood, which is highly resistant to the attacks of insects. It is yellowish or reddish, hard and dense and is used in cabinet work and in the making of musical instruments. Some writers believe it is the (<cedar5) and also the (<gopher)5 wood mentioned in the Bible. C. torulosa is probably the tallest species ; it is a native of the Himalayas and attains a height of 150 feet. The hardiest species and perhaps the one most frequently planted is C. macna-biana, a bush with several small trunks or a small, dense, pyramidal tree of about 20 feet It is a native of California, where it is very popular in private grounds and public parks. Another popular Californian species is C. macro-carpa, generally known as the Monterey cy¬ press. It usually grows about 40 feet tall but occasionally nearly doubles that height. It thrives well even upon poor soils and makes a rapid growth under favorable conditions, but is more susceptible to frost than the preceding species. Numerous horticultural varities of diversely colored foliage and varying habit and height have been developed. C. funebris, a native of China, ranks about with the last-mentioned species in hardness, rather excels it in height, and is frequently planted on account of its wide-extending, pendulous branches .and twigs. The cedar of Goa (C . lusitanica) is of un¬ known habitat but is frequently planted in southern Europe.

The bald or deciduous cypress (Tax odium distichum) is one of the most valuable of American timber trees, its straight and close-grained, soft, brown wood being highly es¬ teemed where exposure to moisture is expected and where durability but not great strength is demanded. It is very largely used in green¬ house construction. Its range is from Delaware to Missouri and southward to the Gulf States, being especially abundant in swamps, but it will thrive with a more or less noticeable change of habit in dry ground. It is a highly orna¬ mental tree often 150 feet tall and sometimes more than 10 feet in diameter, with but¬ tressed trunk, brown, flaky bark, erect or spreading branches bearing narrow light green leaves, purplish staminate flowers and nearly globular cones. The spread of the branches in old specimens is often more than 80 feet. It has developed a large number of horticultural varieties and is very popular as a park tree as far north as New York, about its northern limit of hardiness. In the Southern swamps the trees develop Hcnees55 from their roots. These knees, which are sometimes 10 feet tall, are supposed to act as aerators, but their func¬ tion is not definitely known. When fully de¬ veloped their tops are above high-water level.

The species of Chamcecyparis best known as cypress are C. obtusa, the hinoki cypress, and C. pisifera, the Sawara cypress. C. lawson-iana,

Lawson's cypress, is a native of the Pa¬ cific Coast States ; the other two are natives of eastern Asia. They attain heights of about 100 and 120 feet, respectively, have developed numerous horticultural varieties and are fre¬ quently planted in parks for their ornamental foliage and graceful habit of growth. See Cedar.

CYPRESS VINE, lpomcca Quamoclil. See Ipomcea.

CYPRIAN, sip'ri-an, Saint (Thasius Caecilius Cyprianus), African bishop, martyr and one of the fathers of the Church : b. about 200; d. Carthage, 14 Sept. 258. He was of patrician parentage and inherited a considerable estate. Having received the highest education he professed rhetoric with eminent success in Carthage and in his school held disputations with representatives of the schools of philoso¬ phy and with believers in the Christian religion, with the result that he applied for admission in the Church. Shortly after being baptized (246) he was ordained priest and then was elected by the Christians of Carthage to be their bishop (248). In the persecutions of the Chris¬ tians by Decius (249-51) he prudently with¬ drew from Carthage and lived in retirement, but on the accession of Gallus (251—53) he re¬ turned to his see. There had been lively con¬ troversies among the churches over the ques¬ tion of readmission to the Christian communion of those who in times of persecution had re¬ nounced the religion of Christ ; churches in Asia Minor and churches in Africa, among them the church of Carthage, had in synods and in the letters addressed by their bishops to other bishops, strongly condemned the prac¬ tice of some churches, among them that of Rome, in accepting as valid the baptism con¬ ferred by heretics. On the question of read¬ mitting the lap si to communion Cyprian favored leniency: he would readmit the fallen on proof of sincere repentance. But he would not ac¬ knowledge the validity of baptism conferred by an heretical minister. On this point he was at variance with the tradition and practice of the Catholic Church, and in support of his view he sent to Pope Stephen the acts of a synod of Carthage in which the invalidity of baptism conferred by heretics was declared. Pope Stephen replied that the tradition of the Church was opposed to this and bade Cyprian not to innovate, but to recognize as true and valid baptism administered by heretics if given in the name of the Trinity. Firmilian, a con¬ temporary, states that Stephen threatened Cyp¬ rian with excommunication. To the threat the bishop of Carthage replied with great heat, but in the entire controversy on rebaptism he never calls the authority of the Pontiff in question, although he laments what he calls the injustice of the decision. In this controversy the final decision

of the Roman Catholic Church was in favor of Stephen : that decision was rendered in the Council of Arles (314) and in that of Nice (325). He did much to relieve and strengthen his episcopate. Under him seven councils were held, the-last in 256. In the reign of Valerian a new persecution of the Christians was decreed, and Cyprian being arrested and brought before the proconsul re¬ fused to sacrifice to the gods and was banished and finally beheaded 14 Sept. 258. His da}' in the Roman calendar is 16 September, which day he shares with Pope Saint Cornelius. His writings include (Unity of the Church5 ; (Dress of Virgins5 ; (Lapsed5 ; the (Lord's Prayer5 ; the (Vanity of Idols5 ; (Against the Jews.5 His works have been edited by Hartel, G., (3 vols., Vienna 1868-71) ; there is an English translation (in (Ante-Nicene Fathers', Vol. V,

Buffalo 1886-96). Consult Harnack, A., (Drei wenig beachtete cyprianische Schriften und die Octa Pauli* (Leipzig 1899) ; Von Soden, (Die cyprianische Brief sammlung> (id. 1904), and for his life, E. W. Benson (London and New York 1897) ; Faulkner (Cincinnati and New York 1906).

CYPRINE, bluish variety of vesuvianite, so called because the bluish tint is due to the presence of a small quantity of copper (cuprum, copper). The hue varies from pale blue to green according to the amount of copper present.

CYPRIND2E, an extensive family of freshwater, teleost fishes, distributed, in about 1,300 species, over the whole world except South America, Madagascar and Australasia. Most of the freshwater fishes of the northern hemi¬ sphere belong to this family, and most of them are small, especially the American minnows, daces, chubs and shiners (qq.v.). Large ex¬ amples are found in Europe and Asia, such as the carp, the Indian mahseer and catla, and a few others, described elsewhere by mane. See Fish.

CYPRINODONTIDiE (Gr. "carp-toothed*), a family of fishes, order Teleostea, suborder Haplomi. Although the dentition of the family

resembles that of the carp the jaws are pro¬ tractile, and the ventral fins, if present, have five to seven rays. The maxillaries do not enter into the formation of the mouth, the dorsal and anal fins lack spines, the scales are cycloid or have erect spines. The frontals meet the supraoccipital. Fundulus and Anableps (q.v.), the fish with eyes divided into portions for vision in air and for vision in water, are important genera.

CYPRIPEDIUM, a genus of plants of the family Orchidacece. The genus has about 40 species, 10 of them occurring in North America, and known generally as lady's-slippers. In medicine the term is applied to the rhizomes and rootlets of several species of Cypripedium. The root contains a volatile oil and tannic and gallic acids, and is used as a mild antispasmodic, for much the same purposes as valerian.

CYPRIS, a freshwater crustacean, typical of the Cypridce, of the order Ostracoda. It is sometimes called the water flea, and has an unsegmented body, seven pairs of appendages, a rudimentary abdomen and a bivalve shell enclosing all. The shell is dainty and elastic ; the posterior antennae bear a long tuft of bristles on their second joint; the second pair of maxillae have a small gill-appendage ; and the posterior limbs are very irregular. C. pubera, the largest form, measures about one-tenth of an inch. Some species, including C. fusca and C. pubera, reproduce by parthenogenesis in summer and autumn, the males being transient ; while others, notably the C. ovum, the males are found throughout the year, and parthenogenesis seems not to occur. The eggs are usually laid in masses on stones and water-plants. The adults are said to be able to survive desiccation, and this is true of the eggs. Some species are very abundant as fossils in freshwater strata.

CYPRUS, an island under British protec¬ torate, lying south of Asia Minor, and the most eastern in the Mediterranean, near the mouth of the Bay or Gulf of Iskanderun. It is the third largest island in the Mediterranean, and, stretch-voi. 8 — 24

ing from southwest to northeast, is about 148 miles long, with a width varying from 100 miles to 15 miles at a narrow peninsula in the north. Area 3,584 square miles. The main physical features of Cyprus consist of a range of mountains running along a large part of the northern coast, and a range parallel to it occupying a consider¬ able part of the island on the south, with a broad tract of plain, called the Messaria, be¬ tween, extending on either side to the sea. The second range

culminates in Mount Troodos (6,406 feet). Cyprus is deficient in water, its streams being chiefly mountain torrents, which dry up in summer. The climate is in general healthy, excepting in various places during the heats of summer, which, causing a rapid evap¬ oration, give rise to malarial fever. The forests were formerly very extensive, and in ancient times yielded wood much valued by the Phoe¬ nicians for shipbuilding, but owring to indiscrim¬ inate cutting, the depredations of goats, etc., they now cover a comparatively small area, with the result that the fertility of much of the soil has been impaired. The forests are now under government supervision, and eucalypti, pines and other trees are being planted. Although about one-third of the cultivable land is under cultivation, agriculture is in a rather backward state. The chief products in 1914 were: wheat, 1,937,000 bushels ; barley, 1,965,000 bushels ; vetches, 195,000 bushels; oats, 412,000 bushels. The cultivation of the vine and the production of wine is increasing, most of it being sent to Egypt and France. Much mischief is sometimes done by locusts, but measures have been taken, under the supervision of the government, by which their numbers have been greatly dimin¬ ished in recent years. The extensive pasture lands of the island support numbers of sheep and goats. Cyprus possesses much mineral wealth, and in early times was celebrated for its copper, a metal the English name of which can be traced to that of this island. The copper is again being worked, as are also quarries of sandstone, marble, granite, limestone, *etc.* Salt in large quantities is obtained from works at Limasol and Larnaca. The sponge-fishery is of some importance. In addition to wine the chief articles of export are carobs, cotton, silk cocoons, cereals, raisins, skins, wool, cheese and fruits. The imports in 1914 were valued at £496,744, with exports of about the same value. Ships entered and cleared (1914) 581,926 tons. The revenue (1914-15) was £290,110 and ex¬ penditure £316,411. There were 628 elementary schools (1914—15) with a total enrolment of 36,661. A complete system of justice has been established. Roads and telegraphs have been constructed throughout the island, and there is a short railroad. Cables connect it with Syria and Egypt. About one-fourth of the people are Mohammedans, the rest are mostly members of the Greek Church.

The Phoenicians established themselves in Cyprus about 1100 or 1200 b.c. Greek colonists followed later; and for a time it was under Assyria. The Phoenicians introduced the wor¬ ship of Astarte, which afterward passed into that of the Greek goddes Aphrodite (Venus). Amasis brought the island under the Egyptian yoke, 550 b.c. In 525 b.c. it was subdued by Cambyses and annexed to the Persian Empire, but it again became a dependency of Egypt under Ptolemy Soter

toward the end of the

4th century b.c. In this condition it remained till the year 57 b.c., when it was made a Roman province. After the division of the Roman territories Cyprus continued subject to the East¬ ern Empire. In 1182 Isaac Comnenus, a prince of the imperial family of Constantinople, made himself independent, but the island was wrested from him in 1191, during the third Crusade, by Richard I of England, who afterward bestowed it upon Guy of Lusignan on condition of his renouncing his claim to the title of king of Jerusalem. After the extinction of the legiti¬ mate male line of Lusignan, James, an illegiti¬ mate descendant, became the ruler. His wife was a Venetian (Catharine Cornaro), and as she had no children, at his death the Venetians took advantage of this circumstance to make themselves masters of the island (1489). They enjoyed the undisturbed possession of it till 1571, when, in the reign of Selim II, notwith¬ standing a brave resistance on the part of Marco Antonio Bragadino, who defended Fama¬ gusta 11 months, it was conquered by the Turks and annexed to the Ottoman Empire. In 1830 it was taken by the viceroy of Egypt, but was retaken by the Turks in 1840, and retained by them till June 1878, when it was ceded to Great Britain by the Convention of Constantinople, concluded during the negotiations consequent on the Russo-Turkish War of 1877-78. It nom¬ inally formed a part of the Turkish dominions, the agreement being that it should be adminis¬ tered by Great Britain so long as Russia should retain possession of Batoum and Kars. Great Britain was also bound to pay a subsidy to the Porte, which amounts annually to £92,868. It was not paid directly, however, but retained as an offset to British claims against Turkey. This arrangement came to an end on 5 Nov. 1914, when, as a result of Turkey's entry into the Great European War on the side of the Central Powers, Great Britain annexed the island. Nearly a twelvemonth after, on 20 Oct. 1915, it was officially announced that, as an inducement for Greece to enter the war' on the side of the Entente, Great Britain had offered to cede to her the island of Cyprus. This offer was, however, declined for the time being and accordingly it lapsed. The island is governed by a high commissioner, assisted by an executive council of six, and a legislative assem¬ bly of 18 members. Six of the last named are officeholders and 12 elective for a term of five years, three by the Mohammedan and nine by the non-Mohammedan population. The island is di¬ vided into six districts, each presided over by a commissioner, and each having a district court. In recent years a vast quantity of interesting archaeological remains have been

found in Cyprus. Pop. 274,108 (56,428 Ottoman Turks and 214,480 Christians of the Cypriote Church). The capital is Nicosia (pop. 16,052).

CYPSELIDZE. See Swifts.

CYRANO DE BERGERAC, se-ra'no d<?

barzh'rak, by Edmond Rostand, was first acted in Paris 28 Dec. 1897. The hero, always the cen¬ tral figure and usually the speaker, was a man of mark in his day (1620-55) as a gasconnading soldier, intrepid and indefatigable duellist, a facile poet, talented musician and writer of vivacious fancy. Report attributes to him an abnormally large nose, disfigured by sabre cuts. This nose is a mainspring of the action in Ros¬

tand's play. Cyrano twice talks of it at length. He loves his cousin, the precieuse Roxane. He feels that his deformity must render any suit of his hopeless if not impertinent, and makes it the task of his romantic self-abnegation to secure for Roxane the fulfilment of her love for Chretien de Neuville and to defeat the evil designs on her of Count de Guiche and his com¬ placent follower, M. de Valert. Roxane, the willing dupe of her affection, receives vows and verses inspired by Cyrano as Chretien's, attrib¬ utes the valor and magnanimity of one to the other, and discovers her error only years later as a widow at the bedside of the assassinated Cyrano, who is dying, as he has lived, in her service, and has her kiss (<an unstained soldier's plume® as his late reward. The time of the action is 1640 and after; the scene at Paris and near Arras ; the form Alexandrine verse of singular suppleness and polish, with lyrics at¬ tributed to Cyrano and reproducing admirably the temper of his time. It was Rostand's fourth play, his first notable success. Thanks in large part to the genius of the actor Coquelin the performance became a triumph historical in the annals of the Comedie Franqaise. There had been no such enthusiasm there since the famous Night of Hernani (1830). The play was speedily translated into many tongues and acted in many lands with success, notably in America. Among many editions may be noted that with an introduction by Cohn, A. (New' York 1899). There is a translation by Dole, Helen P. (New York 1899). Consult James, H. (in Cornhill Magazine, Vol. LXXXIV, p. 477 f). For the historical background see Platow, (Die Personen von Rostand's Cyrano de Bergerac in der Geschichte und in der Dichtung) (Berlin 1902) ; and for analysis of the character of Cyrano, Schmidt, Erich, <Charakteristiken) (2d series,

Berlin 1901).

Benjamin W. Wells.

CYRENAICA, sir-e-na'i-ka, anciently a Greek state in the north of Africa, between Marmarica on the east and the Regio Syrtica on the west, and extending in its widest limits from the Philsenorum Aras at the bottom of the great Syrties to the Chersonesus Magna or north headland of the Gulf of Platea, or even to the Catabathmus Magnus, but the part possessed and cultivated by the Greek colonists actually occupied no more than the elevated district in the north, now called Jebel Akdar, along with the adjacent coast. It comprised five cities (Pentapolis) — (1) Hesperides-Berenice (Bengazi) ; (2) Barca (Merj) ; (3) Cyrene (Ain Shahat-Grenna) ; (4) Apollonia (Marsa

Susa) ; (5) Teucheira-Arsinoe (Tocra). In later times two more important towns were added, Ptolemais (Tolmeita) and Darnis-Zarine (Derna); During the most flourishing period of the history of the city of Cyrene that town held in nominal subjection the whole of Cyrenaica, or the country lying between Carthage on the west, Egypt on the east and PhazanA (Fessan) on the south, with the Mediterranean for its northern boundary. Cyrenaica remained independent at first as a monarchy under a dynasty of kings, the successors of Battus (the Libyan title of the kings of Cyrene ; the actual name of the founder seems to have been Aristoteles), who led the first colony to Cyrene; afterward as a republic, until it wras subdued by

Ptolemy, the son of Lagus, and annexed to Egypt 321 or 322 b.c. By the will of the last king of Cyrenaica belonging to the Ptolemaic dynasty, it was left to the Romans, 95 b.c., who, about 20 years later, erected it along with Crete into a Roman province. Under Constantine it was separated from Crete and made a province by itself. Under Diocletian, Cyrenaica was separated from Crete and made a distinct prov¬ ince under the name of Libya Superior. As the Roman Empire declined the attacks of the native Libyan tribes became more frequent and for¬ midable, and the sufferings caused by their in¬ roads and by

plagues, earthquakes and locusts reduced the population and enterprise consider¬ ably. The country became overrun by the Arabs eventually and was under Ottoman rule. It is at present, however, not used to the best of its capacity and resources. Together with Tripoli it was annexed to Italy in November 1911 and formed into one province (August 1915), bounded on the west by Tunis and Algeria, on the east by Egypt and on the south and south¬ east by the Sahara. The estimated area is about 400,000 square miles and the population about 1,000,000, mostly Berbers and Jews. The province consists of Tripolitania (capital Tripoli; pop. 73,000) and Cyrenaica (capital Bengazi ; pop. 35,000). Through these cities practically all of. the trade passes. The chief exports are esparto fibre, skins and hides, ostrich feathers and sponges. Each district has its governor, appointed by the king on the nomina¬ tion of the Minister of Colonies in accord with the Minister of War. These governors hold the rank of lieutenant-generals. (See Cyrene). Consult Gottschick, A. F., (Geschichte der Griindung und Bliite der hellenischen Staates in Kyrenaika5 (1858) ; Hildebrand, G., (Cyre-naika5 (1904) ; Haimann, (La Cirenaica) (1882) ; Beechey, F. W., Proceedings of Expedition to Explore North Coast of Africa) (1828).

CYRENAICS, or CYRENIANS, a sect of ancient philosophers, whose founder was a disciple of Socrates, being Aristippus, a native of Cyrene, in Africa, after which city his fol¬ lowers were called. His great maxim was, that a man ought to control circumstances and not be controlled by them. He held that the sum of life was made up of pleasure and pain ; the one to be sought after as good, the other to be avoided as evil. The chief good then, was the greatest number of agreeable perceptions ; and the true philosopher the man who actively and successively pursued pleasure. Every act was regarded as morally indifferent, and only to be viewed as it produced pleasure or pain to the individual. The chief successors of Aristippus were Theodorus, Hegesias and Anniceris, each of whom became the founder of a sect known respectively as the Theodoran, Hegesian and Annicerian schools. Hegesias taught that pleasure is not obtainable in life, and recommended death. As cynicism was the forerunner of stoicism, so cyrenaicism paved the way for epicureanism, which constitutes its chief merit. (See Ethics; Hedonism; Utilitarianism). Consult Watson, (Hedonistic Theories from Aristippus to Spencer5 (Glasgow 1895).

CYRENE, si-re’ne, in Greek mythology, the daughter of Peneus, who was carried by her lover, Apollo, into Africa and gave name to that part of Cyrenaica (q.v.). By Apollo she became the mother of Aristaeus.

CYRENE, in ancient times a celebrated city and the capital of Cyrenaica, in Africa, about 10 miles from the north coast, founded by Bat-tus and a body of Dorian colonists, 631 b.c. The Battiadae were driven out in 450 b.c. and varying forms of government succeeded, both republican and tyrannical. Alexander received its submission in 331 b.c., but it soon afterward fell under the sway of the Ptolemies. Its com¬ merce with Egypt and Greece was extensive in classical times. Explorations and excavations were made in 1821-22 and in 1861. In 1910 the Archaeological Institute of America began ex¬ cavations at Cyrene. Numerous interesting remains have been discovered here, including a bath, two temples (supposed to be of the Roman period), and a magnificent necropolis, contain¬ ing grottoes, facades and monuments of various kinds. In one of the grottoes are several curi¬ ous paintings. A group of Ptolemiac buildings, 3,000 terra cottas, fine sculptures, an acropolis, Greek and Roman walls were discovered by the American expedition, whose work was sus¬ pended because of the Italo-Turkish War. Cyrene was the birthplace of Aristippus, Carneades the philosopher, Eratosthenes and Cal¬ limachus the grammarian. (See Cyrenaica). Consult Smith and Porcher, (Discoveries in Cyrene5 (London 1864) ; Barth, (Wanderungen durch die Kiistenlander des Mittelmeers5 (1849) ; Hamilton, (Wanderings in North Africa5 (1851) ; ˆBulletin of the Archaeological Institute of America5 (II, 1910) ; Robinson, (Inscriptions from the Cyrenaica5 (in American Journal of Archceologv, 2d series, Vol. XVII,

1913).

CYRIACUS, or CIRIACO DE' PIZZI-COLLI, Italian antiquarian: b. Ancona 1391; d. about 1449. He had a passion for travel and to gratify it engaged in the life of a merchant. He became an ardent student of the classics and on his travels engaged in the study of the mon¬ uments and remains of the past. He visited Egypt, Greece, the 2Egean Islands, everywhere purchasing manuscripts, coins and objects of art and copying inscriptions and describing walls, buildings and other evidences of the classic past. His collections were scattered soon after his death and but fragments of his notes and drawings remain. He was not thoroughly learned and made many mistakes, but his zeal was unsparing and to him we owe our knowledge of many monuments which have since disappeared. Consult Jahn, ((Cyriacus von Ancona und Albrecht Differ,55 (in (Aus der Altertumswissenchaft,5 Bonn 1868), and Sandys, (History of Classical Scholarship5 (Vol. II,

Cambridge 1908).

CYRIL, sir'll, Saint, patriarch of Alex¬ andria, and one of the fathers of the Church : b. Alexandria 376; d. there, June 444. He was educated in the desert 65 miles south of Alex¬ andria by the Cenobitic monks of Nitria. He was patriarch of Alexandria from 412, when he succeeded his uncle Theophilus in that station, till his death. He was a very zealous champion of orthodoxy and a fiery adversary of Nestorius, Eutyches and all the heresiarchs and heresies of his time. So intemperate was his zeal for orthodoxy and for the extermina¬ tion of dissent from the creed of Nicaea, Chalcedon and Constantinople, that it has brought down upon him the animadversion of some modern Church historians and has given

material for historical novels in which imagina¬ tion fills in what was lacking in the portrait of Saint Cyril drawn by his contemporary adver¬ saries. Among modern Protestant writers Dean Milman in his (History of Latin Christianity) presses against him charges of bar¬ barity, persecution and bloodshed, on account of which Cyril, though styled saint, must be es¬ teemed ((one of the worst heretics against the spirit of the gospel.® He is charged with hav¬ ing closed the churches of the Novations and seized their church property; with having with an armed rabble wrecked the synagogues and driven the Jews in thousands out of the city; with having excited such tumults that the au¬ thority of the governor of Egypt, Orestes, was for a time defied. The murder of the illustrious Hypatia, neo-platonist philosopher and adver¬ sary of the Christian Church, is not alleged to have been instigated by him, but it is regarded as the inevitable sequel to his violent acts and speeches; and the perpetrators of it were, it is alleged on the authority of contemporaries, <(officers of his Church.® It is further charged that he was attended at Ephesus, on the occa¬ sion of the council of the Church held there in 431, by a rabble of followers, presumably to overawe the fathers over whom he himself presided : in that council he procured the condemnation of Nestorius, followed by deprivation and banishment by the emperor. The works of

Cyril, in the edition published at Paris in 1638 (7 vols.), consist of commentaries, treatises, homilies and epistles. Critical editions of certain of his works have appeared, among them his commentaries on Luke (1859) ; John (1872); (Minor Prophets) (1868); (Five Tomes Against Nestorius } (1881) ; (Scholia on the Incarnation (London 1907). Cyril holds high rank among the Church fathers as a theologian. Consult the biography by Kopallik (Mayence 1881).

CYRIL OF JERUSALEM, Saint, Greek father of the Church: b. Jerusalem about 315; d. there, 18 March 386. After his ordination to the priesthood in 345 his special office was to instruct the catechumens, both those who were to be prepared for admission to the Christian communion through baptism and those who after baptism were to be inducted into knowl¬ edge of the mysteries of the Christian religion, especially the mystery of the Eucharist. This occupation led to his writing his book of (Catecheses,5 one of the most interesting monu¬ ments of the ecclesiastical literature of that time. He was made bishop of Jerusalem in 350. Twice he was deposed and sent into exile by imperial decree because of his unflinching zeal for the creed of Nicsea as against the Arian party, first in the reign of Constantine II and then in that of Valens. On the accession of Theodosius in 379, he was restored to his see and there remained till his death. At the Ecu¬ menical Council of Constantinople (381) he was received with acclamations by the fathers as a confessor of the faith who had gladly suffered persecution for the truth's sake. His (Catecheses,5 or catechetical lectures, are 23 in num¬ ber, of which 18 are for the instruction of cate¬ chumens in the stage of preparation for bap¬ tism, while the remaining five, called the ˆCatecheses Mystagogioe,5 treat, as their title imports, of the mysteries of the Christian religion. The work, translated into English, is

one of the volumes of the Oxford (Library of the Fathers.) Consult the edition of Cyril's works published by A. A. Touttee (Paris 1720; Venice 1761), reprinted in Migne, (Patrologia Graeca5 (Vol. XXXIII), and by G. C. Reischl and J. Rupp (2 vols., Munich 1848-60; Eng. trans. by E. Gifford in (The Nicene and Post-Nicene Fathers5 (New York 1894). For his biography, Delacroix, (Saint Cyrille de Jeru¬ salem, sa vie et ses oeuvres5 (Paris 1865), and Mader, (Der heiligen Cyrillus5 (Einsiedeln

1901).

CYRILLA, a genus of shrubs consisting of one variable species, C. racemiflora , of the natural order Cyrillacece. The shrubs are found from the Carolinas westward to Texas and southward to Brazil. They are almost ever¬ green, and have attractive bright green leaves and white flowers in racemes. Popularly they are known as leatherwood and are sometimes seen in ornamental plantings as far north as New York, which is about the limit of their hardiness. They succeed best in moist, sandy soil and partial shade.

CYRILLIC ALPHABET, the story of whose invention by Cyril (820-69), apostle to the Slavs, whether true or false, forms an in¬ teresting episode in ecclesiastical annals, is still a debatable form of letters as to its precise origin and history. Its reputed inventor was originally a monk called Constantine, who with his brother Methodius led in Thessalonica an ascetic life, when in 860 he was sent to the Chazars, a Tartar tribe on the northern shores of the Black Sea. His work was to counter¬ act Jewish and Mohammedan influences on the people. After a partial success, he returned to Constantinople, living as before with his brother, until sent by the emperor as a mis¬ sionary among the South Slavic tribes, which had been subjected to Roman and Greek propaganda. In his labors among them he founded a Slavic literature by translating into their language portions of the Scriptures and important liturgical books. For this purpose he is said to have invented a new form of alphabet or to have modified the more ancient Glagolitic, which received the name Cyrillic, and was adopted by most of the Eastern Slavs, Bulgarian, Bosnian, Russian, Serbian, *etc.* It was, however, subsequently modified in various ways in those countries. Succeeding also in Slavic lands outside of the Greek Empire, he and his brother were called to Rome by Nicholas I (868) whose successor approved their work and wished them to or¬ ganize independent new churches in the Slav provinces. But Constantine, assuming the name of Cyril, preferred to remain in Rome as a simple monk and died a year later. Methodius continued his efforts-until his death in 885.

In reference to the Cyrillic alphabet, a Bulgarian monk of the next generation in 855 mentions Cyril as author, and gives 38 as the number of its letters which were later in¬ creased to 48. Twenty-four are identical with Greek uncials of the 8th and 9th century. Additional characters were required to express the many Slavic vowels, sibilants and nasals, whose origin is hard to explain. Cyril incor¬ porated Glagolitic characters, mostly signifying Slavonic words — the Glagolitic (from glagol, a word,) becoming of minor account, while

the Cyrillic has developed into one of the three dominant alphabets of the world, to use Isaac Taylor's expression. While the phonetic basis of the language is nearer some Bulgarian dialects, German and Latin words were in¬ cluded in Moravia, which appear to have modi¬ fied the vocabulary. The three alphabets of the Slavonians express their religious depend¬ ence : Latin was adopted for those who held Latin services ; Cyrillic, the Greek uncial, was used by orthodox Slavs for their liturgy; Glagolitic survives in the Dalmatian liturgy and in Montenegro, the Roman Church per¬ mitting its employment. A modern version of the Cyrillic was made for Russia by Peter the Great. The earliest dated Slavonic writing is a Cyrillic inscription of Tsar Samuel of Bulgaria (996). It is the theory of Bruckner that Cyril invented Cyrillic first, but ˆdegraded® it into Glagolitic to conceal its Greek origin from the Latin clergy, as the entire purpose of his mission was hostility to Rome ; in orthodox lands, such caution was . not necessary.

Bibliography. — d'Avril, A., (S. Cyrille et S. Method) (Paris 1885) ; Bonwertsch, N., (Cyrill. und Method. 5 (Erlangen 1885) ; Bruckner, A., (Thesen zur Cyrillo-Methodian. Frage> (in Arch. f. si. Phil. XXVII, 1906); Dobrowsky, (Cyrill und Method,) (Prague 1823) ; Franks, J., (in Arch. f. si. Phil. XXVIII) ; Goetz, (Gesch. d. Slavenapostel C. und M2 (Gotha 1907) ; Taylor, Isaac, (The Alphabet (II, London 1883).

A. S. Isaacs.

CYRILLUS and METHODIUS, apostles of the Slavs. They were brothers and natives of Thessalonica. Cyril was the name adopted as a monk by Constantine, b. 827. For his learning he was surnamed ((the philosopher.® The Khasars, a Tartar people, having about the year 860 asked the Emperor Michael III to send them Christian missionaries, Cyril was sent and made many converts. The Bulgarians of Thrace and Mcesia were evangelized by Methodius, who baptized their king, Bogoris, in 861. At the request of Ratislav, Duke of Mo¬ ravia, the brothers then turned to the countries on the March and Danube. They prepared a Slav translation of the Scriptures and chief liturgical books (which became the foundation of the literature of the

Slavs), and by their services in the mother-tongue won the hearts of the people from the Roman missionaries. The two brothers were summoned to Rome to explain their conduct in conducting services in the vernacular, and Cyril died there in 869. Me¬ thodius, who in the same year was consecrated bishop of the Moravians, completed the evan¬ gelization of the Slavs. Called to Rome in 879 to justify his celebration of the mass in the native tongue, he succeeded in gaining the approval of Pope John VIII, and (according to most probable account) ‘died Hradisch on the March, 6 April 885. Bohemia and Moravia celebrated the millenary festival of their two apostles on 5 July 1863. Both brothers are recognized as saints by the Roman Catholic Church. Their festival falls in the Roman Catholic Church on 9 March ; in the Greek Church 11 May. The Cyrillic alphabet modified out of the Greek by Cyril, superseded the more ancient Slavonic alphabet over a wide area. The history of Cyril and Methodius is still very obscure. Consult Bondwetsch, N.,

(Cyril and Method } (Erlangen 1885) ; Ginzel, (Geschichte der Slawenapostel Cyril und Method) (Vienna 1857) ; Diimmler and Miklosich, (Die Legende vom Heiligen Cyril > (ib. 1870) ; Goetz, (Geschichte der Slawenapostel Constantinus (Cyrillus) and Methodius) (Gotha 1897) ; Miklosich (ed.), (Vita Sancti MethodiP (Vienna 1870) ; Maclear, Conversion of the Slavs* (London 1879) ; (Acta Sanctorum,* ed¬ ited by J. Boland (March, II, pp. 12-25, Octo¬ ber, XI, pp. 168-171) contains some original sources.

CYRUS THE GREAT, king of Persia: b. about 600 ; d. 529 b.c. The ancient original authorities for the facts of his life are Herodo¬ tus and Ctesias, but their accounts are inter¬ spersed with many highly colored legends. His lineage we have from a famous cuneiform cylinder prepared under his own authority. It is now in the British Museum. In it Cyrus establishes his royal claim through his father, Cambyses, back to Teispes, the son of Achsemenes and founder of Achaemenian dynasty. The ancestral home was Anzan, supposed to be a district of Elam. It is, how¬ ever, certain that Cyrus was a Persian. According to Herodotus he was the son of Cambyses, a distinguished Persian, and of Mandane, daughter of the Median king Astyages. He founded the Persian monarchy. A short time before his birth the soothsayers at the court of Astyages divined from a dream of his that his future grandson was to de¬ throne him. Upon this he gave orders that Cyrus should be destroyed immediately after his birth. For this purpose he was delivered to a herdsman, who, moved with compassion, brought him up, and named him Cyrus. His * courage

and spirit betrayed his descent to the king. The Magi having succeeded in quieting the uneasiness which the discovery occasioned him, he sent Cyrus to his parents in Persia, with marks of his favor. Whether this legend is true or not, it is certain that the beginning of Cyrus's career was the conquest of his grand¬ father about 559 b.c. by which he became king of Media and Persia. In 546 he conquered Croesus, the rich and powerful king of Lydia, and in 539 took Babylon, which did not offer much resistance, being torn by internal dis¬ sensions. He also subdued Phoenicia and Palestine, to which he caused the Jews to re¬ turn from the Babylonish captivity. While Asia, from the Hellespont to the Indies, was under his dominion, he engaged in a war against the Massagetae — a people of Scythia, northeast of the Caspian Sea, beyond the Araxes, then ruled by a queen named Tomyris. In the first battle he conquered by stratagem, but in the second was defeated, and was him¬ self slain (529 b.c.). The stories related by Xenophon in the <Cyropaedia> (professing to be an account of the life and character of Cyrus), that he received a splendid education at the court of Astyages, inherited his kingdom and ruled like a genuine philosopher, are mere romance, Xenophon's design being to represent the model of a king, without regard to histori¬ cal truth, and in this way perhaps to exhibit to his countrymen the advantages of a mon¬ archy. The chief points in which the account of Ctesias differs from that of Herodotus are that Ctesias does not make Cyrus any relaticin of Astyages, that after the conquest of Media

Cyrus married Amytis, the daughter of Astyages, and honored the latter as a father, and that he met his death in a battle with a nation called the Derbices, who were assisted by the Indians. Ctesias also mentions certain wars of Cyrus not related by Herodotus, and gives a somewhat different account of the war with Crcesus, king of Lydia. Within a few years Cyrus founded a mighty state, which proves that he must have been possessed of great gifts as a warrior and statesman. His nobility of character is shown by his treatment of the vanquished. He destroyed no town nor did he put the captive leaders to death. By

the Persians his memory was cherished as <(the father of the people,® by the Jews he was con¬ sidered their liberator, and his greatness as a ruler and legislator was acknowledged by the Greeks. His claim to be styled Cyrus the Great, as history has known him, is amply justified and remains unchallenged. He built a city and palace in his native district, which was called after his tribe Pasargadae (now Murghab), and here his body was laid to rest. Consult Amiand, (Cyrus, roi de Perse-* (Paris 1887) ; Duncker, (History of Antiquity > (Eng¬ lish trans., London 1881) ; Geiger and Kuhn, (Grundriss der iranischen Philogie) (Strassburg 1897) ; Horner, (Daniel, Darius the Median, Cyrus the Great* (Pittsburgh 1901) ; Lessmann, (Die Kyrossage in Europa) (Charlottenburg 1906).

CYRUS THE YOUNGER, King of Per¬ sia : b. about 424 b.c. ; d. 401 b.c. He was the second son of Darius Nothus, or Ochus, and at 15 obtained the supreme power over all the provinces of Asia Minor. His ambition early displayed itself ; and when, after his father's death (404 b.c), his elder brother, Artaxerxes Mnemon, ascended the throne, Cyrus formed a conspiracy against him, which was, however, discovered. Cyrus was arrested by his brother and condemned to death, but at the intercession of his mother Parysatis, was released and made governor of Asia Minor. Here Cyrus assem¬ bled a numerous army to make war upon Arta¬ xerxes and dethrone him. Being informed of his brother's design, Artaxerxes marched against him with a much larger army. In the plains of Cunaxa, in the province of Babylon, the two armies encountered each other (401 b.c). In the battle that ensued the troops of Cyrus were at first victorious, but the fruits of the victory were lost through the death of Cyrus himself in the battle. An account of the life of Cyrus is contained in the opening book of Xenophon's Anabasis,* which gives a detailed account of the retreat of the Greek auxiliaries of Cyrus from the interior of Persia to. the coast of the Black Sea. Another account by Ephorus is preserved in Diodorus. Excerpts from Ctesias by Photius also throw light on the career of Cyrus, as also the life of Artaxerxes by Plu¬ tarch. The character of Cyrus is highly praised by the ancients and it appears that he was certainly his brother's superior in energy and as a statesman and general. The fate of the empire would probably have been very dif¬ ferent had he ascended the throne. See Persia.

CYSTADENOMA. See Tumor, Inter¬ mediate.

CYSTICERCUS, sis-ti-ser'kus, a larval stage of the tapeworm, sometimes found in the

human body in the form of small-sized tumors and which may be distributed in a variety of situations. *The tumors may range from the size of a pea to that of a hazelnut and may exist singly or may be multiple. They are found chiefly in the back and sides of the trunk, less frequently in the extremities and are sometimes subcutaneous. Occasionally they involve the brain and other organs, as the liver, kidneys, spleen, *etc.* Frequently they give rise to no symptoms whatever, but when occurring in an important organ of the body may cause major symptoms. In the flesh of many of the lower animals cysticerci also frequently occur, and it is by those present in the meat which he eats that tapeworms are largely communicated to man.

CYSTINURIA, a condition in which large amounts of cystin are found in the urine. It is a very rare condition and is usually associated with excessive intestinal putrefaction.. Some¬ times cystin calculi result because of the excess of this acid in the urine.

CYSTITIS, an inflammation of the uri¬ nary bladder, usually resulting in pain and in¬ creased desire to urinate. The urine may be cloudy or bloody and there is usually an excess of mucus and pus found. The pain is situated over the pubic bone and may extend to the back, and there may be some associated fever with chills, if the inflammation is severe. Cystitis is most frequently due to an infection from without, usually the result of passing an un¬ clean catheter. It may also result from ure¬ thritis and is a very common condition in old men in whom the prostate gland is enlarged. It may also result from the presence of a stone in the bladder. Treatment is often difficult, requiring skilled medical attendance ; but sitz-baths and hot applications to the abdomen are of service, and abstinence from peppery or alcoholic foods is advisable. See Bladder, Diseases of.

CYSTOIDEA, an order of extinct echinoderms. They are spheroidal animals, pedun¬ culate or sessile, enclosed by polygonal calca¬ reous plates. They have a mouth above ; the arms are rudimentary. Buch first elucidated their structure and affinities in an essay pub¬ lished at Berlin, in 1845, and gave them the name of Cystidece in place of Sphceronites, which was their original appellation. Now Cystidece has become Cystoidea. They range from the upper Cambrian to the Silurian, being especially prominent in the Bala Limestone.

CYSTOPTERIS, bladder-fern, a genus of delicate flaccid polypodiaceous ferns. They are found in moist, cool localities. C. fragilis (the brittle fern) is found in this country, as is the very rare C. montana. The brittle fern has a wide range, being found within the Arctic circle to Chile, South Africa and Australasia. They have dot-like

sori covered by hood-like indusia. C. bulbifera, which multiplies by bulblets, is found in the northern Appalachians.

CYSTS, circumscribed tumors containing more or less fluid substance, or occasional gases, cut off from the neighboring tissues by a dis¬ tinct limiting wall. See Tumors.

CYTASE, a ferment or enzyme that exerts a kind of digestive action upon the cell-walls of plants, rendering them soluble in water. It

occurs, in the hyphse of certain parasitic fungi, and also in the germinating seeds of certain plants in which the reserve food-material is normally stored up in masses of stony hardness. It dissolves cellulose, but has no effect upon lignin, and is destroyed by exposure to a tem¬ perature of 150° F. The chemical nature of cytase is not yet established, and it may prove to be a mixture of several enzymes instead of a single substance of definite composition.

CYTHERE, sl-the’re, a genus of Entomostraca, order Ostracoda, family Cytheridce. The eye is single, the inferior antennae setigerous, but without a tuft or pencil of tiny filaments; three pairs of feet are enclosed within the shell, and no heart is present.

CYTHEREA, si-ther’e-a (from Cytherea, a name for Venus), a genus of conchiferous mollusks belonging to the family Veneridce. The shell is like that of the genus Venus. There are three cardinal teeth and an anterior one beneath the tunicle. The cythereas are in all seas; about 176 recent species are known and 200 fossil, the latter ranging from the Oolite down.

CYTISINE, sit’i-sin (CULtN,0). When the ripe seeds of laburnum are powdered, ex¬ tracted with acidulated water, the fluid treated successively with lead acetate and tannic acid, and the precipitate, before it becomes resinous, mixed with lead oxide, then dried and exhausted with alcohol, crude cytisine is obtained on evap¬ oration, and after proper purification it forms a brilliant crystalline mass. It is

very soluble in water and alcohol, but insoluble in ether, benzol and chloroform, has a bitter taste, but no odor. It is a very powerful base, decomposing the salts of ammonia and the metals even in the cold. It combines with the strong acids, but the salts are all deliquescent except the nitrate, which crystallizes very readily in splendid, thick, transparent, colorless, monoclinic prisms. It can be sublimed without decomposition by care¬ ful heating in a current of hydrogen. The poisonous properties of laburnum are well known. The toxicological effects are due to this alkaloid, which in doses of from 0.1 to 0.5 of a grain is fatal in a few minutes to ordinary small animals.

CYTISUS, sit'i-sus, a genus of low shrubs or small trees of the natural order Leguminosce. There are about 40 species, natives mostly of Europe, western Asia and northern Africa. They are characterized by small, deciduous or evergreen trifoliate leaves, yellow, purple or white flowers in terminal or axillary racemes or heads, and few-to many-seeded pods. Several species with long twiggy branches are called broom ; others are popularly known as laburnum and others by the genus name. A good many are cultivated for ornament either in shrubber¬ ies or in greenhouses, where some, especially C. canariensis, are known as genistas and are very popular about Easter time. In Europe several species are valued as forage plants, but in America they have not met the expectations of experimenters. The laburnum is poisonous. See Broom ; Genista ; Laburnum.

CYTODE, si'tod, a piece or bit of proto¬ plasm, defined by Haeckel as without a nucleus In this respect it differs from a cell. The monera of Haeckel are cytodes which have not yet reached a cell stage. As yet no definite nucleus

has been discovered in the bacteria or the cyanophycese, so that these seem to be cytodes.

CYTOLOGY, the science which deals with the structure, development and functions of the cell; of the multiplication of cells and of the relations of cells to organs and tissues. It is distinguished from histology in that histology deals with tissues, while cytology deals rather with the cells of which tissues are composed. A sharp distinction cannot be made between cy¬ tology and morphology, although in general it may be said that cytology is concerned more with individual cells than with organs. Cytol¬ ogy may be called <(oil immersion® morphology because microscopes with very high magnify¬ ing powers are required for cytological studies. The terms,

cytology and morphology, are used very indiscriminately by many botanists and zoologists. During the past 20 years, most botanical studies with such titles as ((The Mor-Fig. 1. — A cell illustrating the parts which are com¬ mon to nearly all cells. Highly magnified. v, vacuole; n, nucleolus; c, chromatin; l, linin; nu, nucleus; p, protoplasm; w, cell wall.

phology of — ,® contain more or less cytology, while only a smaller number of articles pur¬ porting to be cytological are largely morpholog¬ ical. Among the problems which belong indisputably to cytology are the following: The origin, development, structure and functions of the cell and of its various constituents; nuclear and cell division; fertilization; organization of the embryo; the relation of the individual cell to cell complexes ; the role of the cell in heredity. An idea of the subject matter of cytology can best be gained by examining, from the cytologi¬ cal standpoint, a few prominent subjects which are also studied by investigators in other fields. See Embryology; Fertilization; Heredity; Mutation.

The Cell. — A cell has been defined as <(a mass of protoplasm with a nucleus in it.® While this is true for many simple forms, there is in addition, in the vast majority of cases, a cell wall surrounding the protoplasm (Fig. 1).

Cells without nuclei were reported frequently about 40 years ago, but at present no animal cells without nuclei are known. Numerous cases of non-nucleate cells were reported by the older botanists, but as lenses and methods of prepara¬ tion have improved, nuclei have been demon-

FlG. 2. — Cells undergoing nuclear division: 1 an early and 2 a later stage in the division of the nu¬ cleus in a cell of the root tip of the common Onion. 3 and 4, the corresponding stages in epidermal cells of the Salamander. In 2 and 4 the V-shaped chromosomes, which are regarded as the physical basis of heredity, are clearly seen. Highly magnified.

strated until the only doubtful cases now known to the botanist are the bacteria. The blue-green algae were long thought to have no nuclei, but nuclei have now been demonstrated in several genera and are doubtless present throughout the group.

Most cells are too small to be seen without a microscope, cells which are visible to the naked eye being rather exceptional. The egg of a bird consists of a single cell, as do the eggs of all animals and plants. The largest plant cells are the internodal cells of the stonewort, Chara, which reach a length of two inches. The largest egg cell described for any plant is that of Dioon, a plant related to the sago palm ; this cell reaches a length of about one-fourth of an inch.

The most usual shape of free cells is the spherical, and cells forming a part of a tissue are usually more or less rectangular in form.

When first formed, the cells of the individual animal or plant are very much alike, but as one examines cells farther and farther from the regions where active cell multiplication is taking place, it is seen that the originally similar cells are becoming very unlike. In the higher plants the outer cells become differentiated into pro¬ tective tissue, the innermost into conductive tissue, others into assimilative tissue and still others become reproductive cells. In higher ani¬ mals similar differentiations take place, cells

which finally become so different, as. those which form nerves, muscle, glands and even the teeth, having been practically alike in the be¬ ginning. Among the unicellular organisms there is often a remarkable differentiation and divi¬ sion of labor, the single cell performing the functions of locomotion, securing food, respira¬ tion, digestion, assimilation, *etc.* Such differen¬ tiation and the causes which lead to it are among the most important of cytological prob¬ lems.

It is a remarkable fact that while undergoing nuclear division, the cells of animals and planis strikingly resemble one another, even in the behavior of the most minute constituents of the nucleus and protoplasm. (Fig. 2). This must mean that animals have been derived from plants or that structures of amazing similarity have arisen independently in animals and plants.

Fertilization. — One of the most important problems of cytology is the problem of fertiliza¬ tion and attendant phenomena. While new in¬ dividuals, even in the more highly organized plants and animals, may arise occasionally with¬ out fertilization (by parthenogenesis, chemical stimulus, vegetable multiplication, etc.), such cases are so rare that fertilization is assumed to occur unless its absence is definitely established. To the cytologist, fertilization consists in the union of definitely organized male and female elements. The cytological details of fertilization are essentially alike in plants and animals. (Fig. 3). Fertilization, both in plants and in animals, is preceded by a reduction in the number of chromosomes, so that the number of chromo¬ somes found in the male nucleus or in the fe¬ male nucleus is just one-half the number which is found in the body cells of a given plant or animal. Consequently, when the two sexual nuclei fuse during fertilization, the number of chromosomes which characterizes the body cells is restored. The complicated details of the proc¬ esses by which this reduction in the number of chromosomes is effected are essentially alike in animals and plants. The closing paragraphs of this article show that the chromosome con¬ tributions of the two parents are not quite so identical as stated above, and that the differ-Fig. 3. — Fertilization. 1, the egg (oosphere) of a Lily, showing the male and female nuclei about to unite; 2, the egg of a mouse with the male and female nuclei about to unite; p, polar body. (2, after Sobotta.) Highly magnified

ences are effective in determining the sex of the offspring. Those cytologists who have in¬ vestigated most thoroughly the phenomena of fertilization have come to the conclusion that heredity is referable to a definite cytological basis.

A Cytological View of Heredity. — Almost without exception, cytologists believe that chro¬ matin is the physical basis of heredity. The reasons for this belief are, briefly, as follows : The male and female parents are equally potent in transmitting characters to offspring; an equal amount of chromatin and an equal number of chromosomes are contributed by each parent ; nothing but chromatin is contributed equally by the two parents. (Fig. 4). There is usually

Fig. 4. — 1, The egg and sperm of Fucus, showing great inequality in size; 2, fertilization in a worm (A scar is) showing the equal contribution of chromatin, each parent contributing two chro¬ mosomes. P, polar body; c, centrosome. (2 .after Boveri.) Highly magnified.

a great difference in size between the male and female germ cells. The sperm cell (spermato-zoan) of the ostrich is almost invisible to the naked eye, while the egg is as large as a coco¬ nut, and such differences in size are usual both in plants and animals. The egg contains a large amount of protoplasm and various food¬ stuffs, while the male cell contains very little protoplasm or foodstuffs and in many cases even that little is left outside at the time of fertilization, only the nucleus entering the egg. Hence, protoplasm and foodstuffs do not trans¬ mit hereditary characters. While the male nu¬ cleus is usually the smaller at the time of its entrance into the egg, it increases in size so that, at the time of fusion, the sex nuclei are alike in size. (See Fig. 3). Investigators of this subject are usually tempted into speculative phi¬ losophy. Philosophizing over the facts is com¬ mendable, but the wild philosophizing in ad¬ vance of the facts which has attended this subject has been of little value, except as it has stimulated investigation.

The organization of embryos and mature or¬ ganisms from eggs is a cytological problem which has not yet been solved. The visible stages in development have been observed and described ad infinitum. Both experimental cy¬ tology dealing largely with living material, and

anatomical studies of thin sections, stained so as to show the most minute details of structure, are contributing to the solution of the problem, but the fundamental causes underlying the phe¬ nomena are still unknown and seem as difficult of solution as the problem of the origin of life. The eggs of the sunflower and the willow, like the eggs of all flowering plants, are too small to be examined with the naked eye, but even when examined with the aid of modern tech¬ nique and the most powerful microscopes, they present no essential differences in external ap¬ pearance or internal structure, and yet one al¬ ways develops into a sunflower, and the other into a willow. Within the fertilized egg are all the potentialities of the adult, even to the color of the flower or the markings on tne wings of the butterfly. Some have believed that each

part of the adult comes from a certain predeter¬ mined part of the fertilized egg. This is called the theory of germinal localization. Others have made experiments to show that this theory is not true. Most botanists and zoologists ac¬ cept, as a working hypothesis, that chromatin is the physical basis of heredity, an hypothesis which assumes that there is no prelocalization in the protoplasm of the egg. The problem of organization is so bound up with that of hered¬ ity that much of the literature of the subject will be found in treatises on heredity.

At present, the determination of sex is re¬ ceiving a great deal of attention from students of both animal and plant cytology. In various animals it has been shown that the chromosome contributions of the two parents are not identi¬ cal. In the grasshopper, all the eggs have six chromosomes ; but, in the male, two of the four sperms developed from each sperm-mother-cell have six cromosomes and the other two have only five. Eggs fertilized by sperms containing six chromosomes produce females, while those fertilized by sperms with only five chromosomes produce males. Similar results have been re¬ corded for other animals. The problem in plants is much more difficult because the separa¬ tion of the sexes is not so prevalent and be¬ cause cases are rare in which the four sperms formed from one mother-cell remain together for any length of time. However, some prog¬ ress is being made and it seems probable that differences in the chromosome contributions of the two parents are responsible for the deter¬ mination of sex in plants.

If these conclusions are well founded, no amount of feeding or fasting on the part of the female could affect the sex of the off¬ spring in

animals ; and culture media applied to the female would be equally futile in plants.

It has become increasingly evident that not only spermatogenesis, oogenesis, fertili¬ zation and development of the embryo, are cell problems; but also that mutation, Mendelism genetics and other phases of the great problem of heredity must find their basis in the indi¬ vidual cell. Plant physiologists are also turning more and more to the individual cell as the unit of physiological activity.

Bibliography. — Cytology is too recent a sub¬ ject to have given rise to many textbooks, most of the literature being in the form of articles in leading botanical and zoological jour¬ nals. Probably the most important book on the subject is Prof. E. B. Wilson's (The Cell in De¬ velopment and Inheritance.* The following head¬ ings of chapters in Professor Wilson's treat¬ ise indicate quite accurately the subject mat¬ ter of cytology as presented in the few univer¬ sities which offer courses in this subject : (1) General sketch of the cell; (2) Cell division; (3) The germ cells; (4) Fertilization of the ovum; (5) Reduction of chromosomes, oogen¬ esis and spermatogenesis; (6) Some problems of cell organization; (7) Some aspects of cell chemistry and cell physiology; (8) Cell division and development; (9) Theories of inheritance and development. This book contains a very complete bibliography. Other books on the sub¬ ject are Hertwig's > (The CelP and Hacker's (Praxis und Theorie der Zellen-und Befruch-tungslehreP All volumes cited above are by zoologists ; no similar books have been written by botanists. A part of the subject is covered

by Professor Strasburger's book on (Reduk-tionstheilung, Spindelbildung, Centrosomen, und Cilienbildner im Pflanzenreich.* <Zellen-und GewebelehreP by the same author, published in 1913 as the second volume of the fourth part of the third section of (Kultur der GegenwartP is the latest authoritative treatment of plant cytology. The chief scientific journals in which the great majority of cytological investiga¬ tions are published are (Botanical), Annals of Botany, Botanical Gazette, Jahrbucher fur wissenschaftlichc Botanik, Bericlite

der Deutschen Botanischcn Gesellschaft, Flora, and Annals des Science Naturelles Botanique, (Zoological), Journal of Morphology, La Cellule, Anatomische Anzeiger, Archives de Biologie, Sitzungsbericht der Gesellschaft fur Morphologie und Physiologie Miinchen, and Bulletin Acad. Roy. de Belgique.

Charles Joseph Chamberlain, Professor of Cytology and Morphology, Univer¬ sity of Chicago.

CYTOPLASM, the protoplasmic contents of the cell outside of the nucleus. See Cell; Cytology.

CYZICUS, Asia Minor, a peninsula 70 miles southwest of Constantinople. It projects into the Sea of Marmora, and is connected with the mainland by a narrow isthmus, but was once an island and the site of the ancient town of same name, which stood on its south extremity, and of which some remains, including a fine amphi¬ theatre and the foundation of a splendid temple of Hadrian, are still seen. The peninsula, which stretches east to west for 18 miles, with a breadth of about 9 miles, is very beautiful and picturesque. Its mountains, called by the Turks Kafu-Dagh, rise to a height of about 2,500 feet. Consult Hasluck, <Cyzicus) (Cambridge 1913).

CZACKI, chat'ske, Tadeusz, Count, Polish statesman: b. Poryck, Volhynia, 1765; d. 1813. In early youth he was employed in the Superior Court of Justice at Warsaw and in 1788 he was appointed to the Treasury Commission of the Diet. He was deeply interested in the economic and educational development of Poland, and to this end traveled throughout the country, in¬ specting and mapping its river system. On the second partition of Poland his property was confiscated and he taught for a time at Cracow. Paul I restored him his estates and for the rest of Czacki's life he devoted himself to the exten¬ sion of education among his countrymen. Alexander I looked with favor on his efforts and appointed him inspector of schools in Volhynia, Padolia and Kiev. Of his own re¬ sources he gave over 500,000 thalers to the cause of education, and also donated a library of 4,000 manuscripts, 12,000 works in Polish and 80,000 miscellaneous works. He founded the famous Gymnasium of Kremenetz, long the in¬ tellectual centre of Poland. In 1807 Count Czacki was accused of stirring up political dis¬ content among his countrymen, but he ably de¬ fended himself before Alexander I, who ap¬ pointed him deputy curator of public instruction in Russian Poland. His works, mainly archaeo¬ logical and historical, were published in three volumes (Posen 1843). His most important work is (On Lithuanian and Polish Laws) (2 vols., Warsaw 1800; 3d ed.,

Cracow 1861).

CZAJKOWSKI, chi-kov'ske, Michal, Polish novelist : b. near Berditchev, in the Ukraine,

1808; d. 1886. In 1831 he was obliged to flee to Paris because of his participation in an insur¬ rection against Russia. A number of Polish exiles sent him on a secret mission to Turkey in 1840 and he embraced the faith of Islam in 1851. He became commander of a body of troops known as the Cossacks of the Sultan and fought with distinction against the Rus¬ sians in 1853-54. He returned to Russia in 1873 under a decree of amnesty. An accusation of treason was made against him in 1886 and in consequence he committed suicide. His stories of Cossack life were very popular, and several have appeared in German, French and English translations.

CZAR, zar, ZAR, or TSAR, tsar, the title of the former emperors of Russia, de¬ rived from the Old Slavonic cesar, king or emperor, which, although long held to be de¬ rived from the Roman title C cesar, is almost certainly of Tartar origin and is a survival of Asiatic dominion in Russia, as may be judged from the fact that there were czars of Georgia and other khanates, evidence of the non-imperial content of the term. In the beginning of the 10th century the Bulgarian prince Symeon assumed this title, which remained attached to the Bulgarian crown. In 1346 it was adopted by Stephen Duschan, king of Serbia. Among the Russians the Byzantine em¬ perors were so called, as were also the khans of the Mongols that ruled in Russia. Ivan III, grand prince of Moscow, held the title, and Ivan IV caused himself to be crowned as czar in 1547. With the conquest of Little Russia and Smolensk the rulers of Russia assumed the title of Czar of All the Russias. In 1721 the Senate and clergy conferred on Peter I, in the name of the nation, the title Emperor of Russia, for which in Russia the Latin word imperator is used. But among the Russians the common designation of the emperors was czar, or, as it is more properly spelled, tsar. See Russia.

CZARNEKI, or CZARNIEKI, char-nets'ke, Stefan, Polish general: b. 1599; d. 1665. He fought brilliantly in the war against Charles X of Sweden in 1655-60, and was hailed as the liberator of his country. In 1660-61 he defeated the Cossacks in two great battles. He went on an expedition to the Crimea, seeking an alli¬ ance with the Tatars, but died as the result of fatigue and exposure incurred on the journey.

CZARTORYSKI, char-t6-ri'ske, Adam George, Prince, Polish statesman and patriot: b. Warsaw, 14 Jan. 1770; d. Paris, 16 July 1861. He was the son of Prince Adam Casimir Czartoryski, the head of an-ancient Polish house. His education was completed at the University of Edinburgh and in London. After the partition of his country in 1795 he was sent as a hostage to Saint Petersburg. There he formed a close friendship with Prince Alexan¬ der, who on his elevation #to the throne ap¬ pointed him assistant to the Minister of Foreign Affairs and curator of all the educational estab¬ lishments in Poland. On 11 April 1805 he signed in name of. Russia the Treaty of Alliance with Great Britain. While curator of the University of Vilna he used his influence to keep alive a spirit of nationality among the Poles, and when some of the students were arrested for sedition and sent to Siberia, he resigned his office. On the

outbreak of the Polish revolution of 1830 he showed himself active on behalf of his coun¬ try, and was chosen president of the provisional government (18 December). On 30 Jan. 1831 he became the head of the national government, and gave up the half of his property to the service of his country. On the appointment of Krukowiecki to the dictatorship Czartoryski re¬ signed his post as president of the Senate. In the last days of the struggle for freedom he served as a common soldier in the corps of General Romarino. Thenceforth he lived at Paris, ceaselessly engaged in aiding his needy fellow-countrymen. He was excluded from the amnesty of 1831, and his estates in Poland were confiscated. In 1848 he liberated all the serfs on his estates in Galicia, and during the Crimean War endeavored to induce England and France to identify the cause of Poland with that of Turkey. Alexander II offered him an amnesty which he refused. Consult his (Memoires et correspondance avec l'empereur Alexander Premier* (Paris 1887; Eng. trans., London 1888) ; Morfill, (Story of Poland *(ib., 1893) ; Zaleski, (Life of Adam Czartoryski* (Paris 1881); Gadon, (Prince Adam Czar¬ toryski } (Cracow 1900). See Poland.

CZASLAU, chas'low, Bohemia. (1) Town, capital of a circle or district

of the same name; located in a fertile plain, 45 miles east-southeast of Prague; and is memorable for the defeat which the Austrians sustained from Frederick the Great in 1742. The church Saint Peter and Saint Paul has the loftiest steeple in Bohemia, and contains the remains of the celebrated Hussite leader, John Ziska. Alcohol, beer, beet sugar and pressed yeast are the principal manu¬ factures. Pop. 9,122; mostly Czechs. (2) The circle or district is well wooded and fertile, yielding excellent crops of corn and flax; and large quantities of minerals, especially iron. Area, 233 square miles. Pop. 61,064.

CZECH LANGUAGE. See Bohemian

Language.

CZECH LITERATURE. The uncon¬ tested earliest document in the Czech language dates from the year 973 a.d. It was a hymn sung at the installation of Bishop Dietmar at Prague, beginning with the phrase: (Gospodi pomiluj ny* (Lord, have mercy on us). When Czech literature had its resurrection, about the year 1800, and enthusiastic followers of the ardent movement everywhere searched for hidden records of the past, a number of MSS. turned up that were hailed with more or less plausibility as evidence of the ancient character of Czech letters. Some of these, it is now ad¬ mitted by overwhelming authority among the Bohemian philologists themselves, were clever literary forgeries. The one MS. that aroused the greatest interest for many years was the so-called Koniginhof collection of poetry. It was alleged to have been discovered, in 1817, in an ancient deanery church of the small Bohemian town of Kralove Dvur (or Konigin¬ hof), and contained lyrical fragments, some of them charming, like (Kytice* (The Nosegay), which Goethe subsequently translated, purport¬ ing to date from a very early age. However spurious this MS. maybe, there are still some moot points about it quite unexplained. The authenticity of another of these MSS., the one of Griineberg, and a third one, of Saint Vitus,

has likewise been assailed. But some of them, no doubt, are genuine enough, such as a frag¬ ment of the Gospel of Saint John; which seems to have been written in the time of the Slavic apostles, Methodius and Cyrillus, in the 10th century. And it must further be borne in mind that during the 150 years of ruthless .Austrian oppression, about 1620-1774, it was the object of the Court of Vienna to wipe out, if possible, every vestige of separate Bohemian nationality and religious and literary life. The Jesuit, Konias, alone is recorded as

having destroyed some 60,000 Czech books and manuscripts, many of them priceless and unique, in pursuance of this object. However, so far as susceptible proof is concerned, it is known that, aside from early folk songs, legends, etc., not distinctly traceable, poetry of no despicable order had penetrated Bohemia as early as the reigns of Wenceslas I and Ottokar II, about 1250, knight¬ hood and its chivalrous lays drifting in apace, though most of it either in German or Latin. But we know of an adaptation in Czech of the (Alexandre'is* of Walter de Chatillon, about 1300; also of similar adaptations or translations in Czech of the Artus cycle, of the (Tristan> version by Godefroy of Strassburg, and of ˆandarias a Floribella* (in the 14th century). Next we find the rhymed chronicle, ascribed to Dalimir, but in reality the production of an unknown Bohemian knight, about 1334; also a Bohemian history in verse, and the tale (Tkadlecek,* written in excellent Czech prose, some time before 1400. Didactic and satirical original ditties in Czech or serious poems also flourished, such as the (Nova Rada* (New Counsel), very popular in Bohemia (1394) and written by Smil Flaska, of Pardubitz, as also the (Quarrel between Body and Soul* and some other spirited dialogues, as well as allegorical poems, such as the (Anticlaudianus*, after Alanus of Ryssel ; also hymns, religious poems, legends, such as that of Saint Catharine, translations of psalms, mystery plays, such as (Mastickalf*, about 1320. The monks of the Abbey of Sazava were distinguished in this way. Translations of portions of the Sacred Scriptures followed each other rapidly; the Lives of the Saints, mostly translated from the Latin, were collected in the reign of Charles IV, who was not only Emperor of the Holy Roman Empire, but also hereditay King of Bohemia and a Czech and most enlightened monarch of his time. This collection made at his bidding was called the Passional. The foundation of the University of Prague, in 1348, gave a strong impetus to Bohemian science and letters. One of its first graduates, Thomas of Stitny*, wrote his theological disquisitions in Czech, whereas up to then the clerical Czech chroniclers and theologians had written in Latin, such as Kosinas of Prague (d. 1125). The oldest chronicle in Czech prose is that of the priest Pulkawa of Radomis (d. 1380). Marco Polo's Travels also were put into Czech at this time, and later those of Mandeville, de¬ scribed by Laurentius of Brezova. Andrew of Duba, about 1375, wrote commentaries on the Laws of Bohemia. Then came one of the most important turns in Bohemian history, the ad¬ vent and final death as a martyr (died at the stake, 6 July 1415, at the Church Council of Constance) of Jan Hus. This reformer was not only endeavoring to cleanse and popularize

the Church of Rome and its teachings, but he, as did Luther for the Germans a century later, likewise did much to make the common ver¬ nacular a more vigorous and an apter instrument in diffusing knowledge. The war of religious propaganda, the so-called Hussite War, that followed the death of this great and good man, brought, nevertheless, much turmoil and injury to Bohemia and eventually to the Czech cause. In 1487 the first printing press was put up at Prague, and a full translation, in Czech, of the whole Bible was published there the follow¬ ing year. Before this, however, many cheap hand-written pamphlets in behalf of Hus and the equally inexpensive <Postilles) and the (Net of Faith) of the Moravian brother, Peter Chelnicky, and similar fugitive publications on religious topics had circulated throughout Bohemia. Next we see, toward the end of the Middle Ages, a group of Czech historians and annalists who claim attention. There is Bartos Pisar, who is also known as Bartholomew the Scribe, and who recorded faithfully and in detail the shining political events of his day, more particularly the period from 1524—37. So does, slightly later, Sixt of Ottersdorf, of the years 1546-47 ; and Martin Kuthen does the like. Vaclay Hajek of Libocan. in his (Bohemian Chronicles,* writes often with reckless dis¬ regard of the truth, but in his account of the Thirty Years' War, especially 1618-20, he writes as an eye witness and most interestingly. Prokop Lopac has given a faithful (History of Charles IV,* and Brother Blahoslav, in his (Historie Bratrska,* furnishes a good account of the Moravian Brothers' movement. The (Captivity of John Angusta,* of 1547, by Jan Bilek is vividly descriptive, and Wenceslas Brezan in his (History of the House of Rosen¬ berg,* toward the end of the 16th century, gives a graphic survey of the life and manners of the Bohemian nobility and of their political illations with the Court of Vienna. Charles of Zerotin, b. 1564 at Brandeis, a Czech nobleman, spent his whole life traveling and seeking ad¬ ventures, and his correspondence is replete with the political gossip floating about in the coun¬ tries and courts he visited. His writings are, therefore, most entertaining and many of his historical anecdotes delightful, but rather un¬ critical. He was in the service of Henry IV of France and died finally an exile from Bohemia. Wenceslas Vratislav, b. 1576, went to the Sultan's court at Constantinople with the Austrian ambassador, and shared his imprison¬ ment there. His accounts of the Turks of those days are very amusing and graphic. Christo¬ pher Harant, another Czech noble, was likewise a great traveler, to the Holy Land, the Orient,

Hungary, etc., and particularly in the campaigns against the Turks. His writings are interesting and minute. Count Wm. Slavata, b. 1572, d. 1652, published several volumes in which he describes the stirring events of his day, in some of which, as in the historically famous <(fenestration** scene on the Hradzin in Prague, mark¬ ing the outbreak of the Thirty Years' War, he was one of the main participants. Paul Skala, b. 1583 at Saaz, belonged to the burgher class. He wrote a (Chronology of the Church,* a mere, compilation, however. Lastly must be mentioned the voluminous writings of Jan Amos Komensky (or Comenius), during the period both before and during the Thirty

Years' War; those were mostly pedagogical or religious in tenor. His most pretentious book is (Labyrint Sveta* (The Labyrinth of the World), of 1623. And then comes that long and un¬ happy period in the annals of Czech literature when it, together with the very language of Bohemia, came near being entirely obliterated, when it was suppressed and tabooed by the Austrian tyrants in Vienna. Toward the last quarter of the 18th century only do we see traces of a new life springing up. The Em¬ peror Joseph II, an enlightened ruler, permitted the establishment of a Bohemian Society of Sciences. He also established a professorship of the Czech language at the University of Vienna, and later one at the University at Prague. Those were the beginnings of a literary resurrection for the Czech tongue as an idiom more than a mere rustic vehicle of intercourse and of Czech literature to boot. First in this new and amazingly fruitful period must be mentioned Joseph Bobrovsky, b. 1753, d. 1829, the man chiefly instrumental in this process. He was a deeply learned philological scholar, not only of Bohemian but of all Slavic languages. His main work, a masterly gram¬ mar of Czech, he wrote in German, as he did nearly all his works. But his (History of the Bohemian Language and its Older Literature,* which followed some time after, in 1792, he himself rewrote in Czech, in 1818. And when the regular publication of the Journal of the Museum of the Bohemian Kingdom was pro¬ posed, in 1827, he insisted it should appear solely in German. He was also a Jesuit priest and was by no means stirred by enthusiasm in his life work of fashioning Czech anew for the struggle for existence. On the contrary, he remained thoroughly dispassionate and on the whole disapproved of his countrymen's burning desire to look upon the whole task chiefly from the viewpoint of nationalism. For all that, Dobrovsky it was who dug out the Czech lan¬ guage from the quagmire where it had been submerged so long and brought it to vigorous life again. Joseph Jungmann, b. 1773, in his painstaking and

wonderfully copious (History of Bohemian Literature,* written all in Czech, as Czech now becomes once more the medium of thought for the Czechs, undertook a gigantic task in gathering in this work all the stray strands left of casual Czech writings during the past, especially the 150 years preceding. His dictionary, containing even many obsolete Czech words that he again included in the vocabulary, is unsurpassed in many respects even to-day. John Kollar, (1793-1852), b. in Mosovec, a Slovak village in northern Hungary, was for many years the pastor of the Protestant church in Pest; he advocated the literary unity of all Slav races. Later he held the chair of Slavic archaeology at the University of Vienna. He was the author of <A Daughter of Slava* USlavy Deera*), a book of sonnets. Paul J. Safarik) (1795—1861) was also of North Hun¬ garian and Slovak origin, professor of Slavic philology at Prague, later librarian at the Uni¬ versity there, but politically persecuted by the Austrian government until 1859, two years before his death, and died in complete im-pecuniosity. He wrote (Tatranska Musa s. Lyrou Slovanskou,* when only 19; also lyrics and a number of translations from the German and the Greek, and a history (in German) of

Slavic language and literature. This last named is a great work, full of original research on Slavic philology, dividing all the Slavs linguistically into only two branches. The only work he wrote in Czech is his (Slavic Antiquities) ((Starozitnosty Slovanske5). Francis Palacky (b.. 1798, d. 1876) from Hodslavice, Moravia. His monumental labor was his his¬ tory of Bohemia.5 This work is a phenomenal achievement, one of the great historical works of the world, and Palacky was busied with it until his death, adding, revising, reshaping. At first he wrote it only in German, but later on also in Czech. It made Palacky recognized among all Czechs as their greatest living man. He became, in 1827, editor of the Journal of the Museum of the Bohemian Kingdom , a periodical still flourishing and which Morfill, an Englishman and Slavologue, terms a “Mine of Slavic Lore.® For his history he ob¬ tained, by extensive travels to the libraries of Dresden, Munich, Vienna, Italy, much original material. From 1861-76 he was the recog¬ nized leader of the National Party of Bohemia. He also wrote (in German) ‘Die Vorlaufer des Hussitenthums5 ; (Wiirdigung der alten bohm. Geschichtschreiber) ; ‘Zur bohm. Ge-schichtschreibung> *etc.* Wenceslas Hanka (1791-1861), the alleged discoverer of the much-contested MS. of Koniginhof, was the author of a collection of popular Czech lyrics, some Slavic philological works and many transla¬ tions. Ladislav Celakovsky wrote two volumes of pleasing lyrics ‘Echoes of Russian Song) and ‘Echoes of Bohemian Song,5 full of Slav myths and ancient legends, and one entitled ‘Hundred-Leaved Rose.5 Charles Ignace Macha5 (b. 10 Nov. 1810), died in 1836, in utter misery. He was one of the earliest Bohemian novelists of mark. His poetry was strongly imbued with the Byronic spirit, and Walter Scott formed his style of narrative. His chief work ‘Maj5 (May), a lyrical epic, and his group of tales, like ‘The Gypsies,5 survive him. Svatopluk Cech, b. in Ustredek, Bohemia, in 1846, was successively editor and contributor of the periodicals ‘Pokrok,5 ‘Sveto-zar5 ‘Lumir,5 ‘Kvety,5 and has written many excellent tales, novels, humorous short stories and several volumes of bright verse. His chief works are ‘Dreams,5 ‘Europa,5 ‘Jan Ziska,5 ‘Vaclav Z Michalovic,5 ‘Dagmar,5 ‘Slavia,5 ‘Jitrni pisne,5 ‘Arabesky,5 *etc.* Many judges consider him the equal of the best.

Thomas G. Masaryk, b. in Goding, Moravia, 1850, is chiefly a writer on sociological and political subjects. His writings, however, are nearly all in German ; even his most sensational book, ‘Der selbstmord als soziale Massenersch,5 was translated in Czech only many years after its first appearance. His other chief works are ‘Ueber den Hypnotismus,5 ‘Ueber d. Studium d. dicht. Werke,5 ‘Grundzuge einer konkreten Logik.5 For many years he filled a chair in the Czech University at Prague. He has also been a great political radical leader of the Czech people. At the outbreak of the great European War he fled to foreign parts, and was condemned to death for treason, in contumaciam. In 1918 he undertook a trip for purposes of political agita¬ tion to the United States. Jan Rubes is the author of ‘Ja jsem Chech a kdo je vie5 (a Czech patriotic song became a sort of war hymn). Joseph V. Kamaryt (1797-1833) is the

author of ‘Pisen vesnicanuv5 ; ‘Boleslav5 ; Jablonsky; (1813-81); J. Chmelensky and V. Stulc are all poets of deeply nationalistic tendencies. Other novelists and short story writers of distinction are the following : Bohumie Havlasa (1852-77), author of ‘Still Waters5 ; Aloys Jirasek, b. 1851, the author of ‘At the Court of the Voyvoda5 ; and ‘In Foreign Service5; Sophia Podlipska (1833-97) ; Jan Neruda, ‘Tales of Old Prague5 ; Gustav Pfleger-Moravsky (1833-95), vivid tales; Jan Holly, a Slovak (1785-1849), author of ‘Svatopluk,5 an epic of the ancient glorious ruler of Moravia; J. E. Vocel (1802-71), ‘Sword and Chalice,5 a historical novel of the days of Ziska; Jaroslav Kalina (1816-47), a satirist and humorist; Jan P. Koubek (1805—54) ; Joseph J. Langer (1806-46), Aloys A. Smilovsky5 (1833-85), dramatic and lyric writings, both of excep¬ tional quality; Joseph G. Stankovsky5 (1844-79), ‘King and Bishop,5 ‘The Patriots of the Booth5; Karel Sabina (1814— 77), one of the founders of the romantic novel in Bohemia, with Walter Scott as his model; Prokop Cholousek (1819-64) ; Adalbert Hlinka (pen name Francis Pravda) ; Benes Trebezky, author of many historical novels. Mrs. Bozena Nemcova deserves a word by herself. Her village tales have often been compared with those of Berthold Auerbach for their charm, but they are far more realistic. Her master¬ piece, ‘Babicka5 (Grandmother), has been translated into many languages. Emil Zibrt busied himself with the long-neglected subject of Bohemian folklore, publishing his results in ‘Cesky Lid5 (The Bohemian People), of which he is the editor. His efforts are being ably seconded by Celakovsky, Susil and Erben. ‘Jaroslav Vrchlicky5 (pen name for Emil Frida), born 1853, is one of the greatest living Bohemian writers. Of his many works, his ‘Rok v Jihu5 (‘A Year in the South5) and his ‘Ponti k Eldoradu5 (

‘Pilgrimages to Eldorado5) may be mentioned. He is also fertile as a dramatist. ‘Brothers5 and ‘Drahomira5 (both tragedies founded on events in Bohemian his¬ tory) deserve especial mention. He has like¬ wise published many polished translations from the works of foreign, particularly early Italian, poets. His ‘Moderni Basnici Anglicti5 (Modern English Poets) is a volume of these. J. V. Sladek (b. 1845) has admirably translated Byron in metric form, also Coleridge and some Shakesperean plays. Julius Zeyer and Adol¬ phus Heyduk are both poets and novelists of some distinction. Jacob Arbes (b. 1840) in his ‘Romanetta,5 a volume of short novels pos¬ sessing a distinctive flavor of their own, is very original. Eliska Krasnohorska (b. 1847) and Karolina Svetla (b. 1830), belong, to the best women writers of modern Bohemia.. The lat¬ ter’s admirable sketches from low life are un¬ surpassed in realism and depth of feeling. Her novel ‘Gold in the Furnace5 is certainly very good; and so is her ‘Zlato v ohni.5 Her real name is Johanna Muzak. Jaroslav Vlcek is also worth noting among the better novelists. Among Bohemian historians of the day must also be mentioned V. Kfizek (1833-81), who has written a synchronous history of the Slavic peoples; Constantine Jiricek (b. 1854), ‘His¬ tory of the Bulgarians5 ; Joseph Perwolf (1 842— 92), ‘Mutuality among the Slavs5 ; Beda Dudik (1815-90), author of ‘History of Moravia5;

Vincent Brandi (b. 1834), K. V. Zap (1812-72), (Bohemian-Moravian Chronicle* ; M. Kolar, J. Havelka.

The drama has only begun to flourish in Bohemian literature the past 40 years, and especially since the erection of a National Czech theatre in Prague. Among the first dramatists was Joseph K. Tyl (1808-56), who wrote numerous plays. In one of them occurs the song (Kde je domov muj) ((Where is my home?5), now the national air of Bohemia. Wenceslas Klicpera (1792-1859) wrote more than 50 comedies and tragedies and greatly aided the development of a Czech stage, though none of his plays are above the mediocre. Count Zdenko Kolovrat (1836-92) wrote several clever comedies. Of writers on scientific topics Jan Presl, professor of natural history in Prague, wrote much on this theme. Charles Jaromir Erben (b. 1810; d. 1870) as archivarian of Prague devoted his life to editing the works of earlier writers. He edited and published a new edition of the selected works of Jan Hus; also of Stitny's books on (General Christian Matters, *the travel books of Harent of Polzic, the Chronicle of Bartos, and of many other minor works. Joseph Jirecek (1825-88) in his works deals mostly with Slavic, especially with Czech, literature. Jirecek's (Rukovet) is per¬ haps the best book on Bohemian literature ex¬ tant. Of other historians, not mentioned here¬ tofore, Anton Gindely (1829-92), wrote au¬ thoritatively on the period of the Thirty Years' War, on the reign and court of Rudolf II, and on the Moravian Brothers. Wenceslas Tomek is the author of a monumental work, (Dejepis Mesta Praby* (History of Prague), a colossal work, full of erudition and of glimpses of Bohemian history in general. Joseph Kalousek (b. 1838; d. 1907) in his (Ceske Statni Pravo,* gives an account of the ancient Bohemian con¬ stitution. A. Goll (b. 1846), has written a his¬ tory of the Moravian Brothers and a monograph on early relations between Bohemia and Prussia. Prof. Karel Tieftrunk (b. 1820; d. 1901), and Anton Rezek (b. 1853), wrote exhaustively of Bohemian history since the accession of the Hapsburgs (1526) and ending with the Battle of the White Mountains. In philology Prof. Ignace Gebauer has published the important historical Grammar of the Bohemian Lan¬ guage.* Dr. Vaclav Flajshans has also pub¬ lished a similar work. Very valuable for Bohemian early literature and philology are the labors of Adolphus Patera, head librarian of the Bohemian Museum in Prague.

Bibliography. — (£asopis Museo Kralovstvi Ceskeho* (Prague publ.

annually) ; Flajshans, V., (Pisemnictvi Ceske* (ibid. 1898) ; Jerabek, F. V., (Stara Doha romantickeho basnictvP (ibid. 1883) ; Tirecek, J., (Rukovet k d£j lit. Ceske* (ibid. 1875-76) ; Jungmann, J., historie Liter. Ceske* (ib. 1849; Leger, L., (Le Monde Slave) (Paris 1902) ; Liitzow, Count F., his¬ tory of Bohemian Literature) (London 1907) ; Morfill, W. R., (Slavonic Literature* (London 1895) ; Murko, M., ˆAnfange d. bohm. Roman-tik* (Leipzig 1885) ; Palacky, F., (Wiirdigung d. alten bohm. Geschichtschreiber* (Prague 1869) ; Pupin, A. N., and Spasovic, V. D., (Geschichte d. slavischen Literatur) (ib. 1887) ; Safarik, P. J., cGesch, d. slav. Spr. u. Lit.* (Vienna 1869); Tieftrunk, K., historic Liter.

Ceske* (Prague 1880) ; Vlcek, J., (Dejiny Lit. Geske* (ib. 1890).

Wolf von Schierbrand, Author of (Austria-Hungary and the Polyglot Empire ,* *etc.*

CZECHOSLOVAKIA, a republic of cen¬ tral Europe, peopled by a Slavonic ethnic group. About 10,000,000 Czechs inhabit Bohemia, Mora¬ via and Austrian Silesia, while about 3,000,000 Slovaks live in Slovensko. The approximate total of 14,000,000 Czechs and Czecho-Slovaks must be accepted with some reserve. The last official census, 1919, shows a total of 13,916,336. Prominent Bohemians claim that the official figures are inaccurate and that the total stands nearer to 15,000,000. In 1526 the Czechs by popular choice invited the Haps¬ burgs to the Bohemian throne under pledges to respect the ancient privileges and liberties. The continual encroachments of successive Hapsburg monarchs upon the constitutional rights enjoyed by Bohemia since the 7th century reduced the country from a kingdom to a province by 1620 and had almost exterminated Czech nationality by persecution and confisca¬ tion. Many thousands were driven into exile ; German was introduced as the official language and the Czech spirit rigorously suppressed. It was in the country districts and village com¬ munities, however, that the national language and aspirations were cultivated, and early in the 19th century a number of Czech writers inspired their countrymen to revive the smolder¬ ing embers of national consciousness. The European upheaval in 1848 strengthened the Czech movement ; it assumed a political shape with the establishment of a Czech language press which found its first expression in a pro¬ test and a revolt against Germany's Central-European imperialism. Czech representatives were summoned to attend the German revolu¬ tionary Parliament at Frankfort; they refused, and convoked a Pan-Slav congress at Prague instead, at which

Czechs, Poles and Jugo-Slavs formulated plans for unification. The dream came to naught; hopes of union wrere still fur¬ ther removed by the Ausgleich or Dualist Set¬ tlement of 1867, by which the Slovaks were separated from the Czechs and handed over to Hungary. By the same instrument the Czechs were compelled to send representatives to the Parliament in Vienna, which for years they had refused to do. They entered it under pro¬ test, still asserting the inalienable rights of the Bohemian Crown. Being in a hopeless minor¬ ity, they were unable to exert any influence on foreign or domestic policy. The Austrian gov¬ ernment never ceased its systematic coercion of the Czech minority, yet their national aspira¬ tions grew stronger under repression and broke into flame with the European War. A stringent policy was adopted in Bohemia ; during the first 18 months of the war upwards of 1,000 Czech civilians were executed in Bohemia for political offenses. The Czecho-Slovak population was covered by the operations of the Imperial secret police. Women, girls and old men were crowded — chained — into cattle-trucks and con¬ veyed to internment camps, where public flog¬ gings of both sexes were of frequent occur¬ rence. During the Austro-Russian campaign thousands of Czechs went over to the Rus¬ sians; many joined the Serbian army and the

French Foreign Legion. In the Austrian Parlia¬ ment the leader of the Czech nationalists, Herr Stanck, declared on 30 May 1917 that his party would strive for the union of all the branches of the Czecho-Slavs into a democratic state.

Meanwhile, the Czecho-Slovak movement was energetically supported in the United States, France and England by the propaganda of Prof. Thomas G. Masaryk, its foremost representative and exponent. As organizer and president of the Czecho-Slovak National Com¬ mittee, he lectured in London, Paris and New York, enlisting Allied sympathy on behalf of the oppressed Slavs in the Dual Monarchy. In June 1918 the British government accorded official recognition to the Czecho-Slovak Na¬ tional Council as the representative of the Czecho-Slovak

nation and its aspirations. Similar recognition had already been extended by France, Russia and Italy. The celebration of Kossovo Day in New York on 17 June 1918 evoked a letter of sympathy from President Wilson, addressed to Dr. Axson, National Sec¬ retary of the American Red Cross. During the summer of 1918 there were large bodies of Czecho-Slovak troops operating with the Allies in France and Italy; about 14,000 landed in Vladivostok, and proceeded along the Siberian Railway with the Russian White Guards to oppose the Soviet or Bolsheviki government. By the end of June they controlled a number of towns on the railway for a distance of over 1,300 miles. Together with the White Guards they established a new Siberian central gov¬ ernment at Novo Nikolaievsk, making the fourth government at the time claiming control of Serbia. On 14 Nov. 1918, the National As¬ sembly of the Czecho-Slovaks in session at Prague formally declared the Czecho-Slovak state to be a republic, with T. G. Masaryk as its first president. A constitution was adopted 29 Feb. 1920. The National Parliament, the sole legislative body, consists of a chamber of 300 deputies elected for a period of six years, and of a senate of 150 members elected for eight years. The two chambers in joint session elect the president who holds office for seven years. The franchise is open to all citizens, regardless of sex, of 21 .years.

CZEGLED, tse'glad, Hungary, large mar¬ ket town, in the county of Pest, circle of Ketskcmet, on a plain between the Danube and Theiss, 46 miles southeast of Budapest. The land in the vicinity is well cultivated and pro¬ duces large quantities of grain and common red wine. Grain is ground in local mills. It is a large military post for cavalry. Pop. 33,942, mostly Magyar.

CZERMAK, cher'mak, John Nepomuk,

German physiologist and physician: b. Prague, 17 June 1828; d. Leipzig, 16 Sept. 1873. He studied at Vienna, Breslau and Wurzburg and was appointed lecturer on physiology and microscopic anatomy at Prague ; and later pro¬ fessor of zoology and comparative anatomy at Graz (1855-56) ; of physiology at Cracow (1856-58), and at Pest (1858-60). In 1865 he became professor of physiology at Jena and from 1869 till his death filled a similar position at Leipzig. He was the inventor and intro¬ ducer of the laryngoscope and rhinoscope and of a new method for the therapeutical and surgical treatment of diseases of the epiglottis aud throa* work on (The Laryngoscope*

has been translated and published in several languages. His biography

was published by Springer in (Gesammelte Schriften) (2 vols., Leipzig 1879) and (Populare physiologische Vortrage* (1869).

CZERNIGOV, cher'ne-gof, Russia, a prov¬ ince ; area 20,232 square miles, bounded on the north by the province of Mohilef, on the east by Arel and Kursk, south by Poltava and west by Kief and Minsk. The surface, with ex¬ ception of a hilly district along the Dneiper, is flat and the soil fertile. The Dnieper flows along its west frontier and the Desna passes through its centre. It has numerous lakes, though none are of great extent. All kinds of grain grow in abundance, but the crops often suffer from hosts of locusts. Hemp, flax, to¬ bacco and the opium poppy grow well and the forests furnish timber and fuel. The chief mineral products are saltpetre, porcelain-earth, chalk and a little iron. The interior trade is almost confined to the four annual fairs, which are held in Nijni-Novgorod. The chief exports are cattle, corn, brandy, honey, wax and potash. Pop., almost all belonging to the Greek Church,

3,131,500.

CZERNIGOV, Russia, town, capital of the province of the same name, situated on the right bank of the Desna, 80 miles north-north¬ east of Kiev. It is a place of great antiquity and contains numerous buildings of antiquarian interest. It is the seat of an archbishop and has many churches — -one of them, Saint Sophia, supposed to have been founded in 1024 — three monasteries, a gymnasium and an orphan hos¬ pital. Important annual fairs are held here. Pop. about 36,000.

CZERNIN, cher'nin, Count Ottokar von und zu Chudenitz und Morzin, Austro-Hun¬ garian statesman : b. Dimokar, Bohemia, 27 Aug. 1875. For six years preceding the out¬ break of the European War he served as Austro-Hungarian Minister to Rumania. On his appointment to that diplomatic post the Hungarian press raised a chorus of disapproval and Count Tisza, the Premier, even went to Vienna and protested to the Emperor Francis Joseph against the appointment. But Count Czernin was strongly supported by the late heir-apparent, the late Archduke Francis Ferdi¬ nand (q.v.), and was duly accredited to Ru¬ mania. The reason for his unpopularity in Hungary was that, both as politician and author, he had striven to range the German and Slav elements of the Dual Monarchy as against the Magyars. When Rumania declared war on Austria-Hungary on 27 Aug. 1916, another vio¬ lent outcry arose in Hungary against Count Czernin for his failure to bring Rumania into the war on the Austro-German side. He had

said all during the crisis that Rumania would either maintain a benevolent neutrality or else join the Central powers. It was charged against him that while he was still in Bucharest, Ru¬ manian troops had been invading Hungarian territory (Transylvania) for 24 hours before either Vienna or Berlin knew that Rumania intended war. Already in 1914-15 Count Czernin had held out to Rumanian statesmen a prospect of liberal concessions by Hungary to the Rumanes of Transylvania, for which he was violently denounced by the Hungarian press. Nevertheless, on the removal of Baron Burian

(q.v.) from the Foreign Office in December 1916, Count Czernin was appointed to succeed him, assuming also at the same time the offices of Minister of the Imperial House and presi¬ dent of the Joint Council of Ministers. As Baron Burian was always regarded as the instrument of Count Tisza, the accession of Count Czernin, who belongs to an old Bohemian (Slav) family with clerical tendencies, seemed to imply a diminution of Hungarian influence over the foreign affairs of the monarchy. One of his first official acts was to affirm the solidar¬ ity of the Austro-German alliance against all enemies in a telegram to the German Chancellor. See War, European — Peace Movements.

CZERNOWITZ, cher'no-vitz, Rumania, capital of the province of Bukovina, situated on the right bank of the Pruth. An insignificant village a century ago, it has developed into a clean and pleasant town of about 90,000 inhabit¬ ants, with numerous fine buildings and a mag¬ nificent episcopal palace. Though the majority of the people are Germans and the German lan¬ guage predominates, the population is more mixed than that of any other town in Rumania; Jews, Greek Christians and Roman Catholics are nearly equal in numbers, while there are many Croats, Hungarians, Czechs, Italians, Ruthenes, Armenians, Poles, gypsies and Ru¬ manians. Its importance is derived from its po¬ sition as a local centre, a frontier place and a university, founded in 1875. Opposite Czernowitz is the small town of Sudagora, the home of a famous dynasty of miracle-working rabbis. During the European War the vicinity of the town was the scene of many violent

conflicts. When the Russians overran Galicia and the Bukovina in August and September 1914 Czernowitz fell into their hands, but they did not hold it. Two months later, however, they re¬ captured the place, but were driven out in Feb¬ ruary 1915. They held it for a time in 1915, but withdrew across the frontier again. In Jan¬ uary 1916 the Russians once more approached the town, routed the Austrians 10 June and took 35,000 prisoners. On the 16th they reoccupied Czernowitz and by the 24th they were in pos¬ session of nearly the whole of Bukovina. See War, European — Eastern Front.

CZERNY (cher'ne) GEORGE, Serbian hospodar: b; near Belgrade, 21 Dec. 1766; d. July 1817. His true name was George Petrovitch, but he was called Czerny or Kara George on account of his. dark color, ˆCzerny® in Slavonic and <(Kara)) in Turkish, signifying black. In 1788, as the leader of a Serbian volunteer corps, he fought in the Austrian army against the Turks, and in 1801 returned to his native country and organized an insurrection with the view of delivering it from the Turkish yoke. He succeeded in driving the Turkish garrisons out of Serbia, took the town of Belgrade (1806) and compelled the Porte to recognize him as hospodar of Serbia. When the Turks again invaded Serbia, in 1813, he was compelled to retire. In 1817 he ventured to return to his native country, in the hope of inducing Milosh Obrenovitch, who had meanwhile received

Serbia as a vassal state from the Turks, to take part in a comprehensive scheme of rebellion; but Milosh betrayed him to the pasha of Bel¬ grade, who caused him to be assassinated. A feud between the families of Milosh and George ensued. See Serbia ; Early History.

CZERNY, Karl, Austrian pianist and com¬ poser: b. Vienna, 21 Feb. 1791; d. there, 15 July 1857; son of a teacher of the pianoforte, Wenzel Czerny, who was his first instructor. He then studied under Beethoven and Clementi and made rapid progress. At the age of 15 he began giv¬ ing concerts and lessons and was enthusiasti¬ cally received in the musical world. He was the author of an immense number of pieces, which, from their brilliancy, were at one time extremely popular. His exercises for the piano¬ forte are still valuable. They include (Die Schule der GelaufigkeiD (Op. 299) ; (Tagliche Studien> (Op. 337); (Die Schule des Virtuo-seiP (Op. 365) ; (Die Schule der Fingerfertig-keit) and many others. Among his pupils were Liszt, Dohler, Thalberg, Jaele and Kullak.

CZERNY, or TCHERNY, a Slavonic pre¬ fix sometimes signifying black, and sometimes tributary, appearing in many geographical names, as Czernigov, Czernowitz. It corre¬ sponds in the former meaning to Turkish Kara, Czerny George and Karageorge being inter¬ changeable

CZOLGOSZ, chol'gosh, Leon, American assassin : b. Detroit, Mich., 1873 ; d. Auburn, 29 Oct. 1901. He was of Polish-German ancestry; worked at various trades in the United States and became affiliated with anarchists. On 6 Sept. 1901, while President McKinley was hold¬ ing a public reception at the Pan-American Exposition in Buffalo, N. Y., Czolgosz shot him twice. On 14 September the President died; on 23 September Czolgosz was brought to trial ; on the 26th was sentenced to death, and was exe¬ cuted in the prison at Auburn, N. Y. See McKinley, William.

CZUCZOR, tsoo'tsor, Gergely, Hungarian poet and philologist: b. Andod, 17 Dec. 1800; d. Pest, 9 Sept. 1866. He was a Benedictine monk, and the eroticism of the first collection of his (Poetical Works* (1836) brought on him stern animadversion from his superiors. From 1825 to 1835, he was professor in the gymnasia at Raab and Komorn. He left the latter to ac¬ cept a post as second secretary and keeper of the archives of the Hungarian Academy. Un¬ der these auspices he began the edition of the great lexicon of the Hungarian language pub¬ lished in six volumes 1861-74, of which four volumes were edited by him. His works are not scientifically accurate, because of his ignor¬ ance of comparative philology. He is best re¬ membered for his poems, a later edition of which appeared at Pest in 1858. His two fine hero-ballads, (The Battle of Augsburg1* (1824) and (The Diet of Arad) (1828) brought him instant celebrity. In 1848 he published (Riado\ a passionate appeal to Hungarian national senti¬ ment, and was imprisoned for it. Among his prose works are legends and translations of Latin authors and a (Life of Washington.)

D

Dthe fourth letter of the English alpha¬ bet and the third consonant, is a sonant dental corresponding to the mute dental T. It holds the same place in the alphabets of the Phoenician, Syrian, Chaldee, Hebrew, Samaritan, Greek and Latin, and in those of all the modern European lan¬ guages, except the Russian and the two or three others which retain the Cyrillic alphabet ; in these the symbol of delta is the fifth letter. The most ancient forms of the symbol D in the languages of Phoenicia, Palestine, etc., are angular with the vertex pointing to the left, for example, ˆ3, <3, and the most ancient Greek form was the same angular figure reversed, v (changed afterward to A). In some ancient Greek inscripitons in Hellas itself and in the-Greek colonies the angular form of the primitive delta (t>) is rounded to the form D, and this form was adopted by the Latins, who got it from the Greeks who settled in Campania, now the province of Caserta. For the later history of the letter see the plate to Alphabet. The sound of D is produced by pressing the end of the tongue against the upper gums and then forcing the vocalized breath into the mouth. The point of contact of the tip of the tongue with the gums in articulating the sound ot D in English pronounciation is a little higher above the in¬ sertion of the teeth than when the D of those speaking other languages is sounded, and the same is to be said of the production of the sound of T. Hence the English sound is alveo¬ lar rather than dental. The letter D in very many English words represents an element in the speech of our early language ancestors which became for the Greeks theta (0, th), for the Latins f, for the Germans t, for example, Eng. deer, Gr. <%>, Lat. fera, Ger. tier. More curious is the change of the Greek name Odys¬ seus to the form Ulysses in Latin, and within the Latin language itself the change of olor to odor, and from dacrima to lacrima, adbiter to arbiter. In many words in English d is inter¬ calated or appended for phonetic reasons, for example, Old English thonor becomes thunder, Old English soun becomes sound, Norman Eng¬ lish jaunisse becomes jaundice; on the other hand the d is dropped out of some words., for example, Old English woodbind becomes wood¬ bine ; godsib, gossip ; godspel, gospel.

D is the Latin numerical symbol for 500. The ancient Romans represented a thousand by the symbol 0 (later written CD), and they took one-half of that symbol to express half a thousand, 500. The symbol D with a horizontal stroke over it (D) stood for 5,000. In Roman personal names D stood for the praenomen Decimus; thus D.

As an initial D is used:

1. In chronology, (1) for Domini, genit. sing, of Latin. Dominus — Lord, as A.D .—Anno Domini — in the year of our Lord. (2) for died.

2. In music, as an abbreviation for Discantus, Dessus, Destra, *etc.*

3. In university degrees, etc., for Doctor, as M.p. = Doctor of Medicine; D.C.L. = Doctor of Civil Law; D.D.ˆ Doctor of Divinity; D.Sc. = Doctor of Science, *etc.*

4. In English titles, for duke.

5. For Latin Deus— God and Divus — Divine.

D as a symbol is used :

1. In chemistry, didymium.

2. In music, for the second note of the nor¬ mal scale of C corresponding to the Italian re, or for any symbol or key on a keyboard corre¬ sponding to this note. It is also used for the keys having this note for a key note.

3. In biblical criticism, for the Beza manu¬ script of the Greek New Testament.

4. In commerce, for English penny or pence, as £ s._ d. = pounds, shillings and pence, being the initial of Latin denarius.

DAAE, da/e, Ludvig, Norwegian historian: b. Aremark, near Frederikshald, 7 Dec. 1834; d. Christiana, May 1893. He was for 20 years an active member of the Storthing; was several times minister in the various Radical cabinets ; and won several gold medals with his his¬ torical essays on ancient Norway. His best-known works are (Norwegian Village Legends } (1870-72) ; < Norway's Saints) (1879) ; and

(The Migrations of the Norsemen to Holland and England1* (1880).

DAB, a popular name given to several species of flatfish (Pleuronectidee) , which are found on European seacoasts. The species known as dabs are Pleuronectes Cimanda ; the long rough dab,

Hippoglossoides limandoides, and the smeardab or lemon sole, Glyptocephalus Microcephalus. See Flatfish.

DABAIBA (also written Dabaybe, d'Abaibe, ' etc.), a region lying south of the Gulf of Darien, of which the boundaries were never exactly defined. Spanish adventurers in the 16th century learned, as a matter of common report, that they might find there, or at least by exploring in that general direction, a temple lined with gold; and in this half-true story told by the Indians of Darien we probably have the earliest form of the Eldorado myth. Balboa, when governor on the Isthmus, organized a Dabaiba expedition which he led in person (1512). One hundred and sixty men in two brigantines proceeded up the Atrato River, but

made little headway against the hostile natives. Governor Pedrarias Davila (June 1515) sent 200 men under Luis Carillo and Balboa on the same errand. Attacked by Indians on the Atrato, one-half of the soldiers were killed, and the survivors took nothing but news of shameful defeat back to the coast. It seemed that ((the mysterious dominion so mysteriously defended must hold great treasure, and in the inflamed minds of the Christians the savage pantheon of Dabaiba had risen into a lofty edifice glittering with gold and gems, and situated in a region rich and beautiful beyond comparison.® (H. H. Ban¬ croft). Subsequently an expedition of 160 men under Tabria and Birues, with light brigantines and canoes, tempted fate upon the river. The savages on this occasion enjoyed more than their usual measure of supernatural protection, for (<the divinity of the golden temple® sent a flood which uprooted trees, overturned one of the vessels and drowned both leaders. Even Fran¬ cisco Pizarro, who was of the party, shared the superstitious fears inspired by these events to such a degree that he declined to assume com¬ mand and continue the quest. Peter Martyr speaks of four attempts to gain the golden tem¬ ple, one expedition attaining a distance up the river of 80 leagues ; but <(wonderful mischance ! — the unarmed and naked people always over¬ came the armed and armored.® Francisco Cesar, captain of

infantry, starting from San Sebastian in 1536, with 80 foot-soldiers and 20 horse pene¬ trated a short way into the mountains, returning with treasure valued at 30,000 Castellanos. Pedro de Heredia in the same year led 210 mail-clad men into the sierra, but came back empty-handed. Cesar, repeating his experiment, se¬ cured treasure amounting to 40,000 ducats. Next, Badillo led 350 men from Cartagena to explore the same region in 1537. The expedi¬ tion lasted more than a year, and was a com¬ plete failure. One-half of the soldiers died; Badillo was ruined and disgraced; Cesar, who accompanied him, lost his life. Such luring by occasional gains, such varied and dire misfor¬ tunes seemed the work of enchantment ; but a realistic explanation is not far to seek. We know that the territory southeast of the Gulf of Uraba or Darien was subject to a cacique named Dabaybe ; his name is still given to a village in the department of Antioquia and to a spur of the Western Cordillera in Colombia. This mountain range for years was an insuper¬ able barrier preventing the isthmian Spaniards from extending their domain overland toward the south. Accordingly their eager search was fruitless, though the temple actually was in existence. The Indian stories described, accu¬ rately enough, the splendors of the Inca empire, of Curi-cancha and Cuzco (see those titles). But the adventurers could not realize, and the Indians themselves probably did not know, how far away the famous temple at Cuzco really was. The facts in the case, the accent of truth in the Indians' accounts, sustained the explorers' confidence year after year; but confident search in a region far removed from the object sought is always ((mysteriously® baffling. Long before the report of Pizarro's discoveries in Peru reached the isthmus, a fixed belief had taken possession of the minds of the Spaniards that a kingdom more desirable than any they had despoiled, with gold-adorned temples, was some¬ where hidden away in the heart of the continent.

The attributes of elusiveness and mystery had become an indispensable part of the conception ; therefore the true accounts of the wonderful Temple of the Sun did not exactly tally with the <(glittering phantom® of their imagination. After Quesada (see Colombia), starting from Santa Marta, succeeded in penetrating, by way of the Magdalena River, the region of Colombian up¬ lands which lay beyond Dabaiba, naturally the golden temple was sought still further inland ; and thus the headwaters of the Orinoco and Amazon were discovered. Bancroft and other writers following his prompting have suggested that an ancient building in the Cenu Valley, near which were found tombs containing gold and gems, may have been the temple of Dabaiba ; it is quite impossible, however, to accept

this con¬ jecture, for the reason that colonists of San Sebastian came upon the Cenu building at an early date, and, if it had been the real object of their search, they would have been able, with the assistance of the natives, to identify it be¬ yond question. See Eldorado.

Marrion Wilcox.

DABB, or PALM-LIZARD, an agamoid lizard (Uromastix acanthinuras) , common in the sandy deserts of northern Africa.

DABCHICK (Podicipes fiuviatilis) , a bird of the family Podicipedidce and the smallest of the grebes, distinguished by the absence of cephalic crests. The total length slightly ex¬ ceeds nine inches; the back is brownish black; the belly has silvery gray mixed with the dusky color, but is whiter and more silky in winter; the bill bluish in summer, dull yellow in winter. It ranges and breeds throughout tropical and temperate Europe, Asia and Africa. See Grebes.

DABLON, dab'lon', Claude, Jesuit mis¬ sionary: b. Dieppe, France, February 1618; d. Quebec, 3 May 1697. In 1639 he entered the Society of Jesus and in 1655 was sent to Can¬ ada. With Chaumonot he was sent to establish a mission among the Iroquois at Onondaga. He endured great hardships on his journey to and from this mission. 'In 1661, with Druillettes, he journeyed overland to Hudson Bay to discover an outlet to the China Sea and to establish missions among the Indians of that region. With Allouez and Marquette he was on Lake Superior in 1668 and was the first to inform the world of the rich copper mines of the region. Dablon appointed Marquette to under¬ take the expedition which resulted in the dis¬ covery of the upper Mississippi. In connection with this discovery he drew attention to the feasibility of passing from Lake Erie to Florida <(by cutting a canal through only half a league of prairie to pass from the end of the Lake of the Illinois (Michigan) to the River of Saint Louis (the Illinois). This project after more than 230 years was revived in 1907. Dablon founded Sault Sainte Marie and in 1670 was apˆ pointed general of all the Canadian missions, retaining that office until 1680. He was again appointed, in 1686 and remained in office until 1693. His contributions to the (Jesuit Relations) are of great value for his descriptions of places and peoples and his clear and compre¬ hensive narration of events. Consult Campbell, (Pioneer Priests of North America) (New York 1908).

DABNEY, Charles William, American col¬ lege president: b. Hampden-Sydney, Va., 19 June 1855. He is a son of R. L. Dabney (cpv.). He was graduated at Hampden-Sydney College in 1873, and at the University of Virginia in 1877; and for two years studied in Berlin and Gottingen. He was professor of chemistry in the University of North Carolina, and State chemist, and later director of the North Caro¬ lina Agricultural Experiment Station at Ra¬ leigh, and an executive officer of the Cotton Centennial Exposition, New Orleans, 1884-85, and of other industrial expositions. He was prominent in establishing the North Carolina College of Agricultural and Mechanical Arts, Raleigh ; assistant Secretary of Agriculture of the United States, 1893-97 ; president of the University of Tennessee, 1887-1904 ; and presi¬ dent of the University of Cincinnati after 1904. He discovered phosphate and tin-ore deposits in North Carolina. He has published, among other works, (Washington's Interest in Education) (1899) ; (History of Agricultural Education in America) (1899) ; (Agriculture and Education) (1899) ; (A National University) (1897) ; (The Problem in the South) (1903) ; (Educational Principles in the South) (1904) ; (The Relation of Agriculture to Other Sciences) (1904) ; (The Meaning of the Solid South> (1909) ; (The South Renationalized by Education) (1911).

DABNEY, Julia Parker, American artist and author: b. Fayal, Azores, about 1850. She was educated at Teneriffe, Canary Islands, and in Boston. She published (Little Daughter of the Sun> (1896) ; (Poor Chola> (1897) ; (Songs of Destiny > (1898) ; (The Musical Basis of Verse) (1901).

DABNEY, Richard Heath, American his¬ torical writer: b. Memphis, Tenn., 29 March 1860. He is a son of Virginius Dabney (q.v.). He was graduated at the University of Virginia in 1881, afterward studying and taking the doctor's degree at Heidelberg, 1885. He was professor of history in Indiana University, 1886-89; and assistant professor, 1889-96; asso¬ ciate professor, 1896-97, and professor of his¬ torical and economical science after 1897 in the University of Virginia. In 1905 he became dean of the department of graduate studies there. He has published (The Causes of the French Revolution (1888) ; (John Randolph: A Char¬ acter Sketch) (1898) ; and numerous magazine articles and pamphlets.

DABNEY, Robert Lewis, American Pres¬ byterian clergyman: b. Louisa County, Va., 5 March 1820; d. 1898. He was a professor in Union Theological Seminary, Virginia, 1853-83, and from 1883 was professor of philosophy in the University of Texas. During the Civil War he was a major in the Confederate army and in 1862 was Gen. “Stonewall® Jackson’s chief of staff. He published (Life of General Thomas J. Jackson (1864); (Defense of Virginia and the Soutn (1868); (Sacred Rhetoric) (1866); (Sensualistic Philosophy > (1878) ; (Theology, Dogmatic and Polemic) (1879) ; and (Collected Discussions) (1891).

DABNEY, Virginius, American author: b. Elmington, Va., 15 Feb. 1835. His publication of (The Story of Don Miff, as Told by his Friend, John Bouche Whacker, a Symphony of Life) (1886), reached its fourth edition in six

months. He also published (Gold that Did not Glitterˆ

DABOIA, da-boi’a, the generic name of a venomous serpent of the East Indies, known also as Russell’s viper.

DA CAPO, da ka’po (It. ((from the head or beginning®), in music, an expression written at the end of a movement, to acquaint the per¬ former that he is to return to, and end with, the first strain. It is frequently used in the ab¬ breviated form D. C.

DACCA, dak’a, or DHAKA, dha’ka, India, a division of eastern Bengal and Assam, ex¬ tending from the Garo Hills to the sea. It is one of the richest divisions in India, and al¬ though containing a good deal of jungle and unoccupied land, produces such quantities of rice as to be called the granary of Bengal. The surface is an uninterrupted flat, and is inter¬ sected by three great water systems, the Brah¬ maputra, the Padma and the Meghna. The peri¬ odical inundations give rise to its extraordinary fertility. Dacca was at one time celebrated for its hand-woven muslins, which are of singular delicacy and beauty. This branch of industry, however, is now carried on to a very small ex¬ tent. The fineness of the yarn or thread used in the making of these muslins is not equal to that in some fabrics of European manufacture, but in durability and delicacy the Dacca mus¬ lins excel other muslins. The finest or <(royal muslin® used to be worth about $5 a yard. For the most delicate varieties only yarns are used that are some years old. Pop. about 11,000,000.

DACCA, India, city, capital of the district of the same name, and for 80 years, during the 17th century, the capital of Bengal. It is the largest city in eastern Bengal, and is situated on the river called the Boor Gunga (Old Ganges), at the distance of about 150 miles northeast of Calcutta. In this city and vicinity, the celebrated Dacca muslins are manufactured, jute works have been established in recent years and boat building is carried on. It has an extensive manufacture of shell bracelets, much worn by the Hindu women. The city was formerly much more extensive than it is at pres¬ ent (in 1801 having a population of 200,000), and exhibited a degree of splendor to which it has now no pretensions, as the magnificent ruins of bridges, causeways, caravanseries, pal¬ aces, gardens, etc., sufficiently prove. Destruc¬ tive tornadoes visited the city in 1888 and 1902. Dacca is considered one of the healthi¬ est and most pleasant places in Bengal. A teaching and residential university was founded here in 1914. Pop. 108,551.

DACE, a name rather loosely applied to various species of small freshwater fishes of the minnow family (Cyprinidce) , but especially to members of the genus Leucisus, of which 22 North American species are discriminated; others belong to Rhinichthys, Notropis and Semotilus, those of the latter being also called chubs and roach. Semotilus atromaculatus, the horned dace, is one of the best known and largest species, and abounds in the small brooks of the eastern half of the United States. As in many of the other species, the upper surface of the head of the male is ornamented during the breeding season with cutaneous tubercles. Because of their abundance the dace are im-

portant as furnishing food for larger fishes, and some of the larger species are much sought by juvenile anglers. The European dace (Leu - ciscus leuciscus) is common in British rivers, as well as in those of France, Germany and Italy. It prefers deep, clear streams and swims in shoals. See Cyprinhle.

DACH, daH, Simon, German lyrist : b. Memel, 29 July 1605; d.

Konigsberg, 15 April 1659. From 1639 he was professor of poetry, and 1656-57 was rector of the University of Konigsberg. His numerous hymns and songs are found in various collections, his hymns especially in the (Scriptural Arias } of Heinrich Albert. His (Annie of Tharau,1* a Low-Ger¬ man lay for the wedding of his friend Parson Portatius with Anna Neander, became a popu¬ lar favorite; his (Praise of Friendship) seems to belong to a better age ; and his spiritual songs (In Thy Control, O Lordp (Be Comforted, my Souip etc., are hardly surpassed by any com¬ positions of his day.

D'ACHE , Caran, ka-ran dash. See Poire,

Emmanuel.

DACHSHUND, daks'hoont (Ger. dachs, badger; hund, dog), a breed of small German hounds with very long, cylinder-shaped bodies ; short, crooked legs ; large heads ; long pendant ears; and short, stiff, smooth hair. In color these dogs are black-and-tan, or tan with black ears, the former being the characteristic color¬ ing of the best sort. They were originally used in Germany to hunt badgers, and sometimes even in fox-hunting. Though slow in move¬ ment, they are possessed of a keen scent, and great power of endurance, rendering them valu¬ able as hunting-dogs wrhen suitably trained. They are much used by sportsmen on the continent of Europe, but their usefulness is impaired by the difficulty of keeping them under proper command. The dachshund is akin to the old English turnspit, and a similar dog is de¬ picted on the ancient Egyptian monuments.

DACIA, da'shi-a, in ancient times, a district of uncertain limits to the north of the Danube, inhabited by the Daci or Getse, afterward a Roman province. It comprised that region now known as Moldavia, Wallachia and portions of Transylvania and Hungary. For a long time the Daci were formidable enemies of the Romans, and during the reign of the Emperor Domitian obtained so great an advantage that the emperor was compelled to accede to a dis¬ graceful peace. To wipe off this stain Trajan, the second emperor after Domitian, in the year 100 a.d. invaded the Dacian territory, and forced the Dacian king, Decebalus, to accept humiliat¬ ing terms of peace. These he soon broke; and Trajan entering Dacia a second time, again sub¬ dued it, and then erected it into a Roman province, 106 a.d. The Romans remained mas¬ ters of this province till the reign of the Em¬ peror Aurelian, when, in 274 a.d., they with¬ drew from the region to the north of the Danube, and assigned to the Roman colonists of Dacia a territory on the south of the Danube lying between Upper and Lower Mcesia, which was hence called Dacia Aureliani. The former Dacia

was now successively overrun by the Goths, Huns, Gepidae and Avares. Since that time the history of this country, which then lost the name of Dacia, is to be sought for in

that of the provinces of which it formerly con¬ sisted.

DACIA, a Hamburg-Amerika liner origi¬ nally employed in the cotton trade between Gal¬ veston and Hamburg. Just before the outbreak of the European War she entered Port Arthur, Tex., and remained in obscurity there until, at the end of the year (1914), the announcement was made that she had been sold to Mr. Brei-tung, an American citizen of German extraction. It was also stated that the vessel, renamed the Margaret, was to carry a cargo of cotton direct to Bremen, sailing under the American flag. The British, French and Russian governments would not admit the transfer of the vessel to American registry on the grounds that such transfer was not valid in accordance with inter¬ national law. It was further objected that this transfer would, if allowed, serve as a precedent on which might be decided the fortunes of a large number of German liners interned not only in the United States, but in many other neutral countries. On 21 Jan. 1915 the British Ambassador in Washington gave notice that his government was unable to agree to the transfer and that, if the Dacia (or Margaret) put to sea and were captured, she would be brought before a prize court. If, however, the cargo consisted solely of cotton owned by American citizens, the British government would guarantee the purchase of the cargo at the. price which would be realized by the shippers if it had arrived at its foreign destination; or, if preferred, the government would undertake to forward the cotton to Rotterdam without further expense to the shippers. The United States Treasury Department decided to insure the cargo, but refused to insure the vessel. Clearance papers were issued on 22 January, from Galveston for Rotterdam; after coaling at Norfolk, Va., the ship sailed on 12 Feb. 1915. On 28 February she was arrested in the Channel by a French warship and taken into Brest. On 5 July 1915 the Dacia's cargo was declared a prize, and to be sold at Havre 27 July. The validity of the seizure was confirmed by the prize court on 4 August.

DACIER, da'se'a', Andre, French philol¬ ogist: b. Castres, Upper Languedoc, 6 April 1651 ; d. 18 Sept. 1722. He studied at Saumur under Tanneguy Lefevre, whose daughter Anne was associated in his studies. After the death of Lefevre, in 1672, he went to Paris, and in 1683 he married the daughter of his former teacher. In 1695 Dacier was elected a member of the Academy of Inscriptions and of the

French Academy; of the latter he was afterward perpetual secretary. The care of the cabinet in the Louvre was entrusted to him. Besides editions of (Pompeius Festus) and the (CEuvres d'Horace, en latin et en frangais,> with the (Nouveaux eclaircissemens sur les (Euvres d'Horace> (1681-89), and <Nouvelle traduction d'Horace* with critical annotations, he prepared translations of (Marcus Antoninus, >

(Epictetus, 5 (Aristotle's Art of Poetry, with Annotations.) In general, he is erudite and mediocre in his writings.

DACIER, Anne Lefevre, French classical scholar: b. Saumur, March 1654; d. Paris, 17 Aug. 1720. She was wife of the preceding, and early displayed her learning by an edition of (Callimachus. } Her learned works were

not interrupted by her marriage, which took place in 1683. In her Considerations sur les causes de la corruption du gout) she defended Homer with the acuteness of a profound com¬ mentator, and Lamotte replied with a great deal of wit and elegance; on which account it was said Lamotte wrote like an ingenious woman, Madame Dacier like a learned man. In her (Homere defendu) she showed little mercy to Hardouin, who had written a satirical eulogy of this poet. On this occasion she was said to have uttered more invectives against the reviler of Homer than the poet himself had placed in the mouths of all his heroes. She edited Aure¬ lius Victor, Dictys Cretensis, Eutropius and Florus for the Delphin classics. She translated (Terence) and three pieces of dautus,5 in the prologue of which she treats of the origin, the cultivation and changes of dramatic poetry with acuteness. Her translation of the <Plautus) and the (Clouds) of Aristophanes deserves indul¬ gence as the first translation of the Greek comic poet. Her translation of Anacreon and Sappho, with a defense of the latter, met with success. Equally estimable for her character and her talents, she gained as many admirers by her vir¬ tue, constancy and equanimity, as by her works. She was a member of several learned academies.

DACITE, a volcanic rock of the diorite family, of porphyritic or compact texture, hav¬ ing crystals of plagioclase felspar quartz and biotite in a glassy or finely crystalline-ground mass. The name is derived from the old prov¬ ince of Dacia, now part of Hungary. Dacites grade into andesites by a lessening of the amount of silica, and differ from rhyolites and trachytes in containing plagioclase rather than orthoclase felspar. A typical dacite shows on analysis the constituent acids and bases in about these proportions: S2O2 67.2; A1203 17.0;

Fe203 3.5; FeO 1.2; CaO 4.5; MgO 1.5; Na20 3.7 ; K2O 1.6. Dacites are found at Lassen's Peak, Cal.; in the Yellowstone Park; in the Eureka District, Nev., and elsewhere in the western United States. See Diabase; Diorite.

DACOITS, bands of robbers in the East, especially in Burma, India, where for years they were the terror of the country until the an¬ nexation of Burma by the British in 1886.

DA COSTA, Izaak. See Costa, Isaac da.

DA COSTA, Jacob Mendes, American phy¬ sician : b. Saint Thomas, W. I., 7 Feb. 1833 ; d. Villanova, Pa., 11 Sept. 1900. He was descended from an ancient Portuguese family long resi¬ dent in Saint Thomas, W. I. He received his early education at Dresden and other places in Europe. He was graduated at Jefferson Medical College in 1852. He afterward studied in Paris and Vienna and on his return to America be¬ gan to practise in Philadelphia. He specialized in clinical medicine and pathology. In 1863 he became lecturer in Jefferson Medical College, in 1872 professor of the theory and practice of medicine there, and in 1891 professor emeritus. His method of teaching and ability as a lecturer attracted general notice, and he became known as one of the greatest clinical teachers of his time. In 1895 he was chosen president of the College of Physicians and Surgeons in Phila¬ delphia. He wrote c Harvey and His Dis¬ covery* (Philadelphia 1879) ; (Modern Medicine) (ib. 1872) ; (The Physicians of the Last Century) (ib. 1857) ; (The Scholar in Medicine*

(Boston 1891) ; (Medical Diagnosis* (9th ed., Philadelphia and London 1900), his greatest work, which has been translated into several languages, *etc.*

DACROCYSTITIS, dak-ro-cys-ti'tfs, an inflammation in the tear-sac. It

may result only in the sub-acute swelling of the tear-sac, or it may become purulent, very much inflamed, swollen and painful and finally discharge pus. Prompt evacuation by surgical means is the safest and best treatment.

DACRYDIUM, a genus of tall trees, mostly Australian, of the natural order Taxacece, nearly related to the genera Podocarpus and Taxodium, important timber and ornamental trees. Several species are of wide utility in ship-and house-building and furniture-making, especially for carved furniture; others yield edible fruits (drupes) and seeds. A kind of beer is made from the young twigs of some species. The most valued species are probably D. kirkii, D. cupressinum and D. franklinii, the so-called huon-pine, which is really a yew. They often attain heights of 100 feet and diameters of four feet or more.

DACRYOMA, a disease of the lachrymal duct of the eye, by which the tears are pre¬ vented from passing into the nose, and conse¬ quently run over the eyelid.

DACTYL, in Greek and Roman versifica¬ tion, a foot consisting of one long followed by two short syllables. In the following line, for example,

Tityre | tu patu | lae recu | bans sub | tegmine | fagi,

the first, second, third and fifth feet are dactyls. In modern hexameter verse a dactyl is repre¬ sented by one accented and two unaccented syl¬ lables. The word is derived from the Greek daktylos, a finger, because a finger has one long and two short joints. See Versification.

DACTYLIOMANCY (Greek daktylios, a ring, and manteia, divination), the pretended art of divining by means of finger rings.

DACTYLIS, or ORCHARD-GRASS, a

monotypic genus of the grass family (Grami - nece) native of Europe and Asia. It is natural¬ ized in America, and cultivated as a fodder plant. The flowers are in rounded compressed spikelets at the end of a one-sided panicle. The fruit is loosely enveloped in the glume. The common orchard grass (D . glomerata) is often met with in fields and waste places. It is a coarse grass, relished by cattle in its wild state, and especially acceptable in its culti¬ vated state. It grows from New Brunswick south to South Carolina, westward to Kansas and north to Manitoba. It is sometimes called cocksfoot-grass. Its tendency to grow in clumps can be overcome by rolling. It yields two good crops a year. See Grasses.

DACTYLITIS, etymologically, an inflam¬ mation of the finger, but generally restricted to an osteomyelitis of the phalanges or metatarsal or metacarpal bones. This may be either tuber¬ culous or syphilitic. In tuberculous form the bone slowly enlarges, the skin becomes red¬ dish, softening takes place, and pus is dis¬ charged through a short cavity which leads to dead bone. In its treatment care should be paid to the general condition of the patient. Gen¬ eral upbuilding, by cod-liver oil and other

tonics, is necessary. Surgical procedures may be imperative. In the syphilitic form, which usually affects infants, there is as a rule a gummatous deposit in the bones. It resembles the tuberculous forms, but responds to treat¬ ment by means of potassium iodide.

DAD A YAG, da-da-yag', the name of a Philippine tribe of Malayan race, who live in the Cagayan mountains in Luzon. The Dadayags are said to have been cannibals. Their speech differs in some respects from that of any other of the 47 tribes of the Malayans.

DADDY-LONG-LEGS, a name sometimes substituted for the more appropriate term ((cranefly,® to designate the small British dipter¬ ous insect of the family of Tipulidce, some groups of which are harmless, and dance in the twilight air, while others are injurious to grow¬ ing crops. They are true flies, though having long legs. In America the name daddy-long¬ legs is applied only to the harvest-spider, of the family Phalangidce , which is not a fly. The body is very small when compared with the great length of the legs, which contain over 50 joints each. The legs are thought to be organs of sense as well as of locomotion. This harvest-man lives on small insects and is entirely harm¬ less to man.

DADO, da'do, an architectural term for the middle part of a pedestal, that is to say, the solid rectangular part between the plinth and the cornice ; also called the die. In the interior of houses it is applied to a skirting of wood several feet high round the lower part of the walls, or an imitation of this in wall-paper or painting.

DADUCHUS (Lat.-Gr., dadouchos) , lit¬ erally a torch-bearer, an epithet applied to any ancient divinity or other personage when repre¬ sented as bearing a torch or flambeau. The Daduchi were those participants in the celebra¬ tion of the Eleusinia at Athens, who carried the sacred torches.

DiEDALION, de-dal'i-on, the son of Luci¬ fer, changed, according to the Greek legend, by Apollo into a falcon, when in grief over the death of his son Philonis, killed by Diana, he leaped from the summit of Mount Parnassus.

DiEDALUS, de'da-lus or ded'a-lus, mythi¬ cal Greek sculptor, the scene of most of whose labors is placed in Crete. According to the common accounts Daedalus lived three genera¬ tions before the Trojan War, was distinguished for his talents in architecture, sculpture and en¬ graving, and as the inventor of many instru¬ ments ; for instance, the axe, the saw, the plum¬ met, the auger; also of glue and masts and yards for ships. As a sculptor he wrought mostly in wood, and was the first who made the eyes of his statues open. He built the famous labyrinth and a temple of Artemus Britomartis in Crete; and executed for Pasiphae the notorious wooden cow. Being imprisoned with his son Icarus, he invented wings for flying. The wings were fastened on with wax, and Icarus flew so high that the heat of the sun melted the wax, and the wings dropped off, leaving him to fall into the sea, whence the Icarian Sea is said to have received its name. Daedalus himself reached Sicily, on the southern coast of which a place was called, after him, Daedalium. Philologists suppose that Dsedalus

is not really a proper name, but the common appellation of all the first architects, metal¬ lurgists and sculptors in Grecian antiquity, be¬ ing derived from or akin to the Greek daidal-lein, ((to work with skill.® The mythical Dseda¬ lus is sometimes confused with Dsedalus of Sicyon. Consult Kuhnert, (Dsedalus > (Leipzig

1886).

DˆDALUS OF SICYON, Greek sculptor who lived about 400 b.c. He is said to have been the pupil, and some authorities say the son, of Patrocles. The trophy or stack of armor erected at Olympia, in remembrance of the vic¬ tory over the Lacedaemonians, was

attributed to Daedalus. Other works credited to him are (Two Boys using the StrigiP ; (Cowering > or (Crouching Venus > ; and a number of portrait statues of victors in the Olympian games.

D.7EMONELIX, a scientific name provision¬ ally given to an extraordinary formation ap¬ parently fossiliferous, extending over a large area in northeastern Nebraska and eastern Wyoming. The soft sandstone of this region has undergone excessive erosion, leaving fan¬ tastic figures, some of them 40 feet high. The objects to which the term is especially applied are of various shapes, including gigantic pillars, lower cake-like forms, and columns appearing like fingers and cigars. Those particularly ex¬ citing scientific inquiry are spiral and twisted, giving rise to the local name ((Devil's Cork¬ screw.® These in some cases resemble huge hop-poles with definite vines running up spi¬ rally, or screws with exactly cut threads. In other cases the corkscrew is closely imitated,- leaving the spiral without the central pole. They penetrate the fossil bones found in the same beds. So far as the tests have gone, the composing material is found to contain cellular, non-vascular, parenchymatous tissue — a fibre distinguishing it from its stony matrix, and not to be referred to animal but rather to plant origin, and pointing to an alga. It has been suggested that they are merely well-preserved rodent burrows. See Barbour, E. H., (Nature, Structure and Phylogeny of Daemonelix) (Bul¬ letin of the Geological Society of America, Vol. VIII, Rochester 1897) ; Peterson, description of New Rodents and Discussion of the Origin of Dsemonelix) (Carnegie Museum Memoirs, Vol. II, Pittsburgh 1905).

DAENDELS, dan'dels, Hermann Wilhelm,

Dutch general: b. Hattem Gelderland 1762; d. Africa, June 1818. He took part in revolu¬ tionary disturbances in Holland in 1787, and was in consequence compelled to seek refuge in France. In the campaign of 1793 he rendered important service to Dumouriez, and was ele¬ vated to the rank of a general of brigade. In 1806 he took service under the king of Holland, and from 1808 to 1811 he was governor-general of the Dutch East Indian possessions, and pub¬ lished (Staat der Nederlandsche Oost-Indische Bezittingen* (1808-11). On the overthrow of Napoleon, the new king of Holland, William I, entrusted Daendels with the organization of the Dutch colonies on the coast of Africa, and there he died.

DAET, da'at, Philippines. (1) City of Luzon, in the province of Ambos Camarines, situated between the Daet River and one of its branches. It is a radiating point of several roads, a port of entry. It was the capital of the

DAGGERS

Top (Left to right) 1 Dagger for Left hand (Main Gauche; Italian: XVI Century). 2 Eared Dagger (Venetian: End of XV or beginning of XVI Century). 3 Landsknecht Dagger with Sheath (German: Middle of XVI Century). 4 Dagger for Left hand (Main Gauche; Italian: Second half of XVI Century). Collections Ressman, de Dino ,and Metropolitan Museum, New York. Bottom (Left to right). 1 Dagger in Cinquedea Style (Venetian: Early XVI Century). 2 Dagger with Antenna-torm Pommel (Flemish: XV Century). 3 Kidney Dagger (Burgundian: XV Century. Grip restored). 4 Dagger a Rondelle (South German: XV Century). Bashford Dean and Spitzer collections loaned to the Metropolitan Museum of Art, New York

.

■

Spanish province of Camarines Norte. There are gold mines in the vicinity and the ruins of an old Spanish fort. Pop. about 15,000. (2)

A river which enters the sea near the town of the same name.

DAFFODIL (corrupted from the Latin asphodelns) , the English name of those species of Narcissus which have a large bell-shaped corona. The common daffodil (N . pseudo¬ narcissus) is a native of England and of nearly all parts of Europe, growing in woods and hedges, and often cultivated in gardens, where it not unfrequently becomes double. In gardens many varieties of it are among the most es¬ teemed of early flowers. See Narcissus.

DAFOE, John Wesley, Canadian journal¬ ist : b. Bangor, Ontario, 8 March 1866. He re¬ ceived his education at Arnprior high and public schools and after serving as a school-teacher joined the Montreal Star

in March 1883, and was its Parliamentary correspondent at Ottawa. In December 1885 he resigned from the Star and accepted the editorship of the newly-founded Evening Journal of Ottawa. In May 1886 he went west and was on the editorial staff of the Manitoba Free Press up to March 1892, when he was called to Montreal to accept the chief editorship of the Daily Herald, the leading Eng¬ lish Liberal organ in the province of Quebec. He remained with the Herald until August 1895, when he became a member of the staff of the Star and was for six years editor of its weekly edition. Since 1901 he has been editor-in-chief of the Manitoba Free Press. He has published (Fortunes of a Manitoban* (1891) ; (Western Canada) (1907) ; (The Imperial Press Confer¬ ence * (1909).

DAGAMI, da-ga'me, Philippines, town in the province of Leyte, on the Maya River, 16 miles south-southwest of Tacloban. Pop. 25,000.

DAGE, da'ge, Eduard, German historical painter : b. Berlin, 10 April 1805 ; d. there, 6 June 1883. He was a pupil of Neiderlich and Wach at the Berlin Academy, finishing his stud¬ ies in Italy. In 1838 he was elected a member of the Academy; in 1840 he became professor and was vice-director 1861-75. Besides his re¬ ligious paintings, mostly altar-pieces, Dage was remarkable for his genre pictures of small size. His chief works are found in the churches of Rostock and Sigmaringen, and in the chapel of the Chateau at Berlin. His (The Old Sa¬ cristan and the (Discovery of Painting) hang in the National Gallery at Berlin. Among his other works are many altar-pieces for churches : <The Parcse* and (Woman and Child,* in the Raczynski Gallery in Berlin; (Initiation of a Nun* ; (Shelter at the Altar) ; (Charitable Monk) ; Toman Woman and Child. 5

DAGGER-MOTH, a common name given to both A crony eta and Apatela, genera of noc¬ turnal moths, which feed upon the leaves of orchard trees and small fruits. Acronycta has fore wings varied with dagger-like black marks. Apatala has gray fore wings margined with black dots and transverse lines. The caterpillar is of a velvety black color and is beautiful. It forms its cocoon by wrapping itself in leaves bound with a silken thread.

DAGGERS, short-bladed weapons for stabbing. There are still extant flint daggers not less than 5,000 years old. Homer makes mention of the dagger. Primitive nations use

daggers made of wood, bone, animals' sharp horns, *etc.* The cultellus,

or coustel , of the 11th century was used by Saxon and Norman foot soldiers for piercing the links of the hauberk (see Hauberk) in dispatching unhorsed knights ; it got to be as long as a short sword. In the (<camail and jupon" period (see Chain Armor) the misericorde ("Dagger of Mercy"), used by the knights in dealing the ((coup de grace," had a triangular blade and hung by a chain from the knight's right breast. It became a very short sword in the plate armor period (see Plate Armor), with a thin, sharp blade that could penetrate between the junctures of the armor parts. In the reign of Richard II of England (14th century) everybody wore a dag¬ ger, even the ladies carried a baselard attached to the girdle. The long Continental poinard followed. A dagger that was called anelace was worn by civilians in the 14th and 15th centuries ; the brasses of that period display it. The left-handed dagger (main-gauche) was in use in the 16th century ; it was to ward off the opponent's sword thrusts while the right hand was offen¬ sively wielding the sword. The "kidney" dag¬ ger, with its heavy blade and stout wooden handle, had a guard consisting of two round lobes, whence the name "kidney." It was used from the 14th century till the reign of Charles I in England. The dague d rouelle, with its disc-shaped guard, belongs to the 15th century. The "eared" dagger (of Oriental origin) had two ear-shaped flat lobes serving as pommel. To the 15th century also belongs the "ox¬ tongue" dagger, having a short blade and wide groove and flat hilt. It developed, in Italy, into the cinquedia dagger, so called from its "five-finger" breadth of blade at the hilt end.

The more modern Italian stiletto has a slender, short, but thick, tapering blade. But daggers have been used less and less in more recent times and remain now in warfare, but with the maritime forces (midshipmen) carried as a side-arm {dirk). The dirk is still carried in the stocking of the Scotsman as a show feature of former days. See also Japanese and Oriental Arms and Armor.

Bibliography. — Ashdown, C. H., (British and Foreign Arms and Armour) (London 1909) ; Hewitt, J., (Ancient Arms and Armour in Europe* (1855-60) ; Viollet-le-Duc, E. M., (Dictionnaire raisonne de Mobilier frangais* (Vols. V, VI, Paris 1872).

Clement W. Coumbe.

DAGGETT, Mary Stewart, American writer : b. Morristown, Ohio, 30 May 1856. She was graduated at Steubenville Seminary 1873. In 1888 she removed to California. Columbia Hill, Pasadena, San Gabriel Valley, has been her home for 25 years. Southern California en¬ vironment influences much of her writing. Mrs. Daggett has published

the following novels : <Mariposilla* (1895); (The Broad Aisle* (1899) ; (The Higher Court) (1912) ; (The Yel¬ low AngeP (1914) also short stories.

DAGHESTAN, da-ges-tan', Russia, prov¬ ince in the Caucasus, stretching along the west side of the Caspian Sea;, area, 11,471 square miles. It is very largely in the region of the Caucasus Mountains, some of the peaks rising to 14,000 feet, and its climate is in the main rigorous. Its fertile and cultivated valleys pro¬ duce good crops of grain, silk, cotton, flax and

tobacco. It was a province of Persia until 1812. Pop. 689,300 (mainly Lesghians, and Mo¬ hammedan in faith).

DAGNAN-BOUVERET, dan-yan boov-ra, Pascal Adolphe Jean, French painter: b. Paris, 7 Jan. 1852. He was a pupil of Gerome, and recipient in 1874 of the second <(Grand Prize of Rome.® He soon broke with the style of Gerome and showed the influence of Bastien Lepage. His picture of the death of Manon Lescaut, which took the medal of the third class at the Salon of 1878, showed him to be in possession of an original and particularly individual style of painting. (A Wedding Party at the Photographer's,5 exhibited in the Salon of 1879, was much admired for composition and technique. But this style was too close to caricature and was soon abandoned. In the Salon of 1880 he displayed a much more serious form of talent. His picture (An Accident,5 which took the medal of the first class that year, remains one of his masterpieces, being greatly admired for the truth of its types and expressions. These early works ranked him among the most keen portrayers of our modern manners. (The Blessing of a Young Couple before Mairiage) (1882) bore the stamp of ex¬ traordinary poetical feeling which his later paintings — illustrating, for the most part, the life, customs and costumes of Bretagne — have served to accentuate. In his (Hamlet and the Grave Diggers5 the artist is himself represented as the moody Danish prince. Among his best-known works are (The Consecrated Breads in the Luxembourg; (The Virgin5; (The Bre¬ tons at the Pardon5 (1886) ; (The Breton Peas¬ ant

J (1888) ; (The Cemetery of Side Kebir> ; (The Conscripts5 ; (The Lord's Supper5 (1896), a very great work; (The Horses at the Water¬ ing Trough5 ; two portraits of de la Rochetaille and Gustave Courtois ; (Spanish Dancer5

(1909) ; (Marguerite au Sabat5 (1912). Very modern in his taste for individuality, he re¬ sembles the great masters in the touching sim¬ plicity of his feeling, and the idealism which is evolved from and illumines his strong real¬ ism. See Stranahan, (History of French Paint¬ ing5 (1899) ; Van Dyke, (Modern Fernch Painters5 (1896).

DAGO, dag'e, or DAGDEN, Esthonia, an island situated to the southwest of the entrance of the Gulf of Finland and just to the north of the island of Osel. It has productive fisheries. The soil is mostly poor, and the coast rocky. The inhabitants include many Swedes. The country belonged to Denmark, but was acquired by Sweden in 1645 and belonged to Russia from 1721 to 1919. Pop. about 16,000.

DAGOBA, in Buddhist countries and those which at one time held the Buddhist faith, a massive temple building containing relics. The word is said to be derived from da, ddtn, or dhatu, a relic, and geba or garbha, the womb. They are built of brick or stone, are circular in form, and are erected on natural or artificial mounds, while the stone or brick structure itself sometimes rises to an immense height. The contents of a dagoba usually consist of stone or metallic vessels of various shapes and sizes. One* of the articles is usually a silver casket, with a gold casket, often highly wrought with chased work on the surface and set with pre¬ cious stones, and this second casket is either en¬

closed in the first or lying beside it with the rest of the objects. Some of the smaller arti¬ cles, such as pearls, gold, buttons, rings, beads, etc., are sometimes contained in these caskets, which are in some cases scratched on the sur¬ face with a peculiar character. These dagobas are held in the highest veneration by the Bud¬ dhists, and a common mode of testifying their veneration is to walk around them, repeating prayers. Some remarkable dagobas are to be seen at Anuradhpura, in Ceylon.

DAGOBERT I, dag'6-bert or da-go-bar, king of the Franks: b. about 600; d. Epmay 638. In 628 he succeeded his father, Clothaire II, who had acquired the divided members of the Frankish Empire. He waged war with success against the Slavonians, Gascons and Bretons; but

stained the splendor of his vic¬ tories by cruelty, violence and licentiousness. He deserves praise for his improvement of the laws of the Franks. He was buried in Saint Denis, which he had founded.

DAGON, a deity of the Philistines, whose image is generally believed to have been in the form of a triton or merman, with the upper part human and the extremities, from the waist downward, in the shape of the tail of a fish. From this latter supposition the name is de¬ rived from the Hebrew dag, a fish. Dagon and his temple are mentioned in Scripture, more especially in 1 Sam. v, 4. Another derivation takes the origin of the word from a Semitic root dagan, meaning grain, and thus makes the god a patron of agriculture. The same name is used of a god of Babylon. His temples were at Gaza and Ashdod and he was probably wor¬ shipped at other places than Phoenicia, as the testimony of place names and names of several kings indicate. Milton alludes to him in de¬ scribing the infernal senate in (Paradise Lost.5

DAGUERRE, da-gar, Louis Jacques Mande, French inventor: b. Cormeilles, Seint-et-Oise, 18 Nov. 1789; d. Petit-Brie, near Paris, 10 July 1851. He was at first a scene-painter at Paris, and while engaged in painting pano¬ ramic views, he discovered a method of repre¬ senting moonlight, day and night, changes of season and so on, by the proper illumination of a large transparent canvas painted on both sides. (See Diorama). The pictures were first ex¬ hibited in Paris in 1822. On 19 Aug. 1839 his successful completion of photographic printing was announced to the Academy by Arago. As early as 1814 Nicephore Niepce had directed his attention to photography, and in 1827 had deliv¬ ered pictures on metal to the Royal Society. In 1826 he had been joined by Daguerre, and on 14 Dec. 1829 a formal agreement was made between them. Niepce died 5 July 1833, and had apparently before his death given up the hope of succeeding with a plate sensitized by iodine. Daguerre, however, persevered, and at length produced the method which has been since called daguerreotype. In 1839 the dis¬ covery was published and Daguerre received a pension of 6,000 francs and became a member of the Legion of Honor. He published several works describing his inventions. See Daguerre¬ otype Process.

DAGUERREOTYPE PROCESS. This is one of the earliest methods known for fixing the image afforded by the camera,

and thus producing permanent pictures, or ˆphotographs.® As practised by Daguerre (q.v.), the method consisted in exposing a silver plate to the action of iodine vapor until a suf¬ ficient coating of iodide of silver was produced upon it, the image in the camera being then ex¬ posed upon it for a time varying from three minutes to an hour or more, according to the nature of the subject and the intensity of the light. The plate was then submitted to the action of the vapor of mercury, 'which con¬ densed most upon the parts where the light had acted most, and in this way greatly increased the distinctness of the image. The plate, after development by mercury vapor in this way, was immersed in a solution of hyposulphite of soda, which dissolved those parts of the iodide that had not been affected by light, and thus ren¬ dered the picture permanent. Daguerre made the details of his process public in 1839, and for this he was awarded a pension by the French government. Important improvements in the method were soon made. In December 1839, before the first French photograph by the iodine process had been received in the United States, Dr. Paul Beck Goddard of Philadelphia discovered that iodine could be advantageously replaced by bromine, an element discovered by Balard 13 years before. By the use of bromine, the sensitiveness of the plate was increased so greatly that Dr. Goddard obtained some prac¬ tically instantaneous views. Early in 1840 Rob¬ ert Cornelius, of Philadelphia, fitted up a room exclusively for portraiture, and this was the first photographic studio in the world. The expensive silver plates were afterward replaced by plates of copper that had been heavily elec¬ troplated with silver, and a method of toning the pictures by the use of chloride of gold was also devised. Daguerre was associated, in his experimental work, with Nicephore Niepce, who had previously discovered the bitumen process (q.v.) of taking photographs; and many author¬ ities maintain that Daguerre took unfair advan¬ tage of his partner, and published, as his own, processes for which Niepce should have had equal credit. Flowever this may be, it is certain that Niepce died in 1833, some years before Daguerre produced any pictures by the method that now bears his name ; and it .would appear that Daguerre is at least entitled to the sole credit for the discovery of mercury as a de¬ veloping agent. The way in which this discovery came about is of deep interest, and was cited by Professor Liebig as one of the finest ex¬ amples of the inductive method of reasoning. Daguerre had discovered that iodide of silver is affected by

light, and he had repeatedly iodized silver plates and exposed them in his camera, with the result that feeble images were obtained. He was filled with hope that some way might be found to intensify these images, but he worked for years without success, and Niepce died with a feeling of regret that they had wasted so much time upon a method that was apparently incapable of yielding the results that they sought. On one occasion, after the death of Niepce, Daguerre removed one of his old plates from a closet in which it had been stored, and .was about to repolish it and use it over again in a new experiment, when he observed that the view to which it had been previously exposed, and which showed but faintly when he had put . the plate away, was now strong and dear.

Without disturbing anything in the closet, he prepared a new plate, sensitized and exposed it as before, and placed it in the closet for a similar time. The same intensification of the image was observed. He concluded that the developing agent that he had sought so indefatigably was present in his closet, but he had no idea what it could be. To identify it, he prepared and exposed plate after plate, each time leaving the place where the first one had stood, but each time removing one article from the closet. The pictures still developed, even when the last thing had been apparently re¬ moved. He found, however, that some mercury had been spilled in the closet, and being driven to the conclusion that this was the mysterious agent sought, he tried it, and his mercury de¬ velopment process was the result

DAGUN, a god worshipped in Pegu, Burma. According to Hindu mythology, when Kiakiak destroyed the world, Dagun reconstructed it. The similarity of name to Dagon, the national god of the Philistines mentioned in 16 Judges v, 23 is obvious.

dagupAn, da-goo-pan', Philippines, a town in the province of Pangasinan, Luzon, situated on the Lingayen River where it enters the gulf of the same name, about 130 miles northwest of Manila, on the Manila and Dagu¬ pan Railroad. It is an important road centre, and has a large trade. It was one of the strongholds of the Filipino insurgents and the point where most of the filibustering expeditions landed. Soon after hostilities between the United States and the insurgents opened, the American military authorities were unanimous in the opinion that Dagupan should be made a base of operations, but sufficient troops were lacking till November 1899, when an expedition left Manila for this place under command of General Wheaton. A

landing from the trans¬ ports, supported by a number of naval vessels, was made at Lingayen, a suburb of Dagupan, which has a sheltered harbor and had hastily constructed earthworks. The works and town were shelled, but there was no response from shore. As the American troops were being landed in steam launches a long line of insur¬ gents suddenly appeared among the sand dunes and fired on the troops. The Americans re¬ turned the fire, completed their landing and drove the insurgents out of Dagupan, and then started on a march to the east and south in the expectation of surrounding Aguinaldo at Tarlac, where he had established his headquarters. Pop. 20,357.

DAHABIEH, da-ha-be'e, an Egyptian barge-like boat, the forerunner of the European and American houseboat, used on the Nile for conveyance of travelers. It varies considerably in size, has one or two masts, with a very long slanting yard on each mast supporting a tri¬ angular or lateen sail, and affords good accom¬ modation for passengers. Seats on the fore and aft deck are used by rowers when needed. Wealthy travelers often hire one of these ves¬ sels for a trip up and down the river, the voyage to the First Cataract and back, under the most favorable circumstances, occupying seven weeks, and three weeks more if prolonged to the Second Cataract. Their use, however, has been largely superseded by pleasure steamers.

DAHL, Johann Christian Clausen, Nor¬ wegian landscape painter: b. Bergen, Norway, 24 Feb. 1778; d. Dresden, 14 Oct. 1857. His talent displayed itself early and he studied at the Academy of Copenhagen 1811-18. He then went to Dresden, where from 1821 onward he was professor of painting in the Art Academy. Among his works are (Storm at Sea) (1823) ;

(Winter Landscape) and HCronberg by Moonlight) (in Schiefer Castle near Gotha). He was a prolific painter and his works are found in many European galleries. Consult Aubert, <Maleren Professor DahP (1892-94).

DAHLAK, da-lak', a group of three islands, with many smaller rocks, in the Red Sea, off the Bay of Massowah. They are famous since Roman times for their pearl-fisheries. They carry on a trade with the Arabian coast. They are a dependency of Italy. The main island is Dahlak-el-Kebir, 32 miles long and 18 wide. The entire area of the group is about 450 square miles. The population is made up of Nubians and Arabs who number about 1,500.

DAHLGREN, Fredrik August, Swedish poet and dramatist: b. Nordmark, 20 Aug. 1816; d. 1895. He wrote man}' dialect songs and ballads, collections of which were published in three volumes (1876). These have attained an extraordinary degree of popularity. Of his dramas many have been very successful; his (Vermlandingarne,* a musical drama (1846), had more than 100 consecutive representations. He translated a great many dramas from for¬ eign languages, and wrote a history of the Swedish stage.

DAHLGREN, John Adolf, American naval commander: b. Philadelphia, Pa., 13 Nov. 1809; d. Washington, D. C., 12 July 1870. In 1826 he entered the navy of the United States as a mid¬ shipman, in 1837 was advanced to the rank of lieutenant, and in 1855 to that of commander. From the year 1847 he was employed on ord¬ nance duty, and invented the cannons which are called after him Dahlgren guns, besides contriv¬ ing a more effective method of arming gunboats with 12-to 24-pounder howitzers, throwing canister-shot and shrapnel-shells. At the out¬ break of the Civil War he was commander of the naval station at Washington; in July 1862 he undertook the supreme command of the South Atlantic squadron; and after the death of

Admiral Foote in 1863 was appointed rear-admiral of the fleet stationed before Charles¬ ton. He led a successful expedition up the Saint John's River in 1864, assisted Sherman in the capture of Savannah and in 1866 was given command of the South Pacific squadron. He served as chief of the ordnance bureau 1868-70 and just before his death was placed in charge of the navy yard at Washington. He is the author of (Thirty-Two Pound Practice for Ranges) (1850) ; (Systems of Boat Armament in the United States Navy) (1852) ; (Naval Percussion Locks and Primers > (1852) ; Ord¬ nance Memoranda) (1853) ; and (Shells and Shell-guns) (1856) ; (Notes on Maritime and International Law) (1877). Consult Mrs. Dahlgren, (Memoir of John A. Dahlgren*

(1882).

DAHLGREN, Karl Fredrik, Swedish poet and humorist : b. Stens-Bruk, East Gothland, 20 June 1791 ; d. Stockholm, 2 May 1844. He

excelled in descriptions of nature and in the idyllic burlesque. Many of his songs and bal¬ lads have a permanent place in the treasury of Swedish popular songs. For years he published a (Muses' Almanac, * containing his stories and comic sketches. His novel (Nahum Fredrik Bergstrom's Kronika) (1831) is a work of dis¬ tinguished merit.

DAHLGREN, Madeleine Vinton, Ameri¬ can author; wife of Rear-Admiral Dahlgren: b. Gallipolis, Ohio, about 1835 ; d. Washington, D. C., 28 May 1898. Her works include Udealities) (1859) ; (South Sea Sketches) (1881) ;

(Etiquette of Social Life in Washington * (1881); *Memoirs of John A. Dahlgren) (1882); (The Lost Name) ; and (Lights and Shadows of a Life) (1886). For her Spanish translation of Donoso Cortes' (Catholicism, Liberalism, and Socialism,* she received the thanks of Pius IX.

DAHLGREN, Ulric, American military and naval officer: b. Bucks County, Pa., 1842; d. 4 March 1864. He was a son of Rear-Admiral J. A. Dahlgren (q.v.). At the outbreak of the Civil War he became aide, first to his father and later to General Sigel, and was Sigel's chief of artillery at the second battle of Bull Run. He distinguished himself in an attack on Fredericksburg and at the battle of Chancellors-ville, and on the retreat of the Confederates from Gettysburg he led the charge into Hagers¬ town. He lost his life in a raid undertaken for the

purpose of releasing national prisoners at Libby prison and Belle Isle.

DAHLGREN GUN (named from Rear-Admiral John A. Dahlgren), a gun in which the front portion is materially lightened and the metal transferred to the rear, giving the <(bot-tle-shape,** which caused some surprise on its first appearance in Europe. They were in use in the Civil War, but are now obsolete.

DAHLIA, a genus of perennial herbs of the family Asteracece, closely related to the genera Bidens, Coreopsis and Cosmos (q.v.), which are distinguished by technical characters. In¬ deed, Cosmos diversifoliiiSj or black cosmos, is well known to American gardeners as Bidens and Dahlia. The true dahlias are much con¬ fused as to nomenclature, only about 10 well-authenticated species being recognized out of a large number of synonyms. With few ex¬ ceptions (Central American species) they are natives of Mexico. Six species are cultivated, but only two of these (D . rosea and D. juarezii) are of wide horticultural importance. The former has given rise to several thousand hor¬ ticultural varieties since 1814, when well-marked double varieties first appeared ; the latter, which was introduced about 1879, has produced a con¬ siderable number popularly known as cactus dahlias. There are also many single varieties. Considering the short time the dahlias have been in cultivation (since 1879) they have attained a very high rank as a garden plant, being num¬ bered among a dozen plants to have special societies and exhibitions, both in Europe and America. Besides the cactus forms, which are less formal than the earlier double varieties, there are many forms and sizes ranging in color from white to yellow and deep red, but deficient in the shades of blue. The plants may be propagated by seeds for obtaining new va¬ rieties, by division of the underground parts, or

commercially by cuttings. They succeed well in almost any good soil, the tubers or the young plants, being set in beds as soon as danger from frost is past. When frost has killed the tops in the autumn the plants are dug and the tubers stored in a cool, dry cellar until spring, or until they are needed for obtaining cuttings, when they are placed

on greenhouse benches and forced. Few pests attack the plants. Consult Peacock, lThe Dahlia, } and other literature mentioned in article “Dahlia® by Bailey in ˆCyclopedia of American Horticulture } ; dah¬ lia, a Talk About,) Cornell University Experi¬ ment Station Bulletin 128.

DAHLIN, da’lm, a white substance, also called inulin, obtained from the pounded tubers of the dahlia. The juice is pressed from the tubers, clarified by standing, mixed with an equal bulk of strong alcohol, filtered, and then with two other volumes of alcohol. Inulin pre¬ cipitates, and is washed and dried. It is a white starchy powder, with distinct crystalline char¬ acter; it has no taste or smell, is hygroscopic, but sparingly soluble in water, until it passes into a non-crystalline modification. The tubers pounded and distilled with water yield a strongly smelling, sweetish ethereal oil, which is heavier than water, but becomes buttery and semi¬ crystalline in it. The tubers also contain a fixed oil and salts of organic acids. The coloring matter of the purple dahlia is very sensitive to acids, which turn it red, and to alkalis, which turn it green. When extracted by water or al¬ cohol, and paper steeped in it, it forms Georgina paper, and is used as a chemical test instead of red and blue litmus paper.

DAHLMANN, dal’man, Friedrich Chris¬ toph, German historian: b. Wismar, 13 May 1785; d. Bonn, Prussia, 5 Dec. 1860. He studied at Copenhagen and Halle; in 1812 was appointed professor extraordinary of history at Kiel, and in 1829 accepted a call to fill the chair of politi¬ cal science in the University of Gottingen. There he continued his historical studies, but did not on that account altogether abandon the domain of politics. He contributed in great measure to the establishment of the constitution of PTanover in 1833, and was a vigorous advocate of liberal principles. In 1842 he was appointed to the chair of history in the University of Bonn, where he gave himself up entirely to literary pursuits. The revolution of 1848 recalled him to public life. He was sent as a deputy to the Diet of the confederation, had a share in elabo¬ rating the constitution called that of the “Seven¬ teen,® and became one of the chiefs of the con¬ stitutional or parliamentary party. He was afterward a member of the Prussian Chamber of Deputies, in which he set himself to withstand the reactionary movement which followed the troubled period of 1848-49; but finally re¬ nounced politics entirely, and devoted the re¬ mainder of his life to literature. He left a large number of works, all characterized by great depth, an accurate understanding of the events he relates and a thorough knowledge of men. Among these are his (Quellenkunde der deutchen Geschichte) (1830) ; (Geschichte Danemarks) . (1840-43) ; (Geschichte der englischen Revolution }

(1844) ; and (Geschichte der fran-zosischen Revolution) (1845). Consult Nasse, (F. C. Dahlmann) (Kiel 1885) ; Springer, (F. C. Dahlmann> (Leipzig 1870-72).

DAHLONEGA, da-lon'e-ga, Ga., county-seat of Lumpkin County, about 20 miles north by west of Gainesville, on one of the branches of the Chattahoochee River, among the foot¬ hills south o,f the Blue Ridge Mountains. It is the seat of the North Georgia Agricultural Col¬ lege, a department of the State University. The town is the centre of the richest gold min¬ ing region east of the Mississippi River. The town was first settled in 1831 by gold miners. It was incorporated in the following year and is governed by a mayor and a city council. The principal industries are those connected with the mining and refining of gold. Until the Civil War a United States branch mint was situated here. The Cherokee Indians called the place Dah-lo-ne-ga, meaning "yellow money.® Pop. 829.

DAHLSTJERNA, dal-sher'na, Gunno, Swedish poet : b. Ohr, Dalsland, 7 Sept. 1661 ; d. Pomerania, 7 Sept. 1709. His father was a clergyman named Eurelius. The son's ver¬ satility as surveyor, cartographer and poet, earned him a title of nobility as Dahlstjerna in 1702. He received his degree at Upsala in 1677 and in 1687 refused the offer of a pro¬ fessorship at Leipzig. From 1681 he was in the land surveying department of Sweden of which he was appointed director in 1699. During his long journeys in Sweden, Livonia and Pomer¬ ania, he composed the patriotic poems on which his fame rests. Chief of these are: (Kunga Skald) an elegy on the death of his master Charles XI (1697) ; and the spirited (Goth's Battle Song) (1701).

DAHN, dan, Felix, German historian and novelist: b. Hamburg, 9 Feb. 1834; d. 1912. At the universities of Munich and Berlin, where he was educated, he made especial studies in history and jurisprudence. In 1857 he was ap¬ pointed privatdozent at the former institution, becoming professor of law there five years later. In 1863 he removed to Wurzburg in a similar capacity, to Konigsberg in 1872, and lastly to the University of Breslau in 1888. His historical works include (Die Konige der Germanen) (9 vols., 1861-1902) ; (Urgeschichte der germanischen und romanischen Volker) (4 vols., 1881-90). He also wrote (Das Kriegs-recht> (1870) ; (Handelsrechtliche Vortrage* (1875) ; (Deutsches PrivatrechD (1878) ; (Die Vernunft im Recht) (1879) ; (Die Landnot der Germanen* (1889), all in law and jurisprudence. In poetry, he published (Markgraf Riideger von Bechelaren> (1875) and (Die Staatskunst der Frauen) (1877) ; in

fiction, (Ein Kampf um Rom> (1876); <Odhins Trost> (1880); (Felici-tas) (1883) ; (Fredigundis) (1885) ; <Attila) (1888); (Stilicho> (1900); (Sigwalt und Sig-ridh) (1898) ; (Herzog Ernst von Schwaben) (1902) and (Die Germanen* (1905). A collec¬ tion of his literary works appeared (21 vols., 1898; continued 1903-).

DAHOMEY, da-ho'mi or -ma (native name of the people, Dauma or Dahome), West Africa, formerly a negro kingdom, now one of the colonies of French West Africa, bounded on the east by the British possessions of Nigeria and Lagos, on the south by the Gulf of Guinea, on the west bv Togoland district, and on the north bv the French military possessions; area ?bo"t ˆ2.000 square miles, having been increased in 1900 by territory in the north, adjacent to

the Niger. The coast line is only about 70 miles in length, but opens out northward into a wide hinterland. About midway on the coast lagoon is the port of Whydah, whence a road extends inland to Abomey, a distance of 65 miles. Dense forests and dismal swamps cover nearly two-thirds of this distance, but from the Great Swamp of Agrime vast undulating plains rise for many miles in the direction of the Kong Mountains. The Avon and Denham lagoons receive the rivers, which are not very important. The soil is extremely fertile. Among native trees are the baobab and the coconut palm. Groves of oil-palms encircle each town, and palm-oil is made in large quantities. Maize, beans and peas, as well as cassava, yams, sweet potatoes, limes, oranges, pineapples and other tropical fruits grow in luxuriance ; cotton, sugar and spices of all kinds are also grown, and sheep, goats, swine and poultry are raised, though not in large numbers.

In 1911 the imports, which consisted chiefly of liquors, tobacco, machinery and cotton goods, were valued at $3,904,906; and the exports, which were chiefly maize, copra, kola nuts, rubber, palm-oil and palm kernels, $4,391,660. Some cotton cloth is made in the country, and weapons and tools are forged from native iron. There are few roads in the country, but in recent years they have been greatly improved. A new metalled road (310 miles in length) for motor traffic

runs from Save to the Niger. In 1902 a railway was constructed from the port of Kotonu into the interior to Save (156 miles). The line is intended to run to Chaoru (400 miles). The gauge is a metre. A metre gauge railway has also been constructed from Porto Novo to Pobe (50 miles) along the Lagos frontier. A telegraph line connects that port with Abomey, the Niger and the Senegal. There were 1,389 miles of telegraph and 70 of tele¬ phone line in 1916. The currency consists of cowrie shells and French, English and Amer¬ ican coins. The colony is administered by a lieutenant-governor with an administrative council. The seat of government is Porto Novo, the chief business centre, which has about 30,000 inhabitants. At Kotonu is a wireless-telegraph station, and there is regular steamship communication with Europe. Dahomey was an absolute monarchy previous to the French oc¬ cupation. There was a standing army estimated at over 15,000, consisting partly of female warriors or Amazons, who were distinguished by superior physique and high skill in the use of weapons. The natives are full-blooded Guinea Negroes, or Nigritians of the coast. The Dahomans are tall, very long-headed, but not so black as the tribes of Senegal. In their own tongue, a dialect of the Ewe language, common in this part of the Slave 'Coast, they are called Fon or Fawin. Their religion is purely fetish, and the sacrifice of human beings, a widespread custom in former times, is still supposed to be practised. In spite of a low standard of morality and warlike attributes and usages, the Dahomans are polite in their intercourse. The activity of missionaries has thus far been attended with little success, ex¬ cept in the case of the dervishes, who are inde¬ fatigable in their efforts to spread the gospel of Islam. The population was estimated in 1911 at 902,000. Whites numbered less than 500. 'The kingdom of Dahomey arose in the 1 7th

century around the city of Abomey as a nucleus. By successive conquests the kings extended their rule to the highlands of the Mahe on the north and to the Slave Coast on the south. There they came into contact with Europeans and succeeded in obtaining control of a large part of the slave trade, which was then actively carried on by the English, the French and Portuguese. With the cessation of the slave trade the prosperity of the country came to an end. France secured a firm footing on the coast in the second half of the 19th century. Between 1878 and 1885 it obtained possession of Kotonu, Porto Novo and Grand Popo, and after a bloody contest in 1890 forced King Behanzin to acknowledge its title to the coast region. War broke out ajgain in 1892 and re¬ sulted in the taking of Abomey, the deposition of Behanzin, since retained a prisoner at Fort-de-France, Martinique,

and the establishment of a virtual French protectorate. Since then the French have been actively engaged in extending their authority over the region to the north, so as to bring Dahomey into touch with their pos¬ sessions in the Sudan. In 1897-98 they con¬ cluded treaties with the Germans and the Eng¬ lish and the sphere of influence claimed by each was determined. The boundary question settled, the French government busied itself with Gallicizing the native population. Village, regional and urban schools were established under the new West African educational system in 1902, and in every way the government undertook to win over the natives. Consult Careb, (Les territoires africains et les conven¬ tions anglaises> (Paris 1901); Frangois, (Notre colonie du Dahomey y (ib. 1906) ; Le Herisse, (L'ancien royaume du Dahomey > (ib. 1911).

DAIBUTSU, dl-boo'tsoo, the name given in Japan to a gigantic statue of Buddha. The largest Daibutsu in the empire is found at Nara. It is 53 feet high and supposed to date from the 8th century. The image is shrined in a pagoda. At Kamakura is a bronze Daibutsu over 49*4 feet in height. The eyes, which are four feet long, are made of gold.

DAILLˆ, da-ya', Jean, French Protestant theologian: b. Chatelherault, 6 Jan. 1594; d. Charenton, near Paris, 15 April 1670. He be¬ came pastor in 1625 of the church at Saumur, and in 1626 of that of Charenton at Paris, where he passed the remainder of his life. He was one of the ablest and most learned divines of his day, and did essential service to the Protestant cause by several works, among which the most celebrated is entitled (Traite de l'emploi des SS. Peres pour le jugement des differends de la religion } (1632). It was also published in

Latin and translated into English, and in both forms has had a very extensive circulation both in England and on the Continent. It aims to show that the authority of the fathers has been far too much overvalued, and that the ignorance or inaccuracy apparent in almost all their works unfit them for the establishment of any doctrine not clearly laid down in Scripture. He also wrote distinct treatises on several of the lead¬ ing points of controversy between Protestants and Roman Catholics. .

DAIMIEL, di-me-el', Spain, town in the province of Ciudad Real, about 20 miles east-northeast of the city of that name on the Azuer River. It is well built ; the principal

edifices are two parish churches, the one Gothic, the other Doric, and both surmounted by towers. The manufactures consist chiefly of linen and woolen fabrics and lace, soap, liquors and bricks. Pop. 15,940.

DAIMIOS, di'me-oz, a class of feudal lords formerly existing in Japan, but now deprived of their privileges and jurisdiction. As long as their feudal possessions remained to them, they exercised in their own domains the rights of petty rulers, and 18 of them were to all intents and purposes independent ; a circumstance which greatly limited the power of the Mikado, and formed a hindrance to the career of prog¬ ress and reform on which Japan had entered. In order to centralize the power of the govern¬ ment, a decree was issued on 12 Aug. 1871 by which the daimios were deprived of all rights of sovereignty, their districts incorporated with the Imperial territories, and their troops handed over to the Imperial government. At the same time a new constitution and organization were given to the state. A deliberative assembly, consisting of two chambers, was created, to which deputies were sent by the former feudal governments or districts of the daimios (Han) ; and the daimios themselves were made official governors of those districts which they pre¬ viously held as feudal rulers, and were placed upon a salary hereditary in their families. Their salaries now equal one-tenth of their former income. See Samurai.

DAIMLER ENGINE. See Internal Com¬ bustion Engine.

DAIQUIRI, da-e-ke-ree', Cuba, town I5j4 miles southeast of Santiago, on the southern coast, noted for the successful landing of the American army of invasion (excepting Kent's division), 22 June 1898. See United States — The War With Spain.

DAIRCELL, Saint, said to have lived in Kerry, Ireland, in the 7th century. The legend is that he was the illegitimate son of a husband¬ man, and that the mother sought to kill the child at birth. A fluttering white dove, which seemed to descend from heaven, stayed her hand, and saved the life of the babe.

DAIRY CATTLE. See Cattle.

DAIRY CHEMISTRY. See Agricul¬ tural Chemistry.

DAIRY FARMING. See Farm Manage¬ ment.

DAIRY INDUSTRY, American. Com¬ pared with other farming and agricultural in¬ dustries in the United States, dairying is of considerable import and shows great develop¬ ment during the last two or three decades; in fact each decade far outstrips the preceding in every line of the industry. According to gov¬ ernment statistics, the leading dairy States are New York, Wisconsin, Pennsylvania, Illinois, Iowa, Ohio, Minnesota, Michigan, California, Indiana, Massachusetts and Missouri. Butter is made extensively in all these States, but Wis¬ consin, New York, Michigan, Ohio and Penn¬ sylvania are the heaviest producers of cheese, the varieties including many imitations of for¬ eign cheese. Dairy farms are developing rapidly in sections where wheat and other ˆgeneral** crops have become unprofitable. Recently the industry has made great progress in the Pacific

Coast States and in the Southern States. It has been proved that cows can be kept and good butter and cheese can be made in al¬ most any district where suitable coarse fodder can be produced. It is often possible to grow more abundant and better fodder crops than are furnished by the natural grasses. Well or cistern water may take the place of the flowing spring. Favorable freight rates and fast refrigerator-car transportation lines have the effect of placing the distant dairyman near the markets where grains can be purchased and his products can be disposed of to the best advantage. Dairying seems to be the one branch of agriculture least affected by condi¬ tions of soil and climate.

Dairying has advantages over many other kinds of farming. It improves the land instead of wearing it out, because the products of the dairy which leave the farm permanently are not rich in plant food, as is the case with field crops, and it provides fertilizer in the form of manure, which is of immense value for enrich¬ ing poor soil. It furnishes a profitable way of using certain farm products, such as grass and straw, that otherwise would be valueless. It provides cheap by-products in the form of skimmed milk, buttermilk and whey, which can be made into human food or very profitably fed to calves and other animals. It can be com¬ bined with other forms of agriculture. Per¬ haps best of all, it engages the farmer in pay¬ ing work for the entire year. For these reasons the general appearance of any section where dairying is extensively followed shows thrift and progress. The

growth of the dairy industry is sometimes checked temporarily by unfavor¬ able economic conditions, such as high cost of feeds and high prices of beef.

The United States census for 1910 and esti¬ mates for 1917, made by the Dairy Division, United States Department of Agriculture, give the following dairy statistics:

Cows on farms and ranges (1910) . . 21 ,801 ,000

Cows in towns and cities (1910, est.) . 1 ,000,000

Total cows in the United States (1910) ... 22,801,000

Census report for igio:

Total milk produced in the United States,

gallons (1910) . 7,466,406,384

Butter made on farms, pounds (1910) 994,650,610

Butter made in factories, pounds (1910). . 627,145,865

Total butter made, pounds . 1,621,796,475

Cheese made on farms, pounds (1910)... . 9,405,864

Cheese made in factories, pounds (1910).. 311,175,730

Total cheese made, pounds . 320,581 ,594

Total dairy products factories, 1910 . 8,479

Total dairy products factories, 1914 . 7,982

Average yield of milk per cow in United

States, gallons (1910) . 362

Dairy Division estimates for 1917:

Number of cows required to supply the

various dairy products: Cows

Milk for consumption as milk . 9,813, 008

Butter (at 177 pounds, per cow, per year) 9 , 334 , 880

Cheese (at 371 pounds, per cow, per year) 1,138, 400

Icecream . 842,416

Condensed milk . 660,272

Milk for dairy calves . 979,024

Total dairy cows on farms, est . 22,768, 000

The number of cows in towns and cities is estimated at about 1,500,000.

The aggregate annual value of dairy products is estimated to exceed $500,000,000 for the year 1900, while in 1910 the value, exclusive of home consumption, was $656,301,246. Exports of dairy products, with the exception of cheese and condensed milk, have always been small. Exports of cheese gradually increased from about 5,000,000 pounds in 1850 to 150,000,000 in 1880, when they amounted to one-half of the production. From that date they gradually de¬ clined until 1915, when they again reached the low ebb of 1850. War orders for cheese com¬ menced in 1915 and by 19i7 exports reached 66,000,000 pounds. Exports of condensed milk have not been a very important item in our for¬ eign trade in dairy products. In 1910 they amounted to about 13,333,333 pounds. The war caused a very great increase, however, and in 1916, exports totaled about 160,000,000, and in 1917 about 260,000,000 pounds. The demands

of foreign markets differ somewhat from do¬ mestic requirements, but the fact that butter and cheese which will satisfy foreign tastes can be supplied from this country has been proved many times by the experience of exporters as well as by trial shipments made by the De¬ partment of Agriculture. There are great pos¬ sibilities for American dairy products in other countries, and these will be developed as soon as our production is permanently in excess of our needs. The annual exports of butter have exceeded 25,000,000 pounds but twice since 1900, and those of cheese had not reached 50,- 000,000 since 1900, except for the years 1915 and 1917, due to conditions arising from the European War.

The quantities and values of imports, ex¬ ports, and re-exports of dairy products for the years 1910, 1912, 1914, 1916 and 1917 are as follows :

UNITED STATES IMPORTS AND EXPORTS OF DAIRY PRODUCTS

Butter

Fiscal Year

General imports

Domestic exports

Re-exports

Pounds

Value

Pounds

Value

Pounds

Value

1910 .

1,360,245

$298,023

3,140,545

$785,771

10, 194

$2,551

1912 .

1,025, 668

237,154

6,092,235

1,468,432

40,151

6,953

1914 .

7,842,022

1,753,461

3,693,597

877,453

51,935

11,835

1916 .

712,998

212,370

13,487,481

3,590,105

21,265

6,391

1917 .

523,573

192,767

26,835,092

8,749,170

2,610

716

Cheese

Fiscal Year

General imports

Domestic exports

Re-exports

Pounds

Value

Pounds

Value

Pounds

Value

1910 .

40,817,524

$7,053,570

2,846, 709

$441,017

138,754

$26,088

1912 .

46,542,007

8,807,249

6,337,559

898,035

104,980

18,600

1914 .

63,784,313

11,010,693

2,427,577

414,124

152,244

27,369

1916 .

30,087,999

7,058,420

44,394,251

7,430,089

267,201

60,139

1917 .

14,481,514

4,465,633

66,087,213

15,244,364

169,946

55,718

Condensed Milk

Fiscal Year

General imports

Domestic exports

Re-exports

Pounds

Value

Pounds

Value

Pounds

Value

1910 .

598, 134

$45,253

13,311,318

$1,023,633

None

None

1912 .

698, 176

49,955

20,642,738

1,651,879

U

U

1914 .

14,599,339

1,005,500

16,209,082

1,341,140

u

1916 .

18,174,505

1,399,840

159,577,620

12,712,952

U

1917 .

18,375,698

1,462, 468

259,102,213

25,129,983

it

a

See Milk and Cream Tables for 1916 and 1917 re-export figures.

Casein

Fiscal Year

General imports

Domestic exports

Re-exports

Pounds

Value

Pounds

Value

Pounds

Value

1910 .

1912 .

1914 .

1916 .

1917 .

3, 769,476 9, 138,338 10,798,614 10,376,641 12,319,111

$304,001 830,845 705 , 264 984 , 899 1,843, 492

No record

found

(

t

*

(

No r

ecord found

UNITED STATES IMPORTS AND EXPORTS OF DAIRY PRODUCTS — Concluded

Milk and Cream

Fiscal

Year

Domestic Exports

Re¬

exports

TOTAL VALUE

Milk, fresh

Cream

Foreign milk, cream and con¬ densed milk.

Value

General

imports

Domestic

exports

Re¬

exports

Gallons

Value

Gallons

Value

Gallons

Value

1910…

1912…

1914…

1916…

1917…

140,492 46,823 607 , 848 891,931

$18,243

6,282

80,939

115,614

283,978

731,375

1,120,240

1,773,113

1,193,911

743,819

$577,335

923,786

1,549,604

1,042,775

666,267

Not reported

u

U

U

u

Not

reported

$244,913

333,217

835,106

283,467

$709,061 833 , 344

$8,296,425

10,855,271

16,105,461

10,813,918

8,914,605

$2,250,421

4,263,259

2,965,934

24,568,252

49,406,984

Not

found

a

u

$775,591

889,778

The best and most profitable breed of dairy cattle has as yet never been agreed upon. Each of the dairy breeds has strong claims to high¬ est merit and each has its enthusiastic advocates. The latter are often influenced by conditions which have no economic importance. The breeds differ markedly in such characteristics as size, color and disposition, as well as in quan¬ tity and quality of milk. As a general rule, when a large amount of milk is given, it is low in fat-content or ˆrichness.® The data shown in the following table regarding several leading dairy breeds of cattle have been compiled from Advanced Registry records.* The figures of production and composition of milk are aver¬ ages based on the number of cows given.

There is a wide variation in the milk pro¬ duction among cows of the same breed. Yields of milk above 30,000 pounds a year have been produced and the world's record of butterfat production at present is 1,205.09 pounds. These records of milk and butterfat production were all made by pure-bred cows.

The great majority of dairy cows throughout the country are ˆgrades,® that is, some of their ancestors are pure bred and some are not. As producers of milk, individual grade cows can be selected that will equal pure breds, but the latter are more satisfactory for breeding purposes. A grade Holstein cow in Michigan, in 1917, gave 9,139 pounds of milk containing 298 pounds of butterfat, equivalent to 351 pounds of butter. The total feed cost of the

*Farmers' Bulletin 893

Breed

Num¬ ber of cows

Pounds of milk for a year

Butterfat

Per

cent

Pounds a year

Ayrshire 1 .

2,598

9,555

3.95

377.51

Brown Swiss 2 .

199

10,868.7

3.995

433 . 45

Guernsey 3 .

6,200

8,934.44

4.99

446.01

Holstein-Friesian 4 .

3,220

14,622.7

3.424

500.7

Jersey 5 .

5,244

7,792

5.35

417.0

Records completed to 1 July, 1917. 2 Records com¬

pleted to June, 1917. s Records completed to 15 Aug. 1917. 4 Records completed to 19 Feb. 1917. 5 Records com¬

pleted to 16 Feb. 1917.

year was $73.39 and the total value of her products was as follows :

351 pounds of butter @ 40 cents per lb . $140.40

7,736 “ skim milk @ 40 cents per cwt . 30.94

1 , 105 “ buttermilk @ 25 cents per cwt …. 2.75

Total . . $174.09

The income over cost of feed was $100.70, while the feed cost of one pound of butter was

$0,209.

The average dairy cow in the United States produces about 4,000 pounds of milk, containing about 160 pounds of butterfat, equivalent to 188 pounds of butter.

188 pounds of butter @ 40 cents per lb . $75.20

3,360 “ skim milk @ 40 cents per cwt . 13.44

480 “ buttermilk @ 25 cents per cwt … 1.20

Total . $89.84

The cost of feed for such a cow would be about $60 and the income over cost of feed about $29.84, as compared with $100.70 for the grade cow previously mentioned.

Milk of the cow is secreted in the mammary glands known as the udder. Wing thus well describes the udder of a good cow : ((It should be large and well developed; it should occupy the whole space between the hind legs, extend¬ ing well up between the thighs and well for¬ ward upon the belly. It should be held firmly against the wall of the abdomen. It should be level or nearly so on the bottom, and the four quarters should be as nearly as possible equally developed and each furnished with a cylindrical perpendicular teat of moderate length. The whole organ should diminish rapidly in size, as the milk is withdrawn. The hair upon the udder should be fairly abundant, fine and soft, and abundantly supplied with brownish dand¬ ruff. * As milk is a product of the blood, the importance of an ample blood supply to the udder, a vigorous constitution, and a strong circulation is readily seen. It is highly import¬ ant to withdraw the milk from the udder regu¬ larly, quietly and completely, if the flow is to be maintained.

Van Slvke gives the average of 5,552 Ameri¬ can analyses of cow's milk, expressed in per¬ centages, as follows :

Total

Water solids Fat Casein Albumin Sugar Ash

87.10 12.90 3.90 2.50 0.70 5.10 0.70

Breed

Number of analy¬ ses

Water

Total

solids

Solids not fat

Fat

Casein

Milk

sugar

Ash

Nitrogen

Daily

milk

yield

Per cent

Per cent

Per cent

Per cent

Per cent

Per cent

Per cent

Per cent

Pounds

Ayrshire .

252

86.95

13.06

9.35

3.57

3.43

5.33

0.698

0.543

18.40

Devon .

72

86.26

13.77

9.60

4. 15

3.76

5.07

.760

.595

12.65

Guernsey .

112

85.39

14.60

9.47

5.12

3.61

5.11

.753

.570

16

Holstem-Friesian .

132

87.62

12.39

9.07

3.46

3.39

4.84

.735

.540

22.65

Jersey .

238

84.60

15.40

9.80

5.61

3.91

5.15

.743

.618

14.07

In addition to the constitutents named cer¬ tain others are present in minute quantities. The average specific gravity of milk is 1.032. The composition of milk of different cows varies between wide limits. The same may be true of the product of any individual cow from day to day. The New York Agricultural Ex¬ periment Station is authority for the above averages of analyses of milks from cows of different breeds.

Koenig gives variations of milk constituents in about 800 samples, expressed in percentages, as follows :

	Maximum	Minimum
Water .	90.69	80.32
Fat .	6.47	1.67
Casein .	4.23	1.79
Albumin .	1.44	.25
.Sugar .	6.03	2.11
Ash .	1.21	.35

In some instances American analyses have shown even wider variations.

The most variable constituent of milk is fat. By it the ˆrichness® of milk is judged and the commercial value is determined. Milk fat is a complex mixture containing several glycerine compounds. It is present in the . form of minute globules suspended in the remaining or watery portion called the serum. The globules average about one ten-thousandth of an inch in diameter and are plainly visible under a high-power microscope. About 150,- 000,000 of them are contained in a single drop of milk. Some conditions affecting fat-content of milk have been mentioned. A few others are important. From about the middle to the last of the period of lactation, the fat in milk increases slightly. The percentage of fat in¬ creases gradually from the first to the last of any milking; the first milk drawn contains about 1 per cent fat and the last as high as 9 or 10 per cent. It is popularly supposed that the feed given a cow has a decided influence on the quality of her milk. As a matter of fact, the milk of a cow in normal condition is little affected by the feed, except that certain feeds may give it a strong flavor. Feed has a much greater influence upon the quantity of milk than its quality.

Casein and albumin are protein or nitrogen constituents of milk. The former is coagulated by rennet or acid, the latter by heat. Coagu¬ lated casein or (<curd® enters largely into the composition of cheese. Casein is said to be in a state of ˆpseudo-solution® in milk. Milk sugar or lactose is in solution in milk. When separated it resembles

powdered sugar. It is less sweet than cane sugar and is used to a con¬ siderable extent in druggists' preparations and in certain proprietary foods. The mineral mat¬ ter in milk, called ash or salts, is the part re¬ maining when milk is evaporated to dryness

and burned. It includes phosphorus, potassium, calcium, chlorine, magnesium, sodium, sulphur and iron. Certain gases and other constituents are present in milk in minute quantities.

Different Grades of Milk (Magnified 300 Times). a. Skimmed milk.

The first milk given after parturition is called colostrum. It differs in composition from normal milk, and is fit only for food for the newly born calf.

The only precise method of determining the quality of milk is by a complete gravimetric analysis, but for practical purposes the knowl¬ edge of the specific gravity of milk and its fat content is usually sufficient. The specific grav¬ ity can be ascertained quickly by the use of a lactometer, and the fat content can be quite accurately determined by the use of the Babcock test. In making this test, a definite amount of milk is mixed with sulphuric acid in a special bottle having a graduated neck. This is whirled rapidly in a machine and the fat is separated from the rest of the mixture by centrifugal force. By the addition of water heated to about 130° F. the fat is brought up into the neck of the bottle, where its exact percentage can be read. Simple tests have been devised for de¬ termining the acidity of milk, and whether or not it has been heated.

Milk is a very delicate product and is sub¬ ject to taints and changes in great number. It readily absorbs strong odors with which it comes in contact, and objectionable flavors are easily imparted to it when the cows are allowed to eat certain foods within a few hours before milking. The flavors caused by garlic and rag¬ weed are well known ; rape and green rye are said to produce bad flavors in the milk when they are fed in certain conditions. Flavors due to the causes named are most noticeable when the milk is first drawn from the udder, and may be largely reduced by aeration or the exposure of milk to the air.

When held, milk undergoes many kinds of changes. The most common is souring, but it may become slimy or “ropy,® curdle without souring, become “soapy,® turn to a red, blue or other color, develop peculiar and disagreeable odors, form poisonous products, or become altered in other ways. Most of these changes are directly due to bacteria, but some are caused by enzymes or unorganized ferments.

Bacteria find in milk an exceptionally favor¬ able medium for growth. They enter milk in so many ways that it is a practical impossibility to produce milk which is germ-free. But the character and number of the bacteria that get into milk and their development are largely controllable and have much to do with the suc¬ cess or failure of all operations with milk and its products. Many species of bacteria found

in milk are perfectly harmless. Some are essential to certain dairy operations, for example, when it is desired to ripen cream to make butter, lactic acid bacteria are needed ; they produce lactic acid from milk sugar and cause the milk or cream to sour. Other species have their peculiar effects in the ripening processes of the various forms of cheese. Numerous varieties of bacteria are objectionable and some are dan¬ gerous. The latter include pathogenic bacteria and other forms that may be the direct or in¬ direct cause of disease to the consumer. Well authenticated cases are on record of typhoid fever, diphtheria and other disease germs being carried by milk, and there seems to be proof that tuberculosis is sometimes spread in this manner.

Bacteria are introduced into milk from many sources. As secreted, milk is probably sterile, but it becomes contaminated in the teats of the cow, so that milk as it leaves the udder always has a few bacteria. In some cows this number may run into the hundreds of thousands per

cubic centimeter, although more often the count is in the hundreds. After leaving the udder it is subject to external contaminations, the most serious of which from the standpoint of num¬ bers is unsterilized utensils. The next im¬ portant source of contamination is manure. Stable air ordinarily plays little or no part in introducing large numbers of bacteria into milk. It is possible for the average dairyman on the average farm to produce milk practically free from visible dirt, which when fresh has a low bacterial count, by the use of three simple factors ; namely, sterilized utensils, clean cows with clean udders and teats and the small-top pail. To facilitate keeping the cow clean the stable should be kept clean and the cows bedded. It is desirable that the udders and teats be washed before each milking.

High bacterial counts in milk are most fre¬ quently due to growth of the organisms in the milk if it is not promptly cooled at least to 50° F. Bacteria multiply rapidly at temperatures above 50° F. and in general the higher the tempera¬ ture the faster they grow up to 100° F. Milk immediately after production should therefore be cooled quickly and kept cold.

Pasteurization. — Since pathogenic bacteria may be present in milk it is a common prac¬ tice to heat it to temperatures above 140° F. This process is known as pasteuriza¬ tion. From a sanitary standpoint pasteurization is of greatest value when market milk is under consideration. The pasteurization of milk, when the process is

properly performed, de¬ stroys the organisms which cause typhoid fever, diphtheria, septic sore throat and dysen¬ tery, and offers protection against the foot-and-mouth disease. From an economic stand¬ point, pasteurization is of value because it in¬ creases the keeping quality of milk and pre¬ vents financial losses by souring. As practised at present, pasteurization destroys about 99 per cent of the bacteria present in milk, including all disease-producing organisms.

Three processes are commonly used in this country: The first is known as the flash, or continuous process ; the second as the holder or holding process ; and the third as pasteuriza¬ tion in the bottle. The flash process consists in heating the milk rapidly, usually to 160° F. or above and then cooling quickly. The heating in this process requires only from 30 seconds to one minute. In the holder process the milk is heated to from 145° to 150° F. and held for 30 minutes before being cooled. This is the most commonly used process and is superior to the flash process in every way. Pasteurization in the bottle is one of the latest developments in the process to be used on a practical scale. In this process the, milk is bottled, then heated in the bottles to from 145° to 150° F., then held for 30 min¬ utes before being cooled. In any method of pasteurization the milk after heating is cooled as rapidly as possible to 50° F., and lower when possible.

The temperature recommended for pasteur¬ ization is 145° F. for a period of 30 min¬ utes. This temperature and period of hold¬ ing is the most desirable (1) because it is high enough to destroy pathogenic bacteria; (2) be¬ cause it leaves in the milk a maximum num¬ ber of lactic-acid-producing bacteria which cause the milk to sour in a more or less normal

manner, although the souring is delayed; (3) because the milk does not undergo any appre¬ ciable chemical change ; (4) because it has little or no effect on the flavor or on the cream line of milk; and (5) because of the economic ad¬ vantage of not having to heat the milk to higher temperatures, thereby saving in heating and consequently in cooling.

Cream is pasteurized by the same method as milk, and usually the viscosity of the cream is somewhat reduced. This is particularly true in high-temperature pasteurization. The early ob¬ jections to pasteurization have been shown by scientific investigation not to be valid, so that the pasteurization of milk and cream is now ex¬ tensively and in fact very generally practised. It is even compulsory in a large number of cities.

Milk should be produced and handled in such a manner as to keep bacterial contamination as low as possible and prevent subsequent growth. The practical way of accomplishing this is to observe the utmost cleanliness in all stages of production, to cool the milk to at least 50° F. promptly after it is drawn and to hold it continuously at such low temperature. As pathogenic or disease-producing bacteria are the most dangerous of all forms ever found in milk, special care should be taken to exclude them. For this purpose, it is necessary to give close attention to the health of the ani¬ mals and all persons having to do with the herd or the milk. Some serious outbreaks of dis¬ ease have been due to the handling of milk by persons suffering only mildly with a contagious disease such as typhoid fever or who have been exposed to the disease. Dairy cows should be examined at least twice every year by a com¬ petent veterinarian ; some of the best dairies have examinations more often. The milk of a cow suspected of being out of condition or not in good health should not be used. Many bac¬ teria that enter milk are carried by small parti¬ cles of foreign matter such as manure, dust, dirt, hairs, *etc.* Of course, these are most abundant in ill-kept barns, where milkers as well as the cows and their surroundings are al¬ lowed to be unclean. Barns should be kept thoroughly clean. The use of pine shavings for bedding contributes _ much to cleanliness and they are now found in many of the best dairies. Barns should be so constructed and the work should be so planned that there would be no occasion for unnecessary dust in the atmos¬ phere at the time of milking. Milch cows should be

ˆgroomed® frequently and udders should always be cleaned just before milking with a damp cloth. Milking should be done quietly. Freeman has shown that the milk drawn by a man who agitates the udder vio¬ lently may contain 10 times as many bacteria as that drawn by a quiet milker. Milk should not be used until it becomes normal after calv¬ ing. In addition to being in good health and avoiding exposure to contagion, the attendants in a dairy should be personally clean. A spe¬ cial clean suit should be put on and hands should always be thoroughly cleaned before milking. The practice of ((wet® milking is ex¬ tremely filthy. All dairy utensils should be sim¬ ply constructed and easily cleanable. They should not be made of any open or porous ma¬ terial such as wood. Immediately after use they should be cleaned and then sterilized for

five minutes with steam. Milk should be promptly removed from the stable, strained, cooled and cold-stored. It should be handled in a room specially fitted for the purpose — clean and light. A good form of strainer is provided with a double thickness of sterile cheese-cloth filled between with pure white sterile cotton. The cloth and cotton should be changed as often as they commence to show dirt near the lower surface. The usual cool¬ ing device consists of an apparatus made of thin metal and so arranged that cold water is on one side while the milk being cooled passes over the other. With certain forms of coolers, it is found entirely practicable to reduce the temperature of the milk quickly to within 2 to 4 degrees of the temperature of the water. After cooling, milk should be placed in cans or jars, as may be required and held at a low tem¬ perature continuously until used. When milk is to be used for butter and cheese making it is also necessary for it to be held at low tem¬ peratures to prevent undesirable fermentations.

Items that need to be kept in mind and con¬ ditions which should be observed in the man¬ agement of a first-class dairy are summarized in ˆTwenty Dairy Suggestions,® issued by the United States Department of Agriculture, as follows :

THE COWS

1. Have the herd examined at least twice a year by a skilled veterinarian. Promptly remove animals suspected of being in bad health. Never add an animal to the herd until certain it is free from disease, particularly tuberculosis,

2. Never allow a cow to be excited by fast driving, abuse, loud talking, or unnecessary disturbance; do not expose her to cold or storms more than necessary.

3. Clean the entire body of the cow daily; hair in the region of the udder should be kept short by clipping.

4. Do not allow any strong-flavored food, like garlic, cabbage or turnips,. to be eaten except immediately after milking. Changes in feed should be made gradually.

5. Provide fresh pure water in abundance, easy of access and not too cold.

THE STABLES

6. Dairy cattle should be kept in a stable, preferably without cellar or storage loft, and where no other animals are housed.

7. The stable should be light (4 square feet of glass per cow) and dry, with at least 500 cubic feet of air space per animal. It should have air inlets and outlets, so arranged as to give good ventilation without drafts of air on cows.

8. The floor should be tight and constructed preferably of cement; walls and ceilings should be tight, clean, free from cobwebs and whitewashed twice a year. Have as few dust-catching ledges, projections and corners as possible.

9. Allow no dusty, musty, or dirty litter, or strong¬ smelling material in the stable. Haul manure to field daily, or store under cover at least 40 feet from stable. Use land plaster daily in gutter and on floor.

MILK HOUSE

10. Have a light, clean, well-ventilated and screened milk room, located so as to be free from dust and odors.

11. Milk utensils should be made of metal, and all joints smoothly soldered. Never allow utensils to become rusty or rough inside. Use them only for handling, storing or delivering milk.

12. To clean dairy utensils, use only pure water. First rinse the utensils in warm water. Then wash inside and out in hot water in which a cleansing material has been dissolved, and rinse again. Sterilize with boiling water or steam. Then keep inverted in pure air and sun, if possible, until wanted for use.

MILKING AND HANDLING MILK

13. Use no dry, dusty food just previous to milking.

14. The milker should wash his hands immediately before milking, and milk with dry hands. He should wear a clean outer garment; kept in a clean place when not in use. Tobacco should not be used while milking.

15. Wipe the udder and surrounding parts with a clean damp cloth immediately before milking.

16. In milking be quiet, quick, clean and thorough. Commence milking at the same hour every morning and evening, and milk the cows in the same order.

17. If any part of the milk is bloody, stringy or un¬ natural .in appearance, or if by accident dirt gets into the milk pail, the whole should be rejected.

18. Do not fill cans in the stable. Remove the milk of each cow at once from the stable to milk room. Strain immediately through cotton flannel or cotton. Cool to 50° F. as soon as strained. Store at 50° F. or lower.

19. Never mix warm milk with that which has been cooled, and do not allow milk to freeze.

20. A person suffering from any disease, or who has been recently exposed to a contagious disease, must remain away from the cows and the milk.

The successful management of a dairy re¬ quires great intelligence, patience and persist¬ ence, and no person should expect to succeed in this business unless he has a decided liking for it. Of course the matter requiring first at¬ tention is the location of the farm. The ele¬ vation and conformation of the land should be such that good air and drainage would ob¬ tain. There should be an abundant supply of pure water. For this purpose a well-protected spring or deep well is best, and care should be taken to have it located distant from build¬ ings and other possible sources of contamina¬ tion. Barns and dairy buildings should stand on elevated ground, and they should be isolated from other structures. It is well to store all forage in a building separate from the cow stable. By a system of overhead tracks and suspended cars, feed can be easily brought to the herd and manure economically removed. Unless the manure can be spread at once upon the land, it should be stored under a roof. The stable should be planned to facilitate the work of caring for the herd. Light and fresh air are necessary and should be admitted in abund¬ ance. It is generally advised that there be al¬ lowed at least one cubic foot of space for every pound of live weight. Where the winters are not too cold and expense of construction must be kept low, the cows may be allowed to stand on the ground, the floor of the barn being made from hard-packed clay or earth. Better floors are made from planks treated with tar and laid close together. A cement floor is the best, but because of its hardness an abundance of bedding must be used. T.he stalls should be from 3ˆ4 to 4 feet wide and just long enough for the

manure gutter to be immediately back of the hind feet when the cow is standing. Many devices for tying cows have' been proposed, but one of the most satisfactory is the stanchion attached above and below by a few links of chain, so as to allow some freedom of motion in all directions. A separate feeding-box for each animal is objectionable because of the difficulty of keeping it clean. At many of the best dairies the cows are fed on the floor, a long shallow trough in front of the stalls being constructed for this purpose. Provision should be made for frequent access to water. Milch cows should be allowed to go out doors every' pleasant day for exercise.

The selection of cows for a dairy herd, re¬ gardless of the breed chosen, should be based upon individual merit. Small and unprofitable producers as well as unhealthy cows and those of weak constitution should be avoided, and when they are found in the herd advantage should be taken of the first opportunity to dis¬ place them. It is well said ((the bull is half the herd.® When calves are to be raised, as is the rule in most dairies, the influence of the bull upon the development of the herd is readily seen. If possible a bull of proved excellence should be used. It is always well to give spe¬ cial attention to the breeding of the bull and

attach considerable importance to the perform¬ ances of his dam and grand-dams. The quan¬ tity of milk given by each cow, and its fat test, should be recorded at least one day each month for the purpose of showing which ani¬ mals of the herd are profitable and which are not. The time for breeding cows depends upon the requirements for milk. Formerly it was a general practice in dairies not supplying milk for retail sale to have cows calve in the spring and be <(dry® throughout the winter. At pres¬ ent, however, a large number of dairies are operated most profitably during the winter for the purpose of supplying milk for butter and cheese making, as well as for consumption in towns and cities.

Feeding for best results is a subject which requires much study and experience. Espe¬ cially is this the case where winter dairying is practised. In the first place feed should be wholesome and palatable. Then care should be taken to have the nitrogenous and non-nitro-genous components properly proportioned. Just what feeds will be used depends largely upon local conditions, cost, availability, *etc.* The fol¬ lowing rules given in Farmers' Bulletin 743 may be followed in most cases, but the prac¬ tical feeder will study carefully the needs of each individual animal in the herd.

1. Under most circumstances the cow should be fed all the roughage that she will eat up clean, adjusting the grain ration to the milk production. Only when the cow tends to be¬ come overfat should the quantity of roughage be restricted.

2. A grain mixture should be fed in the pro¬ portion of 1 pound to each 3 pints or pounds of milk produced daily by the cow, except in the case of a cow producing a flow of 40 pounds or more, when the ration can be 1 pound to each 3J4 or 4 pounds of milk. An even better rule is 1 pound of grain each day for every pound of butterfat produced during the week by the cow.

3. Feed all the cow will respond to in milk production. When she begins to put on flesh, cut down the grain.

Milk is a food of great value. Next to bread and water it is used more commonly than any other article of food or drink. It contains, in easily digestible form, the four kinds of nutri¬ ents required by the body — protein, fats, carbo¬ hydrates and mineral matter. It contains more nutritive matter than can be obtained at the same cost in any other animal food. Jordan has shown the economy of using milk in the family dietary. The increased use of good wholesome milk is strongly recommended. Skimmed milk also contains considerable food value and could well be used as a human food much more than is the present custom. The average amount of milk consumed daily in cities and towns is about 0.7 pint per capita, and to supply this there must be within easy reach one cow for about every 12 persons. Many cows are kept within corpo¬ rate limits and their product is delivered twice daily — often ((warm from the cow.® For best results it should be cooled promptly, but it is often used before any considerable change takes place. Most of the milk supply of small and medium-sized towns and a large portion of the milk used in cities is taken from the dairy to the consumer by teams, and the general rule is

to serve in the morning the product of the same morning and the previous evening.

The bulk of milk used in larg£ cities is trans¬ ported by special trains, and sometimes these originate as far as 200 to 300 miles from their destination. <(Train® milk is from 12 to 72 hours old when delivered to the consumer. Most of it is either 24 or 36 hours old. Producers, dealers and shippers have learned that milk so long delayed must receive good care, and it often happens that this milk is finally delivered in better condition than milk not so old but neglected. The receipts of milk in New York city are more than 2,700,000 quarts daily, and practically all is brought by trains. Milk usually is transported in heavy tin cans holding 8ˆ2, 20, 32 or 40 quarts. In recent years bottles have come into general use. Some concerns maintain bottling stations near the producing farms, and their product is shipped in glass jars which are packed in cracked ice during hot weather. Much milk is bottled in the cities before delivery.

Farmers lately have received 5 to 7 cents per quart for their milk. City retail prices range from 10 to 14 cents per quart. Most milk is delivered promptly after it reaches the city. When it must be held before delivery a clean cold place must be provided for this purpose.

Much is being done by State and municipal governments to improve market milk, but the greatest influence to this end that can be produced is a determined demand on the part of the consumers for pure milk and a willingness to pay for it. Medical milk commissions in some cities are entitled to credit for good results already obtained. Some concerns produce a special grade of milk. It is their aim to produce milk in a scientific manner and to take every reasonable measure to insure its purity. One of them operates in 16 different cities and conducts dairies which are models in cleanliness and management. The same company has de¬ veloped a large trade in ((modified milk,® which is milk altered in its composition according to the peculiar requirements of infants and in¬ valids, and specially prepared upon physicians' prescriptions. Kumiss is one of the forms of fermented milk used as a beverage. It is pro¬ duced with the aid of yeast. Bulgarian milk is a sour milk ripened by a bacterium, Bacterium bulgaricum. This organism is able to pro¬ duce a high percentage of acid, and the Bul¬ garian milk is therefore usually of a higher acidity

than normally soured milk. Bul¬ garian milk has become rather popular since Metchnikoff suggested that it may be beneficial to health and therefore possibly a means by which to prolong life. Bulgarian milk is often sold under various names, such as Fermilac, Yougert, Morilac, *etc.* Ice cream is rapidly be¬ coming one of the more important dairy prod¬ ucts. It is estimated that the ice cream output in the United States for the year 1917 amounted to 210,000,000 gallons. This at $1 per gallon represents an industry of $210,000,000. Ice creams are known under different names, such as plain ice cream, parafaits, mousses, *etc.* No classification has up to this time been accepted officially. It has been customary to distinguish between two classes of ice creams, Philadel¬ phia,® an ice cream made without the addition of eggs, and Neapolitan,® an ice cream con¬ taining eggs.

Bibliography. — Van Norman, H. E., (First Lessons in Dairying) ; id., Questions and Answers on Milk and Milk Testing-* ; Farring¬ ton & Woll, (Testing Milk and Its Products* ; Russell & Hastings, (Dairy Bacteriology *; Conn, (Bacteria in Milk and Its Products*; Sadler, W., (Bacteria as Friends and Foes of the

Dairy Farmer) ; Aikman, C. M., (Milk, Its Nature and Composition* ; Wing, H. H., (Milk and Its Products* ; Eckles, C. H., (Dairy Cattle and Milk Production ; Eckles and Warren, (Dairy Farming* ; Sheldon, (The Farm and the Dairy* ; Spargo, John, (The Common-sense of the Milk Question* ; Pare of Milk and Cream on the Farm* (Extension Bulletin No. 8, Nebraska) ; (Cooling Cream Without

Ice* (Farmers' Bulletin 549, Department of Agriculture, Washington, D. C., p. 22) ; (The Care of Milk* (Extension Bulletin, Missouri) ; (The Care of Milk and Its Use in the Home* (Farmers' Bulletin 413, United States Depart¬ ment of Agriculture, Washington, D. C.) ;

(How to Produce Cream that Makes Good Butter* (Circular 51, Indiana Experiment Sta¬ tion) ; Production of Clean Milk* (Farmers' Bulletin 602, United States Department of Agriculture, Washington, D. C.) ; (A Simple Steam Sterilizer for Farm Dairy Utensils* (Farmers' Bulletin 748, United States Depart¬ ment of Agriculture, Washington, D. C.) ;

(Sources of Bacteria in Milk* (Bulletin 51, Connecticut Experiment Station, Storrs, Conn.) ; (Quality of Milk Affected by Common Dairy Practices* (Bulletin 42, Connecticut Ex¬ periment Station, Storrs, Conn.) ; (Handling

and Marketing of Milk and Cream* (Bulletin 198, North Carolina Experiment Station) ; (The Covered Milk Pail* (Bulletin 210, United States Department of Agriculture, Washington, D. C., p. 26) ; Production of Sanitary Milk* (Farmers' Bulletin 457, United States Depart¬ ment of Agriculture, Washington, D. C.) ; (A Plan for a Small Dairy House* (Farmers' Bulletin 689, United States Department of Agri¬ culture, Washington, D. C.) ; (Ice Houses and the Use of Ice on the Dairy Farm* (Farmers' Bulletin 623, Department of Agriculture, Wash¬ ington, D. C.) ; Unexpensive Appliances and Utensils for the Dairy* (Circular 6, Kentucky Experiment Station) ; (The Financial Stimulus in City Milk Production* (Bulletin 363, Geneva Experiment Station, Geneva, N. Y.) ; Post of Milk Production* (Extension Bulletin 2, New Hampshire Experiment Station) ; (Influence of Fatness of Cow at-Parturition on Per Cent of Fat in Milk* (Bulletin 100, Missouri Experi¬ ment Station) ; <Testing and Handling Dairy Products* (Bulletin 152, South Dakota Experi¬ ment Station) ; Peeding Cows for Milk Pro¬ duction* (The Journal of the Department of Agriculture of Victoria, 10 Jan. 1911) ; (The Utility of Testing Cows* (Department of Agri¬ culture, Victoria) ; Peeping Records of Dairy Cows* (Circular 57, Missouri Experiment Sta¬ tion) ; (Studies in the Range of Variation of the Per Cent of Butter Fat in the Milk of Individual Cows* (Special Bulletin 71, Michigan Experiment Station) ; Pour Systems of Dairy Farming and the Profit on Each* (Circular 151, Illinois Experiment Station) ; Practical Dairy¬ ing* (Bulletin 49, Georgia Experiment Sta¬ tion) ; (Better Dairy Methods* (Bulletin 67, Nebraska Experiment Station) ; Parrn Dairy¬ ing' (Bulletin 192, North Carolina Experiment

Station) ; (Records of Dairy Herd for Five Years' (Bulletin 73, Connecticut Experiment Station, Storrs, Conn.) ; (The Cost of Rearing a Dairy Cow' (Bulletin 164, Massachusetts Ex¬ periment Station) ; (Care, Feed and Manage¬ ment of the Dairy Herd' (Circular 16, Iowa Experiment Station) ; (The Feeding of Dairy Cows' (Farmers' Bulletin 743, Washington, D-C.). Raymond A. Pearson,

President of Iowa State College and Assistant Secretary, United States Department of Agri¬ culture, assisted by M. Mortensen, Professor of Dairy Industry, Iowa State College, and E. B. Reid, Chief of Division of Publications, United States Department of Agriculture.

DAIRY PRODUCTS. The dairy industry is one of the most important branches of farm¬ ing in this country, both from the standpoint of production of food for human consumption and, also, that of soil fertility. The size of this industry is indicated by the fact that, on 1 Jan. 1917, there were 22,768,000 milch cows in the United States, having a farm valuation of $1,358,435,000. The following are the States which had more than 1,000,000 cows in 1917 : Wisconsin, 1,750,000; New York, 1,539,000; Iowa, 1,405,000; Minnesota, 1,302,000; Texas, 1,175,000; Illinois, 1,057,000. The amount of milk produced on farms in 1909 was 5,813,699,- 474* gallons, and the total value of the dairy products was reported as $596,413,463*. The following table shows the amounts and value of the different manufactured dairy products for the year 1914:

Product	Pounds	Value
Butter .	769,809,781	$218,021,690
Cheese .	370,278,599	50,377,018
Condensed milk .	873,410,504	58,747,252
Powdered milk .	20,454,051	1,968,259
Casein .	18,570,220	977,770
Milk sugar .	4,051,320	400,613

New York leads all the States in the produc¬ tion of milk for direct consumption. Wiscon¬ sin produced the most butter, followed by Minnesota, Iowa and California. In the pro¬ duction of cheese, Wisconsin leads, followed by New York, Pennsylvania and Michigan. For condensed milk, the leading States are Wis¬ consin, Illinois and New York.

For many years the dairy industry has in¬ creased steadily and quite rapidly. This growth is the more significant in view of the fact that, during recent years, there has been a decided , decrease in the raising of cattle for beefi This general tendency toward an increase in the raising of dairy cattle at the expense of other kinds is, doubtless, due to certain fundamental economic principles: (1) A given amount of feed consumed by a dairy cow will produce a much greater amount of human food (milk, butter or cheese) than would be produced if it were used for the production of beef, mutton or pork; (2) the sale of milk, butter or cheese removes very little fertility from the farm, and the cow provides a means for converting certain farm products, such as hay, corn, stover, straw, etc., into more salable products; (3) it is easier to maintain the fertility of the soil where stable manure is available than where it is not ; (4) labor on a dairy farm is more constant throughout the year than in most other lines

* Exclusive of milk and cream consumed on farms where produced. If these amounts were included, both these figures would be increased materially.

of farming. This makes it possible for the dairyman to use both man and team labor eco- •nomically, and provide a nearly uniform income throughout the year, instead of having it con¬ centrated into a few months, as in grain or fruit-growing. It is significant that the dairy industry has reached its greatest development in those sections of the country which have been farmed longest and where the types of farming have become most permanent and also that there is a marked tendency toward greater de¬ velopment of this industry in the newer sections. This may be interpreted as meaning that the dairy cow grows in importance with the increase of population, need for human food and the development of a permanent type of farming. During recent years, the number of dairy cows has increased in all sections except the New England and Middle Atlantic States, where the industry was already well developed. The mar¬ ket for our dairy products is chiefly domestic, a very small percentage going into export trade.

Milk. — Milk is produced by the females of all species of mammals as food for their young. In nature the mother produces only the amount of milk needed to feed her young, but, in the case of the cow, the function of milk secretion has been developed by means of artificial breed¬ ing and selection far beyond the needs of the young calf in order that it may be available for human food. In appearance cow's milk is a yellowish white, slightly viscous, opaque fluid, having a pleasant, sweetish taste. Milk is a true secretion, the fat, casein, lactose, etc., being made by the activity of the cells in the mammary gland.

The analysis of several thousand samples of cow's milk shows the average composition to be as follows: water, 87.17 per cent; milk-fat, 3.69 per cent; casein, 3.02 per cent; albumin, 0.53 per cent ; milk-sugar, 4.88 per cent ; and ash, 0.71 per cent.

The constituents of milk, less the water, are usually called the milk solids or total solids, and the total solids without the fat, the solids-not-fat. The entire milk, less the fat, is called the milk serum, or skimmilk.

Some of the constituents of milk are in true solution; some are simply held in suspension, while others are partly in solution and partly in suspension. Van Slyke states this condition as follows :

Milk constituents

partly in solution Milk constituents Milk constituents and partly in sus-entirely in sus-in true solution pension or colloidal pension or col-in milk serum solution loidal solution

(a) Sugar

(b) Citric acid

(c) Potassium

(d) Sodium

(e) Chlorine

(a) Albumin (1)

(b) Inorganic phos¬

phates

(c) Calcium

(d) Magnesium

(a) Fat

(b) Casein

The constituents of milk vary considerably in percentage, being influenced by the breed, period of lactation, individuality and certain other minor conditions. The greatest variation occurs in the per cent of fat. The influence of breed upon this constituent and the total solids as compiled by Wing from a large number of analyses by American experiment stations is as follows :

Solids Fat

Jersey .

Guernsey .

Devon .

Shorthorn .

Ayrshire .

Holstein-Friesian

14.70 5.35

14.71 5.16 14.50 4.60 13.38 4.05 12.61 3.66 11.85 3.42

The per cent of fat normally increases with the advance of the lactation period. This is shown by the following monthly averages for nearly 100 lactation periods (Van Slyke) :

Percentages

in

Per cent

comparison

of fat

with first

Month of Lactation

in milk

month

1 .

4.30

100.0

2 .

4. 11

95.6

3 .

4.21

97.9

4 .

4.25

98.8

5 .

4.38

101.9

6 .

4.53

105.3

7 .

4.57

106.3

8 .

4.59

106.8

9 .

4.67

108.6

10 .

4.90

114.0

11 .

5.07

118.0

Milk-fat or butterfat, as it is sometimes called, is not a single chemical substance, but is made up of a number of fatty acids or glycerides. Browne gives the composition of milk-fat as follows, with the percentage of each of the fatty acids :

Per cent of total

Fatty Acid fat

Oleic . 33.95

Palmitic . 40.51

Myristic . 10.44

Stearic . 1.91

Dioxystearic . 1.04

Butyric . 6.23

Laurie . 2.73

Caproic . 2.32

Caprylic . 0.53

Capric . 0.34

Babcock gives the following substances as constituting the proteids of milk : Casein, 3.0 per cent ; albumin, 0.6 per cent ; lactoglobulin, galactin and fibrin (trace), 0.2 per cent; a total of 3.8 per cent. Likewise the mineral matter or ash is made up of many distinct substances as shown by Babcock:

Ash, 0.7 per cent

r Potassium oxide . 0.175

Sodium oxide . 0.070

Calcium oxide . 0.140

J Magnesium oxide . 0.017

] Iron oxide . 0.001

Sulphur trioxide . 0.027

Phosphoric pentoxide . 0.170

‘Chlorine . 0.100

Colostrum is the milk which a cow produces immediately after parturition. It is quite differ¬ ent in appearance and composition from normal milk, having a reddish yellow color and a vis¬ cous, almost slimy, consistency. Richmond gives its composition as follows: Water, 71.69; fat, 3.37; albuminoids: casein, 4.83, albumen, 15.85; sugar, 2.48; and ash, 1.78 per cent. Colostrum acts as a purgative to the newly-born calf, and should not be used for human food under four or five days after calving, by which time it becomes normal milk.

Until recent years, it was supposed that the composition of milk could be decidedly changed by the feed which the cow consumed, but later investigation has established the fact that the feed has but slight, if any, influence on the relative amounts of the various constituents. Certain feeds, however, may affect the quality of the milk fat ; for example, linseed or gluten meal makes an oily, soft fat, while cotton seed meal and wheat bran make a hard fat. The fat exists in milk in the form of minute globules which are held in their spherical form by the surface tension of the liquid fat and the viscous nature of the milk serum. Since the value of

milk is largely proportional to its per cent of fat, it is often necessary to determine its fat content. This may be done by chemical analysis but this method involves considerable time and expense and the method generally used in com¬ mercial work in this country is that devised by Dr. S. M. Babcock, of the University of Wis¬ consin, and known as the (<Babcock Test® for milk-fat. This test is based on the principle of liberating the fat globules by dissolving the casein with strong sulphuric acid and the sep¬ aration of the fat by centrifugal force; — the fat being lighter than the other elements in the milk. Briefly, the method of making the Babcock Test is as follows: (1) Secure an accurate sample of the milk to be tested; (2) measure out 17.6 cubic centimeters, and place it in the test bottle; (3) add 17.5 cubic centimeters of sulphuric acid, and mix thor¬ oughly by rotating the test bottle ; (4) place bottles in centrifuge and whirl at proper speed for five minutes; (5) add hot water to bottom of neck and whirl two minutes ; (6) add hot water to bring fat up to graduated scale and whirl one minute; (7) place test bottles in water bath at 135°-140° F.

for five minutes; (8) read amount of fat column, including meniscus both at top and bottom of column.

Milk is heavier than water, the average specific gravity of normal milk being 1.032, with variations between 1.029 and 1.035. The specific gravity of milk may be determined by an instru¬ ment called a ˆlactometer.® Taken in connec¬ tion with the Babcock Test, the lactometer reading makes it possible to determine both the total solids and the solids-not-fat in any given sample of milk. There are a number of formulae which may be used for this purpose. Babcock's modified form is as follows :

F*L + .2F + .14 = S.n. F.

in which L stands for the lactometer reading and F for the per cent of fat. The total solids may be obtained by adding the solids-not-fat to the fat reading.

Milk is a delicate substance and very sus¬ ceptible to undesirable flavors and odors. These may be either of two types: (a) those which are absorbed from feed eaten by the cow or from outside sources, or (b) those resulting from the action of microorganisms, especially bacteria, in the milk itself. If it is exposed to strong odors, such as foul stable air, cabbage, gasoline, etc., they will be absorbed very quickly. If placed in an ice-chest with such foods as pineapple or strawberries, it will be quickly tainted and have a disagreeable flavor. Dis¬ agreeable as these absorbed troubles may some¬ times be, they are not so serious as those result¬ ing from the growth of bacteria. The former decrease after removal from the source of con¬ tamination, while those resulting from bacterial action continue to increase in intensity as the milk grows older. It is highly desirable that milk should reach the consumer in as nearly as possible, the condition in which it leaves the udder of the healthy cow. This means that much care must be exercised in its production and handling to prevent contamination. Bac¬ teria gets into milk chiefly from the following sources : the interior of the cow's udder, the milk utensils, the surface of the cow's body, the atmosphere of the stable and milk house, and the hands and clothing of the milker. If

the udder is free from disease, it is not a serious source of contamination, since its germ content rarely exceeds a few hundred per cubic centi¬ metre. If, however, the udder is diseased, it may be a very serious source of infection. To secure milk with a low bacteria content those parts of the cow's body around the udder should be as clean as possible at milking time. The stable air should be free from dust, the milker's hands should be clean, and he should wear a clean suit. In many cases the utensils are the worst source of trouble, and great care should be taken to see that these are prop¬ erly constructed and thoroughly washed and well sterilized either with boiling water or steam.

As soon as produced, milk should be cooled to a temperature which will prevent the rapid development of the bacteria in it. Bacteria grow very rapidly at temperatures above 70° F., but more and more slowly as the temperature is reduced below that point ; at 50° or below, growth is relatively slow, hence for best results, milk should be held at these low temperatures. During recent years, the "pasteurizationˆ of milk for the purpose of reducing the bacteria content and destroying any disease germs which may be present has become a common practice. Pasteurization consists of heating the milk to a temperature sufficient to kill all pathogenic organisms and a large percentage of the other forms, and then immediate cooling to prevent the rapid growth of those that remain. A tem¬ perature of 145° F. maintained for 30 minutes is believed to be sufficient to destroy all disease organisms.

The average per capita consumption of milk is about one-half pint per day. Large quantities, therefore, are required to supply the needs of the large cities, New York city alone consuming about 2,000,000 quarts daily. The problem of getting this vast amount of milk to the con¬ sumer in the city is a serious one for, as the cities have increased in size, it has been neces¬ sary to go farther away for the necessary sup¬ ply of milk. At present, New York city obtains part of its milk supply from farms 300 to 400 miles away, which means railroad transportation of 10 to 12 hours, after which it must be taken to the

city plant, pasteurized, cooled and bottled before ready for delivery. As a result this milk is frequently 24 to 36 hours old when delivered to the consumer. Because of the great rapidity with which bacteria grow, the injection of this long period of time between production and consumption has greatly increased the problem of a satisfactory city milk supply and has changed many of the methods of production and handling on the farm, during transportation and in the city.

Grades or Classes of Milk. — The present tendency is toward the division of milk and cream into grades, primarily upon its sanitary quality. The grades established in New York city will illustrate the general divisions into which market milk is placed: (1) Grade “A® — For infants and children. Raw: Cows tuber¬ culin tested and free from all diseases; bacteria not more than 30,000 for milk and 150,000 for cream when delivered to the consumer or at any time prior to such delivery; employees free from all communicable diseases or disease germs ; delivered to consumer within 36 hours after production. Pasteurized: Cows healthy, as determined by physical examination at least

once each year; bacteria content not to exceed 200,000 before pasteurization and not more than 30,000 for milk and 150,000 for cream when delivered to consumer or at any time after pasteurization; employees free from communi¬ cable disease or disease germs ; delivered to consumer within 36 hours after pasteurization; (2) Grade ((B)} — For adults (pasteurized). Cows in good health as determined by physical examination at least once each year; must not contain more than 1,500,000 bacteria before pasteurization and not more than 100,000 for milk and 500,000 for cream when delivered to consumer or at any time after pasteurization ; employees free from communicable disease or disease germs ; milk delivered to consumer within 48 hours after pasteurization, and cream within 72 hours; (3) Grade “C®* — For cooking and manufacturing purposes. Milk or cream not conforming to all the requirements of the subdivisions of Grade A or Grade B, and which has been pasteurized, according to the regulations of the Board of Health, or boiled for at least two minutes. This milk must come from healthy cows, as determined by physical examination at least once each year; bacteria content must not be excessive ; milk delivered to consumers in cans only, within 48 hours and cream within 72 hours after pasteurization. Same requirements as to health of employees as for Grades A and B. In addition to these requirements certain other regulations must be observed for each grade. In the case of each of these grades, the container must bear a

dis¬ tinct label, approved by the Board of Health, indicating the grade and no other statement or designating mark.

Certified milk is milk produced under the supervision and in conformity with the require¬ ments of a medical milk commission appointed by the local county medical society. This milk must conform with very rigid regulations laid down by the commission, which insures this grade of milk being of a very high standard of composition and sanitary excellence.

Butter. — Butter is the fat of milk which has been separated from most of the other con¬ stituents by the process of churning. In mod¬ ern dairy practice the cream is removed from the milk by centrifugal force, by means of the cream separator, this being possible because of the fact that the fat globules are lighter than the other constituents of the milk and are thrown out as the milk passes through the rapidly revolving bowl of the separator.

Bulletin 149 of the United States Depart¬ ment of Agriculture gives the following com¬ position for butter :

Average Composition of Butter by Classes

Class

Num¬ ber of sam¬ ples

Fat

Water

Salt

Curd

Per ct.

Per ct.

Per ct.

Per ct.

1 84 per cent fat or over

2 Less than 81 per cent

124

84.78

12.45

1.78

0.98

fat .

130

79.77

15.32

3.52

1.37

3 81 to 84 per cent fat . .

370

82 . 55

13.85

2.41

1.18

Variation .

5.01

2.87

1.74

.39

Average of all samples.

695

82.41

13.90

2.51

1.18

408

Variations in the composition of individual lots of butter are frequently much greater than those indicated by these averages. This is shown by the following:

Results of Analyses of 117 Samples from

Wisconsin

Percentage

Fat

Water

Salt

Curd

Average .

Per cent

82.48

Per cent

13.77

Per cent

2.61

Per cent

1.14

Highest .

86.75

75.68

18.23

10.52

5.46

.95

2.12

.23

Lowest .

Variations .

11.07

7.71

4.51

1.89

There are two common types of butter, known as sweet cream and

sour cream butter. The sweet cream butter is made from cream in which lactic acid has not been allowed to de¬ velop. It has a mild flavor which is desired by many persons, and may be made from either raw or pasteurized cream. Sour cream butter is made from cream in which lactic acid has been allowed to develop, resulting in a product with a more highly pronounced flavor. This is the standard type of butter in America and in most countries of Europe. The production of good butter of uniform quality and high flavor requires the use of cream which has been pro¬ duced and handled with care, cleanliness being a first essential in the making of good butter. After the clean, sweet cream is obtained, the next step is the development of the proper degree of acid or the ˆripening® process. This is brought about by the action of certain forms of bacteria commonly known as the lactic acid bacteria {Bad. lactis acidi), which work on the milk-sugar, changing it into lactic acid. It is during this ripening process that the character¬ istic flavors and odors of the butter are de¬ veloped, the final flavor depending upon the kinds of bacteria which take part in the ripen¬ ing and the degree to which the fermentation is allowed to develop. The finest qualities of the butter may be lost by the over-ripening of the cream. Cream may be ripened by the action of the lactic acid bacteria normally occurring in it or the process may be hastened by the use of a ˆstarter,® which is a pure culture of the lactic bacteria grown in skimmilk or buttermilk. In many factories the cream is pasteurized before the starter is added, thus destroying most of the miscellaneous bacteria in the cream and making it possible to more completely control the nature of the ripening process. The pur¬ pose of churning is to remove the butterfat from the milk serum and bring the fat globules into compact form. This is done by placing the cream in a churn of such form that when it is revolved slowly the cream is thoroughly agitated, thus bringing the minute fat globules in contact with each other and causing them to adhere as a result of the concussion. The ease with which cream will churn is influenced by many factors, but chiefly by the richness of the cream, the temperature and the speed of the churn. When a sufficient number of fat glob¬ ules have coalesced to form visible granules, the butter has ˆcome.® The churning process may be controlled to give granules of any de¬ sired size. After the churning has been com¬

pleted, the buttermilk is drawn off and the butter washed with cold water to insure the further removal of the buttermilk and to firm or harden the butterfat, so it can be more easily handled. The wash water is then re¬ moved, the desired amount of salt added and the butter worked enough to give an even dis¬ tribution and thorough

incorporation of the salt. It is now ready to be packed in tubs or made into prints, depending upon the market to which it is to be sent. The butter markets recognize certain fairly definite grades known as extras, firsts, seconds and thirds.

Definition of Grades. — Extras shall be a standard grade of average fancy quality in the season when offered under the various classi¬ fications. Ninety per cent shall conform to the following standard; the balance shall not grade below Firsts :

Flavor: Must be sweet, fresh and clean for the season when offered if creamery, or sweet, fresh and reasonably clean if renovated or ladles. Body: Must be firm and uniform. Color: Not higher than natural grass, nor

lighter than light straw, but should not be streaked or mottled. Salt: Medium salted. Package: Sound, good, uniform and clean.

Firsts shall be a grade next below Extras and must be good butter for ’the season when made and offered, under the various classifica¬ tions. Ninety per cent shall conform to the following standard ; the balance shall not grade below Seconds :

Flavor: Must be reasonably sweet, reason¬ ably clean and fresh if creamery or renovated, and reasonably sweet if ladles. Body: Must be firm and fairly uniform. Color: Reasonably uniform, neither very high nor very light. Salt: May be reasonably high, light or medium. Package: Sound, good, uniform and clean.

Seconds shall be a grade next below Firsts.

Flavor: Must be reasonably good. Body: If creamery, must be solid boring. If ladles or renovated, must be 90 per cent solid boring. Color: Fairly uniform, but may be mottled. Salt: May be high, medium or light. Package: Good and uniform.

Thirds shall be a grade below Seconds and may consist of promiscuous lots.

Flavor: May be off flavored and strong on tops and sides. Body: Not required to draw a full trier. Color: May be irregular or mottled. Salt: High, light or irregular. Package: Any kind of package mentioned at time of sale.

In grading any given lot of butter, it is scored on the basis of the following numerical values :

Butter Score Card

Perfect Score score allowed

Flavor . 45 .

Body . ; . . 25 .

Color . 15 .

Total . 100

Process or renovated butter is made from butter of very poor quality by subjecting it to certain methods of cleaning and clarifying. The butterfat is melted and cleaned by wash¬ ing, aerating and other processes. This clari¬ fied butter fat has very little taste or odor and must be reconstituted to make it resemble genu¬ ine butter. For this purpose it may be mixed

with milk, skimmilk, buttermilk or cream and rechurned and worked to get the desired tex¬ ture and flavor. In 1916 there were 23 factories operating under Federal licenses. These plants produced 27,542,015 pounds of renovated butter during the vear, of which 635,038 pounds were exported.

Cheese. — Cheese is a product made from milk by the coagulation of the casein and the expulsion of a portion of the moisture. The finished cheese contains most of the milk-fat, the casein and a part of the milk-sugar and salts. In the process of making, a small per cent of the fat, most of the albumin and milk-sugar and a small part of the mineral matter are washed out with the larger part of the original water, in the form of whey. The chief purpose of making cheese is to bring the nutri¬ ents of the milk into a concentrated form so they will keep longer and develop the special flavors characteristic of the different types of cheeses. A great variety of cheeses are found on the markets of this country and Europe, the variety being much greater in Europe than here, although the number is increasing here. The Department of Agriculture gives a list of more than 100 kinds of cheese, with the methods of making and chemical composition of each. Cheeses may be divided into two general groups, based on the method used for coagulating the casein, these are the ((acid-curd® cheeses and the (<rennet-curd® cheeses. In the first group the casein is coagulated by the formation of lactic acid in the milk. This may result from the growth of the lactic acid bacteria normal to the milk or by the addition of a ((starter.® The cheeses in this group are little more than fresh, sour curd and are eaten fresh without any ripening process. There are but few varieties. In the second group the coagulation is caused by the action of rennet, which is added to the milk while it is fresh and has but little acid. This group contains the varieties which are of greatest commercial value. At one end of this group are the so-called <(hard,® while at the oiher end are the <(soft® varieties. Between these extremes there are many kinds which blend into each other by imperceptible degrees, the chief differences being due to the degree of moisture they contain and the nature of the microorganisms causing the ripening processes: The most important of the cheeses is

the one known as the American or Cheddar cheese. Its composition depends upon the quality of the milk and the method of making. Extended studies by the New York Experiment Station show the following composition for Cheddar cheese made from normal milk:

Lowest Highest Average

Water . 32.69 43.89 36.84

Total solids . 56.11 67.31 63.16

Fat . 30.00 36.79 33.83

Proteins . 20.80 26.11 23.72

Salts, *etc.* (represented in ash). .. 3.12 7.02 5.61

Percentage of solids in form of fat . 50.39 56 83 53 . 56 Ratio of fat to proteins . 1:0.79 1:0.63 1:0.70

The differences in composition are due chiefly to the variations in fat and casein in the milk.

The yield of cheese from milk is directly influenced by the per cent of fat it contains. This is shown by the following table:

Ratio of Fat to Cheese Yield in Normal Milk (Van Slyke)

Per cent of

Pounds of

Pounds of

casein in

cheese made

cheese made

Per cent of

milk

from 100 lbs.

for each lb. of

fat in milk

of milk

fat in milk

3.00

2.10

8.30

2.77

3.25

2.20

8.88

2.73

3.50

2.30

9.45

2.70

3.75

2.40

10.03

2.67

4.00

2.50

10.60

2.65

4.25

2.60

11.17

2.63

4.50

2.70

11.74

2.61

4.75

2.80

12.31

2.59

5.00

2.90

12.90

2.58

It will be seen that the yield of cheese in¬ creases with the per cent of fat in the milk, the increase, however, being not directly pro¬ portional to the increase in fat because the casein does not increase as rapidly as the fat. The quality of the cheese which can be made from any given lot of milk depends very largely upon the care it has received. Clean milk is the first essential for successful cheese making, and great care should be used not to take in milk having high acidity or bad flavors or odors or showing visible dirt. Any of these conditions indicate the presence of certain types of bacteria which will injure the quality of the finished product. After milk of good quality has been obtained, the first step is to develop the proper degree of acidity. This may be done by allowing the milk to stand at a temperature favorable to the growth of the lactic acid bacteria, or the process may be hastened by using an artificial starter, as in the making of butter. As soon as the desired degree of acidity has developed, the rennet should be added. The amount to be used, as given by Publow, depends on (1) the strength of the extract; (2) the temperature of the milk; (3) the

acidity of the milk; (4) the composi¬ tion of the milk; (5) the kind of cheese to be made, and (6) the temperature of curing. In general, an amount sufficient to coagulate the milk fit for cutting in 25 to 35 minutes should be used; generally from 2ˆ4 to 4 ounces for 1,000 pounds of milk will suffice.

When the milk is well coagulated, small wire knives designed for the purpose are used to cut it into small cubes to allow the whey to escape. It is important that the expulsion of the whey and the firming of the curd should be carefully controlled, which is done by stirring the curd and by the application of heat. When the little cubes of curd have contracted to slightly less than one-half their original size and are firm and rubber-like, the whey is drawn off from the vat. As soon as the whey is sufficiently removed the curd is piled along either side of the vat and allowed to drain thoroughly; after it is well matted it is cut into strips which may be piled to any desired depth to hasten the further removal of the whey. This cheddaring process is continued till the curd shows the desired texture and the whey coming from the curd has the required degree of acidity. The curd is now (<milled® by running it through a machine which cuts it into small, even sized pieces in order to further assist in the escape of the whey and make the salting process easier. The curd is then spread over the bottom of the vat, the salt sprinkled over the surface and the curd is stirred to insure the even distribution of the salt to the surface of each piece. The

chief purpose of the salt is to improve the flavor of the finished cheese ; it may also assist in the removal of whey and the control of acid de¬ velopment. It is now ready to be put into proper form for marketing by placing the loose pieces of curd in metal hoops and subjecting to sufficient pressure to cause the pieces of curd to adhere to each other firmly. American Ched¬ dar cheese is placed upon the market in a num¬ ber of forms or styles as is indicated by the following table :*

Approximate Approximate Name Shape size weight

In dia. Lbs.

Cheddar or Export Cylindrical.. 14—15 60—70

Flats or twins. … “ 14-15 30-35

Home-trade . “ 11-13 20-25

Daisies . “ 12-13 20

Young America… “ 7— 8 8—12

Longhorn . ” 5 12

Picnic . “ 4-5 1-2

Square . Rectangular. Various (3-4 in. thick)

Print . “ 10x1 0x2 f 10 (marked

in blocks or prints)

Cheese of the Cheddar type requires consid¬ erable time for the development of the charac¬ teristic flavor. When first made the texture is tough and rubbery, and there is little cheese flavor or aroma, but in the course of a few months chemical and biological changes take place which give the cheese a soft, smooth tex¬ ture and its characteristic aroma and flavor. Not all the changes occurring

during this ripening process are well understood, but it is known that they are largely the result of bac¬ terial action and that the Bad. lactis acidi and B. bulgaricus types are important agents. This kind of cheese is commonly eaten at from three months to one year of age, depending upon the amount of flavor desired by the consumer. The following score card shows the method of judging the quality of this type of cheese:

Cheese Score Card

Perfect Score score allowed

Flavor . 50

Body and texture . 25

Color . 15

Finish . 10

Total . 100

There are several groups of cheeses of dis¬ tinct characteristics resulting from the nature of the microorganisms which cause the ripen¬ ing. One of these groups contains the Roque¬ fort, Gorgonzola and Stilton in which a species of Penicillium mold plays a very important part in the ripening and development of the charac¬ teristic flavor. In these cheeses, the mold grows all through the interior and produces a rather strong, pungent flavor. Another type is repre¬ sented by the Camembert, originating in France, but now made also in this country. This is a soft cheese in which the ripening is brought about by the combined action of molds and bacteria. A species of Penicillum grows upon the surface, producing enzymes which work into the curd, changing it to a soft creamy, semi-fluid texture. At the same time, Oidium lactis develops on the surface and this, to¬ gether with the lactic bacteria growing inside the cheese, is largely responsible for the final

flavor. Certain other species probably play a minor part in the ripening process. Still an¬ other group contains the Cottage. Cream, Neuf-chatel and others. These are soft cheeses which undergo no special type of ripening, but depend chiefly upon the amount of cream con¬ tained for their richness and flavor.

Ice Cream. — The manufacture and con¬ sumption of ice creams has increased rapidly in recent years. Formerly it was considered simply as a delicacy to be used only in hot weather, but now its real food

value is recognized and it is an article of year round consumption. The term “ice cream,® as at present used, includes a great variety of products, the chief character¬ istic of which is that they are eaten in a frozen condition. Most of these are made from milk or cream with the addition of sugar and some flavoring material, frequently a small amount of “filler® being used. These products vary widely in the per cent of butterfat and the flavoring materials used. The classification for this class of dairy products given by the Iowa Experiment Station (Iowa Bulletin 123) is: Plain ice creams, nut ice creams, fruit ice creams, bisque ice creams, parfaits, mousses, puddings, aufaits, lactos, ices, including sher¬ bets and punches.

The following score card for judging ice cream has been prepared by the Wisconsin Experiment Station: Flavor, 40; body and texture, 20; bacteria, 20; fat, 10; appearance and color, 5; package, 5.

Fermented Milk Drinks. — Within recent years several forms of milk drinks which have undergone a lactic acid fermentation have come to be extensively used for human consumption. These various forms of buttermilk are all rich in food nutrients since they are made from some form of milk, but they are chiefly valu¬ able as an aid to digestion and in the treatment of certain forms of intestinal disorders. They are found on the market under a variety of trade names such as kefir, kumiss, bacillac, zoolak, matzoon, yogurt, leben, *etc.* All these products are the result of changes caused by the action of certain types of microorganisms. In some of them, as in common buttermilk, the fermentation is caused by the action of the common lactic acid bacteria {Bad. lactis acidi) in splitting up the milk sugar and forming lactic acid. Normally from 0.6 to 0.8 per cent of acid is formed. This type of buttermilk may result as a by-product of the ordinary process of but¬ ter-making or it may be made artificially by inoculating milk with a “starter® of lactic acid bacteria. After the milk is coagulated, it is churned to give it a smooth creamy consistency, then held at a low temperature to prevent further bacterial growth or deterioration in flavor. Most of the commercial fermented milks are made with cultures of Bacillus bul¬ garicus, a type of lactic acid organism originally introduced from Bulgaria, but which has re¬ cently been found to be common in milk in this country. A culture of B. bulgaricus is added to either skimmed or partly skimmed milk from which the miscellaneous flora present in the raw milk has first been eliminated by pasteurization. In this way, a more uniform product of high quality can be secured. After standing at the proper temperature until coagulated, the milk is churned in order to secure the desired smooth,

* Science and Practice of Cheese-making.'

creamy texture and then bottled and kept cold until needed for use. The B. bulgaricus is capable of producing a much higher percentage of acidity than is Bact. lactis acidi 2 to 3 per cent being not uncommon. It also gives a flavor which is preferred by many persons. Another type of product is represented by the kumiss and kefir in which there is an alcoholic as well as a lactic fermentation, the former being caused by the action of certain species of yeasts, which may develop 1 or more per cent of alco¬ hol. Carbonic acid gas is also developed, causing these products to be decidedly effervescent.

Condensed Milk. — Some of the difficult problems in handling market milk are due to the facts : first, that it is bulky and, therefore, expensive to handle and transport ; second, under normal conditions its life is not more than two or three days; and, third, its produc¬ tion is not constant throughout the year, result¬ ing in periods of shortage and surplus. To overcome these difficulties .large amounts of milk are now being condensed. This method was first used in America by Gail Borden in 1856, his first plant being in Connecticut. At first the industry grew very slowly, but in recent years its development has been very rapid and it now represents one of the im¬ portant branches of the dairy industry. In 1914 the output of condensed milk in the United States amounted to 875,507,438 pounds, with a money value of $58,870,609. In general there are two kinds of condensed milk, known as sweetened and unsweetened. The first is made by condensing about 2ˆ4 to 3 parts of milk to one part of finished product and the addition of about 40 per cent of cane sugar. In the second 2 to 2ˆ4 parts of milk are condensed to one part and no sugar is added. The removal of water is accomplished by heating the milk in partial vacuum, the milk usually being heated to 160° F. or higher in an open tank before being run into the vacuum pan. In the sweetened product the sugar is added to the milk in this open heating tank. The condensing is usually done under a pressure of about 25 inches and at a temperature of 130° to 160° F. This makes it possible to remove the water rapidly without imparting very much cooked flavor to the finished product. When it has reached the desired degree of concentration it is removed from the vacuum pan and run into

suitable containers for marketing. That which is designed for household use is put into hermeti¬ cally sealed tin cans, while for the wholesale trade milk cans or barrels may be used. While the sweetened condensed milk is not sterile it will keep for considerable lengths of time be¬ cause of the inhibiting effect of the high con¬ centration of the milk solids and the added cane sugar upon the growth of the few micro¬ organisms it contains. The unsweetened prod¬ uct is sterilized after the cans are sealed by treatment in a steam sterilizer, where it is sub¬ jected to pressure and a temperature well above the boiling point for from one to two hours. After being taken from the sterilizer the cans are placed in a mechanical device and shaken violently, for the purpose of breaking up any particles of curd which may have formed and to give the milk a smooth creamy consistency. Richmond gives the composition

of the different kinds of condensed milk as follows :

UNSWEETENED

Milk—

Sample Water Fat sugar Protein Ash

1 . 63.47 10.22 12.98 10.30 2.07

2 . 62.40 11.91 13.04 9.68 2.14

3 . 63.07 10.86 13.38 9.80 2.21

SWEETENED

(Made from whole milk)

Milk-Cane—

Sample Water Fat sugar sugar Protein Ash

1 . 24.06 11.28 13.97 38.31 9.36 2.13

2 . 26.10 10.84 14.68 36.93 9.55 1.90

3 . 25.69 10.98 16.29 32.37 12.33 2.34

(Made from skim -milk)

Milk-Cane—

Sample Water Fat sugar sugar Protein Ash

1 . 29.05 1.28 14.91 40.07 10.63 2.33

2 . 29.23 0.64 15.50 40.19 10.73 2.63

3 . 28.43 0.36 16.88 39.27 11.73 2.58

Considerable quantities of both the sweet¬ ened and unsweetened condensed milk are used for household purposes, especially in hot cli¬ mates where fresh milk cannot be easily secured. Large amounts are used in the army and navy and for ocean voyages. That which is put up in bulk is used for manufacturing purposes, chiefly by bakers, candy and ice cream makers.

Powdered Milk. — Powdered milk is made by the more complete removal of moisture than in the case of condensed milk. The objects sought by this process are similar to those for which condensed milk is made; namely, reduc¬ tion in volume and cost of transportation and

an increase in keeping quality. Two distinctly - different methods are in use for making pow¬ dered milk. In one the partly condensed milk is dried on the surface of a heated revolving drum, and in the other it is sprayed or atomized into a current of heated air. In the former method the dried milk is scraped from the sur¬ face of the drum by means of knives, then ground into flour. In the latter method the moisture escapes as the minute particles of milk fall through the hot air, and the finished product collects on the floor of the drying chamber in the form of a very fine powder. Powdered milk is made from milk with differ¬ ent percentages of fat and also from skimmilk.

Powdered milk is not entirely sterile, but since it normally contains not more than 3 to 5 per cent of moisture bacteria cannot grow in it. If properly protected against moisture it will keep for a long time. Its chief uses are for cooking and for the making of candies and ice cream, for which purpose its small bulk and excellent keeping quality make it especially valuable. By the reincorporation of the proper amount of water powdered milk may be made to resemble normal fresh milk.

Malted Milk. — Is made from whole milk and the liquid obtained from a mash of ground barley, malt and wheat flour. Small amounts of sodium chloride, sodium bicarbonate or potassium bicarbonate may be added. This product is then dried until it contains not more than 3z/2 per cent of moisture. Its keeping properties are similar to those of powdered milk. Malted milk is largely used in the arti-

ficial feeding of infants. See Farm Manage¬ ment.

William A. Stocking,

Professor of Dairy Bacteriology, New York State College of Agriculture.

DAIS, da’is, a platform or raised floor at the upper end of an ancient dining hall, where the high table stood ; also a seat with a high

wainscot back, and sometimes with a canopy, for those who sat at the high table. The word is also sometimes applied to the high table itself.

DAISY (from ((day's eye®, in allusion to the appearance of the flower), a name applied to many plants of the Aster family, especially to those in which the heads are surrounded by white rays. The daisy proper is Beilis perennis , native of Europe, often grown, in its dou¬ ble forms, for its handsome flowers. In Amer¬ ica the name daisy is most often applied to Chrysanthemum leucanthemum , known also as ox-eye daisy, a native of Europe but natural¬ ized as a weed in eastern North America. The wild asters are sometimes known as daisies and various species of Erigeroh are known by the same name.

DAISY MILLER. To know this novel by Henry James in all its forms, from the straight¬ forward first telling of the story in the Cornhill Magazine in 1878 to its revision in the New York edition of 1909, including the preface to the latter and the reworking of the former as a comedy (printed in the Atlantic Monthly in 1883), is to know the matter and the manner of its author as well as any one book or group of books can indicate the changing style and spirit of an author. Although refused by the first publisher to whom it was offered, as ((an outrage on American girlhood,® (Daisy Miller) justified itself by its later success both in Eng-' land and America. It was, Mr. James says, (<promptly pirated in Boston — a sweet tribute I hadn't yet received and was never again to know — and became ultimately the most pros¬ perous child of my invention.® Although essentially dramatic in its quality as a story, it lost its character when rewritten as a play, and (Daisy Miller-: A Comedy } was the first of a line of paradoxical failures which marked the play-writings of this dramatic storyteller. As a character, too, Daisy Miller was one of the first of a long line — the successful line of those ˆinternational young ladies® who represent over a third of the feminine interest in Mr. James' stories. Like Charlotte Verver and Maggie, Julia Bride, Isabel Archer, Miss Gunton, Pan¬ dora Day, and dozens of others, she was young America sketched on a background of Europe, where neither the glare of her moneybags nor the shadow of her newness could obscure her real inwardness. Whether she was altogether fine like Isabel Archer in (The Portrait of a LadyP exquisitely, unmorally superior like Charlotte Verver in (The Golden Bowl, 5 or naively, tragically vulgar, made up of <(charming little parts that did not match and that made no ensemble,® like Daisy Miller, she was always a type that Henry James drew with vigor, truth and affection. For anyone interested in the contrast between the ((early® and the <(later® manner of James, a parallel reading of the first and last editions of cDaisy Miller'* will well repay study. Artistically, the simpler diction and form of the

original is as much better

suited to the tale as it would be less well suited to the more intricate psychology of (The Awk¬ ward AgeP (The Ambassador,) or (The Golden BowlP

Edith J. R. Isaacs.

DAK, dak, or DAWK, a Hindu word used in India for the mail or post ; a relay of men, as for carrying letters, dispatches, etc., or travelers in palanquins. The route is divided into stages and each bearer or set of bearers serves only for a single stage. A dak-bunga¬ low is a house at the end of ‘the stage de¬ signed for those who journey by palanquin.

DAKAR, da-kiir’, .Senegal, a port furnish¬ ing one of the best harbors on the west coast of Africa. It is situated near Cape Verde. There is a railroad between the port and the capital, Saint Louis. Dakar is a fortified mili¬ tary post. Pop. about 25,000.

DAKOTA, or DAKOTAH, a tribe of North American Indians, constituting at one time an important element in the great Sioux group. Primarily the Dakota Indians are di¬ vided into three bands each having a distinct dialect: Santee, Yankton, Teton. These clas¬ sify as follows: Santee, subdivided as Meday-wakanton, Wakpekute, Wahpeton, Sisseton; Yankton, subdivided as Assinoboin, Yankton, Yanktonai; Teton, subdivided as Brule, Oglala, Minneconjou, Sans Arc, Two Kettle, Huno-papa, Blackfeet. The famous seven council fires of the Dakota Confederacy consisted of the four Santee bands, the Yanktons and Yank¬ tonai and the Tetons, considered as one band. In 1658 they had 30 towns on the Mississippi, the Missouri and Saint Croix. They were warlike and as late as 1862 a portion of the tribe attacked the whites and killed about 1,200. In 1890-91 the whites feared another uprising when the ghost-dance took place at the Pine Ridge agency. The Dakotas are located in the United States, chiefly in North and South Da¬ kota, Nebraska and Montana. There are about 900 in Canada and in the United States about 25,623. See Indian Schools; Reservations, Indian; Siouan.

DAKOTA. States of the United States, See North Dakota ; South Dakota.

DAKOTA RIVER. See James River.

DAKOTA STAGE, one of the formations of the Lower Cretaceous series

in the United States. The rocks, mostly conglomerates, clays and sandstones, cover a vast area extending over the Great Plains from Texas northward into Canada. Their origin is still a matter of speculation, since they are not marine ; and in Texas lie unconformably upon the Comanche limestone. Near the Rocky Mountains the Da¬ kota beds are much tilted, hardened and eroded. West of the Rocky Mountain uplift the Dakota rocks are more fine-grained and in¬ clude beds of coal or lignite of workable thick¬ ness. In much of the Rocky Mountain region the Dakota rests conformably upon Comanchean and even Jurassic strata. The exact equivalent of the Dakota stage along the eastern border of the United States is undetermined. The lower cross timber sand of Georgia and Missis¬ sippi is probably equivalent to the Dakota. See Cretaceous System.

DAKOTA WESLEYAN UNIVERSITY.

A charter for an institution to be known as Dakota University was obtained in 1883, as the result of a resolution of the Dakota Mission Conference held at Parker the year before. This resolution had provided for the appoint¬ ment of a committee to investigate various of¬ fers of land and money for the object of es¬ tablishing a school under the auspices of the Mission Conference. During the years 1883 and 1884 a stock companjr was formed, univer¬ sity addition to the city of Mitchell was plated, lots were sold, and in this way and by sub¬ scriptions, money was raised to begin the con¬ struction of a college building. In April 1885 a new company was organized and a new char¬ ter obtained which provided for the (<establishment of an institution of learning of high grade at Mitchell, S. Dak., whose course of instruction should become and be a full uni¬ versity course.® Provision was made also for the establishment of a preparatory department and of <(such auxiliaries and branches as shall be decreed by the board of directors, in localities where suitable aid shall be offered for that pur¬ pose.® The university and all of its depart¬ ments were to be under the control of the Meth¬ odist Episcopal Church. The university was opened and instruction was begun in the

fall of 1885. In 1886 the Dakota Conference at its session at Watertown formally accepted the new institution, and since that time it has been under the control of a board of directors elect¬ ed by the Conference. On 9 March 1888 the college building was completely destroyed by fire. Other quarters were, however, provided for the classes and the work continued without serious interruption. During the following year a new building was erected, the present College Hall. More recently Graham Hall, the President's House and Science Hall have been added. These buildings are all constructed of Sioux Falls granite. They are modern and well adapted to their purposes. Since the construc¬ tion of Science Hall the laboratories have been quite generously equipped. The total re¬ sources of the institution besides campus, buildings and equipment are approximately $300,000. The library contains 40,000 volumes and the total enrollment is 400. The attendance for the last school year is 369.

DAKSHA, dak'sha, in Hindu mythology, a priest to whom Siva, his son-in-law, gave a ram's head after he had cut off Daksha's head in anger, because he did not invite the god to his grand sacrifice.

DAL, dal, Vladimir Ivanovitch, Russian lexicographer : b. Lugansk, govt. Ekaterino-slav, 1801 ; d. Moscow, 3 Nov. 1872. Of Danish parentage, he studied medicine at Dorpat (now Yuriev), and as military doctor took part in the Turkish and Polish campaigns of 1828-31. He was attached to the governor-general's staff in Orenburg for some years, and later ac¬ companied the expedition to Khiva in 1839. Liberated from official duties, Dal made a tour of observation and research throughout the Russian Empire, collecting ethnographical data, folklore and some 30,000 proverbs, sayings and idioms. These he published between 1862 and 1879. His most valuable work was an Ex¬ planatory Dictionary of the Living Russian Languages y (in 4 vols., Moscow 1861-68). His

stories vividly reflect the characteristics of the people. A collected edition of his works was issued in Saint Petersburgh in 1860-61. His (Handbook of Botany } appeared in 1849.

DAL, a Swedish word signifying, like the German Thai, valley, as in Dalecarlia.

DALAGUETE, da-la-ga'ta, Philippines, a town on the southeast coast of Cebu, 44 miles southwest of the town of Cebu. It was found¬ ed in 1711. Pop. 21,825.

DALBERG, dal'berg, Karl Theodor,

baron von. Prince and Archbishop of Mayence, chancellor of the empire, and elector: b. 1744; d. Ratisbon, 10 Feb. 1817. Having made his academic studies in the universities of Gottin¬ gen and Heidelberg, he devoted himself to the study of canon law and entered the ecclesiasti¬ cal state. In 1772 he was made, by the Elector-Archbishop of Mayence, privy counselor and governor of Erfurt. His administration was directed purely to the welfare of the people and he earned the reputation of being a faithful and capable man of affairs. He continued in the service of the elector and at the death of his patron he succeeded him as archbishop, elector and arch-chancellor o*f the empire (1802). In 1804 the Pope, Pius VII, being then in Paris for the occasion of the crowning of Napoleon, Archbishop Dalberg was invited by Napoleon to Paris for the purpose of inducing Pope Pius to approve a proposed readjust¬ ment of ecclesiastical affairs in Germany. The archbishop served well the interests of the French emperor and later had his reward when the readjustment was effected, for, though he had to give up the archiepiscopal see of Mayence and his dignities in the empire, he was more than recompensed by being made metropolitan of Ratisbon, while Aschaffenburg, Wetzlar and Ratisbon were erected, on his be¬ half, into a princedom. Further his purely ec¬ clesiastical jurisdiction was enlarged by being made to extend over such parts of the ecclesi¬ astical jurisdiction of Mayence, Cologne and Treves as lie on the right bank of the Rhine. But of all these dignities and powers, except the archbishppric of Ratisbon, he was deprived after the fall of Napoleon. He was a man of learning, a lover and patron of art and the inti¬ mate friend of Goethe, Schiller, Wieland and the great contemporary lights of German lit¬ erature. He was author of several works on philosophy and aesthetics (much consulted by scholars), and he took a lively interest in nat¬ ural history, mineralogy, chemistry and agricul¬ ture. Consult Beaulieu-Marconnay, (Karl von Dahlberg und seine Zeit) (2 vols., 1879) ; and Kramer, (Life of Karl von Dahlberg) (Leip¬ zig 1821).

DALBERGIA, a genus of fine tropical forest trees and climbing shrubs, natural order Leguminosce, some species of which yield ex¬ cellent timber. D. lati folia (the blackwood, or East Indian rosewood) is a magnificent tree, furnishing one of the most valuable furniture woods. D. sissoo gives a hard, durable wood, called sissoo, much employed in India for rail¬ road sleepers, house-and shipbuilding, *etc.* Similar forms are found in Brazil.

DALCHO, Frederick, American physician: b. London, England, 1770; d. Charleston, S. C., 24 Nov. 1836. His father, a distinguished officer

under Frederick the Great, had retired to Eng¬ land for his health, and at his death Frederick came to Baltimore, Md., at the invitation of his uncle, who had removed to that place a few years before. Here he received a classical edu¬ cation, and then studied medicine, giving special attention to botany. He then entered the med¬ ical department of the army, and was stationed at Fort Johnson, Charleston harbor, but, in consequence of some difficulty with his brother officers, resigned in 1779, and practised in Charleston, where he was active in establishing a botanical garden. About 1807 he left his practice and became one of the editors of the Charleston Courier, a daily Federal newspaper. He began to be interested in theological studies in 1811, and in 1818 was ordained a priest of the Protestant Episcopal Church. In 1819 he became assistant at Saint Michael's, Charleston, where he remained until his death. He pub¬ lished (Evidence of the Divinity of Our Saviour * (Charleston 1820) ; (Historical Ac¬ count of the Protestant Episcopal Church in South Carolina) (1820) ; and (Ahiman Rezon)

(1822).

DALCROZE, dal'kroz', Emile Jacques,

Swiss composer and originator of eurythmics : b. Vienna, 6 July 1865. He lived in Geneva from 1873 to 1910. While pursuing the study of lit¬ erature at the University of Geneva, he also attended the conservatory. Later he studied with Fuchs, Graedener and Bruckner at the Vienna Conservatory, and also with Delibes in Paris. In 1892 he became professor of harmony and solfeggio at the Conservatory of Geneva. It was here that he first conceived his idea of laying special stress on rhythm. He began by insisting on his pupils beating the time with their hands. Gradually the feet and the entire body were called into play, thus co-ordinating the music with elaborate and graceful rhythmic movement. He had developed his ideas to a considerable extent when he succeeded in inter¬ esting the French psychologist

Edouard Clapa-ride, and together with him he elaborated a special terminology and reduced his practice to a system. When his request to have his system introduced as a regular course into the conserva¬ tory was refused, he resigned and left Geneva. At Helleran, near Dresden, he established in 1910 a special school for eurythmics, of which he was thereafter the director. The fame of this institution spread rapidly, so that within three years the system found its way into many schools of Germany, France, Russia and Eng¬ land. In 1913 it was introduced into Bryn Mawr College, and two special schools were established in New York and Chicago respectively. Fie has written two operas, Janie* (i893) and (Sancho Panza* (1897) ; (La Veillee* and (Poeme Alpestre,* for soli, chorus and orchestra; a violin concerto and some excellent songs.

DALE, Alan (Alfred J. Cohen), American dramatic critic : b. Birmingham, England, 14 May 1861. After leaving Oxford University he came to the United States and was dramatic critic on the New York Evening World 1887— 95, and on the New York Journal from 1895, and later on the New York American. He has published Jonathan's Home) ; (A Marriage Below Zero* ; (An Eerie He and She> ; (My Footlight Husband1* ; (A Moral Busybody* ; <An Old Maid Kindled) ; (Familiar Chats with

Queens of the Stage*; ˆConscience on Ice*; (His Own Image* ; (A Girl Who Wrote* (1902) ; < Wanted — A Cook* ; (The Great Wet Way* (1909).

DALE, David, Scottish manufacturer : b. Stewarton, Ayrshire, 6 Jan. 1739; d. Glasgow, 17 March 1806. He commenced life as a weaver, and having made the acquaintance of Sir Rich¬ ard Arkwright a partnership was entered into between them for the erection of cotton-mills on the Clyde, and the settlement of New Lanark was in consequence formed. He had also ex¬ tensive shares in other spinning factories estab¬ lished under his superintendence in various parts of Scotland, and was head partner in a large manufacturing firm in Glasgow, besides acting there as agent for the Royal Bank of Scotland. In 1799 he retired from business, and disposed of the works at New Lanark to a company of English capitalists, who entrusted the management of them to the celebrated Rob¬ ert Owen (q.v.), who afterward married Mr. Dale's eldest daughter. He was the founder and pastor of a small religious sect called <(Dalites,** or ((01d Independents.**

DALE, Richard, American naval officer : b. 1756; d. 1826. At the beginning of the Revolutionary War he joined the English serv¬ ice, but soon resigned and entered the American navy, serving under John Barry and later as first lieutenant to Paul Jones. Fie distinguished himself in the engagement between the Bon Homme Richard and the Serapis. He was sev¬ eral times a prisoner. He became captain after the war, and in 1801 commanded a squadron sent against Tripoli. He resigned the following year and the remainder of his life was spent in retirement.

DALE, Robert William, English Congrega¬ tional clerygman : b. London, 1 Dec. 1829; d. 13 March 1895. He was for many years one of the foremost of non-conformist leaders in England. In 1868-69 he was chairman of the Congrega¬ tional Union and for seven years was editor of The Congregationalist. In 1877 delivered a series of lectures on preaching at Yale Univer¬ sity, being the first Englishman appointed to the Lyman Beecher lectureship. Among his more important writings are (The Atonement* (1875) ; (Lectures on Preaching* (1877) ; (The Epistle to the Ephesians : its Doctrine and Ethics* (1882) ; (The Living Christ and the Five Gospels* (1890) ; fellowship of Christ* (1891). He was a versatile and powerful speaker and exercised an extended influence, both in the United States and England.

DALE, Sir Thomas, Colonial governor of Virginia : d. Masulipatam, India, 1619. The date of his birth is unknown. He served with the English troops in the Netherlands and in 1606 was knighted by James I. The London Company sent him to Virginia in 1611 with supplies. In the absence of the governor-general, Lord de la Warr, Dale acted as deputy governor from May to August 1611, when he was succeeded by Sir Thomas Gates, but he was in control again in 1614-16. His administration was noted for its severity. He placed the colony under martial law and republished a code of severe repressive laws, since known as ˆDale's Code.** He defeated the Indians and founded the settlements of Henrico and Ber¬ muda Hundred. He returned to England in

1616, was sent with an East India Company fleet against the Dutch in 1618 and defeated a Dutch fleet near the present Batavia in Novem¬ ber 1618. Consult Brown, (The Genesis of the United States> (Boston 1890) : id., <The First Republic in America > (ib. 1898) ; Bruce, Eco¬ nomic History of Virginia> (New York 1907). The laws above referred to may be found in Force, (Tracts and Other Papers Relating to the Colonies in America> (Vol. Ill, Washing¬ ton 1836-46).

DALE, Thomas Nelson, American geolo¬ gist: b. New York, 25 Nov. 1845. In 1885 he joined the United States Geological Survey, of which he became geologist in 1892. From 1893 to 1901 he was instructor in geology and bot¬ any at Williams College. He is author of <The Scientific Spirit Applied to Living Subjects) (1913); also various bulletins, reports and papers on geological subjects.

D'ALEMBERT, da'laii'bar', the assumed name of Jean le Rond, French mathematician and philosopher: b. 1717; d. 1783. He was the natural son of Chevalier Destouches and Madame de Tencin. As an infant he was left on the portico of the chapel of Saint Jean le Rond. His father contributed secretly toward his support and had him educated by the Jan-senists at the College Mazarin, where he was especially brilliant in mathematics, physics and astronomy. At the age of 22 he published a work on the integral calculus and two years later a work on the refraction of solid bodies. His (Dynamics y (1743) is an epoch in mechani¬ cal philosophy. In it is elaborated his famous principle, ((The impressed forces are equivalent to the effective force.® Fie was elected to the Academy of Sciences in 1741 and to the French Academy in 1754, becoming the perpetual secre¬ tary of the latter in 1772. From 1751 to 1758 he was associated with Diderot in editing the (Encyclopedic. } To it he contributed the gen¬ eral introduction, sketching in broad outline the evolution of civilization, art and science. He was invited by Frederick II to become presi¬ dent of the Berlin Academy, and by Catharine II of Russia he was offered 100,000 francs a year as tutor to her son. Because of his desire to live simply, he refused both offers. In his last years he was closely associated with Mile, de l'Espinasse, and her death in 1776 was a shock from which he never recovered. D'Alembert ranks among the greatest geometri¬ cians of his century, and holds a high place also in literature and philosophy. His great service to letters was his exposure of the evils of patronage and his fostering the independence of his class from social and political power. Consult Bertrand, <D'Alembert) (Paris 1889) ; Condorcet, (Eloge de D'AlemberD (delivered before the Academy, 1784) ; Tallentyre, ((D' Alembert the Thinker,® in his (Friends of

Voltaire) (London 1906). There is a partial edition of D'Alembert's <Works) by Bossange (Paris 1821).

DALEN, (Nils) Gustaf, Swedish engineer: b. Stenstorp 1869. He was educated at the Gothenburg Engineering Institute and the Zurich Polytechnicum. An eminent consulting engineer, he was employed by the Swedish Carbide and Acetone Company in 1905, and later by the Swedish Gas-Accumulator Company. He in¬ vented a method for dissolving acetylene in

acetone which is used for automatic lighting in unmanned lighthouses and for railway signals ; and he improved hot-air turbines, air com¬ pressors and milking machines. In 1912 he re¬ ceived the Nobel prize in physics and in 1913 was elected to the Royal Swedish Academy of Science. He wrote technical papers and a book, (Chemische Technologie des Papiers) (1911).

DALHOUSIE, George Ramsay, 9th Earl of, English soldier and administrator: b. 1770; d. 1838. He saw service at Martinique, in the Irish Rebellion of 1798, in Egypt and in the Peninsular War, and was present at the battle of Waterloo. In 1815 he was raised to a peerage of the United Kingdom as Baron Ramsay. He was lieutenant-governor of Nova Scotia, 1816-20, and founded Dalhousie College (q.v.), Halifax. His term as governor-in-chief of Canada, 1820-28, was marked by conflicts with Papineau and the Lower Canada assembly. He was instrumental in founding the Quebec Literary and Historical Society, and in raising a monument to the joint 'memories of Montcalm and Wolfe.

DALHOUSIE, James Andrew Ramsay,

10th Earl and 1st Marquis of, British states¬ man : b. near Edinburgh, 22 April 1812 ; d. 19 Dec. 1860. After filling the offices of vice-president (1843) and president of the board of trade (1844), he was appointed governor-general of India (1847). In the administration of In¬ dian affairs he showed marked ability, establish¬ ing railway lines, telegraphs, irrigation works, *etc.* Under his rule was annexed the Punjab, Oude, Berar and other native states, as well as Pegu in Burma, to the British Empire. His policy of annexation — especially where it was brought about through the failure of natural heirs in native states adjoining the British do¬ minion, has been severely criticized ; but that aside, he is regarded as one of the greatest of the Indian proconsuls. He was created a marquis in 1849.

DALHOUSIE, New Brunswick, capital of Restigouche County, and a port of entry. It is situated on Chaleurs Bay and the estuary of Restigouche River. The chief industries are fishing and trading in lumber, salmon and lobsters. Pop. 1,650.

DALHOUSIE COLLEGE AND UNI¬ VERSITY, an institution of learning located at Halifax, N. S. It was founded in 1818 by the Rt. Hon. George Ramsay (q.v.), 9th earl of Dalhousie, whose last public act in Nova Scotia was the laying of the cornerstone of the old building, 22 May 1820, but it was not until 13 Jan. 1821 that the (<bill to incorporate the Governors of Dalhousie College at Halifax® became a law. The purpose of the college as originally stated was <(for the education of youth in the higher branches of science and literature,® and ((to be open to all occupations and sects of religion.® It was to be modeled after Edinburgh University. The first name of Dalhousie was the <(College of Halifax,® but in 1821 the legislature granted £1,000 to the new college and named it after its founder. The original endowment, about £10,000 ($50,000), was derived from funds collected at the port of Castine, Me., during its occupation in 1814 by Sir John Sherbrooke, then lieutenant-gov¬ ernor of Nova Scotia. In 1841 university powers were granted to the college. The early

history of Dalhousie is a brave struggle for existence. Two attempts were made to unite It with King's College (q.v.), but both proved failures. It did not open its doors until 1838, and closed them again in 1843. From 1844 to 1863 Dalhousie ceased to operate as a college, and the governors either allowed the funds to accumulate or managed it as a high school. In 1863 the college wras reorganized, with a staff of six professors, a tutor in modern languages and about 60 students. The governing bodies of the institution are (1) the board of gov¬ ernors, the supreme governing body ; appoint¬ ments to it are made by the governor-in-council on the nomination of the board. The governors have the management of the funds and the property of the college ; the power of appoint¬ ing the president, professors and other officials, and of determining their duties and salaries, and the general

oversight of the work of the university. (2) The senate, consisting of the presidents and professors. To this body are entrusted, by statute, th(e internal regulations of the university, subject to the approval of the governors. All degrees are conferred by the senate. (3) The faculties of arts and science, law, medicine and dentistry. These are commit¬ tees of the senate for the supervision of the teaching of the university, the preparation of regulations governing the courses of study and the recommendation of suitable candidates for prizes, scholarship, diplomas and degrees. In addition to the courses in the liberal arts and in pure science and engineering, the university has schools of Law, Medicine and Dentistry. In affiliation with the Halifax Conservatory of Music it gives courses for the diploma of Licentiate of Music and the degree of Bachelor of Music. In affiliation with the Nova Scotia College of Pharmacy it gives courses leading to the degree of Bachelor of Pharmacy. The university is well equipped for its work and is constantly enlarging its sphere of usefulness. It has a large student body and admits students of either sex. The first site of the college was on the Grand Parade. In 1887 the college was removed to Carleton street, where the professional schools still are. In 1915 the Arts and Science departments were removed to the Studley estate, a beautiful site of 42 acres on the outskirts of the city, near the North West Arm. This was made possible by the results of a canvass for funds for building and endowment in 1912 which brought in $400,000. The buildings already erected on the new site are the Science Building, the cornerstone of which was laid by H. R. H. the Duke of Connaught, governor-general of Canada, and the Macdonald Memorial Library, the style of architecture chosen being 18th century Georgian. Many generous gifts have been made to Dal¬ housie, notably those of the late George Munro of New York, from 1879 to 1884, amounting to about $350,000, which did much to put the institution on a solid financial basis. Alexander McLeod, Sir William Young, John P. Mott, Dr. D. A. Campbell, Joseph Matheson and John Macnab have also made large gifts. Dalhousie University was put on the first list of the Accepted Institutions of the Carnegie Founda¬ tion. It is the chief institution of learning in eastern Canada, and draws students not only from all over the Dominion but also from Newfoundland and the West Indies. It is

noted for the number of its graduates who have attained eminence in educational and professional life. It is non-sectarian, and is supported en¬ tirely by its .endowment.

DALECARLIA, or DALARNE, an old district of Sweden, now included

in the prov¬ ince or Uin of Kopparberg.

DALIN, da-len', Olof von, Swedish his¬ torian and poet : b. Vinberg, Holland, 29 Aug. 1708; d. Drottningholm, 12 Aug. 1763. He studied at Lund, visited Stockholm, where he received a minor public office in 1726. He began to publish the weekly Svenska Argus in 1733 which appeared anonymously. This was followed by (Tankar ofver Critiquer' ((Thoughts About Critics') in 1736 ; (The Story of the Horse and Aprilverk,' a series of politi¬ cal satires (1738) ; and (Svenska Friheten' ((Swedish Liberty,' 1742). He then received a series of offices, first as tutor to the crown prince (1751) ; secretary of the Swedish Acad¬ emy of Literature (1753). He endured a short period of political exile (1756-61) during which he wrote his most famous work, (Svea Rikes historia) ((History of the Swedish Kingdom'), which was published in three volumes (1746-62). He was ennobled in 1751, was made privy councillor in 1753 and remained at court as royal historiographer until his death. Besides the works already mentioned, he wrote several minor dramatic works and numerous poems, epigrams, *etc.* His style is characterized by great vigor and spirit. The best edition of his poetical works appeared at Stockholm (1782-83).

DALKEITH, Scotland, market town, six miles southeast of Edinburgh. It has a corn market, a large and commodious market hall, erected in 1854; manufactories of carpets, brushes and bricks, besides iron foundries and tanneries. There are large coal mines near by. Much truck gardening for Edinburgh is car¬ ried on in the neighboring country. Dalkeith arose around an ancient castle, which was long a stronghold. It was successively held by the Grahams, the Douglases, the Earls of Morton and the Earls of Buccleuch. Dalkeith Palace, the chief seat of the Duke of Buccleuch and Queensbury, built about 1700 on the site of the old castle, is a large square structure overhang¬ ing the North Esk. Three times English rulers have occupied the palace on visits to Scotland. Pop. 7,019.

DALL, Caroline Wells Healey, American author: b. Boston, Mass., 22 June 1822; d. 1912. She lectured frequently on theological subjects and on questions associated with the ameliora¬ tion of conditions affecting woman and was a founder of the Social Science Association. For many years she conducted a class in literature and morals at her home in Washington. With Mrs. Pauline Wright Davis, she founded Una, a journal devoted to woman's rights and the pioneer publication of its kind in Boston. The writings of Mrs. Dali are devoted chiefly to a discussion of the rights of woman, and her work {The College, the Market and the Court or Woman's Relation to Education, Employ¬ ment and Citizenship) (1867), is a widely known contribution t-o that

subject. She was an indus¬ trious literary worker, and wrote many other books, among which are (Essays and Sketches ' (1849); (Woman's Right to Labor' (1860); (Egypt's Place in History' (1868) ; (Patty

Gray's Journey to the Cotton Islands,' and (\hat We Really Know About Shakespeare) (1885); (Nazareth' (1903); <Fog Bells' (1905).

DALL, William Healey, American natural¬ ist : b. Boston, 21 Aug. 1845. He was a special student in natural sciences under Louis Agassiz. In 1865-68 he accompanied the International Telegraph Expedition to Alaska, and from 1871 to 1884 he was on the United States Coast Survey of Alaska. In 1880 he became honorary curator of the United States National Museum, and in 1893 professor of invertebrate paleon¬ tology at the Wagner Institute of Science, Phila¬ delphia. In 1884-1905 he was paleontologist to the United States Geological Survey. He has received many honorary degrees, including that of LL.D. from George Washington University in 1915. His publications number some hundred titles, mostly on scientific subjects. He wrote works on the natural history of Alaska, such as < Alaska and Its Resources' (1870) ; (Reports of the Mollusca of the Blake Expedition' (1880-90) ; (Mollusca of the Southwestern Coast of the United States' (1890).

DALLAS, Alexander James, American statesman: b. Island of Jamaica, 21 June 1759; d. Trenton, N. J., 14 Jan. 1817. He was edu¬ cated at Edinburgh, studied law in London and settled in Philadelphia in 1783. He became eminent at the bar, and was United States dis¬ trict attorney in Pennsylvania from 1810 to 1814. He was Secretary of the Treasury under Madi¬ son from 1814 to 1816 and in this capacity recommended to Congress the incorporation of a new United States Bank. For a short time he also served as Secretary of War. He originated a definite financial policy for the treasury and left it with a surplus of $20,000,000 within two years after he had found it bankrupt. He pub¬ lished (Reports of Cases Ruled and Adjudged by the Courts of the United States and of Pennsylvania before and since

the Revolution' (4 vols., 1790-1807) ; (Address to the Society of Constitutional Republicans' (1805) ; Expo¬ sition of the Causes and Character of the War of 1812-15' (1815). Consult (Life and Writ¬ ings of Alexander James Dallas,' by his son, George M. Dallas (Philadelphia 1871).

DALLAS, George Mifflin, American diplo¬ matist : b. Philadelphia, Pa., 10 July 1792; d. there, 31 Dec. 1864. He was the son of A. J. Dallas (q.v.). In 1813 he was admitted to the bar, and soon after entered the diplomatic serv¬ ice. In 1831 he was elected a United States Senator from Pennsylvania; was United States Minister to Russia 1837-39, and in 1844 was elected Vice-President of the United States. In 1846 his casting vote as president of the Senate repealed the protective tariff of 1842, though he had previously been considered a Protectionist. His course on this question aroused much indignation in Pennsylvania. _ He was United States Minister to Great Britain from 1856 to 1861. His principal published writings were posthumous, and include a (Series of Letters from London' (1869), and a (Life of A. J. Dallas' (1871).

DALLAS, Ga., town, county-seat of Pauld¬ ing County; on the Southern and Seaboard Air Line railroads ; about 34 miles northwest of Atlanta. There are cotton, yarn, hosiery mills, and several gold mines. New Hope Church, vol. 8 — 27

four miles from Dallas, was the scene of a sharp conflict betwen the armies of General Sherman and General Johnston on 25-28 May 1864. Pop. 1,259.

DALLAS, Ga., Battle Lines at. After the Confederate evacuation of Dalton (see Dalton, Ga., Military Operations at), 12 May 1864, and the battle of Resaca, 14—15 May, Gen. Joseph E. Johnston's army retreated by way of Calhoun and Adairsville to Cassville, where General Johnston prepared to make a stand, and General Sherman closed in on him for battle; but Johnston abandoned Cassville during the night of the 19th, and next day crossed to the south side of the Etowah. Sherman occupied Cassville and Kingston, and prepared for an¬ other advance. As Johnston held the line of the railroad at Allatoona Pass and other points in advance of Marietta, Sherman concluded to turn those positions by moving from Kingston to Marietta by way of Dallas, a small town about 25 miles south of Kingston and 20 miles west of Marietta, and the converging point of many roads. On the 23d the movement began, but on the same day the Confederate cavalry discovered it, and Johnston divined its

intention and prepared to check it by marching to Dallas and covering the roads leading to it.

On the 25th as the advance of Hooker's (Twentieth) corps neared Dallas it was discov¬ ered that Hood's Confederate corps held the cross roads at New Hope Church, four miles northeast of Dallas. Hooker concentrated his corps and attacked Hood late in the evening and was repulsed with a loss of 1,346 killed and wounded, and about 60 missing. Hood's loss was less than 400. During the night and early next day the rest of the army moved up on the right and left of Hooker and entrenched, Mc¬ Pherson's two corps, on the right, holding Dallas.

Sherman gradually extended to the left, skirmishing heavily all along the line, and on the evening of the 27th T. J. Wood's division of the Fourth corps attacked the extreme right of the Confederate army near Pickett's Mill and, after a most gallant effort, was repulsed with a loss of 1,224 killed and wounded and 318 missing. The Confederates reported a loss of 85 killed and 363 wounded. This engagement was a little over two miles northeast of New Hope Church.

There was now heavy skirmishing all along the line, some seven miles in length; and Sher¬ man, still extending to the left, ordered Mc¬ Pherson, who was entrenched at Dallas, to close in on Hooker at New Hope Church, that Hooker might extend to the left; but McPher¬ son deferred the movement until next day (28th), and was getting ready to make it when he was attacked. The Confederates made a desperate effort to seize his works, but were repulsed with a loss of some 390 killed and wounded. McPherson's loss was over 400, of whom 325 were killed and wounded and 54 missing in the Fifteenth corps, which bore the brunt of the assault. This was the battle of Dallas.

Sherman continued his movement to the left; McPherson left Dallas 1 June, and closed in on Hooker at New Hope Church; Hooker went to the left ; all the wagon roads leading to Allatoona and Ackworth were secured. Alla-

toona was seized, also the railroad back to the Etowah, and 4 June Sherman was preparing to attack Johnston, at New Hope Church, when he found that he had abandoned all his works and fallen back to Kenesaw Mountain ; whereupon Sherman moved to the railroad at Ackworth and Big Shanty, and the first stage of the campaign for Atlanta ended. The Union loss in the battles and constant heavy skirmishing near and at Dallas (25-31 May) was about 3,600 killed and wounded. Johnston reports the Confederate loss at 2,005 killed and wounded. The first stage of the campaign (6-31 May) cost the Union army 9,299 killed, wounded and missing; Johnston reports the Confederate loss for the same period at 5,807 killed and wounded. Consult (Official Records > (Vol. XXXVIII) ; Van-Horne, (History of the Army of the Cumberland> (Vol. II) ; Sherman, <Memoirs) (Vol. II).

E. A. Carman.

DALLAS, Ore., city, county-seat of Polk County ; situated on La Creole Creek and the Southern Pacific and other railroads ; about 70 miles southwest of Portland. The industries are dependent upon the production of the fertile Willamette Valley, in which Dallas is situated. Flour mills, sash and door factories, sawmills, organs, leather and woollen factories and tan¬ neries constitute some of the industries. Sand¬ stone quarries in the vicinity furnish excellent stone. The industrial interests are promoted by good water power. Dallas was settled in 1849 and in 1891 was chartered as a city. It con¬ tains a Carnegie library. Pop. (1920) 2,527.

DALLAS, Tex., city, county-seat Dallas County, 270 miles north of the Gulf of Mexico on the Trinity River, navigable to that point, and on nine steam and five electric interurban railroads. The steam railroads are the Missouri, Kansas and Texas Railway; Missouri, Okla¬ homa and Gulf Railway; Houston, Texas Cen¬ tral Railway; Texas and Pacific Railway; Texas and New Orleans Railway; Gulf, Colorado and Santa Fe Railway; St. Louis and San Fran¬ cisco Railway, and the St. Louis Southwestern Railway. The interurban railway lines are the Texas Traction Company to Denison, north 77 miles; Southern Traction Company to Waco, south 97 miles, and to Corsicana, southeast 56 miles; Northern Texas Traction Company to Ft. Worth, west 30 miles, and to Cleburne, southwest 67 miles. Dallas has a new

union (steam) terminal station, opened to the public in 1916, representing an investment in building and grounds of over $6,500,000; and a new electric interurban station representing an in¬ vestment in building and grounds amounting to

$1,600,000.

Commerce, Industries. — Dallas is the centre of the famous black lands of the Southwest, the principal products of which are cotton, corn, wheat, oats, truck and fruit. As the largest inland cotton market in the world the Dallas Cotton Exchange handles 1,500,000 bales of cotton in a normal year. The 1914 census gave the number of factories as 412, capital invested $23,488,000, with a total output of $42,559,789. Dallas leads in the manufacture of cotton gin¬ ning machinery and in saddlery and harness. Other important industries are flour mills, port-land cement plants, oil refinery, iron and metal works, brewery, packing houses, cotton seed

oil mills, cotton compresses, grain elevators, *etc.* The largest wholesale jobbing and distributing centre of the Southwest, with 570 jobbers and manufacturers, that in a normal year do $262,- 000,000 business, Dallas is the distributing centre for automobiles of the Southwest, with large factories having assembling plants here, and in the sale and distribution of agricultural im¬ plements is second only to Kansas City. Dallas ranks 28th in postal receipts in the United States, is seventh in express business, sixth in tele¬ graph business. It is the Southwestern head¬ quarters for all classes of insurance business and is the home of the 11th District of the Federal Reserve Banking System, with 686 banks, whose capital and surplus amount to $49,972,500. There are 10 banks in the city of Dallas, whose resources on 1 Jan. 1918 amounted to $96,662,549, with deposits amount¬ ing to $80,143,274. The State Fair of Texas is the most successful institution of its kind in the world. It is unique in its organization, never having received State or Federal aid. All of its receipts are devoted to paying the expense of the annual fair and to making improvements upon its 162 acres of ground, which is the property of the city, being turned over to the city for park purposes with the exception of one month in the year during the annual fair. The plant was worth (1918) $2,200,000. As high as 1,001,400 admissions have been recorded during the two weeks of the fair. The permanent buildings are built of reinforced concrete and are The Coliseum,

150x200 ft., seating capacity 5,000; Textile and Fine Arts Building, 125x125 ft. ; Exposition Building, 280x375 ft.; Ladies' Rest Cottage; Live Stock Pavilion, 124x192 ft. — cattle and swine barns are of reinforced concrete steel, with steel pens for the swine; Vehicle and Implement Building, 200x 550 ; Grand Stand, 60x300 ; Automobile Build¬ ing, 148x296. There are 19 individual and per¬ manent exhibit buildings owned and erected by exhibitors.

Public Buildings, *Etc.* — Dallas is the con¬ vention city of the Southwest, with ample hotel facilities, unsurpassed by any city of its size ; the Adolphus Hotel, the latest addition, 23 stories high, costing $1,600,000, with an addi¬ tion or annex costing $1,000,000; and adequate convention halls. Notable among public build¬ ings are the city hall, courthouse, public li¬ brary, the cathedrals of the Sacred Heart and of Saint Matthew's, the city hospitals and Saint Paul's and the Baptist Memorial sani¬ taria. One of the longest concrete via¬ ducts in the world connects the city proper with Oak Cliff, a residential section of the city on the west side; this was built at a cost of $657,466. Much activity has been displayed in recent years in street paving and the develop¬ ment of a comprehensive system of boulevards, under a city plan. On 1 Jan. 1918 Dallas had 160 miles of paved streets, with 325 miles of cement sidewalks. The parks of the city, taste¬ fully laid out, now cover 400 acres, and with public playgrounds are being developed to cover eventually 3,500 acres easily accessible.

Government. — Dallas enjoys the commis¬ sion form of government, having been one of the first cities to adopt this plan. The property in the city is assessed for taxation at $136,971,975, the city tax rate being $1.95, and the State and county tax rate being $1.10.

Schools, Churches. — An important, educa¬ tional centre, the principal educational institu¬ tions are the Southern Methodist University, with cash assets of $3,000,000 and 660 acres of ground, which opened in 1915 with 800 stu¬ dents; Dallas University (Catholic institution for boys), an investment in building and grounds

amounting to $500,000 ; the Baylor Medical College and 53 private schools. There are 3 high schools and 29 ward schools in Dal¬ las, the city having an investment in buildings, grounds and equipment of $2,000,000. The scholastic population of Dallas is 27,229. Dal¬ las has 154 places of worship, of all denomi¬ nations.

Climate. — The following are the average or normal temperatures in degrees Fahrenheit at Dallas as shown in the Special Bulletin No. 5, United States Department of Agriculture Weather Bureau: January, 46.3; February, 50.9; March, 57.3; April, 67.7; May, 73.4; June, 81.4; July, 84.4; August, 82.5; September, 76.8; October, 66.4; November, 55.5; December, 53.9, and annual, 66.4. The relative humidity, as it affects evaporation, is a potent factor in keep¬ ing the human organism cool. At Dallas the average humidity for the year at 7 a.m., 90th meridian time, is 80 per cent, and the average at 2 p.m. is about 43 per cent for July, 53 per cent for August and 54 per cent for September. Maximum or highest temperature recorded at the local office of the United States Weather Bureau since it was established in Dallas Octo¬ ber 1913 was 102° on 30 July 1914. The tem¬ perature for the year of 1915 did not go as high as 100°. There is generally a cool, fresh and invigorating southerly breeze from off the Gulf of Mexico throughout the summer months that adds much to the comfort of the inhabitants of Dallas, and when this is taken into consideration with the records of the tem¬ perature and humidity it can readily be seen why sunstrokes are almost unknown in this section of the country.

Population. — In 1885 the population of Dallas was 10,000; (1900) 42,438; (1910)

92,104; July 1917 the government estimate was 129,632 and the Chamber of Commerce and Manufacturers' Association estimate 1 Jan. 1918 (which includes suburbs not included in government estimate), 147,000; (1920) 158,976.

Grant S. Maxwell,

Secretary of Dallas Chamber of Commerce and Manufacturers' Association.

DALLES, The, or DALLES CITY, Ore., county-seat of Wasco County; on the Oregon-Washington Railroad. It is about 30 miles northeast of Mount Hood, and on that portion of the Columbia River (on the Washington State boundary line) where the scenery is noted for grandeur. The Dalles contains Saint Mary's Academy, a Carnegie

library and a hos¬ pital. It is situated in a sheep and cattle-rais¬ ing country, hence its trade is largely in cattle and wool, live stock, grain and fruit. Fruits grow here in the Columbia Valley. Its chief industries are flour and grist milling and wool scouring, box factories, salmon and fruit can¬ neries, lumber yards, machine shops, *etc.* A military post at Fort Dallas was established in 1838, and about the same time a mission was opened by the Methodist Church. The railroad station is known by the name of Dalles and the local name often used is Dalles City; but the

name of the postoffice is The Dalles. It was incorporated in 1858. The government is ad¬ ministered by a mayor, elected annually, and a municipal council. The waterworks are owned by the city-Pop. (1920) 5,807.

DALLIN, Cyrus Edwin, American sculp¬ tor: b. Springville, Utah, 22 Nov. 1861. In his native West he came into close contact with Indian life, in the realistic and impressive por¬ trayal of which he excels all other artists. He studied under Truman Bartlett in Boston and under Chapu in Paris, where Buffalo Bill's Wild West Show inspired his first equestrian statue, the (Signal for Peace5 (1890), which received a gold medal at the Chicago Exposi¬ tion of 1893, and is now in Lincoln Park in that city; this was followed in 1899 by (The Medicine . Man5 (Fairmount Park, Philadel¬ phia), considered one of the most notable products of American sculpture. His other works include the marble statue of Sir Isaac Newton in the Congressional Library at Wash¬ ington; (Don Quixote,5 which received a gold medal at the Saint Louis Exposition of 1904; the monument to the pioneers in Salt Lake City, and (Peace or War5 (1906) ; and (The Redskin's Prayer5 (1909). Consult Brush and Pencil , Vol. V, and Taft, (History of American Sculpture5 (New York 1903).

DALLINGER, William Henry, English scientist and clergyman : b. Devonport, England, 5 July 1842. He entered the Wesleyan minis¬ try in 1861 and after being minister at Liver¬ pool 12 years was governor of Wesley College, Sheffield, 1880-88. His microscopical researches began in 1870. He became fellow of the Royal Society in 1880, has been Rede lecturer to the University of Cambridge, lecturer at Oxford and at the Royal Institution and was president of the Royal Microscopical Society 1883-87. He has published (Minute Forms of Life5 (1886); (The Origin of Life5 (1878); <The Creator and What We May Know of the Method of Creation5 (1887) ; revision of Car¬ penter's (The Microscope and Its Revelations5

(1891).

DALMAN, dal'man, Gustaf Hermann,

German Lutheran scholar : b. Niesky in Si¬ lesia, 9 June 1855. He was educated among the Moravians and was graduated from their theological school at Gnacfenfeld. Here he was professor of the Old Testament and practical theology 1881-87. In 1887 he left the Mora¬ vians and joined the Lutherans and the same year received the degree of Ph.D. at Leipzig University. For the next 15 years he was a professor and finally the director of the Institutum Delitzschianum at Leipzig. Beginning with 1890 he has been associate professor of Old Testament Exegesis in the University of Leipzig. Since 1902 he has been on furlough and has been serving as director of the German Evangelical Archaeological Institute in Pales¬ tine. He has been a voluminous writer, his writings covering quite a wide range in the various fields of theology. Several of his works have been translated into English. His most important productions are Christianity and Judaism5 (German, 1898; English, 1901) ; <The Words of Jesus considered in the light of Post-biblical Writings and the Aramaic Lan¬ guage5 (Edinburgh 1902). He has been a pro¬ found student of the Aramaic, and issued a

grammar of the language in 1894. It has not been translated into English.

DALMANUTHA. A place mentioned in the New Testament (Mark viji, 10.). Rendell Harris conjectures that the name is a corrup¬ tion from the Syriac. Other writers think Megiddo is meant. YV. M. Thompson located it on the sea of Galilee, one mile north of Jarmuk, at a site now known as Ed-Delemiyak. Sir C. Wilson and H. B. Tristram suggest that the site is one and a half miles from Migdel.

DALMATIA. A district of Jugoslavia forming part of the republic of the

Serbs, Croats and Slovenes and situated ale “ > g the eastern Adriatic coast. It is bounded to the north by Croatia, to the east by Bosnia-Herzegovina, to the south by Montenegro. The area is 4,956 square miles. There are about 500 islets of which about 50 are of appreciable size and importance, belonging naturally to Dalmatia and known generally under the name of Dal¬ matian Archipelago. The largest (exceeding 100 square kilometers) and most fertile are Brazza, Lessina, Curzola, Meleda, Lissa, Solta and Lagosta. The numerous channels, straits, gulfs, bays, fjords and the hills and rocks of the mainland branching from the mountain range of the Dinaric Alps, give the country a most picturesque aspect. The Gulf of Cattaro, which is in the extreme south of Dalmatia, is one of the finest harbors in Europe. The principal rivers are Neretva, Zrmanja, Krka and Cetina, but there are many rivulets and brooks whose course is interrupted by frequent cascades of incomparable beauty. The climate is moderate as the thermometer never shows below zero (C) in winter and the heat in sum¬ mer is tempered by many winds. The most important towns are Dubrovnik (Ragusa), Zadar (Zara), Shibenik (Sebenico), Blato and Kotor (Cattaro). By a recent census the population of Dalmatia was computed to 645,- 666 consisting chiefly of Serbo-Croatians (about 95 per cent). According to the same census there were 510,669 inhabitants speaking Serbo-Croatian language, 3,065 persons speaking other tongues and 18,025 speaking Italian. Serbo-Croatian is the official language but the use of Italian, which is known to the majority of urban population, is also permitted. Notwith¬ standing the dearth of water and forests the vegetation of Dalmatia is very diverse. The rich forests were cut down by the Venetians for the construction of their mighty fleets. The fields sown with cereals of all description cover 11 per cent of the entire area. The chief products of Dalmatia are wine, which is of an exceptionally good quality, and olive oil. Agri¬ culture is very popular and prosperous in the islands but the most usual industries and manu¬ factures are almost totally absent. Shipbuild¬ ing, wine and oil-pressing are the principal in¬ dustries. Cattle and horses are very scarce while sheep and goats are numerous and of good breed. Asphalt, lignite and salt are mined. The ports of Dalmatia are very active as the bulk of the republic’s foreign com¬ merce is conducted through them. There arrive about 20,000 merchant vessels every year. Olive oil, maraschino cordial, fish, meat, honey, wine and asphalt are exported. Cereals are a principal item of import. The ways of com¬

munication in the interior of the country are wholly inadequate chiefly on account of the rocky configuration of the soil, despite the

good lesson which Napoleon I taught the inhabitants while he ruled the Illyrian provinces. There are about 145 miles of railway. Dalmatian waters teem with many varieties of delicious fish and fishing constitutes one of the chief re¬ sources of the inhabitants of the coast. Sar¬ dines and tunny-fish are caught in enormous quantities.

Education is obligatory between the ages of 6 and 12 and there is hardly a village to be found without at least one primary school. There are two theological seminaries at Zara and many secondary, naval, commercial and professional schools and agricultural colleges, all of which are supported by the central government. At Ragusa and Cattaro there are naval colleges which supply officers for the mer¬ cantile marine. In 1911 there were 458 elemen¬ tary schools with 58,000 enrolled pupils.

Prior to the Roman invasion of Dalmatia the country was populated by the Illyrians against whom a military expedition was sent by Rome under the leadership of Consul Origul in the year 156 b.c. but the definite subjugation of that province was effected by Augustus on the occasion of pacification of the Pannonians a.d. 6. The Illyrians were occupying them¬ selves chiefly with cattle raising, agriculture and seafaring. Dalmatian pirates are notorious in the history of navigation in the Adriatic. The language and customs of the Dalmatians soon gave way to the Latin, and Diocletian, born in Dalmatia, transferred his capital to Spalato (((Palatium))). The ruins of the imperial palace are still to be seen in that town. Upon the fall of the Roman Empire in 395 Dalmatia was apportioned to its eastern part only to be conquered, about a century later, by the Ostro¬ goth kings. In the course of the 6th century the Avars took hold of Dalmatia but had soon to yield it to the irresistible invasions of the Serbians who divided the entire province in several counties with Belgrade (Zara Vecchia) as the capital. The influence of Venice was felt in Dalmatia as early as the 10th century, but it was only in 1104 that Doge Dominico Minieli succeeded in defeating the Hungarian king, Koloman, who had effected a union with the Croatians and proclaimed himself king of Croatia-Dalmatia. The city of Belgrade was demolished by the Venetians. After the fall of the Republic of Venice (1797) Austria, by virtue of the Treaty of Campo Formio obtained sovereign rights over Dalmatia but had soon (1805) to cede it to Napoleon who incorporated that province in his famous Illyrian Kingdom. The little Republic of Dubrovnik (Ragusa) re¬ tained its autonomy until 1808 but Napoleon abolished it in that same year.' By the Treaty of Vienna (1815) Dalmatia was again given to Austria. In 1869, when the Austrian Govern¬ ment introduced in Dalmatia

universal con¬ scription, a rebellion took place in Krivoshiya and Bocca di Cattaro and the Austrians suffered great losses in men and provisions. However the year 1881 saw a fresh insurrection which lasted until 1882 when it was put down with great cruelty by the Imperial army. Emperor Francis Joseph I, by his acts of 26 Feb. 1861 and 1 Jan. 1868, granted charters whereby Dal¬ matia formed part of the Triune Kingdom of

Croatia-Slavonia-Dalmatia whose king was the sovereign of Austria-Hungary. The head of the government in Zagreb bore the title of Ban of Croatia, Slavonia and Dalmatia. In the Imperial Parliament in Vienna Dalmatia was represented by 11 deputies elected by universal suffrage of whom nine were Croatians and two Serbians. The principal instrument of the public local government was the Diet (Sabor). Its power, organization and functions were de¬ fined by the constitution of the country. When the Dual Monarchy broke up as a result of the Great World War, Dalmatia joined with Slo¬ venia, Croatia and Bosnia in declaring their in¬ dependence and subsequently joined the move¬ ment for the formation of the Serb, Croat, Slo¬ vene State (Jugoslavia), by the union of the Slovenian parts of Austria-Hungary with Serbia.

Bibliography (see also Jugo-Slavia) . Sakchinski, I. K., (Putne Uspomene iz Kroat-ske, Dalmacije, etcP (Zagreb 1873) ; Iriarte, (Les bords de l'Adriatique et le Montenegro* (Paris 1878) ; De Nolhac, (La Dalmatie) (Paris 1882) ; Pisrni, (Les possessions venetiennes en Dalmatie> (Paris 1890) ; Jackson, (Dalmatia, the Quarnero and Istria) (Oxford 1887) ; Hutchinson, F. K., (Motoring in the Balkans along the highways of Dalmatia, Montenegro, the Herzegovina and Bosnia) (Chicago 1909) ; Jelich, (Das alteste kartographische Denkmal iiber die romische Provinz Dalmatien* (in Wissenschaftliche Mitteilungen aus Bosnien und der Herzegovina, Vienna 1900) ; Krshnjavi, I., (Dalmatiens und Bosniens staatsrechtliche Zu-kunft) (Oesterreichische Rundschau, October, Briinn, 1906) ; Lux, J. A., <Reisebilder aus Dalmatien,* (Leipzig 1908).

W. M. Petrovich,

Chief of Slavonic Division, New York Public Library.

DALMATIAN DOG. See Dog.

DALMATIC (Dalmatica) , an ecclesiastical vestment, open at each side below the insertion of the sleeves, which are wide. It is the princi¬ pal vestment worn by the deacon in the Roman Catholic Church when ministering at the Mass, or in processions and in other functions. It is also worn under the chasuble, by bishops, when they celebrate the Mass pontifically; and it is a part of the vesture of a king both in England and in continental European countries. It is commonly of silk; its color varies according to directions of the ritual. The dalmatic was originally a long undergarment of white Dal¬ matian wool, but little different from the Roman tunic, and not till the fourth century was it a distinctively ecclesiastical garment. At first it was worn only by the Roman deacons, but later its use extended throughout the whole Church. So, too, the use of the dalmatic as part of the solemn attire of bishops was at first restricted to the Pope, but afterward was conceded to all bishops. In the Greek Church a vestment an¬ swering to the dalmatic, called stoicharion, is worn by deacons in solemn functions, and in the same Church, the celebrating priest wears the stoicharion under the chasuble ; but in this case the garment is always white. The two stripes, usually on the dalmatic, were origin¬ ally purple, that is, a shade near scarlet, and were probably a survival of the latus clavus of the tunic of senators. See Costume, Ecclesiastical.

DALMELLINGTON, Scotland, village of Ayrshire, terminus of a branch line of the Glasgow and SouthWestern railway, 15 miles northeast of Ayr. It is a coal mining and stone-quarrying centre, and was prominent during the Covenanting period. Pop. 1,500.

DALMORES, dal-mo'-res', Charles, French operatic singer: b. Nancy, 31 Dec. 1871. With the object of training as a violinist he entered the Conservatoire de Nancy. An accident to his arm obliged him to relinquish all hope of becoming a violinist and he took up the study of the horn, which he also studied at Paris. In 1888-94 he was engaged on the Lamoureux orchestra, becoming also a skilled 'cellist. In 1894 he removed to Lyons as teacher of the horn at the conservatory there. Dauphin here trained his voice and in 1899 he made a success¬ ful debut as singer at Rouen. In 1906 he was engaged as tenor by Hammerstein at the Man¬ hattan Opera House, New York, where he

won fame which spread to Europe and brought many tempting offers from Continental opera houses. In 1910 he became first tenor of the Chicago Opera Company. His principal roles are Nicias in (Tha‘is> ; Julian in <Louise) ; Vinicius in (Quo Vadis* ; Samson in (Samson and Delilah) and Herod in Salome.5

DALNY, da I’m, or TAIREN, but now generally Dairen, city and free port 20 miles north of Port Arthur belonging to Japan. It is situated on the Liao-tung Peninsula, which extends south into the Gulf of Pechili, China. It was intended for the eastern terminus of the Siberian Railway and was established as a com¬ mercial seaport by edict of the Tsar of Russia, dated 30 July 1899, and was thrown open to the commerce of all nations in December 1901. During the Russo-Japanese War it was occu¬ pied by the Japanese troops under Oku, 30 May 1904, following on the battle of Kin-chow. With the leased territory of Kwantung, the southern part of the Liao-tung Peninsula, it fell to Japan as the spoil of war under the Treaty of Portsmouth; and the lease from China, orig¬ inally for 25 years, was extended to 99 years by treaty in March 1913. Dalny again became a free port in 1906. The harbor, in which ves¬ sels drawing 30 feet can enter at low water, is one of the finest and deepest in the Pacific, is ice-free all the year, and the surface of the bay is sufficient for all the shipping of China. It is protected by a breakwater 1,000 yards in length. The railway lines connect Port Arthur and Dalny with Mukden, Harbin and the East China railway system. The population is about 36,000. The area of the leased territory extends to 1,256 square miles, with a population of

522,489.

DALRYMPLE, Alexander, Scottish hydrographer : b. Hailes, near Edinburgh, 24 July 1737; d. London, 19 June 1808. In 1752 he went to India in the service of the East India Com¬ pany and while there made hydrography his particular study. In 1795 he obtained the ap¬ pointment of hydrographer to the admiralty, as well as to the East India Company. His most important publications are (Discoveries in the South Pacific Ocean* ; (A Collection of South Sea Voyages) ; (A Relation of Expeditions from Fort Marlborough to the Islands of the West Coast of Sumatra) ; (A Collection of Voyages in the South Atlantic Ocean) ; (A Memoir of a

Map of the Land Round the North Pole) ; journal of the Expeditions to the North of California) ; (The Oriental Repertory.* He was also the author of many historical and political tracts.

DALRYMPLE, Sir David, Lord Hailes, Scottish lawyer and antiquarian : b. Edinburgh, 27 Oct. 1726; d. 29 Nov. 1792. In 1766 he was made lord of session with the title of Lord Hailes, and later a lord of judiciary. He pub¬ lished (Annals of Scotland) (1786) and other works on Scottish history, both ecclesiastical, biographical and political, antiquities. He is mentioned in Boswell's (Life of Johnson* as an intimate friend and correspondent of John¬ son.

DALRYMPLE, James, 1st Viscount Stair, Scottish lawyer and statesman : b. Ayr¬ shire, May 1619; d. Edinburgh, 25 Nov. 1695. In the Civil War he sided with Parliament, but soon relinquished that party and became pro¬ fessor of philosophy at Glasgow. He then adopted law as a profession, and in 1670 was made president of the Court of Sessions. He was adverse to the severe measures adopted against the Covenanters, and having excited the enmity of the Duke of York, lost his ap¬ pointments and retired to Holland in 1682. Here he became a favorite with the Prince of Orange, who, after the revolution, created him Viscount Stair. Stair wrote (The Institutes of the Laws of Scotland) (still a standard au¬ thority) ; (Philosophia nova experimentalˆ ; Vindication of the Divine Perfections> ; (An Apology for his Own Conduct.* Scott has made Dalrymple's daughter, Janet, the heroine of the (Bride of Lammermoor.* Consult Mac-key, (Memoirs of Sir James Dalrymple, First Viscount Stair* (Edinburgh 1873).

DALRYMPLE, John, 1st Earl of Stair, Scottish statesman: b. 1648; d. 8 Jan. 1707. He was son of James Dalrymple (q.v.). He was called to the Scottish bar in 1672, and his eloquence and ability soon gained him a leading place in his profession, as later in the Scottish Parliament. He became Lord Advocate (1687). Under Charles II he suffered imprisonment twice for not sufficiently enforcing the persecut¬ ing acts, but held office in Scotland under James. He was largely instrumental in carry¬ ing out the 1688 revolution in Scotland, and for some time acted as the king's representa¬ tive in that country, but

his undoubted services have been somewhat discounted by his connec¬ tion with the massacre of Glencoe in 1692. He assisted largely in bringing about the union between England and Scotland. Under Anne he was privy councillor for Scotland (1702). He succeeded his father as viscount in 1695 and in 1703 was created earl.

DALRYMPLE, John, 2d Earl of Stair, Scottish general; b. Edinburgh 20 July 1673; d. there, 9 May 1747. He entered the Cameronian Regiment in 1692, and in 1701 was ap¬ pointed lieutenant-colonel of the Scots regi¬ ment of foot guards. In 1707 he succeeded to the earldom and became one of the Scottish representative peers, but still continued his military life, and distinguished himself in the campaigns of Marlborough, and more particu¬ larly at the battles of Oudenarde, Malplaquet and Ramillies. On the accession of George I he was appointed a privy councillor, and went

on a diplomatic mission to France, where he attracted much notice by the splendor of his retinue, and also displayed great skill and address. He returned in 1720, and for the next 20 years he took an active interest in agricul¬ tural pursuits. In 1742, on the dissolution of Walpole's administration, he again entered pub¬ lic life and was sent as ambassador to Holland. He served later under George II at Dettingen, and was made commander-in-chief of the army of Great Britain. Consult Graham, (Annals and Correspondence of the Viscount and First and Second Earls of Stair.*

DALSGAARD, dals'gard, Christen, Dan¬ ish artist: b. Krabbesholm, Jutland, 30 Oct. 1824; d. 1907. He studied at the Copenhagen Academy. He was made professor of drawing at the Academy of Soro in 1862, and was elected to the Copenhagen Academy in 1872. His impressive delineations of Danish peasant life, showing a keen sense of observation and imbued with sincere sentiment, have justly caused him to be esteemed one of the typical masters of Denmark. Especially noteworthy are: (Christmas Morning*; (Jutland Peasants going to Communion* ; (Fisherman and Daugh¬ ter* ; (Seizure for Debt* ; (One of the Wise Virgins* ; (Ansgar and Odbert Baptizing Mother and Child* ; and (The Farewell.*

DALTON, John, English chemist and physicist : b. Eaglesfield, near Cockermouth, Cumberland, 6 Sept. 1766; d. Manchester 27 July 1844. He was educated at the Quakers' school in his native town and from 1781-93 was assistant at a boarding school at Kendal. Here he showed such a decided turn for mathematics that he obtained the position of

professor of mathematics and natural phi¬ losophy in New College, Mosley Street, Man¬ chester, in 1793. The same year he published his early meteorological observations and essays. In 1799, on the removal of New College to York, he resigned his chair, but continued to give private lessons in the same branches. In 1808 he commenced the publication of his (New System of Chemical Philosophy,* which, containing his brilliant discovery of the atomic theory, produced an important revolution in the science, gave him a very high place among philosophical chemists, and spread his fame over Europe. He pursued diligently research in mixed gases, force of steam, elasticity of vapors and the effect of heat on gases and other im¬ portant chemical actions. The Royal Society of London in 1826 admitted him a member, and unanimously awarded to him the first of two gold medals intended for those who had made the greatest discoveries in science. He was also elected member of the Institute of France, of the Royal Academies of Science of Berlin and Munich, and of the Natural History Society of Moscow. His papers were published in the Memoirs of the Literary and Philosophical Society of Manchester (of which he was presi¬ dent), in the Philosophical Transactions, in Nicholson's Philosophical Journal, and Thom¬ son's Annals of Philosophy. His (Meteorolog¬ ical Essays and Observations* were published in 1793. Consult fLife,* by Lonsdale (1874); Roscoe and Harden, (New View of the Origin of Dalton's Atomic Theory* (1896).

DALTON, John Call, American physiolo¬ gist : b. Chelmsford, Mass., 2 Feb. 1825; d. New

York, 11 Feb. 1889. He was graduated at Har¬ vard in 1844 and at Harvard Medical School in 1847. He was successively professor of physiology at the University of Buffalo, at the Vermont Medical School, at the Long Island College Hospital, and at the New York College of Physicians and Surgeons, of which he be¬ came president in 1883. He served as an army surgeon throughout the Civil War. His pub¬ lished works include (Human Physiology > (1859) ; (Physiology and Hygiene for Schools, Families and Colleges* (1868) ; (The Experi¬ mental Method of Medicine) (1882) ; topo¬ graphical Anatomy of the Brain > (1885).

DALTON, Ga., city and county-seat of Whitfield Count}'-; on the Southern and the Nashville, Chattanooga & Saint Louis railroads; 100 miles northwest of Atlanta. It is a health resort, and the seat of Dalton Female College. Iron, manganese, and limestone are found in great quantities in its vicinity and the city has a large trade in cotton, grain and fruit. It has canning factories, cotton compresses, flour mills, marble works, agricultural implement factories, car factory, a chair factory, lumber mills, *etc.* Dalton was settled in 1848 and was incorporated the same year. In 1863-64 it was a Confederate headquarters of Joseph E. Johnson defending the approaches to Atlanta and was the scene of considerable military activity. The government is vested in a mayor elected biennially, three commissioners and a board of aldermen. The municipality owns the waterworks, gas and electric-lighting plants. Pop. 5,324.

DALTON, Ga., Military Operations at

(23-25 Feb. 1864, and 8-12 May 1864, including

ton is in the northwestern part of Georgia, where the Chattanooga and Atlanta Railroad is intersected by that from Cleveland, Tenn. By rail it is 38 miles southeast of Chattanooga.

When General Bragg was supposed definitely to have abandoned Chattanooga, 9 Sept. 1863, Gen¬ eral Halleck ordered General Rosecrans to occupy Dalton, and there Bragg retreated after his defeat at Lookout Mountain and Missionary Ridge, 24—25 Nov. 1863. In February 1864 Gen¬ eral Grant ordered General Thomas to seize the town. Thomas moved, reported that he could not carry the position, and the effort was aban¬ doned. His movement cost the Union army about 300 killed and wounded, and the Con¬ federates about 200.

Dalton, the first objective point of Sherman's Atlanta campaign, was held 30 April 1864, by Gen. J. E. Johnston, with 54,400 men. The ap¬ proaches to the place were difficult, and it was practically impregnable. Early in May, Sherman concentrated his grand army in and around Chattanooga for his Atlanta campaign. It was made up of the armies of the Cumberland, Tennessee and Ohio, commanded respectively by Gens. Geo. H. Thomas, J. B. McPherson and J. M. Schofield, aggregating 98,797 men'and 254 guns. The Army of the Cumberland had about 60,000 men, the Army of the Tennessee 25,000, and the Army of the Ohio 14,000. On 6 May the Army of the Cumberland was at and near Ringgold, the Army of the Tennessee at Gordon's Mill, on the Chickamauga, and the Army of the Ohio near Red Clay, on the Georgia line, north of Dalton. The four corps of Thomas and Schofield were ordered to move on Dalton in front, while McPherson with two corps moved through Snake Creek Gap. On the 7th McPherson was ordered to march from Gordon's Mills through the Gap to Resaca, 18 miles south of Dalton. He marched by way of Ship's Gap and Villanow, pushed through Snake Creek Gap, a wild defile, nearly six miles long, 15 miles south of Buzzard's Roost, and on the morning of the 9th drove back Grigsby's Kentucky cavalry brigade, and marched to within a mile of Resaca, then held by two brigades under General Cantey. Finding the place too strong to be assaulted, McPherson fell back to a strong position at the east end of the Gap. Meanwhile Thomas and Schofield had pressed forward. Thomas drove the Con¬ federates in his front full through Buzzard's Roost Gap, and Schofield closed down on Thomas' left. On the 8th there was heavy skir¬ mishing between Thomas and the Confederate divisions of Stewart and Bate at Buzzard's Roost and about six miles farther south a deter¬ mined assault.

The road from Lafayette to Dalton passes through a cleft in the palisade, which had been deepened and widened, . hence known as Dug Gap. Geary's division attacked this gap. Skir¬ mishers were thrown out who drove those of the enemy from the foot of the ridge and up the road nearly to the summit, when two bri¬ gades were formed in double lines on either side of the road. The Confederates

were driven clear to the summit. The position of the Gap could not be carried, and an assault on the per¬ pendicular palisade south of it was ordered, where it was broken by a few clefts through which four or five men could move abreast. The men charged, a few reached the summit, to be killed or captured, and the assault failed. After a short breathing-spell another effort was re¬ pulsed with much loss. Still another attempt was made by a single regitnenfi but it also failed.

Everywhere the assault was repulsed, and the Federals withdrew after a loss of 306 killed and wounded, and 51 captured or missing. It is doubtful if the Confederate loss exceeded 30 men. At Varnell's Station Stoneman's and Wheeler's cavalry divisions had an engagement in which the loss was about 150 on each side, and Thomas pressed so vigorously in front of Buzzard's Roost that the heavy skirmishing at¬ tained the dimensions of a battle. By the 11th Sherman moved his army to pass through Snake Creek Gap. On the evening of the 12th Johnston was fully informed of the movement toward his rear, which had been covered by the ridge and the forests of the country, and he abandoned his position that night to give Sher¬ man battle at Resaca. On the morning of the 13th Howard occupied Dalton. The Union loss around Dalton, 7—12 May, was about 830 killed and wounded; the Confederate loss not more than half that number. Consult (Official Records, > Vol. XXXVIII; Van Home, <History of the Army of the Cumberland, > (Vol. II) ; Johnston, ˆNarrative* ; Sherman, (Memoirs) (Vol II) ; Cox, <Atlanta) ; the Century Company's (Battles and Leaders of the Civil War> (Vol. IV).

E. A. Carman.

DALTON, Mass., town in Berkshire County, on the Boston and Albany Railroad, five miles east of the city of Pittsfield. It has a public library; the industries comprise spark coil works, woolen factories and paper mills. Much of the paper used in government paper cur¬ rency is manufactured at Dalton. Pop. 3,568.

DALTON-IN-FURNESS, England, town in Lancashire, three and one-

half miles northeast of Barrow-in-Furness. In its vicinity are ex¬ tensive iron works, rich hematite iron-ore mines, and the ruins of the magnificent abbey of Fur¬ ness. Dalton Castle, an old tower in the town, was formerly associated with ‘Furness Abbey. The painter Romney was born and buried here. It is connected with the Irish Sea by a canal three miles long. Pop. 10,762.

DALTONISM. See Color-Blindness.

DALTON’S LAW, a principle discovered by the English physicist, John Dalton (q.v.), that in a mixture of gases which do not unite chemically, the pressure is equal to the sum of the pressures of all the gases in the mixture. See Pneumatics.

D’ALVIELLA, dal-vyel’la, Count Goblet,

gob-la, Belgian savant : b. Brussels, 10 Aug. 1846. He was educated at Brussels and Paris and in 1879 married a Miss Packard of Albany, N. Y. He is a member of the Royal Academy of Belgium and of the Royal Asiatic Society of Great Britain. As correspondent of the Inde¬ pendence Beige, he went to India with Edward VII, then Prince of Wales; later he was envoy extraordinary to Constantinople. He was for some time director of the Revue Belgique, was Hibbert lecturer at Oxford University in 1891, and has published (Sahara and Lapland* (1874) ; Unde et Himalaya* (1877) ; (Contemporary Evolution of Religious Thought in Eng¬ land, America and India> (1885) ; Hibbert Lec¬ tures on (Origin and Growth of the Conception of God* (1892); (The Migration of Symbols* (1894) ; (Ce que l’lnde doit a la Grece* (1897) ; cEleusinia de quelques problemes relatifs aux

mysteres d’Eleusis* (1903) ; (A travers le Far West, souvenirs des Etats-Unis* (1906) ; L’Uni-versite de Bruxelles pendant son troisieme quart de siecle* (1909); (Croyances, rites, institutions) (3 vols., 1911).

DALY, Arnold, American actor: b. Brook¬ lyn, N. Y„ 4 Oct. 1875. In 1892 he made his debut in (The Jolly Squire.* Thereafter he appeared in many successful plays and in 1903 produced in New York Bernard Shaw’s Can¬ dida. } For the next six or seven years he appeared exclusively in Shaw’s dramas (Mrs. Warren’s Profession (1904) ; (You Never Can TelP (1904) ; (Arms and the Man) ; (The Man of Destiny,* *etc.* In 1913 he appeared in Birmingham’s (General John Regan. *

DALY, Charles Patrick, American jurist and author: b. New York, 31 Oct. 1816; d. 19 Sept. 1899. He had a distinguished judicial career in

his native city, becoming justice of the Court of Common Pleas in 1844, first judge of the court in 1857 and chief justice in 1871, retir¬ ing on account of age in 1886. He was presi¬ dent of the American Geographical Society from its incipiency until his death. His works include (First Settlement of Jews in North America* ; (What We Know of Maps and Map Drawing Before Mercator* ; (A History of Physical Geography) ; *(Historical Sketch of the Judicial Tribunals of New York) (1855).

DALY, John Augustin, American drama¬ tist and theatrical proprietor : * b. Plymouth, N. C., 20 July 1838; d. Paris, 7 June 1899. In 1869 he opened his Fifth Avenue Theatre on 24th Street, New York; and after its destruction by fire in 1873 he opened its successor on 28th Street. In 1879 he opened Daly's Theatre on Broadway. Among his original plays are (Di¬ vorce *; <Pique) ; (Horizon* ; (Under the Gas ■ light. J He also wrote: (Peg Woffington, a Tribute to the Actress and the Woman.*

DALY, Joseph Francis, American lawyer: b. Plymouth, N. C., 3 Dec. 1840; d. Yonkers, N. Y., 7 Aug. 1916. He studied law in New York and was admitted to the bar in 1862. He was a judge of the Court of Common Pleas 1870-96 and chief justice of the same court in 1896. He became a justice of the State Su¬ preme Court in 1896 and in 1900 was appointed by President McKinley commissioner to revise the laws of Porto Rico. He was a member of the American Bar Association, the New York State Bar Association and the New York City Bar Association. He was one of the founders of the Players' Club and was its vice-president for a time. He was also a member of the Catholic Club, of which he was president 1894 — 99 ; and of many other societies.

DALYELL, or DALZELL, Thomas,

Scottish soldier: b. about 1599; d. 23 Aug. 1685. He was taken prisoner fighting on the loyalist side at Worcester and afterward escaped to Russia, where he was made a general. Return¬ ing to England at the Restoration, he was made commander-in-chief of the forces in Scotland and made himself notorious for his ferocity against the Covenanters.

DALZELL, John, American lawyer: b. New York, 19 April 1845. He removed with his parents to Pittsburgh in 1847, was educated at Yale and after studying law was admitted to the bar in 1847, He has practised his profession

ii-Pittsburgh ; was attorney for the Penn¬ sylvania Railroad Company for its western lines for many years and for many other corpora¬ tions. He has been a Republican member of the 50th-62d Congress inclusive, for many years ranking member of Committee on Ways and Means ; participated in the making of the Dingley and Payne tariff bills; member of Commit¬ tee on Rules during speakerships of Reed, Hen¬ derson and Cannon ; first elected chairman of that committee when committee was made elective ; regent of Smithsonian Institution ; and delegate to National Republican conventions of 1904 and 1908, and in each member of sub¬ committee of Committee on Resolutions that reported the platform.

DAMA, da'ma, a genus of the deer family (Ccrvidce) , comprising the common fallow deer (Dama vulgaris) and the Persian fallow deer (D . mesopotamica) . The name is also given to a species of large gazelle (Gazella dama) found in the Sudan. It is closely allied to the mohr (q.v.), which is often regarded as but a sub¬ species, but has no dark stripe on the flanks. Closely allied to it also is the aoul of Somali¬ land.

DAMAGES, the indemnity recoverable by a person who has sustained an injury, either in his person, property or relative rights, through the act or default of another; also, the sum claimed as such indemnity by a plaintiff in his complaint. Compensatory damages are damages allowed as a recompense for the injury actually received. Consequential damages are those which though directly, are not immediately, consequen¬ tial upon the act or default complained of. Ex¬ emplary, vindictive or punitive damages are, in legal contemplation, synonymous terms. Ex¬ emplary damages would seem to mean such damages as would be a good round compensa¬ tion, and an adequate remedy for the injury sustained and such as might serve for a whole¬ some example to others in like cases.

Where injuries are maliciously, wantonly or recklessly inflicted, the right of the jury to award punitive damages is said to be as old as the right of trial by jury itself and is not, as some seem to suppose, an

innovation upon the rules of the common law. In England as early as 1763, it was declared that the jury had done right in giving punitive damages. (Hackle v. Money, 2 Wils. 205.) And now, both in Eng¬ land and in the United States, the doctrine of punitive damages seems to be well settled and the right of the jury to give such damages in a proper case cannot be shaken in any of the States by anything short of legislative enact¬ ments.

General damages are those which necessarily and by implication of law result from the de¬ fault or act complained of. Special damages are such as arise directly, but not necessarily, from the wrongful act or default complained of. Parties entering into an agreement may estimate beforehand the amount of damages to result from a breach of the agreement and may pre¬ scribe in the agreement itself the sum to be paid by either of the parties to the other by way of damages for such breach. Such damages are called liquidated damages when sanctioned by the law. If, however, the agreement is such that the law refuses to adopt it, then the dam¬ ages agreed upon will be regarded as a penalty,

or as in the nature of a penalty. General dam¬ ages need not be alleged in the complaint of the person injured, nor is it necessary that any spe¬ cific proof of damages be given to entitle the party injured to recover. The legal presump¬ tion of injury in cases where it arises is suffi¬ cient to maintain the action. Whether special damage be the gist of the action, or only col¬ lateral to it, it must be particularly stated in the complaint, as the plaintiff will not be permitted otherwise to go into evidence of it at the trial, because the defendant cannot also be prepared to answer it.

To constitute a right to recover damages, the party claiming damages must have sus¬ tained a loss ; the party against whom they arc claimed must be chargeable with a wrong; the loss must be the natural and proximate cause of the wrong. Where there is no loss there is no right to damages, properly so called. A sum in which the wrongdoer is mulcted simply as a punishment for his wrong and irrespective of any loss caused thereby, is a ˆfine® or a ˆpenalty,® rather than damages. Damages are based on the idea of a loss to be compensated, a damage to be made good. It is not necessary, however, that this loss should always be dis¬ tinct and definite, capable of exact description, or of measurement in money. A sufficient loss may appear, from the case itself, to sustain an action. The law in many cases presumes a loss where a wilful wrong is proved; and thus dam¬ ages are also awarded

for injured feelings, bodily pain, grief of mind, injury to reputation and for other sufferings which cannot be made the subjects of exact proof and computation in respect to the amount of loss sustained. Con¬ sult Harris, (Treatise on Damages by Corporations) (Rochester 1894) ; Holmes, (The Com¬ mon Law) (Boston 1881) ; id., (Essays on Anglo-Saxon Law) (ib. 1876) ; Lee, (Historical Jurisprudence) (New York 1900) ; Mayne, (Treatise on the Law of Damages) (5th ed., London 1894) ; Sedgwick, (Elements of Dam¬ ages > (Boston 1896) ; id., (Treatise on the Measure of Damages) (8th ed., New York 1891) ; Sutherland, (Treatise on the Law of Damages) (3d ed., Chicago 1903) ; Watson, (Treatise on the Law of Damages for Personal Injuries > (Charlottesville 1901). See Contract; Tort.

DAMAN, da-man', or DAMAO, India, a seaport town in Hindustan, at the mouth of the Gulf of Cambay, on the Damanganga or river of Daman, 100 miles north from Bombay. It belongs to the Portuguese, who sacked it in 1531, retook it in 1558, and have kept possession of it ever since. It carries on some cotton weaving, fishing, ship building and several salt works. Pop. about 6,000. The Portuguese dis¬ trict here of the same name possesses valuable teak forests. It has an area of 160 square miles. Pop. about 32,700.

DAMAN, da'man, the Syrian name for the coney of Scripture. See Cony ; Hyrax.

DAMANHUR, da-man-hoor', Egypt, town of Lower Egypt, capital of the province of Beheirah, an important railway centre and seat of cotton manufacture. Pop. 46,555.

DAMAR. See Dhamar.

DAMARALAND. See German South

West Africa, Former.

DAMASCENE, dam'a-sen, Saint John (Jo¬ annes Damascenus, John of Damascus), an illustrious theologian of the Greek Church in the 8th century, native of Damascus : b. about 676; d. about 755. He was a pupil of Cosmas and in 730 was persecuted for his active opposition to the Iconoclast heresy. The last of the Greek Fathers, he was the first to reduce to system the Church's dogmas and to classify the decrees of the General Councils concerning matters of faith, in the third part of

his work (The Fountain of Knowledge.5 In the first part, (Points of Philosophy,5 he makes application to theology of the principles of Aristotle's Dialectica; the second part consists of a reproduction of Epiphanius' work (On Heresies,5 with addi¬ tional notices of heresies condemned by the Church after Epiphanius' time; the third and most valuable part is the (Precise Exposition of the Orthodox Belief.5 In mediaeval times the (Precise Exposition,5 translated into Latin in the 12th century, gave direction to the theologi¬ cal views and speculations of the schoolmen ; it influenced also the trend of Arabian philosophy ; and hence Damascenus has been denominated the (<Father of Scholasticism.55 Styled also the ((Prince of Greek hymnodists,55 the English titles of three of his most famous hymns are the well-known (<Come, ye faithful, raise the strain55 ; (<The Day of Resurrection,55 and (<Those eternal bowers.55 Many other treatises are extant which bear his name as author, but of most of these the authenticity is doubtful. No contemporary account of his life has come down to us ; the earliest biographical notice of him that we have dates from the 10th century, and that is unworthy of credit. The epithet ((Chrysorrhoas,55 that is, gold-streaming, be¬ stowed upon him in his lifetime, testifies to his reputation for eloquence. He is recognized as a saint both in the Greek and the Latin Church.

DAMASCIUS, da-mash 'i-us, a philosopher, so called from his supposed native place Damas¬ cus, lived in the beginning of the 6th century. He is known as one of the most distinguished teachers of the Neoplatonic philosophy. In Alexandria he studied rhetoric under Theon and mathematics under Ammonius ; and after¬ ward in Athens his teachers were Zenodotus and Marinus, the successors of the more cele¬ brated Proclus. Numerous fragments of his writings remain, one of which is entitled (Doubts and Solutions Respecting the First Principles.5 It is so mystical as to be almost unintelligible, but it is important to the history of philosophy from its frequent notices of earlier philosophers. It was edited by Ruelle (Paris 1889).

DAMASCUS (native name Dimishk-es- ShAm, Syria), a celebrated city, capital of the district of Syria, finely situated on a plain, at the eastern base of the Anti-Libanus range and supposed to be the most ancient city in the world. It is six miles in circumference, and is surrounded by a dilapidated wall pierced by seven gates. Damascus, from the beauty of its surroundings, is called the <(Pearl of the Desert.® The plain on which the city stands is of great extent, and is covered with the most beautiful gardens and orchards, irrigated by the waters of the Barrada (the Abanah of the Old Testament), forming a grove of more than 50 miles in circuit, rich in fruits, including

oranges, lemons, citrons, pomegranates, mul¬ berries, figs, plums, walnuts, pears and apples. So plentiful and cheap are fruit and foodstuffs, that it is almost a proverb that ((you can sup or breakfast in Damascus for nothing.55 Its interior by no means corresponds with its envi¬ rons. The streets are narrow and crooked, paved with basalt, and have a gloomy and dilapi¬ dated appearance ; they are generally in three divisions — that in the middle devoted to cattle and riders being the lowest, and of the same width as the other two. In most parts of the city the fronts of the houses are built with mud, and pierced by a very few small grated windows, with red painted shutters. They are low, with flat-arched doors, resembling those of stables, while a dunghill and pool of putrid water almost invariably stand before each door. In many of them, however, a singular contrast is presented between the dull, prison-like outer walls of gray mud and the richness within. These are of a quadrangular form, enclosing a court paved with marble, ornamented with beautiful trees and flowering bushes, and hav¬ ing copious fountains playing in the centre. The lower rooms on each side of the court are raised above its area, and open in front — their roofs and walls highly ornamented with figures of flowers and inscriptions, and a variety of ara¬ besque devices. The furniture, also, is of the most splendid description. The best and wealth¬ iest part of the city is the Moslem quarter, where the streets are wider and cleaner, the houses higher and better built, and the supply of water much more abundant than in any other part of the town. The Christian and Jewish quarters are the most miserable.

Among the places most worthy of notice in Damascus are the bazaars. They are merely long streets — the principal one about one and a half miles in length — covered in with high woodwork and lined with shops, stalls, stores and cafes. The shops are narrow and go only a short way back. There is a separate bazaar for almost every commodity exposed to sale, and all of them are patrolled by multitudes of con¬ fectioners and dealers in ices and cooled sher¬ bets. In the midst of the bazaars stands the Great Khan, said to be one of the most magnifi¬ cent structures of its kind in the world. It is an immense cupola, supported on granite pillars and built in part of alternate layers of black and white marble. Its gate is one of the finest specimens of Moorish architecture to be seen in the world. In this building, and in 30 inferior khans, purchases and sales are daily conducted by the merchants, who have their counting-houses near them. There are some 200 mosques : the principal, a magnificent

edifice, was de¬ stroyed by fire 14 Oct. 1893. The interior was completely gutted and except for the long lines of Gothic columns and capitols, all is modern. There are three Latin monasteries in Damascus — those of the Franciscans, Capuchins and Lazarists. The principal Roman Catholic churches form part of the monastic buildings; there are, besides, a number of detached churches belonging to different sects in various parts of the city. Besides the more remarkable archi¬ tectural objects mentioned, there are an exten¬ sive citadel, the castle of the Crusaders, and a serai or palace, in which the pasha resides. The most interesting locality in the city is, per¬ haps, what is called “Straight Street,® mentioned

in connection with the conversion of the apostle Paul. It is the most important, largest and busiest street in Damascus; has a corrugated roof ; is one mile in length, and runs from east to west. The house of Judas, also, to which Ananias went, is still pointed out, as well as that of Ananias.

Damascus was formerly a great emporium of trade between Europe and the East; its trans¬ port trade declined with the opening of the Suez Canal ; but it is still a large buyer and still imports English cottons and other goods. It is also a place of considerable manufacturing in¬ dustry. There are a number of manufactories of silk, damasks, cotton and other fabrics; numerous cotton-printing and dyeing establish¬ ments, tobacco factories, copper and iron found¬ ries and glass works. The manufacture of Damascus blades, for which the city was once so celebrated, no longer exists. Saddles and bridles, rich and highly finished, fine cabinet work and elegant jewelry, are among the manu¬ factures of Damascus. Fruit is an article of export. Damascus is one of the holy cities of Islam and here the pilgrims assemble on their journey to, and separate on their return from Mecca. The tomb of Fatima, daughter and only child of Mohammed, is an object of special veneration. Buckle, the historian of civilization, is buried in the Protestant cemetery.

Damascus to-day is perhaps the most thor¬ oughly Oriental in all its

features and char¬ acteristics of any city in existence. Of its origin nothing certain is known. There is, how¬ ever, abundant evidence of its great antiquity, as it is mentioned in Gen. xiv, 15, as existing 1913 b.c., and appears even then to have been a place of note. At subsequent periods it fell successively under the power of the Israelites under David, the Persians, Greeks and Romans, attaining great eminence under the last. In 1516 it fell into the hands of the Turks. A Protestant mission and schools have long been in operation here. Beirout is the seaport of Damascus, and is reached by a road 70 miles long. There are three railroads entering the city, the main line running to Beirout. Gas, electricity and street cars have been introduced. Pop. estimated at about 250,000, of whom perhaps 25,000 are Christians, and 11,000 Jews. Consult Porter, (Five Years in Damascus* (London 1870); Macintosh, (Damascus and Its People* (London 1882) ; and articles by A. Fordor in Nat. Geog. Mag., January 1911, and R. Hichens in the Century, February 1910.

DAMASCUS BLADES, swords or scimi¬ tars anciently made at Damascus, Syria. These famous weapons, used among nations little skilled in the metallurgic arts, long before the Christian era, and made familiar to European nations from the time of the crusades, long defied all attempts at imitation. It appears that the Indian wootz or carbonized iron was in ancient times exported from the region of Gol-conda in Hindustan (where, as well as in Persia, it is still manufactured by the original rude process), and at Damascus was converted into weapons. These were particularly distinguished for their keen edge, capable of severing heavy iron spears or cutting the most delicate gossa¬ mer fabric floating in the air; and for the peculiar watered appearance of the steel, which was covered with delicate black, white and

silvery veins, parallel to each other or inter¬ laced. The Damascus appearance may be given to iron by welding together bars of different de¬ grees of hardness, drawing them down, and repeating the process several times. (See Da¬ mascus Iron). Karsten suggests that by the use of bars of good steel the best Oriental blades may have been fashioned in this way. The ˆmosaic** process differed from the other by cut¬ ting the bar into short lengths and fagoting these pieces, the cut surfaces always being placed so as to face outward. Blades of great excellence were thus produced, but still inferior to the genuine Damascus. It was not till after the investigations of General Anossoff in the first half of the 19th century that successful reproductions were obtained. These researches led to the establishment of works at

Zlatoosk in the Ural Mountains, where Anossoff manu¬ factured Damascus steel by processes of his own invention. According to his best method 11 pounds of iron were melted in the crucible with one-twelfth as much graphite and one thirty-second part of scales of iron. All his sword blades were tempered in boiling grease. The process of bringing out the watered appear¬ ance was accomplished by the use of a diluted acid, which acts more upon the ground than upon the lines. The Zlatoosk weapons proved to be of properties similar to those of the old Damascus blades. General Anossoff with one of them cut through floating gauze. Bones and nails may be cleft without injury to blades tem¬ pered for such use, and other steel tempered to the same point may be nicked by them with¬ out causing a gap. Their elasticity is so great that one may put his foot upon the end of the blade and bend it to a right, angle, when it will fly back perfectly unchanged. General Anossoff died in 1851, and his successors at the works failed to produce the remarkable blades for which the establishment had become celebrated.

DAMASCUS IRON, or DAMASCUS TWIST, iron produced by the following method, which is supposed to be similar to the process anciently followed in the manufacture of the celebrated Damascus blades (q.v.). Twenty-five alternate bars of iron and mild steel, each about two feet long, two inches wide and one-quarter inch thick are united by welding; the fagot being drawn into a bar three-eighths inch square, is cut into lengths of five or six feet. One of these pieces is heated to redness, and one end is held firmly in a vise, while the other is twisted by a wrench or tongs, \#hich shortens the rod to half its length and makes it cylindrical. If two of these twisted pieces are to be welded together, they are turned in di¬ verse directions, one to the right and the other to the left; these are laid parallel to each other, welded and flattened. If three rods are used, the outside rods turn in a direction the opposite of the middle one, and this produces the hand¬ somest figure. By these operations the alterna¬ tions of iron and steel change places at each half revolution of the square rod, composed of 25 laminae, the external layers winding round the interior ones ; thus forming, when flattened into a ribbon, irregular eccentric ovals or circles. The fineness of the Damascus depends upon the number and thickness of the alternations.

DAMASK, a textile fabric, the ground of which is bright and glossy, with vines, flowers

and figures interwoven. At first it was made only of silk, but afterward of linen and woolen. According to the opinion of some, this kind of weaving was derived from the Babylonians; ac¬ cording to others, invented at a later period by the inhabitants of Damascus, from which latter place it is known to have derived its name. The true damasks are of a single color. In modern times the Italians and Dutch first made damask; and Europe was supplied, as late as the 17th century, from Italy alone, chiefly from Genoa. But the French soon imitated it, and now sur¬ pass the Italians. Damask is made in great quantities in Germany, chiefly in Upper Lusatia. Dunfermline is the chief seat of the manufac¬ ture of damask linen in Scotland, and Lisburn and Ardoyne in Ireland.

To trace the origin of the art of weaving, or to ascertain the name of the artisan whose necessities led him to devise the crude appli¬ ances capable of being used in the production of even the very coarsest woven material, would be a hopeless task indeed, separated, as we are, from a period so exceedingly remote by the im¬ penetrable gloom and obscurity which must ever enshroud the events of three or four score cen¬ turies ago. And yet we are safe in assuming that the ability to produce woven fabrics by means of a loom, no matter how elementary in construction, far antedates all written history, carrying us back to those early ages when the first rays of the sun of progress were faintly discernible above the horizon of time, awaken¬ ing within our humble ancestors the desire for those things, which when obtained served to lighten their toil, and at the same time form part of the foundations of the noble structure, to which successive generations have contrib¬ uted their share, and which we call civilization.

Coming down to a later period, however, we are enabled to gather authentic information re¬ garding the degree of progress made in the art of weaving. Trustworthy records dating as far back as 2000 b.c. reveal the fact that the weavers of ancient Egypt were far advanced with the production of plain woven fabrics, many ex¬ cellently preserved fragments of fine linen, which have been taken from the mummy cases, of that period, testifying not only to the rever¬ ence with which they regarded the embalmed remains of their illustrious dead, but also to their skill and proficiency as weavers.

In the Bible also we find numerous refer¬ ences to the products of the

loom. Job speaks of his days as being swifter than a weaver's shuttle (Job vii, 16). We also read that the draperies of the tabernacle and the veil of the temple were woven fabrics, richly embroidered with various colors. These allusions to the art of weaving, and others too numerous to mention, are scattered profusely throughout the pages of the sacred volume; while heathen writers of antiquity frequently allude to weaving as an art which was held in the highest esteem, and which furnished a favorite occupation for people rep¬ resenting every grade of society, from those who dwelt in the marble halls of princes down to the occupants of the most humble dwellings.

Nor was skill in weaving confined to one locality or people ; an art so essential to the comfort and welfare of humanity at large must speedily have become the common property of widely separated races ; consequently we find that the Babylonish weavers of the year 1000

b.c. were celebrated for the richness and quality of their woven fabrics ; while at the same period the patient Hindu and the stolid Chinese were producing fabrics of the finest texture on looms of the most primitive description.

From this it is obvious that the ancient races were familiar with the principles of fabric con¬ struction and that they were able to produce a considerable variety of elementary weaves by using different varieties and counts of yarn in combination with each other ; yet there is noth¬ ing to show that they were acquainted with any form of loom, the mechanism of which made possible the production of intricate floral or ornamental designs, such for example as could easily have been woven on the draw loom of a later period, or by its successor, the highly im¬ proved Jacquard power loom of the 20th cen¬ tury. This obvious drawback, however, they endeavored to overcome by means similar to those employed by modern manufacturers of textiles, who, in order to meet the demand for showy and inexpensive fabrics of a certain description, are accustomed to arrange either the warp or filling in the form of a series of stripes of contrasting colors, harmoniously ar¬ ranged together or else by changing the color of both warp and filling at such intervals as a previously devised pattern indicates, are enabled to .produce an extensive variety of checkered patterns.

Designs of this character the weaver of ancient times found no difficulty in creating, but any large ornate or floral patterns with which he was familiar were obtained either by print¬ ing, or the skill

of the embroiderer, or when considered desirable, a combination of both added to the woven material after it had passed from his hands, and which as a result cannot be classed with those fabrics which, produced en¬ tirely on the loom, are valuable on account of the elaborate nature of the designs with which they are embellished, as much as by the costli¬ ness of the materials employed in their con¬ struction.

It will thus be seen that a loom which could only be used in the production of a compara¬ tively restricted variety of designs was sure to be superseded sooner or later by one of a more highly developed type, which would allow the decorative instinct of the early textile artist greater opportunity to express the ideas suggest¬ ing themselves to him.

In due time a loom capable of accomplishing these results was invented, probably in China, where, like so many other relics of the long for¬ gotten past, it may be seen in operation at the present day, although long since consigned to the rubbish heap in all progressive countries.

From China the draw loom, as it came to be called, found its way to other parts of the globe. But it remained for the weavers of the ancient city of Damascus, the capital of Syria, to de¬ velop the possibilities of the new loom to the utmost extent, with the result that in time they established a large manufacturing and export trade in the beautiful silken fabric which soon became widely known as damarsk, taking its name from that of the city to which for cen¬ turies it brought wealth and renown, and in the manufacture of which the Damascene excelled all competitors.

Stated as briefly as possible, it may be said that the draw loom tie-up was a com-

pound arrangement, one part of the harness be¬ ing controlled by a lad known as the draw-boy, the other part controlled by shafts for the

pur¬ pose of subdividing the warp, so as to form the fine ground weave peculiar to damask fabrics. Just as the weaver was about to throw the shut¬ tle across the lathe, the warp, of which there may have been five, six, seven or more ends to each mail, according to the quality of damask desired, was raised en masse by the draw-boy in accordance with the requirements of a previ¬ ously painted pattern, all the remaining warp being left down. The shuttle would thus have passed under the warp raised and over the warp left down without interlacing or forming cloth, had it not been for the supplementary arrange¬ ment of harness shafts, through which the entire warp was drawn, for the purpose of enabling every end to be used separately.

For each pick one of these shafts would be raised and one depressed, the others remaining undisturbed, the shaft which had been raised lifting every eighth end from among the mass of warp left down, the shaft which had been depressed carrying down with it every eighth end from the mass of warp raised, while the shafts which remained in a neutral position were so constructed as to permit the lifting of one portion of the warp and the sinking of the remainder as called for by the design, without interfering with the shed or passage of the shut¬ tle. By this means the pattern was formed and the warp and filling were interwoven so as to produce an eighth shaft satin or any similar weave required.

During the wars of the Crusades the draw loom, along with many other things oriental, found its way into various European countries, thereby aiding greatly the development of weav¬ ing as applied to silk damask, brocade, velvet and other fabrics; the great artists of the Mid¬ dle Ages not considering it beneath their dig¬ nity to supply the necessary designs for these rich textiles. For centuries, however, the draw loom remained practically the same as when first introduced, but in the year 1604 a French¬ man named Simblot devised a method by means of which the draw-boy was enabled to raise the warp while standing at the side of the loom, instead of the top, as had been the custom pre¬ viously.

In England also, during the 17th and 18th centuries, patents were taken out for several devices intended to render the services of the draw-boy unnecessary ; these, however, soon passed from public view, but the draw-boy re¬ mained, toiling away at his monotonous task for many a day after the mortal remains of Jacquard had crumbled to dust.

In the United States the manufacture of the finer grades of silk and cotton damask and upholstery fabrics in general is of comparatively

recent origin, the vast majority of looms de¬ voted to this industry being located in Phila¬ delphia, with lesser numbers scattered through¬ out New York State, New Jersey, Connecticut and Virginia.

Thirty-five years ago the business was in its infancy, but <(mighty oaks from little acorns grow," and to-day the manufacture of uphol¬ stery goods is one of the most important indus¬ tries of the country, which, with allied trades, such as yarn-spinning, dyeing and the manu¬ facture of textile machinery, provides the means

of livelihood for tens of thousands of opera¬ tives, and at the same time is a standing mon¬ ument to the business enterprise of the Ameri¬ can manufacturer. Nor have we by any means reached the limits of our development in this direction ; the remarkable inventive ingenuity of the American artisan, which in many other lines of business has practically placed him beyond the reach of competition, will not be likely to fail him when applied to the weaving industry.

William Laird Turner, Teacher of Jacquard Designing, Philadelphia Textile School.

DAMASKEENING, the art of inlaying iron or steel with other metals, especially gold and silver. It is also known as damascene work. This art is of great antiquity. Herod¬ otus mentions a dish so ornamented ; and the shields of some of the forces of the Samnites who fought against Rome were damaskeened. This method of ornamentation was formerly much used in Damascus and is found in modern Persian objects of art. The most beautiful specimens are produced by cutting into the metal with a graver and other tools proper for engraving on steel, and afterward filling up the incisions with a pretty thick gold or silver wire. The cuttings should be made in a dovetail form, so that the wdre which is inlaid may adhere the more strongly. An inferior style of damaskeen¬ ing can be produced by the electrotype process. The pattern is etched on the steel, and gold or silver deposited in the etched lines.

DAMASKIN, Yoann, or DAMASCENUS.

See John of Damascus.

DAMASUS, the name of two popes. 1. Saint Damasus I was of the Hispanic race : b. Rome, about 304; d. 384. From an early age he was employed as an inferior minister in the service of the Roman see. He was elected to the papacy (366) ; but as his election was displeasing to

a strong faction in the city they set up a rival Pope, Ursinus. In a riot between the supporters of the two claimants of the papal chair in the Liberian Basilica, represented now by the church of Santa Maria Maggiore, 137 persons,, men and women, lost their lives; and Ammianus Marcellinus, the pagan historian, whose* testimony is naturally hostile, declares that the ardor of the rivals to seize the episcopal seat surpassed the ordinary measure of human ambition. But ecclesiastical writers of the time make no mention of the 137 persons said to have lost their lives on this occasion, and its authenticity rests on the narrative of Ammianus alone. Pnetextatus, the magistrate, wˆho re¬ stored tranquillity to the city, is said to have remarked to the successful Pope, <(Make me bishop of the city of Rome and I will straight¬ way be a Christian." Damasus was on terms of intimate friendship with Saint Jerome, who was his secretary and counsellor, and it wras at his pressing instance that Jerome made a new revision and translation of the sacred Scrip¬ tures. In his pontificate the Emperor Valentinian I, 370 a.d., enacted a law designed to cor¬ rect a grave abuse which had arisen in the Church — the custom of priests and monks re¬ ceiving from wealthy penitents, especially women, gifts and legacies for themselves. Valentinian's law now made such gifts and bequests void; further it forbade ecclesiastics and monks to frequent the houses of widows and virgins

under severe penalties. It is said that Pope Damasus himself suggested this law to the em¬ peror, as a means of correcting the abuse at which it was aimed. His feast is observed 11 December. 2. Damasus II: b. Bavaria; d. Palestrina, 9 Aug. 1048. At an early age he was ordained a priest. Later he was con¬ secrated bishop and received the appointment to the diocese of Brixen in Tyrol. In 1047 he was elected Pope, but lived only 23 days after being raised to the pontificate.

DAMBUL, dam-bool', DAMBOOL, or DAMBULLA, a village in the island of Ceylon, at the junction of four lines of road, 70 miles northeast of Colombo. It takes its name from the rock Dambul, a large mass of gneiss and mica schist which rises 550 feet above the sur¬

rounding plain, and contains a number of caves, one of them with a long inscription relating to the government of Ceylon in the 12th century, and another with a colossal statue of Buddha hewn out of the rock. The priests of Buddha still officiate in these cave temples.

DAME (Lat. domina, mistress), a title of honor which long distinguished high-born ladies from the wives of citizens and of the common¬ alty in general, and which still is the legal title in Great Britain of a baronet's or a knight's wife. In consequence of the greater courtesy shown toward women of higher rank, arose the custom of prefixing the word ma to dame, as a special proof of veneration and homage. Hence, too, the Virgin-mother was called in France Notre Dame (our lady, as if no single Chris¬ tian could exclusively claim the privilege of serving her with the homage of his heart). The daughters of the king of France, as soon as they came into the world, were called madame ; and this was also the sole title of the wife of the king's eldest brother. In England, the word dame, though not much used, is now applied to married women of all classes. It is also ap¬ plied particularly to the mistress of a small elementary school or boarding-house at boys' schools. Madame is shortened into madam, a usual term of address for ladies in general, but still also a word of honor, applicable, in par¬ ticular cases, to majesty itself.

DAME AUX CAMELIAS. See Lady of

the Camellias.

DAMES OF THE REVOLUTION, an

American society organized in 1896, and com¬ posed of women above the age of 18 years, of proved descent from ancestors who, either as military, naval or marine officers, or officials in the service of any one of the 13 original colonies or States, assisted in establishing American independence during the War of the Revolution, or between 19 April 1775, when the hostilities began, and 19 April 1783, when they ceased.

DAME'S VIOLET. The genus Hesperis, of the natural order Cruciferce, or mustard family, the only American representative of which is H. matronalis. The genus belongs to Europe and Asia, and the American plants have escaped from cultivation. The pale purple flowers, sweet-scented at night, are found in fields and on roadsides in southern New Eng¬ land, westward to Kansas, and also in North Carolina. Other common names, mostly from England, where it is a very common flower,

are Queen's or dame's gillyflower; night-scented gillyflower ; damask violet, *etc.* The flower is extremely cultivated, and garden varieties are found in all tints from purple to white.

DAMIANA, da-mi-a'na, a drug derived from the leaves of South American, Mexican and Central American species of Turnera, es¬ pecially Turnera diffusa. The botanical rela¬ tionships of the various species are not well known. The chemical components consist of volatile oil, resin and bitter principles, and the drug, therefore, acts as the aromatic bitters. It was formerly supposed to have aphrodisiac properties. It is widely used in many dis¬ reputable quack remedies that are practically worthless.

DAMIANI, da-me-a'ne, or DAMIANUS, Petrus, Saint, one of the fathers of the Church : b. Ravenna 1007 ; d. Faenza, 23 Feb. 1072. In infancy he was abandoned by his mother and then treated inhumanly by one of his brothers who gave him shelter, but another brother, Damianus, undertook his guardianship and gave him a good education. In gratitude, Petrus as¬ sumed the name Petrus Damiani, Damianus' Peter. For some years he conducted schools in Ravenna, but at the age of 30 joined a com¬ munity of hermits and 1041 was elected to be their abbot. The renown of his piety, sanctity and wisdom having spread widely, brought to his cell people high and low to entreat his prayers or his counsel, and popes and emperors did not disdain to solicit his advice. Made cardinal and bishop of Ostia, 1057, he prevailed on Benedict X, irregularly elected by the dom¬ inant faction of the Roman nobility, to resign 1058, and 1062 he induced the anti-Pope Honorius II to forego his claims to the Roman see. He was an intensely zealous advocate of the reform of the Church and correction of the flagrant abuses which were widespread among the clergy in his time. In his manifesto, well styled by him (Liber Gomorrhinus) (Book of Gomorrha), he exposes, without regard to the dignities held by the offenders, the vices and the unspeakable enormities by which they brought discredit on the Christian profession. Had not the interests of religion demanded it, such outspokenness would have been inexcus¬ able and an offense against public morality. Another of his works bears the title, (De Cor-rectione Episcopi et Papae) (of correcting a bishop and a Pope). All his life he practised the utmost austerities of the hermit. By decree of Pope Leo XII his name was added to the roll of Doctors of the Church, and 23 February was appointed as his feast-day. For his works consult Migne, (Patrologia Latina > (cxliv, cxlv) ; and for biography L. Guerrier.

DAMIANISTS, or ANGELISTS, dis¬ ciples of Damian, the monophysite patriarch of Alexandria, in the 6th century. They professed a belief in only one nature in Christ. The Council of Chalcedon, in the 5th century, had condemned the heresy held by the Damianists in the 6th century. It is also the name given to the Sisters of Saint Clare, a Franciscan order of nuns, which had its first convent at Saint Damiano, Assisi.

DAMIANUS, famous rhetorician of Ep¬ hesus in the 2d century, mentioned by Philo-stratus in his (Lives of the Sophists. > He was

a pupil of HHius Aristides and of Adrianus, whose methods he taught.

DAMIEN, da-myan, De Veuster, Joseph,

Belgian missionary : b. near Louvain, Belgium, 3 Jan. 1840; d. Molokai, Hawaiian Islands, 10 Aug. 1889. He was educated at the University of Louvain; joined the Order of the Sacred Hearts of Jesus and Mary in 1863 and soon after was sent -by his superiors as missionary to Hawaii. In 1873 he requested to be attached as chaplain to the Molokai leper colony. Here he found his life work. He at once set about improving the housing conditions of the settle¬ ment, the food supply and the water, which was none too good. He founded schools, built a church, partly with his own hands, and insti¬ tuted religious worship among these unfortu¬ nates. About five years before his death he noticed the incipient stages of the fell disease in his own body. From that time until his death he identified himself fully with the other colonists, beginning his sermons usually with the address, «We Lepers.® Consult Pamphile, ‘Life and Letters of Father Damien> (1889); Stevenson, Robert Louis, ‘Open Letter to the Rev. Dr. Hyde,> and Stoddard, (The Lepers of Molokai (1885).

DAMIENS, Robert Francois, French fanatic: b. Tieuloy, Artois, 1715; d. Paris, 28 March 1757. He enlisted as a soldier, and was afterward a servant in the college of the Jesuits at Paris, but in 1738 left this service in order to marry. He then served in different houses of the

capital, robbed one of his masters, a Russian, and saved himself by flight. His mind was disordered when he returned to Paris at the end of 1756. In the beginning of the next year he went to Versailles, took opium for two or three days, and prepared for the crime which he attempted 5 January. As Louis XV was on the point of getting into his carriage Damiens stabbed him in the right side. The wound was of a trifling nature. Damiens did not attempt to escape. When questioned he said he never intended to kill the king, which he might easily have done. The most cruel tortures he bore with resolution, and could not be induced to confess that he had any accom¬ plices. He asserted that he should not have committed the act had he been bled, as he re¬ quested, and that he thought it meritorious. He was condemned to be torn in quarters by horses, and the sentence was executed on the Place de Greve at Paris.

DAMIETTA, Egypt, town in Lower Egypt, on one of the principal branches of the Nile, 125 miles north-northeast of Cairo; lat. 31° 25' N. ; long. 31° 5' E. It is irregularly built, and contains some fine mosques, bazaars and marble baths. Damietta was at one time a very important place, with 80,000 popula¬ tion, and carried on an extensive foreign trade, but is now eclipsed by Alexandria. The weaving of cotton fabrics is the principal industry. Rice, fish and fruit are exported. A bar at the mouth of the Nile prevents large vessels from reaching the town, compelling them to anchor outside, and to load and unload by means of small craft of from 30 to 60 tons burden. A military school and cotton-factory were established here bv Mehemet Ali. In 1219 Count William of Holland, with his fleet

of 12 ships, manned chiefly by men of. Haarlem, by means of a high platform built on their masts and a scuttle let down, captured the out¬ lying tower, broke the great chain between this and the mainland and captured the city. In commemoration of this event, the city of Haar¬ lem bears on its shield a cross and a sword be¬ tween four stars, with the motto ((Virtus Vim Victus® (Courage conquers force) and the carillon of bells, nightly at nine o'clock, sounds out the (<Damietje.® The ancient town of Damietta (Tamiathis) stood about five miles nearer the sea, or farther north. The danger to which it was exposed, however, from its posi¬ tion on the shores, induced the Egyptian caliphs to change its position, and to remove it to where the modern town now stands about the year 1251. The present town contains many antique columns and blocks, supposed to have been brought from the old city. It is the terminus of a railway from Cairo. Pop. 29,354.

DAMMAR, a resin derived from various plants, principally Agathis dammara and A. australis, both members of the pine family, or the trees themselves. These are natives of Molucca and the East India Islands, also of the Philippines and New Zealand. Dammar is exuded from the main stems and also from the roots of the plants. Fossil dammar is called kauri (q.v.). In some regions, notably in the mountains of Sumatra, the resin bursts forth in profusion from spontaneous fissures. In other regions artificial incisions are made in the trees, with a yield of resin correspondingly greater. Dammar comes into the market in large masses, or small pieces. It is yellowish, transparent when in small pieces, smooth and brittle, breaking with a clean, glassy fracture and it is readily reduced to powder. It is inter¬ mediate in hardness between colophonium and copal. Chemically it contains traces of ethereal oil, dammarolic acid and two resins. . It is widely used in the manufacture of varnishes.

The same name is applied in commerce to the resin of other and unrelated trees. Thus the dammar of shipyards is obtained from a species of Canarium, an amyridaceous tree, while black dammar is a kind of pitch derived from the same genus. Shorea robusta, a tree, yields pitch and resin used in Indian dockyards, and some¬ times also called dammar. Dammar is also occasionally confused with kinds of copal; thus, the resin of Vateric indica (Dipteraceaz) is sometimes known as dammar or piny dam¬ mar, of which the piny varnish of India is com¬ pounded. One of the Australian species, A. robusta, has been grown in some parts of Cali¬ fornia with fair success.

DAMMARA. A genus of coniferous trees now known as Agathis. See Dammar; Kauri.

DAMMOOD, a river in British India, which rises in the district of Ramghur and flows through Bengal, east, southeast and south a distance of 350 miles. Rich deposits of coal and iron are found in its valley.

DAMOCLES, a native of Syracuse, and one of the courtiers and flatterers of the tyrant Dionysius the Elder. His name has become proverbial in consequence of a well-known anecdote related of him as illustrative of the uncertainty of human greatness and felicity. He had been extolling the grandeur and happi¬ ness of Dionysius, whereupon the latter invited

him to a magnificent banquet, where he would be regaled with regal fare and royal honors. In the midst of the entertainment, however, Damocles happened to look upward, and per¬ ceived a naked sword suspended over his head by a single hair. The sight of this filled him with dismay, and taught him at what a sacrifice of mental peace and personal security the en¬ joyments and splendors of royalty may be pur¬ chased.

dAmodar, da-mo'dar, a river of Bengal, in India, which after a southeast course flows into the Hugli, just above the James and Mary Sands and below Calcutta. A little below the mouth of its chief tributary, the Barakhar, which it receives from the north, the Damodar becomes navigable. The valleys of these two streams contain the coal-fields which produce about four fifths of the whole amount of coal mined in British India. Length about 350 miles.

DAMON AND PHINTIAS (not Pyth¬ ias), two illustrious Syracusans, celebrated as models of constant friendship. Phintias had been unjustly condemned to death by Dionysius the Younger, tyrant of Sicily, but obtained per¬ mission to arrange his affairs in a neighboring place on condition that his friend should remain as a pledge of his return. Damon surrendered himself at the prison, ready to suffer death in¬ stead of Phintias if he did not return at a fixed time. Unexpected impediments detained him. Damon, still fully convinced of the faithfulness of his friend, was on the way to the place of execution, and the people began to murmur and to pity his credulity, when Phintias suddenly rushed through the crowd into the arms of his friend. While they demanded each to die for the other, Dionysius himself approached, par¬ doned them and entreated them to admit him, a third in their friendship. Schiller has de¬ scribed this adventure in an excellent ballad, ˆDie BurgschaftP and it is the subject of a popular English drama.

DAMPER, a plate in an air-draft or flue, for the purpose of controlling the fire by regu¬ lating the area of the passage for the ingress or egress of air as the case may be. Dampers are of various forms. They are to the air-pipe or flue what the valve or faucet is to the duct for steam or liquids. The dampers of furnaces are either in the door of the ash-pit, to regulate the ingress of air, or in the course of or on top of

the chimney, to close the egress of the vola¬ tile results of combustion. In the latter form they are used in almost all metallurgic furnaces.

In locomotive engines, a kind of iron venetian-blind, fixed to the smoke-box end of the boiler in front of the tubes; it is shut down when the engine is standing, and thus stops the draught and economizes fuel, but it is opened when the engine is running.

In pianofortes, certain movable parts, which are so arranged as to press upon the wires and check their vibration whenever the finger leaves the keyboard. Perfect damping is difficult to obtain, but when efficient it enhances brilliance of execution and distinctness of harmony in a composition.

DAMPIER, dam'per, Alfred, Anglo-Aus- tralian dramatist: b. London, 28 Feb. 1847. He began as an actor at Stratford-on-Avon and in

1873 he acted Mephistopheles in his own version of Goethe's (Faust.* He visited the United States, Canada and South Africa. Returning to London he produced several of his own' plays. From there he went to Australia and took over the Alexandra Theatre and renamed it the ((Australia.® Here many of his plays were pro¬ duced, himself and his wife acting leading roles in them. Later on his son and his daughter also played leading roles in their father's pro¬ ductions. Among his dramas are (The Bush King* ; <Waratha* ; (Under the Southern Cross *, and (Robbery Under Arms.* Some of his numerous dramatic pieces were written in collaboration with Garnet Walch and W. L. Lincoln.

DAMPIER, William, English navigator : b. East Coker, Somerset, June 1652; d. Lon¬ don, March 1715. In 1673 he served in the Dutch War and subsequently engaged in a band of privateers, as they called themselves, although in reality pirates, with whom he roved on the Peruvian coasts. Dampier, wishing to obtain some knowledge of the northern coast of Mex¬ ico, joined the crew of Captain Swan, who cruised in the hopes of meeting the annual royal Manila ship, which, however, escaped them. Swan and Dampier were resolved to steer for the East Indies and they accordingly crossed the Pacific and after various adventures Dampier and others were left ashore on Nicobar Island. After making several trading voyages in the Eastern seas he entered as a gunner in the fort at Bencoolen. Upon this coast he remained until 1691, when he found means to return home. In 1697 he published an account of his voyage round the world, which had a

great success and was supplemented by a second volume in 1699. He now obtained command of a ship in the king's service fitted out for a voyage of discovery. In this he made import¬ ant explorations on the coasts of Australia and New Guinea, giving his name to Dampier Archipelago and Strait. His last two trips around the world 1703-07 and 1708-11 were commercial enterprises. Dampier's writings in¬ clude (A Voyage Round the World) (1697); (A Discourse of Winds) (1609) ; Vindication of the Voyage to the South Sea* (1707) ; Voy¬ ages to the Bay of Campeachy) (1729). They bear all the marks of fidelity ; and the nautical remarks display much professional and even philosophical knowledge. His observations on natural objects are also extremely clear and particular.

DAMPIER, the name of several places in Australasia: (1) Dampier Archipelago, a clus¬ ter of about 20 small rocky islands off the northwest coast of Australia, in lat. 21° S., and long. 117° E., divided by the Mermaid Strait in two groups ; in the east is Rosemary, the largest island. (2) Dampier Island, off the northeast coast of New Guinea, with a volcano about 5,250 feet high. (3) Dampier's Land, a penin¬ sula of western Australia, fertile and well watered, lying between King Sound and the Indian Ocean. (4) Dampier Strait, separating Neupommern (off Papua) from Rock Island. (5) Dampier Strait, separating the island of Waigiu from the northwest extremity of New Guinea, the safest and easiest passage between the Indian and Pacific oceans. It is 70 miles long and 35 miles wide.

DAMPING-OFF, the rotting of seedlings and cuttings in the seedbed and the cutting bench, usually just above the surface of the soil. The immediate cause is a soil fungus (usually Artotragas or Pythhim debaryanum, though other fungi may produce the same effect) which feeds upon decaying organic matter until it obtains a favorable opportunity for attacking a living host. This opportunity is generally af¬ forded by a weakened condition of the seedlings or cuttings due to a more or less stagnated atmosphere highly charged with moisture and of rather high temperature. The fungus gains entrance to the

weakened stems which soon turn brown or black. The foliage quickly becomes infested and sometimes in a single night a whole seedbed or bench full of cuttings may become a rotting mass with no healthy plants left. With careful management the trouble can be avoided. The propagating medium should be clean, sharp sand, which should be thoroughly drenched when the bed is watered, the excess water pass¬ ing quickly away in perfect drainage. The bed should never be allowed to become dry. In short, both seedlings and cuttings should be kept growing steadily and sturdily. The drench¬ ing washes the spores of the fungus down through the sand. Should a bed become infested the healthy plants should at once be transferred singly and with as little soil as possible to fresh quarters. Neither freezing nor drying the soil will kill the fungus, which can live for months when growth is impossible. Sterilizing the sand or soil with steam is sometimes resorted to, the sand being heated for several hours. Less frequently plants in the open air are attacked. In the greenhouse and nursery experience in management will count for much.

DAMPS, certain deleterious gases which are released in mines. See After-damp; Choke-damp; Fire-damp; Lamp, Safety Lamp.

DAMROSCH, dam'rosh, Frank Heins,

American musician: b. Breslau, Prussia, 22 June 1859. He was trained by his father, Leopold (q.v.), and in 1882 became conductor of the Denver Chorus Club and supervisor of music in the public schools of that city. He was chorus master at the Metropolitan Opera House, New York, from 1885 to 1891, and in 1892 organized the People's Singing Classes. From 1897 to 1905 supervisor of music in the public schools of New York; from 1898 to 1911 di¬ rector of the Oratorio Society; since 1893 director of the Musical Art Society; since 1905 director of the Institute of Musical Art.

DAMROSCH, Leopold, German musician: b. Posen, Prussia, 22 Oct. 1832; d. New York, 15 Feb. 1885. He was graduated from the Univer¬ sity of Berlin, and began the practice of medi¬ cine ; but his love for music predominated, and in 1864 he gave up his medical profession and started on a tour as violinist. He met with great success and on his return to Posen was appointed musical director at the Stadt Theatre. He subsequently held a similar post in Breslau. Coming to the United States, he was made leader of the Arion Society in New York, founded the Oratorio and Symphony societies of that city and was successful in introducing German opera at the Metropolitan Opera House. He published several cantatas, over¬ tures and numerous pieces for the violin.

DAMROSCH, Walter Johannes, American musician: b. Breslau, Prussia, 30 Jan. 1862. He is a son of Leopold Damrosch (q.v.), and has been a resident in the United States since 1871. He inherited the musical talent of his father, and succeeded him in his enterprises. In 1894 he founded the Damrosch Opera Company for the production of Wagner. Since 1903 he has been director of the New York Symphony Orchestra which he also reorganized. He is the special exponent of the Wagnerian school of music, and has conducted operatic perform¬ ances in all the large cities, proving himself a most acceptable leader. His compositions in¬ clude an opera founded on Hawthorne's tale of (The Scarlet Letter) with which he toured the United States (1894) ; (Manila Te Deum,* a sonata produced in New York (1898) ; (Cyrano de Bergerac,) an opera in four acts (1913); and the incidental music for ˆedea' and <Iphigenia) for the Greek Theatre at Ber¬ keley, Cal., in 1915. In 1914, Columbia Univer¬ sity conferred on him the degree of doctor of music.

DAMS. To dam (originally, to stop up) is to obstruct or restrain the flow of a liquid. In engineering, a dam is a barrier to constrain or keep back a body of water. Dams vary in structure as widely as the physical character of their sites, the purposes for which they are constructed and the materials used. Every dam is, in a sense, a special adaptation, and may only be classified by referring it to some more or less varying type.

The art of dam building is coeval with civil¬ ization when the stream from the mountains, spending itself in the arid plain, was diverted for irrigation. The gardens and the water¬ wheels of Damascus are back of history. The Nile Valley, the Euphrates-Tigris plain, the Oxus and Jaxartes, and much of India, devel¬ oped civilization in the application of the waters to the land, and this will be the history of their restoration. It was a time of mighty en¬ deavor in hydraulic engineering, little under¬ stood in humid lands, demanding a high social organization and a closely knit state. Cyrus turned the Euphrates from Babylon and an em¬ pire fell and rose. Lake Moeris regulated the floods of the Nile in the days of Joseph, and its operation is credited with the seven fat and the seven lean years by some antiquarians ; and Bahr Jussuf (meaning, the water carrier) still leads to the Fayum basin. Modern Egypt has built the barrage across the Rosetta and Damietta mouths of the Nile for the continuous irrigation of the delta, and the dam at Assouan puts under service more than 6,000,000 acres of new lands, nearly doubling agricultural Egypt.

The old Hindu anicut turned the flow of formidable rivers into irrigation canals, and as a rock-fill with long paved slope and an apron down stream, it serves the engineers of India to-day. The ancient Hanks® of India are natural depressions closed by a bank of earth, sometimes of great height and miles in length, formed probably by basket carriage and con¬ solidated by tramping. The Veranum Tank still in use has a water area of 35 square miles held by a dam of clayey earth 12 miles long.

The protection of lands against flood by embankments, levees or dykes, belongs to primitive times. Along the Yellow River

(v(China's Sorrow**) the Chinese built levees in double line with cross-banks, so that the failure of the front line at any point by undercutting or other cause would only inundate the check immediately behind. The Po and Adige of northern Italy were embanked in remote times and the history of these works is of great interest.

The basket-work dam of moderate height on alluvial streams was long since devised, and from this has evolved the modern bank pro¬ tection of braided willow mattress in use on Western rivers. The .primitive neighborhood grinding-mill led the he*ad-race upstream to a dam of simple type.

The utilities widen in approaching the mod¬ ern era. The stream flow of the growing season no longer suffices for the needs of irri¬ gation .and the surplus is impounded for larger areas and the time of need. The uncertain navigation of natural streams no longer satisfies commerce, aud canal systems follow with exten¬ sive storage and feed-water developments, and this again, with steam navigation, gives way to the direct improvement and the canalization of rivers by means of fixed or movable dams. Growing cities need water supplies, a demand now universal, and often extraordinary struc¬ tures are required. Industries develop with the water power, the turbine makes higher heads available and changes the problem of dam con¬ struction for power purposes ; and finally comes the electric generator and distant transmission of power to satisfy further demands.

The United States contains water power capable of enormous development, in fact, more than tenfold all the power now in use. Next to the land itself the running streams are the most valuable economic asset. The future may well see an era of dam and reservoir building, in the humid as well as in the arid regions, for the better equalization of the flow of streams, in the interest of navigation, the reclamation of alluvial lands, the development of water power, and the creation of fisheries. The acre of water , may be made even more valuable than the acre of land.

Embankments. — Embankments for restrain - ing water are widely applied and have special names : as levees and dykes for protecting lands, banks forming canals, coffer-dams, reservoir embankments and

the embankment with spill¬ way adjunct for impounding water, the latter being called a dam.

The levee is built of the alluvium of river bottoms to restrain flood overflows. It is given sufficient freeboard above the greatest known flood, the top width is usually greater than the height and the side slopes are very flat, some¬ times as low as five or six to one. The site is cleared of all humus and other vegetable mat¬ ter and well broken, so as to bond the embank¬ ment to the natural ground, and all such ma¬ terial is excluded in forming the embankment. A ((muck-ditch** is made when deemed neces¬ sary, and <(buckshot** or other watertight ma¬ terial is puddled in and carried up into the embankment as a core.

Many hundred miles of levees have been built along the Mississippi River and its tribu¬ taries, some of them of very large proportions. When built according to the best practice, well seasoned and turfed over, failures are very rare, though floods often stand against them for

weeks and the material is comparatively mobile when saturated. Failures have been due to in¬ sufficient height and the chopping effect of waves, but especially to lack of maintenance and of care at critical periods. The crawfish burrowed through at the turf line when its re¬ moval was omitted, and the board fences built in the levee to intercept this pest, decayed and weakened the levee. In northern latitudes the muskrat has also been a nuisance, as in the embankments of the reservoir system at the headwaters of the Mississippi River built for the purpose of increasing the low water flow.

Canals frequently skirt the sides of valleys or contour slopes, partially in excavation with part or full bank on the lower side. The ma¬ terial for forming such banks is generally far superior to that available for levee construc¬ tion. The slopes are usually flat, from two to three on one, and a watertight core or face is added in permeable ground, or the entire prism may be given a puddle lining when the percola¬ tion is liable to be serious. Sheet piling has been driven in such banks, but this divides the bank and is not now considered good practice. The unwatering of navigable canals in the winter time is also bad practice, as it subjects the inner face to frost action.

Canals are carried across water courses and valleys on supporting embankments, sometimes of great magnitude. Such embankments are given easy slopes and care exercised in form¬ ing a watertight prism

above, so as to avoid saturation and the resulting instability.

Ditches for irrigation and hydraulic mining sometimes reach the dignity of large canals, requiring care in the formation of banks. The soil of their location is usually of fine tilth with an admixture of adobe, and such channels generally ((seal** quickly with the fine sediment carried in the flowing water of certain seasons.

The embankment used as a coffer-dam usu¬ ally encloses some large site, as for the con¬ struction of a canal lock or for rock excavation in the dry, and is of a temporary character. Suitable material may be dumped from a trestle, the mass of material formed in water by dumping from a height being usually suf¬ ficient. In a notable case, a recent contract for a rock channel in the Saint Mary's River, a heavy embankment more than a mile long was formed of dredged material to a maximum height of 30 feet, and rock, estimated as wet excavation, was taken out in the dry at a large profit. No great care was tajcen in this em¬ bankment, except to provide suitable material and sufficient mass.

The reservoir embankment proper is usually for a storage or distributing reservoir, as for a municipal water supply. Such reservoirs are often 30 feet deep and the embankments are formed with great care from selected material placed in thin layers, watered and rolled. The inner face is lined and protected by a face-wall, a pavement of brick, stone pitching, or even riprap in some large storage reservoirs. The height of the embankment varies with the supporting ground.

Earth Darns. — The impounding embank¬ ment, or earth dam, is usually carried across some drainage line between steep valley slopes, so as to make a reservoir in the valley expanses above, and generally seeks to store a large pro¬ portion of the run-off. An ample spillway on

an independent site is provided to carry the ex¬ treme flow of the valley when the reservoir is full.

Earth dams are made of carefully selected material, preferably gravel containing enough clay to make a watertight puddle. Too much clay is to be avoided: it may range from 5 to 30 per cent of the remainder, according to the kind of material. The water slope being more or less saturated should be much flatter than the dry slope, the approved practice being a slope of three horizontal to one vertical. The earth is built up in shallow layers which are thoroughly compacted by rolling, trampling by horses or solidified with water.

Earth dams fall usually within four classes : (1) The homogeneous bank of earth; (2) the bank of earth with puddle core; (3) the bank of earth with a core of masonry or sheet pil¬ ing; (4) the bank of earth puddled on the water slope.

The object of the masonry core is chiefly to

ing from a height, the finer material upstream, and having very flat slopes. Such a dam is in reality a mound, and can be made of a wide variety of material, the stability depending upon a moderate ground-water plane through the body of the fill rather than on impermeability. Such plane should not be sufficient to produce springs that will disturb the material, and the fill can be tightened or ((sealed)) by means of roily water or mud against the upstream face. Such dams are sometimes built with wood core walls and sluiced only on the upstream side.

Besides the Tomhannock Dam here illus¬ trated may be mentioned the following notable earth dams :

The Ekruk Dam (India) is 7,300 feet long and 72 feet high, the reservoir holding 24,870,- 000,000 gallons.

The Belle Fourche Dam (South Dakota) is 6,493 feet long, and has a maximum height of 122 feet. It is 19 feet thick at the top and 620 feet at the base. It is built of heavy clay, in

Transverse Section

Earth Dam with Concrete Core Wall. Tomhannock Dam; Water Supply of Troy, N. Y.

cut off water seeping through, not to resist the hydrostatic pressure. The thickness of the core walls at the water level is usually one-seventh to one-sixth of the head in the reservoir.

Earth-dams have failed by overtopping from insufficient spillways or deficient free¬ board, from saturation and sloughing of the rear slopes, and from cutting out around pipes carried through the base. Embankments sub¬ ject to water action should have slopes much in excess of the so-called “natural® or dry slope. Present practice tends to an impermeable up¬ stream face and upper toe wall or intercept to a safe depth with good drainage behind, thus developing the full stability of the material. Pipe lines through made banks are to be avoided, and in any location great care is needed to prevent seepage along the. pipe line. The minimum thickness at the top is 10 feet, and 30 feet is regarded as a safe maximum.

The hydraulic-filled dam is probably a de¬ parture in the right direction. Dams of large section are filled by water carriage or by dump-

6-inch layers, packed by steam rollers. The upstream face is covered with heavy concrete slabs. The reservoir holds 66,500,000,000 gal¬ lons.

The Gatun Dam (Canal Zone) is 7,700 feet long, 115 feet high, 100 feet wide at the top and 2,019 feet at the base. It contains 21,146,000 cubic yards of earth. The hydraulic fill has a base 1,200 feet wide.

The Lahontan Dam (Nevada) is an earth fill of gravel and silt built up in 4-inch layers. It is 1,300 feet long and 124 feet high. The thickness at the bottom is 620 feet, and at the top 20 feet. On the water side it has a facing of riprap 24 inches deep.

The San Leandro Dam (California) is 500 feet long and 125 feet high. It is 28 feet thick at the top and 1,700 feet at the base. About one-third of the material was sluiced in by the hydraulic method.

The Tabeaud Dam (California) has a length of 636 feet and a height of 120 feet. It is 20 feet thick at the top and 620 feet at the base.

It is built of red gravelly clay in 6-inch layers, which were sprinkled and rolled, trampled by horses and grooved lengthwise by cartwheels. The upstream slope is puddled and covered with a loose rock fill.

The Arrowhead Dam (California) is the second highest earth dam in the world — 222 feet. It is 850 feet long, is 20 feet wide at the top and 950 feet at the base. It has a core wall of concrete 207 feet high, 20 feet thick at the base and 10 feet at the top. The earth was dumped dry and hydraulicked into place.

The Calaveras Dam, an adjunct of the San Francisco water supply, built 1913-16, is the highest earth dam on record. It is 1,260 feet long, with a maximum height of 240 feet above bed rock. It is 25 feet thick at the top and 1,312 feet at the base. The material was sluiced in, the centre being the finest clay and silt de¬ posited in still water to simulate lacustrine clay. It was washed out of borrow pits down an open channel, the clay content varying from 20 to 50 per cent, the remainder being sand and gravel. The flowing material was raised to the dam by mud pumps.

Timber Dams. — The timber dam across flow¬ ing streams for power purposes was well-nigh universal in the pioneer development of the country. Timber was plentiful and its uses widely familiar. Wooden wheels with horizon¬ tal axes utilized moderate heads, and these were also limited by the height of banks, so as to avoid excessive flowage with sufficient pond so that the flow of the dry season could be used in the daylight hours.

Such dams were usually built for heads of 6 to 16 feet, though the Connecticut River Dam at Holyoke had a height of 30 feet. This dam was gradually undermined by the erosive action of the water falling over it, as it had no apron. Better heads were often produced by a dam at the head of some rapid, with a race leading down stream.

Timber dams were built in a great variety of forms, much depending on the character of the site and the material available. A common type was the crib or ˆcob-work® structure with the pockets filled with stone, having a broad base, sheeted upstream and banked with earth, on the downstream side, the spillway and apron dropping in steps. Piling was sometimes driven, capped and sheeted to an apex like the roof of

a house, the spaces between piling being filled with stone and the upstream toe banked with earth. Frame dams were also built, a sheeting of timber being supported by triangular frames resting on mudsills ; the upstream slope was flat, usually two to one, the toe being covered by a bank of earth. Log dams were cribbed up

and sheeted upstream like frame-dams; and dams were built of piling and sheeting alone, driven into the river bed.

Timber dams have lasted well where the height has not been excessive, the upper parts have been easily renewed when decayed or worn out, and they have been exempt from wholesale failure with disastrous results. Most of the failures on record have been due to lack of a proper apron, the water running over gradually cutting away the foundation. They will always .be used in timber regions for manu¬ facturing lumber and with sluiceways for driv¬ ing logs. No material equals timber in resist¬ ing water shock and vibration, and its use will be preferred by many. Under water, timber is everlasting, and it will always be a useful ma¬ terial to the engineer.

A large proportion of the small water powers have been abandoned, and with the de¬ velopment of the turbine higher heads have been sought. The electric generator and trans¬ mission has greatly enlarged the waterpower field, and this has accentuated the tendency toward higher dams and larger units. In recent years Portland cement has become cheap and reliable, and timber less available, and concrete dams with higher heads are coming into use.

Brushwood dams are useful on small streams having a soft bottom. Saplings and even trees of considerable size are used for the larger con¬ structions, the branches being laid upstream. Stone is loaded upon the brushwood sufficient to sink it, and gravelly soil is thrown on to fill the interstices. These dams are carried up in several alternate courses of brush and gravel, and are either planked on the face or covered with riprap.

Some notable examples of the timber dam are: The New Hartford dam, 232 feet long and 21 feet high, with a width at the bottom of 68 feet. The timbers are 9 to 12 inches thick and 6 feet apart, the spaces between being filled with stone. Both faces are planked with oak, and the upstream side has a long graveled earth slope. This dam has stood

a freshet of water 10 feet deep flowing over the top of the dam.

The Columbia Dam across the Susquehanna River is 6,847 feet long and iy2 feet high. It is 16 feet wide at the top and 30 feet at the bot¬ tom. It has withstood many severe ice freshets since it was built, in 1875.

The Canyon Ferry Dam (Montana) is 485 feet long and 29 feet high. It is built of tim¬ ber cribs filled with stone. The downstream face is constructed in two long slopes, the lower one flatter. These slopes take the place of an apron. The upstream slope is planked and protected by a gravel fill covered with riprap.

Masonry Dams. — Masonry dams are built after three general types: (1) gravity dams, in which the weight of the material of which the dam is built is depended on to hold back the pressure of the impounded water; (2) arch dams, in which the principle of the arch is opposed to the water pressure; (3) hollow dams, in which the water face of the dam is supported by a series of buttresses. In the third class belong the (<multiple arch® dams, in which the small arches are sprung from the buttresses.

The first requisite in masonry dam construc¬ tion is an exploration of the site. Where there is an earth cover, borings are made to discover

the location and quality of the necessary rock formation, and exposed rock is searched for existing seams. After diversion works to turn aside the stream while the dam is being built, a trench is dug down to the rock, large enough to accommodate the base of the dam, and room for carrying on the work. The rock surface is cleaned of earth with wire brooms; large seams are filled with concrete, and small seams are grouted under pressure — up to 200 pounds per square inch. Grooves are cut in the rock for the toe of the dam, and if the structure is a high one, additional grooves are cut to ensure against the dam's sliding on its foundation.

The former practice of building the two faces of cut stone and filling between with rub¬ ble masonry has been largely superseded by cyclopean masonry, in which great masses of rock are placed by the derrick, and the filling out to the faces done with concrete. With present-day machinery cyclopean masonry can be laid four times as fast as rubble masonry. Another development in dam construction is the reduction of the proportion of stone used in the concrete. Where formerly the stone amounted to 50 per cent of the mass, it is now only about 25 per cent.

Many timber dams have been rebuilt in masonry, including the great dam at Holyoke before referred to. Modern practice in power plants combines a number of turbines on a horizontal shaft connected direct to the electric generator, and this demands that the floor of the forebay and of the generator room shall be above the back-water of floods, and that the turbines discharge into the tail-bay through draft-tubes. Recent practice as at Keokuk, Iowa, and the Cedars of the Saint Lawrence, has installed very large single turbine units of the vertical type and has thus much simplified power development. The exacting demands of electrical service require uninterrupted power, or that the head shall be sufficient to give effective results in flood time. These conditions have increased the height of dams to about twice the flood range, with low-water heads of 20 to 40 feet. Some over-fall dams have, how¬ ever, been carried up to 60 feet.

The approved form for an over-fall dam is a roll-way — a curved crest

with a reverse curve extending downstream as an apron to protect the bottom. The crest and upper slant should be worked out as a gravity curve for the maxi¬ mum flood, thus avoiding the tendency of the mappe to lift, which has been credited as the source of tremor and vibration. The flash-board is a common error, and failure to remove these in floods has caused such vibrations of the confined air as to shake off the tops of dams, in one concrete dam for one-third the height.

A high and well-formed roll-way dam may be called a speed-generator, and in high water the horse power turned into velocity is tre¬ mendous ; and this is not dissipated by wave action for some distance downstream. The beds and banks must therefore be defended, and naturally rock sites are sought. These are not always safe, as shown in the failure of the 60-foot dam at Austin, Tex., where the down¬ stream toe was undermined by reason of the omission of proper defense.

For sites without rock bottom in reach, great care is necessary in defending the chan¬ nel below from erosion. For such sites the

ˆtumble-bay® dam is best adapted, in which the force of the falling water is dissipated within the confines of the structure. In dams of this type, the sheet of water is given a sheer fall, being well ventilated behind, into the pool or bay which has a depth of one-half to two-thirds the height of the fall, and the water escapes from the bay over a breast wall or roll-way with little or no destructive energy. Some recent designs show an A-shaped plan of dam with a triangular tumble-bay closed by a low roll-way, with a bridge of reinforced concrete spanning the roll-way between piers. The bottom of the bay is a heavy bed of concrete defended by a timber floor beneath the sheet of falling water. The dam on rock across the Mississippi River opposite Keokuk, at the foot of the Des Moines Rapids, for a head of 35 feet is of the roll-way type divided into panels by piers fitted for <(stop locks® on the crest.

High dams without rock foundations will, in many situations, require foundations of bear¬ ing piles and a liberal use of sheet piling. The structure has naturally a broad base which is an element of security. Further security may be had by sealing the river bed with silt or clay puddle for some distance up stream, depending upon its character and the head. Nature will perform this service in time, if a blow-out does not meantime occur, as streams generally carry sediment at some

season.

The problem in such foundations is one of percolation around and beneath. The history of the barrage across the two outlets of the Nile, near the head of the delta, is instructive in this connection. A masonry structure was built upon strata of the most mobile character, and has been put in successful operation by sealing the bed up stream with impermeable material for a distance of 20 times the head on the dam. This experience should assure the practicability of founding a dam on any site.

Movable Dams. — In the improvement and canalization of rivers the dams are usually of moderate height, and when of the ordinary type are called <(fixed® dams. The purpose of canal¬ ization is to maintain the ordinary pool level as high as the adjacent lands will permit without interfering unduly with the flood regimen, and for this end several types of movable dams have been devised. These are much used abroad and a great development is to be expected in this country. Movable dams are of two general classes: (1) automatic dams, and (2) those operated by external power. In the first group belong the eight types of bear-trap dams : in the second are the bridge dams ; shutter and wicket dams; roller dams; frame dams; and curtain dams.

The original of the automatic types is the bear-trap first used on the Lehigh River naviga¬ tion of Pennsylvania early in the last century. This consisted of a timber platform at or near the level of the stream-bed, with two leaves overlapping. The top leaf was hinged at its up¬ stream edge to the floor of the dam. The under leaf was similarly hinged at its downstream edge. By introducing water beneath through a regulating sluice these leaves rose with the head of water above until they reached the proper height in the form of a flat A dam. The use of these dams for navigation disappeared for a time, but continued in the lumber regions as a device for holding a pool of water for storing

logs and then flushing the same down the stream. As thus used the bear-trap has been variously altered and made as long as 60 feet, beyond which trouble has occurred from the warping or twisting of the leaves. Various de¬ signs have been proposed for waterway pur¬ poses. The most notable application is the so-called “Chicago® bear-trap, 160 feet long, in¬ stalled at Lockport, Ill., as a part of the “controlling works® of the Chicago Drainage Canal. This is made of metal, is hinged at the top angle, the upper-leaf dropping in front of a breast-wall. It has a range of 15 feet and is

so counter-weighted and controlled that the depth flowing over, is practically uniform at any elevation, and it is easily manceuvered by one man. The other modifications of the bear-trap are the DuBois dam, in which the two leaves are hinged at the apex, and the downstream leaf hinged to the foundation, the upstream leaf sliding; the Carro dam, in which the leaves are hinged at the apex, and both slide in links on the foundation ; the Girard dam, in which the leaves are hinged at the apex, and the down¬ stream leaf in two parts hinged at its middle, folding up stream; the Parker dam, in which the leaves are hinged at the apex, and the up¬ stream leaf in two sections, hinged at its mid¬ dle, and protected by an idler leaf sliding on the foundation ; the Lang dam, claimed to be an improvement on the Parker, in which the upper part of the latter’s upstream leaf is omitted, and the lower part hinged to the idler; and the Marshall dam, in which the hinge joining the leaves is near the middle of the water leaf, on its downstream side, and the downstream leaf is in two parts, hinged at the middle, form¬ ing a salient angle pointing down stream; the upstream part of the downstream leaf is con¬ stantly horizontal, and its lower part is parallel with the water leaf, forming an exceedingly flexible dam, managed entirely without chains or stops.

Bridge dams consist of a permanent bridge with the openings between the piers closed by some form of gates supported directly by the piers. The type is an evolution from the old “stop-plank® used in mill practice, set vertically or horizontally. If vertically it is called a needle dam. The “needle® is a piece of light wood, rectangular, and shaped into a handle at toˆp. These are placed in juxtaposition against a sill on the floor of the pass or on the weir and against a girder above

water level. The needles are usually designed for one man to handle,

and their application is thus limited to needles 4 24 inches square, and about 16 feet long, weigh¬ ing about 100 pounds. It is properly an auxil¬ iary in some other type of movable dam for the purpose of regulating pool level in moderate flows of water. A needle dam has been built, however, on the Big Sandy River in which the needles are 12 inches square and 18 feet long, and weigh 863 pounds. They are handled by a derrick mounted on a boat.

The shutter or wicket dam is thus far the favorite for river work. * This consists of shut¬ ters several feet in width and of the length de¬ sired set side by side, the lower edge resting against a sill and supported by a prop behind, the shutter tipping automatically and falling to the riverbed when the depth over top exceeds a certain limit. The shutters are raised by means of a windlass from a service bridge or boat. This type of dam is used on the Ohio and Great Kanawha rivers. The dams on the Ohio River improvement are mostly of Chanoine wickets in their navigable passes, with pool regulating weirs of bear-trap type. The length of these wickets varies from 9 feet 9 inches for the lowest weirs to 18 feet for the highest passes. The wickets are 3 feet 9 inches in width, set with 3-inch openings between which they are closed by pieces of scantling in time of low water. The vertical height of the bear-trap dams varies from 9 feet to 15 feet. The usual width of the navigable passes is 600 to 700 feet, and of the bear-trap dams 91 to 94 feet, with ex¬ tremes of 52 feet and 120 feet.

Roller dams are formed by a massive cylin¬ der having a diameter equal to the desired height. Opening the dam is accomplished by rolling the cylinder bodily up inclined tracks laid at both ends of the dam. In a roller dam recently built at Schweinfurth, Germany, the cylinder is 13 feet 6 inches in diameter, and closes an opening 59 feet across.

Frame dams are essentially bridge dams, in which the bridge itself is movable. In its sim¬ plest form it consists of a series of A-shaped frames set closely side by side. These are ar¬ ranged to drop down sideways nesting one in another. They are raised by a chain connecting the peaks of the A-frames.

Curtain dams have an operating bridge with a series of frames hinged to the bridge at the top. These can be lowered till the other end abuts against a stop on the dam floor. The actual closure is effected by

curtains of hori¬ zontal bars of wood hinged together on their upstream side, the lower bars being heavier. A rolling “shoe** of iron is attached to the lowest bar, and an endless chain passes around the curtain at its centre. The curtain is rolled up by a windlass operating the chain. At the Port Villez Dam across the Seine 90 miles be¬ low Paris is the original curtain dam, 700 feet long and 10 feet 6 inches high.

The Taintor gate has been much used for closing passes and chutes and has been built in sections 20 feet long and for a. depth of 10 to 12 feet. This is a sector of a cylinder against the water, the centre of motion and support being below the centre of figure, so that the water pressure shall nearly balance the weight and assist in raising the gate. Some dams have been built for power purposes in which the flood flow is practically controlled by Taintor gates.

The reverse Taintor or rigid bear-trap is a sector of a cylinder in the form of an inverted trough, having one side straight, and the other curved to the radius of the straight side. The free edge of the straight side is hinged to the dam floor, so that the whole structure can re¬ volve, sinking into a well in the floor. The curved side and ends of the ˆtrough® make an approximately watertight contact with the ma¬ sonry. Water from above the dam can be ad¬ mitted to the under side of the sector, raising it until the water pressure balances the weight of the gate. The river flows over the crest, and down the straight side. This type is in

use at the power plant of the sanitary district

of Chicago and is under construction in the Genesee River at Rochester, N. Y.

Under this classification belongs also the butterfly dam in the Chicago Drainage Canal, the only structure of its kind. The swinging leaf is 184 feet long and 30 feet high, and weighs 710 tons. It consists of a girder faced with steel plates on the upstream side. It is pivoted at the centre, and so as to swing into

the line of the flowing stream when open. The

maximum pressure against the bottom pivot when the dam is closed is 1,888 tons; on the top pivot 870 tons. The dam is opened by re¬ leasing the lockbar blocking the downstream end, and then opening several shutters in the end that swings up stream : the pressure thus reduced on that end, the pressure on the other end swings the dam open — with some mechan¬ ical aid.

Rock-fill Dams. — Hydraulic mining on the Pacific slope developed the rock-fill dam, and it has been utilized for irrigation works. Orig¬ inally this dam consisted of a dump of loose rock in a canyon or other rock-bound site, tak¬ ing its natural slope down stream, the upper slope being hand-laid and steeper and faced with redwood or other planking and calked.

(Op Strep m) ELEVATION

Castlewood Rock-fill Dam, Denver Land and Water Co.

Later a sheet of metal was substituted for the planking, and the construction was varied by setting the metal sheet vertically in the heart of the dam. The metal sheet was coated and some¬ times enclosed in asphaltum concrete. Such dams had an independent spillway.

These dams have been carried to consider¬ able heights, several exceeding 100 feet,, the highest being the Lower Ottay, near San Diego, Cal., 161 feet above rock and 130 feet above natural surface. It is 565 feet long, 20 feet wide at the top and 282 feet at the base. Set¬ tlement has occurred in most of these dams, causing apprehension, but no serious disaster has occurred.

A dam of this character was undertaken in Goose-neck canyon on the south fork of the

South Platte, some 50 miles southwesterly from Denver. In order to avoid settlement, the rock was dropped into place from a height of about 100 feet, as experience in the spoil-banks of the Chicago Drainage Canal had shown such con¬ solidation from this cause that blasting was re¬ sorted to in opening up a roadway across such a fill. The downstream slope was to be flattened and the hand-laid stone up stream was to be filled with lean concrete, and faced with a metal sheet. When this dam had reached a height of 50 to 60 feet it was overtopped by an unprece¬ dented flood and washed away. The experiment was valuable in showing that a mound of gran¬ ite rock thus co'nsolidated was nearly water¬ tight, under a head of 50 feet of water. (The facing was not carried up). This experience suggested that a filling of finer material gradat¬ ing to adobe at the face would have made a successful structure without the intervention of wall or metal sheet. The site was later occu¬ pied by a high masonry dam.

The Castlewood Dam (Colorado) is a rock-fill dam 600 feet long and 92 feet high. It is 8 feet wide at the crest, and 225 feet at the base, and has a facing of rubble laid in cement on both slopes.

The Pecos Valley Dam is a rock-fill, 1,686 feet long and 52 feet high. It is 14 feet wide at the top and 115 feet at the bottom, with an earth backing for 162 feet on the water slope. The earth fill is faced with riprap one foot thick.

The Morena Dam (California) is 520 feet long, with a maximum height of 267 feet. The water slope is 9 horizontal to 10 vertical, of masonry behind which was placed loose rock by hand 54 feet wide at the base and 16 feet at the crest. The loose rock-fill was dumped behind this, forming a total base of 357 feet. The water face was finished with reinforced concrete slabs 12 inches thick.

Experience in this class of construction also suggests the flatter slope down stream and the watertight skin at the upper face, rather than a core or intercept in the heart of the dam. Dams which depend on a timber or metal sheet for .tightness cannot be regarded as permanent structures, and a lack of care in maintenance invites destruction. They are, however, useful expedients in the early development of remote regions.

Metal Dams. — Metal dams are often pro¬ posed, and a few examples have been executed in steel. Steel is perhaps more perishable than timber, and its failure from growing weakness and lack of care is likely to be more complete and disastrous. It is adapted to much greater heights, but is to be regarded as. an expedient for a few years until something better is justified.

Prominent examples of the steel dam are :

The Ash Fork Dam (Arizona), 184 feet long and 46 feet high. It is of open front, design, the deck being supported on 24 triangular bents set 8 feet between centres on a concrete foundation. The water face is of steel plates which are riveted to 20-inch I-beams which form the upstream members of the bents. The deck plates are Y% of an inch thick, and are curved to a radius of 7p2 feet (laterally), the concave side being up stream. The. deck makes an angle of 45 degrees with the horizontal.

The Redridge Dam (Michigan) is of the same general construction as the Ash Fork Dam. It is 464 feet long and 74 feet high. The face members of the bents vary from 15-inch I-beams on the low bents to 24-inch I-beams on the high ones.

The illustration shows a combination of steel

Among the notable masonry dams of the gravity type may be instanced the following :

The Assouan Dam, across the Nile, in Egypt, is the largest masonry dam in the world. It is built of granite rubble, is 6,400 feet long, and has a maximum height of 112 feet. Its mass contains 1,179,000 cubic yards of solid masonry.

Water *eve*

4-

-!2*

W?’

— 6- -

-rr

-

‘12”

-22—

CR0SS SECTION

(Tot a/ tenft/r of (/am - /20ft.)

ELEVATION

(Down stream encts of buttresses)

Concrete-si eel Dam, Theresa, N. Y.

bents with a reinforced concrete deck, in a small dam erected at Theresa, N. Y.

High Masonry Dams. — The high masonry dam is comparatively recent, originating in Spain some three centuries ago, but its rational design began with the Furens Dam in France less than a half century ago. The examples are not yet numerous, but the better quality of ma¬ sonry for hydraulic construction and the greatly reduced cost, together with the more enlightened demand for the conservation of water for irri¬ gation, water supply, water power, navigation and fisheries, combined with the greater security

Cross-section through the Wachusett Dam at the deepest part of the valley. Metropolitan Water Supply, Boston, Mass.

and permanence, promises an era of high ma¬ sonry dams.

The approved cross-section has a thickness at top of 8 to 10 per cent of the height, a curved batter down stream and a slightly curved batter up stream, the conditions being that the locus of strain shall not pass outside the middle third, and that the greatest pressure in the ma¬ sonry shall not exceed safe working limits, the latter being governed by the quality of the ma¬ sonry. The construction . is massive random rubble work with an avoidance of continuous beds and joints, the upstream face in courses with roughly dressed beds and joints, the down¬ stream face of selected stone. The top of the dam is usually finished as a roadway with para¬ pet walls, and the spillway is constructed on an independent location. The site is a rock gorge or canyon with a valley expanse above for the reservoir.

The New Croton Dam (built 1892-1906), a part of the water supply works of New York city has a length of 1,168 feet, with a spillway of 1,000 feet connecting at right angles. The maximum height of the dam is 297 feet, and the head of water 136 feet. The dam is part rubble and part cyclopean masonry, and has a mass of 855,000 cubic yards — by far the lar¬ gest in America and second only to the great Assouan Dam on the Nile. (See diagram on another page).

The Ashokan, or Olive Bridge Dam (New York city water supply), across the Esopus Creek, is 1,000 feet long, with continuing core walls and embankment — 4,800 feet in all. Its maximum height is 251 feet. It is of cyclopean masonry faced with concrete blocks. The masonry mass has a content of 488,200 cubic yards.

The Tansa Dam, in India (water supply of Bombay), is of rubble masonry, 8,800 feet long and 118 feet high, with a mass of 408,500 cubic yards.

The Waldeck Dam across the river Eder, in Germany, is of rubble masonry. It is 900 feet long, 160 feet high and has a content of 392,400 cubic yards.

The Poona Dam, in India, is of rubble masonry, 5,136 feet long and 108 feet high, with a mass of 362,000 cubic yards.

The Roosevelt Dam, in Arizona (built 1905—

11) , is of rubble masonry with concrete in ver¬ tical joints. It is 680 feet long and 260 feet high. It is 158 feet wide at the base and 16 feet at the top. Its content is 344,000 cubic yards.

The Mauer Dam, in Germany (built 1904—

12) , is of rubble masonry, 918 feet long and 208 feet high. It has a mass of 332,000 cubic yards.

The Lake Cheesman Dam, of the Denver water supply, is one of the very high masonry dams carrying a free head of water second only to the Arrowrock Dam. It is 700 feet long on the crest, with a maximum height of 225 feet. It is built on a curve, the radius of which is 400 feet. It is of granite rubble, with a mass of 103,000 cubic yards.

Of all-concrete dams of the gravity type, the following are examples :

The Arrowrock Dam, over the Boise River, in Idaho (built 1912-16), is of concrete with

Two of the highest dams in the world

DAMS

Copyright by Underwood & Underwood

Roosevelt Dam across Salt River, Arizona

1 View looking up stream

2 View looking down stream

a

Q

3

O

O)

X

a;

a

o

<u

£

o

o.

t* >

xa

•3

OJ

3

CO

t-«

o

-♦-»

3

w.

<U

3

a>

00

ao

13

lO

< 0

H

M

3

£

O

i— t

JX

3

J4

o

CL >

a

o

a >

>

o >

.2*

35

CO

‘55 .2

.52 o

s|

ft)*-1

.3 ~ 3

to 3 2 -a 2§ a 3

•c

bO

3

o

0)

$<U$

00

M

a

3

Q.

3

O

<0

M.

DAMS

Copyright by Underwood & Underwood

I Assouan Dam, Egypt, looking down stream

2 San Roque Dam, Providence, Arizona

as many opiums® distributed through its mass as could be conveniently placed. It is 1,160 feet long, with a maximum height of 351 feet — the highest dam in the world at the time of its completion. It is built on a curve of 662 feet radius, though of gravity type, being 238 feet wide at the base, and 15p2 feet at the crest. Its content is 530,000 cubic yards. The free head of water behind the dam is 248 feet — 31 feet higher than at the Lake Cheesman Dam, which formerly held the record in this respect.

The Elephant Butte Dam, across the Rio Grande in New Mexico, is of cyclopean concrete carried up in huge block sections. It is 1,310 feet long and 305 feet high, with a cubical con¬ tent amounting to 608,000 cubic yards, making it the third largest masonry dam in the world, surpassed in bulk only by the Assouan Dam in Egypt and the New Croton Dam in New York.

The Keokuk Dam on the Mississippi is a massive concrete monolith, 4,649 feet long and 53 feet high. It is 29 feet wide at the top and 42 feet at the bottom. The spillway section is 4,278 feet in length and a height of 36 feet, allowing for a head of 11 feet over the crest. The deck of the dam above the spillway is supported on 119 arches, 36 feet from centre to centre, on 6-foot piers. From this deck are operated the steel gates (11 feet by 32 feet) which close the spillway openings. In building this dam concrete was poured 40 feet deep per day — a 15-foot lift, then 5 hours for setting, followed by the 25-foot lift.

The Barcelona (Spain) Dam, completed in 1916, the largest dam in Europe, is of concrete and was built by American engineers. Its maximum height is 330 feet and its length on the crest is 700 feet. The thickness at the base is 230 feet and at the crest 14 feet. The dam holds an artificial lake 15ˆ2 miles long and 3ˆ4 miles wide, designed to irrigate 100 square miles of arid country and also furnish 20,000 electric horse power, later to be increased to 40,000 horse power.

Notable examples of the arch type of dam are the following:

The old Bear Valley Dam (built in 1884) surpassed in boldness of

design all dams pre¬ viously built. It was of granite ashlar faces with rubble filling, set in Portland cement. It was 450 feet long and arched to a radius of 335 feet. Its maximum height was 64 feet and it was 20 feet thick at the base and 3.2 feet at the crest. Notwithstanding the severe criticism it received, it stood unimpaired until submerged in 1915 behind the new dam.

Barossa Dam, in Australia (built 1899-1903), is of cyclopean masonry. It has a maximum height of 113 feet and is 42 feet thick at the base and 4ˆ2 feet at the crest.

An arch dam of remarkable design was re¬ cently built across Crowley Creek, in Oregon. It is of gravel concrete, without reinforce¬ ment, 170 feet long with a maximum height of 65 feet. It is 5.2 feet thick at the base and 3 feet at the crest. For the upper 30 feet the faces are parallel, the slight batter being below that section on the downstream side.

The Shoshone and Pathfinder dams, in Wyoming, depend in part upon their arch form for stabflity.

Shoshone Dam (built 1905-10) is of rubble masonry, arched to a radius of 150 feet. It is 200 feet long, with a maximum height of 328

feet. It is 108 feet thick at the base and 10 feet at the crest.

Pathfinder Dam, across the North Platte

River (built 1906-10), is of masonry, arched to a radius of 150 feet. It hag a maximum height of 210 feet and is 94 feet thick at the base and

11 feet at the crest.

Among the more recent hollow dams are :

Douglas or La Prele Dam, in Wyoming (built 1908-09), an open front dam of the Am-bursen type, 360 feet long and 135 feet maxi¬ mum height. The deck is at an angle of 40 de¬ grees with the horizontal and is 12 inches thick at the top and 54 inches at the bottom. The sup¬ porting buttresses are 18 feet between centres,

12 inches thick at the top and 50 inches at the bottom, 10 feet deep at the crest and 160 feet at the base. The material is reinforced concrete. The whole batter is on the water face.

Jordan River Dam, on Vancouver's Island, is of reinforced concrete, 756 feet long and 126 feet high. The buttresses are 7ˆ4 feet deep at the crest and 148 feet at the base. They are placed 18 feet between centres and are 12 inches thick at the top and 42 inches at the bottom. The deck (cast after the buttresses

16 inches thick at the top and 31 inches at the bottom. A rock foundation not being avail¬ able, the buttresses were built on a thick mat¬ tress of concrete.

Adjuncts — The ordinary dam across a stream is its own spillway. For impounding dams of earth or rock-fill the necessity for independent spillway is obvious. It should be equally obvious for the high masonry dam, and this is now recognized by the best practice. Many errors have been made, especially in arid regions, through insufficient spillway. In humid regions the <(greatest ffodˆ occurs two or three times in a century, and if these are provided for, the margin is usually sufficient for any con¬ tingency. In the arid regions a flood as great may be possible, but the occurrence is far more erratic. Cloudbursts produce startling effects in small basins, but the results in basins of considerable area are not significant.

The Yellow River of China has a large pro¬ portion of arid and semi-arid territory, and five times in its history it has devastated its valley, notwithstanding all the defenses of man, and

SCALE

100

200 FEET.

CONTOUR INTERVAL 20 FEET.

♦ /OS f * tra A/cs

fAi

VAL V£

+ 60’ fMr/rANC£

TA/NrORGArE

EA/rˆA/VCE

WAr£#W4r

MA/viVA y

SECTION ON TUNNEL LINE

‘AINTOg G AT f

‘YAIVTS

Lake Cheesman Dam. Water Supply of Denver, Colorado.

were built) is 15 inches thick at the top and 55 inches at the bottom.

The Three Miles Falls Dam, in Oregon (built 1914), is a multiple-arch dam, curved to a radius of 1,200 feet, and 24 feet in height. It is composed of 40 arches sprung from the buttresses as piers with a radius of 18 feet. The buttresses are placed 20 feet from centre to centre, 2 feet wide at the crest and 34 feet at the base. They are 12 inches thick at the top and 24 inches at the bottom.

The Big Bear Valley Dam, in California (built 1914—16), is 363 feet long and 92 feet high. It is a multiple-arch dam, consisting of 10 arches of 30ˆ4 feet chord, sprung from but¬ tresses 22 feet deep at the crest and 111 feet at the base. The buttresses are 18 inches thick at the top and 54 inches at the bottom.

The Mathis Dam, at Tallulah Falls, Ga., is 650 feet long and 90 feet high, of reinforced concrete. The deck is 18 inches thick at the top and 39 inches at the bottom, and is sup¬ ported by buttresses 16 feet deep at the crest and 148 feet at the base. The buttresses are

changed its lower course to the sea. All the factors in flood flow will sometime conjoin, and a work that is to last through the centuries must recognize all the possibilities.

Adjuncts in the way of gates, sluices and movable structures are much favored by some designers, especially where they serve to lessen cost. Such provisions should not be carried to a point where their failure to operate or be operated will produce damages amounting to a disaster.

The location of service pipes and outlets through or beneath dams is shown by experi¬ ence to be a source of danger, and the best practice now seeks an independent location.

The tendency is now to avoid the long race for power purposes, to build the dam at the foot rather than the head of the rapids or descent, and to make the power station and forebays a part of the structure, taking the water directly from the pool.

Outside of the main elements-of a structure on which safety and permanency depend, many devices and constructions are permissible, as

Two views of Elephant Butte Dam across the Rio Grande River, New Mexico

failure in these results in only temporary loss and inconvenience.

General Remarks. — Dam building is still in

the evolutionary stage, and the resources of en¬ gineering therefor are still developing. Modern practice includes the construction in the body of the dam of a more or less complete drainage system to collect any water leaking in from the reservoir. In the Kensico Dam there are also thermophones to give warning of unusual changes of temperature. The Wachusett Dam (diagrams on another page) was the first in which ice pressure was taken into account in calculating the crossrsection. The engineers estimated it at 47,000 pounds per lineal foot for ice 12 inches thick at full reservoir. In the Arrowrock Dam there is a system of inspection galleries, of which the control chambers form a part. These give access to the body of the dam at several elevations, the lowest being 230 feet below normal high water in the reservoir.

So far as general designs are concerned, the type structures would seem to be well defined, but every site has its own peculiar conditions, requiring elasticity in treatment, and financial limitations often blight the proper solution. A dam when once built assimilates so closely to natural resources, is so fully identified with the public welfare, and the failure is so disastrous, that its construction becomes a matter of solici¬ tude above that of any other engineering work. Of 28 failures of dams investigated, 12 were found to be due to faulty construction, although the dimensions were correct; 11 were due to in¬ sufficient spillway — these were mainly earthen dams, and high water overtopped them ; 4 were due to faulty foundation and 1 to

percolation along pipe-lines. See Irrigation ; Reservoir ; Waterworks; Water Power.

Bibliography. — Bassell, B., < Earth Dams: A Study' (New York 1907) ; Blight, W. G., Tams and Weirs' (Chicago 1915) ; Bright-more, A. W., Structural Engineering' (Lon¬ don 1913) ; Morrison, C. E., and Brodie, O. L., (Hieh Masonry Dam Design' (New York 1916) ; Ottley, J. W., Stresses in Masonry Dams' (London 1908) ; Prelini, C., (Graphic Determination of Earth Slopes, Retaining Walls, and Dams' (New York 1908) ; Smith, C. W., Construction of Masonry Dams' (New York 1915) ; Strange, W. L., Hndian Storage Reservoirs' (London 1913) ; Thomas, B. F. and Watt, D. A., improvement of Rivers' (New York 1913) ; Wegmann, E., (Design and Construction of Dams' (New York 1911).

Richard Ferris.

DAMSEL-FLY, sometimes, though rarely, used as a popular name for the common dragon¬ fly, or mosquito-hawk, of the neuropterous family Libellulidce or Odonata. Damsel-fly is the English equivalent for the French demoiselle (fly) which is applied only to the genus Agrion and its immediate allies. This is a very small dragon-fly, not half as large as Libellula. Its metallic greenish-blue color and slender delicate form produce a beautiful effect in the sunshine and suggest the name. See Dragon-fly.

DAMSON, a variety of plum (q.v.).

DAN (Heb. ˆjudgment"), one of the sons of Jacob by his concubine, Bilhah. Like the other sons of Jacob, Dan became headˆ.of one of the 12 tribes of Israel. At the time of the exodus the Danites numbered 62,700 adult males.

The territory assigned them in Canaan lay on the coast, but living in the immediate neighbor¬ hood of the hardy and well-equipped Philistines — for the district lay partly within the Philistine territory — the available land proved somewhat too narrow for the Danites, and they were pushed back into the more mountainous region, where they encroached on the boundaries of Judah. The tribe also possessed an isolated portion of territory in the extreme north of Canaan, containing the town of Laish or Dan, which gave rise to the proverbial expression <(from Dan to Beersheba." This town was in later times selected by Jeroboam as one of the two centres of his idolatrous

worship, but a species of idolatry had been maintained there from the earliest times of the settlement in con¬ nection with the image of Micah. The most notable person connected with the tribe was Samson. Consult Schmidt, N., (The Messages of the Poets' (1911).

DAN RIVER, river rising in the Blue Ridge Mountains in Patrick County, Va. It flows south into North Carolina and recrosses the boundary four times ; it next joins the Staun¬ ton River in Virginia to form the Roanoke River. It is about 175 miles long and drains an area of 3,500 square miles. The United States government has made the channel navigable for boats of light draught as far as Madison.

DANA, Charles Anderson, American jour¬ nalist: b. Hinsdale, N. H., 8 Aug. 1819; d. Glen Cove, L. I., 17 Oct. 1897. He was educated at Harvard and in 1842 was a member of the Brook Farm Community, in Roxbury, Mass., remaining there only two years. He edited The Harbinger (1844-47), his associates being George Ripley, Parke Godwin and John S. Dwight. In 1847 he became managing editor of the New York Tribune, with which he re¬ mained until 1861. In 1855, with George Ripley, he projected and edited Appleton's (American Encyclopaedia' in 16 volumes, completed in 1863, and revised in 1873-77. He also edited several other works, among them the popular (House¬ hold Book of Poetry' (1857) ; (Life of Grant' (1868); (Art of Newspaper Making' (1895); (Lincoln and His Cabinet' (1896) ; Recollec¬ tions' (1897). From 1862 to 1865 he was in the service of the United States government, during the last two years as assistant Secretary of War under President Lincoln. About the beginning of 1866 he became editor of the Chicago Republican, a daily paper. In 1868 he purchased an interest in the New York Sun, also a daily, of which he was editor and chief proprietor until his death. He was a man of forcible character and impressed his person¬ ality upon his paper. His literary judgments and perceptions were keen and his own writing exhibited a perfect mastery of English style. Under his management the Sun became noted for the literary quality of its editorials. In his later years, however, his intense political par¬ tisanship became very marked and greatly diminished the weight of his influence in journalism.

DANA, Charles Loomis, American phy¬ sician: b. Woodstock, Vt., 25 March 1852. He was educated at Dartmouth and at the New York College of Physicians and Surgeons. He served as professor of physiology in the New York Woman's Medical College in 1880-86, of

nervous and mental diseases at the New York Postgraduate Medical School in 1884-96, and of nervous diseases in Dartmouth Medical Col¬ lege in 1890-93, and four years later he became professor of nervous diseases in Bellevue Hos¬ pital Medical College. He was also an editor of the Journal of Comparative Medicine and associate editor of the Medical Record. He is author of a (TextBook of Nervous Diseases) (1892 ; 7th ed., 1908), and many monographs on nervous and mental diseases.

DANA, Edward Salisbury, American min¬ eralogist : b. New Haven, Conn., 16 Nov. 1849. He was graduated from Yale in 1870 and has been a member of the faculty at that institution from 1874, since 1890 has been professor of physics. He received the degree of D.Ph. at Yale in 1876, and spent some time at the uni¬ versities of Heidelberg and Vienna. After 1875 he edited the American Journal of Science. He is a member of the National Academy of Science. He has published (A Text Book of Mineralogy5 (1877) ; (Text Book of Mechanics5 (1881); ˆMinerals, and How to Study Them5 (1895) ; (Sixth Edition of James D. Dana's System of Mineralogy5 (1892) ; also many papers on mineral and other scientific subjects.

DANA, Francis, American jurist and diplo¬ mat : b. Charlestown, Mass., 13 June 1743; d. 25 April 1811. He was a son of Richard Dana (q.v.), was graduated at Harvard in 1762, and admitted to the bar in 1767. In 1775 he was sent to Europe on a confidential mission to Benjamin Franklin, carrying letters from War¬ ren, Quincy and other patriots. He returned the next year and reported to General Wash¬ ington that the colonies need expect nothing of Great Britain. In 1777 he was elected a member of the Congress that formed the Con¬ federation, and filled various offices during the Revolutionary War. In 1781 he was made Minister to Russia, and after his return was again elected to Congress. In November 1791 he was appointed chief justice of Massachusetts for a term of 15 years. He was one of the founders of the American Academy of Arts and Sciences.

DANA, Francis, American lawyer and author: b. Singapore, East India, 4 March 1866. He was educated at Saint Paul's School, Con¬ cord, N. H., and the Harvard Law School, and engaged in active law practice in New York city. Besides contributing short stories to periodicals has published (Leonora of the Yaw-mish5 ; (The Decoy,5 *etc.*

DANA, James Dwight, American mineral¬ ogist : b. Utica, N. Y., 12 Feb. 1813; d. New Haven, Conn., 14 April 1895. He showed an interest in science from his early youth, and this was encouraged by Fay Edgerton, his teacher in the Utica High School. In 1830 he matricu¬ lated at Yale, where he studied under the elder Benjamin Silliman, whose reputation had at¬ tracted him. After devoting three years to the study of mathematics, the classics and natural science, he received an appointment as instructor in mathematics to midshipmen in the United States navy, and cruised in the Mediterranean while engaged on this duty. From 1836 to 1838 he assisted Professor Silliman in his chemical laboratory at Yale, and there wrote his first important work, (The System of Mineralogy.5

From 1838 to 1842 he acted as mineralogist and geologist to the United States exploring expeditions sent out under Capt. Charles Wilkes to investigate the Pacific Ocean and its natural history. During the next 13 years, he worked up the material which he had col¬ lected during this expedition into many scien¬ tific articles. This labor ruined his health. In 1844 he returned to New Haven, where he mar¬ ried the daughter of Professor Silliman. When the latter resigned in 1850, Dwight was ap¬ pointed Silliman professor of natural history and geology at Yale, and held this chair till 1892, when he retired. In 1846 he became joint editor with Professor Silliman of the American Journal of Science and Arts , and after the death of his teacher he became the chief editor. Dana had a keen, analytic, imaginative mind. His speculations concerning the formations of continents, mountains, volcanoes and other major features of the earth's crust still possess the utmost value. He was a member of many of the great learned societies of the world; and was president of the American Association for the Advancement of Science in 1854; and of the Geological Society of America in 1890. He received the Wollaston medal of The Geologi¬ cal Society of London in 1874 and the Copley medal of the Royal Society of London in 1877. He published 214 books and papers. Of these the most important are those which record the results of the Wilkes expedition as to geology, zoophytes (with 230 new species), and Crus¬ tacea (with 658 new species), and his (System of Mineralogy5 (1837, with many later edi¬ tions) ; (Manual of Geology5 (1862; 4th ed., 1895) ; (Manual of Mineralogy5 (1848) ; later (Manual of Mineralogy and Lithology5 (4th ed., 1887); (Corals and Coral Islands5 (1872; 2d ed., 1890) ; Characteristics of Volcanoes5 (1890). Consult Gilman, D. C., (Life of J. D. Dana5 (1899).

DANA, John Cotton, American librarian : b. Woodstock, Vt., 19 Aug.

1856. He was grad¬ uated at Dartmouth College 1878, and admitted to New York bar 1882. He was librarian of the Public Library, Denver, Colo., 1889-97 ; of the City Library Association of Springfield, Mass., 1898-1901, and has since been at the head of the Public Library of Newark, N. J. He is secretary and director of the Newark Museum Association which has its home in the public library building and is largely the outcome of the library's activities since 1901 ; member of the Century Association of New York. He has written (A Library Primer5 (1899) ; (Notes on Bookbinding for Libraries5 (1906) and several chapters in (Modern American Library Econ¬ omy5 ; and, with Henry W. Kent, edited litera¬ ture of Libraries in the Seventeenth and Eigh¬ teenth Centuries (6 vols., 1906-07). With C. L. Dana he compiled (Horace: The Roman Poet Presented to Modern Readers5 (1908), a selection of versions of the Odes; and published (Copa: The Hostess of the Inn5 (1909), a ver¬ sion of the pseudo-Virgilian poem.

DANA, Marvin, American writer: b. Cornwall, Vt., 2 March 1867. His published works include (Mater Christi and Other Poems5 ; (History of General Custer5 ; his¬ tory of the Mormons5 ; (Wars of the Century5 ; (Studies in Criminology5 ; (A Brief Universal History,5 *etc.*

DANA, Richard, American jurist: b. Cam¬ bridge, Mass., 7 July 1699; d. 17 May 1 772. He was a grandson of Richard Dana, the first of the family who came from England and settled at Cambridge in 1640. After practising law at Marblehead and Charlestown, he removed to Boston, where he became a leading barrister. He was distinguished for his prominence in the measures of resistance which immediately preceded the American Revolution. He was a leading figure and sometimes presided at the Boston town meetings from 1763 to 1772. It was the custom of Boston in those troubled times to address the country at large on public affairs tinder the form of published instructions to the representatives of the town. Warren, Hancock and the Adamses were on committees for this purpose. Dana was always a member, and often at their head. He reported the papers of 20 Nov. 1767 and 8 May 1770, noted at that time. He was a member of the

association of the Sons of Liberty, and at their celebrated meeting of 17 Dec. 1769, administered to Secretary Oliver the oath of non-execution of the Stamp Act, and made and signed a solemn official record of that fact. In 1770 he was a member of the committee which made an investigation of the Boston Massacre.

DANA, Richard Henry, the Eldqr, Ameri¬ can poet and essayist: b. Cambridge, Mass., 15 Nov. 1787; d. Boston, 2 Feb. 1879. He was a son of Francis Dana (q.v.) ; studied at Harvard College and was admitted to the Massachusetts bar in 1811. He was connected with the North American Review from its commencement in 1815, and his earliest writings first appeared in that periodical, of which he became joint-editor in 1818. His lectures on Shakespeare's char¬ acters, delivered in the principal cities of the Atlantic coast (1839A0), awakened a deep pub¬ lic interest. His principal poems are (The Change of Home* (1824) ; (The Dying Raven) (1825) ; (The Buccaneers* (1827), specially noteworthy for its descriptions of the vicissi¬ tudes of ocean scenery. To a periodical publi¬ cation, The Idle Man (New York 1821 —22), of which he was editor, he contributed critical papers and several stories; among them (Paul Fenton* and (Edward and Mary.*

DANA, Richard Henry, American jurist and miscellaneous writer : b. Cambridge, Mass., 1 Aug. 1815; d. Rome, Italy, 7 Jan. 1882. He was a son of the preceding. He entered Har¬ vard College in 1832, but compelled on account of an affection of the eyes to suspend his studies in 1834, he undertook a voyage to California in the capacity of a common sailor. This voyage he described in a very interesting book, (Two Years Before the Mast* (1840, enlarged edition 1869; latest edition by Dr. W. T. Grenfell, New York and London 1911), which still remains a classic in sea stories. Returning to college he completed his law course, and was admitted to the Boston bar in 1840, soon securing a large number of admiralty cases. In 1841 he published a treatise on seamanship, (The Sea¬ man's Friend* (republished in England as (The Seaman's Manual*), containing a treatise on practical seamanship, a useful dictionary of sea terms, and valuable information on maritime law. In 1859-60 he made a voyage round the world, visiting the Sandwich Islands, China, Japan, Ceylon, India and Egypt, returning

through Europe. In 1861 he was appointed United States attorney for Massachusetts, and was counsel for the United States in the pro¬ ceedings against Jefferson Davis for treason, in 1867-68. In 1866 he published a copiously anno¬ tated edition of Wheaton's (Elements of Inter¬ national Law.* (See Two Years Before the Mast). Consult

Adams, (Richard Henry Dana: a Biography > (1890).

DANA, Richard Henry, American lawyer: b. Cambridge, Mass., 3 Jan. 1851. In 1874 he was graduated at Harvard University and three years later from the law school there. In 1878— 79 he helped organize the charities department of the city of Boston and in 1884 drew up the bill subsequently passed by the Massachusetts legislature as the Civil Service Reform Act. In 1888 he drafted the New Ballot Act, which also became law, and has since been referred to as the Massachusetts Ballot. In 1889-92 he served as editor of the Civil Service Record. His published works are (Double Taxation in Massachusetts> (1895); introduction and notes to speeches in (Stirring Times and Letters to a Son) (1910) ; introduction and concluding chapter to (Two Years Before the Mast* (1911); (The Corrupt Practices Act* (1906); Australian Ballot System of Massachusetts) (1911); (Trent: an Aftermath* (1912), *etc.*

DANA, William Parsons, American marine artist: b. Boston, Mass., 18 Feb. 1833. He studied in Paris under Picot and Le Poitevin, became a member of the National Academy in 1863 and obtained a third class medal at the Paris Exhibition of 1878 for his fathering Seaweed.* Other good examples are (Embys Admiral* ; (The Burning Wreck* ; hearts¬ ease.* One of his most noted pictures is the (Chase of the Frigate Constitution in the Met¬ ropolitan Museum, New York. He was elected to the National Academy of Design in 1867.

DANAE, dan'a-e, in Greek mythology, daughter of Acrisius, king of Argos. She was shut up by her father in a brazen tower, because an oracle had declared that a son of his daughter should put him to death. But Zeus, inflamed with passion for the charming virgin, trans¬ formed himself into a golden shower, and de¬ scended through the apertures of the roof into her embraces. When Acrisius discovered that his daughter had become a mother he exposed her with her child, in a chest, to the violence of the waves. But the sea-goddesses, anxious for the preservation of the son of Jove, com¬ manded the billows to bear the box safely to Seriphos, one of the Cyclades. Polydectes, or rather Dictys, the governor of the island, re¬ ceived her, and educated the child, which he named Perseus. She eventually accompanied her son to Argos where he accidentally killed Acrisius at Larissa. The story has been much used in literature and painting, especially in paintings by Rembrandt at the Hermitage of Saint Petersburg; Correggio at the Palazzo Borghese at Rome and Titian at the Museo Nationale at Naples.

DANAI. See Danaus.

DANAIS, da'na-is, a genus belonging to the group Nymphalidce (by some placed in Papilion-idce), the largest family of day-flying lepidopter-ous insects, widely scattered over the globe. D. (now usually called Anosia) erippus (or

archippus) is prevalent in all parts of the United States. Its wings are varied with yellow, black and white bands and it occurs frequently in summer along country roads, in pastures, and wherever the milkweed, its favorite food, grows. It is known as the milkweed butterfly (q.v.) The chrysalis is well known for its beauty of green and gold. The caterpillar is marked with yellow and black bands. Danais is a famous globe-traveler, having spread by some unknown means from continents to islands of the ocean, and to Australia. Very beautiful species abound in India. In New Holland it was found that the natives, who called it "bu-gong moth,® valued it highly for food. By means of smothered fires they were able to suffocate and collect the "moths® in large quan¬ tities, after which the appendages were removed and the bodies were made into oily cakes. The South American species, which are distasteful to most of their enemies, are the object of mimicry by edible species.

DANAKIL, da-na-kel' (singular Dankali), the Arabic and now general name for the numerous nomad and fisher tribes inhabiting the coast of northeast Africa, from Massowah south to Tajurrah Bay, and from there south¬ west to Shoa. They belong to the Ethiopic Hamites, and are well built and slender, with features indicating an intermixture of Arab blood. In a country of waterless plains, they are generally nomads, living partly by caravan traffic and the slave trade, but mostly on the milk of their flocks.

DANAO, Philippines, (1) town on the east coast of the island of Cebu, four miles north of Compostela, and 18 miles north of the town of Cebu. The productions of the interior are im¬ portant for exports, but the anchorage at Danao is not good enough to encourage steamers to load at this port. The road along the coast is in a good condition. Pop. 15,483. (2) Danao, a

hamlet, is on the west coast of South Antique, Panay, four miles north of Dao. (3) A lake in West Leyte, south of Panangua crater. (4) A mountain peak on the island of Luzon. (5) A river in the northeast of Negros Occidental, ris¬ ing in the crater of Solitario, flows east into a small bay, on the north shore of which is situ¬ ated Escalante.

DANAUS, in Greek mythology, the son of Belus and twin-brother of 2Egyptus, originally ruler of Libya. Fearing his brother, he fled to Argos with his 50 daughters, the Dana'ides, and here he was chosen king, in place of Gelanor. The 50 sons of Higyptus followed him, and under the pretense of friendship sought the hands of his daughters in marriage. Danaus consented, but on the bridal night he gave his daughters each a dagger, and urged them to murder their bridegrooms in revenge for the treatment he had received from 2Egyptus. All did so, except one, Hypermnestra, who allowed her husband, Lynceus, to escape. The fable states that in the under-world the Dana'ides were compelled, as a punishment for their crimes, to pour water forever into a vessel full of holes. From Danaus, the Argives were called Danai.

DANBURY, Conn., city in Fairfield County in the southwestern part of the State. This is one of two county-seats. It has railroads to New York, New Haven, Bridgeport, Hartford,

Pittsfield, Poughkeepsie and Litchfield. These are all branches of the New York, New Haven and Hartford road. A right of way has been secured for extending the Westchester and Northern Railroad from White Plains to Dan¬ bury by way of Ridgefield. An electric railway connects Danbury with Bethel. Electric roads connect this city with Bridgeport and Golden's Bridge. Danbury is 62 miles northeast of New York and 63 miles west of Hartford. It is the centre of a picturesque mountainous country. The town is noted for its beautiful drives and healthful climate. Lake Kenosia, a small pleasure resort surrounded by summer resi¬ dences, is about two miles west of the city. Danbury has public waterworks capable of sup¬ plying a city of 50,000 and was one of the first towns to establish a modern filtration system of sewage disposal. The place was settled in 1684 by families from Norwalk and was called Pahquioque, the Indian name, until 1702 when the general assembly granted a patent for a town under the name now used. In 1855 the southern part of the town was separated and incorporated under the name of Bethel. A city charter was obtained in 1880. Danbury is one of the leading felt hat manufacturing cities of the United States, making 75 per cent of the stiff hats, besides soft hats

and hats in the rough. Thirty-four factories are engaged in this industry, which began in 1780, five in the preparation of fur for hats, two mills producing silk used in their manufacture, three making hat cases. There are foundries and machine shops, a paper mill, two silver plating companies, two electric supply firms, a lime kiln, under¬ wear and silk factories, medical printing company, two savings banks, two national banks, 10 churches, a library, State normal school, high school, graded public and private schools. The United States census of manufactures for 1914 recorded for Danbury 124 indus¬ trial establishments of factory grade, em¬ ploying 5,933 persons; of whom 5,290 were wage earners, receiving annually $2,963,000 in wages. The capital invested aggregated $7,689,000, and the year's output was valued at $10,582,000 : of this, $4,781,000 was the value added by manufacture. The Danbury News with daily and weekly editions was established in 1870 by James Montgomery Bailey, known as the "Danbury News Man.® He was the author of humorous articles and several books including a history of Dan¬ bury. Julius H. Seelye, former president of Amherst College, and P. T. Barnum, the show¬ man, were born in that part of Danbury that is now the town of Bethel. The town was de¬ stroyed by the British in 1777, when General Wooster was killed defending the place. Woos¬ ter Square and Wooster Cemetery were named in his honor. Among the public buildings are the courthouse, city hall, hospital, almshouse, new postoffice and new armory. The agricul¬ tural fair held here every year has an average attendance of about 60,000. The famous Dan¬ bury Hatters' Case in which the Supreme Court of the United States held that labor unions came under the Sherman Act originated in this city. Pop. 18,889. Consult Bailey, (History of Danbury 1684-1896) (New York 1896).

DANBY, Frank (Mrs. Julia Frankau),

English author: b. 30 July 1864. She was edu-

cated privately by *Mme.* Paul Lafargue, the eld¬ est daughter of Karl Marx, and in 1883 was married to Arthur Frankau, who died in 1904.

She began work with dilettante journalism, wrote for the Saturday Review, became popular as a novelist, but abandoned writing for a few years in favor of studying engraving. Her early works are (Dr. Phillips) (1887) and (A Babe in Bohemia* (1889). After 10 years she wrote 'Eighteenth Century Color Prints *(1900) ; 'Life of John Raphael Smith) (1902) ; 'The Lives of James and William Ward* (1904). She relapsed into novel writing and published 'Pigs in Clover* (1902) ; 'Baccarat* (1904); 'The Sphinx's Lawyer* (1906); (A Coquette in Crepe* (1907) ; (The Heart of a Child1* (1908) ; 'An Incomplete Etonian) (1909); 'Let the Roof Fall In* (1910); 'The Story of Emma, Lady Hamilton) (1910); 'Joseph in Jeopardy) (1912); 'Concert Pitch) (1913) ; 'Full Swing* (1914) ; 'Nelson's Leg¬ acy } (1915); 'The Story behind the Verdict*

(1915).

DANCE OF DEATH, a grotesque allegori¬ cal representation in which the figure of Death under various forms takes the lead, followed by dancers of all ages and conditions. It was fre¬ quently drawn by artists of the Middle Ages for cemeteries and cloisters. These representations were common in Germany, and also in France, where they received the name of Danse Macabre. This term is supposed by some to be derived from the Arabic magbarah, a cemetery, but much more probably from the Chorea Macha-bceorum, or dance of the Maccabees, a kind of dramatic representation performed in the Mid¬ dle Ages, in which the seven martyred brothers mentioned in the second book of Maccabees (Apocrypha) would appear to have been intro¬ duced. A Dance of Death was painted on the walls of the churchyard of the Innocents at Paris, about the middle of the 15th century, which the chapter of Saint Paul's in London caused to be copied, to adorn the walls of its monastery. Gabriel Peignot, in the 'Recherches sur les danses des morts et sur l'origine des cartes a jouer) (Dijon and Paris 1826), inves¬ tigated the origin of the Dance of Death in France, and explained the dancing positions of the skeletons, by the fact which old chronicles relate, thˆt those who were attacked by the plague ran from their houses, making violent efforts to restore their rapidly declining strength by all kinds of morbid movements. The most remarkable Dance of Death was painted, in fresco, on the walls of the churchyard in the suburb of Saint John at Basel, which was in¬ jured, in early times, by being washed over, and is now entirely destroyed. This piece has been ascribed to Hans Holbein (q.v.), but it has long •since been proved that it existed 60 years before his birth. It was painted at Basel in the year 1431, by an unknown

artist, in commemoration of the plague, which prevailed there at that time. It represented Death as summoning to the dance persons of all ranks, from the Pope and the emperor down to the beggar, and was explained by edifying rhymes. That piece con¬ tained about 60 figures as large as life. Be¬ sides being ascribed to Holbein, as was before stated, it has also been ascribed to a painter named Glauber but without foundation. Hol¬ bein perhaps conceived, from this picture, the

idea of his Dance of Death, the original draw¬ ings of which are at Saint Petersburg. Very fine engravings of these are in the 'CEuvres de Jean Holbein, par Chret. de Mechel* (Vol. I, Basel 1780). Consult Goelte, 'Holbein's Toten-tanz und seine Vorbilder* (Strassburg 1897) ; Seelmann, 'Die Todentanze des Mittelalters* (Norden 1893).

DANCE, Saint Vitus. See Chorea.

DANCING, a form of exercise or amuse¬ ment in which one or more persons make a series of graceful movements in measured steps in accord with music. Aristotle ranked dancing with poetry, and Pindar applies the name of "The Dancer® even to Apollo. Dancing corre¬ sponds to a universal primitive instinct in man, and is practised by the South Sea Islanders, the Forest Indians of Brazil, the Zulus, the negroes of central Africa and the native Australians, exactly as it was in the earlier stages of every civilized modern race. Ferocious war-dances were practised by savage warriors, as the North American Indian braves, who brought on a frantic mechanical intoxication capable of carry¬ ing them to victory. The Zulu wardance is a noble exercise for warriors, like the Pyrrhic dance of the ancient Spartans ; and the dancing and spinning dervishes in the East, who work themselves into spasms of physical excitement, are still highly esteemed for devoutness and piety. The idea of magic always enters into savage dancing. Thus, the Mandan Indians dance the buffalo-dance to bring game when supplies of food are low. The rain doctors of central Africa dance mystic dances to bring rain ; and the wives of the Gold Coast negroes dance a battledance to give their absent hus¬ bands courage in battle.

The art of dancing dates back to the early Egyptians, who ascribe that invention to their god, Thoth. Among the ancient Jews, Miriam danced to a sound of trumpets, itself an act of worship, and David danced in procession before the Ark of God. Religious processions went with song and dance to the temples ; the Cretan chorus moving

in measured pace sang hymns to the Greek god, Apollo, and one of the Muses (Terpsichore) was the special patroness of the art. The Phrygian Corybantes danced in honor of Cybele, and the festivals of Rhea Silvia at Rome were also accompanied with wild dances, while during the early festival of Mars the Salian priests sang and danced, beating their shields. The Spartans practised dancing as a gymnastic exercise and made it compulsory on all children from the age of five. The Romans in general considered it disgraceful for a free citizen to dance except in connection with re¬ ligious rites, but willingly witnessed the per¬ formances of professional dancers like the Alme of modern Egypt, and the Bayaderes, or Nautch girls, of India. The early Christians practised choral dances, which came into discredit with the love-feasts or Agapae. A survival of reli¬ gious dancing is still seen even within the pale of Christendom, where during the Corpus Christi octave a ballet is danced every evening by boys from 12 to 17 years of age, wearing plumed hats and in the dress of pages of Philip Ill's time.

The Puritan ancestors saw deadly sin in promiscuous dancing. Father Mariana tells us that the famous saraband worked more mischief

than the plague. The fandango was hotly con¬ demned by the clergy, but when danced before the Sacred College, who wished to see it before prohibiting it, so charmed the judges that they gave it their unanimous approval. Many of the mediaeval dances were solemn and stately in character like the danses basses, which were danced to psalm tunes at the court of Charles IX of France. It is said that the whole august Council of Trent danced at a ball given in 1562 to King Philip II of Spain. The Galliarde and volta were introduced into France from Italy by Catharine de Medici. Dancing reached its height during the reign of Louis XIV, who was himself an enthusiastic dancer in the court ballets.

The minuet was a favorite in France for a century; and then came the quadrille or contre-danse, often connected erroneously with the English country-dauce ; the Lcossaise was first introduced in 1760; the galop was introduced from Germany ; the cotillion was fashionable under Charles X ; polka was first danced at the Odeon in 1840 by a dancing master from Prague; the polka tremblante or schottisch, was of Bohemian origin and was first brought out in Paris in 1844; the lancers was introduced by Laborde in 1861 ; and the waltz, originally Ba¬ varian, and now modified from its original form, promises to retain its supremacy.

Characteristic of particular races or merely of classes of people are such forms of the dance as the Scotch reel, Highland fling and strath¬ spey, the Irish jig, the negro breakdowns, sail¬ ors' hornpipe, step-dances, the can-can, morris dances, *etc.*

A ballet is a theatrical exhibition composed of dancing, posturing and pantomimic action. The Roman pantomimes bore a strong resem¬ blance to the modern ballet d'action. In an en¬ tertainment given to celebrate the victory of Actium, the ˆTrachinise® of Sophocles, and an erotic interlude founded on the myth of Leda, were performed in dumb show, the dancers Pylades and Bathyllus taking the leading parts ; and the whole wound up with a Pyrrhic wardance. Some tradition of this form of enter¬ tainment doubtless suggested the courtly dances which became fashionable in the early days of the Renaissance. The first on record was that given by Bergonzio di Botta, at Tortona, to celebrate the marriage of the Duke of Milan in 1489. This was famous throughout the civilized world. From that time great

events, such as royal marriages and births, were celebrated by grand productions of ballet on which enormous sums of money were lavished. These ballets were frequently historical in subject, treating of the siege of Troy, the conquests of Alexander and similar events. There were also mythologi¬ cal, poetical, moral and fantastic ballets, on such subjects as the Judgment of Paris, the Sea¬ sons, Truth, the Diversions of the Carnival, *etc.* All these were in five acts, each of which con¬ sisted of 3, 6, 9 or 12 entries, and in all of them singing and recitation mingled with the dancing.

Catharine de Medici introduced the ballet into France, and encouraged dances by females that would now be deemed highly improper, to distract the attention of her son, Henry III, from state affairs. Henry IV was a great sup¬ porter of the ballet, no fewer than 80 grand entertainments being given by him between 1589 and 1610. Louis Xlil and Louis XIV carried

their love of ballet to an extreme length, and themselves danced publicly. In 1661 the latter founded an Academy of the Dance, with Qui-nault as director and Lully as composer. It was not until 1681 that female dancers appeared in public, the first being four ladies, who danced (<La Triomphe de 1' Amour.® In the early part of the 18th century the names of professional dancers began to appear, two of the most fa¬ mous being Miles. Salle and Camargo, immor¬ talized by Voltaire. The great male dancer of his time was Dupre, the predecessor of the universally known Gaetano Vestris.

In 1697 De la Motte introduced more changes into the ballet, chiefly in the direction of more interesting subjects, and about the same time comic ballets were invented by Danchet ; but no important alterations were made till the advent of Jean Georges Noverre in 1749. The dancers wore masks, huge wigs and headdresses and hoops. The mask finally disappeared in 1773. Hitherto the form of the ballet had remained practically unchanged, each act being performed by different dancers, and generally in different styles of dancing. Noverre invented the ballet d'action, and revived the art of pantomime. Dancing now had dramatic meaning, and the most intricate plots were represented by panto¬ mime alone. The principles of Noverre were carried to great perfection bv Vincenzo Galleotti in Copenhagen, and by his successor, Bournon-ville. Under the Directory a form of grand ballet was revived, in which patriotic songs were a feature.

The history of the ballet since Noverre's time is a history of dancers

rather than of dancing. In England, this class of entertain¬ ment was never more than an exotic, and has practically no history. The word balette is first used in English by Dryden (1667), and the earliest attempt at a descriptive ballet seems to have been (The Tavern Bilkers, > played at Drury Lane in 1702. Within the last few years an important revival of the ballet has taken place in Italy, where the famous aExcelsior,® by the Chevalier Luigi Manzotti, Messalina, Amor, etc., have furnished magnificent examples of the ballet d'action.

Skirt-dancing, so called on account of the voluminous skirts made of sheer or flimsy ma¬ terial, which are worn by the dancers and play so important a part in their dances, ljas become a science and a popular attraction on the stage. The dancers, by the clever manipulation of their draperies and assisted by light effects, assume such forms as flowers ; the rose, calla lily, pan¬ sies, pinks ; butterflies of different colors and flags of various nationalities ; all to the accom¬ paniment of music. Among the most noted skirt dancers were Amelia Glover, Loie Fuller, the inventor of the serpentine dance, Papinta and Anna Held. In 1911 the ((negroid and animal®- dances began by the introduction of the turkey-trot in San Francisco. Variations of it known as grizzly bear, Texas Tommy, and others, soon followed and spread rapidly over Europe and America. Even more popular was the Argen¬ tine tango in an expurgated form. Consult Caffin, (Dancing and Dancers of Today) (New York 1912) and Flitch, (Modern Dancing and Dancers) (London 1912).

Daniel Frohman.

. DANCING DISEASE, an epidemic nerv¬ ous disorder, apparently allied to hysteria and

chorea (qq.v), occasionally prevalent in Ger¬ many and Italy during the Middle Ages. In the last-mentioned country the disease was ascribed to the bite of a spider called the taran¬ tula and was hence known as tarantism ; but as scarcely any of those affected with it had any consciousness of being bitten by a spider or any other insect, and

as it has been in every instance chiefly propagated by suggestion, like chorea, there is every reason to conclude that it had a like origin. In 1734, during the celebration of the festival of Saint John, at Aix-la-Chapelle, the streets became crowded with men and wo¬ men, of all ranks and ages, who commenced dancing in a wild and frantic manner, many losing entire control over themselves, and con¬ tinuing to dance until dropping down from fatigue, and some, in a moment of frenzy, dash¬ ing out their brains against walls. The mania spread to Cologne, Metz and Strassburg, and gave rise to much imposture, profligacy and disorder. At the beginning of the 17th century the epidemic began to decline and is generally known now in Europe only as a nervous affec¬ tion in individual cases. Similiar outbreaks, however, are common in some Oriental coun¬ tries and have been known to occur in Europe in connection with religious fanaticisms. Con¬ sult Hecker, (The Dancing Mania of the Middle Ages, (3d ed., London, 1859).

DANCING FAUN, a frolicsome sylvan creature, half-human, half-goat, corresponding to the Greek Satyr, only gayer and less hideous than his woodland brother; often used in an¬ cient comedy as the very embodiment of humor and mischief. Poets, painters and sculptors of every age have loved to depict the faun in the madness of dancing. A bronze representation was found in a house at Pompeii in 1853.

DANCING TERMS: Balancez — set to partners ; chaine anglaise — the top and bottom couples right and left ; chaine anglaise double

— the right and left double ; chaine des dames

— the ladies' chain; chaine des dames double — the ladies' chain double, which is performed by all the ladies commencing at the same time ; chassez — move to the right and left ; chassez croisez — gentlemen change place with part¬ ners and back again; demie chaine anglaise — the four opposite persons right and left; demie promenade — all eight half promenade; demie moulinet — the ladies all advance to the center, giving hands, and return to places ; la grande chaine — all eight chassez quite round, ladies starting to their left and gentlemen to their right, giving alternately right and left hands ; la grande ronde — all join hands and advance and retire twice; pas d'allemande — the gentle¬ men turn the partners under their arms ; tra-versez — the two opposite persons change places ; vis-a-vis — the opposite partner.

DANCLA, dan-kla, Jean Baptiste Charles,

French musical composer and violinist: b. Bagneres de Bigorre, 19 Dec. 1818; d. 1907. He was a pupil at the Conservatory of Paris, where he took the first prize for the violin in 1833, at the age of 15, becoming professor there in 1857. He displayed remarkable fecundity as a composer, among his works being: a (Method of the Violin,* studies, sonatas, solos, fantasies and airs for that instrument ; symphonies, trios and quartettes for stringed instruments; Chris¬ topher Columbus, * a dramatic scene for an or-VOL. 8 — 29

chestra; a volume of (Notes and Souvenirs)

(1893).

DANCOURT, dan-koor, Florent Carton,

French actor and playwright; b. Fontainebleau, 1 Nov. 1661; d. Courcelles-le-Roi, France, 6 Dec. 1725. Although he personated the first characters in high comedy, he succeeded best as an author in low comedy. He displayed much ingenuity and wit in introducing upon the stage amusing subjects of real occurrence in his time. Louis XIV was very fond of humorous pieces, and Dancourt often used to read his produc¬ tions to the king before they were played. Among his dramas are (Le chevalier a la mode) (1687) ; (Les bourgeoises de qualite* (1700) ; (Les trois cousins) (1700). His daughters, Manon and Mimi, became noted actresses in the Theatre Frangais. His works were col¬ lected (12 vols., 1760), and selected plays were published by Sarcey, F., in (Theatre Choisi.*

DANDELION, a common and well-known plant, Taraxacum taraxacum, belonging to the chicory family. It yields a milky juice, which in the form of extract is used medicinally as a diuretic and alterative. It contains a bitter crystalline principle called taraxacin. Its root has been used to adulterate coffee in a similar way to chicory, and is used to adulterate chic¬ ory itself. The blanched leaves are eaten as a salad. In America it is a common article of food in the spring of the year, boiled and eaten as ˆgreens.® It has a naked, hollow stalk, with a single bright yellow flower-head. The seed is furnished with a fine white pappus, by means of which it is carried far and wide by the wind. The leaves are lanceolate and sinuous, rising from a taproot in the form of a rosette. The plant is probably native in certain parts of America, but is found as a weed in all parts of the

civilized world.

DANDIE DINMONT. See Dog.

DANDOLO, dan'do-lo, Andrea, doge of Venice and Italian historian: b. about 1310; d. September 1354. He became doge in 1343. He carried on a war against the Turks with various success, and greatly extended Venetian commerce by opening a trading connection with Egypt. The jealousy entertained by the Geno¬ ese of this new trade produced a war between the two states, which gave rise to a correspond¬ ence between the doge and Petrarch, who ex¬ horted him to peace. To Andrea Dandolo is ascribed the compilation of the sixth book of Venetian statutes; but he is most distinguished for his (Chronicles of Venice, * written in Latin, and comprehending the history of the republic from its commencement to 1342. It is praised for its impartiality and for its judi¬ cious use of authentic documents, and was first published by Muratori in his collection of origi¬ nal Italian historians.

DANDOLO, Enrico, doge of Vendee: b. Venice about 1108; d. Constantinople 14 June 1205. He was chosen to office in 1192, at the advanced age of 84. He had a defect of sight approaching nearly to blindness ; but neither that circumstance nor his age impaired the vigor of his administration, the events of his government being among the principal causes of the Venetian greatness. On the formation of the league for the fourth Crusade, under Bald¬ win, Earl of Flanders, Dandolo induced the

Senate to join in it, and by this policy the first hostilities of the armament were directed against Zara, which had revolted from Venice, and thereby greatly extended the Venetian boundaries, gaining possessions in the Ionian Sea, Phrygia, Morea, Epirus and the island of Crete (by purchase). On the storming of Con¬ stantinople the aged doge, it is said, was the first who mounted the walls. When the Crusaders proceeded to the election of a new emperor of the city Dandolo was first nominated; but in consequence of his age and the

incompatible character of doge, he declined, and the choice ultimately fell on Baldwin. In the sharing of the Imperial dominions Venice obtained a full moiety and Dandolo was solemnly invested with the title of Despot of Romania.

DANDRUFF, a condition of scaliness in the head, attended with desquamation or scaling of the superficial layers of epidermis. It may sim¬ ply indicate a dry and unhealthy skin, or it may be the result of several distinct skin diseases, chief of which is pityriasis. There is usually a slight amount of itching, and on scratching the head large quantities of minute scales are de¬ tached and fall on the clothing. Dandruff also occurs from seborrhcea, in which case it is due more to a mild inflammation of the sebaceous follicles of the skin. The sebaceous matter from the glands dries and forms scales. One of the general results arising from dandruff is a gradual loss of hair. The treatment consists in better hygiene of the head, shampoos and care¬ ful stimulation by appropriate tonics. Many of the so-called hair tonics are valueless. Vig¬ orous rubbing of the scalp, with periodical shampooing, is one of the best means of com¬ bating this condition, but medical advice should always be sought as to the exact cause of the dandruff. See Hair.

DANE, Nathan, American jurist: b. Ips¬ wich, Mass., 27 Dec. 1752; d. Beverly, 15 Feb. 1835. He was graduated from Harvard in 1778, studied law in Salem, Mass., and began prac¬ tising in the adjoining town of Beverly in 1782, where he resided until his death. In 1812 he was chosen an elector of President of the United States; in 1814 he was a member of the Hartford Convention ; and in 1820 he was a member of the convention for revising the constitution of Massachusetts. While he was a delegate from Massachusetts to the Conti¬ nental Congress in 1786, the best method of providing for the government of the vast ter¬ ritory owned by the Confederacy north and west of the Ohio River came into consideration. It was determined to do this by an ordinance which should establish with much detail not only the foundation of that government, but the leading principles which should prevail in the systems of law and public policy to be .in force there. The drafting of this instrument was entrusted to Dane, and it was adopted by Congress without a single alteration, 13 July 1787. Th$ name of the <(Northwest Territory® was given to it ; and it comprehended all the territory at that time belonging to the Con¬ federacy northwest of the Ohio. He incor¬ porated in this ordinance a prohibition against all laws impairing the obligation of contracts, which the convention that formed the Con¬ stitution of the United States, a few months afterward, extended to all the States of the

Union, by making it a part of that Constitu¬ tion. His Abridgment and Digest of Ameri¬ can Law) appeared 1823-29. In 1829 he gave to the law school in Harvard University $10,000 (adding $5,000 more in 1831) for the founda¬ tion of the Dane professorship of law.

DANE, The Great. See Dog.

DANEBROG, dan'e-brog, the Danish na¬ tional flag (brog simply meaning cloth), which was carried at the head of the army, like the oriflamme of France. It is red with a white cross in the centre, and, as the legend has it, fell from heaven, as an omen of victory, when the pious Danes under Waldemar II were besieging the pagan town of Reval. In memory of this auspicious event the king founded the order of the Danebrog, which fell into abeyance, how¬ ever, at a later period. In 1671, under Chris¬ tian V, and again under Frederick IV, it was revived. It may be conferred upon all ranks, and may be awarded for military or civil services. The decoration consists of a white enameled gold cross, suspended by a white rib¬ bon with a red border.

DANEFF, Stojan, Bulgarian statesman: b. Shumla 1858. He was educated in Bohemia and at the universities of Paris and Heidelberg, became member of the Commission of Codifica¬ tion after the Russo-Turkish War, in 1901 be¬ came Minister of Education. In 1902-03 he was Prime Minister and Minister of Foreign Affairs, and again for a few days in 1911. He became president of the Sobranje in the same year and in 1912 was one of a commission of three in the negotiations with Turkey over the armistice. In December 1912 he was again on a commission of three who went to London for the Balkan-Turkish Peace Conference, in which he bore a leading part. He was the Bulgarian signatory to the Peace of London between the Balkan States and Turkey concluded 30 May

1913.

DANEGELD, dan'gelt, or DANEGELT

(A.-S. Dene , Danes; gild, geld, payment), an ancient annual tax of the Anglo-Saxons, to maintain forces to resist the Danes. It was first paid in 991, when Ethelred purchased the retreat of the invaders, which had reached as far as Maldon. The tax was continued until the time of Stephen, as one of the rights of the Crown. It was not actually

repealed until Henry II's time (1163).

DANELAGH, dan'la, the ancient name of a strip of territory extending along the east coast of England from the Thames to the Tweed, ceded by Alfred the Great to Guthrun, king of the Danes, after the battle of Ethandune. Ihis name (Danelagh or Dane-law) it retained till the Norman conquest, and its inhabitants were governed by a modification of Danish law and not by English law. King Canute, to pre¬ vent any changes in the laws, had them gathered together and taught to the people.

DANENHOWER, da/nen-how-er, John Wilson, American Arctic explorer: b. Chicago, Ill., 30 Sept. 1849; d. Annapolis, Md., 20 April 1887. He was graduated at the United States Naval Academy in 1870, and took part in a sur¬ veying expedition to the northern Pacific on the Portsmouth. He joined the Jeannette expedi¬ tion, which started from Havre, France, went to San Francisco, and thence sailed, 8 July 1879,

for the Arctic Ocean, via Bering Strait. The vessel was lost in the ice and the crew after dragging their boats over the frozen deep for 95 days reached the open sea. A terrible storm separated the boats and none ever was heard of except the one in which Lieutenant Danen-hower had embarked. It reached Lena Delta, 17 Sept. 1881, and he arrived in the United States in June 1882. He wrote (The Narrative of the Jeannette.*

DANES ISLAND, a place made noted by Andree, the Arctic explorer, who, on 11 July 1897, started from this island on his fatal polar expedition. It is a small island off the coast of the Spitzenbergen group and to the northwest.

DANEWERK, da'ne-verk (Danes' work), an ancient wall from 30 to 40 feet high and of an equal thickness, constructed of earth, stone and wood, about the middle of the 10th century, seemingly as a protection against the Saxons. It extended along the southern frontier of

Schleswig for a distance of nearly 10 miles, and being defended by a series of forts the Danes relied upon it to check the approach of the Ger¬ man troops during the Schleswig-Holstein war of 1864. It was soon discovered that their army was too weak for the defense of so extensive a line, and the position was abandoned. The wall was soon after leveled to the ground.

DANHAUSER, Joseph, Austrian painter : b. Vienna, 18 Aug. 1805 ; d. 4 May 1845. He turned his attention at first to historical paint¬ ing and living for some time at Venice, fell under the influence of the works of Titian and Paolo Veronese, and followed religious paint¬ ing for a while, later becoming a genre painter, which better suited his talent. Among his his¬ torical pictures is (Etienne the Fortunate Offer¬ ing the Crown of Hungary to the Virgin) (1832). An altar piece in the cathedral at Erlau, representing the martyrdom of Saint John, and an (Abraham Driving Away Hagar and Ishmael* are noted among his religious pictures. He is perhaps best known by his humorous scenes depicting the manners and cus¬ toms of Austrian life. Of these there are several in the Imperial Museum at Vienna. Many of his works have been popularized by engraving, such as (Cured without knowing it* ; (The Oculist* ; (The ProdigaP ; (Reading the ■ WilP ; (Soup at the ConvenP ; (Wine, Women, and Song) ; (Judge and Lawyer* ; and (The Evening Festival,) his last work.

DANICHICH, dan'e-chich, Dyuro (Ser¬ bian Djuro Dani&c), Serbian philologist: b. Neusatz, 1825; d. 1882. Educated at Neusatz, Presburg and Buda-Pesth, he came to Vienna in 1845 where he met the famous Serbian scholar Vuk Stefanovich-Karadjich, and dedicated all his efforts to the study of Serbian and other Slavonic languages. In 1855 Danichich came to Belgrade to take the chair of Comparative Slavonic philology at the City College. He also became librarian of the Serbian National Library and member and secretary of the Ser¬ bian Academy of Sciences. In 1865 he lost his chair in the Belgrade City College, through cer¬ tain intrigue, but was immediately invited to Agram to take the secretaryship of the South-Slav Academy of Sciences, which position he accepted. All his activity tended to prove the unity and the identity which naturally exists be¬

tween the Serbians and the Croatians but which have been endangered by foreign and religious influences. While still a student he had written (The War for Serbian Language and Orthog¬ raphy. } The publication of that book strangely enough was prohibited in Vienna (<for higher political reasons,® but it was published at Buda-

pesth and caused a sensation throughout the Slav world. His translation in modern Serbian of the (01d TestamenP was published together with Vuk's translation of the (New TestamenP but the book was suppressed in Serbia by preju¬ diced authorities. By his (Akcenti u glagola* ((Accents in Verbs*) he definitely established the existence of four main accents in the Ser¬ bian idiom. His much more important works (Serbian GrammaP (Vienna 1850; 8th ed., 1892) ; (History of the forms of the Serbian or Croatian Language to the End of the 18th Cen¬ tury, } (A Concordance of old Serbian Literary Monuments) and his collection of material for a standard dictionary of the Serbo-Croatian language as also his monographs dealing with the ancient monuments of the Serbian tongue (Domentian's (Life of Saint Sava* ; <Life of Saint Simeon and Saint Sava* ; Danilo's (Lives of Serbian Kings and Archbishops*) have earned for him a very high place in the history of Serbian philology.

DANIEL (Heb. «God is my judge®). The hero and putative author of the book of Daniel. According to this book, he was carried away from Jerusalem by Nebuchadnezzar in the third year of Jehoiakim, i.e., 606 b.c. Although at the time a youth, he was old enough to be <(skilful in all wisdom, cunning in knowledge, and understanding science.® For three years he was taught the literature and language of the Chaldaeans, and at the end of this period excelled in wisdom all the magicians and en¬ chanters of the realm. In the second year of Nebuchadnezzar (604-03 b.c.) he was able, not only to interpret a dream of the king, but to tell him what the dream had been (ii). Later he explained the meaning of another dream which referred to a coming period of insanity in the king's life, with the result that after the humiliating experience Nebuchadnezzar was led to worship Daniel's God (iv). On the night when King Belshazzar, son of Nebuchadnezzar, was overthrown by Darius the Mede, son of Xerxes, Daniel read the handwriting on the wall and announced to him its solemn signif¬ icance, whereupon he was clothed with purple and proclaimed one of the three highest rulers under the king (v). This position he re¬ tained under Darius the Mede, who even con¬ templated making him grand vizier with au- . thorit}>- over all others. When his rivals forced this monarch to cast him into the lions' den for breaking a royal decree in regard to religion, he was found uninjured in the morning, they were punished, and the worship of his God was enjoined upon all men in the kingdom (vi). Daniel not only interpreted the dreams of others but also had dreams and visions of his own, in the first year of Belshazzar (vii), the third year of this king (viii), the first year of Darius the Mede (ix), the first year of Cyrus, accord¬ ing to the Greek, or third, according to the Hebrew (x), and

again in the same first year, according to the Greek and Theodotion (xi). The historical character of this Jewish sage, master of magicians and statesman, holding

high positions at th-e court of Chaldaean, Median and Persian kings in the course of 70 years, is made doubtful by certain peculiarities of statement that cannot altogether be due to errors of transcription but seem to reveal a serious want of familiarity on the part of the author or authors with the period in which the hero's career is laid. Thus there is no evidence that Jerusalem was captured by Nebuchadnezzar in 606 b.c., and he was not then king. No son of his by the name of Belshazzar sat upon the throne of Babylon. Bil-shar-uzur, the son of Nabunaid, the last king of Babylon, seems to have been mistakenly supposed to be a king and a son of Nebuchadnezzar. History knows no Darius the Mede, son of Xerxes, and im¬ mediate successor of the last Babylonian king. Darius Hystaspis seems to have been meant, but he was the father of Xerxes, and not his son, and the successor of Gaumata, not of Belshazzar.

In Ezekiel xiv, 14, 20, Noah, Daniel and Job are quoted as examples of righteousness ; but it is declared that even they could only save them¬ selves if they were in a country that had sinned and against which destruction by famine, wild beasts, sword or pestilence had been decreed. In Ezekiel xxviii, Iff, the prince of Tyre is charged with claiming that he is a god ; his divinity is denied, but it is admitted that he is wiser than Daniel, and that there is no secret that can be hidden from him. If these pas¬ sages were written by Ezekiel in 592 and 586 B.c., it would be difficult to avoid the conclusion that Daniel was already at that time a figure belonging to antiquity like Noah and Job. But some scholars consider them either as inter¬ polations or as parts of a late work showing acquaintance with the book of Daniel in its earliest form. The version of the Achikar story discovered in the Elephantine papyri indi¬ cates that already in the century following the downfall of the Assyrian empire narratives began to circulate concerning grand viziers of kings like Sennacherib and Esarhaddon,

and the part that Achikar plays in the Tobit story shows how easily a popular figure of this kind could be appropriated. On the other hand, the career of a Nehemiah suggests the possibility of a nucleus of historic fact even where the ex¬ tant documents are not of such a nature as to warrant a marked degree of confidence. It is perhaps significant that the name Daniel occurs in Ezra viii, 2, and Neh. x, 6, in lists which also contain the names of Mishael, Azariah and Hananiah. For literature see Daniel, Book of.

Nathaniel Schmidt.

DANIEL, Anthony, French Jesuit mission¬ ary in North America: b. Dieppe 1601; d. 4 July 1648. In company with the Sieur de Champlain he came to Quebec in 1633 and was soon after transferred to the mission among the Huron Indians. He was shot during an attack upon the town of Saint Joseph by a band of hostile Iroquois. Consult Parkman, (The Jesuits in North America) (Boston 1867).

DANIEL, John Moncure, American jour¬ nalist : b. Virginia 1825 ; d. 1865. He became a member of the staff of the Richmond Examiner in which capacity his free speech obliged him to engage in several duels. He was appointed Minister to Sardinia in 1853, but his indiscreet action in several matters seriously impaired his

influence as a diplomatist. During the Civil War he served in the Confederate army for a time, but being wounded, retired, resuming his editorship of the Examiner. He attacked in its columns the president and treasurer of the Con¬ federacy, and in consequence was obliged to fight a duel with the latter. His writings were published by his brother (New York 1868).

DANIEL, John Warwick, American politi¬ cian : b. Lynchburg, Va., 5 Sept. 1842 ; d. there, 29 June 1910. He served in the Confederate army during the Civil War; subsequently studied law and entered upon the practice of his profession. He was a member of the Vir¬ ginia legislature 1866-72 and 1875-81 ; and was defeated for governor of his State in 1881. He was a member of Congress 1885-87 ; entered the national Senate in the year last named and was reelected at the expiration of his term. He published Attachments Under the Code of Virginia5 ; Negotiable Instruments5 ; (The Character of Stonewall Jackson5 (1868) ; (Speeches and Orations5 (1911).

DANIEL, Hermann Adalbert, German author and hymnologist : b.

Kothen, 18 Nov. 1812; d. Leipzig, 13 Sept. 1871. In 1835 he re¬ ceived the degree of Ph.D. from the University of Halle, and for nearly 20 years occupied an inferior position in that university. In 1854 he became professor, and continued to serve until 1870, when he resigned and retired to Dresden. He was the author of geographical, scholastic and liturgical works. His most noted work was his great collection of hymns: the¬ saurus Hymnologicus sive Hymnarum, canti-corum, sequentiarum, circum annum M.D. usititarum, collectio amplissima5 (5 vols., Halle 1841-43). Sets are now quite scarce and sell for a good price.

DANIEL, Samuel, English historian and poet: b. Taunton, England 1562; d. Beckington, Somerset, 14 Oct. 1619. As an historical poet Lucan seems to have been his pattern. He be¬ stowed much labor on the poem in eight books (History of the Civil Wars between the Houses of York and Lancaster.5 Daniel contributed much to the improvement of the poetical dic¬ tion of England. His stanzas, formed with a careful attention to the Italian octave, have more dignity and euphony than most verses of this sort in English literature in the first half of the 17th century. He is not wanting in rhetorical beauty and force. He was also the author of some poetical epistles, pastorals, 57 sonnets and a few tragedies. The first seem to have excited much attention. During the reign of Queen Elizabeth he wrote a sketch of the history of England till the time of Edward III, a work learned and clear, without ostenta¬ tion and containing useful and acute views. His complete works' were edited by Grosart (5 vols., London 1885-96).

DANIEL, Book of. In the Greek Bible and its daughter versions, as well as in the Syriac Peshita, the Latin Vulgate and most modern translations, the book of Daniel has a position among the Prophets ; but in the Hebrew Bible its place is among the Hagiographa, near the end of the collection. The earliest testi¬ mony of the latter arrangement is found in the Babylonian Talmud (Baba bathra5 14b. Though it is uncertain at what time the prophetic rolls

in the Alexandrian synagogue were arranged in a definite order, the inclusion of Daniel can scarcely have been a late innovation, since Jews and Christians alike who used the Greek Bible in the 1st century a.d. appear to have considered him as a prophet and made no distinction be¬ tween his book and those of other prophets ; Josephus regarded him as ((one of the greatest" of the prophets, (Antiquities) x, 266, and obvi¬ ously included his book among the 13 prophets, (Ag. Apion) 1, 40, and he was referred to in Matt, xxiv, 15, as ((Daniel the prophet." It is, therefore, probable that the book was rele¬ gated to the third division of the canon in the 2d century a.d. The reason may have been its powerful influence in fanning the Messianic hope and the use of it by the Christians.

The Massoretic text differs from all early versions, with the doubtful exceptions of the Syriac Peshita and Aquila, in excluding the deutero-canonical parts, and especially from the oldest Greek version in many other respects. There is a tendency at present to assume that the prayer of Azariah, the hymn of the three friends of Daniel, the fable of Susanna and the stories of Bel and the Dragon were trans¬ lated from an Aramaic original. But it is also widely recognized that these sections are likely to be later additions in the original, though ear¬ lier than the Greek version. The oldest testi¬ mony to the text is unquestionably this Greek version for which the Church substituted Theodotion's. The latter seems to have had for its foundation a version of which traces are already found in the 1st century a.d. There is no valid reason for questioning that the old Greek trans¬ lation was a fairly faithful, though not very elegant, rendering of the text current about 100 b.c. This text itself was not free from additions and transpositions ; but its most im¬ portant characteristic was the apparent absence in it of many later embellishments of the Mas¬ soretic text. Thus the image of gold was. 6 cubits high, and not 60 (iii, 1), and the. enemies who secured the edict from the king, spied upon Daniel, had him punished, and were themselves thrown to the lions together with their families (vi) were the two fellow-presidents, and not all the rulers of the empire. The only manuscript extant of the old Greek version was published by Magistris in 1772, and by Cozza in 1877; a valuable Syriac translation of it made by Paul of Telia in 617 a.d. was published by Bugati in 1788, and by Ceriani in 1874. The C)ld Latin, Coptic, Ethiopic, Arabic, Georgian, Armenian and Slavonic versions were made from Theodotion, the Syriac Peshita. and the Latin Vulgate from a Hebrew-Aramaic text nearer the Mas¬ soretic.

One part (i, 1-ii, 4a; viii-xii) of the proto-canonical book is in Hebrew, another part (ii, 4b-vii, 28) in Aramaic. The Hebrew is. of a late type; the Aramaic is not Mesopotamian or Babylonian, but the Judean

dialect, yarious theories have been proposed to explain this bilingual character. Some have thought that the author began his work in Hebrew, but changed into Aramaic to reproduce the words of the Chaldseans in the dialect they spoke, or he supposed that they spoke,, and then returned to the Hebrew to conceal in the sacred tongue what was meant only for the. wise men of his own people. Corrodi, ˆKritische Geschichte des Chiliasmus) (1781), suggested that the whole

book was originally written in Hebrew, but that the author himself translated some parts into Aramaic ; Lenormant, Bevan, Haupt, Barton, Prince, Riessler and G. Jahn thought that, a part of the original having been lost, the Ara¬ maic translation was substituted for it. Huet, (Demonstratio evangelica) (1679), Marti, Buhl, Wright, Charles and Buttenwieser have ex¬ pressed the view that the whole book was orig¬ inally written in Aramaic, but that either the beginning and the end were translated into Hebrew or the original was used for certain missing parts of the Hebrew translation. Spi¬ noza, (Tractatus theologico-politicus) (1670). supposed that the Aramaic parts were written by Chaldaean chroniclers. Eichorn (Allgemeine Bibliothek, 1787), considered ii, 4b-vii as an earlier Aramaic work, while he assumed that the remainder was written in Hebrew. This view has been revived by Meinhold, Strack, Dal-man, Torrey, Sellin, Kent and Schmidt. Most of these students look upon i-ii, 4a as a trans¬ lation from the Aramaic and vii as an Aramaic version. It seems more probable that the story¬ book was written in Aramaic, that vii was a late addition to this work in the same language, and that the author of the visions, who affected the use of Hebrew, wrote i-ii, 4a as an intro¬ duction to take the place of some other exor¬ dium.

In earlier times the unity of the book was generally accepted, the only apparent exception being Josephus who speaks of several books written by Daniel, (Antiquities* x, 267. Even the deutero-canonical sections were widely re¬ garded as a part of the original work, in spite of Jerome's attitude, and the ascription of xiv to ((the prophet Habakkuk." Until the 17th century the entire Hebrew-Aramaic text seems to have been assigned to the same author. But Spinoza distinguished between the stories which he did not ascribe to Daniel, and the visions. A similar view was taken by Isaac Newton (1732) and Isaac Beausobre (1742), while Edward Wells, (A Help to the Understanding of DanieP (1716), suggested that chapter i was written after Daniel's time. J. D. Michaelis (1772) re¬ garded the book as

made of independent sec¬ tions ; Eichhorn (1787) regarded ii-vi as a work later than the exile but earlier than the Macca-bsean age when i, vii-xii were written ; and Bertholdt (1808) considered the book as a com¬ pilation of at least seven distinct pamphlets, the visions from the days of Antiochus IV, and the stories earlier. Volney, (Recherches nouvelles sur l'histoire ancienne) (1814), thought of sev¬ eral authors living after Antiochus IV, one of them in the Roman period. Lagarde (Gott . gelehrte Anzeige, 1891), maintained that vii was written in 69 a.d., and that Josephus did not have in his copv either vii or ix-xii. Hertlein has developed the theory more fully, assigning ii, vii, ix-xii to the year 70 a.d. Barton (1898) suggested, in addition to the introductory chap¬ ter, nine independent pamphlets written by three or four different authors between 168 and 164 b.c. Views similar to that of Eichhorn have been expressed by Meinhold . (1884), Strack, Wildeboer, Torrey, Kent, Sellin and Schmidt. Meinhold assigned ii-vi to the first part of the 3d century, vii-xii to the Maccabaean period, and Torrey called special attention to the fact that no event later than the reign of Ptolemy III seems to he alludod to in ii, and dated the

story-book c. 242 b.c. It seems necessary to assume several literary strata, such as (1) the 3d century Aramaic story book in which iii appears to have been a later insertion; (2) Daniel's vision in Aramaic (vii), added to the story-book soon after 168 b.c.; (3) the visions in Hebrew (viii-xii) and the introduction in 165 B.c.; (4) the prayer in ix, 4-19, as pointed out by Gall, and some minor interpolations, and (5), the deutero-canonical parts written in Aramaic be¬ fore the end of the 2d century. Even strong defenders of the traditional view, like Zockler (1869), Myrberg (Bibelforskaren , 1894),

Thompson (1897), and Wright (1906) have looked upon xi as an interpolation or an expan¬ sion of the original text.

Among scholars maintaining the unity of the book it has generally been held until recent times that both the Hebrew and the Aramaic parts were written by Daniel. This opinion has been defended, with learning and acuteness, by Hengstenberg, Havernick, Pusey, Keil,

Auberlen, Hebberlynck, Comely, Wright and Wilson. Certain peculiarities, however, aroused doubts and questions already in antiquity, and in the last century many Protestant, Jewish and Cath¬ olic scholars have been led to assign it as a whole to a later age. The Talmudic statement that Daniel was written by the men of the great synagogue ((Baba bathra® 15a, still remains obscure, but some kind of editorial activity is probably meant. Celsus (c. 178 a.d.) obviously did not believe in the story of Daniel in the lions' den or that it was told by the prophet himself, Origen, (c. CelsunP vii, 53, 57 ; and even among Christians there seem to have been some doubts on this point in the time of Hippolytus, <Com.) iii, 29, 4. Porphyry in the 3d century was forced to the conclusion that the author lived in the time of Antiochus IV. His opinions, set forth in the 12th book of his lost (Treatise against the Christians, } were fre¬ quently quoted, sometimes with approval, by Jerome, who rejected the main thesis, but re¬ marked, <(if this is said concerning Antiochus, what harm can it do to our religion?® Isidore of Seville (d. 632) declared that Daniel and Ezekiel were written ((by some wise men,® <Orig.) vi, 2-. According to Maldonatus (1611), some Manichseans (Paulicians) and Anabap¬ tists rejected the authenticity of Daniel; Tiziano was accused at Coira in 1547 of regard¬ ing some parts of the Prophets as spurious, Comba, (I nostri protestantP (II, 487, f. 1897). Uriel da Costa in 1624 maintained, in a lost work, that the book was written by some Phar¬ isee in the Maccabaean period. Hobbes, (Levi-athan) (1651), only threw out the hint that Daniel and other early books may have received their present form after the exile, perhaps through Ezra. But Anthony Collins, (The Scheme of Literal Prophecy Considered) (1727), presented a solid array of arguments for a Mac¬ cabaean origin of the book; full justice has not yet been done to the scientific character of his reasoning. Corrodi (1781) regarded the work as made up of unconnected fragments written by an author living in the Maccabaean age to which extensive additions and changes were subse¬ quently made. Bleek (Theol. Zeitschrift, 1822) urged against Eichhorn and Bertholdt the unity of the book and the Maccabaean origin of all its contents. This has become the view of a great majority of critics. Like Volnev, Havet, *Xe

Christianisme et ses origines> (1878), thought of the Roman period, and he supposed that the author depicted Herod the Great under the guise of Antiochus IV. Among those who reject the unity, the visions are as a rule assigned to the Maccabaean period, Lagarde and Hertlein being the chief exceptions.

The leading arguments for a later origin of the entire book than the exile, and for a Macca¬ baean date of the visions of Daniel are (1) the position of the book in the Hebrew canon; (2) the omission of Daniel's name in Ecclesiasticus xlix; (3) the occurrence of Persian and Greek words and later forms of names; (4) the men¬ tion of the Chaldaeans as a priestly class; (5) the reflection upon the 70 years exile; (6) the use of the West Aramaic; (7) the absence of any acquaintance with the book before the 2d century b.c.; (8) later theological ideas; (9) the peculiar survey of history, involving seem¬ ingly erroneous ideas of the earlier period, re¬ markable familiarity with Antiochus IV and his immediate successors, but a mistaken notion as to the end of this king's reign; and (10) the apparent significance of the image, the four beasts, the ((one like a son of man,® the little horn, and the 70 weeks. These arguments are not all of equal weight. Thus we know some¬ thing about early critical opinions as to the status of sacred books, but as yet nothing with certainty concerning the time and manner of their acceptance for public reading. The silence of the author of Ecclesiasticus xlix (see Ec¬ clesiasticus) in regard to Ezra is even more remarkable than his omission of Daniel; Joseph is clearly an afterthought and his services to Israel may have seemed greater than Daniel's. Persian and Greek words are not likely to have been used in Babylon at the time of the exile; the spelling of Nebuchadnezzar for Nebu¬ chadrezzar may be due to a copyist; it is not known when the names of foreign gods began to be changed (Abed Nego for Abed Nebo, Shadrak for Marduk, Mishak for Nusku). There is a possibility that galdn or kaldn was the name of a priestly class (Cf. Yale Oriental Series, 66fT, 1915), but the Hebrew Kasdim seems to be connected, not with Kaldu, but with Kashdu, the Babylonian name for the Chaldaean people. It is not easy to see why Daniel should have sought for a new interpre¬ tation .of the 70 years before the 70-year period was up. The use of West Aramaic, if original, favors Palestine as a place of composition. While there appears to be no trace of Danielic ideas in the Jewish writers after the exile, it is not certain that any of them had a natural occasion for referring to them. The advanced angelology does not with certainty show Zoroas-trian influence, but the doctrine of a resurrection is probably of Persian origin. The direction in prayer, fasting as a preparation for a revelation, and a rigid observance of dietary rules are not necessarily signs of a later age; and the refer¬ ence to <(the books® only shows that some kind of a collection of sacred writings existed.

Neither Jeremiah nor the author of Kings knows anything about a capture of Jerusalem and deportation of Jehoiakim in 606 b.c. In 2 Chron. xxxvi, 6, however, Nebuchadnezzar is said* to have deported

Jehoiakim and carried away some of the sacred vessels to Babylon, though the year is not indicated. But Jer. xxxvi, 1 seems to preclude such a deportation

in the third year of Jehoiakim. Belshazzar (Bel-shar-uzzur) was not a son of Nebuchad¬ nezzar, but of Nabunaid, and there is no evi¬ dence that he was ever king of Babylon; but he is mentioned together with his father, com¬ manded an army and may have been killed defending a part of the city after Babylon had been delivered over to Cyrus. History knows nothing of a Darius the Mede. He was for many centuries identified with Cyaxares, son of Astyages, known only through Xenophon's (Cyropsedia.) Xenophon nowhere suggests that Cyaxares had the name of Darius, or was made king of Babylon. He speaks of the part taken by Gobryas in the occupation of Babylon, and this has been verified by the inscriptions (cp. Scheil, Revue d'assyriologie, p. 165, 1914). But he is not said to have been made king of Baby¬ lon, or to have taken the name Darius, and he is distinctly declared to be a native Baby¬ lonian. Winckler, (Altorientalische Forschun-gen> (II, 214ff, 1899), assumed that Cambyses was Darius the Mede, and that he was made king of Babylon by his father in 538 b.c., and the suggestion has been carried out more fully by Boutflower (Journal of Theological Studies , 1915). But it is not yet certain whether it was in 538 or 530 that Cambyses was king of Babylon. Darius the Mede, son of Xerxes, seems to be a reflection of Darius Hystaspis, father of Xerxes, as was seen by Marianus Scotus in the 13th century. It has even been plausibly suggested by Lagrange (Revue bih-lique, 1896) that his name may not have oc¬ curred at all in the original text. In xi, 1, the Greek has Cyrus ; ix, 1, looks like a late editorial superscription ; and in v, 30, the Greek reads, ((the kingdom was taken away from the Chaldaeans and given to the Medes and the Per¬ sians.® It is not distinctly stated in xi, 2, that there would be only four Persian kings; from the biblical books the author is likely to have known of others, and it is not probable that vii, 6, refers to Persia. Of the four kingdoms there have been six leading interpretations. They have been held to be: I, Those

of (1) Babylonia, (2) Media and Persia, (3) Alex¬ ander and (4) the Seleucids (Porphyry and many modern scholars) ; II, those of (1) Babylonia, (2) Media, (3) Persia and (4) Alexander and his successors (Ephraim, the annotator of the Syriac text in the Paris polyglot, and many modern scholars) ; III, those of (1) Babylonia,

(2) Media and Persia, (3) Alexander and his successors and (4) Rome (Hippolytus, Jerome, Theodoret and many modern scholars) ; IV, those of (1) Babylonia, (2) Media and Persia,

(3) Alexander and his successors, and (4) Rome and Islam (Jephet the Karaite, Ibn Ezra, Saadia the Italian, Rashi and others) ; V, those of (1) Babylonia, (2) Media and Persia, (3) Alexander and his successors, and (4) Rome and the Papacy (Paulicians, Albigenses, Fratri-celli, Luther and others) ; and VI, those of (1) Babylonians, (2) Medians and Persians, (3) Alexander and his successors, and (4) Rome and 10 kingdoms growing up within the Roman Empire (Mede, Rule, Auberlen and others). The first is most probable, but the second also recognizes Antiochus IV as the little horn. Against the third must be urged the impossibility of fitting the description to the career of Ves¬ pasian, and the difficulty of removing ii from

the earlier book and viii from the latter. It was clearly the desire to find references to contem¬ porary events that caused a search for the Mos¬ lem world power, the ecclesiastical empire of Rome, and the 10-kingdomed confederacy of European states. The one Hike a son of man® was long understood as the Messiah. As in the explanation the place of the manlike figure is taken by the saints of the Most High, many interpreters have understood Israel to be meant. It is probable that the figure represents Michael, who stands for the Jewish people, as Schmidt has suggested, with the approval of Bertholet, Marti, Porter and Kent. In ix the 70 years are explained as 70 weeks of years. The oracle is evidently Jer. xxx, 18; the ((anointed prince® in vs. 25, as was seen by Hippolytus, is Joshua ben Jozadak; the cessation of the legitimate high priesthood in 171 b.c. seems to be intended in vs. 26; and the desecration of the temple by Antiochus IV in 168 by the erec¬ tion of an altar and image of Baal Shamen (Zeus Olympius) is clearly meant in vs. 27. In Talmudic times Agrippa II was looked upon as the <(anointed prince.® Christians naturally saw a reference to the death of Christ. Many students, counting backward from the death of Jesus, as¬ sumed that the word went forth in 458 or 445 b.c., and that the last week extended from the Crucifixion to the destruction of Jerusalem in 70 a.d. Already Julius Hilarianus (397) objected to

starting the 490-year period 100 years after Daniel and insisted upon the last week being seven years ending 164 b.c. Most modern scholars divide the weeks of years into six from 586 to 537, 62 from 537 to 171, and 1 from 171 to 164. The second period should be 434 years, and is, therefore, 66 years too short. Lacking a fixed chronology before the Seleucid Era, both Demetrius and Josephus made this period several decades too long, as Schiirer has pointed out ((Geschichte des jiidischen VolkesP IV, (1909). Cornill has suggested that the author may have counted 12 generations of high priests, giving each an average of 40 years.

It is assumed by many scholars that the author of the stories derived his material partly from biblical sources, partly from legends of foreign origin. The figure of Daniel, extant in post-exilic tradition, seems to have been en¬ riched by reminiscences of Joseph, who also was carried away to a strange land, falsely ac¬ cused, distinguished as an interpreter of dreams and exalted to be a ruler of the country; of Moses, who was educated at a foreign court, excelled the native magicians and uttered prophecies of doom against a powerful king; of Jeremiah, who was rescued from certain death in a den; of Nehemiah, who held a high position at the Persian court, and possibly of Mordecai, who was exalted by Xerxes. The tale of Achikar, supposed to have been a vizier of several Assyrian kings, was read by the Jews of Elephantine in the 5th century, and may have been known in Palestine. Stories of huge idols, of religious festivals, of Belshazzar's death at the time of a feast, of the devices of astrologers, of punishment by fire, and of lions kept for the hunt in cages or enclosures, may have become a part of Palestinian folklore. The conception of successive ages, represented by different metals, as in Hesiod, the use as symbols of

various animals and monsters so frequently found among the sculptures and paintings of the pagan world, the adaptation of myths like that of Marduk and Tiamat and other con¬ flicts of heavenly beings, and even speculation on significant numbers, may have been

due to foreign contact.

The stories were eminently suited to inspire endurance and hope in the midst of a terrible persecution, while the visions created a keen expectation of the immediate end of the foreign tyranny and the founding of an imperishable Jewish kingdom. In every later crisis the book has tended to foster the same eschatological mood. The succession of four empires to be followed by the kingdom of heaven became a deeply rooted idea. It dominated the conception of history until the 16th century when the division into ancient, mediaeval and modern history be¬ gan to be advocated. The faith that surveyed the passing of empires and looked with intense longing for the kingdom of heaven on earth gave to this book a power which it still possesses to kindle fresh hopes for the overthrowing of oppressive world-powers and the establish¬ ment of a nobler order of things.

Bibliography. — Commentaries by Hippolytus, Ephraim, Jerome, Theodoret, Albertus Magnus, Thomas Angliae (c. 1310, wrongly ascribed to Thomas Aquinas), Nicolaus Ly-ranus; Abu Ali Japhet, Rashi, Ibn Ezra, Saadia the Italian (c. 1190, wrongly ascribed to Saadia Gaon) ; Melanchthon, CEcolampadius, Calvin ; Pererius, Junius, Polanus, Piscator, Maldonatus, Sanctius, Alcazar, Grotius, Calmet, Mede, Wintle; Bertholdt, Rosenmiiller, Havernick, Hitzig, Pusey, Ewald, Keil, Auberlen, Reuss, Zockler, Trochon, Knabenbauer, Meinhold, Bevan, Behrmann, Stave, Thompson, Farrar, Prince, Driver, Marti, Porter, Buhl and Charles. Introductions by Eichhorn, Jahn, De Wette, Bleek, Glaire, Herbst, Kuenen, Vatke, Riehm, Strack, Wildeboer, Comely, Kaulen, Cornill, Baudissin, Sellin, Gautier, *Gigot, Bennett, Moore, McFadyen, Creelman, Hengstenberg, E. W., (Die Authentic des DanieP (1831) ; Gratz, H., in Frankel's Monatschrift des Judenthums (1871) ; Lenormant, F., (La divination et la science des presages chez les Chaldeens* (1875) ; Hebberlynck, A., (De auctoritate libri Danielis) (1887) ; Cornill, C. H., in Theologisclie Studien und Skizzen aus Ostpreussen (1889) ; Bludau, A., (Die alexandrinische Uebersetzung des Buches DanieP (1892) ; Trieber, A., in Her¬ mes > (1892) ; Gall, A., (Die Einheitlichkeit des Buches DanieP (1895) ; Barton G. A., in Journal of Biblical Literature (1898); Schmidt, N., (ib. 1900) ; Riessler, P., (Das Buch DanieP (1904) ; Jahn, G., (Das Buch Daniel nach der LXX> (1904) ; Wright, C. H. H, < Daniel and His Critics) (1906) ; id., (Daniel and His Prophecies) (1906); Bertholet,- A., (Daniel und die griechische Gefahr) (1907) ; Hertlein, Ed., (Der Daniel der RomerzeiP (1908) ; id., (Die Menschensohnfrage) (1911) ; Torrey, C. C., in Transactions of the Connecticut Academy of Arts and Sciences (1909) ; Kent, C. F., (The Old Testament Student > (1910) ; Wilson, R. D., <Studies in DanieP (1917) ; Buttenwieser, M., in Journal of Biblical

Literature (1917).

Nathaniel Schmidt,

Professor of Semitic L anguages and Literatures, Cornell University.

DANIEL DERONDA, George Eliot's last novel, considered by some critics her greatest work. Deronda was brought up in ignorance of his Jewish parentage, but ultimately cast in his lot with his own people. The influence of Deronda remolds the character of the heroine, Gwendolen Harleth, who is unhappily married to Grandcourt. In (Daniel Deronda y George Eliot had three objects in view: (1) To show the influence of heredity; (2) to show that ideals and sentiments lie at the basis of religion; (3) to contrast a social life founded on tradi¬ tion (that of the Jews) with mere individualism. The novel was first published as a whole in

1877.

DANIELL, John Frederick, English scien¬ tist: b. London, 12 March 1790; d. 13 March 1845. He was elected a Fellow of the Royal Society in 1814, and devoted himself to chem¬ istry and meteorology. In 1823 he published his (Meteorological Essays } ; and in 1831 was ap¬ pointed professor of chemistry in King's Col¬ lege, London; and in 1839 published his (Intro¬ duction to Chemical Philosophy. } In 1843 he received the degree of D.C.L. from the Univer¬ sity of Oxford and obtained all the three medals in the gift of the Royal Society. He invented a hygrometer (1820), and a new pyrometer (1830), as well as the electric battery known by his name ; and he wrote many valuable papers on chemistry, especially on voltaic combinations and electrolysis.

DANIELL, Samuel, English artist and traveler: b. London 1777; d. Ceylon 1811. He was a brother of William Daniell (q.v.). He spent three years at the Cape of Good Hope, and afterward proceeded to the interior of Africa, making sketches of the scenery and people, which he brought home with him to England in 1804, when they were published, with an account of the animals of southern Africa. He afterward went to the island of Ceylon, and during a residence of six years collected a large amount of similar materials, one volume of which was published, with a description of that country and its inhabitants, in 1808.

DANIELL, Thomas, English landscape painter and engraver: b. 1749; d. London 1840. In company with his nephew, William Daniell (q.v.), he made an extraordinary journey through India, for the purpose of preparing sketches and illustrations of the scenery, which were afterward published with the title Orien¬ tal Scenery 5 (1808). He was originally a her¬ aldry painter, and became Fellow of the Royal, Asiatic and Antiquarian societies. He pub¬ lished also (Views in Egypt*; <Hindu Excava¬ tions at Ellora) ; 'Picturesque Voyage to China by Way of India* (1817).

DANIELL, William, English painter and engraver: b. 1769; d. 1837. He set out at the age of 14, in company with his .uncle, Thomas Daniell (q.v.), upon an artistic exploration of the peninsula of Hindustan. They began their journey at Cape Comorin, and sketched al¬ most everything beautiful or interesting in the country between that point and Serinagur, in the Himalaya Mountains. They were occupied 10 years in this undertaking. Of their immense number of sketches, they selected and published a portion in a great work entitled (Oriental Scenery > (1808). William also published <A Picturesque Voyage to India *; 'Zoography* ;

(Animated Nature, > etc., and from 1814 to 1825 was engaged in making sketches for (A Voy¬ age round Great Britain.*

DANIELS, Cora Linn, American author: b. Lowell, Mass., 17 March 1852; married Joseph H. Daniels 1871. She has written much for the press and has published in book form: ˆSardia* (1892) ; (As it is To Be: Ps3xhical Philosophy* (1892-1900) ; (The Nurse) ; (Omar Khayyam* ; (The Bronze Buddha) (1899) ; (Encyclopedia of Superstitions of the World* (1901). Mrs. Daniels' recent work has been trade letters to the press from Europe and many poems, soon to be collected into a volume.

DANIELS, Fred Harris, American mechan¬ ical engineer: b. Hanover Centre, N. H., 16 June 1853 ; d. 30 Aug. 1913. He was educated at the Worcester Polytechnic Institute and made a special study of iron and

steel manufactures during a tour in Europe. In 1873 he became connected with Washburn, Moen and Company and was at one time general superintendent. He remained as chief engineer when this firm was merged with the American Steel and Wire Company in 1899 and after the merger with the United States Steel Corporation in 1901 he was made chairman of the board of engineers. He owned over 150 patents relating to the iron and steel industry, especially the manufacture of wire rods.

DANIELS, Josephus, American public offi¬ cial : b. Washington, N. C., 18 May 1862. He received an academic education at the Wilson Collegiate Institute and at the age of 18 became editor of the Wilson (N. C.) Advance. In 1885 he was admitted to the bar but did not practise. In 1887-93 he was State printer for North Carolina, and chief clerk of the Department of the Interior from 1893 to 1895. In 1885 he be¬ came editor of the Raleigh (N. C.) State Chronicle, which journal he consolidated in 1894 in the North Carolinian, with a weekly edi¬ tion known as the News and Observer, of which he has since been editor. He took an active interest in politics, both State and na¬ tional, and in 1912 was publicity manager for the Wilson forces. He served as member of the Democratic National Committee after 1896. He became Secretary of the Navy in President Wilson's Cabinet and in this post greatly im¬ proved the condition of the enlisted personnel of the navy, established courses for the instruc¬ tion of the men in various trades, and banished alcoholic liquors from the officers' mess. His advocacy of a greater navy did much lo bring the United States naval forces to a high point of efficiency on its entrance into the great con¬ flict in April 1917.

DANIELS, William Haven, American author: b. Franklin, Mass., 18 May 1836. After studies at Wesleyan University and travel in Europe, in 1866 he became librarian in North¬ western University, and in 1868-69 was professor of rhetoric in Illinois Wesleyan University. From 1869 to 1876 he served in the Methodist ministry. He published: (That Boy: Who Shall Have Him) ? (1878); (The Temperance Reform and Its Great Reformers) (1878); (Moody, His Words, Work and Workers* (1879) ; (Illus¬ trated History of Methodism in the United States) (1880) ; CA Short History of the People Called Methodists* (1882),

DANIELS, Winthrop More, American political economist: b. Dayton, Ohio, 30 Sept. 1867. He was educated at Princeton where he was graduated in 1888, and afterward spent one year at the University of

Leipzig. He was pro¬ fessor of political economy at Princeton from 1892 to 1911, when he became a member of the board of utility commissioners of New Jersey. In 1914 he was made a member of the Inter¬ state Commerce Commission. He was mean¬ while on the contributing staff of the New York Evening Post. He has published (Revision and Continuation of Alexander Johnston's History of the United States) (1897) ; (Elements of Public Finance) (1899) ; (Continuation of

Johnston's History of American Politics) (1902), and contributions to periodicals.

DANIELSON, Conn., borough in Wind¬ ham County, on the New York, New Haven and Hartford Railroad and the Quinebaug River, 25 miles northeast of Norwich. Cotton manu¬ facturing is the principal occupation and in¬ dustry of the inhabitants. Pop. (1920) 3,130.

DANISH EAST INDIA COMPANY.

See East India Companies.

DANISH LANGUAGE. The Danish lan¬ guage belongs to the Scandinavian group of the Germanic languages. This group comprises, in modern times, besides the language already mentioned, the Dano-Norwegian, the Nor¬ wegian Landsmaal, the Swedish, the Icelandic and the Faroish languages.

The earliest specimens, still preserved, of the primitive Scandinavian language (Urnordisk), soon after the beginning of the Christian era, are loan words in Finnish (and Lappish), sev¬ eral hundred in number, mostly denoting uten¬ sils belonging to a fairly advanced stage of civil¬ ization. In the Scandinavian countries them¬ selves the earliest specimens of Urnordisk are the inscriptions in the early Runic characters, 24 in number, developed from the Latin and Greek alphabets and known to all Germanic peoples. There are over 100 of these early Runic inscriptions. Some of these are the old¬ est existing traces of any Germanic tongue and closer than any other to what is supposed to have been the original primitive Germanic lan¬ guage. From these early specimens that have been preserved we learn then that the Urnordisk belongs to the Germanic (Teutonic) group of the Indo-European family, and is an independ¬ ent and individual branch, most nearly related to the Gothic. The most famous old Runic inscription found in Denmark is the inscription on the Golden Horn, found in 1734 and lost in 1802: (Ek hlewagastir holtinar horna tawido* (I Lagest from Holte (Holt's son) the horn made). The

Norwegian Professor Sophus Bugge and the Danish Professor Ludvig Wim-mer were the first scholars able to interpret these Runic inscriptions, of which some, how¬ ever, have as yet not been interpreted. During the Viking Age (750-1000 a.d.) the language of the Scandinavian nations, as evidenced in the Runic inscriptions in the later, peculiarly Scan¬ dinavian, Runic characters (16 in number), un¬ derwent a very decided change. The Scandina¬ vian peculiarities distinguishing the language from the other Germanic idioms now appear fully developed, and by and by even dialectal differences between the languages of the sev¬ eral Scandinavian nations commence to assert

themselves. The principal changes from Urnordisk are: (1) dropping unaccented vowels, (2) introducing vowel harmony (i-and u-mu¬ tation), (3) assimilation of consonants. Toward the close of this period the dialectic differences establish two groups: Norwegian-Icelandic (western group) and Danish-Swedish (eastern group). In the eastern group there are fewer cases of u-umlaut, not as many assimilations, the simplicity of verb inflections is much further advanced, the passive ends in s, while in the western group it ends in sk. The differences, however, are still unimportant, and the Scandi¬ navians themselves consider their language as one (Danish tongue.) Generally speaking, the western group has preserved the more primi¬ tive forms. As an example of old Danish from this period may be cited the inscription on one of the 200 runestones found in Denmark, the smaller Jellinge-stone : (<Gormr konungr gserdi kumble p si seft pyrwi konu sina, Danmarkar bot® (King Gorm made this mound [with runestone], after his wife, Tyra Danebod).

Danish in the Middle Ages (1050-1500). — It is only after the introduction of Christianity (about 1000 a.d.) that real literature is made possible. The monks brought with them the art of writing, and literary activity in the Middle Ages is especially connected with the churches and monasteries. The Latin alphabet was in¬ troduced, but sometimes, especially in Iceland, characters denoting peculiar Scandinavian sounds were added. The Norwegian-Icelandic literature from the earlier Middle Ages stands, both as to extent, age and value, far above the Danish and Swedish, and the language of the oldest Norwegian-Icelandic manuscripts varies only a little from the Runic language of about 1000 and has greater linguistic interest. The earliest preserved Danish manuscripts date from the close of the 13th century. From 1050-1250 Danish language is known only from rare Runic inscriptions and from Latin manuscripts with Danish names. The oldest manuscripts with Danish words contain the old Provincial Laws. They show that the separation from the orig¬ inal common Scandinavian idiom, already indi¬ cated in the younger Runic inscriptions, now is strongly apparent. Old Danish (1050) was an old Scandinavian dialect, middle Danish (1300) is an independent language which has diverged far from the original idiom and also from the western Scandinavian language, and now is on the point of parting company with Swedish. In the Middle Ages (and later) Danish was spoken also in Sleswick and in Scania, Halland and Blekinge (now

belonging to Sweden.) There were three groups of popular dialects, those of Scania, Zealand and Jutland. But already the earlier manuscripts show a tendency toward cre¬ ating a uniform Danish literary language, and this is gradually developing essentially from the Zealand dialect. In this period some of the changes to be noticed are : A large number of Low German words are introduced, especially in the 14th and 15th centuries, when the Han¬ seatic League controlled the commerce of Den¬ mark, and also the political influence from Ger¬ many was very considerable. Most of these words have been retained and are later con¬ sidered pure Danish. Many German deriva¬ tional endings were adopted and often added to native words. Of German prefixes adopted were be-, for-, und-. The declension of nouns,

adjectives and pronouns was greatly simplified. Instead of the original four cases only two, nominative and genitive, were ordinarily used (in pronouns also the objective form). The orig¬ inal three genders (retained in most dialects) were reduced to two, common and neuter, in the literary language. In western Jutland only one, the common gender, was used. The use of prep¬ ositions is developed more and more. The order of the words in the sentence, to show the syntactical connection, becomes more fixed. Al¬ ready from the 10th century the monophongi-fication of original diphthongs was observed in the eastern group of Scandinavian languages (Danish and Swedish), Stein became sten, daudr-dodr, leysa-losa. The language of Nor¬ way, on the other hand, with the dialects spoken in the countries settled from or belonging to Norway, Iceland, the Faroe Islands, Greenland, the islands north and west of Scotland, retained the old diphthongs as diphthongs. About 1300 the Danish language began to substitute voiced stops (mediae) for voiceless stops (tenues or hard consonants) after a long vowel at the end of a word or a syllable. The Swedish retained the old voiceless stops. K, t, p were changed to g, d, v. Swedish rike — D. righae, S. lata — D. ladhe, S. drapa — D. draewae. About 1300 also the glottal catch, so peculiar to Danish pronunciation, was introduced. The earlier Da¬ nish ju (retained in Swedish) is changed into y.

Danish (1500-1900). — With the 15th cen¬ tury a new period in the history of the Danish language takes its beginning. With the intro¬ duction of the art of printing (1482) many books were brought into circulation. The most important work of the Danish Reformation is Christian Ill's Bible, translated by Christian Pedersen and others. In this translation the authors made an effort to establish a consistent

orthography and to avoid double forms. It has had great influence on the literary, particularly the church, language of later times. Of other works marked by their comparatively pure Dan¬ ish may be noted A. S. Vedel's translation of Saxo (1575), Klaus Lyskander's (1558-1623), (Danske Kongers SlcegtebogP a kind of gene¬ alogy of Danish kings. The following period down to Holberg (1684-1754) produced few works written in good Danish. Best known are Thomas Kingo's hymns and the works of the Norwegian preacher and poet Petter Dass. Of the greatest linguistic importance is Christian V's (Danish Law) (1683). During the human¬ istic ascendency, the literature was strongly markedly Latin-German influence. Almost all the learned men of the period wrote in Latin. Many Latin and High German words were adopted. From German were now introduced the prefixes er-and ge-. During the latter half of the 16th century, German was the official language of Sleswick and also to a great extent in Denmark proper. Later French exerted great influence, especially in court circles. Even the great author and linguist Holberg, who taught the people to respect their mother tongue, shows foreign influence. About 1750 arises a move¬ ment against foreign influence. The most prom¬ inent representatives of this movement are Eil-schow (1747) and Sneedorf and his periodical <(Den Patriotiske Tilskuerˆ (1761-63). From Sneedorf and his school the modern Danish prose may be said to have its origin. Before 1800 only Ewald and Baggesen are really great

masters of prose style. But it is only from 1840, beginning with such masters as H. C. An¬ dersen, Goldschmidt, Kierkegaard and continu¬ ing with numerous writers and authors of fic¬ tion, of critics, political writers, historians that Danish prose has developed to the degree of perfection it now has. Many writers of poetry have attained the same efficiency in the use of the Danish language. The vocabulary has been enriched by adopting many words from the early Scandinavian literature, from the dialects and from the speech of the people. The gram¬ mar has been simplified. Uniform orthography was officially established in 1889.

Bibliography. — V. Dahlerup, (Det danske Sprogs Historie) (1896) ; H. Bertelsen, (Dansk Sproghistorie) (1908) ; C. Molbech, (Dansk Ordbog) (2d ed., 1859) ; Dahl and Hammer, <Dansk Ordbog for FolkeD (1907-14) ; V. Dahlerup, (Dansk Ordbog) (in preparation) ; O. Kalkar, (Ordbog til det aeldre danske Sprog*. (1881-1907) ; H. F. Feilberg, (Ordbog over jyske AlmuesmaP (1886-1911) ; Falk and Torp, (Etymologisk Ordbog over det norske og danske Sprog) (1903-06; the same in German, revised, 1910) ; Falk and Torp, (Dansk-Norskens Syn¬ tax* (1900) ; J. Brynildsen, (English-Dano-Norwegian Dictionary* (1902-07) ; the periodicals Dania (1893-1903) and Danske Stndier (1904-) ; K. Mikkelsen, (Dansk Sproglaere* (1894) ; M. Kristensen, <Nydansk) (1906) ; O. Jespersen, (Fonetik) ; P. Groth, (Danish Grammar) (1894) ; J. C. Poestion, (Die danische Sprache.*

Gisle Bothne,

Head of the Department of Scandinavian Languages and Literature, University of Minnesota.

DANISH LITERATURE. Danish history may properly, be divided into three epochs : The heathen age, from the earliest times to 1000; midde age, 1000-1500; modern age, 1500 to the present. Apart from the Runic inscriptions, no literature originating in the first period has been preserved. Great Danish scholars as Rask, one of the founders of comparative philology, Thomsen, Steenstrup, Worsaae, Sophus Muller, Olrik and others have shown that great epics had their origin among

the Danes from the time of the migrations to the close of this period, the golden age of Danish heroic poetry. We find traces of them in Saxo, in the Norwegian-Ice- landic sagas, in English sources. In the Mid¬ dle Ages a written literature first arises by reason of the practical needs of the Catholic church, especially after the establishment of the archiepiscopal seat at Lund (1104). The lan¬ guage used is Latin. The first book written in Denmark was a brief history in Latin of Saint Canute. The author was the English monk ZEnoth who was a preacher in Odense shortly after 1100. Many Danes had studied in Paris and other places and were well versed in the scholastic learning of the times. Of these, An¬ ders Suneson, Archbishop at Lund (1201-1222) , who had been a professor in Paris, wroteˆ in Latin hexameters (Hexaemeron,* describing the creation of the world in six days and also containing scholastic comments on doctrines of the church. In the age of the Valdemars (1150-1250) Denmark reached her highest point of power and culture. The great Ahsalon is the central figure. At his instigation the history of Denmark was written, a very brief (Historia re¬

gum Daniae* by Sven Aageson and <Gesta Da-norum) (in 16 books) by Saxo. In spite of their Latin form they reflect the national aspira¬ tions of Absalon and the great Valdemars. Saxo completed his famous work shortly after 1200. It is the greatest intellectual effort and the most important work of mediaeval Den¬ mark. The oldest books written in Danish are the Provincial Laws. The Scanian Law is from Valdemar the Great (1157-82). One of the manuscripts is the only Runic manuscript in existence. The Zealand Law is from the same time; the Jutland Law, the most important and interesting, was principally written by Bishop Gunner and promulgated in 1241 by Valdemar the Victorious. In Danish are also medical works written by Henrik Harpestreng (d. 1244). In the 15th century appeared Peder Laale's Proverbs in Latin and Danish. Toward the close of the Middle Ages we have the Dan¬ ish Rhyme Chronicle, the first Danish book printed (1495). The kings are introduced in chronological order, and each relates his own story, which includes even his death and burial. But more important than the written literature is the Danish ballad. In the Middle Ages,* the popular ballad flourished in all the Scandina¬ vian countries, and especially in Denmark from the grand age of the Valdemars. Denmark alone has over 500 original ballads, while the variants number several thousand. The first printed collection (of 100 ballads) appeared in 1591 and was edited by A. S. Vedel. Before his time ladies of the nobility had copied -many of them. But they continued to enjoy a vigor¬ ous life on the lips of the people until

they finally were collected in the 19th century. The main critical edition is by Svend Grundtvig (5 vols.) ; this edition was continued by Axel Olrik (d. 1917) who published three additional volumes and also a selection of ballads with an excellent introduction. _ The popular ballad orig¬ inated among the nobility or higher classes in connection with the dance, introduced into the Scandinavian countries in the 12th century.

In the ballads may be traced many relics of old, mythological beliefs and there may be found many themes of former ages, so they, in a manner, preserve the connection between the spiritual life of past ages and the national renaissance of times that follow. But they also paint pictures of the life of chivalry, of the doings of the common people, of moral aspects and customs. In vigorous descriptions they show us life when not <(the monk® but (<the knight® was the centre of attraction. They supply the lack of a more complete national history and poetic activity. There are songs of magic and miracle, ballads relating to his¬ torical persons and numerous ballads of chivalry.

Modern Denmark. — The revolution in the mode and view of life which characterizes the transition from the Middle Ages to the Modern period has been treated fully by the Danish Professor Troels-Lund in his great work, (Dagligt Liv Norden.* In Denmark the reli¬ gious life was mostly affected. The time of the Reformation signifies principally opposition to the Catholic church and to the scholastic way of thinking. The religious liberation spread rapidly from Germany to the Scandinavian countries, while the effects of the renaissance came later. The literature of the Reformation

period (16th century) shows very little orig¬ inality, blit has its great national significance by being written in the mother tongue, the principal condition for having an independent literature. After the struggle about the new creed, it looked as if a really liberal view would win in all lines. New science arose, the educational system was improved, the Univer¬ sity of Copenhagen (founded 1479) was re¬ established in 1537, much work was done to have the history of Denmark written, the higher classes, including the court and the nobility, took much interest in art and science. But soon all interest centred in the establish¬ ment of the ((pure® Lutheran doctrine, theology itself became learned and made use, as the other sciences, of the Latin language; censor¬ ship was established and checked all free liter¬ ary development. It became Holberg's great mission to raise the people by making them acquainted with the progress made by the lead¬ ing countries of Europe.

In the age of Reformation proper, Kristiern Pedersen (1480-1554), called ((the father of Danish literature,® was one of the leaders. His use of the Zealand dialect became the foundation of the literary language of the country. His translation of the New Testa¬ ment was published in 1529, and the translation of Christian Ill's Bible (1550) is in the main his work. He also published a free adaptation of a book by Luther on how children should be kept in school. Hans Tausen (1494-1561) by his eloquence and with his pen contributed most to the reformation in Denmark. Peder Palladius (1503-60), Zealand's first evangeli¬ cal bishop (superintendent), edited a number of books in Danish and Latin to advance the cause of general education and morality. His most important work is his Wistatsbog,* a collection of addresses delivered on his pro¬ fessional visits through his bishopric. It gives a vivid picture both of the able and imperious bishop himself and of the times. Povel Hel-gesen was the first to oppose the sale of in¬ dulgences, even anticipating Luther himself, but later attacked the Lutherans for going too far in their attack on the Roman church. They called him Povel <(Turncoat.® His po¬ lemical writings show the excellent style of this great humanist. His (Skiby Chronicles* is the only historical work of importance from that time. Hymn writers were Hans Kristensen Sthen and Hans Thomesen, who published (1569) the first authorized hymn-book, which contained the best of the earlier hymns and very good contributions by himself.

The Period of Learning (1560-1700). — The majority of the writers of this period had no longer any use for the people and the ver¬ nacular. They returned to <(the language of the gods,® Latin, and subtle theological discourses and treatises now succeeded the religious re¬ vival of the people. Melanchton's disciple, Niels Hemmingsen (1513-1600), is the greatest theologian of the time. He published a num¬ ber of highly valued commentaries on the New Testament, a great dogmatic work and also text books for the use of pastors. His fame spread over the whole of Europe and he re¬ ceived the cognomen <(The Teacher of Den¬ mark.® With his (De lege naturae* he became the forerunner of the founders of <(natural law,® Grotius and Pufendorf, Because his

views differed from the established orthodoxy he was discharged from the university. Jesper Brochmand (1585-1682), Bishop of Zealand, was the most learned theologian of Denmark in the 17th century and the orthodox leader who exercised a decisive influence on his epoch On his (Universae Theologise Schema> is based his reputation in the whole Lutheran church, while his Danish (Postil,* translated into sev¬ eral languages, has been popular down to our days. It was a time characterized by trials of witches, bigotry and superstition, and both theologians and scientists showed the prejudices of the times. A number of men with much book learning brought together a wealth of ma¬ terial in various sciences without much critical elaboration. Within the field of empirical sci¬ ences, especially medicine and astronomy, Den¬ mark had at this time several men of world renown. Tyge Brahe (1546-1601), a member of one of the oldest noble families, was an astronomer. Kaspar Bartholin and his son Thomas (1616-80) were great anatomists. Ole Borch, also a polyhistor, excelled in chem¬ istry and Latin. Simon Paulli, also much in¬ terested in botany, established (1644) the Domus Anatomica in Copenhagen. Most fa¬ mous, perhaps, was Niels Steensen (Nicolaus Steno, 1638-86), who made great discoveries in anatomy and founded the science of geology. Ole Romer, the astronomer, gained for himself great celebrity by his scientific discoveries. His calculation of the velocity of light (1675) marked a new area in scientific research. Of interest is the fact that men and women of the old Danish nobility distinguished themselves in science and literature. Holger Rosenkrans was considered one of the best theologians of the time. Noble ladies made collections of popular ballads, many of them were learned and de¬ voted to studies. Noblemen were liberal pa¬ trons of the arts and sciences. Arild Huitfeldr published in ten volumes a chronicle of the Danish kingdom. Under the influence of Ger¬ man-Dutch renaissance

and also, after abso¬ lutism was established (1660), of French classicism, what was of Danish native origin was more or less despised. But there also flowed through the period a national and to some extent a popular current, which was not very strong but is of great interest as a con¬ tinuation of the great popular movement cre¬ ated by the Reformation. Anders S. Vedel (1542—1616) published his excellent translation of (Saxo* in 1575 and his selection of Danish ballads in 1591. Of Norwegian writers who after the Reformation and until 1814 belong to Danish literature, Peder Clausson Friis trans¬ lated (Snorre) and wrote his description of Norway,* both works printed after his death. Anders Arreboe (1587-1637) translated the Psalms of David and wrote <Hexaemeron,) partly in hexameters and partly in alexandrines, according to the rules laid down by Opitz in his (Prosodia Germania. * The poem is a free imitation of the French poem by Bartas, but many parts are original. Peder Syv published the first grammar in Danish (1685) ; Erik Pontoppidan also wrote a Danish grammar in Latin. Ole Worm, with his (Monumenta Danica) (1643), is the founder of Danish runology and archaeology, and awakened an in¬ terest in the study of the earlv Scandinavian (Norwegian-Icelandic) literature'. Mathias Moth

left in manuscript rich collections which were used in the compilation of a voluminous Danish dictionary. The most important Danish prose works of the period are, besides Christian V's (Danish Law,* Birgitte Thott's translation of 'Seneca^ and Leonore Christine's (Jammers-minde,-* in which this daughter of Christian IV in simple and touching language describes her long sufferings in prison. Anders Bording (1619-77) enjoyed a great reputation as a poet and possessed great skill in versification. The Norwegian Petter Dass (1647-1708), for many years pastor in Nordland in the north of Norway, wrote in lively anapaests with tuneful rhyme his (Nordlands TrompeD in glorification of the scenery and life of his beloved native region. He turned the catechism and Bible into verse adapted to singing, in plain and simple language. He gained an immense popu¬ larity. Bishop Thomas Kingo (1634-1703) is the greatest poet of the period and one of the greatest psalmists. Many of his hymns still remain unsurpassed. In this field he showed that (<the spirit of the Danes can rise as high toward heaven as that of other nations.®

The Norwegian Ludvig Holberg (1684— 1754) is by far the most prominent figure of the next period. After years of study and travel, he became a professor at the University of Copenhagen. He was strongly influenced by English and French ideas (especially by Locke and Bayle), but also national and independent in his conception and application of what he had learned. He was well equipped for the mission he had chosen for himself. He attacks the worthless traditions of the past and exposes to the light the dark sides of his times, but he also builds up by creating a rich and many-sided literature in his country in all the fields within reach of his far-seeing and clear intelligence. His literary production is enormous and em¬ braces history, philosophy, poems, satires and comedies. In more than 500 Danish <Epistles> he discusses all burning questions. His lively prose created a rich literary language out of the hitherto uncultivated Danish tongue. This was also his aim of which he was fully con¬ scious. He wrote in order (<to polish the lan¬ guage.® But he had also an ethical object in view. He wanted to inculcate his own tolerant views, his own healthy common sense. He became in truth the

intellectual father of pos¬ terity. Holberg incorporated Denmark and Norway with contemporary Europe and left to the <(twin nations,® as an imperishable inherit¬ ance, a modern literature, a modern stage, and a modern prose. In the age of Holberg lived H. A. Brorson who wrote his fervent and deeply touching hymns. Pontoppidan (the younger) published religious works and a de¬ scription of Denmark. The poems of Am-brosius Stub show that love of nature still lived in Danish hearts. H. Gram started the critical study of history. J. Langebek edited a series of historical sources. ((The Academy of Sciences® and (<The Society for the Study of the Fatherland's Language and History® were established. One great philologist, Jens Hoys-gaard, lived at this time, but was only appreci¬ ated a long time afterward.

The latter half of the century (1750-1800) is called the (<Age of Enlightenment,® char¬ acterized by the crossing of many new ideas and influences. English influence was shown

when the Norwegian Tullin wrote his much admired (Maidagen} in imitation of Thomson's ˆeasonsP Another Norwegian Nordahl Brun's tragedy <Zarine) was fashioned after the French model, and the French was in the main the ruling influence, until a third Nor¬ wegian published his immortal travesty (Love without Stockings,* which drowned it and all that class of plays in laughter. The principal author of the period, the Danish genius Johannes Ewald (1743-1781) owed much to German impulses, but broke with the old forms and in an epoch-making manner showed the way back to the early and heroic age of the Scandinavians.

Interesting on account of his wit and ele¬ gant language is the <(poet of the graces® Jens Baggesen who belongs to the transition period between the old and the new of the 19th cen¬ tury. P. A. Heiberg's comedies are also to be mentioned. In this period were published a number of periodicals. The most important are Sneedorf's cDen patriotiske Tilskuer,* Rahbek and Pram's <Minerva) and Rahbeck's (Den-dan- ske TilskuerP The thing of importance was to teach, to moralize, to popularize. This is also, in the religious field, the idea of the so-called Rationalism whose representative was Bastholm, while Bishop Balle is the orthodox leader. The typical and influential writer in this age of ˆenlightenment® is, without comparison, K. L. Rahbek (1760-1830), influenced by the ideas of the French revolution. This influence appears even stronger in P. A. Heiberg and Malte Brun who ventured to discuss also political questions and are sent into exile.

With the 19th century came a new spirit and a new literature. The romantic movement introduces the golden age of Danish literature. The first and most promi¬ nent name we meet is that of Adam Oehlen-schlager (1779-1850), who almost at once was able to shape the new ideas to the national needs and created a peculiar Danish romanti¬ cism. He produced one work after another which crushed all opposition of the old school and established his fame on a firm basis. After his epoch-making (Digte) (1803) he chanted the praise of the genius in his (Aladdin> (1805) and in 1807 he published his first great tragedy (Hakon JarP ; Grundtvig (1783-1872), the greatest national leader in Denmark, was prominent as a vigorous writer and ((skald,® a scholar, a preacher, a leader in church and education. Men of great talent, but less na¬ tional and more influenced by German romanti¬ cism were Schack Staffeldt, Ingemann and Hauch. In the twenties, J. L. Heiberg (1791-1860) made an attack on the formlessness of the romanticists and championed the beautiful artistic form. In this he was supported by Henrik Hertz (1798-1870). Through both his literary and critical writings Heiberg exerted the greatest influence. The most prominent writers close to Heiberg were Hertz who handles a great variety of subjects with mas¬ terly skill, and his mother, Thomasine Gyllem-bourg, who writes about the higher circles in the capital with fine taste and keen psycho¬ logical insight, and Christian Winther (1796— 1876) who in his songs of nature and love reached higher than any before him. The only Danish writer known throughout the world, H. C. Andersen, and F. Paludan-Miiller, one of the best by his depth of thought and fine

form, were also originally of Heiberg's school. More independent positions have Steen St. Blicher who in pathetic and humorous tales gave a masterly description of the Jutland villagers, Poul M. Moller, a professor of phi¬ losophy, whose comparatively few poems are marked by an original and choice style, while a fresh humor is shown particularly in his un¬ finished story (En Students EventyrP and Emil Aarestrup whose glowing poems show a marked individuality. In the forties much of the literature has a political errand.' The poems of

Ploug advocate the close union of the Scandinavian countries, sing the praises of the Constitution (1849) and the heroes and deeds of the First Sleswick war. Goldschmidt makes in his weekly (Corsaren) scathing attacks on absolutism. The most popular writer of this time was J. C. Hostrup (1818-92) whose comedies are superior to Heiberg's in humor and knowledge of real life. Between 1850-70 a number of talents, though no great genius, appears. Kaalund and Richardt gain much new popularity by their lyrics, Bergsoe, H. F. Ewald and Carit Etlar as writers of stories. With the famous lectures of Georg Brandes (1871) a new period begins, that of Realism. While the old writers still continue in the old ways and spme of the younger also associate themselves with them, the most prominent fol¬ low the lead of Brandes. The literature is filled with modern ideas and the style is new. In fiery poems Drachmann presents the revolu¬ tionary movements of the times, Schandorph introduces without any romantic embellishment his characters from country and city. J. P. Jacobsen from his view of life based on modern science paints his colorful pictures of the past and the present. As others of the same school may be mentioned Gjellerup and Ponto-piddan who shared the Nobel literary prize of 1917, H. Bang, G. Wied, Karl Larsen. In the eighties the French Beaudelaire and symbolists exerted great influence on lyric poets who then became known, S. Michaelis, S. Clausson, J. Jorgensen, Stuckenberg and later H. Rode. Later this influence disappeared as in the poets V. Rordam, L. C. Nielsen, J. Aakjaer. Among authors who have written stories of real life in new fields may be mentioned J. Knudsen, Skjoldborg and especially J. V. Jensen who is characterized by originality, great imagination and mastery of style.

In the 19th century Denmark produced a number of scholars of the highest rank. The greatest thinker this country has is Soren A. Kierkegaard (1813-55) whose theological and philosophical writings have exerted great in¬ fluence. As noted writers on philosophical subjects may, in addition, be mentioned: Sib-bern, R. Nielsen, Brochner, Hoffding, Kromann. Great historians are Allen, C. Paludan-Miiller, Holm, A. D. Jorgensen, Erslev, Steenstrup, Troels-Lund. In philology are such names as Rask, Westergaard, Madvig, Verner, V. Thomp-sen, Wimmer, Nyrop. Famous scientists are Oersted, Schouw, Warming, Forchhammer, Schiodte, Steenstrup, J. Thomsen, Zeuthen, J. Petersen, Finsen.

Bibliography. — Petersen, N. M., (Bidragtil den danske Literaturs Historie) (5 vols., 1872, 2d ed.) ; Hansen, P., Ullustreret dansk Literatur historic (3d ed. by Carl Petersen now nearing completion) ; Erslew, (Almindeligt

Fortfatter-lexicoiP (1843-53; Supplement 1858-68) ; Bricka, (Dansk biographisk Leksikon> (19 vols.) ; shorter works by Muller, (Winkel-Horn) (translated by R. B. Anderson 1884) ; Levin and Clausen, Ronning, Karl Mortensen ; Rosenberg: Nordboernes Aandsliv (1885) ; valuable works on different authors and periods by J. Paludan, Georg Brandes, F. Ronning, K. Arentzen V. Vedel, V. Andersen, Brix.

Gisle Bothne,

Head of the Department of S candinavian Lan¬ guages and Literature, University of Minnesota.

DANISH SOUND DUES, maritime taxes prior to 1857 imposed by Denmark on all vessels passing through the sounds connecting the North and the Baltic seas, based according to Danish interpretation, ((upon immemorial pre¬ scription, sanctioned by a long succession of treaties with foreign powers.® Contending that navigation of straits connecting open seas was free to all, the United States in 1826 had ob¬ tained a provisional 10-year treaty that (<neither the vessels of the United States nor their car¬ goes shall, when they pass the Sound or the Belts, pay higher or other duties than those which are or may be paid by the most favored nation.® In 1855 prior to the renewal of the treaty for the fourth time the United States emphasized the fact that it would not pay for the privilege of using the maritime highway connecting two seas, but was willing to con¬ tribute its share for the maintenance of the <(lights, buoys and pilot establishments.® These aids to navigation were adjudged at $393,011 by the treaty of 1857 with Denmark.

DANISH WEST INDIES. See Virgin

Islands.

DANITES, dan'its, a former secret society of the Mormon Church, for militant action against its enemies. It was organized by Joseph Smith at Kirtland, Ohio, 30 March 1836, by a ˆcovenant® to avenge any further expulsion of the Missouri Mormons by mobs ; on the basis of a <(revelation® of 6 Aug. 1833, justifying any Mormon in ((rewarding thine enemy according to his works.® The first name chosen was Daughters of Zion, from Micah iv, 13; this not seeming graphic, it was changed to Destroying Angels, or Flying Angels, the former used for many years; then the Big Fan (Jer. xv. 7 or Luke iii, 17) ; then Brothers of Gideon; finally Sons of Dan, turned by outsiders into

Danites, from Gen. xlix, 17. A constitution was adopted, giving the executive power to the president of the Church and his counselors, and the legisla¬ tive power to the same, with the generals and colonels of the society; this legislature to have power to <(administer punishments to the guilty in accordance with the offense.® The oath taken by the members was to obey the Prophet and First Presidency <(in all things, the same as the supreme God® ; to (<stand by my brethren,® and ˆuphold the presidency, right or wrong® ; and invoking terrible punishments for revealing the secrets of the society. The Mormons have usu¬ ally denied that the society existed, or if so that it was countenanced by the Church; and Smith's Nauvoo council denied its existence there. Brigham Young, however, boasted of its existence in Salt Lake City. Its actions, from the nature of the case, can only be inferred. It is usually credited with all the deeds of blood

charged against the Mormons, including the Mountain Meadows massacre (q.v.). The name was attached by the Douglas Democrats to the administration (Buchanan) Democrats in the Lincoln-Douglas senatorial Illinois campaign of 1858, as an insinuation that they were Buchan¬ an's tools in upholding the Utah Rebellion. Consult Ferris, (Utah and the Mormons> (New York 1854).

DANNECKER, dan'nek-er, Johann Hein¬ rich, German sculptor: b. Waldenbach, near Stuttgart, 15 Oct. 1758; d. Stuttgart, 8 Dec. 1841. At the Karlsschule he devoted himself so suc¬ cessfully to sculpture that a statue of Milo of Crotona, executed in his 17th year, excited great admiration. On leaving he was appointed court sculptor, and three years after visited Paris and Rome. In the latter city he executed a Ceres and Bacchus, which procured him admis¬ sion into the academies of Bologna and Milan. In 1790 he returned to Wurtemberg, and be¬ came professor of the fine arts at Stuttgart. From this period he continued his professional labors with most brilliant success, and was patronized by the most distinguished personages in Germany. His acknowledged masterpiece is a statue of Christ, which occupied him during eight years, and the prototype of which is said to have been suggested to him in a dream. His (Ariadne seated on the Panther* is a splendid work, and in the opinion of some critics is superior as a work of art to his 'Christ.* As a sculptor he occupies an intermediate place be¬ tween Canova and Thorwaldsen, having blended in the happiest manner the spirited conception of the former with the latter's great anatomical skill, careful execution, and nice appreciation of nature. His ability to delineate character has made his busts famous. Among these are 'Schiller* at Weimar, and kings Frederick and William at Wurtemberg. Consult Radcliffe, (Schools and Masters of Sculpture* (1894).

DANNEMORA, N. Y., village in Clinton County; on the Chateaugay Railroad; 12 miles west of Plattsburg. Here is located one of the State prisons called Clinton State Prison. The iron ore found in the vicinity is of an excellent quality. Pop. 1,146.

DANNEMORA, dan-ne-moo'ra, Sweden, a straggling village and

mining field, 12,250 square metres in extent, on a lake of the same name, 24 miles northeast of Upsala, in the dis¬ trict of Upsala. It is celebrated for its iron mines, the second richest in Sweden, which have been worked uninterruptedly for upward of three centuries, and produce the finest iron in the world. The mine has been sunk more than 100 fathoms, and as part of the workings runs under the lake, great trouble is sometimes ex¬ perienced in keeping out the water. The ore consists of 86 to 90 per cent magnetic oxide of iron, 7 to 12 per cent silica, and traces of man¬ ganese, lime, magnesia and alumina, the earthy matters being in the proportion to form a fusible slag without further addition. It is almost free from sulphur and phosphorus, and as the charcoal fuel employed in smelting is also free from these impurities, the Dannemora iron enjoys the highest reputation, and is in great demand for conversion into steel.

DANNREUTHER, dan'roi-ter, Edward, English pianist and conductor : b. Strassburg, Germany, 4 Nov. 1844; d. 12 Feb. 1905. He was

educated at Cincinnati, Ohio, studied music at Leipzig under Moscheles, and in 1863 went to London and lectured on Wagner, Bach, Beetho¬ ven and Chopin. He conducted the first Wag¬ ner concerts in London 1873-74, and has pub¬ lished (Musical Ornamentation *; 'Richard Wagner: His Tendencies and Theories) ; (The Music of the Future* ; (On Conducting, *and also the sixth volume of the Oxford History of Music, (The Romantic Period* (London 1905).

D'ANNUNZIO, da-noon'zyd, Gabriel, Italian novelist, dramatist and poet : b. 1864. See Annunzio, Gabriel D'.

DANTAN, dan-tan, Antoine Laurent,

Dantan the Elder, French sculptor: b. Saint Cloud, 9 Dec. 1798; d. there, 31 May 1878. He was a pupil of Bosio, taking the second grand prize of Rome for sculpture in 1823 and the first prize in 1828, the latter for a 'Death of Hercules.) Yielding himself, at first, entirely to the influence of the antique in his art, he afterward found a more original style. He ob¬ tained the decoration of the Legion of Honor in 1843, and secured a medal of the third, class at the Exposition in 1855. Among his works are (Young Bather and Dog* (1835), which took a medal of the first class, 1833; drunken¬ ness of Silenus* (1836) ; a bronze (Young Girl and Tambourine) (1838) ; Statue of Louis Joseph de Bourbon *; (Statue of the Marechal de Villars* ; 'Bust of the Dauphin of France.) A monumental (Juvenal des Ursins) was or¬

dered for the Hotel de Ville in Paris 1838; and 'The Angel Raphael* for the Madeleine 1839. (Duquesne) was made for Dieppe in 1844, and a (Saint Christopher* for the church of La Villette in 1846. He was the author of many statues decorating the monuments of Paris, the churches of Saint Gervais, Sainte Clotilde, Saint Laurent, the Tower of Saint Jacques, the belfry of Saint Germain l'Auxer-rois and the new Louvre, besides busts for the museum at Versailles, the senate and the Comedie Frangaise.

DANTAN, Jean Pierre (called Dantan the Younger), French sculptor: b. Paris 26 Dec. 1800; d. Baden, 6 Sept. 1869. He was a brother of A. L. Dantan (q.v.). He achieved great reputation for his diverting caricatures of prominent men, such as Paganini, Rossini, Vic¬ tor Hugo, Frederic Soulie, Balzac, Alexander Dumas, Frederic Le Maitre and of himself which were exhibited at the Dantan Museum in Paris, but his popularity as a caricaturist in¬ jured to some extent his fame as a serious artist. Among his works are statues of Boiel-dieu, at Rouen ; Philibert Delorme, at the Louvre; and busts of Adelaide Kemble, Rose Cheri, Canrobert, Jean Bart, Pleyel, Rossini, Thalberg, Duke of Wellington and Lord Brougham.

DANTAN, Joseph Edouard, French painter: b. Paris, 26 Aug. 1848; d. Villerville 1897. He was a son of J. P. Dantan (q.v.). He was a pupil of Pils, but soon abandoned his¬ torical and religious for genre painting. Among his works are (The Holy Trinity *; 'An Epi¬ sode of the Destruction of Pompeii* (1869) ; (A Monk Carving a Christ in Wood* ; Her¬ cules at the feet of Omphale* (1874) ; (The Nymph Salmacis and the Young Hermaphro-dite) (1876) ; 'Vocation of the Apostles Peter and Andrew* (1S77) ; 'The Corner of a Stu-

dio> (1880), in the Luxembourg; (Breakfast of the Model* (1881) ; interior at Villerville) (1883); (The Studios> (1884); <The Widower) (1885) ; (Modeling from Nature* (1887).

DANTE (orig. Durante) ALIGHIERI, dan'ta a"le-gya're, Italian poet : b. Florence, May 1265; d. Ravenna, Italy, 14 Sept, 1321. He was of a family belonging to the lower nobil¬ ity and of mixed descent, the Aldighieri, or Alighieri, being originally Teutonic. He lost his father in early life, but his mother watched carefully over his education, which was confided to the eminent philosopher and statesman, Brunetto Latini. He is said to have studied at Bologna, Padua, Naples, and even Paris and Oxford, but we have no means of confirming the statement in any measure. What is tolerably certain is that he had mastered the learning of that age. He was a musician and painter, a theologian and linguist of no mean order. Many of his biographers state that it was in 1274, when nine years of age, that he saw for the first time, and ever afterward de¬ votedly loved, Beatrice Portinari. Others af¬ firm that that event took place shortly before her death, in 1290, three years after she had mar¬ ried a noble Florentine, Simone Bardi. His love for her awakened in him a new life; all the powers of his soul were to be henceforth de¬ voted to immortalize her, and we can watch the struggles of his spirit in that record he has left us of his early years, the (Vita NuovaP About the period when Dante reached the age of manhood the Guelfs (the Papal or Church party) were predominant in Florence, whence they had, aided by the Pope and Charles, king of Naples, driven the Ghibellines (the imperial or state party). At Arezzo, on the other hand, the Ghibellines had succeeded in exiling the Guelfs, who implored the assistance of their Florentine friends. A war was declared be¬ tween the two cities, which was terminated in June 1289 by the battle of Campoldino, in which the Ghibellines were defeated. Dante was there fighting bravely and contributed not a little to the victory of the Guelfs. In 1291 he married Gemma dei Donati, a daughter of one of the most powerful families of the state, and which belonged to the Guelf faction. By this lady he had seven children, the youngest, Beatrice, being born about 1301. In 1293 a revolution broke out in the city, headed by Giano della Bella, whereby the priors of the trades took the power into their own hands and made nobility a dis¬ qualification for holding office. The following year, however, Giano della Bella was deprived of power and the nobles disagreeing among themselves and splitting into two factions, the Bianchi and the Neri

(the White and the Black), the streets of Florence were continually the scenes of sanguinary fights. In order to check the excesses of the greater nobles, a num¬ ber of the lesser nobility, Dante among them, threw in their lot with the citizens' party. In order to render himself eligible for office Dante had his name inscribed in the books of the physicians and apothecaries, and in June 1300 was nominated a prior of the trades, one of the highest offices in the state. Although leagued by marriage to the Guelf side, Dante was no rampant partisan, and on one occasion, when roused by some fresh act of atrocity he proposed and carried a law to the effect that

the heads of the Bianchi and Neri parties should be temporarily banished. It appears that the Bianchi and Neri were originally Guelfs, but the latter were the extreme Papal party, and the former leaned toward a recon¬ ciliation with the Ghibellines. Dante's sym¬ pathies were with the Bianchi and on the too hasty return of one of the exiles, Guido Caval¬ canti, a friend of the poet's, and one of the Bianchi, Dante was charged with undue par¬ tiality in permitting him to remain in the city. The Neri wrote to the Pope that the Bianchi were making common cause with the Ghibel¬ lines and Boniface VIII sent Charles of Naples to occupy the town and keep down the turbu¬ lent spirit of the Florentines. The Neri were allowed, • however, to commit the greatest ex¬ cesses unchecked by Charles : many of their ri¬ vals were slain in the open street and their houses burned to the ground; among others that of Dante, who had been sent to Rome by his party to try to influence the Pope in their be¬ half. Taking advantage of his absence, his enemies obtained a decree of banishment against him, together with the heads of his party and he was further condemned to pay a fine of 8,000 florins or have his property con¬ fiscated (January 1302). Two months later a second sentence was launched against him and several of his friends: they were condemned to be burned alive for malversation, peculation and usury. The fine he refused to pay, as it would imply a confession of guilt.

From this time forth the life of the poet becomes semi-mythical. We find some traces of him first at Arezzo, then at Siena, then at Verona. He himself says, (<Through almost all parts where this language (the Italian) is spoken, a wanderer, well nigh a beggar, I have traveled, showing against my will the wounds of fortune.® His sympathies now lay entirely with the Ghibelline party. The expedition of the emperor, Henry VII, into Italy (1310) roused the hopes of Dante to the highest pitch. He wrote the emperor that famous letter advising him first of all to crush the hydra, Florence, as being the cause of all the misfortunes

of Italy. Henry, however, spent his time in foolish in¬ activity till his death in 1313. Shortly after this event Dante is said to have visited Paris; but according to Balbo he spent the year 1313-14 in Pisa and Lucca and then took refuge with Can Grande della Scala at Verona, where he remained till 1318. In 1316 Florence sent forth a decree permitting the exiles to return on con¬ ditions of fine and penance, which Dante indig¬ nantly refused. In 1320 we find him at Raven¬ na staying with his friend Guido Novello da Polenta. In the following year, on his return from an embassy to Venice, his wanderings and sufferings were ended by death. He was buried in thd church of the Minorites, under a monument built by his friend Guido Novello, on which was an epitaph written by Dante himself. Such, imperfectly sketched, was the career of the great poet; by it he gained a sense of the nothingness of earthly honors and pros¬ perity possible only to the rich, and a knowl¬ edge of man possible only to the poor. In his youth living amid the excitement of the tented field and penning sonnets to his adored Bea¬ trice; in his old age compelled <(to climb the stranger's toilsome stairs and eat the bitter bread of others.® Out of his misfortunes the

world found her rich account ; the apocalypse of the Middle Ages, the ‘Divina Commedia,) was begun and finished in his year of exile. Of this grand poem we can give only a very brief analysis. It is divided into three parts : Hell, Purgatory and Heaven. Each part is subdi¬ vided into 33 cantos, in allusion to the years of our Saviour’s life, the extra canto in the first part being introductory. Dante dreams that he had (<reached the halfway point in his path of life, at the entrance of an obscure forest.” He would advance, but three horrible beasts bar the way; then the shade of Virgil appears and offers itself as his guide. Dante accepts and then takes place that wondrous journey in the <(world of souls.” Virgil tells him he can only accompany him through hell and Purgatory ; but that Beatrice shall conduct him through those happy spheres, the portals of which a pagan may not enter. Now begin the peregri¬ nations of the Florentine through the regions of the damned, over the entrance of which is written the awful words — (< All hope abandon ye who enter here.” This is the most impress¬ ive and best-known part of the poem ; the sin¬ gular diversity of the chastisements ; the ra¬ pidity with which Dante passes in review the great criminals of history; the intensity with which he paints, at a single dash, so to speak, their distorted features; the grace of certain episodes (the adventure of Francesca da Rimini, the death of Ugolino and that of Manfred), attest the vigor of imagination never surpassed, if ever equaled. From Hell (which the poet places in the centre of the earth) he ascends to Purgatory, a solitary mountain rising from the ocean on the side of the globe opposite to us. This mountain is divided into terraces and its top is the terrestrial paradise, the first abode of man. In Purgatory there are still scenes of pain and suffering; but these punishments are only temporary. The poet hesitates when he comes to a path filled with a sheet of flame; but Virgil speaks : ((Between Beatrice and thee there is but that wall.” Dante at once plunges into the heart of the flames. The two poets have now reached the earthly paradise and be¬ hold Beatrice surrounded by a scene of surpass¬ ing magnificence ; noble forests, whose trees are gently moved by celestial zephyrs; the melo¬ dious songs of birds to which the murmuring of the sacred woods and streams give harmoni¬ ous reply; meadows of the freshest green and groves of

deepest shade. From this en¬ chanting region Dante ascends faster than tongue or pen can tell, into the celestial para¬ dise. This realm consists of 10 heavens or cir¬ cles. Dante roams at first over the seven plan¬ ets, the Moon, Mercury, Venus, the Sun, Mars, Jupiter and Saturn ; then he enters the eighth sphere, and at last into the empyrean. Each of these globes has its inhabitants, who are souls or spirits. Arrived at the eighth sphere, he looks down upon our globe ; but the earth ap¬ pears so abject that he smiles with pity upon it. Beatrice calls his attention to a nobler scene. “See the glorious company which surrounds the triumphant Redeemer.” The eyes of the poet cannot sustain the splendor of the view. In the ninth sphere Dante feels himself in the presence of the Divine essence, hid from his sight by three hierarchies of angels. He sees the souls of the blessed on thrones in a vast amphitheatre, whose steps and circles widen

into infinity. Beatrice takes her place upon her throne of glory; from that sublime height she smiles benignantly down upon the poet ; then turns toward him who is’ the source of life and light. Thus ends the Divine trilogy, the noblest effort of the Middle Ages.

The name (<Commedia” is derived from Dante’s idea concerning the forms of eloquence, which were in his opinion tragic, comic and elegiac, as he relates in his work (De vulgari EloquioP which was first written in Latin. What he called tragedy was a piece commencing with happy and peaceful scenes, and ending with events of a painful and terrible character, and what he called comedy was a piece which, be¬ ginning unpleasantly, terminated happily. The qualifying word divina was, however, added by others. We may mention the opinion maintained in 1753, by Bottari, that Dante made use of the (Vision of Alberico) a monk who lived in the 12th cetury, in a monastery on Monte Cassino, in Naples. There have been many such visions from the earliest ages of Christianity; as, for instance, the (Vision of an English Monk,* which Matthew Paris mentions in his ‘History of England) (in the year 1196), and which re¬ sembled Dante’s poem much more than the ‘Vision of Alberico) published by Cancellieri in 1814 at Rome, with observations (‘Osser-vazioni intorno alia Questione sopra la Orig-inalita della Divina Commedia di Dante*). It is possible that Dante here and there may have borrowed a thought or image from those vi¬ sions; but this is no fault: the recollections of great men are sparks which serve to kindle mighty flames.

There is no poet who bears so distinctly the impress of his age, and yet

rises so high above it, as Dante. The Italians justly regard him as the creator of their poetical language, and the father of their poetry, which, regulated and con¬ trolled by his genius, at once assumed a purer and far nobler form than it had previously worn. The terzina first reached its perfection in the time of Dante, on which account he has been erroneously regarded as the inventor of it.

Florence soon recognized that she had lost her noblest son. In 1350 a sum of 10 golden florins was ordered to be paid by the hands of Giovanni Boccaccio to Dante's daughter, Bea¬ trice, a nun in the convent of Santa Chiara at Ravenna. In 1373 an annual sum was granted for public lectures, to explain the 'Divine Com¬ edy* in the churches, and Boccaccio was one of the first lecturers. A monument was voted for if Ravenna would give up the now sacred remains, which that city refused, and has re¬ peatedly refused to do. In May 1865 all Italy assembled at Florence to render homage to the seer who prophesied so confidently her unity; and the following year a colossal statue of the poet was erected on the Piazza della Croce.

The best editions of the 'Divina Commedia) are those of Lombardi (1791), frequently re¬ printed with valuable improvements, of Viviani (1823), of Bianchi (5th ed., Florence 1857), of Karl Witte (Berlin 1862), *etc.* In 1821 Luigi Fantoni published an edition of the 'Divina Commedia,* stated to have been printed from a manuscript in the handwriting of Boccaccio. In 1869 the 'Vernon Dante* was published in London by Lord Vernon in three large volumes folio. It contains the text of the 'Inferno,* and, in Italian, an explanation of everything in the

text regarding which any reader might have the least difficulty, together with an immense mass of information — biographical, topographi¬ cal, historical, etc., relating to the life and times of Dante, and a large number of maps, plans and illustrative plates. Dante's complete works appeared at Venice in 1757-58, published by Zatta (in 5 vols. 4to). His lyric poems, sonnets and canzonets, of which some are beautiful, others dull and heavy, were written at different periods of his life. We have yet to mention his 'Banquet5 (II Convito) — a prose work worthy, says Bouterwek, to stand by the side of the best works of antiquity. It contains the substance of all his knowledge and experience, and thus illustrates his poetry and his life. The most popular English translation of the (Divina Commedia) is that by Cary in blank verse (1814). Longfellow executed a faithful poetic version (1867) ; and that by Dean Plumptre in the original metre deserves mention. Other English translations are Boyd's (1785), Wright's (1833), Pollock's (1854), Parsons-Norton's (1891-92). The German translations are numerous, and are highly praised for faithfulness and force. The translation by Kannegieser is in the measure and rhyme of the original ; that of Philalethes (King John of Saxony) has a deservedly wide reputation. The French have four or five translations, including one by Lamennais, but that graceful and feminine tongue is incapable of doing anything like justice to the manly thoughts of Dante.

In one respect Dante stands unrivaled by any man, as he, we might almost say, created the language, which he elevated at once to its high¬ est perfection. Before him very little was writ¬ ten in Italian, Latin being the literary lan¬ guage ; but no one attempted to use the lingua volgare for the purposes of dignified composi¬ tion. The poet, indeed, thought it necessary to excuse himself for having written in Italian after having attempted to compose his poem in Latin. Thus he is to be regarded as the founder of Italian literature. One of the strangest productions of Dante is his (De Monarchia.5 He labors in this work to prove that the emperor ought to have universal authority, and draws his arguments from the sacred Scriptures and from profane writers, which in this book appear very often with equal authority. The dialectics of the schoolmen are here exhibited in a most characteristic way. The (De Monarchia) is valuable as a source of information respecting the great struggle of the Guelfs and Ghibellines and its influence upon the Christian world at that time. This struggle

was a part of the great convulsion attending the separation of the civil power from the ecclesiastical, with which in the earliest ages it is always united. On the whole, Dante's works are important chiefly in three respects — as the productions of one of the greatest men that ever lived, as one of the keys to the history of his time, and as exhibiting the state of learning, theology and politics in that age. To understand Dante it is necessary to be acquainted with the history and spirit of his time, particularly with the struggle of the Guelfs and Ghibellines, the state of the north of Italy, and the excitement caused by the begin¬ ning of the study of the ancients ; also to have studied the Catholic theology and the history of the court of Rome, and to keep always in mind that Dante was an exile, deprived of home and

happiness. The personal appearance and char¬ acter of the man are thus described by Boccac¬ cio : ((Our poet was of middle height; his face was long, his nose aquiline, his jaw large, and his under lip protruding somewhat beyond the upper. His eyes rather large than small ; his hair and beard thick, crisp, and black, and his countenance sad and pensive. His gait was grave and gentlemanlike, and his bearing, in public or private, wonderfully composed and polished. In meat and drink he was most tem¬ perate. Seldom did he speak unless spoken to, though he was most eloquent. In his youth he delighted in music and singing, and was intimate with all the musicians and singers of the day. He was of marvelous capacity and the most tenacious memory; inclined to solitude and fond of study when he had time for it.® See Vita Nuova; Divina Com media.

Bibliography. — Balbo, (Vita di Dante5 (1839); Missirini, (Vita di Dante5 (1844); Fraticelli, 'Vita di Dante) (1861); Scartazzini, 'Dante Alighieri, seine Zeit, sein Leben, und seine Werke5 (1897) ; Kraus, (Dante, sein Le¬ ben und sein Werk5 (1897) ; Church, R. W., 'Dante: an Essay5 (1879) ; Rossetti, M. F., (A Shadow of Dante) (1871); Lowell, 'Among My Books) (2d Series 1876) ; Moore, 'Textual Criticism of the Divina Commedia) (1889) ; Scartazzini, 'Dante in Germania) (1881-83) ; Symonds, 'Introduction to the Study of Dante5 (1890); Butler, 'Dante: His Times and His Work5 (1895) ; Botta, 'Introduction to the Study of Dante5 (1887); Creighton, 'Historical Essays and Reviews 5 (1902) ; Moore, 'Dante and Aquinas5 (London 1913) ; Toynbee, 'Dante in English Literature5 (New York 1909) ; Dins-more, C. A., 'Life of Dante5 (New York 1919).

DANTON, dan -ton, Georges Jacques,

French revolutionist: b. Arcis-sur-Aube, 26 Oct. 1759; d. Paris, 5 April 1794. He played a very important part during the first years of the French Revolution, of which he was an active and zealous promoter. His external appearance was striking, his stature was colossal, his frame athletic, his features harsh, large and dis¬ agreeable ; his voice shook the dome of the chamber of the assembly, his eloquence was vehement and his imagination was as gigantic as his person. These qualities contributed to extend his influence and he became one of the founders of the club of the Cor¬ deliers. After the capture of Louis XVI at Varennes he took the lead in the meeting of the Champ-de-Mars which demanded the dethronement of the king. He is said to have had a share in organizing and conducting the attack on the Tuileries (10 Aug. 1792) ; a few days afterward he was appointed Minister of Justice. He also became a member of the pro¬ visional executive council and usurped the ap¬ pointment of officers *in the army and depart¬ ments. Money flowed from all sides into the hands of the minister, and was as profusely squandered on his tools and partisans. He endeavored by the terrors of proscription to annihilate all hope of resistance on the part of the Royalists. The invasion of Champagne by the Prussians 2 September spread consternation through the capital. The ministers, the most distinguished deputies and even Robespierre himself now relied upon Danton, and never was his splendid courage and audacity more strik-DANTZIC

ingly manifested. He assumed the administration of the state and prepared measures of defense, called on all Frenchmen capable of bearing arms to march against the enemy, and prevented the removal of the assembly beyond the Loire. The close of his celebrated speech has been often quoted, <(Le tocsin qu'on va sonner n'est point un signal d'alarme, c'est la charge sur les ennemis de la patrie. Pour les vaincre, il nous faut de l'audace, encore de l'audace, toujours de l'audace, et la France est sauvee !® From this time forward he was hated by Robespierre, who could never pardon the superiority which Danton had shown on that occasion. He voted for capital punishment being inflicted on all re¬ turning Royalists and undertook the defense of religious worship. The contest between the Girondists and the Mountain daily assumed a more serious aspect, and Danton, while he feared the consequences of these dissensions, allowed matters to drift. He wished to over¬ throw the despotism of Robespierre, and the

crafty Robespierre endeavored to undermine him in order to get rid of a dangerous rival. St. Just denounced him to the Committee of Public Safety and Danton was arrested on the night of 31 March 1794, together with those who were called his accomplices. Being thrown into prison in the Luxembourg he maintained the appearance of serenity. When transferred into the Conciergerie his countenance became dark and he appeared mortified at having been the dupe of Robespierre. All his discourses were a strange mixture of sorrow and pride. At his trial, on the formal question as to his name and residence being put, he answered, with perfect composure, <(I am Danton, suffi¬ ciently known in the Revolution ; I shall soon pass to nothingness, but my name will live in the Pantheon of history.® So powerful and defiant were his speeches in reply to his accusers that St. Just got a resolution passed by the revo¬ lutionary tribunal that the mouths of men who had ((insulted justice® should be shut, and on 5 April he mounted the fatal car with courage, his head elevated, his look commanding and full of pride. Before ascending the scaffold he was for a moment softened. ((Oh my wife, my dear wife! shall I never see you again?® he ex¬ claimed, but checked himself hastily and by call¬ ing out (<Danton, no weakness !® ascended the scaffold. Consult Robinet, (Danton, Memoire sur la vie privee) (1865); Bougeart, <Danton) (1861); Dubost, < Danton et la politique con-temporaine5 (1880); Gronlund, (Ca ira! or Danton in the French Revolution (1882) ; Beesley, (Life of Danton > (1889); Morse-Stephens, < Orators of the French Revolution > (1892); Belloc, (Danton: a Study* (1899).

DANTZIC, DANTSIC, or DANZIG,

dant'siH. Free Hanseatic City, under the pro¬ tection of the League of Nations, 253 miles northeast of Berlin; on an arm of the Vistula (now cut off by a dam from the river), about three miles above its mouth, and on the Mottlau, several arms of which traverse the town. It is one of the most important seaports of the Bal¬ tic littoral, as well as one of the chief commer¬ cial entrepots. It is nearly circular in form and ranks as a fortress of the first class. The for¬ tifications on the north and west side gave place about 1896 to streets and public gardens, those on the east and south being retained and

strengthened. Provision is also made for laying a considerable part of the surround¬ ing country under water. It is entered by four gates, has nine suburbs, and is di¬ vided into five parts — the Old, New and Low town, the Speicher (granaries), an island, and Langgarten. The last is

the more modern part of the town and is regular and well built. The principal edifice is the Dorn, or cathedral, begun in 1343, but not finished till 1503. It is 360 feet long by 142 feet broad, and its vaulted roof, 98 feet above the pavement, is supported by 26 slender brick pillars. It possesses a fine brass font and a curious astronomical clock, which has long ceased to move, but its chief attraction is a painting of the (Last Judgment,* attributed to John Van Eyck. The other build¬ ings and institutions deserving of notice are the town-house, the church of Saint Catharine, the oldest in Dantzic, and the exchange, an impos¬ ing Gothic edifice, built in 1379. Many of the modern public buildings are models of architec¬ ture. It is the seat of the provincial govern¬ ment and contains the various offices connected therewith ; and is also the seat of a United States consulate. It is governed by a municipal council of 63. members, effectively controlled by a smaller executive council. It has excellent water supply and sewerage systems; owns the gas and electric plants, and is well equipped with educational and charitable institutions. The in¬ dustrial establishments include several shipyards, works for artillery and firearms, iron foundries, machine shops, steel works, breweries, distil¬ leries, works producing the liqueur called Danziger Goldwasser, or Eau de Vie de Dantzic, flour-mills, sawmills, paper-mills, rope, wire, oil, chemical, soap and glass works. Although losing as a shipping centre in favor of ports more favorably situated, it is developing rapidly in manufacturing industries. A considerable part of the trade is of products in transit. Among imports the chief are coal, iron, cured herrings, salt, tallow and lard, petroleum, rice, coffee and some breadstuffs. The chief exports are timber, beet-sugar, grain and seeds, oil¬ cake, flour, spirits and molasses. Dantzic has a great trade in grain, especially wheat, rye and barley, for the warehousing of which there are immense granaries on the island of Speicher. The wheat, which is chiefly Polish, is remarkable for both the quantity and the quality of the flour which it yields. There is considerable trade at Dantzic in amber, which is manufac¬ tured into various ornamental articles. The proper port of Dantzic is Neufahrwasser, at the mouth of the Vistula (now known as the dead Vistula), and connected with it by an artificial channel. Here a free port has recently been established. By dredging and otherwise, various obstructions to navigation have been removed and vessels of large size come up close to the town. The history of Dantzic reaches back to the times of historical obscurity. As early as 970 there was a town here. In 1271 it was taken by Mestwin, and in 1294 by the Poles. In the 14th century it fell into the hands of the Teu¬ tonic Knights, under whose sway the town in¬ creased and its commerce was extended. In 1358 the city joined the Hanseatic League; in 1454 it fell into the hands of the Poles, who granted it

important privileges. After endur¬ ing many vicissitudes of fortune, on the second partition of Poland, in 1793, it came into pos-468

session of Prussia. By the Treaty of Versailles (Art. 102) Dantzig and the surrounding terri¬ tory was constituted a Free City under a High Commissioner appointed by the League of Na¬ tions. Pop. 182,4(38.

DANUBE (ancient, Danubius; German Donau; Hungarian, Duna), the second river of Europe, originating in two small streams, the Brege and the Brigach, rising on the east slope of the Schwarzwald, a mountainous region of southwest Germany (the Black Forest), in the state of Baden, at an elevation of 2,850 feet above sea-level, and uniting at Donaueschingen. Its general course is from west to east, and it flows into the Black Sea by four different out¬ lets, called respectively the Kilia, Stambool, Su-lina and the Edrillis or Saint George's mouths. The Sulina mouth or channel is the deepest. The extent of the basin of the Danube is about 300,000 square miles, and its total length is about 1,875 miles. The Danube basin comprises portions of Austria, Germany, Hungary, Ser¬ bia, Bosnia, Rumania and Bulgaria. From its source it flows northeast to Ratisbon, in Bava¬ ria, whence it takes a southeast course, by Vi¬ enna and Pressburg, to Waitzen, in Hungary. Here the course is changed to nearly due south of the point where it receives the waters of the Drave, near Esseg, in Slavonia ; thence it flows southeast to Belgrade, the chief city of Serbia, and for some distance it forms the boundary be¬ tween Serbia and Rumania. The course con¬ tinues in an easterly direction to Orsova (the Iron Gate), where it changes to southeast, then again nearly east, forming for a long distance the boundary line between Rumania and Bul¬ garia. At Rustchuk, in Bulgaria, it turns more to the north, through Rumania to Galatz, then southeast between the Dobruga region and Bes¬ sarabia, in Rumania, and finally into the Black Sea.

The great basin of the Danube has been divided into four minor basins. The first con¬ sists of a vast plateau 1,640 feet above sea-level, 150 miles in length and 125 miles broad, sur¬ rounded by mountains, and comprising a por¬ tion of the former principality of Hohenzollern, part of the state of Wiirtemberg and the greater part of the state of Bavaria. This tract is by far the most fertile and most populous

through which the Danube passes on its course. The principal branches within this space are the Iser and Lech. A canal connecting the Altmiihl with the Regnart, an affluent of the Main, gives access to the Rhine.

The second basin belongs to the region of Austria, having Vienna nearly in its centre, and comprising the divisions of Austria, Hungary as far east as Waitzen, and Czechoslovakia. It is very irregular and is bounded by very high mountains. The soil is rich in mineral prod¬ ucts and the climate one of the best in Europe. The principal branches in this basin are the March or Morava and the Enns — 'the former from the left and the latter from the right. The Danube here passes through a succession of the most picturesque scenery.

The third basin of the Danube comprises Hungary east of Waitzen and the district of Transylvania, and consists of an immense plain, almost without undulations of any kind, and only 394 feet above the sea-level. It is inter¬

sected by large rivers with marshy banks, and interspersed with stagnant pools, saline and sandy wastes. It comprises about one-half of the entire basin of the Danube. The marshes cover a space 3,053 square miles. The princi¬ pal branches in this basin are the Save, the Drave and the Morava. From Budapest to Bel¬ grade the river passes through an immense plain covered with sand and alluvium, through which it is constantly forming new channels and filling up the former ones. Below Moldava it passes for 60 miles through a succession of rapids and shallows interspersed with rocks and sandbanks, where it has cut a passage for itself through the cross chain of hills which connect the Carpathian Mountains with the Alps ; and between Drenkova in Jugoslavia and Scala Kla¬ dova in Serbia, the navigation is partially inter¬ rupted by three great rapids, the principal or last and lowest of which is the famous Iron Gate, where the stream rushes through a narrow channel between stupendous rocks, ending with a series of whirlpools, eddies and smaller falls. By the removal of various obstructions vessels drawing nine feet have long been able to pass at certain seasons ; and by works carried out in 1890-96, and extending over some 50 miles, a permanent waterway has been secured.

The fourth basin comprises Rumania, the province of Bessarabia and Bulgaria. This tract is flat, inundated and marshy along the banks of the river; dry and mountainous on the borders of the basin. The

principal branches in this basin are the Aluta, Sereth and Pruth. In the lower part of its course the Danube in¬ creases in width from 1,400 to 2,100 yards; and in one part it forms an expanse of water like a sea and is studded with islands. Excepting be¬ tween Drenkova and Kladova, the Danube may be said to be navigable for steamers from Ulm to the sea, although in some places navigation is rendered difficult by shallows and sandbanks, in¬ tersected by narrow and intricate channels. The outlets of the Danube are separated from each other by several low islands covered with reeds and trees. The greater part of the ships bound up the river enter it by the Sulina mouth. The Danube has 60 navigable tributaries, and its volume of water is nearly equal to that of all the rivers that empty themselves into the Black Sea taken together. Its rapidity is in many places above Orsova so great as to render navi¬ gation difficult, but below that point its current is less rapid. A number of steamers now ply on the river between its principal towns. The prin¬ cipal towns on the banks of the Danube are Ulm, in Wiirtemberg; Regensburg (Ratisbon) and Passau, in Bavaria; Linz and Vienna, in Austria; Pressburg, in Czechoslovakia; Buda¬ pest, in Hungary; Belgrade, in Serbia; Widin, Nicopolis, Rustchuck, in Bulgaria, and Silistria, Brahilow and Galatz, in Rumania.

DANUBE NAVIGATION COMMIS¬ SION, an international commission, constituted in 1856, when at the Peace of Paris the naviga¬ tion of the river was declared free to all nations. It was composed of delegates of all the great powers, to whom a representative of Rumania was added in 1878. It was appointed1 on the express condition that it should dissolve in 1858, but such was its usefulness that it was infor¬ mally continued till 1866, when the Conference of Paris formally prolonged its powers for five

years. In 1871 the Conference of London con¬ tinued the commission for 12 years, and in 1883 a second London conference extended its exist¬ ence for 21 years. It exercises almost sovereign power on the mouths of the Danube, where it has conducted great engineering works; it has its own flag, uniform and revenue, and has raised loans,

made laws and maintained its own small army of police. Its jurisdiction, originally limited to the river between Isaktcha and the sea, was extended at the Congress of Berlin (1878) as far as Galatz, and afterward to the Iron Gate; but in the last-named portion of the stream its authority is exercised only by delega¬ tion to the Riverain Commission of the states on the bank, or on appeal from its decisions.

DANVERS, Mass., town in Essex County, on the Boston and Maine Railroad, five miles northwest of Salem. It was a portion of Salem till 1756, and the Salem village parish where the witchcraft excitement broke out and 10 of the inhabitants were tried and hanged, is included in the present Danvers. It is the seat of Pea¬ body Institute, founded by George Peabody, a resident of the place, who in 1852 donated $200,- 000 for the promotion of knowledge and mo¬ rality among the inhabitants. It is also the seat of the Danvers State Hospital, Essex County Agricultural College, the Danvers Historical Society and Saint John's Roman Catholic Pre¬ paratory College. Danvers has extensive manu¬ factures of shoes, bricks and carpets, and has foundries, rolling mills, tanneries, municipal water works and electric lighting plants, churches, high school, weekly newspapers, pub¬ lic library, a national bank and good public and private schools. Samuel Holton, Israel Putnam and Grenville Mellen Dodge were bom at Dan¬ vers, which also contains the home of Whittier and Mount Burnett, frequented by Hawthorne. Pop. (1920) 11,108.

DANVILLE, Ill., city, county-seat of Ver¬ milion County, on the Vermilion River, and the Wabash, Chicago and Eastern Illinois and the Cleveland, Cincinnati, Chicago and Saint Louis railroads; 125 miles south of Chicago. It has a National Soldiers' Home for disabled veterans, with over 2,500 inmates. Its chief industry is coal mining, which is carried on extensively on the bluffs of the river. Other important indus¬ tries are flour and lumber mills, marble, zinc, smelting, boiler and iron works, glass and hard¬ ware factories and railroad and machine shops. There are many churches, 13 public schools, a high school, a number of new public buildings, including post office and government building, courthouse, city hall, public library, chamber of commerce, Y. M. C. A., Elks' club house and six fire departments, four national banks, two State banks, two daily papers. Bank clearings 1915, $26,602,812.47. The city is governed by a mayor and 14 aldermen. Pop. 35,000.

DANVILLE, Ind., town and county-seat of Hendricks County; situated on the Cleveland, Cincinnati, Chicago and Saint Louis Railroad, about 20 miles west of Indianapolis. The man¬ ufacture of flour and lumbering are the princi¬ pal industries. It is the site of the Central

Nor¬ mal College, a private institution, and has a Carnegie library. Pop. (1920) 1,729.

DANVILLE, Ky., city, county-seat of Boyle County, on Dick's River and the Cincin¬ nati Southern Railroad, 42 miles south of

Frankfort. It is a stockraising centre and the seat of several well-known educational, pub¬ lic and benevolent institutions, among them the Southern Collegiate Institute, Center Col¬ lege, the Caldwell Female Institute and also the State Asylum and School for Deafmutes. It has churches, public schools, municipal water¬ works, three national banks and weekly news¬ papers. Danville was settled in 1781 and be¬ came a strong political centre, the seat of nine historical conventions. Here the separation from Virginia was discussed and the first State constitution framed, which selected Frankfort as the capital. Danville received a charter of incorporation in 1789. James G. Birney and Theodore O'Hara were born in Danville. Pop.

5,420.

DANVILLE, Pa., borough and county-seat of Montour County; on the Susquehanna River, and on the Pennsylvania, the Lackawanna and the Philadelphia and Reading railroads; 154 miles northwest of Philadelphia. Danville is in a district abounding with iron ore, limestone and anthracite coal, and contains the first establish¬ ment erected in the United States for the manu¬ facture of railroad iron. It still ranks among the most extensive iron manufacturing places in the country. There are blast furnaces, iron foundries, rolling-mills, stove works, silk and knitting mills, municipal waterworks and elec¬ tric lighting plant, churches, two national banks, the Danville Institute, a State asylum for the insane, hospital, public library and opera house. First settled in 1776 and laid out in 1792 as Dan's Town, named after the son of the first settler, Danville developed after the discovery of iron on Montour Ridge and the opening of the Pennsylvania Canal in 1832. It was incor¬ porated in 1849. Pop. 7,517.

DANVILLE, Va., city and county-seat of Pittsylvania County, on the Dan River, 140 miles southeast of Richmond, on the Danville and Western and the Southern railroads. One of the oldest cities in the South ; incorporated as a town in 1792. For a short time during the last days of the Southern Confederacy it was the seat of government. It

is located in the famous and picturesque Piedmont section of Virginia, on a gradual slope extending from the river to an altitude of 600 feet above the sea. The river furnishes power for the cotton-mills, flour-mills, foundry, ice factory and electric light plant ; and further development of its water power has been made about three miles up the river, at an estimated cost of $2,000,000. Danville is the largest loose tobacco market in the world, her average annual sales being 50,-000,000 pounds. The surrounding country is well adapted to grain, fruits and tobacco. The improvements in public utilities within the past few years include larger water mains in the down-town district (16-inch) and additional fire engines at a cost of $23,000; Main street repaved with Belgian block and Mack brick, $100,000; Craghead street, same material, $24,- 500, and several other less important streets paved with cobble. Further extension of the sewerage system from time to time as the growth of the city requires; new electric-light plant owned by city, with new $5,000 incan¬ descent machine, furnishing lights for streets, business and dwelling houses ; electric railway system rebuilt at a cost of about $320,000, first-470

class equipment, double track on Main street, about eight miles of track, new power-house, with double set of dynamos and engines. The Southern Bell Telephone and Telegraph Com¬ pany has expended about $30,000 in improve¬ ments, and the growth of their business has been such as to require additional' accommoda¬ tions. Danville is the seat of Roanoke Female College (Baptist), established 1859, Randolph Macon Institute for Young Ladies (Methodist), founded in 1883, and Danville Military Insti¬ tute, established in 1890. The climate of the city is mild and pleasing, the streets well shaded and paved, and as a residential city it is excelled by few locations in the South. There are many new public buildings, churches and schools ; a general hospital recently enlarged and fitted with the latest improvements, seven banks — one national, five State and one private and two daily newspapers. Under the new constitu¬ tion of the State the municipal government is administered by a mayor, elected quadrennially, and a city council, composed of two branches having different numbers, which controls ap¬ pointments to most of the administrative offices. The waterworks, electric light and gas plants are owned and operated by the municipality. Pop. (1920) 21,539.

DANZIG. See Dantzic.

DAPHNE, daughter of river-god Peneus. See Laurel in Art and Symbolism.

DAPHNE, a famous grove near Antioch, planted by Seleucus Nicator, who erected a temple there and dedicated it to Apollo and Diana. It was a place of pagan pilgrimage noted for its license, until the spread of Chris¬ tianity caused its abandonment. Julian sought to revive its splendors but the temple was burned and the site was soon after abandoned. Its probable site is the modern Bet-el-Ma, where the vegetation is luxurious, but ancient remains are few. A graphic description of this grove is given in (Ben HurP For Daphne in Egypt see Tahpanhes.

DAPHNE, a genus of plants belonging to the Thymelceacece or mezereon family. The genus has about 80 species, natives of Europe and Asia. The single American species is the spurge or lady laurel found in northern New England and New York as a fugitive from cul¬ tivation. The berries are poisonous and the flowers of many are very fragrant. These plants are common in temperate climates in Europe and Asia, and are valuable commer¬ cially. From the bast of some species fibres are obtained, and most of the paper used in central Asia is made from some species of the daphne. The inner bark of D. lagetta, when cut into thin pieces after maceration, assumes a beautiful net-like appearance, whence it has received the name of lace-bark. The bark of the spurge-laurel is used in decoction as a diaphoretic in cutaneous and syphilitic affections. Paper and ropes are made from the bark of a species common in Madagascar.

DAPHNEPHORIA, one of the most an¬ cient and important of the Greek festivals observed in honor of Apollo. See Greek Festivals.

DAPHNIA, a minute entomostracan crus¬ tacean of somewhat globular shape, which swarms in millions in ponds and ditches, and

is important as a food for tadpoles, fish-fry and other small aquatic creatures. It is useful in an aquarium, but care must be taken that it does not multiply unduly.

DAPHNIN, a glucoside having the formula CisHieOs + 2H20, and occurring in the bark and blossoms of certain species of plants belonging to the genus Daphne. It is slightly soluble in cold water, from which it crystallizes in rectangular prisms containing two

molecules of water. It is insoluble in ether, but readily dis¬ solves in boiling alcohol. It reduces Fehling's solution slowly, and by the action of emulsin or of dilute acids it is converted into glucose and a substance called daphnetin, or di-oxy- coumarin.

DAPHNIS, in fabulous history, the son of Hermes (Mercury) by a nymph, educated among the nymphs, and celebrated in the Sicilian traditions as the author of bucolic poetry, and also as a performer on the shepherd's pipe. He pastured his flocks upon Mount 2Etna. The nymph Echenais, who loved the youth, threatened him with blindness if he should love another; but being intoxicated with wine by the daughter of a Sicilian prince, he forgot the warning, and thus brought upon hims*elf the threatened punishment. Some say that he died of grief; others that the nymph transformed him into a stone. All the nymphs bewailed his death, and Hermes raised him -to the heavens. On the spot where he died flowed a fountain, at which the Sicilians afterward performed yearly sacrifices. Consult Prescott, (A Study of the Daphnis Myth) (in (Harvard Studies in Classical Philology, > Vol. X, Boston 1899).

DAPHNIS AND CHLOE. This Greek prose pastoral romance, attributed to one Longus, about whom nothing is known, may have been written in the 2d or early in the 3d century a.d. Despite many marks of decadence, it is by far the most delightful of the Greek romances. Daphnis, a boy, and Chloe, a girl, infants ex¬ posed by their respective parents, are found and adopted by shepherds ; and their fortunes are followed through the years of their love for each other as it .grows with the ripening seasons, — to the happ}' end, when they are re¬ claimed by their parents, and married. The charm of the story lies in the children's naive courtship and in the rich and exquisite scenery of their rural life, both the action and the set¬ ting being such as a sophisticated urban imagi¬ nation frames for idealized dwellers in the Golden Age. The book appeals to every sense in a succession of lovely idyls.

It pleased the Renaissance, and has pleased the centuries since. The cditio princeps was printed in 1598 (Florence) ; but in 1559 Jacque.s Amyot had already translated (Daphnis and Chloe* into a French classic (often re¬ printed), from which in 1587 Angel Day made a wretched English paraphrase (reprinted London 1890 with introduction by Joseph Jacobs). Both versions gave Robert Greene material for his <Pandosto) (1588), which in turn became the chief source of Shakespeare's (The Winter's Tale> (1611) ; Shakespeare seems to have taken several details directly from Day. How much Allan Ramsay's (The Gentle Shepherd* (1725) owes to (Daphnis and

Chloe* is not certain; its theme is much the same, as is that of Bernardin de Saint-Pierre's

(Paul ct Virginie* (1789). An enlarged re¬ cension of Amyot's translation was published in 1810 by Paul Louis Con rier, who in 1807 had found in a Florentine manuscript — and in 1809 had transcribed and then blotted- — a portion missing from all other manuscripts. Of Pierre-Paul Prud'hon's admirable illustrations three appeared in the French version published by Didot and one other in Annibal Caro's Italian version, published by Renouard, both Paris 1800. The most useful and accessible English translation is that by George Thornley (first published in 1657), revised and augmented by J. M. Edmonds, (Loeb Classical Library } (Lon¬ don and New York 1916).

Samuel Lee Wolff.

DAPITAN, da-pe'tan, Philippines, a prov¬ ince in the northwestern part of the island of Mindanao. Numerous rivers are navigable for the native boats, and these are the chief means of communication in the province. Hemp, cot¬ ton, sugar, etc., are cultivated for domestic con¬ sumption ; the forests, particularly the ebony, are valuable. There is some export trade in gums, wax, honey, cacao, *etc.* Pop. 20,270.

DAR-EL-BEIDA, dar'el-ba da, or CASA¬ BLANCA, Morocco, the largest seaport in the country, situated on the west coast. About one-fourth of the entire trade of the country passes through it. It is surrounded by walls. Wool and leather form the chief items of ex¬ port. The Portuguese founded it in 1468. It was the scene of the revolt of 1907 against French control of Moroccan ports. Pop. 25,000, including 5,000 Christians.

DAR-ES-SALAAM, dar'es-sa-lanT, East Africa, a growing city, the capital of Tan¬ ganyika Territory, situated on the coast a few miles south of Zanzibar. The harbor is good and the city has a number of churches and substantial public buildings. It has telegraphic connection with Zanzibar, Ivilwa and Tanga. Copal, rubber and ivory

are exported. Pop. about 24,000, including 500 Europeans and about an equal number of Arabs.

DARBHANGAH, dur-bun'ga, India, (1) a district in the Patna division of Bengal. In the rainy season the district becomes inundated, by the overflow of the rivers Kamla and Little Baghmati. Area 3,348 square miles; pop. under 3,000,000. (2) A town of the same name is the

capital of the district. It is situated on the Little Baghmati, and is the residence of the maharaja of Darbhangah. The chief exports are oil-seeds and timber. Pop. 62,628.

D'ARBLAY, dar'bla' (Madame), Frances Burney, English novelist, daughter of Charles Burney: b. King's Lynn, Norfolk, 13 June 1752; d. Bath, England, 6 Jan. 1840. When Frances was eight years old the Burneys removed to London, where at the musical assemblies given by her father she saw much of fashionable life. This she depicted with much humor in her first novel, (Evelina. } After she had published Eve¬ lina, or a Young Lady's Entrance into the World* (1778), she became the favorite of the literary men of the day, especially Dr. Johnson. Fler second novel, (Cecilia) (1782), was no less admired. In 1786 she was made second keeper of the robes to Queen Charlotte. She disliked the position and resigned in 1791. While visit¬ ing her sister at Mickleham she made the ac¬

quaintance of her future husband, General D'Arblay, a French army officer, whom she married in 1793. Her other books are (Camilla* (1795) and (The Wanderer, or Female Difficulties } (1814). Her play, (Edwy and Elvina, > was performed in 1795 and had little success, though having Mrs. Siddons and Kemble in the leading roles. Her (Diary and Letters, *edited by her niece (1842-46), surpass in modern esti¬ mation the rest of her writings. The record begins with (Evelina.) The success of her first effort, the dinings, winings and compliments that followed, are recorded with a naive garrulous¬ ness perfectly consistent with simplicity and sincerity. She also wrote memoirs of her father (1832). <Evelina) and (Cecilia* were published with introductions by Annie R. Ellis (London 1881-82). A new edition of the (Letters and Diaries* in six volumes appeared in London in 1904-05. The < Early Diary, 1768-1778> (2 vols., New York 1907) was edited by A. R. Ellis. Consult Dobson, (Fanny Burney, Madame D'Arblay) (New York 1903) ; Hill, C., (Fanny Burney at the Court of Queen Charlotte) (ib. 1912) ; and Macaulay, T. B., (Essays.*

DARBOY, dar-bwa, Georges, archbishop of Paris : b. Fayl-Billot, department of Haut Marne, 16 Jan. 1813; d. Paris, 24 May 1871. He was admitted to the priesthood 1836, and began regular parish work ; but in 1839 became professor, first of philosophy, then of dogmatic theology in the ecclesiastical seminary of Langres. Removing to Paris in 1846 he was for a while attached to the College of Henry IV and was also editor of the journal Moniteur Cath-olique ; in 1854 he was appointed vicar-general of the archbishop of Paris and inspector of re¬ ligious instruction in the schools of the diocese, that is, superintendent of the Christian doctrine work in the diocese. In 1859 he wras consecrated bishop of Nancy, and in 1863 wras appointed successor to Archbishop Sibour of Paris, who had been slain by an assassin. He was a strenu¬ ous upholder of episcopal independence and became involved with Rome through his efforts to suppress the jurisdiction of the Jesuits and other religious orders in his diocese. Pius IX refused him the cardinal's hat and rebuked him for his liberalism. In the Vatican Council he wTas one of the leaders of the minority who op¬ posed the declaration of papal infallibility on the ground that such a declaration wras in¬ opportune ; but after the definition he was one of the first among its former opponents to make submission. In the siege of Paris by the German armies he won universal approval for his de¬ voted labors in relieving the wounded and succoring the distressed ; and when the Com¬ munists, known to be his mortal foes, came into control of the city, he refused to seek safety outside the walls. Arrested by the Commune and held as a hostage, he with other hostages was fusilladed to death in the yard of the prison of La Roquette. The end came while he vˆas in the attitude of blessing his assassins and in¬ voking forgiveness for them. His body was recovered with difficulty and was buried with imposing ceremony at the public expense on 7 June 1871. It was not a mere accident or coincidence that he was the author of a (Life of Saint Thomas a Becket* (1859), that arch¬ bishop of Canterbury, who was slain by assassins before the high altar of his cathedral

church 700 years before; within 23 years he had seen his two nearest

predecessors, archbishops of Paris, murdered, one by an individual assassin, the other (Affre) by the insurgent populace. In addition to his scholarly work, (The Life of Saint Thomas a Becketp he wrote a new translation of (Dionysius the Areopagite,* and also a translation of the (Imitation of Christ) ; (Women of the Bible) (8th ed., 1876) ; (Holy Women* (4th ed., 1877). Consult the biography by Foulon (Paris 1889) and Guiller-min (ib. 1888).

DARBY, John Nelson, founder of the Brethren: b. London 1800; d. 1882. In 1819 he was graduated at Trinity College, Dublin, and was called to the Irish bar in 1825. He left the Church of Ireland because of conscientious scruples, believing that denominational distinc¬ tions and a regular ministry should be discarded. He formed an association in Dublin in 1828. Another was organized soon after in Plymouth, and the fact that Providence Chapel was the first regular place of meeting gave the name Plymouth Brethren to the sect in 1830. Darby labored as an evangelist in England and on the Continent until his death in 1882. He preached in English, French and German, and for many years edited the Christian Witness, the official organ of the Brethren. His collected writings were published in 32 volumes (London 1867-83).

DARBY, Pa., borough of Delaware County, on the Darby River, the Baltimore and Ohio and the Philadelphia, Baltimore and Washing¬ ton railroads, five miles southwest of Philadel¬ phia. It has silk, cotton, woolen and worsted mills and manufactures filters, tanks and tools. It has also a public library which dates from 1743, a Friends (Quaker) meeting house and cemetery established in early Colonial times. The borough was first settled about 1660. Pop. 7,922.

DARBY AND JOAN, the names of a married couple traditionally reported to have lived in the West Riding of Yorkshire in the 18th century, remarkable for their long and happy life together. A ballad entitled (The Happy Old Couple,* by Henry Woodfall, former apprentice to the printer John Darby, com¬ memorates their excellencies. Humdrum, un¬ eventful married life is sometimes referred to as a (<Darby and Joan® existence.

DARBYITES, a name often applied to the Plymouth Brethren (q.v.) from their principal founder, John Nelson Darby (1800-82), of whose collected writings 32 volumes have ap¬ peared (London 1867-83). Consult his Per¬ sonal Recollections) (ib. 1881).

DARBYSHIRE, Alfred, English architect: b. Salford, Lancashire, 20 June 1839; d. 5 July 1908. He began the practice of his profession in

1862 at Manchester and designed many build¬ ings of importance there and elsewhere. His principal literary works are Experiences of an Architect, Professional, Artistic, and TheatricaP ; (A Book of Old Manchester and Salford.*

DARCET, dar-sa', Jean, French physician and chemist: b. Douazit, 7 Sept. 1725; d. Paris, 13 Feb. 1801. He accompanied the celebrated Montesquieu to Paris in 1742, and remained with him till his death as a literary assistant. He afterward devoted himself to chemistry, especially to technical chemistry, was appointed professor of chemistry in the College of France,

and regent of the medical faculty. Darcet made many experiments with a view to the improve¬ ment of the manufacture of porcelain. He also tried the effect of fire on the various kinds of earths, and demonstrated the volatility of the diamond. In 1776 he published a memoir on the geology of the Pyrenees. He succeeded Macquer as a member of the Academy of Sciences and director of the manufactory of Sevres. He was afterward appointed inspector-general of the assay of coin and inspector of the Gobelin manufactory. He made several import¬ ant chemical discoveries, and contributed much to the present improved state of the science. A fusible alloy of lead, bismuth and tin is named after him. He published several works describ¬ ing his discoveries.

DARCET, Jean Pierre Joseph, French chemist: b. Paris, 31 Aug. 1777 ; d. there, 2 Aug. 1844. He was a son of Jean Darcet (q.v.). He began his chemical studies early with his father and with Vauquelin. In his 24th year he was made assayer of the mint, and from that time devoted his time chiefly to chemistry in its application to the arts. Being employed by the government in the manufacture of gunpowder, he rendered its preparation much more easy by new processes. He greatly assisted in extending the manufacture of soda artificially, succeeded in producing alum equal in quality to that of Italy, brought the art of stereotyping to greater perfection, facilitated the preparation of sul¬ phuric acid, investigated the best alloys for cannon, for cymbals and tam-tams and for statues, *etc.* Among his other discoveries were the extraction of soda from chestnuts, the preparation of sugar from the same material and the extraction of jelly from bones by means of an acid. He also made another discovery of the means of protection against the fine dust of quicksilver, which had been so injurious to the gilders. Darcet's discovery completely attained the object and gained him the prize of 3,000 francs which Ravrio had

offered for this discovery.

DARDANELLES (ancient Hellespont), a narrow channel in the Turkish dominions, which connects the Sea of Marmora with the 2Egean Sea and separates Europe from Asia. It is about 42 miles in length, varying in breadth from 1,400 yards to five miles. There is always a rapid current in the channel, the volume and velocity of which is much increased by the prevailing winds, which blow in the same direc¬ tion with the stream for at least 10 months in the year. The modern name of this strait is derived from the castles, called the Dardanelles, built on its banks, at its southwest entrance ; its ancient name, Hellespont, from Helle, daughter of Athamas, king of Thebes, who was fabled to have been drowned in it. Xerxes on his great expedition against Greece, in 480 b.c., crossed this strait by means of two bridges of boats, constructed in the neighborhood of Sestos and Abydos. It is also renowned as the scene of the death of Leander, who, it is said, used to swim across from Abydos on the Asiatic side, at the narrowest part of the strait (but yet about a mile in width), to visit Hero of Sestos on the European side. This feat of swimming the channel was also performed by Lord Byron, who achieved it in 1 hour and 10 minutes. To protect Constantinople, coast batteries have

been built since 1867, on both the Asiatic and the European side. These batteries have latterly been supplied with ordnance of recent type, such as the guns made by Krupp, and strength¬ ened under German supervision. In 1770 the Turkish defenses were almost in ruins. Warned by the condition of the batteries when a Russian squadron appeared before the castles, the Turkish government ordered the defenses repaired ; but they were again allowed to be¬ come almost useless until 1807. In that year a British squadron passed the Dardanelles and appeared before Constantinople, which until then had never seen an enemy’s fleet. In 1854, during the Crimean War, the castles and other defenses of Constantinople were again put in repair. It had long been recognized that the Turks had a right to prevent any foreign ship of war from passing the Dardanelles, and in 1841 a treaty

was signed between the five great European powers and the Porte, in which it was laid down that this was not to be permitted. The treaty was confirmed in 1856, the Sultan, however, retaining the right to permit certain vessels belonging to foreign governments to pass. By the Berlin treaty of 1878 the duty was again imposed upon the Sultan to prevent the passage of any foreign ship of war. This arrangement was modified in 1891, when Russia secured right of passage for her <(volunteer fleet.®

For the Allied campaign in the Dardanelles, see War, European.

DARDANUS, dar'da-nus, in mythology, the progenitor of the Trojans, and so of the Romans, and the son of Zeus and Electra, the daughter of Atlas. He emigrated from Sam-othrace (according to some accounts, from Arcadia, or Crete) and settled in Phrygia in the country which was afterward called Troas. Here he built a city, which, from him, was called Dardanum, or Dardanus, and introduced the worship of Athena (Minerva).

DARDISTAN, dar'dis-tan, the name given to a region of central Asia, bordering on Bal-tistan, the northwest portion of Cashmere. This country, which consists of lofty mountains, is little known, and its limits are variously given; but its interest depends mainly on the fact that its inhabitants, the Dards, are an Aryan people, speaking a Sanskritic tongue mixed with Per¬ sian words. They have been called ((Stray Aryans in Tibet,® and are Moslems converted from Buddhism at a comparatively recent period. The rajah of Cashmere is constantly endeavor¬ ing to subject them completely to his. authority. The chief districts are Hasora, Gilghit and Tassin ; some authorities also include Chitral in Dardistan.

DARE, Virginia, first child of English par¬ ents in the New World: b. Roanoke, August 1587, and named after the district of Virginia. She was the granddaughter of John White, who was governor of the colony sent by Sir Walter Raleigh to found an agricultural, state, which sailed from Plymouth, 26 April 1587, and reached the shores of Virginia in July of the same year. White's daughter was married to Mr. Dare, who was one of the assistants of the governor, and Virginia was bOfii about a month after the arrival of the expedition.

DARFUR, dar'foor, or DARFOOR (Coun¬ try of the Fur, a tribe of negroes), a region of central Africa, occupying a large portion of

the area between Abyssinia and Bornou and forming part of the Egyptian Sudan. It may be considered as lying between lat. 10° and 16° N. and long. 22° and 28° E. ; area 150, 000-square miles. On the east it has Kordofan ; on the west, Wadai; on the north, the desert; while the regions to the south are occupied by barbarous nations. The most important physi¬ cal feature is the Djebel Marrah, a chain of mountains near the centre of the country, of a crescent form, lying north and south and reaching the height of 6,000 feet. Some of the peaks are extinct volcanoes. There are other subordinate chains and elevated masses. There seem to be no permanent streams, the water¬ courses being filled only temporarily. The country belongs mainly to the Nile basin, partly to that of Lake Chad. Large portions of it are barren or are covered with verdure only in the rainy season. The inhabitants are of vari¬ ous races, some of them of the negro type, others having little of the negro character, and a considerable number being Arabs. The Fur or For, who give name to the country, inhabit the mountainous central parts and are a brown¬ ish-black color with negro features. Moham¬ medanism is the religion of the country, and to it is due what little civilization the people possess ; but the natives are still semi-barba¬ rous. Their occupation is chiefly agriculture. A few of the mechanical arts are carried on, and in particular the people manufacture a con¬ siderable variety of articles, including cotton goods, pottery, leather, lance-heads, *etc.* Their houses are rudely constructed of clay and reeds, and with scanty accommodation. Among the exports the most important are camels, ivory, the horns, teeth and hide of the rhinoceros and hippopotamus, ostrich feathers, gum and cop¬ per. The imports comprise beads, glass, arms, light cloths of different kinds, silks, shoes and other manufactured articles. Darfur was an independent kingdom till annexed by Egypt in 1874. During the ascendency of the Mahdi and his successor it was independent ; but it is now recognized as within the ((sphere of influence® of Great Britain. In 1898 it was made a part of the Anglo-Egyptian Sudan. The hereditary sultan manages the internal affairs. The capital is El Fasher. Pop. 4,000,000.

DARGAN, Edmund Spawn, American jurist: b. Montgomery County, S. C., 15 April 1805; d. Mobile, Ala., November 1879. He was the son of a Baptist minister of Irish de¬ scent, at whose death he was left without means. By his own exertions, he obtained a fair knowl¬ edge of English, Latin and Greek, although he was at work on a farm until he was 23 years old. He read law, was admitted to the bar in 1829, went to Alabama and taught three months in Washington, Autauga County. Here he was elected a justice of the peace and filled the of¬ fice for several years, meanwhile engaging in the practice of law. In

1833 he removed to Montgomery and in 1841 was elected to the bench of the Circuit Court of the Mobile dis¬ trict and removed to Mobile. He resigned the office of judge in 1842 and in 1844 was elected to the State senate. He was also mayor of Mobile the same year. He resigned from the senate the following year and was elected to Congress, where he served from December 1845 to March 1847. On the question of the north¬ west boundary of Oregon he made an able

speech and offered some valuable amendments to the resolution of notice. He was the first to propose the line of adjustment finally-adopted on the settlement of the question with the British government. He declined a renomi¬ nation and in 1847 was elected to fill a vacancy-in the Supreme Court of Alabama. In 1849, by the resignation of Justice Collier, he be¬ came chief justice, which office he resigned in 1852 and resumed the practice of law in Mo¬ bile. In 1861 he was a delegate to the State convention and voted for the ordinance of se¬ cession. He also served for one term as a representative in the Confederate Congress.

D'ARGENSON, dar-zhan-son, Marc Pierre,

Comte, French statesman: b. 1696; d. Paris 1764. He was the younger son of the Marquis d'Argenson (1652-1721), who created the se¬ cret police and established the Icttres de cachet. He became War Minister in 1743, at a time when the political existence of France was imperiled and by his vigor and lucky" choice of generals changed the fortunes of the war in the course of a single year. After the peace of Aix-la-Chapelle (1748), he devoted himself to the improvement of the military system and in 1751 established the £cole Militaire. He was an illustrious patron of literature. Diderot and D'Alembert dedicated to him their great (En¬ cyclopedic > and to Voltaire, whose fellow-stu¬ dent he had been, he furnished materials, gracefully acknowledged in the dedication, for his (Siecle de Louis XIV. } In 1757 he was banished to his estate by the machinations of Madame Pompadour; but on her death he re¬ turned to Paris.

DARGOMYZHSKY, dar'go-mizh'ske, Alex¬ ander Sergeyevich, Russian composer: b. Tula 1813 ; d. Saint Petersburg 1869. Having made his preliminary studies, in which he exhibited great precocity, he removed to Saint Petersburg in 1835 and thereafter made his home in that city. He had previously met Glinka, and helped him in producing (The Life of the Tsar,' in the course of which work Dargomyzhsky ob¬ tained a sound knowledge of and training in orchestration. At the capital he soon be¬ came known by his opera, (Esmeralda) (1839) in which he followed the traditions of Ros¬ sini and Auber, both of whom were then at the pinnacle of their fame. In 1847 Esmeralda1' was produced at Moscow. It was followed in 1855 by ˆussalka,* which at length brought him fame. In 1867 he was made president of the Russian Musical Society and during his later years his home became the centre of the modern Russian school, which looked for inspiration to Schumann, Berlioz, Wagner and List. He next wrote the opera, (The Stone Guest, > to Pushkin's tale of the same name, but did not live to complete it. Four years after his death it was produced with great success. He composed also fantasias for orches¬ tra, notably (Finnish Fantaisie) ; <Bala-Yaza) ; and <Kazachok) ; and several ballads. His later years were also devoted to the training of prom-ing singers, of which he practically created a new school. Consult Cui, (La musique eri Russie) (Paris 1880) and Pougin, (Essai historique sur la musique en Russie) (Turin

1897).

DARIC, dar'ik, properly DARICUS (Gr. Aapeucoc) , an ancient Persian coin of pure gold,

specimens of which are still preserved in sev¬ eral European collections, bearing on one side the image of a kneeling archer, on the other that of a royal palla. It was known to the Greeks, Romans and Jews; the latter used it after the Babylonian captivity, under the reign of the Persians, and called it adarkon or darke-mon (mentioned in the first book of Chronicles, by Esdras and Nehemiah). Its value was equal to 20 silver drachmae, or 16 shillings 3 pence ; 3,000 being equal (according to Xenophon) to 10 talents. Its name is variously derived from that of King Darius Hystaspes, who regulated the Persian currency, and from several Per¬ sian words meaning king, palace and bow. The so-called silver darics were not designated by this name in antiquity.

DARIEN, Ga., city, county-seat of McIntosh County, on the Altamaha River and the Geor¬ gia Coast and Piedmont Railroad, about 65 miles southwest of Savannah and about 10 miles from the ocean. It exports large quanti¬ ties of pine lumber, crossties, handles, rice, fish and garden produce. Settled in 1736, Darien was incorporated as a town in 1816 and was chartered as a city in 1818. It is gov¬ erned by a board of five aldermen selected by the grand jury, one of the five being chosen mayor. The waterworks are owned by the city. Pop. 1,391.

DARIEN (Sp. da-re-an'), The Colony of,

established by the Spaniards on the Gulf of Uraba (see Darien, Gulf of), in the first dec¬ ade of the 16th century, was the centre from which exploring expeditions were sent out until Panama was founded in 1519. A notary of Tri-ana, named Bastidas, sailed along the Carib¬ bean coast of the isthmus in 1501, Balboa being one of his companions. At the end of 1502 and beginning of 1503 Columbus carefully examined the region immediately west of this gulf. In 1508 the king granted to Nicuesa the territory from the Gulf of Darien to Cape Gracias a Dios; to Ojeda, the territory from the Gulf of Darien to Cape de la Vela. The dividing line was more precisely fixed by the grantees, who agreed that it should be the Atrato River. (See Darien, Gulf of). In that event the only permanent settlements were made near this river and the gulf into which it flows. Ojeda first landed at Cartagena (1509), where his ex¬ pedition endured great hardships. Removing thence to the eastern side of the Gulf of Uraba, he built the fort called San Sebastian, which he entrusted to Francisco Pizarro, and then re¬ turned to the West Indies. Pizarro, Balboa and all who remained alive set sail for Carta¬ gena once more. There they were met by En-ciso, with re-enforcements from San Domingo, and after some hesitation, crossed the gulf to the western shore, where the colony of Santa Maria de la Antigua del Darien was estab¬ lished in 1510. Balboa gained ascendency by recommending the selection of this place (which he had visited with Bastidas) and became the leading spirit in the undertakings which fol¬ lowed — the expedition to Dabaiba, the cross¬ ing of the isthmus, *etc.* (see Balboa).

Nicuesa's expedition, though it started under brighter auspices, resulted in a lamentable fail¬ ure. Its courtly leader, after losing nearly all his followers near Cape Nombre de Dios, was forced to put to sea in a boat that could not

outlive a single storm — practically condemned to death by the authorities at Darien, whom he had offended. In 1514 Pedrarias Davila super¬ seded Balboa as governor. Five years later Panama was founded ; the capital was estab¬ lished on the Pacific coast ; exploration north¬ ward and southward began along the shores of the newly-discovered ocean ; the isthmian traf¬ fic sought and found an easier route, better harbors and a less deadly climate at a dis¬ tance from the Gulf of Uraba. Darien was abandoned. Consult Anderson, Dr. C. L. G., (01d Panama and Castilla del OroP See Cen¬ tral America.

DARIEN, Gulf of, also called The Gulf of Uraba, an extension of the Caribbean Sea forming a wedge-shaped indentation in the northern coast of Colombia; of great width be¬ tween Colon and -Cartagena, but narrowing toward the south until it becomes an estuary of the Atrato River. A distinction to be com¬ mended on the ground of convenience is that which would restrict the name of Uraba to the southern portion, which is about 7 miles wride by 30 long. Some of the earliest Spanish set¬ tlements, at the beginning of the 16th century, were located on the Gulf of Uraba (see Darien, the Colony of) ; the region has not prospered, however, owing to the lack of good harbors; to the extremely unhealthful, hot and damp climate of the coast at this point ; and the diversion of traffic to Colon via the Panama Canal.

DARIEN, Isthmus of, the neck of land uniting South and Central America ; more spe¬ cifically, the lower portion which is narrowed between the gulfs of Uraba and San Miguel, while its prolongation on the northwest, be¬ tween the Caribbean Sea and the Gulf of Pan¬ ama, is called the Isthmus of Panama, now traversed by an interoceanic canal, known as the Panama Canal (q.v.). It is traversed by the Cordillera de Baudo. Its principal rivers are the Tuira (also called Darien), which rises in the heights of Aspaves, receives the waters of a number of tributaries and flows into the Gulf of San Miguel, and the Atrato, which comes out of the department of Cauca and empties into the Gulf of Uraba. In regard to the climate on the coast, see Darien, Gulf of. A Colombian official publication says : (<The interior of the Isthmus of Darien is very sickly and only the negroes and Indian half-breeds can stand its excessively rainy climate, hot and damp, and its atmosphere, which the marshes make

malarious. Though about the Darien cordillera the temperature is milder, it cannot be said that the region is salubrious ; and it will never be until the great woods and groves shall have disappeared.® The woods in question, es¬ pecially in South Darien, are of excellent qual¬ ity and colossal growth, constituting a source of wealth. Gold is obtained from the rivers Bal¬ sas and Marca, and the mines of Cana or Espiritu Santo, near the Tuira River, were fa¬ mous in the old days. For other natural re¬ sources, etc., see Panama, Republic of; for historical sketch, see Darien, the Colony.

DARIEN RIVER, the name sometimes given to two streams in the Republic of Colombia: (1) A river emptying into the Gulf of Uraba, on the banks of which Balboa and others founded in 1510 the town of Antigua del

Darien (see Darien, the Colony) ; (2) the

Tuira River (see Darien, Isthmus of).

DARIEN SCHEME, a celebrated financial project, conceived and set afloat by William Paterson (q.v.), a Scotchman, toward the close of the 17th century. On his original and osten¬ sible design of establishing an East India trade in Scotland he ingrafted the secret and magnifi¬ cent plan of forming an emporium on each side of the Isthmus of Darien or Panama for the trade of the opposite continents. According to his idea the manufactures of Europe were to be sent to the Gulf of Darien and thence conveyed by land across the ridge of mountains that intersect the isthmus, where they were to be exchanged for the produce of South America and of Asia; and thus, to use his own emphatic language, he would wrest the keys of the world from Spain. In order to attract encouragement and support he proposed to render his settle¬ ment a free port and to banish all distinction of party, religion or nation. Now Scotland was at this time very poor and Paterson went to Lon¬ don to procure subscriptions, which soon ran up to the amount of $1,500,000. But alarm, first excited by the East India Company and the West India merchants, soon spread over the whole English nation and the English subscrip¬ tions were withdrawn. Yet Paterson himself was not to be easily intimidated; and Scotland, indignant at the opposition which the plan had met with in England, avowedly because it would be beneficial to the Scotch, immediately subscribed $2,000,000, although at that time there was not above $4,000,000 of cash in the kingdom. Only a little more than half of the subscriptions, however, were ever paid up. Be¬ sides this sum,

$1,500,000 was subscribed at Hamburg, which, however, was withdrawn in consequence of the threatening memorial pre¬ sented by the English resident to the senate of that city. The Scotch, nevertheless, persisted in their scheme ; five large vessels, laden with merchandise, military stores and provisions, with a colony of 1,200 persons, sailed for the Isthmus of Darien, which they reached after a voyage of about four months.

The settlement was very judiciously formed at Acta, a place at an equal distance between Porto Bello and Cartagena. Here is a secure and capacious harbor, formed by a peninsula which the colonists fortified and named Fort Saint Andrew. To the settlement they gave the name of New Caledonia. For eight months the colony bore up against accumulated mis¬ fortunes and persecutions, but at the end of this period those who survived were compelled by disease and famine to abandon their settlement and return to Europe.

Before this circumstance was known two other expeditions sailed from Scotland and the information of the abandonment of the first colony only served to arouse the Scotch nation to more determined perseverance in the plan. When the second expedition arrived they found the huts burned and the forts demolished; famine and disease assailed them ; they were attacked by the Spaniards from Panama — these they repulsed, but a larger force coming from Cartagena obliged them to capitulate, on condition that they could embark with their effects for Europe; few, however, of these survived to return to Scotland.

In order to pave the way for a better under¬ standing between the two countries the lords commissioners for England agreed in 1706 to purchase the shares of the particular members of the Darien Company. A full account of the Darien expedition is to be found in the second volume of Sir John Dalrymple's (Memoirs of Great Britain and Ireland. > The best recent authority on the subject is John Hill Burton, (History of Scotland* and (Darien Papers.* Consult also Sir Walter Scott's (Tales of a Grandfather* for a most interesting but

rather one-sided narrative.

DA RIMINI, Francesca, da-re'me-ne, an Italian lady of the 13th century, the daughter of Guido da Polenta of Ravenna. She was mar¬ ried to Giovanni Malatesta da Rimini, a cripple, but loved his brother Paolo. Giovanni surprised the lovers at one of their meetings and killed them both (about 1285). Their story is told in Dante's (Inferno* and is the subject of Leigh Hunt's poem (The Story of Rimini,* and of the dramas (Francesca da Rimini* by D'Annun¬ zio, and (Paolo and Francesca) by Stephen Phillips. Fuseli made the story the subject of a well-known painting.

DARfO, Ruben, Nicaraguan poet: b. 1867; d. Leon, Nicaragua, 7 Feb. 1916. He was of mixed Indian and Spanish blood, and the blend¬ ing of these two strains produced in him a literary temperament very different from that of Spanish writers born and educated in Spain. Dario had much in common with the Mexican Indian poets Altamirano and Ramirez and the novelist and dramatist Mateos, all three of whom were noted orators. In him the fervid aboriginal blood predominated over the Span¬ ish; and in the days of his literary activity his became the voice of the native-born crying out <(America for the Americans.® At this time his vision was foreshortened to such an extent that, if he did not actually hate the people of non-Latin tongue occupying the territory to the north of Spanish America, he found little place for them in the American policy of which he had made himself the mouthpiece. But he eventually came under the influence of Santos Chocano (q.v.), who had already begun to see with a far-reaching and clear vision the inter¬ dependence of Saxon and Latin America. Dario was a man of wonderful adaptability, which enabled him to gather his experiences, his sentiments and his information from the most varied and incongruous sources, to weigh and judge them and to select from them, instinct¬ ively, those that fitted into his program. Soon he began to blow on his trumpet almost as loudly as Santos Chocano had done, announcing himself as the herald of the natural unity of all the races living on the American continents. This was done in the face of a host of writers of lesser talent who could see nothing good in the United States or in the people of English tongue. Yet Dario never became the poetical champion of English-speaking America that Santos Chocano long has been. His was more of a borrowed sentiment, for his interests, edu¬ cation and associations had always been and continued to remain Latin.

Leaving home quite early in his career Dario went to Argentina, where he attracted at¬ tention through his daring literary innova¬ tions, his poetical fervor, the beauty of his style

and the vividness of his imagination. Soon his became a name to conjure by in Argentina, where a very active school of younger writers gathered about the prophet of Americanism in literature and art, as Dario began to be called. All of Latin-America began to pay at¬ tention to the new voice ; Dario's poems began to appear in high class Spanish magazines in Madrid and translations of them in the periodi¬ cals of Paris. The young poet was appointed Nicaraguan Minister to Madrid and he be¬ came a sort of literary lion in the Spanish capi¬ tal, where the younger literary set, especially the Latin-Americans resident in Europe, gath¬ ered about him as they had done in Argentina. From Madrid Dario went to Paris, where he continued to be the literary leader of Latin-America. As editor of La Revista Mundial he exercised a strong literary influence apart from his poetical efforts. Shortly after the outbreak of the European War Dario, broken down in health, visited New York, where he read an (Ode to Peace * before the students and faculty of Columbia University. From there he went to Guatemala, where he was enthusiastically received. But, unable to stand the fatigue of public receptions, he was hurried to Nicaragua in a dying condition.

Although not 50 years old at the time of his death Dario had been, for a quarter of a century, the foremost literary figure in Latin-America. His genius was naturally cosmopolitan, and his long residence in Argentina, Madrid and Paris largely accentuated this cosmopolitanism. Lit¬ erary and scientific reciprocity between all the countries of the Western hemisphere he saw coming in the not distant future, and he was clear-sighted enough to see that Latin-America was destined to get more out of it than English-speaking America. In Poe, Whitman, Long¬ fellow and Hawthorne he recognized spirits kindred to those of Latin-America yet different; and from all of them he borrowed forms of metre and inspiration, and from them he learned to remodel the conventional Spanish rhythm and to give it new forms and greater life and variety. But though he carried the flag of reform yet few Spanish poets have been truer and more fervid interpreters of Latin life and culture than Dario, who had drunk deeply at the fountains of the two mothers of the Latin races.

Dario's first noted success, <Azul,) a volume composed of fervid verse and passionate prose, published in Valparaiso, Chile, in 1888, brought him into almost instant notice. Here he worships at the shrine of beauty and ele¬ gance and he turns his back upon the ex¬ cesses of the naturalistic school with all its crudeness and ugliness. He preached the beauty of language and the musical quality of words ; and his

strongly poetical and sensi¬ tive nature enabled him to exemplify in his own work his new gospel, which the poets of Latin-Amenca and not a few in Spain are still preaching. (Prosas Profanas) (1896) shows a great improvement in Dario's power and art, for in the meantime he had been in Spain in an official capacity and had made his entree into Spanish literature, and in Paris, where he had become a well-known figure in literary circles and had imbibed much of the French literary spirit. (Prosas Profanas,* in which Dario attempts many innovations and

preaches his literary ideals, became the text¬ book of the younger literary Latin-American generation, who acknowledged him as their master. Among his other published works are (Los Raros) ; (Cantos de Vida y Esperanza' (1905) ; (E1 Canto errante* (1907). Consult Coester, A., (The Literary History of Spanish America) (New York 1916) ; Gonzalez Blanco, A., (Ruben Dario > (Madrid 1910, preface to the 3 vol. ed. of Dario's works).

John Hubert Cornyn, Editorial Staff of The Americana.

DARIUS, da-ri'us, the name of several Per¬ sian kings, or, according to some writers, the royal title itself. Among the most distinguished individuals of this name are:

1. Darius I, fourth king of Persia: b. about 558 b.c. ; d. 485 b.c. He joined the conspiracy against the False Smerdis, who had possessed himself of the Persian throne. After the con¬ spirators had succeeded in getting rid of the usurper, they agreed to meet early the next morning, on horseback, and to appoint him king whose horse should neigh first after sunrise. The groom of Darius, apprised of this project, led his master's horse in the night with a mare to the appointed place, and, in consequence of this stratagem, the horse of Darius neighed first the next morning. Darius was therefore saluted king, and the nation approved the choice. His reign was marked by many important events. The city of Babylon revolted, partly on account of burdensome impositions of tribute and partly because the royal residence, under

Cyrus, had been transferred thence to Susa. Darius besieged the city nearly tw'o years without success, and was on the point of abandoning the siege when Zopyrus, one of his generals, by a heroic sacri¬ fice, placed the city in his possession. After the subjection of Babylon Darius undertook an ex¬ pedition, with an army of 700,000 men, against the Scythians on the Danube, who enticed him so far into their inhospitable country by their pretended flight, that he succeeded with diffi¬ culty in extricating himself and his army, after suffering great losses. Leaving a part of his forces under the command of Megabyzus in Thrace, to conquer that country and Macedonia, he returned with the remainder to Asia, to re¬ cruit at Sardis. In the year 501 b.c. a disturb¬ ance at Naxos, in which the Persians had taken part, occasioned a revolt of the Ionian cities, which the Athenians endeavored to promote, but which was suppressed by the capture and punishment of Miletus in 496. To revenge him¬ self upon the Athenians, Darius sent Mardonius with an army, by the way of Thrace and Mace¬ donia, against Greece, and prepared a fleet to make a descent upon its coasts. But his ships were scattered and destroyed by a storm in doubling Mount Athos and the army was almost entirely cut to pieces by the Thracians. Darius, however, collected another army of 500,000 men and fitted out a second fleet of 600 ships. Naxos was conquered, and Eretria, in Euboea, sacked. Thence the army under Datis and Artaphernes proceeded to Attica and was led by Hippias to the plains of Marathon. The Athenians had in vain besought assistance from their neighbors, and were obliged to depend upon their own resources alone. They marched forth, 10,000 strong, under the command of Miltiades, to meet the Persian army, and animated by the reflection that they were fighting for freedom

and their country, obtained a complete victory (490 b.c.) . This prince did much to improve the internal administration of his kingdom. In the year 508 b.c. he sent his admiral, Scylax, to explore the river Indus, and he encouraged commerce and arts by useful institutions and laws. Inscriptions on the great rock of Behistun give an account of the events of his reign. They have been compiled by Tolman, (The Behistun Inscription of King Darius) (Nash¬ ville 1908).

2. Darius II, king of Persia (surnamed Nothos, or the Bastard, by the Greeks) : d. 404 b.c. He was an illegitimate son of Artaxerxes I (Longimanus) . He ascended the throne in 423 and suppressed several rebellions of his satraps ; but Amyrtaeus succeeded in maintaining himself in independent possession of Egypt, which had revolted in 414. His son Cyrus is familiar to us through Xenophon's (Anabasis. }

3. Darius III, king of Persia (surnamed Codomannus). He was the great-grandson of Darius II, and the 12th and last king of Persia. He ascended the throne 336 b.c., when the king¬ dom had been weakened by luxury and the tyranny of the satraps under his predecessors and could not resist the attacks of a powerful invader. Such was Alexander of Macedon, and the army sent against him by Darius was totally routed on the banks of the Granicus, in Asia Minor. Darius then advanced with 400,000 soldiers to the plains of Mesopotamia. The Grecian mercenaries advised him to await the enemy here, as the level country would enable him to draw out his forces to advantage ; but Darius hastened forward to meet Alexander in the mountainous Cilicia. Darius was a second time totally routed, near the Issus 333 b.c. He himself escaped, under 'cover of the night, to the mountains. His mother, his wife and three of his children fell into the hands of the con¬ queror, who treated them with great generosity. Darius was so far from being discouraged by these defeats that he wrote a haughty letter to Alexander, in which he offered him a ransom for the prisoners, and invited him to a new engagement, or, if he did not choose that, granted him permission to retire into Mace¬ donia. Alexander then laid siege to Tyre, on which Darius wrote him another letter, offering him not only the title of king, which he had before refused to do, but also 10,000 talents ransom and all the countries of Asia as far as the Euphrates, together with his daughter, Statira, in marriage. These propositions, how¬ ever, were unavailing. Alexander subjected Egypt and the two armies met between Arbela and Gaugamela, and after a bloody engagement Darius was compelled to seek safety in flight (331 b.c.) . Alexander took possession of his capital, Susa, captured Persepolis and reduced all Persia. Darius fled to the northern prov¬ inces, where he was seized by Bessus, one of his satraps, and afterward murdered. Consult Justi, (Grundriss der iranischen PhilologieL (Strassburg 1897).

DARJEELING, British India, town and capital of the district of Darjeeling, in Bengal, at over 7,000 feet elevation on the slopes of the Sikkim Himalayas. The Rajah of Sikkim ceded it to the British in 1835 and by the latter it has been converted into a sanitary station, being equipped with a modern sanitarium, bo¬ tanical gardens, bazaars, *etc.* It is the summer

residence of the lieutenant-governor of Bengal, and has become a popular health resort. Tea is extensively grown nearby. Pop. 17,053.

DARK AGES, The, a period supposed to extend from the fall of the Roman Empire, 475 a.d., to the revival of literature on the discovery of the Pandects at Amalfi in 1137. Not to draw the limits too finely, say 700 years (450 to 1150). The Middle Ages may be extended to about 1550, covering from 10 to 11 centuries.

DARK AND BLOODY GROUND, The,

a name frequently applied to the State of Ken¬ tucky. It is said to be a translation of the Indian words ((Kain-tuk-ee,5) though some au¬ thorities claim that they signify <(At the head of the river.® The epithet was originally be¬ stowed because the region was the scene of many sanguinary conflicts between the redmen of the northern and southern tribes. Later the constant feuds between white settlers and the aborigines rendered the phrase peculiarly appro¬ priate to this locality.

DARK DAY, a name frequently used in this country in connection with 12 May 1780, but applied also to days on which similar phe¬ nomena have been discerned. On the date men¬ tioned the atmosphere in New England was so obscure as to cause in some places cessation from outdoor labor. Birds and domestic fowls acted as during an eclipse. The darkness began at 10 and lasted until night, causing a feeling of alarm by its unprecedented nature. There ap¬ pears to have been an absence of clouds for the most part, though light rain occurred. Though known as the Black Friday of New England, the area covered by darkness also extended west of that section. Two dark days are recorded as occurring in America earlier than the Black Friday, one in 1716 and another in 1762. The Dark Days of Canada were 16 Oct. 1785 and 3 July 1814. On the latter date the darkness extended over a tract estimated to be about 300 miles in length and 200 in breath, in the region of the Saint Lawrence River and Gulf. There were showers of sand and very dark ashes and the atmosphere was of a deep yellow color. The characteristic features seemed to point to vol¬ canic action as an origin rather than to forest fires. These two causes have in recent years received much attention in their relation to the obscuring and tinting of the atmosphere over immense areas. The smoke from great forest fires in the northwestern States and in Canada was in 1881

carried south or southeast to almost incredible distances, and in June 1903 extensive fires in the forests of New England and of the Adirondacks caused a yellowish haze that ex¬ tended far from its source. After the volcanic eruptions of Mount Soufriere and Mount Pelee in May 1902 vast quantities of volcanic dust were borne seaward, more or less obscuring the daylight by their persistence in the atmosphere. The volcanic dust from Krakatoa is believed to have encircled the entire earth and to have affected the color of the atmosphere for months. In countries situated like Egypt a marked ob¬ scuration of daylight may often be accounted for by the fine sand brought by winds from the desert.

DARK HORSE, a phrase used in racing concerning a horse when its power of perform¬ ance or chances of success are not generally known. The expression has been transferred

to fields of human competition, and is fre¬ quently used in politics, especially in reference to candidates for nomination in a convention when they are unexpectedly brought forward or draw a following that had not been an¬ ticipated.

DARKE, William, American soldier : b. Pennsylvania 1736; d. Jefferson County, Va., 26 Nov. 1801. At 19 he served with the Vir¬ ginians in the battle of Braddock's defeat, and afterward in the war of the American Revolu¬ tion. At Saint Clair's defeat he commanded the left wing of the army and made two gallant and successful charges with the bayonet, in the second of which his youngest son, Capt. Joseph Darke, fell mortally wounded (4 Nov. 1791). He was repeatedly a member of the Vir¬ ginian legislature, and, as member of the conven¬ tion of 1788, voted for the Federal Constitution.

DARLASTON, England, town in Stafford¬ shire, included in the parliamentary borough of Wednesbury. It is an irregular, straggling place, in which there are blast furnaces and iron manufactures. In the vicinity there is abun¬ dant coal and iron. Pop. 17,107.

DARLEY, Felix Octavius Carr, Ameri¬ can artist: b. Philadelphia, Pa., 23 Tune 1822; d. Claymont, Del., 27 March 1888. His illustra¬ ting of literary masterpieces gave pleasure to thousands and made him famous. His best work comprises his drawings to accompany the text of (Rip Van Winkle) ; (Sleepy Hollow5; (Courtship of Miles Standish> ; (Scarlet Let-ter) ; Evangeline5 ; the novels of Cooper, Dickens, and others, besides many special pictures. His book (

Sketches Abroad with Pen and Pencil5 (1868) is well known. His water-color paintings of incidents in American his¬ tory are full of spirit and his banknote vig¬ nettes are also worthy of mention. Consult F. Weitenkampf (American Graphic Art5 (New York 1912).

DARLEY, George, English poet and critic : b. Dublin 1795 ; d. London 1846. He was graduated at Trinity College, Dublin, in 1811, went to London in 1825, and became attached to the Literary Gazette and Athenceum jour¬ nals, in which his criticisms of poetry and the fine arts made him well known. He is the author of the (Labors of Idleness5 (1826) ;

(Sylvia5 (1827), and miscellaneous works of a mingled philosophical and poetic character.

DARLING, Flora Adams, American novel¬ ist: b. Lancaster, N. H., 1840; d. 6 Jan. 1910. She married Edward Darling, a Confederate officer, killed in the Civil War. She was one of the founders of the society of Daughters of the Revolution and was prominent in that and other patriotic organizations. She published : (A Wayward, Winning Woman5 (1890) ; (Was It a Just Verdict?5 (1890) ; (The Bour¬ bon Lily5; (Mrs. Darling's Letters, or Mem¬ ories of the War5 (1894) ; (A Social Diplomat5 (1898) ; (History D. A. R. 'and D. R. Societies of Patriotic Organizations5 (1901) ; (The Senator's Daughter,5 *etc.*

DARLING, Grace Horsley, English hero¬ ine: b. Bamborough, England, 24 Nov. 1815; d. 20 Oct. 1842. She was the daughter of the keeper of the Longstone Lighthouse. The event which made her famous occurred on 7 Sept. 1838. The steamer Forfarshire was wrecked near the lighthouse, and at daylight William

DARJEELING, INDIA, SHOWING THE HIMALAYA MOUNTAINS

Darling descried the wreck from Longstone, but, accustomed to scenes of danger as he was, shrank from attempting to reach the steamer through a boiling sea in a boat. His daughter, who could see, by the aid of a glass, the sufferers clinging to the wreck, implored him to let her accompany him in the endeavor to relieve them. At last he consented ; and father and daughter reached the wreck, and found nine sufferers, whom they succeeded in bringing to the light¬ house. The news of the heroic deed soon spread, and a purse of $3,500 was quickly sub¬ scribed and presented to the brave girl.

DARLING (so called from Sir Ralph Dar¬ ling, a governor of New South Wales), a name of several applications in Australia. (1) The Darling River, a river rising in southeast Queensland, is formed by the junction of sev¬ eral streams, and flows through New South Wales in a southwesterly and southerly direc¬ tion till it joins the Murray at Wentworth on the border of Victoria. It has a drainage basin of about 200,000 square miles, mainly arid, except for a strip on either bank. (2) Darling district is a pastoral district about 50,000 square miles in extent, in the southwest of New South Wales, and watered by the Darling and the Murray. (3) The Darling Downs are a rich table-land west of Brisbane in Queens¬ land, forming excellent pasture and arable land. It is well watered, and measures about 6,000 square miles. (4) The Darling Range, granite mountains in western Australia, running in a northerly direction parallel with the coast from Point D'Entrecasteaux for nearly 250 miles. Its highest peaks do not exceed 1,500 feet.

DARLINGTON, James Henry, American Protestant Episcopal bishop : b. Brooklyn, N. Y., 9 June 1856. He was graduated at New York

University in 1877 and three years later at the Princeton Theological Seminary. In 1882 he becam-e assistant, and from 1883 to 1905 was rector of Christ Church, Brooklyn. On 26 April 1905 he was consecrated first bishop of Harrisburg. In 1902-03 he was lecturer at New York University and from 1910 to 1915 served as chaplain of the Masonic Grand Lodge of Pennsylvania. He edited (The Hymnal of the Church5; (In Memoriam5 ; (Little Rhymes for Little People, > and is the author of ‘Pastor and People5 (1902) and sermons on various subjects.

DARLINGTON, England, a municipal and parliamentary borough in Durham County nine miles west-southwest of Stockton-on-Tees. It is well built, chiefly of brick, and nearly in the form of a square, and has among its public buildings an ancient Gothic church with a lofty spire, founded in 1160, and restored in 1865. The woolen manufacture is carried on to a considerable extent; there are important iron and steel manufactures ; also the locomotive works of the North Eastern Railway are lo¬ cated here. The town is on the old Stockton and Darlington Railroad, which was the first line in England on which locomotive steam-engines were used. The borough returns one member to the House of Commons. Pop. 55,631.

DARLINGTON, S. C., town, county-seat of Darlington County, on the Atlantic Coast Line Railroad, about 70 miles northeast of Columbia. It is in an agricultural region, and

is a trade centre for tobacco, cotton, corn, and other products. The manufactures are chiefly cotton goods, tobacco, cottonseed oil, and fertilizers. Pop. (1920) 4,669.

DARLINGTONIA, a genus of pitcher-plants, belonging to the family Sarraceniacece D. calif ornica grows in the northern part of California, chiefly in the district around Mount Shasta. It is found in boggy places on the slopes of mountains. It entraps insects, which are attracted to the curious pitcher or hood at the extremity of the tubular leaves ; and, once inside, ‘the insects are prevented by the fine hairs which point downward from return¬ ing. Sometimes the pitchers at their base are filled to the depth of four or five inches with insect remains. The larva of a small moth Xanthoptera semicrocea preys on the plant, and that of a dipterous insect, Sarcophaga sarracenice, feeds on the dead insects which it encloses. See Carnivorous Plants.

DARMESTETER, Agnes Mary Frances Robinson, English poet : b.

Leamington, Eng¬ land, 27 Feb. 1857. She has attained great proficiency in Greek studies, her verse showing the influence of Hellenic literature. In 1888 she married James Darmesteter (q.v.), the Orientalist, who died in 1894, and in 1901 she married Emile Duclaux, director of the Pasteur Institute in Paris. Her writings include (A Handful of Honeysuckle) (1878) ; 'The Crowned Hippolytus, from Euripides) (1881) ;

(Arden,? a novel (1883) ; 'Emily Bronte5 (1883) ; (The New Arcadia and Other Poems) (1884); 'An Italian Garden) (1886); 'The End of the Middle Ages: Essays and Questions in History) (1888) ; (Songs, Ballads and a Garden Play) (1888) ; <Lyrics) (1891) ; 'Retro¬ spect5 (1893) ; 'Life of Renan5 (1897) ; (A Mediaeval Garland5 (1897) ; (Collected Poems5 (1901) (The Return to Nature5 (1904); 'The French Ideal5 (1911) ; 'Twentieth Century French Writers5 (1914) ; and in French, 'Marguerites du Temps Passe5 (1892) ; 'Froissart5 (1S97) ; 'Grands Ecrivains d'Outtre-manche5 (1901) ; 'La Vie de Emile Duclaix5 (1907) ; 'Madame de Sevigne (1814).

DARMESTETER, darm'ste-tar', James, French Orientalist: b. Chateau-Salins, 28 March 1849; d. Maisons-Lafitte, near Paris, 19 Oct. 1894. He was of Jewish parentage; re¬ ceived his education at The Lycee Bonaparte, Paris ; and became professor of Zend at the Ecole des Hautes Etudes. In 1885 he became professor of Iranian languages and literature at the College de France. In 1886 he went to India where he spent several years at phi¬ lological research, and became fellow of Bom¬ bay University. He succeeded Renan as secretary of the Societe Asiatique de Paris and edited a prominent journal, La Revue de Paris. Besides works of strict scholarship on the Oriental literatures, as 'Ormazd and Ahriman5 (1877) ; 'Iranian Studies5 (1883) ; 'Origins of Persian Poetry,5 he wrote many essays on miscellaneous subjects. There is an English translation of some of his 'Selected Essays.5 He translated with Mills the 'Zend-Avesta5 for the 'Sacred Books of the East5 series, published by the University of Oxford and edited by Max Muller.

DARMSTADT, darm'stat, Germany, capi¬ tal of the Republic of Hesse, near the

Darm River, 15 miles south of Frankfort. It consists of an old and a new town. The former, which is the business part of the town, is very poorly built; the houses are old, and the streets narrow and gloomy. The new town is laid out with great regularity, and has handsome squares and houses. Among the remarkable buildings are the old palace, with a library of 564,000 vol¬ umes and 4,000 MSS. ; a picture gallery with some good examples of the early German and Dutch masters. The chef-d'oeuvre is the c Madonna of the Burgomaster Meyer } by Holbein the Younger. It has a museum of natural history, the Roman Catholic church, patterned after the Pantheon, the Stadtkirche, and the Rathhaus, or town-hall, built in 1580. Other notable features include the new palace, the palace of Prince Henry, the new town-hall, theatre, and the Herrngarten, a fine public garden and park. Darmstadt has some iron foundries, breweries, and other manufactures, and its industries are increasing. Under the empire the court life added greatly to the importance of the city. The chief articles of manufacture are machinery, carpets, hats, tobacco, chemicals, scientific instruments, playing cards, and beer. It owns its own elec¬ tric and gas plants, and its schools, and chari¬ table institutions are numerous for its popula¬ tion. Justus von Liebig, the scientist, was born here in 1803. Darmstadt appears as Darmund-stadt in the 11th century. It acquired municipal rights in 1330 and became in 1567 the capital of Hesse-Darmstadt. It was burned by the French in 1688 and 1693, but attained great prosperity toward the end of the 18th century. Consult Zernin and Worner (Darmstadt und seine Umgebung) (Zurich 1890). Pop. 87,089.

DARMSTADTER BANK, The. The

Darmstadter Bank was established at Darm¬ stadt in 1853 as the Bank fiir Handel und Industrie, but it is from 1856 that its important activities begin. Its initial authorized capital was 25,000,000 florins (say 42,750,000 marks), of which 10,000,000 florins were issued at first. While devoted to the general banking business, its policy has always aimed at main¬ taining the liquidity of its resources and the avoidance as much as possible of long-term en¬ gagements. The deposit business was not systematically encouraged, as the utilization of its own means was held to give greater stability to the institution and to its financial activities. In many respects its policy coincided with that of the A. Schaafhausen'scher Bank-verein. Its charter was modeled after that of the Credit Mobilier, providing <(for the issue of

such bank obligations as, secured indirectly by the newly created industrial enterprises, were to combine the scattered small capitalist forces in the launching of large enterprises.® Up to a very recent period the Darmstadter Bank has been exclusively an institution for the promotion of industry, and relatively un¬ important as a bank for the emission of state, communal, and railway securities. In the pro¬ motion of industrial enterprises, largely through stock issues, the bank from the outset retained large blocks of the shares issued- — a source of incidental financial losses more than counter¬ balanced by the control given to the institution through board membership, in addition to actual dividends. In 1900 the bank decided to

foster the deposit business, there being (1908) 31 deposit offices, of which 16 were in Berlin. From its beginning certain operations were carried on abroad, particularly in Italy, Bel¬ gium, and Austria-Hungary, joining with the Rothschilds and the Kreditanstalt in State and railway finance operations in the last named. Commandites, to promote foreign business re¬ lations, were early established, but without uniform success, as being in advance of their time. As early as 1854 a commandite was formed at New York with the firm of G. vom Baur & Co., and in 1857 and 1867 in Paris and Vienna respectively. In 1908 the whole number of commandites was 4 ; branches, 7 ; establishments, 5 ; and agencies 5 ; all these in Germany. Through subsidiary banks or connections, the Darmstadter Bank has direct representation in The Netherlands, China, Japan, Italy, Belgium, London and Bulgaria; and through communities of interest, stock ownership, board representation, etc., either active or silent, this institution has connec¬ tions with every portion of the German Re¬ public and every foreign land. Board repre¬ sentation is maintained in 92 important in¬ dustrial corporations, many interested in international trade. In 1909 the capital of the Darmstadter Bank was 154,000,000 marks; sur¬ plus, 30,250,000 marks. The capital control of the Darmstadter Bank group amounted (in 1908) to 297,437,490 marks, of which 255,750,000 marks constitute the capital and 41,687,490 marks the surplus. Consult (Die deutsche Grossbanken und ihre Konzentration,* by Riesser, Dr. J. (1909) ; (Germany’s Economic Forces) (1913) ; (Report on Cooperation in American Export Trade* (Washington 1916).

DARNEL, the popular name for Loliwn temulentum, which some suppose to be the Infelix lolium of Virgil and the Zizania (tares) of Scripture. It was believed by the ancients to be poisonous and narcotic. It is common in waste places and fields in America from New

Brunswick to Georgia and northwestward to Michigan. It is remarkably abundant on the Pacific Coast and is generally a troublesome weed. It has been naturalized from Europe. It has been shown that its poisonous properties are due to a peculiar fungus that almost al¬ ways infests the seed.

DARNLEY, Henry Stuart, Lord, husband of the Scottish queen, Mary Stuart : b. Eng¬ land 1546; d. Edinburgh, 10 Feb. 1567. His father, the Earl of Lennox, was descended from a branch of the house of Stuart; his mother, Margaret Douglas, was the daughter of Margaret of England, sister of Henry VIII. Darnley, though devoid of real merit, had, by his personal attractions, won Mary's heart, but it was an unfortunate match ; and ere long gave rise first to coolness, then to open quarrel, and finally to deadly hate. Darnley thought, or affected to think, that her regard for David Rizzio was of a kind which no husband ought to tolerate. He leagued with a body of conspira¬ tors, who, on 9 March 1566, dragged Rizzio from the queen's presence, and murdered him under circumstances of horrid barbarity. About the end of that year. Darnley was seized with smallpox. In January Mary had him conveyed to an isolated house called Kirk of Field, which stood at some distance from Holyrood. This

dwelling, which belonged to a retainer of Bothwell, the rapidly rising favorite, was blown into the air with gunpowder. The dead bodies of the king and his page were found in a field at a distance of 80 yards from the house, quite free from any mark which such an explosion would cause. Previous to this tragedy a son had been born of the marriage, who afterward united the Scotch and English crowns under the name and title of James I of England and VI of Scotland.

DARROW, Clarence S., American lawyer: b. Kinsman,- Ohio, 18 April 1857. He was edu¬ cated in the public schools of Ohio and was admitted to the bar in 1875. For a time he was attorney for the Northwestern Railway. He has been identified with many prominent cases of recent years, notably in suits against monopolies, including protracted litigation against combine in Chicago. He was chief counsel

for the anthracite miners in the anthra¬ cite coal strike arbitration at Scranton and Philadelphia in 1902-03, was counsel in the Debs strike case and in a large number of labor injunction and labor conspiracy cases on the side of labor. In 1902 he was elected mem¬ ber of the Illinois legislature. He has been active in politics as an Independent Democrat. He was counsel for the McNamara brothers in the Los Angeles Times case in 1911 and was indicted for alleged bribery of a juror and a talesman in connection with that case, but was acquitted after a trial which extended over three months. He defended Moyer, Haywood and Pettibone when they were tried for the" murder of Governor Steunenburg of Idaho. Formerly he was a member of the law firm of Darrow, Masters and Wilson, Chicago, and is at present member of the firm of Darrow and Sissman.

DART, a javelin, a short missile weapon thrown by the hand, or impelled by the breath, through a tube. Dart-heads are usually made of iron, but among savage nations flints, sea-shells, fish-bones, and other hard substances have been employed ; and among some of the aboriginal inhabitants of the United States and Africa, the dart was merely a sharp-pointed stick, the end of which was carbonized by fire. The weapon is always very simple in its construction, and is usually' from three to five feet long.

DART MOTH, a name applied to the genus Agrotis, a night-flying moth of destructive hab¬ its, the caterpillar of which is widely known as the cut-worm (q.v.). A European species is the winter dart moth which destroys wheat. The American group includes several species, most of which appear about midsummer.

DARTER, a name given to water birds of a small family (Anhingidce) , found in the south¬ ern United States, in Africa, Asia and Australia. The American species (Plotus anhinga), also called the snake-bird and water-turkey, is espe¬ cially common in Florida, and extends north¬ ward to North Carolina and Illinois. In ap¬ pearance and habits the darter resembles the cormorant, especially in the structure of the feet, wings and tail ; the bill and neck are like those of the heron, the neck, owing to a peculiar anatomical mechanism, being remarkably flex¬ ible. The general color of the body is dark glossy green with silvery gray markings ; .wings and tail bluish-black. The tail is rather long

and consists of 12 narrowly wedge-shaped quills. Their haunts are in low swampy local¬ ities, by the side of murky streams. They gen¬

erally perch on trees whose branches dip into the water. They are the best freshwater divers known, and drop into the water with such surprising skill that the large body makes scarcely any noise, and but little ripple on enter¬ ing the water. When swimming, its body is submerged, and the only part visible is the long neck, writhing about like an aquatic serpent, from which peculiarity its name of snake-bird. Its food consists of small fish, shrimps, young reptiles, leeches, *etc.* The quantity of fish it can consume is enormous ; but, like other birds feed¬ ing on fish and flesh, it can remain several days without food with impunity. It captures fish, not by diving upon them from above, but by pursuing them under water and spearing them with its closed beak. A bulky nest of sticks, roots, etc., is placed in a tree and receives three or four white, chalky eggs.

DARTERS, small freshwater fishes form¬ ing a sub-family of the Percidce (q.v.), from the typical members of which they are dis¬ tinguished by having the pseudobranchise (oper¬ cular gills) imperfect or absent, the margin of the gill-cover smooth, the skull less perfectly ossified, *etc.* They have been described as perches reduced in size and compacted. The Etlieostoviatince are peculiar to North America, where 15 genera and about 80 species occur, mostly in rocky rills and clear mountain brooks too small to be occupied by other fishes. They are among the smallest of fishes, some of the species being less than two inches, and the largest — the so-called log-perch (Percina cap-rodes) of the Great Lake region and Mississippi Valley — only six to eight inches long. The typical and largest genus is Etheostoma. The darters spend most of their time resting on their fins on the bottom, hiding beneath stones or burying themselves in the sand, leaving only the eyes uncovered. Owing to the protective re¬ semblance of their often brilliant markings to the bottom, they are difficult to distinguish. When disturbed, most of the species dart for a short distance with the greatest rapidity, and again settle on the bottom in a quiescent state. These little fishes are among the most interest¬ ing inhabitants of our fresh waters, and a valuable account of their habits will be found in a paper by Jordan and Copeland in the American Naturalist for 1876.

DARTFORD, England, market-town of Kent, in the narrow valley of the Darent River, two miles above its entrance into the Thames, and 17 miles east-southeast of London. Edward III here founded an Augustinian nun¬ nery (1355) ; Saint Edmund's chantry was a great place of pilgrimage ; and at Dartford Wat Tyler began his rebellion (1381). Spiel-man built here the first paper-mill in England (1590). There is considerable manufacturing, chief of which are locomotives and machinery, cotton goods, gunpowder, paper and corn meal, oil

and chemicals. Pop. 23,609.

DARTMOOR, an extensive, rugged, moun¬ tainous tract in England, in the western part of Devonshire, often called the ((Forest of Dartmoor, w but at present having no appearance of a forest, except what is afforded bv some dwarf oaks, intermixed with ash and willow,

reaching from Brent south to Okehampton north, 22 miles, with a breadth of about 20 miles, and occupying about 140,000 acres. In the centre of the moor there is an extensive swamp in which the rivers Dart, Teign, Taw, Yealm, Erme and a great number of smaller streams have their source. Cattle and sheep are fed on the coarse grass during the summer months. In the winter the storms from the Atlantic sweep over it and it would be difficult to imagine a more desolate-looking place. Sev¬ eral of the rugged granite hills (here called Hors®) are of considerable height, Yes Tor rising 2,050 feet above the plain. The district is noted as being the site of a prison built in 1809 for the custody of the French prisoners of war. At one time it contained 10,000 inmates. It is now fitted up for the reception of convicts. Experiments made in cultivating the moor by convict labor have turned out successful. The quarries to the west of the prison also give employment to convict labor. The large kaolin-works and a meteorological ob¬ servatory are at Lee Moor. Dartmoor offers considerable attraction to the tourist and nat¬ uralist. Druidical and other aboriginal remains may be traced, especially Gray Wethers, which is thought to have been a Druidical temple. The dolmens, cairns and other indications of an ancient town are found at Drewsteignton. Since 1337 Dartmoor has been part of the duchy of Cornwall.

DARTMOOR MASSACRE, The, 6 April 1815. During the War of 1812 the American naval prisoners of the British, with impressed American seamen discharged from British ves¬ sels, were collected at Dartmoor military prison. On 31 March 1815 they numbered 5,693, includ¬ ing about 1,000 negroes. They had heard of the Peace of Ghent, 24 Dec. 1814, and expected immediate release; but the British government refused to let them go on parole or take any steps till the treaty was

ratified by the Senate, 17 Feb. 1815. It took several weeks for the American agent to secure ships for their trans¬ portation home and the men grew very im¬ patient. On 4 April the dishonest food con¬ tractor attempted to work off some damaged' hardtack on them in place of soft bread and was forced to yield by their insurrection, and the commandant, Capt. T. G. Shortland, sus¬ pected them of a design to break jail. This was the reverse of truth in general, as they would lose their chance of going on the cartels; but a few had made reckless threats of the sort and the commandant was very uneasy. About 6 p. m. of the 6th he discovered a hole from one of the five prisons to the barrack yard near the gun-racks. Others had been begun, apparently for pastime. Some prisoners were outside the guard railing noisily pelting each other with turf, and many more near the breach (and the gambling tables), though the signal for return to prisons had sounded; altogether he was con¬ vinced of a plot, and rang the alarm bell to collect the officers and have the men ready. This luckless precaution brought back a crowd just going to quarters; just then a prisoner broke a gate-chain with an iron bar and a num¬ ber pressed through to the prison market square ; and after attempts at persuasion, Shortland ordered a charge which drove part of the prisoners in. Those near the gate, however,

hooted and taunted the soldiery, who fired a volley over their heads ; the crowd yelled louder and threw stones, and the soldiers, probably without orders, fired a direct volley which killed and wounded a large number. Then, losing their heads, they followed the throng of prisoners struggling frantically to get within the prison doors, shooting them down as they went, some even going up to the doors and firing in; while others ran up to the walls and fired into the fleeing knots below. Finally the captain, a lieutenant and the hospital surgeon (the other officers being at dinner) suc¬ ceeded in stopping the murder and caring for the wounded — about 60, 30 seriously, besides seven killed outright. The affair was examined by a joint commission, Charles King for the United States and F. S. Larpent for Great Britain, who agreed in exonerating Shortland, justifying the first firing, blaming the subsequent and pronouncing the culprits undiscoverable. The British government provided for the fami¬ lies of the killed, pensioned the disabled and promoted Shortland. Consult Charles Andrews, (The Prisoners' Memoirs; or Dartmoor Prison*; Cobb, (A Green Hand's First Cruise, Together with Five Months in Dartmoor.*

DARTMOUTH, Canada, a town on the Chebucto River, one mile east of Halifax Har¬ bor, on the Intercolonial Railway. It was founded by

British settlers in 1750, and was for a number of years the centre of a whale-fishing industry which was established by a colony of Nantucket Quakers after the American Revolu¬ tion. It is connected by ferry with Halifax, and has iron foundries, shipbuilding and repair¬ ing, fish cannery, rolling mills, cordage manu¬ factory and sugar refining. Pop. 5,058.

DARTMOUTH COLLEGE, a seat of learning in Hanover, N. H., which received its charter in 1769 and opened its doors the follow¬ ing year under the presidency of Eleazer Wheelock, D.D. It grew out of an earlier school established by Eleazer Wheelock in Lebanon, Conn., and was intended for the education of Indian children. The idea of this school had been suggested to him by his success in edu¬ cating a young Mohegan Indian, Samson Occom, who became a remarkable preacher. Other pupils from several Indian tribes were after¬ ward received and the school became an object of public attention and interest. In 1754 a farmer named Joshua Moor gave a house and two acres of land for the purposes of the institution, which was from this time known as Moor's Indian Charity School. Occom, accom¬ panied by the Rev. Nathaniel Whitaker, visited England to collect funds ; a sum of over $50,000 was subscribed and a board of trustees was there organized, of which Lord Dartmouth, one of the subscribers, was made president. The school was so much resorted to by the native tribes that Dr. Wheelock determined to transfer to some place near to them. Many offers of situations were extended to him, but he selected the town of Hanover, on the Connecticut River, in the western part of the State of New Hamp¬ shire, and grants of about 44,000 acres of land were made to him. The institution was char¬ tered by Governor Wentworth under the name of a college, with all the privileges and im¬ munities of any university within the British realm, and was called Dartmouth College in

DARTMOUTH COLLEGE

I1? ‘ V -Jp

jSSSftfnSk • mr§-

IBr-fyw .. a

J-. . 1

of, •jl

ipplil & . yfˆMn

./{ imm- \

SKI ™

ˆpnti

1 Wilson Library

2 Faculty Avenue

honor of the Earl of Dartmouth. Moor's school soon afterward obtained an independent charter and remained as an academical or preparatory-department until 1849. It maintained a le£al existence until 1915, when by a decree of the court it was consolidated with the college. In

1770 Dr. Wheelock removed his family and school, consisting of 18 whites and 6 Indians, from Lebanon to the wilderness of Hanover, where the whole colony lived in log huts. In

1771 the first class of four students was grad¬ uated. President Wheelock retained his office till his death in 1779, and was succeeded by his son, John Wheelock, who, in 1782, was sent by the trustees to Europe to promote the interests of the college ; and through introductions by General Washington, Dr. Franklin and John Adams he obtained considerable sums of money, philosophical instruments and other valuable donations. William, Prince of Orange, was one of the donors. Wheelock returned in 1784, and after a presidency of 36 years was removed from the office by the trustees, in 1815. This act, which had its origin in a local religious controversy, led to a conflict with the legislature of the State ; that body claimed the right to amend a charter of which it was the guardian, and in 1816 passed acts creating a new cor¬ poration, in which the property was vested, and changing the title of the college to Dartmouth University. The old trustees began a suit for the recovery of the college property. (See Dartmouth College Case). Wheelock, who was succeeded as president of the college by Francis Brown, was raised to the presidency of the university, in February 1817, by the trustees of that institution, but died within two months. He was succeeded by William Allen, D.D., and in 1819 the ((College Case® was decided in favor of the college, when the university disbanded.

Dartmouth College still remains an institu¬ tion for men only. It comprises, besides the regular classical department : the medical school, founded in 1798; the (<Chandler School of Science,® established in 1851, by the trustees, on the receipt of a bequest of $50,000 from Abiel Chandler, who left it to them in trust ((for the

establishment and support of a per¬ manent department or school of instruction in the college, in the practical and useful arts of life.® The course in this school, leading to the degree of bachelor of science, covered four years and included courses in general science, political science, modern languages, mathematics and history, was incorporated into the college in 1893 and is now known as the Chandler scientific course. Another department is (<The Thayer School of Civil Engineering,® founded in 1867 by Sylvanus Thaver, a graduate of Dartmouth. This is a graduate school, com¬ prising a two years' course in civil engineering. The government of this school is vested in a board of five overseers, of whom one is the president of Dartmouth College. In 1900 the trustees created the ((Amos Tuck School of Administration and Finance,® according to the terms of the Amos Tuck Endowment Fund, the gift of $300,000 by Mr. Edward Tuck, of the class of 1862, as a memorial to his father, of the class of 1835. This school is postgraduate in nature and is established in the interest of college men who desire to engage in affairs rather than enter the professions. The report

of the college for 1915 gives the following statistics: Officers of administration and in¬ struction, 130; number of students, 1,468; volumes in library, 125,000, and 20,000 pamphlets ; the value of the college plant, $2,000,000, with $750,000 additional invested in dormitories ; the value of the endowments, $4,000,000.

DARTMOUTH COLLEGE CASE, The.

The Dartmouth College Case is the name by which is commonly known the action entitled Trustees of Dartmouth College v. Woodward, which is repeated in volume four of Wheaton's (United-States Supreme Court Reports. > Per¬ haps no decision ever rendered in any tribunal has attracted more attention or exerted a greater influence over the legislative and judi¬ cial history of our land than has the decision in this case, which arose as follows :

In the year 1769. the Rev. Eleazar Whee¬ lock, aided financially and politically by friends in England and America, conspicuous among whom was the Earl of Dartmouth, and with the assistance of the Province of New Hampshire, given in the form of extensive land grants, founded Dartmouth College under a charter from King George III of England. This charter vested the control of the institu¬ tion in a board of trustees, who were designated by Mr. Wheelock to manage the same, and under the management of those trustees so in¬

corporated and their successors the college grew and prospered until the year 1816, when the State legislature passed an act amending its charter by which they curtailed the power of its trustees, changed its name to Dartmouth Uni¬ versity and made it a State institution subject to State control. For protection against this infringement of their powers, the trustees had recourse to the courts in the now famous case above named.

In the State tribunals the decision went against the college trustees and an appeal was taken to the Supreme Court of the United States, the appeal being based upon the theory that the charter granting the control of the college to the trustees was a contract, that un¬ der Section X of Article 1 of the Federal Con¬ stitution no State can pass an act impairing the obligation of any contract, and that the said act of the New Hampshire legislature violated the contract of the charter of Dartmouth College.

It should be remembered that in 1819 when the case came up for final hearing, the popular views of the scope and effect of the National Constitution were far from harmonious. All then regarded that instrument as the greatest existing governmental compact, but the Repub¬ lican party then in power demanded that it be so strictly construed as to preserve unimpaired the rights and powers of the individual States. On the other hand, there then-presided over the Federal Supreme Bench, in the person of John Marshall, one of the <(midnight appointees® of John Adams, the last President of that Federal¬ ist party which demanded so liberal a construc¬ tion of the instrument as to give the country a strong national government. Of the section of the Constitution invoked, we may safely say with Ordronaux that <(Drafted at a time when commerce was in its infancy; when public credit was depreciated to the lowest ebb ; and confi¬ dence in monetary transactions almost de¬ stroyed, it was manifestly introduced as a

barrier against the tide of repudiation which threatened to overwhelm both public and pri¬ vate credit.® The framers of the Constitution never intended that clause to be given the in¬ terpretation urged in this. case. But the case was up before a court presided over by the jurist who has been truthfully said to have <(found the Constitution a skeleton and clothed it with flesh and blood.® Therefore, when it was clearly shown, as it was in the celebrated argument of Daniel Webster for the college trustees, that this case came fairly within the provisions of that section, in principle, the court, guided by John Marshall, held that the act of the New Hampshire legislature was void be¬ cause it impaired the obligation of a contract. Justice Duvall alone dissented.

This decision has perhaps been more severely criticized and has perhaps given rise to more strenuous efforts to escape its consequences than has any other decision of the tribunal which rendered it, and the reasons are obvious. While it gave assurance that capital invested in char¬ tered business and charitable ventures would be forever protected from legislative interference, it also invited political corruption by saying in effect to promoters of corporations that the courts would protect them in the possession of every concession or right which they beguiled from pliant legislative bodies. It made possible the mechanical and industrial achievements of the 19th century in this country, but it also made profitable the limitless corruption which has at¬ tended those achievements and which has fre¬ quently, by virtue of this decision, stripped the government of very important powers.

But the correctness of a judicial decision is not to be gauged by its influence for weal or woe. Rather should that be determined by its conformity to the Constitution, the statutes and the judicial precedents upon which it rests and the approval given it by later decisions. Judged by this test we must hold that Marshall and his colleagues decided well in the Dartmouth Col¬ lege Case. The Supreme Court of the United States had early laid down the rule that there are certain vital principles of republican govern¬ ment which will overrule a flagrant and appar¬ ent abuse of legislative power. It had in the year 1810 declared a law granting land to pri¬ vate companies to be in effect a contract which could not be so repealed as to impair the obliga¬ tion of that contract. If the passage of the law were procured

by fraud the court there doubted its power to declare it void for those reasons, but if that power existed it could be exercised only under those rules of law and equity which govern private transactions. Two years later there came before the same court a case involving a somewhat similar question. The State of New Jersey had traded land with an Indian tribe and had, by legislative enact¬ ment, provided that the Indians should forever hold the lands received by them free from tax¬ ation. With the consent of the State they sold their lands and, the question being properly presented, the court held that the law granting the exemption was a contract, that the exemp¬ tion ran with the land and that the purchasers from the Indians enjoyed the same exemption.

By the decision in the Dartmouth College Case the rules laid down in the foregoing cases were followed and their application extended to contracts in charters of incorporation, but their

force when so applied had already been limited by another line of decisions. In 1804 Chief Justice Marshall, speaking for the court, had said that the charter gives to a corporation all of the powers it possesses and no powers not granted can be exercised. A little later he had decided that there is a difference between a grant of corporate existence and a grant of peculiar remedies. The first is general. The second can only be exercised in those courts which the power bestowing the privilege can regulate. Moreover, as the bank charter in¬ volved in that case contained a clause making it a felony to counterfeit its notes, the court be¬ lieved it to be a public act and subject to repeal by succeeding legislatures. And in the year 1819 the same court had decided that the right to use a peculiar form of attachment granted in its charter to a bank could be taken away at any time because (<The forms of administering jus¬ tice and the duties and powers of the courts as incident to the exercise of a branch of the sov¬ ereign powTer must ever be subject to the legis¬ lative will and the power over them is inalien¬ able so as to bind subsequent legislatures.®

It is thus made fully apparent that the Dart¬ mouth College Case decided only that if a legis¬ lative grant, whether made in the form of a charter of incorporation or in any other form, conveyed to private citizens that which the leg¬ islature had power to contract away, the grant so made was a contract and no succeeding legis¬ lature could rescind the same without following the same rules which govern the rescission of private contracts. But if there is any doubt that such was

the understanding of the chief justice who wrote the opinion of the court in that case, the same will be removed by a con¬ sideration of certain later decisions in which he participated. In the year 1821 the court over which he presided decided that Congress had power to incorporate a lottery to do business beyond the limits of the District of Columbia, yet, where no mention was made thereof in the charter, it would not be presumed that Congress had done so and had thereby deprived the States of their power to regulate lotteries by prevent¬ ing the sale of tickets within their boundaries. In the same year the same court decided that a town government cannot contract away its leg¬ islative power. And in the case of Providence Bank v. Billings, the court presided over by Marshall decided that while a State might, through its legislature, grant immunity from taxation, it could not be presumed to have done so, and that, in the absence of any agreement to the-contrary, it might tax to death a franchise which it had itself granted.

But the effect of the Dartmouth College de¬ cision was not fully understood at the time of its rendition and the States eagerly availed themselves of a suggestion found in the decision itself to the effect that if they wished the right to amend, alter or repeal charters granted by them they must expressly reserve that power. Such a reservation, whether expressed in the charter itself, the Constitution or the general laws of the State, has been held to have the effect of ((placing the State legislature back on the same platform of power and control over the charter containing it, as it would have oc¬ cupied had the constitutional restriction never existed.® Yet the later decisions hold that this reserve power must be reasonablv exercised.

The alterations must be made in good faith and consistent with the objects and scope of the act of incorporation. Sheer oppression and fraud cannot be inflicted under the guise of amend¬ ment or alteration. This power cannot be so employed as to defeat or substantially impair the object of the grant or any right which has become vested under it. Where this power has been reserved, a State may tax property which it has forever exempted from taxation, but the taxes must not be greater than those imposed upon other property. It can regulate the charges of common carriers, but no such legislation must amount to the taking of private property for public purposes without due process of law. We thus see that not only was the Dart¬ mouth College decision as moderate as any of the later cases which have been said to have practically overruled it, but that even where reservations in charters have obviated the effect of that decision the later courts have reached a similar conclusion by a different chain of logic.

Bibliography. — Cook, (The Corporation Problem 5 ; Cooley, (Constitutional Limitations) ; Curtis, (Life of Daniel Webster > ; Hitchcock, Constitutional Development of the United States as Influenced by Chief Justice Marshall5 ; Morawetz, (Private Corporations5 ; Kent, Commentaries on American Law5 (Bos¬ ton 1884) ; Maine, (Popular Government (Lon¬ don 1885) ; Pomeroy, (Introduction to the Con¬ stitutional Law of the United States5 (Boston 1886) ; Shirley, Che Dartmouth College Causes and the Supreme Court (Saint Louis 1879) ; Story, (On the Constitution (Boston 1891) ; Tiedeman, Che Unwritten Constitution of the United States) ; Von Holst, Constitu¬ tional Law of the LInited States5 ; Walker, Che Dartmouth College Case.5

S. V. Wright,

Attorney, San Luis Obispo, Cal.

DARTON, Nelson Horatio, American geologist: b. Brooklyn, N. Y., 17 Dec. 1865. He received a common school education and became an analytical chemist and geologist. In 1886 he became geologist to the

United States Geologi¬ cal Survey, from which in 1910 he was trans¬ ferred to the post of geologist to the Federal Bureau of Mines of the Geological Survey. In 1912 he again became geologist to the United States Geological Survey. His chemical re¬ searches were on sugar refining, tannic acid and water analysis ; the latter led to the elimi¬ nation of 300 polluted pump wells in Brooklyn. He is a specialist in geology of underground waters, and much of his later work consists of government reports on artesian conditions and structural materials. He edited the Survey's first bibliography of North American geology from 1732 to 1891 in (Survey Bulletin 127 5 (1906), and has published many articles in magazines and scientific journals.

D'ARUSMONT, da-rus-mon, Madame Frances (maiden name Fanny Wright), American philanthropist and author : b. Dundee, Scotland, 6 Sept. 1795; d. Cincinnati, Ohio. She married M. d'Arusmont in 1838, but the marriage was not a congenial one and her later years were spent in the United States. She lectured extensively on social, religious and political questions. Among her works _ are (Views on Society and Manners in America) ; f Altorf,5 a tragedy (1819) ; (Lectures on Free Inquiry5 (1836).

DARWAR, dar'war, or DHARWAR,

India, (1) town and fortress in the presidency of Bombay, 285 miles southeast of Bombay city, capital of a district of the same name. The town exports cotton and rice. It is connected by railroad with Goa, the Portuguese colony, and with other places. Pop. (1911) 30,289. (2) The district of Darwar has an area of 4,602 square miles. The soil and climate are well adapted to the cultivation of cotton. The climate is about the healthiest in the Bombay presidency. Pop. about 1,100,000.

DARWEN (till 1889 Over Darwen), Eng¬ land, a municipal borough in the northeast of Lancashire, four miles south of Blackburn. The staple manufacture is cotton. The other manu¬ factures are paper, iron castings, machinery, earthenware, *etc.* Coal and stone are abundant in the neighborhood. Water, gas, electric light¬ ing and tramways are municipally owned. Pop.

40,322.

DARWIN, Charles Robert, English nat¬ uralist: b. Shrewsbury, 12 Feb. 1809; d. Down, Kent, 19 April 1882. His father, Robert Waring

Darwin, was a distinguished physician of that town, the son of a still more distinguished father, Erasmus Darwin (q.v.). He was edu¬ cated at Shrewsbury School, and at the universi¬ ties of Edinburgh and Cambridge. He early devoted himself to the study of natural history and in 1831 was appointed naturalist to H.M.S. Beagle, then about to sail on an extended sur¬ veying expedition. He served without salary and paid a portion of his expenses on condition of having at his own disposal such collections of specimens as he might make during the voyage. The vessel sailed in December 1831 and did not return till October 1836, after having circum¬ navigated the globe. Darwin came home with rich stores of knowledge, part of which he soon gave to the public in such works as his (Journal of Researches into the Natural History,5 *etc.* (1839), of the countries visited; the (Zoology of the voyage of H.M.S. Beagle 5 (1840-42); Structure and Distribution of Coral Reefs5 (1842) ; (Volcanic Islands5 (1844) ; (Geological Observations5 (1844-46). Although known among naturalists as a man of distinguished ability, to the general public his name was not familiar, when all at once it attained a celebrity second to none by the publication in 1859 of (The Origin of Species by Means of Natural Selection.5 This work, scouted and derided though it was at first in certain quarters, may be said to have worked nothing less than a revolution in biological science. In it for the first time was given a full exposition of the theory of evolution as applied to plants and animals, the origin of species being explained on the hypothesis of natural selection. The central idea of the work is that all forms of organic life are derived from a small number of primitive types, and that all the vast variety of vegetable and animal organisms now existing, or having formerly existed, have owed their origin to the slow and gradual operation of the modi¬ fying influence of local or special causes trans¬ mitted hereditarily; such formsˆ as best suit any particular time and locality being selected and adapted by the action of natural laws for that time and locality. The theory of evolution was warmly taken up by some of the ablest men of science, and now there are few who have not

in whole or in part given their adhesion to the principle. The rest of his works are largely based on the material he had accumulated for the elaboration of the great theory. (See Dar¬ winian Theory; Origin of Species, The). The principal are a treatise on the (Fertilization of Orchids5 (1862) ; (Movements and Habits of Climbing Plants5 (1864) ; (The Variations of Animals and Plants under Domestication5 (1868) ; (Descent of Man and Selections in Re¬ lation to Sex5 (1871) ; (The Expression of the Emotions in Man and Animals5 (1872) ; (In¬ sectivorous Plants5 (1875) ; (Cross and Self-Fertilization5 (1876) ; 'Different Forms of Flowers5 (1877) ; 'The Power of Movement in Plants5 (1880) ; 'The Formation of Vege¬ table Mould5 (1881) ; the last dealing ex¬ haustively with the common earth-worm. Dar¬ win was buried in Westminster Abbey. Consult (Life and Letters of Charles Darwin5 (1887) by his son, Francis Darwin; (More Letters of Charles Darwin (1905) ; and volumes pub¬ lished on the occasion of his centenary (1909), foundations of the Origin of Species5 ; fifty Years of Darwinism5 (by American authors) ; and (Darwin and Modern Science5 (by foreign authors).

DARWIN, Erasmus, English physician and poet: b. near Newark, Nottinghamshire, 12 Dec. 1731 ; d. near Derby, 18 April 1802. Set¬ tling at Litchfield, he acquired a great reputa¬ tion and an extensive practice. His son, Robert, was the father of the famous Charles Darwin. Erasmus Darwin's name is chiefly remembered for his poem of 'The Botanic Garden,5 which is comprised in two parts. The first treats of the 'Economy of Vegetation5 (1792), the second of the (Loves of the Plants5 (first published in 1789). It was received with much favor; but a very ingenious parody, entitled (The Loves of the Triangles,5 published in the Anti-Jacobin (and written either by Canning or Frere), greatly damaged its popularity. In 1794 Dr. Darwin published the first volume of 'Zoono-mia, or the Laws of Organic Life5 ; the second volume, completing the work, appeared two years afterward. In 1799 he published f hytologia, or the Philosophy of Agriculture and Gardening.5

DARWIN, Sir Francis, English botanist: b. Down, Kent, 16 Aug. 1848. He is the son of Charles Robert Darwin (q.v.) ; was educated at Trinity College, Cambridge, and studied medi¬ cine at Saint George's Hospital in London. He did not practise medicine but assisted his father in his work at Down and was later made reader in botany at Trinity College. His works include fife and Letters of Charles Darwin5 (1887) ; 'Charles Darwin5 (1892) ; 'Practical Physi¬ ology of Plants5 (with E. H. Acton, 1894) ; flements of Botany5 (1895) ; 'More Letters of Charles Darwin5 (with Seward, 1903) ; foundations of the Origin of Species5 (1909). He was knighted in 1913.

DARWIN, Sir George Howard, English scientist: b. Down, Kent, 9 July 1845; d. 7 Dec. 1912. He was the eldest son of Charles Robert Darwin (q.v.) ; was educated at Cambridge, studied law and was admitted to the bar but did not practise. He was a fellow of Trinity Col¬ lege, Cambridge, 1868-78; was a member of the expedition to Sicily to observe the eclipse in

1870-71 ; and was appointed Plumian professor of astronomy and experimental philosophy at Cambridge in 1883. Among his writings are (Small Deflections of the Plumb Line due to the Movement of the Earth5 ; (Periodic Orbits 5 (1896) ; 'Tides and Kindred Phenomena in the Solar System5 (1898) ; Scientific Papers5 (1907), *etc.* He was created K. C. B. in 1905.

DARWINIAN THEORY, the explanation of the working of natural selection in effecting specific changes in plants and animals. "Dar-winism55 must not be confused with <(Evolution.55 The term Darwinism is applied to one particu¬ lar interpretation of the mechanism of the uni¬ verse, and is summarized in Darwin's great work, 'The Origin of Species by Means of Natural Selection.5 Whatever may be the future development of our evolutionary ideas, the epoch-making importance of the Darwinian theory will be unaltered.

Outline of Origin of Species. — To gain an insight into the means of modification, Darwin begins with a study of the variation of plants and animals under domestication. Those who admit the unity of domestic races should be cautious in denying the unity of the wild ones. Domestic races all exhibit .adaptations to man's use or fancy, rather than to their own good. The key to this is man's power of selection. Nature gives successive variations, man accumu¬ lates these, so making for himself useful breeds, and often (for example, in sheep, cattle, roses, dahlias) profoundly modifies their character even in a single human lifetime; so that in all the characteristics to which he pays attention they may differ more than the distinct species of the same genera. Unconscious selection, which results from everyone trying to possess and breed the best animals, is even more im¬ portant than conscious selection. Two flocks of Leicester sheep kept equally pure appear quite different varieties after 50 years. Such slowly accumulated change explains why we know so little of the origin of domestic races; and its absence in regions inhabited by uncivil¬ ized man explains why these yield no plants worth immediate culture. Human selection is facilitated (1) by the keeping of large numbers,

since variations will be more frequent; and (2) by preventing free intercrossing. Some species vary more than others.

Variation under Nature. — No two blades of grass are alike, and far more marked dif¬ ferences often occur, several strains-or varieties sometimes existing in the same species. Between these strains, and even between forms which systematic botanists and zoologists rank as true species, perfectly intermediate forms may occur. No agreement about the definition of species (the amount of difference necessary to give any two forms specific rank) has ever been reached. It is an interesting fact, however, that closely allied species often differ in their chromosome number. Individual differences are of the high¬ est importance as the first steps toward the slightest varieties worth recording; these in turn toward more distinct and permanent varieties; these varieties again toward sub-species, and in the next stage to species, though extinction may often arrest the process. The species which present most varieties are those which have the greatest geographical range or the widest dif¬ fusion in their own territory, or which possess the greatest number of individuals.

-

.

-

Struggle for Existence. — All organic beings tend to increase with extreme rapidity, so that il they were not kept down the earth would soon be covered by the progeny of a single pair. Since organisms are reproducing themselves so rapidly, and not all their offspring can escape their enemies, get food and live, much less leave progeny in turn, there must in every case be a struggle for existence, either of one individual with another of the same species, with the in¬ dividuals of distinct species, or with the physical conditions of life; often with all these at once, and that more or less intensely throughout the whole duration of life. The checks which pre¬ vent increase are more obscure and vary in each case. In all cases the amount of food gives the limit. The youngest organisms generally suffer most. The stock of game on an estate depends chiefly on the destruction of vermin. Climate is important and periodic seasons of extreme cold and drought seem the most effective of all checks. Epidemics too may occur, especially where numbers have inordinately increased. The struggle for life is most severe among in¬ dividuals and varieties of the same species and among the species of the same genus, since these tend to fill the same place in the economy of nature. The structure of every being is related to that of the others with which it competes, or from which it seeks to escape, or on which it preys.

Natural Selection. — The natural process which results in the preservation of favorable variations and the elimination of injurious ones, is termed by Darwin ((Natural Selection,® or less figuratively by Spencer, the (<Survival of the Fittest.® No country can be named where the native inhabitants are perfectly adapted to their conditions and competitors, for as some foreign¬ ers have taken firm possession in every country, we may safely conclude that the natives might have been modified with advantage to resist them. Human selection acts only for man's own good on mere external and visible charac¬ ters, and irregularly throughout a short period ; natural selection acts for the good of the being itself, on the whole machinery of its whole life, and incessantly on the species, throughout almost infinite time. It leads to the improve¬ ment of each creature in relation to its organic and inorganic conditions of life, and conse¬ quently in most cases to

what must be regarded as an advance in organization. The circum¬ stances favorable to the production of new forms are great variability, large numbers of individuals, the complex effects of intercrossing, isolation in small areas, also extension over continental ones, especially if these vary in alti¬ tude or climate, and considerable lapse of time. Rare species are shown to be in process of extinction. The divergence of character in domestic breeds, largely due to the fact that <(fanciers do not, and will not, admire a medium standard, but like extremes,® applies throughout nature from the circumstance that the more diversified the descendants from any one species become in structure, constitution and habits, by so much will they be better enabled to seize on many and widely diversified places in nature and so to increase in numbers. A carnivorous animal which has reached the maximum num¬ bers its territory can support, cannot succeed in increasing unless its varying descendants seize places hitherto occupied bv other animals.

This must hold equally true of all species and is separately demonstrated for plants. The greatest amount of life can be .supported by help of proportionally great diversification of struc¬ ture; hence in small areas where competition is severe the inhabitants are extremely varied.

Sexual Selection. — Not merely do individ¬ uals struggle for existence, but the males strug¬ gle for the females and the most vigorous tend to leave most progeny. Several weapons offen¬ sive and defensive, like the cock's spurs, the stag's horns or the lion's mane, are used in this struggle, and the most useful variations are those which are transmitted. Just as man can in a short time give beauty to his domestic birds, so there is no reason to doubt that female birds, in thousands of generations by selecting, as they are observed to do, the most melodious or beautiful males, might produce a marked result, and many sexual differences are thus explained.

Laws of Variation. — The same laws appear to have acted in producing the lesser differences between varieties of the same species, and the greater differences between species of the same genus. Specific characters are more variable than generic and varietal than either. Rudimen¬ tary organs and secondary sexual characters are variable. Zebra-like stripes on horses or wood-pigeons' markings on fantails, tumblers, etc., may be explained as revisions toward their ancient progenitors.

Geological Succession of Organic Beings.

— The most ancient forms differ widely from those now living, yet frequently present charac¬ ters intermediate between groups now widely divergent and resemble the embryos of the more recent and more highly specialized animals be¬ longing to the same classes. These and the important law of the succession of the same types within the same areas during the later geological periods, and most notably between the Tertiary Period and the present time, cease to be mysteries and become at once thoroughly intelligible on the principle of inheritance and on that alone. Darwin's belief that the distinct¬ ness of birds from all other vertebrates was to be accounted for by the extinction of a long line of progenitors connecting them with rep¬ tiles, was in 1859 a mere assumption, but in 1862 the long-tailed and palpably reptilian bird Archaeopteryx was discovered, while in 1875 the researches of Marsh brought to light certain cretaceous birds, one with teeth set in a groove, the other with teeth in sockets and with bi¬ concave vertebrae. Besides these reptilian birds, bird-like reptiles have similarly been forthcom¬ ing, and the hypothesis of Darwin is thus ad¬ mirably verified.

Geographical Distribution. — Neither the similarity or the dissimilarity of the inhabit¬ ants of various regions, whether of land or sea, can be accounted for by identity or differences of climate or other physical conditions ; but both are related in the most striking degree to the absence or presence of barriers to migration between those regions.

. Morphological Arguments. — The physiolog¬ ical and distributional lines of argument fur¬ nished by morphology are mainly four, and are derived from (a) Classification, (b) Homol¬ ogies, (c) Embryology, (d) Rudimentary Or¬ gans. The great fact of classification is that organic beings throughout all time are arranged

in groups subordinated under other groups, individuals under varieties, and these again under species ; species under genera ;

genera under sub-families, families and orders, and all under a few grand classes. The nature of all these relationships established by naturalists re¬ ceives a simple and natural explanation on the view of the common descent of allied forms with modification through variation and natural selection, no other explanation ever having been attempted. The element of descent is already used in linking all the sexes, ages, forms and varieties of the same species, widely though these may differ from each other in structure.

The members of the same class, independ¬ ently of their habits of life, resemble one an¬ other in their general plan of organization. Thus the hand of man, the digging-paw of the mole, the leg of the horse, the paddle of the porpoise and the wing of the bat, are all con¬ structed on the same pattern, bone correspond¬ ing to bone. This conformity to type is ((powerfully suggestive of true relationship, of in¬ heritance from a common ancestor'* ; and ad¬ mits of a simple explanation in terms of the evolutionary theory, thus strengthening that theory.

Serial Homology is that unity of type which is found on comparing the different parts and organs in the same individual. The complex and varied jaws and legs of a lobster, or the different leaves, sepals, petals, stamens and pis¬ tils of a flower are all found to be modifications of a simple leaf-organ respectively. Not only are such metamorphoses apparent on compari¬ son, but they can be actually observed during the development of each individual. So closely do the embryos of the most distinct species be¬ longing to the same class resemble each other, that even Von Baer was unable to decide whether two unlabeled specimens were lizards, birds or mammals. The process of development goes from the general to the special; thus there is generally an advance in organization. In pe¬ culiar conditions degeneration may occur. All these facts are explained on the principle of suc¬ cessive slight variations not necessarily or gen¬ erally supervening very early in life and in¬ herited at a corresponding period ; hence it is in the highest degree probable that most embryonic stages show us more or less completely the pro¬ genitor of the group in its adult state; and em¬ bryology thus rises greatly in interest. Darwin points out that the theory of evolution by natu¬ ral selection is no more inimical to religion than is that of gravitation, to which the same ob¬ jection was raised. Since the researches of the last two decades on heredity (q.v.) have brought to light the fact that variations are not in gen¬ eral infinitesimal, but are in general rather of the nature of mutations, the discussion of natural selection has entered on a new stage. The periods which were formerly believed to be essential for the differentiation of a species have been shown to be far too large. On the other hand, the problem how a series of what are

apparently arbitrary jumps can lead to the development of such a perfectly adapted organ as a wing is exceedingly difficult to explain, more particularly as it appears that the number of mutations of which an* organism is capable, though great, is predetermined in the chromo¬ somes (q.v.) of its cells. This fact has led certain biologists to have recourse to the theory

of the inheritance of acquired characteristics, which, indeed, was not foreign to the views of Darwin. The weight of evidence, however, seems to oppose this theory. See Evolution, Theories of; Heredity; Genetics.

Bibliography. — Dewar, D., & Finn, F., (The Making of Species* (London 1909) ; (Fifty Years of Darwinism : Modern Aspects of Evolu¬ tion (New York 1909) ; Fiske, J., Darwinism and Other Essays* (Boston 1888) ; Kellogg, V. L., (Darwinism To-Day* (New York 1908) ; Romanes, G. J., (Darwin and After Darwin *(London 1893-97) ; Schmidt, E. O., (The Doc¬ trine of Descent and Darwinism) (London 1891) ; Schurman, J. G., (The Ethical Import of Darwinism* (New York 1893) ; Spiecker-mann, A., Das Darwinism Played Out?) (Gettysburg, Pa. 1908) ; Thomson, J. A., Dar¬ winism and Human Life* (New York 1910) ; Wainwright, L., Scientific Sophisms (New York 1883) ; Wallace, A. R., (The Present Posi¬ tion of Darwinism* (London 1908) ; Stallcup, J. S., (A Refutation of the Darwinian Concep¬ tion of the Origin of Mankind) (Tacoma 1913).

DARWINIAN TUBERCLE, a small raised portion, or tubercle, that may be found on the pinna of the ear. It is said to be pres¬ ent in a number of the primates and by many scientists has been regarded as an evidence of degeneracy in mankind. Different forms of Darwinian tubercles are described by anthro¬ pologists, but they have no real special signifi¬ cance.

((Katie of Heilbronn*). This romantic drama by Bemt Heinrich von Kleist, first produced in 1810, long remained one of the favorities in German theatrical repertory. It is the most romantic work of its author, himself per¬ haps the most romantic of Germany's poet-dramatists, and is a representative product of (Storm and Stress *in individual and national life. Goethe, who was director of the theatre at Weimar when it was written, refused, at first, to present it, calling it (<a jumble of sense and nonsense,** and an abstract criticism of the play amply justifies his judg¬ ment. Yet the work has undeniable charm and merit in spite of its faults, or perhaps because of them, since its very exaggeration of romance in situation, characterization and poetic fervor is what has given it its vogue. The quick shifts from darkness to light, from verse to prose, the contrast between the luminous Katchen who sacrifices everything for love and her wicked rival Kunigunde are typical of Kleist, both of his work and of his life. He himself called <(Katchen von Heilbronn** the obverse of <(Penthesilea,** the Amazon-feminist heroine of an earlier play, ((her opposite pole, a creature as powerful through submission as Penthesilea is through action.** It is as a type like Griselda that Katchen survives, not as a story, for the tale of her blind devotion to Graf Wetter von Strahl, of the intrigue and mystery and treachery that bar her path and of her final emergence as a lost Kaisers-tochter are too well-worn for distinction.

Edith J. R. Isaacs.

DASHEEN, a plant of the genus Colocasicv of the Arum family. The plants are cultivated for their starchy roots which are cooked and eaten much like the common potato. In recent

years they have been introduced and grown ex¬ tensively in the southern United States. They thrive in regions too warm and in soil too wet for the growth of the potato.

DASHIEL, Robert Laurenson, American clergyman and educator: b. Salisbury, Md., 25 June 1825; d. Newark, N. J., 8 March 1880. He was graduated from Dickinson College in 1846. He was a Methodist pastor in Baltimore, Md., Newark, N. J., Jersey City, N. J., and Orange, N. J. From 1868 to 1871 he was presi¬ dent of Dickinson College. From 1872 until his death he was secretary of the Board of For¬ eign Missions of the Methodist Episcopal Church. He represented his conference in the General Conferences of 1872 and 1876. His pulpit ability was noteworthy.

DASHKOFF, dash'kof, Princess Ekat'- erina Romanovna, Russian scholar : b. Petrograd 22 March 1743; d. Moscow 16 Jan. 1810. She married Prince Dashkoff when only 15 years old, but was left a widow three years after. She was an intimate friend of the Empress Catherine II, and one of the heads of the conspiracy formed against Peter III, the success of which secured the throne to Cathe¬ rine. Soon afterward, quarreling with Cathe¬ rine, she obtained permission to travel, and visited Germany, England, France and Italy, making the acquaintance of many eminent men. On her return the princess was appointed di¬ rector of the Academy of Arts and Sciences; and in 1783, president of the Russian Academy, established at her own suggestion in imitation of the French Academie. Besides writing several comedies and occasional papers, the Princess Dashkoff was mainly instrumental in inducing the Russian Academy to draw up a dictionary of the Russian language, and herself executed part of the work. On the death of Catherine she was removed from office and retired to Moscow. Consult her autobiography (trans. by Mrs. W. Bradford, London 1840.)

DASS, Peder, or Petter, Norwegian poet: b. Nord-Hero, parish of Alstahoog, Nordland, 1647 ; d. Aug. 1708. He studied at the University of Copenhagen, became pastor of the parish of Alstahoog in 1689 and grew rich from commerce and fisheries, buying for him¬ self the royal domain of Vefsen. He became the most popular poet in Norway, leaving 127 poems of which only 24 are now extant, his masterpiece being a descriptive poem: (The Trumpet of the Nordland,* written in the Dano-Norwegian dialect. His works were col¬ lected by Eriksen (Christiania 1873-77).

DASSY, or DASSIE, the name given in South Africa to the rock-rabbit (Procavia capensis), the Dutch name for which is klip-das. The name dassy is merely a diminutive in local use, especially in Cape Colony. See Hyrax.

DASYPROCTA, a genus of agoutis (Dasy - proctidce) , a familiar group of rodent mammals inhabiting Central and South America, and

some of the West India Islands. The agoutis are a little larger than the common rabbit, have a rabbit-like head, but with short ears, hooped, pig-like claws, and are swift-footed. They live in the woodland, and search for food by night in the open country. See Aguti.

DASYURE, das'i-ur, a marsupial native to Australasia; and belonging to the family Das-yuridce. Dasyures are the survivors of the fossil forms found in Tertiary strata in South America, and elsewhere ; and are allied to the opossum. The hind and fore legs are about equal in length, and the toes are furnished with claws ; the long hairy tails are not prehensile. The teeth are fitted for tearing flesh, and there are eight upper incisors. There is no coecum. The pouch is often rudimentary, and in Myrmecobius is absent. The dasyures are chiefly strong, fierce creatures of cat-like, propensities, whose depredations have caused heavy losses in farming and ranching districts, so that the colonists of Australasia, more especially those of Tasmania, have nearly exterminated them, by persistent effort. Among them we find the Tasmanian zebra-wolf (Thylacinus cynocepli-alus), a wolf-like creature, rather smaller than the common wolf, with short fur, a long smooth tail and rounded ears. Its color is brownish, and it is barred at the hinder portion of the back and the roots of the tail with dark stripes. It prowls about by night, making raids upon unguarded sheep-folds. By day, it skulks in caverns among the rocks. Another foe to the flocks is the Tasmanian Devil (Sarcophilus ursinus). This creature, in size like a badger, in appearance like a bear, is ponderous, powerful, dark-colored, and covered with a coat of long fur. It sleeps by day; and, like the zebra-wolf, seeks its prey by night. It is very strong and ferocious; but despite this, has been successfully put down by the colonists ; in fact, it has been nearly exterminated. Another species is the Australian ((native cat," a spotted creature, almost as large as a house-cat. It belongs to the genus Dasyurus, in which are also several other and smaller species. Perhaps the most interesting of the small Dasyures, is the banded ant-eater (Myrmecobius fasciatus) found in western and southern Australia. It is a reddish brown in color, banded posteriorly with white; is about the size of a squirrel, and has a long protrusile tongue for gathering its insect food. It is considered as a practically unmodified representative of certain extinct marsupials found in the Secondary rocks of Europe. It lives in sandy plains, where it finds food in plenty. Other species, small as rats and mice, and living chiefly on insects, birds, eggs, etc., are found in the genus Phascogale, and allied genera; and the jerboa-like creature (Antech - inomys laniger) constitutes another genus, of a single species. It is native to Queensland and New South Wales, but is very rare. See

Marsupials.

DATA, Psychological Value of. In applied psychology the use of data is fundamental. Data are necessary for the purpose of getting averages upon which may be based deductions whereby action may be foreseen and properly estimated. In educational psychology the col¬ lection of data has been very extensive. It is not only used for the purpose of finding averages, but for the purpose of finding fre¬ quency distribution, and measuring variability and relationship. On such data are founded systems of measurement for mental ability. The selections of men from the ranks of the soldiers for officers' training camps is based on the results so obtained. In business psychology'

the same results are used to promote efficiency founded on known ability. In the psychology of religion, data are the basis for what has been done. So far the data are comparatively meagre except in the one subject of the age of con¬ version. Even there it is comparatively slight as compared with the data of educational psychology.

DATA OF ETHICS. A book written by Herbert Spencer first issued in 1870. Many subsequent editions have appeared. It teaches * the evolutionary idea of ethics. By some writers Spencer's ethics are even called mate¬ rialistic. He approaches his subject from the physical, biological, physiological and sociologi¬ cal standpoints. He largely ignores the Chris¬ tian view of a divine authority instructing the judgment, followed by action in complete freedom of choice by the human will.

DATARIA, an office of the Curia Romana (q.v.) from which are sent forth certain classes of papal documents, as dispensations and ap¬ pointments to Church benefices. The word had its origin in the formula of subscription of letters, for example, Dates Kalendis Martiis, given (or sent) 1 March; that is, the date of the document ; and it is the duty of the Dataria to guard against possible errors of either dating or addressing documents, or in the tenor of the documents themselves.

DATE. See Epoch ; Chronology ; Cal¬ endar.

DATE LINE. See International Date Line.

DATE or DATE PALM (Phoenix dactyl-ifera), a tall tree of the natural order Palma-cecs. It is most notable for its fruit, which is an important part of the daily food of the natives of western Asia and northern Africa, where the tree is indigenous and from whence large quantities of dried dates (the fruit) are exported to other countries. The tree is also cultivated in some other warm countries, includ¬ ing China, Italy, France, Spain and parts of the United States — Florida, New Mexico, Arizona and California, in the last three of which a promising industry seems to be becoming started. The tree, which attains a height of 100 feet, and bears fruit for one or two centuries, is, like other palms, useful in many ways; nearly all its parts are used for something. Date seeds are roasted and used as a substitute for coffee, or ground, and pressed for oil and the pomace used for stock food. The leaves are used for matting, baskets, thatch, *etc.* ; the terminal bud as a vegetable ; the wood for fence making and other purposes where great strain is not expected; the fibre of the bark for making rope; but the fruit, which contains proteids, gum and pectin, and is particularly rich in sugar, is the most important part. It is one of the principal sources of wealth in the countries where the date is indigenous. It is believed that the leaves of this palm are the ones referred to in biblical writings, and at the present time the leaves of this palm are largely used upon Palm Sunday among Christians living where the trees abound. The leaves were also symbolical of victory, beauty, etc., among the ancient Greeks and Tews.

Since the male and female flowers are borne on separate trees, enough specimens of staminate flowering trees must be planted to fertilize

the blossoms on the others which alone produce fruit. Since the plants obtained from seeds are of unknown sex until they flower, and since the proportion of inferior seedlings to seedlings which bear superior fruit is very large, the date is propagated by means of suckers, since these retain the characteristics of the parent. The young plants are set in sunny situations, in almost any kind of soil where water is within reach of the roots or can be supplied by irriga¬ tion. The sandy, alkaline soils of deserts seem more satisfactory than the richer soils necessary for the growth of general crops. The trees are very difficult to make grow after transplanting, because they demand much attention especially as to watering. A loss of 50 per cent is not

uncommon even with the best of attention. The surviving trees should commence to bear when about eight years old. The fruit is borne in clusters which hang from the thick crown of large pinnate leaves. Individual trees produce from 300 to 500 pounds or more of fruit in a season. The fruit is eaten both fresh and dried and is divided into soft and dry dates. They vary in color, quality and size.

DATE-PLUM, a common name for plants of the genus Diospyros, of the ebony family (Ebenacecs) . The genus has about 190 species and is most abundantly represented in Asia. In the United States two species are known, the most common being the persimmon (q.v.), D. virginiana. The common date-plum or pishamin, also called the European lotus and the date of Trebizond (D . lotus), is a tree 18 to 30 feet high, with oblong shining leaves and small reddish-white flowers, a native of the coasts of the Caspian Sea, northern Africa, etc., but culti¬ vated and naturalized in the south of England. Its fruit is of the size of a cherry, and in favor¬ able climates larger, yellow, sweet and astrin¬ gent. It is eaten when overripe, like the medlar, or is used for preserves. This fruit has been supposed by some to be the lotus (q.v.) of the Lotophagi. D. mabola is cultivated as a fruit-tree in Mauritius. D. kaki, the Japanese per¬ simmon, is a native of Japan, and occasionally is kept in greenhouses in France and England. The sweetmeat called figues-caques is made from this fruit in France. The fruit of some other species is also edible, as, for example, that of D. decandra of Cochin-China. See Ebony; Persimmon.

DATE-SHELL, or DATE FISH, a bi¬ valve shell or its inhabitant of the genus Pholas, a kind of mollusk. They bore holes in clay, peat, and soft rocks and in some instances in hard stone, as in columns from the Temple of Serapis, which were brought from Africa to Italy. Species of the date-shell are found in the Mediterranean and its arms, on the coast of California and in a few places on the west shore of the Pacific. Some are edible:

DATHA, American cacique. He governed the province of Chicora, on the east coast of Florida, visited by Lucas Vazquez de Ayallon, auditor of San Domingo, in 1520. He was a giant, and Helps, in the (Spanish Conquests in Americaˆ says: <(His gigantic stature had been artificially produced, for it is said that the In¬ dians of those parts, had a method of elongat¬ ing the bones of children when very young, a practice which they applied to those of royal race,®

DATIA. See Dutteeah.

DATISCIN, da-tis'sin, a substance yielded by the bastard hemp, Datisca cannabina, a com¬ mon plant in gardens, indigenous to the Punjab, and largely used in the south of Europe and in Asia for dyeing yellow. It can be extracted from the leaves and roots by exhausting with alcohol, concentrating, adding water, filtering from a resin, crystallizing and purifying the glucoside so obtained. When pure it forms colorless silky needles, which are readily soluble in alcohol, sparingly in ether and in water, and have a bitter taste. It has feeble acid proper¬ ties, and gives yellow compounds with lead and tin which can be used as dyes. When boiled with dilute acids it is resolved into sugar and datiscetin, which crystallizes readily. This is soluble in alcohol and in ether, almost insolu¬ ble in water. It also gives a fine yellow color when 'combined with lead.

DATIVE, in grammar, one of the cases of nouns and pronouns, the usual function of which is to mark the recipient of something given. In English there is no distinctive form for this case ; yet when we say, for instance, <(give me or him that,® (<I gave the man a .crown,® me, him and man are really in the dative. In Latin, Greek, Sanskrit, German, etc., there are distinct forms for this case.

DATOLITE, dat'o-lit, or DATHOLITE, a

basic silicate of boron and calcium, having the formula H20.2Ca0.B203.2Si02, and crystallizing in the monoclinic system. Its crystals are glassy in appearance, white in color (often with a greenish tinge), and transparent or translucent. Before the blowpipe it melts with intumes¬ cence, and gives a green color to the flame. Its hardness is from 5 to 5.5, and its specific gravity is about three. In the United States it occurs' in Connecticut, New Jersey and the Lake Su¬ perior district. It is also found in the Salis¬ bury Crags near Edinburgh, as well as in Nor¬ way, Sweden and other parts of the European continent. The name is from two Greek words that refer to the tendency that one of its massive varieties exhibits, to divide into granular por¬ tions. The crystals when polished are used as ornaments.

DATS E IRADIER, Eduardo, Spanish statesman : b. Coruna, 12 Aug.

1856. He studied law at Madrid and became doctor in jurispru¬ dence in 1875. He was elected deputy to the Cortes in 1884, and reelected in 1891 and 1893. He was early allied with the Conservative Party under Canovas, but withdrew for a time. In 1887 he became a member of the board of the Madrid Law College, and in 1890-94 served as vice-president of the Royal Academy of Juris¬ prudence and Legislation. He became Minister of the Interior in Silvela's cabinet and made an exhaustive study of labor conditions during a visit to Catalonia in 1900. In 1902 he was Minister of Justice in the new Conservative cabinet of that year, and in 1905 he was made a member of the Royal Academy of Moral and Political Science. He was mayor of Madrid in 1907, and upon the organization of the new Cortes, he became president of the chamber. In 1913 on the fall of the Liberal ministry of Romanones he became Prime Minister, but was soon after displaced by a Liberal ministry under Canelejas.

DATURA, a genus of plants of the potato family (Solanacea) . It contains about 15 species, widely distributed. The genus is repre¬ sented in the United States chiefly by coarse weeds naturalized from tropical America. Jamestown or Jimson weed (D . stramonium) is said to have received its name from a poison¬ ing that occurred from its use by the settlers of Jamestown, Va. . It is also called thorn-apple, It is found in waste places from the eastern seaboard west to Minnesota and Texas. The purple thorn-apple or purple stramonium (D . tatula) is also found throughout the same region. An extract from these plants is used in medicine. When taken internally it is a power¬ ful narcotic ; medically it is used in mania, con¬ vulsions, epilepsy, tic-douloureux, *etc.* When smoked it palliates the symptoms in asthma. The seeds of some species were used by the aboriginal Americans as narcotics. Some plants of the genus are cultivated for their showy flowers. The seeds of certain species are said to have been used to produce the frenzied rav¬ ings of the priests in the Delphic and some other temples. The Peruvians use for the same purpose D. sanguinea, manufacturing from it also an intoxicating beverage.

DATURINE, a poisonous alkaloid found in the thorn-apple (Datura stramonium) , and now known to be identical with atropine.

DAUB, dowp, Karl, German Protestant theologian: b. Cassel, Germany, 20 March 1765; d. Heidelberg, Baden, 22 Nov. 1836. He be¬ came professor of theology at Heidelberg from 1795. His works include (Lehrbuch der Kate-chetik) (1801) ; (Theologumena) (1806) ; (Die Dogmatische Theologie jetziger Zeit) (1833). He attempted to

reconcile philosophy with theology.

DAUBAN, do-ban, Jules Joseph, French painter: b. Paris, 31 May 1822; d. 1908. He was a pupil of Auguste Debay. His taste led him to historical and religious subjects, and his compositions, severe in design and of a great simplicity in the accessories, are somewhat cold and sober in color. He became director of the museum and the School of Fine Arts in Angers in 1849, received a medal in 1864 and the decora¬ tion of the Legion of Honor in 1868. Among his works are (Louis XI, presenting Guil¬ laume de Cerizay as Mayor of Anjou > (1861) ; deception of a Stranger by the Trappists) (1864), Luxembourg Museum; (Trappists Ex¬ changing the Kiss of Peace before Communion) (1865), Museum of Angers; (Madame Roland Going to the Revolutionary Tribunal) (1869) ; (Fra Angelico da Fiesole) (1873) ; and several portraits and decorative paintings. His last im¬ portant work was six decorative compositions for the church of Quintin (Cotes du Nord).

DAUBENTON, do-ban-ton, Louis Jean Marie, French naturalist and physician: b. Montbard, Cote-d'Or, France, 29 May 1716; d. Paris, 31 Dec. 1799. He became celebrated for his participation in the (Histoire naturelle* by his friend Buffon ; the anatomical part of which was prepared by Daubenton with great accu¬ racy, clearness and sagacity. In 1744 he was chosen member of the Academy of Sciences, and enriched its publications by a number of anatomical discoveries, and also by researches concerning the species of animals and their varieties, the improvement of wool, and the

treatment of the diseases of animals. He threw much light upon mineralogy, botany and agri¬ culture, and proposed a new method for the classification of minerals. He was the author of numerous works of general utility, instruc¬ tion pour les bergers5 (1782) ; (Memoire sur les indigestions,5 and many others. He became professor of natural history in the College of Medicine in 1778 and about seven years after professor of mineralogy in the Museum of Natural History. During the Reign of Terror, when everyone was required to give some evi¬ dence

of patriotic spirit, he was represented to his section as employed in introducing the Span¬ ish sheep into France.

DAUBENY, da'be-ni or dob'ni, Charles Giles Bridle, English scientist : b. Stratton, Gloucestershire, 11 Feb. 1795; d. Oxford, 13 Dec. 1867. He was educated at Winchester School and Magdalen College, Oxford, and practised for some years as a physician in Ox¬ ford. In 1819 he visited Auvergne, and in 1837 made a scientific visit to the United States. From 1822 to 1855 he was professor of chemis¬ try in the University of Oxford. In 1834 he became professor of botany, and in 1840 of rural economy in the same university. He held the last appointment till his death. His prin¬ cipal works are (A Description of Active and Extinct Volcanoes5 (1826) ; (An Introduction to the Atomic Theory5 (1831) ; with a supple¬ ment, 1840) ; (Mineral and Thermal Waters5 (1836) ; lectures on Agriculture5 (1841) ; (Sexuality of Plants5 (1860) ; (Lectures on Climate5 (1863).

D'AUBIGNE, do-ben-ya, Jean Henri Merle, Swiss ecclesiastical historian: b. Eaux-Vives, near Geneva, Switzerland, 16 Aug. 1794; d. Geneva, 21 Oct. 1872. In 1818 he became pastor of the French Protestant church in Ham¬ burg. In 1823 he was appointed court-preacher at Brussels; but after the revolution of 1830 returned to Geneva, and filled the chair of Church history in its theological seminary until his death. The work which has given him a widespread reputation is his (Histoire de la Reformation au Seizieme Siecle5 (1835-53), which has been translated into most European tongues. It is written with a devout, fervid sym¬ pathy that is often eloquent, although the nar¬ rative is too graphic to be everywhere exact. Among his other writings are (Germany, Eng¬ land and Scotland5 (1848) ; a vindication of Cromwell (1848) ; (Trois Siecles de Lutte en Ecosse5 (1849) ; and (Histoire de la Reforma¬ tion en Europe au Temps de Calvin 5 (1862-78).

D'AUBIGNE,, Merle. See D'Aubigne, Jean-Henri Merle.

D'AUBIGNE, Theodore Agrippa. See

Aubigne, D\

DAUBIGNY, do-ben-ye, Charles Francois,

French landscape painter and etcher: b. Paris, 15 Feb. 1817; d. there 19 Feb. 1878. He studied under his father, who was a miniature painter; Paul Delaroche and others; and from 1838 ex¬ hibited in the Salon, though his full recognition came only after the artist had

reached his 50th year. He devoted himself to close and sympa¬ thetic study from nature, working much on the Seine in a houseboat, and developed a style of landscape art marked by singularly unaffected fidelity and originality. In 1853 he gained a

first-class medal with his (Pool of Gylien.5 In 1857 he produced his (Springtime5 ; in 1861 (The Banks of the Oise5 ; in 1872 (Windmills at Dordrecht5 ; and in 1877 his large and very impressive (Rising Moon.5 His Sluice in the Valley of Optevoz5 (1855) and his (Vintage5 (1863) are in the Luxembourg Gallery. The public galleries of America contain numerous paintings by Daubigny, and small sketches were sold to private collections. He is also known as a book-illustrator and as a vigorous etcher, having produced over 100 plates — some repro¬ ductions, others direct from nature, marked by great frankness of method and free painter-like quality. Consult Henriet, (Daubigny et son oeuvre5 (1878) ; Van Dyke, (Modern French Masters5 (1896) ; Stranahan, (History of French Art5 (1900).

D'AUBUSSON, PIERRE. See Aubus-son, Pierre d\

DAUCUS, da'kus, the typical genus of the UmbellifercB or carrot family. The genus has about 25 species, two of them growing wild in America. Wild carrot, crow's-nest, or Queen Anne's lace (D . carota), is generally a perni¬ cious and abundant weed throughout the Union. It is a native of Asia, naturalized from Europe. It is the original of the cultivated carrot. See-Carrot.

DAUDET, do-da, Alphonse, French novel¬ ist: b. Nimes, 13 May 1840; d. Paris, 16 Dec. 1897. He was educated at the Lyons Lycee and for two years after leaving it supported himself as an usher at Alais. Going to Paris in 1857 he took to writing verse, his first volume being (Les Amoureuses5 (1858), which met with some success. This was followed by other poems, including (La Double Conversion5 (1859), and at this time he also contributed to the Figaro and other journals. About 1862 he began writing for the stage, and during the suc¬ ceeding 10 years or so several dramas by him were represented but only with moderate suc¬ cess. These included (La Derniere Idole5 (1862) ; <L'CEillet Blanc5 (1865), and <Le Frere Aine (1868). Greater public favor was ac¬ corded to his (Lettres de mon moulin,5 which appeared in 1866 in a Parisian journal. In 1872 he produced his celebrated (Les Aventures Prodigieuses de Tartarin de Tarascon,5 an amusing satire on the boastfulness so character¬ istic of the south of France. From this time he published numerous works, some of the best being (Fromont Jeune

et Risler Aine5 (1874); (Jack5 (1876); <Le Nabab5 (1877) ; (Les Rois en Exil5 (1879) ; (Numa Roumes-tan5 (1881); 'L'Lvangeliste5 (1883); <Sapho5 (1884) ; tartarin sur les Alpes5 (1885). a sequel to (Les Aventures Prodigieuses5 ; (Trente Ans a Paris5 (autobiographical) (1887) ; (Souvenirs d'un Homme de Lettres5 (1889) ; (Port Tarascon, dernieres Aventures d'lllustre Tartarin5 (1890) ; (Rose et Ninette5 (1892) ; (La Menteuse5 (1893) ; (Entre les Frises et la Rampe5 (1894); (La Petite Paroisse5 (1895) ; (Contes d'Hiver5 (1896) ; (L'Enterrement d'une Ltoile5 (1896) ; (Les Meres5 (1896) ; (Le Tresor d'Arlatan5 (1897) ; (La Fedor5 (1897) ; and (Soutien de Famille5 (1897). M. Daudet has often been compared with Dickens in his mastery of pathos and humor. Some of his principal works rely mainly on his great powers of caricature for their success.

Literary critics appreciate Daudet for his pol¬ ished style, his originality and his insight into the foibles of humanity. His unaffected sym¬ pathy, somewhat tinged with a certain melo¬ dramatic sentimentality, and his saving sense of humor constitute his greatest appeal to the average reader. His works have been translated into English and in this dress have been very popular. A complete edition appeared in Boston in 1900. (See Sappho; Tartarin). Consult Brunetiere, (Le Roman naturaliste) (1896) ; Ratti, G. A., (Les Idees morales et litteraires d'Alphonse Daudet d'apres ses CEuvres) (1911) ; Daudet, L., Alphonse Daudet* (1898).

DAUDET, Ernest Louis Marie, French novelist and historian: b. Nimes, 31 May 1837. He is a brother of Alphonse Daudet (q.v.). His most notable novels are (The Venus of Gordes) ; (The Bloom of Sin* ; (Martha.* He is author of an autobiographical sketch, (My Brother and Myself) (1882). Completely

eclipsed in fiction by his brother he devoted his energies to the field of historical research, in which he became known as a prolific and relia¬ ble contributor. His noteworthy works are (History of the Royalist Conspiracies in the South during the Revolution* (1881) ; his¬ tory of the Emigration *(1886) ; (Les Bourbons et la Russie pendant la Revolution*

frangaise (1888) ; (Les Recits des Temps revolutionnaires* (1908) ; (Tragedies et Comedies de l'Histoire) (1912). Consult Ernest-Charles (Les Samedis litteraires 5 (Paris 1903).

DAUGHTER OF THE CONFEDER¬ ACY. See Davis, Varina Anne Jefferson.

DAUGHTER OF THE REGIMENT, The. Opera comique in two acts by Gaetano Donizetti (libretto by Bayard and St. Georges), first produced at Paris, 11 Feb. 1840. While in most of his operas Donizetti is pure Italian, in this he comes close to the French type of opera. With (Don Pasquale) and (L'Elisir d'Amore,* both of which are buffa operas, it forms the group out of the long list of works accredited to the composer which seems to possess the greatest vitality. The music is vivacious and sparkling, with a raciness born of the combination of French and Italian man¬ ner. The deeper note is heard just enough to give the needed contrast, as in Marie's touching farewell song at the end of the first act, one of the finest melodies in Italian opera. The ((Rataplan® duet between Marie and the Sergeant, recurring through the latter scenes, the Song of the Regiment, the romance in the second act with the amusing irruptions into the military spirit and the rousing choruses are household favorites. It is one of those strange instances of erroneous first impression that the opera was not successful in Paris after it had gone the rounds of the other European capitals. The role of Marie, the vivandiere for whom the course of true love is so troubled, is a grateful one and has always been popular with the great artists, such as Jenny Lind, Patti, Sontag and Sembrich. Donizetti has always been famed as a writer of prima donna operas — a reputa¬ tion not altogether undeserved. In /The Daughter of the Regiment* this claim, in its better sense, is well supported.

Lewis M. Isaacs.

DAUGHTERS OF THE AMERICAN REVOLUTION, a society composed of

women who are descendants of ancestors, any of whom ((with unfailing loyalty rendered ma¬ terial aid to the cause of independence as a recognized patriot, as soldier or sailor, or as a civil officer in one of the several colonies or States.® It was organized in Washington, D. C., 11 Oct. 1890. Its objects are to perpetuate the memory of the spirit of the men and women who achieved American independence; to pro¬ mote institutions for the general diffusion of knowledge ; to

cherish, maintain and extend the institutions of American freedom; to foster true patriotism and love of country ; and to aid in securing for mankind all the blessings of liberty. The society has a membership of 115,865 women, organized into 1455 local chapters. Delegates from all chapters meet in annual congress in Washington in the third week of April. The society has collected many historical relics, and it has also a valuable historical and genealogical library at its headquarters. The National Society was incorporated by Act of Congress in 1896 and, in accordance with that act, reports annually to Congress. The society publishes The American Monthly Magazine and also a series of lineage books containing the record of the ancestry of each member of the organiza¬ tion.

DAUGHTERS OF THE CONFEDER¬ ACY, United, an association of the widows, wives, mothers, sisters and lineal female de¬ scendants of men who served honorably in the army and navy of the Southern States or who gave personal services to the Confederate cause. It was organized at Nashville, Tenn., 10 Sept. 1894, and to date has 1,575 chapters in the United States and one chapter in Mexico City. The organization has about 90,000 members.

DAUGHTERS OF THE HOLLAND DAMES, a colonial society of women, the official title being ((The Daughters of Holland Dames, Descendants of the Ancient and Honor¬ able Families of New York,® was incorporated for the purpose of erecting a memorial to com¬ memorate the early Dutch period of our colonial history and to preserve and collect historical documents relating to the same. The head¬ quarters are in New York. This society is not connected with the Holland Dames.

DAUGHTERS OF THE KING, The Order of, a Protestant Episcopal order of women (not to be confounded with the King's Daughters), organized in 1885. The aim of the society is to bring young women within the in¬ fluence of the Church and to co-operate with the rectors of parishes to that end. The office of the council is in New York. Its constitution is framed as far as it is possible on the terms of the Brotherhood of Saint Andrew, the men's organization of the Protestant Episcopal Church to whose purposes and work it closely corresponds. The membership is about 4,500, with about 415 senior chapters and 50 junior chapters. It holds a triennial convention. Its official organ is The Royal Cross.

DAUGHTERS OF THE REVOLU¬ TION, a patriotic society of women in the United States, organized in 1891. Eligibility to membership is restricted to ((women who are lineal descendants of an ancestor who

was a military or naval or marine officer, soldier, sailor or marine, in actual service under the authority of any of the 13 Colonies or States,

or of the Continental Congress, and remained always loyal to such authority, or descendants of one who signed the Declaration of Inde¬ pendence, or of one who as a member of the Continental Congress or of the Congress of any of the Colonies or States, or as an official appointed by or under the authority of any such representative bodies, actually assisted in the establishment of American independence by service rendered during the War of the Revolu¬ tion, becoming thereby liable to conviction of treason against the government of Great Britain, but remaining always loyal to the au¬ thority of the Colonies or States.® There are numerous subordinate State organizations. The total membership is about 4,000.

DAUGHTERS OF 1812. See United States Daughters of 1812, National Society of.

DAULATABAD, dow-lat-a-bad' («fortunate city®), India, a town and fort in the Dec-can, within the Nizam's dominions, 28 miles northwest of Hyderabad. The fortress consists of a conical rock, 600 feet high, with a wide ditch and an outer wall nearly three miles in circumference. The place surrendered to the Mohammedans in 1294, and Shah Murhammad Tughlak (1324-51) thrice attempted to remove the seat of government hither from Delhi. The fortress has not been garrisoned now for many years and the town has greatly decayed. Pop. about 1,000.

D'AULNOY, dol 'nwa, Marie Catharine Ju-melle de Berneville, Countess, French writer: b. about 1650; d. 1705. She wrote many romances, long consigned to safe oblivion, but her fame rests securely on her (Fairy Tales,' written in a simple, bright and charming style, not altogether unworthy of Perrault. (The White Cat,' the (Yellow Dwarf,) (Finette Cen-dron,' and (Le Mouton' have for two centuries been naturalized in the nurseries of Europe and are still familiar figures in pantomime. Her altogether delightful (Travels in Spain' was

reissued in New York in 1898.

DAUMER, dow'mer, Georg Friedrich,

German poet and philosopher, often referred to under his pen name Eusebius Emmeran : b. Nuremberg, 5 March 1800; d. Wurzburg, 14 Dec. 1875. He was educated at the Universities of Erlangen and Leipzig and in 1822-30 was a professor in the Nuremberg Gymnasium. He un¬ derwent some remarkable revolutions of thought concerning religion ; in his student days leaned strongly to Pietism; next was the declared foe of the Christian religion and about 1859 em¬ braced Catholicism and became one of its fore¬ most champions. He wrote among many other philosophical tractates (Hints Toward a System of Speculative Philosophy' (1831) ; to his sec¬ ond period belongs: (The Fire and Moloch Worship of the Hebrews' (1842) ; to his third: (My Conversion (1859). Of his poetical works, the (Flowers of Song from Hafiz' may be named — a very beautiful transcription of the Oriental poet, with free variations in the very spirit of Hafiz himself. He wrote also (Beatitiful Souls: a Little Wreath of Legends and Poems) (1862) ; (Legends and Poems of Saint Mary.' For a time he was instructor of the celebrated foundling Kaspar Hauser, in regard to whom he published (Mittheilungen

fiber Kaspar Hauser' (1832) ; (Enthfilungen fiber Kaspar Hauser' (1859) ; and (Kaspar Hauser, sein Wesen, seine Unschuld' (1873).

DAUMIER, do'me-a', Honore, French caricaturist and painter : b. Marseilles, 26 Feb. 1808; d. Valmondois, 10 Feb. 1879. His father tried to dissuade him from entering the artistic profession by apprenticing him to a huissier and later with a bookseller. He managed, however, to master the technique of lithography and entered on his career by making plates for music publishers and illustrations for advertisements. He joined the staff of La Caricature under Philipon and started upon his pictorial cam¬ paign of satire. Fashion, tittletattle, scandal, poli¬ tics, blemishes of figure and oddities of charac¬ ter in turn inspired his inexhaustible genius for mockery. Few among his illustrious contempo¬ raries escaped his pencil, and his caricatures had always some strikingly truthful feature about them. His caricature of Louis Philippe as (Gargantua' led to his imprisonment for six months in 1832. La Caricature was discontinued soon after, but was replaced by Charivari,

where Daumier continued his famous social 0 • •

caricatures in a series of sketches known as the (Robert Macaire' series. The Revolution of 1848 turned him toward the political field and suggested two of his most remarkable series, Parliamentary Idylls' a'nd (The Representa¬ tives Represented.' Despite his prodigious ac¬ tivity in the field of caricature — he has left about 3,958 lithographs — he found time for painting. He produced several remarkable works in this field, such as (Christ and Apostles,' at the Ryks Museum in Amster¬ dam; (The Good Samaritan'; (Don Quix¬ ote and Sancho Panza' ; (Christ Mocked,' *etc.* He is represented in the Louvre by (The Thieves and the Ass' and (The Republic,' also in the museums of Berlin, Bucharest, The Hague, Montreal, Rheims and by two pictures in the Metropolitan Museum, New York. As a painter he was one of the pioneers of naturalism and did not meet with success until shortly before his death, when an exhibition of his works demonstrated the full range of his genius. His ability as a painter has only become generally known since the exhibition of his work in 1900. He was appre¬ ciated and loved by his great contemporaries, Victor Hugo, Balzac, Corot, Daubigny, Cour¬ bet, Rousseau and Diaz. He became blind in 1877 and in his last days was befriended by Corot, in whose house he died at Valmondois, Seine-et-Oise. Consult the complete catalogue of his lithographs by Hazard and Delfteil (Paris 1904) ; the biographies by Alexandre (Paris 1890) and Klossowski (Munich 1914) and Geoff roy and Frantz and Uzanne Daumier and Gavarni (London, the Studio , 1904). Consult also brief works on his lithographs by Marcel (Paris 1906) and Car}- (London 1907) and Champfleury (Histoire de la caricature moderne' (Paris 1872).

DAUN, L. J. C. See Dhaun, Leopold Joseph Maria, Count von.

DAUNOU, do'noo', Pierre Claude Fran¬ cois, French statesman: b. Boulogne-sur-Mer, 1761 ; d. Paris, 1840. He ioined the Congrega¬ tion of the Oratory in 1777. On the outbreak of the Revolution he became a member of the

National Convention. He opposed the execu¬ tion of Louis XVI and advocated his deporta¬ tion pending a settlement. He was opposed

also to the proscription of the Girondists and was imprisoned and escaped the guillotine only by the downfall of Robespierre. He was first president of the Council of Five Hundred and prepared a program of study for the central schools which was adopted in 1795. He was librarian of the Pantheon in 1801 and added to it the valuable collection of Pius VI. He was archivist of the Empire in 1807 and founded the Bibliotheque des Archives Nationales. He edited the Journal des Savants after 1816. He wrote (Histoire litteraire de la France, > and (Essai historique sur la puissance temporelle des papes} (1810). Consult Taillandier, docu¬ ments biographiques sur DaunoiP (Paris 1841).

DAUPHIN, da'fin, Fr. do-fan, the title of the eldest son of the King of France. Dauphin was originally a title held by several of the feudal lords of France and is believed to have originated from the dolphins (Fr. dauphin) worn on their helmets or used as a family crest. In 1349 Humbert II, dauphin of Viennois, being childless, transferred his estate, called the Dauphiny (le Dauphine) , in the south of France, to Philip of Valois, on condition that the eldest son of the King of France should in future be styled the dauphin and govern this territory. The dauphin, however, retained only the title, the estates having been united with the crown lands. On the death of the dauphin his eldest son inherited this title ; if he had no son his eldest brother succeeded him. If the king had no son, as was the case in the reign of Louis XVIII, the title of dauphin was not be¬ stowed on any one ; for it was never given to the next prince of the blood and presumptive heir, even if he were the king's brother. The wife of the dauphin was called dauphiness {dauphine). The Delphin classics (q.v.) were editions made for the use of the dauphin {in usum delphini) .

DAUPHINE, do'fen-a', one of the ancient provinces of France. It was divided into Upper and Lower Dauphine. It comprised the depart¬ ments of the Isere, the Hautes-Alpes and part of the Drome. The capital of the whole was Grenoble. The province constituted a. sort of triangle, bounded north by Bresse and Savoie, east by Piedmont, south by Provence and west by the Rhone. After the fall of the Roman Empire, it passed into the control of the Franks and eventually became part of the new Bur¬ gundian kingdom of Arles. From 1032 until the middle of the 14th century it was in the possession of Germany. It was bequeathed to France by the lords of the kingdom and for the next century was governed as a separate prov¬ ince by the eldest son of the King of France, when it was finally made part of the kingdom of France. The Huguenots made this place their stronghold during the civil wars.

DAURAT, do-ra', Jean, French scholar: b. about 1510; d. 1588. He became president of the College Coqueret, where he superintended the studies of Ronsard, Du Bellay, Baif, and Belleau. These poets he carefully trained for the task of reforming the vernacular, and ennobling French literature bv the imitation. of Greek and Latin models. He wrote nothing of importance in French, but devoted himself

to guiding and stimulating the other members of the Pleiade, or seven great poets of the age, in whose works his learning and enthusiasm bore rich and enduring fruit. Consult Marty-Labeaux, in (Pleiade franqaise> (Paris 1875).

DAUTHENDEY, Max, German poet : b. Wurzburg, 1867. He is descended from an old family of the nobility, which came to Germany from France and England in the 16th century. His father achieved some dis¬ tinction as a pupil of Daguerre in Paris and subsequently as court photographer in Saint Petersburg. From that city he migrated to Wurzburg where in 1867 his son was born. Of a highly imaginative disposition from his earliest childhood, young Dauthendey exhib¬ ited no little aptitude for painting, although his strongest inclination lay in the direction of poetry, to which he soon decided to devote himself. He never attended the university, but pursued his studies at the Gymnasium of his native city far enough to qualify for the shorter, one-year term of military service. An inveter¬ ate traveler, he visited Paris, England and Sicily in 1896, Mexico the following year, Greece in 1898, and in 1906 made a trip around the world. The poetic chronicle of his im¬ pressions from these journeys is his (Die ge-fliigelte Erde) (Munich 1910), which bears the subtitle (A Song of Love and the Wonders of the Seven Seas) and ranges from the fish-market of Cairo to the sky-scrapers of New York. Dauthendey is a lyricist of some origin¬ ality and power, although it must be said that his earlier poems ((Ultra Violettp 1893), novels and plays (<Kind,) (Gluck, } (Sehn-suchtp 1895) are marred by excessive striving after a bizarre and fantastic virtuosity. Since 1907 he has produced a considerable bulk of poetry, of which the best is probably contained in his Unsichversunkene Lieder im Laub) (1908). Perhaps the most agreeable quality in his verse is his delicate nature-sense. His drama (Ein Schatten fiel fiber den Tisch) (1911) is a sordid exposition of marital infeli¬ city. Among other collections of his lyrics and longer works are (Reliquien) (1899) ; (Liebes-liedeC (1905) ; (Singsangbuch) (1907) ; (Lachen und SterbenP two one-act plays (1911) ; and (Der Geist meines Vaters) (1912), which pur¬ ports to be a history of his

family.

William A. Braun.

DAUW, da, or PEECHI {Equus bur-chelli), an animal closely resembling the zebra, which inhabits the plains of southern Africa, particularly to the north of the Orange River. It is about the size of an ass, but more delicately formed. Its general color is a pale brown, with grayish-white on the abdomen and inner parts of the limbs. Its head, neck, and body, and the upper parts of its limbs are striped like the zebra, but the stripes are not so dark in color. It migrates periodically in search of food, and in times of scarcity visits the culti¬ vated lands and makes havoc of the crops. It has been tamed to some extent, but its temper cannot be relied on. The Dutch colonists call it Bonte-quagga. It is known also as Burchell's zebra. See Zebra.

DAVAO, da-va'o, Philippines, a province in the southeastern part of the island of Min¬ danao ; area 8,976 square miles ; with dependent islands 9,171 square miles. Most of the com-

munication between towns and villages is by sea, as almost all are on the coast; there are a few roads, and the United States troops have done much to improve them. Hemp, coffee, tobacco, rice, and corn are cultivated ; the cinna¬ mon tree, the betel nut, cloves, and nutmeg grow without cultivation ; large numbers of horses, cattle and hogs are raised. There are indications of deposits of coal and some gold, and there are many valuable forests, well watered by numerous streams. Davao, the chief town, is situated on a bay of the west coast of the gulf of Davao. Davao was occu¬ pied by United States troops in December 1899, and was given civil government in 1903.

DAVENANT, John, English clergyman and author; b. London about 1570; d. 1641. He was educated at Queen's College, Cambridge, and in 1597 accepted a fellowship in the college. In 1609 he became Lady Margaret Professor of Divinity. The same year also he was advanced to the degree of D.D. In 1614 he became Master of his college. The

greatest honor of his life came to him in 1618 when he was appointed as one of the four clergymen who were sent from England to attend the meeting of the Synod of Dort. In 1621 he became Bishop of the See of Salisbury. He in¬ curred the displeasure of King James I by preaching before him on the subject of predes¬ tination, a subject which was not allowed to be discussed according to royal order. Charges were preferred against him and he had to humble himself before the king. He was one of the great scholars of the time. According to the custom then in vogue he wrote his works in Latin. His (Treatise on Justification has been translated into English (2 vols., 1844-46). His most noted work was a commentary on the Epistle to the Colossians.

DAVENANT, Sir William, English poet and dramatist: b. Oxford, February 1606; d. London, 7 April 1668. He was employed in preparing several masques for the entertainment of the court; and on the death of Ben Jonson in 1637, succeeded to the vacant laurel. On hostilities breaking out between Charles I and the Parliament, Davenant displayed his attach¬ ment to the royal cause. At the siege of Glou¬ cester in 1643, he was knighted by the king; and on the decline of the royal cause retired to France, where he became a Roman Catholic, and began the composition of his principal work, a heroic poem, entitled (Gondibert.5 An attempt which he afterward made to lead a French colony to Virginia had nearly proved fatal to him. The ship in which he had sailed from Normandy was captured by a cruiser in the service of the English Parliament, and carried into the Isle of Wight, where Davenant was imprisoned in Cowes Castle. In this for¬ lorn captivity, from which he had but little hope of escaping alive, he composed the third book of Eondibert.5 In October 1650 he was re¬ moved to London for trial before the high commission court. His life is said to have been preserved by the interposition of Milton. There is a corresponding tradition, that Davenant repaid the good offices of Milton by protecting the republican poet after the Restoration. On the return of Charles II to England the stage was re-established with renewed splendor, and Davenant became patentee of a theatre in

Lincoln's Inn Fields. He continued to employ his pen and his talents as a theatrical writer and manager till his death. The introduction of opera on the English stage, and women in female roles has been ascribed to him. He was buried in Westminster Abbey. His works con¬ sist of dramas, masques, addresses, and the epic (Gondibert,5 which was never finished; but he is remembered chiefly by the

reconstruction of Shakespeare's (Tempest, 5 in which he was engaged along with Dryden, a work which long held the stage in place of the original, although unequivocally condemned by modern criticism as a vulgar and degraded version of a drama which stood in need of no such emendation. His plays were edited by Laing and Maidment (5 vols., Edinburgh, 1872-74).

DAVENPORT, Charles Benedict, Ameri¬ can biologist: b. Stamford, Conn., 1 June 1866. He was graduated at the Brooklyn Polytechnic Institute in 1886, at Harvard in 1889, and took the degree of Ph.D. at the latter place in 1892. In 1888 he began to teach at Harvard, where he was instructor in zoology until 1899. In 1904 he became director of the station for experi¬ mental evolution at Cold Spring Harbor, L. I., and in 1899-1904 was assistant professor of zoology at the University of Chicago. In 1906 he was president of the American Society of Naturalists. His works include Observations on Budding in Paludicella and Some Other Bryozoa) (1891) ; (On Urnatella Gracilis) (1893) ; Experimental Morphology 5 (1897-99) ;

(Statistical Methods, with Special References to Biological Variation (1899); 'Introduction to Zoology 5, with Gertrude Crotty Davenport (1900); Unheritance in Poultry5 (1906); 'In¬ heritance of Characteristics in Domestic Fowl5 (1909) ; (Heredity of Skin-Color in Negro-White Crosses5 (1913); 'Heredity in Relation to Eugenics5 (1913); Eugenics5 (1910); 'The Feebly Inhibited5 (1915).

DAVENPORT, Cyril James, English au¬ thority on bookbinding: b. Stirling, Scotland, 5 June 1848. He became an official of the British Museum 1868, and became superintendent of bookbinding there: 'The English Regalia5 (1897); (Royal English Bookbindings5 (1892);

(Cantor Lectures on Decorative Bookbindings5 (1898); English Embroidered Bookbindings5 (1899) ; (Cantor Lectures on Cameos5 (1900) ; (Life of T. Berthelet' (1900); Eersonal Jewelry5 (1902); 'Mezzotints5 (1903); Bag-ford's Notes on Bookbindings5 (1904) • 'History of the Book5 (1908); English Heraldic Book-stamps5 (1909); (Cameo Book-stamps5 (1911) ; (Castor Lectures on Miniatures5

(1913); English Heraldry5 (1914).

DAVENPORT, Edward Loomis, Ameri¬ can actor: b. Boston, 15 Nov. 1814; d. Canton, Pa., 1. Sept. 1877. His first appearance was made in 1836 at Providence, R. I., as Parson Will in 'Sir Giles Overreach5 with Junius Bru¬ tus Booth as Sir Giles. In 1838 he played in Philadelphia. He soon became a leading per¬ former in comedy, melodrama and

tragedy. Up to 1847 he appeared chiefly in Boston. In that year he went to England with Mrs. Mow-att there playing Claude Melnotte in ‘The Lady of Lyons,5 with Mrs. Mowatt as the Pauline. For two seasons he supported W. C. Macready. In 1854 he returned to the United States, where he traveled extensively, playing

especially Shakespearean parts and those in dramatizations of Dickens. As Brutus in (Julius Caesar) and Bill Sykes in (01iver Twist* he was equally successful. Among his other characters were Sir Giles Overreach and Hamlet. In 1859 he became manager of the Howard Athenaeum, Boston, and in 1869 of the Chestnut Street Theatre, Philadelphia. His versatility and finish were notable. Consult Ed-gett, (E. L. Davenport* (1901; Dunlap Society Pub., new series, No. 14) ; Moses, M. J., (Famous Actor-Families in America) (New York 1906).

DAVENPORT, Eugene, American agri¬ culturist and educator: b. Woodland, Mich., 20 June 1856. He was graduated from Michigan Agricultural College in 1878; engaged in farm¬ ing 1878-89; was professor of agriculture in the Michigan Agricultural College, 1889-91 ; presi¬ dent of Agricultural College, Sao Paulo, Brazil, 1891-92 ; dean of College of Agriculture of the University of Illinois, since 1895, and director of Agricultural Experiment Station, since 1896; professor of animal husbandry 1895-1901 ; pror fessor of thremmatology since 1901. In Illinois he did particularly important work in investiga¬ tions of soil fertility. Member of the Authors' Club, London ; fellow of the American Asso¬ ciation for the Advancement of Science. Au¬ thor : Principles of Breeding) ; domesti¬ cated Animals and Plants) ; Education for Efficiency.*

DAVENPORT, Fanny Lily Gypsy, Ameri¬ can actress: b. London, 10 April 1850; d. Dux-bury, Mass., 26 Sept. 1898. Her first appear¬ ance on the stage was in 1857 at the Howard Athenaeum in Boston, then under the manage¬ ment of her father, E. L. Davenport (q.v.). Her real debut was at Niblo's Garden in 1862, as King of Spain in Paint Heart Never Won Fair Lady.* Later she came under the notice of Augustin Daly, and joined his Fifth Avenue Theatre in 1869. She played during her career in the theatres of all the large cities in the United States. Her most noted roles were in (La Tosca,* (Giaconda,* PedoraP and (Cleo-patraP She was married in 1879 to Edwin H. Price, but was divorced and subsequently mar¬ ried Melbourne McDowell, an actor of leading roles in her company. In 1897 she produced (A Soldier of FranceP a play with Joan of Arc as the heroine. It was a failure and

this is believed to have hastened her last illness. Her last appearance was on the stage of the Chicago Grand Opera House, 25 March 1898. Consult McKay and Wingate Pamous Ameri¬ can Actors of To-Day* (New York 1896), and Moses, Montrose, J., Pamous Actor-Families in America) (ib. 1906).

DAVENPORT, Henry Kallock, American naval officer: b. Savannah, Ga., 10 Dec. 1820; d. Franzensbad, Bohemia, 18 Aug. 1872. He entered the navy in 1838, and in 1844, as passed midshipman, became connected with the coast survey. In 1849-53 he was in the mail-steam¬ ship service, subsequently was on sea duty with various squadrons, and in 1856 participated in the capture of the Barrier forts, Canton River, China. During the Civil War he commanded the steamer Hetzel in 1861-64, being in 1862-64 senior officer in command of the sounds of North Carolina. Promoted captain in 1868, he vol. 8 — 32

was assigned to the command of the Congress of the European squadron in 1870.

DAVENPORT, Herbert Joseph, Ameri¬ can educator and publicist: b. Wilmington, Vt., 10 Aug. 1861. He was educated at the Univer¬ sity of South Dakota, and the Harvard Law School, and from 1899 to 1902 was principal of the high school at Lincoln, Neb. He was in¬ structor in political economy at the University of Chicago 1902-08 and in the latter year was made head of the department of political economy at the University of Missouri. He has published (Outlines of Economic Theory* (1896); Plementary Economic Theory) (1898); Principles of Grammar) (with Emerson, 1898) ; (Value and Distribution (1908) ;

Pconomics of Enterprise) (1913), and contri¬ butions to economic journals.

DAVENPORT, John, American Puritan clergyman : b. Coventry, England, 1597 ; d. Boston, Mass., 15 March 1670. Educated at Oxford, he became chaplain of Hilton Castle, near Durham, later was made minister of Saint Stephen's Church, London (1616-33), and there attained a considerable reputation as a preacher. His Puritanical principles and views ere long brought him into conflict with Archbishop Laud, and in 1633 he withdrew from the English Church, and removed to Holland, where he became colleague of the Rev. John Paget, pastor of the Puritan church at Amsterdam. In 1636, however, he returned to England, where he was very active in obtaining the charter of the Massachusetts colony. He arrived in Boston in June

1637, sat with the synod of Cambridge in August, and in March 1638 sailed with the band of colonists that founded New Haven (Quinnipiac). Here he was extremely influential in civil as well as ecclesiastical affairs. He was minister there for 30 years, and aided in establishing the sys¬ tem of civil polity, which began by the declara¬ tion that ((all of them would be ordered by the rules which the Scriptures held forth to them.® On 4 June 1649, holding their constituent as¬ sembly in a barn, the ((free planters® resolved that church members only should be burgesses, and Davenport was chosen one of the <(seven pillars® to support the ordinance of civil government. He exhorted the governor to judge justly, and the ((cause that is too hard for you to bring it to me.® Annual elections were ordained, and God's word established as the only rule in public affairs. In his careful¬ ness in regard to the admission of members to the Church, he held in reality also the keys of all political power. When the messengers of the king, who had come to New England in pursuit of Goffe and Whalley, the regicide judges of Charles I, approached New Haven, he hid the fugitives in his house, and preached to his congregation from Isaiah xvi, 3 and 4; ((Hide the outcasts : betray not him that wandereth. Let mine outcasts dwell with thee, Moab : be thou a covert to them from the face of the spoiler.® After the death of Wilson, the pastor in Boston, in 1667, he removed there to succeed him. He was installed in December 1668. His election caused a division in . the congregation. Those who opposed his views on the ((halfway covenant® withdrew and or¬ ganized the Old South Church. The contro¬ versy went on for many years. Among his

publications are (Discourse About Civil Gov¬ ernment in a New Plantation Whose Design is Religion > (1663) ; (The Knowledge of Christ Indispensably Required of All Men Who Would be Saved) (1653) ; (A Catechism, contain¬ ing -the Chief Heads of Christian Religion) (with Hooke 1659) ; (The Saints' Anchor-Hold* (1661) ; (The Power of Congregational Churches Asserted and Vindicated) (1672). He was also an editor of the works of Dr. John Preston, for some time leader of the English Puritans. Consult Mather, (Magnalia) (1702), and Dexter, (Sketch of the Life and Writings of Davenport* ((Papers) of the New Haven Colony Hist. Soc., Vol. II, New Haven,

1877).

DAVENPORT, Richard Graham, Amer¬ ican naval officer: b. Washington, D. C., 11 Jan. 1849. In 1869 he was graduated at the United States Naval Academy, was commis¬ sioned ensign in the navy, 12 July 1870; pro¬ moted through the various grades, retiring after more than 42 years' active service, 30 June 1907, as commodore, while in command of the Georgia. His various assignments included those of aid to the rear-admiral representing the Navy Department at the Centennial Exposi¬ tion, Philadelphia in 1876, temporary duty at the Chicago Exposition of 1893, member of the Board of Civil Service Examiners for nautical experts, president of the permanent general court martial, also navigation and equipment officer and senior member of the board of in¬ spection at the navy yard, Washington, member of the naval retiring board, assistant to the chief of the Bureau of Navigation, and at various times chief of divisions of the Hydrographic Office. During the war with Spain he was second in command of the fleet blockad¬ ing the coast of Cuba, and later was com¬ mander-in-chief of the Eastern Squadron. In 1898-1899 he made a biological survey of the waters around Porto Rico and vicinity. . He assisted in revising and editing many sailing directions and nautical books, published by the United States Hydrographic Office.

DAVENPORT, Robert, English poet and dramatist: flourished about 1623; d. after 1640. He is known only through his (A Crowne for a Conqueror; and Too Late to Call Backc Yesterday. Two Poems, the One Divine, the Other MoralP (1623) ; (King John and Matilda) (1655), a

tragedy; and two comedies: (A New Trick to Cheat the DivelP (1639), and (The City Night Cap* (printed 1661). That he was associated with Shakespeare in producing parts 1 and 2 of (Henry VP seems established; and it is almost certain that he is the author of a play called (The Pirate.*

DAVENPORT, William Edwards, Ameri¬ can social worker: b. North Stamford, Conn., 31 Aug. 1862. He was educated at the Brooklyn Polytechnic Institute 1875-81 ; and was a special student at the Union Theological Seminary, 1897-99. In 1901 he founded the Brooklyn Italian Settlement, which with other organizations was consolidated in 1910 as the United Neighborhood Guild. In 1902, 1904, and again in 1909 he was foreign correspondent for the Brooklyn Eagle and the New York Evening Post. He is well known as a lecturer on subjects relating to Italian immigration. He has published (The New Dispensation (1884) ;

(Visions of the City* (1884) ; (The Perpetual Fire) (1886); (The Praise of Plymouth) (1892) ; (The Poet and His Friends) (1893) ; (Beecher-An Ode* (1891) ; Poetical Sermons) (1896) ; (The Beggar Man of Brooklyn Heights* (1904); (More Outcries from Brooklyn Hol-low) (1905) ; (Moral Effects of the Messina Earthquake* (1910), and contributions to vari¬ ous periodicals.

DAVENPORT BROTHERS. Ira E. (b.

1839) and William H. (b. 1841). So-called ˆmediums,** who professed to be adepts in spiritistic arts, and who, by their skill in per¬ forming various feats and their clever decep¬ tions, gained many followers. They flourished in 1845-65, but were finally exposed as impos¬ tors. Consult Abbot, (The Davenport Brothers) (1864) and Barkas, (Lecture on the Brothers Davenport* (1864).

DAVENPORT, Iowa, city of Scott County, of which it is the county-seat, on the western bank of the Mississippi, opposite Rock Island, Ill., 330 miles above Saint Louis, and 184 miles west by south of Chicago, on the Rock Island Southern, the Chicago,- Milwaukee and Saint Paul, the Chicago, Rock Island and Pacific and other railways. It is pleasantly situated at: the foot of the Upper Rapids of the Mis¬ sissippi, on the slope of a steep bluff which extends for three miles along the river and commands an extensive view. It is con¬ nected with the Illinois shore by an iron railway and carriage bridge, built in part by the Federal government, and costing $1,200,000, and an iron

railway bridge costing $800,000. On Rock Island, which is crossed by the former structure, are the central United States arsenal and armory, military headquarters and other government buildings. The surrounding re¬ gion is important both agriculturally and for its coal mines. Davenport ships large quanti¬ ties of farm produce, river-packets from Saint Paul to Saint Louis furnishing means of trans¬ portation in addition to that of the railways. The flour and grain business is an important one. Among the numerous manufactured prod¬ ucts are lumber and planing-mill products, brick and stone, bread and other bakery prod¬ ucts, carriages and wagons, agricultural im¬ plements, woolen goods, glucose and its prod¬ ucts, foundry and machine-shop products, cordage, pottery, furniture, cigars and cooper¬ age products. Wholesale slaughtering and meat-packing is also carried on here. The United States census of 'manufactures for 1914 showed for Davenport 231 industrial es¬ tablishments of factory grade, employing 5,292 persons, of whom 3,958 were wage earners, receiving annually $2,402,000 in wages. The capital invested totaled $13,413,000, and the year's output was valued at $17,173,000; of this, $7,057,000 was the value added by manufacture.

Davenport has an Academy of Natural Sciences, the organization having been begun 14 Dec. 1867 ; Saint Luke's, Mercy and other hospitals; a public library; two opera-houses; a Masonic temple and other important buildings. It is the seat of Saint Ambrose College and other educational institutions, and of the State Orphanage; and it is an episcopal see of the Roman Catholic Church and the Protestant Episcopal Church. The Academy of Natural Sciences regularly publishes Proceedings,* and

has a large scientific library and a fine collec¬ tion of mound-builder relics.

Davenport was founded in 1835, in the autumn of which year a company, led by Col. George Davenport, long a resident on Rock Island, was formed for the purchase of a site. In 1838 it was incorporated as a town, and in 1851 a city charter was obtained from the legis¬ lature and adopted. The Chicago and Rock Island Railway was chartered in 1851 and com¬ pleted in February 1854. The government is by a mayor, biennially elected, and a city coun¬ cil, comprising the mayor and aldermen elected by wards and at large. The annual income is about $540,000; the expenditure is $500,000. Pop. (1920.) 56 ,127.

DAVID, 2d king of Israel, shepherd and harpist, royal armor bearer and warrior, exile and monarch, psalmist and conqueror. Biblical sources present a strictly historical pic¬ ture of one of the leading characters in Scrip¬ ture, embellished in later legends, rabbinical and Mohammedan. According to 1 Chron. xl, 15, he was the youngest of the seven sons of Jesse of Bethlehem, or as stated in 1 Sam. xvi, 10, and following xvii, 12, the youngest of the eight sons. Less rugged than his brothers, he kept his father's sheep, but showed daring courage in their defense. His fame as singer and player was widespread, and was to occasion his sum¬ mons to the court to cure Saul's chronic melan¬ choly. His playing on the harp relieved the despondent king, who grew fond of the youth and made him armor-bearer. David's prowess in the constant struggles with the Philistines gained him increasing popular favor, Saul's daughter Michal as wife and his son Jonathan as close friend. But with a king's proverbial fickleness, Saul's fondness changed to envy and hatred, and David fled for safety to the priests of Nob, all of whom, except one, were put to death as traitors by the king. The fugitive now headed a band of resolute men who secured Keilah when, threatened by the Philistines but could not make stand against Saul. Varied ad¬ ventures followed, in one of which he spared the king's life, when he sought refuge among the Philistines and became a vassal of Achish of Gath,

receiving Ziglag as residence, where he ruled four months. Then came the luckless battle of Gilboa, with Saul and his three sons slain, and Israel once again under Philistine sway, although Abner, Saul's general, succeeded in founding a small kingdom east of the Jordan in Mahanaim for Saul's son Ishba'al or Ishbo-sheth, as the name appears in Samuel.

At this crisis, David resolved to return to Israel, and was anointed at Hebron as tribal king of Judea, after having begun communica¬ tions with its tribes and families. He did not abandon, however, his relations as vassal of the Philistines. For seven years and a half he con¬ tinued this arrangement when events rapidly brought about the logical result. Abner's de¬ feat at Gideon, while attempting to conquer for Saul's son David's small kingdom ; that general's defection to David and subsequent death at the hands of David's chieftain Joab, and the mur¬ der of Ishba'al; — all this induced Jonathan's young lame son Mephibosheth to offer David the vacant throne, and his anointment followed. The next step was to free Israel from the yoke of the Philistines, which was accomplished

after a long series of sanguinary battles. Then he planned to secure another centre for his kingdom, instead of at Hebron, which was too far south ; and without much delay he con¬ quered from the Canaanite tribe of the Jebu-sites the city and stronghold of Jerusalem. With solemn services the Ark of the Covenant was transferred, and in memory of its journey-ings in the wilderness it was at first placed in a tent. It was the prophet Nathan who dis¬ suaded David at that time from building for it a temple at Jerusalem. Despite his triumphs on the battlefield, David retained his sense of hu¬ mility and yielded to the prophet in a memor¬ able episode (2 Sam. vii, 1-17).

While details are scanty of David's political and military activity as ruler, Ammon, Edom and Moab and their Aramean neighbors on the north were conquered and made tributary, his kingdom thus becoming the most powerful be¬ tween the Nile and the Euphrates. But now at the height of his fame, David revealed his moral weakness in the incident with Bathsheba, whose husband he indirectly caused to be slain. There followed quickly the episode of his eldest son Amnon and stepsister Tamar, which led to Amnon's death by Absalom, her full brother. Absalom's rebellion next ensued, and his death at the hand of Joab, against David's express command. Much bitterness arose with the Judeans, due to internal jealousy among the tribes not yet wholly unified, which David was unable to counteract. Sudden revolt spread

which might have proved more serious, had it not been promptly quelled by Joab. The only further cloud on David's remaining years was occasioned by the question of his successor. Adonijah, now the eldest of his sons, had been ' allowed by David to appear officially in that role ; but Bathsheba strove to secure the honor for her son Solomon, the youngest. David, who had now grown weak and credulous, believed the rumor that Adonijah had already proclaimed himself king. Hence he was induced to present Solomon to the people, with full ceremonial, and had him anointed as king. He died soon after in his 70th year, having reigned 33 years at Jerusalem.

The outline of David's life and work as here presented is based on 1 Sam. xvi to 1 Kings xi, but a somewdiat different impression is given in 1 Chronicles, which, omitting features that might be regarded as doubtful and offensive, stresses his activity in the organization of the Temple service, the gathering of material for the structure, the planning of every detail, the arrangement of the priests and ritual, subordi¬ nate functionaries as well as judges and officials, together with ordinances referring to military matters and the royal lands. Hence arose the tradition of David as the founder of Israel's religious poetry. Although only 73 of the psalms have special headings assigning their authorship to him, the entire Psalms are credited as Davidic, which modern criticism disputes. His literary skill and dramatic power attained their highest mark in the dirge on the deaths of Saul and Jonathan (2 Sam. i, 19-27). Apart from his genius as poet, he gave Israel its national unity and character, developing a nation out of a collection of tribes and families. In all its subsequent history, with every change in condition and environment, the national idea was never wholly lost. It is not surprising then,

such was the glory of his reign and the strength of his personality, with its human weaknesses which were never extenuated but frankly stated and bore their full penalty in countless sorrows and struggles, that his name belongs to the im¬ mortals of Israel and has become interwoven with visions of the future, rising into roseate clouds of saga in many a rabbinical story and later Mohammedan legend.

Bibliography. — Cited portions of the Old Testament tell the record of his life. For Davidic legends consult Ginzberg, L., (The Legends of the Jews5 (Vol. IV, pp. 81—121) ; Weil, (Biblische Legenden der Muselmanner) ; Griinbaum, Max, (Sprach und Sagenkund* (pp. 511 ff).

Abram S. Isaacs.

DAVID, Saint (Welsh, Dewi), patron saint of Wales: d. 601. He was archbishop of Caer-leon and afterward of Menevia, now Saint David's. He was celebrated for his piety, and many legends are told of his miraculous powers. Several theological treatises are ascribed to him. He was canonized in 1120. Consult Rice Rees, (An Essay on the Welsh Saints* (Lon¬ don 1836).

DAVID I (often called Saint David), king of Scotland: b. about 1080; d. Carlisle, England, 24 May 1153. He was the youngest son of Malcolm Canmore and Saint Margaret. He succeeded his brother, Alexander the Fierce, in 1124. He married Matilda, grandniece of Wil¬ liam the Conqueror; and was Earl of North¬ umberland and Huntingdon when called to the Scottish throne. On the death of Henry I, king of England, he maintained the claim of his niece • Matilda against King Stephen, and seized Car¬ lisle, but was defeated at the battle of North¬ allerton in 1138. He devoted the rest of his reign to the introduction of English civilization into Scotland. He built many castles and founded five bishoprics and many monasteries. He forwarded the process of feudalization which had been begun by his predecessors. He introduced legislation whereby commerce and manufactures were greatly benefited. Much of this is contained in (The Acts of the Parlia¬ ment of Scotland) (Vol. I, Edinburgh 1844). Consult Robertson, (Scotland under her Early Kings * (2 vols., Edinburgh 1862) and Skene, (Celtic Scotland) (3 vols., ib. 1876-80).

DAVID II, king of Scotland: b. Dunferm¬ line, Scotland, 5 March 1324;

d. Edinburgh, 22 Feb. 1371. He was the son of Robert Bruce (q.v.), and succeeded to the throne in 1329. On the death of his father he was acknowledged by the great part of the nation. Edward Baliol, however, the son of John Baliol, formed a party for the purpose of supporting his pretensions to the crown; he was backed by Edward III of England. Battles were frequent, and at first Baliol was successful ; but eventually David's supporters succeeded in driving him from Scot¬ land. David and his queen, who had taken refuge in France, now returned to Scotland and took the reins of government into his own hands. Still, however, the war was carried on with England with increasing rancor, till at length David was made prisoner at the battle of Neville's Cross (1346). After being detained in captivity for 11 years he was ransomed for 100,000 marks. David returned to Scotland but the kingdom was so poor that it was found im¬

possible to raise the ransom. A few instal¬ ments were paid and David sought to be rid of further liability in the matter by offering to make Edward III, or one of his sons, his suc¬ cessor in Scotland. The Scottish Parliament indignantly rejected all proposals of this nature, but David treated secretly with Edward III over the matter. He left no children and was succeeded by his nephew, Robert II. As a ruler he was weak and incapable, lacking the patriotic spirit which animated his father. Consult (Chronica gentis Scotorum*, ed. by W. F. Skene (Edinburgh 1872* ; Burton, (History of Scotland* (ib. 1905) ; Lang, A., (History of Scotland) (ib. 1900).

DAVID, da-ved, Armand, French abbe, naturalist and missionary : b. Espelette, Basses-Pyrenees, 7 Sept. 1826 ; d. 1900. He entered the congregation of the Lazarists in 1848, teaching the natural sciences for some time at Savone, and going, in 1862, to China, where he made an enormous collection of plants, minerals and animals, which he sent to the Museum in Paris. In 1866 he undertook a new exploration, chiefly through Mongolia and eastern Tibet, discover¬ ing many new genera and species of flora and fauna. In 1872 he made a third voyage to China, lasting two years. Besides the accounts of his journeys, appearing in the archives of the Museum under the title of journal of My Third Voyage of Exploration in the Chinese Empire) (2 vols., maps, 1875), he left many works on natural history, among which are (The Birds of China) (with 24 plates 1877) and (Plantae Davidianae ex Sinorum Imperio) (1890).

DAVID, Christian, Moravian missionary: b. Sinftleben, Moravia, 31 Dec. 1690; d. Herrnhut, 3 Feb. 1751. At first a Roman Catholic, he

was converted to Lutheran doctrines and in 1717 became a Moravian. In 1722 he was the leader of the Moravians who took refuge from persecution with Count Zinzendorf and founded their settlement at Herrnhut. In 1733 he went to Greenland, establishing the first mission there ; he later made several visits to Greenland, as well as missionary journeys to Denmark, Hol¬ land, Livonia and England. Consult Thomp¬ son, (Moravian Missions* (New York 1882). See Moravians.

DAVID, Felicien Cesar, French musician and composer : b. Cadenet, Vaucluse, 13 April 1810; d. Saint Germain, near Paris, 29 Aug. 1876. After some vicissitudes he entered the Paris Conservatoire in 1830, and became an ardent disciple of Saint Simon, Enfantin and other social speculators. In 1832, with a few companions, he went to the East in order to realize his dreams of a perfect life, but returned disappointed in 1835. He then published his (Melodies Orientales,* and soon after his most successful work, the ode-symphony (Le Desert0 (1844). His other works include many com¬ positions for strings and for the pianoforte, and 'Mo'ise sur le SinaP (1846); (Christophe Co-lombe> (1847) ; <L'Eden> (1848) ; (La Perle du Bresil* (1851) ; (Herculanum) (1859) and (Lalla Rookh) (1863). In 1862 he was made an officer of the Legion of Honor, and succeeded Berlioz at the Institute in 1869 and became li¬ brarian of the. Conservatory of Paris. His work abounds in felicitous and melodious ex¬ pression, and is pre-eminently marked by the qualities characteristic of French music. Con-DAVID

suit Azevedo, A., (Felicien David) (Paris 1863) and Brancour, R., (Felicien David) (ib. 1908).

DAVID, Ferdinand, German violinist: b. Hamburg, 19 June 1810; d. near Klosters, Swiss Alps, 18 July 1873. He was a pupil of Spohr; made his debut in 1825; and became leader of Gewandhaus Concerts, Leipzig 1836. He was a friend of Mendelssohn and the teacher of Joachim and Wilhelmj. Among his composi¬ tions the five violin concertos, a number of vari¬ ations and other concert pieces for the violin hold the first rank. It has been truly said that the publication of his (Hohe Schule des Violin-spiels } marked an epoch in the development of modern violin-playing. In 1843 he became first instructor of violin at the new Leipzig Con¬ servatory. Consult

Bellaigue, C., (Etudes musicales et nouvelles silhouettes des musiciens) (Paris 1898) and Eckard, J., (Ferdinand David und die Familie Mendelssohn) (Leipzig 1889).

DAVID, da' 'vet,, Gerard (Gheerardt Davit), Dutch painter: b. Oudewater about 1460; d. Bruges, 13 Aug. 1523. He studied with Dutch masters, perhaps with Aelbert Ouwater at Haarlem. In 1484 he entered the Painters' Guild of Bruges, of which he became dean in 1501. Here he studied the works of the Van Eycks, Van der Weyden, Vander Goes and Hans Memling. He was soon recognized as the great master of Bruges, was awarded several important commissions by the city and became closely identified with the religious life of the city. Until recently he was a forgotten master, his importance being but little recognized until the comparative exhibition of Early Flemish masters at Bruges in 1902. In America he is represented in the Metropolitan Museum, New York, by (Christ's Farewell to the Holy Women* and in the New York Historical So¬ ciety by (The Marriage of Saint Catharine* and in private collections. The National Gallery, London, contains an admirable example of his work in (A Canon and His Patron Saints,* a wing from an altar-piece; and among his other pictures are a Madonna,* in the museum at Rome; a (Crucifixion,* in Berlin; and a bap¬ tism of Christ,* and a (Descent from the Cross,* both at Bruges. Consult Bodenhausen, (Gerard David und seine Schule* (Munich 1905). For his paintings in America see Bodenhausen and Valentiner, (Zeitschrift fur bildende Kunst* (Vol. XXII, Leipzig 1911).

DAVID, Jacques Louis, French painter: b. Paris, 30 Aug. 1748; d. Brussels, 29 Dec. 1825. He studied under Vien and entered the schools of the Academy. After obtaining the grand prize in Paris he studied in Rome from 1775 to 1780, devoting himself particularly to historical painting. He visited Rome a second time in 1784 and finished his masterpiece, the (Oath of the Horatii,* which Louis XVI had commis¬ sioned him to design from a scene in the Horaces of Corneille. In the same year he painted his (Belisarius* ; in 1787, the (Death of Socrates* ; and in 1788, (Paris and Helen.* He finished, in 1789, a large painting represent¬ ing Brutus condemning his sons to death. He also furnished the designs of the numerous monuments and republican festivals of that time. In 1792 he was chosen an elector in Paris; afterward a deputy in the National Convention; and during the Reign of Terror was one of the most zealous Jacobins and wholly devoted to

Robespierre. He proposed to erect a colossal monument of the nation

on the Pont-Neuf, from the materials of the king's statue. At the trial of Louis XVI he voted for his death. In 1799 he executed the (Rape of the Sabine Women,* from the exhibition of which he re¬ ceived, as it is said, 100,000 francs. In 1804 the emperor directed him to execute four pieces, among which the coronation of Napoleon was particularly distinguished. Among his finest works of this period were many representations of the emperor, particularly that in which Na¬ poleon was presented on horseback, on Mount Saint Bernard, pointing out to his troops the path to glory. This is often engraved. While court painter to Napoleon he produced the colossal canvas, (The Coronation of Napoleon I* (now at Versailles) ; which has been regarded as the greatest historical painting of the 19th century. In 1814 David painted Leoni¬ das,* his last painting in Paris. After the second restoration of Louis XVIII he was in¬ cluded in the decree which banished all regicides from France. He then established himself at Brussels, where he died in exile. While at Brussels he painted some exceptional portraits, notably those of the Abbe Sieyes, (Three Ladies of Ghent,* and of the daughter of Joseph Bonaparte. The opinions of the merits of this artist are various, but the praise of correct delineation and happy coloring is universally conceded to him. He found in the history of his time, in the commotions of which he took an active part, the materials of his representations. Consult the monographs by Coupin (Paris 1827) ; Chesneau (ib. 1862) ; Delecluze (ib. 1855) ; Blanc (ib. 1860) ; De Villars (ib. 1850) ; Jules David (ib. 1880) ; Rosenthal (ib. 1905) and Saumier (ib. 1904). Consult also Muther, (History of Modern Painting* (Vol. II, London 1907) and Stranahan, (History of French Painting* (1899).

DAVID, Laurent Olivier, Canadian au¬ thor: b. Sault au Recollet, Quebec, 24 March 1840. He was educated at the College of Sainte Therese, and was admitted to the bar in 1864. He assisted in founding the papers Le Colonisateur, L'Opinion Publique and Le Bien Publique. In the latter he attacked the Roman Catholic clergy for their interference in political matters. In 1886 he was elected to the provincial legislature from East Montreal, but declined renomination in 1890. He became city clerk of Montreal in 1892, and was called to the senate in 1903. He has written biog¬ raphies et Portraits* (1876) ; (Les Heros de Chateauguay* (1883) ; (Les Patriotes de 1837-38* (1884); (Les Deux Papineau* (1896) and (Le Clerge Canadien : sa mission et son oeuvre* (1896) ; (Laurier et son Temps* (1905) ; (Vingt Biographies* (1905) ; (Souvenirs et Biographies* (1910).

DAVID, Pierre Jean, French sculptor: b. Angers, 12 March 1789; d. Paris, 5 Jan. 1856. He is commonly called David d'Angers. Against his father's wishes he came to Paris in 1808, and for a time had a hard

struggle with poverty. In 1810 he entered the' atelier of Rolland and was at the same time the pupil of J. L. David (q.v.). His bas-relief of Epaminondas having gained the first prize for sculpture in 1811, he was enabled to go to Rome to perfect himself in his art. In Rome he came under the influence of Canova, On his return to Paris he laid the

foundation of his fame by a colossal statue of the great Conde in marble. In August 1826 he was nominated a member of the Academy of Fine Arts, and in December of the same year professor in the School of Painting and Sculp¬ ture. He executed busts of Goethe for Weimar, of Schelling for Munich, of Tieck for Dresden, of Rauch and Humboldt. In 1830 he fought in the ranks of the Republicans and soon after received the commission for his masterpiece' — the sculptures of the Pantheon. In 1831 he be¬ gan the magnificent sculptures of the Pantheon, his most important work, which he finished in 1837. He took part also in the revolution of 1848 and became a Member of the Constituent Assembly. He went into exile after the coup d'etat of Napoleon III and spent some time in Greece, whence he returned, broken in health, soon after. He executed a great number of medallions, busts and statues of celebrated per¬ sons of all countries, among whom may be named Walter Scott, Canning, Washington, Lafayette, Guttenberg, Cuvier, Victor Hugo, Beranger, Paganini and Madame de Stael. David worked with great rapidity and ease, and his chief strength consisted in his facility of invention and execution, especially in large works. In works of smaller size his drawing and modeling are seen to be deficient in fineness and accuracy. Consult Brownell, (History of French ArD (New York 1892) and Gonse, (La Sculpture frangaise depuis le XIV Siecle) (Paris 1895).

DAVID, da-veth', Colombia, town on the Isthmus of Panama near the west end, 200 miles southwest of Panama city in a fertile plain on the Rio David which enters the Pacific eight miles to the south. Stockraising and the cul¬ tivation of tobacco are extensively engaged in; there is a considerable trade and some gold mining. Pop. 9,000.

DAVID AP GWILYM, da'ved ap gwel'im, Welsh poet of the 14th

century. There is a doubt about his dates, some authorities giving 1340-1400; others 1300-68. He had a good edu¬ cation and considerable knowledge of Italian and Latin. His tendency to keen satire was very un¬ pleasant to his kinsmen and neighbors, and he was at one time forced to leave home on this account. To Morvydd, the lady whom he loved, he addressed nearly 150 poems; though she re¬ turned the poet's love she was forced into an uncongenial marriage with a wealthy man. David eloped with her, and the fine imposed on him by the husband was so heavy that he could not have paid it but for the assistance of the men of Glamorganshire. He is undoubtedly the greatest of mediaeval Welsh poets, and has been compared to Shakespeare, Burns, Ovid and Petrarch. Most of his poems were written in the metre called cywydd, of seven-syllable lines rhyming in couplets. Over 250 of his poems were collected and published by Owen Jones (1789) ; and a translation published by Arthur James Johnes (1834). Others of his poems have been discovered in manuscript in the Mostyn Library and British Mqseum. Consult Stern, L. C., ((Davydd ab Gwilym® (in (Zeitschift fiir celtische Philologie,5 Vol. VII, pp. 1-265, Halle 1910). See Welsh Literature.

DAVID BALFOUR; Being Memoirs of His Adventures at Home and Abroad, a novel by Robert Louis Stevenson, published in 1893.

A sequel to { Kidnapped^ this novel opens with the attempt of David Balfour to effect the es¬ cape of his friend, Alan Stewart, from Scot¬ land; and to aid Stewart's brother, unjustly imprisoned on a charge of murder. He falls in love with Catriona Drummond, is imprisoned, and after his release goes to Holland, where he lives with Catriona without marriage. Her father interfering, the two are separated ; but by the intervention of Alan Stewart they meet again and are married. The novel is in the romantic vein, written with Stevenson's simplic¬ ity and clearness, and is artistic in construc¬ tion. See Kidnapped.

DAVID CITY, Neb., the county-seat of Butler County, situated on the Union Pacific, the Burlington and Missouri, the Chicago and Northwestern railroads, and about 45 miles northwest of Lincoln and 90 miles west of Omaha. It is a trade centre for the populous agricultural region surrounding the city. The city contains a public library, park and Chau¬ tauqua grounds. The waterworks and electric-light plant are owned by the city. Pop. 3,000.

DAVID COPPERFIELD. This novel ap¬ peared in 20 monthly numbers, beginning in May 1849 and ending in November 1850. After finishing

the novel, Dickens remarked that he liked it the best of all his books. His fondness for this child of his fancy, as he called it, was partly due to the fact that the novel was remi¬ niscent of his own early life. Not autobiog¬ raphy exactly, the novel rather runs on corre¬ spondencies between the careers of Charles Dickens and David Copperfield. D. C. is C. D. reversed. (David Copperfield) is the story of a young man, who by his industry and talents rises out of the lower middle class — the pro¬ letariat almost — into literary fame. He passes through a cruel and degraded childhood, being compelled at one time to earn his living by pasting labels on bottles in a wine-shop with urchins like Mick Walker and Mealy Potatoes, and in the occupation he nearly starves to death. He is befriended by his great-aunt, Betsy Trot-wood, who puts him to school, where he displays unusual abilities ; he studies law, learns stenog¬ raphy and becomes an expert reporter in the House of Commons ; he writes books and there¬ by gains a name. Throughout his career he associates with all sorts and conditions of men, from gentlemen down to rascals, some of whom, like Uriah Heep, find their way into jails. He marries twice; the child wife Dora dies, and he becomes supremely happy in the union with the mature Agnes. Everywhere (David Copperfield) is a skilful mixture of fact and fiction. Dickens drew upon himself and a score of others for personal traits out of which his imagination created characters, rare and new.

Quite apart from autobiography, many readers have regarded (David Copperfield* as Dickens's best novel. <(Dickens never stood,® says his biographer, ((so high in reputation as at the completion of (Copperfield.* The popularity it obtained at the outset increased to a degree not approached by any previous book except (Pickwick.*® The novel was admired by Bulwer-Lytton and Thackeray, and praised by Matthew Arnold, who rarely condescended to notice fiction. ((What treasures of gaiety, invention, life, are in that book! What alertness and re-

sources ! What a soul of good-nature and kind¬ ness governing the whole !® These were Arnold's words. In my opinion, (David Copperfieldˆ contains no character quite, equal to Mr. Pickwick, Sam Weller or Dick Swiveller, nor does it display the grotesque fancy of (Great Expectations,5 or the wonderful intellectual grasp of (Bleak House.) To know Dickens it is necessary to read all that he ever wrote. But as a work of art (David Copperfield) is Dickens's masterpiece. It contains little or no melodrama, little or no exaggerated pathos ; farce and caricature are held in restraint to the point where they become comedy; incident naturally rises out of character, and character naturally rises out of incident. The most re¬ markable creation, said to be a remote likeness of Dickens's own father, is Mr. ' Micawber, the happy impecunious gentleman, whose debts do not trouble him so long as he can keep out of jail; who always eats, drinks, orates and sleeps in perfect contentment, certain that something will turn up. He is not dazed by the prospect of emigrating to Australia, where something does actually turn up, and he finds ample scope for his rhetoric in a colonial newspaper.

It is a decided drop from Micawber to Copperfield. The story of his boyhood is excellent, but Copperfield really develops into a cad with¬ out the author's knowing it. Nor are Dora and Agnes girls who now greatly interest readers. But there is the eccentric Betsey Trot-wood who treats Mr. Dick the lunatic as if he were sane and protects David against Mr. Murdstone. She is admirably conceived and" developed. And there are Peggotty, nurse and servant, with cheeks and arms so red that the birds might peck them in preference to apples, and her brother the fisherman and Barkis who <(was willin',® and finally won her. In depicting the Peggotty group of characters Dickens ren¬ dered the mingled humor and pathos and heroism of humble life in a surprising manner. And was there ever elsewhere an undertaker like Mr. Omer? Streaks of pain and crime run through the book, but scoundrels like Steerforth and Uriah Heep are somehow forgotten for the fun. (David Copperfield, } it has been ob¬ served, (<is the perfection of English mirth.®

Wilbur L. Cross,

Professor of English, Yale University.

DAVIDGE, William Pleater, American actor: b. London, England, 17 April 1814; d. Cheyenne, Wyo., 7 Aug. 1888. He made his first appearance on the stage at the Drury Lane Theatre in London ; after acting in various places in England, came to the United States in 1850. He took the part of Sir Peter Teazle at the old Broadway Theatre in New York, sup¬ ported Forrest, Fanny Davenport and other leading actors and took part in the Shakes¬ pearean revivals at the Winter Garden Theatre in 1867. In 1869-77 he was at Daly's Fifth Ave¬ nue Theatre ; in 1879 he appeared as the original Dick Deadeye in (Pinafore5 ; and in 1885 he became a member of the Madison Square Thea¬ tre Company. He played over 1,000 parts, among them Hardcastle in (She Stoops to Conquer> ; Croaker in (Good Natured Man5 ; Cali¬ ban in (The Tempest5 ; Nick Bottom in ˆlid-summer Night's Dream5 ; and Old Gobbo in (The Merchant of Venice.5 He published a volume of reminiscences, (Footlight Flashes5

(New York 1866) ; (The Drama Defended) (ib. 1859), *etc.*

DAVIDISTS, the name given to two dis¬ tinct religious sects, namely, the followers of David of Dinant in the 13th century, and those of David George or Joris in the 16th. David of Dinant was a teacher in the University of Paris and contemporary of Almaricus of Bena (Amaury de Bene). At the death of Amaury (1204) he continued to teach Amaury's panthe¬ istic doctrine, founded on Neoplatonism, that the ((A11 is God.® David taught that holiness is simply the consciousness of the presence of God, the thought that God is the (<One and the All® : that he who attains the perfect view of the God-All cannot sin, no matter what enormities he commits ; he is the Christ, he is the Holy Ghost. The other sect of Davidists, called also David-Georgians, after the name of their founder, who was born at Delft in 1501, had its rise in 1534. Its founder published in 1542 his (Book of Wonders,5 recounting his marvelous visions and divine revelations. But he retired from the leadership in 1544, and dur¬ ing the remainder of his life was a prosperous merchant at Basel, under an assumed name. By order of the senate of Basel, his body, as that of a heretic, was exhumed and burnt. The sect, with Henry Nicolas as its head, made prog¬ ress in Holland and got a footing in England, being now known as Familists. The Familists taught as their chief tenet the gospel of love, divine love. Love, they held, is above all laws, whether

ceremonial, moral or civil, and the practice of the sectaries was so consonant with this doctrine that early in the 17th century the societies of Familists had to be suppressed in both countries, by the civil power.

DAVIDS, Thomas William Rhys, English Oriental scholar : b. Colchester, 12 May 1843. He was educated at the University of Breslau; from 1866 on filled judicial places in Ceylon and acted as archaeological commissioner. In 1877 he was called to the English bar; was pro¬ fessor of Pali and Buddhist literature in Uni¬ versity College, London (1882-1912) ; and pro¬ fessor of comparative religion, Manchester (1912-15). Among his works are ˆBuddhism5 (1877) ; translations of (Buddhist Birth Stories5 (1880) ; (Buddhist Suttas5 and (Vinaya Texts5 (1891) ; (American Lectures5 (1896) ; (Sacred Books of the Buddhists ; Dialogues of the Bud¬ dha5 (1899) ; (Buddhist India5 (1902) ; (Early Buddhism5 (1910).

DAVID'S DEER (Cervus davidianus), a deer found in northern China and in Man¬ churia. It derives its name from Pere David, a French Catholic missionary, who first saw it in the imperial park at Pekin. It resembles the Indian swamp-deer, but has long, shaggy hair and a long tail. It has no brow-tine. Little is known of its wild habits, for all of the rep¬ resentatives are found in parks in Europe, and it is likely soon to become extinct.

DAVIDS ISLAND, an island in Long Island Sound, near New Rochelle, N. Y., owned by the United States government and. used for military purposes, especially as a training sta¬ tion for infantry recruits. It has an area of about 100 acres, and is fortified as Fort Slocum.

DAVIDSON, Andrew Bruce, Scottish bib¬ lical scholar : b. Aberdeenshire 1831 ; d. 1902.

He studied at Aberdeen, was ordained in 1863 and appointed professor of Oriental languages in New College, Edinburgh. He was generally regarded as the foremost British biblical critic of his day, and was a member of the Old Tes¬ tament Revision Committee. Among his more famous pupils were George Adam Smith and W. Robertson Smith. Among his publications are Commentary on Job) (1862) ; (An Introduc¬ tory Hebrew Grammar5 (9th ed., 1888) ; prim¬ ers on (Job,5 <Ezekiel,) Hebrews5 (1877) ; (The Called of God5 (1903) ; and (Waiting upon God5 (1904), with biography by Taylor Innes.

DAVIDSON, Charles, American educator: b. Streetboro, Ohio, 29 July 1852. He was grad¬ uated at Iowa College in 1875 and studied sub¬ sequently at Yale. After several years of teach¬ ing in seminaries and academies he became as¬ sistant in English at Indiana University in 1893, and in the following year was associate pro¬ fessor of English at Western Reserve Univer¬ sity, and from 1906 to 1911 was professor of education at the University of Maine. He is author of (English Mystery Plays5 (1892) ; (Necessary Equipment for Teachers of Eng¬ lish5; (English a Factor in the Training of a Business Man5 ; (A Guide to English Syntax5 ; (English in the Secondary School5 ; (Motor Work and Formal Studies in Primary Grades5 (1911), and various monographs and numerous papers and articles on education and the teach¬ ing of English.

DAVIDSON, Sir Charles Peers, Canadian jurist: b. Huntingdon, P. Q., January 1841. He is a graduate of McGill University; was called to the bar in 1864; was returned for the Quebec provincial legislature, 1881, and sat in the Do¬ minion House of Commons, 1882-87, when he was appointed a judge of the Supreme Court of Quebec. He was one of the commissioners appointed in 1891 to inquire into the Baie des Chaleurs Railway scandal, and in 1915 was charged with the investigation of alleged war contract irregularities. He was knighted in

1913.

DAVIDSON, George, American astron¬ omer: b. Nottingham, England, 9 May 1825; d. 1911. He came to the United States in 1832; was graduated at the Central High School, Philadelphia, in 1845; and

joined the United States Coast Survey. While in this service he was chief engineer of a party which surveyed a ship canal route across the Isthmus of Darien. He also made a geographical survey of the coast of Alaska in 1867. He traveled extensively in Egypt, China, India and Europe, for purposes of scientific study and also took charge of the tele¬ graph-longitude work, and of the main triangu¬ lation and astronomical party carrying the geo¬ detic work across the continent. From 1877-84 he was regent of the University of California, and for many years was president of the Cali¬ fornia Academy of Sciences. He retired from the coast survey after 50 years of distinguished service, in 1895, and became professor of geog¬ raphy in the University of California. He pub¬ lished (The Alaska Boundary5 (1903) ; (The Glaciers of Alaska5 (1904) ; (The Discovery of San Francisco Bay5 (1907) ; (Francis Drake on the Northwest Coast of America5 (1908) ; (Origin and Meaning of the Name California*

(1910).

DAVIDSON, James Wheeler, American capitalist: b. Austin, Minn., 14 June 1872. He was graduated from the Northwestern Military Academy, Highland Park, Ill., in 1891. He was a member of the Peary Artie Expedition to the North Polar regions, 1893-94; war correspond¬ ent with Chinese army, 1895; and with the Japa¬ nese army, 1895-96. In June 1897, he was ap¬ pointed by President Cleveland consular agent for the island of Formosa, where he remained nine years, during which time he wrote numerous monographs on Formosan affairs, as well as a large volume entitled (Formosa Past and Present5 (1890), which is consid¬ ered as a standard book of reference on this subject. In 1903 he obtained leave of absence, and under the auspices of the Russian Com¬ munications Department made a careful survey of the territory adjacent to the Asian section of the Trans-Siberian Railway, collecting mate¬ rial for a complete report of this territory, ex¬ tracts from which appeared in the Century Magazine (April-June 1903). In 1904 he was appointed to Dalny, Manchuria, one of the political consulates, where he was expected to promote Secretary Hay's ((open door55 policy. Later he became consul at Antung, Manchuria, and commercial attache to the American lega¬ tion, Pekin, and special agent of the Depart¬ ment of State. He was appointed by President Roosevelt in 1905 consul-general at Shanghai. He was decorated by the Emperor of Japan in 1895 with Order of Rising Sun for services ren¬ dered Japanese army in capturing the capital of Formosa. He is a fellow' of the Royal Geo¬ graphical Society and member of the Asiatic Society, the Explorers'

Club and the Authors' Club. He has large lumbering interests and in 1915 was president of eight banks in North Da¬ kota. His publications include (Formosa Cam¬ phor and Its Future5 (1895) ; (A Review of the History of Formosa5 (1896) ; (Formosa Under Japanese Rule5 (1903), and contributions to the publications of scientific societies and magazines.

DAVIDSON, James Wood, American author: b. Newberry County, S. C., 9 March 1829; d. 1905. He was graduated from South Carolina College (now the State University) and taught Greek at the Mount Zion Collegiate Institute. During the Civil War he fought in the Confederate army as adjutant in Stone¬ wall Jackson's army corps under Lee in Vir¬ ginia. After the war he took up journalism, was literary editor of the New York Evening Post, 1873, and American correspondent of the London Standard from 1873 to 1878. After 1887 he was employed in the Treasury Depart¬ ment at Washington. He wrote (The Living Writers of the South5 (1869) ; (A School His¬ tory of South Carolina5 (1869) ; (The Corre¬ spondent5 (1886) ; (The Poetry of the Future5 (1888) ; and (The Florida of To-day5 (1889).

DAVIDSON, John, Scottish poet, novelist and miscellaneous writer: b. Barrhead, Renfrew¬ shire, 11 April 1857; d. 3 Aug. 1905. He was at first a teacher, but in 1890 adopted a literary career, writing for the Speaker and other iournals. He has published (Scaramouch in Naxos5 (1889); (Fleet Street Eclogues5 (1893: 2d series, 1896) ; (A Random Itinerary5 (1894); (Ballads and Songs5 (1894); (Plays5 (1894); <Earl Lavender5 (1895); <New Bal¬ lads5 (1896) ; (The Last Ballad and Other

Poems' (1899) ; (The Testament of a Man Forbid' (1901) ; ˆhe Testament of an Empire Builder) (1902) ; and the novels <Perfervid) (1890) ; and (Baptist Lake' (1894). In a fit of depression he committed suicide by drowning near Penzance, and, in accordance with his directions, his body, on being recovered, was buried at sea.

DAVIDSON, John Wynn, American soldier: b. Fairfax County, Va., 18

Aug. 1824; d. Saint Paul, Minn., 26 June 1881. He was a graduate from West Point in 1845; served dur¬ ing the Mexican War in the Army of the West, was then placed on frontier and garrison duty, and fought a battle against the Apache and Utah Indians at Cienguilla, N. Mex., in 1854, in which he lost three-fourths of his command. He served in the Federal army during the entire Civil War, and in 1866 became lieutenant-colonel and in 1879 colonel, in the United States cavalry. He was professor of military science at the Kansas Agricultural College, and commanded various posts in Idaho, Texas, Indian Territory and Montana.

DAVIDSON, Randall Thomas, archbishop of Canterbury : b. Edinburgh, 7 April 1848. He was graduated at Trinity College, Oxford; after holding important livings was appointed bishop of Rochester in 1891 ; bishop of Winchester, 1896 ; and succeeded Temple as primate of England in January 1903. He visited America in 1904. Published (Life of Archbishop Tait) (1891) ; (The Christian Opportunity ' (1904) ; (Captains and Comrades of the Faith) (1911).

DAVIDSON, Samuel, Irish biblical scholar: b. near Ballymena, Ireland, 1806; d. 1 April 1898. After entering the ministry of the Pres¬ byterian Church, he beoamq in 1835 professor of biblical criticism and literature in the Pres¬ byterian Theological College in Belfast. He afterward joined the Congregationalists, and was appointed, in 1842, a professor in their col¬ lege in Manchester, but resigned in 1857, owing to his advanced opinions. His works include (Sacred Hermeneutics) (1843); translation of (Gieseler's Ecclesiastical History' (1846) ; (The Ecclesiastical Polity of the New Testament'

• (1848) ; (An Introduction to the New Testa¬ ment } (1848-51) ; (Biblical Criticism' (1852) ; Untroduction to the Old Testament (1862) ; (On a Fresh Revision of the English Old Tes¬ tament (1873) ; (The New Testament Trans¬ lated from the Critical Text of Von Tischen-dorf) (1875); <Canon of the Bible) (1877) ; (Doctrine of Last Things Contained in the New Testament (1882). His autobiography was published in 1889.

DAVIDSON, Thomas, Scottish philosopher and writer: b. Aberdeenshire, 25 Oct. 1840; d. Montreal, 14 Sept. 1900. He came to the United States in 1867, and was subsequently professor of classics in the Saint Louis High School. In 1875 he settled in Cambridge, Mass. Later he traveled in Greece and Italy. Included in his publications are (A Short Account of the Niobe Group) (1874) ; (The Place of Art in Educa¬ tionˆ (1886) ; (Giordano Bruno) (1886) ; a (Hand-Book to Dante' (1887) ; (Prolegomena to Tennyson's ftIn Memoriam" ' ;

(Aristotle and Ancient and Modern Educational Ideals' ; (The Education of the Greek Peoplq and Its Influence on Civilization.'

DAVIDSON, William, American general: b. Lancaster County, Pa., 1746; d. Cowan's Ford, N. C., 1 Feb. 1781. He took up arms at the outbreak of the Revolution, was major of one of the first regiments raised in Carolina, was appointed brigadier after the battle of Camden, and in 1781 was dispatched by Greene to prevent Cornwallis from passing the Catawba at Cowan's Ford. With his death in the battle which ensued, and with the dispersion of his troops, began the pursuit of Greene by Corn¬ wallis.

DAVIDSON COLLEGE, an educational institution at Davidson, N. C. ; founded in 1837, under the auspices of the Presbyterian Church, and is at present governed by a board of trustees appointed by the presbyteries of North Carolina, South Carolina, Georgia and Florida. No theological department, however, is maintained, and the degrees conferred are the academic ones in art and science. Its pro¬ fessors and instructors are about 15 in number; students, 353 ; volumes in the library, 25,000 ; value of property, about $360,000, and the en¬ dowment $250,000.

DAVIE, William Richardson, American soldier: b. England, 21 June 1756; d. Camden, S. C., 8 Nov. 1820. He was brought to North Carolina when a child, and was graduated at Princeton, N. J., in 1776. He entered the Amer¬ ican army, and obtained a captaincy in Pulaski's Legion. He rose to be colonel and commis¬ sary, served throughout the war, and was a favorite officer under Sumter and Greene. He was a member of the convention to form the United States Constitution in 1787, and advo¬ cated its acceptance in the convention of North Carolina. Through his influence the University of North Carolina was established. He was elected governor of that State in 1799, but served only a few months, resigning to accept the position of member of the embassy to the French government which resulted in the con¬ vention of 30 Sept. 1800. A good biographical sketch is to be found in (The Library of Amer¬ ican Biography' (ed. by J. Sparks).

DAVIES, Arthur B., American landscape and figure painter : b. Utica, N. Y., 1862. He studied under Dwight Williams, and in the Chicago Art Institute and in New York. He began as an illustrator for Saint Nicholas Magazine. He is a representative of the Romantic school in painting. He is represented in the permanent collections of the Art

Insti¬ tute of Chicago and the Metropolitan Museum, New York. Among his important works are (Spring's Renewal' (1901) ; (The Breath of Light' (1901); (The Girdle of Ares' (1908; now in the Metropolitan Museum, New York) ; (Visions of the Sea' (1911); (The Hunter of the Starlands' ; (Maya, Mirror of Illusions' (Chicago Art Institute) ; (Children of Yester¬ year,' and three other paintings in the Brook¬ lyn Museum. He has of late shown pronounced Cubist tendencies in a series of paintings, of which the most important is (The Great Mother' (1914).

DAVIES, Charles, American mathemati¬ cian: b. Washington, Litchfield County, Conn., 22 Jan. 1798; d. Fishkill Landing, N. Y., 18 Sept. 1876. He was educated at the United States Military Academy and was appointed _ professor of mathematics there in 1828. He

held the same post subsequently at Columbia College and in the University of New York. He published (Surveying) (1832) ; an edition of Legendre's (Geometry } (1828) ; (Trigonometry } (1840); (Elements of Algebra > (1844; latest ed., 1901) ; (Logic of Mathematics) (1850) ; Mathematical Dictionary and Cyclopaedia of Mathematical Science, } with W. G. Peck (1855), and other works and textbooks on ■arithmetic, mathematics, *etc.*

DAVIES, Henry Eugene, American soldier: b. New York 1836; d. 1894. He was educated at Harvard, Williams and Columbia. He was admitted to the bar of New York in 1857, and entering the United States volunteers as captain when the Civil War broke out, he became brigadier-general in 1863. Serving with Sheridan he was made major-general of volunteers 1865. He resigned in 1866, after¬ ward practising law in New York. He published (General Sheridan) in the (Great Commanders Series) (1895).

DAVIES, John, English poet : b. Hereford about 1565; d. London 1618. He was famous as a writing master at Oxford, and writer of curious philosophical poems, epigrams, *etc.* He was the author of <Microcosmos) (1603) ; (The Witte's Pilgrimage) ; (The Scourge of Folly* ; (Witte's Bedlam* (1617), *etc.* Consult Grosart (ed.), (Complete Works* (2 vols., Blackburn

1873).

DAVIES, Sir John, English poet and law¬ yer : b. Tisbury, Wiltshire, 1569; d. 8 Dec. 1626. He was educated at Westminster and Oxford. Called to the bar in 1595, he became solicitor-general for Ireland in 1603, and attorney-general in 1606, being knighted the next year. He was elected to the Irish Parliament in 1613, and be¬ came speaker of the Lower House. He was returned to the English Parliament in 1621, and appointed lord chief justice in 1626. He pub¬ lished two works connected with his Irish career, (A Discovery of the True Causes why Ireland was Never Subdued* (1612), and Re¬ ports of Cases Adjudged in the King's Courts in Ireland) (1615). As a poet he was a reac¬ tionist from the love poetry of the earlier Eliza¬ bethan period, turning to moral themes. He wrote (Orchestra,* a poem on dancing, in which he maintained that all motion is music; (Hymns to Astraea>

(1599), a series of acrostics; (Nosce Teipsum* (1599), a poem on the immortality of the soul. Consult (Complete Works,* with memoir by Grosart (3 vols., Blackburn 1869-76).

DAVIES, Sir Louis Henry, Canadian jurist: b. Charlottetown, Prince Edward Island, 4 May 1845. He was educated at Prince of Wales College in his native town, and was called to the bar of the Inner Temple, London, in 1866. Beginning practice in Charlottetown he rose rapidly, being solicitor-general 1869 and 1871— 72, and premier and attorney-general of the island 1876-79. He entered the Dominion House of Commons in 1882, remaining a mem¬ ber till his appointment as a judge of the Supreme Court of Canada. He was created K. C. M. G in 1897, and was Minister of Marine and Fisheries 1896-1901. In 1897 he was a member of the joint high commission appointed for the settlement of outstanding differences with the United States.

DAVIES, Samuel, American clergyman : b. New Castle County, Del., 3 Nov. 1724; d.

Princeton, N. J., 4 Feb. 1761. He was educated at the seminary of the Rev. Samuel Blair, Fogg's Manor, Pa., was ordained in 1747, and was at his request appointed to officiate at dif¬ ferent places of worship in Hanover County, Va., where, the Episcopal Church being then the established church of Virginia, dissenters were obnoxious to the civil authorities. His labors were highly successful, and led to a controversy between him and Peyton Randolph, the king's attorney-general, as to whether the act of tolera¬ tion which had been passed in England for the relief of Protestant dissenters extended also to Virginia. The ultimate decision of the question was in the affirmative. With Gilbert Tennent he visited England in 1753 to obtain funds for the College of New Jersey (now Princeton University). In a footnote to a sermon, preached in 1755, and dealing with the spirit aroused by the French and Indian War, he wrote : (<As a remarkable instance, I may point out to the public that heroic youth, Colonel Washington, whom I cannot but hope Provi¬ dence has hitherto preserved in so signal a manner for some important service to his coun¬ try.® The first presbytery in Virginia was es¬ tablished through his exertions in 1755; and in 1758 he was chosen to succeed Jonathan Edwards as president of the College of New Jersey. A collection of his sermons was published after his death, in three volumes, and passed through several editions in Great Britain and America. Consult memoir by Barnes in the (Complete Works* (New York 1851).

DAVIES, Thomas Frederick, American Protestant Episcopal bishop : b. Fairfield, Conn., 31 Aug. 1831 ; d. Detroit, Mich., 9 Nov. 1905. He was a graduate of Yale in 1853, and subse¬ quently studied at the Berkely Divinity School, where he was for a time professor of Hebrew. He was ordained in 1857, and after being suc¬ cessively rector of Saint John's Church, Ports¬ mouth, N. H., and Saint Peter's, Philadelphia, was consecrated bishop of Michigan in 1889.

DAVIES, Thomas Frederick, American Protestant Episcopal bishop : b. Philadelphia, 20 July 1872, the son of Thomas Frederick Davies, bishop of Michigan. He was gradu¬ ated at Yale in 1894 and at the General Theological Seminary of New York in 1897. He was ordained a deacon in 1897 ; and priest in 1898 by the Protestant Episcopal Church. He was assistant minister at the Church of the Incarnation, New York 1897-1900; rector of Christ Church, Norwich, Conn., 1901-03; rector of All Saints', Worcester, Mass., 1903-11, and became bishop of western Massachusetts in

1911.

DAVIES, T. Witton, English Baptist theologian and Orientalist: b. Nantyglo, Mon¬ mouthshire, 1851. He was educated at Univer¬ sity College, London, and studied also in Berlin, Leipzig and Strassburg. He was pastor of a church in Merthyr Tydfil in 1878-80, professor of classics, Hebrew and mathematics at Haver¬ fordwest Baptist College 1880-91, principal of Midland Baptist College, Nottingham 1892-99, lecturer in Arabic and Syriac, University Col¬ lege, Nottingham 1897-99, and professor of Hebrew and Old Testament Literature in Ban¬ gor Baptist College 1899-1906, and since the lat¬ ter year professor of Semitic languages. His publications include (Oriental Studies in Great

DAVIESS

Britain' (1892); (Magic, Divination and Demonology among the Hebrews and their Neighbors' (1898) ; (The Scriptures of the Old Testament' (1900); (Heinrich Ewald, Orientalist and Theologian' (1905) ; commen¬ taries on <(Psalms," ((Ezra," ((Nehemiah" and ((Esther," in (The Century Bible' (1906-09) ; (The Survival of the Evangelical Faith' (1907) ; joint-author (Welsh Political and Educational Leaders' (1907) ; and (Wales To-day and To¬ morrow' (1907) ; (Literary and Human Factors in My Life' (1911) ; (Bel and the Dragon,' in¬ troduction and commentary in the (Oxford Apocrypha' (1913) , and contributions to various biblical journals, (The Encyclopaedia Biblica,' (Orientalische Studien,' *etc.*

DAVIESS, da/ vis, Joseph Hamilton, Amer¬ ican lawyer: b. Belford County, Va., 4 March 1774; d. Tippecanoe, Ind., 7 Nov. 1811. He was famed for his eccentricities and was commonly known as ((Jo" Daviess. He was appointed United States district attorney in Kentucky and in that capacity prosecuted Aaron Burr for treason. Jo Daviess County in Illinois was named in his honor. He was killed at the bat¬ tle of Tippecanoe.

dAvila, da've-la, the name of several per¬ sons well known in the history of Spanish-America : 1. Gil Gonzales. (See Central

America; First Spanish Colonies). 2. Juan, Spanish soldier: b. Granada, Nicaragua, 1530; served in Peru, and later under Coronado in Costa Rica, and wrote (1566) (Relacion de la Provincia de Costa Rica,' a document of his¬ torical value. 3. Coello y Pacheco, governor and captain-general of Chile, 1667-70.

DAVILA, da've-la, Alonzo, Spanish soldier: b. City of Mexico; d. there, 1566. He was sup¬ posed to be implicated in a plot to make Mar¬ tin Cortes ruler of New Spain, and was executed on this account.

DAVILA, Enrico Caterino, Italian states¬ man and historian : b. near Padua, Italy, 30 Oct. 1576; d. near Verona, 8 Aug. 1631. His father, a Cypriote, who fled to Venice after the conquest of Cyprus by the Turks in 1561, introduced him to the French court, where he was made

page; after this he entered the French service, in which he highly distinguished him¬ self. He subsequently entered the Venetian service, gradually rose to the post of governor of Dalmatia, Friuli and the island of Candia, and was esteemed at Venice the first man in the republic after the doge. While . governor of Crema he was murdered. He is principally celebrated for his (History of the Civil Wars of France, from 1559 to 1598' ((Storia delle Guerre Civili di Francia,' Venice 1630). This has been translated into several languages, and deserves a place near the works of Guicciardini and Machiavelli. His (Life' has been written by A. Zeno (Venice 1733) ; Ciscato (Vicenza 1885). Consult also President J. Adams, dis¬ course on Davila' (1805).

dAvila. Pedrarias, Spanish governor of the Darien Colony, Castilla del Oro and Nica¬ ragua: b. Segovia, Spain, about 1440; d. Leon, Nicaragua, July 1530. His name was originally Pedro Arias, but the form given above is better known in history. He was the brother of the Conde de Punonrostro, and married the daughter of the Condesa de Moya, the friend of

Isabella the Catholic; won distinction in the wars of Granada, and enjoyed the protection of Fonseca, bishop of Burgos, master of the affairs of the Spanish-American colonies during the reigns of Ferdinand and Isabella and Charles I. Fonseca made Davila governor of Darien in 1514, and the governor promptly employed the adventurers who accompanied him in a number of expeditions, including that of Hernan Ponce and Bartolome Hurtado (1516) to the coasts of the present republics of Nicaragua and Costa Rica. He established himself at Panama, and had at his command the famous soldiers Bal¬ boa, Hernandez de Cordoba, De Soto, Ojeda, Olid, Ponce and Francisco Pizarro. In 1526-27 he asserted that, as governor of Castilla del Oro, he ought to administer Nicaragua and Honduras as well. His claim to the former was recognized. Balboa suffered death in conse¬ quence of incurring his enmity. Pedrarias is cited most frequently as the type of the vigor¬ ous, but wholly unscrupulous official of the first period of Spanish colonization on the American mainland.

dAvila y padilla, pa-thel'ya, Au¬ gustin, Mexican historian: b. Mexico 1562; d. Santo Domingo 1604. He entered the order of Dominicans in 1578, taught philosophy and theology at the College of La Puebla and Mex¬ ico, becoming prior of his convent La Puebla, and procurer of his order at the courts of Madrid and Rome 1596. He became preacher for Philippe II 1588, and was consecrated as archbishop of Santo

Domingo 1601. He burned several hundred copies of the Bible translated into Spanish and annotated by Protestants. He wrote (Historia de la provincia de Santiago de Mejico' (1596-1634) ; and (Varia historia de la Nueva Espana y Florida' (Valladolid 1634).

DA VINCI, Leonardo. See Vinci,

Leonardo Da.

DAVIS, Arthur Hoey, Australian literary man : b. Drayton, Queensland, Australia, 14 Nov. 1861. After spending six years in a somewhat venturesome life for a boy, from 1882 to 1888, on sheep and stock farms, he entered the office of the curator of Intestate Estates at Brisbane, and the following year he became clerk in the sheriff's office and under-sheriff in 1902, a position which he left the following year to found Steel Rudd's Magazine, a journal which was destined to exert a very considerable influence on contemporary Australian thought and literature. Davis, _ or <(Steel Rudd," the name by which he is universally known, may be said to have created an Australian literary school of his own and to have done more than any other modern Australian writer to bring his country before the eye of the public. He has encouraged the younger generation of Australian writers to renewed literary efforts, through the columns of his magazine which have been always invitingly open to them. As the chronicler of the lives of the people of the <(back country" he became famous in Australia in 1906, and soon thereafter he acquired an international reputation, to such an extent, in fact that, as a critic complains, there seems to be only one name in modern Australian literature worth chronicling. His language is terse, vivid, picturesque, and his power of depicting the life he presents is noticeable in all he does. Among his works which have attracted attention at

home and outside Australia are (On Our Section) (1899) ; ‘Our New Section) (1903) ; ‘Dad in Politics5 (1904—05) ; ‘Sandy’s Section. 5 Davis has been called the Mark Twain of Australia, and his “Dad,55 the father of the Rudd family, has been compared to the work of the great American humorist.

DAVIS, Arthur Powell, American civil engineer: b. Decatur, 111., 9 Feb. 1861. He was graduated at the Emporia State Normal School and at Columbian University in 1888: He was topographer of the United States Geo¬ logical Survey 1884—94, when he conducted sur¬ veys and explorations in Arizona, New Mexico and California. In 1895-97 he was hydrographer in charge of all government stream measurements, and in 1898-1901 was in charge of the hydrographic examination of the Nica¬ ragua and Panama Canal routes. He is a chief engineer of the United States Reclama¬ tion Service since 1906 and in 1909 was con¬ sulting engineer of the Panama Canal. He has published ‘Elevation and Stadia Tables) (1893) ; (Progress of Stream Measurements) (1897); ‘Irrigation near Phoenix, Arizona) (1897) ; ir¬ rigation Investigation in Arizona) (1898) ; (Hy¬ drography of Nicaragua) (1899) ; ‘Hydrography of the American Isthmus) (1902) ; ‘Water Stor¬ age on Salt River, Arizona) (1903), also arti¬ cles in magazines on irrigation, the Isthmian canals and other hydrographic subjects.

DAVIS, Bradley Moore, American bot¬ anist: b. Chicago, 19 Nov. 1871. He was graduated at Leland Stanford Junior Univer¬ sity in 1892, and studied also at Harvard, Bonn and Naples. From 1895 to 1906 he was con¬ nected with the department of botany at Chi¬ cago University. He was assistant in botany in 1911-14 and professor of botany since 1914 at the University of Pennsylvania. He is joint author of ‘The Principles of Botany) (1906) ; laboratory and Field Manual of Botany) (1907), and many papers on plant cytology and plant genetics.

DAVIS, Charles Belmont, American author: b. Philadelphia, Pa., 24 Jan. 1866. He is a son of Rebecca Harding Davis and a brother of Richard Harding Davis (qq.v.) ; was educated at Lehigh University, and was United States consul at Florence, Italy, for some time. He has written (The Borderland of Society) (1898) ; (The Stage Door5 (1908) ; ‘The Lodger Overhead5 (1909) ; ‘Tales of the Town5 (1911) ; (In

Another Moment5 (1913) ; (Nothing a Year5 (1915).

DAVIS, Charles Harold, American artist: b. Amesbury, Mass., 7 Jan. 1856. He studied three years at the Art Music School of Boston and under Lefebvre and Boulanger at the Academie Julien, Paris. He lived in France from 1880 to 1890, and exhibited annually at the Salon. In 1906 he was elected to the National Academy of Design. He was awarded prizes and medals at every exposition since 1887. He paints chiefly evening effects and is remark¬ able for simplicitv of execution. . His more not¬ able works are 'The Brook5 (Philadelphia Acad¬ emy) ; 'Late Afternoon5 (Union League Club, New York) ; 'Evening5 and August5 (Metro¬ politan Museum, New York) ; (Deepening

Shadows5 (Corcoran Gallery, Washington) ; 'Summer5 (National Gallery, Washington) ; 'Close of Day> and 'Twilight } (Chicago Art

Institute) ; 'Moonrise at Twilight5 (Carnegie Institute, Pittsburgh) ; 'Landscape5 (Boston Museum). He is also represented in the City Museum, Saint Louis ; the Art Museum, Syra¬ cuse ; the Wordsworth Athenaeum, Hartford; the Art Museum, Worcester, Mass. ; the Provi¬ dence School of Design and the Art Museum, Minneapolis.

DAVIS, Charles Henry Stanley, American

physician and Egyptologist: b. Goshen, Conn., 2 March 1840; d. Nov. 1917. He studied in New York and European hospitals and subse¬ quently settled in Meriden, Conn., of which he was mayor 1877-88 and city treasurer 1897-99. He published 'History of Wallingford and Meriden5 (1870) ; 'The Voice as a Musical In¬ strument5 (1873) ; 'Classification, Education and Training of Feeble Minded, Imbecile and Idiotic Children5 (1880) ; 'The Egyptian Book of the Dead5 (edited 1897) ; 'History of Egypt in the Light of Modern Discoveries5 (1896) ; 'Grammar of the Old Persian Language5 (1878) ; 'How to Be Successful as a Physician5 (1905) ; 'Grammar of the Modern Irish Lan¬ guage5 (1909) ; 'Some of Life's Problems5 (1914). He was editor of Biblia, a journal of Oriental archaeology from 1887, and a member of many learned societies.

DAVIS, Cushman Kellogg, American

legislator: b. Henderson, N. Y., 16 June 1838; d. Saint Paul, Minn., 27 Nov. 1900. He was gradu¬ ated at the University of Michigan in 1857; was admitted to the bar, but enlisted in the Union army in 1861. He began the practice of law in Saint Paul in 1865 ; was chosen to the

Minne¬ sota legislature in 1867; became United States district attorney in 1868; governor of Minnesota in 1874; and United States senator in 1887, 1893 and 1899. He was a Republican and a member of the peace commission which negotiated the treaty between Spain and the United States in 1898. He was for several years chairman of the Senate Committee on Foreign Relations, and reported the resolution which practically de¬ clared war against Spain.

DAVIS, David, American jurist: b. Cecil County, Md., 9 March 1815; d. Bloomington, Ill., 26 June 1886. He was graduated at Ken¬ yon College in 1832, and settled in Illinois as a lawyer in 1835. He was elected to the legisla¬ ture in 1844 and served as a State circuit judge from 1848 to 1 862. In the latter year he was appointed an associate justice of the Supreme Court of the United States. He voted in favor of the Legal Tender Act. He resigned in 1877 to enter the United States Senate, of which he became president pro tern, in 1881, and retired in 1883.

DAVIS, Edwin Hamilton, American

archaeologist: b. Ross County, Ohio, 22 Jan. 1811; d. New York, 15 May 1888. He was' the author of 'Ancient Monuments of the Missis¬ sippi Valley5 (1848), which was described by A. Morlot, the distinguished Swiss archaeologist, as being "as glorious a monument of American science as Bunker Hill is of American bravery.55

DAVIS, George Whitefield, American

army officer : b. Thompson, Conn., 26 July 1839 ; d. 12 July 1918. Educated at the New Britain State Normal School; on the outbreak of the Civil War he enlisted in the 11th Connecticut Infantry and by 1865 had attained the rank of major of volunteers. He was commissioned

captain of the 14th United States Infantry in 1867 and retired as major-general in 1903. He was military governor of Porto Rico in 1899, and provost-marshal of the Philippines in 1901. He was appointed on the Isthmian Canal Com¬ mission in 1904 and was governor of the Canal Zone in 1904-05. He was special agent of the State Department to the government of Guate¬ mala in 1913. He wrote the military history of the governments of Porto Rico and Manila and was president of the board of publication of the official records of the Civil War.

DAVIS, Henry Gassaway, American cap¬ italist and legislator: b. Baltimore, Md., 16 Nov. 1823; d. Washington, D. C., 11 March 1916. He became superintendent of the plantation of ex-Gov. George Howard of Maryland, near Woodstock, Md., and subsequently was brake-man and conductor on the Baltimore and Ohio Railway, and agent at Piedmont, W. Va. Then he was active as a merchant and collier at Piedmont, and later carried to success the West Virginia Central and Pittsburgh Railway, by means of which he gave access to timber and coal lands of great value. The president of this road, he also became president of the Piedmont and Cumberland line. Sold these roads to the West Maryland Railroad in 1902 ; at ‘once built coal and coke railway from Elkins to Charles¬ ton, W. Va., of which he became president; was also president of the Davis Colliery Company, Elkins National Bank and chairman of board, Davis Trust Company of W. Va. and personally managed these institutions at the age of 92 (1916). He was elected as a Democrat to the West Virginia house of delegates in 1865, was State senator in 1867-69, and having served two terms (1871-83) as United States senator, declined re-election. In July 1904 he was nom¬ inated by the Democratic party for the vice¬ presidency of the United States. He was a delegate to the Pan-American Congress, and became also a member of the Intercontinental Railway Commission. He was a power in the Democratic party in the State (as was his son-in-law, S. B. Elkins, in the Republican party). He gave from his great wealth to local charities and educational institutions.

DAVIS, Henry Winter, American states¬ man and orator : b. Annapolis, Md., 16 Aug. 1817; d. Baltimore, Md., 30 Dec. 1865. He was a member of Congress for three terms (1856— 65), and took a leading part in advocating emancipation and loyalty to the Union. His published works are (The War of Ormuzd and Ahriman in the 19th century > (1853) ; (Speeches and Addresses in Congress } (1867).

DAVIS, Jefferson, American statesman: b. in Christian County, Ky., 3 June 1808; d. New Orleans, La., 6 Dec. 1889. A year or two after the birth of Davis the family removed to Wilkinson County, Miss., a new and pros¬ perous cotton region. Young Davis was sent to various private schools in Mississippi and Ken¬ tucky before he became a student at Transyl¬ vania University in 1822. From Transylvania he went as a cadet to West Point in 1824, where Robert E. Lee, Albert Sidney Johnston and Joseph E. Johnston were his friends or class¬ mates. After his graduation in 1828 Davis served seven years as an officer in the United States army along the Northwestern frontier, that is, in Iowa, Wisconsin and Minnesota. Col.

Zachary Taylor was for a part of this period his commander. In 1835 he was married to Miss Taylor and the same year he resigned from the army and settled as a cotton planter in Warren County, Miss., where he quickly rose to the position of a wealthy and influential citizen and owner of slaves. An older brother, a leading public man of the State, contributed much to this easy success and was in consider¬ able measure responsible for the entry of Jef¬ ferson Davis into politics, 1843, as a candidate for a seat in the House of Representatives. Meanwhile the first Mrs. Davis had died and he married Miss Varina Howell, a daughter of a well-to-do planter of the State. Hence the connections and social ties of the young political aspirant were such as to advance him rapidly. The issue which drew him into public affairs was the proposed repudiation of a great debt which the State of Mississippi had contracted with Nicholas Biddle, the Philadelphia capital¬ ist. The older counties, those along the Mis¬ sissippi River, were prevailingly Whig and op¬ posed to repudiation on both moral and political grounds. Davis was a Democrat who broke with his party on the issue and offered himself as candidate for the legislature with the purpose of preventing the Democrats from carrying out their plans. Although he was defeated, he be¬ came an elector on the Polk ticket in 1844. As such he canvassed the State and became widely known as an effective speaker and ardent ex¬ pansionist. The next year he was elected a member of Congress, but he resigned to take command of a regiment of Mississippi volun¬ teers in 1846. He played

a conspicuous part under Gen. Zachary Taylor at Monterey and Buena Vista, for which his name became famil¬ iar to the whole country. On his return from Mexico in 1847 he was appointed by the gover¬ nor of Mississippi to a vacancy in the United States Senate. When the legislature met he was unanimously chosen for a full term. When he appeared in Congress he was promptly made chairman of the Senate Committee on Military Affairs and as such he labored constantly for a larger army and for the conquest and retention of that part of Mexico which borders on the Gulf of Mexico. To the disgust of Davis, John C. Calhoun lent his influence to the party of opposition and the extreme expansionists were defeated. Nevertheless Davis was an avowed follower of Calhoun and upon the death of the latter he became the accepted leader of the South in national affairs. In the critical strug¬ gle of 1850, when there was imminent danger of a disruption of the Union, Davis was an ex¬ tremist who urged secession on the part of the South rather than submission to the compromise measure which allowed California to enter the Union as a free State. He demanded the extension of the Missouri Compromise line to the Pacific which would have made southern California a slave State and left New Mexico, Arizona and Utah open to slave colonization. Failing to secure the adoption of his plan, he signed, with most of the other Southern delegates in Con¬ gress, a protest against the compromise, re¬ signed his seat in the Senate and went home to lead a party of protest there. As candidate for the governorship he waged a vigorous campaign, but was defeated by the Unionists on a margin of less than 1,000 votes. Davis was

now a discredited politician, for not only Mis¬ sissippi but -every other Southern State, save South Carolina, repudiated the idea of seces¬ sion. He retired to his plantation, but he soon began to take an active part in public discus¬ sions and when his friend, Franklin Pierce, was nominated for the presidency by the Democrats in 1852, he made an active canvass in his be¬ half both in Mississippi and Louisiana. After the election of Pierce, Davis was asked to be¬ come a member of the Cabinet. The offer was declined, but the President-elect prevailed on him finally to enter the Administration as Secre¬ tary of War. Although the avowed purpose of the Democrats was never to disturb the Compro¬ mise of 1850, Davis the bitterest opponent of that measure two years before was now one of the first advisers of the Administration. There was uneasiness in the country, but Davis had changed his mind. He never again urged the South to secede but insisted on fighting for the South and slavery within the Union. As Secretary of War Davis was a vigorous and resolute reorganizer. He undertook to reform and enlarge the Military Academy at West Point ; he enlarged the army and tried to abolish the rule of seniority which he considered a handicap to any military organization; and he brought camels from Arabia to be used as car¬ riers on the dusty plains of the Far West. But his greatest work was the survey of the Rocky Mountain region with a view to building a Pacific railroad. Five routes were surveyed and an elaborate report in 12 octavo volumes was laid before Congress at the end of his term. Engineers, geologists and botanists had contributed their work and the value of the great West was made plain to the country. He recommended the building of a road by the southernmost route, that is, from Memphis to southern California. The government should give public lands and bonds and aid in financing the scheme, the war powers of the President be¬ ing called into use in support of these national¬ ist recommendations. Although nothing was done at that time, these surveys were the beginning of a new agitation for a railway to the Pacific. When Pierce's term closed, Davis returned to the Senate where he continued to represent and press Southern interests upon Congress and the country. The repeal of the Missouri Compromise in 1854, which he had favored, had set the sections to fighting each other as fiercely as before 1850. He now took the view that Kansas should be kept open to slavery and he saw in the Dred Scott decision of the Supreme Court full justification for his contention. The new President, Buchanan, was not in the beginning in sympathy with the ex¬ treme pro-slavery

demand and he sent Robert J. Walker, whom Davis and most other leading Southerners distrusted, as governor to Kansas. When the Lecompton constitution was defeated in Kansas, Davis denounced Walker as a traitor to the South. Buchanan removed Walker in obedience to the entreaties of Davis and others. Stephen A. Douglas, the Northern leader of the Democratic party, denounced the President for his treatment of Walker and for his acceptance of the Lecompton constitution. Douglas im¬ mediately regained the popularity he had lost in 1854. The issue was joined and Davis became the irreconcilable opponent of Douglas and of his candidacy. The Senate was made the scene

of their manceuvers. Douglas was ˆread® out of the party by Davis which only added to the followers of the former at the North. Davis procured the adoption of a series of resolutions in April which was made the platform of the re¬ actionary or Southern element in the convention which was about to meet in Charleston. Davis gave instructions to the national committee while the convention was in session. Douglas directed the conduct of the majority of the dele¬ gates. The unyielding attitude of the two leaders caused the break-up of the convention and the nomination of two Democratic candi¬ dates, Breckinridge and Douglas. But when it became increasingly clear that Abraham Lin¬ coln, the candidate of the Republicans, would be elected, Davis, who had remained in Wash¬ ington all summer, endeavored, in September 1860, to bring about a reconciliation between the angry sections of the party. Unable to find a leader who could unite the followers of Dou¬ glas and Breckenridge, he gave up and let events take their own course. He was in Mis¬ sissippi when the election of Lincoln was an¬ nounced and his opinion was at once sought by secession and anti-secession men. He wrote The Charleston Mercury on 10 November that he was opposed to breaking up the Union and advised that Mississippi would probably not fol¬ low South Carolina. Later the governor of Mississippi called a conference of the State's delegation in Congress in which Davis again advised against secession. This led to a reac¬ tion against him and he was charged with being simply an ambitious candidate for the presi¬ dency of the United States. But the shaping of events had already passed beyond the con¬ trol of the leaders. South Carolina was al¬ most a unit in favor of immediate secession. The cause had long been a popular one in that State. And if South Carolina left the Union and should then be coerced by the Federal gov¬ ernment nothing could prevent the secession of the other Southern States. South Carolina se¬ ceded. Davis, again in Washington, urged Bu¬ chanan to recognize the

act as the right of any State. Buchanan refused to follow this advice and when Mississippi withdrew Davis gave up his place in the Senate with the greatest reluc¬ tance. He returned to Mississippi warning the people along the way that there would be a long and bitter struggle. In so far as he had any plans for the new regime, he wished to be¬ come the commander of an army in the field. But his election to the presidency of the Con¬ federacy on 9 Feb. 1861 placed him at the head of the movement which he had, to be sure, fa¬ vored in the beginning but which he had cer¬ tainly not urged in recent years. He now en¬ deavored to reconcile all elements of the South. The radicals he thought would be satisfied to remain in private stations or fight in the ranks. Conservatives who had opposed secession were placed in Cabinet positions. Charles G. Mem-minger of the Treasury, L. Pope Walker of the War Department and Robert E. Lee of the armv were all of this group ; and Alexander H. Stephens, the Vice-President, had always been opposed to secession and he was a personal op¬ ponent of Davis. This conciliatory program of Davis was adopted by the States when they chose opponents of the secession movement to scats in the Confederate Senate. Radicals like William L. Yancey and Robert Barnwell Rhett,

who had fought for a Southern Confederacy for 20 years, scarcely obtained recognition — a policy which brought Davis many of his greatest prob¬ lems as the war wore on. Seeking to enlist the conservatives of the South on his side, he also sought to conciliate the conservatives of the North and thus isolate the radical Republicans who urged the prompt coercion of the seceded States. To this end Davis labored consistently to prevent bloodshed at Charleston where a Southern army was gathering to compel the surrender of Fort Sumter. William H. Seward, the most influential man of the North before the inauguration of Lincoln, likewise endeav¬ ored to prevent an outbreak. The policy of conciliation was so publicly and openly culti¬ vated that Southern leaders of the radical type insisted that there would be no war, that Davis and Seward had an understanding between them whereby the Union was to be restored. When, therefore, General Beauregard telegraphed from Charleston that Fort Sumter would be repro¬ visioned by order of the Federal government, Davis still hesitated and advised against attack if by delay any sort of assurance were given that the fort would be given up peacefully. When the order to begin firing was finally given it was done hurriedly by subalterns of Gen¬ eral Beauregard who feared that otherwise there would be no war and a reconstruction of the Union would follow. But the firing on Major Anderson on the night of 12 April 1861 stirred the martial spirit of the whole South, as well as of the North, and the border States of Virginia, North Carolina, Tennessee and Ar¬ kansas joined the Confederacy. Davis became the President of all the seceded States and the capital was removed from Montgomery to Rich¬ mond. The constitution of the new group of commonwealths was in many respects the work of Davis and the moderate attitude of the Con¬ federacy toward the foreign slave trade and the tariff was due to his influence. Although presidents of republics are not held rigidly to the strict letters of constitutions, Davis was most careful not to overstep the bounds set him save in the gravest emergencies. He set aside the writ of habeas corpus only in rare instances and then for limited districts and for limited periods. He allowed the greatest freedom of the press, even when most of the leading papers insisted upon denouncing him every day. I be¬ lieve no newspaper office was

closed by his or¬ der during the whole period of the war. One of the weaknesses of his administration was due to the fact that he was definitely elected in 1861 for a term of six years after the expiration of which he could not be a candidate for re-election. This gave the Confederate Congress a freer hand than any other American Congress has ever had. But an equally difficult problem for Davis consisted in choosing the command¬ ers of the armies. The high officers who re¬ signed from the Union army all expected high¬ er commands from the Confederate government. Davis hoped to appoint men according to what he prematurely called a merit system ; but they insisted each, save Lee, upon the old seniority rule of the Federal government. Dissatisfac¬ tion began when the first list of generals was sent in; it grew steadily to the end. Davis be¬ lieved in the volunteer system for the begin¬ ning of the struggle ; but in the winter of 1861 — 62 he became convinced that conscription alone

would keep the army units full. Congress op¬ posed him constantly on this issue. He be¬ lieved the lines of State sovereignty should be partially obliterated during the war; but Con¬ gress and the legislatures of the States opposed him bitterly. He urged that appointments to all the responsible military positions should be made by the President upon recommendation of the army chiefs; but the governors of the States opposed and the judges of State courts inter¬ vened in military matters with contrary opinions and with habeas corpus proceedings. In spite of all these and other difficulties, he did create great armies and a considerable navy; he set up arsenals and built salt works, laid railroad tracks and encouraged all sorts of domestic manufac¬ tures. Zeal and energy characterized his adminis¬ tration from the start and the positive blunders of serious magnitude of which he was guilty were few. With a population of less than 7,000,000 white people, the Confederacy raised armies which numbered near a million men and it required the work of 2,000,000 soldiers and four years of time to suppress them. But the pressure of the blockade which President Lin¬ coln increased with every month and the fail¬ ure of every European power to recognize the Confederacy finally brought Davis and his gen¬ erals to expect defeat. Moreover the railroads wore out ; rolling stock failed and the plentiful supplies in the country districts could not be transported to the armies or the centres of pop¬ ulation. Bread riots occurred in Richmond and the army of Lee while it guarded the lines about Petersburg had no meat and little bread. The people lost heart. Lee’s army surrendered on the 9th of April 1865. Davis was already hastening south in flight. He was captured at Irwinsville, Ga., on the 10th of May following and

he was promptly imprisoned at Fort Mon¬ roe. There he remained until 15 May 1867 when he was released on bail signed by Horace Greeley and other lifelong opponents. Broken in body and fortune, he visited New Orleans, his former home near Vicksburg, England and France; but settled down to work as the presi¬ dent of a life insurance company in Memphis in 1870. The panic of 1873 caused the business to fail. He then endeavored to promote some large commercial enterprises in New Orleans but these never materialized and he took up his residence at Beauvoir in 1878, a pretty home on the Gulf coast which was presented to him by a friend, where he spent the remainder of his life. He died in New Orleans where he had gone on a business journey. His remains were buried there, but removed to Richmond in 1893.

Bibliography. — Davis, Jefferson, (The Rise and Fall of the Confederate Government } (New York 1881) ; Davis, Varina Howell, (Jefferson Davis: a Memoir) (New York 1890); Dodd, William E., (Jefferson Davis) (in American Crisis Biographies, J Philadelphia 1907); Pol¬ lard, E. A., <The Life of Jefferson Davis, with the Secret History of the Southern Confed¬ eracy } (New York 1869).

William E. Dodd,

Professor of American History, University of Chicago.

DAVIS, Jefferson Columbus, American military officer: b. Clark County, Ind., 2 March 1828; d. Chicago, 30 Nov. 1879. He left school for the Mexican War, in which he received a

commission for gallantry. He was with the garrison at Fort Sumter, S. C., as first lieu¬ tenant when its bombardment began the Civil War. He received the brevet of major-general of volunteers and the full rank of colonel in the regular army for distinguished service on the Union side during the war. For some years after the war, he was stationed on the Pacific coast, where he suppressed the Modoc revolt in northern California; and was afterward the first United States army officer to hold com¬ mand in Alaska, a new post, Port Davis, being named after him in 1900.

DAVIS, John, English navigator : b. Sand-ridge, near Dartmouth, Devonshire, about 1550; d. 30 Dec. 1605. In 1585 he was sent out with two vessels to find a northwest passage, when he discovered the strait which still bears his name. He afterward explored the coasts of Greenland and Iceland, proceeding as far as lat. 73° N. He made five voyages to the East Indies, on the last of which he was killed in an engagement with some Japanese pirates off the coast of Malacca. He wrote an account of his voyages and invented a quadrant.

DAVIS, John Chandler Bancroft, Ameri¬ can lawyer and diplomatist : b. Worcester, Mass., 29 Dec. 1822; d. 1907. In 1849 he went to London as secretary of the United States le¬ gation ; in 1854 became American correspondent of the London Times, and in 1869, 1871 and 1873— 74 was Assistant Secretary of State. He repre¬ sented the United States in the ((Alabama55 con¬ test, zealously pushing the ((indirect55 claims ; was Minister to Germany in 1874-77 ; and judge of the United States Court of Claims in 1878— 82; and became reporter of the United States Supreme Court in 1883. He is the author of (The Massachusetts Justice) (1847) ; (Mr. Sumner, the Alabama Claims, and their Settle¬ ment (1878) ; a work published in French en¬ titled Erocess Tribunals of the United States> (1878); and many volumes of United States Supreme Court reports.

DAVIS, Katherine Bement, American sociologist : b. Buff alo, N. Y., 15 J an. 1860. She was graduated at Vassar College in 1892 and studied also at Chicago, where she received the doctor’s degree in political economy in 1900. Mt. Holyoke College conferred the degree of LL.D. on her in 1912 and Yale awarded her an M.A. in 1915. From 1892-97, she was head-worker at the College Settlement in Philadel¬ phia. From 1901-14 she was superintendent of the New York State

Reformatory for Girls at Bedford, and by her careful scientific methods of handling the inmates, made that institution a noteworthy experiment in penology. In 1914 she was appointed commissioner of correction for the city of New York by Mayor Mitchel. She was the first woman to. hold such an of¬ fice. In addition Miss Davis has been active in various philanthropic and civic organizations and is a well-known lecturer;

DAVIS, Noah Knowles, American philo¬ sophical writer: b. Philadelphia, Pa., 15 May 1830; d. Charlottesville, Va., 3 May 1910. He was educated at Mercer University, Ga., was professor of philosophy at the University of Virginia from 1873. Among his published writings are (The Theory of Thought5 (1880) ; Elements of Deductive Logic5 (1890) ; Ele¬ ments of Psychology5 (1892) ; (Judah's Jewels;

a study in the Hebrew Lyrics5 (1895) ; Ele¬ ments of Ethics5 (1900); (Synopsis of Events in Life of Jesus of Nazareth5 (1900); <The Nazarene5 (1901).

DAVIS, Oscar King, American journalist: b. Baldwinsville, N. Y., 13 Jan. 1866. He was graduated at Colgate University 1888, from which he received the honorary degree of Litt.D. in 1914. During the Spanish-American War and the Philippine insurrection, and in China during the Boxer Campaign he was spe¬ cial correspondent of the New York Sun and Harper's Weekly at Manila. He was special correspondent of the New York Herald with the First Japanese Army 1904. He was Wash¬ ington correspondent of the New York Times and the Philadelphia Public Ledger 1907-12, and became secretary of the Progressive Na¬ tional Committee in 1912. He was special cor¬ respondent of the Chicago Tribune in the Far East 1915-16. He has published (Our Con¬ quests in the Pacific5 ; (At the Emperor's Wish5 ; (Dewey's Capture of Manila5 ; (Sher-reaf's Exclusive5 and other stories; (The Storm Birds5 (with Reginald Schroeder).

DAVIS, Rebecca Blaine Harding, Ameri¬ can writer and novelist : b. Washington, Pa., 24 June 1831 ; d. 29 Sept. 1910. She contributed many short stories and sketches to periodicals, and also wrote several novels, including (Life in the Iron Mills5 (1861); (A Story of To¬ day5 (1861), published later under the title (Margaret Howth5 ; and (A Law Unto Herself 5 (1878). She was the first writer in this coun¬ try to introduce the labor question into fiction. Her later works include (YVaiting for the Ver¬ dict5 ; Eallas Galbraith5 ; (Natasqua5 ; Erances

Waldeaux5 ; (Doctor Warrick's Daughters5 ;

(Silhouettes of American Life.5

DAVIS, Reuben, American lawyer: b. Tul-lahoma, Tenn., 18 Jan. 1913; d. Huntsville, Tenn., 14 Oct. 1890. He was educated in his native place, studied medicine and after a few years' practice abandoned that profession for the study of law. He removed to Aberdeen, Miss., and was prosecuting attorney for the sixth judicial district from 1835 to 1839. He was appointed judge of the High Court of Ap¬ peals in 1842, but resigned after four months' service. He served in the war with Mexico as colonel of the second regiment of Mississippi volunteers. He was a member of the State house of representatives from 1855 to 1857 and was elected to Congress from Mississippi, serving from 1857 to 1861, when he retired and entered the Confederate army as brigadier-gen¬ eral commanding a brigade of Mississippi mi¬ litia in Kentucky. After the close of the Civil War he resumed his law practice. He pub¬ lished (Recollections of Mississippi5 (Boston

1889).

DAVIS, Richard Harding, American jour¬ nalist and popular novelist : b. Philadelphia, Pa., 1864; d. Mount Kisco, N. Y., 11 April 1916. His mother was Rebecca Harding Davis. He was educated at Lehigh and at Johns Hop¬ kins-; became a reporter on the Philadelphia Record in 1887; and in 1888 went to New York where his striking stories of local life, first printed in the New York Evening Sun, brought him into prominence. For a short period he was managing editor of Harper's Weekly (1890). From that time on he roved wherever he

pleased or where editors sent him. His first war correspondence came out of the conflict between Greece and Turkey. Later he “cov¬ ered” all the important wars for various news¬ papers and magazines — the Spanish-American, South African and Russo-Japanese wars. In 1914 he was correspondent for the New York 7 ribune in Mexico during the seizure of Vera Cruz. In August 1914 Mr. Davis was captured by the Germans and narrowly escaped being shot for a spy. His last assignment was with the French and British armies in the retreat from Serbia, and the hardships of his cor¬ respondent’s life is believed to have brought on the attack of angina pectoris which caused his death. A high type of fearless American jour¬ nalism is exhibited ir. his travel sketches and war correspondence. While not deeply analytical, his stories and novels are full of action and the characters impress by independence and ex¬ uberant vitality. Among his books are “Gal-lagher and Other Stories) (1891) ; ‘Stories for Boys) 0891) ; ‘Van Bibber and Others’ (1892) ; ‘Our English Cousins) (1894) ; ‘About Paris’ (1895) ; ‘The Rulers of the Mediterranean’ (1894) ; ‘The Exiles’ (1895) ; ‘Three Gringos in Venezuela and Central America’ (1896) ; ‘Cuba in War Time’ (1898) ; ‘The Cuban and Porto Rican Campaign’ (1898) ; ‘With Both Armies in South Africa’ (1900) ; ‘The Prin¬ cess Aline’ (1896) ; ‘The King’s Jackal’ (1899) ; ‘Soldiers of Fortune’ (1897), dramatized with great success in 1902; ‘Captain Macklin : His Memoirs’ (1902) ; ‘The Bar Sinister’ (1904) ; ‘Kits and Outfits’ (1905) ; ‘Real Soldiers of Fortune’ (1907) ; ‘The Man Who Could Not Lose’ (1911) ; ‘The Lost Road’ (1913) ; ‘The Taming of Helen’ (1903) ; ‘Ranson’s Folly’ (1904) ; ‘The Dictator’ (1904) ; and the fol¬ lowing plays 1903-13 ‘The Galloper’ ; ‘Yankee Tourist’ ; ‘Vera the Medium’ ; and ‘Black¬ mail.’

DAVIS, Thomas Edward, American editor: b. Bedford, Va., 25 Sept. 1835; d. 20 Feb.. 1917. He was graduated (1858) at the University of Virginia, studied medicine and law but did not practise; in May 1861 joined the Confeder¬ ate Army, became adjutant of the 21st Vir¬ ginia Cavalry and was promoted major and as¬ sistant adjutant-general. He

fought in nu¬ merous engagements and at the close of the war removed to Montana and engaged in min¬ ing. He removed to Galveston, Tex., in 1871, where he was engaged in business for several years. He entered journalism in 1876 at Hous¬ ton, founding the Houston Telegram. In 1879 he joined the staff of the New Orleans Pica¬ yune, of which journal he became editor in 1884, remaining in this relation till the sale and consolidation with the Times-Deniocrat in 1914.

DAVIS, Varina Anne Jefferson, American novelist: b. Richmond, Va., 27 June 1864; d. Narragansctt Pier, R. I., 18 Sept. 1898. She was called “the Daughter of the Confederacy,” her father being Jefferson Davis, the President of the Confederate States. Her education was obtained partly in the United States and partly in Germany and France, and she wrote ‘The Veiled Doctor,’ a novel, and ‘A Romance of Summer Seas.’

DAVIS, Varina Howell Jefferson, Ameri¬ can writer: b. Vicksburg, Miss., 7 May 1826; d. New York city, 16 Oct. 1906. She was the vol. 8 — 33

second wife of Jefferson Davis (q.v.). She was her husband’s amanuensis when he wrote his ‘Decline and Fall of the Confederate Govern¬ ment’ and was the author of ‘Jefferson Davis: a Memoir, by His Wife’ (1890).

DAVIS, William Morris, American geolo¬ gist and geographer: b. Philadelphia, Pa., 12 Feb. 1850. He was educated at Harvard Uni¬ versity. He rendered valuable service as as¬ sistant astronomer in the Argentine National Observatory at Cordoba from 1870 to 1873. He taught astronomy and geology at Harvard from 1878; in 1890 became professor of physical geography there, and in 1899 was made Sturgis-Hooper professor of geology, continuing in this relation till 1912, when he became professor emeritus. He attained high rank in physiog¬ raphy by his lectures and writings on the de¬ velopment of the physical features of the earth and in 1911 was elected president of the Geolog¬ ical Society of America. He received numer¬ ous honorary degrees, became a member of many learned societies and scientific bodies, and was made a chevalier of the Legion of Honor in 1912. His many valuable treatises were pub¬ lished in the American Journal of Science and other periodicals. Besides these, his published works . include ‘Elementary Meteorology’ (1894) ; ‘Physical Geography’ (1899) ; ‘Whirl¬ winds, Cyclones and Tornadoes’ (1884) ;

‘Jour¬ ney Across Turkestan’ in Pompelly’s ‘Explora¬ tions in Turkestan’ (1905).

DAVIS STRAIT, a strait on the west coast of Greenland, which connects Baffin Bay with the Atlantic Ocean. It was discovered in 1585 by John Davis (q.v.). It measures from 200 to 500 miles across. In 1888 the identity be¬ tween Ginnunga Gap, referred to in the Sagas, and the present Davis Strait, was demonstrated. The northern half is navigable in late summer. Two powerful currents have beein discovered, one on the west of drift ice toward the south and another on the east, flowing in a northerly direction.

DAVISON, Emily Wilding, militant suffragist. A lady of good Northumbrian family and a B.A. of London University, she had been imprisoned for “militancy” on several occasions and repeatedly resorted to the “hun¬ ger strike.” On Derby Day, 3 June 1913, as the horses swept round Tattenham Corner at Epsom, she dashed out in front of them, bring¬ ing down Anmer, the King’s horse, and its jockey to the ground, and herself sustaining grave injuries, to which she succumbed on 8 June. The passage of her remains through London on the way to interment at Marpeth was made the occasion of a great demonstra¬ tion on the part of the “militants.”

DAVIT. (1) A beam projecting from a ship’s bow, for the attachment of the tackle whereby the anchor-fluke is lifted without drag¬ ging against the side of the vessel. The opera¬ tion is nauticallv called “fishing the anchor.” (2) One of a pair of cranes on the gunwrale of a ship, from which are suspended the quarter or other boats. The boat-tackles are attached to rings in the bow and stern of the boat re¬ spectively and the fall is belayed on deck. When the boat is lowered the hooks of the fall-blocks are cast off simultaneously, or great dan¬ ger results when the ship is under way.

DAVITT, Michael, Irish Nationalist politi¬ cian and journalist: b. Straid, County Mayo, 25 March 1846; d. Dublin, 31 May 1906. His par¬ ents, peasant farmers, were evicted from their farm in 1851 and

migrated to Lancashire, where at the age of 10 Michael began work in a cotton mill at Haslingden. Here in 1857 he lost his right arm by a machinery accident and secured employment in a printing office^ where he also managed to educate himself. He joined the Fenian brotherhood in 1867 and in 1870 was sentenced to 15 years' penal servitude for treason-felony in arranging for sending firearms into Ireland. He was released on a ticket of leave in 1877 and went on a lecture tour in the United States. Returning to Ire¬ land he founded at his birthplace, 21 Oct. 1879, the Land League, which spread all over Ire¬ land. He was again in America in 1880, or¬ ganizing an American branch of the Land League, and on his return to Ireland was im¬ prisoned under the Coercion Act. He was re¬ leased in 1882. While in prison he had been chosen parliamentary representative for Meath, but being a convict was disqualified. He was one of the respondents before the Parnell Com¬ mission 1888-90, and conducted his own de¬ fense in a five-day speech. He became an Anti-Parnellite in 1890 and in 1892 was elected mem¬ ber of Parliament for North Meath, but was unseated on petition. He was next returned for Northeast Cork but had to vacate his seat through bankruptcy, caused by the costs in the North Meath petition. He was elected for West Mayo in 1895 but resigned in 1899.

He visited Australia in 1898 and on his re¬ turn published the volume (Impressions of Aus¬ tralasian Democracy. ■* He visited South Africa as war correspondent during the Boer War, investigated the Kishinev massacre and also traveled as correspondent of London journals in the Balkans and the Near East. In politics he was a sincere Nationalist, bitter in his atti¬ tude toward English methods and anti-clerical. In his later years his radicalism brought him into association with the Labor party. He con¬ tributed hundreds of articles to journals in Ire¬ land, England and America and published (Leaves from a Prison Diary5 (1884); (Defense of the Land League) (1891) ; (The Boer Fight for Freedom5 (1902) ; (Within the Pale) (1903) ; (The Fall of Feudalism in Ireland) (1904) ; (Pageant of London) (1905). Consult Cashman, (Life of Michael Davitt5 (Boston

1881).

DAVOS, da'vos, a valley and district of Switzerland in the canton of Grisons, lying at a considerable elevation among the Alps and now a favorite place of residence both in summer and winter for people troubled with tubercu¬ losis. The valley is about 10 miles long, shut in by mountains from 6,000 to 10,000 feet high and exhibiting many

picturesque features. The chief centre of population is Davos-Platz, a place of 5,000 inhabitants, containing numer¬ ous hotels, boarding-houses and other establish¬ ments for visitors and having a handsome town-house and an English church. It is well sheltered on the north and east and the air is remarkably pure and dry. The Davos Land-wasser traverses the district. This stream takes its rise in Lake Davos, which is one-fifth of a square mile in area and 175 miles deep. Con¬

sult Symonds, (Our Life in the Swiss Fligh-lands) (London 1892).

DAVOUT, da'voo', Louis Nicholas, Duke of Auerstadt, Prince of Eckmirhl and Marshal of France: b. Annoux, Yonne, 10 May 1770; d. Paris, 1 June 1823. He was educated at Bri-enne and entered the army as sub-lieutenant of cavalry in 1788. On the outbreak of the Revo¬ lution he embraced its principles. He was chef de bataillon in the campaign of 1792, was promoted general of brigade, but was removed because of his being of noble birth. He served on the Rhine in 1794-97, and accompanied Desaix to Egypt in 1798. His skilful handling of his troops at Aboukir came under the atten¬ tion of Napoleon, and in 1800 he was made general of division and commanded the cav¬ alry in the Marengo campaign. He was next appointed commander of the consular guard and marshal of France in 1804, soon after Na¬ poleon became emperor. He distinguished him¬ self in all of the succeeding campaigns as commander of the Third Army Corps. At Aus-terlitz his corps bore the brunt of the fighting, in the Jena campaign with a single corps Da-vout won the great victory of Auerstadt against the main Prussian army. His fame was enhanced at Eylau and Friedland. He was ap¬ pointed governor-general of the grand-duchy of Warsaw after the Treaty of Tilsit in 1807, and in 1808 Napoleon made him Duke of Auer¬ stadt. He again distinguished himself in the actions leading to the brilliant victory of Eckmiihl, and also in the battle of Wagram. He was made Prince of Eckmiihl in 1810. He helped organize the gigantic army which in¬ vaded Russia in 1812. In this campaign he won the victory of Mobiler and was wounded at Borodino. He was placed in command of the Hamburg military district in 1813, defended that city for several months, only surrendering on the direct order of Louis XVIII after the fall of Napoleon in 1814. His character and methods were often regarded as cruel and ra¬ pacious, but he doubtless acted on the instruc¬ tions of Napoleon; being a rigid disciplinarian he gave the same precise obedience to superior orders which he exacted from his own subordi¬ nates. His military talents were of the highest, and later judgment has regarded him as perhaps the ablest of all Napoleon's marshals. Al¬

though at the first restoration he made his sub¬ mission, he maintained his hostilitv to the Bour¬ bons and during the Hundred Days acted as Minister of War, showing extraordinary ability in organizing troops and procuring army sup¬ plies. After Waterloo he directed the hopeless defense of Paris, and was deprived of his es¬ tates and titles after the restoration. He pro¬ tested against the proscription of 1815 and when some of his subordinate generals were in¬ cluded, Davout demanded to be held responsible for their acts, as executed under his orders. He made every effort to prevent the condemna¬ tion and execution of the gallant Marshal Ney. His rank was restored to him in 1817 and he became a member of the Chamber of Peers in 1819. Consult Blocqueville, (Le marechal Davout5 (Paris 1879-80) ; (Correspondance du marechal Davout5 (ed. Mazade, 4 vols., Paris 1885) ; Chenier, (Davout, due d'Auerstadt5 (ib. 1866) ; Montegut, <Le Marechal Davout5 (ib. 1882) ; Holzhausen, (Davout in Hamburg5

(Miilheim-on-Ruhr 1892') ; Vigier, Eavout, Marechal de l'Empire) (2 vols., Paris 1898).

DAVY, Sir Humphry, English chemist: b. Penzance, Cornwall, 17 Dec. 1778; d. Geneva, Switzerland, 29 May 1829. A taste for chemis¬ try, which he displayed in some experiments on the air contained in seaweed, attracted the at¬ tention of Mr. Gilbert, president of the Royal Society, and Dr. Beddoes, and the latter offered him the place of assistant in his laboratory. Here Davy discovered the respirability and ex¬ hilarating effect of nitrous oxide. He pub¬ lished the results of his experiments, under the title of Researches, Chemical and Philosoph¬ ical* (1799). This work immediately se¬ cured for him the place of professor of chem¬ istry in the Royal Institution, at the age of 22. His lectures were attended by crowded and brilliant audiences, who were attracted by the novelty and variety of his experiments, the elo¬ quence of his discourses and the clearness of his exposition. His discoveries with the gal¬ vanic battery, his decomposition of the earths and alkalis and ascertaining of their metallic bases, his

demonstration of the true nature of oxymuriatic acid, his discovery of chlorine as an element, etc., obtained him a European repu¬ tation ; and in 1808 he received the Napoleon prize of the French Institute. In 1812 he was knighted. In 1813 appeared his valuable Ele¬ ments of Agricultural Chemistry.) The nu¬ merous accidents arising from fire damp in mines led him to enter upon a series of ex¬ periments on the nature of this explosive gas, the result of which was the invention with which his name will always be associated, the safety-lamp (1815). In 1818 he was created a baronet. In 1820 he succeeded Sir J. Banks as president of the Royal Society. Cuvier said of him that, <(in the opinion of all who could judge of such labours he held first rank among the chemists of this or any other age.® Near the close of his life he wrote his (Salmonia, or Days of Fly-fishing) ; and his (Consolations in Travel, or the Last Days of a Philosopher.) Besides the works already mentioned, he also wrote Elements of Chemical Philosophy) (1802) ; (Bakerian Lectures* (1807-11) ; cOn the Safety-lamp) (1818), *etc.* A statue was erected to him at Penzance in 1872. Consult his (Memoirs,* edited by his brother, John Davy (2 vols., London 1836) ; his Eife) by Dr. Paris (1831) ; and Eragmentary Remains) (London 1858).

DAVY, John, English composer : b. Upton-Helion, Exeter, 1765; d. London, 22 Feb. 1824. He was a teacher of music in London and wrote music for popular songs. His air, (The Bay of Biscay, Oh!* is famous.

DAVY JONES, a sailor's familiar name for a malignant sea-spirit or the devil generally. The common phrase <(Davy Jones' locker® is applied to the ocean as the grave of men drowned at sea. A very dubious explanation of the name makes it compounded from Duffy, a West Indian negro spirit name, and the scriptural prophet Jonah, in jocular allusion to his somewhat unusual adventure.

DAVY LAMP, the safety-lamp of Sir Humphry Davy, in which a wire-gauze envelope covers the flame -chamber and prevents the pas¬ sage of flame outward to the explosive atmos¬

phere of the mine, while it allows circulation of air.

DAW. See Jackdaw.

DAWALLA (Hypophthalmus dawalla), a fish of the family Silnridce, found in the rivers of Guiana, and highly esteemed for the delicacy of its flesh. It is sometimes two and a half feet long, and is brightly

colored. The eye is situated below the angle of the mouth.

DAWANT, da -van, Albert Pierre, French historical painter: b. Paris, 21 Sept. 1852. He was a pupil of J. P. Laurens. He took a medal of the third class 1880, and second class 1885. Among his works are (St. Thomas a Becket* (1879) ; (Henry IV of Germany Before Pope Gregory VIP (1880) ; East Moments of Charles II of Spain* (1881) ; (Burial of an Invalide) (1882) ; (Salute to the Invalides) (1884); (St. John the Hospitaller* (1885); Embarking of Emigrants *; and (The Rescue* (1889); (In Alsace) (1892); (Teaching the Children* (1888), in the Luxembourg Museum; End of the Mass) (1890) ; (A RehearsaP (1894) ; (Marshall Lannes at Convent of St. Pollen* (1895) ; (The Captive) (1896). He was made officer of the Legion of Honor in 1900. His later works include (Distress) and (Death: Sebastopol* (1904), and Review at Bethany* (1905), in Versailles Gallery. He also illustrated the works of Victor Hugo, Alphonse Daudet and Alfred de Vigny. From 1908 he devoted himself chiefly to portraiture.

DAWES, Anna Laurens, American writer: b. North Adams, Mass., 14 May 1851. She is the daughter of H. L. Dawes (q.v.) and has been Washington correspondent of several New England papers, besides being prominent in various philanthropic and other organizations. She is the author of Tow We are Governed) (1885); (The Modern Jew: His Present and Future* (1886) ; Explanation of the Consti¬ tution and Government of the United States* (1895) ; (Charles Sumner * (1892).

DAWES, Henry Laurens, American legis¬ lator : b. Cummington, Mass., 30 Oct. 1816 ; d. Pittsfield, Mass., 5 Feb. 1903. He was gradu¬ ated at Yale in 1839. Becoming a lawyer, he entered the State senate as a Republican and in 1857 was elected to Congress, serving in the House until 1873. He was elected to the United States Senate in 1875, and served until 1893. The condition of the Indian tribes especially claimed his attention, and after his retirement from Congress he was at the head of the Commission to the Five Civilized Tribes.

DAWES' HOLE, the astronomical name for the minute circular spots on the nucleus of a sun-spot, darker than the rest of the nucleus, and supposed to be the mouths of tubular orifices penetrating to unknown depths. They were first observed by the astronomer whose name they bear.

DAWK, or DAK, a term in India for postal traveling arrangements, by palanquins or other carriages, on the principal of the posting-horse station plans of pre-railway days in Europe and America.

DAWKINS, John. See Artful Dodger, The.

DAWKINS, William Boyd, English geolo¬ gist : b. Buttington, near Welshpool, Montgom-

eryshire, 26 Dec. 1838. In 1861 he joined the Geological Survey, became curator of Manches¬ ter Museum in 1870, and professor of geology in Owens College there in 1872. The Channel Tunnel Committee employed him in 1882 to make a special survey of both coasts, and next year he laid down the line for a tunnel under the Humber. He delivered the Lowell Lectures in Boston in 1880. His chief works are (Cave¬ hunting: Researches on the Evidences of Caves Respecting the Early Inhabitants of Europe) (1874) ; (Early Man in Britain, and His Place in the Tertiary Period) (1880), the latter a work of great interest; (British Pleistocene Mammalia' (1866-87).

DAWLEY, Thomas Robinson, Jr., Amer—

can journalist: b. New York, April 1862. He was educated in the Brooklyn schools, left home at 17, went to Liverpool on cattle ship, tramped from Liverpool to London; later en¬ gaged in the printing business in New York. He traveled in Central America, the West Indies, Spain and France; studied law at Providence, R. I. ; went to Cuba for Harper's Weekly in 1896; visited insurgent camps and went out with Spanish troops. He was arrested several times, was confined two weeks in Morro Castle and expelled from the island by General Weyler. He returned to Cuba in the following year; visited the army of General Gomez ; became volunteer aide on staff of General Miles in the Spanish-American War. After the taking of Santiago, he published the first American daily newspaper in Cuba, The Times of Cuba. The plant was seized by the Cuban authorities and he was obliged to re¬ turn to the United States. He next went to Spain for the Century and was special com¬ missioner for the Outlook at the Pan-American Congress in Mexico in 1901. He traveled through the Dominican Republic in 1904 and reported on political and sociological conditions there to President Roosevelt. He was special agent of the Bureau of

Labor in 1907-09, and was assigned to investigate the effect of fac¬ tory employment on the women and children drawn from the farms to the cotton mills of the South. He published several articles on Spain and Spanish-American countries to periodicals and the book (The Child that Toileth Not> (1912).

DAWN, The. (The Dawn,): or more cor¬ rectly (The Dawns' ((Les Aubes)),is generally regarded as the greatest symbolistic drama of Emile Verhaeren. It differs from the plays of his Belgian countryman, Maeterlinck, in con¬ tent, in that it concerns itself directly with social problems and the social revolution of the future, rather than with the psychic readjust¬ ments of the individual. (The Dawns' here prophetically foreshadowed are the beginnings of justice between class and class, the triumph of great cities and the coming of peace through renunciation of victory by a people that has conquered its past and its traditional leaders. It announces that the time has come to found new religions and proclaim new doctrines. It differs from Maeterlinck also in construction and style ; for whereas Maeter¬ linck allures with feminine charm and an insinuating grace, Verhaeren attacks his theme with abrupt vigor and irresistible elan that bursts into passages of magnificent poetry.

He would compel rather than win his audience. Indeed, it is in these longer impassioned and flaring outbursts that the meaning of the play as well as its poetic value is to be sought. The drama proper is not well articulated, and into it are wound so many strands of meaning that at points it breaks down. For this reason, though published in 1898 it has been produced but once, and then privately, and in all proba¬ bility will never prove successful on the stage. In the person of its tragic hero, the people's liberator, Herenien, the suppressed impulses and hopes of the early 20th century came to triumphant expression, and his outbursts of eloquent aspiration contain many foreshadow¬ ings of the social and socialistic movements toward fraternization and an end of national conflicts which were to mark the progress of the World War of 1914. The play has been admirably translated into English by Arthur Symons.

Christian Gauss.

DAWSON, Coningsby (William), Eng¬ lish author : b. High Wycombe, Buckingham¬ shire, England, 26 Feb. 1883. He was gradu¬ ated at Merton College, Oxford, in 1905 and came to America in the same year. He did special work for English newspapers on Cana¬ dian

affairs and in 1910 became literary advisor to the George H. Doran Publishing Company. He is joint editor, with his father, of (The Reader's Library,' and has published (The Worker and Other Poems' (1906); (The House of the Weeping Woman' (1908) ; (Murder Point' (1910) ; (The Road to Avalon' (1911) ; (The Garden Without Walls' (1913) ; (Florence on a Certain Night' (1914) ; (The Raft' (1914) ; <Out to Win' (1918) ; <The Test of Scarlet' (1919).

DAWSON, George Mercer, Canadian geol¬ ogist: b. Pictou, Nova Scotia, 1 Aug. 1849; d. 1901. He was a son of Sir J. W. Daw¬ son (q.v.) and was educated at McGill Uni¬ versity and at the Royal School of Mines in London. In 1874 he was appointed assistant director and from 1895-1901 director of the Geological Survey of Canada. He was the author of (Geology and Resources of the Forty-ninth Parallel,' and similar works.

DAWSON, Henry, English landscape painter; b. Hull, 3 April 1811; d. Chiswick, 13 Dec. 1878. In early life he was a worker in a Nottingham lace-factory, but this occupation he gave up for art in 1835. After struggling some time at Nottingham he removed to Liver¬ pool in 1844, and thence to Croydon in 1850, and subsequently he resided at Chiswick. It was long before his abilities were fully recog¬ nized, and his pictures began to bring high prices only a little before his death. Among the best of them are (Wooden Walls of Old England' ; (London from Greenwich Hill' ; ˆHouses of Parliament' ; <The Rainbow' ;

(Rainbow at Sea' ; (The Pool Below London Bridge.'

DAWSON, Sir John William, Canadian

geologist: b. Pictou, Nova Scotia, 13 Oct. 1820; d. Montreal, 19 Nov. 1899. He was educated at Edinburgh University, and early turned his at¬ tention to geology. He accompanied Sir Charles Lyell.when examining the geology of Nova Scotia in 1842. In 1850 he became su¬ perintendent of education for Nova Scotia, and

was in 1855 appointed principal and professor of natural history in McGill College, Montreal. He became a member of the Royal Society (London) in 1862, was knighted in 1885, and was president of the British Association in 1886 and president of the Geological Society of America (1893). His published works in¬ clude (Acadian Geology J (1855) ; Handbook of Canadian Zoology) (1871); <The Story of Earth and Man> (1872); (The Origin of the World* (1878) ; (The Chain of Life in Geolog¬ ical Time) (1881) ; (The Geological History of Plants-* (1888) ; (Modern Science in Bible Lands* (1888); (Handbook of Canadian Geology) (1889) ; (Modern Ideas of Evolution) (1890) ; (The Ice Age in Canada) (1894).

DAWSON, Miles Menander, American actuary, insurance lawyer and author : b. Viro-qua, Wis., 13 May 1863. He was educated at Kentucky (now Transylvania) University and the New York University Law School. He took up general practice as an insurance law¬ yer and consulting actuary. He was actuary of New York Legislative Life Insurance In¬ vestigating Committee, known as the Armstrong Committee, in 1905, of the Royal Commission on Life Insurance of Canada and the Wiscon¬ sin Legislative Insurance Investigating Com¬ mittee 1906, and actuarial expert adviser of the New York Workmen's Compensation Com¬ mission in 1914; has made two study tours in Europe on Workmen's Compensation and Social Insurance, for Russell Sage Foundation in 1808 and for the United States Bureau of Labor in 1910; American secretary International Com¬ mittee on Social Insurance; and treasurer of the Poetry Society of America. He has pub¬ lished (Elements of Life Insurance) (1892; 3d ed., 1911) ; Assessment Life Insurance) (1895) ; Principles of Insurance Legislation (1895) ; Practical Lessons in Actuarial Science) (1897, 2d ed., 1905) ; (Things Agents Should Know* (1900) ; (Various Derived Tables>

(1900; 3d ed., 1915); Pusiness of Life Insurance) (1905) ; Comparative Reserve Tables) (1905, 3d ed., 1915); Survivorship Annuity Tables) (1910-15) ; (Working Men's Insurance in Europe* (joint author Lee K. Frankel, 1910) ; (Elsie, } a novel from the

Norwegian of Alexander Kjelland (1892) ; Poems of the New Time)

(1901) ; Pthics of Confucius* (1915).

DAWSON, Samuel Edward: b. Halifax, 1 June 1833. He was educated at Montreal and engaged in business as a bookseller and publisher. He was king's printer of Canada, 1891-1909, and president of the Royal Society of Canada, 1907. He is the author of (The Saint Lawrence Basin and its Border Lands* ; <A Plea for Literature) (1908).

DAWSON, William, English clergyman: b. Garforth, Yorkshire, 30 March 1773; d. Colne, 5 June 1841. He became a local preacher of the Wesleyan Methodist Church. He went all over England preaching with great power, often to immense audiences in the open air. By many he was considered the most emi¬ nent and able lay preacher produced by the Wesleyan movement. His life was written and his letters edited by James Everett. His ser¬ mons were posthumously published.

DAWSON, William Harbutt, English publicist b. Skipton, 27 July 1860. He was

educated at Skipton School and Berlin Univer¬ sity. He married a German lady. He has been actively engaged in social work; most of his books have been written for the purpose of in¬ terpreting German thought, life and character to English people, and particularly of ex¬ pounding German practice in the treatment of social, economic and industrial questions. His publications include (Evolution of Modern Germany* (1908) ; (German Socialism and

Ferdinand Lassalle) (1888) ; Prince Bismarck and State Socialism* (1890) ; (Germany and the Germans) (1894) ; (Social Switzerland)

(1897) ; (German Life in Town and Country) (1901) ; (Matthew Arnold and his Relation to the Thought of his Time (1903) ; Protection in Germany: a History* (1904) ; (The German Workman: A Study in National Efficiency-* (1906) ; (School Doctors in Germany* (1906) ; (The Vagrancy Problem* (1910) ; (Social In¬ surance in Germany* (1883, 1911-12) ; (Indus¬ trial Germany* (1913); (Municipal Life and Government in Germany *(1914) ; (What is Wrong with Germany?"*, the causes of the War (1915) ; (Introductions to Treitschke's

German History) (1915), and contributions to the Fortnightly Review, the Nineteenth Cen¬ tury and the Economic Journal.

DAWSON, William James, English poet, novelist and clergyman: b. Towcester, North¬ amptonshire, 21 Nov. 1854. He entered the

Wesleyan ministry in 1875 and is at present pastor of the old First Presbyterian Church, Newark, N. J. His works include (A Vision of Souls* (1884); (Quest and Vision: Essays on Life and Literature) (1886) ; (The Makers of Modern Poetry) (1890); Poems and Lyrics) (1893) ; (London Idylls } (1895) ; (The House of Dreams *(1897) ; (Through Lattice Win¬ dows* (1897) ; (Table Talk With Young Men) (1898); (Makers of Modern Prose* (1899); (The Man Christ Jesus> (1901); <The Quest of the Simple Life* (1903) ; (The Book of Courage) (1911); (Robert Shenstone* (1917).

DAWSON, Canada, city and capital of Yukon Territory, constituted 1898. It is situated at an elevation of 1,400 feet on the right bank of the Yukon River, 1,500 miles from its mouth, at the confluence of the Klon¬ dike River, about 50 miles east of the Alaskan boundary; in lat. 64° 5' N. and long. 139° 30' W. The city, which is near the site of old Fort Reliance, has grown up since the discov¬ ery of gold on Bonanza Creek, 16 Aug. 1896, and is the receiving and distributing centre for the Klondike mining district. It is mostly well built, the two great fires of 1899 having de¬ stroyed many of the rude, temporary struc¬ tures. Forty below zero is the average tem¬ perature for days at a time, but blizzards are not common. Thawing the ground by steam, the use of automatic lifts and buckets, and of machinery in general, have largely increased the gold output of the region. Coal deposits have been found nearby. Steamers ply upon both the upper and lower Yukon in the season of navigation from 1 June until October. Daw¬ son has a United States consulate. Pop. 3,013.

DAWSON, Ga., city and county-seat of Terrell County, on the Central of Georgia and the Seaboard Air Line railroads, 95 miles south¬ west of Macon. It has oil, lumber and grist mills and is the centre of a cotton and fruit-

growing district. It contains a Carnegie library. It was settled in 1855 and incorporated the following year. It is governed by a mayor, elected biennially, and a board of aldermen under a charter of 1891. It owns the water plant and electric-lighting system. Pop. 3,827.

DAX, daks, a town in department of Landes, southwestern France, on the left bank of the Adour 32 miles northeast of Bayonne by rail. It consists of the town proper, sur¬ rounded by old ramparts partly Roman, and of a suburb called Sablar, on the opposite side of the river and communicating with it by a bridge. The principal edifices are the high church, once a cathedral, the bishop's palace, now occupied as public offices, the communal college, and a handsome thermal establishment. There are various ancient Roman remains. Its chief attraction is its warm sulphur springs, which have temperatures varying from 86° to 166° F., were much frequented by the Romans, and are still in great repute. Its old name was Aquae Tarbellicae. Pop. 11,387.

DAY, Arthur Louis, American physicist: b. Brookfield, Mass., 30 Oct. 1869. He was graduated at Yale in 1892, and was instructor in physics there in 1894-97. He was a member of the scientific staff of the Plrysikalisch-Technische Reichsanstalt at Charlottenburg, Germany, 1897-1900, and physical geologist of the United States Geological Survey 1900ˆ06, and in the latter year was appointed director of the geophysical laboratory of the Carnegie Institution at Washington. He is member of several learned societies, and has written many papers upon physical and geophysical investiga¬ tions at high temperatures in German and American scientific journals.

DAY, Benjamin Franklin, American naval officer: b. Plymouth, Ohio, 16 Jan. 1841. He was graduated at the United States Naval Academy in 1862. During the Civil War he served with the West Gulf (1862-64) and North Atlantic (1864-65) blockading squadrons, and attained the rank of lieutenant-commander in 1866. In 1876 he became commander, in 1891 captain, in 1899 rear-admiral, and was re¬ tired from the service in 1900. From 1897 to 1900 he was a member of the Naval Examining and Retiring boards.

DAY, George Edward, American theo¬ logian : b. Pittsfield, Mass., 1816; d. New Haven, Conn., 2 July 1905. He was graduated at Yale in 1833 and in 1838 at the Yale Divin¬ ity School, where he became assistant instructor in sacred literature. From 1840 to 1851 he was pastor of churches in Marlboro and Northampton, Mass.; from 1851 to 1866 he occupied the chair of biblical literature in Lane Theological Seminary; and then that of Hebrew and biblical theology in Yale Divinity School, where he founded in 1891 the Historical Library of Foreign Missions. From 1863 to 1871 he was editor of the Theological Eclectic (after¬ ward merged in the Bibliotheca Sacra) and, besides contributions to periodicals, published a translation of the (Theology of the New Testa¬ ment of Van Oosterzee (1871) ; an American

edition (1883) of Oehler's (Theology of the Old Testament 1 ; and other works.

DAY, Holman Francis, American journal¬ ist and author: b. Vassalboro, Me., 6 Nov. 1865, He was graduated at Colby College in 1887 and

entering journalism the year after, has since been editorially connected with various Maine journals. He has contributed extensively to periodicals and is the author of three volumes of popular verse, (Up in Maine) (1900) ; (Pine Tree Ballads> (1902) ; (Kin o' Ktaadn1 (1904); also of novels, (Squire Phin) (1905), dramatized as (The Circus Man/ produced Chicago (1909); (The Rainy Day Railroad War1 (1906) ; (The Eagle Badge) (1907) ; (King Spruce) (1908); (The Ramrodders1 (1909) ; (The Skipper and the Skipped1 (1911); (The Red Lane> (1912); <The Land-loper) (1915) ; (Blow the Man Down' (1916) ; (Along Came Ruth,1 a play, produced (1914) by Henry W. Savage.

DAY, James Roscoe, American educator : b. Whitneyville, Me., 1845. He studied at Bowdoin and was ordained a minister of the Methodist Episcopal Church in 1872. He was pastor at Bath, Me., 1872-74; Portland, Me., 1876-78; Boston, 1881-82, New York, 1883-85 and 1889-93. In 1893 he became chancellor of Syracuse University. He was elected bishop in 1904, but resigned to continue in present position. He has written many magazine articles and sermons and has published in book form (The Raid on Prosperity1 (1907).

DAY, Jeremiah, American educator: b. New Preston, Conn., 3 Aug. 1773; d. New Haven, Conn., 22 Aug. 1867. He was gradu¬ ated at Yale 1795. Having early made choice of the profession of theology, while acting as tutor he began to preach as a candidate for the ministry; but before taking charge of any parish was in 1801 elected to the professorship of mathematics in Yale College. In 1817 he became president of the college, continuing in that position till his resignation in 1846. He published (An Introduction to Algebra) (1814) ; Navigation and Surveying) (1817) ; and other works.

DAY, John, English dramatist : fl. about 1600. Of his life hardly anything is known. He is mentioned in Henslowe's (Diary 1 in 1598 as an active playwright. But few of his earlier works have come down to us save (The Blind Beggar of Bethnal Green.1 Day collab¬ orated freely with contemporary writers, as Chettle and Dekker. Ben Jonson

in his con¬ versations with Drummond of Hawthornden grouped him with some other admirable gentle¬ men and authors as a rogue and a base fellow. His best works that have reached us are a graceful comedy, (Humor out of Breath1 ; and (The Parliament of Bees,1 a kind of allegorical masque in which all the characters are bees. <(The very air,11 says Charles Lamb, <(seems replete with humming and buzzing melodies. Surely bees were never so be-rhymed before.11 An edition of Day's works was privately printed by A. H. Bullen in 1881. Consult Swinburne's essay in Nineteenth Century (October 1897) ; and (Cambridge History of English Literature1 (Cambridge and New York, 1907-13).

DAY, Richard Edwin, American author

and editor: b. West Granby, Oswego County, N. Y., 27 April 1852. He was graduated at Syracuse University 1877, engaged in teach¬ ing, then journalism, being associate editor of the Syracuse Standard for 18 years. Since 1899 he has edited State publications at Albany,

N\ Y., since 1904 in the State historian's office. He has published (Lines in the Sand) (1878) ; (Thor: a Drama' (1880) ; (Lyrics and Satires> (1883); <Poems' (1888); <New Poems' (1909); Catalogue of Sir William Johnson Manuscripts in New York State Library' (1909).

DAY, or DA YE, Stephen, American colo¬ nial printer: b. London about 1610; d. Cam¬ bridge, Mass., 22 Dec. 1668. He was employed by the Rev. Joseph Glover to accompany him to America in 1638, to operate a printing press which he was going to set up in Massachusetts. Mr. Glover died on the voyage and the press was placed in the house of Rev. Henry Dunster, first president of Harvard College. The first book printed in the colonies was issued from it in 1640, and was entitled (The Whole Booke of Psalmes, faithfully translated into English metre,' commonly styled (The Bay Psalm Book. ' The printing house was taken from him about 1648, and put into the hands of Samuel Green. Consult Thomas, (History of Printing in America' (1810).

DAY, Thomas, English writer: b. London, 22 June 1748; d. 28 Sept. 1789. He was edu¬ cated at Oxford, and was called to the bar but never practised. He published several works in favor of the American Revolution and against slavery. His principles led him to re¬ nounce most of the indulgences of a man of fortune that he might bestow his superfluities upon those who wanted necessaries. He wrote, in prose and verse, on various subjects, but his name is kept alive chiefly by the well-known book written for the young, entitled (History of Sanford and Merton.' His (Poems' were published in (British Poets' (Vol. LVIII). His (Life' was written by Keir (London 1791) and by Blackman (ib. 1862).

DAY, William Rufus, American jurist: b. Ravenna, Ohio, 17 April 1849. He was grad¬ uated from the University of Michigan in 1870, and from the law school of the same insti¬ tution in 1872. In the latter year he was ad¬ mitted to the Ohio bar, and began the practice of law at Canton where he soon gained local and State distinction ; in 1886 he was elected judge of the Common Pleas Court of the ninth judicial

district, being the candidate of both political parties. In 1889, President Harrison appointed him United States district judge for the northern district of Ohio, but he was obliged to decline the appointment on account of ill health. In 1897 he was made Assistant Secretary of State by his friend, President McKinley, and in April 1898 he succeeded Sher¬ man as Secretary of State, as such conducting all the negotiations of the Spanish War. Later in 1898 he resigned the secretaryship, and was appointed chairman of the United States Peace Commission to frame a treaty of peace with Spain, in which capacity he had a conspicuous and responsible part in all peace negotiations. He then returned to his law practice, but in 1899 was appointed to succeed Judge Taft as United States circuit judge, and on 26 Jan. 1903 was appointed to the Supreme Court by President Roosevelt.

DAY, a word used with several different senses. Its most ancient meaning is the period of light (<(natural day®) as. opposed to the period of darkness, and in this sense it is still

quite commonly used. Its most common appli¬ cation, however, is to the period of light and that of darkness together, but even in this sense there are different days. The sidereal day is the time that elapses between two suc¬ cessive culminations (see Culmination) of any particular fixed star, or, in other words, is the time occupied by a revolution of the earth round its axis. The solar, astronomical or ap¬ parent day is the time that elapses between two successive returns of the same terrestrial merid¬ ian to the centre of the sun. This period is not always of the same length, and its mean length gives us the mean solar or civil day. The 24 hours of the sidereal day are numbered in succession from 1 to 24, while the civil day in most countries is divided into two portions of 12 hours each. The abbreviations p.m. and a.m. (the first signifying post meridiem, Latin for afternoon.; the latter ante meridiem, forenoon) are requisite, in consequence of our division of the day into two periods of 12 hours each. In this respect the mode of numbering the hours from 1 to 24 consecutively has an advantage, and in some countries is being introduced ; in parts of Italy it has long prevailed. The Baby¬ lonians began the day at sunrise; the Jews and Greeks at sunset ; the Egyptians and Romans at midnight, as do most modern peoples. Astronomers use a day of the same length as the civil, but commonly make it begin at noon and number the hours up to 24, though latterly midnight has been partly adopted as the start¬ ing point.

If we take a day according to the second definition given above (that

is, a sidereal day), its length, of course, is the same throughout the year (see Sidereal Time). The solar day, in consequence of the varying rapidity of the earth in its orbit, and the obliquity of the ecliptic, is different at different times (see Solar Time), and this difference is uniform throughout the earth; but the time of the natural day (or period of light) is different at the different points of the earth, according to their distance from the equator. To get a fixed measure of solar time astronomers imagine a sun moving uniformly in the celestial equator and com¬ pleting its circuit in the same time as the real sun. The time marked by this imaginary sun is called mean solar time ; when the imaginary sun is on the meridian it is mean noon ; when the re-al sun is on the meridian it is apparent noon. Four times a year these two kinds of solar time coincide. In -the intervals the sun is always either too fast or too slow, and the difference is called the equation of time. The daily apparent revolution of the sun takes place in circles parallel to the equator. If. the equator and the ecliptic coincided the circle bounding light and darkness would always divide, not merely the equator, but all its par¬ allels, into two equal parts, and the days and nights would be equal in all the parallels through the year; but at the poles there would be no night. Owing to the inclination of the earth's axis to the plane, of its orbit (the eclip¬ tic), the parallel of latitude in which the sun appears to move is continually changing; and therefore the equator alone (being a. great cir¬ cle) always remains bisected by the circle divid¬ ing light from darkness ; so that the days and nights here are always equal ; while the parallels of latitude, not being great circles, are not

equally divided by the circle separating light from darkness, except at the time of the equi¬ nox, when the sun is moving in the equator; and, of course, at this time only are days and nights equal in those parallels. As you approach the poles the inequality between the days and nights becomes continually greater, till, at the poles themselves, a day of six months alternates with a night of equal duration. The most dis¬ tant parallel circles which the sun describes north and south from the equator are, as is well known, only 21ˆ4 degrees from it. The dis¬

tance between the polar circles and the poles is the same. Therefore, as a little reflection will show, when the sun is in one of the tropics, all the polar circle in the same hemisphere will be within the illuminated region (because it will be within 90 degrees of the sun) during the whole of a diurnal revolution, while the other polar circle will be in the region of darkness. These circles, therefore, have one day of 24 hours and one night of the same length in each year. From the polar circles to the poles the time of the longest day increases fast, and in the same measure the length of the longest night. Not¬ withstanding the inequality of the periods of light and darkness in the different parts of the earth each portion of the earth's surface has the sun above its horizon every year precisely six months, and below it the same length of time.

A day, in law, includes the whole 24 hours from midnight to midnight. In reckoning pe¬ riods of time from a certain event the day on which the event occurred is excluded. On the other hand, if it be required to prove survival for a certain number of days, it will suffice if the person be alive for any portion, however small, of the last day. While an obligation to pay on a certain day would therefore be theo¬ retically discharged by payment before mid¬ night, the law requires that reasonable hours be observed — for example, if the payment (as a bill) is at a bank or place of business, it must be within business hours.

A lawful day is a day in which there is no legal impediment to the execution of a writ — that is, a day may be unlawful, dies non juridicus, either by common law or specific statute. By common law Sunday is a day on which the service of a writ cannot legally be made. Other days have been made holidays by both State and Federal statute in this country, and no such legal holiday is a lawful day.

Days of Grace. — The time at which a note is at maturity is in general three days after the time expressed on the face of it; the addi¬ tional days are called days of grace. These days must be lawful days.

DAY OF ATONEMENT. See Atone¬ ment.

DAY-BLINDNESS, or HEMERALO¬ PIA. See Vision, Defects of.

DAY OF THE DEAD* See Mythology, Growth of Myths.

DAY LILY, the popular name for a genus of lilies (Hemerocallis) , natives of temperate Asia and chiefly of eastern Europe, grown in gardens. They have long radical leaves, and a branched few-flowered scape, with hand¬ some large blossoms, the segments of which are

united into a tube. The flowers are found in meadows and along streams throughout the

Atlantic seacoast from New Brunswick to Vir¬ ginia, and west to Ontario and Tennessee. A species with bright yellow flowers (H . fiava) is sometimes found near old gardens. The name of the genus is from Greek signifying (<beautiful for a day.® In Europe these plants are sometimes cultivated as fodder for cattle. A Japanese plant, Funkici subcordata, is also known as the day lily.

DAY OF THE LORD. Sometimes called the Day of Jehovah, or Day of Jahweh. A term originating in the Old Testament escha¬ tology of the 8th century b.c. The Day of the Lord was to come when Jehovah would inter¬ fere in the affairs of Israel and deliver them from their misery and their foes. Hence the Day of the Lord is always spoken of as a day of judgment, not as an end, but in order that salvation may come. The judgment may be administered by some distant nation and would be accompanied by the terrors of the Lord. The prophets regarded the day as near at hand. While the day was primarily a day of judgment on Israel, yet it was to include all nations.

DAY NURSERIES, institutions for the care of those infants whose mothers' occupa¬ tions oblige them to work away from home during the day. The movement originated in France under the leadership of Marbeau in 1844. A society was formed for the propaga¬ tion and support of these nurseries, which was so successful in its efforts as to induce the municipal boards of charities to include these institutions in their programs. Some of the ((creches,® as they are called in France, are still supported by private contribution. The movement was carried to Austria, Germany, Spain, Russia and other countries. In the first-mentioned countries, they became public institutions. In the United States, the first day nursery was founded in New York city in 1854. From insignificant beginnings, it grew to include a hospital, and changed its name to Nursery and Child's Hospital. Now nearly all of the larger cities of the country have such establishments, supported by private philanthropy. The Asso¬ ciation of Day Nurseries of New York City was founded in 1897; and in 1898, the Na¬ tional Federation of Day Nurseries held its first meeting at Chicago. In England, the British National Society of Day Nurseries was established in 1901.

The need for these foundations is increas¬ ingly great with the more extensive occupation of women in industries. Children are generally admitted between the ages of two months and six years. They are left

there in the morning before the mother goes to work, and are called for on her return home in the evening. It is desirable that the nurseries be adequate in size for the neighborhood and well scattered throughout those portions of the city where social conditions demand them, so as to render them readily accessible to the mothers. Plenty of air and light, spacious rooms and out-of- door playgrounds are Uecessary requisites. The work of the nursery is primarily concerned with medical attention for the children en¬ trusted to it ; and with provision for food and occupation of those children during the day. The mothers also receive advice as to the care of the children. Ramifications of the work have carried the efforts of the day nursery

into close touch with other social agencies. Kindergartens, lunchrooms for school children of working mothers, and playgrounds to keep these older children busy after school until the mothers return, have been added. A small fee is paid for the daily care of the child.

DAYˆ OF SECTIONS, in French history, 4 Oct. 1795, when the National Guard attacked the Convention in the Tuileries. The forces of the government, under command of Napoleon, disarmed the regiments in the different sections, the first clash occurring in the Rue Saint Honore.

DAYFLY, a name sometimes used for the well-known Mayfly. A neuropterous insect of the family of Ephermeridw. The aquatic in¬ fant stages of larva and pupa are unusually long, often extending to 10 months ; but the adult period is short, and is passed without taking food, and covers only a few hours, never more than a day. The mouth is atro¬ phied in the adult, which passes through an im¬ mature winged stage known as the subimago. The body ends in two or three long thin tails. The membranous front wings are much biggcr than the hind wings. In the early summer Mayflies abound in great numbers about north¬ ern lakes and rivers, furnishing food for other insects, and for crustaceans and fish. See Neuroptera.

DAYLIGHT SAVING. A movement originated in England by William

Willett (1857-1915) in 1907 by the publication of a booklet entitled (The Waste of Daylight. > Briefly stated, his scheme aimed at securing more daylight leisure for recreation and lessen¬ ing the work performed by artificial light dur¬ ing the summer months. This was to be brought about in the following manner : The hour between two and three o'clock in the morning of each of the first four Sundays in April should be a short hour consisting of only 40 minutes, while the same hour in four Sundays in September was to be reckoned as 80 minutes. Greenwich and Dublin mean time were to be retained for purposes of astronomy and navigation, as well as for legal and par¬ liamentary documents unless otherwise signi¬ fied. Shorn of technicalities, it simply meant that during the summer months people should rise an hour earlier than usual in the morning, begin work an hour earlier and finish an hour earlier in the afternoon or evening. The value of early rising has been extolled by wise men of all ages. <(Daylight saving® has been prac¬ tised in the oldest of all industries — agri¬ culture — probably since the creation of man; from the earliest times down to the present day it has been, and still is, in active, daily operation among the bulk of mankind — in Asia, Africa, Australia and the agrarian com¬ munities of America and Europe. To the so-called ((working classes® it would be superfluous to preach the ((early to bed and early to rise® doctrine : upon them the rising nart at least is a lifelong obligation. Early rising has become almost a lost art among the "higher ranks® of city dwellers; gas, elec¬ tric light and the multiplication of amusements have added at least half of the night on to the end of the normal day and produced the natural result of later rising in the morning. Benjamin Franklin was perhaps the first to

draw attention to the anomaly of burning ex¬ pensive artificial light in the evening whilst an abundance of free daylight was wasted in the morning by late rising. In March 1784 (while United States Minister to France) he pub¬ lished in the Paris Journal a long, humorous letter headed, (An Economical Project, } in which he related that he was in ((grand com¬ pany® one evening where a newly-invented lamp was introduced. ((I went home, and to bed, three or four hours after midnight, with my head full of the subject.® Suddenly awakening at six in the morning, he was "astonished,® not only to find that the sun was shining, but (<that he gives light as soon as he rises.® But for the accidental wakening, he says, ((I should have slept six hours longer by the light of the sun, and in exchange have lived six hours the following night by candle¬ light… .®

The movement started by Willett produced a heated controversy in

the British Empire that spread over six years. Numerous municipali¬ ties and corporations welcomed the proposal and several private firms adopted it, though not by altering the clock, but by commencing daily operations an hour earlier. The fiercest opposition to the scheme came from prominent scientists and learned societies. Early in 1908 a (<Daylight Saving Bill® was introduced in the House of Commons and, after passing a second reading, was referred to a Select Parliamentary Committee, which reported favorably on it, • stating that the proposal would not only be beneficial to the general health of the com¬ munity at large, but would curtail expenditure on artificial light. The bill, however, did not reach the final stages in the House ; a similar bill was introduced in the following year and also referred to a select committee, which re¬ ported against it. One of the main objections was advanced in behalf of meteorological instru¬ ments designed to record continuously day and night, and the system of daily international telegraphic reports of synchronous observations upon which weather reports are based. It was pointed out that acts of Parliament could pro¬ duce no effect upon daylight ; that gas or elec¬ tric light could be saved by making more use of daylight without alteration of clocks, and that it would be just as reasonable to change the readings of the thermometer at a particular season. The late Sir John Milne, the astrono¬ mer, wrote, (<The only people that have a shifty time are Mahommedans and savages, and it is now suggested that we should … join their ranks.® Other prominent men asserted that the proposal was based upon self-deception, ((rising at five and making yourself believe it is six o'clock.® M. Charles Lalle-mand, scientist and administrator, was ap¬ pointed by the French government tp investi¬ gate and report upon the scheme. He con¬ demned it in toto, maintaining that the position of the sun in the sky afforded the proper de¬ termination of time, and that an arbitrary dis¬ placement of noon, combined with differences of longitude, would operate very unequally in districts east and west of Paris, and that Brest would be as much as one and a half hours' away from true time. Up to the outbreak of the European War repeated efforts were made in Great Britain to promote legislation on the sub¬ ject, but without success. Willett died 4 March

1915. Though he did not live to see his cherished plan adopted except in isolated cases, he knew that it was supported by over 700 city corporations and town and district councils, as well as by hundreds of societies and associa¬ tions. The year 1916, however, was destined to witness a remarkable translation of theory into practice in the way of (<daylight saving® In April its adoption was contemplated in Austria. On 8 May the question was raised in the House of Commons and advocated as a war measure of economy. Sir Henry Norman estimated that altogether $12,500,000 would be saved in lighting. A bill was introduced on

10 May, passed through both houses, received the royal assent on the 17th, and came into operation three days later. Farmers and mu¬ nition workers expressed disapproval, the former deciding to adhere to the real as against the ((sham time® shown by the public clocks. Although the bill referred explicitly to the year 1916 it gave power to extend the operation of the act in any year, so long as the war con¬ tinued. Instead, however, of adopting the com¬ plicated Willett plan, it was decided to advance the clocks by a full hour on 21 May and return to normal time on 1 October. The same month (May 1916) the system was introduced in Den¬ mark, Germany and Holland; Italy, France and Portugal followed in June. In Germany, per¬ manent adoption of the scheme was proposed in July; New Zealand rejected (after passing) it in August; Tasmania adopted it in Sep¬ tember; Victoria in November, and the Aus¬ tralian Dominion Parliament passed the meas¬ ure to take effect in January 1917. The city corporation of London proposed permanent adoption, and in October it was actively urged in the United States. Norway decided in favor of daylight saving in May 1916, but rejected it in April 1917, as also did Denmark and Sweden in the same month, while Spain adopted it in May, at the same time that the Australian Cabinet decided to repeal the act. Turkey, Switzerland and Russia also adopted daylight saving; Nova Scotia and Newfoundland were the pioneers of the scheme in the New World. The French bureau in February 1917 suggested an international daylight saving conference to be held after the war. On 17 April 1917 a bill drafted by the National Daylight Saving Asso¬ ciation was introduced in the United States Senate by Senator Calder of New York. It was pointed out that New York city could save $1,500,000 annually in gas alone. The American Federation of Labor welcomed the plan; the American Astronomical Society was divided as to its value, voting 18 in favor, 22 against, 6 neutral. The measure was passed 27 June 1917 without a roll call, to take effect on the last Sunday in April 1918. Actually, it came into force at 2 o'clock in the

morning of Easter Sunday, 1918. Consult The Independent, 19 Feb. and 5 May 1917; Current Opinion, 17 Feb. 1917; Nature (London), 9 Julv 1908; 11 March 1909 ; 22 April 1909; 6 April 1911 ; 27 April 1911 ;

11 May 1911; 27 April 1916; 4 May 1916; 11 May 1916; New York Herald, 17 March 1918; New York Sun, 24 March 1918; 13 Jan. 1918; Smyth, A. H., (The Life and Writings of Benjamin Franklin (Vol. IX, New York 1906).

Henri F. Klein, Editorial Staff of The Americana.

DAYS OF GRACE. The time of delay allowed for a bill to become actually due and payable, except in the case of bills payable on demand or at sight. In the United States and Great Britain the period is three days after the time expressed on the face of it, and these three additional days are called days of grace. In the United States, a bill or note becoming due on a Sunday or a holiday is payable on the first business day thereafter, but in England if the third day of grace falls on a Sunday, Christmas Day, Good Friday or a national fast or thanksgiving day, the bill is payable the day before.

DAYTON, Elias, American soldier: b. Elizabethtown, N. J., July 1737; d. there, 17 July 1807. He joined the British forces in 1760 which were employed in completing the con¬ quest of Canada from the French; and he sub¬ sequently commanded a company of militia, with which he marched on an expedition against the northern Indians. He took part in the im¬ portant battles of Springfield, Monmouth, Brandywine, Germantown and Yorktown. Af¬ ter the war he served several terms in the legislature of his native State.

DAYTON, John, American state gov¬ ernor : b. about 1761 ; d. Charleston, S. C., 27 Nov. 1822. He held several government offices, was chosen governor of South Carolina in 1800 and again in 1808, and was afterward appointed judge of the United States District Court, a position which he held until his death. He published (A View of South Carolina, > and (Memoirs of the Revolution in that State.

DAYTON, William Lewis, American

jurist and statesman: b. Baskingridge, N. J., 17 Feb. 1807 ; d. Paris, 1 Dec. 1864. He was grad¬ uated at the College of New Jersey in 1825; and was admitted to the bar of his native State in 1830. In 1838 he was chosen one of the asso¬ ciate justices of the Supreme Court of

New Jersey, which position he resigned in November 1841 ; and in 1842 was appointed by the gov¬ ernor to fill a vacancy in the United States Senate. At the expiration of his term he re¬ sumed the practice of his profession at Tren¬ ton ; and in 1856 was nominated by the Republi¬ can national convention as their candidate for the Vice-Presidency of the United States, with Fremont as the candidate for President. He was attorney-general of New Jersey 1857-61, and was Minister to France 1861-64.

DAYTON, Ky., city in Campbell County, on the Ohio River, and the Chesapeake and Ohio Railroad opposite Cincinnati. The manu¬ factures include watch cases, pianos, whisky; and among public buildings are good schools and the Speers Memorial Hospital. Dayton was settled and incorporated in 1849 as James¬ town. It received a new charter in 1893. Pop.

(1920) 7,646.

DAYTON, Ohio, city and county-seat of Montgomery County, at the confluence of the Great Miami, Mad, and Stillwater rivers and Wolf creek. It is on the Erie, the Big Four and the Pittsburgh, Cincinnati, Chicago and Saint Louis and the Baltimore and Ohio rail¬ roads, 67 miles southwest of Columbus and 60 miles north of Cincinnati. There are 125 trains

entering the city daily. The union station was opened to the public in July 1900, and cost in¬ cluding tracks $900,000. The city has an area of 17 square miles.

Manufacturing Interests.— While Dayton's manuiacturing industries are widely diversified and include the manufacture of cash registers, railroad cars, water-wheels, agricultural imple¬ ments, sewing machines, foundry work, etc., these are conducted on so large a scale that many establishments employ from 500 to 2,500 hands. According to the United States census of 1900, the average number of wage-earners in the city was 16,869; the total wages paid was $7,959,792 and the value of the productions was $35,697,695. Great progress was made since 1900 and careful estimates show that in 1918 the average of wage-earners had increased to 38,500 with a total wages paid of $20,000,000 and the value of the products $180,000,000.

In 1918 there were 130 factories engaged in making supplies and ammunition for the United States government. The city's industrial pres¬ tige lies largely in the manufacture of airplanes, automobile starting, lighting and ignition sys¬ tems, cash registers, recording devices, electric lighting systems for homes and farms, cigars, to}rs and paper box goods.

Street Railways. — Seven interurban electric roads radiate from Dayton forming an im¬ portant network in the traffic of the Central States. There are 10 local car lines with total mileage of 85.

Government. — Dayton is the largest city in the United States operating under the com¬ mission-manager form of government, the new city charter having become operative 1 Jan. 1914. Five commissioners are elected by the people and the commissioners choose a city manager. The manager and commissioners are subject to recall and the initiative and ref¬ erendum is incorporated in the charter. The municipal government is divided into several divisions, as follows : Service, which oversees all matters pertaining to streets and alleys ; street repairs, city asphalt plant, garbage and ash removal, the operation of the municipal garbage reduction plant, boulevards and

road¬ ways, *etc.* The Safety Department supervises management of the fire and police department. The Finance Department is concerned with the receiving and disbursing of public moneys, city purchasing agent and all license fees. The Law Department protects the city's legal interests, drafts ordinances, *etc.* The Welfare Department oversees all municipal recreational facilities, parks and playgrounds, public health and sani¬ tation, public nursing, *etc.* Since the opera¬ tion of the commission-manager form of gov¬ ernment, the city has centralized all public health nursing, erected a leprosorium, garbage reduc¬ tion plant, which sells grease, established numerous medical clinics and baby feeding sta¬ tions and a crime prevention bureau. The city has acquired the largest country club, munici¬ pally owned, in the world, a tract of 294 acres donated by John H. Patterson. A policewomen's bureau is also maintained. In safeguarding health and social conditions, the municipality works in intimate relations with all local social service agencies. Free legal aid is administered the poor. Each department is presided over by a director commanding a salary of $4,000 a year and each department is subdivided into

divisions and bureaus for specific service. The city manager receives $7,500, the commissioners $1,200 each and the mayor, who is the commis¬ sioner receiving the highest vote cast in the election, $1,500. The municipal revenues for 1917 were $1,310,510.21 and the expenses were $1,354,610.67, making an excess expenditure of $44,100.46, due to increased cost of materials on account of the war. The tax rate for 1918 was $1.56 on the hundred dollars. Total value of municipal property was $13,675,000, including lands, buildings, stock, automobiles, mechanical equipment, *etc.*

Banks and Banking. — Dayton has 15 na¬ tional and State banks, including two savings and trust companies with deposits aggregating $36,000,000. Bank clearings in 1917 were $177,- 134,087.65. During the year 129 corporations were chartered under Ohio laws adding to Day-ton capital $15,881,750 net. The city has 18 building and loan associations with total de¬ posits of $38,000,000. This is one of the strongest features of Dayton life. Through these agencies approximately 30 per cent of the residents of Dayton own their homes.

Education. — There are 32 public schools, with total enrolment of 21,300, including adult night classes. There are three high schools, a normal training school and special schools, largely in the nature of classes for defectives, cripples and sub-normal children. One high school, Parker, is for freshmen only. Stivers Manual Training High

School is said to be one of the most complete in the country. Manual training centres are maintained in eight schools; home economic centres in nine schools while sewing is taught in all high schools and in the seventh and eighth grades in all elementary schools. There are three night school centres.

Catholic churches have 15 parochial schools with enrolment in excess of 7,000. There is also one Lutheran parochial school. Saint Mary's College, maintained by the Brothers of Mary, has an enrolment of 600 students and fine laboratory equipment. The United Brethren Church has a theological seminary here, Bone-brake, and the Reformed Church, Ohio synod, maintains its theological school in this city, Central Seminary.

Dayton has 130 churches, a magnificent Y. M. C. A. and Young Women's Christian As¬ sociation and Young Women's League. Its charity and social welfare agencies are co-ordi¬ nated through the federation for charity and philanthropy.

There is considerable civic, philanthropic and social welfare activity in Dayton and 40 organi¬ zations at this time are engaged exclusively in war work. Co-relating war, social welfare, com¬ mercial and civic efforts, is the Greater Dayton Association, made up of 2,000 Dayton men and women and engaged in a multiplicity of com¬ munity services.

Public Library. — Dayton had the first li¬ brary incorporated in the State, one having been established in 1805. The public library was opened in 1855 and is supported by public taxa¬ tion, having an income of $18,000 per annum. The total number of volumes recorded 1 Jan. 1920, was 114,955. There are four daily news¬ papers, besides 25 church and other publications. There are also two large church publication houses.

Hospitals. — The city hospitals include the

Saint Elizabeth Hospital, the Miami Valley Hospital, and the District Tuberculosis Hospi¬ tal. The Dayton State Hospital for the insane is maintained by the State. The Hospital of the National Military Home which adjoins the city is the largest military hospital in the world and has an average of 600 patients, all of whom are veteran volunteer soldiers of the Civil and Cuban wars. There are several private hos¬ pitals.

History. — The town was laid out in No¬ vember 1795 by Gen. Israel Ludlow and was named after Gen. Jonathan Dayton. The first settlers arrived in the spring of 1796. Situated in the Miami Valley, one of the most fertile valleys in the United States, producing for many years great crops of corn, wheat, tobacco and numerous cattle, sheep and horses and with abundant water power to develop its industries, Dayton has grown to be the third largest manu¬ facturing city in the State. From Dayton (c. 1900-06) the Wright brothers (q.v.) developed aviation. With its industries so diversified, its banks and building associations so strong and uniformly successful and with its people so well educated, it is one of the richest and most prosperous communities in the Union. Pop. (1900) 85,333; (1910) 116,577; (1920 official census) 152,559.

Jesse B. Gilbert,

Associate Secretary of the Greater Dayton Association.

DAYTON, Tenn., city and county-seat of Rhea County, on the Cincinnati, New Orleans and Texas Pacific Railroad, 75 miles south¬ west of Knoxville. It is in the centre of a coal¬ mining and agricultural district; and iron, ma¬ chinery, lumber, bricks and flour are the chief manufactures. Pop. 1,991.

DAYTON, Wash., city and county-seat of Columbia County, on the Touchet River, and the Washington and Columbia River, and the Oregon railroads. It is about 28 miles, in di¬ rect line, northeast of Walla Walla and 50 miles southwest of Colfax. It is situated in one of the best agricultural regions of the State, and its trade is largely in agricultural products, wheat, barley, fruit, hogs and cattle. It contains stores, banks, large flouring-mills and well-built courthouse, city hall, churches and schools. Pop. 2,500.

DAZA, da’za, Hilarion, Bolivian general and ex-President: b. Sucre 1840; d. 28 Feb. 1894. In 1857 he enlisted as a soldier in the fa¬ mous battalion of Colonel Balsa, and was rapidly promoted. On 24 Nov. 1870, by an act of treachery he deprived President Melgarejo of office,

and defeated him in an engagement 15 Jan. 1871. After that he was practically the arbiter of the destinies of the country for sev¬ eral years. By the coup d'etat of 4 May 1876, he became President in place of Frias. The army deposed him 27 Dec. 1879. He went to France, but after a few years returned to Bolivia, and in that country was assassinated.

D'AZEGLIO. See Azeglio, Massimo Taparelli, Marquis d'.

DEACON (from the Greek diakonos, a servant), a person who belongs to an inferior order of ministers in the Christian Church. Seven were apparently first instituted by the apostles (Acts, chap, vi), which number was retained a long time in several churches.

In the Roman Catholic Church, a sacred minister whose functions are to assist the priest in the liturgical service and in the administra¬ tion of the sacraments ; also in emergencies to baptize, . to preach and to administer the Eucharist. These three functions it is not law¬ ful for the deacon to discharge without ex¬ press authority from the bishop save in case of necessity. But in the first ages of the Church it was the deacon that gave the communion, in both species, to the faithful in the public litur¬ gical service and at their homes in case of sickness. In the present usage of the Church the diaconate is, save in exceptional cases, simply a step toward the priestly state and office and for the deacon as such there is no recog¬ nized place in the economy of the Church.

In the English Church, also, the diaconate is merely a step toward the priesthood, and the deacon's duties are all in the way of assisting the priest. He preaches only by episcopal per¬ mission, and he cannot consecrate the elements of the Lord's Supper, or pronounce the absolu¬ tion. No person can be ordained deacon before he is 23 years old, except by dispensation from the archbishop of Canterbury. The office of deacon in other churches varies considerably, and some, of course, have no functionaries bear¬ ing this name.

In the Methodist Episcopal churches, the junior order of priesthood, the novitiate being first ordained a deacon, and then after a time, if satisfactory conditions have been ful¬ filled — such as progress in grace and gifts, and the probation of character — elevated to the full priesthood or eldership - — the latter the highest order in the Church — the bishops oc¬ cupying not a superior ecclesiastical order, but holding a merely supervisory office.

In the Presbyterian churches, the orders here are teaching elders, or ministers, ruling elders, generally called simply elders (these two orders looking over the spiritual affairs of the con¬ gregation); and deacons (now gradually being displaced in many places by managers), to at¬ tend to the more secular matters.

In the Congregational, Baptist and other churches, deacons are spiritual officers ranking immediately after the minister, and looking af¬ ter both the spiritual and the temporal concerns of the congregations. In the Eastern churches the office of deacon as it existed in the early Church has been preserved with slight modifi¬ cations. Consult Hort, (The Christian Ecclesia) (London 1897) ; Lindsay, (The Church and the Ministry in the Early Centuries* (ib. 1902) ; McGiffert, (The Apostolic Age* (New York 1897) ; Seidl, (Der Diaconat in der katholischen Kirche) (Regensburg 1884).

DEACONESSES, in the time of the apostles, were usually widows who assisted in the solemn baptism of women (by immersion), instructed female catechumens in the doctrines and usages of the Church, visited those of their sex who were sick or were in prison for the faith's sake, dispensed the alms of the faithful, and kept order in the women's part of the as¬ sembly room during the liturgical service. That the deaconesses were in the earliest times widows, and not maids or married women, ap¬ pears from the curious fact that Saint Ignatius, disciple of Saint John the evangelist, speaks of "virgins who are called widows®; as clear a proof of the original custom of choosing widows

only to be deaconesses, as would be the formal declaration that such custom existed. For a long time it was required that the deaconesses should be not less than 60 years old; by the councils of Chalcedon and in Trullo the age of 45 years was made the minimum ; by the Coun¬ cil of Chalcedon deaconesses were forbidden to marry ; and no widow who had married a sec¬ ond time was ever admitted to the rank of deaconess. The institution of deaconesses was extinct in the Western Church in the 10th cen¬ tury and in the Greek Church in the 12th ; but it survives in churches of the Syrian rites.

The work done by the deaconesses in the early centuries is performed now, in the Roman Catholic, and in many of the Protestant Episco¬ pal, churches by the nuns. (See Sisters). In the 19th century the order of deaconesses was revived in several of the Protestant churches. Theodore Fleidner (1836), of the United Evan¬ gelical Church of Prussia, founded a home for deaconesses, in Kaisersworth, Prussia. Ger¬ many has several homes, and in 1855 the order was established in Baltimore, Md. The Gen¬ eral Convention of 1889 adopted a canon regu¬ lating the order and providing that members should have adequate preparation both tech¬ nical and religious, extending over a two-year period. Training schools are maintained in New York and Philadelphia. The Methodist Episcopal Conference in 1888 provided for the establishment of an order of deaconesses, and this church now has many homes in the United States. The Lutheran Church also maintains several homes, the first being established in New York in 1852. In 1891 the Presbyterians insti¬ tuted the order. Consult Golder, < History of the Deaconess Movement (Cincinnati 1903) ; Nutting and Dock, (History of Nursing) (New York 1907) ; Potter, (Sisterhoods and Deaconesses) (London 1898) ; Wear Book) of the New York Training School for Deaconesses (New York 1892-1915).

DEAD, in nautical language, a word fre¬ quently employed as part of a designation or phrase having, in general, a meaning somewhat opposite to that of active, effective or real. The chief of such phrases are the following: Deadeyes : circular, flattened wooden blocks, without sheaves, and having eyes for lanyards, which form a purchase or tackle whereby the shrouds or other parts of fixed rigging are ex¬ tended or set-up taut; dead-flat: the name for one of the midship-timbers ; dead-lights : strong wooden shutters used to close cabin windows, on the approach of a storm, to protect the glass ; dead-ropes : such as do not run in blocks ; dead-wood : the term applied to the solid blocks of timber erected upon the keel throughout the sharp portions of a ship's hull at stem and stern, the chief object being to give solidity and strength to the ends of the ship.

DEAD, Book of the. See Book of the Dead.

DEAD, Disposal of the. In every age and in all countries, the living have shown their respect for the dead by various modes of burial ceremony, and the religion and laws of all countries reflect in large measure this feeling of reverence for the memory of those who have gone before. The methods of disposal of the dead are many, and historic romance has pre¬ served for us many interesting and pretty cus¬

toms. In the main, however, three methods are largely employed by modern peoples ■ — burial, embalming or its modifications or cremation with its modifications. It is impossible to tell which method has the greatest antiquity, but probably simple burial antedated the other, since cremation and embalming usually imply a com¬ plex religious development. The Hebrews, the Greeks and the Romans in the main buried their dead, their burying-grounds having been located outside of town walls ; but cremation also was largely practised by the Greeks, and it has been thought that Hebrews at one time likewise burned their dead. As is well known, embalming was widely customary among most of the nations of antiquity, although the Egyptians may be said to have been the fore¬ most of those employing it.

The argument in favor of cremation is based principally on sanitary grounds, and despite the general sentiment against it, cremation has made considerable progress in the United States and other countries. There are crematories in many of the leading cities of America, and while much of the feeling against cremation has undoubt¬ edly passed away, there is still great general dislike to burning of the dead.

Apart from methods of antiquity, the prob¬ lem of disposing of the dead with least danger to the living is, from the medical point of view, one of great interest. Its discussion is by no means of recent origin, however, for the early Italians, French and English contributed learned treatises on the subject. It would seem that from the scientific point of view most of the modern writers and those of the Middle Ages strongly favor cremation as one of the cleanest and most efficient modes of disposal of the dead, and it is a matter of history how the ancient Etruscans and others had their burial urns in which to keep the ashes of their forbears.

The method of burial beneath the ground is condemned by practically all sanitarians, but it will probably be many generations before the custom is abandoned, if indeed it is ever to be given up. As to actual dangers that may arise from dead bodies buried beneath the ground, it cannot be claimed that these are imminent. Disease is mainly transmitted from the living person, and now that we have more definite knowledge of factors involved in the transmis¬ sion of disease, the bogy of danger arising from burial has little terror for us. It can hardly be claimed with much show of justification that such a water-born disease as typhoid can orig¬ inate from the water that may percolate through the ground in cemeteries and ultimately reach a

potable supply. This danger is theoretical rather than practical, and the amount of time spent in devising methods to prevent such con¬ tamination would be much more rationally em¬ ployed in taking care of the excreta of the liv¬ ing. The contamination of the earth, the air and the water is, therefore, ready of secondary importance ; yet it cannot be denied that, except¬ ing some exclusive cemeteries, the present methods of burial are disgusting; and in times of war or pestilence not only is burial disagree¬ able, but there is no doubt that contagion may arise from it, and hence special portable crem¬ atories have an undeniable place. See Cremation of the Dead.

DEAD-LETTER OFFICE. The de¬ partment of the General Post Office at Wash-

ington, D. C.. to which all undelivered or tech¬ nically Mead® mail is sent, and from which, after examination, such mail, whenever possi¬ ble, is returned to the sender. See Post and Postage.

DEAD LINE. A phrase which probably originated during the Civil War. In some of the prison camps a line was drawn through or around the camp. If a prisoner attempted to cross the line he was shot at once. To the men it became the dead-line. In a figurative sense it applies to the age-limit of efficiency.

DEAD-MEN'S-FINGERS, an English

fishermen's name for the Alcyonium, a genus of polyps, the typical one of the family Alcyonidce, characterized by the polyps of the colony having eight hollow arms and eight mesenteries, and a skeleton composed of separate calcareous spic¬ ules. It contains many well-known species, such as A. digitatum, or sea-finger (dead-men's-fin- gers, known also to fishermen as dead-men's-toes, and cow's-paps), and A. glomeratum. A common species on the United States Atlantic coast is A. carneum. The name is also applied to certain species of branching sponges.

DEAD-NETTLE, a common name applied to the genus Laminin of the natural order Labiates, mint family. It is an annual or peren¬ nial herb, of which there are about 40 species, all natives of the Old World. It has been naturalized in America, and several species are found in waste places and cultivated ground from New Brunswick to Florida and west to Ontario, Minnesota and Arkansas. The best-known species are L. pnrpureum and L. album, which are used in the northern parts of Europe as pot-herbs. A species of the genus Galeopsis (G . tetrahit) is called dead-nettle, as is one of the species of Stachys (S. palustris). It was an old belief that the hairs of the dead-nettle, when dry, caused irritation to the exposed parts of persons coming in contact with the plant, and that this, extending through the system, sometimes caused death ; hence the name.

DEAD RECKONING, computation of a

ship's position without recourse to astronomical observations. This reckoning is computed from the following data — the longitude and latitude sailed from or last determined; the course or direction sailed (determined from the com¬ pass) ; the rate of sailing; and the time elapsed. These data are liable to many inaccuracies, due to currents, change in declination of the com¬ pass. The results arrived at by this method of reckoning are corrected as soon after as is pos¬ sible by sun or stellar observation. See Navi¬ gation.

DEAD SEA, the usual name given to a most remarkable lake in the southeast border of Palestine, called in the Old Testament <(The Salt Sea,® ((Sea of the Plain® or ((East Sea® ; by Josephus, <(Lacus Asphaltites® ; and by the Arabs now, Bahr-Lut, <(Sea of Lot.® It lies along the line of a great fault from the Gulf of Akaba at the head of the Red Sea to Hermon. It is 47 miles long, with a breadth of from 5 to 10 miles and occupies an area of 340 square miles. Its surface, which is lower than that of any water known, is 1,292 feet below the level of the Mediterranean. There is evidence that its level was nearly 1,200 feet higher than now. The depth of the greater part of the northern

section is about 1,300 feet; but at the south end the water is only from 3 to 12 feet deep. The shape is that of an elongated oval, interrupted by a promontory which projects into it from the southeast. The Dead Sea is fed by the Jordan from the north and by many other streams, but has no apparent outlet. It is estimated that 6,000,000 tons of water flow into it daily, al¬ most all of it being carried off by

evaporation. Along the eastern and western borders of the Dead Sea there are lines of bold, and in some cases perpendicular, cliffs rising in general to an elevation of 1,900 feet on the west and 2,500 feet on the east. It is a striking fact that these cliffs are all composed of limestone on the west, and on the east of sandstone of gorgeous hues, and are destitute of vegetation except in the ravines traversed by fresh water streamlets. The northern shores of the lake form an exten¬ sive and desolate muddy flat, marked by the blackened trunks and branches of trees, strewn about and encrusted with salt. The southern shore is low, level and marshy, desolate and dreary. On this shore is the remarkable ridge of rock-salt, 7 miles long and 300 feet high, called Khashm Usdom (Ridge of Sodom). Lava-beds, pumice-stone, warm springs, sulphur and volcanic slag suggest the presence here of volcanic agencies at some period; but some modern geologists declare that no active vol¬ canoes have ever existed in this vicinity; and that the subsidence of the Jordan Valley oc¬ curred in the Tertiary Period. On the other hand it is claimed by modern travelers that the neighborhood of the Dead Sea is frequently visited by earthquakes, and the lake still occa¬ sionally casts up to its surface large masses of asphalt The long-entertained belief that the exhalations from this lake were fatal is not founded upon fact. The absence of bird life is most impressive. The salinity of the waters is adverse to life, though some lower organizations are found in them. The region of the Dead Sea is rich in all kinds of minerals ; copper mines were worked in the Byzantine period near the southern end ; bitumen and sulphur are abundant, and its basin is rich in marble, porphyry, and other fine stones.

The water of the Dead Sea is characterized by the presence of a large quantity of magne¬ sian and soda salts. Its specific gravity ranges from 1172 to 1227 (pure water being 1000). The proportion of saline matter is so great that, while to every ton of water in the Atlantic there are 31 pounds of salt, in the Dead Sea are 187 pounds. Its water contains 23 per cent solid matter, and is, bulk for bulk, heavier than the human body. In all lakes or collections of water without any outflow, the water acquires an infusion of salt, its feeders constantly bring¬ ing in this material, while none can go off by evaporation, even when the shores do not as here abound in salt and nitre. The evaporation is great as the heat is intense, and the sea

but slightly increases its area. Rain hardly

ever falls; the water is nearly as blue and

clear as that of the Mediterranean ; and though its taste is horribly salt

and fetid, a bath in it is refreshing. Owing to the great specific gravity of the water, it is almost impossible for the bather to sink in it, strive as he may. Several of those who have navigated and ex¬ plored the sea have fallen victims to a fatal fever. For the story of the (Cities of the

Plain, } see Gen. xix; but according to Captain Conder, (<it is now generally agreed that the Dead Sea and Jordan were formed by a great fault or crack in the earth's surface long be¬ fore the creation of man, and that the district presents in our own days much the same aspect as in the days of Abraham. It is vain, there¬ fore, to suppose that the (Cities of the Plain) were beneath the present sea, though this view was held as early as the time of Josephus.®

The Dead Sea was first navigated by Costigan, an Irish traveler, in 1835, and he was fol¬ lowed by Molyneau, a British officer, in 1847, neither of whom survived their experiences. Lynch, an American traveler, was the first (1848) to explore its coasts and to take sound¬ ings of its depths. Consult Abel. (Une Croisiere autour de la Mer Morte5 (1911) ; Blancken-thorn, (Naturwissenschaftliche Studien am Toten Meer und im JordantaP (Berlin 1912) ; Schmidt, in (The Fifth Annual Report of the Director of the American School for Study and Research) (1905) ; Tristram, (The Land of Moab) (1874).

DEAD SOULS. Gogol was indebted to the great Russian poet, Pushkin, for the subject of his ˆepoch-making® satire, (Pokhozhdveniya Chichikova ili Myertvuiya DushiP (Chichikof's Adventures or Dead Souls5— perhaps better translated (Dead Serfs5) and to (Don Quixote) for its plan. Under the old regime in Russia the serfs, ˆfastened to the soil® by the economic regulations of the usurper Tsar, Boris Godunof, who was compelled to stop by drastic measures the emigration of farmhands, were regarded as personal property and the pomyeschiki, or landed-proprietors, were allowed to mortgage them to the State bank. The census was taken only once in ten years, and it naturally happened that in those intervals many of them died. It was argued that the birth-rate would offset the death-rate, so that taxation on the

basis of the previous enumeration would be fairly equitable. In Gogol's tale, which he called a Poem, a wily rascal, the Collegiate Councillor, Pavel Ivanovitch Chichikof, conceives the scheme of going about from place to place and getting by hook or by crook, by purchase or by gift, the title to such serfs as had died since the previous census. With the long list thus acquired he plans to borrow enough ready money to pur¬ chase a genuine estate with living souls. His journeys bring him into contact with all sorts and conditions of men and women. Gogol describes them without mercy, showing the deleterious influence of slaveholding on owner and serf alike. As in (Uncle Tom's Cabin,) to which (Dead Souls 5 has been compared, there is no attempt to preach ; the implication is per¬ mitted to carry its own weight. The emancipa¬ tion of the muzhiks had been advocated by the most enlightened Russians for many years, especially during the reign of the Emperor Alexander I (1801-25) ; during the reign of Nicholas I (1825-55), who was occupied with other affairs, the reform slumbered or at least was put aside, and not until Alexander II had come to the throne was the liberation actually effected. It had been made necessary by the demand of popular sentiment stimulated by (Dead Souls) and by Turgenief's (Recollections of a Sportsman. 5 (Dead Souls) was to have consisted of three parts. The first part ap¬

peared in 1842 and created a sensation. A second edition followed in 1844. It naturally aroused bitter enmity among the proprietor-class who felt that they had been traduced. The author, who was a sick man, tried to make ex¬ planations ; he begged his readers to wait for the conclusion before they formed their final judgments; but he grew more and more hypochondriacal ; and in a fit of melancholy he burned the manuscript of the second part which was only partially finished; after his death in 1852, an earlier draft was discovered and incorporated with the first. Later a Dr. Zaharchenko of Kief took it upon himself to continue and finish Gogol's masterpiece, but it was a dead failure. The chief interest of (Dead Souls) is historical: it depicts a condi¬ tion forever passed away, but its gallery of por¬ traits and of landscapes shows vividly what Russia was in the first half of the 19th cen¬ tury. Chichikof shrewd, plausible, tactful, am¬ bitious ; his lackey, Petrushka, taciturn, stupid, ugly; his coachman Selifan, talkative, with his head in the clouds and always getting lost ; his troika of horses (a threefold Rosinante), each with its own individuality; his ((brichka® with leather flaps and staring bull's-eyes ; all are as familiar to the Russian reader as Don Quixote and Sancho Panza. In Russian literature the names and varied characters of

Chichikof's dupes frequently appear without explanation: they are household words ; and many of the sayings so wittily and often sardonically intro¬ duced by Gogol have become proverbs. The work is only a torso, but in its details it became the model for many successive Russian writers who affected his style of realism. <(Myertvuiya Dushi® fills the third volume of the collected works of Gogol published in a beautiful edition by T. I. Hagen, Moscow 1884. It was trans¬ lated by Isabel F. Hapgood and published, New York 1886, London 1888. It is analyzed by the Vicomte de Vogue in (Le Roman russe) ((The Russian Novelists,5 Boston 1887), and in Ernest Dupiiy's (Great Masters of Russian Literature.5 A more detailed life of Gogol, with analyses of his works and a bibliography, may be found in Louis Paul Marie Leger's (Nicolas GogoP (Paris 1914). (Dead Souls5 \yas translated into French under the title, (Les Ames mortes,5 by Ernest Chariere (Paris 1885) ; the first part was translated into Ger¬ man, as (Die todten Seelen ein satirisch-komisches Zeitgemalde5 by Philipp Lobinstein in 1872.

Nathan Haskell Dole.

DEADLY NIGHTSHADE. See Bella¬ donna.

DEADWOOD, S. D., city, county-seat of Lawrence County; on the Chicago and North¬ western, and the Chicago, Burlington and Quincy railroads. It is one of the principal trade centres for the mining camps of the Black Hills. A considerable amount of the gold, silver, lead and other valuable minerals found in the Black Hills is brought to Dead-wood for smelting, refining or reshipment. Be¬ sides the large smelter and the cyanide reduc¬ tion works, there are manufactories for mining implements and machinery, brick and planing-mills. The Masonic Temple is a large building. The first permanent settlement was made in 1876. Pop. (1920) 2,403.

DEAF, The (((Deaf and Dumb,® <(Deaf-Mutes®). The term (<the deaf® is used in this article to designate the class of persons who are unable on account of deafness to be taught in ordinary schools and consequently must re¬ ceive their education in special schools or through special teachers at home.

Such persons are sometimes called <(deaf and dumb,® wdeaf-mutes,® or simply (<mutes.® The first schools established in Great Britain and America were named <(asylums for the deaf and dumb® ; then, as the character of their work became better understood, they were called ((institutions for the education of deaf-mutes® ; one or the other of these terms still persists in the corporate titles of a few of the older schools. But all that have been established within recent years have been entitled <(schools for the deaf® and nearly all the older ones have changed their names to this title. There are excellent reasons for preferring the term (<the deaf® to ((deaf and dumb,® <(deaf-mutes® or <(mutes.® ((Deaf and dumb® is objectionable for three reasons : (1) It tends to perpetuate the popular error that deafness and dumbness are two distinct physical defects, whereas there is only one, namely deafness. There is usually no imperfection in the vocal organs of the deaf, except such imperfection of development as may be the result of the lack of exercise; dumbness, where it exists, is simply the consequence of the deafness. (2) The word (<dumb® in some parts of the United States carries with it an implication of stupidity and brutishness. The deaf child, even before it receives any educa¬ tion, is not <(dumb® in this sense. (3) <(Dumb,® even when it is properly used to indicate per¬ sons unable to speak on account of their deaf¬ ness, is inaccurate if applied to the whole class of the deaf, for many of them, having lost their hearing by accident or disease after they had learned articulate language through the ear in the usual way, still retain their speech not¬ withstanding their deafness ; and others, originally dumb from having been born deaf or having lost their hearing in infancy or early childhood, have acquired the art of speech through instruction and are no longer to be classed as dumb. The confusion of mind caused by the use of the term ((deaf and dumb® in taking the thirteenth census of the United States in 1910 led to so many errors on the part of the enumerators that, as is stated in the bulletin of the census bureau published in 1915, <cit was finally considered inadvisable to make any tabulation covering the total population re¬ turned as deaf and dumb.® The term (<deaf-

mutes® is preferable to wdeaf and dumb,® but when applied to the whole class of the deaf it is equally inaccurate, and for the same reason; a large proportion of the deaf are not mute. ((Deafmutes,® however, is a correct designa¬ tion for persons deaf from birth or earlv child¬ hood who have not acquired the power of speech through instruction. Happily, owing to the progress made in oral teaching within recent years, the number of persons belonging to this class is now much less than formerly. The abbreviated form ((mutes® without the qualify¬ ing prefix ((deaf® is objectionable for the same reason as ((deaf-mutes,® and is open to the further objection that it suggests to readers of English literature the assistants of an under¬ taker at a funeral. The only proper designa¬

tion for the whole class of persons under con¬ sideration in this article is ((the deaf.® This is the term that is always used by their teachers and themselves in America and Great Britain, is incorporated in the titles of most of their schools, has been adopted in the annual reports of the United States Bureau of Education and the special report of the twelfth census, and is coming more and more into general use. There are several distinct classes of the deaf. These are, first, the two great classes of the congenitally deaf (those deaf from birth) and the adventitiously deaf (those who have be¬ come deaf at some time after birth). Accord¬ ing to the thirteenth census of the United States the congenitally deaf constitute 39.3 per cent of the whole number and this percentage agrees pretty nearly with that of the statistics of schools for the deaf. But it is often impossible to be sure whether a child is congenitally or adventitiously deaf. Deafness is not usually discovered until he arrives at the age when children ordinarily begin to speak. He may have been bom deaf or he may have lost his hearing later from some unobserved cause. An important distinction with respect to the educa¬ tion of the deaf is made by the division of the adventitiously deaf into the two sub-classes of <(quasi-congenitally® deaf and ((semi-mutes.® The quasi-congenitally deaf are those who lose hearing at some time during the first two or three years of life — sometimes even later — and, in consequence of the loss of hearing, also apparently lose the limited knowledge of lan¬ guage and speech they have acquired through the ear before deafness occurred. Like the congenitally deaf, these children are, and with¬ out instruction remain, true deaf-mutes. To them the spoken and written language of their fellow men is entirely unknown, and, even with the best education that special schools can give, they rarely attain to such a mastery of its idioms that they can use it with the accuracy and freedom that a hearing person does. There is, however, a subtle

difference in the mental condition of congenitally deaf and quasi-con¬ genitally deaf children. . Up to the time they enter school, indeed, this difference is not ap¬ parent; the quasi-congenitally deaf child speaks and understands speech no more than the deaf-born child and he possesses no conscious memory whatever of the words he once heard or even used. But it must be that there still remains in his mind a dim, subconscious memory of those words and of language; for it is observed by his teachers that he acquires words, language, and speech more readily and quickly than the child who was born deaf or who lost hearing within a few months after birth. Persons who lose their hearing in later childhood, after they have learned to under¬ stand a great deal of language and to speak readily and fluently themselves, are known in schools for the deaf as <(semi-mutes® ; an awkward and objectionable term, since it does not accurately describe their condition and is not generally understood, but one for which no satisfactory substitute has been proposed. Even these may cease to speak if they are not encour¬ aged by their family and friends to persist in the use of the voice ; but their memory of words remains, especially if they have learned to write, and, if they receive proper encourage¬ ment, it is easy for them to retain the power of

speech. When they are too deaf to hear their own utterance their voices are always peculiar and often disagreeable; but great improvement in this respect may be effected by the careful training of skilful teachers of articulation. Their mental condition is essentially different from that of the congenitally and quasi-congeni- tally deaf; not that their native capacity and learning ability is superior, but that their knowl¬ edge of language obtained before hearing was lost gives them an incontestible advantage over the deaf-born and the deaf from early child¬ hood. The pupils who arouse admiration at public exhibitions by their fluent speech and good command of written language, and the deaf who distinguish themselves in later life as writers and poets, generally belong to the class of semi-mutes. Persons who become deaf in adult life retain their speech but, unless they receive special instruction in speech-reading, generally cannot understand much of the speech of others and so are more or less cut off from society and sometimes from their former busi¬ ness or profession. They usually feel their deprivation more keenly than those deaf from birth or childhood, but by persistent study of the art of speech-reading under competent teachers, for which opportunity is now offered in many places, they may often be to a large extent restored to the society of their families and friends and enabled to carry on their busi¬ ness or profession more successfully than at first seemed possible.

Another important classification of the deaf from an educational point of view is based upon the degree of deafness. There are all degrees of deafness, extending from a slight impairment of the hearing to a total inability to perceive through the ear the loudest sounds. Those who are only slightly deaf, who can hear well enough to be taught in ordinary schools, do not come within the scope of this article; but among those who are so deaf that they must be taught by special methods there are great differences in the degree of deafness. They are thus divided into two classes : the totally deaf, who have no hearing or scarcely any, and the semi-deaf, wdio can hear more or less. In a few cases of tfie semi-deaf the hearing powder, even when before instruction it was so slight as to have remained unnoticed, may be so

developed, or rather educated, by suitable acoustic training, with or without the aid of mechanical appliances, that those who entered school as deaf-mutes may be graduated as hard-of-hearing persons. Even where this result is unattainable, any hearing that exists (especially if it is sufficient for the pupil to hear his own voice) is a great aid in acquiring natural and agreeable speech — an acquisition that is almost impossible when the deafness is total. The semi-deaf, like the semi-mute, are sometimes exhibited to the public as deaf-mutes, and the speech of the semi-deaf and the lan¬ guage of the semi-mute are shown as the re¬ sult of instruction given in the school. Much credit is often due to the school in both cases, but far more credit for the excellence of the speech is due to the partial hearing that the child possesses, and for the excellence of the language to the fact that it was acquired before hearing was lost. In justice to the real deaf-mutes, who are less favored by nature, and in the interest of truth, the existence of partial

hearing and of speech naturally acquired ought always to be explained to visitors. The semi¬ deaf pupil may also be semi-mute ; in that case he has a twofold advantage over his congeni¬ tally or quasi-congenitally and totally deaf classmate.

Causes of Deafness. — The division of the deaf into the congenitally and adventitiously deaf is an important one with respect to the causes of deafness. Congenital deafness is not al¬ ways hereditary but heredity is probably its most frequent cause. For this cause to be effective it is not necessary that one or both of the parents should be deaf ; though both parents may hear, the existence of deafness in other relatives, as grandparents and more remote ancestors, uncles and aunts, brothers and sisters and cousins, is an indication that the deafness is hereditary. Consanguineous marriages often result in deaf children and a large proportion of these children are congenitally deaf. In these cases the deaf¬ ness is probably hereditary. It is not necessary to believe that consanguineous marriage in itself is a true cause of deafness, but a tendency to deafness exists in many families ; when two members of such a family marry each other, that tendency is transmitted to their offspring with increased intensity and deafness is the result. Another frequent cause of congenital deafness, though one rarely found in the statis¬ tics of “assigned® causes, is constitutional syphi¬ lis. While this cause is prenatal, and the re¬ sponsibility for its results rests directly upon one or both of the

parents, the deafness is not to be classed as hereditary. Other non-heredi- tary causes of congenital deafness are probably alcoholism, tuberculosis, scrofula and other dis¬ eases in one or both of the parents, but it has not yet been determined how far these causes are effective. The causes of adventitious deaf¬ ness are many and various. Even the prenatal influences above mentioned that cause congenital deafness sometimes produce, or combine with other causes to produce, adventitious deafness. Accidents, such as concussion, falls, blows on the ear, etc., are responsible for some cases ; but a large majority of the adventitiously deaf have lost their hearing from some disease. The dis¬ eases of childhood that most frequently cause deafness are scarlet fever, cerebrospinal menin¬ gitis, brain fever, catarrh, measles and typhoid fever, in the order named.

History and Statistics. — The enumerators of the thirteenth census reported 44,519 “deaf and dumb® and 189 were subsequently added for good reasons in the office, making a total of 44,708 in the United States in 1910; but, as is stated in the preliminary bulletin of the Bureau published in 1915, “it was impossible to say just what this total represented ; on the one hand it fell short in all probability of including all deaf-mutes, and on the other it included many who were not deaf-mutes at all.® Probably the ac¬ tual number of the deaf in the United States ex¬ ceeds the returns of the thirteenth census re¬ ports. The number of the deaf bears a cer¬ tain relation to the population, being far greater in countries wherein squalor, privation, medical ignorance or unhygienic conditions prevail. The ratio of deaf-mutes to population is as follows, for the different countries named: Sardinia, 1 to 760; Nova Scotia, 1 to 880; Ireland and Norway, 1 to 970; France, 1 to 1,200; Prussia, 1 to 1,675; England, 1 to 1,970; Holland. 1 to

2,000; United States, 1 to 2,400. Whether deaf¬ ness in the United States is increasing or di¬ minishing it is impossible to say positively, for unhappily the decennial censuses of the deaf

(From an engraving by Gio. Pavesi, a pupil in the Royal Institution for Deaf Mutes, Milan, 1867.)

have not been taken upon a uniform plan and therefore do not afford an exact basis for com¬ parison. According to the returns it appears to be diminishing, and the progress that has been made within recent years in the prevention and treatment of the diseases that cause adventitious deafness gives us reason to hope that this appar¬ ent diminution is real and that in the future such deafness will become more and more infrequent. Congenital deafness is more difficult to deal with ; but this also appears to be diminishing, as it certainly ought to be. Syphilis is both pre¬ ventable and curable ; alcoholism is at least pre¬ ventable ; and now that the laws of heredity are becoming better understood there should be fewer marriages liable to result in deaf off¬ spring. In antiquity and through the Middle Ages the condition of the deaf was deplorable. Belonging generally to the lower classes, igno¬ rant, unable to understand the speech of others or to make themselves understood except by rude gestures, classed under the law with the idiotic and insane, popularly supposed to be possessed of a devil and so shunned as objects of contempt or superstitious dread, their lot, save in rare cases, must have been one of deg¬ radation and wretchedness and always of isola¬ tion and unhappiness. Girolamo Cardano, of Milan (1501-76), was the first to express the be¬ lief that the deaf could be educated. In ((De Surditate® and <rParalipomenon® he not only de¬ clared that it was possible, though difficult, for deaf-mutes to learn to read and write, but also stated clearly the principle upon which their edu¬ cation depends ; namely, that ideas can be as¬ sociated with written words without the inter¬ vention of sound and so ffthe deaf-mute can hear by reading and speak by writing.® The

seed sown by Cardano was slow in springing up and bearing fruit. In the great intellec¬ tual progress of the 16th and 17th centuries the

deaf had but a scanty share. A few fortunate individuals among them were taught by Ponce, Bonet and Carrion in Spain; Wallis, Holder and Baker in England; Amman in Holland; Pasche, Kerger, Raphael and Lasius in Germany; Fay, Pereire and Vanin in France. Some of these teachers, especially Bonet, Wallis and Amman, and one who was not a teacher, Dalgarno in Scot¬ land, published expositions of their methods. But it was not until the middle of the 18th cen¬ tury that the human conscience was aroused to the duty of educating the deaf generally. The first great impulse in this direction was given by the benevolent Abbe de l'Epee, whose school for the deaf, established at Paris about 1760, speedily became famous throughout Europe. At nearly the same time, independently of De l'Epee and of each other, schools were begun by Samuel Heincke in Dresden and Thomas Braid-wood in Edinburgh. Similar schools soon fol¬ lowed in other countries and they have contin¬ ued to increase to the present time. There are now about 670 schools for the deaf in the world.

Gallaudet College at Washington, D. C., was established in 1864 through the efforts of Ed¬ ward Miner Gallaudet, who was its president

Statue of Thomas Hopkins Gallaudet. founder of Deaf-Mute Education in America, at Washington, D. C. Daniel Chester French, Sculptor.

from that date until 1910. It was named in honor of Thomas Hopkins Gallaudet, the founder of deaf-mute education in America. Congress has made liberal appropriations for

its grounds, buildings and support, and provides 100 free scholarships. It is the only institution in the world devoted to the higher education of the deaf. While it is possible for the deaf, with special help, to pursue courses of study in ordinary colleges, they can do so with

much greater facility in Gallaudet College. Among its graduates are clergymen ministering to the deaf, editors, publishers, teachers, architects, artists, chemists and other specialists in science, successful business men, farmers, *etc.*

Among the Americans who have been es¬ pecially associated with the education of the deaf may be named: Dr. F. A. P. Barnard of New York, William W. Turner of Hartford, Abraham B. Hutton of Philadelphia, John A. Jacobs of Kentucky, Harvey P. and Isaac L. Peet of New York, Edward and Thomas Gal¬ laudet.

Notable cases of great proficiency among the deaf are those of Laura Bridgman, a celebrated blind deaf-mute and pupil of Dr. S. G. Howe, and Helen Keller of Boston, a lady of wide in¬ formation and great intelligence.

Besides papers published at many of the resi¬ dential schools, there are two American periodi¬ cals devoted to the education of the deaf, both published at Washington, D. C. : The American Annals of the Deaf , established in 1848, issued bi-monthly during the school year by the con¬ ference of superintendents and principals of American schools for the deaf, and the Volta Review, issued monthly by the Volta Bureau for the increase and diffusion of knowledge relat¬ ing to the deaf, which was founded and en¬ dowed by Dr. Alexander Graham Bell in 1887. The work of this bureau is carried on by the American Association to promote the teaching of speech to the deaf, which was also endowed by Dr. Bell. Other important organizations working in the interests of the deaf are the convention of American instructors of the deaf, which meets triennially; the conference of superintendents and principals above mentioned ; and the American Association of the Deaf, whose membership is composed of the educated deaf. One of the leading aims of this associa¬ tion of the deaf is to promote the combined system of instruction ; another is to suppress the vagrant impostors who beg from the public on the pretext that they are deaf. As a matter of fact the really deaf are scarcely ever beggars.

Most of the larger cities in the United States have churches or missions for the deaf in which religious services are conducted in the sign language and much is done in various ways to promote the social enjoyment and ma¬ terial welfare of the adult deaf as well as their moral and religious culture. The Episcopal Church under the leadership of the Rev. Dr. Thomas Gallaudet, a son of Thomas Hopkins Gallaudet, was the pioneer in this work and still has the largest number of workers ; but within recent years churches or missions have

also been established by Methodists, Baptists, Presby¬ terians, Lutherans, Roman Catholics and Jews.

Bibliography. — Arnold, (Education of Deaf-Mutes) (1888) ; id., (History of American Schools for the DeaP (1893) ; Best, (The DeaP (1914); Fay, (Marriages of the Deaf in America) (1898); Horne, (Hereditary Deaf-MutisnP (London 1909) ; Winnie, (History and Handbook of Day Schools for the Deaf and

Blind in Wisconsin (1912) ; and the Publica- . tions issued from time to time by the Volta Bureau, Washington, D. C.

Edward Allen Fay, Editor (American Annals of the Deafd

DEAF, Education of the. The education of the deaf presents two fundamental problems. First, the problem of giving them an under¬ standing of their native language. Second, the problem of teaching them to speak the lan¬ guage and to understand it when spoken by others. A deaf child may be taught to read and write the English language, and may be given a good education without ever learning to speak or to understand people when they speak. This result can be accomplished by the sole use of writing. It can be further facili¬ tated by the employment of gestural signs and finger spelling. The child so taught gets mental development, knowledge and education.

For a long time that was all that was at¬ tempted by educators of the deaf. But to-day in every civilized country in the world some at¬ tention is being given to the additional problem of teaching the congenitally deaf to speak and to read the lips of speakers by sight. In many countries, including the United States, this im¬ provement has gone so far that now a consider¬ able part of all deaf pupils are taught exclu¬ sively by means of the speech method without any use whatever being made of the sign lan¬ guage or finger spelling.

The public education of the deaf in the United States began in 1817 in a small institu¬ tion established in Hartford, Conn., through the interest and generosity of a few men, one of whom, Dr. Cogswell, had a deaf daughter, Alice. A young divinity student, Thomas Hopkins Gal¬ laudet, became interested in this little girl, and in 1815 consented to go to England for the pur¬ pose of learning the method there employed of educating deaf children in order to use it in the institution it was proposed to establish in Hartford. The method was what is known as the speech or oral method, as distinguished from the

silent, or manual, method. But the young Mr. Gallaudet found a curious situation in Eng¬ land. The education of the deaf there was at that time a monopoly in the hands of the Braid-wood family, and the terms under which those in charge of the schools in London and Edin¬ burgh were willing to permit Mr. Gallaudet to familiarize himself with their methods were such that he did not feel it possible to accept. When the young American emissary arrived in England, it chanced that the Abbe Sicard, a kindly French priest, who was continuing in Paris the work of educating deaf children by the silent or manual method begun by the Abbe de l'Epee, was in London, and met Mr. Gal¬ laudet with much friendly interest, extending to him a cordial invitation to come to Paris and learn his method of instruction. After striving in vain for eight months to secure in England the knowledge he wished of the speech method of teaching the deaf, Mr. Gallaudet decided to accept the Abbe Sicard's invitation and went to Paris, where he was received with the greatest kindness. After a stay of three months, the Abbe consented to allow his best pupil, Clerc, to accompany Mr. Gallaudet to the United States. Therefore, it seemed wiser to return at once rather than to take the time to himself learn more

fully the French silent method, since it could be efficiently inaugurated in collaboration with the deaf Clerc. The little school that was opened in Hartford in 1817 was, therefore, conducted by the silent method of signs and finger spelling then in vogue in France, instead of by the speech method as employed in England. Schools were from time to time established in other States, the first being in New York in 1818, until to-day each State has one or more. For 50 years all schools were modeled after the little institution in Hartford, and employed the silent method.

Statue of the Abbe De L'Epee. By Felix Martin.

The speech, or oral, method, used in England and in Germany, and later supplanting the silent method in France, did not gain a foothold in the United States for half a century. But in 1867 two little oral schools were established, one in New York and one in Massachusetts. In these schools no use was made of finger spell¬ ing or the sign langauge, all instruction, and all communication between pupil and teacher be¬ ing by means of speech and writing. This method possesses many obvious advantages and, in sj5ite of considerable opposition, made steady progress. During the half century from 1817 to 1867 little or no attention was given in

the schools for the deaf in the United States to the teaching of their pupils to speak or to the preservation of the existing speech of those who had the misfortune to become deaf after speech had been acquired. The result was that not only did the congenitally deaf leave the schools truly deaf and dumb, but even those who had possessed speech up to 8 or 10 years of age lost it entirely, and went out into life dumb as well as deaf. With the establishment of the first oral schools in the United States, and the publicity that was given to their success in teaching even the congenitally deaf to speak, the older schools began to pay more attention to the matter of speech for their pupils.

The history of the progress of this speech branch of education in the United States has been that of increasing attention to the more normal treatment of the deaf during the educa¬ tional period. The exclusion of the deaf from general intercourse with those about them, and the resultant segregation, are largely due to their dependence upon gestural signs and finger spelling with which very few hearing people are familiar. When they possess any ability to speak and to read the lips of those speaking to them, this isolation is greatly reduced. Fifty years ago the terms ˆdeaf-mute® and <(deaf and dumb® were correctly applied to almost all deaf persons whose deafness occurred before the 10th year of age. To-day, this name would be a misnomer in the cases of thousands of such persons because they have either been taught to speak or have had their early speech retained or restored.

The efficiency of the educational processes employed with the deaf has enormously in¬ creased during the past 100 years in every civi¬ lized country, but nowhere has there been greater progress than in the United States. The schools here are now the best equipped and the most lavishly maintained in the world. Not only do they provide the ordinary education of the pub¬ lic schools, but many of them give a

thorough training in from 1 to 10 trades; each pupil be¬ ing taught that means of livelihood to which he or she seems best adapted.

The last statistics (20 Oct. 1917) report the number of schools for the deaf in the United States as 157. Of these, 64 are public board¬ ing schools, 73 public day schools and 20 private and denominational schools. The total number of pupils in attendance was 12,792. Total num¬ ber of teachers 1,858. Total value of equipment of the public boarding schools $18,215,685. Thirteen of the public boarding schools were conducted on the pure oral plan, by which no teacher or other employee of the schools ever uses either finger spelling or the sign language in communicating with the pupils. Sixty-eight of the public day schools used this method, and 13 of the private and denominational schools, making a total of 94 schools conducted exclu¬ sively by the speech method. Forty-eight of the public boarding schools were conducted on what is known as the Combined system, which is a compromise between the silent method brought from France by Mr. Gallaudet and the speech method that reached this country half a century later. In the best of the Combined schools very little use is supposed to be made of either finger spelling or the sign language in the school rooms, but the pupils are instructed in these means of communication for use outside of

class rooms, in their intercourse with the teach¬ ers of industries, supervisors, servants and each other. The result of this is that the pupils spend by far the greater part of their school lives in an atmosphere of finger spelling and the sign language, and these become their thought vernacular. They think in these methods of expression,

and when they speak it is usually with a somewhat laborious process of translation from one means of communication to another. Naturally these pupils do not attain the maxi¬ mum average efficiency in speech and lip-read¬ ing. Five of the public day schools and seven of the private and denominational schools are conducted by this system, making a total of 60 combined schools.

The age of admission to the schools for the deaf has been steadily decreasing from 10 years of age at the beginning to five and even four years of age in certain schools now. There are also three schools in which children of two are received. The age of dismissal varies greatly, and is modified by circumstances. The course of study extends from kindergarten through the high school.

Gallaudet College, in the city of Washington, founded 1864, is an endowed and government subsidized institution for the deaf in which a deaf person may pursue a course of higher edu¬ cation and obtain the degrees of bachelor of science and bachelor of arts. A knowledge of the sign language and of finger spelling is neces¬ sary in order to pursue the courses at Gal¬ laudet College. Most of those who have been orally educated who wish to take a college course enter the regular colleges and universities and, with the help of their classmates and special tutors, take the same courses that are offered to all students. In this way deaf students have obtained degrees from Harvard, Columbia, Georgia School of Technology, Johns Hopkins and other institutions.

(<The American Association to Promote the Teaching of Speech to the Deaf® is a philan¬ thropic society, incorporated in 1890, to aid schools for the deaf in their efforts to teach speech and speech reading. In addition to this special work the Association carries on the work of the Volta Bureau (q.v.) in Washing¬ ton, D. C., an institution dealing more gener¬ ally with the education of the deaf.

The State of New York provides for the payment of $300 a year to any deaf man who is a matriculated student in the recognized uni¬ versities of the State. This money is to de¬ fray the expense of special readers and tutors to enable the deaf pupil to overcome to some extent his handicap. Recent investigations seem to show that something over 97 per cent of the graduates of schools for the deaf in the United States are self-supporting; also, that the earning power of those possessing some ability to speak and understand speech is greater than of those who must depend exclusively upon finger spelling and the sign language, or pencil and paper. The deaf are found in every conceivable occupation, but the majority of them earn a living in

some one of the trades, especially printing, brick laying, painting and carpentering.

For educational purposes, the deaf fall natur¬ ally into three classes: (1) Those totallv deaf from early infancy or birth; (2) Those par¬ tially deaf from birth or early infancy; (3)

Those adventitiously deaf after speech has been acquired.

All three of these groups need to be given the ordinary common school education as a minimum educational equipment. In addition to this, in the case of each group, special atten¬ tion must be given to certain other problems not met with in ordinary educational institu¬ tions. The first group must be taught to speak and to understand when spoken to by means of sight and in spite of the absence of hearing. The partial residual hearing of the second group must be developed and trained in order to make it of the utmost possible service in the acquisi¬ tion of speech and language and in the under¬ standing of what is said. The already acquired speech of the third group must be preserved and improved, and lip-reading by sight must be taught to supply the place of the lost power to comprehend by sound. These additional tasks superimposed upon the ordinary educational burdens of the school makes necessary in the schools for the deaf a higher standard of effi¬ ciency and effort than is found in the schools for the hearing. Otherwise these schools would not be able to accomplish in approximately the same length of time the same educational ad¬ vancement that is attained in the ordinary school where the pupils are not handicapped by deaf¬ ness.

Bibliography. — Bell, A. Graham, <Deaf Mute Instruction in Relation to the Work of the Public Schools > (Washington, D. C., 1884) ; •Garrett, directions to Parent's of Deaf Chil¬ dren } (ib. 1886) ; Gallaudet, (The Combined System of Educating the Deaf) (ib. 1891) ; (What the Mother of a Deaf Child Ought to Know) (New York) ; and the publications of the Volta Bureau, Washington, D. C. Consult also Arnold (Manual for Education of the Deaf >

John Dutton Wright,

Author of (Educational Needs of the Deafd

DEAF-BLIND, The. Obstacles are things to be overcome® is the motto given by Dr. Howe to the Perkins Institution for the Blind. When this remarkable man learned in 1837 that up in the mountains of New

Hampshire there was a little girl not only blind but also deaf and dumb, he eagerly sought out the child and obtained the parents' consent to take her to South Boston to be educated. He had already formed a theory as to how he would reach a mind thus doubly shut in, and with the finding of Laura Bridgman came the wished-for oppor¬ tunity to test this theory. It should be noted that Laura Bridgman saw and heard until she was two years old. She had been rather a deli¬ cate child, however, having enjoyed only about four months of robust health, when she sick¬ ened, her disease raging with great violence during five weeks, <(when her eyes and ears were inflamed, suppurated and their contents were discharged.® Her sufferings continued for months, and it was not <(until four years of age that the poor child's bodily health seemed re¬ stored.® She was intelligently active, following her mother about the house, seeming anxious to feel of everything, and thus to learn about it; and she developed signs for her father and her mother, and for some things.

She was eight years old when brought to the Perkins Institution. Dr. Howe writes: ((There was one of two ways to be adopted : either

to go on and build up a language of signs on the basis of the natural language, which she had already herself commenced, or to teach her the purely arbitrary language in common use; that is, to give her a sign for every individual thing, or to give her a knowledge of letters, by the combination of which she might express her idea of the existence, and the mode and condi¬ tion of existence, of anything. The former would have been easy, but very ineffectual ; the latter seemed very difficult, but, if accomplished, very effectual ; I determined, therefore, to try the latter.® After the child had become adjusted to the change of homes, Dr. Howe began teach¬ ing her by means of common articles with which she was familiar — spoons, forks, keys, etc., on which labels with their names printed in raised letters had been pasted. Similar detached labels were given her to feel. Her touch was acute enough, hence she was able to match labels, placing that for book on the book, *etc.* She did this easily and willingly because she

received approbation for so doing; but the idea that the printed word stood for the name of the object had not entered her brain. Then other detached labels were cut up into their component letters. These her memory soon enabled her to build into wholes or the words she had felt. Such exercises continued for many weeks to be only a meaningless play to the poor child. The suc¬ cess had been (<about as great as teaching a very knowing dog,® when suddenly the idea flashed upon her that ((Here was a way by which she herself could make up a sign for anything that was in her own mind, and show it to another mind, and at once her countenance lighted up with a human expression; it was no longer a dog or parrot — it was an immortal spirit, eagerly seizing upon a new link of union with other spirits ! I could almost fix upon the moment when this truth dawned upon her mind, and spread its light to her countenance; I saw that the great obstacle was overcome, and that henceforward nothing but patient and persever¬ ing, plain and straightforward efforts were to be used.® Next, she was given metal type each bearing some embossed letter, and a frame with holes to receive them. With this appliance Laura readily wrote the name of any object she knew and by writing them fixed in mind an extensive vocabulary of common names. Then the less cumbrous manual alphabet was taught her. Here was a means by which she could both write and read ; she could spell to her teacher and read what her teacher spelled into her hand. Dr. Howe's reports teem with inter¬ esting psychologic material. At the end of the year he writes : ((She is nine years of age, and yet her knowledge of language is not greater than a common child of three years. There has been no difficulty in communicating knowledge of facts, positive qualities of bodies, numbers, *etc.* ; but the words expressive of them, which other children learn by hearing, as they learn to talk, must all be communicated to Laura by a circuitous and tedious method. In all the knowledge which is acquired by the perceptive faculties, she is of course backward; because, previous to her coming here, her perceptive faculties were probably less exercised in one week than those of common children are in one hour.® And so her instruction went on. Through it all the child showed an eagerness to learn and to put herself in touch with the world

that was a powerful aid to the teacher. In a few years, when Oliver Caswell, also deaf, dumb and blind, came to the institution, Laura naturally took great interest in teaching him, and thereby profited much herself. As she approached womanhood her education was already good. She had learned to sew, to knit, and to do fancy work. She often visited her home, but her true home was the institution ;

there she died in her 60th year, the first case of any one so afflicted made capable of leading an industrious and happy life, and as the first case, historically the most remarkable. Popular in¬ terest in Laura Bridgman, both in this coun¬ try and abroad, was naturally very great. The printed reports of her progress which were eagerly awaited were as eagerly absorbed. Dis¬ tinguished foreigners coming to Boston visited her. Charles Dickens wrote in his American notes a sympathetic account of his impressions of her. The way to give liberty to the impris¬ oned mind had been made plain.

In the year 1887 something like the old in¬ terest was aroused by accounts of the brilliant deaf, dumb and blind child in Alabama, Helen Keller. This child had lost sight and hearing at 19 months as a result of a serious illness. Like Laura she kept actively interested in all that surrounded her, and like Laura she de¬ veloped her own little language of signs. When she was six years old, her friends, who knew of Laura Bridgman's case, applied to Boston for a teacher. In the following year Miss Annie M. Sullivan was sent. This lady was able to put herself in touch with Helen in a very short time and in a marvelous way. In fact, she has proved herself to be a most remarkable teacher. Following in general the methods adopted in teaching Laura, Miss Sullivan began her work by putting Helen in possession of the manual alphabet. A doll was happily chosen to begin with ; and with the doll on the child's lap, the teacher formed in Helen's hand the finger let¬ ters d-o-l-l. Other familiar objects were simi¬ larly introduced, and strange as it may seem, that which had taken three months to reach in Laura's case in Helen's took but a few days ; or, in Miss Sullivan's words, <(it was not more than a week before she understood that all things were thus identified.® Her teacher writes : <(Never did a child apply herself more joyfully to any task than did Helen to the acquisition of new words. In a few days she had mastered the manual alphabet and learned upward of 100 names.® After teaching verbs and prepositions through action and position Miss Sullivan made a departure. She began to use new words in connection with old words, letting Helen under¬ stand them if possible from the context. The child adopted these words ((often without in¬ quiry.® In this way she became familiar with the use of many words whose meaning never had to be explained to her.

As to the letters of the raised alphabet, Miss Sullivan writes : "Incredible as it may seem, she learned all the letters both capital and small in one day.® Then came the primer; then pencil writing than which there is scarcely a more diffi¬ cult exercise for the blind to learn; and yet Helen ((wrote without assistance a correctly spelled and legible letter to one of her cousins ; and this was only a little more

than a month after her first lesson in chirography.® Braille,

or tangible point writing, became a constant de¬ light to her.

Words like “perhaps® and “suppose® and those indicative of abstract ideas she learned more through association and repetition than through any explanation of her teacher. The child had the language sense largely developed. Much of the time when no one was talking with her she was reading in books printed in raised letters. Dr. Bell in trying to account for Helen’s wonderful familiarity with idiomatic English, considers of great significance the statement of Miss Sullivan, that “long before she could read them [the books] … she would

amuse herself for hours each day in carefully passing her fingers over the words, searching for such words as she knew.® In 1888, when Helen was eight years old her teacher took her to South Boston, where she could have the advantage of all the appliances and embossed books that a school for the blind affords. Thenceforth an account of her progress reads like a romance. It was no more difficult for her to learn a new word in German or in Greek than in English ; and she took great delight in picking up and using French or Greek phrases. And when later she came to study these lan¬ guages, she seemed to advance without effort in the knowledge of them. The educators of the deaf, who have good reason to comprehend the exceeding difficulty of teaching their pupils to articulate intelligibly, feel that Helen Keller’s rapid mastery of speech is by all odds her most wonderful achievement. After she had been in South Boston some little time she heard of a Swedish girl afflicted like herself, who had learned to speak, and she said, “I must learn to speak.® Miss Sullivan took her to Miss Sarah Fuller, principal of the Horace Mann School for the Deaf, and though Helen’s only means of learning the position of the vocal organs in speech was to put her fingers on the lips, tongue, teeth and throat of the speaker, she learned in 10 lessons to articulate so well that she could carry on an intelligible and audible conversa¬ tion, having communication addressed to her spelled into her hand by the manual alphabet. She has learned since that time to read from the lips

and throat of a speaker by placing her fingers lightly on them ; so that any one sitting near her can converse with her just as though she could both hear and see. She spent a win¬ ter at the Wright-Humason Private School for the Deaf, where she improved her articulation. When Helen was 16 years old she entered the Cambridge School for Girls, Miss Sullivan ac¬ companying her. There, under the guidance of Mr. Arthur Gilman, the director of the school, she took the course preparatory to entering Radcliffe College. At the end of one year she took the regular required examinations in the history of Greece and Rome, in English, in Latin, in elementary French, in elementary Ger¬ man and in advanced German. As the ques¬ tions and other matter were read into her hand by Mr. Gilman himself, Helen wrote her an¬ swers and translations on an ordinary type¬ writer. She passed the tests in every subject, taking “honors® in English and German. Mr. Gilman writes : “I think that I may say that no candidate in Harvard or Radcliffe College was graded higher than Helen in English.® She entered Radcliffe in 1900 and was graduated from it in due course in 1904, receiving her A.B.

“cum laude® or with distinction. Miss Sullivan remained with her throughout, acting every¬ where as interpreter. Miss Keller still lives with this faithful friend who is now Mrs. Macy. She spends much time reading and writing and studying; in fact she is essentially a student and a thinker and is not, as is often hinted, depend¬ ent for ideas upon those about her. Neither is she merely intellectual, being unusually capa-able in the practical affairs of the household. She has a very normal interest in her personal appearance and has cultivated a charming social personality.

Miss Keller has been able to be personally serviceable to those shut in like herself, es¬ pecially to the blind. Her great heart throbs in behalf of all suffering humanity; hence, her in¬ terest in socialism, the red flag of which means to her only warmth and universal fair play. Desiring to add to her earnings through lec¬ turing, she has now had her speaking voice strengthened and improved in quality under the devoted instruction of Mr. Charles White of the New England Conservatory of Music. Since 1912 she has often appeared on the pub¬ lic platform, speaking with evident effect to many thousands of people in different States of the Union. Her autobiography, (The Story of My Life) and other of her writings have been translated into several languages. People who have visited Miss Keller in her home, some¬ times doubting the truth of the unique accom¬ plishments of this deaf-blind woman, — and in¬ deed impossible and ridiculous things have

been attributed to her — these visitors have in¬ variably gone away convinced that Helen Kel¬ ler represents, as indeed she does, one of the greatest achievements of objective love and subjective will known to education. Her career has exerted a profound influence upon the aspirations of humanity. The literature of the subject, which is very large, has been collected in two special libraries where it may be con¬ sulted, namely, at the Perkins Institution. Watertown, Mass., and at the Volta Bureau. Washington, D. C.

The other deaf-blind children who have come under instruction have been or are some at schools for the blind, some at schools for the deaf. They must always have a special teacher and use embossed books and adapted appli¬ ances. All have been or are being taught on principles employe ’ in teaching Laura Bridg¬ man and Helen Keller. At the Perkins Insti¬ tution they attend classes with other pupils, the special teacher acting simply as interpreter and companion.

Bibliography. — Ferreri, Giulio, (Education of the Deaf-Blind5 (in Association Review, Washington, October 1907) ; Harry, Gerard, (Man’s Miracle5 (New York 1913) ; Howe, Maud and Hall, Mrs. F. Howe, (Laura Bridg¬ man, Dr. Howe’s Famous Pupil5 (Boston 1903) ; Howe, Samuel G., (Laura Bridgman5 (Reprint from Perkins Institution Reports, 1889) ; Keller, Helen, (Out of the Dark5 (New York 1913) ; Keller, Helen, (Story of My Life5 (New York 1903) ; Keller, Helen, (The World I Live In5 (New York 1908) ; Lamson, Mrs. M. S., (Laura Bridgman: Life and Education5 (Boston 1878) ; Le Blanc, Georgette, (Helen Keller: the Girl who Found the Blue-Bird5 (New York 1914); Stone, W. M., Education

and After Care of the Deaf-Blind) (London

1914).

Edward E. Allen,

Director of Perkins Institution and Massachu¬ setts School for the Blind.

DEAFNESS, a condition in which there is loss of hearing, partial or complete, due to dis¬ turbance or destruction of some part of the hearing apparatus, either external or internal. See Deaf, The; Ear.

DEAR, da-ak, Ferencz, Hungarian states¬ man: b. So j tor, Zala, Hungary, 17 Oct. 1803; d. Budapest, 29 Jan. 1876. Having studied law at Raab, he practised for some time as a barrister, but his political career began with his election to the National Diet in 1832. He soon became, in •spite of his loyalist and conservative tendencies, a prominent member of the liberal opposition. He was particularly desirous of preserving Hungarian nationality intact and of improving internal conditions. At the revolution of 1848 he became Minister of Justice under Count Batthyanyi and advanced a scheme for the re¬ organization of the administration of justice which did not materialize owing to the pressure of events. He spent great efforts in attempting to avoid the break with Austria, and retired when the Committee of Defense was formed and Kossuth obtained power. He tried to negotiate peace with the Austrian commander in 1848, but terms could not be agreed upon. On the defeat of the patriots in 1849 he retired from public office and did not return till 1860. He led the Diet of 1861, where he formulated the address to the emperor stating the Hun¬ garian demands for constitutional rights. The Diet was immediately dissolved by the emperor, but Deak did not give up the project. It was not until after the war between Austria and Prussia that these demands were granted and Deak's hopes for a dualistic constitutional monarchy were realized. Deak refused to ac¬ cept any honors, but remained in the Diet until his death, working patiently and consistently for the unity of Hungary and jealously guarding its rights and liberties. Great praise has been given him for his generosity, simplicity and sincere patriotism. His statesmanship was marked by clarity of vision and lofty unselfish devotion to his country. Consult Forster, (Francis Deak, Hungarian Statesman > (London 1880) ; Ferenczi, Z., (Life of Deak* (Budapest 1894, in Hungarian) ; Csengery, (Franz Deak* (trans. into German by Heinrich, Leipzig 1877-78).

DEAKIN, Alfred, Australian statesman; b. near Melbourne, Victoria, 3 Aug. 1856; d. Sydney, New South Wales, 8 Oct. 1919. He was educated at Melbourne University; was Minister of Public Works and Water Supply 1883-86; Solicitor-General 1885; Chief Secretary 1886-90; Member of Federal Council 1889-95, 1897-99 ; Attorney-General of the Common¬ wealth of Australia 1901-03; and Prime Minis¬ ter 1903-04 and 1905-08. He published (Irrigation in Western

America) (1885) ; ‘Irrigation in Egypt and Italy* (1887) ; Hrrigated India* (1892) ; ‘Irrigation in Australia) (1893) ; ‘Temple and Tomb) (1894).

DEAL, in the United States, a plank 12 feet long, 11 inches wide, and 2ˆ inches thick. Deals are sawed of other sizes, but are reduced to that cubic dimension in computing them. The name deal is applied in Europe to boards of fir

above seven inches in width and of various lengths exceeding six feet. If seven inches or less wide they are called battens, and when under six feet long they are called deal-ends. The usual thickness is three inches and width nine inches. The standard size, to which other sizes may be reduced, is one and one-half inch thick, 11 inches broad and 12 feet long. Whole deal is deal which is one and one-half inch thick; slit deal, half that thickness. Deals are ex¬ ported from many parts of Europe and the American continent. In the timber trade 50 cubic feet of deals are a load, and 100 feet superficial are a square.

DEALFISH, deep-sea bony fishes of the family Traclvypteridce, allied to the oar-fish and the ribbon-fish (q.v.). As the name suggests, the elongated body is laterally compressed, and with the exception of a small separate elevated anterior portion, the dorsal fin is continuous along the back. The anal fin is absent. The tail-fin is peculiar in being sharply turned up¬ ward. The skeleton is very fragile. Some eight species are known from specimens accidentally thrown ashore on European coasts and from the west of South America.

DE AMICIS, Edmondo. See Amicis,

Edmondo de.

DEAN, Amos, American jurist: b. Bar¬ nard, Vt., 16 Jan. 1803; d. Albany, N. Y., 26 Jan. 1868. He early acquired eminence in his profes¬ sion and after being professor of medical juris¬ prudence in the Albany Medical School and of law in the Albany Law School, became chancellor of the University of Iowa in 1855. Among his published works are ‘Lectures on Phrenology* ; (Manual of Law* (1838) ; Medi¬ cal Jurisprudence) (1854) ; (Bryant and Strat¬ ton’s Commercial Law* (1861) ; (History of Civilization (1869-70) ; ‘The British Consti¬ tution } (1883).

DEAN, Bashford, American zoologist : b. New York, 28 Oct. 1867. He was educated at the College of the City of New York and at Columbia

University. He was instructor in biology at Columbia after 1891 and has been professor of vertebrate zoology there since 1904. He also served as biologist and special investigator of the United States Fish Com¬ mission in 1900-01. He became member of the advisory board of the New York aquarium in 1902 and in 1903 curator of herpetology and ichthyology at the American Museum of Natural History, and curator of arms and armor at the Metropolitan Museum of Art in the same year. He is author of 'Fishes, Living and Fossil * (1895) and of numerous papers in

palseichthyology and embryology of fishes, besides a number of articles on arms and armor.

DEAN, John Ward, American author and genealogist: b. Wiscasset, Me., 13 March 1815; d. Medford, Mass., 22 Tan. 1902. He was edu¬ cated in the public schools of Portland, Me., learned the bookbinding trade and conducted a bookbinding business in Boston for many years, till his appointment in 1872 as librarian of the New England Historic Genealogical Society. Except from 1889 to 1893 he filled this position until his death. He was editor of the New England Historical and Genealogical Register, and of nine volumes of the 'New England Bib-liopolist* (1880-98). Among his writings are

numerous biographical memoirs, including the 'Memoir of Nathaniel Ward* (1868) ; (Memoir of Michael Wigglesworth* (1871) and the 'Story of the Embarkation of Cromwell and his Friends for New England.*

DEAN, in ecclesiastical language, a church dignitary presiding over the chapter of a cathe¬ dral. The word is from the French doyen and from the Latin dec anus , one set over 10 (Gr. deka, Lat. decern, 10). Originally decanus was the designation of a petty civil functionary: its ecclesiastical use had its rise in monachism, where a decanus was named to be chief and monitor of 10 monks or 10 hermits; and the senior decanus of a ccenobiuni served as head of the monastic community in the absence of the abbot. From the institution of canons

regular, serving in the chapters of cathedral churches, came the usage of naming the chief among the canons of a chapter as its dean. Rural deans are parish priests who, appointed by the bishop, ex¬ ercise a certain jurisdiction and supervision over the churches or congregations and their rectors within a definite district in a diocese. In the Curia Romana, the dignitary styled Cardinal Dean of the Sacred College is the chief among the cardinals and is usually the oldest of the seven cardinal bishops : he succeeds his prede¬ cessor in the see of Ostia. From ecclesiastical usage the term dean was adopted as designation of the leading member of various secular bodies, for example, the head of a university faculty, or a college, or of a guild. The deans in German cathedrals are subordinate to the provosts ; they are appointed by the bishop usually, but some¬ times by a sovereign or chapter. In the Church of England some of the deaneries are valuable benefices. A dean may hold one other living along with his deanery. He is bound to reside eight months of the year at his cathedral. The bishop of London holds the honorary office of dean of the chapel royal, and there is also a sub-dean and chaplains. Rural deans are beneficed clergymen appointed by the bishop or arch¬ deacon to exercise jurisdiction in certain mat¬ ters in some part of the diocese. This office had fallen into disuse, being superseded by the appointment of archdeacons, but has latterly been revived. The rural deans hold office dur¬ ing the life of those by whom they are ap¬ pointed. There are also a few deans called deans of peculiars, who exercise an independent jurisdiction, and are not under a bishop. In Scotland the honorary title of dean of the chapel royal is bestowed on a clergyman of the established church, and six chaplains are also appointed to a similar honorary office. Deans of colleges are, in English universities, officers appointed to superintend the behavior of the members, and to enforce discipline. In the uni¬ versities of Scotland and elsewhere the head of each of the faculties of law, theology, medicine, science, etc., is called dean of the faculty. In universities in the United States the dean of a department is the registrar or secretary, and in some institutions he has considerable to do with the discipline. The dean of guild in Scotland is a burgh official whose duty it is to see that buildings are erected in accordance with the municipal regulations.

DEANE, Charles, American antiquarian : b. Biddeford, Me., 10 Nov. 1813; d. Cambridge, Mass., 13 Nov. 1889. He was for many years a

merchant in Boston but retired from business in 1864 and devoted himself to the collection of works relating to American history. He

edited ‘Bradford’s History of Plymouth Plantation) (1856); ‘Wingfield’s Discourse of Virginia) (I860) and John Smith’s ‘True Relation.*

DEANE, Silas, American diplomatist : b. Groton, Conn., 24 Dec. 1737 ; d. Deal, England, 23 Aug. 1789. He was graduated at Yale Col¬ lege in 1758, and was a member’of the first Con¬ tinental Congress in 1774. He was sent by Con¬ gress to France as a political and financial agent, with instructions to ascertain the temper of the French government concerning the rupture with Great Britain, and to obtain supplies of military stores. But he did not confine himself to his instructions, and made promises and engage.- ments on all sides, which afterward brought the Congress into considerable embarrassment. When it was determined to send ministers to negotiate treaties, Dr. Franklin and Arthur Lee were commissioned to join him at Paris, and he assisted ‘in the negotiation of the treaty with France. In consequence of the extravagant con¬ tracts he had entered into, he was recalled 21 Nov. 1777, and John Adams appointed in his place. He left Paris 1 April 1778, and upon his return, being called upon to give an account of his proceedings on the floor of Congress, evaded a complete disclosure on the ground that his papers were in Europe. He then attacked his fellow commissioners and Congress itself in a public manifesto for the manner in which he had been treated, but did not succeed in remov¬ ing the public suspicion from himself. Later his lack of sympathy with the American Revolution increased the animosity of his fellow citizens. He afterward published in 1784 ‘An Address to the Free and Independent Citizens of the United States) on the same subject, and returning to Europe, died in great poverty. It was not until 1842 that Congress succeeded in adjusting his case and discovered its financial indebtedness to the supposed mismanagement of Deane. About $35,000 was subsequently paid to his heirs. Consult Ingraham, E. D. (editor), ‘Papers in Relation to the Case of Silas Deane) (1855); Clark, George Larkin, ‘Silas Deane, a Connecticut Leader in the American Revolu¬ tion (New York 1913).

DEANS, Jeanie, the heroine of Sir Walter Scott’s tale, ‘The Heart of Midlothian.) When her sister Effie was sentenced to death for the murder of her own child, Jeanie went on foot to London and obtained from the queen a pardon for her sister. Her devotion forms a contrast to the attitude of the father, David Deans, whose rigid sense of justice leads him, in spite of the dictates of his heart, to drive Effie from his door. Effie is married to her lover and be¬ comes a lady of the court.

DEARBORN, Henry, American soldier: b. Hampton, N. H., March 1751 ; d. Roxbury, Mass., 6 June 1829. He was practising medicine at

Portsmouth when, on hearing the news of the battle of Lexington, 20 April 1775, he im¬ mediately marched with 60 volunteers, and was at Cambridge early the next day, a distance of 65 miles. He was made a captain, was at the battle of Bunker Hill 17 June, and accompanied Arnold on the expedition through the woods of Maine to Quebec. He served as major under Gates at the capture pf Burgoyne, and distin-

guished himself and his regiment by a gallant charge at the battle of Monmouth in 1778. In 1779 he served in Sullivan's expedition against the Indians, in 1780 with the army of New Jer¬ sey, in 1781 at Yorktown, and in 1782 was on garrison duty at Saratoga. He was twice mem¬ ber of Congress, and for eight years, during the presidency of Mr. Jefferson, Secretary of War. In 1809 he was made collector of Boston, and on 27 Jan. 1812, became senior major-general in the United States army. Resigning his commission in the army in 1815, he was appointed, 7 May 1822, Minister to Portugal, where he remained two years, and was recalled at his own request.

DEATH, in common language, a state opposed to life, and considered as the cessation of it. Strictly speaking, we can trace only the cessation of organic life. The matter of which the body is composed does not perish on the death of an organized being; it undergoes various changes, which are known by the names of decay and putrefaction, and which are the preparation for its becoming subservient to new forms of fife. What becomes of the mind, or thinking principle, whether in man or animal, after death, is a matter of philosophical con¬ jecture or religious faith. The investigations of science do not throw the least light upon it. The change here adverted to, which is called death, does not take place so quickly as is gen¬ erally believed. It is usually preceded and caused by disease or the natural decay of old age. The state called death takes place suddenly only when the heart or the brain is injured in certain parts. Probably the brain and the heart are the parts from which, properly speaking, death proceeds; but as the cessation of their func¬ tions is not so obvious as the cessation of the breath, which depends on them, the latter event is generally considered as indicating the mo¬ ment when death takes place. In the organs of sense and motion the consequences of death first become apparent ; the muscles become stiff ; cold¬ ness and paleness spread over the whole body; the eye loses its brightness, the flesh its elas¬ ticity; yet it is not perfectly safe to conclude, from these circumstances, that death has taken place in any given case, because experience shows that there may be from certain causes a state of apparent death, in which all these cir¬ cumstances may concur

without the extinction of the vital spark. The beginning of putrefac¬ tion, in ordinary cases, affords the first certain evidence of death. Putrefaction begins in the bowels and genitals, which swell, become soft and loose, and change color ; the skin also be¬ gins to change, and becomes red in various places; blisters show themselves; the blood be¬ comes more fluid, and discharges itself from the mouth, nose, ears, eyes and anus. By degrees, also, the other parts are decomposed, and, last of afl the teeth and bones. In the beginning of decomposition nitrogen and ammonia are produced: in the progress of it; hydrogen, com¬ pounded with carbon, sulphur and phosphorus, is the pevailing product, which causes an offen¬ sive smell, and the light which is sometimes ob¬ served about putrefying bodies. At last, only carbonic acid gas is produced, and the putrefying body then smells like earth newly dug. A fat, greasy earth remains, and a slimy soap-like sub¬ stance, which mixes with the ground, and con¬

tributes with the preceding decompositions to the fertility of it. Even in these remains of organ¬ ized existence organic life is not entirely ex¬ tinct ; and they contribute to produce new vegetable and animal structures. Putrefaction is much influenced by external circumstances, particularly air, heat and water. When the body is protected from the action of such agents it changes into adipocere ; but this process requires a much longer time than common putre¬ faction. In very dry situations the body is con¬ verted into a mummy, in which state bodies are found in the arid deserts of Africa, and on the mountains in Peru. Some vaults are re¬ markable for preserving corpses from putre¬ faction. It is well known to every reader that particular substances counteract putrefaction ; for instance, those used in tanning and in em¬ balming mummies.

The death-agony is the state which imme¬ diately precedes death, and in which life and death are considered as struggling with each other. This state differs according to the cause producing it. Sometimes it is a complete exhaus¬ tion ; sometimes a violent struggle, and very irregular activity, which at last, after a short pause, terminates in death. In some cases con¬ sciousness is extinguished long before death arrives ; in other cases it continues during the whole period and terminates only with life. The person in this condition has already somewhat the appearance of a corpse : the face is pale and sallow, the eyes are sunken, the skin of the fore¬ head is tense, the nose pointed and white, the ears are relaxed and the temples fallen in ; a clammy sweat covers the forehead and the ex¬ tremities, the alvine discharges and that of the urine take place involuntarily, the respiration be¬

comes rattling, interrupted and at length ceases entirely. At this moment death is considered to take place. This state is of very variable length; sometimes continuing for minutes only, some¬ times for days. When the patient is in this con¬ dition nothing should be attempted but to com¬ fort and soothe him. As long as the dying per¬ son is able to swallow, wine or other cordials may be given from time to time.

Signs of Death. — During death the chief physical processes, such as respiration and cir¬ culation, ma}' first cease, but molecular activity may persist for some time, as is evidenced in the common observation of the growth of hair after death. The desirability of knowing the absolute signs of death is due not so much to the danger of burying the living, as to the possibility that efforts at resuscitation may not be adequately performed in cases of apparent death. The idea that at the present time people can be buried alive is more or less absurd; but it is very true that many cases of apparent asphyxia, notably following drowning or electrical shock, are re¬ coverable if proper means are taken.

There are a number of conditions that simu¬ late death The commonest of these are cata¬ lepsy and trance states, partial asphyxia and syncope or fainting. In catalepsy there is usu¬ ally a loss of consciousness, the muscles of the body generally become very rigid, but the limbs may be readily moved and placed in various positions. The temperature is lowered, but the respiration and the heart-action, while reduced, are apparent. In trance the appearance, of death is much more striking, consciousness is usually abolished, the face is pale, the limbs may be

flaccid, and sometimes are rigid, the reflexes may be lost, and the pupils may be dilated and immobile. The absence of the signs of decom¬ position, the normal ophthalmoscopic appearance of the fundus of the eye, and the persistence of electrical excitability are sufficient, however, for determining this condition. Partial asphyxia by drowning is one of the most frequent causes of apparent death. Resuscitation has resulted even after a body has been under water for an hour. This fact emphasizes the desirability of continued treatment in all cases of asphyxia by drowning. Ordinary fainting is readily dis¬ tinguished from normal death.

The special signs of death are those that in¬ volve the circulation, respiration, conditions of the muscular system and certain changes in the eye. Circulatory changes are those of stoppage of the heart, with consequent loss of heat and coagulation of the blood. Careful listening to the heart-sounds by means of specially devised instruments may be necessary to determine whether the heart has stopped beating or not, and special methods of applying ligatures to the lobe of the ear or the finger, cutting off the venous return and permitting the ordinary in¬ flow to continue, may be used. The respiratory changes consist of cessation of respiration, with consequent change in the color of the patient, there being marked palloi in distinction usually to marked C} ranosis of asphyxia. A mirror placed before the nose or over the mouth will sometimes detect breathing when it cannot be seen or heard; and if a vessel of water be placed over the chest, movements of that organ may be detected. Muscular changes are very characteristic. There is usually complete muscular relaxation, followed by great stiffness (rigor mortis) after a certain number of hours. There is commonly loss of excitability of the muscles. Changes in the eye are corroborative rather than unique. The iris is usually flaccid ; the pupil is ordinarily moderately dilated and irresponsive to light, and is not reacted upon by atropine or eserine half an hour after death. There is a marked anaemia of the fundus of the eye when viewed with the ophthalmoscope.

Finally there are a series of cadaveric changes that result and which are indubitable evidence of death. There is gradual loss of heat, although in certain cases of cholera tem¬ peratures as low as 76° F. have been observed, and the patient has still lived. Rigor mortis develops, probably, by the action of a ferment resulting in the

formation of myosin. This condition may come on very rapidly, sometimes in a few hours, but complete rigor mortis rarely takes place within this time. Occasionally there is an instantaneous rigor mortis, when death occurs suddenly during violent muscular exer¬ tion. This happens in times of war, when weapons are sometimes firmly grasped in the dead hand ; and in some cases of drowning the patients may be found with weeds and mud clutched in the fingers. The disappearance of rigor mortis usually takes place in from 16 to 36 hours, although there is no absolute rule. Coagulation of the blood, post-mortem hy¬ postases, post-mortem lividities and putrefactive decoloration, with formation of gases, are usually characteristic and unequivocal.

Death in Mythology, *etc.* — The repre¬ sentation of death among nations in their earlier stages depends upon the ideas which they form

of the state of man after this life, and of the disposition of their gods toward mankind. In this respect the study of these representations is very interesting. Of later ages the same cannot be said, because imitations of representa¬ tions previously adopted are very often the subjects of the plastic arts in such periods. However, these representations do not alto¬ gether depend on the causes above mentioned, as the general disposition of a nation (ˆor in¬ stance, that of the Greeks, who beautified every object) has also a great influence upon them. The Greeks represented death as a pleasing, gentle being, a beautiful youth. They personi¬ fied death under the name Thanatos, while the Keres were rather the goddesses of fate and violent deaths, like the Valkyrie in the northern mythology. According to Homer, Sleep and Death are twins, and Hesiod calls them the sons of Night. They are often portrayed together on cameos, *etc.* During the most flourishing period of the arts Death was represented on tombs as a friendly genius with an inverted torch, and holding a wreath in his hand; or as a sleeping child, winged, with an inverted torch resting on his wreath. Sleep was represented in the same manner, except that the torch and wreath were omitted. According to an idea originating in the East, death in the bloom of youth was attributed to the attachment of some particular deity, who snatched his favorite to a better world. It was ascribed, for instance, to Jupiter, or to his eagle, if the death was oc¬ casioned by lightning; to the water-nymphs if the individual was drowned, as in the case of Hylas ; to Eos or Aurora if the death happened in the morning; to Selene, if at night, *etc.* These representations were more adapted to relieve the minds of surviving friends than the pictures of horror drawn by later poets and artists. (Consult Herder's (Wie die Alten den Tod gebildet.*) Euripides, in his

<Alcestis,) even introduced Death on the stage, in a black robe, with a steel instrument in his hand, to cut off the hair of his victims, and thus devote them to the infernal gods. The later Roman poets represent Death under more horrible forms, gnashing his teeth and marking his victims with bloody nails, a monster overshadowing whole fields of battle. The Hebrews, likewise, had a fearful angel of death, called Samael, and prince of the world, and coinciding with the devil ; but he removes with a kiss those who die in early youth. The disgusting representa¬ tions of Death common among Christians originated in the 14th century; for the repre¬ sentation of Death as a skeleton merely covered with skin, on the monument at Cumae, was only an exception to the figure commonly ascribed to him among the ancients. In recent times Death has again been represented as a beautiful youth — certainly a more Christian image than the skeleton with the scythe. The monument made by Canova, which George IV erected in honor of the Stuarts in Saint Peter's Church at Rome, represents Death as a beautiful youth. He is sometimes portrayed under the figure of a dy¬ ing lion

Causes of Death. — There are 15 principal

causes of death, with the rate per 100,000, as given by the census bureau. They are as fol¬ lows: Pneumonia, 191.9; consumption. 191.5; heart disease, 134; diarrheeal diseases, 85.1; kid¬ ney diseases, 88.7; apoplexy, 66.6; cancer, 60;

old age, 54; bronchitis, 48.3; cholera infantum, 47.8; debility, 45.5; inflammation of brain and meninx 41.8; diphtheria, 34.4; typhoid, 33.8; and premature birth, 33.7. Death from all principal causes shows a decrease during the last two decades, the most notable instance be¬ ing that of consumption, which shows a de¬ crease of over 50 per cent per 100,000. The world's death rate is estimated at 68 a minute, 97,920 a day, and 35,740,800 a year.

Bibliography.— Alden, H. M., (A Study of Death' (New York 1903) ; Carrington, H. and Meader, J. R., (Death: Its Causes and Phe¬ nomena' (New York 1912) ; Gasser, H., (The Evolution of Death' (Chicago 1902) ; Lead-beath, C. W., (The Other Side of Death' (Chi¬ cago 1903).

DEATH, Civil, in English law, formerly the entire loss or forfeiture of civil rights, which followed on attainture for treason or felony. A man was considered civilly dead who retired into a monastery or abjured the realm. By Act 33 and 34 Viet. cap. xxiii a con¬ viction for treason or felony no longer causes attainder or forfeiture of civil rights. In the strict sense, the term has never been used in the United States.

DEATH, Dance of. See Dance of Death.

DEATH-ADDER (Acanthophis antarcti-cus), a very venomous and justly feared snake of Australia, which also occurs throughout the Indo-Malayan Islands to the Moluccas. It be¬ longs to the Elapidce, of which the cobra is also a member, but the death-adder lacks the spread¬ ing (<hood." The end of the tail is flattened laterally, and is terminated by a horny spine, anterior to which are several rows of enlarged scales.

DEATH-SONG. It was the pride of the ancient man to depart from life exulting in his victories and defying his enemies. There are traces of

death-songs in many languages and among many peoples. The custom has been in vogue especially among some of the tribes of American Indians. The dying chief chanted all the warlike deeds of his life, gloating in his victories over his foes. It is sometimes called the swan-song because of the legend that the dying swan after a long life approaches its end and at the last moment is given the power of sweet song. The Christian believes in a happy deathbed. John Wesley proudly said on one occasion <(Our people die well."

DEATH-TICK (Clothilla pulsatoria), a neuropterous insect of the family Psocidce, of the size and appearance of the common plant-louse, one species of which is a visitor of gar¬ dens. Another species is the little book-louse found running over books and feeding on the paper. In England it is called ((death watch," because there it is said to make a ticking sound like that of the beetle (Anobium), thus excit¬ ing many superstitious notions. See Death-watch.

DEATH VALLEY, Cal., a low desert in Inyo County, near the Nevada border The name of this region was given by a survivor of an emigrant party of 30 who, in 1849 or 1850, lost their way here, and of whom, after endur¬ ing indescribable sufferings, 18 perished in the sands. No other such spot is known. Like all the great valleys of California, it lies oblong from north to south. Its length is about 150

miles; width varies from 10 to 35; surface about 210 feet lower than that of the ocean, the lowest point of dry land in the United States. It is interesting to note that Mount Whitney, the highest point in the United States (14,501 feet), lies at a distance of less than 80 miles from the point of lowest depression. The Panamint Mountains shut out from it the moist winds of the Pacific. In the August atmosphere there is less than one-half of 1 per cent of moisture. The surrounding country is made up of volcanic ranges — black, red, green, yel¬ low and brown — which have furnished the valley with the borax now found there.

On the north of the valley is Ralston Desert, on the west Panamint Desert, on the south Mojave Desert and Amargosa Desert is on the east. Death Valley has the lowest depression. Summer heat here rises to 137° F. or more, far higher than anywhere else in the Western world. Death Valley, as seen from the summit of the Panamint Range, presents in November a long gray waste desert, in which there are nar¬ row bands of white made by thin deposits of borax; and to the south is seen a thin line like a blade of steel — the Amargosa River, as

it dies away upon entering Death Valley sink. It is a sluggish, dead stream, and evaporation and absorption at last take it all. The land was once the centre of a system of lakes. Toward their summit, the Panamint Mountains are of carboniferous limestone formation, rifted and worn, with a very slight growth of pinon, pine, mahogany and juniper, near the crests; and below the vegetation becomes more scant. In the gorges and narrow canons are seen numer¬ ous vines and creepers, on which grow wild gourds resembling oranges, also similar to the bitter desert apples that grow near the site of ancient Sodom. Here also are the most distorted forms of the cacti, and an inferior growth of greasewood or palaverde. The wealth of this desert is wholly mineral.

A sand-storm playing in Death Valley is a wonderful sight. Sand-augers rise like slender stems, reaching up into the burning atmosphere for thousands of feet and terminating in a bushy cloud. They travel hither and thither and grad¬ ually fade from sight. Here mirage raises up spectral cities, groves, fields and tree-margined rivers. A low ruin will seem to be hundreds of feet high ; arrow-weeds are magnified into stately palms ; and crows walking on the ground appear as men on horseback. Besides crows, here are seen a few poor jack-rabbits, mangy coyotes, buzzards, horned toads, red-eyed rattle¬ snakes, mice and mountain rats ; and in the Pan¬ amint Range there are still a few bighorns or Rocky Mountain sheep.

At the summit of the Panamint and Funeral mountains, the thermometer at times, it is said, falls to 30 degrees below zero. The mineral wealth of this region is great. In the Panamint Range are many mines of antimonial silver ore ; and copper, gold, iron, travertine, onyx and marble are also found. In the Funeral Range, gold, silver, lead, copper and antimony have been found in paying quantities, while the thick strata or measures of the east and southeast hills show almost inexhaustible quantities of colemanite, a borate of lime named for W. T. Coleman, who was one of the first to discover this deposit and •find out its richness in borax. Very rich gold quartz has been taken from mines along the

route traveled by the ill-fated old emigrant party. Human society in Death Valley is con¬ fined to a few miners in the Funeral, Calico and Panamint mountains, some few roving bands of Piute Indians and a few squaw-men owning cattle and horses. Visitors to Death Valley should not go earlier than 15 October, nor later than 15 April; no one should attempt to cross it while a sand-storm is blowing; a gallon of water is needed for each person in a party, and three gallons for each horse. At present one can go from Dagget on the Atlantic and Pa¬ cific Railroad, but the route is little better than from Panamint to Furnace Creek and up through Nevada via Pioche, Nev.

DEATH'S-HEAD MOTH, a species

(atropos) of Acherontia, genus of the Sphinx or hawk-moth family, one of the largest of the group, widely distributed over the world, being found in parts of Africa, Asia and Europe. It is crepuscular in its flight. Its fore wings are blackish-brown, with transverse lines of black and a white spot near the middle. The hind wings are yellow, with black stripes crossing the middle and tracing the margin. Upon the dark thorax is described in pale yellow a mask re¬ sembling a man's skull. Hence the common name. The moth is about five inches in extent of wings. The caterpillar is of the same length, of bright yellow color, with violet stripes and a row of blue spots along the back. It is injurious to potato and tomato plants, and in some localities is said to rob beehives of their honey withstanding the attacks of the bees. When frightened or seized, the moth gives forth a squeaking noise. This, with the death's head, suggests an evil omen to the superstitious, mak¬ ing appropriate the generic name Acherontia. Similar superstitions attach to other members of the genus.

DEATH'S JEST BOOK ('The Fool's

Tragedy*) is the most extensive and important work of Thomas Lovell Beddoes, begun by him at Oxford in 1825 and touched up and altered till near the close of his life. It was finally published in 1850. The play is a tragedy of re¬ venge, written under the inspiration of such later Elizabethan dramatists as Webster and Tourneur, but embodying also a spirit of fan¬ tastic horror, a love of grim and spectral im¬ agery, derived from early 19th century romance. Beddoes' special contribution is a species of weird merriment in death, sufficiently suggested by the strange title, 'Death's Jest Book.* On one occasion the figures representing the me¬ diaeval dance of death descend from their places on the walls of a cathedral to partake of a banquet with

living men. The prime mover of the tragedy is a court fool, Isbrand,. who causes the body of his murdered brother to be inter¬ changed in the grave with that of the wife of his murderer, Duke Melveric. Melveric, by the incantation of an Egyptian sorcerer, summons up the spirit, thinking it his wife's and at the close of the drama is obliged to accompany the ghost to Hell. In plot construction, character¬ ization, and all the specifically dramatic qualities Beddoes is very weak, but the songs with which the piece abounds are rich in poetry of a highly individual kind. Consult (The Poetical Works of Thomas Lovell Beddoes* (edited with a memoir by Edmund Gosse, 1890).

James H. Hanford.

DEATHWATCH, a small blackish beetle, about a quarter of an inch long, of the genus Anobium, common in Europe and America. It re¬ ceives its ordinary name from the ticking sound which it makes in the woodwork of houses — 6 to 12 distinct ticks being produced at regu¬ lar intervals, like the clicks of a watch. These rappings are caused by the striking of the beetle's head on the hard wood, presumably to attract the attention of its mate. Both the beetle and the larvae of several species are de¬ structive of books, and are the real bookworms.

DEBACLE, da-bakl (Fr. debacle), a sud¬ den breaking up of ice in a river ; used by geolo¬ gists for any sudden outbreak of water, hurling before it and dispersing stones and other debris.

DE BARY, ba're, Heinrich Anton, Ger¬ man botanist: b. Frankfort-on-Main, 26 Jan. 1831 ; d. Strassburg, 19 Jan. 1888. After a course of medical studies he began in 1853 to practice in his native city, but next year be¬ came a privat-docent in Tubingen, and the year after was called to be professor of botany at Freiburg, where in 1859 he was appointed ordinary professor. From 1866 until his death he was editor of the Botanische Zeitung. In 1867 he obeyed a call to Halle, and in 1872 to Strassburg, where he was the first rector of the newly reorganized university. As a botanist, De Bary is famous especially for the contributions he has made to our knowledge of the morphol¬ ogy and physiology of the fungi and the Myx-omycetse. Of his numerous works in these departments, the Comparative Anatomy of Phanerogams and Ferns) has been translated (1885) ; as also the 'Morphology of Plants) and 'Lectures on Bacteria) (1888).

DEBAT-PONSAN, de-ba-pon-san, Edouard Bernard, French painter: b.

Toulouse 1847; d. 1913. He was a pupil of Cabanel and although he has produced some noted historical works, is chiefly known as a genre and portrait painter. He won the second grand prize 1872, a medal of the second class 1874, receiving the ribbon of the Legion of Honor 1881, and a bronze medal in 1889. He signed his name Ponsan-Debat until 1880. His pictures include historical sub¬ jects such as 'A Story of Phieltas* (1870) ; 'The First Morning* (1874) ; 'Jephtha's Daughter* (1876), in the Carcassone museum; 'Saint Paul upon the. Areopagus > (1877) ; 'Devotion of

Saint Louis toward the Dead) (1879) ; 'A Door of the Louvre on Saint Bartholomew's Day* (1880, Clemont-Ferrand Museum); and por¬ traits of Doctor Pichaud (1874) ; Paul de Cas-sagnac (1882) ; General Boulanger; *etc.* Among allegorical works his 'Nec Mergitur* (1898), inspired by the Dreyfus case, is famous and his genre paintings 'The Untamable Mare* (1911), and 'Those Who Watch * (1912) are executed in a finished academic style, showing literary rather than pictorial imagination.

DEBATABLE LAND, a district of country on the west, border of Scotland and England, for a long time a cause of contention between the two countries and a refuge for outlaws. In 1542, a joint commission appointed by the two kingdoms divided the land east and west by a line between the rivers Esk and Sark.

DEBATING SOCIETIES. See Educa¬ tion, Supplemental.

DEBAY, de-ba', Auguste Hyacinthe,

French painter and sculptor: b. Nantes, 20

April 1804; d. Paris, 14 March 1865. He was a son of J. B. J. Debay the elder (q.v.), and was a pupil of his father and of Gros. He took a medal of the third class 1819 at the age of 15, the second prize of Rome in 1822 with his paint¬ ing (Orestes and Pylades) ; the first grand prize of Rome with his painting (Higisthus Discover¬ ing the

Body of Clytemnestra,5 and a first-class medal in 1831. From 1830 onward he exhibited in all the expositions at Paris, either as painter or sculptor. His • principal pictures are (The Old Man and His Children) ; (Enlisting at the Place du Palais RoyaP ; (The Meeting at the Field of the Cloth of Gold5 ;• (Attila5 ; Prome¬ nade of Sixtus Fifth5 ; and the (Battle of Dreux.5 As a sculptor he received honorable mention for his (Napoleon I.5 (1841) ; the first prize in open competition for the monument of Monsignor Affre, now at the church of Notre Dame, Paris ; and a first-class medal at the Ex¬ position 1855 for his best-known work, Primi¬ tive Cradle5 ; first shown in 1845. Among other works are statues of Perrault and Claude Lor¬ raine, at the new Louvre ; and the marble mau¬ soleum of the Comte and Comtesse de Damas.

DEBAY, Jean Baptiste Joseph, The

Elder, French sculptor: b. Malines, Belgium, 16 Oct. 1779; d. Paris, 14 June 1863. He was first a pupil of the painter Van Biscom, then went to Paris and studied under Chaudet. Sum¬ moned to Nantes, he made 30 busts for the li¬ brary, 10 statues for the Exchange, the frontal of the Hotel de Ville, and the statues of Saints Peter, Paul and John. Returning to Paris 1817, he made two colossal statues of Neptune and Apollo for Havana ; and took a second-class medal with a bust of Talma. Among his works are a bronze equestrian statue of Louis XIV at Montpellier; statue of the (Chancellor of the Hospital5 at Aigueperse; marble statue of (Mer¬ cury putting Argus to Sleep5 and (Mercury Preparing to Slay Argus5 at Havana; group of the (Three Fates5 ; marble statue of Charles Martel in the museum at Versailles; marble statue of Colbert; (Young Woman and Shells,5 considered his best work; and the figures of (Ocean5 and (The Mediterranean5 for one of the Place de la Concorde fountains. During his later years he held the position of restorer of sculptures at the Louvre. He received the decoration of the Legion of Honor 1825. He executed numerous portrait-busts in excellent style.

DEBAY, Jean Baptiste Joseph, The

Younger, French sculptor: b. Nantes, 31 Aug. 1802; d. Paris, 7 Jan. 1862. He was the eldest son of the preceding. He was a pupil of his father and of Bosio, and went to Havana at 17 years of age to deliver his father's statues. He took the second prize of Rome 1823, with a bas-relief, (The Grief of Evander,5 and in 1829 the first grand prize of Rome with the (Death of Hyacinth.5 He received the decoration of the Legion of Honor in 1851. Among his works are (Theseus5 ; (Genius of the Sea5 ; <Genius of the Hunt5 ; (Young Slave5 (first-class medal

1836) ; (Anne de Bretagne5 (Luxembourg Gar¬ den) ; a bronze statue of (Cambronne5 (Nantes) ; (Marshal Oudinot5 (Bar-le-Duc) ; <Modesty and Love,5 marble group; equestrian statue of Napoleon III (Bordeaux) ; <Six Apostles5 (Church of Saint Eustache, Paris) ;

and 10 statues for the Pommeraie Gallery at Nautes.

DE BECKER, Jules Alphonse Marie,

Belgian ecclesiastic and educator : b. Louvain, 7 Dec. 1857. He was educated at the Josephite College and Catholic University of Louvain, and the Gregorian University, Rome. He was ordained to the priesthood in 1881, was ap¬ pointed professor of canon law and liturgy at the American College, Louvain, in 1885, and after 1889 served as professor of canon law at the Catholic University there. He was made a canon of Mechlin Cathedral in 1891 and in 1898 became rector of the American College, Lou¬ vain. At the latter institution he founded a chair of philosophy and secured the admission of its students to the theological courses of Louvain University. In 1904 Pius X appointed him a member of the commission for the codi¬ fication of the canon law. He has published (L'Lglise aux Ltats-Unis5 (1903) ; <De Spons-alibus et Matrimonis5 (1903) ; <Legislatio nova de forma substantial! quoad sponsalia et matrimonium5 (1908), and contributions to the American Ecclesiastical Review, La Revue generale, (The Catholic Encyclopedia,5 *etc.*

DEBENTURE, in finance, a certificate or document signed by a legally authorized officer, as an acknowledgment of a debt due to some person ; a deed or bond of mortgage on certain property for the repayment to a certain person of a certain sum of money advanced by such person, together with interest thereon at a cer¬ tain stated rate. Debentures are frequently issued by public companies, especially railroad companies, for the purpose of raising money for the completion or carrying on of their undertakings. They differ from certificates of stock in that they contain some form of cove¬ nant to repay the principal sum with regular interest at some date specified in the future. They are also issued in series and for the pur¬ poses of borrowing money. They may or may not be negotiable.

In customs, a certificate entitling the person to whom it is granted to a drawback on certain goods exported, the duties on which had been paid.

In public offices, in some government de¬ partments, a term used to denote a bond or bill by which the government is charged to pay a creditor or his assigns the money due on auditing his account. The issuing of debentures is regulated by general statutes in the laws gov¬ erning corporations. Consult Palmer, Com¬ pany Precedents5 (London 1902).

DEBIT AND CREDIT (<Soll und Haben5). Out of the hunger for a national life, for a character that should be nationally German, for traditions upon which to build them and hopes wherewith to feed them, grew such novels as Gustav Freytag's (Debit and Credit5 (1855), called by the Germans a Zeitro-man, or novel of the times, to distinguish it from the historical romance or novel of other days. The book was a direct product of the revolution of 1848. (Debit and Credit5 is the apotheosis of the great middle class, the mer¬ chant class, to which Germany owes so much of her growth, her success and her constructive national spirit. _ As such it has made a unique place for itself in German literature, and was in its day as widely translated and read as any

book in the language. In spite of Freytag's consciousness, however, that in painting such an imaginative picture of the people he loves an author must use exceeding care to avoid (<distortion in the outline of his picture, because not love alone, but hatred too, flows freely and readily from the pen,® the book has, in a marked degree, the defects of its qualities. The glorified pictures of Anton, Schroter, Sabine and the other middle class men and women, the likenesses of the slowly decaying landed aristocracy, of the rapacious Jews to whom they become a prey, of the Poles — a romantic and incapable nobility, a debased peasantry — who give way before the intelligent, eager, idealistic German colonists — all bear the stamp of that untruth which comes not of a purpose to be false but of prejudice. The book has been well translated into English, with an enlighten¬ ing preface by the Chevalier Bunsen.

Edith J. R. Isaacs.

DEBORAH, Hebrew seer or prophetess. She lived in the time of the Judges, and by the aid of Barak delivered the northern tribes from the oppression of Jabin and secured a peace of 40 years' duration. The triumphal ode at¬ tributed to her is a remarkable specimen of Hebrew poetry. The story is told in (Judges) IV and V.

DE BOW, James Dunwoody Brownson,

American journalist and statistician: b. Charles¬ ton, S. C., 10 July 1820; d. Elizabeth, N. J., 27 Feb. 1867. He studied law, was admitted to the Charleston bar in 1844, became a contributor to the Southern Quarterly Review, published at Charleston, and in 1844 took charge of that periodical as chief editor. Among other papers prepared by him for its pages was an elaborate article, published in 1845, upon ˆOregon and the Oregon Question, > which attracted much atten¬ tion both in this country and Europe. It was translated into French and was the occasion of a debate in the French Chamber of Deputies. In 1845 he removed to New Orleans and estab¬ lished De Bow's Commercial Review. This enterprise proved successful and the work at¬ tained a circulation greater than has ever been reached by any similar publication in the South. In March 1853 he was appointed superintendent of the United States census. In that position he collected and prepared for the press a large part of the material for the quarto edition of the census of 1850. He afterward compiled the volume entitled Statistical View of the United States,* a compendium of the 7th census. In 1853 he compiled from his review a work pub¬ lished under the title of Undustrial Resources of the Southwest.*

DEBRAUX, de-bro', Paul Emile, French balladist : b. Ancerville, department of Meuse, 30 Aug. 1796; d. Paris, 12 Feb. 1831. He was an ardent Republican and wrote for the com¬ mon people lively songs of wine and love, sung everywhere in tavern and workshop. He was called <(the Beranger of the rabble.® His best-known songs are (Mt. Saint John) ; <Belisarius> ; Say, Do You Remember ?) ; (The Soldier's Widow* ; (Marengo.* Beranger published a

complete collection of his Songs.)

DE BRAY, Guido, one of the most famous of the Walloon writers and reformers, and author of the Belgic Confession of Faith, one of the great creeds of the Reformation and

noblest monuments in the Walloon language: b. Mons, in Hainault

1520; d. Valenciennes, May 1567. The Belgic confession was adopted by the nobles as well as by the Reformed clergy. Translated into Dutch, German and Latin, the Belgic Confession was printed and presented in 1562 to Philip II of Spain, overlord of the Belgic Netherlands, in the vain hope of securing toleration. The invasion and deso¬ lation of the Walloon and Flemish provinces followed five years later. De Bray was active as preacher and scholar among his refugee countrymen in France, Germany and England, he being at home in both the Flemish and Wal¬ loon tongues. He wrote an important work in Latin, condemning the tenets and excesses of the Anabaptists. Cast into prison by the Spaniards in 1567, he wrote letters to his wife and mother, which are classics. The Belgic Confession is the standard of belief in the Reformed Churches of Belgium, in the Netherlands, in the Dutch colonies and in the Reformed Church in America. Consult Langaard, L. A. van,

(Guido de Bray* ; (Zyn Leven en Werken,* Zerikzee (1884); Schaff's (Creeds of Christendom) (1877) ; Griffis, (Belgium, the Land of Art* (1912).

DEBRECZIN, da-bret'sin, Hungary, an im¬ portant city on the edge of the great central plain of Hungary, about 137 miles east of Buda¬ pest by rail. Its houses are mostly of a sin¬ gle story; and in wet weather the wide but un¬ paved streets become almost impassable from mud. The chief edifices are the principal Prot¬ estant church (from the pulpit of which Kos¬ suth moved the resolution declaring that the House of Hapsburg had forfeited the Hun¬ garian crown, 14 April 1849) ; and the princi¬ pal Protestant college, with an attendance of about 2,000 students and a library containing nearly 160,000 volumes ; Roman Catholic church, town-house, Piarist college, gymnasium, *etc.* Both the manufactures and trade are import¬ ant; the former consisting chiefly of coarse woolens, leather, soap, tobacco-pipes, casks, etc., and the latter being in tobacco, wine, flax, hides, wool, potash, cattle, cheese, *etc.* There are four large fairs annually and the swine market is the largest in the kingdom. Debreczin is the headquarters of Hungarian Protestantism. The Protestant college, founded in 1531, is consid¬ ered the best educational establishment in Hun¬ gary. This town suffered much in the wars between the Hungarians and the Turks, and afterward in the religious wars. Pop. 92,729.

DE BRY, de-bre' Theodor, Flemish gold¬ smith and copperplate engraver: b. Liege 1528; d. Frankfort-on-the-Main, Germany, 1598. He settled in Frankfort-on-the-Mair. about 1570 and established a printing-house there. On a visit to England he engraved the

(Procession of the Knights of the Garter under Queen Elizabeth* (12 plates after Geerarts) and (The Funeral of Sir Philip Sidney* (34 plates after Thomas Lent). The most important of the works issued from his press is the collection of ˆVoyages to the East and West Indies,) pub¬ lished in Latin (25 parts, 1590-1634) and Ger¬ man (27 parts 1590-1630). The New York Public Library possesses an excellent collection of his prints.

DEBS, Eugene Victor, American socialist : b. Terre Haute, Ind., 5 Nov. 1855. He received

a common school education and became a loco¬ motive fireman. He was elected to the Indiana legislature in 1884 and was later an official of the Brotherhood of Locomotive Firemen, and, from 1893 to 1897, president of the American Railway Union. He conducted the strike of 1894 in Chicago and was later sent to jail for contempt, because of his management of the same, though he pleaded innocence of any crime and requested to be tried by a jury and be allowed to summon witnesses in his defense. Since 1897 he has been prominent in the Social¬ ist movement, and in 1900, 1904, 1908, 1912 and 1920 was the candidate of the Socialist party for President of the United States. In 1907 he joined the editorial staff of the Appeal to Rea¬ son, remaining in its service six years, during which time he made a nation-wide speaking and organizing campaign in the interest of the So¬ cialist party. In 1914-17 he was the editor-in- chief of the National Rip-Saw published at Saint Louis and while serving in this capacity he continued his speaking tours in the interest of the Socialist movement. In 1915 he was elected chancellor of the People's College, a working-class educational institution organized upon a co-operative basis for the education of working people through correspondence courses, as well as the regular course in the parent school, located at Fort Scott, Kans. In 1918 he was sentenced to 10 years in a Federal prison for violation of the Espionage Act. He began his sentence 13 April 1919.

DEBT (Lat. debitum, owed) in legal ac¬ ceptance is a stipulated amount of money that one person owes to another under contract or agreement. In popular usage it implies the idea of a certain and definite sum due by book, note or bond, whether money, goods or services, that can be verified by data arising out of the transactions. While denoting any kind of a just demand — in its broadest sense meaning duty, or what one owes to another — an obli¬ gation of a debtor — debt has different shad¬ ings of definition, owing to the subject matter of the various statutes in which it is used ; but legally and generally, its significance is em¬ bodied in the above definitions. It denotes not only the obligation of the debtor to pay, but also the right of the creditor to receive and en¬ force payment. In its common

significance it implies the moneyed obligation of a person in¬ curred in his private capacity, or from his in¬ dividual acts, and not such obligations as are imposed upon him by law in his public rela¬ tions, or in common with all other citizens. It is the correlative of Credit (q.v). As gener¬ ally defined by statute the word includes any claim or demand upon which a judgment for a sum of money or directing the payment of money could be recovered by an action. As used in the statutes relating to the estates of deceased persons, the term is not limited to such as are strictly legal debts but includes every claim and demand by a creditor, whether recoverable at law or in equity. (<Debt® is a common-law word and also a technical term. The legal definition of the word is opposed to unliquidated damages or a liability in the sense of an undetermined or contingent debt not en¬ forceable by ordinary process. A debt exists when a certain sum of money is owing from one person (the debtor) to another (the cred¬ itor). A debt is not the less owing because it is

not yet due. Everything is a debt which is of absolute obligation, but, in its more limited sense, it implies only a particular kind of duty, and in this sense is substantially synonymous with contract. The word debt, however, is of large import, including not only debts of rec¬ ord or judgment, and debts by specialty, but also obligations arising under simple contract, to a very wide extent, and in its popular sense includes all that is due to a person under any form of obligation, or promise. Even in its broadest significance it implies that the con¬ sideration of the obligation of the debtor has been executed on the part of the creditor and the payment of the debt discharges the obliga¬ tion. In common law, the words debt and de¬ mand are of allied meaning, but the latter word is a term of much more comprehensive signifi¬ cation than the former. The term debt im- . poses a sum of money owing upon a contract, express or implied, while the term demand comprises all rightful claims, whether founded upon a contract, damages, or a superior right of property. (See Demand). The words (<debt® and ˆindebtedness® are not always used in the same sense ; that is they do not always impose a legal obligation on the part of one to pay another something due to him. They often imply a mere moral or equitable obligation, as well as a strictly legal one. Debt, however, is synonymous with due ; they are both derived from the same verb. The words <(debts now due® are held as synonymous with the word ˆliabilities.® While debt means that which is due from one person to another, the word due does not

necessarily vary the meaning, as that means, in one sense, simply owed. It may, when used with that intent, mean a debt actu¬ ally payable, the time for the payment of which has arrived. The context and the circumstances under which it is used must determine in what sense it is used. Due, when used as a noun, is synonymous with debt. See Debt, Action of; Debtor; Debtor and Creditor, Laws of. Con¬ sult Mack, W., ed., (Cyclopedia of Law and Procedure) (Vol. XIII, pp. 393-401. New York 1904).

DEBT, Action of. This is one of the old¬ est procedures known to the common law and in its origin of a personal right or proprietary nature. The law officer was commanded by the writ of debt to order the defendant to return to the plaintiff the sum of money or property, of which he unjustly deprived him; and if the defendant refused, he was to give his reason in the King's Court. The action was often set¬ tled with trial by battle. After the evolution and development of the action of assumpsit (q.v.), that action for a time supplanted action of debt on simple contracts. At common law there was perhaps no action which had so extensive and varied an application. While in modem procedure it has been found unwise to extend this form of remedy, where its limits are definite and clearly established, it has never¬ theless been given a much wider scope than the language of the elementary writers would seem to justify. While no longer in vogue in Eng¬ land, in some jurisdictions in the United States, statutes have expressly declared this remedy to be appropriate for the enforcement of certain obligations or the recovery of designated pen¬ alties. It has long been held and is now so well recognized by the courts as a whole that

it may be said to be a general rule, that action for debt is a concurrent remedy with assump¬ sit upon all simple contracts where the sum to be recovered is certain or may readily be as¬ certained either from the contract itself or by operation of law. A distinguishing feature of this action is that it lies only for the recovery of a sum certain, or readily reducible to a cer¬ tainty from fixed data or agreement, as dis¬

tinguished from unliquidated or unascertained damages. See Debt; Debtor and Creditor, Laws of.

DEBTOR, a person who owes a debt, or is under obligation, arising from express agree¬ ment, implication of law, or from the principles of natural justice, to render and pay a sum of money to another. A person who by reason of an existing obligation is or many become liable to pay money to another whether such liability is certain or contingent is classed as a debtor.* So are persons who have engaged to perform, or who owe to others the performance of an obligation; or who owe anything to others as money, goods or services. The term ((any debtor® includes anyone who is capable of con¬ tracting a debt and has done so. The relation of debtor and creditor may arise by direct agree¬ ment or through breach of duty between the parties; the relation of debtor and creditor im¬ plies, naturally, that the one has given credit to the other in a contract. The word debtor in its broad sense implies liability and includes corporations and partnerships as well as indi¬ viduals. It likewise includes the indorser of a promissory note before maturity and all those who at the appointment of a receiver for the winding-up of a bank are liable to the bank for the payment of money, whether their liabil¬ ity had matured or not, and without any regard to the exact nature of the liability, whether as principal or surety. If a person depart from his usual residence or remain absent therefrom, or conceal himself in his house, so that he can¬ not be served with process, with intent unlaw¬ fully to delay or defraud his creditors, he is an absconding or delinquent debtor. But if he depart from the State or from his usual abode, with the intention of again returning and with¬ out any fraudulent design, he has not absconded nor absented himself within the intendment of the law. Where a man stays away with intent to delay his creditors, he thereby absents him¬ self within the meaning of a statute providing that traders absenting themselves to delay creditors shall be adjudged bankrupts. See Debt; Debt, Action of; Debtor and Creditor, Laws of.

DEBTOR AND CREDITOR, Laws of.

One of the earliest institutions among men is the right of holding individual property. Upon this right depends the power of making bargains and effecting exchanges. In various ways bar¬ gain-making gives rise to deferred engagements, and obligations are incurred which are called debts. These obligations rest upon a double foundation. The right of holding individual property implies the right of recovering any property which has been entrusted to others, or of claiming possession of any property which others have, for a valuable consideration, agreed to make over to us. The primary foundation of

debts, therefore, is the right of holding prop¬ erty. A debt is a contract freely entered into.

Whether the right of property is valid or not, it is commonly recognized by the person who incurs debt; no abstract doctrine of the rights of property, therefore, can properly come be¬ tween him and his creditor to justify the viola¬ tion of an engagement for which he has accepted an equivalent. Credit affords a means by which those who have no property of their own may acquire important advantages through the use of the property of others, and while proprietary rights are recognized, it is of great consequence to society that the obligations incurred in bor¬ rowing should be faithfully fulfilled. Hence a very great practical importance is to be attached to the moral obligation implied in the contract of a debt, independently altogether of any ab¬ stract or theoretical views which may prevail as to the soundness of the particular institution of proprietary rights on which that obligation may be founded.

In early and rude states of society the nat¬ ural tendency is to regard all obligations as sacred and inviolable, and all who from any cause fail to fulfil them as criminal in act or intention, either by omission or commission, and liable to the most severe and exhaustive punitive treatment. In such a state of society both the primary and secondary foundations of the obli¬ gation are likely to be held in extreme estima¬ tion. Hence in the earlier stages of society the laws against debtors are universally found to be of the most stringent kind, and as civilization advances and the relations of society become more complicated, the necessity of repeated modifications of these severe laws becomes ap¬ parent. Any modification in favor of the debtor of the consequences of incurring debt, however equitable in itself, necessarily tends to increase the facility with which debt will be incurred, and if these consequences are over¬ relaxed society will be deprived of a needed protection; debt will be incurred carelessly, and as carelessness borders upon recklessness and recklessness upon fraud, the lines of distinction between right and wrong dealing will become fainter, the protection due to misfortune and the condonation necessary to be extended to miscalculation and errors of judgment will be¬ come a cover for deliberate conspiracy, and society will become a prey to an organized predatory system or modernized form of highway-robbery, thinly disguised under the forms of commerce. Such are the practical difficulties which the modern theory of the law of debtor and creditor has to encounter.

Among the Jews, under the Mosaic law debt was treated with great stringency, but there were regulations adapted to discourage the incurring of it, and also some humane re¬ strictions on the power of the creditor after it had been incurred. Lending on usury was for¬ bidden, and the taking of pledges put under severe restriction. The alienation of the estate of an Israelite was also forbidden. The cred¬ itor, on the other hand, had power over the person of his debtor, and even over those of his wife and family, and could cause them to be sold in satisfaction of his claim. If the debtor was an alien he might be sold to perpetual bondage, but on the occasion of a jubilee, which was appointed to be proclaimed every 50th year, every Israelitish debtor was set free and his property, if pledged or sold, returned to him.

Nothing is more common in rude states of

society, and under arbitrary and despotic gov¬ ernments, than the liability of the person of the debtor for his debt. This is one of the original sources of slavery. Even in the comparatively enlightened states of Greece and Rome the power of the creditor over the person of his debtor was recognized by law. This power was abolished in Athens by Solon, who is said to have taken his reform from Egypt, where the same unjust law had already run its course. The early Roman law was even more excessive in its undiscriminating severity. By the law of the Twelve Tables the creditors might cut the body of the debtor in pieces and share it among them, they might also sell him and his wife and family to perpetual slavery. In the Middle Ages, notwithstanding the influence of Christianity, the debtor was treated with hardly less severity. Even the Church took the side of the creditor, and the debtor who died without discharge was excommunicated and deprived of Christian burial. As society became more re¬ fined the laws against debtors were again grad¬ ually ameliorated, but the process was a slow one. Imprisonment for debt in England, except as an instrument for compelling the surrender of the debtors' effects, was only put an end to in the reign of Victoria.

In the United States originally imprisonment of debtors was adopted as a part of the common law, but at the present time imprisonment for debt, except in case of fraud, or of an ab¬ sconding debtor, does not legally exist in any of the States. Congress, empowered by the United States Constitution to make a uniform bankruptcy law, exercised this power, and sub¬ sequently repealed the law of imprisonment; and now, by Revised Statutes 990 and 991, no per¬ son can be imprisoned for debt by any process issuing out of the courts of the United States, in any State where by the laws of the State imprisonment for debt has been abolished. Most of the States, by constitutional provision, have prohibited arrest or imprisonment for debt, while the other States, either by direct statutes prohibiting imprisonment for debt, or by poor debtors laws, or by insolvent laws, secure the same result ; it being held to be against public policy to deprive a man, by imprisonment, of the power to pay his debts and make him a direct charge upon the State. See Debt ; Debt, Action of; Debtor.

DEBTS, National. See National Debts of the World; Debts, Public.

DEBTS, Public. Public debts are essen¬ tially a modern phenomenon, for before they could appear, private credit with its accompany¬ ing mechanism of banks, brokers and credit instruments had to be developed. Certain pre¬ conditions had to be met before states could resort to public borrowing on any considerable scale, and these conditions have been fulfilled only in comparatively recent times. These con¬ ditions are, first, the existence of a money market where capital can be obtained in ex¬ change for the promises to pay in the future which constitute a public debt. The capital itself, the machinery for carrying on these transactions, and lastly the willingness on the part of capitalists to lend their money must all exist. This last necessity points to the second of the pre-conditions mentioned above, namely the existence of some adequate security by

which the lender may be induced to make the desired loan. At first the promise of a needy monarch was backed up by the pledge of some tangible security, as the crown jewels, or land, or the revenues from some impost. But with the development of constitutional government a more adequate guaranty, has been given the lender, and with the development of public credit has gone on the expansion of public debts. The greater security afforded the lender under constitutional government consists, as Prof. H. C. Adams has pointed out, in the power and influence exerted by the propertied classes upon the legislative bodies to prevent them from re¬ pudiating public obligations. The public creditors in effect lend to a corporation — the government — which they themselves control.

Public debts were first created on any con¬ siderable scale in the 18th century, but the 19th century saw an enormous increase in the num¬ ber of countries making use of public loans and in the sum total of these loans. It has re¬ mained for the opening years of the 20th cen¬ tury, however, to demonstrate the extent to which states can make use of their credit in times of national emergency. The following brief table shows the growth of the public indebtedness of the civilized nations of the world for the last two centuries :

NATIONAL INDEBTEDNESS OF THE WORLD.*

Per cent

Year	Aggregate debt	of increase
1714	$1,500,000,000	
1793	2,500,000,000	66.7
1820	7,750,000,000	210.0
1848	8,650,000,000	11.6
1862	13,750,000,000	58.9
1872	23,025,000,000	74.7
1882	26,970,000,000	17.1
1890	27,525,000,000	2.0
1908	36,548,000,000	32.8
1912	42,000,000,000	16.0
1918	150,000,000,000	258.5

* The figures for the years 1714-1882 are from Adams' " Public Debt," p. 4; those for 1890—1912 are from the U. S. Census volumes on Wealth, Debt, and Taxation; while those for 1918 were compiled by the author, but represent the indebtedness only of the seven leading nations engaged in the European War. Consult ' Direct Costs of the Present War' (Carnegie Endowment for International Peace, Washington 1918).

Purposes, Temporary Necessity. — The

purposes for which governments may properly incur debts are in the main reducible to three — temporary necessity, special emergency and the construction of public works. The first of these arises when the actual revenues fall below the estimated revenues and a deficit ensues. It is, of course, impossible that the budget should exactly balance every year, and either a surplus or a deficit is likely to result. Constant sur¬ pluses are dangerous as tempting the legislative body to extravagance, and should be avoided. We have only to point to

congressional extrava¬ gance in the United States between 1888 and 1892 for illustration. Occasional deficits may, therefore, be regarded as a normal incident, and provision should be made for meeting them by the issue of short term treasury notes, payable, as in the case of the Federal government, in three years, or an even shorter period. These should be met out of taxes which may be in¬ creased for this purpose, or the necessary funds be met by greater economy on the part of the legislative body for the next two or three years. It is only when these temporary deficits become recurrent and when accumulated deficits are

converted into permanent obligations, as in Austria from 1904 to 1914, that this practice becomes dangerous. This method of treating temporary deficits must be condemned, as they should never be allowed to become a part of the permanent debt.

Special Emergencies. — By far the greatest part of existing national debts has been incurred to meet special emergencies, of which war has been the chief. An emergency arises when the need of the government for money is immediate and pressing, so that it cannot wait for the tardy returns of new taxes. There are several conceivable ways in which such a situation might be dealt with which may be briefly de¬ scribed. In the first place a nation might ac¬ cumulate in prosperous times a reserve fund or <(war-chest® for use in emergencies. Such a method has been followed by Prussia since the time of Frederick the Great ; since 1871 this war chest had consisted of $25,000,000 in specie, which in July 1913 was increased to $60,000,000, in addition to which there were various securi¬ ties. It may be conceded that such a reserve fund renders the first mobilization of the troops somewhat easier, but as a substitute for borrow¬ ing the enormous sums necessary in a modern war it is ludicrously insufficient. Moreover, there are various serious financial weaknesses in this method.

In the first place a reserve sufficient to meet such an emergency as war could not be accu¬ mulated; the people would not submit to the present real sacrifices involved for the sake of warding off a future imaginary danger. More¬ over, in a democratically governed country such a fund would be exposed to constant assaults ior diversion to other uses which could probably not always be successfully resisted. But if the fund were kept intact it would result in con¬ tinuous loss, for it would subtract just that much from the nation's money supply if it existed in the form of specie. While if it took the form of securities the situation is still more absurd, for to realize upon these when the emergency arose would compel their sale in a falling market, and would after all differ in no essential respect from the sale of the gov¬ ernment's own securities. The policy of a re¬ serve fund as an alternative to public borrowing must, therefore, be dismissed as ineffectual and unwise. In practice it is so little used to-day that we need give it no further consideration.

Another method by which a state might raise considerable sums in

order to meet a sud¬ den emergency, which is closely analogous to that just described, is by the sale of public property or government owned enterprises. In states like Prussia, which owns its railways, or New Zealand, which owns much of the land, considerable sums might be realized in this way. These states have accumulated a fund of wealth not specifically as a war chest, but it is sug¬ gested that this capital might be used rather than go into debt; utilize past accumulations rather than mortgage the future. But aside from the fact that most nations do not have large amounts of disposable wealth this method is open to the same objection as in the previous case, that such sales would be effected in a fall¬ ing market. In times of sudden emergency, like war, it would involve a tremendous loss and might bring in returns quite incommensurate with the sacrifices made.

Another method of meeting the urgent de¬ mands of a sudden fiscal emergency is to raise the rate of some existing tax or taxes so as to bring in the needed additional revenue ; as an illustration the English procedure with the in¬ come tax may be cited. The machinery for col¬ lecting this tax is always kept in good working order, but the rate of the tax is kept purposely low; then when a sudden emergency occurs additional revenue may be quickly secured^ by the simple expedient of raising the rate. <(That is to say,® writes Prof. H. C. Adams, (<this policy establishes a war-chest whose funds are deposited with the people, and assigns a par¬ ticular tax to serve as its key.® Exception may possibly be taken to the use of the income tax solely as an emergency tax, for the income tax should form an integral part of any scientifi¬ cally constructed scheme of taxation, and its full use should not be reserved for special needs. But the principle is unimpeachable and was invoked in this country when the sudden need of greater revenue in 1914 led to the emergency taxes of that year, which consisted simply of an extension of the internal re'venue system. On the other hand the lack of such an easily expan¬ sible system of taxes was keenly felt at the be¬ ginning of the War of 1812 and again when the Civil War began. This method, however, is not always feasible at the beginning of a fiscal emergency when funds must be had at once; it takes time for new taxes to become remunera¬ tive, and a sudden or large increase in the rate of existing taxes may introduce greater evils and injustices in a well-adjusted tax system than would be involved by a resort to bor¬ rowing.

A fourth method by which a nation, in case of a fiscal emergency, could avert recourse to borrowing might be the issue of paper money. But so serious and far-reaching are the effects of this that the use of its

credit in this fashion is generally resorted to by a modern nation only in the last extremity. Perhaps the best example of a war financed by the issue of paper money rather than by taxes or loans is the American Revolution against England. As the Continental Congress was not clothed with power to levy taxes and did not have the financial standing and prestige to enable it to borrow money at the beginning of the struggle, it was forced to resort to the only alternative open to it, namely the issue of bills of credit. The necessity of issuing large amounts with consequent over¬ issue, depreciation in value, derangement of prices with accompanying injustices as between debtors and creditors, and the final practical re¬ pudiation of its obligations by the government itself, constitute a story which has been re¬ peated in essentials in almost every case where the government has resorted to this method. In the present European War practically every bel¬ ligerent has issued paper money, though it has so far been kept within manageable limits, but the fall of foreign exchange with neutral nations marks the extent, in part at least, of the over¬ issue and consequent inflation which has occur¬ red in each country. The use of paper money may indeed be regarded as involving the credit of the issuing country so that it is only another and less defensible method of borrowing, and in fact is often called a ((forced loan.® We are, therefore, thrown back upon the final alterna¬ tive, that of public debts, as the only feasible

method of meeting a sudden fiscal emergency, at least at the beginning.

Never has this method of financiering been illustrated on so stupendous a scale as during the European War, which began in 1914. Tax¬ ation was resorted to sparingly during the strug¬ gle itself, England being the only country which made vigorous use of this source of revenue. General resort was had to the issue of paper money, either directly by the government or indirectly through the increased circulation of bank notes issued by government-controlled in¬ stitutions. But the main reliance of all, and the sole financial resource of some nations, was loans. By the middle of 1918 the new war loans created since July 1914 by the seven leading pow¬ ers amounted to about $150,000,000,000. As the debts of these same nations, namely, the United States, France, Great Britain, Italy, Russia, Austria-Hungary and the German Empire, amounted to about $23,000,000,000 before the war, their aggregate debt on 1 Aug. 1918 was not far from $175,000,000,000. This represented a per capita charge on the populations of these seven nations of about $361, as against $47 in 1914. It has been estimated that this indebted¬ ness is equal to about 15 per cent of their national wealth. The burden involved in such a charge is perhaps made clearest by comparing it with the per capita debt of the United States, which amounted to $10.59 in 1913, representing one-half of 1 per cent of our national wealth.

Public Works. — ‘There is one other pur¬ pose for which the employment of public credit is justifiable and that is the construction of public works. If a canal or an electric light plant is to be constructed it is essential both from an engineering and a fiscal point of view that the money for this purpose must be instantly available so that the work can be car¬ ried through to completion without any unnec¬ essary delay. From the engineering standpoint any interruption means waste, for an idle plant, half constructed, would rapidly deteriorate and much of the work would have to be done over again. While from a fiscal standpoint it is essential that the whole

work be completed as speedily as possible in order that it may become productive; a half finished canal or electric light plant involves expense but brings in no return. To raise the large sums necessary to carry out a modern public work it is necessary to resort to public loans, as it would be both impracticable and unjust to attempt to secure them by taxation. Moreover, in the case of an improvement whose use extends over a long period of time, it is not unreasonable to ask future generations to share in the burden.

Advantages of Borrowing. — We may at this point endeavor to summarize briefly some of the alleged advantages and disadvantages of public debts. It is necessary to emphasize the fact that the question is not as to whether the money asked for shall be spent. We must as¬ sume that the need exists and that the proper authority has decided upon the expenditure. Then the only question is as to the relative merits of public borrowing as contrasted with other methods of raising the necessary funds. Numerous advantages have been cited in favor of the policy of public debts, such as that it affords a safe and convenient form of invest¬ ment ; this may have been true in the 18th cen¬ tury, but could hardly have much force in this

age of corporate and public utility securities. It has also been urged, as by Alexander Hamilton in this country, that the issue of government bonds is equivalent to the creation of so much new capital in the country. Some writers have even carried this doctrine so far as to suggest that the cause of England's wealth was the ex¬ istence of her large national debt.

A more solid advantage lies in the fact that by a policy of borrowing a government can secure that part of the national capital which is easily disposable, while a system of ex¬ tremely heavy taxation might have serious eco¬ nomic consequences and result in practical con¬ fiscation of some incomes. The purchaser of a government bond gives his property voluntarily for public uses in exchange for an equivalent ; it is not, therefore, in ordinary circumstances withdrawn from production, but only the free capital, the surplus from current income, is placed at the disposal of the government. Pri¬ vate industry is, therefore, interfered with as little as possible under this system. Of course this argument assumes that the rate of interest offered by the government is not so high as to cause the withdrawal of capital from existing industries. In case this is done this argument loses much of its force.

But the most convincing argument in favor of a policy of public borrowing lies in the fact that the financial burden of the present genera¬ tion is thereby lessened and future generations are made to contribute to expenditures, a part at least of whose benefits they will share. This is particularly true when very large sums are needed for undertakings that will last for a long time, as any great engineering work, like a state-owned railroad or a canal or a road sys¬ tem, or municipal improvements such as sewers, street pavements or a lighting plant. In all such cases the expenditure is an investment of capital, the returns from which will be enjoyed by pos¬ sibly several generations of taxpayers, and it is consequently argued that they should be ex¬ pected to bear a part of the cost. The same argument would apply to expenditures for war, at least for a war of defence, which should protect the country and possibly preserve its very integrity and independence. Here is an immeasurable benefit, the costs of which may fairly be distributed among successive genera¬ tions through the medium of a public debt.

Disadvantages of Public Debts. — On the other hand, there are undeniable disadvantages and dangers connected with the constantly in¬ creasing tendency to resort to public credit to meet all unusual or large expenditures. Per¬ haps the greatest danger is connected with the last argument cited in favor of public debts. It is so easy to impose the burden of an unusual cost upon the next generation by borrowing the money instead of levying heavier taxation that there is danger that this may be done when there is no real justification for it. Many a local community in the United States to-day is paying the interest on bonds issued to pay for im¬ provements that either never were constructed or wore out before the debt was paid.

Another danger lies in the effect which the raising and spending of large sums obtained by the sale of government bonds may have upon private industry. This will be keenly felt if the need of the government is great and it raises the rate of interest in order to attract the

needed supply of capital. Then the capital which would normally have replaced losses through depreciation, or have provided for ordinary growth of the business, may be ’di¬ verted from private industry into the public purse. But before describing even such a di¬ version as an evil we shall have to know the use to which the money will be put. It may be that the government expenditure will bring advan¬ tages so great as far to outweigh any losses that may be inflicted upon private industry; unhap¬ pily the reverse has generally proven to be the case in the past.

Classification of Public Debts. — In the

creation of a public debt various technical ques¬ tions arise which it is necessary to describe if’ we are to have a clear idea of its character. The classification of public debts may first be considered, and here there are several lines of distinction. A usual distinction is that between forced loans, or legal tender paper money, and voluntary loans or bond issues. As the former may more properly be discussed under the title paper money, we shall pass on to the further classification of bonds. With reference to the character of the security behind them, these may be classified as floating or funded ; the former consist of unpaid accounts charged against the state, while the latter are debts which have been formally acknowledged by the government and their payment provided by law.

Funded debts again may be classified with reference to the time they have to run, into terminable and perpetual debts. By the former is meant debts which run for a certain specified term upon the expiration of which they are redeemable or convertible at the option of the government. By a perpetual debt is meant one whose contract mentions no time at which pay¬ ment can be demanded by the creditor ; while the government theoretically may pay off such a debt at will, it seldom exercises the privilege, and the debt becomes practically a perpetual one. Such is the form in which most of the French debt has been thrown, while the favorite form-for debts incurred by federal, state or local governments in the United States has been the terminable bond.

One great advantage which the latter has is the fact that the government is thereby given the power, when the bond matures, of

convert¬ ing it into another one bearing a lower rate of interest. Inasmuch as most loans are created in times of crisis or of urgent necessity, the rates of interest have probably been higher than they will be subsequently. Moreover the tend¬ ency of the whole 19th century was toward lower interest rates. Short term bonds with frequent conversions would, therefore, lower the national interest charge and set free income which could be used to pay the principal of the debt. Sometimes the debt is thrown into a form intermediate between the terminable and per¬ petual, namely the annuity. This is really paid in installments, for the obligation of. the gov¬ ernment is terminated upon the expiration of the term agreed upon, whether a certain definite time or the life of an individual.

Rate of Interest. — Another technical ques¬ tion to be decided when the debt is created is whether loans shall be placed at or below par. The general verdict is that the government should fix the rate of interest at a point that will approximate the market rate as closely as possible, for if it is fixed any lower the bonds will sell for less than par and the government will then have to pay back a larger sum when it extinguishes the debt than it receives at the time of sale. Usually only those nations which have a practically perpetual debt have preferred to sell their bonds at a discount in order to secure the lower interest rate.

Should a Public Debt be Paid? — The final problem, but probably the most important of all after the debt has been incurred, is that of debt payment. Should a nation endeavor to pay off its debts? The policy adopted by the United States from the very beginning of its national existence has been one of debt payment, but this policy has not been generally adopted by other nations. England was practically the only European nation which reduced its national debt during the 19th century. This difference in practice reflects two very different theories as to the desirability of debt payment. The one school holds that the only way to get rid of or reduce the burden of a debt is to pay off the principal ; the other wishes to accomplish the same purpose by so developing the resources of the country that the burden of the debt be¬ comes negligible.

The arguments against debt payment or rather in defense of a perpetual debt may be briefly stated. It is claimed that the burden of a public debt is gradually lessened by the de¬ preciation of gold ; but this is both too uncer¬ tain and too tardy in effect to be assigned

much weight. Another argument which is entitled to more serious consideration holds that the burden of debt will be diminished by the natural growth of the country in population, industries and wealth. Thus while the French debt, for instance, trebled between 1840 and 1870, the national wealth grew as rapidly and the burden of the larger sum was not felt any more heavily than was the smaller amount a generation before. A third argument urges that surplus revenue should be applied to other re¬ forms before that of debt payment. Thus, John Stuart Mill, writing of English conditions in the forties, said, (<the increase of revenue should rather be disposed of by taking off taxes than by liquidating debt, as long as any very objec¬ tionable imposts remain." Eventually, he ad¬ mitted, the remission of taxes should stop and the proceeds be applied to debt payment, but other writers have been unwilling to grant this and have insisted that <(taxes fructify in the pockets of the taxpayers, that these could pro¬ mote the national welfare more if they were not taxed than if taxes were collected and applied to the payment of a national debt.

The arguments advanced in favor of a policy of debt payment rest upon firmer economic ground and justify the action of this country. These are partly economic and partly political. In the first place it has been argued that the payment of a debt will convert the bondholder, who previously had been a drone, living upon his income, into an active man of business. In order to pay the debt the government collects capital from the taxpayers and hands it over to the bondholders in exchange for their bonds. These latter must then actively interest them¬ selves in the investment of the capital thus re¬ paid them, and in many cases must undertake the operation of new enterprises in order to safeguard it. Society is thus better off by this

addition, forced though it be, to the number of productive workers. The existence of an idle class, supported by the proceeds of general tax¬ ation, is moreover a social menace, and the pay¬ ment of the debt is thus socially desirable.

Another argument for debt payment has to do primarily with

improvement debts, the pro¬ ceeds of which have been applied to some capital investment, as sewers, street paving, schoolhouses, parks, *etc.* In these cases the property is subject to depreciation and will require ulti¬ mate replacement. If such debts were not paid within a reasonable time a situation would arise in which the property would have disappeared or lost its value, but society would still be pay¬ ing interest for its use and the principal would remain as a burden upon the future. Not only does every consideration of equity and good finance demand that such a debt be paid, but economic and engineering considerations set a definite limit to the life of such a loan: it should in no case run longer than the economic life of the property to purchase which it was incurred. This would apply in the United States primarily to municipal and local improvement bonds.

For the payment of our national debt the argument is a political rather than a purely economic one. The debt is almost entirely a legacy of war, and this is even more true of the debts of other nations. Nothing is of greater value to a nation in time of war than unim¬ paired credit, and nothing impairs the national credit more than a heavy and permanent debt charge. If the adage, (<in time of peace prepare for war® be true, it applies with especial force to the payment of a national debt at a rate as rapid as is consistent with sound economic de¬ velopment. It is a truism of modern war that success is determined largely by economic and financial strength. Here we have perhaps the most potent influence making for debt payment, though it must be admitted that hitherto it has not been very effective.

Methods of Debt Payment. — If it is de¬ cided that public debts ought to be paid, the further question arises as to the best manner of doing so. The oldest method is probably that of the sinking fund, which still finds expression in our national legislation on this subject. Prob¬ ably the best known application of the principle of the sinking fund was made by Pitt in Eng¬ land in 1786, embodying a proposal put forward by a clergyman named Price. This scheme con¬ sisted in the inviolable appropriation of a fixed annual sum to the purchase of public obligations, which should be placed in a fund into which should be paid each year the interest accruing on these bonds. Each year additional bonds would be purchased and placed in the fund and the interest would thus be compounded until in time it would expunge a debt of any magnitude. Indeed the calculations of Dr. Price on this point seemed magical. The payments into the sinking fund were continued during the Napole¬ onic wars even though money had to be bor¬ rowed to do it. But the absurdity of this piece of fiscal machinery was exposed in 1813 by Dr. Robert Hamilton, and it was later estimated that between 1785 and 1829 the government had borrowed

over £300,000,000 at 5 per cent in order to pay a debt bearing per cent interest. The scheme was thereupon abandoned and has never been resumed.

Another method of debt payment, which has been followed by England largely since the breakdown of the sinking fund policy, is that of annuities. If the public debt is thrown into this form, either as terminable or life annuities, the principal of the debt is automatically reduced as these fall in or mature. The objection to them is similar to the objection to the old sink¬ ing fund, that it commits the government to fixed annual payments whether these are con¬ venient or not.

This criticism leads to the statement of the correct policy of debt payment, which consists in the establishment of a permanent appropria¬ tion beyond the annual interest charge. But such an appropriation must be out of surplus revenue and therefore cannot be “inviolable.® No automatic machinery can compel the extinc¬ tion of a public debt unless there exists a clear net revenue to devote to that purpose. Consid¬ erable discretion must therefore be granted in the administration of a system of debt payment, for it must necessarily be suspended in periods of deficit. One favorable feature may be con¬ ceded to the sinking fund policy, which was that it committed a government definitely to the pol¬ icy of debt payment. And to-day it has a place in local finance, where most of the debts are for purposes of improvement, and where accordingly it is essential that definite provision be made for debt payment. More recently, however, the principle of serial bonds has been adopted as a better and more economical, systematic and reg¬ ular method of debt payment. See National Debts of the World.

Bibliography. — Adams, H. C., (Public

Debts) (New York 1887) ; Bastable, C. F., Pub¬ lic Finance) (3d ed., New York 1903) ; Bullock, C. J., ed., ‘Selected Readings in Public Finance) (Boston 1906) ; Dewey, D. R., ‘Financial His¬ tory of the United States) (New York, rev. ed., 1912) ; Jeze, G., ‘Science des Finances) (5th ed., Paris 1912) ; McCulloch, J. R., ‘Taxation and the Funding System > (3d ed., London 1863) ; Wagner, A., ‘Finanzwissenschaft) (Leipzig, Vol. I, 3d ed., 1883; Vol. II, 2d ed, 1890; Vol. Ill, 1889; Vol. IV, 1899).

Ernest L. Bogart,

Professor of Economics, University of Illinois.

DEBTS, Right of a Wife to Contract.

See Husband and Wife.

DEBUSSY, Claude Achille, distinguished French composer: b. Saint-Germain-en-Laye, 22 Aug. 1862 ; d. 26 March 1918. He was educated at the Paris Conservatoire. From the time he was 12 years old he attracted attention as possessing remarkable musical ability. In 1884 he won the Grand Prix de Rome for his cantata “L’Enfant Prodigue.® Later compositions brought rebuke instead of commendation, for their departure from estab¬ lished forms. After a sojourn in Russia, where he assimilated the modes of the native music, Debussy returned to Paris and gave himself Up to composition; but it was not until 1893 that he began to receive public recognition. In 1902 his opera ‘Pelleas and Melisande) was produced in Paris, and from this time his fame and position were assured. Debussy has written profusely, not only dramatic music, but also a multitude of songs and pieces for piano and orchestra. While his work is refined, graceful and elegant to the

highest degree, and his mastery of technique acknowledged to be perfect, it is claimed that his music is of the intellect rather than of the soul. It is also criticized as being too depend¬ ent for full interpretation upon the non-musi¬ cal aid of the ˆprogramme.® Among his prin¬ cipal works are (La Mer> ; <Printemps) ; Pre¬ lude a l’apres-midi d’un Faune) ; (Petite Suite* ; (Images* ; (Ariettes oubliees* ; (Trois Nocturnes) ; (Cinq Poemes de Baudelaire) ; (Proses Lyriques.*

D&BUT, da-bii, a French word which has been adopted into the English language, signi¬ fying generally a beginning or entrance, but specially applied to the first appearance of an actor or actress on the stage, or to a first ap¬ pearance in a particular theatre. In these cir¬ cumstances, the actor is called debutant; the actress, a debutante. The expression is very frequently used with reference to a young lady’s

first entrance into society.

DEC A (Gr. signifying ((ten**), a prefix of frequent occurrence; as in Dccapolis, a group of 10 cities; decalogue, the 10 commandments; decametre, a measure of 10 metres, *etc.* From dcca is formed decade, a collection or group of 10. In the calendar of the French Republic the term decade was used to designate the week of 10 days, which were severally named primidi, duodi, tridi, quartidi, quintidi, sextidi, septidi, octidi, nontidi, and decadi. See Calen¬ dar.

DECACHORD, dek'a-kord (Gr. deka-chordos, ten-stringed), an ancient Greek in¬ strument of 10 strings, triangular in shape; also a kind of large guitar with 10 strings.

DECADE. See Deca.

DECADENTS, The, a school of artists and writers, the followers of which delight in the more or less morbid refinements of feel¬ ing and style, and pride themselves upon this perversion of taste. The decadent is fond of the products of declining civilization corrupted by many centuries of culture, of works too highly seasoned and vitiated, which presage the final dissolution of a social order fallen into decrepitude, and shuns the simple, the natural, the healthful, clinging only to the artificial and the complicated in life and char¬ acter. The name of decadents may rightly be given to those who make a subtile virtuosity out of art. Among French writers Baudelaire was the first theorist of this school, and his influence was felt by many writers of the <(end of the century,® such as the Goncourts and Maurice Barres. The decadents' school of poetry is best represented by Stephane Mallarme and Verlaine, and its disciples are numerous, including many men of undoubted talent who have combatted the stiffness and dryness of the Parnassians, not without suc¬ cess. They are often termed deliquescents and symbolists ; the latter term is well chosen as indicating their aims and manner.

DECALOGUE. A term, from the Greek, corresponding to the Hebrew (Ten Words* (Ex. xxxiv. 28; Deut. x, 4); in the Septuagint ol Sera \6yoi. In the Pentateuch it appears in two versions (Ex. xx, 2-17 and Deut. v, 6-18) with some variants that have given rise to much discussion and criticism. The sources in the Bible describe it as embodying the statements of God on Mount Sinai; revealed

to Moses and the people of Israel on the third month after the

deliverance from Egypt amid thunder, lightning and heavy smoke. The Ten Words were written by Him on two tablets of stone ((tables of testimony) or (tables of the covenant), and given to Moses. In his anger at the people's apostasy, Moses broke the tables (Ex. xxxii, 19), and later God com¬ manded him to make two other tables like the first (Ex. xxxiv, 1), upon which to rewrite the Ten Words. In another passage, however (Ex. xxxiv, 27-28), Moses was ordered to rewrite and did rewrite the commandments him¬ self ; but in Deut. iv, 13, and other passages, God is the writer. Moses placed in the book (Ex. xxv, 16, 21, xl, 20) this second set brought down from Mount Sinai. The Ark was called, therefore, (Ark of the Testimony* (Ex. xxv, 22; Num. iv, 5).

The Decalogue begins with the declaration in the first person that the speaker is Israel's God who led him out of Egypt and bondage. Hence no other gods shall be for Israel, and as a necessary corollary, no graven image or representation of anything shall be made as idol to bow down to and serve. The sin of idolatry is further enlarged upon as contrast¬ ing with the nature of the Deity, who while punishing the children for the sins of their fathers unto the third and fourth generation of those who hate God is merciful to the thousandth generation of those who love Him and keep His commandments. Next comes the prohibition against taking His name in vain, which is followed by the injunction to keep the Sabbath holy as a rest day from all work for man as well as beast, the stranger as well as the household. Honoring father and mother is the substance of the next commandment, and a reward is added — long life. In quick suc¬ cession murder, adultery, theft, and false testi¬ mony are forbidden. The Decalogue concludes with a commandment against covetousness of anything that is one's neighbor's.

The differences in the two versions of the Decalogue form an interesting chapter in the critical study of the Pentateuch. While there is no essential variation so far as vital obliga¬ tions are concerned, verbal changes occur and in one instance, that of the Sabbath, an en¬ tirely different reason is adduced for its ob¬ servance. The slight variants in the Masoretic text, occasional differences in words, as for instance <(covet® for ((desire,® ((remember the Sabbath® in one case and <(keep® in the other, and ((false witness® in one and <(a witness of deceit® in the other ; some additions and amplifications, all this has been explained as due to carelessness on the part of transcribers, who trusted to their memory. But the varia¬ tion in the reason alleged for the Sabbath cannot be so readily explained. The Exodus version connects it with creation ; that of Deuteronomy associates it with Israel's release from Egyptian slavery. In the one

case, the universal, in the other a national historical element. One can understand how the critics of the different schools analyze these variants to discover which text is the earlier. The difficulty is less felt by the early rabbis who claim both versions to be alike of divine origin and spoken at the same time. The division of the Decalogue is another subject of inquiry. As it was written on two tablets of stone and

on both sides, its arrangement would have been naturally one group of five ((words® each on one stone. So, in fact, is the statement as to the original division made by Josephus ((Antiquitates) Vol. Ill, 5, 4) and by Philo ((De Decalogo* 12) the first group of five in¬ cluding the commandments referring to our relation to God and the second referring to our conduct toward our neighbors. Another variation is to be noted. The sequence of cer¬ tain of the (<words® differs in various versions. The Masoretic text, Josephus, the Syriac Hexapla agree as to the order of the pro¬ hibitions against murder, adultery, and theft, but' the Septuagint, Codex Alexandrinus and Ambrosianus have the sequence of <(murder, theft, and adultery,® while Philo has the order <(adultery, murder, theft,® and the Codex Vaticanus ((adultery, theft, murder® — slight variations, it is true ; but in so fundamental a code as the Decalogue one would expect in every version uniformity throughout. No less peculiar is the diversity in the numbering of the different commandments. According to the Jewish tradition, Ex. xx, 2, forms the first tfword,® while verses 3-6 constitute the second. The Codex Vaticanus of the Septuagint and the Deuteronomy of Ambrosianus have a similar arrangement. Josephus and Philo re¬ gard verse 3 as first, verses 4-6 as second, verse 7 as third, verses 8-11 as fourth, verse 12 as fifth, verse 13 as sixth, verse 14 as seventh, verse 15 as eighth, verse 16 as ninth and verse 17 as tenth commandment. The Roman Catholic and Lutheran rule combines verses 3-6 into the first, and every commandment is advanced by one to the last, the traditional Jewish Henth® being divided into ninth and tenth, to maintain the traditional number. In the exegetical and philosophical writings of the early and mediaeval rabbinical authorities, the Decalogue plays an important part — piety, mysticism and ingenuity alike enter into their interpretations. A point that aroused much dispute was the relation of revelation to the Ten Words. Was the Deca¬ logue exclusively essential compared to the rest of the Law? In the daily liturgy in early Talmudic times the recital of the Ten Words was a special feature, but later withdrawn to silence the inference that the Decalogue alone had been revealed by God on Mount Sinai (Berak. 11a).

Consult Caverno, C., (Ten Words) (Boston 1899) ; Driver, introduction to the Old Testa¬ ment (New York 1902) ; Geffken, (Ueber die Versifications Eintheilungen des Dekalogs) (Hamburg 1838) ; Green, (Higher Criticism of the Pentateuch } (New York 1895) ; Monte-fiore in Hibbert Lectures (London 1892) ; Robinson, (The Decalogue) (Chicago 1899) ; Smith, W. Robertson, (The Old Testament in the Jewish Church) (pp. 331-345). Consult also the latest Bible dictionaries and the Cath¬ olic and Jewish encyclopedias.

Abram S. Isaacs.

DECAMERON, The. In the year 1348 the plague, which had been for some time devastating the East, appeared in <(the notable city of Florence.® A hundred thousand persons perished. Boccaccio in the first part of his work, after his immortal description of the ravages of the pestilence, exclaims : (<Alas, how many great palaces, how many goodly houses, how many noble mansions, once full of families, of

lords and ladies abode empty even of the mean¬ est servants ! How many memorable families, how many ample heritages, how many famous fortunes were seen to remain without lawful heir ! How many valiant men, how many fair ladies, how many sprightly youths whom not others only but Galen, Hippocrates or Aescula¬ pius themselves would have judged most hale, breakfasted in the morning with their kinsfolk, comrades and friends and that same night supped with their ancestors in the other world !® Boccaccio tells us how at seven o'clock of a Tuesday morning it chanced that seven young ladies, all knit to one another by friendship, neighborhood or kinship met in the venerable church of Santa Maria Novella for divine service : ((Each was discreet and of noble blood and well-mannered and full of honest sprightli¬ ness.® He does not give their actual names but applies to them fictitious designations cor¬ responding to their qualities. The eldest is called Pamfinia, (<the all-admonishing® ; there is Fiammetta, known to be the Princess Maria, illegitimate daughter of King Robert of Naples, for whom Boccaccio cherished a (<very high and noble passion.® The others are Filomena, the ((Nightingale,® Emilia, Lauretta, the laurel-crowned,® Neifile, the (<novelty-loving,® and Elisa. They propose to flee from the death-stricken city and go to the country : ((There,® they say, <(we may hear the small birds sing; there we may see the hills clad all in green and the fields and plains full of corn wave even as doth the sea ; there may we see trees, a thousand sorts, and there is the face of heaven more open to view, the which angered against us though it be, nevertheless denieth

not unto us its eternal beauties, far goodlier to look upon than the empty walls of our city. More¬ over, there is the air far cooler.®

While they are discussing how best to go, three young men enter — Pamfilo (<(Perfect in Love®), Filostrato ((<Unhappy in Love®) and Dioneo ((<The Amorous®), <(all very agreeable and well-bred, of worth and discretion.® The ladies invite the young men to accompany them, and the next day with a train of servitors of every kind they repair to a place two miles from the city, on a little hill back from the road where stands a palace with courtyard and logeric and saloons and bedrooms, abounding in costly paintings, with wells of cool water and cellars full of rare wines. They organize their sessions in the most formal manner with the design of "living merrily.® Each member of the party must take turns in being ((King or Queen of the day.® Pamfinia is chosen to be first and is crowned with <(a goodly and honorable wreath® of laurel-leaves. Each servant has an appropriate name and a set task: Parmeno is seneschal and has charge of the chief saloon; Sirisco is purveyor and treasurer; Misia and Lirisca take charge of the kitchen ; there are others in charge of the bed-chambers. They stray about till dinner; then they find the tables laid with snowy cloths and glittering with silver: the viands are delicious, they have the choicest wines. Dinner is followed by music and dancing: Dioneo plays the lute, Fiammetta the viol.

At three in the afternoon, after their siesta, they go to a little meadow of green grass and the daily session of storytelling begins. The "Queen® calls upon each in turn and one story

suggests another, but each is <(free to tell of such matters as are most to his liking.® On the Second Day Filomena assigns a general topic: ((of those who after being baffled by divers chances have won at last to a joyful issue beyond their hope.® Friday and Saturday they have no general gathering, but begin again on Sunday, which is devoted to tales of ((such as have by dint of diligence acquired some much desired thing or recovered some lost good.® It is rather odd that the stories on this Third Day, whether told by the three young men or by the seven young ladies, rival one another in not merely veiled vulgar allusions but in broad farcical obscenity. This tone is carried on in the stories of the Fourth Day which is ordained by Filostrato, when they all discourse of those whose loves had unhappy endings. Fiammetta is (<Queen® for the Fifth Day, and she proposes for the topic the happy fortunes of lovers who had suffered sundry cruel and misfortunate ad¬ ventures. Elisa is (<Queen® for the Sixth Day, and commands discourse of such as had ex¬ tricated themselves from perilous or unpleasant predicaments by some ready reply or device. On this occasion most of the stories are mere anecdotes, and it is the shortest part of the (Decameron. > The Seventh Day, guided by Dioneo, is devoted to relating the tricks played by wives on their husbands for their own preservation. The Eighth is a sort of continua¬ tion of the preceding, treating of the tricks that all day long women play upon men or men upon women or men upon one another. This again comes on a Sunday, and many of the stories are long and exceedingly obscene. Emilia offers no set topic for the Ninth Day, and they all follow their own impulses. The Tenth and last Day is under the lordship of Pamfilo, and the company discourse of such persons as have wrought generously or magnificently in matters of love or in any other way. (The Decameron } ends with an apology for the author's license (<in inditing these stories as well as in making ladies now and then say and very often hearken to things not very seemly to be said or heard of modest women.® He defends himself by saying: ((There is nothing so unseemly as to be forbidden unto anyone, so but he express it in seemly terms, as methinks I have here very aptly done® ; and he goes on to argue at some length that no harm can come to any one who reads the stories in the right spirit ; and says naively that while it is perfectly true that some might well have been omitted, yet he had to tell them as his little company of 10 told them at their daily sessions. Boccaccio did not invent the hundred stories ; many of them are folk¬ tales which had been in vogue for centuries. He merely

retells them in a style which has been the admiration of the world, although in many places it is marked by strange obscurities, by affected attempts at ((Ciceronian concision,® by imitations of Dante's symbolism and by the use of words of unfamiliar significances. There are beautiful descriptions; there is broad wit; there is farce ; there is pathos, as in the famous story of the Patient Griselda. Some of the stories are elaborations of the anecdotes of the (<Gesta Romanorum ;® but Boccaccio makes no attempt to attribute them ; he took whatever he wanted wherever he found it and made it his after the manner of the famous conquerors of the world. Attempts have been made to locate

the deserted villa where the lieta brigata first took up their abode and that to which they moved after the Second Day as being more commodious and magnificent. The one is con¬ sidered to have been the Poggio Gherardi ; the other, judging from the famous description of its surroundings, was the Villa Pasolini or Ras-poni, at that time the property of the Memmi, the pupils of Giotto, overlooking the valley which in the last century belonged to the American, Prof. Willard Fiske.

Each of the stories is introduced by a vignette in words, describing the activities of the gay little company; all of the characters are vividly depicted and artfully contrasted. Their behavior is in deliberate contrast to the freedom of their speech, and when there is some talk about a scandal arising from their sojourn together Filomela replies to Neifile: (<That amounts to nothing, where I live virtu¬ ously and my conscience in no wise reproaches me ; let those who will speak against me : I take God and the Truth for my defence.®

Some of the stories have been retold in modern times ; others have been elaborated into plays. Washington Irving used that of <(Frederick of the Alberighi and his Falcon.® Keats put into immortal verse the (<Pot of Basil.® Chaucer, who died only a quarter of a century later than Boccaccio, imitated him and used his material. In spite of the indelicacy of many of the stories the work, as a whole, is one of the classics of world literature. It has been fre¬ quently translated in expurgated form ; com¬ plete it is to be found in three volumes trans¬ lated into rather stilted and affected English by James Payne and published in 1886 by the Villon Society for private circulation. Consult Bartoli, Adolpho, (I Precursori del Boccaccio e alcune delle sue FontP (Florence 1874) ; Lee, A. Collingwood, (The Decamerone, its Sources and Analogues) (London 1909) ; Symonds, J.

A., < Giovanni Boccaccio* (London 1895) ;

Moutier, Ignazio, (I1 Decamerone, con spiega-zioni tratte dai migliori commentari* (Paris 1849) • Morley, Henry, (I1 Decamerone, Forty of the 100 Novels with Introduction (1902 and 1909) ; also the edition by Dr. Guilio Farrario with notes from the best editions (Florence

1841).

Nathan Haskell Dole.

DE CAMP, John C., American naval offi¬ cer: b. New Jersey, 5 Oct. 1812; d. Burlington, N. J., 24 June 1875. He entered the navy in 1827; served in the frigate Constitution off the coast of Africa in 1854, and received the rank of commander the next year. During the Civil War he had command of' the steam sloop Iroquois in the attack on Fort Jackson and Fort Philip, and served on the Mississippi under Farragut, distinguishing himself especially at Vicksburg. In 1868-69 he commanded the re¬ ceiving ship Potomac, and was retired in 1870 with the rank of rear-admiral.

DE CAMP, Joseph Rodefer, American figure and landscape painter : b. Cincinnati, Ohio, 5 Nov. 1858. He studied there under Duveneck and at the Royal Academy of Munich. He established himself in Boston in 1893, and became an instructor in the school of the Bos¬ ton Museum of Fine Arts. He was elected to the Society of American Artists in 1888. He received the Temple gold medal from the

1 An East Indian edible crab (Fodophthalmus vigil)

2 East Indian sping crab (Parchenope horrida)

3 A Mediterranean crab (Pisa armata)

4 Three-angled Mediterranean crab (Gonoplax rhomboides)

5 Three-angled Atlantic crab (Pisolambrus nitidus)

6 East Indian shrimp (Stenopus hispidus)

7 Northern shrimp (Palaemon serratus)

8 A Mediterranean porcelain crab (Albunea symnista)

9 Cocoanut crab (Birgus latro)

10 Mediterranean purple crab (Lissa chiragra)

‘

*

«

’

■

-

Pennsylvania Academy of Fine Arts in 1909; honorable mention at the Paris Exposition of 1900 for a (Woman Drying Her Hair,' and a gold medal at the Saint Louis Exposition in 1904. He created great enthusiasm in Berlin in 1910 with (An Interior' and (A Lady Play¬ ing a Lute.' Has painted a great many promi¬ nent Americans and was award Beck portrait medal at Philadelphia in 1911. Notable works are in the Cincinnati and Worcester museums.

DECAMPS, de-kan', Alexandre Gabriel,

French painter: h. Paris, March 1803; d. Fon¬ tainebleau, 23 Aug. 1860. He was educated in the studio of Abel de Pujol. When a young man he made a journey to the East, and returned from thence with a collection of sketches, from which he afterward produced some of his finest pictures. Among the more celebrated of these are (The Grand Bazaar) ; (Relieving Guard at. Smyrna' ; (A Turkish Cafe' ; (Turkish Children Going Out of School' ; and (Arab Horsemen Passing a Ford.' Of pictures of another class are (The Shepherd and His Flock Overtaken by a Storm' ; (An Italian Village' ; (The Hawking Party' ; Spaniards Playing at Cards' ; (Don Quixote and Sancho Panza.' Decamps also produced some historical and sacred pictures of a high order of art, including the (Defeat of the Cim-bri' ; (The Miraculous Draught of Fishes' ; 'Joseph Sold by His Brethren' ; 'The Finding of Moses,' and others. The leading merits of this painter are great originality of conception and vigor of expression, with a wonderful skill in the treatment of light and shade. He was made chevalier of the Legion of Honor in 1839. He was extremely sensitive and conscious of his departure from classical tradition, and he abandoned art for many years. Consult the monograph by Moreau; Chesneau, (Movement moderne en peinture : Decamps' (Paris 1861); Stranahan, Modern French Painters' (New York 1888).

DE CANDOLLE, Augustin Pyrame,

Swiss botanist: b. Geneva, 4 Feb. 1778; d. there, 9 Sept. 1841. He studied chemistry, physics and botany in Paris, where in 1797 his earliest work, on lichens, was published. Other works quickly followed, including his (Astragalogia' (1802) and his valuable 'Historia Plantarum Succulentarum.' In 1802 he was elected to an honorary' professorship in the Academy of Geneva, but remained in Paris, and delivered his first botanical lectures in the College de

France in 1804. His ‘Flore Franqaise’ appeared in four volumes in 1805. Employed by the government, he visited all parts of France and Italy in 1806-12, investigating their botany and agriculture. The results of his journeys are partly embodied in a supplement to the (Flore.’ He was appointed in 1807 to a chair at Mont¬ pellier, where he lived from 1810 to 1816; he then retired to Geneva, where a professorship of botany was founded for him and where he spent the remainder of his life. De Candolle was an industrious writer, and the fruits of his studies in systematic botany and the properties and natural affinities of plants are embodied in a considerable number of works. The greatest of these, his (Regni Vegetabilis Systema Naturale’ (Vols. I and II, 1818-21), was com¬ menced on too grand a scale, and was continued within more reasonable limits in the ‘Prodro-mus Systematis Regni Vegetabilis’ (17 vols., 1824-73, the last 10 by his son and others).

DECAPODA, an order of malacostracous Crustacea (q.v.), in which the fourth to the eighth pairs inclusive of the thoracic append¬ ages form uniramous walking limbs; the head and thorax are united to form a cephalothorax and the eyes are stalked. Three suborders are usually recognized: (1) The Macrura, in which the abdomen is not permanently flexed beneath the thorax, but forms a long, powerful swim¬ ming organ terminated by a so-called caudal fin; (2) the Brachyura, having the abdomen much reduced in size and permanently flexed beneath the thorax, which is usually shorter than its width, while the antennae and antennules are much reduced in size. The crab is typical of this group. (3) The Anomura, or hermit crabs and their allies, with soft, usually asym¬ metrical abdominal segments. See Crab ; Lob¬ ster; Hermit Crab.

A suborder of cephalopods (q.v.), contain¬ ing those forms with five pairs of tentacles, is also known as Decapoda. It comprises the squid, cuttlefish, the fossil belemnites, the giant cephalopods of the ocean and other related forms. See Cephalopods.

DECAPOLIS, The. The name of a Greek confederation of cities east of the river Jordan. After the conquests of Alexander the Great many Greeks settled in Palestine, many going to the country east of the Jordan. The con¬ federation was formed after the death of Herod in 4 b.c. Some of the cities had been free but had been deprived of their freedom by the Jewish Maccabean princes. Later Pompey re¬ stored their freedom to them. Their civic eras dated from the year 64-63 b.c., the year of Pompey’s campaign in the country. As the Latin name signifies the confederation included 10 cities at first. Later other cities joined the league, until there were 18 members of the league from

first to last. It was formed for protection against Semitic influences hostile to them. Scythopolis was the only city west of the Jordan. It was included in the league be¬ cause of its strategic situation which com¬ manded the route to the Greek cities on the seacoast and to the sea. The rest were east of the Jordan and southeast of the Sea of Galilee. The other nine original cities were Gadara, Hippos, Pella, Dion, Gerasa, Philadel¬ phia, Raphana, Kanatha and Damascus. Those added later were Abila, Kanata, Kapitolas, Edrei, Boasra and three of their neighbors not named. Each city controlled the territory in the surrounding country. Jesus Christ entered the land of the Gadarenes and performed a miracle there (Mark v, 1-20). His demon-possessed patient published the news of his cure in all Decapolis. The cities were usually built for defense and were located on a .hill or mound and near some stream or body of water. Many of the streets were colonnaded. In the ruins of Gerasa, one of the richest of the cities, nearly 200 of these columns are still standing, and at Philadelphia about a dozen still remain. Some of the cities had two amphi¬ theatres each. The largest was at Philadelphia, which would possibly seat 7,000 people; the others would accommodate from 2.000 to 4,000 spectators. Some of the cities also had artificial lakes on which sham sea-fights were staged.

Each city had its own annual festival for ath¬ letic games. The temples were beautiful. In each was a central hall ranging in size from 50 to 70 feet in length and from 30 to 50 feet in width. The religion of the homeland prevailed. Gadara was an important town before the time of the fall of Jerusalem. Vespasian captured it and destroyed most of the inhabitants. Jo¬ sephus was the Jewish general in command and was made a prisoner and taken to Rome. The site of Pella has been explored and a volume published by the Palestine Exploration Fund containing the results. Ivanatha occupied the site of the city of Kenath mentioned in the Old Testament. The sites of some of the other cities remain undiscovered by modem archaeologists. These cities were centres of lit¬ erary activity. From Gadara came <(Philodemus the Epicurean, a contemporary of Cicero, Meleager the epigrammatist, Menippus the satirist, Theodorus the rhetorician, the tutor of Tiberius, and others. Gerasa also was the mother of teachers. Stephanus Byzantinus men¬ tions three, Ariston, Kerykos and Plato.® The cities flourished most during the period of the Antonines. It was then that Gerasa reached the height of her glory. For fuller details the reader is referred to (The Historical Geography of the Holy Land> by George Adam Smith, to which we acknowledge indebtedness for many of the facts of this article.

DECATUR, Stephen, American commo¬ dore: b. Newport, R. I., 1751; d. Philadelphia, 14 Nov. 1808. During the war of the American Revolution he commanded several privateers and acquired some reputation by the capture of English ships. At the commencement of hostilities with France in 1798 he was ap¬ pointed to the command of the Delaware, of 20 guns, in which ship he cruised during the years 1798-99 on the American coast and in the West Indies, capturing at different times the French privateers Le Croyable of 14, and Marsuin of 10, guns. In 1800 he commanded a squadron of 13 sail on the Guadeloupe station, the Philadelphia, a frigate of 38 guns, being his flagship.

DECATUR, Stephen, American commo¬ dore : b. Sinepuxent, Md., 5 Jan. 1779; d. Wash¬ ington, D. C., 22 March 1820. He was the most conspicuous figure in the naval history of the United States for the 100 years between Paul Jones and Farragut. He was well educated at the Episcopal Academy and at the University of Pennsylvania. Refusing a clerical life, in 1796 he entered the counting house of a

firm of ship owners. In 1797 he got out the keel pieces of the frigate United States and was on her when she was launched, the first ship of the United States Navy. Through the instru¬ mentality of Commodore John Barry he was app.ointed a midshipman in the navy by Presi¬ dent Adams, 30 April 1798. He cruised in the West Indies during the French War in the United States, taking part in various minor naval actions. Such was his aptitude and ability that he was commissioned lieutenant, 3 June 1799. At the outbreak of the Tripolitan war, in command of the schooner Enterprise, he captured the bomb ketch Mastico, 23 Dec. 1803. In this ketch, renamed the Intrepid, he destroyed the frigate Philadelphia in the harbor of Tripoli by a singularly bold stroke.

On 3 Aug. 1804 Decatur commanded the American gunboats in their attack on the Tri¬ politan flotilla. He captured two gunboats by the most desperate hand-to-hand fighting in a battle which has been called the <(biggest little fight in history,® and well merits the name. He took part in four other attacks on Tripoli with his usual distinction. For the burning of the Philadelphia he was commissioned a captain, and at the age of 25 was placed in command of the frigate Constitution. At the close of the war he returned home, having divided with Commodore Preble the honors of the campaign.

On 8 March 1806 he married Miss Susan Wheeler of Norfolk, Va. He had no children, and his wife survived him many years. At the outbreak of the War of 1812 he was in command of the United States, in whose build¬ ing he had assisted, on which he had been launched, and in which he had made his first cruise. On 25 Oct. 1812 the United States cap¬ tured the British frigate Macedonian , which was dismasted and almost cut to pieces. She lost 35 per cent of her complement, or 89 killed or mortally wounded, and 15 severely wounded, besides many others slightly wounded. On the American ship seven were killed or mortally wounded, and five severely wounded. The United States was practically intact. The weather remained favorable and by strenuous work for two weeks the Macedonian was patched up and brought back to New York, the only trophy of the great frigate actions of the war that remained afloat. The disparity in force in favor of the United States was about 7 to 5, in damage inflicted about 9 to 1.

After being blockaded in New London for a year Decatur took command of the frigate President. On the night of 14 Jan. 1815, in the midst of a howling gale, he put to sea from New York. On the morning

of the 1 5th, off the eastern end of Long Island, he fell in with a British squadron of five heavy ships. Every effort was made to escape, but in the afternoon the President was brought to by the frigate Endymion. A running fight ensued until 6 o'clock, when Decatur attempted to lay the Endymion aboard, hoping to capture her, scut¬ tle the President and escape on the British ship, but the Endymion had the heels of the Presi¬ dent and avoided the manoeuvre. For two hours the vessels sailed side by side in furious con¬ flict. At the end of this time the Endymion was entirely silenced. She had been fought to a standstillˆ Decatur could not take possession for fear of the other ships. He tried running again, but the President had been severely in¬ jured in the battle, and about 11 o'clock she was overhauled by two British frigates, which ran alongside and opened fire. The British flagship was also in range and the last ship was coming up rapidly. The President had lost 24 killed and 55 wounded, including most of her deck officers. Decatur himself had been twice wounded. Further conflict with two fresh ships was hopeless. Decatur reluctantly struck his flag and surrendered to the commodore of the squadrom He was court-martialed for the loss of his ship, and acquitted of any misconduct in words of the highest commendation.

After the close of the war he was placed in command of a squadron and sent to the Barbary States to exact reparation for injuries and to enforce treaties of peace. His squadron cap-

DECATUR

tured the Algerine frigate Meshouda and the brig Estedio on 17 and 19 June. On 30 June 1815 he exacted submission and peace from the Dey of Algiers; on 26 July the same from the Bey of Tunis; and on 7 August the same from the Bashaw of Tripoli. The treaties were made at the mouth of the cannon and indemnities demanded were paid immediately.

In 1816 he was appointed naval commis¬ sioner. On 22 March 1820 he was killed in a duel with Commodore James Barron. The cause of this duel arose from certain strictures which Decatur passed on Barron. Barron had been suspended for his conduct on the Chesa¬ peake when she was attacked by the Leopard in 1807. He had not returned to the United States during the War of 1812 but had remained in England, where he claimed to have been im¬ prisoned for debt. When he applied for rein¬ statement after the close of the war Decatur opposed his request. He need not have enter¬ tained Barron's challenge save for a too nice sense of honor. He is buried in Saint Peter's churchyard, Philadelphia.

Loyalty to his country was the very breath of life to Decatur. Our judgment does not entirely approve the ethic significance of his famous sentiment, (<My country — may she ever be right, but, right or wrong, my coun¬ try® ; but our affections tend to make the senti¬ ment our own. There is a ring of sincerity in the words and in him which wins us in spite of all. His nephew, Stephen, b. 1815; d. 1876, was also a commodore in the United States Navy.

Consult Brady, (Decatur) ; Mackenzie, (Decatur) ; (Autobiography of Commodore Mor-ris) ; Allen, (Navy and Barbary Corsairs) ; va¬ rious naval histories.

Cyrus Townsend Brady.

DECATUR, Ala., city, county-seat of Mor¬ gan county, on the Tennessee River and the Louisville and Nashville, and Southern rail¬ roads, 75 miles north of Birmingham. It has extensive manufactures of agricultural imple¬ ments, engines, foundry products, lumber, sash

and blinds, furniture, iron, flour, cotton, cot¬ tonseed oil, fertilizer and leather. Its chief buildings are the new post office, city hall, Car¬ negie library, schoolhouses, hospital and in¬ firmaries. Pop. (1920) 4,228.

DECATUR, Ga., town, county-seat of De Kalb County, on the Georgia Railroad, six miles east of Atlanta. Decatur was settled about 1822 and is governed by a mayor and a council of six members elected by popular vote. It is connected with Atlanta by two electric street railroads, and is the seat of the Agnes Scott Institute for young ladies and the Donald Fraser School for boys. A battle was fought here 20 July 1864 between a portion of Sher¬ man's army, under General Thomas, and the Confederates under General Hood, the latter re¬ treating at nightfall. Pop. (1920) 6,150.

DECATUR, Ill., city and county-seat of Macon County, near the Sangamon River, and on the Wabash, the Illinois Central, the Cincin¬ nati, Hamilton and Dayton and the Vandalia railroads, 173 miles southwest of Chicago and 38 miles east of Springfield. It was settled in 1830 and in 1836 was incorporated. Decatur is in the midst of the famous Illinois corn belt and is the trade centre of sever.J cc*ir*Hes. The

chief manufacturing establishments are corn mills, railroad shops, iron works, flour mills, planing mills, agricultural implement works, engine and boiler works, casket and coffin fac¬ tories, bridge works, electric-light fixtures, corn-sheller, waterworks equipment, starch factories, soda fountain works and mantle factories. The United States census of manufactures for 1914 recorded for Decatur 126 industrial establish¬ ments of factory grade, employing 4,988 per¬ sons, of whom 4,003 were wage earners, receiving $2,326,000 annually in wages. The capital invested totaled $12,550,000, and the year's output was valued at $11,957,000; of this $5,291,000 was the value added by manufacture. The city has a large trade in grain, coal, live¬ stock and manufactured products.

The principal public buildings are the gov¬ ernment building, the county courthouse, the municipal buildings, a Carnegie library, home for aged and orphans, Saint Mary's Hospital, the churches (about 25 buildings) and the schools. There is a good system of public schools, including a well-equipped high school. There are two parish schools. The principal departments of the James Milliken University are located here. There are three national banks. The government is by

commission since 1911. The city owns and operates the electric-light plant and the waterworks. Lincoln re¬ ceived his first endorsement as presidential can¬ didate at the Illinois Republican Convention held here on 6 May 1860. Decatur is also the birthplace of the Grand Army of the Republic, Post 1 having been organized here on 6 April 1866. Pop. (1920) 43,818.

DECATUR, Ind., city, county-seat of Adams County, on the Saint Mary's River, and the Grand Rapids and I., Toledo, S. L. and K. C. and Erie railroads, 20 miles southeast of Fort Wayne, and near the eastern boundary of the State. Its principal industries are the manu¬ facturing of lumber, brick and machinery, and stone quarrying. It has municipal water and lighting plants, a Carnegie library and a Knight of Pythias home. Decatur was settled in 1840 and incorporated in 1882. Pop. 5,000.

DECATUR, Mich., town of Van Buren County, on the Michigan Central Railroad, 24 miles southwest of Kalamazoo. It is in a rich farming section and has an important trade in grain, fruit, celery and peppermint. The indus¬ tries are a large measure works, novelty factory, foundries, and manufactures of flour, stoves, etc., and two grain elevators. Pop. 1,500.

DECATUR, Tex., city, county-seat of Wise County, on the Fort Worth and Denver Rail¬ road, 45 miles northwest of Fort Worth. The town, which has municipal waterworks and electric-lighting plant, is the trade centre of an agricultural region and its industries are chiefly those of a cotton-growing country, with the quarrying of limestone. The Northwest Texas Baptist College is located here. Pop. (1920) 2,205.

DECAZES, de-kaz', Elie, Due, French statesman : b. Saint Martin du Laye, Gironde, 28 Sept. 1780; d. Decazeville, France, 25 Oct. 1860. He gained the confidence of Louis Bonaparte, king of Holland, whom he served even after his abdication in 1810; but joined the cause of the Bourbons in 1814 and under the second restoration discharged the duties of Prefect of Police at Paris with marked ability. In 1818 he

became Home Minister, and in November 1819 Premier. After the assassination of the Duke de Berry in 1820 he resigned and Louis XVIII made him a duke and his Ambassador to Eng¬ land, where he remained till December 1821. Under the reign of Charles X he opposed the extreme measures of the government, and after 1830 adhered to Louis Philippe. From 1834-48 he was grand referendary of the peers. Con¬ sult Daudet, E., (Louis XVIII et le due Decazes) (Paris 1899).

DECEASED WIFE'S SISTER MAR¬ RIAGE BILL, a bill to legalize marriage be¬ tween a man and the sister of his deceased wife that was brought up in almost every session of the British Parliament after 1835, when Lord Lyndhurst secured the passing of a bill which declared all such marriages null and void. The bill legalizing marriage with a deceased wife's sister passed the House of Com¬ mons several times, but till 1896 was invariably rejected in the House of Lords, with, however, decreasing majorities. In 1896 the bill was passed by the Lords, but went no farther. The Colonial Bill, passed in the House of Commons more than 20 years ago and in the House of Lords during the session of 1898, to make mar¬ riages of this class legally contracted in the colonies legal also in England, and the Scotch Bill, having a similar object, also was never carried, though there were not wanting high au¬ thorities who pronounced such marriages legal in Scotland even without any special permissive legislation. It may be added that marriage with a deceased wife's sister was specially legalized under the sanction of the Crown in all the Australian colonies, in Canada, Barbados, Cey¬ lon, Mauritius, New Zealand, South Africa and Jersey. Bills similar to the English bill were also passed in Natal. These were, however, re¬ fused ratification (by the Crown) for special or technical reasons. Throughout India marriages of this kind were universally legal among all sects and creeds, except British subjects whose domicile was in Great Britain. In every Chris¬ tian country, except Great Britain, such mar¬ riages were legal ; and at last, despite the oppo¬ sition and subsequent refusals of the High Church party to recognize the fact, marriage with a deceased wife's sister was rendered legal by the Act of 1907. The marriage of a woman with her deceased husband's brother, however, is still illegal, and the Act forbids the marriage of a man with the sister of his divorced wife during the wife's lifetime.

DECEIT, in law, the misleading of a person as to material facts, with the intention of fraud and to his damage. It has been held by the courts that erroneous and misleading statements without the intent to

defraud, but as a consequence of neglect of the duty of know¬ ing the truth as to such statements, has amounted to deceit. Deceit is recognized as a sufficient ground for the voiding of contracts, and as foundation for suit for damages.

DECEMBER, the 12th month of our year, from the Latin decern, 10, because of the Ro¬ man year instituted by Romulus it constituted the 10th month, the year beginning with March. In December the sun enters the tropic of Capri¬ corn and passes our winter solstice. This month was under the protection of Vesta.

DECEMBRISTS (in Russian «Deka-bristy®), name given in Russian history to the members of various secret societies which were formed in Russia during the reign of Alex¬ ander I, beginning in 1816, and rising in open insurrection on 14 Dec. 1825. The failure of Alexander I to put into effect his humanitarian ideals which he had promised to the people before his accession to the throne, and the utter inability of Count Arakchew, into whose hands passed the administrative power, to understand the needs and wishes of the people, caused a great dissatisfaction amongst the people and a secret society was formed under the name ,(<Soyuz spaseniya® (((Union for Salvation®) Ambng the founders of this union were several grand dukes, high officers of the army and the civil service. The main objects of that society, as expressed in its constitution, were to en¬ deavor by all means and available forces and for the general good to maintain the mild and honorable measures of the government, to pre¬ vent all evils and crooked actions on the part of the officials, *etc.* But its most secret and sacred ideal was to introduce in Russia a parliamentary system of government. In 1818 the society adopted another name Soyus Blagodenstviya (((Union of Prosperity®). During the coro¬ nation of Emperor Nikolas Pavlovich the Decembrists, profiting by the interregnum that preceded and the military disorder, proclaimed Prince Trubetzkvy dictator of Russia, with the aim of effecting a revolution and establishing a republican form of government. But Tru¬ betzkvy declined autocratic power ; the revolu¬ tion broke out, however, on 14 Dec. 1825, and was immediately suppressed and the ringleaders were summarily dealt with.

DECEMVIRS, (1) the 10 men appointed to codify the laws of ancient Rome. Commission ers were sent to Greece to study Greek statute law and on their return (451 B.c.) all the magistracies were suspended and a commission of 10 patricians (decemviri le gibus scribendis) appointed, with consular powers to reduce the laws to writing and to

govern the state during their term of office. The finished code, after being ratified by the comitia of the centuries, was erected in the Forum inscribed on. 10 tables of wood. Next year the decemvirate was renewed and added two tables. The whole code was known as the Twelve Tables (q.v.). The president of both the decemvirates was Appius Claudius (q.v.). They resigned in 447 b.c. and the usual magistracies were restored. (2) The decemviri sacris faciundis were mem¬ bers of a sacred college, appointed for life, whose duty it was to take care of the Sibylline books and to celebrate the feasts of Apollo.

DECHAMPS, de-shan', Adolphe, Belgian journalist and statesman: b. Melle, 17 June 1807; d. near Brussels, 19 July 1875. Early in life a disciple of Lamennais, he subsequently became an orthodox Roman Catholic. From 1843 to 1845 he was Minister of Public Works, and from 1845 until August 1847, when the triumph of the Liberal party led to his secession, Minister of Foreign Affairs. From 1837 to 1851 he conducted the Catholic Revue de Bruxelles, founded by himself and Dedecker. He was an able administrator and an influential parliamen¬ tary speaker. He was the author of (L'Empire et l'Angleterre) (1860); (La France et l'Alle-

magne) (1865) ; (Le Prince de Bismarck et 1'entrevue des trois empereurs) (1873).

DECIDUOUS (Lat. deciduus, that falls down, from decidere, fall down, from de, down + cadere, fall), in botany, a term applied to various organs of plants, particularly leaves, to indicate their annual or periodic fall. When the calyx of a flower falls with the corolla it is called deciduous ; when it falls on the expan¬ sion of the flower it is called caducous. Decid¬ uous trees are those which for the most part annually lose and renew their leaves. See Duration.

DECIDUOUS TEETH. See Teeth.

DECIMAL ARITHMETIC, the common system of arithmetic, in which the figures or digits ranged in a row increase in value by being

multiplied by 10 as they are read from right to left, and decrease at a similar ratio from left to right. Also that part of the science of numerical calculation which treats of deci¬ mal fractions. See Fractions.

DECIMAL FRACTION, a fraction whose denominator is a decimal or power of 10. Thus

1234

- - is a decimal fraction. It may be decom-

posed into the sum

1000 200 30 4

- - + - + - + -

100 100 100 100

3 4

=10 +2 + - + -

10 100

By an obvious extension of the method of local values, where each digit has 10 times the value of the like digit, which immediately suc¬ ceeds it, the above decimal fraction may clearly be written more concisely in the form 12.34, where the decimal point after the 2 merely serves to indicate which digit represents units.

In this abbreviated form a decimal fraction is termed a decimal. The operations of addi¬ tion, subtraction, multiplication and division may be applied to decimals in exactly the same man¬ ner as to integers; hence their great utility. They present, nevertheless, this disadvantage, that comparatively few fractional quantities or remainders can be exactly expressed by them ; in other words, the greater number of common fractions cannot be reduced, as it is called, to decimal fractions, without leaving aˆ remainder.

Common fractions, such as §, i, -7 and for instance, can be reduced to decimal fractions only by multiplying the numerator and denominator of each by such a number as will convert the denominator into 10, or 100, 1,000, *etc.* (The common process is merely an abridg¬ ment to this). But that is possible only when the denominator divides 10 or 100 without re¬ mainder. Thus, of the above denominators, 2 is contained in 10, 5 times; 4 in 100, 25 times; and 25 in 100, 4 times; therefore.

1 1 X 5_5_ 1_1 X 25

2 2 X 5 10 4 4 X*25

25 9 9 X 4 36

= — =25; — = - =—=.36

100 25 25 X 4 100

But neither 3 nor 7 will divide 10 or any power of 10; and therefore these numbers cannot pro¬

duce powers of 10 by multiplication. In such cases we can only approximate the value of the fraction, though this approximation may be made as close as we wish by taking a sufficient number of places after the 0 point. Thus F$=3.3333 is less than .0001 ; %=3. 33333 is less than .00001, and so on. Analogues of decimal fractions can be made by taking some other number than 10 as the base of our system of notation : if 6 is our base, for instance, we may write 20 ˆ as 32.143, meaning (3X6) + 2 ~F (ixy6) + (4X y62) + (3 x y63).

DECIMAL SYSTEM. See Metric Sys¬ tem.

DECIMATION, in war, the selection of the tenth man of a corps by lot for punishment, as in case of a mutiny. It was early practised by the Romans. Sometimes every tenth man was executed ; sometimes only one man-of each company, the tenth in order, as was the case when the Saxons mutinied against Bliicher be¬ fore the battle of Waterloo.

The practice was followed by Essex at Dub¬ lin (1599), by the Austrians at Leipzig (1642), and by the French at Treves (1675). The term is frequently used in a loose way for the de¬ struction of a great but indefinite proportion of people, as of an army of inhabitants of a country.

DECIUS, GAIUS, ga'yus de'shi-us, Messius Quintus Trajanus, Roman emperor: b. Buba-lia, Panonia; d. 251 a.d. He reigned from 249 a.d. to 251 a.d. He persecuted the Chris¬ tians, and among them martyred Fabianus, bishop of Rome, Cyprian, bishop of Carthage, and cast Origen into prison. He perished with his army in a bloody battle near Abricium against the Goths, through the treachery of Gallus, who succeeded him as emperor.

DECIUS JUBELLIUS, Roman general. He was appointed to the command of the Cam¬ panian legion, which had been stationed at Rhegium for its protection 281 b.c. Under pre¬ text that the inhabitants were intending to be¬ tray the garrison to Pyrrhus, he

perpetrated the greatest atrocities. Shortly after, having been attacked by a disease in his eyes, he sent to Messana for a physician, who happened to be a native of Rhegium. The physician, to revenge the cruelties inflicted on his countrymen, pre¬ scribed an application, enjoining Decins to con¬ tinue it, however painful it might be, till the physician again returned. The pain became in¬ supportable, and at length Decins found that his sight was destroyed. To complete his punishment, the Romans gave effect to the com¬ plaints of the citizens, and he perished by his own hands in a Roman prison.

DECIUS MUS, mus, Publius, Roman con¬ sul. In a war against the Latins 340 b.c., he devoted himself to death for his country, that is, after certain rites, rushed into the midst of the foes to certain death. His example was followed by his son, and, according to some historians, by his grandson. Such acts of self-devotion (devotioncs) were not unusual at that time, when patriotism and piety exerted a powerful influence.

DE CIVITATE DEI, <The City of God.> Augustine's characteristic theological system is to be looked for elsewhere in his writings against Pelagius and the Donatists : the depths

of his individual religious experiences are re¬ vealed with keen powers of self-analysis in (The Confessions.) The title of the present work suggests that Augustine had in mind the kind of composition of which Plato's <Republic) is the supreme example. Such a detailed ideal construction of a newly-organized polity was, however, far from the author's mind. For this reason to appeal to (The City of God) as a preliminary outline of mediaeval politics is to misunderstand the point of view from which it was written. Neither Plato nor More nor Campanella nor Harrington, nor • the various recent constructions of a new order of society along socialistic lines, can be used to render intelligible the purpose Augustine had in view. There are political and sociological elements in Augustine's work as there are theological and philosophical presuppositions, but there is no systematic development of any of these factors; nofc because Augustine had an unsystematic

mind like Clement of Alexandria, but because he prepared (The City of God} as a complete armory of Christian apologetic adapted for the questions debated between Christians and Poly¬ theists in the 4th century. Just because the book was written to meet peculiar contemporary conditions, it is full of what appears to the modern reader as extraneous and tedious material. (The City of God> is primarily an attack on paganism in the form in which paganism was still supported? in the age after Christianity had become, under Constantine, the recognized religion of the Roman state. Augustine planned on a large scale an argument in rebuttal against the claim made by the ad¬ herents of old-fashioned polytheism that the adoption of Christianity by the Roman Empire had brought about political ruin and ethical de¬ moralization. To make the anti-pagan case complete, copious quotations are made from the historic records of the Roman people to show that they had always be'en debarred and that their political schemes had failed. Augustine uses extensive literary sources, but as he is dealing with what was to him a practical every¬ day issue, he often draws examples and illus¬ trations from actual life. He describes the manufacture of silverware, he tells of miracu¬ lous cases of healing, relates wonders he has witnessed himself, notes in detail examples of heathen astrology and thaumaturgy, mentions the invasion of the Goths under Alaric and refers to the civil wars due to the dynastic quarrels in the family of Constantine. All this varied material is treated from a special point of view which itself is closely related with the generally misunderstood title of the book. Ac¬ cording to Augustine the summum bonum is man's supernatural union with God. All rational beings enjoy the privilege of this union either under normal or transcendent conditions. (The City of God) then is the community of all spiritual beings, angels as well as men, who are within the sphere of divine grace. In sketching such a community of souls, questions of a visible, social organization are altogether unimportant. All the emphasis is laid upon the contrast between the city of earthly beings, whose end is destruction, and the city of God, in which the souls of the elect realize the true laws of their own being. There is nothing in the book which leads one to infer that Augus¬ tine looked for a reorganization of society

under the influence of the Church as a result of the downfall of the Roman Empire. Incident¬ ally in the course of his argument Augustine introduces judgments on the actual social order as he knew it which are of permanent interest. He touches on aesthetic questions, discusses family and state relationships, examines the foundation of the right of

private property and the justification of class distinctions. To this extent (The City of God} has a permanent place in sociological thought, because it gives expression to the reflections of a keen and original mind on the last stage of ancient civili¬ zation.

Among the many translations of (The City of God) the most satisfactory is that of Marcus Dods in T. and T. Clark's (Patristic Library. 5 A reprint of the 17th century revision by John Healey will be found in Dent's (Temple Classics. J The Latin text appears in a con¬ venient form in Teubner's series of classical texts. The best critical edition is that published in the (Latin Ecclesiastical Writers) (Vienna Academy Collection). Among modern works the following are especially useful : Carlyle, R. W., and Carlyle, S. J., < History of Mediaeval Political Theory) ; Bertrand, L., (Saint Augustin) ; Troeltsch, E., (Augustin die christliche Antike im Mittelalter) ; Mausbach, J., (Dip Ethik des HI. Augustin) ; Schilling, O., (Die Staats und Soziallehre des Augustins* ; Hardy, Georges, (Le De Civitate* ; Angus, S., (Sources of the First Ten Books of Augustine's City of God* ; Eucken, R., (Die Lebens auschauungen der grossen Denker.*

Wilson Lloyd Bevan.

DECK. See Ship.

DECKEN, Karl Klaus von der, German African traveler: b. Kotzen, Brandenburg, 8 Aug. 1833; d. Africa, 25 Sept. 1865. He en¬ tered the Hanoverian army, which he left after 10 years' service (1860) to follow his bent toward travel. On Barth's advice he went to Zanzibar and started thence on a journey to Lake Nyassa, which failed through the treach¬ ery of his Arab guide. Next year he started on a second and successful journey to the moun¬ tain regions of Kilimanjaro. In the follow¬ ing year, with Kersten, he climbed that moun¬ tain to the height of 13,780 feet. In 1863 he made an extensive voyage along the east coast of Africa, after which he returned to Europe to plan a great expedition for the exploration of East African rivers. This journey ended in disaster and Decken was murdered by a So¬ mali. A description of his journeys was pub¬ lished by Kersten and other survivors in (Karl Klaus von der Deckens Reisen in Ostafrika 1859-65 > (4 vols., 1869-79).

DECKER, Thomas. See Dekker, Thomas.

DECLARATION, (1) a formal or posi¬ tive explanation of any circumstance. (2) That part of law process or pleadings in which a statement of the plaintiff's complaint against the defendant is set

forth, with the additional circumstances, of time and place when and where the injury was committed, where these-are requisite. (3) A simple affirmation allowed in certain cases to be taken instead of an oath or solemn affirmation. (See Affirmation; Oath). . In the United States, the form of an oath is immaterial, provided it be such as the witness believes is binding upon his conscience,

but it is essential that the oath, declaration or affirmation be administered in a manner pre¬ scribed by law. Mere technical variations do not affect the validity of an oath, and verbal deviations are immaterial. Perjury may be committed although the person was improperly sworn. No person is permitted to make a dec¬ laration or affirmation unless he has conscien¬ tious scruples against swearing or taking an oath. Declaration in lieu of an oath or affirma¬ tion has become general throughout the United States. (4) The statement made by a prisoner, on being arrested on suspicion of a crime, which is taken down in writing.

DECLARATION, Dying, a declaration made by a person near death. The rule .that secondary or hearsay evidence is inadmissible suffers an exception, in law, in the case of a declaration made by a person convinced of im¬ pending death and who may not survive the trial of the accused. In Scotland, the dying declaration of a witness is admissible even though not conscious of the danger of death, and in the United States a declaration is fre¬ quently admitted, both in civil and in criminal cases, as primary evidence, without regard to the immediate apprehensions of death. The principle, under which the dying declaration is admitted is that the awful situation of the dying person is as powerful over conscience as the obligation of an oath, and does away with all motive to disguise the truth. Accordinglytthe person against whom a dying declaration is put in evidence may be allowed to show that the deceased was not of such a character as to feel the religious obligation of the situation. A dy¬ ing declaration may be adduced for as well as against a person accused of crime ; and .there are cases on record in which persons charged with murder have

been successfully exculpated on this kind of evidence.

DECLARATION OF INDEPEND¬ ENCE, United States. The steps by which the extra-legal de facto governments of the colonies during the early Revolution — the Committees of Correspondence and Safety — were turned into formal legislative bodies, are detailed under' Constitutions, State; and Con¬ gress, Continental.

The first Congress, of 1774, assumed neither executive nor legislative authority. The sec¬ ond, early in its existence (6 July 1775), for¬ mally disclaimed any purpose of separation. The first half-unconscious step was the appoint¬ ment, November 1775, of five commissioners to maintain communications with friends of the colonies in <(Great Britain, Ireland, or else¬ where ® : only independent countries send min¬ isters. Thomas Paine's (Common Sensed urg¬ ing independence as inevitable, and the sooner the better, appeared 9 Jan. 1776; it had wide in¬ fluence and unlocked many tongues. So gen¬ eral was the concurrence with Paine's views that, in fear of them, three of the middle colo¬ nies — New Jersey, Pennsylvania and Mary¬ land — instructed their delegates to vote against any such measure; the other two. New York and Delaware, were bitterly divided and their delegates took no part in forwarding the inde¬ pendent movement ; South Carolina was also hostile, contrary to its usual habit of eager initiative — probably from fear of England stirring up the great Indian confederations against the South, as was afterward done. But vol. 8 — 36

events pushed them on. British naval captures led Congress, 23 March, to declare all British vessels lawful prize; and on 6 April it opened all United States ports to all vessels other than British. This was an act of absolute sover¬ eignty, acknowledged or not. The colonies, under instructions from Congress, were steadily forming State governments (see Constitutions, State) ; and Congress 10 and 15 May recom¬ mended all the remaining ones to take the same step, which of course involved making their common Union independent also. John Adams was the foremost agent in all this work. The North Carolina convention 22 April re¬ solved to <(concur with those in the other colonies in declaring independence.® On 17 May Virginia instructed her delegates in Con¬ gress to move a ˆDeclaration of Independence® ; and on 7 June Richard Henry Lee made a motion to that effect in Congress, which was seconded by John Adams. On the 8th and 10th this was debated in Committee of the Whole ; but action -was postponed *to 1 July, as some delegations were averse and others

were wait¬ ing instructions.

On the 10th a committee of five was ap¬ pointed to draw up the Declaration : Thomas Jefferson of Virginia, John Adams of Massa¬ chusetts, Benjamin Franklin of Pennsylvania, Roger Sherman of Connecticut and Robert R. Livingston of New York. Its composition was assigned to Jefferson by the committee; the latter and Congress made many changes, but mostly by omission rather than alteration of wording, so that the language is practically all Jefferson's. The chief cancellations were five; (1) and (2) The last two counts of his indict¬ ment of the king. (1) That he had <(inc.ited treasonable insurrections of our fellow-citizens® by promising them confiscated property. The charge was probably felt to be too weak to maintain, as well as likely to weaken the gen¬ eral case. (2) That he had carried on the slave-trade, and refused to allow American leg¬ islatures to suppress it. South Carolina and Georgia, which were actively carrying it on themselves, would not permit this ; and too much Northern wealth had been earned by it not to make the North very willing to suppress the passage, which would impress foreign na¬ tions unpleasantly as to their sincerity. (3) Superfluous rhetoric about the incredulity of <(future ages® as to the daring tyranny of the king. (4) Review of American history, denying that Great Britain had assisted in our estab¬ lishment, and alleging that <(submission to their parliament was no part of our constitution.® It was thought best to go as little into the remote origins as possible, fixing the attention upon recent oppressions and natural rights ; and above all, to ignore the existence of Parliament altogether. That body is not alluded to, except inferentially as the <(others® with whom the king has <(combined® to subject the colonies to an alien and illegal jurisdiction. This was in pursuance of the steady contention of the col¬ onies. (5) Attacks on the English people for re-electing <(the disturbers of our harmony,® and allowing their chief magistrate to perpe¬ trate these enormities. This was struck out to avoid giving offense to the friends of the colo¬ nies in England, who in fact, by upholding Lib¬ eral leaders and even generals, saved us at last.

The Declaration was reported 28 June. On

1 July as fix-cd, debate was begun afresh on Lee's resolution. New Jersey and Maryland had reversed their instructions meantime. In Committee of the Whole that evening, nine States voted for it; Pennsylvania and South Carolina voted against it (but the latter dele¬ gates, possibly after hearing from the South, offered without instructions to vote yes if it would make a unanimous vote), Delaware was divided, and New York refused to vote. The (<yea® Delaware delegate, McKean, sent an urgent message to the third, Caesar Rodney, then on a political trip in southern Delaware, to come on at once ; Rodney traveled 80 miles the next day, arrived in the evening, and reversed his State's vote. Pennsylvania reversed hers also; and this leaving only -the abstaining Now York delegates out of the voting, the South Carolina members voted yes. This carried the motion that <(these united colonies are and of right ought to be free and independent States, that they are absolved from all allegiance to the British Crown, and tha-t all political con¬ nection between them and the state of Great Britain is and ought to be totally dissolved,® by 12 yeas and no negative vote. On the 3d the Declaration was taken up, and as amended was passed on the evening of the 4th. The anniversary of the fact of independence is therefore the 2d ; that of the adoption of the specific document in which it was proclaimed to the world is the 4th, as celebrated. The usual statement that it was Signed® by the members at this time, however, is incorrect; it was signed by the president and secretary, whose signatures only were borne by the printed copies sent out. The journals of Congress did not enter the Declaration, but left a blank for it, which was afterward filled in and the signa¬ tures taken from the engrossed copy. On the 9th the New York convention ratified it, and the delegates gave in their formal adherence on the 15th; it was then, as entitled, ((The Unanimous Declaration of the Thirteen United States of America.® Six additional Pennsyl¬ vania members also recorded a formal vote on the 20th. On 19 July Congress passed a reso¬ lution that it should be engrossed on parch¬ ment, and on 2 August it was signed by 53 members present ; Gerry of Massachusetts, McKean of Delaware and Thornton of New Hampshire were empowered by their legisla¬ tures to sign later, Thornton not signing till 4 November. For an analysis of the Declaration and bibliography see United States — The Declaration of Independence.

The parchment with the original signatures was deposited with the

Department of State when the government was organized in 1789. In 1823 John Quincy Adams had a copperplate facsimile made, to give copies to the signers and their heirs ; but unfortunately it ruined the original. The wet sheet pressed on the face drew out the ink so that the signatures have become illegible and almost invisible, and the text partially so ; and after being shown for many years only on special occasions, in 1894 it was definitely sealed up in a steel case to keep it from light and air. From 1841 to 1877 it was in the Patent Office.

The signers represented the States as fol¬ lows :

New Hampshire: Josiah Bartlett, William Whipple, Matthew Thornton.

Massachusetts: John Hancock, Samuel

Adams, Robert Treat Paine, Elbridge Gerry.

Rhode Island: Stephen Hopkins, William Ellery.

Connecticut : Roger Sherman, Samuel Hun¬ tington, William Williams, Oliver Wolcott.

New York: William Floyd, Philip Living¬ ston, Francis Lewis, Lewis Morris.

New Jersey: Richard Stockton, John With¬ erspoon, Francis Hopkinson, John Hart, Abra¬ ham Clark.

Pennsylvania: Robert Morris, Benjamin Rush, Benjamin Franklin, John Morton, George Clymer, James Smith, George Taylor, James Wilson, George Ross.

Delaware : Caesar Rodney, George Reed, Thomas McKean.

Maryland : Samuel Chase, William Paca, Thomas Stone, Charles Carroll of Carrollton.

Virginia: George Wythe, Richard Henry-Lee, Thomas Jefferson, Benjamin Harrison, Thomas Nelson, Jun., Francis Lightfoot Lee, Carter Braxton.

North Carolina: William Hooper, Joseph Hewes, John Penn.

South Carolina : Edward Rutledge, Thomas Heyward, Jun., Thomas Lynch, Jun., Arthur Middleton.

Georgia: Button Gwinnett, Lyman Hall, George Walton.

It may be noted that several of these were not members of Congress when the Declaration was passed.

The Declaration, as agreed to, follows :

A DECLARATION

BY THE REPRESENTATIVES OF THE UNITED STATES OF AMERICA IN CONGRESS ASSEMBLED

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which the laws of nature and nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that, whenever any form of government becomes destructive of these ends, it is the-right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long estab¬ lished should not be changed for light and transient causes; and, accordingly, all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But, when a long train of abuses and usurpa¬ tions, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. Such has been the patient sufferance of these colonies, and such is now the necessity which constrains them to alter their former systems of government. The history of the present King of Great Britain is a history of repeated injuries and usurpation, all having, in direct object, the establishment of an absolute tyranny over these States. To prove this, let facts be submitted to a candid world:

He has refused to assent to laws the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and, when so suspended, he has utterly neglected to attend to them.

He r?ˆuse(ˆ to pass other laws for the accommodation of large districts of people, unless those people would relinquish the.right of representation in the legislature; a right inestimable to them, and formidable to tyrants only.

He has called together legislative bodies at places unusual.

SIGNING THE DECLARATION OF INDEPENDENCE

.

.

uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly, for opposing, with manly firmness, his invasions on the rights of the people.

He has refused, for a long time after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the State remaining, in the meantime, exposed to all the dangers of invasion from without, and convulsions within.

He has endeavored to prevent the population of these States; for that purpose, obstructing the laws for naturaliza¬ tion of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appro¬ priations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone, for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers to harass our people, and eat out their substance.

He has kept among us, in times of peace, standing armies without the consent of our legislatures.

He has affected to render the military independent of, and superior to, the civil power.

He has combined, with others, to subject us to a juris¬ diction foreign to our constitution, and unacknowledged by our laws ; giving his assent to their acts of pretended legislation :

For quartering large bodies of armed troops among us:

For protecting them by a mock trial from punishment, for any murders which they should commit on the inhabitants of these States:

For cutting off our trade with all parts of the world:

For imposing taxes on us without our consent:

For depriving us, in many cases, of the benefit of trial by jury:

For transporting us beyond seas to be tried for pretended offenses:

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries, so as to render it at once an example and fit instrument for introducing the same absolute rule into these colonies:

For taking away our charters, abolishing our most valuable laws and altering fundamentally, the powers of our govern¬ ments:

For suspending our own legislatures, and declaring them¬ selves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection, and waging war against us.

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people.

He is, at this time, transporting large armies of foreign mercenaries to complete the work of death, desolation, and tyranny, already begun, with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow-citizens, taken captive on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrections amongst us, and has endeavored to bring on the inhabitants of our frontiers, the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions.

In every stage of these oppressions we have petitioned for redress in the most humble terms; our repeated petitions have been answered

only by repeated injury. A prince whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them, from time to time, of attempts made by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circum¬ stances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them, by the ties of our common kindred, to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They, too, have been deaf to the voice of justice and consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war — in peace, friends.

We, therefore, the representatives of the United States of America, in General Congress assembled, appealing to the Supreme Judge of the World for the rectitude of our intentions, do, in the name and by the authority of the good people of these colonies solemnly publish and declare, That these United Colonies are, and of right ought to be, Free and Independent States; that they are absolved from all allegiance to the British crown, and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved; and that as free and independent States, they have full power to levy war, conclude peace, contract alliances, establish commerce and to do all other acts and things which independ¬ ent States may of right do. And for the support of this declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our fortunes, and our sacred honor.

‘a/1 aSr?u,ˆ

jul/l

DECLARATION OF INDULGENCE, a

name applied to the declaration or proclama¬ tion issued by Charles II (15 March 1672), and also to a proclamation of James II (4 April 1687), which were ostensibly acts granting lib¬ erty of conscience to all whose rights to their own method of worship had been curtailed by the Conventicle and Five Mile Acts. These royal acts and declarations of Charles and James suspended the enforcement of the penal statutes which had been made against the Roman Catholics and Nonconformists, and re¬ moved the test of qualification for the holding of office in the corporations, army and civil service. James II ordered the declaration to be read in the churches 25 April 1688. The pri¬ mate and six bishops of the Church of England protested against the order, saying that under cover of zeal for toleration, the governing motive was the benefit of Roman Catholicism ; that it was aimed against the established church and was unconstitutional. The king declared their act seditious libel against the Crown and sent the offenders to the Tower. Later they were tried and acquitted, 30 June 1688. On the day of their release an invitation was sent to William of Orange to come and save England from the Roman Catholics. The signers of this invita¬ tion, who wished the downfall of James II, were the Earls of Danby, Devonshire and Shrewsbury, the bishop of London, Admiral Russell and Henry Sydney. (See Test Acts). Consult Howell, (State Trials) ; Burnet, his¬ tory of James IP ; Fox, (Reign of James II.)

DECLARATION OF LONDON. A

diplomatic instrument framed at an interna¬ tional conference held in London in 1909 for the purpose of settling and defining certain rules of maritime law in times of war. The famous Declaration of Paris (q.v.) in 1856 enacted, among other provisions, that a neutral flag covered enemy’s merchandise except con¬ traband of war, and that

neutral merchandise, with the exception of contraband of war, was not liable to capture under an enemy's flag. Although the 1856 declaration was never ac¬ cepted by the United States and never ratified by Great Britain, both those nations regarded themselves as being bound by it, and those principles were acted upon by all belligerent nations in all wars between 1856 and recent years. By the 14 Hague conventions of 1907 and the Declaration of London two years later further efforts were made to codify maritime laws in war, especially those referring to the capture of enemy property. But ever since 1856, and more especially after 1907 and 1909, there was a steady growth of opposition in Great Britain against these rules governing capture at sea, on the ground that they deprived the British navy of its most effective weapon against an enemy. Under the pressure of public opinion the Brit¬ ish government refused to ratify the 1909 decla¬ ration, for it had been signed without the knowledge either of the people or the Parlia¬ ment. The ministry endeavored to carry the measure by the Naval Prize Bill in 1911; the colonial ministers then assembled in London for the Imperial Conference realized the inher¬ ent danger of the declaration to the empire in case of war and demurred against its ratifica¬ tion. Sir Edward Grey, however, won them over by stating that the Declaration ((might be

made better than it is if we could get other powers to agree," but that it had either to be taken as it stood or left altogether. The House of Lords, however, came to the rescue and rejected the bill. Speaking from knowledge gained under actual war conditions, it is now easy to realize that the Declaration of London would, if acted upon, have been more accept¬ able to a nation like Germany than to a people situated like the British. How it would have impaired British naval power may be gathered from the following examples : It was made eas}' to break a blockade, for the right of a blockading force to capture a blockade-runner did not cover the whole period of her voyage and was confined to ships of the blockading force; stereotyped lists of contraband and non¬ contraband were drawn up, instead of the old custom of leaving the question to the discretion of the Prize Court; a ship carrying contraband could only be condemned if the contraband formed more than half its cargo ; a belligerent warship could destroy a neutral vessel without taking it to a port for judgment; the transfer of an enemy vessel to a neutral flag was pre¬ sumed to be valid if effected more than 30 days before the outbreak of war ; the question of the test of enemy property was left in high confusion; a neutral vessel, if accompanied by any sort of warship of her own flag, was ex¬ empt from search; belligerents in neutral vessels on the high seas were

exempt from capture, a provision by which enemy reservists could re¬ turn from foreign lands and rejoin their army; and the captain of a German raider could justify his sinking of British ships instead of taking them to a port for adjudication. Directly after outbreak of the war a British Order in Council announced on behalf of the Allies that the principles of the Declaration of London, though not binding upon them, would be ad¬ hered to. Successive Orders in Council, insti¬ gated by sheer necessity, altered the Declaration beyond recognition. Owing mainly to the ex¬ istence of the British navy, the German mercan¬ tile marine of 3,000,000 or more net tons dis¬ appeared from the seas. The provisions of the Declaration of London, however, left Germany free to use (he shipping of her neutral neigh¬ bors, Norway, with a tonnage of 1,718,000; Sweden with 805,000; Holland with 617,000; Denmark with 548,000, a total of 3,688,000 tons. Finally, an Order in Council, dated 7 July 1916, announced the withdrawal of Great Britain and her allies from the Declaration of London. The note stated that "these rules, while not in all respects improving the safeguards ap-forded to neutrals, do not provide belligerents with the most effective means of exercising their admitted rights," and <(lhat they could not stand the strain imposed by the test of rapidly changing conditions and tendencies which could not have been foreseen." Consult Cohen, A., (The Declaration of London) (London 1911).

DECLARATION OF PARIS. A formal

statement of rules as to the procedure of belligerent ships in time of war, proposed by the representative of France, and recommended by the plenipotentiaries of the several nations who drew up the Treaty of Paris in 1856. These rules were adopted by France, Great Britain, Austria, Prussia, Russia, Turkey and Sardinia. The United States declined to adopt the Decla¬ ration on the ground that they had no navy, and

in case of war would have to depend upon arm¬ ing merchant vessels as privateers. Other na¬ tions declining to ˆ agree were Spain, Mexico

and Venezuela. The code as adopted was as follows :

(1) Privateering is and remains abolished.

(2) The neutral flag covers enemy's goods with the exception of contraband of war.

(3) Neutral goods, with the exception of contraband of war, are not liable to capture under the enemy flag.

(4) Blockades to be binding must be effec¬ tive, that is to say, maintained by a force suffi¬ cient to prevent access to the coast of the enemy.

DECLARATION OF RIGHTS. The

Stamp Act Congress (see Congress, Conti¬ nental) of 1765 published a "Declaration of Rights and Grievances of the Colonists of America,® protesting against the Stamp Act, and any other effort to tax the colonists while deny¬ ing them representation in the Parliament which imposed the taxes. They sent a petition to the king, and another to Parliament, claiming the same rights as were enjoyed by Englishmen born within the British Isles. The right of rep¬ resentation was included in these ; but instead of petitioning for that right, they declared its obvious impossibility a reason why they should not be subject to taxation. The Continental Congress of 1774 (see Congress, Continental) asserted a similar claim in its declaration, as a preliminary to calling a final congress, and the Declaration of Independence begins with a like assertion. The assertion of such claims was considered so vital in written constitutions by men of that age that the strongest objection to our national one was its omission in this particular, and the storm of amendments pushed forward (see Constitutional Amendments) consisted mainly of bills of rights. For a state¬ ment of the Bill of Rights of the English nation prepared for the convention that called William and Mary to the throne, see Bill, Bill of Rights.

DECLARATION OF WAR. A public proclamation in which one government de¬ clares itself to be at war with another. In the United States, Congress alone has the power to declare war, and when that body votes for war with a foreign power, such a measure is con¬ sidered tantamount to a declaration of war. Prior to the ratification of The Hague Con¬ vention (q.v.) which provided for procedure in regard to the opening of hostilities, the doc¬ trine that notice must be given an enemy be¬ fore commencing hostilities had not been re¬

garded as an obligation, and practice respect¬ ing it had shown no uniformity. Owing to the world-wide use of the telegraph, submarine cable and wireless telegraphy and the wide diffusion of news by which every incident in the events leading to war are instantly pub¬ lished, a formal declaration was scarcely deemed necessary or required by morality or interna¬ tional law, and each belligerent was usually satisfied with announcing its warlike intentions to its own subjects and to neutrals. On the outbreak of war belligerents have usually fol¬ lowed the custom of issuing a manifesto de¬ scribing the events leading to the necessity for such a declaration and justifying their attitude, but such a document is not obligatory, though oftentimes useful. The Hague Convention, to

which the United States subscribed, provides as follows :

Article I. — The contracting powers recognize that hos¬ tilities between themselves must not commence without previous and explicit warning, in the form either of a reasoned declaration of war or of an ultimatum with conditional declaration of war.

Article II. — The existence of a state of war must be notified to the neutral powers without delay, and shall not take effect in regard to (hem until after the receipt of a noti¬ fication, which may, however, be given by telegraph. Neutral powers, nevertheless, cannot rely on the absence of notifica¬ tion, if it is clearly established that they were in fact aware of the existence of a state of war.

The first step after an endeavor to adjust the difficulties by diplomacy is an ultimatum, the non-compliance with which on or before the time limit set usually means the outbreak of hostilities, though often no absolute time limit is set. This happened in President Wilson's demand on 25 June 1916 that Carranza, constitutionalist President of Mexico, imme¬ diately release the American troopers captured in the encounter at Carrizal and make an early declaration as to his intentions regarding the American punitive expedition then in Mexico. Several days elapsed before Carranza replied and even then failed to answer fully, but this was overlooked since he evinced a desire, to adjust the dispute diplomatically, thus removing the immediate pressing necessity for commenc¬ ing hostilities. For legal purposes the date of the official opening of a war is usually stated in the declaration. In April 1898 the United States sent an ultimatum to Spain demanding her instant withdrawal from Cuba on pain of war. On her refusal, Congress, 25 April 1898, declared that a state of war

between the two countries had existed since 21 April. The same condition obtained in the Russo-Japanese War, the Japanese Minister on 13 Jan. 1904 having presented a note to the Russian government requesting a prompt reply, implying that if there were an unreasonable delay, hostilities would be commenced by Japan. On 5 February telegraphic instructions were issued to the Japanese Minister to announce to the Russian government that Japan had terminated negotia¬ tions relative to the proposed Russian conven¬ tion, which communication was made the fol¬ lowing day. On the 8th hostilities began at Port Arthur but the formal declarations of war were not issued until 10 February. When no direct notice is given war is held to date from the time when either party commits the first hostile act. In 1854, before the British Ambassador had withdrawn, a British fleet steamed into the Black Sea to compel the re¬ tirement of the Russian fleet to Sebastopol. On the other hand in 1870 Bismarck received a formal notice from the French charge, and in 1877 Russia sent a formal dispatch to Turkey. For the various declarations on the outbreak of the European War in 1914 see War, Euro¬ pean. Consult Wilson, George G., interna¬ tional Law) (New York 1910).

DECLARATORY ACT, an act passed by the English Parliament, 7 March 1766, accom¬ panying the repeal of the Stamp Act, asserting the constitutional right of the king, with the advice of Parliament, to bind the colonies by its laws and action “in all cases whatsoever.® This is English colonial law still ; but no at¬ tempt is made to enforce it against the wishes of the colonies, except where the rights of British subjects are infringed.

DECLE, dakl, Lionel, English explorer and author: b. Rocourt, Saint Quentin, France, 16 May 1859; d. 1 March 1907. He was of French parentage but a naturalized Englishman. He traveled extensively in Asia, Africa and America, was on the staff of the Pall Mali Gazette for several years and commanded the Daily Telegraph expedition from the Cape to Cairo (1899-1900). He published (Three Years in Savage Africa) ; (Trooper 3809, > an account of his personal experience in

the French army; (The New Russia) (1906).

DECLENSION, the change of termina¬ tion in certain classes of words, in various lan¬ guages, to indicate the relation in which those words stand toward other words in a sentence. The condition of change to which the words are brought by the several terminations are styled cases (Lat. casus) or fallings, for some reason imperfectly understood. The words subject to declension are of the classes, noun, adjective, pronoun, article. In the Latin language gram¬ marians generally recognize five declensions, five different modes of forming cases, and to each declinable word they assign six cases, namely, the nominative, genitive (or possessive), dative, accusative (or objective), vocative (or interjectional), and ablative. There is also a locative case, used in the names of cities, and in such forms as humi, domi. In the plural the nominative and vocative are always of the same form ; so, too, are the dative and ablative. The Greek declensions are variously classified, but most generally made three in' number and the cases five, as well as two locative cases found in the dialects. The ancient Sanskrit language has eight cases of nouns and the present lan¬ guage of the Finns has 15; but the languages of western Europe derived from Latin — Italian, Spanish, Portuguese, French, *etc.* — have dropped the declinational terminations of the Latin, and hence the Latin for "man,® which is declined homo, ho minis, homini, hominem, homo, homine, has in those modern languages the one form homme in French, uomo in Italian, hombre in Spanish. The ancient Germanic language, from which English is descended, had declensions ; but in our language the only remnants of the an¬ cient forms are, the possessive cases of nouns and the objective case of pronouns, I, me; he, him; she, her; they, them. While in the Indo-European languages above cited, as well as in the Semitic tongues, the unity of the word is not destroyed by inflection, in languages like the Turkish, which are styled agglutinative, ele¬ ments are added in declension which supersede or obscure the individuality of the original word. See Case; Inflection.

DECLINATION, in astronomy, the dis¬ tance of a heavenly body from the celestial equator (equinoctial), measured on a great circle passing through the pole and also through the body. It is said to be north or south ac¬ cording as the body is north or south of the equator. Great circles passing through the poles, and cutting the equator at right angles, are called circles of declination. Twenty-four circles of declination, dividing the equator into 24 arcs of 15 degrees each, are called hour circles or horary circles.

DECLINATION, Magnetic. See Mag¬ netism — Terrestrial.

DECLINATION NEEDLE, or DECLI¬ NOMETER. The magnetic meridian passing through any place on the earth's surface is a vertical plane whose direction is that in which a magnetic needle, free to move about a vertical axis, comes to rest under the influence of the earth's magnetic force. In general, the mag¬ netic and geographical (or astronomical) merid¬ ians are not coincident ; the angle between is termed the magnetic declination, or (in nautical phraseology) the variation. It is east or west, according as the magnetic is east or west of the geographical meridian. Any apparatus for the measurement of this angle is termed a decli¬ nometer, and consists essentially of a means of ascertaining the two necessary elements — namely, the directions, at the place of observa¬ tion, of the two meridians. Permanently fixed instruments of this nature are set up in all magnetic observatories. They are generally self-registering, and record the slightest hourly, diurnal and annual variations in the declination of the magnetic needle, as well as the more violent changes due to magnetic storms. See Magnetism.

DECLINE AND FALL OF THE RO¬ MAN EMPIRE, The, a monumental work by Edward Gibbon, the first volume of which appeared in 1776, and the last in 1788. (The Decline and FalP has been pronounced bv many the greatest achievement of human thought and erudition in the department of history. It is a history of the civilized world for 13 centuries, during which paganism was breaking down, and Christianity was superseding it; and so bridges over the chasm between the Old World and the New. It is fnarked by dignity of style and picturesqueness of narration. The great criti¬ cism of the work has always been upon the point of Gibbon's estimate of the nature and influence of Christianity.

DECOCTION, in pharmacy, a solution of a vegetable principle largely obtained by boiling in water the substance containing the principle. Inasmuch as plant drugs usually yield their con¬ stituents more readily to hot water than they do to cold water, decoctions are preferred to in¬ fusions for obtaining the active principles of plants. Decoctions are not very much used at the present time, because of their great com¬ plexity, the active principles of plants being ob¬ tained by other means.

DECOIC ACID, or CAPRIC ACID, an

organic acid having the formula C10H20O2, and occurring in the form of various compounds in butter, cocoanut oil, fusel oil (from certain

sources), Limburg cheese and -the fatty matters extracted from the wool of sheep. It is solu¬ ble in alcohol and ether, but almost insoluble in cold water. It crystallizes in needles that have a faint odor suggestive of rancid butter, and is prepared by the distillation of oleic acid, or by the oxidation of that acid by nitric acid. The name ˆcapric® has reference to the fancied re¬ semblance of the odor to that of a goat ; while ˆdecoicˆ refers to the 10-carbon atoms that the acid contains.

DECOMPOSITION, Chemical, is the

separation of the constituents of a body from one another, these constituents being obtained either free or in a new state of combination. Limestone, for example, is decomposed into lime and carbonic acid, oxide of mercury into

mercury and oxygen, by heat. This is called simple decomposition. Definite organic bodies resemble inorganic in being influenced by similar forces, but the result in their case is somewhat different, arising from their different composi¬ tion. In the case of an organic body it is pos¬ sible to convert its constituents at once into their simplest states of combination, but it is also possible to obtain a large number of intermedi¬ ate compounds by regulating the decomposing action. The process by which such bodies are thus decomposed is styled by chemists com¬ pound decomposition. A double decomposition is a reaction in which the elements of two sub¬ stances rearrange themselves to form two new substances, each of which contains elements from each of the old substances. Thus salt and sulphuric acid react to give hydrochloric acid and sodium sulphate. See Reaction.

DECORAH, Iowa, city and county-seat of Winneshiek County, situated near the north¬ eastern corner of the State on the upper Iowa River, about 30 miles from its mouth, and on the Chicago, Milwaukee and Saint Paul and the Chicago, Rock Island and Pacific railroads. It is a centre of farming, milling and stockraising industries, and has

manufactures of wagons, metal boats, valves, patent medicines, etc : Luther College, Valder College and a hospital are the chief institutions. Decorah was settled in 1849 ; was incorporated as a town in 1857 and was chartered as a city in 1871. Its government is administered under a general law by a mayor elected biennially and a city council. Pop.

(1920) 4,039.

DECORATED STYLE, the second style of pointed (Gothic) architecture, in use in Great Britain from the end of the 13th to the beginning of the 15th century, when it passed into the Perpendicular. It is distinguished from the Early English, from which it was devel¬ oped, by the more flowing or wavy lines of its tracery, especially of its windows, by the 'more graceful combinations of its foliage, by the greater richness of the decorations of the capi¬ tals of its columns, and of the moldings of its doorways and niches, finials, etc., and gener¬ ally by a style of ornamentation more profuse and naturalistic, though perhaps somewhat florid. The most distinctive ornament of the style is the ball-flower, which is usually in¬ serted in a hollow molding. The Decorated style has been divided into two periods, namely, Early or Geometrical Decorated period, in which geometrical figures are largely introduced in the ornamentation ; and the Curvilinear, in which the peculiar characteristics of the style are ex¬ hibited. To this latter period belong some of the finest monuments of British architecture. See Architecture.

DECORATION, Interior. See Interior Decoration.

DECORATION DAY, a holiday observed in many States as an occasion for decorating the graves of soldiers killed in the Civil War, whether in national or private cemeteries. The custom of a ˆMemorial Day® (as it is other¬ wise called) originated with the Southern States, and was copied scatteringly and on dif¬ ferent days in some Northern States, — all in the spring, for natural reasons. On 5 May 1868 Gen. John A. Logan, then commander-in¬ chief of the Grand Army of the Republic, issued

an order appointing 30 May of that year for Grand Army services in so decorating graves — choosing that day possibly as being the date of discharge of the last Union volunteer of the War. The States which observe the day have adopted it singly, there being no national law on

the subject. It is a legal holiday in all States including Porto Rico, Hawaii, Alaska and the District of Columbia, with the exception of Arkansas, Florida, Louisiana, Mississippi, North Carolina, South Carolina and Texas. In Vir¬ ginia it is called Confederate Memorial Day.

DECORATIONS. See Orders and Deco¬ rations.

DECORATIVE ART. The generic name for all the arts which have for their purpose the embellishment or beautifying of buildings or other objects. Since the decorative arts, as such, make their appeal to the aesthetic sense in serving primarily the end of beauty rather than of utility, even though applied to objects of use, they are properly classed among the fine arts. (See Fine Arts). Yet inasmuch as their opera¬ tions do not produce independent creations but are applied to, or executed upon, buildings and objects of utility, the decorative arts form a class by themselves, midway between the useful arts and the independent or (<pure® fine arts, whose works are produced for their own sake, or rather for the sake of the aesthetic enjoy¬ ment which they in themselves afford — such as painting, sculpture, architecture or music. The higher forms of decorative art do, however, approach closely to the rank of independent art. Since architectural decoration employs both painting and sculpture for the embellishment of buildings, the sculptor or mural painter may produce for this purpose works of such beauty in themselves, apart from their function of decorating the building, as to rank with the finest works of independent sculpture or paint¬ ing. The pediment sculptures of the Parthenon are superb as statues, though deposed from the pediments for which they were designed. The world's museums are full of paintings originally designed as decorations of altars, ceilings or even furniture, but which, separated from their original settings, are admired as paintings, that is, as pure fine art. No absolute line can there¬ fore be drawn between decorative art on the one hand, and pure fine art on the other. Architecture, which ranks as one of the major fine arts, is itself the greatest of the decorative arts, its function being to make beautiful the utilitarian structures it designs for the shelter of man and of his varied activities. But by reason of its superior importance and its recog¬ nized place among the major fine arts, as well as its employment of many of the decorative arts in subordination to itself, it is rarely ranked with the latter.

Classification. — The decorative arts are divided into two main classes : those which serve architecture, that is, which are employed for the adornment of buildings or fixed struc¬ tures ; and those which are applied to movable objects. The first are the major decorative arts, or

the arts allied to architecture ; the sec¬ ond are commonly called the industrial decora¬ tive arts, or the minor arts. The major decora¬ tive arts include mural painting, architectural sculpture and carving, mosaic, inlay, stained glass and architectural woodwork, metalwork

and plasterwork. The industrial decorative arts include furniture, textile art (tapestries, rugs, carpets, embroidery, needlework, laces, brocades and printed fabrics), wall-papers, decorative ceramics and pottery, jewelry, goldsmith's and silversmith's work, bookbinding, typographical ornament, manuscript illumination and many other arts and industries. Some of the minor arts in their highest phases approach the pure fine arts, as in the case of cameos, medals and jewelry; others trench upon the domain of architectural decoration, as in the more monu¬ mental forms of church furniture. Here, again, absolute lines of demarcation cannot always be drawn.

For the discussion of sculpture applied to decoration see the article Sculpture; for that of decorative painting see Interior Decoration ; Mural Painting and Painting. See also Decorative Arts, Minor, of which a number are treated under separate titles, e.g., Book¬ binding, Embroidery, Furniture, Jewelry, Lace, Pottery, Tapestry, *etc.*

Methods and Technic. — A volume would be required even to summarize the immense amount and variety of the processes and manip¬ ulations of the decorative arts, and the books and manuals treating of them would fill a large library. In a brief article it is only possible to notice a few of the more general considera¬ tions involved. Decoration is effected by modi¬ fications of the form and surface of an object, or by the use of color, or by both combined. All the arts which manipulate form alone are called the plastic arts ; these include all kinds of modeling, carving, embossing, forging, cast¬ ing and all relief and incised work. The arts of decoration by color are the chromatic arts, such as painting, mosaic, inlay, stained glass, enamel, all textile work in color, damascening and niello-work in or on metal, and manuscript illumination. There are also many arts which combine plastic and chromatic manipulations.

On the side of design, the decorative arts make use of pictorial representation, not only in mural painting and decorative sculpture, but also in the minor arts, as in painted vases, mosaics and stained glass. Both the human figure and the forms of animals are prolific ele¬ ments in the decorative arts of almost all ages and peoples, with the exception of the majority of the Mohammedan arts, which exclude all realistic portrayals of living beings, even of plants. Flowers and foliage are conspicuous in certain styles of decorative art (see Plants,

Ornamental), but these are usually conven¬ tionalized, not represented in a purely realistic way. The original purpose of decorative repre¬ sentations of living form has usually been symbolic or allegorical, or even, in the more primitive arts, animistic. But as each art has developed, such forms have come to be used more and more for their purely decorative value, their original symbolic significance be¬ ing gradually lost. Along with these, all styles of decoration have developed other forms, purely ornamental, as motives which they have combined into patterns (conventional orna¬ ment), having little or no symbolic significance, but serving purely as embellishments, enrich¬ ing the object by a pleasing play and variation of line, light-and-shade and color, through the rhythmic repetitions, alternations, variations and contrasts of the pattern, The Mohammedan

races, deprived of the resource of naturalistic representation, have developed the art of sur¬ face patterning with purely geometric motives to an extraordinary degree of variety and splendor. See MohaMMePAn ART;

History.— Decoration is the earliest form of expression of man's aesthetic instinct. The fine arts had their birth in primitive efforts to embellish the person or to beautify objects of personal or ceremonial use. (See Aboriginal Art). With the advance of civilization, to the primitive arts of weaving, pottery and wood carving was added architecture, in the effort to .adorn the cave, hut or kraal of the tribe or of its fetish or gods. Later the art of smelt¬ ing metals enabled men to make tools of copper or bronze, later of iron and steel, superior to the primitive flint knives and axes. Decorative metalwork, jewelry and architectural sculpture and carving now began to advance to higher achievements than had been dreamed of before, and painting was applied to walls and ceilings with great effect. These developments took place first, some thousands of years b.c., in the Nile Valley, while in the valley of the Tigris-Euphrates a parallel development was going Ott, with brick and tile as the chief building ma¬ terials, in place of stone. In both regions tex¬ tile art was carried to a very high pitch of decorative beauty, .and gold, silver, bronze and glass as well as pottery were employed for dishes and vases of great elegance of form and richness of decoration.

These various arts were disseminated through the Mediterranean basin by Phoenician com¬ merce, and contributed to the formation of Greek decorative art, which, developing after the middle of the 7th century

b.c., excelled in two fields especially — architectural carving and sculpture, and pottery; although, indeed, the Greeks <(touched nothing that they did not adorn.® The Roman civilization, developing later* and borrowing freely from the Greek, carried the art of architectural carving to even higher perfection, at least in variety and splen¬ dor, especially during the Imperial Age, from 27 b.c to 313 a.d. The Romans made the first systematic applications of mosaic to architec¬ tural decoration. This art was taken up by the Byzantines in the 5th century a.d. and employed by them in wall and vault decorations of unsur¬ passed splendor, for at least eight centuries, in Italy as well .as in their own empire. They also excelled in ecclesiastical goldsmith's work, in enameling on metal, in needlework and in manuscript illumination. See Byzantine Art.

The Middle Ages witnessed the growth of two distinct systems of decorative art : that of the Christian world in Europe generally, which culminated in the superb triumphs of Gothic architecture, carving, stained glass and manu¬ script illumination, besides enamel and metal¬ work in France and inlay and mosaic in Italy; and that of the Mohammedan peoples in west¬ ern Asia, northern Africa, Spain and India. This Oriental art was especially rich in surface decoration (as in the stucco wall-paneling of the Moors), and in various forms of textile art — carpets, rugs and needlework. To this day the great peoples of Asia, the Chinese, Japanese and Hindus, as well as the Moham¬ medans of Persia, Turkey and parts of Arabia, are consummate masters of the minor arts.. The decorative arts of the non-Moslems of

DECORATIVE ART

Arabic, Byzantine, and European Designs of the 15th and 16th Centuries

I

India and of the Chinese and Japanese form a roup by themselves apart from the European evefopments, which they surpass in variety and richness of minute patterning, and in harmonies of brilliant colors, if not in intellectual quality.

The Renaissance, from 1400 on, revived many of the antique Roman forms, but de¬ veloped them on new lines. While stained glass passed out of general use, mural painting, from as far back as 1300 under Giotto (q.v.), took its place in Italy and spread thence into all countries. (See Painting). All the arts of wood, stone, metal and textiles were marvel¬ ously expanded, enriched and developed. Italy took the lead in all these arts except that of decorative sculpture, in which France has led ever since the early Middle Ages.

The first half of the 19th century was in Europe a period of artistic stagnation. Since then the decorative arts have been revived in all branches, but the development of machine production has greatly modified this develop¬ ment, generally for the worse. Hand-crafts¬ manship has greatly declined ; in certain in¬ dustries it has wholly disappeared. On the other hand, the multiplying of factory products has made possible a wider distribution of artis¬ tic manufactures than when only handwork pre¬ vailed. One effort, then, of modern artists is to perfect the design of machine-made products. But another, quite as important, is represented by the <(Arts and Crafts® movements of our time, which seek to revive forgotten and neglected handicrafts, to increase the number of individual craftsmen and craftswomen, and to stimulate the public appreciation of the indi¬ viduality, the personal quality, of hand-wrought objects of decorative art — textiles, pottery, china, metalwork, bookbindings, jewelry — as well as of the major arts of mural painting and decorative carving and sculpture. See Morris, William.

Bibliography. — Consult the bibliographies of the various articles on particular arts and on the art of particular countries or periods. Also Blanc, Ch., (Grammaire des arts decoratifs> (Paris 1876) ; Hamlin, A. D. F., <A His¬ tory of Ornament, Ancient and Medieval 5 (New York 1916) ; Jones, O., ˆGrammar of Ornament5 (London 1910) ; Meyer, F.

S., (Handbook of Ornament5 (New York 1905) ; Racinet, A., (L'Ornement polychrome) (Paris 1869-87) ; Sturgis, R., (A Study of the Artist's Way of Working5 (New York 1904), and (The Interdependence of the Arts5 (Chicago 1905) ; Van Pelt, J. V., (Essentials of Composi¬ tion as Applied to Art5 (New York 1913) ; Ward, J., historic Ornament5 (Vol. II, Lon¬ don 1898).

Alfred D. F. Hamlin, Professor of the History of Architecture, Columbia University.

DECORATIVE ARTS, Minor. Called in

former days, frequently, <(minor arts.55 As the term implies, the decorative arts are those which are called into play in giving an ornamental ap¬ pearance to articles of utility. In the practice of the decorative arts the essential feature al¬ ways to be borne in mind is that the decoration is subsidiary to utility. The article itself must not, in its decoration, become less fitted for its purpose, else the article becomes an ornament. The basic form of the article decorated must not

be modified sufficiently as to hide its purpose. The decorative arts have the function of beautify¬ ing; they hide the nakedness of a plain surface, or break the cold regularity of a plain outline. But such embellishments are not brought about by covering (overloading) the available space, crowding of ornamentation being a vulgarity not art. If we take, as an illustration, the structure of a chair, the appearance of cumbersomeness may be eliminated for artistic effect by reducing the woodwork to smaller proportions, or round¬ ing off the square edges, thereby creating a decorative effect of lightness. Or the back and legs of a chair may be given decorative curves to avoid angularity. But the tapering or re¬ duced proportions must be so calculated as in no wise to encroach on the necessary strength of the joints or other parts of the structure where the lateral or vertical strain is imposed. In jewelry, as another example, a brooch that is to be worn on delicate or flimsy textiles must have no sharp projecting points which will tear or tangle the textile. Another canon in the teachings of the arts of decoration is then of the adaptability of the decorative treatment to the medium operated on. Thus, with the pass¬ ing of the ((Gothic55 period in the tapestry weaves, wonderful imitations of (<painting55 ef¬ fects were aimed at by the use of thousands of color tones of yarn. The painted picture was simulated, but the lovely woven effect of tapes¬ try was sacrificed, much to the

detriment of the decorative art value. The greatest masters in the decorative arts were, incomparably, the ancient Greeks. Their utensils had marvelous beauty of form, but the form was ever con¬ trolled to bring out perfection of the practical usefulness of the object for the purpose de¬ sired. The surface decoration never was allowed to interfere with its usage; and the decorative ((values55 were always subjected to the size and shape of the spaces embellished. The asymmetric disposition of their ornament alike with that of the Japanese kakiemon style (see Japanese Ceramics) are admirable expo¬ sitions of decorative art treatment in perfection. Some of the spheres in which the decorative arts find application are ceramics, enamels, lacquers, arms and armor, woodwork, embroid¬ ery, bronzes, engravings, textiles, ironwork, jade and other stone carving, furniture, bookbinding, glass, silversmithing, goldsmithing, rugs, ivories, clocks, locksmithing, mosaics, manuscripts, laces, numismatics, *etc.* When the Italian Renaissance (16th century) brought its influence to bear on furniture and household utensils the vogue became so forceful that the existing pieces of decorative art work were not only discarded but largely destroyed. With the more grandiose ideas of the French under Louis XIV much of the refined furnishings of royalty and nobility was destroyed or set aside to decay. When the great changes in style of the Regency and Louis XV came about we get the same discard¬ ing and destruction of the former art pieces. But soon the Revolution arrived with destructive tendencies entirely void of reconstruction. And the danger of entire loss of the art examples of the past became apparent to a few connois¬ seurs. David, in supreme power in all art mat¬ ters early in the 19th century, had no respect for anything but misrepresentations of the antique then being produced and offered no pro¬ tection for true art works. These connoisseurs,

in order to aid the survival of some of the beautiful work of the past, began collecting the remnants of the styles, examples of which were rapidly disappearing. Of such were Alexandre Lenoir, Vivant-Denon (Director of Museums under the Empire) ; Charles Sauvageot and du Sommerard, who made great collections for the propaganda; Villemin, about 1806, began publishing the great work (Monuments franqais inedits,) recalling by illustrations the art beauties of other styles. Revoil assisted in the work. Other art publications helped to place the ˆpseudo-classic" style of the Empire back in its inferior rank. The hunt for examples of the past art styles became quite popular and such pieces were disclosed in sacristies, garrets, or put to most vulgar uses by the lower classes, given to children to play with, *etc.* The work of the amateur collector of ˆperiod" furniture and ˆbric-a-brac" became popular with the wealthy in the days of the <(Restauration." Noted among these were such connoisseurs as Car-rand, de Pourtales, de Monville, d'lvry, Brunet-Denon, Durand, Fierard, Debruge, Dumenil, Renesse-Breidbach, *etc.* In 1832 Du Sommerard's great collection was taken to the old Cluny Hotel (Paris) to become the decorative arts museum visited by the world's artisans for study. The French government, in 1843, pur¬ chased the collection and the old Cluny build¬ ing. The antique treasures of royalty were al¬ ways dispersed through the different palaces, but after the Revolution of 1848 these different collections were taken over by the state and the Louvre Museum became a rendezvous for art lovers with its old Gallery of Apollo restored and others added and filled with art examples of the Middle Ages and Renaissance. France became the supreme decorative arts producer of Europe when the ficole Nationale des Arts Decoratifs (founded 1765) was advanced as the centre of art culture for artisans.

The Electors of Saxony from 1553 to 1733 collected large quantities of art works in their Dresden palace, and by 1724 there were separate salons for statuary, ivories, wood-carving, stone and metalwork, gold and silver smithing. The term Grime Gewolbe (Green Vaults) was applied to the collection. Dresden also acquired, in the 19th century, its Historisches Museum for arms and armor. Ludwig I of Bavaria near the middle of the 19th century brought into being great collections of ivories, wood-carving, Limoges enamels, etc., in his palace at Munich. Friedrich Wilhelm III of Prussia gathered to¬ gether his art collections and placed them in his Berlin palace which received the title ((Konig-liche Kunstkammer" (Royal Chamber of Art). Its immense popularity

and usefulness and its rapid growth caused it to be removed to the ((Berlin Museum." Vienna got together its fine armor collection from the Ambras castle and its great quantities of art and industrial art treasure in the Imperial Palace. Darmstadt, Hanover, Nuremberg, got their museums. In Italy the Uffici Palace Museum of Florence con¬ tained many decorative art collections, such as the ˆCabinet of Gems" ; also the Pitti Palace of Florence became a museum for great gold, silver and bronze art work besides jewelry and faience collections. Rome had long since her galleries of antiques and art collections. England re¬ mained oblivious to the fact of the growing decorative arts movement until the Universal

Exhibition held in London in 1851, when she opened her eyes to the poverty of her art product from the lack of collections to afford examples as models. Many purchases were made for the British Museum (Arundel Collec¬ tion, Bernay Collection, etc.). At Burlington House a new museum of decorative arts was accumulated. South Kensington Museum was built and filled with art treasures for use of students of the arts. In 1857 the South Ken¬ sington Department of Science and Art was started with branches elsewhere for art instruc¬ tion. In the Paris Exposition of 1867 was shown the great advance in France in its pot¬ teries, its glass work, also in the furniture in¬ dustry. Vienna then (1864) started her Museum for Art and Industry with fine examples of the arts and crafts. South Kensington Museum (1872) opened its Bethnal Green Museum branch in the midst of the factory district. Berlin in 1867 started its Kunstgewerbe Museum (Museum of Arts and Crafts) after the Vienna model to soon become one of the richest collec¬ tions in the world. Its instruction schools quickly grew to large proportions in the pro¬ vincial towns, elevating the chief industries. The Vienna Universal Exposition of 1873 de¬ veloped into her (<Fachschulen" (schools for special branches of study), now so numerous. In Bavaria the Munich National Museum (founded 1867) became powerful in its art work; the ancient treasures of Nuremberg as¬ sisted her to greatly increased industrial activity, and it later received its Gewerbe Museum with its permanent exhibition for manufacturers and merchants. Its arts and crafts schools became specialized with separate establishments such as for metal-founding, bookbinding, locksmithing, *etc.* Now started Kunstgewerbe museums at Hamburg, Leipzig, Dresden, Kaiserslauten, Frankfort, Stuttgart, to be followed later by those of Dusseldorf, Konigsberg, Danzig, Karls¬ ruhe, Cologne, Kiel, Krefeld, Halle, Hanover, Flensburg, *etc.* Crafts expositions helped the industrial art progress, such as those at Munich (1876), Berlin (1872), Dresden (1875),

Cologne (1876), Liibeck (1879), Dusseldorf (1880), Nuremberg (1885), Augsburg (1886), Strassburg (1895), Dusseldorf (1901). The great progress¬ ive outcome of all these activities became ap¬ parent in the Paris Exposition (1900) and the Turin Exposition (1902).

France, in order to maintain her hold, and seeing her supremacy in the decorative arts severely threatened, formed the “Union des Beaux-Arts Appliques a l’lndustrie” and founded a “Retrospective” Museum for annual exhibitions. This became later the “Musee Na¬ tionale des Arts Decoratifs” located in the Louvre, and, with the State factories at Sevres for porcelains and other enamel techniques, the Gobelins doing decorative art work, the Garde-Meuble (furniture, etc.), France was enabled to at least hold her own with the sharp competi¬ tion. In England William Morris carried on his decorative arts propaganda backed by such artists as Burne-Jones, Rosetti, Ford Madox Brown, etc., and his workshops (started in 1874) showed fine work in quality and capacity. In 1883 they started the <(Art Workers’ Guild,” to be continued as the “Arts and Crafts Exhibi¬ tion Society” (1880-90). In 1885 started the <(Birmingham Guild of Handicrafts.” Walter Crane, Professor Lethaby, J. Hungerford Pol-DECORATIVE DESIGN — DE COSTER

len, etc., continued working enthusiastically to further the British decorative arts movements. In recent years the magnificent Victoria and Albert Museum (London) emerged from the less pre¬ tentious South Kensington Museum. Summing up the above historic facts we arrive at the fol¬ lowing analysis of conditions. The movement brought about by Germany transformed the method of displaying the contents of the mu¬ seums for archaeological, cultural and esthetical purposes into a systematic arrangement for in¬ dustrial, practical study propaganda. The scheme was so successful in industrial results that the other advanced European nations had to fall into line.

Until quite recent times nothing of this artist-artisan propaganda was practised in the United States. European art students and artisan specialists have found here a free noncompeti¬ tive and highly profitable field for their talents. What little has been done to promote native teaching of the decorative arts has been of a sporadic nature, unsupported by the government. Its chief platform has been that of

“extension** study in the schools. But a national awakening has taken place. Museums are being opened in all the industrial centres, and all are basing their activities in a systematic teaching of “Art** in a vocational sense; the art museums of New York, Brooklyn, Boston, Philadelphia, Chicago, Pittsburgh, Saint Louis, Buffalo, Worcester, Minneapolis, Cleveland, Toledo, San Francisco, etc., are vying with one another to excel in con¬ ceiving methods of teaching art for practical purposes to the neighboring schools with lectures and class visits to the exhibited ex¬ amples of the Gothic, Renaissance and other periods. Art schools for vocational teaching are multiplying; in New York we have as centres, the Art Students’ League, the Na¬ tional Academy of Design, Pratt Institute, the Independent School of Art, the New York School of Fine and Applied Arts, the Beaux-Arts, Cooper-Union, Teachers College, the New York School of Applied Design for Women, *etc.* ; a worthy beginning imbued with an en¬ thusiastic impulse. See also Interior Decora¬ tion.

Bibliography. — Bucher, B., (Geschichtte der technischen Kiinste) (Stuttgart 1875-93) and (Reallexikon der Kunstgewerbe) (Vienna 1883) ; Bliimner and von Schorn, (Geschichte des Kunstgewerbes) (Prague and Leipzig 1884-87) ; Bussler, F., (Verzierungen aus dem Alterthume) (Berlin 1805) ; Bose, E., (Dictionnaire de l’Art, de la Curiosite et du Bibelot* (Berlin 1898-99) ; Champeaux, A. de, T’Art decoratif dans le vieux Paris* (Paris 1898) ; Collinot, E. and Beaument, A. de, (Ornements du Japon* (in Encyclopedic des Arts decoratifs de l’Orient* (Paris 1883) ; Cutler, T. W., (A Grammar of Japanese Orna¬ ment and Design * (London 1880) ; Davillier, J. C., baron, (Les Arts decoratifs en Espagne au Moyen Age et a la Renaissance) (Paris 1879) ; Dyer, W. A., (Creators of Decorative Style; being a Survey of the Decorative Periods from 1600 to 1800) (Garden City 1917) ; Falke, J., (Geschichte des deutschen Kunstgewerbes) (Berlin 1889) ; Harrer, A., (Mittelalterliche Ver¬ zierungen aus dem 15 Jahrhundert fiir Tischler, Holzschnitzer, Schlosser, Giirtler) (Munich 1852) ; Heaton, J. A., (Furniture and Decora¬ tion in England during the 18th Century (Lon¬ don 1890-93) ; Heideloff, C., (Les Ornements du

Moyen Age* (Nuremberg 1847-52) ; Hessling, E., (Louis XIV Mobel des Louvres und des Musee des Arts decoratifs* (Berlin 1909) ; Hirth, G., (Das deutsche Zimmer vom Mittel-aiter bis zur Gegenwart* (Munich and Leipzig 1899) and (Formenschatz* (Leipzig 1877) ; La-barte, J., (Histoire des Arts industriels) (Paris

1864) ; Lacroix, P., (The Arts of the Middle Ages, and at the Period of the Renaissance *(London 1875) ; Lafond, P., (L'Art decoratif et le Mobilier sous la Republique et l'Empire) (Paris 1906) ; Lenygon, F., (Decoration in Eng¬ land from 1660-1770* (London 1914) ; Martin, C., (L'Art roman en Italie; l'Architecture et la Decoration* (Paris n. d.) ; Oppenart, G. M., (Oeuvres de G. M. Oppenart* (Paris n. d.) ; Pfnor, R., Architecture, Decoration, et Ameublement, Lpoque Louis XVI* (Paris

1865) ; Poulson, F., (Die dekorative Kunst des

Altertums* (Leipzig 1914) ; Roger-Miles, L., Architecture Decoration et Ameublement pendant le 18me Siecle* (Paris 1900) ; Quinn, J. E., discourses on Decorative Art in England from the Accession of Henry VII, 1485, to the last Part of George III, 1820) (New York 1912) ; Polley, G. H., (Gothic Architecture, Fur¬ niture and Ornament of England from the 11th to the 16th Century* (Boston 1908) ; Salvatore, C., (Italian Architecture, Furniture and In¬

teriors during the XIV, XV and XVI Centuries) (Boston 1904) ; Shaw, H., (The Decorative Arts, Ecclesiastical and Civil, of the Middle Ages) (London 1851) ; Teirich, V., (Ornamente aus der Bliitezeit italienischer Renaissance) (Vienna 1873).

Clement W. Coumbe.

DECORATIVE DESIGN. See Art

Drawing.

DECORATIVE PLANTS. See Plants, Ornamental.

DE COSTA, Benjamin Franklin, Ameri¬ can clergyman and writer : b. Charlestown, Mass., 10 July 1831; d. New York, 4 Nov. 1904. He entered the ministry of the Episcopal Church and was rector North Adams, Mass. (1857-58) ; Newton Lower Falls (1858-60) ; chaplain in the Federal army (1861-63) and rector of the church of Saint John the Evangelist in New York (1863-99). In the year last named he be¬ came a Roman Catholic. Included in his many publications are (The Pre-Columbia Discovery of America by the Northmen * (1869) ; (The Moabite Stone> (1870) ; (The Rector of Rox¬ burgh,) a novel under the pen-name of William Hickling (1873) ; (Verrazano the Explored (1880); and <Whither Goest Thou?> (1902). He became president (1884) of the first branch of the White Cross Society, of which he was the organizer. He was editor also of the Christian Times, The Episcopalian, The Maga¬ zine of American History and White's (Me¬ moirs of the Protestant Episcopal Church)

(1881).

DE COSTER, Charles Theodore Henri,

Belgian poet : b. Munich, 20 Aug. 1827 ; d. 7 May 1879. He was professor of French litera¬ ture at the military academy in Brussels. His principal work is the prose epic, (La legende de Tiel LJylenspiegeP (1867) ; others are (Legendes flamandes) (1857) ; (Contes braban^ons" (1861); (Voyage de noce) (1872). Consult Potvin, (Histoire de lettres en Belgique* (1882).

DECOURCELLE, de-koor-sel', Pierre, French dramatist: b. Paris, 25 Jan. 1856. His first work was the five-act drama (The Ace of Clubs', written for Sara Bernhardt, which had extraordinary success. This was followed by a succession of comedies, dramas, comic-opera libretti, and dramatizations of popular novels, written by him individually or in collaboration with other authors; among them (The Ama¬ zon' (1885); (Madame Cartridge'; (The Abbe Constantin' (founded on Halevy's story) ; and (The Man with the Broken Ear' (after About). He wrote also a sensational novel, (The Gray Hat' (1887), land (Fanfan' (1889), both of which were received with great favor. Among his later works are (Gigolette' (1894) ; (Les deux gosses' (1896) ; and (Papa la Vertu' (1898).

DECOY, a place into which wild fowl are decoyed in order to be caught. A decoy pond is kept only in a secluded situation. Several channels or pipes of a curved form, covered with light hooped network, lead from the pond in various directions. The wild fowl are en¬ ticed to enter the wide mouth of the channel by tamed ducks, also called decoys, trained for the purpose, or by grain scattered on the water. When they are well into the covered channel they are surprised by the decoy-man and his dog, and driven up into the funnel net at the far end, where they are easily caught. There are differences of detail, but the general features of decoys are the same. Consult

Grinnell, (American Duck Shooting' (New York 1901).

DECREE, in general, an order, edict or law made by a superior as a rule to govern inferiors. In law it is a judicial decision or determination of a litigated cause. The decree of a court of equity or admiralty answers to the judgment of a court of common law. It differs from a judgment in that the decree decides the justice of the case on the principles involved rather than the right or wrong of the bare question. In ancient history it signified a de¬ termination or judgment of the Roman emperor on a suit between parties. In the former Ger¬ man empire the resolutions of the emperor, de¬ clared to the estates of the empire, were called decrees. The old name of royal orders in France was ordonnances or lettres. The na¬ tional convention, while it possessed sovereign power, used the expression, La convention nationale decrete ; but the imperial government used the words imperial decree, for instance, in the famous decrees of Berlin and of Milan. In ecclesiastical history the term is especially used with reference to the authoritative decisions of councils; or to a decisioin of the Pope arrived at by consultation with the cardinals. See Berlin Decree; Milan Decree; Decretals.

DECREES pF GOD. This expression is of Calvinistic origin and is found in the West¬ minster Confession. The term includes the doctrines of predestination, foreordination and election. It has, however, a much wider applica¬ tion and includes the whole plan of God. By implication, also, it includes the doctrine of the sovereignty of God. The entire subject was much debated by Calvinists and Arminians.

DECREPITATION, the crackling noise made by several salts and minerals when sud¬ denly heated. It is accompanied by a violent exfoliation of their particles, and is due to the sudden conversion into steam of the water

which is mechanically enclosed between the solid particles of the body; or to the unequal expansion of the laminae of which the mineral is composed in consequence of their being imper¬ fect conductors of heat. The true cleavage of minerals may be often detected in this way, as they fly asunder at their natural fissures.

DECRETALS, The (Decretales) , signify¬ ing pontifical disciplinary decisions, (1) the second part of the Canon Law or Corpus Juris Canonici which contains in five books the papal constitutions, laws, and decisions from the time of Gratian's Decretum, 1151 to 1234,

when this second part was compiled by Saint Raymond of Pennafort at the order of Gregory IX. The subject matter of each of the five books is ex¬ pressed in the mnemonic hexameter verse :

Judicium, judex, clerus, connubia, Crimea; meaning that the decretals of the first book re¬ late to the constitution of tribunals, those of the second to the duties'of judges, those of the third to the rights, privileges, etc., of the clergy, those of the fourth to marriage, and those of the fifth to offenses against the Church's laws.

(2) The False Decretals, or the Pseudo - Isidorian Decretals, a collection of decretals, gathered ostensibly by Isidorus Mercator, in the middle of the 9th century. The exact date and authorship of the document are not known ; but as a canon of the Council of Paris (829) is quoted, the collection must have been made later than the year in which the council was held. Some modern historians claim that the collec¬ tion was well known before the year 845 ; the period has been narrowed down to 847-850. Rheims and Mayence are each given as the place where the work of collating and writing was done. The writer called himself Isidore Mer¬ cator (the ((Merchant") and in some MSS ((Peccator" (the (<Sinner"). (The writer may have had in mind the great Saint Isidore, who had previously made a compilation of decrees and canons). Historians claim that the name was, like the decretals, false, and that evidence points to Benedict Levita of Mainz as the com¬ piler. The collection was received at first as authentic. To have at hand and in convenient form all the decrees of councils and the decretal letters of deceased popes, was indeed a boon to be highly appreciated. It was known that letters and documents existed other than those to be found in any collection, so when this collection made its appearance, it was regarded as worthy of praise and thanks.

The collection opened with the 50 apostolic canons received and collected by Dionysius Exiguus ; and these were followed by a number of decretal letters said to have been written by early popes, from Clement of Rome, one of the apostolic fathers, to Melchiades, at the end of the 3d century. None of the letters claimed to have been written by popes are genuine. De¬ crees purporting to have been promulgated at the councils of Nicaea and Seville, came next. Some of these are true. Then came other let¬ ters said to have been written by popes, begin¬ ning with Sylvester (who succeeded Melchiades) and ending with Gregory the Great. One letter in this collection credited to Pope Siricus (384-399) is genuine. The last part of the com¬ pilation is a copy of the canons passed by Gregory II (731) at the council held in Rome. Mohler, the German theologian, in commenting

upon the fact that these decretals were at first so well received, almost without a dissenting voice, says: uPseudo-Isidore seized exactly that in his own age which corresponded to the wishes of all the higher and better order of men. Thence it was that this legislation was so joyfully received. No one suspected anything false, because it contained so much that was weighty and true. If we examine carefully these invented decretals, and try to characterize their composer in accordance with their general im¬ port and spirit, we must confess that he was a very learned man, perhaps the most learned man of his time, and at the same time an ex¬ tremely intelligent and wise man, who knew his age and its wants as few did. Rightly he perceived that he must exalt the power of the centre — that is, of the Pope — because by that way only was deliverance possible. Nay, if we would pass an unconstrained judgment, we may venture even to call him a great man?*

At the time of the appearance of the collec¬ tion and for centuries afterward, its contents were so in harmony with the leading thoughts of Europe that the whole was accepted without thorough examination or criticism. Nicholas of Cusa, an able theologian of the 1 5th century, was the first one to express a doubt of the genuineness of the collection, and to advance proofs of the truth of his assertion. The Mag¬ deburg Centuriators began investigations, and then many Protestant critics followed the same line of study, arriving at the same conclusion as that of Nicholas of Cusa. Finally, when the Isidore decretals were examined critically by theologians and historians, it was ascertained that nearly all were forgeries, and that anach¬ ronisms and blunders existed in large num¬ bers. Phillips, Hefele, Mohler and others show that in the whole collection there was nothing against the supremacy of the Pope, as had been advanced by some writers ; that the letters said to have been written by popes were nearly all false, also that several of the spurious docu¬ ments existed prior to the 9th century and may have been used in good faith by the compiler. See Canon Law ; Christian Doctrine, De¬ velopment of.

Bibliography. — Paulus Hinschius, (Decretales Pseudo-Isidorianae) (Leipzig 1863) ; Laurin, Untroductio in corpus juris canonicP (Frei¬ burg 1889) ; Schulte, (Geschichte der Quellen und der Literatur des Kanonischen Rechts) (Stuttgart 1875-80) ; Taunton, (The Law of the Church) (London 1906).

DECURIONES, magistrates in the pro¬ vincial municipia of the Roman state, corre¬ sponding to the senate at Rome. Originally the popular assemblies had the sovereign power in the municipia, and conferred the executive authority upon the decuriones. They consisted at first of 10 men, but in later times they fre¬ quently numbered more, and sometimes even amounted to 100. Each curia decurionum was presided over by two members who were called duumviri, and whose powers within their municipium resembled those of the Roman consuls during peace. Under the republic the whole administration of the internal affairs of their respective cities was in the hands of the decuriones, but after the establishment of the empire they exercised nearly all the circum¬ scribed rights of the communities, though finally they were little more than receivers of

taxes. The decuriones were created by elec¬ tion, and each decurio was required to be at least 25 years old, and to possess a certain annual income. Their election took place on the kalends of March. Consult Reid, (The Municipalities of the Roman Empire* (Cam¬ bridge 1913).

DEDEKIND, da'de-kint, Friedrich, Ger¬ man poet: b. Neustadt on the Leine 1525; d. 27 Feb. 1598. His principal work is (Grobia-nus) (1549), a satire in Latin distichs against drunkenness and obscenity; it had wide cir¬ culation, and was translated into German, Dutch and English. He wrote two dramas having a religious polemic end in view: (The Christian Knight* ; and (The Converted Papist.*

DEDHAM, Mass., town, county-seat of Norfolk County; on the Charles River about 25 miles from its mouth, and on the New York, New Haven and Hartford Railroad, 10 miles southwest of Boston. The town is one of the oldest in the State, the first settlement within the town's limits, having been made in 1635. The town is noted as having estab¬ lished the first public school in America sup¬ ported by a general tax (1644). It has con¬ siderable manufacturing interests in cotton, wool, carpets, handkerchiefs and clay, but its chief interests are connected with Boston, of which it is practically a suburb. The promi¬ nent buildings of the town are the Historical Society building, the county

buildings, includ¬ ing the courthouse, jail, and house of correc¬ tion, and a public library. Water power is obtained from Mother Brook, a canal connect¬ ing the Charles and Neponset rivers, built in 1641. The government of the town is admin¬ istered by means of town meetings. Pop. 10,783. Consult the town records (8 vols., 1635-1890) ; Mann, historical Annals of Dedham* (Ded¬ ham 1847).

DEDICATION, Feast of the (Heb. Chan-ukka) an annual Jewish festival in commemo¬ ration of the purification of the Jehovah Temple in Jerusalem after it had been used for pagan worship by the Syrians and later recovered by Judas Maccabaeus. The temple had been dedicated in b.c. 168 to the worship of Zeus Olympius by the then ruler of the land Antiochus IV, Epiphanes, and an altar to the god set up on the altar of burnt offerings. When Judas Maccabaeus in b.c. 164-65 drove the Syrians out of Jerusalem, he removed the pagan altar, rebuilt the altar of burnt offerings and purged the temple. It was then rededi¬ cated to Jehovah with a series of festivals that covered a period of eight days. There is some doubt as to the exact date when the dedication took place ; in 1 Macc. iv, 52-54, the date is given as the 25th of Chislev (December) ((the same day the heathen had profaned it,** but the day when the pagan altar was set up is given in 1 Macc. i, 54, as the 15th of Chislev. It is most probable, however, that it took place on the 25th from the manner in which the feast is now celebrated, and from the fact that both nations celebrated the winter solstice on that date. The use of lights is one of the characteristics of the feast, it is called the (<Feast of Lights** by Josephus ((Antiq* xii, 7, § 7), and the custom is also mentioned in Talmudic literature. The feast is mentioned

only once in the New Testament (John ix, 22) in the following words : (<And it was at Jerusalem the feast of the dedication, and it was winter.ˆ Consult Wellhausen, Usrael-itische und jiidische GeschichteC

DEDLOCK, Lady, the wife of Sir Lei¬ cester Dedlock, in Dickens' novel called (Bleak Housed Outwardly cold and haughty she is inwardly wretched in consequence of being haunted by recollections of her past

life, and by fear that the existence of her illegiti¬ mate child, Esther Summerson, will be revealed. Lady Dedlock dies at the cemetery where her former lover is buried.

DEDUCTION. Deduction is reasoning from a general principle to other less general truths which are dependent upon this prin¬ ciple. It consists in showing that the general law or principle assumed as the starting point is applicable to a particular subject matter, and in drawing the necessary consequences of its application. The form of this mode of infer¬ ence is therefore given by the syllogism (q.v.), where the major premise (all M is P) states the general law, the minor premise (S is M) the application to a particular case, from which the conclusion (S is P) follows as a necessary consequence. The principle of this method of reasoning is commonly described as subsumption : the conclusion is shown to fall under or be included in the more funda¬ mental propositions which are assumed as the starting point. These latter propositions can similarly be derived from others of still greater generality, until at last we reach the ultimate principles which form the foundation of all science. As to the foundation on which the ulti¬ mate principles themselves rest, various theories have been held. Until comparatively recent times the prevailing view (though by no means universally adopted) has maintained that these propositions neither require nor admit of any demonstration. They are necessary intui¬ tions of the mind whose certainty is direct and immediate, and of a higher type than demon¬ strations can yield. They thus' constitute the basis of all science, since they are the funda¬ mental first truths to which all science appeals as to an unquestioned authority. In the 17th and 18th centuries particularly, mathematics was regarded as the ideal science, and the position of the indemonstrable first principles of all science was often paralleled with that of the axioms of mathematics. It was as¬ sumed before the time of Kant that mathe¬ matics was wholly a deductive science which derived its results through an analysis of its initial concepts. In like manner it was hoped to put all knowledge on a demonstrative basis by discovering the whole system of necessary truths, and by showing how all particular facts in the various fields could be derived from them ; for this would afford the absolute cer¬ tainty which science was supposed to demand, i.e., every fact would be deduced as a neces¬ sary consequence from some general principle. At this time the empirical conclusions reached by inductive reasoning were not regarded as worthy of the name of science, for they are not universal and necessary truths, but only particular and more or less probable.

The development of thought in recent times has, however, entirely revolutionized our

ideal of knowledge, and at the same time broken down the sharp distinctions between necessary, or a priori principles, and empirical truth, as well as between induction and deduc¬ tion as contrasted methods of reasoning. It is now widely recognized that there are no a priori truths in the old sense ; no propositions that are certain in themselves apart from their connection with the rest of experience. It is true, the principles of logic itself and of mathe¬ matics, which is a branch of logic, may be said to partake of apriority to such an extent that we are justified, for most purposes, in treating them as quite a priori. No matter how ulti¬ mate any truth may appear, or how necessary in itself, its certainty and necessity are mediated in and through its relation to other experienced facts with which it is connected in the organic unity of a system. It is only through this systematic connection of the parts of knowledge that any inference is possible. For it is only in a whole, where the parts are systematically connected, that the nature of one part enables us to say what the other parts must be. And when it is seen that reasoning consists in making explicit the sys¬ tematic connections of facts, the contrast between induction and deduction falls away. The structure of every inference is essentially the same; every inference is constituted by the relating of facts through a general principle. In deduction, as we have seen, the general truth is the starting point and we go on to explicate it in its application to some particular group of facts. On the other hand, the problem may be to find some relating principle for a given group of facts; and here we have to work in the reverse direction, beginning with the particulars and by the use of inductive methods seeking to bring to light some universal prin¬ ciples of connection. There are no sciences which use exclusively either one of these methods. Even mathematics, which popu¬ larly is supposed to employ only deduct¬ ive reasoning, depends for a very essential class of demonstrations, known as existence proofs, on a more or less direct reference to concrete experience; and, on the other hand, the so-called observational sciences reason deductively in tracing out the application of the laws which have already been discovered and the consequences of the hypotheses which are employed. In every field thought uses all the means and methods which it can command to aid in solving its problems. Induction and deduction, observation and reasoning, are not separate and isolated processes, but functions of the knowledge-process which are supple¬ mentary and go hand in hand.' See Induction, Mathematical; Logic.

James E. Creighton,

Professor of Logic and Metaphysics, Cornell

U niversity.

DEE, John, English astrologer : b. London, 13 July 1527 ; d. Mortlake, England 1608. In early life he had devoted much of his time to mathematical, astronomical and chemical stud¬ ies ; and in 1548 rumors began to prevail that he was addicted to the black art. They were prob¬ ably well founded; and to avoid the conse¬ quences he went abroad. In 1551 he returned to England and through the instrumentality of Cecil, who presented him to Edward VI,' ob¬ tained a pension of 100 crowns. The suspicion

of the black art appears still to have clung to him, and shortly after Queen Mary's accession he was charged with practising against the queen's life by enchantment and imprisoned. He obtained his liberty in 1555 and after Queen Elizabeth's accession was consulted by Lord Dudley as to <(a propitious day® for the coro¬ nation. Lilly's account of him is that he was the queen's intelligencer, with a fixed salary; a great investigator of the more secret hermetical learning, a perfect astronomer, a curi¬ ous astrologer, a serious geometrician and ex¬ cellent in all kinds of learning. The nature of his employments excited strong suspicion and in 1576 he was furiously attacked by a mob, from which he had difficulty in escaping with his life. In 1578 during an illness of the queen, he was sent to consult with the German physi¬ cians and philosophers as to her recovery and after his return was employed to draw up a sketch of the countries which, from having been discovered by English subjects, belonged to the crown. He accordingly prepared two rolls, giv¬ ing both a geographical description and a his¬ torical acccount of the countries. These curi¬ ous documents are still extant in the British Museum. After many wanderings, Dee, re¬ turning home, obtained from the queen in 1594 the chancellorship of Saint Paul's Cathe¬ dral and in 1595, the wardenship of Manchester College, which he held nine years. It has been supposed, with some plausibility, that Dee's character as an alchemist was merely assumed to enable him to act more securely and

effectu¬ ally as a spy in the employment of the English government. His writings on the occult sciences were published in 1659.

DEE, the name of several British rivers.. 1. A river in Scotland, partly in Kincardineshire, but chiefly in Aberdeenshire, one of the best salmon rivers in Great Britain. It rises on the southwest border of Aberdeenshire in the Cairngorm Mountains and flows generally east, 87 miles to the North Sea. Its total course is 96 miles. The city of Aberdeen is at its mouth. 2. A river of North Wales and Chesh¬ ire; rises in Lake Bala, Merionethshire; flows north-northeast and northwest to the Irish Sea, 20 miles below Chester ; length, about 70 miles. 3. A river of Scotland, county of Kirkcudbright, rises in Loch Dee. It flows southeast and south into Kirkcudbright Bay; length, 50 miles.

DEED, a written instrument under seal, containing a contract or agreement which has been delivered by the party to be bound and accepted by the obligee or covenantee. It has also been defined as follows : <(A writing con¬ taining a contract sealed and delivered by the party thereto.® (2 Wash. Real Prop. 553.) The law requires greater form and solemnity in the conveyance of land than in that of chattels. This arises from the greater dignity of the free¬ hold in the eye of the ancient law, and from the light and transitory nature of personal property, which enters much more deeply into commerce, and requires the utmost facility in its incessant circulation.

In the early period of English history the conveyance of land was ordinarily without writ¬ ing, but it was accompanied with certain acts, equivalent, in point of formality and certainty, to deeds. As knowledge increased, conveyance by writing became more prevalent and ulti¬

mately by the statute of frauds and perjuries, of 29 Charles II, ch. 3, secs. 1, 2, all estates and interests in lands (except leases not exceeding three years) created, granted, or assigned, by livery of seisin only, or by parol, and not in writing, and signed by the party, were declared to have no greater force or effect than estates at will only. And by the fourth section no person could be charged upon any ((contract or sale of lands, or any interest in or concerning the same,® unless the agreement, or some memo¬ randum or note thereof, was in writing, and signed by the party to be charged therewith, or some other person by him lawfully author¬ ized.

With some trivial changes this statute pro¬ vision has been adopted or assumed as law throughout the United States. Deeds must be upon paper or parchment, must be completely written before delivery, must be between com¬ petent parties, and certain classes are excluded from holding lands and, consequently, from be¬ ing grantees in a deed; must be made without restraint ; must relate to suitable property, and should be signed, sealed and delivered. The consideration of a deed must be good or val¬ uable and not partaking of anything immoral, illegal or fraudulent.

A deed to be effective must be delivered and accepted. A delivery is the transfer of a deed from the grantor or his agent to the grantee, or some other person acting in his behalf, in such a manner as to deprive the grantor of the right to recall it at his option. An absolute delivery is one which is complete upon the actual transfer of the instrument from the pos¬ session of ttie grantor. A conditional delivery is one which passes the deed from the posses¬ sion of the grantor, but is not to be completed by possession in the grantee, or a third person as his agent, until the happening of a specified event. A deed delivered in this manner is an escrow, and such delivery should be always made to a third person. No particular form of procedure is required to effect a delivery. It may be by acts merely, by words merely, or by both combined, but in all cases an inten¬ tion that it shall be a delivery must exist. It may be made by an agent as well as by the grantee himself. To complete a delivery, an acceptance must take place, which may be presumed from the grantee's possession.

In a deed the premises embrace the statement of the parties, the consideration, recitals in¬ serted for explanation, description of the property granted, with the intended exceptions. The habendum begins at the words (<to have and to hold,® and limits and defines the estate which the grantee is to have. The reddendiun, which is used to reserve something new to the grantor; the conditions; the covenants; and the conclusion, which mentions the execution, date, etc., constitute the formal parts of a deed and properly follow in the order observed here.

The construction of deeds is favorable to their validity; the principal includes the in¬ cident; punctuation is not regarded; a false description does not harm ; the construction is least favorable to the party making the con¬ veyance or reservation ; the habendum is re¬ jected if repugnant to the rest of the deed. The lex rex sitce governs in the conveyance of lands, both as to the requisites and the forms of conveyances.

Chancellor Kent, after observing that in the United States generally the form of convey¬ ance is very simple, says : <(I apprehend that a deed would be perfectly competent, in any part of the United States, to convey the fee if it was to the following effect: (I, A. B., in consideration of one dollar to me paid by C. D. do grant, bargain and sell to C. D. and his heirs, the lot of land (describe it), witness my hand and seal, etc.555 See Covenant; Es¬ crow.

DEEG, deg, India, town and dismantled fortress in Rajputana, state of Bhurtpore, 24 miles west of Muttra. It is a walled town, is situated in the midst of marshes, and almost surrounded by water during a great part of the year. At the southwest corner is the lofty rock of the Shah Boorj, on which the citadel stands. Deeg is a place of great antiquity, and contains remarkably fine palaces, only sur¬ passed in beauty by the Taj Mahal of Agra. Holkar was defeated here by the British under General Fraser in November 1804, and the following month the town and fortress were taken.

DEEMS, Charles Force, American clergy¬ man and writer: b. Baltimore, Md., 4 Dec. 1820; d. New York, 18 Nov. 1893. He was graduated at Dickinson College in 1839, became professor of logic and rhetoric in the Univer¬ sity of North Carolina (1842-47) ; of natural sciences at Randolph Macon College 1847-48. Becoming a Methodist minister at New-bern, N. C., he was from 1850-54 principal of the Greensboro Female College, N. C. From 1866 to his death he was pastor of the Church of the Strangers of New York, and was widely known as editor and author. He founded the American Institute of Christian Philosophy in 1881, and edited its journal Christian Thought A lectureship in phi¬ losophy was founded at New York University in his name in 1905. Included in his publica¬ tions are (Triumph of Peace and Other Poems) (1840) ; (The Light of the Nations> (1870) ; (Weights and Wings5 (1872) ; (Chips and Chunks for Every Fireside5 ; and (My Septuagint5 (1892) ; (Life of Jesus5 (1872) ; the Gospel of Common Sense as Contained in the Canonical Epistle of James5 (1889) ; (The Gospel of Spiritual Insight and Studies in the Gospel of

Saint John5 (1891). His autobiog¬ raphy with a memoir was edited by his sons (New York 1897).

DEEMSTER, an officer once attached to the high court of justiciary in Scotland, who for¬ mally pronounced the doom or sentence of death on condemned criminals. The office was conjoined with that of executioner. The name is now given in the Isle of Man to two judges who act as the chief justices of the island, the one presiding over the northern, the other over the southern division.

DEEMSTER, The, a novel by Hall Caine, called by the author the story of the Prodigal Son. It was published in 1877. The scene was laid in the Isle of Man, and opens in the latter part of the 17th century. The Deemster is Thorkell Mylrea, whose nephew Dan, the prodigal, deeply loves his cousin Myra ; but her brother Ewan interferes and a duel ensues, resulting in the death of Ewan. Dan is tried and is declared cut off forever from his people,

and banished to a remote corner of the island. During a visitation of the plague, Dan takes the place of Father Dalby, the Irish priest, effecting many cures and at last dying of the pestilence. A dramatization of (The Deemster5 was produced by Wilson Barrett under the title (Ben-Ma-Chree5.

DEEP BOTTOM, Va., Battles at. 1. On

25 July 1864, General Grant, then besieging Petersburg, ordered a movement, the principal object of which was to threaten Richmond and draw as many of Lee's troops as possible from the lines in front of Petersburg, so as to give promise of success in assaulting them, upon the springing of a mine prepared by General Burnside. Deep Bottom is opposite a great bend of James River, making a neck of land known as Jones' Neck, at a point where Bailey's Creek flows into the James from the north. Butler's pontoon bridges, one below and one above the mouth of the creek, were held by General R. S. Foster with a brigade of the Tenth corps. The Confederates were entrenched on the west side of the mouth of the creek in Foster's front. About 2 a. m. of the 27th, Hancock began crossing the James by the lower bridge, to turn the Confederate left, while Foster attacked the right. At day¬ light all moved forward. Gen. Nelson A. Miles' brigade drove the Confederates from their position on the New Market road, east of the creek, and captured a battery of heavy guns, but progress across the creek was barred. From the river to Fussell's Mill, a distance of about two miles,

its west bank was held by Kershaw's and Wilcox's divisions, joined dur¬ ing the day by Heth's division. On the morn¬ ing of the 28th, Kershaw advanced on the Charles City road and drove Sheridan back over a ridge upon which he was posted ; but Sheri¬ dan, dismounting his men, drove Kershaw back in some confusion, taking 200 prisoners and two colors. Reinforcements arrived until five-eighths of Lee's army was now north of the James. Grant wanted no assault made, and on the 29th Hancock and Sheridan recrossed the James. The Union loss in this movement was 334 killed and wounded.

2. General Grant, on 12 August, ordered another movement on the north side of the James to threaten Richmond. Hancock's Second corps, part of the Tenth corps, under General Bimey, and General Gregg's division of cavalry, were designated for the purpose. Birney's command was at and near Deep Bot¬ tom; the cavalry and artillery went by land, as in July; and Hancock's corps marched to City Point and took steamers for Deep Bottom, 16 miles up the river, where it was landed on the morning of 14 August. Mott's division was to advance on the New Market road and drive the Confederates into their works beyond Bailey's Creek, while Barlow, with his own division and Gibbons', was to move on Mott's right, and assault the line near Fussell's Mill. Gregg's cavalry was to cover Barlow's right, and when the infantry uncovered the Charles City and Darby roads, was to make a dash on Richmond, if opportunity offered, and if not, to destroy the railroads entering it. Bir-ney was to attack the Confederate right, and, if successful, move up the river roads on Chaffin s Bluff. Field's Confederate division held Bailey's Creek and Wilcox's division was

at Chaffin's Bluff. At the first intimation of Hancock's movement Wilcox moved up and joined Field, and from the south side of the James, General Lee sent Mahone's division of infantry and the two cavalry divisions of Wade Hampton and W. H. F. Lee. Johnson's and Gary's brigades followed, and there were three regiments from Pickett's division. Mott ad¬ vanced on the New Market road, but was checked at the creek. It was 4 o'clock before Barlow, on his right,

could get up one brigade, and with this he assaulted the position near Fussell's, was repulsed, and rested for the night. On the right Gregg had advanced well Up the Charles City road, and on the left Birney seized a part of the Confederate line and captured three guns. On the morning of the 15th Birney's corps and a brigade of Mott's division endeavored to turn the ' Confederate left. Birney moved toward the Charles City road, on which Gregg was advancing, but he made so wide a detour and found so many obstructions, that it was night when he found his proper position, and attack was deferred until morning. As a diversion to his attack Gregg's cavalry, supported by Miles' brigade of infantry, were to move up the Charles City road. Gregg was off at an early hour of the 16th, driving the Confederate cavalry beyond Deep Creek, as far as White's Tavern, only seven miles from Richmond. At 10 a. m. Terry's division of Birney's corps, supported by Craig's brigade of Mott's division, and Birney's brigade of colored troops, advanced against the Confederate line near Fussell's Mill, and, after a severe fight, carried it, taking three colors and between 200 and 300 prisoners from Ma¬ hone's and Wilcox's divisions; but the Confed¬ erates soon rallied, retook their works and drove Terry back. Soon after noon the Confederate cavalry, supported by infantry, advanced on Gregg and Miles, slowly driving them back to Deep Creek, and later in the day across it. There was a cessation of hostilities on the 17th. On the 18th the Confederates advanced from their works above Fussell's Mill and at¬ tacked Birney, who, with the assistance of Miles, repulsed them. On the night of the 20th the Union troops were withdrawn and returned to their positions in front of Peters¬ burg and at Bermuda Hundred. In this battle the Union troops numbered about 28,000, the Confederates about 20,000. The Union loss was 2,161 killed and wounded, and 625 missing. There are no returns of Confederate losses. Consult (Official Records) (Vol. XLII) ; Humphreys, (Virginia Campaign of 1 864 — 65 5 ; Grant, (Personal Memoirs) (Vol. II) ; Sheri¬ dan, (Personal Memoirs) (Vol. I) ; Walker,

(History of the Second Army Corps. J

E. A. Carman.

DEEP RIVER rises in Guilford County, N. C. Its general direction is . southeast to Chatham County, where it unites with the Haw River and forms the Cape Fear River. Its length is about 125 miles ; it has good water power, some of which is utilized at Lockville. It is navigable to Carbonton.

DEEP-SEA EXPLORATION. While the beginnings of our knowledge of the surface of the sea date back to the earliest recorded voyages of

discovery, the physical conditions obtaining in the depths of the great oceans have

been ascertained chiefly during the past half century.

The modern science of oceanography (q.v.) is based largely upon the voyages of a score or more of vessels sent out by various govern¬ ments for the special purpose of making physi¬ cal and biological investigations of the oceanic basins.

As late as Captain Cook's time the ocean had been sounded no deeper than a few hundred fathoms. For scientific attempts to ascer¬ tain depths far from land, it is scarcely neces^ sary to go back farther than a century and a half, and' it was not until the day of submarine cables that systematic soundings were taken.

The dredge has been employed by naturalists in obtaining marine forms in shallow water for a century and a half, but its use in ocean depths has been limited to about half that period.

The governments that have participated largely in modern deep-sea exploration are the

The Albatross Dredging at Sea.

English, French, German, Austrian, Dutch, Russian, Norwegian, Swedish, and by no means the least, that of the United States. The foundations of oceanography as a science were laid by the British in the publication of the results of the famous Challenger Expedition. The investigations of this vessel were followed by those of American vessels, one of which, the Albatross, is perhaps better equipped for such work than any other vessel afloat, and has been in commission for more than thirty years.

Deep-sea explorations have now been carried into all seas and the general conditions of temperature, depths, and animal life in the great oceanic areas are no longer unknown, while the literature of oceanography occupies an important place in science.

The deep-sea exploring vessel of the present time might properly be

described as a floating laboratory, equipped for hydrographical, meteorological, geological and biological in¬ vestigations. The equipment would include not

merely that of a general scientific laboratory, but also the heavy apparatus necessary for sounding and dredging. The ship machinery for deep-sea work has been gradually brought to a state of high efficiency. Soundings formerly made with rope are now made with a single strand of wire, and instead of the stout rope cable for dredging, light wire rope of great strength is employed. Various self-recording instruments have gradually been per¬ fected for quick and accurate work in taking deep sea temperatures and in the collecting of small forms of life at intermediate depths.

Sounding. — During the course of deep-sea exploration, many soundings have been made in depths exceeding 3,000 fathoms. More than 50 great depressions, or <(deeps® as they have been called, are now known, varying from 3,000 to 5,000 fathoms. Ten of these exceed 4,000 fathoms. It is only in the western Pacific that depths exceeding 5,000 fathoms have been found. The greatest depth known was dis¬ covered in July 1913 by the German survey ship Planet , about 40 miles east of northern Mindanao, where a sounding was made of 5,348 fathoms, or 406 feet more than six miles. This depth exceeds by 3,000 feet the height of the loftiest mountain peak. The deeps now known are distributed over the Atlantic, Pacific and Indian oceans. While many of them are far out in great ocean basins, some of them are close to the continental slopes. One exceeding 3,000 fathoms (Bartlett Deep) lies in the Caribbean Sea between Honduras and Cuba. Some of the deeps are now known to extend over thousands of square miles while others are apparently mere holes. Enough sounding has already been done to indicate that the greatest depths have probably been discovered.

Deep-sea sounding has shown that the floor of the ocean has not only its depressions, but its elevations. Many islands are merely the pro¬ jecting summits of submarine peaks, their bases often resting on an

ocean floor lying 3,000 fathoms deep. Submarine ridges of great ex¬ tent have been discovered in the north and south Atlantic. The average depth of the ocean is probably not less than 2,200 fathoms.

Several types of sounding machines are in use, but whatever the pattern, each contains a reel wound with thousands of fathoms of piano wire. In the operation of sounding, a detach¬ able shot weighing from 30 to 60 pounds is employed to draw the wire rapidly and steadily from its reel. It is secured to the sounding rod at the end of the line in such a manner as to become detached when the bottom is reached. Several instruments are sent down at each operation. The sounding rod is provided with a device for bringing up a specimen of the bottom mud. A few feet above it are attached the deep-sea thermometer and water bottle. The latter secures its sample of water at the bottom only. All deep-sea instruments are necessarily self-acting at the bottom and thermometers are so constructed that they will not be effected by higher temperatures on being brought toward the surface. While the sound¬ ing instruments are carried down by the heavy shot, the wire is reeled in by steam power. It takes about one hour to make a sounding three miles deep and reel in the line with its attached instruments.

Dredging. — For the collecting of animal life from the bottom, the dredge is employed. This may be described as a bag-shaped net about 20 feet long, fitted with an iron-framed mouth from 8 to 12 feet wide and 3 or 4 feet high. It is towed by a wire cable about one-third of an inch in diameter, its length depend¬ ing upon the region to be investigated. The cable is operated by a powerful engine on the main deck, and the cable itself is coiled upon a

Townsend Closing Tow-Net for Intermediate Depths.

Fig. 1. — Showing net in position for lowering and towing: a. Tow line; b, Tripping arm; c, Tripping ring; d, Opening slings; e, Closing slings; f, Folding net ring; g, Closing weight; h, Closing messenger. (See also Fig. 3.)

Fig. 2. — Showing net closed for heaving in.

Fig. 3. — Closing messenger.

Fig. 4. — Showing heavy tripping arm used on steamer Alba¬ tross, with 60-pound sounding shot attached as sinker for proper strain on wire tow line in deep-sea work, i. Common sounding shot — 60 pounds.

reel sufficiently large to contain the whole of it. The dredge sinks by its own weight, which is sufficient to carry down the dredge line with it, the only weights ordinarily used being small ones to carry the end of the net down below its iron-framed mouth and prevent its fouling. When dragging along the bottom, it usually fills rapidly. Very often the hauls of animal forms are large, but the dredge is more often heavily loaded with oozes of various kinds in which animal forms are imbedded. The dredge

rope is passed over the side of the ship from the end of a boom, the top of which is guyed to the mast with a spring to relieve strain. The spring or accumulator is graduated and often shows the dredge to be pulling thousands of pounds. The net is sometimes too heavily loaded to be lifted, and may be tom from its frame. Much of the deep-sea mud or ooze washes away during the progress of the dredge toward the surface and under ordinary condi¬ tions its load is no greater than can be lifted from the water and swung on board with safety.

Dredges are of several forms, the common¬ est being that of the beam trawl employed by fishing vessels in shoal water, but with a shorter beam. For convenience we shall refer to all appliances used for collecting at the bot¬ tom as dredges. For the exploration of in¬ termediate depths, several types of nets are employed which can be opened and closed by devices operated by metal messengers sent down the dredge line. Various devices are used for collecting forms of life in deep water, such as the otter net and other appliances well known to fishermen. The surface and intermediate depths of the sea bear forms of life for the capture of which fine-meshed tow nets are used.

Before using the dredge or beam trawl, the depth is ascertained by

sounding. In dragging the dredge upon the bottom it is necessary to let out considerably more line than the actual depth, and the dragging of the dredge along the bottom can often be felt by merely placing the hand upon the dredging cable. The deepest dredge haul ever made (that taken by the Albatross off the Tonga Islands in the South Pacific) was 4,173 fathoms, and the time re¬ quired from the moment the dredge was put overboard until brought to the surface was about 10 hours. On very rough bottom, where dredging nets may be torn from their frames, the ˆtangle® is often used. This apparatus consists of bunches of shredded rope attached to iron bars, and is effective in obtaining star¬ fishes, sea urchins, crinoids and other creatures which have their surfaces sufficiently rough to become entangled in the loose strands of rope. Fish traps of special design have been used successfully at great depths, and the Albatross has succeeded in taking fishes at a depth of a thousand fathoms with ordinary gill nets.

Deep-Sea Life. — As plant life does not exist in the sea at depths below the influence of sunlight, we find at the bottom and at irtter-mediate depths, forms of animal life only. These consist of fishes, mollusks, crustaceans, medusae, echinoderms and representatives of practically all of the classes of marine life to be found living in shallow waters under the influence of sunlight, but of very different genera and species. When deep-sea investiga¬ tions began, it was hoped that archaic forms would be discovered; but this hope has not been realized except in slight degree. Animal forms are sometimes brought up by the dredge in great abundance. It is not an uncommon thing to obtain several barrels of crustaceans, starfishes, mollusks or echinoderms, at a single haul. The dredge of the Albatross once brought up 800 fishes from a depth of 1,770 fathoms. The fact that the Albatross obtained living sponges at 4,178 fathoms indicates that

there is probably no depth too great for the existence of animal life.

Surface Life. — The surface life of the sea consists of both plant and animal forms, the latter in great variety. It is usually minute, and much of it phosphorescent. It is the small life at or near the surface and now collectively called plankton, which makes the phosphores¬ cence with which travelers at sea are familiar. It is more abundant in some regions than in others, and constitutes the food not only of many of the larger animals living at the sur¬ face, but is the basis of the food supply of all creatures living at the bottom and intermediate depths. These small forms are constantly dying and falling to the bottom. Indeed, their dead shells and skeletons cover great tracts of

the ocean floor in the regions where they abound. The Crustacea are doubtless the most abundant of these pelagic forms, but almost all classes are represented, including mollusks, worms, ccelenterates, tunicates, protozoans, fishes and even reptiles. In the colder waters of the ocean the tow nets used in taking plankton fill very rapidly with certain forms which swarm in cold waters ; but in tropical waters the variety of forms is greater, although usually less abundant. Several forms of nets are used in taking the plankton, but all are lined with fine gauze or silk bolting cloth. Under the most favorable conditions the dragging of such nets at or near the surface often yields enor¬ mous quantities of surface forms. When the ship is at rest in favorable weather, surface life is readily attracted to insulated electric lights lowered a few inches below the surface of the water where it can be gathered from the deck with long-handled gauze-lined dip nets.

Great currents like the Gulf Stream, drift the surface life of warm regions into colder waters where it is killed by the lower tempera¬ ture and deposited in great quantities upon the bottom. In such places the dredges have*taken bottom forms in greatest abundance. There are, however, wide areas such as those of mid-Pacific regions, which are almost devoid of surface forms, and where the bottom is cor¬ respondingly lacking in animal life.

Marine Deposits. — Geology, like zoology, is also dependent upon the deep-sea dredge for what is known of the floor of the ocean. The deposits may be referred to three groups : Those derived from the land through the ac¬ tion of rivers and currents and called terrige¬ nous deposits. They consist of muds of various kinds which are characteristic of the adjacent lands from which they have been derived. Farther off, and beyond the influence of rivers, are the pelagic deposits which are made up of dead organisms originating at the surface. These are usually found in the form of diatom, radiolarian, or globigerina oozes, _ depending upon the character of the surface life prevail¬ ing above them. Still farther from land, in the deeper parts of the ocean, are the red clay de¬ posits, which are believed to cover about half of the floor of the ocean. These deposits re¬ ceive the minimum of dead matter from the surface, and are far beyond the influence of matter washed from the continents. The red clay deposits are believed to have formed very slowly, and to have been subjected to little change during long periods of time.

Light . — The most recent investigations have shown that light does not penetrate deeper than five or six hundred fathoms, and even there is very dim. Experiments with the photometer have shown that light penetration is greater in tropical than in northern waters. A photo¬ graphic plate exposed at a depth of 900 fathoms for two hours, was in no way affected. Below the levels reached by sunlight, the sea is in total darkness, and plant forms, with the ex¬ ception of diatoms, are unknown. There is, however, some phosphorescent light, as the deep-sea dredge has brought up many fishes and in¬ vertebrates with phosphorescent organs. Such light must, however, be very faint and unevenly distributed.

Notwithstanding the absence of light, a considerable number of deep-sea forms are brilliantly colored, brilliant reds being often found. Most of the deep-sea fishes are, how¬ ever, black or grayish. Starfishes and crusta¬ ceans are frequently red or pink, while holothurians are often violet.

There is a great variation in the size of the eye among deep-sea fishes, which is doubtless dependent to some extent upon the penetration of sunlight or the existence of phosphorescence, their eyes ranging from very minute to abnor¬ mally large. A number of the deep-sea species are totally blind.

Temperature. — The influence of the warmth to be found in the surface waters does not ex¬ tend below a few hundred feet, even at the equator where such warmth is greatest. Below 900 fathoms the temperature is always within three or four degrees of the freezing point of fresh water. The low temperature at the bot¬ tom is caused by the settling of cold surface water in polar regions. The cold water thus slowly distributed over the floor of the ocean carries with it the oxygen necessary for the maintenance of life in the depths. The bottom of the Black Sea, receiving no such supply of polar water, is devoid of animal life. All deep-sea life would doubtless perish were it not for the air thus brought down.

Salinity. — Studies of the salinity of the ocean, based on samples of water secured by special forms of apparatus from all depths, have shown various degrees of salinity in different seas. Sea saltness in the

Atlantic is higher than in other great open oceans, and highest of all in the Red Sea and in the Mediterranean. It is remarkably low in the Black Sea and in the Baltic, where there are many rivers but no great evaporation.

Pressure. — Sea pressure amounts to about a ton to the square inch with each 1,000 fathoms of depth. At 1,000 fathoms it amounts to 180 atmospheres, while at the greatest depth known (over 5,000 fathoms), the pressure would be about six tons to the square inch. It is evident that animal forms of the surface regions could not endure such conditions, but the tissues of deep-sea animals are so permeated by fluids, that a balance is maintained. Most of the deep-sea forms are so soft that when brought to the surface they require various laboratory hardening processes for their preser¬ vation as specimens. Both fishes and inverte¬ brates, when brought up from the greater depths, are always dead, and probably die before being dragged far from the bottom. It is in¬ teresting to note, however, that the Albatross

has taken alive fishes from 590 fathoms, and large Lithodes crabs from 735 fathoms.

Size of Deep-Sea Forms. — The dredges hitherto used in deep-sea exploration have se¬ cured no fishes or invertebrates of large size. The largest fishes taken seldom exceed four or five feet in length. It is not unlikely that by using larger dredges, with wider-meshed nets less liable to become overloaded with mud, larger animals .could be captured.

Bibliography (British and American only). — Agassiz, A., (Three Cruises of the Blake* (Boston 1888) ; ‘Bulletins and Memoirs of Museum of Comparative Zoology* (Cambridge, Mass.) ; < Challenger Expedition (50 vols., ed. by Sir John Murray, Edinburgh) ; Fowler, (Science of the Sea1* (1912) ; Hickson, (Fauna of the Deep Sea> (London 1894) ; Murray, Sir John, and Hjort, Dr. Johan, (The Depths of the Ocean (London 1912) ; (Reports and Bulletins) (United States Bureau of Fisheries) ; Tanner, (Deep Sea Exploration1* (Washington 1897); Townsend, < Records and Bibliography of the Albatross * (Washington 1901) ; Thomson, (Voyage of the Challenger > (1878).

Charles Haskins Townsend, Director New York Aquarium; formerly in charge of the Deep-Sea Investigations on the U. S. S. « Albatross .»

DEEP-SEA LIFE. In this account of midoceanic, or ˆpelagic,** life the

writer purposes to restrict himself to the open ocean, that is the spaces of deep water covering the real oceanic basins. The great land-masses are bordered by a submerged rim of varying width, where the water does not exceed an average depth of 100 fathoms, beyond which the bottom falls or slopes to the plain of the original ocean-basin. The sum of these continental borders and simi¬ lar shallows elsewhere, as in the archipelagic region of the western Pacific, forms only about 15 per cent of the 140,000,000 square miles of salt water, leaving more than four-fifths of it deeper than 100 fathoms, while nearly 10,- 000,000 square miles exceeds 3,000 fathoms in depth.

We speak of <(oceans,® but in reality it is all one body of water, which by a constant inter¬ change through currents both horizontal and vertical, maintains a virtual uniformity, yet not a complete one, since distinct variations are ob¬ servable in temperature, density (salinity), pres¬ sure and other physical characteristics that in¬ fluence animal being. Therefore some parts of the ocean are more populous than others; some are more populous in summer and less so in winter, and there is a definite (although as yet undetermined) geographical distribution of marine life, both horizontal and vertical.

Ocean Floors. — The character of the bot¬ tom must be considered. The rivers discharge into the ocean daily an enormous amount of landymaterial, which is sorted out by weight, readiness to dissolve, etc., and by the action of waves and currents, and is spread out on the bottom to a greater or less distance according to circumstances, but nowhere goes far from the coast. This outer border of deposits from rivers shows a bottom of bluish mud, or, in places, of coral sand or of volcanic dust. It is rich in food-material, and supports in the water above it a far larger assemblage of plants and animals than does the sea outside of

r

g

2 3

26

4

10

n

1 Pheronema Carpenteri 2 Hyalonema Sieboldii 3 SempereUa Schultzei 4 Dactylocalyx pumceus^^ ^Sdeˆroˆranps c > a“sii 6 Chondrocladia virgata 7 Actinotheca peUucida 8 Pecianthis asteroides 9 Drymooema Victoria 10 Ypsilothuria attenuatta 11 Rhojpalodina Heurteb ararilioes 20 Colossendpi«i TJfo Euphromdes Talismani 14 Peniagone rosea 15 Psychropotes buelossa

16 Styracaster spinosus 17 Hymeoaster rex 18 Arcturus Baffini 19 Nematocarcinu g bathyphilum 27 Mam.r an i w-2* ^ymphon robustum 22 Boltenia pedunculata 23 Eustomias obscurus 24 Eurypharynx pelecanoides 25 Halosaurus macrochir 26 Neostoma batnypu. 27 Macrurus globiceps 28 Melanocctus Johastoni 29 Stomias boa E’us’omias 0Dscurus

it. We have no further concern with this littoral rim further than to point out that, by means of currents, it contributes considerable food to pelagic animals. The floor of the vast spaces of ocean-bottom shows none of this land mud, but is covered with deposits of three kinds. The most extensive of these is a red clay, which covers the bottom in the great bight of the Atlantic between North and South America west of the 50th meridian, a large part of the mid-Atlantic, and most of the floor of the Pacific and Indian Oceans; it is believed to have been derived from the decomposition of submarine rocks, and of pumice and other vol¬ canic debris showered into the sea, mainly in past ages.

Scarcely less widespread is a loose deposit called <(ooze,® composed almost exclusively of the remains of minute animals and plants that have silicious or lime-carbonate skeletons which have sunk down from the surface. All over the bed of the Atlantic, except where the red clay appears, the ooze shows more tests of the protozoan Globigerina than of anything else, and it is therefore known as globogerina ooze. Pteropod ooze, patches of which occur here and there, has a predominance of pteropod shells ; and so on. Bottom of this kind is far more thickly inhabited by benthonic (deep-sea) ani¬ mals than is the clay bottom ; and it lies under the paths of the great oceanic currents, whereas the red clay underlies chiefly the areas of com¬ paratively stationary water — the great eddies in the oceans.

These oozes imply an abundant life in the open sea. What is its character and how does it exist in a world of only sea-water?

Factors of Deep-Sea Life. — First we must glance at certain conditions. The pressure exerted by water on anything lowered into it increases at a rapid rate as you go down, so that at a depth of only 500 fathoms it equals about 100 times that at the surface. This con¬ tributes to the density of the underlying water. The saltiness of the sea also

contributes to its density, but varies somewhat according to local conditions, and decreases slightly from the sur¬ face downward.

More important than either in its effect on life is temperature, the factor determining to a great extent both the amount and the distribu¬ tion of marine life. In the middle of the At¬ lantic, near the equator (Sargasso Sea), the water at the surface in summer, will be about 22.30° G, and at 100 fathoms of depth about 16.70° C., below which it diminishes more slowly to about 2.25° C. at 2,000 fathoms, and to below the zero of centigrade (freezing-point of Fahrenheit) in the deeps. The temperature, density, etc., below a few hundred fathoms are probably fairly constant for each measure of descent, so that the water may be regarded as consisting of a series of layers bounded by thermometric limits, which are substantially permanent, and are biological strata as well. At the surface, however, temperature varies with latitude, with seasons, and with circumstances, especially under the influence of winds and cur¬ rents — those rivers that flow <(on the face of the deep,® here warm, there cold, each one fos¬ tering and carrying far the kinds of life agree¬ able to it.

A fourth factor conditioning deep-sea life is that of light, which penetrates to a distance

only recently understood; but the rays at the blue end of the spectrum go much further than do the red rays — a fact of considerable biologi¬ cal significance. The result of late trials with the best photographic plates show that the blue rays at least penetrate to a depth of about 800 fathoms. Below that is absolute darkness, il¬ lumined only by the phosphorescent glow of the lanterns carried by animals living in those Stygian depths.

Such in broad outline are the physical con¬ ditions of plant and animal life in midocean; and there is good reason to believe that they have changed little since the beginning of earthly time.

Oceanic Plants the Basis of Subsistence.

— Now how do organic beings maintain life in the world of sea water? What do they get to eat? Well, here, as elsewhere, the larger and more advanced feed on the weaker ; and at the base of the list, as on land, are plants. Leaving aside the vexed question of origin, investigation has shown that not only near shore, but all over the ocean, plants exist in myriads. Most of them are lowly algae invisible

to the unaided eye, yet of vast variety in form, degree of or¬ ganization and nutritive value. They find their nourishment dissolved in the sea-water and dis¬ tributed uniformly around them, hence they abound everywhere within the (<photic zone,® or surface-layer penetrated by sunlight ; and at certain times and places they may be so plenti¬ ful as to give the water a tinge of color.

The majority are single-celled, silicious-framed diatoms. As they are heavier than the water all would sink were it not that some have means of propulsion, others parachute-like sus¬ pension-organs. They may have bladder-like attachments, or be flattened into twisted ribbons, or drawn out like a hair, or be furnished with long projections (flagellae). Still more remark¬ able suspension-organs and varieties of form belong to the Pcridince, which are more com¬ plicated, mobile algae often highly phosphores¬ cent. A third series of pelagic algae are the brown flagellates, which possess calcareous frames forming globules called cocoliths and other shapes. Microscopic ((brown algae® occupy the most important place in the economy of the sea, and their shields of lime may be met with in geological deposits as far back as the Cam¬ brian, practically identical with those of the present day.

Masses of seaweed are found floating in various parts of the ocean. These have been uprooted from their fastenings on shore, and collect in quiet, eddy-like places. The greatest and most permanent collection is that of the Sargasso Sea, in the Atlantic just north of the equator, where the plant Sargassum predomi¬ nates. These continue to live and grow, but do not propagate. Such floating rafts of seaweed are the home and hiding place of a great variety of marine animals.

These algse and seaweeds form the basis of food-supply for the whole of the marine animal-life, since those creatures that feed upon them directly are themselves the prey of all the rest, from shore to shore, from the surface to the depths and from animalcules to whales.

Character of Plankton. — Associated with the almost invisible plants swarming in the sur¬ face-layers of the ocean, is an assemblage of animals, varying from single-celled globules of

protoplasm (Protozoa) to all the higher classes of invertebrates. These together constitute the “plankton,® the swimming or floating sea-life, and its zone is regarded as about 100 fathoms thick. It is far more populous near most shores than in mid-sea, and in warm than in colder waters, and varies in density of life according to season, temperature, and other regional con¬ ditions, yet is everywhere present. Efforts have been made to estimate the amount of plankton, as that might help to determine the amount of fish-food present, but with little success.

In this plankton are multitudes of_ minute protozoans (q.v.), principally foraminifers and radiolarians in a profusion of species. They have shells consisting either of lime or of silica, and it is these shells, raining down upon the bottom, that constitute the globigerina and other oozes. Here, too, float a great variety of salpce, jellyfish and other coelenterates and their larvae, and many swimming worms, notably the wide¬ spread sagittas. Outnumbering all these, except the Protozoa, are the oceanic crustaceans, which, in countless forms and multitudes, play there, as Haeckel remarks, a part corresponding to the insects on land. Most numerous of these are the copepods, all very small ; and they are the chief consumers of the minute plants, and, in turn, are among the most important food-supplies for larger creatures. Almost equally numerous are the ostracods and other crusta¬ ceans, including some big crabs.

Mollusks are fewer, for these as a rule are bottom-dwellers ; but one group, the delicate, winged pteropods, are so extraordinarily numer¬ ous, that their glossy shells characterize large patches of ooze in the tropics. One species is called “whale’s food,® and actually is the princi¬ pal subsistence of the northern whalebone whales. A large variety of small squids is also to be found at or near the surface of the open ocean.

The pelagic plankton, which is very largely different from that of coastal regions, is aug¬ mented in summer by an extensive variety and amount of larvae and young animals bom both there and in the deeper layers ; and at night many animals rise to the surface that are never caught there in daytime. Finally, it is the abode of innumerable fishes that seek their prey at or near the surface. Among these the family Scopelidae, although represented also in the abyssal fauna, play a more important part at the surface than all other fishes combined ; yet most of them are only a fraction of an inch long. Transparency and colorlessness (or a blue tint) are characteristic (for safety) of all the

lesser creatures in this surface-fauna.

Intermediate Depth-Zones. — It has been said already that between the surface and the bottom the sea seems to be divided into layers or strata in respect to its inhabitants, certain kinds of animals when adult dwelling only within certain limits of depth. These inter¬ mediate zones, and their occupants are called “bathypelagic® — a term including the facts of both their undersea and deep-water existence. Practically, however, these intermediate zones can hardly be defined, and seem to be determined by limits of temperature or of osmotic pressure, and thus vary in their distance below the sur¬ face according to the general warmth and den¬ sity of various regions. Animals taken only by deep hauls of the nets within the tropics, for

instance, may be found near the surface in cooler latitudes ; furthermore the vertical dis¬ tribution of fishes, as a class, may differ from that of crustaceans or other groups as a class. Nevertheless it is generally true that many sorts of pelagic animals dwell at intermediate depths, from which, when adult, they cannot either rise or descend to any great distance. Space cannot be given to much evidence of this, but the fol¬ lowing extract from the report of the “Michael Sars Expedition® (1910) gives the following general results of its dredgings and net-haul- ings, as bearing on this point, as follows :

“These catches may be classified into three main regions : (1) A region extending down¬

ward from about 500 metres, characterized by the recurrence of Cyclothone and various black or dark-colored fishes, and of many peculiar inver¬ tebrates, red prawns being prominent; (2) a region ranging between 150 and 500 metres, characterized by a peculiar community of sil¬ very or grayish fishes belonging to the families Sternoptychidce and Stomiatidce ; and (3) the surface region, comprising the upper 150 metres.

… The layer from 800 to 1,000 metres downward may require to be still further sub¬ divided, for certain forms, like the larger Acanthophyra with red eggs, Notostomus , and several fishes and squids have been taken only in the deepest hauls at 1,500 or 2,000 metres.®

Abyssal Life. — Let us now consider the creatures of the abyssal

depths, where eternal cold, stillness, darkness and equability unite to make an environment so forbidding that the imagination would refuse to people it with living beings, yet where life and strife do actually abound. This bottom fauna, however, is not equally distributed. It is far more scanty on the areas of red clay than on the ooze ; and the faunae of the various ocean-beds differ, because barrier ridges separate them. What is said here relates to that of the bed. of the deep Atlantic, which is better known than any other.

The real bottom-animals are mainly fixed, and consist of sponges, hydroids, actinians, bryozoans, ophiurans, crinoids, brachiopods, holothurians, worms and mollusks. These are nowhere numerous, and below 2,500 fathoms are very scarce, to judge by the results of dredg¬ ing. Their subsistence is wholly derived, appar¬ ently, from the surface, some catching it as it falls and others sucking it out of the top layer of the ooze. Moving about there also is a lim¬ ited population of snails, crabs, squids and fishes, making their living upon or close to the bottom ; and a larger and more varied company of their relatives swim in the water above them, up to, say, the 2, 000-fathom line. All are of forms different in many respects from related species at or near the surface, and some brought up by the dredge can hardly be distinguished from fossils entombed in the oldest fossiliferous rocks, so unchangeable is the environment in which their race has been propagated for per¬ haps 50,000,000 years.

Through these black abysses swim fishes with extraordinary adaptations to their conditions. No attempt at even brief descriptions would be worth making. All are small, often less than an inch, rarely as much as six inches long, yet they are armed to the teeth. This is especially true of the families Stomiatidce and Sternoptychidce, in which fishes of grotesque shape have big heads with a savage array of long sharp teeth.

DEER (Cervidae)

1 The Sambur (Cervus Aristotelis)

2 The Virginia Deer (Cariacus virginianus)

3 The Elk (Alces palmatus)

4 The Axis (Cervus axis)

5 The Muntjac (Cervulus muntjac)

6 The Reindeer (Rangifer tarandus)

f

*

/• n

All are voracious, and some, as Chiasmodus, have mouths so capacious and stomachs so dis¬ tensible that they can often swallow fishes as large as themselves, when their stretched stom¬ ach with its load hangs beneath them like the yolk-sac of a newly-born trout. All are dark in color, brown, blue or violet marking the abyssal species. Some of them have light¬ giving organs ; and this was formerly regarded as a peculiar possession of deep-sea fishes, enabling them to see their prey in the Stygian gloom of the sunless abyss ; but it is now known that light-organs are especially characteristic of pelagic fishes of the region between the surface and 250 fathoms of depth; and ichthyologists are uncertain what service they are to the fishes that carry them. y

The eyes of most fishes, such as Macrwrus armatus, that inhabit the deepest bottom-layers are very large and have the quality of nocturnal eyes generally — are “day-blind® ; yet many fishes, squids, etc., hauled from great depths, have no visible eyes at all, or small and nearly useless ones ; . and this puzzling contradiction applies to other fishes living at intermediate depths. Some of the blind abyssal fishes are provided with whiplike fin-rays or very long head-filaments that probably act as “feelers,® and so serve the purpose of eyes in seeking food or taking warning of danger.

The general deductions to be made from this outline are that the waters of the ocean are everywhere inhabited, even to their uttermost depths, by living beings ; and these are adapted to various circumstances and so form faunas of local extent and character.

Bibliography. — Goode and Bean, (Oceanic Ichthyology* (Washington

1885) ; Mosely, (Notes of a Naturalist) (London 1878) ; Mur¬ ray and Hjort, (The Depths of the Ocean) (London 1912) ; Thomson, (Voyage of the Challenged (London 1877), and publications of sea-exploring expeditions and scientific insti¬ tutions.

Ernest Ingersoll.

DEER, animals of the family Cervidce (q.v.), which are noted for their grace of struc¬ ture and their fleetnesss of motion. Since the earliest times they have been known as objects of the chase, and their meat, “venison,® is con¬ sidered a delicacy. The male deer is usually called “buck,® but the male red deer of Europe is a “stag,® or when mature a “hart.® The female is called a “hind,® or “doe.® In the lan¬ guage of mediaeval venery each kind of deer, and each age of growing buck, has a distinctive name.

All deer have a coat of short fur, dull in tone, ranging from reddish-brown to gray on the upper surfaces, and usually white below. Those that are marked bear such markings on the face and throat and on the tail. Only a few genera are spotted. In most genera only the young (the fawns) are spotted, and lose their spots when they are about one year old. Deer breed annually, the young, one or two at a birth, being produced in late spring. The fawns re¬ main with their mothers until they are about a year old, when they are sufficiently mature to become independent. The grass-land deer, especially, are gregarious, and often gather in large herds at the approach of winter. These feed on the meadow herbage, whereas the

forest deer eat the leaves, twigs, and buds of bushes.

The deer is valued not only as food (it is the main subsistence of some northern tribes), but for commercial purposes. The skins make a peculiarly strong, soft leather, known as buck¬ skin ; skins with the fur on are not of much account, as the hair is brittle and soon dis¬ appears. The hoofs and horns are prized for ornamental purposes, especially the antlers of the roedeer, which are utilized for making umbrella-handles, and for similar purposes; and the elk-horn, often employed in making knife-handles. The Chinese also make a medicine from stag-horn and they eat the antlers of cer¬ tain species when “in the velvet.® The reindeer is as valuable to the people of the frozen North as the camel is to the desert traveler. The In¬ dians of the region north of Hudson Bay and Great Slave Lake are almost wholly dependent on the caribou.

Deer have long been bred in captivity as ornaments for parks, but only in the case of reindeer has thorough domestication succeeded. Considerable attention is being paid in those parts of the United States where large tracts of wild land are available to breeding the Ameri¬ can deer for market and this will doubtless be¬ come in the future an important source of meat supply.

The deer family is older than other fami¬ lies of ruminants, dating back to the Lower Miocene Period, when they were very small and without antlers. With a gradual structural change in other directions, such as variations in dentition and increased size, the antlers have been produced and amplified, so that the deer of the present is a far larger and finer-looking animal than his fossil ancestor. In the matter of antlers the young stag typifies the evolution of the race ; as a yearling, his antlers are merely one-pronged spikes ; but each successive year they become more branched and forked until at maturity they may have seven or more branches. See articles under various English names of deer, as Elk ; Fallow Deer ; Moose, *etc.* Con¬ sult Lydekker, (Deer of All Lands* (London 1898); Roosevelt (and others), (The Deer Family) (New York 1902) ; Ingersoll, (Life of Mammals * (New York 1907).

DEER FORESTS, large tracts of waste or uncultivated and mostly uncultivable land, chiefly situated in the Highlands of Scotland, set apart as grounds in which the stag or reddeer is hunted for sport, but is otherwise pro¬ tected and allowed to roam in its natural wild state. The name forest does not in this case imply the existence of trees. As a matter of fact most deer forests are mountains or highlying stretches of ground, exhibiting large areas covered with heath, in many places peat-bogs, marshes, lochs or bare rock, elsewhere patches of grass or other herbage, while plantations of trees of greater or less extent may also occur. Some of the deer forests are of very great extent, the larger covering, say, from 50,000 to 70,000 acres. The counties in which they are chiefly situated are Sutherland, Ross, Cro¬ marty, Inverness, and Argyle, while they also exist in Aberdeen, Banff, Forfar, Perth and Caithness. A number of them are retained in the hands of their proprietors, while many others are let, either for the shooting season or

for a period of years, and in this case may bring a large rental to their owners. The annual rental value of the larger deer forests ranges from $5,000 to $20,000 or even more, and the total rental of the deer forests of Scotland has been set down at over $1,000,000 per annum. Every stag killed costs the person who rents the ground about 50 guineas. A deer forest is always an expensive affair, not only for the rent that has to be paid, but also for the number of keepers, gillies, watchers, beaters, etc., that have to be employed in connection with it.

DEER-GRASS (Rhexia virginica), one of the American representatives of the large family of plants called Melastomacecu, meadow-beauty family, of which only about 20 species are found in the United States. The deer-grass extends from Maine to Florida and west to Illinois, Missouri and Louisiana. Other species extend the habitat of the genus to Texas. The flowers are conspicuous and showy, with bright rosy purple petals, and render the meadows unusually gay when adorned with patches of this lovely plant, entitling it to the common name of the meadow-beauty.

DEERMOUSE (Peromyscus leucopus), the common white-footed mouse of North America, a rodent of the family Muridcu. The main color of its body is buff or fawn, growing dark along the back, the feet and under parts being snowy white. With full, bright eyes, high, rounded ears, long whiskers and tail, graceful and sprightly movement, it is a very attractive little animal. It has been found to have small cheek-pouches. Its length rarely exceeds four inches, its tail being nearly as long. In different sec¬ tions of the country its markings and habits are varied, and in some it seeks a home in the human dwelling, as do other mice. Also the jumping mouse, Zapus hudsonins.

DEER-STALKING, an exciting but labori¬ ous mode of hunting the reddeer, in which, on account of the extreme shyness of the game, their far-sightedness and keen sense of smell, they have to be approached by cautious manoeu¬ vring before a chance of obtaining a shot oc¬ curs. Great patience and tact and a thorough knowledge of the ground are essential to a good stalker, who has to undergo many dis¬ comforts in crouching, creeping and wading through bogs, *etc.* Advance from higher to lower ground is usually made, since the deer

are always apt to look to the low ground as the source of danger. <(Deer-driving® toward a point where the shooters are concealed is often practised, but is regarded as poor sport by the true deer-stalker.

DEERFIELD, Mass., town of Franklin County, on the Connecticut River and the Bos¬ ton and Maine and the New York, New Haven and Hartford railroads, 33 miles north of Springfield. It is an agricultural region, and its industries are chiefly related to agricultural products. It has also manufactures of pocket books and art novelties. It has a high school, Deerfield Academy and a public library. The town contains the village of South Deerfield, and in colonial times was the scene of several contests with the Indians. Among them were the <(Bloody Brook Massacre® (1675) and the burning of the village by the French and In¬ dians under De Rouville (1703). Old Deerfield has a beautiful soldiers' monument, and there

js at South Deerfield a marble monument com¬ memorative of the Bloody Brook disaster. Eliza Allen Starr, author and art teacher, was born in Deerfield. The waterworks are owned by the municipality. The government is administered by annual town meetings. Pop. 2,209. Consult Sheldon, (A History of Deerfield, Mass.* (Deerfield 1895-96), and Powell, (Historic Towns of New England * (New York 1898).

DEERFIELD RIVER, a river in Massa¬ chusetts, rising in southern Vermont and flow¬ ing generally southeast for 60 miles, when it enters the Connecticut River. The great fall of the river of nearly 1,100 feet in 50 miles fur¬ nishes water power at many places, of which the chief are at the Hoosac Tunnel and Shel¬ burne Falls. Several streams nearly as large as the main river enter it from the north.

DEERFOOT, famous runner: b. Cattarau¬ gus reservation, Buffalo, 1828; d. there, 18 Jan. 1897. A half-breed Seneca Indian, he was taken to England in 1861 and matched against the best long-distance runners, defeating nearly all of them. He lost a six-mile race against Mills in September 1861, but defeated White in a four-mile contest a few days later, and direct¬ ly after outran both of those experts in a 10-mile championship. He beat Levett and Mills (12 miles) at Dublin for $500 in 65 minutes, and Howitt — the <(American Deer,® in Lon¬ don (four miles). He made a record of 11 miles 720 yards in one hour (London, October 1862), and \V/z miles in one hour less six seconds February 1863) ; another record was 11 miles and 12 miles in 57 minutes and 62 min¬ utes respectively.

DEERHOUND, the Scottish greyhound

used for deer-hunting. See Dog.

DEERSLAYER, The. (The Deerslayer,* last of the Leather-Stocking tales, which Feni-more Cooper published in 1841, is first in the order of events narrated in that famous series. The actions take place on and about Otsego Lake between 1740 and 1745. According to Cooper's own words, the <(legend is purely fic¬ tion, no authority existing for any of its facts, characters, or other peculiarities,® but ((the de¬ scriptions of scenery in the tale are reasonably accurate.® Essentially a romance, full of a dewy freshness, with large, blarfd, eloquent landscapes, and full of the forest philosophy which underlies the whole of Cooper's con¬ ception of Leather-Stocking, the book is at the same time, like all his later novels, considerably realistic. The dialect is careful, the wood¬ craft generally sound. The reality of the piece, however, comes chiefly from the reasoned pre¬ sentation of the central issue: the conflict in Leather-Stocking between the forces which draw him to the woods and those which seek to attach him to his human kind. The same con¬ flict had figured in earlier volumes of the series, but here it is more appealing than ever before because the hero is in the warm morning of his youth and must choose his career even against the enticements of love. It is hard to tell whether it is at the prescription of romance or at the demand of realism that he chooses his native forests ; he is enough a romantic person¬ age to prefer the wilderness, and yet his victory is not a romantic victory but a victory realisti¬ cally in keeping with his total character. What helps him to his choice is that Judith Hutter,

who loves him, one of the few convincing young women in Cooper's works, has been cor¬ rupted by the settlements, and to turn from her is an act forced by his simple principles of virtue as well as suggested by his preferences for a life in nature. (The Deerslayer) is thus the tale of his coming age. Already a hunter, as his name implies, he kills his first man. His distress at the realization seems immeasurably eloquent to readers who, knowing his future from the other Leather-Stocking

stories, re¬ member the many deaths Natty has yet to deal. In other matters he is near his later self, for he starts life with a steady philosophy which, through all the many experiences of the vol¬ ume, keeps him to the end as simple and honor¬ able as at the outset. Of the minor characters only the ardent young Chingachgook and the silly Hetty Hutter call for mention. The move¬ ment is rapid, the incidents varied, and the piece as a whole absorbing.

Carl Van Doren.

DE FACTO. The word de facto means <(actual, in fact, based on fact,®- in contradis¬ tinction to de jure, which means Rased on law, by right, by lawful title.® A de facto govern¬ ment is always a usurpation and may be said to exist when the usurping government has ex¬ pelled the regularly constituted authorities from their customary seats and functions and has established itself in their place, so becom¬ ing the actual government of a country. Such was the government of England under the Commonwealth. Such government continues to be a usurpation as long as it is in power or until legalized by the recognition of the de¬ partment entrusted with the authority to recog¬ nize the existence of a state ; but the authority claimed for a de facto government must be ef¬ fective and actually in operation before it may assume the de facto character. The United States Supreme Court has said: <(Who is the sovereign de jure or de facto of a territory is not a judicial but a political question the de¬ termination of which by the legislative and ex¬ ecutive departments of any government con¬ clusively binds the judges, as well as other of¬ ficers, citizens and subjects of that government. This principle has always been upheld by this court and has been affirmed under a great vari¬ ety of circumstances. It is equally well settled in England.® The Confederacy of 1861-65 in the United States was a de facto government and its actual exercise of authority over a given territory gained for it a certain amount of for¬ eign recognition (see Secession; Confederate States of America; United States — Seces¬ sion, etc.), but in point of law, since the Con¬ federates did not gain independence and could not establish a government de jure, the usur¬ pation remained illegal to the end. On the other hand, the Continental Congress exercised de facto authority which became de jure when Great Britain recognized the independence of the colonies. Thus their success gained for the colonies legal sanction of their usurping acts. A government may be de facto also when by paramount force it maintains itself by military power despite the regularly constituted authori¬ ties and is able to compel the obedience of pri¬ vate citizens. A de facto authority may usurp and exercise the authority of any public office, legislative, executive or judicial, but the mere

usurpation of the office does not constitute the usurper a de facto officer unless he actually ex¬ ercises the functions of the office. Thus when President Johnson removed Secretary of War Stanton (q.v.) on 21 Feb. 1868 and appointed Lorenzo Thomas Secretary ad interim, Stan¬ ton's refusal either to resign, to relinquish the office, or to allow another to exercise the func¬ tions of Secretary really constituted him a usurper in spite of the Tenure-of-Office Act (partially repealed in 1869 and wholly in 1887), and his actual exercise of authority, backed by Congress, made him the de facto Secretary. The failure of Congress to sustain Stanton by removing Johnson prevented Stanton again becoming Secretary de jure which he had been prior to his removal by Johnson. (Consult Dun¬ ning, William A., Reconstruction, Political and Economic, y pp. 90-92, 99-108, New York

1907). Acts performed under the authority of a de facto government are valid if such govern¬ ment by legal process subsequently become the government de jure, and certain acts of a de facto government which does not become de jure may be valid, e.g., if the regular taxes for administrative purposes be paid by a private citizen to the de facto authorities, he may not be forced to pay such taxes a second time. As far as other nations are concerned such a gov¬ ernment is treated as in most respects possess¬ ing rightful authority; its contracts and trea¬ ties are usually enforced ; its acquisitions are retained; its legislation is in general recog¬ nized; and the rights acquired under it are, with few exceptions, respected after the res¬ toration of the authorities which were expelled (96 Lb S. 176, 185-86). For decisions consult Thorington v. Smith, 8 Wallace 1 ; Williams v. Bruffy, 96 U. S. Sup. Ct. 176; Jones v. U. S., 137 U. S. 202. See Government; State; In¬ ternational Law.

DE FACTO CORPORATIONS. See

Corporations, Legal.

DEFAMATION, the speaking or writing words of a person so as to hurt his good fame. Written defamation is termed libel, and oral defamation slander. See Libel; Slander.

DEFAULT, a failure to appear in any court on the day assigned; especially applied to a defendant when he fails or neglects to plead or put in his answer on an appointed day. In such cases the plaintiff is entitled to sign judg¬ ment against him, which is called judgment by default, and the defendant is said to suffer judgment by default.

Failure to perform an obligation is termed a default.

DEFAUX, de-fo', Alexandre, French land¬ scape painter: b. Bercy, near Paris, 27 Sept. 1826. He was a pupil of Corot and his paint¬ ings are distinguished by a remarkable under¬ standing of perspective. He began to exhibit in the Paris Salon in 1859 and among his nu¬ merous landscapes are (View at Caen) ; (Abandoned Race Course at Ivry > ; (View of Saint Maur, Coast of Gravelle) (1863) ; Even¬ ing in Spring1* (1869); (Fine Winter Day in Bas Meudon1* (1873); (The Loire after a Flood1* (1873) ; (Birches at FontainebleaiP (1874) ; (Gravel Pit at FontainebleaiP (1877) ; (Forest of FontainebleaiP (1879) ; (Harbor of Pont-Avcn) (1880); (01d Birch-trees at Pigeon Pond in Fontainebleau) ; Row Tide in Nor-

mandy) (1884) ; (Pastimeof a Flock of Geese) ;

(After the Storm > (1885).

DEFEASANCE, in law, an instrument which defeats the force or operation of some other deed or estate. That which is in the same deed is called a condition ; and that which is in a separate deed is called a defeasance. The defeasance may be subsequent to the deed in case of things executory, but must be part of the same transaction in case of an executed contract. Yet where an instrument of de¬ feasance is executed subsequently in pursuance of an agreement made at the time of making the original deed, it is sufficient ; as well as where a deed and a defeasance bear different dates but are delivered at the same time. The instrument of defeasance must at law be of as high a nature as the principal deed. It must re¬ cite the deed it relates to, or at least the most material part thereof ; and it is to be made be¬ tween the same persons that were parties to the first deed. Defeasances of deeds conveying real estate are generally subject to the same rules as deeds, as to record and notice to pur¬ chasers, but in some cases, notice is not suffi¬ cient without recording.

DEFECTIVES. See Feeble Minded.

DEFENDANT, in law, the party against whom a complaint, demand or charge is brought, in a civil or criminal proceeding; one who is summoned into court and defends, denies or opposes the demand or charge and maintains his own right. The term is applied even if the party admits the claim.

DEFENDER OF THE FAITH (de¬ fensor fidei), the title bestowed on Henry VIII of England by Pope Leo X (1521) in recogni¬ tion of the monarch's great service to the Roman Catholic Church in writing his Assertio Septan Sacramentorum adversus Martinum Lutherum (vindication of the seven sacraments against Martin Luther). Pallavicini, in his his¬ tory of the Council of Trent, describes the great satisfaction given to the papal court by King Henry's book and the modes suggested by various cardinals of acknowledging the obliga¬ tion to the monarch. The Pope, with the aid of his secretary Sadolet, had a form of bull drawn up conferring on-Henry the title (<Defender of the Faith,® so that he might be 'on a par in the matter of titles relating to religion with the king of Spain's ((Catholic majesty® and the king of France's <(most Christian ma¬ jesty".® At the suppression of the religious houses at the Reformation the Pope recalled the title. In 1544 it was reconfirmed by Par¬ liament and has remained ever since.

DEFENDER OF THE MARRIAGE TIE, Defensor Matrimonii, or Defensor Vin-culi Matrimonialis, an official in every episcopal jurisdiction of the Roman Catholic Church, whose duty it is in all cases of petitions or suits for judicial separation of married couples or for annulment on whatever ground of mar¬ riage contracts or of the marriage relation, to defend with all his power the validity of the contract and resist its abrogation. The De¬ fensor is required to be in person present at every stage of the trial of a matrimonial cause, and he must have access to all the records and all the testimony. Not only may he, in case the court decides for the nullity of the marriage, appeal to a court of second instance ; he is

under obligation to appeal every single case; and if he demands it, he must be allowed a further appeal to the highest court. Nor is that all ; he has the right, and it is his duty, to open the case anew if he finds there was any serious flaw in the judgment of nullity. In short, a matrimonial cause involving nullity of a consummated marriage contract is in the Catholic Church never finally and absolutely determined so long as either of the two parties to the suit is living. Consult Taunton, (The Law of the Church > (London 1906).

DEFENDERS, a Roman Catholic asso¬ ciation in Ireland (1784—98), the opponents of the Peep o' Day Boys.

DEFENSE, (1) the answer, denial, or plea of the defendant to the plaintiff's or prose¬ cutor's case. By common law, the defense was merely an answer to the plaintiff's cause of ac¬ tion, being thus the second step in the pro¬ ceeding. It did not include the demurrer, but in England and in the United States generally the defense includes the demurrer. Although common-law • pleading is followed in many States in this country, the term defense has been extended generally to include the plea as well as the demurrer. Under the reformed procedure the term defense may be properly applied to the answer of the respondent to a bill in equity of the complainant, although for¬ merly this was not the case, the term being ap¬ plied exclusively to common-law actions. It is used both in civil and in criminal suits. The defense must contain every material fact re¬ lied upon by the defendant at the trial to de¬ feat the plaintiff's cause of action, and every statement of claim made by the plaintiff must be admitted or denied, although other facts may be pleaded. A statement of defense must generally be delivered to the plaintiff or his attorney within a limited time, varying often with the jurisdiction.

DEFENSE OF POESIE, The. The title

given to Sir Philip Sidney's (Apologie for Poesie) when printed for the second time in the third edition of the <Arcadia) in 1598.

DEFENSE OF THE REALM ACT. An

emergency measure passed by the British Par¬ liament 7 August on the outbreak of the Euro¬ pean War in 1914, authorizing the trial during the war by court-martial of persons contraven¬ ing regulations designed (a) to prevent com¬ munication of information to the enemy which might be useful, and (b) to secure the safety of railways, docks and harbors. A second act of similar title somewhat strengthened its pro¬ visions. Power was also given to detain actual or suspected spies ; by the Restriction of Aliens Bill all alien enemies were required to register themselves with the police and, were prohibited from traveling more than five miles from their registered address without permission.

DEFFAND, def-fan, Marie de Vichy-Chamrond, Marquise du, French letter writer: b. Chateau de Chamrond, France, 1697 ; d. Paris 24 Sept 1780. In 1718 she married the Marquis du Deffand, from whom she separated after 10 years. During the latter part of her long life she

became the centre of a literary coterie, which included some of the greatest geniuses of the age. Among women remarkable for their wit and talents in the 18th century Madame du Deffand claims a distinguished

place, though she left no monument of her abilities except her epistolary correspondence, highly praised by D'Alembert as affording a model of style in that species of composition. During the last 30 years of her life she was blind. In 1810 was published Correspondence inedite de Madame du Deffand, avec D'Alem¬ bert, Montesquieu, le President Henault, la Duchesse du Maine ; Mesdames de Choiseul, de Stael ; le Marquis d'Argens, le Chevalier d'Aydie, etc.* Her letters to the celebrated Horace Walpole, for whom she conceived a violent passion, have likewise been printed. Consult Sainte-Beuve, Causeries du Lundi* (Vols. I, XIV).

DEFIANCE, Ohio, city, county-seat of Defiance County; on the Maumee River near the tributary mouth of the Tiffin and Auglaize rivers, and on the Cincinnati and Toledo Canal, 50 miles southwest of Toledo. The Baltimore and Ohio, the Wabash railroads and the Ohio Electric railroad to Lima, 42 miles distant, af¬ ford transit facilities for the farming products and live stock of the surrounding agricultural region. Defiance is a busy trading centre and its manufacturing industries include flour mills, important machine shops, steel factories, farm implements, wagon, carriage and bicycle works, and woolen mills. It is the seat of Defiance College (q.v.), and has a national bank, daily and weekly newspapers. On the site of an In¬ dian village where General Anthony Wayne built Fort Defiance in 1794, the city dominates a fine view of river and county scenery. Defi¬ ance was platted as a town in 1822; in 1845 be¬ came the county-seat ; and was incorporated as a city in 1881. Pop. (1920) 8,876.

DEFIANCE COLLEGE, a coeducational (non-sectarian) institution in Defiance, Ohio; founded in 1902. It was originally the Defiance Female Academy founded in 1850 and opened in 1885. In 1918 it reports professors and instructors, 26; students, 601; volumes in the library, 7,000. Courses are given in the general academic, music, normal and commercial de¬ partments. It is owned by the Christians, and is connected with the Christian Biblical Insti¬ tute, which has a separate board of trustees under the same president.

DEFILEMENT. In many ancient reli¬ gions the doctrine of ceremonial

defilement was taught as is so clearly proven by J. G. Frazer in his (Golden Bought Contact with a dead body, or anything tabooed was defile¬ ment. In the Hebrew religion the same idea was taught in the Levitical Code, and rules for purification stated. The Rabbinical teach¬ ing carried the observance of defilement and purification to an extreme. Elaborate and lengthy ceremonies were instituted. In the Christian religion as taught in the New Testa¬ ment, the idea of defilement is purely symboli¬ cal, and relates to the defilement of the heart by sin or evil motives. In the early church the old sacrificial idea of defilement was sometimes prevalent, as in the teaching of Saint Simon Stylites and his followers.. The fundamental principle of monasticism is the escape from defilement in a worldly environment. The present teaching is a return to the New Testa¬ ment idea.

DEFINITION (from the Latin definitio) of a thing signifies, in lexicography, a concise

account of its essential and characteristic points. A definition should embrace all the essential properties of the object intended to be defined, and not admit any which do not belong to it, which is often extremely difficult, on account of the shades and gradations by which different things are blended. The most simple things are the least capable of definition, from the diffi¬ culty of finding terms more simple and in¬ telligible than the one to be defined. Accord¬ ing to the old scholastic logic, a definition must give the mark of the genus (nota generalis seu genus) and of the species (nota specialis seu differentia specified) ; for instance, a barn is a building (nota generalis) for the purpose of preserving corn, etc., (nota specialis) . According to Aristotle every strict definition could be divided into two distinct parts ; one dealing with the genus, and the other declaring the specific difference by which the given sub¬ ject varies from others of the same order. Kant and his followers on the contrary make definition merely a list of essential marks summed up without any distinction between genus and difference.

In optics definition means the defining power of a lens — the giving of a clear and distinct image of an object together with all details of importance.

DEFLATION, that geologic activity of the , atmosphere that is manifested in the removal of rock material by wind work, entirely aside from any mechanical wear or abrasion. It is characteristic of desert regions.

DEFLECTION OF THE PLUMB LINE, The, or the deflection of the vertical is the angular variation between the line verti¬ cal to the actual curve of the earth's surface at any given point, as determined by the vary¬ ing nature of its constituents beneath, and the line normal to the theoretical curve of the earth considered as a homogeneous ellipsoid of revolution. (See Isostasy). Consult United States Coast and Geodetic Survey, (Special Publications) 10 and 12 (Washington 1912).

DEFOE, Daniel, English journalist and novelist, author of (Robinson Crusoe) : b. Lon¬ don 1659 or 1660; d. London, 26 April 1731. He was the son of James Foe, a butcher, and was born in the parish of Saint Giles, Cripplegate. The date of his birth used to be given as 1661 from a statement in the preface of his (Protestant Monastery) (1727), that he was then in his 67th year; but the late G. A. Aitken showed (Athe - nceum, 23 Aug. 1890) that he was born late in 1659 or early in 1660. Little is known of his early years save that he was bright and active and well grounded by his parents in the Bible and in the Presbyterian faith. At about 14 he was sent to a Dissenters' school kept at New¬ ington Green by the Rev. Charles Morton, after¬ ward vice-president of Harvard. Here he studied theology, the classics, some of the mod¬ ern languages, mathematics, and history and geography, becoming later extraordinarily pro¬ ficient in the two subjects last named. In after years Defoe, defending the school, laid special emphasis on the instruction in English composi¬ tion. His school course was intended to fit him for the Presbyterian ministry, Dissenters being not then allowed at the universities; but some¬ where about 1678 he came to the conclusion that the position of a Dissenting clergyman was not

an enviable one and that he would do better to go into business.

Scarcely anything is known of his life for the next five years, save that he was interested in public affairs during the (<Popish Plot® and that he wrote — whether he published is doubt¬ ful — in favor of Austria against the Turks. In 1683 he was established in Cornhill, probably as a ((hose factor,® or wholesale dry-goods mer¬ chant. On 1 Jan. 1683-84 he married Mary Tuffley, by whom he soon had several children. It appears from his writings that he made voy¬ ages to Spain and Portugal and resided in Spain for a time, but no dates are given. Probably this was before his marriage, and at this same period he may have done the traveling in Italy and elsewhere of which he makes mention. Equally obscure is his share in the Monmouth uprising, yet it seems likely that he took part in that visionary enterprise and, unlike some of his old schoolmates, escaped being brought before Jeffreys. During the short reign of James II he appears to have used his pen against the Declaration of Indulgence, but his tract or tracts cannot be identified, the <Letter> believed by Lee to be Defoe's seeming to be Bishop Burnet's. In January 1687-88 he was enrolled in the Butcher's Company, thus becoming a liveryman of the city of London. There is also some evidence that he was a resident of subur¬ ban places and that his standing in Presbyterian and commercial circles was good.

At the close of 1688 Defoe joined the army of William III at Henley, and ever after he made that monarch his special hero, praising him in his writings whenever he could. In 1691 he published his first definitely identified work, a satire on a recent Jacobite plot against William, (A New Discovery of an Old Intreague.5 For many years he continued to essay poetry, but only on one or two occasions did he rise above mediocrity, his genius being essentially that of a prose writer. In 1692 his affairs, which had probably been going wrong for some time, partly through the multiplicity of his interests, forced him into bankruptcy with a deficit of £17,000. He may have gone into hiding from his creditors, possibly at Bristol. Then he com¬ pounded with them and, according to the testi¬ mony of a journalistic rival, Tutchin, he later discharged in full some of the obligations that had been scaled. Rejecting an offer to take charge of some business in Spain, he became secretary of a tile factory at Tilbury and was also for four years (1695-99) accountant to the commissioners of the glass duty. He seems to have had some reputation as a financier and he may

have pleased the government by urging in a pamphlet a vigorous prosecution of the war against France ((The Englishman's Choice, } 1694). His writings between 1691 and 1697 are, however, practically unrecoverable and may not have been notable in quantity. By 1697 he had re-established himself in comfortable circum¬ stances, and before the close of 1700 he had issued a considerable number of tracts dealing with the question of a standing army, with reformation of manners, with foreign affairs and with the vexed problem of the occasional conformity of Dissenters. The only work of extended compass and interesting to the general reader is the (Essay upon Projects) (1697, but in part written earlier), in which he made numerous and often highly valuable suggestions

about such matters of public interest as banks, insurance, good roads, asylums for idiots, and academies, especially for women, in whose wel¬ fare he was more interested than almost any other man of his time. The tracts on occasional conformity were vigorous performances that gave anxiety to easy-going Dissenters, and his strong defence of William's policy with regard to the army and in foreign affairs may have helped him to obtain the confidence of that monarch when a little later he was introduced at court.

Defense of William was also the occasion of his publishing in January 1701 the best of his poems and the most popular of all his early works, his satire (The Trueborn Englishman. > Much prejudice had been stirred up against the foreign-born king, and in rough but energetic verses Defoe turned the tables by dwelling upon the mixture of stocks that made up the English people. Over 80,000 pirated copies were sold, and Defoe, who a little later for unde¬ terminable reasons added the prefix to his name, for some years delighted to style himself on his numerous titlepages <(The Author of (The Trueborn Englishman. J ®

Between January 1701 and March 1702 on the 8th of which month King William died, De¬ foe continued to be a fairly prolific pamphleteer. He still dealt with occasional conformity and foreign affairs, but he began more specifically to attack political abuses at home — corrupt elec¬ tions to Parliament, the misdeeds of stock¬ jobbers, Jacobite intrigues and the like. His powers as an acute arguer sure of making the average reader see his point and as a writer of homely, racy, fluent prose were now fully re¬ vealed. He also showed himself to be remark¬ ably well informed on economic, constitutional and diplomatic questions, and full of a sturdy patriotism of the Whig

variety. The most note¬ worthy of his pamphlets of this period are his weighty assertion of (The Original Power of the Collective Body of the People of England) (December 1701) — a rebuke of the independ¬ ence displayed by the high Tory members of Parliament which would have been worthy of Somers himself; and (Reasons against a War with France> (October 1701), which to some students — though others take his reasoning lit¬ erally — is the first of the tracts in which De¬ foe sought to attain his ends by irony and indi¬ rection — a war with Spain for the sake of colonial aggrandizement being his object despite the inevitably resulting struggle with France. (Legion's MemoriaP (May 1701) represents, however, the zenith of his short-lived popu¬ larity. The Tories had imprisoned the five pre¬ senters of the Kentish Petition (of which De¬ foe wrote a <History)) and he thought it time to protest in the names of the many — Legion. He presented the (MemoriaP to Harley, the speaker (in what manner is not clear), and the House dared not resent the bold action. On the release of the petitioners Defoe sat by their side at a complimentary banquet.

Several poems on various subjects and prose manifestoes against the High Church party fol¬ lowed; then, at the end of 1702, Defoe re¬ turned to the attack on occasional conformity, which was destined to cost him dear. The High Churchmen in power had carried through the Commons a bill to prevent the practice, which was, indeed, as Defoe held, a scandal from the point of view of consistency in ecclesiastical

matters, but which, so long as occasional com¬ munion according to the rites of the Established Church was requisite to the holding of office, would certainly be pursued by ambitious Dis¬ senters. Defoe's arguments were sincere and forcible, but unfortunately left him in an ex¬ posed position between the two firing lines. Perhaps it was to strengthen himself, whether with the Dissenters, who thought him a deserter, or with the Whig leaders, that he published in December 1702 his famous (Shortest Way with the Dissenters, > in which, assuming the charac¬ ter of a High-Flyer, i.e., of an uncompromising churchman, he argued for the suppression of dissent by any means, no matter how cruel. It is hard to believe that he could have been taken seriously, but there is proof that he was. The Dissenters were alarmed by any hint of proposed persecution at such a time of partisanship; and, when the High Churchmen discovered that they had been applauding a Dissenter who was really aiming to secure toleration, they were furious at being hoaxed. The result was that Defoe, accused of libeling the Church, went into hiding for months — whether abroad or near London is not clear. He was arrested in Spitalfields near the end of May 1703, committed to New¬ gate, examined in vain as to his political back¬ ers, who, if he had any, deserted him, condemned after unfair proceedings, and sentenced to pay a fine, stand in the pillory and be imprisoned. He stood in the pillory on July 29, 30, 31, 1703, but the people draped it with flowers and read his clever (Hymn) to the instrument of shame.

It used to be thought that Defoe remained in Newgate until August 1704; but it now seems clear from his correspondence with Har¬ ley (published by the Historical Manuscripts Commission, 1897, 1899) that through the good offices of the latter he was released about the first of November 1703. This not only disposes of the notion that he began his famous (Review5 in prison, but also makes it clear that he was not, as has been charged, drawing on his imagination when he described his personal ex¬ periences during and after the great storm of the end of November 1703 in his volume (The Storm) published the next year. He was in prison long enough, however, for his business to go to ruin and his family to come to want, from which they were

partially relieved by Harley. He had every reason to be grateful to that leader, and, although while serving him. during the next 10 years, Defoe did and wrote much that it is impossible to regard as honor¬ able, his offenses are mitigated by his position of dependence and by the loose examples in politi¬ cal morality set by the leading men of the time.

During and immediately after his imprison¬ ment Defoe continued industriously to publish poems and pamphlets, adding as new topics, not only the (Storm, > but the theological vagaries of John Asgill, regulation of the press and the state of the Episcopalians in Scotland. His main achievement, however, was the establish¬ ment (17 Feb. 1704) of his newspaper, A Review of the Affairs of France, etc., which, after several minor changes of title, became A Review of the State of the British Nation. Starting as a weekly this speedily became a bi-weekly and then a tri-weekly sheet. A literary depart¬ ment, supposed to be furnished by a (Scandal ClubC appeared in early volumes. Defoe wrote practically the whole of the paper, which

steered between the extreme Whig Observator of Tutchin and the extreme Tory Rehearsal of Leslie. Even during his long periods of absence in Scotland the numbers appeared regularly, spreading Defoe's fame and influencing later journalists like Steele. After some changes in title and manner of issue the Review came to an end with its ninth volume (of which the British Museum copy is the only one known and even that is incomplete) on 11 June 1713. Its success entitles Defoe to be called the first great English journalist, whether or not his affectation of independence must give him a high place among casuists. It should be added that in the main he supported the constitutional and reli¬ gious principles in which he believed and was constant in his endeavors to promote peace with honor and commercial prosperity.

In the spring of 1704 Defoe was in fre¬ quent correspondence with Harley, and in the summer he took a trip through several counties to electioneer and gather information. Whether at home or on his journeys, he was continually writing. Between July 1703, when he issued the first of two volumes of his collected writings — a pirated volume had appeared some months earlier — and the same month of 1705, when the second volume probably appeared, he was responsible for at least 35 publications. The most important of these to the latter-day reader is the celebrated and able (Giving Alms no Charity* (November 1704) in answer to a bill for employing the poor — an

attack upon pauper legislation in a tone strikingly modern. His let¬ ters of 1705 show that he was receiving pay but did not know whether it came from Harley's pocket or the Treasury. He submitted his writ¬ ings to his employer, communicated political in¬ telligence, and in the summer and fall under¬ took another electioneering tour under an assumed name. Of the numerous publications of the year besides the Review the most import¬ ant is (The Consolidator, or Memoirs of Sun¬ dry Transactions from the World in the Moon,* a rather heavy prose satire on English politics. He showed his knowledge of American affairs in (Party Tyranny,* written in defense of the Non-Conformists of South Carolina, a subject to which he recurred a few months later. Early in 1706 he had a rough pamphlet duel with Lord Haversham in defense of the ministry, and he discussed the new bankrupt law, a matter in which he was interested, as his creditors, stirred up by his numerous political enemies, were pressing him hard. Of the publications of the year the most important are the huge satire in verse (Jure Divino,* creditable to his learning and his political principles but impossible as poetry, and his famous (True Relation of the Apparition of one Mrs. Veal,* which has no superior as a realistic presentation of a supernatural event. The notion spread by Sir Walter Scott and others that this was composed to help the sale of Drelincourt's (Fear of Death* was long since shown to be false; some 20 years ago the late G. A. Aitkin proved that Defoe merely reported with won¬ derful realism an apparition story current in Canterbury at the time.

The chief political events of 1706 were con¬ nected with the proposed union between Eng¬ land and Scotland. In May Defoe began pub¬ lishing a series of acute, well-informed and conciliatory essays (at Removing National

Prejudices, > which by January 1707 amounted to six in number. Meanwhile in September 1706 at Harley's orders he had set out for Scot¬ land to help on the negotiations at the meeting of the Scotch Parliament. From October 1706 to December 1707 he continued at his post send¬ ing full and interesting letters to Harley, inter¬ viewing leaders of every faction, encountering the violence of mobs, publishing pamphlets — in short, making himself valuable in every way. Except for an occasional visit to a disturbed centre like Glasgow, he remained in Edinburgh, and part of the time he was in attendance on parliamentary committees, serving them by his knowledge of English commerce and finance, and picking up information about Scotland of which he afterward made much use. The pity of it all is that he passed, part of the time at least, as (<Alexander Goldsmith,® declared that he was in Scotland on his own business and in nobody's pay, and yet was continually writing begging letters to Harley, who was not prompt in forwarding funds. During the 15 months, besides maintaining his Review, he published a poem, (Caledonia, } and several pamphlets.

On his return to England Defoe found Har¬ ley in political difficulties and in February 1708 learned of his fall. He immediately offered to share his superior's fortunes, but Harley dis¬ countenanced such romantic notions and turned his useful agent over to Godolphin, whom De¬ foe served with apparent fidelity until Harley came into power in 1710. This meant that Defoe was regarded as a permanent secret service man and not as an official of dignified and regular status. He visited Scotland again in 1708 and in 1709, and supported warmly the Whig measures of Godolphin and Marlborough both in his Review and in his pamphlets, which during these years apparently decreased in num¬ ber. One reason for his not appearing oftener in his favorite role is probably to be found in the fact that he was at work upon his volumi¬ nous (History of the Union of Great Britain (1709) which, while scarcely interesting, is valu¬ able and a clear proof of his interest in everything Scotch. In 1710 he naturally took his part in the Sacheverell controversy and on the dismissal of Godolphin he was glad to be employed once more by Harley. In the fall he visited Edin¬ burgh as ((Mr. Claude Guilot,® for the purpose of undermining the Jacobites. By February 1710-11 he was back in London having frequent interviews with his chief and writing him letters full of suggestions and also of requests for money. Another visit to Scotland

was made in the fall of 1712, but his travels in Harley's in¬ terest are not so important as the changed tone of the Review and of the pamphlets of the period. Defoe had the hard or, rather, im¬ possible task of maintaining outwardly his journalistic independence and at the same time of abandoning his support of the war and his general Whig attitude. On the whole, he was fairly consistent, opposing vigorously as he did the passage of the Occasional Conformity Bill, but, of course, his path was a perilous one. The extreme Tories, who were powerful in the new Parliament, would not trust him, and the Whigs, whom he had deserted, detested him as a renegade. The modern reader, making allow¬ ance for the facts that it was a factious period, that regular party government was in its in¬ fancy, and that Defoe, both by his disposition

and by his circumstances, was practically forced into his equivocal position between the Whigs and the Tories, finds it possible to admire the dexterity of his casuistry and the versatility and range of his activity. Between March 1710 and June 1713 when the Review came to an end, he published more than 60 pamphlets, be¬ sides at least two. books. He dealt with Sache¬ verell, public credit and loans (essays errone¬ ously attributed to Harley), the extravagant partisanship of the <(October Club,® the advan¬ tages of the South Sea trade, the reasons for advocating peace and the treaty of commerce with France, the impolicy of the Occasional Conformity Bill, the political reputation of Har¬ ley and the efforts of the Jacobites in favor of the Pretender. On the last topic he was spe¬ cially effective. His five or more pamphlets (1712-13) are still readable, and one is amused in endeavoring to understand how the ironical (Reasons against the Succession of the House of Hanover* should have misled the stupid as much as his (Shortest Way with the Dissenters * had done 10 years before. This tract came near getting him into just as much trouble, certain Whigs who had themselves been prosecuted for their writings bringing an action against him for treason based upon his having written as a Jacobite. Defoe injured his cause by dis¬ cussing the case in the Review, but Harley secured bail for him, and, after much manoeu¬ vring, since it was to the interest of both to keep their relations from being definitely known, however much they were suspected, he was finally pardoned under the great seal. The statement of some biographers that Defoe was a prisoner between April and November 1713 is shown by his correspondence with Harley and by contemporary newspapers to be an error. He was confined in the Queen's Bench Prison for only a few days.

Between June 1713 and August 1714 when the fall of Harley and the death of Queen Anne brought a change to his fortunes, Defoe wrote about 20 pamphlets (four of them forming an interesting (General History of Trade*) and labored upon two newspapers, Mercator, or Commerce Retrieved, and a sham Flying Post. He warmly welcomed the new king and, feeling that he must as far as possible clear himself from the charges of being a turncoat and a mercenary writer, he published in February 1715 his eloquent if not wholly ingenuous (Appeal to Honor and Justice.* He was also the author of the three parts of the much criticized (Secret History of the White Staff *(1714—15), a defense of Harley, which that unpopular person felt obliged to declare the work of an opponent. Whether he was nearly so ill from apoplexy as he wished readers of his (Appeal* to believe is very doubtful, but there can be no doubt that he was in an equiv¬ ocal position, distrusted by all parties and de¬ pendent upon his wits for the support of an expensive family.

Defoe's bibliography now becomes exceed¬ ingly complicated. In the four years that elapsed before the appearance of the first part of (Robinson Crusoe) (25 April 1719) he pub¬ lished anonymously over 90 pamphlets, at least six books — including his popular (Family In¬ structorˆ the exemplary (Memoirs of the Church of Scotland* and the forged (Minutes * — worked on a series of political (Annals

of King George, > edited the monthly Mercurius P oliticus and Mercurius Britannicus and contributed to at least three newspapers. He was one of the most conspicuous figures of the time, but was at no period admitted to the brilliant literary circles of Swift and Pope and of Addison and Steele. Meanwhile he had been convicted (July 1715) of libeling Lord Annesley by the declaration that his lordship had tam¬ pered with the Irish troops in the interest of the Pretender, and it would have gone hard with him if he had not thrown himself on the mercy of Chief Justice Parker. The latter commended him to the Secretary of State, Lord Townshend, who found him very ready to serve the new government in a hazardous employment, to wit, as a spy in the offices of Jacobite newspapers. His chief connection of this sort was with Mist's Journal from 1717 to 1724, with intermissions. He took the sting out of articles and kept the government informed of what the disaffected Tories were doing and writing, doubtless justi¬ fying himself by the thought that he was serving the best interests of Great Britain and the Protestant religion. There is simply no defense for Defoe's conduct; but it should be remem¬ bered that as Harley's man he had become inured to intrigue, and it is at least to his credit that his skill made Mist's Journal popular. He continued to labor as an anonymous and outwardly renegade journalist, now editing his own paper — e.g., The Whitehall Evening Post — now contributing leading articles to Applebee's Journal, until 1726, long after his fiction had obtained popularity. Our knowledge of this portion of his career is largely due to the researches of Mr. William Lee, who in the second and third volumes of his great work published the choicest of Defoe's articles in which will be found some of the best of all his writings. Under the protection of Harley he had made himself the ablest political journalist of his time ; left to his own devices, he became the ablest journalistic commentator on the gen¬ eral news of the day and on morals that Eng¬ land had yet known, with the exception, in certain particulars, of Addison. The later phase of his activity naturally fitted in with his writing of fiction and of utilitarian manuals, and in the combined functions he has probably exerted an almost unrivaled influence on English literature.

Defoe had shown in (Mrs. VeaP and in his description of the supposed destruction of the island of Saint Vincent (Mist's Journal, 1718) his ability to write realistic narratives; but it was (Robinson Crusoe,) founded mainly on the adventures of Alexander Selkirk on Juan Fernandez, as told by Captain Woodes Rogers, that gave the great journalist a high standing among world authors. The book, concerning the origin of which we know almost nothing, became popular at once, was pirated, printed as a serial and translated into French and German, and subsequent editions, transla¬ tions and imitations have been almost number¬ less. A second part, (The Farther Adventures of Robinson Crusoe, } was added in August 1719, and a third part, the (Serious Reflections,* a group of essays now little read, appeared a year later. Neither the story that the first and best part was by Harley, nor the notion that Defoe used Selkirk's manuscripts, nor the theory that he gave in (Robinson Crusoe* an

elaborate allegory of his own life (partly sup¬ ported by his language) will bear close investi¬ gation. That in his most famous book he made admirable use of a theme of universal interest, and that he employed in writing it all his resources as a realistic reporter and an imagi¬ native projector, is proved by the position it has attained as a classic.

From the date of this success until 1727, that is, from his 60th to his 68th year, Defoe's work is simply astounding both in quantity and in quality. Of about 70 items some 30 are volumes and several of the remainder almost too large to be called pamphlets. To this period belong the picaresque stories (Moll' FlandersJ (1722), (Colonel Jacque) (1722) and (The Fortunate Mistress* or (Roxana* (1724) — unrivaled as studies in low life and showing growth on Defoe's part in character-drawfing and plot-construction ; the adventure stories of (Captain Singleton* (1720) — remarkable for the knowledge displayed of African geography

— and (A New Voyage 'round the World* (1725) — interesting for its descriptions of the lower part of South America; the history1 of a famous teller of fortunes, Duncan Camp¬ bell (1720) ; those portrayals of stirring his¬ torical epochs and episodes, (Memoirs of a Cavalier *(1720), (A Journal of the Plague Year* (1722) — probably Defoe's best work after (Robinson Crusoe) — and (Due Prepara¬ tions for the Plague) (1722) ; and those popular manuals of conduct, the curious (Religious Courtship) (1722), and the two parts of (The Complete English Tradesman* (1725, 1727). To these books, some of them masterpieces in their kind, must be added a (History) of Peter

the Great (1723), a book on the servant question ((The Great Law of Subordination Considered, *1724), three volumes of an early guide-book ((A Tour thro' the Whole Island of Great Britain, > 1724, 1725, 1726), <The Political His¬ tory of the Devil* (1726) and (A System of Magic* (1726), at least 10 pamphlets on famous criminals, such as Jack Sheppard, and several tracts on commercial, economic and social topics

— some of them published under the assumed name of Andrew Moreton. There is scarcely another such record of literary activity on the part of an aging man, and these multifarious productions illustrate his times better than is the case with the writings of almost any other author. These were nearly always anonymous save in such a case as <The Four Years Voy¬ ages of Capt. George Roberts) (1726), which describe the adventures among the Cape Verde Islands of a possible real seaman.

Between 1727 and his death Defoe pub¬ lished at least 30 books and tracts, among them (Conjugal Lewdness) (1727), a well-meant but hazardous volume; (An Essay on the History and Reality of Apparitions) (1728), (A New Family Instructor (1727), (A Plan of the English Commerce) (1728) and a number of pamphlets many of which were specially de¬ signed to promote the better civic government of London. He also seems to have compiled for a veteran, Capt. George Carleton, a volume of <Memoirs) (1728) describing experiences as a soldier and prisoner in Spain, which has been too implicitly trusted by historians, and for a certain Robert Drury a volume entitled (Madagascar* (1729), giving an account of the young man's captivity on that island. These

books are frequently ascribed to their putative authors, and the first has been attributed to Dean Swift, but there is good reason to hold that Defoe was mainly responsible for them. It is pleasant to believe that his incessant labors enabled Defoe to spend some of his last years in comfort at Stoke Newington; certainly, from the account of him given by his son-in-law, Henry Baker, the naturalist, he must have had

a fair income. About 1730, however, at a time when he was working on a periodical, The Political State of Great Britain, founded by an old rival, Abel Boyer, he seems to have deeded his property in trust for his wife and daughters to one of his sons, who apparently was false to his trust. Defoe, probably to escape some of his old persecutors, went into hiding, and in April 1731 died in London lodgings. Mystery surrounds his last days, and there are numerous passages in his more active period that need to be cleared up. The man's character, too, re¬ mains enigmatic, though we may be sure that he was neither the hero of the early biographers nor the unprincipled mercenary and liar of many contemporaries and some latter-day critics. Fortunately there is little doubt that in his com¬ bined achievements as journalist, pamphleteer, realistic novelist and miscellaneous purveyor of information and instruction he is unsur¬ passed among prose-writers. See Robinson Crusoe.

Bibliography. — No edition of Defoe's works contains more than a small fraction of his writings. The best is that printed at Oxford in 20 volumes (1840-41). A good edition begun in 1840 by the younger William Hazlitt did not get beyond three volumes. (The Compleat Eng¬ lish Gentleman* and (Of Royal Education* were first printed from a manuscript in the British Museum by Dr. Biihlbring in 1890 and 1895. There are two recent editions of the fiction — the excellent one in 16 volumes, edited by the late G. A. Aitken (1895), and that of equal scope, by Dr. G. H. Maynadier (1904). The most important biographies are those by Walter Wilson (1830, 3 vols. — very valuable for its account of Defoe's times), by William Chadwick (1859 — rather eccentric), by William Lee (1869), 3 vols. — the second and third con¬ taining Defoe's newspaper articles), and by Thomas Wright (1894, useful, but disfigured by the curious theory that Defoe kept a vow of silence for a period equal to that spent by Crusoe upon his island). Consult also John Forster's (Historical and Biographical Essays) (1858), Minto's (Daniel De Foe) ((English Men of Letters,* 1879) and D. W. Rannie's (Daniel De Foe) (The Stanhope Essay, 1890). Lee's bibliography of 254 items (slightly amended by Wright) was long standard, but is now antiquated. His selections from Defoe's newspapers, although unsupported by much external evidence, seem to have been made with great skill. Consult for further information the present writer's chapter in the ninth volume of (The Cambridge History of English Literature) and his volume on Defoe in the (How to Know the Authors' Series* (1916).

William P. Trent,

Professor of English Literature, Columbia Uni¬ versity.

DE FONTAINE, Felix, American journal¬ ist; b. Boston, Mass., 1832; d. Columbus, S. C.,

11 Dec. 1896. The first statement given to the North of the attack on Fort Sumter was written by him ; and he was correspondent of the Charleston Courier from the principal bat¬ tlefields during the Civil War. Subsequently he went to New York, and was connected with the Herald much of the time until his death. He was the author of (Cyclopaedia of the Best Thoughts of Charles Dickens* ; (Gleanings from a Confederate Army NoteBook) ; and (Birds of a Feather Flock Together.)

DE FOREST, Jesse, the reputed founder of New York city and Walloon ancestor of many thousands of Americans: b. about 1575 at Avesnes, Hainault ; d. 1624. He was married to Marie du Cloux, 23 Sept. 1601. In Sedan, also, on 22 July 1604, Henry De Forest, founder of Harlem, N. Y., and David de Forest, resi¬ dent of New Amsterdam in 1659, were born. Jeˆse was a merchant dyer. His name appears next in the Walloon records of Leyden, where his daughter, ancestress of many New York families, was born in 1609, marrying in 1626 Jean Mousnier le Montagne. Many other mem¬ bers of the De Forest family were in Leyden, the majority of them recorded as natives of Avesnes. Isaac, the future ancestor of the American De Forests, b. 10 July 1616, was one of Jesse's four children born in Leyden. In all, it is probable that Jesse De Forest had at least 10 children — his large family thus furnishing a noble motive for emigra¬ tion. During the Great Truce, from 1609 to 1626, there were many thousand Walloon sol¬ diers and others in the Dutch Republic. In July 1621, Jesse applied to King James of England, through Sir Dudley Carleton, in the name of 60 families of Walloons, for trans¬ portation to Virginia. The ((round robin** was signed by 56 men, heads of families represent¬ ing 227 persons, but the response of the Vir¬ ginia Company was unsatisfactory. In April 1622, Jesse petitioned the States of Holland and again, on 26 Aug. 1623, the States-Gen- eral, for aid, and the very next day received his authorization to enroll colonists. Twenty-six ships were sent by the Dutch West India Company to Brazil and Guiana, laden with thousands of fighting men and colonists, one of the latter being Jesse De Forest, who sailed out of the Maas River at Rotterdam on 23 De¬ cember. He wrote an account of this voyage. On the ship New Netherland, 260 tons, com¬ manded by Cornelis Jacob Mey, of Hoorn, the company of Walloon settlers, with Jesse de Forest's children, sailed for America in March, via the Canary Islands, and touching at Oya-puk in Guiana, sailed northward into the Mau¬ ritius

(Hudson) River. There being yet no military occupation of New Netherland by the Dutch, this ship, with the armed yacht Mac¬ kerel, arrived in time to save the region from French occupation. These Walloon settlers (see Walloons) began immediately to culti¬ vate the soil and became the ancestors of many thousands of Americans, many of them emi¬ nent in the annals of war and peace, of inven¬ tion, finance and philanthropy. It is not known where or when Jesse De Forest died. Consult his journal in R. W. De Forest's book; De For¬ est, J. W., (The De Forests of Avesnes* (1900) ; and De Forest, R. W., (A Walloon Family in America) (2 vols., p. 705, 1914).

DE FOREST, John William, American novelist: b. Humphreysville, Conn., 31 March 1826; d. New Haven, Conn., 17 July 1906. He passed many years in independent study and foreign travel, becoming proficient in several languages ; entered the army as captain at the outbreak of the Civil War and rose to major. Among his works are (History of the Indians of Connecticut (1853) ; (Oriental Acquaintance) (1856) ; (Witching Times) (1856) ; Eu¬ ropean Acquaintance* (1858) ; <Seacliff) (1859); (Miss Ravenel's Conversion (1867); <Overland) (1871); (Kate Beaumont (1872); (The Wetherell Affair* (1873) ; (Honest John Vane5 (1875); (Justine Vane* (1875); (Playing the Mischief * (1876) ; (Irene Vane)

(1877) ; (Irene, the Missionary) (1879) ; (The Oddest of Courtships; or, The Bloody Chasm) (1881) ; (A Lover's Revolt (1898) ; (Overland* (1899) ; (The De Forests of Avesnes and New Netherland* (1900).

DE FOREST, Lee, American inventor : b. Council Bluffs, Iowa, 26 Aug. 1873. He was graduated at the Sheffield Scientific School of Yale University in 1896. He is one of the pio¬ neers in the development of wireless telegraphy in America. He was vice-president of the American De Forest Wireless Telegraph Com¬ pany in 1902-06, which was succeeded by the United Wireless Telegraph Company. He is vice-president of the Radio Telephone Company and the De Forest Radio Telephone Company since 1907. He was awarded a gold medal at the Saint Louis Exposition of 1904 for his work in wireless telegraphy. He

has taken out over 100 United States and foreign patents on radio telegraphy and telephony; his most important contribution in this field is the (< Au¬ dion** — detector and amplifier, which made possible the transcontinental telephone service, both by wire and wireless.

DE FOREST, Robert Weeks, American lawyer: b. New York, 25 April 1848. He was graduated at Yale in 1870, studied law at Co¬ lumbia, and studied also at Bonn. He was admitted to the bar in 1871 and joined his father's and uncle's law firm, later with his brother and sons. In 1874 he became general counsel and in 1902 vice-president of the Cen¬ tral Railroad of New Jersey, and holds offices and directorships in several railroad and other corporations. He has taken an active part in several public movements and in 1888 became president of the Charity Organization Society, which office he still holds. In 1913 after 25 years of service as trustee he became president of the Metropolitan Museum of Art. He was chairman of the New York State Tenement House Commission in 1900 and was the first tenement house commissioner of New York city. In 1903 he was president of the National Conference of Charities and Correction and is a vice-president of the American Red Cross and vice-president of the Russell Sage Founda¬ tion. Since 1912 he is president of the Amer¬ ican Federation of Arts.

DE FOREST WIRELESS TELE¬ GRAPH SYSTEM, The. The inception of this system, invented by Dr. Lee De Forest, dates back to 1899. Dr. De Forest's original idea was to develop a receiver, working on an electrolytic principle, which would be entirely automatic in its actions, requiring no tapping vol. 8 — 38

back or decohering arrangement like the co¬ herer, but allowing the use of a telephone re¬ ceiver for rapid and accurate work. During the years 1901 to 1905 Dr. De Forest developed the radio telegraph system bearing his name. He was the first in this country to use alternat¬ ing current generator and transformer at the transmitter as distinguished from the spark coil and direct current and the telephone receiver, with a ˆself-restoringˆ detector as distinguished from the filings coherer and Morse inker at the receiver station. These radical improvements put the radio art upon an engineering basis. In 1904 all then existing records for overland wireless transmission were broken in the service established between the World's Fair at Saint Louis and Chicago, 300 miles. Five months later the American De Forest Wireless Tele¬ graph Company installed five high-power 35 k.w. stations for the United States navy, op¬ erating over distances of

1,500 miles. The elec¬ trolytic receiver was in 1906 supplanted by the De Forest Audion or ionic current detecter. The Audion and Ultraudion are more sensi¬ tive than any other types of detecters, abso¬ lutely reliable in action and enable opera¬ tion over distances quite impossible with other types.

In an exhausted glass bulb are a hot fila¬ ment, a cold plate and a grid wire electrode lo¬ cated midway between these two. In circuit between the plate and filament are connected a *B** battery and telephone receiver. The in¬ coming high frequency impulses to be detected are led to the grid and the filament. The nor¬ mal negative current passing by means of ions or electrons from filament to plate is more or less interrupted by the slightest negative change impressed on the grid electrode of the Audion. The action is self-restoring instantly upon ces¬ sation of the train of waves from the trans¬ mitter. In this way an operator listening in the telephone receiver hears an exact reproduc¬ tion of the transmitted signals. The Audion permits radio telegraphy over immense dis¬ tances.

In 1906 Dr. De Forest discovered that the Audion could be made to amplify weak tele¬ phonic currents and this without any distortion of the voice. The Audion amplifier was de¬ veloped as a telephone repeater or relay to such a degree that in 1912 the American Telephone and Telegraph Company purchased a license under all the De Forest Audion patents for wire telephone purposes. Within a short time there¬ after transcontinental wire telephony was an accomplished fact, an impossibility before the advent of the Audion relay. The Audion am¬ plifier has been pronounced by eminent tele¬ phone engineers as the one radical innovation in the telephone art since the discovery of the microphone.

De Forest devoted most of his efforts from 1906 to 1910 to the development of radio telephony. Sixteen United States battleships were equipped with this system just prior to their historic round-the-world cruise. From 1913 to 1916 De Forest developed the Ultrau¬ dion receiver for undamped wave reception, and also the Oscillion, or oscillating Audion, as a source of high-frequency undamped waves, as a transmitter, especially for radio telephony. The United States navy has adopt¬ ed the Ultraudion exclusively for all long

distance reception, utilizing thousands of these bulbs each year. In 1915 there was installed at the large United States navy station at Ar¬ lington, Va., a high power radio-telephone transmitter employing over 500 Oscillion bulbs. These high-frequency currents generated by these lamps were controlled by a small (<mas-terM microphone. In receiving stations at Mare Island, San Francisco and Honolulu, Audion amplifiers and directors were installed, and the spoken voice was heard distinctly over 6,000 miles. Thus was first demonstrated the correct¬ ness of the prophecy made by De Forest in 1908 that transoceanic telephony would be achieved within 10 years. In 1917 attention was drawn to the discovery of De Forest that the Audion in connection with telephone re¬ ceivers could be used as a source of musical sound. An elaborate musical instrument on this novel principle was developed. A large number of bulbs are controlled by keys cor¬ responding to the keys of a piano. The pitch quality of the notes can be closely regulated through variable wide ranges by simple changes in the inductance and capacity connected with the various oscillating apparatus.

Lee de Forest.

DEFREGGER, Franz von, da-freg'er, Austrian genre painter : b. Stronach, Tyrol, 30 April 1835. The son of a peasant, he early showed a talent for drawing and wood carving, which he practised untutored while tending his father's cattle. His career began late, for he lacked instruction till, in I860, he went to Inns¬ bruck to study sculpture under Michael Stolz, who, discovering his greater talent for painting, sent him to Munich, where he studied at the Academy under Anschutz. He later became a pupil of Piloty, to whose influence he is indebted for his technique. He soon found the sphere in which he was to score success — the delineation of Tyrolese everyday life and of many stirring episodes in the history of his native land. His (Joseph Speckbacher and his Son) (1869, Fer-dinandeum, Innsbruck), a patriotic scene of soulful conception, and (Wrestling Match in TyroP (1870), a spirited representation of this popular sport of his countrymen, were received with great favor, and most of his subsequent efforts quickly found their way into the principal galleries of Germany and Austria. Among these may be noted (The Last Summons > (1874, Vi¬ enna Museum), an episode of the rising of the Tyrolese in 1809; (Return of the Tyrolese Rifle¬ men in 1809) (1876, National Gallery, Berlin) ; (Andreas Hofer on his Way to Execution)

(1878, Konigsberg Museum) ; (Storming of the Red Tower at Munich in 1705) (1881, Pinakothek Munich).

He appears to even greater advantage in his village genre scenes, such as <The Prize Horse) (1872) ; (The Zither Player 5 (1876, Vienna Museum) ; the ironical (Fashionable Tyrolese) (1882, National Gallery, Berlin); (The Fortune Teller> (1891); (Before the Dance) (1892). Keen insight into character and quaint humor are the main features of his com¬ positions. He passed most of his life in Munich, where he became professor at the Academy in 1878, and was ennobled in 1883. A (Defregger Album, > with text by Rosegger, was published in Vienna (2d ed., 1889-92). Consult Meissner,

(Franz von DefreggeU (Berlin 1900).

DE FUNIAK SPRINGS, Fla., town, county-seat of Walton County, situated on the Louisville and Nashville Railroad, 80 miles northeast of Pensacola and about 25 miles north of the Gulf of Mexico. The industries of the place are those of an agricultural and fruit¬ growing country, which produces cotton, rice, sugarcane, grapes and peaches, manufactures turpentine, and has also important lumber, poul¬ try and stockraising interests. It is the site of a Presbyterian college, a State Normal School and the Florida Chautauqua. The waterworks and electric-light plant are owned by the city. Pop. 2,097.

DE GARMO, Charles, American educator: b. Mukwanago, Wis., 7 Jan. 1849. He was graduated from the State Normal University of Illinois in 1873; was principal of public schools, Naples, Ill., 1873-76; professor of modern lan¬ guages at the State Normal University 1886-90, and president of Swarthmore College 1891-98. Since 1898 he has been professor of the science and art of education at Cornell University. He was elected president of the National Herbart Society in 1892 and is considered the leader of the Herbartian school in the United States. He has published (Essentials of Method) ; (Herbart and Herbartians) (1896) ; (Language Lessons> (1897) ; a translation of Lindner's (Manual of Empirical Psychology* (1889); < Essentials of Method) (1889-1907) ; Unterest and Education> (1902); Principles of Secondary Education* (1907-10) ; laboratory Exercises in the Art of Appreciation (1907) ; (./Esthetic Education

(1913).

DEGAS, de-ga', Edgar Hilaire Germain,

French painter and engraver: b. Paris, 19 July 1834; d. September 1917. He was a pupil of La Mothe and studied at the Beaux Arts in Paris. He was one of the most interesting members of the impressionist school, having worked in pas¬ tel, etching, dry point and stone-engraving, pro¬ ducing numerous interiors of theatres and cafe-concerts, foyers of the opera, views of the circus and of laundries, studies of dancers, etc., and all with a masterly touch. He expresses a modern ideal of energy and uses a modern language for its expression. In order to say what he wanted he was obliged to master the human figure, and this he did with the thoroughness of the an¬ cients. In pure draftsmanship he was un¬ equaled. He also produced several portraits of Manet.

DEGENERACY. In every community there are individuals who fail to measure up to the physical norm and more especially to the mental and moral norm of the race. In a large number of cases this is due to the action of an unfavorable environment upon a normal consti¬ tution, but in another extensive group the constitution, be it physical, mental or moral, is itself at fault. The three types of defects are inextricably fused with one another, but in certain individuals the mental and more espe¬ cially the moral inadequacy predominates, and these are known as degenerates. The basis of most degeneracy, if not of all, is some lesion of the nervous system or sense organs. Mere con¬ genital blindness and deafness is often sufficient to reduce their victim to a state of idiocy unless early measures of education are taken. On the other hand, the fundamental defects may be

obscure and inaccessible to the pathological anatomist of the present day. The neuro-sen- sory defects are often, but not always, accom¬ panied by malformations of a more conspicuous character, known as stigmata. These include various distortions of the external ear, facial asymmetry, very early or very late closure of the cranial sutures, polydactylism and other digital anomalies and various signs of imper¬ fect or abnormal development. Individual stigmata may be present in a person of normal mental and moral make-up, but the concurrence of a considerable number of stigmata is a fairly good sign of degeneracy.

The forms assumed by degeneracy are very various. The mental defect varies from utter idiocy, where the patient is unable to protect himself from immediate physical danger, through imbecility, where he is still incapable of carrying out the daily processes of dressing and undressing, washing, etc., to the various grades of feeble-mindedness, in which he is able to satisfy all his immediate personal needs, but cannot earn an independent liveli¬ hood nor associate with his fellows on equal terms. These grades of deficiency naturally shade into one another by insensible gradations. Even the lowest of them is compatible with the high development of some one power of the mind, such as the mathematical or musical faculty.

Mental degeneracy brings of necessity in its train a greater or less degree of inability to perform the customary moral duties and to discern and avoid the temptations of evil con¬ duct. There are also certain malformations of the moral character which are less directly dependent on an atrophied mental development, and which indeed are consistent with a men¬ tality normal or even supernormal in most respects. These may take the form of a gen¬ eral indifference to the claims of good and evil, with a consequent cold-blooded selfishness and brutality or of certain morbid and unnatural impulses. In the latter group of phenomena are included kleptomania (an unreasoning impulse to steal), pyromania (an unreasoning impulse to set fires), and the sexual perversions. These anomalies belong to that group of functional mental disorders known as psychasthenias, which are more or less intimately related with hysteria.

The causes of degeneracy are manifold. The racial poisons of alcohol, drugs and ve¬ nereal diseases are responsible for a large pro¬ portion of the cases, though in many cases alcoholism and drug habits may be symptoms rather than causes of degeneracy. Any factor which enfeebles the mother — poverty, illness or the like — may injure the mental and moral constitution of the child as well as its physical constitution. However, the most important cause of degeneracy is in all probability the inherent inferiority of the stock. That certain forms of degeneracy exhibit a pedigree con¬ forming to the Mendelian law is now an established fact. This hereditary quality of degeneracy, together with the fact that degen¬ erates are often likely to have many children, owing to their immorality, makes the problem of degeneracy a most serious one. The so-called Jukes family cost the taxpayers of New York State millions of dollars in the course of

the 19th century. For this reason many States have enacted laws making it legal in certain cases to perform on degenerates operations designed to prevent their propagating their kind. There has been a large amount of con¬ troversial literature, associated with the names of Nordau and Lombroso, designed to prove a connection between degeneracy and genius. This is for the most part too biased to be con¬ vincing. There is no doubt, however, that the existence of a degenerate taint is not inconsis¬ tent with genius. See Alcoholism ; Criminol¬ ogy ; Degeneration ; Eugenics ; Feeble-Minded; Idiocy; Insanity; Pauperism.

Bibliography. — Aschaffenburg, (Crime and its Repression (Boston 1913) ; Beach, (Racial Decay > (London 1911) ; Davenport, (Heredity in Relation to Eugenics) (New York 1911) ; Demoor, devolution regressive en biologie et en sociologie) (Paris 1897) ; Dugdale, (The Jukes* (New York 1888; 4th ed., 1910) ; Ellis, H. H., (The CriminaP (London 1901) ; Galton, (Hereditary Genius* (ib. 1871) ; Janet, (Les obsessions et la psychasthenie* (Paris 1898-1903) ; Jastrow, J., (The Subconscious) (London 1906) ; Lombroso, C., (L'uomo delinquente) (Turin 1896-97) ; Magnon-Legrain, (Les degeneres* (Paris 1895) ; Maudsley, H., Pathol¬ ogy of Mind* (London 1895) ; Morel, (Traite des degenerescences* (Paris 1857) ; Nordau, M., degeneration* (tr. New York 1895) ; Savill, T. D., <Neurasthenia) (London 1906) ; Talbot, E. S., degeneracy: its Causes, Signs and Results) (London 1898) ; Warner, Ameri¬ can Charities * (New York 1894).

DEGENERATION. See Man, Chris¬ tian Anthropology.

DEGENERATION. In medical pathology degeneration is one of the processes that occur in the cells of an organ whereby different grades of disintegration and shrinking take place. It is one of the retrograde or breaking-down processes in contrast to those of abnormal growth and increase, although in many of the degenerations both processes are going on side by side. When abnormal intracellular metabol¬ ism slowly converts the cell plasma into useless and abnormal substances the process is known as degeneration, and then following upon such degenerations there usually results a partial or complete death of the plasma, leading to the destruction of the cell. In large measure, ac¬ cording to the character of the substances pro¬ duced in the degenerative processes, various forms of degeneration are known. If in the organs there is a deposit of a waxy or lardy substance derived from the serum of the blood, the degeneration is known as amyloid degenera¬ tion. This is very frequently found in several organs at the same time, and results in large part from the infectious diseases accompanied by nutritional disturbances. Thus, in connec¬ tion with chronic tuberculosis and syphilis amy¬ loid degeneration is apt to occur. Hyaline de¬ generation is another form, which takes place in the connective tissue by which that type of cell is rendered homogeneous. Hyaline de¬ generation commonly occfirs in the arteries and heart-valves, and is frequently associated with chalky infiltrations in these structures. Colloid degeneration occurs in certain forms of cancer in which the substance in the cells resembles

softened glue. Mucoid degeneration consists in the transformation of the leading tissues into a transparent, viscid, homogeneous mass consist¬ ing of mucins and pseudo-mucins. Mucoid de¬ generation takes place largely in the connective tissue in the epithelial cells, and sometimes as a result of the disturbance of the functions of the thyroid gland as in myxsedema. Fatty de¬ generation is a degeneration in which fat globules are deposited in the cells. Albuminous degeneration, or cloudy swelling, as it is some¬ times called, consists in a fine granulation of a number of cells in the body, particularly in the kidneys, liver and brain. This acute degenera¬ tion is very frequently associated with fatty degeneration, and is due in great part to anoma¬ lies of nutrition largely produced by bacterio¬ logical agencies, as in the infectious diseases, and also at times to auto-intoxic

products having their origin within the body itself as a result of perverted oxidation. Pigmentary de¬ generation is another form, in which are depos¬ ited in the cells small or large quantities of iron compounds derived largely from the blood and known as pigments. The abnormal deposition of lime in living tissue is known as calcareous degeneration. It occurs in the walls of the arteries in arteriosclerosis.

DEGENERATION, a work of Max Nor-dau (1895), which aimed at a scientific criticism of those degenerates not upon the acknowledged lists of the criminal classes. ˆDegenerates,55 as¬ serted Nordau, ((are not always criminals, pros¬ titutes, anarchists, and pronounced lunatics ; they are often authors and artists. These, how¬ ever, manifest the same mental characteristics, and for the most part the same somatic features, as the members of the above-mentioned anthro¬ pological family, who satisfy their unhealthy impulses with the knife of the assassin or the bomb of the dynamiter, instead of with pen and pencil… . Now I have undertaken the

work of investigating the tendencies of the fashions in art and literature; of proving that they have their source in the degeneracy of their authors, and that the enthusiasm of their admirers is for manifestations of more or less pronounced moral insanity and dementia.55

DEGENERATION AS A FACTOR IN EVOLUTION. Degeneration is a term used in biology to describe those not infrequent cases where an entire organism falls below the structural level of its young stages (ontogenetic degeneration) or its ancestors (phylogenetic de¬ generation) ; or where an organ in the same way loses its fullness of function and becomes more or less atrophied, abortive and simplified. Thus many parasitic worms, crustaceans, etc., are emphatically simpler than their free-swim¬ ming larvae, and the sessile adult ascidian shows only traces of the vertebrate characters of the embryo. Examples of the degeneration of indi¬ vidual organs are the tail of a frog; the digest¬ ive system of the mature mayfly; the pineal gland of man (primitively a medium eye) ; the human wisdom-tooth ; the spint-bones of the horse (metacarpals and metatarsals of lost digits) ; the lungs of certain salamanders, *etc.* As in the case of the feet of the horse the per¬ fection of the entire structure is often depend¬ ent on the atrophy or loss of certain of their parts. The loss of the hind legs in the whale

unquestionably permits it to offer less resistance to its motions in the water. On the other hand, the degeneration of an organ may be accom¬ panied by no very great advantage to its owner. Thus a crustacean which starts with a well-developed eye may exhibit the gradual loss of this on assuming a dark habitat. Degeneration must be distinguished (1) from occasional abortion; (2) from reversion to an ancestral type; and (3) from the occurrence of rudimen¬ tary and undeveloped organs where a character possessed by ancestral types remains more or less undeveloped, or shows itself only in embry¬ onic life. Degeneration may be due to the en¬ vironment. Absence of food, heat, light, etc., may mean the absence of the necessary stimulus for the growth and maintenance of the organs ; or superfluity of food may cause one system to preponderate over others. Nor can it be doubted that cessation of function checks the food-sup¬ ply to a given organ, and in other ways helps to bring about its degeneration. Again, the mere pressure of a hypertrophied organ on its neighbors, particularly in the embryonic stages of growth, is capable of causing their atrophy But on the other hand, some less obvious cause — the fatigue of early life, a constitutional slug¬ gishness, *etc.* — may share in conditioning de¬ generation, as in the case of the Tunicata. Weismann and others, however, would explain degeneration by what they call the non-opera¬ tion of natural selection. On this view, organs are not only developed but maintained by nat¬ ural selection; and if it happens that an organ is no longer an advantage in this struggle for ex¬ istence (for example eyes in dark caves), then natural selection no longer maintains that organ and it disappears in the course of generation. In other words retrogressive variations have an equal chance of survival to that of progressive variations, and as the ways in which a compli¬ cated organ like the eye can deteriorate are vastly greater in number than those in which it can improve, the interbreeding of the surviving cave animals is sure to create sooner or later a race with defective eyes. Weismann applies this ultra-Darwinian conception especially to cases of purely phylogenetic degeneration — for example, to the slightly developed wings of the Apteryx. Many cases of degeneration properly so called appear hardly to. require his subtle explanation, but find a sufficient one in the nature of the environment, in the effects of stopped function and in the constitution of the organism. The problem of ontogenetic degeneration is im¬ mersed in the obscurity that shrouds all the phenomena grouped under the law of recapitu¬ lation (q.v.). Degeneration is curiously dis¬ tributed in the animal kingdom. There are groups, such as the vertebrates, in which with all the degeneration that may occur, a certain high level of structure is everywhere maintained. There, are groups, such as the ascidians, which are distinguished by the universality of a de¬ generation at

once phylogenetic and ontogenetic. Again, there are groups like the arthropods, where, progressive and retrogressive lines of evolution are found in the closest proximity and interconnection. The Crustacea contain highly developed free-swimming forms, like the lobster or crab ; hopeless vegetative parasites, like Sac-culina, which nevertheless has a free-swimming larva ; slightly modified ectoparasites, degener-DEGER — DEGREE

ate non-parasitic forms, such as the barnacles ; free-swimming forms which pass through a vegetative parasitic stage in their existence; and forms in even more involved degrees of abor¬ tion. These forms are related to one another in a manner but distantly suggesting the extent of their degeneracy ; neighboring genera may be at very different levels of organization. The in¬ sects are also characterized by a mingling of degenerate and non-degenerate forms. (See Degeneracy; Environment; Evolution, etc.). Consult Demoor, Massart and Vanderville, (Evolution by Atrophy* (New York 1899) ; Lankester, E. R., (Degeneration * (London

1880) ; Morel, (Traite des degenerescences* (Paris 1857).

DEGER, da'ger, Ernst, German painter : b. Bockenem, Hanover, 15 April 1809; d. Diisseldorf, 27 Jan. 1885. He was a pupil of Wach and Schadow, in Berlin and Diisseldorf, be¬ coming a painter in oil and of frescoes and giving much attention to the latter form of work. He decorated the chapel at Castle Stolzenfels for Frederick William IV of Prussia, becoming in 1869 professor at the Diisseldorf Academy and member of the Berlin and Munich academies. Among his works are (Pieta) (1830); (Bearing the Cross) (1832);

(Annunciation } (1834); (Virgin Adoring Christ* (1836) ; (Madonnas and Seven Scenes from

the Life of Christ* (1841-51, in Saint Apolli-naris' Chapel, Remagen) ; (Adam and Eve* (1853, Raczynski Gallery, Berlin). His works are noted for vigor and finish. He was a leader of the so-called <(Nazarean School.® See Nazarenes.

DE G&RANDO, zha-ran-do, Joseph Marie,

Baron, French philosopher and statesman: b. Lyons, 29 Feb. 1772; d. Paris, November 1842. On the siege of Lyons in 1793 he took up arms in its defense, and greatly distinguished him¬ self by his bravery, but was subsequently obliged to flee. He returned to France on the proclamation of an amnesty, and joined a cavalry regiment. While in garrison at Col¬ mar he composed an essay on the theme pro¬ posed by the French Institute, (Quelle est Fin-fluence des signes sur l'art de penser?* and gained the prize. In 1799 he took office under Lucien Bonaparte as Minister of the Interior, and became Secretary-General of that depart¬ ment in 1804. In 1811 he was made a coun¬ cillor of state, and in 1812 governor of Cata¬ lonia. In 1819 he commenced a course of lectures in the Faculte de Droit, in Paris, on public and administrative law, suspended in 1822, and resumed in 1828. He was raised to the peerage in 1837. De Gerando acquired great fame by his philosophical writings, in which he follows with some deviations the school of Condillac. His principal works are <Des signes et de Fart de penser considers dans leur rapports mutuels* (1800), an enlarge¬ ment of the dissertation formerly written for the French Institute; (De la generation des connaissarices humaines* (1802) ; (Histoire comparee des systemes de philosophic-* (1804), completed after his death ; <Du perfectionnement moral et de Feducation de soi-meme,* a treatise which gained the prize of the French Acad¬ emy in 1825; (De Feducation des sourds-muets de naissance) (1827) ; < Institutes du droit ad¬ ministrate fran<;ais, ou elements du code

administratif reunis et mis en ordre* (1829ˆ15) ; (De la bienfaisance publique) (1839).

DEGGENDORF, deg'gen-dorf, Germany, a town of Lower Bavaria, near the Danube, 39 miles northwest of Passau. It has manufac¬ tures of paper, linen, woolens, stoneware and matches. Its church of the Holy Sepulchre is visited annually by a large number of pilgrims. Pop. about 7,500.

DEGLUTITION, the physiological act of swallowing, or the process by which food is conveyed to the stomach. See Digestion.

DEGRADATION, a penalty inflicted on criminous clerics in the Catholic Church. It consists of two degrees, being either ˆverbal® or ((actual.® The canon law specifies minutely the crimes for which the punishment of de¬ gradation may be legally inflicted. No juris¬ diction is vested in bishops for degrading, ex¬ cept the causes determined by the law and the Pope. By <(actual® degradation the

offender, besides being deposed from the ministry, is deprived of his order and of the canonical privileges attached to his order, and in par¬ ticular is delivered over to the secular arm for punishment ; nor does any one who makes a violent assault on him incur the excommunica¬ tion decreed against whoever violently attacks a cleric or a monk. By (<verbal® degradation the cleric is deprived of all his clerical func¬ tions and stripped of his Church benefice if he holds any; but he retains the privileges of his order, and is not handed over to the secular power : he has right of appeal to ecclesiastical courts. If his offense merits imprisonment he must be shut up in some monastery or other ecclesiastical establishment ; and though he is degraded, still were one to make an assault on him the assailant would, ipso-facto, incur excommunication. Nevertheless, since the sacra¬ ment or order imprints an indelible character, the degraded cleric, whether by actual or verbal degradation, is still priest or deacon or what¬ ever he was before in the ministry; and his purely sacerdotal and sacramental acts, even his priestly absolution, if given in articulo mortis or in grave peril of death when no priest in full church communion is at hand, is valid. So, too, his celebration of the mass is valid though -sacrilegious.

The process of actual degradation, which was formulated by Boniface VIII (1235-1303), is as follows : The culprit, in the attire of his order and bearing in his hands some instru¬ ment of his clerical functions, a chalice or a mass-book, is brought before the bishop. That emblem of his priestly state is taken away from him; then he is stripped of his ecclesiasti¬ cal attire, and his head is shaven to obliterate the mark of the clerical tonsure. Finally the bishop addresses him in these words : ((By the authority of God Almighty … we take away from thee the clerical habit and depose, degrade, and deprive thee of all order, benefice, and clerical privilege.®

DEGRADATION. See Erosion.

DE GRASSE, Comte. See Grasse, Comte

DE.

DEGREE. A title given by a university or college to those who have completed a more or less definitely prescribed course of

study. While educational institutions corre¬ sponding to our universities existed in ancient times, and while these undoubtedly gave to those who had completed a course of study some marks or title of distinction, the present academic degrees do not go back continuously further than the Middle Ages. As the titles doctor and master show, they were originally nothing more nor less than licenses to teach. They were also perfect synonyms ; and it was only after some centuries of varying usage that the English universities came to appropriate the title of doctor to the higher faculties of theology, canon law and medicine, and the title master to the lower faculties of grammar and arts. The title of doctor was often ap¬ plied to distinguished scholars, together with some laudatory epithet : thus Duns Scotus was known as the ((Subtle Doctor,® and Thomas Aquinas as the (<Angelic Doctor.® The degree was also sometimes conferred honorarily by the Pope or the Emperor, and those who re¬ ceived it in this manner were known as doctores bullati. Those who received their degree in course, the doctores rite promoti, had to pre¬ pare a thesis in Latin, read it in public and defend it against a doctor of their faculty, other selected adversaries, and in general against all comers. This custom survived in its original form in England until the middle of the last century. In Germany and America, though the doctoral dissertation is not read in public, the examination to which each candi¬ date must submit consists in a large measure of a defense of his thesis against the members of his faculty or department.

The title of bachelor was not a degree at the time of its first appearance in the 13th century but merely indicated that its. possessor had fulfilled certain preliminary requirements for the degree of doctor or master. As the mediaeval courses varied from 4 years in arts to 14 in theology, the importance of the pre¬ liminary title varied much between the different faculties. In the higher faculties, and eventu¬ ally in arts, it took on the significance of a degree, except in France, where to the present day it represents merely the completion of a secondary education. Another preliminary de¬ gree which gave the right to teach was the Licentiate, so called from the licentia docendi. The licentiate stood between the baccalaureate and the doctorate.

In England the bachelor's degree is usually the first to be conferred, after a course of three years. The courses for the ordinary or pass

degree and the honors degree, which is sub¬ divided into three or four classes or levels of merit, are different, and each may be taken in several different subjects (schools at Oxford, triposes at Cambridge). There are special bachelor's degree for those from other institu¬ tions, and in law and some other faculties. The master's degree in arts is generally con¬ ferred without further examination upon the passage of a certain term of years and the pay¬ ment of certain fees. The various doctor's degrees are generally either honorary, or are only given upon the production of mature scholarly works of real value. The German and American schemes, however, have been adopted by some of the newer universities. The University of London and some other institutions confer degrees by examination upon

those not in residence. The British universities outside of England follow in general the Eng¬ lish scheme, except in Canada, where the American system of degrees has had more or less influence, and in Scotland, where there is a different established tradition. In Scotland the master's degree in arts is not proceeded by a baccalaureate. The German universities give no other degree than that of doctor except in the faculty of theology, where there is also the degree of licentiate.

The vast majority of the students at a German university take the degree under the faculty of philosophy, and indeed this is a necessary preliminary to the degree under cer¬ tain other faculties. The doctor's degree is given after the presentation of a thesis and examination, and is divided into four grades of excellence : rite, cum laude, rnagna cum laude, and summa cum laude. The title of privatdozent may almost be regarded as a de¬ gree : it gives its possessor the vcnia legendi, or right of lecturing — collecting his own fees — at any German university. To acquire this right, a so-called Habilitationschrift must be prepared and accepted. The German system of degree prevails to a greater or less extent throughout the Continent, though in most cases the degree of licentiate or master are also given.

The French degrees are divided into those given by the state and those given by the university. The former consist of the several licentiates and doctorates, for the latter of which one or more dissertations are necessary. The latter consists of the doctorates of the university, which in general resemble the state doctorates.

In America, the older British system has been overlaid by the German plan, so that both master of arts and doctor of philosophy are given. The college course of four years, pre¬ scribed to a greater or less

extent according to the university or college at which it is given, leads up to a bachelor's degree, usually in arts, science or philosophy, according to the amount of attention devoted to the classics and the natural sciences. These are given in most colleges and universities in four grades, of which the three higher are cum laude, magna cum laude, and summa cum laude. The various technical and professional schools, which may or may not require a college degree or a cer¬ tain amount of college work for admission, give a bachelor's degree, except in the case of medicine and dental medicine, where the first degree is usually that of doctor. The master's degree is given upon the completion with credit of a year or two of postgraduate work, with or without the writing of a thesis. The doctorate in philosophy and science, and oc¬ casionally in theology and law,- is given much after the German fashion, upon from two to five years of postgraduate work, the writing of a thesis and the satisfactory passing of written and oral examinations. For the most part the degree of doctor of letters (Litt.D.), doctor of laws (LL.D.) and doctor of divinity (D.D.) are conferred as honorary degrees. This practice of conferring honorary degrees has in many cases been grossly abused, and even the ordinary degrees given in course have been put to the entirely unnatural use of compliments or gifts.

The more familiar degrees are usually known by the following abbreviations :

A. A.

A.B. or B.A .

A. M. or M.A .

B. C.L .

B.D. or S.T.B. (Sanctce Theo¬ logies Baccalaureus or Scien-tioe Theologicee Baccalareus) .

B.Litt., B.L., or L.B .

B.L.L. or L.L.B. (Legum Bac¬ calaureus) .

B.P., B.P.H., or Ph.B .

B. S. or B.Sc .

C. E .

C.M. or Ch.M. (Chirurgiae

D.C.L. .’ .’ D.D. or S.T.D. (Sanctce Theo¬ logies Doctor) .

D.Litt. or Litt.D. (Litterarum

Doctor) .

D.M. or M.D .

D.M.D. (Dentariee Medicines

Doctor) .

D.V.M .

D. S., D.Sc., S.D. or Sc.D .

E. E .

J.D. (Juris Doctor) .

J.U.D. (Juris U triusque Doc¬ tor) .

L. H.D. (Litterarum Humani—

orurn Doctor) .

LL.B. (Legum Baccalaureus) …

LL.D. (Legum Doctor) .

LL.M. (Legum M agister) .

Litt.B. (Litterarum Baccalau¬ reus) .

Litt.D. (Litterarum Doctor) …

M. B. (Medicines Baccalaureus).

M.C.E .

M.D. (Medicines Doctor) .

M.M.E .

Mus.B .

Mus.D .

Ph.D. (Philosophies Doctor) …

Associate in Art. Bachelor of Arts. Master of Arts. Bachelor of Civil Law.

Bachelor of Divinity. Bachelor of Letters.

Bachelor of Laws.

Bachelor of Philosophy. Bachelor of Science.

Civil Engineer.

Master of Surgery.

Chemical Engineer.

Doctor of Civil Law.

Doctor of Divinity.

Doctor of Letters.

Doctor of Medicine.

Doctor of Dental Medicine. Doctor of Veterinary Medi¬ cine.

Doctor of Science.

Electrical Engineer.

Doctor of Law.

Doctor of Civil and Canon Law.

Doctor of Letters.

Bachelor of Laws.

Doctor of Laws.

Master of Laws.

Bachelor of Letters.

Doctor of Letters.

Bachelor of Medicine. Master of Civil Engineering. Doctor of Medicine.

Master of Mining Engineer¬ ing.

Bachelor of Music.

Doctor of Music.

Doctor of Philosophy. Pharmaceutical Graduate. Veterinary Surgeon.

Ph.G V.S. .

See Costume, Academic; Doctor; Doctor of the Church ; Master of Arts ; University.

DEGREES, Measurement of. After New¬ ton had taught that the earth, on account of its motion round its axis, must be highest near the equator, and that the diameter of the equator must be longer, by one 230th part, than the diameter from pole to pole, the French wished to investigate the subject further by actual measurement. The measurement was begun with the result that the axis of the poles was found to be longer than a diameter of the equator, and that the earth was, in form, more like a lemon than an orange. For 40 years disputes were maintained on this point without settling the question; and at last the Academy of Sciences resolved, on the proposi¬ tion of Condamine, to have a degree measured at the equator (the expedition went to South America in 1735), and one in Lapland (Kittis and Tornea being the extreme stations to which the expedition was sent in 1736). It was found that the northern degree was greater than that under the equator, and that Newton's conjecture was right. But the question still remained, How great is the flattening of our planet? The theory said one 230th part, if the earth had been in a perfectly liquid state when it began its rotation. The calculations, however, always gave differ¬ ent results, varying according to the different measurements adopted as the basis of them ; for measurements had been made, not only in America and Lapland, but also in France, Eng¬

land, Hungary and Italy. When the French established their new and admirable system of measures and weights upon the basis of the metre, which was to be the ten millionth part of the distance from the equator to the pole (3.2808992 English feet, or 39.37 inches), it was necessary to know with accuracy the circum¬ ference and the flattening of the earth. A meas¬ urement, therefore, took place in France, not of one degree, but of 10 degrees, from Dunkirk to Formentera, one of the Balearic Islands. In Sweden in 1802 the degree, which 80 years before had been measured by Maupertuis, was

now measured again with better instruments, and thus the circumference and flattening of the earth were pretty well ascertained. After the Peace of Amiens the measurements of de¬ grees just made in England, under General Roy, by Lieutenant-Colonel Mudge, were connected with those in France; and thus an arc of 20 degrees, from the Balearic Islands over France and England, to the Orkneys, was measured, and the flattening of the earth calculated to be l-304th (the most recent estimate being l-292d). In India the measurement of a degree, begun by Lambton, was continued by Everest and completed by Walker. The measurement of an arc of 25 degrees 20 minutes from Hammerfest to Ismailia was completed in 1855. Similar measurements have been continued to the present time, and at the Geodetic Congress in London in 1900, it was announced that English experts were engaged in measuring an arc of the meridian of 104 degrees from Cape Colony to Alexandria, and had made considerable progress.

The annexed table shows the lengths of a degree of longitude for places at every de¬ gree of latitude from 0 degree to 90 degrees. It is computed on the supposition that the earth is a sphere.

Deg.

lat.

English

miles

Deg.

lat.

English

miles

Deg.

lat.

English

miles

0

69.07

31

59. 13

61

33.45

1

69.06

32

58.51

62

32.40

2

69.03

33

57.87

63

31.33

3

68.97

34

57.20

64

30.24

4

68.90

35

56.51

65

29.15

5

68.81

36

55.81

66

28.06

6

68.62

37

55.10

67

26.96

7

68.48

38

54.37

68

25.85

8

68.31

39

53.62

69

24.73

9

68.15

40

52.85

70

23.60

10

67.95

41

52.07

71

22.47

11

67.73

42

51.27

72

21.32

12

67.48

43

50.46

73

20.17

13

67.21

44

49.63

74

19.02

14

66.95

45

48.78

75

17.86

15

66.65

46

47.93

76

16.70

16

66.31

47

47.06

77

15.52

17

65.98

48

46. 16

78

14.35

18

65.62

49

45.26

79

13.17

19

65.24

50

44.35

80

11.98

20

64.84

51

43.42

81

10.79

21

64.42

52

42.48

82

9.59

22

63.97

53

41.53

83

8.41

23

63.51

54

40.56

84

7.21

24

63.03

55

39.58

85

6.00

25

62.53

56

38.58

86

4.81

26

62.02

57

37.58

87

3.61

27

61.48

58

36.57

88

2.41

28

60.93

59

35 . 54

89

1.21

29

60.35

60

34.50

90

0.00

30

59.75

Measurement of a Degree of Longitude. —

The degrees of longitude are largest under the equator, and diminish continually toward the

pole. Under the equator a degree of longitude contains 60 geographical, 69.16 statute miles. If the form of the earth is not entirely regular, the degrees of longitude on the same parallel of latitude cannot all be of the same length ; and it has been proposed to investigate this by actual measurement. This task is in the trigonometric part, as easy as the measurement of a degree of latitude; but in the astronomical part it is 15 times more difficult. The difference of the longitude of two places is determined by the difference of the hour of the day at the same point of time in the two; as a place situated 15 degrees to the east of another has noon a whole hour earlier. One hour, therefore, corresponds to 15 degrees, or 1,042ˆ4 statute miles, under the equator, or 5,504,400 feet ; a minute of time to 91,740 feet, and a second of time to 1,529 feet. A mistake of a second of time, therefore, in calculating the longitude of two places, makes a corresponding error in space. To determine time within two or three seconds, by means of rockets, at a distance of 1,042ˆ4 miles is im¬ possible; and while the measurement of an arc corresponding to this distance trigonometrically, may be attended with an error to the amount of 200 feet, an astronomical measurement would leave an uncertainty of 2,000 feet. The earlier measurements of the French were directed, in the north, by Maupertuis ; in the south by Bouguer. Since that time measurements have been made in all the great continents of the globe' — in Pennsylvania, in the time of Maskelyne, by Mason and Dixon ; at the Cape of Good Hope by Lacaille, completed by Maclear; in Prussia by Bessel; in Russia by Struve; in Denmark by Schumacher; and in England by Roy Kater and Colby. The French arc from Formentara to Dunkirk was measured by Mechain and Delamore. The results of the meas¬ urements, as given by Airy, make the equatorial diameter 7925.648, and the polar diameter 7899.170 miles. Bessel's results are almost identical namely, equatorial diameter 7925.604 and polar diameter 7899.114 miles. There is an international association, having as its main object the correlation of all degree measure¬ ments and connected data with the view of accurately ascertaining the figure of the earth.

DEGREES OF LATITUDE AND LONGITUDE. Degree of latitude is the space or distance on the meridian through which an observer must move to vary his latitude by one degree, or to increase or diminish the distance of a star from the zenith by one degree; and which, on the supposition of the perfect sphericity of the earth, is the 360th part of the meridian.

Degree of longitude is the space between the two meridians that make an angle of one degree with each other at the poles, the quantity or length of which is variable according to the latitude. See Latitude and

Longitude.

DE HAAS, de has, Maurice Frederick Hendrick, Dutch-American marine painter : b. Rotterdam, 12 Dec. 1832; d. 23 Nov. 1895. He studied in England and at The Hague under Louis Meyer, and in 1857 was appointed painter to the Dutch navy. In 1859 he came to the United States and opened a studio in New York which remained his home henceforth. Among his paintings are (Admiral Farragut's Fleet passing New Orleans> ; (Coast of

France } ; (Sunset at Sea) ; (Moonlight at Sea) ; (Sunset at Pigeon Cove) ; (Sunrise in a Fog at Newport } ; (Shipwreck) ; (Menhaden Boats off Long Island) ; and (Off Marblehead.* His brother William Frederick was also a well-known marine painter: b. 1830; d. 1880. He settled in New York in 1854. Among his pictures are (Evening at Halifax) ; cNarragan-sett Pier) ; (Sunrise on the Susquehanna. *

DEHMEL, da'mel, Richard, German lyric poet: b. Wendisch-Hermsdorf in the Spreewald, 18 Nov. 1863; d. Berlin, 11 Feb. 1920 He was the son of a forester and got his first impressions of nature wandering in the oak forests tended by his father. After finishing the schools of his native city, he became a stu¬ dent at the Sophiengymnasium at Berlin, but later went to Danzig and was graduated from the Gymnasium in that city. At the university — chiefly at Berlin — he devoted himself to philosophy and the sociological and natural sciences. He finished at Leipzig with a thesis on the insurance business. Up to the year 1895 he was then secretary of the Association of German Fire Insurance Companies. In this difficult work he learned, as he himself states, self-control. While in this position he pub¬ lished his first books of poems, <Erlosungen) (1891), (Aber die Liebe* (1893) and (Lebens-blatter* (1895). After serving the insurance company for seven years, he resigned and moved to Pankow near Berlin. There he wrote (Weib und Well) (poems and fairy tales 1896) ; (Der Mitmensch) (tragi-comedy, 1895) ; (Lu-cifer) (pantomimic drama, 1899) ; and the chil¬ dren's book (Fitzebutze) (1900; 15th ed., 1910), which he wrote in connection with his first wife, Paula Dehmel, from whom he separated in 1899. After remarrying and traveling for sev¬ eral years in Italy, Greece, Switzerland, Hol¬ land and England, he settled down at Blank-enese, near Hamburg. In 1903 he published a lyrical novel (Zwei Menschen.* In 1906 he pub¬ lished his complete works up to that date after having subjected them to a thorough revision. Later works are <Michel MichaeP (a comedy, 1911) and (Schone Wilde Welt) (new poems and proverbs, 1913).

In his earlier writings Dehmel was influ¬ enced by Heine and Schiller and later by Liliencron, Strindberg and Nietzsche. He claimed to stand as an artist between the pure em¬ piricists like Liliencron and the pure meta¬ physicians like Mombert. His relation to Nietzsche he defined by saying: ((Nietzsche is a doubting dissector of the ordinary emotions of the soul and I as a faithful believer give a syn¬ thesis of the unusual emotions.® By some crit¬ ics Dehmel is considered the greatest lyrical genius since Goethe. Others, are willing to admit his genius but object to the extreme real¬ ism of some of his poems. To be just to him it is necessary to remember that he is constantly struggling toward higher levels. He stresses the importance of the feelings, but connects them with our intelligence. There is always with him an interaction of intellect and emo¬ tions. The result is a constant emphasis of the need of self-control and self-development. All about us, to be sure, are mysteries, but we must fathom them to the best of our ability. He has always been a hard worker and a champion of the rights of the workingman. His poems are

finished in form and represent diverse metrical schemes. Dehmel volunteered his services in the European War, even though he was over 50 years of age. He was permitted to go to the front, was soon promoted to a lieutenancy and awarded the iron cross for distinguished services. Consult Lessing, O. E., (Masters in Modern German Literature) (Dresden 1912). Also the histories of German Literature of Kummer and Biese.

William F. Hauhart,

Assistant Professor of German, University of

Michigan.

DEHORNING, the act or practice of de¬ priving animals, specifically cattle, of their horns. Clippers or shears have been invented for the operation wherewith it is performed quickly and with comparatively little pain and scarcely any disturbance of the animal’s normal func¬

tions or condition. The most favorable condi¬ tions of weather, etc., should be chosen for it, and the aid of a skilful operator is desirable. When all features of cruelty or unnecessary pain are avoided, there is believed to be much to justify the practice of dehorning, inasmuch as it tends, among other benefits, to conve¬ nience, safety and comfort in the handling of cattle, especially during their transportation from place to place.

DEHRA DUN, deh'ra doon. (1) A dis¬ trict in the United Provinces, British India. It lies at the base of the Himalayas. Good roads, cultivated fields, hedges, streams flowing through meadows — all, in parts of this dis¬ trict, look like some of the old country dis¬ tricts of the well-cultivated parts of Europe. The area is 1,209 square miles. (2) Dehra is the name of the chief town or capital of the district. It has an English garrison and con¬ tains a number of European inhabitants. Pop.

38,610.

DEI GRATIA, de'i gra'shi-a (Lat. ((by the grace of God®), a formula which many Euro¬ pean sovereigns add to their title, and which is taken from an expression of the apostle Paul in the New Testament. It was first used by the clergy in the time of Constantine the Great, as an expression of dependence upon the grace of God; and afterward the higher clergy came to use along with it the addition et apostolicce sedis (by the grace of God and the apostolic see). In the time of the Carlovingian race the secu¬ lar princes also assumed it; and in course of time it came to be regarded as asserting some¬ thing like the divine right of kings and their independence of any earthly power. The ex¬ pression has been made use of on the coins of many nations and still appears on British coins.

DEIAMBA, da-yam'ba, an African plant commercially known as Kongo tobacco. It grows wild in the marshy districts of Kongo. The flowers produce a narcotic effect when smoked.

DEIANIRA, in Greek mythology, a daugh¬ ter of (Eneus, king of yEtolia. Her father promised to give her in marriage to him only who proved to be the strongest of all his com¬ petitors. Hercules obtained the prize and mar¬ ried Deianira, by whom he had three children. When Nessus, a centaur, who had offered vio¬ lence to Deianira, was dying by a poisoned arrow shot from the bow of Hercules, she ac¬

cepted from him the present of his tunic, which Nessus said had the power of reclaiming a husband from unlawful loves. Accordingly, when Hercules became enamored of Iola, daughter of the king of CEchalia, she sent him the centaur's tunic, which caused his death. Deianira was so disconsolate at this event that she destroyed herself.

DEIDAMIA (Deidameia) , daughter of Ly-comedes : she bore Pi'rrhus and Oneirus to Achilles, during his abode at Scyrus.

DEILER, John Hanno, American educa¬ tor: b. Altoetting, Upper Bavaria, Germany, 8 Aug. 1849; d. 20 July 1909. He was graduated at the Royal Normal College, Freising, and studied at the Royal Polytechnic Institute, Munich. He taught in the public schools of Munich until 1871, and was principal of a Ger¬ man school in New Orleans 1872-79. He has been professor of German in the University of Louisiana and Tulane University since 1879. He has been connected with various German societies in New Orleans and has published (Das Redemptions-System im Staat Louisiana) ; (Geschichte der Deutschen Kirchen-gemeinden im Staat Louisiana5 ; (Geschichte der Einwanderung von 1820-18965 ; (Deutsche Gesellschaften von New Orleans,5 *etc.*

DEIMOS, dimos, and PHOBOS, the names respectively of the outer and inner satellites of Mars, discovered by Prof. Asaph Hall in the summer of 1877, with the 26-inch equatorial of the Washington Observatory. Deimos revolves about its primary in 30 hours and 18 minutes, while Phobos, a most extraordinary body, ac¬ complishes its revolution in 7 hours, 39 minutes and 14 seconds, being at a distance of only about 3,700 miles from the surface of Mars.

DEIOCES, de-i'6-sez, Median king: fl. about seven centuries b.c. He rose from a pri¬ vate station to be the founder of the Median empire. By acting as arbitrator in the disputes which took place in his own vicinity, he had ac¬ quired a high reputation for wisdom and jus¬ tice; and when the Medes, in consequence of their revolt from the Assyrians, stood in need of a sovereign, they found none whose claims to the honor seemed stronger than those of Deioces. Immediately after his election he as¬ sumed great state, surrounded himself with bodyguards and built the city of Ecbatana, in the centre of which he resided, almost wholly hidden from public view, transacting all busi¬ ness by deputies. His administration was vig¬ orous, and after a peaceful reign of 35 years he was able to transmit the throne, without a a contest, to his son Phraortes.

DEIOTARUS, de-i-ot'a-rus, Galatian te-trach : d. 30 b.c. He received from the Roman Senate the title of king of that province and Armenia Minor, on account of services ren¬ dered to the Romans in the Asiatic wars. In the civil war he joined the party of Pompey. Caesar took from him Armenia, obliged him to march with him against Pharnaces, and left him nothing but the title of royalty. He was accused of having plotted against the life of Caesar, from which charge Cicero defended him in an oration yet extant. After the mur¬ der of Caesar he returned to his dominions, joined Brutus, and afterward fought with Oc¬ tavius against Antony.

DEIPHOBUS, de-if'6-bus, in Greek legend the son of Priam and Hecuba, who married Helen after the death of Paris, but was be¬ trayed by her to the Greeks.

DEIPNOSOPHIST, de-ip-nos'6-fist (from the Greek Deipnosophistcn, learned men at din¬ ner), one of an ancient sect of philosophers famed for their learned conversation at meals. The work or rather compilation, (Deipnosophis-taeP of the celebrated Greek grammarian and rhetorician, Athenasus, who flourished about two centuries before Christ, has preserved to posterity thousands of quotations and names of authors to the number of 700, that otherwise would have been lost. The Hearned guests® in his voluminous work numbered 29, who meet and banquet for days, entertaining one another with excerpts which Athenieus must have gath¬ ered at great pains and labor from the library of Alexandria, afterward destroyed. The titles of books he puts into the mouths of his char¬ acters alone number 2,500.

DEIR EL-BAHERI, dar-el-b5h're, or DER EL-BACHRI, is a temple site in the district of Thebes, on the west bank of the Nile, opposite Karnak, which is about five kilo¬ meters distant from it. At Deir el-Baheri are some remarkable ruins of a temple built on terraces up the hillside which edges the alluvial plain. This is known as the temple of Queen Hatasu. The building is probably contempo¬ rary with those of Luxor and Karnak, being erected in the same style of magnificence. The first exploration of this site is due to the efforts of Mariette and later of

Naville under the auspices of the Egyptian Exploration Fund. Further excavations in 1906 unearthed the temple of Mentuhetep, and under the auspices of the Metropolitan Museum of Art the cause¬ way of this temple was revealed. Consult Mariette, (Deir-el-Bahri) (Leipzig 1877) ; and (Egypt Exploration Fund Memoirs) (London

1894-1913).

DEIR-EL-KAMAR, ka'mar (<(convent of the moon®), a town of Syria, formerly the capital of the Druses, 13 miles south-southeast of Beyrout. It is situated on the side of a hill of a deep and picturesque glen of Mount Leb¬ anon, on the opposite side of which stands the palace Bteddin, the summer residence of the Christian governor of Lebanon. The town's chief industry is the making of embroideries and rich stuffs. Wine and grain are the princi¬ pal agricultural products. Pop. 8,000, mostly Maronites.

DEIRA, de'i-ra, an ancient Anglian king¬ dom stretching from the Tees to the Humber, and extending inland to the borders of the British realm of Strathclyde. With Bernicia it formed the kingdom of Northumbria. The union between Bernicia and Deira seems to have been rather unstable, for it was only under Edwin, Oswin and other strong kings, either of Deiran or Bernician blood, that a real united Northumbria existed; and when the struggle for supremacy among the English kingdoms resulted in the triumph of Wessex, the two northern kingdoms were allotted to separate earls. Finally Deira became a kingdom under the Danes. The story seems to be authentic that the slaves who attracted Gregory I in the slave market of Rome were from Deira.

DEISM, the belief in the being of a God, with the denial of the existence or even neces¬ sity of divine revelation, believing that the light of nature and reason are sufficient guides in doctrine and practice ; a believer in natural religion only. Etymologically the words deist and theist are the same in meaning, only deist is from Latin and theist from Greek. Conven¬ tionally, however, they are widely different in import ; the term theist being applied to any believer in God, and revealed religion, whether that believer be a Christian, a Jew, a Moham¬ medan, etc., or a deist properly so called. A deist is, as the definition states, one who be¬ lieves in God, but disbelieves in Christianity, or more generally in revelation.

The term Deists, or Freethinkers, is usually employed to designate a series of writers who appeared in England in the 1 7th and 18th cen¬ turies and sought to establish Natural Religion upon the basis of reason and free inquiry, in opposition to all positive religions and without reference to supernatural revelation. They were critical, if not hostile, in their attitude toward Scripture. The first, in point of time, of the celebrated English deists was Lord Her¬ bert of Cherbury, the publication of whose work, (De Veritate,* which appeared in Paris in 1624, began the controversy. There followed, on the same side, Hobbes, Tindal, Morgan, Toland, Bolingbroke, Paine and others. The standard work on the subject is the Rev. Dr. John Leland's (Deistical Writers,) first pub¬ lished in 1754.

DEISSMAN, dls'man, Gustav Adolf, Ger¬ man theologian: b. Langenscheid, Nassau, 7 Nov. 1866. He was educated at Tubingen and Berlin and the Herborn Theological Seminary. He entered the ministry in 1890, became a teacher at Marburg in 1892 and at Herborn in 1895, and was made professor at Heidelberg in 1897 and at Berlin in 1908. He lectured at Cambridge (England) in 1907 and at Upsala in 1910, and received the honorary degree of D.D. from Aberdeen (1906), Saint An¬ drews 1911 and Manchester in 1912. He has published (Johann Kepler unddieBibeP (1894) ;

(Bibelstudien) (1895); (Neue Bibelstudien) (1897) ; (Theologie und Kirche> (1900) ; (Die neutestamentliche Formel <(in Christo Jesu® > (1892) ; (The Epistle of Psenosiris) (1902) ;

(Die Hellenisierung des semitischen Mono-theismus) (1903) ; (Evangelium und Urchris-tentunt (1905) ; (New Light on the New Tes¬ tament (1907) ; (Philology of the Greek Bible) (1908) ; (Light from the Ancient East (1910) ; (Urgeschichte des Christentums in Lichte der SprachforschungJ (1910); <Saint PauP (1912, in English; also in German and Swedish).

DEIST. See Deism.

DEISTIC, or DEISTICAL, pertaining to deism or the deists, containing the doctrines of deism or Natural Religion. See Deism.

DE KALB, Johann, French soldier: b. Huttendorf, Bavaria, 29 June 1721 ; d. Camden, S. C., 19 A.ug. 1780. He was educated in the art of war in the French army. In 1762 he vis¬ ited the Anglo-American colonies as a secret agent of the French government. He was a brigadier in the French service, when, 7 Nov. 1776, he made with Franklin and Silas Deane an engagement to serve in the forces of the

revolted colonies: and in 1777 he accompanied

Lafayette to America. Congress appointed him a major-general 15 Sept. 1777, after which he joined the main army under Washington and was active in the events near Philadelphia, which preceded the encampment at Valley Forge. He served in New Jersey and Mary¬ land till, in April 1780, he was sent to re-enforce General Lincoln, then besieged in Charleston. He was second in command under General Gates; and in the disastrous battle of Camden, 16 Aug. 1780, was at the head of the Maryland and Delaware troops, who maintained their ground until Cornwallis concentrated his whole force upon them. He fell in the charge upon his regiments before they gave way. He died at Camden three days afterward, and a monu¬ ment was erected there to his memory in 1825, Lafayette placing the cornerstone.

DE KALB, Ill., city in De Kalb County, on the Chicago and Northwestern and other rail¬ roads, 60 miles west of Chicago. The indus¬ tries of the city are the manufacture of wire and other iron products, agricultural imple¬ ments, piano, nail and creamery-package works, glove and shoe manufacturing establishments. De Kalb has three banks with a combined capi¬ tal of $350,000. The city is governed by a mayor and council of 10 members, elected for two years, and owns its own water-plant. The Northern Illinois State Normal School is lo¬ cated here. Settled about 1838, De Kalb was incorporated in 1877. It was the scene of an engagement in the Black Hawk War. Here after the battle Lincoln, Davis and Zachary Taylor held a conference. Pop. 9,036.

DE KAY, Charles, American poet, grand¬ son of Joseph Rodman Drake: b. Washington, D. C., 25 July 1848. He was educated at Yale and was the literary and art editor of the New York Times during 30 years, 1876-1906, and art-editor of the New York Evening Post in 1907. From 1894-97 he was consul-general of the United States at Berlin, where, among his activities, he organized the Berliner Fechtklub on the lines of the New York Fencers Club which he had

founded in 1882. Always inter¬ ested in literature and art, he was one of the original founders of the Authors' Club (1882), the National Arts Club of New York (1889) and of the Circle of Friends of the Medallion (1907). He was managing governor of the National Arts Club. His poems are mostly founded on themes from Oriental, classical and literary history. Among his works are (The Bohemian5 (1878); <Hesperus and Other Poems5 (1880) ; (The Vision of Nimrod5 (1881) ; (The Vision of Esther5 (1882) ; (The Love Poems of Louis Barnaval Kay5 (1883); (Life and Works of Barye, Sculptor5 (1889); (Bird Gods5 (1898); and translation of Hein¬ rich Heine's (Letters5 and of several works from the French.

DEKEN, da'ken, Agathe, Dutch author: b. Amstelveen, near Amsterdam, 14 Nov. 1741 ; d. 14 Nov. 1804. She wrote a number of novels with her friend Elizabeth Bekker (q.v.) and poems, among them diederen voor den Boerenstand) and (Liederen voor Kinderen.5 They give charming and truthful pictures of the life of the natives of Holland.

DEKKER, Eduard Douwes, Dutch novel¬ ist, pseudonym (<Multatuli55 : b. Amsterdam,

2 March 1820; d. Nieder-Ingelheim, 19 Feb. 1887. He spent several years in government service in the Dutch East Indies, but resigned because of his disagreement with the Dutch government there. His story, (Max Havelaar5 (1860), is a forceful accusation of wrongs and scandals of the Dutch administration of Java. He later published many satirical works on social, political and philosophical questions, among them a volume of admirable <Parables) ; a novel, (La Sainte Vierge5 ; a drama, (Vorsten-school5 ((The School of Princes5). After his death there appeared (Geschiednis van Wouterje Pieterse5 (1888) ; and (Letters and Works, 5 published bj' his widow. His biography was written by Busken (in Ten Brink's (Heden-daagsche Letterkundigen,5 1885).

DEKKER, or DECKER, Jeremias de,

Dutch poet: b. Dort 1609 or 1610; d. Amster¬ dam 1666. His first published poetical work was (The Lamentations of Jeremiah5 ; and several others which soon followed it were also translations. His dove of Gold,5 a power¬ ful satire, and his (Goede Vrijdag,5 or the dassion of Christ,5 as well as his lyric poems, are still in high estimation; and his (Epigrams5 (Puntdichten) are, beyond dispute, the best of the kind

which the literature of that period produced. The best edition of his poems, ac¬ companied with a biography, was published by Brouerius van Nideck (1726).

DEKKER, or DECKER, Thomas, Eng¬ lish dramatist: b. London about 1570; d. after 1637. He is first mentioned as a theatrical writer in 1597. He was one of the literary antagonists of Ben Jonson, who satirized Dek-ker in his (Poetaster, 5 and the latter took his revenge in his (Satiromastix.5 He appears to have lived from hand to mouth, and been often in difficulties, imprisonments for debt being almost the only record, besides his works, that is left of him. Among his writings may be mentioned the (Seven Deadly Sinnes of Lon¬ don,5 a moral tract; the (Double P P,5 a violent tract against the Catholics ; (A Knight's Conjuring,5 in which he introduces Chaucer, Spenser and many other dead poets; (The Gull's Hornbook,5 valuable as a picture of the time. Besides his own plays he cooperated with Massinger in the (Virgin Martyr5 and with Ford in the (Sun's Darling,5 a moral masque; the dleasant Comedie of Old Fortunatus5 (1600) ; and (The Honest Whore5 (1604) ; are among the most esteemed of his dramas. The number of Dekker's plays which have survived is about 28, of his tracts about 25. His works have been edited by Shepherd (4 voR, London 1873) ; selected edition by Rhys (1887) ; and his non-dramatic works by Grosart (5 vols., 1884-86). Consult Hunt, (Thomas Dekker5 (New York 1911) ; and the (Life5 by Bullen (in dictionary of National Biography5).

DE KOVEN, Anna Farwell, American novelist : b. Chicago, 19 Nov. 1862. She was graduated at Lake Forest University in 1880 and married to Louis Reginald De Koven (q.v.) May 1884. She is the author of (A Sawdust Doll5 (1894) ; (An Iceland Fisherman,5 a translation from Pierre Loti (1889) ; (By the Waters of Babylon5 (1901) ; dife and Letters of John Paul Jones5 (1913) ; des Comtes de Gruyere5 (1914) ; also contributions in prose and verse to various periodicals.

DE KOVEN (Henry Louis), Reginald,

American composer: b. Middletown, Conn., 3 April 1861 ; d. Chicago, Ill., 16 Jan. 1920. He was graduated at Oxford in 1879 and studied music in Europe. On his return from Europe in 1882 he took up his residence in Chicago, but subsequently moved to New York. From 1902 to 1904 he lived in Washington as conductor of the Washington Symphony Orchestra. He then returned to New York as musical critic of the World. His scores show refinement of instru¬ mental coloring and harmony. His operettas had great success, notably (The Begum5 ; (Don Quixote 5 ; (Robin Hood,5 his greatest success; (The Fencing Master) ; (The Three Dragoons> (1899); (Maid Marian1* (1901); (Foxy Quiller> (1900) ; (The Student King) (1906). He also composed many songs, includ¬ ing (Oh, Promise Me} and (A Recessional,) and various music for piano and orchestra.

DE KOVEN, James, American Episcopal clergyman and educator : b. Middletown, Conn., 19 Sept. 1831 ; d. Racine, Wis., 19 March 1879. He was educated at Columbia College and at the General Theological Seminary in New York. After his ordination to the priesthood in 1855 he took a pastoral charge at Delafield, Wis., and at the same time became principal of the preparatory school for Nashotah Seminary, founded two years earlier. In 1859 this became Racine College and De Koven its first warden. He soon acquired a marked influence throughout the West, both in educational and ecclesiastical matters, in the latter taking up and carrying forward the teachings of the Oxford Movement. His most prominent appearance in this connec¬ tion was in the General Convention of 1871, at a time when the ritual controversy ran very high. In bold and outspoken terms, which have become historical, he proclaimed and defended his position, with a marked effect on the legis¬ lation under discussion. When, however, in 1875, he was elected bishop of Illinois, a con¬ siderable majority of the standing committees of the other dioceses refused to confirm his election, regarding his views as dangerous. He labored diligently for the upbuilding of Racine College, where he remained until his death. The published volume of his sermons (1880) con¬ tains a preface by Mr. Dix, which gives some idea of his commanding position in the church life of his time.

DE KROYFT, de kroift', Susan Helen Aldrich, American author : b. Rochester, N. Y., 29 Oct. 1818; d. Dansville, N. Y., 25 Oct. 1915. She was graduated at Lima College, New York, 1843, and married Dr. William De Kroyft, of Rochester, who was killed on his wedding day by a fall from a carriage. Mrs. De Kroyft shortly afterward became blind. Her works include: (Little Jakey5 (1871); (Darwin and Moses, 5 a lecture; (A Place in Thy Memory5 (1849; revised 1905) ; (Mortara5 (1888) ; (The Foreshadowed Way5 (1901) ; and (The Soul of Eve5

(1904).

DE LA BLACHE, de-la-blash', Vidal, French geographer: b. Pezenas, Herault, 1845; d. Paris, 5 April 1918. He was educated at the Upper Normal School, from which he was graduated in 1863. He directed the issue of a series of maps which is known by his name and which was published in the (Historical and Geographical Atlas5 of 1890. In 1912 M. de la

Blache was a member of the French delegation which arrived in New York on 7 April of that year with a bronze bust which was erected at Crown Point, Lake Champlain, N. Y., on 3 May following, in memory of Samuel de Champlain.

DELABARRE, Edmund Burke, American psychologist : b. Dover, Me., 25 Sept. 1863. He was graduated at Amherst College in 1886, and later studied at Harvard and Freiberg. In 1891— 96 he was associate professor and after 1896 professor of psychology at Brown University. During the absence of Dr. Miinsterberg in 1896-97 he was director of the Psychological Laboratory at Harvard. He is a member of the American Psychological Association and Fellow of the American Association for the Advancement of Science. He wrote (Ueber Bewegungsempfindungen5 (1891) ; (Report of Brown-Harvard Expedition to Nachoak, Lab¬ rador, in 19005 (1902).

DELABORDE, de la-bord', Henri Fran¬ cois, Count, French general: b. Dijon, 21 Dec. 1764; d. 3 Feb. 1833. He distinguished himself in the Republican armies ; fought through the whole of the Napoleonic wars and was ennobled in 1807. Upon the return of Napoleon from Elba he again espoused the cause of the em¬ peror. With the advent of the Restoration he was brought before a military tribunal but was acquitted owing to a technical flaw in the wording of the charge.

DELACROIX, de-la-krwa', Ferdinand Victor Eugene, French painter: b. Charenton-Saint-Maurice, near Paris, 26 April 1799; d. Paris, 13 Aug. 1863. His father was an ardent revolutionist who died when Eugene was seven years of age. He was sent to the Lycee Na¬ poleon and then to the atelier of Baron Guerin to study painting. His first painting, (Dante and Virgil in the Infernal Regions,5 attracted much notice in the exhibition of 1822. This picture displayed a wide departure from the coloring and manner of the school of David, and accord¬ ingly it gave rise to enthusiastic praise on the one side ; on the other to contemptuous deprecia¬ tion, but everywhere to wonder. His (

Massacre in Scio5 (1824) was a formal declaration of war against the school of the classicists, who named it a ((Massacre of Painting.55 These were followed by the (Execution of the Doge Marino Falieri5 (1826) ; the (Death of Sardanapalus5 (1827) ; and the (Murder of the Bishop of Liege5 (1830) — pieces painted with fire and vigor. His sympathy with the revolutionary party was shown by his celebrated picture of the (Goddess of Liberty at the Barricades.5 In 1831 he joined the embassy sent by Louis Philippe to the emperor of Morocco. To this journey we are indebted for several pictures re¬ markable for their vivid realization of Oriental life as well as their masterly coloring. They are the (Jewish Marriage5 ; (Muley Abderrahman With His Body-guard5 ; (Algerian Ladies in Their Chamber5 ; (Moorish Soldiers at Exer¬ cise5 ; and the several scenes of common life. In spite of his undoubted genius Delacroix failed in gaining popularity with the general public. He was commissioned not only with the decora¬ tion of public buildings, such as the Luxem¬ bourg Palace, the town-hall and the Louvre, but large paintings were executed by him for the Parisian churches, and the historical museum of Versailles contains two of his master-DE LACY — DELAFIELD

pieces — the (Battle of Taillebourg> (1838) and the (Taking of Constantinople by the Crusaders J (1841). In 1857 the Academy elected him a member of their body. An exhibition of his works was opened in 1864, containing 174 pictures and 303 drawings. Delacroix was an artist of great versatility; mythology, legend, history and poetry by turns furnished him with subjects, and in addition he painted portraits, allegorical and genre pictures, hunting scenes, *etc.* ; but all exhibit at once his strength and his weakness — brilliant coloring and incorrect drawing. He is dramatic, passionate and in¬ tensely virile in his concepts. Consult Dargenty, <Eugene Delacroix par lui-meme) (Paris 1885) ; Robaut and Chesneau, (L'CEuvre complet d'Eugene Delacroix) (Paris 1885).

DE LACY, William Henry, American jurist: b. Washington, D. C., 8 Feb. 1863. He was educated at Georgetown University and the Catholic University, Washington. He practised law from 1883 to 1906, was admitted to the bar of the Supreme Court of the United States in 1902, and from 1906 to 1913 served as judge of the Juvenile Court of the District of Columbia. He is also associate professor of common law

at the Catholic University. He was one of the vice-presidents of the International Peace Con¬ gress, Washington 1910 ; was delegate to the American Prison Congress, the National Con¬ ference of Charities and Correction, the National Conference of Catholic Charities, *etc.* He is the author of (The Treatment of United States Prisoners by Probation* (1906) ; co¬ author of Administration of Justice in the United States) (1910), and was a contributor to (The Catholic Encyclopedia) (1914).

DELAET, de-lat', Johan, Dutch scholar: geographer and historian : b. Antwerp about 1582; d. Leyden (?) near the end of 1649. Lit¬ tle is known of his life except what he himself has occasionally set down in his own works. In 1624 he was established at Leyden and for 25 years thereafter he was busy publishing and editing books for the Elzeviers. As a director of the Dutch West India Company he had, of course, ready access to its records ; while as co-patroon of Rensselaerswyck he had an especial interest in the country where his daughter, Johanna, and his son-in-law had made their home. Therefore, to popularize the knowledge of foreign lands connected with that company, he wrote his (Nieuwe Wereldt,* which is an excellent compilation made from the works of a great number of foreign geog¬ raphers and navigators (Leyden 1625). Five years later there appeared a second revised and enlarged edition, which contained several new maps. DeLaet's intention to give to his fellow-citizens as perfect a description of the New World as circumstances would allow was carefully carried out, so that a Latin transla¬ tion, apparently with some additions, and a French translation followed within the next 10 years. This was followed later by a (History or Yearly Account of the Proceedings of the Dutch West India Company from its beginning to 1636, > written in Dutch. Meanwhile, the Elzeviers were busily engaged in publishing a series of historical monographs on the countries of Europe and Asia, which, because of their appearance in extremly small form, were called the <Little Elzevirian Commonwealths.* In the

publication of these volumnes DeLaet played no small part, so that Struve, writing about a cen¬ tury later, says that DeLaet's must be consid¬ ered the best of all that had appeared. The first of these was that on England (1625), almost half of which was taken up by a Latin translation, not DeLaet's, of the (De Republica Anglorum* of Sir Thomas Smith. There fol¬ lowed in rapid succession the works on Italy (1628), Spain (1629), France (1629), the Bel¬ gian Confederation (1630), the Empire of the Grand Mogul or True India (1631), Persia (1633 and 1637), Portugal (1641), Poland, Lithuania,

Prussia and Livonia (1642), and per¬ haps Turkey. It was in 1643-44 that DeLaet had his famous literary controversy with his compatriot, Hugo Grotius (q.v.), on the origin of the American aborigines, in which he com¬ pletely vanquished the great Dutch statesman and the father of international law. DeLaet also published notable works along other lines. He edited the (Natural History) of Pliny the Elder (1635), published a book (On Gems and Precious Stones) (1647), gathered together and put in order the notes of the celebrated natural¬ ist, Marggraf, on the natural history of Brazil (1648), and finally published an edition of Vitruvius (q.v.), (On Architecture,* together with the works of several minor writers on the same subject. In all of these works, which were written in Latin with the exception of those concerning the Dutch West India Com¬ pany, DeLaet proves his vast and profound knowledge, but he seems to have been confess¬ edly a popularizer rather than a savant. Con¬ sult Wright, H. F., (Origin of American Aborigines: A Famous Controversy *(Washing¬ ton 1917) ; Foppens, J. F., (Bibliotheca Bel-gica* (Brussels 1739) ; Niceron, J. P., (Memoires pour servir a l'histoire des hommes illustres dans la repnblique des lettres* (Paris 1737) ; Winsor, Justin, (Narrative and Critical History of America) (Boston 1884-89).

Herbert F. Wright,

Division of International Law , Carnegie En¬ dowment for International Peace.

DELAFIELD, Richard, American military engineer: b. New York, 1 Sept. 1798; d. Wash¬ ington, D. C., 5 Nov. 1873. He was graduated from West Point in 1818 and was draughtsman to the American Boundary Commission ap¬ pointed under the Treaty of Ghent. In 1819-38 he was assistant engineer in the construction of forts Monroe and Calhoun, had charge of the improvements on the Mississippi and of the building of the Cumberland road and the con¬ struction of Fort Delaware. In 1838 he was appointed superintendent of the Military Acad¬ emy at West Point and held the position seven years at that time, and again from 1856 to 1861, when he was relieved at his own request. In 1855 he was senior member of a commission sent to the Crimea to report on modern meth¬ ods of warfare ; he prepared the report which was published by Congress in 1860. During the Civil War he assisted in organizing and equip¬ ping the New York troops and had charge of the construction of fortifications in New York harbor. In 1864 he was made chief of engi¬ neers, and retired in 1866 with the rank of major-general. He was a member of the com¬ mission for the improvement of Boston harbor and a regent of Smithsonian Institute (1865—

67).

DELAGOA BAY, a bay on the southeast coast of Africa, in the Portuguese colony of Mozambique, partly enclosed by Inyack penin¬ sula. It is about 70 miles long and 20 miles wide. Though crossed at its entrance by a shifting bar it is accessible to vessels of the largest class and is the finest harbor on the east coast of Africa. Several large rivers flow into it chief of which is the Komati. The Delagoa Bay Railway projected 57 miles from the port of Lourengo Marques to the Trans¬ vaal border extends 290 miles further to Pre¬ toria and is the commercial highway regulated by the agreement of 1 April 1909 between Por¬ tugal and Great Britain for the transit of export and import goods with the Transvaal gold fields. Another railroad of which (1918) 44 miles were open for traffic is projected to the Swaziland border. Delagoa Bay was discovered in 1502 by Portugese navigators and has had a varied history of international dispute. It was block¬ aded by the British during the South African War (1899-1902) to enforce neutrality. In 1889 the Portuguese seized the railway and in 1900 were compelled by) arbitration to pay $5,000,000 compensation. Consult Tesset, (The Key to South Africa, Delagoa Bay' (London 1899). See Portuguese Possessions in Africa.

DELAGRANGE, de-la-granzh, Leon, French aviator and sculptor: b. Orleans 1872; d. Pau 1910. He studied at the Ecole des Beaux-Arts, Paris. He produced several works well deserving of notice, including (Love and Youth) ; (Girl Dancers) ; (A Huguenot' ; (The Templar) ; (A Florentine Page.' In 1907 he was president of the Aero Club of France, and in this year also made his first flight in an aeroplane. In 1908 and 1909 he made several sensational flights and established new speed records, notably at Doncaster, England, during a storm on 17 Oct. 1909 he established a world record — 6 miles in 7 minutes, 36 seconds. He received the decoration of the order of the Legion of Honor in 1909, and the following year a medal from the Paris Academy of Sci¬ ences. He was killed in an accident to his monoplane at Pau.

DE LA HIRE, de-la-er', Philippe, French mathematician : b. Paris, 18 March 1640 ; d. there, 21 April 1718. He was a member of the Academy of Sciences and professor at the Col¬ lege of France. His chief work was in pure mathematics, but he was also an astronomer. Many of his napers are in the Memoirs of the Academy of Sciences. Among his writings are (Nouvelle methode de geometrie' ; (Sectiones Conicae' ; (Memoire sur la epicycloid' (1694) ; and (Memoire sur les conchoids) (1708).

DELAMBRE, de-lan'bl. Jean Baptiste Joseph, French astronomer: b. Amiens, France, 19 Sept. 1749; d. Paris, 19 Aug. 1822. In 1790, eight years after the discovery of Uranus, Delambre published the tables of that planet, although in that period it had but performed a small part of its 80 years' course. He also con¬ structed tables of Jupiter and Saturn and of the satellites of Jupiter, which, with several treatises, procured him a reception into the National Insti¬ tute. In 1792 he was appointed to measure the arc of the meridian between Dunkirk and Bar¬ celona for the French government. With his associate, Mechain, he completed this work in

1799. In 1802 Napoleon appointed him Inspecteur-General des Btudes, which post "he resigned when chosen perpetual secretary of the class of mathematical sciences (1803). His first tables of the sun were published in 1792; in 1806 appeared his new ones. In 1807 he succeeded Lalande in the College de France and wrote his (Traite d'astronomie theorique et pratique) (1814) ; (Histoire de l'astronomie du mojˆen age' (1819); (Histoire de l'astronomie moderne) (1821) ; (Histoire de l'astronomie du 18e siecle.'

DELAMINATION, the division of the blastoderm into two layers, epiblast and hypo¬ blast. See Embryology.

DE LANCEY, William Heathcote, Ameri¬ can Protestant Episcopal bishop : b. Westchester County, N. Y., 8 Oct. 1797; d. 1865. He was graduated at Yale College in 1817; studied the¬ ology and entered the Episcopal ministry in 1822. He was secretary of the House of Bish¬ ops in the General Convention of the Episcopal Church of the United States 1823-29. Upon the reorganization of the University of Penn¬ sylvania in 1828, he was chosen provost of that institution, which office he retained for five years. In 1839 he became bishop of the dio¬ cese of western New York. In 1852 he was sent as a representative of the Episcopal bish¬ ops of the United States to England.

DELAND, Ellen Douglas, American writer for girls : b. Lake Mahopac, N. Y., 3 Sept. 1860. She was educated in New York, but lived in Philadelphia until 1901. She has since lived in Boston and in Dedham, Mass, where her home now is. She is a suffragist and active in that cause, in the work of the Episcopal Church, and in various civic affairs, and a trustee of the Dedham Public Library. She is a member of the Boston Author's Club. Her published books include <Oakleigh) (1896) ;

(Malvern' (1896); Un the Old Herrick House) (1897) ; (A Successful Venture) (1897); (Alan Ransford) (1898); <Katrina) (1898); (Three Girls of Hazelmere) (1903); 'Josephine' (1904); <A Little Son of Sunshine) (1906) ; 'The Friendship of Anne' (1907); .'Miss Betty of New York> (1908); (The Girls of Dudley SchooP (1911) ; 'The Fortunes of Phoebe) (1912); 'Country Cousins) (1913); 'Cyntra' (1915).

DELAND, Margaret Wade (Campbell),

American novelist: b. Allegheny, Pa., 23 Feb. 1857. She was educated at the Cooper Union, New York, and for a time taught drawing. In 1880 she married L. F. Deland and has since lived in Boston. 'John Ward, Preacher' (1888), her first novel, attracted wide notice. Other works are (The Old Garden and Other Verses> (1887) ; (S}Mney) (1890) ; (Florida Days,* a collection of sketches of travel; 'The Story of a Child) (1892) ; (Mr. Tommy Dove and Other Stories) (1893); ˆPhilip and His Wife' (1894) ; (The Wisdom of Fools) (1897) ; 'Old Chester Tales' (1901); <Good for the SouP ; 'Dr. Lavendar's People' (1904) ; 'The Common Way' (1904); 'The Awakening of Helena Ritchie' (1906); 'An Encore' (1907); (The Way to Peace' (1910); <The Iron Woman' (1911); (The Voice' (1912); Part¬ ners' (1913) ; (The Hand of Esau' (1914) ; (Around Old Chester' (1915).

DE LAND, Fla, town, county-seat of Volusia County, on the Atlantic Coast Line Railroad, about 60 miles south of Saint Augus¬ tine. It is a favorite health and winter resort, noted for its sulphur springs and its

fine shell-paved and shaded streets. It con¬ tains Carnegie and Sampson libraries. The John B. Stetson University, a Baptist institu¬ tion, was established here in 1887. The town owns its water plant. Pop. 2,812.

DELANO, Columbus, American lawyer and politician: b. Shoreham, Vt., 5 June 1809; d. Mount Vernon, Ohio, 23 Oct. 1896. He studied law at Mount Vernon, was admitted to the bar in 1831, and shortly after elected prose¬ cuting attorney of the county. He was elected member of Congress in 1844 and voted against the declaration of war in Mexico ; he was again elected to Congress in 1864 and 1866. He was delegate to the Republican conventions of 1860 and 1864, and member of the State legislature in 1863. In President Grant's first administra¬ tion he was appointed Commissioner of Internal Revenue, and reorganized the. department, put¬ ting it on an excellent financial footing. In 1870 he became Secretary of the Interior, re¬ signing in 1875 and retiring from public life. He was one of the trustees of Kenyon College and endowed its preparatory department.

DELAPLANCHE, de-la-plansh, Eugene, French sculptor: b. Paris (Belleville) 1836; d. there, 9 Jan. 1891. He was a pupil of Duret, received the grand prize of Rome, 1864, and the medal of honor 1878. Among his works are (Child and Turtle) ; (Eve Before the FalP ; (Saint Agnes) ; (Maternal Education* ; (Harmony) ; (Africa,* in bronze; (Music) ; (Vir-gin of the Lilies, } in the Luxembourg; (Au¬ rora, } also in the Luxembourg; (Circe) ; (The Dance1* ; and a statue of <Auber) for the opera house. He is noted for grace and nobility of treatment and refinement of style.

DE LA RAMEE, de-la-ra-ma', Louise. See Ouida.

DE LA REY, de-la-ra'e, Jacobus Hendrick,

Boer general : b. Lichtenburg District of the Western Transvaal 1849; d. 14 Sept. 1914. He gained distinction in his first command against the Basutos, when very young, and served two years in the Volksraad, supporting Joubert. He commanded the Lichtenburg burghers at the outbreak of the Boer-British War, 1899-1902, which force served later in Cronje's west¬ ern column. He distinguished himself at Magersfontein ; in the retreat before Lord Rob¬ erts, and at Nooitgedacht 1900, where he cap¬ tured 500 English troops. He proved himself a resourceful leader in the guerilla warfare that marked the later stages of the war, his prin¬ cipal achievement being the capture at Klerks-dorp, 7 March 1902, of Lord Methuen with many of his men, but he released him on ac¬ count of not being able to treat

his wounds, as he was lacking hospital facilities — an instance of humanity that made a most favorable im¬ pression on his foes. He served on the Boer committee which arranged for peace, and later on the deputation visiting Europe and the Uni¬ ted States to raise funds for the Boers that they might continue their occupations at home. In 1907 he became a member of the legislative as¬ sembly and was later called to the senate.

t

DE LA RIVE, Auguste Arthur, Swiss physicist : b. Geneva, 9 Oct. 1801 ; d. Marseilles, 28 Nov. 1873. He received the appointment to the chair of natural philosophy in the Academy at Geneva at the age of 22. First devoting himself to the study of the specific heat of gases, and of the observation of the temperature of the earth's crust, he soon turned his com¬ plete attention to electricity, making original discoveries in connection with magnetism, electrodynamics, the relation between magnet¬ ism and electricity, and the properties of the voltaic arc, and presenting new theories on the subject of the aurora borealis. He discovered the process of electro-gilding, for which he re¬ ceived the grand prize of 3,000 francs from the Academy of Sciences 1842, becoming one of the eight foreign associates of the Academy in 1864. His chief work was a complete trea¬ tise on electricity in three volumes, which was translated into several languages, and was con¬ sidered of the highest authority upon the sub¬ ject.

DELAROCHE, de-la-rosh', Paul (his real name was Hippolyte), French painter: b. Paris, 17 July 1797; d. there, 4 Nov. 1856. He en¬ tered the studio of Baron Gros, and rapidly rose to eminence as one of the greatest of modern painters in France. He visited Italy in 1838 and 1843. His subjects are taken principally from French and English history. Among others may be mentioned, Saint Vin¬ cent de Paul Preaching before Louis XIII on Behalf of Deserted Children* ; (Joan of Arc Interrogated in Prison by Cardinal Beaufort* (Wallace collection, London) ; (Flora Mac¬

donald Ministering to the Pretender after the Battle of Culloden* ; the (Death of Queen Elizabeth,* a work greatly admired by French and generally reprobated by English critics; (A Scene of the Saint Bartholomew Massacre* ; (The Children of Edward IV in the Tower* ;

(Cardinal Richelieu conducting Cinq Mars and De Thou up the Rhone to Execution* ; (Crom¬ well Contemplating the Dead Body of Charles

I,* 1831, (Nimes Museum,* one of Delaroche's most exalted efforts; the (Execution of Lady Jane Grey, ˆ *and the (Death of the Duke of Guise,* 1835, Chantilly Museum. What he considered his chef-d'oeuvre, was the pictorial decoration of the hemicycle of the Palais des Beaux-Arts, on which he was engaged from 1837 to 1841. In this composition Delaroche has sought to illustrate the history of art from the remotest period to the present day, by representing, in one compartment, the great artists of all ages, painters, sculptors and

architects. Notwithstanding the number of per¬ sons depicted (upward of 80), and the diver¬ sities of figure and costume, the whole presents a group in perfect harmony, with a coloring at the same time quiet and rich, and a correctness of drawing which leaves nothing to be desired. It has often been objected to Delaroche that the accessories of his pictures are finished with such minuteness as to divert the attention from the main subject. His signal merits consist in correct drawing, brilliant and harmonious color, and great distinctness and perspicuity in treatment, rendering the story of his pictures at once intelligible. Consult monographs by Mirccourt (Paris 1856) ; Halevy, (Notice sur la vie et les ouvrages de Paul Delaroche* (ib.

1858) ; Muther, (History of Modern Painting0 (London 1907).

DE LA RUE, del-a-roo', Warren, Eng¬ lish inventor and physicist : b. Island of Guernsey, 18 Jan. 1815; d. London, 22 April 1889. He was educated in Paris and followed his father's business, that of manufacturing paper wares. For this he invented many new processes and machines. He is best known for his application of photography to astronomy. In 1850 he constructed a large reflecting tele¬ scope at Canonbury, which was transferred later to Cranford, Middlesex. He was a mem¬ ber of the International Electrical Congress at Paris in 1861, president of the Royal Astro¬ nomical Society, and held other posts of honor. His reports of original observations in chemis¬ try, astronomy and physics are of the greatest value.

DELAUNAY, de-l6 > 'na', Charles Eugene,

French astronomer : b. Lusigny, Aube, 9 April 1816; d. Cherbourg, 5 Aug. 1872. He studied at the Ecole Polytechnique, becoming a mining en¬ gineer. He taught mechanical engineering at the Polytechnique and in the Faculty of Sciences of Paris, and was made a member of the Institute in 1855. In 1870 he became di¬ rector of the Paris Observatory. Among his works are (Sur une nouvelle theorie analytique du mouvement de la lune) (1846) ; (Rapport sur les progres de l'astronomie) (1867) ; (Cours elementaire d'astronomie)

(1876) ; (Traite de mecaniqueP He left an unfinished work on (Theorie de la lune} (in 2 vols.). His ‘Life* was written by Thevenot (Paris

1878).

DELAUNAY, Jules Elie, French figure and portrait painter: b. Nantes, 12 June 1828; d. Paris, 5 Sept. 1891. He studied under Flandrin and at the Ecole des Beaux-Arts. He received the Grand Prix de Rome in 1856 and then went to Italy where he perfected his drawing to such a marked degree that his sureness and strength in this branch of his art became his distinguishing characteristic. He won the first-class medal at the Paris Exposition of 1878; and at that of 1889 was awarded the medal of honor. He was made an officer of the Legion of Honor and a member of the Institute. His portraits are considered masterpieces. He exe¬ cuted the frescoes in the church of Saint Nicholas at Nantes, several panels at the Paris opera house and 12 paintings for the Palais Royal, which are hung in the hall of the Council of State. His ‘Diana* is in the Luxembourg Gallery, Paris, and the ‘Death of the Centaur Nessus,* and the ‘Lesson on the Flute* are in the Museum at Nantes. Consult Claretie, J., (L’Art et les artistes frangais.*

DELAUNAY, Louis Arsene, French actor : b. Paris, 21 March 1826; d. Versailles, 22 Sept. 1903. He made his debut in October 1846, at the Odeon. In 1848 he acted at the Theatre Frangais in the role of Durante, becoming secretary to the theatre in 1850. In 1877 he was appointed professor of dramatic declaration at the Conservatoire, and in 1883 became a mem¬ ber of the Legion of Honor. Till he retired (1887), he was one of the most accomplished actors on. the French stage. He has found some of his greatest parts in the plays of Hugo, Pailleron, De Musset and Augier.

DELAUNAY - BELLEVILLE, Louis,

French engineer: b. 1843; d. 10 Feb. 1914. He was educated at the Ecole Polytechnique and served in the Franco-Prussian War. Entering the Naval Engineering School in 1864, he joined the Belleville works at Saint Denis, near Paris, in 1867, rising to head of the firm. He in¬ vented the Belleville boilers used in various navies and the automobile known by his name. He was a grand officer of the Legion of Honor and one time president of the Paris Chamber of Commerce.

DELAVAN, Wis., city of Walworth County near Delavan Lake, on Rock River, 62 miles southwest of Milwaukee, and on the Chicago, Milwaukee and Saint Paul Railroad. It has some manufacturing interests, including knit goods and dairies. It is the seat of the State institution for the education of the deaf ; and on account of mineral springs in the vicinity and the lake is a place of summer resort and the site of a summer school. The waterworks are owned by the city. Pop. (1920) 3,016.

DELAVIGNE, de-la-ven'ye, Jean Fran¬ cois Casimir, French poet and dramatist: b. Havre, 4 April 1793; d. Montmorency, 11 Dec. 1843. He was educated at the Lycee Napoleon, Paris, and in 1811 composed a dithyrambic on the birth of the king of Rome, which attracted considerable attention and procured him, from Comte Frangois de Nantes, a situation in the revenue office. He competed unsuccessfully for the Academy prize. At the Restoration he pub¬ lished a set of elegies, 'Messeniennes,* which deplored the faded glories of France. The patriotic fervor of these pieces won immediate and widespread popularity for their author. He produced in 1819 his tragedy of 'Les vepres Siciliennes) ; 'Comediens* appeared in 1820, and the tragedy of 'Paria* in 1821. The liberal political opinions expressed in this play alienated the patronage of the king. Louis-Philippe, duke of Orleans, secured a position for him as librarian of the Palais Royal, where he remained for the rest of his life. In 1823 appeared his (Ecole des vieillards,* his best comedy. This won for him membership in the Academy (1825). (La Princesse Aurelie* followed in 1828 and 'Marino Faliero) (1829). Two patri¬ otic hymns, (La Parisienne) and (La Varsovi-enne,* became very popular. Other works are 'Louis XI* (1832) ; (Les Enfants d'Edouard) (1833); (Don Juan d'Autriche) (1835); 'Une famille au temps de Luther) (1836) ; (La Popu¬ larity (1838); (La fille du Cid> (1839) ; 'Le conseiller rapporteur* (1840) ; and 'Charles VI,) an opera (1843). He left Paris for a vacation in Italy but died before he reached his destination. His popularity in his day was well merited both on account of the simple reality of his works and his private virtues. Because he was so essentially expressive of his time his works are devoid of that imaginative universal quality which ensures posthumous fame. His collected works were published by his brother (1845 and later). His poems and dramatic productions were published separately (1863). Consult Sainte-Beuve, 'Portraits contemporains* (Vol. V) ; Favrot, A., (Etude sur Casimir Delavigne) (1894).

DELAWARE. "The Diamond Stated the smallest but one and the least populous of the 13 original States; southernmost of the Middle

DELAWARE

Estimated population, |213, 380

COUNTIES

Pop-Pop.

32,721 Kent . F 24 46,413 Sussex . H 25

123,188 Newcastle . C 23

56

Bethany Beach,

2,158 Lewes .

Sussex .

.11 25

285 Little Creek …

… E 23

370

Bethel .

. . J 24

210 Magnolia .

… F 24

212

Bowers .

.F 25

1,399 Middletown . .

… B 25

939

Bridgeville .

. H 24

2,603 Milford .

,.H 25

553

Camden .

.F 24

451 Millsboro .

… I 23

223

Cheswold .

. E 24

193 Millville .

… J 24

764

Clayton .

. D 23

1,038 Milton .

. .H 27

176

Dagsboro .

. . J 27

1,913 Newark .

… A 28

1.132

Delaware City. .

. B 24

3,351 Newcastle… .

…A 26

530

Delmar .

K 24

722 Newport .

. . A 24

3,720

Dover .

E 24

302 Ocean View…

… J 28

216

Ellendale .

. H 26

585 Odessa .

… C 23

374

Elsmere .

.A 24

299 Port Penn ….

…B 24

255

Farmington … .

. H 24

327 Rehoboth .

… I 28

451

Felton .

. . F 24

155 Roxana .

… J 27

395

Frankford .

. . J 27

264 St. Georges …

…B 23

659

Frederica .

. F 25

2,108 Seaford . .

… .1 24

1,609

Georgetown… .

. I 25

342 Selbyville ….

…K27

362

Greenwood .

.G 24

1,843 Smyrna .

… D 24

1,500

Harrington .

. H 24

494 Townsend… .

…C23

209

Kenton .

, ,E 24

94,265 Wilmington . .

…A 24

2,166

271

Laurel .

Leipsic .

K 24 . .E 24

517 Wyoming … .

Gettysburg

Greoloclr

Mcroerburg

Invert

i’TKompi

Peach Bottom

Stewartstown

Intersectionˆ’ New Freedom

llassboro

‘Nurrisville HVh ltcford(/’C:i niin °ˆCa?ea 0Ha71tifi*ˆ FJmJr

SylmarRiˆk0o {) Cal vert Prov ide

j Farmington r Pleasant Hill lr0T«K < ?\ \Ch

Harney /’Piney Creek,

A”,vA\Tburo °Ruh’v’f”

I/lelrosep/ˆaoirnianvlllffˆl 1 . ..ˆ/AJesiaL Bentley ot \S r,

oM/ˆnch/eter y’p.nT1 VSS “‘n* Jupiter. < ParttoiiM s • VQteJhtnoJnt0ˆai’vl1”

jm,y Ml. Car,,,

Shijoh | ,V Trenton-? Forest on /°I!

arfel’Sy

N)C j / owblesburg. Belfast

Tearfoaaj

Deep Hi . », . _n- /ˆEbbvftle’

.HIllT&h!

Tyrone Amjderabu „fa … ‘ 0 Frizellbur ‘ 0 Blˆ

kiddiygˆontoˆW ostmijnster

ˆTfewMiilwafˆˆS’ˆ5“*g ■

Leflore Lin wood

Foodsboro o Nenˆˆindsor V [oAleer J»k““s’£ˆk_M?,＞,t„n

I Broad ford i

,C»v\eˆnuf/Hˆ‘ˆ

•C’-Lb* u> / . -ˆTi s Deerfield or

XT .•>.ˆCavet4ˆ1i VˆoBotld; ► <?/° Poid3yllle|Th’urj)K”‘tˆ-ˆx

Kvvˆr # ˆLdLiartieJdˆj Inflown .Heave/terefiV I CatoctW \

ˆ1 / M iddleiVolnˆW*- •

‘%Vˆ JWolfsyiire ‘ ‘

- ’ Ml

rfkS. , ; .ˆtUleribnˆ-

\C Mountain-ˆ

/Crabs teˆ Shniret.te

Rlddlctoo

,t«r«

Canal

Rutledgeˆ H igb -Mlynum 0 pulford ˆVcb9{?£ intV.o Air[°Cal\ary- —

arKs . cScarˆy?aU.rTn|c>ˆ v«te r.O. Aberdeen

*nlx Laurel Brqokˆˆ Failston CreswcU06>e,,. _ \oy7

“d -

1 O fv . L_ p, _ 1. O wilnn / ,C’

hiplovu

turtnery

d Ransom’ iSmal\woodj

‘c‘1-1 Bcasont

m3o;l

ˆ■Vineland

o McDo

Armstron:

ˆAValkersvill.

L* < 7r’I

W.L* .ansi

‘Llbertytoy’iv

BJA L Td

Vd, CockeySMllel

, lW\ < =& jKKoodys/llie fjA Rj

,sl T ,r*& hf ?Wiap:fVˆ

) ˆ.ˆHˆ-ATregod Rohˆereylllei £ ?

7 /ˆ>AˆBeeler\5/L=" .9 £/ ‘

. ’ o’*/, 3 n { A a ‘ ummity ˆ ‘-V A’ Df

fe.W 3’ 1-XˆrkitteviUo;

k/t, y/n-oSrf.

Lctow n

Indian > Spring

Bridgeton’

, /‘i’OWSOl^j.^X^Al

, T^ybt’dbTr’dlO °FuTlcrion /Ty pu J”

PFmk»>4!

isTvO.

,c U M B E\R L AND

Cecllton o

^ yjTT^orjetoenV^l

mt OrQtk ° Galena . t A.ruie .txou >r

l&^Ar ge&r

■ — TTTT T>Iaesei

Freedom Lrr-.n«S ^ tCTS

y*$acr.°,n., v—:

A ‘ABlaokblrd

“tiodj ko\ forest

Green ?

-®AjeRt*rsom| Keller jf Lime Kiln C g.£° Olive ^j- , / Bu<Jkey6town k

^®R0^>2oub^»E»jryMlll»

Spring’

|mday Hook

‘Ule/ 0\ . J V^otrfeAll^n V 1 (Daisy / yjJ «

\ \ EiitVott&r

fl oienelg/d City Held ^ lo — -EUp ate 0 /llchester

O’WA

? Lay ton s ville-IWdlt(,D_tClvtessUU

‘ft°D0 (‘VˆY> ASimpsonylHh? a]

1. ˆitBrooteeWUeˆ oHlghlando

«>lS.oyp1fAF»A;

rj \bFy3ˆ

\ATirv01o.etlJl pˆoeˆvlUeLaur,

kteitep; f

Wupnd“Pb\cf4n’/

i.Garrett Bark \/ I

* I oˆen®lngtK‘ \

letnyjdaˆOVˆ t-iltfr’lSprEv

Wortoi

CbeatervUle

Rrenfordjˆ J „

lielpskˆj

Vcheewoldy _rJb. D u pon t

[Uliuetyn

[/e Tolcheflter Be*‘

Tliewtertow

f^vRolU”

yw

lolton

.oGuUfordTJisrood

pTsjjHyl?

SpvfeRlf

Egg Island Pt.

gudlerSTuU

/ Hartly _

Slaughter

•omoDl

Wyoming,

Cburch Hill V

Severn” ipyˆVE [/-PasadcnA .0. Bentleld

ˆ‘ilnzlettvillc

WJ)li > wˆUov

-L’aindbn

-Magnolia.

Wood8ida

{iendcraon

1 9Ai..i.w.v Ijffi

i ff\ niniendaleCˆo’IwV

iiifftisatpsw

. /. < Branchvtlle ttyaˆudwle * ?5ˆSk61n?tleld ˆLakrianU
> fflienniDftle \ Ki-or,l.,l,-/T5enbr0ulc VculUnAmi AlfX Jc > J
Larlbam MiAllikin o > i Hyatus/iUej } \ MitcbeBlvillem). \s > /f l
andover » »

I ones

Potorsb

Va — ^v’arvill

/ Centervillt

|-y Brlston Ruthsburg < > P^ueenstox n T ^y^Si^Bldom in gdale] FalsewTyVi’ye Mills/ tuts IcbaeWS^y ill ough) ^\y y o JttiUe

‘Arnold

Felton l Frederica,

msterfleld0- — f

Greensboro

Riverton

\ °Dil’ Idsonvul 1 South lˆlver . *iHardcety-0 „d) BWi ville do

Harwood , o f»Bll>»rdtun’beˆW /ˆLothian o Wti oDruryc Churcbton n [o. JcˆGreenook It. Culvert \oTrdl K_ Plndell) Laftj! lˆSrfjyoilBˆCrcˆ

‘TfSV ilsonrv 0 PuDlciri Nottingham i KilarnioavP.O

eorgi

Tuokaboe’

Reotortown

■inooln

Xongwoods J^jP Cord^a Deilt WuN^lobbs

;1 ll.diWLU-

Hickman

< ‘ l a’l > ” • r 1 1- . ,

ty^ChapcI / Matthews f Flemings J

fesAmltraoP to 1 Two Johns ^

Ellendale

illa-Z_S—

Greenwood

5”o¥ , Fowling Creek o Newton q s.nlthvill

Jr J lRobbinO＜rr～ˆ＜ˆ＜v～ˆˆ

oSmtin iy Aniton r y ˆ

°*u”XˆX Redden c＞-td Springˆ＞ˆ troadklll orVlarbesofi ˆebob

rJ \ ˆ-ˆRobini

iriretowiivˆ- \Falrraount— ～ ˆ

/s-asv\e « xyy

'V oo;l yB ranch

Vstocjtley… — —

-o\s, Warwick Trinity

jKgfcW North Pta /

ValliaˆfflViˆ

Mirhaven

W— Holland Pt.PoiNutf&-,f MMjshlp Is.ˆMlC

a Tllfhmˆ,

(t. Harmony or Paris P.Olu . /fChesupoake Beach

QUaw I TlLGHMAft la

M.rlbotS#V BlMk«l»ut Pt. Wilburn Willows,

Railroads

Steam and Electric Lines Electric Lines

(lebem

Bridgovllle

ibnrg Cannon A ssard MiddA I Oak C f, L(5rove O l1

Midway

jnwill* ,

Preston

Llandal

Manust

ML Vernon

Seaford

Cone \ Bladed

‘oodlaXnd-

L4

illlnnislXurff,

Hurlock)/

Mattaw <

fEllerslit

T int;S tone

Ip,. i»eice3ir\Ai‘ni« „ lHk2L •‘m Buffalo, B

I Selby sporty

ct care riP// * > ˆ0’

nyiebaugb Si Kendall

5o ElderT»/ˆj jHoyse. IT 03ang Run i Wa Mollenry

rantsviliep1

MUlpboro_

.pdmonke;

ˆ / Gallantˆ

y Vwbite Plaint

B,/V Bryant-

East NewVuLodcedale Market

vˆBethany Beachˆ

f A. ® dl

Ilarksvilfco Ocean

y0mat MSUtViU

Frankford BayartQg

liroadyC i

y.7i

t / ^-^New Germao7iVaafA>j

, C uj u l.w i r 1 aujltv

[nobmofint Twigctow

Dares Wharf

nee

1’eriek

Marbury

ˆjˆvvlnth rop Q |- .˚Rison

u*Hcatuuxen J

T > on caster I (

Thimpson J&VpChur/h Creek ‘

jUetbel’ Ihatptow l oColu:

Pagsbort

k/LinkwoojT] j ReidsJGrovej Salem /c* |

Buena O

pˆHlAt *7>lertens >°aW(5cean tA V;* ■*' tnd* flCresaptow nˆoj

Eotoriiaq>crg ■Lon aeon In g 0/r/t> _'ˆSsBierˆ/pro ‘ Raiv 11 n ■Aˆyr.ˆ.k\

|,i_iY T>bita /‘t bHughesviiicˆA)

Springnlll DentsvlM* *f 0Huntort»ljl-S I* 0 ICharlotte Ua*U>

Cbx/or Jmboiˆ <U-ew Market “

BdVVUon PvftˆT1-r7lˆv 2-

James PL James R

(rton

.Port Tobacco I P. 0J° I

Aireys

Bacns

0opM5Fl

Lewis’” Knob

*;Mg,

Madison Wool ford1

vVienna

S(i T E Hi

Bˆfktown /g jC

Taylors

~y^ BisbupvUle

i Bishop

, Ldthair oi Faulk neˆ

jlslaud Creek

JMgiBroot&s i

j }m eeban lea v 1 1 1

I la) oOraville\X BudtlsCttik Laurel Sandgat \(/ˆ＞0G0rove ‘Oakvill L-/. Aden Morgduia Ct-4 ChaplicoV 0 Loveville o Hurry Hˆliy V Jladdux Xplements Vjtˆ insville D«t TMUestownˆ.

rankvTjlc*-Bbndvlc«i

- - A/ˆyFraBkla

:kerey Bigˆ‘OLokf. Cutto

Blaclˆlak /ˆCookerlyˆ; ■•:stcri?Pt$®rS iv ledmont Jp*GcrMellˆ ˆfr7K»vWDawapn 40 (

＞SsJ’TfIlogedale ˆ Sir

Hebron

RSitree

liUantony

Golden Hill

Rocka walking

Nanjemoyˆ:

Friendsb]

£A, £•.. I

,«.Y „ /b«t.Pa,.l£. \

vo-p’ y Deer Pars, Hotel ”v

R / vs /∼C v’f Kitrmllller. ICvliin-.Mountalo ljke:Park *35 1 ‘ Dddson °)k∼

I A;«rtn.t

)crs. ˆ o /mi. or

j Robbins 7 , EakeedW ‘J — ˆ

McreAAD’lrc*

oCrapo j-; Toddvi

Salisbury/’ ,

[uantici

Martin

[aryland^Bt:

^"^BerlinJ [ronshire /

Mi M

■tt

Barren W, CO \ !edar Point

Powellville

Leonardtown o| }

f o P,,ˆ, Q Californi:

‘ejh oRedgattyO

frJˆˆsRritton ‘—s. i)

Bivalve oCapiWa

KING’ GEORGE

Ironsnire,

p. o.yA

,JeBtcrville

iJiicponco-or- NewtSk P. O.y

y y Nati tiedke

Eipdryy iTle / ˆoVnartmons ville

Ivins: Georgeˆ

‘Jarboesville |

Lorctto

lbi.A n

APi,Wjte®) 4/%

s ~ wBlOOORWORTII .1.^^,

lanville

Romney

Buka

‘Wall man

Vir—

fCRON

st.catiiER?

‘ /TGonnaniaJ Bayard J*

Chance

Twifc Mount

r > 7”.i Djuw

ˆnbnˆsrˆjj

ˆLfTlLEldAl

RuinlSey’

Dobbin ‘ *Henry Wilsonio*

ADAMil

1.0N0 o ˆHollands’] Holland iJj

MARYLAND

AND

DELAWARE

Toladn®^^(^ St.Georgonfl ^vSt. Georo

^Lur»- sMmm.

,‘ocombkc City-P.JG— — J. ’ - , jlSr \ qj > Ilur8l-.J or L Ajir ^Wt ‘SmlV
■ jHacktoyT?

BeavordamW

L I ˆ — 1 • ” .>5 Long PtwA /

ˆ I - I 1 n I lifrf../ — - A ‘

fy, RumlJJey o

Cornficld^^^^, K«dge$ Strait f—

llarborˆ1ˆ Poi*‘» Lookout t33 , _

ˆ //XIS o

ˆ SMITHSjVAˆ.l

|T Rhodes Poii/{%ˆ

ˆIslaWiM

yMarloo Sti Tulls CoKˆ

SCALE

Statute Miles, 15

Moorefleld

Crisfieldˆ

’L&osr

Horn town

‘yierton

Rand MoNally’s 11 i H Map of Maryland and Delaware Copyright by Rand McNally k Coˆ

States; 96 miles long by 9 to 35 broad; 2,120 square miles in area; 1,960 square miles of land. It is bounded on the east by the Atlantic, Dela¬ ware Bay and Delaware River, the latter separating it from New Jersey; north by Penn¬ sylvania, the boundary being a semi-circle struck 12 miles from New Castle Courthouse; west and south by Maryland, arbitrary lines at a right angle. The broadest part is about 25 miles of the extreme south, whence it narrows almost regularly to the north. Capital. Dover, near the centre. Population of State (1920) 223,003.

Topography.— The whole peninsula be¬ tween the Chesapeake Bay and the Delaware River estuary and bay, divided between Mary¬ land and Delaware, is part of the Atlantic Coastal plain ; flat, sandy and with frequent swamps, of which there is one of about 70 square miles in extreme southern Delaware. North of New Castle, where the Pennsylvania uplands sink down to it, there is a handsome rolling country ; and behind Wilmington, the divide between Brandywine and Christiana creeks becomes a ridge rising as high as 438 feet, being the most elevated ground in the State. South of this, a loamy ridge, nowhere over 85 feet high, runs through the State north¬ west to southeast, forming the watershed be¬ tween the bays, but following the line of Delaware Bay about a dozen miles inland. In the southwest, the part of the State west of the ridge is extensive enough to form a few fair¬ sized creeks, all feeding the Nanticoke in Mary¬ land. On the east, flowing into the Delaware, are six or eight good-sized creeks navigable for vessels and steamers of small draft a distance of 6 to 11 miles, to four or five of the larger towns ; while in the extreme north, the Brandy¬ wine and Christiana flow southeast from Penn¬ sylvania, and uniting about a half-mile from the Delaware form a broad and deep stream (yet further deepened by the United States government), and together afford a commodious harbor, with fine water facilities, for the city of Wilmington, whose limits also extend quite to the Delaware River itself. The only other good harbors on this marshy coast are at New Castle and Lewes, the latter protected by the Dela¬ ware Breakwater at Cape Henlopen, constructed of heavy granite masonry, 2,800 feet in length, exclusive of the ((ice breaker,® which

is 1,700 feet long. This whole structure cost $2,125,000, and was more than 40 years in building. Con¬ rad, in his (History of Delaware,* says it ((is one of the most important and wonderful works of internal improvement in the United States.® On the southeast coast are two large but shallow lagoons called Rehoboth Bay and Indian River Bay, communicating at their outer edges, and separated from the sea by a sandspit pierced by the Indian River Inlet, through which ves¬ sels under six feet draft can pass to navigate the lagoons within. The Delaware Bav itself has 35 to 75 feet of water in mid-channel.

In November 1913, the government began building a canal, called the Inland Waterway, to connect Rehoboth Bay and Delaware Bay. It will have a depth of 6 feet, 40 feet mini¬ mum bottom width, be 12 miles long and cost

$365,000.

A bill is also pending before Congress au¬ thorizing the government to buy the Delaware and Chesapeake Canal and, after enlarging it, make it a part of the nation's great system of VOL. 8 — 39

inland waterways. The bill has been favorably reported and will no doubt become a law.

Natural Products. — The State has four geological divisions. (1) The Archean, com¬ prising most of the State northwest of the meridian of Wilmington; (2) The Cretaceous, passing across the State as a northeasterly and southwesterly belt about 18 miles wide and 15 to 20 long, consisting of plastic clays and varie¬ ties of marl, extending south to the Appoquini-mink Creek; (3) The Tertiary, embracing all the State south of the Cretaceous ; (4) The Quaternary, which, as a later formation, covers all the others, the whole State over, with a broad sheet of gravelly deposit, of glacial origin, and known as the <(Delaware gravels,® averag¬ ing 25 feet in thickness. When these gravels were laid down, the entire Delaware and Mary¬ land Peninsula was submerged, forming an estu¬ ary like the present Chesapeake Bay into which the swollen Delaware emptied its detritus, cover¬ ing the entire peninsula. The most valuable minerals, found in the north, near Wilmington, are granite quarries ; kaolin or porcelain clay beds, among the first worked in the United States, and other clays for brick and terra¬ cotta. There are found also fine white glass sand,

feldspar, shell marl, rich in potash in the green sand districts, and bog-iron ore in many of the swamps in New Castle and Sussex counties. The natural woods of the State are valuable but most of them have been cut away (including the white-oak for shipbuilding, once plentiful) except forests of cypress and other evergreens in the swamps. There is some shoot¬ ing of wild ducks and wild geese, more of reed and rail birds, together with some other small game, and now and then a catch of the coveted diamond-backed terrapin.

Climate and Rainfall.-'- Delaware has natu¬ rally a range of temperature between the severe cold of New England and the heat of the South, still further tempered by the sea breezes which alternate with the southwest winds in summer The northwest winds of winter and spring are not more severe than of old, but the delicate crops, like peaches, have furnished a more costly thermometer, and the precariousness of the spring warmth is felt. On an average the spring begins about 1 April, and the autumn frosts toward the middle of October; the aver¬ age temperatures run from about 85° in August to 25° in January. The rainfall is from 40 to 46 inches annually, the heaviest on the coast; and droughts are rarely ruinous. In the swampy districts and southern lowlands, there is still some malaria, though much less than formerly; but as a whole, the State has a very good sanitary record.

Soils and Agriculture. — The soil of the State steadily lightens southward from a rich loam underlaid with yellow clay, in the north, and for some miles inland along the Delaware River, to a lighter loam with the clay, in Kent County, becoming in Sussex a very sandy loam without clay below. The north is the region of cereals and hay; the centre and south, of fruits, berries, grapes and vegetables; and the south especially of peaches and strawberries. The State is one immense market garden and orchard for the North, especially the great cities of New York, Philadelphia and Baltimore. New Jersey, Maryland and Delaware raise three-fourths of all the peaches, berries and

other small fruits sold in those markets. Dela¬ ware in the popular mind is identified with the peach crop, but there is a growing tendency to replace this now uncertain crop with cereals, market gardening and especially apples. The other orchard fruits together exceed the peaches, the apple crop being very large. Experts pro¬ nounce the flavor of the Delaware apple very superior. The year's crop of 1918, though shorter than in former years, was 350,000 barrels.

Of the market gardening, the tomato is by far the principal crop, and it is exceeded only by that of Maryland. A surprising increase, however, in which it is alone among the Eastern States, has been in the wheat crop for the past two decades; its acreage in 1900 was 118,740, or nearly one-sixth of all the improved land, against 87,530 in 1880 and 125,000 acres in 1915. The first place in acreage, however, belongs to corn, with over 210,000 acres, and with a yield of 6,615,000 bushels. Third is hay, 77,000 acres, yielding 110,000 tons. There is also 11,000 acres of potatoes, yielding 1,095,000 bushels, or 100 bushels to the acre. The State raises 276,- 000 carriers of cantaloupes, 373 carloads of watermelons and 20,000,000 quarts of straw¬ berries annually. The dairy interest has in¬ creased greatly in the decades ; in 1910 there were 11 creameries against five in 1890 and 16 in 1916, counting shipping stations, the capital increasing from $19,085 to $300,000, and the value of the yearly products from $124,780 to $500,000. The largest creamery in the whole section is the Middletown Farms, which has a capital of $150,000, a yearly product of $450,000, drawing its milk from a country about 20 miles wide by 40 long. The annual value of the live¬ stock of the State in round numbers is as fol¬ lows : Horses, mules, milch cows and other cattle, $6,277,000; ' sheep, $55,000; swine,

$400,000.

Outside of its one great manufacturing city, the agricultural interest is supreme ; no other State compares with Delaware in the propor¬ tion of land under cultivation. Less than half the farmers own their own farms, and nearly the same proportion work on shares, though trucking in the south is increasing the number of owners of small holdings. The thin soil of the southern part of the State reduces the

aver¬ age value of farms from $70 in the north to $45 there, per acre. Fertilizers are used in the whole State, but from three to four times as much is needed in Kent and Sussex.

Manufactures. — While Delaware as a State is predominantly agricultural, the enormous rel¬ ative magnitude of its one great city, Wilming¬ ton, and the industries concentrated around it, makes the northern end a very important manu¬ facturing section. The great natural advantages of the spot were early utilized ; the deep harbor for building the largest ships, the 126Toot falls of the Brandywine four miles from its mouth, and the proximity to the great coal and iron fields of Pennsylvania, Maryland and Virginia. All branches of iron and steel manufacturing are carried on to an immense extent. The first iron sailing vessel in the country was built in 1854 in Wilmington, which had previously been noted for building wooden ships ; and that city has built iron and steel steamers of greater number and aggregate tonnage than any other single port in the United States. Pumping and mining apparatus and paper-making ma¬

chinery and car-wheels are famous specialties; in 1817 the first endless-sheet paper machine was set up in Wilmington, revolutionizing the busi¬ ness. Its manufactures of steam and street cars, machine tools, engines, boilers, etc., are known all over the globe. Next to iron and steel comes the dressing and manufacture of leather, in which Delaware takes a high rank. Wilmington has several of the largest morocco plants in the world. The flouring-mill and textile industries are large. Paper is extensively made on the Brandywine, where, a few miles from Wilmington, the foremost and most in¬ teresting manufactory in the State is located — the great powder works of the Du Ponts, the oldest and largest of the kind in the country. The company was founded by the French exile Eleuthere I. Du Pont de Nemours in 1802 and till 1903 remained a family preserve; in that year it was turned into the E. I. Du Pont de Nemours Company with a capital of $20,000,000. It now has in several States many kindred plants. Besides making all kinds of explosives upon a colossal scale, the company is also mak¬ ing many other articles, such as chemicals, sub¬ stitutes for ivory, shell, leather, *etc.* The total Du Pont industries represent a capitalization of $258,000,000. New Castle on the Delaware, six miles south of Wilmington, has the finest harbor in the State, and since the location there of many large manufacturing concerns, among others a branch of the Bethlehem Steel Works and the largest shipbuilding plant in this country, has become the second largest and most prosperous city in Delaware. The vulcan¬ ized fibre

industry had its origin in the State and about seven-eighths of the world's output is made there. It is said that the waters of Delaware, like those of Ireland for linen, are peculiarly adapted to the manufacture of that product. The canning industry throughout the whole State is very large and embraces corn, peas, tomatoes, string and lima beans, sweet potatoes, strawberries, blackberries, pears, apples, potato-chips, fish-roe, chicken, ham, oysters,' soups and plum pudding. The tomato canning alone annually averages over 30.000 000 ((No. 3® cans, of three pounds each. The 1917 crop was 33,139,320 <(No. 3® cans.

Fisheries. — The oyster, shad, herring, stur¬ geon and menhadden fisheries of the State are of considerable magnitude and value.

Commerce and Transportation. — Wilming¬ ton, Lewes and New Castle are ports of entry and the first is a customs district. It has some direct foreign commerce, a steamer line to New York and coasting lines to Philadelphia and down the bay, besides communication with Bal¬ timore by the Delaware and Chesapeake Canal (see Canals), 13ˆ4 miles long, 66 feet wide and 10 feet deep, completed in 1829. The great Delaware Breakwater opposite -Lewes was be¬ gun in 1828 and finished in 1869 and forms an artificial harbor some 300 acres in extent, with 24 feet of water. (See Delaware Bay). Railroad facilities are excellent; there are about 400 miles of main track in the State. The one great line, which serves nearly all the State, is the Philadelphia, Baltimore and Washington, whose main line, double-tracked, runs through it lengthwise from Wilmington to Delmar at the southern boundary, where it connects with another to Cape Charles and Norfolk, Va. ; its Delaware, Maryland and Virginia branch in the southeast serves that section. Eight other

branches run from it. In the north, the Balti¬ more and Ohio and the Philadelphia, Baltimore and Washington division of the Pennsylvania system parallel each other through Wilming¬ ton, and the line to Philadelphia and Baltimore, the Maryland, Delaware and Virginia Railroad, runs across the State centre to Chesapeake Bay.

Banks, *etc.* — The State, national and savings banks of Delaware had (1918) a total paid cap¬ ital of $6,521,075; a surplus of $9,695,040; de¬ posits, $75,154,040 — total resources of all bank¬ ing institutions, $91,370,155. There are a number of local fire and mutual life insurance societies.

Churches. — The strongest religious denomi¬ nation is the Methodist Episcopal ; next in order of size are the Presbyterian, Protestant Episcopal, Baptist, Roman Catholic, Quaker and Lutheran. There are several smaller bodies. Wilmington is the seat of the Roman Catholic diocese of the same name, embracing Delaware and part of the Southern Peninsula, and of the Protestant Episcopal diocese of Delaware.

Charities and Penal Institutions. — There is a State Almshouse and Insane Hospital. There being no State institution for the feeble¬ minded, deaf-mutes or the blind, the statutes permit five of the last, two from each county, and 14 imbecile children from the State to be main¬ tained at institutions of other States; and they are so kept at Philadelphia and Washington. Wilmington has The Ferris Industrial School for Boys, founded by Dr. Caleb Harlan ; two industrial colored institutions and one for colored boys; also the Gause Home for Friend¬ less and Destitute Children. There is a public workhouse in New Castle County. There is a State prison at Greenbank, capable of hold¬ ing 500 inmates. The whipping post is a pun¬ ishment for many offenses such as burglary, arson, larceny, wife-beating, *etc.*

Good Roads, *etc.* — A new spirit of progress pervades the entire State, shown in better, mod¬ ern roads, improved farming, finer homes, *etc.* General T. Coleman Du Pont spent $500,000 building in Sussex County a model public road from Selbyville on the extreme southern

edge to Georgetown, and with characteristic liberality signed (Aug. 1918) an agreement to connect this road with a fine boulevard system north and south throughout the entire State. A joint county and municipal building, costing $1,500,000, was completed in 1916 in the city of Wilmington. It is a commodious and handsome structure. The capitol building at Dover has been enlarged and beautified and a large mural painting by Stanley M. Arthurs commemorating (<The De¬ parture from Dover Green, July 1776, of the First Delaware Regiment,® placed upon the walls of the senate chamber.

Various State Boards, *etc.* — There are the following State boards : Health ; Medical Ex¬ aminers ; Dental Examiners ; Education ; Par¬ dons ; Trustees of Delaware College; Trustees of Delaware College for Colored Students; Agriculture; Trustees of State Hospitals; also a State Library Commission ; State Revenue and Taxation Commission; and seven hospitals with capacity for about 700 and a tuberculosis sanatorium.

Education. — The public schools are sup¬ ported by local taxes; by a State distribution of the income of a fund now about $944,407 and of the proceeds of certain taxes, both yielding about $180,875 a year, devoted entirely to Spay¬

ing teachers' salaries and for furnishing free textbooks® ; and by an annual appropriation beyond this, fixed by the constitution at a minimum of $100,000. The school year is 9 ■or 10 months in many schools throughout the State, though shorter in others. Attendance for all children between the ages of 7 and 14 for five months in the year is made compulsory by law, though any district may by vote reduce this period to three months. Thanks to the enthusiastic labors of Chas. A. Wagner, Ph.D., Commissioner of Education, an increased inter¬ est is being aroused throughout the State in the subject of education. One hundred and fifty ((Parents' Teachers Associations,® with a membership of 3,600 have been formed, whose meetings have been attended by 20,000 persons — one-fifth of the State's population attending school at night. Wilmington has a fine school system which is excepted from the provisions of the general law ; has its own superintendent of schools, with many handsome buildings whose architecture and equipment compare fa¬ vorably with those in other cities. There are separate schools for colored children, their schools sharing equally with the white in the State school fund. They have a State Agri¬ cultural College near Dover and there is also at Clayton a Roman Catholic school for colored orphans. The Wilmington

Conference Academy of the Methodist Episcopal Church is at Dover. Wilmington has two business col¬ leges, while throughout the State* are many excellent academies and high schools. Its one college proper, Delaware College, at Newark, was founded in 1833. The State . supports an experiment station with courses in agronomy, animal husbandry and horti¬ culture. The facilities ‘ of its argicultural department are placed at the disposal of the farmers of the State during the first week in January of each year, styled ((Farmers’ Week.® The college has greatly prospered in recent years. From 1870 to 1913 it was entirely sup¬ ported by Federal and State appropriations. In 1914 the Alumni Association raised $67,000 and in 1915 $1,000,000 was donated for the purchase of land and the erection of new buildings. In 1914 the Woman’s College of Delaware was established by the State and is sharing in the large growth and prosperity of the older insti¬ tution. There is a State board of education and in each county a school commission and a superintendent of public instruction. Teachers’ institutes are yearly held in each county.

Government. — The present constitution’ is of 1897 ; following its own practice — as is also the custom of a number of Southern States — it was framed by a convention elected by the people, but was not submitted to the people. The registration and educational provisions in part exclude unfit electors. The legislature has a senate elected for four years and a house for two. Seven members from New Castle County and five each from Kent and Sussex compose the senate, and 15 members from New Castle and 10 each from Kent and Sussex the house. Sessions are biennial. Provisions for revenue and impeachment are the same as in the national Constitution. The members are paid $5 a day for 60 days, after which they sit at their own expense; special sessions are thus limited to 30 days. All State and county officers are chosen for four years, save the State treas-612

urer and auditor, and county sheriff and coroner, chosen for two. The governor's veto includes any item of a bill for raising revenue; his pardoning power is on recommendation of a board of pardons. <(The judicial power is vested in a supreme court, a superior court, a court of chancery, an orphans' court, a court of oyer and terminer, a court of general sessions, a register's court and justices of the peace® ; there are six judges — a chancellor and five (<law judges,® of whom one is chief justice — all ap¬ pointed by the governor for 12 years with the concurrence of the senate. The State has one representative in Congress and three members in the Electoral College, chosen by popular election.

From 1889 to 1895 the Hon. Anthony Hig¬ gins, a Republican, represented Delaware in the United States Senate and throughout his dis¬ tinguished career therein maintained the former prestige of the State. In 1895 he was defeated for re-election and, owing to political entangle¬ ments, no senatorial choice was made.

Thereafter, for a period of 10 years, John E. Addicks vainly endeavored to have himself chosen for this office, a division of the Republi¬ can party being the result. The ((Regulars® were opposed to Addicks and the Union Re¬ publicans were in favor of him. Four times senatorial vacancies occurred that left the State but one senator for five years and with none for two.

Finance. — A State capitation tax of 25 cents is imposed; but the receipts are chiefly from fees, licenses, inheritance taxes, special taxes on banks, railroads, *etc.* The assessed valuation of ♦ the State is (1918) $185,283,517. This valuation includes only real estate and livestock — no other personal property.

Divisions and Population. — The State has three counties: New Castle, Kent, and Sussex. The first, including Wilmington, has about one-half of the entire population of the State/ The counties are divided into (<hundreds® instead of townships. There are incorporated cities and towns, of which Wilmington is the only large one, with a population (1920) of 110,168; (1900) 76,508, showing 43.7 per cent increase. Of the others the chief are Dover, the capital, slightly growing; New Castle, Milford, Lewes, and Smyrna. In Indian River hundred, Sussex County, there is a settlement of <(white Indians® or <(Moors,®

descended, tradition says, from a band of Moors. A like body of Moors is found in Kent County, near Moorton, who came there direct from Spain in 1710, Scharf says in his History. The two settlements, which are decreasing, are probably identical. They do not associate with the colored race, intermarry and maintain separate schools and churches with the help of the State.

History. — Delaware represents the sole at¬ tempt of Sweden to seize its share of America. It does not take its name from the Indians who inhabited it, but from the river and bay, named by the English after Lord de la Warr (Sir Thomas West), who, tradition says, anchored in the bay in 1610; the Dutch called the river (<Sonth River® as distinguished from the ((North River,® the Hudson. The first settlement actu¬ ally made in Delaware was by the Dutch trader Peter Heyes in April 1631, on the creek near the present Lewes ; he called it Hoornkill, or Hoorn Creek (<(Kill® Dutch for creek), in honor of Hoorn, the home of De Vries who

visited the Delaware in 1632. The story that seeks to explain the corruption of the name Hoornkill to Whorekill has no historical truth whatever. Giles Hossett, whom Heyes left in command of this ((Zwaanendael® (((Valley of Swans®) colony — so called from the number of swans there — fell out with the Indians, who slaughtered the whole settlement of about 30 persons and burned their little fort, Oplandt. This brief little settlement defeated Lord Balti¬ more's claim to the western half of this penin¬ sula. Out of its ashes arose the present State of Delaware. In 1637 Axel Oxenstiern, the great Swedish Minister of Gustavus Adolphus, revived his dead master's pious plan of found¬ ing a Swedish West India Company and sent Peter Minuit, the ex-director-general of New Netherlands, with a mixed Swedish and Dutch expedition to seize and settle a point on the coast. Minuit landed April 1638, choosing the peninsula where Wilmington now stands, about two miles back from the river; he called the creek <(the Elbe,® and built a fort which he named Christina, after the girl-queen of Swe¬ den, Gustavus' daughter. The creek later was given that name, now changed to Christiana. The entire domain he called New Sweden. The Dutch protested, but as their company had to pay its own war bills they did no more, and in 1640 the Swedish government sent another body of colonists. More Dutch came also and settled some miles below ; the stockholders of the enterprise were partly in Holland and partly in Sweden, and each party sent its own country¬ men. The Swedish settlements were vigorous for a while and spread rapidly, colonizing New Gottenburg at Tinicum Island and Upland

near by, driving a New Haven English colony off Salem Creek in New Jersey and keeping the place themselves, with a fort called Elsenburg. In 1646 the Dutch built a block-house on the site of Philadelphia, opposite Fort Nassau built by them in 1623; the Swedish governor, Printz, marched there and pulled it down. But when Stuyvesant came to New Netherlands in 1647 he was under orders to fight, and in 1651 built Fort Casimir on the site of New Castle, blocking the Delaware to the Swedes. Rising, Printz's suc¬ cessor, attacked and captured it in 1654 and changed the name to Trinity. Stuyvesant came down in 1655 with a large force, captured not only Trinity but Christina, deported the officers to New Amsterdam and forced the rest to swear allegiance to New Netherlands or leave the country. Trinity was renamed New Amstel. The Swedish rule was now ended, but the Swedish blood remained, as many family names still attest, and made a worthy part of that mixed strain of blood, English with a very little Dutch, which composes the population of the State. Between 1631 and 1656 10 expedi¬ tions were sent out by the Swedish government and, according to a census taken by Rising in 1654, there were 368 persons, Swedes and Dutch, on the Delaware.

When the Duke of York took New Amster¬ dam from the Dutch in 1664 the Delaware set¬ tlements went with it, and New Amstel was re¬ named New Castle. When the Dutch retook New York in 1673 there was a renewed Dutch rule on the Delaware, which, however, lasted but one year, Delaware and New York being restored to England by the Treaty of Westmin¬ ster, 1674. On 24 Aug. 1682, by a supplemental

deed from the Duke of York, William Penn ac¬ quired the whole country comprising the present State of Delaware. There were at that time about 3,500 people ((in the province of Pennsyl¬ vania, and territories and on the eastern bank of the Delaware from Trenton to Salem®; 7,000 in 1684 in the province alone. The people from the earliest settlements were successively governed by Swedish, Dutch and English rulers, with few or no legislative powers until Penn's time, when a pretense of granting such was made by him. It is, indeed, a strange anomaly that a good man who from his Newgate cell penned works on liberty of conscience wor¬ thy to rank with Milton's ˆreopagitica,* or other like classics of human liberty, could have originated so autocratic a system of govern¬ ment as his Upland Code of 1682, which was, in fact, an utter denial of all self-government ! But, despite this, the people gradually won the right of self-government, till, upon their separa¬ tion in 1776 from Pennsylvania, ((the three coun¬ ties upon the Delaware,® as they had been styled, assumed the full power of autonomy under the name of the ((State of Delaware.® The century-long title dispute with the Baltimores was set¬ tled in 1768. The lower river settlements were first governed as part of Pennsylvania, sending six representatives each to its legislature ; but there was no community of interests or feel¬ ings between the two sections ; quarrels were frequent and in 1691 the three counties seceded and for two years there was a dual government. In 1703 they were granted a separate legislature, which met at New Castle and the two sections continued more peaceably together, having one council and governor, till the Revolution. In the Continental Congress the colony was sepa¬ rately represented as the <(Three Lower Coun¬ ties on the Delaware.® These counties were originally known as New Castle, Jones and Whorekill or Deal, but Penn changed them — Deal to Sussex and Jones to Kent. On 21 Sep¬ tember a convention at New Castle adopted a State constitution, in which the three counties were called ((The Delaware State.® John Mc¬ Kinley was elected its first president or gover¬ nor in 1777. It was the first (7 December) to ratify the national Constitution. In 1792 it adopted a new constitution; in 1831 a third and in 1897 the present one.

Delaware was a slaveholding State during the Civil War, and a large number of its people, especially in Kent and Sussex counties, warmly sympathized with the South, but even there a deep reverence for the Constitution and a devo¬ tion to the Union was felt. But the large pre¬ ponderance of population and wealth in New Castle, together with the courageous loyalty of its war governor, William Cannon, kept the State from secession. Still, had the buffer State of Maryland seceded, it is possible Dela¬ ware would also have done so. On 2 Jan. 1861, the house unanimously, and the senate by a majority, voted ˆunqualified disapproval® of a solicitation to secede, made in person by Henry Dickinson, a commissioner from Mississippi. The call for Union troops was answered so quickly and fully that Lincoln said in his mes¬ sage of 3 Dec. 1861, ((Noble little Delaware led off right from the first.® The records of the War Department show that out of its entire male population of 59,689 — of which nearly one-sixth were blacks — it furnished 13,651

troops — a proportion probably not equaled by any other State. If to this be added the hun¬ dreds who entered the Southern army, it would amount to about one-fourth of all the males ! In this it kept good its unequaled record of 1776, when out of a population of 37,219 it gave 4,728 to the cause of the Revolution, besides several hundred militia. During the Recon¬ struction period, however, the legislative ma¬ jority sympathized with the South, and by large majorities in both branches voted against the Fourteenth and Fifteenth amendments. Delaware and Kentucky never ratified the Thirteenth Amendment. The leading element in State politics since 1850 has been the ((Peace Democrats,® devoted to the Union but opposed to coercion of the States, as exemplified in the Bayard family (see Bayard, James A. 2d, and Thomas F.). The Democratic majority was always small, except in 1878 when the Republi¬ can party was temporarily ruined by joining the Greenback-Labor party.

The American Flag was first unfurled on land in the fight at Cooch's Bridge, Del. 3 Sept. 1777; a handsome monument marks the spot. George Read, ((The Signer,® as he is styled in Delaware annals, shares with one other the unique distinction of having signed all the three great charters of the Nation's freedom, viz., the first petition of the Congress of 1774 to the king, the Declaration of Inde¬ pendence and the Constitution of the United States. The nickname, <(The Blue Hen's Chickens,® for the people of Delaware, was first given to the Revolutionary soldiers of Captain Caldwell, famous for their dash and grit; either because of the prize fighting cocks (chickens of a certain

((blue hen®) he carried with him, or from their blue uniforms. Tradi¬ tion says their flag also bore the inscription.

The early colonizers or governors of New Castle, Kent and Sussex counties, prior to Delaware statehood, were as follows :

DUTCH RULE

Cornelius Jacobsen Mey . 1624-1625

William Verhulst . 1625-1626

Peter Minuit . 1625-1632

Wouter Van Twiller . 1633-1638

SWEDISH RULE

Peter Minuit .

Peter Hollandaer .

John Printz … .

DUTCH RULE

Peter Stuyvesant .

SWEDISH RULE

John Pappegoya .

John Claude Rysing .

DUTCH RULE

Peter Stuyvesant .

Dirk Smidt .

John Paul Jacquet .

Andreas Hudde .

Gregorius Van Dyck .

William Beekman .

Alexander Hmoyossa .

1638-1640

1640-1643

1643-1653

1647-1653

1653-1654

1654-1655

1655-1664

Vice-Directors

ENGLISH RULE

Richard Nichols . 1664-1664

Robert Needham . 1664-1667

Francis Lovelace . 1667-1668

John Carr . 1668-1673

DUTCH RULE

Anthony Colve . 1673-1673

Peter Alrichs . 1673-1674

ENGLISH RULE

Edmond Andros . 1674-1674

Edmund Cantwell . 1674-1676

John Collier. . 1676-1677

Christopher Billop . 1677-1681

Anthony Brockholst . 1681-1681

Under William Penn, proprietor, 1681-1718, twenty-six representatives of Penn ruled up to 1704 when the three counties, New Castle, Kent and Sussex seceded and set up their own local government, merely acknowledging the au¬ thority of the Provincial governor of Pennsyl¬ vania. Thereafter, 13 such Provincial gover¬ nors represented William Penn till his death in 1718, and his three sons as Proprietors up to 1776, when the three counties separated from Pennsylvania and became the autonomous State of Delaware.

PRESIDENTS UNDER THE CONSTITUTION OF 1776

John McKinley, 21 Feb. 1777, captured by the British 11 Sept. 1777.

Thomas McKean, acting. 12 Sept. 1777 to 20 Oct. 1777

George Read, acting . 20 Oct. 1777 to 20 March 1778

Caesar Rodney, Pres. … 20 March 1778 to 13 Nov. 1781

John Dickinson . 13 Nov. 1781 to 4 Nov. 1782

John Cook, acting . 4 Nov. 1782 to 8 Feb. 1783

Nicholas Van Dyke . 8 Feb. 1783 to 27 Oct. 1786

Thomas Collins . 27 Oct. 1786 to 29 March 1789

Jehu Davis, acting . 29 March 1789 to 30 May 1789

Joshua Clayton . 30 May 1789 to 13 Jan. 1793

GOVERNORS UNDER THE CONSTITUTION OF 1792

Joshua Clayton. Federalist… . Jan. 1793 to Jan. 1796 Gunning Bedford, Federalist … Jan. 1796 to28Sept. 1797 Daniel Rogers, acting, F ederalist, 28 Sept. 1797 to Jan. 1799

Richard Bassett, Federalist… Jan. 1799 to March, 1801

James Sykes, act., Federalist… March 1801 to Jan. 1802

David Hall, Federalist . Jan. 1802 to Jan. 1805

Nathaniel Mitchell, Federalist. Jan. 1805 to Jan. 1808

George Truitt, Federalist . Jan. 1808 to Jan. 1811

Joseph Haslet, Federalist . Jan. 1811 to Jan. 1814

Daniel Rodney, Federalist… . Jan. 1814 to Jan. 1817

John Clark, Federalist . Jan. 1817 to Jan. 1820

Jacob Stout, acting, Federalist. Jan. 1820 to Jan. 1821

John Collins, Dem.-Rep . Jan. 1821 to April 1822

Caleb Rodney, act., Dem.-Rep. . April 1822 to Jan. 1823

Joseph Haslet, Dem.-Rep . Jan. 1823 to 20 June 1823

Charles Thomas, acting Dem.-Rep, 20 June 1823 to Jan. 1824 Samuel Paynter, Federalist.… Jan. 1824 to Jan. 1827

Charles Polk, Federalist . Jan. 1827 to Jan. 1830

David Hazzard, Federalist… . Jan. 1830 to Jan. 1833

GOVERNORS UNDER THE CONSTITUTION OF 1832

Caleb P. Bennett, Amer. Rep.. Jan. 1833 to 9 April 1836 Charles Polk, acting, Amer. Rep. April 9, 1836 to Jan. 1837 Cornelius P. Comegys, Whig. . Jan. 1837 to Jan. 1841

William B. Cooper, Whig . Jan. 1841 to Jan. 1845

Thomas Stockton, Whig . Jan. 1845 to 2 March 1846

Joseph Maull, acting, Whig… 2 March 1846 to 1 May 1846

William Temple, acting, Whig. … 1 May 1846 to Jan. 1847

William Tharp, Dem . Jan. 1847 to Jan. 1851

William H. Ross, Dem . Jan. 1851 to Jan. 1855

Peter F. Causey, Whig . Jan. 1855 to Jan. 1859

William Burton, Dem . Jan. 1859 to Jan. 1863

William Cannon, Rep . Jan. 1863 to 1 March 1865

Gove Saulsbury, acting, Dem.. 1 March 1865 to Jan. 1867

Gove Saulsbury, Dem . Jan. 1867 to Jan. 1871

James Ponder, Dem . Jan. 1871 to Jan. 1875

John P. Cochran, Dem . Jan. 1875 to Jan. 1879

John W. Hall, Dem . Jan. 1879 to Jan. 1883

Charles C. Stockley, Dem.… Jan. 1883 to Jan. 1887

Benjamin T. Biggs, Dem . Jan. 1887 to Jan. 1891

Robert J. Reynolds, Dem . Jan. 1891 to Jan. 1895

Joshua H. Marvel, Rep . Jan. 1865 to 8 April 1895

William T. Watson, acting, Dem, 8 April 1895 to Jan. 1897 Ebe W. Tunnell, Dem . Jan. 1897 to Jan. 1901

GOVERNORS UNDER THE CONSTITUTION OF 1897

John Hunn, Rep . Jan. 1901 to Jan. 1905

Preston Lea, Rep . Jan. 1905 to Jan. 1909

Simeon S. Pennewill, Rep . Jan. 1909 to Jan. 1913

Charles R. Miller, Rep . Jan. 1913 to Jan. 1917

John G. Townsend, Jr., Rep . Jan. 1917 to Jan. 1921

William D. Denney, Rep . Jan. 1921 to Jan. 1925

William E. Wright.

DELAWARE, Ohio, city and county-seat of Delaware County; on the Whetstone (Olen-tangy) River, and on branches of the Cleveland, Cincinnati, Chicago and Saint Louis, the Pennsylvania and several other railroads, 24 miles north of Columbus. It is the trade centre of Delaware and surrounding counties, and has manufactures of iron, flour, woolens, lumber, furniture, agricultural implements, chairs, car¬

riages, cigars, gasoline engines, *etc.* It is the seat of Ohio Wesleyan University and the Ohio Wesleyan Female College. The former is a coeducational college which was organized in 1842. Part of its work is at Columbus, also. It contains a Carnegie library and was the birthplace of Rutherford B. Hayes. There are sulphur, magnesia and other mineral springs nearby, and the city has large railroad repair shops, hotels, daily and weekly newspapers, and two national banks. Delaware, incorporated in 1827, is governed by a mayor elected every two years, and a municipal council. Pop. 9,076.

DELAWARE BAY, a large bay or arm of the sea, between the States of Delaware and New Jersey. The Delaware River and several small streams flow into this bay. It is 65 miles long, and in the centre about 30 miles across, and about 15 miles at its mouth, from Cape Henlopen to Cape May. At the entrance to this bay, near Cape Henlopen, is situated the Delaware Breakwater, the object of which is to afford vessels a shelter within the cape. The breakwater proper is 1,200 yards in length, and runs in a straight line from east-southeast to west-northwest, leaving an entrance 650 yards wide between its east end and the north point of the cape. It serves also as an ice-break against the floating ice which sometimes comes down the bay. At the distance of 350 yards from the upper or western end of the breakwater a

similar dike, of 500 yards in length, is projected so as to form an angle of 146 degrees 15 minutes with the breakwater. Government lighthouses are stationed at the entrance, to indicate shoal places in the channel and breakers along the shore. The dividing line between Delaware and and New Jersey runs northwest and south¬ west through the centre of Delaware Bay and up the Delaware River. The bay is a broad open watercourse to Wilmington, the most populous city of Delaware, and beyond Wilmington, to the north, on the Delaware River, to Philadelphia and Camden, two of the largest shipping ports on the Atlantic Coast.

DELAWARE COLLEGE, an institution founded at Newark, Del., 1833, closed in 1859. In 1870 it was reopened as a <(Land Grant Col¬ lege, w the State of Delaware appropriating funds received under the Land Grant Act of 1862. Further aid received from the State funds obtained under the congressional act called the ((Hatch Bill® enabled the college to open an agricultural experiment station in 1887. A still further grant was received under the act of 1890. The college began to receive an annual appropriation of $40,000 in 1897, under the terms of the Nelson bill which was enacted in that year. Until 1913 the charter was renewable every 20 years but in that year by act of the legislature it was made permanent. In 1913-18 the college received a State appropriation of $150,000, paid in five instalments for the erection of buildings and plant to house a woman's col¬ lege, which in the main is a distinct institution from Delaware College, but for certain pur¬ poses of State administration they are co¬ ordinated. The library contains about 20,500 volumes; there are 232 students and 31 instruc¬ tors. The college is non-sectarian ; its property is valued at $400,000 and its total income, including tuition or incidental charges, is $97,-

480. The cost of tuition is $60 per annum; while the student's living expenses are from $175 to $275 a year, with additional expenses (fees, books, etc.) of $75 to $100.

DELAWARE & HUDSON RAILROAD.

The Delaware and Hudson Railroad system is the outcome of a series of amalgamations of many small line's leased and constructed from time to time by the Delaware and Hudson Canal Company, which was chartered under the laws of the State of New York in 1823 as a coal min¬ ing and transportation corporation. The State also loaned its credit of $500,000 to aid in the construction of a canal from Honesdale, Pa., across the Delaware River to Rondout, N. Y. (now a part of the city of Kingston) on the Hudson River, hence the name, ((Delaware and Hudson. w The canal was completed in 1828 with capacity for boats carrying 25 tons. It was enlarged in 1844 for 40-ton boats and again in 1862 for boats of 125 to 150 tons capacity. It was finally abandoned in 1899, with the con¬ sent of the State. The rail lines of the Dela¬ ware and Hudson Company extend from Wilkesbarre, Pa., to Rouse's Point on the Canadian boundary, with branches to Bingham¬ ton and Troy, N. Y., Rutland, Vt., Lake George and Lake Placid, and some lesser points. In the number and variety of its summer resorts this railroad occupies a unique position, touch¬ ing Cooperstown, Sharon Springs, Round Lake, Saratoga Springs, the Lake George and Lake Champlain resorts, and the eastern gateways into the Adirondack Mountains.

The total mileage operated on 30 June 1916 was 885.63 miles, of which 352.26 miles were owned by the company, and the remainder leased or controlled under trackage rights. The operating revenues for the fiscal year ended 30 June 1916 were $25,933,675, earned by the transportation of 7,459,533 passengers and 22,623,328 tons of freight. The individual passenger travel averaged 17.4 miles at a charge of 2.2 cents per mile, aggregating 443,297,189 miles and $2,860,283. The freight traffic aver¬ aged 145.31 miles per ton, at a charge of 0.658 cents per ton per mile, aggregating 1,414,674,323 ton-miles and $21,631,350. The operating ex¬ penses were $16,381,569. After deducting taxes, etc., the total operating income was $8,912,868. Rents for leased roads amounted to $2,006,142, and interest on the funded debt was $2,712,833. The net income, which was transferred to profit and loss, was $4,769,972. The dividend appro¬ priation from surplus was $3,825,234.

The equipment of the road on 30 June 1916 consisted of 488 locomotives with an aggregate tractive capacity of 18,274,250 tons, 246 pas¬ senger cars, and 18,818 freight cars, of which 11,431 are coal cars with an aggregate capacity of 463,401 tons. By far the largest freight ton¬ nage of the railroad is coal, amounting in the year quoted to 12,567,166 tons, or 56 per cent of all the freight handled.

The entire investment in road and equipment on 30 June 1916 totaled

$68,642,658. Other in¬ vestments, including $6,645,026 in coal lands, amounted to $63,103,256. The total long term debt amounted to $62,798,000, and the credit balance of the profit and loss account was

$18,489,610.

In 1915 the company mined 8,100,767 tons of anthracite coal, which was sold under con¬

tract at the pit mouth to the Hudson Coal Com¬ pany for $15,860,677.

The Delaware and Hudson system includes 333.79 miles of electric lines, embracing the United Traction Company, operating in the cities of Albany, Rensselaer, Troy, Watervliet, Cohoes, Waterford, *etc.* ; the Hudson Valle}' Railway Company, operating from Waterford to Warrensburgh and Glens Falls to Mechanics-ville ; the Schenectady Railway Company, operating in the counties of Schenectady, Albany and Saratoga; and other lines in Troy and Plattsburgh, N. Y. The company also owns (in connection with the Rensselaer and Saratoga Railroad) and operates two fleets of passenger steamers, one on Lake Champlain and the other on Lake George. The regular routes of the Champlain steamers total 159 miles and their excursion routes 112 miles. The route of the Lake George steamers is 38 miles. An interesting event in the history of the company is the fact that the first steam locomotive ever placed on a railroad in the western hemisphere, <(The Stourbridge Lion,® made its trial trip on the Delaware and Hudson Railroad, between Carbondale and Seeleyville, on 8 Aug. 1829. The locomotive was built by Foster Roswick & Company, of Stourbridge, England. It arrived in New York in May 1829. It was of the grasshopper type with walking beams and vertical cylinders. The locomotive and the tender were each four-wheeled, with spokes and felloes of wood, iron tires and wheel centres. The track on which it ran was of strap iron spiked next the inner edge to large hemlock sleepers laid on cross ties. The Delaware and Hudson Railroad sys¬ tem in 1916 included the Albany and Susque¬ hanna Railroad; the Chateaugay and Lake Placid Railroad; the Cooperstown and Charlotte Valley Railroad; the Cooperstown and Susque¬ hanna Valley Railroad; the Rensselaer and Saratoga Railroad ; the Albany and V ermont Railroad; the Rutland and Whitehall Railroad; the

Saratoga and Schenectady Railroad ; the Ticonderoga Railroad ; the Greenwich and Tohnsonville Railway; the Napierville Junction Railway; the Northern Coal and Iron Com¬ pany; the Quebec, Montreal and Southern Rail¬ way; and the Schoharie Valley Railway.

DELAWARE INDIANS (their own name Renno Renappi, or Lenni Lenape, <(true menˆ ; cf Illinois, Innuit, Lokono, Muysca, Alemanni, etc.), an important Algonquin tribe which lay in the path of white settlement on both sides of the Delaware River, and therefore fills a large place in colonial history. Previously thev had been subjugated by the Iroquois, who, instead of exterminating or absorbing them, exacted tribute, called them ˆwomen,® and dictated their action. The early Dutch settlers were massacred as usual ; but the Swedes on the Delaware up¬ held Indian titles to land to secure their own possession against the Dutch, compelling the latter in turn to buy instead of seizing, so there was peace with the Delawares in this period. The Swedes tried to christianize them with Luther's catechism, without much success. In October 1682, Penn made his famous treaty with them, as well and as ill kept by his successors as others of the kind; that the Delawares did not revenge the white encroachments by massa¬ cre was due to Penn's sagacity in buying up

their overlords, the Iroquois, who threatened to destroy them if they molested ((Onas'® people. The infamous trick of the "Walking Purchase® (q.v.) in 1737 (denounced by the Quakers) ousted them from half a million acres in the forks of the Delaware above Easton, and the Iroquois with furious menaces compelled them to retire to the Susquehanna. Here settlement pursued them, and not daring to resent it, a large part of them by 1750 had removed to the Alleghany and Muskingum, where they re¬ covered Indian courage and ferocity. The Mo¬ ravian missionaries converted part of the re¬ mainder, and these always remained peaceful. The others, maddened by aggression, joined the French and Iroquois in the French and Indian war, and helped in Braddock's defeat ; sullenly yielding in 1758, after the Senecas had turned against them, they broke out again in Pontiac's

Conspiracy (q.v.) of 1762, and were among the besiegers of Detroit, Fort Pitt, Duquesne, *etc.* Defeated by Bouquet at Bushy Run, 1763, they made peace in 1764 — 65. In 1768 all the remnants east of the Alleghanies migrated west ; and the Christian Delawares founded the village of Gnadenhutten on the Muskingum. Roving bands of the others kept the field till the crushing defeat of Point Pleasant (q.v.), 1774. In the Revolution they were divided ; part went with the English, part made a treaty with Congress in 1778. The Christians remained quietly at Gna-denhiitten, till in 1781 the English broke it up and removed them to Sandusky. Part of them returned thither to save their crops, and were attacked by the Americans and 90 of them mur¬ dered; the rest fled mostly to Canada. Land was given them on the Thames, and they founded Fairfield, with others who came in 1787 from the Muskingum, where Congress had settled them. The wild tribesmen remained hostile, and con¬ tributed to St. Clair's defeat in 1791 ; but Wayne's victory forced them to make peace in 1795. Successive treaties removed them from Ohio, and by 1800 the main body were on White River, Indiana. They did not join Tecumseh in the War of 1812, and in 1818 they ceded all their lands east of the Mississippi and moved to White River, Missouri. There were then 1,800 in all, a few remaining in Ohio. Later, some went south to Red River, on the Texan border, by Spanish permission. By treaty of 24 Oct. 1829 the main body, about 1,000, settled on the Kansas and Missouri. They had schools and missions. In 1853 they sold all but a reservation in Kansas, invested the moneys sagaciously, and built fair houses, improved their farms, *etc.* During the Civil War, out of 201 warriors they sent 170 to the Union side, who proved good sol¬ diers and guides. In 1866 their land was cut up by the Union Pacific Railroad, and they sold the whole in 1867-68, and took up lands on the Verdigris and Cane, bought from the Cherokees. A special treaty of 1866 permitted them to take lands in severalty and become citizens; they did so, and are not a <(tribe® any longer, though they form a part of the <(Cherokee Na¬ tion® in Oklahoma, numbering now 914. There are other bands, which in all make more than 780. The had three clans, the Turtle, Turkey and Wolf or Munsee (q.v.) ; the latter, differ¬ ing strongly from the rest, is in three divisions, — 71 on the Thames in Canada, about 200 at Green Bay, Wis., with the Stockbridges, and some with the Chippewa in Kansas. There are

also some on Grand River reserve in Ontario, and about 350 Moravians on the Thames. Con¬ sult Harrington in American Anthropologist (1913) and Skinner, (Report of the Archaeologi¬ cal Survey of New Jersey } (1913).

DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY, The, is a consolidation of a number of short rail¬ roads originally separate corporations. It was chartered under the laws of Pennsylvania in 1849 as the Ligetts Gap Railroad. This name was changed in 1851 to the Lackawanna and Western Railroad. In 1853 a consolidation was effected with the Delaware and Cobbs Gap Railroad chartered but not yet built, and the present name was then adopted. The system as now operated extends from the seaboard at New York to the Great Lakes at Buffalo, traversing New Jersey, Pennsylvania and southern and western New York, with branches into the slate and cement regions of Pennsyl¬ vania and New Jersey, the anthracite fields of Pennsylvania, and the agricultural, dairy and industrial area of central New York.

The total mileage operated on 30 June 1916 was 955.06 miles, of which 236.12 miles were owned by the company, and the remainder held under leases and trackage rights. The operat¬ ing revenues for the fiscal year ended 30 June 1916 were $49,335,739, earned by the trans¬ portation of 24,756,837 passengers and 26,458,931 tons of freight. The individual passenger travel averaged 21.83 miles at a charge of 1.566 cents per mile — aggregating in the year 540,372,771 miles, and $8,462,493. The freight traffic aver¬ aged 189.35 miles per ton, at a charge of 0.719 cents per ton-mile — aggregating in the year 5,010,072,493 ton-miles, and $36,034,113. The operating expenses for the year were $29,511,- 905. After deducting taxes, etc., the total operating income was $17,609,604. Rentals for leased roads amounted to $5,960,196. The total net income from all sources was $14,289,516, of which $8,444,080 was appropriated for dividends ; $2,056,742 for physical betterments ; and a balance of $3,788,694 transferred to profit and loss.

The equipment of the road on 30 June 1916 consisted of 733 locomotives with an aggregate tractive capacity of 23,438.100 tons, 535 pas¬ senger cars; and 27,812 freight cars, ‘of which 11,452 were coal cars with an aggregate capacity of 451,110 tons. By far the largest freight ton¬ nage of the road is coal, amounting in the year cited to 12,200,415 tons, or 46 per cent of all the freight handled.

The entire investment in the road and its equipment on 30 June 1916 was $68,656,640. Other investments of the company amounted to $71,314,561. The total stock outstanding on the date mentioned was $42,291,120, and the total long term debt was $102,600. The credit balance of the profit and loss account was

$43,644,436.

The company owns extensive anthracite coal lands in Lackawanna and Luzerne counties, Pa. Under the decision of the United States Supreme Court the railroad discontinued its coal business in 1909, and this was taken over by the Delaware, Lackawanna and Western Coal Company. The latter sold in 1915 9,113,- 144 tons of coal, valued at the mines at $22,-

726,155.

The railroad owns and operates the New

York and Hoboken Ferry, connecting the city of New York with Hoboken, N. J.

The present ((Lackawanna Railroad® as it is popularly called includes as its oldest com¬ ponent the Ithaca and Owego Railroad, char¬ tered in 1828, completed in 1834. For six years this road was operated by horse power and stationary engines, the company having no locomotives until 1840. Other railroads now a part of the system are the Morris and Essex Railroad; the Newark and Bloomfield Railroad; the Sussex Railroad; the Chester Railroad; the Passaic and Delaware Railroad; the Warren Railroad; the Oswego and Syracuse Railroad; the Syracuse and Binghamton Railroad; the Utica, Chenango and Susquehanna Railroad; the Valley Railroad; the New York, Lacka¬ wanna and Western Railroad; the Bangor and Portland Railroad; and the Erie and Central New York Railroad. An interesting incident in its history relates to the efforts of the railroad to induce the public to use anthracite Coal as fuel, many carloads being given away in the early 50s to those who would agree to try it.

DELAWARE RIVER, a river of the United States. Its main fork takes its rise in a little lake of Schoharie County, N. Y., on the slopes of the

Catskill Range and at an elevation of almost 2,000 feet. This branch takes a south¬ western course to Deposit, about 100 miles dis¬ tant, whence it flows southeast and becomes the boundary line between the States of New York and Pennsylvania. The lesser or eastern fork also takes its rise in the Catskills and flows into the main branch at Hancock. After leaving Port Jervis, N. Y., it divides the States of New Jersey and Pennsylvania, flowing in a southerly direction through the famous Dela¬ ware Water Gap, to Easton, Pa. Its course is now southeast to Trenton, N. J., whence it turns southwest and flows past the great cities of Chester and Philadelphia. Below Chester it gradually widens into Delaware Bay. Its ex¬ treme length including the bay and estuary is 410 miles, of which the bay takes up about 50. The total area of the watershed of the Dela¬ ware is 12,012 square miles, of which 3,000 miles are in New York, 2,500 in New Jersey and over 6,000 in Pennsylvania. Along its course are considerable waterfalls which are extensively used for power purposes ; among these are Welles's Falls at Lambertville, about 15 feet, the Foul Rift of 23 feet at Belvidere and the 30-foot fall at Port Jervis, N. Y. In New York it receives the waters of the Mongaup and Neversink, in New Jersey the Musconetcong and Maurice, and in Pennsylvania the Lacka-waxen, Lehigh and Schulykill. Ocean-going vessels ascend the Delaware to Philadelphia and vessels of lighter draught to Trenton. From Easton to a point opposite Trenton its course is paralleled by a canal. Other canals linking it with great waterways are one to the Raritan River, connecting New Brunswick and Trenton, and one to the Hudson River, from Phillipsburg to Jersey City, N. J. The river was first explored in 1609 by Hendrik Hudson, and in 1615-16 by Cornelius Hendrikson, and their reports led to the organization of the Dutch West India Company.

DELAWARE WATER GAP, Pa., village in Monroe County, on the Delaware River and the Delaware Lackawanna and Western and

the New York, Susquehanna and Western rail¬ roads, near Stroudsburg, Pa., 65 miles north¬ east of New York. The Delaware River, where it passes through the Kittatinny Range of the Appalachian Mountains, forms a gorge about three miles in length and above the water the sides rise to the height of 1,400 feet. Its great scenic beauty attracts annually a considerable number of tourists and vacationists.

DELAWARR, or DELAWARE, Thomas West. See West, Thomas, Lord Delawarr, or Delaware.

DELBRUCK, del'bruk, Hans, German his¬ torian of military science : b. Bergen, Riigen, 1848. He was educated in Heidelberg, Bonn and Greifswald. He was an officer in the Franco-Prussian War and in 1874 became tutor to Prince Waldemar. He was a member of the Reichstag in 1882-83 and 1884-90 and after 1883 was on the editorial staff of the Preussiche Jdhrbiicher. He was appointed professor of modern history at the University of Berlin in 1885. He has written several important works on the art of war as practised within historic times. The more important of his works are (Die Perserkriege und die Burgunderkriege) (1887); (Die Strategic des Perikles erlaiitert durch die Strategic Friedrichs des Grossen* (1890); (Friedrich, Napoleon, Moltke, Aeltere und Neure Strategie) (1892) ; (Geschichte der Kriegskunst im Rahmen der politischen Geschichte) (3 vols., 1900-07) ; (Erinnerungen, Aufsatze und Reden) (1902).

DELBRUCK, Martin Friedrich Rudolf von, German statesman : b. Berlin, 16 April 1817; d. there 1903. He was educated at Halle, Bonn and Berlin. Entering public life in 1849 he was finally made director of the Department of Commerce and Industry (1859) ; and his part in detaching Prussia from the Austrian commercial policy was considerable. After 1862 Bismarck, then president of the Cabinet, supported von Delbriick's commercial ideas and on the same principles he negotiated treaties with foreign powers. In 1867 Delbriick was made president of the Imperial Chancellory of the North German Federation. In 1870 he negotiated the treaties which made Germany a unit. For five years after the founding of the Empire, Delbriick retained his office as presi¬ dent of the General Chancellory, now become the Imperial Chancellory. In 1876 he was dis¬ missed in spite of his reputation and service. Later, as a member of the Reichstag, he dared oppose Bismarck. He retired from the Reich¬ stag in 1881. In 1896 he received the order of the Black Eagle at the hands of the emperor. He published (Der Zollverein und das Tabaks-monopoP (1857) ; (Der Artikel 46 der Reichs-verfassungP

DELCASS&, del-ka'sa, Theophile, French editor and statesman : b. Pamiers, Ariege, France, 1 March 1852. For some time on the staff of La Republique Frangaise and was elected deputy from Foix 1889 and reelected 1893 and 1898. He was under-Secretary of State for the colonies and became Minister for the Colonies in 1894. He was Minister of Foreign Affairs in Brisson's Cabinet, holding the same office under Dupuy, Waldeck-Rousseau and Combes. He settled the (<Fashoda Affair® with England and gave an eastern frontier to the possessions of France in Africa. He also con-

eluded a commercial convention with the United States. Owing to disapproval of his Moroccan policy, on 6 June 1905 he resigned his post as Minister of Foreign Affairs. In the following May he again became a member of the Cham¬ ber of Deputies and in 1909 was appointed chairman of a committee of deputies appointed to investigate various matters in connection with the navy. The report of this committee, when presented to the Chamber, drew an at¬ tack on Delcasse from Georges Clemenceau, the Premier. Delcasse, saw his naval plans adopted in 1910, and held the portfolio of Minister of Marine under Monis, March-June 1911, and in the cabinets of Caillaux and Poincare in 1911— 12. In January of the latter year he became Minister of Foreign Affairs. In 1913 he was sent to Saint Petersburg on a temporary mission. He was again Minister of Foreign Affairs in 1914, retaining his portfolio until October 1915.

DEL CREDERE, del kred'e-re, an Italian mercantile phrase expressing a guarantee or warranty, given by factors, brokers or mercan¬ tile agents, who. for an additional commission, become bound not only to transact business for their employers, but also to guarantee the sol¬ vency of the persons to whom the goods are sold, or with whom business is done. This additional commission is known as a del credere commission. The term has come into general use in international commerce, and is recognized in the common-law system of England and America.

DELEB PALM, the Borassus JEthiopum, a native of the interior and west of Africa, allied to and somewhat resembling the Palmyra palm (q.v.). Its leaves and fruits are used by the Africans for the same purposes as those of the Palmyra by the Asiatics, and the tender roots produced by the young plant are exten¬ sively used as an article of food. The trunk is swollen about halfway up.

DELECLUZE, de-la-kliiz, Etienne Jean,

French painter and critic: b. Paris, 20 Feb. 1781 ; d. Versailles, 12 July 1863. He was a pupil of David, and although achieving a fair success in painting he abandoned it for criticism 1816. He was connected with several reviews and papers, including the Moniteur and the Journal

des Debats, and the Revue des Deux Mondes, being allied with the young literary circle of the Restoration. He also wrote sev¬ eral novels. Among his many works are (Precis d'un traite de peinture) (1828) ; (Mademoiselle Justine de Liron} (1832) ; (Notice sur la vie et les ouvrages de Leopold Robert) (1838) ; (Dona Olympia, the Sister-in-law of Pope Innocent X> (1842); (Gregory VII, Saint Frangois d'Assise and Saiiit Thomas d'Aquin) (1844) ; (Louis David, son ecole et son temps) (1855) ; and (Souvenirs de soixante annees> (1862). In the museum at Versailles there are some curious pen and ink sketches by him of scenes of the invasion of Paris in 1814. Among his paintings are (Mort de Astvanax) ; (Enlevement d'Europe> (1808) ; (Enlevement d'Helene par Paris> (1810) ; (Un sacrifice a Ceres, Herminie et Tancrede) (1812) ; (Auguste et Cinna1* (1814).

DELEDDA, Grazia (Mrs. M. P. Lom¬ bard), Italian poetess and novelist: b. Nuoro, Sardinia, 1872. She owes her wide popularity to an impulsive originality in her portrayal of

Sardinian life. Her first essays were accepted by Angelo De Gubernatis for his reviews, Vita Italiana and Naiura ed Arte. Her first novel, (Anime onesteP received the honor of a grace¬ ful preface by Ruggiero Bonghi. Among her works, many of which have been translated into other languages, are (Fior di Sardegna,) (Rac-conti Sardip (Amore regaleP (La via del maleP <Nostra Signora del Buon ConsiglioP (Le ten-tazionip (I1 Vecchio della MontagnaP (Dopo il DivorzioP HI TesoroP (Elias Portolu* — which is perhaps her best — and ˆostalgieP The main charm of her romances is described as <(une certaine sauvagerie.®

DELEGATE. See Delegation ; Dele¬ gates, Court of.

DELEGATES, Court of, the old English court final of appeal, and was so-called because the judges thereof were delegated, by the king's commission under the great seal, to hear and determine appeals in the three following cases :

(1) Where a sentence was given in any ecclesi¬ astical cause, by the archbishop or his official ;

(2) when any sentence was given in any ecclesi¬ astical cause in the places exempt; (3) when a sentence was given in the admirals' court, in suits civil and marine, by order of the civil law. This court has been abolished, and the privy council is now the great court of appeal in all

ecclesiastical causes.

DELEGATION, a person or body of persons deputed to act for another. Before the present Constitution of the United States of America was adopted, the per¬ sons constituting the Congress at Philadel¬ phia were called delegates, and the body of representatives of a State in Congress is still called the delegation of a State. In Maryland and Virginia the branch of the State legis¬ latures which, in most of the other States, is called house of representatives, has the name of house of delegates. The name of delegate is also given to the representatives sent to the Con¬ gress of the United States from Territories not yet formed into States. In Italy branches of government are often called delegazione , and their members delegati. Formerly in Lombardy, Venice and the states of the Church the term delegazione was applied both to the governor and governing court of a province and to the province itself. The delegate was always a prelate, and directly appointed by the Pope. In the civil law, delegation is that act by which a debtor transfers to another person the duty to pay, or a creditor transfers to another person the right to receive payment.

DELENDA, de-len'da, things to be erased or expunged. Delenda est Carthago is the cele¬ brated sentence with which Cato the elder was accustomed to conclude all his speeches in the Roman senate. His hatred of Carthage arose from a jealousy of its flourishing state, and the consequent danger to Rome.

DE LEON, Thomas Cooper, American author and playwright: b. Columbia, S. C., 21 May 1839; d. 19 March 1914. He was auditor Topographical Engineering Bureau, Washington, 1858-61, served in Confederate army 1861-65, and at. the close of the war was connected with magazine and newspaper work in Baltimore, New York and Mobile. He organized the Mo¬ bile Mardi Gras Carnival and was its manager

for 25 years, and designed carnivals for many other cities for their various celebrations. Among his works are (The Rock or the Rye5 ;

(Creole and Puritan5 ; (A Fair Blockade Breaker5 ; (The Puritan's Daughter5 ; (Four Years in Rebel Capitals5 ; (Out of the Sulphur5 ; (A Bachelor's Box5 ; (An Innocent Cheat5 ; (Crag Nest5 ; (Life of Joseph Wheeler5 ; and Confederate Memories.5

DELESCLUZE, de-la-kliiz, Louis Charles,

French communist: b. Dreux, 20 Oct. 1809; d. Paris, 28 May 1871. The February revolu¬ tion opened to him a career in Paris, where his clever and facile pen quickly made him popular with the rabble, but earned him from the author¬ ities imprisonment and a fine of 10,000 francs. Again at Paris in 1853, he was sentenced to two years' imprisonment, and was next trans¬ ported to Cayenne, where he remained till 1859. He described his sufferings in (De Paris a Cayenne: journal dun transportˆ5 (1867). After his return he was quiet for some years, until his journal, Reveil , started in 1868 to advocate the doctrines of the International, brought him into new trouble. In the history of the Paris Commune he played a prominent part, and upon his head rests in great part the guilt of the murder of the hostages, and the burning of the public buildings of the city. He died on the last barricade.

DELESSERT, de-les-sar, Benjamin, French naturalist and philanthropist : b. Lyons, 14 Feb. 1773 ; d. Paris, 1 March 1847. In 1803 he started cotton-spinning in France, but is particularly distinguished by his efforts to produce beet¬ root sugar. As early as 1801 he was engaged in refining, but in 1806 he began the experiments which were successfully terminated and an¬ nounced to Chaptal on 2 Jan. 1812. When he heard of it Napoleon was in ecstasies: ((We must see it : let us go,55 he said. ((Delessert,55 says Flourens, who narrates this incident, <(had just time to go to Passy, where his work was. On his arrival he found the gates surrounded by the imperial chasseurs, who refused him admit¬ tance. He told them who he was and entered. The emperor had seen and admired everything; excitement was at its height. Approaching Delessert, the emperor took the cross of the Legion of Honor from his own breast and gave it to him.55 It was announced next day in the Moniteur ((that a revolution in French com¬ merce had been accomplished.55 Delessert lived through the collapse which the manufac¬ ture suffered after Napoleon's fall, and long enough to see it revive and become of the greatest importance.

DELFSHAVEN, or DELFTSHAVEN,

the former being the modern form, once the haven or port of Delft, but now part of the city of Rotterdam, on the river Maas, and the

start¬ ing point of the voyage of the Pilgrim Fathers to America, in 1620, and the birth place of Piet Hein, the Dutch admiral who in 1628 captured the West India Spanish plate fleet, with its cargo of $12,000,000 in silver. His statue is in the little park behind the historic edifice of the Reformed Church. The large island, which formed in the river Maas in front of the town, has been recently reclaimed to the main land, by filling the space occupied by the inner channel. In front, facing the river, is the Pilgrims' Ave¬ nue, or quay, named July 1892 in honor of the

Separatists sailing for America. They spent the night before embarkation on the Speedwell, in the now greatly altered warehouse of the East India Company, the ship sailing 22 July. After the revival of interest in Pilgrim his¬ tory, a stone from this edifice was, with one from Scrooby, England, and another from Plymouth, Mass., set in the facade of the New England Congregational Church in Chicago. After the great fire, in which this handsome edifice was gutted, the three stones remained intact. Three large dykes defend Delfshaven from the water, and here, in 1574, these were cut to flood the country and relieve Leyden. Two hundred (<Cannon boats,55 loaded with herrings and bread, moved up the flood and raised the siege. The arms of Delfshaven con¬ tain representatives of green fields and white waters, in alternate strips, with herrings and wheat. In the river Schie which from Leyden and Delft has for centuries been made into a canal and flowing through D., the Pilgrim boats were moored. On 28 Sept. 1906, in celebration of the 300th anniversary of the sailing of the first Pilgrim company — others followed — a bronze tablet, presented by the Boston Congre¬ gational Club and set in the south wall, was unveiled in the Reformed Church, before an international audience. In the Consistory Room of this church, formerly a cloister chapel built in 1416, is kept a registry book for the Americans and others who visit the place. On the north wall, is a stone from Chicago with a Greek inscription. In 1915, a storm destroyed several of the larger windows and the Dutch congregation replaced the same in stained glass, with two splendid memorial designs in cele¬ bration of the ((rocking the cradle of a great nation.55 Other companies of Pilgrims from Leyden sailed later from this port. A picture, painted by one of the Cuyps, father or son, dis¬ covered, in 1895, by George H. Boughton, prob¬ ably depicts the actual scene of embarcation. The rotunda picture in the capitol at Washing¬ ton, by Weir, showing luxurious costumes and imaginary hills in the background, was painted before the recovery of the Pilgrim story. Con¬ sult Griffis, (The Pilgrims in Their Three Homes,5 (1914).

William Elliot Griffis.

DELFT, or DELF, Holland, town in the province South Holland, six miles southeast of The Hague and eight miles northwest of Rotter¬ dam. It stands on a dead flat, and is intersected in all directions by canals, which are crossed by 69 bridges, mostly of stone. These canals make the great market-place with its public build¬ ings an island, approached by nine bridges. The counterscarps of the old ramparts are now planted with trees, and form public walks. The town-hall (Stadhuis), in the market-place, is a large, solid-looking building, with a heavy square tower rising from its roof. The Prinsen-hof, once the occasional residence of William I of Orange, and the scene of his assassination (10 July 1584) , is now a military barrack. The old Reformed church contains the monuments of Admirals Tromp and Hein, the famous naturalist Leeuwenhoek, and other worthies. The magnificent mausoleum of William, and the burial-place of the Orange family, are in the New Church (1412-76) ; and from its huge square tower the town and neighborhood are from time to time regaled with the richest

music from a chime of three octaves; the New Church contains also the tomb of Hugo Grotius. Delft has long been the seat of an arsenal, and was formerly the centre of the manufacture of the kind of pottery called delftware or del, an industry now revived under the name of “New Delf.® The chief manufactures now carried on comprise firearms, carpets, leather, soap, oil and gin. Delft was founded in 1075 and received its charter in 1246. It was almost wholly con¬ sumed by fire in 1536; and in 1654 the powder magazine of the arsenal exploded accidentally, when not a single house entirely escaped, and many persons were killed or maimed. Pop.

34,485.

DELFT FAIENCE. To the Dutch town of Delft the world is indebted for

a style in faience that has claimed the admiration of the world. When, at the beginning of the 17th century, the Dutch East India Company brought such large quantities of Chinese and Japanese porcelain ware they created a great rage for this beautiful “china.® The cost of this im¬ ported ware was, however, too high for most of the citizens. The rich Italian faience (majolica) had shown what fine effects were obtainable with oqaque tin enamels. Already the Dutch potters had been producing tin enameled tiles for decorating wall surfaces and for covering the surface of househeating apparatus (ovens). These tiles, with their quaint painted decoration consisting of biblical subjects, landscapes, ships, coats-of-arms, etc., had become popular all over Europe. By coating his darker clay body with white opaque tin enamel the Delft potter had found a method of creating an appearance of porcelain very pleasing to the eye. With the Chinese and Japanese porcelain pieces in such abundance before him he had forms and decora¬ tion in plenty to carry out a close imitation of equal variety and beauty. Starting at the very beginning of the 17th century, by 1680 this Delft faience was in such favor throughout the Continent and England that about 30 busy fac¬ tories were in existence. Careful workmanship in potting and talented decoration produced a ware which is greatly admired by connoisseurs to the present day. The industry was continued till the end of the 18th century, when the cheap, handsome English “standard® formula “china® (see Ceramics) flooded the European markets. Leading Delft makers and painters were Her¬ man Pietersz, Van Frytom, A. Pynacker, L. Fictor, L. and S. Eenhorn, J. Van Brower, A. de Kooghe, Th. Witzenburgh, *etc.* Among the best known factories were The Metal Pot; the Double Jug; the Claw; the Peacock; the Porcelain Bottle; the Three Tuns; the New Moor’s Head; the Two Little Ships; the Jug; the Two Savages.

Characteristics. — The thick, warm yet bril¬ liant glaze of Delft faience contrasts favorably with the steely glitter of most Chinese porce¬ lain. The white enamel background had a pure, though subdued, mellow tone.

Product. — Handsome “garnitures® for the chimney, consisting of a central gourd-shaped bottle, a beaker on either side, and at either end a jar with cover (all of Chinese form and deco¬ rative motifs), were favorites. Small vessels and beakers and small plates and brushbacks with bright-colored decoration and gold, on black or dark brown ground, are a much sought-

for style. Other ornaments were cruets, candle¬ sticks, scent bottles,

bird cages, lanterns, sun¬ dials, flower holders, human and animal figures, *etc.* Peculiar forms were naturalistic violins, shoes and slippers for holding flowers, boxes of all sizes. Useful house services were made on a large scale.

Decoration. — Imitations of the Chinese blue-and-white decoration were made in largest profusion — A. de Keyser excelled in this. Gay colors alongside the blue followed. Japanese styles called “Imari® and “Japanese taste® were closely imitated from 1662. Many Oriental motifs were treated in a semi-European way (chinoiseries) .

Glaze. — Delft ware is coated with a very thick, soft glaze.

Paste. — The body runs from a dark brown to yellow.

Marks. — The name of the factory or maker is quite commonly used.

English Delftware. — The beautiful Dutch Delft pieces quickly attracted foreign imitation, and England, aided at first, no doubt, by Dutch potters, soon (the date is somewhat obscure) began making the white opaque-coated ware. This is generally termed delftware in distinc¬ tion to true Delft. Lambeth (London) is sup¬ posed to have first started this ware, which was then taken up by Bristol and Liverpool. Whereas the Dutch very closely imitated the Chinese styles at first, the English copied the Dutch almost slavishly for a time, but the early product was inferior to the Dutch, its body being coarser and glaze thinner and more uneven. The glaze is not well fused to the body, decoration is inferior and colors cruder. While the Dutch did but one firing for body, glaze and decoration, the English baked the body first, then the decoration and glaze after¬ ward. Much of the ware shows crazing. The product was more for use than ornament and consisted of pill-slabs, drug pots, “Merry Men® plates. The latter are both round and octagonal. They are in sets, each with its motto. Thus we find one set with the lines “What is a Mery Man® ; the next plate reads “Let him doo all what he kan® ; then others “to entertayn his Gests,® “with wyne and Mery jests,® “But if his wyfe doth frowne,® “All meryment goos downe.® Other articles are mugs, dishes, candlesticks, posset pots, three-handle mugs, “puzzle jugs,® *etc.* Five colors were used — blue, green, yellow, orange, brownish purple. The so-called “blue dash chargers,® with their crude daub, are much prized; they have kings, queens, statesmen, etc., as decoration. Richard Chaffers of Liverpool, shipped so much of his ware to America that this country is now the best source for obtaining specimens.

Bibliography. — Blumlein, K., (Delft und

seine Fayencen) (Hamburg 1899) ; Burton, W., (English Earthenware and Stoneware) (London and New York 1914) ; Havard, Henry, (Histoire de la Faience de Delft) (Paris 1878) ; Knowles, W. P., (Dutch Pottery and Porcelain) (London 1907) ; Moore, Mrs. N. Hudson, (Delftware: Dutch and English) (New York

1908).

Clement W. Coumbe.

DELFTSHAVEN. See Delfshaven.

DELHI, India, city, proclaimed the capital of India in 1911, also capital since 1 Oct. 1912

of a province, formerly a division of the same name, and anciently of the Patan and Mosul empires stands about 700 miles northeast of Bombay, and about 790 miles northwest of Cal¬ cutta. It was at one time the largest city in India, covering a space of 20 square miles, and having a population of 2,000,000. It is now re¬ duced to a circumference of seven miles. A vast tract covered with ruins marks the extent of the ancient metropolis of the Mogul empire. The present city, built on two rocky eminences, is surrounded by walls of red sandstone 30 feet high, and from three to five feet thick, with a moat 20 feet broad. There are seven colossal arched gates, defended by round bulwarks, and all built of freestone. The streets of the old part of the city are narrow, but in the modern portion they are broad. The houses here are of sandstone and brick, and are of two and three stories in height. The palace or residence of the Great Mogul, built by Shah Jehan, com¬ menced in 1631, and finished in 10 years, is by far the most interesting building in Delhi, and the most magnificent structure of the kind in India. The Great Mosque, a magnificent

structure in the Byzantine-Arabic style, is con¬ sidered by the Mohammedans the wonder of the world. It is built of white marble and red sandstone, inlaid like mosaic, in lines and arabesques ; at the two extreme corners rise minarets 150 feet high, and between them two lofty domes. This imposing edifice was built by the Emperor Shah Jehan, in 17th century, and took several thousand men for six successive years (1631 to 1637) to complete it. There are no fewer than 40 other mosques in different parts of the city, many of them having lofty minarets and gilded domes. The fine structure which stands near the Ajmeer gate was for¬ merly the Delhi College. The famous observa¬ tory of Jye Singh, rajah of Jyepoor, at the southwest extremity of the city, has been much dilapidated, and its astronomical instruments nearly all destroyed or carried off. A monu¬ ment was erected in 1888 by the government to Willoughby, one of the heroes of the siege in 1857. The principal manufactures of the town are cotton cloths, indigo, finely embroid¬ ered shawls and jewelry, for which, as well as for delicately carved ivory, Delhi is somewhat noted. The chief imports are by the northern caravans, which bring from Cashmere and Cabul shawls, fruit, and horses. Precious stones of good quality are to be had at Delhi, particularly the large red and black carnelians. The agricultural products of the district con¬ sist chiefly of wheat, rice, millet, and indigo. The trade of the neighborhood is centred in Delhi, and the Rajputana State Railroad tra¬ verses the district.

Delhi, or as anciently called, Indraprastha, is one of the oldest cities of India. The modern name Dilli or Delhi is first met with in the 1st century b.c. It has been taken frequently bv hostile powers. In the beginning of the 19th century the prosperity of the city and. country around was threatened with destruction, and the Mogul emperor and royal family were re¬ duced to poverty and distress, by the Mahrattas, who took possession of his capital, of his gardens and houses, and used his name to op¬ press and impoverish the people by fraud and extortion. From this miserable state of desola¬ tion and ruin the city was rescued by the British

in 1803, when it was entered and taken posses¬ sion of by Lord Lake. On the breaking out of the Indian mutiny in May 1857, Delhi became the centre of the operations of the rebels, who flocked to it from all quarters. The nominal representative of the Great Mogul, who held the sovereignty of the place under British pro¬ tection, joined cause with the rebels; and in addition to assuming the character of an in¬ dependent potentate, gave his sanction to the massacres and atrocities

perpetrated on the European residents. By the middle of June a British army assembled in front of the city, and a siege commenced, which, from the smallness of the besieging force, was necessarily slow and protracted. It was brought to a successful termination on 20 September, when Delhi was entered by the British troops, and the nominal sovereignty heretofore possessed by the king was declared ended; and he himself, after being tried for the murders committed under his authority, was found guilty, and sentenced as a convict to perpetual banishment. A large part of the place was reduced to ruins in the mutiny and siege, but it has since recovered much of its former appearance, and has also been much improved in its sanitary condition by good drainage, an ample water supply, and lighting system. Delhi on 1 Jan. 1877 was the scene selected for the ceremonial proclaiming Queen Victoria ‘Empress of India) and also in 1903 and again in 1911 of the brilliant durbars proclaiming Edward VII and George V em¬ perors of India. In 1911 Delhi was proclaimed capital of India and the supreme government was transferred there from Calcutta. Pop.

230,000.

DELHI, N. Y., village and county-seat of Delaware County ; on the Delaware River, and a branch of the New York, Ontario and Western Railroad, about 55 miles east of Binghamton. It is in one of the best dairying regions in the country, and the trade is largely in butter, cheese, eggs and agricultural products. Pop.

1,736.

DELIBES, de-leb, Clement Philibert Leon, French composer: b. Saint Germain du Val, 21 Feb. 1836; d. 18 Jan. 1891. He entered the Paris Conservatoire in 1848, and in 1855 produced an operetta, (Deux sacs de charbonP At the Grand Opera, where he became second director in 1865, his music for the ballet (La Fontaine> (1866), met with great success, and his ballet-music for (Coppelia) (1870), his finest work, secured his position as a composer. He wrote music for a third ballet and for three comic operas, one of which, (Le roi l’a dit) (1873), became very popular. In 1880 he was appointed professor in the Conservatoire. Con¬ sult Pougin, ‘Musiciens du XIXe siecle) (Paris 1911).

DELILAH, de-ll'la, the Philistine mistress of Samson. She persuaded him to reveal to her the secret of his great strength, and learn¬ ing that it lay in his long and thick hair, cut off his locks while he was asleep and then treacher¬ ously delivered the helpless man into the hands of his enemies.

DELILLE, de-lel, Jacques, French didac¬ tic poet: b. Aiqueperse, Auvergne, 22 June 1738; d. Paris, 1 May 1813. His translation of Virgil's 'Georgies, > published in 1770, with a (Discours preliminaire5 and numerous annota-

tions, established his fame and obtained him admission to the French Academy. He became professor of Latin poetry in the College of France, and of belles-lettres at the University of Paris. Though an adherent of the old sys¬ tem, Robespierre spared him on every occasion. At his request Delille wrote the (Dithvrambe sur l'immortalite de fame,5 to be sung on the occasion of the public acknowledgment of the Deity. His reputation mainly rests on the <Georgics) and (Les jardins,' a didactic poem. Other works are 'L'Homme des champs) ; (La pitie) ; (Les trois regnes de la nature'; (La conversation ; (L'Eneide de Virgile.' Consult Sainte-Beuve, (Portraits litteraires' (Vol. II, Paris 1864).

DELIQUESCENCE (Lat. «to melt away"), in chemistry the property manifested by many salts, of absorbing moisture from the atmosphere until they become distinctly damp. The name is usually applied to the more pro¬ nounced cases, in which the moisture absorbed is so copious that the salt becomes visibly wet, or even dissolves entirely ; salts in which the action is less pronounced being called (<hygroscopic.® Carbonate of potash, caustic potash and chloride of calcium are familiar examples of delinquescent substances.

DELIRIFACIENT, any drug that in¬ duces an irritability of the brain leading to forms of delirium. Thus alcohol for some sus¬ ceptible minds invariably leads to delirium in the early stages, and also induces delirium in chronic poisoning. Belladonna is a drug that

causes a certain amount of delirium, as do also cannabis indica, cocaine and its allies. Opium in small doses brings about an exhilaration and for some delirium. Mescal, a drug widely used among the Indians of South America and of the southwestern United States, also induces a form of delirium. Delirifacients are rarely used in medicine for the effect on delirium.

DELIRIUM is a general disturbance of consciousness, a perversion of the intellectual and perceptive faculties, characterized by a greater or less degree of mental confusion, by more or less transitory delusions and fleeting hallucinations, often accompanied by disordered, senseless speech and muttering, and motor un¬ rest. It varies in degree from the ordinary wandering or flightiness of mild types, such as fever deliriums, to the higher, excited or more violent form, which are then termed maniacal delirium, as seen in delirium tremens, general paresis, katatonia, epileptic or manic-depressive patients. It is a frequent symptom of many brain disorders. Present day psychiatry does not recognize — or designate — any one mental disorder by the term delirium. It is a symptom of many mental disorders. The delirium grave which still persists as a term in psychiatry is an exhaustion or toxic delirium — not a disease per se.

There are innumerable causes of delirium, the more prominent ones being infectious fevers, in the young and able-bodied, diseases dependent upon some specific microorganism, such as is seen in typhoid fever, pneumonia, scarlet fever, yellow fever, puerperal fever, pyemia and malaria ; although delirium occurs also in analo¬ gous diseases not proven directly due to any specific microorganism, also in trauma. Surgi¬

cal operations are frequently followed by delir¬ ium.

In the delirium of intoxication the causes may be divided into endogenous and exogenous, the former arising from within the body proper, such as septic intoxication, pyemic or uremic absorption, cholemia, diabetes, auto-intoxication and insolation, that is, sunstroke. The latter (exogenous) causes are alcohol, drugs, mvdriat-ics, for example, belladonna, duboisin, atropin ; also cocaine, morphine, mineral poisons, for ex¬ ample, iodoform.

Delirium due to exhaustion and inanition is seen in acute anaemia, resulting from haem¬ orrhage of any cause, or the presence in the blood of powerful haemic poisons, for example, plasmodium of

malaria. It is also due to wast¬ ing diseases and lactation.

Delirium may originate in central or periph¬ eral lesions of the brain, for example, blood clot from accidental injury, trauma, surgical operations, meningitis or encephalitis. Delirium may also be due to, or associated with, central depression, notably that occasioned by epilepsy, hysteria major, *etc.*

Delirium of senility is due to inanition and pathologic changes in the cerebral vascular supp!y- …

The delirium of disease, or acute delirium, resembles that arising during febrile diseases ; it is ordinarily accompanied by rise of tempera¬ ture, which pursues no definite course, and by rapid and progressive body weakness (asthenia), and the typhoid state. The treatment consists of utilizing remedial agents that rapidly pro¬ duce sleep, and fighting the progressive weak¬ ness, by stimulating drugs and nutrition, quiet¬ ing the motor unrest and reducing fever by hydrotherapy, *etc.*

The treatment of delirium in general is first : Induce sleep, and quiet motor unrest ; this is best accomplished by the reduction of fever, the exhibition of proper narcotics, thorough cleansing of the intestinal tract and hydrotherapy. In the selection of hypnotics, the one or the group which is followed by the least depression is advisable. Hyoscamine, in sthenic cases is safe and reliable. Bromide of potassium, chloral hydrate, hyoscin, morphine and opium and the various synthetic coal tar derivatives are frequently used. Second: Dis¬ cover, if possible, and remove the inciting cause of delirium ; to do this the pathological factor must be determined and treated accordingly.

DELIRIUM TREMENS, a. form of acute insanity due to alcoholic poisoning marked by sweating, tremor, atonic dyspepsia, restless¬ ness, anxiety, precordial distress, mental con¬ fusion and hallucinations. See Delirium.

DE LISLE, Charles. See Leconte de Lisle, C.M.R.

DELISLE, de-lel, Guillaume, French geog¬ rapher : b. Paris, 28 Feb. 1675; d. there, 25 Jan. 1726. He was instructed by Cassini, and soon conceived the idea of reforming the whole sys¬ tem of geography. Fie published, in his 25th year, a map of the world, maps of Europe, Asia and Africa, and a celestial and a terrestrial globe of a foot in diameter. By rejecting Ptolemy’s statements of longitude, or rather by comparing

them with the astronomical observa¬ tions and the statements of modern travelers, he founded the modern system of geography.

DELISLE, Joseph Nicolas. French astron¬ omer: b. Paris, 4 April 1688; d. there, 11 Sept. 1768. He was a brother of Guillaume Delisle (q.v.). Among his works are cMemoires pour servir a l'histoire et au progres de l'astronomie) (1738) ; (Memoire sur les nouvelles decouvertes au nord de la Mer du Sud> (1752).

DELITZSCH, da'lich, Franz, German Hebraist and theologian : b. Leipzig, 23 Feb. 1813 ; d. there, 4 March 1890. He was educated in the university of his native city, became pro¬ fessor of theology at Rostock in 1846, at Erlan¬ gen in 1850, and in 1867 at Leipzig. His earlier works dealt with post-biblical Jewish literature, and he afterward wrote commentaries on vari¬ ous books of the Old Testament. He was also the author of numerous theological and devo¬ tional works, among which were (Biblico-prophetic Theology5 (1845) ; (The House of God5 (1848); (Biblical Psychology) (1855); (Jesus and HilleP (1867) ; (Christian Apologetics) (1.869) ; (Ein Tag in Kapernaum5 (1871) ; (Durch Krankheit zur Genesung) (1873). He was chiefly eminent as a commentator on the Old Testament, and his honesty as a theologian was shown in the concessions he was willing to make (in the last edition of his commentaries on Genesis and Isaiah, 1887) to the latest critical views of the Pentateuch. He interested himself in the conversion of the Jews — he was of Hebrew descent — and for this purpose used his great knowledge of Hebrew and the Talmud and founded a training school in 1886, now called the Institutum Delitzschianum. His translation of the New Testament into Hebrew (1877) was widely circulated in Galatia and Russia. Consult Curtiss, (F. DelitzsclP (Lon¬ don 1891).

DELITZSCH, Friedrich, German Assyriologist : b. Erlangen, Bavaria, 5 Sept. 1850. He is a son of Franz Delitzsch (q.v.). He has published among other works (Assyrian Studies) (1874); (Where is Paradise?) (1881); Pro¬ legomena of a New Hebrew and Aramaic Vocabulary to the Old Testament5 (1886) ; (As¬ syrian Vocabulary5 (1887 onward)

; (Assyrian Grammar5 (1889) ; (Assyrisches Handworter-buch5 (1894-96); Pas Babylonische Welt-schopfungscepos5 (1896) ; (Babel und Bibel5 (1902; Eng. trans., 1903) ; (Asurbanipal und die assyrische Kultur seiner Zeit5 (1909) ; (Handel und Wandel in Altbabylonien5 (1910) ; (Kleine sumerische Sprachlehre5 (1914) ; (Sumerisches Glossar5 (1914), and numerous articles in Mitteilungen der Deutschen Orient-Gesellschaft (1899-1913), and a translation of George Smith's (Chaldean Account of Genesis.5 In 1877 he became extraordinary professor in Leip¬ zig, ordinary professor at Breslau in 1893, and in 1899 professor of Assyriology in the Univer¬ sity of Berlin. His lectures attained a wide popularity, and one of them, entitled (Der baby-lonische Ursprung hebraischer Ideen5, delivered in 1901, was attended by Emperor William II who also gave a large sum toward the re¬ searches to be made in the territory of ancient Babylonia. In 1906 he lectured in the United States.

DELITZSCH, Germany, town of Prussian Saxony, on the Lober, 15 miles north of Leip¬ zig. The town is well bir'lt and portions of its ancient walls are still to be seen. It contains a

castle, first erected in the 14th century and ren¬ ovated late in the 17th, which is now converted into a penitentiary for female delinquents. lhe town's industries include brewing, cigar-making, preparation of cereals, sugar refining, shoe¬ making and also woolens and hosiery. Chris¬ tian Gottfried Ehrenberg, the naturalist, and Schulze-Delitzsch claim Delitzsch as their birthplace. Several important fairs are held each year. Pop. 13,031. Consult Lehman, (Chronik der Stadt Delitzsch5 (Delitzsch

1852).

DELIUS, da/le-oos, Nikolaus, German Shakespearian critic : b. Bremen, 19 Sept. 1813 ; d. Bonn, 18 Nov. 1888. He studied philology at Bonn and Berlin, and in England and France. He settled in 1846 in Bonn, where he taught from 1855-80. He published a critical edition of Shakespeare (1854-61) ; (Shakespeare-Lexi- kon} (1851) ; (t)ber das englische Theaterwesen zu Shakespeares Zeit5 (1853).

DELIVERY, in law, the transfer of a deed from the grantor to the grantee or to some person acting in his behalf, in such a manner as to deprive the grantor of his right to recall it at option. A delivery may

be either absolute, i.e., to the grantee himself ; or conditional, i.e., to a third person to hold till some specified conditions be performed on the part of the grantee. In certain cases such as in wills, bonds made by a parent in favor of his chil¬ dren, or deeds in which the grantee himself has an interest, or where there is a mutual obliga¬ tion between the parties, delivery is not re¬ quired.

In contracts, delivery refers to the transfer of the possession of a thing from one party to another. Often the actual transfer of goods does not take place. Delivery sometimes de¬ notes transfer of property in chattel and some¬ times transfer of the right of possession of the chattel. In the latter sense it may refer either to the formation of the contract or to the per¬ formance of it.

DELLA CRUSCANS, krus'kanz, a coterie of English poetasters resident about 1785 in Florence (and so named from the Accademia della Crusca of that city), who took to penning verses, which they published under the name of the (Florence Miscellany.5 Notwithstanding the inconceivable silliness and affectation of these productions they found numerous admirers. The newspapers of the day began to give publicity to their lucubrations. Genuine poetry seemed for a time at a discount, and nonsense and Della Crusca prevailed. The frenzy was, however, of short duration. The (Baviad5 (1794) and (Maeviad5 (1796) of William Gifford swept the butterfly Orlandos, Carlos, Lauras, Marias ((and a thousand other nameless names55 into merited oblivion.

DELLA MARIA, Dominique, French mu¬ sician : b. Marseilles 1768; d. Paris, 9. March 1800. He was very precocious, but his fame rests upon the score he wrote for (The Pris¬ oner5 by Duval.

DELLA ROBBIA, Luca. See Robbia, Lucadella.

DELLA ROBBIA WARE, brown terra¬ cotta bas-reliefs thickly enameled with tin-glaze; made at Florence (chiefly in 1450-1530; in France 1530-67) ; so called from the name

of the artist and its attributed inventor, Luca Della Robbia. The most important and largest work in this ware, perhaps, is the frieze on the hospital at Pistoia, made after the artist's death. At Tamworth, England, there is a plant, founded in 1847, that turns out this style of pot¬ tery, especially for architectural decorations, with great success.

DELLENBAUGH, Frederick Samuel,

American artist and author : b. McConnelsville, Ohio, 13 Sept. 1853. He was educated in Buf¬ falo, New York city, Munich and Paris. He was assistant topographer and artist of Major Powell's second expedition down the Colorado River in 1871-73, and accompanied the Harri-man expedition to Alaska and Siberia in 1899, and made several personal expeditions to the Southwest. From 1909 to 1911 he was librarian of the American Geographical Society, and is a member of the American Ethnological Society. He has written (The North Americans of Yes¬ terday } (1900) ; (The Romance of. the Colorado River) (1903) ; (Breaking the Wilderness>

(1905) ; (A Canyon Voyage5 (1908) ; Fre¬ mont and '49) (1913). He contributed to Stur¬ gis' (Dictionary of Architecture5 on American aboriginal buildings.

DELLYS, del-lez', Algeria, a seaport in the department of Algiers, 49 miles east of the city of Algiers. The inhabitants are mostly French and Arabs. It contains the mosque of the Mohammedans and the mission school of the Christians. The trade is principally in grain, oil and salt. The city is now under French con¬ trol. Pop. 3,987.

DEL MAR, Alexander, American political economist: b. New York, 9 Aug. 1836. He was educated at New York University and in Europe. He edited the Daily American Times in 1854; Hunt's Merchants' Magazine 1860; the Social Science Review in 1864; and the Fi¬ nancial Chronicle in 1865. In the latter year he organized and was director of the United States Bureau of Statistics, Navigation, Emi¬ gration and Commerce (now the Department of Commerce and Labor). He was appointed United States delegate to the International Con¬ gress at Turin 1866; The Hague 1868; Saint Petersburg 1872. In 1876, he became mining commissioner of the United States Monetary Commission. He is president of the Latin-Amer¬ ican Chamber of Commerce ; member of the Societe de Statistique de Paris, of the Societe Astronomique de France, of the Ligue de l'En-seignement de Bruxelles, and numerous politico-economical societies. He has written (Gold Money and Paper Money) (1862) ; (Resources, Productions and Social Conditions of Egypt, Spain, France, Germany, Russia, etc.5

; his¬ tory of the Precious Metals> (1879) ; (History of Money in Ancient States) (1881) ; (History of Monetary Systems) (3d ed., 1901) ; fluc¬ tuations of Gold5 ; (The Law of Payment5 ; (Essay on Corporations> ; (Money and Civiliza¬ tion5 (1885) ; (The Science of Money5 (1889) ; (History of Monetary Crimes5 (1899) ; (History of Money in Modern States) ; (History of Money in America5 (1900) ; < History of Money in Greece, Rome, Great Britain, France, Ger¬ many, Russia, Spain, etc.5 ; (The Middle Ages Revisited5 ; (Barbara Villiers and the Mint Act5 ; <The Aryans and the Conquest of India5 (1911) ; (History of the Precious Metals5 ; also

numerous other works, including over 100 bro¬ chures on national and sociological subjects.

DELMONTE Y TEJADA, dal-mdn'ta e ta-ha'da, Antonio, Dominican historian : b. Santiago de los Caballeros, Santo Domingo, 29 Sept. 1783; d. Havana, 19 Nov. 1861. He studied law at the University of Santo Domingo. His share in the campaign against Toussaint l'Ouverture, caused him to seek refuge at Havana, where he became an official of the government. He is the author of (Historia de Santo Domingo5 (1853), a history of the island from its discovery.

DE LOACH, Robert John Henderson,

American botanist : b. Statesboro, Ga., 21 Dec. 1873. He was graduated at the University of Georgia in 1898. In 1900 he was superintendent of city schools at Swainsboro, Ga., 1900; taught in the United States Indian School at Fort Sill, Okla., 1900-02. In 1903-05 he was prin¬ cipal of the Statesboro High School and in 1906-08 botanist of the Georgia Experiment Station; professor of cotton industry at the Georgia State College of Agriculture since 1908, and director of the Experiment Station since 1913. During the summer of 1911 he was col¬ laborator in the Bureau of Plant Industry at Washington. He has written (Rambles with John Burroughs5 (1912) ; (Agriculture for the Common Schools,5 and bulletins on plant breed¬ ing and diseases, and contributions to period¬ icals. He is editor of the agricultural depart¬ ment of the Atlanta Constitution.

DELOLME, de-lolm', Jean Louis, Swiss writer: b. Geneva in 1740; d. Switzerland, 16 July 1806. He at first practised as a lawyer in his native city, but the part which he took in its internal commotions obliged him to go to England, where he passed some years in great poverty. He became known by his once cele¬ brated but superficial

Constitution de l'Angleterre,5 translated by the author himself into English in 1772. Delolme also published in English his (History of the Flagellants or Me¬ morials of Human Superstition5 (1783) ; an (Essay on the Union with Scotland5 (1796). He returned to Switzerland about 1775.

DE LOME, de-lonT, Enrique Dupuy,

Spanish diplomatist: b. Valencia, Spain, Au¬ gust 1851; d. Paris, France, July 1904. He be¬ came first secretary of the Spanish legation in Washington in 1882, and minister to the United States in 1892 and 1895. In February 1898 it was discovered that he had written a letter to Senor Canalejas, a Spaniard of high rank who had been in United States a short time previous supposably to make observations for the Span¬ ish government. The letter, which followed Canalejas to Havana, and was probably ab¬ stracted from his apartments there by some friend of the insurgents, contained disparaging phrases regarding the President of the United States, and otherwise plainly showed that neither the writer nor the recipient of it believed that Spain was acting in good faith with the United States government. De Lome at first denied the genuineness of the letter, but it was proved beyond a doubt that he was the author, and he telegraphed his resignation to Madrid on 9 February.

DE LONG, George Washington, Ameri¬

can naval officer and Arctic explorer: b. New

DELOO

York, 22 Aug. 1844; d. Siberia, 30 Oct. 1881. He was graduated from the Naval Academy in 1865 ; he reached the grade of lieutenant-com¬ mander, and perished of cold and exposure whileˆin command of the Jeannette Expedition in 1879-81. His body was finally recovered by George W. Melville and Lieutenant Danen-hower, and was taken to New York for burial. His journals have been published, entitled (The Voyage of the Jeannette5 (1883) ; and the story of the search for the survivors is told in Mel¬ ville's (In the Lena Delta5 (1884).

DELOO, an African antelope, one of the duiker-bok (q.v.).

DELORME, de-lorm, Marion, French courtesan: b. Blois, 3 Oct. 1613; d. Paris, 2 July 1650. Her beauty and wit soon made her house the rendezvous of all that was gallant and brilliant in Paris. The king, the princes of Conde and Conti, Buckingham, Cinq-Mars, Saint Evremont, were among her admirers. The leading spirits of the Fronde regularly assem¬ bled in her house, and she is said to have as¬ sisted them in their enterprises. Mazarin was about to have her arrested when she died sud¬ denly. The legend arose in France that the death and funeral were a mere pretense, got up to permit her to make her escape. She is said to have crossed over to England and married a rich lord, who shortly afterward died. She then returned to France, married a chief of brigands, who was captivated by the charms of his victim. After his death she married a pro¬ curator of finance in Franche-Comte, with whom she spent 22 years of her life. Upon his death prosperity forsook her. Plundered by adven¬ turers and her own servants, she died in ex¬ treme poverty in 1706, or according to another story in 1741, at the age of 129 years. Victor Hugo has taken her as the subject of one of his dramas; Alfred De Vigny makes her the leading character in his novel (Cinq-Mars. 5 The story of her life and the legends concern¬ ing her were written by Peladau (Paris 1882).

DE L'ORME, Philibert, French architect: b. Lyons 1515; d. Paris, 8 Jan. 1570. He studied in Rome, aided by Cardinal de *Ste.* Croix, and became the favorite architect of Henry II and Diane de Poitiers. On the death of Henry II he was in disfavor for some time. He began the Tuileries for Catharine de Medici. The Chateau d'Anet, at the com¬

mission of Diane of Poitiers was begun in 1552, and was one of his chief works; another is the tomb of Francis I, at Saint. Denis. Numerous chateaux of France are attributed to him. He wrote a book which was long a high authority on architecture: (Nouvelles inventions pour bien bastir et a petits frais5 (Paris 1561). Critics ascribe a high place to De l'Orme, as one of the chief figures in the French renais¬ sance of architecture. He was strongly na¬ tionalistic in his tendencies and strove to create a distinctive French style. He succeeded in making new adaptations of the Greek forms and paved the way for further innovations. Con¬ sult Vachon, (Philibert de l'Orme5 (Paris 1887).

DELORME, Pierre Claude Francois,

French genre painter: b. Paris, 28 July 1783; d. there, 8 Nov. 1859. He was a pupil and imi¬ tator of Girodet. Among his works are (Death of Abel5 (1810); (Hero and Leander5 (1814);

(Raising of Jairus' Daughter5 (1817), in church of Saint Roch, Paris; (Christ Reappearing5 (1819), in Notre Dame, Paris; 'Cephalus Carried Off by Aurora5 (1882), in the Luxem¬ bourg; (Hector Reproaching Paris5 (1824) ; (Sappho Reciting an Ode to Phaon5 (1833) ; (Eve Plucking the Forbidden Fruit5 (1834) ; 'Magdalen at the Sepulchre5 (1835); Adam and Eve After the Fall5 (1839) ; (Holy Family in Egypt5 (1850).

DELORT, de-lor', Charles Edouard,

French painter: b. Nimes, 4 Feb. 1841; d. 10 March 1895. He was a pupil of Gleyre and of Gerome. Among his works are: (Daphnis and Chloe5 ; (The Stolen Cattle5 (1866), Mu¬ seum of Nimes; Confidence5; (Starting for the Chase5 (1873); (Marauders5 (1874); Em¬ barking of Manon Lescaut5 (1875) ; After Breakfast5 (1876) ; (A Poacher5 ; Admoni¬ tion5 (1880) ; Capture of the Dutch Fleet by the Hussars of the French Republic5 (1882) ; (Return from the Review5 (1884) ; and (Re-turn from Exile5 (1889).

DELOS, de'los (ancient Asteria; Cynthus; Ortygia), the central and smallest island of the Cyclades, in the ZEgean Sea, a rugged mass of granite about two square miles in ex¬ tent. Near the centre of the island is a rocky hill, Mount Cynthas, 360 feet high.

Delos, according to old legends, was raised from the sea-bottom by Poseidon. It was then a naked rock floating about in the ocean, and was accidentally driven by the waves into the centre of the Cyclades. The earth had promised Hera (Juno), with an oath, not to grant a resting place to the fugitive Latona where she might be delivered. The unhappy goddess wandered restlessly over the earth until she perceived the floating island. As this was not stationary, it was not comprehended in the oath of the earth, and offered her an asylum. Here Latona bore the infant gods Apollo (who was hence called Delios) and Artemis (who was called Delia). Both were worshipped on this island. Delos was thenceforth no longer the sport of the winds; it was moored to the bot¬ tom of the Egean with adamantine chains by Zeus, and the fame of the isle spread over the world. Thus far mythological tradition.

At an early period the island, occupied by the Ionians, had kings of its own, who also held the sacerdotal office. In the course of time it came under the dominion of Athens. In 477 b.c. Delos became the common treasury of the league against Persia, but the money was after¬ ward transferred to Athens. In 426 the Athenians purified Delos by removing all the tombs, and thenceforth they prohibited births and deaths from taking place on the island. In 422 they removed all the Delians from the island in order to complete its purification, but soon afterward these were allowed to return. After the destruction of Corinth the rich Corinthians fled thither and made Delos the seat of a flourishing commerce. Delos had a famous temple of Apollo, built of Parian marble, and containing, besides the beautiful statue of the god, a remarkable altar, from which the Delian problem (Doubling the Cube), as it is called, had its name. The inhabitants, having consulted the oracle concerning the remedy for a plague which raged in Delos, were ordered to double the altar of Apollo, which

was a cube. A solution of this problem of the duplication of the cube was attempted in different ways by several of the ancient mathe¬ maticians. The Grecians celebrated the Delian festival here every five years ; and the Athen¬ ians performed annually the pilgrimage called theoria, with processions and dances.

Delos was celebrated in ancient times for the number and the excellence of its artists, and workers in silver and bronze. Cicero, in his oration for Roscius, has many eulogiums upon the fine vases of Delos and Corinth. Delos, called Dili or Sdili, is now without permanent inhabitants; a few shepherds from the neigh¬ boring islands of Mycenos and Rhenea pay it summer visits with their flocks. Some ruins of its former magnificence yet exist. Among these are remains of the temple of Apollo above referred to, of one to Latona, of an amphitheatre, etc., besides a curious primitive temple of Apollo, called the Cave of the Dragon, which is not a real cave.

In 1829 the work of exploration of the ruins began under Blouet; in 1873 Lebegue ex¬ plored the ancient shrine and grotto on Mount Cynthus. Since 1877 the work of excavation, still under French auspices, has proceeded largely under the direction of Theophile Homolle. The procedure has been slow and eco¬ nomical, and the results excellent. Delos is the only ancient Greek city that remains approxi¬ mately intact. It may almost be termed the Greek Pompeii in view of the scientific results which it has yielded. The complete plan of the sacred precinct of Apollo has been recov¬ ered ; together with the theatre, the temple on Mount Cynthus, the temples of foreign gods, and an extensive part of the commercial sec¬ tion of Hellenistic and Roman days. Sculpture of all periods has been found in abundance, as well as inscriptions throwing light on various points of discussiofl. Not the least interesting of the finds has been a series of accounts, pre¬ senting what may be called a balance sheet, which throws ligh(on mundane or financial side of the religious life of the time.

From the ancient mole there is an approach to the precinct of Apollo through an avenue flanked by porticos. The temple of Apollo is the centre of the precinct. It is a Doric work, with 13 columns at either side, and six in front and rear; and having comparatively few sculp¬ tural decorations. It dates from the early 4th century b.c. The

decorative groups on the two gables have been in part recovered, and are now in the National Museum, Athens. To the north ‘of the precinct of Apollo are large remains of the commercial Delos. In the 2d and 1st cen¬ turies b.c., Delos was the chief commercial town of the eastern Mediterranean. The most extensiv*e building in this region is a kind of exchange, with a very large court encircled by apartments. The shore, facing Rhenea, was lined with docks and warehouses. A well of six metres in depth was found filled with tablets of marble and bronze, having upon them 20 ancient inscriptions regarded as of great value. The sanctuaries contain exvotos, stelae, and in¬ scriptions on marble and bronze giving in full detail accounts of the high priests and cata¬ logues of the offerings brought by pilgrims. Streets, gardens, and sewage canalization may be distinctly traced. Interesting private houses have also been discovered. Mention should

also be made of the long and narrow hall, ex¬ tending north and south and entered through a portico at its southern end, having at its north¬ ern end the famous <(altar of horns, ” composed of the horns of the victims and accounted one of the seven wonders of the world. The entire building is often called ((The Sanctuary of the Bulls,® from the design of the capitals of the two columns separating the altar from the re¬ mainder of the hall. Consult Diehl, Excur¬ sions in Greece) (Eng. trans. by Perkins, 1893) ; A. E. Haigh, (The Attic Theatre’ (3d ed., Ox¬ ford 1907) ; Homolle, (De Antiquissimis Dianae Simulacriis’ (Paris 1885) ; Ees archives de l’intendance sacree de Delos’ (Paris 1886) and Exploration archeologique de Delos (parts 1-3, Paris 1910-11) ; Sir R. C. Jebb, (Journal of Hellenic Studies’ (Vol. I, London 1881) ; Lebegue, ‘Recherches sur Delos’ (Paris 1876) and Baedeker’s (Greece.’

DELPHI, the seat of the most famous oracle of ancient Greece, was situated in Phocis, on the southern side of Parnassus. Apollo, ac¬ cording to fable, having killed the serpent Python, and determining to build his sanctuary here, perceived a merchant vessel from Crete sailing by. He immediately leaped into the sea in the form of an immense dolphin (Greek, delphis), took possession of the vessel, and forced it to pass by Pylos, and to enter the harbor of Crissa, not far from Delphi. After the Cretans had landed he assumed the figure of a beautiful youth, and told them that they must not return to their country, but should serve as priests in his temple. Inspired, and singing hymns, the Cretans followed the god to his sanctuary on the rocky declivity of Parnas¬ sus ; but, discouraged by the sterility of the country, they implored Apollo to save them from famine and poverty.

The god, smiling, declared to them the advantage which they would derive from serving as his priests. They then built Delphi, calling the city at first Pytho, from the serpent which Apollo had killed at this place. The oracles were delivered from a cave called Pythipm. Tradition ascribes its discovery to a shepherd who pastured his flocks at the foot of Parnassus, and was filled with prophetic inspiration by the intoxicating vapor which arose from it. Over the cave, which was contained in a temple, was placed the holy tri¬ pod, upon which the priestess called Pythia, by whose mouth Apollo was to speak, received the vapors ascending from beneath, and with them the inspiration of the Delphian god, and proclaimed the oracles (hence the proverb, to speak ex tripode, used of obscure sentences, dogmatically pronounced). After having first bathed herself, and particularly her hair, in the neighboring fountain of Castalia, and crowned her head with laurel, she seated herself on the tripod, which was also crowned with a wreath of the same, then, shaking the laurel tree and eating perhaps some leaves of it, she was seized with a fit of enthusiasm. Her face changed color, a shudder ran through her limbs, and cries and long protracted groans issued from her mouth. This excitement soon increased to fury. Her eyes sparkled, her mouth foamed, her hair stood on end, and almost suffocated by the ascending vapor, the priests were obliged to retain the struggling priestess on her seat by force; then she began, with dreadful howlings, to pour forth detached words, which the priests

collected with care, arranged them, and de¬ livered them in writing to the inquirer. At first the answers were given in verse, or were put into hexameters by priests of the temple who were poets, but in later times, the authority of the oracle being diminished, they contented themselves with delivering them in prose. This oracle was always obscure and equivocal ; yet it served, in earlier times, in the hands of the priests, to regulate and uphold the polit¬ ical, civil and religious relations of Greece. It enjoyed the reputation of infallibility for a long time ; for the Dorians, the first inhabitants of the place, who soon settled in all parts of Greece, spread an unbounded reverence for it. At

first only one month in the year was assigned for the delivery of oracles; afterward, one day in each month ; but none who asked the god for counsel dared approach him without gifts. Hence the splendid temple possessed immense treasures, and the city was adorned with nu¬ merous* statues and other works of art, the offerings of gratitude. Delphi was at the same time the bank in which the rich deposited their treasures, under the protection of Apollo, though this did not prevent it from being re¬ peatedly plundered by the Greeks and bar¬ barians. Although the sanctuary and its treas¬ ures had been almost miraculously preserved from the Persians and Gauls, they were forced by Sulla to contribute to the payment of his soldiers, and Nero removed 500 brazen images from the sacred precincts. Constantine the Great enriched his new city by the sacred tri¬ pods, the statues of the Heliconian Muses, the Apollo, and the celebrated Pan dedicated by the Greek cities after the conclusion of the war with the Medes.

The ancients believed Delphi to be the centre of the earth; this, they said, was determined by Jupiter, who let loose, from the east and from the west, two eagles, which met here. The tomb of Neoptolemus (or Pyrrhus), son of Achilles, was at Delphi, and near it the famous Lesche, adorned by Polygnotus with the history of the Trojan War. In the plain between Delphi and C'irrha the Pythian games were celebrated. These national games, and the pro¬ tection of the Amphictyons, gˆve Delphi a last¬ ing splendor. It is now a village called Castri, near, which the Castalian spring may still be seen.

In 1892 the site of Delphi, until that time occupied by the village of Castri, was purchased by the French government, a new village was established farther westward, and the French School at Athens, under the direction of Theophile Homolle, began important excavations. The entire precinct has been revealed, and, with the assistance of Pausanias' (Itinerary, > many structures have been identified, including the altar, temple, stadium, theatre, treasuries and other buildings. More than 3,000 inscriptions have been found, many of great value for Grecian history. The sculpture discovered con¬ tributes much to the history of art in the late 6th and early 5th century b.c. The ancient wall (the Hellenico), extending east and west, has been recovered in its entire length, and the two boundary walls, climbing the hill at either end of the Hellenico, have been traced. The main entrance was in the eastern of these two walls, and from this the Sacred Way proceeds by a zigzag course to the temple. Just within the

precinct wall, on the northern side of the Sacred Way, stood the large

building dedicated as an offering by the Lacedaemonians after the battle at 2Egospotamos (q.v.). To the west, on the southern side of the way, was the Sicyon-ian treasury, in the form of a Doric temple, distyle in antis. Still further westward, on the same side of the way, is the Cnidian treasury, originally a small marble Ionic temple, distyle, with a sub-structure of tufa. The sculpture from the pediment and frieze of this building, and the fragments of moldings, are of very considerable interest. The structure has been described as perhaps the most nearly perfect extant example of the transitional style of the early 5th century b.c. Here the Sacred Way makes a decided turn ; and further north, but still on the same side of the way, is the Athen¬ ian treasury — a Doric temple in antis , of small size, with a basis bearing the remains of a ded¬ icatory inscription which announces that it was built with the spoils from the battle of Mara¬ thon (q.v.). It was on stones in this treasury that the hymns to Apollo with ancient musical notation were found. Beyond this treasury was the many-fluted ((Column of the Naxians," which supported the colossal marble sphinx, now in the museum.

The site of the temple shows the remains of various successive buildings. Many remains have been recovered of that built by the Alcmse-onidis (6th century), which was destroyed by an earthquake. Some archaic sculptures discovered have been assigned to the gables of this struc¬ ture. The foundations now extant are those of the temple built in the 4th century. No definite information can be gained as to the oracle. The theatre, in the northwest corner of the precinct, dates from the early 2d century and is one of the best preserved in all Greece. The walls and seats of the auditorium remain; there are 33 tiers of seats arranged in seven sets, with a paved longitudinally intersecting passage, or diazoma. Consult the (Bulletin de correspondance hellenique' (Vols. XVII et seq. ; Vols. XVI, XVII, Paris 4893 et seq.) and the, (Comptes rendus de l'academie des inscriptions' (Paris 1893 et seq.) ; Mommsen, ˆelphika' (Leipzig 1878).

DELPHI, Ind., city of Carroll County, of which it is the county-seat, about 20 rpiles south¬ west of Logansport, and 60 miles north by west of Indianapolis; on the Wabash River and the Louisville, New Albany and Chicago, the Wa¬ bash and other railways. The waterpower is excellent. There are lime-works, the lime inter¬ ests being extensive ; besides paper mills, wagon and carriage manufactories, flour and planing-mills and a bent-wood factory. There are mu¬ nicipal waterworks and a public library. 'Pop.

2,161.

DELPHIN CLASSICS (Auctores Classici in nsum Serenissimi Delphini) , a collection of the works of the Latin classic authors, pre¬ pared by order of Louis XIV, at the sugges¬ tion of the Duke of Montausier for the use of the dauphin of France. The Duke of Montau¬ sier was the dauphin's governor, and in making a selection of authors, texts and editors, em¬ ployed the services of Bossuet, <(the Eagle of Meaux,® and Huet, bishop of Avranches, both preceptors to the young prince. This collection of the Latin classics does not comprise all the

works of Latin writers that are extant, and it contains a few authors to whom the title classic can be given only by a very generous interpre¬ tation of the word. A notable omission of a genuine classic is the (Pharsalia) of Lucan, which seems to have been dropped, as having no place in the library of the heir of an absolute monarch. The series was completed in 64 vol¬ umes, 4to, including a dictionary of Antiquities) in one volume. The text is accompanied by copious explanatory notes (in Latin), and, in the case of all poets and of difficult prose writers (Tacitus, for instance), by an interpre¬ tation in easier Latin. . The same is done in the case of all difficult phrases occurring anywhere in the prose authors. The complete works of the several classics, as far as extant, are given ; as well as the spurious works commonly attrib¬ uted to them. A valuable feature of this col¬ lection is the very complete verbal index to the works of each author. In the years 1819-30 Valpy, of London, republished the Delphin Classics, with the whole of the notes and inter¬ pretations, but usually with the texts as amended by later critical research. To the notes of the Delphin edition Valpy added very voluminous Notes Variorum. These last far ex¬ ceed in bulk both the text and notes of the original Delphin Classics. Consult Sandys, (A History of Classical Scholarship) (Vol. II, Cambridge 1908).

DELPHINE, a romance by Madame de Stael, published in 1802. Its bold imagery, keen¬ ness of observation and power of impassioned description, perhaps justify ˆelphineV posi¬ tion among the

masterpieces of French litera¬ ture. But neither situations nor characters are true to nature. The romance had a special interest for Madame de Stael's contemporaries, for several of the great men and women of the time appear in it under the thinnest of disguises. As in the case of ˆCorinne,ˆ the liberal ideas scattered through the story drew down on the author the anger of Napoleon, who ordered her to leave France.

DELPHINIA, a festival celebrated in honor of Apollo (Delphinios being one of his names) at Athens, on the 7th of the month Munychion (April). On this occasion a pro¬ cession of girls bearing garlands marched to the temple of the god to seek his favor more espe¬ cially, perhaps, in the interests of seamen.

DELPHINIDiE, the dolphin family of cetaceans. See Dolphin; Narwhal; Porpoise.

DELPHINIUM, a genus of beautiful annual and perennial plants of the crowfoot family (Ramin culacece) , with large irregular flowers, comprising about 60 species, natives for the most part of the north temperate zone ; some few species are found in the mountains of Mexico. The name is a reference to the sup¬ posed resemblance of the flower to a dolphin. The genus is represented in America by about 25 species, which are known as larkspur, with blue or purple flowers, rarely red or white. The field larkspur (D . ajacis) is found in waste places in southern New Jersey, Pennsylvania and farther southward, naturalized from Eu¬ rope. The cultivated plants have shorter spurs and longer and denser racemes of flowers. The tall larkspur (D . exaltatum) is found in the woods of central Pennsylvania, west to Minne¬ sota, south to Nebraska, northern Alabama and

North Carolina. Other species extend the range of the genus westward across the continent. From the European D. staphisagria, stavesacre, is extracted an alkaloid known as delphinine. The field larkspur is a simple astringent.

DELPHINUS, del-fi'nus (the dolphin), one of Ptolemy's original 48 constellations, situ¬ ated between Vulpecula, Pegasus, Equuleus, Aquarius and Aquila. It has no stars brighter than the third magnitude. The names Sualocin and Rotanev assigned to its stars Alpha and Beta, are merely reversals of the name Nicolaus Venator, an astronomer's assistant, who wished to commemorate himself.

DELPHOS, Ohio, city in Allen and Van Wert counties, situated on the Miami and Erie Canal, and on the Pennsylvania and other rail¬ roads ; about 70 miles southwest of Toledo. The principal industry of the city is the Fort Wayne railroad repair shops. It has marble and granite works, paper and flour mills, brewery and manufactories of galvanized iron products, oil cans, printing presses, furniture, pipe, *etc.* Settled in 1834, Delphos was incorporated in 1851 as a village and become a city in 1913. Its government is administered by a mayor, elected biennially, and a municipal council. It owns the water plant and has a Carnegie library. Pop. 5,745.

DEL RIO, Tex., county-seat of Val Verde County; about five miles from the Rio Grande River; 170 miles west of San Antonio, on the Southern Pacific Railroad. Notable features of the city are the San Felipe Springs, a hospital, two convents and the Federal building. Its industries are those of an agricultural and stockraising region, and it has several small cotton and wool manufacturing plants. Pecans, wool, hides, livestock, fruit and vegetables constitute important exports. Del Rio has adopted the commission form of government. Pop. 10,589.

DELS ARTE, del-sart, Frangois Alexan¬ dre Nicolas Cherie, French educator: b. Solesmes, 19 Dec. 1811; d. Paris, 19 July 1871. He attained distinction as a tenor singer in the Opera Comique, suddenly lost his voice, and thereafter applied himself to musical and dra¬ matic instruction, having among his pupils many who afterward achieved operatic and dramatic celebrity. He was author of several melodies and romances, but his chief work was the elab¬ oration of a system of dramatic expression, by which the voice and entire action of the body were trained by fixed rules. He aimed to make elocution a science. His system, at least in part, has of late been gaining many adherents among elocutionists.

DELSARTE METHOD, a system of physical training for voice and gesture, invented by Frangois Delsarte (q.v.). It is not a method of gymnastics, but a system of~ exercises to gain poise and breath control.

DELTA, the name of the fourth letter of the Greek alphabet, the capital form of which is an equilateral triangle. The name is also applied to a tract of land triangular in shape, generally formed by the deposit of river sediment, espe¬ cially at the mouths of rivers which flow into lakes or seas. A mountain stream changing the force and rapidity of its current upon entering a level plateau deposits at the base of the moun¬ tain sediment which assumes the triangular form

and is called a cone-delta or a fan-delta, or an alluvial fan.

The nature of the current in the body of water receiving the river deposit has much to do with the size of the delta. A swiftly-flowing current or high tides carry off the deposit from the shore line, sometimes forming long coast islands or sand-bars or sandspits, or distribut¬ ing the sediment over the ocean bed ; but slowly moving waters are conducive to large deltas. The almost tideless Mediterranean and Gulf of Mexico have deltas at the mouths of the large rivers which bring deposits to the sea. Usually the finest particles of land waste are swept away by currents, but the rest accumu¬ lates at the mouth of the river and builds up a fan-shaped land mass, or delta, in front of the old shore line. Old rivers that bring down much sediment, may, if the coast is neither up¬ lifted nor depressed, build deltas of great size. In the case of a river emptying into a sea even the fine waste brought down falls to the bot¬ tom before long, as the salts in the sea water precipitate matter in suspension. The river usually enters the sea over the front of its delta by several channels, these branches of the main stream being called distributaries. An excellent example is the way the Mississippi divides up at its mouth. As a large river bringing down waste can build a delta even where waves and tidal currents are active in distributing the ma¬ terial, the absence of a delta at the mouth of a large river indicates generally some recent change of level. Thus the absence of deltas along the Atlantic coast of the United States is due to a slow depression of the coast, still in progress. This submergence of the coast has a tendency to create estuaries at the mouths of rivers. Some notable deltas are those of the Po, Hoangho, Ganges and Niger. As showing how rapidly a delta may grow, Adria in Italy was a seaport in the time of Augustus, but the growth of the Po delta has left it 20 miles in¬ land. The Mississippi delta is advancing into the Gulf of Mexico at the rate of one mile in 16 years. The Mississippi delta is, in area, about 12,500 square miles; that of the Nile about 10,000 square miles. Large rivers fre¬ quently change the channel of their distribu¬ taries, thus making the deltas unsafe for dwell¬ ing places. Consult Geikie, ‘Elementary Les¬ sons in

Physical Geography5 and (Text Book of Geology5 (London 1903) ; Tarr, R. S., Phys¬ ical Geography5 (ib., 1906).

DELTA METAL, an alloy containing 56 parts of copper, 42 of zinc and small quantities of iron, lead and manganese. It is said to be as strong as mild steel, over which it has the advantage of not rusting by exposure to the weather. Delta metal is largely used in Eng¬ land and Germany, especially in shipbuilding, and is also employed in the United States, though to a more limited extent.

DELUC, de-liik', Jean Andre, Swiss geol¬ ogist and meteorologist: b. Geneva, 8 Feb. 1727; d. Windsor, England, 8 Nov. 1817. He passed the first half of his life in commercial pursuits. In 1773, obliged by commercial dis¬ aster to quit his native city, he went to England, was elected a Fellow of the Royal Society of London, and appointed reader to the queen, a situation he held for 44 years. He made nu¬ merous geological excursions in central Europe

and in England, of which he has published ac¬ counts. He enriched science with very im¬ portant discoveries. Among his numerous writ¬ ings are his (Recherches sur les modifications de l'atmosphere5 (1772) ; (Nouvelles idees sur la meteorologie5 (1786) ; 'Traite elementaire de geologie5 (1810) ; and (Letters physiques et morales sur les montagnes et sur l'histoire de la terre et de l'homme5 (1778), the most important of his works, in which he endeavors to recon¬ cile the account of the origin of the earth in Genesis with geological data.

DELUGE (through the French, from Lat. diluvium, ((a flood55). There is scarcely any con¬ siderable race of men among whom there does not exist, in some form, the tradition of a great deluge, which destroyed all the human race ex¬ cept their own progenitors. The classical story of Deucalion and Pyrrha is but a typical ex¬ ample of similar myths found everywhere, and savages and fathers of the Church alike have ar¬ gued that the shells, corals and other marine ob¬ jects often found on the tops of mountains offered distinct proof of the historical reality of a deluge. That the Noachian deluge recorded in Scripture covered the whole earth and destroyed all mankind save one family, was the universal opinion until toward the close of the 18th cen¬ tury. The organic remains, on which the science of palaeontology is now founded, were regarded as its Wrecks, and were held to prove that it had covered every known country, and risen over the highest hills. In the progress of geol¬ ogy, it soon became evident that most of the stratified rocks demanded an earlier origin

than a few thousand years, and the influence of the deluge was consequently restricted to the slightly altered superficial deposits ; but many of these were, after a few years, found to belong to a period vastly anterior to any historical epoch, and to have been produced by long-con¬ tinued and persistent agencies, differing totally from a temporary cataclysm. The story of the flood of Noah, recorded in Genesis vi-ix, is composite, being made up of two independent narratives, the Yahwe and the Elohim. The more common modern opinion regards the flood of Noah as partial and local, although the uni¬ versality seems fairly enough to be implied in the biblical description, and although the old theory has been revived by writers of some au¬ thority, other noted men have argued and main¬ tained the partial character of the flood from the absence of all record of a deluge among the black races of the world, as the negroes and Papuans, asserting that this opinion is quite con¬ sistent with the exegesis of Scripture, with tradition, and the doctrine of the Church, while it is the only theory that avoids all the ethno¬ logical and linguistic difficulties presented by the existence of the great negro and yellow races marked off so distinctly from the Noachian type. The deluge traditions of many primitive races are connected with religious mysteries, and it is scarcely true, as has often been asserted, that it is the Old Testament alone that gives a moral reason for the deluge sent upon the world. The Chaldean account discovered by George Smith presents a striking resemblance to the Genesis story, and agrees with it also m making the flood distinctly a divine retribution for human sin, although it of course differs from the Jew¬ ish account in being polytheistic instead of monotheistic. The vessel in which Xisuthros,

the Chaldean Noah, sails, is a ship guided by a steersman, and others beside his own family are admitted into it. The flood is seven days at its height, and Xisuthros sends out in succession a dove, a swallow and a raven. The ship finally rests on Rowandiz, the highest mountain of eastern Kurdistan, and the peak which supports the heavens, instead of upon Ararat, the north¬ ern or Armenian continuation of the range. Babylonian tradition also confounds Noah with Enoch, for Xisuthros is

taken to the skies immediately after coming out of the ark. Two deluge poems were amalgamated together in an Akkadian epic, in 12 books, describing the adventures of Gizdhubar.

Bibliography. — R. Andre, (Die Flutsagen* (Brunswick 1901) ; Buckland, (Reliquiae Diluvi-anae) ; Howorth, (The Mammoth and the Flood* ; Lenormant, (Histoire ancienne de l'Orient* ; Motais, (Le Deluge Biblique.* Com¬ pare Sayce, (Fresh Light from the Ancient Monuments *; Prestwich, (On Certain Phenom¬ ena Belonging to the Close of the Last Geo¬ logical Period) ; Vail, (The Deluge and its Causes1* (Chicago 1905) ; and for a careful tab¬ ulation of all the deluge stories, Winternitz, in (Mitteil. der anthrop. Gessellschaft in Wien,* 1901, pp. 305-33.

DELUGE TABLET, or DELUGE TAB¬ LETS, the name given to the tablet or tablets (the 11th of the Izdubar Legends) inscribed with cuneiform writing, which being translated is found to contain the Chaldean account of the deluge. Perhaps it may have been originally Acadian. A paper on the subject was read by George Smith, of the British Museum, before the Society of Biblical Archaeology, on 3 Dec. 1872, and a revised translation published in 1874. What Mr. Smith called the Flood-hero was Adra-hasis. In Bablylonian proper names compounded of two elements, either might at pleasure be placed first. Reversing the relative positions of the two elements, the name becomes Hasis-adra, which being imperfectly heard by the Greeks was by them written Xithurus or Xisuthrus.

DELUNDUNG (native name), the linsang or weasel-cat (Prionodon gracilis), a small quadruped inhabiting the vast forests of the eastern extremities of Java and Malacca. It is of , pale yellowish-white color, with elegantly marked stripes and bands of a deep brown. It is allied to the civets, but is destitute of a scent-pouch.

DELUSIONS. A delusion is a mental state in which the mind, reasoning from definite facts, arrives at erroneous, undemonstrable, and perhaps foolish conclusions, and is unable to modify these conclusions, whatever proof may be brought to show their falsity. Thus a pa¬ tient suffering from delusions may read into the actions of others ideas and conclusions relating to himself that have no basis in actual logic. Seeing several people on a corner, a man with persecutory delusions may infer that they are gathering to do him harm, or planning to de¬ prive him of his liberty, *etc.* See Insanity.

DELYANNIS, del-i-an'is, Theodoros,

Greek statesman : b. Kalavryta, Peloponnesus, 1826; d. Athens, 13 June 1905. He entered politics early in life and in his long career held many Cabinet positions. He was Minister of

Foreign Affairs in the provisional government of 1862-63, Minister to France (1867) ; served again in the Cabinets from 1868-78; represented Greece at the Berlin Congress 1878; Prime Minister also from 1885-86 and 1890-92. While Prime Minister for the third time, 1895-97, he brought about the Gneco-Turkish war, whose disastrous result obliged him to resign with his whole Cabinet. He was Premier again from 1902-05. He was stabbed by a professional gambler for the stringent measures taken by him against gambling houses.

DEMADES, dem-a'dez, Athenian orator : d. 318 b.c. Originally a fishmonger, he rose to high places in the republic. He was captured by Philip of Macedon in the battle of Chceronea, but soon set at liberty. He afterward exerted his influence in favor of the Macedonion party at Athens, but betraying Antipater, was put to death by Cassander, the son of the latter. Of his speeches, none have come down to us. A collection of sayings under the title (Demadea* have been attributed to him. Consult Blass, <Attische Beredsamkeit* (Vol. Ill, Leipzig

1887-93).

DEMAGOGUE (from Gr. demos, the people, and agogos, leader, from agein, to lead), one who leads or directs the people in political matters. In its original acceptation it was con¬ sidered an honorable designation, and in this sense Pericles, Demosthenes and Cicero were demagogues. On the other hand, the tanner, Cleon, satirized by Aristophanes in his play of the (Knights,* is a portrait of the personage to whom the epithet in its bad sense is applied. It is a handy nickname to throw at a popular politician with whose views you have no sym¬ pathy. Usually it means an orator or political agitator who curries popularity and power with the masses by pandering to their ignorance or prejudice.

DEMAND, a technical term in law, of comprehensive meaning. When referred to contracts it means a claim, a legal obligation, Its correlative is release, and a release of all demands is a release of all covenants real and personal, whether the conditions are broken or not, of all annuities, recognizances, obligations and contracts.

Demand, in the practice of law, is a requisition made by one individual to another to do a particular thing, namely, pay some debt, fulfil some contract, release ,ome person or property. Demands are either ex¬ press or implied. Sometimes an express de¬ mand is required before action can be taken, in other cases the law requires no more than the demand implied by bringing an action. Whether an express demand is required before a plaintiff can commence action to enforce ful¬ filment of a contract depends upon the express or implied stipulations of the parties to the contract. When no date is given in a contract for its fulfilment, whether in the case of a promissory note, or in the contracting of a debt, the payment of the obligation is due on the present day, or immediately on demand. It is requisite, in some cases arising ex delicto, that is, in some criminal cases, to make a de¬ mand for the restoration of the right before the commencement of an action, or, for instance, when the wife or other member of the plain¬ tiff's household has been enticed away, in order

to constitute the party a wilful wrongdoer, a demand for restoration must be made. When property lawfully obtained possession of is un¬ lawfully detained, or converted, a demand for the delivery of its possession to the owner is requisite before an action can be laid. When an order to pay, or to do something has been made a rule of court, a demand for the pay¬ ment of the money, or performance of the thing must be made before an attachment will be made for contempt. In like manner, before action can be taken for breach of promise of marriage, a demand for marriage must be made by the plaintiff, unless the defendant has mar¬ ried another person, or has refused to marry at any time. See Contract; Recognizance; Release.

DEMAND AND SUPPLY, in political economy, the desire for services or utilities on the one hand, and the production or offer of them on the other, which tend to complete an act of exchange. Demand is therefore the amount of a commodity that will be taken at a given price ; supply the amount that will be offered at a given price. Demand is commonly said to be relative to supply, but in reality it is

reciprocal to it. Certain political economists qualify the term demand by the word effectual, but it is scarcely necessary to make such a limitation. A mere desire for objects has no commercial significance, but that desire simply which contemplates a mutual benefit. Thus the wish of a beggar to possess a diamond cannot affect the price of the article, as he can offer no desirable object in return. The intensity of demand, and the consequent effect upon values, will be proportionate to the necessity which exists for satisfying the demand. Different rules, therefore, will apply to the increase of price consequent upon increased demand and reduced supply in articles of voluntary use, and to the same rise in price when affecting articles of necessary use. The demand for the latter class of utilities is constant, and a deficiency in supply cannot be met by abstinence, except to a scarcely appreciable degree, whereas any con¬ siderable deficiency in the supply of articles of voluntary use is to some extent met by economy. Prices will, therefore, increase in different ratios according to the degree in which the commodities demanded are necessary or con¬ venient. Thus the price of grain may rise, in the case of a bad harvest, from SO to 100 per cent; cotton or wool, in similar circumstances, would certainly fluctuate, but not to anything like the same extent ; wine would vary in price least of all ; the deficiency in the last two com¬ modities being artificially restored by the de¬ crease of demand consequent on economy and abstinence. In recent economic theory the law of demand and supply is accepted as a pre¬ liminary step, but chief interest is held to cen¬ tre in the forces underlying demand and sup¬ ply, such as cost of production, *etc.* See Political Economy.

DEMARATUS, Spartan king. He suc¬ ceeded his presumed father, Ariston, about 516 b.c. ; but lost the throne, partly in consequence of a quarrel with his colleague Cleomenes, and partly on account of doubts which had been cast upon his real parentage. He retired into private life; but having afterward become a magistrate, was sitting in that capacity at the

Gymnopaedian games when Leotychides, who had supplanted him as king, sent tauntingly to ask him how he felt in a secondary place after having occupied the first. The boldness of his reply forced him to take flight, and he passed over into Asia, where he was well received by Darius. He afterward accompanied Xerxes as councillor on his expedition against Greece.

DEMARCATION, Line of, the boundary established 4 May 1493 by Pope Alexander VI, who assigned to Spain all the lands she had dis¬

covered or might discover west of a line run¬ ning from the North pole to the South, distant 100 leagues west of (<any of the® Azores and Cape Verde Islands (provided such lands had not been in the actual possession of any other Christian king or prince up to the preceding Christmas), and to Portugal, on the same con¬ ditions, all the territory she had discovered or might discover east of the said line. The gov¬ ernments of the peninsula held that the Pope had sole and absolute authority to dispose of all countries inhabited by heathen peoples; moreover the papal bull inter ccetera of 4 May 1493, forbade all persons without special per¬ mit to go (<for the purpose of trade or any other reason® to the islands and mainlands thus granted exclusively to Spain and Portugal. After this territorial concession had been made, Portugal's possessions in the eastern hemi¬ sphere Were called the East Indies, and those of Spain in the western hemisphere were called the West Indies. An extension of the papal gift of the Indies was made in the bull dated 25 Sept. 1493. A dispute arising in regard to the position of the line of demarcation, the two countries concerned sent commissioners to the Spanish city of Tordesillas, and on 7 June 1494 the commissioners agreed that the line should pass, north and south, 370 leagues west of the Cape Verde Islands. On the strength of this agreement, Portugal claimed and secured the eastern part of South America (see Brazil) After the Victoria returned to Seville (1522) from her voyage to the Moluccas, and so round the world, the Portuguese accused their rivals of having broken the treaty of Tordesillas. The Spaniards in reply said that the Spice Islands (Moluccas) were not within the limits of the Portuguese territory. To settle this im¬ portant dispute, a congress was convened at Badajoz in 1524. Commissioners of both coun¬ tries were in attendance — Fernando Columbus, Sebastian Cabot and others. The two main points to be decided were: (1) Whether the line of demarcation should be drawn at the stated distance west of the western or eastern limit of the Cape Verde Islands; and (2) where it would pass on the opposite side of the earth. This Badajoz junta failed to come to an agreement <(owing to the Portuguese ex¬ perts, who could not overcome this dilemma : If the line was pushed more to the west, Portu¬ gal would gain a greater part of Brazil ; but she might lose all rights over the Moluccas, as the line, of course, had to be carried to the other hemisphere as well.® The treaty of Vitoria, signed 19 Feb. 1524, provided that, inasmuch as some doubt existed between the sovereigns of Castile and the king of Portugal as to the possession and ownership of the Moluccas, there should be appointed by each one of the parties to the treaty ((three astrologers and three pilots, and sailors, for the determination

of the demarcation.® A treaty negotiated at Saragossa and signed by representatives of the Spanish and Portuguese monarchs 22 April 1529 fixed the line of demarcation 29 7*/2 leagues east of the Moluccas, Spain selling for a stated sum whatever rights she had formerly claimed to possess in the Spice Islands, and agreeing for the future practically not to colonize, and expressly not to ((trade there in any manner whatsoever.® It did not seem necessary at that time to raise the question as to the location of the line in the New World, though it is plain that if the circle thus "determined from pole to pole® in the east had been logically completed, Portugal would have been excluded from the South American continent. The bearing of this matter upon Spanish rights in the Philip¬ pines is of special interest. The Molucca Islands, the Philippines, and, indeed, the western half of Australia lay within the Portuguese as¬ signment, as a matter of fact. Therefore the principal Spanish settlements and explorations in the Far East appear to have been made in contravention of Portugal's treaty rights. A dispute over the southwestern boundary of Brazil in the 18th century resulted in the abro¬ gation of the line of demarcation and all agree¬ ments based thereon by a treaty of 1750. This treaty was also abrogated in 1761 and all dis¬ putes involved were at length settled by a new treaty in 1779. The other nations of Europe paid little regard to the papal bull. Consult Blair and Robertson, (The Philippine Islands,* (Vol. I) ; Harrisse, (The Diplomatic History of America* (New York 1898) ; Dawson, (The Line of Demarcation of Pope Alexander, *etc.*

with an inquiry concerning the Metrology of Ancient and Mediaeval Times, *(in Proceedings of Royal Society of Canada, 1899) ; Bourne, (Essays in Historical Criticism* (New York 1901).

Marrion Wilcox.

DEMAREST, William Henry Steele,

American educator: b. Hudson, N. Y., 12 May 1863. He was graduated at Rutgers College in 1883 and from the New Brunswick Theological

Seminary in 1888, when he was ordained minis¬ ter of the Reformed Church in America. He held pastorates at Walden, N. Y., 1888-97, and at Catskill, N. Y., 1827-1901 ; in the latter year he was appointed professor of church history of New Brunswick Theological Seminary. In 1906 he was made president of Rutgers College.

DEMAS, a fellow-laborer with Paul and mentioned in the New Testament three times. (Col. iv, 14; Philemon xxiv; 2 Tim. iv, 10). In the last passage he is described as having deserted the Apostle in his hour of need, when Paul was waiting for his trial before Nero, because “he loved this present world.® He went to Thessalonica which may have been his home town, it is thought. He probably never returned to his faith, for by tradition he is classified among the apostates to the faith. John Bunyan uses his name -and character as a warning in his (Pilgrim’s Progress.* The word Demas-like, is a word applied to a traitor who is tempted by his greed to desert his good cause.

DEMAVEND, dem-a-vend’, a volcanic mountain, now extinct, of Persia, and the high¬ est peak of the Elbruz chain, 45 miles south of the Caspian Sea, and about 40 miles northeast

of Teheran. Its height, according to the most reliable measurement, is 18,464 feet. At a dis¬ tance the mountain has the form of a smooth cone, and appears to slope evenly from top to bottom at an angle of 45 degrees. The cone terminates in a crater of 85 yards in diameter, and is nearly surrounded by jagged rocks, com¬ posed partly of basalt and partly of limestone and sulphur. This sulphur is an article of commerce. The basin within is almost entirely filled with snow. Around the base are many hot springs. William T. Thompson was the first European to ascend Demavend (1837).

DEMBEA, dem’be-a or dem-be’a, or TZANA, a lake of Abyssinia, in the western part of the country. It is about 50 miles long and 6,000 feet above the level of the sea. It contains many islands, one of which is a place of confinement for state prisoners. The Bahr-el-Azrek, the Abyssinian Nile, flows through it.

DEMBINSKI, dem-ben’ske, Henryk, Polish general : b. Strzalkow, near Cracow, 3 May 1791 ; d. Paris, 13 June 1864. Entering the Polish army in 1809, he aided in the French invasion of Russia three years later and was made captain by Napoleon at Smolensk. In the year 1825 he became a member of the Polish Diet, where he cast in his lot with the opposi¬ tion party. On the outbreak of the revolution in that

country (1830), he was made brigadier-general, and in the following year was nomi¬ nated governor of Warsaw and commander-in¬ chief of the Polish army. On the fall of Warsaw in September into the hands of the Russians, Dembinski made his escape to France. From 1833-35 he was in the service of Mehemet Ali of Egypt. The Hungarian Revolution of 1849 once more offered him a field for his ac¬ tivity, and he was appointed by Kossuth com¬ mander of the insurgent troops. He had the misfortune to lose the battle of Kapolna, and resigned his command, but consented to act under Gorgei. A,fter the capitulation signed by the latter at Villagos, and the resignation of Kossuth, Dembinski fled to Turkey. He re¬ turned to France in 1850 and began his (Memoires) of the Hungarian War. Consult Dan-zer, (Dembinski in Ungarn* (Vienna 1873).

DEME, dem, a subdivision of ancient Attica and of modern Greece. The demoi were townships or hundreds, subdivisions of the phulai, and were equivalent to the Dorian komai, Latin pagi. The word really meant a country district, or a common name for divi¬ sions of the country, and in the time of Herod¬ otus they were 100 in number in Attica (10 in each phule), afterward 170; their origin was commonly referred to Theseus. The govern¬ ment of the deme was by a presiding officer, treasurer, controller and assembly which carried on the public business of the deme. Membership was hereditary, regardless of the location of the actual residence of the member. The word demos early came to be applied to the com¬ mon people, and survives significantly in our “ democracy and demagogue .® Consult Leake, (Demes of Attica) (London 1820).

DEMENTIA PRECOX, a term used in psychiatry to designate a disorder group char¬ acterized by certain types of mental deteriora¬ tion or disintegration. This term originated with Kraepelin, professor of psychiatry at Munich. Clouston of Scotland termed the dis-

order the ((insanity of adolescence,® and Bleuler of Zurich has used the term “schizophrenia.® Thus from the terms alone a brief description can be formulated — a mental disorder, chiefly occurring in adolescence or young life, char¬ acterized by a splitting of the psyche “schizo¬ phrenia,® and usually leading to a precocious dementia, or mental breakdown. This mental disorder is the most frequent of all of the psychoses, constituting fully 30 per cent of the admissions to hospitals for mental diseases. In some individuals it runs a comparatively mild course — recovers, or becomes chronic, this last individual being called ((eccentric,® “bizarre® or ((very peculiar.® On the other hand it may run an exceeding violent and furious course — the patient being wildly maniacal, with active delirium accompanied by hallucinations. These patients may die in a delirium from exhaustion or they recover — or the process quieting down leads to a more chronic mild deteriorating proc¬ ess, marked by episodes or outbursts of unruly or disorderly conduct. These types of chronic de¬ mentia precox cases make up the vast majority of the mentally ill in the State hospitals for the insane of the country. The chief feature that characterizes dementia precox is the tendency for the patient to make use of autistic think¬ ing. That is the individual withdraws his interest from the external world [introverts] and constructs a phantasy world into which he tends to withdraw more and more. At first this type of thinking detaches him only partially from the world of reality. He is able to come out of his ((day dreaming® as it were — but as the introversion of his phantasy life becomes more and more pronounced the splitting between his phantasy world and the real world becomes too great to be bridged. When this occurs the individual is ((sick.® The early stages of this process are marked by a lack of interest taken by the potential schizophrenic in his surround¬ ings. He is apt to lie in bed all the morning or all day, uninterested or only mildly inter¬ ested in the newspapers or books. He fails to move about or does so in a listless halfhearted manner. There is a failure of voluntary at¬ tention and a lack of sociability. There may be some keenness of interest but it is largely on the internal phantasies. Hence they seem heedless of what is going on about them, may lose themselves in their abstractions, may wander about aimlessly. In this stage many take up

a tramp or hobo existence and are able to get along in this haphazard, indifferent, lazy sort of manner, without many obligations and living from hand to mouth. In others there is a greater disintegration — the lack of unity of the personality commences to show in the development of certain trends which have been called the [a] hebephrenic, [b] catatonic and [c] paranoid types of the disease process, [a] The hebephrenic types show a gradual dilapida¬ tion of interests. They make up the simpler types of the disease. They show a number of addi¬ tional somatic or bodily signs. Headaches are frequent, irritability and failure of concen¬ tration, with gastro-intestinal disturbances, are prominent. They sleep badly and in this phase are often diagnosed by the unskilled physician as subjects of “nervousness ,® or “neurasthenia® or “nervous breakdown.® Some are mistakenly treated for “stomach trouble,® or other bodily disease until the mental disorder passes into a

further stage of evolution. These patients then are apt to develop “flurries.® They be¬ come excited, confused, congested. They do not sleep, cannot work, go aimlessly here or there, become fussy, possibly go on a “tear® — get intoxicated, create a disturbance, commit some moral infraction or sexual delinquency and land in the police station or hospital where the mental nature of the difficulty may be ap¬ parent. All this may have been in the making a month, a year or two — each individual case varying greatly. Depression or silly conduct may mark the gradual development of these breakdowns. The ideas which some express become more and more bizarre. They fre¬ quently hear voices — are having telepathic com¬ munications. Some of these patients believe themselves clairvoyants, can read the stars, or what people are thinking. The train of thought commences to get loose, they commence to be¬ come foolish or fantastic in their speech. They repeat things over and over again. They nearly all become resistant and negativistic — they are all “from Missouri.® One offers to shake hands, they pull back. “Show the tongue !®, as a re¬ quest of the doctor, is met with shut teeth. If they talk much they later tend to develop a gibberish all of their own. A “word salad® is a type of this which consists of a regular hash of different ideas, all of which may be ex¬ pressed in the most matter of fact and ap¬ parently sensible manner. The patient acts as if it were quite logical. These simple demented and hebephrenic types go on to delusional ex¬ pressions of a most bizarre type. These de¬ lusional ideas are often based upon the halluci¬ natory voices or feelings. These are all in¬ ternal wishes — their own phantasy formations — but which are referred to their organic sensa¬ tions or to the external world. They project their

wishes upon the body or externally upon people. Thus a strong desire to masturbate will be in¬ terpreted as some one else putting the X-ray upon the genitals. Other types of misinterpre¬ tation are frequent. These hebephrenic types gradually get more and more involved in them¬ selves and finally are found in institutions sitting about the wards, muttering to themselves, or monotonously walking up and down, grimacing or gesturing or making some bizarre series of movements. They are unapproachable, their detached personality is inaccessible to ordinary modes of contact and they live a life apart from the rest of the world. They carry out the idea of the old Greek philosopher, Protagoras, who said "It is only when we do not act at all we can differ utterly from all others and live our own private life apart.® These patients have separated themselves from the social herd and live in their own phantasies. From the ex¬ ternal point of view, and from the standpoint of logical thinking, their productions are meaningless and "crazy,® but if one can get within the wall of their phantasy life, one can learn that from the ego point of view their system is quite logical. It is like a foreign lan¬ guage they use which if the key be found, the thought life of these patients can be interpreted and may be adjusted to reality — especially if they are studied before the fragmentation of the personality has gone too far. [b] In the catatonic types the symptoms just described are also found — but in addition there is a greater amount of motor activity. The muscles are

more tense. The patients hold themselves stiffly. They stick out their chests, or hike a shoulder, or constantly show unique or queer mannerisms. Some will stand in one position for hours, days or even weeks. Some patients are known to lie rigid in bed for years, not moving — stomach tube fed, mute and abso¬ lutely resistant and with eyes closed, oblivious to everything, heat or cold, hot irons or ice, no amount of torture can make them move. In the days of the mediaeval tests for witches or devils some of these patients stood most sur¬ prising tortures without flinching. They will say the same thing over and over again — ((Locks and keys — keys and locks — locks and keys — keys and locks® one patient will repeat six to seven hours without cessation. Some walk backward and forward a certain invariable number of steps — ˆStereotypy.® Again the catatonic type of patient will become violently excited, rush aimlessly here and there, into things, through windows, pound on doors, or attack people with chairs or sticks with enor¬ mous violence. This fury may be frightful, occasion a high temperature and a host of physi¬ cal symptoms, or the patient will go into a stupor and lie comatose for weeks or months — abso¬ lutely negativistic to every call of nature, refuse to empty their bladders or move the bowels. Saliva may accumulate in the mouth and even decompose without their regard. In a few cases, after it may be months of stupor, these catatonics will suddenly get up, appear per¬ fectly normal and, surprising as it may appear, may know everything that happened about them for months, during which time they lay ap¬ parently oblivious to their surroundings. More often, however, they pass into a chronic stage of dementia or die from an acute meningeal suf¬ fusion — ((Catatonic brain death.® [c] The paranoid forms seem to come off the best in their conflicts. They split the least as it were. They construct a fairly logical system of de¬ fense. They find an external cause for their internal wishes and by this projection mechan¬ ism are able to get along fairly well in the social world. Only when they commence to react violently to these external sources of irritation are they made the subjects of detention, of in¬ carceration. A large number of mild types are to be expected. Many inventors, reformers, re¬ ligious zealots, quacks, litigious and vindictive individuals approach this group or slide into it in varying degrees. Most frequently the delu¬ sional attitudes are sexually colored. The most common is that certain men or women are fol¬ lowing them or conspiring against them to ruin them, or degrade them. Various secret so¬ cieties are banded against

them. Cliques and political parties are hampering their activities. Certain of these patients are constantly seeking vindication for certain fancied wrongs. Their reputations are being assailed and they must protect them. Others must right all the wrongs of others, especially political wrongs and hence become assassins or regicides, *etc.* Others are religious fanatics and would make what is symbolic, real. To take the blood of the (<Savior,® in a symbolic sense, is not sufficient. They must have actual blood and hence kill to satisfy their pathological sadistic wishes. Cer¬ tain sadists and masochists belong in this para¬ noid type of dementia precox. These are often remarkable for their apparent lucidity of

thought and clear logical capacities. In the paranoid type the fragmentation of the person¬ ality is the least marked and hence there is a greater coherency of the personality. Thus many of this type of mentally disordered indi¬ viduals are rarely recognized by the layman to be sick. They are often thought of as difficult people to get along with, especially in the family circle, but to the average outsider they are rarely considered sick. They may even occupy important positions in the community and yet be very seriously and severely sick. Under the term <(monomania® a number of this type were classed by former students of mental disorders.

Nature of Dementia Precox. — From this abbreviated description it may be pointed out that it presents correlations on the one hand to the more distinctly so-called psychogenic types of disorders, such as the psychoneuroses, and on the other hand to many of the more distinctly somatic diseases, (various chronic disorders). It is possible to formulate the mental symptoms in a way that they are formulated in the psycho¬ neuroses. The mental symptoms are capable of interpretation at a psychological level. On the other hand, it can be seen that recent in¬ vestigations are tending to show more and more that there are distinct biochemical disturbances during life and pathological changes are being found after death. In any case the acute cases that lead to death must be conceived as having profound bodily changes correlated with psychi¬ cal symptoms. The formulation of the disease process from either standpoint alone must of necessity be unsatisfactory. For example, the toxic theory of the etiology fails to give a comprehensive idea of why the mental mani¬ festations take the particular form they do, why for example, an hallucinatory voice which a patient heard should be that of a young woman whom the patient had seduced, <(telling him to lead a decent life.® This is the patient's self-critique appearing in hallucinatory

form. It would seem, that when the type of splitting of the personality is very severe then the term dementia precox or schizophrenia applies. It is possible that the. somatic processes, whatever they may be, aid in this deeper regression to the infantile and the archaic in the individual and therefore have been less efficiently sub¬ limated and thus permit the older phylo¬ genetic thought symbols to appear in conduct. At any rate, it seems quite evident that the greater difficulty of conception here is due in part to the quite arbitrary separation of the individual into two distinct and mutually ex¬ clusive parts, namely mind and body. The dualistic hypothesis that conceives of the mental and the physical going side by side without mutual interference or interaction is responsible for such a conception. From the medical stand¬ point such a concept seems entirely unnecessary, for one is met at every turn with the intimate relations constantly maintained between the body and the mind, and therefore comes natur¬ ally to consider the human being as a biological unit presenting types of reactions that at one extreme are predominantly psychic, while at the other they are predominantly physical, but which present every grade of intermediary type. The severe mental disturbance of the nature of anxiety that goes with certain cardiac and pul¬ monary diseases is well known, as are also the physical upsets, particularly the gastro-in-

testmal, that are associated with certain mental conditions such as worry. The interrelations between the mental and the physical are a matter of daily observation. Occasionally, however, they are very pronouncedly empha¬ sized. The following case, cited by Jelliffe and White, is an instance. ((A chronic patient who had been for many years in a hospital, working daily at outdoor labor, was suddenly seized with a violent impulse in which he attacked all about him. He seized a heavy iron bar, killed two people and injured another, and ran head¬ long and wildly without direction into the woods. He was finally cornered, and in the process of securing him he was shot by a farmer with a load of buckshot, none of which, however, penetrated farther than through the skin and produced no serious wounds. He was brought back to the hospital, incoherent, mumbling and trembling, showing all the evidences of a tremendous emotional upset. The shot were picked out of his skin, the wounds were dressed and he was put in bed. Up to that time he had been a strong, physically

healthy negro. He never left his bed again, and approximately a year afterward he died, having developed an acute tuberculosis. Such cases as these demonstrate the necessity of considering the human being as a unit and not endeavoring to draw hard-and-fast lines of distinction between the mind on the one hand and the body on the other.® In the pres¬ ent state of knowdedge, however, one is often unable to make any specific correlation be¬ tween the physical findings and the mental symptoms, while on the other hand it is quite possible to express the symptomatology of the disease, to describe it, to, so to speak, recon¬ struct the psychosis purely in psychological terms. For the present, therefore, the disease must be described psychologically, and the ex¬ planation of the mental symptoms must be sought psychogenetically, without, however, forgetting that there are certain somatic changes which are pretty generally attached to the symptomatology of the disease process and which must ultimately be made to fit into the general rubric before a complete understanding of the entire situation is had. On the psycho¬ logical side, then, dementia precox is seen to be a certain type of reaction to a mental con¬ flict, resulting in a splitting of the psyche and the outcrop of unconscious mental trends to the surface of the mental life. The patient is confronted with a situation to which he can¬ not quite adjust himself which is absolutely in-acceptable and impossible, and he is therefore driven away by his incapacity to assimilate it and cast back upon himself. The battle of the opposing forces produces the disease picture which is the outward evidence of the effort on the part of the individual to reach a solution of the difficulty. The symptoms are the result of the appearance of the unconscious trends distorted and disguised as they are in dream formations. Jung has especially noted this similarity to the dream state and would con¬ sider dementia precox as a sort of waking dream or dream from which the patient does not awake, the dream picture being fixed as it were.

The psychological side of the situation, how¬ ever, as may be seen is not all. There are cer¬ tain physical changes in the course of the dis¬

ease and certain pathological findings. So far as the observation goes, however, the etiological factors lie almost, if not quite entirely, in the mental sphere, and one must therefore con¬ ceive of the physical changes as superadded. This is a possibility which was well illustrated by the case already quoted of the man who died after a tremendous emotional explosion, during which he killed two people. When the psychic splitting is profound and when it is of considerable duration, it is quite understandable that it should unloose bits of physiological

mechanism and thus produce the physical changes found. From the descriptions of the mechanisms in the psychoneuroses, taken in connection with what is known of the vegeta¬ tive nervous system, it may be seen that con¬ stantly operative psychic disturbances are capa¬ ble of producing the physical changes.

Ways of Getting Well.— With the concept of the disease process which has been previously elaborated, what is the significance of the three main types of precox which are found clini¬ cally? Bertschinger has recently made an ad¬ mirable study of the process of recovery in dementia precox and his discussion of the nature of the conflict and the ways of adjusting is particularly illuminating. The three clinical types of the disease are the expression of the interplay of the two factors, the conflict and the reaction, the severity of the former and the efficiency of the latter determining the outcome in the individual case. The degree of confusion in the acute onset is an expression of the com¬ pleteness with which the patient is driven back from reality and the dominance of the uncon¬ scious trends. Conditions of moderate confu¬ sion with capacity for adequate reaction to reality at times, or under the special stimuli of, for example, questions, show that the patient still has a certain grip upon the real world and is making an effort at least to retain it. Cer¬ tain other cases of quite clear consciousness with complete orientation show a very adequate grasp upon reality, and these patients, to the casual observer, often seem quite natural. In such patients, however, one will notice inter¬ ference of thought, hesitations in the course of conversations, stutterings and stammerings over certain points, the evidences, in other words, of complex interferences, and the patients will complain that from time to time their minds seem to be absolutely blank. These saltatory associations and thought deprivations are the expressions of reactions to buried com¬ plexes, so that in these patients there is a fairly adequate grasp upon reality for ordinary pur¬ poses at least, with only spasmodic influences from relatively restricted areas. In general, then, the hebephrenic type may be seen to be a reaction to the conflict which is essentially inadequate and inefficient. In the acute stages the patient may be absolutely overwhelmed by the conflict, disoriented and confused. Later on the progressive disintegration and dilapida¬ tion of thought indicates the slowly progressive conquering of the capacity for adjustment to reality by the invasion into consciousness of the unconscious trends. The catatonic type repre¬ sents a somewhat different form of reaction. Here the patient is oftentimes suddenly over¬ whelmed by the conflict, as under circum¬ stances of accident or sudden and severe shock. No attempt at adjustment is made at first, but

the whole situation is actively and definitely shut out. Here there is an active effort on the part of the individual to exclude the offending tendencies, and when this succeeds recovery takes place as the result, so to speak, of the encapsulation of the objectionable material, and its exclusion from consciousness. This form of the disorder is the most acute, and the re¬ covery is equally most apt to be prompt, and it will be seen from this explanation why this is so. In the paranoid form of the disorder the reaction is much more efficient than in the hebephrenic variety, and in some respects less efficient than in the catatonic. Here the indi¬ vidual takes a flight into a psychosis, and the delusions are the expression of a compromise between the opposing psychic trends. Unable to live in the real world, the patient succeeds in inventing a world in which he can live, and having invented it he succeeds in getting along fairly well without noticeable deterioration. The conflict in these cases tends to become sta¬ tionary after the development of the delusional world. Bertschinger has more especially de¬ fined the ways of getting well by pointing out that the patient in recovering may, as a result of the conflict which he cannot adjust, find a compromise by changing himself and inter¬ preting the world of reality in terms of his morbid phantasy, or by translating the world of his phantasy into terms of external experience. And so one would find on the one hand delu¬ sions of grandeur which are a compromise formation and serve to change the individual so that he may be better satisfied with life, and on the other hand one finds delusions of persecution, the delusions of influence from the outer world, that serve to change the outer world in conformity with the patient's com¬ plexes. These outside influences are but the reflections back upon the patient of his failures to get from the world what he wants, and they are consequently felt as malign and destructive influences. Another method of getting well is that already described of the catatonic, the shutting out and walling off of the conflict in a circumscribed forgetfulness. In many cases conversions into bodily symptoms, such as are found in hysteria, are found. Another method of getting well is by living through a series of imaginary experiences which brings the com¬ plex to a logical conclusion. For example : A young Japanese

woman was overwhelmed by the sad news that five members of her family had been killed in battle. She passed instantly into a dreamy state of consciousness, went on with the work of the household just as if all five were members of it, made their beds, set their places at table and acted in every way as if they were alive and present. Finally she, so to speak, let one of them die and then another and another until finally she had com¬ passed the death of all five, after which she awoke from her dream-like state and was well. She had succeeded in an efficient reaction to the situation by its attenuation, extending it over a considerable period of time. Finally, a cer¬ tain number of patients get well by the final domination of the reality motive, with a result¬ ing correction of their delusional phantasies. These patients are best helped by psychoanaly¬ sis when they are capable of establishing mental contacts with the physician. As a rule they are treated foolishly for bodily diseases too long

and the mental disintegration goes too far for possible skilled intervention. They then are left to their own devices. Appendicitis used to be treated in this way for centuries, but now prompt surgical intervention saves thousands of lives. Early psychoanalytic treatment will help the dementia precox patient. Consult Jelliffe and White, (Diseases of the Nervous System) (2d ed., 1917) ; Bleuler, (Die Schizo¬ phrenic* (1911).

Smith Ely Jelliffe.

DEMERARA RIVER, British Guiana, rises in the unexplored mountains of the in¬ terior, flows northward and empties into the At¬ lantic at Georgetown. It is navigable for small vessels to a point about 150 miles above its mouth. The estuary of the Demerara forms a moderately good harbor. See Georgetown.

DEMESNE, d$-men’, or DOMAIN (in

French domaine), in its popular sense, denotes, under a feudal aristocracy, the lord’s domain, his manor place, with the lands thereto belong¬ ing. In England the demesne of the Crown de¬ notes either the share reserved to the Crown in the distribution of landed property at the time of the Conquest (ancient demesne), or such as came to it afterward, by forfeitures or other means. They are at present contracted within a very narrow compass, having been almost en¬ tirely granted to private subjects. The rents and profits of the demesne lands of the British Crown are no longer kept separate, but are in¬

corporated with the ordinary revenue. See Civil List.

The alienation of the domains in France, ren¬ dered necessary to reward powerful supporters, was the main cause of the fall of the Carlovingian dynasty. The succession of the Capets was likewise due to their great possessions, which rendered them the most powerful nobles in France. The policy of this house, particu¬ larly of Louis XI of the Valois branch, in despoiling the great nobles, made them at length absolute masters of the kingdom, although at first their authority, beyond their own domains, was very feeble. The despotic power of the French monarchy reached its climax under Louis XIV, the most powerful of the Bourbon branch of the family. The nobility had now lost nearly all its feudal privileges, and could easily be re¬ warded by places at court, appointments in the public services, and pensions out of the national revenue. Napoleon, who endeavored as much as possible to revive the traditions and institu¬ tions of the monarchy, had also a domaine ex¬ traordinaire (law of 30 Jan. 1810), which con¬ sisted of his acquisitions by conquests, and were kept entirely at his disposal; these supplied the means of donations to his generals, *etc.* The domaine extraordinaire was likewise retained by the Bourbons (law of 22 May 1816). The administration of these donations was conducted with great wisdom; and Napoleon, as Las Casas relates, dwelt with pleasure on this branch of his government.

DEMETER, de-me'ter, one of the twelve principal Grecian deities, the great mother-god- dess, the nourishing and fertilizing principle of nature. She was the daughter of Cronos and Rhea, and mother of Persephone (often called Cora, the Maiden, the Proserpine of Roman mythology), and according to Hesiod, of Di¬ onysus (Bacchus). By the Romans she was

identified and worshipped with Ceres. See Ceres.

DEMETER, Dimitrija, de-me'ter, de-me- tre'zha, Croatian dramatist and poet : b. Agram, 21 July 1811; d. there 24 June 1872. His prin¬ cipal dramas are: <Love and Duty) ; 'Blood-Revenge*; and the

tragedy <Teuta.) He wrote a lyro-epic poem, 'The Battlefield of Grobnikp and several stories. He translated several for¬ eign dramatic works into Croatian.

DEMETRIUS I, surnamed POLIOR-CETES, king of Macedonia : d. Pella, Syria, 284 b.c. He was defeated at Gaza by Ptolemy in 312, and shortly after defeated Cilles in Syria. He appeared before Athens with a fleet, and restored to the people their ancient form of government (307 b.c.). After defeating Ptolemy in a naval battle at Cyprus he at¬ tempted to besiege Rhodes, but was unsuccessful. Having lost the battle of Ipsus against Seleucus, Cassander and Lysimachus (301 B.c.), he fled to Ephesus, and passing over to Corinth, em¬ barked on an expedition against the Thracian dominions of Lysimachus. He then went to Asia, to bestow his daughter Stratonice in mar¬ riage on Seleucus, and on his way took posses¬ sion of Cilicia, by which his friendship with Seleucus was broken off. He conquered Mace¬ donia (294 b.c.) , and reigned seven years, but lost this country by his arbitrary conduct. He surrendered to Seleucus and remained his pris¬ oner for the rest of his life.

DEMETRIUS II (called «Nicator»), king of Syria : d. 126 b.c. Ptolemy Philometer, king of Egypt, placed him on the throne of his father, after expelling the usurper, Alexander Balas, 146 b.c. He married Cleopatra, the wife of the same Alexander, and daughter of Ptol¬ emy. About 138 he was defeated and taken pris¬ oner in an expedition against the Parthians. Restored to his throne about 128 he was over¬ thrown by a pretender. He committed suicide at Tyre.

DEMETRIUS, or DMITRI, a series of impostors who usurped supreme authority in Russia, and led to some of its remarkable revo¬ lutions. Ivan Wasiliewitch, who had put his eldest son to death, left the throne in 1384 to another son, Feodor, whom Boris Godunov en¬ tirely supplanted in his authority. Ivan had left another son, Dmitri, by a second marriage ; and Boris, fearing that he might one day prove a formidable obstacle to his ambitious projects, made way with him, but no one exactly knew how. Shortly after, in 1598, Feodor died, and Boris took possession of the throne. Mystery still hung over the fate of Dmitri, and Grishka or Gregory Otrepieff, a monk belonging to the convent of Tehudov, determined to turn it to account. Several persons had been struck with his resemblance to Dmitri, and he at once ex¬ plained the fact by declaring that he was Dmitri indeed, and that the design of Boris to murder him had been frustrated. The report quickly spread and Otrepieff fled into Poland, where Sigismund III, king of Poland, who saw in him a useful instrument for introducing Polish in¬ fluence into Russia, aided him to enter that kingdom at the head of a

body of troops. Boris was deserted by his soldiers, and ended his life by poison. Otrepieff in 1605 entered Moscow in triumph, and, as the genuine son of Ivan, was

proclaimed grand duke of Russia. He was now firmly seated on the throne, and might have transmitted it to his descendants had he gov¬ erned with prudence. Conspirators, after ex¬ citing a tumult, forced their way into the palace and put the false Dmitri to death. His body was exposed to public view, but in such a state that its features could not be recognized; and a rumor of his being still alive having spread, an¬ other impostor quickly appeared to personify him. The Poles espoused the cause of the sec¬ ond false Dmitri, and had made it triumphant, when he was assassinated in 1610 by the Tartars whom he had selected as his body guards. A state of anarchy ensued, and continued for nearly half a century, during which a number of other false Dmitri appeared in different quarters. Consult Munro, (The Rise of the Russian Empire) (London 1900) ; Kostomaroff, (Les faux Dmitri > (Petrograd 1864).

DEMETRIUS PHALEREUS, fa-le'roos, Greek orator and philosopher : b. Phalerum, At¬ tica, about 345 b.c. ; d. about 283 b.c. He was made Macedonian governor of Athens (317 b.c.) and archon (309 b.c.), and embellished the city by magnificent edifices. The gratitude of the Athenians, over whom he ruled, erected him as many statues as there are days in the year, but these were afterward scornfully broken, and he himself condemned to death by that fickle people. He fled to Egypt, where he is said to have promoted the establishment of the Alexandrian Library, and of the museum, the superintendence of which Ptolemy Lagus en¬ trusted to him. Under Ptolemy Philadelphus, he fell into disgrace, and was banished to a remote fortress, where he died from the bite of an asp. Demetrius was among the most learned of the Peripatetics, and wrote on several sub¬ jects of philosophical and political science. But the work on rhetoric, under his name, probably belongs to a later age. _ Consult Wright, (A Short History of Greek Literature) (New York

1907).

DEMETZ, de-mats', Frederic Auguste, French philanthropist and prison reformer: b. Paris, 12 May 1796; d. there 22 Nov. 1872. He was judge, vice-president of the chamber of correctional police and court

councillor. He founded, in 1840, the penitential and agricultural Colony of Mettray for juvenile delinquents, de¬ voting himself wholly to this establishment, which has served as a model in France and else¬ where. He was elected corresponding member of the Academy of Moral and Political Sciences, Paris, in 1864. He wrote many essays and re¬ ports upon penitentiary methods and reforms. Among the latter were (Rapports a Monsieur le Comte de Montalivet sur les penitenciers. des Etats-Unis,* a study of United States' peniten¬ tiaries which he undertook for the French gov¬ ernment in 1836.

DEMI-MONDE, Le ((The Outer Edge of Society*), by Alexandre Dumas the Younger, was written in 1854, and, after troubles with the censorship amusingly recounted in a pref¬ ace, acted and published in 1855. By "demi¬ monde** Dumas says (Preface, p. 11) he means not courtesans, to whom this phrase of his coin¬ ing is often misapplied, but the semi-society of unclassed women of respectable stock, whose loss of full social recognition had love for its

sole cause, with some recruits whose talents have gained them a semi-respectability and others from among the foreign residents. This society, he says, is not for everybody. (<One is banished from the <demi-monde) for selling herself, as one is from the (mondc) for giving herself away — It begins where the legal con¬ sort ends and ends where the venal consort be¬ gins, or, as his Olivier puts it (Act II, Scene 8, p. 103), (<The first woman who was turned out of doors hid and lamented her fault in the dark¬ est retreat she could find ; the second went to look for the first and they learned to call fault <misfortune,) crime (error, * to console and excuse one another. When they were three they asked one another to dinner. When they were four they had a quadrille. Then there gathered around them girls who had made a false start in life, sham widows, women who take the names of the men with whom they live, some legal couples who have spent supernume¬ rary years in a liaison, in short all women who want to make believe that they have been some¬ body and do not wish to appear what they are.® In construction the play is faulty, its

denoue¬ ment is a piece of dramaturgic legerdemain. The scheming Suzanne d'Ange, overreaching herself, throws away her hope of rehabilitating herself through marriage with the soldierly Ray¬ mond de Nanjac, while Marcelle's straightfor¬ wardness wins hand and heart of Olivier le Jalin, the exponent throughout of Dumas' ideas. But this is of less interest that the keen insight shown in the satiric portrayal of a social class more clearly defined in the Paris of its day, than since divorce has gained greater social recogni¬ tion in France.

Benjamin W. Wells.

DEMI-RELIEF, or DEMI-RILIEVO,

re-le'vo, a term applied to sculpture projecting moderately from the face of a wall; half raised, as if cut in two, and half only fixed to the plane. Mezzo-rilievo, which is the more correct term used to designate this style of sculpture, is lower than alto-rilievo and higher than basso-rilievo.

DEMIDOV, dem'e-dof, or DEMIDOFF, a

noble Russian family, whose head, Nikita Demidoff, was an armory-founder at Toula. This Demidoff was entrusted by Peter the Great with the business of casting the cannon for that prince's numerous warlike expeditions. He actively seconded all the exertions of the tsar, by whom he was ennobled, and in 1725 discovered the mines of Kolyvan, the working of which speedily enriched him. He left a son, Akinfiy, and several grandsons, who distinguished them¬ selves in the same career as their progenitor and amassed colossal fortunes. The best known of these are Prokop Demidov, who worked with great profit the iron, copper and gold mines of the Ural Mountains; Nikolai Nikitich (about 1774-1828), a zealous philanthropist, who intro¬ duced into his country several branches of in¬ dustry, founded establishments of public utility and carried to a great state of perfection the working of mines. He had an annual income of more than $1,000,000. His last years he passed in France and Italy, enjoying the society of learned men and heaping benefits on all around him. He left two sons, Paul and Anatoli (1812-70), who, as well as inheriting his fortune, had also the same high taste and

benevolence. The latter married Princess Mathilde, daughter of Jerome Bonaparte.

DEMIJOHN, a jug in a wickerwork casing or box, used for holding

liquor.

DE MILLE, Henry Churchill, American playwright: b. North Carolina about 1853; d. Pompton, N. J., 10 Feb. 1893. He was gradu¬ ated at Columbia College, and was by turns preacher and teacher till 1882, when he became examiner of plays at the Madison Square Theatre, and later for a short time an actor. His first successful play was the (Main Line,* in which he collaborated with Charles Barnard. In 1887, having become associated with David Belasco, he wrote the society dramas (The Wife* (1887); (Lord Chumley* (1888); (The Charity Ball* (1889) ; (Men and Women* (1890). His last work was a melodrama adapted from the German, entitled (Lost Para¬ dise,* which was successfully produced in 1892.

DE MILLE, James, Canadian novelist : b Saint John, N. B., Aug. 1837; d. Halifax, N. S., 28 Jan. 1880. He was graduated at Brown Col¬ lege in 1854. He was professor of classics in Acadia College (1860-65), and of history and rhetoric in Dalhousie College, Halifax, from 1865 until his death. Among his publications are (Andy O'Hara* (1860) ; (The Soldier and the Spy' (1865); (The Dodge Club* (1866); (Cord and Creese* (1867); <The American Baron* (1870) ; (The Lady of the Ice* (1870) ; (A Comedy of Terrors* (1872) ; (The Living Link* (1874); (A Castle in Spain* (1882-83); (The Winged Lion* (1877; 2d ed., 1904), and many books for boys, including treasures of the Sea.* A posthumous work, (A Strange Manuscript Found in a Copper Cylinder,* ap¬ peared in 1888. A treatise of his on rhetoric was published in 1878.

DE MILLE, William Churchill, American playwright: b. Washington, N. C., 25 July 1878. He was graduated at Columbia University in 1900, and received his diploma from the Ameri¬ can Academy of Dramatic Arts in 1901. His plays include (Strongheart* (1905); <The Warrens of Virginia* (1907) ; (The Land of the Free* (1912) ; <The Woman* (1912) ; <The Royal Mounted* (1908) ; (Classmates* (1907).

DEMING, Philander, American lawyer and author: b. Carlisle, N. Y., 6 Feb. 1839; d. 9 Feb. 1915. He was graduated at the Univer¬ sity of Vermont 1861, and at the Albany Law School. From 1878-79 he was president of the New York State Law Stenographers' Associa¬ tion. He began to write stories for the maga¬ zines in 1873, and his published books include (Adirondack Stories* ; (Tompkins and Other Folks.*

DEMING, county-seat of Luna County, New Mexico, 88 miles northwest of El Paso on the Southern Pacific, Silver City branch of Atchison, Topeka and Santa Fe and a branch of El Paso and

Southwestern railroads. It is situated in a wide desert flat on bank of Mimbres River which is usually dry. Altitude 4,335 feet. For many years it was a small cen¬ tre for widely scattered ranches and mining districts in Florida, Tres Hermanas and Vic¬ toria mountains and Cooks Range and had con¬ siderable cattle and wool business. It was incor¬ porated 1901. The population was 1,864 in 1910, and about 3,500 in 1914, and has grown

greatly since owing to great extension of irrigation, and the establishment of Camp Cody, for the concentration and training of soldiers for the war with Germany. A large amount of water underlies the desert in the Deming region which by pumping is raised for the irrigation of an extensive area yielding abund¬ ant crops of beans, tomatoes, alfalfa and other products.

DEMISE, de-miz' (literally, a ((laying down®), a grant by lease; it is applied to an estate either in fee-simple, or for a term of life or years. The word demise in a lease implies an absolute covenant on the part of the lessor for the lessee's peaceable enjoyment during the term. As applied to the Crown of England, demise signifies its transmission to the next heir on being laid down by the sovereign. ((So ten¬ der is the law of supposing even a possibility of the sovereign's death, that his natural dissolu¬ tion is called his demise, an expression which merely signifies a transfer of property® (Blackstone). The principle of immediate demise was laid down by William and Mary, in order to avoid the disturbances and inconveniences consequent to the death of the sovereign.

DEMIURGE, dem'T-erj (Greek, demiour-gos, ((a handicraftsman®), (1) designation ap¬ plied by Plato and other philosophers to the Di¬ vine Being, considered as the Architect or Cre¬ ator of the universe. The Gnostics made a dis¬ tinction between the Demiurge and the Supreme Being; with them the first is the Jehovah of the Jews, who, though deserving to be honored as the Creator, was only the instrument of the Most High who created physical man. He was also called Archon and Son of Chaos, chief of the lowest order of spirits or eons of the Pler-

oma. Christ, according to the Gnostics, brought the revelation of the spiritual life which added to the ˆpsyche® or sensuous soul, created by the Demiurge, the ((pneuma® or divine rational soul. The origin of evil was some¬ times attributed to the Demiurge.

(2) In some of the Peloponnesian states of ancient Greece the name Demiurge seems to have been given to a chief magistrate, probably corresponding to the Roman tribune. Among the Eleians and Mantineans they were the chief executive magistrates. In the Achaean league they ranked next to the strategi or generals. They were found also in the Dorian states.

DEMOCEDES, Greek physician: b. Crotona about 550 b.c. ; d. 504 b.c. He was for a time physician to Polycrates, tyrant of Samos; was taken prisoner by the Persians and rose to a position of considerable influence at the court of Darius I through his medical skill. He per¬ suaded the king to send him with others on a secret mission to Greece, but escaped from his companions and fled to Crotona. He is men¬ tioned in Herodotus Bk. 3, pp. 129-138.

DEMOCRACY, History of. Introduc¬ tory. — Some preliminary notion of* what is meant by democracy will be indispensable at the outset in order to provide some logical basis for the organization of a discussion of its historical development. As a general concept it may be held that democracy is a form of social organization in which the participation of each individual in the various phases of group activities is free from such artificial re¬

strictions as are not indispensable to the most efficient functioning of the group, and in which group policy is ultimately determined by the will of the whole society. The procedure adopted will be to trace the evolution of democ¬ racy in each succeeding period, as: (1) a prac¬ tical fact in society ; (2) a concept in social, political, and economic theory.

Democracy in Primitive Society. — Critical ethnologists have come into essential agree¬ ment that the earliest type of social organiza¬ tion among primitive men was that of the local group organized about the institutions of the family and the village, and characterized by the absence of any elaborate kinship organiza¬ tion. It is in these small social groupings that the nearest approach is found to the so-called ((primitive democracy.® Here one finds small groups on a basis of intimate association, little affected by external influences, and the

com¬ ponent individuals participate in the whole cul¬ ture of the group to a degree unknown in mod¬ ern society. As Professor Cooley has pointed out, these circumstances provide a psychologi¬ cal situation highly adapted to the development of intimacy and freedom in social relations. But, at the same time, as Professor Durkheim has vigorously insisted, these conditions are conducive to the maximum operation of those socio-psychological influences so familiar to the student of crowd psychology. Consequently, one finds in these primitive local groups a very considerable prevalence of customary regula¬ tions and restrictions, some tendencies toward the development of caste, and a particular sus¬ ceptibility to the domination of the forceful personality — all of which seriously impair the operation of a democratic type of social or¬ ganization and functioning. Also it must be recognized that these approximations to de¬ mocracy in primitive society are rather inci¬ dents of an undeveloped pre-political condition than the result of conscious planning of social organization on the basis of political liberal¬ ism.

When one turns to examine what are gen¬ erally the more advanced types of primitive so¬ ciety organized on a kinship basis, with either maternal or paternal descent, even less appears of the alleged democratic characteristics of primitive society. Every phase of life within the group is minutely ordered by a veritable maze of customary regulations which are en¬ forced with great rigidity and severity. Within the group the freedom of the individual is fur¬ ther restricted by the general prevalence of so¬ cial ranks and grades. The much vaunted tribal assemblies have been reduced by modern critical research from the ˆoriginal fountain springs of political liberty,® as pictured by such writers as Maurer, Kemble and Freeman, to mere formal gatherings to grant a pre-assured acquiescence in the policies of the leaders of the group — a function strangely similar to that of the American narty convention. A distin¬ guished authority has remarked that the defi¬ ance of the policies of the chiefs by a tribal assembly is such a rarity as to constitute no less than a political revolution, . something which is even less frequent in primitive than in modern society. Finally, an individual in primitive kinship society is not free to transfer his membership from one group to another, but must remain forever in his own group, as an

individual in primitive society has no standing outside of his kinship group, and in such a case occupies the position of an outlaw. Viewed exter¬ nally, then, primitive society is a ((closed shop,® and internally it is dominated by a mass of cus¬ tomary regulations and is organized more or less according to a hierarchy of social classes. As primitive society approaches most closely the beginnings of real political or civil society the undemocratic features of social organization greatly increase.

It is scarcely necessary to point out the fact that aside from mythology there is no specific theorizing with respect to social and political relations in primitive society. In that period there is only one theory as to the foundations and justification of the existing social order, namely, that it is the only ((safe® order. Its perpetuation unaltered and unimpaired is the only guarantee of relative immunity from the dangers lurking in the unknown. In primitive society, as among modern conservatives, there is a veritable sanctity in the existing order which precludes the possibility of any critical examination of its origin and justification.

Democracy in Early Political Society. — If any position of historical sociology can be regarded as established it is that political soci¬ ety and the state originated through the amal¬ gamation of tribal groups as a result of the in¬ cessant wars waged in what Bagehot has called the <(nation-making age.® In the highty auto¬ cratic and hierarchical caste society which then developed and which characterized early po¬ litical society there was, of course, not the slightest approximation to anything democratic in any field of social relations. In no other stage has the individual counted for so little and been so circumscribed in his liberty as in the period of the formation of states and the development of early despotisms. The facts almost justify Hegel's famous dogma that in this period only the despot was free.

Early political society is characterized by as complete an absence of democracy in theory as in practice. The only expenditure of politi¬ cal thought was in justifying the existing regime on the basis of the sanctions of a unique revealed religion or the superior wisdom of ancestors. Existing institutions were held to be a part of the divine order as in primitive society they had been regarded as the source of

the <(luck® of the social group.

Democracy During Classical Times. — It is impossible to make any sweeping statement as to the degree of democracy realized in an-•cient Greece as the situation varied greatly in different periods in both Athens and Sparta. The radical transformations of Greek govern¬ ments from tyranny to aristocracy and from aristocracy to the so-called democracy were so frequent as to give rise to the famous Platonic and Aristotelian theory of the cycles of gov¬ ernmental changes. True democracy was not prominent in Hellenic society. Even Athens, the most liberally inclined of the Greek city-states, at the period of its most democratic or¬ ganization could scarcely be regarded as a de¬ mocracy in the modern application of the term. While, as Mr. Zimmern has pointed out, there has been a tendency to exaggerate the number of slaves in Athens, there can be no doubt that - there was never a time in Athenian history when a majority of the population was not ex¬

cluded from participation in the life of the state. Greek ˆdemocracy® meant relative so¬ cial and political equality only among the cit¬ izen class — the class, which in the opinion of Aristotle, was <(born to rule.® Within this privileged citizen class, however, Athenian de¬ mocracy made the closest approximation in an¬ tiquity to a democratic control of group ac¬ tivities.

In republican Rome the same conception of exclusiveness in the citizenship existed as had prevailed in Greece. The large numbers of slaves and foreigners were excluded from the political life of the state and within the citizen body itself there was less of a democratic con¬ trol of political activities than had existed in Athens. Despite the gains made by the plebeians in the 4th century b.c. and the later at¬ tempts of the Gracchi to break down the domi¬ nation of the aristocratic governing clique, the government of Rome drifted steadily into the exclusive control of the autocratic ((ordo sena-torius® and from that into the principate and the empire. The sodalities or industrial asso¬ ciations were the only approximation to social democracy, and they were discouraged and pro¬ hibited by the government. During the im¬ perial period a slight movement toward de¬ mocracy might be detected in the reduction of the number of slaves through manumission and the extinction of many of the sources of sup¬ ply, but this slight symptom was more than offset by the growth of imperial despotism, the increase of plutocracy and the extinction of the curiate or middle class through the dispropor¬ tionate burdens of

taxation imposed upon it. As a result the middle class, the lower class freemen and the slaves were all assimilated into one semi-free class — the so-called <(colonate.® Classical antiquity, then, never brought real de¬ mocracy in the political, social or economic realms. It passed, leaving a more decided con¬ dition of. inequality than*it had received from the primitive tribal society with which it had started.

With the Greeks systematic speculation re¬ garding the foundations of society and politics first appears. In the 'Republic* and the 'Statesman* Plato discussed the nature of de¬ mocracy. He defined it as the rule of the many and held that it inevitably tended to degener¬ ate into anarchy. Plato's "rule of the many,® of course, meant only the rule of the citizen minority of the population. Even this shadowy democracy did. not attract Plato who pre¬ ferred an enlightened monarchy. Aristotle devoted a portion of his 'Politics* to a discus¬ sion and definition of democracy. From the standpoint of the terminology of political science he maintained that democracy was that form of government in which the majority of the citizens, excluding foreigners and slaves, directed the activities of the state for the ad¬ vancement of their own class interests. It was, then, the corrupt form of "popular® govern¬ ment, the* term "polity® being reserved for the virtuous administration of government bv the whole body of the citizens. From an economic standpoint Aristotle held that democracy meant the control of public policy by the mass of the poor citizens who possessed little or no property. Aristotle was no more favorable than Plato to the exclusive ((democracy® of the Greeks and held that the only valuable func-DEMOCRACY

tion of the people lay in electing and ((scrutinizing® the officials, and not in the direct and actual control and operation of the government. Finally, Aristotle was as distinctly opposed to the full application of the democratic principle in society as in the state. He laid down his famous dictum that merit should determine so¬ cial and political position and held that certain individuals on account of their inferior intelli¬ gence were born to serve the more intelligent and capable members of society. It is scarcely necessary to add that by the ˆintelligent and capable,® Aristotle meant the Attic Greeks, and by those fitted for perpetual servitude, the ˆbarbarians.® Thus, his seemingly useful con¬ ception of social differentiation on the basis of

ability resolves itself upon closer examina¬ tion into a chauvinistic apology for racial ego¬ ism. While Plato and Aristotle had looked with disfavor upon even the limited democracy of Greece, Polybius held that in any stable state some permanent concessions must be made to the democratic principle. Drawing upon the experiences of the early Roman re¬ public he put forth his famous theory of ((checks and balances® which were to be brought about by including in the organization of the government the monarchical element, the aris¬ tocratic senate and the democratic assemblies. Only through this arrangement could one hope to prevent the continual changes in government which had been outlined in the famous classi¬ cal theory of the cycle of governmental trans¬ formations. Finally, one finds among the Greeks the first adumbration of the doctrine of a governmental contract as the origin of politi¬ cal society — a theory first stated by the Sophists, Plato and the Epicureans and which was destined in the 17th and 18th centuries to work strongly for the development of demo¬ cratic tendencies in politics.

Among the Romans the only significant de¬ velopment in political theory making for democracy was the doctrine of the Roman lawyers concerning the origin and justification of the political order. The lawyers held that the foundations of political authority lay in the consent of the people. Though the emperor might in fact be chosen by his legions in a remote boundary district the legal theory al¬ ways held that he owed his authority to the tacit assent of the whole body of the Roman citizens. This theory fitted in well with, and advanced the doctrine of, the origin of political authority in a governmental compact.

Democracy in the Middle Ages. — The Roman Empire ended with the growth of plu¬ tocracy and the crushing out of practically all of the few democratic tendencies which ex¬ isted. With the barbarian invasions and the establishment of the Teutonic kingdoms the fruits of classical civilization were for the most part lost and western Europe dropped back in a cultural sense into the conditions from which classical civilization had developed a thousand years earlier. Even the feeble advances which classical civilization had made in the direction of democracy had to be regained before further progress could be made toward the securing of personal freedom, political enfranchisement and popular control of public policy.

Feudal society, developing from roots in the Roman villa and in the German mark and comitatus, offered little opportunity for the

development of democracy. With its perpetua¬ tion to a slight degree of the slavery of classical times and its retention on an extensive scale of the serfdom or half-free condition found in the colonate of the later Roman Empire, the feudal age was in general even less democratic in a political sense than the classical city-states. On the manors there were some democratic tendencies in the intimate communal life of the serfs, and Professor Giddings has insisted that the real origin of modern social democracy is to be looked for in the enforced equality among the members of this servile class in the Middle Ages. Some symptoms of democracy also appeared in the mediaeval free towns, but they were not extensive. The political, social and economic organization was hierarchical and restrictive, and equality in the mediaeval town, as in the classical city-state, meant the equality of the favored few. The Magna Charta as a harbinger of modern democracy has withered before modern historical research quite as much as the Teutonic folk-moot. It did not mark a movement looking toward modern political liberalism, but was a reactionary manifesto of the feudal lords who were irritated by the recent extension of royal power and in 1215 made an effort to pull England back into the decentralized lawlessness and local tyranny of the feudal period. The only notable develop¬ ment of democracy in the Middle Ages occurred as an incident of the rise of Christianity. A number of writers have claimed with some degree of justification that the first instances of real democratic society are to be found in the early Christian communities of the Apostolic Age. Certainly, the only extensive development of democracy in social organization in the mediaeval period occurred in the monastic movement, and in the monasteries essential equality was the general rule. The organiza¬ tion of the secular clergy in the mediaeval Church, however, with its elaborate hierarchies for ecclesiastical administration and for the control of the sacraments, was scarcely less autocratic than the feudal society of the period. The only concession that the mediaeval Church made to democracy was that its offices were in theory, at least, open to all classes solely on the basis of merit. On the whole, however, democracy or any strong prophecy of democ¬ racy scarcely appeared during the thousand years that followed the collapse of the western Roman Empire.

The advances made toward the development of the theoretical concept of democracy during the mediaeval period were as scanty as the achievements in the field of democratic prac¬ tices. The Christian conception of the (<brotherhood of man® was certainly more democratic in its implications than the early Stoic doctrine. The Stoics

had meant by this phrase merely the brotherhood of the intellectually elite, but the Christians rejected this limitation and em¬ phasized the reality of universal human brother¬ hood through the medium of faith and belief. In the field of political theory there were few developments beyond a revival of various doc¬ trines which had appeared in classical antiquity. Manegold of Lautenbach, in the last half of the 11th century, gave the first explicit state¬ ment to the mediaeval version of a govern¬ mental compact as the basis of political society and held that the breaking of this contract by

the prince was sufficient to justify rebellion among his subjects. In the same century the revival of Roman law familiarized western Europe with the lawyers' doctrine of popular sovereignty, a conception later developed with great vigor by Marsiglio of Padua. The Con¬ ciliar movement of the 15th century, based largely upon the Roman legal theory of the corporation, attempted to work out a theory of representation for ecclesiastical government. While the insistence of the great theorists of the Conciliar movement, such as Gerson and Cusanus, upon the validity of the doctrine of popular sovereignty was an important develop¬ ment in the direction of democratic political theory, the Conciliar doctrine of representative government was rather one which looked back to the system of feudal estates than forward to the modern parliament. Those who look to the Conciliar movement for the origins of modern representative democracy are not less in error than those who try to derive it from the Magna Charta. The concept of democracy scarcely figured in any mediaeval discussion save in the writings of those mediaeval scholastic philosophers who revived the Aristotelian ter¬ minology and analysis with its contempt for democracy. The concept of the "people,® which appeared so frequently in the latter part of the mediaeval period, in the discussions of popular sovereignty was scarcely a democratic notion. By the "people® was meant only the first three estates, excluding the peasantry which constituted the vast majority of the population, and it did not usually refer to the people as individuals but as a corporate entity.

Democracy from the Commercial Revolu¬ tion to the Industrial Revolution. — Beginning with the opening of the 16th century and ex¬ tending over about two centuries there occurred that great transformation which marks the dawn of modern society — the "Commercial Revolution.® The explorations and discoveries and the resulting contact with new cultures broke through the "cake® of mediaeval custom and opened the way for the development of modern institutions and ideas. The increased volume of wealth at the disposal of the mon¬ arch, as a result of the "intervention of capital,® enabled him to develop a paid officialdom and army and by their assistance to crush feudalism and perfect the national state. But the most important of all of its results was the great increase of the bourgeoisie, or middle class, which, as Professor Hayes has so well ex¬ plained, was destined for centuries to be the centre from which all liberalizing and

democra¬ tizing influences spread and which ultimately secured the well-nigh universal destruction of the autocratic and exclusive social and political regime which had characterized the Middle Ages. The Protestant Reformation made few contributions to democracy in politics. In fact, it made the lot of the peasantry harder than be¬ fore, but it did increase the power of the upper middle class and thus accelerated the movement already begun by the commercial revolution.

In England during this period the new middle class effected the greatest transformation of the social and political order which was ac¬ complished before the 19th century. By the beginning of the 17th century the power of the feudal nobility had generally vanished, serf¬

dom had disappeared and the restrictive gild system of industrial organization had been prac¬ tically eliminated. Before the close of the cen¬ tury, through successive concessions from the king and through the revolutions of 1649 and 1689, the bourgeoisie had dethroned two auto¬ cratic monarchs, had eliminated the rule of royal arbitrariness in politics and law, had brought about the predominance of Parliament in the government and had enacted into a con¬ stitutional document those guarantees which have since come to be recognized as the most fundamental of human rights. While oppressive religious disabilities, exclusive property qualifi¬ cations for participation in political life and the perpetuation of many of the social phases of mediaeval feudal aristocracy all operated to prevent England from being classed as a demo¬ cratic nation in 1700, the fact that the middle class had created a constitutional system and had secured the complete domination of the Parliament — the popular branch of the gov¬ ernment — constituted an epoch-making step toward the ultimate development of democracy.

In France, even more than in Tudor Eng¬ land, the commercial revolution at first made rather for the development of royal absolutism than for the growth of constitutional or demo¬ cratic government. The Estates-General, sum¬ moned in 1614 for the last time in 175 years, made a pathetic failure as compared with the achievements of the English “Long Parliament® and the hope of a gradual evolution of legis¬ lative supremacy in France, such as had taken place in England, perished. The political power of the feudal nobility was crushed by Riche¬ lieu’s centralizing policies and by the sup¬ pression of the “Fronde® in 1652, but they re¬ tained their oppressive social and economic privileges until the “August days® of

1789. The French Revolution of 1789 to 1795 was the product of the abuses of the “old regime,® of the revolutionary political theory of the English Whigs, of the intellectual impulse from the French “philosophes® and of the American ex¬ ample of a successful experiment with revolu¬ tion and the beginnings of democracy. The “third estate® had been too weak in 1614 suc¬ cessfully to oppose the combined strength of the monarch and the first two estates, but their strength had so increased by 1789, as a result of the effects of the commercial revolution, that they were able to coerce the monarch, the weakened nobility and the clergy and they pro¬ ceeded to clear away not only the vestiges of feudalism but also the oppression of the Church and the tyranny of the monarch. The calling of the Estates-General in 1789 is worthy of passing mention in any historical survey of the development of democracy because the first instance in history of the exercise of universal manhood suffrage occurred rn the election of the deputies of the third estate. The most significant achievements of the French Revolu¬ tion were the abolition of those economic and social aspects of feudalism which still persisted, the establishment of a constitutional monarchy in 1791 and of a republic in 1792. Though many of these reforms proved transitory, their effect was never entirely lost and they constituted the stimulus and precedent for the more gradual development of French democracy in the 19th century.

In all other important European states, with

the exception of the abortive reforms of Joseph II of Austria, the old regime with all of its mediaeval institutions and practices remained practically undisturbed until the 19th century. It was not until after the influence of the French Revolution was spread throughout Europe by Napoleon, and the <(Industrial Revo¬ lution® had still further increased the numerical strength of the bourgeoisie, that this class was able to carry its liberalizing activities with some degree of success into central, southern and eastern Europe.

The establishment of an aristocratic republic in America in the closing years of the 18th century marked an important advance in the development of democracy. While American society and politics at the beginning of our national history abounded in undemocratic features, the new state had been founded on revolution from established authority; and it was one of the first examples in history of an extensive federal republic and of a government organized on the basis of a written constitu¬ tion formulated by a national constituent con¬ vention. It, therefore, stimulated the growth of constitutionalism and republicanism else¬ where, most notably in France, and it laid the foundation for what became in the 19th century the most ambitious experiment which has yet been conducted in the democratic control of political institutions. In America, as in Eng¬ land and France, the revolutionary movement was organized by the middle class made up of merchants and the professional classes.

In the period between 1500 and 1800 many notable advances were made toward the de¬ velopment of democratic tendencies in political theory. The most significant and influential of these was the doctrine of a social contract as the explanation of the origin and justification of social institutions and political organization. This doctrine, as distinguished from the earlier theory of a governmental contract, was first enunciated by tineas Sylvius in the middle of the 1 5th century, but it did not become an im¬ portant dogma in political theory until it was expressed by the English churchman, Hooker, and the German jurist, Althusius, at the opening of the 17th century. It received a systematic exposition in a number of classical works, par¬ ticularly

those of Hobbes, Pufendorf, Spinoza, Sydney, Locke, Rousseau, Kant and Fichte. It was not necessarily a democratic doctrine and it was used by some of its adherents, most notably by Hobbes, to defend royal absolutism. In the hands of Locke and his plagiarist, Rous¬ seau, however, it worked strongly for the de¬ struction of the obscurantic and autocratic divine right theory and provided a theoretical justification for altering the existing political order when it had become subversive of the terms of the original contract. In other words, it provided a doctrinal foundation for political revolutions and it was used to inspire and justify the great revolutions of the 17th and 18th centuries in England, France and America. This revolutionary version of the social contract theory powerfully stimulated the development of the doctrine of popular sovereignty. Another important contribution was the doctrine that (<life, liberty and property® are the natural and inherent rights of all men. This theory, first stated by Fortescue at the close of the 15th century, was again enunciated by the Levellers

m the middle of the 17th century and was given a permanent position in political theory through the influence of John Locke. It was widely at variance with the contemporary social and eco¬ nomic oppression and arbitrary government and it was highly influential in combatting these conditions, especially when these ˆrights® be¬ came a part of the program of the radical party in the various countries. In addition to their early formulation of the doctrine of natural rights, the Levellers made another significant contribution to the general body of democratic political theory, namely, the doctrine that every citizen should be accorded the right of par¬ ticipating in political activity through the exer¬ cise of the suffrage. Another important doc¬ trine making for democracy in politics was that which was most vigorously expounded by Locke, namely, the legal supremacy of the legis¬ lative or popular branch of the government. The importance of this doctrine appears when one reflects that without the predominant power of the elective or popular branch of the govern¬ ment which makes it possible for the repre¬ sentatives of the people to control the policies of the state, the fact that the people have the right of universal suffrage and the election of representatives does not ensure a democratic control of public policy. The impotence .of the German Reichstag and the autocratic nature of the German imperial government, in spite of universal suffrage, is the most striking modern demonstration of the fact that without a power¬ ful legislature all the other incidents of democ¬ racy may be vain and empty forms. Finally, the Utopian socialistic schemes of such writers as More, Bacon,

Campanella and the pre¬ revolutionary socialists in France made provi¬ sion for the introduction of some degree of social democracy. It is most significant, how¬ ever, that during this entire period there was no systematic analysis of the meaning and im¬ plications of democracy, nor, with the doubtful exception of Mably in France, Tom Paine in England and Jefferson in America, was there any important defense of democracy as the ideal form of government. Most of the radicals regarded a constitutional monarchy or, at the most, an aristocratic republic as the ideal form of government. Montesquieu and Rousseau, for example, both held that a democracy would only be tolerable in a very small state and could never be successful in an extensive country. In short, all of the theories of the period which have been briefly summarized above were rather fragmentary contributions which might later be utilized in a systematic analysis and defense of democracy than anything which could be regarded as comprehensive and thorough-going discussions of the nature and validity of democracy itself.

Democracy from the Industrial Revolution to the Present Day. — At the opening of the 19th century democracy did not prevail in any coun¬ try in the world, and only England, France and the United States had made any notable progress in that direction. Even these modest advances seemed destined to be crushed and the old order restored after 1815 through the sinister influence of Metternich, the able and alert statesman of the old regime, who had extended his reactionary system throughout continental Europe by 1823. But in that year he received his initial reverse in Great Britain's

challenge to the intervention of the reaction¬ aries in the South American revolutions. This action of Great Britain was not so much motivated by an abstract love of liberty and revolution, for these were scarcely more pleas¬ ing to her Tory ministry than to Metternich, but was rather led to this course by the fact that her trading interests, so greatly increased by the industrial revolution, were more likely to be advanced by the freedom of the Spanish-American republics than through the return of Spanish control. The industrial revolution thus gave the old regime its first serious rebuff and from that time on it has caused it con¬ tinually to retreat until to-day it retains only a precarious hold on those mid-European states where Metternich had most thoroughly established his system. This greatest trans¬ formation of all phases of life in the history of mankind, which has been known since Arnold Toynbee's time as the ˆIndustrial Revolution,® came first in England between 1750 and 1825 and was passed along to the Continent, reaching France between 1825 and 1840, Germany from 1840 onward, but espe¬ cially after 1870, Austria about the same time, and scarcely touching Russia until the last decade of the 19th century. In addition to its great series of mechanical inventions, it tremendously accelerated the process begun by the com¬ mercial revolution, namely, the increase of the bourgeoisie or middle class, to which the world owes most of the great advances in civilization and liberalism. This class, motivated in part by sentiments of enlightened humanity and in part by selfish class interests, carried the day against the autocracy of the old regime and made it possible for the proletariat, which was also created by the industrial revolution, to consolidate the positions already won for it by the bourgeoisie and to begin the struggle for the final realization of democracy in the true sense of the word. The battle for political and social democracy, then, in the last century has centred about three successive tasks: (1) the elimination of the vestiges of the old regime — the heritage of the Middle Ages; (2) the estab¬ lishment of the liberal regime of the <(benevolent bourgeoisie®; and (3) the attack upon the supremacy of the bourgeoisie by the proleta¬ riat, beginning about the middle of the 19th century. All of these forces were created or set in motion by the industrial revolution and attention may be turned to the manner in which they have been realized in the leading countries of the Western world. Most of the achievements in these directions have consisted in the extension of the suffrage, the increase in the importance of the popular or legislative branch of the government as

compared with the executive, the extension of representative institutions, a broadening of the conception of the scope and functions of government, and the drafting of written constitutions which acknowledge and guarantee these progressive achievements. As important as political and social democracy is economic democracy, or the equal right of all classes to such action as is necessary to advance and safeguard their material interests. At the beginning of the 19th century economic democracy was as far from realization as political democracy and the advances made since that time have been most notable. In 1800 most of the extensive re¬

strictive economic regulations which had been enacted during the two previous centuries operated in favor of the vested interests of the squirearchy. With the growth of the political power of the bourgeoisie after the industrial revolution went the abolition of most of the old restrictions on economic activities and there was instituted the reign of laissez-faire which gave the middle class manufacturers and merchants unrestricted opportunity for the de¬ velopment of their great industrial enterprises and for the enjoyment of the ((blessings® of the freedom of contract. This individualistic movement was most thorough-going in Eng¬ land, where it was chiefly associated with the work of Cobden, Bright, Mill and Gladstone, but no European country entirely escaped its influence. Laissez-faire, however, gave-eco¬ nomic liberty only to the upper middle classes and it is to the development of trade-unionism that one must look for the movement which has been, up to the present time, the most effective instrument for advancing economic democracy among the laboring classes.

In England the middle class secured their first great triumph over the old order in the Parliamentary Reform Bill of 1832 and in the Municipal Reform Act of 1835. These reforms destroyed the mediaeval system of election and representation which had persisted in England until that time and gave political recognition to the dislocation of economic interests and population caused by the industrial revolution. They were scarcely a direct victory for democ¬ racy, as they did not carry with them an en¬ franchisement of the masses, but they did con¬ stitute an indirect triumph in that they brought into power the bourgeoisie who immediately proceeded to clear away many of the most formidable obstacles to the ultimate realization of democracy. The democratic movement of this period — Chartism — proved a pathetic fail¬ ure, but essentially all of the Chartist demands have since been realized, a significant testimony to the progress of democracy in England. The first important direct step in the actual

realiza¬ tion of political democracy in England came in Disraeli's Borough Franchise Bill of 1867 which brought something approaching universal man¬ hood suffrage to the residents of boroughs. A similar extension of the franchise to the work¬ ing classes in the country by Gladstone's bill of 1884, for all practical purposes, made Eng¬ land a political democracy. The process has been carried to completion by the sweeping Franchise Act of February 1918 which brought universal suffrage to males and introduced on a very liberal scale the principle of woman suffrage, thus making England's electorate the most inclusive and democratic of that of any modern nation. Fortunately, England, two centuries before, had established the supremacy of Parliament and when the people secured the vote they were able to use it to influence the policies of the government and secure for them¬ selves the substance as well as the form of political and social democracy. The grip of the people upon the legislative power in Great Britain was made more extensive and more certain by the Parliament Bill of 1911 which finally assured the supremacy of the House of Commons. Beginning with the Elementary Education Act of 1870, the people have been able in part to transform England into a social

as well as a political democracy. Especially rapid has been the progress in this direction under the Liberal domination since 1905, as is abundantly testified by the remarkable series of reform measures passed since that time. Among the most conspicuous of these have been the Workmen's Compensation Act of 1906, the Education Act of 1906, the Small Holdings Act of 1907, the Old Age Pensions Act of 1908, the Labor acts of 1909 and 1913, the Lloyd George Budget of 1909-10, the Na¬ tional Insurance Act of 1912 and the Franchise and Education Acts of 1918. These are a con¬ vincing demonstration of the fact that the English proletariat has now gained for itself the position held in 1815 by the Tory squirearchy and in 1848 by the bourgeoisie liberals. Economic democracy in England has been realized through the abolition of the various restrictions upon the freedom of economic activity which existed in 1800. This was accomplished through the efforts of the middle class and the proletariat. Especially significant has been the development of trade-unionism. This was first legalized through the activities of Francis Place and Joseph Hume in 1824-25. It has received further legislative encouragement by the laws of 1871-76, 1906 and 1913, and, in spite of some recent adverse court decisions, the right of trade unions to organize and act seems firmly established in England. In spite of a titular monarch and aristocracy, England is at the present day, per¬ haps, the most democratic of the great modern nations.

In France the ultra-conservative squirearchy, led by the arch-reactionary Charles X, made a most daring and determined effort, between 1815 and 1830, to restore the old regime. The futility of the attempt to revive in France the order of things which had existed before 1789 was demonstrated by the Revolution of 1830 Avhich sent into final oblivion the autocracy and corruption of Bourbon absolutism. The bour¬ geoisie liberals, strengthened by the effects of the industrial revolution, came into power with the Orleanist monarchy of 1830 to 1848. Louis Philippe, however, refused to square his policies with the growth of liberalism and met, in 1848, the fate which Charles X had encountered in 1830. The new Republican government de¬ veloped a fatal split over its policies and the

Bonapartist adventurer, by the aid of this division among Republicans and Socialists and the romantic lustre of his name, was able to establish a temporary autocracy. But during its brief period of power the Provisional Gov¬ ernment of 1848 secured for France the enact¬ ment of a universal male suffrage law, which has been retained almost entirely unchanged down to the present day. This gave France the double honor of being the nation which origi¬ nated the practice of universal manhood suffrage in 1789 and also the first powerful na¬ tion to adopt as a permanent political institu¬ tion the practice of universal manhood suffrage. Like his predecessors, Charles X and Louis Philippe, Louis Napoleon was unable to resist the growing forces of democracy and liberalism which were being continually aug¬ mented by the effects of the industrial revolution and the growth of the bourgeoisie, and even before he was swept off the throne by the debacle of 1870 he had been compelled to

relinquish most of the attributes of autocracy and to establish a liberal constitutional mon¬ archy. The attempts to return to monarchy between 1871 and 1879 failed utterly, and with the accession of President Grevy in 1879 it was definitely established that the constitution of 1875 would be interpreted to mean that France was to be henceforth a Parliamentary Republic. Gathering impetus in the decade of the eighties, through the vigorous leadership of Jules Ferry, the Republic gained sufficient strength to be able to withstand the onslaughts of monarchists and clericals in the Boulanger episode and the Dreyfus affair and emerged from the latter stronger than ever. Under the Third Republic the French proletariat has increased in political power until the progressive democratic element is to-day as firmly entrenched in its control of political policies as the bourgeoisie were in 1840. lheir power has been given objective expres¬ sion in a series of social reform acts which rival England's achievement in this field. In France, economic democracy was advanced by the law of 1864, giving workingmen the right to combine for strikes, and by that of 1884, granting general freedom of organization to the working-class. The attempt of the gov¬ ernment employees, however, to establish their right to strike in 1909 and 1910 failed almost completely. In France, as in England, democ¬ racy is to-day a realized fact.

Vastly different than the record of England and France has been the course of events in central Europe in the 19th and 20th centuries. Stein and Hardenberg had abolished serfdom in Prussia in 1808-11, but in 1815 Metternich was able to preserve the old regime intact in

Austria and was also able to nullify the de¬ cree of the Congress of Vienna which ordered each ruler in the German Confederation to give his state a constitution. Between 1815 and 1848 the power of the middle class was increased by the first effects of the industrial revolution and a disgruntled proletariat was also created. A liberal and democratic regime would probably have come into existence in cen¬ tral Europe in 1848 had it not been for the fact that the problems and issues of nationality and dynasty conflicted with the cause of lib¬ eralism and democracy. Taking advantage of this division of strength and interests among the liberals, the reactionaries, led by Schwart-zenberg, were enabled to triumph in 1848-50 as they had in 1815. The tragic significance of this failure of the liberal movement in mid-Europe in 1848 can scarcely be exaggerated. In Germany it meant that German unity was not to be accomplished under the benevolent auspices of the liberals of the Frankfort Par¬ liament, but under the autocratic and brutal <(blood and iron® policy of Bismarck, who, after creating the German Empire in this man¬ ner was able to throttle all subsequent at¬ tempts to liberalize it and bring it up to the level of modern democratic nations. Taking over bodily the • mechanical aspects of the in¬ dustrial revolution from England, Germany presents, as Professor Veblen has so convinc¬ ingly pointed out, the curious spectacle of a great modern industrial and commercial nation dominated by political autocracv and a mediaeval intellectual atmosphere. The semi-mediae¬ val constitution given to Prussia in January 1850 by Frederick William IV has been re-646

tained practically unchanged and no redistribu¬ tion of seats in the Prussian Landtag has taken place since 1860, thus giving rise to a situation resembling that of the notorious ((rotten bor¬ oughs® of England before 1832. Furthermore, the exclusive three-class system of distributing the suffrage and the archaic method of oral voting in Prussia destroy even those slight traces of democracy which might exist in spite of discouraging surroundings. In the German Empire universal manhood suffrage was intro¬ duced in 1871 for elections to the Reichstag, but as the Reichstag is only an impotent de¬ bating society dominated by the autocratic Bundesrat and the still more mediaeval Prus¬ sia, the representatives of the people cannot make their will effective in the government and the vaunted universal suffrage and the alleged democratic Reichstag appear upon close exami¬ nation to be merely empty shams, the verbal eulogies of Prussian apologists notwithstanding. To make matters still worse, the distribution of electoral districts for seats in the Reichstag has not been altered since 1870. This excludes the great industrial cities of modern Germany from anything like an equitable representation, deprives the bourgeoisie and proletariat of a just expression of their will, even in the for¬ ensic department of the German political or¬ ganization, and perpetuates the dominating in¬ fluence of the reactionary squirearchy. More¬ over, since 1907 that most fundamental of all contradictions of democracy, the subordination of the civil government to the military, has, for all practical purposes, existed in the German Empire. From the standpoint of the realiza¬ tion of political democracy, then, Germany's condition to-day is very similar to that of Eng¬ land in the time of Henry VIII and of France in the days of Charles X. Nor is there any greater degree of social democracy m Ger¬ many. The elaborate social legislation pro¬ gram of Bismarck came not from the influence of the people nor as a result of the modern democratic conception of the state as the agent and servant of the people, but proceeded from Bismarck's highly undemocratic desire to crush the Social Democrats, to ensure a healthy nation as the indispensable basis of a strong military system, and to attach the peo¬ ple to the autocratic German state through gratitude for its paternalism. The social leg¬ islation of modern Germany is, thus, in no way a symptom of social democracy, but is simply the outgrowth of the same 18th century en¬ lightened despotism that impelled Frederick the Great to undertake his internal reforms in Prussia. Of the truth of this assertion over¬ whelming proof

is afforded by the fact that the Social Democrats invariably opposed the social legislation of Bismarck, and by Bismarck's ac¬ knowledged purposes in undertaking the pro¬ gram of social reform. In Germany, trade unionism, as a movement toward economic de¬ mocracy, made its first appearance as a signifi¬ cant movement in the decade of the sixties, but was greatly weakened and suppressed during the period of anti-socialistic legislation be¬ tween 1878 and 1890. After 1890 it revived and has received legal sanction for extensive eco¬ nomic activities. It is probable that no fact in recent history so clearly indicates the power of the underlying forces now making for democ¬ racy as the action of the German governing

classes in 1914. In spite of their throttling control over the organs of government, they were unable to check the operation of those great industrial and social forces which have created modern democracy and they deemed it necessary to stake their very existence in the desperate attempt to stifle the growth of liber¬ alism by the consolidation of all classes and the submergence of all opposition through the psychological effect of the great national and patriotic enterprise of an aggressive, vigorous and glorious European War.

In the Austrian Empire political liberalism, since its defeat in 1850, has met a somewhat kinder fate than in the Prussianized German Empire. No serious attempt was made to re¬ store the feudal system which was abolished in 1848-49, and in the period from 1860 to 1867 the liberally inclined Francis Joseph, in order to placate his own subjects and the Hungarians for their disappointments in 1848-49, granted reforms which embodied many of the aspira¬ tions of the liberals of 1848. An important ap¬ proximation to real parliamentary government was secured by the Constitution of 1861 and the ˆfundamental laws® of 1867 which gave the Austrian legislature a legal position of much greater power than that possessed by the Ger¬ man imperial legislature, carrying with it the institution of ministerial responsibility. While the suffrage was at first extremely exclusive, the acts of 1896 and 1907 have introduced uni¬ versal manhood suffrage. The existence of a considerable degree of social democracy in Austria is also attested to by the passage of a number of important social reform acts since 1885 which have not been simply a perpetua¬ tion of the benevolent despotism of Joseph II, but have been largely a result of the agitation of Socialists and Liberals. Economic democ¬ racy has appeared in Austria as a result of the legalization of trade-unionism in 1869 and its subsequent growth since that time. While many influential vestiges of autocracy still re¬ main in Austria in

theory and law, and many more in actual fact, there can be no doubt that Austria has advanced much further along the ((democratic path® than her great mid-Euro¬ pean ally.

Hungary, however, has been little affected by the progress of either political or social de¬ mocracy in the other member of the Dual-Mon¬ archy. It has made almost no advances in a liberal direction beyond the situation which ex¬ isted in 1847 except to retain the act of the lib¬ erals of 1848 abolishing the political and eco¬ nomic aspects of feudalism. Hungary remains to the present day politically and socially the most illiberal, archaic and mediaeval of any great European nation.

In Italy the permanent establishment of par¬ liamentary government was anticipated by Charles Albert of Piedmont in 1847-48 and was assured by the efforts of Cavour, a great ad¬ mirer of the English system and one of the mpst vigorous advocates of parliamentary in¬ stitutions among the liberal statesmen of the 19th century. The necessary complement of parliamentary government, universal suffrage, was secured by the laws of 1882 and 1912. Fi¬ nally, social democracy has made great strides in the laws of 1886, 1898, 1908 and 1912 which protected the labor of women and children, in¬ sured the working classes against accident, sick-

ness and old age and established a national life insurance system. In Italy trade-unionism has had a very recent origin and development. Coming into existence along with the growth of the strength of radical parties recruited from the proletariat, trade-unionism has been little hampered in Italy by restrictive legisla¬ tion.

In Russia, which retained most aspects of the mediaeval system unimpaired, with the ex¬ ception of the transitory reforms of Alexander I, down to the middle of the 19th century, an epoch-making step was taken in the formal abolition of serfdom by the decree of Alexan¬ der II on 3 March 1861. The adjustment of the conditions of emancipation, however, brought little progress in the direction of social democ¬ racy, but resulted essentially in a transforma¬ tion of the peasantry from serfs of nobles to c(serfs of the state.® Not until the manifesto of 16 Nov. 1905, the edicts of November 1906 and the sweeping land reforms of 27 July 1910 and 11 June 1911, were the intended benefits of the Emancipation Act of 1861 and the real abolition of serfdom actually accomplished. The first important movement in the direction of political democracy in modern Russia came in 1864, when Alexander II issued his notable decree creating the local assemblies or zemstvos, thereby introducing some degree of local self-government into Russia, something which had not existed since the period of centralization under Peter the Great at the opening of the 18th century. After the Polish revolt of 1863 Alexander II, like his uncle, Alexander I, aban¬ doned his early reforming tendencies and the night of reaction settled upon Russia which was not to be broken for 40 years, in spite of the policy of revolutionary terrorism and the assassination of tsars, dukes and public offi¬ cials. But the grip of reaction, which assassina¬ tions could not break, was weakened by that deadly and persistent enemy of medievalism in politics and society — the industrial revolution — which first began to affect Russia on a con¬ siderable scale in the nineties during the min¬ istership of Witte. This greatly strengthened the hitherto insignificant Russian middle class, in which lay the only hope of liberalism. Guided by such able leaders as Professor Mil-yukov and aided by the discrediting of the old regime through the disasters of the Russo-

Japanese War, the bourgeoisie, in the revolu¬ tionary movement of 1905-06, were able to ex¬ tort from the tsar the grant of approximate universal suffrage and the creation of a con¬ stitutional parliamentary government. When freed from the strain of war, however, the tsar, encouraged by his reactionary ministers, pro¬ ceeded to abrogate his liberal measures by lim¬ iting the powers of the Duma and by altering the electoral law so as to defeat the principle of universal suffrage. While this reactionary pol¬ icy proved temporarily successful, in 1917, dis¬ asters more serious than those of 1904-05 drove the discredited autocracy from Russia in complete humiliation. During the summer of 1917 the Russian revolution passed through those stages, so familiar to students of French history between 1789 and 1793, from the control of constructive bourgeoisie statesmen to that of the leaders of the Bolsheviki mob. The ulti¬ mate outcome of the revolution cannot be pre¬ dicted, but it is probable that it will be as im¬

possible to re-establish the conditions of 1900 in Russia, as it was in France to bring about a return to the order of things which existed in 1788.

In the United States democracy was nearer to realization in 1800 than in most European countries, and, consequently, the advances made since that time have been more gradual and less spectacular than those in Europe. In the first half of the century the main ((achievements® in ˆdemocratizing® the nation consisted in the abolition of the aristocratic property qualifications for the exercise of the suffrage and in the vulgarization of the concept and practices of democracy, as a result of the Jack¬ sonian system. To men like Jefferson democ¬ racy had a strong Aristotelian flavor and great emphasis was laid upon special training, high intelligence and expert direction of government. With the advent of the Jacksonians all this was changed. The Mangers® of special prepara¬ tion for office were emphasized, supreme faith was put in <(pure® democracy, and rotation in office and the ((spoils® system were made the indispensable guides for administrative proce¬ dure. It was not strange, then, that the rule of statesmen ceased in the United States and the era of politicians, so inseparably connected with the democracy of America, began. The scandals of the (<spoils system® were in some degree curbed by the movement for civil serv¬ ice reform which began in the administrations of Grant, Hayes and Arthur. This salutary tendency was courageously supported by Cleveland, particularly in his second term, and though it was weakened somewhat by McKin¬ ley, it was revived with renewed

vigor by Roosevelt and Taft. Even firmer and more extensive is the hold of the spoils system on American State and local government. Democracy in America has, thus, failed to produce that efficiency in the public serv¬ ice which has been realized in autocratic Germany or in democratic England and France. The most pressing problem in American poli¬ tics is to work out a plan for the introduction into the democracy, already won, of the principle of special fitness for public service. The great obstacle to social democracy in America — negro slavery — was removed in part in 1863, but this question has been one in which de¬ mocracy has been complicated with the much more difficult problems of race prejudice, and its final solution is not likely to be arrived at for a century. In many ways the show of strength of the Progressive party and the vic¬ tory of the Democratic party in 1912 may be regarded as a gain for social democracy as they were symptoms of a great popular pro¬ test against the domination of American poli¬ tics and legislation by the conservative wing of the capitalistic class, which had become en¬ trenched in American politics as never before, after the retirement of President Roosevelt. Economic democracy seems legally if not actu¬ ally achieved in America. The use of ((blanket injunctions® against trade unions, so common in the labor disputes of the nineties, has de¬ clined greatly, and the attempt of the con¬ servative capitalists between 1908 and 1912 to bring the trade unions within the reach of the anti-combination acts was at last defeated by the Clayton bill. Finally, it must be noted that ˆdemocracy in America® is no longer restricted,

as it was in the time of De Tocqueville, to the United States alone, but has become an assured fact in the Dominion of Canada and has made notable advances in some of the leading coun¬ tries of Latin America.

Nor is the United States, as it was in De Tocqueville's day, the most advanced and ex¬ tensive laboratory in the democratic experi¬ ment. That position has passed to the Austral¬ asian possessions of Great Britain. Building on the precedent of the United States, Australia and New Zealand have passed far beyond their model in the originality and extent of their ex¬ periments in social, economic and political de¬ mocracy. With their universal male, and prac¬ tically universal female suffrage, their parlia¬ mentary government, their elaborate series of social reform measures, and their original ex¬ periments in attempting to solve the perplex¬ ing problems of economic democracy they are easily entitled to the front rank in the vanguard of the world's progress toward ultimate de¬ mocracy.

These notable achievements, which have been all too briefly enumerated above, have cohstituted great strides in the direction of po¬ litical democracy since 1800, but they have left many grave problems still unsolved which will have to be met and conquered before democracy can be regarded as finally achieved. The se¬ curing of universal suffrage and representative government has made political democracy pos¬ sible, rather than assured its existence. As Mr. Bryce and Mr. Michels have so well pointed out, the political boss has proved quite as much of an obstacle to modern democracy as did the feudal lord to democratic tendencies in the mediaeval period. Attempts have been made, which are as yet only partially successful, to eliminate his sinister influence through such devices as the direct primary and the civil serv¬ ice laws. Also archaic forms of political in¬ stitutions have often been found unsuited for a rapid and flexible adjustment to the desires and needs of the people and such machinery as the initiative, referendum and recall has been introduced in the hope of making government more sensitive and responsive to the public will. Again, many of the problems connected with the perfection of representative institu¬ tions are yet to be solved, and to meet this need schemes are being proposed and adopted which embrace the principle of minority and propor¬ tional representation and the representation of professional and economic groups. Then Mr. Hobhouse and others, from the standpoint of political theory, and

President Wilson, from the position of the constructive statesman, have reminded the world that most difficult and per-perplexing problems are involved in reconciling political democracy at home with the repres¬ sion of subject peoples in imperial dominions. Finally, no one can seriously maintain that so¬ cial and economic democracy are yet fully achieved when such extremes of social and eco¬ nomic position exist as are revealed, not in the morbid harangue of the soap-box orator, but in the sober and reliable statistics gathered by every great modern nation. While it is neither probable nor desirable that society will permanently adopt any method of graduating social and economic reward other than that of services rendered, it is a patent fact that the prevailing methods of determining the value of

services is sadly antiquated and in need of re¬ vision, particularly in the direction of prevent¬ ing rewards from being inherited instead of earned. It is further necessary to take such steps as shall be required to ensure that all members of society may receive approximate equality of opportunity and equipment for rendering services to society and receiving their reward therefor.

There can be no doubt that the present World War will have a far-reaching effect upon the future of democracy, not only in its reac¬ tion on the domestic policies of the various States involved, but also in the readjustment of nationality and imperialism in a manner more in accordance with the principles of self-deter¬ mination and democracy. While there are powerful classes, organizations and individuals in every country opposed to Germany, who are really much more in sympathy with the German system, principles and practices than with true democracy in politics, society and industry, it is certain that as the gigantic conflict has pro¬ gressed it has assumed more and more the nature and characteristics of a final struggle between arrogant nationalism and mediaeval autocracy, on the one hand, and modern democ¬ racy and the rule of international law on the other. A profound change in the political and social order, comparable only to that which took place from 1789 to 1815, must be the inevi¬ table outcome.

The development of the importance of de¬ mocracy as a problem for theoretical analysis by the various branches of social science since 1800 has been fully as remarkable as the phenomenal growth of democracy in social, political and economic life. As was pointed out above, democracy until this period was not of sufficient importance in

politi¬ cal philosophy ever to have received a compre¬ hensive and systematic analysis by a political theorist. Since the beginning of the 19th cen¬ tury, however, works on various phases of de¬ mocracy have appeared in such a volume that only a few leading tendencies can be noticed in the scanty space which remains.

In the first place, it is interesting and signifi¬ cant that the chief trends in the development of democracy in political theory closely parallel, and, to a large degree, were determined by the actual development of democracy in practice. Just as the first great advances toward democ¬ racy in the 19th century were the work of the middle class advocates of laissez-faire, so the first great expositions and defenses of democ¬ racy came from individualists in political theory such as Jefferson, Mill, Cobden and Spencer, who defended a semi-Aristotelian variety of democ¬ racy, in which the masses should participate but should be directed by the intellectually elite. Again, in the same way that democracy has in fact been made more inclusive to embrace the proletariat as well as the bourgeoisie and has tended to adopt a broad program of social re¬ form and state activity, so to-day the chief advanced exponents of modern democracy are to be found among the Socialists and radicals — men like the great socialistic leaders Bebel, Liebknecht and Jaures, such radicals as H. G. Wells, Bernard Shaw and others of the English Fabian group, and sociological reformers who advocate a policy of extensive state activity and a radical program of social reconstruction in

behalf of the proletariat. The present day ad¬ herents of the mid-Victorian individualism of Mill have become the conservatives, who, in political theory, occupy to-day the position once held by Metternich and the Duke of Wellington and their apologists, Bonald, De Maistre, and Von Haller.

An interesting development in the field of the analysis of democracy in social and political theory has been the clarification of the definition of democracy. The early definitions were gen¬ erally formalistic and concerned chiefly with such problems as distinguishing between “pure® and “representative® democracy and analyzing the political concept of democracy. Especially important has been the “democratizing® of the very conception of democracy. The old Aris¬ totelian notion of the “people® as the upper and middle class members of society, which per¬ sisted down to the close of the 18th century, has been supplanted by the newer view which re¬ gards the people as embracing all the members of society with no exception. Consequently, the phrase “government by the people® meant quite a different thing when used by Lincoln than it did when employed by Aristotle, Cusanus, Locke or Rousseau. Again, more recent stu¬ dents of the subject have come to see that de¬ mocracy is far more than merely a form of government. Professor Giddings, who may be taken as typical of the recent synthetic interpre¬ tation of democracy, finds that democracy is a form of government, a form of the state and a type of social organization and social control. As a form of government a “pure democracy® is held to mean the enfranchisement of the ma¬ jority of the population and the direct participa¬ tion of the whole mass of the citizens in the operation of all the affairs of government. The much more common “representative democracy® is defined as one in which the citizens govern indirectly through periodically selected deputies or representatives. As a form of the state democracy implies the existence of popular sovereignty. Lastly, as a form of society de¬ mocracy means both a democratic organization and control of non-political forms of activity and a determination of public policy by a ma¬ jority of the citizens. (For a detailed analysis of the various phases of democracy see the following article on

Democracy by Professor Ellwood). Finally, a number of students of democracy, among them Prof. James Harv.ey Robinson, have become dissatisfied with a for¬ malistic and static analysis of democracy, have given it a pragmatic definition and have identi¬ fied it with a dynamic program. Professor Robinson, for example, holds that democracy not only requires the popular control of public policy, but also implies a type of social organi¬ zation which will develop to the fullest extent the latent potentialities of every member of the society, and imposes upon society the moral obligation to do everything in its power to hasten the realization of such a condition.

Another phase of the development of the theory of democracy in the last century which can only be touched upon here is the great controversies over the merits of democracy as opposed to monarchy and aristocracy. That anyone should have thought democracy worthy of a lengthy and sustained attack or defense is significant of the growing importance of the subject, for such a thing rarely or never occurred before this

period: The first phases of the controversy, fol¬ lowing the French Revolution, were particularly acrimonious and partisan when the reaction¬ aries, such as Burke, Bonald, DeMaistre and Von Haller bitterly attacked the new order of things and were answered in kind by its ad¬ mirers such as Paine, Jefferson, Bancroft and Lamartine. The more recent echoes of the Burke-Paine controversy have been more schol¬ arly and temperate. Maine, Lecky, Faguet,.Le Bon and Treitschke have questioned the merits of democracy and they have been effectively answered by Giddings, Sumner, Lowell, Eliot and the English Liberals and Fabians. On the whole, English, French and American ˆwriters now tend to defend the efficacy of a democratic form of social and political organization, while Teutonic writers, with the exception of the Socialists, have drifted away from their mid¬ century liberalism and have tended more and more to defend autocracy. Both tendencies have, no doubt, been the logical outgrowth of their social and political environment.

The remaining tendency in the development of democratic theory, and that which is des¬ tined to bring the most fruitful results, has been the gradual shift of method from a priori mythology and generalization, setting forth what some theorists imagine democracy to be, to a real concrete and inductive study of de¬ mocracy in operation and an analysis of its * fundamental foundations. The first conspicu¬ ous case of a concrete study of a democracy in action was made by De

Tocqueville nearly a century ago and it remained for over a half-century the only analysis of its kind. James Bryce next essayed the task with equal suc¬ cess in his remarkable (American Common¬ wealthˆ Still more recently Ostrogorski and Croly have continued this line of approach in a brilliant but less comprehensive manner. These studies, however, though epoch-making, were mainly descriptive rather than analytical. The need of a more profound analysis has been effectively stated by Mr. Graham Wallas and a number of fragmentary attempts have been made to supply this need. The impulse to this more penetrating analysis has come mainly from sociologists and economists, as the politi¬ cal scientists have, for the most part, been content to proceed with the further develop¬ ment of the external, and somewhat superficial, formalistic and legalistic line of approach to politics, which received its most effective formu¬ lation in the monumental works of Professor Burgess. Professor Beard's brilliant and orig¬ inal torso has for the first time presented in their true perspective the origins of American democracy. Mr. Bentley, in a profound and too little read book, has brought the methodol¬ ogy of Gumplowicz, Ratzenhofer and Small to bear on an analysis of that struggle of economic interests in society and politics which furnishes the only key to the understanding of so many problems in modern political life. The sociolo¬ gists, particularly in America, have shown that democracy is not something which may be plucked from the clouds, but requires certain indispensable conditions in the social environ¬ ment for its successful operation, and they have tried to indicate the nature of some of these indispensable prerequisites of the successful de¬ mocracy. Professor Giddings, in a number of thoughtful volumes and essays, has sketched the

environmental background which determines the nature of political life and organization, has pointed out the necessity of homogeneity of mental reactions for the existence of a liberal and democratic society, has attempted a har¬ monizing of the Aristotle-Harrington concep¬ tion of the leadership of the intellectual elite with the modern view of the necessity of a democratic control in society, and has outlined the significant-reasons for believing that de¬ mocracy and imperialism are not mutually exclusive. Professor Ross has carried out Pro¬ fessor Giddings' conception of the necessity of homogeneity and general intelligence for the successful operation of a democracy and has shown by trenchant writings the grave dangers to American democracy from the carelessness and indifference of the government in allowing the unrestricted immigration of heterogeneous and ignorant elements from the "surplus popu¬ lations® of Europe. Also, following out Pro¬ fessor Giddings' emphasis on the importance of racial and psychological homogeneity in de¬ mocracy and upon the determination of political organization by the conditions in the social environment, Professor Tenney has pointed out many of the most important biological founda¬ tions and prerequisites of democracy and has sounded a note of warning against the dangers latent in the admission to the United States of peoples and classes who neither satisfy these conditions nor can be made to satisfy them by assimilation into the population. Professor Cooley, in a brilliantly written work, has ana¬ lyzed, in a penetrating manner, the psychological problems inherent in the organization of dem¬ ocratic society on a large scale and has made numerous helpful suggestions as to how some of these perplexing problems may be solved. The students of social psychology, such as Sighele in Italy, Tarde, Durkheim and Le Bon in France, Bagehot, Wallas, MacDougall and Trotter in England, and Giddings, Sumner, Cooley and Ross in America, have analyzed the diverse phases of those socio-psychic phenomena that affect group behavior and are especially prominent in modern democracies with their predominance of urban life and the resulting increase in the volume and variety of psychic reactions, intercourse and interstimulation. Professor Ellwood, in several erudite and lucid volumes, has produced a synthesis of the chief results of the work of the social psychologists and has indicated their bearing upon the prob¬ lems of politics in general and of American democracy in particular. Finally, statisticians, led by Professors Mayo-Smith and Willcox, have begun that quantitative measurement of political and

social phenomena which Profes¬ sors Wallas and Giddings have insisted is the only procedure which will be able to raise poli¬ tics and sociology to the level of true sciences. These diverse but complementary contributions toward a concrete investigation and a funda¬ mental analysis of the problems of democracy doubtless forecast the most fruitful tendencies in the future formulation of the "theory® of democracy. The synthesis of these various lines of approach to the analysis of the foundations of democracy — geographical, economical, bio¬ logical and psychological — studied by the exact methods of statistical measurements, is the most pressing task which awaits execution in the field of political and social theory.

Bibliography. — Primitive Society : Durk¬ heim, E., 'The Elementary Forms of Religious Life) ; Goldenweiser, A. A., (The Social Organ¬ ization of the Indians of North America) (in Journal of American Folklore, October-Decem- ber 1914) ; Sociological Terminology in Ethnology) (in American Anthropologist, July-September 1916) ; Hobhouse, L. T., 'The Ma¬ terial Culture and Social Institutions of the Simpler Peoples) ; Levy-Bruhl, L., 'Les fonc-tions mentales dans les societes inferieures) ; Lowie, R. H., 'Primitive Society) ; id., 'Culture and Ethnology* ; Marett, R. R., ' Anthropology* (Chap. VI); Rivers, W.

H. R., 'Kinship and Social Organization ; Swanton, J. R., (A Reconstruction of the Theory of Social Organization (Boas Anni¬ versary Volume 1906). Early Political So¬ ciety : Breasted, J. H., (The Development of Religion and Thought in Ancient Egypt" ; (A History of the Ancient Egyptians* ; Janet, P., (Histoire de la science politique* (Vol. I) ; Jastrow, M., Civilization in Babylonia and Assyria *(Chap. VI) ; Marvin, F. S., 'The Liv¬ ing Past) (Chap. Ill) ; Sayce, A., (The Baby¬ lonians and Assyrians) ; Taylor, H. O., (Ancient Ideals* ; Willoughby, W. W., (Political Theories of the Ancient Worlds Classical Times — 1. In Practice: Botsford, G. W., (Hellenic History) ; 'Hellenic Civilization*; 'The Roman Assemblies) ; Dill, S., (Roman Society from Nero to Marcus Aurelius* ; Toman Society in the Last Century of the Western Empire) ; Fowler, W., (Social Life at Rome) ; (The City-State of the Greeks and Romans* ; Marvin, F. S., (The Living Past) (Chaps. IV-V) ; Zimmern, A., 'The Greek Commonwealth.* 2. In Theory: Barker, E., (The Political Theory of Plato and Aristotle) ; Carlyle, A. J., (A History of Medieval Political Theory* (Vol. I) ; Coker, F. W., 'Readings in Political Philosophy* (Chaps. I— II I) ; Dunning, W. A., (A History of Political Theories, Ancient and Medieval > (Chaps. I-IV) ; Loos,

I. , 'Studies in the Politics of Aristotle and the Republic of Plato) ;

Ncttleship, R. L., (Lectures on the Republic of Plato* ; Willoughby, W. W.,

(Political Theories of the Ancient World) ; Zeller, E., ‘Stoics, Epicureans and Sceptics.) The Middle Ages — In Practice: Adams, G. B., Civilization during the Middle Ages) ; Bryce, James, ‘The Holy Roman Empire) ; Bury, J. B., ‘The History of the Freedom of Thought*; Davis, H. W. C., (Medieval Europe* ; Emerton, E., ‘ Introduction to the Study of the Middle Ages) ; ‘Medieval Europe*; Giry and Reville, ‘Emancipation of the Medieval Towns*; Luchaire, A., ‘Social France in the Time of Philip Augustus) ; Seignobos, C., ‘The Feudal Regime* ; Thorndike, L., ‘The History of Medieval Europe) ; Vinogradoff, P., ‘The Foundations of Society* (in ‘Cambridge Medi¬ aeval History,* Vol. II, Chap. 20) ; ‘The Growth of the Manor* ;‘ English Society in the Eleventh Century.) (2) In Theory: Carlyle, A. J., ‘A

History of Medieval Political Theory* (Vols. I— III) ; Coker, F. W., ‘Readings in Political Philosophy* (Chaps. IV-VII) ; Dunning, W. A., ‘A History of Political Theories, Ancient and MedievaP (Chaps. V-XI) ; Figgis, T. N., ‘From Gerson to Grotius> ; Gierke, O., ‘Politi¬ cal Theories of the Middle Ages.* From the Commercial Revolution to the Industrial Revolution — In Practice: Cross, A. L., ‘A

History of England and Greater Britain5 (Chaps. XVIII-XLIV) ; Cunningham, W.,

(Western Civilization in Its Economic Aspects, Medieval and Modern Times5 (Book V) ; Hayes, C. J. H., (A Political and Social History of Modern Europe5 (Vol. I) ; Oppenheimer, F., cThe State5 (Chap. VI) ; Robinson and Beard, Development of Modern Europe5 (Vol. I) ; Seignobos, C., (Medieval and Modern Civi¬ lization5 (Chap. XVII). In Theory: Atger, F., D'Histoire des doctrines du contrat social5 ; Bluntschli, J. K./Geschichte der neueren Staats-wissenschaft5 ; Coker, F. W., (Readings in

Political Philosophy5 (Chaps. VIII-XX) ; Dun¬ ning, W. A., (A History of Political Theories from Luther to Montesquieu5 ; Franck, A., Deformateurs et publicistes de l'Europe5 (3 vols.) ; Gooch, G. P., (A History of English Democratic Ideas in the Seventeenth Century5 ; c Political Theory from Bacon to Halifax5 ; Graham, W., (English Political Philosophy5 ; Scherger, G. L., Evolution of Modern Liberty.5 From the Industrial Revolution to the Pres¬ ent Day — In Practice: Beard, C. A., (An Eco¬ nomic Interpretation of the Constitution of the United States5 ; (Some Economic Origins of Jeffersonian Democracy5 ; Bryce, James, (The American Commonwealth5 ; Croly, H., Pro¬ gressive Democracy5 ; (The Promise of Ameri¬ can Life5 ; De Tocqueville, A., (Democracy in America5 ; Ford, H. J., <Rise and Growth of American Politics5 ; Haworth, P. L., < America in Ferment5 ; Hayes, C. J. H., (A Political and Social History of Modern Europe5 (Vol. II) ; Hazen, C. D., (Europe since 1815 5 ; Hobhouse, L. T., (The Labor Movement5 ; Howe, F. C., Socialized Germany5 ; Marvin, F. S., (The Living Past5 (Chaps. IV-XII) ; Ogg, F. A., (The Governments of Europe5 ; (The Economic Development of Modern Europe5 ; Orth, S. P., Socialism and Democracy in Europe5 ; Ostrogorski, M., (Democracy and the Organization of Political Parties5 ; Robinson and Beard, Development of Modern Europe5 (Vol. II) ; Rose, J. H., (The Rise of Democracy5 ; Rosen¬ blatt, F., (The Chartist Movement5 ; Slater, G., <The Making of Modern England5 ; Slosson, P. W., (The Decline of the Chartist Move¬ ment5 ; Webb, S.,

and Webb, B., (The History of Trade Unionism5 ; Weyl, W., (The New De¬ mocracy. 5 In Theory: Addams, Jane, De¬ mocracy and Social Ethics5 ; Barker, E., Politi¬ cal Theory in England from Spencer to the Present Day5 ; Bentley, A. F., (The Process of Government5; Cooley, C. H., Social Organ¬ ization5; Duprat, G., Science sociale et demo¬ cratic5 ; Ellwood, C. A., Sociology in its Psy¬ chological Aspects5 ; Faguet, E., (The Cult of Incompetence5; Giddings, F. H., Democracy and Empire5 ; Hnductive Sociology5 ; (A Theory of Social Causation5 ; Godkin, E. L., Problems of Modern Democracy5 ; Hayes, C. J. H., (German Socialism Reconsidered5 (in American Historical Review, October 1917) ; Hobhouse, L. T., Democracy and Reaction5 ; Diberalism5 ; Social Evolution and Political Theory5 ; Hobson, J. A., Hmperialism5 ; Kir-kup, T., (A History of Socialism5 ; Lowell, A. L., Public Opinion and Popular Govern¬ ment5 ; (Merriam, C. E., (A History of Ameri¬ can Political Theories5 ; Michels, R., Political Parties5 ; Mill, J. S., (Essay on Liberty5 ; Ross, E. A., Social Control5 ; Sellars, R. W., (The Next Step in Democracy5 ; Shaw, G. B., et alii,

(The Fabian Essays5 ; Small, A. W., Detween Eras: From Capitalism to Democracy5;

Spencer, H., Social Statics5; /Man versus the State5; Tenney, A. A., Social Population and Democracy5 ; Tufts, J. H., (Our Democ¬ racy5 ; Wells, H. G., (A Modern Utopia.5

Harry E. Barnes,

Professor of History, Clark University.

DEMOCRACY, The Nature of. The

word Monocracy55 (Greek, demos, the people) means the rule of the <(people.55 The meaning of the word ((people55 has, however, varied from age to age, so that to understand the na¬ ture of democracy we must view it as an historical process of development.

Historical Phases of Democracy. — The conclusion of present-day anthropologists is that primitive society and primitive govern¬ ment were everywhere essentially democratic. That is, in primitive society there existed only natural class distinctions such as the distinc¬ tions of age, sex and capacity; and that such government as existed in primitive groups was usually based upon the customs and the opin¬ ions of the adult members of the group — the headmen, leaders or chiefs, usually being se¬ lected by the free suffrages of the group. The

case of the North American Indians with their clan and tribal assemblies and councils will serve as an illustration of this ˆprimitive de¬ mocracy.55 Such primitive democracies usually decided what the action of the group should be, whether it concerned the election of a peace chief, a war chief, the making of war or a penalty for some offender against tribal usages, only unanimously. A discussion was held until practically unanimous agreement was reached regarding the policy of the group, usually without formal voting.

In primitive democracies the <(people55 were the whole membership of the primitive group (clan or tribe) of adult age, though among some primitive peoples, such as the Australian aborigines, the women seemed to have had very little voice. The organization and func¬ tions of such primitive democracies were of the simplest sort and they were based almost wholly upon customary, we might almost say instinctive, usages. A democratic form of group control was possible in such cases be¬ cause of the similarity of the habits, feelings and ideas of all members of the group.

Primitive democracy was gradually super¬ seded during the period of barbarism, owing to the stresses and strains of the prolonged and constant warfare which characterized that stage of social evolution, especially of warfare for purposes of conquest, by more despotic types of government. The war chief became a king, usually, however, with his authority more or less limited by the tribal council. After the conquest and subjugation of one group by another centralized social control in the hands of definite authorities became even more neces¬ sary. However, the tradition that the freemen of the dominant tribe were the source of this authority persisted; and in some groups after the subjugated elements had become recon¬ ciled to their position as slaves, the freemen of the dominant or conquering group drove out their kings and distributed authority again among their own male members. Thus arose the <(ancient democracies,55 such as those of early Greece and Rome, These ancient de-652

mocracies were of a very limited kind. The (<people® in this case consisted of the freemen, the warriors, of the conquering tribe or group, while from one-half to four-fifths of the pop¬ ulation as a whole were slaves. The democ¬ racies of classic antiquity were thus of the authoritative and coercive type. This is a point not always recognized, but which should be carefully borne in mind in considering the nature of democracy. ((Primitive democracy,® as we have seen, was a democracy which sprang spontaneously from the similarity of habits, feelings and ideas of the whole group ; while ((ancient democracy® was the effort of a master class, or conquering group, to dominate a very much larger group with its ((mores.® It was democratic only with reference to the members of this master class, while with ref¬ erence to the whole population it was aristo¬ cratic or oligarchic.

The third stage of the evolution of demo¬ cratic society and government, namely, .(<mod-ern democracy,® is much more complex and must not be confused with the two preceding. Like primitive democracy, modern democracy means the rule of the whole adult population recognized as politically belonging to a certain group. Unlike primitive democracy, however, modern democracy does not rest upon the sympathetic and formal likemindedness of the members of the group, but rather upon that rational likemindedness which we term <(public opinion.® Unlike ancient democracy, modern democracies generally recognize no subject or servile class, and of recent years, the tend¬ ency is for all adult members of the political group, whether male or female, to participate in the work of government.

In other words, modern democracy is that form of social control in which the opinion and will of every adult member of the group enters into the determination of group behavior. It

is a phase of social evolution which attempts to reconcile individualism and collectivism. Instead of being a mere stage in social and political development, as manifestly was the case both with primitive and with ancient de¬ mocracy, modern democracy believes itself to represent the final phase of social control and of political evolution. It depends not only upon the freedom of the personality of the indi¬ vidual, but also upon equality of social and political rights

and upon the recognition of the solidarity, or fraternity, of all members of the group. Its method as a process of social con¬ trol is not through the development of mere formal likemindedness in the population by coercive authority or otherwise, but rather through the development of rational likemind¬ edness by means of free discussion, the un¬ trammeled formation of public opinion and the free selection of leaders or agents of au¬ thority.

Democracy as a Form of Social Control.

— The exact significance and nature of de¬ mocracy in relation to social evolution will be best brought out if we consider briefly the historical succession of forms of social con¬ trol. The lowest form of group control of which we know is that which rests chiefly upon the instincts and upon the correlated se¬ lective processes of the natural environment. Such control is characteristic of animal groups ; but the lowest human groups of which we have

knowledge show a very different type of con¬ trol — 'that of habit, or of custom and tradi¬ tion. All existing savage communities of mankind universally show this type of con¬ trol and we have every reason to believe that it represents the primitive human social con¬ dition. A third form of social control is that in which the control is exercised by the despotic power of a small group of individuals over a larger group. This control, as we have seen, sprang originally from the conquest of one group by another. Such an authoritarian type of social control characterized the social and political life not only of barbarous peoples, but also of peoples in the lower and middle phases of civilization. Authoritarian or des¬ potic control could not arise, of course, until some machinery of government had become established. The ruling class in such cases often maintained, as we have seen, democratic relations within their own group, but they established and maintained the unity of the population of the group as a whole through a fear-inspired obedience which finally estab¬ lished habits of solidarity. The most promi¬ nent national groups of the ancient and mod¬ ern world, until very recent times, have been authoritarian societies of this sort.

A fourth and higher type of social control, however, has been gradually emerging among modern civilized nations, a type of control in which the unity of the group is secured not so much by coercive authority as through the in¬ direct means of rational discussion, the for¬ mation of a rational public opinion and the free selection of

leaders. This is what we may call (<free society® in contrast with the authori¬ tarian and custom-ruled societies of the past; and this is modern democracy. It recognizes not merely that certain rights belong to the individual as a member of the group, but also that certain functions pertain to the individual in controlling the behavior of the whole group. As Hobhouse says, ((It founds the common good upon the common will, in forming which it bids every grown up, intelligent person to take a part.® Modern democracy is therefore much more than a form of the state or of govern¬ ment. It is rather a new phase of social evolu¬ tion, a goal toward which all human history has been striving. Whether it will succeed or not obviously depends upon the effectiveness of indirect means of social control, such as education, public discussion and the possibil¬ ity for vast masses of men to form rational opinions and execute rational decisions as a group; since social control and social unity are necessities of social existence. If de¬ mocracy fails, obviously social control must revert to control by a master class. It is for this reason that it is rightly said that democ¬ racy is ((the great adventure of modern civili¬ zation.®

In democratic societies, then, public opin¬ ion is the force which lies back of the power of all regulative institutions. Just in propor¬ tion as public opinion becomes rational and powerful can a democratic society be efficient and successful. For this reason democracies depend upon free thought, free public dis¬ cussion, free assemblage and a free press. If these rights are seriously abridged, it is ob¬ vious that the whole machinery of intercom¬ munication in the group will be hampered,

that it will be impossible to compare ideas and to come to a rational judgment regarding group policies. It is only through free dis¬ cussion and the formation of a public opinion untrammeled by either the prejudices and emotions of the whole group or by the inter¬ ests and power of some special class, that democracy can be what Mazzini declared it should be, (<the progress of all through all, under the leadership of the best and wisest.®

> There has been much debate whether the principle of democracy should be liberty or equality. In practice, however, both absolute liberty and absolute equality are destructive of democracy. Too great liberty has been found to lead to the exploitation of the weak by the strong and indeed to the negation of all government and all forms of social con¬ trol. In brief, it leads to anarchy. On the other hand, nothing has been more destruc¬ tive of democracy than attempts to realize in social and political life an absolute or dead-level equality. In this case, social efficiency and liberty both are destroyed. The greatest degree of absolute equality in society, indeed, seems more compatible with certain forms of autocracy than with democracy. For this reason social and political writers have usually concluded that democracy rests upon, not ab¬ solute, but relative liberty and equality among citizens. The truth seems to be, however, that the liberty and equality of democracy, if not socially destructive, must both rest upon an¬ other principle, that of ((fraternity.® By fra¬ ternity we mean such sympathy, understanding and good will among the members of the group that what they do collectively is a spon¬ taneous expression of the inner psychic unity of the whole group, or at least of a large majority of its members. Democracy, in this sense, doubtless remains largely a social and political ideal but such sympathy, likeminde,d-ness and good will are the necessary sociologi¬ cal bases of successful democracy.

In answering the question, <(Upon what basis have free communities risen and flour¬ ished?® Professor Giddings very rightly re¬ plies : ˆAlways this : the people that have made them and maintained them have been suffi¬ ciently likeminded, sufficiently alike in their

purposes, in their morals, in their ambitions and ideals, in their views of policy and method, to work together spontaneously. Naturally there has been among them what the. old Ro¬ man lawyers called (a meeting of minds, } so that without a whip over them, or a strong hand to hold them together they have collec¬ tively carried on the struggle for existence and advantage, freely and effectively. They have all seen the same truth ; they have all wanted the same success, they have striven by the same method for the realization of the same great purpose.®

Democracy as a Form of the State and of Government. — As a form of the state de¬ mocracy means what is ordinarily called <(popular sovereignty.® It is the like participation of all adults in creating the actual power that is sovereign in the state at any given time. As a form of government democracy is the actual rule through universal suffrage of the citizens taken as a mass. Unlike primitive democracies, modern democracies have found it necessary to adopt the principle of ((majority rule® in

reaching political decisions. Unanimity is not possible in the great complex societies of mod¬ ern civilization. Decisions upon public poli¬ cies and leaders to carry out these policies are usually reached, therefore, by a majority vote. Unfortunately, in this method there is always a danger that the result will be a compromise and that the will of the group will not be ef¬ fectively behind the proposed change. Defi¬ nite social choice, in other words, has not really been reached and th£ whole situation remains unstable. It is obvious, however, that in such cases what is lacking is a sufficient develop¬ ment of consciousness on the part of the group regarding the situation as a whole. With fur¬ ther discussion a more fully developed social consciousness and a social decision can be reached which are truly representative of the will of the group. The dangers of majority rule in complex modern societies can best be met, therefore, by such means of public edu¬ cation as will arouse fully social consciousness regarding any given situation. This again, of course, shows that modern democracy to be successful depends upon highly developed in¬ telligence and patriotism in the individual citi¬ zen.

Much has been made of the distinction be¬ tween ((pure® and ˆrepresentative® democracies. The pure democracies are those in which ques¬ tions of public policy are settled by the meet¬ ing of men in mass, such as in the assembly of primitive democracies, in the cantonal meet¬ ings in Switzerland and in the New England town

meeting. Government by assembly, or by mass meetings, however, is quite impossible in complex societies, even though there are cer¬ tain advantages in the way of securing unanim¬ ity and mutual understanding in such a sys¬ tem. If means of intercommunication are sufficiently highly developed and kept untram¬ meled, moreover, there is no reason why demo¬ cratic government should not work equally successfully under the system of delegated rep¬ resentatives. Popular control in representa¬ tive democracies obviously depends upon some system for the (<recall® of officials, when elected, at the will of the electors, if they are not found to be truly representative. For the same reason the initiative and referendum are necessary means of completing representative democracy in the field of legislation. Where these methods work badly, as it must be ac¬ knowledged that they often do, it is because democracy itself has failed through the lack of intelligence and patriotism on the part of the people. In all the democratic nations of the present, the tendency is toward more direct government ; and this on the whole is probably to be commended, for the exercise of the re¬ sponsibilities of government is itself an edu¬ cation. If democracies are to be a success, the whole mass of citizens must be trained in the knowledge and art of self-government.

Whether democracies are <(absolute® gov¬ ernments or not has also been a much debated question. Rousseau and perhaps a majority of the popular exponents of democracy have held that democratic rule is <(absolute,® not less than autocratic rule, since ˆsovereignty® by its very nature must be absolute. In practice, however, democratic governments have usually refrained from exercising absolute control over many things, such as the opinions, beliefs

and practices of the people in religion and in many other matters. ((Limited majority ruled' instead of (<absolute majority rule,® is coming more and more to be recognized as the safest principle of democracy, since the belief in the absolute state, whether democratic or auto¬ cratic, is seen to be contrary to the practices of the most enlightened democracies and fraught with danger to the democratic prin¬ ciple itself, as under ˆabsolute® democracy freedom of thought, speech and conduct may easily be entirely lost.

Modern democracy is, however, far from giving allegiance to the principle that <(that government is best which governs least.® On the contrary, modern democratic government is constantly extending its functions and re¬ cognizes that government as an agency of social control is coextensive, as Mill said, with human interests. Nevertheless, a too rapid extension of the functions of government may prove im¬ practicable or dangerous under present condi¬ tions. This is especially true of democratic governments, because they depend so much upon the development of intelligence and char¬ acter in the individual citizen. Again, it must be remembered that even democratic govern¬ ments in their control of social life are lim¬ ited in their direct action to relatively external conditions and that their success depends not so much upon their power of coercing the in¬ dividual as upon eliciting his initiative and cooperation.

Democracy as a Form of Industry. — It

must be acknowledged that a democratically organized industry would be something very far removed from traditional modern capital¬ ism. It would imply the giving of a large voice in the management of industry to the workers ; it would also imply the giving of equal remuneration for equal services ; finally, it would imply fraternity in the management of industrial enterprises and in industrial life generally. Whether such a democratization of industry implies complete government own¬ ership or not, we need not here discuss. Ob¬ viously, it does imply such a collective control of industry that the opinion and will of every individual in the political group will count in the determination of industrial policies. This implication of democracy is being rapidly per¬ ceived by all democratic nations ; and demo¬ cratic governments are now accordingly rap¬ idly developing their control over industry in the

interests of democracy. Socialism, in this moderate sense of democratic control and reg¬ ulation of industry in the interests of public welfare, would seem near realization in the immediate future in all fully democratic na¬ tions.

However, the relations between democracy and the modern socialistic movement are very complex. Socialists are wont to claim that socialism is simply democracy carried over into industrial relations. But many socialists favor, not democracy as we have defined it, but rather working-class domination. Appar¬ ently many socialists wish the establishment of socialism whether it comes through the wishes of the majority of citizens or not. This particular class of socialists we may call the revolutionary socialists, as they are not in¬ clined to wait for the coming of socialism through the working of democratic machin¬

ery. Quite recently some prominent German socialists have claimed that socialism will de¬ pend for its successful development, not upon a democratic, but upon a bureaucratic, social and political organization.

Democracy as a Form of Social Life. — In its essence, as we have seen, democracy is a form of Social control ; but social control is broader than government, extending even to the more intimate relations of individuals in society. Democracy is gradually coming to expression in these relations, also. Thus in the family life, we find the authoritative fam¬ ily to be passing and a more democratic type of the family to be evolving. In the demo¬ cratic family quite evidently a larger measure of liberty and equality must be introduced; but here as elsewhere in democratic society, fraternity, even more than liberty and equal¬ ity, is necessary if a democratic type of family life is to succeed. A larger and larger meas¬ ure of democracy is, indeed, being introduced into all of the <(free associations® and the in¬ stitutions of society. Churches are gradually becoming more democratic in their spirit, al¬ though older forms of governmental organi¬ zation may persist. Even schools are trying out the principles of self-government. In the still more intimate personal relations of social life the most advanced democratic peoples are striving to realize a higher degree of lib¬ erty and equality among their members. But in these more intimate relations democracy has developed slowly and relatively unevenly, because here perhaps more than anywhere else in the social life, democracy is dependent upon fraternity, that is, upon sympathy, under¬ standing and good will.

Democracy and Social Efficiency. — Critics. of democracy, such as Lecky, have always pointed out that democracy is apt to mean the control of ignorance and mediocrity and so is incompatible with social and political effi¬ ciency. The Great War has brought this question again to the forefront in democratic nations and some even claim that it will de¬ cide the matter. It may be pointed out that whether democracy means the control of the inefficient and mediocre will altogether depend upon circumstances. Doubtless the mass of men can never be trained to be experts in the work of government and of social control generally; and such work, it may be admitted, in order to be efficient, must always be done mainly by experts. However, the masses can be taught to select intelligently their leaders, and with patriotic rather than selfish ends in view; and in the long run the mass of the group are more to be trusted in the determina¬ tion of group policies than any governing class, however wise that class may be. De¬ mocracies, then, can be equally efficient, prob¬ ably more efficient, than autocracies, when all of their members have been trained so that they will take and play intelligently their part in the social life spontaneously, and not through coercion from above.

Bibliography.— Cooley, C. H., < Social Or¬ ganization > . (New York 1909) ; Croly, H., (The Promise of American Life) (New York 1909) ; Croly, H., Progressive Democracy* (New York 1914); Ellwood, C. A., (Introduc¬ tion to Social Psychology *. (New York 1917) ; Garner, J. W., ˆIntroduction to Political Sci-

ence> (New York 1910) ; Giddings, F. H., (De¬ mocracy and Empire > (New York 1900) ; Hobhouse, L. T.f (Democracy and Reaction > (London 1904) ; Hobhouse, L. T., (Liberalism) (New York 1910) ; Lecky, W. E. H., < Democ¬ racy and Liberty) (New York 1896) ; Scherger, G. L., (Evolution of Modern Liberty)

(New York 1904) ; Sims, N., (Ultimate De¬ mocracy and Its Making> (Chicago 1917) ; Weyl, W. E., (The New Democracy) (New York 1912).

Charles A. Ellwood,

Professor of Sociology, University of Missouri.

DEMOCRATIC PARTY, The, one of the

chief political organizations in the United States. To Thomas Jefferson belongs the honor of being the founder, and for a third of a century the undisputed leader, of the Demo¬ cratic party. Scarcely had the present Consti¬ tution been adopted before there appeared a line more or less distinct dividing those who, like Jefferson (q.v.), believed the people fully capable of self-government and trusted them, and those who, like Hamilton (q.v.), thought that the masses needed to be under the control of a strong and centralized government. This' fundamental difference of opinion manifested itself in the treatment of every important ques¬ tion, and party organizations were soon per¬ fected.

As Jefferson himself has described the birth of parties in the United States, his opinion can be accepted as authoritative. In a letter writ¬ ten in June 1823, near the close of his life, to William Johnson, he said:

At the formation of our government, many had formed their political opinions on European writings and practices, believing the experience of old countries, and especially of England abusive as it was, to be a safer guide than mere theory. The doctrines of Europe were that men

in numerous associations cannot be restrained within the limits of order and justice, but by forces physical and moral, wielded over them by authorities independent of their will. Hence their organization of kings, hereditary nobles, and priests. Still further to constrain the brute force of the people, they deem it necessary to keep them down by hard labor, poverty and ignorance, and to take from them as from bees, so much of their earnings, as that unremitting labor shall be necessary to obtain a sufficient surplus barely to sustain a scanty and miserable life. And these earnings they apply to maintain their privileged orders in splendor and idleness, to fascinate the eyes of the people, and excite in them an humble adoration and submission, as to an order of superior beings. Although few among us had gone all these lengths of opinion, yet many had advanced, some more, some less, on the way. And in the convention which formed our government, they endeavored to draw the cords of power as tight as they could obtain them, to lessen the dependence of the general functionaries on their constitu¬ ents, to subject to them those of the States, and to weaken their means of maintaining the steady equilibrium which the majority of the convention had deemed salutary for both branches, general and local. To recover, therefore, in prac¬ tice the powers which the nation had refused and to warp to their own wishes those actually given, was the steady object of the Federal party. Ours, on the contrary, was to maintain the will of the majority of the convention and of the people themselves. We believed, with them, that man was a rational animal endowed by nature with rights and with an innate sense of justice; and that he could be restrained from wrong and protected in right, by moderate powers confided to persons of his own choice, and held to their duties by dependence on his own will. We believe that the complicated organization of kings, nobles, and priests, was not the wisest nor best to effect the happi¬ ness of associated man; that wisdom and virtue were not hereditary; that the trappings of such a machinery, con¬ sumed by their expense, those earnings of industry they were meant to protect, and, by the inequalities they pro¬ duced, exposed liberty to sufferance. We believe that men, enjoying in ease and security the full fruits of their own industry, enlisted by all their interests on the side of law and order, habituated to think of themselves and to follow their reason as their guide, would be more easily and safely governed, than with minds nourished in error and vitiated and debased; as in Europe, by ignorance,

indigence, and oppression. The cherishment of the people then was our principle, the fear and distrust of them that of the other party. Composed, as we were, of the landed and laboring interests of the

country, we could not be less anxious for a government of law and order than were the inhabitants of the cities, the strongholds of federalism. And whether our efforts to save the principles and form of our Constitution have not been salutary, let the present republican freedom, order, and prosperity of our country determine.

Jefferson not only gave a history of the formation of parties, but fortunately for later generations, he enumerated the elements which each party contained. In a letter to C. E. Ebeling in 1795 he said:

Two parties exist within the United States. They em¬ brace respectively the following descriptions of persons. The Anti-Republicans consist of: (1) The old Refugees and Tories; (2) British merchants residing among us, and com¬ posing the main body of our merchants; (3) American merchants trading on British capital, another great portion;

(4) speculators and holders in the banks and public funds;

(5) officers of the Federal government with some exceptions;

(6) office hunters willing to give up principles for places, — a numerous and noisy tribe; (7) nervous persons, whose languid fibres have more analogy with a passive than active state of things. The Republican party of our Union com¬ prehends: (1) The entire body of landholders throughout the United States; (2) the body of laborers not being land¬ holders whether in husbanding or the arts. The latter is to the aggregate of the former party probably as 500 to 1; but their wealth is not as disproportionate, though it is also greatly superior and is in truth the foundation of that of their antagonists. Trifling as are the numbers of the Anti-Republican party, there are circumstances which give them an appearance of strength and numbers. They all live in cities together, and can act in a body and readily at all times; they give chief employment to the newspapers, and, therefore, have most of them under their command. The agricultural interests are dispersed over a great extent of country, have little means of intercommunication with each other, and feeling their own strength and will, are conscious that a single exertion of these will at any time crush the machinations against their government.

Jefferson's philosophical mind sought not only the facts, but the reason for the facts, and in 1824, in a letter to Mr. Lee, he thus classified men according to their party tendencies :

Men by their constitutions are naturally divided into two parties: (1)

Those who fear and distrust the people and wish to draw all powers from them into the hands of the higher classes; (2) those who identify themselves with the people, have confidence in them, cherish and consider them as the most wise depositary of the public interests. In every country these two parties exist, and in every one where they are free to think, speak, and write, they will declare themselves. .Call them, therefore, liberals and serviles, Jacobins and ultras, Whigs and Tories, Republicans and Federalists, aristocrats and Democrats, or by whatever name you please, they are the same parties still, and pursue the same object. The last appellation of aristocrats and Democrats is the true one expressing the essence of all.

Jefferson's purpose was to found a party that would be really democratic in personnel, in purpose and in method. The party, however, was at first called the Republican party, and afterward the Democratic-Republican party. It was not until in Jackson's time that it became universally known by its present name. As there were no national conventions and no national platforms in the early days of the Republic the position of the party on public questions must be gathered from the words and speeches of the leaders and from the votes of the members of the party in Congress. Jef¬ ferson's first inaugural address contained the essence of the party creed as generally accepted during the first quarter of the 19th century. In fact, it is still the creed of the party, and no group of men desiring to maintain an in¬ fluence in the party can even now admit any essential departure from it. It will be found below :

About to enter, fellow-citizens, on the exercise of duties which comprehend everything dear and valuable to you,

it is proper you should understand what I deem the essential principles of our government, and consequently those which ought to shape its administration. I will compress them within the narrowest compass they will bear, stating the general principle, but not all its limitations. Equal and exact justice to all men, of whatever State or persuasion, religious or political; peace, commerce, and honest friendship with all nations, entangling alliances with none; the support of the State governments in all their rights, as the most competent administrations for our domestic concerns and the surest bulwarks against Anti-Republican tendencies; the preservation of the general government in its whole constitutional vigor, as the sheet anchor of our peace at home and safety abroad; a jealous care of the right of election by the people — a mild and safe corrective of abuses which are lopped by the sword of revolution where peaceable reme¬ dies are unprovided; absolute acquiescence in the decisions of the majority, the vital principle of republics, from which is no appeal but to force, the vital principle and immediate parent of despotism; a well-disciplined militia, our best reliance in peace and for the first moments of war, till regulars may relieve them; the supremacy of the civil over the military authority; economy in the public expense that labor may be lightly burthened; the honest payment of our debts and sacred preservation of the public faith; encouragement of agriculture, and of commerce as its handmaid; the diffusion of information and arraignment of all abuses at the bar of the public reason; freedom of religion, freedom of the press, and freedom of person under the protection of the habeas corpus, and trial by juries impar¬ tially selected. These principles form the bright constel¬ lation which has gone before us and guided our steps through an age of revolution and reformation. The wisdom of our sages and blood of our heroes have been devoted to their attainment. They should be the creed of our political faith, the text of civic instruction, the touchstone by which to try the services of those we trust; and should we wander from them in moments of error or of alarm, let us hasten to retrace our steps and to regain the road which alone leads to peace, liberty, and safety.

The first and most fundamental difference between the Democratic party (when it was known as the Republican party, afterward as the Democratic-Republican party and to-day as the Democratic party) and the party which has opposed it (first known as the Federal party, then as the Whig party and more recently as the Republican party) was

upon the construc¬ tion of the Constitution. The former party has insisted upon a strict construction, while the latter has leaned toward a liberal construction of the Federal Constitution. This difference is a natural one for the Democratic party, be¬ lieving in the right of the people to, and in the capacity of the people for, self-government, has insisted upon giving them as large a part as possible in the control of their own affairs.

It follows, therefore, that the Democratic party favors local self-government and opposes the centralization of power in remote centres. It believes that the nearer the people are to their government the more effective will be their control over it. The various parties that have opposed the Democratic party have given more or less emphasis to the Hamiltonian view and have increased the power of the repre¬ sentative at the expense of the constituents.

While this distinction has not at all times been clearly marked, and while these views have not been held by all the individual mem¬ bers, the general tendency has existed.

In the very beginning this tendency was illustrated in the Alien and Sedition laws en¬ acted by the Federalists and in the Kentucky and Virginia resolutions supported by the Demo¬ crats. (See Alien and Sedition Acts ; also Kentucky Resolutions and Virginia Resolu¬ tions). Both parties in this instance went to the extreme, the Federalists attempting to confer dangerous power upon the Federal gov¬ ernment, the Democrats asserting views which were afterward so misconstrued as to weaken the Federal Union. The preservation of the

balance between the Federal government and the State governments has always been a deli¬ cate matter, and as the line cannot be drawn with mathematical accuracy there has always been room for dispute; the public sentiment having gone to the one side or the other as it was necessary to maintain the equilibrium. It is likely that this discussion will continue, but the efforts to carry the government to an ex¬ treme in either direction will be thwarted by the conservative middle class, which rallies to the support of the side that is attacked.

Beginning with Jefferson’s administration in 1801, and continuing to the end of Monroe’s administration in 1825, the Democratic party held undisputed sway in the nation. Jefferson, like Washington, refused to consider a third term, and his Secretary of State, James Madison (q.v.), succeeded him. Madison, following the example set by

his predecessor, retired at the end of his second term, and James Monroe (q.v.), who had been his Secretary of State, succeeded him.

The War of 1812 was conducted by the Madison administration, and it was during this ‘period that the Hartford resolutions were adopted by a convention of Federalists which met at Hartford, Conn., in December 1814. These resolutions went further in the direction of States rights than either the Kentucky reso¬ lutions or the Virginia resolutions. They began by recommending ((to the legislatures of the several States represented in this convention, to adopt all such measures as may be necessary effectually to protect the citizens of said States from the operation and effects of all acts which have been or may be passed by the Congress of the United States, which shall contain provi¬ sions subjecting the militia or other citizens to forcible drafts, conscriptions, or impressments not authorized by the Constitution of the United States.®

While the Hartford resolutions announced a political policy, they had their origin in the commercial interests which were affected by the War of 1812 and by the embargo act (see Embargo) which was enacted as a war measure.

The Federal party which supported Clinton’s candidacy in 1812 laid great stress upon the commercial interests. The platform adopted by the New York Federalists urged the election of Clinton as the surest method of guaranteeing the protection of those commercial interests which were flagging <(under the weakness and imbecility of the administration.® The Federal¬ ists attacked what they called the Virginia regency, and the Hartford resolutions recom¬ mended a constitutional amendment making the President ineligible for renomination, and an¬ other prohibiting the selection of two Presidents in succession from the same State.

It was during the administration of James Monroe that the doctrine, afterward known by his name, and followed ever since, was pro¬ mulgated. The doctrine was set forth in a message sent to Congress by James Monroe on 2 Dec. 1823. (See Monroe Doctrine). The following is the text covering this subject:

In the wars of European powers, in matters relating to themselves, we have never taken any part, nor does it comport with our policy so to do. It is only when our rights are invaded or seriously menaced that we resent injuries or make preparations for our defense. With the movements on this hemisphere we are, of necessity, more

immediately connected, and by causes which must be obvious to all enlightened and impartial observers. The political system of the allied powers (the Holy Alliance) is essentially different in this respect from that of America. This dif¬ ference proceeds from that which exists in their respective governments. And to the defense of our own, which has been achieved by the loss of so much blood and treasure, and matured by the wisdom of their most enlightened citizens and under which we have enjoyed unexampled felicity, this whole nation is devoted. We owe it, therefore, to candor and to the amicable relations existing between the United States and those powers to declare that we should consider any attempt on their part to extend their system to any portion of this hemisphere as dangerous to our peace and safety. With the existing colonies or depend¬ encies of any European power we have not interfered, and shall not interfere. But with the governments who have declared their dependence and maintained it we have on great consideration and on just principles, acknowledged we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition toward the United States. Our policy in regard to Europe, which was adopted at an early stage of the wars which have so long agitated that quarter of the globe, nevertheless remains the same, which is not to interfere in the internal concerns of any of its powers; to consider the government de facto as the legitimate government for us; to cultivate friendly relations with it, and to preserve those relations by a frank, firm, and manly policy; meeting in all instances the just claims of every power, submitting to injuries from none. But in regard to those continents, circumstances are emi¬ nently and conspicuously different. It is impossible that the allied powers should extend their political system to any portion of either continent without endangering our peace and happiness; nor can any one believe that our southern brethern, if left to themselves, would adopt it of their own accord. It is equally impossible, therefore, that we should behold such interposition, in any form, with indifference.

This message was written after consultation with Jefferson, who was

then living in retire¬ ment at Monticello. The following extract from a letter written by Jefferson to Monroe in October 1823 not only shows Jefferson's part in the formulation of the doctrine, but also proves his foresight and his comprehension of American interests and his devotion to the wel¬ fare of his country;

The question presented by the letters you have sent me, is the most momentous which has been offered to my con¬ templation since that of Independence. That made us a nation, this sets our compass and points the course which we are to steer through the ocean of time opening on us. And never could we embark on it under circumstances more auspicious. Our first and fundamental maxim should be, never to entangle ourselves in the broils of Europe. Our second, never to suffer Europe to intermeddle with cis-Atlantic affairs. America, North and South, has a set of interests distinct from those of Europe and peculiarly her own. She should, therefore, have a system of her own, separate and apart from that of Europe. While the last is laboring to become the domicile of despotism, our endeavor should surely be to make our hemisphere that of freedom. One nation most of all, could disturb us in this pursuit; she now offers to lead, aid, and accompany us m it. By acceding to her proposition, we detach her from the bands, bring her mighty weight into the scale of free government, and emancipate a continent at one stroke, which might otherwise linger long in doubt and difficulty . Great Britain is the nation which can do us the most harm of any one, or all on earth; and with her on our side we need not fear the whole world. With her, then, we should most sedu¬ lously cherish a cordial friendship; and nothing would tend more to knit our affections than to be fighting once more side by side in the same cause. Not that I would purchase even her amity at the price of taking part m her wars. But the war in which the present proposition might engage us, should that be its consequence, is not her war, but ours. Its object is to introduce and establish the American system, of keeping out of our land all foreign powers, of never per¬ mitting those of Europe to intermeddle with the affairs of our nations. It is to maintain our own principle, not to depart from it. And if to facilitate this, we can effect a division in the body of the European powers, and draw over to our side its most powerful member, surely we should do it. But I am clearly of Mr. Canning's opinion, that it will prevent instead of provoke war. With Great Britain withdrawn from their scale and shifted into that of our two continents, all Europe combined would not undertake such a war For how would they propose to get at either enemy without superior fleets? Nor is the occasion to be slighted which this proposition offers, of declaring our

protest against the atrocious violations of the rights of nations by the interference of any one in the internal affairs of another, so flagitiously begun by Bonaparte, and now continued by the equally lawless Alliance calling itself Holy. But we have first to ask ourselves a question. Do we wish to acquire to our own confederacy any one or more of the Spanish provinces? I candidly confess that I have ever looked on Cuba as the most interesting addition which could ever be made to our system of States. The control which, with Florida Point, this island would give us oyer the Gulf of Mexico, and the countries and isthmus bordering on it, as well as all those whose waters flow into it, would fill up the measure of our political well-being. Yet I am sensible that this can never be obtained, even with her own consent, but by war; and as its independence, which is our second interest (and especially its independence of England), can be secured without it, I have no hesitation in abandoning my first wish to future chances and accepting its independence, with peace and the friendship of England, rather than its association, at the expense of war and her enmity. I could honestly, therefore, jc>in in the declaration proposed, that we aim not at the acquisition of any of those possessions, that we will not stand in the way of any amicable arrangement between them and the mother country; but that we will oppose, with all our means, the forcible inter¬ position of any other power, as auxiliary, stipendiary, or under any other form or pretext, and most especially, their transfer to any power by conquest, cession, or acquisition in any other way.

Jefferson died on 4 July 1826, just 50 years after the signing of the Declaration of Inde¬ pendence. Two years before his demise the second great Democratic leader had made his entrance into the arena of politics.

Andrew Jackson (q.v.) of Tennessee, the hero of the War of 1812, had grown in fame and popularity from the day of his victory over the English at New Orleans. In 1824 he became the nominee of his party, and in the election following received 155,872 votes, as against 105,321 cast for John Quincy Adams; 44,282 cast for Crawford; and 46,587 cast for Henry Clay. In the Electoral College Jackson received 99 votes, Adams 84, Crawford 41 and Clay 37. As no one of the candidates had a majority in the Electoral College the election of the Presi¬ dent devolved upon the House of Representa¬ tives ; and by a coalition between the friends of Adams and the friends of Clay, the former received the votes of 13 States, while Jackson received but 7 and Crawford 4.

The defeat of Jackson after he had secured a large plurality of the popular vote, and a considerable plurality in the Electoral College, aroused great partisan feeling, and from that time until 1828 Jackson was the candidate of the party, his campaign growing in strength as the years proceeded until when election day arrived he had a popular majority of nearly 140,000 and a majority of nearly 100 in the Electoral College. Calhoun was chosen Vice-President at the same time.

The chief features of Jackson's administra¬ tion were his treatment of the nullification act of the South Carolina legislature and his veto of the act for the rechartering of the United States bank. He took vigorous steps to en¬ force the Federal authority and, in an elaborate message, presented the arguments against the right of secession with a force and clearness never since surpassed. His action in this mat¬ ter resulted in the alienation of John C. Cal¬ houn, who up to that time had been a staunch political friend.

The fight over the bank charter not only occupied a large part of the time of his adminis¬ tration, but resulted in a controversy that per¬ meated other issues. The Senate passed a reso¬ lution censuring him for removing the deposits from the bank, and this became an issue. Under

the leadership of Thomas H. Benton, of Mis¬ souri, the Democrats began a fight for the reversal of the action of the Senate, and finally secured a majority of that body and expunged the resolution.

While Jackson's military achievements were the foundation for his early popularity, his great political fame was due to championing the cause of the masses, as against the concentrated power of wealth. In his message vetoing the bank charter he presented with emphasis and accuracy the Democratic view of the sphere of government. He said :

Distinctions in society will always exist under every just government. Equality of talents, of education, or of wealth, cannot be produced by human institutions. In the full enjoyment of the gifts of heaven and the fruits of superior industry, economy, and virtue, every man is equally entitled to protection by law. But when the laws undertake to add to those natural and just advantages artificial dis¬ tinctions — to grant titles, gratuities, and exclusive privi¬ leges — to make the rich richer and the potent more powerful — the humbler members of society — the farmers, mechanics, and the laborers — who have neither the time nor the means of securing like favors for themselves, have a right to complain of the injustice of their government.

Jackson's position on the bank charter rep¬ resented the views of his party adherents. His veto was sent to Congress on 10 July 1831, and it was the main issue of the campaign of 1832, when, with Henry Clay as his opponent, he secured a popular plurality of 157,000. In the Electoral College he had 219 votes as against 49 cast for Clay. His Secretary of State, Martin Van Buren, succeeded him as the Democratic candidate and was elected, having both a popu¬ lar majority and a majority in the Electoral College. Van Buren defeated William Henry Harrison in that year, and was defeated by him in the following campaign. In the earlier cam¬ paigns the nominations were made by a Con¬ gressional caucus, or by the various States, but Jackson's renomination in 1832 was made bv a national convention held at Baltimore, and Van Buren was nominated by a convention held at the same place four years later.

In 1840 the Democratic convention was again held at Baltimore, Van Buren was renominated and a lengthy platform was adopted. As this platform was the basis of all platforms adopted from that time to the

breaking out of the Civil War it is worthy of reproduction. It was as follows :

1. Resolved, That the Federal government is one of limited powers, derived solely from the Constitution, and the grants of powers shown therein ought to be strictly construed by all the departments and agents of the govern¬ ment, and that it is inexpedient and dangerous to exercise doubtful constitutional powers.

2. Resolved, That the Constitution does not confer upon the general government the power to commence and carry on a general system of internal improvements.

3. Resolved, That the Constitution does not confer authority upon the Federal government directly or indirectly, to assume the debts of the several States, contracted for local internal improvements or other State purposes; nor would such assumption be just or expedient.

4. Resolved, That justice and sound policy forbid the Federal government to foster one branch of industry to the detriment of another, or to cherish the interests of one portion to the injury of another portion of our common country — that every citizen and every section of the country has a right to demand and insist upon an equality of rights and privileges, and to complete and ample protection of persons and property from domestic violence or foreign aggression.

5. Resolved, That it is the duty of every branch of the government to enforce and practice the most rigid economy in conducting our public affairs, and that no more revenue ought to be raised than is required to defray the necessary expenses of the government.

6. Resolved, That Congress has no power to charter a United States bank; that we believe such an institution

one of deadly hostility to the best interests of the country, dangerous to our Republican institutions, and the liberties of the people, and calculated to place the business of the country within the control of a concentrated money power and above the laws and the will of the people.

7. Resolved, That Congress has no power under the Constitution to interfere with or control the domestic insti¬ tutions of the several States; and that such States are the sole and proper judges of

everything pertaining to their own affairs, not prohibited by the Constitution; that all efforts by abolitionists or others, made to induce Congress to interfere with questions of slavery or to take incipient steps in relation thereto, are calculated to lead to the most alarming and dangerous consequences, and that all such efforts have an inevitable tendency to diminish the happiness of the people, and endanger the stability and permanence of the Union, and ought not to be countenanced by any friend to our political institutions.

8. Resolved, That the separation of the moneys of the government from banking institutions is indispensable for the safety of the funds of the government and the rights of the people.

9. Resolved, That the liberal principles embodied by Jefferson in the Declaration of Independence, and sanctioned in the Constitution, which make ours the land of liberty and the asylum of the oppressed of every nation, have ever been cardinal principles in the Democratic faith; and every attempt to abridge the present privilege of becoming citizens, and the owners of soil among us ought to be resisted with the same spirit which swept the Alien and Sedition laws from our statute book.

As the names of several different persons had been presented for Vice-President the con¬ vention of 1840 made no nominations for that office, but adopted resolutions leaving the decision to members of the party in the various States, and trusting that ((before the election took place the opinion would be so concentrated as to enable the Electoral College to secure the choice of a Vice-President.®

Upon the death of Harrison, John Tyler became President, and during his term vetoed two bills which had for their object the re¬ establishing of the United States bank. Tyler favored the annexation of Texas, which had separated from Mexico and had existed under an independent government since 1836. Jas. K. Polk, the Democratic candidate, also favored annexation, while Henry Clay, for a third time a candidate for the Presidency, opposed annexation.

In the platform of 1844, the first nine resolu¬ tions of the platform of 1840 were reaffirmed, and new resolutions added demanding, first, that the proceeds of public lands be sacredly applied to the national object specified in the Constitu¬ tion, rather than distributed among the States ; second, sustaining and defending the veto of the President which had <(thrice saved Americans from the corrupt and tyrannical domination of the Bank of the United States,® and third, de¬ claring for the annexation of Texas. The cam¬ paign resulted in the election

of Polk and Dallas, although their majority in the Electoral College was proportionately larger than their popular plurality.

The campaign of 1848 was waged with Lewis Cass of Michigan and William O. Butler of Kentucky as the Democratic candidates for President and Vice-President. The platform of 1848 reaffirmed that of 1840 and 1844, and added new planks covering new questions. Res¬ olution No. 19 -of the platform of 1848 is given below because it reiterates the Democratic con¬ tention in regard to the value of self-govern¬ ment. It reads :

Resolved, That in view of the recent development of this grand political truth, of the sovereignty of the people and their capacity and power for self-government, which is prostrating thrones and erecting republics on the ruins of despotism in the Old World, we feel that a high and sacred duty is devolved, with increased responsibility, upon

the Democratic party of this country, as the party of the people, to sustain and advance among us constitutional liberty, equality, and fraternity, by continuing to resist all monopolies and exclusive legislation for the benefit of the few at the expense of the many, and by a vigilant and constant adherence to those principles and compromises of the Constitution, which are broad enough and strong enough to embrace and uphold the Union as it was, the Union as it is, and the Union as it shall be, in the full expansion of the energies and capacity of this great and progressive people.

The Whig candidates, however, Zachary Taylor and Millard Fillmore, were successful that year, having both a popular majority and a majority in the Electoral College. In the cam¬ paign of 1852 Franklin Pierce of New Hamp¬ shire and William R. King of Alabama were the Democratic nominees, and the platform re¬ iterated the leading planks of 1840, 1844 and

1848.

The platform of 1852 also reiterated the prin¬ ciples laid down in the Kentucky and Virginia resolutions and defended the Mexican War (<as just and necessary.® The campaign of 1852 resulted in an overwhelming Democratic vic¬ tory, the popular plurality being more than

200,000.

The slavery question was constantly growing in prominence, and at last exerted an influence upon every issue that arose. The position taken by the various parties in regard to the Mexican War was largely determined by the slavery views held by the members of the parties.

The Fugitive Slave laws of the various States also came up for

consideration, and each elec¬ tion showed an increase in the anti-slavery senti¬ ment. In 1856 the Democratic platform again reaffirmed the principles set forth in 1840 and reiterated in subsequent campaigns. It quoted resolution 7 of the platform of 1840, and said:

That the foregoing proposition covers, and was intended to embrace, the whole subject of slavery agitation in Con¬ gress; and, therefore, the Democratic party of the Union, standing on this national platform, will abide by, and adhere to, a faithful execution of the acts known as the compromise measures settled by the Congress of 1850, " the act for reclaiming fugitives from service labor " included; which act, being designed to carry out an express provision of the Constitution, cannot, with fidelity thereto, be repealed, or so changed as to destroy or impair its efficiency; that the Democratic party will resist all attempts at renewing in Congress, or out of it, the agitation of the slavery question, under whatever shape or color the attempt may be made.

The Republican party took the name by which the Democratic party was originally known, and it held its first national convention in 1856, John C. Fremont and William L. Day-ton being the nominees. James Buchanan and John C. Breckinridge were the Democratic nominees. They received a majority of 60 in the Electoral College and a popular plurality of about 500,000. The American party, led by Millard Fillmore and Andrew J. Donelson, se¬ cured only eight electors but polled 874,000 votes. During the Buchanan administration the Dred Scott decision was rendered, and this, while it was a legal victory for the friends* of slavery, resulted in an anti-slavery agitation that inured to the advantage of the Republican party.

In 1860 the conflict between the Northern and Southern Democrats became irreconcilable, and the Charleston convention, which met 23 April, having failed to harmonize the differ¬ ences, adjourned without a nomination. The Northern Democrats met at Baltimore 18 June and nominated Stephen A. Douglas of Illinois for President and Herschel V. Johnson of Georgia for Vice-President, while the Southern wing of the party met at the same place 10 davs

later and nominated John C. Breckinridge of Kentucky for President and Joseph Lane of Oregon for Vice-President. As the Douglas platforms adopted at that time represented the positions taken by the two wings of the party they will be found below :

1. Resolved, That we, the Democracy of the Union in convention assembled, hereby declare our affirmance of the resolutions unanimously adopted and declared as a platform of principles by the Democratic convention at Cincinnati, in the year 1856, believing that Democratic principles are unchangeable in their nature when applied to the same subject matters; and we recommend, as the only further resolutions, the following:

Inasmuch as differences of opinion exist in the Demo¬ cratic party as to the nature and extent of the powers of a Territorial legislature, and as to the powers and duties of Congress, under the Constitution of the United States, over the institution of slavery within the Territories.

2. Resolved, That the Democratic party will abide by the decisions of the Supreme Court of the United States on the question of constitutional law.

3. Resolved, That it is the duty of the United States to afford ample and complete protection to all its citizens whether at home or abroad, and whether native or foreign.

4. Resolved, That one of the necessities of the age, in a military, commercial, and postal point of view, is speedy communication between the Atlantic and Pacific States; and the Democratic party pledge such constitutional govern¬ ment aid as will insure the construction of a railroad to the Pacific coast at the earliest practicable period.

5. Resolved, That the Democratic party are in favor of the acquisition of the island of Cuba, on such terms as shall be honorable to ourselves and just to Spain.

6. Resolved, That the enactments of State legislatures to defeat the faithful execution of the Fugitive Slave Law are hostile in character, subversive of the Constitution, and revolutionary in their effect.

7. Resolved, That it is in accordance with the true interpretation of the Cincinnati platform, that, during the existence of the Territorial governments, the measure of restriction, whatever it may be, imposed by the Federal Constitution on the power of the Territorial legislature over the subject of domestic relations, as the same has been or shall hereafter be finally determined by the Supreme Court of the United States, shall be respected by all good citizens, and enforced with promptness and fidelity by every branch of the general government.

The <(Breckin ridge platform® was as fol¬ lows :

Resolved, That the platform adopted by the Democratic party at Cincinnati be affirmed, with the following explan¬ atory resolutions:

1. That the government of a Territory, organized by an act of Congress is provisional and temporary; and, during its existence, all citizens of the United States have an equal right to settle, with their property in the Territory, without their rights, either of person or property, being destroyed or impaired by congressional or territorial legislation.

2. That it is the duty of the Federal government, in all its departments, to protect when necessary, the rights of persons and property in the Territories, and wherever else its constitutional authority extends.

3. That when the settlers in a Territory having an adequate population, form a State Constitution in pur¬ suance of law, the right of sovereignty commences, and, being consummated by admission into the Union, they stand on an equal footing with the people of the other States, and the State thus organized ought to be admitted into the Federal Union, whether its Constitution prohibits or recognizes the institution of slavery.

4. That the Democratic party are in favor of the acqui¬ sition of the island of Cuba, on such terms as shall be honor¬ able to ourselves, and just to Spain, at the earliest practicable moment.

5. That the enactments of State legislatures to defeat the faithful execution of the Fugitive Slave law are hostile in character, subversive of the Constitution and revolutionary in their effect.

6. That the Democracy of the United States recognize it as the imperative duty of this government to protect the naturalized citizens in all their rights, whether at home or in foreign lands, to the same extent as its native-born citizens.

Whereas, One of the greatest necessities of the age, in a political, commercial, postal, and military point of view, is a speedy communication between the Pacific and Atlantic coasts; therefore be it

Resolved, That the Democratic party do hereby pledge themselves to use every means in their power to secure the passage of some bill to the extent of the constitutional authority of Congress, for the construction of a Pacific railroad, from the Mississippi River to the Pacific Ocean, at the earliest practicable moment.

It will be seen that both conventions re¬ affirmed the Cincinnati platform of 1856. It will also be noticed that the only difference between the platforms grew out of the slavery question, the Douglas platform leaving the question to the Supreme Court, promising to abide by its decision ; the Breckinridge platform declaring that the people of a Territory had the right to decide the slavery question for them¬ selves, and also declaring that the citizens of the various States had the right to settle in a Territory and carry their property with them (meaning slaves) without being interfered with by congressional action.

The election of 1860 resulted in a victory for the Republican party, whose candidates, Abra¬ ham Lincoln and Hannibal Hamlin, ran upon a platform denouncing ˆthreats of disunion,® and saying that <(the new dogma, that the Constitu¬ tion, of its own force, carries slavery into any or all of the Territories of the United States,® was a <(dangerous political heresy.® The plat¬ form did not call for the abolition of slavery in the States where it existed, but asserted ((that the normal condition of all the territory of the United States is that of freedom ; that as our Republican fathers, when they had abolished slavery in all our national territory, ordained that (no person shall be deprived of life, liberty or property, without due process of law,J it be¬ comes our duty by legislation, whenever such legislation is necessary, to maintain this pro¬ vision of the Constitution against all attempts to violate it ; and we deny the authority of Con¬ gress, of a territorial legislature, or any indi¬ viduals, to give legal existence to slavery in any Territory of the United States.®

Lincoln received a popular plurality of nearly 500,000 and a plurality of 108 in the Electoral College. Douglas came second in the popular vote, but fell behind both the Breckinridge ticket and Bell and Everett ticket in the Electoral Col¬ lege. This was due to the fact that the Douglas vote was large in the States which Lincoln carried.

In the war between the States the supporters of Douglas enlisted side by side with the sup¬ porters of Lincoln, Douglas himself having urged the support of Lincoln in the war for the maintenance of the Union. During the war, however, many things were done which aroused criticism from the Democratic leaders, and by the Democrats generally. Among the things complained of were arrests and courts-

martial in States not in insurrection and where the civil authority was undisturbed.

The Democratic platform of 1864 announced <(unswerving fidelity to the Union under the Constitution, as the only solid foundation of our strength, security and happiness as a people, and as a framework of government equally con¬ ducive to the welfare and prosperity of all the States, both Northern and Southern;® and then declared

as the sense of the American people, that after four years of failure to restore the Union by the experiment of war, during which, under the pretense of a military necessity of a war power higher than the Constitution, the Consti¬ tution itself has been disregarded in every part and public liberty and private right alike trodden down, and the material prosperity of the country essentially impaired, justice, humanity, liberty, and the public welfare demand that immediate efforts be made for a cessation of hostilities, with a view to an ultimate convention of all the States, or other peaceable means, to the end that, at the earliest practicable moment, peace may be restored on the basis of the Federal union of all the States.

Gen. George B. McClellan of New Jersey was nominated by the Democratic party for President and George H. Pendleton of Ohio for Vice-President. The election resulted in a popular majority of 408,000 for the Republican ticket and in an electoral majority of 191 — Kentucky, New Jersey and Delaware being the only three of the 24 States giving their electoral vote to the Democratic ticket. It will be seen that the Republican plurality was less than it was in 1860.

The assassination of Abraham Lincoln and the inauguration of Vice-President Andrew Johnson (q.v.) as President precipitated a struggle in which most of the Republican sen¬ ators and members of Congress were arrayed against the President. The Democrats took the side of the President, and with the aid of a few Republicans prevented the adoption of the articles of impeachment presented by the House.

During the reconstruction period that fol¬ lowed, the Democrats insisted that the States which were held in the Union should be given the rights and privileges of other States.

The campaign of 1868 was fought under the leadership of Horatio Seymour of New York and Francis P. Blair of Missouri, and the plat¬ form demanded :

1. Immediate restoration of all the States to their rights in the Union under the Constitution, and of civil government to the American people.

2. Amnesty for all past political offenses, and the regula¬ tion of the elective franchise in the States by their citizens.

3. Payment of all the public debt of the United States as rapidly as practicable — all money drawn from the people by taxation, except so much as is requisite for the necessities of the government, economically administered, being honestly applied to such payment; and when the obligations of the government do not expressly state upon their face, or the law under which they were issued does not provide that they shall be paid in coin, they ought, in right and justice, to be paid in the lawful money of the United States.

4. Equal taxation of every species of property according to its real value, including government bonds and other public securities.

5. One currency for the government and the people, the laborer and the officeholder, the pensioner, and the soldier, the producer and the bondholder.

6. Economy in the administration of the government; the reduction of the standing army and navy; the abolition of the Freedman's Bureau and all political instrumentalities designed to secure negro supremacy; .simplification of the system and discontinuance of inquisitorial modes of assessing and collecting internal revenue; that the burden of taxation may be equalized and lessened, and the credit of the govern¬ ment and the currency made good; the repeal of all enact¬ ments for enrolling the State militia into national forces in time of peace; and a tariff for revenue upon foreign imports, and such equal taxation under the internal-revenue laws as will afford incidental protection to domestic manu¬ factures, and as will, without impairing the revenue, impose the least burden upon, and best promote and encourage the great industrial interests of the country.

7. Reform of abuses in the administration; the expulsion of corrupt men from office; the abrogation of useless offices and the restoration of rightful authority to, and the inde¬ pendence of, the executive and judicial departments of the government; the subordination of the military to the civil power, to the end that the usurpations of Congress and the despotism of the sword may cease.

*8. Equal rights and protection for naturalized and native-born

citizens, at home and abroad; the assertion of American nationality which shall command the respect of foreign powers, and furnish an example and encouragement to people struggling for national integrity, constitutional liberty, and individual rights; and the maintenance of the rights of naturalized citizens against the absolute doctrine of immutable allegiance and the claims of foreign powers to punish them for alleged crimes committed beyond their jurisdiction.

Besides this statement of the position of the parties the platform arraigned the Republican party for its reconstruction policy, charging that instead of restoring the Union it had ((so

far as was in its power dissolved it and sub¬ jected 10 States in time of profound peace to military despotism and negro supremacy,® and that it had (<nullified the right of trial by jury, abolished the right of habeas corpus and over¬ thrown the freedom of speech and press.® The Republicans nominated General Grant and Schuyler Colfax and secured a popular plu¬ rality of about 300,000 (less than the plurality of 1864) and an electoral majority of 134.

In May 1872 a convention known as the Liberal Republican Convention was held at Cin¬ cinnati, Ohio, and nominated Horace Greeley of New York for President and Benjamin Gratz Brown of Missouri for Vice-President. The platform demanded the recognition of the doctrines of equality of all men before the law, and pledged the party's support to Articles 13, 14 and 15 of our amended national Constitu¬ tion. It favored the sacred maintenance of the public credit, opposed repudiation and insisted upon the return to specie payments.

The Democrats met on 9 July at Baltimore and nominated the same ticket and adopted a platform substantially like the one adopted by the Liberal Republicans.

Those members of the Democratic party de¬ scribing themselves as "straight-out® Democrats met 3 September following and nominated Charles O'Connor of New York for President and John Quincy Adams of Massachusetts for Vice-President; although both declined, nearly 30,000 votes were cast for the head of the ticket. The platform declared that the Balti¬ more convention had betrayed the party into a false creed and false leadership, and proclaimed that the members of the "straight-out® Demo¬ cratic party preferred principle to power, and would not surrender those principles in ex¬ change for offices which Presidents confer. The election resulted in an overwhelming vic¬ tory for the Republican ticket, Grant and Wil¬ son receiving 286 electoral votes out of 349 and a popular plurality of more than 750,000.

The nomination of Horace Greeley brought to his party a large number of influential Re¬ publicans and alienated many Democrats,

yet the party's vote was only about 125,000 more than the Democratic vote of 1868, while the Republican vote of 1872 was nearly 600,000 greater than the vote of four years before.

The Democrats entered the campaign of 1876 with courage and confidence. The discovery of corruption in several of the departments and the conviction of officials high in authority, to¬ gether with the panic of 1873, had broken the prestige of the Republican party and caused a widespread demand for reform. The Demo¬ cratic party took advantage of the situation and nominated as its candidates Samuel J. Tilden of New York, who had become conspicuous in re¬ form in his State, and Thomas A. Hendricks of Indiana, who represented all that was highest, purest and best in Democratic principle and purpose. The platform described the abuses of power and demanded reform in every depart¬ ment. Among other things it demanded re¬ form in the tariff and condemned the resump¬ tion clause of 1875.

The campaign resulted in a popular plurality of 250,000 for Tilden and Hendricks. The re¬ sult, however, was disputed and charges of fraud were made in the election of several

States. The situation grew so serious that Congress created an electoral commission, to which the whole matter was referred. This commission was composed of five senators selected by that body, five members of Con¬ gress selected by that body, and the five senior members of the Supreme Court. See Elec¬ toral Commission.

The Senate being Republican selected three Republicans and two Democrats ; the House being Democratic selected three Democrats and two Republicans, and of the judges three were Republicans and two Democrats. The Elec¬ toral Commission thus contained eight Republi¬ cans and seven Democrats and on every con¬ tested question the vote stood eight to seven, each member casting his vote so that it would aid his party.

The Democrats of 1880 endorsed the princi¬ ples embodied in the platform of 1876, protested against centralization as dangerous to the gov¬ ernment and denounced the "great fraud of 1876 and 1877 by which upon a false count of the electoral votes of two States the candidate defeated at the polls was declared to be Presi¬ dent, and for the first time in American history the will of the people was set aside under a threat of military violence.® The righting of the wrong of 1876 was declared to be the para¬ mount issue. Gen. Winfield Scott

Hancock, the Democratic nominee, weakened his campaign by putting the tariff question aside as ((a local issue.® He was defeated, however, by a popu¬ lar vote of less than 10,000 and by only 59 votes in the Electoral College.

In 1884 the Democrats met at Chicago and nominated Grover Cleveland of New York for President and Thomas A. Hendricks of Indiana for Vice-President. A platform of great length was adopted, the tariff question being the one discussed at great length. The platform con¬ tained the following plank on the money ques¬ tion : ((We believe in honest money, the gold and silver coinage of the Constitution, and a cir¬ culating medium convertible into such money without loss.® This platform also contained a plank reaffirming that portion of the Democratic platform of 1856 which endorsed the liberal principles of Jefferson.

The Republican ticket, headed by James G. Blaine and John A. Logan, received a plurality of a little more than 20,000 in the popular vote, but Mr. Cleveland had 37 majority in the Elec¬ toral College.

The Democratic platform of 1888 reaffirmed the platform adopted in 1884 and endorsed the President's views on the tariff question as ex¬ pressed in the tariff message which he sent to Congress in December 1887. The tariff question was made the paramount issue and the cam¬ paign waged on this question, and resulted in the election of the Republican ticket and its candidates, Benjamin Harrison and Levi P. Morton, that ticket having a majority of 65 in the Electoral College, although the Demo¬ cratic ticket had a popular plurality of about

100,000.

During the Cleveland administration an at¬ tempt was made to reduce the tariff and the Mills Bill received the support of the Demo¬ cratic members of the Senate and House. The Republicans, however, took advantage of the Republican victory of 1888 to propose and enact

a high tariff law, known as the McKinley Act, taking its name from the chairman of the Ways and Means Committee of the House. The pas¬ sage of this law was followed by an increase in prices of commodities and it became the para¬ mount issue in the following campaign of 1892. The Democratic party that year nominated Grover Cleveland for a third time and named Adlai E. Stevenson of Illinois as his running mate.

There was a fight in the convention over the tariff plank, and as finally adopted it declared that the Federal government had no constitu¬ tional power to impose and collect tariff duties except for revenue only. The trusts were de¬ nounced and the party pledged to the enactment of laws made to prevent and control them.

The money plank of the platform was as follows :

We denounce the Republican legislation known as the Sherman Act of 1890 as a cowardly makeshift, fraught with possibilities of danger in the future which should make all of its supporters, as well as its author, anxious for its speedy repeal. We hold to the use of both gold and silver as the standard money of the country, and to the coinage of both gold and silver without discrimination against either metal or charge for mintage, but the dollar unit of coinage of both metals must be of equal intrinsic and exchangeable value or be adjusted through international agreement, or by such safeguards of legislation as shall ensure the maintenance of the parity of the two metals, and the equal power of every dollar at all times in the markets and in the payments of debts; and we demand that all paper currency shall be kept at par with and redeemable in such coin. We insist upon this policy as especially necessary for the protection of the farmers and laboring classes, the first and most defenseless victims of unstable money and a fluctuating currency.

President Harrison was renominated by the Republicans and Whitelaw Reid was placed upon the ticket with him. In the election the Democratic ticket polled a plurality of 132 in the Electoral College and a popular plurality of about 380,000. The People's Party nomi¬ nated James B. Weaver of Iowa for President and James G. Field of Virginia for Vice-Presi¬ dent and polled a little more than 1,000,000 votes.

During President Cleveland's second term two questions occupied public attention — the money question and the tariff question. Con¬ gress was called together in extraordinary session in August 1893 and the President recommended the unconditional repeal of the Sherman Law. By reference to the Democratic platform of 1892 it will be seen that the money plank contained a statement of the party's faith in the double standard as well as its desire for the repeal of the Sherman Act, and an effort to repeal the makeshift without restoring the double standard caused a division in the ranks of the party; but the President succeeded in securing the legislation which he desired. Doing this, however, he had the support of a larger percentage of the Republican senators and members than he had of the Democrats.

Congressman Wilson, chairman of the Ways and Means Committee, reported a measure which bears his name and the bill as it passed the House was satisfactory to the friends of tariff reform ; but it was emasculated by the Senate, where a coterie of Democratic senators refused to support it until the rates of several schedules were raised. The President refused to sign the bill, but allowed it to become a law without his signature. The bill contained an income tax, but this clause was declared un¬

constitutional by the Supreme Court, the vote standing five to four. The decision was ren¬ dered at the second hearing. At the first hear¬ ing the vote stood four to four, and as the ninth judge who was not present until the sec¬ ond hearing favored the tax it required the change of opinion on the part of one of the judges to render the income tax inoperative.

After the passage of the tariff law the cur¬ rency question again occupied the attention of Congress and became the paramount issue in the campaign of 1896. The money issue was fought out in the party and the delegates to the Chicago convention were instructed to carry out the financial policy endorsed by the mem¬ bers of the State convention selecting them, who in turn had been instructed by county con¬ ventions. As a result of this inter-party contest the advocates of bimetallism won a decisive victory, having more than two-thirds of the national delegates.

The following platform was adopted;

We, the Democrats of the United States in National Convention assembled, do reaffirm our allegiance to those great essential

principles of justice and liberty, upon which our institutions are founded, and which the Democratic party has advocated from Jefferson's time to our own — freedom of speech, freedom of press, freedom of conscience, the preservation of personal rights, the equality of all citizens before the law, and the faithful observance of constitutional limitations.

During all these years the Democratic party has resisted the tendency of selfish interests to the centralization of governmental power, and steadfastly maintained the integrity of the dual scheme of government established by the founders of this Republic of republics. Under its guidings and teachings the great principle of local self-government has found its best expression in the maintenance of the rights of the States and in its assertion of the necessity of confining the general government to the exercise of the powers granted by the Constitution of the United States.

The Constitution of the United States guarantees to every citizen the rights of civil and religious liberty. The Democratic party has always been the exponent of political liberty and religious freedom, and it renews its obligations and reaffirms its devotions to these fundamental principles of the Constitution.

Recognizing that the money question is paramount to all others at this time, we invite attention to the fact that the Federal Constitution named silver and gold together as the money metals of the United States, and that the first coinage law passed by Congress under the Consti¬ tution made the silver dollar the monetary unit and admitted gold to free coinage at a ratio based upon the silver-dollar unit.

We declare that the act of 1873 demonetizing silver without the knowledge or approval of the American people has resulted in the appreciation of gold and a corresponding fall in the prices of commodities produced by the people; a heavy increase in the burden of taxation and of all debts, public and private; the enrichment of the money-lending class at home and abroad; the prostration of industry and impoverishment of the people.

We are unalterably opposed to monometallism, which has locked fast the prosperity of an industrial people in the paralysis of hard times. Gold monometallism is a British policy, and its adoption has brought other nations into financial servitude to London. It is .not only un-American, but anti-American, and it can be fastened on the United States only by the stifling of that spirit and love of liberty which proclaimed our political independence in 1776 and won it in the War

of the Revolution.

We demand the free and unlimited coinage of both silver and gold at the present legal ratio of 1 6 to 1 without waiting for the aid or consent of any other nation. We demand that the standard silver dollar shall be a full legal tender, equally with gold, for all debts, public and private, and we favor such legislation as will prevent for the future the demonetization of any kind of legal-tender money by private contract.

W e are opposed to the policy and practice of surrendering to the holders of the obligations of the United States the option reserved by law to the government of redeeming such obligations in either silver coin or gold coin.

We are opposed to the issuing of interest-bearing bonds of the United States in time of peace and condemn the trafficking with banking syndicates, which, in exchange for bonds and at an enormous profit to themselves, supply the Federal treasury with gold to maintain the policy of gold monometallism.

Congress alone has the power to coin and issue money, u11 j ,resi(ˆenˆ Jackson declared that this power could not be delegated to corporations or individuals. We, therefore, denounce the issuance of notes intended to circulate as money by national banks as in derogation of the Constitution, and w e demand that all paper which is made a legal tender ‘ public and private debts, or which is receivable for dues t-o the United States, shall be issued by the government of the United States and shall be redeemable in coin.

We hold that tariff duties shall be levied for purposes of revenue, such duties to be so adjusted as to operate equally throughout the country, and not discriminate between class or section, and that taxation should be limited by the needs of the government, honestly and economically administered. We denounce as disturbing to business the Republican threat to restore the McKinley law, which has twice been condemned by the people in national elections, and which, enacted under the false plea of protection to home industry, proved a prolific breeder of trusts and monopolies, enriched the few at the expense of the many, restricted trade and deprived the producers of the great American staples of access to their natural markets. •

Until the money question is settled We are opposed to any agitation for further changes in our tariff laws, except such as are necessary to meet the deficit in revenue caused by the adverse decision of the Supreme Court on the income tax. But for this decision by the Supreme Court there would be no deficit in the revenue under the law passed by a Democratic Congress in strict pursuance of the uniform decisions of that court for nearly 100 years, that court having in that decision sustained constitutional objections to its enactment which had previously been overruled by the ablest judges who have ever sat on that bench. We declare that it is the duty of Congress to use all the con¬ stitutional power which remains after that decision, or which may come from its reversal by the court as it may hereafter be constituted, so that the burdens of taxation may be equally and impartially laid, to the end that wealth may bear its due proportion of the expense of the government.

We hold that the most efficient way of protecting American labor is to prevent the importation of foreign pauper labor to compete with it in the home market, and that the value of the home market to our American farmers and artisans is greatly reduced by a vicious monetary system which depresses the prices of their products below the cost of production, and thus deprives them of the means of purchasing the products of our home manufactories; and as labor creates the wealth of the country, we demand the passage of such laws as may be necessary to protect it in all its rights.

We are in favor of the arbitration of differences between employers engaged in interstate commerce and their employees, and recommend such legislation as is necessary to carry out this principle.

The absorption of wealth by the few, the consolidation of our leading railroad systems, and the formation of trusts and pools require a stricter control by the Federal govern¬ ment of those arteries of commerce. We demand the enlargement of the power of the Interstate Commerce Commission and such restriction and guarantees in the control of railroads as will protect the people from robbery and oppression.

We denounce the profligate waste of the money wrung from the people by oppressive taxation and the lavish appropriations of recent Republican congresses, which have kept taxes high, while the labor that pays them is unemployed and the products of the people's toil are depressed in price till they no longer repay the cost of production. We demand a return to that simplicity and economy which befits a Democratic government and a reduction in the number of useless offices the salaries of which drain the substance of the people.

We denounce arbitrary interference by Federal authori¬ ties in local affairs as a violation of the Constitution of the United States and a crime against free institutions, and we especially object to government by injunction as a new and highly dangerous form of oppression by which the Federal judges, in contempt of the laws of the States and rights of citizens, become at once legislators, judges, execu¬ tioners; and we approve the bill passed at the last session of the United States Senate, and now pending in the House of Representatives, relative to contempts in Federal courts and providing for trials by jury in certain cases of contempt.

No discrimination should be indulged in by the govern¬ ment of the United States in favor of any of its debtors. We approve of the refusal of the Fifty-third Congress to pass the Pacific Railroad Funding Bill

and denounce the effort of the present Republican Congress to enact a similar measure. _ .

Recognizing the just claims of deserving Union soldiers, we heartily endorse the rule of the present commissioner of pensions, that no names shall be arbitrarily dropped from the pension roll; and the fact of enlistment and service should be deemed conclusive evidence against disease and disability before enlistment. , . .

We favor the admission of the Territories of New Mexico Arizona, and Oklahoma into the Union as States, and we favor the early admission of all the Territories having the necessary population and resources to entitle them to State¬

hood, and, while they remain Territories, we hold that the officials appointed to administer the government of any Territory, together with the District of Columbia and Alaska, should be bona fide residents of the Territory or District in which their duties are to be performed. The Democratic party believes in home rule and that all public lands of the United States should be appropriated to the establishment of free homes for American citizens.

We recommend that the Territory of Alaska be granted a delegate in Congress and that the general land and timber laws of the United States be extended to .said Territory.

The Monroe Doctrine, as originally declared, and as interpreted by succeeding Presidents, is a permanent part of the foreign policy of the United States and must at all times be maintained.

We extend our sympathy to the people of Cuba in their heroic struggle for liberty and independence.

We are opposed to life tenure in the public service, except as provided in the Constitution. We favor appoint¬ ments based on merit, fixed terms of office, and such an administration of the civil-service laws as will afford equal opportunities to all citizens of ascertained fitness.

We declare it to be the unwritten law of this Republic, established by custom and usage of one hundred years and sanctioned by the examples of the greatest and wisest of those who founded and have maintained our government, that no man should be eligible for a third term of the Presi¬ dential office.

The Federal government should care for and improve the Mississippi River and other great waterways of the Republic, so as to secure for the interior States easy and cheap transportation to tide water. When any waterway of the Republic is of sufficient importance to demand aid of the government, such aid should be extended upon a definite plan of continuous work until permanent improvement is secured.

Confiding in the justice of our cause and the necessity of its success at the polls, we submit the foregoing declara¬ tion of principles and purposes to the considerate judgment of the American people. We invite the support of all citizens who approve them and who desire to have them made effective through legislation, for the relief of the people and the restoration of the country's prosperity.

The minority, led by Senator Hill of New York, submitted the following, which was re¬ jected by the convention:

To the Democratic National Convention: 16 delegates, constituting the minority of the Committee on Resolutions, find many declarations in the report of the majority to which they cannot give their assent. Some of these are wholly unnecessary. Some are ill considered and ambigu¬ ously phrased, while others are extreme and revolutionary of the well-recognized principles of the party. The minority content themselves with this general expression of their dissent, without going into a specific statement of the objec¬ tionable features of the report of the majority; but upon the financial question, which engages at this time the chief share of public attention, the views of the majority differ so fundamentally from what the minority regard as vital Democratic doctrine as to demand a distinct statement of what they hold to as the only just and true expression of Democratic faith upon the paramount issue, as follows, which is offered as a substitute for the financial plank in the majority report:

" We declare our belief that the experiment on the part of the United States alone of free silver coinage and a change of the existing standard of value independently of the action of other great nations, would not only imperil our finances, but would retard or entirely prevent the establishment of international bimetallism, to which the efforts of the gov¬ ernment should be steadily directed. It would place this country at once upon a silver basis, impair contracts, dis¬ turb business, diminish the purchasing power of the wages of labor, and inflict irreparable evils upon our nation's commerce and industry.

" Until international cooperation among leading nations for the coinage of silver can be secured we favor the rigid maintenance of the

existing gold standard as essential to the preservation of our national credit, the redemption of our public pledges, and the keeping inviolate of our country's honor. We insist that all our paper and silver currency shall be kept absolutely at a parity with gold. The Demo¬ cratic party is the party of hard money and is opposed to legal tender paper money as a part of our permanent financial system, and we therefore favor the gradual retirement and cancellation of all United States notes and Treasury notes, under such legislative provisions as will prevent undue contraction. We demand that the national credit shall be resolutely maintained at all times and under all circumstances."

The minority also feel that the report of the majority is defective in failing to make any recognition of the honesty, economy, courage and fidelity of the present Democratic administration. And they therefore offer the following declaration as an amendment to the majority report: "We commend the honesty, economy, courage and fidelity of the present Democratic National Administration-"

The main resolutions submitted by the minority were rejected by more than a two-thirds vote and the platform as reported by the committee was adopted by the same vote. The resolution endorsing the administration was defeated by a little less than two-thirds.

The convention named as its candidates William Jennipgs Bryan of Nebraska and Arthur Sewall of Maine. The ˆNational® Democrats met at Indianapolis in September following, issued a platform endorsing the gold standard and named John M. Palmer and Simon B. Buckner as their national ticket. William McKinley of Ohio and Garret A. Hobart of New Jersey were the nominees of the Republican convention. The platform con¬ tained a plank favoring a protective tariff and a plank opposing free coinage until foreign cooperation could be secured — but pledg¬ ing the party to promote international bimetal¬ lism.

The People's party, generally known as the Populist party, met at Saint Louis and adopted a platform containing the same silver plank as the Democratic platform and endorsed and nominated the Democratic candidate for Presi¬ dent. Instead of endorsing Mr. Sewall for the Vice-Presidency, the convention named Thomas E. Watson of Georgia for that office. The Silver Republicans met at the same time, en¬ dorsed the Democratic ticket and adopted a silver plank identical with the Democratic plank.

The campaign aroused deep feeling on both sides and was warmly contested in the Central States. It became apparent early in the cam¬ paign that the Democratic ticket would carry the Western and Southern States and that the Republican ticket would sweep the Eastern States. A very large vote was polled, the total that year being nearly 2,000,000 in excess of the total vote of four years before. The Republican party secured a popular plurality of 601,854. The electoral vote stood : McKinley and Hobart, 271 ; Bryan and Sewall, 176.

Between 1896 and 1900 there was an im¬ provement in industrial conditions, an increase in the volume of money and a series of wars throughout the world. In 1898 the United States interfered in behalf of the Cubans and became involved in a war with Spain, which war resulted in Cuban independence ; but during the war a naval victory in the Philippines put this nation in temporary control of those islands

and resulted in our possession of them as an indemnity for the expenses incurred in behalf of the Cubans. The cession of the Philippine Islands to the United States raised a question which has not yet been settled. The sentiment is at present divided, the Democrats favoring the immediate promise that independ¬ ence will be given as soon as a stable govern¬ ment is established, this independence to be accompanied by protection from outside inter¬ ference. Some of the Republicans desire that the Philippine Islands be held under a colonial system and others desire that the islands be given a territorial form of government with a view to ultimate statehood.

The Democratic convention which met at Kansas City, 4 July 1900, endorsed the Declara¬ tion of Independence and adopted the following platform :

We, the ˆ representatives of the Democratic party of the United States, assembled in national convention on the anniversary of the adoption of the Declaration of Inde¬ pendence, do reaffirm our faith in that immortal proclama¬ tion of the inalienable rights of man and our allegiance to the Constitution framed in harmony therewith by the fathers of the Republic. We hold with the United States Supreme Court that the Declaration of Independence is the spirit of our government, of which the Constitution is the form and letter.

We declare again that all governments instituted among men derive their just powers from the consent of the gov¬ erned; that any government not based upon the consent of the governed is tyranny, and that to impose upon any people a government of force is to substitute the methods of imperialism for those of a republic. We hold that the Constitution follows the flag, and denounce the doctrine that an Executive or Congress, deriving their existence and their powers from the Constitution, can exercise lawful authority beyond it or in violation of it.

We assert that no nation can long endure half republic and half .empire, and we warn the American people that imperialism abroad will lead quickly and inevitably to despotism at home.

Believing in these fundamental principles, we denounce the Porto Rican law, enacted by a Republican Congress against the protest and opposition of the Democratic mi¬ nority, as a bold and open violation of the nation’s organic law and a flagrant breach of the national good faith. It imposes upon the people of Porto Rico a government with¬

out their consent and taxation without representation. It dishonors the American people by repudiating a solemn pledge made in their behalf by the commanding general of our army, which the Porto Ricans welcomed to a peaceful and unresisted occupation of their land. It doomed to poverty and distress a people whose helplessness appeals with peculiar force to our justice and magnanimity.

In this, the first act of its imperialistic programme, the Republican party seeks to commit the United States to a colonial policy inconsistent with republican institutions and condemned by the Supreme Court in numerous decisions.

We condemn and denounce the Philippine policy of the present administration. It has involved the public in unnecessary war, sacrificed the lives of many of our noblest sons and placed the United States, previously known and applauded throughout the world as the champion of freedom, in the false and un-American position of crushing with mili¬ tary force the efforts of our former allies to achieve liberty and self-government. The Filipinos cannot be citizens with¬ out endangering our civilization; they cannot be subjects without imperiling our form of government, and as we are not willing to surrender our civilization or to convert the republic into an empire, we favor an immediate declaration of the nation's purpose to give the Filipinos, first, a stable form of government; second, independence; and, third, protection from outside interference, such as has been given for nearly a century to the republics of Central and South America.

We are not opposed to territorial expansion when it takes in desirable territory which can be erected into States in the Union and whose people are willing and fit to become American citizens. We favor expansion by every peaceful and legitimate means. But we are unalterably opposed to seizing or purchasing distant islands to be governed outside the Constitution and whose people can never become citizens.

We are in favor of extending the Republic's influence among the nations, but believe that influence should be extended, not by force and violence, but through the per¬ suasive power of a high and honorable example. The importance of other questions now pending before the American people is no wise diminished, and the Democratic party takes no backward step from its position on them, but the burning issue of imperialism growing out of the Spanish war involves the very existence of the republic and the destruction of our free institutions. We regard it as the paramount issue of the campaign.

The declaration in the Republican platform adopted at the Philadelphia convention, held in June 1900, that the Republican party " steadfastly adheres to the policy an¬ nounced in the Monroe Doctrine," is manifestly deceptive. This profession is contradicted by the avowed policy of that party, in opposition to the spirit of the Monroe Doctrine, to acquire and hold sovereignty over Targe areas of territory and large numbers of people in the eastern hemisphere. We insist on the strict maintenance of the Monroe Doctrine in all its integrity, both in letter and in spirit, as necessary to prevent the extension of European authority on this continent and as essential to our supremacy in American affairs. At the same time we declare that no American people shall ever be held by force in unwilling subjection to European authority.

We oppose militarism. It means conquest abroad and intimidation and oppression at home. It means the strong arm which has ever been fatal to free institutions. It is what millions of our citizens have fled from in Europe. It will impose upon our peace-loving people a large standing army and unnecessary burden of taxation, and will be a constant menace to their liberties. A small standing army

and a well-disciplined State militia are amply sufficient in time of peace. This republic has no place for a vast military service and conscription.

In time of danger the volunteer soldier is his country's best defender. The National Guard of the United States should ever be cherished in the patriotic hearts of a free people. Such organizations are ever an element of strength and safety. For the first time in our history and coeval with the Philippine conquest has there been a wholesale departure from our time-honored and approved system of volunteer organization. We denounce it as un-American, unDemocratic and un-Republican and as a subversion of the ancient and fixed principles of a free people.

Private monopolies are indefensible and intolerable. They destroy competition, control the price of all material and of the finished product, thus robbing both producer and consumer. They lessen the employment of labor, and arbitrarily fix the terms and conditions thereof, and deprive individual energy and small capital of their opportunity for betterment. They are the most efficient means yet devised for appropriating the fruits of industry to the benefit of the few at the expense of the many, and unless their insatiate greed is checked all wealth will be aggregated in a few hands and the republic destroyed.

The dishonest paltering with the trust evil by the Repub¬ lican party in State and national platforms is conclusive proof of the truth of the charge that trusts are the legitimate

Sroduct of Republican policies, that they are fostered by Republican laws, and that they are protected by the Repub¬ lican administration in return for campaign subscriptions and political support.

We pledge the Democratic party to an unceasing war¬ fare in nation, State and city against private monopoly in every form. Existing laws against trusts must be enforced, and more stringent ones must be enacted providing for publicity as to the affairs of corporations

engaged in inter¬ state commerce, requiring all corporations to show, before doing business outside the State of their origin, that they have no water in their stock, and that they have not at¬ tempted, and are not attempting, to monopolize any branch of business or the production of any articles of merchandise, and the whole constitutional power of Congress over inter¬ state commerce, the mails and all modes of interstate com¬ munication shall be exercised by the enactment of compre¬ hensive laws upon the subject of trusts.

Tariff laws should be amended by putting the products of trusts upon the free list, to prevent monopoly under the plea of protection.

The failure of the present Republican administration, with an absolute control over all the branches of the national government, to enact any legislation designed to prevent or even curtail the absorbing power of trusts and illegal com¬ binations, or to enforce the anti-trust laws already on the statute books, proves the insincerity of the high-sounding phrases of the Republican platform.

Corporations should be protected in all their rights, and their legitimate interests should be respected, but any attempt by corporations to interfere with public affairs of the people or to control the sovereignty which creates them should be forbidden under such penalties as will make such attempts impossible

We condemn the Dingley tariff law as a trust-breeding measure, skilfully devised to give the few favors which they do not deserve and to place upon the many burdens which they should not bear.

We favor such an enlargement of the scope of the inter¬ state commerce law as will enable the commission to protect individuals and communities from discriminations and the public from unjust and unfair transportation rates.

It will be seen that the question of imperial¬ ism was made the paramount issue, the trust question coming next in the amount of attention given to it. The convention, however, re¬ affirmed the principles embodied in the Chicago platform, and reiterated the position taken four years before on the money question and on several other questions.

Mr. Bryan was renominated and Adlai E. Stevenson of Illinois was placed upon the ticket as the candidate for Vice-President. This ticket was endorsed later by the People's Party convention, and by the Silver Republi¬ can convention, both of which parties adopted platforms in

line with the Democratic platform upon the leading issues. The Democratic ticket was also endorsed by the Anti-imperalists.

While the Democrats tried to focus public attention upon the menace of imperialism, the Republicans said : ((Let well enough alone," and credited the improved conditions of the peo¬ ple in part to the gold standard and in part to

the high-tariff law enacted in 1898. They pro¬ tested against any change in the financial laws or the tariff law, and denied that they intended any departure from the principles of free gov¬ ernment.

The Republican ticket, headed by President McKinley and Theodore Roosevelt of New York, was again successful, the popular plurality being 849,455. The electoral vote stood, Mc¬ Kinley and Roosevelt 292 ; Bryan and Stevenson 155. The campaign of 1900 did not excite as much interest as the preceding campaign. In 1904 Alton B. Parker of New York was nomi¬ nated for President, with Henry G. Davis of West Virginia for Vice-President. In this elec¬ tion the party practically reversed its previous position on the money question. The Republi¬ can party, with a ticket headed by President Roosevelt, was again successful, the electoral vote standing 336 to 140.

While Roosevelt's popular vote and popular majority were the largest ever recorded for any President up to that time, it is remarkable, and indicative of the increasing independence of the voters, that five States which gave Roosevelt large majorities elected Democratic governors : Massachusetts, Minnesota, Missouri, Colorado, and Montana. The same zeal for thorough¬ going reform and an appreciation of the per¬ sonal character of candidates has greatly af¬ fected State and municipal elections, resulting in the overthrow of bosses and machines and a permanent elevation of popular political standards for parties and for administration.

The principal declarations in the platform of the Democratic party, adopted at Saint Louis, Mo., 8 July 1904, were:

In favor of laws giving labor and capital impartially their just rights; trial by jury in cases of indirect contempts in Federal Courts; liberal appropriations for the improve¬ ment of waterways; economy of administration, without impairing efficiency of any branch of the government; and the enforcement of honesty in public service:

Condemning the action of the Republican party in Congress in

refusing to prohibit an executive department from entering into contracts with convicted trusts or unlaw¬ ful combinations in restraint of interstate trade, and in favor of “ Jeffersonian simplicity of living ” on the part of public officials; against “ executive usurpation of legislative and judicial functions ” by the President; preservation of “ an open door for the world’s commerce in the Orient without any unnecessary entanglement in Oriental and European affairs, and without arbitrary, unlimited, irre¬ sponsible and absolute government anywhere within our jurisdiction,” against “ an indefinite, irresponsible, discre¬ tionary and vague absolutism and a policy of colonial ex¬ ploitation ”; and against making one set of laws for those “ at home ” and a different set of laws for those “ in the colonies”;

Against tariff legislation that “ robs the many to enrich the few,” and in favor of a tariff limited to the needs of the Government, economically administered, and so levied as not to discriminate against any industry, class or section; a gradual reduction of the tariff; against private monopoly, and in favor of individual equality of opportunity and free competition; against rebates and discrimination by trans¬ portation companies; and in favor of an enlargement of the powers of the Interstate Commerce Commission, reclama¬ tion of arid lands in the West, no land monopoly, the speedy construction of the Panama Canal, and the election of U. S. Senators by direct vote of the people—

Condemnation of polygamy within the jurisdiction of the United States, and also of the ship subsidy bill passed by the United States Senate; and in favor of upbuilding a merchant marine, liberal trade arrangements with Canada, the maintenance of the Monroe Doctrine, a reduction of the army, generous pensions, and civil service reform.

In 1908 the Republican party nominated Sec¬ retary of War William Howard Taft, of Ohio, for President and Congressman James S. Sher¬ man, of New York, for Vice-President, The Democratic party for the third time selected William J. Bryan as its Presidential candidate

and John W. Kern, of Indiana, for Vice-Presi¬ dent. The Socialists nominated Eugene V. Debs, of Indiana, and Ben Hanford, of New York; the Populists Thomas E. Watson, of Georgia, and Samuel W. Williams, of Indiana; and the Prohibitionists Eugene W. Chafin, of Illinois, and Aaron S. Watkins, of Ohio. This election witnessed the entry of a new party into the political arena — the Independence party, of which William R. Hearst, of New York, was the chief factor, and of which Thomas L. Hisgen, of Massachusetts, and John T. Graves, of New York (formerly of Georgia), were the candidates. The results of this elec¬ tion were as follows: Taft, Republican, 7,637,- 676; Bryan, Democrat, 6,393,182 ; Debs, Socialist, 448,453; Chafin, Prohibitionist, 241,252; Hisgen, Independent, 83,183; Watson, Populist, 33,871; Gillhaus, Socialist Labor, 15,421.

This election was remarkable in that nearly 1,350,000 more votes were cast than in the elec¬ tion of 1904. Taft received a popular vote ex¬ ceeding that of Roosevelt by over 14,000; Bryan received over 1,300,000 votes more than his predecessor, Parker ; and the Socialist vote in¬ creased more than 45,000. On the other hand the Prohibition vote was more than 17,000 less than that of 1904; the Populist vote was over 83,000 behind the vote of 1904; and the Social¬ ist-Labor candidate less than 50 per cent of the vote of his predecessor. In this election the independence of the voters was again mani¬ fested as it had been in 1904, several States which gave Taft majorities electing Democratic governors, notably Indiana, Minnesota, and Ohio. Also several States that had previously been Republican in gubernatorial elections changed to the Democratic column, notably Colorado, Nebraska, and Ohio, while the usually Democratic Missouri elected a Repub¬ lican governor. Oklahoma, with seven electoral votes, had been admitted as a State since the election of 1904, thus increasing the electoral vote to 483 and raising the majority necessary to a choice from 239 to 242. The electoral college gave Taft 321 votes and Bryan 162.

The principal declarations in the platform of the Democratic party, adopted at Denver, Col., 10 July 1908 were as follows:

Against the misuse of patronage on the part of the Presi¬ dent; in favor of a law preventing any corporation con¬ tributing to a campaign fund, and any individual contrib¬ uting an amount above a

reasonable minimum, and pro¬ viding for the publication before election of all such contributions above a reasonable minimum; against the extension of the powers of the general government by judi¬ cial construction; in favor of additions to federal remedies for the regulation of Interstate commerce and for the preven¬ tion of private monopoly, as well as State remedies of the same kind;

In favor of tariff reform by immediate revision and reduction of import duties; that articles entering into com¬ petition with trust-controlled products should be placed upon the free list, and material reductions made in the tariff upon the necessaries of life, especially upon articles competing with such American manufactures as are sold abroad more cheaply than at home, and that graduated reductions should be made in such other schedules as may be necessary to restore the tariff to a revenue basis; the immediate repeal of the tariff on pulp, print paper, lumber, timber and logs, and that these articles be placed upon the free list;

Against private monopoly, as in 1904: — By first, the enactment of a law preventing a duplication of directors among competing corporations; second, a license system which will, without abridging the right of each State to create corporations or its right to regulate as it will foreign corporations doing business within its limits, make it neces¬ sary for a manufacturing or trading corporation engaged in Interstate commerce to take out a federal license before it shall be permitted to control as much as 25 per cent of the product in which it deals, a license to protect the public

from watered stock and to prohibit the control by such corporations of more than 50 per cent of the total amount of any product consumed in the United States; and, third, a law compelling such licensed corporations to sell to all purchasers in all parts of the country on the same terms after making due allowance for cost of transportation;

Control over Interstate commerce by Congress and by each State within its borders, the platform containing detailed recommendations in this connection as well as on the subjects: of banking and currency; an income tax; labor and injunctions; the American merchant marine; the navy; the protection of American citizens at home and abroad; civil service; pensions; the organization of a National Health Bureau; the extension of industrial education through agri-tural experiment stations and secondary agricultural and mechanical colleges; the popular election of Senators; the admission of Arizona and New

Mexico to statehood; free grazing upon public lands; the improvement of waterways; maintenance of post-roads; curtailment of arbitrary power on the part of the Speaker of the House; economy in admin¬ istration and a reduction in the number of office holders; conservation of natural resources; the independence of the Philippine Islands; developing closer ties of Pan American friendship and commerce; regulation of rates and services of telegraph and telephone companies engaged in the trans¬ mission of interstate messages.

At the Democratic convention held at Balti¬ more, 25 June-2 July 1912, 46 ballots were taken, the first ballot for the four leading candidates resulting: Champ Clark, Missouri, 440ˆ4; Woodrow Wilson, New Jersey, 324 ; Judson Harmon, Ohio, 148; Oscar W. Under¬ wood, Alabama, 117ˆ4; the final ballot, Woodrow Wilson, 990; Champ Clark, 84; Judson Harmon, 12; Thomas R. Marshall, Indiana, was nominated for Vice-President. The Re¬ publican party renominated as President, Wil¬ liam Howard Taft, Ohio, and nominated as Vice-President, Nicholas Murray Butler, New York. The Progressive party nominated Theo¬ dore Roosevelt, New York, for President and Hiram W. Johnson, California, for Vice-Presi¬ dent. Eugene V. Debs, Indiana, as President with Emil Seidl, Wisconsin, as Vice-President were nominated by the Socialist party ; Eugene W. Chafin, Ariz., as President and Aaron S. Watkins, as Vice-President by the Prohibitionist party; and Arthur E. Reimer, Massachusetts, President, August Gilhaus, New York, Vice-President, by the Socialist Labor party. The results of the election were as follows: Woodrow Wilson received a plurality vote of 2,173,519; the figures being Woodrow Wilson, 6,193,019; William H. Taft, 3,484,956; Theodore Roosevelt, 4,119,507; Eugene V. Debs, 901,873; Eugene W. Chafin, 207,928; Arthur E. Reimer, 29,259. Among the chief declarations in the National platform of the Democratic party, adopted at Baltimore, Md., 2 July 1912, were those on tariff reform; cur¬ rency reform ; on the enforcement of the anti¬ trust law ; on income tax and popular election of senators ; on Republican extravagance through oppressive taxation; on the establish¬ ment of rural credits ; a redeclaration from the platform of 1908 on the rights of labor; the conservation of national resources ; on law re¬ form ; and the policy toward' the Philippines. Attention was also called to the fact that

The Democratic Party's demand for a return to the rule of the people, expressed in the National platform four years ago, has now become the accepted doctrine of a large major¬ ity of the electors. We again remind the country that only by the larger exercise of the reserved power of the people can they preserve themselves from the misuse of delegated power and the usurpation of governmental instrumentalities

by special interests. For this reason the National conven¬ tion insisted on the overthrow of Cannonism and the inaugu¬ ration of a system by which United States senators could be elected by direct vote. The Democratic party offered itself to the country as an agency through which the com¬ plete overthrow and extirpation of corruption, fraud and machine rule in American politics can be effected.

At the Democratic National Convention held at Saint Louis, Mo., June 14-16, 1916, Presi¬ dent YVilson and Vice-President Marshall were renominated by acclamation. The Republican party nominated Charles E. Hughes, New York, and Charles W. Fairbanks, Indiana, respec¬ tively, for President and Vice-President. The election resulted with a plurality vote of 581,- 941 for Wilson, the figures being Woodrow Wilson, New Jersey, Democrat, 9,129,269; Charles E. Hughes, New York, Republican, 8,547,328; Allen J. Bensen, New York, Socialist, 590,579; J. Frank Hanly, Indiana, Prohibitionist, 221,329; Arthur E. Reimer, Massachusetts, Socialist Labor, 14,180.

Endorsing the administration of Woodrow Wilson as the best exposition of sound Demo¬ cratic policy ever displayed at home and abroad, the National Convention at Saint Louis, Mo., 16 June 1916, adopted a declaration which challenged a comparison of the record of the party in keeping pledges and in constructive legislation, with those of any party at any time. The achievements wrought by four years of Democratic administration were summarized, and for the further conduct of national affairs the policies to which the party committed itself included: Economic freedom to remove so far as possible every remaining element of unrest and uncertainty from the path of the business men of America; an unreserved endorsement of the Underwood tariff law as the best means for providing sufficient revenue for the economical administration and operation of the Govern¬ ment ; the development of Americanism, sum¬ moning all men of whatever origin or creed who would count themselves American, to join in making clear to all the world the unity and consequent power of America ; industrial pre¬ paredness as preparedness to maintain peace and to ensure the same respect for its rights as the nation extends to the rights of other powers ; to make the honor and ideals of the United States a standard for international re¬ lations alike in negotiation and action ; to con¬ tinue the promotion of the Pan-American Con¬ cord, the friendly relations between the peo¬ ple of the Western Hemisphere; the develop¬ ment of the merchant marine; of agriculture and betterment of the farmer; the construction of good roads; the extension of the franchise to the women of the

country by the States upon the same terms as to men ; the pro¬ tection and preservation of the sacred right of American citizenship at home and abroad; the modern principles of prison reform to be applied in the Federal penal system. The conclusion of the declaration summarized as follows :

This is a critical hour in the history of America, a critical hour in the history of the world. Upon its record, which shows great constructive achievement in following out a consistent policy for our domestic and internal development, upon the word of the Democratic administration, which maintained the honor, the dignity and the interests of the United States and at the same time retained the respect and friendship of all the nations of the world, and upon the great policies for the future strengthening of the life of our country, the enlargement of our national vision and the ennobling of our international relations, we appeal with confidence to the voters of the country.

In the President's armed neutrality message delivered in a personal address to Congress 26 Feb. 1917 he said in part:

Since it has unhappily proved impossible to safeguard our neutral rights by diplomatic means against the unwar¬

ranted infringements they are suffering at the hands of Germany, there may be no recourse but to armed neutrality, whigh we shall know how to maintain and for which there is abundant American precedent. It is devoutly to be hoped that it will not be necessary to put armed forces anywhere into action. The American people do not desire it, and our desire is not different from theirs. I am sure that they will understand the spirit in which I am now acting, the purpose I hold nearest my heart and would wish to exhibit in everything I do. … . No course of my

choosing or of theirs will lead to war. War can come only by the wilful acts and aggressions of others.

In the President's address to Congress, de¬ livered at a joint session of the two Houses 2 April 1917, the reasons for entering the World War were stated as follows :

The present German submarine warfare against com¬ merce is a warfare against mankind… . It is a war

against all nations. American ships have been sunk, Amer¬ ican lives taken in ways which it has stirred us very deeply to learn of, but the ships and people of other neutral and friendly nations have been sunk and overwhelmed in the waters in the same way. There has been no discrimination. The challenge is to all mankind. Each nation must decide for itself how it will meet it. The choice we make for our¬ selves must be made with a moderation of counsel and a temperateness of judgment befitting our character and our motives as a nation. We must put excited feeling away. Our motive will not be revenge or the victorious assertion of the physical might of the nation, but only the vindication of right, of human right, of which we are only a single cham¬ pion… . When I addressed the Congress on the

twenty-sixth of February last I thought that it would suffice to assert our neutral rights with arms, our right to use the seas against unlawful interference, our right to keep our people safe against unlawful violence. But armed neutral¬ ity, it now appears, is impracticable. Because submarines are in effect outlaws when used as the German submarines have been used against merchant shipping, it is impossible to defend ships against their attacks as the law of nations have assumed that merchantmen would defend themselves against privateers or cruisers, visible craft giving chase upon the open sea. It is common prudence in such circumstances, grim necessity, indeed, to endeavor to destroy them before they have shown their own intention. They must be dealt with upon sight, if dealt with at all. The German Govern¬ ment denies the rights of neutrals to use arms at all within the areas of the sea which it has proscribed, even in the defence of rights which no modern publicist has ever before questioned their right to defend. The intimation is con¬ veyed that the armed guards which we have placed on our merchant ships will be treated as beyond the pale of law and subject to be dealt with as pirates would be. Armed neutrality is ineffectual enough at best; in such circum¬ stances and in the face of such pretensions it is worse than ineffectual: it is likely only to produce what it was meant to prevent; it is practically certain to draw us into the war without either the rights or the effectiveness of belligerents. There is one choice we cannot make, we are incapable of making: we will not choose the path of submission and suffer tne most sacred rights of our nation and our people to be ignored or violated. The wrongs against which we now array ourselves are no common wrongs; they cut to the very roots of human life… . Just because we

fight without rancor and without selfish object, seeking nothing for ourselves, but what we shall wish to share with all free peoples, we shall, I feel confident, conduct our opera¬ tions as belligerents without

passion and ourselves observe with proud punctilio the principles of right and of fair play we profess to be fighting for… . It is a distressing and

oppressive duty, Gentlemen of the Congress, which I have performed in thus addressing you. There are, it may be, many months of fiery trial and sacrifice ahead of us. It is a fearful thing to lead this great peaceful people into war, into the most terrible and disastrous of all wars, civilization itself seeming to be in the balance. But the right is more precious than peace, and we shall fight for the things which we have always carried nearest our hearts — for democracy, for the right of those who submit to authority to have a voice in their own governments, for the rights and liberties of small nations, for a universal dominion of right by such a concert of free peoples as shall bring peace and safety to all nations and make the world itself at last free. To suen a task we can dedicate our lives and our fortunes, every¬ thing that we are and everything that we have, with the pride of those who know that the day has come when Amer¬ ica is privileged to spend her blood and her might for the principles that gave her birth and happiness and the peace which she has treasured. God helping her, she can do no other”

The work of the administration is briefly summarized in a survey of the principal acts passed by the 65th Congress making provision

to prosecute the war. On 2 April the German war resolution was introduced in the House, and four days after the assembling of Congress, on 6 April, the President affixed his signature to the measure. A general deficiency appro¬ priation act was passed amounting to $163,- 841,400.52, of which $100,000,000 was for na¬ tional security and defense. The first issue of liberty bonds was authorized to meet expenses for national security and defense, to aid allied governments and for other purpose. The act appropriated $3,007,063,945.46 for establishing credits in the United States for foreign govern¬ ments by purchase of bonds of our Allies, and expenses incident to preparation and issue of bonds and certificates ; it authorized the issue of bonds amounting to $5,063,945,460, of which $3,000,000,000 were to meet the loans authorized to foreign governments ; $2,000,000,000 to meet domestic expenditures ; and $63,945,460 to re¬ deem the 3 per cent loan of 1908 to 1918, maturing 1 Aug. 1918; it also authorized $2,- 000,000,000 of one-year certificates of indebted¬ ness temporarily to provide revenue. Other acts appropriated $273,046,322.50 for the sup¬ port of the army for the fiscal year 1918; $1,- 344,896.18 for the support of the Military Acad¬ emy during 1918; $3,281,094,541.60 for the mili¬ tary and naval establishments on account of war expenses, including $405,000,000 for an emergency shipping fund with which to begin construction of the greatest merchant fleet the world has ever known ; $640,000,000 to increase temporarily the Signal Corps of the army and to purchase, manufacture, maintain, repair and operate airships; $27,826,150 for the construc¬ tion, repair and preservation of certain public works on rivers and harbors; $45,150,000 to in¬ sure vessels and their cargoes with attendant expenses ; $176,250,000 to provide a military and naval family allowance, compensation and in¬ surance fund for the benefit of soldiers and sailors and their families; and $1,250,000 for the construction of a building for the increased work of the Treasury Department in Washing¬ ton. To provide further for national security and defense, $11,346,400 were appropriated to stimulate agriculture and facilitate the distri¬ bution of agricultural products, and $162,500,000 to encourage the production, conserve the sup¬ ply and control the distribution of food prod¬ ucts and fuel. The President was also author¬ ized to increase temporarily the military estab¬ lishment of the United States by selective drafts ; to take over for the United States any vessel owned in whole or in part by any corporation, citizen or subject of any nation with which the

United States might be at war; to take posses¬ sion of a site for use for permanent aviation stations of the army and navy for school pur¬ poses ; to institute condemnation proceedings of lands for military purposes ; to punish acts of interference with foreign relations, the neutral¬ ity and the foreign commerce of the United States ; to punish espionage and better enforce the criminal laws of the United States; and $450,000 were appropriated to enforce the pro¬ visions of an act to define, regulate and punish trading with the enemy and for other purposes. To supply deficiencies in appropriations for the fiscal year 1918 and prior years on account of war expenses and for other purposes, a further appropriation of $5,356,666,016.93 was author¬

ized and also contract obligations, to be met by future Congresses, amounting to $2,401,458,393.- 50; the second issue of liberty bonds amounting to $4,000,000,000 was authorized, also an addi¬ tional issue of one-year certificates of indebted¬ ness amounting to $2,000,000,000, and an issue of five-year war saving certificates amounting to $2,000,000,000. The total appropriations and contract authorizations for 1918 amounted to $21,380,730,940.46, of which, however, $7,000,- 000,000 of loans to the Allies is reimbursable by the foreign governments to whom the advances are made. Since this summary was made the third issue of liberty bonds amounting to $5,000,000,000 has been effected, and the fourth issue amounting to $6,000,000,000 has been authorized. In its stupendous task the people have loyally stood by the government and sup¬ ported the President and Congress in all that they have undertaken.

The two decades preceding this regrettable catastrophe had witnessed remarkable progress in Democratic economic reforms. Among the more important are :

1. The popular election of United States senators — the gateway to other reforms.

2. An income tax amendment to the Federal Constitu¬ tion, followed by an income tax law that equalizes taxation.

3. A reduction in import duties — the best tariff law in fifty years.

4. Currency reform — the greatest piece of constructive legislation enacted during this generation, freeing business from the despotism of high finance and politics from the grip of Wall Street.

5. This includes the restoration to the government of the sovereign

right to issue paper money.

6. A rural credits law, that gives the farmer his first opportunity to borrow on long time, and at approximately what money is worth in the market.

Two anti-trust laws:

7. One creating a Trade Commission; and

8. The other, built on the theory that a private monopoly is indefensible and intolerable, lays the axe at the root of the tree.

9. A shipping law, which, by the creation of a government-owned merchant marine, enables the people to lay out new trade routes and to protect themselves from extortionate freight rates on the sea.

10. A Child Labor law which restrains the money-mad employer from stunting the body and dwarfing the mind of the child of this generation, who is to be the citizen of the next generation.

11. An eight-hour day law, which protects the wage-earner in his right to reasonable time for the enjoyment of home and for preparation for responsibilities of citi enship; and

12. Abolition of Government by Injunction — or, stated in another way, the recognition of the right of trial by jury when the alleged contempt is not committed in the presence of the court.

13. The Philippine law, which, by giving to the Filipinos the promise of ultimate independence, relieves the United States of the suspicion of having abandoned the principles of the Declaration of Independence, and enables it to resume its proper place among the nations as the foremost champion of the doctrine that governments derive their just powers from the consent of the governed.

14. And, last of the reforms to which attention will be called now, the 30 peace treaties which, by providing for investigation of all international disputes, make war between the contr cting parties a remote possibility.

In the foregoing review an attempt has been made to present a history of the Democratic party from its organization to the present time, and the party's position on public issues has been shown by quotations from platforms adopted by its national conventions. While platforms are not so specific as laws, and not so elaborate as speeches, they are

probably a better index to the general thought and purpose of parties than either laws and speeches — for the reason that laws are often compromises, and # speeches may represent the individual opinions of the speakers rather than of the

party, while platforms are written by delegates chosen for that purpose.

It will be seen that the party has met with successes and reverses, but it is also noticeable that it has adhered to its principles regardless of the immediate effect of those principles upon it. For instance, it was defeated in 1840, and yet the platform of 1840 was constantly re¬ affirmed and reiterated for 20 years afterward. 1 he platform of 1892 and subsequent platforms reaffirmed and even made stronger the platform of 1888, upon which the party had suffered defeat. Between 1913 and 1916 the party car¬ ried out the platform of 1908 as well as the platform of 1912.

It may be said, however, in conclusion, that there is to-day and will continue to be an im¬ perative need for a party thoroughly commit¬ ted to the defense of the inalienable rights of the individual and to local self-government, and jealous of the encroachments of Federal power. Even when such a party is not in power, it exercises a potent influence in molding public opinion and in restraining excesses, because it is very quick to champion the cause of an in¬ dividual whose rights have been trespassed upon, or the cause of a community whose rights have been ignored. In proportion as the organization is true to the principles promul¬ gated by Jefferson and defended by Jackson, it may hope to appeal to the confidence of those who seek neither favoritism nor privileges, but are content to enjoy the blessings of a govern¬ ment in which the individual is protected in the enjoyment of life and liberty and in the pursuit of happiness. -Consult Benton, T. H., (Thirty Years View) (New York 1854-56) ; Blaine, J. Q., (Twenty Years of Congress) (New York 1884-86) ; Cooper, T. V., Ameri¬ can Politics) (Boston 1884) ; Cox, S. S., (Three Decades of Federal Legislation J (Providence 1885) ; Creel, G., (Wilson and the Issues) (New York 1916) ; Jefferson, T., (Complete Works* (New York 1904-05) ; (Jefferson Cyclopedia* ; Taylor, (Cyclopedia of Political

Science*; Vincent, ‘Platform TextBook*).

William Jennings Bryan.

DEMOCRATIC SOCIETIES IN THE UNITED STATES, political associations in 1793 organized on the lines of the French Jacobin (q.v.) clubs. The masses in this country sympathized with the French Revolu¬ tion, as essentially the same with their own, and clamored for an open stand by the govern¬ ment on that side. Instead, the attempt of Edmond Genet (q.v.) to drag the country into an active alliance with France, forced Washing¬ ton to proclaim neutrality. This irritated popular feeling, and made it worth while for local politicians to organize a faction on the basis of French sympathies, ignoring American questions wholly. It is curious that this basic element of the Democratic or “people’s party,® which charged the Federalists with being anti¬ national, monarchic, and a <(British party,® was itself the only purely foreign party ever known in the United States. In all the important towns, clubs were organized in imitation of the Jacobin clubs of France. That of Charleston openly claimed to be a branch of them and was formally recognized as such. As usual in such cases, they mimicked ludicrously the outer semblance of their prototypes, without regard to American fitness : wore cockades and liberty

caps, called each other “citizen® and “citizeness,® held banquets of fraternity, *etc.* They were at first looked down upon by the “Republicans® or opponents of the Federalists on American questions, who accepted their votes but scorned their antics and irrelevancy; but common political opposition soon forced them into a common organism, which was called Demo¬ cratic-Republican, still the official name of the party. Washington’s denunciation of the so¬ cieties in 1794, as having fostered the Whiskey Insurrection (q.v.), which in fact they ap¬ proved, the atrocities of the Reign of Terror, and the final downfall of Robespierre and the Jacobin Club of Paris, — perhaps equally the fact that the craze had become a bore, — caused the general disappearance of the clubs or societies in 1794-95.

DEMOCRITUS, Greek philosopher of the new Eleatic school : b. Abdera between 470 and 460 b.c. ; d. 370 b.c. Some Magi and Chal¬ deans, whom Xerxes left on his return from his Grecian expedition, are said to have excited in Democritus the first inclination for philos¬ ophy. After the death of his father he trav¬ eled to Egypt, where he studied geometry, and probably visited other countries, to extend his knowledge of nature. Among the Greek philos¬ ophers he enjoyed the

instruction of Leucippus. He afterward returned to his native city, where he was placed at the head of public affairs. Indignant at the follies of the Abderites, he resigned his office and retired to solitude, to devote himself exclusively to philosophical studies. Of his numerous philosophical works mentioned by Diogenes Laertius (q.v.) only the titles and a few doubtful fragments are pre¬ served.

In his system he developed still further the mechanical or atomical theory of his master Leucippus. Thus he explained the origin of the world by the eternal motion of an infinite num¬ ber of invisible and indivisible bodies, atoms, which differ from one another in form, posi¬ tion and arrangement and are alternately sep¬ arated and combined by their motions in infinite space. In this way the universe was formed, fortuitously, without the interposition of a First Cause. Although denying the presence of design in nature, he admitted that of law. He called the common notion of chance a cover of human ignorance, the refuge of those who are too idle to think. The eternal existence of atoms (of matter in general) he inferred from the consideration that time could be conceived only as eternal and without beginning. In the atoms he distinguished figure, size, gravity and impenetrability. Fire consists, according to him, of active globules, and spreads, like a light envelope, round the earth. The soul consists, in as far as it is a moving power, of the finest fire-atoms ; but since it is acquainted with the other elements, and anything can be known only by its equal, it must be composed in part also from the other elements. Knowledge by sense is due to contact with atoms emanating from the sensed objects, through the mediation of the organs of sense. Direct contact and mediated by the organs of sense, gives rise to ‘trueborn* knowledge. The continuation of the soul after death was denied by Democritus, who divided it into two parts : into the rational part, which has its seat in the breast; and the sensual part, which is diffused through the whole body. Both

constitute only one substance. He applied his atomical theory, also, to natural philosophy and astronomy. Even the gods he considered to

have arisen from atoms and to be perishable like the rest of things existing. In his ethical phi¬ losophy Democritus considered the acquisition of peace of mind as the highest aim of existence. The purest joy and the truest happiness are only the fruit of the higher mental activity exerted in the endeavor to understand the nature of things, of the peace of mind arising from good actions and of a clear conscience. (See Epicurus; Leucippus; Lucretius). Consult Brieger, A., (Die Urbewegung der Atome und die Weltentstehung bei Leukippus und DemokriD (Halle 1884) ; Dryoff, Adolt, <Demokristudien) (Leipzig 1899) ; Mullach, (Democriti operum fragmenta) (Berlin 1843).

DEMOGEOT, de-mo-zho, Jacques Claude,

French historian and poet: b. Paris, 5 July 1808; d. there, 9 Jan. 1894. He taught in the colleges at Beauvais, Rennes, Lyons, and in 1843 became professor of rhetoric at the Lycee Saint-Louis, which he left to take a chair in the faculty of letters at the Sorbonne. He wrote (Etude sur Pline le Jeune) (1845-50) ; (Les lettres et les hommes de lettres au XIX siecle* (1856) ; (Tableau de la litterature frangaise au XVII erne siecle) (1859) ; (Histoire de la litterature frangaise depuis ses origines jusqus nos jours> (1851). His poetical writings are a drama, (Romeo et Juliet } (1852) ; (Contes et causeries en vers) (1862); (Francesca da Rimini > (1882).

DEMOGORGON, de-mo-gor'gon, (from Gk. <5ai/uovt demon, and yopy6?} horrible), a mysterious divinity in pagan mythology, viewed as an object of terror rather than of worship. He is first mentioned by Lactantius (or Luta-tius) Placidus in a commentary on Statius, about the 5th century a.d. By some he is regarded as the author of creation, and by others as a famous magician, to whose spell all the inhabitants of Hades were subjected. In Shelley's (Prometheus Unbound) it is this dread power of the Demogorgon that overthrows Jove. The use of the word in later poets probably originated with Renaissance mythology, rather than with the classical authors.

DEMOISELLE, da-mwa-zel', the Numid-ian crane (Anthropoides virgo), an African bird which visits the south of Europe. It is about three feet in length and differs from the true cranes in having the head and neck quite feathered and the tertials of the wings elongated and hanging over the tail. It has its name from its gracefulness and symmetry of form.

Among insects , a dragon-fly of the family Agrionidae, characterized by more slender build, exact resemblance between fore and hind

wings and the wide separation of the eyes.

Among fishes , a small species of pintado (Abu-defduf Saxatilis) , common in tide-pools from Florida to Uruguay, especially about Porto Rico.

DEMOIVRE, de-mwavr', Abraham, French mathematician : b. Vitry, 26 May 1667 ; d. Lon¬ don, 27 Nov. 1754. He settled in London after the revocation of the Edict of Nantes and gained a livelihood by becoming a teacher of mathematics and solving problems. His chief works are (Miscellanea Analytica) ; (The Doctrine of Chances, or a Method of Calculating the Probabilities of Events at Play) ; and a work on (Annuities } ; besides

(Papers } in the (Transactions > of the Royal Society, of which he was a Fellow. . He was selected by the Royal Society to judge the dis¬ pute between Leibniz and Newton concerning the discovery of the infinitesimal calculus (q.v.). He is best known for his investigations on com¬ plex numbers (see Imaginary Quantity), and the theorem that (cos#-f-'sin#)n= cos n&+t sin n&) bears his name.

DEMON (Greek daimon), a name given by the ancients to a spirit or genius supposed to hold an intermediate place between men and the celestial deities. In Homer we find the term daimon sometimes applied to one or other of the gods, but it is commonly used by him in a general sense, as when we speak of <(the Deity® or ˆProvidence.® Daimon is probably derived from daid, to divide or distribute, though some look upon it as equivalent to daemon , intelligent or wise. Hesiod uses daimon in a different sense from Homer. He admitted four classes of rational beings — gods, demons, heroes and men. A strict classification was not made until the popular belief had been introduced into the schools of the philosophers. Aristotle divides the immortals into gods and demons : the mor¬ tals into heroes and men. In the Greek philos¬ ophy these demons early played an important part. Thales and Pythagoras, Socrates and Xenophon, Empedocles and the Stoics, invented many fictions concerning them, each in his own way. The poetic Plato, however, goes further than any of the others. In (The Banquet Dia¬ logue > the character of the demons is thus ex¬ plained : (<Demons are intermediate between God and mortals ; their function is to interpret and convey to the gods what comes from men, and to men what comes from the gods; the prayers and offerings of the one and the com¬ mands of the others. These demons are the source of all prophecy and of the art of the priests, in relation to

sacrifices, consecrations, conjurations; for God has no immediate inter¬ course with men, but all the intercourse and conversation between the gods and mortals is carried on by means of the demons, both in waking and in sleeping. There are many kinds of such demons or spirits.® In other places he says of them, they are clothed with air, wander over heaven, hover over the stars and abide on the earth ; they behold unveiled the secrets of the time to come, and regulate events accord¬ ing to their pleasure ; every mortal receives at birth a particular demon, who accompanies him until his end, and conducts his soul to the place of purification and punishment. Later writers divided them, in reference to the effects ascribed to them, into good and bad spirits — Agatho-demons and Cacodemons. The Romans still further developed the Greek demonology; with less, however, of a poetical character and mixed with Etruscan notions.

A full and systematic development of demon¬ ism is found in Buddhism, which recognizes six classes of beings in the universe, two only of which, those of men and angels, are good ; the other four — the Asuras, irrational animals, Pretas or goblins and the denizens of hell — are evil. The Asuras are the most powerful of the wicked spirits, and are at constant war with the gods (Devas). They dwell beneath the three¬ pronged root of the world-mountain, occupying the nadir; while their great enemy, Indra, the highest Buddhist god, sits upon the pinnacle of

the mountain in the zenith. With the Asuras are associated numerous groups, as the Raks-hasas, gigantic opponents of the gods, terrible ogres with bloody tongues and long tusks eager to devour human beings, and lurking in fields and forests; the Nagas, snakes with human faces; the Mahoragas, great dragons; the Pis-hatshas or Vampires, *etc.* According to their nature and office, the different species of de¬ mons dwell in the air, the water or the earth, in holes, dens or clefts. See Egypt, Religion; and also Hebrews ; Zoroaster.

In the New Testament we find demons, ˆdevils® or <(unclean spirits" occupying a prom¬ inent place, the Greek word used being gener¬

ally daimonion (a neuter adjective noun from daimon). These spirits are represented as en¬ tering into and ˆpossessing" human beings, in¬ juriously affecting them in some strange manner, and as being ((cast out" by Christ and his dis¬ ciples, and even by some among the Jews them¬ selves (Luke ii, 19). Very different views are held regarding these accounts of demoniacal possession. Some regard them as plain state¬ ments of fact, believing that ((nothing can be more plainly declared than that demons ob¬ tained possession of man's soul and body, so as to assert their mastery, and that by our Lord and his agents they were miraculously driven out." <(There is every reason to suppose that as the world has become Christian, the powers of evil have been controlled and rendered unable to gain such possession of men as they did in Judaea and neighboring places in the time of our Lord and the apostles, and as they are said to do in some parts of the world now. It is be¬ lieved, moreover, that when Christ was on earth the Devil put forth his utmost power, knowing that his time was short and that he was then suffered to put forth a stronger hand than be¬ fore or since in order that the triumph of Christ might be more conspicuous." These sentences, from Blunt's dictionary of Doctrinal and His¬ torical Theology,* represent what may be called a highly orthodox view of the subject of pos¬ session. The same writer admits that (<the symptoms of possession, as described in the Gos¬ pels, are those of some ordinaryˆ diseases, and we have one case which might be put down as confirmed epilepsy with suicidal mania." The Roman Catholic Church teaches that there can be no doubt of the actuality of demoniacal pos¬ session. See Exorcism.

In the opinion of some writers the persons spoken of in the New Testament as possessed of devils were really sufferers from common diseases, being the unhappy victims of madness, monomania, hypochondria, hysteria, epilepsy and kindred ailments, and that Christ in dealing with them merely accommodated his language to the prevalent opinions of the time.

However much the first teachers of Chris¬ tianity participated in the beliefs of their fellow-countrymen respecting the doctrine of spirits, there can be no doubt that their successors, the fathers and teachers of the Church, were con¬ siderably influenced by the popular ideas on this subject. In the early Church the fenergumens" or persons possessed were recognized as a dis¬ tinct class, and the Church originated a regular discipline in regard to them. The lives of the saints and holy men and women contain many a story in which demons figure, and the office of exorcist was long one of importance. It did

not readily occur to the Jew or early Christian to deny even the existence of the gods of the heathen nations ; they were simply regarded as demons or devils. We thus find in literature up till the Middle Ages, and even on this side of them, the divinities of Oriental, classical, and Scandinavian mythology figuring as princes of hell. Consult such works as Sir Walter Scott, (Demonology and Witchcraft *; Conway, (Demonolgy and Devil-Lore* ; and for the de¬ mons of Scripture the dictionaries of the Bible, as Smith, Hastings, and the (Encyclopaedia Biblica) (Vol. I, 1899) ; also Horst, (Daemono-magie) (2 vols., 1818) ; and <Zauberbibliothek) (6 vols., 1821-26) ; Ukert, (Ueber Daimonen, Heroen, und Genien) (1850); Bastian, (Dcr Mensch in der Geschichte) (3 vols., 1860) ; Taylor, Primitive Culture) (2 vols., 1871) ; Roskoff's admirably learned (Geschichte des Teufels) (2 vols., 1869) ; Maspero, (Dawn of Civilization* (New York 1894) ; Nevins, Ve¬ rnon Possession (Chicago 1895) ; Alexander, (Demoniac Possession in the New Testament (Edinburgh 1901) ; Townsend, (Satan and De¬ mons * (Cincinnati 1902) ; Carus, (History of the Devil and the Idea of Evil from the Earliest Times to the Present Time) (Chicago 1900) ; Tambornino, (De antiquorum daemon-ismo) (1909) ; Wendt, (Christentum und Dualis-mus) (1909) ; also some of the older books, as Bodin, (De Magorum Demonomania) (1581) ; and the like. See Angels ; Animism ; Devil ; Evil; Exorcism; Hell; Serpent-worship; Werewolf; Witchcraft; Zoroaster.

DEMONETIZATION. See Bimetallism.

DEMONIAC, a term to designate an old superstitious idea, that of a person whose mental faculties are overpowered, and whose body is possessed and actuated by some created spiritual being; especially a person possessed of or controlled by evil spirits. See Demon.

DEMONOLOGY, the scientific study of beliefs in and evidences of the existence and in¬ fluence of evil spirits. It is founded on the theory that there are beings out of the body as well as those in the body, and that these dis¬ embodied beings have the power to influence, control and obsess to their hurt those now liv¬ ing in the flesh. The belief in demons is preva¬ lent particularly in India, South Africa and China, and in some sections of Ireland. Its foundation seems to lie in the recognition of the evil influences constantly at work in human consciousness to distort and deform the good, and the personification of such influences. The bibliography of the subject is very large, but consists almost wholly of tales of incidents which are ascribed to the activities of the as¬ sumed evil spirits. All of the investigations that

have been made have not as yet resulted in what may be rightly termed a science and the subject remains rather in the status of a re¬ ligious belief. (See Witchcraft). Consult Conway, M. D., (Demonology and Devil-Lore) (2 vols., New York 1889) ; Nevins, Rev. J. L., (Demon Possession and Allied Themes> (Chi¬ cago 1896) ; Scott, Sir Walter, (Demonology and Witchcraft (London 1868) ; Seymour, St. J. D., < Irish Witchcraft and Demonology* (Baltimore 1913) ; Tonna, C. E. P., (Principalities and Powers in Heavenly Places* (New York 1843) ; Waite, A. E., <Devil Worship in France * (London 1896).

DEMONSTRATION, a proof in which the conclusion necessarily follows from the prem¬ ises, and the rejection of the conclusion, there¬ fore, always involves a contradiction. The great domain of demonstration is mathematics, in which all the proofs, however complicated, are drawn from a few simple axioms, founded on intuitive perception of number, time and space. In ordinary language, however, demon¬ stration is often used as synonymous with proof and sometimes even more loosely as syn¬ onymous with explanation and exhibition, as when we speak of anatomical demonstration. In military tactics it is an operation which may be performed to the end of deceiving the enemy in regard to the real measures to be taken against it.

DEMOPHON, or DEMOPHOON, in my¬ thology, the son of Celeus and Matanira, whom Ceres loved so passionately that she wanted to make him immortal. To attain that purpose she made him pass through fire, but, being dis¬ turbed by the cries of his mother, who chanced to see him, the goddess hurriedly mounted her car, leaving Demophon to perish in the flames.

DE MORGAN, Augustus, English mathe¬ matician : b. Madura, southern India, 27 June 1806; d. London, 18 March 1871. In 1828 he was appointed professor of mathematics in University College, or as it was then called, London University — a situation which he held until 1866, with the exception of the five years from 1831 to 1836. Previous to this appoint¬ ment he had turned his mathematical

attain¬ ments to account in the service oi some of the London assurance companies and continued throughout his life the confidential adviser of some of the most important of these associa¬ tions. He was first president of the London Mathematical Societ}r and was a member of the Royal Astronomical Society and did much to encourage a decimal system of coinage. Among his many works are (Elements of Arithmetic (1830) ; (Elements of Algebra> (1835); (Elements of Trigonometry > (1837); (Essay on Probabilities and on Their Applica¬ tion to Life Contingencies and Insurance Offices) (1838); (Formal Logic) (1847), and contributions to various encyclopaedias. A me¬ moir was written by his widow (London

1882).

DE MORGAN, William Frend, English novelist: b. London, 16 Nov. 1839; d. Chelsea, 15 Jan. 1917. He was educated at University College School, was a student at the Royal Academy in 1859 and adopted art as a profes¬ sion. In the years following 1864 he was chiefly engaged in stained-glass work ; in 1870 turned his attention to ceramic work, when his experiments in lustre, at that time not much known in England, attracted some attention among artists. In 1905 he. commenced as a writer of fiction with (Joseph Vance, > which achieved an immediate success. The novels that followed were equally successful, so much so that De Morgan was soon regarded as one of the most popular and pleasing novelists of his generation. His other publications are (Alice-for-Short* (1907) ; (Somehow Good) (1908) ; (It never Can Happen Again* (1909) ; (An Affair of Dishonor* (1910) ; (A Likely Story* (1912) ; When Ghost Meets Ghost* (1914). Consult Phelps, W. L., As¬

says on Modern Novelists) (New York 1910), and Cooper, F. T., (Some English StoryTell- ers) (ib. 1912).

DEMOSTHENES, famous Greek orator: b. Athens, 384 or 385 b.c. ; d. 322 b.c. His father left him a considerable fortune, of which his guardians attempted to defraud him. Demosthenes, at the age of 17 years, conducted *a suit against them himself, and gained his cause. He studied rhetoric under Isseus, and benefited in some degree from the teachings of Isocrates and Plato. But nature had placed great obstacles in his way, and his first at¬ tempts to speak in public were attended with derision. He not only had very weak lungs and a shrill

voice, but was unable to pronounce the letter r. These natural defects he endeav¬ ored to remedy by the greatest exertions, hie succeeded by the advice of the actor Sat3'rus, who advised him to recite with pebbles in his mouth, on the roughest and steepest places. To strengthen his voice he exercised himself in speaking aloud on the seashore, amidst the noise of the waves. At other times he shut himself up for months in a subterranean room, with his head half-shaved, that he might not be tempted to go out, and endeavored to ac¬ quire dignity of manner by practising before a mirror. He is also said to have transcribed the history of Thucydides eight times for the purpose of forming his style. After such a laborious preparation he composed and deliv¬ ered his masterly speeches, of which his ene¬ mies said that they smelt of the lamp, but to which posterity has assigned the first rank among the models of eloquence — speeches in which he openly opposed the foolish wishes of the multitude, censured their faults and in¬ flamed their courage, their sense of honor and their patriotism. He thundered against Philip of Macedon in his orations known as the Phil¬ ippics, and instilled into his fellow-citizens the hatred which animated his own bosom. The first Philippic was delivered in 352 b.c., when Philip could no longer conceal his ambitious scheme of subjugating the whole of Greece. In 349 the city of Olynthus, the northern ally of Athens, was captured and destroyed by the Macedonians, and shortly afterward Philip took possession of the Pass of Thermopylae. The orator insisted on the necessity of immedi¬ ately preparing a fleet and an army; urging the Athenians to begin the war themselves ; to make Macedonia the theatre, and to terminate it only by an advantageous treaty or a decisive battle. They admired and approved his plans, but did not execute them. The celebrated Phocion, who knew the weakness of Athens, un¬ ceasingly advised peace. Demosthenes went twice to the court of Philip to negotiate, but without success. On his return he recom¬ mended war and endeavored to arm not only Athens, but all Greece. When Philip had finally penetrated into Phocis, through the Pass of Thermopylae, and had taken possession of the city of Eletea (338), to the terror of Athens, Demosthenes obtained a decree of the people for fitting out a fleet of 200 vessels, marching an army to Eleusis and sending am¬ bassadors to all the cities of Greece, for the purpose of forming a universal confederacy against Philip. He was himself among the ambassadors, and prevailed on the Thebans to

receive an Athenian army within their walls. He also exerted himself actively throughout Bceotia, and by his efforts a numerous army was collected to act against Philip. A battle was fought near Cheronea, and the Greeks were vanquished. Demosthenes fled, like thousands more. Nevertheless he was desirous of deliver¬ ing a funeral oration over those who had fallen in battle. iEschines, his rival, did not fail to attack him on this account. The hostility be¬ tween the two orators was the occasion of the speech (De Corona) (on the crown), which resulted in the triumph of Demosthenes and the exile of his adversary. Philip having been soon after assassinated, Demosthenes en¬ deavored to rouse Athens to regain her inde¬ pendence, but Alexander's dreadful chastise¬ ment, of her ally Thebes filled the Athenians with such terror that they sued for mercy. It was with difficulty that Alexander could be persuaded to desist from his demand of the surrender of Demosthenes and some other orators; for the Macedonians feared Demos¬ thenes more than they did the armies of Athens. He was afterward fined 50 talents on a charge of bribery, and being unable to pay the fine, was thrown into prison, from which he escaped and fled to ZEgina, where he re¬ mained till the death of Alexander. Then followed the war with Antipater. Demosthenes again appeared in public, and endeavored to persuade the small Grecian states to unite against Macedonia. The Athenians received him with honor; but the war was unsuccessful, and Antipater insisted upon his being surren¬ dered to him. Demosthenes fled to the Temple of Poseidon, in the island of Calauria, on the coast of Argolis, but finding himself not secure, he took poison, which he always carried about with him. He died, according to the general account, in 322 b.c., at the age of 60 or 62 years.

The character of Demosthenes is by most modern scholars considered almost spotless. Cicero pronounces him to be the most perfect of all orators. He ahvays spoke as circum¬ stances required, and was by turns calm, vehe¬ ment, or elevated. He carried the Greek lan¬ guage to a degree of perfection which it never before had reached. In energy and power of persuasion, i-n penetration and power of rea¬ soning, in the adaptation of the parts to the whole, in beauty and vigor of expression, in strong and melodious language, he surpassed all his predecessors. Everything in his speeches is natural, vigorous, concise, symmetrical. This alone can explain his great influence over his contemporaries. We have under his name 61 orations, 56 exordiums, and 6 letters, some of which are not genuine. Among the oldest edi¬

tions of the orations the best is that of Paris, 1570, in folio, with the commentaries of Ulpian. The first edition of his complete work, Greek and Latin, was edited by Hieronymus Wolf (Basel 1549). The edition by Bekker (Leipzig 1855) is considered among the best of the modern ones. (See Oration on the Crown). Consult Schafer, < Demosthenes und seine Zeit) (2d ed., Leipzig, 1885-87) ; Jebb, (The Attic Orators* (2 vols., London, 1875-76) ; Wright, (Short History of Greek Literature* (New York, 1907).

DEMOTIC, or ENCHORIAL, Alphabet.

See Hieroglyphics.

DEMOTICOS, or DEMOTIKA, Greece, a town in the province of Adrianople, on the Maritza, five miles south of Adrianople. The town has some silk, woolen, and earthenware manufactures. The agricultural pursuits con¬ sist of the raising of vegetables, tobacco and wine. It is the see of a Greek archbishop, and is defended by a citadel, containing a palace, in which several of the Turkish sultans resided before they gained possession of Constantinople. Charles XII remained here for some time after the disaster of Pultowa. It was occupied dur¬ ing the Balkan War by the Bulgarians. The Treaty of London, 31 May 1913, confirmed the Bulgarian possession of the town, but it was later restored to Turkey by the Treaty of Con¬ stantinople 29 Sept. 1913. In 1919, it was ceded to Greece. Pop. 8,700.

DEMPSTER, John, American clergyman and theological educator; b. Florida, N. Y., 2 Jan. 1794; d. 28 Nov. 1863, while on his way to California. His father, the Rev. James Dempster, was a graduate of the University of Edinburgh and became one of the early helpers of John Wesley in England. After he came to America he became a minister of the Presby¬ terian Church and was pastor of the church at Florida, N. Y., for many years. In 1816 John Dempster entered the ministry of the Methodist Episcopal Church. He served important churches and was 12 years a presiding elder. He also served as a missionary in Buenos Ayres for a short period. He was one of the founders of the first theological school of the Methodist Episcopal Church, which was first located at Newbury, Vt., and then at Concord, N. H., and was called the General Biblical Institute. In 1867 it was moved to Boston and became the Boston University School of Theology. Mr. Dempster was president and professor, 1845-54. He was also one of the founders and

the first president of Garrett Biblical Institute, Evanston, Ill., serving from 1855 to 1863. He planned to found a third theological school in California and was on his way to that field when stricken. His (Lectures and Addresses> were collected and published in 1864.

DEMPSTER, Thomas, Scottish scholar: b. Cliftbog, Aberdeenshire, Scotland, 23 Aug. 1579; d. near Bologna, Italy, 6 Sept. 1625. His autobiography, which contains a curious mixture of truth and fiction, states that he became heir to the title of Baron of Muresk, but that the property accruing thereto had been fraudulently handled by his father and he was unable to re¬ gain it. Dempster's adherence to the Roman Catholic faith was one cause of his estrange¬ ment from his father. He studied at Cam¬ bridge, Paris, Louvain, Rome and Douay and became successively professor at Tournay, the College of Navarre at Paris, at Poitu, Nimes and again at various colleges of Paris. Quar¬ rels forced him to leave Paris, and after a brief service as historian to James I of England he became professor of civil law at Pisa and later of humanities at Bologna — a period full of quarrels and scandalous duels. Urban VIII made him a knight and gave him a pension. He remained at Bologna until his death. Bayle says that though his business was only to teach a school he was as ready to draw his sword as his pen and as quarrelsome as if he had been a duelist by profession. Scarcely a

day passed, he adds, in which he did not light either with his sword or at fisticuffs, so that he was the terror of all the schoolmasters. Demp¬ ster's works are very numerous and exhibit proofs of great erudition. Among them his (Historia Ecclesiastica Gentis Scotorum) is the best, though, instead of being as its title would indicate an eccelsiastical history of Scotland, it is merely a list of Scottish authors and Scot¬ tish saints. It is full of astounding inaccura¬ cies and deliberate untruths. It was edited by the Ballantyne Club in 1829. His really most valuable work is (De Etruria Regali,* an edition of which was published at Florence in 1725. His Latin poems were also highly esteemed by his contemporaries.

DEMULCENTS, remedies of a mucilagi¬ nous nature that are used in inflammatory con¬ ditions of the mucous membrane. They con¬ sist largely of mixtures of the oils, gums and albumins. Thus sweet oil, acacia, tragacanth, marshmallow, slippery elm, white of egg, cream, milk and flaxseed are all types of this class of remedies.

DEMURRAGE, in maritime law, is used to signify the amount to be paid by the char¬ terer to the owner of a ship for detaining her in port longer than the time specified. The time of delay in port for a cargo, for convoy, etc., is usually stipulated in the charter-party and also the allowance to be made in case of longer delay for those objects, and this time is some¬ times specified in working days or lay days, as distinguished from holy days when no cargo can be put on board. All ordinary cases of deten¬ tion, such as port regulations, the overcrowded state of the harbor and the like, or even from the unlawful acts of the custom-house officers, are at the freighter's risk, and demurrage must be paid although it is proved that the delay was not caused by any fault of his. But demurrage cannot be claimed when the ship is detained by a public enemy or by the hostile occupation of the port, nor if the detention is caused by the owner, master or crew. The claim ceases when¬ ever the vessel is cleared and ready for sailing, though she should be detained by adverse winds or rough weather.

DEMURRER, a pause or stop put to the proceedings of an action upon a point of diffi¬ culty, which must be determined by the court before any further proceedings can be had therein. He that demurs in law confesses the facts to be true as stated by the opposite party, but denies that by the law arising upon those facts any injury is done to the party or that he has made out a lawful excuse. Demurrer upon evidence is a statement by the party making it that he will not proceed because the evidence on the other side is not sufficient to maintain the issue. A general demurrer is one not specify¬ ing an objection, but relying on some defect in substance ; a special demurrer specifies some particular defect in the form of the adversary's allegation. A demurrer when allowed puts an end to the suit, unless it is confined to only a part of the bill. If overruled a fresh defense is required. Generally there is a provision that the counsel must certify that the demurrer is well-founded in law and an affidavit must be made by the defendant that it is not interposed for delay.

DEMY, de-mi. (1) The popular term for the demi-socii or half-scholarships of Magdalen College, Oxford ; the seniors valued at $500

and the juniors at $400 a year. (2) A term desig¬ nating American writing paper 16x21 inches in size.

DENAIN, de-nan, France, town in the de¬ partment of Nord, six miles from Valenciennes, on the left bank of the Scheldt, which is here navigable. It stands in the centre of a coal¬ field, and both coal and iron are extensively mined and supply several blast-furnaces and other ironworks. Shipbuilding and the manu¬ facture of beet-sugar, beer and spirits are also carried on. Denain had once a celebrated abbey, founded in 764. A great victory was gained here in 1712 by the French under Villars over the allies under Eugene and Albemarle. Pop.

26,800.

DENARIUS, a Roman silver coin, the prin¬ cipal one under the republic and the empire, originally of the value of 10 asses or pounds of copper; but afterward of 16 asses, when the weight of the ass was reduced to one ounce in 217 b.c. It was first minted in 269 or 268 b.c., when it weighed 72 grains. It was equivalent to about 16 or 17 cents of United States money. The obverse bore the helmeted head of Roma and the mark of its value X — that is, 10 asses ; the reverse had Castor and Pollux upon it. Later other mythological and historical types were cast upon it. It continued to be the ordinary silver currency down to the age of the Emperor Septimus Severus and his sons, by whom pieces composed of a base alloy were introduced. The name was also given to gold coin struck during the empire ; its full title was denarius aureus , and it was generally called aureus, but by Pliny uniformly denarius. It passed for 25 silver denarii. Diocletian in 296 a.d. gave the name denarius to a coin of copper issued by him. The denarius of Tiberius is the penny mentioned in the New Testament. In the British formula <(£. s. d.® the d. is represen¬ tative of the denarius, or silver penny of medi¬ aeval days ; when a penny had nearly the pur¬ chasing power of the dollar of our day. Hence, as the English translation runs, the master of the vineyard agreed with the laborers, <(for a penny a day,® in the parable in Matthew xx. The copper penny was not coined in England until 1665. A strong effort was made to se¬ cure, in the Revised Version of the New Tes¬ tament of 1881, the original word ((denarius,® but the word ((penny® was retained.

DENATURED ALCOHOL, Alcohol that

has been rendered unfit for use as a beverage or as a medicine by the

addition of poisonous and offensive substances. It is also called denaturalized and denaturized alcohol, and in¬ dustrial alcohol. Denature means to change the nature of, and the reason for changing the nature of alcohol is that it may not be subject to the Government tax on alcohol as a beverage, and thus be sold at a low price for industrial pur¬ poses. The first official recognition of denatured alcohol as a distinctly industrial substance was the action of the British government in 1855, in relieving it from the payment of duty de¬ manded on alcoholic beverages. The denatur¬ ing agent then used was, as now, methyl or wood alcohol, added to the ethyl or grain al-

cohol in the proportion of 10 per cent. The mixture was called methylated spirit.

France, in 1872, provided a special tax of about 30 cents per gallon on alcohol denatured for use in the arts. In Germany, denatured al¬ cohol was first freed from tax in 1879. The Netherlands untaxed the denatured spirit in the same year. Austria-Hungary followed in 1888; Sweden in 1890; Switzerland in 1893; Norway in 1894; and Belgium in 1896. The United States law went into effect in 1907. At that time the selling price of proof alcohol in the United States was about $2.50 a gallon, and the Government tax was $2.08, so that the distiller received about 42 cents a gallon. Being relieved of this tax on the denatured product the distiller could afford to sell it for 42 cents, rendering it available for a variety of uses. As a matter of fact it can be made for much less than 42 cents a gallon, as the price in Germany has been as low as 15 cents, and the figures presented in Congress at the time the proposed law was discussed went to show that it might be made as low as 11 cents a gallon. In 1916, proof alcohol was selling for $2.04 per gallon, the tax was $1.10 per gallon, and denatured alcohol was 60 cents.

The uses to which denatured alcohol may be applied, for light, fuel and power purposes, all require a cheap article, as it comes into competition with petroleum products that are sold at a low figure. But because alcohol is better than petroleum for many purposes, often it will be used even at a somewhat higher price. The price of $2.50 a gallon, however, was pro¬ hibitive, in most cases, to industrial uses.

Ordinary alcohol, specifically called ethyl al¬ cohol, for the purpose of taxation and storing in bonded warehouses, is made to a uniform standard called proof alcohol, which is 94 per cent pure, the remainder being water. For use as a beverage or medicine this is diluted. (See Alcohol). To denatured alcohol there is added to the proof alcohol a small quantity of methyl or wood alcohol, which is distinctly poisonous, and which of course renders it un¬ fit to drink. In order to spoil the taste and render it offensive, a little benzine or pyridine is also added, when the denaturizing is con¬ sidered

complete, and this product is called ˆcompletely denatured alcohol.® It is the regu¬ lar commercial grade.

The United States law provides that (<to every 100 gallons of ethyl alcohol of 180 de¬ gree proof shall be added 10 gallons of ap¬ proved methyl (wood) alcohol, and half a gallon of approved benzine,® and that this mix¬ ture shall be free from taxation as alcohol.

Besides the commercial type, the Govern¬ ment provides also for ˆspecially denatured alcohol® to be used for certain manufactures in which the commercial type would be injurious. The latter can be used in making soaps, lini¬ ments, compound camphor, etc., but not for medicines taken internally. For example, the alcohol used in making chloral is denatured by passing through it a current of chlorine gas. Alcohol used in making chloroform is denatured with chloride of lime. In varnish factories the denaturing agent used is turpentine. In vine¬ gar factories the alcohol is denatured by adding an equal quantity of vinegar. For other similar specific uses several resins are employed; also camphor, acetic or nitric acids, acetic ether,

acetone oil, several of the coal-tar dyes, naph¬ thaline, nitrobenzol, castor-oil, caustic soda, phenolphthalein, chloroform, formalin and others. The United States law does not specif}' the articles and quantities, but simply the condition that it must be rendered unfit for use as a beverage or medicine, and making the revenue officers the judges as to when this has been accomplished. About 50 processes have been published for making denatured alcohol.

Denatured alcohol has to be made in a dis¬ tillery, and a bonded warehouse must be erected on the premises, and accommodation provided for a revenue officer to watch the process. Dealers in denatured alcohol and manufacturers who use it must secure permits from the col¬ lector of internal revenue in that district. Manu¬ facturers using the ((special® grade have to give bonds.

To protect denatured alcohol from accidental handling as ordinary alcohol, the Government requires that it be put up in cans of light green color, not smaller than five nor larger than 135 gallons, and that these cans be marked (<Denatured Alcohol® in letters of red, at least one and one-half inches long. Dealers in bever¬ ages are forbidden to have such cans of de¬ natured alcohol about their premises.

Denatured alcohol may be manufactured more cheaply than ordinary

alcohol by using cheaper materials, such as are unfit for use in making a beverage. Ordinary alcohol is made from grain, either Indian corn, wheat or barley. Alcohol for industrial use may be made from any starchy vegetable substance, or a waste by¬ product, as the poorest grade of molasses, or the waste of a canning-house. In the Louisiana sugar belt and in Hawaii, where molasses is cheap, that is probably the best material ; in Maryland, wheie there are many canneries, fruit waste could be used; in Kansas and Oklahoma in the years when there is an oversupply of corn, it can be made into denatured alcohol ; where potatoes are very cheap, these can be employed. In such ways denatured alcohol can be produced at a cost low enough to justify its use in lamps and for fuel, and for operating-engines of the gasoline type, as for automobiles. Since wood alcohol is the principal and most important article used in denaturizing, the en¬ deavor of the trade is to cheapen it, but while wood pulp and sawdust (the raw material) are cheap, they do not yield a large quantity of alcohol, hence much material has to be handled in its manufacture. Any woody fibre or cellu¬ lose can be used, however.

Alcohol does not burn with a bright enough flame to make a good illuminant, but by using its heat to render a mantle incandescent it gives a good light, that is safer than kerosene, and presents no nuisance of smell and accumu¬ lated carbon.

As a fuel, denatured alcohol is convenient, clean and safer than petroleum. As a motive power fluid, it is cleaner and better in some ways than any of the petroleum products, but is also more costly. It requires an engine and carburetter specially designed for alcohol to render it practicable for automobile and similar engines.

Denatured alcohol is commonly used in the manufacture of aniline dyes, electric apparatus, starch, transparent soaps, tobacco, shellac var¬ nish, celluloid, paints, hats, shoeblacking, insect

powders, disinfectants, cements, gas mantles, cartridges, anti-freezing mixtures and in clean¬ ing and polishing preparations.

For the fiscal year ended 30 June 1915, the Commissioner of Internal Revenue reported the manufacture of 5,386,647 gallons of com¬ pletely denatured alcohol and 8,599,822 gallons of specially denatured alcohol.

Bibliography. — Brachvogels, (Industrial Al¬ cohol 5 (1907) ; Herrick, (Denatured or Indus¬ trial Alcohol) (1907) ; Wiley, Manufacture of Denatured Alcohol 5 (1910).

DENBIGH, den'bi, Wales. (1) A mari¬ time county of North Wales; area, 426,084 acres. Oats, barley and rye are the principal crops ; sheep are raised in the uplands ; and woolens are manufactured. The principal in¬ dustry is mining, coal, iron, lead and slate being extensively worked. The county is divided into two divisions for parliamentary purposes, each returning one member. Pop. 144,783. (2) A municipal and parliamentary borough, capital of the county of Denbigh. Population of municipal borough, 6,892.

DENBY, Charles, American diplomatist : b. Mount Doy, Va. 1830; d. Evansville, Ind., 13 Jan. 1904. He was educated at Georgetown University and Virginia Military Institute and became a lawyer. Having served through the Civil War and attained the rank of colonel, he resumed the practice of law. He was appointed minister to China in 1885 and served for 13 years in Peking. In 1898 he was made a mem¬ ber of the commission to investigate the con¬ duct of the war with Spain, and in 1899 a mem¬ ber of the Philippine Commission. During the war betwen China and Japan the Japanese gov¬ ernment placed its interests in China in his care. He wrote (China and Her People5 (2 vols., 1906).

DENDERAH, den'der-a, Egypt (the Ten-tyra of the Greeks and Romans), a village on the left bank of the Nile; lat. 26° 10' N. ; long. 32° 40' E. ; celebrated for its temple, one of the most magnificent and best preserved remains of antiquity in Egypt, begun under Ptolemy XI and completed in the reign of the Emperor Tiberius. It was dedicated to the goddess Athor or Aphrodite, and is enclosed within a wall built of sun-dried bricks, in some parts 35 feet high and 15 feet thick. The portico of the temple consists of 24 columns, in three rows four deep on either side, each above 22 feet in circumference, and 50 feet high. The in¬ terior consists of a number of apartments, all the walls and ceilings of which are covered with religious and astronomical representations, including the figure of Athor. The roofs are flat, and are formed of oblong masses of stone resting on the side walls, or on rows of col¬ umns carried down the middle of the building, and whose capitals are richly ornamented with the budding lotus. The only

light admitted to the interior was by small perpendicular holes cut in the ceiling, or by oblique apertures in the sides. The hieroglyphics and ornamentation of the temple belong to the declining period of Egyptian art. The effect of the portico is greatly heightened by the fact of its roof being re¬ tained ; and on the ceiling is the famous zodiac, at one time regarded as of great antiquity. Another remarkable object belonging to the temple, and which excited the greatest interest,

was a celestial planisphere or zodiac, forming the ceiling of one of the upper chambers. This was carefully removed from its original place in 1822, and conveyed to Paris. Flinders Petrie in 1898 excavated the tombs of the ancient princes of Denderah. Consult Mariette, (Den¬ derah 5 (5 vols., 1869-80) ; Petrie, (Denderah5

(1900).

DENDERMONDE, den-der-mon'de, or TERMONDE, Belgium, town in the province of East Flanders at the junction of the Dender and the Scheldt rivers, 12 miles northwest from Brussels. It is strongly fortified, defended by a citadel and surrounded by low, marshy ground which can be laid under water. It contains manufactories of woolen and linen goods, tobacco and other articles. It is an important railroad centre. It possesses a college, a pub¬ lic library, an academy of design and archi¬ tecture, a music school, a fine church in which are a number of paintings by Van Dyck and De Crayer and a remarkably decorated town-hall of the 14th century. Pop. 10,193.

DENDRERPETUM, dendrer'pe-tum, a small lizard-like fossil amphibian, discovered by Dawson and Lyell in Nova Scotia; so named from its being found in the interior of a fossil trunk and hence supposed to have been of arboreal habits. It is now regarded as a laby-rinthodont 'and is ranked by some scientists under the suborder Labyrinthodontia Vera. The skull is parabolic in form.

DENDRITE (Gr. (<tree-like55), any mineral in which arborescent forms resembling trees or mosses occur. These peculiar markings, which are often of great delicacy and beauty, are commonly due to the presence of certain me¬ tallic oxides which have separated from the general mass of the mineral. Moss agate is a familiar example of a dendrite, the markings in this case being due to the presence of oxide of manganese. The name ((dendrite55 is also ap¬ plied to the

complex, tree-like crystalline growths often observed in the case of silver, lead, copper and certain other metals. Man¬ ganese oxide dendrites on limestone are often, but incorrectly, called fossil ferns.

DENDRITIC DRAINAGE. See Trel—

i.ised Drainage.

DENDROBATES, a genus of South Amer¬ ican tree-frogs representing the family Dendro-batidce, which is remarkable in having species in West Africa and Madagascar, as well as seven species in tropical South America. These frogs are small, brightly colored, toothless, and have not webbed feet, but adhesive disks on their toes, fitting them for life in trees; and are noteworthy from the use made of them by man. The Indians heat these frogs before a fire, then scrape off the poison exuded under the pain of the heat, and with it poison their arrowheads. This skin-poison is also em¬ ployed for dyeing the Amazonian green parrots in a fanciful way. To do so feathers of the part to be dyed are pulled out, and these places are rubbed with the collected poison, or simply with a living frog (Dendrobates tinc-toria), and again when the new feathers begin to appear. (<The result is that these appear yellow instead of green, and since the Brazil¬ ians … are rather partial to these arti¬

ficially produced freaks or (contrafeitos5 as

they call them, the industry is kept up.® These little frogs are remarkably attentive to their young. They spawn in shallow puddles that quickly dry up. The father frog therefore sits down in the puddle as soon as the eggs hatch, whereupon the tadpoles crawl upon his back (the brood is small), and stick there by sucker¬ like mouths while he carries them to another wet place, and so on until their metamorphosis is finished. Consult Gadon, (Amphibia and Reptiles) (New York 1901).

DENDROBIUM, an extensive genus of epiphytes belonging to the

family Orchidace < r, natives of Asia and Australasia, where they are found in great numbers in the damp tropical forests. About 600 species are known, of which many are cultivated in hothouses. The genus varies greatly in the character of its flowers, some of the species being among the finest of the orchids. Among these are D. nobile, D. chrysanthum, D. gibsonii, and D. densiflorum.

DENDROLAGUS, a genus of marsupial animals, popularly known as tree-kangaroos, from their habit of living in trees. Their fore legs are longer and stouter in proportion than with the kangaroo, and their hind legs shorter. They move in the tree-tops with a jumping motion of the hind legs, clinging to the land¬ ing place with the forelegs, which are armed with long sharp claws. Four species are known, one of them (D. lumholtzi) being a native of northern Queensland, and the other three (D . ursinus, inustus and dorian-us) natives of the island of New Guinea.

DENEEN, Charles Samuel, American lawyer and public official : b. Edwardsville, Ill., 4 May 1863. He was graduated at McKendree College in 1882, was admitted to the bar in 1886 and practised law in Chicago until 1904. In 1892 he was a member of the Illinois house of representatives, was attorney for the Sani¬ tary District of Chicago 1895-96, and attorney for Cook County 1896-1904. He was governor of Illinois from 1905 to 1913, and afterward served as attorney for a committee of investiga¬ tion into the Chicago voting-machine scandal.

DENGUE (den'ga) FEVER (also called dandy, breakbone, and seven-days' fever, scarla¬ tina rheumatica, abu rokab), a specific disease usually distinguished by an acute onset with fever, intense muscular and joint pains, and later by a measle-like eruption. In some coun¬ tries it is endemic and has three times assumed pandemic proportions. It is found in Eastern countries — Arabia, China, India, Africa, espe¬ cially in Egypt and Zanzibar. It has been found in Spain, Greece and Asia Minor ; in Bermuda, the West Indies, the southern United States ; in parts of South America; and in Sydney and Brisbane, Australia. It is essentially a disease of the tropics, where it is usually found in hot weather, in the coast and river districts and low levels more than in inland parts; and it would seem to be a communicable disease, depending upon some microorganism. As a rule the dis¬ ease lasts from four to eight days, and the prognosis is favorable. Complications or a fatal end are very rare. It is frequently con¬ founded with influenza, yellow fever, rheuma¬ tism, measles, scarlet fever. Treatment is by means of quinine, ice, the newer antipyretics and opium.

DENHAM, Dixon, English explorer : b. London 1786; d. Sierra Leone, 9 June 1828. He was educated at Merchant Taylors' School with a view to entering business, but joined the army in 1811, and fought in the Peninsular campaign and in the Netherlands. In 1823-24 he was engaged, in company with Captain Clapperton and Dr. Oudncy, in exploring the central regions of Africa. The account of the expedition was prepared by Denham, and pub¬ lished under the title (Narrative of Travels and Discoveries in Northern and Central Africa) (1826). In 1826 he went to Sierra Leone as superintendent of the liberated Africans, and in 1828 was appointed lieutenant-governor of the colony.

DENHAM, Sir John, English poet: b. Dub¬ lin, Ireland, 1615; d. London, March 1669. He was the son of Sir John Denham, chief baron of the exchequer in Ireland, and was educated in London and at Oxford. In 1641 he first be¬ came known by his tragedy of (The Sophy.) This piece was so much admired that Waller observed, ((Denham had broken out like the Irish rebellion, 60,000 strong, when no person suspected it.® In 1643 he published the first edition of his most celebrated poem, called (Cooper's Hill. > Among the last and best of his productions is a poem in which he com¬ memorated the death of Cowley. In 1665 a corrected edition of his works appeared. He was forced to escape to France in 1648 be¬ cause of his implication in the secret service of Charles I. Returning to England in 1652, he was appointed after the Restoration as sur¬ veyor-general of the royal buildings. His tomb is at Westminster Abbey. Consult Ward, (English Poets> (London 1880-83). His poetry generally is remarkable for its rhythmic flow and smoothness, leading up sometimes to pas¬ sages of force and dignity.

DENHART, or DENHARDT, Clemens and Gustave, German explorers: b. Zeitz 1852 and 1856, respectively. They made a tour in 1878, through the Tana River region, East Africa, to establish German trade, and another from the island of Lamu to Vitu in March 1885, the sultan of the Swahili desiring a treaty with Germany based upon proposals made by him 18 years previously. Clemens Denhart trans¬ ferred part of the territory acquired by him to the German Colonist Society, the Deutsche Witugesellschaft. All rights to this territopr were ceded by Germany to England in 1890, in exchange for the island of Helgoland, the brothers receiving an indemnity of 150,000 marks from the German government. An im¬ portant work by Clemens Denhart was pub¬ lished in 1883 in the Mitteilungen des Vereins fur Erdkunde at Leipzig under the title (Anleitung zu geographischen Arbeiten bei For-

schungsreisenP

DENIA, da’ne-a, Spain, seaport on the east coast of Alicante. Roman antiquities abound in the neighborhood. The harbor is small and there is a lighthouse. Raisins and salt are the principal articles of commerce.

DENINA, da-ne’na, Carlo Giacomo Maria„

Italian historian : b. Revello, Piedmont, 28 Feb. 1731 ; d. Paris, 5 Dec. 1813. He studied at Turin, and in 1758 became a professor in the university there. In 1769 he published the first three volumes of his (Delle rivoluzioni

d’ltalia,* his most important work, which was finished in 1772. He went to Berlin in 1782, and was appointed a member of the Academy. He published <La Prusse litteraire sous Frederic IP ; (Political and Literary History of Greece *; and (Letters from Brandenburg, etc.* His lClef des Langues,* dedicated to Napoleon, brought him the position of librarian to the emperor. His <Rivoluzioni) was trans¬ lated into English by Langhorne (London 1773). Consult Surra, (Vita de Carlo Denina) (Turin 1902).

DENIO, Hiram, American jurist: b. Rome, N. Y., 21 May 1799; d. Utica, 5 Nov. 1871. He studied law, was admitted to the bar and prac¬ tised at Rome and Utica. He was appointed circuit judge of the Fifth New York circuit, and was three times elected judge of the State Court of Appeals, the first time in 1853. He retired from that office in 1866. He edited with William Tracy (Revised Statutes of New York* (1852), and published (Reports of Cases Argued and Determined in the Supreme Court and in the Court for the Correction of Errors* (5 vols., 1845-48).

DENIS, Fr. de-ne, or DENYS, Saint, or DIONYSIUS, Saint, first bishop of Paris, and patron saint of the French nation. Exact information regarding Saint Denis cannot be ob¬ tained, but there is no doubt he belongs to the 3d century. In the Middle Ages it was believed by many

that Saint Denis, or Dionysius, of Paris was the same as the Dionysius converted at Athens by Saint Paul ; but the number of years intervening between the time of Saint Paul and when Saint Denis was bishop of Paris (about 207 years) is proof that the Areopagite of Athens and the apostle of Paris were not the same person. The most reliable authorities say that Saint Denis of Paris was sent by the Pope to Gaul about 250 a.d. His mission was most successful and many pagans were converted to Christianity. The number of his disciples at¬ tracted the attention of the Roman governor who caused the arrest of Denis and several ot his companions, among whom were Eleutherius, a deacon, and Rusticus, a priest. The Chris¬ tians, refusing to denounce Christ and offer sacrifice to the gods, were tortured and put to death. The bodies of Denis, the priest and the deacon were thrown into the Seine. Catulla, a Christian woman, recovered the bodies and gave them burial. Later a church was built over the place where the bodies were interred. Dagobert I built (about 636) here the abbey of Saint Denis. His feast, in the calendar of the Roman Catholic Church, is 9 October. Con¬ sult Butler, (Lives of Saints> ; Tailliar, <Apostolate of Saint Denis1* (Amiens 1869) ; Vereilly, (Vie de Saint Denis) (Paris 1854).

DENIS, Saint, san de-ne, France, a north ern suburb of Paris and lying within the lines of forts surrounding the capital. It has numer¬ ous manufactories of calicoes and other printed cotton goods, gelatine, candles, saltpetre and soda, and a great annual live stock market, ex¬ tending for a fortnight. In the latter part of the 3d century a chapel was erected on or near the present site to the memory of Saint Dionysius or Denis, who is said to have been martyred here. For this chapel Dagobert I, in the 7th century, substituted a large basilica, in which he himself was interred, and afterward it

was used as the burial place of the kings of France. Changes were made later but under the Abbot Suger the building became most beau¬ tiful. The chapel was destroyed during the Revolution and the bodies of the kings put into a cannon pit. Many of the tombs and relics were, however, preserved in the Musee des Petits Augustins. Napoleon’s decree of 20 Feb. 1806 made Saint Denis again the burial place of the reigning family of France. Louis XVIII obliterated from Saint Denis all traces of Napoleon’s rule; but under Napoleon III the famous architect Viollet-le-Duc effected a mag¬ nificent restoration of the ancient building. The present stained-glass windows are all, with one exception, modern. Pop. 71,549.

DENISON, George Taylor, Canadian soldier: b. Toronto, 31 Aug. 1839. He was edu¬ cated at Upper Canada College and Toronto University, was called to the bar in 1861, and practised law in Toronto, in 1877 being ap¬ pointed police magistrate of the city. In 1872 and 1873 he was sent to England as commis¬ sioner in behalf of immigration. He began his military service in 1855 and was made lieutenant-colonel in 1866; he was in active service in the Fenian raid of 1866 and in the Riel rebellion in the Northwest Territory in 1885. His his¬ tory of Cavalry* (1877) won the first prize of¬ fered by the emperor of Russia for the best book on the subject; he has written also {The National Defenses) (1861) ; (Canada, Is She Prepared for War?* (1861) ; (The Fenian Raid at Fort Erie) (1866) ; (Canada and Her Rela¬ tions to the Empire1* (1895) ; (Soldiering in Canada* (1900) and (The Struggle for Imperial Amity* (1909). He was one of the founders of the (<Canada First** party, and through his contributions to periodical literature and public addresses has been known as an earnest advo¬ cate of Canada's rights and of the preservation of the unity of the empire.

DENISON, Iowa, city, county-seat of Crawford County, on the Boyer River, and on the Chicago and Northwestern and the Illinois Central railroads, about 100 miles west by north of Des Moines. A business college and a nor¬ mal school are situated here. There is a flour¬ ishing trade carried on in grain, flour and live stock, dairy products and general agricultural produce. The city has a hospital, flour mills, refrigerating and ice plant, creameries, *etc.* The water-supply system is owned and operated by the city. In 1849, an Indian massacre took place at Fort Purdy, nearby. Pop. (1920) 3,581.

DENISON, Tex., city of Grayson County, 70 miles northeast of Dallas, on the Missouri, Kansas and Texas, the Texas Central and other railroads. It is of importance as a railroad centre, and contains shops of four systems, also cotton, cottonseed-oil, and flouring mills, creo¬ sote works, handle factory, mattress and felt factory and grain elevators. In 1914, 1,109 per¬ sons were engaged in 30 manufacturing estab¬ lishments, capitalized at $1,052,000; $743,000 was paid in salaries and wages; $1,175,000 worth of materials were used, and the value of the prod¬ ucts was $2,069,000. It is the seat of Saint Xavier Academy and Washington School, and has a government building, public library, city hospital and two parks. The union railroad station is also a noteworthy feature. It was settled and incorporated in 1872, owns its water-DENISON UNIVERSITY — DENMARK

works and has the commission form of gov¬ ernment. Pop. (1920) 17,065.

DENISON UNIVERSITY, an educational institution in Granville, Ohio, founded in 1831, under the auspices of the Baptist Church, and intended at first as a manual training school. The manual training was soon abandoned, and the theological department was dropped in 1870. The Shepardson College for Women, estab¬ lished in 1887, became affiliated with the uni¬ versity in 1900. In 1917 the library contained about 55,000 volumes ; the attendance was 710 students; instructors 55.

DENITRIFICATION. See Nitrification.

DENIZEN, in English law, an alien who by letters patent has been constituted a British subject permanently or for a time. A denizen is in a middle state between an alien and a natural-born or naturalized subject. He may take lands by purchase or devise, or derive a title by descent through his parents or any ancestor though they be aliens. No denizen can sit in Parliament or take office, civil or military. The right of conferring denizenship is within the powers of the king and of Parlia¬ ment, though usually exercised exclusively by the former. In the United States this civil condition is well known in South Carolina, having been created by statute. In natural his¬ tory, an animal or plant originally introduced into a country or district by human agency, which now maintains itself there without the direct aid of man, is called a denizen of that country or district.

DENMARK (Danish, Danmark), northern kingdom of Europe, between lat. 54° 40’ and 57° 45’ N., and long. 8° 4’ and 12° 45’ E. It is composed of a peninsular portion and an extensive archipelago, lying east of it, with a few scattered islands on its west side ; and is bounded north by the Skager Rack, which sep¬ arates it from Norway; northeast and east by the Cattegat and Sound, which separates it from Sweden; east and south by the Baltic; south by the duchy of Schleswig, and west by the German Ocean or North Sea. The penin¬ sular portion is composed of Jutland and meas¬ ures, north to south, 185 miles with a breadth varying from 40 to 108 miles — its broadest part being from Fornses Point, lat. 56° 26′ 42″ N., on the east coast, to Nissum Fiord on the west coast. The numerous islands lying east of Jutland are mainly comprised in two groups: first, that of Sjalland, Seeland or

Zealand, in¬ cluding, besides the large island of that name, the small adjoining islands east of the Great Belt, the principal of which are Amager, Langoe, Taroe, Masnedoe, Agersoe, Lolland or Laaland, Falster and Moen, and second, the Fiinen or Fyen group, comprising, besides the large island of that name, the neighboring is¬ lands west of the Great Belt, including Lange-land, Aeroe, Fanoe, Taasinge and others. Be¬ sides these, there are the outlying islands of Lessoe and Anholt, in the Cattegat, and Born¬ holm in the Baltic.

Besides these territories, Denmark possesses the Faroe Islands and Iceland, in the north Atlantic Ocean; Greenland, in the Arctic re¬ gions.

Copenhagen is the capital, and among the towns of importance are Aarhuus, Odensee and Aalborg.

The following table gives the main divisions of the country, with their area and population, as well as the total area and population of the whole monarchy, according to the latest official enumeration :

Divisions

Area Eng¬ lish sq. m.

Population

City of Copenhagen (Kjobenhavn)

without suburbs .

Islands in the Baltic .

27

5,117

9,898

540

506,390

1,161,163

1,253,809

19,617

Peninsula of Jutland .

Faroe Islands (17 inhabited) .

Total .

15,582

2,940,979

Previous to 1864 the duchies of Schleswig-Holstein and Lauenburg belonged to Denmark, so that the area of the kingdom was then greater by about 7,360 square miles, the cor¬ responding population being more than a million.

Geology and General Aspect. — Denmark is a very lowlying country, there being no eleva¬ tion of any consequence throughout the whole kingdom. The greatest height is attained on the eastern side of the peninsula, though even there it never exceeds 550 feet. In respect of geo¬ logical structure all the rocks belong to the upper series of the Secondary, and to the Ter¬ tiary formation, and have been deposited from water in regular strata. The rock most fully developed is the chalk, of which several dis¬ tinct species have been recognized. The whole west coast is rendered almost uninhabitable by the drift-sand, which has formed an almost uninterrupted line of sterile downs, called Klitten, extending from Cape Skagen to Blaavands Hook, a distance of nearly 200 miles. Along parts of the coast of Jutland are exten¬ sive flats or plains, which have been wrested from the sea, and which are protected from its encroachments by huge dykes, as in Holland.

Rivers, Lakes, Sea-arms, Ports, *etc.* — Denmark has no large rivers ; the principal is the Guden Aa, which is navigable for part of its course. Less important streams are the Holm Aa, the Lonborg Aa and the Stor Aa. All the others are insignificant streams. There are no rivers in any of the islands, but brooks and streamlets abound. There are. a number of lakes, particularly in Jutland, and several in the larger islands ; but they are all small. The most remarkable of the physical features of Den¬ mark are its lagoons or fiords, winding inlets of the sea, that penetrate far into the land. The largest of these is the Lymfiord or Liim Fiord, in Jutland, which entering the land in the Cattegat, winds its way quite through the peninsula and is separated from the North Sea merely by a narrow strip of land which storms have ruptured in one or two places. Most of the streams, lakes and coasts of the kingdom are well stocked with fish. Besides these in¬ land seas, the Great Belt separates the large islands of Seeland and Fiinen and the Little Belt flows between the latter and the coast of Jutland and Schleswig. Denmark is well sup¬ plied with excellent seaports, the most im¬ portant being Copenhagen, Aalborg, Aarthuus and Randers.

Climate. — The prevailing characteristic of the climate of Denmark is humidity; it is also remarkably temperate for so northerly a re-

gion; both the result of the lowness of the land and of its proximity to the sea on all sides. The heats of summer are great, sometimes ex¬ cessive. The mean temperature of the year is 47°. The shortest day is about 6 hours, the longest \7y2 hours. Heavy rains are frequent in autumn, and mists in summer, especially on the west coast of Jutland. The annual rainfall ranges from 21 to 27 inches.

Animal and Vegetable Products. — Horses and cattle are reared in great numbers, and both are excellent. Large flocks of sheep are kept; but rather for the flesh than the wool, which is coarse and short. Swine are also reared to a great extent. Deer, stags, roes, hares and a variety of other game are met with in the royal and other forests, but do not abound anywhere else. Wild fowl — including the eider-duck, so famous for its down — are numerous. Poultry of all kinds are raised, particularly geese. Potatoes, barley, oats, rye, beans, pease, tares, flax, hemp, madder and tobacco are raised; wheat in Laaland and buck¬ wheat in Fiinen. Among the garden fruits are apples, plums, cherries, pears and nuts. Few of the great forests with which the country was once covered now remain. Government, however, has of late years paid some attention to this source of national wealth, and has taken measures for the protection and better management of the forests. The larger forests are now confined to the east side of Jutland and to Seeland.

Agriculture, Cattle-Breeding, *etc.* — Al¬ though not particularly favored by nature, Den¬ mark is yet pre-eminently an agricultural country. Of the total area 80 per cent is pro¬ ductive; about one-sixth of the unproductive area is bog. The land is greatly subdivided, as the law interdicts the union of small farms into larger and encourages the division of landed property. The kinds of grain most largely cul¬ tivated are barley, oats, rye and wheat, the greatest area being occupied by oats, the second by barley. Rye is grown throughout the whole peninsula and in the islands of Fiinen and See¬ land, and some of the islands on the west coast. From this grain the greater part of the bread used in Denmark is made. Wheat, which occu¬ pies but a comparatively small area, is grown chiefly on the islands of Laaland and Lange-land, and on large estates in other quarters of the kingdom. The yearly yield of the cereal crop is said to be larger than that raised by any corresponding European population except that of Mecklenburg. The oats crop of 1917 amounted to 273,270, the barley

crop to 194,660, that of rye to 112,659 and that of wheat to 58,466 tons. Buckwheat is culti¬ vated to some extent in Jutland, as also in the island of Fiinen and elsewhere. Potatoes, which were introduced into Denmark early in the 19th century, are now very generally culti¬ vated. Herbage plants and grass are carefully cultivated. Beans, pease and tares are also ex¬ tensively cultivated throughout the whole country and form an important article of food. Flax, hemp, hops, tobacco, madder, lavender and mustard seed are grown, but not in suffi¬ cient quantities to supply the home demand. The part of the kingdom best adapted for the production of fruit is the island of Fiinen. Cattle-breeding, grazing and the dairy engage the greatest share of the farmer's attention in

Denmark. Large and increasing numbers of cattle are annually exported from the country. A great increase has of late years taken place also in dairy produce, and the export of butter is now the main source of the wealth of Den¬ mark. The rearing of horses is extensively carried on. The old Danish breed is found chiefly in Jutland. Those from the islands are said to be of Tartar descent and are small but strong and active. Sheep-rearing is on the decline in Denmark. Eggs are now largely exported and the rearing of hogs is much attended to ; the greatest number are reared in the vicinity of the woods in East Jutland. The rearing of bees occupies a large share of atten¬ tion, particularly in the island of Fiinen, and wax is largely exported.

Fisheries. — The fisheries are an important branch of national industry. Next to the her¬ ring the turbot, torsk and salmon are the most abundant sorts of fish. Oyster banks occur on the east coast of Jutland, near its northern extremity, and near the island of Lessoe. Fish¬ ponds were at one time very general over the country and were profitable. The seal fisheries of Denmark are considerable. The value of its fisheries in 1916 was $16,053,225.

Manufactures. — These are comparatively insignificant and do not comprise any particular or national manufacture. There are, however, one or two articles which have attained a con¬ siderable reputation ; these are the woolens and earthenware of Jutland, the former a domestic manufacture ; the wooden clocks of Bornholm and a superior kind of stove made in Copen¬ hagen. The manufacture of paper is pretty extensive and has of late years been greatly improved and extended. There are also iron foundries, sugar refineries, some extensive tan¬ neries and many distilleries. Randers in Jut¬ land and

Odensee in the island of Fiinen were formerly celebrated for the manufacture of gloves ; but the peculiar kind of leather from which they were made, and in which their ex¬ cellence consisted, is now prepared in other countries. The people of Denmark bake their own bread, brew their own beer and spin the greatest portion of the woolen yarn afterward knitted into stockings or woven into cloth by the village weaver. The women make up their own dresses and frequently the clothes of their husbands ; the latter make the wooden shoes and slippers and manufacture the greater part of the house furniture and farming utensils. Several of the manufacturing establishments of Denmark belong to the government. Among these establishments are a royal porcelain manufactory in Copenhagen and a royal cloth manufactory in Irsserod, which supplies cloth for the army. According to statistics gathered on 26 May 1914, there are 82,442 industrial fac¬ tories and shops in Denmark, employing alto¬ gether 346,000 persons, of whom 229,000 were skilled workers. Of the total establishments 15,400 used mechanical power. There were 22 distilleries (5 in Copenhagen) whose output of brandy reduced to 100 degrees, amounted to 2,- 989,646 gallons. In 1916 there were produced 297,000 gallons of excisable beer and 348,250,- 000 gallons (small) beer, not excisable. In the same year 137,760 tons of beet sugar were produced at 9 sugar factories and 56,480 tons of margarine in 49 factories.

DENMARK

.

\ ‘ ?

-

«

* }

• . -

,

‘ ‘ - • ‘

… .

♦

,

■

m •* “, r |

.

\

‘ - ‘ • •. -‘4

*

-

.

^ ‘ *

** ■ V ..

-

* V

Commerce, Canals and Railways. — The

commerce of Denmark is carried on chiefly with Great Britain, Germany (especially Schleswig-Holstein), Norway, Sweden, United States and Russia, Great Britain and Germany possessing by far the largest share. The chief imports are textile goods (especially cottons), metals and hardware, wood and articles made of it, coal, bricks, salt, manure, oil, oil-cake, fish, rice, coffee, fruit, glassware, paper. The principal imports are cotton manufactures, coal and iron. Considerable quantities of cotton are imported by Denmark from Germany. The manufactures of Denmark being, as already mentioned, in¬ significant, the articles exported consist chiefly of agricultural products. The declared value of the total imports in 1914 amounted to $220,- 913,330 and that of the exports to $240,957,220. In 1916 the mercantile marine of Denmark con¬ sisted of 3,570 vessels, with a total tonnage of 595,252 tons. The coasting trade is extensive and is largely shared in by foreigners. There are several canals in Denmark, but none of them of any great consequence. There are 2,404 miles of railroads, over half owned by the state, running across the islands of Seeland, Fiinen, Laaland and Falster, which, assisted by ferries, gives direct communication with the capital on the one hand and with Jutland on the other.

Moneys, Weights, *etc.* — Since 1 Jan. 1875 the unit of the Danish monetary system has been the krone or crown, equal to about 26 J4 cents. The krone is divided into 100 ore. The use of the metric system of weights and meas¬ ures became obligatory in Denmark in public offices on 1 April 1910, and generally on 1 April 1912.

People, Education, Religion. — The popula¬ tion of Denmark is composed almost exclusively of Danes, with a few thousand Jews and others. The Danes have regular and well-formed features, fair or brownish hair and blue eyes, with muscular frames; they are kind-hearted, honest and simple-minded, and continue to maintain their ancient reputation of being bold and hardy seamen. All classes are noted for their hospitality, which is indeed a char¬ acteristic of the nation. At the head of the educational institutions stand the University

of Copenhagen and the Holberg Academy at Soroe. Elementary education is widely diffused, al¬ though in this regard Denmark is no longer so pre-eminent as formerly; it is compulsory for children between the ages of 7 and 14 years, and the public schools, maintained by communal rates, are, with the exception of a few middle-class schools, free. Of elementary schools there are 3,446 with 400,000 pupils. There are train¬ ing colleges for teachers, and classical and other higher education is afforded by a large number of colleges in the more important towns, with the University of Copenhagen (1,300 students) for the centre of the entire system. Denmark has also a theological seminary, a royal surgical college, a veterinary and agricultural school, and numerous military, technical and commercial schools, while 71 ((people's high schools® provide instruction in agricultural subjects. There are three public libraries in Copenhagen, of which the Royal Library, with 500,000 volumes, is espe¬ cially rich in Oriental and Icelandic MSS. The established religion is Lutheran, to which the king must belong; but complete toleration is en¬

joyed in every part of the kingdom. The Reformation was introduced in 1536, when the Church revenues were seized by the Crown. Denmark is divided into seven dioceses, in which there are 1,360 parishes. According to the census of 1911 there were 2,732,792 Protes¬ tants, 9,821 Roman Catholics, 256 Greek Cath¬ olics, 5,164 Jews and 9,043 other or of no confession.

Government, Army and Navy, Finance. —

The government of Denmark is a constitutional monarchy, the king being assisted by a cabinet of 10 ministers. The Crown was elective until 1660, when the people and clergy, impelled by hatred toward the nobles, invested the sovereign (Frederick III) with absolute power, and de¬ clared the succession to the throne hereditary. From that time the Crown exercised absolute rule till 1831, when a constitution was granted. This proving unsatisfactory was superseded in 1848 by the form of government which, with some alterations, Denmark now enjoys. The present Constitution of Denmark is founded on the ˆGriindlov® (charter) of 5 June 1915, which was put in force 1 Jan. 1916. According to this new charter, the executive power is vested in the king and his responsible ministers, and the right of making and amending laws in the Rigs¬ dag, or Diet, acting in conjunction with the sov¬ ereign. The king must be a member of the Evangelical Lutheran Church, whjch is declared to be the religion of the state. The

Rigsdag comprises the Folkething and the Landsthing, the former being the popular chamber, the lat¬ ter a senate. The Folkething consists of 140 members returned in direct elections by uni¬ versal suffrage for the term of four years. The franchise is enjoyed by all citizens of good repu¬ tation, male and female (of an age gradually decreasing from 30 years at present to 25), who are not in receipt of poor-relief. All voters are eligible for election to the house. Of the 140 members the capital has to elect 24 by the list system of proportional representation. Outside the capital 92 members are elected in single¬ member constituencies by simple majority, and furthermore 23 additional seats are to be allotted to candidates of those parties who have obtained less than their proportional share. The addi¬ tional seats are to be had by those non-elected candidates having received the most votes. The Lansdthing consists of 72 members. The fran¬ chise is enjoyed by all electors to the Folkething, of 35 years of age, and residing in the electoral district. All former privileges for the largest taxpayers have been abolished by the Griindlov of 1915. The election is indirect and exclusively proportional. Fifty-four of the 72 members are elected by the Andra (Hare) method of pro¬ portional representation in large electoral dis¬ tricts, mostly embracing 10 to 12 members. The remaining 18 members are to be elected on the principle of proportional representation by the members of the outgoing house. Fifty-four members of the Landsthing are reappointed in two sections, each including about 27, and sitting 8 years. Both the members of the Landsthing and of the Folkething receive payment for their services at the rate of 10 kroner ($2.26) per day. Members must accept payment. The Rigsdag must meet every year on the first Tues¬ day in October. To the Folkething all money bills must in the first instance be submitted by the government. The Landsthing, besides its

legislative functions, has the duty of appoint¬ ing from its midst every four years judges who, together with the ordinary members of the Hoiesteret, form the Rigsret, a tribunal to try parliamentary impeachments. The ministers have free access to both of the legislative as¬ semblies, but can only vote in that chamber of which they are members. .

For administrative purposes Denmark is di¬ vided into 18 counties (amter), each of which is administered by a governor (amtmand). Moreover, the county is a municipal division with a county council superintending the rural municipalities (about 1,200). There are 77 ur¬ ban municipalities with a mayor and a town council. Rural as well as urban municipal coun¬ cils are elected direct by universal suffrage. Copenhagen forms a district by itself, and has its own form of administration. The total rev¬ enue in the fiscal year from 1916 to 1917 was $134,388,105 ; and the expenditure $82,633,085. Since the war of 1866, the government has maintained a comparatively large reserve fund to meet any sudden emergency. That fund in 1917 was $3,182,605. The total national debt is $163,634,870, or about $58 per head of the popu¬ lation ; the investments of the state (in tele¬ graphs, etc.) amount to over $301,111,110. The deposits in the Danish savings banks increased from $262,827,000 in 1916 to $298,440,000 in 1917.

The Danish army is a national militia, re¬ sembling in some respects the Swiss army. Every able-bodied Danish subject is liable to serve in the army or navy, except the in¬ habitants of Iceland, and the Faroe Islands. Exemptions in Denmark are few, even clergy¬ men having to serve. Service commences at the age of 20 and lasts for 16 years. For the first 8 the men belong to the active army, and for the second 8 years to the extra, or territorial, reserve. At the time of joining, the recruits are continuously trained for 465 days in the in¬ fantry, 280 days in the field artillery, 1 year in the garrison artillery and 200 days in the cavalry. The engineers have 7 months', and the train 2 months' continuous training. In the case of about one-fourth of the men their initial training is prolonged by periods ranging from 2y2 to 8y> months, according to the arm of the service to which they belong. Subsequent training for all arms only takes place once or twice in the remaining 6 or 7 years of army service, and then only for 25 or 30 days on each occasion. The peace strength of the active army is about

820 officers and 12,900 men. The navy in 1916 had 3 monitors, 15 torpedo boats, 2 small cruisers, 2 minelayers and 6 submarines. Besides these, there is a nominal fleet of war-craft, but this has little or no fighting power. The navy numbers 4,000 officers and men. The military budget for 1916 amounts to $4,902,465, besides allotments for fortifications, *etc.*

History. — The early history of Denmark is lost in the twilight of the saga-period, out of which loom dimly the figures of its heroes, their brave deeds and daring voyages. Within its borders the Celts had first their home, and from its shores the Angles and Saxons sailed in the 5th century to the conquest of England ; while in their place the Danes from Zealand settled on the deserted lands, extending their sway as far south as the Eider. One of their earliest kings, Harald Hildetand, fell in battle against the Swedes in 695; and shortly afterward a branch

of the Ynglinger occupied Jutland, where they held a footing for two centuries. One of their kings, Harald Klak, received baptism in 826 from Ansgar, but the introduction of Christianity did not at once place any check on the long accus¬ tomed inroads on Frankish territory, or on the piratical expeditions of the Vikings; although the country was soon torn by dissensions be¬ tween the adherents of the old and new faiths. Gorm the Old, who drove the Ynglinger from the peninsula, and first united the mainland and islands under one rule, was the bitter enemy of Christianity; and although his death in 936 gave fresh vigor to the diffusion of the new faith, yet even its ultimate success was only ensured by the zealous support it received from Gorm's grandson, Canute. On his death in 1035 the three kingdoms of his Anglo-Scandinavian Em¬ pire separated, and his sister's son, Svend Estridsen (1047-76), ascended the throne of Denmark, founding a princely line that flourished 400 years. Internal dissensions and external wars weakened the country, and the introduction of a feudal system raised up a powerful nobility, and ground down the once free people to a con¬ dition of serfdom. Waldemar I (1157-82) added Riigen to the other Wendish districts of Meck¬ lenburg and Pomeraia, and extended his sway over Norway also. Under Waldemar II the conquests of Denmark extended so far into Ger¬ man and Wendish lands, that the Baltic was little more than an inland Danish sea. The jeal¬ ousy of the German princes and the treachery of his vassals combined to rob him, however, of these brilliant conquests, and his death in 1241 was followed by a century of anarchy and in¬ glorious decadence of the authority of the Crown, during which the kingdom was brought to the brink of annihilation. Under his great-grandson,

Waldemar IV, Denmark made a tran¬ sient recovery of the conquests of the older Waldemars, rousing the jealousy of the Hanse¬ atic League, and the national laws were codified. From his death in 1375 to 1412, his daughter, the great Margaret, widow of Haakon VI of Nor¬ way, ruled not only that country and Denmark, but in course of time Sweden also, with so light yet firm a hand that for once in the course of their history the three rival Scandinavian king¬ doms were content to act in harmony. Mar¬ garet's successor, Eric, the son of her niece, for whose sake she had striven to give permanence, by the act known as the Union of Calmar (1397), to the amalgamation of the three sovereignities into one, undid her glorious work with fatal rapidity, lost the allegiance and the crowns of his triple kingdom, and ended his disastrous existence in misery and obscurity. After the short reign of his nephew, Chris¬ topher of Bavaria (1440-48), the Danes ex¬ erted their ancient right of election to the throne, and chose for their king Christian of Oldenburg, a_ descendant of the old royal fam¬ ily through his maternal ancestress, Rikissa, the great-granddaughter of Waldemar II. Chris¬ tian I (1448-81), who was at the same time elected Duke of Schleswig and Holstein, was the founder of the Oldenburg line, which con¬ tinued unbroken till the death of Frederick VII in 1863. His reign was followed by half a cen¬ tury of international struggles in Scandinavia. The insane tyranny of Christian II cost that monarch his throne and freedom; the Danes chose his uncle Frederick I to be their king,

while Sweden was forever separated from Den¬ mark and rose under the Vasas to be a power¬ ful state. See Gustavus I.

Under Christian III (1536-59), the Reforma¬ tion was established in Denmark. Christian IV after his brief share in the Thirty Years' War proved one of the ablest of all the Danish rulers. His liberal and wise policy was, however, cramped in every direction by the arrogant nobles, to whose treasonable supineness Den¬ mark owes the reverse by which she lost (1658) all the possessions she had hitherto retained in Sweden ; and with the relinquishment of these, and consequently of the undivided control of the passage of the Sound, the country's former in¬ ternational importance came finally to an end. The national disgraces and abasement which fol¬ lowed led, in 1660, under Christian's son, Fred¬ erick III, to the rising of the people against the nobles, and their surrender into the hands of the king of the supreme power. For the next hun¬ dred years, chiefly marked by wars with Sweden, the peasantry were kept in serfdom, and the middle classes depressed ; but by the end of the 18th century the peasants had been gradually emancipated, while many improvements had been effected in the mode of administering the laws, and the Danish kings, although autocrats, exercised a mild rule. The miseries of the reign of Frederick VI, who governed as regent from 1784, brought the country to the verge of ruin. Denmark having joined Russia in a com¬ pact of the northern powers hostile to England, a fleet was sent into the Baltic and considerable injuries were inflicted by an attack on Copen¬ hagen, in 1801, under Parker and Nelson. From this the country rallied; but in 1807 the British government, suspicious of an intention on the regent's part to violate his neutrality and take sides with Napoleon, demanded the surrender of the entire Danish navy, to be restored at the conclusion of peace. A refusal was followed by the bombardment of Copenhagen in Sep¬ tember 1807, and the fleet was given up ; but this treatment drove Denmark into Napoleon's arms and with him the kingdom was obliged to co-operate until the close of 1813.

By the Congress of Vienna, Denmark was compelled to cede Norway

to Sweden. From this period a spirit of discontent grew up in the duchies, degenerating into mutual animosity be¬ tween the Danish and German population, which led to an open rupture with Denmark in 1848, immediately after the accession of Frederick VII. (For the whole question, see Schleswig-Holstein). After alternate hostilities and armis¬ tices, the war was virtually concluded in 1850, by the victory of the Danes at Idsted; but in 1863 the quarrel was renewed. On the death of Frederick in that year, Prince Christian of Schleswig-Holstein-Gliicksborg ascended the throne under the title of Christian IX, in con¬ formity with the act known as the Treaty of London of 1852, by which the succession to the Danish crown had been settled on him and his descendants by his wife, Princess Louise of Hesse-Cassel, niece of King Christian VIII of Denmark. A pretender, backed by German in¬ fluence and help, at once started up in the person of the eldest son of the Duke of Augustenborg, who assumed the title of Duke Frederick VIII of Schleswig-Holstein ; but his cause was speedily merged and lost sight of by Prussia and Austria in their direct aim of incorporating

the duchies with the German Confederation. Denmark, unaided by England and France, allies on whose support she had relied, was forced to go single-handed into the unequal contest. After a brave but utterly futile attempt at resistance, the Danes found themselves forced to submit to the terms dictated by their powerful foes, and resign not only Laurenburg and Holstein, but the ancient Crown-appanage of Schleswig. By the peace of Vienna 1864, the Danish king bound himself to abide by the decision which Prussia and Austria should adopt in regard to the destiny of the severed Danish provinces. The dissensions between these two great powers, which led to the Austro-Prussian War of 1866, resulted in the triumph of Prussia, and since then the duchies have remained an integral part of that state. Since the war, Denmark, although reduced to the narrow limits of the islands and Jutland, has recovered from its fall, and has greatly prospered, in spite of the spread of socialistic opinions, and the political dissensions that have ranged the government and Land's-thing, supported by the press of the capital, against the Folkething and majority of the people.

In 1870 war broke out between Germany and France and an alliance was formed be¬ tween France and Denmark, with a view to the protection of the latter from German ag¬ gression. The result of the war was the downfall of the French Empire; this treaty was dissolved, and Denmark felt that her safety lay in a strict neutrality. Yet the re¬ sentment of the country toward Germany was by no means allayed,

and the general popula¬ tion were indignant that so many leading politi¬ cians were anxious to draw closer the lines that bound Germany and Denmark together. This indignation frequently broke out into such violent manifestations that at least it became evident that anything like a close alliance and understanding between the two states seemed impossible.

The 5th article of the treaty made between Austria and Prussia (23 Aug. 1866) had given to Denmark some prospect of recovering the northern districts of Holstein. There arose, however, considerable discussion with Prus¬ sia about the realization of this hope, and Prussia seemed reluctant to give any guaran¬ tee for the restoration of the territory. So long as the Emperor Napoleon was in power, this article, which he had not only suggested, but had maintained and advocated, the hope of Denmark for the surrender of North Schles¬ wig appeared reasonable. After the catas¬ trophe of Sedan (1870) this hope was for¬ ever abandoned. The French Republic took no interest in Schleswig, Italy was equally in¬ different, England was occupied in other mat¬ ters and had learned in the Crimea to shun all meddling with other people's quarrels. The rage of the Danes was roused in 1879 on learning that Germany was discussing with Austria the abolition of Article 5 in the treaty, and even the Danish court, by the marriage of the Princess Thyra, in 1878, with the Duke of Cumberland, whose dislike for the Germans was well known, had shared, by anticipation, in this expression of feeling. This national senti¬ ment of the Danes took almost a warlike char¬ acter. In the Rigsdag, 1873, legislative meas¬ ures were proposed for the reorganization of

the land and sea forces and the fortification of Copenhagen. The ruling party in the Folkething strongly advocated an increase in the army and navy, and an improvement in the coast fortifications ; this was advisable as a demonstration of power which would be of effect in the case of war between other nations, but would also secure Denmark against the en¬ croachments of Germany. The representatives of rural constituencies or Agrarians, however, together with the Radicals, were opposed to an active policy on the part of Denmark. The Conservatives, vdth the sympathy of King Christian, were for warlike preparations, by the increased national defenses.

In 1874 the Liberal party, under Fonnes-bech, succeeded Holstein-Holsteinborg's Con¬ servative Cabinet, which had been in power since 1870, but even the Liberals failed to overcome the opposition which the Folkething persisted in showing to the proposed expenditure on the military and naval forces. The king therefore called into office a minis¬ try of a purely bureaucratic character, which he had counseled Estrup to appoint. Jacob Bronnum Estrup was a remarkable man. When he took his seat in the Landsthing in 1864, he appeared as leader of the Agrarians, and showed both power and patriotism in his political career, and did much for the advancement of Danish constitutionalism. His desire always was to render Denmark's place among the Powers secure and inde¬ pendent, to develop its resources, and espe¬ cially to secure for his country adequate pro¬ tection in the carrying trade of the world's commerce. The king had found in him a man ready to carry out his wise designs for the little realm. In 1866 he had been a lead¬ ing spirit in the revision of the constitutional code of Denmark, and he strongly advocated the view of the Conservatives that the Folkething, or lower house of the Rigsdag, had not, like the English House of Commons, the sole right to make appropriations from the public treasury. The Radicals of the Folkething, however, claimed supremacy in all mat¬ ters of taxation and finance, and formed the Left in that assembly. On the other hand, the king and Landsthing, or upper house, according to the Conservatives, had constitutionally the right of overruling the Folkething. Estrup was on the side of those who would not trust the lower house with the sole control of the ex¬ chequer. The government, he maintained, was threefold, — king, Landsthing and Folkething; where any two of them were united against the third, the majority ought to be paramount in deciding the issue. From the time Estrup was appointed Minister of

Finance and president of the Council, the clash of parties increased day by day; Estrup again and again brought forth his measures of warlike preparation ; again and again were they defeated. In the Folkething the opposition majority increased with every division. In 1876 this party had 74 members as against 27 supporters of the govern¬ ment. It threw out the budget of Estrup, and the government was compelled to beat a re¬ treat, although the fortification of Copenhagen went forward. This brought about a crisis in political affairs and also led to a new develop¬ ment in the constitution. Estrup stood his ground and was supported by the press as well

as by the public opinion of the capital. He maintained that, according to the parliamentary system of Denmark, he had it in his power to propose a provisional finance measure ; that such a measure could be carried by the Lands¬ thing, the upper house, which controlled the Folkething. The measure was carrried with the approval of the king, and the fortifications at Copenhagen were on their way to be com¬ pleted. In 1880 two measures were passed for the increase of the army and navy. The op¬ position thereupon began what was known as the ((Verdorrungspolitik,® <(The policy .of blight,® i.e., obstruction. Not only did they oppose the finance measures of the government, but every measure, of whatever kind, proposed by Estrup's party and sanctioned by the Lands¬ thing, they threw, out. But the king and the ministry remained firm, and were supported by a large majority of the population of the coun¬ try. The fortification of Copenhagen was com¬ pleted with the assistance of volunteer con¬ tributions to the amount of $253,333.33. The financial prosperity of the country was evi¬ dent. The appropriation made for land de¬ fenses amounted to $10,033,333.33 ; the de¬ partment of railways had expended $17,733,- 333.33. There was still a large balance in the treasury. The history of Denmark from that time is a history of parliamentary struggle. The Moderates of the Left could not keep pace with the violence of the Radicals, and in 1891 an actual rupture took place. The Moder¬ ates desisted altogether from the <(policy of blight,® or obstruction, and drew nearer and nearer to the Conservatives. The consequence was that the Radicals lost their supremacy in the Rigsdag, and in the elections of April 1892 forfeited many seats. The opening speech of the Prime Minister in the Folkething (1892) outlined a policy which was not long in being carried out. The Moderate Lefts supported a measure for land defenses; the fortifications projected were quickly finished, and the triumph of the Conservatives was complete. This was shortly before the resignation of Estrup in 1894. But the fluctuations of parliamentary life in Denmark

were not yet complete. The dispute indeed seemed interminable. The Landsthing and the ministry stood on one side, a majority of the Folkething on the other. This majority in the lower house gradually completed the rupture which had been threatened during the debates on land defenses, and seemed at last rent asunder permanently into Radicals and Moderates. In August 1899 M. Horring became Premier. The Radicals had been gathering strength since the retire¬ ment of Estrup and the absence of his firm hand and clear judgment had imperiled the tranquillity of the political voyage in Denmark. In 1900, however, the new Conservatives rallied their strength, and a Cabinet was formed by one of their number, M. Sehosted, who, after a stormy experience, resigned m 1902, when the Radicals won an overwhelming victory at the polls and a Radical administration, under Pro¬ fessor Deuntzer, came into power. After the elections of 1915 the Landsthing contained 5 Free Conservatives, 22 Right (Conservatives), 26 Left, 6 Radicals and 4 Socialists. The Folke¬ thing, elected May 1915, contained 42 Left, 27 Radical Left, 32 Socialists, 8 Right (Conserva¬ tives), and 5 Independents. On 29 Jan. 1906

the aged Christian IX died. He was succeeded by his son Frederick VIII, whose second son Charles had been elected in the preceding year to the throne of Norway as Haakon VII. On 14 May 1912, Frederick died suddenly in Ham¬ burg, while traveling incognito, and the body remained unidentified for some time in the public morgue. His son succeeded as Chris¬ tian X. In the year following his accession he was shorn of some of his powers by the Folkething, which in the same session granted suf¬ frage to women.

The prosperity of Denmark has greatly ad¬ vanced since its dismemberment in 1864, and the increase in its trade has been remarkable. In 1915 the merchant steam fleet included 3,564 vessels of 589,873 registered tons. These form a part of the great tramp fleet that plies be¬ tween Europe and America. The trade be¬ tween Denmark and the United States has especially shown a healthy growth, the imports from the United States to Denmark for 1914 being

$21,073,000, while the United States im¬ ported from that country goods to the value of $2,915,250. This growth of trade between the two countries has been rapid, for the route from Copenhagen to Newport News and Nor¬ folk, Va., was only opened up in 1898. The six Danish steamers engaged on this route also run to New Orleans and carry American goods to all the principal Baltic ports. The New York route has several large steamers built since 1898. The Danes emigrate in considerable numbers to the United States and generally set¬ tle in the agricultural districts of the West, notably in Illinois. Returns for 1914 give 6,262 as the extent of Danish immigration to the United States. Agriculture has been developed in the peninsula to a remarkable degree dur¬ ing the past few years, and dairy produce manufactured with the aid of steam machinery has shown a proportionate increase. There are about 900 steam dairies in Denmark. The sani¬ tary precautions taken by government in the in¬ spection of cattle are more thorough perhaps than anywhere else in the world.

The Danish West Indian possessions have recently become territories of the United States. These comprise Saint Croix, the largest of the Virgin Islands, Saint Thomas, a smaller island further south, and Saint John, to the east of Saint Thomas. Their united area is 118 square miles. The proximity of these islands to Porto Rico and their importance as stations in the trade routes of the Caribbean Sea adds to their desirability as United States possessions. There was expressed for many years a willingness by Denmark to transfer these islands, and the question was brought up afresh in 1902, when a treaty, providing for the sale of the Danish West Indies to the United States for $5,000,000, was signed at Washington by President Roose¬ velt, 14 January, and ratified by the Senate, 17 February. This was considered to have settled the question finally, but 23 April of the same year the Danish Landsthing passed a reso]utio»i postponing a decision as to the sale, until the electors qualified to send members to the Colonial Council should be consulted. The sale was not to be ratified until these electors should approve the cession. The Folkething went even further than this, and refused to ratify the sale, unless the inhabitants of the islands, who are mostly free negroes engaged in the cultiva¬

tion of the sugar cane and number 35,156, de¬ clared in favor of the transfer by a plebiscite. The matter was thus naturally referred once more to the Landsthing, and when the matter came before that body (22 October) their de¬ cision was regarded as adverse to the bill. As the Premier reminded the Council, it would be necessary to put out

more capital in the islands unless they were sold, and accordingly the West Indian Co., with a capital of $1,000,000, was formed at Copenhagen three days after the de¬ cision of the Landsthing. Trade between Den¬ mark and these three islands had been steadily decreasing for some years, and the Danish gov¬ ernment in 1902 appointed a commission to pro¬ ceed to the islands and report on measures for improving their commercial condition. In Feb. 1917 Congress of the United States appropriated $25,000,000 for the purchase of the islands and fixed the form of government. The formal transfer of the islands took place a few weeks later. See Danish Language; Danish Litera¬ ture; Virgin Islands.

Bibliography. — Baedeker, K., (Norway, Sweden and Denmark (10th ed., London 1912) ; Both (Kongeriget Danmark, en historisk-topographisk Beskrioelse) (2 vols., Copenhagen 1882-85) ; Brochner, J., (Danish Life in Town and Country) (London 1903) ; Christensen, W., (Dansk Statsforvaltning i det 15 Aarhundrede) (Copenhagen 1904) ; Cousange, Jacques de, (La Scandinavie) (Paris 1914) ; (Danmarks Riges Historie) (Copenhagen 1896) ; Drachmann, Pori, (The Industrial Development and Com¬ mercial Policies of the Three Scandinavian Countries) (Oxford 1915) ; Gallenga, A., (The Invasion of Denmark in 1864) (2 vols., London 1864); Harvey, W. J., and Reppien, C., Den¬ mark and the Danes* (ib. 1915) ; De Lannoy, C., and Van der Linden, H., (Histoire de l'Expansion coloniale des peuples europeens* (Vol. II, Netherlands and Denmark (Brussels 1911) ; Otte, E. C., (Denmark and Iceland) (London 1881); Sellers, Edith, (Danish Poor Relief System* (London 1904) ; Sidgwick, C. S., (The Story of Denmark) (London 1890) ; Starcke, Olrik, and Carlsen, (Le Danemark) (Paris 1900) ; Stefansson, Jon., (Denmark and Sweden* (Lon¬ don 1916) ; Thomas, Margaret, (Denmark Past and Present* (London 1902) ; Weitemeyer, H., (Danemark: Geschichte und Beschreibung) (London 1891) ; (Kongelig Dansk Hof og Stats-kalender* (Annual Copenhagen).

John B. McDonnell, Editorial Staff of The Americana.

DENNER, Balthazar, German portrait painter: b. Altona, 15 Nov. 1685; d. Rostock, 14 April 1749. He was painter to several courts, executing portraits of princes and dig¬ nitaries, and was noted for his extraordinary minuteness of finish. Among his works are (Head of an Old Woman> ; for which Charles VI paid 4,700 florins; and (Head of an Old Man,* both in the Vienna Museum; and many canvasses in other famous galleries.

D'ENNERY, Adolphe Phillipe. See

Ennery, Adolphe Phillipe de.

DENNEWITZ, den'ne-vits, Germany, vil¬ lage in the province of Brandenburg, Prussia, famous for the battle between the French and Prussians, 6 Sept. 1813, the former commanded by Ney (under whom were Oudinot, Bertrand, Reynier and Arrighi), the latter by Tauenzien

and Billow. Forty thousand Prussians main¬ tained their ground for several hours against 80,000 French; and on the arrival of the Rus¬ sian and Swedish battalions victory declared in favor of the allies, who, after the Russians and Swedes came up, were far superior in num¬ bers. The French were defeated, and fled in dis¬ order, leaving behind them on the field of battle 15,000 in killed, wounded and prisoners and 43 pieces of ordnance. The allied, mostly Prussian, losses totaled about 9,000. A point well deserving of notice in connection with this victory was the fact that it was due to the valor of the Landwehr (militia) troops, whose fighting qualities Napoleon had disdained.

DENNEY, James, Scotch theologian of the United Free Church: b. at Paisley, 5 Feb. 1856. He received his M.A. at the University of Glasgow in 1879, and his B.D. from the Free Church College of Glasgow in 1883. He was minister of East Free Church, Broughty Ferry, 1886-97. Since 1897 he has been professor of New Testament language, literature and theology in the United Free Church College of Glasgow. He is the author of (The Epistle to the Thessalonians5 (1892) ; and (The* Second Epistle to the Corinthians5 (1894, both in*(The Expositor's Bible5); (Studies in Theology0 (1895) ; (The Epistle to the Romans) (in (The Expositor's Greek Testament, > 1900) ; (The

Death of Christ5 (1902) ; (The Atonement and the Modern Mind5 (1903) ; (Jesus and the GospeP (1908) ; (The Way Everlasting) (1911) ; (War and the Fear of God5 (1916).

DENNEY, Joseph Villiers, American edu¬ cator : b. Aurora, Ill., 9 Jan. 1862. He was graduated at the University of Michigan in 1885, and

afterward studied law, taught for a year at the University of Michigan and from 1891 to 1894 was associate professor and from 1894 to 1904 professor of rhetoric at the Ohio State University. In 1908 and in 1911 he lectured at Columbia University. He is author of (Burke's Conciliation Speech5 (1898); (Macaulay's Warren Hastings5 (1907);

(American Public Addresses5 (1909) ; (Four Idylls of the King5 (1911) ; (Washington,

Webster, Lincoln5 (1911); Argumentation and Debate5 (1911); and in collaboration with Fred N. Scott (Paragraph Writing5 (1893) ;

(Composition-Rhetoric5 (1897) ; (Elementary English Composition5 (1900); Composition Literature5 (1902) ; also with Charles H. John¬ ston (High School Education5 (1912) ; with S. B. Tobey, (An English Grammar5 (1913), and contributions to the educational press on lan¬ guage training and rhetorical theory.

DENNIS, John, English dramatist and critic: b. London 1657; d. 6 Jan. 1734. In 1697 he produced a comedy entitled dot and No Plot,5 which was followed by several dramatic pieces and poems of little value. He also be¬ came a political writer for the Whig party. The irritability of his disposition, heightened probably by the unprosperous state of his finances, involved him in perpetual broils, and made him a sort of standing jest with the wits of his time. He wrote some severe strictures on Addison's (Cato5 and Pope's (Rape of the Lock.5 Pope in return gave him a place in the (Dunciad,5 and in conjunction with Swift produced a sarcastic tract entitled (A Narra¬ tive of the Deplorable Frenzy of Mr. John

Dennis.5 In his old age his necessities were re¬ lieved by a benefit at the Haymarket Theatre, to which his former antagonist, Pope, con¬ tributed a prologue. The most important of his critical essays is his Advancement and Reformation of Modern Poetry5 (1701). Con¬ sult Paul, H. G., (John Dennis: His Life and Criticism.5

DENNIS, Louis Munroe, American chem¬ ist: b. Chicago, 26 May 1863. In 1885 he was graduated from the University of Michigan, and afterward studied at Munich, Dresden and Wiesbaden. From 1887 to 1889 he was in¬ structor, 1891-93 assistant professor and after 1900 professor of inorganic and analytical chemistry at Cornell University. He is head of the department of chemistry since 1903. He has published (Chemical Problems in Inorganic Chemistry5 (1890) ;

(Elemeritary Chemistry5 (1902), with Frank W. Clarke; laboratory Manual of Elementary Chemistry5 (1902), with same; (Manual of Qualitative Analysis5 (1902), with Theodore Whittlesey; (Gas Analysis5 (1913). He is translator of Walther Hempel's (Methods of Gas Analysis5 (1902), and con¬ tributes frequently to American and German chemical journals.

DENNIS, William Cullen, American law¬ yer: b. Richmond, Ind., 22 Dec. 1878. He was graduated at Earlham College in 1896,and from Harvard Law School in 1901. In 1902-04 he was assistant professor of law at the University of Illinois, at Stanford University 1904—05, at Columbia 1905-06 and professo'r of law at George Washington University 1906-09. From 1906 to 1910 he was assistant solicitor of the Department of State. In 1909-10 he was United States agent before The Hague Tribunal in the United States-Venezuela arbitration case ; he was again agent of the United States in the Chamizal case with Mexico before the Inter¬ national Boundary Commission 1910-11, and was secretary to Chief Justice White in the Costa Rica-Panama Boundary Arbitration 1911-14, and engaged in private practice at Washington after 1911.

DENNISON, Walter, American educator: b. Saline, Mich., 9 Aug. 1869; d. 18 March 1917. Graduated at the University of Michigan in 1893, in 1894—95 he studied at Bonn University. He was instructor in Latin in the University of Michigan in 1897-99, professor of Latin and Roman archaeology at Oberlin College 1899-1902, and junior professor of Latin at the Uni¬ versity of Michigan 1902-10, and since 1910 professor of Greek and Latin at Swarthmore College. In 1908-09 he was professor of Latin at the American School of Classical Studies at Rome. He wrote A Junior Latin Book,5 with John C. Rolfe (1898) ; and he also edited (Livy, Book I and Selections, from Books II-X5 (1908). He revised (Kelsey's Topical Out¬ line of Latin Literature5 (1899) and (Frieze's Virgil's 2Eneid5 (1902).

DENNISON, William, American states¬ man : b. Cincinnati, Ohio, 23 Nov. 1815; d. Columbus, Ohio, 15 June 1882. He was gradu¬ ated at Miami in 1835 and became a lawyer, being elected to the Ohio legislature in 1848. He became governor of Ohio in 1860, and ren¬ dered invaluable aid to the Union cause through¬ out the Civil War. President Lincoln ap¬ pointed him postmaster-general in 1864, an office

he retained under President Johnson, resigning in 1866. Dennison College owes much to his liberality.

DENNISON, Ohio, village in Tuscarawas County, 100 miles northeast of Columbus, on the Pittsburgh, Cincinnati, Chicago and Saint Louis Railroad, and on the Panhandle Ohio Canal. It contains a public library and a hospital and has sewer-pipe works and railroad shops. The government, under the Ohio law of 1902, is ad¬ ministered by a mayor and council. Pop. 5,524.

DENNY, George Hutcheson, American educator : b. Hanover County, Va., 3 Dec. 1870. He was graduated at Hampden-Sidney College in 1891. He taught at Pantops Academy, Charlottesville, 1892-96 and from 1896 to 1899 was professor of Latin and German at Hamp¬ den-Sidney College. He came to Washington and Lee University as professor of Latin in 1899, became acting president in 1901, and was president from 1902 to 1911 when he was made president of the University of Alabama. He is chairman of the Rhodes Scholarship Committee for Alabama and president of the Alabama State Board of Arbitration since 1912. He has received the following honorary degrees Ph.D. from the University of Virginia 1896, and LL.D. from Furman University 1903, Washington Col¬ lege 1905, Tulane 1912, Washington and Lee 1913 and D.C.L. from the University of the South in 1914. He wrote (The Subjunctive Sequence After Adjective and Substantive Predicates and Phrases > (18%). He contrib¬ uted to the (Library of Southern Literature) on the South in the (Building of the Nation. }

DENON, de-noii, Dominique Vivant,

Baron de, French artist, diplomatist and author: b. Chalons-sur-Saone, 4 Feb. 1747; d. Paris, 27 April 1825. He studied law and drawing with Halle. He was attached to embassies at Petrograd, Switzerland and Naples, successively. At Ferney, Switzerland, he painted the portrait of Voltaire and drew the well-known picture (Dejeuner de Ferney. J At Naples he took ad¬ vantage of the opportunity to collect old masters and make portraits ; and with the Abbe Saint-Non wrote (Voyage pittoresque de Naples et de Sicilie) (1788)). Becoming acquainted with Bonaparte, he accompanied the general in his campaigns to Italy

and Egypt, and Desaix to Upper Egypt. The work which was the result of his journey, (Voyage dans la Basse et la Haute Egypte,' was issued in 1802. When he returned to Paris with Bonaparte he was appointed in¬ spector-general of the museums and all the works of art executed in honor of the French successes — 'monuments, coins, the erection of the triumphal pillar in the Place de Vendome, *etc.* He accompanied Napoleon in all his cam¬ paigns, and employed himself in drawing and in selecting those masterpieces in the conquered countries, which were taken to Paris as trophies. After the abdication of the emperor he retained his office, but was deprived of it in 1815, in consequence of having joined Napoleon on his return from Elba. He retained, however, his place in the institute. From that time he lived retired, and the preparation of engravings and lithographs of his splendid collection of works of art formed the occupation of his last years. In 1826 appeared at Paris the (Description des objects d'art composant le cabinet de feu M. le Bar. V. DenonP In 1872-73 his etchings

were published with an introduction by La Frizelere.

DENS, Petrus, author of a manual of Catholic theology: b. Boom, Belgium, 1690; d. Mechlin, 15 Feb. 1775. He is noteworthy only as the reputed author of a manual textbook of Catholic theology, (Theologia Moralis et Dogmatica) (Moral and Dogmatic Theology). His work was published under his name by the pro¬ fessors of Mechlin and probably contained much of Dens' teaching. It is still used, with modifications, by the professors of Mechlin. He was a professor in the diocesan seminary of Mechlin and during 40 years was president of the institution. He was also honored with sev¬ eral offices of importance in the diocese of Mechlin — pastor of the metropolitan church there, president of the seminary, canon peni¬ tentiary, synodical examiner and archpriest of the chapter. He wrote treatises on penance, on the virtue of religion and several tracts.

DENSITY, a term denoting the mass per unit of volume in a body. (See Specific Gravity). The density of the earth has been de¬ termined as about 5.527. See Gravitation.

DENT, Frederick Tracy, American soldier: b. White Haven, Mo., 17 Dec. 1820; d. Denver, Col., 24 Dec. 1892. He was graduated from the United States Military Academy at West Point in 1843 and served in the Mexican War, being engaged in the siege of Vera Cruz and the bat¬ tles of Churubusco and Molino del Rey. He took part in the Yakima expedition (1856), in the Spokane expedition and in the Snake

River expedition (1860). During the Civil War he commanded a regiment in the Army of the Potomac in 1863; was stationed in New York in September 1863, where riots were feared, and was Grant's aide-de-camp throughout the Rich¬ mond campaign. He was secretary to President Grant during his first administration. He re¬ tired from active service in 1881 with the rank of brigadier-general in the regular army.

DENT, John Charles, Canadian author: b. England 1841 ; d. 1888. He came to Canada in early life and was called to the bar of Upper Canada. Returning to England, he engaged in journalism; afterward pursued that vocation in Boston, Mass., and in 1870 joined the staff of the Toronto Globe. He was the author of (Canadian Portraits* (1880) ; (Last Forty Years) (1881) ; (Upper Canada Rebellion)

(1885).

DENTAL CORPS, a branch of the United States Army established by the act of 3 March 1911. It consists of dental surgeons and acting dental surgeons, in all not more than one to each 1,000 enlisted men in the army. The num¬ ber of dental surgeons is limited to 60. Acting dental surgeons have a status similar to that of contract surgeons (q.v.). They must be gradu¬ ates of a standard dental school and are ap¬ pointed by the Surgeon-general after a physical examination of the same standard as that re¬ quired for a commission in the medical corps of the army and a mental examination involv¬ ing oral and written questions and clinical work. The dental surgeons, who rank as first lieu¬ tenants, are appointed from among those acting dental surgeons who have served for three years with a clear record. The physical exam¬ ination is given over again, and a new profes-688

sional examination, consisting of a written and a practical part, must be passed. Officers of the Dental Corps rank next below officers of the Medical Reserve Corps, and their right of com¬ mand is limited to the Dental Corps.

DENTAL FORMULA. See Teeth.

DENTALIUM, a genus of mollusks of the class Scapliopoda, the shell of which, about two inches long, is shaped like an elephant's tusk. These mollusks, called tooth-shells, bury them¬ selves uprightly in the sand, and capture their food, which mainly consists of foraminifers, by means of their tentacles. Several species are known in various parts of the world, one of which, common on the northwest coast of America, was valued by the Indians as an orna¬ ment for clothing, and strings of it served as money among them. This shell, when used as money by the Indians, was called hiqua, and the shell is often called hiqua-shell.

DENTARIA, pepper-root, a genus of plants of the natural order Cruciferce. There are about 15 species, natives of temperate countries, of which 11 are found in America. They are ornamental herbs, with creeping singularly toothed rootstocks, from which they receive the names of pepper-root and toothwort. The stem-leaves are opposite or in whorls of three and the flowers are white or pink. The Ameri¬ can species extend from Nova Scotia to Florida and west to Minnesota and Louisiana. The best-known is the pepper-root, crinkle-root or toothwort (D . laciniata) . The common names refer to the pungent and tooth-like divisions of the root, which is, in some localities, ground and used like horseradish.

DENTATUS, Manius, or Marcus, Curius,

Roman statesman, flourished in the first half of the 3d century b.c. His first office was tri¬ bune of the people, in which he distinguished himself by his opposition to Appius Claudius Caecus, who, in defiance of law, refused to accept any votes for plebeian candidates. In 290 b.c. he was consul with P. Cornelius Rufinus, and by his decisive victories over the Samnites terminated a war which had lasted for 49 years. He then marched against the Sabines and was again successful in restoring them to the Roman protectorate. In 283 b.c. he became praetor and in 275 b.c. he was again consul, and near Beneventum defeated King Pyrrhus. The triumph which followed was one of the most magnificent which had ever been witnessed. In 274 b.c. he was a third time consul, and after terminating the war with the Lucanians, Samnites and Bruftians, retired to his Sabine farm and spent the remainder of his life in cultivating it. In 272 he became censor, and in that year he built an aqueduct, the Aniensis Veto, which carried the water from the river Anio. He was noted for his great simplicity and frugality as well as for his mili¬ tary and executive achievements.

DENTEX, a genus of acanthopterous fishes near the perches. One species (D . vulgaris), the Dcntex of the ancient Romans, abounds in the Mediterranean, and has occasionally been taken on the southern

shores of Great Britain. It is voracious, and has large, sharp teeth. It is sometimes seen three feet in length and 20 to 30 pounds in weight. Great numbers are taken in the mouths of rivers in Dalmatia and the Levant, where they are cut in pieces and packed

in barrels with vinegar and spices, just as the ancients used to treat them.

DENTIFRICE (Lat. dentifricium, a tooth-powder, dens, tooth, fricare, to rub), any prep¬ aration, liquid or powder, for the purpose of cleaning the teeth. Chalk, precipitated, is gen¬ erally the base of most of the dentrifrices on the market. For detergents, charcoal, cuttlefish-bone or pumice are sometimes incorporated with the milder principle. Bleaching salts and acids find their way in many market preparations, constituting a grave danger to the tooth struc¬ ture. Astringency is acquired by using catechu, cinchona and rhatany; myrrh gives odor; pep¬ permint is used to make the taste pleasant ; bole armeniac to color the pastes. A few drops of any of the standard antiseptics added to water will often prove an efficient cleanser aided by the friction of the brush.

DENTILS, in architecture, the little cubes or small squarish blocks resembling teeth, into which the square member in the bed-molding of an Ionic Corinthian, composite and occasionally a Roman Doric cornice is divided. Their breadth should be half their height and the metoche (interval) between them two-thirds of their breadth.

DENTIN, or DENTINE, den’tm, the bone¬ like structure constituting the body of a tooth, which in the crown portion is covered by enamel and in the root portion by the crusta petrosa or cementum. See Teeth.

DENTISTRY. Dentistry may be defined as being a special department of the science and art of healing; embracing a knowledge of the structure, physiology and pathology, and the therapeutic, surgical and mechanical treatment of the tissues of the mouth and its contained organs, also a knowledge of the materials used and their manipulation in the restoration of the dental and oral structures. The early history of dentistry is so closely interwoven with that of medical science that it is impossible to dis¬ tinguish it from its mother science. The ‘Baby¬ lonians, Egyptians, Assyrians, Hebrews, Hindus, Greeks and Romans were the early cultured in¬ habitants of whom historical records exist. The recent excavations in Babylon have brought to light some interesting facts concerning the practice of dentistry under King

Hammurabi, at about 2250 b.c. The law stated that ((if one knocks out a tooth of one of his caste, his own tooth shall be knocked out, while, if it is the tooth of a freeman, he pays one-half mine silver.® The Egyptian medical history is principally recorded in the various papyri, es¬ pecially those deciphered by Ebers and Brugsch, which probably cover the period of 3700 to 1500 b.c. The Egyptian physicians were largely specialists, and it is very probable that some were selected to look after the welfare of the teeth. Most of the dental remedies found in the papyri consist of pastes, powders, plasters, decoctions, etc., in which Saint John's bread, sage seed, honey and some unknown plants play important parts. The treating of abscesses, caries and loose teeth seems to have been known. The Hindus were apparently very proud of their teeth. It is recorded that the use of tooth powders and washes, and especially the use of the tooth cleaner, ˆrinacarya,® were necessities of their daily toilet. As a toothpick they employed a bitter tasting wood, which,

when chewed, produced a fibrous bundle, which was then used as a brush for the gums and the teeth. The aborigines of the western coast of Africa are still using the wood of the sis-sako and the molungo tree for such purposes and a toothbrush of this very same nature has been recently introduced in the United States, in Great Britain, *etc.* In the writings of Hip¬ pocrates and Pliny frequent allusion is made to drugs which were especially advocated for diseases of the teeth and the mouth. With the simpler remedies as hyssop, licorice, dog's milk, goat's butter, etc., many disagreeable substances, especially of the animal kingdom, were recom¬ mended. In Pliny's writings we find, among other dental suggestions, that <(if one wishes to be free from toothache, one should eat a whole mouse twice a month.® The ancient writings on dental therapeutics contain so many con¬ flicting statements relative to the sources of specific medications that it is extremely diffi¬ cult to reach an unbiased decision regarding their origin. Plagiarism was of common occur¬ rence among the early scribes ; it was, however, not looked upon as a breach of literary eti¬ quette in the same sense of the word as we in¬ terpret this term to-day. As an illustration, may be cited Pliny (79 a.d.), who in his famous (Naturalis Historia) prides himself on the fact that he is able to present excerpts of nearly 100 writers and their 2,000 works. He is hon¬ est enough, however, to name these authors, while many of his colleagues of this and a later period prefer silence on this point. Even the renowned Galen (131-200 a.d.) owes most of his botanical knowledge as presented in (De sim-plicium medicamentorunP to the materia med-ica of Dioscorides, which he duly acknowledges. Again, the seven books of Paulus ZEgineta (about 600 a.d.) are primarily compilations culled from Galen and Oribasius (about 360 a.d.) . The dental therapeutics as presented by the more important Greco-Roman writers — Galen, Oribasius, Celsus, Aurelianus, Paulus ZEgineta, etc., the Arabo-Persians — Rhazes, Ali Abbas, Abulcasis, Avicenna and Mesue; the early Germans — Schenck von Grafenberg, Heinrich von Pfolsprundt and Ryff ; the early Italians — Arculanus and Vigo ; and the early French — Guy de Chauliac., Valescus, Pare and Houillier — all, in their final analysis are culled from Dioscorides. Especially Avicenna (980-1037), ((the prince of Arabian Physicians,® as he has

been styled, and whose treatise on gen¬ eral medicine — the (Canon* — for many cen¬ turies enjoyed equally as high a reputation as did the works of Galen, and to-day is still to be found in many homes of Asiatic Turkey, has been a flagrant plagiarist of Dioscorides' dental medicine. And Walther H. Ryff (1 500— 72), that <(jack-of-all-trades® to whom Hseser refers as ftthe roving plagiator,® compiled his dental medicine from the same source via Arcu¬ lanus. The dental remedies referred to by that mixture of charlatanism and necromancy, John Gaddesden (about 1310 a.d.), sometime pro¬ fessor in Merton College, Oxford,, are so thor¬ oughly tainted by medical avarice, _ superstition and ignorance that it would be an insult to the enumerated writers if we place him in the same category. Merely to mention a typical exam¬ ple of the disgusting therapeutic measures re¬ corded in his bizarre tome, (Rosa medicinaP which has been significantly dubbed by the il-vol. 8 — 44

lustrious Guy de Chauliac, <(Rosa fatua,® the following (<mixtum compositum® in the form of a decoction which he recommended to be taken against dental podagra (neuralgia), may be cited: The gall of a cow, wormwood, alum, pepper, nutgalls, cloves, pitch, mustard seed, the heart of a magpie, the fat of mice, crow-dung, plantain and lice. The famous German (Artzney Buchlein wider allerlei Kranckheit und Gebrechen der Zeen gezogen aus dem Galeno, Avicenna, Mesue, Cornelio Celso,* *etc.* (Leipzig 1530), is an anonymous compilation which, as far as its pharmaco-therapeutics is concerned, merely exhibits the same stigmata as do the works of the above mentioned writ¬ ers, i.e., it is an epitome from Dioscorides' dis¬ sertations, with slight alterations, as a sequence of having passed through the works of the vari¬ ous authors enumerated on its titlepage. In a most interesting collection of Anglo-Saxon manuscripts bearing the quaint title, (Leech-doms, Wortcunning and Starcraft,* which in modern English would signify ((Phvsicians' prescriptions, the Knowledge of Plants and Astrology,® and which was published some dec¬ ades ago in London — numerous references re¬ lating to the diseases of the teeth are contained. Here, again, one meets with many drugs which are readily traced to a dissemination of dental knowledge by the Greco-Roman military sur¬ geons accompanying the conquering cohorts during their occupation of Britain.

It is probably not amiss to depict a concep¬ tion of the practice of medicine, and incident¬ ally of dentistry, as it may be gathered from the study of the medical works written during the early centuries of the Christian era. The freeborn Roman looked upon the practice of

medicine as a handicraft, the pursuit of which was not compatible with the dignity of a (<civis Romanus.® The practice of medicine in Rome prior to its invasion by the better educated Greek physicians was carried on by slaves ; the larger estates depended on their <(servus medi-cus,® a slave who had acquired some routine medical knowledge, or the ills of the subjects of the household were looked after by the patriarchal ((pater familias.® Some of these latter representatives of lay medicine gathered together quite an extensive knowledge of the healing art, and their recorded experiences furnish some of the most valuable data to the medical historians. Celsus, Pliny and Cato are elucidative types of Roman lay practitioners, and incidentally are voluminous and fruitful litterateurs on this subject. To the cultured Romans, who were highly conscious of the blessings of personal hygiene, the demand for the services of some genius who would keep their masticating organs in perfect condition was a matter of necessity. The works of med¬ ical writers of this period are filled with in¬ numerable recipes for tooth preparations. The mechanical side of dentistry, which by necessity must have been carried out by specialists, has received its ample share, as is testified by an excerpt from the famous Law of the XII Tables, enacted 450 b.c., which contains the following paragraph: <(Neither add any gold (to a corpse) ; if any one shall have teeth bound with gold, it shall be no offense to bury or burn him with it.® Numerous specimens of Roman and Etruscan dentistry have been found in burial-places. The great satirist, Martial,

has preserved the name of at least one dentist, Cancellius, ((who has grown rich like a senator among the grands and belles dames, and who cures the tooth diseases ; and how he can ex¬ tract !® It is also of interest to note that in the epigrams of Martial many allusions are made to the teeth and their care. So we read, for instance :

Esse quid hoc dicam, quod olent tua basia myrrham?

How do I explain it that your kiss smells of Myrrh?

Artificial teeth seem to have been quite fash¬ ionable with the Roman dames, as the following would indicate :

Dentibus atque comis, nec te pudet, uteris emtis;

Quid facies oculo, Laelia? Non emitur.

Without shame you make show with bought teeth and hair; But what about the eye, Laelia ; can one buy this also?

Specimens of Etruscan dentistry in form of bridges, crowns, bands, etc., are still preserved in the National Museum of Naples. With the exception of a few monographs the early liter¬ ature of dentistry is found scattered among the various treatises on general medicine. In the large majority of instances these records are published by medical practitioners, although sometimes by laymen who themselves did not practice the art of dentistry. Prior to the ap¬ pearance of the work of Fauchard, (Le Chiru-gien Dentiste) (1728), who has been signifi¬ cantly styled the ((Restaurateur de la chirugie dentaire,® dentistry is not entitled to the cog¬ nomen of a <(learned profession.® In reality it constituted the handicraft of vagabonds who traversed the country from one end to the other practising medicine, dentistry, alchemy, chiro¬ mancy and necromancy as occasion demanded, now and again interspersing these with a little pilfering. The professional mountebank who pre¬ sented himself as a tooth-puller, barber, leech and theriac vender was a familiar figure in the market-places of the big cities or at the annual fairs of the smaller towns. The extraction of the aching tooth was incidentally an incentive for the sale of some tooth preparation or an amulet for the prevention of the occurrence of pain in the remaining teeth. The <(dentatores® or ((dentispices® of the Romans, the ((cava-denti® of the Italians, the ((arracheur des

dents® of the French, the (<zahnbrecher® of the Germans, and the ((kindhart® *of the English represented the bulk of our professional an¬ cestors. The patron saint of dentistry, Saint Apollonia, was canonized in Rome about 300 a.d. Being a Christian, Saint Apollonia was tortured by her persecutors by having her teeth, one by one, extracted, and finally suffered death upon the pyre. Her memory is com¬ memorated on 9 February of each year. Re¬ mains of her skeleton are preserved in the va¬ rious churches of Rome, Naples, Cologne, Ant¬ werp, Brussels and Quebec, and excellent pic¬ tures of the saint by Guido Reni, Carlo Dolci, and others are found in Milan, Florence and other cities. The name of Saint Apollonia is frequently mentioned in prayers in the various prayer books of the Middle Ages, and is es¬ pecially intended for the relief of toothache.

Prior to 1840 comparatively few import¬ ant communications on dental surgery had ap¬ peared. The foremost literature of this time was published in France and England, and a few books of importance appeared in Germany. The United States was at this period princi¬

pally concerned with the practical development of the new branch of the healing art, and, with the exception of the writings of Longbotham, E. Parmly, L. S. Parmly, Trenor, Fitch, Bost-wick, Spooner, S. Brown, the Burdells and others, little was printed in relation to dentistry. Dental textbooks, if used at all, were imported from England, or translations of French works were published. Leonard Koecker, a practi¬ tioner of international reputation, pictured the situation quite correctly when he stated, in 1826, that «in the United States, although little or nothing has been done in the way of pub¬ lishing on the subject of dental surgery, yet I feel myself authorized to say that in no part of the world has this art obtained a more ele¬ vated station.® No specific current dental lit¬ erature was in existence at that time and com¬ paratively few medical journals tried to dis¬ seminate the progress of medical and, incident¬ ally, dental knowledge. The few journals were seriously hindered in this laudable cause by the extreme difficulties of interchange on account of the very limited facilities of the postal service. The first dental periodical of this or any other country appeared in 1839 under the name of American Journal of Dental Science, and was published by E. Parmly, E. Baker and S. Brown. The first regularly or¬ ganized dental society of any importance was the (<American Society of Dental Surgeons,® which was founded in New York on 18 Aug. 1840, with Horace H. Hayden as president. The birth of dentistry as a distinct and definite profession may be recorded simultaneously with the date of

the incorporation of the first dental college of the world, the Baltimore Col¬ lege of Dental Surgery, which received its charter in 1839. Its first session commenced in the following year, with a faculty composed of Horace A. Hayden, Chapin A. Harris, Thomas E. Bond and H. Willis Baxley. Medi¬ cine and dentistry were from that year practi¬ cally divorced, and, while dentistry in its early days depended very largely on medicine for its further development, it bases its fundamental studies at present on general biology exactly in the same manner as medicine, veterinary medicine, or any other branch of the healing art is forced to do. Among the earliest dental practitioners in the United States aside from those to whom we have referred should be men¬ tioned Robert Woofendale, a student of Thomas Berdmore, dentist to His Majesty King George III, Josiah Flagg, James Ger-dette, Edward Hudson and many others too numerous to record. The means of education and professional training of these men were ex¬ tremely limited and they were forced to obtain their knowledge by being apprenticed to some practitioner who would usually extort a large fee for initiating the novice Jnto the art of dental practice. As a consequence, the knowl¬ edge thus gained at a considerable expense was usually jealously guarded and professional intercourse among practitioners was therefore a rare feature. A record concerning the more important events of the development of den¬ tistry would be incomplete if the discovery of general anaesthesia were not mentioned, even if it is only en passant. To the dental profes¬ sion of the United States belongs the honor of having introduced into surgery the first practical method of obtaining complete anaes-DENTISTRY

thesia. The discovery of anaesthesia is the greatest boon ever bestowed on mankind for the relief of suffering. With the introduction of nitrous oxide as a general anaesthetic in 1844 by Horace Wells, the stimulation for fur¬ ther researches was initiated and the future de¬ velopment of anaesthesia was merely a se¬ quence of this incentive.

The distinguishing factor of dental training and one which is not required to the same de¬ gree in any other department of the healing art is the manual skill and mechanical train¬ ing needed for the successful practice of the prosthetic or restorative operations which the dentist is constantly called upon to perform. It was the lack of facilities in medical schools for obtaining the necessary training in the

me¬ chanical procedures of dental art that led to the establishment of the first dental college and placed dental education upon a basis independent of general medical education. The increase in knowledge of the diseases of the mouth and its contained organs and the growing recognition of the vital relationships of the oral tissues to the body as a whole, have gradually com¬ pelled the broadening of the dental educational curriculum until at present all of the funda¬ mental medical sciences are included in the cur¬ ricula of the best dental colleges, and upon this scientific foundation is erected the superstruc¬ ture of technical education and manual train¬ ing necessary to the art of the dentist. The development of dentistry in America has been phenomenal especially in all that pertains to its art side. The incorporation of the systematic teaching of mechanical dentistry in the college course instead of depending upon the uncertain educational results of the apprenticeship system has had greatly to do with creating a body of American practitioners skilled in their art. It is in fact for his skill as an operative dentist that the American practitioner has been mainly dis¬ tinguished. The art of replacing lost portions of tooth crowns by gold fillings has had its greatest development in America ; indeed as we know the operation to-day it may be said to have originated there. As originally practised the ideal gold filling was one which simply acted as a stopper inserted in a cavity produced by decay, for the purpose of excluding moisture and furnishing a surface sufficiently resistant to withstand the wear and tear of mastica¬ tion. The filling was finished on a level with the cavity margins and no attempt was made to restore the lost contour of the tooth in imi¬ tation of its natural configuration. When, how¬ ever, the discovery of the cohesive property of annealed gold foil was made and promulgated by Dr. Robert Arthur, of Baltimore, in 1855, the whole method of filling teeth with gold was revolutionized and complete artistic restoration of the normal configuration of the tooth by building with gold foil became the accepted ideal of practice. In connection with the general use of cohesive gold as a filling material certain in¬ genious and important devices came into exist¬ ence as adjuncts to the operation of tooth¬ filling, having their origin in the necessities of the case. These were the dental engine, the mallet and the rubber coffer-dam. The opera¬ tion of preparing the cavity for the reception of the gold involves the removal of decayed por¬ tions and frail margins, and giving to the cavity a retentive shape, so that the filling when in¬

serted shall be solidly and immovably held in place. The early methods of cavity preparation were laboriously performed by small

chisels and cutting instruments manipulated exclusively by the hand. Hand instruments were also exclu¬ sively used for the insertion and condensation of the gold foil in building the filling and sub¬ sequently giving it the required form and sur¬ face finish. The introduction of the dental en¬ gine run by foot-power or by electric motor has not only greatly facilitated the operation of tooth-filling but has made possible more accu¬ rate and perfect results. So manifold has been the improvements made in the dental engine and its equipment of accessory appliances that it may, if the operator so desire, be used for every step of the operation from cavity preparation to the finished filling. As the cohe¬ sive property of gold, upon which its value in restoring the form of the tooth depends, is at once destroyed by contact with moisture, great difficulty was formerly experienced during large filling operations in excluding the gold from contact with saliva ; napkins, bibulous paper and various mechanical devices were used for the purpose, but were often insufficient to prevent the destruction of a filling during the progress of its insertion. The device known as the rub¬ ber dam, introduced by Dr. S. C. Barnum of New York, about 1865, solved the problem of effectually excluding moisture from the teeth undergoing filling operation, and made possible more extensive and thorough restorations than had previously been attempted. The discovery of the usefulness of the cohesive property of gold in filling operations soon brought into requisition other means than simply hand pressure or condensing the gold foil into a solid homogeneous mass. It was soon found that greater solidity could be obtained by the per¬ cussive force of a mallet applied to the gold through the plugging instrument, so that the use of the mallet became general for the pur¬ pose, largely through the persistent advocacy of Dr. W. H. Atkinson of New York. The earlier forms of condensing mallets were simply hand mallets with heads made of various materials and different weights to attain desired varia¬ tions in the impact and quality of the blow de¬ livered upon the condensing instrument. Later, automatic mallets, combining a plugging instru¬ ment and mallet, were introduced. In these instruments the blow was produced by a ham¬ mer propelled by the release of a spring com¬ pressed by pressure, the malleting mechanism being contained in a casting connected with the plugging point which was applied to the surface of the filling upon which the impact of the blow was ultimately expended. In 1867 Dr. W. G. A. Bonwill of Philadelphia introduced his electro¬ magnetic mallet, an instrument which involved the principle of the Morse telegraphic recorder so modified that the armature of the electro¬ magnet was effectively utilized as a mallet act¬ ing upon the free end of the gold-plugging in¬ strument. With the automatic interrupter of the current afterward added to it the

Bonwill instrument contributed greatly to the improve¬ ment of gold-filling operations both in the solidity of the gold, its more accurate adapta¬ tion to the walls of the cavity and in lessening the fatigue and discomfort of both patient and operator incident to the operation. The blows delivered by the electro-magnetic mallet while

light arc extremely rapid, an advantage which its inventor sought to realize in a later device, to be used in connection with the dental engine, known as the Bonwill engine mallet, an instru¬ ment of high efficiency and the parent device of many subsequent modifications. To further lessen the stress encountered alike by patient and operator in the malleting of gold fillings the cast gold inlay was introduced by Dr. W. H. Taggart in 1905. This method of restoring lost tooth substance consists in the utilization of a contoured gold plug obtained by casting pure gold into a mold made from a wax pattern and which is set into the prepared tooth cavity with a thin layer of cement. The extensive use of gold as a filling material as the perfection to which the technique of its use for that purpose has been developed, especially in America, has recently brought about a reactive tendency against the display of elaborate operations of gold, especially in conspicuous positions in the front teeth, aesthetic considerations stimulating the search for some substitute more in harmony with the texture and color of human teeth. Recently through the invention of an improved technique by Dr. C. H. Land of Detroit, Mich., and the further investigations of Dr. N. S. Jenkins, an American dentist formerly residing in Dresden, Germany, the use of porcelain as a restorative material has become practically pos¬ sible and bids fair to supplant gold as a filling • — at least in conspicuous situations. The dura¬ bility of porcelain restorations as compared with gold fillings remains to be tested by time and experience, but the immediate result is in all respects in favor of porcelain, especially in the matter of appearance, which so harmonizes with the teeth structure in color and texture as to be invisible when the operation is correctly per¬ formed. The filling of cavities is also exten¬ sively done with plastic materials that have the property of becoming hard in the course of time after having been inserted in a soft state. This class of materials includes the amalgams and cements, also gutta-percha. Certain of these materials, the cements for example, serve only a temporary purpose, and their usefulness is therefore of limited duration. Silicate cements which at present are extensively employed as substitutes of gold and porcelain in the restora¬ tion of decayed portions of the anterior teeth must also be classified as limited in duration. The amalgams, however, while unsightly in ap¬ pearance, are extremely useful ; being quite durable and capable of insertion without great difficulty, they can be used in cases of great loss of tooth structure, thus restoring many cases that could not otherwise be as successfully treated and with less cost than

gold filling. Following the researches of Koch in bacterial pathology the role played by microorganisms in the causation of dental diseases became the subject of study by numerous investigators, notably the late Prof. W. D. Miller, an Ameri¬ can dentist resident in Berlin, through whose researches the cause of tooth decay was ex¬ plained. Similarly the causal relation of disease-producing microorganisms to disorder of the dental pulp and the tissues surrounding the roots of teeth has been clearly made out, with the result that operations upon the pulp chambers and root canals of teeth in which the pulp has been devi¬ talized by disease or design are now among the recognized conservative operations of dentistry.

This advance in the treatment of pulpless teeth has made possible the permanent saving of mul¬ titudes of teeth in a condition of comfort and functional usefulness which were previously in¬ evitably sacrificed or lost. Later investigations in the domain of dental and oral pathology are throwing light upon the causes and improving the modes of treatment of those diseases of the retaining tissues of the teeth which when un¬ checked result in their early loss by destruction of their attachment to the gums and alveolar sockets. The grafting of artificial crowns of porcelain upon healthy natural roots is accom¬ plished in a large variety of ways, the attach¬ ment being by metallic dowels cemented into the properly enlarged pulp canal of the root, this being in most cases reinforced by means of a gold collar or ferrule connected with the porce¬ lain crown, closely encircling the periphery of the root at and slightly under the gum margin. Perfect adaptation of the crown and root end is obtained by correctly shaping the exposed por¬ tion of the root and then the properly fitted porcelain crown is attached to this foundation by gold solder and backing plate of gold con¬ necting with the platinum pins of the crown. In certain cases hollow crowns, made entirely of gold plate shaped to the contour of the original natural crown, are used upon the roots of the grinding teeth instead of porcelain crowns, as they possess the advantage of superior dura¬ bility. Aggregations of crown permanently united upon their contiguous surfaces and sup¬ porting crowns in spaces where teeth have been extracted constitute so-called bridge work. No restorative operation in dentistry requires more judgment and skill, nor has any dental pro¬ cedure been more abused in its performance than bridge work. Where the operation is in¬ telligently and skilfully done, it constitutes the most satisfactory result both as to comfort, utility and appearance that prosthetic dentistry has yet attained ; otherwise it defeats the very object for which only it should be undertaken, namely, the restoration of the denture to full functional

usefulness and aesthetic appearance.

The department of dentistry technically known as mechanical or prosthetic dentistry comprises all those operations and the labora¬ tory manipulation of the materials involved in the construction of substitutes for lost dental organs and parts of the oral tissues. Where lost teeth are to be replaced by means other than those described as crown and bridge work, it is done by mounting the porcelain crowns upon a base-plate adapted to the surface of the palatal vault as well. An impression of the alveolar arch is taken in an impression tray containing a plastic material which will subsequently harden, usually plaster of paris or a modeling compound consisting of gum kauri, stearin and talc; bees¬ wax or beeswax and gutta-percha have been used, but are now practically abandoned for this purpose. Into the matrix formed by the im¬ pression a batter of plaster of Paris is poured, which after it has hardened forms the cast upon which the base-plate to support the artificial teeth in the mouth is constructed. The base¬ plate may be of vulcanite or of metal, and in the former case the porcelain teeth are adjusted to the cast by means of wax, and a wax plate is constructed which is the counterpart of the pro¬ jected finished vulcanite plate. When the ar¬ rangement of the teeth to the wax trial plate

has been found to be satisfactory by actual trial in the mouth of the patient, it is returned to the cast and the whole embedded in plaster of Paris contained in a sectional iron founder. The upper and lower sections of the flask are sepa¬ rated after the investing plaster of Paris has fully hardened, and the wax is completely re¬ moved by a stream of boiling water, leaving a facsimile matrix in the plaster, which is then packed full of vulcanizable caoutchouc ; the flask is then closed and after being firmly bolted together is subjected to the action of the heat from superheated steam for about an hour at 320° F. in a vulcanizer. The case is allowed to cool and when removed from the matrix the now thoroughly hardened plate is finished with a fine polish and is ready for insertion in the mouth. Metallic plates serving as the base of support of artificial teeth are constructed by stamping or swaging the flat plate cut approxi¬ mately to the desired pattern between male and female dies, made from zinc and lead, respec¬ tively, which have been obtained by casting the molten zinc into a sand matrix made from the plaster of Paris model of the alveolar arches. This furnishes a zinc model or male die upon which a female die or counter-die of lead is cast, and between these the metallic base-plate is struck up to the form of the alveolar arch upon which it is intended to rest. Upon this base¬ plate porcelain teeth are fitted and attached by a metallic connection between the platinum pins (which for the purpose are baked in the porce¬ lain texture of the artificial teeth) and the base¬ plate, union being made by soldering. Dentures upon an enameled platinum base-plate consti¬ tutes a form of work known as continuous gum work, in which, after the teeth by means of their pins have been united to the plate by soldering with pure gold, porcelain paste or <<body,)> as it is technically called, is packed around the roots and between the teeth ; then carved into form until the natural contour is reproduced. The piece is then subjected to high heat in a muffle until vitrified, after the man¬ ner of firing or baking china or pottery. It is next given a coating of enamel in imitation of the natural gum color, and after this has been fused in the muffle and the piece finally finished it constitutes the most artistic, hygienic and anatomically perfect denture of which dental art is capable. The prosthetic department includes, besides the restoration of lost teeth,

the con¬ struction of mechanism for the correction of. palatal defects whereby imperfect speech and deglutition are restored to practically normal conditions; it includes also the construction of splints in the treatment of fractures of the jaws and the restoration of parts of the jaws lost by accident or disease ; construction of mechanism for the correction of irregular positions of the teeth and for the restoration of facial deformi¬ ties due to irregular or imperfect development of the jaws and bones of the nasal or facial regions. The correction of irregularities in the position of the teeth has developed such im¬ portance and covers such a wide field of study and work as to constitute a distinct specialty of modern dental practice. This department of dentistry is termed orthodontics ; its importance is due not only to the cosmetic value of its results, but because of the direct bearing which irregular positions of the teeth and deformities of the dental arches exert upon the bodily

health. The whole field of dental and oral pathology has been so far developed by study and research as to place modern dental practice distinctly among the recognized specialties of the healing art. Most of the bacteria causing general bodily disease find access to the system through the mouth, which is also the habitat of many bacteria, benign and disease-produc¬ ing as well. Hence the hygienic care of the mouth as a protection against disease invasion is of the utmost importance. Late researches have shown that the mouth, its tissues and its secretions, and the teeth themselves, furnish important indications of certain bodily diseases, malnutrition, etc., which are extremely valu¬ able as diagnostic means. The training of the dental practitioner has therefore been enlarged so that in the foundation elements it is now co¬ extensive with that of the practitioner of gen¬ eral medicine, but specialized with reference to its particular field of inquiry.

In 1918 there were about 46 institutions within the border of the United States and its possessions engaged in the exclusive teaching of the science and art of dentistry. These institutions are partially bonafide departments of universi¬ ties, partially correlated therewith, or they are conducted as private schools. The present dental curriculum consists of four annual sessions each in consecutive academic years ; each aca¬ demic year consists of a period usually begin¬ ning about the first of October and lasting until the middle of June. In most institutions the courses in dentistry are open to women on the same terms as to men. For the session 1918-19 the preliminary educational requirement for matriculation is the completion of a standard four-year high school course or the equivalent, which (in the

States of New York and Pennsylvania) must include the satisfactory completion of a one-year course in an ap¬ proved high school in each of the following sciences : physics, chemistry and biology,

or in lieu thereof, the passing of each of these sciences at 75 per cent or above in examinations conducted by the Bureau of Pro¬ fessional Education of the respective State or other state examinations of equivalent grade. These requirements may be satisfied by a certifi¬ cate from an approved high school or a prepara¬ tory school of equal academic grade or by en¬ trance examination. At the close of the course of study the student who has fulfilled all the requirements satisfactorily receives his degree. This degree in most institutions is designated as Doctor of Dental Surgery (D.D.S.), while a very few (Harvard, Minnesota, etc.) confer the degree of Doctor of Dental Medicine (D.M.D.). The practice of dentistry is regu¬ lated separately by each political division of the United States. Examining or licensing boards look after the enforcement of the laws regulat¬ ing the practice of dentistry in each individual State. In most instances the prerequisite for obtaining a state license is the possession of a bonafide diploma from a reputable dental school recognized by the National Association of Dental Examiners. Interchange of licenses is practised by a few States. There were in 1918 approximately 47,000 registered dentists in the United States, *i.e.* about one dentist to each 2,000 inhabitants. A lower ratio (about one to three or five thousand) may be recorded for other civilized countries. The dental profession

of the United States, in harmony with other professional callings, has formed numerous associations for the promotion of scientific intercourse, among which the National Dental Association, the respective State dental associa¬ tions and many city and county dental societies are most influential bodies. The dissemination of useful professional knowledge is readily accomplished through numerous current period¬ icals, of which 28 appear in the United States. The Army and Navy Dental Departments offer excellent opportunities to the recent graduates. In 1918 the army dental corps numbered 210,

the dental reserve corps 5,124 (of which 1,337 were on active duty), and the dental corps of the National Guard 261. A proportionately less number was enlisted in the navy. During the closing hours of the 65th Congress a bill was passed and approved which states that within the Dental Surgeons Corps there shall be (<commissioned officers of the same grade and pro¬ portionately distributed among such grades as are now or may be hereafter provided by law for the Medical Corps, who shall have the rank, pay, promotion and allowances of officers of corresponding grades in the Medical Corps, in¬ cluding the right to retirement as in the case of other officers.®

Bibliography. — Bennet, (Science and Art of Dental Surgery 5 (1913) ; Black, (Special Dental Pathology) (1915) ; Blair, (Oral Surgery) (1917) ; Cryer, internal Anatomy of the Face5 (1916) ; Fones, (Mouth Hvgiene> (1916) ; Goadby, (The Mycology of the Mouth5 (1903) ; Harris, Principles and Practice of Dentistry> (1896) ; Hopewell-Smith, (Normal and Patho¬ logical Histology of the Mouth) (1918) ; Kirk, (American Text Book of Operative Dentistry) (1911) ; Litch, (American System of Dentistry5 (in treatises by various authors 1886-87) ; Miller, (MicroOrganisms of the Human Mouth) (1890) ; Peeso, (Crown and Bridge Work5 (1916) ; Pickerill, Prevention of Den¬ tal Caries and Oral Sepsis> (1914) ; Prinz, (Dental Materia Medica and Therapeutics) (1917) ; Smale and Colyer, (Diseases and In¬ juries of the Teeth) (1903) ; Turner, Ameri¬ can Text Book of Prosthetic Dentistry5 (1914).

Hermann Prinz,

Professor of Materia Medica and Therapeutics, School of Dentistry, University of Pennsyl¬ vania.

DENTISTRY, Public. This term may properly be used to denote all phases of dental service except that bought of a dentist by an individual. It includes military and naval den¬ tistry as well as that provided by municipalities and by privately endowed institutions. It is one of the most recently realized of the responsibili¬ ties of the state, 15 years embracing the whole organized movement up to 1918, save perhaps in some few advanced communities.

Budapest had <(a fine public dental clinic in 1892.® In England the government began to take a hand in the care of the mouths of the people in 1904. In a report of the Inter-Depart¬ mental Committee on Physical Deterioration presented to Parliament a warning was sounded that <fthe teeth of the people have become much worse of late years and in many parts of the country may be described as very

bad.® (Eng¬ land was at that time using 90 pounds of sugar per capita per year). It was suggested that

dental hygiene be given special prominence and far better practical attention in the schools. In France nearly every hospital long since has had a dental department giving free treatment to the poor, besides numerous municipal clinics in Paris and in the larger provincial cities. Italy has not been behind in this work : Florence early had three dental clinics, Naples two, Rome one attached to the University School of Den¬ tistry, while Brescia, Turin, Milan, etc., in like manner carried on this work at a period rela¬ tively early. <(Germany had 33 clinics exclu¬ sively for school children,® and Switzerland followed closely the German system. (Zentler).

America, which by universal consent has always led the world in dentistry, has been a little slow in taking up the work for the chil¬ dren; but it has in some respects surpassed all other nations in public dentistry, thus main¬ taining its original lead.

Boston at an early date began the system of school medical service and promptly agitated for and actually established dental therapeutics as a part of that system, including dental nursing as a profession legalized and encouraged by the general court (legislature) of Massachusetts. Since 1914 that city has had in the Forsyth Dental Infirmary for Children the most ade¬ quate institution for public dentistry in the world. In December 1910, by the appointment of two dental consultants and special lecturers on oral hygiene of the New York State de¬ partment of health, ˆCommissioner E. H. Por¬ ter earned the distinction of being the first State commissioner of health in the United States to take an active part in the crusade for clean mouths,® the contention of their public lectures, long since and now common knowledge, being that ((a clean tooth never decays and a lazy tooth becomes in time a rotten tooth.® Haven Emer¬ son of New York city found in the summer of 1907 that 97 per cent of the <(stay parties® of the Sea Breeze (adults) had decayed teeth; and the American Statistical Association in the same year showed that approximately 9,000,000 chil¬ dren in the United States had bad dental equip¬ ment or diseased teeth.

The Boston institution is the pioneer and sole present model for further constructions in the direction of the public care of children's teeth, mouths and throats. The institution de¬ veloped from the philanthropic idea of Mr. James Bennett Forsyth, a Boston business

man, who had been a great sufferer from neglected teeth. The idea acted upon by his two brothers, John Hamilton and Thomas Alexander For¬ syth (the actual creator of the Infirmary), and the heirs of another deceased brother, Mr. George Henry Forsyth, resulted in the foundation and erection of a memorial building of utility and beauty, the equipment and admin¬ istration of which is unrivaled for its objects, which are summarized as follows :

(1) To educate parents, teachers, nurses and children in the hygienic value of healthy mouths and sound teeth, and to furnish instruction as to the best methods of securing the same.

(2) To prevent dental caries by oral prophy¬ laxis and by the care and preservation of the temporary teeth.

(3) To investigate the causes and to study the prevention of oral diseases and caries of the teeth.

(4) To remedy, so far as possible, existing

Operating Room, Forsyth Dental Infirmary for Children, Boston, Mass.

conditions of dental caries and other oral dis¬ eases.

(5) To establish and promulgate a higher standard of dental asepsis.

(6) To furnish for the dental profession an opportunity for charitable work and for the educative experience of a large clinic.

War work was enthusiastically taken up by the institution, courses were organized to fit dentists for service in the Dental Officers' Re¬ serve Corps, 600 dentists registered for the first course and the director was appointed prelimi¬ nary dental examiner of the corps. The lec¬ tures given in the course have been compiled and edited as a textbook under the title, (War Dentistry. J

In addition to its work more strictly and directly therapeutic, this infirmary conducts two schools, a training school for dental hygienists and a postgraduate school of orthodontia. There are departments of social service and registration ; Roentgen rays ; extraction ; sur¬ gery; orthodontia; research; oral hygiene; library and museum ; lectures for the public and the staff ; besides the extensive dental-clinic de¬ partment suggested in our illustration. In 1917 the total number of cases treated was 31,750; new cases, 16,457 ; returned cases, 14,293 ; emer¬ gency cases, 2,917 ; average number of full-time operators, 18, and of half-time operators, 14; average number on visiting staff, 75 ; and aver¬ age number of patients daily, 363.

It cannot be doubted that when the world re¬ turns again to the pursuits of peace and social progress numerous such institutions will spring up to educate and to cure the children of this and of other lands, certain that septic teeth are the cause of much pain and disease heretofore ascribed to other causes. •

George Van Ness Dearborn, Medical Corps, United States Army.

DENTISTRY IN THE UNITED STATES. From the earliest times dentistry was practised as a branch of surgery. Herod¬ otus speaks of means of preserving the teeth, and artificial teeth are alluded to by

Greek and Latin poets. In the United States the first historic mention of dental practice is about the year 1785, and for some 40 years thereafter there were but few dentists in the country, and they were for the most part peripatetic, only the largest cities giving support to a resident den¬ tist. The Baltimore College of Dental Sur¬ gery, established in 1839, was the first institu¬ tion of the kind in the world. It was the direct result of an agitation to put dentists on a higher professional plane and followed an un¬ successful attempt to found dental chairs in medical schools. It had been argued that pathology of the mouth and dental mechanics should be taught in the medical schools as branches of medicine and that, graduates choos¬ ing these courses should receive the degree of M.D. as in the case of other branches of medi¬ cine. At the beginning no previous preparatory studies were required. To obtain a graduate's degree the student was required to attend two courses of lectures, each of four months, cov¬ ering dental surgery, dental mechanics and dental pathology. In addition some general in¬ struction was given in anatomy, physiology and therapeutics. A previous experience of five years as a practising dentist was credited as

equal to one term's attendance. In 1839 also the American Journal of Dental Science, the first dental periodical in the world, was estab¬ lished. For five years this was the only pub¬ lication of the kind, but within a few years a dozen had come into being. In 1845 the Ohio College of Dental Surgery (since 1888 the dental department of the University of Cin¬ cinnati), in 1856 the Pennsylvania College of Dental Surgery, in 1863 the Philadelphia Dental College were founded. These separate schools taught at first very little medicine, but paid attention almost entirely to mechanical training and to those branches which a dentist must know. All conferred the degree of D.D.S. In 1865 the New York College of Dentistry was founded with the purpose of educating men to practise dental surgery as a specialty of medi¬ cine. The curriculum included the fundamental departments of medicine with operative den¬ tistry and oral prosthetics. In 1867 Harvard University opened a dental department and began to teach dentistry as a branch of medi¬ cine with the special degree D.M.D. (Dentarice medicince doctor). By this time the practice of dentistry had come to include to a large degree the healing ©f diseased teeth and mouth tissues, requiring medical as well as dental education. In 1875 the University of Michigan and in 1878 the University of Pennsylvania followed the example of Harvard in opening dental depart¬ ments. Since 1878 there has been a most astonishing increase in dental schools and dental students, due largely to the fact that the

dental laws in many States now require graduation from a dental school as a condition for license. In 1878 there were 12 schools and 701 students; in 1910 there were 53 schools and 6,439 students. The number of practitioners of dentistry in the United States in 1917 was 46,223; 115 institutions in the United States (and 7 in Canada) are devoted to the sys¬ tematic education of dentists ; the profession has an extensive literature of standard works and periodical publications, and the furnishing of supplies and material used in dental practice is an enormous industry involving millions of capital, a growth which has all developed within 70 years.

In 1840 the American Society of Dental Surgeons, the pioneer of the associations to which dentistry owes so much of its progress, was organized in New York. This was fol¬ lowed by the organization of the Virginia So¬ ciety of Surgical Dentists in 1842, and within the next five years several other district and State organizations were formed. The Na¬ tional Association of Dental Faculties, organ¬ ized in 1884, has done much to strengthen courses of study in dental schools. At the time of its organization only those schools were ad¬ mitted which had proper facilities for instruc¬ tion and a corps of competent teachers. From time to time standards have been raised by rules governing attendance, instruction and graduation. The schools in the association, all require three full courses of dental lectures. The main defect of these schools as a rule is failure to require a sufficient preliminary gen¬ eral education for admission.

The first State to regulate by law the prac¬ tice of dentistry was Alabama. In 1841 a law was passed requiring the examination of dental practitioners in the State by a medical board

containing at least one dentist of recognized ability. This was the first legislation as to dentistry passed in any country. For nearly 30 years no other State passed such a law, but here and there regulations affecting the practice of dentistry became part of the existing stat¬ utes of several States. The next State to pass a dental law was New York, but this action was not taken till 1868. The English law was enacted in 1878, and those of other countries about that time or later.

Supervision. — The practice of dentistry is now regulated by statute in all political divisions of the United States. Examining boards are appointed in Alabama, Kentucky, North Caro¬ lina and South Carolina by the State dental associations ; in District of Columbia by dis¬ trict commissioners ; in Indiana by the gov¬ ernor, State Board of Health and dental asso¬ ciation; in Nebraska by State Board of Health; in New York by the Regents; in the Philip¬ pines by the Board of Health; in the remaining divisions by the governor, usually, on recom¬ mendations of the State dental societies.

Licensing. — Interchange of licenses is highly desirable and will doubtless be brought about to some extent in the near future. An important step toward interchange of licenses was taken iff 1898 when the New York dental law was amended so that the Regents may now issue their license to any applicant who holds a license to practise dentistry granted by a State board of dental examiners, indorsed by the Dental Society of the State of New York, pro¬ vided that his preliminary and professional education meets the New York statutory re¬ quirements. The dental examiners of Pennsyl¬ vania having been endorsed by the New York State Dental Society and recommended by the State dental examiners, the Regents endorse Pennsylvania licenses granted under the new regime.

Licentiates of Other States— Delaware, In¬ diana, Montana, Ohio, and Wisconsin admit licentiates of other States having equal require¬ ments on ˆsignification of reciprocal courtesyˆ ; Illinois on approved diploma from reputable dental or medical college, or on five years' prac¬ tice; New Jersey, Pennsylvania, and Wisconsin, on proof of license from other State boards having equal requirements; New Mexico and Utah, on proof of diploma recognized by the National Association of Dental Facul¬ ties; New York, on proof of license from another State board having equal require¬ ments and endorsed by the

New York State Dental Society, or on graduation from a registered dental school and six years' practice ; District of Columbia, Louisiana, Michigan, Missouri, Nebraska, Nevada, North Dakota, Oklahoma, South Dakota, Tennessee, Wiscon¬ sin, on approved diploma from other States ; Kansas, Kentucky, Ohio, Texas, on approved diploma from a dental college in the United States or any foreign country. In the remain¬ ing political divisions no provision is made in the law for admission of licentiates of other States.

Synopsis of Educational Requirements. —

In most divisions dental diplomas do not now confer the right to practise, an examination being required. The few exceptions are at the discretion of the examining boards.

The requirements for admission to the ex¬

aminations before the licensing boards of the several States as compiled up to 1 Jan. 1918, are as follows :

Alabama, a diploma of graduation from some dental college or collegiate department recog¬ nized by the National Association of Dental Faculties, indicating a grade of at least 75 per cent in all dental branches.

Alaska, a diploma from a reputable dental school. Dentists practicing in the Territory since 1909 who have such diplomas are regis¬ tered and licensed without examination.

Arizona, a diploma from some reputable dental school, or a license issued by another State requiring equal proficiency.

Arkansas, a diploma of a reputable school of dentistry; or the certificate of the examin¬ ing board of a State in which equal proficiency is reciuired.

California, diploma of reputable dental school endorsed by State board of dental exam¬ iners, or four-year high school course and not less than five years' practice ; or certificate of examining board of another State requiring equal proficiency showing five years' recent practice.

Colorado, diploma from legally organized reputable dental school.

Connecticut, diploma of graduation from recognized dental school, or

three years' prac¬ tice in the State; or certificate from another State board of dental examiners with equal requirements. The license may be issued with¬ out examination in the discretion of the board. Assistants are licensed to practice in the office of a licensed dentist.

Delaware, no restrictions to applicants ; li¬ censes also those who have lawfully practised dentistry in States ' which reciprocate such courtesy to Delaware dentists.

District of Columbia, certificate of the board of examiners that qualifications for examination are sufficient.

Florida, diploma of graduation from recog¬ nized dental college or collegiate department.

Georgia, diploma from reputable dental college.

Hawaii, a diploma of graduation from a recognized dental college or collegiate depart¬ ment.

Idaho, a diploma from a legally organized dental school ; a license from the examining board of another State ; or four years' study with a licensed Idaho dentist.

Illinois, a high school education or its equiv¬ alent, previous to the dental course, and a di¬ ploma of graduation from some reputable den¬ tal college; or active legal dental practice in some other State for the five years next preced¬ ing the examination.

Indiana, diploma recognized by National Association of Dental Faculties.

Iowa, diploma from reputable dental school. Any dentist having been engaged in lawful practice for five years under certificate of a board of dental examiners in another State may be licensed without examination.

Kansas, a diploma from a reputable dental school ; or previous lawful dental practice in another State for the five years next preceding the examination.

Kentucky, diploma from a recognized dental college or collegiate department.

Louisiana, no stated requirements ; examines all applicants.

Maine, a diploma of graduation from a reputable dental college and a preliminary edu¬ cation equivalent to that required for gradua¬ tion from a Maine high school. The board may license at discretion, without examination, dentists of five years' practice in other States requiring equal proficiency.

Maryland, a diploma of any legally author¬ ized university or collegiate dental school. A licentiate of another State may be licensed without examination at the discretion of the board.

Massachusetts, a diploma from an approved dental school; or at least three years' study without diploma, at the discretion of the board. Dentists with five years' practice in other States demanding equal requirements are li¬ censed without examination.

Michigan examines all applicants ; and issues licenses without examination to licentiates of other States which demand equal proficiency.

Minnesota, a diploma from a reputable dental school ; or five years' lawful dental practice in another State. A licentiate of an¬ other State may be licensed without examina¬ tion, at the discretion of the board.

Mississippi, a diploma of a reputable dental school and a preliminary education equivalent to a high school course.

Missouri, a diploma of any authorized dental school.

Montana, diploma of a reputable dental school ; or five years' dental practice in any State which extends a similar courtesy to Montana dentists.

Nebraska, a diploma of graduation from a reputable dental school, and such preliminary education as shall be approved by the dental secretaries of the State.

Nevada, a diploma from a recognized dental school, and a three-year

course in high school.

New Hampshire, a diploma of a reputable dental school ; or practice in another State for the five years next preceding the examination. A dentist holding a certificate of proficiency from another State may be licensed without examination at the discretion of the board.

New Jersey, a certificate of good moral char¬ acter from two licensed dentists of the State, a preliminary academic education of four years in a high school, and a diploma from an ap¬ proved dental school, attested by an identifying photograph endorsed by an official of the school ; or five years' practice immediately pre¬ ceding application certified by the board of the State in which the practice was carried on.

New Mexico, a diploma of graduation from a reputable school of dentistry.

New York, a four-year high school course, or its equivalent and a degree from registered dental school or medical degree with a special two-year course; or license to practise den¬ tistry in another State, or a practice of 25 years without the State, or in a foreign country.

North Carolina, a diploma of graduation from some reputable school of dentistry.

North Dakota, preliminary education of four years at high school, a diploma from an approved school of dentistry, and at least one year in the State University, or an equivalent institution ; or five years of practice in den¬

tistry in another State requiring equal pro¬ ficiency.

Ohio, a certificate of the State superintend¬ ent of public instruction that the applicant is possessed of an education equal to that required for graduation from a high school, and a di¬ ploma from a legally chartered dental school; or five years' dental practice under license in another State requiring equal proficiency, pro¬ viding that such State reciprocates such cour¬ tesy. In the latter case a license may be issued without examination at the discretion of the board.

Oklahoma, a diploma of graduation from a dental college approved by the examining board.

Oregon, diploma from dental school in good standing, or dental study and practice in Oregon prior to this act.

Pennsylvania, a competent preliminary edu¬ cation and a three-year dental course ; or a diploma of a recognized dental school.

Philippines, diploma from legally incorpo¬ rated dental school.

Porto Rico, a diploma of a reputable dental school, certified as genuine by two freeholders. Lacking these, the applicant may demand ex¬ amination on his merits.

Rhode Island, graduation at a recognized dental college ; or actual practice of dentistry in another State for the five years next preced¬ ing the examination.

.South Carolina, no requirements ; all appli¬ cants examined.

South Dakota, a diploma of graduation at an approved dental school ; or practice in den¬ tistry in another State for the five years im¬ mediately preceding the examination.

Tennessee, a diploma of a reputable dental school.

Texas, no restrictions; examines all appli¬ cants.

Utah, diploma recognized by National As¬ sociation of Dental Faculties, or two years' practice or three years' study with licensed dentist.

Vermont, a preliminary high school course, and the diploma of a reputable school of den¬ tistry.

Virginia, a diploma of graduation from a recognized dental college ; or active practice of dentistry in another State for the five years preceding the examination.

Washington, a diploma from a recognized dental school.

West Virginia, the diploma of a reputable den¬ tal school. Any dentist holding a license from another State may be licensed after examina¬ tion.

Wisconsin, a general education equivalent to a four-year course in the Wisconsin high schools, and a diploma of graduation from a reputable dental college; or license to practise in other States issued previous to 1909, and with at least five years' practice in such State — provided a

similar courtesy is extended to Wis¬ consin dentists removing to such State.

Wyoming, a diploma from a recognized dental college or collegiate department.

DENTITION. See Teeth.

D'ENTRECASTEAUX (dan-tr-kas*t69 ISLANDS, since 1884 part of the British pro¬ tectorate of New Guinea, lie north of the south-

east extremity of New Guinea; area 1,083 square miles. They comprise three chief islands separated by narrow channels. They are named after the French admiral and explorer, Joseph Antoine Bruni, chevalier d'Entrecasteaux (q.v.), who visited these waters in 1792. His name is also preserved in D'Entrecasteaux Point on the southwest coast of western Australia and in D'Entrecasteaux Channel, separating the south of Tasmania from the Bruni Islands. The isl¬ ands contain boiling springs and other indica¬ tions of volcanic action. There are several very high mountains. Administratively, the islands are part of the Territory of Papua, the name given to British New Guinea by a procla¬ mation of the governor-general of Australia 1 Sept. 1906.

DENUDATION. See Erosion.

DENVER, James W., American soldier and frontiersman: b. Winchester, Va., 1817; d. 9 Aug. 1892. He removed to Cincinnati, Ohio, in 1842, where he studied for the bar. Later he removed to Missouri, where he raised a company and served as captain in the Mexi¬ can War. In 1850 he went to California where he became prominent in politics, serving as state senator, and was appointed secretary of state, and afterward was elected to the 34th Congress. Before the end of his congressional term he was appointed commissioner of Indian affairs, but resigned to accept the office of gov¬ ernor of the Territory of Kansas in 1858. He returned to Washington after 12 months of service leaving the territory well-

organized and law-abiding. He returned to California in 1859, but soon after removed to Wilmington, Ohio. He served in the Union army as Brigadier-General of volunteers during the Civil War until 1863. After the war he practised law in Washington, D. C. General Denver, at that time governor of Kansas, suggested the name Colorado for the Territory formed out of Kan¬ sas, Utah, New Mexico, and Nebraska, and the capital city of Saint Charles was renamed Den¬ ver in his honor.

DENVER, Colo., city, capital and com¬ mercial centre of the State, 639 miles west of Kansas City, 538 miles from Omaha, 2,025 miles from New York and 1,457 miles from San Francisco.

Topography. — • It is situated on both sides of the South Platte River at its junction with Cherry Creek, usually a dry stream, but at intervals carrying great floods of water; lat. 39° 40′ 36″ N., long. 104° 56′ 55″ W. ; altitude, 5,270 feet. The site of the ((Queen City of the Plains, ˆ as it has been designated, with an area of 58J4 square miles, coterminous with the county of Denver, slopes gently back from either bank of the river, and has a com¬ manding view of the main range of the Rocky Mountains, terminating with Pike's Peak on the south and Long's Peak on the north. It lies 15 miles from the foot-hills, the eastern base of the Rocky Mountain Range.

Government, Municipal Conditions. — The municipal government is vested in a mayor elected for three years, a mayor's cabinet of four members, consisting of the managers of revenue, safety and excise, parks and improve¬ ments, and health, all appointed bv the mayor, and nine elective councilmen. The manufac¬ ture or sale or giving of alcoholic and malt

liquors is prohibited by the constitution of the State, and public drinking places do not exist. The city is laid out regularly with broad streets and is substantially built with brick and stone, no wooden structures having been permitted since 1876. In 1915 there were 990 miles of streets, 370 miles of which were graded and surfaced with asphalt or dis¬ integrated granite; 700 miles of sidewalk are uniformly paved with stone or concrete and 38.59 miles of alleys are likewise paved. There are 141.25 miles of storm and sanitary sewers. The streets are generally bordered by trees, the elm and maple being most abundant ; but every shade tree known to the local forester can be found.

Public Utilities. — The public utilities are modern in every particular. Street cars oper¬ ated by overhead trolley traverse 203 miles of streets, and in 1915 carried 72,983,000 passen¬ gers. Overhead trolley lines also connect with Golden, 12 miles west, Boulder, 30 miles north¬ west, and Littleton, 10 miles south. Gas, elec¬ tric light and electric power are supplied by the Colorado Power Company. The current used is generated near Glenwood Springs, west of Denver, and transmitted 150 miles, and also near Boulder, whence it is transmitted 50 miles. Telephone communication exists between Den¬ ver and all communities in neighboring States ; long distance service extends to the two oceans. The domestic water supply is furnished by The Denver Union Water Company, a private corporation. Water is taken from the South Platte River, Cherry Creek and Bear Creek at distances varying from 6 to 48 miles from the city. The greater portion of the water is handled through two reservoirs known as Cheesman and Marston lakes, having a joint capacity of 33,000,000,000 gallons, furnishing a storage reserve equal to the needs of at least half a million population. The water from these reservoirs, although of remarkable nat¬ ural purity, is all filtered before reaching the city mains. The daily consumption for domes¬ tic and irrigating purposes averages approxi¬ mately 220 gallons per capita, and at times has reached a maximum of 375 gallons per capita. Sanitary conditions are safeguarded by a health department to which is delegated great power. Inspection of all public and private properties is regularly and carefully made. The mortality record for 1915, based on a population of 250,000, was 1.36.

Public Buildings. — Among the notable public buildings of the city are the State Cap¬ itol and Federal building; the first, constructed of Colorado granite, cost $2,700,000; the sec¬ ond, of Colorado white marble on strictly classic lines, cost $2,400,000; the Federal build¬ ing houses the Federal courts, postoffice and other government offices. The United States Mint cost $1,225,000. During 1915 it received in gold_ and silver bullion $34,842,618, of which $574,175 was gold. Of the total receipts Colo¬ rado smelters and mills furnished $14,303,768. No gold was coined in 1915; $1,987,175 was coined into half-dollars, quarters and nickels; 220,500 pennies were coined. The mint, accord¬ ing to the United States Treasurer, contained on 6 July 1916 $485,000,000. Among other public buildings are the union railroad station costing $1,000,000, two museum buildings, public library, public baths, city hall, county court-DENVER, COL

The Business Portion of Denver, from the State Capitol

DENVER, COLORADO

house, armories, schools and colleges. A stock-show stadium has a seating capacity of 7,500 and cost $250,000. An auditorium, erected and controlled by the city, has a seating capacity of 12,000 and is so arranged that it can be re¬ adjusted temporarily for smaller gatherings, for theatre, concert and other purposes.

Banks, Public Finance. — Denver's banking and financial institutions are strong. The five national banks report combined capital and sur¬ plus for 1915 as $7,103,386; national bank clear¬ ings, $508,421,052; deposits, $67,606,781 ; loans and discounts, $34,030,906. Total number of banks, 36. The assessed valuation of the city in 1915 was $358,365,823; bonded indebtedness, $1,564,350, with sinking fund $855,096, leaving net bonded indebtedness $709,254; indebtedness per capita, $2.88 ; annual tax levy, 16.2 mills on the dollar; property assessed at its full cash value; number fire alarms, 1,057; number fires, 908; loss by fire, $244,354; number of persons per policeman, 1,072.

Parks, Public Playgrounds. — The city has 30 parks and 10 playgrounds. Those lying strictly within the municipal limits comprise 1,318 acres. They contain bronze and marble statuary and all floral adornment known to the modern scientific landscape artist, lakes and fountains, pavilions for musician entertainments where the municipal band of 50 pieces gives daily concerts during the summer (in winter the concerts are given Sundays in the municipal auditorium), floral-bordered walks, wide-sur¬ faced drives, municipal golf links, tennis courts, camping grounds for automobile tourists, bath¬ ing beaches and playgrounds with modern equipment and competent supervision and in¬ struction. A natural history museum is lo¬ cated in City Park, also a zoological garden well stocked with native animals and birds. Another feature of this park is the electric fountain, which plays every summer evening with varicolored lights. The connecting sys¬ tem of parkways about the city includes 12 miles of parking, with gardens, lawns and floral decorations, altogether embracing 56 acres. Denver owns in the mountains within 30 miles from the corporate limits parks comprising 2,530 acres, to which more is being added from year to year. These mountain parks include canon and peak, to reach which a

highway has been constructed by way of Lookout Mountain to the summit of Genesee Peak, rising to an altitude of 8,270 feet. The mountain roadways are at no point less than 20 feet in width and their grade more than 6 to 100 feet, and wherever necessary are guarded by post-and- cable protection. Rustic shelters and rest sta¬ tions where refreshment may be had, fire¬ places for cooking, etc., are convenienty located for parties who motor over part or all of the 72 miles of highway. A mountain pasture stocked with elk and buffalo lends to the attractiveness of the parks, while trout streams lure the city dweller and the tourist. These parks are maintained by the city of Denver for the free use of its citizens and guests, and pro¬ vide unique and pleasurable rural excursions and mountain outings. The round trip from Denver by automobile over one of the most popular routes is accomplished in four hours. From various points on the trip the city is in full view, and with a glass its streets, buildings and parks are distinctly recognized. From these

summits at night the view of the distant bril¬ liantly lighted city is enchanting. In 1915 the city spent on the maintenance of its parks $233,000, and on improvements including moun¬ tain parks $160,000.

Schools, Libraries, *Etc.* — The public schools provide free education for all from the kinder¬ garten through the high school, 15 years. In addition to the elementary fundamental branches, night schools are provided for adults of all nationalities ; manual training, special training in cooking and sewing, modern and ancient languages, music, drawing, trade schools with special preparation for advanced work in technical schools and military training. In 1915 $1,463,000 was expended for the maintenance of public schools. The school property is valued at $4,260,000. The public library contains 100,000 volumes; five branches of this library are maintained at various points in the city. In addition there is a medical library of several thousand volumes ; six law libraries ; school libraries containing 60,000 volumes exclusive of textbooks ; at the State Capitol a library num¬ bering approximately 15,000 volumes. Denver has four daily newspapers, 35 weekly papers and a number of trade journals. Its church edifices number over 200.

Climate. — The climate is one of the most delightful and remarkable in the country. United States Department of Agriculture data for the years 1872 to 1915 give the following information : Discarding fractions of a degree, the mean annual temperature at Denver is 50° as

against 49° at Chicago, 49° at Boston, 55° at Washington, 56° at Saint Louis and 69° at Jacksonville. During the last 44 years 100° or higher has been touched 13 times, 7 in July and 6 in August. While these high tempera¬ tures were maintained for only a few minutes, readings in the 90's are common during every summer month. For July, the warmest month, the average temperature is 72°, and the average daily maximum, or afternoon reading, is 86°. Here, as elsewhere over the greater part of the United States, the coldest month is January, with an average temperature of 31°. The annual precipitation is 14.5 inches ; Chicago, 33.2 ; Saint Louis, 40; Washington, 42.7; Boston, 41.8; and Jacksonville, 54.1. Of sunshine Denver has 67 per cent of the possible, as against 65 at Saint Louis, 57 at Washington, 54 at Boston and 58 at Chicago. The average relative hu¬ midity is 52 per cent. It is highest in February, 57 per cent, and lowest in October, 49 per cent. Twice during the last 42 years a humidity as low as one-half of 1 per cent has been re¬ corded. The annual relative humidity at Saint Louis is 70 per cent, Boston 72, Washington 73, Chicago 74 and Jacksonville 80; and for the warmer months — June, July, August and Sep¬ tember — at Saint Louis 66 per cent, Chicago and Boston 74, Washington 76 and Jacksonville 82. It will be observed that in the Atlantic States the humidity during the warm months is greater than the average annual, just the reverse of that which obtains in Denver. In brief, Denver summers are characterized by warm days and cool nights, the heat of the day not attended by the usual debilitating effects ; the winters by an abundance of sunshine and general absence of snow and severe, long-continued cold.

Railroad Service. — The railroad lines enter¬ ing the city are the Atchison, Topeka and Santa Fe, the Chicago, Burlington and Quincy, the Chicago, Rock Island and Pacific, the Colo¬ rado Midland, the Denver and Rio Grande, the Union Pacific, the Colorado and Southern, the Denver and Salt Lake and the Denver, North¬ western and Pacific. Of these, jointly with others, four continue across the continent, and the Denver and Salt Lake, now under con¬ struction, will make the fifth. The Union Pacific Railroad takes its passengers through Denver

to the western coast by way of Cheyenne and Ogden; the Burlington and Rock Island transfer to the Union Pacific, Rio Grande or Santa Fe; and the Santa Fe, whose main line extends south of Denver across the conti¬ nent through New Mexico and Arizona, makes southern connection for Denver. The greatest transportation enterprise of recent years, in¬ volving a six-mile tunnel through the Rocky Mountains, is the construction of the Denver and Salt Lake Railroad, by which the rail dis¬ tance between Denver and Salt Lake City will be shortened 100 miles.

Commerce, Industries. — As a commercial centre Denver is increasing in importance each year, and a combination of natural conditions gives much promise to the city. In 1890 manu¬ factured products totaled $30,000,000 and in 1915 $62,000,000. The wholesalers sold in 1915 $53,000,000 worth of goods. Foundry, railway and mining machinery are manufactured. Five flouring mills have daily capacity of 3,500 bar¬ rels. Four paint manufactories and one varnish factory have a total annual output of $1,125,000. Window and plate glass is not made in Denver, but mirrors and ornamental art glass made and jobbed in 1915 totaled $750,000. Denver is the distributing point for Colorado, New Mexico, Arizona, Wyoming, Idaho, Montana, Nebraska and Kansas. The paints and varnishes produced are especially adapted to dry climate use. The live stock interests of the West centre in the Denver Union Stock Yards and added packing plants; 425,000 head of cattle (chiefly Western) were received in 1915. The packing companies are at present (1916) increasing their capacity at a cost of half a million dollars; 768,421 head of sheep were received in 1915 and 341,501 hogs were handled at the packing plants. The live stock industry is growing rapidly and money to finance operations is easily obtainable. Denver's proximity to the mining and agricul¬ tural regions of the State has greatly assisted in its upbuilding. The gold production of Colo¬ rado for 1915 was $23,3ˆ8,608; silver, $4,137,333; zinc, $13,545,212; lead, $3,629,524; coal, 8,537,775 tons ; a total, excluding coal, of $50,489,943. Among the leading agricultural products of the State in 1915 were sugar beets, 1,254,913 tons of which were converted into 195,343 tons of sugar. The executive offices of the beet sugar companies, and of many other substantial in¬ dustries, are in Denver.

Population. — The population in 1910 was 213,381. In 1920 (United States Census) it was 256,491. It is more largely cosmopolitan than is usual in cities of like size. Representative citi¬ zens, while more largely from northern States of the Union, are found from every State as well as from most European countries. Census re¬ turns of 1910 gave 25,300 of foreign birth and 4,000 of negro descent, Only the first

genera¬

tion of native Coloradoans have arrived at adult life.

History. — Denver was settled by gold seekers in 1858. The following year it was in¬ corporated as a city by the provisional legis¬ lature and named in honor of Gen. J. W. Den¬ ver, the governor of Kansas. In 1861 it was re¬ incorporated by the first Territorial legislature and became the capital of the Territory in 1867. In 1870, on the completion of the Denver Pacific and Kansas Pacific railroads, it was first con¬ nected with the older settlements of the Mis¬ souri Valley. The bibliography of Denver is found complete in the library of the Colorado Historical Society. The Denver Public Library also has a complete list of books and pamphlets relating to the history of the city from its foundation.

Thorndike Deland,

Secretary of the Denver Chamber of Commerce.

DENVER, University of. This institution is the pioneer school of higher learning in Colorado. With the commencement of 1916 the list of graduates numbers more than 3,100, and the institution therefore leads all institutions in the Rocky Mountain country in service to so¬ ciety. Approximately 1,400 students are now in residence as candidates for degrees. There are some hundreds of additional students in Denver who are taking college work without seeking degrees. The departments are as fol¬ lows : graduate school, extension college, extra¬ mural college, summer school, Warren Academy, law school, dental school, school of commerce, school of art, lecture department. The prop¬ erties and endowments of the university now aggregate more than a million dollars in value. The General Education Board has made a con¬ ditional grant of a large amount for endow¬ ment exclusively on conditions which have been fully met. Within three years the university properties and endowments will aggregate more than a million and a half in value. The univer¬ sity is owned by the Methodist Episcopal Church. No religious test has ever been made for admission to any of the departments. The university is conspicuously the university for Denver, though it attracts students from nearly all the States in the Union.

DENYS, Nicolas: b. Tours 1598; d. Acadia 1688. He accompanied De Razilly to Acadia in 1632 and engaged in sedentary fish¬ eries at Port

Rossignol, now Liverpool Bay, Nova Scotia, receiving a grant from the Com¬ pany of New France. His fort was seized by D'Aulnay Charnisay, lieutenant-general in Acadia, in 1647. In 1653 he received a grant from the French king of the coasts, estuaries and islands of the Gulf of Saint Lawrence, to which Newfoundland was afterward added. He established the. headquarters of his fisheries first at Chedabucto (Guysboro Harbor, N. S.) ; then at Saint Peters, Cape Breton, where his build¬ ings were destroyed by fire; and finally at Nipisiguit (Bathurst, N. B.). His description and Natural History of Acadia* was published in 1672.

DEOBUND, de'- or da'6-bund, or DEO-BAND, India, city in the Saharunpur district, United Provinces of Agra and Oudh ; an ancient place, with manufactures of fine cloth and a grain trade. It has many temples and is much resorted to by pilgrims. Pop. 19,250.

DEODAND, de'6-dand (Deo dandum, a thing to be given or dedicated to God), an ob¬ solete legal term for anything that had directly caused a person's death, all such chattels being, by the old rule of the common law of England, forfeited to the king, to be devoted by him to pious uses, though often finding way to his privy purse. In all indictments for homicide, the grand jury specified the instrument that im¬ mediately caused the death, and its value, that the king might claim the deodand and distribute it wto appease God's wrath.® Though these forfeitures were originally incurred to the king, yet they were frequently granted to the lord of the manor or territory upon which the death happened. Deodands were abolished in' 1846. There has never been anything analogous to this custom in the United States. Consult Blackstone, Commentaries on the Laws of England. >

DEODAR, de-6-dar' ((<divine tree®), from the Sanskrit devadarn), a tree (Cedrus deo-dara), a native of the mountains of India, where it grows to the height of 100 feet and upward. It chiefly resembles the cedar of Lebanon in habit of growth and is probably a species of the same genus. The timber is among the most valuable grown in India. The name is rather freely applied to trees, especially to species of the

Conifercc. See Cedar.

DEODORIZER, a substance used for ab¬ sorbing foul-smelling gases, or for substituting an odor which is pleasing for one that is dis¬ agreeable. Deodorizers are not disinfectants or antiseptics, and should not be confounded with them. They are of no use save to cover up disagreeable smells, and often do a great deal of harm by shutting people's nostrils to real signs of danger.

DE OFFICIIS, de o-fls'i-is (Lat. «of duties®), a treatise in three books by Cicero on moral obligations written about 44 b.c. It is addressed to his son Marcus.

DEOGARH, de'- or da'6-gur, India, the name of several cities, of which the following two are the chief: (1) In Bengal, 170 miles northwest of Calcutta ; it contains a group of Siva temples to which numerous pilgrims resort. Pop. 8,667. (2) In Udaipur, Rajputana; its

chief attraction is an old palace. Pop. 7,400.

D'EON DE BEAUMONT. See Eon

de Beaumont, Charles.

DEOPRAYAG, da"o-pra-yag\ or DEVA-PRAYAGA, India, village of Tehri, United Provinces, at the juncture of the Alaknanda and the Bhagirathi, which form the Ganges. It is 2,265 feet above sea-level. It is a place of pilgrimage for the Hindus and has a mag¬ nificent temple of Raghunath, built on a high terrace. The permanent population, about 1,000, is made up mostly of Brahmins.

DE ORATORE (Lat. <(on the orator®), a rhetorical work by Cicero, in three books, writ¬ ten about 55 b.c. It is in the form of a dialogue, the principal characters being L. Crassus and M. Antonius. It outlines the studies necessary for a public orator to pursue, the composition, form and method of delivery of effective speeches. The work ranks with the most fin¬ ished productions of Cicero on account of its varied contents and its excellent style.

DEPARTMENT, the name given certain territorial divisions of countries, especially to

the principal territorial divisions of France. At the time of the French Revolution, when the former division of the kingdom into provinces

was abolished and succeeded by a division of it into departments, this division was determined partly by the number of inhabitants, partly by extent of territory and partly by the amount of direct taxes. The new division was proposed in the Constituent Assembly in 1789 and effected in 1790. The whole kingdom was at first di¬ vided into 83 departments, which were subse¬ quently increased by the gradual extension of the empire to 130, and were reduced by the Peace of 1814 to 86. By the cession of Savoy and Nice to France in 1860 the number was increased to 89, and by the cession of Alsace-Lorraine to Germany in 1871 was reduced to 87. The return of the latter in 1919 again raises the number to 89. At the head of each is a prefect, appointed by the President of the Republic, and assisted by a conseil de prefecture. Most of the states of South America are also divided into departments (departimentos) , but these resemble the French ones in nothing but name. Each French depart¬ ment is subdivided into arrondissements, these into cantons, and these into communes. The name is applied to military divisions and various other divisions, as of government and schools.

DEPARTURE, a nautical term signifying the distance along a parallel of latitude measured in nautical miles, especially the distance made by a ship in a course due west or due east. When the course is other than east or west departure is the distance sailed X sine of course. Taking a departure is determining the exact position of a ship on the outset of a voyage and after leaving port.

DE PAUL UNIVERSITY ACADEMY,

an institution for the secondary education of boys at Chicago. It was founded in 1898 and is conducted by the Vincentian Fathers. Its courses are given for entrance into college, for business training, and general education The De Paul High School for Girls is under the direction of the Sisters of Charity.

DE PAUW, de-pa’, Washington Charles,

American manufacturer: b. Salem, Ind., 4 Jan. 1822; d. New Albany, Ind., 5 May 1887. He received a liberal education; worked himself up to the foremost rank among the business men of his State ; and was successively a mill-owner, a merchant and a banker. He was noted for his extensive gifts in behalf of education. His aid to the Indiana Asbury University set it upon a sound basis, and its name was changed to De Pauw University in his honor. He also founded De Pauw College for Women and sev¬ eral charitable institutions at New Albany, Ind. See De Pauw University.

DE PAUW UNIVERSITY, a coeduca¬ tional institution in Greencastle, Ind. ; founded in 1837, under the auspices of the Methodist Episcopal Church, and known as the Indiana Asbury University until 1884, when the name was changed to De Pauw University. In the original charter of the institution there existed provisions for schools of divinity, law, medi¬ cine, art, music and pedagogy, and of liberal arts. At some period in the course of its ex¬ istence the university has instituted and con¬ ducted every one of these. Insufficient endow-

ment and income rendered it impossible to keep these professional departments up to the standard which the institution set itself and it suspended all except the school of music, thus leaving only the college of liberal arts and this school in operation at present. In 1915 there were in attendance 883 students with 40 professors and instructors; number of volumes in library, 27,725 ; grounds and buildings valued at $528,000; productive funds, $1,200,000.

DE PERE, de-per' or de-par', Wis., city in Brown County, on the Fox River at the head of steamer navigation, and on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads, about 100 miles north of Milwaukee. Here was established the first mission in Wisconsin. Saint Norbert's College is situated here. The parts of the city on either side of the river are united by means of a steel bridge over the river. The industrial establishments of the city include brick, pottery and tile works, paper mills, boiler works, in¬ ternal combustion engines, sash and door fac¬ tories, flour mills, cigar factories, boat works, foundries, woolen mills, creameries, limestone quarries, and municipal waterworks. The city ex¬ ports principally cattle, grain and hay. Pop. 5,165.

DEPEW, Chauncey Mitchell, American lawyer, legislator, politician and orator : b. Peekskill, N. Y., 23 April 1834. He was gradu¬ ated from Yale College in 1856, studied law in Peekskill and in New York and was admitted to the bar in 1858. He was soon after elected to the New York assembly and served as chair¬ man of the committee on ways and means. For a time he was acting speaker of the house. In

1863 he was nominated upon the Republican ticket for secretary of State and was elected by over 30,000 majority. In 1865 he declined a renomination. President Grant tendered him the Japanese mission about this time, but Dr. Depew declined the office to enter the service of the New York and Harlem Railroad as attorney. In 1869, when the consolidation oc¬ curred of the Hudson River, Harlem and New York Central railroads he was made a director and attorney for the newly organized company. In 1872 he accepted the nomination for lieuten¬ ant-governor on the Republican State ticket, but was defeated by a small plurality. In 1875 he became general counsel for the entire Van¬ derbilt system of railroads, and in 1882 second vice-president of the reorganized New York Central and Hudson River Railroad, and presi¬ dent in 1885. The same year Yale College con¬ ferred upon him the title of LL.D. During this period he was acting as a regent of the State University. He remained president of the New York Central until 1898, when he became chairman of the board of directors of the Van¬ derbilt system, which included the New York Central and Hudson River, Lake Shore and Michigan Southern, Michigan Central and the New York, Chicago and Saint Louis railroads. His political career during these later years was eventful. In 1885 he declined the election to the United States Senate. In 1888 he figured prominently as a candidate for the presidential nomination at the National Republican Conven¬ tion, withdrawing from the contest in favor of Benjamin Harrison, of Indiana, who, after his election and elevation to the Presidency, ten¬ dered to Mr. Depew the portfolio of Secretary

of State, which was declined owing to large rail¬ road interests. In 1899, on 17 January, he was elected to the United States Senate as junior member from New York State. He remained in the Senate until 1911. He became involved in the investigation of certain New York life insurance companies in 1905, with the result that he repaid to the Equitable Life Assurance So¬ ciety, of which he was a director, a loan made to a concern in which he was interested, and he resigned from the directorate of the Equi¬ table. Since 1885 Dr. Depew has been regarded as one of the leading Republicans of the coun¬ try. Dr. Depew was married in 1871 to Elise Hegeman, who died 1893, leaving one son. He was married again in 1902 to Miss Palmer. Dr. Depew's fame abroad is even greater than in the United States. In London and Paris he is re¬ garded as America's representative citizen. This fame rests largely upon his ability as orator, after-dinner speaker and lecturer. He delivered important addresses at the Washington Centen¬ nial at New York in 1889 and the dedication of the World's Columbian Exposition, at Chi¬ cago, in 1893, and . orations at the

memorial services of President Garfield and General Sher¬ man. As a wit and humorist. Dr. Depew has ac¬ quired a name second to none in this country, and he has been in great demand for many years at annual dinners and banquets as the chief after-dinner speaker. He has published collec¬ tions of his orations and after-dinner speeches in one volume (1890), and his later speeches (1894). Consult Clemens, (Depew Story Book)

(1898).

DE PEYSTER, de pis'ter, Abraham, American merchant: b. New York, 8 July 1658; d. there, 10 Aug. 1728. He was the eldest son of Johannes DePeyster (q.v.) ; and filled many important public offices after the final cession of the New Netherlands to Great Britain. Be¬ tween 1691 and 1695, he was mayor of New York, and subsequently became chief justice of the province and president of the king's coun¬ cil, in which latter capacity in 1701 he acted as colonial governor. He was also colonel of the forces of New York and treasurer of the provinces of New York and New Jersey. A statue has been erected to him in Bowling Green, New York city.

DE PEYSTER, Arent Schuyler, British

military officer: b. New York, 27 June 1736; d Dumfries, Scotland, November 1832. He was a grandson of Abraham DePeyster (q.v.). In the American Revolution he was a colonel in the Royal army ; was at different times in command of the British posts of Detroit, Mackinac and elsewhere in Canada.

DE PEYSTER, Johannes, American colonial merchant: b. Haarlem, Holland, 1600; d. New York about 1685. He was one of the early settlers of New York; and became prom¬ inent in public affairs during the Dutch posses¬ sion; was one of the last to swear allegiance to the Crown after the English succeeded to the government ; served several times as alderman and deputy mayor, and was frequently urged to become mayor by the English residents, but declined from ignorance of the language.

DEPILATORIES (((I pull out the haiU),

applications used to remove the hair from the body, especially the face and scalp, without in¬ juring the texture of the skin. Quicklime, caus-

tic alkalis, arsenic barium sulphide and orpiment are the most common ingredients. The most celebrated depilatory is the rustna, used by Oriental nations, which consists of quicklime and orpiment (trisulphide of arsenic) boiled in water impregnated with a strong alkaline lye. The parts which are to be deprived of hair are rubbed with this mixture, and after a time washed in warm water. This depilatory acts with great energy, and the utmost care is neces¬ sary in using it that it may not irritate and in¬ jure the skin. Sometimes a plaster of pitch and resin is used for the same purpose. The best and most effective means of removing the hair to-day is by means of a galvanic current, and needle electrode, which is applied directly to the hair-follicle, thus killing it. This procedure is sometimes called electrolysis. There are few depilatories that are free from all chance of poisoning, and none that are not liable to leave a scar unless used with the utmost care.

DEPONENT, (1) in Latin grammar, a verb which is passive in the conjugation of its tenses, but active in meaning. The old grammatic fiction was that such a verb laid aside (deponens , laying aside) its passive meaning. These verbs were originally reflexive. (2) In law, a person who depones or makes a deposi¬ tion ; one who gives his testimony in a court of justice; a witness upon oath. See Deposition.

DEPOSIT, in geology, a layer of soft or hard matter formed by the settling down of mud, gravel, stones, detritus, organic remains, etc., which had been held in suspension in water. Marine deposits are those formed on sea bot¬ toms ; lacustrine, those formed at the bottoms of lakes ; fluviatile, those formed on river bottoms ; and so on. In contradistinction to bed or layer, which is matter more evenly distributed during formation, a deposit is nearly always irregular in form. See Geology.

DEPOSIT, a term of wide meaning in law, but especially applied to money paid as an earnest or security for the performance of a contract ; also to money or goods belonging to one person entrusted to the safe-keeping of an¬ other, to be kept without fee, and to be re¬

delivered on demand. When such a deposit is made to a bank or trading company, interest, according to agreement, is generally paid on it. The person who makes the deposit is called the depositor and the person who receives the de¬ posit is called the depositary. An irregular deposit arises where one deposits money with another for safe-keeping, in cases where the latter is to return, not the specific money de¬ posited, but an equal sum. A quasi deposit occurs where one comes lawfully into possession of the goods of another by finding. By the civil law, deposits are divided into two classes, neces¬ sary and voluntary. The first class is where the depositor is compelled by some sudden emer¬ gency, such as fire or shipwreck, to confide his property to some one, without having oppor¬ tunity for choosing his depositary. The sec¬ ond class is where the deposit is made by the mutual consent of the parties. Besides such deposits of money received by banking or com¬ mercial companies with a view to employing it in their business, a merchant or commercial company frequently deposits with a bank docu¬ ments, such as deeds or bonds, as security for the payment of a loan. The civil law again

divides deposits into simple deposits and seques¬ trations : the former is when there is but one party depositor (of whatever number com¬ posed) having a common interest; the latter is where there are two or more depositors, having each a different and adverse interest.

DEPOSIT CURRENCY. See Currency.

DEPOSITION, (1) in law , the testimony of a witness reduced to writing in due form of law, by virtue of a commission or other author¬ ity of a competent tribunal, or according to the provisions of some statute law, to be used on the trial of some question of fact in a court of justice. In criminal cases, depositions cannot be used without the consent of the defendant, in most of the States; in some provision is made for the taking of depositions by the ac¬ cused. An act of Congress and various statutes provide for taking depositions in civil cases. The privilege of deposition is granted to wit¬ nesses living more than 100 miles from the scene of the trial ; to very old or infirm per¬ sons, or by reason of sickness, imprisonment or being bound to a voyage at sea ; or undertaking a journey out of the United States. All wit¬ nesses granted deposition must be duly sworn before committing evidence to writing.

(2) In ecclesiastical laWj the act of depriving a clergyman, by a competent tribunal, of his clerical orders, to punish him for some

offense, and to prevent his acting in the future in his clerical character.

DEPOSITION OF METALS. See

Electroplating.

DEPOT, de'po, Fr. da-po, a French word in general use as a term for a place where goods are received and stored ; hence in military mat¬ ters a magazine where arms, horses and mules, ammunition, etc., are kept, or where recruits are sent for assignment and preliminary training. The term is now usually applied to those com¬ panies of a regiment which remain at home when the rest are away on foreign service. In the United States it is the common term for a railway station.

DEPRAVITY. A theological doctrine which has been the subject of much discussion. The Calvinists held that because of the fall of man our depravity was total, involving even the bond¬ age of the will and an inability to do any spirit¬ ual good. On the other hand, the teaching of Arminianism was that depravity was only a bias, which was entirely nullified by belief in the efficacy of salvation in Christ. The freedom of the human will and the consequent right of choice determines the continuation of depravity.

DEPRES, de-pra, Josquin, Flemish com¬ poser: b. Hainault, about 1450; d. Conde, 27 Aug. 1521. But little is known of his personal history. He studied probably under Ockegehem and was choir-boy and later chapel-master at Saint Quentin. He went to Italy, where he remained for several years at the court of Pope Sixtus IV and visited all of the great courts of the world. His contemporaries regarded him as the foremost composer of his times. His work forms the connecting link between Ockegehem and Lassus and Palestrina. His principal service to music was in the develop¬ ment of counterpoint and in the adaptation of musical themes to the words of the piece. He left 32 masses, which were partly edited by

DEPRETIS

Petrucci, and fragments have since been pub¬ lished. The Sistine Chapel possesses a number of manuscript fragments. The Gesellscliaft fur Musikf or s chung published selected pieces in modern notation (Berlin 1877). Consult Eitner, (Bibliographic der Musiksammelwerke) (1877) ; Menil, (Josquin de Pres* (in Revue Inter¬ nationale de Musique, No. 21, Paris 1899).

DEPRETIS, da -pra'tes, Agostino, Italian statesman : b. Mezzana-Corte-Bottaroni, near Stradella, 31 Jan. 1813; d. there, 29 July 1887. He studied and practised law in Turin and in 1848 was elected to the Piedmontese Chamber, there supporting the opposition. He was most prominently identified with Italian politics from 1849, when he was made civil governor of Brescia, and in 1861 was sent to Sicily as pro¬ dictator for Garibaldi. He served in a number of the Italian ministries, beginning in 1862 as Minister of Public Works under Rattazzi. Under Ricasoli in 1866-67 he was Minister of Marine and afterward held the portfolio of Finance. In 1876 he was called to form a ministry him¬ self, and while acting as President of the Council and Minister of Finance he instituted many reforms in the government. In 1879 he resigned and Cairoli formed a government, but Depretis was again placed at the head of the Council in 1885 and remained there until his death. In 1893 a monument was erected in his honor at Stradella.

DEPREZ, de-pra', Marcel, French engineer and pioneer electrician : b. 1843. In 1872 he conducted an extensive series of experiments in electric power transmission and 10 years later succeeded in transmitting electric power 35 miles by telegraph wire between Munich and Miesbach. This is considered the first success¬ ful experiment in the transmission of electric power through a considerable distance. Later he conducted many other successful experiments on the line of the Northern Railway of France. He became professor of electricity at the Con¬ servatoire des Arts et Metiers and professor of physics at the College de France. He is a member of the Academy.

DEPRIVATION, the removing of a clergy¬ man from his benefice on account of heresy or misconduct. It entails, of course, loss of all emoluments, but not the loss of clerical charac¬ ter, except it be deprivatio ab officio, or dep¬ rivation of office, which then becomes deposi¬ tion (q.v.) or degradation*. The lighter punishment, simply

taking away a clergyman's living or preferment, is called deprivatio a beneficio.

DE PROFUNDIS, the 130th of the Psalms of David (129th in the Douay version) ; one of the seven psalms expressive of sorrow for sin and desire for pardon used in the liturgy of the Roman Catholic Church and called the Penitential Psalms. The name De Profundis comes from the Latin version of the first words of the psalm, ((Out of the Depths.® See Peni¬ tential Psalms.

DEPTFORD, det'ferd, England, a metro¬ politan and parliamentary borough of southeast London. In the reign of Henry VIII a dock¬ yard was established in this place, then known as Deptford Strond. It was in this dockyard that Peter the Great of Russia served as an apprentice and learned shipbuilding, 1691. It

was from Deptford that Captain Cook sailed in command of the Resolution and Discovery on his last voyage (1776). The London cattle market occupies the site of the old dockyard. The Royal Victoria Victualling Yard, the lar¬ gest army and navy supply depot, is located here. Deptford has important engineering, chemical and earthenware manufactures. The borough returns one member to Parliament. Pop. 109,- 496. Consult Dews, (History of Deptford >

(1889).

DEPUTIES, Chamber of, the lower of the two legislative chambers or second house of national parliament in France, Italy and Ru¬ mania. The first French Chamber of Deputies was established under Louis XVII in 1814. By enactments introduced in 1830 any citizen of 30 years and upward who paid direct contribu¬ tions to the extent of 500 francs might be elected as a deputy. Originally the Chamber was elected for five years; in 1824 it became septennial and in 1830 it was again limited to five years. In France (1917) the Chamber of Deputies is elected for four years by manhood suffrage, and each citizen 21 years old, not actually in military service, who can prove a six months' residence in any one town or com¬ mune, and not otherwise disqualified, has the right of vote. Deputies must be citizens and not under 25 years of age. The manner of elec¬ tion of deputies has been modified several times since 1871. The scrutin de liste, under which each elector votes for as many deputies as the entire department has

to elect, was introduced in 1871. In 1876 it was replaced by the scrutin d' arrondissement, under which each department is divided into a number of arrondissements, each elector voting for one deputy only; in 1885 there was a return to the scrutin de liste, in 1889 the uninominal vote was reintroduced. In 1889 it was enacted that each candidate is bound to make, within the fortnight which precedes the elections, a declaration as to his being a candidate for a given constituency, and for one constituency only — all votes which eventually may be given for him in other constituencies being reckoned as void. In each constituency the votes are cast up and the deputy proclaimed elected by a commission of councillors-general appointed by the prefect of the department. The Chamber in 1917 was composed of 602 deputies ; each arrondissement elects one deputy, and if its population is in excess of 100,000 it is divided into two or more constituencies. The Chamber assembles every year on the second Tuesday of January, unless a previous summons is made by the President of the Republic, and must remain in session at least five months out of the 12. Deputies are paid $3,000 a year and the President of the Chamber receives in addition $14,400 for the expense of entertain¬ ment. Deputies travel free on all railways by means of a small annual payment.

In Italy the number of deputies is 508, elected for five years, unless the Chamber is dissolved by the king, and chosen by almost universal suffrage. Deputies must be 30 years old and must receive a number of votes greater than one-tenth of the total number of inscribed elec¬ tors, and than half the votes given. All depu¬ ties receive $400 annually, to cover expense for correspondence. An additional payment of $800 annually is made to those deputies who receive

no income from any public funds whatsoever. All deputies travel gratis on the railroads.

In Rumania the Chamber of Deputies con¬ sists of 183 members, elected for four years. Deputies must be 25 years of age, and receive $4 for each day of actual attendance besides free railway passes.

DEPUTY, a lieutenant or substitute who exercises power which properly belongs to an¬ other who has placed him in his stead. The appointment of a deputy does not free the prin¬ cipal from responsibility. A deputy must take an oath of office. His salary is paid by the government. If authorized for the time being to act with full power of his principal he is called a general deputy and may act in his own name. Otherwise, when acting in a particular and limited matter, he is only a special deputy. Generally deputies may be appointed only by administrative and executive officers.

DE QUINCEY, Thomas, English miscel¬ laneous writer: b. Manchester, England, 15 Aug. 1785; d. Edinburgh, 8 Dec. 1859. In a striking sense, DeQuincey's life and writings are distinct; for by far the most interesting events in his life took place before 1821, the year of his first publication, after which the course of his life is of an interest wholly sec¬ ondary to his writing. He was the son of Thomas DeQuincey, a well-to-do merchant, of a family that had come to England with the Conqueror. His mother was a Miss Penson, a lady of quality. He was the fifth child and second son among eight children of diverse temperaments. Most of his youth was spent at Greenhay, an estate near Manchester, where, though dominated by the wall of an imperious older brother, his life was that of a shy, sensi¬ tive child, of lively imagination, and with a great love for mysterious and fanciful litera¬ ture. After studying with a private tutor, he was sent to school at Bath, where he distin¬ guished himself in Latin and Greek, and, in 1800, after a visit at Eton and a ramble in Wales with his friend, Lord Westport, to the1 Manchester Grammar School, to the end that he might prepare for Brasenose College, Ox¬ ford. A year and a half, however, was all that he could stand of a regime which deprived him «of health, of society, of amusement, of liberty, of congeniality of pursuits and which, to com¬ plete the precious picture, [admitted] of no variety.® Early one morning in July 1802, he ran away from his master's house, and for nearly a year lived a vagrant life. For some months he roamed about North Wales, with the knowledge of his mother and the support of his uncle, but in November he cast away this support and went to London. Here, according to his own account, he endured many hardships, was frequently obliged to sleep in the streets, to share the lot of vagrants like himself, and to resort to money-lenders for support. Through the aid of one of the latter he was finally dis¬ covered by his family. In .the fall of 1803 he was sent to Worcester College, Oxford, and here he remained off and on till 1809, but never took a degree. Though little in particular is known about his life at the university, he was distinguished as an admirable Greek scholar and read prodigiously in English literature and German

metaphysics. His feeling of superior¬ ity and his desire for privacy, together with a VOL. 8 — 45

straitened income, were the reasons for his se¬ clusion. Leaving Oxford in 1809, he went to live at Grasmere in order to be near Words¬ worth and Coleridge, and in the Lake region he remained almost continuously till 1821. His life here was a very studious one, in which the most conspicuous determinant was the confirma¬ tion of his habit of opium taking. He had first experimented with the drug in 1804, at Oxford, as a relief for an attack of neuralgia, and there¬ after, until 1813, took it systematically at inter¬ vals of two or three weeks simply for the pleasure that it gave. In the latter year, how¬ ever, he (<was attacked,® as he says, <(by a most appalling irritation of the stomach, in all re¬ spects the same as that which had caused me so much suffering in youth, and accompanied by a revival of the old dreams.® It was then that he began taking opium regularly and in large quantities. To some extent he broke the habit at the time of his marriage, in 1816, to Margaret Simpson, the daughter of a farmer in his neighborhood, but the general effect was great prostration of his will, and, though in later years, he had the habit under control, he probably never altogether shook it off. It was some time before he could bring himself to do anything. His first piece of active work, after the failure of his attempt to write a philosoph¬ ical work, (De Emendatione Humani Intcl-lectus) and an unfinished Prolegomena to all Future Systems of Political Economy,5 was the editorship of the Westmoreland Gazette, which office he occupied about a year, 1819-20. The chief, result of all this was to stimulate in him a desire to write, and in September 1821 he published in the London Magazine the first part of his most striking and popular work, (The Confessions of an Opium-eater, being an Extract from the Life of a Scholar.5

Then began the prolific course of writing which has made DeQuincey the prince of maga¬ zine writers. It is unnecessary, from this point, to trace his career in detail. The main facts up to his death are that from 1821 to 1825 he lived chiefly in London, where he wrote a great deal for the London Magazine. Then he returned to Grasmere, whence he contributed largely to Blackwood's Magazine. In 1830 the editor, his friend John Wilson ((<Christopher North,® q.v.), induced him to settle in Edinburgh, and here and at the suburb, Lasswade, he remained till his death. His articles appeared chiefly in Blackwood's, in T ait's Magazine, and, latterly, in Hogg's Weekly Instructor. His life was a very secluded one. Stories are told of his ec¬ centricities and his

absent-mindedness. His quiet was disturbed only by the death of his youngest daughter and his wife. For 20 years at Edinburgh he was obliged to support himself and his large family by his pen, but toward the last decade, legacies enabled him to live in more ease and to give his thought to a com¬ plete edition of his collected writings, of which the first volume appeared in 1853.

DeQuincey's published wrork contains about 150 titles, representing articles varying in length from the moderately long novel (Klosterheim5 (1832), and the historical picture (The Caesars5 (1832-33), to short sketches such as (On the Knocking at the Gate in Macbeth5 (1823), and (English Dictionaries,5 an incomplete note. In these articles he entered the fields of personal experience, reminiscence of personal acquaint-

ance (chiefly of members of the <(Lake® group), biography (principally English), criticism, his¬ tory (largely classical, and, if modern, that of out of th-e way bits of information), philosophy (chiefly by way of expounding well-known men), theology (by way of argument for ortho¬ dox Christian doctrine), economics (exposition and defense of Ricardo), and, more slightly, politics, natural science, linguistics, ethics, aes¬ thetics and fiction. A more compact arrange¬ ment of his works, that adopted by Prof. David Masson, is into autobiography, literary reminiscence and confessions; biographies and biographical sketches; historical essays and re¬ searches; speculative and theological essays; political economy and politics; literary theory and criticism ; and tales, romances and prose treatises; with some miscellanea chiefly in the form of imaginative prose.

In almost all these classes DeQuincey achieved great, though unequal, success. Popu¬ larly, he is best known by the writings in which he exploited his own life and by the dream prose which resulted from his habit of opium-eating. The (Confessions) is naturally his best known work, but scarcely less in interest are his autobiographical sketches. In all these he reveals himself with singular intricacy and free¬ dom. His dream prose, which has done prob¬ ably more than any other of his writings to make great his name as a stylist, is best repre¬ sented by such remarkable pieces as (Suspiria de Profundis* (1845), of which the most fa¬ mous is <(Levana and the Ladies of Sorrow.® All of them are illustrations, as it were, of the states of mind which he describes in the (Con¬ fessions. J Much of the same sort of value at¬ taches itself to the less sensational sketches of his contemporaries, and the instinct of self¬ revelation is here tempered by the addition of brilliant analyses of the characteristics of his great contemporaries for whom he had an in¬ tellectual fondness.

Much of DeQuincey's dream prose is some¬ times included under the head of his narrative writing. His best narrative certainly has the qualities of his imaginative work. In this class are to be found his brilliant (Three Memorable Murders } with its introductory extravaganza, (Murder Considered as One of the Fine Arts* (1826-27), (The Spanish Military Nun) (1847), and what is probably, all in all, his masterpiece, (The English Mail-Coach* (1849). Several of these narrative pieces, like the excellent (Flight of a Tartar Tribe) (1837), may more properly, as regards subject, be classed as historical

writ¬ ings. In all these DeQuincey is always bril¬ liant and successful. The same, however, can¬ not be said of his attempts to write stories and novels. His essays in this field were all com¬ paratively early, took the form of melodra¬ matic, supernatural tales, like (The Fatal Marksman* (1823), translations from the Ger¬ man, like (The Dice> (1823), or of long tur¬ gid romances, like (Klosterheim* (1832), and (The Avenger* (1838).

Of as great importance as the analytical and narrative papers, though not so popularly known, are the biographical and the critical writings. These are hard to separate into dis¬ tinct classes. DeQuincey was too much inter¬ ested in analysis to be a strictly good biog¬ rapher, and whereas the essay on Shakespeare (1838), for example, is mainly biographical, it

rambles into minute questions and contains much matter of a purely critical sort. On the other hand, much of his critical work is in no sense biographical ; such are his well-known dssays on (Rhetoric) (1828), and <Style) (1840-41), and the numerous paradoxical statements of critical theory with which he frequently en¬ livened the pages of contemporary reviews. As good examples as any of his idea of biog¬ raphy and criticism may be obtained from his various essays on Pope. That of 1837 is chiefly biographical; those of 1848 and 1851 are crit¬ ical, and the last, (Lord Carlisle on Pope, * characteristically takes the form of dissent from an accepted view. For the most part his biography and criticism deals with English writers; outside of them, Germany is his fa¬ vorite field.

DeQuincey's historical writings, in like man¬ ner, are hard to divide, and may best be treated together. Many of them, like (The Spanish Military Nun) and (The Flight of a Tartar Tribe,* are narrative and deal with extraordi¬ nary events. He is, however, more likely to be interested in the philosophical aspect of his¬ tory, as in (The Philosophy of Roman His¬ tory *(1839). The best known of his writings of this 'class, and indeed his most ambitious piece of work, is the unfinished (Caesars* (1832-33), in which he desired ((simply to characterize the office of 'Emperor, and to notice such events and changes as operated for evil, and for a final effect of decay, upon the Cae¬ sars or their empire.® It is really an attempt to present a general view of ((the sublimest in¬ carnation of power, a monument of the mighti¬ est of greatness built by human hands, which upon this planet has been suffered to appear.® DeQuincey's more strictly philosophical writ¬ ings, including his discourses on economics and theology, .are

also numerous. They are mainly serious, discriminative, analytical and paradoxi¬ cal in tone and manner. Typical examples are (On Hume's Argument against Miracles* (1839), (Casuistry* (1839), and (Judas Is¬ cariot* (1853).

In general, in all these writings, DeQuincey deals chiefly with intellectual conceptions and is concerned with objects only to a compara¬ tively slight degree and for an ulterior pur¬ pose — that of showing the underlying subtlety. The apparent exceptions to this generalization lie in his descriptions of particular people, like Wordsworth, the particular scenes of such an essay as <The English Mail Coach,* and the narration of historical events, all of which are, however, subordinated to an underlying (<idea.® Furthermore, the purpose of DeQuincey's writ¬ ing, so far as one can see, is much more intel¬ lectual than moral, though it may have sec¬ ondary moral effects. Curiosity is his animus — the desire to present some new body of facts or ancient facts in a new and strange light. He enjoys what might be called intellectual sensation and loves to delve and burrow into the recesses of experience. He has frequently been called an ˆintellectual hedonist® and that term as well as any sums up the vast range as well as characterizes the attitude of the author toward his subjects. The main fact is that he deals in distinctions, that his interest lies in in¬ tellectual phenomena, and that he is appealed to by the logic of situations.

DE QUINCEY'S AUTOBIOGRAPHIC SKETCHES — DER ARME HEINRICH 70?

DeQuincey differs strikingly from such writers as Shakespeare, Addison, Johnson and Lamb, in that it is impossible to trace him through any period of apprenticeship before coming to his own. Rather he is like Swift, in that he took to publishing rather late, jumped at once into success and continued pouring out work of striking quality. Like Swift, DeQuin¬ cey, once embarked, knew no let or hindrance to the course of his expression. Unlike Swift, however, he never took an active interest in affairs and his writing is in no wise concerned with the practical movements of the time. Hence the course of his life after 1821 is, from the point of view of his work, unimportant, and any account to the last 39 jˆears is an account of the interests of his mind. These were so varied that it is impossible to trace the history of his mind with any definiteness, but a few

observations may be made. If anything, the decade between 1841 and 1850 is the most pro¬ lific, and on the whole represents the climax of his activity. In that decade, too, the pre¬ vailing interest is mainly in philosophy and criticism, whereas the preceding 10 years were particularly rich in history and biography. On the whole, setting aside such a striking per¬ formance as the (Confessions,5 there is a tend¬ ency toward originality. His criticism and philosophy are less formal and less of the na¬ ture of summary, while it is especially to be noted that, in narrative, his adaptations of Ger¬ man tales and his own German-bred romances gave place to such original pieces as (The Eng¬ lish Mail Coach) and (The Spanish Military Nun.5 There is in the decade between 1841 and 1850 much reversion to the original type of the Confessionsˆ Probably the fact that De Quincey did a good deal of hack work in the decade beginning with 1830, when he first es¬ tablished himself at Edinburgh, would account for the general inferiority of that decade to the following, and yet many of his best pieces belong there.

DeQuincey is usually regarded as among the English masters of prose style. The appel¬ lation, with regard to him, signifies a marvel¬ lous and unfailing command of means of ex¬ pressing very minute shades of thought and feel¬ ing, combined with the power to write, on oc¬ casion, sonorously, grandly and very wittily. He is always discursive and intricate, to a de¬ gree almost unparalleled among masters of prose. As a critic he has few superiors, and as a thinker few masters in point pf delicacy and exactness, but many in profundity. See Con¬ fessions of an Opium Eater, The; DeQuincey's Autobiographic Sketches.

Bibliography. — The best edition of his col¬ lected works is by David Masson (14 vols., London 1889-90). Separate editions of his more popular works are numerous. (Posthu¬ mous Works5 were edited by Japp (ib. 1891— 93). Consult also (Lives5 by H. Page (2 vols., 1881) ; Masson (in 'English Men of Letters Series5); Leslie Stephen (in dictionary of National Biography5); Findlay (London 1885). The best essays are by Saintsbury (in 'Essays in English Literature,5 1780-1860) ; Stephen (in 'Hours in a Library5); Hogg, 'DeQuin-ccy and His Friends5 (1895).

William T. Brewster,

Professor of English, Columbia University.

DE QUINCEY'S AUTOBIOGRAPHIC SKETCHES. What is commonly called (The Autobiography5 of Thomas DeQuincey is more accurately entitled (Autobiographic Sketches.5 This latter title suggests the mode of com¬ position. DeQuincey did not deliberately plan and forthwith compose his autobiography. Rather he began by contributing reminiscent articles to periodicals, a practice which he con¬ tinued until he had written and published about 30. In 1853, he collected these articles, revised, enlarged and polished them with his custom¬ ary diligence, and gave them to the public under the title (Autobiographic Sketches.5 The reader must not suppose that all of De Quincey's autobiographical work is contained in these collected articles; the 'Sketches5 must be supplemented by a large amount of other reminiscent composition, particularly by the 'Confessions of an English Opium Eater,5 by (The English Mail Coach, 5 and by that note¬ worthy series of papers included under the general title, 'Suspiria de Profundis.5 In truth, all of these compositions might, with entire propriety, be included under the title (Autobiographic Sketches.5 As a matter of fact, the autobiography of DeQuincey, more than that of almost any other man, is fragmen¬ tary — a succession of sketches loosely con¬ nected and widely scattered. DeQuincey lived from early childhood in a dream-world.; the record of his successive dreams constitutes the true inner autobiography of the man. He might have written an objective account of the out¬ ward events of his life and thus have attained a brevity and a form such as David Plume attained in his autobiographic sketch. Fortu¬ nately, DeQuincey did not do this, and, in consequence, we may know his spirit as we may know the spirit of only a few men. Apart from their value as a revelation of De Quincey's soul, the (Autobiographic Sketches5 are remarkable from a purely literary point of view. To be sure, they exhibit both the defects and the virtues of DeQuincey's style. At one time, we are carried rapidly on by the swift flow of the author's "impassioned prose55 ; at another, we are becalmed by sluggish, almost uninteresting narrative. In general, however, the style is of high qual¬ ity and the narrative compelling. Few read¬ ers can ever forget DeQuincey's account of his visit <(about an hour after high noon55 to the chamber where his little sister lay dead ; of the Sunday mornings when he went with his family to a "church having all things ancient and venerable, and the proportions majestic55; of his stay at "Oxford, ancient mother, hoary with ancestral honors.55 The appeal of the whole series is strong, and it is the experience of most readers that they return to these (Sketches 5 frequently to commune with the strange elfin spirit of DeQuincey; to pass under the spell of the ((organ music55 of his rhetoric; to feel something of that "mighty and essential solitude55 which, in the words of the author, "stretches out a

sceptre of fascina¬ tion55 for us all.

Waldo H. Dunn.

DER ARME HEINRICH, a courtly epic, written by the Middle High German poet Hart¬ mann von Aue in the decade between 1190 and 1200. Its source is an unknown Latin work,

probably the family chronicle of the lords of Aue to whose family Hartmann belonged. Dif¬ fering from most of the knights of his time, he proudly boasted that he was able to read books, i.e., Latin books. He tells us, moreover, that he began to interpret a tale he found in writing. The poem relates the touching story of how Prince Henry was cured of the dread disease of leprosy by the devotion and sacrifice of a little girl. In the midst of worldly honors the prince had been suddenly smitten by leprosy, and, forsaken by all his courtiers and friends, took refuge in the house of one of his tenant farmers, whose little 12-year-old daughter cared for him tenderly. Henry in return soon became fond of her, gave her many presents, and called her in jest <(his little wife.® Learning one day that her master could be cured by the blood of an innocent maid she determined to sacrifice herself. After much difficulty she obtained her parent's con¬ sent, and made the journey with the prince to Salerno. Henry, touched by her devotion and by her wondrous beauty, as she lay stripped upon the surgeon's table awaiting the fatal knife, refused to accept the sacrifice. On their homeward journey, however, his skin was re¬ stored to its former purity, and he rewarded the maid's devotion by making her his wife. The monkish origin of the piece is shown by the fact that this 12-year-old girl is prompted to her sacrifice mainly by the hope of winning heaven, and talks like a learned monk on the wickedness of this world and the raptures of heavenly bliss. The subject is a repulsive one, but with delicate tact Hartmann avoided all descriptions of the loathsome disease, and, as the poet Uhland once said, cast over the old legend so soft and subdued a light that it is one of the most charming tales of the Middle Ages. In modern times it has been worked up in English by Longfellow in his (Golden Legend* and by Rosetti in (Henry the

Leper. > Many German writers have attempted to modernize the legend, the most important of whom are Gerhard Hauptmann in a verse drama and Ricarda Huch in a prose tale. Consult Tarbell, H., (Der arme Heinrich in der neueren Dichtung.* The best German edi¬ tions are those of Wackernagel-Toischer (Basel 1885) ; Bech (3d ed., 1891), and Paul, H. (2d ed., 1893). A good English edition is that of J. G. Robertson (London 1895).

Daniel B. Shumway.

DER GRUNE HEINRICH, «Green Henry® (1854) is a psychic autobiography of G. Keller in the same sense and with the same limita¬ tions as <Werther) or (Wilhelm Meister) is of Goethe. Truth is freely mingled with fiction, and there is a generalizing purpose to exhibit the psychic disease that affected the whole generation of the transition from romanticism to realism in life and art. Green Henry, so named from the color that he affected in dress, was a Swiss burgher's son, brought up too tenderly by a widowed mother. After youth¬ ful pranks and experiences, told with delight¬ ful freshness, and a not altogether justified dis¬ missal from school, he idles away some time in his mother's village in activities of which the description is far better worth while than was the reality. He determines to be a painter, and goes to Munich's artistic Bohemia, whence he finds his way to a count's mansion and

thence home to his dying mother and an all-too-tardy and brief repentance. Abandoning art, he enters the civil service. This experi¬ ence affords occasion for extended political reflections. The tone of the reminiscences makes it clear that Keller would have the reader understand that Heinrich has lived through and risen out of his instability and irresolution and sees life steadily and cheer¬ fully at last. (Der Grime Heinrich) was slow in gaining recognition. A second edition was not called for till 1879. It has since won general and often extravagant praise. Keen insight, fresh humor and instinct for realistic narra¬ tion are its outstanding merits ; its faults are lack of proportion, occasional garrulity and obtruded moralizing, but most of all the doubt that it leaves in the reader whether the Hein¬ rich who had shown such persistent lack of character, especially in his relations with his mother, would so quickly be capable of dis¬ covering, rather than recovering, a normal balance of mind.

Benjamin W. Wells.

DERA (a word derived from the Arabic (<der,® a monastery), the name of several towns in British India, the two principal places so designated being (1) Dera Ghazi Khan, and (2) Dera Ismail Khan (qq.v.).

DERA GHAZI KHAN, der'a ga-ze' kan, India, a district and a town in the Punjab, in the division of Multan. The district lies en¬ tirely on the right bank of the Indus, and con¬ sists of a sandy strip of low land shut in be¬ tween the Suleiman Hills and the river. The town lies about two miles from the Indus, has many striking mosques, town-hall, courthouse, handsome bazaar, cantonments, *etc.* Pop. of the town 19,000.

DERA ISMAIL KHAN, es-ma-el', India, a district and a town in the northwest frontier province, in the division of Deraj at. The district lies north of that of Dera Ghazi Khan on both sides of the Indus, and is in great part barren and sandy. The town is situated four and one-half miles west of the Indus, and is the admin¬ istrative headquarters of the Dera Ismail Khan district. There are here various government offices, cantonments for troops, and an im¬ portant station of the Church Missionary Society. An important caravan trade is con¬ ducted with Afghanistan. It is a somewhat straggling town on a level plain. Pop. 35,131.

DERAJAT, der-a-jat', India, division or commissionership forming a portion of the Punjab, and occupying part of the valley of the Indus. It comprises the districts of Dera Ghazi Kahn, Dera Ismail Khan, Muzaffargarh, and Bannu. Much of it is sandy and uncul¬ tivated, but many parts are well cultivated, and irrigation is largely employed. .The area under cultivation is increasing rapidly. Area, 22,315 square miles. Pop. 1,643,603.

DERBEND, or DERBENT (<(gateway®). Russia, a port and capital of the district of Daghestan, on the western shore of the Caspian, 140 miles northwest of Baku. It is charmingly situated among vineyards and orchards and fields of maize and madder, on the declivity of a branch of the Caucasus, which here ap¬ proaches very close to the water's edge. It is surrounded by ancient walls. The harbor is inaccessible to all but small vessels ; but a con-

siderable trade is done at the four large markets held here yearly. Silk and cotton fab¬ rics, earthenware and weapons are manufac¬ tured, and saffron is cultivated. It was long considered the key of Persia on the northwest side. It was captured by the Arabs in 728, by the Mongols in 1220, and frequently changed hands before it was formally incorporated with Russian Caucasia in 1813. Pop. about 15,000.

DERBIGNY, Pierre Auguste Charles Bourisgay, American statesman: b. France, about 1765; d. New Orleans, 6 Oct. 1829. Dur¬ ing the Revolution of 1789 he was obliged to flee from France to Santo Domingo and thence to the United States, living for a while at Pittsburgh, Pa., and subsequently removing to Missouri, to Florida, finally settling in Lou¬ isiana. In 1803 he was made secretary to Mayor Borsee of New Orleans, and in the same year was appointed interpreter of languages for Governor Claiborne. In 1805 he was one of three delegates sent to petition the United States government for the admission of Louisiana as a State of the Union. Their efforts, however, were unsuccessful. Subsequently Derbigny held other public offices, such as clerk of the Court of Common Pleas, secretary of the leg¬ islative council, member of the lower house of the first State legislature and judge of the Supreme Court. He delivered the first Fourth of July oration made in Louisiana and in 1820, with Livingston and Moreau, was appointed to revise the law's of Louisiana. In that same year he received the first license issued to operate a steam ferry across the Mississippi at New Orleans. As a personal friend of General Lafayette he was his representative in legal and business affairs in Louisiana until his death. In 1828 when Governor Johnson's term of office expired, Derbigny succeeded him, and his ad¬ ministration was marked by the visit to New Orleans of General Jackson, who had been in¬ vited by the legislature to take part in the cele¬ bration of his victory of 8 Jan. 1815. Governor Derbigny was killed early in the second year of his administration by a fall from his car¬ riage.

DERBY, Earl of, a title conferred in 1485 on Thomas, second Lord Stanley, two months after Bosworth Field, where he and his family had greatly contributed to Richmond's victory. The Stanleys were descended from Adam de Aldithley, who attended William the Conqueror to England, and whose grandson, having mar¬ ried the heiress of Thomas Stanley, of Stafford, exchanged the manor of Thalk in that county, which he had received as his wife's marriage-portion, for that of Stoneley, in the county of Derby, and afterward assumed

the surname of Stanley. In 1405 Sir John Stanley, who had married the heiress of Lathom, obtained a grant of the Isle of Man, which he and his descend¬ ants ruled till 1733.

DERBY, Edward Geoffrey Smith Stanley.

14th Earl of, English statesman : b. Knowsley Park, Lancashire, 29 March 1799; d. there, 23 Oct. 1869. He was educated at Christ Church, Oxford, and entered Parliament shortly after leaving that university as member for Stockbridge in Hampshire. His very first speech marked him out as a skilled debater, and he rapidly rose to distinction in the House. His views at first inclined him to side with the

Whig party. In 1827 he joined Canning's min¬ istry as Under-Secretary for the colonies, and became Chief Secretary for Ireland and Lord Grey. The opposition, led by O'Connell in the House of Commons, was powerful and violent; but while he firmly resisted the extravagant demands of the opposition and the agitation for the repeal of the union, he succeeded in passing a number of measures wrhich tended to lessen the prevailing discontent. He improved the administration of justice, carried a bill establish¬ ing a system of national education, and after¬ ward, as Secretary of State for the colonies, supported the bill) for the reform of the Irish Church, by which two archbishoprics and 10 bishoprics were abolished. He also gave his warm support to the petitions which were pre¬ sented to Parliament for the abolition of slav¬ ery in the British colonies, and was successful in passing the act for this purpose in 1833. He now joined the Tories and accepted office under Sir Robert Peel, being again appointed C olonial Secretary. He distinguished himself by his wise administration of this department during the four following years. In 1851 he became Earl of Derby, succeed¬ ing his father. In 1852 and 1858 he was commanded by the queen to form a ministry but on both occasions he had to contend against a majority in the House of Commons, and was able to maintain himself in office only for a short period. He was more successful in 1866, when, on the defeat of Lord John Russell's gov¬ ernment on one of the chief clauses of their reform bill, he undertook to form a ministry. His administration on this occasion was signal¬ ized by the reform of the government in India, the successful conduct of the Abyssinian War, and the passing of the reform bill which intro¬ duced household suffrage as the qualification for the electoral franchise. Disraeli (q.v.) was the great force in these ministries, and succeeded him in the

premiership. Earl Derby joined to great ability as a statesman and brilliant ora¬ torical powers a high degree of scholarly cul¬ ture and literary ability. Among other works he published a successful translation of Homer's <Iliad) (1864). Consult Kebbel, (English Statesmen Since the Peace of 1815 : Derby5 (London 1869) ; Saintsbury in Reid's (Prime Ministers of Queen Victoria5 (New York

1892).

DERBY, Edward George Villiers Stanley,

17th Earl of: b. London, 4 April 1865, and succeeded his father the 16th Earl, in 1908. He w'as educated at Wellington College,' served in the Grenadier Guards, 1885-95, was chief press censor in South Africa, 1900. He repre¬ sented the West Houghton division of Lanca¬ shire in the Conservative interest, 1892-1906; was financial secretary to the war office, 1900-03; and Postmaster-General, 1903-05. After the outbreak of the great European War he de¬ voted himself to securing voluntary accessions to the army and was appointed director of re¬ cruiting under what was called the Derby scheme. He was created a Knight of the Gar¬ ter in 1914.

DERBY, Edward Henry Smith Stanley,

15th Earl of: b. Knowsley, Lancashire, 21 July 1826; d. there, 21 April 1893. He was educated at Rugby and Trinity College, Cambridge. He was a member of the House of Commons

(1848-69) ; Under-Secretary of Foreign Affairs; afterward Secretary of State for India. Under his superintendence the management of the British India empire was transferred from the East India Company to the government of Great Britain. In 1866 and also in 1874 he was secretary of state for foreign affairs. Lord Derby became a Liberal in 1879, and was sec¬ retary of state for the colonies under Mr.

Gladstone from 1882 to 1885. However, he took a stand against Irish Home Rule in 1886 and afterward ranked among Mr. Gladstone's op¬ ponents. He became chancellor of the Univer¬ sity of London in 1891, which post he held until his death.

DERBY, George Horatio, pen name ((John Phcenix,® American humorist: b. Dedham, Mass., 3 April 1823; d. New York, 15 May 1861. He was graduated at West Point (1846) and served in the army during the Mexican War (1846-47). He wrote a series of sketches and burlesques, entitled <Phcenixiana) (1855) ; and (The Squibob Papers* (1859).

DERBY, Orville Adelbert, American geol¬ ogist : b. Kelloggsville, N. Y., 23 July 1851; d. 1915. He was graduated at Cornell University in 1870, made trips to Brazil in 1870 and 1871, and was instructor at Cornell in 1873-75. In 1875 he became a member of the Brazilian geological commission, and was later engaged in geological work in Brazil, being at one time curator of the geological department of the National Museum, and holding the position of chief of the geographical and geological survey of Sao Paulo since 1886. In 1907 he became chief of the geological survey of Brazil. He published a number of valuable papers on the geology and geography of Brazil, and was considered one of the first authorities on the subject. In 1891 he published the first detailed topographical maps of South America based on actual surveys.

DERBY, Conn., city in New Haven County, at the junction of the Naugatuck and Housa-tonic rivers and on the New York, New Haven and Hartford Railroad, nine miles west of New Haven. In 1893 the towns of Birmingham and Derby were consolidated and incorporated as the city of Derby. It is a manufacturing city of much importance and has abundant water power from the two rivers. There are exten¬ sive manufactures of brass and iron goods, type¬ writing machines, pianos, organs, piano players, heavy castings, engines, dairy and other ma¬ chinery, files, woolen underwear, corsets, hosiery, combs, hairpins, curling irons, keys, guns and ammunition, paper, pins and spec¬ tacles, and at one time the old town had a large West India trade and noted shipbuilding yards. A bridge across the Naugatuck River connects Derby with the thrifty manufacturing city of Ansonia. It has several parks, daily and weekly newspapers, a national bank, good public and private schools. The government is adminis¬ tered by a mayor, elected biennially, and a unicameral council. It was the birthplace of Gen. David Humphreys, prominent in the Revolution. Consult Orcutt and Beardsley, (The History of the Old Town of Derby> (Springfield 1880), and (The Town Records of Derby,

1665-1710) (Derby 1901). Pop. (1920)

11,238.

DERBY, England, a municipal, county and parliamentary borough, capital of Derbyshire, on the Derwent River and the main line of the Midland Railway, 129 miles north-northwest of London by rail. It has some fine public build¬ ings, among which are the churches of All Saints, Saint Alkmund and Saint Werburgh, built before the time of Henry VIII ; Saint Mary's (Roman Catholic), designed by Pugin. The Derby grammar school dates from 1160. There is a very handsome free library and museum and a fine technical college. The prin¬ cipal manufactures are silk, cotton, paper, ar¬ ticles in Derbyshire spar, castings and porce¬ lain, *etc.* Here are situated the offices and principal workshops of the Midland Railway, giving employment to about 12,000 workmen. The principal public utilities are municipally owned. Derby is one of the oldest towns in the kingdom, and is supposed to owe its origin to a Roman station, Derventio, situated at Little Chester, on the opposite side of the river. Under the Danes it took the name of Deoraby. Derby was the most southerly point reached by Prince Charles Edward in 1745 in his attempted march on London. Richardson, the novelist, and Herbert Spencer were natives of the town. The borough returns two members to Parlia¬ ment. Pop. 109,864.

DERBY DAY, the great annual London holiday, on which ((The Derby, }) one of the most popular of the English horseraces, is run. It always falls on a Wednesday, being the second day of the grand race meeting, which takes place in the week after Trinity Sunday. The race is run on Epsom Downs, an extensive plain in the neighborhood of London. This race was instituted by the Earl of Derby in 1780. The entry-money is now $500, but under the new regulations introduced in 1890 the first prize is definitely fixed at $25,000 with any surplus fees. The course over which the race is run is 1 mile 4 furlongs 29 yards in length. Since the race was instituted the weights have been several times increased, until now the colts have to carry 126 pounds and the fillies 121 pounds. Derby day is now regarded, especially in Lon¬ don, as a great holiday, Parliament is adjourned and vast multitudes flock from the city and its neighborhood to Epsom Downs. During the years of the World War, 1914 to 1918. this clas¬ sic event was suspended but in 1919 was re¬ newed with special peace celebrations. See Horseracing.

DERBY PORCELAIN. A porcelain fac¬ tory was started in this English town in 1750 by William Duesbury assisted by Andrew Planche, a French refugee potter, and with the financial backing of a Derby banker named Heath. The venture was a success, and, in 1769, Duesbury purchased and ran the Chelsea porcelain works.. In 1784 he brought the plant and workers to Derby. In 1776 he acquired the Bow porcelain factory and moved it, to¬ gether with a number of artisans, to Derby. On Duesbury's death, in 1786, his son (same name) continued the works, but in 1795 he took in Michael Kean (a miniature painter) as partner, with the firm name Duesbury & Kean. Next year Duesbury died, to be succeeded by a third William Duesbury. In 1809 Robert Bloor, manager, bought the factory. Sickness caused him to engage John Thomason as man-DERBYSHIRE — DERCETO

ager and a Mr. Clark, sculptor and painter. The latter took over the factory on Bloor's death (1846), but made financial failure, sold out to a Staffordshire firm and the works were closed in 1848. Some of the Bloor workers were, later, employed by Sampson Hancock to carry on a small factory, using the former styles. With royal patronage the firm became The Derby Crown Porcelain Company, Ltd., in 1877, to become, in 1890, The Royal Crown Derby Porcelain Company. It continues to this day.

Characteristics. — Derby shows little of for¬ eign art tendency in her ware. In this she stands out distinct from her contemporaries (Bow, Chelsea, Worcester). Her designs show originality and are thoroughly English. It ,was the time of the Adams brothers, Chippendale and Sheraton, and contemporary silversmithing and furniture are reflected. When the workers, molds and models were brought from Chelsea a number of pieces of exact similarity were made ; they are the Chelsea-Derby ware that puzzles collectors.

Product. — In the earliest Derby period we know that "figures® were the chief production ; Duesbury's notebook says so. We do not know of any of these existing. The later bisque (unglazed) groups and figures show extreme refinement ; they are actual pieces of sculpture. Most of the Derby output consisted of tea, coffee, dinner and dessert services, delicately decorated; also flower baskets, vases, scent bottles,

seals, *etc.* Bloor put into the market the accumulated stock of “seconds,® covering up the blemishes with “Japan taste® decoration.

Decoration. — Among the styles of this fac¬ tory are “Derby Japan,® “Rock Japan,® “Grecian Japan,® “Witches Japan.® Following the Adams furniture motifs, we find vases and urns of Herculaneum model decorated with festoons of “husk® pattern (bellflower) in delicate borders, rosettes interrupting. The noted Derby “gros-bleu,® claret and canary made lovely back¬ grounds. Some transfer-printing was done, but Duesbury preferred the more expensive but artistic handpainting. Beautiful flower decora¬ tion appears from talented artists (Billingsley’s unrivaled roses). Last period shows profuse gilding.

Glaze. — “Soft, lustrous, satiny® are the terms used by connoisseurs. Derby glaze was so soft it powders under a file; services used show wear on the surface. So soft is this glaze that the enamel colors of the decoration appear to have sunk into it almost like under¬ glaze pigments. Bloor’s glaze was harder.

Paste. — Of course early paste is likely to have been the same as Chelsea and Bow, glassy. Soapstone and bone-ash were added in the true Derby paste, later china clay. From 1770 we have a true pate tendre with close fracture and strongly translucent. Bloor paste is inferior.

Marks. — From 1769 to 1773 an anchor sur¬ rounded by the Derby “D.® In 1773 a crown with jewelled bows is added to the “D® (in blue, purple or puce). A crown surrounded by “Duesbury Derby® in gold appears. The crown was authorized by King George II and remained thereafter. Duesbury the Second period (1786-94) used crown and “cross batons® additional to last mark. Duesbury-Kean period used DK monogram. Duesbury III used “W. Duesbury 1803® surmounting a crown, cross batons below and D bottom of all. This was the last mark.

We find the crown in puce, blue, purple, green, lilac, rose, vermilion, black and (rarely) gold.

Artists. — Duesbury gathered in perhaps the finest artists of any English ceramic factory. There were R. Askew, flower painter; William Billingsley, the noted flower genius; Zachariah Bowman, landscapes and birds; John Haslem, flowers (later portrait painter to the queen) ;

F. Duvivier, flowers ; Michael Kean, miniatures ; W. Pegg, plants and single flowers; J. Bacon, R.A., modeler; W. Coffee, modeler; Hill, landscapes; Brewer, figures and landscapes; Keys, gilder; and many equally as noted.

Bibliography.— Bemrose, W, <Bow, Chelsea and Derby Porcelain > (London 1898) ; Binns, \V. M., (The First Century of English Porce¬ lain* (London 1906) ; Bradbury, E., (Derby China } (London 1883) ; Church, Sir A. H„ (English Porcelain made during the Eighteenth Century5 (London 19G4) ; Haslem, J., (The Old Derby China Factory5 (London 1876) ; Nightingale, J. E., Contribution towards the History of Early English Porcelain5 (Salis¬ bury 1881); Solon, M. L., (Brief History of Old English Porcelain5 (London 1903) ; Tiffin, W. F., Chronograph of the Bow, Chelsea and Derby Porcelain Factories5 (Salisbury 1875) ; Wallis, A., and Bembrose, Junior, W., (The Pottery and Porcelain of Derbyshire5 (London

1870).

Clement W. Coumbe.

DERBYSHIRE, a north midland county in England ; area, 1,029 square miles. The county is noted more for its coal mining and manufac¬ turing than for agriculture although about 70 per cent of the area is productively occupied. Oats, barley, potatoes and wheat are the prin¬ cipal crops, with dairy farming and pasture in the uplands. Its beautiful scenery and the numerous mineral springs attract tourists and health seekers. The Peak district is one of the most attractive in the kingdom — Kinder Peak rising to 2,088 feet and the Peak to 1.880 feet. The Trent and the Derwent are the prin¬ cipal rivers. Its chief minerals are coal, iron ore, lead, flour or Derbyshire spar, limestones, marble, zinc and elastic bitumen. Some of the industries of the county are malting and brew¬ ing, the manufacture of iron, silk and cotton goods, calico prints, agricultural implements, paper, hats, porcelain, various kinds of cloth, and vases, urns, etc., from the Derbyshire spar. Coal mining is an important industry and to transport the coal several canals and railroads cross the county. The principal towns are Derby, Buxton and Belper. Haddon Hall, the original of Martindale Hall in Scott's (Peveril of the Peak,5 and Chatsworth, the seat of the Devonshire, are noteworthy historically and as architectural types. For parliamentary purposes the county is divided into seven constituencies, each returning one member. Pop. 683,423.

DERBYSHIRE SPAR, the finely crystal¬ lized fluorite from Derbyshire. The “Blue John® of the Derbyshire miners is a crystalline fluorite in which are alternate bands of blue and pale yellow spar. It is made into orna¬ mental articles such as vases. See Fluorite.

DERCETO, der-se’to, the Greek name of Atargates, a Syrian goddess, the principal fe¬ male deity of the Philistines, widely worshipped at Ascalon. She was the female counterpart

of Dagon (q.v.), terminating like him in a fish. She was a nature goddess presiding over the principle of generation and fertility, corre¬ sponding to the later Greek goddess Aphrodite and the Roman Venus.

DERECSKE, de’rech-ke, Hungary, a market town in Hungary, in the county of Bihar. In the neighborhood are four lakes, from which, by evaporation, soda is obtained. Nearby is another lake, called Fingoto, cele¬ brated from the earliest times for its baths. In the same locality pearls are found, which, though small, are equal in beauty to those of the East. Pop. 8,272.

DERELICT, any property abandoned, de¬ serted or cast away in such a manner as to indicate by the owner that he has relinquished claim thereunto. The mere intention of aban¬ donment does not constitute dereliction. A ship abandoned at sea either by consent or compul¬ sion under stress of weather or other unfore¬ seen conditions is not forfeited if any evidence is left thereon of the owner’s intention to re¬ turn when the stress is removed. The owner may recover on payment of salvage within a year and a day, otherwise the property is con¬ sidered derelict. The same rule applies to goods thrown overboard.

DERENBOURG, de-ran’boor’, Hartwig, French Orientalist: b. Paris, 17 June 1844; d. 1908. He studied at Gottingen and Leipzig, pursuing Arabic later at the Paris Ecole des Hautes Etudes. Engaged at the Bibliotheque Imperiale to continue the preparation of the catalogue of Arabic manuscripts in 1879 he was appointed professor of Arabic and in 1886 pro¬ fessor of Islamism and the religions of Arabia at the

Ecole des Hautes Etudes. In 1880 he examined the Arabic manuscripts in the Escurial and other libraries in Spain (Vol. 1 of his Escurial catalogue appearing in 1884), and on his return was made assistant to the com¬ mission upon Semitic inscriptions at the Academie des Inscriptions et Belles-Lettres. He issued a number of valuable editions of Arabic writers and became a member of the Institute in

1900.

DERENBOURG, Joseph, French Oriental¬ ist: b. Mayence, 21 Aug. 1811; d. Bad-Ems, 29 Aug. 1895. Of a family distinguished for learn¬ ing, whose original home was Derenburg in Saxony, after rabbinical studies in his early youth, he went first to Giessen and then to Bonn, where Freytag was his Arabic teacher, and from which he gained his doctorate in 1834. A few years were spent as private tutor in Amsterdam, when in 1838 he settled in Paris. In 1852 he became proofreader of Oriental texts at the Imprimerie Imperiale, which posi¬ tion he resigned in 1879, owing to an affection of the eye. He was an active educational fac¬ tor in French Judaism, and with wider fields of Oriental learning made noteworthy contribu¬ tions, his erudite works proving mines of value for later scholars. For example, his (Essai sur l'histoire et la geographic de la Palestine) (Paris 1867) shed much light on the history of the Jews in the time of Christ. He planned a complete edition of Saadia's works in Arabic and French, a large part appearing in his life¬ time. He issued a second edition of S. de Saey's (Seances de Hariri/ and collaborated

with his son Hartwig in his edition of Abu-la Walid, and of Saadia.

DE RERUM NATURA, d<? ra-rum na-too'ra ((On the Nature of Things*), a philo¬ sophical poem of about 7,500 hexameter verses, conceived and written in the grand style that is part of the epic form, and dealing with the physical constitution and environment of human life with a view to the emancipation of that life from the tyranny of superstition and of mean desire. The doctrines set forth are those of Epicurus, whom the author reveres as the savior of mankind. Of this author, Titus Lucre¬ tius Carus, we know practically nothing except through the revelation of his personality that is made in the poem itself. Saint Jerome, it is true, in his continuation of the Chronicle of Eusebius, says that Lucretius was born in 95 b.c., became insane through the effects of a love-potion, wrote in his lucid intervals

<(several books® which Cicero subsequently edited, and died by his own hand in his forty-fourth year. Every clause of this brief statement has been disputed and there is no general agreement as to the amount of truth that may be contained in it. It would seem, on the one hand, highly improbable that a poem should have been thus composed that exhibits on almost every page extraordinary acuteness of observation and reasoning. On the other hand, the passionate intensity which marks the style from beginning to end has suggested to many readers, as it did to DeQuincey, that the author was laboring under some abnormal strain, and the internal evidence is conclusive that the work did not receive final revision. But interesting as it would be to know something of the details of the poet's life, it is not likely that any such knowledge would materially change the idea that we have been able to form of him from his work. No poet was ever less autobiograph¬ ical ; no poet ever made a more complete revela¬ tion of his essential self. The greater part of the poem is concerned with the proof of the existence and character of the laws of the physical universe. Yet Lucretius is interested in physical science primarily because it alone provides the necessary foundation for his doc¬ trine of ethics. Observing everywhere in the history of the Mediterranean world the suffer¬ ings of mankind due to belief in the power of anthropomorphic and capricious deities, he set himself the task that modern science has in fact accomplished, to prove that the reign of law is universal, that given causes produce given effects, and that no arbitrary interposition of an external power can modify in the slight est degree the chain of causation. It follow that man is master of his fate, that neither in this world nor in the next (for, the soul being atomic, there is no next) can, the gods affect his life in any way for weal or for woe, and that therefore, if only he is willing to achieve knowledge of nature and control of himself, he may order his thought and action according to the dictates of reason and thus live a life <(that is worthy of the gods.® For though they have no power, the gods do exist. Somewhere in the interstellar spaces is their seat and there in ((passionless tranquillity® they incarnate Epicurean perfection. No aspect of the poem is more striking or more engaging than the en¬ thusiasm with which Lucretius dwells upon this

conception of universal law and supports it by a literally amazing variety of evidence. Every¬ where in the poem there is evidence of a life passed in the open air. He draws instances in support of his reasoning from phenomena within the range of everyone's observation, from the sky, from the sea, from forest and stream, from the life of animals and of men. Yet he is equally at home in the stretches of infinite space and infinite time and reasons with no less absolute confidence about the world, of the infinitesimallv small, where the atoms that must forever elude the observation of the senses are laying the foundations of the visible universe. The poem shows, in fact, that he had to an extent that is surprising in a disciple of Epicurus a passion for knowledge for its own sake. But his supreme interest was, after all, in the nobility of feeling, thought and action that this rational understanding of nature's proc¬ esses brings at last within the reach of men. Intellectually an aristocrat, he is yet essentially a social reformer, and is moved to the depths of his being by the pathos of human life. And the ever-present tragedy is especially poignant because it is quite unnecessary. The way of salvation is simple and obvious ; yet it is ex¬ tremely difficult to persuade mep to follow it. Happiness, for which all mankind strives, con¬ tinues to be sought by means that all experience proves will still, as heretofore, fail to secure it. Simplicity of living, riches gained not by in¬ crease of possessions but by diminution of de¬ sires, contentment found in fundamental human relationships, a life, in brief, devoid of ambition and largely contemplative, such an ordering of existence even in a world whose laws are, on the whole, austere, will gain for man real hap¬ piness, and, at the worst, such happiness as is possible under the circumstances. For a ma¬ ture mind cannot be content with fairy-tales. The facts of life and equally the fact of death must be faced uncompromisingly if man is to retain his self-respect. Rational beings will seek therefore a possible, not an impossible, happiness. Lucretius preaches this gospel of quietism with the fervor of an evangelist and the imaginative power of a great poet.

The poem has been finely translated into prose by H. A. J. Munro (4th ed., Cambridge 1886) and by C. Bailey (Oxford 1910) ; into verse by W. E. Leonard (New York 1916). Illuminat¬ ing criticism may be found in the following works: Sellar, W. Y., Toman Poets of the Republic-* (3d ed., Oxford 1889) ; Mackail, J. W., (Latin Literature *(New York 1895) ; Duff, J. W., (Literary History of Rome* (2d ed., London 1910) ; Santayana, G., (Three Philo¬ sophical Poets* (Harvard University 1910) ; Woodberry, G. E., (Inspiration of Poetry*

(New York 1910) ; Thomson, J. A. K., (Greek Tradition* (New York 1915) ; Masson, J., (Lucretius, Epicurean and Poet* (2 vols., New York 1907, 1909). Consult also Mallock, W. H., (Lucretius on Life and Death* (New York 1900) and Tennyson's poem (Lucretius.* W. A. Merrill has edited the Latin text with an introduction and full commentary on all six books (New York 1907)

Nelson G. McCrea.

DE RESZKE. See Reszke.

DERG, Lough, Ioh derg. (1) An expan¬ sion of the Shannon River, between the

provinces of Munster and Connaught, Ireland. It is 24 miles long and from two to six miles broad. (2) A lake in the southeast of the county of Donegal, province of Ulster, Ireland. It is three miles long and two and one-half miles wide. Saint's Isle and Station Island are in this lake.

DERMATITIS, a name given to certain inflammations of the skin, characterized not so much according to form and arrangement of the pathological changes taking place in the skin, but rather from their cause. These causes may act from within or without. The charac¬ teristic change taking place is some form of ery¬ thema or redness, with the characteristic heat, redness and swelling. Thus there are found dermatitis traumatica, or the dermatitis set up by mechanical injuries such as blows, pressure, friction, scratching; dermatitis calorica, such as is due to sunburn or frostbite; X-ray dermatitis, dermatitis venenata, due to animal, vegetable or mineral poisons, such as mustard, turpentine, croton-oil, tartar emetic, poison ivy, nettle, an¬ iline dyes, strong acids, strong alkalis, arnica, *etc.* ; dermatitis medicamentosa or drug erup¬ tions, such as happen following the use of anti-febrin, antipyrin, belladonna, arsenic, bromides, iodides, *etc.* There may be also dermatitis fol¬ lowing vaccination or following poisoning in wounds. There are other forms too numerous to mention, but those given are the com¬ monest.

DERMATOLOGY (from Gr. derma, the skin), a science that treats of skin diseases. See Skin.

DERMATOPHYTE, a parasitic plant, a sort of fungus infesting the cuticle and epider¬ mis of men and animals, and giving rise to various forms of skin diseases. The com¬ monly known species are A chorion schocnleinii (favus) ; Trichophyton tonsurans (ringworm), and

Microsporon furfur (dandruff, scurf).

DERMESTES, der-mes'tez, a genus of coleopterous insects, the type of the family Der-mestida. The larvae of this genus are covered with slippery hairs. They devour dead bodies, skins, leather and other animal substances. One species (D . lardarius) is known by the name of bacon-beetle, and is often found in ill-kept ham or pork chops. Many insects, the larvae of which have similar habits to those of the true Dermestes, sometimes receive that name, al¬ though they really belong to the genera Atta-genus, Necrophorus, *etc.*

DERMOT MAC MURRAGH, Irish king: the last ruler of Leinster before the sover¬ eignty was assumed by Strongbow in the reign of Henry II of England. He became king of Leinster ' in 1140, and having carried off the wife of O'Ruarc, Prince of Leitrim, was at¬ tacked by the latter and was driven from Ireland in 1167. He betook himself to Aquitaine, where he did homage to the English king, who granted him permission to enlist adventurers in England to aid him in recovering his kingdom. He received the aid of Richard de Clare, Earl of Pembroke, usually called Strongbow, who mar¬ ried his daughter Eva in 1170. With his aid he proved victorious, but when he died in the same year his kingdom was assumed by his son-in-law.

DERNBURG, dern'boorH, Bernhard, Ger¬ man statesman : b. Hesse-Darmstadt 1856. Of Jewish extraction, he received a commercial education and as a young man came to America and engaged in banking business, acquiring a good knowledge of American methods and the English language. In 1906 he was appointed Colonial Secretary, and dur¬ ing his four years' tenure of the office he suc¬ ceeded in developing the resources of the German colonies, notably Southwest Africa. His hustling business methods and brusque manners brought him into frequent conflict with other officials, and he was obliged to resign. A wealthy man, he occupied himself mainly with economic studies till the European War broke out, when he was sent to the United States to co-operate with Count Bernstorff to win Ameri¬ can friendship. The press campaign he con¬ ducted in New

York was directed toward justifying German policy and placing England with Belgium in the wrong. He published Germany's peace conditions in April 1915, de¬ claring there was nothing in the. German program ((which would not be beneficial to the rest of the world, especially the United States.®

DERNE, dern, or DERNA, Africa, town of Tripoli, in Barca, on the north coast of Africa, in a fertile district. It was captured by the United States fleet in 1805 during the war against Tripoli. Pop. about 7,000. See Derne Expedition.

DERNE EXPEDITION (Derna or Dern), a military expedition undertaken during 1805 by William Eaton (q.v.), United States consul to Tunis in 1799-1803. to secure recog¬ nition of American international rights. Eaton became indignant at the abject submission of Christendom, part from fear and part from greed, to the wretched Barbary pirates; he had raged at their insults year after year while he was consul at Tunis; and when Tripoli, in 1801, finally insisted on war despite all payments, eagerly seized the chance of ending its robberies once for all by making it a United States pro¬ tectorate. About 1792 Hamet Caramanli or Caramelli, pasha of Tripoli, had been deposed by his brother Yusuf and fled to Tunis, where he was then living; and Eaton resolved to have the United States restore him on con¬ dition of peace and no tribute, and thus strike terror into the other piratical states. He borrowed $22,000 for Hamet to equip a force with which our navy was to co-operate ; but the naval commanders' hands were tied by their instructions, and in 1803 Eaton's plain-spoken refusal to comply with the bey's extortions caused his peremptory dismissal as consul. He returned to the United States and urged Jefferson to make the country a United States' protectorate, but the govern¬ ment did not feel justified in giving carte blanche for so daring a scheme. At length, in March 1804, Eaton was sent to the Mediter¬ ranean as (<naval agent® with Barron's squad¬ ron, but without authority or instructions. He cared for neither squadron nor authority if he could have help and be left to act un¬ trammeled. Meantime Hamet Caramanli had failed and fled to Egypt, where, when Eaton arrived at Cairo on 8 December (having heard at Malta, in September, of Hamet's fiasco), the viceroy was besieging him and a few followers at Minyeh on the Nile. Eaton rescued him at

great pains and some peril, and brought him to Alexandria; made a pact with him and a plan of campaign with Barron, and collected an (<army® of some 500 floaters — the majority Arabs, some Tripolitan

Kabyles, a hundred Alex¬ andrian Christian Greeks and Americans, a most extraordinary rabble for a desperate mili¬ tary venture — and started for a march of 600 miles across the Libyan Desert to Derne, the seaport capital of Barca, the most fertile prov¬ ince of Tripoli. They had no provisions but what they carried and no water for days to¬ gether, and more than once the Arabs with Hamet were on the point of deserting in a body or cutting Eaton's throat. His energy and moral force finally pulled the entire body through a six weeks' march to Bomba, just east of Derne, 17 April 1805; but no ships were in sight. The Arabs cursed him afresh as an infidel traitor and resolved to break up next morning; Eaton and the Christians took post on a hill for the night and lit fires, and next morning the waiting fleet saw the smoke and came in. The Arabs rejoined them and after restocking from the fleet and resting a week, on the 25th, in cooperation with three cruisers, they assailed Derne, defended by earthworks and 800 men. On the 27th they carried it by storm, Eaton being shot through the wrist. A large force was sent from Tripoli to retake it and on 13 May he repulsed it in a sharp engagement with the aid of the fleet's guns. Another month passed; Derne showed no enthusiasm over Hamet, one Oriental mas¬ ter being about the same as another ; Eaton could not march on Tripoli, some 700 miles farther on, but the pasha's troops could not drive him from Derne. Suddenly the ground was cut from under his feet by the treaty arranged with the pasha by Tobias Lear, United States consul-general for Algiers and commis¬ sioner of peace, it is said through jealousy of Eaton's success. Hamet's supporters were left to the pasha's vengeance, Hamet to European exile and a grudging pension, and Hamet's fam¬ ily became possessions of the pasha. (See Bar¬ bary Powers, United States Treaties and Wars with the). Eaton returned to America, and his services, . while slighted or ignored by government officials, were recognized ((as the virtues and undaunted courage of a single man,® in a resolution passed by a large ma¬ jority in the senate of Massachusetts, 25 Feb. 1806, the committee for the sale of Eastern lands being ((authorized and directed to convey to William Eaton, Esq., a citizen of this Com¬ monwealth and to his heirs and assigns, a tract of land, to contain 10,000 acres of any of the unappropriated land of this Commonwealth in the District of Maine, excepting the ten town¬ ships on Penobscot River.® His exploit was also perpetuated in verse by Paine, author of (Home, Sweet Home,* and by John Pierpont. In 1808 General Eaton was the principal agent in foiling the Aaron Burr conspiracy to invade Mexico. Consult (Life of the late Gen. Wil¬ liam Eaton) (Brookfield 1813).

DEROSNE, de-ron, Charles, French chem¬ ist and inventor: b. Paris 1780; d. there Septem¬ ber 1846. He devised a still for the

rectification of alcohol so arranged that instead of the weaker aqueous spirit which distilled being completely condensed by cold water, it was con¬ densed by water only a little under the boiling

point of the mixture, so that while the alcohol still remained as vapor, a large proportion of the watery vapor was condensed, and thus the distillate was made stronger. This apparatus is called by his name. His most important research was into the composition of opium, in the course of which he isolated a crystal¬ line body, long distinguished as Derosne's salt. He himself did not determine its character, and it was not till some }rears later that it was distinguished as an alkaloid by Robiquet, and called by him narcotin, the name by which it is now known. He was the first to introduce ani¬ mal charcoal for decolorizing syrup.

DE ROSNY, rd'ne, Leon Louis Lucien Prunol, French Orientalist: b. Loos, France, 5 Aug. 1837. He studied in Paris at the Ecole des Langues Orientales, became professor of Japanese at the Special School of Languages in 1868 and founder of the International Congress of Orientalists. In 1863 he was interpreter to the Japanese ambassadors at Paris, whom he accompanied to Plolland, England and Russia. He was decorated with the Legion of Honor in 1884 and in 1886 was nominated assistant di¬ rector of the Lcole des Hautes-Etudes. Among his numerous works are (Asiatic Studies) (1864) ; (The Origin of Language* (1869) ; (Japanese Anthology* (1871) ; (A Grammar of the Chinese Language* (London 1874) ; 0aP_ anese Religion* (1881) ; (Vocabulaire de l'ecriture hieratique yucateque* (1883; 2d ed., 1886) ; (Le livre sacre et canonique de l'antiquite Japonaise) (1885) ; (Les populations danubiennes* (1882-85) ; (Le Taoisme (1892) ; (Cours pratique de la langue Japonaise) (1903) ; (L'Amerique precolombienne* (1904) ; <La Bible du Japon* (1904), and various trans¬ lations, pamphlets and essays.

DE ROSSET, Armand John, American physician: b. Wilmington, N. C., 17 Nov. 1767; d. there, 1 April 1859. He was the son of Moses John De Rosset of London and Mary Ivie, a native of the West Indies. In

1784 he was matriculated at Princeton. At the close of the first session of his collegiate course a fellow-student, Robert G. Harper, observing his rigid economy and close attention to duties and his determination to remain at the college during vacation for want of funds to defray the expenses of the journey home, offered to be his teacher in the studies of the next year. The offer was gladly accepted and at the open¬ ing of the next session De Rosset was promoted to an advanced class, completing his course in three years. While at the medical college he enjoyed the friendship of Dr. Rush, with whom he had a long correspondence. He was ap¬ pointed by the President of the United States to be post-physician, which office he held for many years. During two or more terms he served in the town government. His writings were confined to contributions to medical publi¬ cations — a pamphlet (De febribus intermittenti-bus,* a Latin thesis, *etc.* His son, Moses John: b. Wilmington, N. C., 11 Jan. 1796; d. there, 30 June 1826, also entered the medical pro¬ fession, in which he was associated with his father from 1818 until his death. Armand John, another son of Armand John De Rosset, was born in Wilmington, 6 Oct. 1807; d. 1897. He attended the medical college of Charleston, S. C., in 1826-27, and was graduated at the

medical department of the University of Penn¬ sylvania in 1827. From 1828 to 1837 he prac¬ tised his profession in Wilmington and then en¬ gaged in mercantile affairs, which he relin¬ quished only a few years previous to his demise at the advanced age of 90 years.

DE ROSSET, Moses John, American physician, son of Armand John De Rosset (1807ˆ97) : b. Pittsboro, N. C., 4 July 1838; d. Wilmington, N. C., 1 May 1881. In youth he showed remarkable aptitude for languages and mathematics. He spent three years in Geneva at the famous school of Diederich and spent six months in Cologne to perfect himself in Ger¬ man. He was graduated in the medical de¬ partment of the University of New York in 1859 and was appointed resident physician at Bellevue Hospital, New York, in the same year. At the beginning of the Civil War he entered the Confederate army as assistant surgeon and, after serving through Stonewall Jackson's Val¬ ley campaign, wa s promoted to full surgeon and assigned to duty in Richmond. Subsequently he was detached as inspector of hospitals of the department of Henrico. At the close of the war he settled in Baltimore, where he was ap¬ pointed adjunct professor of chemistry in the medical department of the University of Mary¬ land. He was also professor of chemistry in the dental college of that city. He here pre¬ pared himself for practice in diseases of the ear and eye, and in

1873 removed to Wilming¬ ton, N. C., and devoted himself to this specialty, becoming also a contributor to the North Caro¬ lina Medical Journal. To improve his health he removed for a time to Texas but soon re¬ turned to Baltimore, where he issued a trans¬ lation of Bouchardat's {Annual Abstract of Therapeutics, Materia Medica, Pharmacy and Toxicology for 1867.) His writings were chiefly contributions to medical journals.

DEROULEDE, da-roo-lad', Paul, French poet: b. Paris, 2 Sept. 1846; d. 1914. His (Soldier Songs) (1872) and (Military Refrains) (1888) were immensely popular, and won him the presidency of the Patriotic League, an as¬ sociation intensely hostile to Germans, and whose agitation seemed likely to lead to a col¬ lision with Germany, wherefore the poet was prevailed on to retire from the presidency. He was the chief advocate of the ((revanche** against Germany, having taken part as a soldier in the disastrous campaign of 1870-71. In 1883 he went to Russia to further the cause of a Franco-Russian alliance; and supported Gen¬ eral Boulanger during his temporary rise to power. His anti-Semitism was marked during the Dreyfus case. He was a member of the Chamber of Deputies 1893-95 and 1898-99. He was condemned to banishment in 1900 for 10 years for conspiracy against the republic. The amnesty of 1905 reduced this to five years, and in 1906 he sought but unsuccessfully re-election to the Chamber of Deputies. He wrote a drama on patriotism, (The Hetman,* and the semi-re¬ ligious drama, (The Moabitess.* Other works are a patriotic cantata, Wive la France) (1880) ; (Messire du Guesclin) (1895) ; (La Mort de Hoche* (1897); (Poesies militaires* (1896); *etc.*

DERR, Louis, American physicist : b. Potts-ville, Pa., 6 Aug. 1868. In 1889 he was graduated at Amherst College and studied also at the

Massachusetts Institute of Technology 1892, and at the Harvard Graduate School 1892-93. In 1892 he became assistant in physics at the Mas¬ sachusetts Institute of Technology and became full professor in 1909. He was also instructor in physics at Boston University 1893-98, and from 1895 to 1908 was in charge of instruction in

physics at the Boston Normal School of Gymnastics. He is Fellow of the American Academy of Arts and Sciences and member of the American Physical Society. He has pub¬ lished (Notes on the Principles of Dynamo and Transformer Design) (1902); Photography for Students of Physics and Chemistry > (1906). He edited the * Cyclopedia of Engineering) (1902; 2d ed., 1912) and since 1907 is assistant editor of Chemical Abstracts. He has also published numerous papers in scientific journals.

DERRICK, a mechanical device for lifting and shifting heavy weights. The simplest form of derrick is the gin, a tripod of three legs, with a compound pulley at the apex and another at the hoisting hook and a windlass to operate the pulley rope. These simple derricks are easily portable and are used very commonly for lift¬ ing stones, pulling stumps, lowering iron pipes into trenches and similar work. The builders' derrick has two legs framed together like a broad ladder and set wider apart at the bottom than at the top. The foot piece at the bottom is fitted with wheels which run sideways along a plank parallel to the face of the building. The top of the derrick is inclined toward the build¬ ing and is held in position by guy ropes. This form of derrick is used by stone masons to lift and set in place stone facing, sills, lintels, col¬ umns, *etc.* It is sometimes footed on a beam of an upper story, hanging outward over the street and used also to hoist lumber, window frames and the like.

For large and heavy work, as in excavations and the erections of steel-frame buildings, the derrick in common use is the guy derrick, com¬ prising a mast held upright by four to seven guys widely extended and securely anchored and a boom attached to the mast near the bot¬ tom by a hinged joint, so that it may rise and fall in a vertical plane; the whole having the outline of the letter V. The foot of the mast is a pivot pin set in an opening in a heavy base plate, or, in very large derricks, a ball and socket joint. The guys at the top are attached to a thick circular plate which slips down on a gudgeon pin. The mast is thus free to revolve and if the derrick is small, it is swung by means of a horizontal pushing bar; if large, the base of the mast is fitted with a bull wheel, from five to eight feet in diameter, which is operated by cable from a winding engine. Derricks are usually equipped with two separate hoists, one lifting the load and the other drawing in the guy ropes which control the sag of the boom away from the mast. The winding drums which do this work are generally detached from the derrick itself, but in some cases the winding machinery is built on a platform attached to the base of the mast and revolves with it upon a cogged circular track. In confined situations, as between buildings in cities, where there lacks room to stretch guys to support the mast, the

stiff-leg derrick is used. In this type the mast is held at the top by two heavy beams or legs which spread apart at the ground to the ends of an arc of 90 degrees. The bases of these

legs are heavily anchored with stone, bags of sand and gravel or other weighty material.

Small derricks are of wood; the masts being from 20 to 45 feet in height, and respectively from 10 to 22 inches square, and with booms relatively from 8 to 16 inches square. A five-ton derrick will have a mast 25 feet long, and a boom of 30 feet. The guys will be wire cables of one inch diameter, and the hoisting cable from five-eighths to three-quarters inch in diam¬ eter. If the derrick is upheld with stiff legs, they will have the same cross section as the mast, and be as long as the working area will permit. In stiff-leg derricks the mast is usually much shorter than the boom. The masts and booms of timber derricks are sometimes trussed with iron rods to strengthen them, but for extra heavy work the derrick is often all metal, of latticed structural steel. (See Crane) . Consult Adams, H., (The Mechanics of Build¬ ing Construction (New York 1912) ; Hess, H. D., (Machine Design; Hoists, Derricks,

Cranes) (Philadelphia 1912) ; Thomson, T. K., (Hoisting Machines for the Handling of Ma¬ terial (New York 1908).

DE RUSSY, Rene Edward, American mili¬ tary officer: b. Haiti, W. I,. 22 Feb. 1789; d. San Francisco, 23 Nov. 1865. He graduated at the United States Military Academy in 1812, serving with credit in the war with England. He subsequently supervised the construction of fortifications in New York harbor and the Gulf of Mexico. During the Civil War he was ordered to the Pacific Coast, where he con¬ structed defenses in San Francisco harbor.

DERVISH, the Persian word for the Ara¬ bic faqir or fakir. See Fakir.

DERWENT, der'went, (1) the name of four rivers in England, in Derbyshire, York¬ shire, Durham and Cumberland, respectively. The Yorkshire Derwent is a tributary of the Ouse. (2) A river in Tasmania. It rises in Lake Saint Clare in the centre of the island and enters Storm Bay by an estuary. A light¬ house, elevated 70 feet above the sea, has been erected on Iron Pot Island, at the entrance of the Derwent, exhibiting a fixed light, visible at from 12 to 15 miles' distance. On the Der¬ went estuary is the town of Hobart. Its en¬ tire length is

about 130 miles and it is navigable as far as Hobart.

DERWENTWATER, James Ratcliffe,

Earl of, English nobleman: b. London, 28 June 1689; d. London, 24 Feb. 1716. His grand¬ father had been created Earl of Derwentwater by James II, and his father, Francis, married a natural daughter of Charles II. He suc¬ ceeded to the title in 1705 and entertained a personal attachment toward the Stuart family, which induced him to take part in the attempt to restore them to the English throne. The standard of revolt having been raised in Scot¬ land, Lord Derwentwater commenced the movement in England on 6 Oct. 1715. The cause of the Pretender was a losing one from the first, and in spite of the energy and courage displayed by the Earl of Derwentwater and other Jacobite nobles, they were compelled to surrender at discretion at Preston on 13 Nov. 1715. The Earl of Derwentwater, being im¬ peached for high treason, pleaded guilty, and was beheaded on Tower Hill. His estates were confiscated and given to Greenwich Hospital.

DERWENTWATER, or KESWICK LAKE, a beautiful lake in Cumberland, Eng¬ land, in the vale of Keswick. It is about three miles in length and one and a half in breadth, and stretches from Skiddaw on the north to the hills of Borrowdale. Near the northeast corner is the celebrated cascade of Lodore. Its waters are carried to the sea by the Der¬ went.

DERZHAVIN, dyer-zha'ven, Gabriel Ro-manovitch, Russian lyric poet : b. Kazan, 14 July 1743; d. Novgorod, 6 July 1816. He joined the Preobrazhensky Guard in 1782, be¬ coming lieutenant-captain in 1783. He became successively governor of Olonetz (1784) and of Tambov (1785). In 1793 he was called to the Senate, in 1800 was master of the Imperial treasury, and in 1802 was Minister of Justice. The year following he was permitted to retire on full pay. His poetic talent had become early developed, and he is generally allowed to hold the first place among the poets who appeared during the reign of Catharine. He was an enthusiastic admirer of this empress, and has

celebrated her in his most brilliant odes. Of these, at once the most beautiful and the best known is his (Oda Bog,* or (Ode to God,* which, for sublimity both of thought and ex¬ pression, has seldom been surpassed, and has been translated into most European languages. Almost all his poems are rich in true poetic beauties, though occasionally he indulges too much in gaudy Oriental metaphor. His works, containing, in addition to the Odes, several dramatic pieces and prose writings, were pub¬ lished at Saint Petersburg (9 vols., 1864-83), the eighth volume of which is a biography of the author by the editor, J. Grot. See Ode to God.

DESAGUADERO, da-sa-gwa-da'rd, a val¬ ley in Bolivia and Peru, between two ridges of the Andes into which the great chain divides, near the city of Potosi. This valley or table¬ land is about 400 miles in length, and varies from 30 to 80 miles in breadth; area 150,000 square miles, and includes Lake Titicaca, and the smaller lake Aullagas or Uros. Desaguadero signifies in Spanish <(a channel.®

DESAGUADERO RIVER, Bolivia, the outlet for the waters of Lake Titicaca. It is 180 miles in length, running from Lake Titicaca southward to Lake Poopo or Agullas, in the de¬ partment of Oruro. The lake last mentioned is without any known outlet. For many years traffic on this river has been hampered, the Lake Titicaca steamers running only as far as the town of Desaguadero (the head of naviga¬ tion, pending improvements, for boats of con¬ siderable size), while beyond that town smaller steamers, engaged in carrying the silver and tin ores of Oruro and the copper of Corocoro, descended to a point 40 miles farther down the stream. A concession for canalizing the Desaguadero so as to extend navigation about 200 miles farther south was granted by the Bolivian government to a Peruvian corporation in 1892. Moreover a railroad has been built from the northern shore of Lake Titicaca to Cuzco. These works form a system of land and water transportation unique in all the world ; approximately 500 miles in length, and at an altitude ranging between 11,000 and 13,000 feet above the level of the sea, con¬

necting the historic Cuzco (the ancient Inca capital) and the extensive silver and lead dis¬ tricts of Totalaya on the north, with the mines of Corocoro and Oruro.

DESAIX DE VEYGOUX, de-sa' de va-goo, Louis Charles Antoine, French general : b. Saint Hilaired'Ayat, Auvergne, 17 Aug. 1768; d. Marengo, 14 June 1800. Entering the army at 15, he was in 1792

appointed aide to Prince Victor de Broglie, commander of the Army of the Rhine. He was promoted to the command of a brigade in 1793-94, and then of a division. In 1796 he covered himself with glory by his heroic conduct in Moreau's famous retreat through the Black Forest. Behind the ruinous fortress of Kehl, Desaix resisted the Austrian army for more than two months, only capitulat¬ ing in January 1797, when his ammunition was spent. He served with Bonaparte in Egypt, where he distinguished himself greatly, and was appointed governor of the upper part of the country. He completely subdued Upper Egypt, and received, as a testimony of admiration from Bonaparte, a sword, with this inscription on its blade, <(Conquete de la Haute Egypte .** His own soldiers used to compare him to Bayard, while the inhabitants named him ((the Just Sultan.® He was obliged, however, in 1800, to sign the unfavorable treaty of El Arish with the Turks and English, and on his way to France was captured and detained by Lord Keith as a prisoner of war. He afterward ob¬ tained his parole, and returned from Egypt just in time to take part in the battle of Marengo, in which he was killed. A statue has been erected to his memory at Paris. Consult Bonval, E., (Histoire de Desaix) (Paris 1881).

DESATIR, the name given to a collection of sacred books, purporting to be the work of the 15 old Persian prophets, together with a book of Zoroaster. The collection is written in a language no longer spoken and equally different from the Zend, the Pehlvi and modern Persian. The last of the 15 prophets, Sasan, who lived at the time of the downfall of the Sassanides, literally translated the Desatir, and accompanied it with commentaries. This work was until the 17th century one of the chief sources of the ancient Persian religious doc¬ trines, interwoven with astrology and demon¬ ology; and, after having been forgotten for about a century and a half, was discovered at Ispahan and published at Bombay in 1818. Erskine added an English translation, but con¬ sidered the collection as spurious ; and Sylvester de Sacy believed it the work of a Parsee in the 4th century of the Hegira, who invented the language. By some, however, it is considered as genuine. No trace of any connection with the Zendavesta and the magic of the Parsees has been found in the Desatir.

DˆSAUGIERS, da-zo'zha, Marc Antoine Madeleine, French song writer and dramatist: b. Frejus, 17 Nov. 1772; d. Paris, 9 Aug. 1827. He was educated for the ministry at the College Mazarin, Paris. While visiting San Domingo he became a prisoner of the revolted blacks. His life was in great danger, but he managed to escape to the United States where he taught pianoforte playing at Philadelphia. He re¬ turned to Paris in 1805 and began his dramatic career. His parody of the opera

(Danaids* (<{The Little Danaids®) was acted for 300

consecutive nights. His vaudevilles were remark¬ ably successful. As a light song writer he is second only, if indeed second, to Beranger. Many of his songs will live long; such as (The Consolations of Old Agep (The Picture of New Year's,) (The Market, } (Sunday Pleas¬ ures, J (The Palais RoyalP

DESAULT, de'-so', Pierre Joseph, French surgeon: b. Magny-Vernais, 6 Feb. 1744; d. Paris, 1 June 1795. He was led by his in¬ clination to the surgical profession; in conse¬ quence of which he entered the military hospi¬ tal at Befort, where his situation was favorable for obtaining a knowledge of the treatment of wounds from firearms, in which department he afterward rose to great eminence. He went to Paris in 1764, and was one of the numerous scholars of the celebrated Petit. After having been several years principal surgeon of the hospital De la Charite, he was put at the head of the great Hotel-Dieu in Paris, in 1788. Here he founded a surgical school, in which have been educated many of the most eminent surgeons of Europe. His principal merits were that he brought accuracy and method into the study of surgery; improved the treatment of fractured bones by adopting improved band¬ ages ; and first introduced into France the clinical method of instruction in surgery. He was distinguished for the skill and boldness with which he performed operations. Desault wrote only two small treatises ; but the Journal de Chirurgie, in which his scholars published his lectures delivered in the Hotel-Dieu, and the (CEuvres Chirurgicales) (3 vols., 1798-1803, Eng. trans., 1814), edited by Bichat under Desault's name, contain his whole system. Con¬ sult Labrune, i Etude sur la vie et les travaux de Desault > (Besangon 1867).

DESBARRES, da-bar', Joseph Frederick Wallet, English military engineer: b. England 1722; d. Halifax, N. S., 24 Oct. 1824. In 1756 he sailed as lieutenant for America, where he raised, and for a time commanded, a corps of field artillery. In 1757 he gained a victory over the Indians who had captured Fort Sche¬ nectady; and at the

siege of Quebec was aide-de-camp to Wolfe, who was mortally wounded while Desbarres was making a report. He con¬ ducted the subsequent engineering operations during the conquest of Canada, and was quar¬ termaster-general in the expedition that retook Newfoundland (1762). He made a survey of the coast of Nova Scotia in 1763-73, and after¬ ward prepared charts of the North American coast for Lord Howe. He was lieutenant-governor of Cape Breton (1784-1804), and of Prince Edward Island (1805-13).

DESCARTES, Rene, re'na da-kart', dis¬ tinguished French philosopher : b. La Haye in Touraine, 31 March 1596; d. Stockholm, 11 Feb. 1650. He was educated at the Jesuit College of Le Fleche. Here he studied physics and philos¬ ophy according to the scholastic system and showed especial fondness and aptitude for mathematics, which alone seemed to satisfy his demand for certain and clear knowledge. All else that he had learned seemed to him lacking in the clearness and certainty that would entitle it to be ranked as knowledge. After leaving school he went to Paris where he continued his studies. He then enlisted in the military service of the Netherlands and afterward

in that of Bavaria. During these years he was always tormented by doubts, and was constantly seeking a method by which he could attain certainty. At length he made the dis¬ covery of his famous principle of certainty which he expressed in the proposition, ((I think, therefore, I am}) (cogito ergo sum), and which he regarded as ((the foundations of a wonderful science. In 1629 he withdrew into seclusion in Holland, frequently changing his residence that he might continue his work without interruption. Here he lived for 20 years and produced the works upon which his fame rests. In 1649 he accepted the invitation of Queen Christina of Sweden to come to Stockholm and personally instruct her in his philosophy. The Queen pre¬ ferred to have her lectures in philosophy at 5 o'clock in the morning and Descartes had to proceed to the palace at that hour. The severity of the climate and the life at court were in¬ jurious to his naturally weak constitution, and a year after his arrival he contracted an illness from which he died.

Descartes' fame rests not merely upon his contributions to philosophy, however, but also upon his services to physical science and mathematics. He discarded the old methods of explaining physical phenomena by means of final causes, and insisted that everything takes place mechanically. He is one of the chief pioneers of the mechanical view of the world, and formulates clearly the fundamental

laws of this mode of explanation, which he extends to explain all physiological processes. In mathe¬ matics he made important contributions to the theory of equations and was the originator of the science of analytical geometry.

Descartes' principal works are (The Dis¬ course on Method* which gives a clear account of development of his thought and with which was published his <Dioptrics,) Meteors,5 and Geometry,* under the common title of (Essais philosophiques) (1637) ; 'Meditations on the First Philosophy) (1641) ; (The Principles of Philosophy> (1644) ; (The Treatise on the Passions) (1650). Modern editions of Descartes are those by Cousin (Paris 1826), and by Adam and Tannery (12 vols., ib., 1897-1910). The most important writings have appeared in the English translations of Veitch (Edinburgh 1907) and Torrey (New York 1892). Consult Bou-troux, (L'Imagination et les mathematiques selon Descartes) (Paris 1900) ; Fischer, (Geschichte der neuern Philosophy (Heidelberg 1897) ; Fouillee, 'Descartes* (Paris 1893) ; Hoffmann, 'Rene Descartes) (Stuttgart 1905) ; Haldane, (Descartes: His Life and Times) (London 1905) ; Iverach, (Descartes, Spinoza and the New Philosophy) (New York 1904) ; Mahaffy, 'Descartes* (Edinburgh 1881) ; Smith, 'Studies in Cartesian Philosophy* (London 1902) ; Millet, (Descartes, sa vie, ses travaux, et ses decouvertes* (2 vols., 1871). For Descartes' philosophy see the article Cartesianism.

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

DESCARTES' RULE OF SIGNS is a

theorem by which the maximum number of positive or negative roots of an equation can at once be detected on sight. The theorem may be thus explicated : The number of positive roots of an equation cannot exceed the number of variations in the signs of its coefficients, con-

Hi?

✓

: -

*

sidered in their proper order. A fair example is the cubic equation: $F(x) = 3x3 — 7x2 + l\ lx + 4 = 0$. Here are but two variations of signs on passing from one extreme term to the other, through the intermediate ones ; we conclude therefore that the cubic cannot have more than two positive roots. The maximum number of negative roots is seen on applying the same theorem to the equa¬ tion which is obtained from the original by chang¬ ing x into — x. Thus the positive roots of $F(—x) = 3x3 + 7x2 — llx + 4 = 0$ are negative roots of the original cubic, and by Descartes' rule cannot exceed three.

DESCENDANTS, as a term of law, is applied to the issue of a person, or the offspring of such issue, to the farthest generation. Such descendants have a prior claim over collateral relatives or ascendants in the inheritance of property left by a deceased ancestor. See Descent.

DESCENT IN LAW is the transmission of the real estate of a person dying intestate to his heir or heirs. The title acquired by the heir, in this manner, is called title by descent.

Prior to the Revolution, the law in England was that real estate could only descend and never ascend ; but in the United States the law has been changed by statute, and at the present time real estate may ascend as well as descend ; but, as far as the title is concerned, it is called title by descent.

According to the old English law, real estate descended to the oldest son who was living; provided that he had no elder brother who had died leaving a son to survive him ; if all the sons had died without leaving issue, all of the daughters inherited together. There were ex¬

ceptions to this rule, as in one part of England, the youngest child was the heir. Estates tail might also be called an exception, in some cases, as an estate tail female, where the daugh¬ ter took the property; and if there were no daughters, the estate went to a person outside of that immediate family, the sons being excluded absolutely. In the United States, some of the States have passed laws by which any words used, in the granting of an estate, which would create an estate tail shall be considered as creating an estate in fee simple, and by this means have abolished estates tail.

The rules of descent are applicable only to real estate, although sometimes they are incor¬ rectly spoken of as applying to personal property also. Distribution is the proper word to use in speaking of personal property.

In many of the States there is a wide dis¬ tinction between the laws of descent and those of distribution. The laws on the subject are regulated by statute of the different States, and are consequently subject to change at any time. These laws differ materially, and it is therefore necessary to examine with care the statutes of any particular State in order to determine its rule on this subject.

The general rule in the United States seems to be that real estate, subject to the rights of the surviving spouse, descends to children, grandchildren and on down in the lineal line ; in default of these heirs, then to parents, and, if they are dead, the estate goes to collaterals ; and if there are no heirs to the State. In only a few States are the husband and wife placed

in the line of inheritance. The law of the place where the real estate is situated is the law ac¬ cording to which the estate passes to the heir; and it makes no difference where the decedent was domiciled.

DESCENT OF MAN AND SELEC¬ TION IN RELATION TO SEX, The, a

work by Charles Darwin, published in 1871. The evidences of the descent of man from some earlier, less-developed form, collected and marshaled by Darwin, consist of minute in¬ ferential proofs of similarity of structure, at certain stages of development, between man and the lower animals. This similarity is es¬ pecially marked in the embryonic stages ; and taken with the existence in man of various ru¬ dimentary organs, seems to imply that he and the lower animals come from a common an¬ cestor. Darwin reasons that the early ancestors of

man must have been more or less monkey¬ like animals of the great anthropoid group, and related to the progenitors of the orang¬ outang, the chimpanzee and the gorilla, and that his much remoter ancestors must have been aquatic. The (Descent of Man5 was received with enthusiasm by scientific men, and its in¬ fluence was much greater than that of the (Origin of Species.5 It had a lasting effect not merely on physical and biological science, but on ethical and religious conceptions. In the volumes containing the (Descent of Man5 Dar¬ win placed his elaborate treatise on sexual selec¬ tion, which may be regarded as a part of the theory of man's descent. See Darwinian Theory.

DESCHAMPS, da-shan', Eustache, called Morel, French poet: b. Vertus, Marne, about 1330; d. after 1415. He composed a multitude of short poems of a political or moral nature. The (Miroir de mariage5 comprises 13,000 lines. He wrote also (De l'art de dieter5 (on the Art of Poetizing). His works were edited by Saint Hilaire (11 vols., 1878-1903). Consult Hoepp-ner, E., (Eustache Deschamps5 (Strassburg

1904).

DESCHANEL, da'sha'nel', Emile Auguste Etienne Martin, French critic: b. Paris 1819; d. 1904. He studied at Paris, becoming pro¬ fessor of rhetoric at the Normal School, and wrote literary and other criticism for the Revue des Deux Mondes. These essays took on a radical quality, especially those on (Catholic-isme et socialisme, 5 which offended the gov¬ ernment. After the coup d'etat (1851), he was arrested and expelled from his country. He fled to Belgium, where he engaged in literary labors and made the acquaintance of Victor Hugo. When it became safe for him to return to France, he at once resumed his literary work by becoming one of the editors of the Journal des Debats (1859). In 1876 he be¬ came deputy, and was reelected in the follow¬ ing year. The College de France called him to the chair of modern literature in 1881. A few months later he was elected senator. Of his works the following are the best known:- (Histoire de la conversation5 (1857) ; (Etudes sur Aristophane5 (1867) ; (Le romantisme des classiques5 (1882) ; (Le theatre de Voltaire5

(1886).

DESCHANEL, Paul (Eugene Louis),

French statesman and author: b. Brussels

1856. His father had been exiled because of difficulties with the government of Napoleon III. He was educated at the College Saint-Barbe and the Lycee Condorcet. In 1878 he became subprefect of Dreux, and was secretary-general of Seine-et-Marne and subprefect of Brest in 1879. He entered the Chamber of Deputies in 1885 as member for Eure-et-Loir, became vice-president of the Chamber in 1896, and president 1898-1902. He was a leader of the Progressive Republicans and a firm advo¬ cate of the separation of church and state. He was again president of the Chamber in 1912-16. In 1899 he was made a member of the French Academy, and was a candidate for the office of President of the Republic. On 20 Jan. 1920 he was elected to this office, but ill health caused him to resign after a few months in office. His publications include (Orateurs et Hommes d'EtaC (1888);

(Figures de femmes* (1889) ; (Figures ht-teraires* (1890) ; (Questions actuelles* (1891) ; (La decentralization* (1895) ; (La Question sociale) (1898) ; (La Republique nouvelle* (1898) ; (Quatre ans de presidence* (1902) ; (L'idee de patrie) (1905) ; (Politique in—

terieure et etrangere* (1906) ; (A 1'Institut* (1907) ; (L'organization de la democratic* (1910); (Hors des frontieres* (1910); ˆParoles frangaises* (1911) ; (Segrais, Madame de Sevigne* (1911) ; (Lamartine* (1913).

DESCHUTES RIVER, Oregon, a river rising in the Cascade Range in Klamath County. After a northeasterly course through Crook and Wasco counties, it empties into the Colum¬ bia River. Its length is 320 miles, and its course for 140 miles runs through the great north¬ western lava bed, forming a canyon with walls 1,000 to 2,500 feet in

depth. More than a hun¬ dred layers of stratified lava are thus uncovered.

DES CLOIZEAUX, da klwa'zo, Alfred Louis Oliviei Legrand, French mineralogist: b. Beauvais 1817 ; d. 1897. He devoted himself to the study of science and became an instructor in the Ecole Centrale des Arts et Manufactures, and later lectured at the Ecole Normale. In 1876 he was appointed to the chair of mineral¬ ogy at the Museum d'Histoire Naturelle. His principal contributions to science were in the study of the optical properties of crystals, on which he based his crystallographic system. His discoveries include microline, a triclinic potash feldspar (KAlSuOs) and the circular polariza¬ tion of cinnabar. On the subject of crystallog¬ raphy he wrote ˆegonsˆ de cristallographie) (1861) ; (Manuel de mineralogie* (2 vols.,

1862-93) ; (Nouvelles recherches sur les proprietes optiques des cristaux) (1867). He was elected a member of the Academy of Sciences in 1869 and was awarded the Wollaston medal by the Geological Society of London (1886).

DESCLOT, de-sklo', Bernat, a Spanish historian who flourished in the latter half of the 13th century. He is known chiefly as the author of a Catalonian history of great linguis¬ tic value. Originally published under the title (Libre del rey En Pere,* it is the oldest narra¬

tive of importance in the Catalan language. A Castilian translation was made by Rafael Ccr-vera (Barcelona 1616) and an edition appeared in Madrid in 1793. The first modern edition was made by Bouchon under the title (Chroniques etrangeres relatives aux expedi¬ tions frangaises pendant le treizieme siecle* (Paris 1841).

DESCROIZILLES, da-krwa-zel', Frangois Antoine Henri, French chemist: b. Dieppe, 11 June 1751 ; d. Paris, 14 April 1825. He studied chemistry at Paris under Rouelle, and later be¬ came professor at Rouen. He devoted himself to the technical applications of the science. Berthollet had just discovered bleaching by chlorine, when Descroizilles tried it with suc¬ cess at his works at Lescure-lez-Rouen. He collected the chlorine in water con¬ taining chalk, and thus made a step, at a very early period, in the direction of bleaching-powder. In the course of his operations he contrived different pieces of ap¬ paratus for the rapid valuation of commercial products. His alkalimeter for the estimation of alkalis by Vauquelin's method, his apparatus for estimating vinegar (acetimefer), and for bleaching liquid

(Berthollimeter), are among the earliest contributions to volumetric analysis. He also invented a still for the estimation of alcohol in wine and was the first to show that alum is a double salt. He published a great many treatises, especially on technical chemis¬ try, one of considerable value on a simple method of conserving stored grains.

DESDEMONA, the heroine of Shakes¬ peare's tragedy (Othello. * She is the daughter of a Venetian senator, Brabantio, and is drawn to love the Moor who visits her father, by hear¬ ing him relate the vicissitudes of his adventur¬ ous career. She marries him against her father's will and proves a devoted wife, but Othello, through the machinations of Iago, is led to doubt her fidelity, and, in a jealous rage, smothers her. Pesdemona's character is marked by modesty, sweetness and innocent trustfulness. See Othello.

DESEADA, des-ea'da. See Desirade.

DESERET, State of (from deseret, ((Book of Mormon, ** signifying ((land of the honey¬ bee**), the name given to the State of Utah, 5 March 1849, at a convention of Mormons in Salt Lake City, when they adopted a constitu¬ tion establishing <(a free and independent gov¬ ernment by the name of the State of Deseret.** Congress refusing recognition created the Terri¬ tory of Utah (q.v.) the year following. See Compromise of 1850.

DESERONTO, Canada, a town in Hastings County, province of Ontario, , on the Bay of Quinte, at the mouth of the Napanee River and on the Canadian Northern Railway. It is about 132 miles east of Toronto. Its principal manu¬ factories are lumber-mills, flour and furniture, car shops, shipyards, chemical works, locomo¬ tive works, foundry and iron smelting works. It is an attractive summer resort. Pop. 2,013.

. • *

■

.

.

'

• ■ * f.

[redacted]

-

-

n

',v, 'O' ■. <

- r»;

A'

1 ■•]

^7' »*•';< ^ .V*

r' f fj

>4l

: r- 'n!!rs^,, ,

• .'/U

- T • •,, 1 .

.

n

’,v, ‘O’ ■. <

- r»;

A’

1 ■•]

^7’ »*•’;< ^ .V*

r’ f fj

＞4l

: r- ‘n!!rs^„ ,

• .’/U

- T • •„ 1 .

.

s

‘ ‘.’ J , (‘ ‘

’ i ‘

t-

• ‘V , ‘. r. ^

ri >

”I

.

i -

‘,1^

‘id ‘ ” v”**- ‘ *■ ‘ ‘

■■f,i . *’,V ‘T

r-.n^’ >. i4V’m;.i*

■V ‘

7VV- •■ ■ ■

% ‘ ‘ ; 7 ,rf « ^ ‘ * ‘ I

‘• • 1. .•

.3CSˆt7A. u ••. • _ /. ,,v .

■ , ‘ ‘ . ,»T

i ■’, ,‘f’ •«<-

■;xH *7^”*“

^ ■ ■■ …1 ‘■

…. • ‘ f

/ ’

•if*’ ■’

■■ •’•• r VvU

. m:.

‘• jfc*

j i

• . fc ‘■ ‘^■^i •’•*4’ ^

‘.’ ^ ‘•WV

■ * • >, .1

Jr.’.r ‘v.’ ‘..

iMl

•T’ ’*’ “1

•’ ” ‘#«iiil#* ?•;＞?

.V “.,*y »..,. »I

^ 4‘ ‘ ‘ij

\＞i

JL- ^ ‘l

.*’’V»^‘”” ■•■ ’■” ”’＞6 ■’ ‘■ ‘ ■

I.Vll ^’-Tl 1 !.• X ‘li -■;.. •• i , .,T* -Ji-. ^ -» ^

“ij- ■ -yaP ^

m

1” Mi.

» .1

kiii

m-

-►

‘r

V .1

< >

•* >

■■ ;T”;^‘i

i» »• * , ‘j

..^—fw. ■■■■*■ ii.

T

/‘V Thirty Volumes

1922

I •

<•

r

I

V.

- -♦

THE omCYCLOPEDIA AMEˆ’Cˆ

CORPO:WION ,

vEWYQi < K

lj;.

• ■■■ ‘ < ■

!kV > Kˆ’

T >

* IW’

p

I

i

4

I

I

d

I

4

I

I

THE

AMERICANA

Uhiveb§al

ˆOWLEDGEj

In Thirty Volumes

1922

CORPORATION

NEWYORK CHICAGO

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

•> I

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 1 8 1922

©n!,AG543l7

PARTIAL LIST OF CONTRIBUTORS TO VOLUME IX

ALEXIS, JOSEPH, A.M.

Assistant Professor of Germanic Languages and Literatures, University of Nebraska

EDITOR, THE

AUTENRIETH, GEORGE C.

Professor of Mechanical Drawing, College of the City of New York

DRAWING, MECHANICAL

AYRES, SAMUEL GARDINER, B.D.

Garrett Biblical Institute

DISCIPLINE, ECCLESIASTICAL DISPUTATIONS, HISTORIC

BABCOCK, KENDRIC CHARLES, Litt.B., Ph.D.

Dean of the College of Liberal Arts and Sciences, University of Illinois

EDUCATION, INDIAN EDUCATION, PROFESSIONAL EDUCATION, TECHNICAL

BAKER, IRA O., B.S., C.E.

Professor of Civil Engineering, University of Illinois

EDUCATION, ENGINEERING

BALDWIN, CHARLES SEARS, Ph.D.

Professor of Rhetoric and English Composition, Columbia University

DREAM OF GERONTIUS, THE

BEIK, ARTHUR K., Ph.D.

Instructor in Education, State College for Teachers, Albany, N. Y.

EDUCATION, NATIONAL SYSTEMS OF

BEVAN, WILSON LLOYD, Ph.D.

New York City

DIES HUE

BOGART, ERNEST L., Ph.D.

Professor of Economics, University of Illinois

ECONOMIC HISTORY ECONOMICS

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

DICKENS, CHARLES

BROWN, ELMER ELSWORTH, Ph.D., LL.D.

Chancellor of New York University

EDUCATION, SECONDARY IN AMERICA

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, Univer¬ sity of West Virginia

DOMINICAN REPUBLIC, DIPLOMATIC RELATIONS WITH

CARVER, THOMAS NIXON, Ph.D., LL.D.

Professor of Political Economy, Harvard University

DISTRIBUTION

CHANDLER, FRANK W., Ph.D.

Professor of English, University of Cincinnati

DIANA

DON QUIXOTE

COUMBE, CLEMENT W.

Technical Art Expert, New York

DEVIL IN ART AND SYMBOLISM DOG IN ART AND SYMBOLISM DRAGON IN ART AND SYMBOLISM DRESDEN PORCELAIN DUTCH AND FLEMISH FURNITURE EAGLE IN ART AND SYMBOLISM

CUTLER, FRANCES W., M.A.

Instructor in English, Vassar College

EARTHLY PARADISE

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell University

DETERMINLSM

ECLECTICISM

DAKE, CHARLES LAURENCE, A.M.

DEVONIAN

ECONOMIC GEOLOGY

DEIMEL, RICHARD F., B.S., M.A.

Assistant Professor of Mechanics, Stevens Institute of Technology

DYNAMICS OF MACHINERY

DICKINSON, THOMAS H., Ph.B., Ph.D.

Associate Professor of English, University of Wis¬ consin

DUCHESS OF MALFI, THE

DOLE, NATHAN HASKELL, A.B.

Editor of ” Masterpieces of Famous Literature ”

DIVINE COMEDY, THE

DUGGAN, STEPHEN PIERCE, Ph.D.

Professor of Education at the College of the City of New York

EDUCATION IN THE UNITED STATES

DUTTON, GEORGE B.

Department of English, Williams College, Williams-town

DIANA OF THE CROSSWAYS

EMERSON, HARRINGTON, C.E.

Efficiency Engineer, New York

EFFICIENCY ENGINEERING

ERSKINE, JOHN, A.M.

Professor of English, Columbia%University

DONNE, JOHN

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

DISINFECTANTS DISTILLATION DISTILLED LIQUORS

(

Contributors to Volume IX — Continued

FINEGAN, THOMAS E., M.A., LL.D.

Sˆpsnntendent of Public Instruction for the State of Pennsylvania

EDUCATION, STATE OF NEW YORK EDUCATION, COMPULSORY EDUCATION, RURAL EDUCATION OF FEEBLE-MINDED OR •MENTAL DEFECTIVES EDUCATION OF IMMIGRANTS EDUCATION OF THE PHYSICALLY HANDICAPPED

FLATHER, JOHN JOSEPH, Ph.B., M.M.E.

Professor of Mechanical Engineering, University of Minnesota

DYNAMOMETERS AND THE MEAS¬ UREMENT OF POWER

FOWLER, HENRY THATCHER, Ph.D.

Professor of Biblical Literature and History, Brown University

DEUTERONOMY

FREEMAN, FRANK N., Ph.D.

Professor of Educational Psychology, University of Chicago

EDUCATION, PSYCHOLOGY OF

GARRISON, J. H., A.M., LL.D.

Editor of “ The Christian-Evangelist ”

DISCIPLES OF CHRIST

GRAVES, CHARLES, REV.

Hartford, Conn.

EDUCATION, THEOLOGICAL

GRIFFIS, WILLIAM ELLIOT, D.D., L.H.D.

Author of '"Brave Little Holland and What She Taught Us," " The American in Holland," " The Story of New Netherland "

DUTCH IN AMERICA, THE

HAILMANN, WILLIAM NICHOLAS, A.M.

Professor of The History and Principles of Educa¬ tion, Broadoaks School, Pasadena, Cal.

EDUCATION, ELEMENTARY

HANUS, PAUL HENRY, LL.D.

Professor of Education, Harvard University

EDUCATION, STUDY OF

HARRIS, H. F., M.D.

Georgia State Board of Health

DISEASE, GERM THEORY OF

HEMMETER, JOHN COHN, M.D., Ph.D., LL.D.

Professor in Medical Department of the University of Maryland

DIGESTION

HEUER, COLONEL WILLIAM HENRY

Consulting Engineer, Corps of Engineering, United States Army

DREDGING

HOWARD, WILLIAM G., A.M.

Professor of German, Harvard University

EGMONT

ISAACS, EDITH J. R.

Critic and Essayist

DES MEERES UND DER LIEBE WELLEN

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

DON GIOVANNI DON PASQUALE

JERNEGAN, MARCUS W., Ph.D.

Associate Professor of History, University of Chicago

EDUCATION AND NATIONAL DEVEL¬ OPMENT

EDUCATION AND THE WAR

KELLOGG, VERNON LYMAN, M.S.

Professor of Entomology, Leland Stanford Jr. Uni¬ versity

DISUSE

KUNZ, GEORGE F., Ph.D., Sc.D.

Author of “ Gems and Precious Stones of North America,” *Etc.*

DIAMOND

LAWRENCE, WILLIAM WITHERLE, Ph.D., Litt.D.

Professor of English, Columbia University

EDDAS, THE

LE GALLIENNE, RICHARD

Author, Critic and Reviewer

EGOIST, THE

LEE, GUY CARLETON, Ph.D., LL.D. ’

. Managing Director, National Society for Broader Education, New York

EDUCATION, ADULT

LEONARD -STUART, CHARLES, B.A.

Editorial Staff of The Americana

EASTER

LIVINGSTON, ARTHUR

Professor of Romance Languages, Western Univer¬ sity, London, Ont.

DIALOGUES OF LEOPARDI, THE

LULL, RICHARD SWANN, M.Sc., Ph.D.

Professor of Vertebrate Paleontology, Yale Univer-j . sity

DINOSAURIA

MORE, PAUL ELMER, LL.D., Litt.D.

Author of “ Platonism,” “ The Judgment of Socrates,” *etc.*

DIALOGUES OF PLATO, JOWETT’S TRANSLATION OF DISCOURSES AND HANDBOOK OF EPICTETUS

MOSES, ALFRED JOSEPH, E.M., Ph.D.

Professor of Mineralogy, Columbia University

DETERMINATIVE MINERALOGY

MOSES, MONTROSE JONAS, B.S.

Dramatic Critic

DOLL'S HOUSE, THE

Contributors to Volume IX — Concluded

MUNROE, CHARLES EDWARD, S.B., Ph.D.

The Columbian University, Washington, D. C.

DYNAMITE

NELSON, EDWARD WILLIAM

Chief, Bureau of Biological Survey, Washington,

D. C*

DISTRIBUTION OF LIVING MAMMALS

NOYES, GEORGE RAPALL, Ph.D.

Associate Professor of Slavic Languages, University of California

DRYDEN, JOHN

PILLSBURY, WALTER BOWERS, Ph.D.

Professor of Psychology, University of Michigan

DETERMINING TENDENCY

RANDALL, B. ALEX, M.D.

Philadelphia, Pa.

EAR, THE

ROBINSON, MAURICE HENRY, Ph.D.

Professor of Economics, University of Illinois

ECONOMICS AND THE WORLD WAR

SCHAEFFER, NATHAN C., Ph.D., D.D., LL.D.

• Late Superintendent, Department of Public Instruc¬ tion, State of Pennsylvania

EDUCATION, THE DEVELOPMENT OF THE OFFICE OF SCHOOL SUPER-INTENDExNT

SCHMIDT, NATHANIEL, A.M.

Professor of Semitic Languages and Literature, Cornell University

ECCLESIASTICUS

SMITH CHARLES FORSTER, Ph.D., LL.D.

Professor of Greek and Classical Philology, Uni¬ versity of Wisconsin

DIALOGUES OF THE DEAD

STANOYEVICH, MILIVOY S., M.A., M.L.

University of California

EASTERN QUESTION, THE

SULLIVAN, JAMES, Ph.D.

State Historian, The State Educational Depart¬ ment, Albany, N. Y.

EDUCATION, HISTORY OF EDUCATION, MORAL

THORNDIKE, ASHLEY HORACE, L.H.D., Ph.D.

Professor of English, Columbia University

DRAMA

THAYER, HARVEY W., Ph.D.

Assistant Professor in Modern Languages, Princeton University

DES KNABEN WUNDERHORN

TOLMAN, FRANK L.

Reference Librarian, New York State Library

EDUCATION, HIGHER, IN THE UNITED STATES

TRENT, WILLIAM PETERFIELD, LL.D., D.C.L.

Professor of English Literature, Columbia University

DON JUAN

TUCKER, MARRION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

DUNCIAD

VAN DOREN, CARL, Ph.D.

Associate Professor of English, Columbia Uni¬ versity

DESERTED VILLAGE, THE

WARD, HENRY BALDWIN, Ph.D.

Professor of Zoology, University of Illinois

DISTOMA

DISTILLING INDUSTRY

WARDROP, G. DOUGLAS

Managing Editor “ Aerial Age ”

DIRIGIBLE

WELCH, WILLIAM H., M.D.

Professor of Pathology, Johns Hopkins University

DIPHTHERIA

WELD, HARRY PORTER, Ph.B., Ph.D.

Assistant Professor of Psychology, Cornell Uni¬ versity

DISCRIMINATION, SENSIBLE, OR DIFFERENTIAL SENSIBILITY

WELD, LAENAS GIFFORD, A.M., LL.D.

Author “ Theory of Determinants,” ” Determi¬ nants,” *etc.*

DETERMINANTS

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature,” *etc.*

DIE ELIXIERE DES TEUFELS DON JUAN

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

DUTY

ECSTASY

WILEY, GEORGE M.

Director, Division of Examinations and Inspections, State Education Department, Albany, N. Y.

EDUCATION, COURSES OF STUDY IN EDUCATIONAL ASSOCIATIONS

WILCOX, MARRION, LL.B.

Editor Encyclopedia of Latin America

DOMINICAN REPUBLIC ECUADOR

WOODWARD, ROBERT SIMPSON, Ph.D., Sc.D., LL.D.

President of Carnegie Institution, Washington,

D. C.

EARTH, THE

WOOLEY, MARY E., Litt.D., L.H.D., LL.D.

President of Mount Holyoke College

EDUCATION OF WOMEN

WORKS, GEORGE ALAN, Ph.B., M. S.

Rural Education, Department New York State College of Agriculture, Cornell University

EDUCATION, AGRICULTURAL

(« . > i

KEY TO PRONUNCIATION.

a

%

far, father

n

Span, n, as in canon (can’yon), pinon (pen’yon)

a

fate, hate

‘ Y’ > t’ m “‘AW

ng

mingle, singing

a or

a

at, fat

! ” t !’! ” ’

nk

bank, ink

a

air, care ‘

t

a

ado, sofa ‘ ” i’ Ail Hi-‘,

5. .-Y

no, open

a

all, fall ■ n i 1 K (‘

0 or 6

not, on

cli

choose, chu rch ‘ ‘ - ^ ^ “

A

0

corn, nor

e

eel, we j ; ‘

6

atom, symbol

e or

e

bed, end

0

book, look

e

her, over; also Fr. e, as in de; eu, as in neiif; and oen, as in

oi

oil. soil ; also Ger. eu, as in beutel

•

boeiif, coenr; Ger. d (or oe), as in okonomie.

0 or 00 «

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat. hot

u

mute, use

h or

H

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

between u and e, as in Fr. sur,

Ger. Muller

i or

w

1

him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

i

,

(consonantal) yes, young

j

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

.azure, pleasure

n

Fr. nasal m or n, as in embon¬ point, Jean, temps

‘(prime), ” (secondary) accents, to indicate syllabic stress

Desert, a term designating in its broadest application any uninhabited region. In its more ordinary use the word means a portion of the earth’s surface that on acount of its barrenness can¬ not support inhabitants. Four classes of desert may be distinguished: (1) Ice-wastes occupy the central plateau of Greenland, the is¬ lands of the Arctic Sea, and probably the entire Antarctic continent. (2) Tundras (q.v.) are flat plains, little elevated above sea-level, fring¬ ing the Arctic shores of the northern continents and especially characteristic of Siberia. (3) Temporary deserts, or steppe-lands, border the Asiatic deserts to the north and west. The saline steppes of the Caspian are true arid wastes ; but the typical steppes in South Russia are luxu¬ riantly clothed with verdure and flowers in spring. In the dry season they form a dusty plain of withered herbage. The llanos (q.v.) of the Orinoco have similar characteristics, but the pampas of South America include portions per¬ ennially green and suitable for agriculture. (4) Arid wastes, or deserts in the popular sense of the word, occur mainly in two zones encircling the world, and corresponding to regions of mini¬ mum rainfall. The greater zone extends from near the equator in an east-northeast direction across the whole breadth of North Africa, as the Great Sahara, Libyan and Nubian deserts, over the peninsula of Arabia, through Persia, Turke¬ stan and the vast tracts of Gobi or Shamo to the confines of China. The zone, thus traced throughout the breadth of the ancient continents from western Africa to long. 120° E., has been computed to cover an area of 6,500,000 square miles ; but the Asiatic portion of this tract includes many chains of mountains and fertile valleys. The great Indian Desert in the Punjab is the only extension of this belt south of the Himalayas. The ring is completed by the Great Basin of North America in lat. 40° N. The southern zone, less complete, comprises the Kal¬ ahari Desert in southwest Africa, the interior of Australia and districts in Chile and in the Argentine Republic.

Deserts occur at all elevations, from consid¬ erable depth beneath sea-

level to many thousand feet above it, and with all varieties of surface, from a flat expanse of sand, where the view for days of travel is bounded by a sharp circle as at sea, to rocky mountain slopes rent by rough defiles bare and chiseled by the driving pud. The essential character of an arid waste is its rainlessness, and the scarcity of water on the

surface and of water vapor in the atmosphere. Radiation in the clear air is rapid and desert climate is consequently of an exaggerated con¬ tinental type. The sand in the Sahara becomes heated to over 150° F. during the day, and chilled below the freezing point at night, while the diurnal and seasonal extremes in the lofty deserts of central Asia are much greater. Thus desert-regions are most effective in producing land and sea breezes and monsoon winds in con¬ sequence of the marked periodical changes in at¬ mospheric density. Another effect is the mirage (q.v.), a phenomenon which, combined with the great loneliness that oppresses the occasional traveler, probably accounts for the widespread superstitions peopling deserts, above all other places, with evil and malicious spirits. The dreaded sand storm or simoom is a kind of tor¬ nadoˆ or whirlwind which raises the sand in tall rotating columns sweeping over the surface with tremendous velocity. Sand-dunes sometimes several hundred feet in height are raised by steady winds, and gradually shift their position. The rocks of desert regions are usually worn into fantastic shapes by wind-drifted sand, and many plains are strewn with ˆdesert pavements® of pebbles, the harder remnants of the rocks etched away by natural sand blast erosion. Desert vegetation is extremely scanty, consisting mainly of hard prickly plants of the cactus, euphorbia and spinose kinds, whose surface ex¬ hales little moisture. Animal life is correspond-ingly_ restricted both in variety and number of individuals. The camel isˆ par excellence the beast of burden for conducting traffic across arid wastes. When an overflowing river, such as the Nile, traverses a desert, the land becomes richly fertile in its immediate neighborhood, and wher¬ ever springs bubble up through the sand there are oases, bearing palm trees and grass. Arti-fidal irrigation, especially the sinking of arte¬ sian wells, has done much to reclaim tracts of desert for agriculture in the Sahara and to a less extent in Australia, while the area of arid land in the western part of the United States, once considered irreclaimable, is being rendered by irrigation increasingly productive.

Geological considerations show that arid des¬ erts are not permanent features of the earth’s Surface. The most level expanses are believed

by many to have once formed part of the ocean bed, or at least great inland seas. The oro-graphical changes which cut off these seas and created inland drainage areas probably at the same time modified the rainfall of the locality.

Excessive evaporation dried up the great lakes, leaving at present a series of diminishing salt lakes without outlet, receiving rivers which dwindle down by evaporation as they flow. The only commercial commodities yielded by deserts are the salts (common salt, borax, sodium car¬ bonate and sometimes sodium nitrate) left in the dried-up lake beds. These salt lakes are sub¬ ject to alternate long periods of desiccation and flooding; during the former the area of the desert extends, during the latter it contracts. These periods have been traced out in the case of the Great American Basin by a series of most interesting researches on the part of the United States Geological Survey. See Gobi; Sahara.

DESERT, The Great American. The

North American deserts possess all the physi¬ ographic, geologic and climatic elements which distinguish the African desert of Sahara.ˆ The chief difference between the two regions is the relatively larger area of the Sahara, the arrange¬ ment of the topographic units and the occur¬ rence in the Great American Desert of a wealth of mineral resources which the Sahara does not possess. Through the application of modern mechanical agencies by American energies and brain, its wastes have become inhabited by an intelligent and progressive people, and its arid hills and plains made to yield a wealth twice as much per capita as that of any other portion of the United States.

The vast stretches lying between the Sierra Nevada and California and the eastern Cordilleran ranges (Rocky Mountains) in the United States, and between the Pacific Ocean and the eastern Sierra Madre of Mexico, constitutes the Great American Desert.

Of the total area of the Cordilleran prov¬ ince, three-eighths are forested mountains, one-eighth plateau and one-half waterless, treeless, turfless mountain and valley desert. The des¬ erts occur in Nevada, Utah, eastern and south¬ ern California, Arizona, New Mexico and all of Texas west of the Pecos, ˆ 550,000 square miles. The American Desert is international, however, for in addition to the ˆ above area within the United States, it continues south¬ ward into Mexico, where it includes most of the states of Sonora, Chihuahua, Coahuila, San Luis Potosi and Sinaloa — another 500,000 square miles — making a total .of 1,050,000 square miles, which although one-

third the area is as truly a desert in every natural sense as is the Sahara, which embraces an area of 3,5(X),- 000 square miles, and has a population of 2,500,000 people.

In its entirety (with a few exceptional for¬ ested summits) this desert province is one of barren, stony mountain ranges, separated by equally barren stretches of desert plain, an aggregation of elongated arid plains and lower mountain ranges, which mostly follow the avial line of the Cordilleras. The individual deserts have many names, and each differs from the other in some minor aspects.

From a technical point of view an arid des¬ ert in its ultimate analysis is a region in which the rainfall is insufficient to produce run-off. The light rainfall, striking the heated rock sur¬ faces and sandy soils, is soon evaporated or drunk in ; even the large bodies of water which may start down the mountain sides as roaring torrents usually die out at the margins of the

plains. These waters are highly charged with mineral salts derived from the heated rock sur¬ faces, and these salts are readily redeposited upon the surface or in the interstices of the permeable sands. The torrents locally transport the rock debris — boulders, pebbles and powder — from one locality to another, but only for short distances ; and hence the desert plains are usually composed of the debris of the adjacent mountains, which in more humid regions of ample run-off would have been carried to the sea. The expansion and contraction from the daily temperature causes the desert rocks to fracture in situ into the desert waste. This is distributed by wind and torrent, and hence the features of the desert are largely air-made as well as water-wrought.

The scarcity of jnoisture results in the ab¬ sence of vegetation of the root-twining, soil¬ gathering and soil-making type that distin¬ guishes the humid region. Every plant and species attests the aridity of the country. Exactly as in the Sahara, these plants are thorny, coriaceous bushes and shrubs of the cactus, aloe and acacia families, adapted to withstand their droughty environment and to defend themselves from attack by man or beast.

Physiographically there are two sub-prov¬ inces of the Great American Desert, lying to the east and to the west of the western Sierra Madre and Colorado Plateau, respectively. The westernmost of these may be termed the Nevadan and the eastern the Chihuahuan.

The western, or Nevadan, Desert occupies much of the area of Utah, Nevada, Arizona, southern and east¬ ern California in the United States, and the states of Sonora and Sinaloa in Mexico. The Chihuahuan Desert occupies the vast area of country lying between the eastern and western Sierra Madre of Mexico and their northern continuation into southern New Mexico and Texas west of the Pecos, and is the so-called Mexican Plateau.

The Great Basin Desert is marked by wide flatness and is largely a region of ancient lake beds. Its surfaces are in many instances what the geologists term constructional, built up largely of great alluvial fans or piedmont allu¬ vial plains, constituting the so-called filled val¬ leys of the inter-montane belts. Its flora is mostly sage brush and grease wood; its agri¬ cultural products are cereals and tubers, and minerals gold, silver and copper. The Sonoran Desert is of a more complicated geological type, and instead of being landlocked is bordered on one side by the Pacific Ocean. Some of its surfaces are also the result of what geologists term destructional processes. Its floral types are the saguara, the palo verde and the cats-claw. Its sparse agricultural products are fruit and wheat, its mineral resources gold and copper.

The Chihuahuan Desert, marked by parallel plains and ranges, is a relatively higher region; its features are a combination of destructional and constructional processes. Its floral types are the maguey cactus and yucca; its chief agricultural product maize (corn), and its prin¬ cipal mineral product silver.

While the desert plains may be extensive, they also have many phases of variation. There are the alkali plains, while crystal patches of saline efflorescence which vegetation abhors, and vast plains of ®doby® (adobe) — brownish choc-

olate clay soils through which here and there are cut the deep channels of streamless streams, or arroyos. There are the dreary* <ˆtabosaˆˆ flats covered by the headlike bunches of a woody grass, abhorred by animals and useless to man, through which one may travel for days. The great white gypsum desert of the Tularosa Val¬ ley of New Mexico is one of the most won¬ drous of all the desert plains. To the eye it is a veritable sea of purest granular snow, marked with wind waves and ripples like the Tropic Ocean, with billows and troughs. In some places there are extensive lakes of crystalline salt which the desert inhabitant uses for herd and flock. Sometimes there are stretches of dreary brown sand hills, great billows gathered around the protecting roots of the thorny mes-quite, the particles blowing with each breath of wind.

The half cannot be told of the many other aberrant features of the Great American Desert, like Death Valley; the great ˆˆmedanos® or white sand dunes just south of El Pasp, each as high as the national capitol, which creep from place to place over the desert plain; the vast plains of malpais in New Mexico with their burning, cutting, black, waterless surfaces of lava ; the ®flour dusPˆ deserts of Jimenez and Arizona and Sonora, where the traveler is choked with clouds of chalk-white powder ; the Crow Flat with its glare that blinds ; the Jornado del Muerto, with its hundred whirl¬ winds ; the saguara desert of Sonora, where for hundreds of miles grows no blade of grass.

The clouds are the most wonderful manifes¬ tations of the desert heavens. The forms of vaporous atmosphere are numerous. In the morning they fill the valleys with snow white vapor, which at midday rises and gathers into solitary fluffs sailing majestically along. Some¬ times showers freshen the desert. These are occasionally of sufficient volume to dampen the earth and vegetation, and an awakening of life ensues which is. most remarkable. Vegetation seems to awaken instantaneously, plants which before were dry and dust-covered unfold into broad areas of vivid green. Coriaceous ferns, ordinarily lying like dead leaves among the stones, unroll and wave their fronds in the freshened air. From the inconspicuous flowers of the many

thorny shrubs of the acacia and yucca tribe the air is laden with perfume. It would seem paradoxical to speak of the desert in bloom, but the human senses of sight and smell can be regaled by no more pleasant ex¬ perience than the delicate odors and sweeps of color that sometimes follow an unusual rainfall.

Like a dainty pencil line drawn across the sheet of desert, the trails may be seen for miles and miles. These, originally made by the wild Comanche and Apache, lead in long tangents from water-hole to water-hole, cutting paths of deep-worn ruts. Were it not for these trails connecting the various water places the desert probably would be impassable, for the priceless water is usually concealed in spots where least suspected. These water-holes were discovered by the aborigines long before the ranchman and settler came or the army wagons and cavalry troops deepened the impress of the trails. What stories of death and pain, thirst and star¬ vation could be told by these old trails! We know that as early as 1528 many of them ex¬ isted, for in that year Cabeza de Vaca and his

three shipwrecked survivors of the Narvaez ex¬ pedition followed these paths from water-hole to water-hole across our southern border, and that modern commerce and migration still use these, the oldest and most stable monuments of the desert.

In the desert water is king. Without it priceless ore is but as dross, and fertile soils are worthless. Upon the desert plains many men and cattle have died for the want of a drink of water.

Like the Sahara, the Great American Des¬ ert is superficially waterless. Its plains are usually barren of surface water save for an exceptional saline lagoon. A few brooks, streams or rivers arise within its larger moun¬ tain ranges, but no water ever runs off its sur¬ face to the sea. Even the great floods of water which sometimes burst from an erratic cloud with devastating effect are rapidly swallowed up by the sands or evaporated by sun and wind. It is true that there are two long rivers com¬ parable to the Nile of the Sahara — the Colo¬ rado and the Rio Grande — which rise in the higher forested mountainous border lands and flow into and across the deserts like great canals, without gathering contributory drainage from them, losing volume in fact from absorp¬ tion and evaporation in the desert portions of their courses. These are rivers born of the mountains, however, and not of the deserts.

Upon the area of the Great American Desert the maximum rainfall is less than 15 inches per annum and does not average more than 10 inches. In places such as Death Valley and the Yuma Desert it is less than 5 inches. Deduct¬ ing from this maximum of IS inches 60 per cent of its effectiveness, due to loss through evaporation, the actual rain value is only 6 inches per annum, less than the amount falling in the two crop-growing months of May and June in the Eastern States, and less than one-half the quantity that fell in September 1901 in a single 24 hours at Galveston, Tex. To this great natural fact the desert is resigned, that within its area the land with a few excep¬ tions, not amounting to 3 per cent, is per¬ manently and hopelessly dry, and even the most sanguine cannot refute this fact.

Before the railways came, the Great Ameri¬ can Desert was a most primitive region. It was inhabited by a population about as dense as that of the Sahara now, but practically in the same state of culture ; and the mission bells rang over the same civilization that existed in 1528. The inhabitants practised irrigation, agri¬ culture and architecture very much like that of the Egyptians of to-day, and constructed dwell¬ ings of unburnt brick and stone. The aborigine found sustenance on the desert, but of a kind upon which the white man could not well exist. Maize was his staple of diet. This with the tunas (fruit of the prickly pear) and the roots of various yuccaceous plants, supplemented by a few wild animals, provided an aboriginal diet pure and simple.

It was no great feat for the Spaniard who already possessed an Old-World knowledge of desert craft to amalgamate with the aborigines. He gave to them a few domestic animals (the goat and the burro, which can live where other animals starve). He also gave to them the Catholic religion and the Spanish language. For nearly 400 years the desert population made

no progress in industrial civilization beyond adopting the wooden plow and the cumbersome wheeled cart known as the carretta.

In Mexico the old desert cities and country estates were practically in the same status of civilization that existed in the 1st century after discovery. The cities had no commerce except by caravan ; the estates were great feudal dis¬ tricts with their fortified haciendas, to which all the surrounding people were attached as fiefs. For 200 miles along either side of the inter¬ national border in Mexico and our own desert country the unconquered Apache spread devas¬ tation from the Pecos to the Colorado; and the only white men there were the soldiers at scat¬ tered and lonely outposts, or ®bad men® en¬ deavoring to hide from civilization, and hardly better than the Apaches in instincts or action. Here and there in the United States at the widely dispersed water-holes were a few no¬ madic ranchmen who owned cattle of primitive breed for which there were no purchasers, except the army and beef contractors. Some mines there were also, but these were merely those with easily reducible ores and limited in depth by the distance which a man could dig in solid rock without machines or powder, and from which burdens could be carried on the human back. In Utah alone had the white man attained a foothold.

With the advent of the railroads the modern conquest of the desert began. It was first awakened from its centuries of lethargy by the whistle of the locomotive in the eighties. In the Great American Desert in the United States and Mexico there are now more than 9,000 miles of railway. But for the railroad the Great Ameri¬ can Desert would to-day be as unproductive as the Sahara, and still populated, like the Sahara, by people who exist without division of labor, the use of mechanical appliances or extra-terri¬ torial commerce. The first railways to be con¬ structed were designed merely as highways be¬ tween the Atlantic and Pacific seaboards. No thought of revenue from a desert itself was anticipated. Next came a great longitudinal line following the ancient trails of the Aztec from Mexico to Santa Fe. Mining and popu¬ lation soon followed these trunk lines, which are now extending out even into the utmost recesses of the desert. From the Pecos in Texas to California, a distance of 1,500 miles, the route of the Southern Pacific followed a belt of country devoid of water except occasionally in the Rio Grande. Not a herd of cattle, a mod¬ ern house, a farm or a mine existed along this desert stretch. Nor would

they exist to-day had it not been for the construction of this railway. Now its course is marked by many prosperous embryo cities and villages.

Notwithstanding the apparent scarcity of water, one of the most remarkable features of the American Desert is that water has been secured, often in apparently impossible places, and in quantities which have made possible the existence of cities and industries. Like the des¬ erts of the Sahara and Asia, those of America have a supply of underground water ; there is hardly a desert in which the experiment has been tried where waters have not been found within 2,000 feet of the surface. Though not often sufficient for agriculture, enough has usually been found to afford a supply for cat¬ tle, railroads and mines.

Underground water has usually first been found by the railway companies. When the track was first pushed across the desert, water was brought from the rear in tank cars; but when the track was completed water was bored for in the desert itself. The engineers have had at command a mechanical appliance second only in importance to the locomotive, and one which in the desert usually goes side by side with it. This is the mechanical drill. At great expense they bored in many places. The existence of underground water beneath any particular area having once been demonstrated by the railroad company, individuals, of course, usually repeated the experiment. Three notable triumphs of the mechanical drill over nature are the flowing wells of the Salton Desert, the flowing well at Benson and a supply of 700,000 gallons a day from the deep wells on the Mesa at El Paso. Each of these supplies of water was obtained from the localities which superficially were hopelessly dry.

Several of the largest mines in the desert de¬ pend almost entirely upon the water trans¬ ported on cars. The Copper Queen runs its vast smelters and machinery chiefly by water thus obtained, while the famous Sierra Mojada, of Coahuila, with its population of 5,000 people, has not a drop of water except that brought in tanks <a distance of 125 miles. Yet these two mines annually return millions of profit.

But the sterile and hopeless-looking soil of the desert, when artificially watered, is appar¬ ently more fertile than where rainfall is abun¬ dant. There is no nobler spectacle than a dreary waste converted into an emerald oasis by water artificially applied, and in the desert may be seen some of the most profitable and skilful agriculture in the

world. The wheat fields of Utah and Sonora, the great cotton farms of Coahuila, the alfalfa valleys of the Rio Grande and the orchards of California are all inspiring examples. The transformation made in the desert where irrigation has been possible is marvelous, and in one instance — in southern California — has resulted in the de¬ velopment of communities of great wealth and culture, where the ideals of perfect conditions for existence are as nearly attained as possible.

A word of caution must be written, however, against an overestimate of the agricultural ca¬ pacities of the desert. It is necessary artificially to collect the precipitation over large areas, and to concentrate it upon smaller areas by impounds and canals. In this manner at least 25 acres must be set aside as unproductive catchment areas for every one that may be cul¬ tivated. All rain water that falls upon the desert or upon its neighboring mountain, if it could be protected and carefully preserved, would not irrigate 5 per cent of the great des¬ ert area. The efficiency of the rain of the Great Desert region for agricultural purposes is still further diminished owing to the season in which it falls — June to October — too late for the growing crops, the planting and growing months of spring and early summer being dry. From a practical standpoint it is doubtful if even 1 per cent of the vast area can ever be profitably tilled by irrigation. The underground water supply, too, is entirely insufficient for extensive agricultural uses, even when it is free from in¬ jurious salts; and the desert people, after every possible experiment, have long since ceased to

anticipate any material supply for irrigation from that source.

From whatever point of view the problem is approached, the sober conclusions cannot be avoided that the desert as an agricultural coun¬ try has its limitations. The only apparent way in which the area of irrigable lands can be seri¬ ously increased is by the construction of reser¬ voirs to save the run-off of the forested moun¬ tains, especially that portion of the desert adjacent to the Californian, Utah and Mexican sierras. Even when this is accomplished there will still be left a vast area of desert. Hence the agricultural produce of the desert will never be large, and this product with the exception of the fruits of southern California will con¬ tribute but little for export, and will never be sufficient to supply the needs of its own popula¬ tion. The Great Desert is and will continue to be a profitable market for the consumption of the fresh and preserved food products and forage of the ocean seaboards and Middle West.

Notwithstanding the scarcity of water and forage the pastoral interests of the desert are considerable. Upon the stony foothills and in the mountain canons the scant herbage and grass supply nutritious foods for many ani¬ mals, and there are numerous cattle ranches, especially in the Chihuahua province, which are profitable and thriving. Statistics are wanting and hence exact figures cannot be given, but the livestock values of the desert amount to several million dollars, exceeding the agricultural prod¬ ucts many fold.

So far as even the present agriculture in the desert is concerned, it would not exist were it not that its products were consumed at good prices by the people engaged in mining and transportation. One good mining camp, a few acres in extent — and there are many of these — gives employment and remuneration to more people than whole countries of arid farming lands. Previous to the introduction of the rail¬ way, mining in the desert was limited to simple processes and products. Without mechanical drills and hoists only moderate depths could be reached, and limited quantities of ore taken out and treated. Consequently the deeper, larger and richer ore bodies remained untouched. Sil¬ ver and gold were alone considered, and the mines

which now yield over $50,000,000 annu¬ ally of copper could not be touched.

On the California trail near Pearce, Ariz., for 40 years the overland pioneers built their camp-fires against a ledge of quartz. Since the railway came these rocks are being crushed for the gold they contain at one of the most com¬ plete and profitable mills in America. The huge stamps and other machines were brought from New York, Pittsburgh, Chicago and Denver; the oil for fuel to run them, from California; the food for the village of over a thousand people living in homes built of Texas lumber is all brought in from the great canning, packing and fruit-growing sections of the country.

A dozen other places in the desert, each with its modern hoists, smelters, converters and elec¬ tric appliances, are producing millions of mineral wealth per annum. Not only have new mines been opened and equipped, but many of the his¬ toricˆ old mines of Mexico, abandoned because the limit of hand mining had been reached, have been reopened with the aid of the steam-hoist

and air-drill, and to-day are more productive than ever.

The Great American Desert yields annually over $100,000,000 worth of metals chiefly sil¬ ver, copper and gold. This represents at 10 per cent a productive capital of $1,000,000,000, In addition to the paying mines, as large an invest¬ ment is now being made in mine development and preparation for the coming of lines of rail¬ way which are everywhere reaching out to new mining fields. There is every possible reason to* expect that the mineral output of the desert wilt be quadrupled the next decade. . Mexico's pro¬ duction of gold and silver has increased steadily despite the political turmoil and anarchy of re¬ cent years. It produced in 1912 gold to the value of $24,343,482, and silver valued at $44,- 832,332; Arizona and New Mexico produced a mineral output in 1914 valued at $78,463,191. Silver, instead of being a dead metal, is being mined with renewed activity and improved ap¬ pliances, The American Great Desert 3delds about $8,000,000 from the United States.

The smelting interests are not the least im¬ portant adjuncts of the mining industry, and each smelter gives employment to many work¬ ingmen. The American Smelting and Refining Company, with its capital of $80,000,000, has great central plants in the desert at El Paso, Aguas Calientes and Monterey, Many of the mines like Boleo,

the Copper Queen, the United Verde and Greene Consolidated have their own smelting works.

Many mineral districts of the desert still lie unproductive for want of transportation. This is especially true of the great copper, gold and coal fields of the Pacific States of Mexico, while the rugged western Sierra Madre contains veins of ore awaiting transportation facilities which will furnish many new and important mines.

The total population of the Great American Desert in 1910 was about 2,750,000 people. Of this total population in the United States, 500,000 are in southern California, leaving about one person to every two square miles in the re¬ mainder of the territory. Of the remaining people in the American portion of the desert, at least four-fifths are in cities, towns and min¬ ing camps. These people in their own pictur¬ esque language are by profession ^^prospectors,^^ ^‘punchers,® ^ffiesters,^^ ®miners,^^ ^dungers,^^ ^Mexicans® and ^promoters.® In plainer Eng¬ lish, mineral seekers, cattle men, irrigator-farm¬ ers, miners, health-seeking consumptives, labor¬ ing Indians who have abandoned the ^ffilanket® caste, and men who serve as intermediaries be¬ tween the latent wealth of the desert and the ready cash of the East. As a whole they are an energetic lot. In the United States they consist chiefly of two classes, the Caucasian, whose ingenious brain conceives and develops industries, and the Mexican (Indian) peasant, who does most of the manual labor. Across the line in Mexico the same conditions exist, ex¬ cept that the American finds a ready co-oper¬ ator and companion in the higher caste of Mexican citizens. If any of our readers should still retain in his mind as a type of the desert citizen the bad man with the slouched hat, flow¬ ing mustaches and quick-acting revolver, he is at least ten years behind the times.

The aboriginal population of the Great American Desert was and is of quite a different type fjTom that of the nomadic savage who lived

e

by the chase, in the forested mountains and upon the Great Plains. They were largely vil¬ lage dwellers, home builders and agriculturists who by the arts of pottery and weaving had risen to the cultured stage of barbarism as dis¬ tinguished from savagery. It was their social arts and habits of industry which produced the highest aboriginal type in the ancient Aztec, and it is their blood (not the Spanish) which to-day constitutes the ruling spirit of Mexico. Upon the invasion of their environment, first by the Spanish and later by the Anglo-American civilization, they assumed at least a portion of these and to-day they are the people who con¬ stitute almost the sole laboring classes of the desert, being called Mexicans in the United States and peons or peasants in Mexico.

It is the intensity rather than the density of the desert population that appeals to the ob¬ server. Whatever is done is done better than elsewhere. This is a necessity of the desert condition. It will not pay in that region to trifle with inferior methods or products. In mining the best man and the best machine must be had; in farming with expensive water it is a waste to plant poor seed ; if cattle are placed on the range they must be good cattle, and so on throughout the entire gamut of industry. The desert cities, if not as densely populous as those of some regions, are unique in their thrift and prosperity. They are all picturesque communities, presenting an interesting mixture of architectural, social and business conditions, busy with commerce and buoyant with hopes and prospects. Each desert city is thoroughly alive to municipal improvement and develop¬ ment. Electric lights and street cars, water¬ works, schools, churches and public libraries abound, while many of the American towns have copied from their Mexican neighbors the picturesque plazas or ornate public parks within the central portions of the busy cities. In many of the Mexican desert cities may be seen the union of all the best of modern industrial im¬ provement with the picturesque Spanish archi¬ tectural features for which these places are noted. Steam and electricity have asserted their mastery, but have concealed their cold mecha¬ nism behind the prettily stuccoed and flower-entwined walls of the artistic Mexican type.

DESERT ANIMALS. Men are apt to think of the vast tracts of absolutely treeless arid sand as uninhabited, because they are void of the creatures known to the regions where humanity dwells. Yet these

tracts are often teeming with life. On the shadowless expanse which affords no lurking-place, animals, adapt¬ ing themselves to the exigencies of their life, often assume the pale tints of the sands whereon, by lying motionless, they may be over¬ looked by their enemies. They not only de¬ velop a protective coloring, but acquire certain other capabilities. They learn, for instance, to subsist on a minimum of water, or to store it within their bodies, some, indeed, develop¬ ing an ability to live altogether without direct water-supply. Many desert animals are said to aestivate, that is, to sleep throughout the summer, as animals of cold climate hibernate by lying dormant through the winter season. The desert snail, in order to protect itself from dessication, builds up a wall of mucus, some¬ times with two or three layers, aerpss the open¬ ing of its shell to prevent evaporation of its

moisture during the extremest heats. Small desert animals, like plain-dwellers, are burrow-ers, not only because they can thus escape the fierce rays of the sun, but also because they are so protected against their enemies. Even some serpents burrow, and these are more virulently poisonous than corresponding species of a dif¬ ferent habit. All the desert creatures, from the snakes and lizards to the camels, are provided muscularly with the ability to shut out from their nostrils and eyes the sand that is blown by the powerful winds ; and most of the insects (except the locusts) are practically wingless, so that these strong desert currents do not carry them away.

The large desert animals are swift, and their feet are adapted for the hot rocks and sand by being cushioned beneath with callous skin. The swiftness of these animals is indispensable to their preservation; for they must generally es¬ cape their pursuers by flight, since their habitat affords no hiding-places ; moreover, they have to travel long distances for both food and water. Examples of this may be found in the camel and ostrich (qq.v.).

The desert is undoubtedly the refuge of cer¬ tain animals which have been driven by competi¬ tion from the more desirable habitations, and which, having located in arid land, have adapted themselves to their unfavorable environment. That they are the unsuccessful and outcast rep¬ resentatives of species living under better condi¬ tions is substantiated by the fact that they are almost always closely related to the forms in the fauna of the green, fertile lands beyond the desert; the differences usually being only the changes necessitated by difference of habitat.

DESERT IGUANA, or keeled lizard (Dip-sosaurus dorsalis), a stout-bodied iguanid lizard of the deserts of the Mexican border of the United States, distinguished by a single row of keeled scales along the spine. It is terrestrial, lives ˆ in burrows, runs swiftly and is largely herbivorous. See Iguana.

DESERT LAND LAW. Under the group of acts known as the Desert Land Law, any citizen of the United States 21 years of age or more or any person of such age who has de¬ clared his intention of becoming a citizen and who is a bona-fide resident of the State or Ter¬ ritory in which the land to be entered is located, and who has not previously exercised the right of making desert land entry, may take not to exceed 320 acres of arid land which he proposes to reclaim by conducting water thereon within four years from the date of his application. He must acquire a clear right to the use of sufficient water to irrigate and re¬ claim the whole of the land entered or as much of it as is susceptible of irrigation. At the time of filing his application he must pay the sum of 25 cents per acre. Each year after entry for three years he must file proof of hav¬ ing expended not less than ˆ $1 per acre or a total of $3 for the necessary irrigation, reclama¬ tion and cultivation of the land, in permanent improvements thereon and in the purchase of water rights. Thereafter upon proving com¬ pliance with the law as to reclamation of one-eighth of the irrigable area and the payment of $1 per acre he will receive patent for the lands. Title may be acquired in less time if the showing required by the law is made.

The Desert Land Law is the result of con¬ ditions found as the settlement of the public lands pushed westward beyond the hundredth meridian. It soon became evident that a large part of the public domain was semi-arid and that new agricultural conditions must be met by legislation.

The first attempt was by means of special legislation passed 3 March 1875 for the sale of desert lands in Lassen County, Cal., in tracts of not more than 640 acres at a price of $1.25 per acre. The land was to be reclaimed by conducting water thereon within two years. This act was

a departure in two particulars from the policy of the Homestead Act epacted 13 years before and being then the principal mode of disposing of public lands, first in not requiring residence on the land, and second in allowing an individual to take four times the limit of area fixed in the homestead law.

The general Desert Land Act was passed 3 March 1877, and applied to practically all the States and Territories in which desert land is found. The principal difference from the former act was in allowing three years for reclamation instead of two.

The Act of 30 Aug. 1890 limited the amount of land which anyone could acquire under any or all the public land laws to 320 acres. The Act of 3 March 1891 provided more in detail as to the requirements of reclamation and de¬ manded for three years the annual proof of an expenditure of $1 per acre in the reclamation of the land and in permanent improvements thereon. The entryman is also required to cul¬ tivate one-eighth of the land.

The lack of residence requirement and the ease with which the proof of expenditure could be made opened the way for much fraud under this act and the amount of land permanently improved under it is disappointingly small.

The opportunities for irrigating lands on a scale which could be handled by a small number of individuals were comparatively few and experience showed that irrigation companies which did not also own or control the land to be irrigated were seldom financially successful. Congress has not been willing to give indi¬ viduals or corporations control of large areas such as was necessary for the success of the more extensive and costly irrigation enter¬ prises. The limit of individual development was therefore soon reached and some new plan became necessary.

To meet this situation Congress provided a method of encouraging reclamation by the States under the Act of 18 Aug. 1894 known as the Carey Act, and later Congress provided for the reclamation of the arid lands by funds from the public treasury under the Act of 17 Tune 1902 known as the Reclamation Act. See Reclamation Laws. For the soldiers' and sailors' relief acts of 1917-18, see Homestead Laws.

Morris Bien,

United States Reclamation Service.

DESERT PLANTS, such plants as are characteristic of arid regions ; in

general marked by structures adapted to check transpiration of water, such as reduced leaf-surface, absence of leaves, thickened epidermis, hairy or waxy coverings,ˆ stomata (ˆˆbreathing apparatusˆˆ) in sunken oits. the entrances to

which may or may not be protected by hairs, perennial underground parts such as bulbs, tubers, rhizomes ; and annual plants which flourish during the wet season, where such oc¬ curs, and, like the tops of many of the perennial herbaceous species, die during the dr>' season. On the other hand water-absorbing organs are often highly developed; the root-systems are not only large but the root-hairs are exceed¬ ingly numerous. Storage organs other than underground parts are common, as in many plants with fleshy leaves and in the thick stems of cacti. In regions of less and less rainfall the vegetation becomes more and more monotonous and restricted to the most resistant forms. In addition to intense heat and light, drying winds and small rainfall, the plants have often to adapt themselves to withstand salts which are brought to the surface in solution and left as the water evaporates.

Structural differences and similarities may be observed in the plants characteristic of Al¬ pine and Arctic conditions. Another striking character of desert plants is their restriction to a limited area by isolation and by enforced adaptability to peculiar conditions, in which respects desert and Alpine plants are similar, but in which each differ from Arctic plants that have a wide range. See Alpine Plants ; Arctic Region; Beach Plants; Halophytes; Plant Geography ; Xerophytes.

DESERT VARNISH, a hard dark brown coating that occurs on the surface of most rocks in desert regions. As waters circulate through the rock they gather a certain amount of mineral matter in solution. In humid regions this mineral matter is carried out in springs and removed by river waters. But in deserts all this water evaporates as soon as it gets to the surface of the rock, and the mineral matter is left behind to form the desert varnish.

DESERTAS, da'ser-tas, a group of four srnall rocky islands in the Atlantic Ocean, 30 miles southeast of Madeira, visited at certain seasons of the year by fishermen and herdsmen. They are named Sail Rock, the northernmost and smallest, Deserta Grande, Chao and Bugio, the southernmost.

DESERTED VILLAGE, The. <The De¬ serted Village,ˆ the best known

of Oliver Goldsmith's poems, appeared in May 1770, and reached a 5th edition by August of that year. There has never been any marked diminution of the favor in which it is held by lovers of poetry, though pentameter couplets and didacti-cism_ were even in 1770 not the newest poetic fashion and were soon dispossessed. Gold¬ smith's couplets, less epigrammatic than Pope's and less austere than Dr. Johnson's, are easier and more natural than those of either of his masters, not because Goldsmith paid less at¬ tention to his workmanship but because he gave his measure, by means of unusual variety of pauses and a singularly limpid diction, a flow¬ ing rhythmˆ that matches the deeper rhythm of his genuine emotion. The didactic element grew out of his wish to exhibit the harm done by those rich men who, merely to enlarge their private grounds, buy up neighboring farms or villages and drive the inhabitants out. Doubt¬ less he was somewhat melodramatic in his plea, but the evil did exist, as it does still, and he merely used a poet's weapons against selfish

and inhumane luxury. Argument, however, is not the essential merit of the poem. Grief at finding his native village deserted and in ruins brings back to the poet, who is partly Gold¬ smith himself and partly a mere poetic general¬ ization, the memory of its prosperous days. The images which rise within him — the even¬ ing sports on the green, the parsonage, the schoolhouse, the inn — are described with an exquisite fidelity, a kindly humor, a tender sym¬ pathy and an unexcelled felicity of language which, even if there had never been such an abuse as Goldsmith wrote against, would have made his poem unforgettable and universal.

Carl Van Doren.

DESERTER, in military affairs, a soldier or sailor who absents himself without leave with the intention not to return. An officer who absents himself without intent to return upon tendering his resignation, before that resignation has been accepted, or a soldier who enlists in the army, navy or marine corps of the United States or in a foreign army, before receiving his discharge, is considered ipso-facto to be a

deserter. In the United States deser¬ tion from the army or navy in time of war is subject to a court-martial which may inflict a sentence of death. Desertion under ordinary con¬ ditions is punishable by dishonorable discharge and two and one-half years hard labor, but if done during an insurrection or similar disturb¬ ance, b}ˆ five years' hard labor. The United States government offers a monetary reward for the arrest and delivery of a deserter, the sum usually paid at present being $50. In every civilized country the laws against desertion are similar to those of our own land — always severe upon the man who abandons his duty, punish¬ ing him with harshest discipline, and, some¬ times, death,

DESERTION, in legal terminology a word applied almost exclusively to violations of the obligation of husband and wife to live together in the state of matrimony. Desertion may be defined as the wilful termination of the mar¬ riage relation by one of the parties without lawful or reasonable cause; or the voluntary refusal to renew a suspended cohabitation, without justification either in the consent or wrongful conduct of the other. Where the party absenting himself or herself from marital community with the other has a rea¬ sonable cause for so doing the severance of relations is not a desertion. It has been held that only such misconduct as would constitute a ground for divorce will excuse either a wife or a husband who separates, and lives apart, from the other; but the justification of the act would probably be a matter to be determined on the merits of each case. The refusal of matri¬ monial intercourse, the parties continuing to live in the same house, would not of itself con¬ stitute desertion ; this would be a breach of a single conjugal obligation only. Desertion im¬ ports a complete cessation of relations, and the abnegation of the duty of companionship and all other obligations of marriage by a refusal to live together. Where the separation is by mutual consent, and the husband makes adequate pro¬ vision for the support and maintenance of the wife, desertion cannot be imputed, of course. Where husband and wife are living separate without reasonable cause, and without mutual

consent, and an offer of reconciliation and the renewal of marital relations is made by one party and refused by the other, the party re¬ fusing becomes a deserter. The refusal to return must be voluntary, however. If the refusal is given under restraint or duress from a third party, the remedy is against the restrainer, either by writ of habeas corpus or by a suit for alienation. Probably only the husband could sue out the writ. At common law the remedy for desertion is a suit for

the restitution of conjugal rights, A deserted husband or wife may obtain a decree requiring the deserter to return ; and the decree remains in force until cohabitation is resumed. Formerly, the de¬ serter could be imprisoned for a refusal to comply with the decree. The ecclesiastical courts in England originally had jurisdiction in such cases, which devolved on the Probate and Divorce Division of the Supreme Court of Ju¬ dicature when the high courts were con¬ solidated. Under the present English Divorce law the deserter cannot be imprisoned for the desertion ; but he must pay alimony if cohabitation is not resumed and he may be im¬ prisoned for non-payment of the alimony. The English proceeding has thus been practically assimilated to the American practice. In the United States the institution of suits for the restitution of conjugal rights has never found judicial favor. The deserted spouse was rele¬ gated to the equity jurisdiction for a proper remedy. This was usually a decree of separa¬ tion, with alimony to the wife if guiltless, or without alimony if she was in fault. Desertion is now a ground for divorce, absolute or limited, in nearly all States of the Union (see Divorce). A deserted wife, of course, has authority in law to contract debts for neces¬ saries and charge her husband with the obliga¬ tion to pay. The failure of a husband, or his gross, wanton and cruel refusal or neglect, to provide a suitable maintenance for his wife, would justify the latter in separating herself from his bed and board; and the fact that the wife has been forced by such neglect to support herself, and has been able to do so, is no de¬ fense in his favor.

In nearly all of the States the desertion and non-support of wives and dependent children by the husbands and fathers is now actionable criminally in a quarter sessions court, a police court, or in the Domestic Relations Court, which is a branch of almost every one of the munic¬ ipal courts recently established in the greater cities. The process is summary, sometimes on relation of the overseer of the poor, sometimes on petition of the deserted wife. The husband being shown to have separated himself from his wife and children, or to have neglected to sup¬ port them, will be required to pay a suitable sum weekly for their maintenance. Failing to do so the delinquent may be sentenced to imprisonment at hard labor. This provision for imprison¬ ment at hard labor makes desertion and non¬ support an extraditable offense. Formerly it was easy for a deserting husband to evade the requirement to pay a stipend to the cast-off wife by simply going into an adjoining State to live. A deserted wife for the same reason, namely, the huband's absenteeism, found it difficult to cite the deserter into the courts of her domicile. The process of the State courts does not run beyond the State's boundaries;

but, armed with a requisition of extradition is¬ sued by their governor, the police officers of any State can now take a fugitive wife de¬ serter from any other State to which he has fled or may flee. A propertyless husband in prison, of course, cannot comply with the order to pay maintenance. In some States, therefore, the law permits the delinquent to be committed into the custody of a probation offi¬ cer, who is charged with the duty to see that the order to support the wife is complied with, and the stipend is regularly paid. An alterna¬ tive method to insure payment is to require the institution wherein the delinquent is imprisoned to pay a stated sum per diem to a person desig¬ nated by the court as the proper recipient. The per diem is written off as part of the run¬ ning expense of the penal institution and is charged to the county. In the last analysis, however, it comes out of the labor of the prisoner breaking stones, digging ditches or building roads. The deserter is thus made to earn bread for his abandoned dependents by the sweat of his brow. The legislation on this subject, the more drastic parts of which have gone into effect during the past five or six years, provides the means whereby women in the humbler walks of life can obtain expedi¬ tiously and inexpensively the equivalent of a judicial separation with alimony.

Stephen Pfeil.

DESFONTAINES, da-fon-tan', Pierre Frangois Guyot, Abbe, French writer: b. Rouen 1685 ; d. Paris 1745. He was one of those known to us more for their controversies with Voltaire, and his biting attacks, than from their own productions. Voltaire, by the superiority of his wit, succeeded in gaining many to his opinions; but impartial judges have long agreed that he was not altogether correct, and that the criticisms of the Abbe Desfontaines, though severe, are by no means unjust. One of the works of the abbe, which had the misfortune to excite the particular displeasure of the poet, was the well-known ˆDictionnaire neologique,ˆ of which the sixth edition appeared in 1750 and which was in¬ tended to guard the purity of the French lan¬ guage, as the great writers of the 17th century had formed it ; and in

this respect it has cer¬ tainly proved of much service.

DESFUL, des'fool, or DIZFUL, dez'fool, Persia, city in the province of Khuzistan, its chief commercial centre, 30 miles northwest of Shuster. It is on the Diz or Coprates River here crossed by a stone bridge of 20 arches. Pop. 30,000.

DESGOFFE, da-gof', Blaise Alexandre, French painter: b. Paris, 17 Jan. 1830; d. 1901. He is famous for having imitated jewels and trinkets with pastes, and transparent coats of color. Among his works are ˆOriental Agate Cup of the 16th Century,ˆ after the original in the collection of jewels in the Louvre; ˆOrien¬ tal Vase on Enameled Pedestal of the 16th Centuryˆ ; ˆAmethyst Vase of 16th Centuryˆ (Luxembourg) ; ˆOnyx Jugˆ ; ˆ Money Bag of Henri II, Enamels of Jean Limousin > (Luxem¬ bourg) ; and many fruit and flower pieces. In the Corcoran Gallery, Washington, are _ his ˆSouvenirs of the 16th and I7th Centuries.ˆ He is also represented in the Metropolitan Museum, New York; the Walters Gallery, Balti¬

more; the Brooklyn Museum and many private collections in America.

DESHOULIERES, da-zoo'le-ar', Madame Antoinette de Ligier de la Garde, French poet: b. Paris, 1 Jan. 1638; d. there, 17 Feb. 1691. During the war of the Fronde she fol¬ lowed her husband into exile at Brussels, and he rescued her after she had been for eight months imprisoned at Vilvoorden as a suspi¬ cious personage. She was called the 10th Muse and the French Calliope on account of her idyls ˆLes moutpnsˆ and ˆLes fleurs.ˆ Her subse¬ quent failure in writing tragedy caused this advice to be given her: ˆˆRetourncz a vos moutons?ˆ Voltaire was of opinion that of all the French poets of her sex she had the great¬ est merit. Several learned societies elected her a member, and her agreeable manner, her ani¬ mation and wit, which sometimes, but rarely, gave way to a gentle melancholy, made her the centre of attraction in the best societies at that period. A good edition of her works appeared in 1749.

DESICCATION, the evaporation or dry¬ ing off of the aqueous portion of bodies. It is practised with fruit, meat, milk, vegetable ex¬ tracts and many other matters. It is usually done by a current of heated dry air, and as such may be considered as distinguished from evaporators, so called, to which furnace heat or steam heat is applied. See Food Preserva¬ tion.

se-da’re-o da set-ten-ya’no, Di Bartolommeo Di Francesco, Florentine sculptor: b. 1428; d. 1476. He was a pupil of Donatello. His chief works are the tomb of Carlo Marsuppini, chan¬ cellor of the Florentine republic, in the church of Santa Croce ; and the great marble tab¬ ernacle of the Annunciation in San Lorenzo. Another church in Florence possesses a statu¬ ette of the Infant Jesus by this sculptor, of which there is a replica in the Louvre. The genuineness of many busts attributed to him has of late been disputed. The Paris and Vienna museums possess some fine examples of these.

DESIDERIUS, Lombard King, See Didier.

DESIGN, in painting, the first plan of a large work, drawn roughly, and on a small scale, with the intention of being executed and fin¬ ished in large. See Drawing.

In music, design means the invention and execution of the subject in all its parts, agree¬ ably to the general order of the whole, espe¬ cially in the composition of works of classical formulae as required by a sonata or symphony

In manufactures, design expresses the figures with which the workman enriches his stuff or silk, and which he copies after his own drawing, or the sketches of some artist.

In architecture, a plan of an edifice as speci¬ fied by the groundplans, elevations, sections and any other outlines necessary to guide its construction.

DESIGN, Schools of, schools in which art is taught with an industrial application in view rather than a purely aesthetic end. Theoretically such schools may be considered as intermediate between schools of technology, in which (with the exception of the architectural courses) de-

signing is of a purely mechanical nature and application, and schools for the training of artists ; yet in actual practice this distinction is not always followed. The best results in ap¬ plied art are produced by foundation work sim¬ ilar to that essential in preparation for a distinc¬ tively aesthetic career. The courses in such schools vary in detail but generally include most of the following branches : free-hand draw¬ ing ; the theoretical principles of decoration, and the history of art — especially in its decorative aspects ; copying and variation of designs ; orig¬ inal designing for textile fabrics, wall-paper, stained-glass, pottery, leather-work, book-covers, *etc.* ; and the study of the best examples of de¬ signing — for which accessible museum collec¬ tions are essential. To this is added instruction in technical manipulation.

The definite endeavor to promote art educa¬ tion with the purpose of developing and improv¬ ing the art industries of the nation.had its rise in England as a result of the first international exhibition, that of 1851, at Hyde Park, London. In the United States a similar movement origi¬ nated in Boston in 1870, and was an outcome of the former. The related branches of indus¬ trial art drawing and manual training owed much to the impetus given by the Centennial Exhibition of 1876. The new spirit was felt by the public schools and wrought marked changes in them during the next quarter of a century, and museums of art were created and developed. Among the institutions offering courses in applied art in the United States, may be mentioned the schools of Cooper Union; the Lowell Free School of Industrial Design (1872), affiliated with the Massachusetts Institute of Technology; the School of Design for Women in Philadelphia; the School of Design of the University of Cincinnati; and the University of Minnesota, which has a four years' course in drawing and industrial art. The large cities of Europe were provided with facilities for teaching industrial art long before such a ne¬ cessity was apparent in Great Britain and the United States. In Paris the Lcole Nationale et Speciale des Arts Decoratifs, in Berlin the Bau Akademie and in Vienna the Imperial Art Insti¬ tute, may be especially noted. The great schools devoted to the training of artists created the atmosphere and impulse without which the more practical schools would be impossible, but they hardly come within the scope of this review. Among the results produced in Great Britain by the recognition in 1851, of the superiority of France in the arts of applied design, was the creation of the South Kensington schools and Museum of Art, which have been powerful fac¬ tors in effecting the great change in that nation. Consult Munsterberg, ˆThe Principles oˆ Art Education > (New Yorkˆ 1904) ; and Adams, ˆTheory and Practice in Designingˆ

(New York 1911).

DESIRADE, da-ze-rad', an island of the West Indies, dependency of Guadeloupe, from which it lies about nine miles to the east. Since 1814 it has been a French possession. It has an area of 10 square miles, and a population of about 1,500, composed mainly of emancipated slaves. It is known as the island which Colum¬ bus first discovered on his second voyage in 1493, and to which he gave the Spanish name Deseada, ˆdesired.®

DESJARDINS da-zhar-dan', Alphonse, Canadian journalist and politician: b. Terre¬ bonne, Quebec, 6 May 1841. He was educated at Masson and Nicolet colleges, and was ad¬ mitted to the bar in 1862. In 1868 he turned his attention to journalism, was on the staff of UOrdre, and later became editor-in-chief of Le Nouveau Monde. He assisted in organizing the Papal Zouaves sent to the aid of the Pope in 1868, and is a member of the Order of Pius IX. He was a member of the lower house of the Canadian Parliament (1878-92) and was then called to the senate. In 1893 he was mayor of Montreal and in 1896 for a short time minister of militia and then minister of public works.

DESJARDINS, Martin, gallicized name of Martin Vanden Bogaert, French sculptor: b. Breda 1640; d. Paris, 2 May 1694. He became a member of the Academy in 1671, professor (1681) ; rector (1686) ; and court sculptor to Louis XIV. He was a gifted sculptor, dec¬ orator and woodcarver, executing many works for the churches of Paris, the College of the Four Nations, palace of Versailles, *etc.* His chief work was a monument to Louis XIV (1686), removed in 1792 and destroyed save a few parts now in the Louvre and the Invalides. Another Louis XIV, an equestrian statue, re¬ mains at Lyons, with several portraits in busts and bas-reliefs at the Louvre and at Versailles.

DES KNABEN WUNDERHORN. 'The Boy's Marvelous Hornˆ (Vol. I, 1806, really published in 1805, II-HI, 1808), the most fa¬ mous collection of German folksongs, was the work of Clemens Brentano (q.v.) and Achim von Arnim (q.v.), both members of the Heidel¬ berg Romantic group. The title was furnished by the title of the introductory poem, the theme of which suggests in symbol the content of the whole collection. Romantic mediaevalism began to bear fruit in a profound and varied study of the national past, conspicuously in collections of older tales and poems and in scholarly editions of older masterpieces. German interest in folk-poetry, which was awkened soon after the mid¬ dle of the 18th century largely through the

stimulus of ‘Percy’s Reliques,ˆ centred mainly in Herder and his followers. Herder’s great collection of folk-poetry (1778-79) in accord¬ ance with his conception of the term, was cos¬ mopolitan in scope. ‘Des Knaben Wunderhorn,ˆ on the contrary, was distinctly national, in part conceived as a witness to national treas¬ ures at a time when the political fortunes of Germany were at a low ebb. The transcrip¬ tion of the texts of the songs, whether from older printed sources or derived from oral tradition, is sometimes careless and linguis¬ tically inaccurate; the collectors even made deliberate alterations. Later collections have been more extensive and more scientific, but the importance of ‘Des Knaben Wunderhornˆ re¬ mains : it is a treasure-house of popular song and ballad, of infinite variety and beauty, an index of a people’s soul. The influence of this work on the lyric poets and ballad-writers of the early 19th century can hardly be overesti¬ mated, notably on Uhland, Eichendorff, Wil¬ helm Muller and Heine. The collectors dedi¬ cated the first volume to Goethe, who reviewed it favorably and significantly in the Jenaische Allgemeine Literatur-Zeitung (21 and 22 June 1806). Among several editions with notes and

critical material, those of Boxberger, and of Birlinger and Crecelius may be mentioned. Consult also, Rieser, <Des Knaben Wunderhorn und seine Quellenˆ (Dortmund 1908).

Harvey W. Thayer.

DE SMEDT, Charles, Belgian ecclesiastic : b. Ghent, 6 April 1833; d. Brussels, 4 March 1911, He received his education at the College of Saint Barbara, Ghent, the College of Our Lady of Peace, Namur, the Jesuit scholasticates of Namur, Tronchiennes and Louvain. In 1851 he entered the Society of Jesus, taught several years at Tronchiennes, was ordained in 1862 and from 1864 to 1870 was professor of church history and of dogmatic theology at the scholasticate of his order in Louvain. In 1871-76 he was a member of the staff of the ˆActa Sanctorumˆ and from 1876 to 1911 was a member of the Bollandists at Brussels, serving also (1899-1902) as acting rector of Saint

Michael's College. He made an address on ˆDes devoirs des ecrivains catholiques dans les controverses contemporaines,ˆ at the Second Con¬ gress of the Catholics of Normandy at Rouen in 1885. Many other important addresses were made by him, notably that on ˆLes origines du duel judiciaire,ˆ at the International Catholic Scientific Congress at Brussels in 1894. He was a member of very many learned societies, Bel¬ gian and foreign. His works include ˆDissertationes selectae in primam jetatem historiae eccle-siasticae' (1876) ; ˆPrincipes de la critique historiqueˆ (1883) ; ˆNotre vie surnaturelleˆ (2 vols., 1911) ; he collaborated also in ˆActa Sanc¬ torum Hiberniaeˆ (1887) ; ˆCatalogus codicum hagiographicorum, latinorum antiquiorum saec-ulo XyP (3 yols., 1889-93) ; < Bibliotheca hagi-ographica latina antiquae et mediae aetatisˆ (2 vols., 1901) ; also contributions to ˆˆThe Catholic Encyclopediaˆ (1910) and to various scientific and historical reviews.

DE SMET, Peter John, American Jesuit missionary to the Indians : b. Dendermonde (now Termonde), Belgium, 31 Dec. 1801 ; d. Saint Louis, Mo., 23 May 1873. In 1822, being yet only a scholastic in the order, he was sent by his superiors to join the Jesuit mission in the United States and at the suggestion of the government became an instructor in the Indian school at Florissant, Mo.; later (1828) he be¬ came instructor in the university newly founded at Saint Louis. After this, having been ordained priest, in 1838 he entered on his destined field of labor as missionary to the aborigines, trav¬ ersing on foot or in canoes or with whatever means of conveyance was possible, the regions inhabited by the Pottawatomies, Sioux, Black-feet, Flatheads, Pend' d'Oreilles and other tribes in the valleys of the Missouri, Yellowstone, Platte and Columbia and on both sides of the Rocky Mountains.

On many occasions he was a commissioner on behalf of the United States government in pacifying the redmen when, provoked to fury by the wrongs done them, they went on the war path. United States officials reporting that Father De Smet alone of the entire white race could penetrate to these cruel savages and re¬ turn safe and sound. In his journeys he wan¬ dered over 180,000 miles in those wildernesses In the course of his labors of 40 years. But in the meantime he made visits to Europe repeat¬ edly, to collect funds for support of the mis¬

sions and to enlist young men for labor in the same field. His collections in Europe amounted to 1,000,000 francs.

He wrote several narratives of his ex¬ perience in the western wilds, among them : ˆLetters and Sketches of a Residence in the Rocky Mountainsˆ (1843) ; ˆOregon Missions and Travels over the Rocky Mountainsˆ (1847); ˆWestern Missionsˆ (1863); ˆNew Indian Sketchesˆ (1868).

DES MEERES UND DER LIEBE WELLEN (Waves of the Sea and of Love). Among the poetic dramas of the world so many have been marred either by inadequate verse or undramatic material that ˆDes Meeres und der Liebe Wellenˆ (1831), by Franz Grillparzer, stands out by virtue of the harmony of its material and treatment. It is, as the Ger¬ mans say, ®aus einem Gusse,® all of the same mold — verse, story, handling, setting — all beautiful, majestic, tender, compelling. For his theme, Grillparzer goes back, as he did in ˆ Sapphoˆ and ˆDas goldene Fliessˆ to the Greek world, taking the age-old story of Hero and Leander to illustrate the tragedy of love when it comes to those who are dedicated to the service of the gods. While Grillparzer's method has not the august simplicity or economy of the Greeks in their handling of tragedy, it has a classic strength that is rare in romantic literature. His verse, moreover, and his char¬ acterization, have a warmth and a tenderness that is partly traceable to his appreciation of the great Spanish dramatists. Nowhere in his work does his special gift show to greater ad¬ vantage than in the radiant love-poetry of ˆDes Meeres und der Liebe Wellen,ˆ which fact makes it the more strange and pathetic that a public which gave his earliest and far less favored works a welcome, turned its back on this splendid achievement and on those that followed it. It was not until after Grillparzer's death that ˆDes Meeres und der Liebe Wellenˆ was properly estimated; but to-day it is quite generally conceded to be one of the finest verse-dramas in the German language.

Edith J. R. Isaacs.

DES MOINES, de-moin, Iowa, city, capi¬ tal of the State, and county-seat of Polk County; near the geographical centre of the State, long. 16° 43′ 52″ W. ; lat. 41° 35′ 45″ N. It is situated at the junction of the Des Moines and Raccoon rivers, and is entered by 19 lines of steam railroads and 4 lines of interurban electric roads, operating 203 miles of track. The city is built on a plateau 849 feet above the sea-level, is intersected by both rivers, which are spanned by eight bridges, and is 54 square miles in area. The business portion lies near the rivers and the residences are on the higher grounds beyond.

Industries. — The city is located in the heart of a rich coal mining district, the mines in the vicinity employing over 3,5(X) persons, and

hav¬ ing an annual output of 3,500,000 tons. The principal industries, besides coal mining, In¬ clude pork packing, structural Iron, brick and tile, foundry and machine shop products, brass goods, clay products, carriages and wagons, fur¬ niture, cotton and woolen goods, cement, wall paper and proprietary medicine, shoes, caskets, art glass, aluminum ware, gloves and caps, work garments, suspenders. It is also noted

for its immense insurance interests, there being in the city 45 insurance companies. The in¬ surance pay-roll approximates $200,000 per month. Des Moines is the greatest farm journal centre in the world. The products of Des Moines' 412 factories, employing more than 5,000 operatives, amount to more than $30,000,000. The city has a growing jobbing trade of $103,000,000 a year — an increase of 100 per cent in six years.

Banks and Publications. — There are 21 banks and trust companies in the city, with a combined capital of $3,200,000 and annual de¬ posits of over $40,000,000. There are published in the city four daily newspapers, four weekly newspapers, and 47 other periodicals.

Public Buildings, Churches, Educational Institutions, *etc.* — Among the most imposing structures in the city are the State capitol, erected at a cost of $3,000,000; the Soldiers' Monument, costing $150,000, erected on the site of the old State house ; capitol extension park, $2,000,000; the State Historical building, for the collection and preservation of historical records, specimens of art, science and taxidermy, front¬ age 260 feet, depth 90 feet, height 60 feet, cost $500,000; the county courthouse; the United States government building, containing the post-office and Federal courts ; the State arsenal ; the city library, containing over 50,000 volumes ; two large hospitals and the city hall. There are several small libraries, five large opera houses and 32 hotels. The education of the young is provided for by 50 public schools and several high schools, the pupils being furnished with free textbooks. For higher and technical edu¬ cation there are Drake University (Christian), founded in 1881; Des Moines College (Baptist)

(q.v.), founded in 1865; Danish Lutheran Col¬ lege; Highland Park Normal College (Presby¬ terian) ; Iowa College of Medicine and Surgery; one college of osteopathy and seven technical schools. The college population of the city is 6,500. A military post for cavalry was estab¬ lished there by Congress, the land and buildings costing $1,200,000.

Public Works. — The city has 19 public parks covering in all 970 acres of land, and the Iowa State Fair Grounds, 600 acres in extent, are also permanently located there. The streets are well laid out and paved, there being 150 miles of brick and asphalt pavement ; the city is lighted by gas and electric light, the gas dis¬ tributed by 100 miles of mains, and the electric current carried over 110 miles of wire; the sewage and water systems are excellent, the waste being carried off by 93 miles of brick and pipe sewers, and the water conveyed to all parts of the city through 110 miles of mains by the Holly system for general use and fire pro¬ tection.

History, Government and Population. —

Fort Des Moines was built in 1843 to protect the rights of the Sacs and Foxes, and around it a settlement was made in 1846 bv emi¬ grants from Ohio, Indiana, Kentucky and Mis¬ souri. In 1851 it was incorporated as the town of Fort Des Moines and in 1857 received its charter as the city of Des Moines. In 1856 it became the capital of the State by act of the legislature. The form of government before 1907 was under the general incorporation laws of the State and council of nine members elected annually and representing the seven

wards into which the city is divided. In 1907 the Des Moines plan of commission govern¬ ment was adopted. Five commissioners elected at large direct the affairs of the city. The annual income of Des Moines is about $1,1(X),- 000, and the budget of expenditures amounts to $1,000,000, the principal items being $965,- 763.84 for schools, $155,875 for the fire depart¬ ment, $90,580.09 for street lighting and $99,- 968.61 for the police department. The city debt, exclusive of school debt, amounts to $2,057,- 028.41 ; property valuation $127,164,442, and tax rate 33.5 mills. The population of Des Moines in 1920, according to the United States census, was 126,468.

DES MOINES COLLEGE, a coeduca¬ tional institution at Des Moines, Iowa, was organized in 1865 under the name University of Des Moines. This name was afterward changed to Des Moines College in

order to con¬ form more nearly to the aim of its supporters, the Baptists of Iowa. Like most schools of the kind, it has passed through severe financial struggles and reverses. It has an invested en¬ dowment of about $100,000 and pledges suffi¬ cient to increase this sum to $200,000. It also has a beautiful campus comprising two blocks upon which are three substantial brick build¬ ings and a good gymnasium. An additional block adjoining is set apart as an athletic field, the whole comprising about nine acres and valued, with the buildings, at $150,000. The school has four departments : college, academy, music and art. The college has steadily main¬ tained as its aim a high class of work, and has taken rank with the best of Iowa colleges. It has 36 instructors and an average annual en¬ rolment of 1,500 students.

DES MOINES PLAN OF CITY GOV¬ ERNMENT. See Commission Form of Gov¬ ernment.

DES MOINES RIVER, the largest river in Iowa ; formed by the east and west forks in southwest Minnesota ; flows south-southeast to the capital city, then southeast to a point about four miles below Keokuk, where it empties into the Mississippi River ; estimated length, 500 miles. It drains 10,000 square miles in Iowa ; flows through a region rich in agricultural and grazing grounds, bituminous coal and timber; receives the water of Raccoon, North, Afiddle, South and Boone rivers. In its lower course it falls rapidly and affords abundant water power for manufacturing.

DESMOND, Humphrey J., American editor: b. Ozaukee County, Wis., 14 Sept. 1858. He was educated at Milwaukee University and entered on the practice of law in 1881. In 1891-92 he was a member of the Wisconsin legislature, and subsequently became proprietor of the N orthwestern Chronicle, Saint Paul, and the Memphis Journal, of Memphis, Tenn. In 1891 he drew up the compulsory education law and later the freedom of worship law, both of which were enacted. He was one of the founders of the Western Catholic Summer School and is a rnember of the American Historical Asso¬ ciation. He has published ˆMooted Questions of Historyˆ (1895) ; ˆRandom Notes of a Trip to Europeˆ (1897) ; ˆThe Church and the Lawˆ (1898); <Ways of Well Doing> (1902); <History of the Know-nothing Partyˆ (1904) ; ˆLarger Valuesˆ (1913). He was a collaborator

of ˆThe World’s Best Literatureˆ and has con¬ tributed articles to the American Catholic Quarterly Review, the Century, the Forum, North American Review and ˆThe Catholic Encyclopedia.ˆ

DESMOULINS, Lucie Simplice Camille Benoist, French revolutionist; b. Guise, Pi¬ cardy, 2 March 1760; d. Paris, 5 April 1794. He studied at the Lycee Louis-le-Grand and later took up law. In 1785 he appeared before the Parliament of Paris as an advocate, but a defect of speech made him unsuccessful in this capacity. Before the general republican move¬ ment came to a head, he published in 1788 a pamphlet called ˆLa philosophie au peuple frangais.ˆ But on the removal of Necker, Desmoulins suddenly found himself one of the prime instigators of the revolutionary move¬ ment. Carried along by the enthusiasm of the first few weeks, he published a political pamph¬ let called ˆLa France libre,ˆ which scored an instant and prodigious success. It was fol¬ lowed shortly afterward by ˆ Discours de la Lanterne atix Parisiens,ˆ which gained him the nickname of ®Procureur general de la Lan¬ terne.® In November 1789, there appeared his famous journal La Revolution de France et de Brabant. It inflamed the hatred of the royalists and the loyalty of the republicans, and established beyond question the position of Desmoulins as one of the foremost of republi¬ can journalists. He became a strong adherent of Robespierre, with whom he had studied at college, and of Danton, the leader of the Cor¬ deliers. In April 1792 he founded with Freron the journal La Tribune des patriates, “which. expired after the fourth number had been is¬ sued. He abandoned journalism for the plat¬ form for a while, but he was less influential as an orator than as a pamphleteer. He was, moreover, not an original thinker nor con¬ sistent in his political adherence. The bril¬ liance of his philippics was always the ornament of his devotion to one or another of the great leaders of the various democratic parties, rather than the lustre of his own deeply-rooted poli¬ cies, His attack on the Girondists, which he wrote at the suggestion of Robespierre, was so effective in undermining that party that he earnestly regretted having written it. He even thought that the total expulsion of the Bour¬ bons was far too extreme a measure. He was finally alienated from the Jacobins by his opposition in Le Vieux Cordelier, the Dantonist paper, to the tyrannical character of the Committee of Public Safety. He advocated just trials, less drastic punishments and more liberal policies. This led to his arrest by the

com¬ mittee, along with Danton and others of the party; and after a semblance of a trial and a half-hearted defense by Robespierre, Desmou¬ lins was condemned and executed. His wife met the same fate eight days later. Consult ˆCEtivres de Camille Desmoulins, avec une notice biographique,ˆ ed. by Matton (Paris 1838) ; Claretie, ˆCamille Desmoulins, Lticile Desmoulins etude stir les Dantonistesˆ (Paris 1875) ; and Aulard, ˆLes orateurs de la Legis¬ lative et de la Conventionˆ (Paris 1885-86).

DE SOLA, Abraham, Canadian rabbi : b. London, England, 18 Sept. 1825; d. New York, 5 June 1882. Under the careful supervision of his father he received a thorough Hebrew edu¬

cation, and having perfected himself in his gen¬ eral studies, he' was called in 1847 to Montreal, Canada, by its Portuguese-Hebrew congrega¬ tion. His scholarship and energy soon brought him to the front, and in 1848 he was appointed professor of Hebrew and Semitic literature in McGill College, Montreal. Among his more important works may be mentioned: ˆThe Sanatory Institutions of the Hebrewsˆ ; ˆLec¬ tures on the Mosaic Cosmogonyˆ ; and ˆScrip¬ ture ZoologyP He was for many years presi¬ dent of the Natural History Society of Montreal.

DESOLATION LAND, or DESOLA¬ TION ISLAND, an island belonging to Chile,, in the archipelago of Tierra del Fuego. It is 70 miles long and about 15 miles in breadth. The name Desolation Island is also sometimes applied to Kerguelen Land (q.v.) in the Indiau Ocean.

DE SOTO, Hernando, Spanish nobleman, conqueror and explorer : b. Villanueva de la Serena (Badajoz) about 1496; d. 1542 or 1543.. As a captain in 1523-24 he shared the adven¬ tures of Cordoba's fleet on the Nicaraguan coasts, but was overcome by Gil Gonzalez Davila through treachery. Joining Fran¬ cisco Pizarro in Panama with two ships, 60 men and 10 horses, to take part in the conquest of Peru, he was appointed second in command.. In 1532 he was the first Spaniard who spoke with Atahualpa ; going to visit the unfortunate. Inca in the character of an ambassador, he con¬ tinued to be well disposed toward him dur¬ ing his captivity. He returned to Spain in 1536, where he married in Madrid, the following year, Ines de Bobadilla, daughter of Pedrarias Davila (q.v.). Wholly misled by the first re¬ ports of the wealth of Florida, De Soto re¬ solved to undertake the conquest of that country, which was represented to be as rich as Peru. He sold his property and devoted the proceeds to the equipment of his

ships and the outfit of his men. Charles I bestowed upon him readily enough the title of governor of Florida and Cuba. At Sanlucar he collected 950 fighting men, besides sailors. Seven large ships and three small formed the fleet, his wife and family accompanying him in the San Cristobal. De Soto sailed from Sanlucar 6 April 1538, reached Santiago de Cuba safely, and there entered upon his duties as governor of the island, but transferred his authority at that point to his wife before proceeding to Havana (August 1538). By his orders Havana harbor was fortified (see Cuba). During the stay in Cuba his command was strengthened; 1,000 well-armed men were finally got ready, and this was probably the best force which up to that time had undertaken the conquest of any part of America. The fleet sailed from Havana 12 May 1539. In Florida the Spaniards were moderately successful until they reached the province of Tascaltiza, where a great host of natives attacked them. It was said that in this nine hours' fight 11,000 Indians fell, while on the Spanish side 70 were killed and nearly all (including De Soto himself) were wounded. Worn out by the long marches, which did not lead to the discovery of treasure, the soldiers plotted to abandon the enterprise. On learning of this, De Soto marched his men toward the interior, hoping to reach New Spain (Mexico)

by land, and knowing that, at, any rate, his followers would not care to desert him when the ships had been left far behind. In a noc¬ turnal battle (December 1540) the Spaniards were again severely handled. Four months later they came upon a fort surrounded with a stockade, in storming which many were killed and nearly all wounded. De Soto still led them forward, through the present Gulf States and probably as far north as Kentucky, until he contracted a fever and died — according to Garcilaso, in 1542, though Herrera says 1543. The Spanish soldiers, who had thought to leave their commander in the lurch, were in this man¬ ner finally separated from him. At first they buried him in a trench the natives had opened near a village on the bank of a great river he had discovered; but several days afterward — either fearing the hostiles would dishonor the body

or suddenly realizing how they them¬ selves might best honor it — they hollowed out the trunk of an evergreen oak, weighted the rude coffin with armor, placed the disinterred body within it and sank it by night in the deepest part of the river, which they called the Grande and we call the Mississippi.

Marrion Wilcox.

DE SOTO, de so'to. Mo., mining city in Jefferson County, on the Saint Louis, Iron Mountain and Southern Railroad, about 40 miles south by west of Saint Louis, and 15 miles west of the Mississippi River. In addition to its mining interests of zinc and lead, it has a large trade in agricultural products and exports grain, flour, produce and live stock. Its industries include a flouring-mill, shoe factory and the repair shops of the railroad. The waterworks are owned by the city. Pop. about 5.003.

DESOXYBENZOIN, phenyl-benzyl-ke¬ tone, CeHo.CO.CHaCeHs ; obtained by the ac¬ tion of zinc and hydrochloric acid on chloro-benzil CeHs.CO.CbkCeHs, or by heating mono-brom-stilbene with water. It crystallizes out of alcohol in large tablets which melt at 60° C. Desoxy-benzoin can also be obtained by reduc¬ ing benzoin CeHs.CO.CH (OH) .CeHs.

DESPARD, Edward Marcus, Irish soldier: b. Queens County 1751 ; d. London, 21 March 1803. He served as ensign in 1766 and in 1779 played an important role in the engineer¬ ing service of the San Juan expedition. In 1781 he was made commander of the island of Rattan and from there was transferred to the position of supervisor, with the rank of cap¬ tain, of the English colony in Honduras. In consequence of complaints made against him he was recalled in 1790. This made him disaffected and he matured a plan to assassinate the king on his way to open Parliament. The conspir¬ ators were arrested and tried by special com¬ mission at Southwark 5 Feb. 1803. There be¬ ing no doubt of their guilt, Despard and nine of his associates suffered death.

DESPENSER, de-spen'ser, Hugh le, Eng¬ lish jurist: b. about 1210; d. Evesham, 4 Aug. 1265. He was justiciar of England in 1261 and during the war of the barons with Henry III joined the .former. He was killed at the battle of Evesham.

DESPENSER, Hugh le, The Elder, Earl OF Winchester: b. 1262; d. 27 Oct. 1326. He was the son of the preceding. He served with

Edmund, Earl of Cornwall, in the Welsh War. Later he supported the king in Gascony. He was called to Parliament in 1295 ; fought at Dunbar; joined the expedition to Flanders in 1297, and was sent to negotiate a treaty of peace between Edward, the king of the Romans and the king of France. In the following year, he went as ambassador to Boniface VIH and served in the various Scottish campaigns. Though originally of the barons' party he abandoned it, doubtless for selfish reasons, in order to support Gaveston, the king's favorite. He was temporarily dismissed from the coun¬ cil but soon restored, and rewarded by the grateful king for his services with the gift of the castles of Devizes and Marlborough. He and his son succeeded Gaveston as the king's favorites and honors and grants were heaped on them. This incurred the hatred of the barons who, in 1321, finally secured their ban¬ ishment. At the instigation of the clergy they were soon restored and once more joined forces with the king. They assisted at the trial of the monarch's great enemy, Lancaster, and became generally hated throughout the country. Queen Isabella, wife of Edward H, was driven to drastic action against her weak-willed spouse and his favorites and finally suc¬ ceeded in defeating his troops at Bristol, seiz¬ ing the Despensers and having the elder ex¬ ecuted as a traitor.

DESPENSER, Hugh le, English courtier, son of the preceding: b. about 1290; d. Novem¬ ber 1326. He was made knight on the same day as the Prince of Wales and established him¬ self in power and financial status by marrying Eleanor of Gloucester. He served in the wars against Scotland. He deserted the baronial party for that of Edward II, and became a royal favorite. He and his father were in¬ volved in the misfortunes following the flight of King Edward from London, and were be¬ headed in the same year. His grandson, Henry of Norwich, was chosen by Urban VI to lead a crusade against the antipope Clement VH. Consult Tout, ˆPolitical History of England, 1216-1377 > ˆ(London 1905).

DES PERIERS, da-pa-re-a, Bonaventure, French writer: b. Arnay-le-Duc, about 1505; d. 1544. In 1535, he published with Dolet, his ˆCommentaries on the Latin Language.ˆ He became secretary to Margaret of Navarre in 1536. He wrote a series of 90 stories : ˆNouvelles recreations et joyeux devisˆ (1558). In 1537 was published his ˆC3mibalum Mundiˆ in French, a virulent attack on the Chris¬ tian religion, which was burned by the com¬ mon hangman, and of which only one copy is in existence. He ended his life by suicide. Consult Frank and Cheneviere, ˆLexique de la langue de Bonaventure des Periersˆ (Paris 1888) ; Cheneviere, ˆBonaventure des Periersˆ (ib. 1886) ; Riibner, ˆSyntaktische Studien zu Bonaventure des Periersˆ

(Leipzig 1897).

DES PLAINES RIVER (named from a species of maple called by the French plahie). A river of Illinois which rises in the south¬ eastern part of Wisconsin and flows south and southwest until it unites with the Kankakee River at Dresden, Ill., to form the Illinois River. In length the Des Plaines is about 150 miles. For some distance the river flows al¬ most parallel with the shore line of Lake Michi-

gan. For 13 miles the waters of the Des Plaines have been made to contribute to the Chicago Drainage Canal.

DESPOBLADO, daz-p5-bla'do (desert), a name given in South America to barren tracts in the Andes, which are so high and cold as to be uninhabitable. It is given as a specific name to (1) a treeless, uninhabited plateau, nearly 10,000 feet above the sea, on the Bolivian and Argentine frontier; and (2) a region in Peru between the central and western Cordilleras, ranging from 14,000 to 18,000 feet above the sea-level.

DESPOT (from the Greek despotes), origi¬ nally a master, a lord; at a later period it be¬ came an honorary title which the Greek em¬ perors gave to their sons and sons-in-law when governors of provinces. Alexis III, surnamed Angelus, toward the end of the 12th century, is said to have first introduced this title, and to have made it the first in rank after that of emperor. Thus there was a despot of the Morea, of Serbia, *etc.* At present, despot means an absolute ruler. In a narrower sense, it conveys the idea of tyranny, since in fact the possession of absolute power and the abuse of it are two things bordering very closely on each other.

DESPOTO DAGH, des-p5't6-dah, or RHODOPE MOUNTAINS, a mountain chain of European Turkey, extending 30 miles from the east of the main range of the Balkans to the basin of the Maritza. Its highest summit is Muss-Alla, 9,600 feet. See Rhodope.

DESPRES, da'pra', Suzanne Isabelle,

French actress : b. Mexico 1876. She studied at the Paris conservatory and was awarded first prizes in comedy and tragedy in 1897. She married Aurelien Lugne-Poe, manager of the Theatre I'Oeuvre. She appeared in ˆRem-plagantesˆ at the Antoine and in ˆL'Assommoi'rˆ at the Porte Saint-Martin, and in 1902 made her first appearance at the Comedie Frangaise in ˆPhedre.ˆ She appeared in '^Elektraˆ in 1910. Her greatest success has been the portrayal of Ibsen roles. She has appeared in London and made a tour of Germany in 1906. Consult Nouvelle Revue (May 1902).

DESSAIX, da'sa', Joseph Marie, French general: b. Thonon, Savoy, 24 Sept. 1764; d. 26 Oct. 1834. He served at the siege of Toulon, and in Italy under Bonaparte; was elected in 1798 to the council of 500, where he opposed the coup d'etat of the 18th Brumaire. He was made a brigadier-general by Bonaparte in 1803, and, in the campaign of 1809 against Austria, a general of division, receiving from the emperor the surname of L'intrepide, and the title of count of the empire. He was also made gov¬ ernor of Amsterdam ; served in the Russian campaign of 1812 when he was wounded at Borodino ; in 1814 fought against the Allies in Savoy; and became commander of the National Guards at Lyons after 1830. Consult Dessaix and Folliet, ˆ Etude historique sur la revolution et I'empire en Savoie: Le general Dessaix — sa vie politique et militaireˆ (Paris 1879).

DESSALINES, da-sa-len', Jean Jacques, emperor of Haiti: b. 1760; d. 14 Oct. 1806. He was sold as a slave and took the name of the person in whose service he remained until 1790; after that time he fought under Biasson, and still

later, joined Toussaint L'Ouverture. In his struggle against General Rigaud he signalized himself as much by his cruelty as his bravery. In 1802 he surrendered to General Leclerc. But when an epidemic of yellow fever fell upon the French army and almost annihilated it, he at¬ tacked Rochambeau with an army of 30,000 blacks, thus obliging the French commander to surrender to the English, and to leave the island (1803). In 1804, when governor-general of Haiti, he issued an order lor the general slaughter of the white inhabitants. In Octo¬ ber of the same year he was proclaimed em¬ peror and made an unsuccessful attempt to take the city of Santo Domingo in March 1805. In¬ curring the enmity of his own followers, he was killed in an ambuscade near Port au Prince. Consult Dubroca, ˆVie de J. J. Dessa-

lines^ (Paris 1804).

DESSAU, des'sow, Germany, capital of the state of Anhalt, in a valley on the Mulde, on the railroad between Berlin, Kdthen, and Leip¬ zig, 65 miles southwest of Berlin. Situated in a region well-wooded and well-cultivated it has wide tree-shaded streets, a 16th century palace, containing fine collections of Dutch, Flemish and Italian masters, relics of Napoleon and Prince Leopold, the palaces of the former rul¬ ing prince and of Princess Louise, the parlia¬ ment buildings, post office, municipal theatre and the old and new town halls. In the church of Saint Mary, erected in 1512, restored in 1857, is the tomb of Prince Leopold, noteworthy for the six stone figures which guard the sar¬ cophagus. The city has a modern water-supply system and an electric-lighting plant, several schools and gymnasia, three libraries, one of which is the property of the municipality, two museums, with priceless art collections, and monuments to Moses Mendelssohn, the philoso¬ pher, and Wilhelm Muller, the poet, both of whom were born here, as also the composer Friedrich Schneider. In the Thirty Years War, on 25 April 1626, Wallenstein won a great victory over Count Mansfield on the Elbe bridge at Dessau. Modern commercialism has taken possession of the city during the last decades. It now has thriving industries, such as sugar refining, carpet-making, papermak¬ ing, cloth weaving, machinery manufactures, railroad car works, carriage works and distiller¬ ies. Being the centre of an intensively cultivated region it has a large trade in agricultural prod¬ uce, especially grain. Albert the Bear founded Dessau in the 12th century and it became a city in 1213. In 1603 it was made the capital of the Anhalt-Dessau division of the duchy. It suf¬ fered much during the campaigns of the Thirty Years' War, but recovered within the century following. Consult Wiirdig, ^Chronik der stadt Dessau^ (Dessau 1876). Pop. 56,600.

DESSEWFFY, Count Aurel, Hungarian statesman: b. Nagy-Mihaly, county Zemblen, Hungary, 1808; d. 9 Feb. 1842. He was famous for his euridition, his knowledge of European literature and the political economy of Bentham. Early acquainted with the proceedings of the diet of which he kept a journal, after minor state appointments he achieved fame as a member when he eloquently opposed Kos¬ suth in the sessions of 1832-36. In 1840 he was a member of the committee for the re¬ form of the criminal law.

DESSICANTS

DESSICANTS, in medicine, substances that check secretions from mucous membranes or cause cicatrization. See Astringents.

DESTERRO, da-star'r5, Brazil. See Florianopolis.

DESTINN, Emmy, Bohemian operatic soprano : b. Prague, Bohemia, 1878. She stud¬ ied under Marie Loewe-Destinn and adopted stage name Emmy Destinn in place of her real name Kittl. She secured an engagement at the Berlin Royal Opera, where her debut in 1897 was so successful that she obtained a perma¬ nent engagement. She appeared as Sentaˆ in ˆDer Fliegende Hollander,ˆ upon the invita¬ tion of Cosima Wagner at Beyreuth in 1901. She created the role of Salome, in Strauss' opera, at Berlin and was selected to sing the part in Paris. She had a notable success in London in ˆMadame Butterfly,ˆ and as Donna Anna and Aida 1905. She first appeared in New York in 1908, and has since been prominently identified with the Metropolitan Opera Com¬ pany of that city. She is a great favorite, not only because of her splendid singing but also because of her qualities as a superb actress. Her repertoire includes over 80 operas.

DESTOUCHES, da-toosh', Philippe Neri-cault, French dramatist: b. Tours, France, 22 Aug. 1680; d. near Melun, France, 4 July 1754. His comedy, ˆLe glorieuxˆ (1732), is a master¬ piece in matter, in elaboration and in character delineation. Lessing classes that work, with its companion piece, ˆLe dissipateurˆ (1736), as ˆmodels of the finer high comedy.® Hardly in¬ ferior to these is ˆLe philosophe marieˆ (1727). Consult Burner, A., ˆDestouches et ses come¬ diesˆ (Albe-Royal 1906).

DESTROYERS. See Anti-Torpedo Boats ; Submarines; Torpedo Boats.

DESTROYING ANGELS. See Danites.

DESTUTT DE TRACY, da-stiit' de tra'se, Antoine Louis Claude, Count, French philo¬ sophical and metaphysical writer : b. Paris 20 July 1754; d. there, 10 March 1836. During the French Revolution he held several import¬ ant posts and was in repeated peril. He rep¬ resented the nobility of Bourbonnais at the States General. In 1792 he went into exile with Lafayette. On his return to France he was sentenced to imprisonment, where he re¬ mained until the downfall of Robespierre. He served as senator under Napoleon and was raised to the peerage

under Louis XVI H. He wrote ˆElements d'ideologieˆ (1817), a devel¬ opment of Condillac's philosophy and in part an exposition of what then passed for eco¬ nomics. His ˆDelineations of the Politics of the World's Nationsˆ (1820), and prior works, received considerable notice in the United States through JelTerson, who translated the ˆCommentaire sur I'esprit des lois de Montes¬ quieuˆ (1806) into English and had it pub¬ lished in Philadelphia (1811).

DESULTORES (from desilio, vault®), the Latin name for vaulters or leapers, who jumped from_ one horse to another. The Scythian, Indian and Numidian cavalry were very expert desultores and each man brought at least two horses to the field. When one was weary he jumped with great agility upon an¬

other, which he led by his hand. The Greeks and Romans introduced the same practice in their games, races and funeral solemnities, but never, as far as we know, in war. Homer describes a vaulter of this sort, who performed his feats on four horses at once (Iliad, xv, 679) ; and Livy (xxiii, 29) describes a kind of Numidian cavalry in Hasdrubal's army in Spain, in which the soldiers had two horses each, and in the heat of an engagement frequently leaped, fully armed, from one to another. Hilian gives a similar account of a tribe dwelling not far from the Danube, who, on this account, were called Amphippi. Modern representatives of the desultores are the Russian Cossacks whose equestrian feats surpass those of the ancients.

DETACHMENT, a body of troops or part of a fleet selected from the main body for some special service.

DETAILLE, de-ta'ye, Jean Baptiste Ed¬ ouard, French painter: b. Paris, 5 Oct. 1848; d. 1912. He is distinguished for his treatment of battles and military subjects. He was a pupil of Meissonier. His first picture was ˆRe¬ pose during Drill in Camp Saint-Maurˆ (1869ˆ which was awarded a medal. He served in the War of 1870 and his studies of army life were afterward used in his paintings with great effec¬ tiveness. Among his pictures are ˆSalute to the Woundedˆ (1877) ; ˆMovement of Troops,ˆ ˆThe Dreamˆ (at the Luxembourg Museum) ; ˆDefense of Champignyˆ (at the Metropolitan Museum) ; decorative paintings at the H6tel de Ville, Paris, and ˆThe Pantheonˆ ; ˆGeneral Lassalle at Wagramˆ (1912). He was a mem¬ ber of the Legion of Honor. One of his best pictures, ˆThe Passing Regiment,ˆ is in the Cor¬ coran Art Gallery in Washington, D. C. Con¬ sult Valmy, Baysse, ˆPeintres d'aujourd'huiˆ (Paris 1910).

DETAINER, (1) the unlawful detention of a person against his will or the wrongful deten¬ tion of the property of another. The term is applied to the unlawful detention of both per¬ sonal and real property. The property may have been acquired either legally or illegally, but it must be wrongfully held either as against the owner or one entitled to immediate possession. If the person wrongfully detains the property after demand made by the owner or one enti¬ tled to the immediate possession, he is deemed to have converted it, and he may be sued in trover for damages. The usual remedy for the detention of personal property is replevin, but in some jurisdictions detinet.

Where land is the subject of the contro¬ versy, the usual action is ejectment. If the original entry was legal, no action in trespass can be brought. If a tenant at will detains the property with force after the \vi\ has deter¬ mined, he is deemed guilty of forcible detainer. A detainer of land is held to be forcible where the entry was unlawful and with force and re¬ tained by force illegally, or even where the entry was peaceable and lawful if the detainer was by force and against legal right.

ˆ (2) A writ instructing the keeper of a prison to continue to keep in custody a person detained there. It was superseded by 1 & 2 Viet. c. 110, §§ 1, 2.

DETECTIVE, one who searches for crimi¬ nals or ferrets out crime. The work of the de-

tective is allied to that of the police, and wher¬ ever a police force exists there is some detective work to be done, though only in connection with a large police force are men regularly assigned to detective work. The police force of New York includes a body of men known as detec¬ tive sergeants, who have charge of the work of looking for criminals or investigating such crimes as seem to call for their services. The United States government maintains a force, known as Secret Service men, whose principal duties consist in unearthing counterfeiters, and those who rob the mails or infringe the revenue

laws. The British government has established in London a force of detectives known as Scot¬ land Yard men. There are private detective es¬ tablishments in all large cities, the best-known of these being the Pinkerton bureau, which has offices in several cities of the United States under the style of the Pinkerton National De¬ tective Agency. This agency and similar bu¬ reaus make a business of supplying detectives, usually to get evidence in civil or criminal suits.

The private detective has fallen into some disrepute in the United States, owing to employ¬ ment on divorce cases or other matters where there is a temptation to manufacture evidence instead of finding it. Some judges have refused to credit the testimony of such detectives unless corroborated. In many cities private detectives are obliged to take out a license before they are allowed to follow the calling. See Police; Secret Service.

DETENTION HOMES, State establish¬ ments provided by the juvenile court laws of the United States for the temporary care of children awaiting court decisions. They are usually located in rented -private houses, some exclusively for delinquent children, but most, both for dependents and delinquents, the sexes separated, generally under the care of a hus¬ band and wife, or a matron assisted by male officers. In Syracuse, Columbus and Buffalo, rented private houses contain both detention home and juvenile court. In Philadelphia, Mil¬ waukee and Chicago special buildings accomrno-date under one roof waiting rooms, detention home and court rooms. See Children's Courts; Juvenile Offenders.

DETERMINANTS, an important class of algebraic functions which owe their origin to the attempt to formulate the solutions of gen¬ eral systems of simultaneous linearˆ equations. Such a system of the second order is

a-LX + hxyˆni, a7X-{-b2y = ˆii'i\ from which

dibi — clJ)i di &2 — dibi

The solution of the system of the third order, dtx -f-bt.y -f-ciz = iii, (i~ 1, 2, 3), in like manner gives

iˆibiCz -f-iˆibzCi K.zbiC2 — iˆzbiCi — iˆibzCi ˆzbiCz

dibiCz dzbzCi dzbiCi — dzbzCi — dihzCz — dzbxCs

wifh expressions of similar form for y and s.

The functions appearing in the -numerators and denominators of the expressions for the unknowns in the above, and in similar systems of equations, are determinants. They are

formed in accordance with a general principle, the first precise statement of which was based upon the recognition of the two classes of per¬ mutations, as will presently be explained.

2. It is shown in algebra (q.v.) that the num¬ ber of permutations of n elements arranged in a series is n(n — 1, . . 2‘1 = m! Any two elements, whether adjacent or not, standing in their natural order in a permutation constitute a permanence ; standing in an order the reverse of the natural, an inversion. Thus, in the per¬ mutation dedcb the permanences are de, dc, db; the inversions, dd, dc, db, ea, ec, eb, cb.

The permutations of any set of elements are divided into two classes, *viz.* : the positive, in which the number of inversions is even, and the negative, in which the number is odd. When the elements are arranged in the natural order the number of inversions is zero, which is even.

3. Interchanging two adjacent elements, c and «, of a permutation changes its class. For, if a a is a permanence, a a is an inversion and vice versa; and the interchange either intro¬ duces or destrojˆs an inversion. When the two elements interchanged are nonadjacent let the number of elements between them be q and rep¬ resent these, in the aggregate, by Q. As in the preceding case the interchange has no effect upon the relation of d and a to the elements preceding or following aQ®. The arrangement Qa a may now be obtained by interchanging a with each of the q elements of Q in turn, after which d may be moved to the first place by successive interchanges with the q + 1 elements of Qd. Hence, the total number of interchanges of ad¬ jacent elements involved in the transition from the order dQci to the order a Qd is 2g-t-l, an odd number; from which follows the important theorem : The interchange of any two elements of a permutation changes its class.

Of any complete set of permutations one-half are positive and one-half negative.

4. Assume elements arranged in a square array thus :

didi” … diin) dzdz.” … dzin)

dn dn’ … drSˆ)

In this array the position of any element is shown by its indices. For examples, Us”’ is in the third column and the fifth row. The diagonal through di\ 02”, … dnˆn) is called the principal diagonal; that through dn\ dn — 1, … the

secondary diagonal ; the position occupied b}” a/ the leading position.

The above array, enclosed by vertical bars as shown, is used to represent the determinant of its elements. This function may now be defined.

Write down the product of the n elements on the principal diagonal, arranging them in the natural order, thus: didz’dz ” … an(“). This is the principal term of the determinant. Now permute the subscripts of the principal term in every possible way, leaving the superscripts un¬ disturbed. To such of the n\ resulting terms as involve the positive permutations of the sub¬ scripts give the plus sign ; to those involving the negative permutations, the minus sign. The algebraic sum of all the terms thus obtained is the determinant represented by the given arrav.

Applying the process to the determinant array of the second order, there results

ai’ai”

Oi’az”

= ai’a2”-

a2.‘ai’\

while that of the third order gives

aiGi’ai’”

a2a2’a2”

azat’a/”

=axWW” + 02’a3”ai’” + aM’aˆ” — a3a2’ai” — aiaz’ai” — azax’az”.

Each term of a determinant thus contains a single element from each column and each row of its array and is, therefore, a homogeneous function of its elements.

5. The expansion of the array of the second order may be written out at a glance. The process is less obvious, but still simple, for the array of the third order. It is as follows : Be¬ neath the square array write the first and sec¬ ond rows as shown in the figure. Then form the six

products, each of three elements, traversed by one of the six oblique lines, apply¬ ing the signs as indicated. The aggregate of terms thus obtained is the required expansion, as may readily be verified.

The reader will now do well to note how the values of the systems of unknowns x, y, and x, y, z, obtained at the outset, may be written in the notation of determinants.

No such direct methods as the above are available for the expansion of determinant arrays of higher orders, but these will be con¬ sidered further on. See 13.

6. In writing determinants it is often con¬ venient to use a double-subscript notation, the first subscript designating the row and the sec¬ ond the column to which the element belongs. Thus the element aso stands in the third row and the fifth column. When the elements are merely symbolic it is customary to write only the principal terms between the vertical bars. In this, which is called the urnbral notation, the determinant of the wth order is

1 ai'az" ... a/i(") | or | axxan ... ann | ;

which are often further abridged to | ai(«) | and I ai,n I respectively.

Thus far the economy of the notation of determinants is scarcely apparent. Specific forms of higher order have, however, been pur¬ posely avoided. It is only necessary to write out the expansion of an array of the fourth order, which includes 4! = 24 terms each of the fourth degree, to understand the necessity of a general theory of such forms. Determinants of even the fifth and sixth orders would be, if written out in full, quite beyond manipulation; while the complete expansion of

I ai'a/'a3'"a4iva5VagVia,viia8viiia9ixaioXa„xiai2xii | ^

and such functions are not at all uncommon, would fill over a thousand closely printed vol¬ umes like the present! Yet, by means of the theory of determinants, such expressions are not only intelligible but manageable. The general properties of determinants will now be con¬ sidered.

7. Any term of the development of | may be written

± ah’ai”^af” … ai(n), (a)

Designate by u the number of inversions in the permutation hij … I and by v the number of interchanges of two elements necessary to bring the given term into the form

± axiP)ai(Q)ai(r) … and). (b)

Obviously u and v are either both even or both odd; but the permutation pqr … t is positive or negative, according as v is even or odd, and the term will, therefore, have the same sign whether it be determined by the permuta¬ tion of the subscripts of (a) or by that of the superscripts of (6). It follows that the devel¬ opment of a determinant may be obtained by permuting the superscripts and writing the signs of the terms in accordance with these permuta¬ tions, instead of using the subscripts as already explained. Passing from one of these methods of development to the other is equivalent to changing each column of the array into a row of the same rank and vice versa. Hence, a determinant is not altered by changing the rows into corresponding columns and the columns into corresponding rows. Any statement made with reference to the rows of every determinant must, therefore, be equally true with respect to the columns. Rows and columns are alike called lines.

8. If any two parallel lines of a determinant be interchanged the determinant will be changed only in sign. For, interchanging two lines is the same as interchanging, in each term of the expansion, the indices corresponding to these lines. This reverses the sign of each term and therefore that of the whole determinant.

The element pay be transferred to the

leading position by interchanging the ˆ■th row with the («: — 1) preceding rows and the Jth columnˆ with the — 1) preceding columns. This being done, the resulting determinant must take the sign factor (— 1)

A determinant having two parallel lines iden¬ tical is equal to zero; for the interchange of these identical lines reverses the sign without altering the value of the function.

9. A determinant having a line of elements each the sum of two or more quantities can be expressed as a sum of two or more deter¬ minants. Let

A =

ax{hx -fi — &i” rtr …)ci…

diihi -f-hz — 62*^ — …)c2…

dz (hz -f-bz’ — bz” — …)cz…

be such a determinant. Then, writing Bi = bi bi’ — bf ± _ ,

any term of the development of A is of the form

± dpBqCr … = ± dpbqCr…

dl dphqCr … -f-dpbq’Cr

The terms A are obtained by permuting the subscripts p, q, r, .of dpBqCr …. Permuting simultaneously the same subscripts in the second member and giving to each term thus obtained its appropriate sign, there results

\dxB2Cz… dxb2Cz …

+ f dxb2Cz … I dxb2Cz. . I ± … , •

which proves the theorem.

10. Multiplying each element of a given line of a determinant by a given factor multiplies the determinant by that factor; for each term of the expansion contains a single element from the given line. The common factor thus appears once and only once in each term of the expan¬ sion, and the determinant is, therefore, multi¬ plied by that factor.

In the same _ way it may be shown that a determinant having a line of

zeros is equal to zero. It also follows that if the elements of any

line have a common ratio to the corresponding elements of any parallel line the determinant vanishes.

11. If each element of a line of a determinant be multiplied by a given factor and the product added to the corresponding element of any parallel line the value of the determinant will not be changed. This follows directly from 9 to 10. Thus

dndvidiz . .

. ai”

dnidmdnz .

• . dnn

dudiiifln ~t“ VtClii) …

dnidni(.dm “h mdnO • • • dnn

12. The terms of | ai(«) I which contain the element ch’ are those found in the expansion of

fli’ 0 0 ..

. 0

didz’dz” . .

. d2(n)

dn’dn’dn”.

. . dn(ˆ)

(a)

For if, in forming any term, another element than di be taken from the first column an ele¬ ment zero must be taken from the first row, and the term vanishes. It may readily be shown that the determinant (a) is equal to

di

t

did-^” … dndji”… dn^^

(b)

which is therefore the aggregate of the terms of I di(n) I, (n — 1) ! in number, which contain the element a/.

The determinant factor of order (n — 1) by which the element a/ is multiplied in (b) is called the cofactor of that element in] ai(“)]. It may be obtained from the given determinant by deleting the first column and the first row. The cofactor of any elem’ent dni^) may be

found in the same manner after transposing this element to the leading position. But this transposition multiplies the determinant by the

sign factor (— Hence, to find the co¬ factor of delete its row and its column and

give the resultant determinant the

positive \ . , . . ˆ •„/even\

inegatwe) ˆ‘8” ’

The cofactor thus obtained is represented by zl/c(s), the sign factor (— l)/c + s being intrin¬ sic. For example, the cofactors of the elements of the second row of | dxdi’dz” | are

di’d"

A ” —

did"’

A /// -

di’di’

dz’dz”

, Az —

dzdz”

, Az — —

dzdz’

13. The aggregates of terms containing the elements aˆ’, dˆ’ , … of the determinant

I di(n) I are, respectively,

dˆ‘A/,d/‘Aˆ”, … dAˆ)AAˆ).

Each of these n aggregates includes (n — 1) ! terms of | di(n) no one of which appears in any of the others. In all of them, then, there are n(n — 1) ! or n !, different terms of the deter¬ minant, which is the whole number. Hence

\d,ij > ')\ = dy(‘ A^^’ A-d^’ A^^” • • • A’ dA”^) A (1)

Similarly,

| = fli(*)yli(*) “h < i2(*).d2(*) ~h … -f- (2)

Any determinant may, by means of either (1) or (2), be resolved into determinants of an order one lower and thus, since Afc’, … Ani^) or

zli(«), … An(^) are themselves determinants, it may ultimately be expressed in terms of deter¬

minants of the third or second order, which may readily be expanded (see 5).

14. If the hth and Kth rows of | ai(^) | are identical the elements d^’, dK” , … a/c(“) in formula (1) may be replaced by a/i”, …dhi’^) respectively. But in this case the value of the determinant is zero. Hence, h and n being different indices,

dh’ A-A~ dh” A A~ ■ ■ • + = (3)

Likewise p and .f being different, fli(P).i4 i(s) -l-(Z2(P).d2(®) T … 0. (4-)

15. The determinant of order (n — 1) obtained by depleting the «:th row and the .yth column of 4 = I ai(“) [is called the minor of the determi¬ nant with respect to the element a/c(®), and is

written Obviously, by what precedes,

^k(«) = (— 1 4(s).

If two rows, the hth. and /cth, and two col¬ umns, the pth and ^th, are deleted the result is written and is called a minor of the

second order. Minors of lower orders may be obtained in a similar manner and expressed by a similar notation.

Any wth minor of a given determinant and the determinant of the elements at the inter¬ section of the rows and columns deleted in forming it are called, with respect to each other, complementary minors. The determi¬ nant may be expressed in terms of products of

pairs of complementary minors, a method of expansion due to Laplace. Formulae (1) and (2) are special cases of the method. Its general statement is somewhat complicated.

16. The principles thus far developed will now be applied to the solution of systems of simultaneous linear equations ; the process which, as stated at the outset, led to the dis¬ covery and investigation of determinants. As¬ sume the system of three equations

dix + biy + ciz = Kf (f = 1 , 2, 3.)

In the determinant | /Ci&aCs | let the elements *Cl, ACj,* Cj be replaced by the equal quantities ap¬ pearing in the first members of the given equa¬ tions. The two determinants now in hand are equal to each other ; thus

dix + biy A-ciz, b\, Cl

HibiCi

dzx + bzy + czZ, bz, cz

=

K-zbzCz

dzx + bzy + CzZ, bz, Cz

l^zbzCz

But the first member of this equation may be separated into the determinants (see 9 and 10)

X 1 dibiCs 1 1 y \b1b2Cz I , and z] C1&2C3 | ,

the second and third of which are, by 8, equal to zero. Hence

X I dibzcz I = I icibzCs 1 ;

or, explicity (see 1).

f^ibiCi

f^zbzCz

UzbsCz

X— - •

dibiCi

dibzCi

dzbzCz

Similarly, bv starting with the determinants I d\K.iCz I and I dibiHz |, respectively, the values of y and z are found to be

_ I d\HiCz I _ I dibiKˆ I

ˆ I dibiCz f I dibiCz I

It will be noted that the values of the un-

knowns have for a common denominator the determinant of the coefficients of the given equation; while the numerator is, in each case, obtained from the denominator by replacing the column of coefficients of the unknown in ques¬ tion by the column of absolute terms. The method is applicable to linear systems of any order.

17. When the number of given equations is greater than the number of unknowns their con¬ sistency obviously depends upon some definite relation among the known elements. Let

aix -f hiy = H (f = 1, 2, 3)

be such a redundant system.

Solving the first two of these equations gives (see 1)

K-\h\ n-ibi

x = - , y =

dlbl

dlbl

dzbz

dzbi

If, now, the three equations are consistent, these values must also satisfy

az ± -f hzj = Kz ;

whence, substituting the above values and clear¬ ing of fractions.

aiKi

dz

Kibi

+ bz

Ol/Ci

= /Ca

dlbl

K-zbz

02^2

dzbz

or, by 8, and (1)

dz

biKi

— bz

dlK-l

K.Z

dlbl

bzˆz

dJˆZ

dzbz

dzbzK-Z

azbziiz

$= 0.$

(5)

The above process being generalized, it appears that the condition that n linear equations be¬ tween (n — 1) unknowns constitute a consistent system is that the determinant of the coeffi¬ cients and absolute terms be zero.

18. Consider now the homogeneous linear equations

dix + biy -f-az $= 0$. (f = 1 , 2 , 3) Solving these equations as in 16 gives

unless

\dibzCz\—0; (6)

in which case each unknown becomes > which

may have any value whatever. But the given equations may be written

di — bi ci = 0; (f = l, 2, 3)

Z Z

any two of which will determine the ratios —

z

y

and — • z

If these three equations form a con-

* X y

sistent system in — and — > however, the condition expressed by (6) holds good (see 17) ; that is to say, the given equations consistently determine the ratios x\ y\z only when the de¬ terminant of the coefficients vanishes. In this case, as may readily be shown

x'.y.z: '.AiiBi'.Ci : lAz'.Bz'.Cz

; lAz'.BziCz (7)

When the determinant of the coefficients

does not vanish the equations are satisfied only by the values x—y = 2=ˆ0. In general;

The condition that n homogeneous linear equations between n unknowns form a con¬ sistent system, for other than zero values of the unknown, is that the determinant of the coeffi¬ cients be zero.

The relation expressed by (7) may also be generalized thus : In any determinant which equals zero, the cofactors of the elements of any line are proportional to the cofactors of the corresponding elements of any parallel line.

The determinants (5) and (6) are called re¬ sultants or eliminants, each being the result of eliminating the unknowns from the system of equations from which it is derived.

19. Again let there be r homogeneous linear equations involving n unknowns, r being greater than n, thus :

di'x'+ai"x" + ... -T = 0.

(f=l, 2, … Wi, … r).

The consistency of these equations requires that every determinant of the «th order, formed by selecting n rows from the array whose elements are the coefficients written in order, shall be zero. If these conditions are fulfilled the fact is expressed by writing

dl’dz

. . dn

. . dr’

dl’dz” .

. . dn’

n “

. . CLr

0l(«)02(^)

… dn^”^) •

. dri”^)

the change of rows into columns being purely arbitrary. The above expression is called a rectangular array or a matrix.

20. Let it be required to eliminate the un¬ knowns from the equations

dx^ bxy cy^~ | 0, ax -f /?y = 0.

Multiplying the second equation, first by y and then by x, there become available three equa¬ tions involving the three unknowns x^, xy, y*, as follows :

-T bxy -f-cy’^=0, axy -f-q,

(3xy = 0.

The eliminant of this system, if consistent, is

dbc

0aˆ3

a/3‘0

If the given equations be inconsistent this deter¬ minant does not vanish.

This process, due to Sylvester, may readily be generalized. It is known as the dialytic method of elimination.

21. The product of twˆo determinants may be most readily obtained as an eliminant. To this end let

duxi -}- dizXz — 0, dziX\ a22X-i = 0 (a)

be linearly transformed by substituting

Xi — bnWi -f-bziWz, Xz — bnWi A-bzzWz (b)

the result being

{dubn -}- (dllbzi -f-0;12&22)W2 = -‘ 0,) /^\

{dzibn -j-dzzbiˆIVi -j- {dzibzi -f-dzzb2‘AlVz = 0. /

Now the condition that equations (c) be con¬ sistent is that the determinant

0.11(221 -y 012(222

Oll(2ll -y 012(212 , - .

dzibii -j-dzibiz dzibii -f-dzibzz

shall vanish. But they may be consistent

because equations (a) are so, in which case

ˆ = 0; (e)

< X2l(l22 I

or, this condition failing, and (a) thus having no solution other than x = Qi = y, {c) will still be consistent if equations {b) are so; that is, if

&11ˆ > I2

hub-n.

= 0.

(0

The vanishing of either of the determinants (ˆ) or (/), therefore, causes (d) to vanish; from which it follows that the determinants {e) and _(/) are factors of (d). The only other factor is numerical and may readily be shown, by comparing coefficients, to be unity. Hence,

dndi2

biibi2

diibii -f-dubn

dnbzi 4“ dizbzz

dzibzz

bzibzz

dzibii -f-dzzbiz

dzibzi T dzzbzz

The same method may be applied to the formation of the product of any two deter¬ minants of the same order. The operation may be described as follows ;

To form the product \pm\ of two determi¬ nants |aml and \bin\ , first connect by plus signs the elements of the rows of both [ami and Then place the first row of [ami upon each row of l&m| in turn and let each two ele¬ ments as they touch become products. This is the first row of \pm. Perform the same opera¬ tion upon 16im1 with the second row of \ain\ to obtain the second row of \Pm\, *etc.* Any ele¬ ment of this product is

p s — O-Kibsi “I” Ok2&S2 • • • 0’Knb8n—- (8)

The product may also be formed by columns instead of by rows as above.

22. The operation just described may be applied to form what is conventionally called the product of two rectangular arrays of the same dimensions. Let these be

dnCLu dzidsi ˆ

and

biibii ■ biibiz biibzi

Forming the product by rows gives

dnbn T dnbii dnbzi “p dubn dnbzi -p dnbzi dzibn “p dzzbii diibzi “p dzzbzi dzibzi -p dzzbzz dzibl\ -p dzib\2 dzibzz dzzhzz dzibzi -j-dltbiZ

If this product array be interpreted as a deter¬ minant it can only be zero; for it is the product of the two determinants formed by writing a column of zeros after one of the given rectan¬ gular arraj”s and a column of elements arbitra¬ rily chosen after the other. An entirely different result would have been obtained had the product been formed by columns instead of by rows.

23. The result of replacing each element of a determinant by its cofactor is called the re¬ ciprocal of the determinant. Thus the recip¬ rocal of

3 =

dn .

. din

is A =

An..

• Ain

dm-

.dnn

Ani. ■

.Ann

Multiplying and applying the formulae (2) and (4) to the elements of the product, gives

do ... 0

03 ... 0

of order n;

whence 3-J = 3nˆ or J = 3n— i.

That is the reciprocal of a determinant of the nth order is equal to its (n — l)th power.

Reciprocal determinants are a special case of compound determinants, whose elements are minors variously derived from one or more given arrays.

24. The application of determinants to the study of geometry and pure analysis has led to the recognition and investigation of numerous special forms, some of which will be defined and their most characteristic properties stated without demonstration.

Among the more important are the forms known as symmetrical determinants. In these any two elements symmetrically placed with respect to the principal diagonal, known as conjugate elements, have the same absolute value. If %(*) = asOO the determinant is de¬ scribed as simply symmetrical. If a'n{ˆ)= — dsiK)ˆ

a condition which cannot apply to the elements of the principal diagonal, unless these be zero, it is said to be gauche or skew. When the diagonal elements are zeros and a/c(®)= — ds(.K)

the determinant is skew-symmetric. It is very easy to show that a skew-symmetric determi¬ nant of odd order is equal to zero. When of even order, however, it is equal to the square of a certain rational function of its elements known as the Pfaffian. These functions are ex¬ pressed by triangular arrays ; thus

0

dnm

= {cd — nl -|- bmy = - \dnm

— d

0 b 1

bl

— u -

-b 0 c

c

— m -

— 1 0 c

The properties of Pfaffians are strikingly analogous to those of determinants.

25. Determinants all of whose elements are zeros except those of the prinicipal diagonal and the adjacent minor diagonals above and below, and in which each element of one of these minor diagonals is — 1, are called con¬ tinuants. They were so named by Muir be¬ cause of their connection with the theory of continued fractions. If qz be the number of terms in the expansion of the continuant of order i, it may be shown thatg > z = gn — i + Qn — 2;

a difference equation, the solution of which is

(i + V^^ + — (1— V + ‘

^ V 5

26. A determinant in which the elements of the first row are functions of a given variable, the corresponding elements of the second row the same function of another variable, etc., is called an alternant. If the functions used as elements are powers of the variables it is de¬ scribed as a simple alternant. Such a deter¬ minant is divisible by the difference product of its variables, the quotient being a symmetrical function of these variables. Thus

1 X rH = (y — z) {z — x) (x — y).(a£: + y --z).

\ y y^\

\ z z^\

27. When yi, yz, … yn are functions, each of Xi, X2, … , xn* the determinant

^^2 _ d(yi,n)

dxidxz ’ * ‘ dxn d{xun)

is called the Jacobian of the given functions, a name given by Sylvester. There is a complete

analogy between the Jacobian and the ordinary

dy

differential coefficient which Bertrand has

made the basis of another definition of these functions. Thus, letting

diXi, JiX2, … j ˆiXn (f= 1, 2, … n) be n distinct sets of increments given to Xi,

X2, , Xn,2XiA

My\, My 2, … , ˆiyn, (i= i, 2, … n)

the corresponding increments of yi, y2, … , yn then is

d\y\A2y2 … Anyn 1

A1X1J2X2 … AnXn I

d(yi,n).

d(xi,n)

If the functions be subjected to linear trans¬ formation the Jacobian is multiplied by a con¬ stant factor or modulus, which is the determi¬ nant of the coefficients of the transformation. The Jacobian is thus a co variant of the func¬ tions from which it is derived. See Invari¬ ants AND Covariants.

If the Jacobian vanishes the functions are not independent, and conversely.

28. The Jacobian of the partial differential coefficients of a function, taken with respect to its several variables, is called the Hessian of the function. The Hessian is a symmetrical determinant.

Thus, the given function being the ternary quadric.

w ˆ axˆ byˆ czˆ + 2 fyz -f 2gzx 2hxy,

H (w) =

ah g h bf g f c

a determinant, which in this instance is also known as the discriminant, for the reason that its vanishing is the condition that w be resolv¬ able into linear factors.

Like the Jacobian the Hessian is a covariant. Both were originally called functional deter¬ minants.

29. The theory of determinants has two notable extensions which will be explained, though little more than the definition of the functions suggested can be undertaken in the present article.

Just as elements may be arranged as a square array with two sets of parallel lines, so may w® elements be arranged in the form of a cube so as to lie in three sets of parallel planes. These three sets of planes may be called strata, planes and sections ; the last two correspond¬ ing respectively to the rows and columns of the square array lying in any given stratum. An element of such an array may be represented by aVusy where v is the number of its stratum, n of

its plane, and s of its section. Then | av,K,s |

represents a function known as a cubic determi¬ nant. Its principal term is auia222 … annn, and the others are obtained as follows : Permute the third suffixes and in each of the n ! products obtained permute the second suffixes, thus obtaining {n\y products. Then apply to each product a sign factor which is the product of the sign factor appropriate to the permutation of the third suffixes by that appropriate to the permutation of the second. The aggregate of terrns thus obtained is the cubic determinant.

The sign of the cubic-determinant is changed by the interchange of two planes or two sec¬

tions; but the interchange of two strata has no effect.

There are also determinants whose arrays can be represented only in

hyper-space (see Hyperspaces), but whose elements may be defined by means of multiple suffixes as above. Such determinants are known as hyper-de¬ terminants.

30. In the array

a “X o (!’ X n ˆ — 2, c •

I “‘fU • • •

— p … ˆ0,0 …

ˆP-,—p … ˆP,o …

letting X-{-p. = n = p--(y, the given array repre¬ sents a determinant of order («+l). If now n increase indefinitely, p on the one hand and p, o on the other also becoming indefinitely large, while maintaining the above relation to n, the determinant may approach a definite limiting value, it may become indeterminate, or it may become infinite. Determinants of infinite order, as here defined, present certain analogies to infinite series.

History and Bibliography. — The first defi¬ nite reference to determinants is to be found in a manuscript of Leibnitz, left unpublished at the time of his death. His later development of the idea is embodied in a communication to De I’Hospital (1693) in which he explains the for¬ mation of the eliminant of a system of linear equations identical in form with that discussed in 17. In his notation he used double indices, representing the element aˆp by ns or by*Kˆ.

The next approach to the subject was made quite independently by Cramer (1750), who expounded a rule for writing out the values of the unknowns in a system of linear equations, in which he recognized the two classes of per¬ mutations as given in 2. This rule found in¬ stant favor and the development of the theory of determinants has since been almost con¬ tinuous.

The first attempt at a formal exposition of the theory was made by Vandermonde (1771). His treatment of the functions as independent of their connection with the process of elimina¬ tion and his recognition of several of their more fundamental properties entitles him to be ranked as the real founder of the theory. Al¬ most

simultaneously Laplace gave the method, partly anticipated by Vandermonde, of expand¬ ing determinants in terms of complementary minors. The functions were called by him ˆ‘resultants,® a term now used in the restricted sense explained in 18.

New applications of the functions were at once found by Lagrange (1773), principally in the domains of geometry and the theory of numbers. Their application was further ex¬ tended by Gauss (1801), who used the word determinant to designate the discriminant of the ternary quadric (see 28). He also noted the significance of reciprocal determinants (see 23), and was on the verge of discovering the multi¬ plication theorem. This theorem (see 21 and 22) was first given by Binet (1812), but its satisfactory proof is due to Cauchy.

Cauchy was the first to use the word deter¬ minant in its present sense. His memoir in the

Jour, de I’ecole polytechnique (1812) rounded the general theory of determinants into some¬ thing like its present form. Jacobi early adopted the new calculus and greatly extended its field of usefulness. In his hands it became, not merely an indispensable system of notation, but a powerful instrument of research as well. His justly famous memoirs in ˆCrelle’s JournaP (1841) rnade the subject readily accessible and, since their publication, determinants have been freely used by mathematical writers without apology or explanation.

A new impulse was given through the study of linear transformations, in which Cayley and Sylvester led the way. The more recent de¬ velopments relate mainly to special forms of determinants. Skew determinants and Pfaffians were developed by Cayley, in connection with the orthogonal transformation. He was the first writer to use the vertical bars enclosing the determinant array. Continuants were in¬ vestigated by Sylvester, who also named and made much use of Jacobians and Hessians. Alter¬ nants, first recognized by Cauchy and studied by Jacobi, have been further discussed by Trudi, Nagelbach, and Garbieri. Important re¬ sults relating to compound determinants

were published by Schweins (1825), but these have been rediscovered and greatly extended by Sylvester, Reiss, Kronecker, and Picquet. De¬ terminants of infinite order have been used by G. W. Hill in a memoir on the linear theory appearing in the ˆActa Math.,ˆ Vol. VIII. Their properties have been investigated by Poincare, von Koch, and Cazzaniga. In recent years the arithmetical properties of determinants and the theory of elementary divisors have been dis¬ cussed by H. J. S. Smith, Kronecker, Frobenius and Weierstrass.

Bibliography. — Muir's ˆTheory of Determi¬ nants in the Historical Order of its Develop¬ mentˆ (London 1890) is the standard work on the history of the subject down to 1841. The same author has also compiled a complete bibliography of determinates down to 1900 (Quar. Jour, of Math.). Spottiswoode (1851) prepared the first regular treatise. Other well-known texts are those of Baltzer (Leipzig 1857) ; Gunther (Erlangen 1875) ; Dostor (Paris 1877) ; Scott (Cambridge 1880) ; Muir (London 1882) ; Hanus (Boston 1886) ; Weld (New York 1893) ; Scott and Mathews (Cam¬ bridge 1904) .

Laenas Gifford Weld,

Author of ˆ"Theory of Determinants"ˆ ; ˆDeter¬ minants.ˆ

DETERMINATE PROBLEM, a problem in geometry which admits of a limited number of solutions, an indeterminate problem admit¬ ting of an indefinite number of solutions.

DETERMINATIVE MINERALOGY.

That division of the science of mineralogy (q.v.) which treats of the identification of min¬ erals. While the occasional new or undescribed species is necessarily identified by a determina¬ tion of the percentages of its various ingredi¬ ents (see Chemical Analysis), the symmetry and geometrical constants of its crystals (see Crystallography), and its optical and other physical properties (see Physical Crystall¬ ography) ; specimens of previously described species are accurately and rapidly determined by much simpler methods, varying from sight

recognition to systematic testing with the aid of tables or ˆˆschemes.® Sight recognition is the result of experience in handling and testing and has no fixed order of procedure. Except for this, it is similar to the later mentioned schemes by external signs, inasmuch as it re¬ lies chiefly on lustre, color, crystals, cleavage, associates, etc., and

supplements these by tests such as the color of the mark (streak) made by it upon unglazed porcelain, or its hardness as tested by a knife point. Testing at random is nearly worthless and in all cases of doubt it is better to follow the guidance of some system¬ atic scheme in which a few simple physical or chemical tests made in definite order suc¬ cessively place the specimens in smaller and smaller groups until the group is so small that the differences between its members are read¬ ily recognized and it becomes possible con¬ clusively to eliminate all but one species. There are many schemes which may be said to be chiefly of three types. (1) Schemes in which the classifying characters are the so-called ^^external signs^^ such as lustre, color, crystalline form and simple physical tests such as hard¬ ness, color of powder (streak) or specific gravity. These schemes are invaluable in the classroom, enormously lessening the time spent in looking up characters and they foster acute observation of appearance and require only simple apparatus, such as a pocket lens, streak plate and file or knife. The best known and most followed scheme of this type was pre¬ pared in 1866 by Prof. Albin Weisbach of Freiberg, and while for the great group of minerals with non-metallic lustre and white or gray streak it is not very conclusive, the min¬ erals of metallic lustre or with colored powders (streaks) are often ver>" rapidly determined. For instance by the Frazer-Brown modification of Weisbach's tables only three species are at once

Submetallic or non-metallic.

Red streak.

Hardness about 4 (that of fluorite).

These are easily distinguished by the shade of red of the streak and by the specific gravity. Zincite, orange red. Cuprite, brownish-red, sp. gr. 6, Hauerite, brownish-red, sp.gr. 4; (2) Schemes in which the so-called ^^blowpipe tests® such as ^ fusibility or qualitative determination of principal constituents, or solubility in acids, are the classifying tests, while the external signs and physical tests are subordinate. These, because they are largely independent of the condition in which the mineral occurs, use only minute amounts of material, and give positive proof of the presence of the component ele¬ ments, may fairly be said to be of the .most general applicability. They require in addition to the simple apparatus used in the previously mentioned schemes, a blowpipe and its accom¬ panying lamp, forceps, wire, reagents, *etc.* Undoubtedly the most used schemes of this type are translations and modifications of von Kobell's ^Tables for Determination of Min¬ erals by Simple Chemical Tests,^ first

published in 1833 ˆffo facilitate determination of minerals so that by simple testing with the blowpipe and in the dry way one is led quickly to a small group which includes the mineral being tested.® As with the Weisbach tables, there is first a . division by lustre, but thereafter the route fol¬ lowed is different, the next division being by

fusibility and the further subdivisions in some cases being the detection of particular elements as arsenic, sulphur, antimony, iron, etc., and in others some detail of fusion such as ˆmagnetic after heating® or of solubility such as ®effervescence.® For instance, a specimen of green granular Chrysolite (Mg, Fe)2Si04 would be placed by the Brush-Penfield modification of the Von Kobell tables successively in the fol¬ lowing divisions and subdivisions :

1. Non-metallic lustre. One of several hundred.

2. Infusible. True of 150 of the non-metallic species.

3. Dissolves in HCl leaving a gelatinous residue on evaporation. Therefore one of 16 species,

4. Gives reactions for Magnesium. Therefore one of 6 species.

5. Contains no water. Therefore one of 2 species.

6. Gives reactions for iron. Therefore chrysolite.

This confirmed by color, hardness, structure, *etc.*

(3) Schemes in which characters determined by the polarizing microscope are used as the classifying tests, these including single or double refraction, index of refraction, birefringence, pleochroism, shape, cleavage, color, *etc.* Such schemes are extensively used for the determina¬ tion of the minerals in fine-grained rocks and are coming into more general use for identifica¬ tion not only of those minerals which can be readily made thin enough to transmit light but for the so-called opaque minerals. The testing requires specially prepared sections as thin as paper, or finely crushed powder or, in some cases, polished sections, and the tests while usually easily made require for their proper understanding a considerable knowledge of crystal structure and optics. They, however, supplement admirably the blowpipe and physi¬ cal tests.

Bibliography. — Works in English in addi¬ tion to tables in most textbooks of mineralogy. External Signs: Eakle, A. S., ˆMineral Tablesˆ ; Frazer-Brown, ˆTables for the De¬ termination of Minералsˆ (6th ed.) ; Kraus-Hunt, ˆTables for the Determination of Min¬ eralsˆ p911) ;

Moses, A. J., ˆGuide to Sight Recognition of 120 Minerals.ˆ Blowpipe Schemes: Brush-Penfield, ˆManual of Deter¬ minative Mineralogy\; Lewis, J. V., ˆDetermina¬ tive Mineralogyˆ (2d ed.). Optical Schemes: Johannsen, A., ˆDetermination of Rock Form¬ ing Mineralsˆ ; Luquer, L. McL, ˆMinerals in Rock Sectionsˆ (4th ed.) ; Moses, A. J., ˆUtiliz¬ ing Polarizing Microscope in Determination of Mineralsˆ ; Murdoch, J., ˆMicroscopical De¬ termination of the Opaque Minerals.'

Alfred J. Moses,

Professor of Mineralogy, Columbia University,

DETERMINING TENDENCY. Also called attitude, task (Aufgabe) and is partly synonymous with purpose in its more empiri¬ cal use. Determining tendency was a term introduced by Ach and taken over into English to designate one of the wider influences which control the course of associations and so of thought and action. One ordinarily thinks of the course of thought as controlled by the closeness of the connection between the ele¬ ments of which it is made up, and of these con¬ nections in turn as due to the number of times the two experiences have occurred together in the past, the recency of their appearance to¬ gether, *etc.* Determining tendency is looked upon as a factor of wider influence, which will make some one or some one class of the pos¬

sible associates more likely to appear than others which are in themselves equally strong or even stronger. Thus if one is given a series of words and asked to speak the first other word that comes to mind each word may call up a number of associates. ®Water,® e.g., might suggest ˆMrink® ; ˆˆH20,® pcc,® *etc.* If, however, one has been asked to give the chemi¬ cal composition of the .substances named, ˆˆHaO® alone comes to mind ; if the request was to name the use of the objects, drinking or washing or other words of that class alone will appear. The request is the determining ten¬ dency.

Determining tendencies are frequently not definite tasks, but are furnished by the knowl¬ edge of the circumstances or situation. One tips one's hat to a male friend when he is with a lady, but only speaks when he is alone. One plays one card in a given situation when one suit is trumps; another under the same circum¬ stances when the trump is different. One strikes one note for a given position when the selection is written in one key and another when the key is different. The awareness of the companion, the knowledge of the trump or of

the key constitute in each case the deter- •mining tendency.

The influence of the wider setting has re¬ cently been given wide vogue, chiefly through the work of the Wurzburg school. It was noticed as a factor in the control of perception by Pillsbury in 1897, who spoke of it as ^^attitude® or ˆsetting,® by Watt in the control of association in 1904, who called it Aufgabe, was emphasized under the present name by Ach in 1905 as a factor in the control of action and thought, and by Pillsbury again as mood or attitude as one of -the conditions of attention in 1906. ˆ

The importance of emphasizing the wider controls as opposed to the immediate links which alone were considered by the associationist school is obvious. Were the strength of the mechanical connections alone to be taken into account, we would have no explanation at all of the adaptability and flexibility -of human thought and conduct. If one were limited to a single response to a given stimulus or to a single thought in succession to any other thought, act and thinking would alike follow unvarying courses. One's existence would be a continuous treadmill. While we still think of all the successions as made possible by earlier associations, selection of the proper one in accordance with the situation or context in¬ creases the adequacy of the thought and act.

We must look to the nervous interactions for the real explanation of these influences. The determining tendency acts pnly as it is accompanied by or induces activities in the neurones. In the nervous system an association has as its analogue a connection between neu¬ rone groups induced by simultaneous action at some earlier times. Any neurone group is con¬ nected with several other groups in such a way that it may excite any one of them when it is itself excited. The determining tendency de¬ cides which of these shall be aroused. When a task isˆ set or a wider context is effective, these preliminary stimuli partially arouse larger or smaller groups of neurones. These larger groups will have elements in common with the groups that will be aroused by the other direct

stimulus. When this finds one associated group partially aroused, it will completely arouse that one, while the others associated with it will not respond sufficiently to influence consciousness. Possibly, too, the other associ¬ ates may be actually inhibited, prevented from responding at all. More likely there is both a positive and a negative effect. One group of neurones connected with the stimulus is pre¬ pared to respond by partial excitation and the others are blocked or inhibited. While we speak of determining tendency as an influence of task or setting or purpose, these terms are merely descriptive of the antecedents of the act or thought, of the circumstances under which determining tendencies act. The actual cause of the selection is to be found in the preparation for action of a group of cerebral elements by an earlier stimulus.

Walter B. Pillsbury.

DETERMINISM is the doctrine that everything that exists, as well as every event that happens, is absolutely fixed and necessary in the sense that it has been made what it is by the action of some ground or cause. From this point of view there is accordingly no ele¬ ment of chance or contingency in the world : nothing which is could possibly have been other¬ wise. While this doctrine conceives of all of the parts of the world as determined, it derives its main interest and importance from its applica¬ tion to the sphere of mind and the thoughts, feelings, and actions of human beings. At the present day we have become accustomed to the conception of physical nature as a uniform series of events that happen in a fixed and neces¬ sary way in accordance with uniform laws. The crucial question is whether the same mode of conception is to be extended to mind and its operations, or whether the view can be justified that mind occupies a unique place in nature and is characterized by real freedom. ®Most writers on the emotions and on human conduct, Spinoza tells us, ^^seem to be treat¬ ing rather of matters outside of nature than of phenomena which follow nature's general laws. They appear to conceive man to be situated in nature as a kingdom within a kingdom, for they believe that he disturbs rather than follows nature's order, that he has

absolute control over his actions and is determined solely by himself. As against such a view, Spinoza maintains the doctrine of determinism : ˆffhat nature's laws and ordinances whereby all things come to pass and are changed from one form to another are everywhere and always the same.® Hence ˆfft is impossible that man should not be a part of nature,® and subject, like everything else, to nature's universal laws.

Determinism follows directly when substance and causality are employed as the ultimate prin¬ ciples of explanation. From the point of view of substance, the parts are viewed as deter¬ mined by the nature of the whole. This whole, whether called God, or ˆˆsubstance,® or ®mat-ter,® or ˆenergy,® is conceived as the one ulti¬ mate reality, of which particular phenomena are ˆˆaccidents® or ˆmodifications.® The nature of the whole being given as a fixed datum or prior term, the nature of the parts, as its 'modes or modifications, are therefore also fixed and de¬ termined. More frequently, however, the causal category is employed to support deterministic

conclusions, either alone or in conjunction with that of substance. No part of the universe, it is argued, stands by itself : everything gets its constitution and nature through its connection with and dependence upon something other than itself. Universal causal relationship, then, im¬ plies universal dependence, necessary determina¬ tion. If the principle of cause and effect is valid throughout the whole field of reality — in the mental realm as well as in the physical ■ — determinism is the logical and inevitable conse¬ quence. The adherents of determinism have nevertheless maintained these principles with varying degrees of strictness so far as their applications to mental life are concerned. Many of those professing determinism have given to the causal principle in its application to mind a meaning which they believe guarantees a rational view of freedom. Some of these posi¬ tions will be referred to below under the various headings with reference to which the subject is to be further discussed. Thes-e headings, it will be noticed, indicate different aspects and appli¬ cations of the problem as already outlined, and not separate or exclusive doctrines.

(a) Metaphysical Determinism arrives at its conclusions from a consideration of th-e gen¬ eral nature of the world and the universal form in which events happen. The determin¬ ism of the will is simply one instance among others of the universal order and uniformity of all events. In strict monistic S3ˆstems it is difficult to avoid the conclusion that the nature of the one ultimate reality is that which de¬ termines

everything. This is true, as we have seen, whether that one substance is regarded as God, or as matter or energy. The opponents of determinism accordingly usually fall back upon pluralism, and emphasize the uniqueness and self-centred reality of human personality. But this position is confronted, on the other hand, with the task of accounting for the unity which experience shows actually to exist. How, if there is a plurality of completely in¬ dependent individuals, is it possible to think of the whole as forming a single world — a uni¬ verse? It is clear that this world must be something more than a manifold, and that human beings least of all are mere points which exclude relation to others. This anti¬ nomy is of course just one aspect of the fundamental metaphysical problem of the one and the many, and cannot receive a full dis¬ cussion here. It is however obvious from what has already been said that a solution can be found only by adopting a metaphysical system that is at the same time both monistic and pluralistic ; that holds fast to the unity of things and also maintains the reality and pro¬ vides for the possibility of self-determination on the part of finite individuals. Such a result is not possible for materialism, or any me¬ chanical system of metaphysics. If, however, the view can be defended that the universe exists in its ultimate form as life and conscious¬ ness, freedom can still be maintained. For life and consciousness are principles of inclu¬ sion, not of exclusion, and at the same time they leave within their unity free place and scope for individual differences. From the metaphysical point of view, the solution of the apparent contradiction between freedom and determinism depends, therefore, upon the pos¬ sibility of finding logical grounds for maintain-

ing a teleological and spiritual view ol the world.

(b) Theological Determinism. — The prob¬ lem here is in principle identical with that of metaphysics, though stated in different terms and generated by a special interest. The theo¬ logical doctrine is variously known as pre¬ destination, foreordination, election, *etc.* (qq.v.). The whole course of history, both in its phys¬ ical and moral aspects, is assumed to take place in accordance with the eternal decrees or purposes of God. The crucial problem is regarding man's ability to secure his own sal¬ vation. Theological determinists maintain that God has ^^elected some to everlasting life,® and that such election, as an act of free grace, is the necessary condition of salvation. Thus Jonathan Edwards, in summing up his defense of Calvinism against the Arminians, claims : ^Tf we put these things together, it will follow that God's assistance or influence must be de¬ termining and decisive, or must be attended with a moral necessity of the event; and so that God gives virtue, holiness, and conversion to sinners, by an influence which determines the effect in such a manner that the effect will infallibly follow by a moral necessity, which is what Calvinists mean by efflcacious and irresistible grace.® (^On the Freedom of the Will,> Ch. XIV).

(c) Psychological Determinism. — Psychol¬ ogy has to describe and explain the conscious processes which constitute mind; and, like all the sciences, is necessarily deterministic in standpoint. From the psychological point of view every mental process without exception finds its explanation in its relation, either to some other mental content, or (as some would maintain) to accompanying neural changes in the body. An uncaused or undetermined men¬ tal event, as, e.g., an act of will which is not connected causally with other states of body or mind, is a contradiction from this point of view. Nor is the difficulty to be avoided by supposing that the volition is caused by a free act on the part of the ego, that the self intervenes to produce changes in the natural order of events at this point or that. For if the self is thus distinguished from its states, it is no longer a member of the mental series, and cannot be invoked as a cause of any particular event. To appeal to any such special agent is to abandon the scientific problem, which is to discover the causal relation of the phenomena that consti¬ tute the mental life. As Kant in the ^Critique of Pure Reason^ clearly shows, there is no possibility of freedom in a phenomenal series of

mental events ; since, as occurrences in time, these are subject without exception to tlie law of cause and effect. The oft-repeated attempts of defenders of freewill to overthrow de¬ terminism while still assuming that the psy¬ chological point of view is final are as con¬ tradictory and fruitless as the analogous at¬ tempts to vindicate teleology in the physical order by supposing that at times the natural order is interrupted by a miracle. If determin¬ ism is to be avoided, there must be an advance to a new standpoint and principle of explana¬ tion. This was perceived by Kant who, in his doctrine of man as belonging to a noumenal order of reality, passes beyond the psychological and causal point of view to the idea of self-determination in accordance with ends, It is

true that Kant did not regard this new category as one that is valid for knowledge, but de¬ scribes it as a ^^postulate® of practical or moral reason. The result of his analysis, however, was to establish the fact that while the psy¬ chological or phenomenal description of mind must employ everywhere the category of cause and effect, and can therefore only issue in determinism, yet from another point of view it is equally necessary, in order to do justice to the facts of moral experience, to introduce the idea of freedom, or determination iji accordance with ends.

(d) Historical Determinism may be a de¬ duction from theological determinism, by simply regarding all the events of history as determined by the will of God, who makes even the ^^wrath of man to praise him.® But what is usually known by this name is the theory according to which historical events are to be explained by referring them to natural powers and circumstances as their causes. The demand that history shall be made a science in¬ volves such an explanation of historical events by means of causes, and carries with it the assumption of determinism. To explain his¬ torically is accordingly regarded by some writ¬ ers as requiring exhibition of the various causes — geographical location, climatic conditions, ra¬ cial and economic rivalries,, etc.— which are to be taken as determining the course of events in the period with which they are dealing. Since, however, historical events are determined b}” the volitions of men, the sphere of determina¬ tion must be psychological, and the remarks made in the preceding paragraph will also have application here.

(e) Ethical Determinism. — It is because of the supposed ethical implications of Determin¬ ism that the doctrine has been most vigorously opposed. If all human actions take place, like natural

occurrences, in a strictly determined way, then it seems an immediate corollary that the sense of obligation is unmeaning and the feeling of responsibility an illusion. Conse¬ quences of this character, which seem to the opponents of the doctrine to follow from it directly, are taken by them as involving the refutation of the theory of determinism. The advocates of freedom are often content with this ˆpractical® disproof of the opposing doc¬ trine, admitting that from the theoretical point of view it is unanswerable. Kant, e.g., bases the proof of freedom upon the demands of the moral consciousness. Without the ˆˆpostulate® of freedom the fact of moral obligation would be illusory; the ˆˆought® implies and presup¬ poses the ˆˆcan.® On the other hand, the deter¬ minists as a rule are not willing to admit that it is necessary to assume freedom in the sense of indeterminism in order to give significance to moral distinctions. In the first place they point out that determinism is by no means identical with fatalism ; that the causes of an action are no compelling powers outside the individual, but his own motives and character. Moreover, as H. Sidgwick has remarked : ˆˆThe determinist allows that, in a sense, the ˆoughtˆ implies ˆcan,ˆ that a man is only morally bound to do what is Gn his powerˆ and that only' acts from which a man ˆcould have abstainedˆ are proper subjects of punishment or moral condemnation. But he explains ˆcanˆ and ˆin his power' to imply only the presence

of no obstacle that may not be overcome by sufficient motiveˆˆ (ˆMethods of Ethics,ˆ Ch. V). The determinist is further able to show that freedom, when conceived as indeterminism or ˆˆcontingency,® is not only useless as a moral postulate, but is even subversive of morality. For if ˆfreewill® is something out of all rela¬ tion to the rational organization of experience, if it is not connected with the character and motive of the individual, it is a mere accident (the ˆfreedom of indifference,® liheruni arbit-rium hidifferentice) , and as foreign to the personality of the individual as an external fate. As Leslie Stephen has expressed this argument ; ˆTdentify freewill with the oc¬ currence of chance, and the conception of merit becomes

contradictory and repulsive. Exclude chance, and you are virtually a de¬ terminist.® It may perhaps be questioned whether to exclude chance is ^^virtually® to accept determinism ; but one must in any event admit that the conception of ^contingency,® or ^ffreedom of indifference® is both logically and ethically indefensible.

At the present time controversies regarding freedom and determinism do not occupy the same prominent place in ethical literature as formerly. Modern ethical writers tend to avoid the question as a metaphysical problem that may be left out of account in dealing with the facts and principles of the moral life. However unsatisfactory this avoidance of the problem may be, recent ethical theorizing may be said to take as its assumption a more con¬ crete view of the nature of mind than that af¬ forded by atomistic psychology. It recognizes implicitly that the causal category in terms of which tire discussion has hitherto been largely carried on, is inadequate to exhibit concretely the movements of history and of individual life, and that for ethics, at least, human conduct must be regarded as the process of realizing ends and purposes which are personal rather than merely natural forces. See Ethics ; Election; Will; Freewill; Predestination; Necessitarianism; History, Logic of; Psy¬ chology.

Bibliography. — Bergson, H., <^Time and FreewilP (London 1910) ; Bosanquet, B., ^Principles of Individuality and Value^ (1912) ; Fouillee, A., ^La liberte et la determinisme^ (3d ed., 1890) ; Haldane, J. S., WIechanism, Life and Personality^ (1914) ; James, W., ^Principles of Psychology^ (Chap. XXVI, 1890) , LA. Pluralistic Universe^ (1909) ; Pringle-Pattison, A. S., ^ Man's Place in the Cosmos^ (1897) ; Schopenhauer, A., ^Die Beiden Grund-probleme der Ethik^ (English trans. ^The Basis of Morality,^ London 1903); Seligman, E. R. A., '^The Economic Interpretation of History^ (1902) ; Ward, J., ^The Realm of Ends^ (1912).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell

University.

DETINUE, (1) the unlawful detention of the personal property of another. ^ (2) A common-law action, or the writ therein used, for the recovery of a chattel wrongfully detained or for the value thereof and damages. In some States it has been superseded by replevin (q.v.). The plaintiff in this action must show that he has an absolute or a special property in the chattel. If the defendant is detaining the prop¬ erty

illegally, it is no defense that he obtained

it legally. The plaintiff in this action sues for the recovery of the property itself and dam¬ ages for its wrongful detention, but if the de¬ fendant has not the property in his possession, the plaintiff may sue for its value and dam¬ ages for its wrongful detention. If the prop¬ erty was obtained illegally, demand need not be made before suit is brought. However, de¬ mand is necessary if the plaintiff sues to re¬ cover damages for detention between demand and the commencement of the suit.

DETMOLD, Germany, city, capital of Lippe, on the Werra, 50 miles southwest of Hanover. It consists of an old and a new town, the former poorly, the latter regularly built. Its principal edifice is the palace, a fine old castellated building, with a vast round donjon tower. It contains also several educational in¬ stitutions and a library. The industries consist of the manufacture of cloth, especially linen ; leather furniture, beer, buttons ; and the quarry¬ ing of marble and gypsum. In the vicinity, on the Grotenberg, the loftiest summit of the Teutoburger Wald, a colossal statue, 45 feet high, placed on a solid circular pedestal twice that height, has been erected to the Hermann or Arminius who overthrew Varus and his legions, in the year 9 a.d. In 783 at Detmold Charlemagne defeated the Saxons. Henry H donated the town to the bishops of Paderborn in 1011, whence it descended to the Lippe family. It became a city in its own right in 1350, Pop. about 15,000.

DETONATION. Certain chemical com¬ pounds, which, on being exposed to heat or suddenly struck, explode with a loud report, owing to one or more of the constituent parts suddenly assuming the gaseous state. They often have the power of initiating explosions in more stable compounds. A mixture of equal volumes of chlorine and hydrogen ex¬ posed to direct sunlight detonates violently, forming hydrochloric acid gas. The chloride and iodide of nitrogen are very powerful deto¬ nating substances, but too unstable for practi¬ cal use. For exploding charges of powder mixtures of chlorates with reducing agents such as charcoal have been employed. Fulmi¬ nate of silver and of mercury detonate by slight friction, by means of heat, electricity, or sulphuric acid. The compound used in the priming of percussion-caps and fuses is the fulminate of mercury or silver (C=NO)2 Hg or (C=No) — Ag, respectively), collected as a precipitate when the metal, dissolved in nitric acid, is poured in warm alcohol and the precipi¬ tate formed is collected, washed and dried.

The salts of triazoic acid, NsH, are also coming into use for the purpose. See Explosives.

DETONATORS are the devices used in firing high explosives by detonation. They consist of small cylindrical copper tubes closed at one end and charged with mercuric fulminate or a mixture of mercurial fulminate and potas¬ sium chlorate which is compressed in the bot¬ tom of the tubes. Those used for blasting in mines and quarries are also known as blasting caps and exploders. They are rated as single force, double force, triple force and so on, the charge for the single fo.rce cap being about five grains of the detonating substance, and the charges for the higher force increasing about

two grains for each grade. To fire them a piece of Bnckford or ^^running^^ fuse of the desired length is inserted in the mouth of the detonator or cap and then the copper tube is bent or ^•■crimped^^ securely about the sides of the fuse. The detonator is inserted in the borehole so as to come in close contact with the first cartridge or ^^stick^^ of explosive and the borehole is filled with tamping. When a flame is applied to the end of the fuse that projects from the borehole, the column of powder in the fuse takes fire, the fire travels slowly down to the charge in the detonator, causing the detonation of the dynamite.

For military mines and naval torpedoes and, to a considerable extent, for commercial blast¬ ing detonators to be fired by an electric current are employed. These are known as' electric detonators. They differ from those previously described only in that the mouth of the copper cap is closed by a plug made of sulphur and ground glass, through which two copper wires, known as the ®legs of the detonator,® are led. Inside the cap these wires are bridged over by a very fine wire made of an alloy of iridium and platinum. Around the bridge and between it and the fulminating composition is placed a layer of mealed gun-cotton. When it is desired ®to fire,® the legs of the detonator are connected with a dynamo-electric machine and the current generated. As the current passes it heats the bridges to

incandescence, which sets fire to the gun-cotton ; this causes the fulminate to deto¬ nate, and this detonates the charge of dynamite or other high explosives. The detonators used on the Whitehead torpedoes in the United States navy contain 35 grains of mercuric fulminate, this large quantity being used to make sure that the detonator will do its share of the work in torpedo attacks on an enemy. See Explosives.

DE TREVILLE, traVifl, Yvonne, Ameri¬ can prima donna: b. Galveston, Tex., 25 Aug. 1881. She received her musical education from Madame Marchesi, Paris, being the youngest member of her class. She made her debut in grand opera and created La Boheme in English in New York at the age of 16. Thereafter she sang entirely abroad, appearing in the role of Lakme at Opera Comique, Paris, and at the Stockholm Royal Opera and Petrograd Sym¬ phony Concerts in 1903-04. She sang at the Cairo Khedivial Opera and the Saint Petersburg Imperial Opera 1904-05 ; in Bucharest, Berlin, Budapest and Nice 1905-06; in Brussels, Vi¬ enna, Munich and Trevano Castle, Switzer¬ land 1906-07. In 1910-11 she made a concert and operatic tour of Germany, Austria, Hun¬ gary, Poland and Rumania. She sang ˆ Ophe¬ liaˆ in the gala performance of Ambroise Thomas centenary celebrations in France dur¬ ing the summer of 1911; and in the following winter made another operatic tour of German3L Austria and Russia. Her repertoire covers operas in all the principal languages of Europe.

DETRITUS, applied in geoloˆ to accumu¬ lations formed by the disintegration of rocks, may consist of angular and sub-angular debris, or of more or less water-worn materials, such as gravel, sand or clay, or an admixture of these. Especially applicable to that fragmen¬ tary matter which if consolidated into a solid would form what is known as breccia.

DETROIT (Fr. D'Etroit, strait), Mich., capital of Wayne County, in the southeast ; larg¬ est city of the State and the fourth largest in the United States ; situated on the northwest bank of the Detroit River dividing the United States from Canada, one end fronting west of Lake Saint Clair and the other about 18 miles from Lake Erie. It is 88 miles from Lansing, the State capital; 284 from Chicago; 60 from Toledo, Ohio; 251 from Buffalo; and 291 from Mackinaw. Pop. (1920) 993,739.

Detroit has the finest harbor on the Lakes ; the river, on the city front,

is often called ˆffhe Dardanelles of America.® The broad outlet of Lake Saint Clair, running west and dividing around Belle Isle, narrows to about half a mile and deepens to an average of 32 feet for some miles with a southwest course, before turning directly south, with a current of about two miles an hour. Fed by the Great Lakes, it has always a full stream, neither rising or sinking much, and is little disturbed by storms; and the largest vessels can lie up to the wharves. Here is built Detroit, extending some 11 miles along the river front, lined with wharves, elevators, foundries, factories, warehouses, railroad sta¬ tions, freight depots, *etc.* Area, 80.70 square miles, but with well-built suburbs outside not yet incorporated; indeed, from Grosse Pointe at the northeast to Gibraltar at the south where Lake Erie begins, the whole river front for 30 miles is built up with handsome villages and lined with the summer villas of its wealthy business men, all really parts of Detroit. About three miles west of the centre of the city, commanding the channel, is Fort Wayne, an unfinished military post once intended to be the most formidable fortification in the Northwest, and still garrisoned and armed with batteries. Across the river in Canada are Windsor in the centre, the terminal of railroads, through Can¬ ada, Walkerville on the northeast. Sandwich on the southwest and just below Sandwich is the site of the proposed city of Ojibway, the Canadian City of the Steel Trust.

The ground of Detroit is a gentle slope for 300 or 400 feet back from the river to 20 or 30 feet high ; then sinks slightly, and again rises to about 50 feet, and 661 above the sea. The original plan, on a vepr small scale, was a series of concentric semi-circles, or rather seg¬ ments of ‘polygons, with the Grand Circus — a semicircular park of five and a half acres — as a centre, nearly a mile from the river, toward which the}ˆ extended. This feature is still pre¬ served ; but all the new growth has been laid out in checkerboard system, relieved by a series of noble avenues, 100 to 200 feet wide radiating from the river. Jefferson avenue extends along it; Woodward avenue runs at right angles to it, dividing the city into halves and the Grand Circus into quadrants ; west of Woodward are Michigan and Grand River avenues, at different angles, and east is Gratiot. Between the Grand Circus and the river is the Campus Martins, an open space about 600x200 feet, crossed by Woodward and Michigan ave¬ nues, and from which start Monroe avenue and Fort street running toward Fort Wayne. The streets in the city are generally wide — 50 to 100 feet — and in the residence dis¬ trict wellˆ shaded and notably clean. The chief retail business is on Woodward avenue and the streets radiating from the Grand

Circus and the Campus Martius. Griswold street, with the great banking houses, office buildings, etc., is the Wall street of Detroit; and others spreading from the Campus Martius and Grand Circus are of importance. The chief of the show streets is the Grand Boule¬ vard, a macadamized parkway 150 feet wide and 12 miles long, encircling the heart of the city in a vast sweep from Belle Isle bridge at _ the pst to the river at 26th street. The outer portions of all the great avenues mentioned, of Lafayette avenue and of Fort street, are full of fine residences ; and a notable residence district clusters around Woodward avenue as it stretches toward Palmer Park.

Public Buildings and Monuments. — The chief of these are on or near the Campus Mar¬ tius. ˆ Within it, facing the City Hall, is the Michigan Soldiers and Sailors' Monument, by Randolph Rogers, of bronze and granite,' 55 feet high, with a colossal bronze allegorical statue of Michigan on the summit; it cost $75,000 and was unveiled in 1871. On the west, facing four streets, is the City Hall, three stories and mansard, of sandstone in the Italian style; 200x90 feet, 60 feet high to top of cornice, 180 to top of tower; it originally, in 1870, cost $600,000, and is one of the finest in the West. Near by are the handsome Wayne County courthouse, the largest public building in the city, the splendid Majestic office building, the Ford building, Penobscot building and new Dime Bank building, 22 stories high. On the north of the Campus is the Detroit opera house. The United States government building, ac¬ commodating the post-office, customs and inter¬ nal revenue office and United States courts, oc¬ cupies a whole block bounded by Fort and La¬ fayette, Shelby and Wayne streets. Within the past three years the blocks fronting the West Grand Circus have been built up with lofty office and hotel structures, and near the East Grand Circus are the Y. M. C. A. and Athletic Club buildings. Monuments to Ste¬ vens T. Mason, first governor of the State, Gen. Alexander Macomb, who commanded at the battle of Plattsburg in 1814, and Mayors Pingree and Maybury adorn the central squares.

Public Service and Improvements. — The city has 836 miles of streets, of which 593 are paved, mostly with brick, asphalt or creosote block.

It has 236 miles of public sewers and 600 miles of laterals, and is inaugurating ex¬ tensive additions to its sewer systems to accorn-modate future growth. The water supply is taken from a crib at the head of the American channel of Detroit River, 1,500 feet from the shore and at a depth of 46 feet. The pumping stations house has eight engines with a daily ca¬ pacity of 250,000,000 gallons. The average daily consumption for the last reported year was 142,578,231 gallons, or 173 gallons per cap¬ ita per day. The maximum for any single day's pumping was 194,000,000 gallons. There are in the system 1,076 miles of pipe and 6,350 public hydrants. The works are owned by the city and are supported by rates. The value of the waterworks buildings and pumping plants is about $5,000,000.^

The city is lighted by electricity furnished by a plant municipally owned. There are 9,920 lights furnished for street lighting and the pub¬ lic buildings and school buildings are lighted by this plant. Private lighting and power is

furnished by the Edison Company. Value of public lighting plant in 1917, $1,300,000.

The police department has a force of 1,600 men and the fire department one of 900 men, with 42 engine companies, 15 ladder companies, 7,257 hydrants and 517 reservoirs.

The electric railway system is owned and operated by a single company, the Detroit Uni¬ ted Railway. It consists of 298 miles within the city limits and nearly 600 miles of interurban lines radiating in all directions. In 1917 there were 484,727,818 passengers carried. The fare on about one-third of the city lines is eight tickets for a quarter during the day and six for a quarter at night, with transfers to other portions of the same lines. On the rest of the city system the fare is five cents with universal transfers. There are three railway passenger stations in the city, the Grand Trunk, foot of Brush street; the Union Depot, corner of Third and Fort, accommodating the Pere Marquette, Wabash and Canadian Pacific ; the Michigan Central, Michigan avenue and 15th street, accommodating that road and the Lake Shore.

Parks, Pleasure Resorts, Public Amuse¬ ments, *Etc.* — Detroit has 31 public parks besides a number of small triangular squares caused by the intersection of the radiating avenues with the streets, often with fountains. The largest, and the principal public resort, is Belle Isle in the river, whose entire 707 acres have been parked with great beauty.

It is reached by ferries and by a temporary wooden bridge. The island has cost the city for purchase price and improvements $2,021,689. The annual cost for maintenance is about $150,000. The next largest is Palmer Park, of 141 acres, on Wood¬ ward avenue, about 6lˆ miles from the river, sedulously made a colonial museum; it has a colonial log house; and a most interesting col¬ lection of colonial and other historical relics, besides a colonial casino. The park was a gift to the city by the late Thomas W. Palmer. Clark Park in the west has 32 acres ; in part a gift from J. P. Clark. Voigt Park, 8ˆ2 acres, and the Grand Circus, in each of whose quad¬ rants made by Woodward avenue there is a fountain, 5j/2 acres. Besides these, there are opportunities for delightful summer trips on the river and lakes; and the river is dotted with charming places where excursion steamers run, from Grosse Pointe, on Lake Saint Clair, famed for its cherry orchards, to Grosse Isle, where Lake Erie opens. There are 20 theatres and opera houses in the city, the largest of which are the Detroit, Garrick and Washing¬ ton theatres and the Lyceum. There are also 148 moving picture theatres. The finest ceme¬ teries are Elmwood (Protestant) and Mount Elliott (Catholic), side by side on the north¬ east, about two miles from the centre ; beauti¬ ful in keeping and monuments ; Woodmere, four miles to the southwest of the centre of the city and within the city limits ; Woodlawn, a beautiful cemeterˆˆ situated seven miles on Woodward avenue, and Mount Olivet, another large (Catholic) cemetery about seven miles out at the northeast. Grand Lawn, the largest and newest, is nine miles from the city b'mits, on Grand River avenue. There are a number of Lutheran and Jewish cemeteries, making 23 in all.

Schools, Libraries, Newspapers, *Etc.* — In

1917-there were 135 public schools, of which nine were high schools. For the school year 1917-18 there were about 95,000 pupils enrolled with 2,400 teachers. Aside from the ordinary school curriculum there arc classes for cripples, for the blind, for special and prevocational studies, open-air schools and summer schools. Especial attention is given to night schools for teaching foreign-born residents the English language, the rights and duties of citizenship and the elementary principles of our government. One of the high schools is a fully-equipped tech¬ nical industrial training school. The school appropriations for 1917-18 aggregated $6,566,- 278. There are also about 80 private and pa¬ rochial schools, with an enrolment of 32,000. The number of ^^children of school age^^ (i.e. 5 to 20 years) in 1917 was 164,532. For pro¬ fessional or higher education there is Detroit University (Jesuit) ; a normal training school for teachers, which is part of the public school system ; the Detroit College of Medicine, which has recently been taken over by the city, the Detroit College of Law. On.e of the State Normal schools is at Ypsilanti, 28 miles dis¬ tant, and Michigan University is at Ann Arbor, 38 miles away.

The city owns a central public library, with 14 branches, 27 school and factory stations and 489,854 volumes. The appropriation for 1917-18 was $307,000 for maintenance and $1,250,000 for a new main library building. The Bar Association has an excellent law library. The city also owns an art museum with a fine collection of paintings, statuary and Oriental curios and a good art library. During the last year 177,535 visitors passed through its turnstile.

There are in the city, including trade and advertising sheets, 124 regular publications. Of these six are English dailies, two Polish and one German.

Religion and Charities. — The church and religious assemblies and missions number 316. Of these 53 are Roman Catholic churches, 43 Lutheran, 35 Methodist, 30 Baptist, 25 Protest¬ ant Episcopal, 21 Presbyterian and 16 Jewish. Architecturally may be noted Saint Anne's, Saint Hedwig's and Saint Albertus, all Roman Catholic; the First and Fort Street Presby¬ terian; the Central Methodist; Trinity, Saint John's, Saint Paul's Cathedral (Episcopal) ; Woodward Avenue Baptist; the First Church of Christ, Scientist; church of Our Father

(Universalist) ; First Unitarian, Woodward Avenue Congregational, First Congregational, First Baptist Church and the Temple Beth El.

The charities include a city poor fund, managed by a commission ; the Detroit Asso¬ ciated Charities and a large number of de¬ nominational and special charities. There are several large general hospitals, of which the most noted are Grace and Harper, with train¬ ing schools for nurses; Saint Mary's (Cath¬ olic) ; the Ford General Hospital ; Kiefer Hos¬ pital for Contagious Diseases ; the City Re¬ ceiving Ho.spital ; House of Providence (Cath¬ olic) and the United Statds Marine Hospital.

Manufactures, Commerce and Transporta¬ tion. — Detroit is above all else a manufactur¬ ing centre and its most rapid growth in this respect has come within the last few years. In the calendar year 1909, according to the United States census reports, its 2,036 manufacturing

establishments employed 81,011 wage earners and had a production valued at $252,939,000. It was then 13th in rank among industrial cen¬ tres of the country. In 1916, according to the report of the State labor commissioner, there were 251,000 industrial employees in Detroit and its adjoining manufacturing suburbs. The value of the product was about $900,000,000 and the city stood fourth in this respect, being surpassed only by New York, Chicago and Philadelphia. A large part of this gain was due to the phenomenal growth of the automo¬ bile business. In 1909 there were 68 establish¬ ments in the city which either assembled auto¬ mobiles or devoted their whole business to the making of auto parts and accessories. They employed 15,675 wage earners and their prod¬ uct was valued at $59,536,000. In 1916 there were 31 companies that assembled automobiles and' 120 others whose sole business was the making of auto bodies, parts or accessories. They had 130,000 employees and put out 959,- 000 cars, valued at about $600,000,000. One of the companies, the Ford, had 42,000 men on its pay-roll and the Cadillac, Dodge Brothers, Packard and Studebaker had over 10,000 each. In 1917 and the first part of 1918 the produc¬ tion of cars was less rapid, as the large com¬ panies diverted part of their activities to the production of aeroplane parts, shipbuilding parts, the metal parts of munitions and other govern¬ ment war work. In addition to its primacy in the automobile industry, Detroit is either first or conspicuously near the front in the making of adding machines, aluminum castings, brass and bronze products, malleable iron, corsets, overalls, soda ash and furnaces. The city is also a large producer of furniture, foundry and machine shop

products, tobacco and cigars.

The interests of Detroit in connection with the lake marine are great. It is first or second every year among the lake cities in shipyard production. It has the largest fleet of pas¬ senger steamers of any port in the country except New York. They number 31, with ton¬ nage of 38,000 and licensed passenger capacity of 60,000. Several of the steamers are li¬ censed to carry 3,500 to 4,000 excursion pas¬ sengers each. Their routes include nearby ports on the adjacent rivers and lakes, and also longer trips as far as Buffalo in the East and Mackinac to the north. Detroit is also a port of call for all steamers going from Buffalo to the Upper Lakes. The tonnage passing through Detroit River is more than twice that passing through the Suez Canal, and much lar¬ ger than the tonnage arriving and leaving at New York or any other seaboard port in the world. The vessel passages in 1916 numbered 37,852, with net registered tonnage of 76,677,- 264 and actual freight tonnage of 100,907,279.

Not only are the transportation facilities by water unsurpassed but the city is the centre of far-reaching railroads. They include the Mich¬ igan Central, five divisions ; Pere Marquette, three divisions; Wabash, two divisions; Lake Shore; Detroit, Toledo and Ironton; Detroit and Toledo Shore Line; Grand Trunk, four divisions ; and the Canadian Pacific. The Pennsylvania has also acquired terminals here in order to bring in trains over its own tracks.

The foreign trade of the district of Michi¬ gan, of which Detroit is the port of entry,

DETROIT, MICH

t jii £ ♦» ‘Z

!. £t £ a ££ v; «. .. ˆ ‘

ft it£ £ «* ‘ ‘ ** ‘

t $K ˆ ii fi irf i t(•*

.« C l< f U titt ff I t

I I It I K £t ft ‘ It 8 |i

I I a s n ri ii a i s

fij.

1 » W.S tl IMI ii’ii. jj -f

3 1 is S J

1 Michigan Central Depot

2 Birdseye View of Campus Martins

3 Central High School

goes to a very considerable extent over the two Canadian trunk lines mentioned, reaching tide-water at Montreal. The exports for 1917 totaled $276,190,292. The largest items were foodstuffs for the allied countries in Europe. Other very large items were automobiles, iron and steel manufactures, live animals, chiefly horses and mules for war service, cotton, cop¬ per, lead and zinc. The imports for the dis¬ trict in 1917 aggregated in value $54,569,014.

The assessed valuation of the city for the fiscal year 1917-18 is $1,174,517,700; gross city appropriations $29,084,985; city tax levy, $16,- 217,985; tax rate, $13.81 on the thousand of assessments; net city debt, $20,396,385.

The bank statements for 4 March 1918 showed capital and surplus, $39,000,000; sav¬ ings deposits, $139,407,372; total deposits, $334,- 839,632. The bank clearings for 1917 were

$2,749,173,375.

Municipal Government. — Until very re¬ cently the scheme of government for Detroit comprised a common council of two members from each of the 21 wards; a board of estimates to pass upon all appropriations and bond issues, the board consisting of two members elected from each ward, five elected at large and a number of department heads ex-officio ; a board of education consisting of one from each ward; various commissions ap¬ pointed by the mayor and confirmed by the common council. At present the mayor has absolute power of appointment and removal of commissioners without reference to the coun¬ cil, and this feature is continued in the draft of a new charter which was approved by popular vote 15 June 1918. It became operative in some of its provisions at once, and went into full ef¬ fect in January 1919. The board of education has been reduced to seven members, elected at large. The board of estimates has been dis¬ placed by a commission consisting of the mayor, city clerk, controller and city counselor. Both these changes are retained in the new

charter. That instrument also reduces the council to nine members elected at large, a change which has already had the approval by popular vote, but which has not yet gone into effect. The new charter leaves the mayor, city clerk and city treasurer elective, but gives the mayor power of appointment over most of the other administrative officials and commissions. The judges of the police and recorders' courts are elective, and the members of the board of health, being organized under the State law, are appointed by the governor.

Area and Population. — Since 1910 the city has annexed large areas of territory into which its population and business had already over¬ flowed, thus increasing its area from 40.79 square miles to 80.70. Pop. (1910) 465,766; (1920) 993,739. Of the great cities of the United States only New York, Chicago and Phila¬ delphia exceed it in population.

History. — The following sketch is fur¬ nished by C. M. Burton, official historian of the city : ^^The white man first visited Detroit, so far as records show, about 1645, and the first map of the region was published in 1650. The first settlement was rnade 24 July 1701, by Antoine de la Mothe Cadillac (q.v.), who had been governor of Michillimackinac and wished to establish a permanent post for the centre of French power and commerce in the North¬

west. He built Fort Pontchartrain, now called Detroit, and settled it with 50 soldiers and 50 colonists. During the French and Indian War, on 29 Nov. 1760, Maj. Robert Rogers took the place from the French commandant. Captain Beletre, by order from the Marquis of Vaudreuil ; the garrison were sent off as prisoners, but the Canadian inhabitants were allowed to retain their farms upon swearing allegiance to the British Crown. The first act of Pontiac's conspiracy in 1763 was an attempt to seize De¬ troit; Pontiac was foiled, and after a desperate siege from 9 May to 12 October, heroically sustained by Major Gladwin, the post was re¬ lieved. In 1778 there were about 300 inhabit¬ ants, living mostly in log cabins, in a palisaded village. There was a Roman Catholic church in the enclosure but no other public buildings; in that year the British built Fort Lernoult, re¬ named Fort Shelby by the Americans, but it was not until 1796 that the place was occupied by the Americans. As part of the Northwest Territory it came under the Ordinance of 1787, and in 1802 was incorporated as a town, but in 1805 was obliterated by a fire which de¬ stroyed every building in the village except one. The town was replatted and laid out with broad streets. It became the capital on the or¬ ganization of

Michigan Territory in 1805. In the War of 1812, William Hull surrendered it to the British under Isaac Brock on threat of a general massacre of the inhabitants by Brock's Indians. Hull was court-martialed for this act. The British evacuated it in 1813, and the Americans reoccupied it 29 September. It was incorporated as a village in 1809 and again in 1815 and as a city in 1824. It remained the capital of the Territory till 1837, when Michi¬ gan became a State; then of the new State till 1847. Detroit celebrated its centennial 24 July 1901. Consult Farmer, Hlistory of Detroit and Michiganˆ (1889), and ˆDetroitˆ in ˆHistoric Towns of the Western Statesˆ (1901) ; Bur¬ ton, ˆCadillac's Village,ˆ ˆ Early Detroit,ˆ ˆThe Building of Detroitˆ (1896) ; Parkman, ˆCon¬ spiracy of Pontiacˆ (1867) ; Ross and Catlin, ˆLandmarks of Detroitˆ (1898).

William Stocking,

Statistician, Detroit Board of Commerce.

DETROIT, Minn., county-seat of Becker County, on Detroit Lake and the Northern Pacific Railroad,- about 200 miles northwest of Saint Paul. The town is the trade centre of a rich agricultural district and a popular summer resort because of its situation in the beautiful lake region of Minnesota. It owns its electric light and power plant. Pop. (1920) 3,426.

DETROIT, Siege and Capture of, in the War of 1812. Before war was officially de¬ clared against Great Britain a plan of invading Canada was drawn up. One part of the army under Brig.-Gen. William Hull (q.v.) was to cross from Detroit and sweep eastwardly to meet two other armies along the New York border line. On 25 May 1812 Hull began the march from Dayton with 1,600 troops under (jols. Duncan McArthur, Lewis Cass, James Findlay and James Miller (qq.v.) and after a long, tedious journey reached Detroit 5 July. On the 12th he crossed the river, occupied Sandwich, a little village on the Canadian side, three miles below Detroit, and there inexplicably remained inactive week after week, thus allow-

iiig Brig.-Gen. Sir Isaac Brock (q.v.), the British commander, time to collect a formidable force. The Americans had a few minor suc¬ cesses, such as that at Cunard River, but on 19 and 24 July strong detachments were de¬ feated; on 17 July Michillimackinac was sur¬ rendered by Lieut. Porter Hancks to a superior force of British and Indians; and on 8 August, just as preparations were being made to attack Malden, word was received of a defeat at Brownstown. A company of Ohio volunteers under Capt. Henry Brush was hastening with supplies to join Hull, but near Brownstown, at the mouth of the Huron River, 25 miles below Fort Detroit, met a body of Indians under Tecumseh (q.v.). Learning of this, Hull sent a force to rescue Brush, but it was ambushed, many were killed and wounded and the sur¬ vivors barely escaped to the fort. Hull's dispatches were captured and sent to Brock and, therefore, knowing that the latter was aware of his desperate condition and learning that a large force of British and Indians was approaching, Hull on 8 August ingloriously returned to Detroit. On his arrival there Hull sent 600 troops under Miller to rescue Brush, but simultaneously Col. Henry Proctor set out with a body of British troops to press the advantage gained by Tecumseh. On 9 August the two forces met at Maguaga, near Browns¬ town and 14 miles from Detroit, and the British were routed, retreating to Malden, while Miller, having lost about 75 men, was recalled to Detroit. On the 9th HulF ordered the evac¬ uation of Fort Dearborn at Chicago (qq.v.), but on the way the troops were attacked and massacred by Indians under Blackbird.

On 13 August the British began to place batteries on the Canadian side of the river to bombard Detroit; on the 15th Hull was sum¬ moned to surrender under threat of a massacre by the Indians ; and on Hull's refusal the bom¬ bardment was begun. On the 16th the British crossed the river intending to assault the fort, but found the Americans drawn up in battle array outside the ramparts, with artillery well planted. Nevertheless the British took position without molestation and were preparing to assault when Hull, apparently desperate at the thought of a massacre, withdrew his troops from all exterior positions and decided to sur¬ render. Thus within an hour the British found themselves in possession of the fort; not a blow was struck, not a gun was fired, not a word of consultation was had with the officers and not a single stipulation was made for the honor of the troops ; but everything was uncondition¬ ally surrendered to the enemy. The loss is variously stated. Hull estimated his effectives below 800; Cass

stated the loss at 1,600; while Brock reported the number captured at 2,500. The city remained in possession of the British until 1813, despite attempts to recapture it. See Frenchtown.

Hull was charged with cowardice, ineffi¬ ciency, neglect of duty and treason, was subse¬ quently tried by a court-martial, which con¬ cluded its labors in March 1814, was acquitted of treason but found guilty of the other charges and sentenced to be shot. On the court's recom¬ mendation of mercy. President Madison remit¬ ted the death sentence but ordered Hull's name to be stricken from the roll of the army.

Bibliography. — Albach, James R., < Annals

of the Wes to Armstrong, John, ˆNotices of the War of 1812ˆ (Vol. I) ; Brackenridge, H. M., ˆHistory of the Late Warˆ ; Brannan, ˆOfficial Letters of the Military and Naval Officersˆ ; Brown, S. R., Wiews of the Cam¬ paigns of the Northwestern Armyˆ ; Campbell, Maria, and Clarke, James Freeman, ˆRevolu¬ tionary Services and Civil Life of General Hull, together with the History of the Cam¬ paign of 1812 and the Surrender of the Post of Detroitˆ (New York 1848) ; Cooley, T. M., ˆMichiganO Dearborn, H. A. S., ˆDefense of General Henry Dearbornˆ (Boston 1824) ; Farmer, Silas, ˆDetroit and Michiganˆ ; Fay, H. A., ˆCollection of Official Accounts of the Battles of the War of 1812ˆ ; Hatch, William, ˆChapter of the History of the War of 1812 in the Northwestˆ (Cincinnati 1872) ; Hickman, ˆLife of Cassˆ ; Hull, William, ˆMemoirs of the Campaign of the Northwestern Army in 1812ˆ; King, ˆOhioˆ; Lossing, B. J., ˆHull's Surrender of Detroitˆ (1875) ; id., ˆThe War of 1812ˆ ; McAffee, R. B., ˆHistory of the Late War in the Western Countryˆ ; Mc¬ Laughlin, A. C., ˆLife of Cassˆ ; McMullen, ˆHistory of Canadaˆ; Mahan, A. T., ˆSea Power in its Relations to the War of 1812ˆ (Vol.. I, pp. 292 et seq.) ; Nursey, W. R., ˆThe Story of Isaac Brockˆ ; Parish, ˆThe Robert Lucas JournaP ; Roberts, ˆCity of the Straitsˆ ; Slocum, ˆThe Ohio Countryˆ ; Smith, W. L., ˆLife of Lewis Cassˆ ; Tupper, F. B., ˆLife and Correspondence of Major-General Sir Isaac Brock, K.B.ˆ ; Wiley and Rines, 'ˆThe United Statesˆ (Vol. V, pp. 339-352) ; Wilkin¬ son, James, ˆMemoirsˆ (Vol. I) ; ˆMichigan Pioneer Collectionsˆ (Vol. VI) ; Williams, Samuel, <Two Western Campaigns in the War of 1812> (1871).

DETROIT MUSEUM OF ART, the prin¬ cipal art museum of Detroit, Mich., and one of the largest of the Middle West, founded in 1885. It contains a library and has valuable collections on American art,

archaeology, science and on local and national history. It contains the famous Stearns collection of Oriental curios, the Scripps collection of old masters and a fine collection of Pewabic pottery. Contem¬ porary American painters and sculptors are well represented, including Borglum, Manship, Hawthorne, Saint-Gaudens, Dewing and Chase. The museum receives an annual subsidy from the city, ˆ which in 1916 amounted to $40,000, payable in monthly instalments. Courses of lectures are given and sketch classes maintained, also a school of design for the teaching of art and design and the promotion of art studies generally.

DETROIT RIVER, a river or strait which connects Lake Saint Clair and Lake Erie and forms part of the boundary between the United States and Canada. Detroit is the French word for strait ; and the name was given by the French, the first white men who settled here. Its course is nearly south, with slow current and sufficient depth of water for the navigation of large vessels. It is 25 miles long and from one-half to three miles wide. Opposite the city of Detroit it forms an excellent harbor. The tonnage passing through this river exceeds in volume that passing through any other river in the world.

DETROYAT, da’trwa’yˆ’, Pierre Leonce, French naval officer and journalist: b. Bayonne, Basses-Pyrenees, 1829; d. 1898. He was edu¬ cated at the Ecole Navale, was in active service during the Crimean War and subsequently ac¬ companied an expedition to China. He came to Mexico with the Archduke Maximilian and was made UnderSecretary of State for Naval Affairs in the latter’s short-lived empire. In 1870-71 he was in command of the camp at La Rochelle. He was on the staff of La Liberte in 1866-69 and was its editor in 1869 —76. He founded two journals, Le Bon Sens and L’Esta-fette, and in 1885-86 was editor of the Consti-tiitionel. He published ˆLa cour de Rome et I’empereur Maximilienb (1867) ; ˆL’lnterven-tion frangaise au Mexiqueˆ (1ˆ8) ; ˆDu recrutement, de I’organisation et de I’instruction de I’armee frangaiseˆ (1871) ; ˆLe senat et le scrutin de listed (1881) ; ˆNos possessions fran-eaise en Indo-Chineˆ (1887) ; ˆLes chemins de fer

en Amerique^ (1886).

DEUCHER, doik'er, Adolf, Swiss states¬ man: b. Steckborn, Thurgau, 1831; d. 1912. He studied medicine at Heidelberg, Zurich, Prague and Vienna. He was a member of the Thurgau canton council in 1855 and in 1868 helped to frame the new democratic constitution for Thurgau. He was a member of the Swiss Na¬ tional Council 1869-73 and became its president in 1882. He became a member of the Federal Council in 1883 and its vice-president in 1885. He was chosen President of the Swiss Con¬ federacy and served until 1887. He was re¬ elected in 1897 and 1903.

DEUS EX MACHINA, mak'in-a (Lat.

god out of the machine^U, ^ Latin phrase translated from the Greek, where it was used principally in connection with the theatre. When the tragic situation of a play became so involved that the solution of the difficulty lay beyond the situation itself, a god was brought on the stage by some sort of stage machinery, and the denouement followed quickly. The term has come to connote any extraordinary, unlooked-for agency introduced to solve a diffi¬ culty; or to designate some unknown super¬ natural cause introduced to explain phenomena that one is not able to account for by natural means. Consult Haigh, ^The Attic Theatre^ (3d ed., Oxford 1907).

DEUTERONOMY, «Second» or «Repeated Law,^^ the title applied in Greek, Latin and modern versions of the Old Testament to the fifth book of the Pentateuch (q.v.). The name arose from a mistranslation of the phrase ®copy of law^^ (Dent, xvii, 18; also Josh, viii, 32), yet it has had in the past a certain de¬ scriptive force in contrasting this code of law as promulgated at the end of the wilderness sojourn with the codes of Exodus and Leviticus as given at Sinai. In Hebrew editions of the text the title is ^^These Words,® taken from the beginning of the book.

The central portion of Deuteronomy consists of an hortatory address- (v-xi) and a code of laws (xii-xxvi). Introductory matter is pre¬ fixed to this, chiefly an historical review (i-iii), and an exhortation (iv, 1^0). The closing chapters (xxvii-xxxiv) consist of miscellaneous matter concerning obedience to the law and the last days of Moses.

Deuteronomy has been one of the pivotal VOL. 9 — 3

points in the discussions of the past century as to the true order of

growth of the Old Testament literature and re¬ ligion. It is now generally recognized among those who apply the principles of historical investigation to the Biblical writings that, in the development of Hebrew law, Deuteronomy stands between the briefer and simpler codes of Exodus xxxiv and xx-xxiii and the elaborate, priestly law of Leviti¬ cus. With some slight modifications, almost the entire contents of the ®Book of the Cov¬ enant® (Ex. XX, 20— xxiii, 33) is taken up into this new ^^Covenant® code, which may itself be counted Mosaic in the sense that all the written law of Israel is an organic growth springing in the first instance from the creative work of that great leader. A comparison of the thought and style of Deuteronomy with the historical and prophetic writings similarly suggests its composition between the historical dˆocuments of the 9th and 8th centuries and the 8th century prophets (Amos, Hosea, Isaiah, Micah) on the one hand and, on the other, the historical writings and the prophets (Jeremiah, Ezekiel) of the end of the 7th and beginning of the 6th centuries. A further comparison of the con¬ tents of Deuteronomy with the account of the finding of the book of the law and the reforms based upon it in the 18th year of Josiah's reign (2 Kings xxii-xxiii) makes it clear that the law promulgated in 621 b.c. was that of Deu¬ teronomy and no other. The composition of the main body of the book may thus be assigned to the period between 700 and 621 b.c. The introductory and concluding chapters seem to have been added not long after 621.

The great prophets of the 8th century had called upon the people to reform their entire civic, economic, and religious life in conformity with the newly apprehended requirements of a sole Deity, who demanded justice and mercy rather than religious ceremonies. The prophets had applied these demands to dishonest business dealings, bribery, oppressive monopoly and to established religious customs in a way that united religious conservative and selfish ex¬ ploiter against the much needed reforms. In the reign of Manasseh beginning early in the 7th century there was a great reaction against the reforms undertaken; now anyone who dared to teach publicly the doctrines , of the recent prophets met speedy death. It was probably at this time that followers of the prophets secretly compiled the central law code of Deu¬ teronomy and composed the wonderful horta¬ tory address of chapters v-xi, which bases its appeal to obey the law upon the most generous motives of gratitude to God and sympathy for man. The book was probably laid away in one of the Temple chambers until a favorable time for its public reading should be found. Its authors may already have been dead when it came to light in the repairing of the Temple instituted by Manasseh's grandson, Josiah.

The prophets of the previous century had made an antithesis between spiritual religion and worship. Deuteronomy undertook a great synthesis of the two, seeking to purify worship from pagan license and to use it as an expression of love to God and kindness to man. In order to purify, Deuteronomy changed the old law that permitted altars in various places (Ex. xx, 24) and centralized the cultus at Jerusalem,

The ground of Sabbath observance was made rest for the servants as well as the master. In the joyous harvest feasts the servants, land¬ less Levites, foreign sojourners, fatherless, and widows were to be given, opportunity to share, and the tithes of the produce were to go for the nourishment of these classes. Emphasizing justice, mercy, and knowledge of God as the supreme things, Deuteronomy sought to formu¬ late laws which should give effect to these prin¬ ciples in worship, business, family life, and the entire conduct of the nation. The perpetuity of the na'tion was indeed declared dependent upon faithfulness to the covenant of Sinai, which required loyalty to Jehovah expressed in a purified worship and a righteous, benevolent social order.

Upon the tragic death of Josiah and the establishment of Egyptian suzerainty the nation reacted sharply against the exacting demands of Deuteronomy. The Babylonian exile fol-low'ed speedily and burned the warnings of Deuteronomy into the hearts of some thought¬ ful Jews. Out of these conditions there sprang a school of historians who composed such works as Judges and Kings with the primary purpose of enforcing the great lessons of Deuteronomy.

In literary form this book marks a transition in the growth of the Old Testament scarcely less obvious than that in thought. Its rounded periods and solemn, sonorous tone are in marked contrast to the simple, picturesque style of the earlier prose of Israel ; here again its influence is plainly seen in the writings that follow the time of its publication.

Bibliography. — Carpenter, J. E., and Har-ford-Battersby, G., ˆThe

Hexateuchˆ (London 1900) ; Driver, S. R., ˆDeuteronomyˆ (in in¬ ternational Critical Commentary,ˆ New York 1895) ; Eiselen, F. C., ˆThe Books of the Penta¬ teuchˆ (New York 1916) ; Fowler, H. T., History of the Literature of Ancient IsraeP (New York 1912) ; Kent, C. F., israel's Laws and Legal Precedentsˆ (New York 1907) ; also standard Bible dictionaries. Consult also Old Testament Introductions: Creelman, Cornill, Driver, McFadyen, Moore.

Henry Thatcher Fowler, Professor of Biblical Literature and History, Brown University.

DEUTOPLASM. See Embryology.

DEUTSCH, doitsh, Gotthard, American Hebrew scholar: b. Kanitz, Austria, 31 Jan. 1859. He was graduated at the University of Vienna in 1881 and came to the United States in 1891. He is a member of the editorial board of the Uˆwish Encyclopaediaˆ and of the Cincinnati Board of Education. Pie is professor of history at Hebrew Union College, Cincinnati. He has written ˆSymbolik in Cul-tusˆ (1886) ; ˆTheory of Oral Traditionˆ (1895) ; ˆPhilosophy of Jewish, Historyˆ (1897) ; ˆAndere Zeiten,ˆ a novel (1897) ; ˆUnloesbare Fesseln,J a novel (1902) ; ˆMemorable Dates of Jewish Historyˆ (1904) ; Hsrael Bruna,ˆ a tragedy (1908) ; ˆHistory of the Jewsˆ (1910) ; ˆDer Glaube an Hobelspaene,ˆ a survey of mod¬ ern Judaism (1915) ; and numerous articles in encyclopedias and periodicals.

DEUTSCH, Leo Grigorevitch, Russian revolutionist: b. Kiev 1855. He was educated in his native place, joined the Russian revolu¬

tionary movement in 1874 and in 1876 was arrested, ostensibly as a deserter from the army, but in reality because of his revolutionary tendencies. He managed to effect his escape and in the following year, with a confederate, started to organize a revolt among the peasantry of Kiev. Their plans being discovered, Deutsch was arrested, spent a year in Kiev prison await¬ ing trial and again managed to escape to Switzerland, where he joined a group of Rus¬ sian terrorists, became a Socialist and in 1883 was one of the founders of the Russian Social-Democratic party in Switzerland. In 1884 he was arrested in Germany, with literature of the party in his possession, and Bismarck managed to have him extradited to Russia. He was exiled to Siberia for 13 years and four months, but again escaped in 1901 and returned to Swit¬ zerland through Japan and America. He was one of the editors of the Socialist journal, the Spark. In 1905 he returned to his native land

after the Tsar had manifested a conciliatory policy. The reaction of the following year again led to Deutsch's arrest and sentence of exile to Siberia. For the fourth time he eluded his guards and escaped to France. He came to America in 1911 and for about a year was editor of the Russian Socialist weekly, Novy Mir. Consult his '^Sixteen Years in Siberia^ (New York 1903) and '^Viermal Entflohen^ (Stuttgart 1907).

DEUTSCHBROD, doich'brot, Bohemia, the capital of a district, on the Sazawa, 16 miles north of Iglau. The town has lumber and grist mills, glass works, breweries and woolen mills. In 1422 Ziska defeated the Emperor Sigismund here. The town was destroyed by the Hussites. Pop. about 6,600.

DEUTSCHE BANK, The. The Deutsche Bank (Deutsche Bank in Berlin) was founded in 1870 with a capital of 15,000,000 marks. Its object, as stated in its charter, was ^ffhe trans¬ action of all sorts of banking business, particu¬ larly the fostering and facilitating of commer¬ cial relations between Germany, the other European countries and overseas markets.® Previous to its founding, German importers and exporters were dependent upon English and French banking institutions in the world mar¬ kets — a serious handicap in that German bills were almost unknown in international com¬ merce, generally disliked and subject to a higher rate of discount than English or French bills. The wisdom of its establishment is evident. Following certain difficulties and criticisms dur¬ ing its early years, the Deutsche Bank in time established branches and connections that have given it an international standing. In 1873, after one failure and another partially success¬ ful attempt, a branch was opened ip London — a prime necessity for the establishment of credit in the world's money centre for the German trade. In addition, to keep in touch with the great promising export and import centres, branches were opened at Bremen (1871), Ham¬ burg (1872), Frankfort-on-the-Main (1886), Munich (1889), Leipzig and Dresden (1900), Niiremburg (1905), and Constantinople (1909). In addition, it has two silent partnerships, known as ^^commandites,® and 77 deposit offices. Subsidiary offices have been founded in whole or part by the Deutsche Bank in the United States, Asia, South America (seven countries),

THE "DEUTSCHLAND" AT BALTIMORE, MD., JULY 1916

Spain, Italy, East Africa, Central America and Mexico ; the whole representing a large capital¬ ization. In addition, communities of interest have been established with 13 important banks throughout Germany, these last having 94 branches. Through its ramifications there is hardly a financial organization in any commu¬ nity in the German states in which the Deutsche Bank has not some proprietary con¬ nection ; and no commercial country in which it has not an active or silent financial connection. In addition to its purely banking functions, it has representatives on the boards of German and foreign manufacturing and trading organ¬ izations, many of which are pre-eminent inter¬ nationally in their respective lines. This repre¬ sentation in 1910 concerned 116 such institutions. The capital of the Deutsche Bank (1915) was 250,(X)0,000 marks ; surplus, 180,000,000 marks ; and dividend 12^^ per cent. The capital power of the Deutsche Bank group (1908) was 786,858,095 marks, of which 588,900,800 marks constituted capital, and 197,957,295 marks surplus. Consult Riesser, J., <Die deutsche Grossbanken und ihre Konzentration^ (1909) ; ^Germany's Economic Forces^ (1913) ; ^Report on Cooperation in American Export Trade^ (Washington 1916).

DEUTSCHLAND, The, a German sub¬ marine merchant vessel, the first of its class to cross the Atlantic Ocean. Commanded by Capt. Paul Koenig and a crew of 28 men, the boat sailed from Bremen 14 June 1916, stopped at Heligoland for nine days and then set out for Baltimore, Md., arriving 10 July 1916. The whole distance of about 3,800 miles, with the exception of about 90 miles when it was neces¬ sary to submerge, was traversed above water. The speed of the vessel was about 14 knots an hour. While the vessel could submerge to a depth of 300 feet, it did not go deeper than 150 feet. With a total gross tonnage of 711 tons, net 447 tons, and scuff iron for ballast, the Deutschland brought 3,042 cases of scarce and valuable dyestuffs of 157 tons gross, 125 tons net. The daring voyage attracted great admiration and praise. While both British and German submersible boats on warlike errands had sailed as far, the Deutschland was the first to achieve a noteworthy victory of a peace¬ ful utilitarian commercial character during her hazardous voyage through enemy waters, with¬ out armed escort, eluding pursuers and ac¬ complishing her mission safely. The vessel left Baltimore at 8:30 p.m. 2 August on her return journey, carrying a cargo of rubber, crude nickel and a consignment of gold, and arrived at Bremen 23 August. A sister ship, the Bremen, left port shortly after and never arrived at its destination. The Deutschland ac¬ complished a second voyage across the Atlantic

in 17 days and arrived in New London, Conn., 1 Nov. 1916, bringing a cargo of chemicals, gems and securities valued at $10,000,000. Later she returned to Germany, was surrendered to France after the armistice and sunk by gunfire during target practice by the French navy on 18 June 1921.

DEUTZIA, doit'si-a, or dut'si-a (so named in honor of the Dutch botanist Deutz), a genus of plants of the family Hydrangeacece, contain¬ ing 50 species, all of which are interesting for the beauty of their flowers. Some of the species are cultivated in America as hothouse flowers

or ornamental shrubs. The nearest relatives growing wild in the United States are the syringas (Philadelphus) . The deutzias are small shrubs indigenous to Asia, one species occurring in Mexico, They are covered with stiff stellar hairs, on which account one species (D. scabra) is used by joiners in Japan to polish wood. The flowers are arranged in thyrsi like the lilac.

DEUX-PONTS, de'pon', the French name for the German town of Zweibriicken, in Latin Bipontiuniy all which names signify tv/o-bridges. There was formerly a county of this name, which took its name from this town, which is now in the Bavarian Palatinate. It was afterward erected into a duchy. By the Peace of Luneville (1801) the duchy was ceded, with all the left bank of the Rhine, to France, and afterward composed a part of the depart¬ ment of the Donnersberg. It contains 70,000 inhabitants, on 760 square miles. By the peace of 30 May 1814 it was restored to Germany. See ZWEIBRUCKEN.

DEUX-SEVRES. See Sevres.

DEV, dav (Persian, demon), identical with daeva of the Avesta and the Sanskrit deva. Ac¬ cording to Zoroaster these beings were created by Ahriman and are frequently represented as a source of guile, cunning and evil. Consult Geiger and Kuhn, ˆGrundriss der iranischen Philologieˆ (Vol. II, Strassburg 1896-1904),

DEVA, da'va (Lat. deus, divus), among the Aryans in general, an epithet of divine per¬ sons and things; hence often opposed to the dev of the Parsees, It is commonly applied to the goddess Durga, the wife of Siva, of terrific form and irascible temper. Devakatmaja is the mother of Krishna, who is also named Devakl. Devataru is the holy

fig-tree, belonging to Sverga or paradise, Devata denotes a deity; Devadatta, the younger brother of Buddha, who is called Devadattarraja (Deodatus senior). Devadeva is a name of Brahma; Devapati is Indra, the god of the sky; Devayajna is the Homa or burnt sacrifice ; Devarishi a celestial saint. There are many great classes of choirs of inferior devatas, who are ministers to the higher gods, such as the 12 Adityas or forces of the sun; the Maruts or winds, the celestial musicians ; in short, endless motley hosts with variable attributes, *

DEVA-DASI. See Bayadere.

DEVANAGARI, da'va-na'ga-re, or NA-GARI, the name of the character in which Sanskrit is written, especially in northern and middle India. Devanagari means ˆVriting of the divine city® and Nagari ® (writing) of the city, urban.® The alphabet consists of 48 letters written from left to right. It is believed to have reached its present form about 700 a.d. and is traced to the oldest form of Indian alphabet, the Brahmi lipi, or writing of Brahma, which is known from coins, etc., of about 350-400 b.c. This Brahmi is itself supposed to be an adapta¬ tion of a form of Semitic writing which reached India about 800 b.c. Kircher's ˆ China illustrataˆ (Amsterdam 1667) contains five tables of Devanagari letters contributed by Heinrich Roth, a missionary. Consult Biihler, Hndische Palaographieˆ (Strassburg 1896), and Tayloff ˆThe Alphabetˆ (Vol. II, London 1899).

DEVAPRAYAGA, da-vaˆpra-ya'ga, or DEOPRAYAG, India, a sacred city of the Hindus, in the district of Garhwal, Northwest Provinces, on a mountain side, 2,266 feet above the sea, in the fork of the Alaknanda and the Bhagirathi, which join to form the Ganges. Devaprayaga possesses a notable temple and is a favorite place of pilgrimage. See Deoprayag.

DEVAUX, de-vo', Paul Louis Isidor, Bel¬ gian statesman : b. Bruges 1801 ; d. 1880. He was educated at Liege and early entered the political arena. In 1824, in conjunction with Lebeau and Rogier, he

founded the Journal Politique, and in 1830, with the same associates, established the so-called Doctrinal party. Through the journal Devaux drew together the Catholic and Liberal elements and consolidated the opposition to William I, king of the Neth¬ erlands, to the extent of being largely instru¬ mental in bringing about the separation from Holland and the setting up of an independent government. Devaux assisted in framing the constitution and also the Treaty of London. He was made Minister of State in 1831, but soon afterward resigned. He became leader of the Moderate Liberals in the Chamber and for several years edited the party organ, the Revue Nationale, which he founded in 1840. In his last years he was afflicted with blindness. He published ˆMemoires sur les guerres mediquesˆ (1874), and ˆfitudes politiques sur les principaux Evenements de I'histoire ro-maineˆ (1880).

DEVAY, daVoi, Matyas Biro, Hungarian leader of the Reformers: b. Deva, Transylvania, about 15(X); d. 1574. He studied theology at Cracow, was ordained a priest and in 1529 embraced the doctrines of the Reformation. Thereafter he spent two years with Luther at Wittenberg, and on his return home preached the new faith abroad at the risk of his life until 1534, when he secured the protection of a nobleman. The Turkish invasion of 1541 obliged him to flee to Switzerland, where to Luther's great regret he adopted the sacramental doctrines of Zwinglius. For many years pre¬ vious to his death he labored zealously at Debreczin, Hungary.

DEVELOPING IN PHOTOGRAPHY.

See Negatives, Development of; Pho¬ tography.

DEVELOPMENT HYPOTHESIS, the

doctrine that all nature, inanimate and animate, is the result of a gradual unfolding of inherent qualities and powers, with ever-increasing com¬ binations and complexity, from certain assumed primordial elements, the origin of which is unknown. In biology the term is specifically applied to the alleged derivation of modern dif¬ ferentiated forms (species) of animals and plants from early synthetic types. See Ani¬ mals, Classification of; Evolution; Dar¬ winian Theory, *etc.*

DEVENS, Charles, American jurist and general: b. Charlestown, Mass., 4 April 1820; d. Boston, Mass., 7 Jan. 1891. He was educated at Harvard, became a member of the State Senate in 1848-49, and was United States marshal for the district of Massachusetts at the time

when the case of Thomas Sims, a fugitive slave, at¬ tracted widespread attention. Devens delivered Sims to his master in accordance with the law,

and afterward tried to purchase his freedom, but did not succeed until after the outbreak of the Civil War. He served in the Union army from 1861 to 1865, retiring with the full rank of brigadier-general and the brevet rank of major-general. In 1873 he was made associate justice of the Massachusetts Supreme Court; in 1877 became Attorney-General of the United States, and in 1881 resumed his place on the Supreme bench of his native State. His ora¬ tions and addresses with a memoir by John C. Ropes were published in Boston 1891.

.DEVENTER, da'ven-ter, or DEMTER,

Holland, ancient town in the province of Overyssel, eight miles north from Zutphen, on the navigable river Yssel and 66 miles east of Amsterdam. It has a large town-hall, a court¬ house and prison, places of worship for Cal¬ vinists, Lutherans, Mennonites, Roman Catho¬ lics and Jews. The Groote Kerk has a fine Gothic tower and a crypt dating from the end of the 11th century. The followers of Gerard Groot, or ®the Brethren of the Life in Com¬ mon,® have their college here. Besides the manufacture of carpets and Royal Smyrna rugs,ˆ there are factories for the molding of iron, cigar making, rope and glue making. Cotton products are also manu¬ factured, and a certain honey cake known as ˆˆDeventerˆ Rock.® Considerable trade is car¬ ried on in linen, agricultural products and grain. Erasmus spent his boyhood here. Pop.

28,223.

DE VERE, de ver'. Sir Aubrey Hunt,

Irish poet: b. Curragh Chase, Ireland, 28 Aug. 1788; d. there, 5 July 1840. His works are Uulian the Apostate: a Dramatic Poemˆ (1822); ˆThe Duke of Mercia: an Historical Drama,ˆ ˆ the volume containing also ˆThe Lamentations of Irelandˆ (1823); ˆThe Song of Faith, Devout Exercises and Sonnetsˆ (1842), and ˆMary Tudor: an Historical Drama,ˆ published posthumously (1847). His sonnets Wordsworth declared to be ®the most perfect of our age.®

DE VERE, Aubrey Thomas, Irish poet and essayist : b. Curragh Chase,

Ireland, 10 Jan. 1814; d. there, 21 Jan. 1902. He was a son of Sir Aubrey De Vere (q.v.) and became a Roman Catholic in 1851. In 1842 his first volume of verse appeared, <The Waldenses,ˆ and ˆThe Search after Proserpineˆ (1843). His subsequent books of verse include ˆPoems, Miscellaneous and Sacredˆ (1853) ; ˆMay Carols> (1857); <The Sisters> (1861); <The Infant BridaP (18(M) ; Hrish Odesˆ (1869); ˆThe Legends of Saint Patrickˆ (1872) ; ˆAlex¬ ander the Great> (1874); ˆLegends of the Saxon Saintsˆ (1879); ˆThe Foray of Queen Meave and other Legends of Ireland's Heroic Ageˆ (1882) ; ˆLegends of the Records of the Church and the Empireˆ (1887) ; and ˆSaint Peter's Chains > (1888). Among his prose

works are ˆEnglish Misrule and Irish Mis¬ deedsˆ (1848) ; ˆPicturesque Sketches of Greece and Turkeyˆ (1850) ; Hreland's (Thurch Property and the Right Use of Itˆ (1867); ˆThe Church Establishment of Irelandˆ (1867) ; ˆConstitutional and Unconstitutional Political Actionˆ (1882) ; ˆEssays, Chiefly on Poetryˆ (1887) ; ˆEssays, Chiefly Literary and Ethical ' (1889) ; ˆRecollections of Aubrey de Vereˆ

(1897).

1,1a, lb. Various stages of the Turbot. 4. Female living in body of an Ascidian.

2, 2a, 2b. Development ot the Shrimp. 3. Free-Swimming form, 5, 5a. Forms of a Peltogaster. 6, Oa. Forms of a Crinoid. 7, 7a.

3a, Sessile form of Barnacle. 4, 4a. Forms of a Nautopterus# Torpedo embryo and adult. 8, 8a. Embryo and adult Dog Fish.

DEVEREUX, Robert. See Essex, 3d Earl of.

DEVERON, a river of Scotland, in Aber¬ deenshire and Banffshire, which flows into the sea at Banff. It is about 50 miles long. The salmon-fishery is very valuable.

DEVI, da've, in Hindu mythology, ^^the goddess,® or Mahadevi ^4he great goddess,® wife of the god Shiva and daughter of Himavit (that is, the Himalaya Mountains). She is rep¬ resented as a being of two characters, one gen¬ tle, the other fierce, and it is under the latter aspect that she is generally worshipped. In the Mahabharata she appears under many forms, and her individuality is fully developed in the Puranas.

DEVIATION, in the law of marine insur¬ ance, an unnecessary departure from the course of the voyage insured. The legitimate reasons for departure from the course are stress of weather, want of repairs, joining convoy, suc¬ coring ships in distress, danger from an ene¬ my, sickness and mutiny. Even in these cases the quickest courses must be taken. Deviation, from the moment at which it commences, dis¬ charges the underwriter from all liability.

DEVIATION OF THE COMPASS, the

deviation of a ship's compass from the true magnetic meridian, caused by the proximity of iron. In wooden ships no magnetic deviation is perceptible so long as the ship is heading north or south. The greatest deviation is seen when the vessel heads east or west. In iron ships the magnetism is fixed by hammering and riveting, and the deviation manifests itself ex¬ actly in-accordance with the point toward which the hull headed while these processes were going on. Armor-plated ships should be plated with their head in a different direction from that in which they lay when built. The mode now generally employed to correct devia¬ tion is by introducing on lx»ard ship masses of iron and magnets to exactly neutralize the action of the ship's magnetism. Compasses are sometimes carried on masts as a means of removing them from the disturbing influence of the iron of the hull. In this position they serve as standards of comparison for the bin¬ nacle compass. Wooden ships are also mag¬ netized, so as to affect the compass, though in a far less degree, by the direction in which they lie when building.

DEVIATION OF THE PLUMB LINE.

See Deflection of the Plumb Line.

DEVICE, an emblem, with an accompany¬ ing motto or legend used to convey a hidden meaning of some particular conceit of the wearer. Such emblems became general in the 14th century, and were borne only by the per¬ son who assumed them, and not, like the crest, by the family or descendants. Louis XIII of France had a falcon as a device, with the legend Aquila generosior ales (a nobler bird than the eagle), by which he claimed su¬ periority to the emperor. Consult Radowitz, <Die Devisen und Mottos des spatern Mittelalterˆ (Stuttgart 1850).

DE VIGNY, de veˆnyeˆ Alfred, Comte, French novelist and poet ; b. Loches, Indre-et- Loire, 1799; d. 1863. He received his educa¬ tion in Paris and served in the army 12 years. .In 1822 appeared his ˆPoemesˆ and in 1824-

26 his ˆPoemes antiques et modernes.ˆ These were among the earliest attempts to deal in epic form with philosophic subjects. ˆEloaˆ appeared in 1824 and served as model for La¬ martine's ˆ Chute d'un Ange.ˆ In 1826 De Vigny published his great historic novel ˆCinq-Mars, ˆ which though a falsification of history attained an immediate and splendid success. It was the forerunner of the historic tales of Hugo and Dumas. In 1829 he translated Shakespeare's ˆ Othelloˆ and wrote the comedy ˆQuitte pour la Peur.ˆ These were followed by ˆStelloˆ ; ˆServitude et Grandeur militairesˆ (1835), military stories and his best work in fiction. His drama ˆChattertonˆ (1835) is his best despite its pessimistic tone throughout. After his death appeared the ˆDestineesˆ (1864) and ˆLe journal d'un poete> (1867), rem.arkable for their lyric strength. De Vigny's works were edited in 1ˆ3-66, in 1868-70 and in 1883-85. Consult the biography by A. France (Paris 1868) ; also Caro, 'ˆPoetes et romanciersˆ (ib. 1888) ; Faguet, Lmile, ˆDix-rieuvieme siecle> (ib. 1890) ; Sainte-Beuve, ˆPortraits litterairesˆ (Vol. HI, ib. 1893) ; Seche, L., ˆLa vie litteraire politique et reli-geuse; la vie amoureuse d' Alfred de Vignyˆ (ib. 1913). ■

DEVIL (O. E. deofol; O. S. diubal; O. H. G. tiufal; M. G. Teufel; Gothic, diabo-lus, from Gk. a slanderer), an evil

spirit, Satan, the tempter, slanderer and tor¬ mentor of human beings, according to the Scriptures of the Old and New Testaments. Most of

the old religions of the East acknowl¬ edged a host of demons not good or bad, but merely exercising a salutary or injurious in¬ fluence. In the latter case they were looked upon as punishing spirits, without inimical or wicked purpose. Siva, the judging and de¬ stroying god of the Indian mytholog3% is a symbol of the great power of nature, which is alternately beneficent and injurious, but in it¬ self neither good nor evil. Zoroaster named this evil principle Ahrinian. The Greek my¬ thology did not distinguish with the same pre¬ cision between the good and bad spirits. Beelzebub, or Beelzebul, appears to have been regarded by the Jews as the prince of devils. According to the Mohammedans, who have de¬ rived their account from Jewish traditions,' the devil, or, as they sometimes call him, Eblis, was an archangel, whom God employed to destroy the jinns or genii, a race intermediate between men and the angels, w'ho tenanted the earth before the creation of Adam.

The Satan (^'^adversary®) of the New Testa¬ ment is a rebel against God. Endowed with the intellect and power of angels, he uses them since his fall to entangle men in sin, and ob¬ tain power over them.

The doctrine of Scripture on this subject soon became blended with numerous fictions of human imagination, with the various su¬ perstitions of different countries and the my¬ thology of the pagans. The gods of the ancients became evil spirits, seeking every opportunity to injure mankind. The excited imaginations of people frequently led them to suppose Satan visibly present ; and innumerable stories were told of his appearance, and his attributes dis¬ tinctly described. The writings of the fathers of the Church also contain several passages re-

specting the appearance of the devil. In many works or appearances of an -extraordinary character, the devil was supposed to be con¬ cerned. Thus, many a dam, bridge, etc., has been built in one night with his assistance, and everyone knows that superstitious writers of former days, applying the legends that had become connected with Dr. Faust, the reputed worker of magic, to Fust, to whom the inven¬ tion

of printing has frequently been ascribed, taught that he invented the art by the help of Satan. The modern tendency is to regard the personal Devil as a part of the mythology of early times when men conceived the world forces as endowed with personal form. This is due to the advance of medical and natural science, better methods of historical criticism and modern philosophy. Consult Carus, ˆHis¬ tory of the DeviP (Chicago 1900) ; Conwˆay, ˆDemonology and Devil Loreˆ (London 1878) ; Grimm, ˆDeutsche Mythologies (4th ed., Berlin 1878) ; Horst, ˆDamonologieˆ (Frankfort 1818) ; Lecanu, ˆHistoire de Satan, sa chute, son culte, ses manifestations, ses oeuvresS (Paris 1861); Mayer, ˆHistoria Diabolis (Tu¬ bingen 1780). See Demonology.

DEVIL, Tasmanian, or DEVIL-DEVIL.

See Dasyure.

DEVIL, The, a tavern which once stood near Temple Bar, in Fleet street, London, where the Apollo (Zlub met. Its site is now oc¬ cupied by Child's Bank.

DEVIL IN ART AND SYMBOLISM.

All representations of the Devil during the first four centuries of our era appear to have been that of a serpent tempting Eve. In a fresco in the cemetery of Sainte-Agnes Satan is figured in the form of a human bust termi¬ nating in a serpent's tail. On several early Christian sarcophagi is seen a serpent twined around the trunk of a tree, the head is erect and threatens some doves, whose nest reposes on the tree, M. Le Blant declares that it is an error to consider this, as is frequently done, as a representation of the Devil threatening Inno¬ cence ; this scene, he says, has nothing of the symbolic, but is an ornamental motif borrowed from antiquity by Christian art. As a rule, in the temptation of Adam and Eve, the serpent, with his body encircling a tree, is depicted with an apple in his jaws. In the Middle Ages artists frequently placed the head of a young man or woman on the serpent form. Again, in the Bibliotheque Nationale, Paris, is an Italian miniature which displays a serpent with two human heads, one looking at Adam, the other at Eve. In a 14th century manuscript (ˆSpeculum humanse Salvationist) Didron found the ®tree of the Knowdedge of Good and Evil® surrounded by two serpents, each offering a fig, one to Adam, the other to Eve. The use of the serpent form to symbolize the Devil is confined to the ®temp-tationt scene, the depiction otherwise being given the conventional demon of grotesque form. Hulme describes an illustration of the Devil in a 14th century missal, in which Satan has great tusks protruding from his

mouth and curling up nearly to the eyes ; his ears are long and pointed. Other heads appear at shoulders and thighs, and from the mouths of these heads issue the figure's arms and legs; the arms terminate in bear's claws, the legs in

eagle's talons. This figure's body is open at the waist exposing a nest of serpents darting forth ; large scales cover the rest of the body. In old works of art we find the Devil given the same form as his imps, half man, half beast, and furnished with a tail and horns. Incidents in the lives of the saints are gen¬ erally depicted with the devil in such form. Horses' hoofs or a cloven foot are commonly a part of the personality ; and the wings of a bat are often added to increase the Satanic hideousness. When picturing the Devil as ˆffhe devouring monsteP^ he generally takes on the form of a dragon. In pictures of Saint Michael in combat with the Devil Satan is depicted in a dragon's form ; except rarely, when he is a two-legged creature having a monstrous head with a bird's beak, and is covered with scales. The German Renaissance artists were fond of giving the Devil a crow or raven form. In order to give Satan a special personality the painters of the Middle Ages frequently de¬ picted him as black, but he is found also as red, blue and even green. Besides the above impersonations the evil spirit has been por¬ trayed as lion, hog, boar and monkey, also basilisk. Another variation used in the Middle Ages was that of a monster with three heads each devouring one of the damned ; a statue dating from the 12th century in Sainte-Basile d'Ltampes has this form. Byzantine artists frequently pictured Satan as "cast out of Heaven® in which case he takes on a person¬ ality of black-winged demon. More adapted to modern conceptions are the depictions of the Devil in the form of a young gallant, or of a young girl. A few pictures by great masters which contain Satan are: One by Niccola of Pisa, in which the Devil has the form of a satyr; Orcagna's ˆHelP in Saint Maria Novelle, Florence, depicts the prince of demons as Pluto; Saint Michael's combat with Satan has been painted by Raphael (in Louvre) ; by Guido (in the Capuchine Church, Rome) ; by Jacobello del Fiore (in Berlin Museum) ; by Lucas Giordano (in Belvedere, Vienna). An¬ other favorite subject with artists is the ˆTemptation of Christ.ˆ

According to Husenbeth the following saints have been pictured in connection with the Devil : Saint Demetrius (martyr) has been represented with the Devil appearing to him in prison as a scorpion; Saint (joar (confessor) has been depicted with the Devil on his shoulder; Saint Albert (Carmelite) has been pictured driving away the Devil in the form of a young woman, but with horns and a fish's tail ;

Saint Anthony (abbot) has been portrayed having the Devil at his feet, or with the Devil in the form of a goat; Saint Apollinaris (bishop martyr) has been represented beating the Devil with a club, as also Saint Nicholas of Tolentinum; Saint Hilarion has been depicted mounted on an ass, driving the Devil away with the sign of the cross ; Saint Hidulphus has been pictured casting the Devil out of a boy j Saint Zeno of Verona has been portrayed casting the Devil out of a woman ; Saint Hermes has been represented on horseback casting _ the Devil out of a woman led by a man with a rope, or with the Devil issuing out of the mouth of a child; Saint Melanius also has been depicted driving out the Devil ; Saint (lermanianus has been pictured casting

out the Devil standing near him ; Saint Anthony of Padua has been portrayed vanquishing the Devil; Saint Norbert has been represented with the Devil at his feet, or chained up; Saint Oswald (bishop confessor) has been pictured driving the Devil off a large stone ; Saint John Thaumaturgus has been depicted driving the Devil out of people; Saint Gaudentius of Rimini has been portrayed administering Holy Communion to a man while the Devil is issuing from him; Saint Theodore (bishop confessor) has been represented trampling on the Devil; Saint John Gualbert has been depicted standing on the Devil, a cross and tau staff set on the Devil's head; Saint Benedict has been portrayed with the Devil on each side of him, he piercing one of them through the head with the foot of his pastoral staff ; Saint Theodulus has been represented with the Devil at his feet having a great bell ; Saint Cyriacus has been depicted with the Devil or dragon under him, or chained near him ; Saint Wulstan has been pictured fixing his pastoral staff in Saint Edward's tomb, the Devil behind him with a hook ; Saint Dunstan has been por¬ trayed seizing the Devil by the nose with red-hot pincers; Saint Justina has been represented vanquishing the Devil by the cross ; Saint Euphrasia (410 not of 1534) has been depicted trampling on the Devil, or the Devil throwing her into a well ; Saint Dympna has been pictured leading the Devil bound; Saint Gertrude of Nivelles has been portrayed with two mice at her

feet and the Devil mocking at her side ; Saint Juliana has been represented as scourging the Devil, held by a rope round his neck, or holding the Devil in chains ; Saint Theodora (empress) has been pictured with the Devil taking hold of her hand; Saint Genevieve has been pictured with the Devil on her shoulder blowing out her lighted candle with a bellows.

Clement W. Coumbe.

DEVIL IS AN ASS, The, a comedy of Ben Jonson (1616), which sets about proving the thesis laid down in the title.

DEVIL-IN-THE-BUSH. See Nigella.

DEVIL OF EDMONTON, The. See

Merry Devil of EdiVIOnton.

DEVIL-FISH, huge rays of the family MantidcB, which have a lozenge-shaped disc broader than long, with the head free from the pectoral fins and provided with a pair of ante¬ rior processes and the tail long and whip-like. The two genera and six or seven species are confined to warm seas. So far as known the young are produced alive after the eggs have hatched within the oviduct. The best-known species are M. birostris, sometimes called the blanket-fish by tropical American pearl-fishers, from their belief that it attacks and devours men after enveloping them in its great wing¬ like pectoral fins, which reach a breadth of 20 feet. It is common in tropical American waters and occurs on both the Atlantic and Pacific coasts of the United States. The name also applies to the Octopus and allied eight-armed Cephalopoda.

DEVIL UPON TWO STICKS, The.

Foote's English adaptation of Le Sage's Hˆe Diable Boiteux.ˆ

DEVIL-WORSHIP, the worship paid to the devil as a malignant deity, or the personified

evil principle in nature, by many of the primitive tribes of Asia, Africa and America, under the assumption that the powers of evil are as mighty as the powers of good and have in con¬ sequence to be conciliated. There is a sect called Devil-worshippers, or Yezidees, inhabit¬ ing Turkish and Russian Armenia and the val¬ ley of the Tigris and numbering more than 200,000. They venerate the authority

of the Old Testament above that of either the New Testa¬ ment or the Koran. They practise both infant baptism and circumcision and have a religious ministry of four orders. Their Christian ideas have reached them through Gnosticism. They pay respect to the devil, to Christ and to Allah or the supreme being, and also worship the sun.

DEVILLE. See Sainte-Claire Deville.

DEVILLE, de-vel', Jean Achille, French antiquarian; b. Paris 1789; d. 1875. He was made director of the museum of Rouen and wrote several works on local history and archae¬ ology, including ˆHistoire du Chateau-Gaillardˆ (1829) ; ˆTombeaux de la Cathedrale de Rouenˆ (1838) ; ˆEssai sur I'Exil d'Ovideˆ (1859) ; and his monumental ˆHistoire de I'art de la verrerie dans I'antiquiteˆ (1874).

DE VILLIERS, de viffyerz, John Abra¬ ham Jacob, Anglo-Dutch geographer : b. Lon¬ don, 23 Sept. 1863. He is the son of a Hol¬ lander who settled at Prince Albert, Cape Colony. He was educated at the City of Lon¬ don College. He assisted at the Foreign Office as expert in Dutch in preparing evidence for the boundary arbitration with Venezuela in '1896-99; acted similarly in Dutch and Portuguese in the boundary arbitration with Brazil in 1901-04. He was engaged in researches for the For¬ eign Office in Lisbon 1901, at Berlin 1902, and at other places. In 1911 he lectured in Dutch throughout Holland. He is superintendent of the map room in the British Museum, is acting commercial attache at The Hague and honorary secretary of the Hakluyt Society. His publica¬ tions include ˆFamous Maps in the British Mu¬ seumˆ ; ˆHolland and' Some Jewsˆ ; ˆObjects of Jewish Interest in the British Museumˆ ; *ˆThe TransvaaP ; translations of Lepelletier's ˆMadame Sans-Geneˆ ; Gaulot's ˆChemises rougesˆ ; Bourget's ˆMensongesˆ ; Bire's nal d'un Bourgeois de Parisˆ ; Richard Schom-burgk's ˆReisen in Britisch Guiana,ˆ and other early works on Guiana. He is also author of various articles in the ˆEncyclopaedia Britan-nica.ˆ

DEVIL'S ADVOCATE. See Advocate.

DEVIL'S APRON, brown algae, of the order Laminariales, usually called kelp. See Alg-'E; Ph.eophyceˆ.

DEVIL'S BIBLE, The, the popular name of a manuscript Bible written on ass-skin. The name arose from a legend that the writing was the work of a man who, by the Devil's help, ac¬ complished it in a few hours in order to save his life, but who in return became the slave of the Evil One. After the Thirty Years' War it was taken to Stockholm.

DEVIL'S-BIT, the common name of a species of scabious (Scabiosa succisa), of the natural order Dipsacece. It has nearly globular heads of blue flowers, ovate leaves and a fleshy root, which is, as it were, cut or bitten off abruptly. In America devil's-bit is one of the

common names of Lacinaria spicata, which is known as dense button snakeroot, gay feather, backache-root, colic-root, *etc.* It belongs to the Coriipositce, and is found in moist soil from Massachusetts to Florida and westward to Wis¬ consin and Louisiana.

DEVIL'S BRIDGE, (1) an ancient bridge in Cardiganshire, Wales; it crosses the ravine through which flows the Mynach. (2) A bridge in Switzerland, crossing the Reuss, on the road over Saint Gothard, from Germany to Italy.

DEVIL'S CLAW, a stout split hook at the end of a hawser or chain, for manipulating the chain cable in mooring, *etc.* A firm grip is ob¬ tained by slipping one claw on each side of one link, so that the next link is held at right angles to it. A capstan serves to secure the hawser.

DEVIL'S CLUB. See Aralia.

DEVIL'S COA.CH-HORSE (Deyptis oleus), a common British and European beetle belonging to the family Staphylinidce. It has very much reduced wing-covers and like many of its relatives has the habit of curving its body upward, to adjust the wings under their covers.

DEVIL'S DARNING-NEEDLE. See

Dragon-fly.

DEVIL'S DYKE, (1) an earthwork in Cambridgeshire, England, of prehistoric con¬ struction, about 20 feet in height. It is sup¬ posed to have been erected as a defense against enemies advancing from the Fen country. It extended from the fens or marshes to the wooded hills and thus closed the only way of approach from the interior towns of

England, and prevented raids upon w'hatever band of conquerors held the country near the sea. (2) A natural formation near Brighton, England. The old legend said this was the work of the ®good spirits,® who thus prevented the devil's attempt to flood the country because the people had abandoned paganism.

DEVIL'S-FINGER, a name sometimes ap¬ plied to the starfish (q.v.).

DEVIL'S ISLAND (Isle du Diable), a small rock formation of¥ the coast of French Guiana, belonging to France. The area is about 16 square miles and the island itself is sandy, dry and torrid. Here Alfred Dreyfus was im¬ prisoned for alleged treason.

DEVIL'S LAKE. See Minnewaukon.

DEVIL'S PARLIAMENT, a nickname for an English parliament which met in 1459 at Coventry. The Parliament, under the control of Henry VI, at his instigation unjustifiably pro¬ scribed and attainted for treason the Duke of York and his adherents.

DEVIL'S PUNCH-BOWL, Ireland, a lake near the summit of Mangerton Mountain in the vicinity of the Lakes of Killarney. It is between 2,000 and 3,000 feet above the level of the sea, and is supposed to be the crater of an ancient volcano. It is about half a mile in length and one-third in breadth.

DEVIL'S RIDING HORSE. See Pirate Bug.

DEVIL'S SLIDE, Utah, a formation of the Wasatch Mountains, consisting of a natural arrangement of parallel crags resembling an inclined plane. The accidental juxtaposition of two such boulder masses is accounted for by

the simultaneous action of a cooling atmosphere on liquefied masses. Nearby is the railway station and village of Devil's Slide. Pop. 200.

DEVIL'S THOUGHTS, or DEVIL'S WALK, The, a doggerel of 14 stanzas written jointly by Coleridge and Southey in 1799 and republished in the former's ˆSibylline Leavesˆ (1817). It may also be found in Southey's poems with additional verses referring to Porson.

DEVIL'S TOWER, a huge shaft of columnar igneous rock on bank of Belle Fourche River, 25 miles northeast of Moor-croft, Wyo., visible from Chicago, Burlington and Quincy Railroad. It was made a United

States National monument 4 Oct. 1915. Greatly venerated by Sioux Indians as the ®Bad god's tower.® It is 600 feet high and rises from a platform 600 feet above the river; diameter at top 325 to 375 feet. The columns are an ex¬ ceptionally fine example of prismatic struc¬ ture which some igneous rocks assume in cool¬ ing, notably Palisades of Hudson and Giants Causeway. Described by Newton, Jaggar, and Darton, in reports of United States Geological Survey.

DEVIL'S WALL, an ancient fortification in the southern part of Germany, about 368 miles long. This wall was originally a Roman ditch, with palisades behind it. It was intended 1o protect the Roman settlements on the left bank of the Danube, and on the right bank of the Rhine, against the inroads of the Teutonic and other tribes. Remains of it are found at present only from Abensberg, in Bavaria, to Cologne. As to the time when this rampart was built our information is very scanty. Some parts of the northern Roman fortifications may be as old as the time of Drusus. The Decumat or Tithe Lands, however; that is, the lands to the east of the Rhine and north of the Dan¬ ube, which the Roman emperors allowed immi¬ grants to settle on, on condition of paying tithes to the state, do not appear to have had any protecting wall about 14 b.c. The main rampart, stretching southward from the Main to the Danube, was probably completed under Hadrian, and parts of it which had been destroyed seem to have been restored by Probus. All the parts of this great rampart are still far from being thoroughly investigated.

DEVINE, Edward Thomas, American social worker : b. Union, Hardin County. Iowa, 6 May 1867. _ He was graduated at Cornell Col¬ lege,ˆ Iowa, in 1887. He was for some years a principal of schools in Iowa; in 1891-96 he was staff lecturer on economics for the Ameri¬ can Society for the Extension of University Teaching; and was secretary of the Society in 1894-96, when he was appointed general secretary of the Charity Organization Society of New York. He was editor (from 1897 to 1913) of Charitii's, a paper later published as Charities and the Commons, and after 1909, as the Sur¬ vey. In 1905 he was called to the chair of social economy ini Columbia University. Hf' was directorˆ of the New York School of Philan¬ thropy in 1904-07 and again after 1912. He was president of the National Conference of Charities and Corrections in 1906. and as special representative of the American Red Cross had charge of relief at San Francisco after the

fire and earthquake in April 1906, He was in charge of storm and flood relief in Dayton, Ohio, in 1913. He has been connected with various congresses and organizations interested in social betterment. His published works in¬ clude ˆ Economicsˆ (1898) ; ˆThe Practice of Charity> (1901; new ed., 1904); ˆThe Prin¬ ciples of Reliefˆ (1904); ˆEfficiency and Re¬ liefs (1906); ˆMisery and Its Causesˆ (1909); ˆReport on the Desirability of Establishing an Employment Bureau in the City of New Yorkˆ (1909); ˆSocial Forces> (1909); <The Spirit of Social Workˆ (1909) ; ˆThe Family and Social Workˆ (1912) ; ˆThe Normal Lifeˆ

(1915).

DEVINS, John Bancroft, American clergy¬ man and editor; b. Brooklyn, N, Y,, 1856; d. 1911. He was graduated from New York Uni¬ versity in 1882, and was on the staff of the New York Tribune from 1880 to 1888. In the latter year he was ordained to the Presbyterian minis¬ try and thereafter until 1905 held various pas¬ torates in New York city. From 1890 until 1911 he was managing editor of the New York Observer. He organized the Federation of East Side Workers and the New York Employ¬ ment Society. He was a collaborator in the ˆLife of Dwight L. Moodyˆ and published ˆThe Church and the City Problemˆ (1905) ; ˆAn Observer in the Philippinesˆ (1905) ; ˆOn the Way to Hwai Yuenˆ (1905) ; ˆThe Classic Mediterraneanˆ (1910), and several hymns.

DEVISE, d?-vlz', a gift of real property by a person's last will and testament. The term de¬ vise technically and properly only applies to real estate; the object of the devise must therefore be that kind of property. The word, however, is sometimes improperly applied to a bequest or legacy. In regard to a lapsed devise, where the devisee dies during the life of the testator, al¬ though there may be a residuary devisee, the estate will go to the heir. But if the devise be void, as where the devisee is dead at the date of the will, or is made upon a condition pre¬ cedent which never happens, the estate will go to the residuary devisee, if the language is suf¬ ficiently comprehensive (4 Kent Com., 541, 542, and cases cited in notes). But some of the cases

hold in that case, even, the estate goes to the heir (4 Ired. Eq., N. C., 320; 6 Conn., 292). In England a residuary bequest operates upon all the personal estate which the testator is pos¬ sessed of at the time of his death, and will include such as would have gone to pay specific legacies which lapse or are void. A general de¬ vise of lands will pass a reversion in fee, even though the testator had other lands which will satisfy the words of the devise, and although it be very improbable that he had such reversion in mind. A general devise will pass leases for years, if the testator have no other real estate upon which the will may operate ; but if he have both lands in fee and lands for years, a devise of all his lands and tenements will commonly pass only the lands in fee simple. But if a con¬ trary intention appear from the will, it will pre¬ vail. A devise in a will can never be regarded as the execution of a power, unless that inten¬ tion is clear, as where otherwise the will would have nothing on which it could operate. But to have that operation the devise need not nec¬ essarily refer to the power in express terms. But where there is an interest on which it can

operate, it shall be referred to that, unless some other intention is obvious. The devise of all one's lands will not generally carry the interest of a mortgagee in premises, unless that intent is apparent. Devises are contingent or vested after the death of the testator; contingent, when the vesting of any estate in the devisee is made to depend upon some future event, in which case if the event never occur, or until it does occur, no estate vests under the devise. But when the future event is referred to merely to determine the time at which the devisee shall come into the use of the estate, this does not hinder the vesting of the estate at the death of the testator.

DEVIZES, England, a municipal borough in the county of Wilts, 86 miles west of London. It is the seat of a large corn market, and has cheese and bacon factories. The chief manu¬ factures are steam-engines, boilers, gas-engines and beer. Pop. 6,739.

DEVON, a river of Scotland, which has its source at the foot of the Ochill Hills, and flows into the Forth about two miles above Alloa. Its length is 34 miles. Below the Crook of Devon are a series of cascades, the most noted of which are the Caldron Linn and those at the Rumbling Bridge.

DEVONIAN. The name Devonian appeared in geological literature in 1839, when Murchi¬ son and Sedgwick applied it to a rock system in Devonshire and Cornwall, England, con¬ sisting of conglomerates,

shales and fossilifer-ous limestones lying below the Carboniferous rocks and above the great mass of the gray-wacke or transitional series of Werner, that was already included in the Cambrian or Silu¬ rian. Murchison and Sedgwick also included in the Devonian the Old Red Sandstone of Scotland. The Devonian Period is that part of Paleozoic time following Silurian and preced¬ ing Carboniferous. At the beginning of the period, the seas were greatly restricted in North America, much as they were in the late Silurian (q.v.). Embayments existed on the present site of the Appalachians, and perhaps some¬ what farther west. An arm of the Pacific also covered part of the Great Basin and other smaller embayments probably covered various areas. For the most part, however, the United States was land. By the middle of the period another great interior sea had encroached over a large part of central North America. Europe was also largely submerged in mid-Devonian. In Scotland and Wales were landlocked seas or lakes, and there were others in western Russia. A large part of central South America was covered by water. Fossil evidence indicates that in early Devonian there were land connections between North and South America and between South America and South Africa. Volcanic activity was extensive in western Europe, in New England and probably in California. Some folding took place in northeastern North America, probably near the middle of the period. The rocks of the Devonian System in North America have been variously subdivided. H. F. Cleland (1916) gives the following as the New York type section, beginning with the lowest formations : Helderberg limestone, Oriskany sandstone, Onondaga limestone, Marcellus shale, Hamilton shale, Tully limestone, Genesee shale. Portage shale and sandstone, Catskill and

DEVONPORT

Chemung sandstones. Where the line between the Silurian and Devonian systems should be drawn in North America is still a matter of dispute, the lower Helderberg formation being variously assigned to the Silurian and to the Devonian. In eastern United States Devonian rocks outcrop extensively in New York and south¬ ward throughout the Appalachian Mountains and plateaus. In the central Mississippi Valley Devonian is present but very thin. In Manitoba and the Northwest Territory, Canada, the Devo¬ nian System includes limestones and shales and is of moderate thickness. There is an area of Devonian rocks extending along the Rocky Mountains from Montana across Alberta. In the United States the Devonian rocks of the Rocky Mountains appear in Colorado and Arizona.

In _ England and on the Continent the Devonian System presents two different classes of rocks: (1) the Old Red Sandstone, occurring in Scotland, in South Wales and across the Welsh border in England, also in the Baltic provinces of Russia and in Spitzbergen ; (2) the marine Devonian, occurring in southwest Eng¬ land, in northern and southern France, in Spain and over large areas in Germany and central Russia. The Old Red Sandstone was laid down perhaps in shallow seas either closed or having only slight connection with the open ocean — perhaps in part on land in desert areas. The formation is of interest from its containing remains of Devonian land animals and plants. The rocks are fine-grained conglomerates, sand¬ stones and shales. The marine Devonian of Europe is largely limestone, with some shales and slates.

Devonian rocks in Asia are found over a vast area in Siberia and also occur in China and in Asia Minor. In Africa they are found both in the northern and southern parts of the conti¬ nent. In South America Devonian rocks form a great system, being found in Brazil, Bolivia and the Falkland Islands.

The vegetable and animal life of Devonian time, so far as can be determined, did not differ greatly from Silurian forms, though it shows a general advance toward more highly developed types. The land vegetation included crypto¬ gams and gymnosperms. Of the cryptogams the tree-ferns and the giant club-mosses (Lepidodendra) must have been conspicuous in the forests, being over 50 feet high. Of the gymnosperms, cycads, now almost extinct, were abundant, and it

is possible that conifers of the yew family grew upon the higher ground.

Of animal life the trilobites, so abundant in Cambrian and Silurian time, were less im¬ portant, but other crustaceans developed greatly, including the eurypterids, related to the horse¬ shoe crabs. Corals were very abundant in the Devonian oceans. Crinoids, or sea-lilies, and starfish were more abundant than in Silurian time. The brachiopods, or lamp shells, appar¬ ently were, as in Silurian, the most abundant elements of marine life. Of mollusks there were bivalves and gastropods ; the ammonites appeared among the cephalopods and nautilus¬ like forms were less abundant than in the Silurian. The chief characteristic of Devonian time, however, was the great development of the fishes, the Devonian being known as the ^^age of fishes.® Many of the Devonian forms.

however, have long been extinct, while the teleosts, or bony fishes, which include by far the greater part of modern fishes, evidently did not exist at all in Devonian time. Among the old Devonian forms were the ostracodermata, fish¬ like animals allied to the lampreys, but having the head and sometimes a large part of the body covered with bony plates. Of the true fishes the selachians, or sharks, were repre¬ sented, as were the dipnoi or lung fishes, now almost extinct. The most highly developed Devonian fishes were the ganoids, now repre¬ sented by the sturgeon and the gar-pike. (See Catskill Group; Chemung Stage; Carbon¬ iferous Stage; Hamilton Stage; Marcellus Stage; Portage Stage; Old Red Sandstone; Oriskany Stage). Consult Clarke, Early De¬ vonian History of New York and Eastern North America,^ in New York State Museum, Me¬ moir 9 (2 parts, Albany 1908-09) ; Chamberlain and Salisbury, ^Geology^ (Vol. II, New York 1907) ; Dana, ^Manual of Geology^ (4th ed., ib. 1896) ; (4eikie, Archibald, ^TextBook of Geology^ (London 1903) ; Leconte, '^Elements of Geology^ ; Williams, ®The Devonian and Car¬ boniferous,® in ^Bulletin 80,^ United States Geological Survey (Washington 1891) ; ^^Devonian,® in ^Maryland Geological Survey Reports^ (3 vols., Baltimore 1913) ; Zittel, K. A. von, ^History of Geology and Paleontology^ (Munich

1899).

C. L. Dake.

DEVONPORT (before 1824 called PLYMOUTH DOCK), England, a parlia¬ mentary borough, maritime town and naval arsenal, in the southwest of Devonshire. It forms one of the Three Towns of Plymouth, Stonehouse and Devonport. It owes its exist¬ ence to the dockyard established here by William III in 1698, which is now one of the chief naval arsenals in Great Britain, largely extended so recently as 1907, and now covering an area of 240 acres. There is an important naval engineering college. Trade centres al¬ most entirely in the dockyard and its subsidiary industries. The borough returns two members to Parliament. Pop. 81,678.

DEVONS, the name given to a breed of cattle which were first bred in Devonshire, Eng¬ land. They are rather wild, of a dark-red color, and can be used instead of horses for plow¬ ing. They are smaller than Shorthorns or Herefords. The bull has a small head, fine muzzle and face, very handsome horns, which should taper upward and rather backward ; the eye is large and rather wild, indicating an active disposition ; the neck is arched, but the dewlap is not much developed ; tail set on rather high ; good barrel well up behind the shoulder ; not the depth of carcass in the same height as is found in the Shorthorns ; skin of a dark-red and rather mottled character, and plenty of long curling hair; the skin is thicker than that of Shorthorns, but not so thick as that of Here¬ fords. They furnish a good deal of inside fat and firm meat, and the cows yield very rich milk from which the famed Devonshire clotted cream is made. They are hardy, and able to find food on poor uplands. See Cattle.

DEVONSHIRE, Spencer Compton Cav¬ endish, 8th Duke of, English statesman : b. 23 July 1833; d. Cannes, France, 24 March 1908. He succeeded to the ducal title in 1891, having

DEVONIAN FOSSILS

1 A Brachiopod (Athyris concentrica) ; interior

of dorsal valve, showing spiralia

2 An Ammonite (Goniatites intumescens) ; a

lateral view

3 Hulls of fossil Entomostracans (Cyprididae)

in a slab of schist

4 Shells of the same (Cypridina serratostriata)

5 An Armored Fish (Pterichthys cornu ta)

6 A Trilobite (Phacops latifrons), shown in a

and b rolled uo

7 A Gasteropod Mollusc (Murchisonia bi—

granulosa)

8 A Great Armored Fish (Cephalaspis lyelli) ;

restored

9 The Berry-bone Fish (Coccosteus deci—

piens) ; restored

10 A Gasteropod Mollusc (Macrocheilus subcostatus)

previously become well known by his courtesy title of the Marquis of Hartington. First re¬ turned to the House of Commons in 1857, he was appointed UnderSecretary for War in 1863, and Secretary of State for War in 1866. In the course of the American Civil War, he visited the United States, and had interviews with both Jefferson Davis and Abraham Lincoln, the latter of whom predicted his rise to eminence. He was Postmaster-General under Gladstone 1868-70, and Chief Secretary for Ireland 1870-74. After Mr. Gladstone's retirement from the Lib¬ eral leadership in 1875, he acted as chief of the opposition, again giving place to his old leader after the Liberal triumph of 1880. He was Secretary for India 1880-ˆ2, and became Secretary of State for War 1882-85. After 1886 he was an active and influential leader of the Liberal Unionists, and under a Unionist minis¬ try was Lord President of the Council 1895-1903, retiring when the Tariff Reform issue was raised by Chamberlain, and devoting himself thenceforth to a defense of free trade policy. He was chancellor of Cambridge University, 1892-1908. Devonshire held a unique place in British public life. He was not brilliant or witty; he was no orator; he was perfectly in¬ different to applause ; his ˆˆyou-be-damnedness® was proverbial ; but his high sense of duty, his transparent candor and sincerity, his plain, practical common sense, and the singular im¬ partiality with which he approached public ques¬ tions, drew to him that great body of moderate opinion which is so powerful in England. Thrice he refused the premiership ; he had no ambitions for himself ; and his opposition to both Home Rule and Tariff Reform did much to harden public opinion against these measures.

DEVONSHIRE, the third largest county in England, situated in the southwest. It is fa¬ mous for its Old Red Sandstone (see Devo¬ nian). This county contains the barren tract of Dartmoor and also the valley of the Exe, called ®The Garden of Devonshire.^^ Area, 1,671,364 acres. Three-fourths of the county is arable land or in pasture ; the coast is rugged and precipitous ; the climate mild and salubrious. It is celebrated for its orchards and dairy farms. The mineral wealth includes lead, copper, tin, iron, slate, marble, granite and limestone. Lace, coarse woolens and linens are among the manufactures. The fisheries are im¬ portant and valuable. For parliamentary pur¬ poses, the county is divided into eight divisions, each returning one member. The principal towns are Exeter (the capital), Plymouth and Barnstaple. Pop. 699,703.

DEVONSHIRE CLUB, a Liberal club, founded on Saint James's street, London, in

1875.

DEVONSHIRE HOUSE, the London residence of the dukes of Devonshire, situated in Piccadilly, near Berkeley Square. It contains the ^^Kemble Collection of Plays,® including the first editions of Shakespeare, also priceless collections of gems, portraits, *etc.*

DE VRIENDT, de vrenF, Frans (also known as Floris, F.), Flemish painter of the Renaissance: b. Antwerp, about 1517; d. 1570. His father was a stonecutter and Frans at first studied sculpture and later painting under Lam¬ bert Lombard at Liege. He paid a visit to

Rome in order to study the works of Michel¬ angelo and Raphael. In 1540 he returned to Antwerp, opened a school and is reputed to have there instructed 120 pupils. He was suc¬ cessful in obtaining the patronage of William of Orange and others of the nobility. He deco¬ rated the homes of many of the first citizens of Antwerp and in 1549 and 1556 had charge of the decorations for the reception of Philip II. The best of his portraits is ^The Falconer,^ in the museum of Brunswick. Other pictures characteristic of his mannered style are ^The Last Judgment,^ in the Brussels Museum; ^Lot and his Daughters,^ in the Dresden Gallery; and ^The Fall of the Rebellious Angels,^ in the Antwerp Museum.

DEVRIENT, d?-vryan', Gustav Emil, Ger¬ man actor : b. Dresden, 4

Sept. 1803 ; d. there, 7 Aug. 1872. He was a nephew of Ludwig Devrient (q.v.), and brother of Philipp Eduard Devrient (q.v.). He began his career by engag¬ ing in a manufacturing business, but soon fol¬ lowed the family penchant for the theatre, mak¬ ing a successful debut as Raoul in Schiller's ˆJungfrau von Orleansˆ at Brunswick in, 1821. In 1825 he married the popular actress, Dorothea Bohler, in Leipzig. He played prominent roles in Magdeburg and Hamburg, and in 1831 estab¬ lished that connection with the Court Theatre of Dresden which lasted for the rest of his life. In his role of Hamlet he had no peers, and was considered by his contemporaries as fine an artist as Kean. Posa, Tasso and Uriel Acosta were among the roles in which he scored the greatest success.

DEVRIENT, Ludwig, German actor, first of the noted actor-family of this name : b. Ber¬ lin, 15 Dec. 1784; d.ˆ there, 30 Dec. 1832. He engaged in commerce at the advice of his father, but in 1804 joined a traveling dramatic company. His debut was made in Schiller's ˆBraut von Messinaˆ at Gera. He was engaged at Dessau in 1805 and in 1809 went to Breslau. In 1815, for the first time he appeared in Berlin as Franz Moor in Schiller's ˆRauber.ˆ His best roles were as Talbot, Schewa, Lorenz Kindlein, Shylock, Lear, Richard III and Mercutio. He was remarkable for his originality and inter¬ preted both humorous and tragic parts with equal skill, having a natural aptitude and deft¬ ness. His fondness for society led to dissipation and a consequent early death. Consult Funck, ˆAus dem Leben Zweier Schauspieler, Ifflands und Devrientsˆ (Leipzig 1838).

DEVRIENT, Otto, German actor and dramatist, son of Philipp Eduard Devrient (q.v.) : b. Berlin, 3 Oct. 1838; d. 23 June 1894. In 1856 he made his debut at Karlsruhe, was subsequently engaged in Stuttgart, Berlin and Leipzig; returned to Karlsruhe in 1863, where he remained for 10 years. In 1873 he became the manager of a theatre in Weimar, and sub¬ sequently held similar positions at Mannheim and Frankfort. He removed to Jena in 1879 and there produced his ˆLutherˆ in 1883. In 1884 he was made director of the Court Theatre in Oldenburg and in 1889 was appointed to a similar post in Berlin, from which he retired the following year. He wrote several dramas, including ˆZwei Konigeˆ (1867) ; ˆTiberius Gracchus> (1871) and ˆKaiser Rotbartˆ (1873). Other works of his are ˆZwei Shakespeare-

Vortrageˆ (1869), and an edition of letters of Iffland and Schroder (1881).

DEVRIENT, Philipp Eduard, German actor and dramatist, brother of Gustav Emil Devrient (q.v.) : b. 1801 ; d. 1877. He made his debut as an opera singer in Berlin in 1819, but in 1835 turned his attention to the drama and for a time was manager of the Dresden Theatre. From 1852 to 1870 he was director of the Karls¬ ruhe Theatre. His writings include the libretto for the opera ˆHans Heilingˆ (1827) ; the plays, ˆDas graue Mannlein,ˆ ˆDie Gunst des Augen-blicks' (1833) ; ˆDje Verirrungenˆ (1837) and ˆTreue Liebeˆ (1841); and also a number* of works on dramatic history and criticism of which the best known is ˆGeschichte der deutschen Schauspielkunstˆ (1848-74).

DE VRIES, de-vresˆ David Pieterszen,

Dutch colonist in America. Nothing definite is known as to the dates of his birth and death. He was a member of a company organized in

1630 to settle the tract of land in the present State of Delaware, which had been bought in 1629 from the Dutch West India Company by Samuel Blommaert and Samuel Godyn. On his arrival 1632 he found that the colony founded

1631 on Lewes Creek, Cape Henlopen, and called with the surrounding country ®Swaanen-dael,ˆˆ had been completely destroyed by the Indians. He left some of his party there and visited Virginia, but took the colonists back to Holland in 1634. Later he visited Manhattan several times and tri'ed to found a colony on Staten Island, which the Indians destroyed in 1640. He also lived on a plantation called Vriessendael, on the site of Tappan, N. Y. He published ˆKorte historiaal ende Journaels Aenteyckeninge van verscheyden Voyagien in der Vier Teelen des Wereldts Rondeˆ (ˆA short history and notes of a journal kept dur¬ ing several voyages in the four parts of the world,ˆ 1655). Parts of it have been translated and may be found in ˆCollections of the New York Historical Societyˆ (Vols. I and H, second series).

DE VRIES, Hugo, Dutch botanist : b. Haarlem 1848. He received his education at Leyden, Heidelberg and Wurzburg. In 1871 he began his lifelong connection with the Uni¬ versity of Amsterdam, first as lecturer and then as professor of botany. His research had bear¬ ing

on the development of the theory of mutation and the results of his study were the most sig¬ nificant addition to the principle of organic evolution since the enunciation of the theory of natural selection. De Vries has been emi¬ nently successful in changing the method of studying evolution from observation to experi¬ mental work, and, in all probability, herein lies his great contribution to modern science. His publications include Hntracellular Pangenesisˆ (1889) ; ˆDie Mutationstheorieˆ (1903) ; ˆPlant Breedingˆ (Chicago 1907).

DE VRIES, Marion, American lawyer; b. near Woodbridge, San Joaquin County, Cal., 15 Aug. 1865. He was graduated from the San Joaquin Valley College in 1886 and from the law school of the University of Michigan in 1888. He practised law at Stockton, (Sal., 1889-1900; was assistant district attorney of San Joaquin County in 1893-97, and was ad¬ mitted to practice before the Supreme Court

of the United States in 1897. From 1897-190C he was a member of the United States House of Representatives. He became a member of the United States Board of General Appraisers, New York, 1900, and president from 1906-10. He resigned then, to accept the appointment of associate judge of the United States Court of Customs Appeals.

DEW, Thomas Roderick, American publi¬ cist : b. King and Queen County, Va., 5 Dec. 1802; d. Paris, France, 6 Aug. 1846. He was graduated from William and Mary College, and in 1827 was elected professor of political economy, history and metaphysics ; and in 1836 was made president of that institution. In 1829 he published his ˆLectures on the Restric¬ tive System. > It was brought out at a moment when feeling ran high on the subject of the tariff, between protectionists and free-traders ; and though emanating from the closet of a thinker removed from the agitations of political warfare, took a strong hold on the public mind, and the subsequent adoption of the compromise of 1832 may be attributed in part to its silent influence. His ˆ Essay in Favor of Slaveryˆ did much to decide Virginia's attitude. His most elaborate work was ˆA Digest of the Laws, Customs, Manners and Institutions of the Ancient and Modern Nationsˆ (1853).

DEW, a deposition of moisture after sun¬ down upon the surface of the earth. Three concurrent sources of dew are recognized: (1) the condensation of the moisture of the atmos¬ phere; (2) the condensation of watery vapor arising from the earth; and (3) the moisture exhaled by plants. Regarding the first of these sources, it is a well-known fact that warm air has a larger capacity for moisture than

cooler air. Given a certain degree of humidity the falling of the temperature of the air after sun¬ down will so reduce its absorptive capacity for the moisture that some of it will be condensed on objects colder than itself. Secondly, humid vapor rising warm from the warm soil comes in contact with the cooling strata of the at¬ mosphere already depositing moisture and gives up its superabundance. In the third place, the grass, flowers and foliage which, under the action of plant life in sunlight have been evapo¬ rating into the atmosphere the water absorbed by the roots to liquefy the sap so that it may be raised to the growing parts of the plant, continue this process until a balance is obtained between the temperatures at the roots and at the tips of the leaves. In some kinds of trees this exhalation of moisture is very large and the dew thus formed may be heard dripping from the trees all night long. Most of the large, sparkling dewdrops seen on herbage in the early morning is this third form of dew. When the temperature of the lower air strata drops to 32° F., the dew is deposited as hoarfrost. When the sky is clouded the heat abstracted from the earth's .surface by radiation is returned by the clouds, which, be¬ ing good radiators, transmit an equal amount of heat to what they receive; and a balance of temperature being thus maintained between the earth and the surrounding atmosphere, no dew is formed. The deposition of dew is likewise prevented by wind, which carries away the air before the vapor has been condensed. Horizontal surfaces, and those which are ex-DEWALQUE*

posed to a wide expanse of sky, receive a greater supply of dew than sheltered or oblique sur¬ faces, where circumstances diminish the amount of radiation.

An acquaintance with the cause which pro¬ duces dew and hoarfrost enables us to under¬ stand the rationale of the process resorted to by gardeners to protect tender plants from cold, which consists simply in spreading over them a thin mat or some flimsy substance. To ensure the full advantage of this kind of protection from the chill of the air, the coverings should not touch the bodies they are intended to defend.

The heavy dewsˆ which form in tropical regions are in the highest degree beneficial to vegetation, which, but for this supply of mois¬ ture, would, in countries where scarcely any rain falls for months, be soon scorched and withered. But after the high temperature of the day the ground radiates under these clear skies with great rapidity, the surface is quickly cooled, and the watery vapor, which, from the great daily evaporation, exists in large quanti¬ ties in the atmosphere, is deposited abundantly. This deposition is more plentiful also on plants, from their greater radiating power; while on hard, bare ground and

stones, it is comparatively trifling. In cold climates the clouds, which are so common in damp and chilly regions, pre¬ vent the radiation of heat : the surface is thus preserved warm, and the deposition of dew is, in a great measure, prevented. Consult Martin, E. A., ˆDew Pondsˆ (London n.d.).

DEWALQUE, d?-valk', Gilles Joseph Gustav, Belgian geologist : b. Stavelot 1826 ; d. 1905. In 1855 he was made curator of the mineralogical and geological cabinet at the Uni¬ versity of Liege, and became professor there of mineralogy, geology and palaeontology in 1857. In 1870 he became president of the Belgian Academy. He wrote ˆDescription du Lias dans le Luxembourgˆ (1857) ; ˆ Atlas de Cristallographieˆ (1860) ; ˆProdrome d'une Description geologique de la Belgiqueˆ (2d ed., 1880) ; and numerous contributions to scientific periodicals.

DEWAR, Sir James, British chemist; b. Kincardine-on-Forth, Scotland, 1842. He was educated at Edinburgh University and became assistant to Lord Playfair who at that time was professor of chemistry there. He was afterw'ard Jacksonian professor of experi¬ mental philosophy at Cambridge and Fullerian professor of chemistry in the Royal Institution. He was made president of the Chemical So¬ ciety in 1897 and of the British Association in 1902. He was knighted in 1904. He has done extensive research work in regard to the physiological action of light and the liquefaction of gases and in the study of low temperatures. By evaporating liquid hydrogen under reduced atmospheric pressure he obtained the lowest

temperature yet reached (470° F. of frost).

Other inventions consummated by Dewar are cordite (with Sir Frederick Abel), a smokeless powder; and vacuum containers for keeping foods at any desirable temperature, to which the name thermos bottles has been given.

DEWART, Edward Hartley, Canadian

clergˆ'man and editor; b. County Cavan, Ire¬ land, 1828; d. Toronto, Ontario, 1903. His

parents emigrated to Canada in 1834, settling

in Ontario. Fie received his education at the Normal School, Toronto, and in 1855 be¬ came a Wesleyan Methodist minister. He afterward held a number of pastorates and be¬ came editor of the Christian Guardian, the principal Methodist publication in Canada, and held this position until 1894. He was forceful as an editor, was not narrowly orthodox, al¬ though he took some flings at the higher critics. He was a great factor in bringing together the various Methodist denominations of Canada (Wesleyan Methodist, Methodist Episcopal, New Connexion, Bible Christian and Primitive Methodist), the first meeting of the delegates being held in his home. In 1883 the union of the churches was brought about, but not on the platform suggested by Dewart. Nevertheless, he bent his best energies toward making it effective. He was successful in bringing about the federa¬ tion of Victoria University with the provincial University of Toronto. He was liberal in politics and by his independent action in these matters often excited strong prejudice among his re¬ ligious followers. He was a delegate to the Ecumenical Methodist conferences of 1881 in London and of 1891 in Washington. He aided in editing and compiling a new hymnbook for the Methodist Church. He published ˆSelec¬ tions from the Canadian Poetsˆ (1864) ; ˆSongs of Lifeˆ (1869) ; Uˆsus the Messiahˆ (1892) ; ˆEssays for the Timesˆ (1898) ; ˆOutlines of Christian Doctrineˆ (1899).

DEWAS, da-was', India, two native states in the Malwa Political Charge of central India, founded in the first half of the 18th century by two brothers, Punwar Mahrattas, who came into Malwa with the peshwa, Baji Rao, in 1728. Their descendants are known as the senior and junior branches of the family, and since 1841 each has ruled his own portion as a separate state, though the lands belonging to each are so intimately entangled that even in Dewas, the capital town, the two sides of the main street are under different administrations and have different arrangements for water supply and lighting. The senior branch has an area of 446 square miles and a population of 62,312, while the area of the junior branch is 440 square miles, and its population 54,904. Grain, opium, sugarcane and cotton are the chief pro¬ ducts. Dewas, the capital, is the residence of both chiefs, and near it, ' on a conical hill, is a temple. Its population is about 15,100.

DEWBERRY, Ruhus villosus, or Rubus canadensis, a trailing plant of the natural order Rosacece. Its prickly stems, leaves and fruit resemble the blackberry. During the last quar¬ ter of the 19th century it became popular as a cultivated fruit, principally through the in¬ troduction of its variety, the Lucretia, which is superior to the wild forms common as weeds on wornout pastures and poor land. The plants, which are propagated by means of stem-tips, do best on a rather lighter soil than

the blackberry, like which, with the exception of training, it is cultivated and fertilized. They are usually trained to stakes or trellises and not given summer pruning, except in the removal of canes as soon as they are fruited. The usual distances for planting are three or four feet by six. The fruits ripen considerably in advance of the blackberries. See Blackberry; Raspberry; Rubus.

DEWDNEY, Edgar, Canadian statesman : b. Devonshire, England, 1835. He studied civil engineering, and on removing to Canada was employed to lay out the town of New West¬ minster. He was elected to the legislature of British Columbia in 1869 and to the Dominion Parliament in 1872. In 1879 he was appointed Indian Commissioner and in 1881 Lieutenant-Governor of the Northwest Territory, holding the two offices until 1888, when he became Minister of the Interior. From 1892-97 he was Lieutenant-Governor of British Columbia.

D'EWES, duz. Sir Simonds, British chron¬ icler and antiquarian : b. Coxden, Dorsetshire, 18 Dec. 1602 ; d. 1650. He was educated by private tutors, early embraced Puritan theology from John Dickinson and in 1618 entered Saint John's College, Cambridge. In 1620 he was removed by his father to the Inner Temple and was called to the bar in 1623. He aban¬ doned the law in 1626 and was knighted in the same year. Having married a rich heiress he now had leisure to devote himself to anti¬ quarian studies which he pursued zealously even while serving as member for Sudbury in the Long Parliament. He was expelled in 1648. He collected a great number of manuscripts and made transcripts from monastic and other records ; these transcripts now form part of the Harleian collection in the British Museum. D'Ewes's greatest work is his ˆJournal of All the Parliaments of the Reign of Queen Eliza¬ bethˆ (1629; edited and published for the first time by his nephew, Paul Bower, London 1682). It was incorporated by Cobbett in his ˆParlia¬ mentary History.ˆ Consult Jessopp in the ˆDictionary of National Biographyˆ (Vol. XIV, London 1888) and Halliwell-Phillips's edition of the ˆAutobiography and Correspondence of Sir Simonds D'Ewes during the Reign of James I and Charles P

(London 1845),

DE WET, da-vet', Christiaan, Boer gen¬ eral : b. Leeuwkop, Orange Free State (now Orange Free State Province), 7 Oct. 1854. He was bred a farmer, made a small fortune and became, in 1897, a member of the Volksraad. Though practically without military experience, he served ably in the Boer-British War of 1899-1902, attaining the rank of general and outwitting the pursuit of Kitchener and Roberts in the summer of 1900, and of the former in the early part of 1901. His surprise of the British at Sauna's Post was highly praised by military experts. With the other Boer generals he visited England after the conclusion of the war. His ˆThree years of Warˆ was published in 1902. In 1907 he became a member of the first Parliament of the Orange River Colony, and Minister of Agriculture. Taking advantage of the Great European War, he led an insur¬ rection in October 1914, which, however, was promptly quelled ; on 2 December he surren¬ dered to General Botha, was condemned to six years' imprisonment and fined £2,000, but clem¬ ency was exercised and he was released.

DE WETTE, vet'te, Wilhelm Martin Leberecht, German theologian ; b. Ulla, near Weimar, January 1780; d. Basel, Switzerland, 16 June 1849. In 1807 he became professor of the¬ ology at Heidelberg, and in 1810 he was called to be the colleague of Schleiermacher at Berlin. In 1822 he accepted the chair of theology at Basel, where he remained till his death. The

influence of De Wette's views upon the theolog¬ ical tendencies of his time was most important. He was a member of the council of education at the Grand Council of Basel, and in 1849 be¬ came rector at that university. He was remark¬ able for his critical acuteness and for his pow¬ ers of concise and clear exposition. His works are very numerous. Among them are ˆBeitrage zur Einleitung in das Alte Testamentˆ (1806-07) ; ˆLehrbuch der historischkritischen Ein¬ leitung in die kanonischen und apokryphischen Bucher des Alten Testamentsˆ (1817) ; ˆEin¬ leitung in das Neue Testamentˆ (1826) ; ˆLehrbuch der hebraisch-jiidischen Archaologieˆ (1814) ; HCurzgefasstes exegetisches Handbuch zum Neuen Testamentˆ (1836-48). These works are all more or less of a critical nature ; in the following he developed his own theologi¬ cal views : ˆLehrbuch der christlichen Dogmatikˆ (1813-16) ; ˆChristliche Sittenlehre> (1819) ; and the didactic novel, ˆTheodor oder des Zweiflers Weiheˆ (ˆTheodore, or the Consecration of the Skeptic,ˆ 1822). He translated the entire Bible into German in cooperation with J. C. W. Augusti. He edited the correspondence of

Luther (Berlin 1825-28). Consult Cheyne, ˆFounders of Old Testament Criticismˆ (Lon¬ don 1894).

DEWEY, Charles Melville, American painter; b. Lowville, N. Y., 16 July 1849. From his 12th to his 17th year he suffered from hip disease, an experience which tinged his later paintings with a rare poetic melancholy. He studied in the National Academy of Design, New York, 1874—76, and in Paris under Carolus-Duran, 1876-77. In 1878 he returned to New York. He has specialized in landscapes, both in oil and water color. He is represented in many public and private collections in the United States. Among his works dealing mostly with morning and evening subjects, are Hndian Summerˆ (1904) ; ˆA November Eveningˆ (1904); ˆMorning, Bay of Saint Ivesˆ (1905); ˆThe Edge of the Forest,ˆ in the Corcoran Gal¬ lery, Washington; ˆThe Harvest Moon,ˆ and ˆThe Close of Day,ˆ in the National Gallery, Washington; ˆThe Gray Robe of Twilight,ˆ in the Buffalo Gallery; and ˆOld Friendsˆ in the Pennsylvania Academy, Philadelphia. In 1907 he became a National Academician.

DEWEY, Davis Rich, American political economist and statistician : b. Burlington, Vt., 7 April 1858. He is a brother of John Dewey (q.v.). He M'ˆas educated at the University of Vermont and at Johns Hopkins University. He is professor of economics and statistics in the Massachusetts Institute of Technology, trustee of Massachusetts Agricultural College and managing editor of the American Economic Review. His works are ˆSyllabqs of Political History since 1815U ˆReport of Massachusetts Board to Investigate the Subject of the Unem-plo3ˆedJ (1895) ; ˆReport of Commission to Investigate the Public Charitable and Reforma¬ tory Interests and Institutions of the Common¬ wealthˆ (1897) ; ˆFinancial History of the United Statesˆ (1902) ; ˆEmployees and Wagesˆ — Special Report 12th Census (1903); ˆNa¬ tional Problemsˆ (1907) ; articles in ˆCyclo¬ pedia of American Government,ˆ edited by McLaughlin and Hart (1914).

DEWEY, George, American naval officer: b. Montpelier, Vt, 26 Dec. 1837 ; d. Washington,

D. C, 16 Jan. 1917. At 17, after a preparatory course in the Northfield Military School, young Dewey was appointed a cadet at Annapolis, in the class which was graduated in 1858. At the outbreak of the Civil War he was commis¬ sioned a lieutenant under Admiral Farragut and assigned to the sloop-of-war Mississippi. His first active experience in war was when the West Gulf squadron, early in 1862, forced a passage up the Mississippi River ahead of Farragut. A later enterprise resulted in the grounding of the Mississippi, in the middle of the night, while attempting to run the batteries of Port Hudson. Here she was riddled with shot and set afire by the enemy's batteries, so that officers and crew had to abandon her, and make their way as best they could to the other shore before the flames reached her magazine and she exploded.

Other notable engagements in which Dewey figured during the Civil War were at Donald-sonville in 1863, and at Fort Fisher in the win¬ ter of 1864—65, as an officer of the Agawam. Receiving his commission as lieutenant-com¬ mander in March 1865, he served for two years on the Kearsarge and the Colorado, and was then attached to the Naval Academy for two years more. In 1870 he was given command of the Narragansett, and during his five years' charge of her rose to be a commander. He was then attached to the Lighthouse Board, and in 1882 took his next sea duty in command of the Juniata of the Asiatic squadron. On reaching his captaincy, in 1884, he took charge of the Dolphin, one of the first vessels of the new navy. From 1885 to 1888 he commanded the Pensacola, then flagship of the European squadron ; and this service was followed by shore duty, in the course of which he served as chief of the Bureau of Equipment at the Navy Department, and afterward on the Light¬ house Board for a second time. In 1896 he was promoted to commodore, and made presi¬ dent of the Board of Inspection and Survey. At the beginning of 1898, a few weeks before the outbreak of the Spanish-American War, he was placed in command of the Asiatic squadron, and was thus given the chance to distinguish himself which he so brilliantly improved.

With his squadron he left Mirs Bay, China, 27 April 1898, with orders to ˆffiapture or destroy the Spanish squadron,® then supposed to be in Manila Bay, under command of Admiral Montojo. The squadron entered the channel of Manila at 11:30 p.m., Saturday, 30 April, and early on Sunday morning, 1 May, sank, burned or captured all the ships of the Spanish squadron in the bay, silenced and destroyed three land batteries, obtained com¬ plete control of the bay, so that he could take the city, the chief port of the Philippine Islands, at any time, and all without losing a single man, and having only nine slightly wounded. On 18 August Dewey and his ships aided Gen¬ eral Merritt in the capture of Manila. In recognition of his Manila Bay achievement. Commodore Dewey received _ the thanks of Congress, which awarded to him a magnificent sword, and medals to his men. As a further recognition of his achievement, Commodore Dewey was (7 May 1898) promoted to be a rear-admiral, and subsequently (3 March 1899) made admiral of the navy under an act of Congress, approved 2 March 1899, restoring

that rank for the especial purpose of enabling the country to honor adequately the hero of Manila Bay. To Dewey also was granted a great honor in that the government enacted a law whereby he was never to be placed on the retired list. Thus Admiral Dewey, though long past the age of retirement, was an active officer in the United States navy at the time of his death. In 1914 he came into great prominence again ; the publication of his auto¬ biography revived an incident at the battle of Manila Bay 16 years before. In writing about the battle Admiral Dewey told how a shot was fired across the bow of one of the German ships to impress Admiral von Diedrichs with the fact that the American navy had estab¬ lished a blockade and would countenance no undue activity on the part of the Germans.

*A difference of opinion about international laws had been adjusted,® Dewey wrote, ˆˆwithout adding to the sum of President McKinley's worries.®

A sharp attack by Herr Erzberger in the Reichstag followed the publication and Count Reventlow, the German naval writer, published a scathing article in the Pages Zeitung. Andrew D. White, who had recently returned from being Ambassador to Germany, in speak¬ ing of this incident said that von Diedrichs ˆconceived it his duty in a vague sort of way to butt in to protect German interests.® In 1901 he was president of the Schley court of inquiry, and in the same year became presi¬ dent of the General Board of the Navy, which position

he held until his death, and in 1902 was appointed commander-in-chief of the united squadrons and fleets mobilized for extraor¬ dinary manoeuvres. Consult Clemen's ˆLife of Deweyˆ (1899) ; ˆAutobiographyˆ (1914).

DEWEY, John, American philosopher and educator: b. Burlington, Vt, 20 Oct. 1859. He was educated at the University of Vermont and Johns Hopkins University, and has held the chair of philosophy in the universities of Michigan, Chicago and Columbia, having been connected with the last named institution since 1905. He has been president of the American Psychologic and American Philo¬ sophic Associations, and took an active part in the formation of the American Association of University Professors of which he was the first president. Among his chief philosophical writ¬ ings are ˆLeibnitz's New Essays Concerning Human Understandingˆ (1888) ; ˆThe Influence of Darwin on Philosophyˆ (1910) ; ˆGerman Philosophy and German Politicsˆ (1915) ; ˆStudies in Logical Theory,ˆ and, in addition to minor works on ethics which are out of print, a widely used textbook in ˆ Ethicsˆ (1908), written in conjunction with Professor Tufts of the University of Chicago. Since the death of William James, he is regarded as one of the leaders of the pragmatic movement in philosophy. His writings on education in¬ clude books on ˆThe Philosophy of Educationˆ ; ˆHow We Thinkˆ ; ˆSchools of To-morrowˆ ; Hnterest and Effortˆ (1913) ; ˆMoral Prin¬ ciples in Educationˆ ; ˆ Child and Curriculumˆ ; ˆSchool and Society,ˆ the last-named work hav¬ ing been translated into most European lan¬ guages as well as Japanese.

DEWEY, Lyster Hoxie, American bot-antist : b. Cambridge, Mich., 14 March 1865.

He was graduated from Michigan Agricultural College in 1888, and taught botany there 1888-90. He was assistant botanist of the United States Department of Agriculture 1890-1902, and after 1902 botanist in charge of fibre in¬ vestigation. He has conducted investigations on grasses and troublesome weeds, was United States representative to the International Fibre Congress at Soerabaia, Java, in 1911. He is the author of several bulletins of the Depart¬ ment of Agriculture on the production of fibre from flax, hemp, sisal and manila plants, on the classification and origin of the varieties of cot¬ ton, *etc.*

DEWEY, Melvil, American educator and librarian : b. Adams Centre, N. Y., 10 Dec. 1851. He was graduated from Amherst Col¬ lege in 1874; was college librarian during his senior year and for two years after graduation. He then went to Boston where he was active in founding the American Library Association, the Library Bureaus, the Metric Bureau for introducing the metric system, and the Spelling Reform Association. He was the founder and for five years the editor of the Library Journal and also editor of Library Notes and the Spell¬ ing Reform Bulletin. In 1883 he was appointed librarian at Columbia, and in 1887 established the School of Library Economy, of which he was made director. In 1889 he became secre¬ tary of the University of the State of New York, and director of the State Library, the library school being at that time transferred to Albany; in 1891 he became director of the home education department, and organized the sys¬ tem of traveling libraries. In 1895 he pro¬ moted and organized the Lake Placid Club, a cooperative country residence club with an es¬ tate of 6,000 acres, 4 clubhouses, 60 cottages, dairy and poultry farms and forests in Essex County, N. Y., worth over $1,100,000. He is at present devoting his time to general libraiy and allied educational interests, and the busi¬ ness centering round the Lake Placid Club, of which he is president and treasurer. In New York State he has accomplished much in the raising of school standards, and particularly in the improvement and founding of small public libraries. He has also had much influence on library work in the United^ States ; has twice been president of the American Library Asso¬ ciation, and its secretary for 15 years; he de¬ vised the decimal system for the classification of books which is widely used, and published a set of cataloguing rules, included in his ^Library School Rules. ^ He has also published a revision of the laws of New York State in regard to education (1892), and the ^Decimal Classification and Relativ Index^

(9 editions

1876-1915).

DEWEY, Richard (Smith), American alienist : b. Forestville, N. Y., 6 Dec. 1845. He was graduated at the LTniversity of Michigan in 1869. During the Franco-Prussian War he was volunteer assistant surgeon at the field hospital at Pont a Mousson, France, and at the Reserve Hospital at Hesse-(Jassel, Germany. He studied for a short time under Virchow at Berlin and from 1872 to 1879 was assistant physician at the State Hospital for the Insane at Elgin, Ill. From 1879 to 1893 he was medical superintend¬ ent of the State Hospital for the Insane at Kankakee, Ill., and from 1893. to 1909 was pro¬

fessor of mental and nervous diseases at the Chicago Postgraduate Medical School. He is a writer on mental diseases and in 1899 was presi¬ dent of the Chicago Neurological Society.

DEWEYLITE, a hydrated silicate of mag¬ nesia, ranging in color through all shades of white, yellow, red and brown. It was named after Chester Dewey, an American naturalist.

DEWI, Saint. See David, Saint.

De WINDT, de wint, Harry, English traveler: b. Paris, France, April 1856. He was educated at Cambridge, and, after serving as aide-de-camp to his brother-in-law. Rajah Brooke at Sarawak, 1876-78, went from Pekin to Paris by land 1887 ; visited mines and prisons in Siberia 1890-94; explored the Klondike 1897, and went from Paris to New York by land for the London Daily Express 1901-02. He has written ˆOn the Equatorˆ (1882) ; ˆFrom Pekin to Calais by Landˆ (1887) ; ˆA Ride to Indiaˆ (1890); ˆSiberia as it Is> (1892); ˆThe New Siberiaˆ (1895) ; ˆThrough the (jold Fields of Alaska to Bering Straitˆ (1898) ; ˆTrue Tales of Travel and Adventureˆ (1899) ; ˆFinland as it Isˆ (1901) ; ˆFrom Paris to New York by Landˆ (1903) ; ‘ˆThrough Savage Europeˆ (1903) ; ˆMy Restless Lifeˆ (1908).

DEWING, Thomas Wilmer, American figure and portrait painter: b. Boston, 4 May 1851. He was a pupil of Boulanger and Lefebvre and is an academician of the National Academy of Design 1888, and a member of the Society of American Artists. Among his pic¬ tures are ˆPreludeˆ ; ˆThe Days,ˆ which took the Clarke prize in 1887, and ˆThe

Garden.ˆ He is represented in the Metropolitan Museum of New York; the Corcoran Gallery, Washington; the National Gallery, Washington; the Saint Louis Art Museum ; the Buffalo Academy of Art; the Toledo Museum; and the Rhode Island Gallery of Art, Providence.

DE WINT, Peter, English landscape painter in watercolors: b. Stone, in Staffordshire, 21 Jan. 1784; d. London, 30 June 1849. He studied in the schools of the Royal Academy, where he occasionally exhibited; but most of his pic¬ tures were shown in the exhibitions of the Watercolorˆ Society. English scenery was his favorite subject. He occasionally painted in oil with marked success. Some of his best pictures are ˆA Corn-fieldˆ ; ˆWoody Landscape with Waterˆ ; ˆLincoln CathedraP ; and ˆHarvest-time.ˆ

DE WINTER, d? vin'ter, Jan Willem, Dutch admiral: b. Kampen 1750; d. 1812. He entered the navy at the age of 12 and fought in the French ranks under Dumouriez and Pich-egru, reaching the grade of brigadier-general. He returned to Holland in 1795 and was made commander of the Dutch fleet, composed of 15 ships of the line and 12 friptes. On 11 Oct. 1797 he was attacked by Admiral Duncan's British fleet and defeated at Camperdown, losing his own and seven other ships to the enemy. He was taken to Englandˆ a prisoner of war, was treated there with distinction and on his return to Holland was even commended for his gal¬ lantry and skill in the disastrous fight. He was made Minister Plenipotentiary to France in 1798 and in 1802 was again at the head of the Dutch

fleet. He attempted to suppress piracy in the Mediterranean. He was buried in the Pantheon, his heart in the Nicholas Church of Kampen.

DE WITT, de vit, Cornelius, Dutch naval officer : b. Dort 1623 ; d. 1672. He was edu¬ cated at Leyden. In 1652, with de Ruyter, he succeeded Tromp in command of the fleet which Blake defeated off Kentish Knock. He was with de Ruyter at the burning of British ship¬ ping in the Medway in 1667 and took a prom¬ inent part in the battle of Solebay (Southwold). Tichelaar accused him of participation in the plot to murder the Prince of Orange and he was tortured and sentenced to banishment. When he was leaving the prison the burghers of The Hague attacked and murdered him and his brother, Jan De Witt.

DE WITT, Jan, Dutch statesman : b. Dort, 24 Sept. 1625 ; d. The Hague, 20 Aug. 1672. His father was Jacob De Witt, a prominent figure in the stormy dissensions of Holland's political life, and an ardent supporter of the Republic against the hereditary stadtholders of the house of Orange. The boy received a thor¬ ough education, and because of his natural pre¬ cocity absorbed his father's political views at an early age. In 1652, he was sent in the capacity of deputy to the state of Zealand, in order to secure the allegiance of that province, which seemed to have monarchical leanings. So convincing were his efforts, that on his re¬ turn he was made grand pensionary of Dort (1653), holding that office by repeated election until 1672. De Witt soon demonstrated that the confidence which the Republic had given him was not misplaced. He first turned his attention to the administration of foreign af¬ fairs, and succeeded in establishing arnicable relations with England. In his negotiations with Cromwell, he took special pains to exclude the possibility of playing into the hands of the rival party of the young Prince of Orange. A secret clause inserted in the treaty rendered the office of stadtholder impotent. In his relations with Sweden and Portugal, De Witt was equally fortunate. He did not neglect the internal ad¬ ministration during this time, but set about fix¬ ing its finances on a firm basis, and developed the East Indian commerce. But trouble lay ahead. Charles II was restored to the English throne, and the secret clause inserted in the treaty by De Witt and Cromwell was wiped out. Hostilities were resumed on the sea. De Witt bent all his splendid energies to the task of defending the honor of his state, and finally, with the aid of the naval prowess of Admiral de Ruyter, brought the war to an end with the Treaty of Breda (1667). He further secured his position by the

brilliant triple alliance of the Dutch Republic with England and Sweden. However, this produced only a lull in the gath¬ ering storm. It had been easy enough to sup¬ press the adherents of William III during his minority. But as time elapsed, they grew to formidable numbers and power. They awaited an opportune time to restore the stadtholder, and “the psychological moment finally came. Louis XIV in 1672 suddenly appeared at the head of an army to claim the Spanish Nether¬ lands in the name of his wife, Maria Theresa. The Republic turned to William to resist the invasion; and foreseeing open hostility, De Witt resigned from the office of grand pensioner in VOL. 9 — 4

August. Events followed rapidly. Cornelius, the brother of De Witt, was arrested on charge of conspiracy against William and sentenced to banishment. Jan came to visit him on the day of his release; and, while returning from the prison, both were attacked and killed by the in¬ furiated burghers. When years had mellowed the passions of the moment, Holland saw De Witt in his true light ; and in recognition of his splendid services and sterling qualities erected a monument, the work of Jeltsema, at The Hague, June 1918. Among his writings are his ˆ Mem¬ oirsˆ (1709) and his ˆLettersˆ (6 vols., 1723-25). Consult Beck, ˆHistory of the Nether¬ landsˆ (New York 1898-1907) ; Geddes, J., ˆThe Administration of John De Wittˆ (Lon¬ don 1879) ; Knottenbelt, ˆLife of Jan De Wittˆ (1862) ; Motley, ˆHistory of the United Neth¬ erlandsˆ (4 vols.. New York 1860-62) ; Ponta-lis, Han de Wittˆ (Eng. trans., 2 vols., London 1885) ; Simons, ‘Life of JanDe Witt> (1832-36).

DEWITT, Benjamin, American physician and educator: b. Ulster County, N. Y., 26 Dec. 1775; d. New York, 10 Sept. 1819, son of Andries De Witt, M.D. He was graduated at the University of Pennsylvania in 1797, practised and lectured at Albany and New York, occupy¬ ing the chair of the practice and institutes of medicine in Columbia College and became vice-president of the College of Physicians and Sur¬ geons. For the latter he secured from the State legislature a grant of $30,000. Dr. Thomas W. Blatchford, as orator at the 54th commencement of the medical department of Columbia College, recalled him in these words : “He was a fine looking gentleman, of a tall, portly, command¬ ing figure, open countenance, affable manners, pleasing address and delivery, a popular lec¬ turer and a great favorite with the students. His death was due to yellow fever contracted while engaged in the duties of health officer of the

port of New York.

DEWITT, Moses, American surveyor and pioneer: b. Ulster County, N. Y., 15 Oct. 1766; d. Onondaga County, N. Y., 15 Aug. 1794. He assisted in running the Pennsylvania boundary and in laying out the Military Tract of central New York; was appointed county judge and surrogate for Herkimer County on its erection in 1791 and for Onondaga County on its sepa¬ ration in 1794. He engaged in the salt indus¬ try at Syracuse and with his brothers Egbert and Jacob Rutzen settled near Jamesville. His active and useful career was ended most un¬ timely by bilious fever. That his memory was long cherished was shown in 1835, when the town of De Witt was set off near his estate and named in his honor.

DEWITT, Richard Varick, American capi¬ talist : b. Albany, N. Y., 6 Feb. 1800; d. there, 7 Feb. 1868. Graduating from Union College in 1817, he was admitted to the bar and developed an artistic and literary taste and a scientific in¬ terest that made him a serviceable member of the Albany Institute during its period of scien¬ tific activity and repute. He was active also in several large business concerns and shared in the promotion of the Cayuga Lake Steamboat Company and the Ithaca and Owego Railroad Company, which latter were ernbarrassed by the panic of 1837. Served as brigadier-general of the Albany County militia, 1823-28, and succeeded his father in the Society of the Cincinnati-of

which he was vice-president for New York,

1848-68.

DEWITT, Simeon, American patriot and statesman; b. Wawarsing, Ulster County, N. Y., 26 Dec. 1756; d. Ithaca, N. Y., 3 Dec. 1834. His father was a physician and descend¬ ant from a pioneer settler of Esopus, Tjerck Claessen DeWitt, who probably came from East

Friesland. Studied under Domine Dirck Romeyn and was at Queens (now Rutgers) Col¬ lege, New Brunswick, N. J., when Washington retreated before the British in the autumn of 1776. Returning home, he continued the study and practice of the surveyor's art under the experienced direction of his relatives, the Clintons, and early in 1777 enlisted as adjutant in the State militia and was drafted in the campaign against Burgoyne. Early in 1778 be¬ came assistant to Col. Robert Erskine, topo¬ graphical engineer to Washington, and suc¬ ceeded him in 1780. His duties were to chart the territory covered by his chief's forces and to lay out lines of defense, in which capacities he shared the Yorktown campaign. At the close of the war the topographical materials of his office, 200 manuscripts, were deposited with the New York Historical Society. In May, 1784, DeWitt was called to succeed Gen. Philip Schuyler as surveyor-general of the State and, though tendered a similar position in the Federal service by Washington in 1796, he continued in the service, of his native State for 50 years, supervising in field and office such major en¬ terprises as the establishment of the State boundary lines, the laying out of the extensive public lands and of the city of New York above the older portion, and the laying out and construction of the Erie, Champlain and smaller canals of the State, — in all of which he was the trusted adviser of both Gov. George Clinton and Gov. DeWitt Clinton. In laying out the State lands DeWitt used with good re¬ sults the system of square townships based on lines of latitude, which had come into use in scattered instances by the time of the Revolu¬ tion and was later applied extensively by the Federal government in the western domain. Credit long enjoyed by DeWitt for the classical township names of central New York probably belongs to Robert Harpur (q.v.). In 1802 he brought out the first State map based on sur¬ veys. In 1804-09 he served as one of the com¬ mission to build the first capitol at Albany. His scientific interest and ability were recog¬ nized in 1790 by election to the American Philo¬ sophical Society. In 1798 he was made a mem¬ ber of the Board of Regents of the State Uni¬ versity and served as vice-chancellor and chancellor. He was active in the organization of several societies for the encouragement of agriculture and the useful arts. These societies were in 1824 merged into the Albany 'Institute, which for many years had a wide repute for its scientific researches and learned publications. DeWitt acquired a large tract of land at the head of Cayuga Lake and by his liberality fostered a settlement which has grown to the city of Ithaca. Publications : ˆThe Elements of Perspectiveˆ ; ˆConsiderations on the Estab¬ lishment of an Agricultural Collegeˆ (a re¬ markable plea to the New York legislature in 1818), and a number of scientific essays.

DE WOLFE, Elsie, American actress ; b. New York 1865. She made her debut in Sar-

dou's ˆThermidorˆ in 1890, playing the role of Fabienne with Forbes-Robertson. She joined the Empire Stock Company in 1894 under Charles Frohman and later became the star and manager of her own company, bringing out ˆThe Way of the Worldˆ in 1901 at the Victoria Theatre. She toured the United States with this play and later appeared in the title role of Hubert Davies's ˆCynthiaˆ (1903), as Estelle Kitteridge in ˆThe Other GirP (1903) and as Mrs. Lovette in ˆA Wife Without a Smile ˆ (1904). She retired from the stage in 1905 and has since engaged in house decorating. She has decorated the Colony Club, New York, the homes of J. Ogden Armour, Chicago, and William Crocker, Burlingame, Cal., and many others. She published ˆThe House in Good Taste) (1913).

DEWSBURY, England, a municipal and parliamentaiy borough in the West Riding of Yorkshire, nine miles south of Leeds. Coal is mined, but the trade of the town is chiefly in heavy woolen cloths, including blankets, car¬ pets, flannels and worsteds. It has manu¬ factories for fancy cloths and shoddy goods and contains iron and boiler, glass and dye works. Pop. of municipal borough 53,351 ; of parliamentary borough (one member) 76,923.

DE WULF, Maurice Marie Charles Joseph, Belgian educator and philosopher : b. Poperinghe, 6 April 1867. He was educated at Louvain University and after 1893 served as professor of the history of mediaeval philosophy there. In 1911 he was one of the honorary presidents of the International Congress of Philosophy. He is a member of the Royal Academy of Belgium and of the administrative council of the Royal Library of Belgium. His numerous publications include ˆHistoire de la philosophie dans les Pays-Bas et la Principaute de Liege) (1895); ˆEtudes historiques sur-I'esthetique de S. Thomas) (1896) ; 'Histoire de la philosophie medievale) (4th ed., 1913; Eng. trails., by Coffey, ˆHistory of Mediaeval Philoso¬ phy) 1909) ; Hntroduction a la philosophie neo-scholastique) (1904; Eng. trans. by Coffey, ˆScholasticism Old and New,) 1907) and con¬ tributions to periodicals and encyclopedias.

DEWWORM, British name for the earth¬ worm (q.v.).

DEXIPPUS, Greek philosopher: flourished in the middle of the 4th century a.d. He was a follower of the Neoplatonist lamblichus, wrote

commentaries on Plato and Aristotle. One of these in defense of the Aristotelian categories appeared in both Greek and Latin texts. The Latin text, with the title ˆQuaes-tionum in Categorias Libri Tres,) was edited by Felicien (Paris 1549) and the Greek text by Spengel (Munich 1859).

DEXTER, Edwin Grant, American edu¬ cator: b. Calais, Me., 1868. He was graduated at Brown University in 1891, taught there for one year, and in 1892-99 was science master of Colorado Springs High School, director of the Summer School of Science, Colorado Springs, also professor of psychology in the State Normal School at Greeley, Colo. In 1899 he took the degree of D.Ph. at Columbia Uni¬ versity and the higher diploma at Teachers College. From 1899 to 1907 he was connected with the University of Illinois successively as professor of pedagogy and psychology, director

of the summer term, director of the School of Education, and dean. He was Commissioner of Education in Porto Rico and chancellor of the University of Porto Rico 1907-12; since then has been rector of El Institute Nacional di Panama. He is associate editor of Internation¬ ales Archivar fur Schulhygicne and of Jahr-schrift fiir Kdrperliche Erziehung. He has pub¬ lished ˆHistory of Education in the United States' (1904) ; ˆWeather Influences' (1904) and about 50 articles in educational journals.

DEXTER, Henry Martyn, American Con¬ gregational clergyman; b. Plympton, Mass., 13 Nov. 1821 ; d. New Bedford, Mass., 13 Nov. 1890. He was graduated at Yale 1840, and at Andover Theological Seminary 1844. He filled a pulpit in Manchester, N. H., 1844—49, and was pastor of Berkeley Street Church, Boston 1849-67. He was one of the editors of the Congre¬ gational Quarterly from 1859 to 1865, becoming editor-in-chief of the Congregationalist 1867. He w'as a staunch defender of the Congrega¬ tional polity and delighted in controversy. His principal works are ˆThe Voice of the Bible and the Verdict of Reason' (1858) ; ˆCongrega¬ tionalism : What it Is, Whence it Is, How it Works, Why it is Better than Any Other Form of Church (Government, and its Consequent De¬ mands' (1865) ; ˆ Roger Williams and His

Banishment From the Massachusetts Colony' (1876) ; ˆThe Congregationalism of the Last Three Hundred Years' (1881) ; ˆCommon Sense as to Woman Suffrage' (1885); ˆEarly English Exiles in Amsterdam' (1890).

DEXTER, Henry Morton, American clergyman, editor and historian : b. Manchester, N. H., 1846; d. 1910. He was the son of Henry Martyn Dexter (q.v.) ; was graduated at Yale University in 1867 and at Andover Theological Seminary in 1870. He spent the next three years in travel, was ordained to the Congrega¬ tional ministry, and in 1873-78 was pastor of the Union Church at Taunton, Mass. From 1878 to 1891 he edited the Congregationalist. He made several visits to England and Holland, and in those countries took occasion to investi¬ gate the history of the Pilgrims and early American colonists. He

promoted the erection of a memorial tablet to John Robinson at Ley¬ den, Holland, in 1891. He published ˆThe Story of the Pilgrims' (1899), and ˆEngland and Holland of the Pilgrims' (1905) and numerous magazine articles on historical subjects.

DEXTER, Samuel, American statesman and jurist: b. Boston, 14 May 1761; d. Athens, N. Y., 4 May 1816. He was graduated at Harvard University 1781 ; was admitted to the bar in 1784. He was repeatedly chosen to the legislature of Massachusetts, and in 1798 was elected senator of the United States. While senator he was appointed Secretary of War in 1800, and in the same year Secretary of the Treasury. He was afterward, at different times, offered foreign missions, but always refused them. About the year 1802 he withdrew from political life, and returned to his profession. He was an unsuccessful candidate for governor in 1814. He was the first president of the first society formed in Massachusetts for the pro¬ motion of temperance. Among his publications are ˆLetter on Freemasonry' and ˆSpeeches and Political Papers.'

DEXTER, Timothy, American merchant : b. Malden, Mass., 22 Jan. 1743; d. Newburyport, 22 Oct. 1806. At an early age he became an apprentice at leather dressing, and pro¬ gressed so rapidly as to soon own his own estab¬ lishment. He succeeded in amassing a large fortune for those days. He developed certain eccentricities and his peculiar efforts to attain social prominence gave him great notoriety. For example he assumed the title of ˆˆLord" Timothy Dexter, and he constructed odd and bizarre residences in Newburyport, Mass., and Chester, N. H. The grounds of the first house were adorned with 30 or 40 colossal wooden statues of famous men. He included himself in the number adding the inscription, ˆffhe greatest man of the East." He gathered together an extensive library of books notable chiefly for their rich and expensive bindings, and also made an extraordinary collection of absolutely worthless paintings, in order to prove his knowl¬ edge of art, and supported a poet who was supposed to be ready to sing his praises upon occasions. He wrote a book called ˆA Pickle for the Knowing Ones' and also a pamphlet with all the punctuation marks printed upon the last page, there being none in the text proper. While an able and shrewd man of business he was extremely dissipated and was regarded as a victim of a deranged mind.

DEXTER, Me., town in Penobscot County, 40 miles west-northwest of Bangor, on the Se-basticook River, and on the Maine Central Railroad.

It contains a public library, several churches, woolen mills, foundries and machine shops and vegetable canneries. The waterworks are the property of the municipality. Pop. 4,113.

DEXTRIN (C12H20O10), the commercial name for a group of substances obtained from starch, and very similar to it in composition ; also called starch gum, British gum, *etc.* It resembles gum in being soluble in water, but-is distinguished from that substance by composi¬ tion ; by being, like starch, converted into oxalic acid by nitric acid, and not into mucic acid ; and especially by causing a ray of polarized light to deviate to the right, a property from which it derives its name. The simplest member of the group of dextrins is malto dextrin, and this is the only one which has been obtained in a state approximating purity. For commercial purposes, dextrin is prepared from starch by heating dry starch to a temperature of from 400° to 480° F., in an iron cylinder revolving over a free flame or in an oil bath — usually rape seed oil. When the starch is first moist¬ ened with nitric or hydrochloric acid, the prod¬ uct is whiter but less adhesive as it then con¬ tains some sugar. After roasting to the right degree, as indicated by an iodine test, it is quickly cooled to check further conversion. The product is an indefinite mixture of several dextrins with unaltered starch. The transfor¬ mation may be effected also by the action of dilute sulphuric acid at a temperature a little below that of boiling water. The result in this action is a mixture which contains some dextrin but is mostly dextrose (q.v.). By acting upon starch with diastase (q.v.) dextrin is pro¬ duced. To water at about 70° or 80° F., in a boiler, 8 or 10 parts of dried malt are added, and then 100 parts of starch after the heat is raised to 140° F. The mixture is kept stirred and the temperature maintained somewhat above

DEXTROSE

this for 20 minutes, and then, when the thick mass has become quite fluid, it is raised to the boiling-point rapidly, cooled, the clear liquor filtered and evaporated to a syrup. When cold it is an opaque gelatinous mass, which, on drying, becomes hard like gum. It is then crushed, ground and sifted through silk. Dextrin is used in large quantities for thicken¬ ing calico-printers' colors, as an adhesive for postage stamps, labels and adhesive papers, as a sizing for textiles and for many other pur¬ poses. The corn syrup or glucose of the con¬ fectioner and the manufacturer of table syrups contains dextrin to the amount of 42 per cent. See Glucose.

DEXTROSE, grape-sugar, starch-sugar or dextroglucose, belongs to the class of Mono¬ saccharides, in the section hexoses. Its formula may be expressed either as CeHi20c or C6H70- (0H)5. Dextrose occurs along with levulose in very many plants, and notably in grapes and most other fruits; also in honey, and enters into the composition of many animal tissues and par¬ ticularly in the blood, and also in the urine of diabetic patients. It can be produced by the action of dilute sulphuric acid on cane-sugar, starch, cellulose, *etc.* It can be best obtained by boiling for several hours 50 parts of starch with dilute sulphuric acid (100 parts of water to 5 parts of H2SO4). The solution is then neu¬ tralized with chalk, filtered, boiled with ani¬ mal charcoal to remove traces of color, and then evaporated carefully to dryness, forming an amorphous mass which contains about 60 per cent of dextrose, the remainder being chiefly dextrin. This mass is washed with cold, ethyl alcohol of specific gravity 0.830, and the residue dissolved in more alcohol. Upon cooling the pure dextrose crystallizes out. It may also be crystallized from a concentrated aqueous so¬ lution at 90° to 95° F., and it then contains one molecule of water of crystallization, and forms microscopic rhombic crystals, which soften at 60°, melt at 86° and lose their water of crystal¬ lization at 110°. Heated to 170° it is converted into glucosan or dextrosan (GHioOs), which may again be converted into dextrose by diges¬ tion with water or dilute acids. Dextrose tastes much less sweet than ordinary cane-sugar. By the action of sodium amalgam dextrose is con¬ verted into mannite, CeHuO#. A solution of dextrose becomes brown when boiled with caus¬ tic alkalis.

Dextrose on oxidation yields in the first in¬ stance gluconic acid, CbH6(OH)6.C02H. Fur¬ ther oxidation results in the formation of

sac¬ charic acid, CeHioOs.ˆ

In alkaline solution dextrose reduces com¬ pletely the oxides of gold, platinum, silver and mercury, the metals being produced. With bis¬ muth, lead, copper, iron, manganese, etc., par¬ tial reduction takes place, only the lower oxides being formed. With sodium chloride, iodide and bromide, dextrose forms well-defined crys¬ talline compounds which, however, decompose in aqueous solutions.

Nearly all true yeasts and a great many other organisms, and also zymase, ferment dextrose. In the presence of growing bacteria dextrose yields a variety of products, as lactic acid, bu¬ tyric acid, cellulose, etc., depending on the species of bacteria present.

DEY, da (from Turk, day, maternal uncle, a title of dignity), a title formerly given in the

17th century to the Turkish commander of the army in Algiers. The office was attained by seniority. When the French captured Algiers in 1830, the title and office were of course abol¬ ished. The title of dey as given to the governor of Tunis has been replaced by that of bey, since the end of the 17th century. There existed a dey of Tripoli (q.v.) until 1912.

DHABB, dab. See Dab.

DHAK TREE, dak, or PALAS, a species (Butea frondosa) of the genus Dhawk of the family Leguminoscu, native to India. It has trifoliate leaves with a velvety under surface. They yield a resinous exudation. The gum of this species is said to contain about 70 per cent tannin. The bark and roots, being very fibrous, are used for calking boats, rope making, etc., and the flowers yield a beautiful orange dye.

DHAL, dal. See Pigeon Pea.

DHALAK, da-lak', or DAHLAK, East Africa, an archipelago of the Red Sea, off the coast of Eritrea, belonging to Italy. It contains nearly 1(X) rocks and islets, mostly uninhabited, clustering round Dhalak-el-Kebir, the principal island, 23 miles long by 15 miles broad, situated 25 miles east of Massonah. Coral and pearls are the chief products.

DHAMAR, da-mar', or DAMAR, Arabia, a town of Yemen, 65 miles south of Sana, on the route to Mecca. It is situated in a thriving agricultural district and carries on a large trade in horses. Pop. about

19,000.

DHAMMAPADA, d'hum"ma-pud'a, a sec¬ tion of the sacred writings of the Buddhists. It was translated by Max Muller in ˆSacred Books of the Eastˆ (Vol. X). The Pali text was published, with a Latin translation by V. Fausboll (Copenhagen 1855). Consult the Pali commentary edited by H. C. Normand (London 1909-12), and for selections consult Anderson, ˆPali Readerˆ (London 1907).

DHANIS, da'nes', Frangois, Baron, Bel¬ gian explorer: b. London 1859; d. 1909. He went to Africa and took part in extending Bel¬ gian interests there. In 1ˆ8 he founded several stations on the Middle Kongo and in 1890 ex¬ plored the Stanley Falls region to the Kwango. He was attacked by Arab slave raiders and in 1892-93 he carried on hostilities against several fortified towns, finally establishing the suprem¬ acy of the Kongo Free State. On his return to Belgium he was made a baron and in 1895 returned to the Kongo as vice-governor. In 1896-97 while on an expedition to the Nile the black troops mutinied, Dhanis' brother was slain and he himself escaped with difficulty. His later years were spent in retirement in his native country.

DHAR, dar, India, (1) a small native state in the Malwa agency, in the central part of India, \yith an area of about 1,740 square miles. The soil is fertile, and yields rice and other cereals. Pop. 169,474. (2) The capital, of the

same name, is situated about 180 miles east of Baroda. An extensive trade in grain is carried on.ˆ Someˆ striking buildings still standing are relics of its former importance and greater population. These include mosques, temples and tombs. A fort built of red stone stands outside of the town. Pop. about 15,000.

DHARANGAON, dar-an'ga-6n, India, city in the Khandesh district, Bombay, having a

trade in cotton and oil-seeds, and manufac¬ tures of coarse cloth. Pop. 14,172.

DHARMASASTRA, d'har'ma-shas'tra, the metrical law books of Manu, Yajnavalkya and others. The Manu book is translated by Bur¬ nell (London 1884), but its date has not been fixed. The Yajnavalkya book dates from the 3d century a.d. For a collection of these texts consult the ˆDharmasastrasangraha,ˆ edited by Pandit Jibananda Vidyasagara (Calcutta 1876). Consult also Jolly, ˆRecht und Sitte,ˆ with bib¬ liography (in Biihler, ˆEncyclopaedia of Indo-Aryan Researchˆ (Strassburg 1896).

DHARMASUTRA, d'har'ma-soo"tra, a section of the Sutra or liturgical literature of the Vedas. It is devoted to the definition of ethical relationships and on it the Dharmasastra (q.v.) or law books are based.

DHARWAR, dar'war, India, city, capital of a district of the same name, in the southern Mahratta country, in Bombay presidency. Strongly fortified, it is prominent as a railway centre, being the headquarters of the Southern Mahratta Railway and having extensive trade in cotton with the Portuguese city of Marma-goa.' American cotton is raised successfully and silk and cotton goods are manufactured in the district. Pop. 30,300.

DHAUN, down, Leopold Joseph Maria, Count von, Austrian military commander: b. Vienna, 24 Sept. 1705 ; d. there, 5 Feb. 1766. He began his military career in his father's regiment; he repeatedly distinguished himself in the Turkish campaigns of 1737-39 and in the War of the Austrian Succession, rose rapidly in rank, being made a field-marshal and privy councillor after the Peace of Aix-la-Chapelle. On the opening of the new military academy at Wiener-Neustadt, Dhaun was appointed its first director. Under his vigorous regime, the Austrian army underwent considerable reorgan¬ ization. In 1757, he was placed in chief com¬ mand of the army, and advanced against Fred¬ erick the Great in Bohemia. His first great success was achieved at Kolin (1757), where by a decisive victory over the forces of Frederick, Bohemia was freed from the enemy. However, Dhaun

suffered defeat at Leuthen in December of the same year ; but, rallying his forces, in¬ flicted a terrific blow on the enemy in the follow¬ ing year at Hochkirch; and again in 1759, cap¬ tured the entire army of General Fink with 11,000 men at Maxen. He was finally defeated and severely wounded at Torgau (1760) ; and after three years more of tedious fighting, with no signal defeats or victories, ended his military career with the Peace of Hubertsburg (1763). Dhaun combined skill with valor in the execu¬ tion of his strategic plans, but was outwitted by the more brilliant tactics of the versatile Frederick. Consult ˆLeben und Thaten des Grafen Leopold von Dhaun ˆ (Frankfort and Leipzig 1759-60). See Seven Years' War.

DHAWALAGIRI, da-hwal"a-ger'e, or DHAULAGIRI, once supposed to be the highest peak of the Himalayas, has a height of 26,826 feet above the sea. It is in Nepal, in lat. 29° N., and long. 82° 30' E.

DHOLE, dol, a local Indian name for the wild dog, native to parts of India. It is called ˆTuansuˆˆ in the Himalayas. See Wild Dogs, under Dogs.

DHOLERA, do'ler-a, India, city in the Ah-medabad district of Bombay presidency, on a stream entering the Gulf of Cambay, an im¬ portant cotton mart. Pop. 10,088.

DHOLKA, dol'ka, India, city in the Ah-medabad district of Bombay presidency, prob¬ ably one of the oldest towns in Gujerat. The weaving of women's robes is the principal in¬ dustry of the town. Pop. 16,494.

DHOW, dow, an Arab, sea-going vessel, ranging from 150 to 200 tons burden, with one mast, a yard the length of the vessel, and a large lateen or triangular sail. A pendant and threefold purchase form the halliards of the yard. On the weather rail are fastened the lower block of the tackle and the end of the fall, so that the tackle supports the mast as a backstay. Three shrouds on each side complete the gear. The dhow is used for merchandise and was often employed in carrying slaves from the east coast of Africa to Arabia.

DHULIA, doo'le-a, India, the chief town of Khandesh district, Bombay presidency, situ¬ ated on the south bank of the Panjhra River. There is a new and old town combined. It is a cantonment town. Considerable trade is done in cotton and oil-seeds, and weaving of cotton. A railway connects it with Chalisgaon, on the main line of the Great Indian

Peninsula Railway. Pop. 24,726.

DHULIP, d'hoo-lep', or DHULEEP SINGH, Indian maharajah, son of Ranjit Singh, ruler of the Sikhs: b. 1838; d. Paris 1893. While still a minor he succeeded to the throne on the death of his brother, Charak Singh. In his minority, Lall Singh, Maharanee, allowed the native army to attack the British in 1845. He waged a prolonged warfare against the British and in 1846, by the Peace of Lahore, was compelled to turn over the administration to them. In 1849 he renounced the throne in consideration of an annuity of $200,000. He received his education in England and became a convert to Christianity. In 1864 he married a German and after her death an English¬ woman. In 1886 he abjured Christianity, made an attempt to re-establish his authority and lost his pension as a result. He spent some time in France and Russia, was at length par¬ doned by Queen Victoria, and again received his annuity. His death in Paris was due to a stroke of apoplexy.

DHUNCHEE, dun'che (Sesbania aculeata) , a plant of the Leguminosae cultivated exten¬ sively in India for its fibre. It rises from 6 to 10 feet high, has a sparingly branched stem. It grows rapidly in low, moist soils. The fibre is coarser than hemp, unless cut early. The plant is also grown in China. About 500 pounds of fibre per acre is considered a fair average yield.

DHURRA, doorTa, or DOURAH, Indian

millet. See Sorghum.

DHYAL BIRD, di'al, or DAYAL, an Eastern bird of the genus Copsychus. It is common in Ceylon,ˆ India and China, and is a common cage bird in those countries. The fe¬ male is of a brownish tinge, while the male is black and white. ˆ It nests in tree hollows and at breeding time is exceedingly pugnacious.

DHYANI BUDDHA, d'hi-a'ne bood'da, one of the five Buddhas, called Skshobhya, Vairocana, Ratnasambhava, Amitayu, Amitabha

and Amoghasiddhi, with their female counter¬ parts, the Taras or Saktis. They are produced from meditation alone, are eternal and incor¬ poreal. See Buddhism.

DIABASE, a word used by petrographers with varied meanings; but the present usage in America restricts it to crystalline igneous rocks, of the basalt family, generally occurring as dikes, having as essential constituents plagioclase feldspar, augite and magnetite. Oliyene may or may not be present. Diabases differ from the granitoid rocks, to which they have a somewhat similar texture, in that the crystals of feldspar are long and narrow, or lath-shaped, and the dark silicates are arranged in the intep stices of the feldspar crystals, giving an ophitic texture. Diabases are of common occurrence in the United States. They form dikes and lac¬ coliths at various places along the Atlantic sea¬ board from Nova Scotia to Georgia. The so-called traps of the Connecticut Valley and the Palisades of the Hudson are familiar examples. In the Lake Superior country diabases are of frequent occurrence ; notably in the Marquette Iron Range and on Keweenaw Point ; the lat¬ ter sometimes carry native copper. The con¬ venient field name greenstone is frequently given to old, more or less altered, diabases. By pressure and shearing stresses, and the intru¬ sion of other igneous rocks, diabases change to hornblende and chlorite schists, showing no trace of original structure. Such rocks are common in the Lake Superior region and else¬ where along the Algonkian and Archaean rocks that characterize the formation of so much of northeastern North America. Diabases are of common occurrence in the Rocky Mountains also, and frequently, over deposits, are found along their contacts with sedimentary rocks, particularly limestones. The typical diabase of the Palisades contains: Si02 53.13; AhOa 13.74; FeaOa 1.08; FeO 9.10; CaO 9.47; MgO 8.58; NaaO 2.30; K2O 1.03. The specific grav¬ ity is 2.96. See Basalt; Trap.

DIABELLI, dya-bel'le, Antonio, Austrian composer and music publisher: b. Mattsee, near Salzburg, 1781 ; , d. 1858. He studied with Michael Haydn and came to Vienna in 1803, settling there as a teacher of piano. In 1824 he established the publishing house known by his name. This house published most of Schubert's works. Diabelli w'as very prolific as a com¬ poser, making use of all forms. His sonatinas written for educational purposes still hold their place among the best works of instruction for the piano. His other works have long since passed into oblivion.

DIABETES INSIPIDUS, a chronic dis¬ order, characterized by the

production of large quantities of colorless urine of low specific gravity and containing no sugar or casts and but little if any albumin. It is a disorder particularly of young people, and is more fre¬ quent in males than in females. In the larger number of patients it seems to be of congenital origin. Its exact nature is unknown, although it seems to be related to some disturbance of the vasomotor mechanism in the kidneys. As a rule it is a disease of slow onset, the early symptoms being an increasing thirst and the passage of large quantities of urine. Occasion¬ ally there are pains in the thighs; the appetite is usually good ; there is much thirst ; the

perspiration is small in amount, and the skin is apt to be rough and harsh. Sometimes there is loss of weight and knee jerks. Otherwise the patients suffer but very little. It is a dis¬ ease that is rarely prejudicial to health, having been known to persist for 50 years. The main discomfort is the want of rest frorn the polyuria. Occasionally it passes away without treatment. Treatment is as a rule unsatisfac¬ tory and there is little benefit from dieting. See Diabetes Mellitus.

DIABETES MELLITUS, a disorder of nutrition, in which there is deficient oxidation of the sugar in the body, which permits of the storing up of large amounts of sugar in the blood. This is eliminated in part in the urine, and there constitutes one of the most positive findings of the condition. In European coun¬ tries it is from three to five times as common as here, although statistics seem to show that it is on the increase in the United States. The symptoms vary very widely as the disease is often complicated with other nutritional dis¬ eases such as albuminurea, tuberculosis and digestive diseases. There is an acute form of the disease which proves rapidly fatal, but in the majority of cases there is a gradual onset, during which increased urination and increased thirst are the initial symptoms. Following this, if the disease progresses, the thirst still in¬ creases; there is passing of large quantities of urine containing glucose ; very marked increase in the appetite, amounting sometimes almost to voraciousness and gluttony; and an accompany¬ ing progressive emaciation or the patient be¬ comes obese. Appetite though usually ravenous may fail. The skin is dry and harsh; tempera¬ ture is often below normal ; the tongue is bright red and glazed ; the gums may be swollen ; and constipation is the rule though there may be serious diarrhoea.

As the disease progresses there are apt to be boils, abscesses, pimples, eczema, intense itching or cellulitis from slight injuries. Perforating ulcer of the foot may occur, and occasionally there is bronzing of the

skin. Acute pneumonia is a frequent cause of death. Gangrene of the lung may also arise. In most cases, particularly in the young, there is a form of progressive in¬ toxication due to the gradual retention in the body of acids which are not properly neutral¬ ized by the body's protective agencies. There is gradually progressive anaemia, headache, de¬ lirium, great distress and marked hunger for air, which may be accompanied by blueness of the skin or by jaundice. Neuralgic pains are also frequent complications in diabetes. Arterio-sclerosis may be a result. In the young, especially, there is a liability to functional and structural heart diseases.

The cause of diabetes mellitus is a matter of much inquiry, but it would seem that it is a disease of a number of origins. Funda¬ mentally, however, it is due, as implied at the beginning of this article, to some interference with the physiology of sugar-oxidation. This may result from disease of the pancreas, dis¬ ease of the suprarenal gland, sometimes disease of the central nervous system, and occasionally disorder of the sympathetic system. The pancreas and the suprarenals are considered at the present time as the site of the chief changes leading to the production of this disease. The

outcome is usually dark. In children, as a rule, it progresses rapidly to death. There seems to be an intimate relation between gout and dia¬ betes mellitus, both aggravated by worry, busi¬ ness troubles and mental overwork — hence ®Gouty Glycosuria® of the old. Middle-aged people may live for many years, but instances of cure in true diabetes are quite rare. The treat¬ ment is largely hygienic, and is extremely com¬ plicated. At present time Dr. Allen's so-called ^^starvation treatment® is uppermost. Diet and hygiene are the most important factors. Each patient having his idiosyncrasies, medical advice on the matter of diet is imperative. The patient, not the disease, needs treatment ; hence general rules are more productive of harm than of good.

DIABETIC SUGAR (CeHiˆOe), formerly supposed to be a distinct species of sugar, now found to be the same as glucose (q.v.). It is

regularly produced by the liver, and is a con¬ stant though trifling constituent of healthy urine, but in diabetes mellitus (q.v.) it amounts to 8 or 10 per cent. See Inosite.

DIABLERETS, de-a'ble-ra', Les (Fr. «the little devils®), a secondary mountain group of the Bernese Alps, Switzerland, between the can¬ ton Vaud and canton Valais. The highest peak is 10,620 feet. Two peaks have already fallen, and others threaten to follow. The rocks con¬ sist of limestone, resting at a high angle on beds of shale, which becoming disintegrated leaves the limestone without support, and causes tre¬ mendous landslips. The most disastrous took place in 1714 and 1749. By the former the sur¬ rounding district was shaken as by an earth¬ quake, and many human beings and cattle per¬ ished; by the latter the course of the Liserne was arrested, and two small lakes formed.

DIACAUSTIC (dl-a-kas'tik) CURVE, a curve of intense light, formed by the consecu¬ tive intersections of rays refracted through a lens.

DIACHYLON, dl-ak'i-16n, a combination of oxide of lead or litharge, olive oil and water. It is, in fact, lead soap, insoluble in water, and sparingly soluble in alcohol, hard and brittle while cold, but soft on heating. It is used in surgery as the basis of adhesive plasters.

DIACRITICAL MARKS. A mark used to indicate a special value for the letter to which it is attached. Such a mark may be a conven¬ tionalised letter as the ° in the Swedish a, originally an o, or the " in the German a, d, w, originally an e. Similarly the cedilla (j) under a c in French and Portuguese was formerly a z, and the Greek iota subscript was written in the classical period on the line like any other iota. The *or tilde over n in some Spanish words and English words derived from the Spanish was once nothing but another n.ˆ The accents and long and short signs explain themselves, and are nothing but arbitrary signs. In those Slavic languages which are written in Latin characters, and in other languages of eastern Europe, diacritical marks are enormously multi¬ plied. The Semitic alphabets represent the vowels and the modifications of the consonants by diacritical marks. English uses only the hyphen (-), the cedilla (j),_the tilde ()*, the diaeresis (• •)• The hyphen is not in the strict¬ est sense a diacritical mark; it is used to separate the components of certain compound

words. The diaeresis is placed over the second of two adjacent vowels which might be mis¬ taken for a diphthong: thus cooperate. The tilde

is only found in words from the Spanish, such as canon, and indicates that the n over which it stands is palatalised. The accents are used over a final e or ed to show it forms a syllable, as peaked, Bronte. A cedilla indicates that the c over it is pronounced like an s.

Diacritical marks are used according to sev¬ eral distinct systems in the various styles of phonetic spelling for scientific purposes. See Phonetics.

DIADEM, a band for holding together the adjusted hair of the head, a wreath or chaplet for the head or forehead. In Oriental antiquity it was employed as a badge of royalty or nobil¬ ity among the Egyptians, Assyrians and Baby¬ lonians. It was called nefer among the ancient Jews, and was worn as an ornament by kings and high priests, when it took the form of a golden circlet for the brows. Among the Per¬ sians, Armenians and Parthians, the kingly and queenly diadem was a broad band of pale blue. Alexander the Great adopted this regal decora¬ tion after contact with the Persians, and his suc¬ cessors followed his example in this fashion. The Greeks early adorned their greater gods with the diadem, notably Zeus, Hera and Aphro¬ dite, and it later became the universal ornament of their women, and their young men, especially the Olympic victors. These diadems were made of such various materials as metal and leather. Among the Romans Ancus Martins introduced the diadem from the Etruscans, but it was abol¬ ished on the expulsion of the kings. Which of the Caesars revived its use is not known. Ac¬ cording to some authorities Aurelian first as¬ sumed it. Its use among the non-Roman kings and princes of Europe appears to have been universal. Under Constantine the Great the imperial diadem was studded with gems and took a form which rendered it the prototype of the crowns worn by mediaeval and modern monarchs. See Crowns.

DIADEM SPIDER, a common spider (Argiope diadema) so named from its mark¬ ings, found throughout Europe. See Spider.

DIADUMENOS (Greek, binding around), famous statue by Polyclitus, showing an athlete binding a wreath about his head.

DI.ffiRESIS, di-er’e-sis, in grammar, the resolution or separation into distinct syllables of two vowels whose juxtaposition has either caused them to coalesce or threatened them with coalition. In printing, a mark (“) placed over the second of two adjacent vowels to indi¬ cate that they should both be pronounced : as, aerated.

DIAGEOTROPISM, a forni of sensitive¬ ness to gravity, in which the_

bending part grows at right angles to the direction of gravity. See Geotropism.

DIAGNOSIS (Gr. from dia, through, and gnosis, knowledge), in medicine, the discrim¬ ination of diseases. It includes the study of all the vital phenomena of diseases, and also of their appearances after death, in so far as this can aid their discovery during the life of a patient. It is usual to speak of _ rational or physiological diagnosis, or diagnosis by symp¬ toms, that is, changes chiefly functional, ob-

served by the patient ; and of physical diagnosis, or diagnosis by signs, tnat is, objective phenom¬ ena appreciable by the senses of the observer by means of tests of the throat, chest, abdomen, blood, eyes, urine, stool, heart, etc., with various instruments. The latter method of diagnosis has been much enlarged in scope and increased in importance by the modern methods in medi¬ cine of auscultation and percussion and also by the great advances made in physiological chemistry, and by the use of the microscope. Skill in diagnosis is one of the highest gifts of the physician.

DIAGONAL, DIAGONAL LINE, a

straight line joining two angles not adjacent, in a rectilinear figure. Every rectilinear figure of more than three sides may be divided by diag¬ onals that do not intersect, into as many tri¬ angles as it has sides, minus two. To find the number of possible diagonals, take three from the number of the sides, multiply the remainder by the number of the sides and halve the

product.

DIAGONAL SCALE. A device for graphically constructing fractional parts of a line, such as hundredths. A square is laid off with sides of unit length. This is then subdi¬ vided by equally spaced parallel horizontal lines dividing each side into 10 parts. The top and bottom are also divided into 10 parts, and

oblique lines are drawn from the upper left

hand corner to the first subdivision of the bot¬ tom, from the first subdivision of the top to the second subdivision of the bottom, *etc.* The

length of the mih horizontal line from the left side of the square to the place where it crosses

n m

the nth. oblique line will then be — + — : thus

10 100

the length of the 3d horizontal line to the place where it crosses the 5th vertical line will be .53. Diagonal scales are used in mechanical drawing and especially in plotting maps. The desired distance is laid off on the scale and transferred to the map with a pair of compasses.

DIAGORAS, di-ag‘6-rˆs’, OF MELOS, Greek philosopher ; b. Corinth about 412 b.c. He was a pupil of Democritus of Abdera. On account of his ridiculing the popular religion, he was charged with impiety, and received the surname of the Atheist. Fearing for his life, he fled from Athens and went to Pallene and finally to Corinth. He was the author of lyrics and two treatises, one against the gods and the other attacking the sacred mysteries.

DIAGRAM, a figure or geometrical delinea¬ tion applied to the illustration or solution of geometrical problems, or a description or sketch in general. A diagram is characterized by the subordination, conventionalization, or omission, of unessential features, leaving the emphasis to fall on the important points of the object to be represented. Anciently, it signified a musical scale. Among the Gnostics the name diagram was given to a figure formed by the superposi¬ tion of one triangle on another, and inscribed with some mystical name of the Deity, and worn as an amulet.

DIAKOVA, de-a-koVa, Montenegro, town in the extreme southeastern part of the country, 20 miles northwest of Prisrend, on a tributary of the White Drin. For many centuries it was

held by the Turks, being one of the most im¬ portant towns in the Kosovo vilayet. In the Balkan War of 1912-13 it was occupied by Ser¬ bia, and, in the subsequent rearrangement of territory and by agreement between Montenegro and Serbia, it was given to the former. The in¬ habitants, numbering about 15,000, are in great part Mohammedan and Roman Catholic Albanians.

DIAL, Sun. See Sun-Dial.

DIALECT, from the Greek dialektos, Latin dialectus, Ancient French dialecte, a conversa¬ tion, discourse, manner of speaking, language of a district or country; derived from the Creek verb dialegesthai, to speak through, or across. Hence the term dialect, strictly applied, signi¬ fies speech or vehicle of conversation, phrase¬ ology, idiom, apart — though not necessarily — from what is written. A dialect that is indig¬ enous or native to a particular place is called a vernacular. A striking example of the latter exists in the so-called Pennsylvania-German di¬ alect, a mixture of Frankish and Alemannic, which in recent years has blossomed into a literature. In relation to modern languages, dia¬ lect usually means a variety or form of speech differing from the standard or literary lan¬ guages^ ; a local variation. The French call this patois; their scholars distinguish dialects as variations of a language which is not a common or written language. In its widest sense the name dialect is applied to branch languages springing from a common root, as the Romance longues, French, Italian, Spanish, Portuguese and Rumanian, originated from a common Latin root. Dialects are not in all cases mutilated or corrupted forms of their standard language, for not only does every great language owe its origin to dialects, but is merely a promoted or elevated dialect itself. The English language arose from the Old Saxon, Old Frankish and Old Frisian dialects, with a large admixture of Latin, Norman-French and the standard or lit¬ erary French of Paris. But it was not till Chaucer's time, the latter half of the 14th cen¬ tury, that the East Midland dialect of Britain • — geographically located between the Northern and Southern dialects — became the English lit¬ erary language. There were then six great forms of local speech, divided into smaller groups. What decided the superiority — if there was any — of the East Midland dialect, was the threefold recommendation that it was the court language, the language of Wyclif's translation of the Bible, and the language in which Chaucer wrote. Despite his modern detractors, the influ¬ ence of Chaucer, ^ffhe father of English litera¬ ture,® was the predominant factor not in mak¬ ing, but in starting, the English language. Yet no one who knows that language as it is to-day could, without special study, read Chaucer's dia¬ lect and understand it. Philologists assure us that even Shakespeare's English, if spoken, would be quite unintelligible to our ears. Great languages need centuries to grow ; their scien¬ tific grammatical framework and vast vocabu¬ laries represent the contributions of untold thinkers and writers. Dialects, on the other hand, are not consciously created; their primi¬ tive origins are veiled in obscurity or, like the beginnings of human speech, entirely unknown. They grow and develop naturally

tensively written cannot well become fixed ; for that a literature is necessary. Chaucer wrote in his own dialect and laid the foundation of a literature; that dialect became the literary lan¬ guage. There were four distinct dialects in an¬ cient Greece — the Ionic, Attic, Doric and .diolic, each of which possessed a literature ; but the greater refinement and the cultivation of arts and sciences in Athens, where Attic was spoken, finally gave that dialect the superiority; it became the Greek language. Thucydides wrote in Attic, while Herodotus wrote in Ionic, yet none will assert that the «dialect» of Herod¬ otus w'as a corruption of that of Thucydides. The modern Greek, or Romaic, is derived from the Attic form, and is rather a dialect than a language, notwithstanding that it is the most important tongue in the Levant. The Tuscan dialect became the language of Italy through the genius of Dante, whose mother-tongue it was, as also of his great successor, Petrarch. Italian has many dialects, and even to this day the Italians have not decided which is the cor¬ rect form of the second person plural. More than half of the people use voi, and the rest, lei. The accident that Luther spoke the High German dialect and translated the Bible into it made that dialect the standard German lan¬ guage, though here again, as in English, enor¬ mous changes have taken place through the adoption of foreign words. The Low German or Plattdeutsch (Pladdiitsch) bears a strong re¬ semblance to English, while some of the South¬ ern German dialects are almost incomprehensi¬ ble to the High German. Just as London has its ˆTockneyˆˆ dialect, so both Berlin and Vi¬ enna have special German dialects, easily recog¬ nizable. In the Slavonic family of languages numerous dialects are also encountered. The Great Russian is remarkabl}ˆ free from dialects; Ukrainian or Little Russian may almost be re¬ garded as a distinct language with a literature of its own. But fully 80,000,000 people under¬ stand the literary Russian language- — the ”Mos-cow dialect.® Few living languages have so many dialects as the Arabic. Not infrequently one finds several different dialects spoken in the various districts of the same city. The literary Arabic is inviolably fixed by the Koran, but the ˆVulgar® Arabic of Egypt differs from that of the Sudan, while greater dialect groups exist in Syria, Tunis, Algiers and Morocco. Dialects of Turkish (one of the most scientifically con¬ structed languages) are spoken throughout cen¬

tral Asia to China, and also as far north as the White Sea. Maltese is a mixed dialect of Italian and Arabic. The Jewish dialects of Eu¬ rope, though based upon biblical Hebrew and the neo-Hebraic idiom of the Talmud and Mishna, incorporate many French, German, Spanish, Russian or Polish words, according to the country in which they are spoken. The so-called ˆWiddish® is largely German, and is un¬ derstood throughout Russia, Austria-Hungary and the Balkans. Chinese may be divided into two branches — the written language and the spoken language. The former is understood by all who can write, but the latter is so violently split up into dialects that sometimes Chinese of different provinces can only verbally com¬ municate with each other through the medium of ˆpidgin® English. In the Philippines some 30 distinct languages, divided into almost in¬ numerable dialects, are spoken both by the

Malayan and Negrito tribes. The great lan¬ guages of India present a bewildering mass of dialects. It is estimated that the Iramic and Indie groups of the Aryan family of languages have some 135 dialects; the Dravidian, about 30; the Tibeto-Burman, 84; the island of Sumatra, 14; Celebes, 5; Madagascar, 9; in Australasia, according to one British authority, there are 112 aboriginal languages and dialects, In Africa, Abyssinia possesses two dialects — the Tigre and Amharic, derived from the Ethiopic; the Bantu languages, Haussa, Suahelt and Yo-ruba, in fact, every native tongue, is split up into dialects or tribal vernaculars. Not a few, indeed, are unknown to white men.

From the above outlines it may be gathered that dialects are a most important factor in human speech. It is difficult, in fact, to draw a sharp line of demarcation between language' and dialect. French, Italian and Spanish were Latin dialects ; the Scandinavian languages, as well as Dutch and Flemish, began their careers as Teutonic dialects ; 'Portuguese and Spanish were cognate dialects which might have become one language if the two nations had not been separated politically. As regards the English literary language, it would be more correct to call that a dialect than some of the ˆˆprovincial® variations, for it is constantly changing, both in spellingˆ and pronunciation, whereas the ˆdialects® in remote places preserve their forms with but little divergence from those of their Saxon or Celtic ancestors. One who has traveled much in the British Isles or the United States can quickly distinguish a speaker's county or state. It may be said that there are but two distinct English dialects, the modern English and the Scottish ; on the other hand, few countries, if any, have more variations from the common literary language than the English-

speaking nations. The Scottish dia¬ lect exists in its purity only in the earlier poets, historians and other writers. In Britain every county has its peculiarities, which are some¬ times striking and difficult to be understood, es¬ pecially in Lancashire, Yorkshire and Devon¬ shire. The FVench-Canadian dialect is vivid and picturesque. There are several distinct dia¬ lects in the United States, as is shown by the dialect literature of the East, the West and the South, and dialect of the slums of New York. Much useful research work has been done by the American Dialect Society. Its valuable publication. Dialect Notes, furnishes interesting information on this subject, and The Ithaca Dialect, in which a local New York State dia¬ lect has been investigated by O. F. Emerson, shows that the differentiations of language in distinct sections will some day furnish abun¬ dant material for the student of dialect. British scholars have devoted much attention to the subject. Modern provincial English has been carefully studied, its origin traced and locality recorded in the papers of the English Dialect Society (1873-96). In 1898 the first volume of Wright's great ˆDialect Dictionaryˆ appeared (completed 1905). Consult Axon, W. E. A., ˆEnglish Dialects in the 18th Centuryˆ (London 1883) ; Bonaparte, Prince Louis Lucien, ˆOn the Dialect of Eleven Southern and SouthWestern Counties, with a new Classification of the English Dialectsˆ (London 1877) ; also his works on the Basque, French and Italian Dialects; Conway, Htalic Dialectsˆ (Oseford

1900); Ellis, Dr. A. J., ˆEnglish Dialects — Their Homes and Soundsˆ (London 1890) ; and ˆExisting Phonology of English Dialectsˆ (London 1889) ; Grober, ˆGrundriss der romanischen Philologieˆ (Strassburg 1906) ; Halde-man, ˆPennsylvania Dutch ˆ (1872) ; Moiiaci, ˆCrestomazia italiana dei Primi Secoliˆ (Turin 1913) ; Morris, Dr. R., ˆOn the Survival of Old English Words in our Dialectˆ (London 1876) ; Paul, ˆGrundriss der germanischen Philologieˆ (Strassburg 1900-09) ; Skeat, W. W., ˆ Seven Provincial English Glossariesˆ

(London 1874) ; and ˆ Ray's Collection of Eng¬ lish Words not generally used,ˆ from the edi¬ tion of 1691 (London 1874) ; Skeat and

El-worthy, ˆSpecimens of English Dialectsˆ (London 1879) ; Winkler, J., ˆDialektikorˆ (Berlin 1874).

Henri F. Klein,

Editorial Staff of The Americana.

DIALECTIC, the art of separating a sub¬ ject into its parts by discussion. It thus in¬ cludes both the use of reason and speech, and is the process of defining an idea or principle and testing the definition by showing all the consequences, both positive and negative, that it involves.

Aristotle is reported to have said that Zeno the Eleatic was the father of dialectic. The justification of this remark is found in the fact that Zeno defends the position of his school by showing through a process of reasoning the ab¬ surd and contradictory results that follow from the conceptions defended by their opponents. With Socrates dialectic is an art of investigat¬ ing a subject by means of conversation carried on by two or more persons, each of whom con¬ tributes something to the result, proposing defi¬ nitions, or calling attention to certain aspects of the subject, or certain negative cases that had been overlooked. Thus Xenophon (ˆMemora¬ bilia,ˆ Chap. V.) tells us that Socrates said that dialectic was so called because it is an inquiry pursued by persons who take counsel together, separating the subjects considered according to their kinds. Plato extends the use of the term and makes it the art of working up by a method¬ ological procedure of thought to a knowledge of the highest principles of things. As he says (ˆ Republic,ˆ bk. v.), it is the method by which ˆˆreason avails itself of hypotheses, not as first principles, but as general hypotheses, that is, as stepping-stones and helps whereby it may force its way up to something not hypothetical and arrive at the first principles of all things and seize it in its grasp.® For Plato then dialectic is the term used to describe all logical thinking. Aristotle, however, does not use the term to cover his art of logical demonstration from necessary principles, but ascribes to it a lower place, describing it as the method of dealing with what is merely probable, or of arriving at what is most likely to be true in cases when cer¬ tain demonstration is impossible.

The term dialectic has also frequently been used in ancient and modern times to denote an empty or sophistical art of playing with words or operating with concepts that have no real meaning or content. Thus Kant in the ‘Critique of Pure Reasonˆ employs the word in this sense to denote “the false pretense of knowledge that is based on illegitimate concepts that have no real basis in experience.® He

names the third main division of his work ‘Transcendental Dialectic,ˆ and devotes it to a systematic exposure of the emptiness and futility of this form of reasoning. Hegel, on the other hand, uses the term to describe the true method of the development of thought. According to him there is in thought an in¬ ternal principle of development in virtue of which it moves through three stages — from a thesis or positive position to the antithesis or negative view that is contradictory of the start¬ ing-point, then finally to the synthesis or recon¬ ciliation of the two opposing views. Hegel develops this into a universal method of pro¬ cedure, regarding it as a process that exhibits both the development of the thought-process and also nature of reality, and pointing out illus¬ trations of its course in history and in many departments of life and thought.

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

DIALLAGE, di’al-laj, a laminated variety of pyroxene of a green or brown color and of pearly lustre. It resembles diopside in com¬ position and is also closely akin to augite. The word is also used to designate bronzite and enstatite.

DIALOGUE, a conversation or conference between two or more persons. The dialogues of Plato are a sort of philosophical drama. The Socratic dialogue consists of questions and answers, and the person questioned is obliged, by successively assenting to the interrogatories put to him, to come to the conclusions which the questioner wishes to produce. The Socratic method has been adopted in modern times as a means of instruction in certain schools. Lucian claimed to be the inventor of humorous dia¬ logue (see Dialogues of the Dead). Erasmus of Rotterdam, and subsequently, among the Germans, Lessing, Moses, Mendelssohn, Engel, Herder, Jacobi, Solger, have written in this forrn. ˆ In comic and satiric dialogue Wieland has imitated Lucian. Among the most distin¬ guished Italian writers of dialogue are Petrarch (‘De vera sapiential, Machiavelli, Gelli. Al-garotti and Gozzi ; and among the French, Sar-rasin, Malebranche, Fenelon and Fontenelle. Among the English, Bishop Berkeley and Hurd have imitated Plato and Harris, Cicero. Lord Lyttelton’s ‘Dialogues of the Deadˆ (q-v.) and Addison’s ‘Dialogues on Medals,ˆ are well known, but Landor’s ‘Imaginary Conversationsˆ is the finest production in English belonging to this class of works. In the drama, the dialogue, in a narrower sense, is opposed to monologue or soliloquy; in the opera, it is that which is

spoken, in opposition to that which is sung.

DIALOGUES OF THE DEAD. Lucian is a remarkable figure in the world's literature. A native of Syria and living in the 2d cen¬ tury A.D., he wrote the best Greek that had been written in 300 years, and was, indeed, "the last great master of Attic eloquence and Attic wit.® At the same time he is distinctively modern in flavor, and with his wide knowledge and ex¬ perience of the world, his shrewd and penetrat¬ ing observation, fertile imagination, skilful de¬ lineation of character, dramatic power, rare wit and gift of satire, would have been as much at home in the 20th century as in the 2d. He bor-

rowed the dialogue from Plato but breathed into its severe and dignified form the mocking spirit of Aristophanes, to whom indeed he is close akin in spirit. The ˆDialogues of the Dead> are probably the best known, though not the best, of his works. The conversations of Odysseus with the various shades in Hades (Homer's ˆ Odyssey > XI) doubtless suggested the idea, but all else was original with Lucian; so that he may very properly be called the in¬ ventor of this style of composition, in which he has found many modern imitators, for example. Lord Lyttelton, Fontenelle and Fenelon, in their works of the same title, and Walter Savage Landor in his imaginary Conversations.ˆ Con¬ sult Rentsch, ˆDas Totengesprach in der Litteratur.ˆ The Dialogues are satires upon human life and society, the vanity of human hopes and pursuits ; wealth, power, beauty, strength, the disputations of philosophy furnished the ma¬ terials, and some philosopher like Diogenes or Menippus is usually the commentator. The shortest of the 30 dialogues may give some idea of their quality (VHI).

C. Why, 'tis the proverb fulfilled ! The fawn hath taken the lion.

D. What's the matter Cnemon?

C. The matter ! I have been fooled, miser¬ ably fooled. I have passed over all whom I should have liked to make my heirs, and left my money to the wrong man.

D. How was that?

C. I had been speculating on the death of Hermolaus, the millionaire. He had no chil¬ dren, and my attentions had been well received by him. I thought it would be a good idea to let him know that I had made my will in his favor, on the chance of its exciting his emula¬ tion.

D. Yes; and Hermolaus?

C. What his will was, I don't know, I died suddenly — the roof came

down about my ears; and now Hermolaus is my heir. The pike has swallowed hook and bait.

D. And your anglership into the bargain. The pit that you digged for other …

C. That's about the truth of the matter, con¬ found it,

Charles Forster Smith,

DIALOGUES OF LEOPARDI, The.

Leopardi's philosophical paragraphs, known to Italians as the ˆOperette moraliˆ are mostly in dialogue form; but they are not, as regards sub¬ stance, to be taken apart from the other prose works composed by him largely in 1824, pub¬ lished first in 1827, and again with slight addi¬ tions in 1832; nor apart from his ˆThoughts,ˆ belonging to his later days in Naples, and his ˆNotebookˆ compiled between 1817 and 1832. These works contain the clearest exposition of Leopardi's peculiar attitude toward life that we possess. In them many of the themes made famous by the poems are restated or an¬ ticipated in a different aesthetic compound. Here the sarcasm is merciless, violent and impotent, lashing men and nature in a despair that per¬ mits itself no delusions. The style shows traces of a certain pedantic classicism not wholly vivified by contact with the living Tuscan speech. Erudite also are the motives from which the humor is made to spring. But the movement is vigorous and the attack relentless. The dialogues are models of compactness, clarity, concision, representing indeed the re¬

sults of Leopardi's meditations on aesthetic theory and his ideas on prose forms, the de¬ velopment of which can be reconstructed from others of his writings.

Too little read by those Xvho know Leo¬ pardi only as a poet, the dialogues are, on the other hand, often overestimated as regards their philosophical value. Leopardi's pessimism is not a coherent system. His repudiation of justice, virtue, glory, patriotism, even of truth and love, is in reality an affirmation of these same objects as human ideals, though they are regarded by him as unattainable by man. What is con¬ sidered, and what he states, as his *philosophyˆ' amounts, thus, only to a social satire that easily degenerates under his vehement bias into an unreasoning and not rarely ungracious scold. Leopardi borrows the principal phrases and some of the spirit of French

mechanistic deism of the 18th century. Suppressing the absentee deity of that school — it was in truth a useless encumbrance in social reform — he has left on his hands a hollow lifeless world in which theoretically not even suicide is worth while and which is not resilient enough for a tennis match between Atlas and Hercules. What be¬ comes meanwhile of the humanitarianism, so productive in political and social consequence, that logically springs from the doctrines of French rationalism? This consequence Leo¬ pardi, gritting his teeth, everywhere denies ; but denies in words only; for humanitarianism re¬ mains the universal trait in his deepest moods, just as it is the teaching, if moral there be, of his dialogues. ®Live,® says Nature to the Soul, ˆffie great and unhappy.®

Greatness Leopardi defines as ˆliving in ac¬ cord with nature,® realizing the sublime ®excellence® of which man discerns the potentiality within him. If the first phrase is a platitude of the French philosophasters, the second con¬ cept embraces all the traditional formulae of classic and Christian ethics, abstracting, of course, the mystical virtues of faith. Hence the reactionary, aristocratic toryism of Leo¬ pardi's misanthropy, his ridicule of pretended progress, of social reform, of scientific dis¬ covery and applied inventiveness. These for him are so many phantoms, so many delusions with which cowardly, mean-souled mortals con¬ sole themselves because they are afraid to look the miserable unredeemable lot of mankind un¬ flinchingly in the face. In this destructive criticism of life Leopardi, it is apparent, holds no view of which the Catholic idealist of his time would not have approved. His pessimism is the point from which Manzoni starts to con¬ struct an edifice of Christian hope, and Foscolo to seek a reason for existence in aesthetic con¬ templation and artistic creation. Leopardi, on the contrary, spreads devastation around him¬ self and then rages at its melancholy expanse. With folded arms he views from a superior pinnacle the bootless struggle of humanity for a goal (happiness) beyond its reach; and from his solitude he looks forward to a time when men have become extinct, with insects and beasts inheriting the earth, the sun itself grown cold and a dim moon performing purposeless revolu¬ tions about a planet that is only a sepulchreˆ

If we put the dialogues in their true social and political tradition, we see how the republi¬ can and socialistic movements based on French nationalism failed to redeem and integrate

modern Italy. With their humanitarian impli¬ cations never developed to self-consciousness, it was a sorry appeal indeed they had to make to a suffering but aspiring populace. The dia¬ logues of Leopardi are representative of states of mind that contributed only negatively to the ˆResurrectionˆˆ of Italy. The positive forces are reflected with equal clearness in Manzoni's ˆ Betrothed.ˆ

Arthur Livingston.

DIALOGUES OF PLATO, Jowett's Translation of. The worst and the best of Benjamin Jowett's translation of Plato's Dia¬ logues is expressed in two contemporary epigrams. Ingram Bywater, Fellow of Exeter College, Oxford, and Jowett's successor as Regius professor of Greek, used to say, half in jest, ®I do not suppose he ever looked at any text of Plato beyond Parker's little Oxford edition® ; and it was the opinion of Sir Richard Jebb, of Cambridge, that ˆUowett made Plato an English classic.® The master of Balliol was, in fact, notoriously deficient in the so-called science of philology. The first edition of his Plato was replete with manifest errors, and the correctness of the third edition is owing in some measure to his docility in follow¬ ing the strictures of his critics. But even the third (standard) edition is not always a safe guide in details. But Jowett was not writing a crib, nor was his concern much with the nice¬ ties of Greek grammar. He was a theologian and a student of statescraft as well as a pro¬ fessor of Greek, and he was interested more in the character and practical career of his pupils than in their scholarship. Plato was to Jowett a depository of the wisdom of the ancient world, which, with the parallel wisdom of Christian theology, formed the basis of sound tradition. In such a spirit the Dialogues were offered to Englishmen, and it is in large measure owing to this spirit that the translation of the Dialogues has the manner of an English classic. More specifically, Jowett's success is attributable to his sensitiveness to the peculiari¬ ties of the Platonic style. The characteristic virtue of this style is its power of conducting a philosophical argument in the natural give-and-take of cultivated gentlemen seeking the truth together, or in the no less natural thrust-and-parry of a genuine seeker disputing with sophistical babblers and baiting them with irony and sarcasm. There never has been any other language, not even Greek in the hands of any other writer, so finely adapted as Plato's at its best

for just this sort of conversation, shift¬ ing as it does with incomparable ease from light to grave and from bantering personali¬ ties to the solemn intuitions of eternity. And it is just this note of refined and free-ranging conversation that Jowett, by some gift of sym¬ pathy, has caught and transferred to his Eng¬ lish. We seem not to be listeners among strange men in a remote age, but among men of modern London or Oxford discussing the ever old and ever new themes of justice and temperance and ˆ bravery and wisdom and the ways of God's high providence. If Jowett fails anywhere, it is in his rendering of some of the more poetical passages of the original, where for the moment the speaker is rapt out of the ordinary tone of conversation. At times Jowett is too little ˆfliterary® ; but the fault is on the

right side. Readers who have no Greek often ask how much of Plato can be got out of Jowett. They can get much, but not all. The chief obstacle in their way is the imperfect corre¬ spondence between the Greek ethical terms and their inevitable equivalents in .any modern speech. Thus, sophrosnne is commonly ren¬ dered by the English ˆffemperance,® and, indeed, no nearer equivalent is available. Yet ˆtemper¬ ance® is very far from covering the full sense of the original, which conveys the notion of moderation, but embraces also the wider notion of the mens sana in corpore sano and is deeply colored ˆ by the peculiar graces of Hellenic life. There is no possible way to acquire the right feeling for such a word — and a vast amount of Plato's philosophy revolves about just such terms — except by long familiarity with it in its native setting. What can be done to trans¬ fer that settine to a new medium, Jowett, per¬ haps, has done ; but he is not Plato, and English is not Greek.

Paul Elmer More.

DIALYSIS, a physical process used prin¬ cipally by chemists for the separation of crystalloid elements contained in a mixture with colloids, the former being bodies which diffuse readily, such as sugar, salt, bichromate of potassium, *etc.* ; the latter bodies which diffuse with difficulty or not at all, bodies resembling glue or gelatin, such as gum, starch, caramel, albumen, and many of the ordinary constituents of food. The dialysis is effected by pouring the mixed solution of crˆˆstalloid* and colloid on a sheet of parchment or similar animal membrane stretched over a wood or gutta-percha hoop in theˆ fashion of a tambourine. The parch¬ ment is allowed to float on a basin of water. In a short time all the crystalloid bodies will have passed

through the membranous septum into the pure water, while the colloid matter will remain almost entirely in the dialyzer.

DIAMAGNETISM, the phenomena of re¬ pulsion under magnetic conditions, as contradis¬ tinguished from the attraction shown in the case of iron, nickel and cobalt in the presence of a magnet. The substances exhibiting such repulsion to the magnetic force are termed diamagnetics. At the head of the list, as show¬ ing diamagnetism in the greatest degree, is bismuth. Other diamagnetics, more or less strongly marked, are gold, silver, copper, zinc, lead,_ antimony, cadmium, mercuiy, iridium, uranium, tungsten and some others. See Magnetism.

DIAMANTE, de'a-man'ta, Juan Bautista, Spanish dramatist : b. Madrid at what date is unknown; 1626, 1630 and 1640 have been sug¬ gested by various chroniclers. The date of his death is also unknown, but appears to have been previous to 1684. He was a knight of Saint John, and wrote about 50 plays. His earliest extant work is 'ˆEl honrador de su padre, ˆ based on Corneille's ˆLe Cid.ˆ His most popular work was ˆLa Judia de Toledo,ˆ a work which modern scholarship has shown to be only a slight redraught of ˆLa desgraciada RaqueP of Mira de Mescua. His pla3'S were published in book form (2 vols., Madrid 1670, 1679). The ˆBiblioteca de autores espanoles' contains four of his plays. Consult Fee, A. T.. A., 'ˆEtudes sur I'ancien theatre espagnol ; les

trois Cid> (Paris 1873), and Rennert, H. A., ˆAlira de Mescua et La Judia de Toledo > (in Revue Hispanique, Vol. VII, ib. 1900).

DIAMANTINA, Brazil, city lying some- \Tat north of the centre of the state of Minas Geraes, in a region formerly well known on account of its abundant production of diamonds. At the present tirne the wealth of the state is derived from agricultural and manufacturing industries ; nevertheless Diamantina continues to prosper, being well situated with reference to the Sao Francisco River system, and the routes of travel between Rio de Janeiro and the interior. Its climate is good, owing to its ele¬ vation above sea-level (about 4,000 feet). It lias an

Episcopal seminary and numerous public buildings. It has cotton and leather manufac¬ tures, and also diamond-cutting and goldsmiths' establishments. Diamantina was founded in 1730. It formerly was called Tejuco. Pop. about 14,000.

DIAMENIA, genus of venomous snakes of Australia. See Serpents.

DIAMETER, a straight line drawn through the centre of a circle, and terminated both ways by the circumference. It thus divides the circle into two equal parts, and is the greatest chord. The radius is half this diameter, and conse¬ quently measures the distance between the cen¬ tre and circumference of a circle. The length of the diameter is to the length of the circumfer¬ ence of the circle as 1 is to 3.14159265 …, the latter number being an interminable decimal. A diameter of a conic, in general, is the locus of the mid-points of a family of parallel chords, and is always a straight line. The one of the family of parallel chords that is also a diameter is said to be the conjugate diameter of the first one. See Quadrature of the Circle.

DIAMOND, a natural form of carbon, highly valued as a precious stone when trans¬ parent and of the crystalline form. The dia¬ mond crystallizes in the cubic or monometric system, its common form being the regular octahedron or a modification of it. The faces are often curved and the general form of the crystal is more or less rounded. The surface of the diamond frequently exhibits striae and triangular impressions, while the interior may contain microscopic cavities and various in¬ clusions, often black* carbon. It is the hardest substance known, but is cleavable : specific gravity, 3.52. It is generally colorless, but sometimes tinged with yellow, pink, red, orange, green, blue, brown or black. Blue, red and green are exceedingly rare colors. The finest deep red diamond known was that in the posses¬ sion of the Russian Crown, purchased in the time of the Emperor Paul of Russia. Light yellow, straw and brown are the most common colors ; rich yellow and browns are also highly prized. Some bluish-white Brazilian diamonds are phosphorescent in the dark after exposure to the sunlight. The color is attributed to the presence of a possible hydrocarbon, called TifTanyite. This phos¬ phorescence is a property peculiar also to alizarin. Exposed to the Roentgen or X-ray the diamond is transparent when radiographed, imitation diamonds appearing opaque. The diamond phosphoresces when exposed to roentgen rays, polonium or radium, retaining the light for some time. The brilliancy of

the gem is caused by the planes reflecting all the light that strikes them at an angle exceed¬ ing 24 degrees 13 minutes. The index of refraction is 2.439, being exceeded only by that in chromate of lead and orpiment. The diamond is unaffected by any liquid and infusible at the highest attainable temperature. It gradually burns away at from 760° to 875° C., according to hardness, before the oxyhydro- gen blowpipe, or when heated and plunged into an atmosphere of oxygen, carbonic acid then being produced. Exposed to the intense heat of the voltaic arc, the diamond becomes converted into graphite at 3600° centigrade. Besides its value as a gem it is of great use in the arts and manufactures. Diamond dust is used for polishing other gems, for slicing gems of all kinds, agate, jade and other hard substances. A crystal with natural rounded edges is used by glaziers for cutting glass, for engraving glass, steel and other substances ; the cut is generally to a depth of only 1-100 of an inch, but determines the direction in which the glass shall break; a cut of this depth, while scarcely showing, breaks well, whereas a deep scratch does not. Natural fragments or splinters or cleavages, either with the natural edge or sharpened to a point are used for engraving on glass and other hard substances ; a splinter is also used as a tool for turn¬ ing glass lenses in a lathe ; and rough diamonds, too imperfect to be used as gems, are mounted as boring tools for perforat¬ ing the softer rocks. The amorphous black variety, the carbon, carbonado, or bort, is used for boring hard rocks. Rock to the depth of a mile has been bored with this material. It sells for $90 a carat, the value per carat of a fine transparent rough diamond of from one to two carats, as often only 33^^ to 40 per cent of the crystal is left in the gem after the operation of cutting.

The finest old East Indian, the Jagersfontein, the Rivers and the blue Wesselton dia¬ monds are all of approximately one grade. The finest Jagers and the finest River diamonds are known as ^Txtra-Jagers® and ^Txtra Rivers® respectively. The Wesselton is the quality superior to a fine ^^Cape.® The Cry¬ stals, or fine Capes, as they are called, are of the first quality and always have a fine tint. The Silver Capes have a yellowish tint, while the Bywaters have a decided yellow tint. When the color is pure and rich yellow, it is known as ^Tancy yellow.® Diamonds from the Premier mine occasionally have the faint milki¬ ness or cloudiness of the Brazilian diamonds. Bultfontein diamonds are steel in color and occasionally contain minute black carbon spots. No whiter diamonds were ever found, even in India, than are now found in the Jagersfontein, the Wesselton and Bultfontein mines.

Originally diamonds were preserved in their crystalline forms. But about 1300 a.d. in Europe, and perhaps earlier still in India, the art of

polishing and shaping them seems to have been practised, and it was gradually perfected in the course of the ensuing centuries. Such an octah¬ edral diamond set in a gold ring was found on the hand of Charlemagne at his tomb in Aix-la- chapelle. The invention of the cutting of regu¬ lar facets by polishing the diamond on a rotating disk covered with diamond dust has been doubtfulb.' attributed to Lodowyk van Berghem

of Bruges, in the latter part of the I5th century. These circular discs, about 30 centimetres in diameter, are of soft steel covered with diamond dust and oil, and made to revolve at 3,000 revolu¬ tions a minute. This gives the diamonds the artistic smooth surfaces and sharply defined edges. They are secured in a fusible metal dop or holder, held by a metal clamp to the wheel. The process is slow and tedious, and requires great skill to produce fine results. Until thirty years ago Amsterdam was the great dia¬ mond-cutting centre of the world, but the finest cutting is also done in the United States, and in a great measure by machinery. As to the cutting process : Diamonds are, first, cleaved ; that is, along the line of cleavage of the stone a tiny cut is made by scratching the stone with another diamond at the point where it is de¬ sired to cleave it, then a dull knife-edge is placed in the cut, and a sharp blow will separate the stone on a cleavage plane. More recently, they are sawed with thin circular blades of phosphor-bronze charged with diamond dust and oil. Secondly, diamonds are cut by rub¬ bing two diamonds together (ˆdiamond cut diamond,® as the old adage says), the stones being cemented with shellac to two pieces of wood or handles which are held in the hands, and rubbed together till they are of the desired form. This also has been super¬ seded partly by an American machine. The diamond-cutting trade is carried on by 8,000 cutters and over 30,000 people are employed in preparing and setting the gems. A ®rose® diamond is one which is quite flat under¬ neath, with its upper part cut into 12 or more little faces or facets, usually triangles, the uppermost of which terminates in a point. A ®table® diamond is one which has a large rectangular face on the top, surrounded by four lesser rectangles. A ˆbrilliant® diamond is one which is cut in faces both at top and bottom ; including the table at the top and the culet at the bottom, there are 33 faces on the top above the girdle, and 25 on the back, 58 in all. Sometimes eight more facets are added making 66 in all. The greatest amount of brilliancy and beauty is developed in the diamond by the ˆbrilliant cut® ; 98 per cent of all modern dia¬ monds are cut in this form. Very few are at present ®rosecut® or ®table-cut,® though the rosecut has been more or less in vogue from the I7th century; the table-cut was favored during the 15th and 16th centuries.

Some of the square or oblong diamonds are brilliant-cut with pointed facets as on the other diamonds ; but there is another type of cutting known as the ˆemerald cut,® in which there are generally three rows

of gallery — or de¬ gree-cutting, as it is termed — above the girdle, and they are degree-cut in the back. The brio-lette is a stone that is pear-shape, heart-shape, or irregular shape, and is covered entirely with minute facets. The navette, or marquise, are obovate-shaped, brilliant-cut diamonds. The cut is adapted to the color of the stone.

Diamond cutters vary as to the angle of the dome or the pavilion of the diamond. When measured from the table over the edge to the girdle they vary from 35 degrees to 38 degrees; when measured from the culet over the side to the girdle, from 40 degrees to 45 degrees, al¬ though generally 35 degrees for the top and

40 degrees for the back are the accepted measurements.

Nearly all diamonds are cut in the brilliant form. This was first used in France in the 17lh century, under the influence and possibly at the suggestion of Cardinal Mazarin, who had a wonderful collection of diamonds which he be¬ queathed to the French Crown in 1661. Two of these Mazarins were sold at the sale of the French Crown jewels in 1887.

The combustibility of diamonds was proved in 1694 by Averani and Targioni with the aid of burning glasses. That diamonds turned to car¬ bonic acid when burned was proved by Lavoi¬ sier in 1772. Many curious superstitions are connected with the diamond. It was supposed to show phenomena of sympathy and antipathy. It was fallaciously believed that the diamond, which resisted the two most powerful things in nature, iron and fire, might be dissolved by the blood of a goat ; nevertheless, it could not be destroyed by being struck on an anvil, *etc.* It was believed also to show a curious rivalry with the magnet, to strengthen poisons, and sometimes to drive away madness.

That the diamond was known to the an¬ cients is problematical ; at most, occasional ex¬ amples may have been brought to the Graeco-Roman world about the beginning of our era. Two diamonds are mentioned by Castellani as being set in the eyes of an antique statue, but even this determination is doubtful. Therefore we may safely say that when the Prophet Jere¬ miah speaks of diamonds under the name of Shamir as tools for engraving, and when Ezekiel and Zechariah compare the stubborn¬ ness of the Israelites to the diamond, they refer to corundum. The same is true in almost all cases when the Greek and Latin writers allude to the adamas or adamant, the

®unsubduable® stone. The small, uncut, octahedral diamond crystals set in a very few Roman rings of the 4th century of our era, to be seen in the British Museum, represent all the positive evidence we possess that the diamond was known to the European world in ancient times. Still there is a certain amount of indirect evidence that the diamond-point was used by some of the later Graeco-Roman gem-engravers to a limited ex¬ tent. The ®point of a stone, more precious than gold® of the poet Manilius, who wrote in the 1st century a.d., has also been adduced as confirmatory testimony as to the importation of small Indian diamonds into the Roman world in early imperial times.

Authors and composers of Eastern tales long wrote of diamonds as being found in India only, and chiefly in the mines of Golconda — a mis¬ nomer, as Golconda was the market, not the mine; and diamonds from many mines were sold there. But ever since the year 1728 these stones have been found in great abundance in Brazil, no less than 1,146 ounces having been taken from there to Europe in 1730. In 1829 a few diamonds were discovered in the Ural Mountains; and in 1867, in South Africa, John O'Reilly, a trader and hunter, reached the junc¬ tion of two rivers, and stopped for the night at the house of a farmer named Van Niekerk. Children were playing with some pebbles they had found in the river. O'Reilly took one of these pebbles to Dr. Atherstone at Cape Town, who said that it was a diamond of 22ˆ4

carats. It was sold for $3,000. Niekerk remem¬ bered that he had seen an immense stone in the hands of a Kaffir witch-doctor, who used it in his incantations. He found the man, gave him 500 sheep, horses and nearly all he possessed for the stone, and sold it the same day to an ex¬ perienced diamond buyer for $56,000. This was the famous ^^Star» of South Africa. It weighed 85.77 metric carats in the rough, and was found to be a gem quite the rival of an Indian stone in purity and brilliancy. After it had been cut it was bought by the Earl of Dudley, and is now known as the Dudley diamond. By 1869, parties in ox-wagons had worked their way over the plains to the Vaal River. Soon a tented city of 12,000 or more foreigners grew at Pniel and Klipdrift, on the opposite banks of the stream, where diamonds were found plentifully. Soon hundreds of cradles, like those used by the Aus¬ tralian gold-diggers, were rocking on the edge of the stream, supplied with the precious gravel by a large force of diggers, sievers and carriers.

The Kimberley, or De Beers mines, 600 miles from Cape Town, are immensely valuable, and the great Premier mine in the district of Pre¬ toria, Transvaal, about 300 miles northeast of the Kimberley group, first worked in 1903, has in late years rivaled them in productivity; the New Jagersfontein mine, some 100 miles east of Kimberley, in the Orange Free State, is also a large producer. The total value of the diamonds mined in South Africa in 1913 was $55,000,000, and for the five-year period 1912-16, $160,000,000,. in spite of the fact that in 1915, on account of the war, less than $2,000,000 worth of diamonds were extracted. In the year 1913-14, a single group of mines, those of the De Beers Company, comprising the Kimberley, De Beers, Wesselton and Dutoitspan mines, fur¬ nished diamonds worth $28,000,000. In the 10-year period 1904-13 this company paid dividends amounting to $93,000,000 on its stock, and al¬ though the Great War interrupted such pay¬ ments for a time, they were resumed in 1916 when dividends of $6,000,000 were declared. The records of the other great South African diamond mining company, the Premier, show that for the entire period of its operation from 1903 to 1917, diamonds weighing 19,199,747 carats were recovered, their value ˆ

being $87,083,224. The stock dividends paid in this lime totaled nearlv $14,000,000, on a total capi¬ talization of £80,000 ($400,000).

The diamond fields of the Union of South Africa have produced in the half-century (up to 30 June 1917) since diamonds were first found in this region, stones worth the following enormous sums :

Transvaal .

Capp .

Orange Free State

598,141,150

702,596,679

70,641,828

$871,379,657

When we add to this the product of the German Southwest African mines, approxi¬ mately $35,000,0(X), we have a grand total for all the African field of about $900,000,000. If we estimate the added value of the cut diamonds made from the rough crystals, and add a rea¬ sonable profit for the diamond dealers, there can be little doubt that these African diamonds

were eventually sold for as much as $2,000,-

000,000.

LOADS OF BLUE GROUND WASHED, YIELD AND VALUE OF DIAMONDS FROM THE DE BEERS GROUP OF MINES, FROM 1888 TO 30 JUNE

1917.

Loads of

blue ground Carats of

washed diamonds Value

Kimberley and De-

Beers (1888-

1917) . 50,468,869 36,662,7831 $302,971,777

Wesselton (1897-

1917) . 32,047,389 9,437,0081 86,862,439

Bultfontein (1901-

1917) . 19,709,985 7,343,8491 71,667,251

Dutoitspan (1904-

1917) . 15,272,953 3,342,7451 75,198,367

Total . 117,499,196 56,786,3861 $536,699,834

Most of the miners are natives who are kept in compounds for periods of from three to six months ; this system has broken up the illicit diamond buyers (*I. D. B.ˆU system, which seriously threatened the successful work¬ ing of the mines. The chairman of the De Beers syndicate was Cecil J. Rhodes (q.v.), who by his genius and will

created the corpora¬ tion apparently out of chaos, and regulated the value of diamonds for over 12 years, the result being of great benefit to the jewelers of the world.

In 1908 a new diamond field was discovered in German Southwest Africa. Here the stones are found loosely scattered in a sandy over¬ burden, and are believed to have been blown down, or washed down, from a region to the eastward. In 1913, the year before the war, about 1,500,000 carats of diamonds were re¬ covered, and to sustain the price, the annual output was limited to 1,000,000 carats. The crystals are of good quality -but almost all of them are very small. In 1914 the Great War put a check upon active operations in this region, although some mining has been done during the British occupation.

The first instance on the American conti¬ nent of the occurrence of the diamond in the matrix — in its actual rock, peridotite — was described by the present writer as observed by him in Murfreesboro, Pike County, Arkansas, in 1906. More than two thousand diamonds to date have been found, one of over 16 carats, nearly all in the weathered debris of the peri¬ dotite rock and several of these in the rock itself. Diamonds have never been found in the original matrix in India or on the North or South American continents before this time.

More than a score of other localities in the United States have furnished in all several hun¬ dred diamonds weighing from 1 to 22 carats each, but not one of these was found in the matrix. California, North Carolina and Vir¬ ginia have supplied a few, and in Ohio, Indiana and Wisconsin occasional finds have been made ; the latter diamonds are traced to the glacial debris from Northwestern Canada.

Since 1867 diamonds invoiced at about $700,- 000,000 have been imported into the United States, and have been marketed as jewelry for as much as $1,500,000,000. There can be little doubt that the total value of the diamonds now owned in the whole world is approximately $3,000,(X)0,000 and that those in the United States represent nearly $1,500,000,000 or about one-half of the world's diamond holdings.

The yields of the mines in the various diamond-bearing districts are approximately as follows :

India . $50,000,000

Brazil . 150,000,000

German South West Africa . 35,000,000

Borneo . 1 , 000 , 000

South Africa (Transvaal, Cape Colony,

Orange Free State) . 900,000,000

Total . $1,136,000,000

which, after cutting and mounting, payment of

duties and placing in the hands of customers,

may well have cost $3,000,000,000.

Most of the great diamonds distinguished for beauty and size have very interesting histories. The most noted historic diamond is the Koh-i- nur of the English Crown jewels. It has been generally identified with the diamond given to Humayun, son of the Mogul Emperor Baber, shortly after the former's victory at Paniput, 26 April 1526. In his memoirs Baber relates that the diamond formerly belonged to Sultan Ala-ed-din, of the Khilji dynasty, who reigned over a great part of India from 1288 to 1321. There is a tradition that Ala-ed-din had taken it, about 1304, from a rajah of Malwa, in whose family it had been an heirloom for centuries. The legend runs that it was worn nearly 5,000 years ago by the hero Kama, whose deeds are celebrated in the ^^Mahabharata.® It is believed to have been guarded among the Mogul treas¬ ures of Delhi until 1739, when it was carried off as part of his immense plunder by the Persian Nadir Shah. After Nadir's death it was yielded by his weak successor, Shah Rukh, to the Af¬ ghan chief Ahmed in 1751. The latter's descend¬ ant, Shah Shuja, was forced to give it to Runjit Singh, the Lion of the Punjab, and in 1849 it was surrendered to the East India Company, whose directors presented it to Queen Victoria. The Koh-i-nur was shown to admiring

crowds at the London Exhibition of 1851. Its weight in its Indian cutting was 1861/16 of the old carats (191.10 metric carats), but after it had been recut in London in 1852 the weight was reduced to 1081ˆ metric carats.

The largest Indian-cut diamond was the Great Mogul, which weighed in the rough 817 metric carats (7935ˆ old French carats), but was reduced in weight to 287ˆ4 metric carats by the unskilful cutting of a Venetian lapidary. It was probably found about 1650. It was seen by the great French gem-dealer Tavernier at the court of Aurengzeb in Delhi in 1666, and is believed to have later formed part of Nadir Shah's booty. As there is no definite historic notice of it since Tavernier's time, this great diamond must either have been lost or else cut up into two or more smaller ones. Next in size among the Indian diamonds seen by Tavernier was a table-cut stone weighing 242 5/16 carats (249.46 metric carats). All trace of this diamond also seems to have been lost, although it may pos-' sibly be hidden away in the veiy mysterious Persian treasury, to which belong the ˆˆDarya-i-nuPˆ (Sea of Light), weighing 191 metric carats, and the ®Taj-e-mah® (Crown of the Moon), which weighs 150 metric carats.

One of the finest Indian-cut diamonds is that named the Sancy, after the Huguenot noble¬ man Nicholas Harley de Sancy, who owned it toward the end of the 16th century. There is a romantic tale to the effect that at the request of Henry III of France, Sancy sent this diamond

to the Swiss as pledge for the payment of a body of mercenaries. The messenger to whom he entrusted it was attacked and murdered, but instead of giving up the diamond swallowed it. Sancy had the body opened and found the gem in the faithful man's stomach. This diamond was sold to James I of England in 1604, and was one of the Crown jewels taken to the Continent by Queen Plenrietta Maria in 1642 to raise funds for Charles 1. It eventually came into the possession of Cardinal Mazarin, who bequeathed it with 17 other fine diamonds to the French Crown in 1661. In 1722 Louis XV wore it at his coronation. It disappeared from France during the Revolution and passed through various hands, being acquired in 1865 by the rich Parsee merchant Sir jamsetjee Jeejeebhoy. Later the Maharaja of Puttiala owned it. It now belongs to the son of Viscount Astor.

Regarding the early history of the Orlov many strange tales have been related, among others that it had formed one of the eyes of a Hindu

idol in a temple on the island of Sriran-gam, Mysore, whence it had been stolen by a French grenadier. It almost certainly belonged to the Persian Nadir Shah, and was probably part of the immense plunder he carried off from Delhi in 1739. After his assassination in 1747 the diamond was sold by one of his Afghan soldiers to an Armenian merchant, who event¬ ually disposed of it in 1775 to Count Orlov for 1,400,000 florins ($560,000) and a patent of nobility. The count gave it to Catharine II of Russia. The ˆ‘Orlovˆˆ weighs 194J4 of the older carats (199.73 metric carats). A much smaller Russian diamond is the ®Polar Star,ˆˆ a brilliant weighing 40 carats (41.08 metric carats). Of precisely the same weight is the diamond called the ®Pasha of EgypPˆ bought of Ibrahim Pasha for $140,000.

The ˆRegent® or ®Pitt® diamond was the great diamond of the French Crown jewels. It was bought in India by Thomas Pitt, governor of Fort Saint George, Madras, in 1701. Pitt sent the stone to England for cutting, its weight being reduced by this operation from 410 carats (422.10 metric carats) to 136ˆ carats (140.64 metric carats). After considerable negotiation Pitt sold his diamond to the Regent Orleans for il35,000 (about $675,000). It was stolen from the Tuileries in 1792, but was soon recovered. Later on it was pawned in Berlin and then in Amsterdam to raise money for the Republican army. During the Empire it adorned the hilt of Napoleon’s sword. The Regent was reserved for the state when the greater part of the French Crown jewels were sold in 1887, and has been placed in the Louvre Museum.

The famous Florentine diamond, now in Vienna, is an Indian-cut stone, acquired in the early part of the I7th century by the Grand Duke of Tuscany. After 1745, when Grand Duke Franz Stephan, husband of Empress Maria Theresa of Austria, was crowned em¬ peror of Germany, this diamond entered the Imperial Austrian Treasury. It weighs 137.27 metric carats (133ˆ of the older carats) and is of a yellowish hue. The assertion has often been made that it originally belonged to Charles the Bold of Burgundy, but there is no convinc¬ ing evidence of this.

The celebrated blue diamond of the French Crown jewels, valued in 1791 at $600,000, was

The Sancy

Natural Crystal

The Pasha of Egypt

The Great Mogul

Great Table Stone of India

The Shah

The Orloff

cut from a rough diamond of 115jˆ metric carats sold by Tavernier to Louis XIV in 16ˆ. When cut as a brilliant it weighed carats

(69.1 metric carats). It disappeared in the troubles of 1792. The splendid sapphire-blue brilliant, known as the Hope diamond, weighs 45.52 metric carats. In the Russian Treasury is a fine red brilliant-cut diamond weighing 10 carats; this was acquired during the reign of Emperor Paul. The collection }n the «Green Vaults^^ in Dresden, Saxony, includes a diamond of greenish hue weighing 41.1 metric carats.

A most interesting historic diamond is that called the ^^Shah,^^ given in 1829 by Prince Khusrau of Persia to Emperor Nicholas I to placate the tsar for the murder in Teheran of the Russian Ambassador. On polished faces of the crystal were engraved the names of Akbar Shah, Nisim Shah and Path Ali Shah; the latter began his reign in 1797. The weight of the ^^Shah® is 86 carats (88.19 metric carats).

The largest and finest brilliant in the world to-day is one cut from the great Cullinan crystal found in the Premier mine in the Transvaal in 1905, and which weighed in the rough 3,106 metric carats. This crystal was presented in 1907 by the Union of South Africa to King Edward VII, and was cut into several gems in Amsterdam in the following year. The largest of these, which outranks all other brilliants, is called ^^Star of South Africa® ; its weight is 530.2 metric carats. Another brilliant, from the same crystal, bears the name ^^Lesser Star of Africa,® and weighs 317ˆ3 metric carats; this stone ranks second among the world's brilliants. Next to these in size, among the South African diamonds, is the jubilee,® weighing 245 metric carats (239 of the older carats) ; before cutting it weighed 634 carats (650.81 metric carats). In 1893 the Jagersfontein mine supplied what was until then the largest diamond crystal ever found, the ˆExcelsior,® of 995 2/5 metric carats (969ˆ4 of the older carats). This was cut up into 10 brilliants, ranging in weight from 13.87 to 68.70 metric carats. Another large African diamond is that called the ˆVictoria,® weighing 457ˆ/4 carats (469.88 metric carats) in the rough and 184.77 metric carats as a brilliant. It was purchased by the

late Nizam of Hyderabad for $2,000,000. Still another noteworthy African diamond is the ˆTiffany Yellow® found in the Kimberley mine in 1877. In the rough it weighed 280 of the older carats (287.43 metric carats) ; in its present brilliant form its weight is ‘128.51 metric carats.

The largest diamond crystal in the world, as the Cullinan has been divided into several pieces, would be that called the *Braganza,® now in the Portuguese treasury, providing it were a genuine diamond ; but grave doubts have been expressed in regard to this and it has not been shown for over one century. The stone cornes from Brazil, and must have been found prior to 1746. Perhaps the fact that the Braganza diamond was never submitted to expertˆ exam¬ ination has contributed as much as anything else to the conjecture that it may be only a topaz. According to description, the stone is of a pro¬ nounced yellow shade, its form being oblong and rounded, with a depression on one side, but an illustration in the Gentleman’s Magazine of 1754 shows a rounded egg-shaped stone, sug¬ gesting an elongated rolled pebble; in other words a white topaz pebble and not a diamond.

It weighs 1,680 carats (1,728.72 metric carats). The diamond brilliant known as the ˆˆRegent® of Portugal, found in Brazil in 1775, weighs 215 carats (221.25 metric carats). Next in size among Brazilian diamonds is the ˆˆStar of the South,® found by a negress in the river Baga-gem in 1853. In the rough it weighed 261.37 metric carats, and when cut as a brilliant 128.83 metric carats (12514 of the older carats). It was sold to the Gaekwar of Baroda for

$450,000.

Erom 1750 to 1870 the value of a diamond was fixed on a basis of the square of its weight ; that is, a 1-carat stone was worth $100, a 10-carat stone was worth — 10 x 10 x 100 — $10,000. This was due to the fact that large stones were rare. But in the African mines, large stones are found, and the increase in value from one carat up is worth only a fraction more per carat than the carat weight would show. When brilliants are exceedingly minute the value per carat may be double that of stones weighing one-sixteenth to one-fourth carat each, owing to the difficulty of cutting. The term ®first quality® signifies a

stone absolutely white and free from all flaws and imperfections. Im¬ perfections, even if slight, or a tint of un¬ desirable colors, greatly lower the value of a diamond. Many are cut so small that they weigh from 200 to 400 to the carat or 30,000 to 60,000 to the ounce.

Since 1910 a radical change has been made in the weighing of diamonds and all precious stones, the standard now being a ˆmetric carat® of 200 milligrams, divided into hundredths in conformity with the decimal system ; this change was already suggested by the present writer as far back as 1893.* This new carat, which is the one now used in all European and American countries, is equivalent in weight to 3.08647 grains. It was officially adopted in the United States, 1 July 1913.

As the diamond is known to be a crystal¬ line form of common carbon, many at¬ tempts have been made to manufacture it by artificial means. No great degree of suc¬ cess has yet rewarded these efforts, al¬ though veiˆr small diamonds of apparently good quality can be prepared by methods now known. Carbon being practically in¬ fusible, it has not been found feasible to induce crystallization by causing the carbon to solidify from a molten condition. Free car¬ bon is soluble in but few substances, and from such solutions as can be prepared it is deposited mainly in the form of graphite. It dissolves to a considerable extent in melted platinum, but when the metal is allowed to cool and solidify, the carbon is all thrown down as graphite, and no diamonds are obtained. Of the more suc¬ cessful experiments of this sort, those of Moissan are best known. Moissan made use of the known fact that carbon will dissolve to some ex¬ tent in melted iron. Under ordinary conditions the carbon is here also deposited in the graphitic form ; but Moissan found that when the solution is allowed to cool under an exceedingly ˆ great pressure a small portion of it appears in the form of minute crystals that possess all the properties of the true diamond, even exhibiting the peculiar pittings on the surface that are

*At the International Congress of Weights and Measures, Chicago, 1893.

characteristic of the natural stone. His method consists in saturating the molten iron with car¬ bon and then pouring it into a mold and chilling the casting as quickly as possible by immers¬ ing it in water. The outer layers solidify under this treatment, while the interior is still quite fluid, and the powerful contraction of the sur¬ face gives rise to an enormous internal pressure. As the fluid core solidifies, the greater portion of the carbon that it contains is deposited in particles that are distributed throughout the mass. The casting, when entirely cold, is dis¬ solved in acids, and the residue is treated in various ways to effect the removal of the graph¬ ite and amorphous carbon. A small precipi¬ tate remains behind, in which tiny crystals of diamond may be distinguished. No stones that are large enough to be of commercial value have yet been prepared, and while the process is of great theoretical interest, it is far too ex¬ pensive, in comparison with the yield, to be practicable even for the manufacture of dia¬ mond powder for polishing and grinding pur¬ poses. Moissan's 200 experiments, costing $2,000, yielded one-half carat of diamond powder worth $1.

Minute diamonds have occasionally been found in meteorites, as in that from Canon Diablo, Arizona, at the American Museum of Natural History, New York city. This was one of the earliest instances of diamond identi¬ fication in a meteorite, the discovery having been made by Dr. G. A. Koenig, in 1891. The first find in a meteorite was made in 1888 by the Russian scientists Jerofeyev and Lachinov, in the case of one that fell, in 1886, three miles from the village of Novo-Ursi, in the govern¬ ment of Perm, Russia. A piece of the meteorite from Canon Diablo was dissolved with hydrochloric acid, separating the diamond dust, some of which was used under the direc¬ tion of the present writer to polish several ter¬ restrial diamonds, this being the very first in¬ stance of the polishing of an earth-born diamond by the dust of one dropped from the sky. One of these two stones is to be seen in the collection of the American Museum of Natural History.

These meteorites and diamonds were called to the attention of Dr. Henri Moissan by the present writer, and led to his further experi¬ ments and to the discovery of moissanite (named by the present writer) — a silicide of carbon having the hardness 9.5, next to the diamond. See Gems; Precious Stones.

George F. Kunz.

DIAMOND, Cape. See Cape Diamond.

DIAMONDBACK TERRAPIN (Mala-clemmys palustris). This far-famed turtle be¬ longs to the family Emydidce and may be recognized by the unhinged plastron or lower shell, the concentric grooves and ridges which mark each plate of the upper shell or carapace, the smooth unnotched jaws, smooth skin cover¬ ing the head, and dark olive or black color. Unlike most terrapins, the diamondback inhabits salt and brackish waters, living in the marshes which fringe our seacoast from Cape Cod to Texas. Formerly very abundant throughout this region, the constant extensive fishing to supply the markets has greatly reduced its num¬ bers, soˆ that the problem of its artificial propa¬ gation is now being taken up seriously. The

principal fisheries are in Chesapeake Bay and on the coasts of New Jersey and North Caro¬ lina. Although a considerable number are dug from the mud while hibernating, a much larger proportion are captured by means of traps, seines, etc., during the summer months, and are confined in pens, where they are fed on oys¬ ters, fish, and celery to fatten them for the win¬ ter market. From the point of view of the epi¬ cure, the diairyondback is perhaps the most famous and esteemed product of American waters, and during the season of greatest de¬ mand commands almost fabulous prices. Those commonly sold have a length of shell of from five to eight inches, and are supposed to be from 6 to 10 years old. The habits differ but little from those of other terrapins. They are omnivorous, lay their eggs in June and July in small nests excavated in some warm sandy bank, and hibernate during the winter after burying themselves a few inches beneath the mud. See Turtles.

DIAMOND-BEETLE, the Entimus im-perialis, a splendid coleopterous insect belonging to the family CurculionidcB or weevils. The ground color is black, but the insect is covered by a large number of scales which appear brilliantly green by reflected light. It is very abundant in some parts of South America.

DIAMOND-BIRD, an Australian bird (Pardalotus affinis), of beautiful plumage, re¬ ceiving its English name from the peculiar markings of its feathers. Its general color is gray and white, but spotted with red, yellow, orange, and black. It makes its nest in old tree-trunks, and sometimes burrows in the ground, or utilizes any chance excavation. It feeds on insects.

DIAMOND GAUGE, a gauge for estimat¬ ing the size of diamonds. In the staff are set crystals of graduated size, by which jewels are compared. The crystals are from one-quarter to one-sixty-fourth of a carat.

DIAMOND INDUSTRY, a most import¬ ant and far-reaching department of national and international commerce, which is spreading and increasing, year by year, especially in the United States. The diamond has been a precious stone procured with difficulty, treasured up with jealous care, and sought after by the rich and magnificent for ages. Diamonds are also indispensable for instruments employed in some of the manufacturing and industrial arts. A consideration of the diamond industry must include an account of the mining, polishing, importation, and sale of this gem. The dis¬ tribution of diamonds in the geological forma¬ tions of the world, their mining, etc., has been dwelt upon under the article Diamond (q.v.). It remains to point out some recent industrial facts of importance, with regard to the separa¬ tion of diamonds from the concentrates, which remain when the diamentiferous earth has been washed, after being brought to the surface at Kimberley ; their importation to America, and their artificial manufacture. In mining diamonds, it was necessary until recently to go very carefully over the concentrates to pick out the garnets and many other foreign sub¬ stances until nothing remained but the rough diamonds. This is a slow and laborious opera¬ tion, but it has been an essential part of the mining industry until it was superseded by

a discovery made a while ago. The discoverer was Mr. Fred Kersten, one of the employees in the sorting room. His discovery was acci¬ dental. A rough diamond and a garnet hap¬ pened to be lying on a small board on the bench where he was working. He happened to pick up one end of the board when the garnet glided off, but the diamond remained. Kertsen found that there was a coating of grease on the board which had retained the diamond, while the garnet slipped off. He procured a wider board, coated one side of it with grease and dumped a few handfuls of concentrates on it. Then he found that by holding the board in a slightly inclined position and vibrating it, all the con¬ centrates except the diamonds moved to the lower end and fell off while the diamonds re¬ mained in place. Then he invented a machine by which his discovery might be utilized. The invention was an entire success. All the gar¬ nets and other minerals that are not wanted pass over the surface of the table, while every diamond, large or small, is retained. The entire work is now done by machinery, and both the young inventor and the owners of the diamond mines are profiting by the new labor-saving device. The United States is a very large purchaser of diamonds. One-third of the entire amount of cut stones is owned in this country. The importations are increasing.

More than $49,529,845 worth of diamonds and precious stones were brought into the United States in 1912-13 according to the statis¬ tics of the Department of Commerce and Labor. This is the largest importation of diamonds and precious stones in a single year; since that date there has been a falling off, due to the war. Prior to 1887 the total had seldom, if ever, reached $10,000,000 per annum; from 1887 to 1893 the total gradually moved upward until it reached $16,000,000 ; then it rapidly fell to $5,500,000 in 1894, $7,500,000 in 1895, $6,750,000 in 1896, and $2,500,000 in the fiscal year 1897. In 1898 the total increased to nearly $9,000,000, in 1899 to over $14,000,000, in 1901 to $20,000,000, in 1902 to $23,000,000, and in 1903 it was about $30,000,000, making the total for the year 1903 not only more than in any preceding year, but 50 per cent in excess of 1901, double the figures in 1899, and more than six times the average during the period 1894-97.

The rapid growth in the importation of dia¬ monds, while it suggests general prosperity, also seems to indicate the development of a comparatively new industry in the United States — the cutting of diamonds. _ The total importations of diamonds alone in the 12 months ended with June 1910 amounted to $39,812,214, and of other precious stones $7,987,- 587. Of the $39,812,214 worth of diamonds imported, $10,232,604 were uncut diamonds ; this total of $10,000,000 of uncut diamonds is a large increase compared with the importations of un¬ cut diamonds in preceding years. However, in 1913-14 the importation of diamonds fell to a total of $25,314,787, of which $8,314,688 were uncut. In 1914-15 the importation was still less, due to war conditions.

The diamonds imported are divided by the bureau of statistics statements into two groups, namely : ^^Diamonds uncut, including miners', glaziers', and engravers', not set,^^ and ®Diamonds cut, but not set.^^ The value of diamonds uncut, including miners', glaziers', etc., imported in 11 months ended with May has grown from

$2,500,000 in 1898 to $10,000,000 in 1910, while that of diamonds cut but not set has grown from $4,000,000 in 1898 to $29,500,000 in 1910, these figures being in each case for the period of 11 months. This inference that the cutting of diamonds is becoming an important industry in the United States is strengthened by the fact that the census statistics of ^lapidary work^^ show that the total value of production of lapidary work in 1905 was over $7,600,000 against less than $500,000 in 1890, and that the value of the materials used in this work in 1905 was over $6,200,000 against less than $250,000 in 1890.

It is indeed worthy of note that although the largest percentage of diamonds is cut outside of the United States, and all of them mined in other countries, the most improved machinery and many of the patented devices for mining and cutting have been the products of American ingenuity. Even Gardner F. Williams is an American born and bred.

Although the annual production of diamonds has increased more than 1,500 per cent in the last 30 years, and though there are produced at the present time more than 3,000,000 carats annually as against 200,000 before the discovery in South Africa, the changed condition has come about in such a manner that the stone has not been cheapened in value, has been fixed on a more even market basis, and

has that much enriched the world.

The cutting branch of the industry has almost doubled in the past eight years, and now keeps employed between 700 and 800 men. Nearly five-sevenths of the diamond cutting of the world is done in Amsterdam and Antwerp, though New York has recently begun to make its influence felt in that direction. There are a number of cutting establishments in New York and Brooklyn, employing from 40 to 80 men each, and although the wages paid to American workmen are much higher than those paid in Europe, the advantage of better ma¬ chinery in America average^ the cost of cutting. This is especially true in regard to large stones, though not always so with respect to stones running below an eighth of a carat.

Details of the artificial manufacture of dia¬ monds in an electric furnace by Prof. Henri Moissan, at the University of Paris, were pub¬ lished in June 1903. His experiments were begun after his finding of microscopic diamonds in nature, in the ®blue earth^^ from the Cape, in the sands of Brazil, and in several meteorites. His researches showed that if carbon was pro¬ duced at low temperatures it was always ob¬ tained in the amorphous condition and no crys¬ tals were found. The details of the manufac¬ ture are thus described ;

®For his experiment, Professor Moissan utilized the pressure which is produced in' iron when it passes from the liquid to the solid state. It is known in fact that solid iron is less dense than when in fusion, as is shown by the fact that pieces of the metal will float on the melted bath, and it thus resernbles water in this respect. He melts the iron in the elec¬ tric furnace and saturates it with carbon, and to carry this out 200 grammes of Swedish iron cut into cylinders half an inch long and two-fifths inch diameter were placed in a carbon crucible and completely covered with powdered charcoal. The crucible was placed under the arc and heated during three to six minutes with

a current of 350 amperes at 600 volts. The cover of the furnace was removed and the crucible seized with a pair of tongs and plunged

quickly into a bath of cold water. The crucible and metal remain red for a few moments, giv¬ ing off gases which come to the top, then the whole cools off. It was not without appre¬ hension that the experiment was made for the first time, as it was feared that an explosion would be produced when the melted mass at 3,000 degrees came in contact with the cold water. But no bad effect is produced by the meeting of the hot mass and the liquid ; and during the first period the mass is cooled rather by a rapid radiation. In order to cool it by conduction, and thus more quickly, it was placed in iron filings. In this way the diamonds which were obtained were of a peculiar nature, and they contained specks of black carbon. The pressure seems to be less, and the transforma¬ tion of the carbon into the diamond is less com¬ plete. The experiment is, however, highly in¬ structive, as it gives a form of speckled dia¬ mond which is also found in nature. To obtain a more rapid cooling, a bath of melted lead was found the best; it was kept at about the fusing point, or 617° F. The crucible, heated as before, is quickly plunged into the bath of melted lead, which is about six inches deep. The iron, which is lighter than the melted lead, is detached from the crucible in masses which tend to form spheres and rise more or less rapidly to the top. When the iron is saturated with carbon in the furnace, it becomes so pasty that the crucible can be turned over and it will not run out, but when it cools off the metal soon becomes liquid and gives up graphite.

®The smallest spheres, half an inch in diam¬ eter, were solid and sufficiently cool on coming to the top. These spheres gave a good yield of diamonds and the latter were especially clear and brilliant, and the spotted form was absent. Some of the crystalline forms were very sharp. One of the transparent diamonds measured as high as 0.57 millimetre, and had a somewhat triangular form with the angles rounded off. It was perfectly clear. It is curious to note that three months after its formation it split into two pieces ; this, fact is significant, as some diamonds from the Cape show an identical ac¬ tion, this being no doubt due to irregularities of pressure at the time of formation. The samples of diamonds obtained by this method were interesting to examine as to their differ¬ ent form. Most of them were smooth and brilliant, while others had a grained surface. All the specimens had the particular lustre which is characteristic of the native diamond. When a ray of light is sent into the interior they appear to become luminous. Some of the specimens are cubes and octahedra, with rounded angles.^^ See Diamond.

DIAMOND JOUSTS, jousts instituted by King Arthur, ^^who (according to the Arthuric legend as set forth by Tennyson) by that name had named them since a diamond was the prize.^^ Before he was king he

came by acci¬ dent to a glen in Lyonnesse, where two broth¬ ers had met in combat. Each was slain; but one had worn a crown of diamonds which Arthur picked up, and when he became king offered the nine diamonds as the prizes at nine several jousts, Affine every year, a joust for one.® Lancelot had won eight and intended to

present them all to the queen, *when all were won.® When the knight at last laid them all at her feet, Guinevere, in a jealous rage, flung them out of the palace window into the river.

DIAMOND NECKLACE, a jewel the in¬ cidents connected with which have furnished materials for one of the best historical ro¬ mances of the Dumas. This necklace contained 500 diamonds, was valued at some $40,000, and was made by order of Louis XV for his mis¬ tress, Madame Du Barry. The necklace was not finished in the king's lifetime, and after his death the Du Barry was banished. Between the years 1783 and 1784 the charms of Queen Marie Antoinette had infatuated the Prince-Cardinal Rohan, who was led to believe, by the so-called Countess Jeanne de Lamotte-Valois, an un-principaled adventuress, that the queen recipro¬ cated his feelings. The cardinal was informed that the queen was anxious to purchase the diamond necklace and wished for him to be¬ come surety for the price to the makers, MM. Boehmer and Bassauger. The cardinal agreed to become security, the necklace was delivered, but never reached the queen. Jeanne de Lamotte and her husband, meanwhile, had dis¬ appeared from Paris, and were selling the dia¬ monds in parcels. The plot was discovered when the jewelers went to court complaining that the necklace had not been paid for. The cardinal and others concerned were thrown into prison. As the trial established rather the folly than guilt of any one excepting the Countess Lamotte, she and her husband were branded on the shoulders as thieves, and sentenced to life imprisonment. The resultant scandal greatly aggravated that popular rage which terminated in the French Revolution.

DIAMOND RATTLESNAKE. See

Rattlesnake.

DIAMOND SNAKE, an Australian python regarded by most naturalists as a variety of the carpet-snake (q.v.).

DIAMOND STATE. The popular name of the State of Delaware (q.v.).

DIAMOND WEDDING, the celebration of the 75th anniversary of a

wedding, at which presents of diamonds are given. Other anni¬ versary weddings sometimes celebrated are paper, wooden, tin, crystal, and china weddings, naniely, on the 1st, 5th, 10th, 15th, and 20th anniversaries ; while silver and golden weddings are celebrated on the 25th and 50th, respectively, presents being made to the bride of the material indicated in the title.

DIANA, a goddess of Italy whom the Romans subsequently identified with the Greek Artemis (q.v.). Diana was the protectress of slaves, who held a yearly festival in her honor. She was a virgin and no man was permitted to enter her temple. She dwelt in the groves and near wells. Madness and enthusiasm might be aroused in the hearts of men by this goddess. She was also the goddess of the moon, which fact accounts for her identification with the Greek moon-goddess, Artemis. She seems to have been originally the patron deity of the Sabines and Latins. Her temple stood on the Aventine and was built by Servius Tullius for the benefit of the Latin people. It seems prob¬ able that the worship of Diana was introduced at Rome by the Sabines and the Latins on the

occasion of the admission of these peoples to the plebiscite.

DIANA. One of the few readable pastoral romances is the Spanish ˆDianaˆ (1558) by the Portuguese Jorge de Montemor, whose name is usually given in its Spanish form as Montemayor. The pastoral tradition, taking its rise in the Mdylsˆ of Theocritus, the ˆ Eclogues ˆ of Virgil, and the late Greek story of ˆDaphnis and Chloe,ˆ had been developed by Renaissance Italy in two directions, one dramatic, the other nar¬ rative. The best representative of the narrative type had been the ˆArcadiaˆ of Jacopo Sannazaro (1502) (q.v.). From this work and from Spanish and Portuguese pastorals — es¬ pecially the ˆMenina e Mogaˆ (1554) of Bernar-dim Ribeiro — Montemayor drew inspiration for a tale in prose and verse that should set forth his personal disappointment in love, thinly dis¬ guising folk of a courtly world as moody rustics. His scene was no longer a literary Arcadia of conventional beauty in a time re¬ mote, but the Spain and Portugal of

his own day. His prose was allowed larger room than in the narrative of Sannazaro ; and it was more carefully wrought, more pictorial, more vigor¬ ous. In spirit, the ˆ Diana, ˆ like its prototype, displayed an urban interest in the life of nature, but the longing for an Age of Gold, so frus¬ trate and bitter in Sannazaro, was here absent. The drifting plot was better anchored, and the ideal of love was amplified.

Diana is a shepherdess in the fields of Leon admired by Silvano, whom she scorns, and by Sireno (the author), whom she approves. But Sireno, forced to be absent for a year, returns to find her wedded to Delio, a second rival, and to mingle his tears with those of Silvano, whom once he had feared. The woes of unrequited affection are thereafter portrayed, not only in Sireno's case, but in that of Selvaggia and a whole chain of shepherds and shepherdesses lov¬ ing at cross purposes. Eventually they find sur¬ cease of woe in drinking a magic potion that induces in their breasts a love requiting and requited, the situation somewhat resembling that in ˆA Midsummer Night's Dream. ˆ There are various inserted episodes, the most famous being the story of Felix and Felismena, which suggested to Shakespeare part of the plot for his ˆTwo Gentlemen of Verona.ˆ

Montemayor's fiction, left unfinished at his death in 1561, was continued three years later by Alonso Perez and much more agreeably by Gaspar Gil Polo, whose ˆ Diana Enamoradaˆ ranks little below the original. The Spanish rage for pastorals affected Cervantes and Lope de Vega, and touched the English, who were introduced to the ˆDianaˆ and its sequels in a translation by Bartholomew Young in 1598. Frenchmen felt its influence even more through ˆL'Astreeˆ of Honore d'Urfe, issued in several parts from 1608 to 1624. Three contributions in particular the < Diana ˆ made to the development of prose fiction ; first, it moved later writers to give rein to their feeling for landscape and their sense of nature's sympathy with man; second, it pointed the* way toward the analysis of love, a love romantic and absorbing, but in¬ trospective and sentimental rather than impas¬ sioned ; and, third, it taught a more aristocratic and gallant style than that of the romances of chivalry, offering models of courtly speech. For further inf ormation concerning the ˆ Diana, >

the English reader is referred to F. M. War¬ ren's ˆHistory of the Novel Previous to the Seventeenth Centuryˆ (1895), and to H. A. Ren¬ nert's ˆSpanish Pastoral Romancesˆ (1892).

Frank W. Chandler,

Professor of English, University of Cincinnati.

DIANA, Temple of, a splendid structure and one of the glories of the ancient world, erected at Ephesus in Asia Minor. It was erected at public cost in the year 620 B.c. and became a place of pilgrimage for all Asia Minor and Greece. Its architecture was remarkable for its period and was very rich in the interior. It was 129 metres long and 66 in width and was supported by 122 columns. At the end was erected the golden statue of Diana Artemis. Chersiphron of Cnossus conceived the plan of the temple and supervised its construction and his son. Metagenes, continued the work. Crcesus was a liberal contributor to the fund for its construction. In 356 b.c. the temple was burned by Erostratus, who wished to gain immortality through his act. Dinocrates superintended the reconstruction and it was this restored edifice which was one of the seven wonders of the ancient world. It was plundered by the Scy¬ thians in 263 and was definitely ruined by them. Archaeologists within the last 100 years have discovered traces of earlier temples on this site, notably by J. T. Wood in 1860-75 and by Hogarth in 1904—05. Fragments of the sculpture and some coins and other treasures unearthed by Hogarth now lie in the British Museum. Consult Ferguson, ˆTemple of Diana at Ephe¬ sus,ˆ in transactions of the Royal Institute of British Architects (London 1883) ; Hogarth, ˆExcavations at Ephesusˆ (2 vols., ib. 1908) ; Wood, J. T., ˆDiscoveries of Ephesusˆ (ib.

1876).

DIANA OF THE CROSSWAYS. This novel by George M'eredith is a penetrating study of feminine character in its marital and social relations. Diana, as Meredith proclaims, is ˆˆa positive heroine, with brains and real blood.ˆˆ Her youthful, loveless and unhappy marriage, her reckless plunge into the gaieties of London life, her impulsive and disastrous association with various public men, and her final union, after the death of her first husband, with the unassuming but substantial Redworth, constitute the basis of a brilliant presentation of English society and a delicate and subtle analysis of human nature. The heroine, we are informed in one of Meredith's letters, is modeled after Mrs. Norton, a granddaughter of Sheridan, and many of Diana's experiences resemble those of her prototype. But the central incident of the novel, Diana's sale of a political secret to the editor of a famous newspaper, was founded not upon fact, but upon rumor since disproved. In spite of certain flaws and inconsistencies in the delineation of the leading character' — her dereliction in the crisis of

her career is never quite reconciled with her asserted intellectual discernment— the novel is one of the best bal¬ anced of Meredith's contributions to English fiction. It is packed with thought, yet it is entertaining; it is sparkling with wit, yet its brilliance of expression is not so excessive as to be blinding; it is epigrammatic without being cryptic. The inspiring conception of woman¬ hood embodied in the heroine, — strong, inde¬ pendent, courageous, witty, without sacrifice of

charm and lovableness — should be pondered by all to whom the Victorian heroine is a namby-pamby emotionalist. The incisive discussion in the opening chapter of sentimentalism and sham realism should be studied by all who would gain discrimination in the judgment of fiction. An incomplete version, the basis of certain American editions, ran in The Fort¬ nightly Review from June to December 1884. The. enlarged and completed work was published in 1885. Consult Meredith's ˆLetters, ˆ edited by his son (London 1912) ; Henderson, M. Sturge. ˆGeorge Meredithˆ (London 1907) ; The Nation (Vol. XCV, p. 306; ib., pp. 328—

329).

George B. Dutton.

DIANA OF FRANCE, Duchess of Mont¬ morency and Angouleme : b. Piedmont 1538; d. 3 Jan. 1619. She was a natural daughter of Henry H; was formally legitimized, and mar¬ ried first to a son of the Duke of Parma, next to the eldest son of the Constable de Mont¬ morency. She enjoyed great influence at court under Henry IV, superintended the education of the young prince, afterward Louis XHI, and then retired from court.

DIANA OF POITIERS, pwa'te-a, Comtesse de Breze, Duchesse de Valentinois; b. 1499; d. 1566. At the age of 13 she married the Count

of Maulevrier, Grand Seneschal of Nor¬ mandy. She became in 1538 the mistress of King Henry H of France, in whose name she ruled with unlimited power. Till his death in 1559 she exercised such an absolute empire over the king by the charms of her wit and grace that her superstitious contemporaries ascribed her power to magic. Upon his death she retired to her castle Anet, where she established a charit- .able institution for the support of 12 widows. Medals are still to be seen bearing her image, trampling under foot the god of love, with the inscription, Omnium victorem vici (I have con¬ quered the universal conqueror).

DIANA MONKEY, a monkey (Cercopi-theciis diana), native to the west coast of Africa. Its name is given because it bears on its forehead a crescent of upright white hairs, suggestive of the new moon, which was the emblem of the Greek goddess Diana. It is black in color, streaked with brown down the back; the fore parts are pure white, as also is the long beard. It is gentle and easily tamed, but is not strong enough to endure captivity and change of climate. Hence the specimens sent to menageries usually die within a short time.

DIANA'S TREE {Arbor Diance), silver tree, is formed from a solution of silver in nitric acid, precipitated by quicksilver, and crystal¬ lized in prismatic needles which are grouped together in the form of a tree. To make this beautiful process visible, let a quantity of pure silver be dissolved in nitric acid ; then dilute the saturated solution with 20 to 30 parts of water and put in an amalgam of eight parts mer¬ cury and one part silver leaf, upon which after some days crystals are formed. The crystals consist of an amalgam of silver, or rather a definite compound of the silver and mercury. The name is formed from the supposed connec¬ tion between the moon and the metal silver.

DIANIUM, ancient name of Denia, Spain (q.v.).

DIANO MARINA, de-a'n5 ma-re'na, Italy, winter resort in the province of Porto Maurizio, on the Ligurian Sea, 20 miles east of San Remo, and adjoining the Riviera. It suffered greatly from an earthquake in 1887. There is a large trade in olive oil. Pop. 1,929.

DIANORA, a character in the fifth story of the 10th day of the ˆ Decameronˆ of Boccaccio. Chaucer's ˆFranklyn's Taleˆ is founded on this story.

DIANTHUS, a genus of the pink family {Caryophyllacece). The genus

has about 200 species, natives of the Old World. The name is said to be from the Greek and to signify Uove's flower.^^ The American species are all naturalized from Europe, and are fugitives from cultivation. The best known are maiden pink {D. deltoides) , which in summer is found in the region from eastern Massachusetts to Michigan, and the bunch-pink or sweet-william (D. harhatiis), found wild occasionally in the Eastern and Middle States.

DIAPASON, di-a -pa'zon (meaning com¬ plete, all-pervading), a term in music by which the ancient Greeks designated the octave. The French use the term for tuning fork and as equivalent to pitch. Diapason is also the Eng¬ lish name given to the fundamental sonorous, noble-toned stops of the organ.

DIAPEDESIS, dl-a-pe-de'sis, a process in which red and white blood cells pass through the walls of the capillary blood vessels. It is a constant accompaniment of inflammation, and is to be regarded as a protective mechanism on the part of the body, particularly of the white blood cells.

DIAPER, textile fabric used for towels and napkins, and formed either of linen or cotton, or a mixture of the two, upon the surface of vyhich a figured pattern is produced by a par¬ ticular method of twilling. In the fine arts the term is used for a surface decoration consist¬ ing of a repetition of a surface unit or units of design evenly spaced.

DIAPER ORNAMENT, in architecture, an ornamentation of flowers, or variegated figures, applied to a plain surface, either carved or painted. If carved, the flowers are entirely sunk into the work below the general surface. They are usually square, and placed close to each other, and are various in their pattern and design.^ The name is supposed to be derived from jasper with reference to the decorative effect of veining.

DIAPHANOSCOPE, an apparatus used to exhibit transparent pictures or photographs. It has an adjustable lens so that the picture may be exhibited at the same distance from the eye as the focal lens with which the picture was first taken. Ordinarily a glass positive of the picture is used.

DIAPHORETICS, or SUDORIFICS,

agencies that increase the secretion of sweat. The chief diaphoretics ar(* water, heat — in the form of hot packs, warm drinks, *etc.* — alcohol, ipecac, pilocarpine, opium, sweet spirits of nitre, salicylates,

etc. Diaphoretics are employed largely to reduce temperature, as they increase the perspiration and thus permit of a large amount of surface evaporation. They are also

useful agents often in the treatment of disease of the skin, since they cause an increased amount of blood to flow to the skin and thus improve its nutrition. Sweating is used to eliminate water in drops}ˆ and to relieve the kidneys from part of their excretory function when they are diseased. Sweating helps to reduce obesity, as the surplus fat is consumed to form water. In the case of chills and colds diaphoretics relieve internal congestion. See Perspiration.

DIAPHRAGM, di'a-fram. (1) In anatotny, a dome-shaped muscular partition found in the mammals, separating the abdominal cavity from the pleural cavities containing the lungs. It is attached to the lower end of the sternum, the ninth, tenth, eleventh and twelfth ribs, and the upper three or four lumbar vertebrae. Its general structure is that of a system of muscular fibres radiating from a central tendinous portion. It is pierced by the inferior vena cava, the oesopha¬ gus, the aorta, the thoracic duct, the greater splanchnic nerve, the azygos and hemiazygos veins and the sympathetic trunks. The dia¬ phragm is lined above by pleura, below by peritoneum, and on its lower surface are sup¬ posed to be the stomata by which the lymphatic system opens into the peritoneal cavity, although the existence of these openings is still a matter of dispute. It is innervated by the third, fourth and sometimes the fifth cervical nerves and by the phrenic nerves, which originate from the cervical plexus. It receives blood from the interior phrenic arteries below and behind, the diaphragmatic arteries above and behind, and the superior phrenic, musculo-phrenic, and superior epigastric arteries in front. Its venous circulation is carried on by the inferior phrenic vein. The diaphragm originates from the cervi¬ cal myotomes of the embryo. In the course of development it undergoes the same displacement backwards that characterizes the heart and lungs. This is shown in the adult by the cervical innervation of the diaphragm.

In breathing, the diaphragm causes inspira¬ tion by contracting, thus decreasing its upward curvature and enlarging the chest cavity. In expiration it is relaxed. It is the' principal respiratory muscle. See Respiration.

(2) In optics, an annular disc in a camera or telescope or other optical instrument, to exclude some of the marginal rays of a beam of light. The original form of this beautiful contrivance is the iris of the eye, which shuts out strong light and regulates the quantity ad¬ mitted.

DIARBEKIR, de-ar"be-ker', Asiatic Tur¬ key, city, capital of the vilayet of Diarbekir. It stands on a high bank overlooking the Tigris, and is surrounded by a lofty massive wall, built of blocks of black porous stone, the best houses being also of the same material. The principal edifices are the great mosque, a fine structure with a square tower, and originally a Chris¬ tian church ; and the Armenian cathedral and Chaldasan church, handsome buildings recently erected. The manufactures, once very extensive but now greatly decayed, consist chiefly of iron and copper ware, leather, silk, woolen and cot¬ ton goods ; the bazaars are well stocked with goods of every description and a limited trade is carried on with Syria and Aleppo. It is the seat of the patriarch of the Syrian Jacobites. Pop. about 38,000.

DIARRHCEA, a symptom of a disordered condition of the intestines, accompanied by too frequent movements of the bowels, due to their increased peristaltic (or wave-like) motion. Like dyspepsia, it is only a symptom of some pathological condition. Diarrhoea is usually the result of some indiscretion in diet, such as the eating of unripe or overripe fruit, improper or indigestible foodstuffs; or of poorly cooked, de¬ composed or tainted meats and fish, these in¬ ducing a kind of diarrhoea due to toxic sub¬ stances, and frequently alluded to as ptomaine poisoning. While relatively more prevalent in the city than in country districts, and oftener found among the poor than the well-to-do, it cannot be said that diarrhoea is particularly a disease of the city or of the poor, since severe and even fatal attacks of it frequently occur arnong the rich inhabiting the seaside or moun¬ tains.

The conditions that produce diarrhoea are varied and numerous. Exposure and sudden chilling of an overheated body, particularly of the abdomen, are potent causes ; and travelers who make frequent changes of drinking water are very susceptible to it. In these cases per¬ sonal idiosyncrasy plays an important role. The drinking of impure water and living in poor hygienic surroundings cause

diarrhoea. Whether sewer gas or pollution of the atmosphere has direct influence is a disputed point, but it is certain that direct drainage of polluted sewage from districts infected with epidemic diarrhoea into a water suppl}”- is a potent cause.

Daily variations of temperature, such as are experienced in the hot season from May to September, are familiar predisposing factors. Environment such as is found in densely pop¬ ulated districts where people live in damp base¬ ments, etc., with vitiated atmosphere and want of care, is in the same category of causes.

Diarrhoea is often caused by the irritating action of mineral poisons, such as mercury, arsenic and antimony, by overdoses of croton oil, etc., or by various cathartic nostrums. Worms of various species are likewise causative factors. Of late much attention has been given to these parasitic causes, notably that of proto-zoon Amoeba coli, so frequently found in the stool of diarrhceics, principally in tropical cases. Secondary diarrhoea is a phenomenon found during an attack of some antedating disease, as ulcer of the bowel, cancerous growths of the intestines and the inflamed and ulcerative stage of typhoid fever. In diabetes and Bright’s dis¬ ease it is mostly a form of eliminative diar¬ rhoea. In neurotic subjects psychogenic diar¬ rhoeas are frequent and are often very trouble¬ some. Nearly 25 per cent of the chronic diar¬ rhoeas are of psychogenic origin. They repre¬ sent unconscious wishes. These psychogenic diarrhoeas are characterized by the frequency of partly formed movements although this is not absolute.

The symptoms of diarrhoea naturally vary with the causes, though certain symptoms are common to all forms. One of these is the fre¬ quency and character of the stools, which may vary from 5 to 20 or more in a day. At first soft, and mixed with particles of undigested food, they gradually grow more liquid until almost watery, and are attended by griping colic¬ like pains about the navel. Flatulence and vom¬ iting are also prominent features, and thirst is

often great, owing to loss of liquids from the body through repeated evacuations. The pulse is usually quickened, though the fever is sel¬ dom high, and is of no serious consequence. If the diarrhoea become chronic or long continued, prostration ensues, though this contingency is infrequent. Secondary diarrhoea, due to chronic congestion or pathological changes in the intes¬ tines, is much more intractable.

The treatment of diarrhoea must necessarily vary with the inciting cause, though many cases recover spontaneously or need treatment for only a few days. Absolute rest and low diet are indicated in the toxic forms. If the attack is due to exposure or cold, the application of hot turpentine stupes to the abdomen, with the administration of small and frequent doses of opium and bismuth, may be all that is required ; when, however, it is due to offending food in the intestines, or to ptomaines, the prompt removal of these elements must be effected. Broken doses (one-tenth grain) of calomel every half hour, or a teaspoonful dose of Epsom salts in Vichy water, until the stools assume a more natural consistency, are prompt and efficient remedies. By far the most popular is a pre¬ pared dose of castor oil containing 10 to 15 drops of laudanum. This should be followed by astringent antiseptics, combined with opium and a digestive ; for instance, sulphocarbolate of zinc or soda, opium in either powdered or extract form, with blue-mass. Should the pain be excessive, chlorodyne, or hyoscyamine, or in extreme cases small doses of morphia may be given until the patient is relieved. For the vom¬ iting, small doses of hot water or plain lime water will be effective, and the application of the old-time spice-plaster or hot poultice will be found soothing. Some prefer the ice-bag. Should there be any oppression, aromatic spirits of ammonia, or stimulants like brandy or whis¬ ky, well diluted, will restore the strength, though this is seldom necessary.

The undue haste to stop diarrhoea suddenly, and the eagerness which patients exhibit to take large doses of paregoric or laudanum, or nos¬ trums called cholera drops or diarrhoea mixtures, in all cases are mentioned only to be condemned. A more rational course is to remove the cause, thereby assisting nature to regain her normal tone and reassert her disturbed functions.

In children and infants the same general rules should be followed, with modifications to suit each individual. In place of milk, substitute a milder form of nourishment such as egg, barley or rice water. (See Cholera Infantum). Another and more direct form of treatment than giving remedies by the mouth is the use of enemas, or both can be employed in conjunction. High rectal enemas are used of astringent anti¬ septics held in suspension in thin starch solu¬ tions, or with

turpentine added.

The constipation which usually occurs after recoveiy from diarrhoea had better be disre¬ garded for a day or two, when mild cathartics or laxative remedies can be used. Very effect¬ ive remedies are glycerine suppositories and enemas of cold water,

DIARY, a daily record of events or obser¬ vations made by an individual. It contains a narrative, more or less detailed, of matters of personal interest, often including the results of reading or meditation, Yet references to cur¬

rent events of general interest are sometimes introduced. This form of diary is also known as a journal. Books convenient for making such records are issued every year, containing be¬ sides the blank pages various reference tables, *etc.* The ®Ephemeris^^ of the ancients was originally a military record or journal, a day¬ book or account-book, also a collection of tables showing the position of the heavenly bodies, but passed into literature to mean a collection of records of what has happened on the same day in various years, or a mere general name for any form of periodical books or magazines.

Diaries have often furnished the historian with invaluable material, supplying the absence of public records and furnishing minute and in¬ timate details of manners and of motives that do far more to help us to understand the past than more formal records. Such documents as Robert Baillie's ^Journals,^ the ^Diaries^ of Pepys and Evelyn, and the ^Journals ^ of Greville are among the most valuable sources of real history.

DIAS, de'as, Antonio Gongalyez, Brazilian poet: b. Caxias, state (then province) of Maranhao, 18 Aug. 1823; d. 3 Nov. 1864. He was educated at the University of Coimbra, Portu¬ gal, and returning to his native country, en¬ tered the practice of law in Maranhao. He published at Rio de Janeiro in 1846 a volume of poems entitled ^Primeiros cantos,^ which was followed by his drama of ^Leonor de Men-donga^ (1847) ; ^Segundos cantos^ (1848) ; and ^Ultimos cantos^ (1850). In 1848 he was chosen professor of national history in the Col¬ lege of Dom Pedro H ; he was subsequently employed in the office of the Minister of For¬ eign Affairs, and in 1855 was charged with a scientific mission to Europe. His poetry has been exceedingly popular in Brazil. His works also include a report, ^Brazil e Oceania^ ; and several papers of importance on the migrations of the South

American Indian tribes in the collection of the Institute Geografico e Histor-ico of Rio de Janeiro.

DIAS, Henrique, Brazilian general: b. Pernambuco about 1600; d. latter part of the 17th century. He was a freed negro, who by his superior attainments rose in 1639 to the su¬ preme command of the colored soldiery of the Brazilian army. He took a conspicuous part in the protracted warfare which finally led to the overthrow of Dutch influence. The govern¬ ment failed to reward his services and he died in great poverty and neglect.

DIAS DE NOVAES, Bartholomeu, Por¬ tuguese navigator: d. 1500. In 1486 he was commissioned by John H of Portugal to con¬ tinue the exploration of the African littoral. He advanced along the Atlantic coast of the continent to within two degrees to the south of the Tropic of Capricorn, and 120 leagues further south than any point previously explored. Thereafter he sailed southward on the open sea and doubled without knowing it the merid¬ ional point of the continent and reached land about 40 leagues to the eastward. After reach¬ ing Rio de Infante (Fish River) he turned back, sailing along the coast. It was then he discovered the terminal point of Africa, which he named Cabo Tormentoso, or Cape of Temp¬ ests. The king later changed the name to Cabo de Buena Esperanza or Cape of Good Hope, In

December 1487 Dias reached Lisbon and was received with great acclaim. Ten years later, however, he saw Vasco da Gama chosen in his stead to lead the exploring expedition of 1497. He accompanied the latter to India and in 1500 went to Brazil with Pedro Alvarez Cabral, but perished in a storm on his return from this expedition.

DIASPORA. This was the name given to the Jewish emigrants in the time of the Apostles. The Jews were scattered abroad over the face of the earth. The Roman Empire had in many of its cities these Jewish colonies. In the lands east of the empire they found their way. Some remains discovered a few years ago seem to indicate their presence in far-off China. This widespread movement was due in some quarters to

forcible deportation by con¬ quering peoples, as in the Euphrates Valley. Other groups went forth after the failure of the Maccabean patriots to perpetuate their kingdom. Others no doubt left their native land for commercial reasons. Usually they had their own community organization, which sometimes became very powerful, as it did for instance in Alexandria. The organization was commercial as well as religious. The centre of the community was the synagogue. Every¬ where Jerusalem was the centre of the national worship. To its priests and temples tithes were paid by devout Jewish worshippers, sending them from all parts of the world.

DIASPORE (Gr. ®scatteringˆU> ˆ native hy¬ drated oxide of aluminum, having the formula AI2O3.H2O, and crystallizing in the orthorhom¬ bic system. It is commonly gray, creamy-white or lilac in color, though sometimes various shades of brown and yellow or colorless. It has a hardness of from 6.5 to 7 and a specific gravity of about 3.4. It is transparent to sub-translucent and exhibits powerful doubly re¬ fracting properties. The best-known localities in which it occurs are Chester, Mass., Newlin, Pa., in the United States and in Europe near Schemnitz, Hungary. Many specimens decrepi¬ tate strongly when heated before the blowpipe, separating into pearly scales that are scattered in all directions; and it is from this peculiarity that the mineral derives its name.

DIASTASE, di ‘a-stas, or AMYLASE, a substance belonging to the group of enzymes and believed to be itself a mixture of several simple enzymes. It is found in barley, oats and other plants and also in animal tissues. When in solution it possesses the prop¬ erty of causing starch to break up at the temperature of 156° F., transforming it first into dextrin and then into maltose. It is ob¬ tained by digesting in a mixture of three parts of water and one of alcohol, at a tem¬ perature of 113° F., a certain quantity of ger¬ minated barley ground and dried in the open air, and then putting the whole under pressure and filtering out the liquid. Such extracts evaporated at a low temperature in a vacuum to a thick syrupy condition are known in com¬ merce as *malt extracts.^^ Diastase is solid, white and soluble in water and diluted alcohol, but insoluble in strong alcohol. If 200 parts of fecula be mixed with 1,000 parts of water and a portion of diastase be added and the mixture kept at a temperature of about 156° F., the starch is converted gradually into dextrin

and then into grape sugar. The action of the diastase is threefold, liquefaction of the starch, hydrolizing it into dextrin and then

hydrolizing the dextrin into maltose. This triple function is regarded as proving the composite nature of the diastase. The action of diastase is prevented by acids, alkalis and some salts, but not by alco¬ hol or ether. A solution of diastase becomes acid and loses its power on starch. The ac¬ tion of the diastase of germinating barley is important in brewing, distilling and in the bak¬ ing industry. The composition of diastase has not been exactly determined. It is, however, an albuminoid substance. A body having the power of converting starch into sugar exists in saliva and is known as ptyalin. It is also an albuminoid and is probably analogous to diastase in its composition. Diastase is used in the man¬ ufacture of dextrin (q.v.). As malt extract it has a limited use in laundries for removing starch from stiffened fabrics before they are laundered.

DIASTOLE, di-as'to-le. In the description of circulation of the blood it was shown that Harvey first appreciated that there was a suc¬ cessive contraction and dilatation of the heart-muscle. The term systole has been applied to this contracted state and the term diastole to the succeeding dilatation,

DIASTROPHISM, one of the great proc¬ esses of dynamical geology, including all move¬ ments of the earth's crust produced by internal forces. See section on Diastrophism in the article on Geology, See also Mountains and Continent.

DIATHERMANCY, a term designating the property that is possessed in various de¬ grees by different substances of transmitting radiant heat. Bodies that are equally trans¬ parent, that is, bodies which have equal power of transmitting rays of light, are very different in their power of transmitting heat rays. Thus a thin plate of glass and a thin plate of rock salt may be nearly equally transparent, but the plate of rock salt has far superior power of transmitting rays of heat. This may be shown very simply. Let a delicate thermometer be placed near a lamp (but not above it) ; the mercury will rise on account of the heat radi¬ ated to it. If a plate of rock-salt be interposed between the lamp and thermometer, the mercury will fall slightly; but if a plate of glass of equal thickness with the plate of rock-salt be interposed, it will be seen that the greater part of the heat is at once cut off from the ther¬ mometer. The transparency of bodies to light does not at all necessitate their diathermancy. Thus clear rock-crystal, which is transparent, and smoky rock-crystal, which is opaque, are nearly equally diathermanous ; and solution of iodine in bisulphide of carbon, which is per¬ fectly opaque to light, is highly diathermanous. The diathermancy of plates of various thickness has also been determined. The diathermancy decreases very rapidly as the thickness

increases. See Radiation; Thermo-electricity. Consult Stewart, ˆTreatise on Heatˆ ; Deschanel, ˆEle¬ mentary Treatise on Natural Philosophyˆ ; Tyndall, ˆHeat as a Mode of Motionˆ (6th ed., London 1880).

DIATHESIS, in medicine, a term applied to the predisposition of the body which renders

it prone to certain diseases. The term is par¬ ticularly applied to inherited or congenital pre¬ dispositions which may, however, only become observable at a late period in life. While cer¬ tain sets of reactions are recognized as' being typical of human bodily processes in general, it must not be overlooked that each individual has peculiarities of composition and structure. Thus, there may be a constitutional lack of resisting power to the entrance of the tubercle bacillus. This condition is known as tuberculous dia¬ thesis. The chief types of diathesis are: bilious, or one in which there is imperfect elimi¬ nation of bile as a chronic condition ; calculous, a constitutional tendency to the formation of calculi or stones; cancerous, the imperfectly understood condition where cancers are liable to form ; nervous or psychopathic, an extreme sensibility of the nervous system, generally ac¬ companied by a tendency to derangement ; gouty, lithic, rheumatic, or uric-acid diathesis, a con¬ stitutional tendency to the accumulation of uric acid and urates in the body fluids and con¬ sequent liability to gout, rheumatism, *etc.* The recognition of a diathesis is often important in connection with the treatment to be adopted for any morbid state. The tendency to some diseases may also be defeated by the adoption of a habit of life unfavorable to its develop¬ ment.

DIATOMACEOUS EARTH, and DIA¬ TOMACEOUS OOZE. See Diatoms.

DIATOMS, a suborder of microscopic plants belonging to the class Alga. A plant of this suborder consists of a unilocular or a septate cell ; and its cells are composed of two symmetrical valves, multiplying by spontaneous separation. There are two well-defined sec¬ tions: (1)

Diatomea, including species invested with a silicious epidermal covering occurring both in fresh and salt water, often exhibiting exquisite sculpturings when seen under the miscroscope and testing the highest powers of the instrument; (2) Desmidiea, minute fresh¬ water plants of a green color, without a silicious covering. There are more than 4,000 distinct species scattered over all parts of the world. The walls of the cells are rendered hard by silica and they are reproduced by fission, the splitting taking place parallel to the longer axis. When the protoplasm escapes the cell walls retain their shapes and delicate markings. Enormous quantities of them are found as fos¬ sils in the beds of the Tertiary formation. Often the protoplasm of two diatoms will escape and unite to form a zygospore, which after a time will divide into two, each forming a new cell larger than before. Some diatoms are free and move rapidly through the water ; others secrete a mucilaginous substance whereby they attach themselves to various objects. In some cases the diatoms, after splitting, remain attached to one another, forming bands or ribbons. They are classified, according to the structure of the cell walls, three main families being recognized, according as they have on the principal face of the wall a distinct ridge (Raphidica) , an indis¬ tinct or false ridge (Pseudoraphidiea) , or no ridge at all (Araphidiea or Cryptoraphidiea.

The diatoms possessing a silicious epidermis have been eagerly studied of late years by mi¬ croscopical observers, who have greatly in¬ creased the number of genera and species. They

are universally distributed and their silicious coverings being indestructible, their remains arc accumulated and perpetuated in many localities, sometimes forming extensive deposits, as ot Richmond, Va., which is said to be built upon a stratum of these miscroscopically minute atoms 18 feet in thickness. Species of Arachnoidiscus and other genera of great beauty are obtained from guano. The berg-mehl or mountain-meal of Sweden consists of diatoms. The mud at the mouths of many rivers, the sediment of ponds, ditches and even rain-troughs, contain myriads of the same minute organisms. They were found by the Arc¬ tic navigators infesting the fields of polar ice; and they have also been detected in the dust evolved from volcanoes.

Their remains are found in rocks of many geologic ages, but are especially abundant in the Miocene beds of California. These organ¬ isms are believed to have yielded the organic matter necessary for the formation of the rich petroleum deposits of that State. Diatoms are the

source of the diatomaceous earth used in scouring soaps and polishing powders. Dia¬ tomaceous oozes are now accumulating on the ocean bottom. See Ooze.

DIATONIC, in modern music the term applied to compositions which follow the tones, intervals, or harmonies of the standard major or minor scales, without chromatic alteration. Originally from the Greek, meaning ^^through the tones,^^ the diatonic mode of the ancient Greeks — as distinguished from their chromatic and enharmonic mode — formed the foundation of their whole system of music, and was ar¬ ranged in three tetrachords composed of one semitone and two whole notes.

DIATRIBE, (Gr. diatribe), (a dwelling or lingering upon) originally signified a sustained discourse or disputation, afterward came to be applied to a violent and sweeping criticism, whether written or spoken.

DIAULOS. See Olympic Games.

DIAZ, deth, Don Juan Martin, (El Em-PECiNADo), Spanish patriot: b. Castrillo de Duero, Valladolid, 1775 ; d. 1825. He entered the army in 1792 and during the Peninsular War, at the head of 6,000 men, he successfully harried the French. In 1814 he was made colonel in the regular army and was later made field marshal by the king. In 1815 he petitioned Ferdinand VII to reinstitute the Cortes and for this he was thrown into prison and later banished to Valladolid. He joined the Con¬ stitutionalists in the insurrection of 1820, and in the short and unequal struggle he showed his former great courage. In 1823 he was captured, and after the restoration of Ferdi¬ nand, Diaz was exposed in an iron cage, im¬ prisoned in a loathsome dungeon for two years and then sentenced to death by hanging. He was stabbed to death when he resisted the executioners. The nickname, El Empecinado, ^^the one covered with pitch,^^ is that given by the peasants to the natives of Castrillo, from the fact that two rivers there form a black mud called pecina.

DIAZ, Miguel, Spanish explorer : b. Aragon second half of the 15th century; d. 1514. He took part in the second voyage of Columbus, and was one of the colonists of the island of Santo Domingo. He quitted the colony in 1495

in consequence of a duel, and took refuge with a few of his companions in the southern part of the island, where he married a native. Through the adyice of his wife he discovered the gold mines in this part of the island, the existence of which he communicated to Bartolome Columbus, whereby he reconciled him¬ self with the colonists, and led the way to the foundation of the town of Nueva Isabella, af¬ terward called Santo Domingo. He was made governor of Porto Rico in 1509, but his fidelity to the family of Columbus repeatedly brought him into trouble.

DIAZ, Porfirio, de'as, Mexican statesman; b. Oaxaca, 15 Sept. 1830; d. 2 July 1915. He received a classical education at the Oaxaca Institute, and had begun studying law when the war with the United States broke out. He served through that struggle in the National Guard, and on the conclusion of peace made a study of military science. On Santa Anna's ac¬ cession to the dictatorship, he left the army and practised law ; but returned and bore a con¬ spicuous part in the revolution of 1854. Subse¬ quently Diaz joined the Liberals then under the leadership and control of Benito Juarez, and as a member of this party he won a seat in Congress in 1861. He took the field to oppose the French troops and was taken prisoner, but made his escape; harassed Maximilian's troops till forced to surrender a second time at Oaxaca in 1865 ; besieged and captured Pueblo in 1867, and immediately marched on Mexico City, which surrendered to him 21 June. On the re-establishment of the republic he was an unsuccessful candidate for president. In 1872 and 1876 he led revolutions against the government and after three severe battles occupied the capital in the latter year. In 1877 he was elected president to fill the un¬ expired term of the fugitive president, Lerdo. His energetic and businesslike administration at once gained favor with and inspired con¬ fidence in foreign investors, and foreign capital soon began to flow into the country which en¬ tered upon a new era of development and pros¬ perity. According to the ®plan of Tuxtepec,^^ which he had proclaimed, he was ineligible to succeed himself. His secretary. General Gon¬ zales, was elected president and General Diaz was appointed chief-justice of the Supreme Court, and elected governor of Oaxaca. The new administration soon betrayed signs of weak¬ ness and it became ever more and more evidpit that if peace and prosperity were to endure Diaz must be again placed at the head of the govern¬

ment and so in 1884 he was reelected president ; in 1886 his partisans secured the abolition of the law prohibiting a second consecutive presidential term. As each presidential term expired the constitutional provisions for the election of chief magistrate of the nation were gone through, but it was evident to all that partisans of Diaz manipulated the returns. However, no real opponent appeared, at least no strong leader, until 1911, when Francesco Madero opposed what he called the dictatorship of Diaz. He was successful and in May 1911, Diaz resigned and departed to Spain. To Diaz Mexico is in¬ debted for her rise, progress and standing as a nation.

DIAZ, Ruy, Spanish soldier: b. Seville, Spain, 1503; d. Peru 1538. He went to Peru in 1532 with the expedition of Diego de Alma-

gro, and took part in the conquest of the province of Cuzco; then joined Velalcazar in the conquest of the province of Quito. He was sent by Pizarro to explore the valley of the Rimac, and it was in ac¬ cordance with his report that the site was chosen for the city of Los Re3-es (now Lima), and the city founded. When wˆar broke out between Almagro and Pizarro, Diaz sustained Almagro, was in the battle of Abancay, 1537, and other important engagements ; and was cap¬ tured at the battle of Salinas, 1538, and put to death.

DIAZ DEL CASTILLO, ka-ste'ly5, Ber¬ nardo (vulgarly Bernal), one of the Spanish conquerors of Mexico, and historian of that conquest : b. Medina del Campo, in Old Castile, about 1498; d. Santiago de los Caballeros, Guatemala, about 1590, leaving numerous descendants. His work, entitled ˆHistoria Verdadera de la Conquista de la Nueva Espafia,ˆ is of great value and interest. The date of his death is not known. Probably his family be¬ longed to the minor nobility : he says, when speaking of the conquerors, ®We were for the most part hidalgos, although some were not of such clear lineage as others® ; but he lacked the influence necessary to secure his appointment as an officer. . He speaks of himself as ˆhaving been in this country (Central America and Mexico) twice before the coming of Cortes, and the third time with him.® On the first occasion he accompanied Pedrarias Davila (q.v.) ; on the second, he took part in the expeditions to Yucatan and along the coast of Mexico under Cordoba and Grijalva (1517-18). Between 1515 and 1517 he visited Cuba; from Santiago de Cuba, on 18 Nov. 1518, he sailed with the Spanish fleet under Cortes ; during the next few years he fought, it is said, in more than 100 of the battles with the Indians preceding or following the capture of the City of Mexico ; and in 1523-24 he served under Pedro de Alvarado,

conqueror of Guatemala and Salva¬ dor. Alvarado established the seat of govern¬ ment in the native (Guatemalan) town of Almolonga, afterward called Santiago de los Caballeros ; and Bernal Diaz was made gover¬ nor of this town, as a reward for his service in the field. He writes na'iveU: was held

in no inconsiderable degree of estimation in my day as a soldier® ; and again, ®I was twice in the hands of the enemy who were carrying me off to sacrifice, but God gave me strength to escape out of their clutches.® In 1550 he was summoned to an important council at Vallado¬ lid, *as being the most ancient of the conquerors of New Spain.® His history was finished 26 Feb. 1568. Two licentiates who examined the work at that time, ^^observed that in regard to my style or language it was conformable to that in ordinary use in Old Castile, and that as such it was the more agreeable, not being embar¬ rassed with flowering affected phrases.® The particular merit of the history is that it gives to each of the officers and soldiers the credit which was his due, instead of ascribing the overthrow of the Aztec empire and the estab¬ lishment of New Spain solely to the genius of Cortes. ^^The historians Gomara and Illescas,® Diaz writes, ^^never chose to relate our heroic actions, leaving all our value and honors in the dark, where they would have remained v/erc it

not for this my true history and assigning such great merit to Cortes. Although they were right to a certain degree (in praising our leader), yet they should not have forgotten us.^^ So desirous is he to make known the exact truth, that at the end of his manuscript he writes, beg the printers (sehores impresores) for mercy's sake not to omit anything from or add anything to the foregoing.^^ The original manuscript has always been kept in Guatemala, first by the author and his . descendants and later by the municipality of the capital. Many editions appeared from 1632 to 1877, the chief being that in 3 volumes at Madrid in 1632, the English versions of Maurice Keatinge (1800) and John Ingram Lockhart (1844), the German editions by Ph. J. von Rehfues in 1838 and by Karl Ritter in 1848. Two French

versions ap¬ peared in 1877, one by U. Jourdanet, the other by Jose Maria de Heredia. In 1878 appeared two Hungarian editions, by Karoly Brozik, and by Moses Gaal. All these editions and trans¬ lations failed to do full justice to the original and caused many adverse opinions in regard to the ˆHistbria Verdadera.ˆ This was remedied, however, in 1904 when the first critical edition of the work was issued in Mexico by Genaro Garcia. Alfred Percival Maudslay published an English translation of this edition, with intro¬ duction and notes, under the auspices of the Hakluyt Society (3 vols., London 1908). By means of these publications the work takes its proper place as one of the greatest historical records by an eyewitness of the early conquest and settlement of New Spain.

DIAZ DE LA PENA, pe'na, Narcisse Virgile, French painter: b. Bordeaux, 20 Aug. 1807; d. Mentone, France, 18 Nov. 1876. He was of Spanish parentage, was left an orphan at the age of 10, was educated by a clergyman at Bellevue, where a snake-bite occasioned the amputation of a leg. At the age of 15 he was apprenticed to a porcelain painter, but ambi¬ tious of working in oils, about 1823 began to exhibit in the Salon. He in time won fame by his landscapes, which he peopled with nymphs, loves and satyrs. These figures are badly drawn, but as a colorist Diaz ranks highly among the painters of the romantic school in France, and to color he was content frankly to sacrifice form. He was also an exquisite painter of flower-pieces. He received the cross of the Legion of Honor in 1851. His pictures sold well and he amassed a large fortune, which he expended in great hospitality at his Paris studio. His principal works are ˆThe Fairy with Pearlsˆ ; ˆVenus and Adonisˆ ; ˆFoolish Girlsˆ ; ˆDescent of the Gypsiesˆ ; ˆSous Bois.ˆ The Metropolitan Museum, New York has several of his pictures. He is also represented in Baltimore and Chicago. Con¬ sult Muther, ˆHistory of Modern Paintingˆ (London 1907) ; Hustin, ˆLes artistes celebresˆ ; and Van Dyke, ˆModern French Mastersˆ (New York 1896).

DIAZ DE PINEDA, pe-na'-da, Spanish soldier: b. Torrelavega about 1500; d. Peru 1545. He went to Peru with Francisco Pizarro in 1531 ; explored the river Magdalena in 1535 ; and in 1539 became governor of the province of Quito. In 1540 he joined the expedition of Gonzalo Pizarro for the conquest of the Canelos and the exploration of the country east

of the Andes. He was sent in search of the party of Orellana, who had gone ahead to seek for supplies. In the course of the search, which was

unsuccessful, Diaz explored a large part of the course of the Amazon, but returned to the main expedition, which by his aid suc¬ ceeded in returning to Peru, though with heavy losses. When Gonzalo Pizarro revolted against the viceroy, Nunez, Diaz at first offered his services to the viceroy, but later joined Pizarro. He was surprised and defeated by Nunez, but escaped capture.

DIAZ DE SOLIS, Juan. See Solis, Juan Diaz de.

DIAZEUCTIC TONE, the name given to the tone interval separating the disjunct and the middle tetrachords in the Dorian scale of ancient Greek music.

DIAZO-COMPOUNDS resemble Azo-Compounds (see Coal-Tar Colors), in contain¬ ing the group — N2 — , but with the difference that in the former two organic radicals are united to the characteristic group, as R.N2.R, instead of one as in the latter.

These compounds were discovered in 1858 by Griess, who obtained them by treating aro¬ matic amino-compounds with nitrous acid ˆ at low temperatures. (See Amine). Following up his discovery he experimented with them in reaction with many substances, among these the amido-compounds, from which combinations were developed a series of brilliant direct dyes for animal fibres. The present economic value of the diazo-compounds lies in their availability as intermediates in the manufacture of dye¬ stuffs, and in this function they are not usually separated from the solutions in which they are formed, but are promptly converted into the dyes by a further operation.

When isolated they are colorless crystals, which dissolve readily in water, sparingly in alcohol, and not at all in ether. They are in general unstable, and when dry are explosive.

They are prepared by dissolving a molecular part of the chosen amine in water with from two to three parts of hydrochloric acid, and then adding slowly, while stirring a solution of one molecular part of sodium nitrate, keeping the apparatus cold — ˆat 35° to 40° F. When the mixture shows a slight excess of nitrous acid, the diazotisation is complete. This solu¬ tion is then added to a solution of one molecu¬ lar part of some amine or phenol, stirring constantly. The dye thus formed in some cases precipitates, in others it has to be separated out by the addition of sodium chloride or hydro¬ chloric acid. The benzenoid and naphthal-enoid amines are those most commonly diazotised on a large scale for commercial uses. Diazo-compounds are

also produced in a dry or paste form for the use of dyers in the pro¬ duction ■ of the so-called ˆingrain® azo-colors, which are developed directly on the textile fibres. Consult Beacall, T., ˆDyestuffs and Coal Tar Productsˆ (London 1915) ; Cain, J. C., ˆThe Chemistry of the Diazo-Compounds> (London 1908) ; Sidgwick, N. V., <The Organic Chemistry of Nitrogenˆ (Oxford 1910).

DIBBS, the English name of a simple game dating from remote antiquity. It consists in throwing up the joint bones of the legs of sheep and catching them as they descend first

on the palm and next on the back of the hand. The game is common enough throughout Europe and was known in ancient Greece as is proved by figures on Grecian vases depicted as engaged in the sport. In Scotland small stones are substituted for the bones and the game is popu¬ larly known as ˆˆchucks® or ®chuckie stanes.®

DIBDIN, Charles, English lyric and dra¬ matic poet and actor : b. Southampton, March 1745; d. London, 25 July 1814. He opened a lit¬ tle playhouse in London, the Sans Souci Theatre, and there brought out his own plays, enlivened with his own songs, set to music of his own composition, and with himself as the leading actor. He wrote probably 50 plays and operettas (best remembered among them ˆThe Quaker,ˆ an operetta), two novels, a ˆHistory of the Stage, ˆ and over a thousand songs. His ˆSea Songs, ˆ such as ˆTom Bowling,ˆ and ˆThe Flowing Can,ˆ are popular favorites still. He wrote an autobiography ˆProfessional Life>

(1803).

DIBDIN, John Thomas, English song writer and dramatist : b. London, 21 March 1771 ; d. there, 16 Sept. 1841. He was the sec¬ ond son of Charles Dibdin (q.v.) and in 1775, when only in his fourth year, was brought upon the stage as the Cupid of Shakespeare's ˆJubi¬ lee, ˆ

while Mrs. Siddons personated Venus. After being connected with various theatres, and writing great numbers of songs, he returned to London in 1795, wrote a number of dramas with great success for the minor theatres, and ob¬ tained an engagement at Covent Garden, with which he continued connected for 14 years. Among his numerous pieces the best known are ˆMother Goose, ˆ by which the theatres are said to have netted a profit of $100,000; the ˆHigh-mettled Racer, ˆ which was almost equally profitable; ˆThe Cabinetˆ; ˆThe Jew and the Doctorˆ ; and ˆPast 10 (J'clock,ˆ which long held the stage. He wrote a ˆMetrical History of Englandˆ (1813) ; and ˆReminiscencesˆ

(1827).

DIBDIN, Thomas Frognal, English bibli¬ ographer, son of the elder brother of Charles Dibdin (q.v.): b. Calcutta 1776; d. Kensington, 18 Nov. 1847. He became a popular preacher in London, and was well known there as a biblio¬ maniac. He proposed a club to dine together in honor of bibliography, which was established in 1812, under the name of the Roxburghe Club. This club adopted a rule that each member should every year reprint a book for presenta¬ tion to all the members. Of his numerous writ¬ ings those connected with bibliography are alone of any value. Among them may be noted ˆBibliomaniaˆ (1809) ; Bibliograpical Decam¬ eronˆ (1817) ; ˆTypographical Antiquities of Great Britainˆ (1810-19).

DIBON, the name of two cities mentioned in the Bible. 1. A city of Judah, five miles north of Arad, mentioned in Neh. xi, 25. At present it is known as Dhaib. 2. A city of Moab, five miles north of Arnon, built by the Gadites. It is referred to in Num. xxxii, 34, ib. xxxiii, 45 and ib. xxi, 30. The modern city is called Dhiban. For its historical connections consult Bdhl ˆKananaer und Hebraerˆ (1911) ; Schmidt, ˆMessages of the Poets ˆ (1911) and ˆ Songs of the Conquestˆ (in Journal of Biblical Litera¬ ture, 1914).

DIBRA, Serbia, a city near the Albanian frontier, three miles from the confluence of the Black Drill and the Radika. It is an important agricultural centre. It is fortified and was formerly the capital of the Sanjak of Dibra in the Vilayet of Monastir during the Turkish regime. It was taken by the Serbians in the Balkan Wars of 1912-13 and its possession con¬ firmed by the treaty of peace arranged in 1913. The population, mostly Albanians, with colonies of Bulgarians and

Serbians, numbers about

16,000. .

DIBUTADES, di-bu'ta-dez, Greek sculptor or potter of Sicyon; lived about 600 b.c. Al¬ though he is the reputed originator of work in relief, the only historical basis for his fame is a Corinthian work, bearing his name, supposed to date from before 600 b.c.

DICˆARCHUS, Greek philosopher: b. Messina, Sicily. He was a contemporary of Aris¬ totle and lived mostly in Greece and in the Peloponnesus. He wrote several works on geog¬ raphy, history, philosophy and politics. Per¬ haps his greatest work was his 'ˆLife of Hellas,ˆ in three books, an account of the geography of Greece, its political development, its public and private life, manners and popular customs. Only fragments of it have come down to us. Cicero's ˆ Republicˆ is supposed to be based on a work of Dicaearchus. Many works long at¬ tributed to this author are now known to be from other hands, of these the ˆCities of Greeceˆ was the chief. Consult Christ, ˆGeschichte der griechischen Litteraturˆ (Vol. H. 5th ed., Munich 1913), and Pauly-Wissowa ˆˆReal Encyclopadie der klassischen Altertumswissenschaft> (Vol. V., Stuttgart 1905).

DICiEUM, genus of Australasian and Oriental small birds, of the family Dicceidce and akin to the sunbirds. They are brilliantly colored, feed on insects and have melodious voices. They build purse-shaped nests of pliable material suspended from bushes. They are often called flower or honey peckers.

DICAST, a member of the popular courts of Athens. To Solon is attributed the institu¬ tion of these courts. From the citizens over 30 years of age about 6,000 were chosen annually by lot and of this number sections of from 20 to 500 members were chosen daily to hear cases. These dicasts listened to the speeches of the litigants and heard the evidence read; then they voted in secret, being sworn to give their decision in accord with the evidence and the laws. The dicasts were sole arbiters alike in points of law and in points of fact. Consult Lipsius, ˆDas attische Recht und Rechtsfahrenˆ (Leipzig 1905-), and Meier and Schomann ˆDer attische Processˆ (Berlin 1887).

DICE (plural of Die), small cubes of bone or ivory, on each of the six sides of which a number, ranging from one to six, is marked permanently. The sum of the two numbers on the opposite sides of a

die is always seven ; thus if six is at the top one is at the bottom, and so on. One, two, three, or five dice are used, according to the game to be played. They are placed in a cylindrical box about four inches high, and from one and a half to two inches in diameter, open at the top. The box is shaken and turned quickly up so that the dice will fall flat on the table. The aggre-

gate amount of the spots uppermost at each throw are summed up and placed to the score of the thrower. They are used for a number of purposes and various games are played with them. The principal games are ˆthrowing the dicedˆ ˆTound the spot,'ˆ ˆTentennial,ˆˆ ®multiplication,ˆˆ ˆ%oing to Boston?ˆ ˆMraw poker,® ®craps,® and ˆVingt-et-un, all of which are de¬ scribed in detail with the rules of each game in A. Howard Cady's ˆDiceˆ (1895). There is no period of history, and no nation, in which some form of dice has not been used. They are depicted on the early Egyptian monuments ; those excavated at Thebes can scarcely be dis¬ tinguished from the dice made to-day, and their use is attested by laws regulating the games pla3'ˆed with them in ancient Greece and Rome, as well as in most European countries. The invention of dice is attributed to Palamedes (circa 1,244 b.c.). But the use of cubes with numbered sides for gambling purposes is prob¬ ably much earlier. The Latin word for dice, tessercr, is derived from the Greek tesseres, Ionic for tessares, four, because it is on every side square. Numerous passages in the ancient writers, and very many representations in marble or paintings, show how frequent dice-playing was among them. Different from the tessercB, which were precisely like our dice, were the tali (which means, originally, the pastern bone of an animal — Greek, asiragalos). These were almost of a cubic form, and had numbers only on four sides, lengthwise. Three tesserce and four tali were often used together, and the game with dice was properly called alea, though alea afterward came to signify any game at hazard, and aleator a gambler.

DICERATHERIUM, an extinct genus of rhinoceroses which inhabited North America during the Oligocene Epoch, distinguished by a pair of

horns one above each eye, instead of on the middle line of the head.

DICEY, Albert Venn, English barrister: b. 1835. He was educated at Balliol College, Oxford, was called to the bar in 1863, and from 1882 to 1909 was Vinerian professor of English law at Oxford. In 1890 he was appointed Queen's Counselor. He has published ˆThe Privy CounciP (Arnold prize essay, 1860) : ˆTreatise on Rules for Selection of Partiesˆ (1870) ; ˆThe Law of DomiciP (1879) ; ˆLaw of the Constitutionˆ (1885) ; ˆEngland's Case against Home Rule> (1886); ˆTreatise on the Conflict of Lawsˆ (1896) ; ˆLectures on the Relation between Law and Public Opinion in England during the 19th Centuryˆ (1905) ; Hntroduction to the Study of the Law of the Constitutionˆ (7th ed. 1908).

DICEY, Edward, English journalist and author : b. Leicestershire, England 1832 ; d. Lon¬ don, 7 July 1910. He was graduated at Trinity College, Cambridge, and was from 1870 to 1889 editor of the Observer. He published ˆRome in 1860ˆ (1861); ˆCavour: a Memoirˆ (1861); ˆSix Months in the Federal Statesˆ (1863) ; ˆThe Schleswig-Holstein Warˆ (1864) ; ˆThe Battlefields of 1866ˆ (1866) ; ˆA Month in

Russia During the Marriage of the Czarewich> (1867); ˆThe Morning Landˆ (1870); ˆVictor EmmanucP (1882) ; ˆEngland and Egypt ˆ (1884) 'ˆBulgaria, the Peasant Stateˆ (1895) ; ˆThe Story of the Khedivateˆ (1902) ; ˆThe Egypt of the Futureˆ (1907).

DICHOGAMY, the condition arising in flowers whose anthers and stigmas do not mature at the same time. See Pollination.

DICHOTOMOUS (Gr. «divided into two equal parts®), a term specifically used in botan¬ ical description to designate any appearance of branching by forking. Thus the stems of some phanerogams — for example, mistletoe, doum-palm, and many inflorescences — for example, Caryophyllece, begonias — appear forked, while an ordinary fern-frond has no such appearance. The progress of morphological research has, however, shown that true dichotomy — for ex¬ ample, complete division of the growing point into two lateral apices, is really as characteris¬ tic of development of the fern-frond as of such obviously dichotomous vegetation as that of S elaginella ; while conversely the appearance of forking in phanerogams comes about simply by the suppression of the growing point, and the development of two new axes from opposite lateral buds. Outside the cryptogams, (q.v.) indeed, no case of true

dichotomy has been described, with the doubtful exception of the roots of cycads (q.v.).

DICHOTOMY in logic, a distribution or separation of ideas by pairs ; the division of a class into two subclasses opposed to each other by contradiction, binary classification as revived by Ramus against the Aristotelians ; the Platonic doctrine that all classification should be by dichotomy. Since Kant this opinion has found scant favor. In botany, a term applied to that kind of branching by a constant furcation or division into two parts, as where the stem of a plant branches into two branchlets, each of which in its turn divides into others, and so on. Example, the mistletoe. The veins of various ferns thus branch dichotomously. In astronomy, that phase of the moon where it appears bisected or is only half illuminated, as at the quadratures.

DICHROMATISM. The designation of a phenomenon among birds defined by Chapman as ˆffhe existence of two phases of color in the same species.® Some writers have included under this term, albinism, or lack of pigment ; melanism, or excess of dark pigment, producing an extensive or complete blackening of the sur¬ face (common in mammals, but rare in birds) ; and erythrism, or an excessive reddening of the plumage; but it seems best to learn these outside of the present subject, and also the matter of normal differences in color between male and female and adult and young individ¬ uals, for dichromatism implies the two phases existing independently of age, sex, or season® (Beebe, ˆThe Bird,ˆ N. Y. 1906). The subject has been most thoroughly considered by Leonard Steineger, but neither he nor any one else has been aWe to offer an adequate explanation of the condition.

The best known example is our little screech owl (Scops Asia) , known over almost the whole continent. Most commonly its beautifully mottled plumage is decidedly red or deep red¬ dish-brown in general tone ; but many specimens are purely gray. The size, special ornaments, voice and habits of both are alike ; but all the early American ornithologists considered them as two separate species, or else as young and old respectively — but some said the red ones were the adults and others the gray. In 1853, however, Dr. J. P. Hoy announced that he had

taken both red and gray young from the same nest; and now it is understood that both varieties often occur in the same brood and in any part of the country, although on the Pacific coast the gray phase predominates. The same tendency to be of two colors exists in several other owls, as the brown owl of Europe, and the California pigmy owl (Glaucidiiim) , as mentioned by Coues.

Dichromatism is also displayed by many other kinds of birds, notably those of the heron and family, and by certain seabirds. One of the jaeger-gulls appears in two different styles, one white on the under side, the other sooty-black all over. The reddish egret {Dichroman-assa rufescens) of Central America has a white phase long named separately as ˆTeale's® egret ; and ®Wurdemann's heron® is now considered merely a color-phase of the great white heron of Florida. The common little blue affords another example.

The only noticeable explanation ever offered for dichromatism is that it may indicate the beginning of a divergent, or ®nascent® species, which might subsequently become fixed by birds of the same phase mating; but experiments with the screech-owl have shown that red and gray young will appear ˆwhether both parents are red, or both gray, or one red and the other gray.® Barrows states Birds of Michigan,ˆ Lansing 1912) that it ®has been shown that in captivity the gray bird can be converted into a red one by feeding regularly with liver, and by withholding this fˆood afterward the bird has eventually resumed the gray plumage. This would seem to indicate that the color of the plumage may be largely influenced by the, char¬ acter of the food, yet it is difficult to see how this fact can be used to explain the conditions actually found in nature.®

Consult Steineger, ˆBirdsˆ (Standard Na¬ tional History, Vol. IV, Boston 1885) ; Allen, American Naturalist (Vol. II, 1889, p. 327).

DICHROISM (Gr. dis, «twice,® chroa, ˆAolor®), the property which many colored doubly refracting crystals have of exhibiting different colors in different directions. Thus the color of a green tourmaline appears very much darker in the direction of the vertical axis than when the crystal is viewed at right angles to that axis. As in many instances three colors are exhibited, the term ®pleochroism® (Greek pleon, ˆˆrnore®; chroa, «color®), being of a more general character, is often used. A crystal of iolite (dichroite) appears blue in the direction

of the vertical axis, yellowish-white in the di¬ rection of the macro-axis, and bluish-white in the direction of the brachy-axis. Dichroism is detected and measured by the instrument known as the dichroscope. This consists of a rhomb of Iceland spar with wedges of glass cemented at each end of it. These are enclosed in a metal cylinder with a lens at one end and a square opening at the other. If a section of a dichroic crystal is placed in front of the orifice and is viewed through the instrument, two colored squares are seen side by side, one corresponding to the ordinary ray, the other to the extraordinarv ray. Dichroism may also be observed by means of the polarizing microscope, by remov¬ ing one of the nicols and revolving the stage. TWs furnishes a method of determining in rock sections biotite, tourmaline, epidote and horn¬

blende, all of which are dichroic. Thus horn¬ blende is easily distinguished from augitc, which is not dichroic. Optically uniaxial crystals, or those belonging to the tetragonal and hexagonal systems, are dichroic ; optically biaxial crystals, or those belonging to the orthorhombic, mono¬ clinic and triclinic system, are trichroic. Iso¬ tropic bodies, including isometric crystals and also amorphous substances such as opal and glass, transmit the same color in any direction. Di¬ chroism, or the allied term ®Dichromatism,® has also been applied to those fluids which appear of different colors when viewed by reflected and refracted light; when seen in thick or thin layers, *etc.* For example, venous blood, or any blood impregnated with carbonic acid, hydrogen or nitrogen, appears, when seen in moderately thin laj-ˆers, to be of a purple color; while in ex¬ tremely thin layers it appears green. This property of marked color-variation is due to the difference in the absorption of the light-vibra¬ tions in different directions. The property of dichroism is a great aid to the jeweler in dis¬ tinguishing gems. Diamonds, spinels and gar¬ nets show no dichroism; sapphire, ruby, emerald, beryl, tourmaline, topaz and chrysoberyl all have characteristic dichroism. Consult Fulton, A. E. H., ˆCrystallographyˆ (London 1911).

DICHROITE. See Iolite.

DICK, Charles, American legislator : b. Akron, Ohio, 3 Nov. 1858. He was educated in the public schools, was admitted to the bar in 1893, and established his practice in Akron. He was in active service with the Eighth Ohio Volunteers during the Spanish-American War. In 1886-93 he was auditor of Summit County and in 1887-91 was chairman of the Republican county committee and of the Republican

State executive committee in 1892-94 and 1899-1907. He was secretary of the Republican Na¬ tional Committee 1897-1900. He was delegate to the Republican National Conventions of 1892 and 1896, and delegate-at-large in 1900 and 1904. He was a niember of the 55th to the 58th Congresses (1898-1904), and introduced the militia bill, known by his name, and which passed both houses. On 2 March 1904 he was elected to the United States Senate to succeed the late Marcus Alonzo Hanna. His term ex¬ pired in 1911.

DICK, Mr., colloquial abbreviation for Richard Dabley, a character in Dickens's ˆ David Copperfieldˆ (q-v.).

DICK, Sir Robert Henry, Scottish soldier : b. about 1785; d. 1846. He was son of a doctor in the service of the East India Company, joined the army in 1800, and as an officer took part in the Peninsular campaign, fighting at Busaco, Fuentes de Onoro and Salamanca. He gained added renown at Quatre Bras and Waterloo. He became major-general in 1837 and from 1841 to 1843 was acting commander at Madras. In the Sikh War of 1846 he was made com¬ mander of the third infantry division, and fell in leading a charge at Sobraon.

DICK, Thomas, Scotch theologian and educator: b. Dundee, 24 Nov. 1774: d. Broughty Ferry, 29 July 1857. He was educated at the University of Edinburgh for the ministry of the Secession Church. For tv'ˆo years he was pastor at Sterling. The next 20 years he taught school at Methven and Perth, and the last 20

years of his life he devoted to literary work. He wrote several volumes. Among them are ˆThe Christian Philosopherˆ (1823) ; ˆThe Philosophy of Religionˆ (1825) ; ˆThe Philos¬ ophy of a Future State ˆ (1828) ; ˆCelestial

Scenery ˆ (1838) ; ˆThe Sidereal Heavensˆ (1840); ˆThe Solar Systemˆ (1840); ˆThe Practical Astronomerˆ (1845). His writings were published in an edition of five volumes and later in an edition of two volumes.

DICK BEQUEST, a fund established in 1828 by James Dick of London with the object of encouraging active schoolmasters and to elevate the literary character of both teachers and schools. The fund is for the benefit of the parish schoolmasters of Aberdeen, Banff and Moray, Scotland, and now amounts to about ˆ00,000, yielding about $20,000 annually, which is distributed as an honorarium among the teachers according to their acquirements in English, geography, mathematics, the classical languages, pedagogics, *etc.* Consult Kerr, J., ˆScottish Education, School and University from Early Times to 1908ˆ (Cambridge 1910).

DICKCISSEL, dik-sis'sel, or BLACK-THROATED BUNTING {Spiza americana), a species of finch in which the male is easily distinguished by a conspicuous jet-black throat-patch on a light yellowish background; the upper parts in both sexes are grayish brown variously streaked above with both lighter and darker shades. During the nesting season the black-throated bunting inhabits cultivated fields of the eastern United States, especially southerly. It winters in South America. The song is a veˆ simple unmusical ditty, and the nest is built on or very near to the ground.

DICKENS, Charles, English novelist : b. Landport, England, 7 Feb. 1812; d. Gad's Hill, near London, 9 June 1870. Dickens, who was christened Charles John Huffham Dickens, was the eldest son and the second child among eight of John and Elizabeth Dickens. His father was a navy-clerk in the Portsmouth dockyard at the time of the novelist's birth; thence he was transferred to London, and, when Charles was five, to Chatham. Here Dickens learned to read and got some schooling. The most important influence of this early life was his acquaintance with the great novelists of the preceding cen¬ tury, Fielding and Smollett, and also LeSage and Cervantes, all of whom had much effect on his own work. He also read much travel, and had a good deal of pleasure in the ˆArabian Nightsˆ and the British essayists.

In 1821, the Dickens family returned to Lon¬ don, in straitened circumstances, and the fol¬ lowing year the elder Dickens was confined in the Marshalsea for debt, through hard luck and misfortune rather than, as his biographers are careful to explain, any fault or misdemeanor of his own. The young Charles was put to pasting labels in a blacking warehouse in Blackfriars, much as his hero, David Copperfield, toiled in the warehouse of Murdstone and Grinby, though he was not illused. Begin¬ ning with 1824 he got two or three years of schooling of no very profitable sort, and found some employment, first as lawyer's clerk, and later as newspaper reporter. In order better to

perfect his work in this field he learned short¬ hand and read with some system in the British

Museum. For a time, probably, he thought of becoming an actor, whose profession always had great charm for him, but this was definitely abandoned when, in 1831, his toil was rewarded by his being made parliamentary reporter, and later, in 1834, a regular reporter on the Morning Chronicle, an important Whig newspaper. At his profession Dickens worked with great en¬ ergy, but he found time also to begin the writ¬ ing which led to his great popular fame.

This was a sketch entitled ˆA Dinner at Poplar Walk,ˆ and it was published early in 1834 in the Monthly Magazine. By the begin¬ ning of 1836, enough had been published in that paper and the Evening Chronicle to make a vol¬ ume, which shortly appeared with the title, ˆSketches by Boz,ˆ the nickname of his boy¬ hood, which he used as a pseudonym for many years. The sketches were so successful that Dickens shortly found it profitable to buy back the copyright for 13 times the £150 that he had originally got for it. The same year (1836) he married Catharine Hogarth, eldest daughter of George Hogarth, the conductor of the Even¬ ing Chronicle.

The five years following the appearance of the ˆ Sketchesˆ were marked by an enormous amount of production of varied and admirable quality and great popular success. In that year, at the request of Chapman and Hall, he began the ˆPosthumous Papers of the Pickwick Club.ˆ The original idea was to have a humorous run¬ ning account of a party of unlucky sportsmen, illustrated with suitable pictures. The idea, after the first few numbers, took a more serious turn in Dickens' mind, and though the humor to the end remained unfailing, the characters grew in depth and intensity and became less caricatures by the time of the close of the publication in 1837. The book was almost in¬ stantly popular, it achieved success such as few books have had, and is to-day probably the most familiar of Dickens's writings.

In February 1837, while ˆPickwick Papersˆ was still in progress, there appeared the first instalment of Dickens' first regular novel, ˆOliver Twist. ˆ Besides being a more coherent story than ˆ Pickwick,ˆ though not, even so, a very closely knit narrative, this successor was of a type common in the author's later work; it had a purpose. Strong hints of the type are to be found in ˆPickwick, ˆ as in the trial of Bar-dell vs. Pickwick and Mr. Pickwick's own im¬ prisonment, in which scenes the

intention is not wholly comic. In ˆOliver Twistˆ there is a deliberate representation, somewhat along the lines laid down by Fielding and Smollett, of the under side of life, and there is also an attack on the iniquity of the administration of charity schools and the poor - law. The most intimate and affecting parts of the story are those dealing with the subterranean life of the young pickpockets and Nancy. Dickens' feel¬ ing for reform is even more poignant in the next novel, ˆNicholas Nickleby ˆ (1838-39), where he fell upon the country schools in the person of the immortal Squeers and Dotheboys Hall. Critical opinion is in accord with regard to the infinite superiority of the portraits of the Squeers family, the actors, and the rest of those who are more or less taken from the author's own keen observation of life, to the conventional and unconvincing picture of the

life in the novel. In Mrs. Nickleby, as earlier in Pickwick, and later in Mrs. Gamp, Mr. Alicawber, Uriah bleep and many others, Dickens made an interesting addition to the gallery of permanent and popular portraits es¬ tablished by Chaucer, and added to by Shakes¬ peare, Fielding, Sheridan and others.

After a false start in *ˆMaster Humphrey's Clock, ˆ there emerged ˆOld Curiosity Shopˆ (1840), one of the author's most idyllic and pathetic books, published like all his earlier works, serially. He then essayed a historical novel, and in ˆBarnaby Rudgeˆ (1841) laid his scene at the time of the Gordon Riots, in the preceding century. It is a novel of pretty elaborate plot and uneven dramatic power and historical sense. As usual, in Dickens's work, the best parts deal with genre types and comedy characters rather than with conventional villainy or sentiment. During this period Dickens had not only written his stories but had written sev¬ eral plays, of which two, ˆThe Strange Gentle¬ man,ˆ a farce (1836), and ˆThe Village Co¬ quette,ˆ an operetta (1836), were successful, and had essayed the founding and editing of the weekly magazine in which ˆOld Curiosity Shopˆ appeared.

Early in 1842, Dickens and his wife went to America, where he was warmly received and where his popularity was quite as great as in England. The result of the journey is to be found in the ˆAmerican Notes-ˆ published late in 1842, and, to a certain degree, — in those parts that satirize American life, — in the novel, ˆMar¬ tin Chuzzlewit,ˆ of which the first instalment ap¬ peared on the first day of 1843. This novel, in which Dickens in many respects, as in the immortal Pecksniff and Mrs. Gamp, reached the high-water mark of his comic and satiric power, ran for 20 monthly numbers. It was immediately followed by the first of his ®Christmas Books,ˆˆ which appeared each year from 1843 to 1846 and again in 1848. For about a year, 1844-45, with one return to London, he was with his family in Italy, of which sojourn ‘ˆPictures from Italyˆ contains the record.

A short connection with the newly-founded radical journal The Daily News, early in 1846, was followed by another journey to the Con¬ tinent. On this trip he began <Dombey and Son,ˆ the first number of

which appeared in October 1846. Herein Dickens for the first time on an elaborate scale attempted a state¬ ment of a moral and spiritual, rather than a political and philanthropic, problem. In the misfortunes of Mr. Dombey he preached from the text that ®Pride goeth before destruction.® It is on the ground of insufficient reality that the major characters of the book have often been criticised, but there is little dissent from the view that the minor characters are done with much of Dickens's characteristic power, or that the book was one of his great popular successes.

In 1847, Dickens began a series of intel¬ lectual diversions in the form of an organized amateur theatrical company, which included many well-known men of letters of the time R. H. Horne, Mark Lemon, Mrs. Cowden Ciarke, Wilkie Collins and others — and which gave successful amateur performances in va¬ rious places in England. Performances of Jon-son's ˆ Every Man in His Humor ˆ were given in Manchester and Liverpool, in July, with great

success, and the following year this play alter¬ nated with ˆThe Meriy Wives of Windsorˆ in London and five large towns of the kingdom. Many of the performances were for the benefit of indigent actors and men of letters, and a performance in 1851 of ˆNot So Bad as We Seem,ˆ written for the occasion by Bulwer Lytton, was acted before the queen for the benefit of the Guild of Literature and Art. During 1852, also, the company gave many rep¬ resentations in various parts of the country. Throughout the five years of its existence Dickens was manager of the company.

Meanwhile (May 1849-November 1850), what is commonly regarded as Dickens's master¬ piece of narrative fiction, ˆ David Copperfield,ˆ appeared. Dickens himself thought more highly of the novel than of any of the others, and looked upon it with much affection. The rea¬ son for both the popular and the author's judg¬ ment probably lies in the autobiographical char¬ acter of the book. That is to say, Dickens here speaks more profoundly from his own ex¬ perience, tells with more closeness and reality the tale of his early days, and introduces a larger number of those inimitable characters, which, however comic and retouched, are founded on his own obsers'ˆation of actual life. The humorous passages, the idyllic and the pathetic passages are unexcelled by any of his other work. On the other hand, though there are many traces and delineations of the con¬ ventional villain type

and some soundings of the sentimental motif, these are not so marked as in such earlier novels as, for example, ˆNich¬ olas Nickleby.ˆ In short, Dickens, in ˆ David Copperfield,ˆ followed tnore closely than in any of his preceding novels the groundwork of his own knowledge and experience, at the same time losing no whit of his quality and humor. Criticism and popular verdict alike assign to this novel a very high place in English fiction.

Before the completion of ˆDavid Copperfield,ˆ Dickens had started (30 March 1850) a monthly periodical. Household Words. The design was to furnish an inexpensive and at the same time cheery and wholesome periodical for popular consumption. Its idea was to be pleasant and imaginative rather than sensa¬ tional and literal. To this Dickens himself con¬ tributed the novel ˆHard Times ˆ (1854), and some of Mrs. Gaskell's novels also saw the light through its pages. Coming to an end in 1859, it was followed at once by the similar periodical, All the Year Round.

Three novels which followed are of some¬ what different types from ˆ David Copperfieldˆ and by themselves. ˆBleak Houseˆ (March 1852-September 1853) was more of an attempt at intricate plot construction than had been tried in the earlier novels that depicted the fortunes of a hero, and it attacked vigorously the law's delays by making the Court of Chancery, as it were, the centre of interest of the story. In¬ terrupting the course of his novels by ˆA Child's History of Englandˆ (1853), he produced after that ˆHard Times, ˆ one of his most didactic works. The moral was a general one; we should cultivate the virtues of charity and fond¬ ness for the poor that we have always with us against the evil days wherein hardness of heart will be our bane. More satirical and specific in its application was the attack on the ˆˆCircum¬ locution Office® which forms the burden of

ˆLittle Dorritˆ (December 1855-June 1857). Its animus was a hatred of war and a wish to satirize the war office because of several break¬ downs in the machinery of the Crimean War, then just ended. Of these novels, ˆ Bleak Houseˆ attained an extraordinary amount of popu¬ larity, even surpassing ˆ David Copperfieldˆ in that respect.

On 20 April 1858, Dickens began on the large scale, that he carried out into the year of his death, the famous series of readings from his works. As early as 1853 he had given occasional public readings, but, until 1858, never in an extensive and systematic way. At the outset he read with the text before him, but he soon memorized the scenes, worked up the ˆbusiness,® and cultivated a dramatic action which so grew in intensity, that toward the close of his life, his reading became almost acting. The success of this almost wholly new departure in the career of an author was start¬ ling. His first course consisted of 81 readings in three and a half months, and this was fol¬ lowed by shorter courses. His most successful and arduous courses were a series of 80 read¬ ings in America, in 1857-58, which brought him nearly £20,000, and a farewell course of 100 readings in England the following winter, which were worth £8,000, besides expenses and per¬ centages. The motive that induced Dickens to give these courses was a growing restlessness, the need of activity, and a craving for applause, rather than any pecuniary necessity. As it was, they were a very great tax on his strength and they undoubtedly shortened his life.

In 1859 he gave comparatively few readings, and the following year none. He was then chiefly occupied with the new All the Year Round, in which appeared his second and last historical novel, ˆA Tale of Two Citiesˆ (April-November 1859). This story of the French Revolution was written with more deliberation, care for construction and succinctness than his previous works, and, in spite of its comparative lack of humor and spontaneity, Dickens thought highly of it, though he went back in his suc¬ ceeding novels to his more free and easy way. A series of sketches, ˆThe Uncomipercial Trav¬ eller,ˆ was begun in 1859, shortly after he had taken up his abode at Gad’s Hill Place in Kent, and this change, with its incident trips to Lon¬ don, furnished him material for his work. The effect of the change also appeared in his next novel, ˆ Great Expectationsˆ (in All the Year Round in 1860), which reverted in many respects to the earlier style of ˆDavid Copperfield.ˆ More reading then interrupted the course of his novel

writing, and it was not until 1863 that he set to work on his last complete story, ˆOur Mutual Friend-* (May 1864-November 1865). Many of the passages of this novel, have been greatly admired, but opinion is fairly uniform that it, as a whole, lacks the movement and glow of Dickens' earlier novels and shows signs of the strain under which he was laboring.

A short last course of lectures was delivered between January and March 1870. Then ap¬ peared the first instalment of ˆThe Mystery of Edwin Drood.ˆ The afternoon of 8 June he finished the sixth number of the stoiy. The next day he was suddenly stricken and died at about six in the evening. He was buried in West¬ minster Abbey.

Wilh the possible exception of Scott, no English novelist has boon, and probably still is, so widely popular as Dickens, both in his own country and abroad. His great contemporary Thackeray was not so extensively read in his lifetime, and none of his successors who, like George Eliot, may not unreasonably be regarded as approximating his high place, have been so much beloved. Dickens' manner of expression has had a wide effect on popular style, and many of his sentiments, as well as a whole galaxy of characters, have become common property. Foreign writers, like Daudet, have to some de¬ gree imitated his style. Furthermore, few writers have had so long continued a vogue. Single novels, like ˆ Uncle Tom's Cabin, ˆ may have surpassed any of Dickens' works, and several contemporary novels have had marvel¬ lous success, but with the exception of Scott, there is in English fiction no instance of such widespread and lasting popularity for so long a succession of novels. Of late years there has been some critical disparagement of Dickens as an artist, but it is doubtful if this has in any way affected his popular vogue or lessened the solid esteem that people feel for him.

The reasons for his great success and the just estimation in which he is held are usually accounted to be the marvelous vitality and re¬ sourcefulness of his characterizations, the copi¬ ous and rapid, though lengthy, movement of his narrative, and the unfailing spring of his humor. His power of seeing effects in situa¬ tions and humors in character and of depicting them with a few salient strokes haVe probably been the cause of his adding more figures to the common store of characters than any writer since Shakespeare. Most of these figures, it has frequently been observed, are taken from the lower strata of society ; with the so-called higher classes he is uniformly less successful, and in some instances wholly unconvincing. His natural

habit of mind and his training as a reporter early gave him the faculty of tak¬ ing in a large number of details at a glance, and his boyhood experience and his active life in London had furnished him with an abundance of material. The subtler effects of a more re¬ fined or intellectual society were foreign to his early impressions and were beyond the scope of his swift, definite delineation. In this respect he would fall short of Fielding, Scott and Thackeray as an analyst of various human life, but outside of these three writers it is doubtful if any English novelists have so great a range of characterization. Certainly no English nov¬ elist has depicted a greater number of charac¬ ters. His performance remains, in spite of at¬ tempts to disparage his genius, one of the most vigorous and lasting in English literature. See David Copperfield ; Great , Expectations ; Oliver Twist; Pickwick Papers; A Tale of Two Cities.

Bibliography. — Standard editions of Dickens are numerous. One of the most recent is Kit-ton, ˆThe Autograph Edition of Complete Worksˆ (56 vols.. New York 1902). The chief life is that by his friend John Forster, ˆThe Life of Charles Dickensˆ (London 1872-74). Among other books may be mentioned : Ches¬ terton, ˆLife of Charles Dickensˆ (New York 1906) ; Fields, ˆYesterdays with Authorsˆ (Boston 1872) ; Fitzgerald, ˆThe History of Pickwickˆ (London 1891) ; id., ˆLife of Charles

Dickens as Revealed in his Writingsˆ (ib. 1905) ; Fitzgerald, P. H., ˆMemoirs of Charles Dickensˆ (London and New York 1914) ; Gissing, ˆCharles Dickens: A Critical Study ˆ (New York 1898) ; Hogarth and Dickens, ‘ˆLetters of Charles Dick¬ ensˆ (London 1882) ; Hughes, ˆDickens as an Educatorˆ (New York 190ˆ0) ; Kent, ˆCharles Dickens as an Actorˆ (London 1872) ; Kitton, ˆThe Novels of Charles Dickensˆ (ib. 1897) ; Lehmann, ˆCharles Dickens as an Editorˆ (New York 1912) ; Marzials, ˆLife of Charles Dickensˆ (1887); Pemberton, ˆCharles Dickens and the Stage> (London 1888) ; Pugh, ˆThe Charles Dickens Originalsˆ (ib. 1912) ; Thomson, ˆDickens Bibliography > (Warwick 1904). Con¬ sult also Cross, W. L., ˆThe Development of the English

NoveP (New York 1899).

William T. Brewster, Professor of English in Columbia University.

DICKENS, Charles, English editor: b. 1837; d. Kensington, England, 20 July 1896. He was the eldest son of the preceding; was edu¬ cated at King's College, Eton and at Leipzig; became assistant to his father as editor of All the Year Round and subsequently chief partner in a printing firm. He edited a ˆLife of Charles Mathewsˆ ; ˆThe Dictionary of Lon¬ donˆ ; ˆ Paris and the Thamesˆ ; and a complete edition of his father's works.

DICKENS, Mary Angela Evans, English novelist. A granddaughter of Charles Dickens. Her best-known novel is ˆA Mere Cipherˆ (1893). She has also written ˆCross Currentsˆ (1892) ; ˆPrisoners of Silenceˆ (1895) ; ˆAgainst the Tideˆ (1897) ; ˆOn the Edge of a Precipiceˆ (1899); ˆThe WastreP (1901); ˆUnveiledˆ (1907) ; ˆThe Debtor> (1912).

DICKIE, George William, American engi¬ neer: b. Arbroath, Scotland, 17 July 1844; d. 16 Aug. 1918. He studied engineering in his father's shipyard, and with the North British Railway Company, and came to the United States in 1869. He was engaged in steamship work on the Pacific Coast, designed machinery for the Comstock mines, became president of the Union Iron Works in 1883, giving especial attention to naval work. In 1905 he_ became consulting marine and mechanical engineer of San Francisco. He was at one time president of the Technical Society of the Pacific Coast. He wrote ˆPumping and Hoisting Worksˆ (1876) and numerous papers and articles.

DICKINS, John, American Methodist cler¬ gyman : b. London, England, 24 Aug. 1747 ; d. Philadelphia, Pa., 27 Sept. 1798. He was edu¬ cated at Eton and emigrated to America prior to the American Revolution. Embracing Methodism in 1774, he entered the ministry, be¬ coming one of the most notable preachers of his day. He was instrumental in founding Cokes-bury College, Maryland, and the Methodist Book Concern.

DICKINSON, Anna Elizabeth, American orator, novelist and playwright : b. Philadel¬ phia, 28 Oct. 1842. At the outbreak of the Civil War she became known as a speaker, and under the stimulus of the great events became an ora¬ tor of great power and persuasiveness, who created by her youth, real pathos and brilliant rhetoric the greatest enthusiasm wherever she was heard. Her prominence was gained mainly by her fiery addresses on total abstinence, abo¬ lition, politics and woman suffrage. After a

time she devoted her whole attention to lectur¬ ing and to the drama. She was called the ˆGoan of Arc® of the War. Some of her books are AVhat Answerˆ (1868), a novel; ˆA Pay¬ ing Investmentˆ (1876) ; ˆA Crown of Thornsˆ (1876) ; ˆA Ragged Register of People, Places and Opinionsˆ (1879). She was the author of two plays of excellent dramatic quality, ˆAnne Boleynˆ and ˆ Marie Tudor ˆ (1875), in which she played the title roles.

DICKINSON, Charles Moiiroe, American author and diplomat: b. Lowville, N. Y., 15 Nov. 1842. He attended school at Lowville Academy and Fairfield Seminary, and was ad¬ mitted to bar 1865 ; and practised law in Bing¬ hamton and New York 1865-78. He was editor and proprietor Binghamton Republi¬ can 1878-1911. It was upon his suggestion and initiative in 1892 that the several news organ¬ izations in this country were combined into the present Associated Press. He was presidential elector 1896; and in 1897 was appointed by Presi¬ dent McKinley United States consul-general to Turkey. From 1901-03, he was diplomatic representative to Bulgaria. While serving in this capacity, the American missionary, Ellen M. Stone, was carried off by brigands and, through his efforts and settlement, she was released. He was appointed member of the board to draft rules and regulations for the American consular service, 1906; American consul-general-at-large, 1906 to 1 Oct. 1908, when he resigned because of fatal illness in his family. He is a member of the Authors' Club of New York; president of the Barlow Board of In¬ dustrial Arts of Binghamton. Author of ˆThe Children and Other Versesˆ and ˆThe Children after Fifty Yearsˆ (1915) ; also part of ˆPoliti¬ cal History of the State of New Yorkˆ (1914).

DICKINSON, Daniel Stevens, American lawyer: b. Goshen, Conn., 11 Sept. 1800; d. New York, 12 April 1866. He was admitted to the New York bar, where he soon became promi¬ nent; was elected to the State senate in 1836, and became a leader in the Democratic party, which made him lieutenant-governor in 1842, and in 1844 sent him to the United States Senate. There he became known for his pro-slavery and States-rights proclivities, and was made chair¬ man of the Finance Committee. He was brought forward as a candidate for the presi¬ dency in 1852, but without success. He spent the later part of his life at Binghamton, N. Y., in the practice of his profession. His ˆLife and Worksˆ was published in 1867, two volumes.

DICKINSON, Donald McDonald, Ameri¬ can lawyer; b. Port Ontario, N. Y., 17 Jan. 1846; d. Trenton, Mich., 15 Oct. 1917. He was

graduated at the law department of the Uni¬ versity of Michigan in 1867, and began the practice of law in Detroit, where he rapidly rose to a foremost position at the bar ; and later practised in Washington, D. C. He was conspicuous in politics as a Democrat ; was secretary of the Democratic State central com¬ mittee, which managed the Greeley campaign in 1872; withdrew from the Democratic party, but was won back by Mr. Tilden ; and was chairman of the Democratic National com¬ mittee in 1876; and a member of the committee in 1884-85. He was Postmaster-General of the United States in 1887-89; chairman of the Democratic National campaign committee in

1892 ; and senior counsel for the United States before the Joint High Commission on Bering Sea claims, under the Fur Seal Arbitration in 1896-97, He was a member of the Court of Arbitration to adjust the controversy between the United States and the Republic of Salvador in 1902.

DICKINSON, (Goldsworthy) Lo\yes,

English author, son of the artist, Lowes Dick¬ inson. He was educated at the Charterhouse and at King's College, Cambridge, of which he became Fellow and lecturer. He was also ap¬ pointed lecturer at the London School of Eco¬ nomics and Political Science, He has been par¬ ticularly happy in adapting the dialogueˆ as his literary medium. His published works include ˆThe Greek View of Lifeˆ (1890; 3d ed., 1906) ; ˆFrom King to King: The Tragedy of the Puritan Revolutionˆ (1891; 2d ed., 1907) ; ˆRevolution and Reaction in Modern Franceˆ (1892) ; ˆThe Development of Parliament dur¬ ing the Nineteenth Centuryˆ (1895) ; ˆLetters from a Chinese OfficiaP (1903), which was answered by W. T, Bryan in ˆLetters to a Chinese OfficiaP (1906) ; < Religion: A Criticism and a Forecastˆ (1905) ; ˆA Modern Sym¬ posiumˆ (1905) ; ˆJustice and Libertyˆ (1908) ; Hs Immortality Desirable?ˆ (1909) ; ˆReligion and Immortalityˆ (1911). Consult Chesterton, G. K., ˆHereticsˆ (London 1909) ; More, <Shelburne Essaysˆ (Vol. VH, New York 1910).

DICKINSON, Jacob McGavock, American lawyer and public official : b. Columbus, Miss,, 30 Jan. 1851. He was graduated at the Uni¬ versity of Nashville in 1871, studied law at Columbia College, New York, also at Leipzig and Paris. In 1874 he was admitted to the bar and practised at Nashville from 1874 to 1899, and in Chicago from 1899 to 1909. He served several times by special commission on the supreme bench of Tennessee, was assistant Attorney-General of the United States in 1895-97, Federal solicitor in 1899-1901 and from 1901 to 1909 was general counsel of the Illinois Central Railroad. In 1909-11 he served as Sec¬ retary of War in the Cabinet of President Taft. In 1907-08 he was president of the American Bar Association, He was, from 1915 to 1917, receiver of the Rock Island Lines.

DICKINSON, John, American political writer and statesman : b. Talbot County, Md., 13 Nov. 1732; d. Wilmington, Del., 14 Feb. 1808. In 1740 he removed with his father to Delaware. He studied law in Philadelphia in 1750, in 1753 was entered at the Middle Temple, London, and in 1757 began to practise in Philadelphia. He was elected to the Delaware assembly in 1760 and two years later to the Pennsylvania assembly. He served with dis¬ tinction till 1765 and again in 1770-76. In 1774-76 he was a member of the Continental Con¬ gress. He also served in the American army, attaining the rank of brigadier-general in the Delaware militia. In 1781-82 he was governor of Delaware and in 1782-85 was governor of Pennsylvania. He was prominent in the de¬ bates of the Constitutional Convention of 1787, but is best known as a writer of State papers and pamphlets; these included ˆAddress to the Inhabitants of Quebecˆ ; ˆPetitions to the King) ; ˆAddress to the Armiesˆ ; ˆArticles of Confederation) (first draft), that had great influence in their day. He was the author of

ˆLetters from a Pennsylvania Farmer to the Inhabitants of the Colonies) (1767) ; ˆ Essay on Constitutional Power of Great Britain over the American Colonies) (1774). He opposed the Declaration of Independence and refused to sign it. His influence waned after 1776 on this account. His ˆWritings,) edited by Paul L. Ford, were published at Philadelphia (1895). Consult Stille, ˆLife and Times of John Dick¬ inson) (Philadelphia 1891) and Tyler, ˆLiter¬ ary History of the Revolution) (New York

1897).

DICKINSON, Jonathan, American Pres¬ byterian clergyman : b. Hatfield, Mass,, 22 April 1688; d. Elizabethtown, N. J., 17 Oct. 1747, He was graduated at Yale College in 1706 and soon afterward was installed as pastor of the Presby¬ terian congregation in Elizabethtown, N. J,, which relationship continued until his death. After the separation of the New Jersey churches from the synod of Philadelphia in 1741, it was determined to establish a collegiate institution in the former colony, and a charter for the Col¬ lege of New Jersey (now Princeton University) was obtained. The first classes were opened in Elizabethtown and Dickinson was elected presi¬ dent. His writings on theology were collected at Edinburgh (1793).

DICKINSON, Martha Gilbert, American poet : b. Amherst, Mass. She is a niece of Emily Dickinson, and was married to Alex¬ ander E. Bianchi, 24 July 1903. She has published ˆWithin the Hedge) ; ˆThe Cathe¬ dral and Other Poems) (1901) ; "A Modern Prometheus) (1908) ; ˆThe Cuckoo's Nest> (1909) ; ˆRussian Lyrics and Cossack Songs) (1910) ; ˆThe Sin of Angels) (1912) ; ˆGabri-elle and Other Poems) (1913) ; ˆThe Kiss of Apollo) (1915) ; and also contributions to magazines and literary periodicals.

DICKINSON, Mary Lowe, American edu¬ cator and author: b. Fitchburg, Mass., 1839; d. New York, 8 June 1914. She was married to John B. Dickinson, a New York banker, and after his death taught in schools in Bos¬ ton, Hartford and New York, being for some time principal of the Van Norman Institute in the last-named city. She edited the Silver Cross magazine for 10 years and was the editor of Lend a Hand. She published several vol¬ umes of fiction and a collection of poems ; also many short stories and much general literary work,

DICKINSON, Peard, English clergyman: b. Topsham, England, 16 Nov. 1758; d. London, 15 May 1802. In 1779 he completed his uni¬ versity course and took his M.A. degree at Saint Edmund's Hall, Oxford. For three years he was curate of the noted rector of Kent, Vincent Perronet. In 4786 he became assistant to Charles Wesley at the New Chapel. He had the complete confidence of John Wes¬ ley. Mr. Dickinson was the author of a life of Melancthon. His life was written by Joseph Benson and published in 1803.

DICKINSON COLLEGE, a coeducational institution in Carlisle, Pa., founded in 1783, under the auspices of the Presbyterian Church. The charter of the college was granted by the general assembly of the State as the result of an appeal by the leading men of the Common¬ wealth, including Benjamin Rush and John Dickinson. It was named after the

latter in

memory of his important services to his country and in commemoration of his donation to the college of 200 acres in York County, 500 acres in Cumberland County, $500 in cash and a number of valuable books. The college began its work in 1784. In 1798 the present site was purchased from the Penns for $150. The first building was destroyed by fire, but another, now known as West College, was erected by popular subscription in 1804. In addition to West College, the other buildings are South College (1835), East College (1836), the Law School (1877), Tome Scientific Build¬ ing (1884), Gymnasium (1884), Rosier Memo¬ rial Library Hall (1885), Denny Memorial Hall (1896). The government of the school was changed somewhat in 1833, and it came under the charge of the Methodist Episcopal Church. The degrees conferred by the college are B.A. and B.S. The annual income amounts to about $50,000. In 1916 the number of students en¬ rolled was 501 and the number of volumes in the library was 34,000.

DICK’S COFFEE HOUSE, a house in London, of which Richard Torner was the first proprietor, about 1680; from him it was called ^^Richard’s® and later received its present name. It is now No. 8 Fleet street, near the Temple.

DICKSON, Baron Oskar von, Swedish merchant : b. Goteborg, of Scottish ancestry, 1823 ; d. 1897. He was a member of many learned societies and was a liberal contributor to the support of various Arctic expeditions. He was ennobled in 1880 and in 1885 was rnade baron. Dickson Harbor in the Arctic regions is named from him.

DICKSON, Sir James Robert, Aus¬ tralian statesman : b. Plymouth, England, 1832 ; d. 1901. He received his education in Glasgow and entered the City of Glasgow Bank. In 1854 he emigrated to Australia, settling at first in Victoria, then in New South Wales and finally, in 1862, in Queensland. He was elected to the Queensland Assembly in 1872 and in 1876 became Minister of Public Works in Macalester’s

Cabinet. In 1876-79 he was treas¬ urer of the colony and again in 1883-87. In 1889-92 he lived in Europe; in the latter year he was again elected to the House of Assembly and reelected in 1893 and 1896. He became Secretary for Railways in the Nelson Cabinet of 1897 ; became Secretary for Home Affairs in March 1898 and Premier in the month of Oc¬ tober following. He favored the establishment of an Australian commonwealth, secured a referendum on the question and obtained a majority in favor of federation. He resigned the premiership in November 1899 and a month later was appointed Chief Secretary in the Robert Philp Cabinet. In 1900 he was Queens¬ land delegate to London to discuss matters in relation to the proposed commonwealth. He became Minister of Defense in the First Federal Cabinet, was knighted but died within a few days after the inauguration of the new federal government.

DICKSON, Leonard Eugene, American mathematician: b. Independence, Iowa, 22 Jan. 1874. He was graduated at the University of Texas in 1893 and later studied at the univer¬ sities of Chicago, Paris and Leipzig. In 1897-99 he was instructor in mathematics and in

1899 assistant professor of mathematics in the University of California. In 1899-1900 he was associate professor of mathematics in the Uni¬ versity of Texas and in 1900-07 was associated professor, and after 1910 professor of mathe¬ matics in the University of Chicago. In 1900 he served as research assistant at the Carnegie Institution, Washington, D. C. He is editor of the ˆTransactions of the American Mathe¬ matical Society,ˆ the American Mathematical Monthly. He is author of ˆLinear Groups, and Exposition of the Galois Field Theoryˆ (1901) ; ˆCollege Algebraˆ (1902) ; Hntroduction to the Theory of Algebraic Equationsˆ (1903) ; ˆLin¬ ear Algebras> (1914) ; *ˆTheory of Equationsˆ (1914) ; ˆAlgebraic Invariantsˆ (1915).

DICKSON, Samuel Henry, American physician: b. Charleston, S. C., 20 Sept. 1798; d. Philadelphia, 31 March 1872. He was gradu¬ ated at Yale College in 1814 and immediately after commenced the study of medicine in his native city. He was instrumental in the estab¬ lishment of a medical college in Charleston, and on its organization in 1824 he was called to the chair of institutes and practice of medicine. In 1858 he was called to the chair of practice of medicine in the Jefferson Medical College, Philadelphia, which he held till his death. He was author of ˆManual of Pathology and Prac¬ tice of Medicineˆ ; ˆElements of Medicineˆ (1835) ; ˆEssays on Pathology and Therapeu¬

tics (1845) ; _ˆEssays on Life, Sleep, Pain, etc.ˆ (1852). It is a fact worthy of note that he delivered the first temperance address ever heard south of Mason and Dixon's line.

DICKSON, William Purdie, Scottish theo¬ logian : b. Pettinain Manse, Lanarkshire, 22 Oct. 1823 ; d. 1901. He received his education at the University of Saint Andrews. In 1863 he be¬ came professor of divinity in the University of Glasgow and in 1895 was made professor emeri¬ tus. He translated Mommsen's ˆHistory of Rome> (4 vols., rev. ed., 1895) ; ˆ Roman Prov¬ incesˆ (1887) and Meyer's ˆCommentary on the New Testamentˆ (10 vols., 1873-80). He deliv¬ ered the Baird lectures of 1883, ˆSt. Paul's Use of the Terms Flesh and Spirit (1883).

DICKSON CITY, Pa., borough in Lacka¬ wanna County, five miles north of Scranton, on the Delaware and Hudson and the New York, Ontario and Western railroads. It is a coal mining centre and contains foundries and machine shops and silk mills. The govern¬ ment is vested in a burgess and a unicameral council. Pop. 11,198.

DICLINOUS, dik'H-nus or di-kli'nus, a Linnaean term for flowers possessing stamens or pistils only — Monoecia, Dioecia and Polygamia.

DICOTYLEDONS, a subdivision of the angiosperms, or plants with encased ovules, which is characterized by the fact that the embryo has at least two (sometimes more) cotyledons or seed leaves, whereas the mono¬ cotyledons (q.v.), the other subdivision of the angiosperms, have only one. Besides this almost invariable characteristic, others of nearly equal constancy are the structure of the stem, which consists in the mature plant of a wood layer surrounding a pith, and separated from the last layer enclosing it by a zone of active growth, the cambium ; the forked, anastomos¬ ing venation of the leaves, with free veinlets ending in the margin, which may be lobed or

toothed ; and the prevalently quaternary or quinary symmetry of the

flower, as opposed to the usual ternary symmetry of the monocotyle¬ dons. There is a very interesting difference between the development of the embiyo of the dicotyledons and that of the monocotyledons. In both cases, the cell formed by the union of the two gametes gives rise to a filament of cells placed end to end, the so-called proembryo. In the dicotyledons, the terminal cell by dividing generates the entire embryo except the tip of the hypocotyl, which is formed from a portion of the next cell. In the monocotyledons, the terminal cell forms only the cotyledon, while the whole remainder of the plant is formed from a part of the next cell. The dicotyledons group themselves into two great series : the Choripetalce, with free petals and sepals; and the Sympetalce, with the petals coherent. Those Choripetalce which lack a corolla together with a few related forms are known as the Monochlamydece, as opposed to the Dialypetalce. The orders of Monochlamydece are the V erticillatoe , containing the cassowary trees ; the Juglandi-florce, or walnuts, Querciflorce, or relatives of the oak, Saliciorce, or willows and poplars, and Urticince, containing the elms, mulberries, net¬ tles, etc., all of these orders being characterized by the possession of catkins consisting of uni¬ sexual, wind-fertilized simple flowers, the Loranthiflorce, containing the mistletoe; the Piperince or peppers ; the Hamamelidince or relatives of the witch-hazel; the Tricoccce, typi¬ fied by the spurge; and the Centrospermce, such as the rhubarb, spinach, pink, cactus, *etc.* The orders of Dialypetalce are the Polycarpicce, to which belong the water-lilies, crowfoots, mag¬ nolias, etc., usually with free carpels and a spiral arrangement of some parts of the flower ; the Rhceadince, to which belong the poppies, mustards, etc., the Cisitiflorce, among which are the violets and the tea plants ; the Colunini-ferce, often with a large number of stamens in a single whorl, containing the mallows, cocoa-tree, *etc.* ; the Gruinales, containing the allies of the geranium ; the Sapindice, among which are the sumachs, maples and horse-chestnuts ; the Frangulince, with the grape vine and its allies; the Saxifragince, with the currants, gooseber¬ ries, *etc.* ; the Rosiflorce, containing the rose, apple, strawberry, plum, *etc.* ; the Leguminosce, with a pod for a fruit and with flowers usually bilaterally symmetrical, to which belong such forms as the bean, pea, clover and lentil ; the Passiflorince, such as the begonia, papaw and passion-flower; the Thymelceince ; the Myrti-florce, with the myrtle and eucalyptus ; and the Umhelliflorce, or dogwoods, ginsengs, carrots, parsleys, etc., in most of which the flowers are borne in simple or compound umbels. The Sympetalce are divided into the Pentacyclicce, with two whorls of stamens, and the Tetracyclicce, with one. The Pentacyclicce consists of the Ericince, or heath allies ; the Diospyrince, containing the persimmon, ebony tree, naseberry, *etc.* ;

and the Primulince, typified by the prim¬ rose. The orders of the Tetracyclicce are the Contorted, to which belong the olive, lilac, gen¬ tian, milkweed, etc.; the Tiibifiorce, such as the morning-glory and mint ; the Personatce, among which are the potato, jimson-weed, foxglove, plantain, *etc.* ; the Rubimee, containing the coffee plant, elder and valerian; the Companulince, or bell-flowers, lobelias and gourds ; and the vast

assemblage of the Aggregatce, characterized by the grouping of the flowers in heads with a common involucre and the reduction of the calyx of the separate flowers. This last order, which contains daisies, asters, thistles, sun flowers, tansies, yarrows, etc., possesses at least 12,500 species. The total number of dicotyled¬ onous species is not less than 103,000 whereas there are only about 25,000 monocotyledons.

DICROTIC WAVE, a double beating, aˆ in the human pulse. Each pulse-wave begins with an ascent corresponding to the systole of the heart. This ascent usually forms, as regis¬ tered by the sphygmograph, an unbroken line until the apex of the curve is reached and the descent commences. The descending curve is marked by several minor waves, one of which being quite pronounced is known as the dicrotic wave, and is probably due to a reflection of the arterial tension on the periphery.

DICTAMNUS. See Dittany.

DICTAPHONE, an adaptation of the pho¬ nograph to the needs of business correspond¬ ence or other work of a literary character, talcing the place of the stenographer. The machine carries a waxen cylinder on which it records the spoken words of the dictator. This cylinder is afterward placed in a transcribing machine at the typist's desk, and the typist writes the letter or other matter direct from the record. After the letters have been tran¬ scribed the cylinder is placed in a shaving mechanism, the grooved surface removed, and the cylinder is then ready to record a new series of dictations. Each cylinder will thus serve to record from 1,000 to 1,200 average letters. All the mechanical movement neces¬ sary is supplied by electric motors, controlled by switches. The advantages claimed for the machine are the saving of the stenographer's time in toto ; the saving of a part of the dic¬ tator's time often consumed in waiting upon the leisure of the stenographer, in halts where the speed is too great, and in repetitions ; and the opportunity afforded to the typist of check¬

ing the work by a complete repetition of the original dictation exactly as it was given.

DICTATOR, an extraordinary magistrate of ancient Rome, first appointed 501 B.c. At first no one was eligible to the office who had not been previously a consul. The power of naming a dictator, when an emergency arose requiring a concentration of the powers of the state in a single superior officer, was vested by a resolution of the Senate in one of the consuls. A plebeian dictator was first appointed 356 B.c. The dictatorship was limited to six months, and the person who held it could not go out of Italy and could not touch the treasury. The dictator had the power of life and death, and could punish without appeal. All the other magis¬ trates were under his orders. He had 24 lictors, double the number allowed to a consul. Such were the dictators appointed to carry on the government of the state in special emer¬ gencies ; but dictators were often appointed for temporary purposes, especially during the ab¬ sence of the consuls. The object of these tem¬ porary appointments was generally to secure the discharge of some function which could only be lawfully performed by the first magistrate, as the holding of the comitia (or meetings) for the

elections. The last dictator entrusted with the goveniment of the state under the republic was appointed 216 b.c, the last temporary dictator 202 B.c. The office was revived by Sulla 82 b.c., and afterward held by Caesar 48 b.c., but in these cases the legal restrictions were not re¬ garded, and the office bore no resemblance W in name to the ancient dictatorship. It was abolished during the consulship of Antonius, 44 B.c. In modern times the term is loosely applied to usurpers who have arrogated to themselves extraconstitutional powers. The rulers of Paraguay bore the title of dictator for a number of years, and those of other Spanish-American countries have done so from time to time. Con¬ sult Greenidge, ˆ Roman Public Lifeˆ (London 1907) ; Mommsen, ˆRdmische Staatsrechtˆ (3d ed., Leipzig 1887).

DICTIONARY (Low Latin dictionarium, first used in the 14th century ; from dictio, post-classical synonym for verhum, word). The various applications of the term, general and special, are so familiar that a detail would be of no service. Of its synonyms, it may be said that the Greek word ˆdexicoffiˆ is customarily restricted to a dictionary of ancient or Oriental languages, with definitions, etc., in the language of the supposed reader; ®glossaryˆˆ and ˆVocab¬ ulary® to dictionaries of the terms used in the special works to which they are attached. A glossary (called by the Germans idioticon, by the Italians vocabolario) is a defined list of unusual, antique or foreign words ; a vocabu¬ lary, in classical works sometimes called an in¬ dex, belongs to a book in or textbook of a for¬ eign language, and renders the foreign words into the reader’s language, or the exercises of the latter into the foreign.

The modern use of the term ˆffiictionary® is not limited to a simple compilation, but has been extended to technical and other subjects, in which alphabetical arrangement of topics is maintained. Thus at present there are bio¬ graphical, bibliographical, geographical, mathe¬ matical, historical, philosophical, medical, musi¬ cal, rhyming and other dictionaries.

Functions. — The variation of kind with the variation of users and origin, common to all literature, is well exemplified in dictionaries. The original dictionary was a simple definer of words which a

cultivated reading class was sup¬ posed not to know, — foreign, provincial, tech¬ nical, obsolete, *etc.* ; the modern dictionary of its own language attempted to exclude nearly all but the accepted vocabulary of current liter¬ ature, — that is, what people knew already,— or at least what would be needed for such reading ; the later ones increasingly include the means of understanding everything ever printed in a lan¬ guage. Two classes only, for obvious reasons, are still excluded (one of which the older ones gave), by reason of the change in audience from men to women and children : gross words, ex¬ cept a few too important philologically to be spared ; and argot. The ˆffibridged® dictionaries for many years, with ludicrous logic, excised the difficult words and ˆ retained the familiar ones; the first to exercise common-sense and reverse this plan was Jabez Jenkins in his won¬ derful ®vest-pocket lexicon,® whose nearly 30,000 words contained almost all the unusual ones and the pronunciational cruces. The attempts to draw a line in full dictionaries are now rec¬ ognized as injudicious: that a word or form of

a word has gone out of use is the very reason it should be defined or at least cross-referenced. An incomplete record of the language is by so much unserviceable. Part of the exclusions re¬ sulted from the growth of a half-educated mid¬ dle class who looked to it as a standard of taste. The French Academy at first omitted all techni¬ cal terms, and all words assumed below its standard of elegant usage ; but as this made the book half useless, and the omissions were cred¬ ited to the Academy's ignorance or carelessness instead of its fastidiousness, it could not be maintained. Recent dictionaries attain the same end by marking words as ˆffibsolete,® ˆdittle used,® ˆˆprovincial,® ˆcolloquial,® ˆVlang,® ˆVul¬ gar,® *etc.* The attempted arbitrament of pro¬ nunciations, though inevitable (being among the chief services for which they are consulted), will always remain a battleground embarrassing even to the umpires. Still more important, however, is a dictionary's value for the histori¬ cal development of a language. No dictionary fulfils its best purpose which does not, as far as possible; trace the varying significations from their sources, with their development by meta¬ phor or technical use ; and any arrangement which obscures this is vicious ; whatever tem¬ porary convenience may be subserved. As the validity of this development depends on citation of passages, these should be full, otherwise we have only the arbitrary assertion of the com¬ pilers. Back from even this lie the original etymologies of the words, which are of great value and even more interest; and the best dic¬ tionaries give them with their affiliations in other languages. All the irregular grammatical

forms, and the particles by which words are in¬ flected, — a sufficient grammatical apparatus for correct usage,— should be given as a matter of course. Syllabifications, divisions, etc., should also be indicated: in a word, the dictionary is a proofreader's vademecum, and must contain all requisite material for him to use.

Arrangement. — The first condition of use¬ fulness being that the items shall be easily found, no arrangement is tolerable except an alphabetical one, in all languages where the in¬ flections are mainly terminal or after a conso¬ nant initial. This arrangement, however, may be used only in a key, making feasible other classifications for the main body; as in Roget's well-known ˆThesaurusˆ of synonyms, where the grouping is by ideas, in parallel column with the reverse ideas. This would be a very useful addition to the meagre lists of synonyms given in the large dictionaries ; but it would need great labor and almost impossible accuracy of cross-referencing, as the group heads must be referred to from each word in its alphabetical place.ˆ A very useful variant is in the lists of technical terms of arts and sciences given under each main head in the 'ˆStandard Dictionary.ˆ Rhyming dictionaries are arranged alphabeti¬ cally under the terminations. In etymological dictionaries, attempts have been made to alpha¬ betize by roots ; but as no two scholars ever agree on the roots, the finding is largely guess¬ work, unless with a full alphabetical key, and scholars condemn the plan. In Semitic lan¬ guages the arrangement is usually by roots. It was this necessity of arranging Volapiik dic¬ tionaries, owing to the prefix-inflection involv¬ ing a search in three or four places for one word, which as much as anything else prevented

that ®language^^ gaining favor. The arrange¬ ment of Chinese characters is almost incapable of any readily intelligible system, and is not set¬ tled by sinologists.

History. — The first dictionaries were used by the Assyrians and Babylonians, to explain not words, but signs. The ancient ideographs, when largely displaced by syllabified or alphabetic signs with phonetic values, rapidly became un¬ intelligible ; and syllabaries were therefore com¬ piled, to define them in terms of the latter. The old Sumerian language, however, seems not then to have become ^Mead,® being preserved by the colleges of priests for religious use ; and foreign languages were learned from foreigners. These were inscribed in vertical columns, on clay tab¬ lets; they have been found in the great library of Asurbanipal (Sardanapalus — 668-626 b.c.), at Nineveh, the source of our chief knowledge of Mesopotamian culture. Much the same sort of syllabaries seem to have been used by the Chinese and Japanese.

The ancestry of our own dictionaries, how¬ ever, is Greek. Here we observe the usual pro¬ gression from the special to the general. The typical modern dictionary is a complete or rep¬ resentative , vocabulary of a language, present and historical, with definitions in its own or some foreign tongue; its object being to inter¬ pret either the meaning of the foreign tongue or the bygone part of its own, or the usages and history of the latter. But neither of these was thought of by the ancients. The small upper and priestly class settled their own usages of language, there was no half-educated reading populace relying on books for correct form, there was no foreign literature they cared to read, and foreign conversation they learned from con¬ versation. Their first dictionaries were the same as our special vocabularies. The oldest surviving one, by Apollonius of Alexandria in Augustus' time, was a glossary of Homer's words — probably the oldest of all kinds if we had them, Homer being the common textbook of Greece; others were of ambiguous, corrupt, barbarous, foreign or dialectic phrases in the tragic and comic poets — phrases Attic, Lace¬ daemonian, Cretan, Rhodian, Italian, Phrygian, *etc.* ; others of technical terms in cookery, a fas¬ cinating subject to the Greeks; others of drink¬ ing vessels, of the cries of animals, of syno¬ nyms, *etc.* Besides glossaries of Homer, there were others of Plato, the Ten Attic Orators, Hippocrates, *etc.* All of these, so far as pre¬ served —

unhappily, very few of them are pre¬ served, and Athenaeus in the 2d century gives the names of 35 lost to us — are of priceless value both for words and antiquities. On a larger scale were the Onomasticon (®word-book®) of Julius Pollux, arranged topically in 10 books, which has survived; and a great lexi¬ con, now lost, written by Helladius of Alexan¬ dria about 400 B.c. Of others may be noted an etymological dictionary by Orion of Thebes about 450, the first we have — for Varro's es¬ says in Roman etymology can hardly be called a dictionary; a dialectic and local one by Hesychius of Alexandria, in the 4th century; and one of words similar in sound, but unlike in meaning, by Ammonins of Alexandria. Com¬ ing down to the Middle Ages, the most famous is that of Suidas, of unknown date or place, but probably about the 10th century; it is a slovenly compilation of words, names and places, but

'extremely valuable from its matter, not to be had elsewhere. Overleaping some centuries and their works, we come in 1572 to the mightiest of all, the tremendous ˆThesaurus Graecae Linguaeˆ of the famous French scholar and printer, Henri Estienne or Stephanus (q.v.), Geneva, 4 vols., folio, a work gigantic not only in size but in scholarship ; it was last re¬ printed by Didot at Paris, 1831-65, ed. Dindorf, 9 vols., folio, 9,902 pages. All the mediae¬ val and modern lexicons till the 19th century were Greek into Latin ; the first Greek-English one was not till 1814, by John Pickering, and that was not finished; the first complete one was by John Jones, 1823, London. For many years the only general one on the market has been the Liddell & Scott, revised by Drisler, in its various editions. This, however, is confined to classic and early-empire forms, to common nouns and to book words ; and leaves need for several ad¬ ditional words. Later and mediaeval Greek has been admirably covered by the lexicon of E. A. Sophocles, revised 1887 by J. H. Thayer; and a three-volume lexicon entirely devoted to the vast wealth of forms furnished by the inscrip¬ tions in progress. There is one of modern Greek by Contopoulos, Athens 1889; and there are special glossaries of the New Testament and of various great authors, English-Greek, Yonge, revised by Drisler, latest edition 1893.

Less needful are details of Latin diction¬ aries, though they have been very plentiful ; in the Middle Ages they were the daily necessity of all cultivated existence. They began much later than Greek: even the etymological treatise of the great M. Terentius Varro, Cicero's con¬ temporary, preserved only in fragments, can hardly be called a dictionary; the first real one is of Verrius Flaccus under Augustus. One

of Guttenberg's volumes was the ˆCatholiconˆ or ˆSummaˆ of Johannes de Janua (Giovanni Balbi), 1460. The monk Calepino published in 1502 at Reggio a Latin-Greek lexicon, which was so famous that for many years all diction¬ aries were called ˆcalepinosˆO in 1575 it was made a polyglot of Italian, French and Spanish as well, and in 1590 extended to all languages, and many times reprinted. Robert Estienne, father of Henri published in 1531 at Paris a great ˆThesaurus Linguae Latinae,ˆ not sup¬ planted till Forcellini's ˆTotius Lexicon Latinitatisˆ in 1771, at Padua. All these were Latin into Latin, except that the latter had definitions also in Greek and Italian. A new edition, largely supplemented, Prato, 1858-79, forms the greatest Latin dictionary ever pub¬ lished. The first Latin-English dictionary was the ˆPromptorium Parvulumˆ of a Norfolk monk, Galfridus Grammaticus, compiled 1440, printed 1499 ; the first important one was by Sir Thomas Elyot, London 1538. In the 18th century Robert Ainsworth's was for many years the only popular one (London 1736). At pres¬ ent the two general popular ones are White & Riddle's (London 1880), and Harper's (An¬ drews Freund, revised by Lewis and Short, 1886). The great German-Latin one is (Jeorges', 4 vols., Leipzig, 1880-85. The English-Latin are Smith & Hall, 1890; White & Riddle, 1869. A giant ˆThesaurusˆ was started in Leipzig, 19(X), to outrank any other Latin lexicon in exist¬ ence ; it is to be edited by the greatest German scholars, under the supervision of the five great German academies, and has not yet finished the

letter A. The great dictionary of mediaeval Latin is Du Cange's, 1733-36, re-edited, Paris 1882-88, 7 vols.

For modern European languages into Eng¬ lish and vice-versa, the following are standard : French — Smith, Hamilton & Legros, 1891 ; Spiers & Surenne 1891 ; Case, 1895. German — Thieme-Preusser, 1898; Fliigel, 1891; Lucas, 1854-68; Whitney, 1877, valuable for etymolo^; Adler's, 1875, still unequaled for discrimination of synonyms. Spanish — Velazquez, revised by Gray and _ Iribas, 1901 (the old Velazquez's Seoane revised with a great new technical vocab¬ ulary). Portuguese — Lacerda, 1871; Michaelis, 1894; Valdez, 1879. Italian — Baretti, 1877; Meadows, 1869; James and Grassi, 1884; Mill-house, 1899. Dutch — Calisch, 1890. Danish — Ferrall, Repp & Rosing, 1873. Swedish — Wen-strom & Lindgren, 1889; Nilsson, Widmark & Bollin, 1889. Norwegian — Geelmuyden, 1886. Russian — Alexandrov, 1879. Turkish — Red-house, 1880. Polish — 'Baranowski, 1884. Hun¬ garian — Bizonfy, 1878-86.

The great foreign dictionaries of their own languages, corresponding to the ^Century Dic¬ tionary^ or the ^New English Dictionary^ • of our own, are: French — Littre's, 4 vols., 1863-72, supplement, 1878-82. Larousse's rich work is an encyclopaedia. German — Jacob and Wilhelm Grimm, etc., the first volume published 1854, and the work is still unfinished. The brothers Grimm died 1859-63, and a succession of schol¬ ars have carried it on, but the parts appear slowly. Italian — Tommaseo and Bellini, four volumes in eight, 1861-79. Castilian Spanish — Dictionary of the Spanish Academy; Donadiu and Puignau, 1890-95 ; Cuervo's unfinished work, 1866-94. There is also a two-volume dic¬ tionary of Catalan, by Lobernia and Esteller. There are of course many other smaller but valuable etymological and historical dictionaries. Of other languages may be mentioned : Portu¬ guese — Caldas Aulete, 1881. Provengal into French — Mistral, 1886. Sardinian into Ital¬ ian, and vice versa, Spano, 1851. Dutch — Dale, 1885-89; Franck, 1884-92. Swedish — Kal-kar, unfinished. Icelandic — Cleasby and Vig-fusson, 1874. Welsh — Evans, 1887, unfinished. Irish — Foley, 1855 ; O'Reilly, supplement by O'Donovan, 1864;

Dinneen, 1904. Russian — Dahl, 1862-73. Polish — Rykaezewski, 1866. Slavonian — -Miklosich, 1886. Turkish into Arabian and Persian, Zenker, 1866-76. Chinese into Latin, De Guignes, 1877; into French and Latin, 1869. Annamese — Pauthier, in Chinese characters with pronunciation in Chinese and Annamese.

Though Oriental and ancient, their close connection with our racial and religious ancestry and current problems makes Sanskrit and He¬ brew worth noting separately. For the former, the great English works are by Monier-Wil- liams : English-Sanskrit, 1851 ; Sanskrit-English, 1872. Hebrew, Fiirst, 1867.

English lexicography, on its own language begins very humbly, with John Bullokar's ˆEng¬ lish Expositor,ˆ 1616. More famous was Henry Cockeram's, 1623, which passed through nine editions up to 1650. Blount (1656), Philips (1658) and Coles (1677) succeeded these; but the first attempt at a thorough collection was Nathan Bailey's (1721). This gave etymologies, marked accents, and remained the sole pos¬ sessor of the field till Johnson's appeared in

1755; and was reprinted over a quarter of a cen¬ tury longer from its handy size, the 24th edi¬ tion dating 1782. Johnson's, however, is the first of any importance from a scholar's point of view. The etymologies are superseded, but he was the first to make a dictionary something like a history of the language, with full (even over-full) illustrative examples, precise defini¬ tions, and attention to the form. It has been reprinted as late as 1866, but for popular use is superseded even in England by the great Ameri¬ can dictionaries, and for scholars by special works. It did not mark pronunciation except by accents, likely Bailey's. The first to enter on this unending task was Kenrick (1773); then came Perry (Boston 1777) ; Thomas Sheridan (1780), the elocutionist, father of the great dramatist; Walker (1791), of immense vogue in its time and still cited as an authority, though entirely out of date; Smart (1836), based on Walker; all making their first claim as arbit"rs of elegant taste. Richardson (1836) was i ' imarily for etymologies. Ogilvie's Hmpera ˆ Dictionaryˆ (1850, new ed. 1883) was the firs.: of the great encyclopaedic dictionaries ; the ˆCentury Dictionaryˆ was at first intended only as a slightly revised reprint of Ogilvie, but swelled into the magnificent work so well known. Previously, another English work of the sort had appeared. Hunter's, 1879-88. But the one monumental English dictionary is to be the ˆNew English Dictionary on Historical Principles,ˆ edited by James A. H. Murray and Henry Bradley, greatly assisted by the late Fitzedward

Hall, from matter collected by the Philological Society. It has reached the letter U at this writing, and will take several years to complete ; and will form an absolute history of all English words and meanings from 1200 a.d. to date. Noah Web¬ ster's first dictionary was in 1806, but the first edition of his epochmaking ˆAmerican Dic¬ tionaryˆ was in 1828. This has become the ˆWebster's International Dictionaryˆ of 1890; always connected with Yale College scholarship, through Webster's son-in-law Chauncey A. Goodrich, and later through Noah Porter. Webster was the founder of American lexicog¬ raphy, and by his enthusiasms and original ideas has left a permanent impress on American usages, even where his pet notions have been discarded. His work brought out its chief rival for many years, ˆWorcester's Dictionaryˆ (1860), by a scholar who had assisted him but disliked his innovations, and wished to substi¬ tute elegant usage for what he thought Web¬ ster's barbarisms. It had great influence for a generation, and has a tenacious tradition yet. The ˆStandard Dictionaryˆ p893-95) is a medium between the compression of Webster and the encyclopaedic magnitude of the ˆ Cen¬ tury.ˆ

Among special dictionaries may be named Jamieson's ˆEtymological Dictionary of the Scottish Language,ˆ 4 vols., 1879-82, with a sup¬ plement 1887; Wilson's ˆGlossary of British In¬ dia,ˆ 1851 and Yule & Burnell's ˆAnglo-Indian Words and Phrases,ˆ 1886; Wright's ˆEnglish Dialect Dictionary,ˆ about half finished; Brad¬ ley's ˆMiddle English Dictionary,ˆ 1891; Tay¬ lor's ˆ Words and Places,ˆ several revisions, and Blackie's ˆDictionary of Place-Names,ˆ both etymologies of names; Bartlett's ˆDictionary of Americanismsˆ (1877), much too inclusive, and

Farmer’s ˆAmericanisms, Old and Newˆ(1899) ; Roget’s ˆThesauriisˆ of S3aionyms, last edition 1892; Sturgis, ˆDictionary of Architecture and Buildingˆ (3 vols., 1902) ; Cheyne & Black, ˆEncyclopaedia Biblicaˆ (4 vols., 1900-03) ; Stephen and Lee, ˆDictionar}ˆ of National Biog¬ raphyˆ (66 vols., 1885-1901) — a new edition of this monumental work was published in 22 vol¬ umes (1905-09) ; Adams, ˆDictionary of Ameri¬ can Authorsˆ (New York 1898; 5th ed., revised and enlarged, ib., 1905) ; AVho’s Whoˆ ; AVho’s Who in Americaˆ ; in German, AVer Ist’sˆ (these last three are revised periodically) ; Watts, ‘ˆDic¬ tionary of Chemistryˆ (1888-94) ; Thorpe, ‘Dic¬ tionary of Applied Chemistryˆ (1912-13) ; Wright, ‘The English Dialect Dictionaryˆ (1898-1905) ; Haydn, ‘Dictionary of Races and Peoples A Washington 1907) ; Gould, ‘Illustrated Dictionary of Medicineˆ (6th ed., New York 1910) ; Elson, ‘A Dictionary of Musicˆ (Boston 1905) ; Grove, ‘Dictionary of Musicˆ (5 vols., 1904-10) ; Harbottle and Dalbiac, ‘Dictionary of French and Italian Quotationsˆ (London 1904) ; Cheyne and Black, ‘Encyclopaedia BiblicaANew York 190(L03) ; McClintock, J., and Strong, J., ‘Cyclopaedia of Biblical, Theological and Eccle¬ siastical Literatureˆ (11 vols.. New York 1895) ; Gillow, Joseph, ‘Bibliographical Dictionary of the English Catholicsˆ (5 vols., London 1885) ; Hastings, ‘Encyclopaedia of Religion and Ethicsˆ pO vols., New York 1908) ; Blunt, J. H., ‘Dictionary of Sects, Heresies, Ecclesiastical Parties and Schools of Religious Thoughtˆ (London 1892) ; ‘Encyclopaedia of Superstitions, Folklore and the Occult Sciences of the World ˆ (3 vols., Chicago 1903) ; Smith and Cheetham, ‘Dictionary of Christian Antiquitiesˆ (2 vols., London 1875) ; Piercy, W. C. (ed.), ‘Murray’s Illustrated Bible Dictionaryˆ (London 1908) ; Julian, J., ‘Dictionary of Hymnologyˆ (London

1907) ; ‘New Schaff-Herzog Encyclopedia of Religious Knowledgeˆ (12 vols.. New York

1908) ; Hastings, ‘Dictionary of the Bibleˆ (5 vols., New York 1899) ; Wright, C. H. H. and Neil, C., ‘A Protestant Dictionaryˆ ; Addis, W. E., ‘Catholic Dictionary > (London 1909).

DICTOGRAPH, a species of telephone with a sensitive granular carbon

transmitter and a large diaphragm which increases the reproduction of the sound at the receiving end. This instrument has in recent years figured in many trials. The transmitter is placed incon¬ spicuously behind a picture frame or other ob¬ ject which effectually conceals it, in a room where suspected persons hold conferences. Wires lead to a recording station, where the spoken words are taken down by a stenog¬ rapher. A variety of the instruments has been installed in the waiting rooms of railroad sta¬ tions, the announcer speaks into the transmitter and his voice is repeated by several loud-speak¬ ing receivers located in different parts of the room. See Telephone.

DICTUM, an expression of opinion by a court on some point not involved in the case under discussion. When the court decision is made some statement which has little to do with the case is often found in the middle of the argument on which it either sheds some light or is allied to it or illustrates the cause in some way. Such expressions are frequently quoted for the judge's opinion on the case and have caused considerable confusion in this way.

They are also repeated as binding upon a point which was not involved in the case. When taken by themselves and in their proper rela¬ tion to the court decision on the real point in¬ volved, they are often of great importance and are useful in formulating and grounding other opinions.

DICTUM OF KENILWORTH, the agree¬ ment entered into during the siege of Kenil¬ worth in 1266 by Henry HI and the rebellious barons.

DICTYNIDu®, a family of spiders which weave irregular webs from two kinds of silk. See Spider.

DICTYONEMA, genus of fossil graptolites found from the upper Cambrian to the Carboniferous, in the Baltic Provinces, England, Scandinavia, Eastern Canada and New York. The colony, when found pressed out on the surface of a slab, appears as a network of fine filaments radiating from a common base and united at several points by horizontal threads. See Graptolite.

DICTYOTALES, a group of marine algie. Their combination of characters is very re¬ markable, there being present the tetraspores of the red algse, a brown pigment character¬ istic of the brown algae and sperms proper to themselves. They are generally classed as an offshoot of the red algae.

DICTYS, dik'tis, OF CRETE, a follower of Idomeneus in the Trojan war, whose name is attached to a professed journal of the lead¬ ing events of the contest, which has come down to us in Latin prose, under the title 'Ephemeris Belli Trojani.) An introduction relates how the narrative, inscribed in Phoenician char¬ acters on bark-paper, was found in a coffer of tin in Dictys' tomb, which had been burst open by an earthquake in the reign of Nero, and how the emperor caused it to be translated into Greek; this is accompanied by a letter from one Quintus Septimius, who claims to have pre¬ pared the condensed Latin version that follows. Grenfell and Hunt discovered a fragment of the papyrus in 1904-05. It was published in 1907 in the Tebtunis Papyrit (Book H). This dates probably from the 4th century a.d., and though of no intrinsic value, was a chief source of the romances of the Middle Ages. The best editions are those of Dederich (Bonn 1832 and 1837) and Meister (Leipzig 1872),

DICYCLIC PLANTS. See Biennials.

DICYNODON, a genus of fossil reptiles classified with the Anomodonts, or Anomalous¬ toothed reptiles. Their remains, usually only the skull, occur in a sandstone, supposed to be of Triassic age, in southern Africa and India, and in the Elgin sandstone of Scotland. The bones of the head indicate a distinct type be¬ tween the lizards and turtles though with some characteristics of the crocodile, but they had two nasal apertures instead of the single one possessed by these other reptiles. The anterior portions of the jaws appear to have been al¬ together toothless and they form a kind of beak, which was probably sheathed in horn. The lower jaw has no teeth, but each superior maxilla carries an enormous tusk-like canine tooth similar to the tusk of a walrus, growing from a persistent pulp. The eye orbits were

very large and the cranium flat. They were mostly small, the largest skull found being but 20 inches long. The usual size is about six inches long. They were evidently amphibians, and air breathers.

DIDACHE, did'a-ke, (Gr. (hdaxv Tuv dudsKa d7rn(TT6?Mvˆ the

teaching of the twelve apostles), an ancient Christian work, in Greek, of between 120 and 150 a.d. It was found in 1873 by Bryennios, Archbishop of Nicomedia, in the monastery of the Holy Sepulchre, Con¬ stantinople. The manuscript was of the 11th century. It contains a description of the two ways of life or death, giving rules for Christian conduct. A second part gives directions con¬ cerning the observance of the rites of baptism and the Eucharist and their administration, states the duties of apostles, teachers, bishops, *etc.* The work was held in great esteem in the early church, being quoted as Scripture by some of the Fathers. Most critics are inclined to attribute it to Syria or Egypt and include it among the Apostolic Fathers. The work is of very great value for its information regarding the belief, worship and organization of the primitive Christian church. The text, with critical commentary, is found in Funk, ˆPatres Apostoliciˆ (2d ed., Tubingen 1901). Consult Cruttwell, T. C., ˆLiterary History of Early Christianity) (2 vols., 1889) ; Harris, J. R., ˆThe Teaching of the Apostles) (Baltimore 1887, containing a facsimile of the manuscript) ; Kir-sopp Lake, ˆApostolic Fathers) (in ‘ˆLoeb Clas¬ sical Library,) New York 1912) ; Kruger, ˆHis-tor}ˆ of Early Christian Literature) (ib. 1897) ; Schaff, Philip, ˆThe Teaching of the Twelve Apostles) (3d ed., ib. 1889).

DIDACTIC POETRY (from Gr. dcSanriKdg, pertaining to teaching), has as its object the instruction of the ignorant. In the early ages of Greek literature there was no prose writing. Hesiod taught husbandry and theology in verse, Solon harangued in hexameters. Ever since that time verse has to some extent been used as a vehicle of teaching. The early Ionian philosophers, like Xenophanes, expounded their system in poetry, and, in the later days of the Roman republic, Lucretius, in the finest didactic poem that was ever written, unfolded the theories of Epicurean materialism. Virgil wrote the ˆGeorgies) to , teach the veterans of Au¬ gustus the art of agriculture, and Horace in his ˆArt of Poetry) embodied for young Roman poets the Greek principles of dramatic writing, while Ovid set forth systematically the ˆArt of Love.) Vida, the Italian, Boileau, the French¬ man, Pope, the Englishman, also wrote in verse an ‘ˆArt of Poetry.) English poets have been much inclined to didactic poetry. Darwin’s <ˆBotanical Garden) is a treatise on the Linnaean systems of botany. The longer poems of Cow-per are moral lectures. Dyer’s ˆFleece) is the shepherd’s guide, and even the ˆShipwreck of Falconer) may be looked upon as a manual of seamanship.

DIDELPHIA, a group of mammals com¬ prising the Marsupials (q.v.), so called in ref¬ erence to the double condition of the generative organs in the female. Compare Monodelphia, and see Metatheria.

DIDEROT, Denis, ded'ro', French man of .'etters and encyclopedist: b. Langres, 5 Oct. >713; d. Paris, 31 July 1784. He was educated

by the Jesuits but afterward became one of the bitterest enemies of the church. When his education was at an end he became estranged from his family by turning away from respec¬ table callings and engaging in the Bohemian life of a bookseller's hack in Paris. In 1743 he married Anne Toinette Champion, a devout Catholic, but possessed of a narrow and fretful temper ; in consequence Diderot's domestic life was unhappy. He sought attachments abroad, first with a Madame de Puiseux, who prompted his indecent novel, ˆLes bijoux indiscrets) (1748), and later with Sophie Voland, to whom he was constant throughout her life. In 1743 he published a translation of Stanyan's ˆHis¬ tory of Greece,) and three years later a trans¬ lation of James' ˆDictionary of Medicine.) In 1746 he published his first independent work, the ˆPensees philosophiques,) a general state¬ ment of the usual rationalistic objections to a supernatural religion. It was followed in 1747 by the ˆPromenade du sceptique.) The first work which brought him into general notice was his famous ˆLettre sur les aveugles a I'usage de ceux qui voient) (1749), a study of the philosophy of sensation, involving also an undermining of ethical standards and of social order. It contains strange forecasts of later discoveries and hypotheses, such as the sur¬ vival by superior adaptation and the suggestion of teaching the blind to read through the sense of touch. The publication of the work caused the imprisonment of Diderot at Vincennes, where he remained three months ; then he was released to enter on the gigantic undertaking of his life. Lebreton, the bookseller, had pro¬ jected a French translation of Chambers' ˆEncyclopaedia) and approached Diderot in re¬ gard to the undertaking. Diderot persuaded the publisher to enter upon a new work which should collect under one roof all the active writers, all the new ideas, all the new knowl¬ edge, that were then stirring the cultivated strata of society. The ˆEncyclopedie) thus be¬ came the organ of intellectual emancipation rather than of any single school of ethics or philosophy. D'Alembert was appointed Diderot's colleague and so remained until 1759. Diderot spent 20 years of unremitting toil on the work, revising, editing, correcting and combating the intrigues of opponents. He wrote all the articles on technology and industries, besides many of those on points of philosophy and even on phys¬ ics and chemistry. The first volume appeared in 1751 and the last in 1772. The work fell under the ban of the censors in 1759, but owing to the venality and corruption of the authorities the work went on as before, excepting the defection of Turgot and D'Alembert. The work was not primarily

revolutionary, but practical. It takes for granted the justice of religious tolerance and speculative freedom. It asserts the demo¬ cratic doctrine that it is the common people in a nation whose lot ought to be the main con¬ cern of the nation's government. The entire work is one unbroken process of exaltation of scientific knowledge on the one hand and pacific industry on the other. Despite this arduous task Diderot gave further proof of his ver¬ satility in the admirable reports on the annual exhibitions of painting, by which he established the first bond between art and literature. He wrote two dramas — ˆLe fils natureP (1757) and ˆLe pere de famille) (1758), which mark

the beginning of modern domestic drama. His ˆParadoxe sur le comedienˆ influenced Lessing and the German stage, and Goethe translated an essay on painting from the ˆEncyclopedie.ˆ His novel, ˆThe Nun,> and the dramatic dia¬ logue, ˆLe neveu de Rameau,> are wonderfully effective pictures of the corrupt society of the time. His little sketches are pearls of kindly humor and of witty narrative. It is calculated that the average annual salary received by Diderot for his work on the ˆEncyclopedieˆ was but $600 per year. In 1773 he felt obliged to sell his library to provide a dowry for his daughter. It was purchased by Catharine H of Russia and presented to Diderot whom she constituted her salaried librarian. Diderot went to Russia to thank the empress and spent some months in her society in Petrograd. He re¬ turned home in 1774 and passed his remaining years in the acquisition of new knowledge, in ephemeral compositions and in luminous con¬ versations with his friends, who deemed him unrivaled as a conversationalist. The justice of their opinion is borne out by the fact that his influence on his contemporaries was tre¬ mendous. His works were edited by Assezat and Tourneux (20 vols., Paris 1879). His ˆCorrespondanceˆ with Sophie Voland gives perhaps the best insight into his character. Consult Brunetiere, ˆLtudes critiquesˆ (Paris 1881) ; Carlyle, ˆEssay on Diderotˆ (London 1881) ; Collignon, A., ˆDiderot) (Paris 1907) ; Cru, R. L., ˆDiderot as a Disciple of English Thoughtˆ (New York 1913) ; Lauson, G., ˆHis-toirc cle la litterature frangaiseˆ (Paris 1912) ; Morley, John, ˆDiderot and the Encyclopaedistsˆ

(Lpndon 1891), the best study in English of Diderot's life and influence; Rosenkranz, ˆDide¬ rot's Leben und Werkeˆ (Leipzig 1866) ; Tornezy, A., ˆLe legende des philosophesˆ (Paris 1911).

DIDIER, de-dya, or DESIDERIUS, the

Jast - 'ng of the Lombards. He was Duke of sˆria, anc. happening to be in Tuscany in 756, Astolphus, the previous king, died child¬ less, immediately raised an army and laid claim to the throne. Didier was crowned and seemed to have secured the permanence of his dynasty by marrying his daughter to Charlemagne in 770. The marriage, however, proved unfortu¬ nate ; and when Charlemagne dissolved it by re¬ pudiation, the quarrel between the families became irreconcilable. Didier afterward in¬ vaded the Papal States and made a conquest of a part of them, when Charlemagne inter¬ fered. Didier, unable to oppose him, shut him¬ self up in Pavia, when, after a siege of a year, he was obliged to surrender at discretion.

DIDIER, Charles, French poet and novel¬ ist : b. Geneva 1805 ; d. Paris, 8 March 1864. He wrote some novels designed to awaken pa¬ triotic sentiment in Italy and to make known the struggles of the Carbonari and other revolu¬ tionists against Austrian and papal dominion. Among these were ˆUnderground Romeˆ (1833) ; ˆThe Roman Campagna> (1842) ; and ˆFifty Years in the Wilderness ˆ (1857). His lyric poems, ˆ Melodies ˆ (1827), are character¬ ized less by force than by sweetness.

DIDIER, Jules, French painter: b. Paris, 26 May 1831 ; d. 1892. He studied under Cog-niet and Laurens, and won the Prix de Rome in 1857. He confined himself almost exclusively to

rustic scenes, landscapes and animals. Among-his works are ˆFarm on the Ruins of Ostia ˆ in the Luxembourg; ˆNormandy Landscape ˆ ˆHunting a Hare ˆ ; ˆMorning on the Borders of the Wood ˆ ; ˆAgriculture ˆ ; ˆFord near Autun ˆ ; and ˆReturn of the Drove ˆ ˆ Banks of Lake Trasimene ˆ (1863) ; Wiew in the Forest of Compiegne.ˆ He also executed some beautiful lithographs.

DIDI'ON, de'dyon', Isidore, French soldier and author: b. Diedenhofen 1788; d. 1878. He received his education at the Lcole Polytechnique and the Metz Academy. In 1848 he was ap¬ pointed head of the percussion-cap manufactory of the French government at Paris and 10 years later was made general of brigade. He was an authority on the

science of projectiles; his works on this subject including ˆTraite de balistiqueˆ (1848; 2d ed., 1860) ; ˆCours elemen-taire de balistiqueˆ (1854; 3d ed., 1859) ; ˆProgres des sciences et de I'industrieˆ (1875).

DIDIUS SALVIUS JULIANUS, Marcus,

Roman emperor : b. about 133 a.d. ; d. Rome, 1 June 193 a.d. Having filled the offices of quaestor, aedile and praetor, he was appointed commander of a legion in Germany, and subse¬ quently governor of Belgica. Having distin¬ guished himself in Africa and Asia Minor, he returned to Rome, and, on the assassination of Pertinax, made himself emperor by bribing the praetorian guards. He now assumed the name of Marcus Didius Commodus Severus Julianus; but after a short reign of two months, was killed in his palace by a common soldier.

DIDO, queen of Carthage. She was the daughter of Agenor (Belus) ; according to others, of Carchedon of Tyre, from whom Car¬ thage received its name ; others call her father Mutgo or Muttinus. Her brother was Pyg¬ malion, king of Tyre. Her father married her to her uncle Acerbas, otherwise called Sichaeus or Sicharbas. He was murdered before the altar by her brother, who was instigated by the desire of making himself master of his wealth. She therefore set sail for Africa, with all her wealth and her faithful companions. They landed on the coast of Africa, not far from Utica, a Tyrian colony. She purchased as much land as might be covered with the hide of a bull, which she cut into the thinnest possible strips, and surrounded with it a large extent of territory. Here she first built the citadel of Byrsa, and afterward Carthage. Hiarbas, a neighboring prince, paid his addresses to her. Unwilling to accept and unable to refuse the proposal, she sacrificed her life on the funeral pile. By an anachronism common with poets, Virgil attributes her death to the faithlessness of ..Eneas. Dido was worshipped in Carthage as a goddess.

DipON, de'don, J. Henri, Pˆre, French Dominican preacher and writer: b. Touvet, Isere, 17 March 1840; d. 1900. He entered the Dominican Order in 1858, and attracted much attention for his series of eloquent Lenten ser-rnons. Having come into conflict with his supe¬ riors because pf his views about democracy, he ceased for a time to preach and resided at (Tor-bara, Corsica. His leisure was spent in pre¬ paring a life of Jesus; which should be an anti¬ dote to the skeptical ˆVie de Jesusˆ of Renan. This was published in 1891 under the title

ˆ Jesus Christ,ˆ a book which made a great im¬ pression throughout France. He has also writ¬ ten ˆLes Allemandsˆ (1884). His last years were spent in the education of youth at the ficole Albert-le-Grand at Arceuil, near Paris, of which he became director.

DIDONCEPHALUS, a monster with a double range of teeth, or a double jaw.

DIDOT, de'do', Ambroise Firmin, French publisher: b. Paris, 7 Dec. 1790; d. there, 22 Feb. 1876. He was a son of Firmin Didot (q.v.) and with his brother Hyacinthe published such im¬ portant works as ˆL'Univers pittoresqueˆ ; ˆNouvelle biographic generale,ˆ *etc.* He trav¬ eled much in the Orient and studied Greek. He began the ˆBibliotheque des auteurs grecsˆ and also reprinted Du Cange's ˆGlossarium mediae et infimae latinitatis.ˆ In 1872 he was elected member of the Academy of Inscriptions and Belles Lettres.

DIDOT, Firmin, French publisher, printer and type-founder: b. Paris, 14 April 1764; d. 24 April 1836. He was a brother of Pierre Didot (q.v.). He was inventor of a new sort of script, and an improver of stereotype printing. In 1811 he was printer to the Institut and from 1827 till his death represented Nogent-le-Retrom in the Chamber. He translated Tyrtaeus and Theocritus and the ˆBucolicsˆ of Virgil. After 1811 he had as partners his sons, Ambroise and Hyacinthe.

DIDOT, Frangois, fran-swa, French printer: b. Paris 1689; d. 2 Nov. 1757. He founded the famous firm of Didot in Paris in 1713. His sign read la Bible d'Or.® He it was who published the works of Abbe Prevost.

DIDOT, Frangois Ambroise, French printer: b. Paris, 7 Jan. 1730; d. 10 July 1804. He was a son of Frangois Didot (q.v.), and in¬ vented many of the machines and instruments now commonly used in the typographic art. From his foundry came the most beautiful types, that, up to that period, had been used in France, and he was the first person in France who printed on vellum paper. He took the greatest care to have his editions correct. By the direction of Louis XVI he printed a

collec¬ tion of the French classics for the use of the Dauphin. The Count d' Artois employed him to print a similar collection, the ˆCollection de divers ouvrages frangais imprimee par ordre du Comte d'Artoisˆ (64 vols.)

DIDOT, Henri, French type-founder: b. 1765; d. 1852. He was a son of P. F. Didot (q.v.), and early distinguished himself as a type-engraver. He then applied himself partic¬ ularly to improve the method of founding types, in which he succeeded by the invention of a new founding apparatus. He called his proc¬ ess ˆTonderie polyamatype.® It is more expedi¬ tious than the former mode, and the types are much cheaper.

DIDOT, Hyacinthe Firmin, French pub¬ lisher: b. Paris, 11 March 1794; d. Dandon, France, 7 Aug. 1880. He was a son of Firmin Didot (q.v.), and with his brother, A. F. Didot, conducted the business of the house of Didot from 1827.

DIDOT, Pierre, French publisher and printer: b. 25 Jan. 1761; d. 31 Dec. 1853. He was a son of Frangois Ambrose Didot (q.v.), and succeeded his father in the printing business

in 1789. In the universal impulse which the arts received from the Revolution he aimed at becoming the Bodoni of France, and conceived the plan of a splendid edition of the classic authors in folio, which should excel, if possible, the best editions extant. He spared no expense to adorn them with all the splendor and ele¬ gance of the arts of design, and even sacrificed a part of his property to this favorite object. His ˆVirgiP (1798) was worthy of these en¬ deavors, and still more so his ˆRacineˆ of 1801, which the French regard as the first typograph¬ ical production of any age or country. Only 250 copies of these works were struck off. Among the productions of his press, Visconti's Hconographieˆ is particularly distinguished. Didot devoted the efforts of 10 years to the im¬ provement of the types, and caused 18 different sorts, with new proportions, to be cut, with which he printed Boileau and the ˆHenriadeˆ in 1819. Didot paid no less attention to correct¬ ness and purity of text, and perfect consistency of orthography, than to typographical beauty. Consult Piper, Alfred Cecil, ˆSome Great Printers and their Work: the Didotsˆ (in Li¬ brary World, London 1914), and Werdet, E., ˆLtudes biographiques, sur la famille des Didotˆ (Paris 1864).

DIDOT, Pierre-Frangois, French printer: b. Paris, 9 July 1732; d. 7

Dec. 1795. He was a son of Frangois Didot (q.v.), and distinguished himself by his bibliographical knowledge. He also became printer to Louis XVI. He had a great share in the changes made in the character of types, and contributed to the advancement of his art. He published some very fine editions ; among them the Woyages d'Anacharsis.ˆ

DIDRON, de'drofi', Adolphe Napoleon,

French archaeologist: b. Hautvilliers, Marne, 13 March 1806; d. 13 Nov. 1867. He was advised by Victor Hugo to undertake the study of Christian archaeology. He traveled in Greece, Germany, Italy, England and France, every¬ where studying ecclesiastical remains. He be¬ gan in 1844 to publish ˆAnnales Archeologiques,ˆ devoted to mediaeval art and antiquities, which he continued to 27 volumes. This work was completed, long after his death, by the 28th vol¬ ume, which included a general index. It is a valuable storehouse of mediaeval art and archae¬ ology. His chief works are a ˆManual of Chris¬ tian Iconography,ˆ translated from an ancient manuscript, and ˆChristian Iconographyˆ (1843), which forms a history of the representations of the persons of the Trinity in art, their attributes, *etc.*

piDSBURY COLLEGE, a Wesleyan theo¬ logical institution situated near Manchester, England. It was founded in 1842, from funds collected in 1839 during the commemoration of the centenary of Methodism. It has a high reputation for scholarship, having numbered among its faculty such men as W. B. Pope, the theologian, and Professor Geden, the great biblical scholar. ,

DIDUNCULUS, a genus of birds allied to the pigeons, and comprising only the one species, D. strigirostris of the Navigator Islands. This bird is of special interest as being the nearest living ally of the extinct dodo. It has a length of abˆout 14 inches, with a glossy plumage verg¬ ing from a velvety black on the back to greenish black on the head, breast and abdomen. The

large beak, which is nearly as long as the head, is greatly arched on

the upper half, while the lower is furnished with two or three tooth-like indentations. See Pigeon.

DIDYNA. See Branchidˆ.

DIDYM.ffiUS, did-i-me'us, a surname of Apollo, either because he was the twin-brother of Diana, or from the double light of the sun and moon, which he lends to men. Under this name Apollo had one of the most famous of his temples and an oracle at Didyma among the Milesians. Pindar calls Diana Didyma.

DIDYMIUM (Gr. ˆhwinˆˆ), a supposed me¬ tallic element, isolated from the mineral cerite by Mosander in 1842. The symbol D or Di was assigned to it, and its atomic weight was con¬ sidered to be about 143. The name referred to the close resemblance between the new metal and the element lanthanum, which had been dis¬ covered by the same chemist, and in the same mineral, a short time before. Recent researches have shown that didymium is not an elementary body, but that it consists principally of two other elements, which are respectively known as neodymium and praseodymium (q.v.). This discovery renders the name ˆdidymium® singu¬ larly appropriate for the original substance.

DIDYMOGRAPTUS, a genus of graptolites, consisting of about 40 species, found abundantly in the graptolite shales of the lower and middle Ordovician in Europe, America and Australia. For structure, forms, etc., see Graptolite.

DIDYMUS, Alexandrian grammarian and critic : b. 63 b.c. He was a prolific writer. He belonged to the school of Aristarchus, and was contemporaneous with Cicero. By Seneca his works were estimated at 4,000; none now ex¬ tant. Fragments have been published by Schmitt (Leipzig 1854).

DIDYMUS OF ALEXANDRIA, ecclesi¬ astical writer : b. 309 ; d. 394. He became blind when four years old, but nevertheless succeeded in acquiring all the sciences as then known. Athanasius appointed him director of the Theological School of Alexandria. Nearly all of his writings are lost. Jerome, who was one of his pupils, has left a translation of Didymus' treatise on the Holy Spirit, and there is extant a translation by Epiphanitis of his comments on the canonical Epistles. Other extant works, in Greek, are -a treatise on the Trinity and one against the Manichaeans. These are contained in Migne ˆPatrologia Graecaˆ (Vol. XXXIX).

DIDYMUS, Greek translation of the Hebrew, t'om (Aramaic id' nm), a twin, of which 0Wy«ac, Thomas, is a transliteration. It was the alternative name of one of the disciples of Jesus (John xi, 16; xx, 24). His first name being Judas, the alternative is given to distin¬ guish him from Judas Iscariot.

DIE {Dea Vocontiornm) , the capital of an arrondissement in the department of Drome, southeastern France, is situated on the right bank of the Drome, at the foot of Mount Glandaz, in a wide and fertile plain. The manu¬ factures are woolen cloth, paper, leather and silk; there is some trade in cattle and timber, and the neighborhood produces excellent fruit, and the white wine called ^^Clairette de Die.® The town was formerly the seat of a bishop.

and previous to the revocation of the Edict of Nantes in 1685, of a Calvinistic university. Among the interesting structures of Die are the old cathedral with granite columns from an ancient temple of Cybele, and a porch of the 11th century; the episcopal palace, the walls flanked by towers ; and the ruins of a castle — all of considerable age ; the triumphal arch on the road toward Gap, known as the Porte Saint Marcel, portions of an aqueduct, and other Roman remains. There are several mineral springs in the vicinity. Pop. 4,000.

DIE ELIXIERE DES TEUFELS. The

Devil's Elixir (by E. T. W. Hoffmann, 1816) ; has held for a century a leading place among the shudder-tales of diabolism. In a cloister is preserved among the relics a bottle once left by the devil in the cell of Saint Anthony. Whoever tastes its contents becomes possessed by Satan. Brother Medardus, to keep his imperiled fame as a preacher, drinks, and gains an intense new life for evil. Haunted by a terrible unknown presence, protected from the consequences of his crimes by his ^^double,® a crazy Capuchin, who takes the punishments, he runs a wild course of successful criminality as hunter, gambler, and so on, with intervals of self-reveal¬ ing terrors that border on insanity, and every device of literary fancy to make the naive reader's blood run cold. At last the ex-monk and libertine returns, after long and gruesome penance, to his cloister and, after a weird phantasmagoria of ghost-walking and witches' sabbath, attains an edifying death. The book is remarkable, even in comparison with Hoffmann's other tales of terror, for its exhaustless inven¬ tion, the realistic illusion of its utter unreality, and its power to grip the imagination, while the author seems to smile with romantic irony at his own power. The

fantastic humor of ^^Devil-Hoffmann® finds more congenial expression in ^Lebensansichten des Katers Murr.^ An Eng¬ lish translation of the ^Elixir^ appeared in 1824, and has been followed by many others.

Benjamin W. Wells.

DIEBITSCH-SABALKANSKI, dyi-bech- za-bal-kan-ske, Hans Karl Friedrich Anton, Count, Russian field-marshal : b. Grossleippe, Silesia, 13 May 1785 ; d. Kleczwo, near Polotsk, Poland, 10 June 1831. In 1797, when 12 years of age, he was sent by his father, who had served under Frederick the Great and Frederick Wil¬ liam H of Prussia, to the military school of Berlin, but in 1801 he quitted the Prussian serv¬ ice for that of Russia, entering the ranks of the Imperial guard. He served with distinction in the battles of Austerlitz, in 1805 ; Eylau and Friedland in 1807, and, having attained the rank of captain, for five years subsequent to the treaty of Tilsit, devoted himself to the study of mili¬ tary science. During the invasion of the French in 1812,_ he served under Wittgenstein, compelled the capitulation of the Prussian general, Yorck, became chief of staff in 1813, took part in the battle of Lutzen, and later joined the corps of Barclay de Tolly in Silesia, as quartermaster-general. In June 1813 he was instrumental in bringing about the secret treaty of Reichenbach, between England, Austria, Russia and Prussia. He fought in the battles of Dresden and Leipzig, and for his services was made lieutenant-gen¬ eral, at the age of 28, by Alexander. He was responsible for the march on Paris, in the

French campaign of 1814, which terminated the war, and for this he was decorated with the order of Alexander Nevskoi. He took com¬ mand of the first corps upon Napoleon’s return from Elba, but was later appointed adjutant to the emperor, and, having been made chief of staff, accompanied him on his journey through southern Russia, till his death at Taganrog, in 1825. Diebitsch thereupon returned to Saint Petersburg, and by his intrepid conduct during the revolution of 25 December, won for himself the title of baron, and later Emperor Nicholas created him count. He had the chief command in the Turkish

War of 1828-29; stormed Varna; and made the famous passage of the Balkans, compelling the Porte to conclude the peace of Adrianople, for which the surname of Sabal-kanski (Transbalkanian) , was conferred upon him, and he was raised to the rank of field-marshal. He was appointed commander-inr chief of the army sent to put down the rebellion which had broken out in Warsaw, 29 Nov. 1830, and was also made governor of the provinces adjoining Poland. In this campaign he did not meet with success, suffering defeats at Wisniew and Stoczek, 11 Feb. 1831; at Dobre, on the 18th; at Grochow and Wawer on the 19th, and in the series of engagements fought near Praga, in March. He was, however, more successful in the bloody battles of Nur, Lornza and Ostro-lenka, fought from 15-26 May, but after estab¬ lishing his camp at Kleczwo, was taken sick with cholera, and died shortly afterward. Con¬ sult Belmont, ˆGraf Diebitschˆ (Dresden 1830) ; Chesne}ˆ ˆRtisso-Turkish Campaigns of 1828-29> (New York 1856).

DIEDENHOFEN, de-den-hof'en. See Thionville.

DIEFENBACH, Lorenz, def'en-ban, Ger¬ man philologist: b. Ostheim, Hesse, 29 July 1806; d. Frankfort-on-Main, 28 March 1883. He was 12 years pastor and librarian at Solms-Laubach. In 1848 he settled at Frankfort-on- Main, where in 1865 he was appointed second librarian to the city. His literary industry was enormous, embracing poetry and romances, as well as those more ponderous works by which his name will live. His greatest books are ˆCel-ticaˆ (1839ˆ0) ; Wergleichendes Worterbuch der Gothischen Sprachˆ (1846-51) ; ˆGlossarium Latino-Germanicum mediae et infimae aetatis,ˆ a supplement to Ducange's well-known ˆGlossaryˆ (1857); <Origines Europaeaeˆ ; ˆHoch-und Niederdeutsches Worterbuchˆ (with Wulcker, 2 vols., 1874-75).

DIEFFENBACH, Georg Christian, Ger¬ man poet and theologian : b. Schlitz, Hesse, 1822; d. 1901. He was educated at Giessen and was made chief pastor of his native place in 1871. Plis poems for children are still very popular in Germany. He also wrote many liturgical, devotional, homiletic and poetical works, which attained a great degree of popularity.

DIEFENBACH, def'fen-ban, Johann Friedrich, German surgeon ; b. Konigsberg, 1 Feb. 1794; d. Berlin, 11 Nov. 1847. He was educated in theology, but from 1813-15 served as a volunteer in the war against Napoleon. Upon his return he devoted himself to the study of medicine, taking his degree at Wurzburg in 1822. He soon became widely known as an operator; in 1830 became head surgeon in a

Berlin hospital ; in 1832 became a professor in the university; and in 1840 director of clinical surgery. He was distinguished as an operator, especially in the art of forming by transplanta¬ tion new noses and lips. He wrote ˆDie Trans¬ fusion des Blutes und die Einspritzung der Arzneien in die Adernˆ (1828) ; ˆChirurgische Erfahrungenˆ (4 vols., 1829-35) ; ˆDurch-schneidung der Sehnen und Muskeln> (1841) ; ˆUeber das Schielenˆ (1842); ˆOperative Chi-rurgieˆ (1844-48).

DIEFFENBACHIA, def-fen-bak'i-a, a genus of AracecB (arum family), of which there are about 15 species, found in the woods of South America and the West Indies. Their leaves have sheathing petioles, and are often variegated. Their form of inflorescence is the spathe-enclosed .spadix characteristic of the order, the spathe in Dieffenbachia being green or yellowish. The best-known species is the poisonous dumb cane of the West Indies (D. segiiin).

DIEGO GARCIA, de-a'go gar-the'a, an island of the Indian Ocean, in lat. 7° S., and long. 72° E., extends in an irregular horseshoe shape, and is 30 miles long. It belongs to an archipelago known as the Chagos Islands. It contains a spacious bay, and is very convenient for coaling purposes. The group has about 700 inhabitants, and is a dependency of Mauritius.

DIELECTRIC, a name applied by Fara¬ day to any medium through or across which electrostatic induction can take place. (See Induction, Electrostatic). Solids, liquids and gases possess this property of transmission, though in differing degrees, and their dielectric value, or specific inductive capacity, is measured by the ratio of the capacity of a condenser in which each may form the insulator, to the ca¬ pacity of the same condenser with a vacuum as insulator.

DIELM AN, Frederick, American painter: b. Hanover, Germany, 25 Dec. 1847. He re¬ moved to the United States in childhood, and was graduated at Calvert College. He was a topographer and draughtsman in the United States Engineer Department 1866-72 ; studied art under Wilhelm Diez at Munich, and estab¬ lished a studio in New York in 1876. He de¬ signed the mosaic panels, ˆLaw and Historyˆ in the Congressional Library at Washington, D. C., and was president of the National Academy of Design from 1899 to 1909. He was most successful as a genre painter. His best pictures are ˆThe Patrician Ladyˆ ; ˆMy Own Pussˆ ; ˆLunchingˆ and ˆThe Young Gamblers.ˆ In 1903 Dielman became professor of drawing at the College of the City of New York and about the same time was made director of the art

schools at Cooper Union, New York. He also assisted in promoting the Society of American Artists ; was president of the Arts Federation of New York and an important figure in all art education and advancement.

DIELS, dels, Hermann, German educator: b. Biebrich 1848. He was educated at the universities of Bonn and Berlin and in 1886 became professor ordinarius of classical phi¬ lology at the latter institution. His most notable work is his ˆDoxographi Graeciˆ (1879), in Avhich he first determined the sources of the doctrines of the Greek philosophers as trans-

mitted by post-Aristotelian scholars. He also issued an edition of Simplicius' ˆCommentary on the Physics of Aristotle' (1882) ; and ˆUeber die Philosophenschulen der Griechen' (1887) ; ˆDie Fragmcnte der Vorsokratiker, Griechisch und DeutsclP (1903; 2d ed., 1906-10) ; a treat¬ ise on the ˆSibyllinische Blatter' (1890). He was also a member of the editorial staff of the ˆCommentaria in Aristotelem Graeca' and of the Archiv fur Geschichte der Philosophie (Ber¬ lin, 1887).

DIEMER, dya'mar', Louis, French com¬ poser and pianist : b. Paris 1843. He studied at the Conservatoire under A. Thomas, Marmontel, Benoist and other masters, and took first prize for piano playing at the age of 13. In 18ˆ he was appointed professor of piano at the Conservatory in succession to Marmontel. At the Exposition of 1889 he gave a series of historical piano recitals, the great success of which induced him to devote himself to the older piano music. He is founder of the Societe des anciens instruments and has published a fine collection of ˆClavicinistes Frangais.' His own compositions in the form of chamber music also include several pianoforte selections, concertstiicks for violin, piano, and a brilliant pianoforte concerto.

DIEPENBEECK, depen-ban, Abraham van, Flemish painter : b. Bois-le-Duc, 9 May 1596; d. Antwerp 1675. He first studied glass painting, and a number of windows in differ¬ ent churches in Antwerp are his work. Later he studied under Rubens. He made a journey to Italy and

on his return to Antwerp in 1641 became director of the Academy. Among his paintings are ‘■St. Norbert’; ˆEcstasy of St. Bonaventura’ ; ˆSt. Francis Adoring the Sacra¬ ment’ ; ˆEntombment of Christ’ ; ˆNeptune and Amphitrite’ ; and the ‘ˆFlight of Cloelia.’ (There is some difference of opinion as to the author¬ ship of th-ese works, but they are generally as¬ cribed to Diepenbeeck). He was engaged by Charles I and by the Duke of Newcastle to execute numerous drawings. He designed va¬ rious tapestries and illustrations for books, among others 59 plates of a ˆTemple of the Muses’ (Paris 1655).

DIEPPE, de’ep, France, seaport in the de¬ partment of Seine-Inferieure, 93 miles north-northwest of Paris. It is situated between two ranges of chalk hills at the mouth of the river Arques. The harbor accommodation is exten¬ sive, there being an outer harbor and four inner basins or docks, and a dry dock 341 feet long and 23 feet deep, but Dieppe has been out¬ distanced as a port by Havre. The manufac¬ tures include works in ivory, the most famed in Europe ; works in horn and bone, lace¬ making, sugar-refining and shipbuilding. Fish is the staple trade. Imports include coal, iron, pitch and cement ; exports, silk, wines, brandies, fruit and potatoes also manufactures. The church of Saint Jacques is the principal ecclesi¬ astical foundation, built between the 12th and I6th centuries. Among educational institutions are a commercial college and a school of navi¬ gation, The suburb of Le Pollct, connected with the town by a drawbridge, is inhabited by sailors and fishermen said to be of Venetian ex¬ traction. The castle was erected for defense against the English in 1435. and successfully withstood siege in 1442, but was subsequently

captured and destroyed several times. The town suffered severely from the plague in 1668 and 1670, and was reduced to ruins by the Eng¬ lish and Dutch in 1694. It was occupied by the Germans during the Franco-Prussian War. Pop. 23.973.

DIERX, de’er’, Leon, French poet: b. on the Island of Reunion 1838. He was educated in Paris, where he became a member of the Parnassians. He has published ‘Aspirations’ (1858) ; ‘Poemes et poesies’ (1864) ; ‘ˆLes levres closes’ (1867) ; Les paroles du vaincu’ (1871) ; ‘La recontre’ (1874) ; ‘Les amants’ (1879), The Academy crowned his collected poems (1889-90).

DIES AND DIE MAKING. In the manu¬ facture of machinery by the modern duplicate system, in which every individual part is so nearly

alike that it may be replaced for any other broken or worn part, the art of the die maker has become of great importance. The majority of working parts of machines — prac¬ tically all but the heavy castings — are now made by machine forging, the rough metal stock being fed into presses, and cut and stamped into desired shapes. See Machine Forging.

In order that the forging machine or press may do its work, it must be provided with dies for shaping the stock that is pressed or squeezed between them. Dies are commonly made in pairs, as shown in Fig. 1, the halves being termed male and female. They have to be formed with great accuracy, and require square, sharp, strong cutting or forming edges, and must be tempered as hard as is consistent with toughness. They may be designed in many ways. If it is desired to stamp washers out of thin metal, with a central hole of half inch diameter and one and a half inches over all, one pair of dies could be made to punch out the hole, wasting the half-inch center of metal, and another pair of dies to punch out the washer itself, wasting the spaces between the inch and a half circles. Or gang dies could be made, to punch out say 10 holes at a time, while another pair of gang dies at a following opera¬ tion punched out the 10 washers complete. Or, better still, a progressive gang die could be made that would comprise both rows of half-inch punches and rows of inch and a half punches. This being placed in the press, and a long strip of metal fed in, and advanced at every stroke, so that the row of half-inch holes would be followed on the next stroke with the inch and a half gang, it is apparent that the press would turn out a series of complete washers at every stroke after the first. This outline will enable the reader to recognize that in die mak¬ ing the designer has to consider how many parts are likely to be made from the dies, and the greater the number the more labor and expense he is justified in putting in on the pair of dies to secure the largest output from the forging or stamping machine.

The first thing to be considered to determine whether a punch and die should be used to pro¬ duce work is the number of pieces wanted. If it is standard work, and the demand is 100 or more per week, it is both desirable and economi¬ cal to have a die made, for after the die is once made the work can be produced at a very low cost. Oftentimes when a large number of

t

pieces are wanted, and a power feed is used, the cost will not exceed two cents per 1,000 blanks.

The power required to blank out a piece of metal depends largely on the shape of the blank and the number of cutting inches in the die, a long narrow blank requiring more power than a round blank of the same area, the shear of the dies being equal. If the work will admit of the face of the punch being slightly round¬ ing, less pressure will be required than with a flat-ended punch.

The maWng of dies calls for very expert workmanship both in design and execution, and the tempering requires an intimate knowledge of conditions and the consideration of the form and character of the die. A whole series of die¬ shaping, milling and filing machines have been developed for the special use of the die maker.

Following are the more common types of dies used:

BLANKING DIES.

These are made for cutting out flat blanks from steel, iron, paper, *etc.* Usually both punch and die are hardened and tempered; sometimes the punch is left soft, and as it gets worn is set out and refitted by being forced or shoved into the die; sometimes it is best to reverse this operation, as in punching paper, playing cards, etc., and harden the punch and leave the die soft.

Shear. — A shear or slightly beveled edge is usually given to the punch or die, determined by the work it has to do ; when it is intended to use the blanks, or pieces punched out, the shear should be given to the die, as less distortion is given to the metal by this method, but where the hole is the object sought, as in rivet holes in boiler plates, etc., the shear should be given to the punch.

Die-shoes. — Cutting or blanking dies are usually held in a shoe or die-holder, or if a large die, it is fastened to the bed of the press direct, but as a rule the fewer pieces interven¬ ing between the press and the

die the better re¬ sults will be obtained. Very large blanking dies are usually made in one of two ways : either as rings set in a cast-iron holder, or by welding the rings directly on to a wrought-iron holder or die-plate ; the latter method is the best in making plain dies, but cannot be used in com¬ pound dies. The welding of the steel rings to¬ gether, and then on to the wrought-iron plate, calls for good work on the part of the smith. In the former method the rings are first welded and then turned, hardened and ground true in the universal grinder, then set in a groove turned in the holder and held there by being bolted from the back of the holder.

Hot Work. — In making dies for hot work (as the blanking out of nuts and other thick work from red-hot metal) a die made of chilled cast-iron with a good clearance will give good results, as the temper is not affected by the heat of the stock punched, the punch being made of steel and fitting the die loosely (in very thick stock a difference of Vie" or more in the diameter of the punch and die is not too much), and if a nice job is wanted, the work can be shaved, or repunched, as it is called, by forcing it through a second die that is a trifle smaller than the first, leaving a true and smooth surface.

Repunching. — In the repunching of brass and copper, the use of buttermilk as a lubricant gives a better result than any oil or soap water.

BENDING DIES.

Bending dies are used for forming sheet metal or wire into almost any form that may be wanted. The die shown (Fig. 1) is for bend-

Fig. 1.

ing the piece on the right-hand side of the punch. This is blanked out by a previous opera¬ tion, placed in the die by hand, and is bent as shown by the finished piece on the left-hand side. The two sides of the blank are bent down and the long one on the right is curved around the punch shown and the ring on the end is twisted around to a right angle to the rest of the arm.

The Punch. — The punch is made from a single block of steel which is planed up to fit the press, and then machined out as shown in the cut. /The twister, which is for turning the ring at right angles to the rest of the arm, is counter-bored and held in place by the quar¬ ter-inch pin driven into the side, and which is held up by the spiral spring seen at the upper right-hand corner of the sketch. The die is self-contained and is used in an ordinary single¬ stroke press, and requires no extra attachments to enable it to do the work. This same prin¬ ciple can be used in many cases, and the bend¬ ing performed in one operation which would otherwise require two or more strokes of the press.

DRAWING DIES.

Drawing dies are used for shaping or draw¬ ing up sheet metal. The use of dies of this class is of comparatively recent origin ; it having been first put into practical use by one De Vere of France in the latter part of the 18th century, and in the year 1827 the same process was pat¬ ented for the drawing up of cartridge shells.

Origin.— In 1860 or 1861, two Frenchmen came to this country, bringing with them draw¬ ings of a model of a drawing press. These they had surreptitiously taken from a press upon which they had been employed in France. This press was secreted in a barn near the city of Wilmington, Del., and was finally perfected and put into actual use by Henry Marchand, who formed a company for the manufacture of the

same, known as the Higgins Marchand Co. The first press was set up in one corner of the shop which was boarded up, and only three men allowed in the room. The first piece drawn up was a washbasin made from a 14” blank, which was probably the first piece of drawn work ever made in America.

Drawing dies may be divided into three kinds : the plain drawing or ^^push through® dies ; solid bottom or *knock-out® where the work is to be knocked back; and combination dies which cut and draw at one stroke of the press. Combination dies are often so ar¬ ranged as to perform three, four and some¬ times more operations on the work at one stroke of the press. Dies of this nature are very expensive, and are only desirable when the work is to be done in large quantities.

Push Through Die. — Fig. 2 shows a plain ^^push through® drawing punch and die, the blank being punched out to fit the set edge, and then ^^drawn up® or rather, it is pushed through the die by the punch, and as the punch rises, the work is stripped from the punch by the ®pull off® which is made very sharp for the purpose. A ®draw® of about one-quarter to one-half of a degree is given the die, making it that much larger on the upper side or face, and the upper edge is rounded over and left very smooth and as

hard as fire and water will make it. ®Don’t draw a drawing die.® The lower end of the punch is rounded and left in the same shape; often the die^ will work better if the finish is changed from a circular to a lateral polish. The diameter of the punch is equal to that of the die, minus double the thickness of the stock to be drawn. A die of this kind can only be used on shallow work, or in redrawing or reducing the diameter of the work that has been previously drawn up; if used on deep drawing it will pucker or crimp around the edge. To avoid this there must be a blank holder to hold the stock firmly while it is being drawn.

Single Action. — Fig. 3 shows a single-action cutting and drawing die, better known as a single-action combination die. A combination die is, as the name indicates, a combination of a drawing die and cutting die in one ; it punches the blank, and at the same stroke of the press, draws it up into a cup or shell. The die shown is intended to be used

in an ordinary single¬ stroke power press, and will draw up work not over one or two inches deep.

Double Action. — A double-action die is a modification of a single-action die, to be used in a double-stroke press ; it can be used on work that is too deep for single-action dies. The one shown in Fig. 4 is known as a ^^push through® die. It is somewhat like the single-action die, except that the shell is cut by the punch (B) and is carried to the drawing die (D) and the

Fig. 3.

lower surface of the die acting as a blank-holder is held there while the drawing punch (A) forces it through the drawing die, and as the punch withdraws, the shell is removed by the lower edge of the die, which is ground very sharp for that purpose, and is known as the ®pull off.® The drawing die is held in place by the cutting die being clamped upon it by the ring (G).

This style of die has this advantage ; the cutting and drawing dies are independent of each other, and can be changed for a longer or shorter shell, or either die can be repaired or replaced without changing the other.

Triple Action. — Triple-action dies are in¬ tended to punch, draw and stamp the work at the same stroke of the press. The con¬ struction is the same as the double-action, ex¬ cept that the die block is cut away to allow the stamping die to be set in place, and the shell is carried down to the stamping die and ˆstruck up® between that and the matrix formed on the end of the drawing punch ; as the punch rises, the work is stripped from the punch by the ®pull off,® and is removed from the dies by the use of an inclined press, or by a swinging arm attached to, and operated by the press, that catches the work as it falls from the punch.

Fig. 4.

This style of die is largely used on black¬ ing-box covers, lard-pail lids, or other work where a stamped or embossed cover is wanted. A die of this class should always be used in an arched press, as the strain of the stamping process is very severe on the ^^open back® style press, and is apt to crack the body of the press. In making a drawing

die, use a steel that is high in carbon, and if it shrinks a little in hardening so much the better. There is on the market at least one grade of steel which will stand three success¬ ive hardenings, and will shrink each time so that the die as it wears out can be ˆshrunk upˆˆ and then ground out to size again.

Various modifications of a drawing die are necessary in order to successfully draw up the different metals. Zinc works better when the soap suds, or whatever lubricant may be employed, is used hot as possible, as that metal works much better at a heat of 125 degrees.

Redrawing. — After a cup,, basin, etc., has been drawn, to reduce its diameter still more and make it deeper, redrawing dies are used.

Thick Work. — In drawing very thick work the drawing die can be made bell-mouthed, as the thickness of the metal will reduce the tendency to crimp or pucker. The same method of making the die is followed when it is desired to draw a shell that is very short in proportion to its diamater.

The possibilities of what can be done by this method of forming up sheet metal are almost unlimited; trunks, wheelbarrows, sinks, and the copper boiler for hot-water service are everyday productions at the present time.

Metal. — The great secret of drawing up work is to have good metal, and to properly adjust the blank-holder, so as to hold the metal just hard enough to prevent it from puckering. In drawing up metal it should be borne in mind that it will flow where it can go the easiest.

EMBOSSING OR COINING DIES.

Embossing or coining dies, for coins or jew¬ elry work, are used for striking up coins, med¬ als, emblems, or other work that has to show the imprint and the figures which are cut in the die. Their manufacture is termed die¬ sinking. In the case of dies used for coin work, both the upper and lower die are embossed or engraved with

the design or letter work that it is desired to have stamped on the coin; the blank being fed on to the lower die, which is surrounded by a knurled ring, and as the upper die or punch descends, the metal is confined and kept from spreading by the ring.

Dies used for coining are the oldest example of die work that we have any knowledge of as there are in existence a number of coins which were ˆstruck upˆˆ over two thousand years ago ; showing plainly that the art of die-sinking was known at that period, but the fact that they were left untrimmed or rough, on the edges, indicates that the process of punching by means of a close-fitting punch and die was not known at that time. Dies for coining could have been used in a press of very rude construction, the main requisite being that sufficient power was employed on the upper die or punch, to leave the desired impression upon the coin. This may have been done by the use of an ordinary maul or sledge, the upper die being held by hand. Coining dies are the highest example of the die-sinker's art.

Embossing Dies for Jewelry Work. — In

jewelry dies the impression is usually cut or *hubbed® into the lower die, and the male die or ®force® as it is called, being used to drive the metal into the lines drawn or cut, so as to bring up the desired design. Dies of this class are used to produce almost every known form

of jewelry work. The back of a watch or locket, being a familiar example. Spoons, knives and forks, and in fact almost every article of tableware, are formed by the above method.

Hydraulic Dies. — Embossing is often done on very large pieces of work, especially on what is known as hollow-ware, such as ice-pitchers, etc., the blank being placed in the die, which is sectional and then put into the press. The blank is filled with water or some¬ times a special composition of wax, which is then subjected to a very heavy pressure, forcing the pitcher or other work into the desired shape, and also into the lines which are sunk or cut in the dies.

FORGING DIES.

The use of dies for machine forging of metal is of recent date, and was first used in gun work, the hammer of a rifle being one of the first parts ever made in that manner. It consists of cutting a facsimile of the forging desired, either in the lower die, or sometimes it is divided equally into the upper and lower die, and then the metal, either iron,

steel or copper, is heated and ®drop-forged® into the impression sunk in the dies. See F^orging.

Flash. — The forging operation flings out a fin or ^^flash® as it is known, caused by the amount of metal being used in excess of what the dies v/ill hold. This is either hot trimmed as soon as removed from the dies, or the work is allowed to cool and then cold trimmed; the latter work being done in an ordinary power press.

MULTIPLE DIES, ETC.

When a great many small and simple dupli¬ cate parts are required to be made, as nuts, hinges, lock-keepers, etc., it pays to make gang or multiple dies, in order that a series may be stamped out at low cost. Assuming that the stock will take on a row six wide, it is common to make a gang die with two rows of six punches, each row spaced far enough apart to admit of a row being punched out between them. In other words it is best for the gang die to punch out every other row at the first operation and then to punch the intervening spaces. If this is not done it is impracticable to stamp the rows very closely together, consequently this every-other-row arrangement saves stock.

Articles having a great number of holes, as colanders, sieves, strainers, etc., are made with perforating dies, that perforate usually without removing any metal as waste. The dies used to form the curled-over edge of various articles of tin and agate ware are called curling dies. They form a bead, often enclosing a wire to stiffen the edge. To give a handsome appear¬ ance to a part which may be conspicuous, bur¬ nishing dies are employed, which by applying pressure give an added smoothness and lustre to the piece.

Screw-cutting dies are made in pairs, to fit into a die-stock or screw-cutting machine. They have cutting edges that cut out a spiral of metal, and form the threads of screws, nuts, *etc.*

J. L. Lucas,

Author of “Dies and Die Making/*

DIES FASTI ET NEFASTI, de’az, a Ro¬ man division of days, with reference to judicial business, into working-days and holidays. Dies fastus was a day on which courts could be held

and judgments pronounced; dies nefastus, a day on which courts could not be held nor judg¬ ments pronounced.

DIES IR.ffi (Day of Wrath), technically this supreme product of Latin hymn-writing is called a sequence because of its place in litur¬ gical usage. It is first found in Italian missals in connection with the office for the burial of the dead and by action of the Council of Trent it became a formal element in the requiem serv¬ ice of the Roman Catholic Church. Its popu¬ larity may be judged from the fact that there are in existence nearly 150 versions of the hymn in English alone; the first one appeared at the close of the 17th century. One of the most pop¬ ular versions, a condensed one, however, comes from the hand of Walter Scott in ˆThe Lay of the Last Minstrel.ˆ It is generally recognized that it is a hopeless task to reproduce the sim¬ plicity and vigor of the original phrasing or to imitate the harmonies of the Latin diction. Mr. Saintsbury, the well-known expert in prosody, singles out as unique in this respect the line ˆˆTuba mirum spargens sonum,ˆˆ and in his eulogy of the poem as a piece of technique places its author by the side of Dante and Shakespeare. Yet the authorship of these verses is not firmly established. Most authorities are willing to accept the ascription to Thomas of Celano, the companion and biographer of Francis of Assisi. The attribution to Thomas is made in a vague way in a work written in 1385, considerably over 100 years after the period in which Thomas lived. There is nothing in Celano's biography of Francis to suggest the power in word painting displayed in the stanzas of this hymn. One of the first literary allusions to the Dies Irae is of a depreciatory nature; a 16th century writer, Sixtus Senensis, speaks of it as an ˆfinconditus rythmus,® an uncouth poem. Assuming that the poem came from one closely associated with Francis of Assisi it would be easy to explain its eschatological aus¬ terity from the atmosphere known to have pre¬ vailed in Italy during the long struggle between the Papacy and the last Hohenstaufen emperor, Frederick II. Salimbene speaks of the hopeless¬ ness of a world order presided over by Frederick, who in his mind personified all the vices; and Albert de Beham, comparing the emperor to Luci¬ fer, speaks of him as a man who tries to climb up to heaven, raise his throne above the stars and become superior to the vicar of the Most High. The theme of the Dies Irae and the way it is handled do not reflect the naive joyousness of Francis of Assisi's temperament Thomas

of Celano's biogranhy shows how open he was to the brighter side of the nature of his master. The hymn gives that other aspect of Franciscan teaching which appeared after the death of Francis with strong emphasis on apocalyptic terrors due to the impression made by the long career of Frederick, a versatile, constant and therefore dreaded opponent of the mediaeval church system. Consult Chevalier, ˆPoesie liturgique du moyen age ˆ ; Gebhard, E., Htalie Mystique ˆ ; Julian, S., ˆDictionary of Hymnology ˆ — Julian's Dictionary contains the text and critical remarks thereon. One of the best Eng¬ lish versions is that by Dr. Irons, to be found in the ˆHymnal of the American Episcopal Church ˆ ; Kehrein, J., ˆLateinische Sequenzen

des Mittelalters ˆ ; Warren, C. F. S., ˆAuthorship of the Dies Irse ˆ ; Saintsbury, ˆHistory of Literature ˆ; Trench, R., ˆSacred Latin Poetry.ˆ

Wilson Lloyd Bevan.

DIES NON, more properly Dies non Jnri-dicus, in law, a day on which justice or other business of court or law administration may not be legally undertaken. Under the old common law of England, and also in the United States all Sundays, Christmas Day, All Saints' Day and other holy days, belonged to the category of non-juridical days. In America certain legal holidays (not all) have been added to the list, while the holy days have been reduced to one. Christmas Day, and in some States, Thanksgiving and Independence Day are in¬ cluded. The present tendency is to reduce the number of non-juridical days, and even on such days exceptions are allowed and certain war¬ rants may be issued and executed. These ex¬ ceptions, in almost all jurisdictions, are now gen¬ erally stated explicitly in the codes of procedure so that administrators of justice may know exactly which acts may, and which may not, be performed on such days. Consult Southern Law Review, N. S., 697.

DIESEL, de'zel, Rudolf, German inventor : b. Paris 1858; d. 1913. He was educated in England and at the Polytechnic School, Munich. He became manager of a refrigerating plant in Paris, where he remained for some years, returning to Munich in 1895. For many years he conducted experiments in internal-combus¬ tion engines and about 1893 news of his dis¬ coveries in this field caused considerable com¬ ment. After several failures in trying to make direct use of the energy from fuel combus¬ tion, in 1897 he brought out the engine since known by his name as the Diesel engine. He subsequently brought it to a high state of per¬ fection. He came to America in 1912 and there

delivered a series of lectures and in the year following the British Admiralty summoned him to a consultation. He lost his life by drowning in the Channel while on his way to England. He published ˆTheory and Construction of a Rational Heat Motor ˆ (Eng. trans. by Donkin 1894) and ˆDie Entstehung des Dieselmotorsˆ

(1913).

DIESEL ENGINE. See Internal-Com¬ bustion Engine.

DIESKAU, des'kow, Ludwig August,

Baron, German general in French service : b. 1701 ; d. Surenne, near Paris, 8 Sept. 1767. He was adjutant of Marshal Saxe, whom he ac¬ companied in the campaigns against the Nether¬ lands, and became in 1748 brigadier-general of infantry, and commander of Brest. In 1755 he sailed as general to_ Canada, at the head of French troops, to assist in the campaign against the Engli.sh._ He ascended Lake Champlain with the design of attacking Fort Edward, am¬ bushed a detachment sent for its relief and pur¬ sued them to the fort with the hope of enter¬ ing it with them. He was, however, defeated by Sir William Johnson, was taken prisoner, suffering from four wounds, and remained in captivity until 1763.

DIESTERWEG, de'ster-vag, Friedrich Adolf Wilhelm, German educator: b. Siegen,

Prussia, 1790; d. 1866. ' In 1808-11 he studied at Herborn and Tubingen. He taught at Mann¬ heim and at Worms for about two years, when he removed to the model school at Frankfort. Later he became rector of the Latin school of Elberfeld, and in 1820 was appointed director of the new Teachers' Seminary at Mors. His years in this position enhanced his reputation as a teacher and writer on education and in 1833 he was made director of the Seminary for City

School Teachers in Berlin. Because of his disagreement with the authorities regard¬ ing important phases of higher education he was in constant friction and resigned in 1847. He received a government pension in 1850 and thereafter spread his educational ideas solely through the medium of periodicals. In 1858 he was elected to the Prussian Diet. He was a follower of Pestalozzi and aimed at making every subject a means of education. His great¬ est services to education were through his work as a trainer of teachers, but he exerted also a wide and far-reaching influence through his writings. In 1851 he founded in Berlin the Pddagogisches Jahrbiich and published ˆWeg-weiser zur Bildung fiir deutsche Lehrerˆ (2 vols., 18.34; 6th ed., 1 vol., 1890) ; ˆDas padagogische Deutschlandˆ (1836) ; ˆStreitfragen auf dem Gebiete der Padagogikˆ (1837) ; ˆLeitfaden fiir den Unterricht in der Formlehreˆ (1845) ; ˆLehrbuch der mathematischen Geo¬ graphies (1840; 18th ed., as ˆPopulare Himmels-kunde,s 1891) ; ˆUnterricht in der Kleinkinder-schuleS (5th ed., 1852). Consult Rebhuhn, Adolf, ˆBriefe Adolf Diesterwegsˆ ˆ (Leipzig 1907) and Richter, Karl, ˆ Adolf Diesterwegs Ansichten fiber padagogische Zeit- und Streitfragens (Leipzig 1913).

DIET, a meeting or assembly of delegates or dignitaries convened and held from day to day for legislative, ecclesiastical, political or admin¬ istrative purposes ; specifically, the legislative assemblies of the (German Empire, Austria, Hungary, the old Kingdom of Poland, *etc.* (in German, Landtage) . The Diet of the old Ger¬ man or Holy Roman Empire was composed of three colleges : one of electors, one of princes and one of imperial towns, and began with the edict of Charles IV in 1356. Originally a feu¬ dal body in which none but tenants in chief could appear, it was not until 1489 that the im¬ perial cities secured the right to appear in all diets beside the higher estates of electors and princes. Each college deliberated by itself, the agreement of all three together with the assent of the emperor being finally necessary for pass¬ ing judgment. The best-known meetings were those at Nuremberg 1467, Worms 1521 (at which Luther was excommunicated). Spires 1529 and Augsburg 1530. After the treatyˆ of Westphalia in 1648, which closed the Thirty Years' War, its influence rapidly declined ; but its meetings continued to be held at Ratisbon, until the dissolution of the Holy Roman Empire.

DIET AND DIETARY STANDARDS.

See Dietetics; Nutrition of Man.

DIETERICI, de'ta-re'tse, Friedrich, Ger¬ man Orientalist : b. Berlin 1821 ; d. 1903. He received his education at the universities of Halle

and Berlin and traveled extensively in the Orient. In 1850 he was appointed professor of Semitic literature in the University of Ber¬

lin. His researches in the Arabic language and literature gained him a wide distinction. His numerous works include ‘ˆAlfi3ˆah Carmen Grammaticum Auctore Ibn Nalik cum Commentario Ibn AkiP (1851) ; ˆMutafifiabii Carmina cum Commentario Wahiduˆ (1858) ; ˆDie Naturanschauung und Naturphilosophie der Araberˆ (1860; 2d ed., 1876); ˆDie Logik und Psychologic der Araber im Zehnten Jahrhundertˆ (1867); ˆDie Lehre von der Weltseele bei den Arabernˆ (1872) ; <Die Philosophic der Araber im neuiiten und Zehnten Jahrhundert nach Christusˆ (1876) ; ˆDie Abhandlungen der Ichwan Es-Safa in AuswahP (1883-86) ; LA.1-sarabis philosophische Abhandlungenˆ (1890) ; ˆUeber das alteste Bekenntniss der Christen-heitˆ (1895) ; ˆMuhammad ibn Muhammad ’abu nasr al-Farabi : Die Staatsleitung … aus dem Nachlasse … F. Dieterici,ˆ edited by Paul Bronnleˆ (1904).

DIETERICI, Karl Friedrich Wilhelm,

German economist: b. 1790; d. 1859. In 1813-15 he was an engineer geographer in Blucher’s army, was next engaged in the Ministry of Pub¬ lic Instruction, becoming later professor of po¬ litical science in the University of Berlin. In 1844 he was made chief of the statistical bureau. He wrote very many works, dealing with political economy and statistics, including ˆDe Via et Ratione CEconomiane Politiciane Docendiˆ (1835) ; ˆStatistiche Uel>ersicht der wichtigsten Gegenstande des Verkehrs und Verbrauchs im preussischen Staat und im deutschen Zollver-bandˆ (1838) ; ˆUeber Auswanderungen und Einwanderungenˆ (1847).

DIETETICS, a branch of hygiene, is the science or study and regulation of the diet. Diet is the customary allowance of food and drink taken by any person from day to day — either as a hygienic measure — or as a remedy in cases of disease. The words diet, dietetics and dietary, in their modern significance, ap¬ pear to have a mixed origin. The dictionaries trace their derivation through the French diete to the Latin diceta and the Greek diaita, the lat¬ ter signifying a manner of living. Another meaning, often marked archaic or obsolete by lexicographers, is ®daily fare,® ˆˆallowance of food,® ®daily pay.®

And for his diet, there was a continual diet given him of the king of Babylon, every day a portion until the day of his death, all the days of

his life. — Jeremiah lii. 34.

This meaning has an evident connection with the Latin dies, day, and is followed in the mod¬ ern use of the word dietary. As defined by Mrs. Ellen H. Richards, a dietary is ^*^a known amount of food, of known composition, per person, per day.® Popularly, dietary appears to be associated with cheap fare, perhaps because first used in connection with the allowance of food for paupers and prisoners. The word diet also conveys to the average mind the idea of a reduced food supply, probably because the in¬ dividual choice is restricted.

Under primitive conditions, men satisfied hunger with any edible substances within reach. The progress of civilization, with the increase of material possessions, developed the epicure and gourmand, who magnified the pleasures of the table. The aid of the physician was then required to mitigate woes induced by over-in¬ dulgence. In the days of Hippocrates, dietetics

was the province of physicians, who thus aimed to undo the evils caused by wrong living. Later, economists like Count Rumford applied dietetic principles to feeding the poor of Euro¬ pean cities. Some countries have employed ex¬ perts to prescribe rations for keeping army and navy in fine physical condition at least expense to the government. The victor)-ˆ in the Franco-Prussian War of 1870 has been ascribed to the food experiments of German chemists. The erbswurst, or pea sausage, a food having merit for emergencies, was devised by scientists at that period. Oleomargarine was the result of ex¬ periments made for the navy under direction of the French government. The aim of dieti¬ tians of the present day includes all that has gone before, the best use of materials at hand, prescription of food for the sick and aid to the well in choosing such foods as shall maintain health, with due regard to pleasing the palate. The 20th century finds prevention wiser than cure, and endeavors by the prescription of food adapted to different ages and conditions of body to develop the sound body and sane mind. At the present time no less emphasis is laid upon diet for diseased conditions of the human body than in the past, but more attention is being

largely fat, supplying the heat needed by bodies subjected to severe cold. A mixed diet, both animal and vegetable, has produced the most successful races.

The usual classification of food substances is outlined by the United States Department of Agriculture in the above table.

Sometimes it appears difficult to reconcile practical usage and scientific experiment as to food values, but this is due to an incomplete view of both sides. Many statements about foods are untrue because only one phase is presented. To decide upon the full value of any food we must consider both its physical and chemical composition, its economic value and its physiological effect in the body. The elimi¬ nation of refuse, and the division and subdivi¬ sion of particles in the process of manufacture are important factors in the nutritive value and digestibility of foods. Some experiments have shown that a larger percentage of peas and beans was digested when thoroughly cooked and sifted, after removing the hull, than when

cooked whole. Such external digestion saves energy in the human organism. Whatever tends to cleanse and purify foods before cook¬ ing undoubtedly increases their real nutritive

Food as purchased contains

Nutritive Ingredients (or nutrients) of food.

Edible portion . .

e. g., flesh of meat, yolk and white of eggs, wheat, flour, *etc.*

Refuse,

e. g., bones, entrails, shells, bran, *etc.*

Water.

Nutrients

(Protein.

Fats.

Carbohydrates. Mineral matters.

Uses of nutrients in the body.

Protein …

e. g., white (albumen) of eggs, curd (casein) of milk, lean meat, gluten of wheat, *etc.*

Fats .

e. g., fat of meat, butter, olive oil, oils of corn and wheat, *etc.*

Carbohydrates .

Mineral matters (ash) .

e. g., phosphates of lime, potash, soda, *etc.*

Forms tissue

Are stored as fat

All serve as fuel to yield energy in the forms of heat and muscular power.

Are transformed into fat .

Share in forming bone, assist in digestion, *etc.*

given to building up healthy bodies and then sustaining them by foods chosen with special reference to the work each individual has to do. Some study of dietetics is now included in the preparation of the citizen for life. In the pub¬ lic schools it is a part of the lessons in physi¬ cal training, cooking or domestic science. A practical course in dietetics would cover the source and manufacture of foodstuffs, the proc¬ esses of cookery and wise combinations of foods, the calculations of dietaries for individ¬ uals, families and institutions and the adapta¬ tion of foods to individual needs according to age, sex, climate and occupation. Students of history and sociology are recognizing the effect of food in forming individual and national char¬ acteristics. The French revolution and the de¬ struction caused later by the Communists has been ascribed to the ill-fed condition of the people.

Fresh air, pure water and clean food are more essential for nutrition than any special selection of foods. The surroundings and in¬ stincts of a people lead them to adapt their diet to the climate. In the tropics fruits and vege¬ tables are the main sources of subsistence, in arctic regions foods are chiefly animal and

value. Medical authorities on dietetics have laid much stress upon the choice of foods, but hard¬ ly enough upon their preparation. A piece of meat or a vegetable, however innocent in itself, may be ruined in cooking, while one of doubtful value, by right processes of cookery, may be¬ come harmless and even useful. Thfs is equally true from the economic standpoint. Count Rumford found that ˆffhe richness or quality of a soup depended more upon the proper choice of

ingredients and a proper management of the fire in the combination of these ingredients, than upon the quantity of solid nutritious mat¬ ter employed ; much more upon the art and skill of the cook than upon the sums laid out in the market.® The nutritive qualities of many foods are doubtless made more available by a wise use of flavors, which in themselves con¬ tain little or no nutriment. Condiments and spices, tea and coffee and the extractives of meats are of special value for the flavor which they impart. The cheap substantial grain foods after all provide the larger part of the food of the human race and are made palatable by changes in flavors.

The hours and arrangement for meals have an influence in the assimilation of food.

Breakfast in America is a more substantial meal than it is in Europe, perhaps from climatic con¬ ditions. The midday dinner seems best adapted to children and invalids, the night dinner is a concession to the competition of business. One dietetic authority estimates that more than half of the day's ration of protein and fat and one-third of the carbohydrate is taken at dinner. Therefore the hour of the meal should be such as to provide for a period of rest afterward. The savage gorges himself when food is abund¬ ant, then sleeps like an animal. The gourmand of classic days took an emetic to relieve his stomach that he might partake of delicacies yet to come. The best thought of the present day tends to shorter menus and simpler compounds, toward *plain living and high thinking.®

Dietetic theories vary from age to age be¬ cause of imperfect knowledge of bodily proc¬ esses, or because of changes in the production and preparation of foods. Water, for example, was once excluded mainly from the dietary of patients suffering from fevers, and its use re¬ stricted in other cases. Now it is recognized that a lack of water in the diet is a serious error and that many of our foods as served are not sufficiently diluted with water. In the past an exaggerated nutritive value was ascribed to beef tea and to gelatine, but later investigations show that the one should be classed as a stimu¬ lant and the other not so much a real food as a protein sparer. There is yet much discussion as to the relative value of whole wheat and white flour. The former is probably better for young children, because it supplies bone-mak¬ ing material, but by modern methods of milling most of the nutritive material in the grain is retained in the best grades of white flour. The natural instinct of children for sweets has been repressed, but now sugar is recognized as a val¬ uable food, provided it is taken at proper times. Oysters are less nutritious than is popularly supposed, and as ordinarily cooked are not es¬ pecially easy of digestion. Combinations of foods often produce different effects from the separate ingredients, and small quantities of cer¬ tain things may be helpful where larger quan¬ tities would produce bad results. A food may be nutritious, economic in the true sense, and prepared in such a way as to be easily acted upon by the digestive organs and yet

fail of perfect assimilation because it does not suit the habit or whim of the eater. In popular estima¬ tion a food is digestible when no feeling of dis¬ comfort follows after eating it, or when it is easily and quickly digested. The scientist con¬ siders a food digestible in proportion as it is completely digested, whether the time be shorter or longer. Persons in health should consume some foods that digest slowly and beware of de¬ pending upon pre-digested foods. If allowed to be idle, the stomach, like any other organ, soon finds it difficult to work.

The seven ages of man described by Shake¬ speare might illustrate the different periods of life calling for a change in diet.

The infant thrives and grows on a diet of milk. When the mother cannot supply a suffi¬ cient amount, clean milk from a healthy cow, by dilution with water or whey and by modifi¬ cation with milk and cream, may be adapted to the increasing needs of a baby as it develops. Greater cleanliness in collecting and transmit¬

ting milk to consumers is a first requisite for the diet of young children. Defective nutrition causes indigestion, rickets, intestinal catarrh and many disorders of childhood.

The schoolboy requires abundant food from which to construct his rapidly growing body and to provide energy for his active exercise. With him quantity is often more important than quality, while his sister, enjoying less active sports, is over-fastidious. Dainty children and excessively greedy ones both are usually ill fed. Nervous diseases of children, even stammering, will yield to more careful diet. Milk, fruit, cereals, whole wheat bread, eggs and vegetables should form the bulk of the diet of school children. The school luncheon now receives considerable attention from educators.

The lover and the S9ldier represent the col¬ lege days and the strenuous life of early man¬ hood. The training-tables for athletes in school and college are an admission of the need of a selected diet for special work. The defini¬ tion of an army, given by a famous general — an animal that crawls on its stomach — indicates the importance of proper food for the soldier. No less necessary is it for captains of industry, pioneers and explorers of all kinds. Personal idiosyncrasy and differentiation of occupation demand attention to the individual dietary.

The judge is the type of the prosperous man of sedentary habit who is often overfed, and who should begin modifying his diet after passing the half-century mark, but habits are formed and changes must be made gradually. Luigi Cornaro, an Italian who lived in the I5th and 16th centuries, began at 40 to modify his diet and succeeded in passing the century limit. After he had reached 80 years he wrote several treatises describing his manner of living. That his writings are still the basis for much that is written on diet for the later years of life, is a sad commentary on the self-indulgent habits of the human race, which shorten many valuable lives.

I have come to the conclusion that more than half the disease which embitters the middle and latter part of life is due to avoidable errors in diet, … and that more

mischief in the form of actual disease, of impaired vigor and of shortened life, accrues to civilized man … from

erroneous habits of eating than from the habitual use of alcoholic drink, considerable as I know that to be.

Sir Henry Thompson.

Last of all comes old age, and for this period the food should be similar to that of the young child, and taken often in small quantities. In proportion as actiyity diminishes, the intake of food should decrease. The sense of taste is dulled and higher seasonings may be desirable. Here if anywhere in a normal diet the stimulus of alcoholic beverages may be allowed.

During the last of the 19th century much data has been collected showing how people actually live, the cost of living and the propor¬ tions of protein, fat and carbohydrates. The studies on food and dietaries conducted by the United States Department of Agriculture have furnished much valuable data which is being used as the basis of further work on dietetics by authorities on both sides of the Atlantic. From such studies may be deduced approximate dietaries for different conditions. The ration enabling a man to do good work must neces¬ sarily be larger than one calculated merely to sustain life.

An estimated life ration for one day, meas¬ ured in grams:

Protein. Fat. Carbohydrates. Calories.

75. 40. 325. 2,000.

When poor families are found living on rations lower than this their diet must be enriched be¬ fore they can be expected to display much energy. Prisoners often have different rations according to the time of sentence in sonie re¬ formatories, and a man refusing to work is fed with stimulating food until he desires to expend some of his accumulated energy. A work ration would provide in grams :

Protein. Fat. Carbohydrates. Calories.

125. 125 450. 3,500.

For severe labor this would be increased. (The calory is approximately the amount of heat which would raise one pound of water 4° F. and is a convenient standard of measure of the fuel value of food. The fuel value of protein is 4 calories per gram, or 1,820 calories per pound ; fuel value of fats, 8.9 calories per gram, or 4,040 calories per pound ; fuel value of carbohydrates, 4 calories per gram, or 1,820 calories per pound.)

The estimate of the value of food in con¬ struction of new tissues is less simple than its fuel value. It is impossible to measure the amount of good that might be done in schools, hospitals, and public institutions by improving the conditions of diet. Many hospitals now em¬ ploy trained directors to make dietaries and superintend their preparation. The United States Department of Agriculture issues many valuable dietary bulletins.

Diet for the sick may be considered under three general heads : the typical ration for inva¬ lids, in fluid form, suitable for the crisis of acute disease; food for the convalescent or for building up a body wasted through lack of nutrition; and last, such diet as may aid in the

reduction of an overloaded body but yet sus¬ tain the vital forces. For the first few days of an acute illness the human body may sustain itself on the surplus stored in its tissues. An invalid in bed is not using up energy so fast as the man at work, hence the diet should be less generous, not a work ration but a life ration increased in such directions as may best combat the waste of disease. Liquids are easily taken, quickly absorbed, and as a whole are less irritating than solids to the digestive organs. Concentrated foods are necessary in certain conditions, but these are few. A sick person for the time being is to be fed much like an infant — small quantities of food should be given often, usually warm rather than cold. Pre-digested foods should not be used until or¬ dinary forms fail. Where there are wasted tissues to repair — as in convalescence or in diseases like anaemia, nervous prostration, or tuberculosis, the diet must be generous — milk and eggs are the main dependence, and the art of cookery has devised many simple ways of serving them. Fat, in easily digested forms — olive oil, bacon, cream and butter — is valuable in such cases, because fat is two and a fourth times as valuable for fuel food as the carbo¬ hydrates. For the capricious appetite attractive arrangement and service of the food, and the element of surprise are important. The cookery for the sick conforms to the usual formulas, though greater attention must be given to the

selection of food and its preparation, and all doubtful articles must be avoided. Starches should be thoroughly cooked, woody fibre re¬ duced by cooking and mashing, or removed by straining. Animal foods should be cooked at low temperature. High, composite seasonings are not desirable, but a moderate use of simple flavors is admissible. Gout, rheumatisrn, and obesity may not be due to over-eating in one sense, but indicate an excess of certain sub¬ stances which are neither assimilated nor elim¬ inated, but are stored up in the various tissues, causing discomfort. The many fasts of the early church perhaps were introduced less as a religious duty than as a wise dietetic measure. The ^^Banting^^ system for the reduction of fat consists mainly in decreasing the allowance of starch and fat and increasing the protein. Spe¬ cial diets for other diseases should, like medi¬ cine, be prescribed by the physician in charge, because of the complications to be considered. Water-cures, milk cures, and grape-cures have been successful in some cases. Increased knowl¬ edge of bacteria has explained many heretofore mysterious cases of poisoning, and has changed the point of view regarding the wholesomeness of various food products. Greater attention to cleanliness in all preparation of foods would make the use of preservatives practically un¬ necessary.

With our rapid increase in pros¬ perity Americans in future need to guard against over-indulgence of the sense of taste and to control the appetite to accord with the true needs of the body.

Bibliography. — Some of the most useful books on this subject are these: Abel, Mary H., ˆPractical Sanitary and Economic Cookingˆ ; Atwater, W. O., ˆPrinciples of Nutrition and Nutritive Value of Foodˆ (United States De¬ partment of Agriculture) ; Burnett, R. W., ˆFoods and Dietaries) ; Chapin, H. D., ˆTheory and Practice of Infant Feeding) ; Dukes, Clement, ˆSchool Diet) ; ˆFood as a Factor in Student Life) (University of Chicago) ; Fother-gill, J. M., ˆManual of Dietetics) ; Hart, Alice M., <Diet in Sickness and Health) ; Holt, L. E., ˆCare and Feeding of Children) ; Hoy, A. H., ˆEating and Drinking) ; Hutchison, R., ˆFood and Dietetics) ; Knight, Jas., ˆFood and Its Functions); Langworthy, C. F., ˆDietary Study of Groups, etc.) (Bulletin United States De¬ partment of Agriculture) ; Miles, E. H., ˆMuscle, Brain and Diet) ; Richards, Ellen H., ˆ(lost of Food); ˆ Plain Words About Food); Richards and Williams, ˆDietary Computer) ; Thompson, Gilman, ˆPractical Dietetics) ; Thompson, Sir Henry, ˆFood and Feeding); Yeoˆ I. B., ˆFood in Health and Disease.)

DIETRICH, det'riH, Auguste Edgard,

French writer: b. Nancy 1846. Early in life he took great interest in the study of the German language and literature, and was the first to translate two of Max Nordau's works into French. These were ˆLes mensonges conven-tionnels de notre civilization) (1886) and ˆLe mal du siecle (1890). He also translated Blennerhassett's ˆMadame de Stael et son temps) (1890), and was a frequent contributor to La Revue duˆ Nord, La Jeune France, and Le Messager de Vienne. He is the author of ˆLes maitresses de Louis XV) (1881) ; ˆRouget de Lisle et la Marseillaise) (1882) ; ˆJacques Rich¬ ard et la presse) (1886) ; <La mort de Danton)

(1888). He edited ˆLes poesies de Jacques Richard> (1885).

DIETRICH, Christian Wilhelm Ernst,

German painter and etcher: b. Weimar, 30 Oct. 1712; d. Dresden, 24 April 1774. The picture of a peasant drinking, in the Dutch style executed by Dietrich while a boy, is in the Royal Cabinet of Engravings at Dresdp. He successfully imitated Raphael and Mieris, Correggio and Ostade, but never produced anything of his own. His best work is his historical etchings. His paintings are scattered through almost all Europe, and especially in Germany. In the Dresden gallery, of which he was inspector, there are 53 of them.

DIETRICH VON BERN, a hero of Ger¬ man legend, celebrated for his amazing adven¬ tures, and figuring in the ˆNibelungenlied.ˆ He was in actual life Theodoric the Great, foun¬ der of the Ostrogoth monarchy; but the two names have resulted in much confusion of legend with fact. He flourished in the 5th and 6th centuries of our era. Bern is German for Verona, the principal residence of Dietrich.

DIETRICHSON, Lorentz Henrik Se-gelcke, Norwegian poet and historian of art and literature: b. Bergen, 1 Jan. 1834. While an undergraduate in the University of Chris¬ tiania, he composed many clever student songs which were collected and published in 1859. For a time he served as instructor at Upsala and subsequently for three years was secretary to the Norwegian ˆminister at Rome. On his re¬ turn he became connected with the administra¬ tion of the Stockholm National Museum. He was appointed professor in the Academy of Arts, Stockholm, in 1869 and six years later removed to Christiania as professor of the history of art. He published several volumes mostly dealing with Norwegian art in the Middle Ages. He published the poem, ˆOlaf Liljekransˆ in 1857 and ˆKivleslattenˆ in 1859; ‘ˆDidactic Poetry in the Norths (1860) ; ˆThe Art of Wood Sculpture in Norwayˆ (1879).

DIETZ, dets, Feodor, German painter: b. Neunstetten, Baden, 29 May 1813; d. Gray, France, 18 Nov. 1870. He studied in Karlsruhe under Karl and Rudolf Kuntz, and while there was greatly influenced by Feodor Ivanovitch. He also studied under Philip Foltz at the Munich Acadepiy, and aided the latter in the decoration of the royal palace. In 1835 he executed his ‘•Death of Max Piccolomini,ˆ now in the Karlsruhe Gallery, which brought him considerable fame. He spent three years in Paris, coming under the influence of Horace Vernet, and receiving the gold medal in the Salon of 1839. He was appointed court painter at Karlsruhe, but removed to Munich. He took part in the campaign of 1848 in Schleswig-Holstein, and in 1862 was appointed professor of the newly-founded School of Arts at Karls¬ ruhe. He

entered the army in 1870 in the Franco-Prussian War, and died in the service. He is best remembered as a historical and battle painter. His best works are ˆNocturnal Re¬ viewˆ (1853) ; ˆDestruction of Heidelberg by General Melaˆ (1856), in the Karlsruhe Gallery; ˆFlight of an American Family Across the Susquehannaˆ ; ‘ˆBlucher’s March to Parisˆ (1868)., in the Berlin National Gallery.

DIED ET MON DROIT, dye e mofi drwa (Fr. signifying ˆˆGod and my right®), the motto

of the arms of England, first assumed by Rich¬ ard I, who flung this battle-cry at his French adversaries during the engagement at Gisors, 1198, to intimate that he did not hold his em¬ pire in vassalage of any mortal. It was revived by Edward III in 1340, when he claimed the crown of France. Except during the reigns of Elizabeth and Anne, who used the motto. Semper eadem, and of William III, who used Je maintiendray as his own motto (Dieu et mon droit being retained on the great seal), it has ever since been the royal motto of England.

DIEULAFOY, Auguste Marcel, French engineer and archaeologist : b. Toulouse, 3 Aug. 1844. In 1885 he discovered in Persia the re¬ mains of the royal residences of Artaxerxes. His discoveries are described in his ˆL’art antique de la Perseˆ (1884-89). The Louvre contains a special department devoted to specimens of Persian architecture which he also collected and brought to France. Other works by him are ˆL’Acropole de Suse d’apres les fouilles executees en 1ˆ4-86ˆ (Paris 1892) and ˆArt in Spain and PortugaP (1914).

DIEULAFOY, dy-e-la-fwa, Jeanne Rachel Mayre, French descriptive writer and novelist: b. Toulouse, 29 June 1851. She is the wife of A. M. Dieulafoy (q.v.). Her narrative of travel in ˆPersia, Chaldaea and Susaˆ (1886), and her fiction ˆParysatisˆ (1890) and ˆRose d’Hatraˆ (1891), are evidences of her talent. She was made a member of the Legion of Honor. In collaboration with her husband she published ˆLe theatre dans I’intimite : Nai’s la Sulamite, farce nouvelle du pate et de la tarteˆ (2 vols.,

1900).

DIEZ, dets, Friedrich Christian, German philologist: b. Giessen, 15 March 1794; d. Bonn, 29 May 1876. He fought in the War of Liberation, qualified himself as a lecturer at Bonn and was appointed

professor of modern languages there in 1830. In addition to various works on the poetry of the troubadours, he pub¬ lished a very valuable ˆGrammatik der romanischen Sprachenˆ (1836-42), which was trans¬ lated into English, and an ˆEtymologisches Worterbuch der romanischen Sprachenˆ (1853), also translated into English. Diez laid the foun¬ dation of Romance philology, and to him all later investigators are profoundly indebted. His work stands in much the same relation to the Romance dialects as the researches of Grimm occupy with respect to the German dialects. Consult Breymann's ˆLife,ˆ pub¬ lished at Munich in 1878, and the centenary esti¬ mates by Behrens and Ritter, published re¬ spectively at Giessen and Geneva in 1894.

DIFFERENCE, in heraldry, an additional figure or an alteration in a coat-of-arms to dis¬ tinguish one family from another of the same strain, or particularly to mark the difference be¬ tween brothers and their descendants during the lifetime of the head of the house. Sometimes this is accomplished by variations of the bor-dure, such as having it ingrailed, invected, em¬ battled, *etc.* But usually the eldest son bears a label or lambel ; the second son a crescent ; the third, a mullet; the fourth, a martlet; the fifth, an annulet ; the sixth, a fleur-de-lys ; the seventh, a rose; the eighth, a cross-moline ; the ninth, a double quatrefoil. Such marks of heraldic distinction cannot be regulated by cast-iron rule or set law. Each country follows the customs

resulting from its own particular regime, which seem to be the adoption of changes on an escutcheon best suited to individual needs. Difference is commonly confounded with Cadency (q.v.).

DIFFERENCE OF LATITUDE AND LONGITUDE. See Latitude and Longitude.

DIFFERENTIAL CALCULUS. See

Calculus, Infinitesimal.

DIFFERENTIAL EQUATIONS. See

Equations.

DIFFERENTIAL GEAR. A gearing placed between the two inner ends of the divided driving shaft of a four-wheeled motor vehicle to permit the slowing down of the wheel on the inside of the curve when making a turn, although the engine is running at a constant speed. The inner ends of the divided driving axle are each fitted with a beveled gear wheel fixed at right angles to the axle. Between these two gear wheels are placed four bevel pinion wheels engaging the gear wheels on the axle at four points, 90 degrees apart. These pinion wheels turn loosely upon studs projecting inward from a ring-shaped beveled gear wheel which encircles them, and which is driven by a beveled gear pinion at the end of the driving shaft of the engine. The axle gears are driven by the opposite cogs of the pinion wheels, and when the friction of the road upon which a turn is made operates to hold back the driving wheel on the inside of the curve, the loose pinion wheels revolve on their studs, presenting an¬ other pair of cogs to transmit the motion of the ring gear wheel, thus adjusting the differ¬ ence of speed of the driving wheels. Consult Page, V. W., ˆThe Modern Gasoline Automo¬ bileˆ (New York 1915).

DIFFERENTIAL SENSIBILITY. See

Discrimination, Sensible.

DIFFERENTIAL THERMOMETER, an

instrument for determining the difference of temperatures between two points or places. That of Sir John Leslie is one of the best known, and will be found described under Thermometer. His invention is now used only as a thermoscope. Howard's differential ther¬ mometer is the most sensitive of this class of instruments. It consists of a U-shaped tube, the right-hand branch of the U being about twice as long as the other, and each arm ter¬ minating in a closed bulb. A scale is attached to the long arm. The liquid used is ether, and the apparatus is so constructed that air is wholly excluded, the gaseous element above the level of the ether being the vapor of ether. Rumford's differential thermometer is a very flat U-tube, with closed bulbs on both of its short arms. The entire tube is filled with air except a very short section of the horizontal part of the U, where there is a ˆˆblockˆˆ of sulphuric acid. The scale is attached to this horizontal part, and differences in temperature between the two bulbs are marked by the travel of the sulphuric acid along the scale. A pair of thermo-electric

junctions (see Thermo-elec¬ tricity) is generally preferable to any other kind of differential thermometer. One of the junctions is put at one of the points and the other junction at the other point and a galva¬ nometer is introduced in the usual way into the circuit, great care being taken to keep all the

other junctions of whatever kind that occur in the arrangement strictly at the same tempera¬ ture. The strength of the current generated, which is measured by means of the galvanom¬ eter, is, with the limitation that will be found explained under the article just alluded to, pro¬ portional to the difference of temperature be¬ tween the two thermo-j unctions ; and with the assistance of a previous experiment at known temperatures on the thermo-j unctions employed, the absolute difference of temperature between the two points at which the junctions are placed may be determined with great exactness.

DIFFERENTIAL WEATHERING, the

etching out either chemically or mechanically of softer or more soluble rock by wind or water, giving the weathered surface a pitted appear¬ ance. It is particularly characteristic of wind work in the desert.

DIFFERENTIALS IN RAILROAD TRAFFIC, a term of variable use in railroad and judicial commission practice, signifying fixed differences, established by agreement, be¬ tween rates for similar or competing freight. They originated in a desire to equalize condi¬ tions, to distribute traffic fairly and to avoid rate wars, the short trunk ^^standard^^ lines al¬ lowing the longer roundabout ®differentiaP^ lines lower rates on a fixed difference, and also on competing commodities, as dressed meats and live stock, wheat and flour. By decision of an arbitration committee in 1877, Atlantic seaboard differentials, because of stated^ disadvantages in ocean shipments, gave Philadelphia and Balti¬ more lower rates than those ruled for Boston and New York. See Interstate Commerce Commission; Railroads.

DIFFERENTIATION, in biology, that organic process which occurs when certain parts of a uniform whole become structurally dif¬ ferent from the others, or when, in other words, the homogeneous becomes heterogeneous. In¬ equality in internal and external conditions of life brings about restriction of certain vital proc¬ esses and the predominance of others, and as this division of function is established,

diversity of structure results. Differentiation is the struc¬ tural change which is associated with the physio¬ logical ®di vision of labor, and the process is essentially the same whether it find expression in cells, tissues, organs or entire organisms. See Division of Labor; Evolution; Variation, *etc.*

DIFFRACTION OF LIGHT, the bending of the rays of light, due to interference, as of the slits or ruled lines in a diffraction grating. The study of the diffraction of light has given us the spectrum, and the study of spectra, through the spectroscope, has .added greatly to the sum of human knowledge of the constituents of heavenly bodies. A simple way of noting the diffraction of light is to darken a room and allow a ray to penetrate between the edge of a shade and the window jamb. The light falling on the opposite wall is not a well-defined streak, like the aperture through which it passes, but is divided into a series of upright streaks or bands, showingˆ that the rays of light bend or are dif¬ fracted in passing through the slit. Interesting experiments with diffraction can be made by al¬ lowing the light to pass through a hole or holes of different forms. The phenomena of diffrac¬ tion were first noted and commented on by

Grimaldi of the Jesuits' College of Bologna in. 1665. Sir Isaac Newton investigated the subject and explained it further. About 1819 Fresnel demonstrated that interference was the result of the wave motion of light and that sound waves are similarly affected. Joseph von Fraunhofer of Munich made a most exhaustive study of diffraction and classified the lines of the spec¬ trum, which became known as ˆFraunhofer's lines.® He invented the diffraction grating about 1821 for exhibiting the lines and forming the spectrum. This grating as at first made was a glass surface, smoothed as perfectly as possi¬ ble and covered with a thin film of gold-leaf, lampblack, gelatine or the like. Through this film were scratched or ruled parallel lines, con¬ stituting minute apertures for light. In order that these lines might be made very fine, close and accurate, the dividing engine was de¬ vised. With this were ruled a great many thou¬ sand lines to the inch. These lines

must be exactly the same distance apart to be valuable. When the light was allowed to pass through the rulings or slits of this transmission grating to the screen the light on the screen was divided or dispersed, appearing in bands and forming a spectrum. It was found that to obtain a satis¬ factory spectrum a grating of 15,000 to 20,000 lines to the inch was desirable, and even very much finer rulings have been demanded and manufactured. In order to use gratings ruled on plane surfaces for spectroscopic purposes it is necessary to employ a telescope and colli¬ mator. After a time the reflecting grating was invented. In this a surface of spectrum metal was ruled, and this had some advantages over glass. Prof. Henry A. Rowland of Baltimore achieved distinction in the production of im¬ proved diffraction gratings, making a reflecting grating wkh a concave surface that can be used without lenses. The diffraction grating has been much used in studying the solar spectrum. See Light ; Spectrum ; Spectroscope.

For further information as to diffraction gratings consult ˆGratings in Theory and Prac¬ ticeˆ (in Astronomy and AstroPhysics,ˆ Vol. XII, 1893). For information as to diffraction consult Preston, ˆTheory of Lightˆ (London

1901).

DIFFUSION, in physics, is the gradual and spontaneous molecular intermingling of two gases or two liquids in contact into a homo¬ geneous mixture. It takes place regardless of or in opposition to gravitation and is due to the mutual attraction of molecules. Diffusion is most commonly observed between gases, and the lighter the gas the faster does diffusion take place. It also occurs between viscous substances and, in some cases, between solids. A common experiment, exhibiting the diffusion of gases, is to place mouth to mouth vessels of hydrogen and oxygen. After a time it is found that the con¬ tents of both vessels are alike — a uniform mixture of the two gases. If the heavier gas is placed below the lighter the result is the same, demonstrating the fact that gravity does not check the result. If chlorine is one of the gases used its color will enable the eye to follow the diffusion. If a porous body is placed between the vessels the rate of diffusion can be measured. This fact is taken advantage of in the construc¬ tion of the diffusiometer, invented by Thomas Graham. This instrument consists essentially of

a tube containing a gas, the lower and open end of the tube being dipped in mercury, while the upper end is closed with a porous plug. The rise of the mercury in the tube serves to measure the diffusion of the gas through the plug. Another method of testing diffusion is to fill a diffusion-tube with — for instance hydrogen — and im¬ merse the lower and open end in water, while the upper end is closed with the porous plug. Diffusion then takes place both ways, into the water and into the air.

Alcohol and water afford one of the readiest means of testing the diffusion of liquids. They will diffuse the same as gases, regardless of gravity. Stirring the two hastens the diffusion, because it brings a larger surface of one liquid against the other. At the same time the action is not a mixing in the ordinary sense, but a mix¬ ing of the molecules, forming a liquid that is of like composition throughout when the diffusion is complete. If water in a glass vessel be colored with a few drops of litmus solution and sul¬ phuric acid be introduced through a tube to the bottom of the vessel, care being taken not to disturb the water, the diffusion may be observed visually. The water, which is blued by the litmus, turns from blue to red as the diffusion of the sulphuric acid progresses. The principle of diffusion is used in sugar making for extracting sugar from cane-juice and also from beets. Hot water is applied to the cut cane and sliced beets and diffusion withdraws a large part of the sugar, leaving in place the troublesome colloid matters which are present in the pressed juice of both beets and cane. Surgeons have also utilized diffusion to cause a liquid to pass through a membrane or tissue of the body. It is the principle of diffusion of liquids that en¬ ables the druggist to compound the several items of a prescription. The uniform strength of his solutions and extracts is also largely dependent upon diffusion. If it were not for this several fluids in a vessel would tend to arrange them¬ selves in layers according to their gravity, as is the case with water and oil, which do not dif¬ fuse. Substances in solution also diffuse, following Fick's law of the diffusion of heat, that the diffusion of substances in solution is comparable to the travel of heat in conductors. As the temperature rises the rate of diffusion in¬ creases. Since the rate of diffusion of different solutions and liquids varies, it becomes possible to separate component substances in solution by taking advantage of the difference in rate of diffusion of each component. It has been demonstrated that some solids diffuse, though with extreme slowness. Lead placed upon gold for a period of years will be found to contain gold to a slight distance above the point of con¬ tact. When the metals are kept at a tempera¬ ture of from 300° to 400° F., a recognizable diffusion takes place within 30 or 40 days.

For a fuller understanding of the diffusion of gases, see Kinetic Theory. Compare also Osmosis, which is, practically, diffusion taking place through a membrane.

DIGAMMA, in the Greek language. In addition to the smooth and rough breathings the ancient Greek language had another, which re¬ mained longest among the ˆEolians. This is most commonly called. from_ the appearance of the character used to denote it, which resembled our letter F, a digamma, that is, double F. It

was a true consonant and appears to have had the force of / or z; or - our w. It was attached to several words which in the more familiar dia¬ lect had the smooth or rough breathing. Though the whole doctrine of the digamma is obscure, yet it is found in early Greek words, especially in Homer.

DIGBY, Sir Everard, English conspirator: b. 16 May 1578; d. 30 Jan. 1606. He enjoyed some consideration at the court of Elizabeth and James I, by whom he was knighted. Being gained over by Thomas Tresham to the extreme Catholic party, he was induced to give £1,500 toward the expenses for the execution of the gunpowder plot and was entrusted with the preparation of a rising in the Midlands. On the discovery of the conspiracy he was tried and hanged in 1606.

DIGBY, George, 2d Earl of Bristol, English legislator : b. Madrid 1612 ; d. 1677. He was educated at Magdalen College, Oxford. As a member of the Long Parliament he was noted for his opposition to the policy of Straf¬ ford. We next find him a member of the House of Lords, in which he supported the Royalists. In the Civil War which followed he served as lieutenant-general in the Royalist army. He emigrated to France after the rise of Cromwell, entered the French service as lieutenant-general, but was dismissed because he opposed Cardinal Mazarin. On the acces¬ sion of Charles H he returned to England. His last public act was his lodging a charge of high treason against Lord Clarendon. He wrote ˆElvira; or. The Worst not Always True,> a comedy (1667).

DIGBY, Sir Kenelm, English author, diplo¬ matist and naval commander : b. Gothurst, Buck¬ inghamshire, 11 July 1603; d. London, 11 June 1665. His great-grandfather bore arms for Henry VH on Bosworth field; his father, Sir Everard (q.v.), died on the scaffold as one of the leading Catholic gentry implicated in the Gunpowder Plot, 1606. Kenelm was brought up a Roman Catholic. After completing his aca¬ demic studies at Oxford he went on his travels through France, Spain and Italy; in 1628 equipped at his own cost a squadron against the Algerine corsairs, and incidentally defeated a Venetian force off Scanderoon (11 June). Re¬ turning home, he appears for a time to have oscillated between Protestantism and Catholi¬ cism ; was imprisoned early in 1642 as a Royalist, and released in July 1643, but his property was confiscated, and he retired to France; there he was in high favor with the court and with men of learning and philosophers, among them Des¬ cartes. At the overthrow of the Royalist cause he returned to England and labored in the Catholic interest, but was banished under pain of death by the Parliament. He then for a time served the French king in various em¬ bassies, but under the Protectorate came back to England and was admitted to the intimate friendship of Cromwell. He was one of the founders of the London Royal Society. His works on physical philosophy, on natural science and on metaphysical subjects possess now only the interest of curiosity; among them are a ˆTreatise on the Nature of Bodies,ˆ ˆPeripatetic Institutions,ˆ ˆTreatise on the Soiil,ˆ *etc.* On religious matters he wrote many books, among

them ˆA Conference About a Choice of Re¬ ligion,ˆ and ˆ Lettersˆ on the same subject. His brief critique of Sir Thomas Browne's ˆReligio Mediciˆ gives a specimen of his style of argu-mˆentation. He was all his life an inquirer into occultism and wrote a book on ˆThe Cure of Wounds by the Power of Sympathyˆ ; he hoped also to discover a means of conserving into old age the extraordinary personal beauty of his wife, and invented cosmetics to that end. Con¬ sult Longueville, T., ˆLife of Sir Kenelm Digbyˆ (New York 1896).

DIGBY, Kenelm Henry, English antiqua¬ rian : b. 1800; d. London, 22 March 1880. He was graduated from Trinity College, Cambridge, in 1819, and in 1822 published ˆThe Broad Stone of Honor, ˆ ˆffhat noble manual for gentlemen,ˆˆ as Julius Hare called it, ˆffhat volume which, had I a son, I would place in his hands, charging him to love it next to his Bible.ˆˆ It was much altered in the 1828 and subsequent editions (the latest 1877), its author having meanwhile be¬ come a Roman Catholic. Among his other works may be named < Mores Catholici, or

Ages of Faith> (1831-40).

DIGBY, Nova Scotia, on Saint Mary's Bay, 150 miles west of Halifax. A United States consular agent is stationed here. The town is noted for its curing of a variety of small herrings or pilchards. Pop. 1,247.

DIGEST, in England and America, a legal work of reference containing rules, decisions and laws arranged under appropriate headings for facility of reference. Such a work may in¬ clude also laws or statutes and case law in alphabetical order or may be confined to an index of judicial decisions containing the com¬ mon law in substance. Of such works there exist a vast number, some of which are en¬ cyclopedic in scope and treatment. The best known are: of English law, the Digest of Fisher and Chitty; of American law, Abbott, ˆCyclo¬ paedic Digest of New York Decisions,ˆ and ˆCorpus JurisP edited by W. Mack and W. B. Hale. In addition to these general works there are digests of decisions of the Federal courts and digests of the decisions of the State courts for each State. See Civil Law ; Code. Con¬ sult Wambaugh, ˆThe Study of Casesˆ (2d ed., Boston 1894).

DIGESTER, a closed boiler in which a tem¬ perature above the boiling point can be obtained, the hot water and steam disintegrating or di¬ gesting the substance treated. The invention of the digester is credited to Denis Papin, a French scientist. He noted that_ anything boiled in an open vessel was not subjected to a heat above 212° F., as the water went off into steam at that temperature and was lost. Accordingly he constructed a boiler with a closed top to retain the steam and succeeded in securing a tempera¬ ture of 400° F., which served to readily digest bones. This digester came into use for the man¬ ufacture of soups and gelatines from bones that had been previously wasted or thrown to the dogs. Within ˆ recent years the digester has found a place in a number of industries. The lard or grease tank of a slaughter-house is a digester. In some American cities digesters have been employed to receive garbage and se-DIGESTIBILITY OF FOODS—DIGESTION

cure a product of some value from the refuse. Tannin is extracted from nutgalls by a digester, in which the material is saturated with ether.

The digester has found its most extensive use, however, in

papermaking. The wood, which is abraded by grinders from the log, is introduced in a form resembling fine sawdust to the digester, and comes out pulped, read}ˆ to be rolled into paper. Sulphite digester is the com¬ mon name for these mechanisms owing to the fact that a bisulphite solution is employed in the process of digesting. This serves as a solvent, but being acid would attack the iron or steel of which the digester is constructed. To pro¬ tect the iron shell various linings are employed. The ®Non Antemˆˆ digester employs a lining made of a continuous sheet of lead placed against the inner sides of the shell, and held in place by two courses of acid-proof brick. The Mitscherlich digester is lined with acid-proof brick laid in Portland cement. The Graham digester is made of sheets of boiler plate, \dth the lead lining soldered on before bending. The Partington digester is made spherical, so that the lead lining tends to maintain its place from its form; the lead is also burned to the iron. Pusey & Jones build a digester of welded steel, with double shells and no lining. The Schenck digester is also unlined, being made of deoxidized bronze, and in both of these last named the erosion is claimed to be very slight.

Most sulphite digesters are built in the form of an upright cylinder, with one or more man¬ holes at the top, through which the ground wood is introduced. Steam is admitted by coils and a high temperature maintained for about eight hours. When properly cooked, the liquid is run off and the digested material withdrawn by manholes in the bottom.

DIGESTIBILITY OF FOODS. See

Nutrition of Man.

DIGESTION. The word digestion desig¬ nates the physical and chemical changes which food substances must undergo before they can be absorbed into the blood and lymph. Only a few food substances can become part of the body without previous change. These are water, certain salts and grape sugar. The most import¬ ant alimentary principles, namely, protein, car¬ bohydrates and fats, cannot be absorbed in the form in which they are furnished by nature. The digestive process can be considered most conveniently under three headings : Secretion, Absorption and Peristalsis.

Secretion refers to the elaboration of com¬ plex juices which contain, as a rule, digestive enzymes. One of the secretions, the gastric juice, contains free hydrochloric acid. ˆ Others, like the saliva, the pancreatic and the intestinal juices, are alkaline. The processes by which these digestive juices are formed and brought to the surface of

the organ in which the diges¬ tion takes place are complex and will ˆ require special description. When these secretions act on the food substances at the temperature of the body, the food substances are broken down into simpler compounds, the chemical mole¬ cule becoming smaller and smaller. Some physiologists claim that the molecule of the food substance is reduced to its component atoms before it can be taken up by the living cells that line the digestive apparatus. If food substances are forced to enter the animal or¬

ganism without being digested, for example, if egg albumen is injected into the blood circula¬ tion, it is again excreted by the kidneys. Egg albumen is a foreign albumen and the object of the elaborate chemical process is to convert it into native albumen which chemically and physi¬ ologically corresponds to that which enters the normal or native structure of the body.

Under Absorption are included the proc¬ esses whereby the dissolved food substances, namely, the soluble end products of proteid, carbohydrate and fat digestion are taken up from the mucous membrane of the stomach and intestines and carried directly into the blood, or indirectly by rheans of the lymphatics. The blood, in turn, carries these end products of di¬ gestion to the cells constituting the organs and tissues in the body. The most important seat of absorption is the intestines. To a certain small extent absorption can take place from the mouth and the stomach.

By Peristalsis we mean the periodic con¬ tractions and constrictions which the oesophagus, stomach and intestines undergo, and by means of which the contents of the digestive appara¬ tus are moved from the oral end to the rectal end of the digestive tube. But these peristaltic movements are also essential to effect a proper mixing of the food with the digestive juices in the stomach and intestines. Peristalsis does not, therefore, always mean regular onward movement. At times, the food is churned back¬ ward and forward in a part of the intestines not longer than 8 to 10 inches causing it to be thor¬ oughly mixed with the secretion, and in the as¬ cending colon there is an actual anti-peristalsis which compels the food that has entered the large intestine through the ileocecal valve, after it has reached as far as the hepatic flexure of the colon, to return to the cecum. This may be repeated many times before the food is al¬ lowed to pass into the transverse colon.

To the eye the peristaltic movement con¬ sists of a constriction of the

walls of the in¬ testine which, beginning at a certain point, passes downward away from the stomach from segment to segment. The advancing area of con¬ striction is preceded by an area of inhibition or relaxation. The peristaltic movement, there¬ fore, consists of two acts — constriction of one small region, preceded by the inhibition of an¬ other small region immediately in advance of it. These seem to follow in definite sequence and, when combined in an orderly manner, will facilitate the onward movement of the intes¬ tinal contents. Bayliss and Starling were the ones first to describe this twofold character of the movement and they regarded it as a reflex which is controlled within the intestinal wall it¬ self through intrinsic nerve ganglia and their afferent and efferent communications.

There are principally three kinds of peris¬ taltic movements of the digestive tract, one, the regular peristalsis just described and shown to be of a twofold character by Bayliss and Starling ; secondly, the rhythmical movement ; and third, the anti-peristaltic movement. We will now describe the rhythmical movements. Whilst the .food progresses onward during the regular peristaltic movement just described, it seems to remain in the same place during the rhythmical movement but is apparently re¬ peatedly kneaded and what is at one time a string of food of the shape of a sausage.

continuous in one piece six or eight inches long, may be suddenly segmented into five or six small pieces. These may be recombined, only to be separated again. During these rhythmical contractions there is no steady progression of the food, although it is repeatedly subjected to divisions. From time to time, hov/ever, the sep¬ arated pieces are caught by an advancing peris¬ taltic wave of the first kind, moved forward about 6 to 10 inches and then gathered into a new mass which, in turn, undergoes segmenta¬ tion. F. P. Mall has suggested that these rhythmical contractions may also act as a pumping mechanism upon the venous plexuses in the walls of the intestine and thus aid in driving the blood into the portal system. Sim¬ ilar movements have been described by Hertz in the human being.

Fig. 1 — Digestive organs of Coleoptera.

Anti-peristalsis occurs under normal condi¬ tions nowhere except in the colon, particularly in the ascending colon. Under abnormal con¬ ditions, for instance, during complete intestinal obstruction, it may occur anywhere in the bowels.

The time required for the passage of the food from the mouth to the stomach is six seconds, if solid ; one to two seconds, if liquid. The passage through the stomach may require from two to four hours, according to the quan¬ tity and quality of the food. The passage through the smaller intestine, according to Hertz, is about four hours and a half, though Hemmeter has described in the human being, studied by means of the X-ray, the passage of a meal from the pylorus to the ileocecal valve in

two hours. The colon has the slowest peristal¬ tic movement. The passage of the food through the colon may require from 10 to 14 hours.

Comparative Physiology of Digestion. — Digestion occurs in

unicellular animals, such as the protozoa, in which Hemmeter has de¬ scribed the secretion of an acid into the food vacuole. When food that is stained with acid indicators, for instance, Congo red, is taken into the food vacuole of an ameba, it changes to blue, showing that an acid has acted upon the food.

The next highest class of animals, the Coe-lenterates, possess a mouth and an alimentary tube which opens into the body cavity. A cer¬ tain chemical digestion takes place in this tube and the digested food is absorbed through the cells of the endoderm, the lining membrane of this digestive tube. In the Medusae fine canals radiate from the body cavity into the digestive tube and form part of the so-called gastro vas¬ cular system. In the Echinodermata we have a further development, a complete alimentary canal with mouth and anus, and entirely shut off from the body cavity. In many Arthropods it is possible already to distinguish parts corre¬ sponding to the stomach and the small and large intestines of higher forms, the digestive glands being represented by organs which in some groups seem to be homologous with the liver, and in others with the salivary glands of the higher vertebrates. A few Molluscs seem in addition to possess a pancreas.

Among Vertebrates, fishes have the simplest and birds and mammals the most complicated alimentary system. The stomach in the lower fishes is only indicated by a slight widening of the anterior part of the digestive tube. There are no salivary glands in water-living Verte¬ brates. The oesophagus is generally dilated to form a crop, in Birds, from which the food passes into a stomach consisting of two parts, one pre-eminently glandular (proventriculus) , the other pre-eminently muscular (ventriculus). Among Mammals a twofold division of the stomach is distinctly indicated in rodents and cetacea, but this organ reaches its greatest com¬ plexity in ruminants, which possess no fewer than four gastric pouches. The differentiation of the intestine into small and large intestines and rectum is more distinct, both anatomically and functionally, in Mammals than in lower forms ; but there are marked differences be¬ tween the various mammalian groups, both in the relative size of the several parts of the digestive tract and the proportion between the total length of the alimentary canal and the length of the body. In general, the canal is longest in herbivora, shorter in carnivora. Thus the ratio between length of body and length of intestine is in the cat 1 :4, dog 1 :6, man 1 :5 or 6, horse 1:12, cow 1:20, sheep 1:27. The relative capacity of_ the stomach, small intestine and large intestine is in the dog 6:2:1’5, in the horse 1 :3’5 :7, in the cow 7:2:1. The area of the mucous surface of the alimentary canal is very considerable, in the dog more than half that

of the skin, the surface of the small intes¬ tine being three times that of the stomach and four times that of the large intestine. In the horse the mucous surface has twice the area of the skin.

The gullet or oesophagus is a long tube pass-

ing from the pharynx to the stomach. Its mucous coat is loaded with very large glands which secrete a quantity of very viscid mucus.

Fig. 2 — Section through Mouth, Nose, *etc.* — a, sphe¬ noid bone; b, Eustachian tube; c, soft palate; d, uvula; e, nasal passage; f, upper jaw; g, lower jaw; h, epiglottis; m, mouth.

The stomach itself is a greatly dilated part of the digestive system. It may be said to consist of two parts, even in the human subject; a more complex arrangement is found in many animals, such as the ruminants. The large dilated portion into which the gullet opens is termed cardiac, and the opening the cardiac or oesophageal opening. The whole is lined with mucous membrane, which, in the empty stom¬ ach, is thrown into projecting folds or rugae, but these folds are effaced when the organ is distended with food. In the membrane are innumerable glands which secrete the digestive juices of the stomach. The gastric juice is acid, due to the presence of hydrochloric acid. The ferments called pepsin and rennin, which is necessary for digestion, is secreted by special peptic or enzyme cells of the glands.

The food now called the chyme passes into the small intestine, a tube about 20 feet long. This tube, besides the muscular and mucous coats, possesses an external coat of loose fibrous tissue covered by a single layer of flat cells. This coat is prolonged into and helps to form the mesentery, a mernbrane connecting various loops of the bowel with each other and also the intestine with the abdominal walls. This membrane is called the peritoneum. The small intestine is somewhat arbitrarily divided into three portions — the upper (duodenum), the middle (jejunum), and the lower (ileum). The mucous coat contains glands very like the pyloric glands of the stomach, called Lieberkiihn's follicles. They secrete the intestinal juice. In the duodenum one finds in addition highly branched glands called Brunner's. In both the mucous and sub-mucous coats, and generally involving both layers, are found

masses of tissue — lymphoid — similar to that found in a lymphatic gland. Their function is probably connected with the blood and the blood corpuscles. Collections of these solitary glands, forming oblong patches about two inches long, are called Peyer's patches. In ad¬ dition to the follicles of Lieberkiihn and the glands of Brunner, there are the liver and the pancreas, which pour their digestive juices into the small intestine. The bile, which is the secretion of the liver, is formed continually by that organ, but the amount thus formed is in¬ fluenced by the kind and quantity of food taken. The bile is to be looked upon not only as a digestive juice, but as a drain or excretion, whereby effete and useless matter is removed from the body. The pancreas is very similar in structure to a salivary gland. It secretes pan¬ creatic juice which pours together with the bile into the digestive system, because the common gall duct and the pancreatic duct have a common orifice in the duodenum. The mucous mem¬ brane of the small intestine contains, in addi¬ tion, little projections called villi. These are important organs of absorption. This property they share with the whole digestive system

through any part of which, and especially through the walls of the small intestine, digested matter in solution passes into the numerous blood

capillaries which form everywhere a dense net¬ work. The villi are peculiar, for each one con¬ tains in addition to blood vessels a small lymph ves¬ sel or lacteal. Nearly all the fat absorbed by the digestive system is taken up by the little cells of the villi, and passes on into the lacteals and thence into e c e p t aculum chylPˆ and thoracic ducts into the left subclavian vein.

The unabsorbed food, mixed with the various secre¬ tions we have mentioned, now passes into the large intestine, where both diges¬ tion and absorp¬ tion go on, though to a less extent. The large intes¬ tine is only five feet in length, but its lumen is much greater than that of the small in¬ testine. It com¬ mences with ce¬ cum, a dilated part, into which

scendmg colon; k. rec- ˆ

ˆ canal (the vermi¬

form appendix), in some animals a large and important structure. The large intestine as¬ cends on the right side (ascending colon),

Fig. 3 — Alimentary Canal. — a, oesophagus; b, stom¬ ach; c, cardiac orifice; d, pylorus; e, small in¬ testine; f, biliary duct;

g, pancreatic duct;

h, ascending colon; i, transverse colon; j, de-

crosses over to the left side (transverse colon) and descends again on the left side (descending colon), and makes a bend (sigmoid flexure), and finally terminates in a somewhat enlarged portion (rectum). The mucous mem¬ brane of the large intestine differs from that of the small intestine in containing no villi or Brun¬ ner's glands. Lieberkiihn's and solitary glands are present, but the aggregation of the latter into Peyer's patches is nowhere to be found.

When food is taken into the mouth it is at once swallowed, unless it is in a solid form. In this case it is chewed into a convenient size for swallowing, for which purpose it is, in addition, mixed with the viscid saliva and juices of the mouth. Many animals can hardly be said to masticate; such are the carnivora (dog, cat, etc.), and they are not provided with grinding teeth. In most animals living on vege¬ table food large flat grinding molars are found. In these animals, not only is the food finely divided in the mouth but the food, largely con¬ sisting of starch, is partially digested by the

Fig. 4 — Section of the Stomach. — a, ducts of liver; b, pylorus; c, bile duct; d, pancreatic duct; e, cardiac orifice.

saliva. During mastication the food would nat¬ urally tend to escape from between the grind¬ ing surfaces of the teeth, and would collect within the mouth and outside the gums. This is prevented by the muscles placed in the sub¬ stance of the cheeks and lips.

Physiology of Swallowing. — As a result of mastication, the food is gathered in the form of a round moist bolus on the upper surface of the tongue. It is now ready to be swallowed. In the first place, it is pushed backward by the tongue and seized by mus¬ cles, many of which are attached to the hyoid bone. According to the most recent in¬ vestigation, the bolus is propelled with great rapidity through the pharynx and gullet into the stomach. Following the propulsion of the food downward there is a wave of contraction, which, commencing in the pharynx travels com¬ paratively slowly downward through the gullet. It is evident that swallowing is not due to the falling of food down the throat. A horse drinks ^up-hill,® and the jugglers, or indeed

anyone, can drink or swallow with the head vertically downward. When the food has reached the back of the mouth, swallowing occurs irrespectively of the action of the will.

There is a possibility that during swallowing the food may go the wrong way — that is, it may pass into the larynx and windpipe. It is prevented from passing into it by .the eleva¬ tion of the larynx which pushes its aperture

against and under the back of the tongue, which at the same time is pushed backward.

The act of deglutition or swallowing has been studied by Magendie, Kronecker and Meltzer and by Cannon. The bolus is moved from the anterior end of the tongue along the hard palate to the anterior pillars of the fauces. By the stimulation of the sensory nerves ending in the mucous membrane at this part, a reflex action is produced which results in a forcible contraction of the mylohyoid and hyoglossal muscles. By this the bolus is pushed backward into the oesophagus.

In order that food shall only escape back¬ ward, the pharyngeal cavity must be separated from the mouth, nose and larynx. This is accomplished as follows :

The opening into the mouth is closed by the posterior part of the tongue being pressed against the hard palate and against the neigh¬ boring anterior pillars of the fauces. The nasal cavity is separated from the pharynx by the elevating of the soft palate (by means of the levator palati mollis), by the arching of the posterior walls of the pharynx (by means of the superior constrictors of the pharynx) and by the meeting of the two posterior pillars of the fauces at the median line. The opening into the larynx is closed by the elevation of the larynx by means of the mylohyoid and the geniohyoid and the digastric, to such an extent that it can be covered by the roof of the tongue and the epiglottis.

The first act of deglutition here described may occur with so much force that by means of it the food reaches the stomach. According to Kronecker and Meltzer this is accomplished by contraction of the mylohyoid muscle alone. This is especially true for liquids and soft foods. Only solid and dry foods remain in the pharynx or upper part of the oesophagus till the second step in deglutition carries them downward.

The second part of deglutition consists of a peristaltic movement, that is, a constriction of the oesophagus beginning at the top and traveling downward. The pharynx first con¬ stricts by means of the constrictors, then the oesophagus by means of the constriction of the circular muscles. Thus the parts of the pharynx and oesophagus successively con¬ stricted push the bolus toward the stomach.

The propagation of the contraction from one part of the oesophagus to another does not take place by direct conduction in the muscles, but is dependent upon the central nervous sys¬ tem. After the oesophagus has been cut across, the wave of contraction is set up in the lower part when it has ceased in the upper segment.

The nerve centres which govern the proc¬ esses of chewing, sucking and swallowing lie in the medulla oblongata.

The walls of the stomach and intestines are, like the gullet, provided with muscular fibre. An external layer passes in the direction of the length of the gut, and within this is a circular layer. These muscles contract slowly on stimu¬ lation, and are outside the domain of voluntary action. During the digestion they contract peristaltically, moving the food toward the rec¬ tum. The peristaltic waves may begin in any part of the gut and pass slowly downward fol¬ lowed at varying intervals by other waves.

Vomiting Eructations. — Eructations are frequently caused by anti-peristalsis and by a movement of this kind, food is brought back into the mouth for further chewing in the ruminants (sheep, oxen, etc.). The act of vomiting is a reflex nervous act. It can be excited by stimulating the branches of the vagus nerve, as when indigestible and irri¬ tative food is taken, or emetics are adminis¬ tered. By tickling the back of the throat with a feather, the glossopharyngeal nerve is stimu¬ lated and vomiting may readily be produced. It is of frequent occurrence in irritations of the uterine nerves in pregnancy, of the nerves of the liver biliary apparatus and kidneys during the passage of a hepatic or renal stone, or in¬ deed when irritation of any sensory nerves takes place. Vomiting may be caused by chemic sub¬ stances acting directly on the vomiting centre in the medulla. Apomorphin acts in this man¬ ner. Irritating substances acting on the afferent nerves in the stomach can cause vomiting. Mustard acts in this manner.

In many animals, such as the sheep, ox and camel, the stomach consists of several cavities communicating with one another. In the ox and sheep the cardiac and the pyloric portions are each subdivided into two compartments. The cardiac part consists of a very dilated cavity, the paunch (rumen), into which the food is passed as soon as swallowed. In addi¬ tion there is a smaller part, the reticulum (honeycomb), so called from the folds of lin¬ ing mucous membrane which reduplicate, form¬ ing a reticulum. The pyloric half is divided into two parts. The psalterium (manyplies) , so called from the lamellated appearance of. its mucous membrane, communicates with the last division, the rennet stomach (abomasum). Fluid passes either into the first, second, or third part of the stomach, and thence on into the fourth. Solid matter, such as grass, roots, etc., passes either into the paunch or reticulum. This is mixed with the saliva swallowed with it and in addition it is mixed with juices formed by the mucous membrane of these cavities. When the animal has finished feeding, it lies down and rumination commences. Due in part to the contraction of the abdominal muscles and diaphragm, the food is propelled in the form of rounded pellets from the paunch and reticulum up into the

mouth. The pellets are there thoroughly masticated, and are re¬ turned in a pulpy condition to the stomach. Now the food passes into the psalterium, and into the rennet stomach. Hence the consistency of the food determines into which part of the stomach it passes.

In the bird some interesting modifications in the structure of the alimentary canal are seen. The gullet at about the middle of its course is provided with a pouch or crop. Into this the food passes, and is bathed by a secretion formed by its glands. It is then propelled on¬ ward into a dilated cavity, the proventriculus, and is acted on by digestive juices. Thence it passes into the gizzard. This cavity is provided with muscular walls of enormous thickness in the case of birds that are vegetable feeders. It is lined by thick and corneous epithelium, and in its interior are generally found pieces of stone, chalk, *etc.* The gizzard is a powerful mill, which grinds the food into a soft pulp, vor. 9 — 8

upon which digestive juices can readily act. See Birds.

The most essential change which food under¬ goes in digestion is one of solution. This is effected by the chemic breaking down the large molecule of proteid carbohydrate and fat into smaller molecules. Some physiologic chemists claim that the complex food molecule is broken down to its very elements and completely.

The protein fat and carbohydrate of the food, if they were injected as such into the circulation, would not serve as food, but would be excreted as foreign matter — the proteid and carbohydrate bj^ the kidneys, the fat by the intestines. Albumen, starch, fat, and other foodstuffs are insoluble in the circulating fluids. During digestion these pass either into nearly allied chemical substances which are readily dissolved in water^ or in the case of fat partly into a soluble soap and partly into a state of microscopically minute subdivision. It is not sufficient, however, to have a soluble foodstuff in order that it may be absorbed and used by the body. Cane (table) sugar is solu¬ ble in water, but it is of no use as cane-sugar to the body. If injected into the blood vessels it is at once excreted by the kidneys. During digestion it is converted into glucose, but in a form which can be used by the economy.

The digestion of food is brought about by the action of the saliva, the gastric, pancreatic, intestinal and other juices. These are mixed with the finely divided food by the movements of the alimentary canal. The

digestive juices are in all cases secreted by the microscopic cells which line the various glands opening into the digestive system. All digestive juices exert their efforts on the foodstuffs by means of chemic agents known as enzymes or ferments. These are not formed as active enzymes, but always as inactive pro enzymes, incapable of showing their specific digestive effect until they are made active by an activator. For in¬ stance pepsin is not secreted as such, but as pepsinogen. The pepsinogen is activated into pepsin by the hydrochloric acid (HCl) of the gastric juice.

When food is passed into the stomach, se¬ cretion occurs. In all cases the stomach, pale before, becomes suffused with blood, and the gastric juice is poured out. The flow of the intestinal juice, the pancreatic juice and bile all follow the stimulation of the mucous mem¬ brane of the duodenum, and in all cases the blood vessels enlarge so as to give the cells a good supply of blood, though, as we have seen, they themselves actually pass into a condition of activity as a result of the influence of special secreting nerves. Foods belong to four classes : (I) Proteids — albumens, globulins, etc.; for example, die white of egg, the chief constituent of meat, the gluten of bread. (2) Carbohy¬ drates — starches, sugars, gums; for example, potato-starch, cane-or grape-sugar. (3) Fats and oils ; for example, suet, marrow, olive oil. (4) Inorganic substances; for example, water, table salt, iron, phosphates.

A few substances are absorbed without being digested at all ; for example, water and the salts, though even many of these undergo some physical change. Grape-sugar is absorbed and probably proteids too are often absorbed in very small amount. Fat is profoundly modi¬ fied during digestion. The saliva, of which

about 30 ounces are secreted during the 24 hours, contains a ferment termed ptyalin, which is capable of turning boiled starch into a solu¬ ble sugar called grape-sugar, or, according to other observers, into another soluble sugar termed maltose. The ptyalin may be extracted from the saliva or from the salivary glands themselves. It does not appear to be much exhausted during its activity. The saliva is alkaline, and the starchy food is no doubt partly converted into sugar during its sojourn in the mouth by its action. Starch digestion may continue in the stomach for 45 minutes to 1 hour for the hydrochloric acid of the gastric juice does not destroy the ptyalin until the concentration of free HCl has reached 0.2 per cent. Any nondigested starch is subsequently converted into sugar when the food reaches the small intestine by the pancreatic juice.

The Nervous Control of the Gall Bladder and the Relation of the Secretion of Bile to the Peristalsis and Secretion of the Stomach. — As an example of the highly complex neuro-chemic reciprocal relations existing between the digestion in the stomach and digestion in the first part of the intestines below the stomach called the duodenum, we will describe the reciprocal innervation between the gall bladder and its outlet at the papilla of Vater. The orifice of the common gall duct on the papilla of Vater is at the same time the orifice of the pancreatic duct.

The vagus is the constrictor nerve to sphincter at papilla of Vater and inhibitory to the gall bladder. The splanchnic is the motor or constrictor nerve to the gall bladder and inhibitory to sphincter at papilla of Vater.

Stimulation of central end of splanchnic causes dilatation by reflex stimulation of vagus (inhibitory).

Stimulation of central end of vagus causes contraction of the bladder and a dilatation of sphincter at papilla of Vater.

Now, when there is no food in the stomach the sphincter of papilla of Vater is tightly closed, but as soon as food is taken into the stomach and digested, the solid chyme is spurted out through the pyloric sphincter, by the pyloric reflect (Hirsch — von Mering), into duodenum, and thereby stimulating the afferent fibres of the vagus. This stimulates the splanchnics reflexly, thereby causing inhibition of

sphincter at papilla of Vater, and at the same time causing contraction of the gall bladder which shoots out the alkaline bile into the duodenum through the common bile duct. This then mixes with the gastric acid chyme, previously expelled through the pylorus, thereby making it alkaline, and this alkaline mass will cause the sphincter of the papilla of Vater to contract tightly through its stimulating effect upon the fibres of the splanchnics. Then fol¬ lows a reflex stimulation of the vagus which results in a contraction of the sphincter of the papilla of Vater and relaxation of the gall bladder. Or in other words, the alkaline chyme stimulates this sphincter surrounding the orifice of the gall duct and pancreatic duct to contract reflexly, just as HCl, when present on the duo¬ denal side, causes the pyloric sphincter to con¬ tract reflexly.

But the admirable nuerochemic adjustment is such that whilst acid HCl on the duodenal side of the pylorus causes the pyloric sphincter

to close, this same acid reaction of duodenal chyme causes the sphincter of the papilla of Vater to relax, that the alkaline bile and pan¬ creatic juice may neutralize this acid, for the enzymes of these juices require an alkaline medium for their best effect. When the duodenal chyme is again neutralized the pyloric sphincter opens, letting through four to ten cubic centimetres acid gastric chyme, but at the same time as long as the duodenal chyme is alkaline the sphincter of the papilla of Vater is closed.

The Chemistry of Digestion. Enzymes and Catalyzers. — The chemistry of digestion involves a knowledge of the enzymes. The sub¬ stance upon which the enzymes act is called the substrate ; thus the substrate for pepsin is proteid and the substrate for the diastatic ferment amylopsin is starch. The ferment attaches itself to the substrate and makes a new compound with it, which is capable of standing a higher temperature than the ferment alone. Proteolytic ferments, like trypsin of the pancreatic juice makes, distribute themselves on several different kinds of proteids, if such are present at the same time ; but then the protein of the more difficult digestibility acts as an inhibiting sub¬ stance to the ferment. An example of this is the manner of action of trypsin in a mixture of casein, fibrin and egg albumen. This inhibitive effect gave rise to the idea of anti-ferments in such solutions. The action of enzymes is very similar to that of the catalyzers of inorganic chemistry, but they do not act exactly as the catalyzers do.

According to Ostwald catalyzers simply ac¬ celerate a process that is already started and going on. However, it is well known that carbohydrates, proteins and peptones can be kept for years without any change if kept free of bacteria. Hence, ferments cannot be claimed to simply accelerate a process already begun.

The beginning of ferment action is extremely ppid. Sugar can be detected in starch almost immediately when saliva touches it. There is a glycolytic ferment in muscles which forms CO2 explosively from glucose, provided pancreatic extract has been added. The rapid beginning is a constant sign if the enzymes are allowed to work under the correct conditions, but in experi¬ mental conditions this action ceases quickly ; also, no matter how much glucose is present, the glycolytic action and CO2 formation ceases in 2-10 hours. This is explained by the following possibilities; (1) Ferments may be used up. (2) They may be destroyed because they are labile. (3) They may be inhibited by products.

The characteristic manner of action of enzymes is quick onset and quick cessation. They may act by their presence, they may not be consumed and they do not appear as part of the end products.

For some enzymes it has been demonstrated that their action is reversible — that is, they may take place in opposite directions. One of the first demonstrations of this double effect Avas made by Kastle and Loevenhart in experiment¬ ing with an enzyme of the animal body known as Lipase. A necessary step in the digestion and absorption of fats is tneir splitting up into fatty acids and glycerine. These two chemists found that when they made use of a simple ester chemically analogous to the fats, namely, ethyl-butyrate, that it was not only split up by Lipase into ethyl alcohol and butyric acid, but that the

two last-named substances could be resynthe¬ sized into ethyl butyric and water. In this case this reversibility can be chemically expressed by the following formula :

C3HTCOOC2H5 + H2O C3.HTCPOH + C2H5OH

Ethyl-Butyrate Butyric acid-Ethyl-alcohol

The Functions of the Gastric Juice — The Pawlow Experimental Stomach. — By means of a very ingenious surgical operation the Russian physiologist Pawlow prepared a second¬ ary artificial stomach from the walls of the en¬ tire organ in the dog. The aim of the operation was to separate the stomach into a smaller and larger stomach in such a manner that the two portions did not communicate, but were sepa¬ rated by a partition made of the mucous mem¬ branes of the stomach. The larger portion of the stomach is so sewed up that it remains in continuity with the general digestive tract. The smaller stomach is made to open on the surface of the abdomen by a fistula. It was found by experiment that the juice secreted by the smaller stomach has the same composition as that produced by the large stomach. It had, moreover, the advantage of being free from admixture with food because no food could get into the lesser or artificial stomach.

The gastric juice thus obtained has a specific gravity of 1003 — 1005. It consists of 99 per cent water and nearly 1 per cent solids. The juice also contains free HCl acid in the proportion of 0.2 per cent. It is this HCl acid that explains the inversion of cane-sugar into equal molecules of glucose and fructose in the stomach, for it has been erroneously thought that the gastric juice contains a ferment to which the name Invertase is given, and to which this action was assigned. Similarly a variety of sugar which occurs in dahlia tubers and known as Inulin is converted by the HCl acid of the gastric juice into fructose.

Gastric juice has three functions in addition to that already mentioned. It converts proteids into proteoses by virtue of the HCl acid and pepsin it contains; secondly, it coagulates milk, and, thirdly,

it acts on neutral fats but only such as are in the form of fine emulsion, such as yolk of eggs and milk.

The stages of peptic digestion of protein may be represented in tabular form thus —

Protein.

Soluble Globulin Acid Metaprotein Primary Proteoses Secondary Proteoses Peptones.

Some proteins which occur in food do not undergo these changes. Thus elastin is unaf¬ fected by peptic digestion in the time available in the stomach. The collagen of connective tissue is probably converted first into gelatine and then into gelatoses and gelatine peptones. The protein constituent of the conjugated pro¬ teins is usually converted into proteose and pep¬ tone, the prosthetic group being set free. Thus in the digestion of nucleo-protem by gastric juice an insoluble residue of nuclein is formed; in the digestion of mucin (gluco-protein), glucosamine is found in the products.

The effect of gastric juice upon pseinogen the phosphoprotein of milk is peculiar in that there is a conversion of the caseinogen into a

comparatively insoluble substance, casein. This action of gastric juice has been for many years ascribed to a separate ferment called rennin, but latterly evidence has been brought forward which suggests that the formation of casein from caseinogen is due to pepsin itself. The matter has not been conclusively settled, and it will be convenient to retain the term rennin in the meantime when describing the effect of gastric juice on caseinogen.

Adding rennin to milk and allowing it to stand at a temperature of 37° C. the milk soon becomes clotted, and after a time the clot shrinks, squeezing out a clear fluid, whey, which contains all the constituents of milk except caseinogen and fat.

Three factors are necessary for the forma¬ tion of the clot, namely, caseinogen, rennin and lime salts. If rennin is added to a solution of caseinogen and the mixture is kept for a short time at a temperature of 37° C. and then boiled to kill the enzyme, the addition of calcium chloride will bring about the formation of casein. Obviously the enzyme has produced some change in the caseinogen, and the only factor required to complete the conversion into casein is the addition

of lime salts. The process may be represented thus : —

Caseinogen + Rennin (or pepsin)

Soluble casein + ˆ Calcium salts

Casein.

Gastric juice also acts upon neutral fats, but only on those which are in the form of a fine emulsion, such as yolk of egg and milk. The fats are split into glycerol and fatty acids by the agency of an enzyme, lipase. The fat-splitting function of gastric juice, however, is limited in extent, and is of relatively small importance as compared with that which takes place in the small intestine. Pepsin indirectly assists the di¬ gestion of fat by dissolving the cell envelopes of the fats' cells of adipose tissue contained in the food. In this way fat is set free and prepared for the subsequent digestive action of pancreatic juice.

Nervous Control of the Secretion of Gas¬ tric Juice. — When a dog that has been pro¬ vided with a Pawlow accessory stomach sees food or simply smells food gastric juice begins to drop from the canula in the accessory stom¬ ach. Also, if the oesophagus of the dog is divided and the two ends sewed to the surface at the lower part of the neck, food may be masti¬ cated and swallowed by the animal, but none of it will reach the stomach because it falls out of the end of the oesophageal fistula. In such an animal when food is eaten a secretion of gastric juice from the accessory stomach takes place ; as no food has reached the stomach this indicates that the first secretion is due to a nervous reflex. The secretion of gastric juice will not occur if both Vagi nerves are cut.

The efferent nerves to gastric secretion are therefore the two Vagi. When juices produce purely nervous influence in the absence of any food reaching the stomach it is called a psychic secretion or appetite juice.

The Chemical Mechanism of Gastric Se¬ cretion. — Gastric juice may be secreted even after the two Vagi are divided. This type of gastric juice, therefore, would not be due to influence of nerves. The introduction of meat into the main stomach of a Pawlow dog

is followed in from 20 to 30 minutes by a secretion of gastric juice. The substances which stimulate gastric secretion act by directly excit¬ ing the cells of the gastric membrane, which, in turn, produce a hormone. The word hormone comes from the word opfiaco (I stimulate). There is a hormone formed in the pyloric end of the stomach, according to Edkins. It is called gastric secretin or Gastrin. Hormones are readily diffusible. They are of low molecular weight and each exercises a specific function in stimulating the activity of one particular organ or tissue, and when this function is performed it is rapidly destroyed in the body. It does not act as an antigen, that is does not excite the production of an anti¬ body which would interfere with the perform¬ ance of its function.

The hormones of the body are not destroyed by boiling like the ferments but are soon oxi¬ dized in the body, especially in the presence of alkalis.

The Composition and Functions of Pan¬ creatic Juice. — Pancreatic juice may be obtained from animals by introducing a canula into the pancreatic duct and by an operation providing an external opening for this canula to empty itself into vessels tied underneath the abdomen of the animal. As early as 1677 Rene de Graaf employed a method of obtaining pancreatic juice and published an illustration of a dog with a pancreatic and also a salivary fistula. Consult Ernest H. Starling's work on ˆRecent Advances in the Physiology of Digestionˆ (page 81).

Pawlow's method of making a permanent fistula is to cut out a patch of the duodenal wall with the opening of the pancreatic duct in its centre and stitch up the gap in the duodenum and then suture this patch containing the open¬ ing of the duct into the abdominal wall. Pan¬ creatic juice obtained in this way is a clear, limpid fluid with a specific gravity of 1006, strongly alkaline in reaction. The degree of alkalinity is such that equal volumes of gastric juice and pancreatic juice neutralize each other.

Pancreatic juice contains four enzymes, a nucleo-protein, inorganic salts, chief of which is sodium carbonate. The enzymes are a pro-tase called Trypsin, converting proteins into peptones and polypeptids ; a diastase called Amylopsin which converts starch into maltose, but unlike saliva the amylase of pancreatic juice is capable of digesting

unboiled starch ; thirdly, it contains a lipase called Steapsin, and fourthly contains a milk curdling enzyme.

Pure pancreatic juice obtained directly from the duct without coming in contact with the intestinal membrane possesses no action on pro¬ teins. If, however, the juice has flowed over the duodenal membrane it becomes proteolytic. The inactive juice contains not Trypsin in its active state but it contains Trypsinogen, which is a precursor of Trypsin.

Trypsinogen is converted into active Tryp¬ sin by an activator or coenzyme which is formed in the mucous membrane of the small intestines and the name Enterokinase has been given to this activator. Trypsinogen may also be converted into Trypsin by calcium salts, but not so rapidly as by Enterokinase. Bayliss and Starling have shown that the secretion of pan¬ creatic juice is due to a hormone which they called Secretin, and which is formed in the

mucous membrane of the small intestine. The production of this hormone is brought about by the presence of the acids of the gastric contents when they enter the duodenum.

Pawlow has shown that stimulation of the vagus will start a small flow of the pancreatic juice even when the pylorus of the stomach is ligatured so that the passage of acid contents from the stomach into the duodenum is pre¬ vented. It is possible that the first few cc of juice of the pancreas that are secreted may be of nervous origin.

Secretin is not secreted in its complete or active form, but as a precursory state called pro¬ secretin, and the amount of secretin in former as shown by the amount of pancreatic juice that is secreted varies with the nature of the food. The effect of Tryptic digestion may be repre¬ sented in tabular form in the following manner:

Protein

Soluble Globulin Alkali Metaprotein Primary Proteoses Secondary Proteoses Peptones

Polypeptids and Amino-acids

The action of the pancreatic juice on starch is effected by an enzyme called Amylopsin or Amylase forming maltose from starch, but as the maltose is formed it is hydrolyzed by a ferment called Maltase contained in the pan¬ creatic juice and also in the intestinal juice. Under the influence of maltase each molecule of maltose takes up a molecule of water and is split into two molecules of dextrose. Pan¬ creatic juice differs, however, from the intes¬ tinal juice in having no similar action on other disaccharides, such as lactose and cane sugar.

Action of Pancreatic Juice on Fats. — If neutral olive oil be shaken with pancreatic juice and the mixture kept at a temperature of 37° C., the fatty ester will be hydrolyzed, producing fatty acid and glycerine, and the reaction will become acid. The digestion of fats is greatly aided by the presence of bile and also mechani¬ cally assisted by the formation of soaps. Some of the fatty acid which is set free combines with the alkali of the intestinal contents to form soap. Each fat droplet becomes coated with a fine film of soap, which prevents it from coalescing with adjacent fat droplets and in this way the formation of a still finer emulsion is brought about and the fat made more accessible to the fat-splitting enzyme.

Action of Pancreatic Juice on Milk. —

When pancreatic juice is mixed with milk at the body temperature the milk soon clots, but as the clotting stage is very brief, the curd being dis¬ solved by the proteolytic action of the Trypsin, the milk-curdling function has been ascribed by some authorities to the Trypsin and not to a special pancreatic rennin.

The Bile in Its Digestive Function. — Bile is to be looked upon not as a digestive juice in the prne sense as saliva, but as an excretion which incidentally assists the digestive action of the pancreatic juice. The reciprocal relations, both chemical and nervous, existing between the se¬ cretion of gastric, pancreatic juice and bile have .already been described.

As far as digestion is concerned, bile has five important functions. (1) It precipitates the acid-metaprotein and the proteoses resulting

from gastric digestion of proteins, and the con¬ version of a fluid or semi-fluid material into this solid condition allows more time for the action of pancreatic juice. (2) Bile salts act as a coenzyme or activator to each of the principal ferments of the pancreatic juice. In the presence of bile salts the power of the pancreatic amylase is doubled, the proteolytic power of Trypsin is doubled and the action of the pancreatic lipase is augmented 20 times. (3) Bile promotes the absorption of the products of digestion. When bile is prevented from entering the intestine 60 per cent of the fat of a meal passes into the faeces undigested, while normally the fat should almost have entirely disappeared from the faeces. (4) Bile salts stimulate the peristaltic movements on the intestines. (5) The re¬ absorbed bile salts stimulate the liver to further secretion.

Function of the Intestinal Juice. — Intes¬ tinal juice converts Trypsinogen into Trypsin by Enterokinase. It also contains two enzymes which convert the disaccarhides, cane-sugar and lactose into monosaccarhides. These fer¬ ments are called invertase and lactase. The terminal stages of hydrolysis of proteins are affected by a ferment called Erepsin. Erepsin acts on proteoses and peptones, splitting them up into amino-acids. The secretin spoken of in the preceding as causing the .secretion of pan¬ creatic juice is not poured out into the lumen of the intestines but reaches the pancreas by way of the blood channels. It is not a ferment because it is not destroyed by boiling. The normal stimulus for the secretion of intestinal juice is undoubtedly this very secretin and pos¬ sibly other hormones. It is not satisfactorily demonstrated that the intestinal secretion is influenced by a nervous factor. Hemmeter has • conceived of the digestive secretions as under control of two chemic factors — (1) stimula¬ tors, and (2) arresters of secretion. The first are the hormones already described. The sec¬ ond he designates as koliones from kuXcuv, to check or inhibit. Some of the end products of digestion act as koliones.

John C. Hemmeter, M.D., Professor in Medical Department of the Univer¬ sity of Maryland.

DIGHTON ROCK, a boulder of «greenstone^^ (in fact, bluish-gray), in Berkley, Bristol County, Mass., opposite Dighton, the landing-place to reach it; on the east shore of Taunton River, about 10 feet from low-water mark, and covered two or three feet deep at each flood tide. It is 11^2 feet long and about five feet high, with a flat face toward the river, once covered with inscribed characters varying from scratches to one-third of an inch deep, not chiseled, but ^^pecked^^ in. For many years the streara of visitors, unchecked by any authority, so often scrubbed off the tidal deposits of dirt with brooms and water to see the characters more plainly, that most of the latter are effaced and the whole past effective study. From old draw¬ ings, however, and comparison with similar petroglyphs elsewhere, there is no doubt it is Indian ; Schoolcraft says, in the symbolic char¬ acter of the Kekeewin. (Consult Garrick Mal-lery in annual report of the Bureau of Ethnol¬ ogy, 188^89, pp. 85-86, 762-764; from Dr. Hoff¬ man's examination of 1886). Enthusiasts at various times have made wonderful intcrprcla-tions of it. Rafn of Copenhagen found the name of Thorfinn on the drawing sent him (con¬ sult his correspondence with the Rhode Island Historical Society 1830-34, in ^ Antiquitates Americanse, Copenhagen, 1837), and thought it a record of the Vinland settlement ; an Oriental¬ ist deciphered ®melek^^ (king), and considered it Phcenician, and another believed it Scythian.- Many drawings have been made of it since the first by Samuel Danforth in 1680, and a second by Cotton Mather in 1712; for which, and a pic¬ ture of the rock in situ, consult Rafn as above, and for the drawings, the report above cited.

DI GIACOMO, de ja'ko-mo, Salvatore, Italian dramatist and poet: b. Naples 1862. He made exhaustive studies of Naples, its environs, history and antiquities, and his literary work bears an mistakable evidence of his knowledge in this field. He wrote his plays and poems in the popular dialect of Naples. They at¬ tained great popularity throughout Italy and translations exist in French and German. The plays include Voto^ ; ^A San Francisco^;

mese mariano^ ; ^Assunta Spina^ ; ^Quand I'amour meurt.^ In 1910 a collected edition of his' works appeared at Lanciano.

DIGIT, in arithmetic, usually signifies any one of the 10 numerals, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, though zero was originally not regarded as a digit. The word comes from digitus, a finger, thus indicating the humble means originally employed in computations. In mediaeval times 10, 20 … 90 were called articles, and their combinations with digits were called composites. Digit is also a measure of a finger's breadth equal to three-fourths of an inch.

Digit, in astronomy, is the measure by which we estimate the quantity of an eclipse. The diameter of the sun or moon's disc is conceived to be divided into 12 equal parts, called digits ; and according to the number of those parts or digits which are obscured, so many digits are said to be eclipsed. When the luminary is wholly covered, the digits eclipsed are precisely 12 ; and when it is more than covered, as is frequently the case in lunar eclipses, then more than 12 digits are said to be eclipsed.

DIGITALIN, dij-i -ta'lin, the commercial name for a compound substance extracted from the seeds of the common foxglove (Digitalis purpurea) , and containing digitoxin and the three glucosides, digitonin, digitalin and digitalei'n ; and probably others. Some of these are deadly poisons, but of great medicinal value, while others are almost inactive or harmless. The earliest extract was Homolle's ˆMigitaline,ˆˆ prepared from the leaves by the action of al¬ cohol, acetic acid, lead oxide and ether. It is a white, bitter, partiall}'- crystalline body with¬ out smell, soluble in alcohol, but not in water or ether, and has been used in medicine, under the name of digitalin or digitalis. It contains digitoxin and a glucoside, digitophyllin ; the lat¬ ter being, apparently, identical with the ®crystalline digitalinˆˆ of Nativelle. But no digitalin proper, or digitonin is found in the leaves of the foxglove. Another digitalin was obtained by Walz by treating that of Homolle with ether and water; it is a sort of 'Tamphor,ˆˆ yellow, amorphous, soluble in water, and very power¬ ful in its action, and has received the name 'bligitalein.® Another chemist, Nativelle, ob- lained from the leaves two crystalline bodies.

known as digitalin and digitin, and an amor¬ phous one called digitale'in. It is to this last-named substance that the powerful physiological action of the drug is to be ascribed. Digitalin, prepared by various processes, and probably not chemically pure, is employed in medicine, being useful in stimulating the action of a . weak heart, and effective also in removing drop¬ sical fluid by its action on the kidneys ; but it is apt to derange the stomach and bowels, cause loss of

appetite, *etc.*

DIGITALIS, dij-i-ta'Hs, a name given to the leaves of the plant Digitalis purpurea (see Foxglove), of the second year's growth. This is a biennial herb which is largely cultivated for ornament. It is about two to five feet high, with large succulent leaves and tubular urn¬ shaped purple flowers growing in a raceme. It is a native of southern and central Europe, and is extensively cultivated throughout the world, although the cultivated leaves are not as service¬ able as those of the wild plant. The leaves, which lose on drying about 75 per cent in weight, are mostly obtained from the wild plants growing in the mountainous regions when two-thirds of the flowers are expanded. The leaves should not be kept more than one year, as the quality deteriorates very rapidly. The active principles in the digitalis leaves consist of four or five glycocides : digitoxin, digitophyllin, dig¬ italin, digitalein and digitonin. The seeds also contain large amounts^ of active glycocides. The action of digitalis on the body is complex. It is primarily a local irritant causing secondary paralysis of the sensory nerve-endings. It is bitter to the taste, followed by burning and swelling of the mucous membrane. It is an irri¬ tant to the intestines, where it may cause nausea and vomiting. After absorption the chief action of the drug is on the central nervous system, the heart and the blood vessels. The action on the nervous system is of secondary value to the heart activities, although there is distinct stimu¬ lation throughout. The action of the drug on the heart-muscle is the most important property possessed by digitalis, both pharmacologically and therapeutically. Here, by reason of the complicated physiology of the heart action, the differing effects of digitalis on this organ are somewhat difficult to comprehend. Digitalis stimulates primarily the muscular fibres of the heart. It stimulates the cardiac nervous gang¬ lia ; and it stimulates, and then paralyzes, the cardiac inhibitory nerve, the pneumogastric. Thus the normal heart, under the action of small doses of digitalis, is at first made to beat some¬ what more strongly and rapidly; but as soon as its action upon the pneumogastric becomes mani¬ fest, in larger and increasing doses, the heart action becomes more powerful and is somewhat slowed; and in full medicinal doses, frequently used in medicine when the effects of digitalis are desired, the action of the heart is much stronger and considerably slower. The blood-pressure is high, and the arteries are contracted. If, how¬ ever, the use of digitalis is pushed beyond this point, its action as a paralyzant of the pneumo¬ gastric begins to be evident. By reason of this loss of the inhibitory action of the pneumogas¬ tric, the heart action at first is stronger, and the beat becomes more rapid. If still further toxic doses are given, the heart

runs away, as it were. It beats very rapidly, irregularly, and with in¬

creasingly weakened force, until it finally stops exhausted. Digitalis also increases the secre¬ tion of urine ; it raises the pressure of the blood vessels, and increases the amount of blood in all the organs of the body, including the heart itself. It is thus one of the great cardiac tonics, when used within physiological limits, and is indicated in most cases of heart disease where there is malnutrition caused by the dilatation of the chamber or a leakage of the valves.

DIGNE, de'ny', France, capital of the de¬ partment of Basses-Alpes, 60 miles northwest of Marseilles, at the confluence of the Bleonne and the Durance. It is encircled by walls, and has narrow, crooked streets. It contains a pub¬ lic library, a modern lyceo and a cathedral. It is an important fruit-growing centre and has a trade in dried fruits, confits, marble, honey, wax, woolens, linen, skins and leather, *etc.* There are hot saline springs nearby. Dinia was its name in Roman days and it is mentioned by Pliny. In 1629 its population was nearly wiped out by the plague. Consult Guichard, ˆSouvenirs historiques sur la Ville de Digne et ses Environsˆ (Digne 1847). Pop. 7,317.

DIJKSTRA, dik'stra, Waling, Frisian poet : b. Vrouwen Parish, Friesland, 1821. His nu¬ merous poetical works contributed greatly to the spread and cultivation of the Frisian lan¬ guage and literature. His best-known works are ˆDoaitse mei de noardsce balkeˆ (3d ed., 1875) ; ˆDe silveren rinkelbelˆ (3d ed., 1887) ; Hn doaze fol aide snypsnaren,ˆ in collaboration with Van der Meulen (2d ed., 1882) ; 'ˆFriske winterjounenochtˆ (5 vols., 1861-76) ; and ˆUit Frieslands volksleven van vroeger en laterˆ (Leeuwarden 1892), by many deemed his greatest work.

DIJON, de-zhon' (ancient Dibio), France, chief town in the department of Cotes d'Or, and formerly capital of the old duchy of Burgundy. It is a well and regularly built town, situated at the confluence of the rivers Ouche and Suzon, 211 miles southeast of Paris by rail. It is en¬ circled by eight forts, those formerly nearest the city having made way for handsome boule¬ vards. The church of Saint Benigne (who was martyred here in the 2d century) is the most important ecclesiastical structure; its choir is of the 13th and nave of the 14th centuries. Down to the Revolution there existed a curious circular church in imitation of that of the Holy Sepulchre, with a spire 300 feet high. The church of Notre Dame is of pure Burgundian Gothic and possesses a clock of date 1382. The church of Saint Jean is a 12th century structure now

degraded into a hay-store. The palace of the dukes of Burgundy, begun 1366, now does duty as town-hall, but its front has been en¬ tirely modernized. The carvings and tracery within are exquisite. The museum is specially valuable for its collection of relics and monu¬ ments of mediaeval times. The theatre has a fine Corinthian portico. The ancient burial place of the dukes of Burgundy, founded in 1383, now serves as a lunatic asylum. Dijon is the seat of a university with three faculties and a valuable librar}ˆ It is the centre of the wine trade of Burgundy, is famous for its mustard and has manufactures of machinery, automo¬ biles, boots and shoes, flour, beer, biscuits and soap. Dijon was the birthplace of Bossuet. It was in German occupation in 1870. Pop. 76,847.

DIKA, de'ka, a vegetable fat obtained from the seed of a West African tree, Irvingia bar-teri, of the family Simarubacecu, used in mak¬ ing fine soaps. It resembles cacao-butter and makes very hard soaps. The tree has alternate, entire leaves and drupaceous fruits.

DIKAMALI, dik-a-mari, a resin exuding from Indian trees of the genus Gardenia, espe¬ cially G. Iticida and G. gummifera, a solution of which is used to dress wounds and open sores. These trees belong to the family Rnbia-cece.

DIKE. See Dyke.

DIKE, in geology, a term used to describe a mass of igneous rock, filling a fracture in some other rock. It may be vertical, inclined or even horizontal. The filling rock was in¬ jected in a fluid condition. Dikes vary from sills in that the latter are intruded along bed¬ ding planes parallel to the stratification of sedi¬ mentary rocks. A sill may vary frorn horizon¬ tal to vertical, depending on the position of the beds between which it is intruded. A very small dike, a fraction of an inch through and a few inches long, projecting from some larger ig¬ neous body, is known as an apophysis. Dikes and sills may consist of either basicˆ or acidic rocks, and are usually much greater in tv.ˆo di¬ mensions than in the third, being from a few inches to several feet in

thickness, and often hundreds of feet, or even many miles in length and breadth. It is not uncommon for valuable minerals to be associated with dikes.

DIKE, de'ka, in Grecian mythology, the avenger of wrong and the rewarder of virtue. She is the daughter of Zeus and Themis and is considered one of the Horae.

DIKOA, de-ko'a, Africa, town of the old kingdom of Bornu, in central Africa, Jncluded in the former German colony of Kamerun, about 25 miles south of Lake Chad. It is forti¬ fied and was at one time the residence of the ruler of the native kingdom. Pop. 15,000 to

25,000.

DILATATION. See Heart-disease.

DILEMMA (from Gr. dis, twice, and lemma, an assumption), in logic, an argument in which the same conclusion may be drawn from two contrary propositions. A personˆ is said to be in a dilemma, or on ˆˆthe horns of a dilemma,® when each of several courses of ac¬ tion would lead to an unsatisfactory result. We append one of the most famous of the classical dilemmas. A young rhetorician said to an old Sophist: ˆTnstruct me in pleading and I shall pay you when I gain a cause.® The master sued for the reward, and the scholar eluded the claim by a dilemma. «If I gain my cause I shall not pay you, because the award of the judge shall be against you. If I lose it I may withhold it, as I shall not have gained a caiise.ˆ The master replied; ®If you gain you must pay me, because you promised to pay me when you gained a cause; if you lose you must pay me, because the judge will award it.® When the case came before the judges they were unable to decide it.

DILETTANTE, di-let-tan'ta, an Italian ex¬ pression ; in its original sense signifying a lover of the arts and sciences, who devotes his leisure to them as a means of amusement and gratifica¬

tion. The term was originally applied to a lover of Italian vocal music, and was at one time the name of a party which upheld the su¬ periority of that class of music. In contem¬ porary usage the word has come to mean more or less of an artistic trifler. In 1734 a number of gentlemen founded a Dilettanti Society in London, with the object of combining social in¬ tercourse with the cultivation of artistic knowl¬

edge. On the rapid accumulation of the funds, the members resolved, in 1754, to send out an expedition to collect details and drawings of the most remarkable artistic monuments of an¬ tiquity. Messrs. Chandler, Revett, Stewart and Pars accordingly were sent to Asia Minor and returned with the materials for the splendid work on Ionian Antiquities, published at the expense of the society, the first volume of which was issued in 1769; a secondˆvolume was published in 1797, and a third in 1840. Among other works published by the society are ˆSpecimens of Ancient Sculpture, Egyptian, Etruscan, Greek, and Roman ˆ (2 vols., imp. folio; London 1809, 1835); the ˆUnedited An¬ tiquities of Atticaˆ (imp. folio; London 1817) ; the ˆTemples of -Egina and Bassaeˆ by C. R. Cockerell (folio; London 1860).

DILIGENCE, the name originally given in French-speaking countries to a public convey¬ ance of the nature of a stage-coach. The name was also adopted by other countries for their public carriages. The French diligence was a national vehicle going over regular routes pe¬ riodically. It was a huge, heavy, cumbersome affair, upon four broad wheels which never covered a greater distance than six miles an hour. It had three compartments designed for the same number of classed passengers. Two officials accompanied the diligence on its trip ; a postilion, who managed the horses, and a con-ductenr, who looked after the passengers and their traps.

In law, the care and attention which a per¬ son is required to show in a given situation in his relations with others. There are three de¬ grees recognized by jurists; ordinary, less than ordinary and more than ordinary. It is a term of frequent occurrence in the law of negligence and bailments.

DILKE, Charles Wentworth, English journalist, antiquary and critic: b. 8 Dec. 1789; d. Hampshire, 10 Aug. 1864. He entered the civil service as a youth, became a clerk in the navy pay office and retired on a pension in 1836. All his leisure meanwhile was devoted to litera¬ ture, and already in 1814-16 he produced a continuation of Dodsley's <01d Plays.ˆ He was an intimate friend of Keats and knew Shelley, Leigh Hunt and Tom Hood. Keats went to stay for a time with Dilke's father at Chichester in January 1819, carrying a letter of introduc¬ tion from Mrs. Dilke. ˆ Up to 1829 Dilke con¬ tributed largely to various reviews and maga¬ zines, when he joined the Athenceum, of which he became editor in 1830. He reduced its price from a shilling to 4d (24 cents to 8 cents), en¬ listed the services of Lamb, Barry Cornwall, Sainte-Beuve and other prominent writers, thereby raising the expenses to the extent that there was no salary for himself — the editor. After 10 years' laborious work the Athenmim was an

ekablished success and in 1846 Dilke became business manager of the Daily News, of

which Charles Dickens was the first editor. Lack of unanimity among the proprietors led to Dilke's. withdrawal after three years, when he devoted himself entirely to contributing to the AthencBum, in the columns of which his best work now began to appear. Among his more important contributions is his series of articles on the mystery of the Junius letters, in which he demolished the claims to their author¬ ship advanced on behalf of Colonel Barre, Boyd, Sackville, Francis and several others. The es¬ says are masterpieces of incisive criticism and quite as interesting as the famous ^^Letters® themselves. They were collected and published, together with his articles on Pope, Burke, Swift, Wilkes, Grenville, etc., in 1875 under the title of ˆPapers of a Critic,ˆ by Dilke's grandson. Sir Charles Dilke, in two' volumes, prefaced with a memoir of their author. Consult also ˆDictionary of National Biographyˆ (Vol. 15, London 1888).

DILKE, Sir Charles Wentworth, 1st baronet, English politician; b. 1810; d. Saint Petersburg, Russia, 10 May 1869; son of Charles Wentworth Dilke (q.v.). He was con¬ nected with the Royal Horticultural Society and the Royal Society of Arts. He is best known as one of the promoters of the great International Exhibition held in London in 1851, for which purpose the famous Crystal Palace (now at Sydenham, London, S.E.) was originally erected in Hyde Park. He came to New York in 1853 as commissioner to the In¬ dustrial Exhibition and went in a similar ca¬ pacity to the Paris Exposition of 1855. Dilke was knighted in 1862 and appointed one of the five commissioners for the exhibition of that year. His parliamentary career was unimport¬ ant ; he represented Wallingford as a Liberal 1865-68. He was in Russia acting as commis¬ sioner at an exhibition when he died. He was succeeded in the baronetcy by his son Sir Charles W. Dilke, M.P., the well-known states¬ man (q.v.).

DILKE, Sir Charles Wentworth, M.P.,

2d baronet, English statesman and author : b. London, 4 Sept. 1843; d. there, 26 Jan. 1911. Eldest son of the first baronet of that name and grandson of the critic, C. W. Dilke (q.v.). Educated at Trinity Hall, Cambridge, he was graduated with honors and called to the bar in 1866; member Parliament for Chelsea 1868-86; UnderSecretary of State for Foreign Affairs, 1880-82; president of Local Goverment Board 1882-85 ; chairman of the Royal Commission for Negotiations with France, 1880-82; chairman of the Rojˆal Commission for Housing of the Working-class, 1884—85 ; chairman of the Select Committee on Income Tax, 1906. He trav¬ eled in Canada and the United States in 1866; thence to Panama, New Zealand, Australia and Tasmania, studying The colonies at first hand, returning home across Ceylon, India and Egypt. On his return he published ˆGreater Britain: a Record of Travel in English-speak¬ ing Countries during 1866-67ˆ (2 vols., 1868). The work instantly took its place as a classic, passing through numerous editions in Great Britain and America. Inheriting the Athenaeum from his father and grandfather, he also be¬ came proprietor of Notes and Queries, devoting himself to editorial work for a time. His re-election to Parliament was opposed in 1874 on

the ground that he openly avowed his pref¬ erence for a republican form of govern¬ ment, but he retained his seat. In 1875 he made another tour of the world, this time including China and Japan in his itinerary. His strong predilection for France gained him the friendship of many public men in that country.

Though nominally a Liberal in politics, Dilke leaned to the radical section of the party. How he first obtained office is told in Lord Morley's ˆLife of Gladstone.ˆ In the forma¬ tion of his second administration in 1880 Glad¬ stone had already distributed all the great posts among the ˆˆpatrician whigs,ˆˆ when he was warned not to overlook the radical leaders. He sent for Dilke, who promptly refused to serve unless either himself or Chamberlain (the late Joseph) were in the Cabinet and that the other would then accept a subordinate post.

In the end Chamberlain was chosen and placed at the Board of Trade, and Dilke be¬ came undersecretary to the foreign office, a post not involving a seat in the Cabinet. Be¬ tween 1880 and 1885 he held the various posi¬ tions mentioned above. After the collapse of the Gladstone ministry in June 1885, Dilke came out of office — never to return, for in February 1886 fell the tragedy that blasted his political career, the Crawford divorce case. His resigna¬ tion was inevitable; in his valedictor}'- address to his constituents he said … ®I can only

assure you … as I have already often as¬ sured you, and with equal solerrwiity sworn in court, that _ I am innocent of the charges brought against me… Dilke had been a

widower since 1874; in 1885 he married the widow_ of the Rev. Mark Pattison. She was in India at the time the scandal became public and directly showed her confidence in his in¬ nocence by announcing their engagement. In 1892 he returned to public life as Liberal member for the Forest of Dean division of Gloucester¬ shire, which seat he retained till his death. He had spent the intervening years in literary activity, a recluse from society, yet supremely happy in his domestic life and the small circle of friends who remained by his side. His speeches were invariably listened to with re¬ spect by both sides of the House ; he spoke with authority on numerous questions, colonial and foreign affairs, imperial defense, finance, social and labor problems. A wealthy man, he pos¬ sessed one of the most interesting private col¬ lections in London, including many personal relics of Keats. In addition to the work already mentioned, he wrote ˆNew Americaˆ (1868) ; ˆThe Fall of Prince Florestan of Monacoˆ (1874) ; ˆThe Present Position of European Politicsˆ (1887) ; ˆThe British Armyˆ (1888) ; ˆProblems of Greater Britainˆ (1890) ; Hmperial Defenceˆ ; ˆThe British. Empireˆ (1898) ; and a memoir of his wife prefixed to her ˆBook of the Spiritual Life.ˆ Consult the ˆLifeˆ of S. Gwynn and Miss G. Tucker.

DILL, Ludwig, German painter: b. Gerns-bach, Baden, 2 Feb. 1848. He studied archi¬ tecture and engineering, but soon abandoned these and took up painting under Raab, Seitz and Piloty at the Munich Academy. At first his work showed the influence of the Barbizon school, but afterward was greatly influenced by Baisch. To his early period belong large

marines and fishing scenes painted on the is¬ land of Chioggia, of which ˆ Sirocco,ˆ in the Mannheim Gallery, is a noteworthy example. He paid a visit to Holland and returned to Munich, thereafter spending part of each year at Dachau. He now confined himself to pure

landscape. His best works are ˆ Meadowsˆ (Pittsburgh Gallery) ; ˆSacred Groveˆ (Munich) ; Brook in the Moorˆ (Dresden) ;

C9rner of the Giudeccaˆ (1910) ; ˆA Canal at Chioggiaˆ (Miihlhausen) ; ˆNovember Even¬ ingˆ (1912). In 1897, with Holzel and Langhammer, he founded the so-called ˆDachau Group.® He was one of the judges at the Chicago and Paris expositions and later was appointed professor at the Karlsruhe Academy. Consult Rossler, ˆNeu-Dachauˆ (Bielefeld 1905).

DILL, Sir Samuel, British educator : b. 26 Jan. 1844. He was educated at Queen's Col¬ lege, Belfast, and at Lincoln College, Oxford, and in 1869 became lecturer at the latter. He was Fellow, dean and tutor of Corpus Christi College 1869-77, headmaster of the Manchester Grammar School 1877-88. After 1889 he was commissioner of intermediate education, Ireland; member of the Belfast University Commission and prochancellor of Queen's University. In 1913 he became chairman of the vice-regal com¬ mittee on primary education. He has published ˆ Roman Society in the last Century of the Western Empireˆ (1898 ; 3d ed., 1910) ; ˆRo¬ man Society from Nero to Marcus Aureliusˆ (2d ed., 1912), a standard work in its field.

DILL (Anethum graveolens), the common name for an aromatic plant of the carrot family {Umhellifer<cE). It is a native of Spain, but has been naturalized throughout the civilized world, where the climate is suitable for its growth. It is a particular favorite with the German people, who use it to flavor cucumber pickles, and therefore try to raise it wherever they may be living. In England it is used for the manufacture of gin, and to a small extent in medicine, as a carminative for children. An East Indian species is one of the ingredients in curry powder. It is a hardy biennial plant, growing upright. It has a single slender stem and leaves finely divided or pinnatified. The flowers, which form an umbel, appear in June or July. The seed is of an oval form, convex on one side, flat on the other, having three striae on the outside, and surrounded with a small membranous border. Its taste is slightly acrid, and its odor stronger but less pleasant than that of fennel, to which it is closely allied. In America, where found out of gardens, it is a fugitive from cultivation and is generally called fennel.

DILLENBURG, Prussia, capital of the circle of Dill Hesse-Nassau on the Dill, 20 miles southwest of Marburg. William of Or¬ ange, Liberator of the Netherlands, was born in the castle here in 1533. The site of the castle is now occupied by the Wilhelmsthurm, a tower 130 feet high. Iron mining and leather tan¬ ning are the principal industries. A

mining school is located here. Pop. 5,371.

DILLENIACEˆ, dil-le-ni-a’s?-e, a family of plants found chiefly in Australia, Asia and the warm parts of America. Sepals five, persis¬ tent; petals five, deciduous, in a single row; seeds universally arillate; stamens indefinite, hypogynous. The species are trees, shrubs or

undershrubs. The Indian species are remarkable for their beauty, the grandeur of their foliage and the magnificence of their flowers. They have astringent properties, and some of the species afford excellent timber. The family consists of 13 genera and about 300 species.

DILLENIUS, dil-la’ne-oos, or DILLEN, Johann Jakob, yd’han ya’kob, German botanist : b. Darmstadt 1687 ; d. Oxford, England, 2 April 1747. He was distinguished for his investiga¬ tions into the propagation of plants, particularly cryptogamous plants. In 1721 he went to England, where he became first Sherardian pro¬ fessor of botany at Oxford and published sev¬ eral works, particularly ˆHortus Elthamensisˆ (1732) in which the drawings prepared by him¬ self are distinguished by the greatest faithful¬ ness. His last work, on the mosses, ˆHistoria Muscorumˆ (1741) added much to his reputa¬ tion and was for long a standard book.

DILLER, Joseph Silas, American geolo¬ gist : b. Plainfield, Pa., 1850. He was educated at Harvard University and at Heidelberg, Ger¬ many. He was ‘geologist to the Assos expedi¬ tion in 1881-83, and in the latter year became a member of the staff of the United States Geo¬ logical Survey. His writings are very numer¬ ous, dealing principally with the Pacific coast region; they include ˆGeology of the Lassen Peak Districtˆ (1889) ; ˆThe Coos Bay Coal Fieldˆ (1899) ; ˆGeology and Petrography of Crater Lake National Park, Oregon,ˆ with the co¬ operation of H. B. Patton (1902).

DILLINGEN, Bavaria, town on the Dan¬ ube, 25 miles northwest of Augsburg. It con¬ tains many fine buildings, including the palace, royal gymnasium, a library of 75,000 volumes, a monastery, a Franciscan nunnery. The univer¬ sity founded here in 1544 became one of the strongholds of the Jesuits, was suppressed in 1804 and is now a royal lyceum. The town has manufactories of cutlery, cloth, paper and twine. Agriculture is also an important indus¬ try. The town was the seat of the counts of Dillingen during the Middle Ages. From 1286 to 1803 it belonged to and was the residence of the bishops of Augsburg. In the latter year it came into the possession of

Bavaria.

DILLINGHAM, William Paul, American statesman : b. Waterbury, Vt., 12 Dec. 1843. He studied law, was admitted to practice in 1867, and was State attorney, Washington County, Vt., 1872-76. He was a member of the Ver¬ mont legislature 1876 and 1884; State senator 1878 and 1880; commissioner of State taxes 1882-88 and governor of Vermont 1888-90. Since 1890 he has been president of the Water¬ bury National Bank. He was elected United States senator in October 1900 to fill a vacancy caused by the death of Justin S. Morrill, and was reelected for the terms 1903-09, 1909-15, 1915-21. In 1907 he was chairman of the United States Immigration Commission.

DILLMANN, Christian Friedrich August,

German Orientalist ; b. Illigen, Wurttemberg, 25 April 1823; d. 4 July 1894. He was educated in Tubingen and became lecturer there in 1852. In 1854 he accepted a call to Kiel, where he became professor of Oriental languages in 1860, but was transferred in 1864 to the chair of Old Testa¬ ment exegesis at Giessen, which in 1869 he re¬ signed to become Hengstenberg's successor at Berlin, In 1877 he became a member of the.

Royal Academy of Sciences. Dillmann was be¬ yond question the first authority in Europe on the Ethiopic languages. The best books for the student in this department of learning are his ˆEthiopian Grammarˆ (1857, revised by Bezold 1899) ; ˆEthiopian Dictionaryˆ (1865) ; and his ˆEthiopian Selectionsˆ (1866). Other works (1879-ˆ) deal with the history of the Ethiopic kingdom of Axum. He also wrote commen¬ taries on Job (1869 ; 4th ed., 1891) ; Exodus and Leviticus (1880 ; 3d ed., 1897); Genesis (1875; English ed., 1897) ; Numbers, Deuteronomy and Joshua (18ˆ), and Isaiah (1891). Other works are ˆUrsprung der alttestamentlichen Religionˆ (1865) ; ˆDie Propheten nach ihrer politischen Wirksamkeitˆ (1868), and ˆVorlesungen fiber Theologie des Alten Testamentsˆ (1895). Consult brief biography by Baudissin (Leipzig 1895).

DILLON, John, Irish politician, son of John Blake Dillon, who was a prominent mem¬ ber of the Young Ireland party and member of the British Parliament for County Tipperary in 1865-66: b. New York 1851. He early identified himself with the Parnellite movement and in 1880 was elected to Parliament for County Tip¬ perary. In the House of Commons Dillon soon became prominent for the violence of his lan¬ guage, while speeches delivered by him in Ire¬ land led to his imprisonment in 1881, 1882 and 1888. From 1883 to 1885 he was absent from political life on account of ill-health, but in the latter year he reappeared and was elected for East Mayo, which he has since continuously rep¬ resented. He was one of the most prominent promoters of the ®Plan of Campaign.® In 1896 he succeeded Justin M'Carthy as chairman of the main section of the Nationalist party, con¬ tinuing until 1898. In 1901 he accepted the leadership of Mr. John Redmond in the reunited Nationalist party and since that date has been one of the most active of his lieutenants.

DILLON, John Forrest, American lawyer : b. Montgomery County, N. Y., 25 Dec. 1831 ; d. Far Hills, N. J., 5 May 1914. Going to Iowa in early youth he was graduated at the medical de¬ partment of the Iowa University, but soon gave up medical practice and studied law, being ad¬ mitted to the bar in 1852. He was State prose¬ cuting attorney 1852-58; judge of the Supreme Court of Iowa 1863-69; and judge of the United States Circuit Court, Eighth Judicial District, 1869-79, when he resigned. From 1879-82 he was professor of real estate and equity juris¬ prudence in Columbia Law School and became prominently known as a railroad lawyer, being general counsel of the Missouri Pacific Railway Company and the Western Union Telegraph Company, and consulting counsel of the Man¬ hattan Elevated and Pacific Railway com¬ panies. Among his works are ˆUnited States Circuit Court Reportsˆ (1872) ; ˆMunicipal Cor¬ porationsˆ (1872) ; ˆRemoval of Causes from State to Federal Courtsˆ (1877) ; ˆMunicipal Bonds ˆ and ˆLaws and Jurisprudence of Eng¬ land and Americaˆ (1894) ; ˆJohn MarshalP (3 vols., 1903) ; ˆCommentaries on the Law of Muni-Corporationsˆ (revised and enlarged, 1911).

DILOLO (de-l5'lo) LAKE, Central Africa, a small body of water discovered by Dr. Liv¬ ingstone (1854). Its altitude is nearly 5,000 feet above the sea. It is supposed to be connected with both the Zambesi and Kongo rivers, as it lies on the watershed between these two river

systems. Its location is in lat. 11° 30' S., Jong. 22° 30' E. Hippopotami

and fish abound in its waters.

DILTHEY, del'ti, Wilhelm, German phi¬ losopher: b. Biebrich, 1834; d. 1911. He re¬ ceived his education at the universities of Heidelberg and Berlin and in 1866 became pro¬ fessor of philosophy at Basel, removing to Kiel two years later in a similar capacity, to Bres-lan in 1871 and to Berlin in 1882. He pub¬ lished ˆDas Erlebnis und die Dichtungˆ (1906). He is best known, however, by his attempt to set psychology as the basis for scientific re¬ search in history and sociology and ignoring metaphysics. This plan or system is outlined in his ˆEinleitung in die Geisteswissenschaftenˆ

(1883).

DILUENTS, remedies that increase the pro¬ portion of fluid in the blood. They are em¬ ployed in fevers to lessen thirst and increase secretion, and are used in certain acrid affections of the stomach and intestinal regions. Water is the only .real diluent, though it may be given in various forms — soups, barley-water, toast-water, milk, lemonade, soda water, beer, tea.

DILUVIUM, a term first used by the Eng¬ lish geologist Buckland in 1823, and applied by him to the deposits between the Tertiary sys¬ tem and those now in process of formation. He regarded them as the discharge from a universa*! flood. The diluvium thus includes the boulders, sands and clays which Lyell included under the name Pleistocene and Morlot under the name Quaternary. Though the term diluvium is no longer used, the adjective diluvial is still em¬ ployed, especially by foreign geologists, to desig¬ nate accumulations of gravel or angular stones formed during the Pleistocene period. See Glacial Period; Pleistocene; Quaternary.

DIME (Fr. dime, contraction of dixieme), a silver coin of the United States of the value of 10 cents, or one-tenth of a dollar. It was first coined in 1796 in pursuance of the act of 2 April 1792, though pattern pieces were struck in 1792. Its legal standards have been as fol¬ lows : By act of 2 April 1792 fineness 892.4 thousandths, weight 41.6 grains; by act of 18 Jan. 1837 fineness 900 thousandths, weight 41ˆ4 grains ; by act of 21 Feb. 1853 fineness 900 thou¬ sandths, weight 38.4 grains.

DIMENSIONS. See Units of Measure¬ ment.

DIMINUTIVE, in grammar (Lat., dimin-utivum), a word formed by

adding a suffix conveying the idea of littleness and other con¬ nected ideas, as tenderness, affection, contempt, *etc.* The opposite of diminutive is augmentative. In Latin, diminutives almost always end in Ins, la, or lum; as Tulliola, meiim cordidum, little Tullia, my dear or little heart.

The Italian is particularly rich in diminutives and augmentatives : ino, etto, ello, convey the idea of smallness, dearness, *etc.* ; one, of large¬ ness ; iiccio, sometimes of smallness, with re¬ proach, but often \vithout it ; accio signifies that the thing is disgusting, unpleasing, *etc.* — for ex¬ ample, casa is aˆ house ; casetta, casina, casella, a small house, nice little house; casone, a large house; casuccia, a small, insignificant house; casaccia, an ugly house. That expressive tongue can compound two or three of these endearing affixes; and travelers may frequently hear little Italian children form almost endless words, as

DIMITY

if overflowing with tenderness; for instance, fratellinucciettinetto. Adjectives also can re¬ ceive the diminutive termination ; as carino, carinuccio, from caro. In Spanish there are similar diminutives, augmentatives and other affixes. Thus from hombre, a man, are formed the augmentatives hombron, hombrazo, hom-bronazo, hombrachon; and from ˆlujer, a wo¬ man, mujerona, mujeraza, mujeronaza. Dimin¬ utives in ito and ico usually denote endearment or tenderness, as those in illo do sometimes; those in elo always denote contempt. In Portu¬ guese the diminutives and augmentatives cor¬ respond to those of the Spanish language. In French there are many diminutives formed from other words; as, tablette, of table, charette of char; but there is no general affix which can be added to every substantive. The German has the syllables chen (in Low German, ken, with which corresponds the English kin, as in manikin, and some other words), lein and el, for substantives; lich, etc., for adjectives; lich corresponds to the English ish or like; for in¬ stance, rundlich, roundish or roundlike (from rund, round). The German even adds the diminutive to pronouns, and nurses will some¬ times say diichen, from du, thou.

The English language affords examples of diminutives, but has no affix which can be used at pleasure to convey this idea. Those com¬ monly used are ock, kin, el, ling and et; as in bullock,, lambkin, kernel, gosling and tablet. Diminutives of proper names are also formed, in colloquial and familiar language, by adding y or ie to the names, as Charley, Johnny, *etc.*

DIMITY (Gr. di-double, mitos, thread; literally, made with a double thread), a stout cotton fabric, ornamented in the loom either by raised stripes or fancy figures; stripes are the most common, as the mounting of the loom is much simpler and the texture can be produced at less expense. The figure or stripe is raised on one side and depressed on the other, so that the two faces present reversed patterns. _ It is rarely dyed, but usually employed white, as for bed and bedroom furniture. There is also a much finer cotton stuff on the market to-day which is manufactured for summer dress ma¬ terial. The fabric was first made

in Spain, and as early as 1643 was manufactured in the Massachusetts Bay colony.

DIMMESDALE, dimz'dal, Arthur, the err¬ ing clergyman in Nathaniel Hawthorne's tale, <The Scarlet Letter.ˆ See Scarlet Letter, The.

DIMORPHISM (from the Gr. dimorphos, of double form), in crystallography, the crystal¬ lization of a body in forms belonging to two different systems, or in incompatible forms of the same system. In biology, the occurrence ot individuals of the same species in such a form, that, were not their relation known, they might be considered as separate and distinct in species and even in genera. Thus in sexual dimorph¬ ism, the male and female of the same species present distinct characters, the male may be winged, the female wingless. See Evolution; Pollination.

DIMORPHODON, the oldest known genus of the Ornithosauria, allied to the pterodactyl, and found as a fossil in the Liassic rocks near Lyme Regis, in the south of England. The large head has powerful jaws, with large an¬ terior teeth which are pointed, and small pos¬

terior teeth which are lancet-shaped. The legs are long and slender with the fourth fingers of the four limbs greatly elongated to support the membranous wings. This is the earliest of the reptiles that were capable of flight. See Pterosauria ; Pterodactyl.

DIMSDALE, Thomas, English physician: b. Theyden-Gernon, Essex, 6 May 1712 ; d. Hert¬ ford, 30 Dec. 1800. He was educated at Saint Thomas's Hospital, and practised medicine at Hertford. He published ˆThe Present Method of Inoculation for the Smallpox> (1767). He was famous as an inoculator, making journeys in 1768 and 1784 to Russia to inoculate the Em¬ press Catharine and other magnates. For this service he received $50,000 and an annuity, to¬ getherˆ with other valuable gifts. In 17&4-' he also visited the courts of Berlin and Vienna. His works include ˆThoughts on General and Partial Inoculationˆ (1776) ; ˆObservations on the Plan of a Dispensary and General Inocula¬ tionˆ (1780) ; ˆTracts on Inoculationˆ (1768,

1781).

DINAH, in the Biblical account (Gen. xxxiv) a daughter of Jacob and Leah, who was violated by Shechem, whose people adopted

circumcision and formed an alliance with the Israelites. This alliance, however, availed them little for they were set upon and slain by Simeon and Levi, sons of Jacob and brothers of Dinah. Some biblical scholars claim that Dinah is the name of a clan, which by inter¬ marriage with the Shechemites aroused the enmity of the tribes of Simeon and Levi and were murdered by them. Other scholars main¬ tain, however, that such a reading of the text is far from justified. Consult Meyer, Ed., ˆDie Israeliten und ihre Nachbarstammeˆ (1906) and Wellhausen, Hsraelitische und jiidische Geschichteˆ (7th ed., 1914).

DINAH MORRIS, the heroine of George Eliot's novel, ˆAdam Bedeˆ (Q-v.). She is a factory girl and at the same time a lay preacher whose purity, spirituality, strength and tender¬ ness have an uplifting influence on all who come in contact with her. The beauty of her charac¬ ter is especially developed in her intercourse with the guilty and condemned Hetty Sorrel. Elizabeth Evans, an aunt of George Eliot, ap¬ pears to have been the original from whom the character was drawn.

DINAN, de-nan' (ancient Dinnanum, fort¬ ress on the water), a town in the department of C6tes-du-Nord, France, on the Ranee, 16 miles south of Saint Malo and 30 miles northwest of Rennes. The town is built on the summit of a granite cliff, 250 feet above the river, which is crossed by a fine stone viaduct 130 feet high and about 800 feet long. The remains of the ancient town walls are still to be seen and there are here also the interesting ruins of an an¬ cient castle. The older portion of the town has narrow, crooked streets, but many of the buildings are picturesque. The townˆ has a museum and the cathedral is of considerable interest. There are manufactories of agricul¬ tural implements, linen, sailcloth, cotton and woolen goods, cider, beet-sugar and barges. The town's trade is considerable. Dinan dates from the Celtic period (witness its name de¬ rived from the (Teltic dun, fortress, abain, of the water). It was besieged by the English

under Lancaster in 1359, was then captured and later retaken by

DuGuesclin. Consult Bazouge,

ˆ Guide du voyageur dans la ville de Dinan et ses environsˆ (Dinan 1875). Pop. 11,410.

DINANT, de-nah' or de-nant', Belgium, a town in the province of Namur, picturesquely situated on the Meuse, 17 miles south of the city of Namur. Notable buildings are the church of Notre Dame, an ancient and richly decorated structure, and the city hall, once the palace of the princes of Liege. The town con¬ tains sawing-mills for working the black marble found in the vicinity; paper mills, carpet fac¬ tories, breweries, tanneries, factories for the production of metal-wear and glassworks. In the Middle Ages, Dinant was famous for its copperware, or ˆˆdinanderie.® The town was fortified as early as the 12th century. In 1466 Philip the Good, Duke of Burgundy, besieged it with 50, OCX) men; and having taken it by assault, razed it to the ground and threw 800 of its inhabitants, tied in pairs back to back, into the Meuse. In 1554 and again in 1675 it was captured by the French. On account of its quaintness and the beauty of its natural sur¬ roundings Dinant had long been a popular sum¬ mer resort. The town suffered severely in the European War.

On 15 Aug. 1914 an engagement was fought in the vicinity between French and German troops. More fighting occurred on 22 and 23 August. On the 21st the Germans began setting fire to the houses; batches of inhabitants were driven through the flaming streets at the point of the bayonet, with their hands held above their heads; hundreds were shot or bayonetted. Ac¬ cording to the Bryce Report (q.v.), ˆˆunarmed civilians were killed in masses … about

90 bodies were seen lying on the top of one another in a grass square opposite the con¬ vent.® It was also stated that 60 corpses of civilians were recovered from a hole in the brewery yard and that 48 bodies of women and children were found in a garden. The town was systematically set on fire by hand grenades… . The shooting of inhabitants, women and children as well as men, went on after the Ger¬ mans had passed Dinant on their way into France. The houses and villages were pillaged and property wantonly destroyed.® A little tourist steamer on the Meuse was used to col¬ lect pianos, pictures, clocks and pieces of fur¬ niture from the villas lying on the river banks (Jean Massart, Royal Academy of Belgium).

At Fonds de Leffe, a suburb of Dinant, the population left behind comprised 251 men and boys. They were taken away on 23 Aug. 1914. Of these, eight escaped and 243 were put to death next day. The

population of Dinant before the war was about 8, (XX). Con¬ sult Hachez, ˆHistoire de Dinantˆ (1894-96) ; Massart, J., ˆBelgians under the German Eagle> (London 1916) ; Pirenne, ˆHistoire de la con¬ stitution de la ville Dinant au moyen %eˆ (Ghent 1889) ; Remade, ˆInventaire des ar¬ chives de la ville de Dinantˆ (Dinant 1880-83).

DINAPAC, de-na-pak', or GUINAPAC, ROCKS, Philippines, two tower-like rocks, ly¬ ing east of Camiguin Island, north of Luzon. On 2 Nov. 1899, the United States ship Charleston struck an uncharted coral reef three miles north of Dinapac Rocks and was totally wrecked.

DINAPUR, de'na-poor, India, city in the district of Patna, province of Behar and Arissa, British India, on the Ganges, about 12 miles northwest of Patna. It is one of the great stations of the British army in India. In 1857 it was the scene of the mutiny of three Sepoy regiments. It has cabinet factories, iron found¬ ries and oil presses. Pop. 31,025.

DINAR, de-nar' or dinner (Lat. denarius), formerly an Arab gold piece weighing about 65.4 grains troy. Also a Persian money of ac¬ count worth about 1/125 cent. It is now the name of the chief Serbian coin, value one franc.

DINARCHUS, Greek orator : b. Corinth, 361 B.c. ; d. Athens, 291 b.c. He studied under Theophrastus and was most successful during the reign of Demetrius Phalereus (317-307). After the fall of Demetrius he fled to Chalkis and returned to Athens in 292 b.c. Of his speeches, of which there were probably about 60, only three are preserved; these are entitled ˆAgainst Demosthenesˆ ; ˆAgainst Aristogeitonˆ and ˆAgainst Philocles.ˆ They were spoken during the prosecution of these three on a charge of accepting bribes from Harpalus. Con¬ sult Blass, ˆAttische Beredsamkeitˆ (Leipzig 1893) ; and the editions of the speeches by Matzner, text and commentary (Berlin 1842) and by Thalheim (ib. 1887).

DINARD, dˆ'nar, or DINARD-SAINT ENOGAT, France, the capital of a canton, in the department of Ille-et-Vilaine, opposite Saint Malo, on the estuary of the Ranee. It is a modern town, picturesquely situated on a rocky promontory and is the most fashionable sea-bathing resort in Brittany. It has beautiful villas and summer cottages and is greatly fre¬ quented by tourists. Pop. 7,003.

DINCKLAGE-CAMPE, dink'lag-e-kam'pe, Amalie (Emmy) von, German

novelist : b. Campe, Osnabriick, 13 March 1825 ; d. Berlin, 28 June 1891. Her first novel, ˆThe Loving Old Couple,ˆ was published in 1857. Though she traveled extensively and observantly in Europe and America, her themes for stories were nearly all from her own countryside and she is called ®the poetess of the Ems valley.® Among her works are <The School of the Heartˆ ; ˆTales of Homeˆ ; ˆPictures of Emslandˆ ; (post¬ humously) ˆPoemsˆ ; ˆYoung Alaric's Brideˆ (1890) ; a story, ˆThe Woman Nihilistˆ (1893).

piNDINGS, The, a British possession be¬ longing to the Straits Settlements, consisting of the island of Pangkor and a strip of land on the coast of Perak on the west side of the Malay Peninsula; area about 200 square miles. See Straits Settlements.

DINDORF, Karl Wilhelm, German classical scholar: b. Leipzig, 2 Jan. 1802; d. there, 1 Aug. 1883. He became in 1828 professor of literary history at Leipzig, but resigned in 1833 in order to devote himself entirely to literary work. He contributed to the edition of Aristophanes by Invernizzi and Beck (1820-34), and between 1835 and 1839 published at Oxford an edition of the same poet. Other works by him are editions of ˆschylus (1841-51); Euripides (1834-63) ; Sophocles (1832-36) ; and Demos¬ thenes with notes and the Greek scholia (Ox¬ ford 1846-51) ; ˆLexicon Sophocleumˆ (1871) ; ˆLexicon ˆschyleumˆ (1873-76); and a new edition of Stephens' ˆThesaurus Linguae Graecaeˆ (1831-65). He edited several Greek historians

for Niebuhr's collection of Byzantine writers. Dindorf ranks among the leading Hellenic scholars of the 19th century. Consult Sandy,

History of Classical Scholarship' (Vol. Ill, Cambridge 1908).

DINDYMENE. See Cybele.

DINEIR, de-na-eC, or GEYIKLAR, Asia Minor (the ancient Celˆnˆ), a town in the province of Aidin, close to the headwaters of the Maeander River. It lies at an altitude of 2,845 feet and commands the

road from the Lycus Valley to the interior. Because of this Celaenae was at an early period an important centre of commerce and civilization. After long centuries of decline modern railway con¬ struction is again operating in its favor. It is now the easternmost terminal of the Aidin Rail¬ way from Smyrna and a railway is projected from Adalia north to Dineir. These roads would greatly enhance its commerce, as it is in the heart of a rich agricultural district. It has manufactories of flour. Many of the houses are partly constructed of blocks of marble from the ruins of the ancient town. Pop. 2,000, the majority of which are Turks.

• DINGELSTEDT, Franz von, Baron, Ger¬ man poet and dramatist ; b. Halsdorf, Upper Hesse, 30 June 1814; d. Vienna, 15 May 1ˆ1. His ˆ Songs of a Cosmopolitan Nightwatchman' - (1841) shocked all officialdom, but had a great popular success; and his 'ˆPoems' (1845) showed true poetic feeling and great descriptive power, the latter also visible in his travel sketches and stories ; one of the most successful of the latter is ˆThe Amazon,' a society novel. His tragedy ˆThe House of the Barneveldts' (1851) was a splendid success. He adapted plays from Moliere, Shakespeare and others to the German stage and wrote a volume of ˆStudies and Copies After Shakespeare' (1858). He was a successful theatrical director at Munich, Weimar and Vienna; was ennobled in 1867 and made baron in 1876. In 1877 a complete edition of his works was issued in 12. volumes. Consult his autobiography, en¬ titled ˆMiinchner Bilderbogen' (1879).

DINGLE, Philippines, a city of Panay, in the province of Iloilo, on Jalaur River, 18 miles north of the city of Iloilo. It was founded in 1825. There are gold deposits in the vicinity. Pop. 12,129.

DINGLEY, Nelson, American legislator and journalist: b. Durham, Me., 15 Feb. 1832; d. Washington, D. C., 13 Jan. 1899. He was graduated from Dartmouth College in 1855; admitted to the bar in 1856; purchased the Lewiston Journal in 1856; edited a daily edi¬ tion in 1865 and was its editor and proprietor till his death. He was elected to the State legislature in 1861 ; served in that body till 1865 and in 1868 and 1873, and was speaker of the house in 1864-65. He was elected governor of Maine in 1873 and reelected in 1874 and was a member of Congress from 1881 till his death. From the beginning of his congres¬ sional career he was conspicuous as an advocate of the principle of protection and was author of the Dingley Tariff Bill of 1897. In 1908 he was appointed a member of the Joint High Commission on controversies between Canada and the United States.

DINGO, the Australian wild dog (Canis dingo), the only species of dog known to exist in both the wild and the domesticated states and also the only carnivorous placental mammal in Australia. It is sometimes considered as being of Asiatic origin, the theory being that it was brought to Australia by the first men who came there, and that it has since become wild. The finding of its remains in the Quaternary strata of Australia and in Pleistocene cavern deposits apparently disposes of this theory. It is not found in Tasmania or New Zealand, in which the fauna is generally like that of Australia. The dingo has decreased in numbers, retreating before the advance of civilization and suffering from the war made upon it by the settlers, whose flocks it preys upon. The animal is about two and a half feet long and nearly two feet high ; has large erect ears and a bushy tail. It is tawny in color ; some specimens, however, being pale and others almost black. In the wild state it is especially crafty and courageous and hunts in packs sometimes con¬ taining 100 dogs. The native Australians seek the young dingoes and having taken them from the lairs where they are found, bring them up as domestic animals. When well treated they are affectionate and trustworthy and are used to help their masters in hunting the animals on which the natives live — opossums, snakes, lizards, *etc.* While the domesticated dingo is his friend and companion, the native Australian will hunt the wild dog, kill him and, having roasted him, will eat him with a keen appetite. Consult Lydekker, ˆNew Natural History' (Vol, I, 1897) ; Smyth, ˆThe Aborigines of Victoria' (Melbourne 1878) ; Wheelwright, ˆBush Wanderings' (London 1865). See Dog.

DINGRAS, den-gras', Philippines, city in the province of Ilocos Norte, in Luzon, 11 miles southeast of Laoag. It is on the Grande de Laoag River. It is situated in a fertile plain, surrounded by mountains, which is subject to inundations. Dingras was founded in 1598. Pop. 15,792.

DINGWALL, Scotland, a royal burgh and county town of the united counties of Ross and Cromarty, at the head of the Cromarty Firth, 18 miles northwest of Inverness. A short canal enables vessels of light draught (9 feet) to come up to the town. Nearby are traces of the ancient castle of the earls of Ross. The town lies low, in the midst of a rich, fertile and well-wooded ground. The sulphur springs of Strathpeffer lie five miles to the westward of the town. Pop, 2,639.

DINIAS and DERCYLLIS, characters in an old Greek novel, in 24 books, no longer extant, with the title, Hncredible . Things in Thule.' The author was a Syrian, Diogenes Antonius, who lived about the 2d century of our era. The work was used as a source by many later writers.

DINICHTHYS, di-mk’this, (Gr. ter¬ rible; fish), a genus of enormous fossil

fishes found in Carboniferous and Devonian rocks. They are usually classed with the Dipnoi (q.v.) as members of the order Arthrodira. The body is estimated to have been from 15 tol8feet in length. Its generab shape closely follows that of the Coccosteus. The head, often 3x4 feet, was composed of heavy plates well joined

together. The eyes were large and the teeth were formidable. There is a hinge joint be¬ tween the head plates and the body plates. A great number of these fossils have been dug out of the Upper Devonian shale of Ohio. The best-known species are Dinichthys hertseri and D. terrelli. Consult Dean, ˆFishes, Living and FossiP (New York 1895) ; id., ˆContributions to the Anatomy of Dinichthys,® in ˆTransactionsˆ of the New York Academy of Sciences (Vol. XV, 1896: Vol. XII, 1894 ; and Vol. XVI, 1898) ; id., ˆˆStudies on Fossil Fishes® in ˆ Memoirsˆ of the American Museum of Natural History Vol. IX, New York 1900) ; Newberry, ˆˆThe Palaeozoic Fishes of North America,® in ˆ Monographˆ of the United States Geological Survey (Vol. XVI, Washington 1890).

DINIZ DA CRUZ E SILVA, de’nes da kroos e selVa, Antonio, Portuguese poet : b. Lisbon, 4 July 1731; d. Rio de Janeiro, Brazil, 5 Oct. 1799. A lawyer and official, in 1776 he was made counsel to the Superior (jourt at Rio de Janeiro. He was one of the founders of the celebrated literary society, the Arcadia Lusitana. His poetry comprises sonnets, eclogues, elegies, songs, epigrams, epistles and several volumes of Pindaric odes; a lengthy poem, ˆBrazil’s Metamorphosesˆ ; and a heroi-comic epic, ˆHyssop,ˆ — modeled on Boileau’s ˆLutrin,ˆ but a spirited, original composition, far superior to Boileau’s — which was repub¬ lished several times in France, and translated into French prose. He is referred to as the ˆPortuguese Pindar.® His odes are fine and local color pervades all his works. The ˆ Hyssopˆ pictures faithfully and graphically the vanities and intrigues of the society of a provincial town dominated by two cliques. Boissonade translated the

work into French and it ran through two editions (Paris 1828, 1867). Selections have appeared in English in the Foreign Quarterly Review and in the Manchester Quarterly. The work was edited by J. R. Coelho (Lisbon 1879), with introduc¬ tory study of the poet and his works. His collected works, ˆPoesias,ˆ were issued at Lisbon (1807-17).

DINIZULU, last king of Zululand: b. 1869; d. Transvaal, 19 Oct. 1913. He was the son of King Cetewayo (q.v.), after whose death in 1884 he was proclaimed king. The British an¬ nexed Zululand in 1887, when the regulations which came into force did not recognize the pre-eminence of Dinizulu, who nevertheless con¬ tinued to act as king, ordering executions and imposing fines and taxes. Trouble ensued with the British government and the dusky monarch fled, but surrendered 15 Nov. 1888. Brought to trial, he was convicted of high treason and sen¬ tenced to K) years imprisonment 27 April 1889. This was commuted to transporation to Saint Helena in 1890. He was allowed to return to Zululand in 1897, was given a house and a pension of $2,500 per annum. He was con¬ victed of complicity in a rebellion in 1906, was fined $500 and given four years' imprisonment. He was released in 1910 and allowed to reside at Middleburg on his farm, where he died.

DINKA, a powerful tribe of Negritos who live on both sides of the 'White Nile between lat. 6° and 12° N. in the Egyptian Sudan. Their territory covers about 40,000 square miles.

They are intelligent, have some skill in making articles for household use and also follow agri¬ culture. Each village is governed by its own chief. Polygamy is practised. They are brave and of good physique and for these reasons many find their way to the Sudanese army. It is the common practice to extract the lower in¬ cisor teeth in both men and women. A good grammar of their language was written by Mitterutzner (Brixen 1ˆ6). Consult Gleichen, ˆThe Anglo-Egyptian Soudanˆ (London 1905) ; Kaufmann, ˆSchilderungen aus Central Afrikaˆ (Brixen 1862) and Schweinfurth, Hn the Heart of Africaˆ (Frewer's trans., London 1873).

DINKARD (the enactments of religion), an important compilation of information con¬ cerning the doctrines, customs and writings of the religion of Zoroaster, compiled shortly after the Mohammedan conquest of Persia. In its present form, much of the work is a descriptive list of the contents of a larger and earlier work. It has been edited, with English and Gujerati translation, by Peshotan Behramji

Sanjana (Vols. I-XIH, Bombay 1874-1912).

DINOHYUS, a genus of gigantic, primitive, swine-like animals, some of which were six feet in height at the shoulders, found fossil -in Lower Miocene rock of the western United States.

DINORNITHES. A group of extinct, flightless, ratite birds of gigantic size, the moas of New Zealand, with small heads, stout legs, the bones without air-passages, wings absent or extremely reduced, furculum absent and after¬ shafts large. The genera were Dinornis, Pach-yornio, Mesopteryx, Anomalopteryx and Mega-lopteryx. See Moa.

DINpSAURIA. A group of reptilian ani¬ mals which flourished during the Mesozoic Era, or the Age of Reptiles. They were in many ways the ruling or dominant forms of that time and as such filled the various roles of ter¬ restrial animals as do the warm-blooded mam¬ mals of to-day. Dinosaurs were air-breathing animals and, in common with other reptiles, such as the modern crocodiles, to which they were somewhat distantly related, possessed a more or less scaly or armored skin and were prob¬ ably cold-blooded or poikilothermous, that is, possessing no mechanism for the maintenance of bodily heat, but having an internal tempera¬ ture which varied with that of the outside air. It is assumed that they were egg-laying, but this can neither be proved nor disproved until either eggs or unborn young are found.

In their anatomy the dinosaurs show certain features which link them with the crocodiles on the one hand and with the birds on the other, and whileˆ due in part to community of habit, such as bipedal running on the part of dino¬ saurs and birds and the consequent modification of the hind limbs, these similarities of structure also imply genetic or blood relationships.

In size the dinosaurs ranged from that of a house cat to a length and bulk exceeded only by the greater of the modern whales — upward of 90 feet long and 40 tons in weight. In habits they were as varied as in size, for some were lierht of foot and bipedal while others were quadrupeds of unwieldy bulk, some armored, others armorless, some endowed with horns or with talons and terrible teeth, yet others

DINOSAURS

‘t ‘

V-^;’^?W;.

From a]iaiiitiii}r liy Charles K. Kiiijrht

1 Trachodon — the duckbilled Dinosaur

Courtesy of the Amencau Museum of Natural History, New York

2 Brontosaurus — an amphibious Dinosaur

-c

■“’.; ?.^’:^t- -‘ -i

•u «. < * ^-1:

c • .-»,^j*.’.Jiv;’“ •:^, , , V.—

t ‘ » * ■» -f . • -%• ‘ .., j ♦• I -I ’ • , /’ , - ,

5#’ .’ -V-l’ ■ *•’ r: • •’ - V*-‘

• ■’ ‘•’^^5 ‘ ‘ “‘r* r ^ .

K?ir > n V • •-■. • ■»’ • — • «.,• » . • »

S • . .* • < f’ i • ‘ » I •-■;*• ■ ■” ’

Ptr. •■ V - -‘ ►•’ # »,t V “i ^ • • •■% ‘• . ^ ♦

• ■’““ilrjiA •.* ” V r ‘ ■’ ‘ ”‘ii„-

. ■ ‘.*

. i\

%:h \ ‘ V- , . ■ X ‘\ y qf^ ,y^- ,■ ‘. ^y ^ <• ^ - .Qi’

■*5

■ ^ ‘«’■,» • t ‘- ‘ • «■ T ’ • ^—r . ,’ ■•’» V > > TI* …i^jT ..

I ,. t * ‘ , •i > … A» •

j$

r’ » •f { “

. -

IP- • - • • ‘ • j-f/*. ^ ‘. *! ,v’* ■ /i’ V s. I’ ‘ ‘^ ■”- ’ w^

r .):’ ‘v. S# : i - . ,■■ .’ ,/! ‘.itf ‘ ■ . • -

«.’■ i” • /► fi , • SJ* n r-* ■ ‘ *r ?* .•

“W 1 t • … *Up* •*■ 1 1- -v ’ . < « A W

6 , .*;* . • *%crii*£t£^ ■ ,$■ ■ ■? ‘ .«• - A - *• V -f

.V ‘ v. -‘^’^-‘I, .-■V^’ •.•’■■. I -■• •

. J

I ‘• ^

*. - fij: -r, •,‘ij’^’ • ; M’ . ‘ tv ■»■’ ‘AA.

t

, : • , * re I”* .’^-i . M . -‘ r-r’ ■ # ^,. •.TW’-r’ -

. <■’*:. u;^ ^ *’??4 . A ji’ ■

■ ^ ■■.- V’ 4 :, ; JV’.’. ,.v-; ■•■.

.•..•a-i5, . Av.i.;- •■ ‘ i-.,.,’. ;.• ■ ,” ■ ”.”’ ■ ■ ;> ,*

‘v ‘ ■.• -t ■’ • . ‘-■.’.A^f^yv^’ • \, ■ ‘ ^ -.» V, -*• ■

’* ‘’-K’ : ‘v _ .- V *‘ii: V*- .. ‘• « ‘ :‘w> A’/rV’ ^ ■•

» ■ a ’ ‘ •■ - ‘ ‘ A;*, ‘ ‘ •*’/ ;. ■—■■•: ^

c-;-:‘ . >•,••:■ . .-‘An. ..;.v _ v-‘ :^. :J^t

i..# 9: -

mM *r»’ t

1 •-

r .

•. % \ ^ .

* ’ /■ ‘

L.dul. ^

‘i.r S

■i

I ‘f: I

■)f • £Ji ‘V

i» i . ■’“-I?’

•>■ ■

■« I*’ ‘ r «

/’ •‘ill

whose only apparent means of defense lay in their huge size and inaccessible habitat. They were carnivorous and herbivorous, some of the latter having very defective dentition which made mastication of the food impossible, while others were provided with a dental battery of marvelous detail and perfection.

Their habitat was in all probability the land, at any rate at the beginning of their racial career; indeed, the initial stimulus to their evolution may well have been aridity of climate, which is generally an incentive to the develop¬ ment of traveling powers and hence may have brought about the cursorial adaptation which so distinguishes the earlier forms. Later the dinosaurs, at any rate such as are known to us, were inhabitants of lowland lying along the shores of seas and oceans and some were actually partly, if not wholly, water-living, al¬ though none show an extreme of adaptation to aquatic life and none were salt-water inhabit¬ ants, the occasional inclusion of their remains in marine strata being the result of accident.

There is reason to believe that the dinosaurs were diphyletic, that is, consisted of two races which ran separate though in many ways parallel evolutionary courses, the one group, the carnivores (Theropoda) and their plant¬ feeding derivatives (Sauropoda) being nearer the crocodiles, and the true herbivores (Pre-dentata) being nearer the birds. It is prob¬ able, however, that each phylum was derived from the same ancestral stock, but that the divergence began at once, possibly in Permian time.

The duration of dinosaurian existence was immensely long, for their remains are first found in rocks of Middle Triassic time, but these are already in a state of development that implies a long antecedent evolution. And they continue, despite the extinction of certain lines, until the very close of the Mesozoic, a lapse of time measured by millions of years. Their fos¬ sils appear first in Germany, but this does not necessarily imply a Germanic origin; on the contrary, the belief has been expressed that one must go farther west to a continental mass which once linked Europe and North America across what is now the North Atlantic to find their ancestral home. Thence they spread

the world over, their remains being found in Europe, North and South America, Africa, Madagascar and Australia; but, with the ex¬ ception of India, they are as yet unknown from the great continent of Asia. Whether this is significant or merely because they have not thus far been discovered, is not known.

The classification of the dinosaurs may be given as follows :

Cohort Dinosauria:

Order Saurischia. Primitively carnivorous dinosaurs.

Suborder Theropoda. Bipedal carnivorous dinosaurs.

Suborder Sauropoda. Quadrupedal, amphibious, plant¬ feeding dinosaurs.

Order Ornithischia. Predentate or beaked herbivorous dinosaurs.

Suborder Ornithopoda. Bipedal unarmored dinosaurs.

Suborder Stegosauria. Quadrupedal armored dinosaurs.

Suborder Ceratopsia. Quadrupedal horned dinosaurs.

The two main phyla or orders of dinosaurs have received the rather cumbrous names of Saurischia (Gr. aavpoq, lizard, and ‘icfx’iov, hip joint) and Ornithischia (Gr. ˆpvig, bird), be¬ cause of the basic structure of their pelvis, which in the one case resembles that of the

crocodile or saurian and in the other that of the bird, and, as has been said, there is evidence that the relationship thus implied is real. In many ways the two groups give evidence of having undergone closely parallel lines of evolu¬ tionary progress, especially in their method of locomotion and consequently in their motor organs. This is particularly true of the first suborder in each phylum, the Theropoda and Ornithopoda. Out of each of these more con¬ servative stocks arose aberrant lines in which a premium was placed either on bulk (Sauro¬ poda) or on armor (Stegosauria) or on wea¬ pons (Ceratopsia), with consequent modifica¬ tions and specializations far removed from the primitive stock. Then, too, there was on the part of the two main orders the diametrically opposed dietary — flesh on the one hand, with its relatively simple dental and digestive mechan¬ ism, and vegetal food on the other, with a re¬ sultant complexity of

dentition in the more highly specialized members which has never been surpassed.

Saurischia — Theropoda. The earliest known dinosaurs belong to the Saurischia, suborder Theropoda, and they existed with but little change until the close of the Mesozoic. They were bipedal, with four-toed, bird-like feet, armed with increasingly powerful claws, and with four-fingered hands provided with grasp¬ ing talons. The skull was lightly constructed, somewhat bird-like in form, but possessing no beak. On the contrary, their powerful jaws were armed with a single row of teeth, often flattened, curved and dagger-like, with finely serrate margins which must have made them highly efficient for tearing and rending their prey, but not for mastication. The teeth were mainly in the forward portion of the jaws. The head was poised at right angles to the rather short neck and the compact trunk was followed by a long and often very slender tail which served to counterbalance the weight of the body and head when they were borne on the hind limbs in a semi-erect posture. From an ex¬ haustive study of dinosaurian footprints which exist by the thousands impressed upon the Triassic rocks of the Connecticut Valley, one is justified in assuming that the fore feet were never brought into contact with the ground, al¬ though they doubtless were of use in fighting or in grasping the prey. There is as yet no direct evidence of the nature of their skin ex¬ cept on the sole of the foot, but we have no reason to suppose that it was other than reptile¬ like, clothed in all probability with a flexible scaly covering, but otherwise unarmored.

The Theropoda were highly conservative, in¬ creasing in general dimensions and consequent prowess, with the peculiar exception that in the larger forms, the megalosaurs, the hands failed to keep pace with the general increase in stature until in the final forms they were rela¬ tively so absurdly small that it is difficult to conjecture their use. But not all Theropoda were of this sort, for another group remained relatively small, agile forms until the end of their racial career. At least one of these (Struthiomimus) became entirely toothless — a sign of degeneracy, but in this instance coupled with an otherwise efficient body, which makes the interpretation of habits and habitat a matter of great doubt.

Some of the more notable genera were ;

Anchisaurus, a primitive carnivorous dino¬ saur, some seven feet in length, from the Upper Triassic, known from several skeletons and numerous footprints from the Connecticut Val¬ ley and from New Jersey. See Fig. 1.

Allosaurus, a splendid type, with a length of 34 feet, more than half of which was included in the slender tail. This creature is from the Comanchian or Lower Cretaceous of Wyoming and the adjacent West and is represented in the Old World by a near ally, Megalosaurus, of wide distribution, both in time and space.

Tyrannosaurus, the terminal member of the race, 47 feet long, with the bodily bulk of an elephant, a great four-foot head, armed with teeth three to six inches in length, carried 20 feet in the air, relatively tiny hands, but huge feet which bore powerful claws. This creature, which has been most appropriately named, was the most appalling devourer of flesh which ever stalked abroad, but while admirably adapted and equipped to meet and overcome the unwieldy herbivores of its day, would find it difficult to make a living in these days of brainier, more agile mammals. See Fig. 2.

Accompanying their larger, fiercer kin in their evolutionary career were the smaller and more active carnivores, beginning with the slender Podokesaurus of the Triassic and with Compsognathus of the Jurassic, the smallest known dinosaur, and culminating in the tooth¬ less forms which we have mentioned. Their increase in size was gradual, and their slender¬ ness and well developed grasping hands imply, except in the last rnentioned, their adaptation to more agile and feebler prey.

Sauropoda. — Another, relatively short-lived, race were the amphibious dinosaurs or Sauro¬ poda, apparently derived from the theropod group, but departing widely in habitus and con¬ sequent habit. What gave them their evolu¬ tionary trend we do not know, but their one distinctive character was a vastly increased

bulk, which necessitated their forsaking the strictly terrestrial habitat and becoming partly if not wholly water-borne. This increasing bulk also rendered bipedality impossible, and if they were ever really capable of walking exclusively on the hind limbs, they soon lost that power except, perhaps, when in the water; indeed, in certain of the later types a large part of the weight was borne on the fore limbs, which, con¬ trary to dinosaurian custom, actually exceeded the hinder members in length and bulk. As a further consequence of their increasing stature and amphibious habitat, the neck grew very long so that the small head might range through a considerable arc, both horizontally and verti¬ cally, in its search for food.

The exact nature of this food we do not know, but the spoon-or pencil-shaped teeth, somewhat worn at the end, are in the front of the mouth as with the true carnivores, and could neither have been used for the rending of flesh nor for the mastication of plant food. The inference is that the dietary was vegetal — pos¬ sibly some floating or readily dislodged aquatic plant which grew in great abundance, like the water hyacinth of the Nile. This must have been drawn into the stomach in great inert masses, where a powerful muscular device like a gizzard, together with swallowed stones such as have been actually found between the ribs of certain specimens, aided in their digestion.

These creatures waded, as their heavily ballasted limbs imply, or swam where depth re¬ quired it, but show no distinctively natatory adaptation. They were apparently unarmored, and weaponless, unless the terminal 10 feet of the tail, which was sometimes slender like a whiplash, might be interpreted as a weapon. The earliest forms were moderate in size, some 40 feet perhaps, but the later types were gigantic, the longest authentic measurement being 87 feet, while the living weight exceeded 35 tons. Their bulk, but probably not their length, has been exceeded by the modern whales, but this is because of the slender neck and tail of the dinosaur as compared with the large head borne directly on a neckless trunk and the powerful propelling tail of the cetacean.

Some of the more notable Sauropoda were : Brontosaurus, (Fig. 3) 65 feet long and heavily built, from the Comanchian of Colorado to South Dakota ; Diplodocus, a contemporary, 87 feet in length and much slenderer in build, from Wyoming and Colorado; and Brachiosaurus, some 80 feet in length, the most ponderous of all, with huge neck and fore limbs, a giraffe-like wader found in rocks of equivalent age in Wyoming and at Tenda-guru. East Africa.

Sauropoda were relatively short-lived, exist¬ ing through part of the Triassic and the entire Jurassic, becoming apparently utterly extinct early in Comanchian time. What caused their extinction we do not know, probably a complex of causes of which the most important may have been a temporary restriction of their habi¬ tat. In such relatively huge forms we have come to see evidences of racial senility, with which, as with old age in general, the hold upon life is precarious and a relatively small cause may have far-reaching and disastrous effects.

Ornithischia. — These dinosaurs have been called predentate, from the fact that the front of their mouth bore in the lower jaw a tooth-

less bone, the predentary, while except in one known instance the front of the upper jaw, the premaxillary, was toothless as well. But in the rear of both jaws were grinding teeth deeply implanted in open grooves and arising in suc¬ cession from the depth of the groove outward

later carnivores, and apparently could always be used to support the forward part of the body and for slow locomotion while feeding, although swifter movement was effected by the hind limbs, with the tail for a counterpoise as in the Theropoda.

Fig, 3 — Brontosaurus. 65 feet.

to replace the teeth consumed by wear. Al¬ though in the earlier forms the number of teeth was not great, in the terminal member of one phylum, Trachodon (see Fig. 4), there were so many vertical rows of successional teeth that their total number equaled a half thousand for each half of each jaw, 2,000 more or less all told! The forward part of the mouth varied in form to suit the owner's habits ; in Trachodon it was broadened like the beak of a duck; in others, such as Triceratops, it was more like that of a parrot or turtle ; in all cases the bones must have been encased in horn or a leathery skin and served very well for the pre¬ hension of the plant food which the highly effi¬

cient dental battery reduced to a proper condi¬ tion for digestion. This dental mechanism and the bird-like type of pelvis, although varying in detail, were the principal structures which these dinosaurs had in common; in other ways they varied enormously.

Ornithopoda. — These, the bird-footed dino¬ saurs, were the

unarmored bipeds which in their evolution paralleled the carnivores most closely. They had a four-toed foot armed with claws which in the larger forms became almost hoof-like. Their hands varied, but were gener¬ ally four-toed and never possessed grasping claws. The fore limbs were much smaller than the hind, but never so absurdly so as in the

The earlier types, such as Camptosaurus of the Jurassic and Comanchian, were small to medium in size, ranging from 7 to 17 feet. Igiianodon of Belgium and England was more ponderous, reaching 34 feet in length, and bore on the hand a spike-like thumb, the only weapon thus far recorded in the group. The later Cretaceous types' show evidence, in their webbed feet and compressed swimming tail, of having been aquatic in habits. They are, perhaps, more completely known than any other dinosaurs, for not only are the bones and teeth preserved, but mummified carcasses, presenting with wonderful fidelity the skin, some muscles, and other details of structure usually lost in a fossil. The Orni¬ thopoda were conservative except in their head, which, while generally simple, sometimes bore a helmet-like crest of curious form. Of such were Stephanosaurus and Corythosaurus from Alberta, Canada. Trachodon, although possess¬ ing the most complex dentition, was plain of contour. The last named measured 23 feet in length, and was the terminal member of the race.

Stegosauria. — These were the armored dino¬ saurs, whose body was covered with an increas¬ ingly heavy cuirass and whose tail in some in¬ stances possessed an investiture like a battle mace. The later forms, Ankylosaurus, must have been well-nigh immune to assault, and they mimicked curiously the armored glyptodons — warm-blooded mammals allied to the armadil¬ los of to-day. The glyptodons had to meet the attack of the sabre-tooth tigers, while Ankylo¬ saurus was pitted against the huge Tyranno¬ saurus, but in each case passive resistance was apparently sufficient.

An earlier type, Jurassic to Comanchian, was Stegosaurus, the form which gives its name to the group. (See Fig. 5.) It represented an aber¬ rant side line which died without further issue at the time of sauropod extinction, and like the latter group showed evidences of racial old age. Stegosaurus was a quadruped, short of fore limb, long of hind, with a highly arched back, powerful tail, and small head containing a defi¬ cient dentition and absurdly diminutive brain. But

the most striking peculiarity was its arma¬ ment, which consisted of a double row of armor plates standing on edge, small on the neck, in¬ creasingly large until the base of the tail was reached, and then once more diminishing. The end of the tail was armed with two or more

pairs of long spikes which, together with the armor plates, were encased with horn. Stego¬ saurs are found in Europe and the western United States.

Fig. 5 — Stegosaurus. 21 feet.

Ceratopsia. — These were the horned dino¬ saurs, so far as our knowledge goes an exclu¬ sively American group, and although derived doubtless from the armored forms, from what particular type is unknown. They appear sud¬ denly in the West, in rocks of Upper Cretaceous age, and none are transitional but they show at once all of the distinctive features of the group. Chief among these characteristics is a huge head in contrast to the relatively small skull of other dinosaurs. The head bore upon the face a num¬ ber of horns, one, two, or three, while the rear of the skull was prolonged backward to form an expanded bony crest which served to protect the neck and also to provide leverage for the other¬ wise unwieldy head and horns. In the earlier types, such as Monocloniiis, the crest was in¬ complete, as it had two large apertures through it, one on either side of the middle line. In the later forms such as Triceratops (Fig. 6), the crest was a complete sheet of bone, although in one rare genus, Torosaiints, it was still per¬ forate. In the earlier forms, the horn borne on the end of the nose was the larger, those on the forehead not always being in evidence, but in later genera the nasal horn was reduced and the frontal ones were dominant.

The Ceratopsia, like the Stegosauria, were quadrupedal, the weight of

armor and armament rendering the ancestral bipedal gait no longer possible, and as certain of the latter resembled the later mammalian glyptodons, so the former were rhinocerine in general aspect and were doubtless like the rhinoceros in stupid savagery, for broken horns and jaws and punctured crests give abundant evidence of their combativeness.

Among the dinosaurs there seems to have been a constantly maintained balance throughout

their evolutionary career, for as the carnivores grew and increased in prowess, the herbivores were forced to meet the menace of their aggres¬ sion in several ways, either by increased produc¬

tiveness, or by speed or bulk, or by a partial for¬ saking of the terrestrial habitat. Or they devel¬ oped a defensive armor or aggressive weapons, for one and all lacked brain power; this placed a high premium on brutality, and never perhaps before nor since has the animal world felt to so great an extent the burden of armament.

Extinction. — The cause of dinosaurian ex¬ tinction is by no means clear. One student has argued internecine warfare ; another, destructive slaughter of the young, possibly while yet in the egg, by small blood-thirsty mammals ; yet an¬ other, climatic change, either diminution of heat, for reptiles are very sensitive to temper¬ ature changes, or decrease of moisture, with a consequent change in the character of vegeta¬ tive life. The close of the age of reptiles was marked by great uplifting or diastrophic move¬ ments over portions of the earth's surface — the so-called Laramide Revolution. As a conse¬ quence the old lowlying dinosaurian habitat was largely restricted, and this, together with other of the necessary chain of sequent events which follow so great a crustal movement, put a period to their existence and cleared the way for the evolution of a potentially higher, though long subject race, the mammals.

Richard Swann Lull,

Professor of Vertebrate Paleontology, Yale

University.

DINOTHERIUM (Gr.rˆrdf, terrible; 6?/piov, beast), a genus of

elephantine mammals occur¬ ring as fossils in the Tertiary rocks of Europe and India, characterized by having the lower incisors developed into dome-curving tusks and by having all the molar teeth in use at once. They probably had a proboscis like that of the elephants. See Elephant.

DINSMORE, Charles Allen, American clergyman and author: b. New York. 4 Aug. 1860. In 1884 he was graduated at Dartmouth College, having previously, 1881-82, been en¬ gaged onˆ the United States survey of the Mississippi River. He made his theological studies at Yale and became a Congregational minister in 1888. Therafter until 1901 he held pastorates at Whitneyville and Willimantic, Conn., and Boston, Mass. He became pastor of the_ First Congregational Church of Waterbury in 1905 ; was lecturer at the Divinity School of Yale in 1904 and at Bowdoin four years later. His published works include <The Teachings of Danteˆ (1901; Japanese trans.) ; ˆAids to the Study of Danteˆ (1903; Japanese trans.) ; ˆAtonement in Literature and Lifeˆ (1906) ; and ˆNew Light on Old Truth ˆ (1912).

DINSMORE, Hugh Anderson, American lawyer : b. Benton County, .Ark., 24 Dec. 1850. He was clerk of the Circuit Court 1873-74, when he was admitted to the bar, and began practice in Fayetteville; was prosecuting attorney of the fourth judicial district of Arkansas in 1878-ˆ; a Democratic presidential elector in 1884; min¬ ister-resident and consul-general in the kingdom of Korea in 1887-90; and a member of Con¬ gress in 1893-1905.

DINWIDDIE, Edwin Courtland, Ameri¬ can advocate of Prohibition : b. Springfield, Ohio, 29 Sept. 1867. He received his education at Wittenberg College, Springfield, Ohio, and at Grove City College, Pa. In 1894 he entered the Evangelical Lutheran ministry, was secretary of the permanent committee on temperance of the general synod of the Lutheran Evangelical

Church in 1899-1903, and chairman since 1903. He was legislative superintendent of the Ohio Anti-Saloon League in 1893-96, and State

super¬ intendent of the Pennsylvania Anti-Saloon League in 1897-99. In 1899-1907 he was first national legislative superintendent of the Ameri¬ can Anti-Saloon League, and again since 1911. He has been a prominent worker in the Inter¬ national Order of Good Templars. He led the attack which led to the abolishment of the army canteen, and was instrumental in continuing prohibition in Oklahoma, also led the prohibi¬ tion forces in the campaign to prohibit ship¬ ments of intoxicating liquors in interstate com¬ merce. He is author of several pamphlets on prohibition and allied topics.

DINWIDDIE, Robert, British colonial offi¬ cial : b. Scotland about 1690; d. Clifton, Eng¬ land, 1 Aug. 1770. He was lieutenant-governor of Virginia 1752-58; and during his official career recommended the annexation of the Ohio valley and the erection of forts to secure the western frontier against the French, He was one of the most earnest supporters of the French and Indian War, which began about 1753 and lasted 10 years.

DINWIDDIE, William, American journal¬ ist and author; b. Charlottesville, Va., 23 Aug. 1867, When only 14 years of age, he was as¬ sistant electrician of the National Museum at Washington. He became inspector of customs at Corpus Christi, Tex., in 1883; was connected with the Bureau of American Ethnoloˆ from 1886 to 1895, at which time he went into journal¬ ism, serving as correspondent and illustrator for the New York Herald. He became photog¬ rapher for the Baltimore and Ohio Railroad in 1897. During the campaign in Cuba and Porto Rico he served as war correspondent. During the Boer War he wˆas correspondent in South Africa for Harper's Weekly, and in the Russo-Japanese War he was correspondent for the New York World, Harper's Weekly and Leslie's Weekly. He was associate editor of the New York World 1905-06 and is now a broker. He has published ˆPuerto Rico and Its Possibilitiesˆ (1899); ˆThe War in the Philippinesˆ; <The War in South Africa.ˆ

DINWIDDIE COURTHOUSE and WHITE OAK ROAD, Battle of. General Grant, besieging Petersburg, issued orders 24 March 1865 for a movement on the 29th to destroy the railroads leading into the city from the south to force Lee to come out of his entrenchments and fight on open ground, or so far attenuate his line that a successful assault could be made. The result was the battle of Five Forks (q.v.), the fall of Petersburg and Richmond, the surrender at Appomattox, 9 April and the close of the Civil War. The movement to the left was led by Warren's fifth corps and Sheridan's cavalry, and the first en¬ counter was near the Boydton road, where War¬ ren's leading division (Griffin's) defeated two brigades sent out from Lee's right, driving

them back to White Oak road. On the 30th the second and fifth corps closed in on the White Oak road on Lee's right, and Wilcox's Con¬ federate division, coming out of the entrench¬ ments, attacked Warren and was driven back. Warren's advance division was now within 600 yards of the road, and, on the 31st, Lee ordered another attack. Hunton's and Wise's brigades

attacked in front, and McGavan's and Gracie's on the left flank. Ayres' and Crawford's di¬ visions were driven back in disorder upon Griffin's division, which checked the Confederate advance. General Miles, with two brigades of the second corps, struck Wise's brigade on the left flank, drove it back with severe loss in killed and wounded, and the entire Confederate attacking party retreated, and Warren, resum¬ ing the offensive, pushed his advance across the White Oak road. It cost the second and fifth Union corps, on the 31st, 1,311 killed and

wounded, and 556 missing.

Meanwhile Sheridan had reached Dinwiddie CourtHouse, 12 miles southwest of Petersburg, and on the 30th Devin's division and Davies' brigade were pushed 10 miles in advance in the direction of Five Forks, where they encountered the Confederate cavalry under Gen. Fitzhugh Lee. At night Gens. W. H. F. Lee and Rosser joined Fitzhugh Lee and General Pickett, with five brigades of infantry, marched down the White Oak road to Five Forks, and assumed command of all the troops operating against Sheridan. Munford's cavalry ffivision engaged Devin in front and Pickett moved with infantˆ and the other two divisions of cavalry to gain Sheridan's left, crossed Chamberlain's Creek, struck Davies' brigade in flank and drove it back on Devin, interposed between Devin and Crook, and with the assistance of Munford drove both Davies and Devin northeastwardly across the country. Fitzhugh Lee moved up and formed his cavalry on Pickett's flanks. In following Devin and Davies, Pickett had ex¬ posed the rear of his column* and it was at¬ tacked by the brigades of Gibbs and Gregg, which attack forced Pickett to face about. He drove back the two brigades and advanced upon Dinwiddie CourtHouse. Sheridan had called up Custer with his two brigades, some artillery had come up, and a barricade was thrown up about three-fourths of a mile northwest of the courthouse, behind which Gibbs and Gregg rallied, and Smith's brigade, slowly driven back by the Confederate cavalry, formed on the left. It was now near sunset, and as Pickett advanced, artillery opened upon him, and when within short range the cavalry from behind the bar¬ ricades poured such a shower of. bullets upon

him that he was quickly repulsed, and the battle of Dinwiddie CourtHouse was over. Sheridan says his loss was about 450. The Union forces engaged at Dinwiddie CourtHouse and White Oak road numbered about 42,000; the Con¬ federates about 20,000. The Union loss, 29-31 March, was 2,198 killed and wounded, and 583 missing. The Confederate loss is unknown. Consult ˆOfficial Recordsˆ (Vol. XLVI) ; Hum¬ phreys, ˆThe Virginia Campaign of 1864-65ˆ ; Walker, ˆHistory of the Second Army Corpsˆ ; Powell, ˆHistory of the Fifth Army Corpsˆ ; Grant, Personal Memoirsˆ (Vol. 11) ; Sheri¬ dan, ˆPersonal Memoirsˆ (Vol. II) ; ˆBattles and Leaders of the Civil Warˆ (Vol. IV).

E. A. Carman.

DIOCESE, the territory and population over which a bishop exercises jurisdiction. The word dicecesis was originally a term of civil administration, when toward the end of the 3d century the Roman Empire was divided into 12 dioeceses governed by the emperor's lieuten¬ ants, each dicecesis comprising several of the

divisions called provinces. When the word came into ecclesiastical use it signified rather one of the grand divisions, patriarchates or primatial jurisdictions, instead of the territory presided over by one of the bishops subject to a patriarch or primate or an archbishop. The word began to be used in the meaning it now has in the latter part of the 13th century; but even later it was used in the sense of our pres¬ ent word parish.

DIOCLETIAN, di'o-kle'shan (Gaius Aure¬ lius Valerius Diocletianus, surnamed Jovius), Roman emperor : b. Dioclea, Dalmatia, 245 a.d. ; d. Salona, Dalmatia, 313. He was of humble origin but attained distinction in the army and held important military commands under the emperors Probus and Aurelian. He accom¬ panied Cams to the Persian War and after the death of Numerianus he was chosen em¬ peror by the army at Chalcedon, 17 Sept. 284, and slew with his own hands Arrius Aper, the prefect of the praetorians. He thus fulfilled the

prediction of a Gallic priestess that he would mount a throne as soon as he had slain a wild boar {aper). He was generally loved for the goodness of his disposition. But troubles from within disturbed the Roman Em¬ pire and compelled Diocletian to share the bur¬ den of government with colleagues. He ap¬ pointed Maximianus Augustus in 286, who defeated the Bagaudae insurgents in Gaul and the Germans on the Rhine. Meanwhile Dio¬ cletian was successful against the Persians in the East and afterward penetrated to the sources of the Danube, in Germany. In view of further disturbances and dangers in the empire, he proclaimed Constantins Chlorus and Galerius Caesars in 293. Thus the empire was divided into four parts, with each of the four rulers at a separate capital — Nicomedia, Mediolanum (Milan), Augusta Trevirorum (Trier), Sirmium. At the age of 60, exhausted with labor, Diocletian resigned the imperial dig¬ nity at Nicomedia, 1 May 305, and retired to Salona, where he found happiness in the culti¬ vation of his garden, and where he died eight years afterward. In the latter part of his reign he was induced to sanction a persecution of the Christians, whom he had long protected. In defense of this it may be urged that he hoped to strengthen the empire by a revival of the old religion, and that the church as an inde¬ pendent state over whose inner life at least he possessed no influence, appeared to be a stand¬ ing menace to the imperial authority. In his reign the senate lost practically all its power, republican institutions vanished and were re¬ placed by an absolute monarchy closely akin to despotism. He wore the royal diadem, as¬ sumed the title of lord and introduced a system of etiquette and ceremony, borrowed from the East, in order to surround the monarch and monarchy with a mysterious sanctity. On the other hand he gave great attention to improving the administration of the empire, reformed the coinage, remitted various burdensome taxes, encouraged trade and repressed corruption. He adorned and beautified the city with numerous buildings, notably the baths, portions of which are extant. A famous edict of his and one that has an especial interest in modern days is the ˆDe pretiis rerum venalium,ˆ which, promul¬ gated in 301 A.D., fixed a maximum price for provisions and other articles of commerce, and

a maximum rate of wages. The articles men¬ tioned in the edict which, aside from its illus¬ tration of price-fixing legislation, is chiefly in¬ teresting as giving their relative values at the time, include cereals, wine, oil, meat, fresh and salt fish, vegetables, honey, fruits, skins, leather, furs, foot-gear, timber, carpets, articles of dress and even pernas mendapicae (Westphalian hams), and the wages range from that of the ordinary laborer to the fee of the professional

advocate. The unit of money was the denarius, not the silver, but a copper coin introduced by Diocletian, and the value of which may be gauged from the fact that in the edict it is set down as the equivalent of one oyster, or ap¬ proximately two-fifths of a cent of our cur¬ rency. The edict was a well-intended but abor¬ tive attempt to meet the distress caused by several bad harvests and commercial specula¬ tion. It was mainly in the interests of the soldiery. The punishment for exceeding the fixed prices was death or deportation. The actual effect was disastrous, in that it brought about a disturbance of the food supply in non¬ productive countries, many traders were ruined, and the edict gradually fell into abeyance. Incomplete copies of it have been discovered at various times in various places, the first (in Greek and Latin) in 1709, at Stratonicea in Caria, by W. Sherard, then British consul at Smyrna, containing the preamble and the tables down to number 403. This partial copy was completed by W. Bankers in 1817. It was elaborately edited by Waddington, with new fragments and commentary (1864), and by Mommsen in the third volume of '•Corpus Inscriptionum Latinarum,ˆ where all the frag¬ ments are described and their localities indi¬ cated. Portions of the Greek copy and the Latin preamble were found in Plataea in 1888-89 during the exploration of the American School of Classical Archaeology. In 1890 sev¬ eral hundred lines of the Greek version of the decree were discovered at Megalopolis, includ¬ ing a list of pigments with their prices. For the edict ˆde pretiis, etc.,> in addition to those cited above, consult Lepaulle, ˆL'Ldit de Maximum) (1886) ; ˆPapers of the American School of Classical Studies,ˆ Vol. V (1892) ; and Abbott, ˆThe Common People of Ancient Romeˆ (New York 1911). For life and administra¬ tion of Diocletian, consult Preiiss, T., < Kaiser Diocletian und seine Zeitˆ (Leipzig 1869) ; Mason, ˆThe Persecution of Diocletian) (1876) ; Hunzinger, A. W., <Die Diocletianische Staats-Reform) (1899) ; Allard, P., 'La persecution de Diocletien) (1890) ; Bernhardt, 'T., 'Geschichte Roms von Valerian bis zu Diocletians Todˆ

(1867).

DIODATI, de-6-da'te, Giovanni, Italian Protestant clergyman: b. Lucca about 1576; d. Geneva, 3 Oct. 1649. He was for some time professor, first of Hebrew, then of theology, in Geneva, and in 1618-19 represented the Gen-pan clergy at the Synod of Dort, and aided in drawing up the Belgic confession of faith. He was unsuccessful in his attempts to spread the ˆ Reformed doctrines in Venice and other Italian cities. He is most celebrated for a translation of the Bible into Italian, which is superior to his translation of it into French, and is

still in general use among Italian Pro¬ testants. His biography by Eugene de Bude appeared at Geneva in 1869.

DIODON, di'o-don, a genus of teleostean fish, family Gymnodontes, order Plectognathi, deriving their name from the fact that the ivory-clad terminations of the jaws show no suture, and the fish thus appear to possess but two teeth. The body, as in other members of the family, can be inflated with air till the creature floats on the surface of the water under side uppermost; it is likewise covered with ossifications in the skin, each with a pair of lateral roots and a stiff, movable, erectile spine. The rotundity of these fish when dis¬ tended has earned for them the name of globe-fish, or prickly globe-fish, in addition to the designations porcupine-fish and sea-hedgehog, suggested by the numerous spines. The four species of Diodon are found in all the seas between the tropics, and range to the Cape of Good Hope. The largest species (D. hystrix) attains the length of two feet six inches. The food of Diodon consists of crustaceans and sea¬ weeds, for the trituration of which its jaws are admirably adapted. This genus has by some naturalists been made the type of a family Diodontidce.

DIODORUS (surnamed Siculus), Greek historian: b. Agyritim, Sicily; fl. second half of 1st century. In order to render his history as complete and exact as possible, he traveled through a great part of Europe and Asia. It is very much to be regretted that the greater part of this history, which the author called the ˆHistorical Library,ˆ in the composition of which he combined the ornaments of rhetoric with the detail of facts, after the example of Theopompus and Ephorus, and on which he had bestowed the labor of 30 years, has not reached our times. It consisted of 40 books, and comprised the history of almost all nations. It is written in the style of annals and the events are narrated in a confused and discord¬ ant manner; it is uncritcal ; the writer's lack of military training disqualified him from writ¬ ing authoritatively on the wars ; but the work is valuable as containing a great mass of ma¬ terials collected from a number of writers, whose works have perished. Only the books 1 to 5, containing a history of

Egypt, and to 20. which begin with the second Persian War and end with the war against Antigonus, and a number of fragments, are now extant.

DICECIOUS, di-e'shus, in botany, a term applied to unisexual plants, such as the willow and the hemp, in which the late staminate and pistillate flowers are on separate individuals. In zoology, a term applied to those animals in which the sexes are distinct ; that is, those in which the ovum is produced by one indi¬ vidual (female) and the spermatozoid by an¬ other (male). It is opposed to monoecious.

DIOGENES, dl-6j'e-nez, the most famous of the Cynic philosophers : b. about 412 b.c., in Sinope, city of Pontus in Asia ; d. ˆ Corinth 323 B.c. Having been banished from his native place with his father Icesias, a banker, who had been accused of coining false money, he went to Athens and requested Antisthenes to admit him among his disciples. That philoso¬ pher in vain attempted to repel the importunate supplicant, even by blows, but finally granted his request. Diogenes devoted himself, with the greatest diligence, to the lessons of his master, whose doctrines he extended still fur¬

ther. At the same time he applied, in its fullest extent, his principle of divesting himself of all superfluities. He taught that a wise man, in order to be happy, must endeavor to pre¬ serve himself independent of fortune, of men and of himself ; in order to do this, he must despise riches, power, honor, arts and sciences, and all the enjoyments of life. He endeavored to exhibit, in his own person, a model of Cynic virtue. For this purpose he subjected himself to the severest trials and disregarded all the forms of polite society. He often struggled to overcome his appetite or satisfied it with the coarsest food; practised the most rigid temperance, even at feasts, in the midst of the greatest abundance, and did not even consider it beneath his dignity to ask alms. By day he walked through the streets of Athens barefoot, without any coat, with a long beard, a stick in his hand and a wallet on his should¬ ers ; by night he slept in a tub, though this last has been doubted. He defied the inclemency of the weather and bore the scoffs and insults of the people with the greatest equanimity. Seeing a boy draw water with his hand, he threw away his wooden goblet as an unnecessary utensil. He never spared the follies of men,

• but openly and loudly inveighed against vice and corruption, attacking them with satire and irony. The people, and even the higher classes, heard him with pleasure, and tried their wit upon him. When

he made them feel his su¬ periority, they often had recourse to abuse, by which, however, he was little moved. On a voyage to the island of yEgina he fell into the hands of pirates, who sold him as a slave to the Corinthian Xeniades in Crete. The latter emancipated him and entrusted him with the education of his children. In summer he lived at Corinth and in winter at Athens. It was at the former place that Alexander found him on the roadside basking in the sun, and aston¬ ished at the indifference with which the ragged beggar regarded him, entered into conversation with him, saying, am Alexander the Great,ˆˆ to which the philosopher answered, ®And I am Diogenes the Cynic.® Alexander finally gave him permission to ask for a boon. ®I ask nothing,® answered the philosopher, ®but that thou wouldst get out of my sunshine.® Sur¬ prised at this proof of content, the king is said to have exclaimed: ®Were I not Alexander, I would be Diogenes.® At another time he was carrying a lantern through the streets of Athens in the daytime : on being asked what he was looking for, he answered, am seeking an honest man.® Thinking he had found in the Spartans the greatest capacity for becoming such men as he wished, he said, *Men I have found nowhere; but children, at least, I have seenˆat Lacedaemon.® We are told that Socrates once' remarked to him, ®I see your vanity through the holes of your coat®; but history will not admit of the truth of this anecdote. No doubt many of the anecdotes told of this singular man are fiction. He died 323 b.c., at a great age, and, according to tradition, on the same day with Alexander the Great. When he felt death approaching he seated himself on the road leading to Olympia, where he died with philosophical calmness, in the presence of a great number of people, who were collected around him. Consult Hermann, ˆZur Geschichte und Kritik des Diogenes von Sinopeˆ (Heil-134

bronn 1860) ; Windelband-Bonhoffer, ˆGeschichte der antiken Philosophies (3d ed., Mu¬ nich 1912) ; Zeller, ˆPhilosophie der GriechenS

(1889).

DIOGENES OF APOLLONIA, Greek philosopher; b. Apollonia, Crete, fl.

in the 5th century b.c. Very little is known of his life. His philosophical speculations were developed in his work ˆOn Nature, s still extant in the 6th century, but of which we have at present only fragments, preserved in the works of Aristotle, Diogenes Laertius and Simplicius. His great object was to find the first principle of the world, out of which all things were evolved. Like his master Anaximenes, he came to the conclusion that this great first principle was air, ®the origin of all things® which he believed was endowed with consciousness,

DIOGENES LAERTIUS, Greek philoso¬ pher: b. Laerte, Cilicia, toward the close of the 2d century a.d. His chief work is ˆLives, Doc¬ trines and Apothegms of those who have dis¬ tinguished themselves in Philosophy.ˆ The book is full of absurd and improbable anecdotes, and characterized by much confusion and care¬ less mistakes, yet as containing a mine of in¬ formation regarding the private life of the Greeks, and many fragments of works now lost, it is of considerable value. It was long the foundation of most modern histories of philoso¬ phy, and has preserved the names and doctrines of numerous writers, of whom but for it little would have been known. A translation by Yonge appears in Bohn's Classical Library.

DIOGNETUS, Epistle to, a defense of the beliefs and the religious and social usages of the Christians, written in the 1st century by one who appears to have been himself a disciple of the Apostles, but of whose name and history nothing is known. He refutes the false and malicious accusations brought against his breth¬ ren — as that in their assemblies they were wont to practice abominable immoralities, that they were atheists, enemies of all government, *etc.* He writes with the simplicity and candor of one who has nothing to conceal or to explain away; who rather pities the ignorance of the persecu¬ tors than reproaches them for their cruelties and injustices. He is intensely practical in his teaching, laying stress on godly living rather than on correct dogmatic belief. The last two chapters of his work are plainly additions from another hand and are of later date. The Strassburg MS., the sole authority for the text, was destroyed by fire in 1870. ®This old writer has gradually emerged, by virtue of an inborn lustre, at once the obscurest and most brilliant of his contemporaries, and has cast a glory on the early Church while remaining himself un¬ known.® Consult Lightfoot (text and transla¬ tion), ˆThe Apostolic Fathersˆ (London 1893) ; and Crowe, A, C., for English translation in ˆThe Ante-Nicene Fathers > (Vol. I).

DIOMEDE ISLANDS, a group of three small islands in Bering Strait, and midway be¬ tween Siberia and Alaska. They were dis¬ covered by

Bering in the earlier part of the 18th century. One of the islands, Krusenstern, be¬ longs to the United States ; the other two, Romanzof and Fairway, to Russia.

DIOMEDEA, a genus of birds, including the various species of albatross (q.v.).

DIOMEDES, king of Argos, He was one of the heroes at the siege of Troy, the son of Tydeus. His daring courage rendered him one of the most distinguished heroes and, according to the testimony of Nestor, superior to all his contemporaries. Protected by Pallas, he not only encountered the most valiant of the enemies, many of whom he killed, but even ventured to attack the immortals. He was equally distinguished in council. He boldly op¬ posed the proposal of Agamemnon to leave the plains of Troy without having gained the object of the expedition, and prevailed; he even ad¬ hered to his opinion after Achilles had rejected the proffered reconciliation. By carrying off the horses of Rhoesus from the enemies' tents he fulfilled one of the conditions on which alone Troy could be conquered. With Ulysses he re¬ moved Philoctetes who had the arrows of Hercules from Lemnos, which was another con¬ dition of the fall of Troy. Finally, he was one of the heroes who were concealed in the wooden horse by whom the capture of Troy was at length accomplished. On his return to Argos, he found that his wife had proved unfaithful, and thereupon sailed away to Italy; several cities of that country claim him as their founder.

DIOMEDES, Villa of. See Pompeii.

DION CASSIUS, Greek historian: b. Nicaea, Bithynia, about 155 a.d. ; d. there after 230 A.D. He went to Rome about 180 ; was ap¬ pointed successively to many high offices ; was twice consul; and wrote, in Greek, the ˆHis¬ tory of Rome,ˆ from the arrival of yEneas in Italy to 229 a.d. The portions of Dion's work now extant extend to five volumes.

DION CHRYSOSTOM. See Chrysostom, Dion.

DION OF SYRACUSE, in Greek history, a connection by marriage of the elder and the younger Dionysius, tyrants of Syracuse, over whom he long exercised great influence. He at¬ tempted to reform the younger Dionysius, but his enemies succeeded in effecting his banish¬ ment (b.c. 366). He twice returned and made himself ruler of the city,

but on the first oc¬ casion was, after a time, compelled to withdraw ; in his second period of rule he became un¬ popular, and in 353 b.c. was assassinated.

DION.ffiA MUSCIPULA («Venus' fly¬ trap®), a plant of the sundew family {Droser-acece), found in sandy bogs near the coast of North Carolina. Audubon reported specimens of enormous size as growing, also in Florida. It is a common plant in hothouses. It exhibits in a remarkable degree the irritability common to some plants. There are three hairs upon each division of the leaf, which are so sensitive that an insect alighting upon one of them causes the two sides of the leaf suddenly to come to¬ gether with considerable force, the strong bris¬ tles of the marginal fringe crossing each other like the teeth of a steel-trap, so as to retain the intruder, whose struggles to escape only increase the pressure of the leaf-trap. The insect is re¬ tained until its soft parts are digested and ab¬ sorbed by the plants, after which the leaf opens and the hard parts drop out. This operation requires about 14 days, but if the insect exciting the leaf is not caught, the leaf opens again after an hour or two. The leaf does not retain its

vigor for any length of time, gradually becom¬ ing inert and drying up. Consult Darwin, in¬ sectivorous Plants.ˆ

DIONE, in Greek mythology, the mother of Aphrodite (by the Romans identified with Venus).

DIONNE, de-6n', Narcisse Eutrope, French-Canadian librarian : b. Saint Denis, P. Q., 18 May 1848. He was educated at the Grand Seminary and Laval University, Quebec, began the practice of medicine in 1874, but abandoned it in the following year for a literary and jour¬ nalistic career. From 1880 to 1884 he was editor-in-chief of Le Courrier du Canada and again from 1887 to 1892. He has been secretary of the Associated Press of the Province of Que¬ bec since 1882 and librarian of the legislature of Quebec since 1893. He has written Uˆe tom-beau de Champlainˆ (1880) ; ˆEtats Unis, Mani¬ toba et Nord-Ouestˆ (1882) ; ˆLa Nouvelle France de Cartier a Champlainˆ

(1891) ; ˆVie de Champlainˆ (1891) ; ˆMgr. de Forbin-Jan- sonˆ (1895) ; ˆHennepinˆ (1897) ; ˆJohn and Sebastian Cabot ˆ (ito) ; ˆL'Abbe Richard, cure de Detroitˆ (1902) ; ˆThe Siege of Quebec and the Battle of the Plains of Abrahamˆ (1903) ; ˆQuebec Under Two Flags, ˆ with A. Doughty (1903) ; Hnventaire chronologique des livres, journeaux, et revues, publics en langue frangaise dans la Province de Quebec de 17ˆ a 1905ˆ (1905) ; ˆLe parler populaire des Cana-diens-frangaisˆ (1908).

DIONYSIA, di-o-nish'i-a, festivals in honor of Dionysus, or Bacchus, which, originating in Egypt, were introduced into Greece by Melampus, 1415 B.c. They were four in number, the Rural or lesser Dionysia, which, was the most ancient, the Lenaea, the Anthesteria and the Dionysia proper, all of which were celebrated annually, with much extravagant merriment, though they were not disgraced by the excesses of the Roman Bacchanalia.

DIONYSIUS, dl-o-nish'i-us. Saint, elected Pope in the year 259. He is supposed to have been a native of Greece, but the exact date of his birth is not known. He died 26 Dec. 269, having reigned as pontiff 10 years. Prior to his election as Pope he was held in high repute by the theologians of his day, as history states that Dionysius of Alexandria sent him a most im¬ portant letter on baptism ; and later he was the chief theologian in a synod (262) where the principal question had reference to the Trinity. His able commentaries convinced many who had held views different from those taught by the Church. He labored much to reorganize the Church after the severe persecutions which it had undergone. His feast day in the calendar is 26 December.

DIONYSIUS, Saint, <ˆof Alexandriaˆˆ : b. Alexandria in the last years of the 2d century; d. there 265 a.d. His family were noble, wealthy and pagans. Early in his life his phil¬ osophical studies turned his attention to Chris¬ tian writings, and they so influenced his mind, especially the epistles of Saint Paul, that he left the pagan schools and became a pupil of Origen. About the year 232 he was ordained a priest, and given charge of the Alexandrian school of theology, In 248 he was consecrated bishop.

Shortly after he became bishop of Alexandria the persecution of Decius began, and Dionysius was among the first arrested, and sentenced to be tortured and beheaded. He was rescued by a band of peasants, and for more than a year remained concealed in the Libyan Desert. In 257, during the persecution under Valerian, he was again exiled from Alexandria. His day in the calendar is 17 November. The

writings of Dionysius were numerous, but many have been destroyed. His works were chiefly controver¬ sial, or attacks on the heresies of his day. Con¬ sult Butler, ˆLives of Saintsˆ ; the English translation, ˆAnte-Nicene Fathersˆ ; Forster ˆDe Doctrina et Sententiis Dion3ˆsii Magniˆ (Berlin 1865) ; Harnack, ˆGeschichte der alt-christliche Litteraturˆ (Vol. I, Leipzig 1893), and the biographies of Dittrich (Freiburg 1867) and Paul Morize (Paris 1881). Consult also ˆLetters and Other Remains,ˆ edited by Feltoc (New York 1904).

DIONYSIUS THE AREOPAGITE, con¬ verted to Christianity by Saint Paul (Acts xvii, 34), during the apostle's visit to Athens. Diony¬ sius is called the Areopagite because he was a member of the high court of Athens, the Areo¬ pagus, which held its sessions on Mars Hill. It was generally believed by the early historians that this Dionysius was ordained a priest, was made bishop of Athens and ended his life by martyrdom. Another tradition had it that he was sent into Gaul by Clement of Rome, and died a martyr on Montmartre. This opinion arose from confusion between Denis the Areo¬ pagite and Denis, the patron of France, who founded the church in Paris in the 3d century. The New Testament tells us only that he ®did believe® and adhered to Saint Paul. He has been wrongfully credited with being the author of certain ancient writings on subjects chiefly mystical which, though attributed to that member of the court of Areopagus who was con¬ verted to Christianity by the preaching of the Apostle Paul, Acts xvii, 34, must be referred to some unknown writer of the 4th or the 5th century: hence the author is now usually styled Pseudo-Dionysius, or Dionysius Pseudo-Areo- pagite. The titles of the works attributed to the Areopagite are ˆThe Heavenly Hierarchyˆ ; ˆThe Ecclesiastical Hierarchyˆ ; ˆDivine Namesˆ ; ˆMystical Divinity.ˆ Ten letters are attributed to him, purporting to be addressed to Saint John the Evangelist, Titus, Polycarp and others, their contemporaries. These writings came first into notice in 533 at Constantinople when certain Monophysite heretics presented them in confirmation of their doctrines ; but they were repudiated by the orthodox as mani¬ festly spurious. Nevertheless before long they came into high favor both in the East and the West and throughout the Middle Ages were re¬ ceived by the most eminent schoolmen as indis¬ pensable monuments of the teaching and belief of the early Church. Mgr. Darboy says : ®There is scarcely a passage in the writings of Pseudo-Dionysius that has not been quoted by Thomas Aquinas.® ˆ These writings were studied by the Platonists and others and ex¬ erted a tremendous influence on the Humanists. Dante and Milton were familiar with them as were others of lesser note. Erasmus and Valla appear to have been the first to regard them as falsely attributed to this Dionysius and

later

authorities agree in their opinion that the works were written near the end of the 5th century. Consult article «Dionysiusˆ in Smith and Wace, ˆDictionary of Christian Biog¬ raphyˆ (London 1877-87) ; Koch, Hugo, ˆPseudo-Dionysius Areopagita in seinen Bezie-hungen zum Neuplatonismus und Mysterien-wcsen (Mainz 1900) ; Parker, J., ˆThe Works of Dionysius the Areopagiteˆ (London 1887) ; Vaughan, ˆ Hours with the Mysticsˆ (ib. 1860).

DIONYSIUS THE ELDER, Syracusan tyrant: b. 431; d. 367 b.c. He first attracted general notice during the war against Carthage. When Agrigentum fell, he openly accused the generals concerned, brought about their dis¬ missal and had another staff appointed of which he himself was a member. In a short time he removed his associates and took full command himself. He soon supplanted his colleagues. He contrived to make himself master of the citadel of Syracuse, to¬ gether wdth all the arms and provisions contained in it, and finally to declare himself tyrant, at the age of 25 years. After having finished a short war against the Carthaginians he made preparations for a great war against Carthage. He attacked the Cartha¬ ginians at once by land and water, and gained a complete victory, which was soon followed by an advantageous peace. In 368 he commenced a new war against the Carthaginians, intending to drive them entirely out of Sicily. He did not, however, succeed in this attempt, and was obliged to conclude a disadvantageous peace. He holds the unenviable place in ancient history as the representative tyrant. He lived in con¬ tinual dread of assassination, of which the sword of Damocles has become the symbol. He had the state prison so constructed that even the solitary murmurings of its inmates could be heard by him, and it was hence called the Ear of Dionysius. During his regime the prosperity of the city grew apace and it became the first city of the Greeks. Plato, Aristippus and Phil-oxenus were among the notable personages who visited his court. In 367 Dionysius won first prize at Athens for the tragedy, ˆRansom of Hector.ˆ Consult Freeman, ˆHistory of Sicilyˆ

(Oxford 1894) ; Grote, ˆHistory of Greeceˆ (London 1853), and Holm, ˆGeschichte Siciliensˆ (Leipzig 1874). See Sicily; Syra¬ cuse.

DIONYSIUS THE YOUNGER, Syracu¬ san tyrant : b. 395. He succeeded his father, Dionysius the Elder, in 367 b.c. Dion, his kinsman, directed his attention to the doc¬ trines of Plato, representing to him that this great philosopher alone was able to teach him the art of government, and the means of ren¬ dering his subjects happy. In consequence of this advice Dionysius invited Plato to his court. The latter succeeded in tempting him into the path of virtue and knowledge, and in giving a new character to his whole court. An oppo¬ site party, however, under the historian Philis-tus, awakened the king's suspicions against Dion, and caused his banishment. Dion subse¬ quently made himself master of Syracuse in 3.%. to which Dionysius did not return until after the murder of Dion. During his exile he retired to Locri in Italy, the birthplace of his mother, Doris. Here he ruled despotically until

346. The rule of Dionysius now became so oppressive that the Syracusans sought the aid of Corinth to oust him and Timoleon in 343 appeared with a fleet before Syracuse, and ex¬ pelled the tyrant. Dionysius was carried to Corinth, where he is said to have gained a scanty living by giving lessons in grammar.

DIONYSIUS EXIGUUS, an eminent scholar of the 6th century. He it was who introduced the now existing method of calculat¬ ing the Christian era. He was a monk and, according to his close friend Cassiodorus, was of Scythian origin (natione Scytha). His sur¬ name Exiguus (little) was perhaps self-assumed by him out of humility, for lowly mindedness is one of the virtues enumerated by Cassiodorus in his eulogy of his friend; but the surname may have had reference to his stature. His reputa¬ tion was high as a theologian and as one inti¬ mately conversant with the Scriptures and with the ordinances of the Church. He is author of a collection of ecclesiastical constitutions and canons which is still extant, including the first 50 canons of the Apostles ; the canons of 10 councils; and 38 decretals of the popes, from 384 to 498. This collection had great authority in the West, and in modified form was solemnly promulgated by Charlemagne in 802. Many writings of ancient Greek authors have been saved for us in the translations made of them into Latin by Dionysius. Dionysius died before 555. Several of his works are to be found in Migne, ˆPatrologiae Latinse Cursus Completusˆ (Vol. LXVII). (See Chronology; Canon Law). Consult Tardif, ˆHistoire des sources du droit canoniqueˆ

(Paris 1887).

DIONYSIUS OF HALICARNASSUS,

Greek critic, historian and rhetorician : b. about 50 B.c. ; d. 7 B.c. He came to Rome about 29 b.c, and lived there on terms of intimacy with many distinguished contemporaries till his death. His most valuable work is his ˆArchaeologia,ˆ writ¬ ten in Greek, a history of Rome down to 264 B.c. Of the original 20 books, we possess only the first nine in a complete form. It is a mine of information on the constitution, history, law, religion and social life of Rome, and is highly regarded by scholars despite the author's lack of historical discrimination and his inability to distinguish clearly between fable and fact. He was a greater rhetorician and critic than his¬ torian, and his extant works on oratory, on the criticism in detail of the great Greek orators, on the characteristics of poets and historians from the time of Homer to Euripides, and upon Thucydides and Dinarchus possess great in¬ terest and value. A Latin edition of the Archseologia appeared in 1480, but the first edi¬ tion of the Greek original was that by Stephens (Paris 1546). Fragments of the lost books from a Milan manuscript were published by Angelo Mai (Milan 1816), but are of doubtful au¬ thenticity. His complete works on oratory, etc., including ˆCensura Veterum Scriptorumˆ ; ˆArs Rhetorical ; ˆDe Compositione Verborumˆ ; ˆDe Imitationeˆ ; ˆOn the Style of Demosthenesˆ and ˆOn the Character of Thucydides,ˆ were edited by Usener and Rade-macher (Leipzig 1899). There is a good edi¬ tion of the ˆArchseologiaˆ by Jacoby (Leipzig 1891) and of the ˆDe Compositione Verborumˆ by W. Rhys Roberts (Cambridge 1901) ; the

latter also edited ˆThe Three Literary Lettersˆ of Dionysius (ib. 1901), containing valuable biographical and bibliographical material. Con¬ sult Boksch, ®De Fontibus Dionysii Halicarnen-sis,ˆˆ in ˆLeipziger Studienˆ (Vol. XVII, 1895) and Sandys, History of Classical Scholar¬ ships (Vol. I, 2d ed., Cambridge 1906).

DIONYSIUS, Ear of. See Ear of Diony¬ sius.

DIONYSUS, dI-5-ni'sus, the original Greek name of the god of wine, the name Bacchus, by v/hich he was also called by both the Greeks and the Romans, being at first a mere epithet or surname. See Bacchus.

DIOPHANTINE ANALYSIS, that branch of algebra which treats of the method of solv¬ ing certain kinds of indeterminate problems relating principally to square and cube numbers, and rational right-angled triangles. The fol¬ lowing are examples: (1) To separate a given square number into two parts, each of which shall be a square number; (2) to find three square numbers which are in arithmetical pro¬ gression ; (3) to find a right-angled triangle whose sides shall be commensurable with each other.

DIOPHANTUS OF ALEXANDRIA,

Greek mathematician; the ^^Father of Algebra. He flourished, according to some authorities, about the middle of the 3d century, according to others about the end of the 6th. He left 13 books of ˆArithmetical Questions,ˆ of which only six are extant; and a work on ˆPolygon Numbers.ˆ See Diophantine Analysis.

DIOPSIDE, a variety of the mineral py¬ roxene occurring in monoclinic prisms. It is a silicate of calcium and magnesium, having the formula, CaMg(Si08)2. -Iron is occasionally present in considerable amount, replacing the magnesium, and it then graduates toward heden-bergite. It has a hardness of about 6, and a specific gravity of about 3.3. It is usually pale green to nearly colorless and when trans¬ parent yields gems of considerable beauty. The finest gems come from Dekalb, N. Y., where it occurs in transparent crystals varying from colorless to a deep, rich green. The Mussa Alp, in the Ala Valley, Piedmont, is another celebrated locality from which it is also called Alalite and Mussalite.

DIOPTASE, a rare, beautiful and highly prized mineral, occurring in prismatic crystals of rich emerald-green color and vitreous lustre. Its inferior hardness, 5, greater specific gravity, about 3.3, the terminal rhombohedrons on its crystals, and its reactions for. copper, easily distinguish this so-called ^^emerald-cop¬ per® from the true emerald. It is found spar¬ ingly near Clifton and near Riverside in Arizona, also in the French Kongo, Chile and Hungary, but the finest specimens are from the Kirghese Steppes, Asiatic Russia.

DIOPTRICS (from Gr. clia, through, root op, see), the science which treats of the refrac¬ tion of the rays of light, when the rays pass

through different refracting mediums — for in¬ stance, from the air, through the lenses of a telescope. Dioptrics, consequently, is a branch of optics. It demonstrates the different direc¬ tions in which the rays move, according as they

are broken on plane or curved surfaces. The principles deduced from these observations de¬ termine the nature of the various lenses, explain the manner in which the light is refracted in the human eye, teach the manner of making telescopes, microscopes, *etc.* The ancients were not acquainted with this science. Natural science in modern times has been greatly in¬ debted to it. By its aid the human eye has been enabled to reach objects previously unknown. Kepler, Snellius of Leyden, Descartes, Newton, etc., not only extended this science, but founded a great part of their discoveries on it. In mod¬ ern limes, science has been enriched by the in¬ vention of the achromatic telescope. See Lens; Optic Light; Refraction; Telescope.

DIORAMA, a method of reproducing land¬ scape scenery, invented or perfected by M. Da¬ guerre, and first exhibited by him in 1823. The particular advantage which this method pos¬ sesses is that it causes the light to play over the picture with an intensity graduated at will. The illusion is heightened by the cloth trans¬ parencies, through which light is poured from behind the picture. The principle of the di¬ orama was successfully applied in producing some of the prettiest scenic effects of the modern stage.

DIORITE, a medium-to coarse-grained dark gray or greenish-colored rock consisting essentially of hornblende, biotite mica, and plagioclase felspar that have a granitoid, or completely crystalline, texture. According to variations in composition, there are augite-diorites which grade into gabbros and quartz-diorites which grade into granites. The horn¬ blende and augite-diorites are dark-colored ; the quartz-diorites, light-colored. As augite changes readily to hornblende, many so-called diorites may represent altered diabases and gabbros ; by further metamorphism the horn¬ blende ‘Changes to chlorite. Diorites under shearing stresses may be changed into horn¬ blende and chlorite schists. Andesites and dacites are rocks of the diorite family, but hav¬ ing a porphyritic texture. As compared with the syenites, diorites contain less potash and soda but more lime and magnesia, hence the principal felspar is soda-lime. It has more lime, magnesia and iron than granite and less silica and potash, these constituting the chief differences. It is often used for building. True diorites are rare in the United States, though quartz-mica diorites and auˆite-diorites are

not uncommon, and grano-diorites — the inter¬ mediate stages between diorite and granite — occur in great masses in the Sierra Nevada, in California. True diorites occur in various places abroad. One from Wales contains Si02 61.75; AhOs 18.88; FeaOa 0.52; FeO 3.52; Cal. 3.54; MgO 1.90; NaaO 3.67; K2O 1.24; and has a specific gravity of 2.79.

DIOSCOREACE.®, natural order of monocotyledonous plants, with alternate reticu¬ late, veined leaves, tuberous rootstocks and twining stems. The flowers are small and uni¬ sexual. There ar€ nine genera, with about 200 species, chiefly inhabiting tropical America and South Africa. The typical genus is Dioscorea, which includes the yam of commerce (79. saliva). The best-known species in eastern America is the wild yam-root (D. villosa), which is found in moist thickets from Rhode

Island north, south to Florida and west to Texas. It ascends to 4,000 feet in the Virginia Mountains. The flowers are of a greenish-yel¬ low bloom in June and July, and the fruit, which adheres to the vine until late in the winter, is ripe in September. Tamus (Testudinaria) elephantines, a South African species, some¬ times called elephant's foot, and Hottentot's bread, has a large fleshy rhizome, with a rough cracked bark, which is used as food by the Hot¬ tentots in times of scarcity.

DIOSCORIDES, Peda'nius, Greek physi¬ cian: b. Anazarbus (Caesarea Augusta), in Cilicia, in the 1st century a.d. He was a physi¬ cian in the Roman armies which he accompanied in their various campaigns in several countries, and collected a great store of information on plants in general and on medicinal plants in particular. He was author of a celebrated work on materia medica, in five books. It is particu¬ larly valuable in regard to botany, as most of the medicines which the author mentions are taken from the vegetable kingdom. Two other works attributed to him by Photius are by a later Dioscorides of Alexandria — the ˆAlexi-pharmaca,ˆ which was united with the ˆMateria Medica,ˆ forming the three last books of it, and treating of

the poisons in the three king¬ doms of nature, and their antidotes ; and the ˆEuporista,ˆ which treats of remedies that are easily procured. For 15 centuries his position was pre-eminent in botany and medicine, and he is still highly regarded by the Moors and Turks. The best edition of Dioscorides is that of Spren-gel (2 vols., Leipzig 1829-30). It contains a Latin translation and a commentary. The work has appeared in most European tongues and also in Arabic.

DIOSCURI, di -6s-ku'rT, the classical name for Castor and Pollux, twin brothers, and tute¬ lary deities of wrestlers, horsemen and navi¬ gators. Their transplantation to the sky as one of the 12 constellations of the zodiac (the Twins) is a celebrated allegory of mythology. They are sometimes styled Tyndaridae, because Tyndarus was the nominal father of both.

DIOSCURUS, or prOSCORUS, patriarch of Alexandria, immediate successor (444) of Saint Cyril, was a supporter of the heresiarch Eutyches (q.v.). Pope Leo and Flavianus, patriarch of Constantinople, having condemned the teachings of Eutyches, Dioscurus procured from the Emperor Theodosius II the convoca¬ tion of a council of bishops at Ephesus in 449. To this council Pope Leo sent three legates as his representatives. Dioscurus was present, sur¬ rounded by a host of his satellites, and with their aid prevented the legates from presiding in the council and even from reading to the bishops the letters addressed to the assembly by Leo. Flavianus was so roughly handled by the rabble that he died shortly after in consequence of the injuries he received. The council there¬ after got the title of Latrocinium (Brigandage) from the Latins, and of ˆvvo6o3 from the

Greeks (robbers' synod) ; but Theodosius upheld its decisions, and Dioscurusˆ procured the ap¬ pointment of one of his partisans, Anatolius, to succeed Flavianus in the see of (Constantinople. After the death of Theodosius another council assembled at Chalcedon in 451, which annulled the decrees of the Latrocinium of Ephesus and

decreed the deposition of Eutyches from his offices as presbyter and archimandrite.

DIOSMA, a genus of plants belonging to the rue family {Rutaceos). They are small shrubs with white or red flowers ; leaves alter¬ nate or opposite, simple. They are remarkable for their overpowering and penetrating odor, arising from the presence of a yellowish volatile oil. They are the buchu plants of the Cape of Good Hope. The plant has

been employed in chronic affections of the bladder and urinary organs in general, and has also been admin¬ istered in cholera.

DIOSPYROS, a genus of plants belonging to the ebony family (EbenacecB) . There are about 190 specks, most abundant in Asia. They consist of trees and shrubs with white or pale yellow flowers. D. lotus is the Indian date-plum, and is supposed by some to be the lotus of the ancients. The trees of several of the species furnish ebony wood. The fruit of D. kaki, the Japanese persimmon, is a well-known fruit. D. virginiana, the most common American repre¬ sentative of the genus, is the persimmon (q.v.)

DIP, in geology, the maximum angle of inclination of any stratified rock or of a vein or of a fault plane to the horizontal of a given point. In the same way the cleavage planes of any metamorphic rock are said to dip and a thin intrusion of igneous rock, a dike, has a dip. Also the contact plane of an igneous and a sedi¬ mentary rock may have a well-defined dip. The direction of the dip is the line of highest in¬ clination and is expressed by compass bearing; thus a bed may dip 63 degrees north, 35 degrees east. The line of intersection of the dipping bed or plane with the horizon is known as the strike, and is at right angles to the direction of dip. The angle of dip is determined by an in¬ strument known as a clinometer (q.v.). Initial dip is the name given to the slight inclination away from the land that sedimentary beds have as a whole when laid down in the sea. Such initial dips are often of importance in determin¬ ing flexures when the sediments are subse¬ quently subjected to mountain-building pres¬ sures. See Fault; Fold; Geology; Mountain.

DIP CIRCLE, also called INCLINATION COMPASS and INCLINOMETER, an instru¬ ment for measuring the angle between the plane

of the horizon at any place and the position as¬ sumed by a magnetic needle so mounted as to be capable of turning freely in a vertical plane.

When the vertical plane coincides with the magnetic meridian of the place, the resulting angle is called the Dip. An unmagneti2ed needle if suspended at a point which coincides with its centre of gravity and placed horizon¬ tally, will, of course, remain always in a hori¬ zontal position, but if the same needle be mag¬ netized it will not only assume the magnetic north and south direction, but it will also take up an inclined position with reference to the horizon, the north end of the needle pointing downward at places north of the earth's equator and the south end being depressed in southern latitudes. At either of the magnetic poles of the earth the needle will point directly down¬ ward, that is the dip will be equal to 90 degrees. On the equator the dip is approximately 0 de¬ grees, while in intermediate latitudes it has vˆues intermediate between these. At Green¬ wich at the present time the dip is 66 degrees 54 minutes, but at all places the value is sub¬ ject to somewhat irregular daily, seasonal, and yearly change. Thus at Greenwich the value diminished for a long time at the rate of about two minutes a year, thus changing the dip by a full degree at intervals of about 30 years.

DIPHTHERIA (Gr. diphtheria, a skin, piece of leather, extended in meaning to com¬ prise membrane), a contagious and (in its severe forms) malignant disease, caused by a specific bacillus, and generally characterized by the formation of a fibrinous false membrane in the throat. Although previously observed, it was first clearly described in 1826 by M. Breton-neau of Tours under the name of ®diphtherite,ˆˆ as a form of very fatal sore throat occurring chiefly in children. It is now known that most cases of membranous croup are identical with diphtheria. The membranous inflammations of the throat occurring sometimes in scarlet fever and other infectious fevers may or may not be true diphtheria, a bacteriological examination being usually necessary to determine this point.

The period of incubation is usually from two to seven days. The disease begins by ma¬ laise, feeling of chilliness, loss of appetite, head¬ ache and more or less fever; soon the throat feels hot and painful and the neck is stiff and tender. If seen early, the throat is red

and swollen, but a false membrane of yellowish or grayish color quickly appears in spreading patches, usually first on the tonsils, whence it often spreads to the pillars of the fauces, uvula and back of the throat, and may even extend down the oesophagus or gullet; extension of the membrane into the nasal cavities is a grave symptom. There is usually enlargement of the glands at the angle of the jaw, and albumen in the urine generally occurs at some stage of the disease. Diphtheritic membrane may be formed on any mucous surface, or even on a wound; if it extends into the larynx it gives rise to cough and difficulty in breathing. The throat affection is often accompanied by a low and very danger¬ ous form of fever, with quick, feeble pulse and great and rapid loss of the patient's strength, which is still further reduced by the inability to take food; in other cases, the disease is fatal by paralysis of the heart or by suffocation, due to invasion of the larynx. Invasion of the larynx may necessitate intubation or tracheot¬ omy. After the acute disease is over, the re¬ covery may be delayed by paralytic symptoms

of various kinds ; or simply by extreme debility with exhaustion and loss of appetite. In the early stages of convalescence there is danger of sudden heart failure upon exertion.

Diphtheria is communicable. It may occur as a complication of scarlet fever, measles and other communicable diseases. All gradations in the intensity of the disease from mild sore throat to septic and gangrenous forms occur. Damp and temperate climates seem to favor its development. Insanitary conditions favor its occurrence, but the disease may appear under the most favorable hygienic surroundings. An important mode of its spread is by school chil¬ dren, either infected in a mild form or coming from households where the disease exists. One attack affords little or no protection against re¬ currence. In the treatment of the disease the patient should be isolated and all clothing and other articles which have been in contact with the sick, as well as the discharge, should be disinfected. Local applications to the diseased parts and means to maintain the strength of the patient were the most valuable therapeutic meas¬ ures before the introduction of the antitoxin treatment.

True diphtheria is now known to be caused by a specific bacillus called Bacillus diphtherice, or the Klebs-Loffler bacillus. This bacillus was first recognized by Klebs in 1883 by microscop¬ ical examination of diphtheritic membranes, but it was first successfully cultivated by Loffler in 1884. Its causal relation to the disease was not thoroughly

established till the investigations of Roux and Yersin in 1888, who demonstrated the existence of a peculiar and intensely poisonous substance known as the diphtheria toxin. It is now generally admitted that the Klebs-Loffler bacillus is the cause of true diphtheria. The diphtheria bacillus is a slender rod characterized especially by irregularities in shape and staining with aniline dyes. It grows best at about the temperature of the human body, and all growth ceases below 20° C. It can be cultivated arti¬ ficially on various media, but best on a mixture of blood serum and beef-broth rendered solid by heating. In a moist condition the bacilli are killed in a few minutes by a temperature of 60° C. They survive for months in a dried condi¬ tion. Exposure to the direct rays of the sun kills the bacilli, in a short time. Guinea-pigs, when inoculated beneath the skin with a small quantity of a pure culture of the' virulent diph¬ theria bacillus, die within two to five days with characteristic changes in the body. Skilled bac¬ teriologists can recognize the presence of diph¬ theria bacilli in the throat by microscopical ex¬ amination and the appearances in the cultures within 24 hours or less, but their complete iden¬ tification may require the inoculation ˆ of a guinea-pig. Both in human beings and in ani¬ mals the bacilli grow only or mainly locally in the false membrane, the severe constitutional symptoms being due to the absorption of a powerful poison secreted by the bacilli.

The ways in which diphtheria bacilli may be conveyed from sick to healthy persons are almost countless. In ordinary breathing the ex¬ pired breath contains no germs, but in speaking and especially in coughing, a fine spray, is emit¬ ted which may contain the bacilli and thus convey the disease. All sorts of articles, such as handkerchiefs, toys, drinking utensils, furni¬ ture, clothing, bed-linen and the like, may be-

come contaminated with the bacilli and be the means of spreading the disease. The specific germs have been found in the hair, on the shoes, and elsewhere on the persons of those brought into frequent and close proximity to the patient. Direct contact with the patient, as in kissing,

may communicate the disease. It is especially through direct or mediate contact with in¬ fected individuals that the disease is spread. Hence, preventive measures, consisting in iso¬ lation of the patient till the bacilli have dis¬ appeared from the throat, and in thorough dis¬ infection, are of the first importance in checking the spread of diphtheria. Insanitary conditions, formerly thought to be the direct cause of diph¬ theria, are now regarded only as accessory causes in affording opportunities for the pro¬ longed survival of the specific germs or in weakening the powers of resistance of the in¬ dividual.

The discovery of the diphtheria bacillus has led to the introduction of a new and most successful method of treatment of the disease, known as serum-therapy or the antitoxin treat¬ ment. The establishment of the principles and the introduction of this treatment are due espe¬ cially to Behring of Germany and Roux in Paris. The underlying principle of the treat¬ ment is based on the fact that, if a susceptible animal is inoculated first with small and then with increasing doses of the toxin produced by the bacillus, the blood of the animal is found to contain a substance called antitoxin, which has the power of neutralizing or rendering harmless the toxin. In order to obtain large quantities of the healing serum a horse is gen¬ erally selected for the process of immunization. By proper methods very powerful antitoxins can be obtained. The antitoxin is used not only to cure the disease, but also to render persons insusceptible for a time to the disease. This latter procedure of preventive inoculation has been found especially useful in preventing ex¬ tensive outbreaks in children's hospitals and asy¬ lums after the introduction of one or more cases of diphtheria. Dr. William H. Welch, of the Johns Hopkins University, in 1895, in an analysis of over 7,000 cases of diphtheria treated by anti¬ toxin found that the fatality was reduced by this treatment by over 50 per cent of the previous death-rates ; he concluded that the antitoxin serum is a specific curative agent for diphtheria, surpassing in its efficacy all other known meth¬ ods of treatment for this disease. Since his re¬ port, this conclusion has been confirmed and even more favorable results have been obtained.

Some idea of the great benefits which have been derived from the discoveries outlined above may be had by comparing the death rate before and after the serum therapy became the prac¬ tice. For the five years immediately preceding the discovery and use of antitoxin in the city of Berlin the death rate for diphtheria in every 10,000 inhabitants was 10.2 per cent, and for the next five years it fell to 3.7 per cent; in Paris, 6.5 per cent before antitoxin, and 1.3 per cent afterward; in New York 14.5 per cent be¬ fore, and 6.3 per cent after antitoxin. So safe is the use of antitoxin, it is now advised that every child exposed

should receive an immuniz¬ ing dose, as that confers protection.

William H. Welch, M.D., Professor of Pathology, Johns Hopkins Uni-Z'crsity.

DIPHTHONG (Gr. «having a double sound®), two vowel sounds, following one an¬ other so closely as to form but one syllable, as in out, where the sound is really composed of a and u. Many double vowels in English are not real diphthongs, there being only one sound heard, whereas some single vowels have a diph¬ thongal sound. The only real English diph¬ thongs are i as in high; i as in aye; oi in boil; ow in how; and ew in mew.

The spelling of the English language has lit¬ tle or no relation to pronunciation in this mat¬ ter. In many syllables written with two vowels, only one sound is heard, as in bread. The single vowel letters, again, often have a diphthongal sound; thus the long i, as in high, is really composed of the sound of a, as heard in father, and that of e in me ; and tune is pro¬ nounced as if written teun. Such words as bread, field, which are now monophthongs, are really diphthongs, and are still so pronounced in many parts of England.

DIPLEGIA. See Paralysis. DIPLOBLASTICA. See Embryology. DIPLOCOCCUS. See Bacteria.

DIPLODOCUS, di-pl6d'o-kus, a saurian¬ footed, herbivorous dinosaur found in the Juras¬ sic deposits of Colorado. The length of skull of this species was about 21 inches, of brain about 3 inches and of body 50 feet. The cast of a reconstructed specimen in the Carnegie Museum, Pittsburgh, measures 84 feet in length and is 12 feet 9 inches in height. The animal is supposed to have been a hippopotamus-like wader, and to have lived on vegetation in the water. It would weigh about 20 tons, and re¬ quire about 500 pounds of vegetable food every day.

DIPLOMA (Gr. diplod, ®fold® or ˆdouble®), originally a document on two tablets of wax (see Diptych), or on writing material which was folded. The Roman emperors granted di¬ plomas to couriers, giving them the use of pub¬ lic servants and horses; hence diploma came to signify a writing or document conferring some power, authority, privilege or honor, usdally under seal and signed by a duly authorized offi¬ cial. Diplomas are given to graduates of a uni¬ versity on their taking their degrees ; to clergy¬ men who are licensed to officiate ; to

physicians, civil engineers, etc., authorizing them to practise their professions ; and are awarded as a certifi¬ cate of merit at exhibitions. In European coun¬ tries all diploma-conferring bodies are under state supervision and control,' and a movement is on foot to make similar provision in the United States.

DIPLOMACY. See American Diplo¬ macy; International Law; United States ■ — Diplomacy of the.

DIPLOMATICS, the science of decipher¬ ing ancient MSS., inscriptions, etc., now gener¬ ally known as Paleography (q.v.).

DIPLOPIA, di-plo'pi-a, an affection of the sight in which objects are seen double. It arises from derangement of the visual axis and can be remedied by the wearing of suitable glasses.

DIPLOPTERUS, a genus of fossil ganoid fishes, of four species, belonging to the Old Red Sandstone.

DIPLOZOON, a parasitic trematode worm which infests the gills of the bream, and which appears to be formed of two distinct bodies united in the middle, and resembling an X or Saint Andrew's cross, and only double indi¬ viduals thus attached are capable 'of becoming sexually mature. The larva, formerly called Diporpa, swims about in the water for a time, but ultimately settles in the gills of a fish, where it remains during the rest of its existence. The larvae then unite in pairs by the attachment of the ventral sucker of one individual to a knob on the back of another.

DIPNOI, one of the primary subdivisions of fishes, characterized by the presence of mem¬ brane or covering bones on the skull, the ab¬ sence of secondary bony jaws (maxillary, pre¬ maxillary and dentary bones), and the direct articulation of the lower jaw with the skull. The Dipnoi were early predominant in geologi¬ cal times, many and varied forms occurring as fossils in the Middle and Upper Palaeozoic strata. Some of these, forming the order Arthrodira, are of doubtful

relationship, and are classed with the only provisionally. The

best-known representatives of this group have the anterior region of the body enclosed in continuous bony plates, with a complex articu¬ lation between the head and trunk. In the De¬ vonian of Ohio are found giant forms, like Dinichthys and Macropetalichthys, from 10 to 25 feet long, and with sharp-beaked jaws like a turtle's. Numerous other Dipnoi, more closely resembling the still living ones, have been found as fossils in various parts of the world. At the present time the group is decadent, and but three genera and as many species, each found in a restricted area in widely separated regions of the earth, remain. They are, Protopterus from Africa, Lepidosiren from South America, and Ceratodus from Australia. On account of the lung-like structure of the swim-bladder and its function as an organ of respiration, they are known as lung-fishes. Being the earliest verte¬ brates which are believed to have breathed air, the Dipnoi have an exceptional interest, and many zoologists consider them to have been the original stock from which the Amphibia and all other terrestrial vertebrates arose. See Mud¬ fish ; Stegocephalia. Consult Cope, ˆOrigin of the Fittestˆ (New York 1886) ; id., ˆBatrachia of North Americaˆ (Washington 1899) ; Dean, ˆFishes, Living and FossiP (New York 1895) ; Gadow, ˆ Amphibiaˆ (London 1901) ; Lydekker, Cunningham, Boulengcr and Thom¬ son, ˆReptiles, Amphibia, and Fishesˆ (ib. 1912).

DIPPEL, Johann Konrad, German mystic and alchemist: b. Frankenstein, near Darm¬ stadt, 10 Aug. 1673 ; d. Berleburg, Prussia, 25 April 1734. He became involved in difficulties political and theological, and wrote tracts (1697, 1698) attacking Lutheran theology, which ruined him with all parties, and which provoked replies in the same spirit as that in which the attacks had been made. To avoid persecution he was forced to lead a wandering life. He was imprisoned in a Danish fortress (1719-27) and afterward, through clerical influence, was banished from Sweden. He became a student of alchemical books, and at once threw himself into the search for the philosopher's stone. He is remembered as the refiner of Dippel's Oil (q.v.), from which followed indirectly that of

Prussian blue — an accidental discovery, it is true, but one of a class that could hardly have been made but for the constant and multifa¬ rious, though not well-directed labors, of such men as Dippel.

DIPPEL'S OIL, the black fetid oil which was formerly produced by the

destructive dis¬ tillation of bones, and was used medicinally. Dippel, in 1711, refined it by washing with lime or potash, and rectifying the oil until it became limpid and aromatic. This rectified oil was the oleum animate Dippelii of the older pharmaco¬ poeias, which was prescribed in doses of a few drops as an antispasmodic and diaphoretic, and as a hypnotic.

DIPPER, a name given to the seven stars in the constellation of the Great Bear, from their being arranged in the form of a dipper, or ladle.

DIPPER, a water-ouzel. See Ouzel.

DIPPING-NEEDLE, or INCLINATION COMPASS, an instrument for measuring the magnetic dip or inclination; that is, the angle which a magnetized needle, free to move in the plane of the magnetic meridian, and about a horizontal axis, makes with the horizontal plane at the place. The dipping-needle is a light mag¬ netized steel bar supported on a horizontal axis which passes, as nearly as possible, through the centre of inertia of the bar. The axis is either a steel knife-edge which rests on agate plates, or a fine wire supported by friction-rollers. A vertical circle surrounds the needle, the axis on which the needle turns being at the centre ; the circle is graduated, and the needle moving over the graduations, the inclination to the horizon can be read off by means of it. The vertical circle is mounted on a vertical pillar, which turns round its own axis ; and to the pillar there is attached at the foot an arm or pointer, which moves over a horizontal graduated circle. This last is supported on three legs furnished with leveling screws.

To observe wi-th the dipping-needle the ver¬ tical circle must be placed in the plane of the magnetic meridian, and then the angle at which the needle is inclined must be read off by means of the graduations on the circle. The plane of the magnetic meridian might, of course, be de¬ termined by means of a separate instrument, such as the declination compass. But this is not necessary, the vertical pillar and hori¬ zontal circle described above furnishing all that is required. A complete observation is made in the following way. The instrument having been properly leveled, the vertical circle is turned round on the pillar till the needle points vertically downward. When this is the case we know that the needle must be moving in the vertical plane at right angles to the plane of the magnetic meridian, because it is only in this plane that there is no horizontal component of force acting on the needle. The vertical cYcle is now turned round on the pillar through 90 degrees, which is done exactly by means of the horizontal circle at the foot. The needle is thus free to move in the plane of the magnetic

meri¬ dian, and the inclination is read off.

Corrections for defects in the instrument must be applied in order to make the deter¬ mination exact. In the first place, in order to correct for any error iiv centring of the axis

on which the needle turns, readings are taken at both ends of the needle. Next, because the magnetic axis of the needle may not coincide with the axis of the figure, the needle is turned over on its bearings, and fresh readings are taken. Thirdly, the axis on which the needle turns may not pass exactly through the centre of inertia of the needle. If this were the case the needle would not balance about the axis exactly, one or other end of it being the heavier. To do away with error from this source, after one set of readings have been taken, the needle is lifted from its bearings and remagnetized, the end that was formerly north being now rnade the south end. A complete new set of readings is taken. The mean of all these gives the true inclination. See Declination Needle; Mag¬ netism, Terrestrial.

DIPROTHODONTY. The state of the enlargement in an animal of a pair of cutting teeth, while the neighboring teeth are reduced. This adaptation is frequent and arises inde¬ pendently in many orders of mammals, ancient as well as modern. It is most prominently and familiarly illustrated in the incisors of the rodents, as the rat or the beaver. Sometimes instead of the middle pair, the side pair is so enlarged and it is not always easy to determine their true affinities.

DIPROTODON, dl-pro’to-don, a huge ex¬ tinct marsupial of the Pleistocene Period in Australia. Its nearest living relatives are the wombats and kangaroos, which it somewhat resembled in the character of the head, which was three feet long. The animal was by far the largest of the marsupials, almost equaling a small elephant in size and resembling the elephants in its rather long legs and short post¬ like feet. The structure of the foot-bones is very remarkable; the great toe is short and stout, the others reduced to small slender rudi¬ ments. Its dentition showed molars trans¬ versely ridged as in the

kangaroo, but without the longitudinal connecting ridge. Its remains have been found in great abundance in certain dried-up salt lakes (Lake Callibona, etc.) of the central and south Australian deserts.

DIPSACUS, the typical genus of the Dipsa-cacecE. See Teasel.

DIPSAS, a genus of tropical opisthoglyph serpents, mostly tree-snakes with greatly elon¬ gated bodies and protective coloration, which are usually nocturnal, and feed mainly upon lizards and birds and their eggs, though some species pursue mammals and other birds ex¬ clusively. Their posterior poison-fangs (see Opisthoglypha) are large, but they differ in venomous ability, which is rarely deadly to a large animal. This and several allied genera form the colubrid sub-family Dipsadinse.

DIPSOMANIA. See Alcoholism.

DIPTERA, an order of two-winged insects, of which the common housefly and bluebottle are familiar examples, and of which some 40,000 species are known ; the number yet to be described will bring the total to 350,000. They are characterized by a body with slight coriaceous coverings, a trunk open beneath and containing a sucker composed of two, four or six lancet-shaped elongated scales, two palpi, antennae almost always composed of three joints, large eyes, an abdomen of four to seven

distinct segments, tarsi with five joints and two short clubbed appendages called halteres or balancers, which seem to be the rudiments of the posterior pair in four-winged insects and are kept in continual motion. They all undergo a complete metamorphosis. They are found in the earth, the air and the water in all cli¬ mates and in all localities. The far greater number live exclusively on the sap of flowers. See Flies.

DIPTERACE.®, or DIPTEROCAR-PE.ffi, an important order of exogenous trees. They are found in India, and especially in the eastern islands of the Indian archipelago. There are about 10 genera and over 100 species known. The trees belonging to this order are handsome and ornamental, and abound in resi¬ nous juice. When young, the Dryobalanops camphora yields, on incision, a pale yellow liquid, consisting of resin, and a volatile oil having a camphoraceous odor; when old, it furnishes a kind of crystalline camphor. Other species produce fragrant resins used in temples, also varnishes ; while some of

the commonest produce pitches and valuable timber.

DIPTERUS («two-winged»), a fossil fish occurring in the Devonian rocks and belonging to the IDipnoi subclass, family Dipterid < E, of which this is the typical genus. Its distinguish¬ ing character is the possession of double dorsal and caudal fins. An interesting fact connected with it is that it approaches nearer to the lung-fishes than do any of the present existing ganoids.

DIPTYCH, dip'tik, a tablet consisting of two leaves, light boards, held together by a hinge. In the time of the Roman empire diptychs were much used in correspondence be¬ tween friends and were given by magistrates inscribed with names and portraits to friends on the assumption of office. Even when three boards or more were used the name diptych (Sintoxos, folded double) was generally re¬ tained instead of triptych, tesseraptych, *etc.* Diptychs figure largely in the history of the Church for several centuries, being tokens of intercommunion between the assemblies of the faithful throughout the world. The use of dip¬ tychs in the liturgical service was in full vogue in the middle of the 4th century and it must have commenced much earlier. It was con¬ tinued in the Latin Church to the 12th century and in the Greek Church to the 15th. The Diptychs of the Living had inscribed on them the names of the pope, patriarchs, bishops then living and presiding over the faithful in their respective spheres ; also the names of the clergy of the particular churches in which they were kept ; names also of benefactors of the churches, of the emperor and the empress, *etc.* For all these the faithful offered their prayers. The Diptychs of the Dead contained usually the names which had once been written in the Diptychs of the Living. In the diptychs were also inscribed the names of the Virgin Mary, martyrs and other saints. If any name, whether of the living or the dead, was erased from the diptychs it signified that the person was re¬ garded as out of the communion of the Church. The diptychs both of the living and dead were read from the mnbo or pulpit to the congrega¬ tion. Church calendars and martyrologies seem to have had their origin in the diptychs. In

the Roman Missal, the marks of the diptychs are very evident. At the prayer, ®Te igitur,® the names of the reigning pope and the bishop of the diocese are mentioned. In other prayers of the Mass the diptychs are followed. Con¬ sult Kraus, ˆReal-Encyclopadieˆ ; Benedict XIV, <De Missa.>

DIPUS. See Jerboas.

DIQUE, dek. Canal del, Colombia, an ®artificial armˆˆ of the Magdalena River in the de¬ partment of Bolivar. It is navigable by steam¬ ers, and is a means of communication between Cartagena and the interior of the republic. Its total length is about lˆyˆ miles, , and in its course it passes through several swamps and receives the waters of various conduits, reach¬ ing the coast south of Cartagena.

DIRˆ, di're, or EUMENIDES. See

Furies.

DIRCE, der'se, in Greek legend, the second wife of Lycus, king of Thebes, who from jeal¬ ousy imprisoned Antiope, whom Lycus had di¬ vorced in order to marry herself; but Jupiter set Antiope at liberty, when she soon gave birth to two sons, Amphion and Zethus. These latter grew up in ignorance of their parentage. They were commanded by Dirce to bind Antiope to the horns of a wild bull that she might be dragged to death ; but having learned the secret of their relation to Antiope, they compelled Dirce to accept the fate she had designed for their mother. The gods, pitying her misfor¬ tunes, changed her into a spring, which bears her name and flows near Thebes.

DIRCKS, Henry, English civil engineer: b. Liverpool, 26 Aug. 1800; d. Brighton, 17 Sept. 1873. After 1827 he lectured on chemistry and electricity; later becoming distinguished as a railroad and mining engineer. He also made several inventions, including the mechanical de¬ vice known as ˆPepper's Ghost.® He published ˆJordan-Type, otherwise called Electrotypeˆ (1852); ˆHistory of the Search 'for Self Mo¬ tive Powerˆ (1861) ; ˆThe Ghost as Produced in the Spectre Dramaˆ (1863) ; Hnventions and Inventorsˆ (1867), *etc.*

DIRECT AND INDIRECT TAXES, the former are those which in theory the bearer cannot transfer to others, by adding correspond¬ ent charges to goods or service; as distin¬ guished from indirect, those on goods for sale, which will be added to their selling price. Direct taxes are laid according to some fixed fact, as of personality, rank, property

or earn¬ ings, and are consequently assessed according to some list or roll. Indirect taxes are laid according to some changing, temporary, more or less accidental fact, the result of processes and transactions, and are laid and collected ac¬ cording to tariffs. Direct taxes in current un¬ derstanding include taxes on polls, property, incomes and privileges — that is, fees and licenses for doing business, keeping pets, car¬ riages, *etc.* But the Supreme Court of the United States, in the income-tax cases, decided that only taxes on polls and property are direct ; which is law for this country. The theory at best does not quite conform to facts. Taxes on real estate occupied by the owner, for ex¬ ample, are not transferable ; but those on prop¬ erty for rent are so much added rent charge, and as indirect as customs duties. The heavy

license fees charged by many municipalities for doing certain classes of business are pro tanto an increase of the business expense, and must be met in the charges if the business is to live; often, indeed, they are used openly as ^pro¬ tective,® to give industries of one State an ad¬ vantage over others — this is especially so with insurance companies. On the other hand, in¬ come taxes on salaries cannot in practice be transferred, as an employer will not raise sal¬ aries on account of his employees' taxes; while those on mercantile incomes are in the same category as those on licenses, and can to some extent be recouped from customers. All State and municipal revenues in the United States are raised from direct taxes in the broader sense ; the constitution prohibits them from laying duties on exports or imports, but not on internal manufactures, which, however, are also left en¬ tirely to the general government. In American usage, indirect taxes generally refer to customs and internal revenue duties. On the Continent of Europe they include the octroi and other forms of municipal taxes. Historically, indi¬ rect taxes preceded direct taxes, because sov¬ ereigns found it necessary to disguise the collec¬ tion of revenue and secure it by methods more or less concealed. Although this motive no longer exists in its cruder aspects, there is no doubt that it is easier to collect revenue through increased prices of commodities than by direct payments to the treasury. Practically all of the Federal revenue is derived from indirect taxes. The Federal income tax is a notable ex¬ ception. The cost of collecting indirect taxes is as a rule greater than that of direct taxes. Only six times in its history has the Federal government resorted to direct taxation, in the narrower sense above: in 1798, 1813, 1815 and 1816, on real estate and slaves; in August 1861 a levy of $20,000,000 for war expenses was laid on all house lots with dwellings and improve¬ ments. The operation of the act was suspended 1 July 1862, when $15,000,0(X) had been

collected; and the act of 2 March 1891 refunded it to the States ; and on 3 Oct. 1913 the Underwood Tariff Act imposed on every citizen of the United States, and every person residing in the United States a personal income tax on his en¬ tire net income in excess of $3,000. Consult Bullock, ˆOrigin and Effect of the Direct-Tax Clauseˆ in Political Science Quarterly, XV (1909) ; Bastable, ˆPublic Financeˆ (2d ed., 1895) ; Seligman, ˆEssays in Taxationˆ (1897) ; Plehn, Hntroduction to Public Financeˆ (1909). See Revenue Tax; Income Tax; Imposts; Taxation.

DIRECT AND RETROGRADE, terms which, when used in astronomy, have reference to the real or apparent motion of the planets. When the planet moves forward or appears so to move, from west to east, in accordance with the order of signs in the zodiac, the motion is said to be direct. When the motion appears contrary it is said to be retrograde.

DIRECT LEGISLATION. See Referen¬ dum.

DIRECT PRIMARY. See Convention, Political; Primary, Direct Elections.

DIRECTORS, the persons authorized to manage and direct the affairs and business of a corporation or company. The directors are

sometimes called managers or trustees in ac¬ cordance with the purpose and nature for which the corporation or company was formed. At the present time, nearly if not all corporations are formed under general laws and it depends on the law under which the corporation is created as to the number of directors and their qualifi¬ cations. The general qualification is that all directors must be stockholders in the corpora¬ tion or, if it has no stock, they must be mem¬ bers of the corporation. The directors are gen¬ erally elected by the stockholders, and some States have passed laws allowing cumulative voting, by which each stockholder may multiply the number of his shares by the number of di¬ rectors to be elected, and

cast all his votes for one director or distribute them in any manner he desires. It has been held that this kind of a law is unconstitutional, if applied to corpora¬ tions created before the law was passed; as it impairs the obligation of the contract. It may be valid, if applied only to corporations created after the passage of the act. In some cases directors are appointed. The directors must act as a body and not as individuals. A ma¬ jority of the board of directors is necessary to a legal meeting and if that number is present a majority of those present will be sufficient to perform any act. When there is a quorum present, all acts performed are presumed to be done in the regular course of business. The directors for the purpose of the business of the corporation are held to be the corporation itself ; and their powers and duties depend on the laws under which the corporation is formed and the charter and by-laws of the corporation. Notice to the board of directors during a meeting of any matter in which they are required to act is notice to the corporation.

The directors are considered as general agents of the corporation, and they are the only ones that can manage the business of the cor¬ poration ; although the directors are generally elected by the stockholders they are responsible to the corporation and through the corporation to the stockholders. As the directors derive their power from the charter their acts are of no effect if they are outside of the delegated power; and all acts performed by the directors which are outside of their power must be passed upon by the stockholders.

While directors are sometimes called trus¬ tees, they are not held to the same strict ac¬ countability as an ordinary and regular trustee ; although their position is a fiduciary one. At common law directors are under no personal liability for the debts or obligations of the cor¬ poration. They are, however, liable to the stockholders in an action of tort for gross negligence or misfeasance in office resulting in loss to them. The directors may deal with the corporation the same as any other individual ; but they cannot use their position for any special benefit to themselves. They may even go so far as to buy up the indebtedness of the corporation and at a sale buy in and acquire the absolute title to the corporate property. The directors may delegate their power to an agent, as a private individual may do, and the agent's power is not impliedly revoked by a change of the members of the board, as the act of appointment is not that of the directors in¬ dividually but of the board. The directors have

a discretionary power and when it is honestly exercised there is no

one that can make them account for their acts. A frequent illustration of this power is in relation to suit by or against the corporation, as to whether they shall be brought or defended. If a director's individual interests are in conflict with the interests of the corporation the act must be fair and just to the corporation. Modern statutes have increased the liability of directors of corporations to an extent varying considerably in the different States of the Union. A provision sometimes made is one making directors personally liable for the debts of the corporation if they do not file annually with the Secretary of State a re¬ port upon the affairs and business of the cor¬ poration. Usually the motive of the director in taking the office is the prosperity of the concern as benefiting him in the position of a stock¬ holder. See Corporations.

DIRECTORS OF INCORPORATIONS.

See Corporations, Legal.

DIRECTORY, in French history, the exec¬ utive body established by the constitution of the French republic, 28 Oct. 1795. (Fr. directoire) . This body consisted of five members, called directors (directcurs) who were chosen by the Council of Elders from candidates presented by the Council of Five Hundred. Each director was president for three months in rotation, and one was compelled to make room for a new rnember every year. The unpopularity of the directory's home policy was increased in 1799 by the disastrous results of its war policy, and it was easily overthrown by the coup d'etat of Napoleon and his brother Lucien, 9 Nov. 1799. (See France). Consult Barante, ˆHistoire du Directoireˆ (3 vols., Paris 1855) ; Granier de Cassagnac, ˆHistoire du Directoireˆ (3 vols., ib. 1863) ; Guyot, We Directoire et la paix de rEurope> (ib. 1911) ; Pierre, Wa terreur sous leˆ Directoireˆ (ib. 1887) ; Sciout, We Directoireˆ (4 vols., ib. 1895-97); Sorel, W'Europe et la revolution frangaiseˆ (8 vols., ib. 1910).

DIRECTRIX (Lat. tinea directrix a direct¬ ing lineˆU, in mathematics, a line governing the direction of another line. If a point so move that its distance from a given fixed point is to its perpendicular distance from a fixed straight line in a constant ratio, it describes a conic sec¬ tion, of which the fixed straight line is termed the directrix and the fixed point the focus. The constant ratio referred to is termed the eccentricity, and its magnitude determines the nature of the conic. Thus, if in the figure, AB be the directrix and F the focus, if the point P move so that its distance from F is to its dis¬ tance PM from AB in a constant ratio, then P

will_ trace out a conic

■ ■’ — -m section, which will be

• an ellipse, parabola, or

hyperbola, according as the ratio in question y is less than, equal to,

/ * ^’**’’”^ p greater than unity

i — that is, FP is less

if \ than, equal to, or

greater than PM, or FV than VI. A quadric surface has a direc¬ trix with analogous relations. The fixed lines on which rests the line whose motion, right or curved, generates a surface, are called direc¬ trices or directing lines.

DIRHEM, der’am, or DRAMM, a modifi¬ cation of the Greek drachma, the name under the caliphs for a weight of silver equivalent to about 45 grains, and was also used for pre¬ cious stones and medicine in Arabia, Persia, Egypt and Turkey. As a coin the value varied, but may be given at 11 cents under the caliphs. In Turkey the name dirhem has been given to the much smaller weight, the French gramme.

DIRIGIBLE. Steerable, drivable ; usually applied to lighter than air flying machines which may be propelled and guided.

Form and Size. — If ability to rise in the air depended merely upon a knowledge of the principle that made it possible, dirigible navi¬ gation would undoubtedly have been accom¬ plished many centuries ago. Archimedes estab¬ lished the fact that a body upon floating in a fluid displaces an amount of the latter equal in weight to the body itself, and upon this theory was formulated the now well-known law that every body plunged into a fluid is subjected by this fluid to a pressure from below, equivalent to the weight of the fluid displaced

by the body. Consequently, if the weight of the latter be less than that of the fluid it displaces, the body will float.

Once in the air, a balloon is, to all intents and purposes, a part of the atmosphere. There is scarcely any sensation of movement, either vertically or horizontally. The earth appears to drop away from beneath and to sweep by horizontally, ‘and regardless of how violently the wind may be blowing, the balloon is always in a dead calm because it is really part of the wind itself and is traveling with it at exactly the same speed. If it were not for the loss of lifting power through the expansion and con¬ traction of the gas, making it necessary to per¬ mit its escape in order to avoid rising to incon¬ venient heights on a very warm day, and the sacrifice of ballast to prevent coming to earth at night the ability of a balloon to stay up would be limited only to the endurance of its crew and the quantity of provisions it was able to transport. Unless a voyage is to be governed in its direction entirely by the wind, the dirigible must possess a means of moving contrary to the latter. The moment this is attempted resistance is encountered, and it is this resistance of the air that is responsible for the chief difficulties in the design of the diri¬ gible. To drive it against the wind it must have power; to support the weight of the power plant necessary, the size of the gas bag must be increased. It is also necessary to select a form that presents as small a surface as pos¬ sible to the air as the dirigible advances, while preserving the maximum lifting power. Ex¬ perience has strikingly demonstrated the anal¬ ogy betwen the marine and aerial practice — not only is the shape of the bow of the vessel of great importance but, likewise, the stern. The profile of the latter may permit of an easy reunion of the molecules of air separated by the former, or it may allow them to come together again suddenly, clashing with one another and producing disturbing eddies just behind the moving body. Marey-Monge laid down the principle that to be successfully pro¬ pelled through the air, the dirigible must have ^^the head of a cod and the tail of a mackerel,^^ and nature exemplifies the truth of this in all VOL. 9 10

swiftly moving fishes and birds. The pointed stern prevents the formation of eddies and the creation of a partial vacuum in the wake, which would impose additional thrust on the bow. Zeppelin has disregarded this factor by adher¬ ing to the purely cylindrical form with short hemispherical bow and stern, but it is worth note that while other German investigators originally followed this precedent, they have gradually abandoned it, owing to the noticeable retarding

effect.

Next in importance to the best form to be given the vessel is the most effective size — something which has a direct bearing upon its lifting power. This depends upon the volume, while the resistance is proportional to the amount of surface presented. Greater lifting power can accordingly be obtained by keeping the diameter down and increasing the length. As the gas is frequently under considerable pressure when the balloon expands under the influence of the sun's heat, a great deal of experiment has been necessary to find the best class of fabric for the making of the en¬ velope. Under the pressure an ordinary fabric would stretch and permit the escape of a large percentage of the gas. It has been found impossible to weave any fabric that will be close enough to hold hydrogen under pressure, so that recourse is had to a combination of cloth and rubber. The cloth is an extremely fine weave of cotton, even closer and lighter than the best of racing yacht duck, and is com¬ bined with rubber under high pressures. Three layers of this rubberized fabric are cemented together to form what is known as ˆballoon cloth,® which is about as impenetrable a material as can be made without involving undue weight. The necessity of using rubber in it has intro¬ duced a complication, it having been found by experiment that rubber is strongly attacked by the ultra-violet rays of sunlight, which prob¬ ably accounts for the fact that balloon en¬ velopes are usually found more or less damaged after a high ascension, the influence of these rays being much greater at higher altitudes.

Stability. — Having settled upon the size and shape, there must be an appropriate means of attaching the car to carry the power plant, its accessories and control and the crew. While apparently a simple matter, this involves one of the most important elements of the design — that of stability. A long envelope of com¬ paratively small diameter being necessary for the reasons given, it is essential that this be maintained with its axis horizontal. In calm air, the balloon, or container, is subjected to the action of two forces. One is its weight, ap¬ plied to the centre of gravity of the system formed by the balloon, its car and all the supports ; the other is the thrust of the air, applied at a point known as the centre of thrust and which will differ with different designs, according as the car is suspended nearer or farther away from the balloon. If the latter contained only the gas to inflate it, with no car or weight to carry, the centre of gravity and the centre of thrust would coincide, granting that the weight of the envelope were negligible. As this naturally cannot be the case, these forces are not a continuation of each other. But as they must necessarily be equal if the balloon is neither ascending nor descending, it follows that they

will cause the balloon to turn until

they are a continuation of each other. As this would be neither convenient nor compatible with rapid propulsion, it must be avoided by distributing the weight along the car in such a manner that when the balloon is horizontal the forces represented by the pressure above and the weight below must be in the same perpen¬ dicular, This is necessary to assume a hori¬ zontal position while at rest. But the longi¬ tudinal stability of the airship as a whole must be preserved. Its axis must be a tangent to the course it describes, if the latter be cur¬ vilinear, or parallel with the direction of the course where the course itself is straight. This is apparently something which should be taken care of by the rudder, any tendency on the part of the airship to diverge from its course being corrected by the pilot. But a boat that needed constant attention to the helm to keep it on its course would be put down as a ®cranky^^ boat, in other words, of faulty design in the hull, A dirigible having the same defect would be difficult to navigate, as the rudder alone would not suffice to correct this tendency in emer¬ gencies. Stability of direction is accordingly provided for in the design of the balloon itself, and this is the chief reason for adopting the form of a large-headed and slender-bodied fish. This brings the centre of gravity forward and makes of the long tail an effective lever which overcomes any tendency of the ship to diverge from the course it should follow. However, the envelope of the balloon itself would not suffice for this, so just astern of the latter, ^^stabilizing surfaces® are placed, consisting of vertical planes fixed to the envelope. These form the keel of the dirigible and are analogous to the keel of the ship.

In addition to being able to preserve its static equilibrium and to possess proper longitu¬ dinal stability, the successful airship must also rnaintain its dynamic equilibrium • — the equilib¬ rium of the airship in motion. This may be made clear by referring to the well-known ex¬ pedients adopted to navigate the ordinary spherical balloon. To rise, its weight is dimin¬ ished by gradually pouring sand from the bags which are always carried as ballast. To de¬ scend, it is necessary to increase the total weight of the balloon and its car, and the only method of accomplishing this is to permit the escape of some of the gas, the specific lightness of which constitutes the lifting power of the balloon. The balloon, or the container itself, being merely a spherical bag, on the upper hemi¬ spherical half of which the net supporting the car presses at all points, the question of defor¬ mation is not a

serious one. Before it assumed proportions where the bag might be in danger of collapsing, the balloon would have had to come to earth through lack of lifting power to sustain it longer. Owing to its far greater size, as well as to the form of the surface which it presents to the air pressure, such a crude method is not applicable to the dirigible. Dy¬ namic equilibrium must take into account not only the dirigible's weight and the sustaining pressure of the air, but also the resistance of the air exerted upon its envelope. This resistance de¬ pends upon the dimensions and the shape of that envelope, and in calculations the latter is always assumed to be invariable. Assume, for instance, that to descend the pilot of a dirigible allowed some of the hydrogen gas to escape.

As the airship came down, it would have to pass through strata of air of constantly increasing pressure as the earth is approached. The rea¬ son for this will be apparent as the lower strata bear the weight of the entire atmosphere above them. The confined gas will no longer be suffi¬ cient to distend the envelope, the latter losing its shape and becoming flabby. As the original form is no longer retained, the centre of resist¬ ance of the air will likewise have changed to¬ gether with the centre of thrust, and the initial conditions will no longer obtain. But as the equilibrium of the airship depends upon the maintenance of these conditions, it will be lost if they vary. In the design of a successful dirigible, the proper location of the propulsive effort with relation to the balloon is a very im¬ portant factor. Theoretically, this should be applied to the axis of the balloon itself, as the latter represents the greater part of the resist¬ ance offered to the air. In theory, the balloon offers such a substantial percentage of the total resistance to the air that the area of the car and the rigging were originally considered practi¬ cally negligible by comparison. Actually, how¬ ever, this is not the case. Calculations show that the sum of the surface of the suspending rigging, passengers, air pump and other trans¬ verse members and exposed surfaces, total an equivalent of a quarter or even a third of the transverse section of the balloon itself. To in¬ sure the permanently horizontal position of the ship under the combined action of the motor and the air resistance, a position of the propel¬ ler at a point about one-third of the diameter of the balloon below its horizontal axis will be necessary. Without employing a rigid frame like that of the Zeppelin and the Pax, however, such a location of the shaft is a difficult matter for constructional reasons. Consequently, it has become customary to apply the driving effort to the car itself, as no other solution of the problem is apparent. This accounts for the tendency common in the dirigible to ˆffioat high

forward,® and this tilting becomes more pro¬ nounced in proportion to the distance the car is hung beneath the balloon. The term ˆMeviation® is employed to describe the tilting effect pro¬ duced by the reaction of the propeller. Con¬ flicting requirements are met with in attempting to reduce this by bringing the car closer to the balloon as this approximation is limited by the danger of operating the gasoline motor too close to the huge volume of inflammable gas. The best solution of the problem has been found by placing the motor in the car, and driving a shan so located between the car and the balloon by means of a chain.

The Speed.— ;-Various factors influencing the speed of a dirigible have already been referred to, but it will be apparent that the radius of action is of equally great importance. It is like¬ wise something that has a very direct bearing upon the speed and, in consequence, upon the design as a whole. It is evident that to be of any great value for military or other purposes, the dirigible must possess not only sufficient speed to enable it to travel to any point of the compass under ordinarily prevailing conditions of wind and weather, but it must likewise be able to rernain in the air for some time and cover considerable distance under its own power. In fact, one of the chief advantages possessed by the dirigible over the aeroplane at

present is its ability to make long sustained flights, while carrying a comparatively large crew and a great deal of extra weight. As is the case in almost every point in the design of the dirigible, conflicting conditions must be rec¬ onciled in order to provide it with a power plant affording sufficient speed with ample radius of action.

Power requirements increase as the cube of the speed, making a tremendous addition neces¬ sary to the amount of power to obtain a dispro¬ portionately small increase in velocity. In this connection there is a phase of the motor ques¬ tion that has not received the attention it merits up to the present time. The struggle to reduce weight to the attainable minimum has made weight per horse power apparently the para¬ mount consideration — a factor to which other things could be sacrificed. But it is quite as important to make the vessel go as it is to raise it in the air, so that the question of total weight per horse power hour will undoubtedly come in for much more attention in future, particularly since weight per horse power appears to have approached so closely the minimum attainable consistent with a due regard for reliability.

The relative importance of these two fac¬ tors may be appreciated from the following example :

Assume, for instance, a 100 horsepower motor of a total weight of 1,000 pounds, round figures being chosen merely for the sake of sim¬ plicity. The weight per horse power of such an engine would be 10 pounds. This would not be sufficient data, however, from which the design of a dirigible to employ that motor could be worked out. Pounds per horse power usually refers to a bare engine. The weight of cool¬ ing water, lubricants, accessories, and last, but far from least, that of the fuel must be added. For example, the motor referred to may be assumed to require one pound of fuel and lubricant per horse power to run it at its normal output. This means that it will consume 100 pounds per hour, or for a run of 10 hours 1,000 pounds, and this weight must be added to that of the motor itself in considering the design from the standpoint of radius of action. This factor depends en¬ tirely upon the efficiency of the motor, while its weight per horse

power is a question of its con¬ struction alone. It requires no abstract calcula¬ tion to show that it is quite as possible to have the same number of pounds for the weight per horse power if a very light engine that consumes a great deal of fuel is used as it is with a heavy engine that consumes very little. The diminution of the weight per horsepower hour makes pos¬ sible an increase in the duration of the voyage, which is a very desirable advantage, but as the prime factor is the ability to rise, improvement that involves the addition of weight is closely re¬ stricted by the lifting power available, so that radius of action is governed by numerous con¬ siderations. Take a dirigible with a gas capacity of 12,000 cubic feet, equipped with two 60 horse¬ power motors, giving it a speed of 36 miles per hour. The engines will consume 130 pounds of fuel per hour, and the machine, with six passen¬ gers, will have sufficient lifting capacity to carry 1,300 pounds of gasoline. This would mean traveling for 10 hours, or 5 hours in each direc¬ tion. The radius of action of this dirigible would be 180 miles.

Speed is quite as costly in an airship as it is in an Atlantic liner. To double it the motor power must be multiplied by 8 and the machine must carry 8 times as much fuel. The wind is a serious factor that has to be taken into con¬ sideration. Radius of action as above considered has been based entirely upon traveling in a dead calm. True, where the prevailing wind blew from a certain quarter for a length of time, its favoring influence in going would be neutralized by its resistance in returning, so that the result would be the same, providing the velocity of the wind were not too great to prevent returning at all against it.

When the speed of the dirigible is greater than that of the prevailing wind the dirigible may travel in any direction ; when it is consider¬ ably less it can travel only with the wind ; when it is equal to the speed of the latter it may travel at an angle with the wind — in other words, tack, as a ship does, utilizing the pressure of the contrary wind to force the ship against it. But as the air does not offer the same hold on the hull of the airship as water does on the sea-go¬ ing ship, the amount of drift in such a manoeu¬ vre would doubtless be excessive and the for¬ ward motion practically nil.

The Zeppelin Type. — Outwardly a Zeppelin may be described as a long cylinder with ogival ends and a V-shaped keel running the length of its bottom. From afar the cylinder and pointed ends appear circular in cross section, but they are 16-sided. About one-third of the distance

from either end of the great ship a small boat is suspended from the hull so closely that at those places the keel is omitted to make room. These two boats are rigidly connected with the hull and support it when the vessel rests on or is towed along the water. Within them are the crew and petroleum engines, while above them and outward on each side of the hull and fas¬ tened to it by outrigging are two pairs of screw propellers, so placed as to exert their united thrust along the line of resistance. In some cases the crew can walk through the V-shaped keel from one boat to another, the passageway being illuminated here and there by transparent covering. Again an observer may climb up through the hull and take observations of the sky from above. Telephones, electric bells and speaking tubes serve to transmit intelligence from one part of the vessel to another.

The frame of the hull is formed of 16 or more longitudinal beams or girders of trellised metal work running from prow to stern and riveted at regular intervals to cross bridges of similar trellised metal work, each cross bridge being a 16-sided wheel with trellised rims strengthened by radial rods running inward to a central flange of sheet aluminum. Thus the body of the vessel is divided into many compart¬ ments, each bounded by two wheels and the sur¬ rounding longitudinal beams. Each compart¬ ment contains a hydrogen balloon or sac, which fairly fills it and exerts a lift against the longi¬ tudinal beams and against a netting formed of ramie cords stretched from wheel to wheel, diagonally between beams at their inner corners. Similarly the outward corners of the beams are joined by strong diagonal wires for the purpose of rigidity, and the whole external frame is covered with a heavy fabric which forms the outer skin or wall of the hull. Between this skin and the hydrogen bags are air spaces, as

also between bag and bag. Thus the whole vessel is buoyed up by numerous thin hydrogen sacs, protected by the frame and outer skin from the direct sun, from foul weather and from external shocks. The modern Zeppelin is supported by about 18 separate gas bags, each of

which contains within itself a small air balloonet, in which the air pressure is maintained at a given point by means of an automatic air pump and relief valve. If, therefore, the tem¬ perature of the hydrogen in the gas bags be¬ comes high enough to expand the gas, the pressure set up by it on the outside of the balloonet forces the air out of the balloonet through the relief valve, and the correct pressure is in that way adjusted without the loss of hydrogen. The converse happens in case the temperature of the hydrogen falls, and its bulk for that reason becomes less. When it becomes necessary to reduce the buoyancy of the machine hydrogen can be pumped from the gas bags and stored in a compressing cylinder, this hydrogen being available for use later when desired to increase the buoyancy again. By the simul¬ taneous manipulation of horizontal rudders and ˆtrimming® devices and the discharge of ballast a Zeppelin can shoot up to a higher level at the rate of 2,000 feet per minute, the engines in this case assisting the lifting power of the gas.

The size of the Zeppelin ‘has changed con¬ stantly since 1912, as shown by the following

table :

Cubic Length Diameter

metres metres metres

Type 1912 . 19,500 141 14.80

Type 1913 . 22,000 156 14.80

Type 1914. . 27,000 158 16.58

Type 1915 . 30,000 which should give a

length of about 160 metres.

Other Types. — The Lebaudy airship em¬ ployed by the French is an example of the semi¬ rigid type of dirigible. In this design a sub¬ stantial keel extends to the full length of the vessel ; and to this keel is attached the machin¬ ery, together with the accommodation arrange¬ ment for the crew. The keel is securely fixed to the gas bag above it, to which it gives very considerable support. In the German service the Gross airship is another of this type. The envelope of a non-rigid airship keeps its shape only by the pressure of its gas, the car carrying the machinery *etc.* The German Parseval, French Clement-Bayard and the Astra Torres are all examples of this type.

The Parseval gas bag is provided with an air-balloonet in its forward end and another aft, the amount of air in each of these balloonets being controlled by a pump in the car. When it is desired to alter the trim of the ves¬ sel, air is transferred from the container in the forward end to the other one, with the result that the after end of the ship becomes the heavier. A cord attached to the exterior of the balloonets passes through the hydrogen to a valve in the exterior of the gas bag. If the hydrogen expands to such an extent that the combined capacity of these vessels is insuffi¬ cient to relieve the excessive pressure, their collapse causes a strain on the cord which opens the relief-valve in the gas bag and allows some of the hydrogen to escape.

During the first few months of 1916, the British authorities developed a dirigible of con¬ siderable importance. Small of structure, its

range is naturally limited, but it is capable of great speed which makes it a particularly de¬ sirable instrument. A unique feature of this

dirigible is its car, which constitutes an ordinary fusilage of a British army aeroplane complete with its engine tractor air-screw or propeller. Even the landing gear wheels are retained. This is particularly practicable for small struc¬ tures where it advantageously does away with the heavy car, which togethei with the elaborate engine mounting and propeller transmissions greatly reduces the load and also reduces head resistance which greatly retards the speed of the vessel. During the year 1916 only one dirigible was constructed in the United States — a small vessel of a type of construction which embodied no departure from European practice. See Military Aeronautics.

G. Douglas Wardrop, Managing Editor, Aerial Age.

DIRK, a kind of dagger formerly carried sheathed between skin and stocking as a wea¬ pon by the Higlanders of Scotland. Dirks are worn by midshipmen and cadets of the British navy. See Dagger.

piRK-HARTOG, derk-har'tog, ISLAND, an island on the west coast of western Austra¬ lia, at one of the entrances to Shark Bay, which it partly encloses ; area, about 250 square miles. It forms a plateau with good pastures and plenty of water. The pearl oyster and edible oysters are here in great abundance.

DIRSCHAU, der'show, Poland, city, about 19 miles southeast of Danzig, on the Vistula. The city has railroad and machine shops and large sugar works. Possessed by the Knights of the Teutonic Order in 1360, it became Pol¬ ish in 1466 and fell into the hands of Prussia at the first partition of Poland in 1772 and was returned to Poland in 1919. Pop. 16,894.

DIS (also Orcus and Tartarus), in Roman mythology the name given to Pluto, the Greek god of the lower regions. The word dis is akin to divus, and originally denoted merely godhead.

DISABILITY, in law, when absolute dis¬ ables the party from holding public office or doing any legal act, and is usually the result of murder, outlawry or any outrage upon person or property. Aliens, infirm and aged persons dependent on public charity, are under this ban of incapacity, and in some Catholic countries those individuals who have been excommuni¬ cated. There is a disability termed partial that covers infancy, minority, lunacy and drunken¬ ness. Also a term in accident insurance policies which, on account of inability to work or per¬ form natural duties resultant from injuries, provides payment for the afflicted party. See Attainder.

DISASSOCIATION. See Dissociation.

DISASTERS OF THE WORLD, Not¬ able. In man's unceasing war with Nature and gradual harnessing of her forces in the advance of civilization. Nature has shown frequent and often appalling signs of rebellion, exhibiting by a simple letting go of her tremendous forces how artificial and pitifully puny are man's greatest efforts, even yet. In the following classified list of ®Great Disasters,® one may gather the hopeful fact that in the domain of

ˆEarthquakes® alone mankind is absolutely help¬ less ; that the dangers from ˆˆConflagrations,® ˆFloods® and ˆShipwrecks® may be at least mitigated ; and that a final conquest of “Plagues and Pestilences® is now at hand. In the pre¬ ponderating prevalence of “preventable dis¬ asters,® however, due to man’s carelessness, ig¬ norance of natural laws or disregard of human life, there is food for thought and radical remedial action.

CONFLAGRATIONS.

1666, Sept. 2—6 — London: 89 churches, many public build¬ ings, and 13,200 houses destroyed; 200,000 persons homeless,

1825, Oct. 6 — New Brunswick: Miramichi Forest fires; 160 persons perished.

1835, Dec, 16 — New York: 600 buildings; loss $20,000,000. 1839, Sept. 6 — New York: $10,000,000 worth of property destroyed.

1845, April 10 — Pittsburgh: 1000 buildings; loss $6,000,000.

1850, July 9 — Philadelphia: 350 buildings; 25 persons killed; loss $1,500,000.

1851, May 4 — St. Louis: large part of city burned; loss

$15,000,000.

1851, May 3—5 — San Francisco: 2500 buildings destroyed with loss of many lives and property loss of $3,500,000. June 22 of the same year a second fire occurred with a loss of $3,000,000.

1863, Dec. 8 — Santiago, Spain: Church of the Campania burned with loss of 2000 lives, mostly women.

1865, Feb._ 17 — Charleston, S. C. : almost total destruction. 1865,

April 2—3 — Richmond, Va.: large portion destroyed by Confederates,

1865, July 4 — Portland, Me.: almost complete destruction with loss of $15,000,000.

1871, Oct. 8-9 — Chicago: 3ˆ miles laid waste; 200 persons killed; nearly 100,000 made homeless; 17,450 buildings destroyed. In 1874 another fire in Chicago destroyed property to the value of $4,000,000,

1871, Oct. 8—14 — Michigan and Wisconsin: forest fires caused loss of 2000 live?.

1872, Nov. 9-11 — Boston: 600 buildings; loss of $73,000,000. 1877, June 20 — St. John, N. B.: loss, $12,500,000.

1876, Dec. 5 — Brooklyn theatre. 300 lives lost.

1889 — Seattle and Spokane: loss about $10,000,000 each.

1900, April 26 — Hull and Ottawa: loss $10,000,000.

1901, May 3 — Jacksonville, Fla.: loss, $10,000,000.

1903, Dec. 30 — Chicago: Iroquois theatre, 639 lives lost.

1904, Feb. 7-8 — Baltimore: 75 city blocks destroyed, covering 140 acres; loss $85,000,000.

1904, April 9 — Toronto: business district largely destroyed, loss $12,000,000.

1906, April 18 — San Francisco: four square miles burnt out; loss $350,000,000.

1908, Aug. 2 — Kootenay Valley, B. C,: town of Femie and neighboring places destroyed.

1914, June 25, 26 — Salem, Mass: 1700 buildings destroyed; loss $14,000,000.

1916, Feb. 3 — Ottawa: Parliament buildings of Canada.

1916, July 30 — New York Harbor: Black Tom Island Ex¬ plosion and fire; loss $11,000,000.

1917, Dec. 6 — Halifax, N. S.: Explosion of war materials and fire; 1500 killed, 4000 seriously injured, 20,000 rend¬ ered homeless,

property loss $50,000,000.

GREAT FLOODS AND INUNDATIONS.

353 — Cheshire, England: 3000 persons drowned,

1103 — Flanders: town and harbor of Ostrud inundated by the sea and completely submerged.

1421, April 17 — Dort: 72 villages submerged, 100,000 persons drowned.

1530 — Holland: general inundation by failure of dikes; 400,000 persons drowned.

1617 — • Catalonia: 50,000 drowned.

1889, May 31 — Johnstown, Pa.: town nearly destroyed and 6000 persons drowned.

1896, Japan: 27,000 lives lost, 60,000 homeless.

1900, Sept. 8 — Galveston: swept by tidal waves and more than 6000 lives lost; $30,000,000 damage.

1909-10 — The principal streets of Paris inundated by a flood in the Seine, the water rising 31 feet and 4 inches above normal.

1912 — Floods in Mississippi Valley made 200,000 homeless and caused the loss of several hundred lives and $45,000,- 000 damage.

1913, March 31 — April 1: 415 lives lost and damage esti¬ mated at $180,000,000; Dayton, Ohio, nearly destroyed.

1915, July 12; China, Kwantung, Kwangsi, and Kiangsi; several thousand lives lost, and $90,000,000 damage.

1921, June: Floods in Arkansas River Valley. Many lives k)st. Pueblo, Col., nearly destroyed.

(

GREAT EARTHQUAKES.

B. C.

425 — Euboea made an island by an earthquake.

345 — Duras in Greece, and twelve cities in Campania buried.

A. D.

17 — Ephesus overturned.

•79 — Pompeii and Herculaneum destroyed accompany¬ ing an eruption of Mount Vesuvius.

115 — Autiocle destroyed.

157 — Asia and Macedonia: 150 towns destroyed.

557 — Constantinople: thousands perished.

742 — Syria, Palestine and Asia: terrible loss of life.

936 — Constantinople overturned.

1268 — Cilicia: 60,000 perished.

1318 — ’England; greatest earthquake ever known there.

1456 — Naples: 40,000 perished.

1531 — Lisbon: 30,000 buried.

1626 — Naples: 70,000 perished.

1667 — Shamazi: 80,000 perished.

1693 — Sicily; 354 cities and towns destroyed; over 100,000 perished.

1703 — Jeddo (now Tokio): 200,000 lives lost.

1731 — China: 100,000 perished.

1745 — Lima and Clallao demolished; 18,000 destroyed.

1755 — Lisbon; the great “earthquake,” 50,000 persons and most of the city destroyed.

1797 — Cuzco and Quito destroyed; 40,000 buried

1822 — Aleppo destroyed; over 20,000 perished

1857 — Many towns in Kingdom of Naples destroyed; 10,000 perished.

1868 — Arequipa, Iquique, Tacna and Chincha and many other towns in Peru and Ecuador razed; 25,000 perished; damage $300,000,000.

1874 — Cities in Guatemala destroyed with great loss of life.

1883 — Java and neighboring islands desolated.

1886 — Charleston, S. C.: 41 lives and $5,000,000 worth of property lost.

1887 — Great shocks in southern Europe in the Riviera.

1906, April 18 — San Francisco and neighboring towns;

earthquake followed by fire; over 1000 lives lost and $300,000,000 of property destroyed. The business section of San JosI was destroyed at the same time.

1908, Dec. 28 — Southern Italy was visited by a most destructive earthquake — many towns being almost entirely destroyed and 150,000 lives being lost. See Earthquakes.

PLAGUES AND PESTILENCES.

B. c.

767 — A great plague prevalent through the world.

534 — Cantiage; multitudes affected.

461 — Rome; 100,000 perished.

A. D.

80 — Rome; 10,000 deaths daily.

167-189 — Roman Empire stricken with sickness through¬ out.

250-265 — Roman Empire again devastated; many towns depopulated.

430 — Britain; so many died from plague that not enough were left to bury the dead.

746-749 — 200,000 died at Constantinople of a contagious disease.

772 — Chichester, England; 34,000 died in an epidemic,

954 — Scotland; 40,000 perished.

1172 — Ireland; plague so severe it drove back English invaders.

1340 — The ” Black Death” spread through all Christen¬ dom, causing unprecedented mortality.

1362-79 — Frightful mortality in western Europe.

1383 — The “ Fourth Pestilence ” in Ireland.

1485 — The “ Sweating sickness ” makes its appearance and rages at intervals for nearly 100 years, and with dreadful mortality.

1603-04 — 30,000 perished in London.

1611 — 200,000 died at Constantinople.

1625 — London was again visited; 35,000 died.

1632 — ■ 60,000 died in an epidemic at Lyons.

1656 — At Naples 400,000 died in six months.

1664-65 — ” The Great Plague ” at London; 10,000 died.

1720 — Marseilles lost 60,000 by pestilence.

1741 — Yellow fever makes its appearance in New York.

1760 — Awful plague in Syria.

1773 — France devastated by “ putrid fever.”

1784 — 20,000 died of the plague in Smyrna.

1791-98 — Yellow fever appeared in various places on the Atlantic coast. New York, Philadelphia and Baltimore suffered especially.

1799 — At Suez the plague destroyed 250,000.

1805 — Yellow fever in New York; great fatality; 37,000 out of 70,000 fled from the city.

1814 — Terrible plague in Asia Minor, Palestine and Greece.

1817 — Asiatic cholera started at Calcutta; great mortality.

1818 — Vast numbers perished of cholera in Bombay, Ceylon, Siam and Malacca.

1819-22 — Yellow fever was again prevalent in the United States. The same year Tunis was half depopulated by the plague.

1823 — The cholera extended to the Mediterranean Sea.

1830 — Cholera appeared in England.

1831-2 — Cholera invaded Russia and France. In Paris the mortality was 15,000.

1832 — Cholera crossed the Atlantic, and appeared at Quebec, Montreal and New York, and passed thence to other cities. In the Canadian cities 2000 died, and in New York 3000.

1848-49 — Another visitation of cholera in England and' America.

1865 — Large numbers died at various points in Europe, of cholera.

1878 — Yellow fever devastated many southern towns in the United States.

1884-85 and 1892 — Cholera again raged in various parts of Europe.

OCEAN •DISASTERS.

1778 — Brig Reprisal, foundered off Newfoundland; lives lost, 130.

1780 — The Saratoga, sailed and never heard from; 170 lives lost.

1800 — The Pickering, never heard from; 90 lives lost.

1800 — U. S. Frigate Insurgent, sailed from Hampton Roads and never heard from; 380 lives lost; the greatest wreck disaster to the American Navy.

1814 — Sloop of War, Wasp, last spoken near the Madeira Islands, never heard from afterward; 140 lives lost.

1814 — Sloop of War, Epervier, sunk by collision with British ship Bombay, which passed on without offering assistance; 128 lives lost.

1837 — British transport Albeuria, foundered in the Gulf of St. Lawrence; regiment from garrison at Quebec on board; 525 lives lost.

1840 — Steamer Dundee, Gulf of St. Lawrence; 292.

1841 — The President, left New York and never heard from

120.

1854 — The Arctic, sunk by collision near Grand Banks;

322.

1856 — The Collins liner Pacific, sailed from Liverpool and never heard from; 288.

1857 — Steamboat Montreal, lost 15 miles above Quebec; 253.

1858 — Steamer Austria, burned in mid-ocean; 470.

1863 — Steamer Anglo-Saxon lost off Cape Race; 237.

1866 — Steamer London, foundered in the Bay of Biscay; 220.

1866 — Steamer Evening Star, foundered at sea; 250.

1867 — Royal Mail steamers Rhone and Rye-, 1000.

1868 — The City of Glasgow, lost on the Grand Banks; 489.

1869 — The Vicksburg, off Cape Race; 65.

1870 — The City of Boston, sailed from New York and was never heard from ; 191.

1873 — The White Star liner Atlantic, lost; 585.

1873 — The Ville du Havre, collision in mid-ocean; 226.

1875 — The Schiller, wrecked in mid-ocean; 312.

1878 — The Pomerania, collision in English Channel; 47.

1881 — Steamer Teuton, lost off Cape of Good Hope; 331.

1883 — The Cambria, collision in North Sea; 389.

1883 — Steamer Daphne, turned turtle in the Clyde; 124.

1884 — Steamer City of Columbus, ran ashore off Gay Head Light, Mass.; 99.

1884 — Spanish steamship Gijou, collision off Finisterre; 150.

1884 — Bark Pomena, collision mid-ocean; 145.

1887 — Steamer Kapunda, collision off coast of Brazil; 300.

1887 — British steamship Wah Yeung, burned near Hong Kong; 400.

1889 — U. S. warships Trenton, Vandalia and Mipsic, and German ships Adler and Eber, wrecked by hurricane off Samoa; 147.

1890 — Steamer Persia, wrecked on Corsica; 130.

1890 — British steamer Duburg, wrecked in China Sea; 400.

1890 — British steamship Ouetta, foundered in Torres Straits;

124.

1890 — Turkish brig Ertogrul, foundered off coast of Japan;

540.

1890 — British steamer Utopia, collision off Gibraltar; 574.

1892 — Steamer Namehow, wrecked in China Sea; 414.

1893 — Anchor liner Trinalria, wrecked off the coast of Spain; 115.

1893 — H. M. S. Victoria, rammed in Mediterranean; 350.

1894 — Steamer Norge, wrecked on Rockall Reef in the North Atlantic; 600.

1895 — German steamer Elba, sunk by collision in the North Sea; 335.

1898 — U. S. Battleship Maine, blown up in Havana harbor;

260.

1898 — French liner La Bourgogne, collision off Sable Island;

584.

1904 — Excursion boat General Slocum, burned in East River; more than a thousand lives lost.

1905 — Japanese warship Mikasa-, 500.

1907 — Steamer City of Berlin, off the coast of Holland; 150.

1908 — The Ying King, foundered off Hong Kong; 300.

1908 — The San Pablo, off the Philippine Islands; 100.

1909 — British steamer Waratah, left Port Natal and never heard from; 300.

1911 — From April 1, 1911 to April 1, 1912, there were 66 disasters at sea, with an aggregate money loss of $35,000,- 0(K); 1718 lives lost.

1912, April 15 — The White Star liner Titanic, collision with

iceberg off the Grand Banks; 1503.

1914, May 29 — Canadian Pacific liner in collision with the

Storstad in St. Lawrence River near Father Point; 900.

1915, July 24 — Steam, boat Eastland capsized at wharf on

Chicago River; 852.

DISBARMENT, the expulsion of an at¬ torney, counselor or advocate from practice at the bar, this act depriving him of the privileges of his profession. A lawyer suffers this pen¬ alty if adjudged guilty of any misconduct of grave nature, as gross contempt of court, bri¬ bery, etc., or of notoriously evil character. In England this prerogative is reposed in the four Inns of Court, which have the power of admis¬ sion to the bar, and in Scotland jt is in the hands of the Faculty of Advocates, which is pos¬ sessed of similar powers to those of the Inns of Court; but in the United. States the courts alone have power to deal with an offender. Before disbarment the accused is given every opportunity to refute the charge, being allowed to defend himself in open court. A lawyer so dealt with may, at the discretion of the authori¬ ties, be restored when sufficient proof is brought them that there is no likelihood of a future offense.

DISCHARGE. (1) In architecture, the relieving part of a wall or a beam or other piece of timber from the superincumbent weight by means of an arch thrown over it. (2) In hydraulics, the issuing direction of water from a reaction or turbine wheel; as the out¬ ward discharge or Fourneyron turbine ; the vertical discharge, or Jonval turbine; the centre discharge, *etc.* (3) In bankruptcy, a writing or document certifying that a bank¬ rupt has satisfactorily passed the necessary forms and is thereby discharged from all fur¬ ther responsibility for the debts contracted by him previous to his bankruptcy. (4) In the military and naval services, a document given to each soldier or sailor on his dismissal from or quitting the service, in which are detailed full particulars as to his length of service, con¬ duct, reason for discharge, *etc.* (5) In elec¬ tricity it signifies the removal of the charge by communication between the positive and nega¬ tive surfaces or poles, or with the earth. (6) In dyeing, a substance such as chloride of lime or nitric acid, used by calico-printers to re¬ move a color. Suppose a white pattern is to be produced on a uniformly colored ground. The cloth is first dyed and then the pattern is printed with an acid, such as the tartaric, thick¬ ened with gum. When passed through a dilute solution of bleaching-powder, the acid decom¬ poses it and the liberated chlorine destroys the color at the parts where the pattern was printed. Sometimes the cloth is prepared at the same time for subsequent pigment printing.

DISCIPLE, literally, one who learns any¬ thing from another; and hence the followers of any teacher, philosopher or head of a sect. In

this sense the word is sometimes used in Scripture, as when we read of the disciples of Moses, of John, of Christ. Generally, however, it is used with reference to the last of these — the followers of Jesus. Sometimes all who re¬ ceived the doctrines of Christ are called dis¬ ciples, but in a more limited sense, it is ap¬ plied to the 70 or 72 persons who were his more immediate personal followers. Someˆ

times it is used as synonymous with apostle and is thus applied to the inner circle of the Twelve.

DISCIPLES OF CHRIST. The religious movement, whose representatives have come to be known as Disciples of Christ, or Christians, may be said to date its origin from the ˆDec¬ laration and Addressˆ issued by Thomas Camp¬ bell, September 1809, and endorsed by his son, Alexander Campbell, who later became the leader of the movement. Thomas Campbell migrated from the northern part of Ireland in 1807 to seek a home for himself and his family in the New World. He located near Washing¬ ton in western Pennsylvania. He was related by blood to the poet Thomas Campbell, and was a man of learning and profound piety. Being a minister in the Seceders' branch of the Presbyterian Church, he entered upon his labors in connection with that denomination im¬ mediately upon his arrival in this country. His experiences in seeking to assemble the scattered people of God of different names and creeds and to instruct them in spiritual things led him to realize more fully the evils of divisions among Christians. In his efforts to promote greater unity and cooperation among the mem¬ bers of these different sects, he found himself in conflict with the ecclesiastical authority under which he was working and was brought to trial before his presbytery, which censured him for his course. Mr. Campbell soon withdrew from the ecclesiastical authority under which he had been preaching but continued his min¬ istry to an increasing number of people in private dwellings and wherever else an audi¬ ence could be gathered.

In the ˆDeclaration and Addressˆ referred to it was declared that ®the Church of Christ upon earth is essentially, intentionally, and con¬ stitutionally one, consisting of all those in every place that profess their faith in Christ and obedience to Him in all things according to the Scriptures, and that manifest the same by their temper and conduct; and of none else, as none else can be truly and properly called Chris¬ tians.® While admitting the necessity of ˆMis-tinct societies, locally separate one from an¬ other,® this new declaration of independence declared that ˆffhere ought to be no schisms, no

uncharitable divisions among them. They ought to receive each other as Jesus Christ also re¬ ceived them, to the glory of God, and for this purpose they ought all to walk by the same rule; to mind and speak the same things, and to be perfectly joined together in the same mind and in the same judgment.® The address adds that *in order to do this, nothing ought to be inculcated upon Christians as articles of faith, nor required of them as terms of com¬ munion, but what is expressly taught and en¬ joined upon them in the Word of God. Nor ought anything to be admitted as of divine ob¬ ligation in their church constitution and man¬ agement but what is expressly enjoined by the authority of our Lord Jesus Christ and his apostles upon the New Testament Church, either in express terms or by an approved precedent.®

In a word, the new movement had for its aim no less an object than the unity of Chris¬ tians as they were one in the apostolic Church. In order to realize this consummation in har¬

mony with the Lord's intercessory prayer they decided to reject all party names for those given in the New Testament, and all human creeds or formulas as authoritative or binding on the human conscience, or as bases of fellow¬ ship, and to take the word of God alone as their rule of faith and practice, and especially the New Testament, which was given for the guidance and instruction of Christians in their new life in Christ. Believing it to be necessary to return to the original foundation and prac¬ tice of the Church in order to realize its unity and its power, they made a fresh study of the New Testament to ascertain (1) what was the essential creed or confession of faith required in the early Church; (2) on what conditions persons were received into its membership ; and (3) what was the nature of their organization and government. They reached the conclusion that the confession of faith made by Simon Peter, on which Jesus declared he would build his Church, namely, ®Thou art the Christ the Son of the living God® was the creed of Chris¬ tianity and the essential faith, and that all those who would make this confession from the heart, being penitent of their past sins, were to be admitted by baptism into the membership of the Church ; that baptism in the early Church consisted of the burial of a penitent believer in water in the name of the Father, and of the Son, and of the Holy Spirit, and that only such were fit subjects for baptism; that the form of Church government was congregational ; that each congregation had its deacons and elders or bishops, the former to look after the tem¬ poral and the latter the spiritual interests of the Church. The Lord's Supper, it was found, was

observed at first daily perhaps, but later weekly, on the first day of the week, in remembrance of Christ's suffering and death. Hence they prac¬ tise weekly communion.

With this plea for the New Testament basis of fellowship, and a return to the original purity and simplicity of the gospel and church organi¬ zation, the disciples have made a marvelously rapid increase. The movement at present in the whole world has reached a numerical strength of 1,307,502, having its colleges, its religious journals, and its missionary, educa¬ tional and benevolent organizations, all of which are doing effective work. The American Christian Missionary Society is the national organization for home missions. The Foreign Christian Missionary Society, as its name indi¬ cates, has for its object the evangelization of the world. Besides this the Christian Woman's Board of Missions is an organization of the Christian women, which is doing mission work in both the home and foreign fields.

The Disciples of Christ raised $6,378,493.03 for current expenses in one year, while con¬ tributing a grand total of $2,294,522.08 for all religious purposes in that year. They are sup¬ porting missions in India, China, Japan, Africa, the Philippines, Cuba, Porto Rico, Mexico, Scandinavia and Turkey. Their aim is to be evangelical without being sectarian, and to be liberal without being latitudinarian. They attribute their success to their advocacy of Christian union, the simplicity and directness of their preaching and the freedom which they enjoy, untrammeled by human creeds or by any hierarchial authority.

The following statistics are taken from the

1918 Year Book:

Churches in the world . 9 , 690

Communicants in the world . 1 . 307 , 502

Bible schools (Sunday schools) . 9 , 506

Bible school members . 1 . 055 , 7 19

Ministers (white and colored) . 6,200

MISSIONARY

State missions . . $362 , 669 37

American Christian Missionary Society . 178,992 73

Christian Women's Board of Missions . 518,446.34

Foreign Christian Missionary Society . 550,386 85

Church extension . 1 46 , 904 86

Ministerial relief . . 61 , 327 90

National Benevolent Association . 225,174 76

Board of education . 238,302.55

Association for Promotion of Christian Unity. 5,354 51

Temperance board . 6,962.21

Total for all missions . $2,294,522 08

Money raised for current expenses by the churches (many churches not reporting) … 6,378,493 03

Grand total . . $8,673,015 11

J. H. Garrison,

Editor of The Christian-Evangelist.

DISCIPLINA, Arcani. The name given by John Dallaeus to the secret discipline of the early Christian Church. The early Church had nothing to conceal. It began after the times of the Apostles, probably in the 2d century and was finally matured in the 4th century. It is sup¬ posed to have ceased about the 7th century, when the catechumenate was discontinued. Neander thinks that it had its source in Alex¬ andria and spread east and west from there. At any rate the theology of Clement and Origen contain it to a considerable extent. The Church

seems to have become a secret society. Many things concerning worship, be¬ lief and even the sacraments were revealed only to the initiated and were never referred to publicly. Worship was conducted with an air of profound mystery. As Th. Harnack says, ^^The mystical became mysterious and the liturgical became theurgic.®

Some Roman Catholic writers have made much of the prevalence of secret worship in the early Church, and have gone so far as to claim that there has been a secret tradition com¬ ing from the time of the Apostles and distinct from New Testament teachings.

The first part of the discipline dealt with the enemies of the Christian religion, the doom of Rome and the coming millenium and the end of the world. ®The Apostolical Constitu¬ tions® refer to certain kinds of secret discipline. The Catechumens or Novitiates were not al¬ lowed to attend common prayers, nor were they allowed to have a sight of the celebration of the Lord's Supper, nor to attend the ^Teasts of love.® Baptism ended the novitiate. An¬ other part of the discipline consisted in the preservation of many maxims and opinions in circulation only among the Christians. The secret discipline included as unmentionable :

(1) The manner of administering baptism;

(2) The manner of administering unction or confirmation; (3) Ordination; (4) The public prayers of the Church; (5) The manner of celebrating the Lord's. Supper ; (6) The Creed; (7) The Lord's Prayer; (8) The mystery of the Trinity. There are several conjectures as to its origin. Bingham thinks that it originated because of the plainness and simplicity of the Christian rites and the possibility of their giv¬ ing offense. Others have thought that these

mysteries arose largely through the influence of many pagans who crowded into the Church for political reasons in the reign of Constan¬ tine. Many had been devotees of the Eleusinian mysteries, and introduced some of their features into the Church.

Another theory is that it was adopted to withstand the Gnostic encroachments in doctrine and practice.

Still another theory is that it was developed as a means of the aggrandizement of the clergy. The rites could be performed only by holy consecrated hands, and common minds were unable to be instructors of the sacred doctrines and ordinances. The rites of the

Church had no validity without the bishops.

The chief result of the secret discipline was the corruption of the simplicity and purity of church worship. It is thought by some that the doctrine of the baptismal regeneration from sin, and the doctrine of the actual presence of Christ in the bread and the wine are remains of the secret discipline.

Bibliography. — A fairly complete bibliog¬ raphy may be found in Hastings, J., ˆEncyclo¬ paedia of Religion and Ethics.ˆ Among the best modern discussions are Hatch, E., Hn-fluences of Greek Ideas and Usages upon the Christian Churchˆ (1880) ; Coleman, Lyman, ˆAncient Christianity Exemplifiedˆ (1875) ; Horn, Edward T., article in ˆEncyclopaedia of Religion and Ethicsˆ (1908).

DISCIPLINE, in military and naval affairs, the general term applied to the prescription and enforcement of statutes, rules of procedure, or¬ ders, and regulations governing officers and men in service. Regimental discipline is chiefly maintained by the adjutant. He inspects and tells off all guards, escorts, and parties ; keeps the regimental books ; receives all garrison or¬ ders ; superintends the drill and field move¬ ments, *etc.* In matters of discipline the adju¬ tant-general is to the whole army what the adjutant is to a regiment.

DISCIPLINE, Books of, two books con¬ nected with the Scottish Church. The First Book of Discipline was drawn up by John Knox and four other ministers, and laid before the General Assembly in 1560. It was also sub¬ mitted to the privy council ; and though not formally ratified by them, it was subscribed by the greater part of the members. A similar document, called the Second Book of Disci¬ pline,ˆ in the preparation of which Andrew Melville took a prominent part, was sanctioned by the General Assembly of 1578; and from that time it has been recognized as the author¬ ized standard of the Church of Scotland in respect of government and discipline. It lays down principles regarding the relations of church and state ; defines the provinces, duties, and relations of church-officers, the mode of their election, etc., and states the operation of the Presbyterian polity in the General Assem¬ bly, synods, and presbyteries of the Church of Scotland. See Discipline, Ecclesiastical.

DISCIPLINE, Ecclesiastical. Church dis¬ cipline is the method and means used by the authorities of the Church to preserve the purity and morale of its membership. The Old Tes¬ tament basis for discipline is almost entirely found in the decalogue and the book of Leviti¬ cus, The administration of the law was largely

in the hands of the secular authorities. Some¬ times, however, the seer or prophet took into his hands the power to rebuke and punish a king or leader. Some of the minor ecclesias¬ tical punishments were applied by the priests.

In the New Testament, authority was derived from the decalogue and the ethical teachings of Jesus, especially Matthew xviii, 15-18. At first the Apostles were the administrators, later the deacons were empowered to assist them in minor matters. After the day of Pentecost, Church councils were held which gave added authority to discipline. The administrators of law were the leaders and supervisors of the work of the members or committees appointed by them. Later the bishop was the executor of authority whose power was checked only by the Church council. The punishments consisted almost entirely of exclusion, temporary or per¬ manent, and anathema which was considered the extreme disgrace. Heresy punishment was often resorted to. In Paul's writings various classes of offenders are named. (1 Cor. v, 9-13; 2 Thess. iii, 6).

In the Nicene period to the time of the Em¬ peror Constantine, discipline remained in the hands of the Church and rules were rather rigorously enforced, but there was no precise code governing the whole Church. In this period disciplinary canons were enacted and the system of penance developed, also the secret discipline or Disciplina Arcani (q.v.) developed.

After the adoption of the Church by the state, many ecclesiastical penalties were en¬ forced by the state. They were of a much wider range than before the change and in¬ cluded confiscation of goods, fines, imprison¬ ment, banishment and even the death penalty. Constantine, as Pontifex Maximus, claimed lordship over the whole Church, with the rights of a universal bishop. Under Constantine less attention was paid to moral conduct than to heresies and offenses against the corporate body of the Church. The death penalty was first imposed at Treves in 385, when Priscillian, a Spanish bishop, and six others, including a woman, were executed. Beginning with Augus¬ tine there was a conviction that heresy should be punished by death,

and the schoolmen cited Augustine as being in favor of it.

The period of the Crusades witnessed a further development of discipline. The growth of the papal power and authority also tended to change its character.

With the establishment of the Inquisition by Innocent III at the 12th Ecumenical Council, another step was taken when it was not only planned to suppress heresy but to extirpate it. The bull, Unam Sanctam, promulgated by Boniface VIII, 1302, made obedience to the Pope necessary to salvation and declared that both swords were in his hand. The Council of Constance, 1415, reaffirmed the right of the Church to burn heretics, and condemned Huss and Jerome of Prague. The Council of Trent did not mention the death penalty, but did place great emphasis on the discipline of penance and the use of indulgences.

Luther never made a system of discipline. Zwingle left all right of excommunication to the state. John Calvin, however, was intensely interested in the subject, and in the second volume of his Hnstitutes> (Book IV) devotes many pages to its discussion. The one great

blot on the career of Calvin is his consent to the burning of Michael Servetus. In other matters of discipline the Reformed Churches and the Protestant Church of France followed the teachings of Calvin as set forth in his institutes. ˆ

The Lutheran Church government of Ger¬ many in modern days is a mere shadow as it is under absolute domination of the Imperial government. In America there are five general bodies of Lutherans besides several independ¬ ent synods. No form of Church government is held to be essential and services and organiza¬ tion are carried on under Congregational, Epis¬ copal and Presbyterian forms.

The Church of England in the Thirty-Nine Articles recommended excommunication, but left its execution to civil authorities because the Church was a state institution. The West¬ minster Confession (XXX) prescribes three forms of punishment — admonition, temporary suspension from participation in the Lord's Supper and expulsion. The Kirk Session, com¬ posed of the minister and elders, met once a week and judged and admonished the cases brought before it.

In American colonial times Church discipline was very strict in most of the colonies. It was due to this fact that the Blue Laws were en¬

acted. For a time the Congregational Church was the* state Church of some of the New Eng¬ land colonies. With the organization of the United States government and adoption of the Constitution the execution of ecclesiastical dis¬ cipline was placed entirely in the hands of the churches unless the offense was a criminal act contrary to the civil law. In such a case both civil and ecclesiastical authorities gave judg¬ ment.

The Presbyterian Church is governed by the local session with the possibility of an appeal to the presbyter^^ or the synod and a final appeal to the General Assembly (q.v.). Most of the Reformed and other Presbyterian churches have similar church machinery.

The Congregational Church is governed by its local body. Even the ministry is subject to it.

The Methodist Episcopal Church and most of the Methodist bodies have the general con¬ ference (q.v.) which is the sole lawmaking body of the Church. The judicial conference is the court of appeals. The annual conference is a local executive body, covering a consider¬ able area. The governing body of the local Church is the quarterly conference. Discipline is twofold : admonition, and trial followed by expulsion if proved guilty. The defendant may appeal to a judicial conference and from that to the general conference which renders judg¬ ment through the adoption or rejection of the action of its committee on the judiciary.

There is a general tendency among many of the Protestant Churches to leave the matter of discipline alone and to make it a burden of the conscience as enlightened by the public ministry of the Church.

Samuel G. Ayres, Garrett Biblical Institute.

DISCLAIMER, a renunciation, denial or re¬ fusal ; a disavowal of claims, duties or liabili¬ ties. Specifically: (1) In the law of landlord and tenant, the direct repudiation of that relation by some act on the part of the tenant. Such

disclaimer may be verbal or written, but a mere verbal refusal to recognize the lessor as landlord is not sufficient ; it must be made in a proceeding involving the rights of the* landlord in the property, thus becoming a matter of record. (2) In the law of trusts, disclaimer is the refusal or renunciation of the office or duties of a trustee. No one is compellable to under¬ take a trust, and if so appointed has the right to determine whether he will accept or reject such office. The rejection or disclaimer is usually by a deed or other writing, but it may be by conveyance to other accepting trustees, or even orally. (3) In patent law, disclaimer is the renunciation, by amendment of specifica¬ tions, of all or a portion of an inventor's claim to protection. (4) In equity, a plea put in on the part of a defendant in which he disclaimed all right or title to the matter in demand by the plaintiff's bill. It is a formal mode of defense and grants the defendant a hearing to determine whether he has any interest or con¬ nection with the matters in controversy, and, if he succeeds in proving that he has not, he is entitled to an order striking out his name as a party defendant.

DISCO, an island on the west coast of Greenland, under the parallel of 70° N. It is mountainous, reaching a height of 3,000 feet; and contains much excellent coal. Area 3,100 square miles. Godhavn, the seat of the Danish administration of South Greenland, is on the south coast.

DISCOBOLI, Cuvier's name for the lump¬ suckers (Cyclopterus), besides which he placed the Remora (q.v.), now placed in another group. The term is still used for the family to which the lumpsucker (q.v.) belongs.

DISCOBOLUS, (1) in classical antiquity, a thrower of a discus or quoit; a quoit-player; specifically, the name given to the famous Greek statue of the quoit-thrower, the original of which is lost, but of copies that found in the Esquiline in 1761 and now in the palace of Prince Lancelotti, Rome, is the best example. (See Discus). (2) In ichthyology, a name given by Cuvier to his third family of soft-finned teleostean fishes, having the ventral fins under the pectoral. The name is derived from the ventral fins forming a disc on the under surface of the body, by which the fishes are enabled to catch hold on the points of rocks.

DISCOMEDUS.®. See Jellyfish.

DISCONTO - GESELLSCHAFT, The.

The Disconto-Gesellschaft (Disconto-Gesell- schaft in Berlin) was founded in 1851 as a ˆcredit partnership,® and in 1856 was changed into a limited liability joint-stock company under the name of ®Direktion der Disconto-Gesellschaft,® with a capital of 30,(XX),0(X) marks. Its founder was David Hansemann, later Prussian Minister of Finance. Its purpose and earliest activities were in the fostering of current account business and the underwriting of German state and local loans and railway shares. In 1890 a branch was opened in London, from which dates this institution's activities in overseas matters. In 1901, on the liquidation of the house of M. A. Rothschild & Sons of Frankfort-on-the-Main, a branch was estab¬ lished in that city, connection being made with the Rothschild Syndicate, with which it has

since been largely identified. The interests formed with this group made the Disconto-Gesellschaft a prominent factor in the under¬ writing of many important national and railway loans, notably the state loans of Russia, Ru¬ mania, China and Japan. In addition, in con¬ nection with other interests, it was instrumental in the financing of the Kamerun Railroad Com¬ pany and the Great Venezuelan Railroad, both speculative enterprises, and the latter eventually of great financial annoyance. As a national factor, the Disconto-Gesellschaft has lent its greatest support to industry through the pro¬ motion and financing of enterprises for the development of Germany's natural resources : the mining of coal and metals, smelting, iron and steel, potash, shipbuilding, electrical develop¬ ment, railways, fire and life insurance, *etc.* It assisted in the underwriting of the 10,000, (XX) thaler (30,()(X),0(X) marks) 5 per cent loan for the Krupp Works, in 1874 — the first instance in Germany of the issue of fractional form bonds secured by blanket mortgage and provid¬ ing for common representation of the holders of these bonds. Beginning in 1881, this institu¬ tion has established or participated in the estab¬ lishment of 15 important banking institutions, having 87 branches, scattered throughout Eu¬ rope, Asia, South Pacific, South America and Africa; and through communities of interest has banking connections in Hamburg, Leipzig, Bremen, Mannheim and Geestmunde, these lat¬ ter having 51 branches and numerous other agencies throughout the empire. In 1914 it absorbed the A. Schaaffhausen'seher Bankverein, this latter still retaining its name and clientele. Close relations have been estab¬ lished with other important financial and in¬ dustrial institutions, its directorate having (1908) representation on the boards of 92 cor¬ porations. The capital for the same year was 170,000,000 marks; surplus, 57,592,611 marks; and annual dividend, 8 per cent.

The total capital power of the Disconto-Gesellschaft group amounted to 564,747,329 marks, of which 437,786,200 marks represented capital and 126,981,129 marks surplus. Consult Riesser, Dr. J., ˆDie deutsche Grossbanken und ihre Konzentrationˆ (1909) ; ˆGermany's Economic Forcesˆ (1913) ; ˆReport on Cooperation in American Export Tradeˆ (Washington 1916).

DISCOPHORA. See Leeches.

DISepRD (Lat. discors, inharmonious), in music, is a combination of sounds producing irregular vibrations and technically called caco¬ phony. It is a direct violation of harmonic laws and frequently spoken of as nothing but downright noise. It is often confused with dis¬ sonance (q.v.) which, however disagreeable the effect upon a hearer, obeys certain gram¬ matical rules in the science of music, though never consonant. Celebrated composers have used discords purposely in their composition, requiring macabre character. Berlioz in his ˆDamnation of Faustˆ is a case in point, while VVagner's scores bristle with cacophonies and dissonances.

DISCORDANCE, a term used in geology in two senses. First, Discordance of Bedding applies to unconformities (q.v.) in which the beds below the unconformable plane have un¬ dergone more folding than those above, so that they are not parallel. Second, Discordance of

Junction in rivers applies to hanging valleys. See Unconformity.

DISCOUNT (O. F'. discontes, to count off), a deduction made from a quoted price, in consid¬ eration of a cash payment. Discount is also the amount deducted from the face value of a bill of exchange or promissory note, as the price for cashing it to the payee so many months or weeks before it is payable by the person who is primarily responsible for its payment. Bank discount is simple interest on the face value of a prornissory note, and deducted from the face value, instead of being reckoned on the amount advanced. True discount is such an amount deducted, as would be simple interest on the amount

advanced, for the time specified in the note. To specially favored customers, or buyers of large quantities, prices or percentages less than those listed may be charged; this is called trade discount. In transportation, discounts or preferential terms given to shippers are called rebates.

DISCOURSES AND HANDBOOK OF EPICTETUS. When Domitian banished the philosophers from Rome, in 94 a.d., one of the exiles was Epictetus, a former slave from Phrygia, now a professor of the Stoic philoso¬ phy. He removed his school to Nicopolis, a town of Epirus, and there, among other pupils, received a certain Greek author named Arrian, who has left memorials of the master's teach¬ ing in four books of ˆDiscourses' and in a summary called the 'ˆEnchiridion,ˆ or 'Hand¬ book.ˆ If these records tell the whole story, Epictetus paid little attention to the encyclo¬ paedic training of the sect, but drove straight at its ethical kernel. His lectures were pointed, sometimes extremely personal, alternating with exposition and satire and exhortation. In es¬ sence the Stoicism of the 'Discourses ˆ is an outgrowth of the Socratic doctrine. Epictetus was fond of quoting these two dicta, adapted re¬ spectively from the 'Critoˆ and the 'Apoloˆˆ of Plato • "But, O Crito, if so it is pleasing to the gods, so let it be®; and, "Anytus and Meletus are able to kill me, but not to harm me.® These two sentences are given at the end of the 'Handbook,ˆ with two others from the poets, as the procheira, or rules of conduct to be kept in hand for all the circumstances of life. The other two may be rendered in prose as follows : "Lead thou me, O Zeus, and thou. Destiny, whithersoever my place has been .set by you ; for ungrudgingly I shall follow ; and if, being evil, I am unwilling, none the less I shall follow® — and, "He is the wise man among us and knows the divine, who has yielded nobly to Fate.® There is in these saying a cu¬ rious medley of fatalism and freewill. Stoic¬ ism was deeply influenced by science, and its universe is a mechanical system of causes and effects, God himself being only the finest form of material substance, interpenetrating and dominating the whole. In such a world there should seem to be no place for the moralist's distinction between the spirit and the body of man, no place for a free will; there should seem to be no meaning in the words good and evil, if man has no power of self-determination. But this ethical consequence of their physical theory Epictetus and the other orthodox Sto¬ ics did not draw. They asserted valiantly and vehemently that one thing was left free to man.

his opinions. Caesar, they said, can do what he will with my body, and

circumstances may dis¬ pose of my life as they will, but neither Caesar nor brute circumstance has any control over my opinions. It ought to follow that he is the free man who holds what general opinion of the world it pleases him to hold; but to this de¬ duction Epictetus would not quite consent. The world is necessarily what it is ; not what we think it — one great homogeneous effect of one cause — and therefore contains no real evil. It follows, then, that he alone is in the way of truth and freedom who resolutely, no matter what befalls him, holds to the opinion that this chain of events in which our life is bound is right and good — as certainly it is inevitable; yet practically no philosophers dwelt more than the Stoics on the inherent worthlessness of life. There is in such a doctrine a deeplying para¬ dox, an optimism overlaid upon a radical pessi¬ mism. Epictetus is at bottom a sad teacher, only Ips sad than his royal compeer, Marcus Aure¬ lius ; and this Stoic paradox, with its concealed melancholy, has come down from them, through the English Deists and the French philosophes, to the present day, tincturing the whole of mod¬ ern life. To the student of the history of philosophy Epictetus is particularly interesting as representing the transition from Pagan Greek thought to Christianity. Though Epic¬ tetus, speaking as a physicist, would explain the Deity as fire, or the energy of matter, yet emo¬ tionally his attitude toward the first great cause is a fascinating link between the impersonal and philosophical theory of Plato and the religious and vehemently personal faith of a Clement of Alexandria or a Saint Augustine. A com¬ pendious way to present this distinction would be to set side by side the prayer of Socrates at the end of the ‘Phasdrus,ˆ the prayer of Epic¬ tetus in the 10th chapter of the fourth book of the ‘Discourses,ˆ and the prayer of the Publi¬ can in the 18th chapter of Saint Luke. There are several English translations of the ‘Dis¬ courseˆ and the ‘Handbookˆ ; perhaps the best is that by P. E. Matheson (Oxford 1916).

Paul Elmer More,

Author of ˆ Platonismˆ ; ˆThe Judgment of Soc¬ rates,ˆ *etc.*

DISCOVERY, in law, the act of a litigant who is called on to reveal or make known any matter or document which will aid in enforcing a right or repelling an unjust demand.

DISCOVERY, The, the name of several ships famous in the annals of exploration. (1) The vessel built by the East India Company in 1602 to determine the whereabouts of the north¬ west passage. She was originally commanded by Capt. George Weymouth, who sailed with a consort from Greenland, 2 May 1602. In 1610 Henry Hudson

discovered the Hudson Bay in the same vessel, spending the succeeding win¬ ter in the ice. In 1611 the crew mutinied and set Hudson and some of his companions adrift, never again to be heard of. Later she was com¬ manded by Sir Thomas Button (q.v.) who dis¬ covered Nelson's River and other points. In 1615 and 1616, the Discovery sailed with Baf¬ fin (q.v.) and Bylot, making important discov¬ eries and explorations. (2) One of the vessels of Governor Knight's expedition of 1719 to the Arctic Circle in search of precious metals, lost on Marble Island, Chesterfield Inlet, and the

remains of which were discovered in 1767. (3)

One of the ships of Capt. Christopher Middle¬ ton's expedition of 1742 in search of the north¬ west passage. (4) One of Captain Cook's ves¬ sels in his expedition to discover the north¬ west passage and in which, in company with the Resolution, Nootka Sound was discovered (29 March 1778). The expedition afterward proceeded to the South Seas, and in February 1779 Captain Cook was murdered at the Sand¬ wich Islands. (5) One of the ships of Van¬ couver's expedition to the Pacific coast in 1791 when Vancouver Island was first circumnavi¬ gated.

DISCOVERY OF AMERICA. See

America, Discovery.

DISCRIMINATION, Sensible, or DIF¬ FERENTIAL SENSIBILITY. A term em¬ ployed in experimental psychology to denote our ability to distinguish likeness and difference among sense impressions. Thus, we are able to say that one tone is the same as another, one light is brighter or duller than another, one scent is stronger or weaker than another, *etc.* The psychology of sensible discrimination in¬ volves two distinct problems. The first is quan¬ titative ; we may compare sense-differences and determine the stimulus-differences which cor¬ respond to sense-differences. The second is qualitative ; we may describe the mental proc¬ esses involved in comparison and

discrimination. The former is, historically, the older of the two problems ; it is intimately related to the broader question of mental measurement (see Intensity of Sensation), and to the general correlation between stimulus and sensation-differences. See Weber's Law.

The quantitative determination is of two kinds. We may seek, first, to find the just noticeaˆyle difference between two impressions. For example, two tones from about the middle of the scale and differing by a single vibration may be readily distinguished as different ; but two tones differing by one-tenth of a vibration will be judged as the same. Somewhere between these two extremes of one and one-tenth a dif¬ ference may be found that is just distinguish¬ able. This difference is known as the just noticeable difference (or j.n.d.). We may seek, secondly, to compare two sense-differ¬ ences; if, in a series of grays ranging from a light to a dark gray we find one that lies mid¬ way between the two extremes, then we, in ef¬ fect, equate the difference between the light and mid-gray to that between the dark and mid¬ gray. Again, we may compare a difference just noticeable when two weights are placed on the resting arm with a difference just noticeable when the weights are lifted. The first kind of difference-comparison, that in which we halve a distance, is known as direct comparison ; the second in which stimulus-differences are com¬ pared is called indirect comparison.

The determination' of the just noticeable difference is not as simple, however, as we have made it out to be. The judgment of so small a difference is not easy, and the condi¬ tions are so complex as to require a rigorous method if the determination is to be valid. There are, for example, many errors to which the observer is liable ; some of these are vari¬ able, such as practice, fatigue, habituation and expectation ; others arc constant and result

from the spatial position or temporal order of the stimuli ; still others are accidental in con¬ sequence of slips of attention, the physical con¬ dition of the observer, *etc.* It was the service of Fechner to work out the principles of method whereby these errors may be either eliminated or taken account of by mathemati¬ cal treatment of the results. A number of stimuli are chosen, every one of which ma}'ˆ be regarded as variable, or one may be constant (standard) and the others variable; these stimuli are arranged in regular order, or at haz¬ ard, in series ; the order of presentation of every series is predetermined with regard to the variable errors ; the temporal order

and spatial position of standard and variable are reversed and the series repeated to eliminate the constant errors; the observer is carefully instructed as to what he is to do; and finally, a large number of observations are taken and the ultimate result calculated from the data ob¬ tained. The magnitude which represents the just noticeable difference is known as the dif¬ ferential limen, or DL. This may be defined as that difference which is judged less (the form of the judgment depends, of course, upon the nature of the difference) in one-half of a long series of observations, while in the other half the judgment is equal or greater. The form of the magnitude representing the DL may be absolute or relative, i.e., if in the determination of the tonal DL the pitch of the standard is 500 vs., and that of the variable which in 50 per cent of the cases is judged as higher is 500.25 vs., then the absolute DL is 0.25 v., and the relative DL is The differential

limen is an ideal value, it represents the most probable value, the mathematical equivalent of the difference which, if all sources of error were eliminated, would in fact be just notice¬ able. The just noticeable difference thus found has proved to be of signal importance for analytic psychology. The differential limen of the quality, intensity, clearness, duration, ex¬ tent or any other attribute of sensation may be obtained and mathematically expressed, it fur¬ nishes the basis for the calculation of the num¬ ber of discrirninable qualities in vision and au¬ dition, and it is a significant aid in the analysis of both temporal and spatial perceptions.

We turn to the nature of the process in¬ volved in comparison and discrimination. When we set out to determine a just noticeable difference it is necessary to ensure a proper at¬ titude on the part of the observer ; he must not only be disposed toward the specific problem in hand, but, to avoid the difficulties of language, he must also have the form of the judgment literally put in his mouth. If, for example, we are to find the just noticeable difference of tonal pitch, then the observer will be given some such instruction as the following; ®You will hear two tones in succession; you are to judge the second in terms of the first, and you are to report whether it is ˆhigher, ˆ Mowerˆ or ˆ equal. ˆ The acceptance of this instruction by the observer determines the nature of his response ; he knows what the categories of judgment mean, and the tonal impression au¬ tomatically touches off the report. There is no comparison or discrimination in the popular sense of these terms ; the procedure is as if the judgment were already made in the acceptance of the instruction and the sound itself releases

now this, and now that, form of report. For¬ merly, it was thought that in the event of suc¬ cessive impressions the judgment was mediated by an image of the first tone. When, how¬ ever, the comparison is direct, as in the case described, no image or any other process than the bare impression itself is necessary. In¬ deed, in some cases a long-practised observer will judge by absolute impression, i.e., the re¬ port is released upon the appearance of the first tone. Even here, the second tone (which in such a case is the standard of comparison) is not necessarily imaged. Such a discrimina¬ tion is, of course, far removed from those of everyday life. In the laboratory we reduce the mechanism to its lowest terms; in ordinary dis¬ crimination we are not disposed to observe a single attribute, and the discriminative con¬ sciousness must, on that account, be much more complex than the artificial conditions of the laboratory have shown it to be.

Bibliography. — Ebbinghaus, H., ˆGrundziige der Psychologies (Leipzig 1905) ; Fechner, G. T., ˆElemente der Psychophysiks (Leipzig 1899) ; Kiilpe, O., ˆOutlines of PsychologyS (London 1909) ; Titchener, E. B., ˆEx¬ perimental PsychologyS (Vol. II, New York 1905), ˆTextBook of PsychologyS (New York 1910) ; Wundt, W., ˆGrundziige der Physiologischen Psychologies (Leipzig 1908).

Harry P. Weld,

Assistant Professor of Psychology, Cornell U niversity.

DISCUS, among the Greeks and Romans a quoit of stone or metal, from 10 to 12 inches in diameter, convex on both its sides, sometimes perforated in the middle. The players aimed at no mark, but simply tried to throw the quoit to the greatest possible distance. It was some¬ times furnished with a thong of leather to as¬ sist in the throwing. The throwing of the discus was a notable feature of the revival of the Olympian games at Athens in 1896. In these games the discus-throwing event was won by Robert Garrett of Princeton University, who far outclassed all the foreign competitors. The world's record in 1909 was 142 feet 10j4 inches, held by M. J. Sheridan, of New York. See Discobolus ; Quoits.

DISEASE. Disease is a lack or absence of ease; a condition of uneasiness or of pain. Pathologically, it is a collection of phenomena occurring constantly during life and after death, according to Savile; Huxley defined it as «a perturbation of the normal activities of a liv¬ ing body.^^ Foster conceives of it as *Any de¬ parture from, failure in or perversion of normal physiological action in the material constitution or functional integrity of the living organism.® It is a condition resulting from dis¬ ordered physiological action and recognized by change in structure or in altered function. The area of altered anatomical structure, or the tissue changed through, for example, circula¬ tory or eliminative failure, is called a lesion. The term disorder was formerly given to a group of symptoms without a discoverable anatomical lesion; but disorder and disease are now used as synonymous terms. Briefly and conveniently, then, disease is a departure from health, recognized during life through symp¬ toms and physical signs.

Symptoms are subjective manifestations ex¬ perienced by the patient, as for example, pain or buzzing in the ears. Physical signs are objective manifestations, discoverable by the physician on examination, such as heart mur¬ murs or waves caused by fluid in the abdominal cavity or anomalies of pupils.

In the olden time before chemistry, biology and bacteriology had been developed, disease was regarded as a dynamic entity, which in¬ vaded healthy tissue, causing changes, and with a certain train of symptoms, and was so de¬ scribed, together with its cause and diagnosis, in the old ^^systematic medicine.® Through the elaboration of experimental methods, the new school of pathology has been established and normal physiological processes, as well as the processes of the agencies resulting in disease, have become more thoroughly understood and definite causes have been confidently assigned.

Classification of Diseases. — An old classifi¬ cation divided diseases into diathetic, or those which are dependent upon a constitutional pre¬ disposition, or diathesis (q.v.), and enthetic, or those which arise from invading external causes. An example of the few diathetic dis¬ eases is haemophilia (q.v.). This is a consti¬ tutional disease generally hereditary and charac¬ terized by frequent and prolonged haemorrhages from very slight wounds, or from spontaneous rupture of blood vessels in the mucous or serous membranes. There is a greatly lessened plasticity to the blood and a degeneration of the coats of the blood vessels. Examples of enthetic diseases are plumbism (lead

poisoning) and typhoid fever; the former caused by ab¬ sorbing lead in solution in water run through lead pipes or from fresh paint; the latter caused by swallowing in food or water the typhoid bacillus.

Some make two divisions for purposes of classification : germ diseases and non-germ dis¬ eases, or infectious and non-inf ectious diseases. Germ diseases are caused by entrance into and growth within the body of bacteria (q.v.), which are vegetable spores. (See Disease, Germ Theory of). Many harmless bacteria naturally exist in the intestines ; but most of the fatal diseases, including pneumonia, typhoid fever, tuberculosis, cholera and bubonic plague, are due to the entrance of the specific bacteria in each case.

Another classification, now little used, di¬ vides disease into organic and functional, the former being those in which tissue changes are demonstrated in the viscus or organ affected; while in the latter the organ fails to functionate properly, although itself exhibiting no lesion. But in functional'diseases there are always dis¬ tant lesions, owing to which, through reflex or directly conducted nerve action, functional disorder occurs.

Diseases are also classified as idiopathic, if arising from causes developed within the body; traumatic, if resulting from wounds or injuries; acute, if of sudden invasion and pursuing a brief, definite course ; chronic, if pursuing a long course and persistent; contagious, if com¬ municated from person to person ; constitu¬ tional, if pervading the whole system, as blood-poisoning; local, if limited to a small area, as a boil; congenital, if existing before birth; nervous, if attacking some part of the cerebro-

spinal system or the nerves ; zymotic, if due to the action of ferments.

For convenience of study, diseases are grouped according to the systems in which they cause disorder, as diseases of the respiratory system ; of the digestive system ; of the kidneys or genito-urinary system ; of metabolism ; of the locomotor system, *etc.* Very interesting and important is that group of diseases which are incident to military service and the group of occupational diseases. (See Diseases, Occupa¬ tional). The former includes ˆirritable heart, caused by forced marches in heavy marching order in those who are weakened by privation or illness, by dilatation of the heart, or by degenerated heart muscle. Siˆphilis, alco¬ hol habit or tobacco favors its development, ˆFebrile exhaustion® is also seen in soldiers as a result of excess of acid in the muscles, and is characterized by remittent type of fever, weakness, nervous exhaustion and diarrhoea. ˆFeigned diseases® are especially trying to the regimental surgeon; for resort is not infre¬ quently had to malingering to escape military duty and to enjoy the indolence of the hospital. Most frequently feigned are epilepsy, cholera, insanity, coma, blindness, deafness, heart dis¬ ease and paralysis. The careful study of an experienced physician trained in neurology is often taxed to the utmost to uncover the fraud.

Diseases of occupation, or industrial dis¬ eases, include bronchitis, emphysema, pneumo-kiniosis, tuberculosis, lobar pneumonia, etc., among the respiratory disorders ; cerebrospinal hyperaemia, neuritis, fatigue neuroses, muscular atrophy, toxic paralyses and insanity, among the nerve disorders; eye diseases, from exces¬ sive light or heat, or from dust, gases, bums or accidents; skin diseases (dermatoses) such as scalds, burns, eczema among flax-pickers; or the result of lead, arsenic and other poisons; heart and blood vessel disorders from lifting or other excessive strain ; disturbances of the di¬ gestive tract, as from poisoning with lead, arsenic, mercury, etc.; infectious disorders from pathogenic organisms in materials handled, including anthrax from hides and wool; gland¬ ers; anchylostomiasis (hook worm disease), common among miners, *etc.* ; caisson disease, common among those who work in compressed air, and due to the sudden transit to the ordi¬ nary atmospheric pressure. Besides these, we have glass-blower's mouth, with swelling of the parotid gland. Women have increased suscep¬ tibility to industrial poisons, such as lead, phos¬ phorus or mercury, similarly as to tobacco. Much depends

upon the individual resistance of the worker, his general health and strength, his place of work, its duration jind the processes employed. The fatigue neuroses mentioned include writer's cramp, telegrapher's cramp, piano-player's paresis, etc., to all of which alco¬ hol habit, tobacco habit and mental anxiety pre¬ dispose.

Climate has much to do with the prevalence of certain diseases. For example, cholera and yellow fever are found at sea-level in the tropics ; malaria is found on either side of the equator, and is widespread ; while sunstroke, mountain sickness and frost bite have been erroneously considered as due to climatic condi¬ tions. All that one can truthfully say is that • climate is predisposing.

We formerly encountered a classification

including ^house diseases, founded largely on the false belief that sewer gas caused certain illnesses. These diseases were due to direct contamination, as by insects, or to dust, the conservator of germs.

Propagation of Disease. — The propagation of diseases by insects has been receiving in¬ creased attention since 1894. Many mysterious, isolated causes of contagious diseases, as well as the progress of many epidemics, have been due to the facility with which certain disorders are transmitted by certain insects. The year 1894 is named because at that date Manson, of Dublin, appeared as a vigorous supporter of the theory that the mosquito was the cause of malaria. The theory had, indeed, been advanced by Crawford, an American physician, in 1807 ; again by Mott, of New Orleans, in 1848; and reasserted in 1883 by A. F. A. King, of Wash¬ ington. Laveran, of Paris, who in 1880 discov¬ ered the Plasmodium malarice, advocated the theory in 1883. Through the studies and re¬ searches of the Italians, Bignami, Bastianelli, Grassi and Celli, also Pfliigge, Pfeiffer and especially Manson, his pupil Daniels and Sur¬ geon-Major Ross, of the British army, the dis¬ covery was completed in 1898, that the an¬ opheles mosquito is the carrier of malaria. Reed, Carroll, Agramonte and Lazear, ap¬ pointed in 1900 an American medical commis¬ sion to investigate yellow fever in Cuba, deter¬ mined the fact that the Culex fasciatus mos¬ quito is the host for yellow fever (q.v.). An¬ other species of the Culex is the transmitter of filaria. Elephantiasis has also been trans¬ mitted by the mosquito. Still more culpable is the common house fly (q.v.) in the transmission of disease. It conveys to man the infection of bubonic plague, leprosy, anthrax, Asiatic chol¬ era, typhoid fever, smallpox and diarrhoea. The flea that infests the rat is the common carrier to man of the virus of bubonic plague. The itch mite conveys leprosy. The tick propagates Texas fever among sheep. The ant has car¬ ried bubonic plague as well as anthrax. The bedbug transmits leprosy, tuberculosis, cancer and relapsing fever, according to different ob¬ servers. Roaches and house flies are carriers, not true intermediary hosts, of many disorders.

Obviously, all the propagation of disease by insects can be limited, though not entirely con¬ trolled, by proper measures to destroy all ver¬ min and insects and prevent their multiplication as well as their attacks upon human beings. Those living in mosquito-infected districts should be protected by screens, especially at night. The larvae of the

mosquito can be killed by the use of a small amount of crude petro¬ leum, which spreads easily over the entire sur¬ face of stagnant water. All pools, marshes and flowed lands should be drained, and the banks of ponds and streams should be altered so as to provide for a constant current of water, and obviate stagnation or occasionally flooded flats or margins. All water butts, eave-troughs and accidental receptacles of rain water should be emptied or treated liberally with chloride of lime. An epidemic of bubonic plague in San Francisco was terminated by killing the rats in the city.

Not unnaturally certain diseases are grouped together, as they occur largely during the first few years of existence, and during the last years of life, respectively, and are termed dis-

eases of childhood and diseases of old age. ˆThe former aggregation includes measles, whooping cough, chickenpox, rotheln, mumps, scarlet fever, etc.; while the latter embraces arterio-sclerosis, gout, deafness, cataract, *etc.* See Children, Diseases of; Old Age, Dis¬ eases OF.

Diseases caused by perverted activity of the cell tissues are called autogenous diseases*ˆ ; but they should no longer be considered in a group by themselves. A familiar example is auto-intoxication (q.y.), better termed intes¬ tinal toxaemia, which is due to the retention in the colon and ileum of harmful bacteria, in¬ gested with meat, fish and other albuminous food. Certain amino-acids are generated in the intestine which, being absorbed and car¬ ried in the blood stream, cause severe headache as well as much damage to the blood vessels and the heart muscle. A veiy small quantity of animal food, or a meatless diet, causes a change in the intestinal flora which relieves the con¬ dition.

Discoveries and Methods of Prevention. —

The investigations of recent years have dis¬ covered the origin of bubonic plague, as has been said, that scourge which since the Dark Ages has reaped its harvest of millions of human lives ; they have revealed also the cause of the fatal sleeping sickness, which is an organism carried by the tsetse fly to Jts millions of vic¬ tims in Africa ; aiso the spirochete of syphilis, that dread and deadly disease which invades nearly all organs and tissues in the body. Had Ehrlich achieved nothing else, his life would have been a blessing and his memory immortal because of the invention of Salvarsan (q.v.), which in such a large proportion of cases checks or cures the luetic scourge. Flexner’s serum for treatment of cerebrospinal meningitis ; the surely progressing conquest of hookworm disease among countless thousands of ˆˆpoor whites® and negroes, lazy and shiftless only because of prostrating anaemia caused by the bloodsucking intestinal parasite (Nector Americanus) ; the discovery of the bacillus of typhus fever by Plotz, of New York, in 1915, and the signal success of the serum therapy (q.v.) thereupon devised; these stand as the most brilliant

achievements of a decade of years.

The forerunner of present day serum therapy was the use of diphtheria antitoxin, a procedure which has reduced the mortality of diphtheria from an average of 42 per cent to an average of 20 per cent, the deaths in some epidemics in cases in which the antitoxin was used falling as low as 12.5 per cent.

Vaccination against smallpox has been widely practiced as a protection ˆnd for ter¬ minating epidemics and reducing tiieir incidence to the minimum. See Vaccination.

The use of derivatives of the ˆˆductless glands,® suprarenal, thyroid, thymus, pituitary, corpus luteum and pineal gland, is increasing with the study of hemadenology, especially in treating certain anomalies of preadolescent life. Transitional, compensatory and abortive forms of pituitary disease, for example, are now recog¬ nized, and the individual sufferers, through proper treatment, are saved from progressing to acromegaly, gigantism, infantilism, adiposis, sex inversion and eunuchism.

Through the careful study of foods and of

metabolism, valuable discoveries have been made. Guelpa, of Paris, devised and suggested the system which Allen, of Rockefeller Institute, aided by study of Naunyn, has elaborated into a practical dietary which is largely successful in treating diabetes (q.v.), now known to be an expression of diminished functional capacity of the pancreatic islets.

Beriberi (q.v.), a nutritional disease con¬ sisting of a multiple neuritis, characterized by a special train of symptoms, is very prevalent among sailors and natives of certain countries whose principal food is rice from which the pericarp has been removed. Restoration of the husk of the grain prevents further exten¬ sion of the disease, and this, with other dietary expedients, ameliorates rapidly the condition of the sufferers. In the recent uncovering of the cause of beriberi, a train of exploration was begun which resulted in 1911 in the dis¬ covery, though not the isolation, by Casimir Funk, of the substances he calls ˆvitamines.® They may not be amines, but the name will serve. _ They are essential to health, resembling in that way the lipoids of fats. Vitamines. are found in meats, green vegetables, fruits and the pericarns of grain removed in milling for the sake of the appearance of

the product. Pellagra (q.v.), a disease prevalent in the South, especially among negroes, character¬ ized principally by muscular weakness, skin lesion and insanity, is a similar nutritional dis¬ ease, in the opinion of most students, and is to be relieved by proper diet.

Since a large proportion of disease is avoid¬ able, all reasonable prevention methods should be developed to the utmost. The first measure for a people to adopt for self-protection is a quarantine against the importation of disease by immigration. Records of the incoming ves¬ sel's health are examined at the quarantine station before the dock is reached, and inquiry is made concerning all cases of sickness or death on the voyage. Detention for a varying period may be ordered, all immigrants may be subjected to inspection and the boats may be fumigated. At the port of New York, for example, the stream of arriving immigrants is inspected for contagious eye diseases, hernia, and facial dermatoses ; mental defects are noted as observed, and tnese patients are separated for treatment or further individual examina¬ tion or for return to the country from whence they came. In time of epidemics of cholera and yellow fever, for example, much disease is prevented by strict quarantine regulations. Sim¬ ilar regulations have been enforced against people traveling from one State to another, or from urban to rural districts, as in 1916, during the epidemic of infantile poliomyelitis; and thereby the disease was confined to certain areas, and the number of possible contact cases was limited materially.

Constant preventive measures for the per¬ manent population are taken by municipalities and States through various officials. Tenement-house commissioners enforce ordinances re¬ garding cubic feet of air space, the number of windows proportionate to the size of each room, water supply, plumbing and sewerage, as well as the amount of ground to be left uncovered by the building erected thereon. Factories and workshops are supervised under mercantile inspection laws in order that air-space, ventila-

tion, water supply, plumbing, sewerage, light and fire protection may all be ample ; State meat inspectors examine and approve or destroy car¬ casses of animals slaughtered for food, tagging accepted portions.

State and local health boards cover a wide field of protection through their activities, with milk inspections including determination of specific gravity, butter fat, percentage and con¬ tamination, as well as control of sanitary features of herding and stabling; licensing and inspection of midwives ; suppression of nui¬ sances, including the production of noxious fumes or smoke, as well as maintenance of fly-breeding refuse, contamination of streams, *etc.* ; abolishing of the common drinking cup and the common towel ; prohibiting spitting in public places ; requiring sanitary conditions in barber shops ; more adequate control of tuberculosis ; protection of public and private water supplies; control of communicable diseases, and promo¬ tion of child hygiene.

Protection from and prevention of disease through control of communicable disorders are secured by thorough notification and very early report by physicians and other persons, and an immediate study of sources, in order to trace to the origin and eliminate the source in each instance, vaccinating and immunizing thor¬ oughly and repeatedly, and establishing local headquarters where needed, furnishing diagnos¬ tic service and also serums and vaccines.

Child hygiene, a measure of prime import¬ ance, is promoted by conducting infant welfare campaigns, with traveling exhibits, lectures by members of the department staff, demonstra¬ tions and talks by trained nurses, interviews with mothers' clubs and parent-teacher asso¬ ciations and general public meetings. Infant welfare stations are established where mothers are instructed by station nurses and babies re¬ ceive care. Child welfare exhibits are prepared for county fairs and similar gatherings, at which are distributed pamphlets containing in¬ struction in disease, its cure and its avoidance. ˆBetter baby® contests are inaugurated and m)Otion picture films on child welfare are shown. Older sisters, on whose shoulders fall the care of the babies, are organized into ˆLittle Mother Leagues,® with pledge cards and certificates of membership, and information is communicated at these meetings.

In several cities prevention of disease among public school children is aided by daily inspec¬ tion of all pupils by teachers, who set aside those apparently ill for skilled examination and disposal by the medical school inspectors. All eyes are closely scrutinized ; throats are inspected for adenoids and enlarged faucial tonsils ; teeth are surveyed and treated if necessary, and a daily hot meal is served to the under-nourished pupil.

Modern medical discoveries have resulted In reducing the amount of internal medicine used, and in increased attention to diet, exercise, baths, diversion and rest and natural and hy¬ gienic modes of life. Preservation of infant life, conservation of health by avoidance of morbific agencies and increase of longevity are the aims of medical practice to-day.

See Bacteria; Bacteriology; Climate in Treatment of Disease; Disease, Germ Theory of; Germ; Immunity; Old Age, Diseases of;

Senility; Vital Statistics; Water, Its Rela¬ tion TO Disease, and articles on the various diseases.

Albert Warren Ferris, M.D,

DISEASE, Germ Theory of. Before be¬ ginning a detailed consideration of this subject an attempt should be made to arrive at a clear understanding as to just what is meant by the ®germ theory® of disease. According to this conception disease in either animal or vegetable forms may be the result of the introduction and subsequent growth of minute organisms, all of Avhich are microscopic in size, and which, quickly increasing enormously in number, pro¬ duce in the bodies of their hosts more or less profound chemical alterations, accompanied by the formation of poisons. In the beginning the true character of these so-called «germs® was in great doubt, but with the progress of knowd-edge it was discovered that they are for the most part of a vegetable nature, though it is unquestionably true that some of the.most com¬ mon of the infectious processes are induced by animal organisms. Such morbific agents, being thrown out in the secretions and excretions of their hosts, not uncommonly infect all objects wdth which the diseased bodies are associated, and spreading in this way frequently convey the infectious maladies that they produce to other similar related organisms.

It should be observed that the large nuniber of infectious diseases, the

causative agencies of which have so far been discovered, are, as compared with some affections, without excep¬ tion only mildly contagious, wLile some are only conveyed by means of inoculation or by intermediate hosts. On the other hand, certain maladies — such as smallpox, measles, chickenpox, scarlet fever and German measles — are of a highly contagious character, and it is note-w'orthy that no one has as yet been able to detect the poisons that produce them, and we are still in complete ignorance as to whether they are of an animal or vegetable nature ; so apparently minute and imponderable are the causative factors in these maladies that it seems not impossible that they may after all be the result of the growth and development of certain morbific agencies that belong neither to the animal nor vegetable kingdoms, or conceivably of ferments capable of growth and of multipli¬ cation.

At this point it may be insisted that much real progress has been made in the study of this most important and interesting subject, and that our knowledge has advanced to the point where we are no longer limited by speculation — it having been proved beyond the possibility of doubt that many diseases are produced by what are called ®germs,® and that, therefore, it is no longer necessary or strictly accurate to use the word ˆtheory® in this connection — and that we are justified in asserting without qualifica¬ tion that many infectious maladies are the result of the life-activities of certain minute organisms. Notwithstanding that the word ˆtheory® no longer has any proper place in defining or describing the science of the causa¬ tion of disease by minute microscopic forms, the convenience of the term and the difficulty of finding a short and satisfactory substitute there¬ for has led to its retention, and we therefore find that the expression ®germ theory® is still

commonly employed. We should never forget that while the word ®germ^^ is usually thought of as being synonymous with the term bac¬ terium, that, as already mentioned, it should not be regarded as being strictly limited to such low vegetable forms, and that it may be and is quite as appropriate to so characterize minute animal organisms, a small number of which have been shown to be the causative factors in the production of disease.

History of the Germ Theory. — A few words as to the evolution of the ^^germ theory® may not be without interest.

As to just when the idea of the production of disease by minute living forms of life was first conceived, we are in complete ignorance, the origin of the view being lost in the mists of preceding ages, but that it was held to a greater or less extent in the past there can be no doubt. On the other hand there seems to have been little or no attempt to define the nature of these supposititious poisons until the beginning of the 17th century. In the year 1671 the learned Jesuit Athanasius Kircherus wrote a remarkable book in which he described, with the aid of a very primitive microscope, the dis¬ covery of ®a countless brood of worms not visible to the naked eye® in a variety of decom¬ posing substances such as milk, vinegar, cheese, *etc.* He likewise discovered in the blood and in the pus from the buboes of those suffering from the pest many similar organisms, which were regarded by him as the causative factors in this malady. While it was later recognized that these objects were nothing more than cells normally present in the fluids mentioned, this investigator's writings are of great interest as being the first records which we possess of a microscopic study of the body fluids in disease, and at the same time the first attempt to assign to supposed micro-organisms a role as the causa¬ tive factors in a definite affection. The idea having been once clearly formulated it naturally grew, but its further development 'was slo'w, as it wholly depended on improvement in technique — particularly on greater perfection in the microscope, for which science is largely in¬ debted to Robert Hooke and Anthony van Leeuwenhoek. Likewise the lethargy of the Middle Ages not yet having been shaken

off, further advances were necessarily slow,-;- this being not a little accentuated by the criticism and stubborn opposition that all great discov¬ eries invariably encounter in the beginning. Indeed, we find that this subject made no great advances for almost a century, the next pub¬ lication of any importance in this connection having been a book by Plenciz in 1762. This very able writer made no discoveries, but de¬ serves great credit for having first clearly pointed out the illogical characteristics of the prevalent notions of the etiology of disease and for having strongly called attention to the fact that the causation of contagious diseases could only be logically explained by the assumption that they are the result of a living poison.

With the progress of time considerable ad¬ vances were made in the study of low vegetable forms, particularly by Muller, Ehrenberg, Dujardin, Perty, Cohn and Naegeli,

In view of subsequent discoveries, it is of great interest to note that Donne appears to have been the first observer who definitely

attributed the causation of an infectious disease to a specific low microscopic form, — he having in 1837 described and figured a vibrio, which he stated he had only found in the secretion from syphilitic lesions, the organism being in form and length much like the spirochcete, which only within recent years has been recog¬ nized as the causative factor in the production of lues. Curiously, the first organism definitely shown to be the morbific agency in a contagious malady was a low form discovered by Bassi in a silkworm disease known as muscardine.

Following this the pathogenic organisms of a number of different affections were recognized in quick succession, the sarcince of gangrene having been described by the brothers Goodsir in 1842, the organism of the skin disease called favus by Schonlein in 1839, the Trichophyton tonsurans which causes ringworm of the scalp by Gruby in 1843, the microsporon furfur, which produces Pityriasis versicolor, by Eich-stedt in 1846, the supposed .germ of thrush by Gruby, Langenbeck and Berg in 1839-41, and the bacillus of anthrax by Pollender in 1849.

Following this there was a considerable period during which no new discoveries in this direction were announced, though in the mean¬ time bacteriology was elevated to the dignity of a science through the

epochmaking investi¬ gations of Pasteur. This great observer during the same period demonstrated that all fermenta¬ tions arose from the presence of micro-organ¬ isms. He likewise showed that suppuration in wounds is to be looked upon as an analogous process, and that by shielding abrasions and cuts of all kinds from contamination by bac- . teria pus formation could be prevented, — thus laying the groundwork for the subsequent bril¬ liant demonstrations by the great English sur¬ geon Lister of the practical uses to which this knowledge could be put.

Beginning about the year 1880 and for the next decade a large number of diseases were shown to be the result of the life activities of certain bacteria, the most important of which was the demonstration by Koch that tubercu¬ losis is produced by a bacterium.

This period is also noteworthy from the fact that Laveran first showed that animal micro-organisms may also produce disease in man, he having discovered in 1880 that malaria is due to a germ of this character. Subsequently it was found that a number of affections are likewise to be ascribed to the action of minute parasites of a similar kind, the most important of which is sleeping sickness in man, which is produced by a trypanosom, and that closely related organisms occasion diseases in many of the lower animals.

Space will not permit even a resume of the discoveries that have been made in connection with this subject during the last 30 or 40 years, it being only possible to state that nearly all infectious processes have been associated with some definite organism, and that there is every reason to believe that there is a contagium vivum for those infectious maladies the speci¬ fic ^^germs® of which have not as yet been dis¬ covered. Inasmuch as the great bulk of dis¬ eases in man and the lower animals, as well as in the vegetable kingdom, are of an infectious nature, it will be seen that the investigations which have shown their relationship to micro-

organisms is of the first importance, and that it forms the basis of almost the entire science of medicine. Not only have our discoveries in this connection enabled us to formulate rational methods of treatment, but they give us the key to what is even more important — the pre¬ vention of disease. So far have we advanced in the latter direction that it is probably no exaggeration to say that we are in a position to-day to prevent at comparatively small cost ‘ three-fourths of all the sickness from which the human being suffers, and that the blind fatalism and stupid ignorance of a great ma¬ jority of mankind alone prevent a consum¬ mation so devoutly to be wished — all of which is at bottom due to our study of the relation¬ ship of ®germs® to disease.

H. F. Harris, M.D., Georgia State Board of Health.

DISEASES, Occupational. The complexi¬ ties of modern life and modern living have had much to do with the development of a large class of diseases which, because they are associated with, and in many instances clearly derived from, certain trades and occu¬ pations have received the name of occupational diseases and in very recent years have been carefully investigated and classified as such. The work of W. G. Thompson in this field has been extensive and illuminating. While these diseases have been more carefully investi¬ gated recently than they formerly were, many of them are not new to literature and medical science; many others are however the direct consequence of trades and occupations which have been born and developed as the result and consequence of modern discoveries in chemistry, physics, metallurgy, electricity and other sci¬ ences. The first publication upon this subject which was given to the world, at any rate to the modern world, was by Ramazzini, a care¬ ful Italian observer, who in 1713 published a small book relating to the disastrous effect of their respective occupations upon metal diggers, gilders, chemists and tin workers. We must not forget that in these early days this dis¬ astrous effect was due perhaps as much to un¬ cleanly ways of living and to unhygienic shops and houses as to poisonous and unhealthy con¬ ditions in the work itself. This does not signify that such unfavorable conditions have been en¬ tirely removed from modern industrial plants; if they had there would not be so many oc¬ cupational diseases. But the baneful effect of certain occupations has been clearly recognized and sometimes by legal enactment, sometimes by the force

of public opinion, the disease-pro¬ ducing conditions have been removed or mini¬ mized, compensation for disease or injury sus¬ tained while at work guaranteed, and even the hours of work lessened so that exposure and hazard are becoming less and less noteworthy and the responsibility for disease and injury is becoming shifted more and more to the shoul¬ ders of the laborer himself. At the rate at which industrial conditions are now improving and the demands which organized labor is in¬ sisting upon, the risk which attends many of them ought soon to disappear; moreover it is not unlikely that some of the occupations will have become so unprofitable that they will dis¬ appear. For the best interests of society let us hope that employers will become less rapa¬ cious and laborers less unreasonable and exact¬

ing; that employers will more and more pro¬ vide their shops and factories with hygienic conditions and safety appliances, and that the laborer will become less careless, less indifferent to safety and health, and more careful to avoid preventable disease and accident.

According to Thompson's arrangement, oc¬ cupational diseases may be caused by (1) toxic substances; (2) mechanical irritants; (3) tem¬ perature or air pressure ; (4) overuse of nerves and muscles ; and they may be acute, re¬ sulting in sudden death, or chronic continu¬ ing through years and serious conditions to a fatal issue. The following classes of disease may be noted: (1) Those which are due to irritant substances, including toxic metals, gases and fluids, irritant dusts, including those which are insoluble and inorganic, those which are soluble and inorganic, and organic dusts and fibres, also those which are due to germs and miscellaneous irritants. (2) Diseases which come from harmful surroundings, including modifications of air, temperature and light, and electric shock. (3) Miscellaneous diseases from occupations involving more than one hazard, such as mining, dyeing, pottery making, also in¬ cluding diseases of the blood, skin, nerves, eyes, ears, nose, throat, mouth, bones, joints, bladder, *etc.* The irritant substances which cause the diseases may enter the body in the pure form or as salts of various substances, as dusts, fumes or mixed metal solutions, in¬ haled in the form of sharp particles in the nose or throat, or less frequently by absorption through the skin. These substances not only cause mechanical irritation but, as in the case of such poisonous metals, as mercury, arsenic, lead, silver, antimony, etc., they have their specific effect upon the nerves, arteries, kidneys, mucous membrane, bones, etc., the effect being sometimes quickly fatal and sometimes fatal through prolonged chronic diseases,

especially chronic nephritis, the poisons being chiefly eliminated by the kidneys so far as they are eliminated at all. Some of these substances have a specific action on certain tissues, thus antimony is a specific poison to the nose, pharynx, bronchi, stomach and intestines. Brass dust causes what is known as brass-founders' fever or ague, though one soon acquires im¬ munity from the effect.

The influence of sand blasting is very in¬ jurious to the mucous membrane of the mouth, throat and nose, and upon the bronchi and lungs, unless the face is protected by a suitable mask. Workers in bronze, chromic acid, cobalt, copper, manganese, platinum, -silver and zinc may be poisoned by dust or fumes, but those who work in gold, iron, steel, nickel and tin are not injured except by the dust, or by solder which may be used in working them. The effect of toxic gases is local or general, acute or chronic, and they are eliminated by the lungs or kidneys.

The list of poisonous gases which produce disease or death is a long one, among them being bromine, carbon bisulphide, dioxide and monoxide, chlorine, the vapor from essences, extracts and essential oils, ether, formaldehyde, gasoline, naphtha, iodine, wood alcohol and turpentine, and the gas from phosphorus and sulphur. The inhalation of ammonia and ammonium chloride produces cough, sneezing, catarrh and bronchitis. The clothing of those

who work in amyl alcohol and amilin may be¬ come so saturated that unconsciousness and death may follow prolonged inhalation of the gases as they are volatilized. Benzine vapor is very poisonous and may produce an acute or chronic disease.

Workers in dyes, petroleum, alkalis and carbolic, nitric, hydrochloric and sulphuric acids suffer mostly from the direct effect upon the mupous membrane of the respiratory organs. Those who work in nitro-glycerine soon acquire immunity, as it is readily absorbed. The injury from organic dust and fibre which occurs for example, to those who work in grist mills, grain elevators, sugar refineries, etc., consists in mechanical obstruction in the respiratory passages, in the bruising of the mucous mem¬ brane, in the inhalation of soluble poisons and germs and in the irritation of the skin, eyes, ears and mouth. Other substances which may cause irritation by being received into the body in the course of one's occupation and which may be mentioned in this relation are all those which are connected with the work of miners, asphalt, cement, emery, glass and stones, metals and earths which are ground or crushed or polished. The cleaning occupations are very productive of disease through inhalation, in¬ cluding the gathering of ashes and garbage, street cleaning, carpet cleaning, and the me¬ chanical treatments of cotton, felt, feathers, flax, hemp, fur, horn, bone, shell, horsehair, jute, rags, straw, tobacco, wool and rubber. The harmful occupations which are due to bad physical surroundings are those of workers in caissons and tunnels, in which the so-called caisson or compressed air disease is produced, and also conditions in which there is air con¬ cussion or air rarefaction. In this category must also be included those occupations in which the conditions of heat, cold, moisture or light are excessive or abnormal.

If we turn our attention to specific trades and occupations we see that farmers, though working in the open air and, under ordinary circumstances, having the best chance for im¬ munity from disease, are nevertheless very often victims of disease of the digestive ap¬ paratus and sufferers from bad teeth owing to the large quantities of indigestible, poorly cooked and imperfectly masticated food which are

eaten by so many of them and the failure to give proper attention to their teeth.

Fishermen and sailors are also sufferers from similar diseases and from pneumonia and tuberculosis owing to exposure to bad sanita¬ tion at home and on shipboard, bad habits, and too exclusive a diet of fish, salt pork and other cured foods.

Those who contract anaemia, tuberculosis and many diseases of the lungs, teeth, mucous membrane and skin in connection with their occupation, owing to bad air or to irritating dust or gas which they inhale, include tanners, blacksmiths, miners, bakers, millers, knife grinders, and many others. ˆ

The diseases from working in metals, with serious or fatal poisonous effects and injuries to both soft and hard tissues, affect workers in copper, lead, arsenic, phosphorus, mercury, zinc, tin and brass.

Railroad men, especially those who work on trains, have the usual ailments which come from exposure, such as rheumatism, eye strain

and other eye troubles, and kidney disease from excessive shaking, while they are continually in danger from serious accidents.

The workers in tunnels and caissons and in other places where the air pressure may be as great as four or five atmospheres suffer seri¬ ously with their blood and nervous system, air being forced into the nervous tissue which is not always dislodged, even by careful de¬ compression, when the victim returns to or¬ dinary atmospheric conditions.

Those who live in a rarefied atmosphere or who ascend, like aviators and mountain climb¬ ers, to great altitudes, often suffer from air hunger, from pneumonia and other diseases of the respiratory organs, and from heart troubles. The experience of the great European War shows however that immunity may quickly be gained even for great heights, and ability to work severely and think rapidly and in¬ telligently may be acquired.

Workers in chemicals are particularly sensi¬ tive to diseases of the lungs and skin and in¬ clude bleachers who work in chlorine, sulphur and acids, aniline dye workers, starch makers and workers in ammonia and many other chemicals. Athletes and those who work in strained and trying positions like miners and tunnel drivers suffer

from diseases of the heart and lungs. In the case of pugilists, gymnasts, circus performers and other professional ath¬ letes, periods of training are often followˆed by periods of the grossest and coarsest dissipation, and collapse and early death are the frequent and logical result.

Rupture and aneurism are not of uncommon occurrence in occupations in which there are great and sudden strains, frequently repeated, porters, blacksmiths, draymen and longshore¬ men often being victims of these accidents, and they are the more likely when, as is so frequently the case, the tissues are debilitated by syphilis or other venereal disease.

Those who are exposed to loud noises, like boiler-makers and riveters, are sufferers from deafness, and hundreds and thousands of the soldiers in the European War, particularly those who are in the artillery service, suffer in this way. Those who work under intense light, particularly if it is shifting and uncertain, suf¬ fer from eye diseases, especially impairment of vision. The workers under intense electric light in power houses and elsewhere can hardly escape the bad effects of this unusual experi¬ ence. Brew'ers and saloon keepers suffer, in great numbers, from the excessive use of alcohol, the lungs, liver and kidneys being the organs most often attacked. Flat feet, vari¬ cose veins and constipation are acquired by those who are constantly on their feet, like cooks, waiters, house servants, policemen and salesmen. Glassblowers, potters, and band players on brass instruments often suffer from emphysema of the lungs, a distressing and often serious trouble due to rupture of the lung tissue and escape of air into the chest cavitJˆ Those who work in india rubber and inhale carbon bisulphide and those who inhale benzine and turpentine vapors often suffer from headache, poor sight and hearing and intestinal cramps.

Indigestion is a very common ailment with those vvhose eating and drinking habits are irregular, notably cabmen, various classes of

public officials, and commercial travelers. In¬ strument players,

typewriter operators, stenog¬ raphers, bookkeepers, and all others who are constantly writing are subject to cramps and palsies. The disease called scrivener's palsy was once very common in England and has its counterpart in the classes of workers above mentioned. Sedentary workers, shoemakers and tailors are great sufferers from haemor¬ rhoids, constipation and indigestion, as might be expected, from insufficient use of their muscles and want of stimulus to the circulation.

The list which has been given is far from complete but is sufficient to show the suscepti¬ bility to disease from ordinary occupations and emphasizes the importance of good habits and proper diet in all these pursuits. These diseases in many instances are preventable, and inas¬ much as health is the most valuable asset of the industrial worker, it behooves him to look after it with the greatest care. No constitution is so rugged that it may not be broken down prematurely and with absolute certainty if the laws of hygiene are persistently disregarded.

Andrew F. Currier, M.D.

DISEASES OF CHILDREN. See Chil¬ dren, Diseases of.

DISEASES OF THE EYE. See Eye.

DISEASES OF OLD AGE. See Old Age, Diseases of.

DISEASES OF PLANTS. See Plants, Diseases of.

DISENTIS, de'zen-tis, Switzerland, a vil¬ lage in the canton Orisons, situated on the tiither Rhine. It is about 31ˆ2 miles southwest of Reichenau, and 3,600 feet above sea-level. The Monk Sigisbert, a disciple of Saint Columba, is supposed to have founded a large Benedictine monastery here in 614./ Pop. 1,691.

DISESTABLISHMENT, specifically the depriving a church of its rights, position or privileges as an established church; withdraw¬ ing a church from its connection with the state. A bill for the disestablishment and disendowment of the Irish Church was introduced into the British House of Commons by Gladstone 1 March 1869. It was passed by Parliament within a few months of its introduction but did not take effect till 1 Jan. 1871. In the session of 1914 an act providing for the dis¬ establishment and disendowment of the Church of England in Wales was passed by Parliament, but owing to the outbreak of the European War its enforcement was postponed until the conclusion of peace.

DISFRANCHISEMENT, the act of de¬ priving a person of any privilege, liberty, fran¬ chise or immunity, such as depriving a member of a corporation of his corporate rights. It is distinguished in this case from ˆˆamotion,® which refers to the removal of an officer of the conˆoration from office without affecting his member¬ ship. Another instance is the act of depriving a person of the rights and privileges of citizen¬ ship. This term is often applied to the act of depriving a citizen of the right to vote ; and in Great Britain to the act which deprives a con¬ stituency of the right to return a member to Parliament whether through a redistribution of seats or as a result of bribery and corruption in a constituency, the suspension by the House of

Commons on the recommendation of the judges who tried the case of that constituency's right to return a member. See Aliens ; Electoral Qualifications; Suffrage; Elections; Natu¬ ralization ; Votes, Voters, Voting ; United States — Suffrage in the.

DISHONOR, the refusal or omission of the drawee of a bill to accept, or of the acceptor of a bill, or of the maker of a promissory note to liquidate the obligation on its maturity. There are generally three parties in a bill or note transaction, the holder, the drawer and the per¬ son by whom the bill or note is payable, whether he be the maker or acceptor of it. In case the bill or note is dishonored the holder must at once notify the endorser and the drawer, if the paper be a draft or bill. Then the drawer, if there be funds of his in the hands of the drawee, will have an opportunity of withdrawing them. If a banker refuses to pay a customer's check while holding an account of that customer suffi¬ cient to meet such check he makes himself liable for damages.

DISINFECTANTS, agents used for de¬ stroying or rendering inert the germs of in¬ fectious diseases. It has been amply proved that a large number of diseases are of microbic origin, and when these low forms of micro¬ organisms are introduced into the bodies of sus¬ ceptible individuals they multiply and thereby become capable of producing certain diseases which are called infectious. Any agent capable of destroying these organisms is a disinfectant or germicide, and through disinfection we have a powerful and effective means of controlling these diseases and checking the spread of them.

In order to disinfect thoroughly we must first identify the source of infection. In the eruptive fevers, such as measles, scarlet fever,

smallpox, etc., the infectious germ comes di¬ rectly from the body of the patient suffering with the disease, attaching itself to clothing, bedclothes, etc., and to objects handled by the infected person. The same is true of infectious skin-diseases, such as barbers' itch, ringworm, *etc.* In pneumonia, tuberculosis, diphtheria and whooping-cough the sputum and the breath carry the germ of infection ; in cholera the alvine discharges and possibly the vomits ; in t3'^phoid fever infection is generally due to the specific germ found in the discharges from the bowels ; in malaria, anthrax and elephantiasis the germ is found in the blood and is trans¬ ferred by biting insects ; in hydrophobia it occurs in the saliva, spinal cord and brain ; in gonorrhoea in the urethral discharges, *etc.* Some of the infecting agents do not multiply outside of the body, while others under favorable condi¬ tions are highly procreative. While, therefore, the object of disinfection would be accomplished by destroying all infected material, where this is not admissible it is necessary to subject it to a process of disinfection inimical to the life of the infecting germ. This must be complete and thorough. The selection of an appropriate dis¬ infectant for each disease is the result of labora¬ tory research. A culture of a germ is made in a medium best adapted to its propagation and by experirnenting with various germicides one is found which proves most destructive to the germ in the shortest possible time. The best and cheapest disinfectant is heat, particularly moist heat. There is no infectious germ known that

can survive boiling water continued for a time — longer or shorter, depending on the germ.

In the use of heat various kinds of mechani¬ cal apparatus for both dry and moist (super¬ heated steam) heating are used. Boiling in¬ fected clothes with or without the addition of a chemical disinfectant is a popular means of dis¬ infection. Where it is impossible to use either of these agents resort is had to fumigation with gaseous vapors of the disinfectant. Cold (freezing) is a natural disinfectant, but fails in the case of typhoid germs, which have been known to survive freezing for 103 days ; and the same is true of the tuberculosis germ. Cam¬ phor, medicated papers or the burning of in¬ cense may clear an odorous atmosphere impreg¬ nated with sewer-gas or fumes of decomposing animals or vegetable matter; but these are not true disinfectants.

Of late the utility of steam disinfection has been forcibly demonstrated, and most cities and quarantine stations have established plants for this process. Clothing, bedding, etc., known or believed to be infected are placed in chambers or cylinders and subjected to superheated steam (220° to 230° F.) for 20 or 30 minutes. This thoroughly disinfects all infected material. Dry heat is not so effective. A practical disin¬ fectant for many domestic purposes, both inex¬ pensive and easy of application, is chlorinated lime in the proportion of six ounces to a gallon of water. All typhoid or cholera stools, like¬ wise the sputum of pneumonia or tuberculosis patients, are rendered innocuous by it in less than 30 minutes, if used in equal quantity with the material to be disinfected. It may also be used as a spray, particularly for cellars, and the dry chlorinated lime is useful in the case of privies and garbage cans. Carbolic acid in a 3-per cent solution — that is, in the proportion of four ounces to a gallon of water — is one of the best. It does not stain or burn and is suffi¬ ciently powerful to disinfect floors and wood¬ work, although for this purpose a 5-per cent solution is generally used. For clothing the 3-per cent bath is Used and the immersion should be not less than one hour. The cresols are cheaper and still more effective, a 2-per cent solution

being equal to a 5-per cent solution of carbolic acid. Borax is a good disinfectant for open sores, but should be used only under the direction of a physician, as it frequently devel¬ ops poisonous effects through absorption into the blood. Potassium permanganate is an ef¬ fective disinfectant for water tanks and pipes. It is non-poisonous, comparatively cheap and possesses the power of destroying the noisome odors of putrescence. It depends for its action upon its generation of nascent oxygen. Another bactericide of great oxidizing power is hydrogen peroxide. Corrosive sublimate in proportion of one part to 1,000 parts water is not only an efficient disinfectant, but a powerful insecticide as well. It can be applied to woodwork, walls, floors, etc., but its corrosive action on metal renders its uses limited on sewers, drains and the like. Milk of lime or common whitewash, so highly recommended by the German govern¬ ment in the cholera epidemic of 1892, is a ready and efficient means of disinfection. This may be prepared by sprinkling with water a quart of quicklime in a suitable vessel and, when the lime is reduced to a powder, adding three or more quarts of water, allowing the mixture to

stand. It may then be applied with a brush to walls, floors, *etc.* Drains are flushed and all excreta from infected cases treated with equal parts of lime solution.

The use of chlorine and sulphurous gases is objectionable because of their irritating quali¬ ties. Sulphur fumes to be effective must be accompanied by moisture. Steam from a boiling kettle will do. A more modern disinfectant is formaldehyde, made by subjecting methyl-alcohol to oxidation and commonly known in commerce as formalin, which is a 40-per cent solution of formaldehyde. It is readily soluble in water, does not destroy clothing or furniture and is virtually non-poisonous. It is used for disinfecting surgical instruments, for the wash¬ ing out of sinuses and of indolent and foul ulcers and for the disinfection of dwelling-rooms. An approved method of using it for the last-named purpose is to pour 10 ounces of for¬ malin upon 4 ounces of potassium permanganate. This should be done in a sufficiently large vessel to obviate spattering, and the vessel should be set upon a brick or stone base. To be effective the temperature of the room must not be less than 65° and a humidity of 65 degrees is desir¬ able. This moisture may be provided by boiling a tea-kettle in the room for a time before the gas is liberated, and this will serve also to warm up the room. The proportions given are for a space of 1,000 cubic feet. Larger rooms will require more formalin. Another method which is highly recommended is the following: Make a mixture of three parts

of 40-per cent formalin and one part of carbolic acid. Eight ounces of this mixture will be required for each 1,000 cubic feet of space and the room must remain closed for 12 hours. A sufficient number of sheets are saturated with the mixture, each sheet holding about six ounces, and they are hung on lines strung across the room, free of the walls and floor. A so-called ®solid® form of formal¬ dehyde has been placed on the market, with a container in which it is burned. If sufficient formaldehyde is used for the size of the room this device is convenient and effective, as the resulting gas quickly penetrates all cracks and crevices and renders the air clean and pure, be¬ sides destroying all infectious germs.

Most of the metallic and acid disinfectants are more or less objectionable on account of their destructive action to the skin and tissues. Osmic acid, bromine and iodine are useful in their respective places. The relative disinfectant values of the various germicides in cornmon use, based on the efficiency of carbolic acid on the typhoid germ as 1, is as follows :

Corrosive sublimate . 400-3,540

Hypochlorites . 146-220

Iodine water ... 100

Iodine trichloride . 94

Bromine water . 64

Potassium permanganate . 42

Chlorine water . 28

Silver nitrate . 15

Formic acid . 5.7

Benzoic acid . 5.0

Sodium bisulphate . 4.1

Cresylic acid . 3.7

Copiier sulphate . 2.0

Lactic acid . 1.8

Eucalyptol . 1.2

In all cases of infectious or contagious diseases disinfection should be complete; arti¬ cles infected should be burned, boiled or disin¬ fected and not buried or thrown into sewers

DISINFECTION

before being treated with a proper disinfecting agent, for infecting germs have been known to lie dormant for years. In disinfecting a room in which infectious disease has been housed a thorough mechanical cleansing should be car¬ ried out after a preliminary disinfecting. The walls should be carefully brushed with a vacuum cleaner and the floors and woodwork scrubbed with hot water and soap, finishing with a for¬ malin solution to which has been added a little glycerine. A fresh coat of paint or varnish on the woodwork and new wall-paper or calcimine placed on the walls complete the list of essen¬ tial precautions. The ceiling may be regarded as safe. (See also the article Disinfection). Consult Christian, M., ˆDisinfection and Disin¬ fectantsˆ (London 1913) ; Rosenau, M. J., ˆDis¬ infection and Disinfectantsˆ (Philadelphia

1902).

Richard Ferris,

Editorial Staff of The Americana.

DISINFECTION, popularly speaking, the process of destroying the micro-organisms which produce the class of diseases known as infectious or contagious diseases. These dis¬ eases are communicated in various ways. Lep¬ rosy, anthrax, rabies, the plague and diseases of the genital system are communicated by the direct contact of a healthy bod}'- with a dis¬ eased body. The dry germs of measles, chickenpox, smallpox, scarlet fever and tuberculosis float freely in the atmosphere and being in¬ haled may find lodgment. The tiny drops of mucous emitted in coughing, sneezing, talking, laughing and singing may convey the germs of influenza, diphtheria, whooping-cough, phthisis, tuberculosis, spotted fever and glanders. The disease germs of typhoid fever, dysentery and cholera are abundant in the urine and excreta of the patients, and may be spread by spattering when the vessels are cleansed, or they may find their way into wells and reservoirs through the wash of rain. The germs of anthrax, lockjaw and malignant oedema settle upon the soil and are likely to make their way thence into open wounds. Malaria, yellow and spotted fevers, the plague, sleeping sickness and some others are transferred from a sick person to a well person by mosquitoes, fleas, gnats or

other bit¬ ing insects. Flies carry on their legs, and un¬ destroyed in their intestines, the germs of many diseases and distribute them everywhere, particularly on human foods which are also fly foods: and most kinds of food are excep¬ tionally good breeding ground in which many disease germs multipl}'- with great rapidity. It is to be remembered also that infection is not likely to cease with the primary contact. A germ originally in the soil may be carried for a long distance in a bit of mud on a shoe and thence transferred to a shoe-brush, or to some caressing animal, and so start on a long jour¬ ney in which it may menace any person who is in a state of health susceptible to attack by that particular disease. It is to be understood, of course, that the vast majority of persons, al¬ though equally exposed, are not infected and diseases do not develop in them. The office of disinfection is to protect the susceptible ones.

Practically, then, disinfection is the freeing of articles or substances from the adhering or inhering disease germs, either by removing the germs bodily, or by destroying them where

they are. The first method employs mechanical devices, such as filters for drinking-waters, the use of vacuum cleaners, scrubbing wall-paper with stale bread and woodwork with soap and hot water, *etc.* In the same category would be the coating over of germs with whitewash, cal¬ cimine, paint or varnish. The destruction of germs where they are is a wider field and calls for intimate knowledge of the germ to be de¬ stroyed and of the particular substances which will be fatal to it and the conditions under which such remedies must be applied to be ef¬ fective. For a general description of these agents and the methods of using them, see the article Disinfectants.

The United States government has pub¬ lished several very complete and valuable pamphlets on disinfection and the proper use of disinfectants: Farmers' Bulletin 345 (1913) ; Hygienic Laboratory Bulletin 82 (1912) ;

Public Health Service Bulletin 42 (1911) ; and Public Health Service Reprint No. 287 (1915). In this encyclopedia individual prophylaxis against contagion is described under each in¬ fectious disease and can best be consulted in its proper place. See Antiseptics ; Bacteria ; Dis¬ ease; Germicides.

DISINTEGRATOR, a machine in which various substances are pulverized, crushed or disintegrated through concussion by beaters

projecting from the faces of parallel metallic discs revolving in contrary directions. There are disintegrators for ore and for grain, and one form is used for mixing mortar.

DISLOCATION, the displacement of one bone from another with which it forms a joint. Thus by dislocation a limb is said to be put out of joint. Dislocations are the result of either disease, accident or congenital malformation. The displacement may be either partial or com¬ plete and cases are classified as simple, when the skin remains unbroken, and compound where a wound lays bare the bone; when a fracture of the bones and injury to important blood ves¬ sels aggravates the case, the dislocation is said to be complicated.

The general treatment of dislocations con¬ sists in reduction, that is, drawing back the displaced joint into its socket. The contracted muscles oppose this reduction, and sometimes their spasmodic action has to be overcome by the administration of chloroform or ether. Up to the year 1870 or thereabouts the reduction was generally effected by extension, that is, by pulling out the displaced limb and stretching the restraining muscles until they are exhausted, when the bone would generally slip back into its place with an audible snap.

Of late years, however, reduction by exten¬ sion has been to a very large extent given up in consequence of the general adoption of re¬ duction by manipulation. This method, known it seems from ancient times, but curiously neg¬ lected, consists in executing certain complex movements of the dislocated limb which effect the return of the displaced bone to its socket by ingeniously utilizing its unruptured attach¬ ments and evading the opposition of the mus¬ cles,ˆ by ingenuity rather than by force. It is particularly applicable to the hip, which, as it is commanded by the strongest mass of muscles in the body, always presented the most formidable obstacles to the old method. The first paper on

this subject which attracted general attention was by Dr. Reid of Rochester, N. Y. (1851) ; and in 1869 Professor Bigelow of Boston

pub¬ lished a careful and exhaustive discussion of injuries to the hip, with such full and clear di¬ rections for the manipulation method, as to se¬ cure its general adoption in the case of this joint by surgeons in Great Britain as well as in Arnerica. The method, however, had been de¬ scribed and used in France and elsewhere, though with less care and precision, in the earlier half of the 19th century.

In cases of congenital dislocation of the hip bone and other congenital misplacements of the bones, manipulation, intensified into powerful massage, has been developed practically to a wonderful extent by numerous surgeons.

DISLOCATION (in geology). See Fault.

DTSLY, Duke. See Bugeaud de la Picon-NERiE, Thomas Robert.

DISMAL SWAMP, Great, a tract of marshy land, beginning a little south of Nor¬ folk, Va., and extending into North Carolina; containing 750 square miles; 30 miles long, from north to south, and 10 miles broad. This tract was entirely covered with trees, with almost im¬ pervious brushwood between them, but it has now in part been cleared and drained and is de¬ voted to agriculture. In the midst of the swamp is Drummond's Lake, seven miles in length, the scene of Thomas Moore's ˆLake of the Dismal Swamp. ˆ The Dismal Swamp was originally part of the Virginian estate of George Wash¬ ington; and it was he who superintended the digging of the ˆWashington ditch,® the first step in its reclamation. In 1899, the Dismal Swamp Canal, connecting Chesapeake Bay with Albemarle Sound, first opened in 1828, and to the close of the Civil War a famous historic waterway, was reopened for naviga¬ tion. It extends from the village of Deep Creek, Va., to South Mills, N. C., a distance of 22 miles ; and is one of the most important links in the chain of inland waterways extending along the coast from New York to Florida. A mar&d advantage of the restored canal is that it enables shipping to avoid the dangers of Cape Hatteras; another is that it will furnish the means of inland and protected navigation for the smaller vessels of the navy and the revenue service. Although only 22 miles long it opens up 2,500 miles of inland navigation._ The im¬ provement of this canal cost the United States government nearly $1,000,000. Little Dismal and several smaller swamps are along the coast of North Carolina; area, about 2,000,000 acres.

DISMAS, Saint, according to ancient legends based on doubtful authority, the name of the penitent thief who died on the cross be¬ side Jesus Christ; that of the impenitent thief being given as Gesmas.

DISPART (Lat. dispartire, to divide apart), the difference between the semi-diam¬ eter of the base ring at the breech of a gun and that of the ring at the swell of the muzzle. On account of the dispart the line of aim makes a small angle with the axis, so that the elevation of the latter above the horizon is greater than that of the line of aim. In modern guns the dispart is of no conse¬ quence on account of the present placing of the sights on the mount and not on the gun.

DISPENSARY is literally a place where medicine or food is weighed out for distribu¬ tion ; in our own day the term is applied to a charitable institution where medical and surgi¬ cal aid are given without charge to those who desire or need them. Such dispensaries are found in most large towns of the United States and Europe. In the Old World they originated in the monasteries. The modern dispensary system in England was inaugurated in London in 1687. The oldest institution of that kind in the United States w'as opened in New York in 1795.

Figures compiled by the American Hospital Association show that the number of dispen¬ saries has grown from 200 in 1904 to over 2,300 in the fall of 1916. Of these about 1,000 were dispensaries for the sick poor, treating general diseases, while the remaining 1,300 were pub¬ lic health dispensaries established for the re¬ lief and particularly the prevention of such communicable diseases as tuberculosis.

The dispensaries, founded and maintained for the relief of the sick poor, have been greatly abused in Europe as well as in the Uni¬ ted States and to a large extent have become the propagators of pauperism. In 1897 it was estimated that in Albany 21 per cent, in Brook¬ lyn 31 per cent and in New York 71 per cent of the population (inclusive of suburban pa¬ tients) applied for free treatment in the dis¬ pensaries. In 1899, with the view of remedying matters, it was enacted in New York State that dispensaries were only permitted to be operated under license, and among other reforms, appli¬ cants for relief were compelled to sign a dec¬ laration of their inability to pay; but it is esti¬ mated that, in spite of that and other measures taken, only 50 per cent of those aided are in need of what is practically gratuitous medical relief. In Boston in 1909 it was estimated that those who attended free dispensaries equalled over 25 per cent of the entire population of the city. The weakness of the position is that pub¬ lic clinics are attended by fee-paying students and doctors eager for dispensary experience and that for their sakes patients must be ob¬ tained, who, as an equivalent for free treatment, are expected to

appear before a medical class, submit to public examination and be the text for a medical or surgical lecture.

Consult Goldwater, ˆDispensary Ideals: a Plea for Dispensary Reformˆ (Philadelphia 1909) ; Report of the Boston Dispensary for

1911, and those of New York State Board of Charities for 1878, 1897 and 1905 ; and articles in the Maryland Medical Journal for March 1907, ˆSuggestions for Reorganization of Hos¬ pital Out-patient Departments® ; and Canadian Journal of Medicine and Surgery for January

1912, ®The Out-patient Clinic.®

DISPENSATION, in canon law, is the re¬ laxation of a law in a particular case : it is an act for which the lawgiver is competent as re¬ gards laws enacted by himself or by his prede¬ cessors to whose powers he succeeds. It dif¬ fers from absolution, for it not only forgives the illegal act but validates its results. It is claimed for the Supreme Pontiff that he can dis¬ pense in matters where the jus divinum springs from a human act of will, as in vows and promissory oaths (Liguori) : in such case casu¬ ists hold that the Pope does not do away with the jus ditnnum but removes the ground of the

obligation of oath or vow : in the words of Aquinas, determines what is pleasing to

God.® The claim of power in the Pope to do this rests on the power granted to Saint Peter, of loosing and binding. Dispensations were for centuries granted by bishops to their sub¬ jects, not only from diocesan or provincial statutes, but even from laws imposed by a gen¬ eral council or by the Pope ; but since the time of Innocent III (d. 1216) the right has been claimed as a prerogative of the Supreme Pontiff. Bishops by their ordinary power can dispense from the laws and statutes of their own diocese and from the general laws of the Church by virtue of powers delegated by the Pope, as in most vows

and in the laws relating to fasts, abstinences, observance of holidays, *etc.* In 1534 Henry VIII decided that for his realm applications should no longer be made to Rome, and this assumption of ecclesiastical rights he conferred on the archbishop of Can¬ terbury. Dispensations are generally obsolete in the Anglican Church, but bishops have power of issuing special marriage licenses and per¬ mitting non-residence and the holding of two benefices.

DISPERSION, an optical term applied to the angular separation experienced by the com¬ ponent rays of a pencil of light on emerging from a refracting medium, whose surfaces are not parallel to each other, as in the case of the common prism. The nature of this phenome¬ non was first clearly expounded by Sir Isaac Newton in 1666 and is accounted for by the dif¬ ferent speeds of light of different wave-lengths in the same refracting medium. The refractive index of a transparent medium is different for different kinds . of light. Thus, when white light passes through a given prism, the rays of different refrangibility of which it is composed are bent by different amounts from their orig¬ inal common direction. They are said to be dispersed. The dispersion for the given prism depends upon the difference of the refractive indices of the extreme rays of the visible spec¬ trum. It varies with the substance and the an¬ gle of the prism. The relative breadth of any two parts of the spectrum varies with the sub¬ stance of the prism. This constitutes the so-called irrationality of dispersion. In general, rays of short wave-length are more refracted than rays of long wave-length, but in some re¬ fracting media this law breaks down in part. This is known as anomalous dispersion. The term false dispersion is applied to the scatter¬ ing of light by reflection from motes suspended in a transparent medium. See Light.

DISPLAYED, a heraldic term used to de¬ scribe the position of an eagle or other bird with its wings expanded.

DISPOSSESS, in law, to put out of pos¬ session, to dislodge and evict ; to deprive of actual occupancy, particularly of real property. Dispossess proceedings are begun against a tenant who is then served with a dispossess zvarrant, and ejectment from the premises fol¬ lows. See Ejectment and Eviction.

DISPUTATIONS, Historic. Public de¬ bates on religious questions are of very ancient origin according to the tradition in the Midrash which represents Abraham as holding a debate with Nimrod. In 150 b.c. a debate was held in Alexandria before Ptolemy Philomater on the

comparative pureness and completeness of the Jewish and Samaritan text of the Old Testa¬ ment. Later, Jews and Romans debated. In the early Christian Church debates were held with the Jews. Two are of especial prominence : the debate of Athanasius with Zaccheus and the debate of Justin Martyr with Trypho, the Jew. In the 13th century the Jews and Christians of Italy publicly disputed various questions. A great disputation was held at Paris, 25-27 June 1240, in the presence of Queen Blanche, mother of Louis IX, and a great number of priests and rabbis. Another famous debate took place at Barcelona, 20 June 1263, on the question whether the Messiah had appeared or not. It was at the royal palace in the presence of James I of Aragon and his court. Benedict XIII presided over a great debate which was held with great pomp and numbers at Tortosa beginning in Feb¬ ruary 1413 and ending November 1414. It was probably the longest debate in history, having 69 sessions and many debaters. The councils of the Church were often nothing more than dis¬ putations. The establishment of universities and the granting of degrees further extended the scope of the public debate. Many of the institutions held a weekly debate where the entire faculty assembled and a master presided. The presiding officer proposed theses which were attacked in turn by various masters while the bachelors defended the thesis of their mas¬ ter. The Middle Ages laid great emphasis on disputations. ®Such intellectual tournaments in which the students were taught to defend a thesis against attack, did more to enable them to grasp a subject than the mute and solitary reviewing and cramming of our modern exam¬ inations can possibly do. That method brought into play all the excitement of a contest, the triumph of success, and the disgrace of defeat, in order to emphasize the value of what had been learned, together with the importance of an alert wit and constant readiness to use it.® (F. Paulsen). After the Middle Ages the weekly disputations declined in use and were largely succeeded by the Seminar system. The candidate for the doctorate published a thesis or theses and defended them against all comers, a custom which still prevails in some European universities. It was in keeping with this custom that Martin Luther posted his 95 theses. The farnous Leipzig disputation of Andrew Boden-stein of Carlstadt against John Eck and of Luther against Eck covered a period of 22 days, both sides claiming the victory. In Switzer¬ land the public disputations of the Reformation began with that of Zurich, which opened 29 Jan. 1523. More than 600 men of eminent rank and scholarship were present. Zwingli debated against Faber and won. In December 1524 Stor, a priest, debated against clerical celibacy and the same month Farel also conducted , a disputation. Another disputation in which Eck represented the Papal party was held at Baden in 1526. Haller of Bern and GEcolampadius of

Basel opposed him. The treatment of the rep¬ resentatives of Bern and Basel was such that their home supporters were dissatisfied and another disputation was arranged for which look place at Bern 7-27 Jan. 1528. Zwingli was present and there was no notable debater on the other side. After the printing presses became more common the public debate was largely succeeded by the printed debate made

especially noteworthy in the Marprelate and Deistic controversies, A great disputation was held in Geneva in May 1535 in which Viret and Farel took part against Jean Chapuis. Farel and Viret also debated at Lausanne in October 1536, in a public disputation with the Papal party. In <ˆThe Cyclopaediaˆ edited by Abraham Rees, we find that ®The Port Royalists take occasion to observe that nothing gives so many different lights and openings for dis¬ covering the truth as disputation. The move¬ ments of a mind, employed singly in the exam¬ ination of any subject, are usually too cool and languid ; the mind needs a certain degree of heat to awake its ideas. Now, by the oppositions in dispute we come to find wherein the difficulty lies, and the vigor the mind has acquired en¬ ables us to surmount it.® Some debates have occurred in America which attracted wide at¬ tention. Alexander Campbell, founder of the Disciples Church, was a great debater. At Cincinnati, Ohio, 13-21 April 1829, he debated with Robert Owen of Lanark, Scotland, on the ˆEvidences of Christianity.® Again at Cincin¬ nati, 13-21 Jan. 1837, he debated on the Roman Catholic religion with Rt. Rev. John B. Purcell, bishop of Cincinnati. Mr. Campbell also de¬ bated with Rev. Nathan L. Rice, at Lexington, Ky., 15 Nov. to 2 Dec. 1843, on Christian bap¬ tism. The report of the debate fills a volume of 912 pages. Cincinnati was the place for another noteworthy debate, 1, 2, 3 and 6 Oct. 1845, on the ˆSinfulness of Slavery.® The debaters were both Presbyterian clergymen of Cincinnati, Rev. J. Blanchard and Rev. Nathan L. Rice. A public debate was held at Genoa, N. Y., begin¬ ning 28 Dec. 1847 and ending 5 Jan. 1848, between David Holmes, a Methodist, and John M. Austin, a Universalist, on the doctrines of the ˆAtonement,® ˆUniversal Salvation® and ˆEndless Punishment.® A debate was held near

Cincinnati in 1860 on the ˆComing of the Son of Man,® ˆEndless Punishment® and ˆˆUniversal Salvation® between Erasmus Manford of Saint Louis, editor of a magazine, and Benjamin Franklin of Cincinnati, editor of the American Review. A nine days' debate was held at Vienna, Ill., in August 1868, covering ˆBaptism,® the ˆˆWork of the Holy Spirit,® the ˆDiscipline of the Methodist Episcopal Church® and ®Human Creeds.® The debaters were Clark Braden of the Church of Christ and George W. Hughey of the Methodist Episcopal Church. A large volume of nearly 700 pages was probably the only result of the debate. There have been many informal debates between Arminians and Calvinists, Methodists and Baptists,ˆ Episco¬ palians and Dissenters whenˆ the discussions were not printed. The American political de¬ bates have furnished one of ˆ the most brilliant contributions to the forensic history of the United States.

Samuel G. Ayres, Garrett Biblical Institute.

DISRAELI, Benjamin. See Beacons—

FIELD.

D'ISRAELI, Isaac, English author: b. Lon¬ don, 11 May 1766; d. Buckinghamshire, 19 Jan. 1848. His father, Benjamin D'Israeli, was the descendant of a family of Spanish Jews which had settled at Venice in the 15th century to escape the persecutions of the Inquisition. He was educated at Enfield and Amsterdam. In

1791 appeared the first volutne of his ˆCuriosi¬ ties of Literature,ˆ the most entertaining of his works and that by which he is best known at the present day. This work, the sixth and concluding volume of which was published in 1834, passed through 12 editions in the author's lifetime. Its success was such as to determine D'Israeli to pursue the same path through the literary field, the collection of instructive and amusing gossip relative to literary men and their writings. From this period up to 1812 he appears to have been principally engaged in the collection and preparation of literary materials, the results of his labors appearing in the fol¬ lowing works, published between that year and 1822: ˆCalamities of Authorsˆ; ˆQuarrels of Authors, or Memoirs of Literary Controversyˆ ; and Hnquiry into the Literary and Political Character of James I.> These were afterward published collectively under the title of ˆMiscel¬ lanies of Literature.ˆ In 1828 appeared the commencement of his ˆLife and Reign of Charles I,ˆ a work completed in 1830. In 1841 appeared his ˆAmenities of

Literature.ˆ He also wrote several romances. D'Israeli was a man of a pensive and solitary turn of mind and his life was quite that of a literary recluse, spending the greater part of his time in his library, and on terms of friendship with Scott, Byron and Bulwer-Lytton. He abandoned Juda¬ ism for Christianity in 1817. A memoir of him, prefixed to a new edition of his ˆCuriosities of Literature, > was published by his eldest son, Benjamin Disraeli, afterward Earl of Beaconsfield (q.v.).

DISRUPTION, the name commonly ap¬ plied in Scotland to the act by which, in 1843, about 500 ministers of the Established Church gave up their livings to vindicate principles which they held to be essential to the purity of the Church and in harmony with its earlier history. A conflict between the civil courts and the Church on the question of lay patronage was its immediate cause. The founders of the Free Church held themselves at liberty to re¬ turn when the Church which they had left had abandoned its attitude and revindicated its in¬ dependence of the civil power. See Free Church ; United Free Church of Scotland.

DISSECTION, the process of studying the parts or organs of animals or plants by cutting or tearing operations. Practically no complete knowledge of the structure of organized bodies can be obtained in any other way than by com¬ plete dissection, and in human anatomy its place in the curriculum is most important. The dis¬ section of human bodies in the study of anatomy has probably taken place as long as we know the history of civilization; although, in certain countries and at certain ages, the practice of human dissection has been forbidden by certain ruling classes, — at one time the Church, another time the state, another time the aristocrat, at another time public opinion. At the present time, however, dissection of the dead body is recognized to be a prime essential to the study of medicine, and throughout all civilized countries it is widely practised.

DISSECTION WOUNDS, wounds made by cutting instruments, during the process of dissection, which differ from ordinary wounds of accidental origin, largely in their greater liability to become infected by pus-producing

bacteria. The human body after death makes an excellent host for a number of these septic organisms, notably the staphylococci and strep¬ tococci. It is by the entrance of these usually present organisms into the wounds that this ready infection takes place. Dissection wounds frequently prove fatal by the extension of the infection, with resulting blood poisoning. Great care should be taken by all students of anatomy as well as by undertakers and their assistants in order to avoid accidents of this kind. See Blood Poisoning; Py.ˆmia.

DISSEIZIN, dis-se’zm, or DISSEISIN

(Fr. dessaisir, to disseize, deprive of), is the dispossessing one of a freehold estate, or in¬ terrupting his seizin. ®It is a wrongful putting out of him that is seized of the freehold, not, as in abatement or intrusion, a wrongful entry, where the possession was vacant, but an attack upon him who is in lawful possession, and turning him out. It is an ouster from a free¬ hold in deed as abatement and intrusion are ousters in law.® Under the feudal law, when a vassal was: admitted to an estate by the cere¬ mony of investiture he was said to be seized of it. The disseizing of him was the turning him out of his fee. This term is synonymous, in modern law, with ˆˆadverse possession.® There is also what is called in law disseizin by election, when a property holder chooses to consider himself disseized of certain real estate, in order to avail himself of remedies at law applicable only to a disseizee. Equitable dis¬ seizin is where a person is wrongfully deprived of the equitable seizin of land, e.g., of the rents and profits. A title by disseizin is a good title against all but the rightful owner.

DISSENTERS, the common name by which in England all Christian denominations, except¬ ing that of the Established Churches, are usually designated, though in acts of Parliament it generally includes only Protestant dissenters, Roman Catholics being referred to under their specific name. The name is not applied to those bodies which dissent from the Established Church in Scotland. The term nonconformists is often used as synonymous with dissenters (see Nonconformists). Within recent years the term *Free Churches® has been applied with the same signification to dissenting bodies.

DISSEPIMENT, in botany, a division of the ovary; a true dissepiment is formed when the carpels are so united that the edges of each of the contiguous ones by their union form a septum. Each dissepiment is

formed by a double wall of two laminae; when the carpels are placed side by side, true dissepiments must be vertical and not horizontal. A spurious or false dissepiment is formed when the divisions are not joined by the union of the edges of con¬ tiguous carpels. They are often horizontal, and are then called phragmata. In the Cruciferae they are vertical.

DISSOCIATION, in chemistry, is the reso¬ lution of a ‘substance into other substances, whose molecules have a simpler constitution; but the word is usually applied only to those reversible resolutions in which the secondary products are capable of recombining to form the primitive substance, when the conditions that led to the dissociation are removed or re¬ versed. Dissociation is therefore to be con¬

trasted with ˆdecomposition,® for the latter word is used without any implication as to the subsequent behavior of the products into which the primitive substance is resolved.

Dissociation, in the usual sense of the word, is induced directly by the application of heat, and many cases of it have been exhaustively studied. Calcium carbonate may be taken as an example. When this substance is heated in_ a closed vessel it parts with a portion of its carbon dioxide and becomes reduced to a mix¬ ture of calcium oxide, calcium carbonate and free carbon dioxide gas. The decomposition proceeds only up to a certain limit, however, and if (as in ˆburning® limestone for the pro¬ duction of quicklime) it is desired to reduce the carbonate of calcium entirely to the form of the oxide, it is necessary lO provide for the removal of the carbon dioxide gas. If the operation be carried out in a strong closed vessel which contains nothing but calcium carbonate, calcium oxide and carbon dioxide, the decom¬ position proceeds only until the liberated carbon dioxide attains a definite pressure called the pressure of dissociation, which is always the same for the same temperature, and bears no relation to the quantity of calcium carbonate that is present, provided some quantity of it (no matter how little) still remains. Sir James Hall showed, many years ago, that when calcium carbonate is confined in this way it may even be fused without undergoing decomposition to any considerable extent.

The explanation of these curious facts is, that the carbon dioxide is continually combining with the calcium oxide in certain parts of the vessel with the production of calcium carbonate, while in other parts of the vessel the calcium carbonate is simultaneously dissociating into

free calcium oxide and free carbon dioxide. The recombination proceeds with a velocity that is proportional to the density of the free gas, while the dissociation proceeds with a velocity which, for the purpose of illustration at all events, may be regarded as constant. It follows that at low densities of the gas the dissociation will proceed faster than the recombination, the result being that the density of the free gas will increase. But this will also cause the re¬ combination to proceed faster, and finally, when the density of the gas reaches a certain critical value, the recombination and dissociation will proceed with equal velocity and a state of ap¬ parent equilibrium will be attained. No further visible decomposition of the carbonate will take place, unless the equilibrium is-disturbed by the removal of some of the carbon dioxide (in which case the dissociation will again proceed until the same critical density of the free gas is restored), or by a further increase of tem¬ perature (in which case the dissociation will proceed until the density of the gas attains to a new critical value, higher than the first one, and whose value depends upon nothing but the new temperature to which the system has been raised). Reactions such as the one here de¬ scribed thoroughly refute the old doctrines of chemical affinity, which taught that two sub¬ stances either will or will not combine under given circumstances, according as the chemical ^affinities® of the constituent elements would be more or less thoroughly ˆsatisfied® in the possible new compound than they are in the separate substances that might combine to pro-

duce that compound. In the case considered above, combination and decomposition go on simultaneously, and the only question is, which of the two will proceed the faster under given conditions. _ (See Equilibrium, Chemical). The quantitative study of the phenomena of dissociation is beset with difficulties, for the extent of the dissociation cannot be ascertained with satisfactory precision in all cases. The products into which the primitive substance is resolved are (by the definition of dissociation) capable of recombining when the conditions that lead to the dissociation are removed. Hence it is by no means easy to determine what proportion of a compound is dissociated under given cir¬ cumstances. When (as in the case of calcium carbonate) the primitive substance and one dis¬ sociation product are solid, and the other dis¬ sociation product is gaseous, the extent of the dissociation

may be inferred by computing the mass of the free gas, from observations of its volume, pressure and temperature. When the original substance and the products of dissocia¬ tion are all gaseous, the problem becomes ex¬ ceedingly difficult, and special means must be devised to fit each special case. In the case of nitrogen tetroxide, N2O4, which dissociates into the oxide NO2, the degree of dissociation may be inferred optically, since N2O4 is nearly colorless, while NO2 has a pronounced brownish-red color. In other cases, the extent of the dissociation may be inferred from observations of the vapor density of the mixture. This method has been used quite successfully in the case of iodine, the vapor density of this element indicating a molecular formula of I2 at temperatures below 700° C. and I at temperatures above 1,500° C. : while at intermediate temperatures the vapor is a mixture of I and I2. The dissociation of acetic acid vapor has been studied by the vapor density method and also by observing the spe¬ cific heat of the mixture at different tempera¬ tures, the specific heat being assumed to be greater (on account of the work done in sep¬ arating the molecules) as the dissociation pro¬ ceeds than it is before the dissociation begins, or after it is complete.

Certain compounds (such as sodium chlo¬ ride) appear to be more or less completely dissociated when they are dissolved in water; but the constituents into which they are re¬ solved possess certain distinctive properties that are not manifested by the resolved parts of sub¬ stances that are dissociated by the action of heat. For this reason it is now usual to dis¬ tinguish this particular phenomenon by a special name, and the dissociation that occurs in such cases is called ˆionization.® See Electrolysis ; Solutions.

DISSOCIATION (in psychology). In certain pathological conditions the normal nexus of relations which pervades the consciousness of an individual undergoes a profound altera¬ tion, and for all that memory can do, a portion of the experience becomes a sort of enclave, cut off from its associates by boundaries bar¬ ring out all recollection. Such a portion of experience is said to be dissociated from its companion states. As is indicated in the article Personality, Disorders of. the nature of a dissociated portion of experience may vary be¬ tween wide limits. It may be a longitudinal splinter, consisting of the stimuli received by an anaesthetic limb and the volitions expressed

thereby, or a stratum in practically undisputed sway of the individual over a given period of time, or as is very frequently the case, it may

both coexist and alternate with the primary con¬ dition. Furthermore, the primary and secondary conditions may or may not be of equal com¬ pleteness and of equally sharp outlines. One condition is likely to have a certain degree of insight into the experiences of the other.

The physiological basis and psychological sig¬ nificance of dissociation are alike matters of the greatest interest. It has been asserted by Sidis and other writers that the physiological basis of multiple personality is a change in the con¬ ductivity of the interconnections between the neurons. A theory of this sort, however con¬ venient it may be as a means of summarizing the known phenomena, is worthless for explanatory purposes because of our profound ignorance of the processes of nerve-conduction and because of the practical impossibility of studying the anatomy of the intertwining of the dendrites of different neurons, except as mass-phenomena. The psychological significance of dissociation depends on whether the self as the unity of con¬ sciousness is or is not something superadded to the system of experiences it unites. If the self is not something beyond the system it states,ˆ it follows that the result of a complete dissocia¬ tion is the formation of two distinct selves, which, as Sidis puts it, share the same body in a manner analogous to the heads of a two-headed monster. On the other hand, if the self is an entity entirely beyond its experiences, it becomes possible and even likely that the du¬ plicity of a dissociated self is fictitious. See Personality, Disorders of, and consult the bib¬ liography there.

DISSOLUTION, the resolution of any body into the smallest parts by chemical agency. In English politics, the act of dissolving or put¬ ting an end to the existence of a Parliament. It differs from a prorogation, which is the continu¬ ance of a Parliament from one session to an¬ other, and from an adjournment, which is its continuance from one day to another. A disso¬ lution is the civil death of a Parliament and this may be effected in three ways : (1) By the pre¬ rogative of the sovereign acting on the advice of his ministers — this advice may be due to various causes, the most important being the loss of support of a majority of the House of Commons. (2) A Parliament may be dissolved or expire by length of time. As the constitution now stands the Parliament must expire or die a natural death at the end of every seventh year, if not sooner dissolved by the royal prerogative ; but the custom is to dissolve not later than the sixth year of a Parliament. A situation without precedent in modern times arose after the out¬ break of the Great War in 1914, when the life of the Parliament elected in 1910 and which it was intended should expire on 30 Oct. 1915 was extended from time to time by special acts.

The demise of the Crown was formerly fol¬ lowed automatically by a dissolution of Parlia¬ ment, but since 1867 the life of Parliament re¬ mains unaffected by the death of the sovereign.

DISSOLUTION OF CORPORATIONS.

See Corporations, Legal.

DISSOLVING VIEWS, paintings upon glass magnified and thrown with great distinct¬ ness upon a screen by means of one or two

magic lanterns with strong lenses, and illumi¬ nated by the oxyhydrogen light. If one lantern is used the picture is drawn out of focus gradu¬ ally, and a second substituted, which is brought gradually into focus, thus producing the haze and brilliancy which have gained this sort of exhibition its name. If two lanterns are used, they are placed side by side with their lens tubes slightly convergent, so that the images may be superposed on the screen. An opaque rectangular shutter, capable of revolving verti¬ cally upon a pivot fixed midway between the lanterns, is placed before the lenses in such a position that when horizontal, it cuts off one-half of the pencil of light from each lens. When this shutter is made to revolve through a small arc, it shuts off the whole of the pencil of light from lantern No. 1, allowing that from No. 2 to pass unhindered. When the shutter is in this position the image from No. 2 falls on the screen in full distinctness ; but when the shutter is made to revolve in the opposite direc¬ tion, the image from No. 1 will be gradually disclosed, as that of No. 2 becomes concealed.

DISSONANCE (Lat. dissonantia — dis-sonare, to sound harshly). In music, a sound of two or more tones struck together which are at variance with the formation of a com¬ mon major or minor chord. Thus it is an interval, one or both of whose members must move in a certain way to satisfy the ear — de¬ manding resolution into consonance (q.v.). If the dissonance is minor or major one member only is compelled to move. If augmented or diminished both members

must move, toward each other if the interval is diminished, and contrary if augmented. All augmented and di¬ minished intervals, seconds, sevenths and ninths are dissonances. See Acoustics ; Chord.

DISTAFF, the earliest instrument of spin¬ ning, a staff, on one end of which the wool or flax was rolled. The spinner held it under the left arm, pressed against the body, or fixed in the waistband of the skirt. The left hand was busy at the tip of the distaff, feeding and dis¬ tributing the fibre as it was drawn off by the spindle. The spindle, a round stick of wood about 12 inches long with a whorl of clay, a stone, or a potato, at the upper end to give it momentum and steadiness when in rotation, had a slit or notch to which the yarn was caught or fixed. A prepared end of yarn was fixed in the slit and with a deft rolling motion of the spindle with the right hand against the right leg, the spinster threw it from her, while with the left hand, as explained above, the fibre was fed in an increasing length of yarn and thread, twisted, drawn and criss-crossed from bottom to top until the spindle was full. As sninning was a typically feminine employment, ®distaff® has come to be used figuratively for woman. The 7th of January is called Saint Distaff's Day, because it marks the return of the women to their usual household duties, after the revels of the Christmas holidays ending with Twelfth Day.

DISTEMPER, a germ disease of the dog family commonly considered as a form of in¬ fluenza. It affects not only the domestic dog but also foxes, wolves, jackals and the hyena. It generally attacks young dogs — dogs over a

year old rarely take it — and only once during life. In large cities the disease may break out at any time; in the small towns and in the country it is more prevalent in hot weather. It is contagious in the highest degree, and is only communicable by infection. In most cases a running from the nose and eyes is one of the first and chief symptoms. This defluxion be¬ comes after some time mucous and purulent, loading the eyes and obstructing the nostrils and whenever the animal is subjected to a draught of air, or excitement of any kind, it has violent fits of coughing combined with vomiting, it soon begins to lose appetite, its flesh begins to waste and it becomes listless and irritable. All the mucous membranes of the body are affected. If the disease be virulent, symptoms of affection of the brain manifest themselves accompanied by convulsions or by convulsive twitchings, resembling Saint Vitus' dance. In such cases the dog is often sup¬ posed to be mad, and frequently destroyed in consequence.

Pneumonia is not an infrequent supervention of the disorder, and the bowels are more or less affected by diarrhcea and dysenteric discharges. In the first stage of the disease laxatives, emetics, and occasional bleeding are the principal remedies ; diarrhoea should be checked by astringents, and to re¬ duce the violence of the fits warm bathing and antispasmodics should be resorted to. Medicine, however, is quite secondary in the treatment of distemper; good nursing and dry comfortable quarters in an even temperature are the essentials. The disease generally runs its course in from two to three weeks. The death rate from it is much larger in the large cities than in small towns and rural districts.

The term distemper is sometimes applied erroneously to influenza in horses, and to epi¬ zootic pleuro-pneumonia in cattle.

Consult Hill, I. W., ˆManagement and Dis¬ eases of the Dogˆ (new ed., London 1881) ; Hutyra and Marek, ˆPathology and Therapeu¬ tics of Diseases of Animals,ˆ Vol. I (Chicago 1912) ; Muller and Glass, ˆDiseases of the Dogˆ (3d ed., London 1911).

DISTEMPER (from O. Fr. destemprcr, Mod. Fr. detrempe, Ital. tempera), in painting a preparation of chalk mixed in water contain¬ ing a little glue, white of egg or similar binder. The mixture is tinted by adding dry colors. It is used now chiefly in scene painting, but was employed in the higher departments of art, es¬ pecially in mural decoration, before the estab¬ lishment of oil or varnish painting in the I5th century. It is distinguished from fresco, in which the dry colors are mixed with calcined plaster and water and applied to a fresh damp surface of plaster with which they become in¬ corporated.

DISTICH, dis’tik, a couplet of verse mak¬ ing complete sense ; e.g., Pope’s couplet ;

“ Be not the first by whom the new are tried.

Nor yet the last to lay the old aside.”

It was much used by Greek and Roman writers in the crystallization of thought. No form is more suitable for maxims or aphorisms. It is also employed in elegiac verse. It was used largely by Goethe and Schiller. The ˆDisticha ˆ of Cato Dionysius (q.v.) is a classical textbook on the subject.

DISTILLATION is a special application of the process of evaporation which has for its object the separation of the component parts of a complex or compound substance. The vapori¬ zation is done generally by heat with, in some cases, the assistance of a vacuum, and the vapors are collected and condensed generally into a liquid form. When the resulting distillate is a solid and no liquid form has intervened the process is called ‘^sublimation.®

The apparatus required in a simple distilling plant is: (1) the still or retort in which the vapors are produced; (2) the condenser in which the vapors are liquefied, and (3) the re¬ ceiver in which the product or distillate is col¬ lected.

The process of distillation is applied to both liquid and solid substances. In the latter case it is called dry distillation when the substance dis¬ tilled does not liquefy in the operation.

The theory of distillation depends on the fact that a simple substance boils or vaporizes at a certain constant temperature’ — or, in other words, when its vapor pressure exceeds by the smallest fraction the atmospheric pressure upon it. As a rule the various components of a com¬ plex substance will vaporize each at its indi¬ vidual boiling point. By collecting separately the different vapors which come over from the retort at different temperatures the several com¬ ponents are secured. There are some substances which decompose at the normal atmospheric pressure when raised to a temperature high enough to vaporize them. In order to distil such substances it is necessary to reduce the pressure in the retort by producing therein a partial vacuum, which has the effect also of lowering the boiling point. Vaporization of a substance below its boiling point may also be accomplished by passing a current of steam through it.

Another economic use of distillation is the concentration of volatile substances through repeated distillations, as in the case of the rectification of alcohol and the production of glycerine.

Among the articles in common use made by the distillation process are

gasoline, kerosene, lubricating oils, paraffin wax, coal-tar color intermediates, aniline oil, alcohol, spirituous liquors, perfumes, essential oils, glycerine, cam¬ phor, ether, chloroform, turpentine, sulphuric acid and many others.

When distillation is properly conducted many liquids as for instance, water, can be purified.

Distillation of Water. — Water is never found absolutely pure in nature ; it generally contains salts and other mineral substances, organic matter and decomposhion products, some volatile and some non-volatile. The water is readily separated from the non-volatile com¬ ponents by distillation. Inasmuch as the volatile constituents are highly evaporative they are received in the very first distillate of the water, so that it is customary to reject this first por¬ tion. Experience has taught that pure water is obtained by distilling three-fifths of the entire amount and rejecting the first one-fifth. In some special cases where a water has many volatile impurities which can be detected bv its appearance, odor and taste, the distillation might be rendered more difficult as it becomes neces¬ sary to add certain chemicals to the water in order to combine with the volatile components

and transform them Into non-volatlle bodies. The purifying of water by means of distillation, or, in other words, the preparation of distilled water, is of much practical value. In the phar¬ macy, in the chemical laboratory and in many chemical industries distilled water is an indis¬ pensable article. The transformation of the salt water of the ocean into a potable water by means of distillation is also of inestimable value. Pure distilled water, however, has often an empyreumatic odor and a repulsive flat taste. According to the most recent medical investiga¬ tions pure distilled water when constantly used is, on account of its very purity, deleterious to health. It is claimed that this water possesses high solvent properties and also absterges the mucous membrane of the stomach too much. For this reason the odor of the water is improved by thorough aeration or carbonization, and it is made palatable by the addition of pure salt or sugar or any other desired substance. The large ocean steamers have an equipment for producing potable water from sea water. The fundamental elements in this apparatus are a steam generator or evaporator in which the sea water is vapor¬ ized by means of superheated steam, which is obtained either from a special boiler or directly from the engine boiler, a condenser combined with an aerator and a refrigerator wdth which in many cases a filter is combined. In recent times many ships

supply themselves with an especially good spring water for drinking, while for cooking, washing and boiler feeding they distil the sea water as it is required. For these latter purposes carbonating and aerating are of course unnecessary. In most cases the evapo¬ rator is connected directly with the ship's en¬ gine. The sea water which is to be evaporated is taken from the water cooling the condenser, while the steam is obtained from the steam-jacket or an intermediate compartment of the engine. In this way the cylinder is constantly drained and supplied with fresh steam. One form of still utilizes the escaping gases for heating the water so that the entire apparatus is situated in the chimney. In general the distilla¬ tion of water is very simple, because it is a liquid which has a constant boiling point. More heat in the distillation process simply occasions more rapid evaporation. The escaping steam, unless it is heated in a special apparatus as is done in the case of superheated steam, retains the boiling point temperature until it is cooled.

However, it is different with a mixture of various vaporizable liquids each of which has a different boiling point. According to the predominance of one or the other liquid the mixture will have a varying boiling point. When the vapors passing over at different intervals are separately condensed it is possible to obtain single components from the mixture, provided, of course, that the various components of the mixture differ decidedly in their boiling points. This special method of distillation is called fractional distillation.

The best-known distillation process is the separation of water and alcohol, or, in other words, the concentration or rectifying of alco¬ holic solutions by means of distillation. This is a special branch of modern industry.

Distillation of Soirits. — The boiling points of water and alcohol differ considerably. At normal atmospheric pressure water boils at 100° C. (212° F.), while alcohol boils at 78.4° C.

(173.5° F.). Consequently, it is evident that the boiling point of a mixture of water and alcohol will range between 173.5° F. and 212° F. In proportion to the predominance of alcohol the boiling point will be lower, and as the alcohol vaporizes the boiling point will rise until, finally, pure water is distilled at 212° F. If a dilute mixture of water and alcohol [the mash in the American distillery usually contains 5 to 10 per cent alcohol by volume (10 to 20 proof)] is dis¬ tilled in a simple distilling apparatus consisting of a pot or still and a worm, dilute alcohol is always obtained, and the smaller the quantity of alcohol contained in the mixture the greater pro¬ portionately will be the amount of alcohol con¬ tained in the distillate, as is shown in the fol¬ lowing table of Groening :

is called dephlegmation and denotes a draining of the alcohol, as the older chemists designated the water as a component of spirit by the word ®phlegma.® Another device by which the al¬ coholic vapors are enriched is a small closed retort containing a weak distillate through which the hot vapors are passed. The water vapor is condensed, and the alcohol of the dis¬ tillate vaporizes and joins the vapors from the still. Accordingly, the more recent apparatus in larger distilleries, in which highly concen¬ trated alcohols are manufactured, are equipped with a dephlegmation and rectification appli¬ ance, in direct connection with the still, so that it has become possible in the column type of still, with continual operation, to produce, from the fermented mash, a high wine free from

Percentage of alcohol in the boiling mixture

Boiling point

Percentage of alcohol in the vapor

Volume

= proof

Centigrade

Volume

$$==$$

proof

1.

. . 2

98.75

209.7

13 .

…. 26

3.

. 6

96.25

205.2

36 .

…. 72

5.

. 10

95.00

203.0

42 .

…. 84

7.

. 14

93.75

200.7

50 .

… .100

10.

. 20

92.50

198.5

55 .

… .110

20.

. 40

87.5

189.5

71 .

…. 142

30.

. 60

85.0

185.0

78 .

… .156

40.

. 80

83.75

182.7

82 .

… .164

50.

. 100

82.5

180.5

85 .

… .170

60.

. 120

81.25

178.2

87 .

… .174

70.

. 140

80.00

176.0

89 .

… .178

80.

. 160

79.38

175.2

90.5 _

… .181

90.

. 180

-

78.75

173.7

92 .

…. 184

If the distillate obtained from a dilute mix¬ ture of water and alcohol is redistilled, a dis¬ tillate containing more alcohol is obtained. Thus in four distillations from a mash having 10 per cent alcohol by volume (20 proof), a raw spirit 80 per cent alcohol by volume (160 proof) is obtained, in which the

first distillate contains 28 per cent alcohol by volume, = 56 proof.

second distillate contains 50 per cent alcohol by volume, = 100 proof.

third distillate contains 70 per cent alcohol by volume, = 140 proof.

fourth distillate contains 80 per cent alcohol by volume, = 160 proof.

Of course, we assume that each time the dis¬ tillation is carried out completely.

Formerly, it was necessary to repeat the dis¬ tillation several times, in order to obtain a highly concentrated alcohol. The first weak distillate with less than 20 per cent alcohol by volume was called lutter. It was used for the further concentration of the alcohol. This method of concentrating alcohol was called doubling or rectification, but as this repetition was tedious and consumed much time and fuel, a shortening of the distillation process was eagerly sought for, and with the aid of suitable appliances it has now become possible to ac¬ complish a complex, separatory distillation in one operation.

The following principle is standard for the construction of distillatory apparatus. If the concentrated alcoholic vapors developed at the boiling of the alcohol-water mixture are not cooled at once to the temperature of condensa¬ tion, but only a few degrees, then a greater part of the less volatile liquid, that is, water, is con¬ densed than of the more volatile alcohol. Through this partial cooling, the remaining vapor accumulates more alcohol. This process

fusel, containing 90 to 95 per cent alcohol by volume (180-190 proof).

According to the capacity of the plant, and, especially according to the kind of product, dif¬ ferent types of apparatus are used in the dis¬ tillery; but an enumeration here of these would lead too far, while their description properly be¬ longs under special heads. Therefore only the main types of various distillatory apparatus are mentioned here :

1. Simple stills, with worm condenser heated by direct firing.

2. Simple stills, with closed washwarmers, in which the mash is previously heated by the latent heat of vaporization.

3. Double pot-stills, generally consisting of two superimposed stills. While the mash in the lower still is being deprived of its alcohol, the mash in the upper still is enriched with alcohol and heated by the vapors of the lower mash, until the latter after sufficient concentration is heated to the boiling point. From this time on alcoholic vapors develop in the upper pot which are cooled in a dephlegmator and absorb still more alcohol. The concentrated vapors pass over into the condenser, while the condensed liquid flows back into the upper still. Such apparatus is either heated by direct firing be¬ low the lower sill, or by means of steam, which is introduced into the lower still.

ˆ 4. Two, three or more chamber charge-stills, with or without charging chamber in one ap¬ paratus, in which the single compartments are placed one over the other, and the heat from the lower serves to enrich the one above. Steam is used for heating.

All these apparatus, when heated by direct firing, are made either of copper or iron ; when heated with steam are made generally of cop¬ per, but oftimes of wood, such as heavy

cypress or white oak. These are more suitable for intermittent working, and are used mostly in distilleries which distil rye whisky, *etc.*

5. Continuous pure still apparatus (on ac¬ count of their forrn called column apparatus), which are used mainly in large distilleries, can be regarded as a combination of a large num¬ ber of small stills, in which the mash, contin¬ uously flowing from the upper compartments to the lower, constantly comes in contact with steam flowing in the opposite direction. Through this countercurrent, the rising vapors become rnore rich in alcohol, through the dephlegmation and rectification taking place in each of the compartments, while the mash flowing down¬ ward is constantly deprived of its alcohol until it flows from the lowest chamber as slop, free from alcohol. The concentrated alcoholic va¬ pors, escaping from the uppermost chamber of the column, are then liquefied in a condenser when alcohols of only moderate strength (125 to 150 proof) are to be produced; but, if very pure highly concentrated alcohols are to be man¬ ufactured, these vapors pass over into a simi¬ larly constructed rectification column, where they meet with the liquids (lutter or phlegma), returning from the dephlegmator or condenser. The vapors take up alcohol from the liquids and pass from the upper chamber of the recti¬ fier into the dephlegmator, in which a continual countercurrent between the condensed liquids constantly takes place.

The advantages of the continual column appa¬ ratus in comparison with the simple pot-stills, are, that the mash is more quickly vaporized, that the expense for fuel is diminished and that, as a rule, a more highly concentrated product is obtained. But, on the other hand, they also require more care and attention and skilled operators. Besides, there is a possibility that alcohol might sometimes pass off with the slop. In the simple stills this possibility is consider¬ ably reduced, so that it is still advisable for small distilleries to erect good pot-stills, because they manufacture mostly alcoholic liquors with about 50 per cent alcohol by vol¬ ume (1(X) proof).

The alcoholic liquid obtained in the distillery with the best modern

apparatus contains, besides the highly concentrated alcohol (96 per cent by volume, 192 proof), more or less fusel oil, a mixture of amyl, propyl and isobutyl alcohols. Up to the present time, the following impurities contained in 50 to 95 per cent alcohol have been determined : acetic aldehyde, propylic alcohol, isopropylic alcohol, butylic alcohol, acetic ether, butylic ether, acetal, secondary amylic alcohol, isoamylic alcohol, isobutylic alcohol, furfurol and various amines. In the corn and potato spirits amylrc alcohol is in predominance, and therefore it is briefly called fusel oil. Techni¬ cally, fusel oil is not a uniform substance, but the higher boiling part of the impurities accom¬ panying the alcohol distillation.

Very little is known about the origin of these substances. Their presence might be due to secondary fermentations, which are pro¬ duced by fission fungi, schizomycetes, but the yeast itself may also have a certain influence, as certain yeast species are capable of produc¬ ing fermentation products of a definite aroma and taste. For example: Saccharomyces ellipsoideus produces a peculiar fruit bouquet. It is well known that aging or decaying yeast

furnishes a product with more impurities than a sound and vigorous yeast. The raw material used in the distillery must also be considered. The corn, rye and potato fusel oil differ in com¬ position, so that through experience one is enabled to detect the materials used, by the odor of the raw spirit. The fusel oil of the rye spirit contains, besides amylic alcohol, aromatic oenanthic ether; the molasses spirit contains the ethers of caproic acid, capric acid, caprilic acid, etc., which are very similar to the so-called oil of wine. Finally, the construction of the dis¬ tillatory apparatus also influences the quality of the product. High pressure and too long a sojourn of the alcoholic vapors in the rectificator or dephlegmator are also said to be detrimental.

As it is necessary for some industries to use pure alcohol, these impurities are generally re¬ moved by either of two processes: (1) Filtra¬ tion of the raw spirit through charcoal; (2) re¬ fining, by fractional distillation, or, in some cases, a combination of both.

In the manufacture of brandies, the former method is generally and successfully used, as a trace of impurity gives the brandy its charac¬ teristic aroma and taste. Finely powdered char¬ coal made from soft wood or bark serves as the filtering medium. It is well known that charcoal, by virtue of its absorbing capacity, acts as a decolorizer and deodorant, but in order to effect thorough absorption, the spirit must

be diluted to about 40 per cent by volume (80 proof). In smaller plants the filter consists of a vat packed with charcoal. The larger dis¬ tilleries and refineries use a battery of iron cylinders packed with granular or powdered charcoal. Steam is conducted into the battery until the charcoal is thoroughly saturated ; then the spirits flow in, displacing the steam and fill¬ ing the pores of the charcoal. The larger part of the impurities is absorbed in the lower cylinder, while the remaining impurities are removed dur¬ ing the passage through the remaining cylinders. If a filter is ineffective, it is cut out, the spirit is drawn off, steam is introduced, which forces the distillate into the condenser. This distillate constitutes the so-called ˆTeints.ˆˆ The feints is a dilute spirit, which is milky in appearance on account of the presence of fusel oil in emulsion. After standing, the fusel separates and can then be utilized, while the alcoholic liquid is worked up anew. The emptied filter¬ ing cylinder is repacked with charcoal and used as the last filter. The used charcoal is either ignited in a special furnace, or else purified by means of superheated steam.

Refining of Spirits. — In order to produce an entirely fusel-free and highly concentrated alco¬ hol, which is used for blending wine, cognac, etc., as well for scientific and certain techni¬ cal purposes, the filtered alcohol must undergo a fractional distillation. It is essential that the alcohol, whether filtered or not, be diluted to about 40 to 50 per cent by volume (80 to 100 proof).

The rectificator for refining in general is the same as the distilling apparatus, but, inasmuch as the operation is a fractional one, it is an intermittent one. The columns are equipped with caps, bells or sieves.

Through distillation we receive :

1. The first runnings or fore-shot. This is the first distillate which contains those imnurities

of the alcohol which vaporize at a tem¬ perature below the boiling point of the latter. Among these impurities acetic aldehyde is especially predominant.

2. Rectified fine spirit, which is divided into several distinct products, of which the first still contains some substances vaporizable at a low temperature and the intermediate products are pure alcohol, while the last portions already contain substances which volatilize at tempera¬ tures above the. boiling point of alcohol. All of these products are separately collected at different intervals and furnish :

(a) Wine spirit, commercially known as Cologne spirit. It contains 96 per cent of alco¬ hol by volume (192 proof).

(b) Prime spirit, which is technically abso¬ lute alcohol. For medicinal purposes it meets the requirements of the alcohol deodoratum of the United States Pharmacopoeia. It contains 94 to 95 per cent alcohol by volume (188 to 190 proof).

(c) Common spirit or high wine, commer¬ cially called ˆrectified spirit.ˆˆ It is used for blending wine and cognac for medicinal and all other purposes when a pure, fusel-free, less con¬ centrated alcohol than the foregoing is neces¬ sary. It contains about 90 per cent by volume (180 proof).

(d) Alcohol of about 88 per cent by volume (176 proof), which can be used for blending brandies as well as for preparing dilute alcohol (97 to 100 proof) .

(e) Weaker alcohols, which are usually re¬ distilled with the raw spirit.

(/) The so-called last runnings or feints, which usually contain some amylic alcohol, are used in various industries, as for example, in the textile industries, on account of their solvent power over fats and oils ; in the manufacture of ethereal oil and also in the chemical labora¬ tory.

By means of filtration and fractional dis¬ tillation, about 85 to 90 per cent of the raw spirit is obtained as rectified spirit, therefore it has been the object of many experiments to improve this yield.

The only successful defuselizing process is that of Traube, by which a sufficiently con¬ centrated potash solution is mixed with the spirit in accordance with its strength and heated to 60° to 70° C. (140° to 158° F.). Two layers are formed, the upper, which is dark-colored and foul-smelling, contains the impurities, and in the lower we find the purified alcohol with the salt solution. After removing the former, the latter is distilled in a rectificator and con¬ centrated; 97 to 98 per cent of the raw spirit is secured by this process.

But after all, filtration through charcoal is the best practical refining process for brandies, while filtration and fractional distillation are best employed for Cologne spirits. In large distilleries the manufacture of Cologne spirit and rectified alcohol directly from the mash is both practically and technically the most advantageous when manufactured in apparatus based on Ilges' system. In ordinary distillation and refining, a deterioration of the material takes place, as the fermentation products of the normal mash are purer than those of the raw spirit. The presence of atmospheric air in the condenser induces the formation of aldehydes

and, in the raw spirit, foul-smelling substances. By means of slow evaporization in the rectifier fusel oil is decomposed, while in the new auto¬ matic spirit apparatus, it is obtained as fusel oil. But this apparatus is equipped with very effective dephlegmators and rectificators, so that it is an easy matter to precipitate the fusel from the alcoholic vapors and to receive only the purest alcoholic vapor in the condenser. In order to prevent an accumulation of fusel in the ever-returning phlegma, temperature regula¬ tors and fusel separators are attached in the latter, so that the phlegma constantly has a uniform temperature and fusel can never be in excess. The advantages of this process are not only the dispensing with rectification and filtra¬ tion, but also the production of a pure valuable spirit of about 95 per cent alcohol by volume (190 proof), while the valuable and untaxed fusel is obtained as a by-product. In addition, the yield is greater, as the loss caused by recti¬ fication is avoided.

Absolute anhydrous pure alcohol cannot be made in this way, nor can it be prepared by repeated distillation, as alcohol is in itself hygro¬ scopic and tenaciously holds on to the last traces (3 to 4 per cent) of water. This last remnant of water can only be removed by very effective dehydrating agents ; as for example, freshly burned lime, anhydrous carbonate of potash, anhydrous white copper sulphate, fused calcium chloride and especially metallic sodium. By distillation

over any of these substances the water is absorbed and an absolutely anhydrous pure alcohol is produced. This process is, how¬ ever, only carried out in chemical laboratories and as a precautionary measure this alcohol is stored in small bottles with any of the above substances. This precaution is taken in order to prevent the absorption of moisture by the alcohol. The distillation of alcohol in the United States in the year ended 30 June 1915 was 81,101,064 gallons, of which 42,742,161 gal¬ lons were Cologne spirits and 33,854 gallons ˆOiigh wines.^^

The distillation of alcohol, as in many other distillatory operations, is merely a mechanical process of purification, as no chemical change takes place, because the distillates have the same chernical composition as the original substance. Distillation is only a mechanical separation of the secondary ingredients from the principal one. Some substances, as for instance, glycer¬ ine, when distilled in presence of atmospheric air, will decompose. In such cases the distilla¬ tion is done in a partial vacqum. means of an air-pump the pressure of the ai;- is reduced until the boiling point is lowered to that degree at which the distillation can take place without decomposition. It is well known that matter will boil at a lower temperature, when the pressure is decreased; and that decomposition is less liable to occur. Again, other substances cannot be distilled in the , presence of much oxygen, so that carbonic acid, hydrogen, or other gases are forced into the still. These gases pass over with the vapors of distillation. This process is called the distillation in an atmosphere of an indifferent gas.

By far the most extensive of the distillation industries is that of petroleum, not to mention the many individual industries distilling petrol¬ eum products. The world's annual produc-

tion of crude petroleum is about 20,000,000,000 gallons, and except for a relatively small per¬ centage used direct as fuel, practically the whole output passes twice through the still and con¬ denser before it is fitted for use. In the United States alone nearly 14,000,000,000 gallons is thus twice distilled annually. In Scotland some 70,- 000,000 gallons of crude oil are obtained annu-ually fromˆ the oil shales by dry distillation.

The primary distillation of crude petroleum is commonly called refining. The oil is sepa¬ rated by the first distillation into (1) benzine or naphtha, coming over up to a temperature of 300° F. ; (2) kerosene, coming over above 300° and up to 570° ; and (3) residuum, which in¬ cludes lubricating oils, paraffin wax, vaseline, and pitch or asphalt, according to circumstances. These are again separated before marketing. From the naphtha is obtained gasoline, up to 160° ; benzine between 160° and 250° ; and heavy benzine or ˆturpentine substitute® between 250° and 300°.

In the kerosene distillation, gas oil is first separated : it is used to enrich coal gas. After the principal part of the kerosene is distilled, the remainder is paraffin oil, also a burning oil, but with a higher flash-point. The lubricating oils are obtained by distilling the residuum in a vacuum with superheated steam. There are three degrees of these oils : light, medium and heavy. They are caught in three separate dephlegmating condensing tubes through which the vapors are made to pass, the heaviest oil condensing in the tube nearest the still, and the lightest traveling to the furthest tube before it condenses. Vaseline is obtained by carefully distilling certain kinds of crude petroleum in a vacuum still. Other products obtained from petroleum by distillation are paraffin wax, cere-sine or earth wax, and a variety of asphalt, be¬ sides pitch and coke.

The distillation of coal-tar is detailed under the title Coal-Tar Products.

The distillation process is employed in can¬ dle-making for the purification of the fatty acids from which the candles are made. The

operation takes place in a large copper still heated by a direct fire to about 500° F. Melted fats (after saponification) are run into the still as the operation progresses. Steam, superheated to from 500° to 700°, is blown through the liquid mass, and the fats distilled over into copper coilˆ cooled by running water. The palmitic acid comes over first, followed by the stearic and oleic acids as the heat increases. These three fats constitute about 80 to 95 per cent of the whole. The distillate is allowed to cool very slowly for 10 or 12 hours during which time the stearic and palmitic acids crystallize in large crystals, with the oleic acid entangled among them in a liquid form. The ®cakes® thus obtained are put cold under hydraulic pressure of 250 atmospheres, and then again in the ˆˆhot® press (temperature, 140°) to remove the oleic acid. The candle fats are then ready for molding.

Another important application of the distilla¬ tion process is in the recovery of glycerol (pure glycerine) following the saponification of fats in making soaps and candles. The glycerol re¬ mains in a watery solution after the fatty acids are separated out, and is first concentrated by evaporation to about an 80 per cent solution. This crude glycerol is subjected in a still, in a

vacuum of 28 inches, to blowing with dry steam at 300°. The first distillate contains volatile organic acids. These are neutralized with soda, and the product again distilled in vacuum. After concentration and reconcentration it is again distilled, and once more concentrated, this time to the standard specific gravity of 1.262. It is then ready for market as ˆdynamite glycerol,® extensively used in making high explosives. For medical and food purposes the glycerol is again distilled and clarified.

The manufacture of natural perfumes and essential oils depends largely upon the distilla¬ tion process. In preparing perfumes, the flowers are heated with water in stills, and the steam coming over carries the perfume oil with it. In some instances the perfume oil is dissolved out from the flowers by a volatile solvent like alcohol, ether or benzol, and the solvent then distilled off, leaving the heavier perfume oil. With the essential oils, extraction by pressure sometimes precedes the distillation, as with lemon and orange peel, arid other citrus oils. The preliminary treatment with solvents is also used in gaining essential oils, as with celery (from the seed), cinnamon, cloves, ginger, *etc.* The method of extraction by a solvent (bisul¬

phide of carbon, or petroleum spirit), and sub¬ sequent distillation, is finding favor in a much wider field than formerly. It has been found profitable by this process to extract the oils from the oil-cake residue of the cotton-seed and linseed oil presses, and it is used also at first hand in gaining the oils from poppy seed, rape seed, castor oil beans, copra, palm kernels, pumpkin seeds, grape seeds, and the like. It has also been successfully used to extract olive oil from the residuum of the olive oil presses. The solvent is used over and over again in a continuous still which is almost automatic, re¬ quiring a minimum of attention, and in the case of the recovery of oil from oil-cake, the oil-meal residue is as greedily eaten by cattle as the original oil-cake. This process has made it possible to recover much oil which has here¬ tofore been sacrificed if not altogether wasted.

Another important distillation process is the so-called dry distillation, in which organic sub¬ stances are decomposed into solid, fluid, and gaseous products by means of high temperatures and with the exclusion of air. As a rule these products, called empyreumatic, are formed simultaneously, but are separately collected and treated. An example of dry distillation, which is also called destructive distillation, as it isˆ accompanied by chemical changes, is the distil¬ lation of coal for the manufacture of illuminat¬ ing gas. Ammonia-water (in the raw condition, tar-water, which contains cyanides and sulpho-cyanides in connection with ammonia), semi¬ fluid, viscous, oily, and very valuable products, as, for example, tar-oil, which is extensively used in the manufacture of aniline colors, anti¬ septics, and medicinal preparations, are obtained as by-products, while coke is the residue of the coal distillation.

The distillation of wood is conducted in the case of resinous woods by steam, and with hard woods by dry distillation. The former is pre¬ ferred in the manufacture of turpentine, be¬ cause it avoids drawing the tar from the wood. The retort is filled with pine wood chips, and steam is turned in with a rush, so as to heat the whole as quickly as possible, the pressure

not to exceed ten pounds to the square inch. The contents of the retort are agitated by a mechanical stirrer, and the process continues as long as a pa3dng quantity of oil comes over. With the turpentine is a small proportion of ethers and aldehydes, and some resinous mat¬ ters. The turpentine is redistilled for the mar¬ ket, leaving as a residue, resin oil. The resin (colophony) remaining in the retort is distilled in an iron still by the dry process and yields resin spirit and resin oil, and resin tallow. The resin oils are rectified by the distillation process, followed by a chemical process. In the distilla¬ tion of hard woods without steam, the products are wood vinegar (pyroligneous liquor) 42 to 45 per cent — equal to acetic acid 7 to 9 per cent ; tar 8 to 9 per cent ; and charcoal 22 to 26 per cent. Further distillation of these pri¬ mary products results in the gaining of a great number of substances from the tar, particularly paraffins, phenols and esters such as paracresol, guaiacol (from beech wood tar), kreosol, pyro-gallic esters, fatty acids and their esters, light tar oils and heavy tar oils, and pitch. From the pyroligneous liquor is obtained acetic acid, up to 10 per cent; wood alcohol up to two per cent ; and small quantities of propionic, butyric, formic and other acids, methyl acetate, allyl alcohol, furfurol, phenols, amines, ketones, *etc.* The commercial manufacture of wood alcohol, how'ever, is accomplished by treating wood with concentrated sulphuric acid, thus transforming its cellulose to a form of sugar which is then fermented and the mash distilled.

Resins of all sorts are distilled before being of value for varnish making. The process used is generally by superheated steam under pressure.

Ether is obtained by distilling sulphuric acid and alcohol together in a steam-heated lead-lined retort, and passing the vapors through a solution of sodium carbonate, or milk of lime, to remove all traces of acid. A second distilla¬ tion removes the alcohol, and the ether is recti¬ fied in a columnar still.

Besides these above-mentioned industries, many others are also based on the distillatory process.

A special branch of distillation is that in which a solid is vaporized and by condensation directly passes from the gaseous to the original solid usually in a crystalline form. This proc¬ ess is called sublimation,

and is mostly used to purify volatile solids, as for example, sal¬ - ammoniac (chloride of ammonia), benzoic acid, camphor and indigo. The most interesting fact in sublimation is that the solid does not pass through a liquid state, but at once to the gaseous form. The reverse process also takes place in like manner, namely, the condensation from the gaseous state back directly to the solid condition.

Bibliography. — Brachvogel, J. K., ˆIndus¬ trial AlcohoP (New York 1907) ; Dumesny, P. and Noyer, J., ˆWood Products, Distillates and Extractsˆ (London 1908) ; Lewes, V. B., ˆThe Carbonization of CoaP (New York 1912) ; Lunge, G., ˆCoal Tar and Ammonia' (New York 1909) ; Martin, G., ˆSulphuric Acid and Sulphur Products' (London 1916) ; Schweizer, V., ˆDistillation of Resins' (New York n. d.) ; Walter, E., ˆManual for the Essence Industry' (New York 1916) ; Wright, F. R., ˆDistillation

of AlcohoP (New York 1906) ; United States Chemistry Bureau Circular 36.

Richard Ferris,

Editorial Staff of The Americana.

DISTILLED LIQUORS, or SPIRITU¬ OUS LIQUORS, the alcoholic beverages ob¬ tained by distillation as distinguished from the fermented liquors, wine, beer and cider, *etc.* The highly concentrated alcoholic liquids used in technics, medicine, pharmacy, etc., are called alcoholic spirits. In the distilled liquor bever¬ age, alcohol is always the main ingredient and the varying aroma and flavor, due to the origin and the method of production, influence its commercial value. On the other hand, spirits are judged according to their concentration and any secondary ingredients and aromatic sub¬ stances depreciate their value. Hence in the manufacture of spirits everything that is not alcohol is eliminated.

The distilled liquors best known in the United States before prohibition were :

Whisky — made from malt and unmalted cereals.

Brandy — made from grape wine.

Gin — made from malt with rye or barley.

Riim — made from molasses.

Cordials- — compounded from aromatic tinc¬ tures and sugar syrups.

In Germany, kornbranntwein, made from malt and rye or corn, and schnapps, made by diluting rectified alcohol and adding flavors and sugar, are distilled liquors in common use. In Austria slivovitz is distilled from the fermented juice of the prune-plum. In the East the liquor arrack is distilled from palm wine, with rice and molasses. In Russia the popular liquor vodka is made from rye.

In the United States the concentration of alcohol in liquors and spirits is determined ac¬ cording to proof-degrees. The regulations of the United States Internal Revenue Office say that ^^proof spirit shall be held to be that alco¬ holic liquor which contains one half its volume of alcohol of a specific gravity of 0.7939 at 60° F.” Therefore each proof-degree is equivalent to a volume measuring one-half of 1 per cent.

If 100 gallons of liquor contain 48 gallons of absolute alcohol, it is 2 x48 or 96 proof, and a spirit containing 92 gallons of alcohol per 100 gallons, is one with 92x2 or 184 proof. The revenue standard is a liquor with 50 vol¬ umes per cent (100 proof) of alcohol. ^^Over” and ˆhinder” proof are not officially recognized in the United States, although we find these dis¬ tinctions given in older books.

The raw materials used iri the preparation of alcoholic liquors and spirits are :

1. Alcoholic liquids, as wine and its waste and by-products (wine-yeast, grape-cakes), the waste and by-products of the brewing industry, in which the spirit is obtained solely by distilla¬ tion. The product of the wine distillation is used almost exclusively for cognac and brandy, which were especiallv manufactured in Cali¬ fornia and Ohio.

2. Sugary substances, as the extract of the sugar-beet, sugarcane, mainly molasses and also of sweet fruits (cherries, plums, melons, etc.), the sweet potato, the juice of the sugar palm, the carob bean (Saint John’s bread), *etc.* The sugar must be converted into alcohol by fer¬ mentation prior to distillation.

3. Starchy substances, which comprise the various cereals (barley, barley-malt, corn, rye, wheat, oats, rice, buckwheat, etc.), and also potatoes. Corn, barley, barley-malt, rye, oats and wheat were those mostly used in the United States. Before the alcohol can be obtained, the starch must be transformed into fermentable sugar, which in turn is fermented, to produce the alcohol previous to distillation.

4. Fibrous substances, in which the cellulose is converted into fermentable sugar. The fur¬ ther treatment is the same as detailed above (No. 3). Concentrated mineral acids acting under pressure on cellulose, will cause the for¬ mation of fermentable sugar, and since such fibrous substances (peat, sawdust, etc.) are in¬ expensive, many experiments have been made to obtain a practical method for producing alcohol from such materials. Many such methods have been patented. The manufacture of alcohol from fibre stuff has of late years assumed greater importance and such spirits can now be successfully obtained in large quantities.

5. Mineral spirit is of theoretical interest, although it can be prepared in the chemical laboratory. If ethylene (C_2H_4) is conducted into sulphuric acid, ethylsulphuric acid (C_2HBHSO_4) is formed, which if diluted with water will split up into sulphuric acid and alco¬ hol. Ethylene is a gas and is an ingredient of illuminating gas made from coal. It is also easily produced from acetylene (C_2H_2) by nas¬ cent hydrogen, according to the formula $C_2H_2 + H_2 = C_2H_4$.

In accordance with the importance of these various kinds of raw material that are consumed in the large distilleries, we will first of all discuss the manufactures of liquors and spirits from starchy substances.

These raw materials are treated, as in the brewing industry, with malt (mostly barley malt, sometimes also rye and wheat malt) in such a way that th-e diastase of the malt con¬ verts the starch into dextrin and sugar. But a distiller's malt differs in its properties from a brewer's malt. While the latter must impart its aroma and taste to the beer and only exert its diastatic power in a moderate degree, some of the starch

remaining unchanged in the liquor, the former must be characterized by a maximum of diastatic power, to convert all the starch into fermentable sugar. Consequently the distiller prefers a malt from a small-ker- neled barley, which has been killed at low tem¬ peratures. The diastatic power is weakened by high temperatures and hence some distillers, who operate a malting plant in connection with the distillery, used only green malt, or at most, air-dried malt. The German distillers uni¬ versally use green malt. In contradistinction to the brewer, the distiller prefers a malt made from a barley rich in nitrogenous matter, as this latter furnishes material for the formation of diastase and for the nourishment of the yeast. The malt used by distillers is that known as ˆ4ong malt® (malted for 20 days) as distin¬ guished from ˆˆshort malt® (malted for 7 days), used by the brewers. In making the long malt tlie grain is steeped until it has absorbed 40 to 45 per cent of water. It is then spread upon the malting floor for 20 days and kept at a temperature not above 63°. ˆ The development of mold or other bacteria is avoided by pre¬ viously soaking the grain in diluted milk of

lime. While the long malting causes a loss of starch, the gain of diastase far overbalances it. In mashing, the largest possible amount of starch must be converted into fermentable sugar (maltose) in order to obtain the highest yield of alcohol in the distillation. Under the most fav¬ orable conditions 96 per cent of the starch in the mash material can be converted into maltose (the remaining 4 per cent is changed into dex¬ trin), while in ordinary practice only about 80 to 81 per cent maltose is obtained and the re¬ mainder is dextrin. After the maltose is decom¬ posed into carbonic acid and alcohol, the dextrin is gradually converted by the diastase into mal¬ tose and then fermented. This can only be ac¬ complished with vigorous yeast and proper treat¬ ment in the fermenting rooms. On account of this “after-effect® the diastase must be care¬ fully protected from destruction by avoiding high mashing-off temperatures and the forma¬ tion of an excess of lactic acid and particularly butyric acid, produced by certain bacteria at a temperature of 104° to 122° F.

The mashing process varies according to the kind of product desired, the capacity of equip¬ ment (large, or small, or very small, the latter requiring hand power for mashing in place of machinery), the amount and quality of the raw material and, oftentimes, on the fancy of the customers. Inasmuch as whisky was the main \product of United States distilleries, we will discuss its preparation first of all.

The word “whisky® is of Celtic origin, for it apparently is an abbreviation of the word “usquebaugh® or “uisgebeatha,® which corre¬ sponds to the Latin aqua vitce (water of life). According to historical research the word aqua vitce is a corruption, because the original wording for distilled spirit was aqua ‘^e vite (water from the grape vine). In mediaeval times the monks changed this earlier form to the one now in general use.

Although the same term is used in America, Ireland and Scotland, the product is different.” The Irish and Scotch distilleries use almost exclusively kilned malt (only rarely, other cereals), while the American distilleries had an entirely different equipment and also their own characteristic development.

For the manufacture of whisky, especially corn and rye, sometimes also bran, wheat and kilned malt (6 to 15 per cent) are used. The best-known brands are :

Bourbon whisky, in the manufacture of which corn is the main ingredient, with barley malt, or wheat malt and rye. According to the quality of the Bourbon, the materials vary as follows :

Ordinary Bourbon whisky is made from a mixture of 10 per cent malt; 10 per cent rye; and 80 per. cent corn; Medium Bourbon from 12 per cent malt; 18 to 22 per cent rye, and 66 to 70 per cent corn; Good Bourbon from 15 per cent malt; 35 per cent rye; and 50 per cent corn.

Rye whisky when manufactured as a first-class article is made from 10 to 15 per cent kilned barley malt, 70 per cent rye and the re¬ mainder rye-malt. Some distilleries replace a part of the rye by oats or barley.

Half rye whisky is similarly made as the above, except that for one-half of the lye, corn is substituted.

Malt whisky, in which malt predominates.

Wheat whisky and

Oat whisky are made in the same way as rye and half rye whisky, except that wheat or oats is used in place of rye.

We must remark here, that the above appel¬ lations are in exact use only by the distiller, and that in commerce similar names are given to so-called compound whiskies. Under this term are meant those products which are produced from pure whisky, either by dilution with water and rectified spirits, or by a mixture of several kinds, or by still further blending and mixing. In some cases, other liquors, as for example, cognac, or rum, or even essences, are added to the pure whiskies. This compounding is done in accordance with the requirements of local trade, or the special tastes and desires of the customers. The character of the natural prod¬ uct is dependent upon the materials and the methods of mashing and distilling.

According to the method chosen for mash¬ ing we distinguish a ®sweet mash® and a ®sour mash® whisky. The latter is characterized by a delicate, slightly sour taste and a fine ethereal aroma.

Mashing for Whisky. — The material is ground separately, weighed in hoppers, and placed under a revenue-lock. In the smaller distilleries the corn is mixed with 20 to 25 gal¬ lons of hot water to the bushel, and kept boiling by means of steam until the starch becomes gelatinous. In larger distilleries the corn is gelatinized in high pressure cookers, under a pressure of 60 to 80 pounds. In either case the cooked corn is cooled down to about 150° F. In the high pressure cookers this reduction in the temperature is accomplished by a vacuum pump. In the smaller plants, malt, rye or other cereals are added to the corn mash cooled to 164 to 166° F., so that the entire mash has a temperature of about 156° to 160° F. In the larger distilleries the specially prepared rye or malt mash is drawn into the cooker by means of a vacuum pump. Here it is thoroughly mixed so that the final temperature is about 150° to 155° F. In order to obtain complete sacchari¬ fication, mashing is done at this temperature for 30 minutes or longer, and then the mash together with the grain is run into a collecting tub, from which it is pumped through a cooling system into the fermenters. The cooling sys¬ tem usually consists of a worm of a half inch copper pipe, which is encased in an iron water pipe. The mash flows through the copper pipeˆ in one direction, while the current of water” flows around the pipe in the opposite direction. It is always desirable to cool the mash to 64° F., but on account of the

higher temperature of the cooling water, it is usually possible to cool the mash only to 66° to 68° F. At any rate its temperature should never be above 70° F. The concentration of the mash varies proportionately with the amount of material, and is usually about 18 to 25 per cent (seldom more).

While the mash is pumped into the fer¬ menters, as much water or slop of the same temperature as the mash is added to the latter until its concentration is about 11 to 13 per cent.

The above-described method is used for sweet mash whisky, while for sour mash, slop is always used for mashing in place of water. The slop has not only acquired a definite lactic

acid content through the fermentation process, and certain peculiar and flavoring substances from the yeast, but also contains certain con¬ version products, formed by heating the grains in the distiller. Hence by the use of this slop, the whisky receives certain characteristics which have made it popular. In smaller distil¬ leries, oak vats, so-called bushel tubs, are used, into which boiling slop is poured, and corn in grits-form is doughed in under constant agita¬ tion with the hand (hence the name, hand-made sour mash). The malt and rye are added at 165° F. In medium-sized plants a large quantity of corn is doughed in in a similar manner in special mash tuns, and after the mash becomes somewhat thinner, due to the saccharification, it is pumped into hopper-like copper vessels. After the mashing off, the mash remains in the bushel tubs of the smaller distillery or in the vats of the larger plants for 20 to 24 hours for acidification. After this time, the mash is still of a somewhat solid consistency, so that it is separated in drums by means of a disintegrator. After cooling to the pitching temperature (64° to 68° F.), the mash is diluted with slop, to about 17 to 19 per cent. In some distilleries the concentration is lower.

The mashing process is different in very large distilleries, which have commodious mechanical appliances, and are prepared to mash vast amounts of material. It is customary to bring the corn mashed with water to the boil¬ ing point by means of steam, and then to heat the corn to 300° to 310° F. (60 to 80 pounds pressure). The corn is kept at this tempera¬ ture for 10 minutes in order to gelatinize the starch. The surplus steam is blown off, and the corn mash is cooled to about 164° F. At the same time, malt, rye, oats or barley is mashed in with water in a special mash tank, which is supplied with a simple agitator

and a double copper attemperator coil. After both mashes are united, the temperature is about 130° F., which is the temperature at which the largest possible amount of sugar is formed.

This mashing method is used in the large factories both for the manufacture of whisl^, high wines and spirits. The various brands of whisky are then made by the use of different materials of varying properties. These large distilleries also use slop in place of water when making a sour mash whisky. In order to ob¬ tain a higher degree of acidification, more lactic acid is allowed to form in the malt mash. In comparing the large distilleries with the smaller ones, we find that while the latter can pay more attention to the characteristic properties of the whiskies, especially sour mash and fancy goods, the former does its practical work more techni¬ cally and also obtains much higher yields. The manufacture of concentrated alcoholic spirits is only profitable when all the modern mechanical appliances are at hand, so that, owing to the constant decrease in the price of alcoholic spirits, the number of smaller plants is becom¬ ing less.

Fermentation of the Mash. — The sugary mash is fermented in the fermenters by means of yeast. A very large number of different races of yeasts exist, each of which produces an alcoholic liquor differing in flavor from the others. They fall naturally into two classes : (1) Culture yeasts, and (2) wild yeasts. The former have been cultivated for long periods

of time by the fermentation industries, and hav-e acquired characteristics which render them of great value for the production of alcohol and alcoholic liquors. The yeast used in fermenting whisky mashes belongs to the genus sac-charomyces cerevisice. The yeast used in fer¬ menting wines from which brandy is distilled belongs to the genus saccliaromyces ellipsoideus.

The distiller's yeast must be able to flourish vigorously in solutions with a high percentage of acid, and also when the alcohol content of the mash becomes considerable. In England, com¬ mon ale yeast is usually added; in France and Belgium either top-fermenting or compressed yeast, which is also used by bakers, is generally added. In the scientifically operated German distilleries, the inventions and discoveries of modern times are successfully used, as for in¬ stance, a pure yeast culture of a distiller's yeast is made according to Hansen's method, just as a pure beer yeast was cultivated in many United States breweries according to the same method. In the United States distilleries a yeast obtained by spontaneous fermentation was generally used. Here Delbrueck's teachings in regard to natural pure culture are of importance. Experience teaches that when several yeast species are present, a certain one can be developed under certain conditions of nourishment, because a mash of definite concentration and proportion of fermentable to non-fermentable substances, made from definite materials, consequently con¬ taining definite percentages of albuminous and mineral substances, will vigorously develop at a definite temperature and acidity only one species of yeast and will suppress the rest. By main¬ taining the same conditions on a larger scale, that is, by using a greater amount of mash, the yeast thus developed can be further propagated. But in spite of the utmost care, natural pure culture is oftentimes defective, because the standard requirements are not rigorously ob¬ served. It may also happen that among the air yeasts which are developed for spontaneous fermentation, there is no species which will flourish under these requirements. Consequently, it would be advisable to introduce pure cultures, made from one indivdiial cell, according to Hansen's method. Then the distiller would not be dependent on chance ; and, of course,

a pure yeast developed according to Hansen's method, would have to be cared for according to the principles of natural pure culture, as, otherwise, an infection with undesirable yeasts, mycoderma or fission fungi would gradually destroy the pure yeast.

In the United States distilleries the yeast was, and is, developed as follows :

A clear malt mash is made from ground malt and pure water, generally distilled water. The water is boiled with hops, one ounce of hops per gallon of water, cooled to 170° F. and added to the ground malt, whereupon sacchari¬ fication will take place. As soon as the conver¬ sion is completed, a clear mash is drawn either by filtration or extraction, which is then con¬ centrated to 18 to 30 per cent Balling and cooled to 70° to 72° F. Air is forced into the mash in small copper vessels, so that after 24 to 48 hours the yeasts of the air will cause fer¬ mentation. This mash in the copper jugs is the so-called stock-yeast and is cultivated as needed. In case the yeast thus obtained is not satisfac¬ tory, the process is repeated. Most distillers

constantly have a supply of this jug-yeast on hand and regenerate it by adding a portion of it to the above described, hopped, clear malt mash. This original yeast is poured into sterilized cop¬ per jugs and stored in an ice box or other suitably cool place.

This yeast is propagated for use in this way : The distiller first heats a rye and malt mash very rapidly to 130° F., when the maximum saccharifying action takes place, and keeps it at this temperature a short time. Then the heat is raised quickly to 144° when the maximum liquefaction of starch takes place. Finally the heat is raised to 150° to 154°, which destroys harmful bacteria, but does not injure diastase if plenty of sugar is present in the solution. The temperature most favorable to the action of distiller's yeast is between 75° and 81°. A slightly acid wort favors the development of distiller's yeasts, and checks the brewery yeasts and bacteria.

Souring is accomplished through a special mash at 148° to 158°, from kilned malt to which is added unmalted wheat, corn or rye. This mash at 122° is inoculated with a pure culture of lactic acid bacteria. When about 1 per cent of lactic acid has been formed, the temper¬ ature is raised to 165° and the lactic bacteria killed. The mash is then cooled to 80° and pitched with distillery yeast, and then slowly cooled to 60°. As fermentation proceeds the temperature rises, but it must be kept

below 85°. This yeast mash is ripe in 10 to 14 hours after pitching, and is then run into the sweet wort at 68°. The period of greatest fermentation is after 24 hours, and continues 12 to 18 hours — during which the temperature is kept below 85° to prevent loss of alcohol through evaporation. The duration of fermentation is for spirits and sweet-mash whiskies, 72 hours, while for sour-mash whisky it requires 76 hours.

Sometimes abnormal conditions arise, among which is the so-called ® foaming fermentation'^ that is an exceptionally stormy fermentation, in which losses of alcohol occur, due to the flowing over of the mash over the edge or rim of the fermenter. This is a result of various defects, and is either partly due to the materials,- or the yeast, or may be occasioned by irregularities in the operation, or even by other causes. It would lead too far to enumerate them here, but much has been written on this subject by ex¬ perts.

The fermented mash, called the sour mash, is now pumped into the distilling apparatus, where it is distilled as is fully described in the article Distillation. It is customary to distil the whiskies to 102-105 proof and spirits to 188-190 proof. In small distilleries an ordinary pot-still is used for whiskies and a liquor of about 70 proof is obtained, which is concentrated to 101-102 proof in a doubler. A doubler consists of a copper cylinder having a wide outlet pipe, from which the vapors enter the condenser. In the small distilleries, the heating is accomplished by direct firing, by which a peculiar, characteris¬ tic taste, which is appreciated bv the consumers, is engendered. Such whisky is called ^^Fire Copper Bourbon Whisky."

When oats, barley or wheat are used in the manufacture of certain whiskies, they are worked up in the same manner as rye in the above-described mash.

Potatoes are not mashed in the United States,

although they are commonly used in Germany. They contain only 18 to 20 per cent of starch, while the cereals contain 60 and more per cent of starch. Instead of mashing the ground, rasped or chipped potatoes in open mash-tubs, as was formerly done and is even done to-day in small plants, they are now first steamed under a pressure of two to three atmospheres, whereby the starch is put in condition to be easily acted upon by the diastase. After the steaming the potato mass is cooled to .55 to 60° C. (131 to 140° F.), which is the best saccharification tem¬ perature. Then this mass is mixed with malt, generally green malt, either in the cooker or in the mash-tub, and saccharified. It is customary in Germany to make a thick mash of 22 per cent (Balling), sometimes even of 26 to 28 per cent. The fermentation is accomplished by the addition of a cultivated pure culture yeast. The distilling process is similar to our method. In Germany less brand}ˆ but rnore highly con¬ centrated alcohol for industrial purposes is made.

In all those cases, in which a mealy sub¬ stance is utilized, the thin slop remains after the distillation, which contains all the ingredients of the corn and yeast mash. Besides the skins and husks, we find albumen, unfermented sugar, lactic acid, acetic acid, glycerine, mineral sub¬ stances, *etc.* This wet slop was mainly used as feed for cattle, so that formerly every distiller also had a herd of cattle. It is claimed that an animal's health will suffer if slops are copiously fed, so that on this account, and especially in order to dispense with some of the labor caused by the maintenance of the cattle, the slop was dried. By thorough drying, which can be done immediately after the distillation, spoiling is prevented and a constantly durable and valuable article of commerce, which need never be given away below its full value, is obtained. The drying of slop is accomplished in several opera¬ tions : (1) Settling of the insoluble substances; (2) Pressing out; (3) Drying in cylindrical driers.

There is also apparatus in which the slop is concentrated by means of steam, pressed and finally dried.

The feeding value of wet and dry slop can readily be seen from these analytical data, ob¬ tained by the Industrial Chemical Institute of Milwaukee in an analysis of slop in either condi¬ tion. The mash material was composed of 80 per cent corn, 10 per cent rye, and 10

per cent malt.

certain fungus, as for instance aspergillns oryzce are exposed in hothouse-like compart¬ ments to uniformly moist air of 77° F. on steamed, coarse wheat bran. The spores rap¬ idly develop to an exuberant white mold whose mycelium forms numerous spore-bearing threads which grow into the nutrient medium. A considerable portion of the nutrient medium is consumed and a decided rise in temperature is noticeable. According to the temperature, the formation of mold is finished in about 36 to 48 hours, whereupon the mass with the fungi is mixed with an equal amount of wheat bran and extracted in water, whereby the Koji-extract is obtained. This is added at 140° F. to corn, cooked in the customary manner, whereupon complete conversion is effected as with diastase The mash thus obtained, which has a concentra¬ tion of about 15 per cent Balling, is fermented in four days by means of a fungus, called taka-moto, propagated in a similar manner to the Koji fungus. It is claimed that the yield in this process is 11 to 12 per cent higher than in the process now in vogue. In some large corn dis¬ tilleries in Europe the fungus amylomyces Rouxii is used instead of malt to furnish the diastase. A sterilized corn mash is inoculated with a very small quantity of the fungus and filtered air is blown through the mash for 20 hours. The fungus spreads with great rapidity, converting the starch into sugar. Yeast is added during the action of the fungus-diastase, and ferments the sugar as it is formed, the two agents acting together. One gram (15 grains) of the fungus culture is sufficient to saccharify 25 tons of corn, saving three tons of malt besides the one ton of starch consumed by the malting. This mash being sterilized is worked in closed vessels so that harmful bacteria do not gain an entrance.

In the Belgian distilleries Effront's system is successfully used to prevent disturbances in the operation of the plant caused by infection. The main principle in this system is that the highly antiseptic hydrofluoric acid or mono-or bi-fluoride of ammonia is added to the mash, taking the place of lactic acid. Hydrofluoric acid, in small proportions, is poisonous to the harmful bacteria, while not affecting distillery yeasts up to 2/10 of one per cent.

The Control of the Distillery. — It is self-evident that the control in the distillery is of prime importance in a rationally operated plant, for which reason also the large distilleries, which have well-equipped laboratories, work ad-

Analysis of the Slop

Condition

Water

Proteids

Nitrogen-free

carbohydrates

Fat

Cellulose

Ash

Wet .

Per cent

91.2 11.94

Per cent

2.34 23.43

Per cent

3.63 36.35

Per cent

1.22 12.22

Per cent

0.88 8.78

Per cent

0.74 7.28

Dry .

Preparation of Alcohol by Fungi. — This process, which is used in Japan in the manufac¬ ture of sake, was changed for other cereals by Takamine, a Japanese, and was introduced by him in 1893-94 in the Manhattan distillery in Peoria, Ill. But this process has not been ex¬ tensively used, so that now it is almost for¬ gotten, although it aroused considerable interest at one time. In this process the spores of a

vantageously, while on the other hand, the small distillers constantly suffer losses. The control is properly carried out when regular analyses are made of the raw materials of the supple¬ mentary articles, namely the yeast, the mash before and after fermentation, the slop, the water and also the air in the mashing and fer¬ mentation cellar. (The Kentucky distilleries used a pure, hard water, rich in lime.) It hap-

pens in too many cases that the control is not properly carried out, which is, of course, a loss to the distiller, although at present the small distiller is enabled to have the control carried out by a special laboratory (Industrial Chemical Institute of Milwaukee). When the control is properly exercised, the yield will be increased Inasmuch as theoretically one pound of starch produces 0.5678 lb. of alcohol, then, according to Hantke, the highest possible yield of a distil¬ ler's bushel (which is always figured at 56 lbs. whether the material actually weighs that much or not) with

60 per cent starch in the material will be 5.76 gal. proof

alcohol.

61 per cent starch in the material will be 5.86 gal. proof

alcohol.

62 per cent starch in the material will be 5.95 gal. proof

alcohol.

63 per cent starch in the material will be 6.05 gal. proof

alcohol.

But in practice the yields obtained from one bushel of grain (56 lbs.) are as follows:

90 per cent corn -f-10 per cent malt, about 4.7 gal. proof, seldom 4.9 gal. proof.

55 per cent corn 35 per cent rye -f-10 per cent malt, about 4.25 gal. proof.

65 per cent rye + 15 per cent malt -f 20 per cent of rye, malt or oats, or barley — about 4.0 gal. proof.

Scotch Whisky is made in a pot-still. Its peculiar smgky flavor is due to the use of a peat fire in kiln-drying the malt. It is made from barley malt and corn, the latter often imported from the United States. But in some cases rye and oats are also used.

h'ish Whisky is a pot-still liquor made from 30 to 50 per cent of barley malt, with rye, bar¬ ley, oats or wheat or a mixture of them. The malt is not peat dried and the liquor has a deli¬ cate bouquet and a high alcohol content.

Brandy of the finest sort (Cognac) is dis¬ tilled from clear white grape wine which has been aged for at least a year. It is golden yellow in color and has a content of from 45 to 55 per cent alcohol. Ordinary brandies are dis¬ tilled from freshly made and fermented grape wines in two distillations. The first yields liquor of 25 to 30 per cent alcohol ; the second brings up the percentage to about 65 per cent. To remove the fusel oil, fractional distillation is resorted to. After distillation the brandy is placed in oak casks which previously have been well scalded with boiling water, or preferably, with steam. To acquire a desirable degree of smoothness and flavor, the brandy is stored at least four or

five years. Longer storage, up to 20 years, enhances the value and the price at which it can be sold. When it is ready for market, brandy is commonly reduced with water, and perhaps sugar and coloring are added, or blends may be made with other and newer distillations. Imitation whisky is usually made from diluted grain alcohol with a percen¬ tage of strong-flavored brandy, some coloring matter and sweetening and a very small propor¬ tion of oenanthic ether. Sometimes a little ex¬ tract of oak shavings or chips is added.

Gin is distilled from a mash of malt and un¬ malted rye or barley, with juniper berries added while the distillation continues. A very small percentage of turpentine and hops is sometirnes added. Gin has a delicate flavor, and contains about 52 per cent alcohol.

Rum is distilled from molasses together with the skimmings of sugar factory kettles and a proportion of the raw juice of the sugar cane.

The smaller the proportion of skimmings the better the quality of the product. The usual practice is one part of scum from boiling cane-juice, one part of raw cane-juice, and four parts of diluted molasses. The mixture is fermented in open vats for several days. When freshly distilled, rum is colorless, but it becomes a pale amber color from the casks in which it is stored. Burnt sugar is added to give a darker color. The alcohol content is from 78 to 85 per cent. In the West Indies, especially in Jamaica, the molasses of the sugarcane, which is merely ex¬ tracted to obtain the sugar, so that the molasses contains no admixtures as it does in our sugar refineries, is fermented and distilled. Its pe¬ culiar aroma is due to butyric ether. An infe¬ rior grade of rum is made from the sugar scum and beer yeast. Many brands of rum acquire their particular bouquet through the addition of clover leaves. Botany-bark, *etc.* Artificial rum, made by rnixing spirit with rum essence and adding a little coloring matter, can readily be distinguished from genuine rum.

Arrack is made from a mash of rice previ¬ ously sprouted. It is saccharified at 140° and then cooled to about 70° and a pro¬ portion of 10 to 12 per cent ˆfloddy,ˆˆ the fer¬ menting juice of the cocoanut palm, is added to produce fermentation. Sometimes molasses or raw sugar is used, and the toddy omitted. The liquor is distilled two or three times to secure the desired alcoholic content. Arrack is colorless when first made, but gains a yellowish or brownish color from the casks in which it is stored. Its alcohol content is from 70 to 80 per cent.

Vodka is made from a rye mash with from 15 to 20 per cent of green malt, either of rye or barley. In the cheaper grades corn and potatoes are used. Vodka ranges from the minimum of 40 per cent prescribed by law, up to 60 per cent of alcohol.

Sweet fruits, the juice of which is rich in sugar, also serve as raw materials for the spirit industry. The so-called Kirschwasser and Maraschino are obtained from cherries. Be¬ sides the juice, the extract also contains compo¬ nents of the cherry stones, which are crushed and added to the liquid.

In the East Indies a liquor is distilled from the fermented juice of the date palm, while in the West Indies the same is done with the fer¬ mented juice of the plantain. Pineapples, oranges, apricots, peaches and other fruits can also be made to furnish a liquor.

The large class of various sweet liqueurs, cordials, and ratafias are distillations only of good, fusel-free spirit with an aromatic sub¬ stance, and the addition of sugar syrup and coloring. The best known are absinthe, ani¬ sette, curagoa, benedectine, boonecamp, creme de cacao, creme de menthe, creme de rose, creme de vanilla and creme yvette (violet).

For statistics of production see Distilling Industry.

Richard Ferris,

Editorial Staff of The Americana.

DISTILLED WATER. See Distillation.

DISTILLING INDUSTRY. There can be no question but that alcohol is one of the most important substances produced by the art of man, for, outside of the extensive consump¬ tion of alcoholic liquors as beverages, it is more

extensively applied, and to a greater number of purposes than almost any other manufactured liquid. Notwithstanding, however, there is but one known process by which alcohol can be obtained — the fermentation of sugar or other saccharine matter of plants which contain either free sugar, or a starch convertible into sugar. Commercially, when alcohol is made from grain, it is called grain-alcohol; when it is made from reindeer and Iceland moss, it is called moss-alcohol ; when made from potatoes, or beets, root-alcohol, and, if from grapes, wine-alcohol.

Although the first historic mention of alco¬ holic liquors dates from the 11th century the art of distillation was known for centuries prior to that time. The Chinese had practised it for hundreds of years before it was introduced into Europe, and tradition attributes its discovery to the Arabian alchemists. This art of distillation consists in the process of converting liquid into vapor in a closed vessel by the application of heat and reconverting it into liquid by convey¬ ing the vapor into a cooler vessel ; so that spirits are not produced by distillation but by the prior act of fermentation; the distilling process separates the spirits from the mixture in which they have previously existed. Brandy, one of the first distilled liquors, was originally known as the ®water of life,® and one of the early alchemists was so enthusiastic over the discovery of this liquid that he declared that ^^this admirable essence is an emanation from the Divinity; an element newly revealed to man, but hid from antiquity because the human race was then too young to need this beverage, destined to revive the energies of modern de¬ crepitude.®

While brandy and several other distilled liquors had previously been made, the first prod¬ uct of the distillery to reach the dignity of a commercial position was called ^rectified whisky.® This was a crude high-wine which had been prepared for sale by being passed through a layer of charcoal, a process which was designed to extract the fusel oil. Later, this product was made more saleable by the addition of burnt sugar, some flavoring extracts, and storage in heavily charred barrels, to eradicate some of the rankness and fieriness that distinguished most of such liquors. This method of manufacture was followed until the process of redistilling was invented, when an apparatus was provided by means of which the fusel oil could be more thoroughly extracted from the spirits than had ever before been pos¬

sible, while, to make the liquor more palatable, a certain proportion of old-fashioned Bourbon from Kentucky, or rye from Maryland, or Penn¬ sylvania, was added to give the bouquet, flavor, and appearance of genuine whisky. In fact, the sale of the goods known as ^^redistilled whisky® became so general that the propor¬ tion as compared to the quantity of genuine Kentucky and other whiskies sold was not less than 15 to 1.

Although the name Bourbon whisky® at¬ tained a wide significance, it was originally used to distinguish the particular kind of liquor that was distilled from Indian corn, in Bourbon county, Kentucky. At that time the yield of Bourbon whisky was about in proportion to three gallons to the bushel, and it was so heavy in body and flavor that it was considered as of

great value in the work of compounding, in spite of the fact that it required many years of maturing to neutralize the fusel, and other essential oils which it contained. Popular as this whisky was from the days of its inception, its fame spread so rapidly that it was not long before other distilleries sprang into existence, in Kentucky and elsewhere, and as all of these manufacturers produced an imitation of ®Bourbon,® the best method of defining that liquor now is to say that it was a whisky distilled from corn, after the method which was origi¬ nated in Bourbon County.

Great as the demand for this whisky was, and despite the fact that the trade was com¬ pelled to admit that such goods could not attain to full maturity, ^he only condition in which they were ready for consumption, within less than the specified three years, the improvements in the process of manufacture were slow. It was at about this time that some important changes were made in the science of mashing, and as these not only increased the yield, but lessened the cost of production, the Bourbon whiskies, which had formerly been used so extensively for compounding purposes, began to attain wider popularity as a beverage. It was also quickly discovered that this incr.ease in yield had not injured the quality of the whisky, but that, on the other hand, such goods were of finer grade, the proportion of fusel oil be¬ coming less though the quantity of whisky in¬ creased.

The whisky upon which the reputation of Kentucky so largely depended was that kind of liquor that was known as sour mash, but, un¬ fortunately for the commercial integrity of the distillers, it must be admitted that there were comparatively few establishments that

were so careful as to the preservation of their reputa¬ tions that they would distil nothing but genuine sour-mash goods. Prior to prohibition the con¬ sumption of whiskies of all grades made in Kentucky was estimated as being nearly 14,000,- 000 gallons per annum, while the principal States in which ordinary spirits were produced were Illinois, Indiana and Ohio.

Owing to its greater availability and cheap¬ ness, grain is the material which is most gen¬ erally used in the distillation of liquors. Fruits, which are very good for this purpose when they can be obtained, are not only of a perishable nature, but they are not available during the greater portion of the year ; thus, while apples, peaches and grapes were used in the manufac¬ ture of distilled liquors in California and other States prior to prohibition, the output was neces¬ sarily limited. ˆ In the case of fruit brandies, the State of California manufactured more than nine-tenths of the total product of the country.

Rum, which was once one of the popular liquors, came to be very little used in this coun¬ try, being manufactured mainly for export pur¬ poses. Made of molasses as the chief material, its distillation was confined almost exclusively to New England, where its production constantly decreased, owing partly to the fact that grain-alcohols were cheaper to manufacture, and partly to the steadily increasing popularity of whisky as a beverage. During the past few years sev¬ eralˆ attempts have been made to distill pure spirits from molasses, but none of these experi¬ ments have been successful, owing to the

difficulty of eliminating the odor which is characteristic of rum. In the making of pure spirits, no aging is required. Such prod¬ ucts of the still are ready for manufacturing purposes, or for compounding, the day they are produced, for, no matter how long they are kept, they cannot be improved. It is such a product that is doctored up by the use of coloring and flavoring to the appearance of genuineness in which it is possible to dispose of it as whisky, and some are even made to produce a fairly passable imitation of the real sour-mash liquor.

In reviewing the products of American dis¬ tilleries it is necessary to give more than pass¬ ing attention to the use of distilled spirits in the arts, manufactures and medicines of this country. Among these alcohol and cologne spirits are the most important, although such products as high-wines, whisky, brandy, gin and rum, are also used for these purposes. Pure alcohol is a substance that cannot be ob¬ tained by the process of distillation alone. The alcohol, or rectified spirits of the pharmacopoeias contain, in the United States, 9 per cent by weight of water, and, in Great Britain, 16 per cent; while the proof-spirits, or diluted alcohol, has 54J/2 per cent by weight of water in the United States, and 51 per cent in Great Britain. In spite of its general undesirability, there can be no doubt but that great quantities of plain alcohol were used as a beverage, and while it is impossible to collect anything like reliable data upon this subject, it has been estimated that no less than 15 barrels of alcohol were thus con¬ sumed in New York city alone every day of the year, and that fully one-half of the alcohol which found its way to the Northwest was used as a beverage by the Poles, Norwegians, Swedes, Hungarians, Finns and Russians, who abound in that part of the country. It is also a well-estab¬ lished fact that the foreigners who are em¬ ployed in the coal mines of Pennsylvania con¬ sumed large quantities of alcohol.

In the making of pharmaceutical preparations a large proportion of the cost was due here¬ tofore to the use of distilled spirits in their composition. In some of these denatured alcohol may be used with a great saving of the tax formerly paid, but in many cases in which alcohol would be unsuitable, cologne spirits are used, while such

liquors as whisky, brandy, rum and gin, furnish the basis upon which many proprietary medicines, tinctures and medicinal wines depend, not only for their preservative qualities, but for their effect upon the human system. In fact, it has been estimated that no less than 45 per cent of all the distilled spirits consumed in the United States, are used in the arts, the manufactures and in the making of medicines.

Production. — The production of distilled spirits in the United States for the fiscal year ended 30 June 1917, was 286,085,464 gallons. Of this total, 57,651,834 gallons were whisky; 1,870,936 gallons, rum; 5,756,667 gallons, gin; 167,267 gallons, high wines ; 134,821,292 gallons, alcohol ; and 65,879,886 gallons neutral or co¬ logne spirits. Fruit brandies amounted to 8,- 251,097 gallons.

The total consumption for the year was 315,- 374,562 gallons, of which 41,529,677 gallons were exported; 93,762,423 gallons were denatured; and 13,119,201 gallons lost by leakage.

During the year quoted there were 625 dis¬ tilleries registered in the United States, but only 507 of them were operated. Of these, 198 worked on grain; 284 on fruit; and 25 on molasses.

California led all the other States in the production of brandy, her 148 active stills turn¬ ing out 7,871,759 gallons — 95 per cent of the output of the whole country. Ohio stood sec¬ ond, with 160,133 gallons; followed by New Jersey, with 54,494 gallons; New York, with 39,019 gallons; and Kentucky, with 34,163 gal¬ lons. In the production of spirits from grain, Illinois was first, with 79,320,206 gallons; fol¬ lowed by Indiana, with 43,332,771 gallons; and Kentucl^, with 36,407,615 gallons.

In the matter of materials used, no record of the fruit is available. Of grain, the largest item was corn, 33,973,268 bushels ; of other grains the figures were : malt, 4,239,677 bush¬ els; rye, 2,375,439 bushels; wheat, 2,538 bushels; all other grains, 78,902 bushels. Of molasses, the quantity used was 112,497,633 gallons. Of the whole product, 114,596,202 gallons were rectified.

The output of distilled spirits for the fiscal year 1914-15 was the lowest since 1909, as may be seen from the following figures:

Gallons

1908-1909	139,891,613
1909-1910	163,893,960
1910-1911	183,355,527
1911-1912	187,571,808
1912-1913	193,606,258
1913-1914	181,919,542
1914-1915	140,656,103
1915-1916	253,283,273
1916-1917	286,085,464

In connection with these figures should be compared the following stocks on hand in the distilleries and bonded warehouses on the 30th of June of each of the years cited:

Gallons

1911 . 249,279,347

1912 . 263,785,832

1913 . 276,784,540

1914 . 282,036,460

1915 . 253,668,341

1916 . 232,402,878

1917 . 194,832,683

These tabulated figures show the enormous increase in the distilling industry since the great war began. This is due in part to the large use of alcohol in the making of munitions, and the prodigious increase in exports, amounting to 2,500 per cent for 1917 over 1915.

The number of establishments in the United States in 1914 devoted exclusively to the manu¬ facture of distilled liquors, as returned by the Special Census of Manufactures, was 434. They had an aggregate capital of $91,285,028. They employed 6,296 hands, to whom they paid in the year the sum of $3,994,469 in wages. With the internal revenue and other taxes these concerns paid into the United States Treasury $147,261,065. The value of the product manu¬ factured was $206,778,708.

In addition to the large production of liquors of which we have record, however, there is no doubt that there were a number of illicit stills throughout the country that annually pro¬ duced a considerable amount of distilled spirits that succeeded in evading the government's tax, and, consequently, the government's record. These illicit distilleries, which owed their exist-

ence to the inherent repugnance of a certa&l class of grain growers to pay the heavy tax which the government imposed upon the maker of distilled liquors, were common throughout the sparsely settled regions of the country, more especially, perhaps, in the Southern States. In such sections these small distillers made and sold their product, irrespective of any claim that the government might have in the matter, and as a large proportion of the liquors that were made were consumed in the same neighborhood, it is impossible to obtain any record of them.

The tables on the preceding page show the output and warehouse stocks of distilled spirits down to and including 1917, which was the last normal year for the distilling industry. Pro¬ hibition made rapid strides in 1918, largely be¬ cause of its introduction as an emergency war measure, and its incorporation in the Federal Constitution, in January 1919, at once reduced the industry as regards spirits for beverage purposes from a major industry to a very minor one operating under the most stringent restric¬ tions.

On 1 Oct. 1918, by Presidential proclamation the production of malt liquors for beverage purposes was prohibited except from materials on hand and none were to be produced after 1 Dec. 1918. On 21 Nov. 1918, President Wilson signed the so-called ®bone-dry® law, which pro¬ hibited the manufacture and sale of intoxicat¬ ing liquors after 1 July 1919 and to remain in effect until after the demobilization of the army. The ratification of the Eighteenth Amendment following in January 1919, and the National Pro¬ hibition Act, passed over the President's veto on 28 Oct. 1919, extended war-time prohibition of intoxicating beverages to a permanent peace basis.

In 1918 there were produced m the United States 17,383,511 taxable gallons of whisky, 1,526,743 gallons of rum, 4,178,538 gallons of gin, 125,134,648 gallons of alcohol and 25,229,215 gallons of commercial alcohol. In 1919 whisky and gin disappear from the records, but there were produced in that year 815,793 gallons of rum, 90,371,962 gallons of alcohol and 7,783,916 gallons of commercial alcohol. The consump¬ tion per capita of distilled spirits dropped from 1.60 gallons in 1917 to 0.88 gallons in 1918, and to 0.79 gallons in 1919. See Brewing and Malting; Brewing Industry; Distillation.

DISTINGUISHED SERVICE ORDER,

an order instituted by Queen Victoria 6 Sept. 1886 for the purpose of rewarding the naval and military officers mentioned in dispatches for their distinguished service. Foreign officers who have been associated with British forces in naval and military operations are eligible as honorary members, and th,e order ranks next to the order of the Indian Empire. The badge is a gold cross, enameled white, edged gold, with the Imperial crown on one side and the cipher of the reigning sovereign on the other, each enclosed in a laurel wreath and worn on the left breast, pendent from a narrow red rib¬ bon edged with blue.

DISTOMA, a trematode or fluke having two suckers, an oral and a ventral, but no other holdfast organs. These forms are the most abundant of the Trematoda (q.v.) and include many important parasites of man and the do¬ mestic animals. Of the 30 or more species

recorded from the human host the most im¬ portant are the blood fluke (Schistosoma heematobium) which is the cause of Egyptian haematuria, the lung fluke (Paragonimiis rin-geri) which gives rise to a disease in Japan, Korea and Formosa that simulates pulmonary tuberculosis, and various intestinal flukes that produce grave intestinal disorders. The liver rot of sheep is due to one species (Fasciola hepatica) which is extraordinarily abundant in wet seasons in some parts of Europe, where in 1830 2,000,000 sheep died of this disease and even as late as 1891 a single sheep raiser in England lost over 10,000 sheep. This parasite has been introduced into North America.

Adult distomes occur as parasites in all kinds of vertebrates but are almost wanting among invertebrates. The life history is complicated, involving at least two generations with one or more changes of host. The intermediate stages, really generations in the life history, are found first in mollusks and later in various other hosts. Infection of man takes place through the use of water or uncooked foods which contain encysted larvse of the final generation. No North American fluke attacks man, but one species from the West Indies and several from the Orient are a real menace, with growing in¬ tercourse and increased chances of introduction.

Henry B. Ward.

DISTRESS, or DISTRAIN (from the Lat. distringo, to bind fast), is the taking of a per¬ sonal chattel of a wrongdoer or a tenant, in order to

obtain satisfaction for the wrong done, or for rent, taxes or service due, or for such damage as result from the trespasses of cattle. The thing taken is also called a distress. The remedy has been for long unpopular, as giving an undue advantage to the landlord over other creditors. It has been abolished in New York, South Dakota and some other States ; in Caro¬ lina a landlord cannot distrain except in pur¬ suance of an express agreement. In the New England States the law of attainder, or mesne process, has been substituted. ,

DISTRIBUTION. The distribution of wealth or prosperity is to be sharply distin¬ guished from the circulation of goods. The latter refers to the physical movement of goods from place to place and from hand to hand. It is a part of the process of exchange. Dis¬ tribution, however, refers to the relative well¬ being or prosperity of the various individuals or groups of individuals who perform various parts of the great and complex task of provid¬ ing for the needs of the community.

The problem of distribution, like that of exchange,ˆ grows out of the division of labor. In a primitive, self-sufficing system of economy, where every one produced everything which he consumed, there would, of course, be no ex¬ changing. Neither would there be any problem of distribution, because every one would con¬ sume his own products and his prosperity would be an individual and not a social problem. But in an economic system where each worker does that for which he is best fitted, instead of pro¬ ducing everything which he needs, it is of course necessary that goods and services should be exchanged. As the result of this process of specialized production and exchanging, each one finds himself, at the end of the process, in pos¬ session of a greater or a smaller quantity of

goods. Distribution has to do with this final result, that is, with the cjuantity of goods which each worker or group of workers gets as a reward for his or their part in the complicated work of production. The reward of the differ¬ ent participants in the work of supplying the needs of the community determines their rela¬ tive prosperity.

Production and exchange are processes, hut distribution is a result. Prosperity is, in a sense, the end and purpose of all production and exchange. Not all prosper alike in any economic system except pure communism. The relative prosperity of different classes, or the differences in prosperity and the causes of those differences are the problems of distribution.

Division of labor is of several kinds, the more important of which are territorial, tem¬ poral and occupational. Territorial division of labor, of which international division of labor is one phase, is a system* under which consider¬ able regions, such as the cotton belt, the corn belt, the mining regions, etc., specialize on cer¬ tain products, shipping their surplus out to other regions, and shipping in the specialized products of those other regions. Temporal division of labor is a system under which the same substance is worked upon at differ¬ ent times by different industrial groups. Wheat, for example, is produced by one in¬ dustrial group, ground into flour by another and baked into bread by still another. Hides, likewise, are grown by one group, tanned by another and made into shoes by still another. Occupational division of labor is a system under which, in the same industrial group, such as the milling, baking, tanning or shoemaking groups, various kinds of skill have to be combined in order to get the best results.

Each of these kinds of division of labor has its own peculiar problems of distribution. Un¬ der the territorial division of labor, one region may prosper and another not. Under the tem¬ poral division of labor, one industrial group may get a large and another a small share of the total value of the finished product. In the same industrial group, they who follow one occupation, or supply one of the factors of pro¬ duction, may get a large and others a small share of the value created

by the work of the groups. The causes of these inequalities are the problems of distribution, and they are the most important problems in the whole field of economics.

Inequalities in the territorial distribution of v/ealth or prosperity are not so very difficult to explain. If cotton, for example, is produced in excessive quantities, it helps the other regions which buy cotton, but it impoverishes the cotton belt which has cotton to sell. Other regions can get plenty of cotton in exchange for small quantities of their own special products, while the cotton belt, at the same time, gets small quantities of other things in exchange for large quantities of cotton. Vice-versa when cotton is undersupplied, provided it be not because of crop failure or other disaster, the cotton belt becomes prosperous and other regions rela¬ tively unprosperous. They who have cotton to sell can get large quantities of other goods for the proceeds of the sale of small quantities of cotton. The same principle applies to corn, wheat, coal or any other special territorial product.

The inequalities in the distribution of wealth or prosperity among the various industrial groups which work in succession upon the same material is likewise easily explained. The wheat-growing group, for example, gets its re¬ ward in the form of the price of wheat. The flour manufacturing group gets its reward in the form of the difference between the price of wheat and that of flour and its by-products ; and the baking group gets its reward in the difference between the price of flour and that of bread.

If there should be so many wheat farmers and so few millers as to produce a bad balance, then each individual farmer would cease to be indispensable. He could stop growing wheat, and there would still be as much wheat as the millers could grind. Each mill would, however, become at the same time practically indispen¬ sable. If it should close down, it would seri¬ ously curtail the supply of flour on the one hand and reduce the market for the farmer's wheat on the other. Under such circumstances the reward of the milling group, that is, the difference between the price of wheat and that of flour and its products would be large. In short, the milling group would be prosperous because a large share of the total price of bread would go to it and a small share to the farming group. Vice-versa if there were so few wheat farmers as to provide an insufficient supply to keep the existing mills busy, the distribution of prosperity would be reversed. Whether it be wheat, hides, iron or any other product which passes from one industrial group to another, the question of the distribution

of prosperity among the various groups would be the same.

The great social problems of the present, however, relate to the distribution of wealth or prosperity among the various members or classes in the industrial group. How much of the price of wheat, for example, should go to the landowner as rent, to the farmer as profits, to the capitalist as interest and to the farm laborer as wages? Again, how much of the total reward of the milling group should go to the owner of the site as rent, to the owner of the equipment as interest, to the business head as profits and to the various classes of laborers as wages? This is the problem of occupational distribution. The growth of large industries, with greatly increased numbers of interests to be conserved in each industrial group, has given to this problem its complexity. The vast differ¬ ences in the prosperity of the different classes who participate in the work of the same indus¬ trial group has made this the most acute of all economic problems.

The principles which determine the relative prosperity of different classes within the in¬ dustrial group are practically the same as those which determine the relative prosperity of ter¬ ritorial and of industrial groups. If, for ex¬ ample, two kinds of skill are required in the manufacture of a given product, and one kind of skill is so abundant and the other so scarce as to produce a bad balance, no individual pos¬ sessing the kind of skill which is oversupplied can claim to be indispensable. The mill or fac¬ tory can produce approximately as much with¬ out him as with him. Since he can be spared without great loss, he must work, if he works at all, at low wages, b'ach individual, however, who possesses the kind of skill which is scarce

may be said to be practically indispensable. It will make a considerable difference in the -out¬ put of the whole establishment whether he works or not. He cannot well be spared and he can therefore dictate good terms for him¬ self. In short he will be well paid.

Unskilled labor is generally oversupplied in proportion to skilled labor, and managerial tal¬ ent is generally the scarcest form of skill.

Thus it happens that no individual unskilled worker is in any sense indispensable. There are so many others available that any one can be easily spared. So long as this condition exists, un¬ skilled laborers will never be able to command a large share of the value produced by the group of which they are a part. For the same reason, so long as the same conditions prevail, the more nearly indispensable the individual becomes, the larger the share of that value he will be able to command.

Various kinds of skill, however, are not the only factors of production. Adequate supplies of capital are equally necessary, and in some cases, suitable land, favorably located, is also indispensable. Whether it be land, capital or skill, the more nearly indispensable the factor is, the more it will command of the total prod¬ uct of the establishment.

This being the case, the obvious cure for the inequalities in the distribution of prosperity is . a balancing up of the factors of production, so that no factor and no kind of skill is either oversupplied or undersupplied relatively to all others. With an abundance of available sites, no landowner could command an inordi¬ nate rent for his land. With an abundance of capital, no capitalist could command inordi¬ nate returns for his capital. With an abundance of managerial skill, no executive or business manager could command an inordinate income either in the form of profits or salary. At the same time, if unskilled labor were scarce and hard to find, so that each one could be considered as practically indispensable, no laborer would be compelled to work for low wages.

In addition to a program for the balancing up of our industrial system, we must, of course, eliminate all injustices, such as monopolies and other methods of creating artificial scarcity. See Economics.

Thomas N. Carver,

Professor of Political Economy, Harvard University.

DISTRIBUTION OF ANIMALS. See

Distribution of Living Mammals; Zoogeog¬ raphy.

DISTRIBUTION OF DISEASES. It is

well known that certain diseases without rela¬ tion to climate are found only within certain well-defined areas ; instances are pellagra con¬ fined to Lombardy and beriberi to Ceylon and Malabar. Climate, however, is a very important factor and together v/ith the popular

habits and customs determines the prevalence or absence of certain diseases in certain parts of the world. The tropics are the recognized home of malarial fevers and cholera, in the spread of which the warm damp soil and rotting vegetation plays a large part. Typhus, typhoid and scarlet fever prevail in the temperate zones, and their spread is due principally to overcrowding in the densely populated section of these zones. Tuberculosis

and other pulmonary diseases are commoner in northern latitudes. Consult Annesley, ˆRe¬ searches into the Causes of Diseases in Indiaˆ (London 1855) ; Manson, ˆTropical Diseasesˆ (4th ed.. New York 1907) ; Martin, influence of Tropical Climates on European Constitutionsˆ (London 1877) ; demon, ˆGeography of Dis¬ easeˆ (Cambridge 1904) ; Daniels, ˆTropical Medicine and Hygieneˆ (New York 1913) ; Davidson, ˆGeographical Pathologyˆ (Edin¬ burgh 1892).

DISTRIBUTION OF LIVING MAM¬ MALS. Mammals live in practically all parts of the earth, both on land and in the sea, excepting the icy deserts of interior Greenland and about the South Pole. The diversity of climate and other physical conditions within this vast area, during both past and present time, has furnished an endlessly varied environ¬ ment and the characters of the multitude of suc¬ cessively extinct mammals in the fossil beds of the geologic ages show that the group of mam¬ malia has always had a most plastic organism. The mammalian types now inhabiting the earth by their wonderful variety present living evi¬ dence of this fact. They range from the tiny shrew weighing less than an ounce to the ele¬ phant and the whale, weighing tons; from the clumsy mole to the winged bat, excelling the birds in some of its powers of flight; and from the stupid sloth to man. As we see them mam¬ mals appear to fit so perfectly into their en¬ vironment that at first glance the various species might be considered to have always ex¬ isted in their present haunts. The occurrence of closely related living species in widely separated areas and the evidence of the fossil records in¬ dicate strongly that the ancestors of much the greater proportion of living mammals probably had their origin far from their present homes. The distribution of existing mammals is merely the latest chapter of a wonderful story leading back through the geologic ages and involving almost incredible changes in the earth’s surface and the relationships between land and sea. The fossil beds prove that in practically all regions one fauna has succeeded another, often of the most diverse character, in a marvelous procession.

So far as distribution alone is concerned the mammals may be divided roughly into two main categories, each rather definitely limited. First, those which are characterized by having the four limbs more or less completely developed for life on the land. Second, those which have all of their limbs greatly modified, and sometimes with the posterior pair lacking, in order to fit them for life in the sea. Land mammals, living among infinitely diversified conditions, are correspondingly much varied in size, form, color, specialization of organs and habits. Sea mammals living under far more uniform conditions present much fewer and more uniform types which are included within the three great groups, the whales, the pinnipeds or seals, and the sirenia or manatees and their relatives. The seals and larger whales are most characteristic of the colder northern and south¬ ern seas, while the smaller whales or dolphins and the manatees are most characteristic of the warmer seas and some of their tributary rivers. The present distribution of land mammals has resulted from the interaction of numerous

causes many of which are little understood or are unknown. Temperature is known to be the most potent single influence. A long continued change of 10° F. in the average summer temperature of any region would have a marked influence on its mammal life; many species would disappear and be replaced by others. We have reason to believe that such changes in temperature have been the primary causes of many of the great changes in mam¬ malian faunas in various parts of the earth which have been revealed by studies of the fos¬ sil beds. The distribution of species is strongly affected also by the prevalent degree of atmos¬ pheric humidity, as indicated by the contrasting faunas of hot desert areas and of the mighty forests of the humid tropics. Oceans, great rivers, high mountain ranges and elevated table¬ lands form barriers which also affect the dis¬ tribution of mammals. The Sahara Desert is believed to have existed since a remote period and forms an effectual barrier against the spread of mammals living adjacent to its borders. In the same way great forested areas in other parts of Africa and elsewhere have their peculiar species and bar the way to species living on the open plains. Elevated mountain ranges, especially those extending in a northerly and southerly course, and high interior table¬ lands directly influence climate conditions and the animal life on them. For instance the great mountain system of western North America carries southward to within the tropics repre¬ sentatives of the characteristic northern mice of the genus Microtus. The broad interior table¬ land of Mexico carries southward from the southwestern border of the United States to the valley of Mexico the pocket mice (Perogna-thus), the kangaroo rats (Dipodomys) and others, while along both lowland coasts of that country tropical species of mammals such as peccaries (Pecari) and tiger cats (Fells) range northward to our border.

The distribution of both the recent and the fossil mammals plainly indicates that num¬ berless species have passed from their origi¬ nal home across land bridges to other con¬ tinents where they are now isolated by the dis¬ appearance of the bridges beneath the sea. In many instances the species has no surviving representative in the region of its origin. For ages Asia appears to have been a vast and

fecund nursery for the production of mammal types which passed thence to other parts of the earth. Most of the mammals now inhabiting temperate and Arctic North America were evidently derived from northern Asia by way of a land bridge which united the continents in the region about Bering Strait. By this route came the ancestors of our moose (Alces), elk (Cervus), caribou (Rangifer), mountain sheep (Ovis), mountain goat (Oreamnos) , prong¬ horned antelope (Antilocapra) , musk ox (Ovibos), wolves (Canis), foxes (Vnlpes), bears (Ursus), wolverine (Gulo), marten (Martes), otter (Lutra), Arctic hares (Lcpns), woodchucks (Marniota) , field mice (Microtus) , lemmings (Lemmus and Dicrostonyx) , and others, nearly all of which still have close rela¬ tives living in northern Asia and Europe.

Similar proof of former land connection be¬ tween now distant areas is afforded by the dis¬ tribution of other species of living mammals. This is well illustrated by the distribution of

the marsupials, an extremely ancient group which, as shown by fossils, was once widely distributed in northern continents. They are represented to-day only by the opossums of South and Middle America and by the kanga¬ roos and numerous other marsupials which in form and habits resemble our mice, moles and carnivores, in Australia and neighboring islands. Equally good indication of former land connec¬ tions is given by the existence of tapirs in tropi¬ cal America and in southeastern Asia ; also by the octodont rodents now peculiar to tropical America and Africa as well as by the monkeys of the Old and New Worlds. Land bridges are believed to have once united South America, the Antarctic continent, and Australia on one side, and to have joined Brazil and West Africa on the other.

The comparative length of time during which certain land areas have been separated is at times indicated in a marked way by the degree of differentiation between the related mammals of the regions. The geologically recent union of northern North America and northern Asia is clearly indicated by the close likeness between the living mammals of the two region's. The converse is shown by the monkeys of South and Middle America which, having a close external resemblance to Old World species, have also certain fundamental structural char¬ acters not known to occur in any living or ex¬ tinct Old World forms. This indicates that the New World animals branched from the parent stock at a remote period and have developed free from any subsequent interchange between the old and new continents.

It is interesting to note that the manlike monkeys, including the gorilla, chimpanzee and orang, are limited to Africa, southern Asia and the islands off its southeastern coast. The long isolation of Australia and the surrounding islands is indi¬ cated by the presence of a mammal fauna made up mainly of marsupials, an ancient group of animals once widely spread but now ex¬ tinct elsewhere except for the American opossums. Aside from the bats Australia has representatives of only a few groups of modern mammals, mainly the mice and rats of the genera Mus and Rattus of the rodents, and the dingo or wild dog (Canis), be¬ longing to the carnivores, which may have been introduced by man. Madagascar is an¬ other example of an area separated from other lands since a remote period, its most char¬ acteristic mammals representing types which exist nowhere else to-day, but of which fossil remains occur in adjacent parts of Africa. The recent great abundance and variety of large mammals in North America, both of species and individuals, is in strong contrast to the situation in South America. In the north we have the bison, musk ox, mountain goat, prong¬ horned antelope, mountain sheep, elk or wapiti, several well-marked stˆcies of deer, caribou, and an unequalled variety of bears, including four types, the polar, the black, the grizzly and the huge brown bears of Alaska. To offset these. South America outside the tropics has only two or three deer, the guanaco and vicuna (from which have come the domesticated llamas and alpacas) and the spectacled bear. The fauna of the tropical parts of South and Central America has many distinctive types of smaller mammals, including the prehensile-tailed

monkeys, marmosets, coati-mundis, peccaries, agoutis, prehensile-tailed porcupines, sloths, armadillos and anteaters. Both the scarcity of large mammals in South America and the num¬ ber of surviving peculiar types evidence the long isolation of that continent from contact with other lands on either side. Certain groups of mammals are typical of cool regions, such as the moose, caribou, musk oxen, marmots and lem¬ mings of northern parts of the Old and New Worlds. Others like the monkeys are typical of the tropics. Some mammals appear to be indif¬ ferent to climate conditions as in the case of the mountain lion (Felis concolor and its geo¬ graphic races), which ranges from southern Canada to Patagonia, and appears to be equally at home among the sun-scorched desert ranges of the southwestern United States, the cool slopes of high mountains and the gloomy depths of the vast tropical forests of Central and South America, amid almost constant rains. A simi¬ lar hardiness is shown by the tiger of the Old World which has representatives from the hot lowlands of southern India to the valley of the Amur River in eastern Siberia, where Arctic temperatures prevail in winter. The distribu¬ tion of certain species serve as unmistakable records of former climatic conditions, as in the case of the field mice (Microtus) which occupy high isolated mountain tops in southern Mexico and Guatemala, separated from their nearest northern relatives by intervening tropical low¬ lands. It is evident that they spread southward while a suitably cold climate prevailed on the lowlands, and with the change of climate were forced up and stranded on the elevated islands they now occupy. This discontinuous distri¬ bution on mountain ranges is as significant as is the existence of closely related types on is¬ lands and on distinct continental lands, although they may be separated by a broad and deep ex¬ panse of the sea. Isolation on islands, and to a lesser extent on high mountains, where com¬ petition from invading species may be mainly or entirely absent tends to preserve the representa¬ tives of ancient forms long after they have van¬ ished from other parts of their former range. Both Australia and Madagascar are extreme ex¬ amples of the effect of isolation in bringing down to recent times representatives of ancient faunas which have become elsewhere extinct. The relation of the distribution of living mam¬ mals to their near kin of the geologically not distant past is well shown by the discovery on the open plains of North America of fossil re¬ mains of several types of antelope now abun¬ dant on the plains of Africa. Camels, once oc¬ curring from the

coast of Florida to the Pacific, now exist in the feral state only in central Asia. They have living relatives, how'ever, in the guanaco and vicuna of South America. Members of the elephant tribe, once common in most parts of the world, exist now only in Africa and southern Asia. Fossil remains abundantly prove that the horse developed on the great plains of North America where it existed in extraordinary variety of size and form. At the time of the discovery of America the horse had completely vanished from its confines, al¬ though representatives still survived in the wilds of Asia and Africa. The fact that the horses brought by the Spaniards to America found the plains on both continents perfectly adapted to their needs, and going wild increased

enormously, renders still more inexplicable the cause of the disappearance of the original stock from these haunts. In the past many mammals of extraordinary size existed in various parts of the world which are now represented by smaller species. Among these may be men¬ tioned the giant deer of the Irish iˆat bogs, the huge extinct marsupials of Australia, the gigan¬ tic armadillos of South America and the great wolves and lions of southern California.

The distribution of certain genera is ex¬ tremely restricted. The genus Romerolagus, an aberrant rabbit having but a single species with¬ out near living relatives, is confined to a narrow belt about the bases of the adjacent volcanoes Popocatapetl and Iztaccihuatl on the border of the valley of Mexico, although exactly similar slopes with the same soil and vegetation exist on other mountains distant only a few miles. Another example is the curious rodent genus Aplodontia, confined to damp forests of the northwestern United States and represented by a single species. Such mammals are, no doubt, survivors of groups once having far wider dis¬ tribution and more varied forms, and their present restriction in variety of form and ex¬ tent of range is a forecast of approaching ex¬ tinction. The llamas and alpacas of South America are similar survivals of once widely spread types. In strong contrast to such re¬ stricted distribution may be cited other genera which contain many forms, abound in indi¬ viduals and occupy vast areas of the earth, thus indicating a vitality and attendant fecundity as well as a youthful plasticity of organization able promptly to respond to the requirements of changing conditions. The genus Lepus, which includes the hares, is perhaps the most notable of such groups. It has representatives throughout most of Africa, Europe, Asia and North America, including in its range the northern end of Greenland and the tropic low¬ lands. The meadow mice of the genus Micro¬ tus,

numbering many species and untold mil¬ lions of individuals, occupy most of the low¬ lands and mountain ranges of Europe, the northern half of Asia and America north of Mexico. The vast range of the hardy puma (Felis concolor) has already been mentioned. The disappearance from the earth of once abundant and widely spread species of mammals when climatic and other conditions appear to remain the same presents an unsolved problem. The mammoth, cave bear, and other large species now extinct, ranged the plains of northern Europe and Asia as late as the time of the Cave Men, while the reindeer and other animals contemporaneous with those named and apparently no better fitted for existence still survive. It has been wisely suggested by Lydekker as probable, among the many factors which influence the disappearence of species and even of larger groups of mammals and other forms of animal life, that each species or even rnuch more important groups may, like the in¬ dividual, have its period of youth, maturity and_ decay, leading to loss of vitality and final extinction, to be replaced by vigorous new¬ comers in the endless succession of life. The reasonableness of the foregoing surmise is shown by th-e facility with which certain species of birds and mammals have been known to decrease and even disappear within a very re¬ cent period. One striking instance within the

last 30 years is the inexplicable disappearance of various species of birds in the Hawaiian Islands with no change in their habitat sufficient even remotely to account for it. Their extinc¬ tion appears to have been due to a lack of enough vitality to withstand the trifling en¬ croachment on the great expanse of their forest homes following the advent of civilized man. The steadily decreasing numbers of the prong¬ horned antelope on the open plains of the west¬ ern United States and northern Mexico is no doubt in part due to its small powers of resist¬ ance to changes in environment brought by the increased occupation of its territory by man and domestic animals. The lack of ability to resist changes on the part of the prong-horn is strikingly shown by the difficulty experienced in keeping them alive in zoological parks and to maintain small herds of them in fenced

govern¬ ment game preserves containing thousands of acres in the midst of their former haunts. In these same parks and preserves, buffalo, elk and deer thrive and increase rapidly.

Man appears to have originated in the Old World and to have become the most widely dis¬ tributed of all mammal types. The genus Homo has broken up into a considerable number of specific types which had originally as clearly defined geographic distribution as the lowest of mammals. With the development of civilization man has more and more tended to lose these local distinctions and to obscure the original boundaries of races by migrations at will to all parts of the earth. The weaker species of man .disappear before the stronger, as occurs among other forms of animal life.

No treatment of the distribution of recent mammals can well avoid the consideration of the potent influence of man. Although man is the latest type of mammal to appear on the earth he rapidly developed a dominant position and spread to all lands where he has determined the survival or destruction of numerous species, and his influence in this re¬ spect is rapidly increasing. From th-e most primitive times up to the present animal products, including flesh, fat, hides, ivory and others, have been necessary to man's welfare and have formed valued articles of commerce which has led to persistent pursuit and slaughter. In addition man has_ domesticated the horse, cattle, sheep, goats, pigs, dogs and cats, which he has taken with *him to other lands where under his protection they have enormously increased to the injury of most native mammals, both great and small, with which they have come in competition.* The present situation in the United States is an illustration of this in the presence of many millions of domestic animals, and the vast de¬ crease in all the larger game animals,ˆ such as bison, elk, deer, antelope and mountain sheep, since the settlement of the country. Not all, by far, of this harmful influence on the native mammal life can be laid to the domestic ani¬ mals, for the improvement of weapons of the chase and of means of transportation coupled with the hunting instinct which persists in man are ever-increasing menaces to the welfare of the surviving large and small mammals which offer any value as game, as bearers of fur or as the producers of commercial products. This danger extends to the species living in the sea as well as to those on land. The increasing

occupation and cultivation of the land is another of the factors introduced by man whereby the existence and orderly development of the higher forms of life on the earth is being more and more disturbed

and in many instances jeop¬ ardized.

E. W. Nelson,

Chief, Bureau of Biological Survey, Washing¬ ton, D. C.

DISTRIBUTION OF PLANTS. See

Plant Geography.

DISTRICT, a term ordinarily meaning a region, a tract of land, a territory, but in the United States usually employed to designate a political subdivision of a State, county or city fixed for purposes of legislative or congressional representation, either under a law enacted by the legislature or by the adjudication of a court in which this power may be vested. The term has been used historically and currently in sev¬ eral senses. It was applied to organized bodies of territory administered by the Federal govern¬ ment because they were not populous or com¬ pact enough for territorial institutions or for other reasons were withdrawn from that sys¬ tem. Examples are the District of Columbia, first district, then territory, then district again ; Alaska before its territorial organization ; and from 1804-12. that portion of the Louisiana Purchase north of the present boundaries of the State of Louisiana. Until late in their history the counties in South Carolina were called dis¬ tricts.

State Districts. — The term is used also to designate a State or that portion of a State which constitutes the seat of jurisdiction of a United States court, such districts never cross¬ ing State lines. See Court.

Congressional Districts are marked off by the State legislature after the apportionment of representation in Congress has been made by that body, which bases its action upon the de¬ cennial census. (See Apportionment; Con¬ gress; Elections). These districts must con¬ sist of contiguous and compact territory and as nearly as possible must contain an equal number of inhabitants. Congress has power to alter or to override entirely the regulations made by State legislatures as to the times, places and manner of holding elections, but this power was. not exercised until 1842 when an apportionment act was passed providing that members should be elected by districts instead of by general ticket. Under the Constitution the senator and the representative must be ®an inhabitant of that State^^ in which he is chosen but in some States the two senators have been taken from different sections or districts, while in Maryland for 75 years a statute required that one of the senators be elected from the ^^eastern shore.^^

Custom or law now requires that members of the House reside in the dis¬ trict from which elected. Since no definite rule governs the manner of redistricting a State after a new apportionment, oftentimes the party in control of the legislature will perform this work in such a way as to secure for itself a number of congressmen larger than warranted under its share of the popular vote. See Gerrymander.

State Senatorial Districts follow county lines in most States, especially in New Eng¬ land, where the county itself is usually the basis

for senatorial representation. In the newer States, after each decennial census, the State is redistricted for the ensuing elections of the fixed number of senators. Minnesota and Illi¬ nois are the only States wherein election dis¬ tricts serve for the election of members of both houses of the legislature. In some States un¬ equal senatorial representation occurs, some¬ times because a senator is accorded to each political unit (as in Rhode Island, where each town or city is represented by one senator), and sometimes because limitations are imposed with the intent to restrict the influence of any one city (as in New York, where no county may be represented by more than one-third of all the senators).

State Assembly Districts are usually redis¬ tricted after each decennial census, the unit of representation being the town in some of the older States, particularly in New England. In Vermont each town may elect only one repre¬ sentative ; in Connecticut each town or city may send two but no more and no town which in 1818 elected two representatives has had its rep¬ resentation reduced. As a result the city of New Haven with 150,000 population has no larger representation in the legislature than the town of Union with only 400 population. For convenience each State assembly district is usu¬ ally subdivided into election districts or voting precincts, the number depending upon the size or population and the ratio of apportionment decided upon by the board of elections.

City Districts. — For administrative pur¬ poses cities are usually divided into districts such as police, fire, school, park, sewer, sani¬ tary and election districts. Sometimes for tax¬ ation purposes, cities are districted, particularly if special assessments be imposed for public im¬ provements, the tax rate varying in the several districts. The charters generally establish these districts outright, confer the power to change their boundaries or delegate authority to estab¬ lish them. In some cities are territorial subdi¬ visions known as wards, which are established for specific civic purposes, such as units of rep¬ resentation in the city council, and for police, taxing and election districts. They sometirnes constitute an important part in the organization of political parties. See Cities, American, Government of.

Taxing Districts. — Under a decision of the Supreme Court, a taxing district is any section of a State described in a statute or order as to be

assessedˆ without respect to the civil or po¬ litical divisions which may have been made for election purposes. A remarkable instance was the city of Memphis, Tenn., which, when ruined by plundering politicians, abandoned its city charter and constituted itself the taxing dis¬ trict of Shelby County, to escape suits against the city as a corporation. See also Taxation.

Internal Revenue Districts are established for the collection of internal revenue and come under the supervision of the Treasury Depart¬ ment. The country is divided into 66 districts, each in charge of a collector; as a rule the dis¬ tricts follow the State lines, but the revenues from some States are so large that the States are divided into several districts, as New York into six, Kentucky into five and Illinois into four. See Internal Revenue System.

Customs Districts have been established to administer the tariff laws and to collect the

customs duties. (See Duty.) In each of these districts is a port of entry and in several of these ports the collections are made by a staff of officials, consisting of a collector, appraiser, naval officer, surveyor, inspectors and gaugers, the number varying with the size and commer¬ cial importance of the port.

Rural Districts and Divisions. — The coun¬ ties of the Southern and far Western States and the towns and townships of the North Cen¬ tral and North Atlantic States are divided into smaller districts for special local administrative purposes, such as elections, fire, schools, roads, health, water, *etc.* In the South and Far West, country districts are generally larger than the subdistricts of towns or townships in other States, and to some extent have supplanted the system of township government. The other rural administrative districts, such as county council, town, borough, village, etc., are dis¬ cussed under their individual headings.

Election Districts sometimes comprise an entire town or township, but the larger towns or townships of the North Atlantic and North Cen¬ tral States often contain more than one voting precinct, especially where a town consists of two or more villages. See Elections.

Fire Districts seldom conform to other boundary lines ; in villages and smaller cities the fire district comes within the village or city limits. Fire companies are strictly regulated as to their response to alarms in

a particular dis¬ trict, but such companies are often called from one village to the aid of nearby towns or vil¬ lages. Most States have a fire marshal whose principal duty is the prevention of fires. See also Fire Protection ; Building Laws.

Health Districts are confined to counties. The health officer and his assistants are usually county boards, having jurisdiction throughout the county, and their chief work is to prevent epidemics and to create satisfactory sanitary conditions. See Sanitary Science and Public Health.

Water Districts generally coincide with the village or city limits and usually come under municipal jurisdiction. In States having large irrigation systems the water district often con¬ stitutes an important administrative unit. See also Water Supply ; Waterworks.

Poor Districts may coincide with the limits of the county or township, some States having both systems. The county supports an infirm¬ ary and persons unable to enter the infirmary must be aided or supported by the townships. See also Pauperism ; Charities, Public.

Road Districts. — Most country roads in the United States have been constructed or re¬ paired by a labor or poll tax under the direction of road supervisors or overseers of road dis¬ tricts into which the counties and towns have been divided. These supervisors may be elected by the road districts or appointed by the town¬ ship trustees, their duties being to superintend the road work which must be performed by each male citizen between certain fixed ages. Until recently Ohio permitted cities and villages to require two days' labor on the streets. In the Southern and Far Western States the county officials usually appoint the district road officers but they are elected by each district in Idaho and Washington. In most of the North Central and North Atlantic States the local road officials are usually town officers, in some States the

road supervisors being appointed by the town; but in many of these States county and State officers now supervise the more important roads. See Roads, Improvement of.

School Districts are areas set apart as units of organization for the local control and ad¬ ministration of school affairs; in most States these districts are regularly incorporated, with their own power of taxation. The limits of the township school district usually are the same as those of the civil township, but the school affairs are administered by a separate board, which may or may not consist of persons chosen by each subdistrict, Independent dis¬ tricts may be formed in townships, which con¬ stitute a school district ; or, upon vote, all of the township's subdistricts may be constituted independent school districts. Hence a county might have townships with only subdistricts, or only independent districts, or a combination of both. The independent school districts were first established in Massachusetts in 1789 but were finally abolished in 1882. In the North Atlantic and North Central States towns and townships were formerly very generally subdi¬ vided into petty school districts but the present tendency is to make the town the primary unit for school administration. Small school dis¬ tricts prevail, however, in Rhode Island, Con¬ necticut, New York, Illinois, Michigan, Kansas and NelDraska, while an entire township or one of its subdivisions may still constitute a school district in Minnesota, Wisconsin, North and South Dakota. In the Southern States border¬ ing on the Atlantic and in Louisiana, where the township has not been fully established, the officers of the district are appointed by the county school officials, who also must establish the school district. The district may coincide with the civil or magisterial district and may elect its own trustees, as does the township in the North. In the other Southern States and some of the Far Western, counties are regularly divided into school districts which in most cases are distinct municipal corporations. In other Far Western States districts may be des¬ ignated by county boards or by the county superintendent of schools, but the trustees are selected locally and tax levies for school pur¬ poses are controlled locally. See also School Supervision; Schools, County Training.

Judicial Districts. — For purposes of elect¬ ing justices of the peace, the counties in many Southern and Far Western States are regularly divided into districts ; and some States have districts for the election of county boards. These are called magisterial districts in Vir¬ ginia, West Virginia and Kentucky; civij dis¬ tricts in Tennessee; and judicial townships in California: In some places these judicial dis¬ tricts are used as election precincts.

Other Rural Districts. — Sometimes districts are specially established in certain localities to conduct public works affecting two or more of the regular local districts. Among such special districts are the levee districts along the lower Mississippi and the drainage districts in Illinois.

Bibliography. — Beard, C. A., ˆAmerican Government and Politicsˆ (new ed.. New York 1914) ; Bemis, E. W., ˆLocal Cˆovernment in Michigan and the Northwestˆ (in ˆ.Tohns Hop¬ kins University Studies,ˆ Series I, No. S, Balti¬ more 1883) ; Commons, J. R., ˆProportional Representationˆ (New York \907) ; Dougherty,

J. H., ˆElectoral System of the United Statesˆ (New York 1906) ; Fairlie, J. A., ˆLocal Gov¬ ernment in Counties, Towns and Villages' (New York 1906) ; Goodnow, F. J., ˆMunicipal Government' (New York 1910) ; Goss, J. D., ˆHistory of Tariff Administration in the United States' (in ˆColumbia University Studies,' Vol. I, No. 2, New York 1891) ; Hart, A. B,, ˆActual Government' (New York 1909) ; Haynes, G. H., ˆRepresentation in State Legis¬ latures' (in ˆPublications of American Acad¬ emy of Political and Social Scienceˆ (No. 284, Philadelphia 1900) ; Howard, G. E,, ˆIntroduc¬ tion to the Local Constitutional History of the United Statesˆ (in Uohns Hopkins Studies,ˆ Extra Vol, IV, Baltimore 1889) ; Howe, F. C., ˆTaxation and Taxes in the United States under the Internal Revenue System, 1791-1895ˆ (New York 1896) ; Humphrey, J. H., ˆProportional Representationˆ (London 1911) ; Ostrogorski, M., ˆDemocracy and the Party Systemˆ (New York 1910) ; Ramage, B. J., ˆLocal Government and Free Schools in South Carolina' (in Uohns Hopkins Studies,ˆ Series I, No. 12, Baltimore 1883) ; Reinsch, P. S., ˆAmerican Legislatures and Legislative Methodsˆ (New York 1907).

Irving E. Rines,

Author of ˆHistory of the United StatesJ

DISTRICT OF COLUMBIA, the national capital and its adjoining territory, owned and administered directly by the United States gov¬ ernment, to prevent its action being hampered by conflicts with local jurisdictions. It con¬ sists of 60 square miles of land and 10 of water on the eastern side of the Potomac, at the head of deep-water navigation ; an enclave in Maryland, with three rectangular sides and the fourth following the lines of the river, be¬ sides the islands in the tidal river. Near the southern side of the district, forming the east¬ ern and southern boundary of the city of Wash¬ ington, is the large tidal estuary of Anacostia River, or the eastern branch of the Potomac ; the northwest boundary is formed by Rock Creek, separating Washington proper from Georgetown. There are several brooks. The district is flat and marshy for some distance back, then rises into gentle hills and swells ; there is pleasing scenery along Rock Creek. The geological formation is Cretaceous, overlaid with drift; in the latter has been found the conglom¬ erate called breccia, from which handsome col-ums have been carved, used in the capitol. The soil is light, and especially suitable for market¬ gardening, to which with dairying and the pas¬ turage for the cows it is chiefly devoted, outside the built-up sections. The nature of the capital as a *court city" gives flower-gardening a great importance, and over $5(X),(XX) worth are sold annually. The farms are very small — about 35 acres for white and 18 for colored occupants. But little over a fifth of the surface is in farms, however; the city and its suburban village, the great National Park, and reserved grounds of various kinds, taking up most of it. The climate is excessively variable, but generally humid and warm. The rainfall averages 50 inches a year.

The District originated in the politics of the Confederation time. Until the adoption of the Constitution, the Continental Congress assem¬ bled on 10 occasions at eight different places in succession, at Philadelphia, Baltimore, Phila¬ delphia, Lancaster, Pa., York, Pa., Philadelphia,

Princeton, N. J., Annapolis, Md., Trenton, N. J., New York. The first five were during the Revo¬ lution. On 21 June 1783, a band of unpaid mili¬ tia broke up the session in Philadelphia by hooting the members and pointing muskets in at the windows. This emphasized the need of a district guarded by Federal troops, and on 7 October Congress resolved to erect a build¬ ing near the falls of the Delaware (Trenton). The jealousy of the South, however, demanded one also near the falls of the Potomac, and alternate meetings in the two. Finally a ma¬ jority abolished the second proposition, and a committee was appointed to lay out a town as first voted. There was no money under the Confederation, however, to build or do any¬ thing else, and no action was taken on the committee's report. It had been voted to meet in New York till the Federal town was ready; but this was disliked from fear of the ®money power® corrupting or overbearing Congress. Philadelphia was proposed, but objected to by the Southerners because the Quakers favored abolition. The first Congress under the Con¬ stitution revived the government-district plan, but on the banks of the Susquehanna. Finally Jefferson gave a dinner and arranged a ®log-roll® : two anti-Federalists from the Potomac region, who had voted against the assumption of the State debts by the national government, changed their votes on condition of the Federal¬ ists voting to fix the new capital on the Poto¬ mac, after remaining 10 years at Philadelphia. The act was passed as agreed 28 June 1790, for establishing the seat of government ®at some place between the mouths of the Eastern Branch and the Connogocheague.® The first session of Congress was to be held in the new place the first Monday in November 1800. Maryland in

1788 ceded Washington County, and Virginia in

1789 Alexandria County, forming a district 10 miles square; Washington in person laid it out under the act of 30 March 1791 (having previously sold all his lands in the vicinity). The territory selected included the site of Pow¬ hatan's village, Anacostan or Nacochtank; also the existent village of Georgetown, laid out in 1751 and incorporated in 1789 — both on the Maryland side; and on the Virginia side, Alex¬ andria, formerly Belhaven. The site of the new capital itself had been the plantation of one Pope, classically inclined, who by a curious pre¬ vision called his hill the Capitol and .a brook near by the Tiber. Until 9 September the site was called ®The Federal City® ; then, by order of three commissioners appointed by President Washington, the district was named ®The Ter¬ ritory of Columbia,® and the city ®The City of Washington.® For the latter, see that title ; also Capitol, where is noted the project, after its burning by the British, of removing the capital north, which was carried by the

speaker's casting vote, but buried in committee. In 1846 no Federal buildings having been erected on the Virginia side, nor likely to be, Alexandria County was retroceded to that State upon the petition of the inhabitants thereof, by a vote of 763 to 222. In 1871 the business men of the District, fretting under their political nullity, it was constituted a Territory with a governor and legislature, and delegates in Congress ; but was at once seized upon by a ring of speculators who obtained control of its government and

plundered it into bankruptcy. In 1874 the ter¬ ritorial government was abolished and direct government by Congress restored through three commissioners appointed by the President and confirmed by the Senate.

The commission of 1874 was a temporary government; in cooperation with Congress and the citizens of the District, it framed as a per¬ manent system the act of June 1878, which the Supreme Court has pronounced ®the constitu¬ tion of the District of Columbia.® Under this act half the expenses of the District, previously laid entirely upon the residents, are paid by the national government, as the owner of more than half the real estate. There is no popular suf¬ frage, the entire executive government being in the hands of commissioners appointed by Congress; they recommend legislation and ap¬ propriations to the latter, which in turn con¬ sults them in the same matters. The govern¬ ment, though not appointed by popular vote, is nevertheless swayed by public opinion ; and so excellent that agitations for restoration of suf¬ frage meet no support. The judiciary of the District dates from 1801. _

Population. — 1800: Washington, 8,144; Alexandria, 5,949. 1810: Washington, 15,471;

Alexandria, 8,552. 1820: Washington, 23,336;

Alexandria, 9,703. 1830: Washington, 30,261;

Alexandria, 9,573. 1840: Washington, 33,745;

Alexandria, 9,967. 1850: Washington, 51,687;

1860 (pme), 75,080; 1870 (same), 131,700; 1880 (District of Columbia), 177,624; 1890 (same), 230,392; 1900 (same), 278,718, of whom 218,196 were in Washington proper and 14,549 in Georgetown. Of these, 20,119 only were for¬ eign born; but 87,186

were colored; (1910), 331,069. In 1913 the population was (police census), 353,297. There was in 1913 a very small foreign-born population, but the negro element was large — 98,144. Pop. (1920) 437,571.

DISTRICT OF COLUMBIA, Courts of.

See Court.

DISTRICT COURTS. See Court.

DISTRICTS, Rural Administrative, the

term applied to rural districts other than county, council, town, borough, village and school dis¬ tricts. These minor rural units include elec¬ tion, fire, water, health, road, poor and other districts. In general, they are unsatisfactory, involving crossing and recrossing of district lines and overlapping of authority. The prin¬ ciple of the circumscribed district has been used to restrict college students from voting in col¬ lege towns. See County; County Govern¬ ment; Municipal Government.

DISTURBANCE, at common law, the offense of violating an incorporeal property right, such as a profit, or a public right in the land of another party. Such rights have no possession of right and are not protected by actions of trespass but by appropriate proceed¬ ings against a disturbance by the owner of the land. The forms of the offense are numerous, depending upon the nature of the right involved. See Easement; Nuisance; Trespass.

DISTURBANCE OF PUBLIC WOR¬ SHIP, a modern offense, defined by statute, which in America has superseded the common-law offense of brawling in church. It consists in any wilful interference, by word or deed,

DISTRICT OF COLUMBIA

1 Soldiers' Home

2 Falls of the Potomac

'• - ■^v'^'- '■ •'. •'■' '- Itef?

-S Sr^:

1 -

V\ >

'•. ■? ■ i

" T 'i| y

t ' ■• j - • ■'

■ •» •

■'j.^

' t 'fc'i ;

. *V-

*

’ i’<

k

I - 5-1 : * i f/ .**.

■ > %\

-J-, .‘/*fci .,. < f-

. t ‘ IM •■. ■ . ■ 1*^ . « ■ i * ■•-

•I * ^ . , • ’W..’^/’*’/ • ‘ i ■

■■■■■ ** •*« ” . j /.

ii”

}

■…■ ** ‘»,

• i ;

r.

/ -I .

ff;V;r:

n ’/-

‘ 7, i ‘ I

*■’ ■’• A ‘ ; i … ■ ■■’■. ■; ■

» A Vi‘ V , .♦ -i”

_ - i‘ ^ •■ . v« ‘ ^•

/ .»

TOf • » ’k* • .«J» ^_ ’ .• 1/ *. t ‘ ■• k « _ •! »

’■ …, ‘;’. ■ .r. ■’ “ ‘ l.‘M -

f”. L } , ^ ., ■ “if’ ‘ * ‘ ’. *A /•’..»’* -it ^ i J-l f ‘C* > • •’ 1” - i

■ ■/ .» i .-1- . ■ ■• : . ,■(.• ,

> ’^‘V . ■.•■■■• ‘ ‘- • ■ *V’* ••’■ - ■■ ‘•< ■•. - -M - -

V —O-*.. • ^r— . - ^ -H -

_ f ‘»’• .‘v- … ‘.; t.” -V • - … ., *‘in.!..* . » .. .- . *.t;JB .if*.i=i_ ^

im

.V

w-

‘k ■

i’K

‘ ►

• k

4

J-X *

f

* ‘r

• ‘l

i;M

tl ˆ

rˆ«\ /£?’ ‘ itv M .V*: . faF - •” ■. Vfc M ˆ • ” - 4 U Jˆl li

frv . ” >r,.

♦ .‘ii ■ ‘.‘7ˆ’-i‘ ‘l V.> .I. .’ . »v’ ˆ , .. *• “■ /V.-t’,-‘

•#’ Vˆ’ -‘V*’ ˆ’; ■i-‘ -*‘r rˆvrˆ ‘.‘i

„-C ■•■‘>-‘ . - I-,..

M’IASSS/ . ‘ ■■ -v.’ˆk’Ls . ‘ i’). . r. • *• ‘, /< ■ • .

IHBIk • lriˆ_ ‘*■’■* ‘ ■

I* Ik 9* ;•••■ •‘i-

.’, - ”ˆ’ ’ •” ‘” ‘1 *r’f i-* •

I . ‘; ‘L ” ’ s T ■ . .■ .-

,«i ˆ ■- ‘ ■(. >’ ” -.

- v;- ‘■ ’UFte,

% 4 • ►

f

■■■ > •’ f, , . ./

* /.

.- , « .i I ?

• 4 ■ ■-fr • - ►Jll ‘

‘■■ “- ^ ‘ ■V’-’V

-‘ . ■ . .*■’

- - ^. • ‘.f .’ ^ ^aiKm ‘ V,.

i .

K

■‘ > -4

‘.*’ A

\ \

a

r^;.

Ti1 -* ? ■•’.

■C

I V‘g. • .^-k ♦ • ■ ^

“’.I’ ‘ ; ^i.

*

‘ - ‘4

“f

#4’ .“V

1

•h^

\ “A

‘ ■■ ‘ ^ ■ X a:’”

V ’■ ; v*’.’ , V^l:.’

. ‘• 4.’ 4 ’. J • i ‘ . • •’

/ , ‘ . - , • ‘M ■: .•*• • ■ • ‘ . ‘

{ J A ‘“V !’ V -

l‘. ‘.i

; ■- ■ ‘■”■fe ■’ “^l,.”. >

» f « ‘ • ♦ • » t* ■’* A > ^

I- » ■ ■ . • : ‘ k V • •

. - ■’

■ ••«■ < ■■ ■ . •

4 ’ •

. ‘i.-*

with the good order of persons assembled for religious worship. It may be committed by a person within the place of worship or by noisy conduct on the outside. It is a misdemeanor and is punished by fine or imprisonment, or both. See Nuisance.

DISTYLE, in classic architecture, a com¬ position showing two columns in front.

DISUSE. It is familiar knowledge that continued lack of use of any particular muscles in our body by any one of us tends to make these muscles flabby and weak; in a word, these disused muscles tend to degenerate. This is not only true of muscles but of many other tissues and organs, and is not only true of parts of our body, but of body parts of other animals.

It was largely on the basis of a knowledge of this fact, and of the other related one, that muscles and most other body parts which are much used become larger and better developed, and of an assumption as a further fact that these changes in the structure and functioning of the parts of an individual acquired during the individual's lifetime through use and dis¬ use, are directly inherited by the offspring of the individual, that Lamarck founded his famous theory of evolution. See articles Evolution, History of and Evolution, Theories of.

Many animals that live in dark caves, or at great depths in the sea. or in underground burrows, have rudimentary eyes or no eyes at all, although their nearest relations above ground have well-developed eyes. Species or races of winged animals that have given up, or are giving up, flying, under conditions of do¬ mestication, where flying is no longer necessary, as in the case of the barnyard fowl and the moths of the silkworm, have degenerating wings. In man there is a host of rudimentary, or better, degenerating, organs, such as the vermiform appendix, the skin muscles of the scalp, the wisdom teeth, etc., whose functions are no longer necessary to us, and which are consequently in a state of developing back¬ ward toward total disappearance rather than forward toward better condition. Lamarck's explanation of this is that although these organs were useful to our ancestors of far remote times, they have gradually become less needed • because of changing conditions, and hence have, through disuse and the inheritance of the degenerating effects of this disuse, come gradually to be rudimentary in the species. Oc¬ casionally an individual is met who can use the skin muscles of scalp or the muscles of his outer ears. He represents an ancestral con¬ dition.

Lamarck's explanation is simple : It is plau¬ sible. But it lacks an all-important element, and that is the proof of the assumption that characters or changes, acquired by an individual in his lifetime, due to use or disuse, or the influence of the environment, are actually in¬ herited. As a matter of fact, this has not only not l)een proved, but has been apparently disproved. Darwin, who, many years after Lamarck's theory was offered, proposed another explana¬ tion to account for rudimentary or degenerat¬ ing organs, accepted in some measure Lamarck's assumption of the inheritance of acquired char¬ acters. But

the Neo-Darwinians, coming after Darwin, rejected Lamarck's assumption en¬

tirely, maintaining that there was no evidence to support it and much evidence against it. It was August Weismann, an eminent German evolutionist, who took the lead in the attack and final practical overthrow of Lamarck's evo¬ lution explanation in general and of his ex¬ planation of degenerating organs in particular.

The other principal explanation that has been offered of the presence in animal bodies of rudimentary organs and their increasing degeneration even to actual disappearance is in¬ cluded in Darwin's general explanation of evolu¬ tion, namely his theory of natural selection, based upon a rigorous struggle for existence and survival of the fittest.

If an animal species, or a group of indi¬ viduals of the species, begins to change its habits of life so as to render less important, or even comparatively useless, certain organs of the body, as by the adoption of a cave life which renders seeing a useless function, there will be no advantage to those individuals born with better eyes and no disadvantage to those born with poorer ones. Hence, there will be no selection in the struggle for existence as be¬ tween these two kinds of individuals, and both kinds can persist and produce young like them¬ selves; or they can mate together and produce young with poorer eyes than the better-eyed parent with no disadavantage to the species or part of the species in the caves. Thus a de¬ generation of eyes and eyesight may be initiated by this miscellaneous mating or panmixia, and may be continued even to a nearly or quite complete loss of eyes by continued panmixia.

It is even conceivable that in the case of cer¬ tain organs no longer needed because of a change of habits of the species, the individuals retaining the organ in full size and develop¬ ment might be handicapped in the struggle for existence through the necessity of its being necessary to divert some of their food and air to the nutrition of these useless parts, while others born with the parts smaller or less de¬ veloped would have a certain useless expendi¬ ture of nutrition on the unnecessary parts. These latter individuals might be assumed there¬ fore to have a little advantage in the bitter struggle for existence by being able to use more of their food and oxygen for the other more important parts of the body.

This sounds rather far fetched, but it has been seriously proposed by extreme Darwinians, who assume that the struggle for existence is so rigorous that even the most minute advantage can turn the scale for or against any individual or species.

Herbert Spencer tried to reduce this posi¬ tion to an absurdity by taking as an example the tiny rudimentary bones of the whale's limbs. These bones are but a few inches long in a body that may be a hundred feet long, and of correspondingly enormous mass. How much food is saved to the whale, asks Spencer, that finds itself born with leg-bones a few milli¬ meters shorter than those in another whale? Can anyone of sane mind conceive or admit of a life-and-death determining advantage in this minute difference in nutritive necessity?

So the situation to-day as regards a suffi¬ cient explanation of the actual evolutionary re¬ sults of disuse and the actual causes of the de¬ generation in species of disused parts, result¬ ing in so-called rudimentary or vestigial organs,

is far from satisfactory. We know that disuse of parts by any individual results in degenera¬ tion of such parts in the particular individual concerned, but how it can result in an inherited and increasing degeneration or loss of the parts throughout the species is not clear.

The proponents of the newest theory offered to explain evolution, the mutations theory, have no more satisfactory explanation of the results of disuse, as these results affect the species, than have those who cling to the older evolution theories. Their theory would simply explain the occasional sudden appearance of an indi¬ vidual, or of several individuals in any species, with any one or several organs in undeveloped or rudimentary condition, and this congenital character could be handed on by inheritance. But original use or disuse would have nothing to do with the sudden appearance of the new condition of the organ, nor would the new condition appear necessarily in an

animal or species in which it would be an advantage.

Of all the explanations of the evolutionary results of disuse, the Lamarckian one is the simplest, the most rational and most plausible. But it can have no real standing until it can be proved that acquired characters, or certain cate¬ gories of them, including the changes produced in the individual by disuse, can be handed down to the next generation by inheritance.

Vernon Kellogg,

Professor of Entomology, Leland Stanford

U niversity.

DITCH. (1) A trench or fosse on the out¬ side of a fortification or earthwork, serving as an obstacle to the assailant and furnishing earth (deblai) for the parapet (remblai). It is from 90 feet to 150 feet broad, in regular fortifica¬ tions, and 10 to 12 feet deep below the natural level of the ground. The fosse around a Roman encampment was usually nine feet broad and seven feet deep ; but if an attack was appre¬ hended it was made 13 feet wide and 12 feet deep. The agger, or parapet, of the encamp¬ ment was raised from the earth to the fosse, and was crowned with a row of sharp stakes. (2) In agriculture, a trench usually made along the sides of fields, so that all the drains may be led into it, or along the top of a field so as to divert surface water. Sometimes a double ditch is adopted, and a hedge planted between. In arable land, however, since the introduction of pipes, ditches have largely given place to under¬ ground drains.

DITCHFIELD, Peter Hampson, English author and clergyman : b. Westhoughton, Lan¬ cashire, 20 April 1854. He was educated at Oriel College, Oxford, entered the Anglican priesthood, and has been rector of Barkham, Berkshire, from 1886. He is a prolific writer, especially in the field of ecclesiastical and gen¬ eral antiquities; wrote in 10 volumes ˆThe Na¬ tional Churches Seriesˆ (1891-97) ; contributed the volumes on Buckinghamshire, Oxford, Kent, London, Lancashire and Cheshire to the ˆMe¬ morials of County History Series,ˆ and acted as general editor.

DITHYRAMBUS, or DITHYRAMB, in

Greek literature, a form of lyric or poem sung in honor of the god Dionysus (Bacchus) at his festivals. Since these festivals were celebrated with all the extravagance which would please the god of wine, the dithyrambs employed in his

worship naturally breathed the same frenzy. The character of the dithyrambus therefore re¬ quires bold images and lofty periods. The more apparent disorder it contains, the more it partakes of the fire of intoxication, the better it sustains the true dithyrambic character. In the wild Phrygian music it was sung in choirs. Arion of Methymne, in the island of Lesbos, was the first to give a regular choral form to it, about 625 b.c. Lasos of Hermione is said to have been the first who introduced dithyrambic contests into the public games. It was out of the mournful dithyrambic songs — later intro¬ duced — that ancient Greek tragedy took its rise. The expression dithyrambic poem denotes, also, any lyric poem filled with a wild and impetuous enthusiasm, as is the case with many odes of Pindar. ˆAlexander's Feastˆ by Dryden (1698) is the best example of the dithyramb in English.

DITMERS, Raymond Lee, American nat¬ uralist : b. Newark, N. J., 20 June 1876. He was graduated at the Barnard Military Acad¬ emy in 1891. He spent five years as assistant curator of entomology at the American Museum of Natural History, was court reporter on the New York Tunes in 1898-99, and entered the New York Zoological Park as curator of rep¬ tiles in 1899, and since 1910 has been in charge of the department of mammals. He is a Fellow of the New York Zoological Society and corre¬ sponding member of the Zoological Society of London. He is author of ˆSnakes Found within Fifty Miles of New York Cityˆ ; ˆThe Reptile Bookˆ (1907) ; Reptiles of the World' (1909), two valuable contributions in their fields ; also numerous articles on entomology and herpe¬ tology.

DITMARSH, or DITMARSHES (Ger. Dithmarschen, ˆffhe German marshes"), a dis¬ trict of Holstein in Germany, along the German Ocean, between the mouths of the Elbe and the Eider, so little raised above the sea as to re¬ quire the protection of strong embankments. Area, 531 square miles. Originally a part of Saxony, and from 1474-1559 practically an in¬ dependent state, it became part of Holstein and Denmark, and in 1866 was annexed to Prussia. Pop. 96,373.

DITTANY {Dictamnus) , a genus of plants belonging to the rue family (Rutacece) . The members of this genus are beautiful plants, with alternate compound imparipinnate leaves. Their flowers are large and white or purplish in color. They are arranged in racemes, the peduncles and pedicels of which secrete in numerous more or less prominent glands the essential oil which gives these plants their odor. Their roots were formerly used in medicine ; their flowers fur¬ nish

the perfumer with a fragrant distilled water. The most common species is Dictam-nns albiis, the leaves of which greatly resemble those of the ash. It is said that in hot weather the odoriferous particles thrown off from this plant form an inflammable atmosphere around it • and if a_ lighted candle be brought near the plant, especially in a time of drought, there is a burst of flame around the plant. The dittany of the United States (Ctmila mariana) belongs to the mint family (Menthacecc) and is the only one of the 15 species of the genus native in America. It is an exceedingly aromatic herb,

with purple-pink flowers arrayed in loose clusters. It is found from New York to Flor¬ ida and west to western Georgia and Ohio. The dittany of Crete is Origanum dictamnus, and the bastard dittany is a species of Marru-bium (hoarhound), both labiates.

DITTE, det, Alfred, French chemist: b. Rennes (Isle-et-Vilaine), 20 Oct. 1843; d. 1908. He has made very extensive original investi¬ gations in chernistry. He has written exten¬ sively in magazines and reviews on a variety of scientific subjects which have received official recognition and commendation from the Insti¬ tute of which he was elected member in 1897. He is a commander of the Legion of Honor and received numerous other decorations for his research work and discoveries in the physi¬ cal sciences.

DITTENBERGER, Wilhelm, German classical scholar : b. Heidelberg, 1840. He re¬ ceived his education at Jena and Gottingen. In 1874 he became professor of classical phi¬ lology at the University of Halle. He has pub¬ lished ˆDe Ephebis Atticisˆ (1863) ; Hnscrip-tions Atticse ˆtatis Romanaeˆ (1878-82; Vol. HI of the original edition of ˆCorpus Inscriptionum Atticarum,> published by the Berlin Academy) ; ˆSylloge Inscriptionum Grsecarumˆ (1883; 2d ed., 3 vols., 1898-1901); ˆCorpus Inscriptionum Graecarum Graeciae Septentrionalisˆ (1892) ; ˆOrientis Graeci Inscriptiones Selectae> (2 vols., Leipzig 1903-05). Consult Larfeld, ‘ˆGriechische Epigraphikˆ (Munich

1914).

DITTERS VON DITTERSDORF, Karl,

German musical composer: b. Vienna, 2 Nov. 1739; d. 31 Oct. 1799. He was a brilliant violinist and accompanied Gluck to Italy in 1761. He is particularly distinguished in comic compositions and perhaps unrivaled in this branch of music among the German composers. Several of his operas were represented with great applause even in Italy: ˆDoktor und Apotheker ˆ (1786), which still holds the stage; ˆBetrug durch Aberglauben > ; and ˆDie Liebe im Irrenhause,ˆ were among the rnost successful of these. He also acquired considerable repu¬ tation by his oratorio ˆ Esther,ˆ which secured his elevation to a place among the Austrian nobility. On his deathbed he dictated his autobiography to his son.

DITTO N, Humphrey, English mathemati¬ cian: b. Salisbury, 29 May 1675; d. 15 Oct. 1715. He was for a time a nonconformist clergyman. Through Sir Isaac Newton he received the appointment of mathematical master at Christ's Hospital, which appointment he retained till his death. In 1714, in conjunction with Whiston, he published a new method for finding the lon¬ gitude at sea, as well as on land. He was the author of several mathematical works, the prin¬ cipal of which are the following: ˆGeneral Laws of Nature of Motion) (1705); Hnstitu-tion of Fluxions) (1706) ; ˆTreatise of Per¬ spective, Demonstrative and Practical) (1712) ; 'New Law of Fluids) (1714). He also wrote a ˆDiscourse Concerning the Resurrection of Jesus Christ) (1712), which was afterward translated into several languages.

DIU, de'oo, an island of India, belonging to the Portuguese since a.d. 1535, off the south extremity of the peninsula of Kathiawar, in the

Bombay presidency. Area, 20 square miles. On a point on the east end of the island is the fortified town of Diu, once an opulent city of 50,000 inhabitants, now dwindled to insig¬ nificance. Fishing is the chief employment of its inhabitants ; it has a small but excellent har¬ bor and a Jesuit's college, erected in 1601, now a cathedral. Pop. 14,614.

DIURETICS, drugs used to increase the elimination of urine. Such diuretics may be di¬ rect, in that they affect the renal epithelium, or indirect, in that they increase the blood pres¬ sure within the kidney and thus increase the urine elimination. This is largely an artificial

classification, since it would seem that urine is always a true secretion and not a filtrate, and the renal epithelium must always be involved in the process of manufacture. Still it is a sub¬ division that has received wide recognition. Diuretics are frequently used in a number of heart, lung and kidney diseases ; because in the normal elimination of urine certain catabolic products are cast off from the body in the urine. If they are retained, however, they give rise to various degrees of intoxication, which may be even fatal. Thus in certain heart diseases, either from insufficient pressure or from accompany¬ ing disease of the blood vessels, the elimination of the ordinary amount of urinary solids may be insufficient and result in poisoning. Hence diuretics, by increasing the elimination of urine, increases the output of these poisonous prod¬ ucts. In all patients for whom diuretics are useful, certain concomitant drugs are of benefit, those namely that empty the bowels freely and those that increase the elimination of perspira¬ tion. Of the numerous diuretics the saline salts of potassium, sodium, lithium, calcium, magnesium, the heart tonics, such as digitalis, adonis, caffeine, strophanthus convallaria, theo¬ bromine, are most frequently employed. To this list calomel, copaiba, cubebs, juniper, oil of sandal and other irritating diuretics might be added. Injections of hot water into the rectum cause a pronounced diuresis, and this method is now recognized to be one of the best modes of inducing an increased elimination of urine.

DIVAN. (1) With the Turks it was for long the highest council of state; the Turkish ministry. Every pasha has also a divan. (2) In the large mansions of the rich in Turkey a divan signifies a large hall for the reception of visitors, which communicates with a number of ante-chambers surrounding it and which con¬ tains sofas placed round the walls, often adorned with costly tapestry and richly em¬ broidered cushions. (3) Divan, with the Arabs, Persians and Turks, is used to denote a com¬ plete collection of lyric poems, which they call ghazals and through each of which one single rhyme extends : they never exceed the length of 14 strophes. Such a collection is complete if there are as many divisions as there are let¬ ters in the alphabet of the respective languages ; and each division contains at least one poem, the rhymes of which terminate with the letter under which the division falls ; some letters are excluded, as few or no words end in them. Goethe applied this name to a collection of poems by himself, written in the eastern fashion. (4) The word is also applied to a soft-cushioned seat for the accommodation of several persons.

DIVER, a name properly restricted in or¬ nithology to birds of the family Colymbidce, but applied with little discrimination to vari¬ ous other water-birds of similar habits. The compact, depressed body, powerful, posteriorly placed legs with fully webbed feet, the long sinuous neck and stout acute bill admirably adapt them for aquatic life and the pursuit of fish. They are strong flyers, but on the land are awkward and stand nearly upright. The plum¬ age is peculiarly compact and resistant to water. Three species are well known in the United States. The greath northern diver or loon, Urinator (Colymbus) imber, is a large bird, sometimes attaining a length of three feet. Above the plumage is a lustrous black with green and purple metallic reflections and marked with numerous white spots and streaks ; below, a nearly pure white. The loon is distributed throughout the entire northern hemisphere on both fresh and salt waters, and during the win¬ ter is found in all parts of the United States, in the northernmost of which it breeds, building its nest among the rushes near or in the water, and laying as a rule but two eggs. It winters from the southern limit of its breeding range to the Gulf of Mexico. The loon is best known by the extreme facility with which it dives at the flash of a gun, thus escaping injury while the ball speeds harmlessly overhead, and for its wild resonant cry, about which many traditions and myths have arisen. It can remain several minutes under water and swim 100 yards be¬ fore rising to the surface for air.

The red-throated diver (U. lumme or C. septentrionalis) is eight or nine inches shorter than the loon, of a rusty black, with profuse small white spots above, white below, with a large distinct chestnut-colored patch on the lower part of the throat. It is distributed like the loon, but is rather more northern, and is found in the United States in the winter only. The black-throated diver (U. arcticus) is inter¬ mediate between the other two species, from which it is distinguished by a blue-black neck-patch. It is a high northern species and is represented within the limits of the United States chiefly by a western variety which occurs abundantly on the Pacific coast in winter. Con¬ sult Baird, Brown and Ridgway, ˆWater Birdsˆ (1884) ; Elliot, <The Wild Fowl of the United Statesˆ (1898).

DIVES, dl’vez (Lat. ˆTich*), the name pop¬ ularly adopted from the Vulgate translation for the ®rich manˆˆ in the parable of the rich man

and Lazarus, Luke xvi.

DIVI-DIVI, de've-deve, LIBI-DIBI, or LIBI-DIVI, the astringent bean-pods of Ccusal-pinia coriaria, a tree which grows in northern South America, in the Antilles and in Mexico, and a member of the family which yields sapan, brazil and other red woods. The pods are about one inch broad and three inches long, but are generally bent or curled up and tend to scale off on the outside. They have a pale-brown color with a tinge of yellow ; sometimes they are spotted and black and then they are not so good. They are very rich in tannin (especially in the pod), good samples containing as much as 40 to 5() per cent and form one of the best tanning materials. They are largely used in calico-printing for blacks and dark shades.

DIVIDE, The Great, or THE CONTI¬ NENTAL DIVIDE, names given to an ele¬ vated ridge of land in the United States where occurs the parting of the waters which flow to the Atlantic and the Pacific oceans. The name, ^^The Great Divide,^^ is now commonly applied to a broader extent of country than the Con¬ tinental Divide or watershed proper. It com¬ prises that region in Montana and Wyoming wherein so many of the large rivers of the United States have their source, and which pos¬ sesses within itself nearly all the characteristics of a continent. The arrangement of the ele¬ vated land masses in relation to the valleys and plateaus is continental ; the temperature and vegetation vary almost from that of the tropics to the frigid zones ; its mineral wealth is enor¬ mous ; and its wild animals and great varieties of fish make it the paradise of the hunter and the angler. Its waters flow to the Gulf, the Atlantic and the Pacific oceans, and streams rise on its eastern borderland whose waters flow to the Arctic Ocean. It is the natural geographical centre of North America. The term ^^Divide® is used, especially in North America, as synonymous with watershed.

DIVIDEND. (1) In arithmetic, a number to be divided by another; thus, if 20 is to be divided by 4, 20 is the dividend and 4 the divisor. (2) In commerce the fractional part of the assets of a bankrupt which is paid to the creditor in proportion to the amount of the debt which he has proved against the estate of the debtor. (3) The sum periodically paid as in¬ terest on loans, debentures, etc., or distributed as profit on the capital of a railway or other company. The sum to be divided is broken up into as many portions as there are bondholders or shareholders to claim them, and the frac¬ tional part falling to each holder bears the same proportion to the whole dividend as the amount

of stock or shares he holds bears to the whole capital. Dividends cannot be paid out of the capital of a public company. Preference shares in a company are those entitled to a fixed rate of interest, the interest on which must be paid before the ordinary shareholders can get any return. The declaration of a dividend is one of the powers of directors, but must be confirmed by a meeting of shareholders. In England, dividends must be paid in cash ; in the United States they not infrequently take the form of stock bonds or scrip. When the profits of a company are so large as to invite hostile com¬ ment on the part of that section of the public which it serves, an increase of nominal capital may be deemed politic and carried through by the issue of pro rata stock dividend.

DIVIDENDS. See Corporations, Legal.

DIVIDING ENGINE, a machine for mark¬ ing fine lines at regular intervals by means of a diamond point or other sharp edge, on the scales of scientific, mathematical or other in-stmments, and also for dividing a length into aliquot parts as in the making of metre rods. Another use to which they are put is the mak¬ ing of diffraction gratings, in which a very great number of lines are cut exactly parallel and at very small intervals apart. Joseph von Fraunhofer was the first to make the instru¬ ment for ruling gratings, but others soon were made by Michelson, Rowland and Rutherford.

The same general principle, however, is found in all. The machine consists of a cylinder with a screw thread and its ends held in yokes, while it carries a large nut, which is held on ways parallel to the screw. When the screw is turned by a crank or otherwise, the nut advances or recedes. The cutting edge is set at a point above the screw so that it makes a line at right angles to the axis of the screw cylinder. The piece on whose surface the rul¬ ings are to be made is attached to the nut. A line is then made by' the cutting edge; the cylinder is turned through a certain fraction of a complete revolution, thus carrying the nut and the surface forward a small distance, when a second line is ruled; and so on until the whole surface of the piece is marked. All modern machines are automatic and embody various re¬ finements of design and construction. See Screw and consult ˆThe Collected Papers of Henry A. Rowlandˆ (Baltimore 1902), Physical Review (Vol. XXX, No. 4).

DIVIDING RANGE, Great, an Australian chain of mountains, forming the watershed be¬ tween the rivers flowing into the Pacific and those running westward. It stretches from the north of Queensland to the south of New South Wales and westward through Victoria. The Darling River rises in the range.

DIVINA COMMEDIA, de-vena kom-ma'de-a. See Dante; Divine Comedy.

DIVINATION (Lat. divinatio), the art or act of fortelling future events, or discovering things secret or obscure, by the aid of superior beings, or by other than human means. The deri¬ vation of the word indicates a belief that omens are sent by divine interposition. Natural divina¬ tion was anciently thought to come by divine afflatus ; artificial divination, by signs, ornens, *etc.* At an early time divination formed a regu¬ lar science, intimately allied with religion and furnished with rules and regulations. Even though divination did not have its origin in fraud, it became a fruitful source of imposition. Moses prohibited divination expressly (Deut. xviii, 11). Saul expelled ˆhhose that had famil¬ iar spirits, and the wizards,® from his kingdom ; yet he was weak enough to consult the famous witch of Endor shortly before the

battle in which he fell. The Egyptians and Greeks had their oracles. With the Romans divination and witchcraft were brought into a kind of system, and constituted part of their religion. (See Auguries and Auspices). The ancient Ger¬ mans had consecrated white horses, from whose snorting and neighing they drew favorable or unfavorable signs. They also followed the guidance of prophetesses, whom they called Al-runes. Many Christians, from the period of the 3d century, adopted the series biblicce or sortes sanctorum — a mode of judging of the future by opening the Scriptures at random, and forming an opinion from the passage on which the eye happened to fall. (See Bibliomancy). In early times Virgil's .(Eneid was also used for the same purpose {sortes Virgiliance) . All the ancient Asiatic tribes had modes of divination; and sorcerers are common among the Indians of America. Many of the old forms of divina¬ tion continue to be practised in Christian na¬ tions at the present day, sometimes from super¬ stition, sometimes for amusement, gypsy for¬

tune-tellers being often resorted to. There are many names for the different modes of prog¬ nosticating the future by means of the various appearances which nature and art present, from the revolutions of the stars down to the grounds of a coffee-cup. The following by no means exhaust the list, as the different modes of divination that have been practised are almost endless: Aeromancy, divination by air; aleuro-mancy, by flour ; arithmomancy, by numbers ; bibliomancy, by the Bible; capnomancy, by smoke; catoptromancy, by mirrors; cheiro¬ mancy, by the palm ; cleidomancy, by keys ; ciromancy, by wax ; geomancy, by the earth ; hepatoscopy, by the liver of animals ; hydromancy, by water; lampadomancy, by lamps ; necromancy, by corpses ; nephelo-mancy, by clouds ; oneiromancy, by dreams ; pyromancy, by fire; rhabdomancy, by rods. The works on this subject are very numer¬ ous, including the mystical productions of the East, the Cabala (q.v.)), the treatises on astrology, witchcraft, etc., in the Middle Ages, and the studies of more recent writers. See Astrology ; Black Art ; Cup, Divination by Clairvoyance; Oracle; Palmistry; Witch¬ craft.

Bibliography. — Bossier, ˆDocuments assyri-ens relatifs aux presagesˆ (Paris 1894) ; Bouche-Leclercq, ˆHistoire de la divination dans I'antiquite (4 vols., Paris 1882) ; Cicero, ˆDe Divinationeˆ ; Daremberg and Saglio. ˆDictionnaire des antiquitesˆ ; Ennemoser, ˆHis¬ tory of'Magicˆ; Jung-Stilling, ˆTheorie der Geisterkunde> ; Holliday, ˆGreek Divinationˆ (New York 1913) ; Hoffman, ˆDas Orakelwesen im Alterthumˆ (Stuttgart 1877) ; Konig, ˆDas Orakelwesen im Alterthumˆ

(Crefeld 1871) ; Maury, ˆHistoire des religions de la Grece antique : La divination et les oracles> (Paris 1857) ; Pauly, ˆRealencyclopadieˆ (Vol. II, Stuttgart 1842) ; Plutarch, ˆDe Pythiae Oraculisˆ ; id., ˆDe Defectu Oraculorum> ; Fontaine, ˆDe Divinationum Origine et Progressuˆ (Rostock 1867) ; Schneider, ˆDie Divina-tionen der Alten mit besonderer Riicksicht auf die Augurien der Romerˆ (Kolthen 1862).

DIVINE COMEDY, The. When Dante was nine years old he for the first time saw Beatrice, the daughter of Messer Foleo Porti-nari and Madonna Gilla Caponsacchi. She was his junior by one jˆear; and Boccaccio says that he ˆreceived her fair image into his heart with such affection that from that day forth as long as he lived it never left him.® Nine years elapsed before she spoke to him again, although he tried many times to see her. It is believed that she was married, while still a young girl, to Messer Simone de Bardi. She died in June, 1290, in her 23d year, and Dante was incon¬ solable. In memory of her, that ˆblessed Beatrice, who lived in heaven with the angels and on earth with his soul,® he wrote, Ea Vita Nuovaˆ (The New Life), which is a mystical account of his passion, interspersed with many sonnets and canzoni, he having, as he says, dis¬ covered *the art of saying words in rime.® The book ends with this sentence: ˆˆTo me ap¬ peared a wonderful vision, wherein I saw things which made me resolve to say no more of this Blessed One until I could more worthily descant upon her. And to attain this, I study to the utmost of my powers, as she truly

knows ; so that, if it shall be pleasing to Him through whom all things live, that my life shall be prolonged for some years, I hope to say of her what has never been said of any other woman.ˆˆ The work to which he thus promised to dedicate his life was ˆLa Divina Commedia.ˆ He himself called it simply ˆˆThe Cornedy,ˆˆ the epithet ®Divineˆˆ not having been applied to the poem until 1555, in an edition brought out by Dolce. In the text it is mentioned as ˆhl sacro poema®. Dante, in a letter to Can Grande della Scala, says: ®The title of the book is, ˆHere begins the Comedy of Dante Alighieri, Floren¬ tine by birth not by character.ˆ To understand this one must know that ®Comedia,ˆˆ derived from conins (village) and oda (song) means about the same as village-song. And Comedy is a sort of poetic narrative, different from any other. As regards its matter, it differs from tragedy, since the latter is at first pleasing and quiet; at the end, foul and horrible… .

Whereas comedy begins with some degree of adversity but ends prosperously… . In the

same way tragedy and comedy differ in style : the one being lofty and sublime, the other un¬ studied and popular… . Whence it is evi¬

dent why this work is called a Comedy : for if one regard the matter thereof it is at first hor¬ rible and foul, being in Hell ; at the end it is prosperous, desirable and grateful, since it is in Paradise. If one regard the style, it is un¬ studied and popular, because it is in the vernac¬ ular, in which even ordinary women speak to one another.® He was indeed, for a time, criti¬ cized for not having composed it in Latin, which during the Middle Ages was the polite lan¬ guage.

Like many of the other great works of liter¬ ature it may be interpreted in two ways : its pro¬ tagonist may be conceived as either Dante him¬ self, or as the human soul, the type of sinful man. This protagonist struggles first unaided to escape from the dangers of a wild, tangled and frightful forest and to climb the mountain of virtue, or of salvation, which he is prevented from doing by three symbolic wild beasts ■ — a nimble-footed, sly panther, a lion with head held high and ravenously hungry, and a lean, fierce wolf. He retreats into the depths of the forest and there becomes aware of one who ®by reason of long silence seemed feeble.® It is the shade of Virgil come

to show him the right way to escape the wild beasts and to attain to ®the delectable mountain, which is the beginning and the source of all joy.® There are several ways of interpreting the symbolism of this intro¬ ductory canto. The obscure forest in which Dante, ®in the midst of the road of this our life® (that is, when he has just reached the age of 35) in May 1365 — has wandered in sleep is the world, or sin. The panther is ˆluxury,® ˆdissolute pleasure,® ˆincontinent appetite,® or, with a political significance, is the city of Florence, which had persecuted the poet, con¬ demning him to death, with confiscation of his property, because as a Ghibelline he favored the Emperor and not the Pope. The lion is ˆˆpride® or ˆTestial violence,® or may be regarded as France. The greedy wolf taken subjectively is ˆˆavarice,® ˆˆgreed,® ˆmaterialism® ; taken ob¬ jectively it may refer to Dante's enemies, the Neri (the Guelfs or Black party) ; or, taken politically, it may mean Rome. Dante himself gives no clue to this symbolism, but leaves it

to the reader to interpret. Virgil typifies Man's Reason, and therefore Dante hails him in a double sense as his ˆTeacher and Leader,® the poet from whom he has acquired the beautiful style which has brought him fame. Virgil prom¬ ises to conduct him through the eternal place where he will hear groans of despair, where he will see the spirits in torment. Then they will ascend to the place of those that are content to dwell in fire, because they hope, after purifi¬ cation, to attain the joys of the Blessed. Having had experiences of Hell and Purgatory, Dante, still in the flesh, will be admitted to Paradise, there to be guided by a spirit more worthy, since Virgil (or Human Reason) had not been obedient to the laws of that Emperor who reigns over the universe. This more worthy spirit is Beatrice, typifying Man's spiritual Nature, the functions of which are Faith, Hope and Love. Dante, after some demur, is encouraged to fol¬ low, and with fear and trembling, begins the descent -into the Inferno. Over the gate is the famous inscription which ends with the words, ˆˆLeave all hope behind ye who enter here.® Hell is divided into nine ever-narrowing circles, the last, at the centre of the earth, a place where, surrounded by a fourfold ring of ice, Lucifer crushes in his three mouths Judas, Brutus and Cassius, the three arch-traitors of history. In the circles and their subdivisions all varieties of the seven cardinal sins still continue under the inevitable punishments inherent in them. They are inflicted by the symbolical creatures of Greek mythology — Charon, Minos, Cer¬ berus, the Centaurs, the Harpies and by the devils and other beings created by mediaeval theology, or else they are represented by physical analo¬ gies, such as fire, mud, filth, worms, pitch, ice. Dante

departed from the conception of Hell as depicted by his great contemporary, Thomas Aquinas, for he gives the sinners that had died in their sins, unrepentant, no room for remorse : lost souls, according to Dante's psychology, will to continue in the horrible state which they had chosen, while still alive, as their earthly environment ; they have no wish to escape ; and so forever suffer in the whirlwind of passion and lust, the mud and mire of gluttony, the falling flakes of flame and the desert sands of atheism, the cannibalism of treachery, the never-melting ice of the traitor. He lavishes all the awful symbolism of the Church to express the agony and hopelessness of Hell, and to each place he consigns with sardonic partisanship those that had been his personal or political enemies — popes and poets and teachers : a bit¬ ter revenge, unrelenting and horrible. At the vestibule of the Inferno he places Limbo where dwell those that had lived virtuous lives, such as Virgil himself, but without knowledge of Christianity. Here Dante is met by four tall shades : Homer, the sovereign poet ; Horace, the satirist; Ovid, who sang of the ancient mythol¬ ogy; and Lucan, the poet of the Pharsalia, forming the School of that Lord of most lofty Song, ˆ%ho soars above all as an eagle flies.® They salute him and with marks of honor accept him as the sixth of their august company. Here too he sees many folk with slow, grave eyes, of great authority. Among them he recognizes the heroes and worthies of pre-Christian days, philosophers and historians ; they experience in this underworld desire without hope bqt are not unhappy or subject to other punishmept. In the

Fifth Canto of the Inferno occurs the famous episode of Paolo and Francesca, occupying more than half of it — 69 lines — and since expanded by poets and dramatists, in many forms. The lines, ®There is no greater woe than in misery remembering the happy time,® is an almost literal translation from a Latin apothegm of Boethius. Dante here shows his sympathy with the sinners who died without chance for repent¬ ance, because their sin grew out of genuine love. He never shows sympathy where a sin was due to meanness or ill-will.

The material removed from the earth to make room for Hell was heaped up to form the Mountain of Purgatory, situated like an island in the ocean which, according to his cosmog¬ raphy, forms the under side of the earth. It is exactly antipodal to Jerusalem. Like the Hell, it consists of nine divisions. The first is the Ante-Purgatory where souls that had repented late were compelled to sojourn 30 times as long as they had been in a state of unrepentance. Here is the Valley of the Princes — rulers that had been negligent of salvation. Then come seven ever narrowing circles or ledges where the seven cardinal sins are purged. At the Fifth Ledge, Statius, the poet of the ˆThebaid,ˆ who happened to have been born and to have died in the first century of the Christian era, meets the two other poets and accompanies them, engaging them in charming conversation. On the top of the mountain is situated the Earthly Paradise. Here Virgil suddenly disappears, de¬ claring that henceforth his pupil's will is free, upright and sane ; henceforth he cannot go astray even though he follow his own impulses. In other words. Human Reason must give place to Divine guidance. There follows a scene of exquisite mystical symbolism. Beatrice appears and Dante confesses his dereliction from the Faith and is made to pass through the River Lethe, and to drink of it, whereby he forgets all his evil past ; then he enters the River Eunoe, ˆ"whereby henceforth he will remember only what is good, and is ready to mount with his new guide into Paradise. In the ˆPurgatory, ˆ as in the ˆHell,ˆ Dante departs from the teaching of Thomas Aquinas. Here repentant sinners have no desire to escape from the purging fire ; they rather throw themselves upon it, without regret, exult in it, realizing its effi¬ cacy in purifying them; they cherish hope and have

no fear.

The Paradise is also divided into nine spheres. According to Dante's cosmography the seven great planets revolve around the earth. With Beatrice he ascends in swift flight, first to the Sphere of Fire, pausing for a brief visit on the Moon, which is the abiding-place of those that were, by no fault of theirs, constrained to break their vows; thence to Mercury, to Venus, to the Sun, to Mars, to Jupiter, to Saturn, to the Starry Empyrean, to the Primum Mobile — the Crystalline Heaven, where around a point of dazzling light, symbolizing God, revolves a rain¬ bow ring in turn composed of nine orders : Seraphim, Cherubim, Thrones, Dominions, Vir¬ tues, Powers, Principalities, Archangels and Angels, in the sequence supposed to have been declared by Saint Paul, when he was snatched up into the highest heavens.

Dante and Beatrice are now about 6,000 miles above the earth, according to his calcula-fion, and have one more ascent to make — to

the Empyrean, which is pure light. Here Beatrice is taken from him, and in her place appears Saint Bernard who bids him look up¬ ward. There he beholds the Celestial Vision : the Holy Virgin amid thousands of jubilant angels with wings outspread, the hierarchy, in¬ cluding Beatrice, who is seated just below the ancient Rachel, who is her counterpart in the Old Testament regime, making a Sacred Rose, the circle divided into two parts, one consisting of the Saints of the ancient dispensation and of course complete, the other, as yet unfilled, the place of those who believed that Christ had already come. Even in these supernal realms Dante does not forget his mundane politics : he finds in the Empyrean a place for Emperor Henry VH, who was to bring about perpetual peace on earth, while he consigns to the third pit or den of the Eighth Circle of Hell the treacherous Pope, Clement V.

Throughout the three canticles are found multitudes of striking episodes, vivid descrip¬ tions, now realistic and revolting, now exquisite and beatific, discussions of philosophical, theo¬ logical and political topics, cameoed bits of his¬ tory and biography, innumerable similes, often much elaborated ; together, a vast array of recondite learning. Much of it is obscure, re¬ quiring in order to understand its meaning, an acquaintance with the history of Dante's time, with the mythology of antiquity, with the sym¬ bolism of mediaeval theology, with the works of the Church Fathers, particularly of Saint Thomas Aquinas, with the details of Dante's own life, his friends and enemies,

with the, geography of that Italy through which he wan¬ dered in exile, going ˆfiip and down others' stairs,® eating ˆˆthe bread that savors of salt.® Dante takes great pains to keep exact account of the time spent in his Dream — for it is a Dream, as he intimates in the 32d Canto of the ˆParadise. ˆ It begins on the evening before Good Friday, 24-25 March 1300. The First Canticle occupies four nights and three days ; the Second the same; Friday and Saturday are devoted to the marvels of the Nine Movable Heavens, and the poem ends on the 10th day.

The ˆ Comedy,ˆ while having the triple aspect of a political tract, a theological study of the Fate of Man and a personal relation, is above all a great work of art. It consists of three canticles each of 33 cantos, though the first has one extra as a general introduction, making the full number 100, that being the square of 10, which, according to Dante, is the perfect num¬ ber. The Hnfernoˆ has 4,720 lines, the ˆPurgatorioˆ 4,755, the ˆParadisoˆ 4,758, a total of 14,233. The shortest of the hundred cantos have 115 lines each; the longest has 160. Each canto begins and ends with an alternate couplet ; all the rest of the rimes are triple : hence the verse is called terza rima. To the 400 couplets and 4,611 terzine there are allotted 653 different rime-endings : some are used only once, others occur repeatedly, as ando, 39 times; ante, 45 times; ore (amore, love), 37 times; io, 47 times. Yet though there are only between six and seven new ones to a canto, the general effect is rich and musical. The great majority of the rimes are feminine (dissyllabic), but there are 14 in¬ stances of masculine rimes in on, or and oth (Sabaoth) or in vowels, e, i, o and u; there are 52 cases of versi sdruccioli (trisyllabic or dactyllic rimes). Each of the three canticles

ends with the w'ord stelle, stars. Dante some¬ times invented words, and his skill in managing the difficult metre was extraordinary. At the end of the 28th canto of the ˆParadisoˆ are eight lines in Provencal. There are a number of complete lines in Latin.

Whether Dante knew Greek is uncertain. He was familiar with Platonism and Neo-Platonism, and with the doctrines of Aristotle, which had come into Italy through the works of Avicenna and Averrhoes. Many others be¬ fore him had imagined the arcana of the world beyond the grave; from the Bible he knew the story of the ˆ Witch of Endor,ˆ the visions of Isaiah and Ezekiel, the Revelation of Saint John; and besides the descriptions in the ninth book of the 'ˆOdysseyˆ and the sixth book of ˆThe ˆneid,ˆ he had as examples which he far excelled, many mediaeval legends : ˆThe Vision of Saint Paul,ˆ ˆThe Voyage of Saint Brendan,ˆ ˆThe Vision of Tunalus,ˆ ˆThe Pur¬ gatory of Saint Patrick,ˆ ˆThe Vision of Fra Albertico,ˆ ˆThe Vision of Wettinˆ and the ˆAlberici Visio.ˆ

He conceived the plan of the ˆ Comedyˆ in early manhood; it is supposed that he wrote seven cantos of the Hnfernoˆ before he was banished from Florence. Whether he incor¬ porated that portion in his work is not known ; but he must have begun it anew. It was prob¬ ably finished before 1314, for in the 13th canto of the ˆParadisoˆ Henry VII had not as yet taken his place amid the throng that formed the Sempiternal Rose, and Pope Clement V was still alive.

After Dante's death the ˆ Comedyˆ almost immediately became widely known in manuscript copies, but the original has never as yet been found, to settle many disputed readings. Within 50 years, Florence, which had never allowed the poet to return, and 20 years after he was buried at Ravenna had stigmatized him as a rebel, established a chair for the study of his works, the first incumbent being Boccaccio. Nearly all the other Italian cities did the same. After the invention of printing there were many editions of the ˆDivine Comedy.ˆ There are four of the 15th century; those printed by Aldus in 1502 and 1515 are generally taken as the basis of the modern texts. Those of the Giuntina and of the Della Crusca, in the 16th century, are valuable. In the next century only three were issued. In the first 80 years of the 19th century 250 different editions appeared. The whole number is at the present time not far from 400. Many of them have been illustrated,

beginning with the Florentine edition of 1481. Among great artists who engaged in this labor were Botticelli, Michelangelo, Federigo Zuocaro and Giovanni Strada, Bernadino Pocetti, John Flaxman, Peter van Cornelius, Karl Vogel von Vogelstein, Francesco Scaramuzza and Gustave Dore. Dore's coarse and ill-drawn pictures have had a vogue far beyond their merits. Parts of the poem have been set to music, as for instance, the Francesca da Rimini episode by Rossini and also by several other composers; the first lines of the ˆPurgatorioˆ by Robert Schumann ; those of the ninth canto by Girolamo Alessandro Biaggi. A monk, Matteo Ronto, a contemporary of Dante's, translated the whole work, line for line, into Latin hex¬ ameters. In the I5th century it was translated into Catalan and Provencal. There are nearly

50 German versions, one 'of the best is by King Johann of Saxony (®Philalethes,® 1877). ' It may be read in more than 20 other languages and dialects, including Hebrew and Russian. Chaucer was the first to translate parts of the poem into English. Milton versified a few lines. The Rev. Henry Boyd in 1802 published the first complete English version. He was fol¬ lowed by the Rev. Henry Frances Cary, whose blank verse paraphrase is well known. In 1820 Lord Byron translated the Paolo and Francesca episode in terza rima. In 1867 Longfellow brought out his unrimed translation, which seeks variety by the use of the feminine endings at regular intervals. Some of his interpretations of it are incorrect, and he was often misled by fancied resemblances between Italian and Eng¬ lish words ; but it had great success. Dr. Thomas W. Parsons made the study and trans¬ lation of the ˆ Comedyˆ his life work. He pub¬ lished the Hnferno^ in 1857, other portions at intervals, and the whole was issued after his death in 1893. The latest metrical version, like Cary's in blank verse, is by Professor Courtney Langdon of Brown University. The version runs line for line, facing the latest revised Italian text, and it is provided with a com¬ mentary, in which the translator embodies his lifelong familiarity with Italian and study of Dante; the Hnferno^ came out in 1918. John Carlyle, brother of Thomas, translated the Hnferno^ in 1855 into English prose; with the continuation by A. J. Butler, also accompanied by the Italian text ; this edition is useful. Charles Eliot Norton's careful prose version in three volumes with explanatory notes was brought out in 1893. For a good text edition, with bibliography, consult ˆLa Divina Corn-media, > edited by Charles H. Grandgent (Bos¬ ton 1909-13). There are hundreds of lexicons, commentaries and other aids to the understand¬ ing of Dante, published in all languages, be¬ ginning in 1328 with that of Jacopo della Lana. We may mention the latest 'La Divina Corn-media di Dante

Alighieri, Riveduta nel testo e commentata da Giovanni A. Scartazzinˆ (Leip¬ zig 1874-82). Scartazzini's convenient 'Hand¬ book to Dante ˆ was translated by Thomas Davidson-and published with corrective notes and many additions (Boston 1887). Koch's 'Dante (Jatalogueˆ (Ithaca 1900) contains a thorough critical bibliography up to that date.

Nathan Haskell Dole.

DIVINE OFFICE, the services of the canonical hours. See Office, Divine.

DIVINE RIGHT, the doctrine that the right of sovereigns to rule is derived immedi¬ ately from the Deity, whose representatives they are, and that accordingly they are not respon¬ sible to their subjects for their method of governing, nor to any other human court of appeal. The English Royalists, among whom were Hobbes, Salmasius and Sir Robert Filmer, maintained that as the immediate representative of the Deity, all power and government were vested in the king, who "could do no wrong.® The Parliamentarians contended that the exer¬ cise of political power sprang from the will of the people, by what was termed "the social contract.® Milton, Algernon Sidney and Har¬ rington were among the chief opponents of divine right. This was the doctrine to which the Stuarts were so much attached and which

was taught almost universally by the clergy of the Church of England and in the universities after the Restoration. Even the tyranny of James II was not enough to induce the English clergy to renounce this favorite doctrine, and after the revolution about 400 of them, in¬ cluding some of the bishops, sacrificed their benefices rather than forsake their principles in the matter. After this time the theory of divine right and passive obedience was little more heard of in England. In France the doctrine was upheld by many and was revived in the dis¬ cussions which caused the Revolution. William II of Germany has frequently proclaimed in public addresses his belief that he is ruler of Germany by divine right.

DIVING, plunging into water and remain¬ ing submerged for greater or less periods of time, with or without communication with the atmospheric air. Diving without the aid of some artificial means to supply the diver with air under water is now rarely practised (unless for amusement) except in sponge, coral and pearl fishing, and sometimes for recovering treasure from wrecked vessels. The best divers are able to remain about one minute and a third under water, and only in extreme and excep¬ tional cases as long as two minutes. Instances are recorded of divers remaining four, five and even six minutes under water, but these are of questionable authenticity.

To enable divers to remain for a consider¬ able time (sometimes five or six hours) under water a diving dress has been used, which is so contrived that the diver is constantly supplied with air from above. It consists of a water¬ proof dress, to which is attached a neck-piece or breastplate fitted with a segmental screw bayonet joint to which the head-piece or helmet, the neck of which has a corresponding screw, can be attached or removed by one-eighth of a turn. Air is supplied by means of a flexible tube, which enters the helmet and communicates with an air-pump. To allow of the escape of the used air there is another flexible tube which is led from the back part of the helmet to the surface of the water. There is a signal line attached to the diving dress, by which the diver communicates with the attendants, and he car¬ ries another line in his hand to guide him in returning to the rope or ladder by which he descends.

The helmet of the diving dress is usually made of tinned copper. There are several dif¬ ferent types with special arrangement of valves for the air supply and exhaust. There are three windows in the head-piece, one-half inch thick glass secured in brass frames, the inlet valve in the helmet is non-return and is very import¬ ant, as in the event of the air pipe being broken the valve closes and the diver is given a short time to realize his danger and act for safety. The breastplate and corselet are also carefully designed; they join the helmet to the body dress and preserve the air-tightness of the whole. It is necessary to add weight to the diver to overcome the too great buoyancy which otherwise would cause him to rise to the surface or prevent his descent, due to his displacement. The cuffs at the wrists are made secure by vulcanized rubber rings. The air-connecting pipes from the pumps to the diver are so made and arranged that the least inconvenience due

to weight will be experienced by them. The boots are of stout leather with wooden soles and lead over soles. Electric lamps and tele¬

phones are provided, so that not only has the diver the best means of seeing around him but can communicate with those above him regarding his operations and be communicated with.

A diving apparatus now in use makes the diver independent of any connection with per¬ sons above the water. A strong metallic air reservoir of steel is carried on the diver's back. A respiratory tube issues from the chamber and is terminated by a mouthpiece which is held between his lips and teeth. This tube is fur¬ nished with a valve which permits the expulsion of air, but opposes the entrance of water. When the diver wishes to leave the water he inflates his dress with air from his reservoir and imme¬ diately rises to the surface. The greatest depth, and the pressure consequent upon it, which has been found safe for a diver of experience and of good physique to descend to, is 35 fathoms, the pressure being about 100 pounds. The pres¬ sure on the outside of the diver's dress due to the head of water is counterbalanced in the inside by the air pressure delivered by the air pump. Consult Boycott, ˆCompressed Air Work and Divingˆ (London 1909) ; Dunville-Fife, ˆSubmarine Engineering of To-dayˆ (Lon¬ don and Philadelphia 1914) ; British Admiralty ˆReport of the Committee on Deep-Water Div¬ ingˆ (London 1907) ; Siebe, Gorman & Company, ˆDiving Apparatus,ˆ with notes and tables for the guidance of those conducting diving opera¬ tions (London 1916).

DIVING BEETLE, an aquatic beetle of the family DytiscidiF. It is flat, oval, with thread¬ like antennae, is brown-black in color and some¬ times has yellow markings. It is predacious, feeding on other insects, worms and even small fish. These beetles fly at night with great ease. The eggs are laid in water and the larvae are termed water tigers. The larvae are transformed in a cell in the earth. There are about 300 known species and in America the two common¬ est genera found are Cybister and Dytiscus. Consult Miall, ˆNatural History of Aquatic Insectsˆ (London 1903).

DIVING-BELL, a device by which work may be carried on under water with a full supply of atmospheric air. To illustrate the principle of this machine take a glass tumbler, plunge it into water with the mouth perpendicu¬ larly downward ; it will be found that very little water will rise into the tumbler, but as air is compressible, it could not entirely exclude the water, which by its pressure condensed the air a little. The first diving-bell we read of in Europe was tried at Cadiz bv two Greeks in the presence of the Emperor Charles V. The first of any note was made by Dr. Halley. The diving-bell is most commonly made in the form of a truncated cone, the smaller ˆend being closed and the larger one open. It is so sus¬ pended that it may sink full of air, with

its open base downward. As a diving bell of the ordinary construction is open to the objection of not being easily moved about, an ingenious kind of diving-bell, called a nautihis, has been invented, which is not open to this objection, but which is entirely at the command of the occupants, who can make it sink or swim and

move it about at pleasure, and can use it at the same time to raise great weights and con¬ vey them to any desired spot. (See Diving; Nautilus). For an account of early diving-bells and apparatus consult Gerland and Traumiiller, ˆGeschichte der physikalischen Experimentier-kunstˆ (Leipzig 1893).

DIVINING ROD, a forked branch or rod, generally of witch hazel, or some other wood, though sometimes of metal, by means of which the presence of underground water, minerals, treasure, etc., can be detected by certain gifted persons. When carried by these ®diviners,^^ the rod is grasped by the two extremities of the fork, and the tip or joint is declared to dip downward, in most cases, though in France it turns upward, when directly over the place of concealment of the substance sought. Although the idea has been held up to ridicule, belief in it persists, and the activities of the divining rod and its bearers have received the attention of eminent scientists. In France an extensive series of tests were made in January and Feb¬ ruary 1913, with three noted diviners. The results, so far as they could be verified, showed a complete failure to discover underground water. On the other hand at a convention of 345 members of a German society for the study of the divining rod, held in Halle, Germany, in September 1913, the consensus of the meeting was that the scientific value of the divining rod had been thoroughly established, even to the location of unseen deposits of potash ; and a report was issued claiming success in between 70 and 80 per cent of various locations with the rod in German South Africa. The only ex¬ planation offered by scientific men is that the phenomena of the divining rod depend on an abnormal psychological condition in the diviner, analogous to clairvoyancy.

DIVISCH, de’vish, Procopius, physicist; b. Senftenberg, Bohemia, 26

March 1698; d. Pren-ditz, Moravia, 21 Dec. 1765. He studied at the gymnasium at Znaym and at the cloister school of the Premonstratensians at Bruck in Styria. In 1726 he was ordained and changed his name, Wenceslaus, to Procopius. He became pro¬ fessor of philosophy at the school soon after. He devoted his attention mainly to physics. In 1733 he received his doctor's degree in theology at Salzburg. He became parish priest at Pren-ditz near Znaym in 1736. He devoted himself to hydraulics and electricity, and was called to Vienna to repeat his experiments at court. He applied electricity to medicine, constructed the first lightning rod, meeting much opposition on account of his proposal to render the prac¬ tice of erecting lightning rods universal, and invented a peculiar musical instrument which he called the ˆdenydor.® He published ˆTractatus de Dei imitate sub inscriptione A et ˆ (Salzburg 1733) ; ˆTheoretischer Tractat fiber die langst verlangte Theorie von der metrolo-gischen Electricitatˆ (Tfibingen 1765).

DIVISIBILITY, the capability of being separated into parts. A metaphysical problem, long discussed by philosophers on abstract prin¬ ciples, is the divisibility of matter. The micro¬ scope reveals only to an infinitely small extent the subdivision of substances and tissues, or¬ ganic and inorganic. Even in the mechanical productions of art distinctness of subdivision is amazing. A slip of ivory, of an inch in length,

has frequently a hundred equal parts marked on it, all being distinctly visible. Nobert, a Pomeranian optical instrument maker, is re¬ nowned for producing the finest rulings on glass which have hitherto been executed. These test plates, as they are called, contain a number of bands, the coarsest of which in his 20-band plate contains 11,259 spaces to the inch, and the finest 225,187. Yarn has been spun so fine that one pound of it extended 4,770 miles.

The gold-beaters begin with a ribbon an inch broad and 150 inches long, which has been reduced by passing through rollers, to about the 800th part of an inch in thickness. This rib¬ bon is cut into squares, which are disposed be¬ tween leaves of vellum, and beaten by a heavy hammer till they acquire a breadth of more than three inches, and are therefore extended 10 times. These are again quartered, and placed between the folds of gold-beaters' skin and stretched out, by the operation of a lighter hammer, to the breadth of five inches. There seems almost no limit to the gold-beater's skill in dividing his tissue of gold, for one grain of gold has been beaten out to a surface of 52

square inches, and leaves have been made 367,- 500 of which would go to the inch. Iron, the least malleable of the above-mentioned metals, has been reduced to wonderfully thin sheets. Fine tissue paper is about the 1,200th part of an inch in thickness, but at the exhibition of 1851 Gillott, the steel penmaker, exhibited rolled sheets of iron the 1,800th part of an inch in thickness. Since then a sheet has been pro¬ duced with an area of 55 inches, weighing but 20 grains and having a thickness of 1 -4800th part of an inch.

It has been asserted that wires of pure gold can be drawn of only the 4,000th part of an inch in diameter. But Dr. Wollaston, by an ingenious invention, obtained wires of platinum much finer than this, some of them only the 30,000th part of an inch in diameter. Such excessive fineness is hardly surpassed by the filamentous productions of nature. Human hair varies in thickness from the 250th to the 600th part of an inch. The fibre of the coarsest wool is about the 500th part of an inch in diam¬ eter, and that of the finest only the 1,500th part. The silk line, as spun by the worm, is about the 5,000th part of an inch thick; but a spider's line is perhaps six times finer, or only the 30,000th part of an inch in diameter; insomuch that a single pound of this attenuated substance might be sufficient to encompass our globe. A single grain of sulphate of copper will communicate a fine azure tint to five gallons of water. Odors are capable of a much wider diffusion. A single grain of musk has been known to perfume a large room for the space of 20 years. Some germs are almost inconceivably minute. Thus the germ known as micrococcus is a minute spherical body sometimes no greater in diameter than the 32,0()0th of an inch. The minute organ¬ isms to which the name of bacteria is specially applied are rod-shaped bodies about 1,000th of an inch in length. Many of the so-called in¬ fusorial animalcules are so exceedingly small that myriads of them may exist in a drop of water.

DIVISION, in mathematics, the dividing of a number so as to discover how many times a lesser number is contained in it; one of the four

fundaniental rules of arithmetic. The number to be divided is the dividend, the number which divides is the divisor, and the result of the division is the quotient. Division is the con¬ verse of multiplication. See Arithmetic.

In military matters the section of an army consisting of two or more brigades, composed of the various arms of the service, and com¬ manded by a general officer. (See Army Organ¬ ization.) In the navy, a select number of ships in a fleet or squadron of men-of-war. In de,- liberative legislation the mode of determining a question at the end of a debate. In the House of Representatives at Washington, a division has no traditional formalities, being determined by the rules of the body itself. In the Senate a division is accomplished by a roll call. In the British House of Commons the speaker puts the question and declares whether in his opinion the ®ayes^^ or the ®noes^^ have it. Should his opinion not be acquiesced in by the minority, the house is cleared and the ^ffiyes^^ directed to go into the right lobby and the ^ffioes® into the left, where they are counted by two tellers appointed for each party. In the House of Lords the two sides in a division are called ^contents® and %ot-contents.^^ In logic the act of distributing all the objects included in the denotation of a concept into mutually exclusive classes, each of which is marked off from the others by pos¬ sessing some distinctive attribute. See Logic.

DIVISION OF ACCOUNTS AND DIS¬ BURSEMENTS, The. See Agriculture, De¬ partment OF.

DIVISION OF LABOR, in economics, a theory based on the principle that industry can be best carried on when each man has a special work to do. Constant practice in doing the same thing leads to a perfection which could not otherwise be attained. The classical illustra¬ tion of it in the history of political economy is that of pin-making as given by Adam Smith : ^^One man draws out the wire, another straight¬ ens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on is a peculiar business; to whiten the pin is another; it is even a trade by itself to put them into a paper; and the im¬ portant business of making a pin is in this man¬ ner divided into above 18 distinct operations, which in some manufactories are all performed by distinct hands.® In this way 10 men could make about 48,000 pins in a day, whereas, if they worked separately and independently, they cer¬ tainly could not each of them have made 20, perhaps not one pin in a day. Adam Smith offers the following reasons why the division of labor secures greater efficiency: ®First, the increase of dexterity in every particular workman; sec¬ ondly, the saving of the time which is com¬ monly lost in passing from one species of work to another; and lastly, the invention of a great number of machines which facilitate and abridge labor and enable one man to do the work of many.® Economists believe, however, that Smith has laid too great stress on both the sec¬ ond and

third of the above reasons. Later writers have extended the term to include the separation of employments as well as the proc¬ esses or operations in one employment. The fact that one man is exclusively a bricklayer and another exclusively a carpenter increases their

combined production over what it would be were they not each confined to one trade. The great advantage of division of labor lies in the saving of labor and of time. By devoting him¬ self exclusively to one operation a workman acquires a high degree of skill in that operation, makes a better use of material, thus preventing waste, and the continuity at one operation saves the time which would otherwise be spent in pass¬ ing from one prodess to another. Another ad¬ vantage is the stimulus given to invention by the concentration of energies upon distinct and defi¬ nite processes. Similar advantages result from the differentiation of functions among the peo¬ ple generally, by specialization not only in fac¬ tories and in trade and commerce, but even in professional and scientific activities. The disad¬ vantages urged against the system are that ex¬ treme specialization is harmful to the intelli¬ gence, saps the vitality of the operator and produces workmen who through any industrial upheaval, being capable of doing only one thing, would find themselves without a place and a living. While there may be some truth in such a presentation, it is an extreme one, and is rebutted by the fact that the mechanical opera¬ tions of factories are not so widely dissimilar as to preclude a man, displaced from one type from securing suitable employment in another. In addition it may be noted that through the subdivision of labor and the increasing use of machines, there is opportunity for mental de¬ velopment outside of working hours. The dis¬ advantages of specialization and subdivision, so feared by economists and writers of a genera¬ tion ago, have not proved so serious in their effects on the working classes as they appeared. On the contrary, never in any preceding period of the world's history did the working classes make greater progress, not only in their material welfare, but also in their intellectual develop¬ ment.

In biology, a conception borrowed from economics and introduced into biology by Milne-Edwards to describe the difference of function exhibited by the individual members of an ani¬ mal colony, or by the different organs, tissues and cells of a single organism. The figure of a hydroid colony, Hydractinia, shows how mem¬ bers, primarily and fundamentally the same in structure, become set apart as nutritive, repro¬ ductive, sensitive and protective. The same division of labor on

predominance of special functions in different individuals is beautifully illustrated in the Siphonophora.

DIVISION OF PUBLICATIONS, The.

See Agriculture, Department of.

DIVITIACUS, chief of the ˆdui, often mentioned in the ˆCommentaries of Caesar.ˆ He was a constant adherent of the Romans, and on one occasion made a visit to Rome, where he became the guest of Cicero, who mentions him in his book, ˆDe Divinatione,ˆ as belonging to the order of the Druids, and professing much knowledge of the mysteries of nature and the art of divination. In 58 b.c. when Caesar refused permission to the Helvetii to migrate from Switzerland and settle in Gaul, he depended on the ˆdui and Divitiacus furnished supplies for his army ; but Dumnorix, the brother of Divitia¬ cus, obtained the chief power among the .-Tˆdui and withheld the supplies. When this state of affairs became known to Caesar he suppressed

Dumnorix and restored Divitiacus to power. Having thus assured the supplies for his army, Caesar campaigned against the Helvetii, crush¬ ing them near the town of Bibracte.

DIVORCE, the disruption, by the act of law, of the conjugal tie made by a competent court on due cause shown. In the United States, jurisdiction in divorce cases is usually conferred on the law courts by the statutes in the different States. The causes of divorce enumerated in these various statutes are by no means uniform, and are more numerous in many of the western States than in the eastern. In all the States adultery is recognized as just ground for divorce. Conviction of felony is sufficient ground in all the States but Connecti¬ cut, Florida, Maine, Alaryland, Mississippi, New Jersey, New York, North Carolina, Rhode Island, South Carolina and the District of Co¬ lumbia. Cruelty is a sufficient ground in all States but Alabama, Arkansas, District of Co¬ lumbia, Maryland, New York, North Carolina, Tennessee, Vermont, Virginia, Washington and West Virginia. Habitual drunkenness is ac¬ cepted ground for divorce in all States but Ala¬ bama, District of Columbia, Georgia, Maryland, New Jersey, New York, North Carolina, Penn¬ sylvania, South Carolina, Texas, Vermont, Vir¬ ginia and West Virginia. Desertion for one year is sufficient ground in Arizona, Arkansas, California, Colorado, Florida, Hawaii, Kansas, Kentucky, Minnesota, Missouri, Montana, Ne¬ vada, North Dakota, Oklahoma, Oregon, Porto Rico, South Dakota, Utah, Washington, Wis¬ consin, Wyoming; desertion for two years in Alabama, Alaska, Delaware, Illinois, Indiana, Michigan, Mississippi, Nebraska, New Jersey, Pennsylvania and Tennessee; desertion for three years in Connecticut, Georgia, Maine, Maryland, Massachusetts, New Hampshire, Ohio, Texas, Vermont, Virginia and West Vir¬ ginia; desertion for five years in Rhode Island. The drug habit is sufficient cause in Alabama, Colorado, Maine, Massachusetts, Mississippi and Rhode Island. Insanity is sufficient cause in the District of Columbia, Idaho, Iowa, Missis¬ sippi, New Jersey, North Dakota, Pennsylvania, Utah, Virginia, Washington, West Virginia and Wyoming. Neglect to provide is sufficient cause in California, Delaware, Idaho, Maine, Massachusetts, Michigan, Montana, New Mex¬ ico, North Dakota, Ohio, Rhode Island, South Dakota and Tennessee. In New York adultery is the only ground recognized by law for grant¬ ing an absolute divorce. In South Carolina the courts have no power to grant divorce, strictly speaking, the legislature being the only author¬ ity

for that purpose. In both of these States, as in others, the courts may declare an alleged marriage invalid on grounds which rendered the parties or either of them incapable of law¬ fully contracting it, such as idiocy, lunacy, for¬ mer husband or wife living, *etc.* Separation from bed and board, commonly called limited divorce, is granted on the ground of cruel and inhuman treatment or incompatibility; and de¬ sertion and refusal to support by the husband may be a ground for a decree setting the wife free from the interference and control of her husband, though it may not sunder the mar¬ riage tie.

A person applying for a divorce will not be allowed to obtain judgment should it appear

that he or she has also been guilty of the of¬ fense complained of, or that there is collusion between the persons concerned in order to pro¬ cure a divorce. Moreover, the plaintiff is al¬ ways required to prove the existence of the alleged grounds of divorce by satisfactory evi¬ dence, even though no contest is made on the other side. Parties also who have condoned the offense, that is, who, after it has been dis¬ covered, have consented again to live as hus¬ band and wife, are not allowed to obtain a di¬ vorce, but a second act of the-same nature re¬ vives the right of action on the original offense.

The absence of harmony in the legislation of the different States on this subject has led to very great confusion and conflict in regard to the rights and liabilities growing out of divorce against non-residents of the State where granted, and some uniform system of laws on the subject is greatly needed. As the jurisdic¬ tion of Congress over the subject is doubtful, uniformity can apparently be secured only by an amendment to the Constitution of the United States or by the concurrent action of the va¬ rious State legislatures.

The United States Bureau of the Census published in 1909 a special report upon marri-. age and divorce, covering the 40-year period, 1867 to 1906. The report shows that the total number of divorces granted in the United States in that period was 1,274,341, of which number 945,625 were granted in the latter 20 years — 1887 to 1906. Each 5-year period for the whole 40 years showed a marked increase over the 5 years immediately preceding, aver¬ aging about 30 per cent. During these periods the population was increasing only about 10 per cent.

Of the 945,625 divorces granted between 1887 and 1906, the causes

for divorce arose after marriage in 922,152 cases. In 415,742 cases the cause was abandonment, or desertion ; in 255,155 cases, cruel or inhuman treatment; in 174,558 cases, adultery; in 105,162 cases, neglect of duty, or to make proper provision ; in 54,283 cases, habitual drunkenness ; in 8,841 cases, conviction of felony; in 1,136 cases, vio¬ lent temper ; in 244 cases, in.sanity. Of divorces for causes existing at the time of marriage, there were 3,921. Of this total, bigamy ac¬ counted for 1,203; impotency for 1,092; and du¬ ress, force or fraud, for 465.

In the same 20-year period there were granted to husbands, 316,149 divorces, and to wives, 629,476. The causes on which the grants were made to husbands were : for desertion, 156,283; for adultery, 90,890; for cruelty, 33,- 178; for drunkenness, 3,43*6. The causes on which the grants were made to wives were: for desertion, 211,219; for cruelty, 173,047; for adultery, 62,869; for neglect, 34,664; for drunk¬ enness, 33,080.

ˆ The largest proportion were granted the third, fourth or fifth year of marriage, being about 8 per cent of the whole for each of those years. About 5 per cent were granted in the first year,ˆ and 7 per cent in each of the sec¬ ond and sixth years. Half of the total number were granted before the close of the ninth year.

Geographically, the larger percentage of di¬ vorces granted obtains in the West, being about four times that of the Atlantic seaboard States. The Central section shows a rate about 2ˆ

that of the East. Concretely, the figures show that since 1900 the annual dissolution of mar¬ riages in the United States has amounted to four out of each 1,000 marriages then existing.

The latest available figures for the several States are for 1900 and give the actual number of divorces granted in that year per each 100,- 000 married persons in the State, as follows : Washington, M3; Montana, 497; Colorado, 409; Arkansas, 399; Texas, 391; Oregon, 368; Wyo¬ ming, 361 ; Indiana, 355 ; Idaho, 347 ; Oklahoma, 346; Arizona, 344; Indian Territory, 326; Ne¬ vada, 315; California, 297; Kansas, 286; Maine, 282 ; Missouri, 281 ; Rhode Island, 281 ; Utah, 274; New Hampshire, 272; South Dakota, 270; North Dakota, 268; Illinois, 267; Tennessee, 261 ; Michigan, 257 ; Iowa, 246 ; Kentucky, 237 ; Ohio, 231 ; Florida, 226; Nebraska, 226; Missis¬ sippi, 225; Alabama, 208; New Mexico, 193; West Virginia, 183; Wisconsin, 180; Vermont, 177; District of Columbia, 162; Minnesota, 161; Connecticut, 130; Louisiana, 127; Massachu¬ setts, 124; Virginia, 117; Maryland, 114; Penn¬ sylvania, 94; Georgia, 78; North Carolina, 75; New Jersey, 60; New York, 60; Delaware, 43; South Carolina, 6.

Figures for the same year for foreign coun¬ tries are based on the total population — not upon the married population. For each 100,000 population the number of divorces and separa¬ tions were: Japan, 215; United .States, 73; Switzerland, 38 ; Denmark, 29 ; Roumania, 28 ; France, 26; Germany, 23; Hungary, 18; Nether¬ lands, 16; Belgium, 13; Bulgaria, 11; Austra¬ lia, 9; Austria, 8; Norway, 8; Sweden, 8; Fin¬ land, 5 ; Scotland, 4 ; Italy, 3 ; Servia, 2 ; Great Britain and Ireland, 2. There are no statistics for Russia, and no parallel figures for Canada, Mexico, Central America and South America.

The differences in the divorce laws in the States account somewhat for the differences in the number of divorces granted in certain States. In some of the Western States, where high divorce rates prevail, divorces have fre¬ quently been obtained by residents of other States before the expiration of time necessary for a residence in a State before proceedings for divorce may be legally begun. There are more divorces, in proportion to the population, granted in the United States

than in Europe. The number of divorce courts in the United States will account in a great measure for this difference; nearly every county court, except in New Mexico, New Jersey and South Caro¬ lina, or about 2,921 courts, having the power of granting divorces. There is but one di¬ vorce court in England, 28 in Germany and 79 in France. Canada has fe\v applications for di¬ vorce. In the 21 years ending with 1888, 94 di¬ vorces had been granted in Nova Scotia and New Brunswick, together, and 41 in all the rest of the Dominion of Canada.ˆ

In England, the divorce court is composed of a judge ordinar}ˆ, the three chiefs in the courts of common law, and three puisne judges.ˆ It is provided that either spouse may obtain a divorce on the ground of adultery, but in case the wife is petitioner the adultery must be accompanied by cruelty or desertion. By another act the power to pronounce a decree of divorce, which was at first reposed in the whole court, is given to the judge ordinary sitting alone; but in this case the decree so pronounced is a decree nisi and cannot become final for at least six months.

After a decree of divorce the offending person is free to marry again, even with the paramour. But it is also enacted that no clergyman shall be compelled to solemnize the marriage of any person who has been divorced. He must, how¬ ever, allow another clergyman, if willing to do so, to perform the marriage. The same general rules as to collusion, condonation, the conduct of the parties, etc., which obtain in the United States are law also in England. In order to guard against fraud by parties conniving to procure a divorce, power is given to the queen's proctor to interpose, in case he has reasonable grounds to suspect collusion or recrimination, in order to oppose a petition for divorce. By these acts parties are also entitled to obtain a judicial separation on the ground of adultery, cruelty or desertion. Judicial separation is declared to be in place of a separation ˆˆa mensa et thoro.ˆˆ A married woman, having obtained decree of judi¬ cial separation, is declared to be in all respects as a ˆTemme sole® in regard to any property that she has or may acquire. Even before ob¬ taining a separation a woman deserted by her husband may obtain from the court a protec¬ tion for any property that she has or may ac¬ quire by her own industry.

In France there has been great opposition to any laxity in the divorce laws, but since the year 1884 French law has recognized three grounds of divorce: (1) Adultery; (2) out¬ rage, cruelty or grievous

injury; (3) convic¬ tion of an infamous crime. These causes of action are equally available to husband or wife; but it is provided that the wife shall not marry again till after the expiration of 10 months from the date of the dissolution of the pre¬ vious marriage. It is further provided that, in cases where divorce is sought on the ground of outrage, cruelty or grievous injury, immediate divorce shall not be granted, but the parties may be granted separation for a year, with due provision for the wife's support during that time, at the end of which a final divorce may be granted if they have not been reunited in the meantime. Substantially the same rules as to condonation prevail as in the United States. All the proceedings necessary in such cases are carefully provided for by the code civil, as well as the consequences to the parties personal or proprietary.

In Germany, the question of divorce gave rise to a long contest. The General Prussian Code permitted divorce on the ground of mutual consent and deep-seated aversion, but on ac¬ count of the newly-awakened religious life in the 19th century there was strong opposition ; this under Friedrich Wilhelm I*V arose to an overwhelming power. Many attempts were made to establish the laws of divorce on other bases, but on account of the personal antago¬ nism of Friedrich Wilhelm IV they remained without result. The demand for the biblical ground of divorce was fulfilled by the state, because the Bible does not offer a precise and comprehensive ground of separation. It was claimed that the Prussian law of divorce was lax and capricious and there was a unanimous demand for a more strenuous law in the inter¬ est of morals. This demand found recognition even in circles which were most opposed to ecclesiastical influence in politics. The oppos¬ ing elements were reconciled by the personal influence of Friederich Wilhelm IV; but the

»0B

attempts of the legislature to make a new regu¬ lation of divorce remained without results. At the present time attempts are being made for bringing about a common divorce law for all of Germany. This proposed law rests theoreti¬ cally on very strict principles which find justi¬ fication in the motives. The Austrian code of common law allows to non-Catholic Christians separation from the bonds of

matrimony on ac¬ count of adultery, malicious desertion, five years' imprisonment, or on account of danger¬ ous diseases and repeated cruelty of treatment and invincible aversion.

Among the Jews: The enactment of the Mosaic law was the following: ®When a man hath taken a wife, … and it come to pass

that she find no favor in his eyes because he hath found some uncleanness in her, then let him write her a bill of divorcement, and give it in her hand and send her out of his house® (Deut. xxiv, 1). Here, it will be perceived, im¬ purity is the only assigned cause for such di¬ vorce. The woman sent away might marry an¬ other man, but if he, too, divorced her, it was not_ permitted her first husband to take her again. The word ˆhmcleanness® in the passage now quoted is a free translation: the Hebrew words mean literally ˆˆthe nakedness of a thing.® The exact import of this expression was sharply contested in the immediately pre-Christian times, the school of Hillel giving it a general meaning, and holding that a man might divorce his wife for the most trivial cause ; while that of Shammai considered that the doubtful phrase signified adultery, for which therefore alone a man could put away his wife.

The Mohammedan law of divorce, founded on sortie passages in the Koran, allows of a separation by mutual consent, giving the wife the right of retaining her marriage portion, un¬ less she agrees to relinquish a part of it as the price of the separation. The parties are per¬ mitted to separate and reunite twice, if they can so agree without any particular conditions ; but after the third divorce the husband is not per¬ mitted to receive his wife again until she shall have previously married another husband. The act of divorce is a judicial proceeding before the cadi, who does not decree it until three months after the application.

The Hindu and Chinese laws of divorce show little regard for women, and not only the causes recognized in European and American countries, but others, are deemed sufficient for a husband to discard his wife.

The different Grecian states had each their respective laws* of divorce. At Sparta they do not seem to have greatly regarded the delicacy of the marriage bed when the interest of the re¬ public was in question ; hut divorces appear to have been rare, since the ephori fined Lysander for repudiating his wife. At Athens either the husband or wife might procure a divorce by exhibiting a bill for this purpose to the archon, and obtaining the verdict or consent of a jury to whom the

question was referred. But the party applying must, it seems, have made application personally; and Alcibiades, accord¬ ing to Plutarch, took advantage of his author¬ ity as a husband to prevent his wife from mak¬ ing the application personally; for when she was going from her brother's house, where she had taken refuge, to the archon's, to sue for a di¬

vorce, he forcibly seized upon her and confined her to his own house.

The early laws of Rome permitted the hus¬ band to divorce his wife for poisoning his chil¬ dren, counterfeiting his keys or adultery. But other causes were afterward added; for the first divorce recorded was for the sterility of the wife. This wqs by Sp. Carrilius Ruga, about 230 b.c. Divorces afterward became very frequent and a law was, on this account, made by Augustus, requiring additional ceremonies in a divorce ; among other things, the presence of seven witnesses to the act of dissolution of the marriage. By the Theodosian code the hus¬ band could divorce the wife for adultery; or if she was a witch or a murderess ; had sold a free-born person into slavery; violated a sep¬ ulchre ; committed sacrilege ; been accessory to theft or robbery; was given to feasting with strangers without the knowledge or against the wishes of the husband ; lodged abroad without good reason; or frequented theatres and showˆs, her husband forbidding; or was aiding and abetting in plots against the state ; or dealt falsely; or offered blows. The wife had equiv¬ alent rights in this respect, for she could pro¬ cure a divorce on similar offenses against her husband. He could be remarried immediately; she, not within a year.

The facility of divorce continued, without re¬ striction, under the Roman emperors, but as the modern nations of Europe emerged from the ruins of the Roman empire, they adopted the usual interpretation of the doctrine of the Newˆ Testament (Matt, xix, 6), ®What God hath joined together, let no man put asunder.®

Divorce under the laws of the Roman Cath¬ olic Church is never allowed where the marri¬ age has been duly contracted, ratified and con¬ summated. But a perfectly valid marriage con¬ tracted between baptized persons can be an¬ nulled by the Pope, before its consummation, never after consummation. It is held by can¬ onists that a marriage lawfully and validly contracted but not consummated is annulled by either of the parties taking solemn lifetime vows of continence and entering a religious or¬ der. If of two unbaptized persons, married, one is converted to the faith and receives bap¬ tism,

he or she may be released from the mar¬ riage bond if either party refuse to live peace¬ ably and without insult to the Christian religion in the marriage state; and then the released party can marry again. Outside of such con¬ ditions as have been stated Christians united in marriage cannot in the Roman Catholic Church be freed from the marriage bond, vinculum matrimonii, save by the death of one or other of them. See Family, Law of; Husband and Wife, Law of; Marriage, Law of.

Bibliography — (Seorge, C. E., and Smith, O. J., ˆModernization of Marriageˆ (San Francisco 1913) ; Gore, C, ˆThe Question of Divorceˆ (New York 1911) ; Osman, W. B., ˆDivorce and Remarriage' (Boston 1905) ; Russell, J. F. S., ˆDivorce' (London 1912) ; United States Census Report, < Marriage and Divorce' (Washington 1909).

Richard Ferris,

Editorial Staff of The Americana.

DIVORCE, Court of. See Court.

DIX, Beulah Marie, (Mrs. George H. Flebbe), American novelist and playwright: b.

Kingston, Mass., 25 Dec. 1876. She has pub¬ lished ˆHugh Gwyethˆ (1899) ; 'ˆSoldier Rig-daleˆ (1899) ; ˆThe Making of Christopher Fer-ringhamˆ (1901) ; 'ˆThe Beau's Comedyˆ (with C. A. Harper, 1902) ; Little Captive Ladˆ (1902) ; ˆBlount of Breckeiihowˆ (1903) ; 'ˆThe Fair Maid of Graystonsˆ (1905) ; ˆMerrylipsˆ (1906) ; ˆAllison's Landˆ (1910) ; ˆBetty-Bide- at-Homeˆ (1912) ; ˆMother's Sonˆ (1913) ; ˆLittle God EbisiF ; ˆMaud Melicentˆ (1914) ; ˆBattle Months of George Daurellaˆ ; ˆBlithe McBrideˆ (1916) ; and is author of two plays, ˆAcross the Borderˆ (1914) ; ˆMolochˆ (1915).

DIX, Dorothea Lynde, American philan¬ thropist : b. Hampton, Me., 4 April 1802 ; d. Trenton, N. J., 17 July 1887. In her youth she

supported herself by teaching in Worcester, Mass., but in 1830 fell heir to some property, after which she devoted her life to the relief and betterment of lunatics, paupers and crim¬ inals. She visited the prisons, asylums and alms¬ houses of nearly every State in the Union, and by her efforts contributed largely to the estab¬ lishment of lunatic asylums in those States which had none. She also traveled extensively in Europe in the same service, and her efforts materially improved the condition of the insane there likewise. She published several children's books and in 1845 ˆPrisons and Prison Disci¬ pline,ˆ In 1903 a bill was favorably received in Congress appropriating $10,000 for a monument to her at her birthplace. The report of the House committee declares; «Miss Uix occupies a conspicuous place in history as a philanthro¬ pist. Certainly no other woman in modern times has done more to earn the gratitude of the people of this country than this self-sacri¬ ficing and devoted woman. Pier services dur-the Civil War as chief of the hospital nurses of the United States and her wonderful success in establishing institutions for the insane — over 30 in number — in the South and West and else¬ where in the country, place her among the noblest examples of humanity in all history.ˆˆ Consult Tiffany, <Life of Dorothea Lynde Dix> (Boston 1890).

DIX, John Adams, American statesman and soldier: b. Boscawen, N. H., 24 July 1798; d. New York, 21 April 1879. In 1812 he was ap¬ pointed a cadet in the United States army and in 1813 ensign. He took part in the operations on the Canadian frontier during the War of 1812, afterward studied law and was admitted to the bar in Washington. In 1826 he was sent as a special messenger to the court of Denmark. He resigned from the army in 1828 and began practising law in Cooperstown, N. Y. Later he was secretary of State and adjutant-general of New York and was prominently associated with the ˆAlbany Regency,ˆ the controlling power of the Democratic party. In 1841 he was elected to the State assembly and in 1845-49 was a United States senator. In 1861 he was appointed Secre¬ tary of the Treasury by President Buchanan. At this time there were two revenue cutters at New Orleans and he ordered them to Nˆ York. The captain of one refused toˆ obey his order and Dix telegraphed to put him under arrest, adding the statement which has made him famous, «If any one attempts to haul down the American flag, shoot him on the spot.» At the outbreak of the Civil War he was elected president of the Union Defense Committee and

organized 17 regiments. He was commissioned a major-general of volunteers and through his active measures saved Maryland to the Union cause. In May 1862 he was sent to Fortress Monroe and after the New York Draft Riots in July 1863 he was appointed commander of the Department of the East at New York and re¬ mained in this relation until July 1865, when he returned to civil life. He was United States Minister to France from 1866 to 1869. He was elected governor of New York in 1872, but was defeated on a renomination in 1874, His publi¬ cations include ˆResources of the City of New Yorkˆ (1827); ˆDecisions of the Superintend¬ ents of Common Schools of New York, and Laws Relating to Common Schoolsˆ (1837) ; ˆA Winter in Madeira and a Summer in Spain and Florenceˆ (1850) ; ˆSpeeches and Occa¬ sional Addressesˆ (2 vols., 1864). Consult Dix, 'Morgan, ˆMemoirs of John A. Dixˆ (New York

1883).

DIX, John Alden, American statesman : b. Glens Falls, N, Y., 25 Dec. 1860. He was gradu¬ ated at the Glens Falls Academy in 1879 and at Cornell University in 1883. Entering the lumber and papermaking business he became president of the Iroquois Paper Company, treasurer of the American Wood Board Company, vice-president of the Blandy Paper Company and of the First National Bank of Albany. He was also manager of the Moose River Lumber Com¬ pany and director of the Albany Trust Com¬ pany, the Glens Falls Trust Company and other corporations. He was delegate to the Demo¬ cratic National Convention at Saint Louis in 1904, received 17 votes for the gubernatorial nomination in 1906 and was Democratic nominee for lieutenant-governor in 1908. He was chair¬ man of the Democratic State committee in 1910 and was governor of New York for the term

1911-12.

DIX, Morgan, American Episcopal clergy¬ man: b. New York, 1 Nov. 1827; d. there, 29 April 1908. He was a son of J. A. Dix (q.v.). He was graduated from Columbia College in 1848 and from the General Theological Semi¬ nary in 1852. He then took orders in the Episcopal Church and after serving for a few years as assistant in Trinity Church, New York, became in 1862 the rector of Trinity parish. In November 1902 the 40th anniversary of his rectorship was celebrated. Prior to 1901 he was president of the House of Clerical and Lay Deputies in

many successive general^ conventions of the Episcopal Church. He published ^Com¬ mentary on the Epistle to the Romans^ (1864) ; ^Exposition of the Epistles to the Galatians and Colossians^ (1865) ; ^Lectures on the Pan¬ theistic Idea of an Impersonal Substance Deity^ (1865) ; ^Lectures on the Two Estates^ (1872) ; ^Memoirs of John A. Dix^ (1883) ; ^History of the Parish of Trinity Church^ (4 vols,, 1898-1906).

DIXIE, Lady Florence Caroline Douglas,

English explorer, poet and novelist : b. London, 24 May 1857; d. 7 Nov. 1905. She was the youngest daughter of the seventh^ Marquis of Queensberry and was married to Sir Alexander Beaumont Churchill Dixie. She explored Pata¬ gonia 1878-79, was war correspondent for the London Morning Post in the Boer War 1880-81 and was instrumental in securing the liberty of Cetewayo, king of Zululand. In her later years

she became a zealous advocate of sex equality; her last works reveal the extent to which this subject had taken possession of her mind. She published ^The Songs of a Child and Other Poems ^ ; ^Across Patagonia^ ; ^In the Land of Misfortune^ ; Defense of Zululand and Its King^ ; ^The Child Hunters of Patagonia^ ; ^Aniwee or the Warrior Queen^ ; ^Gloriana^ ; ^Redeemed in BloodO ^Little CherieO Hjain, or the Evolution of a Mind^ ; Hsola,^ a drama; ^Two Castaways,^ *etc.*

DIXIE, a name associated in negro min¬ strelsy with the Southern States. It is supposed to be derived from the name of one Dixie, a large-holding and kind-hearted slave owner on Manhattan Island in the latter part of the 18th century. His treatment of his negroes caused them to regard his plantation (or ^^Dixie's®) as little short of an earthly paradise, and when any of the slaves were taken away from home they always pined for ^^Dixie's^^ while singing and talking of its joys. When slavery moved south¬ ward in search of a more secure and

congenial habitat the same ideal of ®Dixie's^^ was taken along, and the chant which the former slaves of Dixie sang of their old home became so widespread that its origin was lost sight of and it came to be applied to the Southern homes of the negroes.

In fact in the South <^Dixie® is held to mean the Southern States, the word being regarded as a derivation and corruption of ®Mason and Dixon's line®^ (q-v.) which originally divided the free and slave States and was supposed by the Southerners to have first come into use when Texas joined the Union and the negroes frequently sang of it as ®Dixie.®

Daniel Decatur Emmett (1815-1904) com¬ posed a song known by this name as a ®walk-around® for Bryant's Minstrels in 1859, and it was first performed at the Mechanics' Hall in New York. It was first used as a song by the Confederates at the inauguration of Jefferson Davis as President at Montgomery (18 Feb. 1861) and was afterward distinctively the Con¬ federate song of the War of Secession. On 30 May of the same year a version of the same song appeared in the Natchez Courier from the pen of Gen. Albert Pike and also written in the Confederate interest. A third version, but asso¬ ciated with the cause of the North, was written by T. M. Cooley.

piXMUDE, diks'mood-e, (Flemish Diks-muiden), a town of Belgium on the Yser Canal, about 15 miles southwest of Ostend and 10 miles from the coast, with a population in 1914 of 4,000. A quaint, old-fashioned place, all bricks and tiles, dotted with cafes and^ nunneries, Dixmude is the centre of an essentially agricultural district. Surrounded by flat meadows and beet¬ root fields, intersected by canals and marshes, the district has been reconquered from the sea by centuries of effort. The sea is kept under control by a formidable array of sluices, locks, chambers, water-gates and cranks at Nieuport, eight miles away. In the European War Dixmude witnessed stirring scenes during October 1914. After the fall of Antwerp on the 9th a brigade of French marines, numbering 6,000 and commanded by Rear-Admiral Ronarc'h, was thrown into the town to assist the retreating Belgians in holding the Yser line against the German rush to the sea. Outnumbered by six

to one the marines held Dixmude for nearly four weeks, fighting desperately in rags under incessant rain, barring the road to Dunkirk, en¬ suring the safety of the Belgian army and en¬ abling the French armies of the North to con¬ centrate behind the Yser. All the civil

popula¬ tion had left the town. On 25 October the Belgian General Headquarters Staff at the sug¬ gestion, it is said, of M. Charles Kogge, garde zvateringue of the north of Fumes, decided to call the waters to their aid. The sluices and water-gates at Nieuport were opened, the sea entered and forced back the fresh waters of the canal and its tributaries. By slow degrees the water rose in a few days and converted a zone of about 25 square miles into one vast lagoon. Flat-bottomed British monitors, assisted by French and British warships off the coast, fought off the German attempt on Nieuport for 10 da3'S and saved it. The German forces and guns floundered in water and mud, hundreds were drowned and the main struggle for the shortest route to Calais came to an end. The French marines held their position. The loss of Dixmude before 1 November would have been disastrous to the Belgian right. As many as 15 attacks were repelled in one night. On 10 Nov. 1914 Dixmude fell after a heavy bombardment. Consult Le Goffic, C., ˆ Dixmudeˆ (London 1916). See War, European — Invasion of Belgium.

DIXON, Amzi Clarence, American clergy¬ man : b. Shelby, N. C, 6 July 1854. He was graduated at Wake Forest College in 1875 and took his theological course at the Southern Bap¬ tist Theological Seminary. He was ordained to the Baptist ministry in 1876 and subsequently until 1883 held pastorates at Chapel Hill and Asheyille, N. C. After 1883 he successively held pastorates in Baltimore 1883-90, Brooklyn 1890-96, Boston 1896-1901, Chicago 1906-11, and since 1911 at the Metropolitan Tabernacle, London. He has published ˆMilk and Meatˆ (1893; new ed., 1913) ; ˆHeaven on Earthˆ (1896) ; ˆThe Lights and Shadows of American Lifeˆ (1903) ; ˆThe Christian Science Delusionˆ (1903); ˆPresent-Day Life and Religionˆ (1905) ; ˆEvangelism, Old and Newˆ (1905); ˆThe Young Convert's Problemsˆ (1906) ; ˆThe Bright Side of Life and Other Sermonsˆ (1914) ; ˆThe Glories of the Cross and Other Addressesˆ (1914) ; ˆThrough Night to Morn¬ ingˆ (1913).

DIXON, Archibald, American statesman : b. Caswell (Tounty, N. C., 2 April 1802; d. Hen¬ derson, Ky., 23 April 1876. In 1805 he removed with his father to Henderson County, Ky., where he received a common-school education, studied law and was admitted to the bar in 1824, and attained high rank as a criminal law¬ yer. He was a member of the legislature in 1830 and 1841, of the State senate in 1836 and lieutenant-governor in 1843-47. In 1849, when the proposition for gradual emancipation of the slaves was before the people, he vehemently opposed the scheme, and, being chosen a mem¬ ber of the Constitutional Convention, proposed a resolution which was substantially incorporated in the new constitution, declaring that whereas the right of the citizen to be secure in his per¬

son and property lies at the bottom of all gov¬ ernments, and slaves and children hereafter born of slave mothers are property, therefore

ilic convention has not the power nor the right to deprive the citizen of his property except for the public good, and only then by making to him a just compensation. Dixon was the Whig candidate for governor in 1851, but he was not supported by the emancipationists in that body and a Democrat was elected. During the agita¬ tion for the dissolution of the Union, Dixon eloquently seconded before the people the ap¬ peals for its preservation uttered in Washington by Clay and Webster. He and Crittenden were rival candidates before the legislature for the next seat that fell vacant in the United States Senate, but for the sake of party harmony both withdrew. When Henry Clay died, shortly afterward, Mr. Dixon was elected for the unex¬ pired term. He took his seat on 20 Dec. 1852, and served to 3 March 1855. During the Civil War he was an advocate of peace, and in 1863 was a delegate to the peace convention at Frankfort, Ky.

DIXON, Charles, English naturalist: b. London, England, 20 July 1858. His entire life has been devoted to natural history study, bird migration and the geographical distribution of species having been his especial field. His pub¬ lished books include ˆ Rural Bird Lifeˆ (1880) ; ˆEvolution without Natural Selectionˆ (1885) ; ˆOur Rarer Birdsˆ (1888) ; Stray Feathers from Many Birdsˆ (1890) ; ˆAnnals of Bird Life> (1890) ; Hdle Hours with Nature> (1891) ; ˆThe Birds of Our Ramblesˆ (1891)-; ˆThe Mi¬ gration of Birdsˆ (1892) ; jottings About Birdsˆ (1893) ; ˆGame Birds and Wild Fowl of the British Islandsˆ (1893); ˆNests and Eggs of British Birdsˆ (1893) ; ˆNests and Eggs of Non-indigenous British Birdsˆ (1894) ; ˆThe Migration of British Birds ˆ (1895) ; ˆBritish Sea Birdsˆ (1896) ; ˆCuriosities of Bird Lifeˆ (1897) ; ˆOur Favorite Song Birdsˆ (1897) ; ˆLost and Vanishing Birdsˆ (1898) ; ˆBird Life in a Southern Countryˆ (1899) ; ˆ Among the Birds in Northern Shiresˆ (1900) ; ˆThe Story of the Birdsˆ (1900); ˆBirds' Nestsˆ (1902); ˆOpen Air Studies in Bird Lifeˆ (1903) ; ˆThe Bird Life of Londonˆ (1909).

DIXON, Ifrank Haigh, American educator : b. Winona, Minn., 8 Oct. 1869. He was gradu¬ ated at the University of Michigan, 1892. He was professor of economics in Dartmouth Col¬ lege 1903-19 ; in

Princeton since 1919 ; secretary of the Amos Tuck School of Administration and Finance since 1900. He was expert adviser to the Interstate Commerce Commission (1907-08) and to the National W"aterways Commission (1909), and in 1910 became chief statistician to the Bureau of American Railway Economics. Be¬ sides contributing to magazines, he published ˆState Railroad ControP (1896) ; ˆRecent Rail¬ road Commission Legislationˆ (1905) ; ˆA Traffic History of the Mississippi River Svstemˆ

(1909).

DIXON, James, American lawyer and statesman: b. Enfield, Conn., 5 Aug. 1814; d. Hartford, Conn., 27 March 1873. He was graduated at Williams College, and achieved distinction in the practice of law, but turning his attention to public affairs was repeatedly elected to the Connecticut legislature as a Whig, served two terms in the United States House of Representatives and was a member of the United States Senate from 1857 to 1869.

DIXON, James Main, American educator : b. Paisley, Scotland, 20 April 1856. He was educated at the University of Saint Andrews, was professor of English in the Imperial Col¬ lege of Engineering, Japan, 1879-86; professor of English in the Imperial University of Japan 1886-92, and professor of English literature in Washington University 1892-1901. In 1903-04 he was president of Columbia College, Milton, Ore. He was professor of English literature at the University of Southern California from 1905 to 1911, when he was transferred to the chair of Oriental studies and comparative lit¬ erature. In 1906 he became literary editor of the Wesl Coast Magazine. He compiled a ˆDic¬ tionary of Idiomatic English Phrasesˆ (1891) and wrote Hllustrated History of Methodismˆ (1900) ; ˆTwentieth Century Life of John Wes¬ leyˆ (1902) ; ˆˆMatthew Arnold,® in ˆModern Poets and Christian Teachingˆ (1906) ; ˆA Sur¬ vey of Scottish Literature in the Nineteenth Century > (1907).

DIXON, Joseph, American inventor : b. 1799; d. 1869. He was at various times shoe¬ maker, printer, wood engraver and physician, and establishing crucible works in 1827 at Salem, Mass., became very wealthy. In the course of his experiments he devised important improvements in photography, lithography, lens grinding, smelting, banknote printing, *etc.*

DIXON, Joseph Moore, American lawyer and public official : b. Snow Camp, N. C, 31 July 1867. He received his education at Earlham College (Indiana) and at Guilford College (North Carolina). He was admitted to the bar in 1892 and has since practised at Missoula, Mont. He was assistant prosecuting attorney 1893-95, prosecuting attorney 1895-97 of Mis¬ soula County and member of the Montana house of representatives in 1900. In 1903-07 he was member of the United States House of Representatives, being elected from Montana at large. He was also delegate-at-large to the Republican National Convention of 1904. In 1907-13 he was United States Senator from Montana. He is publisher of the Daily Missoulian and the Evening Sentinel of Missoula, Mont.

DIXON, Richard Watson, English clergy¬ man and author: b. London 1833; d. 2 Jan. 1900. He was educated at Oxford; was master in the high school at Carlisle in 1863 and canon of Carlisle in 1874. He became vicar of Hayton in 1873 and of Warkworth in 1883. He pub¬ lished ˆChrist's Company and other Poemsˆ (1861) ; ˆHistorical Odes and other Poemsˆ (1864) ; ˆMano, a Poetical Historyˆ (1883) ; ˆOdes and Eclguesˆ (1884) ; ˆLyrical Poemsˆ (1885) ; ˆThe Story of Eudocia and Her Broth¬ ers, a Narrative Poemˆ (1887) ; ˆSongs and Odesˆ (1896) ; ˆEssay on the Maintenance of the Church of Englandˆ (1875) ; ˆLife of James Dixonˆ (1874) ; and ˆHistory of the Church of England from the Abolition of the Roman Jurisdictionˆ (1880-1900). He was associated with Burne-Jones, Rossetti and Morris in founding the Oxford and Cambridge Magazine, the chief organ of the pre-Raphaelite school.

DIXON, Roland Burrage, American an¬ thropologist: b. Worcester, Mass., 6 Nov. 1875. He was graduated in 1897 from Harvard Lffii-versity and immediately became an assistant in anthropology there, becoming instructor in 1900

assistant professor in 1906 and professor in 1916. He is a Fellow of the American Academy of Arts and Sciences and is author of various papers on the Indians of California and the Indians of North America

in general, including ˆMaidu Mythsˆ (1902); ˆThe Chimariko Indians and Languageˆ (1910) ; ˆMaidu Textsˆ (1912).

DIXON, Thomas, American novelist and playwright: b. Shelby, N. C., 11 Jan. 1864. He was graduated at Wake Forest College, N. C., 1883, and Greensboro, N. C., Law School 1886, and admitted to the bar in the last-named year. After serving from 1884—86 as member of the legislature in North Carolina he resigned to enter the Baptist ministry. He was pastor in Raleigh, N. C., 1887 ; Boston, Mass., 1888-89, and New York 1889-99. Among his works are ˆLiving Problems in Religion and Social Scienceˆ (1891) ; ˆWhat is Religion?ˆ (1892) ; ˆThe Failure of Protestantismˆ (1896) ; ˆSer¬ mons on IngersolP (1894) ; ˆThe Leopard's Spotsˆ (1902) ; ˆThe One Womanˆ (1903) ; ˆThe Clansmanˆ (1904) ; ˆThe Life Worth Liv¬ ingˆ (1905) ; ˆThe Traitorˆ (1907) ; ˆCom¬ rades' (1909) ; ˆThe Root of EviP (1911) ; ˆThe Sins of the Fatherˆ (1912) ; ˆThe South¬ ernerˆ (1913) ; ˆThe Victimˆ (1914) ; ˆThe Foolish Virginˆ (1915) ; ˆThe Fall of a Nationˆ (1916). He was made director-general of the National Drama Corporation (1915).

DIXON, William Hepworth, English au¬ thor: b. Manchester, 30 June 1821; d. London, 27 Dec. 1879. In 1849 he published a memoir of Howard, the philanthropist, followed by the ˆLife of William Pennˆ (1851), and by a work on Admiral Blake (1852). In 1853 he became editor of the Athencuum, a post which he re¬ tained till 1869. During this period he pub¬ lished several very popular works, including the ˆPersonal History of Lord Bacon. ˆ After his retirement from the Athenceum he wrote some 25 volumes of history, travel and fiction.

DIXON, William Macneile, English scholar : b. India 1866. He was educated at Trinity College, Dublin, and has been professor of English literature in the University of Glas¬ gow from 1904. He has published ˆEnglish Poetry from Blake to Browningˆ ; <A Tennyson Primerˆ ; Hn the Republic of Lettersˆ ; ˆHistory of Trinity College, Dublinˆ ; ˆEnglish Epic and Heroic Poetry.ˆ

DIXON, Ill., county-seat of Lee County, situated on the Rock River, about 65 miles above its junction with the Mississippi River and on the Illinois Central and the Chicago and North¬ western railroads. The city contains a court¬ house, public library, the Rock River Military Institute, the Northern Illinois Normal School and the Rock River Chautauqua. The industrial establishments of the city comprise shoe fac¬ tories, wagon works, condensed milk factories, farm implement works, furniture and wire cloth works and a Portland cement factory. The city was first settled in 1836; in 1911 the commission plan of government was put in operation. Pop.

8,000.

DIXON ENTRANCE, a strait on the west coast of North America, separating Queen Charlotte Islands from the Prince of Wales Archipelago, and so dividing British territory from a part of Alaska. It is about 100 miles long from east to west and 70 miles wide.

DIXWELL, John, English regicide : b. 1608; d. 18 March 1689. in 1646 he was elected member for Dover in the House of Commons, was one of the judges who condemned Charles 1 to death and signed the warrant. After the reaction in England which placed Charles H upon the throne, and caused himself and his associates in the trial to be excepted from the general pardon, he escaped to America, changed his name, taking that of John Davids, and lived undiscovered among the inhabitants of New Haven, where he was married and left children. In 1664 he visited two of his fellow regicides, Whalley and Goffe, who had found a refuge amid the solitudes of Hadley, Mass. His favorite study in exile was Raleigh's ˆHistory of the WorldC and he cherished a constant faith that the spirit of liberty in England would pro¬ duce a new revolution. Consult Stiles, 'ˆHis¬ tory of Three of the Judges of Charles I : Whalley, Goffe and DixwelP (Hartford 1794).

DIZFUL, dez-fool', Persia, capital of the province of Arabistan, about 190 miles west of Ispahan, on the river Diz. It has over 35 sacred tombs, and nearly as many mosques, a number of schools and baths ; but on account of the heat half of the town consists of subterranean excavations in the rock. The river is crossed by a handsome bridge of 22 arches. The chief article of commerce is indigo. Its pens, made of oak, are famous throughout the Orient. Pop. about, 25,000.

DJEZZAR, jez'zar (ˆˆbutcher®), the name given to Achmed Pasha: b. Bosnia about 1735; d. Acre 1804. He was born in Bosnia of Christian parents, but embraced Mohammedan¬ ism. He w'as famous for his obstinate defense of Acre against Napoleon I. He rose, through murder and treason, from the condition of a slave to be pasha of Acre. In the beginning of 1799 the French entered Syria from Egypt, and advanced from victory to victory till they reached Acre, which was laid siege to on 20 March. By advice of Sir Sidney Smith, Djezzar was induced to hold out ; and such was the savage doggedness of his defense that Bonaparte was obliged to retire on 21 May.

DMITRIEFF, mit'ryef, Radko, Bulgarian general : b. Grodez, Bulgaria, then a Turkish province. When his country obtained her inde¬ pendence (1878) he was one of the first pupils to pass through the new military academy at Sofia. The Bulgarian army being then entirely under Russian control, he completed his studies in Saint Petersburg (Petrograd), and returned home with the rank of captain on the eve of the Serbo-Bulgarian War of 1885. Immedi¬ ately promoted to colonel, Dmitrieff commanded a regiment in the Slivnitza campaign. He be¬ came implicated in the conspiracy which led to the abdication of Prince Alexander. Driven out of the country by Stambulov, Dmitrieff served over 10 years in the Russian army, but returned after the accession of Prince — later King — Ferdinand. In 1902 he was made chief of the general staff and placed in command of the military district on the Turkish frontier. In the first Balkan War (q. v.) he commanded one of the Bulgarian armies and won the first victory of Kirk Kilisseh. He was regarded as a popular hero, but weary of the quarrels among the Balkan Allies, b.e re-entered the

Russian service as a general. In the European War he was one of the youngest of the great army leaders. When Bulgaria refused to aid Serbia against Austria, Dmitrieff returned all his decorations to King Ferdinand and definitely cast in his lot with the Russians. He per¬ formed marvels of fighting in the Galician and Carpathian campaigns. When von Mackensen began his great Galician drive in the spring of 1915, he opened his attack against the Dunajec-Biala line held by Dmitrieff, broke through at Gorlice, and inflicted a severe defeat upon the Russians, which resulted in the reconquest of the whole province for Austria. Dmitrieff was relieved of his command and brought before a military tribunal. As his failure was due to lack of artillery he was honorably ac¬ quitted and reinstated. He served with dis¬ tinction two years longer and resigned in July 1917. See War, European — Eastern Front.

DNIEPER, ne'per (Russian, Dnjepr, dnyep'er; ancient Borysthenes) , a river of Russia which rises in the government of Smo¬ lensk, flows

south to Kiev, then southeast to Ekaterinoslaff. Here it takes a southerly direc¬ tion, flowing between steep, rocky banks and at a very swift rate through rapids which require the most expert pilots to bring a vessel over them in safetv and then _ only at high water. From Alexandrovsk the direction is toward the southwest. It gradually forms the estuary called the Dnieper Liman and flows into the Black Sea near Kherson. The river begins to be navigable above Smolensk. It has a total length of over 1,400 miles. The watershed or basin of the Dniper is about 202,000 square miles in extent and is inhabited by a population estimated at 14,000,000, who cultivate this fertile region famous for its black soil. The fishing industry of the river is also important and lu¬ crative. The annual commerce on the river in normal times is about $60,000,000, and consists chiefly of lumber and grain. The Beresina Canal connects the river with the Baltic, via the Beresina. Dwina, the Pripet and the Dnieper-Bug and Niemen canals. It is closed to navigation in its upper course during the winter months, but its lower course is closed only for about two months in midwinter.

DNIESTER, nes'ter (Russian, Dnjestr, dnyes'ter; the ancient Tyras ; later Danastris or Danastus), a large river of Europe, which has its source in a lake in the Carpathian Moun¬ tains, in Poland. Near Khotin it crosses the old Russian frontier and flows, in a southeastern direction generally with many windings. It forms the boundaries between Rumania and Poland and Rumania and Russia. It flows into the Black Sea between Ovidiopol and Ackerman. Its length is over 850 miles, 360 of which are in Austria. Its basin is about 30,000 square miles in extent; is mostly high land. There are rapids at Yampol. The chief affluents of the Dniester are the Sereth and the Stry. Modern improvements have made the river navigable from Khotin to the sea and its annual volume of commerce is very great, con¬ sisting for the most part of grain and lumber. It abounds in fish which are also a source of wealth and the catching of which gives a means of livelihood to thousands.

DOAB, doo'ab (Sanskrit, *Two Waters®), a name in Hindu applied indiscriminately to any tract of country between two rivers, but especially to the tract between the Ganges and the Jumna in the United Provinces. It is 500 miles long and 55 broad. It is the greatest wheat-producing area in the United Provinces. Its rich alluvial soil is irrigated by three canals. Other similar tracts have their distinctive name, as the Bari Doab, between the Bias and Ghara and the Ravi ; the Rechna Doab, between the Ravi and the Chenab ; the Jech Doab, between the Jhelum and the Chenab, the Sind Sagar Doab, between

the Indus and the Jhelum. The canal parallel to the Jumna from Delhi to Fyzabad is called the Doab Canal.

DOAK, dok, Samuel, American Presbyterian clergyman; b. Augusta County, Va., 1 Aug. 1749; d. Bethel, N. C., 12 Dec. 1830. He was graduated from Princeton; was for a time tutor in Hampton Sidney College ; and was licensed to preach in 1777. He first settled at Holston, and later at Salem, Tenn., where he built a small church, formed the Salem congregation, and established a school, the first organized in the Mississippi Valley west of the Alleghanies. It was incorporated in 1785 as Martin Academy, and in 1795 became Wash¬ ington College ; Doak was its president from 1795 to 1818. He then removed to Bethel, where he founded Tusculum Academy. He was known as *the apostle of learning and religion in the West.®

DOANE, don, George Hobart, American Roman Catholic clergyman ; b. Boston, Mass., 5 Sept. 1830; d. Newark, N. J., 20 Jan. 1905. He was graduated at Jefferson Medical College in 1850, became a deacon in the Protestant Episcopal Church, but later entered the Roman Catholic Church and was ordained priest in 1857. In 1873 he was made vicar-general of Newark, N. J., and in 1886 the Pope made him a domestic prelate with the title of monsignore. He wrote: ˆ First Principlesˆ ; ˆExclusion of Protestant Worship from Rome,ˆ *etc.*

DOANE, George Washington, American Episcopal bishop: b. Trenton, N. J., 27 May 1799; d. Burlington, N. J., 27 April 1859. He was educated at Union College and the General Theological Seminary in New York. He was ordained deacon in 1821 and priest two years later, having become in the meantime an as¬ sistant in Trinity Parish, New York. Here he remained until 1824, when he was appointed professor of rhetoric and belles-lettres in Wash¬ ington (now Trinity) College, Hartford. This position he held for four years, going then to Boston as assistant and afterward rector of Trinity Church. In 1832 he was consecrated bishop of New Jersey, and took up his resi¬ dence in Burlington, N. J., combining the rectorship of Saint Mary's Church with the episcopate until his death. Besides a vigorous prosecution of general religious work in his diocese, he devoted himself especially to the promotion of Christian education. In 1837 he founded Saint Mary's Hall, a boarding and day school for girls, at Burlington, and in 1846 or¬ ganized Burlington College in the same town. His zeal in this direction, combined with incom¬ plete knowledge of business principles, led to

financial embarrassment and ultimately to pre¬ sentment for trial before his brother bishops ; but though twice brought up, the charge was unanimously dismissed. In many ways Bishop Doane was far in advance of his time, advocat¬ ing daily services and the free church system when they were practically unknown in America. He left a large number of published sermons, lectures and essays, and was also a poet of no mean ability, his best-known poems being that beginning ˆWhat is That, Mother?) and the well-known hymn ˆSoftly Now the Light of Day.)

DOANE, William Croswell, American Protestant Episcopal bishop, b. Boston, 2 March 1832; d. Albany, N. Y., 17 May 1913. He was a son of G. W. Doane (q.v.). He was ordained deacon (1853) and priest (1856) in Saint Mary's Church, Burlington, N. J., serving as assistant there until the latter date, when he took charge of Saint Barnabas' Church, Bur¬ lington. He succeeded his father in the rector¬ ship of Saint Mary's (1859-61), and after hold¬ ing rectorships at Hartford, Conn. (1861-67), and Albany (1867-69), became in the year last named the first bishop of Albany, on the divi¬ sion of the large diocese of New York. In this position he acquired a reputation as a wise and statesmanlike administrator, and a diligent promoter of religious education. Saint Agnes' School at Albany was founded by him. He took a prominent part in the second, third and fourth Lambeth Conferences, and in the dis¬ cussions on the revision of the American prayerbook, to which his liturgical knowledge made valuable contributions. He was a firm believer in the cathedral system, and spent much labor on its organization at Albany, in¬ cluding the erection of a magnificent cathedral. In 1902 he was chosen chancellor of the regents of the University of the State of New York. His most important literary work is his ˆLife of Bishop George Washington Doaneˆ (1860). He has published also 'Mosaics, or the Har¬ mony of the Collects, Epistles, and Gospels) (1881) ; 'A Catechism of the Christian Year); 'The Manifestations of the Risen Lord) ; 'Rhymes from Time to Time) (1901).

DOANE, William Howard, American com¬ poser : b. Preston, Conn., 3 Feb. 1831; d. Cin¬ cinnati, Ohio, 24 Dec. 1915. He was chief edi¬ tor

of the Baptist ‘HymnaP and composed numerous popular evangelistic hymns and songs. He also published more than 20 collections of hymns and several cantatas. He early removed to Cincinnati where he was president and gen¬ eral manager of a firm of manufacturers of woodworking machinery from 1861 till his death.

DOBBIN, James Cochrane, American statesman: b. Fayetteville, N. C., 1814; d. there, 4 Aug. 1857. He was graduated at the Uni¬ versity of North Carolina in 1832, studied law, was admitted to the bar in 1835 and practised in Fayetteville. He was elected to Congress from North Carolina as a Democrat, and served from 1 Dec. 1845 to 3 March 1847. He was a member of the State legislature in 1848-52 and was chosen speaker in 1850. He was a member of the Democratic National Convention at Baltimore in 1852, and appointed Secretary of the Navy by President Pierce, serving from 7 March 1853 to 6 March 1857.

DOBBS FERRY, N. Y., residential village in Westchester County, on the Hudson River, and on the New York Central and Hudson River Railroad, 25 miles north of the city hall. New York. The Yorktown campaign was out¬ lined and planned here by Generals Washington and Rochambeau in the Livingston manor house, and in the same place, in 1783, took place the conference between Clinton, Carleton and Wash¬ ington. The first salute fired by a British waf sloop to the American flag was given opposite this place. At present Dobbs Ferry is mainly a fashionable residential suburb of the metrop¬ olis. It is pleasantly situated at the widest part of the Hudson River, called the Tappan Zee. It is the seat of the Masters School for Girls, Saint Christopher’s Home for Boys and Girls and the New York Juvenile Farm. It has also a hospital, public playground and a public library. The name is derived from a Swede, Jeremiah Dobbs, whose family for over a cen¬ tury maintained a ferry here. Pop. (1920) 4,401.

DOBEREINER, de’be-rl-ner, Johann Wolf¬ gang, German chemist: b. Hof, Bavaria, 15 Dec. 1780; d. Jena, 24 March 1849. He was professor of pharmacy and chemistry at Jena for 39 years, and discovered the combustibility of platinum, the apparatus for utilizing w’hich is known as Dobereiner’s lamp (q.v.). He pub¬ lished ‘Zur Pneumatischen Chemie,) and other works. His correspondence with Goethe and Charles Augustus of Weimar appeared in 1856.

DOBEREINER’S LAMP, a contrivance for producing an instantaneous light, invented by Professor Dobereiner, of Jena, in 1824, and in wide use before the introduction of the sulphur match. The light is

produced by throwing a jet of hydrogen gas upon recently prepared spongy platinum, whereupon the metal instantly becomes red hot, and then sets fire to the gas. The action depends upon the readiness with which spongy platinum absorbs gases, more especially oxygen gas. The hydrogen is brought into such close contact with oxygen (derived from the atmosphere) in the pores of the plati¬ num that chemical union, attended with evolu¬ tion of light, takes place.

DOBRITCH, dbb'rich, Rumania, town situated 26 miles north of Varna, formerly called Bazarjik. It contains a mosque and a number of churches. It was twice captured by the Russians, in 1774 and 1810. An important fair is held here annually. Pop. about 15,000.

DOBRIZHOFFER, do'brits-hof-er, Martin, a Jesuit missionary to the native tribes of Para¬ guay and author of a voluminous and celebrated memoir on the Abipones, a Paraguayan tribe : b. Gratz, Styria, 7 Sept. 1717; d. Vienna, 17 July 1791. At the age of 19 he entered the Jesuit order and in 1749, having been ordained priest, was assigned to the mission of Paraguay, in which he spent 18 years. On the expulsion of the Jesuits from the Spanish possessions in 1767 he returned to Austria, where he passed the re¬ mainder of his life, devoting his leisure to writing his memoir 'Historia de Abiponibus, etc.,) or in its English title, 'A history of the Abipones, a cavalier and warlike people of Paraguay, enriched with copious observations on the barbarous natives, rivers, beasts, amphi¬ bia, insects, principal serpents, fishes, birds, trees, plants and peculiarities of the said province.)

A translation of the work (somewhat abridged) by Sara, S. T. Coleridge's daughter, was pub¬ lished in three large volumes (1822).

DOBROLYUBOV, do-bro-lyoo'bov, or dob-roryiˆi-bolt, Nikolai Alexandrovich, Rus¬ sian critic: b. Nizhni Novgorod, 24 Nov. 1836; d. 1861. At the age of three he knew by heart several fables from Krylov's col¬ lections. At school he was considered as an enfant prodige and at home he spent all his time in the library of his father in which were many books on science and art. At the age of 13 he wrote

several original poems of considerable merit and translated into Russian verse some of Horace's best poems. Owing partly to the influence of his father (a parish priest) and partly to his own inclination to religion he became greatly devoted to the Christian faith and the Orthodox Church, which love he showed by a rough asceticism. During his studies at the University of Petrograd in 1854 Dobrolyubov lost in a rapid succession his parents and a sister. Poverty and sorrow de¬ layed his literary career until 1855, when he abandoned poetry and, aided by Chernyshevski, wrote for Sovremenik several essays in prose which astonished the critics by their manifesta¬ tion of deep erudition. His stories ˆDonosˆ (ˆReport®) and ˆDyeletzˆ (®The VersedˆO iiad a great success and improved considerably his financial affairs. Having lost all his dear ones, his heart, refined by suffering, became (1858) an easy prey to the eyes of a beautiful, chaste but extremely carelessly educated girl with whom he lived for some time, but from whom he had to separate on account of her vulgarity. However, he never forgot the good in that woman and under great strain he sent her at regular inter¬ vals pecuniary aid until her death. After this he had several other unfortunate love affairs which convinced him that his peace lay only in literature, and, indeed, until 1860 he was ex¬ tremely busy writing criticisms on novels, plays, stories, etc., for the leading periodicals of the capital. All his brilliant criticism carries the seal of the spirit of the sixties in Russian litera¬ ture which was then in a transient state from Hegel's metaphysics to the realism of the Eng¬ lish and French philosophers, from mystic dual¬ ism to plain monism and utilitarianism. His critical studies, ˆThe Dark Czardom,ˆ ˆ Spark of Light in the Dark Czardom,ˆ ˆWhen wilHhe To-Day come?ˆ etc., exhibit a powerful realism, deny the theory of nationalism in literature and contain a deep and universal analysis of the most essential sides of the Russian life.

DOBRUDJA, do-briVja, or DOBRUD-SCHA, Rumania (the ancient Scythia Minor), territory forming the southern division of the kingdom. Its boundaries are the river Danube on the north. Bulgaria on the south, the Black Sea on the east and the Danube on the west. Until the Treaty of 10 Aug. 1913, signed at Bucharest, its area was only 6,000 square miles, but at that time it received an addition of 3,500 square miles. It has a mixed population of Bul¬ garians, Circassians, Greeks, Roumanians,ˆ Tar¬ tars, Armenians, Jews and Turks, numbering in all about 500,000, of which about 200,000 came with the new territory in ˆ13. Until 1878 the Dobrudja formed part of Bulgaria. An ex¬ ceedingly fertile region it has always produced quantities of cereals, beets, grapes, forage crops

and tobacco ; agriculture being the main indus¬ try of the people.

DOBSCHUTZ, dop'shuts, Ernst von, Ger¬ man Biblical scholar: b. Halle 1870. He was educated at Leipzig, Halle, Berlin and Jena, and in 1899-1904 served as professor extraordinarv at the last-named institution. In 1904 he was appointed to a chair at Strassburg, in 1910 at Breslau and in 1913 became professor of New Testament exegesis at Halle. He has published several authoritative works dealing with the history of the apostolic age. These include Hverygma Petriˆ (1893) ; 'ˆStudien zur Text-kritik der Vulgataˆ (1894) ; ˆDie urchristlichc Gemeindeˆ (1902; Eng. trans., ˆChristian Life in the Primitive Church,ˆ 1904, probably his greatest work) ; ˆProbleme des apostolischen Zeitaltersˆ (1904) ; ˆDas apostolische Zeitalterˆ (1905; in Swedish, English and French transla¬ tions) ; ®Thessalonians® in Me3ˆer's ˆKom-mentarˆ (7th ed., 1909) ; ˆThe Eschatology of the Gospelsˆ (1910) ; ˆDas Decretum Gelasi-anumˆ (1912) ; ˆThe Influence of the Bible on Civilizationˆ (1914).

DOBSON, Henry Austin, English poet: b. Plymouth, 18 Jan. 1840; d. 2 Sept. 1921. From 1856ˆ1901 he held an official position at the Board of Trade. His earliest verses appeared in the St. Paul's and were subsequently pub¬ lished in book form under the title 'ˆVignettes in Rhymeˆ (1873). Subsequently he published several other volumes of verse, including ˆProverbs in Porcelainˆ (1877) ; ˆOld World Idyllsˆ (1883) ; ˆAt the Sign of the Lyreˆ (1885) ; ˆCollected Poemsˆ (1897) ; ˆCarmina Votivaˆ (1901). Among his prose works may be mentioned his Lives of Fielding (1883) ; Steele (1886) ; Hogarth (1879) ; Goldsmith (1889), and Horace Walpole (1890) ; critical biography of William Hogarth (1891) ; ˆThomas Bewick and His Pupilsˆ (1884) ; ˆFour French¬ womenˆ (1890) ; three series of ˆEighteenth Century Vignettesˆ (1892-96) ; ˆA Paladin of Philanthropyˆ (1899) ; ˆSidewalk Studiesˆ (1892). Many of his poems are written in various French forms, such as the triolet, ron¬ deau and ballade, and all are marked by grace¬ fulness, ease and meticulous finish. The atmos¬ phere of the 18th century hangs like a garment over his most characteristic work, both in prose and verse.

DOBSON, William, English portrait painter: b. London 1610; d. Oxford, 28 Oct. 1646. Having acquired considerable skill as a painter he came under the notice of Van Dyck, who introduced him to Charles J. On the death of his patron he succeeded him as sergeant-painter to the king. Among his portraits are those of himself and his wife. Sir Charles Cot-terell. Sir Thomas Browne's family, the first Duke of Newcastle, the Marquis of Montrose, Fairfax and Old Parr; and in addition there are other pictures by him, the chief being ˆThe

Beheading of St. John.ˆ

DOBSON, the larva of the great neurop-terons hellgrammite-fly (Corydalis cormitus), common all over temperate North America. The adult is among the largest of insects, its papery wings spreading more than four inches ; and it is dull brown in color. The female has strong biting jaws; and in the male these are extended into long, curved instruments that

look liKe formidable pincers, but are harmless, for they are used oitly in holding the female during the mating process. These insects fre¬ quent swift-running streams and rarely fly abroad in the daytime. In midsummer the female lays about 3,000 whitish eggs set on end in roundish patches the size of a cent-piece, glued to leaves overhanging water, or on rocks near its surface. The eggs soon hatch, and the minute larvae drop into the water, descend to the bottom and creep under stones, etc., where they cling to some firm object by claw-like appendages at the hinder end of the body. By preying on everything that can be caught they grow rapidly into powerful, tough-skinned, creeping marauders two inches in length. These are much sought after by anglers for bait, and are known by many names, as dobson, hellgrammite, crawler, water-grampus, hell-devil, alligator, *etc.* This aquatic life lasts for 2 years and 11 months. The dobson then leaves the water and crawls about on land, seeking a suitable place for pupation ; this occurs usually in May, and a month later the fly emerges and spends its few weeks of life in securing and fertilizing a mate, which lays her eggs and then dies. Consult Howard, Hnsect Lifeˆ (New York 1901).

DOCE, dd'sa, a river of Brazil, rising by several streams on the eastern slopes of the Sierra de Mantiqueira in the state of Minas Gerses and flowing to the Atlantic, which it enters about 30 miles northeast of Santa Cruz. It is about 600 miles long and is navigable up to 120 miles from its mouth.

DOCEN, dd'tsen, Bernhard Joseph, Ger¬ man philologist; b.

Osnabriick 1782; d. 1828. He studied under Heyne at Gottingen, and also at Jena. In 1804 he began his connection with the State Library at Munich and in 1811 was made its custodian. Docen made a critical examination of the Old and Middle High Ger¬ man manuscripts, which the secularization of the Bavarian cloisters caused to be deposited under his care at Munich. Docen was the first scholar to show the importance of the old glosses in Latin and German and the glosses in Latin works of the period from the 8th to the 12th century as a groundwork for a thorough study of the modern German language. Docen was a member of the editorial staff of the ˆMu¬ seum fiir altdeutsche Litteratur und Kunstˆ (2 vols., Berlin 1809-11). His published works include ˆMiscellaneen zur Geschichte der deutschen Litteratur und Kunstˆ (2 vols., Munich 1807-09).

DOCENT, dotsent', in America, a term in¬ dicating a member of the teaching staff of the lowest grade. In the University of Chicago it is the rank next above that of fellow. In some other institutions it indicates the highest formal academic honor, e.g., Clark University. In (Germany the docent is a teacher with full offi¬ cial relations and the term is used in a general sense to include professors of all grades.

DOCET.®, do-se'te, sectaries who held the human nature of Christ to be an illusion, phan¬ tasmal and not real. The word is from the Greek verb to appear, to seem. The

Docetae were adherents of the Gnostic school and their peculiar dogma was held by a swarm of Oriental sects which preceded and outlived Arianism, both in the East and West. Their

denial of the real humanity of Christ was made on the same ground on which Cerinthus (q.v.) denied that the universe is the creation of the principle of all good. That this view prevailed among sects in apostolic times is inferred from a passage in the first epistle of Saint John: ^^Every spirit which confesseth that Jesus Christ is come in the flesh is of God; and every spirit which confesseth not Jesus is not of God.^^

DOCHMIOSIS. See Hookworm Disease.

DOCK, a name applied to a large section of the genus Ritmex, belonging to the buck¬ wheat family (Polygonaccce) , chiefly those that are not acid. These are large perennial herba¬ ceous plants, with stout roots, alternate, ovate and often entire leaves, and bearing panicles of small greenish and usually perfect flowers in whorls. Their

roots have an acrid taste, are astringent and styptic and were used in medicine until stronger remedies took their place. The root of the water-dock (Ruinex aquaticus) makes a black color in a solution of sulphate of iron. This plant was greatly venerated by the Druids, who attributed to it miraculous qualities. Numerous species of this genus are known, some widely distributed over the north¬ ern hemisphere, 22 species being known in eastern and northern America. One variety, introduced by European settlers, was known among the Indians as ˆffhe white man's foot.®

DOCK WARRANT, a species of ware¬ house receipt given by a dockowner to the owner of goods specified in dock warrant, and engaging to deliver them to owners or as¬ signees. The Factor's Act in England has placed dock warrants on the same footing as bills of lading, and in many States of the American Union they have been declared nego¬ tiable by statute.

DOCKET, or DOCQUET (from «dock,® to cut short, to abridge), in law, a term indiffer¬ ently used for a summary of a larger writing; a small piece of paper or a formal record of judicial procedure; parchment containing the heads of a writing; an alphabetical list of cases in a court ; or a catalogue of the names of the parties who have suits depending in a court.

DOCKS. See Harbors, Docks and Break¬ waters.

DOCTOR, a term meaning teacher, or in¬ structor, applied by the ancient Romans to those who delivered public lectures upon philosophical subjects. In the Middle Ages, from the 12th century, it came into use as a title of honor borne by men of great learning, as by Thomas Aquinas (Doctor Angelicus), Duns Scotus (Doctor Subtilis), Roger Bacon (Doctor Mira-bilis), Bonaventura (Doctor Seraphicus) and other distinguished schoolmen. It was first made an academical title at the University of Bologna, in Italy, which received from the emperor the right of appointing doctores leguin (doctor of laws). The University of Paris fol¬ lowed in 1145. Soon after the popes granted the universities the right of appointing doctores canonum ct decretalium (teachers of the canon law) ; and when the study of the civil law came to be combined with that of the canon law, the title was changed to doctor utriusque juris (that is, teacher of both laws). The faculties of theology and medicine followed that of law in conferring this title. In the universities of Gerˆ

the title of Doctor of Philosophy (Ph.D.) is that which regularly corresponds to M.A. in Great Britain and in America, the philosophical faculty corresponding to the faculty of arts. The degree of Bachelor is subordinate to that of Master and Doctor. The degree of Doctor is either conferred publicly, with certain cere¬ monies, or by diploma. In many cases it is merely an honorary degree, in other cases it is conferred after examination or when the per¬ son receiving it has presented a sufficient thesis on a subject connected with the branch of study to which the degree distinctively belongs. In Great Britain and the United States the degrees of D.D, (Doctor of Divinity), LL.D. (Doctor of Laws) and M.D. (Doctor of Medicine) have long been conferred, the first two being generally honorary. At some of the universities the degrees of D.Lit. (Doctor of Literature) and D.Sc. (Doctor of Science) have been in¬ stituted in comparatively recent times, at some also that of D.Phil. (Doctor of Philosophy). The degree of Doctor of Music is conferred at the universities of Oxford, Cambridge, Dublin, London and Edinburgh. The degree may be honorary or conferred after examination. See University; Degree, Academic; and consult the authorities there referred to; consult also Denifle, ˆDie Universitaten des Mittelalters bis 1400ˆ (Berlin 1885) ; Rashdall, ˆUniversities of Europe in the Middle Agesˆ (Oxford 1895). Curious accounts of the revelry attending the ceremony of conferring degrees at Oxford will be found in Anthony a Wood's ˆHistory and Antiquities of the University of Oxfordˆ (Lon¬ don 1796).

DOCTOR ANGELICUS, or ANGELIC DOCTOR, a title bestowed by common con¬ sent of the scholastic divines, and ratified by the moderns, upon Saint Thomas Aquinas. See Aquinas, Thomas; Doctor of the Church.

DOCTOR JEKYLL AND MR. HYDE, The Strange Case of. Robert Louis Stevenson's powerful allegory of dual personality, ˆThe Strange Case of Dr. Jekyll and Mr. Hyde,ˆ has created so enduring an impression that ˆ(JekylPˆ and ˆˆHydeˆ' have become proverbial symbols of the good and the evil in human nature.

Dr. Jekyll, through the agency of a drug, is enabled to assume at will a

dwarfish, repulsive form embodying all the evil in his nature, so that in this shape, under the name of Edward Hyde, he may indulge his baser desires. A re¬ newal of the same potion enables him to re¬ assume the tall form of the benevolent physi¬ cian, dominated by the better side of his per¬ sonality — until the failure of the supply of the drug leads to the inevitable catastrophe.

The inception of the tale is traced to Steven¬ son's recollections of nursery traditions of the notorious Deacon Brodie, who was a respectable artisan by day and a burglar by night, sup¬ plemented by later reading of articles on sub-consciousness. But the story actually shaped itself in a terrible dream while the author was suffering from a hectic fever. In three days Stevenson had written a first draft of 30,0(X) words, only to burn it and to complete the final version in three, days more. The story, pub¬ lished in January 1ˆ6, in paper covers, had a sale of nearly 40,000 copies in six months in England alone, and was made the subject of sermons and editorials. It was extensively

pirated in the United States, where, however, further popularized by three dramatizations, it made the author's reputation. In a letter to Stevenson, John Addington Symonds doubted ˆ"whether anyone had the right so to scrutinize the abysmal depths of personality" ; adding, however, ®The art is burning and intense. The Peau de Chagrin disappears, and Poe's work is water. Also one discerns at once that this is an allegory of all two-natured souls who yield consciously to evil. Most of us are on the brink of educating a Mr. Hyde at some epoch of our being."

DOCTOR SYNTAX, The Three Tours

of, a series of three books (published 1812, 1820, 1821) by William Combe, written in verse and depicting the adventures of a certain Dr. Syntax, clergyman and teacher, who, on his horse Grizzle, sets out in the first book ®in search of the picturesque" ; in the second, in search of consolation; and in the third, in search of a wife. The three books were published together in 1826. The work is marked by mild satire, and describes many well-sketched types of char¬ acter and class.

DOCTOR OF THE CHURCH, a name given to certain eminent churchmen. Benedict XIV gave as the things required to make a man a Doctor of the Church : first, learning so eminent as to fit him to be a doctor in the Church and a doctor of the Church ; second, heroic

sanctity ; third, the title must be con¬ ferred by a declaration of the Pope or of a general council. The third has not always been insisted upon. In canon law four Doctors of the Church are named: Jerome, Gregory, Am¬ brose, Augustine. Others are called doctors without the formal declaration of Pope or coun¬ cil : Chrysostom, Gregory Nazianzen, Anselm, Isidore, Peter Chrysologus, Hilary, Athanasius and Basil have not the full office proper to doctors. Others who have been added by dec¬ laration of popes are Saint Thomas Aquinas, Saint Bonaventura, Saint Leo, Saint Bernard, Saint Alphonsus Liguori and Saint Francis de Sales.

DOCTOR-FISH. See Surgeon-Fish.

DOCTORS' COMMONS, in England, the popular name for the courts and offices for¬ merly occupied by the body incorporated in 1768 under the title of ®The College of Doc¬ tors of Law exercent in the Ecclesiastical and Admiralty Courts." This body took the place for older institutions of Doctors' Commons, founded in 1568, the buildings of which were destroyed in the Great Fire of 1666 and rebuilt in 1672. The buildings were situated on the east side of Saint Paul's churchyard. The col¬ lege consisted of a president (the dean of the arches for the time being), and of those doc¬ tors of law who, having regularly taken that de¬ gree in either of the universities of Oxford or Cambridge, and having been admitted advocates in pursuance of the rescript of the archbishop of Canterbiu'y, had been elected fellows of the college in the manner prescribed by the charter. They formed a distinct legal profession, the ad¬ vocates holding a position equivalent to attor¬ neys and the proctors to that of solicitors. The term commons refers to the meals, taken to¬ gether in a common dining-room. The Court of Arches (the appellate court of the archiepiscopal province of Canterbury') was the principal ju-218

dicial body meeting here. After the passing of laws in 1857 which made many legal reforms possible the charter of this college of doctors was surrendered, the property sold, the corpo¬ ration dissolved and the courts are merged with others, and are now open to all members of the bar.

DOCTRINAIRES, d6k-tr?-narz', a term applied to theorists or

theoretical politicians. The name had its origin in France in 1815. After the second restoration of the Bourbons a small number of deputies would neither rank themselves among the friends of absolute power nor among the defenders of the Revolu¬ tion. They supported Decazes while he was minister ; and several of them held offices in the ministry, as, for instance, the councillors of state, Camille Jordan and Royer-Collard. Their system embraced a constitutional monarchy on the British model with parliamentary control, allowing the government more power than the ultra-liberals would admit; ancf, on the other hand, restricting the royal power more and ad¬ mitting less approach toward the old form of government than the ultra-royalists demanded. They retired with Decazes, became merged in the Orleanists in 1830, and after the Revo¬ lution of 1848 ceased to exist as a political force. The first orator among them, was Royer-Col¬ lard ; they drew part of their inspiration from Talleyrand and Montesquieu, and their most distinguished writer out of the Chamber was Guizot. The ˆJournal des Debatsˆ was their principal organ. They received the name of doctrinaires because they were looked upon more as theoretical than practical politicians.

DOCTRINE. See Christian Doctrine, Development of.

DOCZI, dd'tse, Ludwig von, Hungarian author : b. Odenburg 1845. He was educated in Vienna and Budapest, became a journalist and in 1867 entered the office of the Austro-Hun¬ garian Ministry of the Interior. Sometime af¬ terward he became a councillor in the Ministry for Foreign Affairs. He has published ˆUtolso profetaˆ (1868) and '■A Csokˆ (The Kiss 1871), two dramas, also several prose works and some poems. He translated the first part of Goethe's ˆ Faust' (new ed. 1878) into Flun-garian and also Schiller's poems (1903-05).

DOD, Daniel, American mechanic : b. Vir¬ ginia, 28 Sept. 1788; d. New York, 9 May 1823. He was educated at Rutgers College. He de¬ voted himself to the study of steam machinery and the construction of steam-engines; the Sa¬ vannah (1819), the first steamship to cross the Atlantic, had an engine of his construction. He was killed by the explosion of a boiler on a steamboat, the machinery of which he had al¬ tered.

DODD, Frank Howard, American pub¬ lisher: b. Bloomfield, N. J., 12 April 1844; d. New York, 10 Jan. 1916. He prepared at Bloomfield Academy to enter Yale, but instead went into the New York publishing house of his father, M. W. Dodd. To this business he succeeded in 1870, forming a partnership with Edward S. Mead. Six years later Bleecker Van Wagenen joined the firm and the name was changed to

Dodd, Mead & Company. Beside publishing books in all departments of literature, the firm, under Mr. F. H. Dodd's

supervision, founded the Bookman in 1895 and in 1902 the ˆNew International Encyclopaedia' which succeeded the international Cyclopae¬ dia' of earlier years. Mr. Dodd was president of the American Publishers' Association for a number of years and had various civic and philanthropic interests, being largely instru¬ mental, as president of the Fourth Avenue As¬ sociation, in the business development of that street.

DODD, Walter Fairleigh, American edu¬ cator : b. Hopkinsville, Ky., 7 April 1880. He was graduated from Florida State College in 1898. In 1905 he took the degree of D.Ph. at the University of Chicago. In 1904-07 he was in charge of the section of foreign law in the Library of Congress. He held a research ap¬ pointment ■ at Johns Plopkins in 1908-10, in

1910-11 was associate in political science, in

1911-14 assistant professor, and in 1914-15 asso¬ ciate professor of political science in the Uni¬ versity of Illinois. From 1915-17 he was asso¬ ciate professor of political science in the Univer¬ sity of Chicago. He has published ˆModern Constitutions' (2 vols., 1909) ; ˆGovernment of the District of Columbia' (1909) ; ˆRevision and Amendment of State Constitutions' (1910), also contributions to legal and other technical journals.

DODDER, a genus of plants, Ciiscuta, of the family Custcutacece. The characteristics of the group are filiform twining stems, parasitic on other plants, to which they attach themselves by suckers. They have lost all trace of leaves, even the cotyledons of the embryo being no longer distinguishable, while chlorophyll is al¬ most completely absent. In one American spe¬ cies a slight trace of coloring matter has been noticed. The seed germinates very late in spring, and as the seedling rises from the ground a yellow or pink stem soon begins to show the sweeping movements of circumnuta-tion of a climbing plant. If no plant known as the ®host" is in the neighborhood for it to take up its quarters on, it falls to the ground, but retains its vitality for some weeks, by which time a victim may probably have germinated. As soon as it touches a living plant it twines firmly round it, and a series of small wart-like adven¬ titious roots (haustoria) are developed, from the centre of each of which a bundle of suc¬ torial

cells force their way through the epi¬ dermis and cellular envelope into the bast and press against the woody tissue of the host. The portion of the dodder stem below this attach¬ ment now dies off and there is then no longer any connection with the ground. The growing point again circumnutates until it finds a new base of attachment upon the same or a different stem of the host, there to repeat the formation of suckers. In this way a tangled skein of threads is formed, over which, late in the sea¬ son, the yellow or white flowers develop in dense clusters and the black seeds are shaken out of the capsule by the wind or gathered with the crop. This parasite in often very injurious, fields of flax, clover and lucerne sometimes showing well-marked patches completely deso¬ lated by the pest. These have to be mowed down and burned before new seed has set; while pains must be taken to procure seed free from those of the parasite. Preventive meas¬ ures are, to make careful examination of the

seed (see Seed Testing), rejecting any that contains dodder seed and anv produced upon land known to be infested by dodder. When observed growing among a crop, frequent hoe¬ ing and burning are often satisfactory. Pas¬ turing with sheep confined to the infested patches is also practised, the animals being kept for several weeks upon the land and given ex¬ tra food if necessary. The most satisfactory treatment, however, is clean cultivation or the growing of a crop upon which the dodder can¬ not grow. There are about 100 species of dod¬ der of wide geographic distribution, of which at least 25 are found in the western and south¬ ern parts of North America. The temperate species are all annual, but some of the tropical species are perennial. A common American name is tangle-weed. It is a remarkable cir¬ cumstance that Cassytha, a totally unrelated Oriental genus of Lauracece, has not only as¬ sumed the same general mode of life, and the twining, leafless habit, but germinates and pene¬ trates in a precisely similar way.

DODDRIDGE, Philip, American lawyer and statesman: b. Bedford County, Pa., 1772; d. 19 Nov. 1832. His English ancestors had set¬

tled in New Jersey. His father had married in Maryland in 1765 and soon thereafter settled near Middletown, Washington County, which at that time was claimed under the jurisdiction of Virginia. In 1789, young Philip was placed in school at Charlestown (now Wellsburg), W. Va. Soon thereafter he worked his way down the Ohio and the Mississippi as a laborer and super-cargo on one of the numerous flatboats. In 1797 he was admitted to the practice of law in Brooke County, and after a trip to Lancas¬ ter, Pa., to get married, he made Wellsburg his permanent home. In his practice of law, which extended to all northwestern Virginia, he was greatly aided by the endless litigation resulting from the confused and complicated character of land titles. Always interested in public af¬ fairs, he took an active part in politics. He was a member of the house of delegates of the Vir¬ ginia legislature 1815-16 and 1822-23. Against the arbitrary and oligarchical principles of the aristocratic tide-water politicians he began an opposition which he never relaxed. He took a leading part in the remarkable Virginia Con¬ stitutional Convention of 1829-30 which was called to amend the State constitution and over which ex-President James Monroe pre¬ sided. In the numerous debates, he urged a more equitable basis of representation and suf¬ frage, periodical appointment of the governor, selection of county courts independent of the legislature and other reforms. In 1829 he was elected to Congress and continued to serve until his death. He was active in opposing an at¬ tempt to annul the control of the Supreme Court over State courts, which he regarded as equivalent to a motion to dissolve the Union ; and he obtained a wide reputation through a speech which he made in favor of parliamentary privileges in the case of the arrest of Sam Houston. His last public service was per¬ formed as chairman of a committee to draft a code of laws for the District of Columbia. He was buried in the Congressional Cemetery at the seat of government.

DODDRIDGE, Philip, English Non-Con¬ formist clergyman and author: b. London, 26

June 1702; d. Lisbon, Portugal, 26 Oct. 1751. He determined to enter the NonConformist ministry and was educated at a theological acad¬ emy at Kibworth, Leicestershire. In 1723 Dodd¬ ridge became pastor of the dissenting congrega¬ tion at Kibworth. After declining several in¬ vitations from congregations whose rigid ideas of orthodoxy he felt would be uncongenial to him, he established a dissenting academy at Market Harborough in 1729, removing as min¬ ister in the same year to Northampton Here he continued to preach and train young

students for the ministry till shortly before his death. Doddridge was at once liberal and evangelical, and with all his religious earnestness and en¬ thusiasm had humanity enough for such levities as cards and tobacco. He strove earnestly for unity among the dissenting bodies. His prin¬ cipal work is ˆThe Rise and Progress of Re¬ ligion in the SouP (1745), which has been translated into Dutch, German, Danish, French, and even Syriac and Tamil. Besides this may be mentioned ˆThe Family Expositorˆ (1739-56) ; his ˆCourse of Lectures,ˆ delivered to the students under his charge, and published (1763) ; and a great variety of sermons on mis¬ cellaneous religious topics. His hymns, nearly 400 in number, have carried his name over the English-speaking religious world, perhaps the best known being ˆHark, the Glad Sound, the Saviour Comesˆ ; and God of Bethel, by Whose Hand.ˆ His ˆCorrespondence and Diaryˆ appeared 1829-31. Consult Orton, ˆLife of Doddridgeˆ (1766) ; Stanford, ˆLife of Doddridgeˆ (1880).

DODDS, Alexander, American editor: b. Allegheny, Pa., 5 April 1874. Fie was gradu¬ ated from Duff's College, Pittsburgh, Pa., in 1890 and has since been engaged as newspaper writer and editor on various journals. In 1894-96 he was associate publisher of The Builder, Pittsburgh, in 1902 was night editor of the Pittsburgh Dispatch, in 1902-04 associate pub¬ lisher of the Telegraph, Sharon, Pa., and in 1905-08 night editor of the Gazette Times, Pittsburgh. In 1908-14 he was managing edi¬ tor of the Christian Science Monitor, and man¬ aging editor of the Los Angeles Herald, 1914~16.

DODECAHEDRON, d6-dek-a-heMr6n, a regular solid bounded by 12 equal and regular pentagons, or having 12 equal bases. A solid having 12 faces.

DODECATHEON. See Cowslip.

DODGE, Charles Richards, American tex¬ tile fibre expert : b. Covington County, Miss., 17 July 1847. He was educated at the Shef¬ field Scientific School of Yale and was assist¬ ant entomologist in the United States Depart¬ ment of Agriculture 1867-77, editing Field and Forest 1874-77. From 1890-98 was in charge of the fibre investigations of that department, when he published 20 special reports, including ˆA Descriptive Catalogue of Useful Fibre Plants of the World. ˆ Officially connected with 11 international expositions, serving as a mem¬ ber of the jury of awards. He received the cross of the Legion of Honor of France in 1901.

DODGE, Cleveland Hoadley, American merchant: b. New York, 26 Jan. 1860. He is a son of William E. Dodge, was graduated at

Princeton University in 1879. He became a director of several banks, insurance companies,

railroads, mining companies, etc., treasurer of the El Paso and Southwestern Railroad and vice-president of Phelps, Dodge & Company. He was elected president of the board of trus¬ tees of Robert College, Constantinople, is vice-president of the Museum of Natural History, New York, and trustee of the Carnegie Insti¬ tute, Washington, D. C., and of the New York Public Library.

DODGE, Francis Safford, American soldier : b. Danvers, Mass., 1842 ; d. 1908. He saw service during the Civil War, after which he entered the regular service as first lieutenant of the Ninth Cavalry. In 1880 he was trans¬ ferred to the paymaster's department with the rank of major. He was promoted to be pay¬ master-general, with rank of brigadier-general, in 1904. He was retired in 1906. In 1870, with four troops of the Ninth Cavalry, Dodge de¬ stroyed a large Indian camp in the Guadelupe Mountains. In 1879, with Troop D of the same regiment, he made a forced march of 100 miles to the relief of Maj. Thomas T. Thornburg, whose force the Indians threatened to annihi¬ late near Mill Creek in western Colorado. Dodge and his troop of colored cavalrymen fought their way through the Indians, joined Thornburg and enabled him to hold the enemy at bay until re-enforcements arrived. For this he was awarded the congressional medal of honor and brevetted major.

DODGE, Grace Hoadley, American edu¬ cator and social betterment leader: b. New York 1856; d. 27 Dec. 1914. She was a sister of Cleveland H. Dodge (q.v.). For over 30 years she was deeply interested in increasing opportunities for self-supporting women. At various times she was a member of the New York School Board, treasurer of Teachers' Col¬ lege and president of the Working Girls' So¬ ciety. Her greatest work was the unification and assured success of the Young Women's Christian Associations of the United States. She was president of its national board and member of the world's committee. She gave, about two years before her death, $350,000 for the metropolitan association and national board building of the Y. W. C. A. in New York. She edited ˆThoughts of Busy Girlsˆ (1892) and was author of ˆA Bundle of Letters to Busy Girls on Practical Mattersˆ (1897; translated into several European tongues) ; and joint-author of ˆWhat Women Can Earnˆ (1899).

DODGE, Grenville Mellen, American soldier and civil engineer : b.

Danvers, Mass., 12 April 1831; d. Council Bluffs, Iowa, 3 Jan. 1916. He received his education at the University of Norwich, Vt., and served on the United States survey expedition on the Platte River, perhaps the earliest of its kind undertaken with the object of finding a railroad route to the Pacific Coast. In the Civil War he joined the Union forces and at its close was major-general of volunteers. He was commander of the 16th Army Corps under Sherman during the Atlanta campaign and later was placed over the De¬ partment of Missouri. He served as chief engi¬ neer of the Union Pacific Railroad fromˆ 1866 to 1870 and for the next 10 years held a similar post with the Texas and Pacific Railroad. In 1867 he was elected to Congress from Iowa and served two years. He was named chairman of a commission, in 1898, to inquire into complaints

charging mismanagement and incompetency in connection with the war against Spain.

DODGE, Jacob Richards, American agri¬ cultural statistician; b. New Boston, N. H., 1823 ; d. 1902. He received an academic and technical education. From 1845 to 1849 he taught in Mississippi, in 1850-54 edited a paper at Nashua, N. H., and from 1857 to 1861 edited the American Ruralist at Springfield, Ohio. For about a quarter of a century he edited the reports of the Department of Agriculture and wrote pamphlets on rural economics. He had foreign commissions for the department in 1873 and in 1887, and in 1893 became a member of the editorial staff of the Country Gentleman. He wrote ˆRed Men of the Ohio Valleyˆ (1860); ˆWest Virginia: Its Farms and Forests, Mines and Oil Wellsˆ (1865); ˆFarm and Factoryˆ

(1884).

DODGE, James Mapes, American me¬ chanical engineer: b. Waverly, N. J., 30 June 1852; d. 4 Dec. 1915. He was educated at Cor¬ nell University and at Rutgers College. He did much original work in improving conveying machinery and allied appliances. He was elected chairman of the Link Belt Company of Phila¬ delphia and later president of the J. M. Dodge Company and the Dodge Cold Storage Company. In 1903 he was president of the American So¬ ciety of Mechanical Engineers. He published ˆThe Money Value of Technical Education Trainingˆ (1903).

DODGE, Mary Abigail (pseudonym, «Gail HamiltonˆU, American author: b. Hamilton, Mass., 1830; d. there, 17 Aug. 1896. For several years she was instructor in the High School at Hartford, Conn. From 1865 to 1867 she was one of the editors of Our Young Folks. Be¬ sides numerous contributions to current litera¬ ture, she wrote ˆGala Daysˆ (1863) ; ˆWoman's Wrongsˆ (1868) ; *ˆThe Battle of the Booksˆ (1870) ; ˆWoman's Worth and Worthlessnessˆ (1871) ; ˆThe Insuppressible Bookˆ (1885) ; ˆA New Atmosphereˆ (1864); ˆRed-Letter Daysˆ ; ˆCountry Living and Country Thinkingˆ ; ˆA Washington Bible Classˆ ; ˆTwelve Miles from a Lemonˆ ; ˆBiography of James G. Blaineˆ ; ˆOur Common School System.ˆ ˆGail Hamil¬ ton's Life in Lettersˆ was issued in 1901, and ˆChips, Fragments and Verses,ˆ edited by H. A. Dodge, in 1902.

DODGE, Mary Elizabeth Mapes, Ameri¬ can editor, author and poet: b. New York, 26 Jan. 1831 ; d. Tannersville, N. Y., 21 Aug. 1905. Her father was Prof. James J'. Mapes, and she became the wife of William Dodge, a well-known lawyer, of New York, but was early widowed. From 1873 until her death she edited, with remarkable ability and success, St. Nicho¬ las Magazine (New York). Her best-known work was ˆHans Brinker, or the Silver Skates' (1865), which went through many editions, was translated into five foreign languages, was crowned by the French Academy and is a recognized classic of juvenile literature. Among her other works are Hrvington Storiesˆ (1864) ; ˆTheophilus and Others' (1876) ; ˆDonald and Dorothyˆ (1883) ; ˆThe Land of Pluck' (1886) ; ˆ Along the Way,' a collection of poems (1879) ; ˆWhen Life is Young' (1894) ; ˆPoems and Verses' (1904). Consult the memorial article in St. Nicholas Magazine (October 1905).

DODGE, Richard Elwood, American geog¬ rapher : b. Wenham, Mass., 30 March 1868. He was graduated at Harvard University in 1890, taught geology there 1891-94. In 1895-96 he was instructor in geology and geography, in

1896-97 associate professor of natural science,

1897-1916 professor of geography at Teachers' College, Columbia University, professor emeri¬ tus after 1916. He was assistant on the United States Geological Survey in the northeastern and southern Appalachians in the summers of 1890-95, He is the author of EReader in Physi¬ cal Geography for Beginnersˆ (1900) ; ˆDodge's Geographiesˆ (1903) ; ˆDodge's Geographical Note Booksˆ (1912), and numerous articles on the teaching of geography. He is co-author, with Kirchway, of ˆTeaching of Geography in Elementary Schoolsˆ ; and of the English edi¬ tion of 'ˆLa Geographie humaine.ˆ

DODGE, Walter Phelps, American author and lawyer : b. of American parents in Beirut, Syria, 13 June 1869. He is a nephew of William Walter Phelps (q.v.). He studied in Greece and Germany, and later at Yale and Oxford. He was admitted to the London bar in 1898 and to the New York bar in 1909. Among his works are ˆThree Greek Talesˆ (1892) ; ˆAs the Crow Fliesˆ (1893) ; ˆA Strong Man Armedˆ (1896) ; ˆThe Sea of Loveˆ (1898) ; ˆPiers Gavestonˆ (1899) ; ˆFrom Squire to Princeˆ (1901) ; ˆThe Real Sir Richard Burtonˆ (1907) ; ˆKing Charles I, a StudyU1912), and ˆThe Purple IrisU1915).

DODGE, Kan., town, county-seat of Ford County, on the Arkansas River, the Atchison, Topeka and Santa Fe and the Chicago, Rock Island and Pacific railroads, about 150 miles west of Wichita. When first settled as a Texas cattle-shipping point the place was noted for its lawlessness. It was the centre of irnportant lines of freighting. The business attained its maximum in 1884, when herds aggregating 800,-000 cattle in charge of 3,000 men passed through Dodge from Texas on the way north. Much hunting was done in this section, for buffalo and other game were then plentiful. It is the trading centre of an agricultural and stock-raising region. It is the seat of Soule College which is under the control of the Methodist Episcopal Church ; a United States land office and weather bureau and a Carnegie_ library. Dodge has division offices and machine shops of the Santa Fe Railroad. It owns its waterworks and has adopted the commission form of government. It was formerly known as Dodge City and was named for Gen. Henry Dodge, governor of Wisconsin Territory. Consult Wright, R. M., ˆDodge City, the Cowboy Capital.ˆ Pop. 5,061.

DODGE CITY, Kan. See Dodge, Kan.

DODGEVILLE, Wis., city, county-seat of Iowa County, situated on the Illinois Central and the Chicago and Northwestern railroads, about 50 miles southwest of Madison. The in¬ dustries of the place are chiefly those of an agricultural region, notably creameries. The lead and zinc mines nearby add to the wealth of the city. The principal industry is

the making of butter and cheese. The city is named after the Territorial Governor of that name, who lived here for many years. Pop. 1,896.

DODGSON, doj'son, Charles Lutwidge

(Lewis Carroll), English mathematician and author: b. Daresbury, near Warrington, 27 Jan.

1832; d. Guilford, 14 Jan. 1898. He was gradu¬ ated from Christ College, Oxford, in 1854, took orders in the Anglican Church in 1861 and till 1881 was a mathematical lecturer. His first pub¬ lication was ˆA Syllabus of Plane Algebraical Geometryˆ (1860) ; in the following year he issued the ˆFormulae of Plane Trigonometryˆ and in 1864 appeared his ˆ Guide to the Mathe¬ matical Student.ˆ He still remained quite un¬ known to the public at large, but in the next year became famous as the author of ˆAlice's Adventures in Wonderland,ˆ which, though written for the young, has found not less ap¬ preciation among those of riper years and has been translated into many languages. Equally delightful is the continuation of Alice's adven¬ tures narrated in ˆThrough the Looking-glass and what Alice Found Thereˆ (1871), an excep¬ tion to the common rule as to the inferiority of continuations. Both books were admirably illus¬ trated by Tenniel. Dramatized versions by Saville Clark were put on the stage in 1886. ˆThe Hunting of the Snark: an Agony in Eight Fitsˆ (1876), a fantastic narrative in verse, had by no means an equal popularity, however. Among his other works are ˆElementary Treatise on Determinantsˆ (1867) ; ˆPhantas¬ magoria and other Poemsˆ (1876) ; Euclid and His Modern Rivalsˆ (1879) ; ˆRhyme? or Reason?) (1883); 'A Tangled Tale> (1885); ˆThe Game of Logic) (1887) ; ˆCuriosa Mathematica) (1888 and 1893) ; ˆSylvie and Bruno) (1889-93), and ˆSymbolic Logic) (1896). (See Alice in Wonderland; Through THE Looking-glass). Consult his ˆLife and Letters,) edited by S. D. Collingwood (London 1898), and ˆLewis CarrolP by B. Moses (New York 1910).

DODLET, a name sometimes applied to the tooth-billed pigeon (Didiinctilus strigirostris) , of the Samoan IslanGs.

DODO, do'do, or DRONTE (Didus in-eptus), the name of a very remarkable extinct bird discovered by the Portuguese about 1507 on the island of Cerne or Mauritius and after¬ ward seen there by the Dutch, both at the end of the 16th and in the beginning of the 17th

century. Between 1610 and 1620 live specimens were brought to Europe for exhibition. The last authentic record shows its survival until 1681. As it was never seen after this it was deemed by some altogether fabulous ; but its actual existence was completely established not only by drawings made by artists who accom¬ panied the Dutch voyagers and preserved in Utrecht, Vienna and Berlin, but by fragments of the bird itself — among others, a foot in the British Museum, both a head and a foot in the Ashmolean Museum at Oxford and a skull at Copenhagen. Several other fragments and even entire embalmed birds reached certain of the continental museums, but seem to have been mostly lost or destroyed. In 1865 and again in 1889 large numbers of bonesˆ of the dodo were found in a marsh in Mauritius from which an almost complete skeleton has been set up in the British Mjuseum and others distributed to va¬ rious collections. The dodo had short and ill¬ shaped legs and feet, scarcely able to support its clumsy and almost globular body, which was about twice as large as that of a turkey; and a monstrous head which, apparently ill-attached to its body, contained an enormous mouth and

terminated in a strong hooked beak. Though covered with thick plumes it was destitute of wings sufficient for flight and had their place supplied by mere stumps or rudimentary append¬ ages, covered with soft, ash-colored feathers intermixed with yellowish-white ; the tail was composed of a few small curled feathers of the same description. Naturalists are now agreed that the dodo should be put in the order Colombce (q.v.) or pigeons, of which it with one or two similarly extinct birds from neighboring islands, notably the Bourbon or Reunion dodo (Didus solitarius), is the representative of an extremely modified family type (Dididce). The cause of the extinction of the dodo together with several of its associates in the land fauna of Mauritius is said to have been the hogs which, let loose from the ships of the early ex¬ plorers, multiplied greatly and overran the island. Consult Strickland and Melville, ˆThe Dodo and its Kindredˆ (London 1848), and Rothschild's ˆExtinct Birds. ˆ

DODONA, do-do'na, a celebrated town in Epirus, 11 miles west of the modern town of Janina, on a spur of Mount Tomarus, in the neighborhood of which was one of the most ancient oracles in Greece. This oracle long maintained its celebrity. It belonged to the Pelasgic Zeus, who was supposed to dwell in the stem of an oak tree. The prophetic priestesses announced the divine communica¬ tions in different ways. They approached the sacred tree and listened to the rustling of its leaves; or, standing by the fountain at the foot of the tree, observed the murmuring of the water which gushed forth from the earth, and in other ways. The sanctuary at Dodona was destroyed by Dorimachus, the .ˆEˆtolian general, in 219 B.c. For over 1,300 years the site of the shrine was lost to history, but following on the conjectures of Bishop Wordsworth in 1832, excavations made by Constantin Carpanos in 1878 revealed the temples of Zeus and Aphro¬ dite, the walls encircling the town and the theatre. Consult Diehl, ˆExcavations in Greeceˆ (London 1893) ; Gardner, ˆNew Chap¬ ter in Greek History> (ib. 1892) ; and Words¬ worth, C., ˆGreeceˆ (ib. 1839). See Zeus.

DODS, Marcus, Scottish theologian: b. Bel-ford, Northumberland, 11 April 1834; d. Edin¬ burgh, 26 April 1909. He was educated in Edinburgh, and in 1858 was licensed as a proba¬ tioner of the Free Church of Scotland. He was lacking in those pulpit gifts which are sometimes considered essential to success in a democratic church, and served a depressingly long probationership, preaching as a candidate for 23 vacancies before he was in 1866 ordained to Renfield Free Church, Glasgow, where he re¬ mained a power for good, especially among young men (of whom Henry Drummond was one), till appointed in 1889 to the chair of New Testament exegesis in New College, Edinburgh. Among his published works some of the most important are ˆMohammed, Buddha, and Christˆ (1877); ˆHandbook on Genesisˆ (1882); ˆParables of Our Lord> (1883 and 1885) ; ˆErasmus and Other Essaysˆ (1891) ; ˆFoot¬ steps in the Path of Christˆ ; ˆChrist and Manˆ (1909). Two volumes of his letters have been published, edited by his son.

DODSLEY, Robert, English dramatist and bookseller; b. near Mansfield, Nottinghamshire,

1703; d. Durham, 23 Sept. 1764. He became a footman, and published by subscription a volume of poems, entitled the ˆMuse in Livery,ˆ which attracted public favor, less from its intrinsic merit than from the situation of the author. His next effort was the ˆToyshop,ˆ a dramatic

satire. Pope patronized this, and through his influence it was brought upon the stage in 1735. Dodsley was enabled, by his profits as an author, and the financial assistance of Pope, to set up a bookseller's shop in Pall Mall, which ulti¬ mately proved very prosperous, and which brought him into close relationship with the literary celebrities of his time. He next wrote the farce of the ˆKing and the Miller of Mans¬ field,ˆ founded on an old ballad, which suc¬ ceeded so well that he produced a sequel to it, called ˆSir John Cockle at Court. ˆ In 1741 he brought out a musical piece, entitled the ˆ Blind Beggar of Bethnal Green. ˆ He subsequently wrote ˆEconomy of Human Life,ˆ a well-known collection of moral maxims; a tragedy, ˆCle-oneˆ ; and a'selection of fables in prose, with an ˆ Essay on Fablesˆ prefixed. He planned the ˆPreceptorˆ ; the ˆAnnual Register) (com¬ menced in 1758 and still published much on the lines in which he projected it) ; the ˆCollection of Old Plays, ˆ which now chiefly sustains his fame as a publisher; and the ˆCollection of Poems by Different Hands. ˆ Consult paper by Austin Dobson in ˆEighteenth Century Vignettes,) 2d series, 1894; and the biography by R. Strauss (New York 1910).

DODSON, John E., American actor : b. England 1857. He studied law, but early in life went on the stage, appearing first in Manches¬ ter; he supported Charles Matthews and other star players in England; and in 1889 came to the United States with Mr. and Mrs. Kendal. His first appearance in New York was at the Fifth Avenue Theatre in ˆA Scrap of Paper) in 1889; later he joined the Empire Theatre Company as leading comedian. He originated the character of Richelieu in ˆUnder the Red Robe,) and has taken the part of Richelieu in ˆRichelieu's Stratagem,) in vaudeville and the part of John Weatherby in ˆBecause She Loved Him So.) Played at Drury Lane Theatre, Lon¬ don, 1902, as Simonides in ˆBen Hur) ; ap¬ peared as star in ˆAmerican Invasion,) New York, October 1902 ; played Pierre in all-star cast production of ˆTwo Orphans,) 1904-05; created Stephen Roland in Clyde Fitch's com¬ edy, ˆThe Truth) ; created star role. Sir John Coteswold, in <The House Next Door) at the Gaiety Theatre, New York, L909, and played same piece for next two seasons throughout the country.

DOE, John, and RICHARD ROE, two

fictitious personages in law who formerly ap¬ peared in a common-law suit of ejectment. The former was the plaintiff and the latter the defendant. The fiction on which their appear¬ ance was based was abolished by the Common Law Procedure Act (1852), and now accord¬ ingly ˆ they do not appear in England. In American usage, attempts have been made to substitute other names, but in proceedings where the identity of the alleged criminal is not known,

or is designedly concealed for any reason, John Doe is the favorite term employed.

DOES, doos, Jacob Van Der (®The Elder))), Dutch painter: b. Amsterdam, 4 March

1623; d. 17 Nov. 1673. After study with local masters he lived in France and Italy, painting landscapesˆ of merit, but somewhat dark and spiritless in many instances. He was more successful with animals and figures. He had two sons, Jakob and Simon, both painters of note.

DOFFER (doff, to put off), a small and slowly revolving cylinder, which strips the cotton or wool from the cards on the main cylinder of a carding machine.

DOG, a mammal of the order Carnivora, family Canidcu-. The origin of the domesti¬ cated dog is unknown, but probably it is of com¬ posite descent. (See Dogs, Wild.) When the different tribes and races of men drifted about the earth's surface they took their dogs with them and no doubt breeds were mixed and races exchanged. By naturalists and writers in times gone by, dogs have been divided into groups, but for practical purposes at the present time they are divided into two classes — sporting dogs and non-sporting dogs. Controversies still rage as to the origin of certain classes of dogs, but almost all hounds that run by scent and the greyhound that runs by sight, were of Per¬ sian, or at any rate Asiatic origin. The pointer in scientific parlance is the same dog as the hound, and the setter is a large spaniel. The Molossus of the ancient Greeks may be the same as the Thibet mastiff and progenitor of the Great Dane, boarhounds, mastiffs and pos¬ sibly the bulldog.

The main characteristic of the dog is his re¬ liance on man, upon whom he looks as head of the pack.

In enumerating the breeds we have to deal with at the present day the following comprises the category as met with at the leading dog shows

held under the auspices of recognized kennel clubs, or that are used in the ordinary vocations or sports of life :

NON-SPORTING DOGS.

Mastiff.

St. Bernard.

Newfoundland.

Collie.

Smooth Collie. Bobtail Sheepdog. Poodle. Dalmatian.

Bull Dog.

Pug.

Toy Spaniel. Japanese Spaniel. Maltese. Pomeranian.

Italian Greyhound. Schipperke.

Chow Chow. Chihuahua.

Bull Terrier. Boston Terrier.

SPORTING DOGS.

Bloodhound.

Foxhound.

Staghound.

Harrier.

Beagle.

Otterhound.

Deerhound.

Greyhound.

Whippet.

Great Dane.

Wolfhound.

Borzoi (Russian Wolfhound). Pointer.

Setter.

Retriever.

Irish Water Spaniel. Clumber Spaniel. Sussex Spaniel.

Black Field Spaniel. Norfolk Spaniel. Cocker Spaniel. Bassetthound. Dachshund.

Fox Terrier.

Scottish Terrier. Skye Terrier.

Irish Terrier.

Welsh Terrier. Dandie Dinmont. Airedale.

Bedlington.

The interests of the dog and its betterment in breed and those qualities that make the ani¬ mal valuable are looked after by clubs and as¬ sociations principally in the United States, Eng¬ land, France, Germany, Austria, Russia, Italy, Australia and South Africa, in which countries official" shows are held at stated times and the rules governing these organizations are recog¬

nized so far as breeds are concerned by these governments. A large number of illustrated magazines and journals in all parts of the world are devoted to the interests of the canine race. The principal ones in England are Oiir Dogs; Stock-keeper ; Illustrated Kennel News; and The Field; in the United States Rider and Driver; Field and Fancy; Dog Fancier; The Kennel; The Sportsman's Review; Stock-keeper; The Field; and The Dog.

Bloodhound. — In general appearance this noble animal impresses one as the most digni¬ fied of any dog. The head is long and clean with tremendous wrinkles and pendulous ears, the eye is small and deeply set, and shows much of the haw. The old fallacy of bloodhounds being ferocious is absurd ; they hunt or trail persons by scent and on finding their quarry do not attack, but stand baying until the pursuers arrive.

Standard. — Skull long, narrow and very much peaked ; muzzle deep and square ; ears set on very low, thin and hanging in graceful folds close to the face ; deep-set eyes, with triangular lids showing the red haw ; flews long, thin and pendulous, the upper lip overhanging the lower one ; neck long, with profuse dewlap ; skin of face very loose and wrinkled; coat close; skin thin; shoulders deep and sloping; brisket well let down ; loins broad and muscular ; powerful thighs and second thighs ; good legs ; round feet; hocks well bent; tapering stern. Colors: black and tan, red and tan, and tawny.

Saint Bernard. — This magnificent dog takes its name from the monastery of Mount Saint Bernard, Switzerland, and is remarkable for its high order of intelligence. It was used by the monks for rescuing travelers lost in the snow. The old type which was small and some¬ what plain in head is fast dying out, the pres¬ ent show specimens being more on the mastift' type of head.

Standard. — Head very massive and large, showing great depth from eye to lower jaw; face rather short, muzzle wide, deep and cut off square; lips hanging down well and rather loose, the stop well defined, but not too abrupt ; skull massive and well rounded; eyes dark in color, of medium size, rather deeply set, the lower eyelid drooping slightly, so as to show a little of the red haw ; ears rather small, lying well to the cheek, and very slightly feathered in the rough variety; nose black in color, wide and deep, legs straight, with great bone and muscle ; hocks and stifle well bent ; feet large and compact ; body rather long, broad, straight and ribs well rounded. The coat of the smooth-or shortcoated variety should be very close, thick and slightly broken-haired. In the rough variety the coat should be dense and flat,

of medium length, not woolly, rather long on the neck, thighs and tail. Color and markings : orange, orange-tawny and .all shades of brindle and red. The markings should be as fol¬ lows : White muzzle, white blaze on face, shaded with black, black shadings on the ears, white collar round neck and white on chest, legs and tip of tail. The body may be white with patches of any of the above colors.

Great Dane. — This dog is a most symmetri¬ cal animal and the embodiment of agility and strength. They were originally used in Den¬ mark and Germany for boar and deer hunting. They make ideal watch dogs.

Standard. — Head, which should be carried high, long and not too broad ; muzzle broad, strong and blunt; eyes small, with sharp ex¬ pression; neck long and arched, free from dew¬ lap ; chest moderately broad ; brisket deep ; loin slightly arched ; shoulders sloping ; elbows well under ; belly wˆell drawn up ; legs straight and muscular; second thighs long and strong; feet large, well arched, and close ; coat hard and dense; tail strong at root, and ending fine, car¬ ried rather low. Colors : brindle, fawn, harle¬ quin, black, white and blue.

Mastiff. — In this old breed we have prob¬ ably the most massive and ferocious looking of dogs.

Standard. — Head large and massive; skull flatly rounded ; ears small ; muzzle square, deep and broad; teeth level; eyes brown or hazel-colored, and wide apart; front legs straight, with great bone ; chest deep ; loins strong and large as possible; color, brindle or fawn; in both cases muzzle and ears black; size as large as possible, so long as symmetry is retained.

Newfoundland. — This noble dog is famed for his remarkable fearlessness of water and the readiness with which it will risk its life to save human beings from drowning. The black dog, which is spoken of as the true Newfoundland, is a trifle larger than the Landseer type, which is a black and white dog. Much controversy has taken place as to whence white markings came, some claiming a spaniel cross.

Standard. — Head broad and massive with flat skull and somewhat square muzzle ; ears small and lying close to the head ; coat straight and dense and capable of resisting water ; tail carried gaily, but not curled over ; color black, black and white or bronze ; average weight, 100 pounds for dogs and 85 pounds for bitches.

Pointer. — That this breed was descended from the hound was first clearly indicated by Youatt. The disposition to point appears to be due to training, and although other dogs have been taught to point, in no case do they assume the same rigid position so notable in the pointer. This breed is marked by a compact and well-knit body, sloping shoulders, muscular limbs and beautiful action. The head is large and flat, stop well defined with a depression running from the top to occiput, muzzle long and square, with not too much lip. Colors are white with black, liver, and orange markings and solid black and liver.

Greyhound. — The English greyhound, which is of great antiquity, has been regarded by some as the ancestral stock of the majority of our domestic dogs, but this is doubtful. It is easily distinguished at a glance from all other dogs by its graceful outline and large size. Gre3Eounds hunt entirely by sight instead of scent.

Standard. — Head long and lean, rather wide between the eyes and flat at the top; jaw power¬ ful, but cleanly cut ; teeth level and white ; eyes bright ; ears small and fine in texture and rose¬ shaped ; neck long and muscular, elegantly arched and free from throatiness; shoulders oblique and muscular ; chest deep and capacious ; back broad and square, rather long and slightly arched over loins which should be strong and powerful ; forelegs rather long and set under dog, possessing fair amount of bone ; hind quar¬ ters strong and broad across, stifles well bent.

thighs broad and muscular, hocks well let down ; feet round, well split up with strong soles ; tail long, tapering and nicely carried ; coat fine and close ; color, black, red, white, brindle, fawn, blue and the various mixtures of each.

Whippet. — This breed is the result of a cross between a greyhound and a terrier, and is bred especially for rabbit coursing and racing. In the latter sport these dogs are without doubt the most speedy animals known, even exceeding the speed of the racehorse for a short distance. In outline they are identically the same as the greyhound.

Staghound. — It is a large hound, white in color with black and tan markings ; the head somewhat on the pointer type, but the ears more pendulous and set lower. This breed has been used for many years in Europe for stag hunting.

Deerhound. — The Scotch deerhound is larger and more massive than the English grey¬ hound, frequently standing as high as 28 to 30 inches at the shoulder, the body being clothed with a rough coat. Its principal use is for deer¬ stalking in the Highlands,

Standard. — Head long and narrow, tapering gradually from the ears; nose black (occasion¬ ally blue) and pointed; lips level; ears small, set high, carried in fold, soft and silky and free from long hair; neck long, but strong, with the nape or crest very prominent ; shoulders sloping; toes close and arched; chest deep; body long, but well ribbed up ; loins arched with great breadth across hips ; stifle well rounded ; thighs

long; tail set on low, curved but not curled; coat rough and harsh on body; mane on neck and slight fringe on inside legs, on thighs and on tail. Colors: All shades from dark blue or black brindle to light gray brindle, yellow, fawn, dun and drab; white markings objectionable, but very often to be found on chest and toes.

Irish Wolfhound. — This ancient breed was famous for many years in Ireland for its great power and strength and its prowess against wolves. It has practically the same lines as the deerhound only more massive in skull and body. The colors are the same.

Borzoi or Russian Wolfhound. — Is of rather larger build than his English cousin, be¬ ing covered with a wavy silk coat quite differ¬ ent in texture from that of the deerhound and wolfhound; the head is more domed and muzzle of the Roman nose type. It is used in Russia for hunting wolves. Colors are white with drab, fawn or brindle markings.

Italian Greyhound. — This breed is kept purely as pets and may be regarded as a minia¬ ture greyhound. The eyes are much larger and more prominent than in the large greyhound. There are several colors, among which are a golden fawn and a mouse fawn, the most valua¬ ble colors ; white markings are undesirable.

English Foxhound. — The modern fox¬ hound is somewhat smaller than the staghound and cobbler in body; the head is cleaner with more substance in the muzzle ; the ears are rounded and placed much higher on the skull. The American foxhound is much the same type, but somewhat smaller and lighter built, the colors often being black and tan, showing a bloodhound cross.

DOGS

1 Smooth Fox Terrier

2 Clumber Spaniel

3 Basset Hound

4 French Bulldog

5 English Bulldog

6 Pomeranian

7 Pug

8 Boston Terrier

DOGS

1 English Setter 2. Greyhound 3 ‘Irish Terrier 4 Great Dane

5 Poodle

6 Bull Terrier

7 Russian Wolfhound

8 Collie

Beagle. — This term is generally applied to any hound standing less than 15 inches high, although the true pure breed beagle is a distinct breed, which may be regarded as a miniature foxhound with the exception of the ears, which are more pendulous ; the height varies from 9 to 15 inches. The beagle has a musical note and an acute scent as well as great persever¬ ance in following a trail.

Setters. — The various breeds known as set¬ ters are practically large spaniels which acquired this name from being taught to crouch when marking their game.

English Setter. — It is regarded as a result of a cross between the field spaniel and the pointer, and should have a soft coat with a slight wave, but no curl in the hair. There is a great variation in color, which is valued according to the following scale : black and white ticked with large splashes, or the Blue Belton; then orange and white freckled, known as the ˆOrange Beltonˆˆ ; black and white with tan markings and black and white.

Standard. — Head long and lean with a flat skull ; muzzle long and deep ; lips not too pen¬ dulous ; ears of moderate size, fine in texture, set on bone and well back; neck long, muscu¬ lar and well set in sloping, deep shoulders ; chest narrow, but deep, and ribs well sprung; loins muscular and slightly arched, with powerful hind quarters; front legs perfectly straight and feet small and firm ; toes arched and close together.

Irish Setter. — Of a deep-red mahogany color, this dog is rather lighter in build than the English setter, with a narrow and slightly domed head.

The Gordon or black and tan setter is much heavier than either the English or Irish breeds, this heaviness being especially shown in the head, which is broader and deeper. The body should be massive and black with tan markings.

Retriever. — This name applies to a large dog somewhat on the order

of the setter, em¬ ployed for retrieving game. They have more or less Newfoundland blood in them and trace their parentage to the water spaniel or setter. The curly-coated retriever, which may be either black or liver color, is the product of a cross between the smaller black Newfoundland and the Irish water spaniel. It is characterized by the short hair of the face and the tail devoid of any fringe, although covered to within a few inches of its extremity with short, crispy curls. The hair on the body is closely and crisply curled, hence the old phrase of the ^nigger coated retriever,® a term used in some counties in England. The wavy or flat-coated retriever has the same outline, with the exception of the coat, which is flat and wavy, and is close to the body.

Chesapeake Bay Dog. — As the name signi¬ fies, this dog is a native of Chesapeake Bay. It resembles a dull-colored red retriever both in color, shape and size. The coat is extremely dense and absolutely waterproof. For general retrieving work in the water we know of no dog which can equal it. It has been known to work the whole day in the ice and never seems to tire.

Sporting Spaniel. — The Clumber spaniel derives its name from Clumber Park, the estate of the Duke -of Newcastle, where this breed has been kept for many generations. The Clumber

is distinguished by its silence when hunting and is a large, low, heavy, massive dog, with im¬ mense bone.

Standard. — Large, low, heavy and massive throughout, with immense bone; head large, with largely developed forehead; brows heavy and eyes deeply set ; muzzle long and very square, with a fair quantity of lip; ears small when compared with the size of the dog, and well shaped, hanging close to the face. Color is white with lemon markings.

Field or Black Spaniel. — It is somewhat on the Qumber style, but has much more activity, a longer muzzle and cleaner head.

Standard. — Head long and lean, with a good length of muzzle, which must not be snippy; a short, coarse or clumpy head is objectionable; eyes dark; ears very low down, narrow where they leave the head, long and lobe-shaped ; body large, deep, long and low ; tail carried below the level of the back ; legs straight, strong, short and very large

in bone. Although a long, low dog, he must be active, with plenty of life, and any resemblance in shape, action or movement to the bassetthound or dachshund should be discarded.

Cocker Spaniel. — The weight of this vari¬ ety of spaniel at exhibitions is usually under 26 pounds. The head is long and narrow, but not quite so lean or long as the field spaniel, the muzzle well developed and not snippy ; eyes dark, and although not full or prominent, a little larger in comparison with the size of the dog than the eye of the field spaniel ; ears long, and small near the head, set low, and lobe¬ shaped; body large, deep and round throughout, and in length much shorter than . in the field spaniel ; stern set low ; legs powerful and straight and a little longer than the field spaniel ; and coat flat and abundant, but not too long, and with plenty of feather. It should be remembered that, although a small spaniel, the cocker is a sportsman's dog, and any trace in shape, make, expression or action of the toy spaniel should be discarded.

Irish Water Spaniel. — This quaint animal is possibly the most useful all-around worker of the whole group of spaniels. The general appearance is that of a big upstanding shaggy liver-colored dog with a strong head and a dis¬ tinct top-knot, a well-furnished cobby body and a rat-like tail. These dogs are especially fond of the water and good on all retrieving work.

Dalmatian. — The Dalmatian or coach dog is probably allied to the pointer. It is distin¬ guished by the spots which are black or liver, on a white ground. Its use in England and Amer¬ ica is essentially as a carriage dog, and it de¬ votes itself entirely to the horse, often sleeping in the same stall. In its native country the Dalmatian is used as a pointer and is said to be staunch on game.

Standard. — Head longish, skull flat, mod¬ erate amount of stop ; muzzle long and power¬ ful ; eyes medium size, and dark or light according to markings ; neck fairly long and arched, no throatiness ; chest very deep, not wide under ; feet compact, well padded ; tail smooth, slightly curved upward ; coat short, hard, dense; ground color pure white; spots pure black or liver color ; very decided, not intermixed ; ears and tail well spotted ; weight 50 pounds. The general appearance is that of a pointer.

Sheep Dog. — The Collie is essentially of Scotch origin. In appearance it is one of the most handsome of the canine race, having a well-knit frame, chest deep, but not wide; fore legs straight, hocks well bent, feet compact and strong. The head should be long, fairly nar¬ row and flat; ears small, set well back on the head and carried semi-erect, but not pricked. Colors are black and tan, black, tan and white, sable, and sable and white.

Smooth Collie. — Is practically on the same lines as the rough collie, with the exception of the coat, which is smooth and lies very close, and the eyes, which in many cases, are china or wall-eyed, that is of whitish color.

Old English (Bobtail) Sheep Dog. — This quaint old breed is quite different in type from the other sheep dog, having a short, wide skull and very massive body, which is covered with a rough, shaggy coat, with an abrupt, or bob tail, hence the name. Is much used in England by the drovers and is locally known as the drover's dog.

Standard. — Color, any shade of blue, blue merle or grizzle, with white on face or legs for relief ; head big and square ; eyes small and dark; in very light-colored dogs wall or marble ; square in body and as large as possible, with a broken, harsh, wavy coat; ears small and neatly set on side of head.

Bearded Collie. — Is practically a repetition of the bob-tail, with the exception of the tail, which is long and carried low, and the body, which is not quite so short or massive.

BullDog. — This breed is, without doubt, the most maligned of the canine race. In appearance it is that of a low cobby dog, with a very large flat skull, showing much wrinkle, short nose or face and a long, wide turned-up underjaw. In body is low and wide in front, with well-sprung ribs and a short roach or wheel back, and a short, tapering tail, which must not be carried above the level of the back. Since the old-time sport of bull-baiting has been done away with the bulldog has been bred especially as a pet. They are, in no way, fighters, being, without doubt, the most affec¬ tionate of all breeds.

Standard. — Thick-set and compact; very heavy in front, and of comparatively lighter build behind; legs short, muscular and set out¬

side the body, but not exaggerated ; shoulders massive, and standing well out ; chest wide and deep ; skull large ; and temples high, . with stop well defined; eyes wide apart, and dark in color; underjaw wide, and well turned up; nose large, black and very . short; strong loin, well tucked up ; tail short and set on low ; colors, all shades of brindle, fawn, white and all pied colors.

Terrier. — The bull terrier, as its name im¬ plies, is a cross between the bulldog and the white English terrier. The general appearance is that of a symmetrical animal, the embodiment of agility, strength and determination. The ears are cropped, which gives a smart and alert appearance. The popular color is pure white with small black eyes and nose ; a cherry or flesh-colored nose is undesirable.

Standard. — Head long, flat and wide be¬ tween ears, tapering to nose without cheek mus¬ cles, slight indention down face, without a stop ; jaws long and very powerful; large black nose, and open nostrils; eyes small and very black; lips meeting as tightly as possible without a

fold ; teeth regular in shape and meeting ex¬ actly, a deviation being a great fault ; ears always cropped ; neck long, slightly arched, nicely set in shoulders, tapering to head, without any loose skin; shoulders strong, muscular and slanting ; chest wide and deep ; ribs well rounded; back, short and muscular; fore legs perfectly straight, with well-developed muscles, not ®out at shoulder,^^ and very strong in pas¬ terns ; hind legs long, muscular, and good strong, straight hocks, well let down ; feet like those of a cat ; color white ; coat short, but close, stiff to the touch, and with fine gloss ; tail set on very low, and 10 to 12 inches long, thick where it joins the body, tapering to a fine point, carried without a curl and never over the back.

Airedale Terrier. — This is a large rough-coated terrier, found chiefly in Yorkshire, Eng¬ land. It derives its name from the river Aire, where it is much used for all hunting purposes. The general appearance is that of a big, rough-coated dog, on the same lines as the Irish ter¬ rier, but much stronger and heavier built. The colors are black and tan, and grizzle and tan, and the weight from 40 to 55 pounds. The coat should be short, very dense and of a harsh texture.

Scottish Terrier. — The general appearance is that of a low cobby rough-coated terrier with prick ears. The head should be long and narrow, with small, dark eyes and a long pun¬ ishing jaw; the front

legs straight and shoulders strong but not too broad; body short and the tail carried gayly; weight about 14 to 20 pounds ; colors, wheaten, red and black brindle and solid black. White markings are objec¬ tionable.

Skye Terrier. — This is undoubtedly the old Highland terrier, a long, low dog with a long, straight coat of dark steel blue or gray color; head broad and strong, with a long jaw; nose pointed and eyes small, dark and set close to¬ gether ; body long and low but arched at the loins, and tail carried low and ears pricked or drop, the latter carried low and close to the head.

Dandy Dinmont Terrier. — This game little terrier is also of Northern origin. It is low on the leg and strongly built. The head is appar¬ ently large in proportion to size ; skull fairly wide and covered with a top-knot of silky, light hair. Colors are pepper or mustard; tail carried gayly above ; weight not over 25 pounds.

Bedlington Terrier.— This breed hails from the northeastern counties of England. It is rather long and wiry in appearance, with a bluish or sand-colored coat. The head is long and narrow, with a silky top-knot somewhat like the Dandie, but is much narrower in skull. These dogs are exceedingly game and weigh 12 to 18 pounds.

Welsh Terrier. — As the name implies these little dogs come from Wales. They are in gen¬ eral appearance much like the Airedale and of the same color ; the head is broader in compari¬ son and eyes set wider apart. The weight should not exceed 20 pounds.

Yorkshire Terrier. — This is a small breed, bred chiefly in the county of Yorkshire, and is easily distinguished by its very long, silky coat, especially on the face, which is parted from the nose down the whole length of the body to the tail. It is exceedingly bright and quite game, but valued chiefly as a pet. The colors are a

dark blue body with tan markings, and black with tan markings. The ears are cropped and carried erect and the weight is between three and eight pounds.

Maltese Terrier.— This dog is on the same lines as the Yorkshire but a trifle larger; color pure white, with a black nose and small, deep-set eyes. The coat should be flat and not curly, which, in many cases, shows a toy poodle cross.

Manchester or Black and Tan Terrier. — A smooth-coated terrier which has been bred for many years in Manchester, England ; derives its name thence. The general appearance is that of a smart dog with a black body and rich tan markings on the legs and feet; the division be¬ tween the colors should be well defined. The ears are cropped or V-shaped. The weight is from 7 to 20 pounds. The toy black and tan is identically the same breed, but does not exceed seven pounds in weight.

Dachshund. — This quaint and very game breed is essentially of German origin. The general appearance is that of a dwarfy, short¬ legged, long-bodied but sturdy dog, with strongly developed muscles. The head is long and fairly broad, conical in shape, tapering toward the nose, with ears set high and broad and nicely rounded, not pointed or folded. The legs should be short and muscular, but not over at the knees ; elbows well under and shoulders broad and well placed; loin short, firm and broad, and tail short but carried gayly. Colors are solid red, black and tan and dappled. The coat should be smooth and glossy. The rough-coated variety, which is now becoming popular, is on the same lines exactly.

Poodle. — This is probably the cleverest of all dogs and most apt to learn tricks. Its colors are a deep black, blue, red, white or cream. There are two varieties, the corded, which has a long, rope-like coat, and the curly, which should be short and tightly curled like astra¬ khan. They make ideal companions and can readily be broken to the gun and make grand retrievers.

. Fox Terrier. — The fox terrier is probably the most popular of all terriers. It is said to have descended from a cross between the small fox hound and the English terrier. It derives its name from the use of driving foxes from holes or burrows in the ground. The most popu¬ lar color is a pure white body with black and tan markings on the head with an even blaize up the face. The head should be flat and nar¬ row, with a strong foreface or muzzle ; eyes small, ears likewise small and of V shape, car¬ ried forward and close to the head. The body should be short with well-sprung ribs, narrow in chest, with clean sloping shoulders, perfectly straight front and catlike feet. The wire-haired dog is identically the same as his smooth brother, with the exception of the coat, which '-hould be rough with a decided harsh texture. Weight, 15 to 21 pounds.

Irish Terrier. — As the name implies is of Irish origin and is aptly named the ®Dare Devil,^^ iDeing very game. In size it is somewhat larger than the fox terrier and more racy in body and has larger feet. Cropping the ears has now gone out of fashion, the modern ear being the same as the fox terrier.

Standard. — Head long, rather narrow, pun¬ ishing jaw, eyes small and dark, ears fairly small, not set on too high, legs straight and

strong, feet round and thick with good pads ; chest narrow with good depth of brisket, back strong and straight. Color wheaten and red. Expression wicked but intelligent. Coat short and rough and very harsh.

Boston Terrier. — This smart little dog is especially of American origin, having been raised in Boston and the nearby towns for the past 40 years. It resembles the bulldog in head, but is void of wrinkle and must not show the teeth ; the body should be built on the terrier type, having a narrow front with strong but not wide shoulders, short back and a short screw or tapering tail. The ears are cropped and car¬ ried erect. The three classes by weight are under 15 pounds, under 23 pounds and not ex¬ ceeding 32 pounds. Colors are brindle with white markings, fawn and white or red and white. They are used entirely as pets.

Pugs. — This quaint breed is one of the most popular house pets. In appearance they resem¬ ble the bulldog, having a short, square muzzle and heavily wrinkled head. The ears should hang close to the head and be carried forward ; the body be short and round, and the

tail curled and lie on the back. The colors are a rich apricot fawn with black shadings and a deep black.

Toy Spaniel . — The English toy spaniels are the King Charles, or black and tan, the Blen¬ heim or orange and white, the Prince Charles, and the Red, and are practically all of the same family, distinguished only by the colors. The head should be large and domed, with the ears set very low in the skull ; the nose or face, as short as possible and stop well defined; eyes as large as possible and very prominent ; body short and well coated and small in size. They are essentially house pets.

Japanese Spaniel. — It is black and white, or orange and white. The head is not so large or domed as the English spaniel and the ears are much smaller and carried higher and V-shaped ; eyes wide apart and showing a good deal of the white ; tail heavily coated and car¬ ried over the back. In size it is as small as possible.

Bibliography. — Barton, F. T., <Our Dogs and All about Them^ (Boston 1911) ; Beddard, ^Mammalia^ (London 1901) ; Bylandt, H., ^Dogs of All Nations^ (Philadelphia 1905) ; Caius, ^De Canibus Britannicis^ (ante 1572) ; Gray, ^^Varieties of Dogs,® in Annals and Magazine of Natural History (4th series, Vol. Ill, London 1869) ; Huntington, H. W., ^The Show Dog^ (Providence 1901) ; Huxley, ^^Cranial and Dental Characters of the Canidae,® in Proceedings of the Zoological Society of London (ib. 1880) ; Lee, R. B., ^History and Description of the Modern Dogs^ (London 1897) ; Mills, Wesley, ^The Dog in Health and His Treatment in Disease^ (New York 1892) ; Mivart, ^Dogs, Jackals, Wolves and Foxes ^ (London 1890) ; Pearce, W., ^The Dog> (ib. 1872) ; Shaw, Vero, Hllustrated Dog Book^ (ib. 1890) ; id., ^Encyclopedia of the KenneP (New York 1913) ; Tuberville, George, ^The Noble Art of Venerie or Hunting^ (Lon¬ don 1576) ; Walsh, J. H., ^Dogs of the British Islands^ ; id., ^The Dog in Health and Disease^ (London 1859) ; Wortman and Matthew, ^^The Ancestors of Certain Members of the Canidae, Viverridae and Procyonidae® in ^ Bulletin^ of the American Museum of Natural History (Vol.

XII, New York 1899) ; Youatt, W., ˆTraining and Management of the Dogˆ (New York and London 1859). For diseases of the dog, see Dogs, Diseases of. Charles G. Hopton.

DOG IN ART AND SYMBOLISM.

Haydn's Dictionary says of the dog, it ®was worshipped by the Egyptians and hated by the Hebrews.® With the ancient Egyptians Marpi, son of the god Horns, was represented as hav¬ ing the head of a dog. The Oriental symbol¬ ism gives the dog a position of degradation be¬ cause these animals are the scavengers living on the filth of the people and in the Eastern cities the garbage and refuse is thrown into the street for the dogs to care for. Being un¬ domesticated, these animals run wild in packs and become often, when starving, rabid and vicious and are permitted existence by Orientals only as serving to cleanse the neighborhood of offal. Hence the mention of the ˆTriend of man® in Holy Writ is rare and, contrary to Occidental symbolism, always made in an evil sense. We find, in ancient Roman dwellings, a chained dog depicted (generally in mosaic) and the words ®cave canem® — beware of the dog — on the threshold. Assyrian sculptures are extant representing the greyhound and the mastiff. In European symbolism the dog is an emblem of fidelity and loyalty, and for this reason was placed at the feet of the effigies of married women upon sepulchres. Husenbeth says that in ecclesiastical art the following saints have been pictured accompanied by a dog; Saint Bernard (abbot) has a dog at his feet; Saint Wendelin is pictured keeping sheep, a dog at his feet, or held by a cord; Saint Benignus has a dog by his side ; Saint Roch has been portrayed as a pilgrim, a dog near him with a loaf of bread in his month, or a dog licking his feet ; Saint Domenic has been repre¬ sented with a dog firing a globe with a torch ; Saint Parthenius has been pictured killing a mad dog by the sign of the cross ; Saint God¬ frey of Amiens has been represented with a dead dog lying near him ; Saint Sira has been pictured with dogs about her. Sirius or Canic¬ ula is known as the ®dog-star® and figures in the constellation Canis Major (ˆlarger dog®). In the Chinese zodiacal system a dog is the sign of the month of September. In ceramics the amateur collector and the auctioneer use the term ®dog of Fo® to designate a fantastic animal figuring in ornament and decorative composition; but it Is intended as a lion (®lion of the Korea®) not a dog and is usually ac¬ companied by a sphere. The Japanese use the device under the term Shishi. It is an almost necessary companion to the statue of Buddha, and in the Chinese mythology is the guardian of temples and domestic

thresholds, as an em¬ blem of peace, or tranquillity.

Clement W. Coumbe.

DOG-DAYS (Lat. caniculce), the name ap¬ plied bv the ancients to a period of about 40 days, the hottest season of the year, at the time of the heliacal rising of Sirius, the dog-star; that is, the time when it rose just before the sun. The heat, which is usually most op¬ pressive at this season, was formerly ascribed to the conjunction of this star with the sun. We still retain the expression dog-days, as applied to the hottest season of the year, but ‘^wing to the precession of the equinoxes it is

no longer the time of the heliacal rising of the dog-star.

DOG-FENNEL, a plant (Anthemis cotula) belonging to the family Asteracece. It is found in fields and waste places throughout much of North America, having been naturalized from Europe. It is known as a weed in Asia, Africa and Australia. It derives its name cf dog’^— fennel from the resemblance of its leaf to fennel, and from its bad smell. It has an acrid taste and emetic properties. This plant is also called stinking May-weed, the scentless May-weed, or wild camomile. The name dog’s-fennel is some¬ times applied in America to a species of the genus Eupatormm, hog-weed.

DOG-FISH, the popular name of several species of small shark (q.v.), chiefly belonging to Musteliis and Squahis, two quite unlike genera. The name is derived from their habit of swimming in schools or packs in pursuit of their food. In their general anatomy, they differ but little from the other sharks, so well known for their ferocious habits. The dog¬ fishes, though among the smallest of the tribe, manifest propensities equally cruel with those which have rendered the white shark and others so justly dreaded. Although seldom or never injurious to man, they commit great ravages in the fisheries, and where they abound constitute one of the greatest nuisances to the fishermen. Exceedingly voracious, and devouring almost everything which they en¬ counter, the mischief they occasion by taking the baits, and very often the hooks, of the deep-sea lines, is very considerable and not at all compensated for by the flesh of those which are captured.

The smooth dog-fish or dog-shark (M. canis) is found on both sides of the north Atlantic, and on the American side is particularly abundant

south of Cape Cod. It is from two to three feet long. No spines occur in the margins of the dorsal fins, and the smooth pavement-like teeth are especially adapted for crushing crabs, lobsters and other testaceous invertebrates on which they chiefly feed. The young are hatched from the egg in the oviducts of the female (with which, however, they are not connected by a placenta, as in the related Galeus miistelus of Europe), and are born alive. The eggs are similar to others of the family and covered by a tough membranaceous integument. The skin of these fish is beset with numerous small as¬ perities, which render it, when dried, well adapted for polishing wood and for other mechanical purposes.

The spiny dog-fish {Squahis aranthias) is very abundant on the coasts of New England, and, although similar in size and general aspect, is readily distinguished from the smooth dog¬ fish by the presence of a strong spine before each of the two dorsal fins. The eggs are de¬ posited before hatching. This species furnishes material for a valuable fishery and fish industry in Maine, where the oil is extracted from the livers, the flesh ground up for fertilizers or poultry food and the skin utilized for polishing metal and wood. The dog-fish feeds chiefly on herring and mackerel, the schools of which it follows in immense numbers. Similar species occur in the Pacific Ocean and other seas.

The flesh of all the species is hard, dry and unpalatable, requiring to be well soaked before

it is eaten. In England the dried flesh goes under the name of Folkestone beef. Poisonous effects are at certain times observed in conse¬ quence of eating the livers of dog-fish and some pses are recorded in which the most distressing illness has been occasioned by the practice. The name dog-fish is also applied to several other quite distinct fishes, more particularly to the western mud-fish or bow-fin (Atnia calva), and to the dog-salmon (Oncorhynchus keta) .

DOG-GRASS. See Couch-grass.

DOG PARSLEY, one of the common names of ˆthiisa cynapium, a poisonous plant of the carrot family, the only species of the genus ALthusa, found in America, from Nova Scotia west to Minnesota, and south to New Jersey, having been naturalized from Europe. The fruit bears some resemblance to the fruit of dill and fennel, and is sometimes eaten in mistake for these. The sharp acrid taste marks the differ¬ ence. Other names are Fool's parsley, fool's cicely and dog-poison.

DOG ROSE (Rosa canina), a plant of the rose family (Rosacece) ; known also as the canker rose, wild brier, and referred to by Shakespeare as ˆˆcanker-blooms.® It is a native of Europe and northern Asia. The ripe fruit is sometimes used abroad to make a preserve that is employed in the manufacture of pills. The plant is somewhat naturalized in America, and is not rare in cultivation.

DOG-SALMON, a name given on the west¬ ern Pacific Coast of North America to the Oncorhynchus, also known as the chum salmon. The average weight is from 10 to 12 pounds. This is one of the five species of keta, the widely-known Pacific salmon (of which the hump-backed salmon is the smallest), which are found on the North American coasts from Alaska to as far south as Oregon or even the Sacramento River.

DOG-STAR (SiriusT the star that gives their name to the dog-days (q.y.) ; also applied to Procyon, a double star in Canis Minor. Sirius is the brightest star in the heavens, and once was thought to exercise a baleful influence upon human affairs. It is now a clear white star in the constellation Canis Major though Seneca and Ptolemy describe it as red.

DOGTOOTH SPAR, a common variety of the mineral calcite (q.v.), so named because of the resemblance of the acute scalenohedrons, of which it is composed, to a dog's tooth.

DOGTOOTH VIOLET, a common but erroneous name for plants of the genus Erythro-iiium (q.v.).

DOGBANE, the common name of the genus Apocyniim, a group of perennial herbs, possess¬ ing a milky acid juice. Numerous species oc¬ cur in North America, the best known being A cannabinum, Indian hemp (q.v.), and the spreading dogbane or honey-bloom (A. androsce-mifolium). The plants yield the acrid milky juice so common in members of the family; the root is intensely bitter and nauseous. It is the most powerful ˆpart, and is employed by country physicians instead of ipecacuanha.

DOGBERRY. See Dogwood.

DOGE, doj (Lat. dux, ^^a leader or duke®), formerly the title of the first magistrates in the Italian republics of Venice and Genoa. The

first doge of Venice elected for life was Paolo Anafesto, in 697. The doge was first elected by the people, but afterward by the great coun¬ cil under a complicated and almost incompre¬ hensible scheme of voting which maintained the fiction of popular election. He held his dignity for life. His power was at first almost absolute. He could convoke legislative assemblies, de¬ clare war, conclude treaties, take command of the army, appoint military officers and judges, invest bishops and award ecclesiastical penalties. But this absolute authority was by degrees en¬ tirely taken from him, and for centuries before the abolition of the dignity he had become merely a gilded figurehead, ^ffhe outward and visible symbol of the impersonal oligarchy,® The dignity w'as abolished with the overthrow of the republic in 1797. In rank he was con¬ sidered only equal to a duke, though the republic of Venice was in dignity equal to a kingdom. In Genoa the office of doge was established in 1339. Here also the doge was at first elected by the people, but the dignity afterward ex¬ perienced numerous changes both in this and other respects. After the liberation of Genoa from the yoke of France by Andrea Doria the power belonging to this office was more sys¬ tematically defined. A great and small council were created, and the duration of the office was limited to two years. After the overthrow of Genoa by the French in 1797 the dignity became extinct, although it was revived for a short time between 1802 and 1805. See Genoa ; Venice.

DOGE'S PALACE, The (It. Palazzo Ducalc), the official residence of the former rulers of Venice. It was founded about 814, but was subsequently destroyed and rebuilt five times. The present edifice was begun in 1350 and completed in 1442. Its noble arcades, varie¬ gated walls of marble, and its colonnades make it one of the most beautiful and striking monu¬ ments of mediaeval Europe, and adorned inter¬ nally by the works of Titian, Tintoretto, Veronese and other Venetian masters. The Sala del Maggior Consiglio (Hall of the Greater Coun¬ cil) ; the Giant's Stairway, which takes its name from colossal statues of Mars and Neptune at the top; the Scala d'oro (Golden Staircase); the Scala dello Scrutino, or voting hall ; and an archaeological museum, are among the rare and surpassing glories of Renaissance art. A narrow passageway leads to the Bridge of Sighs (con¬ structed in 1660). The dungeons which are now shown to visitors were those

which for¬ merly were reserved for political offenders, from which access is had to a torture chamber and a place of execution.

DOGGER (from Dutch ˆdogger,® a cod¬ fish), a Dutch vessel equipped with two masts and somewhat resembling a ketch. It is prin¬ cipally used for fishing in the North Sea, chiefly on the Doggerbank.

DOGGERBANK, an extensive sandbank of the North Sea, midway between England and Denmark, lying between 54° and 56° N. lat. and 2° and 5° E. long. It is 160 miles long by 70 broad, and has a depth of from 60 feet (English side) to 120 feet. It is celebrated for its cod fishery. An action was fought off the south end in 1781 between the English and Dutch fleets. On the night of 21 Oct. 1904, in a sudden panic which seized the Russian Baltic fleet under Admiral Rozhdestvensky, then on

its way to the Far East, the Hull trawling fleet was apparently mistaken for torpedo boats and fire was opened on them, in which a trawler was sunk and two men killed. The incident led to grave risk of war between England and Rus¬ sia, but matters were smoothed over by means of an international commission of inquiry and the payment of compensation to the parties wronged.

DOGGETT'S COAT AND BADGE, a

prize for a rowing-match on the Thames, which takes place every year on 1 August, the course extending from London Bridge to Cadogan Pier, Chelsea. The first prize is an orange-colored waterman's coat and a silver badge representing liberty, and to this have been added other prizes, the first prize being also augmented. The match is open to six young watermen recently out of their apprenticeship. It was instituted by Thomas Doggett (d. 1721), a native of Dublin, and a popular actor in the early part of the 18th century, who founded the prize in 1716 in commemoration of the acces¬ sion of George 1(1 Aug. 1715) and bequeathed a sum to perpetuate it, the administration of which is now in the hands of the Fishmongers' Company. Dibdin's ballad opera,

ˆThe Water¬ man,ˆ is based upon this rowing contest.

DOGMA, in the theological sense of the word, is a tenet of faith given in the word of God whether written or traditional and pro¬ posed by the Church to the belief of the faithful. Primarily the term dogma, being derived from the Greek verb do/cew, to seem, to appear, meant only opinion ; but in the ancient schools of philosophy dogmata (plural) were the doc¬ trines of the several heads of such schools. The disciples of P3ˆthagoras accepted on the au¬ thority of The Master, as they styled him em¬ phatically, the tenets he proposed, the sufficient ground of the disciples' belief being that avrog £(j)7} ®He said it.® Perhaps the first employment of dogma, dogmata in the now current meaning of the word, is found in a work by Saint Igna¬ tius, disciple of Saint John the Evangelist, who in an epistle to the Magnesians exhorts them to be ˆestablished in the dogmata of the Lord and the apostles.® The dogmas of the Roman Catholic Church purport to have been taught by the apostles arid to have been by them handed down viva voce or in writing, to their contemporaries and successors, who in turn did and still do the like : that tradition is the foundation of all the Church's articles of belief. The Church has no power to frame new dogmas and she must to the end of time pro¬ claim the self-same dogmas which at any time in her history were authentically set forth as truths of divine revelation. What the Church may do and has done is to define, as occasion may require, the precise meaning of her teachings, bringing out into definite shape what before was not expressed with all necessary fulness or clearness. An example of this is had in the appli¬ cation of the term transubstantiation to signify what the Catholic Church had at all times be¬ lieved and taught — that the bread and wine are, in the sacrament of the Eucharist, really and substantially changed into Christ's body and blood. Since the doctrines thus advanced are for belief and not for discussion the dogmatic method may really be considered as the ex¬

pression of an opinion without advancing there¬ for any adequate reason or proof and without considering the viewpoint of others or the light in which it appears to them. Consult Arnold, Matthew, ˆLiterature and Dogma ˆ (1873) ;

Lightfoot, J. B., ˆCommentary on the Epistle to the Colossiansˆ ; Schmidt, W., ˆDogmatik' (1895) ; Stange, C., ˆDas Dogma und seine Beurteilung in der neueren Dogmengeschichteˆ (1898); VVetzer and Welte, ˆKirchenlexicon' (2d ed., 1901). See Christian Doctrine, De¬ velopment of; Theology.

DOGS, Diseases of. Chorea. — Chorea usually appears in dogs as an irregular jerking of the muscles of the head or some other part, or even of the entire body. In most cases medicinal treatment does not give great benefit, unless the chorea is the result of other disease. Dogs may be given Fowler's solution of arsenic, beginning with one-drop doses once daily and increased one drop a day until five to ten drops (depending on the size of the dog) are given three times daily. Simple syrup of hypophos-phites should be given in teaspoonful doses three times daily with the arsenic. This treat¬ ment may be continued for two or three weeks, then stopped for a like period and then repeated.

Distemper. — Distemper is a contagious catarrhal fever that is a common and serious disease among dogs. The disease is caused by a germ and animals contract it from coming in contact with or proximity to another ani¬ mal suffering from the disorder. It is thought that the germs float through the air and are inhaled by the dog. Among the conditions that favor the disease are those that tend to weaken the system. Pure-bred puppies appear to suffer greatly from it. The time that elapses between exposure and the first symptoms is seldom more than three days. When dogs are gathered at shows the disease is likely to occur, owing to exposure to infection and the unusual nervous strain. One attack usually gives immunity to future attacks. The disease is brought on with a chill that may last •an hour or more. It is followed by a high fever, the dog's temperature going to 107° F. There is a slight discharge of watery mucus from the nose and eyes, that soon becomes profuse and purulent, sticking the lids together. Usually a rash breaks out on the inside of the thighs. In some cases there are nervous symptoms, shown by jerking of the head and twitching of the muscles ; or the dog may become delirious. Often there is difficult breathing, with a painful cough or moan. The bowels rnay be constipated, or there may be a severe diarrhaea, with a fetid odor. The dog suffep greatly from prostration and dislikes to be disturbed. The disease runs its course in 10 to 30 days. There is no medicine that will interfere with its course. All the treatment should be directed toward making the animal comfortable and keeping up its strength so that it may resist the disease. Vigorous dogs of good constitution will usually recover ; weak, debilitated animals are likely to be overcome by the disease or by various complications. In the early stages, castor oil in doses of half an ounce, with two or three grains of boric acid added, should be given every six hours until the bowels move thoroughly. This may be followed by two-grain doses of quinine, twice daily. The nose, mouth and eyes are to be well

washed out with warm water three times daily, and the nose and eyes greased with vaseline. The animal is to be given minced fresh beef, beef tea, sweet milk, raw eggs and gruels, and allowed what cold water it wants to drink.

There are many complications that occur with the disease : pneumonia, bronchitis, inflam¬ mation of the brain or spinal cord and paralysis, usually of the hind quarters. When the dog re¬ covers, abscesses are likely . to form in some part of the body. If these occur in the internal organs they are often fatal. Another common sequel is chorea. All infected quarters should be thoroughly disinfected and exposed to the sun and air for several weeks before allowing other susceptible dogs to occupy them.

Ectropium. — This disease is a turning out of the eyelid, usually the lower one, so that it presents a red and irritated appearance. It oc¬ curs in horses as well as in dogs but not fre¬ quently. It is usually the result of severe in¬ flammation, or an injury. When this condition is permanent, the only treatment is to remove a V-shaped piece from the lower lid, stitching together the parts so as to bring the lid up to its normal condition.

Hydrophobia; Rabies. — Rabies is an infec¬ tious disease, originating in dogs, possibly also in wolves, cats and skunks, and by them trans¬ mitted to other animals by direct inoculation, usually by biting. Animals suffering from rabies are said to be ^^mad.® Hydrophobia, the com¬ mon name, means ®fear of water,® and the infer¬ ence is that animals' suffering from this disease are afraid of water; but this is untrue. ^^Mad® dogs usually crave water, but the excitement and effort of drinking are likely to cause con¬ vulsions, which have been mistaken for fear. Although rabies has been studied extensively, and an attenuated virus for preventing the dis¬ ease was discovered and introduced by Louis Pasteur, the germ of the disease, if germ it be, has not been isolated. The virus exists in the saliva, as well as in some other parts of the body, and when injected into a wound is likely to cause the disease. There is less danger from being bitten when the teeth of the rabid animal are cleaned by biting through cloth or

leather. There is a popular idea that rabies is most prevalent during the hot months, but statistics show that a slightly greater number of cases occur during the winter months. In the dog, rabies occurs in two forms, the dumb and' the furious, the latter being the most frequently observed. The period of incubation, — that is the time that elapses after the animal or person is bitten and the appearing of the first symptoms of the disease, — varies frorn a few days to many months, the average being from three to six weeks. The first symptom usually seen in dogs is a dull, depressed condition. The dog crawls into obscure places and dislikes to be disturbed. He licks the original wound and the genital organs. The appetite is abnormal, the dog eating grass, sticks, dung, and the like. As the disease progresses, the, dog becomes cross, snapping at space or at inanimate objects, at other animals, and at persons. A rabid dog shows a tendency to wander, often going long distances and attacking persons and animals. If confined he will bite sticks or other objects, and sometimes will tear his own flesh. In the later stages of the disease, the dog becomes exhausted, the eyes sunken, and the body emaciated. Asso¬

ciated with this is paralysis, particularly of the hind parts and the lower jaw, the latter condi¬ tion being accompanied with a discharge of saliva. The bark of a rabid dog is peculiar, — a short bark prolonged into a whine. Death occurs from exhaustion soon after paralysis sets in.

Post-mortem examination does not give defi¬ nite information. There is slight irritation of the stomach and bowels, the stomach often containing sticks and other foreign bodies swal¬ lowed by the 'dog during the progress of the disease. In order to diagnose suspected cases of rabies, inoculations of the cranial cavities of rabbits can be made with some of the spinal marrow from the suspected case. If the rabbit contracts rabies, the diagnosis is, of course, positive. After a dog has contracted the dis¬ ease it should be put out of its misery, as there is no hope of recovery from rabies. The ani¬ mal should be securely confined, as soon as sus¬ picious symptoms develop, to prevent the possi¬ bility of its injuring anyone. A person bitten by a rabid animal should have the Pasteur treat¬ ment ; the wound should be cauterized with nitrate of silver or other strong caustic, and antiseptics freely used.

Mange. — The term mange as applied to ani¬ mals is identical with itch in the human race, in both of which parasitic life exists in the skin, and is purely a cutaneous disease. Dogs suffer from two varieties,

namely Sarcoptes Canis, sarcoptic mange, and Acariis F olliculorurn, follicu-lor mange. So-called red mange is not due to a parasite but arises from other causes, viz., loo much meat or corn-meal diet, with insuffi¬ cient exercise, deranged condition of the diges¬ tive apparatus, worms, teething, sudden cooling of the body when heated, fleas, *etc.* The symp-torns of sarcoptic mange are : intense itching, small red points appearing on the skin, which quickly develop into pustules exuding a fluid which forms scabs. When scabs are removed the hair will accompany them, leaving the parts nude. The parasite usually attacks the skin where most exposed, under the shoulders and thighs, about the hock joints, the feet and the eyes. Follicular mange also causes itching, is accompanied by a fetid body smell, the pustules sometimes discharging. It does not yield easily to treatment nor is it as easily transmitted as sarcoptic mange, the parasite being more deeply seated. Treatment of both varieties consist of preparations of mercury, such as corrosive subli¬ mate, red or white precipitate, or ordinary mer¬ curial ointment. Carbolic acid solutions are used. There are several mange remedies on the market into which these constituents enter.

Dogs suffer also from jaundice, pneumonia, enlarged glands canker of the ear, indigestion, rheumatism, ophthalmia, black tongue, sore feet, and fleas. For these there are the usual reme¬ dies for similar diseases in human beings, pills, liniments, fomentations, *etc.* Consult Barton, F. T;, ˆOur Dogs and All About Themˆ (Boston 1911) ; Mills, Wesley, ˆThe Dog in Health and Diseaseˆ (New York 1892) ; Shaw, Vero, ˆEncyclopedia of the KenneP (ib. 1913) ; Walsh, J. H., ˆThe Dog in Health and Disease' (London 1859).

DOGS, FOSSIL, several species are known to us in the fossil state remounting to the Eocene period, at which point the forms be¬ come so general that it is only with the greatest

difficulty that they are reduced to their proper classification. Thus in tracing back the ancestors of the dog to this period we meet the fore¬ runners of the same family, the jackal, wolf, fox, etc., and approach

closely to the ancestors of the bear. Naturalists are agreed that all these derive a common origin from the car¬ nivores of the Eocene period.

DOGS, Isle of, a peninsula of London ex¬ tending into the Thames opposite Greenwich in the borough of Poplar. It contains the West India and the Milwall docks, and large ship¬ building yards. The king's hounds were, it is said, formerly kept here, hence the name.

DOGS, Wild. Zoologically the term ^^dog^^ refers to the family Canids (q-v.) which in¬ cludes many prehistoric genera, fossil since the Miocene, and modern wolves, dogs, foxes, fennecs, jackals. South American fox-dogs and a few others. All these belong to the typical genus Canis; but the family also contains a series of ®thooid^^ species of more dog-like aspect than Canis. They comprise the queer little raccoon-dog of China ; the long-bodied, short-legged bush-dog of Guiana; the fennec-like Cape fox of South Africa; the powerful and fierce hunt¬ ing-dog of central Africa, and a group of species native to eastern Asia. These Asiatic species form the genus Cyan, are peculiar in structure, especially as to dentition. One species is Sibe¬ rian, closely resembles an Eskimo sledge-dog, ex¬ cept that its bushy tail does not curl ; and with its compact, robust body and short muzzle it has a very dog-like aspect. It lives in forests and hunts in packs. At the other extreme is the wild dog of the Malay Archipelago, which is thinly haired and gaunt. More widely known than either of these, however, is the wild dog of India, called ^ffiuansuah^^ in the North and ^'dhole^^ in the South. Like the others it is nor¬ mally rustred in color, and makes its lair in rocky jungles. It is shy of mankind, and does not often attack cattle, but a pack will make even a tiger or a leopard turn tail.

None of these unwolf like animals called ^ffiogs^^ belongs in the ancestry of our domestic races as is shown by the teeth. All kinds of our dogs have three molars on a side in each jaw, as in the genus Canis, whereas the dhole and other species of the genus Cyan have but two ; and it is a rule in morphology that a character once lost may not be regained. Examination of the skull and other parts shows that all our domestic dogs must be derived from members of the genus Canis. Dogs have been found associated with natives of all parts of the world except the South Sea Islands, at their first dis¬ covery by Europeans, and sometimes in consid¬ erable variety. These, in all cases, were local wolves or jackals that had been tamed and more or less modified. The sledge-dogs of the Eski¬ mos and Siberians were only subjugated wolves; those of our western Indians tamed coyotes ; those of South Africa modified jackals; the ^pariah® curs of the East came

from the small red wolf of southeastern Asia ; and so on, until intercommunication of tribes or of civilized with savage men, caused mixture of dog-races, and examples might be multiolied. In all these there is probably no admixture of fox blood, for the so-called ˆTox-dogsˆˆ of South America, which were captured and domesticated by the Indians there, are wolves, properly speaking.

Foxes do not interbreed with wolves, jackals, or domestic dogs ; whereas all these readily inter¬ breed with each other, under captive conditions. Hence there has occurred from the beginning a mingling of various captive stocks, so that the domestic dog as we know him now is a com¬ posite that is quite inexplicable. One other ele¬ ment, however, entered into this calculation, and that is the probability that the modern dog may carry some inheritance from one or more extinct species to which it may owe its distinc¬ tively doggish aspect (short muzzle, etc.). We know that men of the Stone Age had dogs about their camps, notably among the Neolithic Swiss Lake dwellers. Riitimeyer, one of the best authorities, considers that their semifossil re¬ mains show such specific distinctions as to indi¬ cate derivation from neither wolf nor jackal, but from a distinct canine animal now extinct. This is by no means unlikely. Consult Mivart, ˆMonograph of the Canidae' (London 1870) ; Huxley, 'Cranial and Dental Characters of the Canidaeˆ (London 1880) ; Lydekker, 'Mostly Mammalsˆ (New York 1903) ; Ingersoll, 'Life of Mammalsˆ (New York 1907) ; and books on dogs and dog-culture.

DOG'S-TAIL GRASS, Cynosnnis cristatus, a perennial grass, 1-2ˆ2 feet tall, with a very thin and fine stem and with a spike-like panicle made up of spikelets alternating on two op¬ posite sides of the stem and of two different sorts, sterile and fertile. Cynosiirus is an Old-World genus, .and in England is one of the most important pasturage grasses. In America it is an escape from cultivation and grows in waste places, fields and waysides from Canada to New Jersey. It is much used for the manu¬ facture of Leghorn hats on account of its great strength.

DOG'S TONGUE, a biennial plant, Cyno-glossum officinale, belonging to the Boragina-cece, borage family. It is a native of Europe, but has become naturalized in North America.

DOGTOOTH, in architecture an orna¬ mented molding used in early mediaeval times in the form of a four-leaved flower, with teeth projecting in the centre; also a steel punch used in working marble.

DOGWATCH, on shipboard, a name given to each of two watches of two hours each in¬ stead of four, adopted for the purpose of vary¬ ing the hours of watches kept by each part of the crew during the 24 hours. The watches are arranged thus: 8 to 12 p.m.; 12 to 4 a.m.; 4 to 8 A.M. ; 8 to 12 A.M.; 12 to 4 p.m.; 4 to 6 p.m., dogwatch; 6 to 8 p.m., dogwatch; 8 to 12 p.m., and so on.

DOGWOOD, the common name of the genus Cornus, a group of plants, either shrubs or trees, with entire leaves, and polygamous or dioecious flowers in cymes, but sometimes soli¬ tary. The fruit is a drupe. The genus consists of some 40 species natives of the northern tem¬ perate zone, Mexico, and parts of Peru. To this genus belong the American shrubs and trees, known as cornel (q.v.), dogwood, and kinnikinnik. The wood of C. florida is smooth, white and fine-grained, and is used for inlaying, ‘and from the bark a febrifuge is made. Those who ®dip^^ snuff, use the small branches of the tree to make the brush with which the snuff is applied. The common dogwood of Europe (C.

sanguinea) is a shrub of remarkable beauty in autumn owing to the deep redness of its foliage. The wood makes the very best char¬ coal for gunpowder. It is very hard, and is made into skewers, cogs for wheels, etc., and in former times it was in request for making ar¬ rows. The small bitter fruit yields as much as one-third of its weight of an oil resembling that of olive. The wood of Rhammus frangula is also used by gunpowder-makers, and called by them doˆvood. Jamaica dogwood (Ichthyo-methia piscipula) is a leguminous timber-tree; the cortex of the root is powerfully narcotic, used for stupefying fish or deadening the pain of toothache.

DOHERTY, Charles Joseph, Canadian jurist: b. Montreal, 11 May 1855. He was edu¬ cated at Saint Mary's College and at McGill University, Montreal, was admitted to the bar in 1877 and was created Queen's Counsel by the Earl of Derby in 1887. From 1891 to 19(fe he was puisne judge of the Superior Court of Quebec and in 1908 was elected to the House of Commons from Saint Anne's Division, Montreal. In 1911 he was made Canadian Minister of Jus¬ tice and since 1909 has served also as professor of international and civil law at McGill Uni¬ versity. He was one of the lawyers for the So¬ ciety of Jesus in its libel suit against the Toronto Mail, and delivered judgment in the case of the Canada Revue Publishing Company vs. Archbishop Favre of Montreal in 1894.

DOHERTY, Henry Latham, American engineer: b. Columbus, Ohio, 15 May 1870. When 12 years old he entered the employ of the Columbus Gas Company, advanced rapidly and between 1890 and 1905 was engineer or manager of gas or electric companies in about 30 cities. In 1905 he organized the firm of Henry L. Doherty & Co. in New York as bankers and operators of public utility corporations. He patented several pieces of apparatus used in gas manufacture, was awarded the first Beall gold medal in 1898 by the American Gas Light Association for his paper, «Gas for Fuel.'ˆ He is a member of the American Academy of Political and Social Science and many other scientific bodies.

DOHM, dom, Ernst, German humorist: b. Breslau, 1819; d. 1883. He

studied theology and philosophy at Berlin and Halle and for many years was editor of Kladderadatsch, one of the most important humorous publications in Germany. He was ranked very high as a master of keen political satire. He translated Lafon-taine's <Fables^ into German, with illustrations by Gustave Dore (1877) and published comedies, farces and poems, the most popular of which was ^Das erste Debut^ (3d ed., 1860).

DOHNANYI, d5-n6n'ye, Ernst von, Hun¬ garian composer: b. Presburg 1877. While a pupil at the Royal Conservatory at Budapest |g94_97 he took several prizes for composition. In 1897 he studied with D' Albert to perfect him¬ self in the technique of the pianoforte previous to touring the chief cities of Austria, Germany and England. His tours of America in 1900 were successful. His pianoforte concerto in C minor took the Rosendorf prize, Vienna, March 1899. This he played with the Boston Symphony Orchestra. Other works are a concerto in Db, an overture, a Concert-stuck for 'cello and

orchestra, piano pieces, two symphonies and some chamber music and the comic opera ^Taiite Simona,^ produced in Berlin in 1913.

DOHRN, dorn, Anton, German zoologist: b. Stettin, 29 Dec. 1849 ; d. 29 Sept. 1909. He studied at Konigsberg, Bonn, Jena and Berlin, lectured for a time on zoology at Jena, and in 1870 he founded the great zoological station at Naples. As an embryologist he devoted him¬ self mainly to the development of insects and crustaceans ; and besides reports, he published works on the origin of the vertebrates includ¬ ing ^Der Ursprung der Wirbelthiere^ (1875) ; ^Studien zur' Urgeschichte des Wirbelthier-korpers^ (1882).

DOIT, a small copper coin anciently cur¬ rent in Scotland, and equal in value to one-eighth of a penny sterling. There was also in Lower Germany a small coin called deut. In the Netherlands the coin is called duyt.

DOLABELLA, Publius Cornelius, Roman leader : b. about 70 b.c. ; d. 43 b.c. He married Cicero's daughter Tullia, but treated her so harshly that she was ultimately obliged to leave him. He possessed considerable talents, but owing to his extravagance was compelled in 49 to seek a refuge from his creditors in the camp of Caesar, and was present at the battle of Pharsalus (48). In the following year he ob¬ tained the tribuneship, and at once brought in a measure cancelling all debts, which led to an embittered struggle in Rome. He accompanied

Caesar to Africa and Spain, but on his leader's death, he usurped the consular insignia, allied himself with the conspirators, and made a show of republican sentiments. Appointed by Antony to the province of Syria, he murdered the proconsul, C. Trebonius, who had resisted his exactions, and at Laodicea, when about to fall into the hands of his enemies, was slain at his own request by one of his soldiers.

DOLABRA, do-la'bra, the Latin name for a Celt. See Celts.

DOLBEAR, Amos Emerson, American educator and inventor: b. Norwich, Conn., 10 Nov. 1837 ; d. 23 Feb. 1910. He was graduated at Ohio Wesleyan University in 1866 and was professor of physics and astronomy in Tufts College 1874. He achieved eminence in scien¬ tific research, and among his numerous inven¬ tions were the writing telegraph (1864), the electric gyroscope (1867), the magnetic tele¬ phone (1876), the static telephone 0879), and the air space telegraph cable (1882). Among his discoveries were the convertibility of sound into electricity (1873), wireless telegraphy (1881) and electric photography (1893). He received several medals, including a bronze medal for an acoustic apparatus at the Cen¬ tennial Exposition, Philadelphia, 1876, a silver medal in Paris 1881, and a gold medal in Lon¬ don 1882. Among his published works are : ˆChemical Tablesˆ ; ˆThe Art of Projectingˆ ; ˆThe Speaking Telephoneˆ ; ˆMatter, Ether and Motionˆ ; ˆ Modes of Motionˆ ; and ˆNatural Philosophy.ˆ

DOLCE, dol'cha, or DOLCEMENTE, in

music, an instruction to the performer that the music is to be executed softly and sweetly.

DOLCI, doPche, Carlo or Carlino, Floren¬ tine painter: b. Florence, 25 May 1616; d.

there, 17 Jan. 1686. His works, which consist chiefly of madonnas and saints, exhibit the char¬ acter attributed to him. The faces are full of a pleasing and tender softness, which, however, is often carried so far as

to rob them of all char¬ acter. Dolci's drawing is generally correct, his coloring exquisitely delicate and transparent, and in the nicety and laborious care of his finish he approaches the most characteristic examples of the Dutch school. His works are numerous and scattered over all Europe. Besides his madonnas his most famous works are his ˆ Saint Ceciliaˆ ; ˆChrist Blessing the Bread and Wineˆ ; and ˆHerodias With the Head of John the Baptist.ˆ

DOLCINITES (from Dolcino, their

founder), a Christian sect which arose in Pied¬ mont in 1304. See Apostolic Brethren.

DOLDRUMS, a nautical term for the parts of the ocean near the equator that abound in calms, squalls and light baffling winds ; other¬ wise known as the horse-latitudes; also applied to the weather variations characteristic of those regions. See Calms, Region of.

DOLE, Charles Fletcher, American Unita¬ rian clergyman: b. Brewer, Me., 17 May 1845. He is a brother of N. H. Dole (q.v.). He has been pastor of the Unitarian Church, Jamaica Plains, Boston, from 1876. He is the author of ˆThe Citizen and the Neighborˆ ; Uˆsus and the Men About Himˆ (1888) ; ˆA Catechism of Liberal Faithˆ (1895) ; ˆThe American Citizenˆ (1891) ; ˆThe Coming Peopleˆ (1897) ; ˆNoble Womanhoodˆ (1900) ; ˆThe Smoke and the Flameˆ (1903) ; ˆThe Spirit of Democracyˆ (1906); ˆThe Hope of Immortalityˆ (1906); ˆWhat We Know About Jesusˆ (1908) ; ˆThe Ethics of Progressˆ 0909) ; ˆThe Coming Re¬ ligionˆ (1910) ; ˆThe Burden of Povertyˆ

(1912).

DOLE, Nathan Haskell, American writer: b. Chelsea, Alass., 31 Aug. 1852. He was grad¬ uated from Harvard 1874, and after teaching at De Veaux College, Suspension Bridge, N. Y., and in the Worcester High School and serving as Preceptor of Derby Academy, Hingham, Mass., he was literary, art and musical editor of the Philadelphia Press, also musical editor of the Bulletin until 1887, when he became managing editor of the New York Epoch. That year he took the position of literary adviser to the publishing house of Thomas Y. Crowell & Co. In 1901, he was for a time head of the publicity department of D. Appleton & Co. His principal original works are ˆYoung Folks' History of Russiaˆ (1881) ; 'ˆA Score of Famous Composersˆ

(1891); <Not Angels Quiteˆ (1893); ˆOn the Pointˆ (1894) ; <The Hawthorn Treeˆ (1895) ; ˆThe Mistakes We Makeˆ (1898) ; and ˆOmar, the Tent-Makerˆ (1898) ; ˆSix Italian Essaysˆ (1907); <Alaska> (1909); <The Life of Count Tolstoiˆ (1911), and ˆThe Spell of Switzerland> (1913). In 1904 he printed privately a ˆSym¬ phonic Poemˆ in four movements, entitled ˆThe Building of the Organ. ˆ He followed this in 1911 with a second ˆThe Pilgrims,ˆ also privately printed. This sjˆmphonic form gives to English poetry a medium only comparable to the Greek ode as_ invented by Pindar, since its possibilities of varietv and scope are unlimited. In 1896, he furnished 250 poems ˆ for the ˆEducational Music Readersˆ and in 1915 was chosen to

write many of the songs for the Boston public schools. He was poet to the Ancient and Honorable Artillery Company of Boston on its 265th and again on its 270th anniversary. He also wrote the ode for the 100th anniversary of the Pierian Sodality of Harvard University and various other poems for public occasions. He translated in the course of 20 years Mas¬ cagni's ˆCavalleria Rusticanaˆ and ˆL'Amico Fritzˆ and other operas as well as hundreds of lyrics from Russian, Polish, Bohemian, the Scandinavian languages, also French, German, Dutch, Italian, Portuguese and other languages and dialects, mainly for music. In 1899 he edited the complete works of Count Tolstoi, whose novels, ˆAnna Karenina,ˆ ˆWar and Peace, ˆ and many others he had already trans¬ lated. He has also translated ˆ Marta y Maria, ˆ ˆMaximina,ˆ and ˆLa Hermana Saint Sulpice,ˆ from the Spanish of Valdes, as well as various works from the Russian, Italian, French, Swedish and German. In 1896 he edited a multivariorum edition of the < Rubaiyat of Omar Khayyam,ˆ containing versions in English, French, German, Italian, Hungarian and Dan¬ ish carefully collated. He translated the ˆMemoirsˆ of the Baroness Bertha von Suttner (1910) and her feminist novel ˆDer Menschheit Hochgedankenˆ (1914). He was editor (with others) of ˆThe International Library of Famous Literatureˆ (1898) ; ˆMasterpieces of Famous Literatureˆ (1899); ˆFamous Orationsˆ (1900) ; ˆLibrary of Oratoryˆ (1902) ; ˆFlowers from Persian Poetsˆ (1901); ˆYoung Folks Libraryˆ (1902) ; ˆVocationsˆ (1910); also many_ editions of English, Latin, Greek and American poets. He was president of the Bibliophile Society (1901-12), for which he edited ˆMarat's Lettersˆˆ and other of its pub¬ lications ; president of the Omar Kha>Tam Club

of America (1901 -) ; also one of the trustees

of the Fellowes Athenaeum of Roxbury, Bos¬ ton. His wife, Helen Bennett Dole, trans¬ lated Victor Hugo's ˆNinet3'ˆ-three,ˆ Rudolf Baumbach's ˆSommermaerchen,> Andre Theu-riet's ˆL'Abbe DanieP and ˆLa Vie Rustique en France, > Paul Marguerite's <L'Avril,> Johanna Spyri's ˆ Heidi, ˆMoniˆ and ˆRosenresli,ˆ Pierre Loti's ˆPecheur d'lslandeˆ and Klemens Brentano's ˆGockel, Hinkel und Gackeleia.ˆ

DOLE, Sanford Ballard, Hawaiian states¬ man : b. Honolulu, Hawaii, 23 April 1844. He studied law in Boston and was admitted to the bar in 1868, returning in the same year to Ha¬ waii. In 1884 he was made-a member of the legislature and again in 1886. He had been, in 1887, appointed an associate judge of the Su¬ preme Court, under the monarchv, which post he resigned to accept the leadership of the revolution that overturned the monarchy in Jan¬ uary 1893, and established a provisional govern¬ ment. ˆ On 4 July 1894 a republic was formally proclaimed, of which he was elected president. Hawaii was created a territory in June 1900 and he was governor till 1903. In the latter year he vˆas appointed judge of the Federal court for the Territory of Hawaii. This appointment was for six years, and upon itsˆ expiration he was reappointed to the same position, retiring to private life in 1915.

DOLE, dol, France, town in the department of Jura, 26 miles southeast of Dijon. It is situated on a hill round which the river Doubs

flows. The church of Notre Dame is of the 16th century, and is built in a Flamboyant style. The Hotel Dieu is a fine Renaissance building. There is an art gallery, a college (once a Jesuit establishment) and a valuable library of 40,000 volumes. The manufactures are Prussian blue, hosiery, ironware, leather, vinegar, optical instruments, *etc.* ; and the trade is chiefly in grain, flour, timber, wine, brandy, coal, iron, millstones and marble. It possesses many ruins of Roman architecture. From the hills above the town, Mont Blanc, 100 miles, may be seen. Dole, at one time in the territory of the Dukes of Burgundy, was taken by Louis XI in 1479. It afterward belonged to Spain, but was finally brought under French rule in 1678. Pop. 16,294.

DOLERITE, the name given to a class of rocks, including dolerite proper, and the coarser-grained varieties of basalt, in which the miner¬ als present can be detected by the naked eye. Dolerite itself consists of Labrador feldspar and augite, with some titaniferous magnetic iron ore, and other minerals. It has a dark-gray color, crystalline and small-grained, sometimes porphyroidal. Its specific gravity is 3. Its average composition is silica 50, alumina 15, oxide of iron 15, lime 10, magnesia 5, and the rest potash, soda and water. It is very widely distributed. With the introduction of the petrographical microscope and the resultant precision attained in rock investigation, the term is falling into desuetude.

DO LET, do'la, Etienne, French scholar and martyr; b. Orleans, France, 1509; d. Paris, 3 Aug. 1546. At the age of 12 Dolet went to the University of Paris, where his attention was directed to the study which became the chief interest of his life — the writings of Cicero. During a sojourn in Italy he imbibed an en¬ thusiasm for the humanities, with its zeal for the classic writers and indifference to the

teach¬ ing of the Church. In 1534 he settled at Lyons; in 1542 he obtained a license for 10 years to establish a printing press and published many notable works, but brought himself — not for the first time — under a suspicion of heresy, and in 1544 was found guilty of heresy on a charge mainly based on an alleged mistranslation of Plato, in which he was accused of denying the immortality of the soul. Afterˆ two years imprisonment, Dolet was burned in the Place Maubert, Paris, where a statue was erected in his memory in 1889 and round which a demon¬ stration of anticlericals is annually held on the first Sunday of August. The proceedings in his trial were issued by Taillandier in 1836 from the registers of the Parlement of Paris. Con¬ sult Boulmier, 'Btudes sur le XVIieme siecle; fitienne Dolctˆ (Paris 1875) ; Christie, ˆBtienne Dolet, the Martyr of the Renaissanceˆ (Lon¬ don 1899) ; Galbier, ˆBtienne Doletˆ (Paris

1907).

DOLGORUKY, dol-go-roo'ke, Katharina Michailow'na, Princess Yurevskaya (b. 1846), the favorite of the Tsar, Alexander II, who married her in July 1880 after the death of his first wife, Marie. After the tsar s death she lived abroad and published in Geneva in 1882, under the pseudonym of Victor Laferte, ˆAlexander II, Unedited Details of His Private Life and His Death.ˆ

DOLICHOCEPHALIC (from Gr. ˆohxd-long, KecpaXf/ a head) ; longheaded : a term used in ethnology to denote those skulls in which the diameter from side to side is less in pro¬ portion to the longitudinal diameter (that is, from front to back) than 8 to 10. This form of skull is seen in an exaggerated form in native Australians and West Africans. The dolichocephalic skull of ordinary type appears among Indo-European races.

DOLICHOPODIDˆ, dol"i-ko-p6dTde, a numerous family of the order Diptera, some 1,200 species being known. They are small, metallic blue or green flies with slender legs and active habits. The larvae live in the ground or in decomposing matter. They are not known to be harmful, but the flies are predaceous, and by this habit are beneficial to agriculture, catch¬ ing, as they do, insects, and even worms, that are injurious to growing crops.

DOLICHOS (Gr. long, that is, in

pods), a genus of tropical herbs and shrubby plants of the family Fahacece. The 40 or 50 species, of which few are cultivated, are sep¬ arated from species of the related genus Phaseolus by technical characters. The best known species are D. lablab, the hyacinth bean, a native of the tropics. It often twines around supports to a height of 20 feet, bears broad, often wrinkled leaves, purple, rather large flow¬ ers in erect, axillary racemes and flat, rather smooth pods containing several small, black seeds. It is an annual, frequently planted in sunny situations to form temporary screens and arbor covers. It succeeds well in any good gar¬ den soil, but attains the greatest growth and bears the most foliage upon rich soils. It has several horticultural varieties.

DOLL, a favorite plaything of children, found in variety of form and decoration. Most of the dolls found in the stores are made in the village of Sonneberg, in the Thuringian forest, Germany. Here the industry of making chil¬ dren's toys can be traced back to the 17th cen¬ tury, where the work of making them — as in other centres of the industry on the Conti¬ nent — is divided among the various members of the household. Other villages in this vicin¬ ity and some towns in France and Switzerland also export large quantities of dolls to England and the United States. The importation of dolls into England was at one time almost en¬ tirely from the Netherlands, hence they were called ^^Flanders babies.® There are about 40 doll manufacturers in London who make dolls of a superior kind. In France expensive life-size dolls are manufactured. There are a num¬ ber of doll factories in the United States, where of late years ®doll shows® or bazaars have been very popular. The phonograph doll, invented by Edison, created great interest when it was first introduced. The interruption of trade from Europe through the Great VVar has given an impetus to their manufacture in the United States: in New York one factory has been established with a productive capacity of 7,000 heads a day. The doll is the oldest toy known and is found among all nations and tribes, even of the most remote antiquity. Mr. Edward Lovett, of London, England has made remark¬ able collections of those toys — one containing 2,000 specimens. The oldest in his collection is

one 4,000 years old, found in an Egyptian tomb, and another — a little broken image, with no arms or legs — is a relic of the Roman occu¬ pation of Britain.

DOLLAR (Low German daler, from thaler, short for J oachimsthaler, coined 1519 from sil¬ ver mines in Joachimsthal, Bohemia, and stand¬ ard for weight and purity), the unit of American currency. During the troubled periods in Eu¬ rope previous to the •19th century some coins because of their intrinsic value, appearance and other qualities came to have a circulation far beyond the confines of the political state which placed them in circulation. Thus it came about that Prussia, Canada, Mexico and the United States received the name of their monetary unit from a section of the little country of Bohemia. Florence in the Middle Ages issued a coin which came to be known by the city's name, and the name is perpetuated in Holland, Austria and England. The West India trade before the Revolution had made the Spanish dollar — more convenient than the sovereign — the real unit of trade here; and the* Coinage Act of 2 April 1792 merely legalized this fact, establishing the dollar as the unit of American currency, making it equivalent to 24.75 grains of fine gold and authorizing the coinage of silver dollars ®of the value of a Spanish milled dollar the same as is now current® (see also Cent), and of halves and quarters correspond¬ ent. The first actual coinage was in 1794, dol¬ lars of 416 gr., 371.25 silver, .8924 fine. The dollar of account was rated at 4s. 6d. sterling, making the pound equal to $4.44; which, as the sovereign was 113 gr. gold, was too little and should have been $4,565. By act of 28 June 1834, the gold in the dollar was reduced to 23.20 gr., raised 18 Jan. 1837 to 23.22, where it remains, the pound having been unchanged, has since been equal to $4.86ˆ. The last act made the weight of the silver dollar 412.5 gr., but raised it to .900 fine, the amount of silver remaining the same as before, 371.25 gr. On 3 March 1849, a coinage of gold dollars was authorized, weight 25.8 gr., .900 fine, 23.22 gr. pure gold; on 21 Feb. 1853, a $3 gold piece, same fineness, 77.4 gr. ; and half and quarter dollars of silver, 192 and 96 gr. respectively, but legal tender only to $5. The act of 1873 discontinued the coinage of the silver dollar of 412.5 gr., but authorized one of 420 gr. (the ®trade dollar®) for the China and Japan trade. The fall in silver shortly after, however (at this time the silver dollar was worth rather more than the gold), inflated its value and made bullion owners anxious to have their metal coined into these, and on 22 July 1876, their coinage was limited to the actual demand for export, they not being intended for internal circulation — 35,959,360 were issued in all. The coinage was suspended April 1878.

The act of 28 Feb. 1878 revived the coinage of the dollar of 412j4 gr., and that of 14 July 1890 continued it. It is notable that many times more silver dollars have been coined since 1873 than be¬ fore; up to 30 June 1872 the total number struck was only 8,045,838, while that of gold dollars was 19,015,642. The act of 14 March 1900 makes the gold dollar the standard of value in the United States. The law, however, did not provide for the issue of coins of this denomination.

DOLLAR BIRD, an Australian roller (Eurostymus australis), prevailingly blue and black in plumage, so called from the large roundish spot of white on its wing, shown in flight.

DOLLAR-FISH, a name used, particularly in Maine, for a small fish of the family Stroma-teidce, more widely known as the butter fish or harvest .fish {Rhombus triacanthus). It is found on the entire extent of the Atlantic coast of the United States and is extremely abun¬ dant during the summer on the shores of the New England and Middle States. The dollar-fish is from 8 to 10 inches long, of an oval form, with a blunt snout and small mouth; the color is silvery, bluish above, beautifully iridescent when alive. Great numbers are cap¬ tured in seines and pound nets and they are highly valued as pan-fish. The young have an interesting habit of swimming, several together, in the company of large jellyfishes, beneath the disks of which they seek shelter and protection. Several allied species occur on both the east and west coasts of the United States.

DOLLARD, Adam, Sieur des Ormeaux: b. 1638; d. 1660. He was an officer of the French garrison at Montreal who, with 16 compatriots and a few friendly Indians, in¬ tercepted 500 Iroquois and held them at bay for five days at the Long Sault, on the Ottawa River above Montreal. He with all his companions perished ; but the resistance they had met so disheartened the Iroquois that they abandoned their projected attempt on Montreal and the colony of New France.

DOLLART, The, an inlet (nearly land¬ locked) of the North Sea, at the mouth of the Ems, between the Dutch province of Groningen and the Prussian province of Hanover. It is nearly 13 miles long by seven broad. It was formed by inundations of the sea, which took place in 1277 and subsequently, overwhelming many large villages and hamlets, arid destroying thousands of human beings, besides much valu¬ able property. A considerable extent of rich land has been regained by embankment, espe¬ cially on the Dutch shore. The city of Emden is in the Dollart.

DOLLIER DE CASSON, dol'ya d? Cas-son, Sulpician : b. near Nantes, 1636; d. Mon¬ treal, 1701. He first served as a cavalry officer under Marshal Turenne. In 1657 he entered the Sulpician order, and went to Canada. In con¬ junction with Father Galinice he made in 1669-70 an important journey of exploration round the Great Lakes, spending the winter on the north shore of Lake Erie. In 1671 he was ap¬ pointed superior of the Seminary of Montreal ; in 1672 he laid out the first streets of that city; and he inaugurated the Lachine Canal under¬ taking. He wrote a history of Montreal cover¬ ing the period from 1640-72.

DOLLINGER, dˆ'mg-er, Johann Joseph Ignaz von, German Roman Catholic theologian and historian: b. Bamberg, Bavaria, 28 Feb. 1799; d. Munich, 10 Jan. 1890. He received his preliminary education in his native city, and next entered the University of Wurzburg, where his father was professor of anatomy and physiology. In 1817 he began the study of

mental philosophy and philology and in 1818 turned to the study of theology. He paid par¬ ticular attention to the independent study of ecclesiastical history. He was ordained a priest in 1822 and in 1823 was appointed professor of ecclesiastical history and canon law at the Lyceum of Aschaffenburg. In 1826 he became professor of ecclesiastical history and law in the newly founded University of Munich, where he spent the rest of his life. Here he became famous as a historian, politician, and publicist. He published ˆDie Lehre von der Eucharistie in den ersten drei Jahrhunderten ˆ in 1826, and m 1828 a history of the Reformation. In 1835 appeared the ˆGeschichte der Christlichen Kirche,ˆ and in 1838 ˆLehrbuch der Kirchen-geschichte.ˆ Dollinger contributed frequently to the Historisch-politische Blatter and pub¬ lished several pamphlets. His connection with politics began in 1845, when he represented hi.s university in the Bavarian chamber ; he lost his seat and professorship in 1847 on the fall of the Abel ministry, and in 1848 he was elected to the Frankfort parliament by a Bavarian constituency. Here he was recognized as the leader of the

Roman Catholic party. He was recalled to Munich in 1849, and resumed his former placo in the Bavarian chamber. In 1857 he visited Rome, and soon afterward it became evident that his views had undergone a change. Previ¬ ously Dollinger had been an ardent defender of Catholicism and a bitter opponent of Protest¬ antism ; from now on he tended more and more to liberalism. Public announcement of this was made in a course of lectures which he delivered at Munich, in which he declared the temporal power of the Pope not an essential part of the Roman Catholic Church, and he expounded his position in ˆHippolytus und Kallistus oder die romische Kirche in der ersten Halfte des dritten Jahrhundertsˆ (1853) ; ˆHeidenthum und Juden-thum, Vorhalle zur Geschichte des Christenthumsˆ (1857) ; ˆChristenthum und Kirche in der Zeit der Grundlegung) (1860), and ˆKirche und Kirchen, Papstthum und Kirchenstaatˆ (1861). This attitude of opposition became more pronounced in 1870, when he declined to accept the doctrine of papal infallibility formu¬ lated by the Vatican Council, and assumed the leadership of the Old Catholic party. As a re¬ sult Dollinger was excommunicated by the Archbishop of Munich in 1871, but still retained the support of the Bavarian government. While the sentence was pending he was chosen rector of the University of Munich, and received numerous honorary degrees and decorations. He continued to lecture on ecclesiastical history and kindred subjects. Numerous works con¬ tinued to come from his pen including ˆSamm-lung von Urkiinden zur Geschichte des Konzils von Trientˆ (1876) ; ˆAkademische Vortrageˆ (1891) ; ˆBeitrage zur Sektengeschichte des Mittelaltersˆ (1890) ; ˆ Brief e und Erklarungen fiber die vatikanischen Dekreteˆ (1890) ; ˆKleinere Schriftenˆ (1890). In collaboration with Reusch he reprinted the autobiography of Bellarmine (1887), and ˆGeschichte der Moral-streitigkeiten in der romisch katholischen Kirche seit dem XVI Jahrhundertˆ (1890). Several of his works have appeared in English including ˆDeclarations and Letters on the Vatican De¬ creesˆ ; ˆFirst Ages of Christianityˆ; ˆJew and Gentile in the Courts of the Temple of Christˆ ; ˆHippolytus and Callistus.ˆ See Old Catho¬

lics. Consult the life by Friedrich (Munich 1901) ; also Kobell, Hgnaz von Dollinger, Erin-nerungenˆ (ib. 1891) ; and Michael, Hgnaz von Dollinger, eine Charakteristikˆ (Innsbruck

1893).

DOLLIVER, Jonathan Prentiss, American lawyer and politician : b. near Kingwood, Pres¬ ton County, W. Va., 6 Feb. 1858; d. Fort Dodge, Iowa, 15 Oct. 1910. He was graduated at West Virginia University 1875 and admitted to the bar 1878. He practised law in Iowa and was a member of Congress from that State from 1889-1900, and was a member of the Senate from 1900 until his death. He offered strenuous opposi¬ tion to the Payne-Aldrich tariff.

DOLLOND, John, English optician of French descent: b. London, 10 June 1706; d. there, 3(3 Nov. 1761. He devoted his attention to the improvement of refracting telescopes, and succeeded in constructing object-glasses in which the dispersion of the rays of light was corrected. Subsequent members of his family have distinguished themselves in optics, astron¬ omy, *etc.*

DOLL'S HOUSE, A. The theme out of which ˆA Doll's House ˆ was constructed was not of sudden choice. In his notes for this modern tragedy, Ibsen jotted down, under date of 19 Oct. 1878, the following statement :

" A woman cannot be herself in the society of the pres¬ ent day which is an exclusively masculine society with laws frarned by men and with the judicial system that judges feminine conduct from a masculine point of view."

Those who take ˆA Doll's Houseˆ as indica¬ tion that Ibsen was a champion of the woman question are wrong in their conclusions ; for he was interested much more in the larger spiritual question of the equality of the sexes. If he stressed the feminine in his plays, to the detri¬ ment of the masculine, it was simply because he felt that the weaker side of the argument needed the stronger support, in order to reach an equal balance of fairness and justice. ˆA Doll's Houseˆ was completed while Ibsen .was spending the summer of 1879 in Amalfi; and it was almost immediately published. It raised a storm of protest everywhere, and for many years was regarded solely as an attack upon marriage. Ibsen was called every preposterous name imaginable. The only way in which the play was allowed to be given in London was in an adapted form made by Henry Arthur Jones and called ˆBreaking a Butterflyˆ ; it was pro¬ duced at the Princess Theatre, 3 March, 1884.

Nora's slamming of the door in her hus¬ band's face, as she leaves the house, resounded throughout the world. Debates were held everywhere as to whether Nora was justified in leaving her home, whether it was the true act of a mother and a wife, and whether Nora, in the end, would return to Torvald, her hus¬ band.

As an acting drama, ˆA Doll's Houseˆ has held the stage and has been as much a goal for the young actress as ˆCarnille.ˆ Apart from its philosophic preachment, it is a portrait of a most interesting woman, — not as subtle a por¬ trait as Hedda Gabler, or as Rebecca West in ˆRosmersholm,ˆ but affording, in deep psychol¬ ogy, as well as in such outward scenes as the Christmas Tree, the Tarantella dance, and the denunciation scene, ample opportunity for his¬ trionic ability. Eleanor Duse, Madame Rejane,

Agnes Sorma, Mrs. Fiske, Madame Nazimova and Ethel Barrymore, are among the many who have attempted the role. The play was first seen in America when, during 1883, in Louis¬ ville, Ky., Madame Modjeska acted Nora. It was first played in London, in its regular form, by Janet Achurch and Charles Carrington, at the Novelty Theatre, 7 June 1889.

Montrose J. Moses.

DOLLY VARDEN, the soft-hearted, wily little coquette in Dickens' novel ˆBarnaby Rudge.ˆ The impression made by the author's description of her dress of flower-sprinkled dimity led to the adoption of a style of dress that is known as the Dolly Varden and was the vogue from about 1865-70. The name is often applied to any light dress-goods with bright-colored flower effects.

DOLLY VARDEN TROUT, the common brook trout (Salvelimis malma), a char of the mountains of western North America, and northward in the coastal streams to the Aleutian Islands, so called because of the beauty of its markings, which are said to resemble the color¬ ing of a Dolly Varden (q.v.) dress. The trout is voracious and game, often attains a weight of 12 pounds. Its general color is olivaceous, the sides with round, red or orange spots as large as the eye. In the region of its native waters it is known as the bull-trout, red-spotted trout and salmon trout. It was at one time regarded as identical to the malma of Kamchatka, but recent investigation has shown them to be dif¬ ferent species. It has been used to stock streams in the northeastern States, Canada, and Europe.

DOLMAN. (1) A long robe worn by the Turks as an upper garment. It is open in front, and has narrow sleeves buttoned at the wrist. (2) It has given its name to a kind of loose jacket worn by women as an outer garment. It has a cape or hanging piece over the arm instead of a sleeve.. (3) The uniform jacket of a hussar.

DOLMEN, a structure consisting of one or more large unhewn stones, resting on a number of unhewn stones, placed erect in the earth. The name is sometimes used as equivalent to crom¬ lech, sometimes in a distinctive sense. Sir John Lubbock maintains that cromlech should be ap¬ plied to a stone circle, dolmen to a stone cham¬ ber, such circle or chamber consisting of huge stones set up in prehistoric times for religious or sepulchral purposes or as memorials of some important event. They are of very wide distri¬ bution ; there are over 3,400 in France, mainly in Brittany, and are to be seen in the British Isles (especially Ireland). Scandinavia, Hol¬ land, Germany, the Crimea, Persia, Arabia, Palestine, Madagascar, Australia and Japan are among the countries in which they have been discovered. Consult Barlase, ˆThe Dolmens of Irelandˆ (London 1897) ; Keane, ˆ Ethnologyˆ (Cambridge 1896).

DOLNJA TUZLA, doKnya toozfla, Bosnia, Jugoslavia, town beautifully situated on the Julia about 20 miles from the Serbian fron¬ tier. It is celebrated for its salt mines, has a trade in alkali and coal, and wasˆ the scene of an Austrian defeat of the Turks in 1690. Pop.

12,000

DOLOMIEU, do-lo-me-e, Deodat Guy Silvain Tancrede Gratet de, French geologist and mineralogist: b. Dolomieu (Isere) 24 June 1750; d. Chateauneuf,. France, 26 Nov. 1801. In youth he became a member of the Knights of Malta, and having killed a brother knight in a duel, was condemned to death but pardoned on account of his youth. He was appointed cor¬ respondent of the Academy of Sciences of Paris, and from 1777 to 1791 made extensive travels in the south of Europe, often on foot, with a hammer in his hand and a bag on his back. In 1796 he was appointed professor or lecturer in the School of Mines, and on the establishment of the institute was made a member of that society. In 1798 he accompanied Napoleon to Egypt, and on his return was detained at Mes¬ sina by the Neapolitan government for having revealed in 1783 its plans for the conquest of Malta to the grand master of the knights. He was imprisoned for 21 months in a noisome dungeon, clothed in rags, with nothing but straw for a bed. Deprived

of writing materials, he made a piece of wood into a pen, and with the smoke of his lamp, for ink, he wrote on the margins of his Bible, his ˆPhilosophie Mineral-ogiqueˆ (published 1801). In 1801 he received the professorship of mineralogy-in the museum of natural history. The mineral ˆMolomite® which he was the first to describe, is named in his honor. Among the works left by him are ˆVoyages aux les de Lipariˆ (1783) ; ˆSur le Tremblement de Terre de la Calabreˆ (1784).

DOLOMITE, carbonate of calcium and magnesium [(Ca,Mg)C03], containing normally 30.4 parts lime and 21.7 parts magnesia, but varying in the ratio of the two carbonates. Iron and manganese carbonates are sometimes pres¬ ent as impurities. The crystallization is rhombohedral ; the hardness 3.5 to 4 ; specific gravity 2.8. The color is normally white but may be reddish, grayish, brownish, or even black. In general the mineral resembles calcite but differs in not effervescing freely with cold acid, even if finely powdered. Massive dolomite in the form of dolomitic limestone is a rock of common oc¬ currence and sometimes forms strata of great extent and thickness. Such limestones fre¬ quently show all transitions from nearly pure calcite to true dolomite. Generally, a limestone containing over 5 per cent MgO is described as a magnesian limestone. Under pressure dolmitic limestones and dolomites become crystalline and are classified as marbles. Many of the great limestone formations in the United States are more or less dolomitic. See Dolomitization ; Limestone; Rocks.

DOLOMITE MOUNTAINS, or DOLO¬ MITE ALPS, a group of mountains, part in Tyrol and part in Italy. The name comes from the rock dolomite of which the mountains are largely composed.

DOLOMITIZATION, the process by which the calcium in limestones is replaced by magnesium, forming dolomitic limestones and dolomites. The exact nature of this process is still a matter of doubt. Dolomites cannot be formed directly from the calcareous remains of animals, since they contain a much larger pro¬ portion of magnesia than any animal shells or tests, and the magnesium therefore was probably added after the calcareous material had accumu-

DOLORES

Jated. Ill the lagoons of coral reefs, the en¬ closed body of sea water becomes concentrated by evaporation, and the chloride of magnesium (present in all sea water) by a process of double decomposition forms magnesium carbonate from the calcium carbonate of the coral rocks. It is also possible that fine calcareous mud in suspension in sea water may exchange some of its calcium directly for magnesium. See Dolomite.

DOLORES, do-16'res, El Grito de, liter¬ ally, ˆ'The cry, or outcry, of Dolores,ˆˆ marking the commencement of the Mexican War for in¬ dependence. On the night of 16 Sept. 1810, Don Miguel Hidalgo y Costilla, the parish priest of the town of Dolores (q.v.), gathered a number of patriots under his banner to the cry of : ®Long live religion ! Long live our Most Holy Mother of Guadalupe! Long live America, and death to bad government 1® All previous at¬ tempts (1798-1810) to rebel against the Spanish authorities had been suppressed; but Hidalgo and his enthusiastic followers were victorious in several engagements. Although he and his lieutenants, Allende, Aldama and Jimenez, were captured and put to death in 1811, the move¬ ment they began was carried on until the revo¬ lutionists triumphed, 27 Sept. 1821, Yturbide entering the capital on that day. See Mexico.

DOLORES HIDALGO, e-dal'go, Mexico,

a town in the state of Guanajuato, department of Allende, about 41 miles from the capital of the state, which is also called Guanajuato. Pop.

6,764.

DOLPH, John Henry, American painter: b. Fort Ann, N. Y., 18 April 1835; d. New York, 28 Sept. 1903. He studied at Antwerp and in Paris, then opened a studio in New York; he was a member of the National Academy and was one of the founders of the American So¬ ciety of Artists. His works include HCnicker-bocker Farm Yardˆ ; <

Season of Plenty^ ;

^Horse Doctor^; ^A June Day^ ; ^Who Will Bell the Cat> ; ^Cat and Kittens^ ; <A Princess> ; <Fish Commissioners^ ; ^Alexander and Diogenes> ; <The Waste Basket^ ; ^A Society Lion> ; and ^Called to Order. > His pictures of ani¬ mals, and particularly cats, are best known.

DOLPH, Joseph Norton, American states¬ man : b. Dolphsburg, N. Y., 19 Oct. 1835 ; d. Portland, Ore., 10 March 1897. He studied law, and began practice at Binghamton, N. Y. In 1862 he settled in Portland, Ore., taking up the practice of law there. In 1864 he was elected city attorney, and was appointed United States district attorney. He was a member of the State senate four consecutive terms, sat in the United States Senate from 1883-95. In^ his second term he was chairman of the Committee on Coast Defenses, a member of the Committee on Commerce and an active opponent of the free coinage of silver.

DOLPHIN, a group of cetaceans belong¬ ing to the family Delphinidcu. The common species (Delphinus del phis) is found chiefly in the Mediterranean and North Atlantic Ocean. It is from six to eight feet long; the body tapers toward the crescent-shaped tail, which is about a foot broad. The blow-hole is also crescent-shaped ; and the beak is usually about six inches long. The dolphin is blackish on the

back, and white below, the sides being gray. The female produces but one at a time, and de¬ votes herself assiduously to caring for it. There are numerous species of dolphin, each confined, apparently, to a comparatively narrow range. All are voracious, and feed on other fish and crustaceans, and are said to eat even the dis¬ abled and feeble of their own kind. They live in herds or ^schools,® and may be seen by ocean voyagers playing about the vessels. They will leap in graceful curves, into the air, make sud¬ den descents into and through the waves, fol¬ lowed by a track of foam. Then they will re¬ appear, show their slender back-fins, expose their broad tails as they plunge below the water; and almost before one has missed them, they will rise on the other side of the ship. They are a source of pleasure to the ocean traveler; and furnish more substantial gratifica¬ tion to the sailors, who eat their flesh with much relish after their usual rations of salt-pork. The grampus, the porpoise and many of the so-called whales, such as the white-whale, the killer-whale and others, are related genera ; as are also the soosoo of the Ganges, and the bouto of the

Amazon, which inhabit fresh water in¬ stead of the ocean. The dolphin gave the name to Dauphine, one of the provinces of France, from which the ˆMauphin,® the heir-apparent to the French throne, derived his title. Consult Beddard, <A Book of Whales> (1900).

DOLPHIN IN ART. This sea mammal has been adopted by both pagans and Chris¬ tians as a symbol of the dead. It has been used in Christian art also as emblematic of swiftness, diligence and love. In classic Greek art we find the dolphin figuring on buildings, on pottery, coins and mural paintings. It was used as symbolizing the sea or water, in the same manner as they used a flower to represent land. The dolphin figured as an attribute ac¬ companying nymphs, nereids, tritons, also Arion, Aphrodite, Poseidon, Apollo, Neptune, *etc.* As symbol of the sea it, naturally, often appears in company with an anchor or a trident. A dol¬ phin entwining an anchor was the device or badge of Aldus Manutius (1447-1515), the Venetian printer — Venice being ˆ*ˆmistress of the Adriatic.® The dolphin figures in French art for the following historic reason. In 1140, Guigo IV, of Viennois, adopted the title of ˆdauphin® and took as his crest a dolphin. Humbert II, a successor, exchanged the dauphiny, in _ 1349, for a legacy, Charles of Vallois receiving the title conditionally that the title ˆDauphin® should be attached always to the heir to the throne. In ceramics the dolphin (crowned) figures as the mark of Lille porce¬ lain (18th century). At the present day the dolphin is greatly favored as a decorative de¬ vice on fountains, *etc.*

DOMAIN, from the Latin dominium, right of absolute ownership, property, dominion. The territory over which Dominion is exercised ; the territory ruled over by a sovereign, or under the government of a commonwealth, as the domains of Great Britain. The term pub¬ lic domain is used in Europe, as property be¬ longing directly to and controlled by the state, such as lands set apart for state or public uses, roads, canals, parks, *etc.* In the United States the lands owned by the Federal government or by a State.

DOMANIG, d5-man'iH, Karl, Austrian numismatist : b. Sterzing, Tyrol,

3 April 1851. He was educated in the high schools of Innsbruck and Strassburg and at the Gregorian University, Rome. In 1880 he was appointed tutor to the children of Duke Philip of Wiirttemberg and until 1891 served in the same capacity to several of the archducal members of the Imperial family of Austria. From 1884 to 1913 he was also engaged successively as assistant custodian, custodian, director and counselor of the Im¬ perial Coin and Medal Collection, Vienna. He traveled extensively for the purpose of artistic research and is honorary member of many Austrian and foreign numismatic societies. In commemoration of his valuable services as its first director the administration of the Vienna Imperial Medal and Coin Collection issued a medal bearing Domanig's head ; the town of Sterzing placed a memorial tablet, cut from native marble, on the house of his birth. He has published ˆEine katholische Burschenschaftˆ (2d ed., 1873) ; ˆDer Tyroler Freiheitskampf ˆ (3d ed., 1909) ; <Der Gutsverkauf,ˆ a drama (1890) ; ˆDie deutsche Privatmedaille der altern ZeiU (1893) ; ˆPortratmedaillen des Erzhauses Osterreichˆ (1896) ; ˆDie Fremden,ˆ a novel (1898; 3d ed., 1911); ˆDie deutsche Medaille in kunst-und kulturhist. Hinsichtˆ (1907) ; ˆDie Entstehung von Wolframs TitureP (1911) ; ˆKonig Lauren,ˆ drama (1912). He edited the Tyroler Kalender for three years, and Klassische Andachtsbilder, and contributed to Gral, ˆThe Catholic Encyclo¬ pedia,ˆ and several anthologies.

DOMAT, do-ma', Jean, or DAUMAT,

a French jurist: b. 1625; d. 1696. He is noted for his ˆLois civiles dans leur Ordre natureP (3 vols., 1689-94), which Blackstone considered a monumental work. Domat also wrote ˆLe Droit publicˆ (published 1697) and ˆLegum Delectusˆ (1700). Pascal, with whom he was on terms of very intimate friendship, bequeathed to him his private papers.

DOMBEY AND SON, a novel by Charles Dickens, published in 1848. It represents a man of proud and unbending nature who centres his worldly ambitions in an only son, but who becornes broken and subdued by his child's death, family disgrace and financial ruin. Paul Dombey, Jr., is a puny child whose only com¬ panion is his sister, Florence, somewhat his senior. The two children are orphans, their mother having died on giving birth to Paul. The father, Paul Dombey, Sr., neglects the girl, and finally becomes jealous of her in¬ fluence over her brother. So the boy is sent to school at the age of six with Doctor Blimber, where he sickens and dies under the strain of forced work and grief at separation from his sister. Dombey marries again, and ill-treats and neglects his wife, a proud sensitive woman, who has

discovered the good qualities of the little Florence. Finally she is goaded to elope with Dombey's manager Carker. In a passion Dombey strikes his daughter and orders her to follow his wife with whom she has, he asserts, always been in league. Florence leaves home and goes to the house of Solomon Gills, where she meets her lover, Walter Gay, Gills' nephew, who has just returned from a long sea voyage. They are married, and embark on a wedding trip. In the meantime Dombey speculates

recklessly and is ruined. Florence goes to him in his trouble and offers him a home, which he accepts. And there he lives his life out devoted to his two little grandchildren.

DOMBOC, ddm'bok, or DOOM-BOOK

(A. S. ^^book of dooms or sentences®), the code of laws compiled by King Alfred, who made few if any original laws, but contented himself with restoring, renovating and improving those which he found already in existence. Alfred's religious character is strongly impressed on his code, which begins with extracts from the Bible. Then follow the Ten Commandments, the part of the Mosaic law relating to criminal offenses, and passages from the New Testament, includ¬ ing the Golden Rule. The code was ratified by the Witan, as Alfred expressly informs us. Thorpe gives it in his ®Diplomatarium Anglicanum aevi Saxonici^ (^English Diplomatarium of the Saxon EraU (1865). Consult Pauli, ^Alfred the Great, ^ from the German (London 1857).

DOMBROWSKI, dom-brof'ske, Jan Hen¬ ryk, Polish general : b. Pierszowice near Cra¬ cow, 29 Aug. 1755; d. Wina-Gora, Prussia, 6 June 1818. After serving under the Elector of Saxony he returned to take part in the Polish campaigns against Russia and Prussia in 1792-94. Next entering the French service, he organized a Polish legion at Milan ; and in the campaigns which followed, Dombrowski and his Poles took a distinguished part. After the fall of Napoleon he returned to Poland and was ap¬ pointed by the Emperor Alexander a general of cavalry and Polish senator.

DOME. See Cupola; Folds.

DOME OF THE ROCK, a name given to the Mosque of Omar, Jerusalem. It stands on Mount Moriah, on the site once occupied by the Temple of Solomon. Immediately under its dome is an irregular-

shaped rock. This rock was the scene of many scriptural events, and has been greatly revered for ages. See Jerusalem.

DOMENICHINO, do”ma-ne-ke’no, or DOMENICO ZAMPIERI, Italian painter: b. Bologna, 28 Oct. 1581; d. Naples, 15 April 1641. He was sent to study first with Calvart, and afterward with the Caracci. From the slowness of his execution he was named, by his fellow-students, the ®ox of painting® ; but Annibal Caracci predicted that the ox would ^^plough a fruitful field.® Having contracted a great friendship for Albano he joined him at Rome, and his former master, Annibal Caracci, jealous of Guido, procured for him the execution of one of the pictures for a church which had been promised to that great painter. It was a cus¬ tom with Domenichino to assume, for the time, the passion he was depicting; so that, while working by himself, he was often heard to laugh, weep ‘ and talk aloud, in a manner that would have induced a stranger to suppose him a lunatic. The consequence, however, was, that few painters have surpassed him in lively repre¬ sentation. His ˆCommunion of Saint Jerome,ˆ now in the Vatican collection, has been con¬ sidered. by some connoisseurs, inferior only to theˆ ˆTransfigurationˆ of Raphael; and the ˆHistory of Apollo,ˆ which he painted in 10 frescoes for Cardinal Aldobrandini, is a notable series. His merit excited so much envy that he

retired to his native city and employed himself two years on his famous picture of the 4ˆosaryˆ now in the gallery of Bologna. He was afterward recalled to Rome (1621) by Gregory XV, who created him his first painter and architect of the Vatican. Losing this post after the Pope’s death, he accepted an invitation to Naples, to paint the chapel of Saint Januarius. But here he encountered a jealousy so rancor¬ ous that his life became altogether embittered by it ; and so great was his dread of poison, that he prepared all his eatables with his own hand. Domenichino, who understood every branch of his art, produced nothing excellent without study and labor ; but in consequence of his great premeditation, no painter has given his pieces more of the properties belonging to the sub¬ ject. At the same time his designs are

cor¬ rect ; and he succeeded equally in the grand and the tender. Nearly 50 of his pieces have been engraved. Consult monographs by Breton (1867) ; C. Landon (1823) ; Roncagli (1842), and Serra (1909).

DOMESTIC INTERIOR DECORA¬ TION. See Interior Decoration.

DOMESTIC RELATIONS, in law, the legal relations existing between the members of a family or domestic group. In its widest ap¬ plication the term includes parent and child, husband and wife, guardian and ward, master and servant. Other classifications omit master and servant or restrict the latter term to domestic servants. The law of domestic rela¬ tions embraces all those rules appertaining to the particular classes of persons above men¬ tioned, and is a term of convenience rather than logical classification. Generally speaking, it may be said to be made up largely of the law of contract, tort and agency. It treats the sub¬ jects of marriage and divorce, the rights and liabilities of parents and children, the rights and liabilities of guardians and wards, and various allied topics. In late years much legis¬ lation has been passed on this subject in the various States, particularly so in New York, which has codified it in a statute known as the Domestic Relations Law. See Divorce; Family, Law of; Husband and Wife.

DOMESTIC SCIENCE. See Home Eco¬

nomics.

DOMESTICATED ANIMALS. See

Animals, Domesticated.

DOMETT, Alfred, English poet: b. Camberwell Grove, Surrey, England, 20 May 1811; d. London, 2 Nov. 1887. He was the original of Browning's ˆWaring.ˆ He lived in New Zealand, 1842-71, and became a colonial statesman of eminence. His verse attracted much attention, the best specimens being in the volumes ˆRanolf and Amoliaˆ (1872) ; and ˆFlotsam and Jetsam: Rhymes Old and Newˆ (1877). Consult Gisborne, ˆNew Zealand Rulers and Statesmenˆ (1897).

DOMICILE is the permanent, fixed home of a person, with no present intention of remov¬ ing therefrom. A person traveling from one city. State, or country into another does not change his domicile and create a new one at every place he stops, but the place to which he intends to return and reside permanently is his domicile. Generally speaking, a person can have but one domicile at one time; but for different

purposes, he may have more than one domicile at one time. Some things for which it is neces¬ sary to have a domicile are : administration of a person's estate, jurisdiction, taxation and home¬ stead exemptions. Some countries of Continen¬ tal Europe ignore domicile altogether, basing their rules of law as to personal status upon na¬ tionality alone. In America, the place at which a person exercises his political rights and privileges, and which he calls his home, is con¬ sidered his domicile. The two things necessary to a domicile are an actual residence and a present intention of remaining there.

The place of birth is a person's original domicile, unless his parents were on a journey at the time, in which case their home is the domicile of birth. This domicile may be aban¬ doned for another, of one's own choice. When the domicile of choice is abandoned the domicile of origin revives until a fresh domicile is again selected. After a person has once acquired an actual domicile, he does not lose it by a tem¬ porary absence, no matter how long it is con¬ tinued, if he intends to return ; and in cases where a person changes his domicile he does not lose the old place of domicile, until he has actually acquired the new one. While the in¬ tention of the person enters into the question of domicile, it is not a controlling feature ; and in a change of domicile the intention must be reinforced by some act, such as exercising a political right, engaging in business, paying taxes, and executing a will, according to the laws of the place; all of which are evidence of the intention to create a new domicile. When persons are married, the wife acquires the domi¬ cile of her husband ; and all children born ac¬ quire the domicile their father had at the time of their birth. If a widow with minor children marries, the domicile of the children is not changed until there is an actual removal. Il¬ legitimate and posthumous children acquire the domicile of their mother in most jurisdictions.

A person absent from home on the service of his government, such as an ambassador, con¬ sul, soldier or sailor, does not change his domi¬ cile ; unless, after the service is finished, he con¬ tinues to reside at that place. A convict or prisoner, a person attending a college or uni¬ versity, does not change his domicile. In case of war it is held that the property of an alien domiciled in a country at war with his own is liable to confiscation as that of an alien enemy. A person may acquire a commercial domicile in a place different from that in which he lives.

When a person goes to a foreign country and engages in business there, he is considered a merchant of that country; and it makes no dif¬ ference what the relations of the government of the countries are with one another.

The domicile of a sailor is where he volun¬ tarily spends most of his time when on shore. A man may become a subject of a new country without losing his domicile in the old.

A guardian cannot change his ward's domi¬ cile from one country or State to another; and it is doubtful even if he can change the domicile from one county to another in the same State. The nature and purpose of the appointment of a guardian may, however, change the general rule. The appointment of a guardian will not prevent the ward from changing his domicile. The question of domicile is important in the case of

marriage contracts. Whether or not two per¬ sons have the capacity to marry depends on the rules of the law of their domicile; but whether the marriage has been validly contracted, on the rules of the law of the place where the cere¬ mony was performed; but generally speaking, a marriage validly entered into according to the laws of the place where it is contracted is valid anywhere. Although the domicile of the wife is considered as that of the husband, yet in ac¬ tions for divorce, a husband, after giving his wife a cause for divorce, cannot acquire another domicile so as to deprive her of that right. In wills, the law of the domicile of the testator governs as to the validity of the execution and the distribution of personal property; but as to real estate, if it is to pass under the will, the testator must execute the will according to the laws of the place where the property is situated. Corporations are considered as domiciled in the country or State from which they have derived their charters. Consult Bentwich, ˆLaw of Domicile in its Relation to Succession ˆ (Lon¬ don 1911) ; Dicey, ˆLaw of Domicile ˆ (ib. 1879) ; and ˆConflict of Laws ˆ (ib. 1896) ; Jacobs, ˆTreatise on the Law of Domicile ˆ (Boston 1912).

DOMINANT, in music, is the fifth note above the tonic or keynote of any scale. It is always major in both major and minor modes, as its harmonies rule or determine the scale. Origi¬ nally so called because in the ecclesiastical sys¬ tem it was the principal reciting note of the Gregorian chant. It also marks the division of the scale into two co-ordinate parts, as in a fugue when the subject commences with the tonic the answer starts with the dominant, or the reverse. In the sonata form it used to be an almost invariable rule to start the second subject in the dcxminant key.

The dominant chord is the major triad on the fifth of the major or minor key. Thus of C the triad would be g-b-d. A dominant seventh is formed by adding a minor seventh to the triad. Add / to the dominant triad given above and you have the dominant seventh of C.

DOMINE, do'mm-e, the title of a minister of the Reformed churches of the Netherlands, South Africa and America, unaltered from the Latin vocative of dominus, master or lord. It is so written in all the old Dutch and American colonial documents, the form of address being often abbreviated to ®Dom. auct» (oritate), pastor with authority. As many Dutch teach¬ ers went to Scotland and thousands of Scottish students and ministers for study in Holland, the term was borrowed and became popular in Scotland, but their dominie is spelled as in the character ^^Dominie Sampson.® The title domine is used as a common noun, as well as an affectionate form of address in the Middle States and in the West. There are several American books with titles showing misspelling of this term, but the true orthography should be Domine to be correct — Murdock, ^The Dutch Dominie of the Catskill,^ ^The Dominie's Daughter,^ and ^The Dominie of Haarlem.^

DOMINGO, San. See San Domingo.

DOMINIC, Saint, founder of the order of Dominicans or Preaching Friars : b. Calaroga, in Old Castile, Spain 1170; d. Bologna, Italy, 6 Aug. 1221. According to the legendary story

of his life his future eminence in the church was foreshown to his mother before his birth by preternatural premonition, for she dreamed that she saw a dog presenting to her child a flaming torch with which to set the world ablaze. This explains the meaning of the dog with torch in his mouth, seen in many pictures of Saint Domi¬ nic. In childhood he gave signs of extraor¬ dinary piety and love of ascetic practices. At 17 he entered the University of Palencia (re¬ moved later

to Salamanca), and devoted him¬ self to the study of philosophy and ancient lit¬ erature. Here on one occasion he sold his clothes in time of famine to obtain the means of relief for the poor; on another occasion he offered himself to be a slave to the Moors in exchange for a widow's only son. He stayed in the university 10 years, and, having been or¬ dained priest, was made a member of the cathedral chapter of Osma, and in that station was the zealous assistant of the bishop in sup¬ pressing abuses in the Church. He accompanied this bishop on an embassage to France in 1203, and in passing through Provence was grieved by the extreme laxity of morals in clergy and laity and the alarming progress of the various Manichaean sects. Dominic vowed himself to a life of evangelical labor among those sectaries, and resolved to make all possible efforts for the cor¬ rection of the evils which menaced the existence of the Church in those parts. There were al¬ ready in the field legates commissioned by the Pope to win the erring back to the fold ; but Dominic was scandalized by their worldly pomp, and declared that not in costly attire and with a showy retinue should they approach the mis¬ guided Albigensians and the poor men of Lyons, but barefoot and without purse or scrip ; and the papal envoys, persuaded by the words of the zealous evangelist, laid aside their*state and for a while followed the examples of humility and zeal set by Dominic. But their preaching proving unfruitful, they retired from the field and reported to Rome their failure. Nor was Dominic himself rewarded with much success in his 10 years' labors, though the annals of his life tell of great miracles which attended his progress through the country. Then resort was had to force, and a crusade against the Albigensian heretics was proclaimed ; which was conducted by Simon de Montfort with extreme severity till, at his death in the siege of Tou¬ louse, resistance on the part of the Albigenses was overcome. No proof exists that Dominic either prompted the crusade or had any part in it; but it is certain that he was a friend of Simon de Montfort and of his family. He quit the country in 1217, one year before the end of the war, and withdrew to Rome, where he spent the remainder of his life in organizing the order of Preaching Friars. He arranged the prayers and meditations of the devotion called the ˆ Rosary,ˆ much in use by Roman Catholics in all parts of the world. He was canonized in 1234. See Dominicans; Rosary. Consult Drane, ˆLife of Saint Dominicˆ (3d ed., Lon¬ don 1891) ; Guiraud, ˆ Saint Dominicˆ Paris 1901 ; Eng. trans.. New York 1901); Herkless, ˆFrancis and Dominicˆ (New York 1901) ; Jordanus de Saxonia (the principal source), ˆOpera ad ˆ res Ordinis Prsedicatorum Spec-tantiaˆ (Fribourg 1891) ; Lacordaire, <Vie de Saint Dominiqueˆ (Eng. trans., London 1883).

DOMINICA, dom-in-eka, or DOMIN¬ IQUE, dom-e-nek', West Indies, an island in the northern half of the Caribbean chain of the Lesser Antilles. (See Antilles). It is the largest of the British Carribbees, being 29 miles long, 16 miles broad, and having an area of 291 square miles ; it has also the highest summit of this volcanic island chain, the Morne Diablotin (5,314 feet), several thermal springs, and an old crater-lake about 2,800 feet above sea-level which formerly ^^was flooded by boiling water from springs bubbling up from the bottom, and every five minutes upheaving in a foaming geyser.^^ The area of this lake was diminished by land¬ slides which occurred in 1880, but it is still of great depth. The rainfall of the island is very abundant. The summer temperature is about 80° F. ; that of winter, spring, and autumn about 70° F. An interesting part of the population is a group of Caribs (q.v.), about 400, though these aborigines are now largely mixed with the blacks. There are about 100 apparently pure Caribs. ^^They inhabit the mountains of the in¬ terior, and make their livelihood by weaving a peculiar basket which is universally used in the island for carrying baggage.® The blacks re¬ ferred to, descendants of African slaves of the period when Dominica belonged to France, are by far the most numerous element ; they, as well as most of the white inhabitants, speak a French patois, and ^^still look upon the British owners as foreigners.® With the exception of the Indians, the people live near the coasts. In the luxuriance and beauty of its vegetation, Dominica excels the other neighboring islands. Its soil is a rich brown mold, in which all trop¬ ical products grow readily. Of its 186,240 acres, two-thirds are crown lands, but the gov¬ ernment has utterly failed to promote agricul¬ ture, which is now nearly ruined. Exports are cattle, cocoa, lime-juice, rum, molasses, coffee, fruit and sugar. The revenues do not equal ex¬ penditures, and taxes are increasing. In 1915-16 the revenues amounted to $253,180, and the ex¬ penditures to $284,975. Imports in 1915-16 were valued at $956,325 and the exports at $1,092,330. There are 432 miles of telephone line in oper¬ ation. Dominica is a presidency, belonging to the British Leeward Island administrative group, which includes also Saint Christopher, Nevis, Antigua, Barbuda, Montserrat, Redonda, and

the British Virgin islands, the seat of the Leeward government being at Saint John, An¬ tigua. The local government is conducted by a commissioner, or president, an executive council of seven members, and a legislative council of 12 nominated members. These officials exercise their authority at the small town of Roseau, which is situated on the western side of the island, and has wide and regularly paved, but deserted, streets, a botanical garden, a public library, and French (Catholic) and English churches. The name of the island (from Span¬ ish Domingo, Sunday) ˆ is due to the circum¬ stance that Columbus discovered it on the first day of the week, 3 Nov. 1493. The warlike Caribs retained control of it during two cen¬ turies, but little by little French settlers gained a foothold, and in the 18th century its posses¬ sion was regarded as essential to the mainte¬ nance of French prestige in the West Indies, owing to its situation between the important de¬ pendencies of that country, Martinique and Guadeloupe. For that very reason the English

insisted upon its surrender, in the final balanc¬ ing of international accounts after the imperial wars, early in the last century. Many laborers have migrated to North and South America in search of employment. Pop. 36,645.

DOMINICAL LETTER (from Lat. Dominica, Sunday), properly called Sunday let¬ ter, one of the first seven letters of the alphabet used in calendars to designate the Sundays throughout the year. The ancient Romans used the first eight letters. A-H, to denote their nundinal period of eight days ; the early Chris¬ tians ˆ dropped the eighth and adopted the re¬ maining seven to indicate the days of the He¬ brew week. These seven letters are employed to show on what days of the week the da3ˆs of the month fall throughout the year. One of those seven letters must necessarily stand against Sunday, and is printed as a capital, and called the dominical letter or Sunday letter; the other six Deing inserted in different type, to denote the other six days of the week. Now, since a common Julian year contains 365 days, if this number be divided by seven (the number of days in a week), there will remain one day. If there had been no remainder it is obvious the year would constantly begin on the same day of the week; but since one remains, it is plain that the ordinary year must begin and end on the same day of the week; and therefore the next year will begin on the day following. Hence when January begins on Sunday, A is the dominical or Sunday letter for that year ; then, because the next year begins on Monday, the Sunday will fall on the seventh day, to which is annexed the seventh letter, G, which therefore will be the dominical

letter for all that year ; and as the third 3'ear will begin on Tuesday, the Sunday will fall on the sixth day; there¬ fore F will be the Sunday letter for that year. Whence it is evident that the Sunday letters will go annually in retrograde order, thus, G, F, E, D, C, B, A; and in the course of seven years, if they were all common ones, the same days of the week and dominical letters would return to the same days of the months. But because there are 366 days in a leap-year, if the number be divided by seven, there will remain two days over and above the 52 weeks of which the year consists. And therefore, if the leap-year begins on Sunday, it will end on Monday; and as the year will begin on Tuesday, the first Sunday thereof must fall on 6 January, to which is annexed the letter F, and not G, as in com¬ mon years. By this means, the leap-year re¬ turning every fourth year, the order of the do¬ minical letters is interrupted, and the series can¬ not return to its first state till after four times seven, or 28 years ; and then the same days of the month return in order to the same days of the week as before. This method of indicating the days has held its place in Church calendars without variation from the beginning,ˆ and rules for finding them are given in breviaries, prayer books, *etc.*

DOMINICAN REPUBLIC. The Do¬ minican Republic, West Indies, occupies the eastern and central portions of the island of Santo Domingo, or Haiti : bounded on the north by the Atlantic Ocean, on the south by the Caribbean Sea, on the west by the republic of Haiti, and separated by Mona Passage from

Porto Rico on the east. Area about 19,325 square miles.

The mountains — the centre and culmination of the Great Antillean uplift — form several cordilleras or roughly parallel ranges. The highest peak, Mount Tina (10,300 feet), is northwest of Santo Domingo City, and near the centre of the island are numerous peaks from 8,000 to 9,000 feet high. While the enormous mass of these mountains, occupying four-fifths of the island, renders much of the territory nearly inaccessible, between the ranges lie plains, some of which are wonderfully fertile, while others are without value for agriculture. Toward the north and west are the famous Vega Real and the sterile plain, Despoblado de Santiago ; near the south coast the rich valley of Bani, which extends between the Nizao and the Ocoa ; and in sequence the valleys of Azua, San Juan, or Antigua Maguana, Santo Tome, On-ceano, Hincha, Quava, and others. Toward the east, extending even to Cape Engano is a region in which the praderias or llanos — valleys, mead¬ ows or plains • — are most common. The ridge of the Cibao Mountains sinks to a height of only 1,000 feet at its eastern end.

The Ozama and Isabel rivers unite to form the port of Santo Domingo after receiving the waters of many smaller streams, such as the Yavacao, the Monte Plata and the Savita. The Haina, or Jana, which empties into the sea about 10 miles west of the capital, and the Nigua, whose course is still farther toward the west, enclose a very beautiful plain which was a source of wealth during the Spanish period. The Nizao flows southw'ard between fields of sugarcane and meadows where herds of cattle graze. Other rivers are the Artibonito, Yaqui, Yuna, Naranja, and Magua. The coastline, about 940 miles in extent, includes the Bay of Samana — a well-sheltered harbor extending westward from the Mona Passage, its average width being 12 or 13 miles and its length more than 25 miles. This bay would accommodate the largest fleets, and defensive works placed at its entrance would make it practically impregnable. Its strategic value is so great that it should be reckoned one of the republic's chief assets. Other ports are : on the north, Puerto Plata and Monte Cristi ; on the south, Santo Domingo and Azua.

The geology of the island is similar to that of the eastern ends of Cuba and Jamaica. There are four principal formations : ®the older moun¬

tain rocks, of Cretaceous and Tertiary Age, made up of igneous rocks and clays, mantled by gravels and crystalline limestone; the white limestones of Tertiary Age ; recent alluvial for¬ mations ; and the coast limestone of elevated reef rock. No recent volcanic rocks are known.® The Spaniards obtained large amounts of gold and silver, especially the former, from mines worked during the early years of coloni¬ zation. Recent reports made by American ex¬ perts are not especially favorable with regard to these two metals. The fact seems to be that gold exists quite generally, but not in paying quantities owing to the high-priced labor. The profits of the old mines were won by the labor of native and African slaves. Copper, iron, manganese, platinum, tin, lignite, salt and petro¬ leum are found; and the analogy of the Oriente mining region in Cuba would suggest that the

deposits of the first three metals deserve par¬ ticular attention.

The diversities of both soil and climate are greater than elsewhere in the Antilles. The Vega Real is fertile and well-watered; the San¬ tiago plain, its western prolongation, is a desert. The soil of the western part of the plain of Seylo is gravelly, while that of the eastern part is composed of loams and cla^^s. The country immediately surrounding Azua is barren ; but the best sugar estates on the island are only three miles away; and the sugar-lands of no other West Indian island can quite rival in fer¬ tility the Dominican Republic's best. The cli¬ mate of this country is healthful, like that of Porto Rico and other large islands in the West Indies. Trade winds blowing most of the year make the nights cool, and only a short part of the day must be called intensely hot, particularly in lowlying and sheltered regions. The dry season extends from the first part of December until June. During the other months the rain¬ fall is as a rule abundant in the central and northern districts, especially in the northeast, which is probably the most fertile section of the entire country.

Cedar, lignum vitae, mahogany, and other cabinet-woods and timber used in house-and shipbuilding, are taken from the forests. The most luxuriant growths, however, have no pres¬ ent commercial importance, because adequate means do not exist for bringing them from the interior regions to the coast. As in other parts of the Antilles, the forms of vegetable life are varied and of special interest, while the reverse is true of the fauna.

History.-— Columbus on his first voyage to America visited the north coast of the island and left a few of his men. These were killed by the

natives; but the colony of Isabel, es¬ tablished on his second voyage, endured until the colonists were transferred to a more healthful locality. The settlement on the south coast became eventually the chief city. Spanish settlements existed also at Concepcion de la Vega, Puerto Plata, Santiago de los Caballeros and Bonao in the first decade of the 16th cen¬ tury. The cultivation of sugarcane began in 1506. Three years later Christopher and Bar¬ tholomew Columbus were imprisoned by Bobadilla in the citadel of Santo Domingo. The natives were set to work in the mines and fields; and very soon shiploads of Indians were being transported from other islands to replace those who died under the hardships of this forced labor. Subsequently negroes were brought from Africa for the same purpose, a considerable number of black slaves reaching the colony before 1522. There was a short period of prosperity. Before the middle of the century, however, the most enterprising colo¬ nists were drawn away by the superior attrac¬ tions of Mexico and Peru, and the country be¬ gan to suffer from the attacks of English and French buccaneers, who established their head¬ quarters on a small island near the northwest corner of Haiti. In the course of a century and a half the section west of the Despoblado, novˆ known as the Republic of Haiti, was won for France. The Spanish government at the close of the 18th century abandoned the eastern sec¬ tion as well, the entire island passing first under French control; but soon afterward the

successes of Toussaint L'Ouverture and Des¬ plines united west and east in one country, independent of the European powers and gov¬ erned by the black revolutionists of Haiti. Be¬ tween 1809 'and 1821 Spain again held the east¬ ern section, and the old name Santo Domingo was revived with that limited application ; but in the year last mentioned the inhabitants of the Spanish part of the island revolted. The east¬ ern and western sections were united from 1822 to 1843, together forming the Republic of Haiti. The final separation took place in 1844, when the Dominican Republic was established. Spain reasserted her authority once more for a brief period (1861-65). With that exception, the many struggles through which the country has passed since 1844 have been due either to revo¬ lutions or to Haitian antipathy. In 1869 a treaty for the annexation of the Dominican Republic to the United States was negotiated during General Grant's presidency, but was de¬ feated in the United States Senate. A revo¬ lution which drove President Baez into exile expressed the resentment of the Dominicans when this failure was made known. Compara¬ tively good order was maintained for a few years, beginning in 1890, but the most violent methods were again employed by political lead¬ ers in 1898-99, and continued in 1902-03. President Jimenez was forced by a revolution¬ ary uprising to resign his office in May 1902. His successor, Vasquez, was driven from power early in May 1903, after severe fighting, at¬ tended with heavy losses. Senor Morales be¬ came President in 1904. Defaults in the pay¬ ment of interest to European holders of Dominican bonds brought on a crisis of a character so threatening that the United States was induced to take charge of the collection and administration of customs dues, acting in the capacity of a trustee, for the protection of the people of the republic and of their cred¬ itors. In 1911 President Caceres was assassi¬ nated, and a revolution necessitated the resig¬ nation of his successor in 1912. Archbishop Nouel served as provisional President for part of a year. The next administration, that of President Bordas Valdes, included such events as thˆ bombardment of Puerto Plata on two occasions by government forces and the agree¬ ment (1914) secured by an American mediatory commission for the establishment of a provi¬ sional government, with Dr. Ram6n Baez as

President. Elections were held under the supervision of the United States. Juan Isidro Jimenez was inaugurated as President 5 Dec. 1914. In April 1915, a new revolution broke out on the island and American gunboats were ordered to Santo Domingo City to maintain order. Revolution again became active early in 1916 and the revolutionists gradually ex¬ tended the sphere of their operations. Jimenez found trouble also in Congress and he was finally impeached by the latter 1 May 1916, and, as a result, he resigned the presidency a week later; and on 15 May 2,000 American marines entered Santo Domingo City to guar¬ antee free elections. The following June Con¬ gress appointed Jacinto de Castro President. Marines had also been landed at Puerto Plata owing to the activity of the revolutionists in that neighborhood and in other parts of the island. By an agreement reached with the

revolutionists Francisco Henriquez y Carbajal was appointed provisional President (26 July), and at the general elections (15 August) he was elected President for a term of five months. Trouble broke out again and the United States intervened formally in the government of the country in November. The revolutionists were defeated by American forces at Macoris (29-30 November). Representatives of the United States government continued in control of the affairs of the Dominican Republic. A military com¬ mission was appointed early in 1917 to study the needs of the diplomatic service and the system of public education, and a claims commission was chosen to investigate all claims against the American government arising between the es¬ tablishment of the American-Dominican con¬ vention of 1907 and the establishment of American control of affairs in November 1916, at which time all the principal Dominican ex¬ ecutive ports were occupied by United States naval and marine officers. Order has been established throughout the country and trade, commerce and general business have improved very much under American control, which is exercised through a military government, in which the military governor combines the func¬ tions of Congress and President.

Government and Progress. — The consti¬ tution vests the executive power in a President chosen by an electoral college for a six years' term. Under the present constitution, which went into effect 1 April 1908, the Congress ˆdesignates a person to take charge of the executive office,® in the event of the death or disability of the President. There is no Vice-President. The cabinet officers are the secre¬ taries of Interior and Police, of Foreign Affairs, of the Treasury

and Commerce, of War and Marine, of Justice and Public In¬ struction, of Agriculture and Immigration, and of Encouragement (Fomento) and Communi¬ cations. The Congress is composed of Senate (12 members, one from each prov¬ ince) and Chamber of Deputies (24 mem¬ bers, two from each province), both senators and deputies being elected by indirect vote, the former for six and the latter for four years. The judiciary consists of a Supreme Court (eight members, appointed for terms of four years), two courts of appeal, *etc.*

Free primary instruction is offered by the communes, with the aid of the central govern¬ ment ; the system including also superior tech¬ nical and normal schools, and a professional school or university. There are about 40 news¬ papers. The State religion is the Roman Catho¬ lic, but there is toleration of other religions.

The legal currency has been the American dollar since 1900, but before the American in¬ tervention the country possessed a very inade¬ quate amount of metallic and paper currericy which has since been withdrawn. Certain native banks were invested with the power of issuing notes, but so great was the national distrust that their currency could not be disposed of. The circulating currency medium of the Re¬ public is Puerto Rico and United States money. The chief banks are the Banco Nacional de Sto. Domingo and the Royal Bank of Canada. The International Banking Corporation acquired the established banking business of Santiago MJichelena in the Dominican Republic, with

head offices at Santo Domingo City and several branches and agencies in other parts of the island. The Michelena Bank was the deposi¬ tory for customs revenues under the arrange¬ ment between the governments of Santo Do¬ mingo and the United States, and the Inter¬ national Banking Corporation succeeded to it in that capacity. There are also a few private bankers and merchants engaged in the banking business. The republic has two principal debts, both guaranteed by customhouse duties, one of $20,000,000 at 5 per cent interest and the other of $1,500,000 at 6 per cent interest. An additional debt of $243,000 makes the total indebtedness $21,743,000 in 1916. This debt is being steadily reduced since the United States assumed the management of the financial affairs of the republic. The government's revenue is derived from customs, alcohol and stamp taxes, wharf-dues, posts and telegraphs, and civil registra¬ tion. In the fiscal year 1916-17, total receipts were estimated at $4,468,000 and disbursements

$4,406,567.

The principal exports of the Dominican Re¬ public, which are rapidly increasing, are sugar, cacao, tobacco, coffee, hides, wax, honey, ba¬ nanas and other tropical fruits, cotton, minerals, cabinet and other woods. The high price of sugar has stimulated the production of sugar¬ cane, the yearly output of which, in normal times, is worth about $5,000,000. The cultiva¬ tion of cacao and coffee is also on the increase, and more attention is being paid to the raising of cattle. The principal imports of the republic consist of iron, steel, cotton goods, wheat flour, rice, meats and dairy products, oils, raw and manufactured woods. The greater part of the export and import trade is now with the United States.

The railways of the republic have an extent of about 176 miles; private lines on large es¬ tates about 225 miles. There are 402 miles of telegraph and 847 of telephone lines. The diffi¬ culties of communication between the various districts of the country, primarily due to the cordilleras, are in large part attributable to the great lack of good highways, without which peace will never be assured. There is steamship service between New York and Dominican ports, but the

vessels are, as a rule, small and slow. There is also regular steamer service between Santo Domingo, Porto Rico and Cuba.

A rural guard (nominally 906 officers and men) supplements a military force numbering about 1,300. The government has six small vessels, four of which are revenue cutters.

The number of inhabitants in 1917 was 724,500, or 37ˆ per square mile. The Despoblado region — the nearly uninhabited district of high mountains, inaccessible valleys and vir¬ gin tropical forests — comprises, roughly speak¬ ing, the central third of the entire area of the island, or one-half of the Dominican Republic. It is the wide borderland fought over by the Haitians and the troops of the Dominican Re¬ public. The people of the latter country, of blended Spanish, Indian and negro blood, with the small proportion of white descendants of the Spanish colonists and foreign merchants, occupy an area that is actually much more re¬ stricted than a glance at the map would suggest.

The Dominican Republic is divided into 12 provinces. Among the principal cities of the

country are Santo Domingo (the capital), 26,000; Santiago, 20,000; Puerto Plata, 16,000; San Pedro de Macoris, 15,000; Samana, 6,000; Sanchez, 5,500; La Vega, 5,200; Agua, 5,000; Moca, 4,900; Monte Cristi, 4,500.

Bibliography. — Abad, J. R., ˆLa Republica Dominicanaˆ (Santo Domingo 1888) ; Aspinall, A. E., ˆThe Pocket Guide to the West Indiesˆ (Chicago and New York 1914) ; ˆDominican Republic: Report of the Commission of In¬ quiry to Santo Domingoˆ (Washington 1871) ; ˆFinancial Conference, Proceedings of the First Pan-American > (Washington 1915) ; Hill, R. T., ˆCuba and Porto Rico with the Oiher Is¬ lands of the West Indiesˆ (New York 1898) ; Hollander, J. H., ˆThe Dominican Convention and its Lessonsˆ (in Clark University, Wor¬ cester, Mass. ˆ Latin America,ˆ New York 1914) ; Monte y Tejada, A. Del, ˆHistoria de Santo Domingo) (Santo Domingo 1890) ; Pan-American Union, ˆDominican Republicˆ (Wash¬ ington 1915) and ˆ Latin America) (Washing¬ ton 1916).

Marrion Wilcox.

DpMINICAN REPUBLIC, Diplomatic Relations with. The United States first be¬ came interested in Santo Domingo through friendly trade

arrangements secured in 1799 from Toussaint (the revolutionist), through Southern fear of the influence of free negroes from that island and in connection with the designs of Napoleon, whose failure there was a prominent cause of the American acquisition of Louisiana. Later, in 1822, the American government was interested in Santo Domingo's declaration of independence from Spain and its union with Haiti, but avoided formal recog¬ nition of a government founded on slave in¬ surrection. Again in 1844 it was interested in the formation of the Dominican Republic (un¬ der Santana) by separation from Haiti, and the adoption of a constitution modeled on that of the United States, and was also attracted by the international importance which the new republic might have on account of its harbor facilities ; but it withheld recognition and con¬ tinued to refuse recognition until 1866.

From 1844 to 1860 American relations with the Dominican Republic centred around two questions : negotiation for a naval coaling sta¬ tion for American steamers and the danger of foreign intervention. In February 1845, in response to reiterated appeals for the American recognition and protection against Haiti, John Hogan was sent to report on conditions in the island. In 1846, D. D. Porter was sent on a similar mission with instructions to ascertain the value of certain privileges which the Dominicans were willing to accord. Later, in 1849, information was received that the Domini¬ can Republic desired aid from the United States to frustrate European designs.

In 1851, the Dominican government having solicited the mediation of the United States, France and Great Britain to secure peace with Haiti, President Fillmore sent R. M. Walsh as a special agent to cooperate with the repre¬ sentatives of Fmnce and Great Britain in a remonstrance with the view of possible joint intervention to urge Haiti to stop the war and recognize the independence of the Dominican Republic.

Though the United States government.

under President Fillmore's administration, had the opportunity and power to obtain a foothold in Dominican territory, and was much in need of a naval station in Samana, its rule of policy was to avoid all disturbance of existing polit¬ ical relations in the West Indies, recognizing that any attempt of any great maritime power to get exclusive advantages might result in counter attempts of other powers, which would make the West Indies a theatre of national competition, and which might disturb the peace of the world.

The policy of the American government changed somewhat under President Pierce. Unsuccessful efforts were made to nego¬ tiate a general treaty. A treaty of amnity, commerce and navigation containing a secret article for the session of Samana Bay was negotiated by October, but it failed to receive the sanction of the Dominican Congress.

In April 1861, when it appeared that Spain by cooperation of President Santana had plans for the establishment of a protectorate in Santo Domingo or for annexation to Spain, the American government, through Secretary Sew¬ ard, promptly gave warning that the President would oppose such enterprises on the American continent by persistent effective resistance. In 1863, in the struggle under Cabral against Spanish authority in the island, the American government remained neutral, but conditions finally induced Spain to abandon the island in April 1865, and the independence of the newly-established republic was recognized by the American government in September of the fol¬ lowing year.

In the period of the American Civil War, in connection with the need of a naval base to meet difficulties in the blockade of Southern ports held by the Confederates, the American government became interested in San Domingo for its excellent harbor. Between 1865 and 1871 the question of the acquisition of a naval base at Samana, or of American annexation of the Dominican Republic, was a prominent one.

In 1869-70 the American government, act¬ ing on confidential

information and invitation from the Dominican Republic, took steps to secure control of at least a part of the republic and, through General Babcock and the American consular agent, negotiated a treaty for the lease of Samana Bay and ultimate annexation, which was defeated in the Senate by a tie vote on 30 June 1870.

In 1871 President Grant, acting under a joint resolution of Congress, passed at his sugges¬ tion, appointed a committee of three (A. D. White, B. F. Wade and Samuel G. Howe), which, after investigation, recommended (April 1871) that Grant's policy had a good basis and should be sustained, but largely through the influence of Sumner, the Senate failed to adopt the resolution.

In 1896 Secretary Olney recommended that the missions to Santo Domingo and Hayti should be put on a plenipotentiary footing.

Late in 1899, after ' the assassination of Heureaux, who had been dictator for 17 years, the American government recognized the new de facto government. The Dominican govern¬ ment frequently invited the aid of the United States. In 1899 it invited a treaty arrangement for placing the unhappy republic under the pro¬

tection of the United States, but the American government declined. In 1903 the American government declined a proposal made by a representative of a foreign government for joint fiscal control of Santo Domingo under an American receivership.

Near the close of 1904, certain European powers intimated that they would be compelled to resort to measures to coerce the Dominican government to pay its indebtedness to European creditors, unless the American government would arrange to collect the Dominican customs and guarantee an equitable distribution of the revenue. With credit destroyed, and the coun¬ try on the verge of anarchy. President Morales appealed to the United States to shield his coun¬ try from foreign interference.

In accord with a protocol concluded by President Roosevelt with Santo Domingo in February 1905, and under a consequent execu¬ tive interim modus vivendi, an American re¬ ceivership was established under the protec¬ tion of the American navy. The result proved satisfactory in the improvement of conditions. The American Senate, which opposed the ter¬ ritorial-guarantee clause of the protocol, finally (in 1907) ratified a revised treaty which recognized the

importance to the United States of orderly conditions in the island by authoriz¬ ing the President to appoint a general receiver of the Dominican customs and to furnish any protection necessary.

The American policy — resulting in a prac¬ tical test of the efficiency of the American gov¬ ernment, in preserving order by intelligent di¬ rection, and in maintaining the Monroe Doc¬ trine which had recently been criticised by Ger¬ man writers — undoubtedly prevented serious difficulties, removed the incentive to revolution, stimulated industry and labor, permitted the President to die a natural death and furnished new evidence in favor of the establishment of a permanent protectorate or right of intervention over the weaker Latin-American states, similar to that guaranteed by the Platt amendment in the American treaty with Cuba.

In outbreaks in 1912 and 1914, American commissioners were sent to restore order.

James M. Callahan.

DOMINICANS, or FRIARS PREACH¬ ERS, or PREACHING FRIARS (Fratres Prcedicantes) , the religious order founded by Saint Dominic. While laboring in Provence for the conversion of the Albigenses, Dominic associated to himself 16 disciples eager, like himself, to devote their lives to the work of reclaiming heretics and ministering to the spiritual needs of the poor and ignorant. In 1215 he visited Rome to obtain from the Ploly See approval of the insti¬ tute he proposed to form. Of the 16, 8 were French, 6 Spanish, 1 Portuguese and 1 English. The Pope (Innocent III), in conformity with the decree of the Fourth Lateran Council, then in session, against approval of new religious orders, refused again and again his consent, but at last promised to give his approbation on the condition that the friars should adopt as their own the monastic rule of the Augustinians. The condition having been fulfilled, the order was formally approved in 1216 by Innocent's successor, Honorius III. The order took definite shape in two general chapters at

Bologna in 1220 and 1221. The costume of the friars was to resemble that of the Augustinians, and to consist chiefly of a black cassock and rochet; but a few years afterward this was changed for the white habit and scapulary with outside black mantle, which is still the costume of the Dominicans. Their name Black Friars was given them because of the black mantle worn out of doors. The memory of their great monastery in London is preserved in the name Blackfriars Bridge. Houses of the new order were immediately founded in France, the Rhine¬ land and Italy; and in 1221 was held the first general chapter of the order at Bologna in which were represented 60 convents of preach¬ ing friars. That same year arrived in England the first band of Dominicans, 12 of the brothers in charge of Gilbert de Fremey. At this chap¬ ter an addition was made to the rule of the order, by which the Dominicans were forbid¬ den to hold any possessions or have any fixed incomes, but to live by the voluntary alms of the people; thus the Friars Preachers became mendicant friars like the Franciscans. All the universities were opened to the young scholastics of the order, and soon many preach¬ ing friars attained the foremost rank as philoso¬ phers, divines, canonists and scholars, although in later times the Jesuits largely displaced them as preachers and teachers. The master-general of the order is elected for 12 years, and is resi¬ dent in Rome ; and there are 52 provincials, elected for four years each. Their manner of life is one of great austerity. They took a conspicuous part in the Inquisition, the office of inquisitor in all countries being generally held by them. Among divines and philosophers the Dominicans Albert the Great, Thomas Aquinas and Raymond of Penaforte, the third general of the order, hold the highest places ; the celebrated German mystics and divines, Meister Eckhart, John Tauler and Henry Suso, were Dominicans, as was also the martyr Savonarola. The great mediaeval encyclopaedic work. Speculum Majus, was the work of a Dominican, Vincent of Beauvais. The highest places in the Church have been occupied by Dominicans; since the order was founded there have been 4 Domin¬ icans popes, 60 cardinals, over 150 archbishops and more than 800 bishops. A second and a third order were also founded by Saint Dominic; the second order being for women, and the third for men and women living in the world, engaged in secular pursuits and married. Saint Catherine of Siena and Saint Rose of Lima, d. 1617 (the first American saint), be¬ longed to the order. (See Tertiaries). The Dominican houses suppressed in England by Henry VIII numbered 58. Consult Drane, ˆHistory of Saint Dominic, Founder of the Friars Preachersˆ (London 1891) ; D'Anzas, ˆBtudes sur I'Ordre de Saint Dominiqueˆ (3 vols., Poitiers 1874-75) ; Jessop, ˆThe Com¬ ing of the Friarsˆ (London 1888) ; Proctor (ed.), ˆShort Lives of the Dominican Saintsˆ (New York 1901).

DOMINIE SAMPSON, the schoolmaster in Sir Walter Scott's ˆGuy Mannering.ˆ

DOMINION OF CANADA. See Canada. DOMINIQUE. See Dominica.

DOMINIS, dom'e-nes, Marco Antonio de,

Italian theologian and ecclesiastic : b. Arbe, an island in the Adriatic, 1566; d. Rome, 8 Sept.

1624. He studied in the college of the Jesuits at Loretto and in the University of Padua, and was made bishop of Segni in the state of Venice, 1596, and archbishop of Spalatro or Spalato 1598. Here he projected schemes for the reformation of the Church and unification of Christendom, but came into disfavor at the Roman court and had to quit, take refuge at Venice, where he made the acquaintance ot Bedell, chaplain of the English embassy, after¬ ward bishop of Kilmore in Ireland. De Dominis accompanied Bedell to England where he was regarded as a convert to Anglicanism, and through his influence obtained from King James the deanery of Windsor and other places in the Established Church. He was zealous for the overthrow of the papal system and published in London (1617) a work in Latin, ˆDe Republica Ecclesiastica,ˆ designed to prove that the Pope possesses in the Church only a primacy of honor, not of jurisdiction. In 1619 was published his translation into English of Fra Paolo Sarpi's ˆHistory of the Council of Trent.ˆ His avarice made him unpopular in England, and in 1620 he opened negotiations with a view to a return to the ancient faith ; and was finally brusquely ordered to leave the kingdom. He returned to Rome 1622, at the instance of the Spanish Ambassador at London, who led him to believe that he would be welcome there and would be raised to the cardinalate. He had published at Brussels a recantation of his sub¬ scription to the Anglican articles of religion, but his hopes of honors at Rome were disap¬ pointed, and in letters to his friends in England he recanted his recantation : but the letters never reached their destination, having been seized by the papal officers. He was thrown into prison by order of Urban VHI and there died 1624. After his death he was adjudged a heretic : his body was disinterred and burned, and the ashes thrown into the Tiber. In 1611 was published his tract, ˆDe Radiis Visus et Luces in Vitris Perspectivis et Iridesˆ (ˆOf the Rays of Vision and Light in Perspective Glasses and the Rainbow U. in which is probably for the first time propounded the true theory of the rainbow.

DOMINIUM (Lat. dominus, a master) in Roman law, the right by which any one exer¬ cised control over property, and by which he was entitled to retain or alienate it at pleasure, as opposed to a mere life interest, or possessory or equitable right. Dominium directum, in feudal law, is the interest or superiority vested in the superior; and dominium utile is the inter¬ est in property vested in the vassal, which amounts to the right of merely using it (see Servitudes, Usufruct) as distinguished from that of his lord's ownership and supremacy.

DOMINO. See Mask.

DOMINO WHIST. See Five or Nine.

DOMINOES, a game played with small flat oblong pieces of ivory, bone or wood, the full number of pieces being 28. They are marked with spots varying in number. Each domino has two sets of spots ranging in number from 0 up to 12, which are distributed in all pos¬ sible combinations — (H), 0-1, 0-2, 0-3, etc., to 0-12; then 1-1, 1-2, 2-3, 2-4, and so on up to 12-12. Those which have the tw'o sets of spots alike — 2-2, 3-3, *etc.* — are called double twos, double threes, *etc.* The game is to appearance

remarkably simple, but is played in a variety of ways. The general principle of all the varieties is that when one player leads by laying down a dpmino, the next must follow by placing along¬ side of it another which has the same number of spots on one of its sides. Thus if the first player lays down 6-4, the second may reply with 4-8, or 6-7, *etc.* ; in the former case he must turn in the 4, placing it beside the 4 of the first domino, so that the numbers remaining out will be 6-8 ; in the latter case he must turn in the 6 to the 6 in like manner, leaving 4-7, to which his opponent must now respond. The player who cannot follow suit loses his turn ; and as the object of the game, modified by spe¬ cial conditions in the different varieties, is to get rid of all the dominoes in hand, or to hold fewer spots than your opponent when the game is exhausted by neither being able to play, it

is a special point of play to shut out your opponent when it can be done without injurˆˆ to your own hand. The game, which is probably of Italian origin, was not known in Europe until well on in the 18th century,

DOMINUS, the Latin word which we commonly render by ®lord,® and which was a title given to the Roman emperor, but which more properly signifies the master of a house and his eldest son, as opposed to slave (senms). The Scottish *dominie,® in the sense of school¬ master, is of course taken from it, as is the same term in America, where in some places it is the title of a minister of the Dutch Reformed Church, and in others is applied to Protestant clergymen generally.

DOMITIA, do-mish'i-a, Roman empress: b. Gaul about 56 a.d. ; d. Rome about 100 a.d. She was the daughter of Domitius Corbulo, a general of Nero's reign. She was married first to ˆlius Lamia, but the Emperor Domitian took her for his wife. Finding that her new husband intended to have her executed she caused his assassination in 96 a.d. Her sub¬ sequent career is uncertain.

DOMITIAN, Titus Flavius Domitianus Augustus, Roman emperor : b. Rome, 24 Oct. 51 A.D. ; d. there, 18 Sept. 96 a.d. He was a son of Vespasian and brother of Titus, and made himself odious, even in youth, by his indolence and voluptuousness and his cruel, malignant and suspicious temper. He became emperor 81 A.D. At first, indeed, he deceived the people by acts of kindness, good laws and a show of justice, so that their fears vanished; but he soon returned to his former excesses and cruelty. Agricola's victories exciting his jealousy, he recalled that general to Rome and kept him in total inactivity. At the same time he spread terror through Rome by the execution of a great number of the first citizens. He gave himself up to every excess and to the meanest avarice. He at last conceived the mad idea of arrogating divine honors to himself, assumed the titles of Lord and God and claimed to be a son of Minerva. His principal amusement consisted in the shows of the circus. The misery of the people was, meanwhile, con¬ tinually increasing; and after the revival of the law against high treason, which enabled almost anything to be construed into this crime, no one was secure of his property or his life. A paper fell into the hands of his wife, Domitia, in which she found her own name and

those of the two commanders of the Praetorian Guards, with many others, noted down by the emperor as victims. This discovery induced

her to conspire against him and he was killed by a freedman named Stephanus.

pOMREMY-LA-PUCELLE, don-ra-me-la-pii-sel (original, Domremy; La Pucelle, that is. The Maid, has been added in honor of Joan of Arc), a small village in the department of the Vosges, in France, not far from Vaucouleurs, on the river Meuse. It is noted for])eing the birthplace of Joan of Arc (1410). The village contains a bronze statue of the heroine, and another monument to her and the cottage in which she was born still stands. A chapel on a neighboring hill marks the spot where she is said to have learned of her great mission. There is here also a museum. Dom¬ remy was exempted from taxation till the Revolution, in honor of the warrior-maiden, and in her honor also an annual pageant is held.

DON (Lat. domimis), a Spanish title of honor, originally given only to the highest nobility, afterward to all the nobles and finally used indiscriminately as a title of courtesy. It corresponds with the Portuguese Dom. Dur¬ ing the Spanish occupation it was introduced and became naturalized in some parts of Italy, particularly in Naples.

Don is also a cant term applied in the uni¬ versities of Oxford and Cambridge to a resi¬ dential fellow or other college dignitary; and in the colleges of the United States to a pro¬ fessor or instructor.

DON, a river in the county of Aberdeen, Scotland. Its source is several small streams flowing from a bog about 1,900 feet above the sea. It flows east (parallel with the Dee) into the North Sea, a mile northeast of Old Aberdeen. It is about 82 miles in length. Its salmon fisheries are of considerable value.

DON (ancient Tanais), a river of Russia which issues from Lake Ivan-Ozero, in the government of Tula, and flows southeast and southwest about 1,300 miles into the Sea of Azof, near the town of Azof, by three mouths, only one of which is navigable. Its ordinary breadth is from 5CX) to 1,850 feet, but it has a breadth of 18 miles during the spring floods, although droughts reduce it so much that it is very difficult in summer, even for light draught vessels, to negotiate the sandbanks and shallows. Generally speaking, the right bank is high and the left flat and low. The delta of the Don is an expanse of sandy flats, about 28 by 22 miles at the coastline. Near its head is the important river-port of Rostov, and Taganrog also shares in the Don traffic. The Don has the most busy trade of all the rivers of South Russia, being navigable for 800 miles. The navigation is generally stopped by ice for about three months of the year; nevertheless, by means of its lower

course, in connection with the Volga, the south provinces of Russia receive much Siberian produce and also manu¬ factured goods from the interior of the empire. It has valuable fisheries. It is connected with the Volga bv a canal. Its largest tributary is the Donetz or Little Don.

DON, or DUN, a river of the West Riding of Yorkshire, England, which rises near Cheshire, flows east and southeast and joins

the Ouse after a course of about 55 miles. By artificial cuttings and canals it has been ren¬ dered navigable for vessels to Sheffield, a dis¬ tance of about 40 miles. From Snaith to Goole the channel is artificial and is known as the Dutch River.

DON CARLOS. See Carlos.

DON CESAR DE BAZAN, don sa-zar d? ba-zan, the title of a French comedy by Du-manovi and Dennery (1844), founded on a portion of Hugo's play, ˆRtiy Blas.ˆ Don Cesar is a ruined nobleman who changes his name, and in rags conducts himself with the happy, devil-may-care nonchalance of his bet¬ ter days. It is also the title of a comic opera by Massenet, produced in 1872.

DON GERARD, Dutch painter. See Dow, Gerard.

DON GIOVANNI, don jo-van'ne (Italian form of Don Juan, the name of the hero), the title of an opera by Mozart, considered his masterpiece, produced at Prague 29 Oct. 1787 (q.v.).

DON GIOVANNI, opera buffa in two acts by Wolfgang Amadeus Mozart (libretto by Da Ponte), first produced at Prague on 29 Oct. 1787. While a buffa opera according to the terminology of the day, or ˆˆdramina giocosoˆˆ as Mozart called it, the buffa elements are transfigured by the power of genius and ˆDon Giovanniˆ has been universally accorded recog¬ nition as one of the musical masterworks of all time. All of the great composers have paid it homage. Rossini,

placing his hands solemnly on an autograph copy of the score, said : ^^He is the greatest, the master of them all ; the only composer who had as much science as he had genius, as much genius as he had science® ; while Wagner wrote: ®Is it possible to find anything more perfect than every piece in Don Juan?® Based on an old subject, that has done service in many literatures, the book of the opera, in spite of certain weaknesses, is an admirable vehicle for musical treatment; but Mozart invested it with a tragic power that carried it to heights undreamt of by the libret¬ tist. The overture which at the outset prepares the way with its solemn chords and progres¬ sions was written in a single day — one of those miracles of musical creation of which Mozart performed so many. The onera is popularly assumed to be merely a string of musical numbers, connected by recitative, in¬ stead of a serious dramatic work ; and the usual style of performance is largely respon¬ sible for this notion. As a matter of fact, Mozart excelled in dramatic characterization, and great as is the sheer musical beautv of the opera, still more wonderful, from the mu¬ sician's standpoint, is its subtle reflection of character expression. One has only to recall the trio in the first act when the Commandant is killed, the duet ^^La ci darem,® the serenade ^^Deh vieni,® the drinking song ®Fin ch'han dal vino,® Zerlina's ®Batti batti,® to see how won¬ derfully the music heightens the power of the situations. The ballroom scene is a triurnnh of contrapuntal skill concealed under a simple exterior. The whole work is filled with touches that reveal the composer's genius at its best and superlatives fade before it. The orchestra, with the utmost economy of means, is as flex¬

ible and responsive an instrument as the great aggregations employed by the most modern composers. An excellent illustration of this is furnished in the accompaniment to Leporel-lo's ®Madamina® aria — the catalogue aria, as it is sometimes called. In 1825 Manuel Garcia, a famous singer, and the head of a remarkable family of musicians, brought an Italian opera company to New York. At that time Da Ponte, the librettist, then an old man, was living there — having left Europe to escape importunate creditors. He called on Garcia and on learning his identity, the singer clasped him in his arrns and danced around like a child, singing ^^Fin ch'han dal vino.® The opera was at once in¬ cluded in the repertory and it was produced on 23 May 1826, with Manuel Garcia himself in the title role and his daughter, later to become world-renowned as Malibran, and two other members of the family also taking part. Its success was immediate and permanent. In spite of the vast strides music has taken in the past hundred years, ^Don Giovanni^ still re¬ mains an ever fresh fount of

inspiration.

Lewis M. Isaacs.

DON JUAN, don ju'an, Sp. don hw-an', the hero of a Spanish legend which seems to have some historical basis in the history of a member of the noble family of Tenorio at Seville. According to the legend Don Juan was a libertine of the most reckless character. An attempt to seduce the daughter of the governor of Seville brought the indignant father and the profligate don into deadly conflict, in which the former was slain. Don Juan afterward, in a spirit of wild mockery, goes to the grave of the murdered man and invites the statue of him erected there to a revel. To the terror of Don Juan the ®stony guest® actually appears at the table to bear him away to the infernal world. The tale has furnished the subject for many dramas and operas. The legend first took definite form in Gabriel Tellez's ˆE1 Burlador de Sevilla y Convidado de Piedra. ˆ About 1650 versions of this drama appeared in Italy from the hands of Cicognini and Giliberto. In rapid succession appeared Dorimond's ˆFestin de Pierreˆ (1658). De Villiers' ˆLe festin de Pierreˆ (1660), Moliere's ˆDon Juanˆ (1665), the versions by Rosimond and Thomas Cor¬ neille, Cokain's ˆTragedy of Ovidˆ (1669) and Shadwell's ˆThe Libertineˆ (1676). It was used repeatedly as a theme for opera in Italy, first by Gluck, and later bv Righini, Cimarosa, Albertini, Gazzaniga and others. The greatest of all, however, was Mozart's ˆDon Giovanni. > In modern days the legend hˆs been used by Prosper Merimee in his <Les Ames du Purga-toire,ˆ by Dumas in the drama 'ˆDon Juan de Marana,ˆ also by Byron, D'Aurevilly, Balzac, etc., and bv Bernard Shaw inAMan and Super¬ man. > The best and most stirring modern treatment of this legend is that bv Jose Zorilla, entitled ˆDon Juan Tenorio: drama fantastico-religioso.ˆ It has become universally popular in Spain, where it is staged annually in practi¬ cally every playhouse in the country about the festivals of All Saints and All Souls on 1 and 2 November respectively. Consult Engel. ˆDic Don Juan-Sage> (Dresden 1887) ; Farinelli, A.. ˆDon Giovanni, Note critiche ˆ (Turin and Rome 1896) ; Gendarme de Bevotte, Hˆa Legende de Don Juanˆ (Paris 1906) ; <Le Festiv

de Pierre avant Moliereˆ (ib. 1907) ; Picatoste, ˆDon Juan Tenorio> (Madrid 1883) ; Schroeder, Theodor, ˆDie dramatischen Bearbeilungen der Don Jiian-Saga in Spanien, Italien, und Frank-reich, bis auf Moliere einschliesslich> (Halle 1912) ; Victor Said Armesto, *ˆLa Legenda de Don juan> (Madrid 1908) ; Waxman, S. M., ˆThe Don Juan Legend in Literatureˆ (in Journal, of American Folk-Lore, Vol. XXL New York 1908).

DON JUAN, a drama in prose by Moliere, was first acted by his own company at Paris, 15 Feb. to 20 March 1665, with a success ri¬ valed only by that of ˆTartuffe.ˆ It aroused opposition at court hardly less bitter and tena¬ cious, was withdrawn from the stage and first published, altered for the worse by the censor¬ ship, in 1682, nine years after Moliere's death. Three copies of the unaltered version survive. An edition printed in Amsterdam in 1683 and reproduced in Brussels in 1694 presents the work in still earlier form before excisions had been made by Moliere, after the first presentatation, in hope of placating powerful offended offenders. Don Juan's origin is in an Andalu¬ sian legend of uncertain date. Here Juan Tenorio, a degenerate descendant of one of the Twenty-four of Seville, abducts the daughter of Commander d'Ulloa, kills him, insults his statue on his tomb, which coming to life sends Juan to subterranean flames. Early in the I7th century this legend was dramatized by Brother Gabriel Tellez of the Order of Mercy, under the name Tirso de Molina, as ˆE1 Burlador de Sevilla y Convidado de Piedraˆ (The Seville Deceiver and the Stone Guest). This was adapted to Italian taste by Giliberto at Naples in 1652 and by Cicognini at Florence before 1664 with the title HI Convitato di Pietra.ˆ One of these plays was acted in Italian at Paris in 1657. A French version by Dorimond was acted at Lyons in 1658, another by Villiers soon after at Paris, both with the inept and mistranslated title ˆLe Festin de Pierreˆ (Peter's Feast). The subject proved very popular. Moliere's company, unable to produce ˆTartuffe,ˆ urged him to use it and ˆLe Festin de Pierreˆ was the original title of the play now known as ˆDon Juan,ˆ written in evident haste, one of the most loosely constructed of his dramas, but for psyghic penetration and strength in presenta¬ tion of character ranking with

ˆTartuffeˆ and ˆLe Misanthropeˆ as chief among his comedies. The subject was treated dramatically in France during Moliere's life also by Gueulette and Rosimond. Thomas Corneille versified and mol¬ lified Moliere's prose in 1677. This version held the stage till 1841. Since 1847 the original Moliere rules unchallenged in France. In epi¬ sodes masterful but not dramatically linked ˆDon Juanˆ presents an awesome picture of a wicked' man of power, fascinating and abusing the despairing love of his wife, horrifying his ignorant and self-seeking but honest-hearted servant Sganarelle, whose part was taken by Moliere, deceiving with facile protestations two fatuous peasant girls, tempting a distressful beggar to curse and tossing money to hirn at last with a jeer at ®the love of humanity,ˆ' showing physical courage in an encounter with robbers and moral bravado at the moving image of the murdered commander. Feigning h3ˆpocrisy as fashionable vice® that he may screen

wickedness under the mantle of religion, he continues the same hard, cruel atheist, indiffer¬ ent to, or taking a fiendish delight in, the suffer¬ ing he inflicts, till clasping the hand of the statue he finds himself consumed by an invisible fire within. The earth swallows him as flames burst from the cleft in which he sinks. Sga¬ narelle gasps, *My wages, my wages !® and adds a moral. Thus Moliere fixed the type for the Don Juans of Mozart and Merimee, of Musset and of Byron. The best editions of ˆDon Juan,ˆ both with accompanying comment and documents, are by Mesnard in Vol. 5 and Moland in Vol. 6 of their ˆCEuvres de Moliere.ˆ Consult also Trollope, H. M., ˆLife of Moliereˆ (London 1905, pp. 371-394). There are good translations by H. Van Laun (Edinburgh 1875) and C. H. Page (New York 1908).

Benjamin W. Wells.

DON JUAN, an unfinished poem by Lord Byron, somewhat difficult to classify, since it may be treated as a narrative-satire, a comic epic, a novel in verse, or — to employ its au¬ thor's amusing description — a ˆA'ersified Au¬ rora Borealis.® There is little doubt that it is one of the most original, brilliant and entertain¬ ing of modern books, fully entitled as such to the position given it by many readers and critics as the poet's masterpiece. From its first ap¬ pearance, however, it has been severely cen¬ sured by the more sedate and conventional por¬ tions of the British and American reading pub¬ lics, both on account of the licentiousness of sundry scenes and passages and because of Byron's contemptuous and defiant attitude to¬ ward many of the beliefs, customs and institu¬ tions of sophisticated societˆL As one

might naturally expect, the first objection is supported by the unprofitable use made of the poem b}” inexperienced readers and by persons of viti¬ ated tastes, while the second objection has steadily lost force in more or less direct pro¬ portion with the liberalizing of society. In¬ deed, it may be held with some justice that the apparently increasing appeal made by Byron and by this masterpiece of his maturer years to seasoned and somewhat disillusioned readers who have reached or passed their prime is largely due to those features of the ebullient performance that originally suggested to con¬ servative minds this second objection.

In length ˆDon Juanˆ stands conspicuous among works in verse since it consists of 16 cantos and a fragment of a 17th, which ag¬ gregate nearly 2,000 eight-lined stanzas (ottava rinia) and make, with the included lyrics, one of which is the famous Hsles of Greece,ˆ a total of a little over 16,000 verses. It was com¬ posed, with intermissions due to the remon¬ strances of the Countess Guiccioli and to the hindering attitude taken by publisher and friends, during a period stretching from the autumn of 1818 to the spring of 1823 — that is, from shortly after the completion of the suc¬ cessful ˆBeppo,ˆ which prompted the inception of ˆDon Juan,ˆ throughout the unregulated but far from unoccupied Italian years that saw the writing of ˆMazeppa,ˆ of all the dramas save ˆManfred, ˆ of ˆThe Vision of Judgmentˆ and of several other important though less memor¬ able poems. Publication was by instalments — Cantos I and IT in July 1819; Cantos III-V in August 1821 ; Cantos VI-VITI, with John Hunt

as publisher of the remainder of the work in place of Murray, in July 1823; Cantos IX-XI and XII-XIV in August and December respec¬ tively of the same year; and Cantos XV-XVI in March 1824. Thus a few weeks before Byron succumbed to fever at Mesolonghi, the world had before it all of his masterpiece save the scathing dedication to Southey, which was added in 1833 after prior circulation as a broad¬ side, and the fragment first published in our own generation. If the speed of composition had not quickened — Cantos VI-XVI were

written between the early summer of 1822 and the early spring of 1823, we should probably not have had the brilliant satire of English life contained in the closing cantos, and we might even not have had the superb siege of Ismail or the picture of Catherine and her court. This would have meant a ˆDon luanˆ consisting only of the Donna Julia, the Haidee andi the Gul-beyaz episodes, with the vivid shipwreck thrown in for good measure — still a great poem doubtless, but one which would have left a more sinister impression of licentious wayward¬ ness than the full poem leaves.

The chief literary influences discernible in the work — aside from Byron's continuous and apt use of details derived from his wide read¬ ing and apart from his employment of special sources of information in the shipwreck and siege cantos — are the ˆWhistlecraft® cantos of John Hookham Frere, which had prompted the writing of ˆBeppo,ˆ and the work of the Ital¬ ian humorous-romantic poets Berni and Pulci. His best editor, Mr. Coleridge, thinks that he knew little of the Spanish ˆˆDon Juan,ˆˆ the legendary titanic embodiment of evil. The name, however, was attractive and suitable to a work that started off as a story of adultery in Spain. Once under way Byron seems to have had no settled plan except to take his hero on a tour — amorous, adventurous, humorous — through a great part or the whole of Europe. Spain, a Greek island, Constantinople and Is¬ mail, Russia and England he lived to compass ; one of his letters mentions projected escapades in Italy and Germany; perhaps, if he had lived to write the 100 cantos he jestingly planned, he would have ventured — with his extraordi¬ nary creative energy, versatility and daring — to embark his hero for the America of Wash¬ ington and Daniel Boone, already praised in the poem ; but all that is certain and important in this connection is that Byron made a not inconsiderable beginning of a comic epic, or whatever else we may call it, of many charac¬ ters and scenes which, though frustrated by his death, became his chief and a real contribu¬ tion to the ˆˆcriticism of life.® It is not the highest criticism of life that we encounter in ˆDon Juan,ˆ but it is a criticism that has its value to mature and catholic readers, a crit¬ icism presented through poetry that yields to nothing else in modern English literature in romantic passion and sentiment, in spirited ac¬ tion, in idyllic charm, in sham-annihilating sa¬ tire, in cleverness and daring, and last — but far from least — in sustained energy'- and sin¬ cerity of creation, in unflagging carrying-power. His correspondence shows that he knew better than the naturally timid Murray and some of his other friends what superb poetry he was putting into ˆˆDonny Johnny,® as he playfully christened his medley, hie knew that it would

be ˆˆknown by and by for what it is intended — a Satire on abuses of the present states of Society, and not an eulogy of vice.® We may dissent when he goes on to say that he cannot help it if it is ˆhiow and then voluptuous® ; but it is at least time for us to recognize that such contemporaries as Goethe, Sir Walter Scott, Shelley and Washington Irving were far¬ sighted and healthy-minded in praising ˆDon Juanˆ highly, and Southey the reverse in con¬ sidering it ®a foul blot® on English literature and ®an act of high treason® to English poetry. Surely the world would be loth to spare such satire as ˆˆOh for a forty-parson power to chant Thy praise. Hypocrisy® (X, 34), such senti¬ ment as ®'Tis sweet to hear® (I, 122), such idyllic beauty as is contained in the stanzas beginning ®They looked up to the sky® (II, 185), such description as that of Lambro's home-coming (HI, 27) praised by S. T. Cole¬ ridge, and of Newstead Abbey (XHI, 55), such effective denunciation of war as in the entire eighth canto — but to attempt to catalogue the great passages of this poem would be absurd. One stanza (XV, 99) ˆBetween two worlds Life hovers like a star® would almost suffice of itself to make ˆDon Juanˆ seem quite as much the work of a true poet as every page makes it seem the work of a shrewd man of the world. Probably no other modern long poem is so brilliantly sustained ; no other charac¬ terized by such infinite and unstaled variety.

William P. Trent.

DON ORSINO, a novel by Francis Marion Crawford, published in 1892. The author's pur¬ pose is to describe a young man of the transi¬ tion period in Rome after the unification of Italy. He chooses for his hero Orsino Sara-cinesca.

DON PASQUALE, pas-kwa'la, an opera buff a in three acts by Gastano Donizetti (libret¬ to by Salvatore Gammerano) first produced in Paris 4 Jan. 1843. The opera was an instant success, largely ensured by the original remark¬ able cast — Grisi, Mario, Tamburini and La-blache. The famous serenade, ®Com'e gentil,® sung by the tenor Mario to the accompaniment of a tambourine, which was introduced at the last minute, swept the audience off its feet. ˆDon Pasqualeˆ is one of the best light operas of the period. The scene is laid in Rome and the story, which is typically Italian, is concerned with the love of Ernesto for Norina, the inter¬ ference of the wealthy Don, who has other mat¬ rimonial plans for his nephew, and the intrigue arranged by the mutual friend. Dr. Malatesta, which is so successful that the Don yields and blesses the nuptials of the young couple. The music is

brimful of melody and merriment and flows along irrepressibly from first page to last. Theˆ solo numbers are primarily prima donna music, filled with the vocal hurdles that are a delight both to the bel canto singer who can successfully negotiate them and to the audi¬ ence ; the ensemble, including an unusually fine finale (second act), are no less noteworthy.

Lewis M. Isaacs.

DON QUIXOTE, don kwiks'ot ; Sp. don ke-hot'a. To have written the book which for three centuries has best interpreted Spain to the world is the title to fame of Cervantes. Most artists in their_ view of life are merely personal ; Cervantes is national and universal.

In him the genius of his people linds its best expression, yet his masterpiece speaks to all men irrespective of period or race. Books that do this may be counted upon the fingers of two hands, but among them is ˆDon Quixote.ˆ When it appeared in 1605, Miguel de Cervantes Saavedra was but two years short of sixty. A native of Alcala, near Madrid, he had been a soldier in Italy and the Azores, a captive among the Barbary pirates of Algiers, and at home a dabbler in drama and pastoral romance, as well as a collector of taxes and of provisions for the Indies fleet. He had been imprisoned twice be¬ cause an agent absconded, and once in La Mancha at Argamasilla de Alba, where tradi¬ tion has it that he began his ˆDon Quixoteˆ in confinement. The original of his hero is said to have been Rodrigo Pacheco, whose portrait hangs there in the parish church in witness of his restoration from madness in 1601 by the grace of the Virgin. For 10 years after the publication of the first part of *ˆDon Quixote,ˆ Cervantes did hack writing for the illiterate, and composed poems, plays and stories to please himself, while vainly seeking court favor. Then, on the appearance of a continuation to his great work by an Aragonese enemy calling himself Avellaneda, Cervantes hurriedly com¬ pleted his authentic sequel, which was issued in 1615. In the next year, after producing a long heroic romance, he died.

That Cervantes was no enemy to the worthy romances of chivalry, this last effort — ˆLos Trabajos de Persiles y Sigismundaˆ — makes clear. Yet it amused him to break a comic lance against the silly books in this kind which had succeeded the ˆAmadis de Gaula.ˆ He conceived the notion of showing a meagre, middle-aged gentleman, gone mad from the reading of such fantastic fictions, attempting to enact in the world of actuality the role of mediaeval knight errant. This gentleman, tak¬ ing the fancy name of Quixote or ®cuish,® sets forth upon his nag, Rozinante, to win glory for his lady, who is only a peasant wench. He makes three journeys. The first and briefest results in his being dubbed knight by a rogue innkeeper. The second, after his mischievous books have been burnt by his friends, a barber and a priest, involves also the misadventures of his squire Sancho Panza, an unromantic anti-hero who was invented as an amusing con¬ trast to

the valiant hero. From encounters with windmills and sheep, to the capture of a barber's basin that resembles the helmet of Mambrino; from the release of ungrateful con¬ victs to a penance of love in the mountains, the experiences of the precious pair parody those of the old romances. At length the disguised barber and priest prevail upon the knight to enter a cage wherein he is brought home on a bullock cart, believing himself under enchant¬ ment. His third quest, filling the entire second part of the novel, is longest and most enjoyable. Here Don Quixote is surer than ever of his dignity and of the glory of knighthood; and Sancho is wittier, richer in proverbs and in common sense, loving,ˆ yet playing upon his master. The climax of interest is reached when a duke and duchess entertain the two, fooling Don Quixote to the top of his bent with elabo¬ rate pageants and arranging a mock island for Sancho to govern. Finally, the bachelor Sam¬ son Carrasco, who has already failed in one

effort to fetch Don Quixote home, succeeds by overthrowing him in combat disguised as Knight of the White Moon. He is brought disconso¬ late to his house, having vowed to abandon knighthood for a year. He thinks to turn shep¬ herd ; but his heart is broken, and he recovers his reason only to part with life and the weep¬ ing Sancho.

Like other great works, this has been sub¬ ject to various interpretations. Some have held it to be a satire directed against individuals — Charles V, Philip H, Ignatius Loyola or the Duke of Medina Sidonia. A Spaniard has pro¬ nounced it to be a mystic allegory, ˆDulcineaˆ lˆing an anagram of ˆDivina Luce,ˆ or divine light. An Englishman — A. J. Dufiield — has written a volume to prove it an attempt to ex¬ pound the nature of madness. An English¬ woman — Mrs. Oliphant — regards it as Cervantes[confession of his own disillusionment with life. Many have seen here his design to present personified the two elements in human nature, soul and sense, poetry and prose. Thus Coleridge has said of Sancho, ˆTut him and his master together and they form a perfect in¬ tellect, but they are separated and without ce¬ ment; and hence each, having a need of the other for its own completeness, each has a mas¬ tery over the other.® Some have held that Cer¬ vantes sides with Sancho as ridiculing extrava¬ gance of feeling and imagination, Heine de¬ claring that this is the greatest of all satires against human enthusiasm, and Sismondi call¬ ing it ˆffhe saddest book ever written.® Others have maintained that Cervantes intends us to approve rather of Don Quixote whose faith and character rise superior to the ills of sense. But whatever interpretation be taken, it is cer¬ tain that Cervantes was not

exclusively either an idealist or a realist, that he and his age were not philosophic or likely to allegorize outside the domain of religion and that he was not a pessimist. It seems certain, too, that his mas¬ terpiece was not a carefully planned structure like the ˆDivine Comedy,ˆ but rather a spon¬ taneous growth. Having set out to poke fun at absurd romances, Cervantes became interested in his burlesque hero; he took from popular literature and from observation the anti-hero as a foil, supplied adventures and a life-like dialogue as the best means for playing off one against the other, and, assuming the humorist's attitude, stood aside to smile at the delusions of both realist and idealist, favoring neither artistically. Thus his Don Quixote and San¬ cho developed from contrasted literary and so¬ cial types to contrasted types that are national and universal.

ˆDon Quixoteˆ is especially significant as a contribution to the novel and to the literature of the comic. Since it grafts upon the stock of old romance the element of observation of the actual, it is one of the first of modern nov¬ els. Although its plot is episodic and inverte¬ brate, it reflects the world of men and nature with a precision nowhere earlier equalled out¬ side of picaresque fiction. Landscape is given in a few strokes incidentally, but men are seen in great variety, especially the folk of the road. If most are drawn merely as to externals, the two principal figures are studied both within and without. They are consistent vital beings who can accept the test of any character; that is, they can be divorced from all they do and

remain alive. Their conduct in other situations can be predicated as exactly as that of persons whom we know. Character, indeed, is here more fully revealed than ever before in prose fiction, and the means for its revelation are not description and analysis but speech and ac¬ tion. Power of characterization through dia¬ logue is Cervantes' greatest technical achieve¬ ment.

As a comic epos, ˆDon Quixoteˆ is equally notable. For the comic is here present in all its phases, severally and combined, in unusual de¬ gree. The comic as burlesque is to be found in the parody of incidents

from the romances of chivalry — the knight's watching of his armor, his decoction of a magic balsam, his voyage with Sancho in an enchanted bark, and their aerial flight astride a wooden horse. The comic as farce is to be found in incongruities of situ¬ ation resulting from rude practical jests and confusions by night at inns. The comic as sa¬ tire is to be found in assaults upon chivalric and pastoral follies, upon physicians, duennas and the governors of Spanish colonies. The comic as wit is to be found in an unflagging play upon words and ideas, as in Sancho's ver¬ bal mistakes and his wealth of proverbs. More noteworthy, however, than these four forms of the comic are two others — irony and humor — in which this novel excels. In irony the in¬ congruous relation is emphasized negatively, as when Don Quixote, watching a puppet show, destroys the Moorish puppets that threaten the Christians, and then asks proudly, ^^Who now can doubt the good of knights errant?* In humor the incongruity concerns character, the humorist exhibiting with genial toleration the clash of inharmonious natures, as when Cer¬ vantes shows Don Quixote determined, m emu¬ lation of love-sick knights, to go mad and dash his head against a rock, whereupon Sancho, un¬ able to understand his master's motives, begs the substitution of cotton, and promises to tell the lady that this substance was rock as hard as any diamond. Humor, indeed, marks the whole relationship of squire and knight, and even their conduct apart, as when the Don re¬ jects the advances of the fair in order to re¬ main true to his Dulcinea, or Sancho, having wisely ruled his island — a mere bend in a river — is fooled by a pretended martial at¬ tack upon it, and, relinquishing ambition, re¬ turns with relief to humble life. Here one feels a touch of pathos, but if there be any lim¬ itation in the humor of this work, it lies in the rarity of such moments wherein English humor abounds.

The influence of ^Don Quixote^ has been extraordinary. Although the romance of chiv¬ alry was already dying or dead, and Byron was wrong in assuming that Cervantes '^flaughed Spain's chivalry away,* this book, translated into all modern languages, has been the subject of countless allusions and hundreds of adaptations in the literature of the world. It has contributed more than any other single work to the development of prose fiction. To trace this influence in detail would require a volume.

Of ^Don Quixote^ some 700 editions have appeared at home and abroad. In English the first translation was that of Thomas Shelton (1612). Other versions by Philips, Stevens,

Molteux, Jarvis and Kelly were popular in their day but have been superseded by those of H. E. Watts (1888) and John Ormsby (1904). The influence of this novel upon English literature is studied by Gustav Becker in JDie Aufnahme des Don Quijote in die englische Literatur^ (1906). The standard English life of Cer¬ vantes is that by James Fitzmaurice-Kelly

(1892).

Frank W. Chandler,

Professor of English and Comparative Litera¬ ture, University of Cincinnati.

DONA FRANCISCA, Brazil, a German colony in the state of Santa Catharina, founded in 1851, lying between the Serra do Mar and the Atlantic Ocean, 14 miles inland from the' port of Sao Francisco. Area, 550 square miles; pop. (1903) 21,000. Chief town, Joinville, with 3,000 inhabitants.

DONALDSON, Henry Herbert, Ameri¬ can neurologist : b. Yonkers, N. Y., 12 May 1857. He was graduated at Yale in 1879, stud¬ ied at the Sheffield Scientific School there, and also at the College of Physicians and Surgeons of Columbia University, and at Johns Hopkins. He was instructor in biology at the last-named institution in 1883-84 and associate professor of psychology there in 1887-88. In 1889-92 he was assistant professor of neurology at Clark University. He was professor and head of the department of neurology 1892-1906 and dean of the Ogden School of Science 1892-98 at the University of Chicago. Since 1906 he has been professor of neurology at the Wistar Institute of Anatomy and Biology, Philadelphia. He has written ^The Growth of the Brain> (1895) ; ^The Physiology of the Central Nervous Sys¬ tem^ (1896) ; ^The Rat^ (1915), and articles in scientific journals.

DONALDSON, Sir James, Scottish edu¬ cator: b. Aberdeen 1831; d. 1915. He was educated at Aberdeen University, New College, London, and Berlin University. In 1852 he was appointed tutor in Greek at Edinburgh Uni¬ versity. In 1854-56 he was rector of the Stir¬ ling high schools and of those of Edinburgh in 1866-81. In 1881 he became professor of humanity at Aberdeen University, was made vice-chancellor and principal of the University of Saint Andrews in 1890 and principal of the United College of Saint Salvador and Saint Leonard. In 1907 he was knighted. His publi¬ cations include ^A

Modern Greek Grammar for the Use of Classical Students^ (1853) ; ^Lyra Graeca^ (1854) ; ^Critical History of Christian Literature and Doctrine from the Death of the Apostles to the Nicene CounciP (3 vols., 1864-66) ; ^The Ante-Nicene Christian Library,^ in collaboration with Roberts (24 vols., 1867-72) ; ^Expiatory and Substitutory Sacrifices of the Greeks^ (1875); ^Woman: Her Position and Influence in Ancient Greece and Rome, and Among the Early Christians^ (1907) ; ^Ad¬ dresses Delivered at Saint Andrews from 1886 to 1910> (1911).

DONALDSON, John William, English classical scholar: b. London 1811; d. 1861. He received his education at University College, London, and at Trinity College, Cambridge. In 1835 he was elected Fellow of the latter college. His earliest work was a revision of Buckham's ^The Theatre of the Greeks.^ In 1839 appeared

the <New Cratylus,) the first attempt on an adequate scale to familiarize the English-speak¬ ing world with the principles of comparative philology, the study of which had been so well advanced in Germany by Pott, Grimm and others. In 1841 Donaldson became headmaster of the grammar school at Bury Saint Edmunds. He continued_ his philological studies and in 1844 issued his ^ Varronianus,^ which did for Latin what the ^New Cratylus^ had done for Greek. He also edited Pindar, Sophocles' ^ Antigone, > with metrical translation, and wrote ^Maskil le Sopher,^ a treatise on He¬ brew grammar, and <Jashar> (1854), a Latin work which, by tests, sought to distinguish the remains of early Hebrew songs in the Masor-etic text of the Old Testament. In 1855 he re¬ turned to Cambridge and here wrote ^Christian Orthodoxy^ in answer to the critics of ^Jashar.) He also wrote a ^Greek Grammar^ and a ^Latin Grammar^ for schools, both of which went through several editions. Donald¬ son became one of the classical examiners in the University of London in 1856 and two years later issued his ^History of the Literature of Ancient Greece^ (3 vols., two of which are translations from the German of K. O. Muller). His health failed while working on the

compila¬ tion of a new ˆ Greek Lexicon.) Consult Gar¬ nett in ˆDictionary of National Biography) (Vol. XV, 1888).

DONALDSONVILLE, La., town, county-seat of Ascension Parish, on the Mississippi River, and the Texas and Pacific Railroad, about 30 miles in an air line south of Baton Rouge. It is tne trade centre of a cotton, rice and sugar-growing region, having large inter¬ ests in these commodities and also in lumber. It is governed by a mayor and commissioners who are elected for a term of four years, sub¬ ject, however, to recall by the electorate. The waterworks and electric-lighting plant are the property of the municipality. The town was settled in 1760 and was incorporated 46 years later. In 1863 it was burned by the Federals after a violent bombardment during the battle of Fort Butler. Pop. (1920) 3,745.

DONATELLO, or DONATO DI BETTO BARDI, Italian sculptor: b. Florence, between 1382 and 1387; d. there, 13 Dec. 1466. By his character and genius, by the historic importance and .artistic quality of his work, he is one of the most original and grandest figures of the glorious Quattrocento. Since the preponderat¬ ing role of naturalism in freeing modern art has been properly recognized, Donatello has been assigned his real place. In 1886 Florence celebrated, as a national event, the fifth cen¬ tenary of his birth. At an early period he was greatly influenced by Brunellesco. The great models of antiquity also exerted a powerful influence over him. After a stay of two or three years in Rome he returned to Florence, where he began in earnest his career as sculptor. The first work in which Donatello impressed his personality was the marble statue of Saint Michael on the northern facade of the church of Or-San-Michele, together with its accompa¬ nying bas-reliefs. Another admirable piece of work are the three figures — Saint John the Baptist, David and Jeremiah on the west-fagade of the campanile of Santa Maria del Fiore. Among the works belonging to this

early Florentine period and in which he holds himself aloof alike from all servile imitation of the ancients and from the violent realism of some of his contemporaries we may note the statue and bust of Saint John in the Martelli palace, ˆChrist in the Sepulchre) ; Madonna and Child); ˆ Jesus Christ giving the keys to St. Peter,) all in the Kensington Museum; the charming profile of Saint John in the Uffizi, and ˆHead of a Young Girl,) in the Louvre. Donatello was very intimate with his patron and protector, Cosmo de Medici, and it is probably to his influence and to that of Ghiberti that are due certain

works directly inspired by the ancients. Of these the bronze ˆ David) is the most noteworthy. The ˆSt. John) of the Uffizi and the ˆMadeleine) of the Florentine baptistery are important as psychological studies rather than as works of art of a purely original type.

Donatello executed four monuments in col¬ laboration with Michelozzo Michelozzi, the tombs of Pope John XXHI, Cardinal Brancacci, and Bartolomeo Aragazzi, also the bas-relief in bronze of the baptismal fonts in the Siena baptistery, all of which were completed between 1420 and 1432. In 1444 Donatello re¬ moved to Padua where he was destined to execute some of his most imperishable works, among others, the statue of Gattamelata, and the decorations in the basilica of Saint Antony. From 1450 to 1453 Donatello was engaged suc¬ cessively at Ferrara, Venice and Modena, after which he returned to Padua. In 1456 we find him at Ferrara and it was probably in the fol¬ lowing year that he returned to Florence. Al¬ though now in advanced years, he was full of activity and it is without doubt between this date (1457) and his death that he executed many of the works mentioned above, also the bronze ˆSaint John) at Siena, and the ‘ˆFour Evangelists) for the church of Saint Laurence, where the artist was buried close by his friend and patron, Cosmo de Medici. Donatello was the precursor of Michelangelo. Well versed in the craft of the ancients he preserved, to a degree even greater than Ghiberti, their great canons and simplicity.

Since 1886 the large hall at the Bargello has been exclusively devoted to the display of his works. Consult the biographies by Angelini, Carocci, Melani and Balcarres (London 1903), the best in English; also Vasari, ˆLives of the Painters, etc.) (English trans.. New York 1912-16) ; Bode, ˆDenkmaler der Renaissance skulptur Italiens) (Munich 1905), which con¬ tains a complete series of reproductions of the sculptor’s works; id., *ˆFlorentiner Bildhauer der Renaissance) (English trans., London 1808) ; Tschudi, ˆDonatello e la Critica moderna) (Turin 1887).

DONATI, do-na’te, Giovanni Battista,

Italian astronomer: b. Pisa 16 Dec. 1826; d. Florence, 20 Sept. 1873. He was appointed in 1852 assistant at the observatory in Florence, of which he became director in 1864. Here he discovered, in addition to five others, the bril¬ liant comet of 1858, which is known as Donati’s comet, and proved the gaseous compo¬ sition of these bodies. He was instrumental in erecting the fine observatory at Arcetri, near Florence, and constructed a spectroscope of 25 prisms.

DONATIO MORTIS CAUSA, in law, a gift of personal property made when the donor believes himself in imminent danger of death and to take effect only if he dies of the illness with which he was affected at the time he made such gift. There must be actual or constructive delivery of the property during the life of the donor to pass legal title. Only personal prop¬ erty is the subject of such a gift. This form of donation is convenient when it is difficult or impossible for the donor to make a will, and it is also claimed that it has been often used to evade the inheritance laws or death duties, as they are known in England and her colonies, now of increasing importance because their justice and expediency are recognized by most economic authorities and because of the probability that they will be adopted generally as they have been in Great Britain, Australia, New Zealand and many European countries. The gift, it will be seen from the foregoing, is conditional, and the recovery of the donor acts as a revocation without other formalities. By the civil law, delivery in all cases was not essential. Bills of exchange, notes and checks of third parties, and certificates of stock may be the subject of such a gift.

DONATION OF CONSTANTINE. An

ancient document purporting to have been given by Constantine the Great in 324, out of grati¬ tude for his healing from the disease of leprosy. It first appeared between the years 755 and 766. It was translated from the Latin text as follows : ^^We give as a free gift to our most blessed father, Sylvester the Pope, the city of Rome, and the cities of all Italy as well as the cities of other western countries. To make room for him we abdicate our sovereignty over all these provinces ; and we withdraw from Rome, transferring the seat of our empire to Byzantium, since it is not just that a terrestrial emperor should retain any power where God places the head of religion.® The document was exposed as a forgery by Lauren-tius Valla about the middle of the 15th century.

DONATISTS, a sect in the 3d century, and till the Vandal invasion a formidable opponent of the Roman Church in the Mediter¬ ranean

provinces of Africa. The sect was not heretical, but was the first to separate from the Church on the ground of discipline. The sect arose out of dissensions at Carthage over the question of the readmission to church fellow¬ ship of those persons who in Diocletian's perse¬ cution had denied the faith either explicitly or implicitly by giving up to the persecutors the Christian sacred books. On that point they were extreme rigorists, as also in holding that a priest or deacon could not validly administer baptism if he were himself in a state of sin. When Mansurius was consecrated bishop of Carthage the faction headed by one Donatus repudiated him as a traditor — one who had given up the sacred books; and when after his death (311) Csecilian became bishop of Carthage 70 Numidian bishops refused to have communion with him, as one that was consecrated by a traditor. They set up a rival bishop, Majorinus, and the schism grew steadily wider, being specially favored by the peasants. The schismatics were condemned by Melchiades, the reigning Pope, with three bishops of Gaul, in 313. This judg¬

ment was confirmed the next year by the Council of Arles, and in 316 by the Council of Milan, convoked under the protection of the Emperor Constantine. But the Donatists paid no heed and in 330 a council was held by 270 Donatist bishops, who denounced their opponents as here¬ tics. The peace not only of the Church but of the civil state was seriously compromised by uprisings of the fanatical multitude against the Roman Catholics throughout northern Africa, to repress which the severe laws enacted by the emperors were ineffective. Saint Augustine, bishop of Hippo from 400 to his death in 430, labored zealously to restore peace to the Church. In 411 a conference with 279 of their bishops was held at Carthage at which Saint Augustine took a leading part, judgment being awarded by the imperial representative in favor of the Roman position. The sect early began to split up into independent smaller sects, they were de¬ prived of civil rights in 414 and rigorously per¬ secuted; they are little heard of after the Vandal invasion in 429, disappearing finally two cen¬ turies later before the Saracenic invasion of North Africa. Consult the works of Saint Au¬ gustine; Bright, ˆThe Age of the Fathersˆ (London 1903) ; Harnack, ˆDer Ursprung des Donatismusˆ (Freiburg 1883) ; ˆHistory of Dogmaˆ (English trans., Boston 1894-1900) ; Sparrow Simpson, ˆSt. Augustine and African Church Divisionsˆ (New York 1910).

DONATUS, do-na'tus, .ffilius, Roman grammarian and commentator who lived in the 4th century. He wrote an elementary work on the

Latin language, ˆDe Octo Partibus Oratio-nis,ˆ which served as a guide to the learning of Latin in the Middle Ages and formed the groundwork of most elementary treatises until recent times. It was one of the books most fre¬ quently printed at the commencement of the art, several editions having been issued from blocks even before the invention of types. Copies of these are among the rarest and most valuable of bibliographical treasures. He was also author of a commentary on Terence.

DONAU, do'now. See Danube.

DONAUWORTH, do'now-vert, Germany, walled town of Bavaria at the junction of the Wornitz and Danube, about 25 miles north by west of Augsburg. It contains saw mills, brew¬ eries and machine factories, and carries on a considerable trade in the agricultural products of the region. A great livestock market, the largest in Bavaria, is held here monthly. The town received municipal rights in the 14th .cen¬ tury, becoming a free city. In 1607, after fric¬ tion between the Protestants and Catholics, it was occupied by the Bavarians who sided with the members of the Old Church. This action was one of the moving causes of the Thirty Years' War. The Bavarians lost a battle here to the Duke of Marlborough in 1704, and almost a century later, in 1805, it was again the battle¬ ground of the French and Austrians, the latter being worsted. Pop. (1910) 5,500. Consult Stieve, <Der Ursprung des dreisigjahrigen Krieges,ˆ Vol. I, ˆDer Kampf um Donauworthˆ (Munich 1875).

DONCASTER, England, municipal bor¬ ough in the West Riding of Yorkshire, on the Don, 32 miles south of York. Here are situated the locomotive and carriage works of the Great

Northern Railway, The miiiiicipalily has been progressive in all forms of collectiw enterprise, gas, water, electricity, tramways and racecourse being owned by the town. It has long been famous for its annual races, begun in 1703. Nearby are the ruins of Conisborough Castle, the stronghold of Athelstan in Scott's ˆIvan-hoe.ˆ Pop. 30,516.

DONDO, don'do. West Africa, town in the Portuguese colony of Angola, situated at the head of navigation on the Coanza River and not far from the Loanda Railway. It has a consid¬ erable caravan trade and is an import coffee market. It is situated in a very fertile region, but the enervating climate of this portion of the Coanza district has given Dondo the un¬ enviable name of '-ffhe furnace of Angola.^^ Dondo has steamship communication with Loanda. Pop. 3,000.

DONDRAH, don'dra, or DONDERA HEAD, the southern extremity of the island of Ceylon, a steep and rugged promontory, for¬ merly the site of a temple.

DONEGAL, don'e-gal', Ireland, town at the mouth of the Eske, in the County of Done¬ gal, 12 miles northw^est of Ballyshannon. It is surrounded by hills and nearby are lofty mountains. Donegal Castle, ancient seat of the O'Donnells of Tirconnell, and the ruins of a Franciscan monastery, founded in 1474 by the first wife of Hugh Roe, are near the town. In this monastery were written the famous ^Annala Righeachta Eireaun,^ or as they are better known, ^Annals of the Four Masters,^ a record of Irish history to 1616, finished in 1636 by Michael O'Clery, a Franciscan monk, and his associates, two of whom were also named O'Clery. Pop. 2,647.

DONEGAL, Ireland (Irish, Dun na nGall, fort of the foreigners, i.e., the Danish corsairs), a maritime county in Ulster province, bounded on the north and w'est by the Atlantic Ocean, south by Leitrim and Fermanagh and east by Londonderry and Tyrone. Its area is 1,193,641 acres (about 1,868 square miles) and it has a much-indented coastline with numerous islands off shore. The land surface is mountainous and boggy and contains numerous loughs (lakes) and is traversed by numerous streams. About 35 per cent of the land is in pasture. Agricul¬ ture is the chief occupation of the inhabitants and is still carried on by primitive methods. Linen and woolen cloths are manufactured. The coastal population occupy themselves with the fisheriesv The lakes inland are favorite haunts of the angler, being well_ stocked with salmon and other food fish. Since 1841 the population has declined steadily, being 296,500 in that year and only 168,537 in 1911.

DONELSON, Andrew Jackson, American diplomatist: b. near Nashville, Tenn., 25 Aug. 1800; d. Memphis, Tenn., 26 June 1871. He was graduated at the United States Military Academy in 1820, and entered the army as a lieutenant of engineers. In 1822 he resigned, studied law and also engaged in cotton raising in his native State. He was private secretary to his uncle. President Jackson, in 1829-30;

Min¬ ister Plenipotentiary to Prussia and later to the federal government of Germany (1846-49) ; was editor of the Washington Union in 1851-52; was candidate of the American party for

Vice-President, and after his defeat retired to private life.

DONETZ, do -nyets', or SEVERNOI DONETZ, a river in Russia which, rising in the government of Kursk, Hows almost due south about 670 miles into the Don, of which it is the principal affluent. It was navigable down to the 17th century, but is no longer so, except in time of floods, owing to forest denuda¬ tion. In its basin are valuable coal mines.

DONG AN, Thomas, Earl of Limerick, English colonial official : b. Castleton, County Kildare, Ireland, 1634; d. London, 14 Dec. 171ff After serving in the British and French armies he was appointed colonial governor of New York by the Duke of York in 1682. He gave the city of New York its first charter in 1686, and also conferred the first charter on Albany. He succeeded to the earldom of Limerick in 1698 on the death of his brother. A Catholic in religion, it was expected that, in conformity with his instructions, he v/ould show great re¬ spect for French claims in America, but instead he disappointed the expectations of the French court by strenuously supporting the English colonists and claimed for England territory to the south of the Saint Lawrence and the Great Lakes, including sovereignty over the Iroquois. In 1688, after the treaty of neutrality between the French and English kings had been signed, Dongan was forced to resign, and was suc¬ ceeded by Andros. After the dethronement of James H he suffered some persecution and did not return to England until 1691.

DONIPHAN, Alexander William, Amer¬ ican military officer : b. Mason County, Ky., 9 July 1808; d. Richmond, Mo., 8 Aug. 1887. He was three times elected to the Missouri legisla¬ ture. He served in the Mexican War, captur¬ ing Chihuahua after an unexpected encounter with an army of 4,000 men. He was one of the peace commissioners at the convention which met at Washington previous to the Civil War.

DONIZETTI, do-ne-dzet'te, Gaetano, Italian composer: b. Bergamo, 25 Nov. 1797; d. there, 8 April 1848. He studied music at Bologna under the distinguished Abbe Mattel, and was for some time in the military

service of Austria. His first opera, ˆEnrico di Bor-gogna,ˆ was presented at Venice in 1818. In 1822 his ˆZoraide di Granataˆ gained him the honor of being crowned on the capitol. In 1830 appeared his ˆAnna Bolena,ˆ which first, with ˆLucrezia Borgiaˆ (1834) and ˆLucia di Lammermoorˆ (1835), the latter the most pop-nlar of his works, acquired for him a European fame. In 1835 Donizetti was appointed pro¬ cessor of counterpoint at the Royal College of Naples, but removed in 1840 to Paris, bringing with him three new operas, ˆLes martyrs,ˆ ˆLa favoritaˆ and ˆLa fille du regimentP Of his other operas none except ˆLinda di Cha-mouniˆ (1842) and ˆDon Pasqualeˆ (1843) achieved any special triumph. During the last four years of his life he suffered from insanity. He showed amazing fecundity in composition and was the author of 64 operas. He also composed with great rapidity, his HI cam-panello di Notteˆ (1836) being composed (mu¬ sic and libretto) and performed all within nine days; and the last act of ˆLa favorita,ˆ his

acknowledged masterpiece, was composed in from three to four hours. He was exceedingly skilful in suiting the voices for which he wrote, had dramatic and comic talent of a high order and great melodic fluency. Consult Ferris, ˆGreat Musical Composersˆ (New York 1887).

DONJON, the grand or principal or com¬ manding tower or keep of a medicEval castle, frequently raised on an artificial elevation. The donjon contained the great hall and principal rooms of state and also, on the lower or under¬ ground story, the prison fortress; whence the term dungeon.

DONKEY. See Ass.

DONNAY, do’na’, Maurice Charles,

French dramatist: b. Paris 1859. In 1891 he made his debut with ˆPhryne,ˆ a Greek shadow play, and in 1892 produced an adaptation of the ˆLysistrataˆ of Aristophanes. In his later works he has abandoned the frivolous attitude so characteristic of his early work.

He was elected to the Academy in 1907. His plays in¬ clude ˆAmantsˆ (1895); ˆDouloureuseˆ (1897); <L'Affranchieˆ (1898); <Le torrent> (1898); ˆLa basculeˆ (1901) ; ˆL'Autre dangerˆ (1901) ; ˆLe retour de Jerusalemˆ (1903), a caricature of Max Nordau; ˆLa Patronneˆ ; ˆMenage de Moliefeˆ (1912).

DONNDORF, donMorf, Karl Adolf, Ger¬ man sculptor: b. Weimar 1835. He was a pupil of Rietschel in Dresden, and finished the Luther monument at Worms from this master's designs. Famous statues from his hand are those of Savonarola, Frederick the Wise, Waldues^ and ˆMourning Magdeburg, > the equestrian statue of Grand Duke Karl August in the Fiirstenplatz, Weimar. He also designed and executed the tombs of Robert Schumann in Bonn, the Kesstner family monu¬ ment at Dresden, the statues of Peter Cornelius in Diisseldorf and of Bach in Eisenach, the ˆAngel of the Resurrectionˆ at Reineck Castle and the James fountain in New York. Among his most celebrated works are the busts of Bismarck and von Moltke in the National Gal¬ lery, Berlin, which are considered as the most characteristic likenesses of these leaders. Re¬ cent works of Donndorf are the equestrian statues of William I at Saarbruck (1904) and at Heidelberg (1905) and the national monu¬ ment at Hohensyburg, Westphalia. In 1876 Donndorf was appointed professor at Stuttgart and in 1910 a Donndorf Museum was estab¬ lished at Weimar.

DONNE, don, John, English poet and divine: b. London 1573; d. 31 March 1631. His father, John Donne, of a Welsh family, was an ironmonger ; his mother, Elizabeth, was the daughter of John Heywood. His father* died in 1575, leaving six children, whom the mother brought up in the doctrines of the Catholic Church. In October 1584 Donne en¬ tered Hart Hall, Oxford, where for a while his roommate was Sir Henry Wotton. After three years at Oxford he seems to have trav¬ eled on the Continent. In May 1592 he was ad¬ mitted at Lincoln's Inn. For some time he shared his rooms with Christopher Brooke, the poet, through whom he apparently became one of the group of young London poets, and who later suffered a brief imprisonment for com¬ plicity in Donne's marriage. In 1593 Donne

suffered for the first time some of that persecu¬ tion which had pursued his family because of their Roman sympathies; his brother, Henry Donne, was arrested for sheltering a proselyting priest, William Harrington. Harrington was put to death at once and a few weeks later Henry Donne died of disease contracted in prison.

John Donne joined the expedition of Essex to Cadiz in June 1596. In August of that year he became secretary to Sir Thomas Egerton. Five years later he made a clandestine marriage with Anne, daughter of Sir George More and niece of Lady Egerton. His patron and his wife's father were exceedingly angry; he and the friends who had connived at the elopement were imprisoned, and all hope of advancement through Sir Thomas Egerton was lost. In a short time Donne was released from prison and forgiven, but he was penniless. For the next few years he lived on the charity of his friends, and at the beginning of the new reign he sought the king's favor. James recognized his ability, but, insisting that Donne was fitted for the Church, he promised only Church preferment, and Donne seems to have waited, in hope of a worldly career.

In 1611 he traveled on the Continent as the guest of Sir Robert and Lady Drury, upon the death of whose daughter Elizabeth he wrote the quaint ˆAnatomie of the World, ˆ remem¬ bered now by the three exquisite lines about ˆ'her pure and eloquent bloodˆˆ that ®spoke in her cheeks.® On his return the following year he gave himself seriously to the study of theol¬ ogy. Ordained by the bishop of London in 1615, he became rector a year later of Keyston and of Sevenoaks. But a more important op-portunitv came at the same time, in the appoint¬ ment as preacher to Lincoln's Inn. Here he immediately proved himself the most eloquent pulpit orator of his day. The death of his wife in 1617 saddened his life permanently, but he seems to have found a new ambition, far from worldly, in the use of the threat powers he had discovered so late. His reputation as an orator was wide. While on a visit to Germany in 1619, as chaplain to Lord Doncaster, he preached in Germany and Holland to the admiration of his hearers. Shortly after his return to Eng¬ land he was made dean of Saint Paul's.

The last 10 years of his life were years of honor. His sermons as he preached them and published them were of extraordinary popu¬ larity, and still justify his fame. His great mind and broad experience of life had the added grace of the poet's temperament, and time sweetened his nature, which in youth at least was intellectuallv hard. Toward the end of his life his health graduallv failed, and at his last sermon, preached before the king at Whitehall on Ash Wednesday, 1631, his hearers and he were conscious that he would never preach again. A .few weeks later he died.

Donne's poems were published posthumously in 1633. Some of the pieces can be dated ap¬ proximately by their context ; most of them might have been written any time before the last 15 years of his life.

The sacred poems, however, are naturally referred to the end and the secular poems to the beginning of his career; the satires probably belong to the time when he was seeking court favor and the epistles to the same time or slightly later. The

funeral poems are comparatively easy to date; the amatory elegies, it is to be hoped, were the work of youth.

Donne's reputation as a poet was great dur¬ ing his life, before his poems were published, and his love poetry shows not only marked individuality, but also the influence of minor schools of the time. In his early work he is clearly a Cavalier poet, yet his genius was not by nature fitted for that kind of song-writing. It has been said that he had no ear; his verse is harsh ; and in spite of vigorous defense on the part of his admirers, the criticism con¬ stantly recurs. But perhaps it is truer to say that Donne had too much intellect for the kind of verse he wrote in ; the brief Cavalier song was no room for his robust mind. Except for occasional lines of great beauty, such as those mentioned in the ˆAnatomie of the Worlds and those of the lovely ˆ Break of Day,ˆ his form of expression is cramped, and the poem as a whole displays no convincing proportion. So strong is the intellect in his verse, and so low is the emotional temperature, that thought and image, or even thought and word, rarely fuse; they frequently remain stub¬ bornly unmated, however interesting each may be in itself. This is equivalent to saying that most of Donne's verse is fanciful rather than imaginative; and if it be added that he had little taste in selecting the image for his thought, it wall be seen that he was by nature fitted to be one of the ˆfantastic® school — indeed the chief fantastic poet in English. At his worst, as in the ironical verses, ®The Indifferent,ˆˆ in praise of inconstancy in lovers, he seems to search for novelty of idea at all costs, and the difficulty of his crowded lines offers little re¬ ward at last to the reader's patience. At his best, as in the famous ˆˆValediction Forbidding Mourning,® in which he compares the parted lovers to the pair of compasses, the ingenuity of the fancy gives a delight of its own ; though its defect as poetry is clear in the fact that the attention is diverted from the poet and his poem to his astonishing conceit. The vogue of fantastic poetry gave Donne his audience ; yet some of his verses have a smoothness and ease rare in him — such as the almost perfect song, ˆˆSweetest love, I do not go,® and the vigorous lines, ˆˆThe Broken Heart,® containing the in¬ genious image of the broken mirror, which Byron turned to his own

good account.

An intellect so energetic as Donne's would not ignore such a strange fashion of thought as the Precieuse movement, transplanted from France by Henrietta Maria. The fantastic problems of that school as to the place of love in society, their perversions of Platonism, ap¬ pealed to his genius. The influpce is felt in several of his poems, but chiefly in ˆThe Ecstasy.ˆ

Donne's sacred poems show the same gen¬ eral characteristics as the secular verse; the in¬ tellectual element is strong, so that their inter¬ est seems usually to be theological rather than religious; and the lack of constructive lyric form still mars any total effect. But the note of trifling, which went with the early fantastic images, is absent from this sacred verse; a great nature speaks seriously throughout, even though none of the poems are memorable. The best perhaps is the ˆ Litany.ˆ

Of the elegies the ninth is the best, written in honor of George Herbert's mother. The others, like the Satires, are made upon Latin models, perhaps as academic trifling, but with the coarseness which the age easily forgave in Latin imitations. The epistles or ˆˆVerse Let¬ ters® are interesting for some of the persons to whom they were addressed — Christopher Brooke, Sir Henry Wotton, Isaak Walton, Ben Jonson.

It has been the fashion to praise Donne's poetry highly and to make a merit of its eccen¬ tricity. Its real merits, of an intellectual kind, are great, and were recognized by his age, but he was best known as a preacher. In the pulpit his keen intellect, his gift for striking expres¬ sion and the force of a great personality deep¬ ened by time and suffering, found room for just expression.

Bibliography. — The best editions are those by Grosart, in Fuller's ˆWorthies' Libraryˆ ; Chambers, with an introduction by Saintsbury, in the ˆMuses' Libraryˆ ; and Grierson. For criticism, consult Hntroductionsˆ to the above; Gosse, ˆLife and Letters of John Donneˆ ; and Ward's ˆEnglish Poets. ˆ An annotated edition, edited by C. E. Merrill, Jr., of Donne's ˆLetters to Several Persons of Honourˆ was published in 1912.

John Erskine,

Professor of English, Columbia University,

DONNELLY, Eleanor Cecilia, American author: b. Philadelphia, Pa., 6 Sept. 1838; d. 30 April 1917. Among her volumes of verse are ˆOut of Sweet Solitudeˆ ; ˆDomus Deiˆ ; ˆLeg¬ end of the Best Beloved and Other Poems ˆ ; ˆCrowned with Stars ˆ ; ˆHymn of the Sacred Heartˆ ; ˆChildren of the Golden Sheaf and other Poems. ˆ She also wrote several prose works, including ˆLife of Father Felix. ˆ

DONNELLY, Ignatius, American prose writer and politician; b. Philadelphia, 3 Nov. 1831; d. Minneapolis, Minn., 2 Jan. 1901. He was prominent in Minnesota politics, being at one time lieutenant-governor of the State, and from 1863-69 a member of Congress, but was best known as an author. Among his writings are an ˆ Essay on the Sonnets of Shakespeareˆ ; ˆAtlantis, the Antediluvian Worldˆ (1882) ; and ˆRagnarokˆ (1883). In ˆThe Great Cryptogramˆ (1887) he endeavors to prove by means of a word-cipher that Francis Bacon was the author of Shakespeare's plays. His theory was further elaborated in ‘ˆCipher in the Shakespeare Playsˆ (19(X)). His best-known novel is ˆCaesar's ColumiP (1890).

DONNELLY, Samuel Bratton, American printer and labor leader : b. Concord, Pa., 7 Nov. 1866. He was educated in the high schools of Lewiston, Pa., and the State Normal School, Shippensburg, Pa., and taught in the country schools of Franklin County, Pa., in 1883-86. In 1886 he began learning the printing trade and in 1895-98 was president of New York Typographical Union No. 6 and in 1898-1900 of the International Typographical Union, In¬ dianapolis. He was secretary of the National Civic Federation 1901-02, and of the Joint Arbitration Board of the New York Building Trades Employers' Association from 1902 to 1908. From 1901 to 1908 he also served as commissioner on the New York city board of education and from 1908 to 1913 was public

printer at Washington. Since 1913 he has been again serving as secretary of the Joint Board of the New York Building Trades Employers' Association.

DONNER, don’ner, Georg Raphael, Aus¬ trian sculptor : b. Essling, Austria, 25 May 1692; d. Vienna, 15 Feb. 1741. He studied at the Vienna Academy of Architecture, and was employed at the imperial court and also by Prince Esterhazy. Among his best works are the fountains on the Mehlmarkt and at the city hall, Vienna, a group of the Crucifixion in Gurk Cathedral and a statue of Charles VI.

DONNER, Johann Jakob Christian, Ger¬ man classical scholar; b. Krefeld 1799; d. 1875. He was educated at Tubingen and from 1843 to 1852 was professor at Stuttgart. He resigned to devote himself exclusively to literary work. He translated the Greek and Roman poets into German in their original metres. These trans¬ lations include the satires of Juvenal (1821), Persius (1822), Sophocles (1838-39; 11th ed., 1889). This work is still the basis for nearly all the metrical translations of Sophocles. Other translations followed; Euripides (1841-53), ˆschylus (1854), the Hliad> (1857), the ˆ Odysseyˆ (1859)’, Pindar (1860) and Aris¬ tophanes (1861), Terence (18M), Plautus (1865) and Quintus Smyrnseus (18ˆ).

DONNYBR’OOK, Ireland, a parish now included within the parliamentary borough of Dublin, on the river Dodder. It was famous for its fairs, abolished since 1855, which used to attract vast multitudes and seldom passed off without riot and bloodshed. Pop. 19,472.

DONOGHUE, John, American sculptor ; b. Chicago, Ill., 1857; d. New Haven, Conn., July 1903. He won a first prize over many com¬ petitors at the Chicago Fair for a classical group, ˆSophocles Leading the Chorus After the Battle of Salamis,ˆ one of the finest speci¬ mens of the nude in American art. He designed the ˆ Saint PauP in the Congressional Library in Washington, the ˆ Saint Louis of Franceˆ in the Appellate Division building in New York, and busts of Governor Ames and John, Boyle O’Reilly in the Boston Public Library. Other works were his Wenusˆ and ˆDiana,ˆ and best known of all, his ˆEgyptian Ibis.ˆ

DONOUCOLI, one of the small species of the South American monkeys of the genus Nyctipitheciis, of which several species are to be found between Nicaragua and the Amazon; also called night monkeys and devil monkeys. They are small, rather thickly built, with short, round faces encircled by a ruff of whitish fur, very large, staring, yellowish eyes, and have close, soft, woolly fur, and bushy, non-prehen- sile tails. All are arboreal and nocturnal in habit, secreting themselves by day and hunting at night for the insects, small birds and fruits on which they feed; and uttering loud, catlike howls. They make amusing

pets, but are very delicate.

DONTENWILL, Augustin, Canadian bishop; b. Birschwiller, Alsace, 4 June 1857. He was educated in his native province and at Ottawa University. He entered the Oblate order in 1880; was consecrated coadjutor bishop of New Westminster, 22 Aug. 1897: bishop in 1899; first archbishop of Vancouver, 7 Sept. 1908; and resigned on his appointment.

on the 20th of the same month, as superior-general of the Oblates, with the title of titular archbishop of Ptolemais. Resident in Rome.

DONUS, Pope from 676 to 678. He is known as a patron of architecture and adorned many of the churches of Rome ; he also com¬ pelled the archbishop of Ravenna to recognize his authority. Sometimes a Donus H is re¬ corded as Pope for a short time in 974, but this is recognized as a mistake, due to an error of a copyist.

DOO, George Thomas, English line-en¬ graver: b. Christ Church, Hants, 6 Jan. 1800; d. Sutton, Surrey, 13 Nov. 1886. He made him¬ self best known by his famous plates of ˆKnox Preaching,ˆ after Wilkie; of Eastlake's Htalian Pilgrims Coming in Sight of Rome-* ; by his ex¬ quisitely finished heads of women and children, after Lawrence, and by his engravings from Raphael, Correggio and others. His plate of the Calmady children, titled ˆNature, ˆ after Lawrence, produced in 1830, ranks as his mas¬ terpiece. He was court engraver to William IV and Queen Victoria, and in 1857 he was elected a member of the Royal Academy. About 1853-55 he painted in oils, his works of this class being mainly portraits. In 1864 he completed, after eight years' work, a large en¬ graving of the ˆRaising of Lazarus,ˆ by Sebas-tiano del Piombo, his last important work.

D'OOGE, do'ge, Benjamin Leonard, Amer¬ ican university professor : b. Grand Rapids, Mich., 18ˆ. He was graduated at the Univer¬ sity of Michigan in 1881, and also studied at the University of Bonn. He was principal of the High School at Coldwater, Mich., in 1881-83, was instructor in Latin at the University of Michigan in 1884—85, and in the following year became professor of ancient languages at the Michigan State Normal College. He traveled and studied abroad in 1899-1901, and again in 190ˆ09. He edited ˆColloquia Latinaˆ (1888) ; Wiri Romaeˆ (1895); ˆEasy Latin for Sight Readingˆ (1897) ; Caesar's 'Gallic War> (1898), and 'Second Year Latinˆ (1899), with J. B. Greenough and M. G. Daniell ; 'Helps to the Study of Classical

Mythologyˆ (1899) ; Cicero's 'Select Orationsˆ (1901) ; 'Latin Compositionˆ (1901) ; 'Latin Composition for Secondar>ˆ Schoolsˆ (1904); 'Latin for Beginnersˆ (1910; 2d ed., 1911).

D'OOGE, Martin Luther, American class¬ ical scholar: b. Zonnenarie, Netherlands, 17 July 1839; d. 12 Sept. 1915. He was graduated at the University of Michigan in 1862 and received the degree of D.Ph. at the University of Leipzig in 1873. From 1870 to 1912 he was professor of Greek in the University of Michigan. In 1878 he entered the ministry of the Congregational Church and was director of the American School of Classical Studies at Athens in 1886-87, and president of the American Philological Association in 1884. He edited Demosthenes' 'De Coronaˆ (1888), and Sophocles' 'Antigoneˆ (1885), and wrote 'The Acropolis at Athensˆ (New York 1909). He contributed also to various periodicals.

DOOLEY, Mr. See Dunne, Finley Peter,

DOOLITTLE, Charles Camp, American soldier; b. Burlington, Vt., 16 March 1832; d. 1903. He entered the volunteer service during the Civil War, becoming colonel in 1862. He led

a brigade at Nashville, and was commander of the northern district of Louisiana in 1865. In June 1865 he was made major-general of vol¬ unteers and was mustered out of service in November of the same year. He moved to Toledo, Ohio, where he was cashier of the Merchants' National Bank.

DOOLITTLE, Charles Leander, Ameri¬ can astronomer; b. Ontario, Ind., 12 Nov. 1843; d. 3 March 1919. Assisted 1873-75 in surveying the northern boundary of the United States from the Lake of the Woods to the Rocky Mountains ; during the 20 years following he was professor of mathematics and astronomy at Lehigh University, and from 1895 to 1912 was professor of astronomy in the University of Pennsylvania. His principal work was in the branch of astronomy known as practical astron¬ omy, on which swbject he wrote a well-

known textbook for the use of advanced students. He was one of the first systematic observers of the variations of latitudes upon the earth, his re¬ search observations in this field having been be¬ gun in 1876 and continued with almost no in¬ terruption for a period of 35 years. During the last eight years observations were made on each night, both with the zenith telescope and with a very unusual instrument called a zenith tube, for the ipurpose of finding whether certain observed, small changes in the latitude of a sta¬ tion were real or whether they were due to im¬ perfections in the instrument eniplqyed. It was found that these changes were indicated by the observations of both instruments. Dr. Doolittle was professor emeritus in the University of Pennsylvania after 1912; treasurer of the As¬ tronomical and Astrophysical Society of Arnerica from 1899 to 1905, and after 1909, a vice-president of the American Association for the Advancement of Science in 1893 and a curator of the American Philosophical Society.

DOOLITTLE, Eric, American astronomer: b. Ontario, Ind., 26 July 1869. He was gradu¬ ated at Lehigh University in 1891, and becarne instructor in astronomy there in 1891-92 ; in the State University of Iowa 1892-93, and as¬ sistant professor of astronomy in the University of Pennsylvania 1896-1912, and professor of astronomy and director of the Flower Astro¬ nomical Observatory in the University of_ Penn¬ sylvania since 1912. His principal contribution to astronomy from the theoretical side was a computation of the secular perturbations of the elements of the orbits of the four inner planets, employing in this work a method first fully developed by G. W. Hill and not hitherto applied in this connection. Outstanding, minute errors in the motions of these bodies, not fully ac¬ counted for by the distributing gravitational pull of the known planets, were verified by the new computation. His work in practical astron¬ omy consists of a continuous series of measures of double stars, begun in 1895 and published in several volumes by the University of Pennsyl¬ vania, and in the labor of extending the ˆGen¬ eral Catalogueˆ of S. W. Burnham (q.v.) and keeping this work complete to date.

DOOM, the old name for the <ˆLast Judgment,ˆˆ a subject usually chosen for-paintings over the chancel arch in parochial churches in England. Dooms were executed in distemper, and are of constant occurrence. In the reign

of Edward VI these representations were ef¬ faced, or washed over, as superstitious.

DOOM PALM, or DOUM PALM, a

palm-tree, Hyphcene thebdica, whose branches terminate in a tuft of large fan-shaped leaves. It is a native of Arabia, is prevalent in Upper Egypt and central Africa and sometimes reaches a height of 50 feet. The fruit is about the size of an apple; it has a fibrous mealy rind, which tastes like gingerbread (whence the name ginger¬ bread-tree sometimes applied to this palm), and is eaten by the poorer inhabitants of Upper Egypt, where it grows. An infusion of the rind, gently aperient, is also used as a cooling drink in fevers. The seed is horny and is made into beads and small ornaments. Ropes are made of the fibres of the leaf-stalks.

DOOMSDAY or DOMESDAY BOOK,

the record of a statistical survey of England, made by royal authority in the reign of William the Conqueror. The origin of the name has been much disputed. Popularly it has often been associated with the final day of judgment. There was a doom-book or dom-boc (q.v.) com¬ posed in the reign of King Alfred, which con¬ tained a collection of the laws and customs of the kingdom, and the doomsday book is con¬ jectured to have taken its name from the fact of its containing the authoritative data on which legal decisions in regard to land and other collateral property were to be given. The gen¬ eral survey of the kingdom was ordered at Christmas 1085, and completed in the following year. It was made by commissioners appointed by the king, who collected the particulars at inquests from a sworn jury, consisting of sheriffs, lords of manors, presbyters, bailiffs, villains ; all the classes, in short, interested in the matter. The information collected consisted in specifications of the extent of land in each district, their proprietors, tenure and value ; the state of culture, namely, the quantity of meadow, pasture, wood and arable land; in some counties the number of tenants, villains, cotarii and servi; even the sheep and cattle on the different estates were taken, but these were not entered in the permanent record. Northumberland and Durham were omitted and the northern part of Cumberland and of West¬ moreland. The original ˆDoomsday Bqokˆ is preserved in the record office. It consists of two volumes; one folio, one quarto. The re¬ publication of this valuable record was under¬ taken in 1767 and completed in 1783. Perfect facsimiles of the whole book in photozincog¬ raphy have also been made.

Taxes were levied on the basis of the dooms¬ day book until 1522, when as a result of another survey, the ˆNew Doomsday Bookˆ was com¬ piled. ˆThe Victoria County Historyˆ gives a translation of the

old doomsday text for each county with a commentary and map.

Consult Ballard, ˆThe Doomsday Boroughsˆ (Oxford 1904) ; and .ˆThe Doomsday Inquiryˆ (London 1906) ; Ellis, H., ˆGeneral Introduction to Domesday Bookˆ (2 vols., ib. 1833) ; Mait¬ land, F. W., ˆDomesday Book and Beyondˆ (ib. 1897) ; Round, J. H., ˆFeudal Englandˆ (ib. 1895) ; Vinogradoff, Willainage in Englandˆ (ib. 1892).

DOOM, a river in Ayrshire, Scotland,

which after a northwesterly course of 27 miles flows into the Firth of Clyde two miles south of Ayr. It is celebrated in the poems of Burns.

DOOR, a wooden or metal, sometimes stone frame or panel constructed to open and shut on hinges; used for entrances to buildings, rooms, *etc.* Sometimes made of one piece, but generally of several sections framed together. The doors of ancient Egypt and kindred coun¬ tries swing upon vertical pintles which pro¬ jected from the top and bottom of the door into sockets above and below. In China and other Eastern countries doors may be seen to¬ day swinging on pivots. In modern carpentry, doors are classified under two general heads : batten-doors and panel-doors. The former are made of two or more boards placed longitudi¬ nally and held together by transverse rails. The latter are formed of a skeleton frame work into which is fitted lengths of thin board called panels. Folding and sliding doors have been improvements upon the hinge variety, working on tracks or grooves and having the particular value of saving space. See also Swinging Doors.

The doors of antiquity are little known to us ; the oldest in existence, those of the temple at Balawat, now in the British Museum, have their tenons sheathed in bronze. The doors of the Pantheon date from the 2d century; two of the Roman period are in the Lateran Basilica at Rome. The door of the church of the Nativity at Jerusalem (6th century) is covered with bronze plates; those of the church of Saint Sophia, Constantinople date from the 8th cen¬ tury. The doors made

in Italy during the Renaissance period were of very simple con¬ struction; those in Germany and France during the same period were by contrast ornate and elaborately carved.

DOORGA, in Hindu mythology the prin¬ cipal wife (10-armed) of Siva, one of the gods belonging to the Hindu triad. She has many names and varied characteristics. In Bengal the name Doorga is her appropriate appellation, and was given her by transference from the giant Doorga, whom she slew. In this presidency a 10 days' celebration in her honor is annually celebrated. In southern and western India she is called Purwutee, or Parvati.

DOORNBOOM (Acacia horrida), a tree common in South Africa. The name ^^thorn-tree,® given to it by the Dutch colonists, and the botanical specific name are due to the number and sharpness of its spines. It seldom much exceeds 30 feet in height, but its timber is hard and tough, and is much used for house-carpen¬ try, *etc.* See Acacia.

DOPE (from Dutch doop, sauce) is a descriptive term meaning any thick liquid like molasses ; a thick sauce or gruel or other vis¬ cous fluid or pasty thing used for eating is called a dope. By extension used vulgarly for any narcotic or drug. Also (1) a thick pasty lubri¬ cant like axle-grease. (2) Fillers used in paint¬ ing to fill the pores of the wood and prevent the absorption of the paint or varnish subse¬ quently applied to the wood. (3) A preparation of pitch, tallow and other ingredients which, when applied to the bottoms of shoes, will en¬ able the wearer to lightly glide over softened snow. (4) Any absorbent material, as cotton-

waste for holding axle-grease or kieselguhr for holding nitro-glycerine. (5) A stupefying sub¬ stance like opium or chloral hydrate. For dy¬ namite dopes see Explosives.

DOPPLER, Christian, Austrian mathe¬ matician and physicist : b. Salzburg, Austria, 30 Nov. 1803; d. 17 March 1853. He was professor of mathematics at Prague 1841-47, and at Vi¬ enna held a similar post in the Polytechnikum 1848-51. For the last two years of his life he was director of the physical institute at Vienna University. He published ˆ Ueber das farbige Licht der Doppelsterneˆ (1842) ; ˆ Versuch einer systematischen Klassifikation der Farbenˆ (1848) ; ˆ Abhandlungenˆ (ed. by Lorenz, 1907), etc., and made known the noted ˆDoppler's Principle® (q.v.).

DOPPLER'S PRINCIPLE, a name given to the physical law (first enunciated in 1842 by Christian Doppler of Prague), that the appar¬ ent wave-length of sound or light depends upon the velocities of the observer and of the source from which the radiation proceeds. For the sake of illustration, let the source of the radia¬ tion be stationary with respect to the medium that transmits the waves, and let the velocity of the waves in this medium be V. If N is the number of waves of a certain definite wave¬ length that the source emits every second, then the observer will also receive N of these waves every second, provided he remains stationary. If the observer is moving, however, the case is different. For example, suppose that he is receding from the source of the radiation with a uniform velocity v, and consider what hap¬ pens in the course of a single second. During this second N waves reach his initial position, just as before; but at the end of the second he is v units of distance beyond that initial position, and hence it is impossible that all of these N waves can have reached him. The deficit will evidently be equal to the number of waves whose combined lengths would just measure v. But the source sends out N waves every second, and when the last of these N is just leaving the source, the first one of the series has proceded to a distance V. Hence

V

we know that the length of one wave is — ;

and to find the number of waves that would be required to fill the distance v, we have only to divide v by the length of a single wave ; that

V

is, we have to divide it by — . Hence the obN

server’s motion will diminish the number of

Nv

waves that reach him every-second by - ,

V

and, therefore, when he is receding from the source with the velocity v, he will receive only

Nv N(V — v)

N - , or - - , waves per second.

V V

The result will be, that the wave-length of the sound (or. light) will appear to him to be longer than it really is. The same line of reasoning will show that if the observer is stationary and the source is receding with a velocity v, the

number of waves that the observer will receive

NV

per second will be - , If the motion is such

V + V

as to diminish the distance instead of increasing it, the algebraic sign of v must be reversed in the foregoing formulae.

The rnost familiar example of Doppler's principle is afforded by the sudden change in the apparent pitch of a sounding bell or whistle on an express train moving at high speed. If the observer stands close to the track, the pitch falls suddenly and very markedly, as the loco¬ motive passes him. The most important appli¬ cations of the principle, however, are in astronomy, in connection with the measure¬ ment of the velocities of the celestial bodies, by observing the displacement that their motion produces in the positions of the lines of their spectra. (See Spectroscope). If the earth is approaching a heavenly body, the lines in the spectrum of that body are all shifted slightly toward the violet end, owing to the apparent shortening of each wave length by the motion. If the earth and the heavenly body are receding from each other, there is a similar displace¬ ment of the lines toward the red end. The rotation of Saturn's rings has been experi¬ mentally demonstrated in this way, and the velocities of approach and recession of many of the brighter fixed stars have also been de¬ termined. Certain stars have been demon¬ strated to be double, by the discovery that the lines of their spectra are periodically double and single ; the lines appearing single when the relative motion of the two components is perpendicular to the line of sight, and double when the positions of the component stars are such that one star is approaching the earth while the other is receding from it. The orbits of certain of these stars have been determined by such measurements, even when the compo¬ nents of the systems are so close together that no telescope can show them separately, nor make them appear otherwise than as a single point of light. See Double Stars.

DOPPLERITE (named after Christian Doppler, the first to bring it to notice), an amorphous mineral occurring in elastic or partly jelly-like masses found in peat-beds in Styria and Switzerland, and regarded as a fossil peat. When fresh it is a brownish-black, with a dull brown streak and greasy subvitreous lustre, insoluble in alcohol or ether. Dopplerite is also the name of a related mineral, grayish, earthy and plastic in the fingers when fresh.

DOR, or BONGO (q.v.), the names given to a mixed tribe of negroes living in north central Africa, in the lowlands of the Bahr-el-Ghazal, Anglo-Egyptian Sudan. The race is of medium size, attaining splendid muscular development. Their skin is red-brown; they live in well-built huts, their main employment is agriculture, and they have the reputation of being industrious and amenable. The women tattoo the upper part of the body, and as orna¬ ments wear rings and straws through the lips and nostrils. They are noted for remarkable productions in iron (which is their currency) and wood work. Consult Schweinfurth, ˆThe Heart of Africaˆ (London 1873).

DOR, or DORR, a species of beetle, be¬ longing to the family of earth-borers; the

cock-chafer of Europe. It is of a glossy violet, black or deep greenish-black. The club of the antennae is yellowish, the elytra smooth, but slightly punctated, as is the thorax. It may often be seen flying about in the summer evenings. Its size and weight render it very unwieldy on the wing, so that it has but little power of guiding itself, and apparently none of checking its course quickly, for it strikes against all kinds of objects, but without suffer¬ ing any hurt. The female lays its eggs in patches of cow-dung. It is about an inch long. It is also called dor-or dorr-beetle, dor-fly and buzzard-fly.

DOR, or MONT DORE, mon' dor (often written Mont d'Or), a chain of mountains in France belonging to the group of the Auvergne Mountains, in the department of Puy-de-D6me. They are of volcanic formation. The Puy-de- Sancy, the highest peak of central France, is 6,190 feet.

DORA, a facetious abbreviation of the British Defense of the Realm Act.

DORA DTSTRIA, des'tre-a, pseudonym of Elena Ghica, Rumanian author: b. Bucha¬ rest, 22 Jan. 1829; d. Florence, Italy, 20 Nov. 1888. She married the Russian Prince Kolzow-Massalsky, Her first work, ˆMonastic Life in the Eastern Church,ˆ alleges monasticism to be the principal obstacle to civilization in eastern and southern Europe. Her other works in¬ clude ˆGerman Switzerlandˆ ; ˆWomen in the Eastˆ ; AVomen, by a Woman.) She con¬ tributed many literary and historical essays to German, Italian, French, and Greek periodicals. Her studies on Albanian poetry gave rise to a nationalistic and literary movement among the Albanians.

DORCAS GAZELLE, the best known of the genus of gazelles, very common in northern Africa, Asia Minor, Arabia and Syria. It attains a height of two feet; has tapering ringed horns from 9 to 10 inches long; and is of a tawny color with white under parts. It is noted for its speed, is naturally very wild, but easily becomes domesticated, and owing to its beauty and gracefulness is frequently alluded to in Oriental poetry. Its name is derived from the Greek dop/cdr, through depKEadai,ˆ to look, owing to the size and brightness of its eyes.

DORCHESTER (ancient Roman Durno-VARIA or Durinum), England, a municipal bor¬ ough, the county town of Dorsetshire, six miles north of Weymouth. It has a considerable agricultural trade, and cavalry and infantry barracks. In March 1645 Cromwell held the town as his headquarters with 4,000 men, and in 1685 Judge Jeffreys held his ˆbloody assize® here, when 292 received sentence of death as being implicated in Monmouth's Rebellion. A Roman amphitheatre, in a good state of preser¬ vation, is near the town. Pop. 9,842.

DORCHESTER, Mass., since 1870 one of the wards of the city of Boston. Dorchester, originally called Mattapan, was settled in 1630 by the Puritans, but the name was soon changed to Dorchester in memory of the Eng¬ lish home of some of the settlers. Dorchester was settled before Charleston and Boston. In 1633 its territory or township extended almost to the borders of the Rhode Island Colony, over 35 miles distant, and was then known as

®ye greatest towiie in New England. Here the form of special township government, since so characteristic of New England, was first insti¬ tuted. The town of Windsor, Conn., was founded in 1636 by Roger Ludlow and a com¬ pany of Dorchester citizens and toward the close of the century, in 1695, it sent another colonizing company to South Carolina. It was by fortifying Dorchester Heights in March 1776 that Washington, forced the evacuation of Boston by the British army. The place is noted as the birthplace of Edward Everett. The population is counted as a part of that of Boston.

DORCHESTER, New Brunswick, town, county seat of Westmoreland County, at the junction where two small rivers enter Shepody Bay, and on the Intercolonial Railway. The industries are principally shipbuilding and nearby quarrying, from which great quantities of building stone are exported. Coal and lum¬ ber are also exported in large quantities. It contains a woolen mill and the penitentiary of the Maritime Provinces. It has an excellent harbor. Pop. 1,080.

DORCHESTER HEIGHTS, nowSOUTH BOSTON, Mass. This hill on the peninsula, southeast of Boston proper, across a navigable channel, commands the city; and in the Revo¬ lution, when Boston was held by Howe in the winter of 1775-76, it was obviously of the first importance to fortify it. Howe neglected to do so, and on the evening of 4 March 1776, under Washington's orders, Gen. John Thomas, with some 2,500 men and the proper implements, took possession of the heights, and by the next morning a sufficient entrenchment had been thrown up. Howe promptly agreed to evacuate Boston if unmolested, and did so on the 17th, leaving all his guns and supplies unharmed for the Americans.

DORDOGNE, dor'don'ye', a department of southwestern France, which includes the greater part of the ancient province of Perigord, and small portions of Limousin, An-goumois and Saintonge. Area, 3,550 square miles, of which about a third is fit for the plow. The chief minerals are iron, which is abun¬ dant, slate, limestone, marble and other stone. Mining, iron manufacture, etc., are carried on to a considerable extent, and there are a num¬ ber of vine3'ards. Also noted for its production of wines and truffles. The climate is mild, but somewhat changeable. The river Dordogne, principal river of the department, rises on the Hanks of the Puy-de-Sancy, flows west-south¬ west, and after a course of 305 miles unites with the Garonne in forming the Gironde. Pop. 437,432.

DORDOGNE, a river of south central France, formed by the union of the Dor and Dogue at the base of Mount Dore and flowing west for 305 miles, uniting with the Garonne about 15 miles north of Bordeaux. The river is navigable for steamers for nearly 190 miles.

DORDRECHT, dor'drent. See Dort.

DORE, do'ra', Paul Gustave, French artist: b. Strassburg, 6 Jan. 1832; d. Paris, 23 Jan. 1883. He early showed signs of remarkable artistic talent : after his fourth year he was seldom without a pencil in his hand, and in his 11th year he executed drawings on borrowed

lithographic stones. In 1847 he was sent to the Lycee Charlemagne at Paris and presently his remarkable skill as a designer and draughts¬ man of humorous and satirical subjects gained him a place among the illustrators of the Journal pour Rire. From 1848 to 1853 he con¬ tributed to the Salon a series of pen drawings which attracted much attention. In 1857 he obtained honorable mention for his landscapes and a picture of the Battle of Inkermann. Meantime his fame as an illustrator of books was rapidly rising, and it is in this branch of art that his fame is mainly founded — one in which his strongly marked individuality, pic¬ torial and decorative sense, grotesque humor and vivid imagination found full play. He be¬ gan his embellishment of the world's literary masterpieces by his drawings for Balzac's ˆContes drolatiquesˆ (1856) ; followed by illus¬ trations for Montaigne (1858), the Hnfernoˆ (1861); ˆDon Quixoteˆ (1863); the ˆPurgatorioˆ and ˆParadisoˆ (1864-66) ; and the Bible (1865-67). His productivity was extraordinary, and included paintings in water colors and oils and sculpture. After 1870 he painted for the most part Scriptural subjects; and on the strength of his large canvas, ˆChrist Leaving the Praetorium,ˆ he was hailed in England as a great poet-preacher and enjoyed a great vogue in that country, and a permanent gallery of his work was established in London. Some of his canvases were so large that he had to erect lad¬ ders and scaffolding in his studio in order to reach them. In sculpture his most successful essays were the colossal vase now in the Golden Gate Park at San Francisco and the monument to Alexandre Dumas in the Place Malesherbes, Paris.

Dore's juvenile and adolescent successes re¬ acted disastrously on his after-career. They prevented him from applying himself steadily to a mastery of the technique of drawing; he lacked self-control; from first to last he was deficient in interpreting the subtleties of ex¬ pression ; he attempted to excel in too many fields ; and so great was the market demand for his work that he wore himself out by over¬ production. He was appointed a Chevalier of the Legion of Honor in 1861 and an officer of the Legion in 1879. Consult Beraldi, ˆLes graveurs du 19ieme siecleˆ (Paris 1885) ; Delorme, ˆGustave Dore' (ib. 1879) ; Jerrold, B., ˆLife of Gustave Dore' (London 1891) ; Roosevelt, ˆLife and Reminiscences of Gustave Dore' (New York 1885).

DOREMUS, Charles Avery, American chemist: b. New York City, 6 Sept. 1851. He was graduated at the College of the City of New York in 1870 and took the degree of D.Ph. at the University of Heidelberg in 1873. In 1874-79 he was a member of the faculty of Bellevue Hospital Medical College; from 1879 to 1882 was professor of

chemistry and toxicology at the University of Buffalo. In 1882-92 he was professor of chemistry at the American Veterinary College, New York, and from 1892 to 1904 was connected with the department of chemistiy of the College of the City of New York. He is a patentee of a process for softening water, for a gas furnace, another for producing hydrofluoric acid, and for extracting alumina from clav and for the extraction of potash from feldspar. He is

author of ˆReport on Photography, Vienna Ex¬ positionˆ (1873) ; section on gaseous poisons in ˆTextbook of Legal Medicine and Toxicologyˆ (1903) ; and contributions to various scientific journals,

DOREZ, do’re’, Leon (Louis Marie), French author and librarian: b. Villemaur, Aube, 1864. He was educated at the Lcole des Hautes Etudes, the Sorbonne and the Ecole des Chartes. In 1893 he was connected with the French School at Rome, and later received the appointment of assistant in the Bibliotheque Nationale, and in 1905 became librarian of the manuscript department there. He edited the Revue des Bihliotheques and the ˆBibliotheque litteraire de la Renaissance.ˆ

DORIA, do’re-a, one of the most powerful families of Genoa. It became distinguished about the beginning of the 12th century and shared with the families Fieschi, Grimaldi and Spinola the early government of the republic. These four were known as Magnce quatiior prosapice, the four great families of this re¬ public. The Dorias and the Spinolas belonged to the Ghibelline, the Fieschi and the Grimaldi to the Guelph faction ; but as this division does not exhaust the combinations of which the number four is capable, the two distinct sec¬ tions entertained their own private jealousies and quarreled among themselves, Guelph with Guelph and Ghibelline with Ghibelline, making, as it were, a bear-garden of the dark and deep streets of their formidable city.

DORIA, Andrea, Genoese admiral: b. Oneglia, 30 Nov. 1468; d. Genoa, 25 Nov. 1560. He entered the Pope’s guards and afterward passed into

the service of the Duke of Calabria, who commanded in Italy for the king of Aragon. He was rapidly promoted, and Al-phonso H gave him a command against Ludo¬ vico Sforza, Duke of Milan. When the French had left Italy the Genoese entrusted the re¬ construction of their fleet to Doria. He was first employed in suppressing the Barbary pirates, from whom he captured a large booty, but was soon after exiled, and entered the service of Francis I, who named him admiral of the French galleys. Displeased with some demands of the French king, who in answer to his complaints deposed him from his command, he entered the service of Charles V in 1528. His defection proved disastrous to the French cause in Italy. He occupied Genoa without resistance on 12 Sept. 1528, and his further successes contributed to the re-establishment of peace. He re-established order in Genoa and organized the government on a new basis, which became permanent during the independ¬ ence of the republic. Charles bestowed on him the highest honors and received in exchange the most important services. In 1532 he took Koron and Patras, in Greece, from the Turks, and in 1535 assisted in the capture of Tunis. He assisted next year in a descent on Provence, took Toulon and ravaged the coasts of the Gulf of Lyons. The emperor and the king of France had afterward an interview, which has become historical, on board his galley, with a view to the conclusion of peace. This interview took place at Aigues-Mortes in Tulv 1538. In 1547 he narrowly escaped assassination in a con¬ spiracy raised in Genoa by the Fieschi. His nephew was killed in this conspiracy, which

excited him to some severities approaching to the barbarity of earlier times. Doria has been accused, probably with justice, of selling his sword too freely, and to too many opposing interests ; but his services to his country have earned him the titles of father and liberator, which were conferred on him, together with the censorship for life, by the Genoese Senate in 1528. Consult Guerazzi, ˆVita di Andrea Doria> (Milan 1874) ; Petit, ˆAndre Doriaˆ (Paris 1ˆ7).

DORIAN MODE, the standard Greek and ecclesiastical mode, the first of the authentic Church tones or modes, from D to D, with its dominant note of A. It resembles the key of D minor, but with the B natural and no C sharp. It is characterized by its severe and austere progressions and is especially adapted to religious or warlike music. Many of the old ‘German chorals are written in this mode.

DORIANS, one of the four great branches of the Greek nation. They derive their name, according to legend, from Dorns, the son of Hellen.

They dwelt first in Histiseotis, were then driven by the Perrhsebi into Macedonia, forced their way into Crete, where the lawgiver Minos sprang from them, built the four Dorian towns (Dorica Tetrapolis) at the foot of Mount CEta, between Thessaly, Aiitolia, Locris and Phocis, and subsequently, together with the Heraclidse, made a settlement in the Pelopon¬ nesus, where thˆy ruled in Sparta. Colonies emigrated from them to Italy, Sicily and Asia Minor. The Dorians were in many ways the reverse of the lonians. The Doric manner always retained the antique style, and with it something solid and grave, but at the same time hard and rough. The Doric dialect was broad and rough ; the Ionic delicate and smooth ; it was the form made use of in solemn odes, for example, in hymns and in choruses forming part of the national celebrations and the acting of the drama at Athens. This use of the word has been perpetuated ; i.e., the Scottish dialect, in contrast with the more polished literary English, being called Doric. The Cretan and Spartan legislative codes of Minos and Lycurgus were much more rigid than the mild Athenian institutions of Solon. The Spartan women wore the light tucked-up hunting-dress, while the Ionian females ar¬ rayed themselves in long sweeping garments. Both have been idealized by artists : the one in Artemis and her nymphs, the other in Pallas Athene and the Canephorae. The same contrast appears no less strikingly in their architecture, in the strong, unadorned Doric and the slender, elegant Ionian columns. See Miiller, ˆDie Dorierˆ ; Grote, *ˆHistory of Greece.ˆ

DORIC ORDER, in architecture, the second of the five orders, being that between the Tuscan and Ionic.

Grecian Doric. — The Doric column was first adapted to edifices having the proportions, strength and beauty of the body of a man. The trunks of trees probably suggested the first idea of columns, but in the Doric style the pro¬ portions of a man appear to have been adopted. A man wˆas found to be six times the length of his foot, hence the plain Doric columns were made six diameters in height. From the middle of the 7th century to the end of the 6th century B.C., the Doric appears to have been the only

style of architecture used by the Greeks, and its highest example is the Parthenon of Athens.

Roman Doric. — An imitation of the Gre¬ cian, with a true Greek entablature and a molded base. The column is slenderer than that found in the best Greek examples, and is possibly of Etruscan proportions.

DORID.®, in natural history. See Sea-Lemon.

DORIGNY, do-ren-ye, Louis, French en¬ graver: b. Paris 1654; d. Verona, Italy, 1742. He was a son of Michel Dorigny (q.v.)._ He entered the school of Lebrun and made a jour¬ ney to Italy, where he copied the great masters.

DORIGNY, Michel, French painter and engraver: b. Saint Quentin 1617; d. Paris 1665. He was a pupil of Simon Vouet, whose_ works he etched and whose faults in drawing, he copied. His style of execution is bold, and his management of light and shade good. He be¬ came professor in the Academy at Paris.

DORIGNY, Sir Nicholas, French en¬ graver; b. Paris 1658; d. there 1746. He was a son of Michel Dorigny (q.v.). He spent 28 years in Italy in studying the most illustrious masters and eight in engraving the famous cartoons of Raphael at Hampton Court, for which he received the honor of knighthood from King George I. In 1725 he became a member of the Academy at Paris. One of his best en¬ gravings, besides his cartoons, is the ˆTrans¬ figuration,ˆ from Raphael, and the ˆApotheosis of Saint Petronilla,ˆ after Guercino. His en¬ graving is easy and strong and the work of the needle and the graver happily united.

DORION, Sir Antoine Aime, Canadian statesman and jurist: b. Saint Anne de la Perade, P. Q., 17 Jan. J818; d. 3 May 1891. He was called to the bar in 1842 and became chief justice of the province of Quebec in 1874. He held various cabinet positions, formed with George Brown the short administration of 1858, and was knighted in 1877. He was the leader of the French-Canadian Liberal party of the province of Quebec during the period of the

Union.

»

DORIS, a small mountainous district of ancient Hellas, was the home of the Dorians (q.v.). It is now a part of the modern govern¬ ment of Phocis. Doris was also the name of a district in Asia Minor on the coast of Caria, in¬ habited by colonists from the Peloponnesus.

DORKING, England, town in Surrey, 22 miles southwest of London, noted for its breed of fowls. It is the scene of the fictitious ˆBattle of Dorking.ˆ Its principal trade is in flour, lime and chalk. Pop. about 8,000.

DORKING, a fowl. See Poultry.

DORMANT STATE. See Hibernation.

DORMER WINDOW (Old French dor-meor, a sleeping-room), a vertical window usu¬ ally flush with the wall of the house and stand¬ ing in a projection built out to receive it from a sloping roof. In ordinary house-building it serves as an ornament and at the same time lighting and enlarging an attic chamber. It is very picturesquely used throughout France, Belgium and the Netherlands. In Gothic and Renaissance architecture the dormer window

effect was often employed on beautiful stone edifices.

DORMEUR, a fish, one of the triple tails (Loboles surinamensis) , found in most warm seas and common in the West Indies. It may reach a length of three feet and is regarded as good food.

DORMITORY (Fr. dormitoire, from Lat. dormire, ^^to sleep®), formerly in a monastery or nunnery sleeping quarters either divided into cells or cubicles, opening upon a corridor, or one great apartment divided by partitions or cur¬ tains. In connection with American colleges and similar institutions the dormitory is often an entire building divided into bedrooms.

DORMOUSE, the common name given to the family Myoxidce, natives of the Old World. They are pretty little creatures, with soft, fine fur and long squirrel-like tails ; but, unlike the squirrels, which they somewhat resemble in habits, they have no cheek-pouches. There are in all four genera of the MyoxidcB, containing about a dozen species, the best known of which is the red dormouse, ®hazel mouse,® or ^^muscardine® (Muscardinus avellanarius) , which lives in the woods in most parts of Europe. It is about the size of the common house mouse ; has a rather large head, a pointed muzzle, large, prominent

eyes and a hairy tail. It is reddish in color above and white below. Its food consists of acorns, nuts (especially hazel nuts) and grain, which it stores for winter use, much as squirrels do. In the coldest weeks of winter it curls up and sleeps, waking, however, at inter¬ vals in milder days to feed upon its gathered stores. Its nest is usually made of tangles of herbage, with an opening at the top, and hidden in the underbrush. The fat dormouse {Myoxis glis) is larger than the red dormouse, and duller in coloring. It inhabits the forests of southern Europe, where it may be found leaping with remarkable agility from tree to tree. The garden dormouse (Eliomys nitela) lives nearer to man, being found in gardens, and often in barns. It destroys fruit growing along walls and trellises. The French call it ®lerot® ; the Germans ®Gartenschlafer.®

DORN, Alexander von, Austrian econ¬ omist: b. Wiener-Neustadt 1838. He was made editor of the Triester Zeitung in 1872, and 12 years later founded the Volkswirtschaftliche IV ochenschrift in Vienna. In 1888 he started a commercial yearbook of the Austro-Hungarian monarchy entitled ˆExportkompass.ˆ He edited Die Seehdfen des W eltverkehrs after 1889 and published ˆKreigsmarine und Volkswirtschaft in Oesterreich-Ungarnˆ (1885), and ˆAmerikan-ischesˆ (19(X)).

DORN, Johann Albrecht Bernhard,

Russian Orientalist: b. Scheuerfeld, Coburg, 1805; d. 1881. He was educated at Halle and Leipzig and in 1826 became professor of Orien¬ tal languages at Kharkov, at the Oriental In¬ stitute of Saint Petersburg in 1835, and in 1842 was appointed director of the Asiatic Museum. In 1843 he became chief librarian of the Imperial Public Library. He has specialized on the his¬ tory and language of Afghanistan and Caucasia. His published works include ˆUeber die Ver-wandtpchaft des persischen, germanischen. und griechisch. lateinischen Sprachstammesˆ (Ham¬ burg 1827) ; ˆAuszuge aus muhammedamischen

Schriftstellernˆ (Saint Petersburg 1858) ; ˆCatalogue des manuscrits et xylographes orien-taiix de la Bibliotheque Imperiale' (1852) ; ˆCaspia: Ueber die Einfalle der alten Russen in Tabaristanˆ (1875) ; Chrestomathy of the Pushtu, or Afghan Languageˆ (with glossary, 1847) ; ˆHistory of the Afghans, translated from the Persian of Ni'mat Allahˆ (2 vols.,

1836).

DORNER, August Johannes, German phi¬ losopher and theologian, son of I. A. Dorner: b. Schiltbach, Baden, 1846. He received his education at the universities of Berlin, Gottin¬ gen and Tubingen. In 1869 he became minis¬ ter of the German congregations in Lyons and Marseilles. After some years of travel in the Orient he settled down at Tubingen as teacher in 1870, visited America in 1874 and on his re¬ turn was appointed professor and director of the Wittenberg Theological Seminary. He re¬ moved to Konigsberg in 1890 and was rector of the university there in 1908-09. He edited his father's ˆSystem der christlichen Sittenlehreˆ (1885) and his correspondence with Martensen (1888) and wrote ˆ Augustinusˆ (1873) ; ˆKirche und Reich Gottesˆ (1883) ; ˆPredigten vom Reiche Gottesˆ (1880); ˆDem Andenken von I. A. Dornerˆ (1885) ; ˆDas menschliche Erkennenˆ (1887) ; ˆDas menschliche Handeln, philosophische Ethikˆ (1895) ; ˆGrundriss der Dogmengeschichteˆ (1899) ; ˆEncyklopadie der Theologieˆ (1901) ; ˆGrundriss der Religionsphilosophieˆ (1903) ; ˆHeilsglaube und Dogmaˆ (1905) ; ˆDie Entstehung der christlichen Dogmenˆ (1907) ; ˆPessimismus, Nietzsche, und Naturalismusˆ (1911) ; ˆDie Metaphysik des Christentumsˆ (1913) and contributions to theological jour¬ nals.

DORNER, Isaak August, German Prot¬ estant theologian: b. Wiirtemberg, 20 June 1809; d. Berlin, 8 July 1884. He studied theol¬ ogy and philosophy at Tubingen; and had al¬ ready filled chairs at Tubingen, Kiel, Konigs¬ berg, Bonn and Gottingen, when in 1861 he was called to be professor at Berlin. His greatest work is the ˆHistory of the Development of the Doctrine of the Person of ChrisD (1861-63). Among his other works are ˆHistory of Protestant Theologyˆ (1871) ; ˆSystem of Christian Doctrineˆ (1880-84); ˆChristian Eth¬ icsˆ (1887). Consult Pfleiderer, ˆThe Develop¬ ment of German Theology Since Kantˆ (New York 1890).

DORNICK, or DORNOCK, a species of coarse, figured linen, named from Tournai or Doornick in Flanders. The manufacture, in¬ troduced

into England by the Dutch who fled from the persecutions of Alva, was long con¬ fined by law to inhabitants of Norwich and Pulham. A similar cloth called dornock was made at Dornock, Scotland.

DORNOCH, dor'nok, FIRTH, an arm of the sea, on the east coast of Scotland, separating Sutherlandshire from Ross and Cromarty. The royal burgh of Dornoch is near the entrance. There is a famous old cathedral dating from the early 13th century. Skibo Castle, the resi¬ dence of Andrew Carnegie, is four miles west of Dornoch. Fishing is valuable but naviga¬ tion is difficult. Pop. about 750.

DORNOCK. See Dornick.

DOROHOI, do-ro-hoi', Rumania, a town in the northwest of Moldavia, near the former Austrian frontier. The principal trade is in timber. Pop. 15,0(X), half being Jews.

pORPAT, dor'pat, or DORPT (Russian official name Yuriev, Lettish Tehrpat), Esthonia, city in the district of Tartu, on the Embach, about 135 miles northeast of Riga. Dorpat is chiefly remarkable for its university, which was founded in 1632 by Gustavus Adolphus, when the Swedes were masters ; it was suppressed, in 1656, by the Muscovites; and re-established by the Emperor Alexander, in 1802-03. In the northwest section of the city there formerly existed a citadel, an episcopal palace and cathe¬ dral. The place of these is to-day occupied by the observatory, which the labors of Dr. Struve have made famous, a library and several uni¬ versity buildings. Dorpat contains also botani¬ cal gardens, several boulevards and promenades, a town-hall, several churches and a monument to its famous son, Barclay de Tolly. A levee system protects the city from the periodical overflow of the Embach. Other educational in¬ stitutions located here are a veterinary school, a training school for teachers, gymnasia and sec¬ ondary schools. It has also a large number of industrial establishments and as a commercial centre is second only to Riga in the Livonia region. Dorpat first fell to the Russians in 1559 and in 1582 was taken over by Poland. Later the Swedes held it for a time, and next came the Poles and in 1704 it finally became a part of Russia. Four years after its occupation by the latter they removed the inhabitants to the interior and dismantled the city. Dorpat passed from Russian rule 24 Feb. 1918 when the new republic of Esthonia was established. German is the language in common use. Consult Hausmann, ˆAus der Geschichte der Stadt Dorpatˆ (1872). Pop. 45,000.

DORPFELD, derp'felt, Wilhelm, German archaeologist: b. Barmen 1853. He received his education at the Bauakademie, Berlin. In 1877-81 he was a member of the exploration and excavation party at Olympia and was di¬ rector of operations there in 1878. In 1887 he received the appointment of secretary to the German Archaeological Institute at Athens. He directed excavations in many parts of Greece, particularly in regard to ancient amphitheatres and theatres. With Reisch he wrote ˆDas griechische Theaterˆ (Athens 1906). He com¬ pleted Schliemann's excavations at Troy and collaborated with Curtius and others on ˆAus-grabungen zu Olympiaˆ (1877-81). He as¬ sisted Schliemann in preparing <ˆTrojaˆ (1884) and ˆTiryns^ (1886). He contributed numer¬ ous articles to archaeological journals on pro¬ fessional topics and wrote ˆTroja und Ilionˆ (2 vols., 1902). Consult Goodell (in American Journal of Philology, Vol. XVHI, 1897).

DORR, Rheta Childe, American editor: b. Omaha, Neb. For two years she studied at the Univer.sity of Nebraska and in 1902-06 was editor of the woman's department of the New York Evening Post. In 1908-11 she was on the staff of Jfampton^s Magasine. She also made special investigations in fac¬ tories, mills, stores, etc., to study the conditions of labor there for women and children. She

wrote ˆWhat Eight Million Women Wantˆ (1910) and magazine articles.

DORR, Thomas Wilson, American poli¬ tician : b. Providence, R. L, 5 Nov. 1805 ; d. there, 27 Dec. 1854. He was a member of the as¬ sembly of Rhode Island in 1833-37, and was the leader of Dorr's Rebellion. See Dorr's Rebel¬ lion.

DORR'S REBELLION, 1840-42. Rhode Island after the Revolution continued under her charter of 1663 for nearly three-quarters of a century (see Constitutions, State), it being already that of a self-governing democracy. But it had two features growingly undemocratic, one of them sure to end in an explosion ; the town representation in the legislature was based on I7th century ratios of

importance, since then greatly changed — thus Newport with some 8,000 people had six members. Providence with 23,000 had four, Smithfield with 9,500 had two; and the suffrage constituted a propertied mi¬ nority with primogeniture, being restricted to holders of $134 worth of real estate or $7 an¬ nual renters, and their eldest sons. Of 22,000 to 23,000 taxable polls, only 9,590 were freemen; Providence with above 23,000 inhabitants had 1,610 voters, Woonsocket with some 3,000 had 150, *etc.* Over $1,000,000 of personal property in Providence was unrepresented. That city was naturally the focus of discontent; Newport as naturally the champion of the established order.

From 1834 on, when he was first chosen to the legislature, the discontent was voiced by Thomas Wilson Dorr (q.v.). He formed some¬ thing like a suffrage party organization; but it dissolved from discouragement in 1838. A con¬ vention representing only the landholders mean¬ time threw out with only seven votes a propo¬ sition to extend the suffrage and the Whigs smothered the agitation till after Harrison's election in the fall of 1840. Then Dorr, who had joined the Democrats, organized mass-meetings and the suffrage became the burning question of the hour during the winter. As the legal organs of relief were packed against them by the very system against which they protested, the disfranchised had no recourse but revolution. On the claim of ˆnatural right,ˆ' they held a convention in October 1841, drafted a constitution and called for a popular vote upon it ; only their own party voted, but by fictitious lists a vote of some 14,000 was com¬ puted, about twice the actual number cast. This being a majority of the legal voters, the suffrage party proclaimed the ˆPeople's Constitutionˆˆ as the lawful regime of the State, 13 Jan. 1842. Meantime the landholders' party had called a legal convention, which met in November, split into angry factions and adjourned to 14 Feb. 1842. But the proclamation of the revolutionary constitution sobered them down ; they drew up one practically as liberal as the other, and for the first time allowed those qualified under it to vote on it. The suffrage party was now offered all it claimed; but it was too much committed to its new principle of mass-rule to recede and the ˆLandholders' Constitutionˆˆ was voted down, 8,689 to 8,013. On 13 April the suffragists held an election under the People's Constitution, at which only their own party voted and chose Dorr governor, with a legislature and corps of State officers. Of course all these proceedings

were legally null, and the ˆˆLaw and Order Partyˆˆ as they called themselves, recognized them only as treasonable attempts to overturn

the legal government.

At an extra session in March the legislature had made the taking of office under the Dorr government treason, and acting as moderator or clerk at their elections a serious misdemeanor; a law dubbed by the Dorr party the Algerine Act.® At the regular April elections Samuel W. King was chosen governor; and another extra session empowered him to proclaim mar¬ tial law and call on the Federal government for the help against domestic insurrection guaran¬ teed by the Constitution. President Tyler re¬ plied that help should be furnished when violence had actually supervened, but the gov¬ ernment could not interfere on a mere appre¬ hension. On 3 May Dorr and his party marched into Providence, and after debating a forcible occupation of the state-house, began legislative sessions in a disused iron foundry. They sat two days, formally repealed the Algerine Act,® demanded of Governor King the custody of the State property, notified the Federal government of their formation of the legitimate State gov¬ ernment, etc., and adjourned to 5 July, but never met again. The regular legislature met at New¬ port 4 May, and the governor again appealed to the President, receiving the same answer; but the military commanders of the vicinity were ordered to keep in touch with the State authori¬ ties. Dorr went to New York and elsewhere for recruits and funds, came back on the 16th and on the night of the 17th-18th undertook to capture the Providence arsenal, but his own men disabled his cannon and his force melted away — his chief adherents by this time being sick of the farce, when the other party were ready to grant all their demands. Dorr escaped into Connecticut (where the governor refused to give him up on requisition) and prowled around the border for several weeks, getting men and stores together — the former mainly young fel¬ lows on a ˆdark® ; finally late in June he crossed the border and the President decided that the time had come to order United States troops to interfere. On the 26th a crushing force marched against Dorr at Chepachet, R. I., and his men on that and the next day dispersed with¬ out waiting the event. Dorr remained in hiding for some weeks and a reward was offered for him ; in October he returned and gave himself up for trial, was convicted of high treason in March 1844, and sentenced to life imprisonment. He was pardoned in 1847 and restored to civil life in 1852. Meantime, in November 1842, a new convention had been held by the regular authorities, adopted by the people November 1842 and became operative in May 1843. The suffrage was practically made universal. The proceedings of the State government were held legal by the United States Supreme Court in Luther v. Borden, argued by Webster and de¬ cided by Taney. It must be said for Dorr that but for the

menace of civil war the suffrage never would have been extended; after the offer of the ^^Landholders' Constitution,® however, he and his party became inexcusable disturbers of public order, risking bloodshed for the question of the legal theory under which the rights al¬ ready obtained should be held. The great re¬ pository of material on this subject is the

^ House Report of the 28th Congress > (1st ses¬ sion, No. 546) ; the best single summary is Francis Bowen's in the North American Review (1844).

DORRIT, Amy, the ^Little Dorrit» of the novel of the same name, by Charles Dickens.

D'ORSAY, dor'sa', Alfred Guillaume Gabriel, Comte, French leader of fashion; b. Paris, 4 Sept. 1801 ; d. there, 4 Aug. 1852. In 1822 he became acquainted with Lord and Lady Blessington and renounced his military career for the pleasure of their society. In 1827 he married Lord Blessington's only daughter by a first marriage, but a separation shortly followed, and Lord Blessington having died in 1829, P'Orsay returned to England with Lady Blessington, where they became the centre of a circle distinguished for art, rank, literature and ac¬ complishments. They returned to Paris in 1849, where D'Orsay occupied himself with portrait painting and the making of busts and became director of fine arts. '

DORSE, a small codfish found in the Baltic. Formerly supposed to be a distinct species (Gadiis callarias), but now believed to be the 3''Oung of the common codfish.

DORSETSHIRE, a maritime countv in the south of England, between Devonshire and Hampshire on the English Channel ; area, 987.9 square miles. Portland stone is quarried in this county. Other industries are agriculture and stock-raising. There are interesting ancient ruins dating from prehistoric times. The sur¬ face is irregular and there are many high ranges. Picturesque watering places make the

county famed as a summer resort. Among these places may be mentioned Lyme Regis, Charmouth, Bridport, Weymouth and Swanage. The Stour, Cale, Bidden, Frome, Yeo and Char rivers traverse the county. The capital is Dorchester. Pop. (of county) about 225,000.

DORSEY, George Amos, American an¬ thropologist : b. Hebron, Ohio, 6 Feb. 1868. He was graduated at Denison University in 1888 and at Harvard in 1890. He traveled and con¬ ducted anthropological investigations in South America for the Chicago Exposition, 1891-92, and was superintendent of archaeology in the department of anthropology at the Exposition in 1893. In 1894-95 he was assistant in anthropolo^ and in 1895-96 instructor at Har¬ vard University. He was assistant curator of anthropology in 1896-98 and curator in 1898-1915 at the Field Museum of Natural History, Chicago. From 1898 to 1913 he served also as professor of comparative anatomy at the North¬ western Dental School. In 1905-08 he was as¬ sistant professor of anthropology, and_ since 1908 associate professor at the University of Chicago. In 1914-15 he made motion pictures in Japan, China and India. In 1909-12 he was on the staff of the Chicago Tribune, investi¬ gating sources of emigration in Italy, Austria, Rumania, Serbia, Bulgaria and studying politi¬ cal conditions in India, China, Japan, Australia and South Africa.

DORSEY, Sarah Anne Ellis, American author: b. Natchez, Miss., 16 Feb. 1829; d. New Orleans, La., 4 July 1879. She received a care¬ ful education and enjoyed the advantages of extended foreign travel. In 1853 she married Samuel W. Dorsey of Maryland. She began

her literary career by writing for the New York Churchman, receiving from that journal tlxe nom-de-plume of ^^Filia Ecclesiae,^^ In 1860 she sent to New York for publication the choral services that she had arranged and used suc¬ cessfully among her black pupils for years, but the war suspended the publication. Her family suffered severely in the Civil War. She re¬ moved to Texas with her slaves and there served as nurse in a Confederate hospital. After her husband's death in 1875, she removed from her plantation in Tensas parish to Beauvoir, on the Gulf shore. Here she continued her literary labors, acting as amanuensis to Jefferson Davis in the preparation of his <Rise and Fall of the Confederate Government.^ She afterward re¬ moved to New Orleans. Her published works are < Recollections of Henry Watkins Allen, ex-Governor of Louisiana^ (New York 1866) ; ^Lucia Dare^ (1867) ; ^ Agnes Graham^ (1869) ; ^Atalie or a Southern Villeggiatura^

(1871) ; ˆPanola: A Tale of Louisianaˆ (1877).

DORSEY, Stephen Wallace, American politician: b. Benson, Vt., 28 Feb. 1842; d. Los Angeles, Cal., 20 March 1916. He served in the Federal army during the Civil War and subse¬ quently removing to Arkansas was active in politics. He was a member of the Republican State and county committees ; was elected to the Unitedf States Senate in 1873 ; and was secre¬ tary of the Republican national committee for the campaign of 1880. At the time of the ®star route® exposures he was accused of having in¬ fluenced legislation in the Senate, was indicted before the grand jury in Washington; but was acquitted on his second trial. After 1880 he withdrew from politics.

DORSTENIA (named after Dr. Dorsten, a German botanist), a genus of plants of the family Moracece, natives of tropical America. The genus is remarkable for the receptacle in which the numerous small flowers are sunken, the female flowers being the most depressed. The rootstocks of various species are used in the preparation of a medicine, once in much repute against low fevers and as a mild stimu¬ lant and diaphoretic, also as efficacious against snake bites, whence the Spanish name, contra-yerba.

DORT, dort, or DORDRECHT, dor'drent, Holland, city in the province of South Holland, on the Meuse delta, 10 miles southeast of Rot¬ terdam. An inundation in 1421 in which up¬ ward of 70 villages were destroyed and 100,000 people drowned, separated the site on which Dort stands from the mainland. It was founded in 1013. It was an important commercial centre in the Middle Ages and a member of the Han¬ seatic League. Here, in 1572, the states of Hol¬ land, after the revolt from Spain, held their first assembly; and sat from 13 Nov. 1618 to 19 May 1619, the conclave of Protestant divines known as the Synod of Dort (q.v.). Dort is the birthplace of the brothers De Witt of Cuyp and Ary Scheffer ; to the last a statue was erected in the market-place in 1862. There is a fine old Gothic church with a tall tower. The principal industries are oil, grist and saw manu¬ factures, foundries and cordage-works. Pop. about 40,000.

DORT, Synod of, an assembly of Prot¬ estant divines convoked at Dort (Dordrecht)

in 1618-19. Besides the Dutch and Walloon divines, it included representatives from Eng¬ land, Scotland, Switzerland and part of Ger¬ many. There were 84 clerical and 18 secular representatives. It was chiefly occupied in con¬ sidering the doctrines of Arminius (see Arminianism). It affirmed the five points of Calvinism: (1) Predestination; (2) Death of Christ; (3) Corruption of Man; (4) Divine Grace; (5) Perseverance of the Saints. It originated the project of translating the Bible into Dutch, which was executed after 19 years' labor. The translation is known as the ˆDort Bible. ˆ As a result of the Synod, Barneveldt, the leader of the Arminians, was executed. Consult SchafiF, ˆCreeds of Christendomˆ (Vols. I and III, New York 1884).

DORTMUND, dort'moont, Germany, city in the province of Westphalia, on the Ems, 73 miles north-northeast of Cologne. In 1899 it was connected by canal with the canalized Ems (giving a waterway to Emden on the North Sea) and extensive harbor accommodation has been provided. It owes its recent great and increasing prosperity to its becoming the centre of several important railway systems, to the opening of extensive coal mines in the vicinity and to the active manufactures of iron, steel, machinery, railway plant, *etc.* It was once a free imperial and Hanseatic town, and the seat of the chief tribunal of the Vehme. The city was once fortified by a great wall, which gave way in the last century to fine promenades. It contains several splendid churches, gymnasia, industrial schools, a municipal theatre and sev¬ eral primary schools. Dortmund began to de¬ cline after the Thirty Years' War, but within the last 50 years, especially since the war with France, it has again advanced rapidly. Consult Sievers, ˆUebersichtkarte de Berg und Hiitten-werke im Oberbergamtsbezirk Dortmundˆ (Leipzig 1890) ; Shadwell, A., industrial Effi¬ ciencyˆ (London 1906).

DORY, or JOHN DORY (Zeus faber), a fish belonging to the family Zenidce, somewhat allied to the mackerel, and celebrated for the delicacy of its flesh. It has the spinous portions of the dorsal and anal fins separated by a deep emargination from the soft-rayed portion, and has also the base of all the vertical fins, and the Carina of the belly anterior to the anal fin, furnished with spines or serratures ; color, yellowish-green, with a blackish spot on each side; dorsal and anal fins with furcate spines and a long filament produced from behind each dorsal spinous ray. The dory has exceedingly protractile jaws, which enable it to capture small fish, etc., when concealed in the

ooze or weeds, after slowly moving upon them in a stealthy, catlike manner. It is found on the coast of England, and on the Atlantic shores of Europe, and in the Mediterranean. A re¬ lated species (Zenopsis ocellatus) has been once taken on our coasts at Provincetown, Mass. Also a North Atlantic species of rock-fish (q.v.)

DOS PASSOS, John Randolph, American lawyer: b. Philadelphia 1844; d. 27 Jan. 1917. He was of Portuguese descent. He studied law ; served in the Federal army during the Civil War, and after practising law in Philadel¬ phia for some time went to New York in 1867,

where he was very successful in the criminal branch of practice. Later he became an author¬ ity upon banking, corporate and financial law. He wrote a number of books. Among his pub¬ lished works are ˆA Treatise on the Law of Stock Brokers and Stock Exchangesˆ (1882; 2d ed., 1905) ; ˆThe Interstate Commerce Actˆ (1887) ; ˆCommercial Trustsˆ (1901) ; ˆThe Anglo-Saxon Centuryˆ (1903) ; ˆThe American Lawyerˆ (1908), and various pamphlets on po¬ litical economy and financial topics.

DOSEH, do'se, an Arabic word meaning ®treating,>ˆ denotes a remarkable ceremony, which, until its suppression in 1884, used to take place in Cairo annually on the feast of the Prophet's birth (Moolid), in the third month of the Mohammedan year. A party of dervishes of the Sa'di order, to the number of a hundred or more, lay down on their faces, side by side, with their arms doubled under their foreheads. A dozen more ran along upon their comrades' prostrate backs, beating drums, and shouting "Allah.® Then the sheikh, mounted, rode along upon the line of bodies, from whom audible prayers could be heard proceeding. It was in consequence of evidences of considerable injury inflicted by the iron-shod hoofs that the Khedive Tewfik suppressed this singular religious rite. Consult Lane, E. W., ˆModern Egyptians,ˆ xxiv; Butler, ˆCourt Life in Egypt.ˆ

DOSITHEANS (from their founder, Dositheus), a sect founded by Dositheus, a Jewish heresiarch of the 1st century a.d., whose life and labors were in Samaria. The popular belief is that he was the first Christian "heretic.® Mosheim, on the contrary, thought that he was not a Christian at all, but a false Messiah, who lived at or about the time of our Lord. He is pid to have been very rigid in his Sabbatarian¬ ism, and to have died of excessive fasting. His other opinions were partly Samaritan, partly Sadducean.

DOSITHEUS, a grammarian who lived in the 4th century, and wrote a Latin grammar for Greek boys. See also Dositheans. Con¬ sult Keil, ˆGrammatici Latiniˆ (Vol. VH, Leip¬ zig 1871).

DOSSO DOSSI, dos'so dos'se (properly Giovanni di Nicolo Lutero), Italian painter: b. near Mantua 1470; d. Ferrara 1542. He was one of the leaders of the Lombardo-Ferrarese school and studied under Lorenzo Costa or Panetti (a disputed point). His brother, Giovanni Battista (d. 1546) was less dis¬ tinguished as a painter. He assisted in execut¬ ing many of the larger paintings. The broth¬ ers are said to have spent six years at Rome and five at Venice. Under the patronage of the Gonzagas at Modena, and later of the dukes of Ferrara, they executed many decorative paintings for palaces and churches and like¬ wise numerous minor works of art. ˆ Saint Bar¬ tholomew and Saint John at Patmosˆ (1527) at the cathedral of Ferrara is ascribed to Dosso Dossi. Together they painted the ˆLabours of Herculesˆ in the Cortile of the Ducal Palace of Ferrara, a ˆMadonna with Saintsˆ p522) at the cathedral at Modena, and frescoes in the Castle of Trent, since destroyed. They are mentioned by Ariosto in <Orlando Furioso> (XXXIH, 2) with the highest praise. In manner Dosso Dossi

resembles Titian. His pictures are distinguished by their bright coloring and imaginativeness. Other paintings are ˆThe BacchanaP in the Palazzo Pitti, Florence, and at the Dresden Museum; < Justice ˆ < Diana and EndymionO ˆOne of the Hoursˆ ; ˆPeaceˆ ; Dreamˆ ; Oudith,ˆ and ˆThe Dispute of the Four Doctors of the Church,ˆ which is generally considered his masterpiece. His ˆCirceˆ was painted for the Palazzo Borghese, Rome, and his ˆSaint Sebastianˆ for the Brera at Milan. The broth¬ ers excelled in landscape painting, and are said to have introduced the painting of independent scenes. Consult Zwanziger, ˆDosso Dossiˆ (Leipzig 1911).

ˆ DOST MOHAMMED KHAN, ddst mo-ham-med kan, founder of the dynasty of the Barakzai in Afghanistan: b. 1793; d. 1863. His brother Fatteh Khan was instrumental in securing the throne for Mahmud, who later, envious of his power, had him assassinated. The family of

Fatteh Khan proceeded to avenge his death by dethroning Mahmud and dividing the territory among themselves. Ghanzi was given to Dost Mohammed, who by conquest gained control of the entire province. Numer¬ ous disputes followed with Ranjit Singh, the Sikh prince of Punjab, which finally resulted in the defeat of the latter, who, however, seized the fortress at Peshawar. The amir desiring to regain this now appealed to England, but his advances were rejected and he turned to Rus¬ sia. Troops were sent against him in 1838 under Sir Willoughby Cotton, and the troops of Dost Mohammed were defeated, while he him¬ self was captured 1840. After the assassination of his rival Shah Sujah whom the English de¬ sired to restore and the subsequent resolve of the British to withdraw from their intervention in international affairs in Afghanistan, Dost Mohammed was re-established at Kabul and set up a strong government. His last participation in hostility to the British was in the Sikh war against them. He finally concluded a treaty with the Anglo-Indian government in 1855. The rest of his reign was occupied with resistance to the encroachments of the Persians and the capture of Herat. He was succeeded by his son Shere Ali Khan.

DOSTOYEVSKY, dos-to-yef'ski, Feodor Mikhailovitch, Russian novelist : b. Moscow, 11 Nov. 1821; d. Saint Petersburg, 9 Feb._ 1881. He was educated at Moscow and at the Military Engineering Academy of Saint Petersburg. He was graduated there in 1843, with the grade of sub-lieutenant. On his father's death in 1814, he resigned to devote himself to literature, and began a long struggle with ill-health and pov¬ erty. He made his literary debut with ˆPoor Peopleˆ in 1846, in which may be discovered the germ of all his imaginative work. Dostoyevsky now became a regular contributor of short stories to the Annals of the Country, but he was wretchedly paid and his work, while re¬ vealing extraordinary power and intensity, is wanting in finish and proportion. In 1847 he became a member of the revolutionary re¬ unions of the agitators, Petrachevski, and for his connection was condemned to death in 1849. On the scaffold the novelist's sentence was com¬ muted to four years' exile in Siberia, and en¬ forced military service in the ranks for life. He was transported to Omsk, Siberia, and spent

four terrible years there. He has left a graphic narrative of his experiences in ˆThe House of the Deadˆ (1858). He was subjected to fresh indignities as a common soldier after his re¬ lease from Siberia, but in 1858, through the intercession of General Todleben, an old school¬ fellow, he was made an under-officer, and in 1859 was

pardoned by Alexander II. His asso¬ ciation with the worst criminals gave him an insight into the dark and seamy side of Russian life. He formed new conceptions of human life and character and gave expression to his new views in ˆ Crime and Punishmentˆ (1866). It showed the author to be possessed of a rare mastery over the emotions of terror and pity. This work was his greatest, for while his later works showed great tragic and analytic power, they are deficient in measure and proportion. The chief of them are ˆThe Insulted and Injured> (1867); <The Idiot> (1869); ˆA Raw Youthˆ (1875) ; ˆThe Brothers Karamazovˆ (1881). After 1865 he became an ardent Slavophile and mystic, with a tendency to absolutism. He was engaged in a succes¬ sion of journalistic enterprises and suffered severe pecuniary losses. For a time he was editor of the Russian World, and after 1876 published a review, the Carnet d'un ecrivain. Toward the end of his life he be¬ came very popular and his latest years were spent in comparative prosperity at Saint Peters¬ burg. The last edition of his works, in six volumes, was issued at Saint Petersburg in 1904. English translations of the following works have been issued: ˆThe Brothers Karamazovˆ (New York 1910) ; ˆCrime and Punishmentˆ (ib. 1911); <The Idiot> (ib. 1912); <The Pos¬ sessedˆ (ib. 1913) ; ˆHouse of the Deadˆ (ib.

1914) ; ˆThe Insulted and Injuredˆ (ib.

1915) ; ˆA Raw Youthˆ (ib. 1915) ; ˆThe Eternal Husbandˆ (ib. 1917) ; ˆPoor Folkˆ (London 1884) ; ˆLetters from the Under¬ world and Other Talesˆ (New York and Lon¬ don 1914). (See Crime and Punishment). Consult Brande, G., ˆDostojewskyˆ (Berlin 1889) ; Hoffman, ˆF. M. Dostojewskyˆ (ib. 1899) ; Koni, ˆDostoievsky criminaliste,ˆ in Revue Internationale de Sociologie (Paris 1898) ; Lloyd, 'ˆA Great Russian Realistˆ _ (New York 1912) ; Merezhkovsky, ˆˆTolstoi and Dostoyevski,® in ˆTolstoi, as Man and ArtisD (ib. 1902); Phelps, W. L., ˆDostoyevsky,® in ˆEssays on the Russian Novelistsˆ (ib. 1912).

DOTEN, Carroll V7arren, American stat¬ istician; b. Panton, Vt., 27 Jan. 1871. He was graduated at the University of Ver¬ mont in 1895, was successively instructor, secre¬ tary and register there until 1903, when he became instructor in economics at the Massa¬ chusetts Institute of Technoloˆ. In 1905 he became assistant professor and in 1914 associate professor there. He also directed the research work of the Boston School for Social Workers, 1907ˆ9 ; was special agent for the United States Census Bureau in 1909. In 1910-12 he was chief investigator of the Massachusetts Corn-mission on Compensation for Industrial Acci¬ dents. He has published statistical papers, monographs, addresses and reports, including < Recent Railway

Accidents in the United States.ˆ

DOTHAN, dd'than, Ala., city and county-seat of Houston County, 120 miles southeast of

Montgomery, on the Atlantic Coast Line, the Central of Georgia and other railroads. It is an important trading centre and contains sash and door factories, lumber, ice, cotton, cotton¬ seed-oil mills and fertilizer factories. It is well built and has fine public buildings. The water¬ works and electric-lighting plant are the prop¬ erty of the municipality. Dothan was first set¬ tled in 1885 and is governed, under a charter of 1901, bv a mayor and council of nine. Pop,

(1920) 10,034.

DOTHEBOYS HALL, the school which figures in Dickens' novel, ˆNicholas Nickleby.ˆ It was kept by Squeers. The name is a render¬ ing of Do-the-Boys Hall. The effect of the ex¬ posure by Dickens of the concfitions prevailing in some of the English boys' schools was a complete reformation in their methods and management.

DOTTEREL (Charadrius-or Eudromias-morinellus), a species of plover (q.v.) which breeds in the north of Europe and returns to the south for the winter. It is found all over Europe and northern Asia. The dotterel has always been highly esteemed for the table, but its extermination in Great Britain is more likely to result from the assiduity of the egg collector than of the sportsman, a consumma¬ tion likely to be hastened from its habit of lay¬ ing but three eggs instead of four like most plovers. It likewise differs from all other species of plover in having the sternum fen¬ estrated instead of notched posteriorly, and in the larger size and brighter colors of the female.

DOTY, Alvah Hunt, American physician : b. Albany, N. Y., 27 July 1854. He was gradu¬ ated at Bellevue Hospital Medical College in

1878. Until 1911 he was health officer of the port of New York and lecturer on quarantine sanitation at Bellevue Hospital Medical College. In 1913 he became medical director for the Employees' Benefit Fund Committee of the American Telephone and Telegraph Company, the Western Electric Company and the Western Union Telegraph Company. Hˆe wrote ˆPre¬ vention of Infectious Diseasesˆ (1911) ; ˆThe Mosquito: Its Relation to Disease and Its Extermination ˆ (1912) ; ˆManual of Instruction in the Principles of Prompt Aid to the In¬ juredˆ (1889; 6th ed., 1913).

DOU, Gerard. See Dow, Gerard.

DOUAI. See Douay.

DOUARNENEZ, doo-ar-ne-nes or -nez, France, a port in the department of Finistere, on the Bay of Douarnenez, eight miles north¬ west of Quimper by rail. It is important for the sardine fishery, rope and net making and shipbuilding. Pop. 13,750.

DOUAY, doo'a', Felix Charles, French general: b. 1816; d. 1879. He served in the Crimea, in Italy and in Mexico. For dis¬ tinguished services at Magenta and Solferino he was made a brigadier-general. He was com¬ mander of the Seventh Army Corps in the Franco-Prussian War of 1870 and was made prisoner at Sedan. He was the first to enter Paris on 22 May 1871 as commander of the Fourth Army (Jorps, organized against the Commune. His timely arrival saved the Louvre from utter destruction.

DOUAY, or DOUAI, France, city in the department of Nord, on the Scarpe River, 20 miles south of Lille. It is one of the oldest towns in France. Its manufactures and trade are quite important. It is noted for the schools which were established here in the 16th and 17th centuries. In 1562 Philip II of Spain es¬ tablished a university. English, Scottish and Irish colleges and novitiates of English Fran¬ ciscans and Benedictines were all affiliated with this university. Printing presses and libraries furnished the books for English Catholics, The university property was confiscated in 1793, during the revolutionary period ; students and teachers fled to England, and to this migration the Roman Catholic college at Ushaw, near Durham, owes its origin. The English Bene¬ dictines still have an establishment at Douay. The library now in the town contains about 96, (XX) volumes and many valuable manuscripts. Pop. 36,314. See Douay Bible.

DOUAY BIBLE, the name commonly given to the version of the Vulgate text of the Scrip¬ tures made at Rheims in France, for the use of English-speaking Catholics. The translators and editors of this version were Dr. William (after¬ ward Cardinal) Allen, Dr. Gregory Martin, Dr. Richard Bristow and John Reynolds, all of them alumni of Oxford University. The work of translating was done mostly by Dr. Gregory Martin, ^^a scholar of distinguished attainments both in Greek and Hebrew,® says the eminent biblical critic. Dr. Westcott. The New Testa¬ ment was published at Rheims in 1582 and the Old at Douay in 1609-10, both in quarto. The text has since that time undergone numerous revisions, chiefly for correction of its literary form which was faulty because of the employ¬ ment of words of Latin origin and unintelligible for readers unacquainted with Latin, instead of the homely English equivalents, for example, ^‘comessations® (revelings), ebriety, impudic-ity, agnition, coinquination, contristate, donary, exinanite, suasible : all mere Latin words with English terminations. This very serious fault was in revision after revision corrected with greatest thoroughness by Dr. Challoner (q.v.), whose first edition of the revised New Testa¬ ment was published in 1749 and that of the Old Testament in the following year. Challoner’s final revision has itself undergone revision several times since, but only for correction of minor errors and oversights. Despite its very serious defects the original Rhemish translation has elicited from a most competent judge. Dr. Westcott, ^History of the English Bible, ^ the praise of great fidelity to the text of the Vul¬ gate. ®The Rhemists,® he says, Hn their scrupu¬ lous and even servile adherence to the text of the Vulgate . . frequently reproduced with

force the original order of the Greek, which is preserved in the Latin; and even while many unpleasant roughnesses occur there can be little doubt that this version gained on the whole by the faithfulness with which they endeavored to keep the original form of the sacred writings… . The same spirit of anxious fidelity to

the letter of their text often led the Rhemists to keep the phrase of the original when others had abandoned it… . When the Latin was

capable of guiding them the Rhemists seem to have followed out their principles honestfi’^; but whenever it was inadequate or ambiguous,

they had the niceties of Greek at their com¬ mand.®

DOUBLE BASS or BASE, sometimes called contrabass, is the largest and deepest voiced of the violin family. Though seldom used in solo work it is counted one of the foundations of the modern orchestra. Origi¬ nally it had only three strings, but used to-day with /our, from the pitch of the third E below the violin clef. The strings are tuned a fourth apart. It probably derives its name from the fact that it sornetimes doubles the bass given to the ’cello or similar instrument in a score. It first appeared in the 16th century and has been attributed to the inventive genius of Gasparo da Salo.

DOUBLE BASSOON, also known as con-trafagotto, stands in the same relation to the oboe family as the double bass fq.v.) does to the stringed instruments, being the largest and deepest toned. It has a compass of more than three octaves upward from the third C (and even) below middle C; an octave lower than the ordinary bassoon. It has a conical tube over 16 feet in length, but bent up so com¬ pactly that it causes no inconvenience to the player. Many great masters of orchestration have written liberally for it, especially Haydn, Beethoven, Spohr and Mendelssohn.

DOUBLE CITIZENSHIP, a term signi¬ fying both State and national citizenship as defined by the 14th Amendment to the Federal Constitution, which states : ®A11 persons born

or naturalized in the United States and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside.® A court ruling says that ®there is a citizenship of the United States and a citizen¬ ship of a State, which are distinct from each other and which depend upon different character¬ istics and circumstances in the individual® Citizenship in the State cannot be given to an alien ; but a naturalized citizen becomes a citizen of the State wherein he resides. The Federal government alone has the right to naturalize; but the State can grant extensive privileges of State citizenship, even the suffrage, to foreigners not fully naturalized. See Citizenship in the United States; Nat¬ uralization; Naturalization Laws.

DOUBLE CONSCIOUSNESS, a peculiar mental condition, illustrated and much over¬ drawn by the celebrated story of Dr. Jekyl and Mr.

Hyde, which describes a type of phenom¬ enon practically never met with in real life, although much utilized by the novelist, dramatist and careless observer. By double consciousness is usually meant that at cer¬ tain times, in the waking consciousness of the individual, certain dominant ideas control and impart to the individual a definite person¬ ality, known and recognized as such by his friends and associates, and that, at other times, also in a distinctly conscious state, an entirely different series of ideas may govern the person, making him think, feel and act in a manner entirely different from that of his former personality. No such phenomenon is really known except in conscious acting, where good actors or actresses can portray many per¬ sonalities. What really happens in the bona-fide situation is a dissociation of consciousness.

The so-called double state, which may be multi¬ ple, is a split or part of the unconscious state of the individual.

The best examples of this dissociation states are seen in alcoholism, where the partly intoxi¬ cated person becomes quite a different type of individual. His unconscious trends are released from a type of conscious control and come out into action. In hysteria similar dissociations are frequent. The so-called classical types of multiple personality, which have been much written about, are various mixed mental states of hysterical dissociation and shrewd duplicity. The physician is often made the dupe of a clever person. Most shrewd women have this capacity to mingle unconscious hysterical fan¬ tasy with conscious reality. The unconscious hysterical part of the phenomenon is bona-fide and not consciously known or controllable. This must be emphatically emphasized. In certain epileptics, an automatic mental state may arise in which the individual may carry on complex motor and intellectual activities, apparently nor¬ mal and conscious — to the lay observer — and yet these are dissociated mental states absolutely unknown to the waking healthy conscious state of the individual in question. During such automatic unconscious states crimes may be committed — such as larceny, murder and yet the patient is not cognizant of the act and is irresponsible. These dissociated mental states are frequent in dementia prsecox and at times in anxiety hysterias and compulsion neurosis.

The usual hypnotic seances, in which such dissociated states are demonstrated, are largely fraudulent. When bona-fide they are usually

examples of hysterical dissociation which is an extremely interesting and widespread mental state. Nearly all individuals are partly capable of a certain amount of hysterical dissociation. Excessive anger and weeping are widespread illustrations of these partly dissociated states.

Consult Janet ‘ˆMental State of Hystericalsˆ ; Freud, ˆHysteria and the Psychoneurosesˆ ; Jelliffe and White, ˆDiseases of the Nervous System.ˆ

DOUBLE DRAGON, Order of the, a

military order of China, established to honor foreigners who had served China in a military capacity. In 1882 it was made to include other foreigners who had rendered service to the nation.

DOUBLE EAGLE, a United States coin of the value of $20, the eagle being $10. The name is a book-word, the popular term being ˆffwenty-dollar gold piece.® The piece was au¬ thorized by Congress in March 1849, and the first ones were struck in 1850. The name refers to the figure of the eagle upon it. It was one of the coins authorized by the Act of 1873.

DOUBLE FLOWERS are flowers which, usually through cultivation, have their stamens and pistils developed into petals, by which the beauty of the flower may be enhanced, though its reproductive powers are sacrificed. All intermediate stages between stamens and petals can be seen in double-flowered roses and carna¬ tions. It is frequently observed that a multi¬ plication of the leaf accompanies the conver¬ sion of stamens into petals ; So that a single stamen may be represented by two or more petal-like leaves. Double flowers remain fresh

two, three even eight days longer than similar normal single flowers.

DOUBLE MAJORITY. In Canada under the Union there sprang up a demand — urged by each of the political parties while in opposi¬ tion but not regarded as practicable when they held the reins of

government — that an admin¬ istration to hold office should possess a majority in both Lower and Upper Canada. Owing to the sharp divergence in race, religion and politi¬ cal ideals between the two provinces, this was unrealizable. The ˆdouble majorityˆˆ was never accepted either as a principle or a convention of the constitution; it received no sanction from the governors ; and was finally disavowed at Confederation.

DOUBLE STANDARD, in economics the phrase used to signify a double standard of monetary value fixed by legislative enactment. It implies the existence of what is known as the gold standard on the one hand, and the silver standard on the other. Wherever the double standard in its integrity is in use a creditor is bound to accept payment of any sum in coins of either of the metals, gold or silver, which the debtor may choose to tender. See Bimetallism.

DOUBLE STARS are stars which, while they may appear single to the eye, are known, by telescopic observation, to consist of two con¬ stituents that are near enough together to jus¬ tify the assumption of a physical connection.

DOUBLE SHUFFLE. An expedient by which John A. Macdonald and his colleagues of the Canadian Macdonald-Cartier administra¬ tion, when they succeeded the short-lived Brown-Dorion ministry in 1858, evaded the necessity of vacating their seats and going before their constituencies for re-election. The Brown-Dorion ministry had only lasted three days ; and the statute governing the case stated that if a minister should resign and within one month accept another office in the ministry, he should not vacate his seat. Accordingly Mac¬ donald and his colleagues changed portfolios, took the oath in their new offices, and immedi¬ ately thereafter resumed their former places in the ministry.

In many such cases it is afterward found, how¬ ever, that the two stars are not members of one system but that one of them is vastly fa’rther away from us than the other, their seeming close proximity

being only apparent and not real. Such pairs are called’ <^optical® pairs. As it is not until measures have been accumu¬ lated for at least several years that a distinction can be made in any case between an optical pair and a true binary system, all discoveries are tentatively catalogued as double stars. About 20,000 such pairs are now known. The first systernatic study of these objects was made by Sir William Herschel, who, between the years 1779 and 1784, made extensive catalogues of them, because he thought it likely that they

were only optically double. If that were the case, the earth's orbital motion about the sun might be great enough to make an appreciable variation in the distance or direction of one star from the other, if the system were viewed at different times in the year. After recording the distances between many of these stars, as well as the direction of the line joining the two components, he went over them again to see if any changes could be noted; and in so doing (as his son. Sir John Herschel, has re¬ corded) ®his attention was altogether diverted from the original object of the inquiry by phe¬ nomena of a very unexpected character, which at once engrossed his whole attention.^^ In¬ stead of finding an annual and alternate in¬ crease and decrease of the distance, and a corre¬ sponding periodic variation in their direction, he saw that in many cases there was a contin¬ uous change in both, advancing steadily in one direction. If this were due to the fact that the solar system and the two components of the double star were moving independently through space, we should expect the motion of either of the components, relatively to the other one, to be sensibly rectilinear. After the lapse of 25 years Herschel became satisfied that this is not always the case, for in some instances he found good evidence of actual orbital mo¬ tion, and in 1802 he announced that *there exist sidereal systems, composed of two stars revolving about each other in regular orbits,^^ in the same manner that the earth revolves about the sun, or the moon about the earth. About the year 1819 William Struve took up the systematic study of these stellar systems, and made a long series of most excellent meas¬ ures of them covering a period of many years. Subsequently the work was taken up by other skilled observers, and we now have a vast mass of data of this sort, from which fairly good orbits of some 60 of the systems have been obtained. A beginner's book on the sub¬ ject is Crossley, Gledhill and Wilson's ^Hand¬ book of Double Stars, ^ which contains methods for computing the orbits of double stars, as well as advice concerning the making of obser¬ vations. The standard and authoritative work is S. W. Burnham's ^General Catalogue of Double Stars, ^ which contains the description of every pair discovered, and references to all measures ever published, and to all proper mo¬ tions and orbits computed, up to the year 1906. In reality, both of the

components of a double star are in motion, each revolving about the common centre of gravity of the two ; but it is known that in a system composed of two bodies revolving about each other no error is com¬ mitted, so far as the relative motion of the two is concerned, by regarding one of them as fixed, and assuming that the other revolves about it. It is customary, therefore, to regard the brighter component of such a star as fixed. The diagram shows the orbit of the pair known as F. 70 Ophiuchi, in which one star is of about the fourth magnitude, while the other is of about the sixth. The large black spot at the intersection of the two straight lines represents the larger star, the straight lines themselves representing, respectively, an hour circle and a declination-circle passing through it. The ellipse represents the apparent orbit of the component star, as determined by Burnham from all the available data up to the year 1905. The dots

that appear irregularly along the ellipse, being sometimes within it and sometimes without, represent the observed positions of the com¬ panion star. According to the computations here cited, the period of revolution of 70 Ophiuchi is 87.75 years. In addition to the stars that are visibly double when viewed through the telescope, numerous stars are now known which have been proved to be double by means of spectroscopic observations. (See Doppler's Principle), The periods of revolu¬ tion of some of these are exceedingly short. Thus, one of the components of ihe telescopic¬ ally double star Kappa Pegasi is itself a spec¬ troscopic binary with a period of only six days. At least one of the spectroscopic double stars (Epsilon Hydrie), is also a visual double in the telescope; the orbit computed from the di¬ rect measures agrees remarkably well with that found from the spectroscopic observations, thus affording a proof (if one were needed), that the displacement of the spectral lines in these cases is due to a true duplicity and is not the effect of some other, unknown, cause.

DOUBLEDAY, Abner, American soldier: b. Ballston Spa, N. Y., 26 June 1819; d. Mend-ham, N. J., 26 Jan. 1893. In 1839 at Cooperstown, N. Y., he aided in drawing up the first baseball rules in the United States. He was graduated at the West Point Military Academy in 1842 and was assigned as brevet second lieu¬ tenant of artillery the same year. During the Mexican War he served in the First Artillery and was present at the battles of Monterey and Buena Vista. He was also engaged in sup¬ pressing the uprising of the Seminole Indians. He participated in the memorable defense of Fort Sumter, firing the first gun in reply to the enemy's attack. From the Shenandoah Valley to the Rappahannock, at Manassas, South Mountain, Antietam,

Fredericksburg and Chancellorsville, he added lustre to his name and justly earned the command of an army corps with the rank of major-general. At Gettys¬ burg General Doubleday found a fitting climax to his active military career. The acknowledged hero of the first day's fight, he contributed as much toward the final result achieved as any other commander in the entire engagement. He continued to serve in the regular army after the war, but retired in 1873. A bronze statue of the general was unveiled on the Gettysburg battlefield 25 Sept. 1917. He published ˆRemi¬ niscences of Forts Sumter and Moultrie in 1860-6P (1876), and ˆChancellorsville and

Gettysburgˆ (1882).

DOUBLEDAY, Frank Nelson, American publisher: b. Brooklyn, N. Y., 8 Jan. 1862. He was educated at the Brooklyn Polytechnic In¬ stitute ; entered the employ of Charles Scrib¬ ner's Sons, publishers, in 1877 and remained with that house until 1895 ; during that time he refounded and edited The Book Buyer (1884), and was appointed manager of Scribner's Maga¬ zine in 1886. From 1897 to 1900 he was a member of the publishing firm of Doubleday and McClure Company. Since 1900 he has been president of Doubleday, Page & Co., publishers of The World's Work, Country Life in America, The Garden Magazine and Farming.

DOUBLEDAY, Neltje De Graff («Neltje Blanchan®), American author: b. Chicago, 23 Oct, 1865 ; d. Feb. 1918. She was married to

F. N. Doubleday in 1886. She published ˆThe Piegan Indiansˆ (1894) ; ˆBird Neighborsˆ (1897) ; ˆ Birds that Hunt and are Huntedˆ (1898); ˆNature's Garden: Our Wild Flowers and Their Insect Visitorsˆ (1900) ; ˆBirds Every Child Should Knowˆ (1907) ; ˆThe American Flower Gardenˆ (1909) ; also pam¬ phlets, magazine articles, essays, etc., on educa¬ tion, North American Indians, nature study, etc,

DOUBLEDAY, Russell, American author : b. Brooklyn, 26 May 1872. He was educated in private schools and served in the United States

navy during the Spanish-American War 1898. He has written ˆA Gunner Aboard the Yan¬ keeˆ (1898) ; ˆCattle Ranch to Collegeˆ (1899) ; ˆA Year in a YawP (1901) ; ˆStories of In¬ ventorsˆ (1904).

DOUBLET, a close-fitting garment, cover¬ ing the body from the neck to a little below the waist. It received its name from being originally lined or wadded for protection. At first it had short shirts, but these diminished as the body of the garment became fuller and more elaborate under the reign of Queen Elizabeth. During the period of Charles I and after Charles H it lost all pretense and dwindled into a sleeveless jacket, the forerunner of our mod¬ ern waistcoat. Originally it was introduced from France into England in the 14th century.

In lapidary work, a counterfeit stone com¬ posed of two pieces of crystal, with a color between them, so that they have the same appearance as if the whole substance of the crystal were colored. It is accomplished an¬ other way by taking a thin layer of a precious gem and fastening it on the line of the girdle to a piece of glass colored to match. Some in¬ visible cement is employed for the purpose, such as gum mastic.

DOUBLING THE CUBE. See Quadra¬ ture OF THE Circle.

DOUBLOON, dub-loon', a gold coin of Spain, equal in value to two pistoles. It was worth 1730 to 1772 about $8.24, from 1772 to 1786, $8.08, and from 1786 to 1848, $7.87. Al¬ though the coinage of the doubloon has ceased in Spain, coins still current are valued at $5.02.

DOUBS, doo, France, (1) department which is traversed by four chains of the Jura. Area, 2,030 square miles. Pop. 299,935. Doubs is traversed by the river Doubs, a tribu¬ tary of the Saone, the Dessoubre and the Loue. The climate is more rigorous ˆ than in most similar latitudes of Europe. Pine, walnut and common orchard trees thrive well ; mines of iron and coal are worked; and gypsum, build¬ ing stone, lime and marble are abundant. The trade is principally in iron, cattle, horses and dairy products. It is famous for its cheese. The department was formed out of part of the old Franche-Comte. The capital is Besangon. (2) Doubs, a river 250 miles in length, rises in this department.

DOUBTING CASTLE, the castle in <Pilgrim's Progress,ˆ where Christian and his com¬ panion, Hopeful, are imprisoned for a time by Giant Despair.

DOUC, dook, a species of small monkey {Semnopithecus nemcens),

native to Cochin-China. It is curiously marked with red, white and black.

DOUCET, doo'sa', Charles Camille, French dramatist; b. Paris, 16 May 1812; d. there, 1 April 1895. He became in 1853 a government official in the theatrical department; was elected to the Academy in 1876, and soon after made its standing secretary. The best known of his many very successful comedies are ˆUn jeune hommeˆ (1841) ; ˆL'Avocat de sa caiise*ˆ (1842); Hˆe fruit defenduˆ (1857); ˆLa con¬ sideration.ˆ His lyric pieces for the stage, ˆ Velasquezˆ (1847), and ˆLe Barqueˆ (1849), were crowned by the Academy.

DOUCET, Henri Lucien, French painter: b. Paris, 23 Aug. 1856; d. Saint Leu d'Essevent, 31 Dec. 1895. He was a pupil of Lefebvre and Boulanger, and won the Prix de Rome in 1880. Among his paintings are ˆAdam and Eveˆ ; ˆAtalaˆ ; ˆApres le baP ; ˆHagarˆ ; and a num¬ ber of portraits, including one of *Mme.* Galli Marie of the Opera Comique.

DOUDNEY, Sarah, English novelist: b. Portsmouth, 15 Jan. 1843. She began writing when quite young and has published ˆA Woman's Gloryˆ (1885) ; ˆThe Missing Rubiesˆ (1886); <When We Two Parted> (1887); ˆ Where the Dew Falls in Londonˆ 'ˆ1890) ; ˆThrough Pain to Peaceˆ (1892) ; ˆA Romance of Lincoln's Innˆ (1894) ; ˆKatherine's Keysˆ (1895); ˆPilgrims of the Nightˆ (1896); ˆA Cluster of Rosesˆ ; ˆLady Dye's Reparationˆ (1899) ; ˆSilent Stringsˆ (1900) ; ˆOne of the Few ˆ (1904); ˆShadow and Shineˆ (1906).

DOUGALL, Lily, Canadian novelist : b. Montreal, Canada, 16 April 1858. She has pub¬ lished ˆBeggars AlP (1891) ; ˆThe Mermaidˆ (1895) ; 'The Madonna of a Day> (1896) ; 'A Dozen Ways of Loveˆ (1897).

DOUGHBIRD, a name given to several species of curlew (q.v.), but more especially to the Eskimo curlew (Numenius borealis).

DOUGHERTY, Denis J., American car¬ dinal. He was for many years connected with Saint Charles' Seminary, Overbrook, Pa. In 1903 he was made the first American bishop of Nueva Segovia, Philippine Islands. In 1908, Dr. Dougherty was translated to the see of Jaro, and in 1915 to that of Buffalo, N. Y. In July 1918 he was appointed archbishop of Phil¬ adelphia in succession to the late Dr. Prendergast. In 1921 Archbishop Dougherty was cre¬ ated cardinal priest.

DOUGH'TY, do'te, Arthur G., Canadian archivist : b. Maidenhead, Berkshire, England, 1860. He was educated at Eldon School, Lon¬ don, and at Oxford University, removed to Canada in 1886 and entered the service of the Legal and Commercial Exchange, Montreal. In 1897 he became private secretary to the Min¬ ister of Public Works, Quebec, and two years later to the Treasurer of the province of Quebec. From 1901 to 1904 he was joint librarian to the Quebec legislature and in the latter year was appointed Dominion ˆ archivist at Ottawa. He has written 'Life and Works of Tennysonˆ (1893) ; 'Rose Leavesˆ (1894) ; 'The Song Story of Francesca and Beatriceˆ (1896) ; 'Nugse Cano-rseˆ (1897) ; 'The Fortress of Quebecˆ (1904) ; 'The Cradle of New Franceˆ (1908) ; 'The Siege of Quebec,ˆ with Dr. Parmelee (6 vols., 1902) ; 'Quebec under Two Flags, ˆ with Dr. Dionne (1903) ; 'Canada and Its Provinces.ˆ

with Professor Shortt (12 vols., 1916) ; Daughter of New Franceˆ (1916) ; articles in ˆThe Catholic Encyclopedia,ˆ the 'ˆEncyclopedia Americana,ˆ and the American Historical Re¬ view; and has edited Knox's ˆAn Historical Journal of the Campaigns in North America.'

DOUGHTY, Charles Montague, English explorer: b. Theberton Hall, Suffolk, 1843. He was educated at Cambridge, spent 'two years in Arabia making a study of the archaeology, eth¬ nography and geography of the country, the results of which were given to the public in ˆTravels in Arabia Deserta' (1888). He pub¬ lished also 'Documents epigraphiques' (1884) ; 'The Dawn of Britain' (6 vols., 1906) ; Adam Cast Forth' (1908) ; 'The Cliffs' (1909) ; 'The Clouds' (1912).

DOUGHTY, William Henry, American surgeon : b. Augusta, Ga., 5 Feb. 1836; d. 1905. He received an academic education in Augusta, was graduated at the medical department of the University of Georgia in 1855 and in the same year began practice in Augusta, giving special attention to gynecology. From March 1862 to April 1865 he served as a surgeon in the Confederate army, being exclusively employed in hospital duty. He was successively surgeon-in-charge in the general

hospitals at Macon, Ga., at Lauderdale Springs and at Augusta. In the course of this long service he tied the sub¬ clavian artery at its external third twice, which operations have passed into the permanent rec¬ ords of military surgery. From 1867 to 1875 he was professor of materia medica and therapeu¬ tics in the Medical College of Georgia. In 1887 he was a member of the International Medical Congress. His contributions to medical jour¬ nals were numerous and embraced a wide range of subjects.

DOUGLAS, Scottish noble family. Their origin is unknown. They were already terri¬ torial magnates at the time when Bruce and Baliol were competitors for the crown, and like most of the Scottish nobility did homage and took oaths of allegiance to Edward I. They had estates both in England and Scotland but chiefly in Scotland. Eight miles frorn Lanark lies the village of Douglas, near which is the old church of Saint Bride and the site of Douglas Castle, their ancestral home. One of them, Wil¬ liam Douglas, joined Wallace, was captured at Irvine in 1297, and died in the Tower of Lon¬ don in the following year. As their estates lay on the borders they early became guardians of the kingdom against the encroachments of the English, particularly of the Percies, who occu¬ pied a similar position on the English border, and acquired in this way power, habits and ex¬ perience which frequently made them formi¬ dable to the Crown. The most important mem¬ bers of this family in chronological succession are :

James, son of the William Douglas who had been a companion of Wallace, and is commonly known as the good Sir James,ˆ early joined Bruce, and was one of his chief supporters throughout his career, and one of the most dis¬ tinguished leaders at the battle of Bannockburn. He fell in battle with the Moors while on his way to the Holy Land with the heart of his master in 1330. He had fought in 70 engage¬ ments, 53 of which were victories, and was buried in the church of Saint Bride.

Archibald, youngest brother of Sir James, succeeded to the regency of Scotland in the in¬ fancy of David. He was defeated and killed at Halidon Hill by Edward HI in 1333.

THE EARLS OF DOUGLAS.

William, son of the preceding, was created first earl in 1357. He recovered Douglasdale from the English, and was frequently engaged in wars with them.. He fought at the battle of Poitiers. He died in

1384.

James, the second earl, who, like his ances¬ tors, was constantly engaged in border warfare, was killed at the battle of Otterburn in 1388. After his death the earldom passed to an illegit¬ imate son of the good Sir James, Archibald the Grim, Lord of Galloway.

Archibald, son of Archibald the Grim, and fourth earl, was the Douglas who was defeated and taken prisoner by Percy (Hotspur) at Homildon, 14 Sept. 1402. He was also taken prisoner at Shrewsbury, 23 July 1403, and did not recover his liberty till 1407. He was killed at the battle of Verneuil in Normandy, in 1427. He was known as “Tineman” (the loser) be¬ cause of his persistent ill-luck in war. Charles VH created him Duke of Touraine, which title descended to his successors.

William, sixth earl, b. 1422, together with his only brother, David, was assassinated by Crichton and Livingstone at a banquet to which he had been invited in the name of the king, in Edinburgh Castle, 24 Nov. 1440. Jealousy of the great power which the Douglases had ac¬ quired from their possessions in Scotland and France was the cause of this deed.

William, the eighth earl, a descendant of the third earl, restored the power of the Doug¬ lases by a marriage with his cousin, heiress of another branch of the family; was appointed lord-lieutenant of the kingdom, and defeated the English at Sark. Latterly having entered into a treasonous league, he was invited by James H to Stirling and there murdered by the king’s own hand, 22 Feb. 1452.

James, the ninth and last earl, brother of the preceding, took up arms with his allies to avenge his death, but was finally driven to Eng¬ land where he continued an exile for nearly 30 years. Having entered Scotland on a raid in 1484 he was taken prisoner and confined in the abbey of Lindores, where he died in 1488.

THE EARLS OF ANGUS.

The estates of the ninth earl, which had been forfeited in 1455, were bestowed on the fourth Earl of Angus, the “Red Douglas,® the representative of a younger branch of the Douglas family, which continued to flourish long after. Thus, “the Red Douglas put down the Black.® The fifth Earl of Angus, Archibald Douglas, was the celebrated “Bell-the-Cat,” one of whose sons was Gawin Douglas, the poet (q.v.). He died in a monastery in 1514. Archi¬ bald, the sixth earl, married Queen Margaret, widow of James IV, attained the

dignity oi regent of the kingdom, and after various vicis¬ situdes of fortune, having at one time been at¬ tainted and forced to flee from the kingdom, died about 1560. He left no son, and the title of Earl of Angus passed to his nephew, David, James Douglas, brother of David, mar¬ ried the heiress of the Earl of Morton, which title he received on the death of his

father-in-law. His nephew, Archibald, known as the ˆ‘Guid,ˆˆ eighth Earl of Angus and Earl of Morton, died childless, and the earldom of Angus then passed to Sir William Douglas of Glenbervie, and the title went on in the Doug¬ las line till William, 11th Earl of Angus, who was created Marquis of Douglas by Charles 1. Archibald, the great-grandson of William, was raised in 1703 to the dignity of Duke of Douglas, but died unmarried in 1761, when the ducal title became extinct.

THE DOUGLAS CAUSE.

When the dukedom became extinct, the title of Marquis of Douglas and Earl of Angus went to the nearest heir-male, the Duke of Hamilton, a descendant of the first Marquis of Douglas. The estates, however, did not go with the title, and their disposal formed the subject of one of the most celebrated of Scottish lawsuits, known as the Douglas cause. The Duke of Douglas had a sister. Lady Jane, who at the age of 48 married Sir John Stewart of Grand Tul-ley. After the marriage they lived abroad. When in her 51st year Lady Jane, it was announced, had given birth to twin sons in Paris. At the duke’s death in 1761 both father and mother were dead, and the surviving child became the heir to the duke. The succession was at once disputed by the Hamiltons, whose contention was that the story of the birth of the twins was false, and that in reality they were the children of French peasants, obtained for fraudulent purposes. For six years the contest went on in the Scottish courts ; by the casting vote of the Lord President, Dundas of Arniston, in the final trial before 15 judges, decision was given against the claimant; but two years after the House of Lords reversed this judg¬ ment, and young Stewart became proprietor of the Douglas estates. The new heir was made a peer as Baron Douglas ; his eight sons all died childless ; but his eldest daughter married the 11th Earl of Home, whose son, the 12th Earl, now owns the property. Thus the Duke of Hamilton is head of the Douglases, but the Earl of Home is Lord of Douglasdale.

Two other peerages are held in the family : the Marquis of Queensbury, who descends from a natural son of the second Earl of Douglas slain at Otterburn ; and the Earl of Morton, who descends from Douglas of Lochleven, the jailer of Mary Queen of Scots. Consult Sir William Fraser, ˆThe Douglas Bookˆ (20 vols., Edinburgh 1899) ;

and Sir J. Heron Maxwell ˆHistory of the House of Douglas,ˆ with the principal authorities prefixed thereto.

DOUGLAS, Alice May, American writer : b. Bath, Me., 28 June 1865. She has done edi¬ torial work for Harper's Young People and has been editor of The Acorn and The Pacific Ban¬ ner, and is active in temperance and Sunday school work. She is also interested in peace work and was a delegate to the Boston Peace Congress. Her writings include in verse : ˆPhloxˆ ; ˆMay Flowersˆ ; ˆGems Without Polishˆ; in prose; Qewel GatherersQ ˆThe Peacemakersˆ ; ˆSelf-Exiled from Russiaˆ and ˆA Friend Indeed.ˆ

DOUGLAS, David, Scottish botanist : b. Scone, Perthshire, 1798; d. Hawaii, 12 July 1834. In the botanical garden at Glasgow, he attracted the notice of Sir William Hooker, who recom¬

mended him as a botanical collector to the Hor¬ ticultural Society of London. He was accord¬ ingly, in 1823, sent by the society to the United States, where he procured many fine plants, and in particular increased the society's collection of fruit-trees. In 1824 he was sent on a second mission to explore the vegetation of the country adjoining the Columbia River, and southward toward California. In making the voyage he never lost sight of his object, and was able, during the short time the vessel touched at Rio Janeiro, to collect many rare orchidaceous plants and bulbs. He arrived at Fort Vancouver in April 1825, and sent home, from time to time, many beautiful plants, with seeds and dried specimens. A species of pine of gigantic size, one of several which he discovered, bears his name, Pinus Douglasii. In 1827 he crossed the Rocky Mountains and reached Hudson Bay, met Sir John Franklin and returned with him to England. The years 1829-32 were spent in California, and 1832-34 on the Fraser River. While on a visit to the Sandwich Islands he was gored to death by a wild bull.

DOUGLAS, Gawin, Scottish poet and bishop: b. about 1474; d. London 1522. He was the son of Archibald, Earl of Angus (ˆ*ˆBell-the-CaPQ. Having taken orders in the church he received the living of Prestonkirk, and was also made provost of Saint Giles, Edinburgh, in 1501. In 1516 he was installed bishop of Dunkeld, but had an uneasy tenure of office; and while in England on a political mission was deprived of his bishopric and died of the plague. Gawin Douglas' great work is a translation of the LTlneidˆ of Virgil (with the supplementary book of Maphaeus) in heroic verse. It is the firstˆ translation of a Latin classic into any British tongue. It is executed with great spirit, and

considering the age, with extraordinary elegance of diction. It was written about 1512, and is said to have been completed in 18 months. To each book is prefixed a highly poetical prologue. It was first published in 1553. Doug¬ las also wrote ˆThe Palace of Honor,' an alle¬ gory of the virtuous life, and ˆKmg Hart,' an allegory of the struggles of the human heart against the temptations of the flesh. A complete edition of his poems, edited by Small was pub¬ lished 1874. Consult the ˆCambridge History of English Literature,' Vol. H, and J. H. Millar's ˆLiterary History of Scotland' (London 1903).

DOUGLAS, George William, American clergyman: b. New York, N. Y., 8 July 1850. He was graduated at Trinity College, Connecti¬ cut, in 1871 and at the General Theological Seminary, New York 1874. He also studied at Oxford and at Bonn during 1874-76, was or¬ dained to the Protestant Episcopal ministry in 1878 and became tutor at the General Theo¬ logical Seminary in 1877-78. In 1878-79 he was assistant at Calvary Church, New York; was vicar of Trinity Church there in 1879-86. He became rector of Saint John's Church, Wash¬ ington, and trustee of Washington Cathedral 1888-91. In 1895-98 he was rector of Trinity Church, New Haven, Conn. He was select preacher for Grace Church, New York, and in¬ structor in the Training School for Deaconesses 1898-1904. Since 1904 he has been examining chaplain of the diocese of New York and senior canon of the cathedral of Saint John the Divine.

He has published ˆ Hints to Sunday School Teachersˆ (1883) ; ˆPrayers for Children' (1884) ; ˆSermons Preached in Saint John's Church, Washington' (1893) ; ˆEssays in Ap¬ preciation' (1912), also occasional public sermons, addresses, magazine articles, *etc.*

DOUGLAS, Henry Kyd, American author and jurist: b. Shepherdstown, W. Va., 29 Sept. 1840 ; d. Hagerstown, Md., 18 Dec. 1903. He was graduated at Franklin and Marshall College (1859), at the time when James Buchanan, after¬ ward President of the United States, was a member of the faculty. He enlisted at Harper's Ferry in the Confederate army as a private in Company B of the noted ˆˆStonewall" Jackson Brigade. He took part in the battle of Bull Run, and for his bravery was promoted until he rose to be a captain. In March 1862 he made a ride of 103 miles in order that General Ewell might at once join Jackson. This ride became celebrated in history. Horses were changed five times, and the ride was made through rain and mud. On his return he was promoted to inspec¬ tor-general by Stonewall Jackson, with whom he served in every battle. At Gettysburg he was seriously wounded and was in prison nine months. His brigade was the last to surrender. Douglas was wounded nine times.

DOUGLAS, Sir Howard, English soldier and administrator: b. 1776; d. 1861. He entered the army and was present at the battle of Corunna. He was lieutenant-governor of New Brunswick 1823-29, and founded King's College, Fredericton, now the University of New Bruns¬ wick. He was commissioner of the Ionian Islands 1835-40 and represented Liverpool in the House of Commons, 1842-46.

DOUGLAS, James, American mining engi¬ neer: b. Quebec, Canada, 1837; d. 25 June 1918. Graduated at Queen's University, Kingston, On¬ tario, in 1858. He taught chemistry for some time in Morrin College, Quebec, but removed to the United States in 1875, settling in Phoenix-ville. Pa., where he had charge of the copper works. He achieved a brilliant success as min¬ ing engineer and became president of a number of mining corporations and also of railroads in southwestern United States and northern Mexico. With the late Dr. T. Sterry Hunt he did much original work in hydrometallurgy of coppers.

He was a member and served two terms as president of the American Institute of Mining Engirieers. He published ˆCanadian Independence' ; Hmperial Federation and An¬ nexation' ; ˆOld France in the New World' ; ˆNew England and New France' (1905), also numerous technical articles, reports, *etc.*

DOUGLAS, Sir James, English colonial administrator: b. West Indies 1803; d. Vic¬ toria, 1 Aug. 1877. He was educated at Lanark, Scotland, and Chester, England; was appren¬ ticed to the NorthWest Company of Montreal; joined the Hudson's Bay Company in 1821, and in 1845 succeeded Dr. McLoughlin as head of the western department. He founded Fort Camosun, now Victoria, Vancouver Island, in 1843; was governor of Vancouver Island, 1851-63 and of British Columbia 1858-64. In these offices he displayed in a remarkable degree tact, resource and firmness in dealing with all classes of settlers, held in an uncommon measure the confidence of the Indian tribes and as a road

builder made a permanent contribution to the welfare of the colonies.

DOUGLAS, John, English prelate: b. Pit-tenweem, Fifeshire, Scotland, 14 July 1721 ; d. Salisbury, England, 18 May 1807. He was educated at Oxford and in 1762 he was made canon of Windsor, which benefice he ex¬ changed for a residentiary canonry of Saint Paul's. In 1751 he wrote ˆMilton Vindicated from the Charge of Plagiarism.) In 1777 he prepared for the press the journal of Captain Cook's second voyage, to which he prefixed a well-written introduction and added notes ; and in 1781 he edited the account of Captain Cook's third voyage. In 1787 he was raised to the see of Carlisle and in 1791 was made bishop of Salisbury.

DOUGLAS, Robert Langton, English au¬ thor and critic : b. 1864. He was educated at New College, Oxford, taking honors in modern history. He was a lecturer on the University Extension Scheme and was formerly in holy orders in the Church of England. He executed a deed of relinquishment under the provisions of the Clergy Disabilities Act. In 1895-1900 he resided mostly in Italy; in 1900-02 was pro¬ fessor of modern history in the University of Adelaide, Australia. He also lectured on artis¬ tic subjects at the Royal Institution and the Society of Arts. He enlisted in the new army in 1914, was made captain in 1915 and trans¬ ferred to the war office in the same year. Doug¬ las has written much for magazines and re¬ views and is known as an authority on Sienese art. He has published ˆFra Angelico' (2d ed., 1902) ; ˆHistory of Siena' (1902) ; ˆLe Maio-liche di Siena'

(1904) ; a new edition of Crowe and Cavalcaselle's ˆHistory of Painting in Italy' (1903) ; Hllustrated Catalogue of Pic¬ tures of Siena and Objects of Art' (1904). He is a Fellow of the Accademia di Belle Arti, Milan.

DOUGLAS, Stephen Arnold, American politician: b. Brandon, Vt., 23 April 1813; d. Chicago, 3 June 1861. His father, a physician, died three months after his birth, and his mother was left with scanty means of support. At the age of 15 he apprenticed himself to a cabinetmaker and worked for two years at .the latter's trade. Then, after a short term of study at the Brandon Academy, he accompanied his mother, who had married again, to a new home, near Canandaigua, N. Y., where he fin¬ ished his schooling at an excellent academy, and where he began the study of law. He was interested deeply in political questions, even in these years, attaching himself with ardor to the new party of Democracy which General Jackson was then molding into form. In 1833 he left Canandaigua to seek a career in the West, and, after several months of ill-health and hardship, found employment for the winter in school-teaching at Winchester, Ill. In the spring of 1834 he was admitted to the Illinois bar and settled himself at Jacksonville, in that State. From that time his rapid rise to prominence was extraordinary, even among careers of ambi¬ tion in the young West. Physically delicate and short in stature, his small body was so strikingly in contrast with the power massed in a big brain and exercised by an indorpitable will that admiring Jacksonville promptly gave

him the name of the ^^Little Giant/^ which clung to him through life. Almost at once he became the acknowledged leader of his party in the town. A winning personality, an elastic temper, a fearless and ardent spirit, unbounded self-confidence and surpassing energy of intellect and will, were qualities that carried him always to the place of command. Within a year from his settlement at Jacksonville he was prosecut¬ ing attorney for his district ; within two years he was seated in the legislature of the State ; and from his service of a session in that body he passed into the office of United States Regis¬ ter of Public Lands, at Springfield, to which he was appointed by President Van Buren in 1837. His residence was at Springfield for the next 10 years, and there he came to acquaint¬ ance wdth Abraham Lincoln, his great political antagonist of a later time, whose rise to emi¬ nence was much slower than his own. In 1838 the bold young Jacksonian very nearly won an election to Congress in the strongly Whig dis¬ trict to which Springfield belonged. In 1841 he was appointed to a judgeship in the Supreme Court of the State, but resigned his seat on the bench two years later, to present himself again as a candidate for Congress, and with success. At that time (1843) he had just passed his 30th year. Most newcomers in Congress, even the ablest, need time to make a position of influence for themselves ; but Douglas was prominent among the Democratic representa¬ tives of the Northwest from the first. The vigorous activity of his mind and the remark¬ able quickness of its working made him for¬ midable in debate, while the unhesitating reso¬ luteness with which he threw himself into what¬ ever he undertook carried him always to the front of the fighting line. At the beginning of his second term in the House of Representatives he was made chairman of its Committee on Territories; and when, at the end of that term, he was elected to the Senate (1845), he re¬ ceived the chairmanship of the same committee in that body. This gave him the direction of subjects in legislation which events were mak¬ ing more important and more exciting than any others in the politics of the time. Texas had just been annexed; the country was on the eve of a war of conquest with Mexico and Great Britain was negotiating a fair settlement of the Oregon dispute. Should an expansion of na¬ tional territory mean expansion of slavery, and, if so, to what extent? were the questions now rising in angry debate. They were brought into Congress by the famous resolution called the ®Wilmot proviso,^^ which declared that no slaves should be held in any territory acquired as the result of the Mexican War. Extremists on

the pro-slavery side set up the opposing doctrine that slave-holding was a constitutional right in any territory, since slaves were a species of property recognized by the Constitution of the United States. A second ground of oppo¬ sition to the Wilmot proviso was discovered, apparently first by General Cass, who contended that the inhabitants of each Territory should admit or exclude slavery as they pleased, by their own votes. This doctrine of ˆpopular sovereignty,® or ˆˆsquatter sovereignty,® as it was branded scornfully by Calhoun, commended itself to Douglas' mind. His attitude toward slavery was that of indifference to the right or

wrong of the system, which he regarded con¬ fessedly as a problem in politics, and no more. Practically, the ˆˆsquatter sovereignty® doctrine triumphed in the compromise measures of 1850, which admitted California to the Union under the free-State constitution that her people had framed, and organized New Mexico and Utah as Territories with no restriction concerning slavery. Excepting Henry Clay, no one did more than Douglas in the framing of those measures and carrying them through. He was now so conspicuous among the chiefs of the Democratic party that he could aspire to its nomination for President in 1852. From the North he received strong support; but the less known and more pliant Franklin Pierce was preferred at the South. Douglas, not yet 40 years of age, could afford to wait. At some time within the next two years he conceived his project for a more complete and final settle¬ ment of the slavery question than the compro¬ mise of 1850 had brought about. This, in his view, could be accomplished by a frank and full adoption of the principle of ˆˆpoptilar sover¬ eignty,® applied to the whole national domain. Accordingly, in 1854, he startled the country by reporting from his committee what was known in its final form as the Kansas-Nebraska Bill, repealing the Missouri Compromise of 1820 (which excluded slavery from the territory of the Louisiana Purchase, north of 36° 30') and leaving ®the inhabitants thereof perfectly free to form and regulate their domestic institutions in their own way.® At the North the bill raised a storm which even the bold spirit of Douglas must have watched with alarm. His own party was torn by it; that of the Whigs had already gone to pieces, and two new parties, ˆˆKnow Nothing® or American, and Republican, now emerged from what seemed to be a general wreck of all in politics that belonged to the past. But Douglas, with no sign of faltering, fought a wonderful battle for his bill and carried it through. Then came the test in practice of his policy, applied in a struggle between anti¬ slavery and pro-slavery forces to control the settlement and the constitution-making of Kan¬ sas. The test was

not favorable to the prestige of Douglas. He had heated instead of cooling the agitation of the slavery question and made it more dangerous than before. As a candidate for the presidency he was hardly so strong in 1856 as in 1852 ; but after Buchanan, then elected, had driven Douglas to revolt, by countenancing the fraud of the Lecompton constitution, making a farce of ˆpopular sover¬ eignty® in Kansas, the manly course of the Illi¬ nois Senator gave him more of popularity in the free States than he lost in the South. The hostility of the administration, combining with the opposition of the new Republican party, already powerful in the Northwest, could not defeat his re-election to the Senate in 1858. Over any antagonist but Lincoln he would prob¬ ably have won a great triumph ; as it was, he came wounded from his debates with that ex¬ traordinary man. He had been forced to decla¬ rations that offended his party in one section of the country more than they satisfied it in the other, and made him the occasion of a hopeless breach between the two. Nominated for T'rcsi-dent at last in 1860 by one wing of a divided party, he fought his last political battle with

all of his old obstinate valor, and went down in defeat. He was at the end of the small gift of bodily strength that he received at his birth ; he had worn it out. He survived the election of Lincoln only long enough to stretch a loyal and supporting hand to his successful rival in the crisis of rebellion that ensued His last words to his followers were : ˆˆThere can be no neutrals in this war.® Consult Johnson, Allen, ˆStephen A. Douglasˆ (New York 1908) ; Brown, W. G., ˆStephen Arnold Douglasˆ (Boston 1902) ; Carr, E. C., ˆStephen A. Doug¬ las' (Chicago 1909) ; Sheahan, J. W., ˆLife of Stephen A. Douglas) (New York 1860) ; Rhodes, J. F., ˆHistory of the United States from the Compromise of 1850' (7 vols., New York 1906).

DOUGLAS, Sir William Fettes, Scottish painter : b. Edinburgh, 12 March 1822 ; d. 20 July 1891. As a painter he was mainly self-taught. On first devoting himself to art he practised chiefly as a landscape painter, but he soon turned to figure subjects, producing 'ˆHu-dibras

and Ralph visiting the Astrologer' (1856) ; ˆLovel and the Antiquary' (1857) ; ˆThe Summons to the Secret Tribunal' (I860) ; and ˆThe Magic Mirror' (1872) ; works dis¬ tinguished by excellent coloring and by espe¬ cially firm, careful and refined handling. His later years were entirely devoted to landscape watercolors. He is represented in the National Gallery of Scotland by ˆThe Messenger of Evil Tidings'; ˆThe Spell'; and ˆThe Bibliophilist.' He was elected president of the Royal Scottish Academy in 1882 and was knighted in the same year.

DOUGLAS, William Lewis, American manufacturer and public official ; b. Plymouth, Mass., 22 Aug. 1845. He was educated in the public schools, began work in a shoe factory at the age of seven, removed to Colorado in 1865 and returned to Brocton, Mass., in 1876. He established a shoe factory there in the latter year, from which he has built up a business with a capacity of 17,600 pairs of shoes daily to supply his 85 retail stores in the large cities. In 1884-85 Douglas was a member of the Massachusetts house of representatives, and of the State senate in 1887. He was elected mayor of Brocton in 1890 and governor of Massachu¬ setts in 1905. He also served as delegate to the Democratic national conventions of 1884, 1892, 1896 and was delegate-at-large in 1904.

DOUGLAS, England, capital of the Isle of Man, and a popular summer resort. Pop. 21,183.

DOUGLAS CITY, Alaska, town on Doug¬ las Island, opposite Juneau. It is occupied chiefly by miners from the nearby Treadwell gold mines. There is a government school in the native quarter for the instruction of the Tlinkit children. Pop. 1,722.

DOUGLAS FIR. See Fir.

DOUGLASS, Frederick, American lec¬ turer and journalist, the son of a negro mother who was a slave: b. Tuckahoe, Md., February 1817; d. Washington, D. C., 20 Feb. 1895. Al¬ though his father was a white man, he was, ac¬ cording to the law, reared as a slave. In 1832 he was purchased by a Baltimore shipbuilder, but made his escape in 1838. He had taught himself to read and write, and changed his name from

Frederick Augustus Bailey to Douglass. He worked as a day laborer in New York city and in New Bedford, Mass. At an anti¬ slavery convention at Nantucket in 1841, he showed talent as an orator, and was employed by the Anti-Slavery Society as one of its lec¬ turers. In

1845 he published his ˆAuto¬ biography,' and afterward made a successful lecturing tour in England. His freedom was bought while he was abroad. In 1870 he edited a journal entitled The New National Era; in 1871 he was appointed secretary of the com¬ mission to San Domingo ; in 1872, presidential elector; in 1877, marshal for the District of Columbia, then commissioner of deeds for that district, and in 1889, United States Minister to Haiti. His autobiography was revised and enlarged in 1882 under the title of Wife and Times of Frederick Douglass.' Consult Wash¬ ington, Booker T., Frederick Douglass' (Philadelphia 1907).

DOUKHOBORS, doohio-borz (Russian dukhobortsy, ˆˆspirit wrestlers," from their van¬ quishing the doctrine of the Holy Spirit), a sect which started in Kharkov, Russia, about 1740, and spread rapidly in the Dnieper provinces who now call themselves Christians of the Universal Brotherhood. The founder's name is not preserved: he was a Prussian sub-officer who settled in Russia when his term expired. He and . his successors, Kolesnikoff, Kapustin, etc., taught the familiar doctrine of the ˆhnne* light," with logical but socially inconvenient extensions : that as God in the soul is the one guide to action, the Bible is not inspired (though they accept the 10 Commandments), and it is not only superfluous but sinful to read and write, printing being a snare of the Devil ; that God manifests himself in the fullest power in the human soul, and as they had that power, they were embodiments of God, and to be wor¬ shipped and obeyed as such ; that Christ was only a sinless man, and the sinless leaders were his equals and successors. Every one's action being dictated by God, it cannot be wrong, and civil rulers are needless and their rule a usurpa¬ tion ; all being equal before God, churches are needless and they do not enter them ; mar¬ riages need neither ceremonies nor permission, being of inclination only. It is easy to see that these tenets brought them in conflict with the authorities, who tried to restrict them to theory instead of practice, and imprisoned numbers for contumacy; but in 1801 a commissioner's report to Alexander I that they were well-behaved citizens induced him to order them left alone. The first colony was founded at Milky Waters, Sea of Azov, in 1801, and by 1816 the com¬ munity numbered 3,0C)0 souls. Crimes com¬ mitted in the internal management of the colony led to their deportation (1841-44). The report of an imperial commission was so shocking that they were deported to the then wilderness of Transcaucasia; a high bleak plateau unfit for agriculture, where they became almost wholly cattle-raisers and eaters, and increased to some 15,000. The government gradually put down the civil despotism of the leaders, and enforced decency of life; but it was not done without much petty

tyranny, and doubtless corruption and abuse, of which they com¬ plained. Then came Pobiedonosteff's policy of unifying the elements of the empire, and

enforcing conformity to the Greek Church ; and in 1887 a bitter faction fight between two pretenders to the Doukhobor leadership rent the community. In 1895, as a sign that they regarded war as sinful, a large number destroyed all weapons of offense, and on ac¬ count of this about 4,000 were deported from their homes and scattered among the Georgian tribes. Championed by Tolstoi, an agitation in their favor sprang up in England and other countries; and int 1898 the Russian government agreed to permit their emigration. About 1,000 went to Cyprus, these afterward joining the main body in Manitoba, where be¬ tween January and June 1899 7,363 located, settling in the vicinity of Yorkton, Swan River and Prince Albert. They would not take lands in severalty, but only in communities ; but they were prospering and learning English, filling the schools with their children, and appearing to slough off their unassimilable characteristics. Suddenly they adopted the tenet that all use of animals or their products for human service is sinful, and refused to eat milk, butter or eggs, wear woolen or leather garments, or use draft animals. Then one settlement refused to pay school taxes, till the government seized and sold their cattle. In the summer of 1902 they all at once turned their stock loose on the prairies and began hauling their own loads to market, sometimes 50 miles off, and themselves drawing the plows ; the government rounded up the stock, sold it and placed the proceeds to the credit of the communities. While crippled in power to work for lack of animals, the rumor spread that Jesus was shortly to appear at Winnipeg, 300 miles east, to lead them to a new kingdom ; they deserted the villages, and on the night of 27 October 1,500 to 2,000 set off across country. After dreadful sufferings from cold and hunger, and joined by thousands more, men, women and children, they came near York¬ ton 10 days after, and lay out in the fields with the thermometer at 22°. The police singled out the women and children and the sick, and locked them into comfortable quarters ; several hun¬

dred of the men went on alone, the women clamoring to accompany them and some going insane. When about 100 miles from Winnipeg, the mounted police forced them into freight cars and took them back to their villages. Pilgrimages on a small scale have since taken place, in each year from 1903 to 1907, but those have occasioned little trouble. Peter Veregin, their leader, has on their behalf made extensive purchases of fruit-lands round Nelson, British Columbia. About 35 per cent of the immigrants have broken away from the community to start on their own account. According to the Cana¬ dian census of 1911, there were 10,943 in the Dominion. Consult Elkinton, ˆThe Doukhobors ˆ (Philadelphia 1903) ; Maude, ˆA Peculiar People: The Doukhobors ˆ (New York 1904).

DOULS, dool, Camille, French explorer: b. Rodez 1864; d. 1889. He made his first tour of exploration in 1887, visiting southern Morocco disguised as a Mussulman merchant. He was captured and thrown into prison by one of the native tribes, was later liberated and managed to reach Morocco. In the following year he set out to cross the Sahara to Timbuktu. After he had penetrated far into the interior he was assassinated by his two Tuareg guides. An ac¬

count of his first exploration trip is given in ˆBulletin de la Societe de Geographies (1881), Revue de Geographie (1888) and ˆLe tour du mondeS (1888).

DOULTON, Sir Henry, English potter: b. Lambeth, 24 July 1820; d. 19 Nov. 1897. At 15 he entered his father's establishment there, where he devoted himself to the most technical branch of the industry, and worked for many years at the potter's wheel. In 1846 he com¬ menced the manufacture of stoneware pipes for sewage and drainage, for Avhich a special fac¬ tory was erected near Lambeth Palace, and thus initiated the substitution of impervious pipes for the old flat-bottomed brick drains. Sir Henry Doulton, however, is chiefly noteworthy as having been mainly instrumental in bringing about the revival in art pottery which has since spread into every civilized country; and his firm's works in art stoneware, silicon, impasto, terra-cotta, faience and Doulton wares, have since 1870 gained the highest awards of judges at every exhibition of note throughout the world. John Bennet of the Lambeth works in¬ troduced the ware into the United States. He was created a Chevalier of the Legion of Honor ' (1878) ; was awarded the Albert medal in 1885; and in 1887 was knighted on the occasion of the queen's jubilee.

DOUM NUT, the seed of the common palm {Hyphen thebacia) found throughout northern Africa. It is used as a substitute for vegetable ivorjˆ in the manufacture of buttons. The palm itself is a small tree, rarely over 30 feet in height, and often forked. The fruits grow in clusters of from 1 to 200 each. The nut is known to commerce under the trade name of gingerbread doum, doom or dum. It is softer than the tagua or corozo ivory nut of South America, has a thicker coating and a large hole in the centre. To offset this it is available in much larger quantities and is much cheaper, the price on the market fluctuating from two to three cents per pound. The quan¬ tity exported from Africa is constantly increas¬ ing. It is now much used in Italy, France and Germany, and is gradually finding faVor in the United States.

DOUMER, doo'ma', Paul, French states¬ man ; b. Aurillac, Cantal, 1857. In 1885 he was appointed chief assistant to Floquet, president of the Chambre des Deputes. In 1888 and again in 1890 he was elected to the Chambre as a Radical. In 1895-96 he was Minister of Finance in the Bourgeois Cabinet and in the latter year was appointed governor-general of French Indo-China. Here he put through several im¬ portant public works and placed the finances of the colony on a secure basis. In 1902 he was again a member of the Chambre, and served as head of the Budget commission, and, in 1905, as president of the Chambre. In 1906 he was the candidate of the Moderates and Reactionaries for the presidency, but was defeated by Armand Fallieres, receiving only 371 votes to 449 for the latter. He was again head of the Budget commission in 1909, but failed of re-election in 1910. He is the author of ˆL'lndo-Chine franQaise> (1904) and <Livre de mes filsˆ

(1905).

DOUMERGUE, doo'merg', Emile, French Protestant historian: b. Nimes 1844, He reˆ

ceived his education at Geneva, Montauban, Erlangen and Berlin. From 1871 to 1880 he was editor of the periodical Le Christianisme an XIXe Siecle. He also received the appoint¬ ment of professor of Church history and dean of the Protestant theological faculty at Montau¬ ban. His greatest work is his biography of Calvin, ˆJean Calvin: les homines et les choses de son tempsˆ (5 vols., Vol. I, 1899; Vol. IV, 1910). Another important work is Hconographie calvinienneˆ (1909).

DOUMERGUE, Gaston, French states¬ man ; b. Aigues-Vives, Card, 1863. He studied law, practised at Nimes in 1885-90, served as colonial magistrate in Cochin-China in 1888 and in Algiers in 1890-93. He was elected to the Chamber of Deputies as a Radical-Socialist in 1898, 1902 and 1906. In 1895-96 he was sec¬ retary and in 1905-06 vice-president of the Chamber. In 1902-05 he was Minister of the Colonies in the Combes Cabinet, in 1906-08 Minister of Commerce in the Sarrien and Clemenceau cabinets, and in 1908-10 was Minister of Public Instruction in the Clemenceau and first Briand cabinets. Afterward he became a member of the Senate and in December 1913 was made Premier, holding at the same time the portfolio of foreign affairs. He resigned the premiership in June 1914. In 1915 he became Minister of the Colonies in the Briand Cabinet.

DOUMIC, doo'mek', Rene, French literary critic : b. Paris 1860. He was educated at the Lycee Condorcet and at the Ecole Normale Superieure. He came to America, where he served as professor at Stanislas College; he lectured in Canada and at Harvard University in 1898. He has become known internationally through his criticisms in the leading journals of France. He was made a Chevalier of the Legion of Honor and was elected member of the Academy in 1909. He has published 'ˆDe Scribe a Ibsenˆ (1893) ; ˆEcrivains d'aujourd'huiˆ (1894) ; ˆEtudes sur la litterature frangaiscˆ (5 vols., 1896-1905); ˆLes jeunesˆ (1896); ˆEssais sur le theatre contemporainˆ (1897) ; ˆHommes et idees du XIXe sieclеˆ (1903) ; ˆLes lettres d'Elivre a Lamartineˆ (1905) ; ˆLe theatre nouveauˆ (1908) ; ˆGeorge Sandˆ (1909) ; ˆLamartineˆ (1912) ; bHistoire de la litterature frangaiseˆ (30th ed., 1913).

DOUNE, Scotland, village of Perthshire, on the Teith, nine miles north of Stirling. Doune Castle, a fine specimen of Scottish baronial architecture, now a ruin, is described in Scott's <Waverley.ˆ Pop. 893. At Deanston, a mile west, are large cotton-mills, long managed by James Smith, a noted inventor and philan¬ thropist.

DOURINE, or MALADIE DU COIT,

a specific infectious disease of the horse and ass, transmitted by the act of copulation. It is caused by a protozoan parasite {Trypanosoma eqiiiperdum) . A symptom of the disease is an irregular period of incubation and it is char¬ acterized by the confinement of the first symp¬ toms to the genital tract, the chronic course which it runs, and by the final complete pa¬ ralysis of the posterior extremities, terminating fatally in from six months to two years. The disease is common in Asia, Africa and Europe and has been introduced into the United States several times with imported stallions. The

United States Department of Agriculture is still engaged in eradicating the disease in certain sections of the West. The disease is detected by the blood test known as complement fixation. Consult ˆBulletin 142ˆ (United States Depart¬ ment of Agriculture, Bureau of Animal In¬ dustry, Washington D. C.) ; Hoare, E. W., ˆSystem of Veterinary Medicineˆ (Vol. I, 2d ed.. New York 1906) ; Hutyra and Marek, ˆPathologv and Therapeutics of the Diseases of Domestic Animalsˆ (Vol. I, London 1912).

DOURO, do'roo, or DUERO, doo-a'ro (ancient Durius), one of the largest rivers of the Spanish Peninsula, which, flowing west, traverses about one-half of -Spain and the whole of Portugal, and, after a course of 500 miles, flows into the Atlantic three miles below Oporto. It is not of much navigable import¬ ance, but small vessels ascend about 70 miles from its mouth. In the Middle Ages it was celebrated for the gold that was found in its bed.

DOUROUCOULI, doo-roo-koo'le, a small Brazilian monkey, of nocturnal habits, which sleeps by day, and preys fiercely by night upon insects and small birds. It is of the genus Nyctipithecus, of which various species are known, all South American. They are about nine inches long, with tails somewhat longer than their bodies; and have soft grayish fur; their voices are discordant and disagreeable. They are known also as ®owl-monkeys,® and ®night-monkeys.®

DOUSA, Janus (Latinized from Jan Van DER Does), Dutch statesman, philologist, his¬ torian and poet: b. Noordwyk, Holland, 6 Dec. 1545; d. there, October 1604. In 1572 he went as Ambassador to England to obtain the support of Queen Elizabeth for the cause of the Dutch and subsequently became governor of Leyden. As chief commander, during the siege of Leyden by the Spaniards, he conducted himself with prudence and courage in the midst of the horrors of famine, plague and civil dissensions. He was sent to England again in 1584 and 1585.

The stadtholder, William I, compensated the city for its sufferings by the establishment of the university, of which Dousa was the first curator. His best-known work is ˆBatavise Hollandiaeque Annalesˆ (1599).

DOUW, Gerard. See Dow, Gerard.

DOUZETTE, dow'zet, Louis, German painter: b. Triebsees, Pomerania, 25 Sept. 1834. He received a gold medal at Berlin in 1886. He is a landscape painter almost exclusively, and is particularly noted for his moonlight effects. Among his works are 'ˆMoonlight on the Fjordˆ (1883) in the Dresden gallery; 'ˆSwedish Coast by Moonlightˆ (1866); ˆHarbor of Liibeck by Moonlightˆ (1891). He was especially in¬ fluenced by the Dutch.

DOVE, dd've, Alfred, German historian: b. Berlin 1844. He was a son of Heinrich W. Dove (q.v.) and studied medicine and the physi¬ cal sciences at Heidelberg and Berlin in 1861-66. Entering the journalistic field he was succes¬ sively editor of the Grenzhoten (1870) and of the periodical Irn Neuen Reich. From 1874 to 1884 he held the chair of history at Breslau, and the same chair at Bonn from 1884 to 1891. In the latter year he returned to journalism and

DOVE

for a short time was editor of the Allgemeine Zeihing in Munich. He published ˆDeutsche Geschichle im Zeitalter Friedrichs des Grossen und Joseph II, ˆ but the literary world is es¬ pecially indebted to him for publishing the post¬ humous manuscripts of Von Ranke, completing in four years the ˆWeltgeschichteˆ and editing the ˆSamtliche Werkeˆ (1890). In the year following he edited the last volumes of Bis¬ marck's parliamentary speeches.

DOVE, Heinrich Wilhelm, German phys¬ icist and meteorologist ; b. Liegnitz, 6 Oct. 1803 ; d. Berlin, 4 April 1879. He was educated at Breslau and Berlin, and in 1845 he was ap¬ pointed professor of natural philosophy at the university of the latter city, a post which he held till his death. He was also director of the Royal Observatory. Among his numerous works are ˆMeteorological Researchesˆ (1837) ; ˆDistribution of Heat on the Surface of the Globeˆ (1852) ; ˆLaw of Stormsˆ (1857) ; ˆOp¬ tical Studiesˆ (1859), and many papers in va¬ rious journals.

DOVE, originally applied in England to several native and domesticated species of the genus Columba; the name dove is now used generally for the smaller species of the pigeon family {ColumbidcB, q.v.), but in many cases interchangeably with pigeon. The name applies to about 10 native North American species, of which the most important are the mourning dove {Zenaidura macroura), the white-winged dove {Melopelia leucoptera) , the ground dove {Columbigallina passerina) , and several species of ground dove, of which only the first extends its range northward, the others being more especially derived from the West Indian and Mexican fauna, which includes many additional species. The mourning dove, so-called on ac¬ count of its plaintive call, and unadorned plum¬ age, ranges and breeds throughout temperate North America. The nest is a loose structure of twigs in which two eggs are deposited. In the late summer and autumn, when congregated in small flocks, doves are sometimes destructive to crops, and are much sought by gunners in localities where the game laws permit.

Several species of European and other ex¬ otic doves are well known in this country in the domesticated state. The ring dove (Columba palumbus) occurs throughout Europe, collecting in large flocks during the winter and depredating fields of turnips and other crops. The rock

dove, or rock pigeon (C. livia) is considered by Darwin (ˆAnimals and Plants Under Domesticationˆ) to have been the origi¬ nal stock of our domesticated pigeons, which, as a result of careful selection, have diverged into many races, arranged by Darwin in four principal groups: (1) Pouters; (2) Carriers, Runts and Barbs; (3) Fantails, Tumblers, Tur-bits, etc.; and (4) Trumpeters — which lead through some little modified varieties to the original stock still existing on the coasts of Europe and North Africa.

The turtle dove (Turtur communis) of Eu¬ rope has been universally adopted in Christian countries as the emblem of gentleness and love, and figures much in poetry. It also symbolized loveliness, and was applied in this sense to women. The dove was the bird of Venus; Babylon was the city of the dove; it was a dove that whispered into the car of Mohammed, and

was his oracle. It was embodied in the pagan worship of ancient Europe, and held a place in funeral rites. The dove was a sacred bird to the Israelites, typefying innocence, and Jerusa¬ lem was the city of the dove. In Christian times it was the attribute of the Virgin Mary; was a symbol of the Holy Ghost, and carved on baptismal and communion vessels and on the tombs of martyrs as a figure of the resurrec¬ tion.

DOVE IN ART. Semiramis was symbol¬ ized by the ancient Assyrians and Babylonians by a dove, the form she is supposed to have assumed on leaving the earth. Venus (Astarte) is generally found accompanied by a dove as an attribute, in mythological art. In Christian sym¬ bolism the dove is figurative of the Holy Spirit. In this sense it figures in pictorial representa¬ tions of such scenes as the baptism of Christ, the annunciation of the Virgin, the creation of the world; with the same intent artists have introduced the dove hovering over the heads of saints. Again, for the same reason the dove form was carved on most baptismal fonts of the older churches.

As Noah’s messenger returning to the Ark with an olive branch, the dove has become a symbol of peace, and accompanies the inscrip¬ tion ®Pax® in the Catacombs. Figuring on tombs or sarcophagi the dove is said to repre¬ sent grief and martyrdom. In profane symbolism the dove usually represents love or affection : Giovanna de Medici adopted two turtle doves as her device to represent conjugal fidelity.

In ecclesiastical furniture the pyx (contain¬ ing the consecrated Host)

suspended from the ciborium over the altar in the earlier Roman Catholic churches frequently took the form of a dove; it was known as the peristerium, from the Greek peristeirion — a dove-cote. Dr. Rock says they were used in many French churches up to a century or so ago ; the custom appears to have died out generally long before as none are known to have been produced later than 1200 A.D. The dove stood, usually, on an enamel¬ decorated dish from which it was detachable. Very few specimens of these ecclesiastical doves are extant. In Germany, the Salzburg and Er¬ furt cathedrals and the monastery church of Gottweih each possess one. Numerous saints have been depicted as accompanied by a dove, such as : Saint Thomas Aquinas, Saint Fabian, Saint Gregory the Great, Saint Louis, Saint Dunstan and a number of others.

DOVE-PLANT, or HOLY GHOST PLANT (Peristeria data), an orchid of Cen¬ tral America, much reverenced by the pious natives because of its resemblance to a dove with outstretched wings, the symbol of the Holy Ghost ; called also Holy-Spirit flower.

DOVE-TICK, a bird parasite (Argas re-flexus), the blind tick which infests doves and other birds. Some of the species are said to cause death by their sting. See Tick.

DOVEKIE, duv'ki, the little auk (Alle alle), one of the smallest of the family Alcidcc, a bird of high northern latitudes, living and breeding gregariously, on rocky seacoasts of the North Atlantic and Arctic oceans. A single egg is laid by this bird on the bare rock. In winter, it is found along the coast of New Eiig-

M

1 Domestic Turtle-dove (Turtur risorious)

2 European Wood-pigeon (Columba palumbus)

at the left; and Stock-dove (C. aenas) at the right

3 American Wild or Passenger Pigeon (Ecto—

pistes migratorius)

4 Papuan Crowned Pigeon (Goura albertisi)

5 Crested and Common Australian Bronze

winged Doves

6 Blue Rock-dove (Columbia livia)

land and the Middle States, and is occasionally blown by storms as far inland as Michigan. The dovekie, or sea dove, as it is also sometimes designated, is from eight to nine inches long; of a glossy blue-black above, with the under parts, and two patches on each wing, white. The adults have a small crest on the base of the beak.

The name is also sometimes applied by fish¬ ermen to one or more species of guillemot.

DOVER, Del., city, capital of the State and county-seat of Kent County, on Jones Creek, and the Philadelphia, Baltimore and Washing¬ ton Railroad, 75 miles south of Philadelphia. It is the seat of Wilmington Conference Acad¬ emy and has a handsome monument erected to the memory of Caesar Rodney, one of the sign¬ ers of the Declaration of Independence. It is the centre of a great fruit-growing region. It is on high ground; is laid out with wide, straight streets that cross each other at right angles ; and is built up chiefly with brick. Among its note¬ worthy buildings are a handsome State house, large courthouse and new United States gov¬ ernment building. Connected with the State house is a State library with upward of 50,000 volumes. There are several churches, a national and a State bank, fruit evaporating and packing establishments, steam flour-mill, foundry, machine shop, and sash, fruit crate, glass and carriage factories. The city has valuable gas and waterworks, weekly newspapers and good schools. Dover was laid out in 1717, became the capital of Delaware in 1777 and was incorpo¬ rated as a town in 1829. The government is vested in a mayor and eight councilmen. Pop.

(1920) 4,042.

DOVER, England, a Cinque port and par¬ liamentary and municipal borough in the east of Kent, England, 78 miles southeast of London by rail and 22 miles from Calais. Owing to its mild and equable climate, it is a favorite sea¬ side and pleasure resort. Its trade is almost entirely with the Continent, to and from which there is a great passenger

traffic. The Duke of York's School, formerly at Chelsea, is now lo¬ cated here. It is the headquarters of the South¬ eastern District of the British army, and the nearest point of the English coast to France. The fortifications comprise Dover Castle, which occupies a commanding position on the chalk cliffs, 375 feet above the level of the sea, and still includes some of the old Saxon and Norman work and three modern forts of great defensive strength have recently been con¬ structed. As the gateway of England fronting the Narrow Seas, Dover has always held an important place in schemes of national defense. One end of the submarine net which was con¬ structed across the English Channel during the great European War was at Dover. Among the antiquities of Dover are a Roman pharos and a Roman-British fortress church. The bor¬ ough returns one member to Parliament. Pop.

44,000.

DOVER, N. H., city and county-seat of Strafford County, 11 miles by rail northwest of Portsmouth, at the head of minor navigation on the Cocheco River, and on the Boston and Maine Railroad. The city has fine power fa¬ cilities derived from the Cocheco River, which here has falls over 30 feet high. It contains cotton and woolen mills, printing press fac¬

tories, machine works, boot and shoe factories, leather belt works, iron castings works, cutlery works, brick and lumber yards, *etc.* The United States census of manufactures for 1914 recorded within the city limits 58 indus¬ trial establishments of factory grade employ¬ ing 2,678 persons ; of whom 2,483 were wage earners, receiving annually $1,219,000 in wages. The capital invested aggregated $5,703,000, and the year's output was valued at $5,682,000: of this, $1,425,(X)0 was the value added by manu¬ facture. Its principal public buildings are the city hall, public library, opera house, two hos¬ pitals, home for the aged, two orphan homes and three banks. The total value of its tax¬ able property is estimated at $10,686,000. The government is vested in a mayor, elected for two years, a board of aldermen and a common council. The waterworks are the property of the city and are operated by the Municipal Water Commission. Dover was settled in 1623 and is the oldest city of New Hampshire; w^as organized as a township 10 years later, and re¬ ceived its city charter in 1855. In its first cen¬ tury of existence it experienced all the anxieties of a frontier

town, being often attacked by the Indians, the worst affair of this nature occurring in 1689 when several buildings were burned, 29 persons taken prisoners and 23 slain. Pop.

(1920) 13,029.

DOVER, N. J., town in Morris County, 39 miles by rail west of New York, on the Rocka-way River, the Morris Canal, the Delaware, Lackawanna and Western and the Central of New Jersey railroads. It has machine shops, large iron works, stove and furnace factories, boiler works, flouring mills, drill and range fac¬ tories, silk mills, knitting mills, hosiery factories, overall factory and a government munition depot. It is governed by a mayor, elected biennially, a recorder, board of aldermen and a common council. All these together form the Municipal Council. In 1826 the place was in¬ corporated as a village, and as a town in 1869; its present charter was granted in 1875. Its chief public buildings are the city hall, two banks, several churches and public schools. The total value of all its taxable property is placed at $8,000,000. Pop. (1920) 9,817.

DOVER, Tenn., town and county-seat of Stewart County, 100 miles west of Nashville, and 15 miles from the Kentucky State line, on the south bank of the Cumberland River. It is about 16 miles from the Louisville and Nash¬ ville and five miles from the Tennessee and Cum¬ berland River railroads. The county is almost wholly agricultural. Dover is the market for practically the entire county. It has two banks, a public school, courthouse and an assessed valuation of $200,000. It is governed by a mayor and board of aldermen. Dover is located about half a mile from the site of Fort Donel-son, where a three days' battle was waged in February 1862. The Fort Donel n National Cemetery is in the suburbs of the town. Dover was almost destroyed during the Civil War. The house in which General Grant received the surrender of the fort is still shown in the town. It was first settled in 1806. Pop. 600.

DOVER, Strait of, the narrow channel which connects the North Sea with the English Channel, and separates England and France. At the narrowest part from Grisnez to Dover —

it is only 21 miles wide. The depth of the chan¬ nel at a medium in the highest spring tides is about 180 feet. On both the French and Eng¬ lish sides the chalky cliffs show a correspond¬ ency of strata which leaves no room for doubt that they were once united. Various projects for connecting Dover and Calais more closely have been advanced, as by bridge or tunnel or by trains on submerged rails. When making examinations for the tunnel scheme, coal was discovered in the bed of the Strait.

DOVETAIL, a term used in carpentry; the fastening of boards together by letting one piece into another, in the form of the tail of a dove. The dovetail is the strongest of jointings, be¬ cause the tenon, or piece of wood which is put into the other, goes widening to the end, so that it cannot be drawn out again. Dovetails are either exposed or concealed; the latter being of two kinds, lapped and mitred. There is also a dovetail hinge, dovetail saw, dovetail file, and in Roman architecture an ornamented molding in the form of a dove's tail.

D'OVIDIO, do-ved'yd, Francesco, Italian philologist and critic : b. 1849. In 1876 he be¬ came professor of Romance philology at the University of Naples. With Ascoli and D' An¬ cona he holds a prominent place in the develop¬ ment of philological science and in the criticism of literature from the historical viewpoint.

DOW, or DOUW, Gerard, Dutch painter; b. Leyden, 7 April 1613; d. there, February 1675. He studied under Rembrandt and was distin¬ guished for the excellence of his coloring and chiaroscuro. He surpassed his master in diligence and nothing can be more finished than his small pieces, which are so delicate that a magnifying-glass is necessary to see distinctly the work in them. His softest figures are full of life and he never neglected, in his representations, the almost invisible minutiae of nature. He is re¬ garded as the inventor of the ingenious mode of painting large pictures on a reduced scale, by covering the original with a frame, including a space divided into small quadrangular parts by means of threads and then transferring the parts into an equal number of similar divisions drawn on the canvas. He made use of the convex mirror to represent objects on a reduced scale. Among his best paintings are ˆThe Even¬ ing School,ˆ a fine study in candle-light effect, now in the Rijks Museum, Amsterdam; Woung Mother,ˆ at The Hague; the ˆSchoolmasterˆ and the ˆ Hermitˆ at Dresden. He numbers among his pupils Gabriel Metsu,

Franz van Mieris, Schalken and Van Slingeland. Consult Van Dyke, ˆOld Dutch and Flemish Mastersˆ (New York 1895).

DOW, Lorenzo, American preacher : b. Coventry, Conn., 16 Oct. 1777 ; d. Georgetown. D. C., 2 Feb. 1834. Adopting the doctrines of the Methodists, 1796, he finally received a regu¬ lar license to preach, and, in spite of contumely and rebuffs and ceaseless hardships and dangers of all kinds, persevered for nearly 40 years, with an enthusiasm which never relaxed and often with astonishing effect. In the course of his ministry he traveled over many parts of the United States and Canada, and in 1799 and again in 1805 visited England and Ireland, where his peculiar eloquence attracted much at¬ tention and on several occasions subjected him

to persecution. Dow's eccentricity of manner and dress for a long time excited a prejudice against him, and in many parts of the country he was familiarly known as ˆArazy Dow.ˆˆ But to the class whom he most frequently addressed, his simple fervor, though coupled with illiterate phraseology, supplied the place of eloquence, and he seldom failed of having attentive hear¬ ers. His journal, containing the history of his life to his 40th year, together with some of his miscellaneous writings, was published in 1856. His wife was Peggy Dow, who was likewise well known for her religious eccentricities.

DOW, Neal, American temperance re¬ former: b. Portland, Me., 20 March 1804; d. 2 Oct. 1897. He was the author of the bill which prohibited the manufacture and sale of intoxicating liquors in the State of Maine, widely known as the ˆˆMaine Law.® During the Civil War he was colonel of a Maine regiment and a brigadier-general of volunteers. In 1880 he was the Prohibitionist candidate for the Presidency and lectured widely on the subject.

DOWAGER, a widow with a dower. The word is commonly applied only to the widows of persons of the titled aristocracy.

DOWAGIAC, do-wa'jak, Mich., city in Cass County, on the Michigan Central Rail¬ road, 35 miles southwest of Kalamazoo. It is the centre of a prosperous farming region and contains flour and lumber mills, a canning fac¬ tory, a gashouse and a public library. There are manufactories of grain drills, stoves, gloves, furnaces and bait. Pop. (1920) 5,440.

DOWDEN, Edward, English literary critic and historian : b. Cork,

Ireland, 3 May 1843 ; d. 4 April 1913. He was educated at Trinity College, Dublin, and from 1867 until his death held the professorship of English literature in that insiitution. He had a commanding posi¬ tion as a critic, especially in the field of Shakes¬ pearian criticism. His works include ˆShakspere: His Mind and Artˆ (1875); ˆPoemsˆ (1876) ; ˆShakspere Primer> (1877) ; ˆStudies in Literatureˆ (1878) ; ˆ Southeyˆ (1880) ; ˆLife of Shelleyˆ (1886), the chief authority on the poet's life; ˆTranscripts and Studiesˆ (1888) ; Hntroduction to Shakspereˆ (1893); New Studies in Literatureˆ (1895); ˆThe French Revolution and English Literatureˆ (1897) ; ˆHistory of French Literatureˆ (1897) ; ˆPuri¬ tan and Anglicanˆ (1900) ; ˆRobert Browning> (1904); ˆMontaigne> (1905); ˆEssays: Modern and Elizabethanˆ (1910).

DOWDEN, John, Scottish prelate; b. Cork, Ireland, 29 June 1840; d. 30 Jan. 1910. He is a brother of E. Dowden (q.v.). He was educated at Queen's College, Cork, and Trinity College, Dublin, and taking orders in the Scot¬ tish Episcopal Church, became bishop of Edin¬ burgh in 1886. He has published ˆThe Anno¬ tated Scottish Communion Officeˆ ; ˆThe Celtic Church in Scotlandˆ ; ˆHistory of the Theologi¬ cal Literature of the Church of Englandˆ ; ˆThe Workmanship of the Prayer Bookˆ ; Further Studies in the Prayer Bookˆ ; ˆThe Mediaeval Church in Scotland.ˆ

DOWELL, Stephen, English author; b. Isle of Wight 1833; d. 1898. He was educated at Oxford, where he was graduated in 1855.

He studied law and in 1863 was appointed as¬ sistant solicitor to the Board of Inland Reve¬ nue, in which office he remained until 1896. He wrote several works on taxation, on which subject he was regarded as one of the greatest authorities in England, also legal and historical tracts and monographs. His long list includes 'ˆThe Income Tax Lawsˆ (1874; 3d ed., 1890) ;

Sketch of the History of Taxes in Englandˆ (1876) ; History of Taxation and Taxes in England, from the Earliest Times to the Pres¬ ent Day>

(4 vols., 1885; 1888), the standard work on this subject.

DOWER. In law, the share or portion of the real estate of a deceased husband which passes to his wife for her natural life. At com¬ mon law it consists of one-third of all the lands and tenements held in fee simple or fee tail by the husband at any time during coverture to which any issue of the marriage might have by possibility become heir. This right attached during the life of the husband and was not sub¬ ject to his debts.

Dower is of ancient origin and has been subject to frequent change. In England it was known before the Norman conquest, and rec¬ ords show it to have been in vogue there in 1100, at the time of Henry I, and it was recog¬ nized in the Magna Charta of King John in 1215. It is known to Mohammedan law as well as to many other systems of law.

In England it was early found that the common-law dower generally served as an obstacle to the free alienation of real property, and this led to various methods of barring it, among them being uses to bar dower, which prevented purchasers from acquiring estates of inheritance. At the time of Henry VIII a statute was enacted to bar dower by the grant to the wife of a jointure before the marriage. This practice was superseded and the whole subject reformed by the statute of 1834, the terms of which permit the husband to defeat the dower, as by will or deed, thus leaving subject to dower only the real property of which he was seized at his death. (Jther changes were made by this act, including the extension of dower to embrace equitable es¬ tates of inheritance.

In the United States many jurisdictions fol¬ low the rules of the common law, at times some¬ what modified by judicial interpretation, by statute or by constitutional limitations. How¬ ever, in other jurisdictions some very valuable changes have been introduced. In a number of States dower has been superseded and a different interest substituted. By some of these statutory changes property acquired by the husband during coverture becomes com¬ munity property, belonging jointly to husband and wife, vesting absolutely in the latter on the death of the husband. Statutes have been en¬ acted in some States which make personalty, unlike the rule at common law, the subject of dower. Dower is not a contract right, but is founded upon public policy, the object being the support of the wife and the care and edu¬ cation of the younger children after the death of the father. Dower in real property is deter¬ mined by the law of the place where such prop¬ erty is located, but dower in personal property is governed

by the law of the domicile of the husband. Statutes abolishing the right of

dower after it has vested by the death of the husband have been declared unconstitutional.

Dower at the present day may be barred by a fair antenuptial or postnuptial agreement in lieu of dower, by a reasonable separation agreement, by acceptance on the part of the wife of a devise or bequest in lieu of dower and by the wife's elopement and adultery. See Husband and Wife.

DOWIE, John Alexander, American leader of a religious sect : b. Edinburgh, Scot¬ land, 1847 ; d. Chicago, Ill., 9 March 1907. He studied for the ministry and held two pastorates in Sydney, Australia, but subsequently became an evangelist preacher. While in Australia he organized the International Divine Healing As¬ sociation of which he - became president. In its behalf he traveled in England and America and finally settled in Chicago in 1890. Here he built his wooden ˆffabernacle® in Woodlawn, which was opened in 1893, and attracted large crowds by his preaching and faith cures. He later organized the Christian Catholic Church in Zion, which grew rapidly, adding many aux¬ iliary lines of work, such as a college for Zion preachers, a training school for deaconesses and a number of charitable institutions. Dowie had already established a publishing house, which became a part of the organization, and had full control of a bank, known as the Zion bank. He finally organized a land association and pur¬ chased a large tract of land on the shores of Lake Michigan, where he and his devotees built Zion City, the centre of all the numerous activi¬ ties of the Christian Catholic Church ; here he also established a lace industry. In this city he was practically dictator, forbade smoking, drinking, card playing, etc., and oversaw all branches of the work. He also preached fre¬ quently and gave special attention to the healing of the sick. In 1901 he made the claim of being ˆˆElijah the Restorer.ˆˆ In 1903 he built the new tabernacle at Zion City, near Chicago. On 2 April 1906, he was suspended by his followers from the leadership and from membership in the church on charges of fraud, tyranny and polyg¬ amous tendencies. Consult Buckley, ˆ Dowie Analyzed and Classifiedˆ ; Century Magazine Vol. LXIV, pp. 928-932) ; Napes, ˆJohn Alex¬ ander Dowie and his Zionsˆ {Independent, (Vol. LIII, pp. 1786-1791) ; Napes, Uohn Alex¬ ander Dowieˆ {Century Magazine, Vol. LXIV, pp. 933-944).

DOWITCHER, dow'ich-er, a sporting name for birds of the genus Macrorhampus, which are related to the snipes and are much hunted along the beaches of this country during the season. Two species, breeding far north, winter in South America and Mexico. The birds are from 10 to 12 inches long, with a bill nearly one-fourth the length of the body. The upper parts are dark while the under feathers are reddish.

DOWLAS, a kind of coarse linen, very commonly worn by the lower classes in the 16th century; also a strong calico made in imitation of the linen fabric. The name is said to be derived from Doullens, a town in the depart¬ ment of Somme, France. Before the introduc¬ tion of machine-woven cotton cloth, dowlas was manufactured largely in Yorkshire, England, and in the south of Scotland.

DOWN

DOWN, maritime county of Ireland, in the province of Ulster, area, 610,730 acres. It pos¬ sesses good agricultural land, is rich in minerals and manufactures fine linens. Oats, wheat, po¬ tatoes and flax are the principal crops. The Mourne Mountains in the south reach to an altitude of nearly 2,800 feet in Slieve Donard. The county returns four members to the House of Commons. Capital, Downpatrick. Pop. 204,303 ; 31 per cent Roman Catholic.

DOWNCAST, in a mine with two or more shafts or openings, that opening through which fresh air from the surface enters the mine. Unless a fan or other contrivance is used to force the air down, the direction of the ventilat¬ ing current changes with the temperature of the outside air.

DOWNERS GROVE, Ill., village in Du¬ page County, 20 miles west of Chicago, on the Chicago, Burlington and Quincy Railroad. It has a public library and manufactures furni¬ ture and tools. It has also large dairy and greenhouse interests. The waterworks and electric-lighting plant are owned by the village. Pop. (1920) 3,543.

DOWNES, William Howe, American journalist, art critic: b. Derby, Conn., 1 March 1854. He has been a staff writer on the Boston Transcript for many years. He has published ˆSpanish Ways and By-waysˆ ; ˆThe Tin Army of the Potomacˆ ; ˆArcadian Daysˆ ; ˆTwelve Great Artistsˆ ; ˆBoston Painters and Paint¬ ingsˆ ; ˆLife and Works of Winslow Hornerˆ (1911), and written many papers on art matters, for various magazines.

DOWNFALL, The («La Debacle®), a novel of the Franco-Prussian War, by Emile Zola, published in 1892. The siege of Sedan forms the dramatic centre of the story, which is concerned chiefly with the friendship of Macquart and Levasseur, and the love of Macquart and Levasseur’s sister Henriette.

DOWNING, Sir George, English soldier and political intriguer : b. Dublin about 1623 ; d. 16M. His uncle. Gov. John VYinthrop, sent him to be educated at Harvard and Downing was graduated as a member of the first class there in 1642. After a few years he went to England and joined the Parliamentary army. He was a member of both Parliaments during the Protectorate, and was a leader in the move¬ ment to offer the crown to Cromwell. In 1655 he was sent to France to

protest against the Vaudois massacre and two years later was appointed British resident at The Hague. He curried favor from the exiled royal family and after the Restoration was well received by them, being knighted in 1660, and made a 1)aronet in 1663. He also served as Secretary of the Treas¬ ury and as Commissioner of Customs. His name is perpetuated in London in the well-known Downing street, where are situated most of the high offices of government, whence the British government is often popularly alluded to as ^^Downing Street.®

DOWNING COLLEGE, one of the col¬ leges of the University of Cambridge founded in 1800 and opened in 1821. Its founder was Sir George Downing, a Cambridgeshire gentle¬ man, grandson of the politician after whom Downing street in London was named. The college is composed of a master, two professors

(one of English law and one of medicine), six fellows and six scholars. There were 34 matriculations in 1913-14 and 19 in 1914—15.

DOWNING STREET, a short street in Whitehall (named after Sir George Downing, Secretary to the Treaury in 1667), London, Eng¬ land, where are the colonial and foreign offices, with the official residence since 1735 of the First Lord of the Treasury. Here Cabinet councils are held, hence the term is sometimes employed as a synonym for the British government.

DOWNINGTOWN, Pa., borough in Chester County, on the Pennsylvania and the Philadelphia and Reading railroads, 33 miles west of Philadelphia. It contains brickyards, knitting mills, machine shops and paper mills. Pop. (1920) 4,024.

DOWNPATRICK, or DOWN (Gael. Dun, fort), Ireland, a municipal borough and county-seat of the County Down, near the mouth of the Quayle, on Strangford Lough, 20 miles south of Belfast. Linen, muslins, leather, liquors and soap are manufactured. Vessels of 100 tons approach a quay about one mile below the town. It is a cathedral town. The present structure was restored in 1790 on the site of the church erected in 1412 and destroyed by fire in 1538. Downpatrick is probably the oldest town in Ulster. It was for a time the residence of the kings of Ulster and was a place of im¬ portance even before the arrival of Saint Patrick, who built the abbey of Saul nearby. By many it is thought that Saints Patrick, Brigid and Columbkill are buried here. Con¬ sult ˆEcclesiastical Associations or Dowm-patrickˆ (Belfast

1897).

DOWNS, a term applied to hillocks of sand cast up by the sea or wind along the sea coast ; also to hilly tracts of grassy land suited for pasture; especially two parallel ranges of grassy hills in the south of England, the North Downs running east to west from Hants through Surrey and Kent to Dover, the South Downs in Hants and Sussex, terminating at Beachy Head. Botley Head (880 feet) is the highest summit in the North Downs, and Ditch-ling Beacon (858 feet) of the South* Downs. Between the two ranges lies the valley called the Weald. The celebrated Southdown sheep pasture on these hills.

DOWNS, The, a celebrated roadstead for ships, eight miles long and six wide, along the southeast coast of Kent, in England, between the North and the South Foreland, the largest natural harbor of refuge on the English coast. It affords excellent anchorage with depths of from 25 to 70 feet and is sheltered by Goodwin Sands, a natural breakwater, with from one to four fathoms of water, but is open to the south Deal, Dover and Sandown castles are its de¬ fense. An obstinate but indecisive sea-fighi took place here in 1666 between the English and Dutch.

DOWRY, the property which a wife brings to her husband at her marriage ; dot. In local¬ ities in which the civil law has been adopted, as Louisiana, it usually forms an important part of the law of property. It is also recognized by common law, and in England is known chiefly in connection with marriage settlements. Dowry is under the absolute control of the hus-

band, subject to the conditions that he cannot convey it if in the form of real estate and that he must use it for expenses of the family. While the title to dower is in the husband, he may take steps to prevent it being seized by his creditors. This term must be carefully distin¬ guished from dower, with which it is sometimes confounded. See Dower.

DOXOLOGY, an ascription of praise to the Almighty; in particular the Greater Doxology (Gloria in excelsis, Glory to God in the highest) and the Lesser Doxology (Gloria Patri et Filio, etc.. Glory be to the Father and the Son; etc.). The Greater Doxoloˆ, as is seen, opens with the words of the evangelist Saint Luke when he recounts the circumstances attending the birth of Jesus at Bethlehem; the heavenly host chanting Glory to God in the highest, and on earth peace among men of good will. This Greater Doxology has a place in the Roman Catholic liturgy and in the communion service of the Anglican Church. Its introduction into the liturgy dates only from the time of Pope Symmachus (beginning of 6th century) ; pre¬ viously it had been customary to recite it after the Mass. The Lesser Doxology had its origin apparently in the commission given to the Apostles (Matt, xxviii, 19) to teach all nations, baptizing them ˆ4n the name of the Father, Son, and Holy Spirit.ˆˆ An ancient form of this Doxology is ®Glory to the Father in the Son,® and that was considered to be consistent with orthodoxy till the Arians favored it as express¬ ing their view of the relation of Jesus Christ to God the Father; then the orthodox rejected it and employed the other formula exclusively. In the Roman Catholic breviary at the end of each of the psalms of the daily office the Gloria Patri, etc., is always pronounced. The latter portion of this doxology, ®as it was in the be¬ ginning, is now, and ever shall be. Amen,® \vas appended as a protest against certain heretics of the 6th century who denied the Son's eter¬ nity. Another doxology called the Trisagion is also in use. It is the seraphic hymn from Isaiah. The Protestants sometimes apply the term to the hymn written by Bishop Thomas Ken. Its opening line is ˆˆPraise God from whom all blessings flow."

DOYEN, dwa'yah', Eugene Louis, French surgeon: b. Rheims, Marne, 1859; d. Paris, 22 Nov. 1916. He became noted for his discoveries in surgery and his investigations of cancer. He introduced many innovations in surgical tech¬ nique and in 1875 established a private clinic in Paris, which soon became a study centre for surgeons, both from France and other countries. His improvements were widely adopted, and Doyen thus became the leader of a new school of surgery. He made a special study of the treatment of cancer, and claimed to have iso¬ lated the germ of the disease, but other investi¬ gators have repudiated his claims. He long resisted bitter attacks made against his treat¬ ment, maintaining that cancer could be cured providing treatment was begun early enough. He published ˆTraitement de Cancerˆ (1904) ; ˆLa malade et le medecinˆ (1906) ; ˆTraite de therapeutique chirurgicale et de technique operatoireˆ (1907) ; ˆLe cancer > (1909).

DOYEN, dwa-yah, Gabriel Fransois, French painter: b. Paris 1726; d. Saint Peters¬ burg, 5 June 1806. After study with Van Loo,

he obtained the Grand Prix de Rome, and spent many years in Italy. His ˆTriumph of Amphitriteˆ is in the Louvre, and an ˆAdoration of the Magiˆ in the museum at Darmstadt. Other noted productions are in various churches, his most famous production, ˆMiracle des Ardents,ˆ painted in 1767, being in that of Saint Roch, Paris. At the invitation of Catharine H and Paul I, he went to Saint Petersburg, where he was employed in decorating the Winter Palace and the Old Hermitage.

DOYLE, Alexander, American sculptor : b. Steubenville, Ohio, January 1858. He was educated in Italy and in American public schools. He qualified for Cambridge Univer¬ sity, but did not enter. He began the study of sculpture in the academies of Carrara and Flor¬ ence, Italy, followed by several years' study at Rome and Paris. Among his notable works are the marble portrait and pedestal at the grave of John Howard Payne at Washington; the marble statues of Bishop Pinkney ; Margaret Haughrey, Senator B. H. Hill and General Garfield; the marble portrait group of the two Cupples chil¬ dren at Saint Louis, Mo. ; bronze statutes of Gen. A. S. Johnston and Robert E. Lee at New Or¬ leans; Sergeant Jasper at Savannah, Ga. ; Gen. Philip Schuyler for the National Revolutionary Monument, Saratoga; Gen. James B. Steedman, Toledo; Horace Greeley, New York; Mrs. Emma Willard, Troy, N. Y. ; senators T. H. Benton, F. P. Blair and J. E. Kenna for the Capitol at Washington; Francis Scott Key at Frederick, Md. ; the Soldiers' Monument at New Haven ; the Soldiers' Monument, Montgomery, Ala. From 1899 to 1909 he was engaged in quarrying building stone in Indiana, resumed sculpture in 1909, and has since executed a statue of E. M. Stanton, Steubenville, Ohio, and the equestrian statue of Gen. G. T. Beauregard for the city of New Orleans.

DOYLE, Sir Arthur Conan, English novel¬ ist : b. Edinburgh, Scotland, 22 May 1859. He is a nephew of Richard Doyle (q.v.). He was educated at the Roman Catholic college at Stonyhurst, Lancashire, and at the University of Edinburgh. After practising as a physician at Southsea (1882-90), the success of several of his books induced him to give up the profes¬ sion for that of literature. His works include ˆA Study in Scarletˆ (1887); ˆMicah Clarkeˆ (1888) ; ˆThe Sign of The Fourˆ (1889) ; ˆThe White Companyˆ (1890) ; <The Adventures of Sherlock Holmes > (1891), a very popular series of detective stories;

ˆThe (jreat Shadowˆ (1892) ; < Memoirs of Sherlock Holmesˆ *

(1893) ; ˆRound the Red Lampˆ (1894) ; ˆThe Stark Munro Lettersˆ (1895) ; ˆExploits of Brigadier Gerardˆ (1896) ; ˆRodney Stoneˆ (1896) ; ˆThe Tragedy of the Koroskoˆ (1898) ;

< Songs of Action > (1898); <A Duet with an Occasional Chorusˆ (1899) ; ˆThe Green Flagˆ (1900) ; ˆThe Great Boer Warˆ (1900) ; ˆThe Hound of the Baskervillesˆ (1902) ; ˆReturn of Sherlock Holmes > (1904); <Sir NigeP (1906); ˆThrough the Magic Door> (1908) ; ˆ Songs of the Road> (1911); ˆThe Lost Worldˆ (1912); ˆThe Poison Beltˆ (1913); ˆThe Valley of Fearˆ (1915); ˆHis Last Bowˆ (1917); ˆThe History of the Great War> (1917) ; ˆThe Neˆv Revelationˆ (1918). He has also written the plays, ˆA Story of Waterlooˆ (1894) ; ˆHalvesˆ (1899), *etc.* He was knighted in 1902.

DOYLE, Sir Francis Hastings Charles,

English poet: b. Nunappleton 1810; d, 8 June 1888. He was educated at Eton and Oxford, held the post of receiver-general and next of commissioner of customs, and in 1867 he was elected to the chair of poetry in Oxford Univer¬ sity for the term of five years, being then elected for a second term of the same duration. He had already published ˆMiscellaneous Verses' (1841); ˆTwo Destinies' (1844); (1866); and of the Guards and other Poems' (1866) ; and he subsequently published his Oxford lectures (1869 and 1877), and ˆReminiscences and Opin¬ ions 1813-85' (1886).

DOYLE, John Andrew, English historian: b. 14 May 1844; d. 5 Aug, 1907, He was edu¬ cated at Eton and Balliol College, Oxford. He was an authority on the history of the English colonies in America, and wrote ˆThe American Colonies' (1869) ; ˆA History of the United States' (1875) ; ˆThe English in America' (1882) ; ˆThe Puritan Colonies' (1887) ; ˆThe Middle Colonies' (1907) ; ˆThe Colonies under the House of Hanover' (1907).

DOYLE, Richard, English artist: b. Lon¬ don, September 1826; d. there, 11 Dec. 1883. His father, John Doyle (q.v.), the author of the celebrated ®H. B." caricatures, initiated him into the mysteries of his art, and the young draughtsman became one of the founder-illus¬ trators of Punch, the current design on the cover of which was Invented by him. His sketches of the ˆManners and Customs of ye English' in that periodical, and the ˆBird's-eye Views of Society' in the early pages of the Cornhill Magazine illustrate the mode of life and manners of London men and women of his time with rare felicity and fidelity. In 1850 he severed his connection with Punch on account of its frequent attacks on the Pope and Doyle's coreligionists and Roman Catholics. His water colors are equally well known. Among them may be mentioned ˆ Under the Dock Leaves' (British Museum) ; and ˆThe Triumphant Entry,' a fairy pageant (National Gallery, Dublin).

DOYLESTOWN, Pa., borough, county-seat of Bucks County, 34 miles north of Phila¬ delphia, the terminus of a branch of the Phila¬ delphia and Reading Railway. It is in a fertile farming section and has a thriving local trade. It has a courthouse, public library, an academy, a female seminary, graded schools and handsome churches and

private residences. The town is lighted by gas and electricity. Its chief manu¬ factures are wagons, carriages and farm im¬ plements, flour, lumber, soap, woolens and cabi¬ net ware, hosiery, silk, worsted mills, a foundry, creamery,ˆ tannery and clay-works. Doylestown has a national bank, a trust company and daily and weekly papers. It is a popular residence town and has a large summer population. Pop.

(1920) 3,837.

DOZY, do'ze', Reinhart Pieter Anne,

Dutch Orientalist and historian, of French Huguenot descent: b. Leyden, 21 Feb. 1820; d. there, 29 April 1883. He obtained the degree of doctor from the University of Leyden in 1844. The following six years were spent in study and writing, and in preparing a catalogue of the Oriental manuscripts in the university library. He was made an extraordinary professor of

history in 1850, and full professor in 1857. He was considered one of the most learned and critical scholars of Arabic of his time ; was an authority upon Oriental language and history, and spoke and wrote almost all of the European languages with facility. He is known chiefly by his great work, ˆHistoire des Mussulmans d'Espagne, jusqu'a la conquete de I'Andalousie par les Almoravides, 711-1110' (1861, 2d ed., 1881), and its supplementary volume, ˆRecherches sur I'histoire et la litterature de I'Espagne pendant le moyen age' (1849, 2d ed., 1860, 3ˆd ed., 1881), which remain the standard works upon this period of Spanish history, and by his ˆSupplement aux dictionnaires arabes' (1877-81). Other important works are his ˆDictionnaire detaille de noms des vetements chez les Arabes' (1845) ; ˆScriptorum Arabum loci de Abbaditis' (1846) ; ˆCommentaire historique sur le poeme d'Ibn Abdoun par Ibn Badroun' (1846) ; History of the Almohades' (1847) ; ˆHistoire de I'Afrique et de I'Espagne' (1848) ; ˆA1 Makkari, analectes sur I'histoire et la litterature des Arabes d'Espagne' (1855-61) ; ˆHet Islamisme' (1863) ; and ˆDe Is-raelieten te Mekka' (1864).

DRAA, dra, or WADY DRAA, a river

of Morocco, rising in the Atlas Mountains and flowing southward till it penetrates the Anti-Atlas at Shagerun. Beyond this point it flows sluggishly through the desert, at first south and then west, forming the shallow lagoon El De-baia.

DRAC.ffiNA, dra-se'na, a genus of tropical plants of the family Liliacece. The species are characterized by woody stems, which bear numerous sword-shaped leaves crowded together near the summit, and greenish-white, or yel¬ lowish, flowers in panicles or heads. A few of the species are cultivated in hothouses, for their attractively colored foliage. The most notable species is probably D. draco, the dragon-tree of the Canary Islands, which attains a height of from 30 to 50 feet, though in one notable speci¬ men, at Teneriffe, the height was 70 feet, and the diameter 15 feet. This was when Hum-bolt visited the island. When this tree was destroyed by a storm in 1868 it was estimated to be about 6,000 years old. It was not only an object of worship, but its sanctuary was inside its own trunk.

DRACHENFELS, draˆHen-felz, ^^the castled crag of Drachenfels," as Byron calls it, one of the hills known as the Siebengebirge, in the gov¬ ernment of Cologne, in Rhenish Prussia, about eight miles southeast of Bonn. It is the most remarkable of the group, which are all evidently volcanic; rises about 900 feet above the Rhine, and is crowned by the old castle of Drachenfels, commanding a magnificent view. It takes its name (Dragon Rock) from the legend of a dragon which occupied a cavern in it, and was slain by Siegfried, the hero of the Nibelungenlied.

DRACHMA, drak'ma, the unit of weight and of money among the ancient Greeks, both as a weight and a coin contained six oboloi, and was itself the one hundredth part of a mina, and the six thousandth part of a talent. The weight of the Attic drachma was 67.5 grains English troy weight, and the Attic talent 70.3 pounds. There were several other kinds of drachma and

talent in use : those of yEgina were the heaviest. Whenever no particular kind is designated, the Attic talent is meant. The drachma was the principal Greek coin. It was of silver, and was divided, like the weight, into six oboloi (silver). The tetradrachma (of four drachmas) was called the stater, but other coins also bore this name. These coins differed much in value in the different states of Greece

and at different periods. The Attic drachma and stater occur most frequently. The value of the former may be stated as 17 cents, of the latter at about 80 cents. The drachma was regarded as equiva¬ lent to the Roman denarius. Besides these sil¬ ver coins there were also the stater (or di¬ drachm) of gold, equal in value to about $5.63. In the time of Solon a sheep could be bought for one drachma, an ox for five. In the time of Demosthenes a fat ox cost 80 drachmas, a lamb 10. The drachma has an important posi¬ tion in the coinage and currency of modern Greece, being the standard unit of reckoning, and a silver coin equivalent to the French franc.

DRACHMAN, Bernard, American rabbi ; b. New York, 27 June 1861. He was educated at Columbia University and the University of Breslau and has been professor of biblical exe¬ gesis and Hebrew philosophy in the Jewish Theological Seminary of New York from 1887, and rabbi of the congregation Zichron Ephraim in that city from 1889. From 1902 to 1908 he was professor of Bible and Rabbinical codes. In 1909 he became rabbi of the congregation Ohab Zedek. He is a staunch supporter of orthodox Judaism and is the author of ˆThe Place and Importance of Jehuda Hajjug in the History of Hebrew Grammarˆ (1885) ; ˆFrom the Heart of Israel: Jewish Tales and Typesˆ (1905) ; a translation into English (1899) of S. R. Hirsch's German work ˆThe 19 Lectures of Ben Uziel.ˆ

DRACHMANN, dran'man, Holger Henrik Herholdt, Danish poet, painter and novelist : 1). Copenhagen, 9 Oct. 1846; d. 14 Jan. 1908. He published about 40 volumes, in narrative and lyric poetry, drama and prose fiction. In poetry as in painting his forte was the sea, and he excels in descriptions of seafaring folk. Radical in his youth, he was intensely nationalist in his later years. He published five volumes of poerns and was also a notable playwright. His novels include ˆ Condemnedˆ (1890) ; ˆOnce Upon a TimeU ˆPaul and Virginiaˆ (1879); and ˆSea Tales. ˆ Drachmann visited the United States in 1898.

DRACO, dra'ko, Athenian legislator: fl. about 621 B.c. His name has become proverbial for severity, and his laws were hence said to have been written in blood, not ink. It seerns, however, probable that Draco only put in writ¬ ing the laws of his time and nation, which pun¬ ished petty theft, and even idleness, no less severely than the robber of the temples and the murderer. Subsequently years afterward, Solon was commissioned to draw up aˆ new code. Tradition relates that Draco, on his ap¬ pearance in the theatre at .iEgina, was suffocated by an enthusiastic audience, who according to their custom, threw their garments and caps upon him.

DRACO, an ancient northern constellation. The Gamma Draconis, a bright star nearly in

the solstitial coliire, was used in determining the coefficient of aberration of the fixed stars.

DRACOCEPHALUM, a genus of odor¬ iferous annual or perennial herbs, of the mint family (Menthacece) , numbering about 40 species, natives of the northern hemisphere. The name is Greek for dragonhead, which is a ref¬ erence to the resemblance of the flowers to the head of the dragons of myth. Of the species comprised in the genus, but two are American. American Dragonhead (D. parviflorum) is an annual, one to two feet high, with light blue flowers, common in stony soil from Ontario, through northern New York, to Minnesota and Alaska, and in the Rocky Mountain region to Mexico. The other species is found only in a restricted area in Nebraska and northern Mexico. It was introduced from Europe and is listed as Moldavian dragonhead.

DRAFT, a written order for the payment of a sum of money addressed to some person who holds money in trust, or who acts in the capacity of agent or servant of the drawer. Documents of this kind often pass between one department of a bank or mercantile house and some other department, and are distinguished from bills of exchange and checks, in not being drawn upon a debtor. One reason for using them is the convenience in keeping accounts and having vouchers for payhients. See Banks and Banking — Commercial Paper.

DRAFT RIOTS, in New York, July 1863, were serious disturbances caused by the military conscription or drafts (q.v.) of that year, which met with a storm of denunciation from Demo¬ cratic leaders and followers alike. The former proclaimed it unconstitutional, because military service was due only to the State ; dangerous, as liable to absorb all the State militia and civil officials into the Federal service; and partisan in execution, the quotas having been gerryman¬ dered to throw an enormous disproportion on the Democratic districts. This last was true, but was the work of subordinates, and was cor¬ rected by the War Department on protest. The rank and file execrated it as a class measure, shifting the burden from the rich, to whom $300 was a trifle, to the poor, who could pay only with their blood, and were least able to leave their families. The only answers were the nation's need, the law of nature that all burdens fall thus on the poor, and the govern¬ ment's wages, bounties and pensions which strained it to

relieve distress. But the legal and party arguments reinforced the class hatred and anti-war prejudice, and Gov. Horatio Seymour, the head of the Democratic party, sent his adjutant-general to Washington about 10 July to urge the postponement of the draft, on the ground of this popular excitement.

The drafting began, however, on Saturday morning, 11 July, at each provost-marshal's or assistant's office ; which in the ninth district, a Democratic stronghold, was at Third Avenue and 46th street. The method was to place the enrolled names in a wheel and turn it, the first names coming out up to the assigned quota being the conscripts. A large crowd assembled, but made no disturbance ; and the names drawn were published in the Sunday papers. Many of the poorer ones, incited and organized bv politi¬ cal leaders, met secretly and formed associations

lo resist; and on Monday morning, parties went around the shops compelling workmen to leave their tasks and join the procession. The drawing was resumed at 10 a.m. ; in a few minutes several paving-stones, one after an¬ other, were hurled through the windows into the midst of the crowd, smashing the furniture ; and in another moment the mob broke in the door, wrecked everything inside but the wheel, beat one of the deputies into insensibility, and set fire to the building, though it was inhabited above. The whole block was shortly in flames ; and when the firemen arrived, the hydrants were denied them till the conflagration was past help. The militia were nearly all in Pennsylvania, where Gettysburg had lately been fought, and the few garrison regulars and marines were under different commands ; so that the Federal General Wool, the State General Sanford and Mayor Opdyke held separate authority with no deciding power. The mob increased, and began wreaking vengeance on political opponents and their property, burning and pillaging; and thieves and toughs, seeing their opportunity, flocked out and joined. Fifty marines, sent to disperse the 46th street mob, fired blank cart¬ ridges, and were instantly routed and chased far along the streets by the rioters, many of them women and children. This changed the mob's attitude from defense to aggression ; a squad of police was set upon and one killed. Then their wrath was turned on the negroes, as the cause of the ^^Black Republican War.® These were beaten and stoned to death, and hanged to lamp-posts ; hotels and restaurants having colored servants were invaded in search of them, and the movables smashed or stolen. In the afternoon the Colored Half-Orphan Asylum, with 700 to 800 children and nurses, was broken into, gutted and set on fire, the inmates being driven into the street while the women of the mob carried off the furniture. The armory on Second Avenue was broken open with stones and sledge-hammers to secure the arms, the police who bravely defended it driven out, and it was fired. All business and trade were suspended. In the lower part of the city the office of the Tribune, the chief Republi¬ can paper, edited by the abolitionist, Horace Greeley, was attacked and about to be set on fire, but the police drove out the rioters. The entire block on Broadway which held the draft office was burned, with the provost-marshal's and the postmaster's private residences, a sta¬ tion-house, a hotel whose proprietor refused liquor to the mob, and other dwellings; and other houses were burned in the upper part. All that day and night the city was protected only by the police, many of whom lost their lives. At

midnight a heavy rain dispersed the rioters for the time.

Tuesday was far worse, though the forces of order had begun to gather. The mobs too had swollen so that an army was needed ; when bands were dispersed by the military, they gath¬ ered elsewhere and continued murder and depredation. Twenty negroes probably had been murdered Monday; far more perished Tuesday, and whole negro neighborhoods were burned out. Lieutenant Wood with 150 regulars from Fort Lafayette fired ball cartridge into a mob, killed a dozen and broke it up, but no officer could be ubiquitous. Colonel O'Brien, who had

dispersed a mob, sprained his ankle and stepped into a drug store ; ordered out by the terrified proprietor, the mob murdered him, and dragged his carcass up and down the street, mutilating and tramping on it. Governor Seymour issued a proclamation summoning the rioters to dis¬ perse, but it was so insufficient that he was forced to issue another putting the city under martial law. Meantime the Secretary of War had ordered home the militia regiments in Penn¬ sylvania, and they began to arrive on Wednes¬ day; the draft was announced as temporarily suspended ; and the mob was so thoroughly beaten and cowed on Wednesday afternoon that cavalry regiments paraded the city at night with¬ out meeting any resistance. Isolated gangs prowled about even on Thursday, but they were mere criminals and soon slunk away. The property-holders had formed associations for self-protection, and the danger was mainly at an end by Thursday morning. The losses of these four days were never known. The bills of mortality for the week were 450 above the average; 90 deaths from gunshot wounds were reported ; and it was said that many rioters were secretly buried by their friends. Claims for property damage were filed to over $2,500,000; though heavily scaled, something like $1,500,000 was paid. The draft was resumed on 19 Au¬ gust, and ended on the 28th. Consult ˆOfficial Record (XXVH, Pt. 2, 1889) ; Fry's <New York and the Conscription of 1863ˆ (1885) ; Greeley's ˆAmerican Conflictˆ (Vol. H, 1866).

DRAFTS, or MILITARY CONSCRIP¬ TIONS, in the history of the United States, aside from the drafts of the Confederate States of 18 July 1863, and the sweeping one of 17 Feb. 1864, which was in action all through the latter part of the Civil War — are those of 1814, 1863 and 1917. In the Revolution, the regular armies of the United States were recruited by drafts from the State militias (see Conti¬ nentals), but these transfers were made by requisitions on the States, who

furnished and officered their quotas in such bodies as they chose. The Constitution gave Congress the twofold power to ®raise armies,® and to ˆorganize and arm the militia.® Knox in 1790, and Jefferson in several annual messages urged a thorough plan for the latter, classifying the militia independently of the State organizations, and drafting one from each section as needed; but jealousy of the States' rights over the militia was too strong. In the War of 1812, re¬ quisition was made on States for militia to re¬ place coast garrisons, denuded for invasion of Canada, but Connecticut and Massachusetts re¬ fused on the ground that as this country was not invaded, there was no constitutional right toˆ summon the militia. When this excuse failed, others were found; in 1813 a militia or¬ ganization bill passed the House, but failed in the Senate. In 1814 the increasing exigencies forced a bill through Congress (Senate 10 Nov.; House 9 Dec.), on suggestion of the New York and Virginia legislatures; but even its Democratic supporters doubted its being either constitutional or useful, and the House loaded it with an amendment on which the Senate dis¬ agreed, as doubtless intended. The war ended shortly after. ˆ Tn the Civil War, volunteering filled the armies during the first two years, the quotas being appor<-i'oned by congressional dis-

tricts; then the numbers grew scant, and on 3 March 1863 the ˆˆConscription BilPˆ passed. The intent was the old plan of militia classifica¬ tion and draft, but the Democrats held it uncon¬ stitutional, and their arguments were un¬ answerable. The Republicans therefore fell back on the broad power to ˆTaise armies,'ˆ as implying the right to fix the method of so do¬ ing; this in turn was incontrovertible, and up¬ held by the Supreme Court. The State militias were ignored. All able-bodied citizens between 18 and 45 were summoned to the national de¬ fense, and were to be enrolled from 1 April on by the provost-marshals ; quotas under future calls not filled by volunteers after a certain period were to be made good by lot from the enrolment; conscripts could furnish substitutes or buy exemption for $300; all persons refus¬ ing obedience to be punishable as deserters. Early in May 300,000 more troops were called for; many Eastern cities were already in ar¬ rears, and the poorer classes, especially those politically hostile to the war, grew very bitter at the real hardships and the real and alleged unfairness of the conscription.

The invasion of Pennsylvania by Lee had drawn the Northern State militia thither in June and early July, and the mob in several places undertook to resist the draft. The police easily put down the rising except in New York, where the great numbers of the rioters, reinforced by the criminal classes, gave the city into their hands for two days, 13 and 14 July, and they were not suppressed till the 15th. (See Draft Riots). The drafts in¬ terrupted by these disorders were resumed and carried through. But their chief value was in goading the districts into filling the quotas by volunteers ; however legal, they were incredibly scanty of direct results. The commutations were toward a third of the whole, the exemp¬ tions nearly a half, and the number held and their substitutes together were but a sixth to a fifth. Also, many of the substitutes turned de¬ serters or ˆbounty-jumpers.® It has been esti¬ mated that of over 3,0(30,0(X) enrolled, less than 100,000 men were obtained by the drafts.

Upon its entry into the European War in 1917, the United States again resorted to conscrip¬ tion. The first Selective Service Act was ap¬ proved 18 May 1917. It required the registra¬ tion of all males between the ages of 21 and 31, including aliens (not alien enemies) who had declared their intention of becoming citizens. Under it 9,925,750 men were enrolled 5 June 1917. ()n 30 May 1918 the President approved a resolution directing registration of all males who had reached 21 years of age after 5 June 1917. Registrations took place 5 June and 24 Aug. 1918, the total enrolment being 912,5ˆ. Another Selective Draft Act, directing regis¬ tration of all males between 18 and 45 years of age except those previously registered, was ap¬ proved 31 Aug. 1918 and under it 13,395,706 men were enrolled 12 September. The first call under the first registration was for 687,000 men. They were selected at a drawing held in Washington 20 July 1917 and began going to the camps 5 September. The four registrations resulted in the enrolment of 24,234,021 and the induction of 2,801,635. The constitutionality of the Selective Service Law was upheld by the United States Supreme Court 8 Jan. 1918 in an opinion written by the late Chief Justice Eel-ward D. White. See Conscription ; Selective Service Law and Draft.

DRAGE, draj, Geoffrey, English publicist: b. 1860. He was educated at Eton and Oxford and is a barrister of Lincoln’s Inn and the Mid¬ dle Temple, but has never practised. He was Secretary of the Royal Commission on Labor, (1891-94), and Unionist M.P. for Derby (1895-1900). He has published ˆCriminal Code of Ger¬ man Empireˆ (1885) ; ˆCyril,ˆ a novel (1889) ; ˆEton and the Empireˆ (1890) ; ˆForeign Re¬ ports of Royal Commission on Laborˆ ; ˆEton and the Labor Questionˆ (1894) ; ˆThe Un¬ employedˆ (1894) ; ˆThe Aged

Poorˆ (1895) ; ˆThe Labor Problemˆ (1896) ; ˆTrade Unionsˆ (1905) ; ˆThe Imperial Organization of Trade' (1911) ; ˆThe State and the Poor' (1914) ; *etc.*

DRAGO, Luis Marfa, Argentine diplomat, jurist, and publicist; b. Buenos Aires, 6 May 1859; d. there, 9 June 1921. He was educated at the university in that city, studied law, became a judge in the national capital, and Minister for Foreign Affairs under President Roca. As Foreign Minister, he sent to the Argentine Minister in Washington (1902) in¬ structions that embodied a principle, advocated in his own country and through the publications of Carlos Calvo (q.v.), which became known as the Drago Doctrine (q.v.). He was one of the Argentine delegates to the second peace con¬ ference ; one of the arbitrators nominated by agreement between the United States and Great Britain for the hearing of differences in regard to the North Atlantic coast fisheries; member of the Permanent Court of Arbitration at The Hague. His works are ˆLa Literatura del slang' ; ˆLa Idea del Derecho' (with D. Mat-renzo) ; ˆColeccidn de Fallos en Materia Civil y Comercial' ; ˆLos Hombres de Presa' ; ˆCobro Coercitivo de Deudas Publicas' ; ˆLa Republica Argentina: il case de Venezuela'; ˆLes Emprunts d'Etat et leur Relations avec la Politique Internationale.'

DRAGO DOCTRINE, the principle laid down by a renowned Latin-American publicist, Luis Maria Drago (q.v.), in line with the teach¬ ings of his predecessor Carlos Calvo (q.v.), the meaning of which was and is substantially that ®no state ought to be invaded for the col¬ lection of money claims" (Albert Bushnell Hart, ˆCyclopedia of American Government,' Vol. H, ˆMonroe Doctrineˆ — ˆThe Drago Doc¬ trine.' The Drago Doctrine, which was pressed upon the United States in the Pan-American Congresses of 1890, 1901, 1906 and 1910, re¬ ceived President Roosevelt's formal adherence ; and, as Professor Hart says, ˆˆEuropean nations reasonably look to the United States to find some way of securing reparation of their injuries and claims, so long as this country [the United States] holds it as part of the Monroe Doctrine that such reparation may not be di¬ rectly sought. Such a use of the Monroe Doc¬ trine would make the United States responsible for the good behavior of all the Latin-American countries. This question was much accented from 1911 to 1914 by revolutions in Mexico, in¬ volving the property, lives and interests of citizens of many countries, and the United States, by fending off other powers, made itself responsible for securing good order in Mexico."

DRAGOMAN, the general name given in Levant countries to an interpreter, or to a guide to foreigners. The dragoman is, however, much more than the Italian cicerone, or the French commissionaire or valet de place. In Syria, for example, he is a contractor for the management of expeditions, and undertakes to solve all the difficulties that arise between the traveler and the natives. The dragomans attached to em¬ bassies have special privileges. Student drag¬ omans is a term sometimes given to student in¬ terpreters preparing for the British consular service in the Orient. The dragoman to the Porte, through whom diplomatic negotations with foreign powers were formerly carried on, used to be a very important dignitary.

DRAGOMANpV, dra' go-ma'nov, Mikhail Petrovitch, Russian author : b. Hadyatch, Poltava, 1841 ; d. 1895. In 1865 he became lecturer at the University of Kiev and was pro¬ fessor of general history there until 1876. He criticized the educational system introduced by Dmitri Tolstoi because of its being based on German classic models. Dragomanov refused to resign when his Ukrainophil activity brought him into conflict with the authorities. Alex¬ ander II appointed a commission which found him guilty and he was forbidden to reside in Little Russia or to engage in literary pursuits. Other measures of repression were at the same time enforced against the Ukrainians. Dra¬ gomanov went to Geneva, and in 1888 was ap¬ pointed professor of history at the University of Sofia, Bulgaria. He stood forth in his gen¬ eration as the foe of autocracy and oppression in every form ; he advocated a complete reor¬ ganization of Russia along the line of federated states, with every nationality securing equal representation. His literary and historical works deal mainly with Little Russia. He pub¬ lished '^The Historical Songs of Little Russia,^ with Professor Antonovitch (1874) ; ^The Question of Little Russian Literature^ (1876) ; a popular series of pamphlets in the dialect of Little Russia; Homada (the Commune), a periodical (1878-82) ; ^Le tyrannicide en Rus-sie^ (Geneva 1876) ; ^La Pologne historique et la democratie moscovite^ (1881) ; ^The Political Songs in the Ukrainian Language in the Eigh¬ teenth and Nineteenth Centuries^ (London

1883-85).

DRAGOMIROV, dra'go-me'rov, Mikhail Ivanovitch, Russian army officer: b. 1830; d. 1905. He was educated at the War Academy in Saint Petersburg, and abroad, and in 1858 was appointed professor of tactics there. His lec¬ tures attracted considerable attention. He participated as military attache in the Austro-Prussian War and in 1868 was made major-gen¬ eral and chief of the general staff at Kiev. He commanded the Russian advance guard in the war with Turkey in 1877-78, and distinguished himself at the crossing of the Danube at Sis-tova. He was wounded in the fighting at the Shipka Pass and was obliged to retire from active service. Later he was appointed director of the War Academy, where his influence on military training and organization was whole¬ some and widely extended. He wrote ˆLectures on Tacticsˆ (1864); *ˆThe Austro-Prussian War> (1866) ; ˆDiscipline and Subordinationˆ (1894) ; ˆA Studv of the Novel ˆˆWar and Peace®ˆ (1895) ; <The French Soldier> (1897) ; nVar is

an Inevitable EviP (1897) ; ˆJoan of Arcˆ (1898) ; (Duels> (1900).

DRAGON, a genus of arboreal lizards, of which the most familiar is Draco volans. The genus is especially remarkable for the extension of the skin of the sides on the prolonged pos¬ terior ribs. A parachute is thus formed which enables the dragon to take rapid swoops from branch to branch. The tail is very long; the skin of the throat forms a loose wattle ; the colors are particularly brilliant. There are several species inhabitants of the East Indies, not including Ceylon. The term dragon has also been applied in modern times to a large lizard (Thorictis draccena) found in Brazil and Guiana. It attains a length of three feet, most of which goes to the tail. Tejus and Ameiva are allied genera.

DRAGON. This mythological monster is often confused with the equally fabulous grif¬ fin. A distinguishing feature is the character¬ istic bat wings (with ribs and web) of the former while the griffin has feathered bird wings. With its supposed terrible fighting powers — having scaled armor and breathing flames — it is not surprising that the ancient Greeks and Romans utilized its figure as ex¬ pressive of power. The Roman armies termed their standard bearers draconarius, because they carried this animal as an ensign. But Meyrick says Trajan adopted it from the Dacians, after their defeat. The Grecian dragon (termed hydra) was specially formida¬ ble from its having seven ferocious heads. The dragon was a Celtic symbol of sovereignty and figured in the English standard from pagan times to the reign of Henry VII. It is found as a device on some of the knights' shields in the

Bayeux tapestry. . In the early days of fire¬ arms (17th century) a certain short musket which was hooked to a swivel attached to the soldier's belt was so termed, because a dragon's head formed the muzzle. Such soldiers were termed dragoons. In mediaeval alchemy the dragon was the emblem of Mercury, hence this beast figured among the signs found on the chemist's and apothecary's drug-pots. A stuffed crocodile is seen hanging from the ceiling of the drug shops in old pictures ; it did service for the fictitious reptile. In astronomy this animal (as Draco) figures in the northern constellation.

In Byzantine art the dragon was the per¬ sonification of evil — public calamity, such as pest, famine, *etc.* In Christian archaeology the dragon has a very active presence. The great dragon, Gargouille, lived in the Seine and ravaged Rouen. It was slain by Saint Romulus in the 7th century. The French word gargouille means waterspout, hence the spouts draining off the water from the walls of churches and large edifices were usually in the decorative form of an open-mouthed dragon. Various races and countries have their special dragon and dragon-slayer legends. The French dragon of Languedoc, Tarasque-gargouille, was slain byˆ Saint Martha, and the city of Tarascon is said to have derived its name from the event. The most favored dragon-slaying legend of the artists, past and present, is that of Saint George (the English patron saint) slaving the dragon. Memling, Tintoretto, Pisanello, Domenichino, depicted this subject (paintings

arc in the London National Gallery), and it is found carved and in stained glass in a great number of the old churches. Another similar picture frequently seen is that of the conflict between Saint Michael and the dragon..

The fact of the ancient origination of this subject is shown in the discovery of the picture of conflict on stone slabs in Persepolis and Nineveh, and the Greek mythology had its Perseus and Andromeda.

In Chinese legend the dragon (lung) figures very prominently. The Celestials say there are three dragons, one (lung) in the sky, one (li) in

the sea, one (kiau) in the marshes; Lung is the most important of these, and is described as having the head of a camel, the horns of a deer, the eyes of a rabbit, ears of a cow, neck of a snake, belly of a frog, scales of a carp, claws of a hawk and palm of a tiger. This marvelous creation has whiskers on each side of its mouth, also a beard (in which is often de¬ picted a bright pearl). The sea-dragon appears in waterspouts and the Chinese fishermen wor¬ ship him in fear (Williams). Mayer accounts for four Chinese dragons. ^^(1) The Celestial dragon, which guards the mansions of the gods and supports them so they do not fall. (2) The Spiritual Dragon, which causes the winds to blow and produces rain for the benefit of mankind. (3) The Dragon of the Earth, that marks out the courses of rivers and streams. (4) The Dragon of the Hidden Treasures, which watches over the wealth concealed from mortals.® A dragon is the emblem of the Emperor of China, and has five claws (others four), and is forbidden to be represented ex¬ cept on imperial goods. As the dragon is one of the chief decorative features of Chinese arts, this latter fact is of value to connoisseurs, since the presence of the five-clawed dragon on bronzes, pottery, tapestry, etc., is proof of the article having been made for the Imperial court. In the Chinese zodiac the dragon is sign for the month of March.

The Japanese dragon (rio or tat su) while, probably, derived from the Chinese, differs from it. It has but three claws, one of which usually grasps the ^^perfect crystal ball,® or a pearl. The Japanese dragon is supposed to have the power of rendering itself invisible; it may shrink to silkworm dimensions or increase its size till the universe is covered with its presence. Pictorially illustrated in multitudes of Japanese decorative work the tatsu is seen floating among the clouds or rising from stormy waves on the ocean. The Persian dragon has cloven hoofs.

Clement W. Coumbe.

DRAGON, in astronomy, one of the an¬ cient northern constellations, in Latin, Draco. The figure is that of a serpent with several small coils. It appears at a very ancient date to have had wings in the space now occupied by the Little Bear. Fable says that Juno translated to the heavens the dragon which kept the golden apples in the Garden of the Hesperides, and which was slain by Hercules. See Hesperides.

In Zoology, a lizard of the oriental genus Draco.

DRAGON-FLY, an order of insects, the Odonata, allied the may-flies and ephemerids, with long, slender bodies, very large mobile heads,

immense eyes, short antennae, and two

pairs of long, nearly equal wings of a firm and glossy texture, and closely netted with many veins. The mandibles are powerful, the mouth-parts being so fused and solidified as to form a most effective trap for catching the small insects upon which dragon-flies feed. The prothorax is small, the meta-thorax and meso-thorax large, and the meso-thorax slopes over the meta-thorax, by which arrange¬ ment the spinous legs are thrust forward, so that they project under the head. These legs are unfitted, and are never used, for walking, but as instruments for catching and holding prey or for clinging to plants. The hind body is proportionately longer than in any other group of insects ; it has 10 evident segments, the hindmost carrying a pair of stiff unjointed cercopods. The male genital armor is situated on the second abdominal segment — a position unknown in any other insect ; and the intromittent organs are separate from the ejaculatory ducts, the latter being near the extremity of the abdomen. ˆTherefore,® as Howard explains, ˆˆbefore copulation the male curves his abdomen around beneath, so that the ninth segment of the abdomen is brought into contact with the sec¬ ond, thus transferring the fertilizing fluid to the intromittent organ. The tip of the abdomen of the female is bent around and joins with the underside of the second segment of the male's abdomen, the male frequently grasping the female around the neck with certain appendages at the extremity of his abdomen. This compli¬ cated embrace commonly observable where these flies are numerous in midsummer, once obtained is likely to be held during the whole process of egg-laying, even in many cases when the deposition takes place under water.

Dragon-flies are semi-aquatic in all their life and habits. The eggs are laid in the stems of submerged plants by some species, which are provided with an instrument for cutting through the bark, each egg being pushed into the cutting as the female moves down the stem. As a rule, however, the eggs are dropped into the water, or washed off by dipping the tip of the abdomen. The number of eggs laid is large, exceeding 100,000 in the case of many libellulids.

When the eggs hatch the young immediately begin a life of activity and depredation. Molts follow one another rapidly, and the first larval form soon changes into a ®nymph,® a form equivalent to the pupa stage of other insects, but differing in the fact that activity continues. These young remain under water, have short, broad hinder bodies, walking legs, feelers, and breathe by means of ˆTectal gills.® They

prey upon everything edible, including their own weaker brethren. To assist them in doing this the mouth-parts are modified into an insect-catching trap, forming an innocent-looking mask, within which are concealed grasping organs, ready to be shot out when an unsus¬ pecting little animal creeps too near and the mask is suddenlj'- lifted. When the broad and flattened nymph has become full-grown it crawls out of the water upon some warm rock, where presently its skin splits open and the adult dragon-fly emerges. These changes are easily studied by breeding dragon-flies in an aquarium.

The voracity of dragon-flies is notorious. They seize and devour all sorts of insects, in¬ cluding smaller species of their own race, and sometimes moths, butterflies and wasps. Flies

form their principal fare, however, and they consume vast quantities of houseflies and mosquitoes, but their service in killing the latter pests is mainly done during the larval stages. They abound, in midsummer, in most parts of the world, and sometimes appear in enormous swarms, millions moving across the country in company; such swarms are the result of various local conditions and are not migrations, properly speaking. The great beauty which most of the species have, glittering in metallic hues and skimming through the sunshine on brilliant, gauzy wings, has made them objects of univer¬ sal admiration ; but this admiration is strangely coupled with a popular fear and superstition toward them. Thus they are comrnonly known among American children as ˆdevil's darning-needles,® and are accused of an intention to sew up the ears of bad boys, or work mischief in the hair of naughty girls. The negroes of the Southern States call them ®snake-doctors,® and say they feed and nurse ailing serpents. In Great Britain, they are known as ˆˆhorse-stingers,® ˆflying-adders® or ˆˆpenny-adders,® and are believed to carry a poisonous sting in their tails. All these superstitions are calum¬ nies upon a harmless and beneficial insect.

About 2,000 species of dragon-flies have been described of which an eighth are peculiar to the United States. The order contains two well-marked groups : the Libellulidae, or dragon-flies proper, and the Agrionidae, demoiselles or damsel-flies, distinguished broadly by the fact that in the former the front wings are dis¬ similar, and are held horizontally in repose ; while in the latter the wings are alike and are held vertically when the insect rests. Another distinguishing feature is the fact that in the Libellulidae the eyes are sessile, sometimes meet¬ ing on the top of the head, while in the Agrionidae the eyes are constricted at the base ajid peduncled. An important subdivision of the Libellulidae, regarded by some as a separate family, is the ˆschnidae, which is characterized by the fact that the eyes touch on the top of the head. To this group belong many of the largest and most gaudy dragon-flies.

An excellent illustrated account of North American dragon-flies will be

found in L. O. Howard's ˆThe Insect Book (1901), which con¬ tains further references. For British species consult Lucas' HLandbook of British Dragon-flies> (1899).

. DRAGON ROOT, or GREEN DRAGON

{Ariscema dracontium) , a plant of the Arum family, occurring in wet woods and along streams, from Maine west to Minnesota and southward to Florida and Texas. The spathe envelops the greenish spadix, the upper part of which tapers into a long, slender appendage, ex¬ tending beyond the apex of the spathe, some¬ times as much as six inches. The corm contains an acrid or pungent sap, which is supposed to possess curative properties, and is much used as a household medicine in the region of its growflh.

DRAGONET, the common name of certain fishes of the family Gohiidfr,. The gemmeous dragonet {Callionymus lura), a beau¬ tiful fish with a large head and a smooth taper¬ ing body, is found in the British seas. See (ˆjOP.Y,

DRAGONNADES, drag-5-nads', the name given to the persecutions directed against the Protestants chiefly in the south of France, dur¬ ing the reign of Louis XIV. They commenced in Poitou, and their nature may be understood from a letter from Louvois, the French Minis¬ ter, to Marillac, the governor of the province. It is dated 18 March 1681, and says, inter alia, that his majesty wishes that the greatest num¬ ber of troopers and officers be billetted on the Protestants, and that when a just division makes them liable only to 10 they may be sad¬ dled with 20. Marillac, thus instructed, lost no time in giving full effect to the letter, and the Protestants were everywhere subjected to cruel extortion and gross indignit}ˆ at the hands of a brutal soldiery. These dragonnades were practised with still greater atrocity in Bearn 1684, and in all the other provinces where the Protestants existed in any considerable num¬ bers. Resistance was attempted in several in¬ stances ; thousands of the most enlightened mer¬ chants and skilful workmen left the country; carrying their talents and industry into the serv¬ ice of its enemies ; but the far greater number, seeing resistance hopeless, and overcome by ter¬ ror, gave in a feigned adhesion.

DRAGON'S BLOOD, a resinous juice obtained by incision from the fruits of the Cala¬ mus draco, the rattan palm of the East Indies.

Dragon’s blood is obtained, in commerce, in three principal forms — in that of oval masses of the size of a pigeon’s egg, enveloped with leaves of the pendanus ; in cylinders covered with palm leaves, in which form it goes by the name of ®reed dragon’s blood® ; and in irregular masses, marked with impressions of leaves ; that in oval masses is the most esteemed.

Dragon’s blood is opaque, of a deep reddish-brown color; brittle, and has a smooth and shin¬ ing conchoidal fracture; when in thin laminae it is sometimes transparent; melts at 248° F., and when burned it gives out an odor similar to benzoin; its taste is astringent; it is soluble in alcohol, and the solution will permanently stain heated marble, for which purpose it is often used, as well as for staining leather and wood. It is also soluble in benzene, chloroform, carbon disulphide, glacial acetic acid and caustic soda, and sparingly in oil of turpentine and ether. It enters into the composition of a very brilliant varnish, which is much esteemed by artists. The deep red varnish of the violin makers of Cre¬ mona was made of pure dragon’s blood. Its quality may be tested by marking with it on paper ; the best leaves a fine red trace, and com¬ mands a very high price. It was formerly in high repute as a medicine, but at the present t«ime is very little used. Other resins to which the same name has been given commercially are those^ of various trees of the genus Dracaena growing on the island of Socotra (whence the trade name, ®Socotrine dragon’s blood®) ; the Ptcrocarpus draco, of the West Indies; the Dal-hergia, of Guiana ; a Croton of South America and Sumatra and from the Dracaena draco (order Liliaceae), which is most celebrated in connection with the Canary Islands. A historic tree of this last species, at Orotava, acquired enormous dimensions, and was visited and celebrated by almost every traveler, including Humboldt, but was destroyed by a storm in 1867. It was supposed to have

been about 5,000 or 6,000 years old. An astrin¬ gent resin, obtained from the Eucalyptus resini-fera of Australia, sometimes gets the name of ˆMragon's blood® in that country. Consult The Geographic Magazine (April 1918).

DRAGON'S MOUTHS, a strait on the coast of Venezuela, running between the Island of Trinidad and the Paria Peninsula, and lead¬ ing into the Gulf of Paria.

DRAGOON, a mounted soldier, first intro¬ duced into the French army about 1585, and trained originally to fight chiefly on horseback, but, if necessary, on foot also, and mounted, armed, and exercised accordingly. Experience proving that they did not answer the end de¬ signed, they were hardly ever used in infantry service latterly, and now form a useful kind of cavalry. The term dragoon probably cornes from dragon, a short species of carbine carried in 1554, on the muzzle of which, from the old fable that the dragon spouts fire, the head of the monster was wrought. The first dragoon regiment raised in Great Britain was the first Royal, the oldest cavalry of the line regiment in the army, raised in 1661 to garrison Tangier, Morocco. There are at present in the British army three regiments of dragoons, and seven of dragoon guards, all being mounted and ac¬ coutred more after the fashion of heavy (or medium) cavalry than the hussar regiments. The three dragoon regiments are the 1st (Royal) Dragoons, the 2d Dragoons (Royal Scots Greys, organized 1683), and the 6th (Inniskilling) Dragoons. Both dragoons and dragoon guards are armed with carbine and sabre, and have metal helmets (except the Scots Greys). Consult White, C, ˆOur Regimentsˆ (London 1915).

DRAGOON BIRD. See Umbrella-Bird.

DRAGOUMIS, Stephan, Greek statesman: b. Athens, 1842. He was educated in Athens and Paris and in 1879 became a member of the

Lower House of Parliament at Athens. He was Foreign Minister in 1886-90 and again in 1892. In February 1910 he became Premier, but his cabinet was overthrown the following Octo¬ ber. During his term of Premier he calmed the Military League and succeeded in having con¬ voked a National Assembly to deal with impor¬ tant public issues. He was opposed to the movement to have Greece openly; allied with the Thessalians in their difficulties with Turkey. In 1912 Dragoumis was sent to Crete to take over the government of that island.

DRAGUIGNAN, dra-gen-yan, France, town, capital of the department of Var; 41 miles northeast of Toulon. It was founded in the 5th century. It contains a prefecture, courthouse, hospital, a fine museum, zoological gardens and a public library. The principal manufactures arc woolens, leather, hosiery, silks, soap, lum¬ ber, brandy, oil and earthenware. Pop. about

10,000.

DRAHMS, drams, August, American Con¬ gregational clergyman: b. Yarmen, Pomerania, 4 March 1849. His parents emigrated to the United States in 1856, and his early education was received in the public schools of Geneva, Ill. In 1863, he enlisted in the 17th Illinois cav¬ alry and served to the end of the war. He afterward studied at Wheaton College, and the Garrett Biblical Institute at Evanston, Illinois,

and entered the Congregational ministry at Oak¬ land, California, 1878. He served as pastor in Martinez, Cal., and was for 18 years resident chaplain of San Quentin prison. He is pastor of the First Congregational Church of Hilo, Hawaii. He has written ˆThe Criminal: a sci¬ entific study; with an introduction by C. Lom-brosoˆ (New York 1900).

DRAIN-PIPE, a pipe used in draining, commonly of tile, but sometimes of wood or metal. See Tiles.

DRAINAGE, in agriculture, a method of improving the soil by withdrawing the water from it. Though practised by the Romans, and though the value of drainage was expounded by Walter Blithe in the middle of the 17th century, it was not till after the middle of the 18th cen¬ tury that the importance of drainage began to be understood in

Great Britain. The public at¬ tention is said to have been then excited by the practice of Elkington, a farmer of Warwick¬ shire, England. But it was James Smith of Deanston, Perthshire, Scotland, who about 1823 led the way in modern practice of thorough draining.

The successful practice of draining in a great measure depends on a proper knowledge of the various strata of which the earth is com¬ posed, as well as of their relative degrees of porosity or capability of admitting or rejecting the passage of water through them and likewise of the modes in which water is formed and conducted from the high or hilly situations to the low or level grounds. In whatever way the hills or elevations that present themselves on the surface of the globe were originally formed, it has been clearly shown, by sinking large pits and digging into them, that they are mostly composed of materials lying in a stratified order, and in oblique or slanting directions downwards. Some of these strata, from their nature and properties, are capable of admitting water to percolate or pass through them, while others do not allow it any passage, but force it to run or filtrate along their surfaces without penetrating them in any degree, and in that way conduct it to the more level grounds below. There it becomes obstructed or dammed up by meeting with impervious materials of some kind or other, by which it is readly forced up into the superincumbent layers, where they happen to be open and porous, soon rendering them too wet for the purposes of agriculture ; but where they are of a more tenacious and impenetrable quality, they only become gradually softened by the stagnant water below them ; by which the surface of the ground is, however, rendered equally moist and swampy, though somewhat more slowly than in the former case.

Where grounds are in a great measure flat, and without degrees of elevation sufficient to permit those over-proportions of moisture that may have come upon them from the higher and more elevated grounds to pass readily away and be carried off, and where the soils of the land are composed or constituted of such materials as are liable to admit and retain the excesses of moisture, they are exposed to much injury and inconvenience from the retention and stagnation of water. Such lands consequently require arti¬ ficial means to drain and render them capable of affording good crops, whether of grain or grass.

Wetness of land, so far as it respects agri¬ culture and is an object of draining, may gener¬ ally depend on the two following causes : — first, on the water which is formed and collected on or in the hills or higher grounds, filtrating and sliding down among some of the different beds of porous materials that lie immediately upon the impervious strata, forming springs below and flowing over the surface, or stagnat¬ ing underneath it; and, secondly, on rain or other water becoming stagnant on the surface, from the retentive nature of the soil or sur¬ face materials, and the particular nature of the situation of the ground. The particular wetness which shows itself in different situations, in the forms of bogs, swamps and morasses, for the most part proceeds from the first of these causes ; but that superficial wetness which takes place in the stiff, tenacious, clayey soils, with little inclination of surface, generally originates from the latter.

Drains. — The drains used in land drainage may be divided into two classes — open and covered drains. These again may each be sub¬ divided into drains intended merely to act as water-courses and drains which, in addition to acting as water-courses, are also intended to carry off the surplus water from the land through which they pass.

Open Drains. — The rudest forms of open drains are the deep furrows, lying between nar¬ row highbacked ridges, which are still to be found in some parts of the country with their accompanying water-furrows (*gaw^^ furrows or ^<grips®) for discharging their streams. These are only meant to carry off the surplus water after the soil is completely saturated. In doing so, however, they carry along with it all the best portions of the soil and of the manure which may have been spread upon its surface.

Open Drains as Water-courses. — ^The ordi¬ nary ditch (dike) is the common form of this kind of drain, which, though necessary to a certain extent, ought, nevertheless, to be spar¬ ingly seen where a perfect system of drainage has been effected. They are constant sources of annoyance and expense from their sides crumbling in, the numerous weeds which _they harbor and the thorough scouring which they require every year. Open ditches occupy an im¬ portant place in the early stages of draining bogs ; but after the bog has become consolidated the greater portion of them may be dispensed with and their places supplied by large covered drains.

Open Drains for Collecting Water from the Land through which they pass (Sheep-drains). — These are employed in drying the surface of mountain pastures, where a more ex¬ pensive and perfect system of drainage would not yield an adequate return for the outlay. They consist of trenches of 12 or 16 inches in depth and 18 in width, placed so as to intercept all the water which may flow from portions of land above them. They are opened at intervals in a direction nearly transverse to the line of the greatest slope and should have sufficient inclination to keep tfie water flowing toward the mains or leaders. These latter should be cut in the hollows or in such other places as will per¬ mit the small drains or feeders to empty them¬ selves most readly into them, and be made to discharge into the nearest water-courses.

Covered Drains. — We now come to the consideration of the more important description of drainage — the removal of water by means of covered drains. The simplest of all the forms of these are what are called mole-drains, and they are formed by means of a machine called the mole-plough. This machine consists of a wrought-iron frame on four wheels, the front pair being connected with worm and chain steer¬ age. A coulter with pointed sock, capable of being raised and lowered to regulate the depth of the drain, is attached to the frame. The ˆ•ˆmole,ˆˆ an oval piece of iron three and one-half inches in diameter, follows the sock, to which it is attached by a short chain. The track which the mole leaves in the ground is the water chan¬ nel. This machine is dragged through the soft clay, which is the only kind of land on which it can be used with propriety, by means of a windlass on the fore end of the frame and a double length of wire-rope wound by an engine on the higher part of the field. A team of horses returns it to the lower side, out of work.

Wedge-drain. — The wedge-drain, like the mole-drain, is merely a channel formed in the subsoil, and, like it, can only be used in pasture lands. In forming wedge-drains, the first spit, with the turf attached, is laid on one side, and the earth removed from the remainder of the trench is laid on the other. The last spade that is used is very narrow, and tapers rapidly, so as to form a narrow wedge-shaped cavity for the bottom of the trench. The turf first removed is then cut into a wedge, so much larger than the size of the lower part of the drain that, when rammed into it with the grassy side undermost, it leaves a vacant space somewhat triangular in shape in the bottom of six or eight inches in depth.

Permanent drains are of two kinds, stone and tile drains.

Stone-drains. — These are either formed on the plan of open culverts of various forms, or of small stones in sufficient quantity to permit a free and speedy filtration of the water through them. As a specimen of the former of these, we may instance the box-drain, which is formed of flat stones neatly arranged in the bottom of the trench. The largest and flattest stones are used in laying the bottom and for covers ; the smaller ones are placed on the sides, the whole forming an open tube. The second description of stone-drains, generally known as the broken-stone or rubble drain, is not so thoroughly ef¬ fective as the first.

Tile-drains or Sewer-pipe drains. — Of all

the materials which have yet been brought for¬ ward for forming the conduits of drains, none are so well fitted for the purpose as tiles or pipes of burnt clay. Draining tiles, especially those in the form of pipes, possess all the qualities which are required in the formation of drains, affording a free ingress to water, while they effectually exclude vermin, earth, and other in¬ jurious substances. When first introduced they were of clumsy construction, and being hand¬ made, sold at a high price. They are now made of ordinary clay and vitrified clay to resist the moisture, and also of concrete. The vitrified are rnost durable but the concrete or cement pipe is largely used ; the best form appears to be the cylinder. Good pipes are straight, smooth and free from flaws, and when struck should

ring clearly. Durability is shown if the wet pipe will dry quickly before a hot fire without crumbling. Where a sudden descent occurs in the course of a drain, or where there is a run¬ ning sand or a boggy place, pipes of one size should either be entirely sheathed in larger ones, or they should be furnished with collars. These collars are merely short sections of pipes of such a size as to fit upon smaller ones, by which means the smaller ones may be so joined end to end as to prevent them from slipping down past each other.

The drawing off of the pent-up waters which are the sources of springs is a department of draining which requires a considerable knowl¬ edge of the different varieties of strata.

In the laying out of drains, the first point to be determined is the place of outfall, which should always afford a free and clear outlet to the drains, and must necessarily be at the low¬ est point of the land to be drained. This should be ascertained by a leveling instrument ; and where a large extent of work is to be done, a competent surveyor should always be employed. A simple form of level for this purpose is a length of ordinary garden hose, with a glass tube in each end. When the hose is filled with water, the height in the two end tubes will be equal. Two persons with such a level can easily mark desired heights on a _ row of stakes, and so get any desired inclination. The outfalls should be as few as possible, and each one should be carefully set in brickwork and covered by a grid hinged at the top to pre¬ vent the ingress of rats and moles, but capable of giving way to a sudden rush of water from drains above. The next point to be determined is the water level or water table. This may be ascertained by digging test holes in different parts of the field and noticing the height to which the water rises in them. In an undulat¬ ing field the height will vary in different places, but the knowledge gained by means of the test holes of the nature of the soil and subsoil will indicate the depth of draining required. In general it will be found that in clay land the drains should be shallow and close together, and in sandy or light land deeper and wider apart ; the looser nature of the lighter soil per¬ mitting the rapid percolation of water, and allowing the drains to

draw from a wider area. Drains in arable land must be beyond the in¬ fluence of agricultural implements ; not only out of the reach of plough or cultivator, but too deep to be displaced by their passing weight. Less than two feet six inches from the surface is unsafe, except in very stiff clay pasture land which is never disturbed. The depths usually adopted in practice for the various classes of soils are as follows:

Stiff clay . . ft. 6 in. to 3 ft.

Medium soils . 3 ft. 3 m. to 3 ft. 6 in.

Light soils . 3 ft. 6 in. to 4 ft. 6 in.

As to the distance apart, experience has es¬ tablished a rule that in clay soils a drain will ˆMraw® an area of from 5 to 6 times it«; depth, on medium soils 7 to 9 times, and on light soils 8 to 10 times its depth. Thus 3-foot drains in the first case might be 15 feet apart, in the second 24 feet, and in the third 40 feet apart. Submains may be necessary in an undulating field and in all cases they are desirable where the minor drains would other¬

wise be more than 10 chains in length. The rate of fall of any drain must not be less than 1 in 200. All drains should be kept as far as possible from the roots of trees, and curves are to be avoided, except at the junction of minor with main drains or submains, when the junction must form an acute angle, the smaller drain curving toward the larger drain and entering it from above. Two minor drains must not enter a large drain opposite to each other, or the stop¬ page thus caused will result in the deposition of silt and consequent chokage of the drain.

Drains are cut from the lowest point upward and the pipes laid in each section day by day. To ascertain if the pipe bed is being laid per¬ fectly true, three leveling staves or ˆboning® rods are used. Each consists of a staff and crosshead, and by placing them at various points in the drain and sighting over the cross¬ heads, uniformity of the bed is determined. The surface soil in cutting the drains ought to be laid on one side of the trench and the subsoil upon the other side, and each should be re¬ turned carefully to its original position. The

size of the pipes to be used is dependent upon a number of factors, such as character of soil and subsoil, gradient, rainfall and length of drains ; but in practice it is found most profitable to use 2ˆ-inch to 3-inch pipes for minor drains, and 6-inch, 8-inch or 10-inch for mains and sub¬ mains. The number of pipes required per acre is found by dividing the area of an acre in square feet by the distance between the drains in feet, provided the pipes are one foot in length. The following table will be of value in this particular:

(Lengths up to 500 feet, 2 in. Lengths 400 to 700 feet, 2I in. Lengths 500 to 1,000 feet, 3 in.

2 to 3 acres . 3-inch tiles.

4 to 6 acres . 4-inch liles.

Mains ■ lo to is acres . 6-inch tiles.

20 to 40 acres . 8-inch tiles.

40 to 100 acres . lo-inch tiles.

The tools used in the formation of drains are few in number, and of a very simple description. They consist of a set of spades — generally three of different sizes — gradually diminishing in width to suit the different parts of drains. For taking out the last narrow spit, to form the seat for the draining pipe, long, narrow, triangularly shaped spades, called bottoming tools, are used. There are also scoops of various widths, fur¬ nished with long handles, and rounded or flat¬ tened in the soles according as they are required to finish the bottom of the drain for the recep¬ tion of stones, a horseshoe tile and sole, or a draining pipe. For the purpose of laying pipes in minor and deep drains an instrument called a pipe-layer, consisting of a short rod attached at a right angle to a long handle, which enables the workman to lay the pipes without going into the drain or reaching the bottom with his hand, is employed. Where the subsoil is strong or indurated, a hand-pick or a foot-pick is required to loosen it before it can be shoveled out.

Benefits of Drainage. — The following are among the benefits arising from thorough drain¬ age :

1. Removal of superfluous water. Not only is the standing water at the .surface carried off, but the water-table is lowered, increasing the

depth of soil. Energy that would otherwise be required for evaporation of water is thus saved for the immediate benefit of vegetation.

2. Improves soil texture. Drained soils are more friable, less lumpy, offer less resistance to plant roots, and are of better texture in every way, than undrained soils.

3. Increases root pasturage. Agricultural literature is full of testimony to the benefits of deep tillage. The deeper the soil is stirred the greater its productiveness. Plant roots pene¬ trate to a depth of several feet under favorable conditions such as drainage supplies. Root pas¬ turage is also increased by the increase of sur¬ face presented by the much finer division of soil particles.

4. Increases soil fertility. It prevents loss of fertility by water passing over the surface. It adds to the fertility by sending summer showers down through the soil, instead of over them, enabling the crop to use the nitric acid and ammonia brought down. It increases the effect of manures by bringing them more quickly into solution and into more intimate contact with plant roots ; and it increases the absorptive power of soils for fertilizing matter in solution.

5. Makes tillage easier. By clearing up waste places and covering ditches the field is •brought into better shape for use of labor-sav¬ ing machinery. Waste land is reduced, and the better texture of soil, its finer tilth and greater friability decrease draft and increase the effec¬ tiveness of tillage implements.

6. Lengthens the growing season for crops. Frost comes out earlier in the spring and the land becomes earlier warmed. Evaporation lowers temperature, but drainage removes water without evaporation. A well-drained soil is 12° to 14° F. warmer than a soil full of stagnant water. The sun's rays penetrate to a greater depth, and warm summer showers have a greater effect. The season is lengthened b}^ adding the days in summer after heavy rains when undrained soils cannot be tilled, and crops come to a standstill ; coming of the autumn is delayed until later, and the soils are warmer throughout the season.

7. Assists disintegration. Frosts penetrate deeper in winter in drained soils, assisting in unlocking the stores of mineral plant food. More surface is exposed to the action of disin¬ tegrating agents, and the soil presents conditions more favorable to their action throughout the season.

8. Favors nitrification and bacterial action. Plants are largely dependent on the decomposi¬ tion of organic matter in the soil for their sup¬ ply of nitrogen. This change is brought about by the action of ferments or bacteria which thrive only under certain conditions of tempera¬ ture and moisture. Drainage supplies the most favorable condition for their development ; it also favors the growth of the nitro-bacteria found on the roots of leguminous plants, which by their means appropriate free nitrogen from the air.

9. Prevents heaving. The effect of stool-ice in throwing out young plants in winter is often to diminish seriously and even destroy the crop. Drainage dries up the surface soil and prevents the formation of stool-ice.

10. Lessens washing and diminishes vio¬ lence of floods. By increasing the absorptive

power of the soil less water is left to pass oyer the surface in a rainy season, so that washing and floods are materially lessened.

11. Improves the quantity and quality of crops. That the yield of crops is much greater on drained soils hardly needs to be substan¬ tiated, while the more vigorous growth of plants renders them much less susceptible to the at¬ tacks of fungi or the ravages of insects, thus improving the quality. Rust, mildew, blight, etc., are much less prevalent in crops on drained soils.

12. Diminishes the effect of drought. By making the season earlier tillage can begin sooner and save moisture from wasting. Plants are given a bettter start and root deeper, thus being less affected by a dry surface. The soil is deeper and has greater capacity for moisture. Its finer texture nearly doubles its capillary power over undrained soils. Ordinarily drain¬ age increases the capillary power of soils from 25 to 40 per cent. A drained soil holds water like a sponge, an undrained clay like a dish.

13. Healthfulness improved. So well known is this fact that large towns have undertaken the drainage of adjacent swamps at public ex¬

pense to render the region more healthful. See Agriculture; Sanitary Engineering; Sanitary Science and Public Health.

Among the later authoritative books pn drainage, Chamberlain, ˆTile Drainingˆ ; Klip-part, ˆLand Drainingˆ ; French, ˆFarm Drain¬ ingˆ ; Miles, ˆLand Drainingˆ ; Waring, ˆDrain¬ ing for Profit and Healthˆ ; Jeffrey, ˆText Book of Land Drainageˆ (1916).

DRAINAGE OF MINES. See Mines,

Drainage of.

DRAINAGE TUBES, in surgery, an ap¬ pliance invented by a distinguished French sur¬ geon, M. Chassaignac. They are composed of india-rubber, from one eighth to three-eighths inch in diameter, perforated with numerous holes, and of various lengths. They are intro¬ duced into the abscess or wound so that one end is in contact with the seat of discharge, while the other reaches to the surface of the skin. They are especially useful in chronic abscesses, but also in large wounds, such as those made by amputation, and in all cases where there is apt to be a deep accumulation of discharge.

DRAKE, Alexander Wilson, American artist and critic: b. Westfield, N. J., 1843; d. New York, 4 Feb. 1916. He studied and prac¬ tised wood engraving and later drew on wood for engravers. He also studied oil and water color painting and taught drawing at Cooper Institute. He was in business for himself as a wood engraver from 1865 until 1870 and was head of the art department of Scribner's Monthly when it became the Century. He remained with the Century until 1913.

It was to Mr. Drake's knowledge of wood engraving and of pictorial arts and to his dis¬ tinguished taste that the reputation of Century Magazine on the artistic side was mainly due. He was known as the ˆˆFather of American Wood Engraving® because of the experiments he made in the reproduction on wood of the many processes of illustration, such as paintings in oil and water colors, etching, crayon drawiˆˆe: *etc.* He was a connoisseur of painting and th > allied arts and his collections, which were unique

and varied, included paintings, copper and brass and many other articles of beauty and curiosity.

DRAKE, Charles Daniel, American lawyer : b. Cincinnati, 11 April 1811; d. 1 April 1892. He served several years in the navy, was admitted to the bar in 1833, and in 1834 took up the prac¬ tice of law hi St. Louis, where he became prom¬ inent in politics. In 1864 he was a member of the convention to revise the Constitution of Missouri ; in 1867-71 he was United States Sen¬ ator; and in 1871-85 Chief Justice of the Court of Claims. He wrote ˆLaw of Suits by Attach¬ mentˆ (1854) ; ˆLife of Daniel Drakeˆ (1871) ; and published a collection of his speeches under the title ˆUnion and Anti-Slavery Speechesˆ

(1864).

DRAKE, Daniel, American physician : b. Plainfield, N. J., 20 Oct. 1785 ; d. Cincinnati, Ohio, 6 Nov. 1852. He was graduated from the University of Pennsylvania in 1815, and settled for a time in Cincinnati. He was professor of materia medica in Transylvania University, Ky., and taught in other medical schools till 1820, \vLen he organized the Medical School of Ohio in Cincinnati ; he was professor there, and in the University of Louisville, Ky. He wrote ˆPictures of Cincinnati and Miami Countyˆ (1815); ˆPractical Treatise on the History, Prevention and Treatment of Epidemic Chol¬ eraˆ (1832) ; ˆSystematic Treatise on the Prin¬ cipal _piseases of the Interior Valley of North Americaˆ (1850-54); and was editor of the Western Medical and Physical Journal.

DRAKE, Sir Francis, English navigator: b. probably in Tavistock, Devonshire, England, about 1540; d. off Porto Bello, 28 Jan. 1596. When very young, he served as an apprentice to a sea captain and later became a coast trader. He joined Sir John Hawkins in his last expedi¬ tion against the Spaniards (1567), losing nearly all he possessed in that unfortunate enterprise. Having gathered a number of adventurers round him he contrived to fit out a vessel in which he

made two successful cruises to the West Indies in 1570 and 1571. In 1572 with two small ships he again sailed for the Spanish main, captured the cities of Nombre de Dios and Vera Cruz, burned Porto Bello, captured and destroyed many Spanish ships, crossed the isthmus to the highest point of the dividing ridge, where, climbing a tree from whose tops the guides told him both seas could be seen, he gazed upon the vast waters of the South Seas, and with that touch of romantic enthusiasm that re¬ deemed all his piracies, ^^besought Almighty God of His goodness to give him life and leave to sail once in an English ship in that sea.® Drake arrived in Plymouth on Sunday, 9 Aug. 1573, during sermon-time, when the news of his re¬ turn ®did so speedily pass over all the church, and surpass their minds with desire and delight to see him, that very few or none remained with the preacher, all hastening to see the evidence of God's love and blessing toward our gracious queen and country.®

In 1577 he fitted out a small squadron, con¬ sisting of his own ship the Pelican, the Elisa¬ beth and three smaller vessels, and with these sailed from Plymouth on 13 December. On 20 August the squadron, now reduced to three ships, entered the Strait of Magellan, and here Drake changed his own ship's name from the Pelican to the Golden Hind. In 16 days they

made the passage, then followed violent tem¬ pests for 52 days, during which the Marigold foundered with all hands and the Elisabeth parted with the admiral and resolved to return home. At Valparaiso Drake provisioned his ship from the Spanish storehouses, reached Callao on 15 Feb. 1579, found a rich prize off Cape Francisco (1 March) and another on 4 April. Drake now determined to return home by crossing the Pacific. He touched land at a creek on the northern side of the Golden Gate, then for 68 days together had no sight of land until he made the Pelew Islands. After refresh¬ ing three weeks at Ternate, and a thorough refit on the southwest coast of Java, he held for the Cape of Good Hope, and arrived in England 26 Sept. 1580. The queen paid a visit to his ship at Deptford, and knighted him on its deck.

In the autumn of 1585 Drake sailed with a fleet of 25 ships against the Spanish Indies, harrying Hispaniola, Cartagena, and the coast of Florida, and brought home the 190 dispirited Virginian colonists, with tobacco and potatoes. Early in 1587 he set sail with a strong squad¬ ron to cripple the king of Spain in his own seas, and retard his preparations for invasion — a sport which he called ^singeing the king

of Spain's beard.® Sailing right into the harbor of Cadiz, he sank or burned as many as 33 ships, and made his way out unscathed. The seeming recklessness of his tactics was no devil-may- care bravado, but due to consummate seaman¬ ship no less than promptitude and courage. Drake next sailed to the Azores, capturing a rich homeward-bound Portuguese carack worth £100,000. In the face of the impending struggle for which Philip H had long been preparing, his persistent plan was to follow up the policy of harassing the enemy on his own coasts ■ — ^^to seek God's enemies and her majesty's where they may be found.®

Drake's division in the threefold arrange¬ ment of the English fleet was at first stationed off Ushant, until all the ships were blown to¬ gether to Plymouth by the same storm that car¬ ried the Spaniards across the Bay of Biscay. Here, on the Hoe, the admirals and captains were playing the famous game of bowls, when the news was brought that the enemy was off the Lizard. Howard was eager to put to sea at once, but Drake would first finish the game, saying ^^there's plenty of time to win this game, and to thrash the Spaniards too.® The story, whether true or no, is in perfect keeping with the character of the man. Early next morning the battle began, and raged along the Channel throughout the week. Drake's consummate sea¬ manship and audacious courage covered him with fresh glory, and inspired new terror in the Spaniards. On 29 July occurred the final action so disastrous to the Spaniards, ^ after which they came to their fatal determination to return to Spain round the Orkneys. Two days later Drake wrote to Walsingham, ®There was never anything pleased me better than the see¬ ing the enemy flying with a southerly wind to the northward. God grant you have a good eye to the Duke of Parma, for with the grace of God, if we live, I doubt it not, but ere it be long so to handle the matter with the Duke of Sidonia, as he shall wish himself at Saint Mary Port among his orange trees.® It was not long before want of ammunition compelled Drake and Howard to fall back from the chase, but the

storms of the northern seas took up their work and swept the Spaniards to destruction. Next spring a great expedition under him and Sir John Norreys sailed for the coasts of Spain and Portugal, but had little success beyond the damage inflicted upon the Spanish shipping, while sickness and actual hunger carried off thousands on board the crowded and ill-vic¬ tualed ships. In August 1595, he sailed from Plymouth on his last expedition to the West Indies. Ill-fortune followed the fleet from the beginning; Hawkins, the second in command, died off Porto Rico in November, and Drake himself fell ill and died off Porto Bello. Con¬ sult the ˆLifeˆ by Barrow (1843) ; Froude, 'English Seamen of the 16th Centuryˆ (1895) ; Julian Corbett, short 'Lifeˆ (1890) ; and his 'Drake and the Rise of the Tudor Navy.ˆ

DRAKE, Francis Marion, American capi¬ talist and lawyer : b. Rushville, Ill., 30 Dec. 1830 ; d. Centreville, la., 20 Nov. 1903. In 1837 his family moved to Iowa, where he was educated. In 1852 he crossed the plains to California with ox-teams, encountering and defeating a band of Pawnee Indians on the route, and in 1854 crossed again with a drove of cattle. In 1855 he engaged in mercantile business in Drake-ville, la., and in 1861 entered the army as a private. He served through the Civil War, at¬ taining the rank of brigadier-general of volun¬ teers. After the war he studied and practised law, and engaged in the railroad business, par¬ ticularly the building of new roads. He was the first president of the Missouri, Iowa and Ne¬ braska Railroad, and was later president of the Albia and Centreville Railroad. In 1880 he founded Drake University (q.v.) which he lib¬ erally endowed, and was president of the board of trustees till the time of his death. He was one term (1896-98) governor of the State of Iowa, being elected on the Republican ticket.

DRAKE, Francis Samuel, American his¬ torical writer: b. Northwood, N. H., 22 Feb. 1828; d. Washington, D. C, 22 Feb. 1885. He was a son of S. G. Drake (q.v.). He prepared a 'Dictionary of American Biographyˆ (1872). He also published 'Life of Gen. Henry Knoxˆ (1873) ; 'Tea Leavesˆ (1884) ; and 'Indian His¬ tory for Young Folksˆ (1885). Before his death he had gathered material for a new edi¬ tion of his 'Dictionary,ˆ which was incorporated in 'Appleton's Cyclopaedia of American Biog¬ raphy. ˆ

DRAKE, dra'ke, Friedrich, German sculp¬ tor: b. Pyrmont, 23 June

1805; d. Berlin, 6 April 1882. He was the son of a mechanic, and after an apprenticeship in cabinetmaking turned to clay modelling and studied under Rauch. He traveled also in Italy, where he met Thorwaldsen (1836-37) by whom he was influenced somewhat. Amonˆ his works are ‘The Eight Provinces of Prussiaˆ (colossal alle¬ gorical figures adorning a hall in the royal pal¬ ace at Berlin), and a ‘Warrior crowned by Vic¬ tor,ˆ which is reckoned one of the masterpieces of German sculpture Noteworthy also are his portrait sculptures of Goethe, Schiller, Rauch ; the marble statue of Frederick William HI in the Thiergarten, Berlin ; that of Christian Rauch, at Berlin ; and the colossal bronze repre¬ senting William I, on the Hohenzollern Bridge of Cologne, for which he was awarded the

cross of the Legion of Honor. His work is marked by virility and classic simplicity. He was professor of the Academy of Art at Berlin, and a member of the academies of all the lead¬ ing countries of Europe. Consult Heinrich, ‘Rauch, Reitschel and Drake ˆ (Basel 1884).

DRAKE, Joseph Rodman, American poet : b. New York, 7 Aug. 1795 ; d. there, 21 Sept. 1820. He studied medicine, traveled in Europe, and after his return in 1819 contributed under the signature of “Croakerˆˆ many pleasant, and ef¬ fective verses to the New York Evening Post. His friend Fitz-Greene Halleck joined him in this series, signing his own pieces at first “Croaker, Jr.,ˆˆ but soon they both adopted the signature of “Croaker & Company.ˆˆ The nov¬ elist Cooper was also one of the intimate asso¬ ciates of Drake and a conversation between them as to the poetical uses of American rivers, in the absence of historical associations, such as belong to the streams of the old world, was the occasion of Drake’s longest and most imagina¬ tive poem, the ‘Culprit Fay.ˆ This, with his other poems, was published in 1835. The poems published with Halleck appeared in book form in 1860.

DRAKE, Samuel, American actor: b. England, 15 Nov. 1768; d. Oldham County, Ky., 16 Oct. 1854. He may properly be called the pioneer of the drama in the west. It is said that his name was Bryant, but he assumed that of Drake on the stage. In early life he was apprenticed to a printer, but ran away before his term had expired and went on the stage. Previous to his coming to the United States he was manager of a country theatre in the west of England. He arrived in America with his family in 1809 and appeared at the Boston theatre the same year, remaining there until 1813, when they joined a company at Albany, N. Y., where Mr. Drake became stage-manager. Mrs. Drake died in 1814 and her husband removed the following year

to Kentucky, hav¬ ing previously arranged to take over theatres in Frankfort, Lexington and Louisville. On the way his company gave several performances in towns of western New York. Among the com¬ pany were N. M. Ludlow and Miss Denney, who later were prominent on the American stage. From Olean to Pittsburgh, Pa., the com¬ pany floated on a flatboat down the Alle¬ ghanyˆ and in Pittsburgh gave the first regular theatrical performance ever seen in that town. From Pittsburgh the company went to Mays-ville (Limestone) and thence overland to Frank¬ fort. Drake was very successful in Kentucky and afterward managed houses in Ohio, Ten¬ nessee, Missouri and Indiana.

DRAKE, Samuel Adams, American jour¬ nalist and writer: b. Boston, 20 Dec. 1833; d. Kennebunkport, Me., 4 Dec. 1905. He entered journalism in 1858. In 1861 he joined the army and served throughout the war, becoming brigadier-general in 1863. ˆ He returned to Boston in 1871 and resumed literary work. His most important publications are ‘Old Land¬ marks of Bostonˆ (1873) ; ‘Nooks and Corners of the New England Coastˆ (1875) ; ‘Around the Hubˆ (1881) ; ‘Heart of the White Moun¬ tainsˆ (1882) ; ‘New England Legends and Folk Loreˆ (1ˆ4) ; ‘The Making of New Eng¬ landˆ (188()) ; ‘The Making of the Great Westˆ

(1887); ˆBurgoyne’s Invasionˆ (1889); <The Taking of Louisburg> (1891) ; <Thc Pine Tree Coastˆ (1891); ˆThe Battle of Gettysburgˆ (1892); ˆThe Making of Virginiaˆ (1893); ˆOur Colonial Hornesˆ (1894) ; ˆThe Cam¬ paign of Trenton > (1895) ; <The Watch Fires of 76ˆ (1895); ‘On Plymouth Rockˆ (1898); ‘The Myths and Fables of To-dayˆ (1900) ; ‘The Young Vigilantesˆ (1904) ; etc,

DRAKE, Samuel Gardner, American anti¬ quarian: b. Pittsfield, N. H., 11 Oct. 1798; d. Boston, Mass,, 15 June 1875. He received a common school education and from 1815-25 was a school-teacher in a country district. In 1828 he removed to Boston and there opened one of the first antiquarian book-stores established in the United States. He was one of the founders of the New England Historical and Genealogi¬ cal

Society, acted as its president in 1858, and was editor of its quarterly ‘Registerˆ for many years. He published ‘Indian Biographyˆ (1832) ; ‘Book of the Indiansˆ (1833) ; ‘The History and Antiquities of Bostonˆ (1856); ‘History of the French and Indian Warˆ (1870) ; ‘Old Indian Chronicleˆ (1836) ; ‘In¬ dian Captivitiesˆ (1839) ; ‘Annals of Witch¬ craft in the United Statesˆ (1869), He also edited Church’s ‘Entertaining History of King Philip’s Warˆ (1825) ; Mather’s ‘Indian War of 1675-76> (1862) ; ‘Early History of New Englandˆ (1864) ; Hubbard’s ‘Indian Warsˆ

(1865).

DRAKE UNIVERSITY, a coeducational institution in Des Moines, la. ; founded in 1881, under auspices of Church of Christ. It was named for Gen. Francis Marion Drake, its bene¬ factor, whose gifts amounted to $230,000, and who served as president of the board of trus¬ tees from the board’s organization until his death, 20 Nov. 1903. Linked with the name of Drake as founder, is the name of D. R. Lucas, through whose influence the institution was located in Des Moines, and that of George Thomas Carpenter, its first chancellor and the moving spirit of the new enterprise. Total assets of the university, $530,000. Available income about $90,000 annually. There are eight organ¬ ized colleges ; liberal arts, Bible, law, medicine, normal, conservatory of music, pharmacy, den¬ tistry, also eight special schools. Enrolment for year 1915-16 was 1,466. General control is vested in board of trustees, composed of (1) life members; (2) members elected by Iowa Christian Convention; (3) members elected by Alumni Association. The president of the university, under direction of board, is head of the school.

DRAKENSBERG, a mountain range of South Africa, which extends from the eastern part of the Cape of Good Hope province along the Orange State frontier to the northwest frontier of Natal. The range is steep on the side facing the sea but slopes gradually inland to the South African plateau. It attains a height of from 10,500 to 12, (KX) feet in the peaks Mont-aux-Sources and Champagne Castle and Giant’s Castle is 9,600 feet high. Its two passes of Van Reenan (5,400 feet) and Laing’s Nek (4,100 feet) are traversed by railroads.

DRAMA, a Greek term meaning action, and applied to that form of literature which is suited for performance, or action, before an

audience. A drama tells a story by means of speeches and dialogue, and these are to be spoken by actors impersonating the characters and performing the actions of the story. Speech, gesture, facial expression, makes, pantomine, stage “business,® music, dancing, scenic paint¬ ing are some of the theatrical accompaniments by means of which the dialogue has been made to imitate scenes from life. (See Theatre). Since mimicry is as old as the race, it is evi¬ dent that there have been from times of primi¬ tive culture dramatic elements in games, sports, dances, religious ceremonies and other mimetic performances ; but it is only late in the develop¬ ment of civilization that the drama takes an important place in literature. Nor can the use of dialogue, as in the Book of Job or in medi-seval estnis, be taken as constituting a dramatic literature. The dramatic tendencies in life and literature have resulted in the various nations in definite literary forms, given regular theatrical presentation ; and it is the history of these that this article discusses.

Although in modern times dramas have fre¬ quently been written in prose, the drama in classical times w’as regarded as one of the three divisions of poetry, and so differentiated from epic, the narration of events, and lyric, the ex¬ pression of emotion, and the same distinction is still applied in a general way to literature. An other distinction due to the (jreek is the division of drama into two species, tragedy and comedy; the former dealing with the more serious themes of life and especially with suffering and death, the latter with life’s follies and absurdi¬ ties, fun and sentiment. This distinction was not made in Indian, Chinese or mediaeval drama, and the two species have varied in different countries and centuries ; and there have always existed dramas which stand outside the strict limits of either class ; as satyric in Greek, morality in the Middle Ages, tragi-comedy and pastoral in the Renaissance, drame in modern French, and melodrama at present denoting a mixed and uncritical form. Nevertheless the two species survive and remain fairly compre¬ hensive, the commonly accepted distinction be¬ tween the two depending on the presence of a happy or an unhappy ending.

The drama of India has been the object of much interest to Western scholars since the translation by Sir William Jones in 1789 of ‘Sakuntala,ˆ one of the masterpieces of Kali¬ dasa, the greatest of Sanskrit dramatists. The drama of China, of much later development, offers, like that of India, many points of differ¬ ence from European drama. The earliest ex¬ amples of the drama, however, are found in Greek, and with these we may begin a survey of the historical development and the general characteristics of the literary drama of Athens, Rome, the Middle Ages and Modern Europe.

Athens. — Greek drama had its origin in the dithyrambic songs chanted by the choruses who impersonated the satyr followers of Dionysius in the festivals in honor of the god. Spoken verses and dialogue were after a time intro¬ duced in the midst of the choral odes, and from this beginning both tragedy and comedy even¬ tually developed. To Thespis (650 b.c.) is cred¬ ited the addition to the chorus of an actor to fill in with speech and mimicry the intervals of singing and dancing. He was the founder of Attic tragedy, which continued to develop

rapidly during the next century. The connection of the drama with the worship of Dionysus was maintained; and tragedies were performed at prize dramatic contests instituted in honor of the god, supported by the state, and witnessed by vast concourses of citizens. No plays sur¬ vive from before the time of .<ˆischylus (b. 525 B.c.) ; and to him and to his immediate success¬ ors, Sophocles and Euripides in the 5th century, Attic tragedy owes its highest development and its long-continued eminence and influence in the dramatic literature of the world.

The dithyrambic chorus, originally of 50 men, was separated into four choruses of 12 or 15 each, and plays were composed in groups of four, three tragedies, sometimes forming a tril¬ ogy on one subject but later usually on discon¬ nected themes, and a fourth satyric play, re¬ taining the satyrs of the ancient festivals. Each play consisted of a series of passages of dia¬ logue interspersed by the odes of the chorus. The dialogue introduced various persons and developed a complete story, usually taken from mythology and dealing with the life of some particular hero. Not more than three actors shared in the dialogue at one time, the second actor having been introduced by .ˆschylus, and the third by Sophocles. The chorus occa¬ sionally took part in the dialogue, but its main function was the singing of odes with accom¬ paniment of music and dancing. In .(Eischylus the chorus is of great importance, and its ex¬ planations, advice, and lamentations are essen¬ tial to the representation of the action ; but by the time of Euripides, its part is subordinate and its odes often have no connection with the dialogue. Although subjects were drawn from mythology, and the same story was often treated by several dramatists, large freedom was per¬ mitted in the treatment of the myths, and con¬ sequently there is development in subject matter as in form. .Eischylus treats the myths as supernatural revelations and deals with the course of fate or Nemesis rather than with the conflict of human motives. Sophocles is inter¬ ested in human nature and in moral law, in human life rather than in the supernatural, Euripides treats the myths with free invention and in a realistic and even skeptical fashion, transforming gods and heroes into men and women of the day, delighting in situations of emotional intensity, and making the passion of love for the first time of capital importance as a dramatic motive.

The symmetry and unity of Attic tragedy were in part the result of

limitations imposed by the conditions of the theatrical performance, resulting in the three unities, the value of which has been the subject of much controversy in modern times. The unity of action involved the restriction of the incidents of a play to those strictly concerned with the main action; the unity of time confined the events of the action to a single day; and the unity of ‘place to a single place. In spite of these and other re¬ strictions already noted, the plays, though want¬ ing the wealth of incident and the variety and surprise common to the best modern plays, are by no means lacking in human interest. More¬ over, they represent the height of poetic style. The splendor and beauty of their language and the exquisite perfection of their versification as well as the power and truth of their representa¬

tion of human character and deed, place them among the consummate products of the imagina¬ tion. After the 5th century tragedies continued to be numerous and popular not only in Athens but in other Greek towns ; and later the plays of the great dramatists and of some of their successors were performed in Alexandria and Rome. Only fragments of later tragedy, how¬ ever, have survived.

Comedy, like tragedy, sprang from the wor¬ ship of Dionysus, developing from the frolic and buffoonery of the harvest festival. Farces were exhibited early in the 6th century, but the first great comic writer was Aristophanes. His comedies were satirical and burlesque criticisms of the life of Athens in his day, dealing with political and intellectual tendencies and fash¬ ionable follies, and putting no limit to direct personal satire. Socrates, for example, was caricatured in the ˆ Cloudsˆ and Euripides in the ˆ Frogs. ˆ Aristophanes, however, was a lyrical poet as well as a great humorist ; and his comedies are medleys of satire, caricature, wit, humor, buffoonery, wisdom, fantasy and poetry. This, the ®old comedy® of Athens, was followed in the 4th century by ˆmiddle comedy,® which avoided political and personal matters, and by %ew comedy® (320-250 b.c.), the an¬ cestor of the modern comedy of manners. The chief representative of the new comedy was Menander, whose work down to to-day sur¬ vived only in fragments and in the translations and imitations of the Roman Terence, but who may be better understood if recently announced discoveries answer to the expectations raised.

Rome. — The early development of the drama in Rome seems to have been similar to that in Greece and other countries ; but as no representatives of the early folk drama or the Atellan farces have

survived, it is impossible to trace any peculiarities in its national develop¬ ment. Roman drama is, indeed, known to us only in the works of three writers, the comedies of Plautus and Terence and the tragedies of Seneca. In this late development it is only a borrowing from the Greek. Terence, aiming at literary excellence and protesting against the coarseness and brutality of his audiences, seems to have imitated or even translated Menander without attempt at any departure. Plautus while he also followed the new comedy of the Greeks, appears to have derived some of his characteristics from the earlier Roman farces, and at all events exhibits a coarseness and directness of humor suited to his audience and characteristic of Roman taste. These Roman comedies served as models and incentives for the dramatic writers of the Renaissance, and its stock characters and lively intrigue have had an influential existence down to the present day. In the same way the tragedies of Seneca served as models for the humanists and became the main classical influence upon modern tragedy. Probably never acted, they were rhetorical imi¬ tations of Euripides and later Greek tragic-writers, preserving in the main the form of Attic tragedy, dealing with the most sensational and bloody stories from Greek mythology and abounding in extravagant declamation and sen¬ tentious philosophizing. Still another inherit¬ ance for future ages came from the very dregs of the Roman theatre, the Mimes. The theatre in the later empire ceased to be the home of the

drama, and was given over to bloody spectacle and indecent pantomime. Attacked violently by the early fathers, it ceased with the triumph of Christianity; but the dispersed mimes became the ancestors of the traveling entertainers of the Middle Ages, and the traditions of clownery and farce were handed down from generation to generation.

The Middle Ages. — After the destruction of the theatres by the Christians, all knowledge of the classical drama or theatre practicallv dis¬ appeared. An extensive and multiform drama arose without dependence on classical precedent, never in any nation attaining much literary value, but of interest to the student both as a most significant illustration of the life of long centuries and as a potent influence upon modern drama. The origins of this mediaeval drama are various. Games and sports offer their share of mimetic performances, tracing back appar¬ ently as did the Dionjˆsiac festival at Athens to early celebrations of spring and harvest ; and the popular entertainers, the direct descendants of the Roman mimes, seem to have exercised an effect, not easily traceable, on comedy, especially on the farces and sottises in France. The main stream of mediaeval drama, however, had its ori¬ gin in the Church liturgy. The Church service contained many manifestly dramatic elements ; and the ®offices,ˆˆ especially those for Easter and Christmas, were gradually expanded into little plays that grew into the mysteries, miracles and moralities of later times. The steps in this growth cannot be traced with chronological exactness, but the process was one of seculari¬ zation, the removal of the play from the service, from the Church itself, and eventually from the hands of clerical actors, and the intrusion of the vernacular and its final triumph over the Latin of the Church service. The institution of the Festival of Corpus Christi (1264, confirmed 1311) gave new support to these plays, and during the 14th and I5th centuries their vogue under control of the guilds and other lay organ¬ izations became enormous, in spite of the pro¬ tests of the Church, which began to look askance at the realistic and spectacular treatment of the holy writ.

The earliest vernacular play is the Norman Adam written apparently

in the 12th century; and the eadiest examples of Miracles date in the 13th. The typical Miracle was a dramatic adaptation of a saint's life with the intercession of the Virgin on behalf of the suffering saint. In French drama, the miracles are to be distin¬ guished from the Mysteries, which dealt with stories from the Bible and which ran to inor¬ dinate length, the entire Bible history being treated in a cycle of short scenes. These cycles in France were huge conglomerates, that of the Acts of the Apostles extending to 62,000 lines and occupying 40 days for its performance. ˆ In England no distinction was made between mira¬ cle and mystery, miracle becoming the generic name, although few plays based on saints' lives occur. After the institution of the Corpus Christi celebration, miracles came into the hands of the town guilds, the cycle to be performed being divided into small plays and each assiˆed to a particular guild. Four great collections exist, the York plays (48 in number), Towneley (32), Chester (25) and Coventry (42), all dating in the 14th or early 15th century. Each follows

the scriptural story from Creation to Judgment Day. There were also other cycles and many separate plays, and the performance of plays by guilds extended to nearly every town of im¬ portance in England.

In Italy in place of miracles there were Sacre Rappresentazioni, and in Spain and Germany the development from the liturgical to the full-fledged miracle or mystery did not differ greatly from that in England or France. Onl}'- in France did the drama depart extensively from religious themes, both in the secular mysteries and also in farces of which Mˆathelinˆ is the best example. In spite of the sameness and artlessness of the religious drama, certain ele¬ ments of development are manifest. A desire to bring the story home to illiterate audiences led to. both realistic and spectacular enforce¬ ment; and the addition of episodes furnished a needed comic relief and gave opportunity for some inventiveness. Another tendency, not so clearly progressive, was didacticism which com¬ bining with the fondness for allegory led to the Morality, a presentation ' of a moral lesson through personified abstractions. Apart from its allegory, however, the morality was an ad¬ vance in requiring invention of plots and in centring the interest on a moral conflict.

The Renaissance. — The mediaeval drama had reached a stage that held some promise of further development, when the revival of classi¬ cal learning introduced entirely foreign ele¬ ments and immensely

hastened dramatic prog¬ ress. In the conflict and amalgamation of these humanistic and mediaeval elements, modern drama had its origin. The mediaeval drama, mainly religious in theme, servile in its adherence to sources, ignorant of any distinc¬ tion between a narrative and a dramatic fable and blind to the absurdity on the stage of much which might be essential in a story, permitted the presentation of all kinds of action and de¬ lighted in discordant combinations of the comic and the tragic. Against such a drama, the humanists protested and opposed their knowl¬ edge of the classics, the rules and proprieties of which they sought to impose on the theatre of their day. Their models, however, were not the Athenians, but Seneca in tragedy and Plautus and Terence in comedy; and their imitations lacked the authority of great masters as well as suitability to current theatrical con¬ ditions. The classical influence proved power¬ ful, not through direct imitations, but rather in modifications of mediaeval forms and methods, in widening the range of subjects, and most of all in encouraging innovation and experiment. The last of the 15th and the whole of the 16th centuries witnessed in the various nations of Europe this conflict between mediaevalism and humanism in the drama as in other fields of literature and life. Neo-Latin plays, vernacular imitations of Seneca and Plautus, miracles, moralities, interludes and farces, every variety of form, jostled together and led at last to rec¬ ognized standards and great achievement. In Spain and England, especially, national dramas arose that carried on mediaeval traditions, though with much indebtedness to classical fecundation.

Italy. — Though Italy, as the home of the Renaissance, was the first of European nations to experience a revival of the drania under

humanistic influence, the varied imitations and experiments of the I5th and 16th centuries failed to result in a national drama of importance. The cominedia delV arte, comedy of masks, con¬ tinued to hold popular favor, and the rappre-sentazione sacra had an early successor in Politian's ˆOrfeoˆ 0502) ; but in the main the medi¬ aeval forms were discarded. Neither tragedy, though attempted by Trissino, Dolce, Giraldi Cinthio and others of international reputation in their own day, nor comedy, which attracted to its services Aretino, Machiavelli and Ariosto, achieved, with a few exceptions, either literary or dramatic excellence. More distinctly national in character and of wider influence on other literature than either tragedy or comedy was a new dramatic genre, the pastoral. It had an early beginning in Politian's ˆOrfeo,ˆ and the ˆAmintaˆ of Tasso and Ml Pastor Fidoˆ of Guarini created a dramatic form for the pastoral tradition so powerful in the Renaissance.

In the 17th century tragedies and pastoral plays continued in abundance, but not until the 18th century was the Italian drama again of European ' importance. Maffeo's ˆMeropeˆ (1714) attracted European recognition, and the operas of Apostolo Zeno and Metastasio at¬ tained literary rank and vast popularity. The cominedia dell' arte, which had spread beyond Italy and was maintaining itself in Paris, took a new departure in the dramatized fairy tales of Carlo Gozzi (1720-1808). Meantime Goldoni revived classical comedy of manners, waged war on the cominedia dell' arte and won for himself the title of the Italian Moliere. The tragedies of Alfieri (1744-1803) also won a European reputation and resulted in a contin¬ uance of classical tragedy. This achievement of the 18th century was largely under the. in¬ fluence of French taste, and the reaction to other models was felt in Italy as elsewhere under the impulse of the Romantic movement. The influence of Shakespeare, perceptible in the classic tragedies of Monti and Foscolo, be¬ came marked in the Romantic innovations of Manzoni (fl. 1820). During the middle of the century the popular plays of Pietro Corsa illus¬ trate the general progress in technic, and at the close of the century the work of D'Annunzio and others gave new promise for the poetic drama.

Spain. — The Renaissance resulted in a more complete survival of mediaeval conditions of the drama in Spain than in any other nation of Europe. The imitative attempts of the humanists made little

impression on the public; and the real founder of the Spanish theatre, Lope de Rueda (fl. 1558), though not unin¬ fluenced by classic and Italian literature, was a practical playwright who wrote for small travel¬ ing companies and adapted the current mediaeval forms to please the taste of an illiterate public. Most notable of his dramatic forms was the paso, an interlude presenting some simple inci¬ dent. He had numerous successors, including Juan de la Cueva, who declared open warfare against Seneca and chose national themes, and the great Cervantes, who wrote plays without much success. Toward the end of the 16th cen¬ tury the great period of the Spanish drama be¬ gins with the career of Lope de Vega. In the course of his lifetime the theatre was firmly established at Madrid, professional activity im¬

proved, the national characteristics of the drama determined, and the plays of Lope awarded a popularity greater than that ever won by any dramatist before or since. The number of his plays almost passes belief, rising perhaps to 1,800 full-length plays without counting many shorter entertainments, and it is on record that he composed an entire play in a single day. His work is consequently marked by carelessness and repetition ; it is often hardly more than im¬ provisation, but criticism itself is breathless when it considers the variety of his invention and the cleverness of his technic. He made use of every kind of subject, religious, heroic, ro¬ mantic or realistic ; and attempted with success every form of current drama, tragedy, history, miracle, morality, pastoral, and most notably of all, the comedia de capo y espada, the cloak and sword play. The use of the ®point of honor® as a motive in these plays of gallantry and intrigue, the importance given to women in the action and the employment of the gracioso, a comic servant of the type of which Sancho Panza is the great representative, are a few of the contributions due mainly to Lope's in¬ vention; but it is useless to analyze his contri¬ butions to a drama that he practically made anew.

The height of Lope's activity was at the be¬ ginning of the l7th century, and the great pe¬ riod of Spanish drama continued until the death of Calderon in 1681. In Calderon the national drama reached its acme. Less of a creative genius than Lope and inferior to him as a play¬ wright, he had the advantage of a generation of theatrical and dramatic progress and he pos¬ sessed great genius as a lyric as well as a dra¬ matic poet. The themes of loyalty to the king, devotion to the Church and the point of honor receive greater emphasis in his hands than they had before; in fact, a narrowness of motives and a sameness of character detract somewhat from the dramatic power of his plays.

Perhaps his genius is the most characteristically dis¬ played in his autos, brief allegorical expositions of the miracle of transubstantiation performed on Corpus Christi day, and late successors of the old religious drama.

In the 18th century the Spanish drama, like that of the rest of Europe, came largely under the influence of French taste and models, though not until French dramatists had found inspira¬ tion in the plays of Spanish masters. Moratin was the most successful follower of Moliere; and in opposition to French supremacy, Ramon de la Cruz composed some hundreds of farces or sainetes, ver}ˆ like the old pasos. In the 19th century the romantic movement made itself felt in the drama, and the Don Alvaro of the Duque de Rivas achieved a triumph in 1835 similar to that of Hernani in Paris. Later in the century Jose Zorrilla was perhaps the most popular of dramatists, and at the present -day the plays of Echegaray have attracted international interest.

France. — Although in the Middle Ages, both the religious and secular drama received a higher development in France than in any other nation, yet in the 16th century the influence of Italian humanism turned French men of letters away from national to classical models. The comic drama indeed continued, but in tragedy the Senecan exotic was for the time triumphant. Jodelle's ˆCleopatreˆ and ˆDidonˆ were strict

imitations of Seneca, retaining even the choruses; and the plays of Gamier and Mont-christien, highly esteemed by the literati of Europe, were similarly misdirected efforts. Toward the end of the 16th century Alexander Hardy, a skilful playwright, made use both of the national drama and of Spanish roman¬ ticism and gave vogue to the genre of tragi¬ comedy and established the rhymed Alexandrine as the verse to be employed henceforth in the drama. Hardy's plays aided in interesting people of culture in the professional theatre and were followed by a generation of dramatic activity.

A well-established theatre and a cultivated audience consequently awaited the arrival of a great dramatic poet. Corneille's (1606-89) first play of importance, the ˆCid,ˆ was based on a Spanish original and, though constructed with admirable coherence and condensation, did not adhere to the three unities. For this it was censured by the French Academy, recently in¬ stituted by Richelieu, and henceforth Corneille adopted their cramping limitations. French tragedy by his powerful example was thus com¬ mitted to the form exampled by Seneca and defined by the Italian humanists though usually the chorus was abandoned. A certain gain in simplicity of plot and conciseness of treatment was thus obtained at the expense of a narrow¬ ing of incident and an artificiality of characteri¬ zation. Corneille dealt with heroic deeds, ex¬ alted character, noble sentiments, extraordinary situations. Racine, who followed him, chose less unusual stories, simplifying the action even more than Corneille, and excelled in the analy¬ sis of passion. Love is the dominant motive in his plays and the heroines are the persons for whom he seeks our sympathy. Melodious and dramatic as his verse is, it carries an impression of artificiality, at least to foreigners, perhaps largely on account of the conventionalized lan¬ guage demanded by the courtly and sophisti¬ cated audiences to which he appealed. French tragedy represents the elegance of the court of Louis XIV, as English tragedy represents the stirring activity of Elizabethan England, and_ as Sophoclean tragedy represents the culmination of Athenian civilization.

The greatest French dramatist, however, was a writer of comedies. An

actor, and a manager of a strolling company of players that finally established itself at Paris, Moliere grew slowly to the full employment of his powers. His early experience taught him the means of win¬ ning his audience, and he availed himself of every known resource in strengthening his dra¬ matic facility. The Italian comedy of masks, * the plays of Plautus and Terence and the methods and themes of Spanish drama were all drawn upon by him in his conquest of every department of comedy. His masterpieces, at once triumphantly effective on the stage and most penetrating m their revelation of the ab¬ surdities and weaknesses of human nature, have a fresh appeal to every reader to-day through their humor and their philosophy, and they have remained these 200 years the unapproached models of modern comedy.

Corneille, Racine and Moliere continued the great models of drama through the 18th century everywhere in Europe, and naturally most of all in France. Lesage, Marivaux and Beau¬

marchais were the leading followers of Moliere; and the classical tragedy received new authority through the weight of Voltaire's precept and example. A new species of drama, however, arose that violated the classical restrictions on comedy and tragedy. The tearful comedy, ˆComedie larmoyante,ˆ pathetic and sentimental, had a considerable popularity in England and France, and was sustained by the criticism and plays of Diderot. Blending with another spe¬ cies, the tragedie boiirgeoise, tragedy of common life, this tearful comedy has indeed continued as a recognized species under the name of drame. In the early 19th century the skilful mechanism of Scribe achieved popular success without obeying the rules, but it was not until the performance of ˆHernaniˆ (1830) that the romantic liberation from the pseudo-classical restrictions was assured. The poetical brilliancy of Victor Hugo and the spontaneous inventive¬ ness of the elder Dumas created a romantic drama, essentially melodramatic perhaps, but at least overwhelming the pseudo-classical preten¬ sions. During the middle of the century, when in other nations the acted drama had ceased to be a serious department of literature, it still held its own in France in the plays of the younger Dumas, Augier and others. Until the advent of Ibsen, its serious study of contemporary society offered the most hopeful sign of the reinvigo-ration of the drama, and its technical excellence was the model of all other theatres. More re¬ cently the varied work of many dramatists, as Hervieu and Rostand, offers evidence that French eminence in modern drama is still to be maintained.

England. — In England, as in Spain, the humanists failed to impose upon the drama the rules supposedly based on classical precedent, but in no other nation was the classical influ¬ ence a more powerful germinating force. Medi¬ aeval forms variously modified continued to sur¬ vive, but in ˆRalph Roister Doisterˆ (1552) and ˆGorbodierˆ (1561), comedy and tragedy appear as highly developed forms. Though similar academic attempts, especially in Senecan tragedy, followed for some years, the establish¬ ment of the first London theatre in 1576 marked the triumph of the professional companies over their amateur and academic rivals. A dozen years later the advent of a group of clever poets determined the course of the popular drama and prepared the way for Shakespeare. The genius of Marlowe (1564-1593) brought poetry to the theatre and raised the prevailing popular forms to dramatic and literary effectiveness. He re¬ made history and tragedy with an utter dis¬ regard for classical rules and yet, in spite of the violence and spectacle with which he delighted his audiences, he made his blank verse a noble and a dramatic _ expression of human passions and aspirations. Kyd borrowing from Seneca the story of re¬ venge and the accompanying ghosts and horrors created a special type, the tragedy of blood. In comedy Lyly and Greene were the most notable innovators, the former producing artificial and courtly plays, lyrical, spectacular and abounding in witty repartee, the latter intro¬ ducing romantic comedy with its averted trag¬ edy and sentimental treatment of love. In all these plays there was rarely any attempt to fol¬ low the three unities, or to restrict in any way

the presentation of the story upon the stage. The primary aim of each dramatist was to tell his story so as to please his audience, but each was also a poet, thrilled with the spirit of the years of the Armada and ardent for the glories of the new poesy.

After these innovators came Shakespeare. This is no place for even a summary of his achievement, but it may be noted that, begin¬ ning as a remaker of old plays and an imitator and adapter of the various popular types, he was throughout his career conditioned by the efforts of his fellow dramatists and the demands of the London theatres. His masterpieces are the culmination of a most varied and virile dramatic period. The most marvelous of his gifts, his faculty of expression and his knowl¬ edge of human nature correspond to the two great excellencies of Elizabethan drama, its poetry and its characterization. The blending of wit, drollery, sentiment and fantasy that makes his comedy so enchanting and the enor¬ mous range of situation and character that dis¬ plays his creative genius as supreme were the outcomes of the freedom of the stage from restrictions and of the adventurous audacity with which the Elizabethan playwrights tried their hands at everything.

The development of Shakespeare's art was in a measure paralleled chronologically by the general development of the Elizabethan drama. During the last half of his career, perhaps in part from the survival of classical influences, the other dramatists were like him, freeing themselves from much of the lawless absurdity of earlier days. Foremost among the reformers was Ben Jonson (q.v.) who sought to impose on the popular drama as much as possible of classical regularity and propriety. He was at his best in a kind of drama that Shakespeare did not attempt, the ˆcomedy of humours,ˆˆ plays dealing with the manners of the day; sometimes conventionalized by too close adher¬ ence to Latin models, but again, as in ˆBartholo¬ mew Fair,ˆ transcending anything else in Eng¬ lish drama in the humor and truth of their realism. Of the other great names of the period there is hardly space here even for mention. Beaumont and Fletcher (q.v.) possessed an extraordinary cleverness of invention and fa¬ cility of expression and, like their contempora¬ ries in Spain, relied on complexity of plot and ingenious alterations of suspense and surprise. The heroic romances of their collaboration and the lively comedies of Fletcher's later years, though long popular and influential on the stage, lacked

the moral vigor that had been characteristic of the 16th century drama and thus supply one of the earliest symptoms of the decline of the drama. Under James I, indeed, the drama no longer reflected a vigorous na¬ tional spirit, but rather a corrupt and immoral society, and the poets no longer felt the stimulus of a free field for exploration and discovery, but wrote under the overshadowing influence of the great masterpieces of their immediate pred¬ ecessors. Massinger, Ford, Middleton, Web¬ ster, Shirley and others produced plays of great beauty and power, but their best work exhibited no marked departure from the past, and in one way or another marked a moral and artistic decline.

Though the Restoration brought in French

tastes and models, the influence of the great Elizabethans continued potent. The heroic plays, written in rhymed verse and drawn from French romances and dramas, carried on the methods of the heroic plays of Beaumont and Fletcher, and the comedies, written under the inspiration of Moliere, depended largely on the examples of Fletcher and Jonson. Shakespeare's tragedy, though modified and deformed to suit the taste of the day, was dominant in the the¬ atre. Jeremy Collier's famous attack on the immorality of the stage made an end to a period that includes Wycherley, Otway, Congreve and Dryden and that rivalled the Elizabethan in the supremacy of the drama over other forms of literature. The divorce between literature and the theatre thus proclaimed has never in the centuries since been completely annulled.

In the 18th century, while French examples dictated English literary drama, they never won much hold on the theatre. Frigid imitations of the pseudo-classical form such as Addison's ˆCatoˆ and Johnson's Hreneˆ were abundant, but even these literary imitations soon began to reflect Elizabethan models. In comedy Steele's sentimental plays correspond to the tearful comedy of France, and Lillo's domestic trage¬ dies, based on Elizabethan predecessors and of importance abroad as well as at home in break¬ ing the classic fetters, correspond to the tragedie bourgeoise. The vogue of the sentimental in comedy was broken by Goldsmith's ˆShe Stoops to Conquerˆ ; and in Sheridan's ˆRivalsˆ and ˆSchool for Scandal,ˆ English comedy of man¬ ners reached a height not since surpassed. The Romantic Movement dealt the death blow to the vestiges of pseudo-classicism still surviving, but was peculiarly sterile in positive achieve¬ ment. The romanticists essayed the drama, but neither Lamb, Wordsworth nor Coleridge suc¬

ceeded on the stage, and Byron and Shelley wrote without the stage in view. English writ¬ ers in the 19th century were too indifferent to theatrical technic to produce effective plays. Tennyson, Browning, Arnold and Swinburne have all written dramas, but they belong to the hybrid ˆcloset drama® that separates itself from the stage. At present in the poetical plays of Mr. Stephen Phillips and the technically skilful studies of social conditions by Mr. Pinero we may discern signs in England as on the Con¬ tinent of a revival of serious dramatic activity and of the reunion of literature and the theatre.

Germany . — The rnodern drama had no inde¬ pendent development in Germany until the sec¬ ond half of the 18th century, when Lessing took the lead in the attack on the prevailing French conventions. His own plays gave support to his preaching and Goethe and Schiller in their early plays followed him in turning to England and Shakespeare for inspiration. Their later dramas take high rank as literature, Schiller's Wˆilhelm TelP and ˆMaria Stuartˆ being perhaps the best of the romantic dramas. Most of the drama of the storm and stress period was intended for readers rather than for spectators, but the plays of Kotzebue, though with little pretensions as literature, were skilful in their adaptation to the temper of the time and to requirements of the theatre, and carried everything before them in the theatres of Europe and America. The literary drama had a host of more worthy followers through the 19th century, the career

of the Austrian Grillparzer (1791-1871) being the most notable. Recently romanticism has given way to the realism of Ibsen, and perhaps the most brilliant accomplishments of the pres¬ ent have come from the renewed activity in the German drama, especially in the plays of Sudermann and Hauptmann.

Scandinavia. — The Scandinavian drama first becomes of European importance in the work of Ibsen. Beginning with historical dramas follow¬ ing the prevailing romantic fashion, he ad¬ vanced to the amazingly fantastic and original ˆPeer Gynt,ˆ and then, in self-imposed exile from Norway, produced the series of social dramas that are influencing so pervasively the theatre of the modern world. Both by their profound criticism of modern life and by their technical reforms, they seem likely to mark the beginning of a new era in the history of the drama. Written in concise, unadorned prose, free from the soliloquies and lyrics and em¬ bellishments that romanticism confirmed, they return to the simplicity and directness of the Greeks ; and at the same time are as modern in technic as in the problems and the psychology that they present.

America. — America has long had a theatre of importance but not a drama. The first theatre in 1766 was followed after the Revolution by the first important acted play by an American — the ˆContractˆ by Royall Tyler, afterward chief justice of Vermont. William Dunlap, the first dramatist of influence, translated from the popular Kotzebue and produced many plays of his own. The visit of Kean in 1820 marked the establishment of the theatre as a social institu¬ tion of importance and has been followed by frequent visits from most of the great European actors ; and, since Forrest played Othello in 1826, there has been a famous succession of dis¬ tinguished American actors. The drama, how¬ ever, has in the main continued servile imita¬ tion of European models. After Kotzebue, Scribe and Sardou were translated or imitated here as elsewhere, and the reproduction of for¬ eign plays to the discouragement of American authors was fostered until 1891 by the absence of any international copyright. The develop¬ ment of the drama in Europe during the 19th century has, however, been

paralleled in some degree in the United States. There has been the same advance in technic ; the same conflict between romanticism and realism, and the same powerful influence of the novel upon the drama. This last influence has been perhaps stifling rather than stimulating and has led recently to a great popularity of dramatized novels, of which ˆUncle Tom's Cabinˆ at least has had an international vogue. More promising for the future of a national drama has been the tend¬ ency to present various phases of American life illustrated by the success of the ˆOld Homesteadˆ and by the more worthy plays of Mr. Bronson Howard and Mr. Augustus Thomas.

The Twentieth Century. — The 20th century has witnessed a remarkable development in the drama of Europe and America, and this has been accompanied by changes in the stage pres¬ entation which may be described as revolu¬ tionary. The revolution of the theatre is still in process, and no one can say with certainty what will be its outcome. But the artistic pro¬

ductions of Reinhardt in Germany, Barker and others in England, have been accompanied by great popular interest in the drama and many efforts to suit the theatre to the proletariat. In the United States, the changes in the stage have lagged somewhat behind the European experi¬ ments, but they are manifest in two quite oppo¬ site directions. First, the number of ˆlittle theatresˆˆ with stage and auditorium suited to literary or intellectual drama have multiplied rapidly. Second, the giving of great spectacles or outdoor pageants indicates a step in bringing the theatre to the people. Manifestly, the old theatre of the nineties no longei suffices for the many dramatic enterprises of our day; and there is in the process of creation a new theatre far more varied and flexible, and more con¬ sonant with dramatic originality.

It is indeed a vast development of dramatic originality which has caused the theatre to change its forms and manners. Everywhere young men of imagination have been turning their talents to the drama and finding in it potentialities of popular appeal not possessed even by the novel and the short story. Undoubt¬ edly a great influence in this modern dramatic revival has been the work of Ibsen. The stage of every country has felt the force of his inspi¬ ration and has welcomed realistic studies of cur¬ rent-manners, intellectual discussions of social problems and symbolic interpretations of life, all of which owe something to the great Scandi¬ navian. But the dramatic revival has not been distinguished merely by the realism, social dis¬

cussion and symbolism which Ibsen initiated. Poetry has reasserted its place, and Romance has never yielded its hold on the stage. More¬ over, the drama of the 20th century has by no means had a uniform international develop¬ ment. One of its most striking characteristics has been the reappearance of strong national peculiarities. These have been most marked in Ireland and Russia ; but there is no nation in Europe where playwrights are not striving to express national peculiarities and aspirations upon the stage ; and in the United States the chief merits of the new drama are its obser¬ vation and interpretation of American life.

In Ireland the Celtic renaissance resulted in the establishment of a literary theatre and the appearance of a national drama distinguished by the plays of Yeats, Synge and a group of en¬ terprising lesser dramatists. In Russia, Tolstoi, Gorky and other novelists have enriched the drama, and the stage has attracted in Andreyev a writer of fantastic but powerful originality. In Scandinavia Ibsen's pessimism has been car¬ ried on in the morbid work of Strindberg, who may perhaps be credited with bringing to the fore one of the characteristic dramatic forms of the time — the one-act play. In Germany neither Sudermann nor Hauptmann has quite realized his early promise, and in men like Fulda and Wedekind, or in the Austrian, Schnitzler, it is difficult to discover any notable advance. In French, however, among a multi¬ tude of clever and intellectual playmakers there are at least three of great international in¬ fluence — Brieux, Rostand and the Belgian Maeterlinck. Brieux is a propagandist who sac¬ rifices art to moral causes, and to special causes at that, but he has succeeded in stirring the world. Rostand and Maeterlinck are romanticists.

and the former by his poetic virtuosity, and the latter by the versatility of his theatrical experiments, have done much to maintain romance and fantasy on the modern stage. The problems of sex and the disasters of love continue to be the chief themes of continental drama, and this preoccupation with a neurotic eroticism finds its most sensational exponent in the Italian D'Annunzio, who mingles great

lyrical beauty with abnormal brutality. In Spain the chief figure has been Echergaray, whose melodramatic and rhetorical romanticism was tinctured in his later works by Ibsen-like sym¬ bolism ; but a swarm of plays are maintaining the popularity of the threatres.

In England Jones and Pinero, who were among the first to feel the inspiration of Ibsen, have continued to write copiously; and brilliant studies of satire and contemporary manners have been contributed by Galsworthy and Bern¬ ard Shaw, while romance and sentiment have found a notable spokesman in Barrie. Shaw's plays have been as successful in Germany as in England ; and all three dramatists have found an enthusiastic public on this side of the ocean. In the United States no dramatist of interna¬ tional eminence has emerged, but the individual plays of Thomas, Gillette, Sheldon, Walter, Moody, Mackaye and others have given evi¬ dence that the new methods and ideas are at work. There are many signs that America will take an active part in the further advances which seem sure to distinguish the drama of the 20th century.

Bibliography. — For criticism of dramatic technic and theory: Schlegel, ˆLectures on Dra¬ matic Art and literatureˆ (English translation, London 1846) ; Freytag, ˆThe Technique of the Dramaˆ (English translation, 1895) ; Price, ˆThe Technique of the Dramaˆ (New York 1892) ; Archer, ˆPlayMakingˆ (1913) ; Hamil¬ ton, W,, ˆStudies in Stagecraftˆ (1914) ; Matthews, ˆA Study of the Dramaˆ (1910); Faguet, ˆDrame ancien, drame moderneˆ (Paris 1898) ; Hennequin, ˆThe Art of Playwritingˆ (Boston 1890). For the history of the drama: Creizenach, W., <Geschichte des neueren Dramasˆ (4 vols., 1893-1903, still incomplete, but the best work on the modern drama) ; Ward, A. W., ˆA History of English Dramatic Literature > (new ed., 1899) ; Schelling, Eliza¬ bethan Dramaˆ (2 vols., 1908) ; Thorndike, ˆShakespeare's Theatreˆ (1916) ; Haigh, ˆThe Attic Theatreˆ (new ed., 1898) ; Haigh, ˆThe Tragic Drama of the Greeksˆ (Oxford 1896) ; d' Ancona, ˆOrigini del Teatro in Italiaˆ (2d ed., 1891) ; de Julleville, ˆHistoire du theatre en France au moyenageˆ (1880-86) ; Cham¬ bers, ˆThe Mediaeval Stageˆ (Oxford 1903) ; Matthews, Brander, ˆFrench Dramatists of the Nineteenth Centuryˆ (New York 1891), and ˆThe Development of the Dramaˆ (New York 1902) ; Thorndike, ˆTragedy ˆ (1908) ; Archer, ˆEnglish Dramatists of To-dayˆ (London 1882) ; Genest, ˆHistory of the Stage ˆ (Bath 1832) ; Fitzgerald, ˆA New History of the Eng¬ lish Staged (London 1882) ; Baker, ˆThe Lon¬ don Stage ˆ (London 1899) ; Dunlap, ˆHistory of the American Theatreˆ (New York 1832) ; Jusserand, ˆLe theatre en Angleterreˆ (2d ed., 1881) ; Lowe, ˆA Bibliographical Account of English Dramatic Literatureˆ (London 1888). Lemaitre, Hmpressions

de theatreˆ (10 vols..

1896-1900) ; Chandler, ˆAspects of Modern Dramaˆ (with full bibliography, 1914) ; Morris, ˆThe Celtic Dawnˆ (1917).

Ashley H. Thorndike,

Professor of Englishˆ Columbia University.

DRAMA, Censorship of, official super¬ vision of plays and stage productions in the interests of public morality. In the United States this is covered by the law governing pub¬ lic morals, which enables a play to be suppressed if any overt act is committed which is consid¬ ered immoral. In England preventive censor¬ ship of the drama dates from the reign of Henry VIII, and under Elizabeth in 1545 the master of the revels was appointed dramatic censor. In 1624 the appointment was trans¬ ferred to the lord chamberlain's office. The necessity of placing a curb upon the license of the theatre in the use of political satire led to the act of 1737 which legalized the lord cham¬ berlain'sˆ authority and established a regular censorship which became particularly active in the early years of the reign of George HI. By the provisions of Acts 6 and 7 Viet., c. 68, new plays or additions to old plays must not be acted for hire at any theatre in Great Britain until they have received the sanction of the lord chamberlain, under a penalty of $250 for each performance and the forfeiture of the building's license. This power is vested in the ˆofficial examiner of stage playsˆˆ attached to the lord chamberlain's office. The licensing of theatres is vested in the county council, and is usually exercised by the presiding justice of peace of the district.

DRAMA LEAGUE OF AMERICA, an

organization founded at Evanston, Ill., 25 April 1910. Its aim is to crowd out vicious plays by attending and commending good plays and building up audiences for them through study classes, reading circles and lectures ; to aid in the restoration of the drama to its honorable place as the most democratic medium for the self-expression of the people. As new plays are produced, the playgoing committee attends them and reports by means of bulletins on those that conform to certain critical standards. These bulletins are sent by mail to all members of the league and to all affiliated clubs or other organizations that belong to the league. The league does not censor. If it approves a play, the members are urged to support it — if it dis¬

approves, it remains silent. The circuit commit¬ tee organizes audiences in advance of a league play in a small town so that the managers are assured of sufficient support to venture to bring to a town a play which otherwise would not have visited it. ‘The educational department of the league is made up of experts who endeavor to introduce drama through its study courses in all study clubs of the country, to equip libraries with suitable works on the drama, in short, to create by every means a better understanding of drama. The league has made rapid progress, having now a total of 60 branches, with mem¬ bers in 48 States, in England, France, China, Australia and in Canada. Its total membership is 23,089, and through affiliated clubs over 200,- 000. The fee for direct membership for the individual is $1, for a club $2, for a supporting member $5, for a life member $100. The Drama League Monthly, its official organ, is published

each month except June, July and August, and is sent free to all members. Wonderful pageants have been successfully conducted in many cities under its auspices, and the League was entirely responsible for the nation-wide cele¬ bration of the Shakespeare Tercentenary with pageants and masques in over 2,000 different cities. The national headquarters of the League are in Washington, D. C.

DRAMA SOCIETY, The, a New York

organization of art-loving playgoers on a basis that secures to regular members of the Society the best seats, for the best productions only, at the box-office price. There are no dues and no initiation fees. The only condition imposed is that the members yearly attend 10 productions found worthy of the intelligent playgoers, within the first month after production. By ensuring that intelligent plays receive immediate attend¬ ance and financial support, the society en¬ courages the better forms of dramatic art. Every intelligent play receives at once an in¬ telligent hearing, financial support and the very best advertising — the report of discriminating people who have seen it. Artistic plays

are thus guaranteed a considerable measure of success. In this way it is ensured that more good plays are produced and that no really excellent play shall fail. Instead of attempting to organize an artistic theatre, the Society aims to organize an artistic and discriminating audience. The treasurer of the society is Mr. Thomas W. Lamont, 23 Wall street. New York.

DRAMATIC ART, Schools of. See

Schools of Drama.

DRAMATIC ARTS, American Acad¬ emy of, a school of dramatic arts, established by Franklin Sargent in New York in 1884 and chartered by the regents of the State of New York in 1889. Its object is to train pupils for the stage. It offers a two years' course, includ¬ ing opportunities for public appearances. The Academy took charge of the dramatic school of the Empire Theatre in 1897. Several plays are produced annually.

DRAMM. See Dirhem.

DRAMMEN, dram'men, Norway, seaport at the mouth of the Drammen River, on an arm of the Christiania Fjord, 33 miles southwest of Christiania. The town, which has been practi¬ cally rebuilt since the fires of 1866 and 1870, is picturesquely situated between two chains of high hills. The river divides the town into three parts which are connected by bridges. The principal manufactures are woolen and cot¬ ton goods, iron work, lumber and tobacco, and there are also several sawmills and shipyards. Its trade is chiefly with Holland and England. It is the second port in the kingdom for the ex¬ port of timber. It also exports zinc, nickel and cobalt. Nearby are large salmon fisheries. Pop.

23,091.

DRANESVILLE, Battle of. Dranesville is on the Alexandria and Leesburg turnpike, 16 miles northeast of Washington ; and 20 Dec. 1861, to collect a supply of forage near there, Gen. E. O. C. Ord, with his brigade of Pennsyl¬ vania Reserves, the First Pennsylvania Rifles, a battery of four guns and a detachment of cav¬ alry — in all about 3,900 men, — moved from

camp near Langley's. Driving a few Confed¬ erate cavalry from Dranesville, he entered it. It happened the same morning Gen. J. E. B. Stuart started from the Confederate lines at Centreville with a brigade of infantry, 150 cav¬ alry, four guns and about 300 wagons, to gather hay near Dranesville; and he was so engaged when he heard that Ord was approaching. Fearing for the safety of his train, and believ¬ ing that the only way to save it was to attack Ord, he advanced for that purpose, at the same time ordering his wagons back to Centreville. Stuart attacked with great impetuosity, and after a severe fight of Lvo hours was defeated and retreated to Centreville, with a loss of 186 killed and wounded. Ord's loss was 67 killed and wounded. Compared with subsequent events, Dranesville was a small affair, but it gave en¬ couragement to the Union cause and stands greatly to the credit of the Pennsylvania Re¬ serves. Consult ˆOfficial Recordsˆ (Vol. V).

DRAPER, Andrew Sloan, American lawyer and educator: b. Westford, N. Y., 21 June 1848; d. Albany, N. Y., 27 April 1913. He attended the public schools of Albany until 1863, when he won a prize scholarship in the Albany Academy. Upon graduating in 1866 he became instructor there, and principal of a graded school, through the next four years. During these years he had been reading law, and, after graduating from the Albany Law School and the School of Law of Union University, he was admitted to the bar in 1871, and practised in Albany till 1887. In 1881 he was elected to the legislature, and for several years was actively engaged in poli¬ tics. In 18ˆ he was appointed by President Arthur one of the judges of the United States Court of Alabama Claims, serving until the duties of that court were concluded.

It is, however, for his long and distinct service to the administration of American edu¬ cation that Dr. Draper is best known and appre¬ ciated. From 1878ˆ1 and again from 1890-92 he was a member of the board of education in Albany; when in the legislature in 1881 he was a member of the committee on public education ; in 1882 he became one of the board of the State Normal School in Albany; in 1886 and again in 1889 was elected, by the legislature. State super¬ intendent of public instruction. Fromˆ 1889-91 he was president of the National Association of School Superintendents ; in 1892-94 superintend¬ ent of public schools of Cleveland, Ohio ; in the latter year resigned this position to become president of the University of Illinois, acting in that capacity for 10 years ; in 1902 was appointed by President Roosevelt a member of the United States Board of Indian Commissioners; in 1903 was elected president of the North Central Association of Colleges and Secondary Schools, and on 9 March 1904 was chosen commissioner of education of the State of New York. He

was chairman of the Department of Education of the International Congress at Saint Louis 1904 and was awarded the grand prize of the exposition for the preparation of educational exhibits from Illinois and New York. Dr. Draper wrote largely on historical and educa¬ tional matters and in 1905, beside contributing many articles himself to the work, became editor of the educational department of the ˆEncyclo¬ pedia Americana.ˆ (See article Education). A large bronze memorial tablet to Dr. Draper

was unveiled at the 53d convocation of the Uni¬ versity of the State of New York in the State Education Building in Albany on 18 Oct. 1917. Among his numerous publications are ˆHow to Improve the Country Schoolsˆ (1887) ; ˆPowers and Obligations of Teachersˆ (1887) ; ˆSchool Administration in Large Citiesˆ (1888) ; ˆThe Indian Problem in the State of New York' (1888) ; ˆHistory of the New York Common School System' ; ˆ Legal Status of the Public Schools' (1890) ; ˆThe Authority of the State in Education' (1890) ; ˆA Teaching Profession' (1890) ; ˆAmerican Schools and American Citi¬ zenship' (1891) ; ˆThe Spirit of the Teacher' ; ˆScience in the Elementary Schools' ; ˆThe Pilgrims and Their Share in the National Life' ; ˆAmerican Universities and the National Life' ; ˆThe Illinois Life and the Presidency of Lin¬ coln' ; ˆThe Rescue of Cuba' ; ˆBankers and the Community Life' ; ˆJohn Marshall and the March of the Constitution' ; ˆMemorial of President McKinley' ; ˆ(Coeducation in America' ; ˆThe Personal Equation in the Medical Profession' ; ˆThe Recovery of the Law' ; ˆThe University's Return to the State' ; ˆThe Element of Inspiration in the Schools' ; ˆEducational Tendencies, Desirable and Other¬ wise' ; ˆUniversity Questions concerning the Common Schools' ; ˆOrganization and Admin¬ istration of American Educational Systems' ; ˆConserving Childhood' (1909) ; ˆHoliday Pa¬ pers' (1912), *etc.* He was also editor-in-chief of ˆSelf-Culture for Young People' (10 vols.,

1906).

DRAPER, Daniel, American meteorologist : b. New York, 2 April 1841. He studied science under his father, J. W. Draper (q.v.), acting as his assistant and amanuensis for years. He helped his brother, Henry Draper, to construct the telescopes, grind the mirrors and build his observatory at Hastings-on-the-Hudson. From 1869 to 1911 he was director of the New York Meteorological Observatory, the self-recording instruments in use there being of his design. He has written a ˆTreatise on the Causes of Pneu¬ monia' and also helped his father in the prepa¬ ration of his ˆHistory of the Intellectual Development of Europe.'

DRAPER, Eben Sumner, American manu¬ facturer and political leader: b. Hopedale, Mass., 17 June 1858; d. 9 April 1914. He re¬ ceived his

education at the Massachusetts Insti¬ tute of Technology, became a member of the firm of George Draper and Sons in 1880 and selling agent of the Draper Company in 1896. He acquired interests in several manufacturing corporations and was chosen president of the Manville Company and vice-president of the Massachusetts Hospital Life Insurance Com¬ pany. He took an interest in politics, was chair¬ man of the Republican State committee in 1892 and of the Massachusetts delegation to the Re¬ publican National Convention of 1896. He was a presidential elector in 1900, was lieutenant-governor in 1906-08 and governor of Massachu¬ setts in 1909-11.

DRAPER, Henry, American scientist : b. Prince Edward County, Va., 7 March 1837; d. New York, 20 Nov. 1ˆ2. He is a son of J. W. Draper (q.v.). He studied in New York from 1852 to 1854 and began the practice of medicine in 1858. He was then professor of physiology

in New York University from 1860 to 1866, pro¬ fessor in the medical school from 1866 to 1873 and afterward professor of chemistry. He con¬ structed large telescopes and devoted himself to celestial photography, rendering important serv¬ ice to astronomy and astrophysics. The contin¬ uation of his spectroscope investigation of the stars which was cut short by his death was pro¬ vided for by the endowment of the Draper Memorial at Harvard Observatory by his widow in 1886. He published ˆOn the (Construction of the Silvered Glass Telescope' (1864; 1904), and ˆA Textbook on Chemistry' 0866).

DRAPER, John Christopher, American physician: b. Prince Edward County, Va., 31 March 1835; d. New York, 20 Dec. 1885. He was graduated from the medical department of New York University, was professor of physi¬ ology in that institution 1858-60 and professor of chemistry in the medical department 1866-85. He was also professor of chemistry at Cooper Union and professor of physiology and natural history at the College of the City of New York. He edited the ˆYear Book of Nature and Sci¬ ence' (1872-73) and for three years edited the natural science articles in Scribner's Monthly. He wrote ˆProduction of Urea' (1856) ; ˆOn Respiration' (1856) ; ˆTextbook on Anatomy, Physiology, and Hygiene' (1866) ; ˆPractical Laboratory Course in Medical Chemistry' (1882) ; ˆTextbook of Medical Physics' (1885).

DRAPER, John William, American phys¬ iologist and chemist: b. Saint Helens, Lan¬ cashire, England, 5 May 1811; d. Hastings-on- the-Hudson, N.Y., 4 Jan. 1882. He obtained his early schooling at

Woodhouse Grove in a Wes¬ leyan Methodist institution and then took up courses in chemistry, physics and higher mathe¬ matics under a private tutor. In 1833, when 22 years of age, he came to the United States and entered the University of Pennsylvania, there taking a course in medical studies and gradu¬ ating with his degree of M.D. in 1836. Shortly after graduating he received an appointment to the chair of chemistry, natural philosophy and physiologyˆ in Hampden-Sidney College in Vir¬ ginia, continuing in that capacity until 1839. It was then that he commenced the experimental researches which rendered his name famous, and during those years he contributed the results of his experiments to the American Journal of Medical Sciences. In 1839 he was called to the chair of chemistry and natural history in the academic department of the University of New York and also gave lectures on physiology to the more advanced undergraduates. In 1841 he became professor of chemistry in the University Medical College and in 1850 professor of physi¬ ology. Draper made many improvements in the art of photography. Following out the princi¬ ples as invented by Daguerre in 1839, he com¬ menced experimenting along the same lines and became the pioneer of photography in America ; and it was he who first applied photography to the portrayal of the human face, his first photo¬ graph being that of his daughter, taken in 1839. He also discovered and described ˆˆmisers' images" or roric figures and about the same time applied the use of ruled glasses and specula to the study of chemical action of light.

Dr. Draper's writings were numerous, among the most important of them being <A Treatise on the Forces which Produce the Organizations

of Plantsˆ (1844), in which the author demon¬ strates that the most intense action of sunlight is produced by yellow rays; ˆTextbook on Chemistryˆ (1846) ; ˆTextbook on Natural Philosophyˆ (1847) ; ˆ Human Physiology, Stati¬ cal and Dynamical of the Conditions and Course of the Life of Manˆ (1856) ; ˆHistory of the Intellectual

Development of Europe^ (1862), a work of great importance and very widely read, later being translated into 10 languages, the purpose of the book being to show that social advancement is as entirely dominated by natural law as is bodily growth; ^History of the Ameri¬ can Civil War^ (1867-70) ; ^History of the Con¬ flict between Religion and Science^ (1875). His collected works were published in 1878, entitled ^Scientific Memoirs, Being Experimental Con¬ tributions to a Knowledge of Radiant Energy.^

DRAPER, Lyman Copeland, American historian : b. Hamburg, N. Y., 4 Sept. 1815 ; d. Madison, Wis., 26 Aug. 1891. He removed to Wisconsin in 1853, became corresponding secre¬ tary of the State Historical Society, and it was mainly through his efforts that the State secured its library and its important antiquarian collec¬ tion. He published '^Collections^ of the State Historical Society (10 vols., 1853-87) ; 'Madison the Capital of Wisconsin and its Heroes^ (1857) ; 'King's Mountain and its Heroes^

(1881).

DRAPERY. See Costume.

DRAPIER LETTERS, a series of letters published by Dean Swift over the signature M. P. Drapier in 1724. They were called out by the proposal to impose upon Ireland a debased coinage from which a court favorite and a king's ministers were to get the profit. The opposition to the action excited by these letters defeated the project and gave Swift a reputation he never lost. See also Swift, Jonathan.

DRAUGHTS. See Checkers.

DRAVE, dra've, or DRAU, a European river which rises in Tyrol, flows east-southeast, part of its course between Hungary on the left and Croatia and Slavonia on the right and after a course of 400 miles joins the Danube 14 miles east of Essek. It is navigable for 200 miles.

DRAVIDIAN, a term applied to the people who inhabited the southern part of what is now India previous to the advent of the Aryans, and also to the language^spoken by these same peo¬ ple. The Dravidiah languages are generally considered to belong to the Turanian class — a family of languages said by some authorities to include all the Asiatic languages in general, out¬ side the European and Semitic families. The Dravidian languages include the Tamil, Telugu, Canarese, Maylayalam, Tulu, Tuda, Gond, Raj-mahal and Oraon.

There are other minor sub¬ divisions made by some authorities. Only the first four mentioned have a literature. The Dravidians now occupy the greater part of the peninsula of India. The Tudas, or Todas, in the region of the Nilgiri Hills, belong to the lowest of civilized people or races, while among the Tamils are found many who have attained a high place in literature.

The Dravidians proper are quite distinct from the Aryans, but they have been assimilat¬ ing with those around them, so that now arnong them may be found traces of the Caucasians,

and their literature partakes much of the Aryan culture ; but they have kept their speech com¬ paratively pure for centuries. In the southeast¬ ern part of the peninsula and in Ceylon live those who speak the Tamil; estimated to be about 18,130,000 people. North of the Tamils, and on the east, are the Telugus, 23,540,000 in number. The Canarese is spoken by about 10,530,000 people who live in the western part of the peninsula ; and the Malayalam by about 6,790,000 people who live in the southwestern part of the peninsula. The Dravidian popula¬ tion totals 62,720,000.

In the Tamil and Telugu languages there are a number of excellent literary productions ; not all original, some are modeled on or adapted from the Sanskrit. Two of the poems which may be traced to at least the 10th century — but which the Tamils claim are much older — are the ‘Kintamaniˆ and the ‘Naladiyar.ˆ The lat¬ ter has been translated by Pope. The Tamils claim also that Agastya lived before Christ and that he was the first teacher of science and lit¬ erature. In about the 12th century, the poet Kambar made, in Tamil, an adaptation of the Sanskrit poem ‘Ramayana,ˆ one of the two great epics of India; and in the 16th century the poet Ati-vira-Rama Pandya, a native king, wrote works of merit. The Tamil poet Tayu-manavar wrote in the beginning of the 18th cen¬ tury ; and at about the same time an Italian missionary, a Jesuit named Beschi, wrote in the Tamil both prose and poetry. The work of this literary priest has done much towiard directing the attention of Eastern scholars to the Tamil language and literature.

The oldest poem extant in Telugu language is a version of the Sanskrit poem, the. ‘Mahabharata,ˆ the other of the two great epic poems of India. This poem was written in the Telugu by Nannaya Bbatta, in the 12th century. A poet named Cesava of the 12th century wrote in the Canarese. In the Malayalam there is one poem based upon the

Sanskrit, an account of Rama, a heroic prince who belonged to a royal house of India. There are also versions of both the ‘Mahabharatˆ and the ‘Ramayana.ˆ Con¬ sult Arden, ‘Grammar of the Telugu Lan¬ guageˆ (Madras 1873) ; Brown, ‘Dictionary of Teluguˆ (Madras 1852-54) ; Caldwell, ‘Com¬ parative Grammar of Dravidianˆ (2d ed., Lon¬ don 1875) ; Carr, ‘Collection of Telugu Prov¬ erbsˆ (Madras 1868) ; Dalton, ‘Descriptive Ethnology of BengaP (Calcutta 1872) ; Graul, ‘Tiruvalluoer’s KuraP (Leipzig 1865) ; Haltzsch, ‘South Indian Inscriptions, Tamil and Sanscritˆ (Leipzig 1890-95) ; Hunter, ‘Dic¬ tionary of the Non-Aryan Languagesˆ (Lon¬ don 1868) ; Kingscote, ‘Folk-Lore of South¬ ern Indiaˆ (London 1890) ; Oppert, ‘Original Inhabitants of Indiaˆ (London 1893) ; Pope, ‘First Lessons in TamiP (Oxford 1891) ; Re-clus, ‘Primitive Folkˆ (New York 1890).

DRAW BAR PULL. See Locomotive.

DRAW-LOOM. See Damask.

DRAWBACK, in common law, an allow¬ ance or rebate made by the United States gov¬ ernment to merchants on the re-exportation of certain imported goods, liable ˆ to duty. This drawback in some cases consists in the sur¬ render of the whole duties collected on the goods ; in other cases, only a part of the duties paid on the importation is returned to the

importer. Goods can thus be sold in a foreign market at their natural cost in the home market.

DRAWBRIDGE, a bridge with a lifting or sliding floor, such as may be used for crossing the ditches of fortresses or may be constructed to cross navigable waters where the height of the roadway is insufficient to allow vessels to pass underneath. There are various kinds of drawbridges. One is the lifting bridge, which is raised bodily on one end. For fortifications this is the kind commonly employed, the plat¬ form forming or strengthening the gate when raised. For detailed history see Movable Bridges uuder Bridge.

DRAWING, Art, Pictorial Representa¬ tion and Decorative Design. See Art Draw¬ ing.

is the basis of all artist's work. This is used chiefly, in a technical way, by architects in mak¬ ing preliminary sketches, in studˆdng problems in design and in showing clients the finished ap¬ pearance of a proposed bˆuilding. Perspective is, however, unsuited for working drawings as it does not aim to convey precise detailed infor¬ mation. The term, mechanical drawing, often indicates the type of drawing used in the in¬ dustrial world by engineers and designers to express and record the ideas and information necessary for the construction of machines and structures. This type of drawing may better be called engineering drawing. Through it the draftsman, using orthographic projection, gives exact and positive information regarding every detail of the proposed machine or structure. By this graphic means any operation may be

Fig. 1. — Third Angle Method.

DRAWING, Mechanical, the art of repre¬ senting objects on paper, or other flat surface, by means of projections of the objects on im¬ aginary planes. A drawing of this sort is exe¬ cuted with the aid of instruments, such as com¬ passes, scales, T-squares, triangles, etc., espe¬ cially designed to facilitate its production. The projections of the objects are areas of the im¬ aginary planes which represent the object and are obtained by drawing imaginary lines from the points of the object to the planes. These imaginary lines may meet in a point or be paral¬ lel. In the former case the representation ob¬ tained on the plane is a conical projection of the object; in the latter, the projectors may be either perpendicular to the plane of projection, giving us orthographic or orthognal projection, or oblique to the plane of projection, giving us oblique projection.

Drawing made on the principle of conical projection is known as perspective drawing and

minutely described and a complete record kept for duplication and repairl This constitutes a graphic or written language. It can be read

only by forming a mental picture of the sub¬ ject represented. Skill in this language is indi¬ cated not alone by execution but by the ability to interpret impressions by visualizing clearly in space. The training this interpretation gives in quick, accurate observation and in the power of reading description from lines has a value not understood by those unfamiliar with it.

The principal lines of most buildings, ma¬ chines and structures are generally in three di¬ rections : one vertical, the other two horizontal and at right angles to each other. The object isˆ placed in the first or third angle of space, with these principal lines or dimensional axes parallel to the planes of projection. The position of the projections called %iews® in engineering drawing correspond to the positions assumed by these views when the planes of projection

are revolved into the plane of-the paper. Since the object is placed with its principal lines or dimensional axes parallel to the planes of projection, each view shows two dimensions of the object in true size; and any line which runs in the direction of the third dimension is represented by a point. Likewise, any surface in the direction of the third dimension will be represented by a line. If the plane of projec¬ tion is parallel to the front of the object the resulting projection is called the front view and shows the dimensions of height and length. If parallel to the top or bottom of the object the view shows the dimensions of length and depth. The former is called the top view and the lat¬ ter the bottom view. If the plane is parallel to a side of the object it is called a side view, which shows the dimˆ‘nsions of height and

depth. Any combination of two or more adja¬ cent views may be used to express the object.

It is the manner of arranging these views which determines whether the drawing is made in accordance with first or third angle projec¬ tion. The former method was abandoned in this country more than 25 years ago and is now almost obsolete. It is occasionally met in old drawings and in foreign drawings and there¬ fore should be understood.

Figs. 1 and 2 show an object made of sheet metal drawn according to first and third angle methods of mechanical drawing.

In both, the following principles are evi¬ dent : the top view is directly over or under the front view; the side views are in the same horizontal line as the front view and the width of the side views is the same as the width of the top view.

An object is sometimes composed of a com-l)ination of units whose dimensions are in dif¬

ferent directions and can be shown to better advantage by combining some of the other views with one taken on a plane so placed as to show the dimension of the part not shown in the reg¬ ular views. Usually it is not necessary to pro¬ ject the entire object on this auxiliary plane, but only the part to be shown in true shape. (See Fig. 3, which is a detailed drawing of a bearing bracket). It is often not possible to show the internal construction of an object clearly by using dotted lines to ex¬ press the invisible parts in an outside view. In such cases the object is drawn as if parts were cut or broken away. Such a view is called a ^^section.^^ (See Fig. 4). In it the exposed portions of the cut surface are indicated by section lining, composed of diagonal lines, usually at 45 degrees and spaced uniformly to

Angle Method.

give an even tone. It must be understood that the portion sectioned to show the interior in one view is not removed from the other views, but is indicated on the view to which the cut¬ ting surface is perpendicular, by a broken line consisting of alternate long and short dashes. When a figure is symmetrical along an axis, half only may be sectioned and the other half shown in an outside view. This shows in one view what would otherwise require two.

Working drawings are drawings which give all the information necessary for the complete construction of the object represented. They are divided into two main classes, assembly drawings' and detail drawings, which are gen¬ erally made in accordance with the principles of orthographic projection.

An assembly drawing shows the object with all its parts in their proper positions. A few of the principal dimensions are given and the parts may be indicated by distinguishing marks

or numbers which serve as a guide to the erector. The overall dimensions are service¬ able in determining the space required. Detail drawings give minute particulars regarding the form and construction of each part of the ma¬ chine and must be made clearly to be self-ex¬ planatory.

All dimensions should be accurately shown (Fig. 3) and it must be borne in mind that the dimensions given are those necessary and most convenient for the workman who is to make the piece. Therefore, the draftsman must put himself in the place of the pattern maker, blacksmith or machinist and must men¬ tally construct the object represented. He must foresee whether the object can be cast or forged practically and economically and must know which dimensions would give in the best way the required information.

Fig. 3.

Since a complete record of the work is nec¬ essary, original drawings are never allowed to leave the drafting-room but the drawings are duplicated by tracing in ink on transparent paper or cloth and a photographic print is made on sensitized paper. Any number of prints may be made from one tracing. The tracing is the ˆmaster drawingˆˆ and must never be taken from the office.

All unnecessary labor in drafting should be avoided. The drawing should give the instruc¬ tions explicitly, but should not be so elaborate as to require a waste of time in its execution. Accordingly, if there is a way of representing an object by a few lines, without sacrificing clearness, that method should be used. There are many details such as screw threads, springs, bolts, rivets, gear wheels, etc., which occur so frequently in working drawings, that easy methods of representation, or conventions, have been universally adopted.

The steps to be taken in making a working drawing may be summarized as follows: (1) Pencilling on paper.

(a) Choice of views — Make only as many views as are necessary to describe the object. Some thought will be involved as to which view will show the object to the best advan¬ tage : whether a section will explain the con¬ struction better than an exterior view; whether an auxiliary view will save one or more other views.

(b) Choice of scale and size of paper — Since the drawings are to be filed for reference it is necessary to establish some sheets of standard size, which would determine the scale.

(c) Block in all views and take care that the location of views on sheet will allow for title and notes,

(d) Complete outline.

(e) Dimension.

(f) Add section lines, notes, title, border, trimming line. (2) Tracing on cloth.

(a) Stretch cloth on pencilled drawing. Dust with chalk or prepared pounce and rub off with a cloth to remove any traces of grease which sometimes prevents flow of ink.

(b) Ink all circles, arcs, irregular curves.

(c) Ink-in horizontal lines with T-square and vertical lines triangle. Work from top to bottom and left to right.

(d) In this order ink-in inclined, dimension, extension and centre lines ; arrow heads, figure, notes, title, section lines and border.

Before sending to the shop,. a working draw¬ ing must beˆ checked for errors and omission, by an experienced checker.

To be effective the checking should be done systematically and with thorough concentration which allows nothing to distract attention. Observe this method: (1) Be sure that the views completely represent the object to be constructed and that they are properly arranged with respect to each other, according to the third angle method; (2) check all dimensions by scaling, and where advisable also by calcu-

lation. Dimensions of parts which go together should be compared. Also see that there are no interferences with adjacent parts and that proper clearances have been allowed. This is especially true in connection with mechanical movements, which should be laid out to scale so that the clearances are maintained; (3) the dimensions should be given as required by the shop ; that is, the shop should not be obliged to add or subtract to obtain any dimensions ; (4) the proper finish marks / should be indicated and likewise the character of the finish desig¬ nated; (5) all the necessary specifications of materials should be correctly given ; (6) all small details, screws, bolts, pins, keys, rivets, etc., should be standard and where possible stock sizes should be used; (7) the title or rec¬ ord strip should be checked to make sure that it contains in complete yet concise form all necessary details ; (8) in connection with any points that have suggested themselves during this checking, the drawing should be reviewed in its entirety; (9) add any explanatory notes which from experience will enhance the effi¬ ciency of the drawing; (10) before placing your initials in the titk space and assuming the re¬ sponsibility for the accuracy of the drawing answer the question, ®Am I willing to sign this drawing as checked

Several kinds of one plane projection which result in a conventional picture have been de¬ vised, so that the pictorial effect of perspective drawing is combined with the possibility of measuring directly the principal lines.

The third dimension is shown by turning the object in such a way that three faces are Ausible. Although these methods of representing objects have pictorial advantages their usefulness has some limitations. The representations are dis¬ torted until the appearance is often unreal and unpleasant. Only certain lines can be measured

Fig. 5.

and the execution requires more time, particu¬ larly if curved lines

occur. Nevertheless these methods are often used to great advantage in technical illustrations, patent office drawings, piping layouts, *etc.* The simplest of these sys¬ tems is isometric drawing. If a cube is con¬ sidered to be placed with one of its diagonals perpendicular to a plane, the edges of the cube will make equal angles to the plane of projec¬ tion; and if an orthographic projection of the

cube is made on the plane, the projection of the edges will be equal in length. The projections of the three edges which intersect (AB, CB, DB) at B will make an angle of 120 degrees to one another, as shown, Fig. 5. These lines are called isometric axes and are parallel to the directions of the three dimensions of the object. The representations of edges which are parallel to these in space will be parallel to the isometric axes and are called isometric lines. In this projection all the lines have been shortened owing to the fact that they make angles to the plane of projection. If this fore¬ shortening is disregarded and the full lengths laid off on the axis, the figure will be slightly larger but of exactly the same shape. This is known as isometric drawing and is used almost exclusively instead of isometric projection. It has the advantage of measuring the lines di¬ rectly with ordinary scale, and the increased size is usually of no consequence. Lines not parallel to one of the isometric axes are called non-isometric lines. Measurements can be made only on isometric lines. If a non-isomet- ric line is to be drawn, it must be drawn by reducing it to a system of isometric co-ordi¬ nates. In this way curves of any shape may be constructed.

Oblique Projection (see Fig. 6), sometimes called cavalier projection, is based on the prin¬ ciple that one face of the object is placed paral¬ lel to the plane of projection. The projectors

make angles of 45 degrees with it in any direc¬ tion. Thus lines perpendicular to the plane of projection will be projected in their true length. Oblique projection is similar to isometric drawing because it has three axes representing three mutually perpendicular lines ; upon these lines measurements can be made, and two of the axes will always be at right angles to each other and will represent lines parallel to the plane of projection. The third axis may be repre¬ sented at any angle, but 30 degrees is generally used. One face of the object will be repre¬ sented without distortion. This is one of the advantages of oblique projection over isometric, particularly in representing objects with circu¬ lar or irregular outlines. There are

general rules in connection with drawing of this sort : First, place the object so that its irregular outline or contour will be parallel to the plane of pro¬ jection; and second, if possible have the long¬ est dimension parallel to the plane of projec¬ tion.

Axonometric Projection. — The principle of isometric projection was shown to be based on the orthographic projection of a cube whose axis is perpendicular to the plane of projection. The cube might be placed in any other position with respect to the plane of projection, so that its projection would show three faces, and the angles and proportionate foreshortening of the

This is based on oblique projection. The object is placed with its vertical axes parallel to a ver¬ tical plane of projection; and it is rotated about this axis until the horizontal axes make angles to the plane of projection, whose tangents are respectively one-third and three. The object is then projected on the vertical plane of pro¬ jection, as shown (Fig. 8), by profile lines which make an angle to the plane of projection whose tangent is one-sixth. The result is a pleasing representation of the object.

Machine Design. — A machine is a combina¬ tion of mechanical movements constructed to transform energy directly or indirectly from natural sources into useful work. The design must be thought out with a view toward the economy of this transformation together with the economic manufacture of the machine. It may therefore be stated that machine design is a problem involving the proper co-ordination of the following elements: Required work; available power; mechanism or kinematic mo-

PlG. 8.

axes used as a basis for a pictorial representa¬ tion. This system is known as_ axonometric (or axometric) projection. This is the general

Fig. 7.

system and it will be noticed that isometric projection is a special case in which the axes are foreshortened equally. When two axes

are equal and the third unequal the system is called ^^dimetric® projection, an example of which is shown in Fig. 7. Here the ratios are 1 :1 :k2 and this makes the tangents of the angles one-eighth and seven-eighths as shown.

Other positions of the object, which would show less distortion, can be

found but are not often used because there is greater difficulty in execution.

In drawing the crystal figures in mineralogy a system known as ˆclinographic® is used.

tion; performance and limiting proportions; the nature and magnitude of the stresses acting on the various members of the machine; the materials and proportions of the several mem¬ bers, as determined by the particular stresses; wear; stiffness; methods of manufacture and other commercial conditions, such as the inter¬ changeability of parts to reduce the cost of both manufacture and maintenance ; the general ar¬ rangement as required for erection, easy repair, oiling and adjustments.

There are, of course, no set rules which can be laid down for the method of procedure in cornpleting the design of a machine, but there are right and wrong ways of attacking the problem, and since the same principles of de¬ sign are applicable to all machines the follow¬ ing general plan of solution is given.

1. Given — (a) Kind of work to be done.

(b) Power available, steam, gas, electric or hydraulic and the method of application of the power to the machine, i.e., whether belt or direct.

(c) Capacity and limiting proportions.

1. Determine the kinematic train with which to connect the available power so that the re¬ quired work may be produced with a minimum energy loss. The design and selection of a combination of material elements so connected that motion in an}'ˆ one involves definite, rela¬ tion, constrained motion of the others for a given machine, is governed by the manner in which the energy is supplied and the

character of the work to be performed; for the energy may be supplied in one form of motion and the work done with quite a different one. If a mechanism which will accomplish the desired results already exists the problem is one of se¬ lection and arrangement of parts. But if a new type of machine is desired or a new mechanism necessary, the problem may become one of the nature of invention. While it is true that the mechanism can usually be designed without ref¬ erence to the energy transmitted it is neces¬ sary to analyze the kinematic energy cycles be¬ fore any definite dimensions of the parts of the mechanism can be fixed. Furthermore as stated above the methods and available facili¬ ties of construction control the design to a cer¬ tain extent. Lay out the centre lines of the ma¬ chine according to the above determinations and check for limitations of motion, interfer¬ ence, *etc.*

2. Clothe the mechanism decided upon in metal by determining the general form of the elements and the materials best suited for their construction together with the allowable work¬ ing stresses. Complete the sizes of such parts of the mechanism as a simple layout will per¬ mit. Lay out the principal joints of the mech¬ anism. When mechanisms are enclosed build from the inside out. Don't design the frame first and try to put the mechanism inside, the frame must conform to the mechanism.

In many cases the forces acting on the ma¬ chine element are very complex, owing to any combination of the following conditions :

(a) Transmission of force from one ele¬ ment to another.

(b) Internal restraint due to circumstances in manufacture.

(c) Restraint due to energy transmission.

(d) Forces due to the inertia of moving parts.

Therefore the theoretical design is not al¬ ways clear and our knowledge of materials and their laws is limited in many respects so that in many cases we must rely on judgment and em¬ pirical data, the result of experiments. Even where the conditions are clear the design must always be controlled by practical modifications and construction considerations. The designer must therefore be a man of judgment, thor¬ oughly familiar with the production of rna-chinery, and the relation thereto of the allied

commercial departments so that he may give each factor its proper weight and obtain the best results at the least possible cost.

The last step, specification and drawing, is a necessary and important supplement to the process of design. It is a powerful aid to the mental process of the designer and is the best and easiest way of showing the workmen how the machine is to be constructed, and also of making a record of what has been done. The drawing is not machine design itself, as ma¬ chines may be designed and built without drawings. It is, however, an essential part of the designer's equipment because the mere act of putting the results of his thought on paper is one of the greatest helps to force systematic and definite thought.

Design which stops short of exact working drawing is only half done. In fact the crucial test of practicability of a piece as part of a machine is the possibility of its being exactly detailed. It is more easy to generalize than to get down to exact detail and there is nothing rnore productive of trouble, delay and waste of time and money than poor detail drawings.

Very often written specifications to accom¬ pany the drawings are not only useful but nec¬ essary, and as the writing of these specifications presupposes a most intricate knowledge of de¬ sign and selection of materials, the highest skill of a designer is often needed clearly and fully to specify in writing just what is to be done.

The actual process of drawing in the devel¬ opment of a design may be outlined as follows : Rough sketches merely representing ideas, not drawn to scale, are made to determine the me¬ chanical ideas concerned in the design. These are followed by layout drawings in which the design is developed and the general detail es¬ tablished. This drawing contains the principal dimensions to fix and control the detailed de¬ sign. Each part of the machine is then de¬ tailed and a working drawing showing every small detail of its shape together with dimen¬ sions and specifications is made so that the workman may be definitely informed as to its construction. Assembly drawings are then made and constitute the last step in the repre¬ sentation. They show the parts assembled in the complete machine. The layout mentioned above may be finished up into an assembly drawing, but it is usually safer to make the lat¬ ter a separate drawing, as changes in detail are often necessary, and it will serve a valuable aid to the draftsman in checking up the dimensions of his detail drawings.

Bibliography. — Bartlett, ˆ Mechanical-Draw¬ ingˆ ; Cathcart, W. E. L., ˆMachine Designˆ French, ˆEngineering Drawingˆ ; Hess, H. D.,

ˆMachine Design, Hoists, Derricks, Cranesˆ ; Jones, Forrest R., ˆMachine Designˆ ; McCord, ˆMechanical Drawingˆ ; Parshall & Hobatt, ˆElectrical Machine Designˆ ; Reid & Reid, ˆA Text Book of Mechanical Drawing and Ele¬ mentary Machine Designˆ ; Spooner, Henry J., ˆMachine Design, Construction and Draw¬ ingˆ ; Undwin, Wm. C., ˆElements of Machine Design.ˆ

George C. Autenrteth, The College of the City of New York.

DRAWING-BOARD, a board 9n which paper is strained for watercolor painting. It is made of a flat piece of wood held together and

prevented from warping by an edging of other pieces, the grain of which runs in an opposite direction. The drawing-paper is first dampened and then attached to the edges of the board with thin glue, gum or paste, and when dry be¬ comes perfectly tight and flat. In charcoal or crayon drawing the board is used, but the paper is merely pinned on the board.

DRAYTON, Michael, English poet: b. Hartshill, Warwickshire, 1563; d. London 1631. His first appearance as an author was in 1591, by the publication of ˆHarmony of the Church, Containing the Spiritual Songs and Holy Hymns of Godly Men, etc.,ˆ followed in 1593 by Hdea, the Shepherd's Garland,ˆ and ˆRoland's Sacrifice to the Nine Muses, ˆ a series of ec¬ logues. In the same year appeared his ˆLegend of Piers Gaveston,ˆ and in 1594 his ˆMatilda.ˆ Drayton's great poem is his ˆPolyolbionˆ (1613), a sort of topographical description of England. It is generally extremely accurate in its details, with, at the same time, many pas¬ sages of true poetic fire and beauty. It is fre¬ quently, however, tedious and obscure, and its extreme length is sufficient to deter many from undertaking its perusal. The gem of Drayton's poems is his ˆNymphidia, the Court of Fairy, ˆ edited by Sir E. Brydges in 1814. His other works comprise several historical poems, such as the ˆBarons' Warsˆ (1603, first issued in 1596 under the title ˆMortimeriadosˆ) ; ˆEngland's Heroical Epistlesˆ (1597) ; the ˆLegend of Great CromwelP (1607) ; the ˆBattle of Agincourtˆ (1627); besides

numerous legends, sonnets and other pieces. He was buried in Westminster Abbey, where there is a monument to his mem¬ ory. His complete works appeared in 1748. Morley published selections from his ˆPoemsˆ (London 1878). Consult Elton, Hntroduction to Daytonˆ (Manchester 1895), and ˆM. Dray¬ ton, a Critical Studyˆ (London 1906).

DRAYTON, Thomas Fenwick, American military officer : b. South Carolina about 1807 ; d. Florence, S. C., 18 Feb. 1891. He was grad¬ uated at the United States Military Academy in 1828, and resigned from the army in 1836. He entered the Confederate army upon the out¬ break of the Civil War and played a prominent part during the attack on Fort Royal, com¬ manding a force in Fort Walker which he was forced to evacuate.

DRAYTON, William, American jurist: b. South Carolina 1733; d. June 1790. He was educated for the bar in the Aliddle Temple, London, where he studied four years. He re¬ turned to America in 1754, and was appointed chief justice of the province of East Florida in 1768. During the war of the Revolution he was suspended from his office and reinstated in it, and went with his family for a time to Eng¬ land. After the peace he became successively judge of the Admiralty Court of South Caro¬ lina, associate justice of the State and a judge under the Federal government.

DRAYTON, William, American politician: b. South Carolina ; d. Philadelphia, 24 May 1846. He was a representative in Congress from South Carolina from 1825-33, and in 1830 was a leader of the Union party in opposition to that of nulli¬ fication. He resided in Philadelphia many years prior to his death, and in 1839 succeeded Nicho¬

las Biddle as president of the United States Bank, the affairs of which he found it impos¬ sible to retrieve.

DRAYTON, William Henry, American statesman : b. Drayton Hall, S. C., September 1742; d. Philadelphia, 3 Sept. 1779. He was educated in England at Westminster School and at Baliol College, Oxford. Returning to Amer¬ ica in 1764, he became an active writer on politi¬ cal affairs and published letters on the side of the government, which brought him into contro¬ versy with Christopher Gadsden and other patriotic leaders. As the Revolutionary crisis approached he espoused the popular cause. In 1774 he was appointed judge of the province,

and when the Continental Congress was about to sit he published a pamphlet under the signa¬ ture of ^^A Freeman,® which substantially marked out the line of conduct pursued by the Congress. In 1775 he was president of the Provincial Congress, and in 1776 was elected chief justice of South Carolina. He was a member of the Continental Congress from 1778 till his death. His ˆHistory of the Revolutionˆ appeared in 1821 in greatly expurgated form. His son, John Drayton, governor of South Car¬ olina in 1800-02 and 1808-10, based his ˆMem¬ oirs of the American Revolution Relating to the State of South Carolinaˆ (Charleston 1821) on the work of his father.

DREAM OF GERONTIUS, The. Cardi¬ nal Newman's < Dream of Gerontiusˆ is a poem of the passing of the faithful soul from earth to purgatory. Gerontius in the horror of disso¬ lution girds himself to his last preparation among his praying friends and fades into his last sleep. The next stage, the soul passing, is a penetrating Intellectual conception realized imaginatively in the separate and successive utterances of the soul and the guardian angel. The third stage, the soul passed, brings the two together in dialogue. Still conversing with the angel, Gerontius then on his way to God meets jeering demons. The final stage is ex¬ pressed in the praises of angelical beings and in the soul's cry before the face of God, ®Take me away, that sooner I may rise.® The verse is perhaps Newman's highest achievement in variety and range. The simple stanza of ®Praise to the Holiest in the height® is carried forward in successive choruses to effects of piercing sim¬ plicity. The dignity of the iambics, the weaving In of litany and psalm and the use of various stanza forms, constitute an exquisite adapta¬ tion, and the poem is no less remarkable in its total movement. It unites with exceptional power the intellectual and the emotional values of poetry. Without sacrifice of precision, theo¬ logical conceptions are transmuted imaginatively into personal experiences. Infinity and purga¬ tory pass from abstract idea into intense feeling. The poem has been set to mnsic by Sir Edwin Elgar.

Charles Sears Baldwin.

DREAMS. These are mental activities, carried on during sleep, which are at times brought into consciousness by a process of secondary elaboration. They are as necessary a part of the brain's activity as is the movement of the heart or the storage of glycogen in the liver, functions of these two other organs re¬ spectively. All people dream during sleep, but not

all the dream activities come into consciousness. In some the memory of the dreaming is very distinct. In others it is less so. Careful atten¬ tion to the subject shows the universality of the dream phenomena, and modern investigation is showing that the functional activity of the brain during sleep is of equal if not greater importance than the same activity during the waking state. The dream is the index or the mode of activity of the unconscious. Logical thinking, so-piled, that of the conscious.

Cabanis, in his "ˆRapports du Physique et du Moral de I'Homme,ˆ says of Condillac, that he often brought to a conclusion in his dreams rea¬ sonings on which he had been employed during the day, and which he had not completed when he went to bed; and of Franklin, that that wise and enlightened man believed that he had been often instructed in his dreams concerning the ispe of events which at that time occupied his mind.

Coleridge thus describes the circumstances under which the fragment called Kubla Khan was composed : He had fallen asleep in his chair while reading in his Purchas' ˆPilgrimaged of a palace built by Khan Kubla, and remained in that state for about three hours ; during which he could not have composed less than from 200 to 300 lines, if that can be called com¬ position in which all the images rose up before him as things, with a parallel production of the correspondent expressions, without any sensa¬ tion or consciousness of effort. On awaking he instantly sat down to commit the poem to paper. After he had written the lines subsequently pub¬ lished, he was interrupted for a time, and when he returned to the task the poem had vanished from his memory. These are illustrations, by no means rare, of the fact that the real creative capacity of the brain is largely an unconscious product.

Viewed superficially, dreams are wanting in coherency; all probabilities and possibilities of time, place and circumstance are violated. Nothing is more common than for the mind in dreams to combine objects and events which apparently could have had no associated exist¬ ence. The faces of friends long since dead and events

long since past rise before us sometimes with more intense vividness than_ in real exist¬ ence and cause no surprise by their incongruity.

The rapidity with which the dream takes place is also remarkableˆ We may seem to live a weary lifetime in the dream of a minute; the sprinkling of a few drops of water on a gentle¬ man's face was accompanied by a dream in which the events of a whole life passed before him, ending with a protracted struggle on the borders of a lake into which he was plunged. The whole process must have taken place in a second or two, as the dreamer was aroused from sleep by the application of the water. Some authorities declare that all our dreams take place when we are in process of going to sleep or becoming awake, and that during deep sleep the mind is totally inactive. This is denied by the majority of philosophers, and with apparent reason.

Freud, one of the most acute and painstak¬ ing of all of the students of the dream phe¬ nomena, has truly stated that all_ men are great in their dreams. The dream_ is the primary creative art. Its great rapidity is due to the fact 'ˆOL. 9 — 21

that in the unconscious all of the individual's life accumulated experiences are on view, as if in a cinematographic flash. The stream of the unconscious contains the entire urge of the in¬ dividual's life, which when it would come into consciousness is immediately blocked off and only a tiny jet of it, as it were, permitted to pass beyond the portals into consciousness. It is a brain function to push back almost the entire force of this accumulated impulse and permit only a little of it to enter into real action — i.e., to do useful work. By useful here is meant the purposeful work demanded by the rules of the herd.

The dream is a fragment of this great urge of the individual's inside activity, hence Freud called it a wish-fulfilment, as Heraclitus, the original pragmatist, did 500 b.c. This Greek philosopher truly said, ®For the waking there is one common world, but for those asleep, each one retires to his own privacy. And do you imagine we could do with impunity what we dream? Is it not because we lie still and do not act we can indulge our fantasies?® This state¬ ment of Heraclitus very cleverly sums up the chief activities of the dream process, namely, that it is a compensation in fantasy for what is denied the individual in reality, hence it is a great balance wheel for cultural repression. The dream seems chaotic and meaningless, however simple, because it is expressed by a special type of symbolic thinking. All thinking is symbolic, but ordinary logical thinking proceeds along

conventionalized and disciplined community thinking. It is thinking which deals largely in terms of herd agreements. Dream thinking is highly individualistic and only deals with primi¬ tive types of resemblance. It is related to animistic thinking. It is guided largely by indi¬ vidual egotistic strivings and like any foreign language needs a key for its interpretation. Since the two primary wishes which have ever been present in all living matter have been to live and to reproduce, a rigid application of such a formula to the dream will bring out the nature of its wish-fulfilling fantasy of the individual, hence any dream may be said to contain a medley of these two motives. It may not be possible to construct a full measure of the dream wish from the fragment which is remembered because this remembered fragment presents only a much distorted, revamped ac¬ count of the primary wish activities of the patient. One can understand a dream by pic¬ turing to oneself an inverted cone. From the bottom of this cone a stream of feeling arises. This feeling stream is unharnessed, undirected, it is just plain urge of the individual's organic cravings. But such cravings need outlets, and in some kind of action, so as the cravings, which are highly dynamic, rise more and more in¬ sistently for expression, they catch up symbolic forms of things through which they can express themselves. They become dramatized as it were, and thus the feelings get related to ideas and to objective forms. As the dream is in¬ tensely creative, the objects first chosen may not be considered consciously eligible for expres¬ sion, hence a form of camouflage takes place — these are technically termed in psychoanalytic literature distortions or displacements, con¬ densations or secondary elaborations, so that by a process of caricature the original cravings

come to a process of expression in a form which the cultural level of the individual will permit. This completed product is termed the manifest content of the dreamer. It is the elaborated, modified caricature of the original type of striv¬ ing, distorted, and may be rendered almost un¬ intelligible to the dreamer. Yet it has done its work. It has helped to conserve sleep and dis¬ charged the energy

which lay behind the craving.

Children's dreams are apt to express their cravings with but little symbolic distortion. As the individual grows up, however, these more childish strivings take on more definite char¬ acter, but in the dream are subjected to greater and greater distortion. Hence in most adults the wish is much modified in its presented and pre¬ sentable form. All dreams mean something. It may not be possible to find out, or it may not be worth while, but it is certain that they have a physiological function just as much as does respiration, circulation, digestion, *etc.* The analysis of these latter functions is still very imperfect, so also is the analysis of the dream function. Human knowledge of human activi¬ ties is still far from satisfactory, but in dream comprehension a great advance has been made by recent psychoanalytic investigation. For the literature to 1917 and full discussion, consult Jelliffe, ˆTechnique of Psychoanalysisˆ (Ner¬ vous and Mental Disease Monograph Series, New York and Washington).

Smith Ely Jelliffe.

DREBBEL, Cornelis van, Dutch philos¬ opher and inventor: b. Alkmaar, North Hol¬ land, 1572; d. London 1634. He lived in Lon¬ don from the year 1620, devoted entirely to scientific labors. He invented several philo¬ sophical instruments, among which, it is said, were the compound microscope and a ther¬ mometer consisting of a glass tube containing water connected with a bulb containing air. His contemporaries say that he displayed to King James a glass globe in which by means of the four elements he had produced perpetual motion, and that by means of machinery he imitated rain, thunder, lightning and cold, and was able quickly to exhaust a river or lake. He discovered a bright scarlet dye for woolens and silks which was introduced into France by the founders of the Gobelin manufactures ; and the invention of the telescope has been ascribed to him, but on no good grounds. Drebbel left treatises which appeared first in Dutch (1608), and afterward in Latin, under the title ˆTractatus duo: De Natura Elementorum ; De Quinta Essentiaˆ (1621). It was also translated into French (1673).

DREBER, Heinrich, known as Fran2-Dreber, German painter: b. Dresden, 9 Jan. 1822 ; d. Anticoli di Campagna, near Rome, 3 Aug. 1875. He began his art education at the Dresden Academy, and became a pupil of Lud¬ wig Richter whose idealistic style he copied. He went to Rome in 1843 at the expense of the Dresden Academy. Two of his pictures are in the Berlin National Gallery, namely, ˆAn Autumn Morning in the Sabine Moun¬ tainsˆ ; and ˆThe Hunt of

Diana. ˆ A land¬ scape, with the figure of the ˆGood Samaritan,ˆ is to be found in the Dresden gallery.

DRED, A Tale of the Great Dismal Swamp, a novel by Harriet Beecher Stowe, published in 1856. It belongs to the literature of the slavery agitation in the United States, and deals with the experiences of a fugitive slave. It is also called ˆNina Gordon.ˆ

DRED SCOTT CASE, the most far-reach¬ ing slavery case ever in the United States courts. Dred, born in Missouri about 1810, was a slave of Dr. Emerson, an army surgeon, who took him in 1834 to Rock Island, Ill., and May 1836 to Fort Snelling, Wisconsin Territory (now Minnesota), where he married Harriet, a slave of his master, and had two children. Slavery was illegal in both places : in Illinois by its constitution, in Wisconsin (upper Louisi¬ ana Purchase) by the Missouri Compromise. In 1838 he was taken back to Missouri — Saint Louis.

Here in 1848 was living the eminent free-soil lawyer, Francis P. Blair, Jr. He learned of Dred's migrations, and wishing to test the right of slavery to reclaim persons once free, induced Dred on being, whipped by his master to sue for assault and battery in the State Circuit Court of Saint Louis County. Blair and his free-soil friends furnished funds and legal as¬ sistance. The suit was sustainable only if Dred was a free citizen charging violence from an¬ other citizen ; and the court held that his resi¬ dence on free soil had made him free, and there was no legal power to re-enslave him. Appeal was taken to the supreme court of Missouri, which reversed the decision ; the two associate justices against the chief justice de¬ cided that Emerson had only made a tempo¬ rary change of domicile in obedience to gov¬ ernment orders, that his property was held ac¬ cording to the laws of his permanent domicile, and that Scott's servile character was merely in abeyance and fully resumed on return to Missouri ; refused to consider the Illinois con¬ stitution or the Missouri Compromise as rele¬ vant, and sent back the case to the Circuit Court.

Meantime Emerson had sold Dred and his family to John F. A. Sandford of New York and suit was brought against Sandford for assault and battery in carrying off Scott — this time in the Federal Circuit Court for Missouri, on the constitutional ground that he was a citizen of a different State from Sandford. Sandford denied jurisdicion on the ground that Dred was not a citizen but ˆˆa negro of African descent,® progeny of negro slaves. Dred's counsel demurred (admitted

the facts but denied their sufficiency), claiming that being a negro did not prevent his being a citizen ; the court sustained him. Sandford denied assault and battery, claiming that he only ˆgently laid hands® on him to coerce him, as was his right toward a slave; the court instructed the jury that this was law ; Dred's counsel took excep¬ tion, and the case went up to the United States Supreme Court.

It was argued at the December terms of 1855 and 1856. Montgomery Blair (brother of Francis P.) and George Ticknor Curtis (brother of Judge Curtis) were counsel for Scott, Reverdy Johnson and Henry S. Gcyer for Sandford; all gratuitously. Justice Nelson pre¬ pared a brief abstract of the decision ; l3Ut the

public excitement over the slavery question was so intense and menacing to the Union (just after the Buchanan-Fremont election), that it was decided to have Chief Justice Taney write a full and careful review of the whole law on the subject of slavery, in hope of making the members of the free-soil party accept it con¬ tentedly and cease their agitation. Taney and six assistant judges concurred against Scott; Curtis andˆ McLean dissented.

The written decisions were withheld from the public till 6 March 1857, two days after the inauguration, to avoid embroiling Pierce's last months. The decision proper was essentially the same as that of the Supreme Court of Mis¬ souri ; that Dred Scott as a negro was not a citizen of the United States within the intent of the Constitution, and therefore the Circuit Court had no jurisdiction and the suit should be dismissed. This decision remained United States law, an irremovable barrier in the way of granting civil rights to the colored race, till the passage of the Fourteenth Amendment (see Constitution — Amendments).

Unfortunately, the court did not confine itself to the case before it; but for the reasons above mentioned, and to answer for the public the arguments brought forward by counsel, who wxnt out of their way to deliver a series of obiter dicta (personal judgments not needed or relevant for the case in hand, and therefore not law), which inflamed the public wrath im¬ measurably as a fresh aggression of the slave power, have remained in public memory as the only interesting points in the case, and are, in fact, by far the most important aspects of it. These were three : in essence, that African negroes had never been recognized in Ameri¬ can law or custom as persons ; that Congress had no power to make regulations for the Ter¬ ritories acquired after the Constitution was adopted, except under the Constitution, which recognized slaves as property; and that the Missouri Compromise, already repealed by the Kansas-Nebraska Bill, had never been constitu¬ tional. (1) Of course no exception had been taken by Scott's counsel to the circuit court's ruling that negro blood was no bar to citizen¬ ship ; but the Supreme Court dragged it in and overruled it.

In the counsel's statement of the condition of public opinion at the time of fram¬ ing the Constitution, they used a phrase which is immortal in public memory, and usually sup¬ posed to be their own decision as a point of present lˆw ; that negroes were then regarded as ^^so far inferior that they had no rights which the white man was bound to respect, and to be rightfully made slaves for white men's benefit. The court held that they were regarded in the Constitution as only chattel property ; were not included in the words ˆpeople® or ^^citizens^^ in the Declaration of Independence, the Articles of Confederation or the Constitution, remained in this condition of civil nullity even when emancipated, had no rights except such as each State chose to grant them, and could not become citizens capable of suing and being sued. The dissenting judges pressed the notorious distinction between citi¬ zenship and suffrage (See Citizen) ; called attention to the Constitution's-repeated mention of the negroes as ^^persons,^^ and to the fact that free negroes were actually voters in five of

the States in 1787, and were so even yet save where the States had changed their Constitu¬ tions to disfranchise them; and held that the civil rights of free negroes were the same at least as those of women and minors. (2) As to the Territories, the obiter decision was that as the Constitution admitted slaves to be prop¬ erty, and by the Fifth Amendment Congress had no right to take away any citizen's property without compensation, it had no right to make laws barring slave property from the Territories more than any other ; that its rules and regula¬ tions must be in conformity with the Consti¬ tution. The dissenting judges held that both by common law and the Constitution slavery was a purely State institution (cf. Art. IV,

§ ii, par. 3: ®No person held to service or labor in one State,^^ etc.), sustainable only by State law and State police power of quelling resistance ; that once out of the State's power, a slave instantly became free by the law of nature, and that State law could not follow him to the Territories. (3) The decision that the Missouri Compromise was unconstitutional, as interfering with the natural right of a slave¬ holder to take his property where he pleased, and with the constitutional equality of citizens of different States, followed from the court's opinion on the second point. The dissenting justices held that the Compromise was a right¬ ful exercise of the constitutional power of Congress to legislate for the Territories, and never before questioned since the government was founded ; and that it did not violate the equality of citizens because citizens could only hold slave

property in States that permitted and enforced it.

The whole question was soon decided by the war. Scott and his family were inherited by Calvin S. Chaffee of Massachusetts (then in Congress), were conveyed by him to Taylor Blow of Saint Louis for emancipation, and were emancipated 26 May 1857. Consult decision in Howard's ˆReport … in the Case of Dred Scottˆ (1857) ; Benton, ˆExamination of … the Dred Scott Caseˆ (1860) ; Corwin,

ˆThe Dred Scott Decision in the Light of Contemporary Legal Doctrines,ˆ in American Historical Review (Vol. XVII, 1911) ; Tyler, ˆLife of Taneyˆ (Baltimore 1872) ; Curtis, G. T., <Life of B. R. Curtis/ (Boston 1880). The Missouri Historical Society has a portrait of Scott, from a photograph.

DREDGE, a machine for excavating mud, rock, or other solid material from the bottom of a body of water. Essentially the dredge consists of a scoop of some sort to pick up the material to be excavated, and a derrick-like mechanism to lift the scoop with its load up to and above the water level, and dump it. There are many ingenious modifications of this essen¬ tial idea, by which the movements of a shovel, of a grasping hand, or of an ice-tongs are imitated with great precision and with im¬ mense power at points 40 feet below the water level. The machinery which operates the dredge is built upon a scow or boat which is floated over the place where the work is to be done. The dredge is held in position by heavy posts called ˆˆspudsˆ which go down loosely through openings in the deck of the scow and rest on the water bottom. There are usually three of these, two at the shovel or bow end

of the dredge and one (sometimes two) at the stem. The bow spuds are much larger, having to withstand the strains of the working shovel. In some large dredges the bow spuds are built-up timbers upwards of 40 inches square and over .50 feet long, with a heavy iron shoe at the bottom. To the shoe is bolted a ®foot® of timber covering an area of 10 by 12 feet to give a substantial bearing on a soft mud bottom. To add to the grip on the bottom some dredges have tackle attached to the bow spuds by which the scow may be hoisted upon them above its natural floating level, thereby shifting a part of the weight of the dredge and its machinery upon the spuds, and thus pressing them down the more firmly. When the dredge has finished the work it can reach from one position, the spuds are raised clear of the bottom, and the machine is moved by a tug¬ boat, or by pulling on chains attached to anchors.

Dredges are of two general classes : inter¬ mittent, and continuous. The former operates a single bucket or scoop, and alternately digs and lifts the load; the latter digs continuously, raising the material at the same time. To the intermittent class belong the dipper dredge and the grapple or grab dredges. To the continu¬ ous class belong the ladder dredges, the hy¬ draulic or suction dredges and the scouring dredges.

Dipper Dredge. — The dipper dredge is similar to the steam shovel used in earth exca¬ vation on land, except that it is worked from a float, and that the dipper or bucket is much larger — up to 15 cubic yards capacity. The dipper dredge is the type almost universally in use in the United States, and is effective in depths of less . than 50 feet of water, and in the greatest variety of bottom material. It will dig economically in stiff clay, hardpan and even soft rock. For such work the dipper is armed with teeth of appropriate size and shape, and a small bucket is used. Generally the material raised is placed upon a scow moored beside the dredge. In some instances the handle of the dipper has been lengthened so that the spoil may be dumped upon a nearby bank. With a dipper of six cubic yards capacity the output of one of these dredges warking in ordinary earth is about 5,000 cubic yards per day of 10 hours.

Grab Dredges. — These are of two models, with, respectively, the clam-shell bucket and the ^^orange-peel® bucket. The former has a bucket composed of two great scoops which close to¬ gether at the

bottom like the valves of a clam¬ shell. They are hinged at the top. They are spread wide open as they descend, close upon the material at the bottom, and remain closed as the bucket is lifted until released to drop its contents upon the scow tender alongside. The orange-peel bucket is of hemispherical shape, divided into three or four sharp, curved triangular sectors, resembling the sections of peel removed when peeling an orange in the usual way. The orange-peel bucket is not much in use in the United States, but the clam-shell dredge is of the greatest usefulness in many locations, particularly for picking up chunks of broken rocks, and for excavation in water too deep for the dipper dredge. The buckets have to be very heavy, as there is no other force

but their weight to drive them into the material they have to dig. One advantage which the grab bucket has over the dipper is the speed with which it gathers its load and drops it. The largest of these buckets have a capaciˆ of 12 cubic yards, and their output on a long job averages about one bucket per minute, two-thirds full.

Ladder Dredge. — The ladder dredge oper¬ ates an endless chain to which many buckets are attached, the chain traveling around a ladder-shaped frame, hinged to the super¬ structure of the vessel at the top. The lower end of the ladder may be dropped down until it touches the bottom, and the chain of buckets is then run at high speed, scooping up the material of the bottom as the dredge moves forward — usually under its own motive power. The buckets have a capacity of about one cubic yard and are raised at a speed of 16 per minute. The dredged material is carried to the top of the ladder and is there dumped into chutes which discharge it into scows alongside; or it may go into hoppers constructed in the hull of the boat itself. Another modification for canal work provides long discharge troughs by which the material is delivered on the canal banks. The ladder dredge is extensively used in mining operations in the streams of Alaska, California, South America, Siberia and South Africa, digging up the gold-bearing sand and gravel from the creek bottoms and landing it on the dredge where the gold is recovered and the waste returned to the stream. Tin and platinum are recovered in the same way.

Hydraulic Dredge. — The hydraulic dredge sucks up the material of the bottom by means of a powerful centrifugal pump. Where the bottom is hard a revolving cutter head is at¬ tached to the inlet pipe of the pump and this breaks up the bottom and mixes it with the

water so that it will be of the right degree of fluidity to flow readily through the pump — about 15 parts of water to one part of solid material. The cutter head may be pushed ahead of the vessel on a boom dragged by a flexible suction pipe. The hydraulic dredge works well in sand, gravel, alluvial deposits and earth free from stones larger than eight inches diameter and from stumps, piling and similar obstruc¬ tions. It has a special field in bottoms so light that the dipper and bucket dredges simply stir them up without lifting them. The discharge of the hydraulic dredge being in large part water, requires a particular method of disposal. Sometimes a long pipe line is laid* from the dredge to a point on shore where the spoil may spread out and settle into solid land as the water drains away. In this way much marsh land is filled in and made available for use, and the cost of the dredging not only recovered but a substantial profit secured. In some cases the dredge float has hoppers into which the discharge is poured, the solid matter settling and the water running out at the scuttle holes. Sea-going dredges of this type are used for harbor work. When their hoppers are full they sail 8 or 10 miles out to sea and dump them.

Universal Dredge. — This title is given to large sea-going dredges which are fitted with both the ladder with its endless chain of buckets and a great hydraulic pump and pipe line. Some of these vessels are of the dimen-

sions of small steamships, with hoppers capable of carrying 2,500 cubic yards of dredged material.

Scouring Dredge. — The scouring dredges are simply submersible harrows, scrapers and agitators used to stir up light silty bottoms and bars so that the natural current of the stream may carry the material to a point where it is not objectionable. The same result has been attained by the use of water jets and aeration with compressed air.

Dredges are employed in some cases in land excavations, a pool sufficient to float the dredge being artifically formed, water being supplied to preserve the pool level as the digging pro¬ ceeds.ˆ This

method has been successfully used in digging irrigation canals in the arid regions of the Wptern States. Along the Mississippi and Ohio rivers dredges are used to secure sand and gravel for commercial pur¬ poses, the hydraulic dredge being used for sand, and the ladder dredge for gravel. Inci¬ dentally the river channels are improved, as the operations are conducted under the direc¬ tions of government engineers. Consult Fowler, C. E., ˆPractical Treatise on Sub-Aqueous Foundationsˆ (New York 1914) ; Mc¬ Daniel, A. B., ˆExcavating Machineryˆ (New York 1913) ; Prelini, C., ˆDredges and Dredg¬ ingˆ (New York 1911).

DREDGING, the operation of removing mud, silt and other deposits from the bottom of harbors, canals, rivers, docks, etc., by me¬ chanical means. The most simple dredging apparatus is the spoon apparatus, which consists of a strong iron ring or hoop, properly formed for making an impression upon the soft matter at the bottom, so as to scoop it into a large leather bag attached to the ring and perforated with a number of small holes. The means for working it is a long handle, a sus¬ pending rope, and a crane or sweep-pole planted in a boat. This primitive apparatus was formerly used in the canals and ditches of the Netherlands. Much more effective is the steam dredging-machine now in common use. It is said to have been first applied by Boulton and Watt for use on the weir at Sunderland, England, in 1796. It has a succession of strong iron buckets on an endless chain running on a frame, the lower end of which is vertically adjustable so as to regulate the depth at which it works. The buckets tear up the matter at the bottom, raise it and discharge it into barges or hoppers stationed close to the dredging vessel. The Suez Canal was excavated by means of a ladder dredge with a long chute and supporting girder. The material excavated was carried in boxes on a sort of tramway and tipped out on the bank.

In excavating at Hell Gate and Flood Rock Reefs, at New York, a barge measuring 120 feet in length, 44 in beam, and 15 in depth, used a grapple which weighed 15 tons and lifted boulders of 70 tons. In some cases the current of river or tides has been utilized in dredging channels. In bottoms of mud or loose sand the steam pump or hydmulic dredger may be used. The watery material is pumped out and deposited on the shore ; the water drains away, leaving the sand ˆ or mud. By this means more than 3,000 cubic yards a day can be excavated at an extremely low cost.

Great improvements have been made in hy¬ draulic dredges, and

some built in recent years for use in the Mississippi River have a capacity of over 1,000 cubic yards per hour.

Dredging is also the operation of dragging the bottom of the sea in order to bring up oysters, or to procure shells, plants and other objects for scientific observation. The oyster dredge is a light iron frame with a scraper like a narrow hoe on one side, and a suspend¬ ing apparatus on the other. To the frame is attached a bag made of some kind of netting to receive the oysters. The dredges used by naturalists are mostly modifications of or some¬ what similar to the oyster dredge. Scientific dredging has of late assumed a high importance as making us acquainted with the life of deep-sea areas. See Deep-sea Life.

William H. Heuer,

Corps of Engineering, United States Army.

DREIBUND, dri'bund. See Triple Alli¬ ance, The.

DREIKANTER, diTkant-er, or WIND-KANTER, rudely triangular polished pebbles, which have been worn smooth by drifting sand. They may be seen in most regions of sand dunes, but especially in deserts.

DREISER, dri'ser, Theodore, American editor and author: b. Terre Haute, Ind., 27 Aug. 1871. He received his education at the University of Indiana, and in 1892 began his career as a journalist on the staff of the Chicago Daily Globe. In 1892-93 he was successively dramatic editor and special correspondent of the Republic of Saint Louis. His next work was on special assignments for various maga¬ zines. In 1905-06 he edited S?nith's Magazine, and in the following year was managing editor of the Broadway Magazine. From 1907 to 1911 he was editor in chief of the Butterick period¬ icals. He wrote several magazine articles and also ˆSister Carrieˆ (1900) ; Uˆnnie Gerhardtˆ (1911) ; '^The Financierˆ (1912) ; Traveler at Fortyˆ (1913); ˆThe Titanˆ (1914); ˆThe Geniusˆ (1915) ; ˆPlays of the Natural and the SupernaturaP (1916). His novels are of the realistic type, eager in their pS3ˆchological analyses of ' their principal characters. Mr, Dreiser presents American life in terms of its materialism, its lesser personalities. His de¬ scriptions are melodramatic and often cheap, but he is nevertheless powerful and vigorous and is given a high place by many modern critics. Because of his frank, often crude, handling of sex problems several of his works have been censored by the United States Press Censorship Board.

DREISSENA, dris'se-na, a genus of fresh¬ water lamellibranch mollusks of the Dreissenidee family, so named from Dreyssen, a Belgian nat¬ uralist. They are allied to the mussels. D. polymorpha, a native of the Caspian and Aral rivers and seas, is a well-known species in the rivers and estuaries throughout western Europe, including Great Britain, where they were accidentally introduced, probably on im¬ ported timber,

DRELINCOURT, dre'lafi'koor', Charles, French Calvinistic clergyman: b. Sedan, 10 July 1595; d. Paris, 3 Nov. 1669. He was the author of many controversial works and of a book en¬ titled ˆLes Consolations de Tame fidUe contre

les frayciirs de la mort, ˆ translated into English under the title ˆThe Christian's Defense Against the Fear of Deathˆ (1675). To promote the sale of the English translation of this work De Foe, it is said, wrote his ˆApparition of Mrs. Veal,ˆ which was published along with the fourth edi¬ tion of it in 1706. His son Charles (1633-97) became professor of medicine and anatomy at Leyden and was appointed physician to William, Prince of Orange, afterward William III of England.

DRESDEN, Germany, capital of Saxony, situated in a valley on the river Elbe. On the left bank are Altstadt (Old Town), Friedrichstadt and other quarters, and on the right the Neustadt (New Town) and the Antonstadt. The municipal area received a large extension in 1897. The portion on the right bank, called the Neustadt since 1732, is really the older, and was formerly known as Old Dresden. Among the structures worthy of notice are the five bridges across the Elbe, noted for their solidity, the first built in 1173; the Sophienkirche or Protestant Court Church ; the Roman Catholic Court Church, which contains several fine pictures ; the church of Our Lady, an imposing edifice; the church of Saint John; the royal palace; the law courts ; the museum, a beautiful building containing a famous picture gallery and other treasures, and forming a wing of the building known as the Zwinger, which contains zoological and other collections; the Japanese Palace (Augusteum), containing the public library of about 570,000 volumes besides a rich collection of antiquities; the Johanneum, now containing the collection of porcelain and the historical museum, a valuable collection of arms, armor, domestic utensils, etc., belonging to the Middle Ages. The royal palace is unattractive exter¬ nally, but has a fine interior adorned with fres¬ coes, and the Green Vault contains a most valua¬ ble collection of jewels and small works of art. There is a fine park of 300 acres. The city is distinguished for its excellent educational, lit¬ erary and artistic institutions, among which are the Polytechnic School with 1,500 students, or¬ ganized much on the plan and scale of a univer¬ sity; an important military academy, Dresden being the headquarters of the 12th Army Corps ; the Conservatory and School of Music ; the Academy of Fine Arts ; the Royal School, for drawing, modeling, *etc.* It is an important centre of the drama ; the municipality owns three theatres ; and the Court Theatre, a large and splendid edifice opened in 1878, which specializes in the adequate production of master¬ pieces in drama and opera, is one of the most famous in the world.

The manufactures of Dresden are not unimportant and are various in character ; the china, however, for which the city is famed, is made chiefly at Meissen, 14 miles distant. In Dresden are made articles in gold and silver, mathematical and surgical in¬ struments, straw hats and plait, artificial flowers, gloves, leather, cigars and cigarettes, musical in¬ struments, chemicals, perfumes, mineral waters, chocolate, playing-cards, *etc.* There are large breweries, and in the neighborhood there are coal mines, iron and glass works and manufac¬ tories of machinery, chemical stuffs, *etc.* The commerce is considerable and of late years, since the development of the railway system, the trade with foreign parts has considerably in¬

creased. A good deal of business is done with the upper parts of the Elbe by means of the steamers, Avhich ply as far up as Tetschen.

The gallery of pictures, one of the finest in the world and especially rich in the works of Italian and Dutch masters, was begun very early, but first became of much importance under Augustus II, king of Poland and elector of Saxony. It owes its most valuable treasures, however, to Augustus III, a prodigal monarch, who exhausted his country by his extravagances. He purchased the greater portion of the gallery of the Duke of Modena for $900,000, and many single pictures, among them Raphael's master¬ piece, the ˆMadonna di Sisto.ˆ This celebrated painting is in a room alone, no other picture being hung near it. The pictures number about 25,000 and in particular comprise many fine specimens of the Italian, Dutch and Flemish Schools. From the Dutch school there are, among others, some 40 Rubenses, 20 Van Dycks, over 20 Rembrandts, besides Ostades, Gerard Dows, Teniers, Wouvermanns, *etc.* Of the old German school Holbein's ˆ Madonna,ˆ a sublime work, is particularly distinguished. Of the French school there are many Claude Lorraines, Poussins, Le Bruns and others. Of the Italian school the gallery is rich in pictures of Cor¬ reggio, including his famous ˆLa Notteˆ or ˆHoly Nightˆ ; of Raphael, the 'Madonna di Sisto,ˆ the 'Madonna della Seggiolaˆ and others. There are also works of Leonardo da Vinci, Giulio Romano, Andrea del Sarto, Battoni Titian — his famous ' Venus ˆ and 'The Tribute Money, ˆ Garofalo, Paolo Veronese, Guido Reni, Carracci, Carlo Dolce, and every distinguished Italian painter. Many modern painters are also represented, among them Hofmann and several specimens from the Dusseldorf school. Murillo and Velasquez are represented by one picture each. This collection is liberally open every day to all visitors. Besides this fine gallery of pictures the museum contains also a collection of engravings and drawings, in all amounting to upward of

350,000. There is here also a rich col¬ lection of casts exemplifying the progress of sculpture from the earliest times and including copies of all the most important antiques, made under the direction of Raphael Mengs, in Italy. The collection of antiques in the Japanese Palace contains some excellent statues, among which are distinguished three female figures from Herculaneum. The Johanneum Museum con¬ tains a historical museum and a large variety of specimens of Chinese, Japanese, East Indian, Sevres, Meissen, etc., porcelain ware, arranged chronologically. Dresden being thus rich in treasuresˆ of art and favored by a beautiful natural situation is the summer resort of many foreigners.

Dresden is of Slavonic origin and first came under German and Christian influence after the subjugation of the Slavs, about the year 922. At the beginning of the 13th century it is mentioned in documents as a city and as a residence of the margraves of Meissen. Since 1485 it has been the residence of the rulers of Saxony. In the first half of the 18th century it was greatly em¬ bellished, but suffered much in the Seven Years' War. In 1760 for nine days it was bombarded by Frederick the Great. Theˆ Austrians occu¬ pied the city in 1809 without injuring it. The campaign of 1813 was most ruinous for the city

and its environs. From May till about the mid¬ dle of September it was held by Napoleon, and severe fighting in and around the city took place almost every day. After some years of war and suffering on 7 June 1815 peace and industry re¬ turned to the ˆˆGerman Florence, as Herder calls Dresden. After that time dwelling-houses, gardens and parks took the place of the former fortifications. During the revolutionar}'ˆ move¬ ment of 1849 it suffered severely. In 18& it was occupied by the Prussians, but was evacuated in the following spring. It has been greatly beau¬ tified and extended in recent times (especially under the auspices of King John), and its popu¬ lation is rapidly increasing. Pop. 548,308.

DRESDEN, Battle of, a battle fought in 1813, when an allied army of

150,000 Russians, Austrians and Prussians, commanded by Prince Schwarzenberg, sought to regain possession of Dresden, which was occupied by 20,000 French troops under Saint-Cyr. The Allies appeared before Dresden on 25 August, but Schwarzen¬ berg did not attack until the following morning, when each division drove back the French and gained advantageous positions in the city, so that it appeared as if Saint-Cyr would be forced to capitulate. In expectation of reinforcements and satisfied with the morning's achievements, Schwarzenberg at noon called a halt. The de¬ lays proved fatal. Napoleon, who had gone to the support of Ney, against Bliicher in Silesia, on learning of the Allies' march on Dresden, had hastened back, and during Schwarzenberg's unfortunate halt, French reinforcements were flocking across the Elbe, so that at four o'clock in the afternoon, when the Allies re¬ sumed the attack, there were 100,000 troops, who easily opposed all their efforts and drove them from their hard-won positions. Darkness stopped the conflict, which Napoleon resumed early the next morning, the fight continuing throughout the day until a strategic cavalry charge under Murat in the rear of the Austrians broke their line of resistance and practically ended the battle, the Allies beginning their re¬ treat into Bohemia at four in the afternoon. The French took over 20,000 prisoners, while the killed and wounded on either side were esti¬ mated at between 7,000 and 8,000.

DRESDEN PORCELAIN, called by con¬ noisseurs Meissen ware, frequently termed Saxe or vieux Saxe. It was the first hard por¬ celain made in Europe. Johann Friedrich Bottger, alchemist to Augustus II, king of Saxony, had exhausted his patron's patience by failing to carry out his promise to convert base metals into gold, after loss of much time and money. His life in danger, he was persuaded by von Tschirnhaus, a scholar and able chemist, to turn his efforts toward attempting the production of porcelain. Bottger's attempts were first re¬ warded by the discovery, in 1707, of a process of making a fine red stoneware (termed then Eisenporzellan) that was so hard it took on a polish from friction. Services of this ware pleased the king and court, and it became popu¬ lar later under the name Bottger ware. By 1710 this dark red ware was turned out in table services, vases, candelabra, pipe-bowls, small figures, *etc.* Some pieces received enamel-color, gold and silver decoration. This Bottger ware was soon being made in several localities (Plane, Bayreuth, etc.).

In 1709 or 1710 Bottger succeeded in getting kaolin, the porcelain clay of the Chinese, frorn Aue and Colditz. True porcelain pieces were

now produced. Bottger's vicious and drunken habits brought about his death in 1719.

Meissen's output from 1707 to 1719 is known by experts as First Period ware. The porcelain was quite plain at first or had simple applied reliefs, all without color decoration, the chem¬ istry and practice of porcelain (grand feu) colors being then unknown. Goldsmith Funcke, of Dresden, had decorated some pieces of the red stoneware in gilt and some gold ornamenta-. tion was done on the early porcelain, which, otherwise, attempted to reproduce the Chinese white porcelain (blanc de chine).

Characteristics. — Two different clays were used in making this early porcelain ware. One. was called blaue Masse (a blue clay) and the other was a white clay. Hence two kinds of body are found, the blue clay making a white paste and the white clay producing a l)ody of yellow tinge and having little holes and unable to take underglaze blue decoration. Later this trouble was overcome. Some pieces copy the forms of silverware of the period; the court goldsmith, Irminger, designed them. The Chinese styles found on other pieces were taken from examples in the fine collection of Oriental porcelains belonging to Augustus. A mark, the ^^caduceus wand,^^ no doubt referred to Bottger's alchemistic transformation, but was used later than this period.

Second Period (1719-35). — Called also ^^painting period.® Dr. Nehmitz, Bottger's fur-nace_ and glaze manager, with von Holzbrink, J. G. Mehlhorn and Steinbriick straightened out the confused condition Bottger left behind. The king died and, under Augustus HI, his suc¬ cessor, Graf Briihl headed a commission to regulate the business and factory. Decoration, paste and glazing were much improved, and, with more scientific firing, much of the great losses from crazing were obviated. Cobalt being discovered in the Saxon mines, Kohler (who later became manager) commenced, un¬ successfully, blue underglaze decoration ; the color ®ran® into the glaze and was defective. Johann Gregor Herold, an expert on colors and painting at the Vienna factory, fled to Meissen (about 1719). His all-round knowledge of the technique of porcelain making soon procured him the directorship of the entire factory. On his retirement in 1765 he had given the factory a high reputation for finely painted wares, besides having greatly advanced the potting technique.

Characteristics. — Numerous qualities of body appear in specimens of this period. It was a period of experiments in clays. Styles were continued from last period, but breakfast services were a specialty.

Applied molded decoration was favored. Vases for chimney ornaments were in sets of five and seven. With J. J. Kandler as modeler (from 1731) beautiful sculpture work came into competition with the painted decoration. The clever modeler Kirch-ner had long aided with his vases and animals, but now resigned (1733), fearing the prestige Kandler was gaining. Herold trained a staff of color decorators and instituted ^team work® like the Chinese, giving over gilding to one man, underglaze blue painting to another,

flowers to the next, figures to another, and so on. Decoration now extended to overglaze colors as well as underglaze blue. A yellow ground color was in use by 1725. Starting with imitation of Japanese and Chinese examples, and white reserve panels, etc., Parisian artists were next copied. Elaborate gilt borders and backgrounds of violet, heightened by gold net¬ work, etc., came into vogue; scenes a la Wat¬ teau, and the Dutch sea coast accompanied by rococo scrollwork. A. Bottengruber and Preusslcr were prominent artists of this time.

Third Period (1735-40). — This is often termed the ^^plastic period.^^ The sculptor, Johann Joachim Kandler, brought great renown with his masterly human figures and groups (^^crinoline groups®) and other relief work. Herold was forced to let flat color decoration take second place.

Characteristics. — Elaborate moulded Ba¬ roque ornament produced a plastic body, human heads, swans, cupids, dolphins, acted as handles. While continuing, to some extent, the Oriental forms and painted motifs, European decoration was preferred. Cobalt blue decora¬ tion was now a success. Figures innumerable were made, including classical gods and god¬ desses, shepherds and shepherdesses, street hawkers, the Seasons and the noted ^^monkey orchestra.^^

Fourth Period (1740-56). — Called also ^^rococo period.® The Louis Quinze rococo style began to displace the former baroque early in this period. Groups found their fullest play now. The Seasons were followed by the Senses, Quarters of the Globe, Arts and Sci¬ ences. Watteau groups, cupids (amorini) be¬ came the rage, ^^Dresden® flower decoration for candelabra.

Characteristics. — The rococo ^^scroll® ap¬ pears and the former ground color gives place to '^'scale® and other motifs in purple, blue, green, yellow. Paris prints are found in the decoration ; camaieu is in vogue. Underglaze blue was continued and armorial bearing deco¬ ration made to order was popular with the wealthy.

Fifth Period (1756-63). — Prussia, under Frederick the Great, ravaged the country now and forced a tribute of great lots of porcelain, besides deporting many of Meissenis best workers. Nothing new in style or decoration appears in this time except the commencement of Greco-Roman antique tendencies.

Sixth Period (1763—74). — The factory now had to be revitalized and the rivalry of por¬ celain factories at Sevres, Vienna, Berlin, etc., contended with. Michael Victor Acier, the Paris sculptor, was engaged in 1764 to give new life to the modeled forms, as Kandler's work had lost in popularity. He created the figures of French street criers, etc., and assisted Meis¬ sen's prosperity. Lovely, delicate lace effects were produced in this period. Search was made for improved colors in other factories, Sevres bleu de roi especially. Meissen's fame was waning.

Seventh Period (1774-1814). — Often termed the ^^Marcolini® period. Count Camillo Marcolini was made chief director and started retrenchment to make up for the immense losses caused through severe competition. He forced sales of surplus stock by lowering

prices ; he reduced salaries. Financial embar¬ rassment, in 1790, forced a subsidy from the state. All without success. His resignation, in face of impossible retrievement, when offered was refused and the factory had to close in 1810. This caused so much labor disturbance that the works were opened again and sales prices again reduced, while much was sold without decoration. Such sales account for much of the spurious ^^Dresden® ware which is of Dresden body but fake decoration. Marcolini retired in 1814. Napoleon's activities were ruining all European commerce; Wedgwood's ware, from Staffordshire, had become the rage all over the civilized world (see Wedgewood Ware). By 1833, with Kiihn as director, the Konigliche Sachsische Porzellan Manufaktur gradually began to rally in its finances, now using old forms and decoration which had made Meissen famous. Later followed Barthel (1871), Brunnemann (1895). Up to the time just before the World War (1914) "Dresden® art ware was made on quite a large scale and found a good all-world demand.

Characteristics.- — Wentzel succeeded in producing the noted blea de roi ground color so long sought after. Acier's rococo style had to change to the more modern Louis Seize style, with its torch and crescent, festoon, creased^ ribbon bow motifs, oval medallions encircled with laurels and containing monograms or por¬ traits. Classic forms were revived. Imitations were made of Wedgwood's white reliefs on blue "jasper^^ backgrounds.

Marks. — The Dresden "cross swords® was used from 1723 to the present time. It was taken from the state coat-of-arms. Chinese marks were used at different times. A.R., for Augustus Rex, was used from 1725 to 1740. K.P.M., for Konigliche Porzellan Manufaktur, occurs

from 1723 to 1730. Other marks, K.H.C., K.H.K., K.H.K.W., K.C.P.C., etc., were initials of different branches of the royal household or estates of the king. The “cross swords® scratched through is the erased mark on pieces that were sold in the white for others to decorate.

Bibliography.— Berling, Karl, <Das Meiss¬ ner Porzellan und seine Geschichteˆ (Leipzig 1900); Doenges, Willy, ˆMeissner Porzellan: seme Geschichte und kunstlerische Entwickel-ungˆ (Berlin 1907) ; Mew, Egan, ˆDresden Chinaˆ (London 1909) ; Sponsel, Jean Louis, ˆ Kabinetstiicke der Meissner Porzellan Manu¬ faktur von Johann Joachim Kandler> (Leipzig 1900) ; Wylde, C. H., ˆHow to Collect Conti¬ nental China ˆ (London 1907) ; Zimmermann, Ernst, ˆDie Erfindung und Friihzeit des Meiss¬ ner Porzellansˆ (Berlin 1908) ; id., -Die Statu-etten Konig Augusts HI in Meissner Porzellan> (in Mitteil. aus den sdchsischen Kunstsanim-lungen, Jahrg. 4, Dresden 1914).

Clement W. Coumbe.

DRESDNER BANK, The. The Dresdner Bank was founded in Dresden in 1872 with a capital of 9,600,000 marks, and in 1881, by the establishment of a branch, transferred its centre of activity to Berlin. Its first success was in its deposit business, closely followed by its regu¬ lar banking business, in which it is to-day one of Germany’s leading institutions. It is par¬ ticularly strong in southern Germany through the number of banking institutions absorbed or

DRESDEN (MEISSEN) PORCELAIN

1 Early Dresden Cup (about 1720) 2 Jar in Chinese Form. “ Escotic ” Birds in Medallion (1725) 3 Polychrome Plate. “ Chinese Taste ” (1720-1730)

DRESDEN (MEISSEN) PORCELAIN

1 Tureen and Platter. 18th Century

2 Table Ware with Scenic Decoration (1725-1731)

•k

established there. In many respects it has pur¬ sued a policy parallel to that of the Deutsche Bank, both in domestic finance and overseas business, the latter being initiated in 1892 by the absorption of a branch in Hamburg, fol¬ lowed in 1895 by a branch in Bremen and in 1901 in London. In all, the Dresdner Bank had (beginning of 1909) 27 branches, all, with the exception of the one in London, being located in Germany. In addition it has one Commandite and 57 deposit offices, 23 being in Berlin. Its forei^ business is carried on through sub¬ sidiaries in China, Japan, Italy, Switzerland, Turkey, Greece, Egypt, Morocco, Argentina, Mexico and Canada, and in 1905 a close alliance was formed with the banking house of J. P. Morgan & Co., New York, for joint action in international finance and issue operations, particularly the absorption of American secu¬ rities by German investors. Operations in the Orient and South America have been carried on jointly in cooperation with the A. Schaaffhausen'seher Bankverein. Between 1872 and 1909-10, important German banks and banking firms having numerous branches throughout Germany were absorbed by the Dresdner Bank. Important among these was the Deutsche Genossenschaftbank (Bank for Cooperative Credit Societies), Sorgel, Parrisius & Co., of Berlin and Frankfort-on-the-Main, closely identified with German industrial and agricul¬ tural cooperative societies. A special depart¬ ment of the Dresdner Bank is also concerned with the fostering^ of these interests. In addi¬ tion, in 1904, jointly with the A. SchaafT-hausen'seher Bankverein, the banking house of Von Erlanger & Sohne of Frankfort-on-the-Main was absorbed, this latter having 8 branches and 97 agencies, besides community-of- interest connections with 2 banks having 52 agencies. In addition, through board super¬ vision or stock control, 12 other important banks with numerous branches and agencies are in¬ cluded within the Dresdner Bank group. The relations of the Dresdner Bank to the industrial life of Germany are indicated by the fact that at the beginning of 1909 representation was had on the boards of 87 other

important industrial and financial organizations. In 1908 the capital was 180,000,0(X) marks (increased in 1910 to 200,000,000 marks), surplus 51,500,000 marks and dividend 7ˆ4 per cent. The total capital power of the Dresdner Bank group in the same year amounted to 283,942,419 marks, of which 227,680,000 constituted the capital and 56,262,419 marks the surplus. Consult Riesser, Dr. J., ˆDie Deutsche Grossbanken und ihre Konzentration> (1909) ; ˆGermany's Economic Forces > (1913) ; ˆReport on Cooperation in American Export Trade> (Washington 1916).

DRESS, the clothing or apparel of the human body. Under this title will be considered the principles underlying the wearing of clothes rather than the minute details of their shape and color, which will be found treated under Costume. The evolution of dress has always been associated with the growth and decline of nations and therefore sheds much light on racial characteristics. In the earliest stage of human history dress must of course have been strictly utilitarian, consisting only of the covering neces¬ sary to protect the body against the extreme conditions of climate and temperature. With

many uncivilized tribes this conception of the function of clothes still survives.

With the dawn of civilization another utili¬ tarian function is assumed by clothes. Clothing becomes a means of indicating distinctions of rank and office in the community. The mini¬ mum of clothing is found among slaves and the lowest classes in general, while garments even more massive and extensive than either climatic conditions or considerations of modesty prescribed come to be worn by those in the higher ranks. Next, a purely decorative motive, which undoubtedly has its source in personal vanity, came to supplement the two more utili¬ tarian ones just mentioned. With some un¬ civilized or semi-civilized peoples this is by far the strongest and frequently the only motive for the wearing of such scant vestments as neither cover nor protect the body. That per¬ sonal vanity underlies the use of clothes quite as much as considerations of modesty and tem¬ perature even among civilized peoples is a view held by many authoritative scientists.

The Assyrians covered themselves entirely with heavy draperies, stiff with embroidery. The Egyptians, of whose dress we have the earliest records, clothed themselves in thin materials which revealed the lines of the body and fre¬ quently left even the limbs exposed. Their dress

was rich in texture and splendid in color¬ ing, the designs of their textile fabrics being of high artistic excellence and beauty. Class distinctions were very strongly emphasized in the dress of the Egytians. A peculiar feature of their priestly garb was the leopard-skin worn on solemn sacrificial occasions. The Eg'ptian women of rank wore beautiful em¬ broidered skirts secured at the waist by a colored sash, or suspended by straps from the shoulders, and over this a long, loose robe. The laboring class used woolen fabrics, but their costumes, especially when at work, con¬ sisted as a rule simply of a loin-cloth and girdle. Among the Chinese the predominating idea of dress has always been splendor of ma¬ terial and decoration. The intense conserva¬ tism of this race is nowhere better shown than in the almost complete sameness of dress from earliest times to the present day. That, as a general rule, progress in civilization — and especially a sudden leap in this direction — makes for radical dress reform, is well illus¬ trated in the case of the modern Japanese. For a long time the figure was merely draped in loose lengths of material, with no attempt at conforming to the lines of the body or limbs — though sleeves and trousers are occasionally ob¬ served, as in the Persian sculptures at Persepolis. The primitive sandal was evidently thought to afford all necessary protection to the foot, until the time of Asstir-bani-pal, or Sardanapalus, when soldiers and hunters appear to have worn a sort of net to protect their legs and boots or gaiters somewhat like the Greek and Roman cothurnus, laced in front. Save as offi¬ cial costumery, hats and caps were little worn in early times. Even in the time of Julius Caesar they were little used except by travelers, most people preferring a fold of the toga or mantle for a head covering. Among the Greeks and Romans the division of classes and professions by dress were very striking. By the Greeks the artistic effect was carried to a height

hitherto unknown, their garments being the per¬ fection of grace and dignified elegance. At no other time has a nation's dress offered such great advantages to the artist. The Greek chiton and himation of about 450-350 b.c. were the highest type of loose clothing, while the highest type of the more tightly fitting costume was found in England and France in 1350. The costumes of western Europe during the last quarter of the 14th and the first of the I5th century were characterized by a beautiful rea¬ sonableness and adaptation at once to use and artistic effect. But there have been other periods in which the exaggeration of good sar¬ torial points led to utter absurdities and de¬ moralization. After the Norman Conquest, which introduced into England, among other unsalutary features, numerous ugly changes in dress, eccentricities in headgear were especially prevalent. In the 17th century shoes grew so small and pointed that they were an encum¬ brance to the wearer and had to be hooked up by their projecting tips to make walking pos¬ sible. Small waists were considered quite as essential for men as for women. Even as late as the reign of George III, English tailors ad¬ vertised corsets for gentlemen. The modern tendency in dress, as in many other things, is decidedly democratic — a tendency toward the complete elimination of differences in dress as marks of social or other distinction. The dress reform movement inaugurated in the 19th cen¬ tury and the greater attention paid to hygienic considerations have resulted in making women more solicitous about the health and comfort of the body than they have been for many cen¬ turies previous. Extravagance in dress has always been a mark for social and religious reformers. Both in France and in England, especially during the Puritan period in the latter country, preachers thundered from many a pulpit against the senseless fashions of their times. Sumptuary legislation has attempted time and time again to regulate it, but usually without success. In England, particularly under the Tudors, considerable drastic legislation was enacted on the subject of dress. Beginning as early as 1463 and taking on a most mandatory form in 1510, when ®An Act against wearing of costly Apparel® was passed, such legislation was re-enacted, or re-enforced, again and again, taking a different — usually a more stringent — form from time to time. But, custom proving stronger than legislation, the people constantly overstepped the bounds of dress laws, with the result that all such legislation was finally re¬ pealed in England in 1604, a century before such action was taken in other countries. There are two satirical literary treatments of this aspect of

dress which are especially famous, that of Swift in the ˆTale of a Tub,ˆ and that of Carlyle in ˆSartor Resartus.ˆ

Bibliography. — Most of the literature on the subject is in the form of magazine articles. The following works treat of dress, specifically or generally: Earle, ˆTwo Centuries of Cos¬ tume in Americaˆ (2 vols.. New York 1904) ; Evans, ˆChapters on Greek Dressˆ (London 1893) ; Farnsworth, ˆThe Art and Ethics of Dressˆ (1915); Fox, ˆFashion: the power that influences the World. The Philosophy of An¬ cient and Modern Dress and Fashionˆ (New York 1872) ; Flill, ˆHistory of English Dressˆ

(London 1900) ; Lacroix, Planners, Customs and Dress of the Middle Ages and the Re¬ naissanceˆ (London 1877) ; AIcClellan, ˆHistoric Dress in America, 1607-1800ˆ (Philadelphia 1904) ; Walker, ˆ Dress as it has been, is, and will beˆ (New York 1885) ; Winterburn, ˆPrinciples of Correct Dressˆ (1914). See Costume; Dress Reform; Fashion.

DRESS REFORM, a movement of the 19th century, having for its aim the modification of the dress of women along hygienic lines chiefly, but also with regard to comfort and con¬ venience. Many articles of feminine apparel had long been operating against the health of the wearers and the injurious effects had been recognized and more or less frankly discussed in private circles before leaders were found with sufficient earnestness and courage to make organized efforts for reform. So far as the United States is concerned dress reform may be said to date from 1851, when Amelia Bloomer published some articles in favor of freer dress for women in her paper called The Lily. A few years before the Civil War (in 1857) a National Dress Association was started, but made little headway. It was not until a similar society was organized in Boston in 1874 that attempts of this nature began to bear any fruit. Several causes seem to have contributed to making the time more propitious for an active propaganda against tight-lacing, high-heeled and cramping foot-wear, trailing garments, *etc.* The greater attention paid to physiology in schools dispelled to some extent the ignorance which had been a partial excuse for unhygienic methods of dress. The increasing number of women receiving a college education ensured for the new ideas an audience with minds too liberal and judgments too sound to be rigidly fettered by conventionality and fashion. A third factor not to be disregarded was the firm attitude of physicians. Prevention of disease and the development of normal conditions was becoming the watchword where formerly cura¬ tive measures had been emphasized. The co¬ operation of the medical

fraternity by lectures, periodical literature and personal influence should receive due credit for the progress of dress reform. Such cooperation was a marked feature of the movement inaugurated in Bos¬ ton. As the century drew to a close conditions became still more favorable. The prominence given to bacteriology associated in innumerable minds the trailing skirt with germ-transporta¬ tion. The investigation, too, into the relative values of the different fabrics — cotton, linen, silk and wool — as material for underwear (a discussion in which Germany took a notable part) was very timely. It called attention to the lamentable lack of judgment exhibited by many persons, especially women, in protecting themselves by suitable under garments against the changes of the season, and especially the sudden variations of the American climate. The adoption of outer garments suitable for wet weather was undoubtedly hastened by the vogue of the bicycle skirt, which accustomed the eye to a style of garment once attracting unfavorable comment or at least unwelcome observation. Rainy-day clubs, formed in many cities, have done their share toward the introduction of the short skirt. The fact that a great number of women are now daily going to business has also

greatly promoted the movement of rational clothes for women. To athletics, too, woman's dress reform is deeply indebted. The present popularity of out-of-door exercise and sport for women and the general interest taken in physical culture have inevitably tended to mod¬ ify the form of women's garments.

The practice of lacing, with its vicious re¬ sults of molding the feminine form into ab¬ normal lines and crowding the vital organs into disease-promoting states, still persists among women who place less value on health and bodily comfort than on outward appearance and unnatural ®grace.® Yet on the whole, the move¬ ment toward rational raiment for women is making steady if seemingly slow progress on both sides of the Atlantic. .(Esthetic considera¬ tions had little effect upon the earliest dress-reformers such as Mrs. Amelia Bloomer and a few women suffragists who first braved public opinion

by a radical change of costume. The Turkish trousers and very short skirt adopted by Mrs. Bloomer did not invite imitation; but later phases of reform, both in England and in America, have aimed at grace and beauty as well as health and comfort in the style of garments advocated. In the United States Mrs. Annie Jenness-Miller has been a prominent exponent of the more artistic aspect of the subject. Very near the time of the establish¬ ment in this country of the second National Dress Association an attempt was made by the crown-princess of Saxony to awaken her fellow countrywomen to the importance of dress-reform, the hygienic side of the question being most prominent in that effort. Under the leadership of Lady Harberton, president of the Rational Dress Association, the dress reform movement assumed a somewhat different direc¬ tion than that associated with Mrs. Jenness-Miller. To retain the natural beauty of the human form and succeed in its harmonious appareling were the aims of some of the dress reformers. There was, however, side by side with this movement one having a utilitarian trend. This was allied to the German move¬ ment in favor of more hygienic garments ; the combination of lightness and warmth in the material used being a great desideratum. Or¬ ganized effort along the line of dress reform in England has resulted in the formation of the Rational Dress Association just mentioned and the National Health Dress Association. There is also a society having for one of its aims a change in the customary mourning apparel. Outside of Germany and England little interest has as yet been taken in Europe in the subject of dress reform, although a certain Russian Minister of Education tried in vain to prohibit corsets. Consult Bloomer, ˆThe Life and Writings of Amelia Bloomerˆ (Boston 1895) ; Godwin, ˆDress and Its Relation to Health and Climateˆ (London 1884) ; Harbeis, ˆThe Art of Dressˆ (ib. 1881) ; Woolson, ‘ˆDress Reformˆ (Boston 1874). See Dress ; Costume; Fashion.

DRESS SHIP, nautical term signifying the decoration or ornamentation of a ship with flags. It is done on national holidays or on some special occasion. There are many forms and degrees, according to the importance of the oc¬ casion or of the personage to be honored. Hoisting the national colors at the mastheads and at the peak is, perhaps, the simplest form of

dressing a ship. Additional flags, usually those of the signal code, are hoisted to full-dress a ship. The ordinary method is to arrange the flags in a line from the water forward, up the forward stay between the mastheads to the peak and thence over the stern. At the stern and

prow weighted lines are dropped to which the flags are attached. When doing honor to a foreign nation the latter's colors are run to the head of the main mast. When more than one country is represented by its colors all must be given posts of honor and none placed in a position of inferiority to another. In naval ves¬ sels the flags of the navy signal code and of the international signal code are used jointly. During the Hudson-Fulton celebration in New York in 1909 the American and visiting foreign naval vessels were dressed with electric lights, arranged to outline the hull and superstructure when illuminated.

DRESSER, Henry Ecles, English orni¬ thologist: b. Thirsk, Yorkshire, 9 May 1838. He is best known by his < History of the Birds of Europeˆ in eight volumes (1871-81).

DRESSER, Horatio Willis, American author: b. Yarmouth, Me., 15 Jan. 1866. He was educated in Denver, Colo., and at Boston; was appointed assistant in philosophy. Harvard University, 1902-11; professor of philosophy, Ursinus College, ˆ 1911-12. Since 1893 he has lectured and written extensively on practical philosophy and metaphysics, and he edited and published the Journal of Practical Metaphysics 1896-98; but it must be pointed out that these terms as used by him and his school of thought have meanings entirely different from those in which they have hitherto been used and are generally understood. He edited The Higher Low' 1899-1902, and is the author of ˆThe Power of Silenceˆ (1895) ; ˆThe Perfect Wholeˆ (1896); Hn Search of a SouP (1897); Woices of Hopeˆ (1898) ; ˆMethods and Problems of Spiritual Healingˆ (1899) ; ˆEducation and the Philosophical IdeaP (1900) ; Woices of Freedomˆ (1899) ; ˆLiving by the Spiritˆ (1900) ; ˆThe Christ IdeaP (1901) ; ˆA Book of Secretsˆ (1902) ; <Man and the Divine Orderˆ (1903) ; ˆHealth and the Inner Lifeˆ (1906); ˆThe Greatest Truthˆ (1907); ˆA Physician to the SouP (1908) ; <The Philosophy of the Spirit > (1908) ; ˆA Message to the WelP (1910) ; ˆHuman Efficiencyˆ (1912) ; 'ˆThe Religion of the Spirit in Modern Lifeˆ (1914).

DREUX, d re (ancient Duroscassˆ), France, one of the oldest towns on the Blaise, 20 miles north-northwest of Chartres. It has a number of churches and other buildings of the 11th, 12th and 13th centuries. It has foundries and manufactures cloth, leather and glass and trades in sheep and cattle. In Roman times it was called Durocassis or Drocie and was also important under the Gauls. Here the Due de Guise defeated the Huguenots and captured the Prince of Conde in 1562. The Germans took the town in 1870. Pop. 10,500.

DREVET, dreVa', French family of en¬ gravers. (1) Pierre: b. Saint

Colombe, near Lyons, 1664; d. Paris 1739. He studied at Lyons, and at Paris with Audran and Rigaud. In 1696 he became court engraver and was elected to the Academy in 1707. He left more than 100 plates, of which the recognized master-

piece is ˆLoiiis XIVˆ (1712). He was particu¬ larly successful in the engraving of portraits. (2) Pierre Imbert, his son: b. Paris 1697; d. there 1739. He studied with his father, but sur¬ passed him in art. He, too, was most successful in portrait work, one of his best pieces being a portrait of Bossuet after Rigaud ; he also copied the works of Coypel, Restout, Andray and other French painters of the time. He succeeded his father as court engraver and they executed many works together. (3) Claude, the nephew of Pierre Imbert: b. Lyons 1710; d. Paris 1782. He was a pupil of his uncle and copied his style without equaling his art. Consult Firmin-Didot, ˆLes Drevetsˆ (Paris 1876).

DREW, Daniel, American capitalist : b. Carmel, N. Y., 29 July 1797; d. New York, 19 Sept. 1879. In early life he was a cattle drover and dealer and was subsequently prominent as a steamboat builder, but was most widely known from his connection with railroads and as a leading stock speculator in Wall Street. The failure of Kenyon, Cox & Co. caused the loss of his great fortune, which at one time amounted to about $15,000,000. He was the founder of the Drew Ladies' Seminary at Carmel and the Drew Theological Seminary (q.v.) at Madison, N. J. He also gave large sums of money to various Methodist colleges and schools. Consult White, Bouck, ˆThe Book of Daniel Drewˆ (New York

1910).

DREW, John, American actor : b, Phila¬ delphia, 13 Nov. 1853. In 1873 he first appeared at his father's theatre in Philadelphia, then under his mother's management. For the next six years he played with the popular stars of that day, including Edwin Booth and Fanny

Davenport. In 1879 he appeared as leading man in the all-star company of Augustine Daly, at Daly's Theatre, New York. His most note¬ worthy successes there were as Petruchio in ˆThe Taming of the Shrew,ˆ and as Charles Surface in Sheridan's ˆSchool for Scandal.ˆ He appeared also in the classic revivals and in original productions of Mr. Daly. He visited Europe in 1892 with Daly's Company, playing classic roles, and began his starring tours in the autumn of 1892, playing in ˆThe Masked Ball,ˆ ˆThe Butterflies,ˆ ˆA Marriage of Convenience,ˆ ˆOne Summer's Day,ˆ ˆThe Liars, ˆ ˆRichard Carvel,ˆ ˆHis House in Order, ˆ Hnconstant Georgeˆ ˆMuch Ado about Nothing,ˆ ˆThe Tyranny of Tearsˆ and ˆThe Will.' John Drew is the best living interpreter of a certain type of character common in high society in America. In 1901 he appeared in a revival of ˆThe Second in Command.' Consult Strang, ˆFamous Actors of the Day' (Boston 1900) ; Moses, ˆFamous Actor-Families in America' (New York 1906) ; Winter, ˆWallet of Time' (2 vols.. New York

1913).

DREW, John, American comedian : b. Dub¬ lin, Ireland, 3 Sept. 1825 ; d. Philadelphia, Pa., 21 May 1862. He made his first appearance at the Bowery Theatre, New York, in 1845, and later became manager, in connection with William Wheatley, of the Arch Street Theatre in Philadelphia. He acted in the principal cities of the United States, England and Australia.

DREW THEOLOGICAL SEMINARY,

in Madison, N. J., an educational institution founded by the Methodist Episcopal Church for

the education and training of its ministers. Daniel Drew donated the ground and buildings. Three years suffice to cover the prescribed courses, which in addition to special training in theology, etc., also cover a wide range of secu¬ lar subjects in order to provide ministers of broad minds and of good general education. The degree of B.D. is conferred on students who already hold an academic degree, and the degree of doctor in theology is conferred on students who take the advanced courses pre¬ scribed for this degree. Tuition is free, and arrangements have been made whereby the cost of student life is most moderate. There are eight buildings altogether, which with the

grounds are valued at about $725,000. The productive endowment funds total over $1,000,- 000. The seminary is provided with an excel¬ lent library of 126,000 volumes and 140,000 pamphlets. The enrolment of students in 1916 was 171, and there were 16 instructors.

DREWRY'S BLUFF, Battle of. When General Grant began his campaign for Rich¬ mond in May 1864, General Butler, commanding the Army of the James, was directed to be well up James River toward Richmond by daylight of the 5th and to push ahead with all energy. By the 6th Butler had reached and entrenched at Bermuda Hundred Neck. Kautz's cavalry division, moving from Suffolk, destroyed sev¬ eral bridges on the Norfolk and Petersburg and Weldon railroads and joined Butler on the 10th. On the 9th Butler advanced with the greater part of his force to strike the railroad connect¬ ing Richmond and Petersburg, but his advance was barred by Swift Creek, which was found impassable and its bridges heavily guarded, upon which he ordered his troops to withdraw to their entrenchments ; but the withdrawal was not effected without an attack by the Confederates on a detachment of the 10th Corps, in which the loss was severe on both sides. Butler's advance was barred by strong works on Drewry's Bluff on the right bank of the river, eight miles below Richmond. The works could not be reached by the navy, and on the land side the Bluff was defended by 22,000 infantry and over 2,000 cavalry, field artillery and heavy guns. On the 12th General Butler moved along the turnpike and after some fighting the Confeder¬ ates fell back toward Drewry's Bluff. On the I5th there was heavy all-day skirmishing and some artillery firing, and General Beauregard issued orders for an attack next morning to cut Butler off from Bermuda Hundred and capture or destroy his army. The attack was made very early in the morning under cover of a dense fog; the right of Butler's line was turned and a large number of prisoners taken, compelling it to fall back a short distance. On the leH Butler's line held its ground and made some progress, but toward evening Butler ordered his troops to fall back and at night they were in the entrenchments at Bermuda Hundred. Beaure¬ gard followed and entrenched in front of But¬ ler's lines. As General Smith says, «Both corps re-entered the historic bottle, which was at once carefully corked by a Confederate earthwork." On the 20th Beauregard assaulted and carried some of Butler's advanced lines and a sharp fight ensued to regain them, which was only par¬ tially successful, a portion of them being re¬ taken by Howell's brigade of the 10th Corps,

which lost 702 men; the Confederate loss was nearly 800. On the 29th General Smith with three divisions of the 10th and 18th corps, 16,000 men,_ and 16 guns, left the Army of the James and joined the Army of the Potomac in time to take part in the battle of Cold Harbor. The Union forces engaged in the battle of Drewry's Bluff, 16 May, numbered about 16,000, the Con¬ federates about 18,000. The Union loss, 14—16 May, was 390 killed, 2,380 wounded, 1,390 miss¬ ing. The Confederate loss, 16 May, was about 460 killed, 2,060 wounded, 212 missing. From 5-31 May, including all of Butler's engagements and Kautz's cavalry operations, the Union loss was 609 killed, 3,769 wounded, 1,580 missing; the Confederate loss for the same period cannot be definitely ascertained, but it was less than that of the Union forces. See ˆOfficial Recordsˆ (Vol. XXXyi) ; ˆButler's Bookˆ ; Grant, ˆPer¬ sonal Memoirsˆ ; Humphreys, ˆThe Virginia Campaign of 1864-65ˆ; Roman, ˆMilitary Operations of General Beauregardˆ (Vol. H) ; and ˆBattles and Leaders of the Civil Warˆ (Vol. IV).

E. A. Carman.

DREWS, Arthur, German philosopher: b. Uetersen, Holstein, 1ˆ5. He received his edu¬ cation at the universities of Munich, Berlin, Heidelberg and Halle. In 1898 he was ap¬ pointed privatdocent of philosophy at Karls¬ ruhe and 10 years later was made professor extraordinary. He is the editor of Hegel's ˆReligionsphilosophieˆ (1905) and is the author of works of criticism on Kant, Nietzsche and others in ˆ Kants Naturphilosophie als Grund-lage seines Systemsˆ (1894) ; ˆE. von Hart¬ manns philosophisches System im Grundrissˆ (2d ed., 1905) ; ˆNietzsches Philosophicˆ (1904) ; Hˆebenswerk Eduard von Hartmannsˆ (1907) ; ˆPlotin und der Untergang der antiken Weltanschatsungˆ (1907). _ Other important works from his pen are ˆDie Lehre von Raum und Zeiten nachkantischer Philosophicˆ (1889) ; ˆDas Ich als Grundproblem der Metaphysikˆ (1897) ; ˆDie Religion als Selbstbewusstsein Gottesˆ (1906) ; ˆDer Monismusˆ (1908) ; ˆGeschichte des Monismus im Altertumˆ (1913). Drews has become well known in America through his two works attacking the historicity of the narrative of the New Testa¬ ment. These are ˆDie Christusmythe ˆ (1910; English translation by Burns 1911; part H, by McCabe 1912), and ˆDie Petruslegendeˆ

(1910).

DREXEL, Anthony Joseph, American banker: b. Philadelphia, Pa., 1826; d. Carlsbad, Germany, 30 June 1893. He became the head of the well-known firm of Drexel & Company, Philadelphia, having been identified with it from the age of 13. He was zealous in pro¬ moting science and art, especially music, and contributed largely to philanthropic and educa¬ tional interests. The Drexel Institute of Art, Science and Industry, Philadelphia (q.v.) was established by him. He became head of Drexel, Morgan & Co. of New York, and Drexel, Harjes & Co. of Paris. With G. W. Childs, he became owner of the Philadelphia Public Led¬ ger (1864).

DREXEL INSTITUTE OF ART, SCI¬ ENCE AND INDUSTRY was founded at Philadelphia in 1891, by Anthony J. Drexel

(q.v.). This school was established for the purpose of giving young men and women op¬ portunity to receive training in the arts and sciences as applied to the industries. The re¬ quirements for admission depend upon the course which the applicant wishes to pursue ; no degrees are given. In 1914 the trustees had applied for the right to grant degrees. The buildings and equipment given by Mr. Drexel cost over $4,000,000; and the amount of en¬ dowment, given also by Mr. Drexel, is $2,000,000. The courses offered are : Fine and applied arts ; elective engineering; commerce and finance; mechanical drawing and machine construction ; domestic science ; mathematics ; physics ; chem¬ istry; and English. Day and evening classes are provided for all departments. The length of time required to complete the work depends upon the course. The free public lectures pro¬ vided by the institute are valuable educational factors.

The department of commerce and finance consists of three special departments : First, the course in commerce and finance; second, the office course ; third, the evening course. These courses are founded on a broad and lib¬ eral basis, resembling generally the commer¬ cial schools of Europe, and they are intended to place commercial education in its proper re¬ lation to other departments of educational work. The object of the course is to train the young to do business rather than simply to re¬ cord business. It provides a liberal and practical course of study for a two years' training in the knowledge of the world's industries and mar¬ kets, the laws of trade and finance and the mechanism and customs of business. The first special department is intended to give a thor¬ ough fundamental training for

the activities of business which include: (1) The production, sale and transportation of articles of com¬ merce; (2) the management of stock compa¬ nies and corporations; (3) the buying and sell¬ ing of securities; (4) the importing and ex¬ porting of merchandise; (5) the borrowing and lending of money and credit; (6) the advertis¬ ing of commercial concerns; (7) the keeping of business records. In addition three distinct office courses are offered, practical in character and designed to prepare the student for enter¬ ing immediately upon the respective lines of employment to which the training leads. In 1895 a beginning was made toward the forma¬ tion of a permanent commercial museum. The collection now represents quite fully the follow¬ ing industrial products : Flour, wool, petroleum, tea, coffee, sugar, cotton, copper, iron and steel, glass, tobacco, leather, paper, wood, carpets, linen, spices, aluminum, building stone, brick and terra-cotta. The art museum contains col¬ lections representing the industrial arts of Egypt, India, China, Japan and Europe. The library contains over 40,000 volumes and is supplied with books, periodicals and pamphlets bearing upon the work and every facility and assistance is afforded for the study of financial, economic and commercial questions. In 1915 the number of students in attendance was 2,900 in all departments. Applicants for admission to any course must pass satisfactory examina¬ tions in English, geography, arithmetic and United States history. For admission to the course in commerce and finance or to any of the

office courses the candidate must be at least 16 years of age. The diploma of a high school of approved standing is accepted in place of an ex¬ amination.

DREYER, John Louis Emil, Irish as¬ tronomer : b. Copenhagen 1852. He received his education at the University of Copenhagen, and in 1874-78 was assistant astronomer at the Earl of Ross's observatory; in the following four years he served as assistant at the Obser¬ vatory of Trinity College, Dublin, and in 1882 was made director of the Armagh Observatory. He has published ˆThe Second Armagh Cata¬ logue of

3300 Stars^ (1886) ; ^New General Catalogue of Nebulae and (Clusters of Stars ^ (1888; supplements, 1895, 1908) ; ^Tycho Brahe^ (1890) ; ^History of the Planetary Systems .from Thales to Keppler^ (1906) ; and an edi¬ tion of Herschel's '^Scientific Papers^ (1912) for the Royal Astronomical Society.

DREYFUS, dra-fiis, Abraham, French playwright: b. Paris, 20 June 1847. He had a fine vein of kindly humor and it pervades both his contributions to the public journals and his theatrical compositions, which are mostly in one act. Among them are 'A Gentleman in Black^ ; ^The Victim^ ; 'The Klepht^ ; 'A Break.^ His four-act play, 'The Saint Cath¬ arine Institution,^ a comedy of manners, was brought out at the Odeon (1881) ; 'A Rupture^ (1885), *etc.*

DREYFUS, Alfred, French military officer: b. Mulhausen, Alsace, 1859. He was a member of a wealthy Jewish family, became a captain in the 21st regiment of artillery and three years later was appointed to the general staff. On 14 Oct. 1894 he was arrested on a charge of communicating certain important military docu¬ ments to a foreign government, and at a secret court-martial on 19 December and succeeding days was found guilty and condemned to public degradation and lifelong imprisonment. He was degraded on 5 Jan. 1895, and in accordance with the act passed by the Chambers was sent to the He du Diable (Devil's Island) near Cay¬ enne, to undergo the other part of the sentence. On 1 June of the same year Colonel Picquart became head of the intelligence department of the army, and in the course of his official duties discovered various circumstances which threw doubt on the correctness of the court-martial's decision and pointed to another officer of the name of Esterhazy as the real traitor. In particular he obtained a copy of a telegram-card, subsequently known as the petit-hleu, al¬ leged to have been addressed to Esterhazy iDy a German officer. Colonel von Schwarzkoppen. On '7 Sept. 1896, he wrote to General Gonse urging a reinvestigation of the case, and seven days later a newspaper divulged the fact that certain documents had been communicated to the court-martial unknown to the prisoner's counsel. Not long afterward Dreyfus' accusers took a false step by the publication of the fac¬ simile of the hordoreau (memorandum, detailed list of documents), alleged to have been written by Dreyfus; and on 16 November Colonel Picquart was superseded in his office by Colonel Henry. On 15 Nov. 1897 M. Mathieu Dreyfus, brother of the condemned man, charged Ester¬ hazy with having written the Bordereau, but on 11 Jan. 1898 he was acquitted by court-martial which sat with closed doors. On the following

day Colonel Picquart, who had been sent to Tunis on a dangerous expedition after his dis¬ missal from office, had been afterward recalled to answer certain charges made by Esterhazy, was arrested and imprisoned. On 13 January M. Zola, the eminent novelist, published in the Aurore a letter headed J'accuse (I accuse), in which he made serious charges against the gen¬ eral staff and the government in regard to the Esterhazy court-martial. After a stormy debate in the chamber it wˆas decided to prosecute him ; but the government steadily refused to reopen the Dreyfus case, declaring their determination to stand by the chose jugee. Zola's trial began on 11 February, and on the 23d he was con¬ demned to pay a heavy fine and to undergo a term of imprisonment. On 2 April the Court of Cassation quashed the sentence of Zola on technical ground, but a fresh prosecution was or¬ dered a few days later. On 27 June M. Cavaignac became head of the war office, and 7 July he read to the chamber several documents which he regarded as proving the guilt of Dreyfus, but three days later Colonel Picquart wrote to the Premier denouncing these documents as for¬ geries. This interference led to his rearrest, and shortly after Zola was again condemned. On 31 August Colonel Henry wˆas arrested and con¬ fessed to having forged the chief document relied on by Cavaignac, but soon after his arrest he committed suicide. The War Minister resigned 4 September and was succeeded by General Zurlinden. The latter resigned because of the government's determination to refer the question of revision to a commission, and on 18 September General Chanoine succeeded him. The commission decided against revision, and on 26 September the government resolved to ascertain the view of the Court of Cassation. On 25 October the Brisson ministry resigned and a few days later the court reported in favor of revision. On 31 October a new ministry under M. Dupuy came into office, and on 9 December the prosecution of Picquart was stopped by the Court of Cassation. The Drey¬ fus case marked the culmination of the anti-Semitic agitation in France, which began in La Lihre Parole in 1882 and became specially men¬ acing after the Panama Scandal in 1892. On 16 Feb. 1899 M. Felix Faure, the President of the republic, died suddenly and three days later was succeeded by M. Emile Loubet. On 3 June of the same year the Court of Cassation, hav¬ ing concluded its hearing ˆ of the evidence, ordered a fresh court-martial to be held at Rennes for the purpose of deciding whether Dreyfus communicated to a foreign government any of the documents mentioned in the bor¬ dereau, of which Esterhazy had previously con¬ fessed himself to be the author. Picquart was re¬ leased on 9 June, and on the 12th of the same month the ministry was

defeated. On 22 June M. Waldeck-Rousseau succeeded iu forming a new ministry. The new court-martial opened 7 August, under the Presidency of Colonel Jouaust, and about this time the press published accounts of the inhuman treatment of Dreyfus in his prison. Dreyfus, who had been brought to Rennes for trial, was defended by MM. De¬ mange and Labori. The chief witnesses in favor of the prisoner were Colonel Picquart and Cap¬ tain Freystatter, a member of the first court-martial, and against him were Generals Mer-

cier, Gonse, Roget, de Boisdeffre and Billot. An attempt to assassinate M. Labori on his way to court 14 August was fortunately unsuccessful. On 9 September the judges, by five votes to two, declared the prisoner guilty, with extenuating circumstances. This verdict was flagrantly opposed to the published evidence, yet Dreyfus was sentenced to 10 years' imprisonment in a fortress, but a subsequent full pardon from President Loubet set him at liberty. On 12 July 1906 the Court of Cassation, after a rehearing of his case, began on 19 June, quashed the verdict of the Rennes court-martial. In its survey of the charges the court declared them without foun¬ dation ; that the bordereau was the work of Esterhazy and that the information contained therein could not have emanated from an officer of the general staff, but must have been trans¬ mitted by a regimental officer such as Esterhazy. The court further held that three new facts had been established: (1) That the document from General Mercier's secret papers (letters sup¬ posed to have been written by Dreyfus, two in 1894 and one in 1896) presented at the Rennes court-martial, in which the initial ^^D^^ was sub¬ stituted for was a forgery; (2) That the document containing the plans for railway mob¬ ilization, supposed to have been given to the Germans by Dreyfus, never reached the War Department authorities and therefore Dreyfus could not have obtained possession of them ; (3) That the Rennes court-martial failed to hear testimony which would have established the innocence of Dreyfus. He was therefore restored to the army with the rank of major on 13 July and Picquart was made a brigadier and subsequently Minister of War. In 1908 he was shot at and wounded by a reactionary jour¬ nalist.

Bibliography. — Consult Dreyfus, ^Five Years of My Life^ (1901) ; Barlow, ^History of the Dreyfus Case^ (1898) ; Conybeare, ^The

Dreyfus Caseˆ (1898) ; Eugon, ˆThe Dreyfus Caseˆ (1898) ; Steevens, ˆThe Tragedy of Dreyfusˆ (1899) ; Marin, ˆComptes-rendus offi-cielsˆ (1897) ; Vanex, ˆDossier de I'affaire Dreyfusˆ (1898) ; Brez, ˆLe solecisme du bordereau et des lettres de Dreyfusˆ (1898) ; Esterhazy, ˆLes dessous de I'affaire Dreyfusˆ

(1898).

DREYSCHOCK, dri'shok, Alexander, Bo¬ hemian pianist: b. Zach, Bohemia, 1818; d. Venice, 1869. He studied under Tomaschek at Prague and developed a truly marvelous tech¬ nique. He began his concert tours in 1828 and continued them until 1848. In 1862 he received the appointment of professor at the Saint Petersburg Conservatory of _ Music, ˆ remaining there until 1868, when his failing health obliged him to travel to Italy. He left no im¬ portant compositions.

DRIESCH, dresh, Hans, German biologist : b. Kreuznach, Rhenish Prussia, 1867. He was educated at the universities of Freiburg, Munich and Jena. In 1889 and in 1893 he traveled in Ceylon, India, Java and Burma, and from 1891 to 1900 was employed at the Stazione Zoologica of Naples. In the latter year he removed to Heidelberg and in 1909 became privat docent and 1911 professor extraordinary of philosophy at the university there. He is one of the found¬ ers of Witalisticˆˆ biology,ˆ and has made special studies and experiments in the morphology of

animals and made also special investigations in logic and natural philosophy. His published works include ˆDie mathematisch-mechanische Betrachtung morpholigischer Probleme der Biologieˆ (1891) ; ˆDie Biologie als selbstandige Grundwissenschaftˆ (1893; 2d ed., 1911); ˆAnalytische Theorie der organischen Entwick-elungˆ (1894) ; ˆDie Localization morphogene-tischer Vorgangeˆ (1899) ; ˆDie organischen Regulationenˆ (1901) ; ˆDie ˆˆSeele® als elementarer Naturfactorˆ (1903) ; ˆNaturbegriffe und Natururteileˆ (1904) ; Witalismus als Geschichte und als Lehreˆ (1905); 'ˆThe Science and Philosophy of the Organismˆ (1909) ; ˆOrd-nungslehreˆ (1912) ; ˆLogik als Aufgabeˆ (1913) ; ˆThe Problem of Individualityˆ (1914).

DRIFT, or GLACIAL DRIFT, a general name given to the deposits made by the ice sheets of the glacial period, or by the water which came

from them. By some geologists the term is restricted to the unsorted deposits left by the ice itself, the deposits worked over by water being called stratified or modified drift. In this restricted sense drift includes (1) lateral and terminal moraines, and (2) till boulder clay or *hardpan,ˆˆ the sheet of clay that frequently covers rock surfaces in the glaciated regions. Drift is sometimes more or less sandy and always contains angular boulders with polished and often striated surfaces, the boulders being scattered through the clay without order. Usually the boulders are derived from rocks nearby, but fragments of tough hard rocks were sometimes transported long distances before be¬ ing ground up by the action of the ice. Thus boulders from the peridotite at Cumberland Hill, R. I., have been found in the till of Martha's Vineyard, Mass., over 30 miles distant. The exact method by which till was formed is in dis¬ pute among geologists, though it is generally regarded as the ground moraine of the ice sheet, in spite of the fact that present glaciers are not forming a similar deposit. The boulders in the till in New Zealand are sometimes as much as 20 feet in diameter and in some places the till is so full of boulders as to render the soil formed from it unfit for agriculture. In north¬ west Ohio the till in many places is over 100 feet deep, and as it includes the detritus from softer rocks such as limestones, in that region boulders are fewer than in New Zealand and the result¬ ing soil is very fertile. Englacial drift is the rock detritus carried along in the body of a glacier. See Glacier ; Glacial Period ; Soil.

DRIFT OF A PROJECTILE, the devia¬ tion of the projectile when fired in still air from the vertical plane. The rifling of the gun makes the bullet rotate about its axis. A body rotating about its axis exhibits what is known as pre¬ cession; that is, if a force acts to turn its axis in a given direction, the axis will move in a direction perpendicular thereto. A bullet leaving a gun begins to fall at once, and at its front end, which receives most of the air pressure, is con¬ sequently raised. This turns it in the direction of the rifling. This drift is often complicated by deflections due to the jump of the gun.ˆ The resulting deflection for the Springfield is 0.26 inch to the left at 100 yards, 0 inches at 500 yards, 13 inches to the riˆht at 1,000 vards. 126.5 inches to the right at 2,000 yards and 456 inches to the right at 2,850 yards. The drift is

automatically corrected for by the sight up to 600 yards, and partly corrected for thereafter.

DRIFT SAND is sand thrown up by the waves of the sea and blown when dry some distance inland until arrested by large stones, tree roots, or other obstacles, round which it gradually accumulates until the heaps or dunes attain considerable dimensions. Except in the case of violent storm winds the action is gen¬ erally a gentle rippling motion, the sand being pushed up by the wind on the seaward side of the ripple and rolling down into the hollow on the other side, thus traveling steadily land¬ ward. When these mounds have reached a certain elevation they are urged farther inland. ^^The same wind,® says Cuvier, ®that drives the sand from the sea upon the mound, drives the sand from its summit to its land side.® In some parts of the coasts of France, the Landes of Brittany, in particular, these inroads upon the land have been attended with destructive con¬ sequences. The quantity of sand annually de¬ posited along that coast is estimated at 3,000,000 cubic feet, and its annual progress inland some 72 feet. Such has been its destructive effects upon a village of Brittany that nothing is visible of it except a portion of the church steeple. In one or two such instances the sand dunes have moved away, exposing again the buried villages. For the purpose of arresting the inland prog¬ ress of drift sand various measures have been adopted, the most successful being the planting of sand-loving plants with long creeping roots, such as Carex arenaria, which help to fix the sand and break the influence of the wind. In France the drift sands of the Biscay gales when unhindered advance upon the land at the rate of 16 to 17 feet per year. They have been checked in their encroachments by the planting of fir-trees in solid belts along the shores. Con¬ sult Cornish, V., ^Waves of Sand and Snow^ (London 1914).

DRIFTLESS AREA, an area without glacial drift, (q.v.) specifically applied to an area of several hundred square miles in extent in Wis¬ consin and adjacent portions of Minnesota, Iowa and Illinois. Although this region is sur¬ rounded on all sides by evidences of glaciation, it has never itself undergone glacial action of any kind, and its topography is in marked con¬ trast with that of surrounding areas. Just why this l egion should have escaped the glacial action that went on all around it, is by no means clear. Consult Sixth Annual Report, U. S. Geol. Survey, 1885, pp. 199-322.

DRILL, an ape of the Gold Coast of West Africa, the Cynocephalus leucophcBus, closely allied to the mandrill (q.v.), whence its abbrevi¬ ated name. It is, however, smaller than the mandrill, has a black face and a short, erect tail, not two inches long. It is distinguished by its white beard and profuse white whiskers and has a much less pronounced grooving of the face.

DRILL, OYSTER DRILL, BORER, or SNAILBORE, a small muricine gastropod mollusk, the American Urosalpinx cinerea, so named on account of its destructive propensi¬ ties in boring through the shells of young oysters and feeding on them. The drill oc¬ cupies a spiral, tawny brown shell, about an inch long and is found along the Atlantic coast

from Maine to Florida. The proboscis con¬ tains a radula or flexible band set thickly with transverse rows of teeth. By rotating this the tender shells are readily bored and the soft parts of the oyster sucked out. The only effective means so far devised to combat them, and this is but partially successful, is the drag¬ ging of a mop of untwisted rope fibre over the oyster beds and close behind it a dredge. The drills stirred up by the mop fall into the dredge and are drawn to the surface and destroyed.

DRILLING, sowing in parallel rows as distinguished from sowing broadcast. It was introduced into England by Jethro Tull, who published a work on the subject in 1731. He saw that mere plowing and rough harrowing were not cultivation, but only its rudimentary operations and that the soil required to be stirred and pulverized, not only before sowing, but also after the plants had appeared above ground, in order that weeds might be extirpated and fresh particles of soil brought in contact with the roots of the crop. The plan of sowing in drills or ridges and hoeing in the intervals was therefore adopted by Tull as the best means to attain his objects. The advantage of sowing in drills has stood the test of experience and drill husbandry, by combining the advantages of continued tillage with those of manure and a judicious rotation of crops, is a marked im¬ provement on the old mode of sowing all seeds broadcast. The crops which are now generally drilled are the grains, beans, peas, carrots, flax, *etc.* Drilling is of more importance on dry than on moist soils, as in the former weeds are more apt to spring up and injure the crops. See Farm Machinery.

DRILLS AND DRILLING. Drilling as

a mechanical operation is often confused with boring. In machine shop practice, drilling is making a round hole through metal or the like with a rotating pointed tool, that forces its way through by pressure and rotation, taking off spiral chips of the material drilled and bringing them out of the hole through channels cut in the drill for clearance. Boring is enlarging a hole that already exists, as in a cast-iron cylinder, by turning the interior surface with a cutting tool. Cutting a circular hole in wood with a bit and brace, as done by carpenters, is boring, but a similar operation in metal is drill¬ ing. The forming of a hole in stone or rock, by repeated blows of a chisel or free-falling tool, as when making a hole for blasting or sinking an oil-well, is drilling. A hollow cylindrical tool for cutting out a core of rock is also called a drill. The forcing of holes in thin metal, as structural steel, by means of opposed dies and sudden pressure, is termed punching.

The machinists' drills are of two sorts :

(1) Hand drills, which may resemble the car¬ penter's bit and brace except that a metal-cut¬ ting twist-drill serves for a bit ; or which may be made on the ratchet-and-pawl principle, for working in confined spaces, as drilling a hole in the web of a section of laid railway track.

(2) Power drills or drilling machines or drill presses — 'the latter being the more common catalogue name — which are of a great variety of forms,_ sizes and styles. They range from the light jeweler's drill, that makes a tiny per¬ foration in a watch-case, to the heavy gang-

drill that cuts a dozen large holes at one opera¬ tion in a heavy I-beam. The typical machinist's drill-press has an upright post with curved top like a letter f. At the overhanging top is a driving mechanism with a rotating chuck, made to hold securely any one of a series of steel drills of varying sizes and to position it perpen¬ dicularly for work. In the centre of the machine is a platform, usually swung lower than the cross-bar on the f, that is adjustable for height

and arranged to swing in the arc of a circle, and to this platform the work to be drilled is clamped. When in position the operator lowers the drill by a lever, or wheel and worm motion, and throws on a belt to start the drill. When the hole is cut through he throws up the drill, and is then ready to repeat the operation.

The miner's drill is known as the rock-drill, and consists of a tripod frame, having an up¬ right steam-cylinder, on the piston of which is mounted the drill, which is simply a hardened chisel arranged to rotate as it strikes the rock, so that the cutting edge is turned for every blow. Several hundred blows a minute may be delivered by this drill, which is the standard machine of the miner as well as the contractor, for forming holes for blasting rock. (See Mining and Milling Machinery). The oil-well drill or drilling rig, for sinking petroleum wells, operates on a similar principle, but a vastly larger and heavier outfit is required, as the hole has to go down perhaps hundreds or even thousands of feet. See Petroleum.

The diamond drill is used by prospectors to take out a core of rock that they may analyze its content and judge of its value. This tool has enabled mining companies to test their ore in the various levels, and thus know far in advance what they can depend upon for future reserves. The original diamond drill was a hollow cylinder with black diamonds on the lower edge for cut¬ ters. These being expensive a serrated edge of hardened steel was next tried. This was fol¬ lowed by the shot-bit or shotted drill. This bit is a soft steel cylinder in connection with which small chilled steel shot are used. The bit grinds the shot into the rock, thus gradually wearing it away by repeated minute crushings or small particles. The hollow drill rods are rotated and lowered by a machine solidly placed at the opening. The lower drill rod is sur¬ rounded by a ®calyx® or cup-like tube and the two are joined at their lower ends by a plug. The centre portion of the plug serves as a bear¬ ing for a protecting ring and on its lower end a ring is threaded, while to this the core barrel is attached on which either the shot bit or the cutter can be threaded. The shot bit is pro¬ vided with a series of triangular notches in its lower end, one of the walls of the notch being vertical and the other forming an angle of 30° therewith. The steel shot, which are fed through the hollow rods from the top, are car¬ ried by a current of water under this notch, and the inclined wall allows them to pass under the edge of the shot bit. The sizes of shot used vary with the nature of the rock to be drilled, some being as large as duck shot, though mostly finer. The working edge of the shot bit is rounded, so that the shot grinds not only directly beneath the drill, but also to a certain extent at the inner and outer sides, thus cutting out proper clearance for the operation of the VOL.

drill. Water is pumped into the hollow drill-rods through a pipe and passes out under the bit and up the annular space outside the core barrel, carrying with it the sludge or fine par¬ ticles ground up by the shot. The current of water flows with great strength up as far as the top of the calyx, where the annular space widens considerably, so that the current is re¬ duced and the sludge it carries drops by gravity. See Boring.

DRIMYS, dri'mis, a genus of plants belong¬ ing to the family Magnoliacecu. They are dis¬ tinguished by their bitter, tonic and aromatic qualities. D. winteri, carried to Europe by Captain Winter from the Straits of Magellan in 1579, yields Winter's bark, which has been employed medicinally as an aromatic stimulant. It somewhat resembles canella bark. The bark of p. granatensis is used in Brazil against the colic. It is tonic, aromatic and stimulant. That of p. axillaris, a native of New Zealand, has similar qualities.

DRINK. See Dietetics,

DRINKHOUSE, Edward J., American clergyman and author: b. Philadelphia, 1830; d. 1903. He joined the Maryland Conference of the Methodist Protestant Church in 1850. Failing health later obliged him to retire from the ministry and he went to California to re¬ cuperate. He received the degree of M.D. from Toland Medical College, San Francisco, in 1865. For 18 years he edited the Methodist Protestant and was one of the principal leaders in his church. He is the author of the important ˆHistory of Methodist Reform Synoptical of General Methodism, 1703 to 1898, with Special and Comprehensive Reference to its Salient Exhibition in the History of the Methodist Protestant Churchˆ (2 vols., 1899).

DRIPSTONE, a corona or projecting tab¬ let or molding over the heads of doorways, win¬ dows, archways, niches, etc., to prevent rain¬ water from trickling down. Called also a label, weather-molding, water-table and hood-molding. The term label is usually applied to a straight moulding. Also a filtering stone, so called by sailors.

DRISLER, Henry, American classical scholar: b. Staten Island 27 Dec. 1818; d. New York 30 Nov. 1897. He was graduated from Columbia in 1839, was appointed tutor of Greek and Latin there in 1843, adjunct professor in 1845, professor of Latin in 1857 and of Greek in 1867. He

was acting president of Columbia at the time of President Barnard's absence as one of the commissioners to the Paris Exposition in 1867 and again in 1888 and became dean of the School of Arts in 1894. He assisted Dr. Anthon in the editing of classical textbooks, prepared a new edition of Liddell and Scott's Greek lexicon and cooperated on the seventh Oxford edition,

DRIVER, Samuel Rolles, English biblical scholar and divine : b, Southampton, 2 Oct. 1846; d. 26 Feb. 1914. He studied at Win¬ chester, and New College, Oxford, was for some years a Fellow and tutor of his college, and from 1876 till 1884 a member of the Old Testament Revision Company. In 1883 he was appointed to the Regius professorship of He¬ brew at Oxford, at the same time becoming

canon of Christ Church. Among his numer¬ ous works may be mentioned Treatise on the Use of the Tenses in Hebrew, *etc.* ˆ (1874) ; Hsaiah : His Life and Times, ˆ (1893); Notes on the Hebrew Text of the Books of Samuel, (1890) ; Hntroduction to the Literature of the Old Testamentˆ (1897), a work suited for pop¬ ular reading, which has passed through a num¬ ber of editions; ˆSermons on Subjects con¬ nected with the Old Testamentˆ (1892) ; and commentaries on Leviticus (1894-98), Deuter¬ onomy (1895), Joel and Amos (1897), Daniel (1900), Genesis and Exodus (1911). He was one of the editors of the ˆVariorum Bibleˆ (1880), and with Neubauer translated a series of Jewish commentaries on the 53d chapter of Isaiah. He was also joint editor of the ˆHe-brew-English Lexicon of the Old Testament.ˆ His presentation of the books of the Old Tes¬ tament, based as it is on the results of the higher criticism, is at the same time informed with a reverential belief in their inspiration and religious authority.

DRIVER ANT, a nomadic predatory ant which makes its forays in column-like masses. The term usually refers to the well-known spe¬ cies {Dorylus, or Annoma, arcens) of west¬ ern Africa; but the genus embraces several species scattered over Africa, and others in southern Asia and the East Indies. All be¬ long to the formicid sub-family Dorylinae, which also includes the highly destructive visiting, or

foraging, ants (Eciton) of tropical America. Thd driver ants are reddish brown, and in general (i.e. the workers and soldiers of vari¬ ous castes) small, rarely exceeding one-third of an inch long; but the females and males are huge, ungainly creatures an inch and a half in length. All except the procreative males are totally blind. Most of the species live almost continuously underground ; but the cele¬ brated West African driver {Dorylus arcens) has a more exposed manner of life. Its colonies construct no fixed home underground or else¬ where, but move about incessantly, taking shel¬ ter during the days in crevices of rocks, under logs, and so forth. Frequently they climb trees, and then hang in clusters, or in long chains that grow until they find an attachment for the lower ends when they serve as ladders up and down which other ants climb.

When they move on one of their expeditions they go at night or in cloudy weather. If de¬ tained abroad collecting food until the morning sun is shining, they will construct an arch over their path, as they proceed, of dirt agglutinated by a fluid excreted from the mouth. They march in an army-like column of millions of individuals, which ®looks like a thick rope,^^ and is flanked by lines of watchful ^^soldiers.^^ Against an excursion of these desperately pug¬ nacious little insects, nothing avails on the part of any beast of the forest but instant flight. ^^The most fierce and powerful animal,® Hamilton asserts, ®and the most deadly snake, become, in the face of their attack, mere panic-stricken fugitives, rushing vainly for relief to the nearest water, or desperately rolling on the earth in their endeavors to free themselves from the torture of a million poisonous bites.® Animals tied or confined in pens or cages, such as calves, pigs or fowls, will be killed and stripped of flesh to the bones, as has often

happened ; and a sleeping man wakened by such an onslaught will have hard work to save his life. A sick man, or an infant, will perish. Dr. T. S. Savage, the celebrated American missionary to the Gaboon region, who first described the gorilla scientifically, had much experience with invasions of his premises by these ants. The first effect of their entrance into a house is the flight or capture of rats, cockroaches and every sort of vermin. Insects, indeed, form their principal and ordinary fare. They ransack the building in regular order, searching for food, preferring fresh meat and fresh fruit-oils, and not touching sugar, milk, pastry and salted meat. When the place is ^looted® to their satisfaction the whole army leaves it completely and goes on. These habits characterize this West African species in par¬ ticular. Other species are not so migratory or predaceous.

Consult Savage, ˆProceedings,ˆ Academy of Sciences, Philadelphia (Vol. IV, 1847) ; Wheeler, ˆAntsˆ (New York 1910) ; Hamilton, ˆAnimal Life in Africaˆ (New York

1912).

DRIVING. Since the advent of the auto¬ mobile, driving has fallen off, and there are fewer and fewer people who know how to drive a horse or a team. A driver should al¬ ways grasp the reins before mounting to his seat, so that if the horse should start before he is ready, he may have control. Both lines or reins should be held in the left hand, with the elbow at the hip and the hand well in front, thumb up. The left line should be grasped between the thumb and forefinger, the right line between the second and -third fingers. The whip should be held in the right hand, which may also be used to grasp the right line, when it is necessary to use more strength. The whip should not be used as an instrument of torture, and the spur is a relic of barbarism. A good driver uses the whip to indicate to the horse when more speed is desired, and if he does not mind the hint, gives one sharp cut along the horse's groin, but never descends to beat¬ ing the animal. A horse should always be started at a very moderate jog, and the speed increased by degrees until the desired pace is attained. Systematic touches with the whip will soon educate a horse to what is desired in this respect. Horses, like people, have all sorts of dispositions, and like people they can be managed easily by firmness, good sense, and fair treatment. Good driving involves good harnessing, and a driver should know when a harness is properly adjusted, and when it is a poor fit. He should know how far from the dash the horse should stand when the traces are taut, and see that the collar fits, and that the breeching is properly buckled. See Horses, Riding and Driving.

DROGHEDA, dron'e-da, Ireland, seaport in the southeast of county Louth ; on the river Boyne, four miles from its mouth ; 32 miles north of Dublin, and 81 miles south of Belfast. It does a large export trade with Liverpool, and there are important textile industries. In 1494, the Irish parliament, then in session at Drogh¬ eda, passed under compulsion, the ˆPoyning's laws,® sometimes called the ˆStatutes of Drogh¬ eda.® In 1649, Cromwell stormed the city and massacred the garrison. William H took posses¬ sion of the city the day after the ˆBattle of

the Bo3me.” Pop. 12,501. See Poyning’s Law.

. DROHOBYCZ, dro-hoˆbich, Poland, town in Galicia, 41 miles south-southwest of Lem-herg. Its public buildings include a castle, sur¬ rounded by extensive grounds, and a handsome Gothic parish church of the 14th century. It has an important trade, chiefly with Hungary, in corn, leather, linen, earthenware, paraffin, petroleum, apd particularly salt, obtained from salt springs in the vicinity. Near the town are valuable iron mines and pitch wells. Pop.

34,665.

droit’ich, England, market town, six miles northeast of Worcester, on the banks of the Salwarp, and on a canal connected with the Severn River. Droitwich is supposed to have been the Salinae of the Romans, and some Roman remains have been discovered. It is still famous for its brine springs, rising near the centre of the town through strata of red sandstone and gypsum from a depth of 200 feet, which contain betwep 35 and 40 per cent of pure salt, and yielding annually over 100,000 tons of salt. From these celebrated wyches, or brine springs, as appears from grants to the church of Worcester, salt has been manufac¬ tured for more than 1,000 years. Pop. 4,146.

DROME, drome, France, a southeastern department, covered almost throughout by ranges of the Alps, the average height of which, however, does not exceed 4,000 feet ; area, 2,532 square miles. Drome is bounded on the west by the Rhone, and the most notable of the rivers, the general direction of which is west¬ ward toward the Rhone, are the Drome and the Isere. The surface is most mountainous toward the east, a spur of the Alps traversing the east-tern limits and from this spur numerous smaller ranges shoot off westward across the entire area of the department. The climate is cold, with piercing winds. The highlands are covered with forests of pine, oak, beech and chestnut, and in the mountainous regions are found valuable deposits of iron, copper, lead, coal and marble. Oats, wheat and potatoes are the principal crops ; sheep and cattle are raised. The staple productions

are chiefly wines, olives, grapes, chestnuts, and silks. Much attention is given to the cultivation of chestnut, walnut, mulberry, and olive trees and vines. The manufactures comprise hosiery, silk, cotton and woolen goods, serge, *etc.* Valence is the capital. Pop.

290,894.

DROMEDARY, a camel, either one¬ humped or two-humped, of a breed and train¬ ing fitting it for use as a speedy saddle-animal. See Camel.

DROMGOOLE, Will(iam) Allen (Miss),

American author and newspaper woman : b. Murfreesboro, Tenn. Since 1904 she has been a staff member of the Nashville Banner, hav¬ ing served as educational editor and as literary editor, and furnishing a regular feature known as Song and Storv. She is the author of <Heart of Old Hickoryˆ ; <The Valley Path> ; ˆThe Farrier's Dog and His Fellowˆ ; ˆAd¬ ventures of a Fellowˆ ; ˆThree Little Crackers from Down in Dixie ˆ ; ˆHero Churnsˆ ; ˆRare Old Churnsˆ ; ˆA Boy's Battleˆ : ‘ˆCinch and Other Stories of Tennesseeˆ ; ˆThe Best of Friendsˆ ; ˆThe Moonshiner's Sonˆ ; ˆHarum-

Scarum Joeˆ ; ˆThe Island of Beautiful Thingsˆ ; ‘ˆOld Thunderˆ (1916) ; and two plays ˆThe Tennesseanˆ and ˆA Nice Little Girl.ˆ

DROMIOS, The, two characters in Shake¬ speare's play the ˆComedy of Errors.ˆ They are twin brothers of close resemblance, who had been separated early in life, and who meet as the respective attendants of Antipholus of Ephesus and Antipholus of Syracuse.

DROMOCYON, a genus of creodonts (q.v.) typical of the family Mesonychidce, ex¬ isting in the Middle Eocene era, and found fossil in complete form in the Bridges forma¬ tion of the Rocky Mountain region. They were long-jawed, wolf-like, fast running creatures, with heads somewhat hyena-like, blunt grind¬ ing teeth, and broad, almost hoof-like claws. It is supposed that they fed mainly on carrion.

DRONE. See Bee.

DRONE-FLY, a dipterous insect (Eristahis ienax) of European origin, but first described as an American fly in 1870. It prevails from the

Atlantic to the Pacific, and so closely resem¬ bles the honey-bee in size and color, that the two are often confounded. Living on the juices of flowers, particularly upon those of agreeable fragrance, jt hovers about dwellings and win¬ dows late in the autumn.

DRONGO, or DRONGO-SHRIKE, a

passerine bird of the family Dicrurice, repre¬ sented by many species in Africa, Southern Asia, and Australia. The typical and most familiar species is the Indian Dicrurusater. Of a glossy black color, it has the stout, hooked bill and forked tail of the shrike. Its food con¬ sists of insects, which it often captures on the wing. In India it is a common bird, where by Europeans it is called ®king-crow® from its habit of routing crows and other large birds in defense of its nest.

DRONGO CUCKOO (Surnicuhis dic-ruroides), an East Indian bird of the order Picarice. It is especially interesting to biologists as a conspicuous example among animals of imitation, according to which one group of animals gradually assumes some characters of another and a different group, when such fea¬ tures are advantageous. Structurally, the dron-go cuckoo is true to the picarian order, having the yoked toes — two in front and two behind, — and resembles the cuckoo, of the same order, in its habits of nesting and of egg-laying. But in other respects it exactly imitates the drongo-shrike, having the same description of plumage and color, with the furcated tail, and inhabits the same locality.

DRONTHEIM, dront'him. See Trond—

HJEM.

DROOGENBROECK, droo'gen-brek, Jan van, Flemish poet : b. Saint Amand-on-Scheldt, 18 Jan. 1835. He was long an educator of eminence, having been for over 22 years a tutor and professor at a prominent school of music in Brussels. He issued his first verse col¬ lection ˆGhazels and Makamesˆ (Arabian terms for stanzas and songs) in 1866, under the pseu¬ donym of Jan Fergunt; his subsequent vol¬ umes, on (Jamoens and other important sub¬ jects, fully sustaining his reputation. The most important of his subsequent works are the treat¬ ise entitled ˆDe Toepassing van het Grieksche

en Latijnsche Metriim op de Nederlandsche Poezieˆ (1886), for which he received a prize at Brussels; and ˆDit zijn Zonnenstraknˆ (6th ed. 1884), some popular poems of childhood. He also wrote the libretto to the opera ˆUndineˆ by Lortzing, which was performed for the first time in 1862.

DROP FORGING. See Machine Forg¬ ing.

DROPPERS, Garrett, American educator; b. Milwaukee, Wis., 12 April 1860. He was graduated at Harvard 1887, and later studied at the University of Berlin 1888-89. From 1889 to 1898 he was professor of political economy and finance in the University of Tokio, Japan. He was secretary of the Asiatic Society of Japan and contributed to its ˆTransactionsˆ several important and valuable articles on Japanese currency questions. From 1898 to 1906 he was president of the University of South Dakota at Vermilion, S. D., and since 1908 has been pro¬ fessor of economics at Williams College. In August 1914 he was appointed United States Ambassador to Greece. He has published a ˆTranslation of Schopenhauer's Essaysˆ (1881).

DROPSIE COLLEGE, Philadelphia, an institution for the advanced study of Hebrew and cognate subjects founded by Moses Aaron Dropsie in 1895. It has a fine library covering biblical and rabbinical subjects, Semitic lan¬ guages and Jewish history, the number of vol¬ umes and periodicals amounting to about 17,- 775. The degree of Ph.D. is awarded for special research in one particular branch of these studies. The students in 1917-18 numbered 26; the faculty and officers, 12. Six fellowships are maintained.

DROPSY consists of an accumulation of lymph-like fluid in the subcutaneous tissues and serous cavities of the body. A number of names may be used to designate the fluid ac¬ cumulation, such as hydrops, when in body cavities ; edema, when the fluid is in the lymph spaces ; ascites when in the peritoneal cavity. Furthermore, localized forms of dropsy have re¬ ceived special names, such as dropsy in the abdomen — ascites ; dropsy of the chest ; hydro¬ thorax ; dropsy of the testicle, hydrocele ; dropsy in the brain, hydrocephalus. The main causes for the symptom called dropsy are (a) insufficient strength of heart-action, allowing the serum of the blood to wander out¬ side the blood vessels, and (b) some ob¬ struction, preventing the return of the blood to the heart, (c) Some acute or chronic

inflammation of the organ itself. Thus in many forms of hydrocephalus there is an inflammatory exudate from the choroid plexus of the brain, (d) Some acute toxic process may bring about severe edemas, such are seen in the so-called anaphylactic reaction. The most important cause of dropsy is some disease of the heart and blood vessels whereby there is either increased forward or arterial pressure, or increased backward or venous pressure. The latter is of more importance than the former. Some vital alteration in the walls of the capil¬ laries is important in bringing about the phenomena. The treatment of dropsy is tech¬ nical to a high degree, inasmuch as the causes are frequently obscure. (See Heart Disease).

Consult article on Edema, in ˆReference Hand¬ book of the Medical Sciences.ˆ

DROSERACE.®, dros-e-ra'se-e, the Sun¬ dew family, marsh plants and natives of tem¬ perate and warm climates. They are herbaceous rosette plants with glandular hairs on the leaves for the capture of insects. The family has six genera and about 125 species, known through¬ out the world. Among members of the family are Venus flytrap {DioncBa rnuscipula) (q.v.), and Parnassia. The family is represented in America by the typical genus of the order Drosera, which has about 110 species, most abundant in Australia, and found also on the heaths and moors of England. Seven species of the sundews are found in various parts of North America.

DROSKY, dros'ki, DROSHKY, or DROS-CHKY, a kind of very small, light, four-wheeled carriage used by the Russians. It is not covered and in the middle there rises a sort of bench placed lengthwise. The driver generally throws one leg on each side of this bench, but the conveyance is also capable of holding two persons. The wheels are covered with wings, which keep off the mud. The term is now applied to several other kinds of vehicles.

DROSOMETER (from the Greek drosos, dew, and metron, a measure), an instrument for ascertaining the quantity of dew which falls. It consists of a balance, one end of which is fur¬ nished with a plate fitted to receive the dew, the other containing a weight protected from it.

DROSSINIS, dro-se'nes, Georg, Greek poet : b. Athens, 21 Dec. 1859. He studied for the law, but later abandoned the practice for literature. He was for sometime editor of the Hestia in Germany. He has

published five volumes of lyrics. ˆSpiders' Webs ˆ (1880) ; <Stalactites> (1881); Hdylls> (1885); <Straw Flowers ˆ (1890) ; ˆ Amaranths ˆ (1891) ; also some stories and other minor works in prose. A charming simplicity of language characterizes all his works.

DROUAIS, droo'a', Frangois Hubert,

French artist: b. 1727; d. 1775. He was the son of Hubert Drouais (q.v.) and studied under Van Loo, Natoire and Boucher. He was noted for his_ portraits, which because of their grace¬ ful delicacy made him the most popular artist of the time. He became court painter and councillor of the Academy. He numbered among his sitters Madame du Barry, Madams de Pompadour and Mademoiselle Helvetius (at the Metropolitan Museum). His pictures are characterized by the same affectation and polished charm which marks his era.

DROUAIS, Hubert, French 'miniature painter: b. La Rocque, 1699; d. 1767. He studied under De Troy in Paris, and became court painter in 1744. Most of his works are in private collections. The Louvre possesses two portraits by him.

DROUAIS, Jean Germain, French painter: b. Paris, 25 Nov. 1763; d. Rome, 13 Feb. 1788. He was a pupil of David and having gone to Rome to study was, in 1784, successful in carrying off the great prize, his subject on that occasion being, ˆThe Canaanitish Woman at the

Feet of Jesus. ˆ His ˆ Dying Gladiator,ˆ and particularly his ˆMarius at Minturnae,ˆ on be¬ ing exhibited in Paris, gained for him and David's school a new triumph.

DROUET, Henri, droo'a', French natural¬ ist; b. Troyes 1829; d. - . He became known

by his researches in natural science and in 1855 published ˆEnumeration des mollusques terrestres et fluviatiles vivants de la France conti-nentale,ˆ due to his travels, examining govern¬ ment and

private collections throughout France and his personal observations, which were ex¬ tended in 1857 by a scientific journey through Portugal. He held a government position in the departmental administration from 1858 to 1870. The chief of his further publications are: ˆLes mollusques terrestres et fluviatiles de la Guyane frangaiseˆ (1859) ; ˆSur terre et sur merˆ (1870) ; and ˆ Alger et le SaheP (1887).

DROUET, droo-a, Jean Baptiste, Comte d'Erlon, French marshal : b. Rheims, 29 July 1765; d. Paris, 25 Jan. 1844. Entering the army as a private in 1782, he saw active serv¬ ice in 1793-96 and became aide-de-camp to General Lefevre, and he was appointed brigadier-general in 1799. In the following year he was made general of a division which was active in the campaign of 1805-07, especially at Jena and Friedland, where he was wounded. His services won for him the Grand Cross of the Legion of Honor and elevated him to title of Comte d'Erlon. His conduct in the Penin¬ sular War was highly distinguished. After the fall of Napoleon he was arrested on the charge of conspiring against the royal family. On the return of Napoleon from Elba he contrived to seize the citadel of Lille, in which he had been imprisoned and held it for the Emperor, who made him a peer of France. At the battle of Waterloo he commanded the 1st corps d' armee. After the capitulation of Paris he fled to Bavaria, where he resided till the July Revolu¬ tion, when he returned to France and received in 1832 the command of the army of Vendee. During 1834-35 he held the office of governor-general of Algeria, and in 1843 was elevated to the rank of marshal. Some autobiographical notes appeared in 1844.

DROUYN DE LHUYS, droo-ah de lii-es, Edouard, French statesman: b. Paris, 19 Nov. 1805; d. there 1 March 1881. He studied law at ihe Ecole de Droit, and in 1831 became an attache to the Embassy at Madrid. He repre¬ sented Erance at The Hague (1833-36) and was appointed First Secretary of the Embassy at Madrid. In 1840 he was placed at the head of Lhe commercial department under the Minister of Foreign Affairs, and shortly after was elec¬ ted deputy for Melun ; but he afterward was deprived of his office because of his opposition to the government by Guizot. Under Louis Napoleon's presidency he became Minister of Foreign Affairs. After the coup d'etat he be¬ came one of the vice-presidents of the Im¬ perial Senate, and again Minister of Foreign Affairs. In 1855 he resigned his office; in 1863 he was recalled to his old post, resigning again in 1866. He wrote a work entitled ˆLes neutres pendant la guerre d'Orientˆ (Paris 1868). His ˆMemoiresˆ were published in the collections of the French academy of Moral and Political Sciences.

DROWN, Thomas Messinger, American educator : b. Philadelphia, Pa., 19 March 1842 ; d. Bethlehem, Pa., 16 Nov. 1904. After gradu¬ ating in medicine at the University of Pennsyl¬ vania in 1862 he pursued the study of chemistry at Yale, Harvard and Heidelberg for seven years, from 1874-81, occupied the chair of ana¬ lytical chemistry at Lafayette College, and for 10 years a similar chair at the Massachusetts Institute of Mining Engineers. He was one of the founders of the American Institute of Min¬ ing Engineers, and served with marked effi¬ ciency for 10 years as its first secretary and edi¬ tor of its ˆTransactions,ˆ being later elected to honorary membership and in 1897 to its presi¬ dency. Dr. Drown did very important original work in quantitative analysis both in metal¬ lurgy and in sanitary chemistry. In 1895 he was called to the presidency of Lehigh University, and by careful and intelligent guidance placed it in its present high position among American schools.

DROWNED COASTS. See Shorelines.

DROWNING, a form of asphyxia induced by submergence in water or other fluid. As a rule in drowning the body is submerged, but Peterson and Haynes in their recent ˆLegal Textbookˆ relate the case of an epileptic patient who, while walking on a low, sandy beach, fell in a paroxysm with his face down, causing by his spasmodic movements a small excavation of an inch and a half in depth in the sand beneath his face. This small depression filled with water and he was found dead from asphyxia about an hour or more after the oc¬ currence. Most cases of drowning result from asphyxia, by which is meant the body be¬ comes poisoned from the lack of oxygenation of the blood, since no oxygen can enter the lungs from the fluid, in a form that can be utilized. Heart failure sometimes occurs in drowning. At one time drowning was a legal method of execution and prevailed in England until the early part of the 17th century; it was much practised in other European countries during the Middle Ages, and is still practised in Mohammedan countries and in the Far East. (See Capital Punishment). It is a frequent method of suicide, fully one-third of the cases taking this method. Danger from drowning to swimmers depends very largely upon the ability of the swimmer, although this is not a guaran¬ tee of safety, since many excellent swimmers have been known to be unable to sustain the fatigue of being long in the water and some¬ times succumb suddenly from muscular cramps or from attacks of syncope. Persons who have respiratory defects, such as asthma or stam¬ mering, or who have organic disease of the cir¬ culation, are more liable to drown. Drowning occurs more often among men than among

women, because of the greater amount of ex¬ posure. Extreme coldness of the water seems to be an important factor in augmenting the danger from drowning. Good health, muscular vigor and calmness of mind are of great im¬ portance in cases of danger from impending drowning. With reference to the .symptoms there is great variability. Some people who have been submerged suddenly and in water of low temperature are found dead on almost im¬ mediate rescue Here probably the nervous shock and deficient heart action accounts for

the result. In a great many more cases, how¬ ever, there is spasmodic closure of the glottis from direct irritation of the water as it enters the nose and mouth and from nervous reflexes due to sudden chilling of the surface. Many of these patients sink to the bottom at once and remain below the surface, unconscious¬ ness occurring in the course of a few seconds. The respiratory movements are few and con¬ vulsive and the heart stops. In the greater number of cases, however, asphyxia results from the entrance of water into the lungs ; the individual struggles to come to the surface and as soon as the surface is reached attempts are made to fill the lungs by long inspirations. This very frequently draws a small amount of water into the larynx and then involuntary con¬ vulsive efforts result. With each convulsive in¬ spiration more water is drawn in and thus pul¬ monary congestion becomes more and more pronounced. The struggle for life becomes vio¬ lent and the patient frequently grasps at every¬ thing in sight, eyen tearing handfuls of mud from the bottom of the body of water. During the convulsive seizures the face becomes blue, the eyes bulge, the features become contorted, the pulse rapid and feeble. Ofttimes the blad¬ der and rectum are emptied. After a few min¬ utes, five or six, respiration ceases ; four to six minutes more, sometimes longer, the heart con¬ tinues to beat, gradually failing in strength and rapidity.

Treatment of all cases of drowning should be insistent and prolonged. If there is a great deal of water in the chest, the chances are les¬ sened. Instances have been recorded in which patients have been

submerged 20 or 30 minutes and have recovered, but if the body has been beneath the surface for over 4 or 5 minutes the general chances of resuscitation are slight. If attempts at resuscitation are made — and they should always be made unless the body has been under water several hours — the body should be placed face downward, the head and shoul¬ ders depressed, so as to favor drainage of water from the lungs and all efforts should be directed at first toward the restoration of breathing. The application of hartshorn, smelling salts or snuff to the nostrils, tickling the throat with a feather, dashing cold water and hot water alternately on the chest and face and vigorous friction of the upper part of the body to create warmth are of value, as also wiping and cleansing the mouth ; surrounding the patient with hot bottles ; and hot rectal irrigations of salt solution or whisky. If these preliminary efforts fail, arti¬ ficial respiration should be resorted to and con¬ tinued for several hours. The patient should be still kept face downward, a folded coat or other article of dress raising and supporting the chest. The weight of the body on the chest forces the air out, then turning the body well over but gently on one side, then turning it on its face again, repeating these movements about 15 times in a minute, occasionally varying the side, at each turn and relief of the chest pressure, air enters the lungs and excites breath¬ ing. This operation should be assisted between each turn of the body by brisk and uniform pressure between and below each shoulder-blade. At the same time, but without interfering with these operations, the hands and feet should be dried, wet clothing removed and the body en¬

veloped in warm blankets or reclothed with dry garments. Should these efforts prove unavailing after from two to five minutes, recourse should be had to Dr. Silvester's method, which consists in placing the patient on the back, on a flat surface inclined slightly upward from the feet, the head and shoulders being raised and sup¬ ported on a small cushion, or folded article of dress placed under the shoulder-blades. The tongue should be drawn forward and fastened by an elastic band, string or tape over the tongue and under the chin, to keep it projecting beyond the lips. Then to imitate the move¬ ments of breathing and to draw air into the lungs, stand at the patients's head, grasp the arms just above the elbows and draw the arms steadily upward above the head, keeping them stretched upward for two seconds. To expel the air from the lungs, turn down the arms and press them firmly for two seconds against the sides of the chest. Repeat these movements deliberately and persistently about 15 times a minute, until a natural effort to breathe is per¬ ceived, when the efforts should be turned toward inducing circulation and warmth, which can be best promoted

by briskly rubbing the limbs upward with flannels, etc., thus propelling the blood along the veins to the heart and by the application of hot flannels, hot water bottles, heated bricks, etc., to the pit of the stomach, between the thighs, the armpits and to the soles.

Another method which has the advantage of simplicity and can be applied by one person is that of Dr. Benjamin Howard of New York. The body is placed face downward with a roll of clothing under the stomach, one arm being bent upward so that the hand supports the fore¬ head. To expel the water from the chest, the body is pulled feet downward over the roll of clothing. Then turn the body on the back, with the roll of clothing under the shoulders, so that the head falls back, thus stretching the neck. Kneel over the body, one knee pressed firmly against either thigh. With both hands spread over the lower part of the chest, so that the thumb hooks in under the lowest ribs on each side, press forward steadily with the weight of the body on the arms, thus raising the ribs, en¬ larging the chest cavity and causing the air to enter. When the ribs have been pushed upward to their utmost extent, release them gently by a receding movement, allowing them to return to their original position, thus expelling the air. Repeat this process until respiration is restored, then resort to the methods already mentioned to induce circulation and warmth. No attempts at resuscitation should be abandoned until all efforts seem to be absolutely futile. See As¬ phyxia; Pulmotor; Respiration, Artificial.

DROWSINESS. See Sleep.

DROYLSDEN, droilz'den, England, town in Lancashire, five miles east of Manchester, of which it is an outlying suburb. It con¬ tains _ large cotton manufactories, copperas, chemical, and dye works, and print mills. Pop.

13,259.

DROZ, dro, Francois Xavier Joseph,

French moralist and historian: b. Besangon, France, 31 Oct. 1773; d. Paris, 5 Nov. 1850. In 1806 he published ˆEssai sur I'art d'etre heureuxˆ (1801) which was very popular; and in 1823 ˆPhilosophie moraleˆ which procured

his admission into the Academy. His reputa¬ tion is, however, founded chiefly on his ˆHistoire du regne de Louis XVI. ˆ

DROZ, Gustave, French novelist: h. Paris, 6 June 1832; d. 31 Oct. 1895. He was trained for a painter, but in 1864 gave up the pencil for the pen. The extraordinary success of his first volumeˆ of stories ˆMonsieur, Madame, et Bebeˆ justified the change. He excelled in lit¬ tle sketches of life and manners, and his lively, playful descriptions of bachelorhood and mar¬ ried life captivated the public. His novel ˆAu-tour d'une sourceˆ (1869) is generally consid¬ ered his best.

DROZ, Pierre-Jacquet, Swiss mechanician: b. La Chaux de Fonds, Switzerland, 28 July 1721 ; d. Bienne, Switzerland, 28 Nov. 1790. Aspiring to be something more than a mere workman, he succeeded in attaching to common¬ time pieces, at a small expense, machinery which produced music resembling the chime of bells, and the music of a flute. His attempts to discover the means of effecting a perpetual motion led him to important discoveries. He contrived, among other things, a pendulum, which being composed of two metals of unequal expansibility, remained unaffected as to its length and time of vibration by heat or cold. He afterward made his celebrated writing automa¬ ton, which, by means of machinery contained within the figure, was made to move its fingers and hands, and to form handsome letters.

DRUG, a name applied to all substances, vegetable, animal, or mineral, used for medici¬ nal purposes, though the term should, perhaps, be strictly confined to what are called simples, balsams, gums, resins, and exotic products used as medicaments in a dry state. The name is also applied to dyeing materials and those used in tanning and other arts. See Pharmacy.

DRUG HABITS. Recent investigations of the United States Department of Agriculture show conclusively a constantly decreasing use of injurious drugs (with the exception of tobacco) among the people of this country. Be¬ fore any means were available for gathering authoritative figures, the estimates of the num¬ ber of drug habitues in the United States ranged as high as 4,000,000. But the report of the

Food and Drugs Commissioner of Tennes¬ see on the first year's (1913-14) operation of that State's anti-narcotic law provided definite statistics, which have been accepted by the Government's experts as a fair basis for a close estimate. Applying to the whole country the ratios gained in the Tennessee records, the total number of drug addicts in the United States would be about 118,000. A check upon these figures is supplied in the amount of habit¬ forming drugs imported into the United States. The Bureau of Chemistry points out that if nine-tenths of all the opium imported into the country were consumed by addicts at the rate of the Tennessee consumption, the number of such users would be 187,000. The same Bureau estimates that all of the importation of cocaine is consumed by addicts at the rate of one ounce per person per year, and that the 150,000 ounces imported annually indicate 150,- 000 users. This estimate is combated by hos¬ pital physicians who declare that many cocaine eaters and snuffers consume as much as 15

ounces annually. The American Pharmaceuti¬ cal Association estimates that the total num¬ ber of drug habitues (exclusive of those ad¬ dicted to alcohol and tobacco) in the United States in 1914 did not exceed 200,000.

Of the whole number of drug users those addicted to morphine amount to 37.6 per cent ; to cocaine, 26.7 per cent; to laudanum, 18.8 per cent ; to heroin, 4.4 per cent ; to gum opium, 2.2 per cent ; and those who have both mor¬ phine and cocaine habits, 10.3 per cent. Fur¬ ther official investigation as to the origin of drug habits show that 54.6 per cent had their beginnings in physicians' prescriptions; 21.6 per cent in the advice or persuasion of drug-using acquaintances; 21.6 per cent as a result of dissi¬ pation; 2.4 per cent in the desire to escape suf¬ fering in incurable diseases.

The drugs used by victims of drug habits are of two general groups: (1) sedatives, and (2) stimulants. The first group includes the soporifics, such as chloral, sulphonal, veronal, etc., and the analgesics and anaesthetics, such as opium, cocaine, cannabis Indica (Indian hemp or hasheesh), etc., and the headache-pow¬ der constituents, phenacetine, acetanilid, antipyrine and its derivatives, bromopyrine, sali-pyrine, etc., and antifebrin and its derivatives, phenalgin and exalgin. The second group in¬ cludes alcohol, tea, coffee, tobacco, *etc.* In the second class should be included also opium in doses of a certain small quantity relative to the degree of habituation, in which it is highly stimulating. This is true also of the delirium produced by

Indian hemp. Coca and cocaine are stimulants in small doses, which, however, speedily require to be made larger. It is for this reason largely that the cocaine habit is regarded as the most insidious and dangerous. The effect of the drug soon passes off, and re¬ peated as well as larger doses are sought by the victim. A debased mental condition follows the brief exhilaration, and a tendency to suicide is developed.

Tea, coffee, cocoa, kola, mate, guarana, etc., depend for their attraction upon their active principles, caffeine, theobromine, or theophyl-lin. The effect of these drugs is similar to that of cocaine, though in a much less degree. They all develop neurotic tendencies in the users. In most cases the system becomes tolerant of the drug, and, the effects being cumulative, the eventual breakdown is sudden.

The foundation of drug habits is very often laid with soothing syrups given to babies. These have been found to contain opium, mor¬ phine, heroin, codeine, chloroform, chloral hy¬ drate, and cannabis. The habits thus begun are nurtured with patent medicines. Asthma reme¬ dies contain practically the same series of drugs as the soothing syrups, with the addition some¬ times of tobacco. Catarrh cures are largely cocaine, cither in powder to be used as a snuff, or in liquid form as a spray. Remedies for coughs and colds contain chloroform, heroin, morphine, codeine, cannabis, and ether. Head¬ ache remedies consist of acetanilid, acetphenet-idin, antipyrine, caffeine, etc., in various com¬ binations. Epilepsy cures are chiefly bromides, with morphine or opium. Many tobacco-habit cures contain cocaine, and, indeed, almost all of the cures offered for the various drug habits have proved to be preparations of the same drug to which the habitue was addicted.

In the endeavor to check the spread of this pernicious use of dangerous drugs, the Federal Government in 1910 issued the first of a series of pamphlets through the Department of Agri- * culture warning the people against the use of habit-forming drugs, and calling particular at¬ tention to the drinks containing cocaine served at many soda fountains. Prior to the appear¬ ance of this bulletin, the Federal authorities had forbidden the sale of certain popular bever¬ ages for this reason, and the manufacturers were not permitted to supply orders again until they had changed their formulas to the satis¬ faction of the Bureau of Chemistry.

In view of Secretary Wilson's charge that druggists, physicians, and patent medicine man¬ ufacturers were largely responsible for the development of drug habits, the revision com¬ mittee of the American Pharmaceutical Associ¬ ation, which met in May 1911, investigated and passed unfavorably upon a number of the so-called ^^remedies.^^

Both the Federal authorities and the health officials of the several States began a definite campaign against the sale of pernicious drugs along the following lines :

(1) To educate the public through the press as well as by lectures, pamphlets, *etc.* (2) To secure the enactment of laws forbidding the sale of habit-forming drugs, and preparations containing them, except on the prescription of duly authorized persons. (3) To require a permanent record to be kept of all transactions in such drugs, whether by prescription or other¬ wise, the same to be subject to Federal and State inspection at all times. (4) The enact¬ ment of laws forbidding the handling of such drugs, except by druggists, manufacturers, and others legally qualified. (5) To secure the pas¬ sage of laws permitting State Boards of Health to revoke the licenses of physicians or drug¬ gists convicted of selling such drugs for other than legitimate purposes. (6) To secure the passage of a Federal law prohibiting the inter¬ state shipment of habit-forming drugs, or prep¬ arations containing them, except through the regular channels of trade in which records of all transactions must be kept. In 1914 the so-called Harrison bill was passed by the United States Congress, and it went into effect 1 March 1915. It requires that ®every person who pro¬ duces, imports, manufactures, compounds, deals in, dispenses, sells, distributes, or gives away opium, or coca leaves, or any compound,

man¬ ufacture, salt, derivative, or preparation thereoPˆ shall register with the collector of internal revenue of the district, and pay an annual special tax of $1. Every sale is to be recorded with the patient's or purchaser's name, age, and address, together with the name of the dealer or physician and the date. It is made unlawful for any dealer or druggist to supply an opiate unless all the requirements have been fulfilled. Exceptions are made in the case of preparations which do not contain more than two grains of opium, one-quarter grain of mor¬ phine, one-eighth grain of heroin, one grain of codeine, or any salt or derivative of them in one fluid ounce, or, if solid or semi-solid, in one ounce avoirdupois. This exception has been sharply criticized, since it has been shown that prescriptions of the strength exempted will readily supply the usual 2-grain dose to an addict if he takes an ounce at a time.

Several of the States have passed similar laws, and the immediate effect has been to cur¬ tail illicit sales of these drugs to a very consid¬ erable degree. In nearly all of the States these drugs can be procured only on a physician's prescription, and in some it is unlawful even for a physician to supply such drugs to addicts except in regular professional treatment of dis¬ ease. In a few of the States these habit-form¬ ing drugs are classed as poisons, and may be sold if provided with a poison label. In Louisi¬ ana chloroform and hyoscyamus are included among the forbidden drugs. The drug law of Michigan forbids any person except a physician lo receive or have in possession any cocaine, al¬ pha eucaine, or beta eucaine, or any of their salts, even as an ingredient of some other prep¬ aration. The law of West Virginia makes it a felony to dispense cocaine to addicts.

In China, where the opium habit has held sway since the 13th century the fight against the habit began with the Imperial Edict issued in 1729 against opium smoking. In 1796 an edict was issued forbidding the importation of opium, which then came from India. The Chi¬ nese set diligently to work cultivating the poppy, and notwithstanding the death penalty decreed to opium smokers, the trade continued.

India has always been one of the large pro¬ ducers of opium, and England has steadily maintained that, so long as China produced most of the opium used in that country, and even exported it to other countries, there was no justification in the demand that exports of Indian opium to China be forbidden. Even when China had announced her intention of suppressing the trade, many statesmen in England questioned the sincerity of that declaration.

In 1905, however, the influence of the anti¬ opium societies became so great that the Im¬ perial Senate was compelled to pass drastic laws against the opium traffic. In 1906 China produced 330,000 piculs of opium — a picul be¬ ing equal to 133% pounds avoirdupois. She also imported 51,000 picules from India. The government decreed that both the cultivation of the poppy and the use of opium must cease.

In 1910 the area devoted to poppy culture had decreased from 614,000 acres (in 1906) to 350,000 acres, and the production of opium had been reduced by more than 25,000,000 pounds. The reports from the five principal opium-using provinces show that the number of shops in which opium is sold has been re¬ duced from more than 42,000 to about 12,000. The number of users of the drug (13,(XX),000 in 1906) has also been largely reduced and is steadily declining. To promote this condition, hundreds of public ^^refuges® for the scientific treatment of victims of the opium habit have been established in China. In 1910, it was re¬ ported that nearly 1,200,000 cures had been ef¬ fected; nearly 1,500,000 patients were then un¬ dergoing treatment.

In 1912 the National laws against the culti¬ vation, sale and smoking of opium went into effect with the support of nearly every news¬ paper in China. Large quantities of opium were burned, as much as $10,000 to $15,000 worth being consumed in a single fire.

One of the most serious obstacles to be surmounted by the anti-opium societies has

been the existence in China of a stock of Indian and Chinese opium valued at $70,000,000, upon which large loans had been advanced by the banks. See Chloral; Cocaine; Intoxication; Opium ; Tobacco.

Bibliography. — Hubbard, F. H., <The Opium Habit ˆ (and other drug habits) (New York 1881) ; McBride, C. A., ˆModern Treat¬ ment of Alcoholism and Drug Narcotismˆ (New York 1909) ; Pettey, G. E., ˆNarcotic Drug Diseases and Allied Ailmentsˆ (Philadelphia 1913) ; Sainsbury, H., ˆ Drugs and the Drug Habitˆ (London 1909) ; U. S. Department of Agriculture, Farmers' Bulletins 377 and 393 (Washington 1910-11) ; U. S. Public Health Service Report 146 (Washington '1913).

DRUG TRADE. The American drug trade is largelˆˆ a modern development, although America's part in the history of drugs dates from the days of the first explorers. When from the Americas travelers returned to the Old World bearing with them specimens of the various products of this new world, the learned men of Europe greeted their arrival with interest and science hastened to affirm that the chief advantage to be derived from the discovery of the new continent would lie in the introduction of new and more potent drugs. From that moment scientists began to devote their attention, to the study of American plants and herbs, and all the old chronicles show a considerable space devoted to a recital of the health-giving qualities of these products of the American soil. Nothing that grew in the New World was neglected by the experimenters. Everything was tested, and many things were found to be of great value. For a long time tobacco, Jesuits' bark, and sassafras, were among the most frequently used medicaments, and, from time to time, the medicinal proper¬ ties of other herbs were discovered and utilized.

The drug, trade itself has no such ancient record to which one may revert. A century ago the stock of every wholesale druggist in¬ cluded such articles as glassware, oils, paints, putty, indigo, madder, etc., and sometimes even commodities still more foreign to the trade. Since the early part of the 19th century, how¬ ever, the wholesaler has improved his commer¬ cial position by restricting his stock to such

articles as may be classified as true drugs or medicines. These articles, of purse, include many ˆffiatenPˆ medicines, and will probably do so as long as the demand for such preparations continues to make them one of the most im¬ portant items in the drug trade.

From the beginning of the history of medi¬ cine and pharmacy the people as a mass have been conspicuous for their faith in the efficacy of the *patent,ˆˆ or more properly, the secret, medicine and the makers of patent medicinp have always flooded the market with their nostrums, depending upon this credulity of the people for financial success. Aside from these articles of commerce, however, the staples of the drug trade, the legitimate drugs and medi¬ cines, were gathered from all quarters of the globe and widely distributed long before the discovery of America with its new drug sources became an important aid to the progress and development of the trade. Since the early days of the country's history, drugs, such as jalap.

ipecac, sarsaparilla and balsams, have been im¬ ported from Mexico, as well as from Central and South America. As early as 1820, through the investigations of the French scientists, the separate alkaloids in cinchona bark were de¬ termined and Pelletier soon began their manu¬ facture. It was at about the same time that John Farr started the first quinine factory in Philadelphia and the popularity of the drug was so immediate that John Currie soon fol¬ lowed by building a similar factory in New York.

In the early days the supplies of cinchona bark were imported through Spain, but the opening of the ports of South America to our commerce enabled us to secure the necessary shipments direct from those countries. In the beginning of the industry in America the Gov¬ ernment placed an import duty upon foreign-made quinine, and as long as such duties re¬ mained in force, the American manufacturers had a practical monopoly of the home trade. In 1879, however, quinine was placed on the free list, and since that time the foreign makers who are able to produce the drug at a much lower cost than that at which we can make it, have not only shipped their surplus stock to this country, but have secured such a firm foot¬ hold that they now control nearly half of the American quinine market.

Stone-oil, or Seneca-oil, the substance which is now known as petroleum, was discovered in West Virginia, where it had long been popularly regarded as a most efficient liniment. It was found at several places in that State, where it rose to the surface of the ground, a heavy

and dark substance, the true character of which was not recognized until many years later. In 1829, a similar supply was found in Cumberland County, Ky., and upon a well being drilled, a phenomenal quantity of oil was obtained. Owing to the fact that no ample provisions had been made to save the oil, the bulk of it was wasted. Some of it was preserved, however, and having been bottled, was sold in Europe under the name of ^^American Oil.^^ The device on the label, a derrick, first suggested the means by which a sufficient quantity of the crude oil could be ob¬ tained to pay the cost of refining it, a process which resulted in the discovery of such valu¬ able filtered paraffine residuums as petrolatum, vaseline, etc., preparations which have since become important articles of export

It is believed that the first historical mention of the manufacture of drugs in this country is that in the instructions given to Sir Francis Wyatt, governor of Virginia, in 1621. In this document he was requested to invite atten¬ tion to the industrial possibilities to be found in the making of oil of walnuts, and he was au¬ thorized to emplo}ˆ such apothecaries as might be necessary to assure its proper production. The colonists were also requested to-search for gums, dyes, and new drugs. In 1785, the South Carolina Agricultural Society offered special premiums for the cultivation of such drug plants as senna, cassia, hops, madder, rhubarb and figs. It is useless to attempt to describe the various articles known to the drug trade of that day, or to enumerate the uses to which they were put, but in even so brief a review as this, a word or two must be said about the old-time business conditions.

In the wholesale branch of the trade, some 75 years ago, the hours of business were from 7 o'clock in the morning until 9 o'clock at night. There were no railroads then, and means of communication between one part of the country and another were very primitive. After the Erie Canal was opened, the change in conditions brought about a corresponding change in busi¬ ness methods. Instead of dragging along through the year, the w'holesale druggist had two busy seasons. There was a rush of trade in the spring, and another rush just prior to the close of navigation in the fall, and clerks, at these times in the year, were often required to remain at work until midnight.

The outbreak of the Civil War had an effect upon the drug trade just as it had upon every branch of business in the North. Many large outstanding accounts were canceled, and many houses, as the result, went out of business, although there were perhaps fewer failures in the wholesale drug line than in other branches of business.

To realize what a great variety of articles were included in the stock of the wholesale druggists of the olden times, it is only necessary to peruse some of the advertisements which such houses published some 100 years ago, while the extent of the purely drug stock may be pretty accurately approximated by a comparison of one of the early pharmacopoeias with the current edition. The volume for 1830 is, per¬ haps, the best one to which we can refer to ascertain the condition of affairs which existed during the two or three decades prior to its issue. According to that authority there were 272 articles of materia medica, while 349 proc¬ esses were given for preparations, making a total of but 621 titles. Sixty years later, the ˆUnited States Pharmacopoeia® had no less than 994 titles, while the ˆNational Formulary,® a semi-official work of almost equal practical im¬ portance, had 435 more titles, making a total of 1,429 articles, or preparations, which the apothe¬ cary wˆas able to furnish a customer upon demand.

Of course, the wholesale druggist of those days was compelled to carry many articles which were not strictly entitled to a place upon the pages of the pharmacopoeias. In fact, this feature of the drug trade has so greatly ex¬ tended that reference to recent price-lists issued by the prominent jobbing houses shows that there are now more than 5,700 articles in the department of drugs, chemicals, oils, etc., and close

upon 8,000 articles in the department of ^^patent,® or proprietary medicines. More¬ over, if one should go so far as to include the almost incalculable number of articles which come under the head of ^Mruggists' sundries,® to say nothing of the ^secret proprietary® medi¬ cines which, being confined largely to local trade, do not appear upon any general price-list, there is little doubt that the figures already given would be doubled; a fact which makes it safe to estimate that there are no less than 25,000 different articles handled by the drug trade of to-day.

So far as the retail druggist was concerned, his business at that period was largely a mat¬ ter of ®go as you please.® If he could pre¬ pare, from the crude material, the prescriptions of the local physicians, he had succeeded in

fulfilling the object of his existence. To-day, however, he enjoys most superior facilities, for while he is still required to be acquainted with all processes, he has the convenience of being able to purchase the greater portion of his stock ready for dispensing. To afford such facilities the business of manufacturing phar¬ macy has been developed, during the past fifty-odd years, into a distinct department of the drug trade.

Without laying undue stress upon the wonderful advances in inorganic chemistry, and especially in the remarkable work accomplished in the discovery and improvements of anaesthet¬ ics, there can be no question that the evolution of organic chemistry is one of the rnost stupendous scientific triumphs recorded since the middle of the 19th century. Wohler's dis¬ covery, in 1828, that urea could be manufac¬ tured artificially from isocyanate of ammonium was really the first step taken toward the synthetic production of organic compounds, for, up to that period, it had been the undisputed theory of the scientists that no organic com¬ pound was possible except through the medium of ®vital force.® Wohler opened the way to further experiments along such lines, however, and, since 1828, innumerable compounds of an organic nature have been prepared synthetically, many of which are of such great commercial importance that they are manufactured in ex¬ tensive quantities. Among such compounds, for example, is alizarine, the chief coloring prin-ple of madder root, of which fully $20,000,000 worth is produced annually from coal tar. Oxalic acid, which formerly came from the juice of the sorrel, is now artificially produced, at one-tenth its former cost, by the use of saw¬ dust and caustic soda ; while salicylic acid, which was formerly derived from

the oil of winter-green, is now produced more easily through the action of carbon dioxide upon carbolic acid and caustic soda. Not only has the chemist suc¬ ceeded in producing many of the most im¬ portant organic compounds in his own labora¬ tory, however, but, during the past quarter of a century, he has discovered a vast number of new and interesting synthetic chemicals which have never been found in living plants and animals, among them, antipyrine, exalgine, phenacetine, *etc.* Moreover, as the number of these compounds which are of importance therapeutically is constantly increasing, such progress as is represented by these discoveries in allied science has exerted a powerful in¬ fluence in elevating the drug trade to its present high position.

Of course, it must not be imagined that chemistry is the only agency that has been oper¬ ative in shaping this development. One of the first in ˆ importance among these agencies has unquestionably been the ˆˆUnited States Phar¬ macopoeia.® The first pharmacopoeia published in the United States was printed in Philadel¬ phia in 1778. It was made up for military pur¬ poses. The next publication of the kind was issued by the Massachusetts Medical Society in 1808. But these did not have a considerable circuladon, and, as a matter of fact, up to the beginning of the 19th century, and even for some years thereafter, drugs were dispensed according to the pharmacopoeias v of foreign countries; and it was not until some time be-

tween 1810 and 1820 that any attempt was made to better these conditions. In 1820, the first edition of the ^^United States Pharmacopoeia^^ appeared, and this work, which has passed through successive decennial revisions up to this time, is regarded the world over as the standard in all manipulations of drugs and medicinal chemicals, from the identification of the crude material to the final stages in its preparation for the use of invalids. The names of Proctor, Maisch and Rice are inseparably connected with the early issues of this great work.

The governmental inspection of imported drugs, which commenced about 1825, was largely the result of the initiative taken by the newly-established pharmaceutical colleges in New York and Philadelphia. This inspection, still conducted by the national officials, has an important effect i-n upholding the standard of purity in drug imports.

The first law regulating the retail sale of drugs and poisons that was passed in the United States was enacted by the State legisla¬ ture of Rhode Island, in 1870, but since that time almost every State in the Union has placed a similar act upon its statutes. While there is a lack of uniformity in these laws, in general they cover the same ground by restricting all dealings in drugs, as well as all compounding of prescriptions to such persons as have been able to pass a satisfactory examination before a board of pharmacy. As such laws were not retroactive their beneficial effect has been only partially determined, as those who were engaged in the drug business prior to the passage of these acts were allowed to continue regardless of their ability to pass an examination.

Another agency that has accomplished im¬ portant results in the betterment of the drug trade are the various associations that have been founded since the middle of the 19th century. The first association instituted for the conserva¬ tion and advancement of the material and pro¬ fessional interests of the business was the Amer¬ ican Pharmaceutical Association, which was founded by 21 active pharmacists in 1852. This association holds annual meetings for the dis¬ cussion of scientific and educational questions, and other matters

relating to the welfare of the trade, has a membership of 2,490 (1916), and one of the effective features of its work is the annual publication of its proceedings, a work which presents a complete review of the scientific progress of pharmacy, and the monthly publica¬ tion of The American Pharmaceutical Associa¬ tion Journal. One of the most important in¬ fluences exerted over the retail trade is repre¬ sented by the various State pharmaceutical as¬ sociations, the oldest of which, that of New Jersey, was organized in 1870, while one of the most notable events in the history of the whole¬ sale drug trade during the 19th century was the organization of the wholesale houses of the West under the name of the Western Wholesale Druggists' Association. It was founded in 1876, and was called into existence by the peculiar conditions of the times. In 1882, many of the prominent Eastern druggists joined forces with the Western wholesalers, at a meeting held at Cleveland, Ohio, and, at this time, the narne of the organization was changed to the National Wholesale Druggists' Association. To secure

trade, and, afterward, to hold it, required a competition that finally became so sharp that concerns which had hitherto been regarded as prosperous houses found themselves unable to make profits. As the result a committee was appointed to try to introduce a system that is now known as the ˆTebate plan.ˆˆ According to the old system such articles as patent medicines had been sold on a very close margin, and the new plan was devised to give the wholesale druggists an opportunity to obtain a fair profit upon such preparations. By the adoption of the ˆTebate plan,® therefore, the wholesale drug¬ gists consented to sign a contract by which they agreed to maintain established prices, on condition that they were to receive 10 per cent reduction, or rebate, upon the regular wholesale price, and with the penalty of being placed upon the ®cut-off® list, and thus debarred from buying frorn the proprietors, in case they were guilty of violating their agreement. At this time the only profit to the wholesale trade was this 10 per cent rebate. The plan worked well for a time, but was completely demoralized by the entty qf the department stores into the drug business, and their policy of using cut prices on drugs and druggist's sundries to attract custom for other articles. The steps taken to correct this situation brought the trade up against the restrictions of the Sherman anti-trust law, and the government brought suit against the pro¬ tective combination. The net result has been to reduce the margin in the wholesale drug busi¬ ness to a bare 3 per cent.

The retail drug trade of the present day has become almost altogether

a mere distribution of the products of the great pharmaceutical and biological laboratories which are continu¬ ally adding new remedies to their already exten¬ sive lists. The business of the largest manu¬ facturing houses has become sixfold: the gathering of the crude drugs ; the extraction of their active principles ; the manufacture of synthetic drug preparations ; the testing out for standardization ; the commercial dispensing of their products ; and the discovering of new drugs by specially commissioned explorers in the most remote regions of the earth. .

Still another important factor in the growth and development of the drug trade is the Amer¬ ican pharmaceutical press. Among the most prominent periodicals are such weekly papers as the Pharmaceutical Era, the Shipping and Com¬ mercial List, and the Oil, Paint and Drug Re¬ porter, all of New York; semi-monthlies like the American Druggist and Pharmaceutical Record, of New York, and such monthly jour¬ nals as the American Journal of Pharmacy, of Philadelphia; the Druggists' Circular and Chemical Gazette, of New York; Pharmaceut-ische Rundschau, of New York; the Western Druggist, of Chicago the National Druggist, of Saint Louis, and the New England Druggist, of Boston. Besides these there are some smaller periodicals of local influence, as well as a con¬ siderable number of publications issued by various colleges and societies, and by prominent drug firms and manufacturing houses.

There is, perhaps, no particular in which the development of the drug trade is indicated more clearly than in the improvements in its methods. Less than a century ago the apothecary was obliged to cut and roll his pills by hand, and

to make his plasters with a ˆˆspreading iron.® ile powdered his drugs in a stone or iron mor¬ tar, and made his tinctures in a wide-mouthed jar with the aid of a stirring stick. To-day such operations are performed by machinery, a process which has so simplified the work that the manufacturing pharmacist is now able, by the use of his power-machine, to turn out more than 100,000 pills a day, and plasters almost ad libitum. The power-machines which are used in the making of compressed tablets now made more than 500 tablets a minute.

The making of fluid extracts as a class of pharmaceutical preparations is essentially an American invention. They are made by perco¬ lation, or displacement, a process by which the powdered drug, placed in a suitable vessel, is deprived of its soluble constituents, by the descent of a solvent through it, an invention the importance of which cannot be overesti¬ mated, as much of the progress in American pharmacy during the last half of the 19th cen¬ tury was largely due to the study and develop¬ ment of the process of percolation, and the in¬ troduction of preparations which owed their existence directly to this invention. Percola¬ tion received the stamp of official recognition in the ˆˆPharmacopoeia® of 1840, and has occupied a place in all subsequent editions of that work. None of the editions of the ˆˆPharmacopoeia,® prior to that of 1850, gave any formulas for the preparation of fluid extracts. In 1850, seven of these formulas were given and by 1890 the number had been increased to 88, although this number does not begin to represent the total manufacture of fluid extracts, which have now become almost as numerous and as popular as the vegetable drugs. Associated with the earliest manufacture of these extracts are the names of Henry Thayer of Boston, and Tilden & Co. of New Lebanon, N. Y.

Another innovation is the so-called ˆelixirs,® which were originated some time in the later thirties. For a time this term was used almost exclusively by manufacturers to designate their aromatic, sweetened, spirituous preparations which contained comparatively small quantities of active medicinal substances, but no formula under that name was published for the use of druggists until 1859.

The first sugar-coated pills made in this country were manufactured by Bullock & Cren¬ shaw of Philadelphia, and the Tilden Company, of

New Lebanon, N. Y. The use of gelatine capsules as a means of administering nauseous remedies in a readily assimilable condition was also the direct result of American enterprise. This process was originally outlined by Mothes, of Paris, but the success in popularizing it was due to the efforts of H. Planten & Son, the firm which first made them in the United States. A firm which became very prominent in the earliest manufacture of gelatine coated pills was McKesson & Robbins.

It is difficult for us to-day to realize that it was not until after 1825, when the American surgeon, Beaumont, made his carefully con¬ ducted observations upon the phenomena of digestion in the living stomach, that the func¬ tions of the gastric juice were revealed. His investigations, which lasted until 1833, stimu¬ lated and suggested the course for subsequent researches, and, in 1836, when the active prin¬

ciple of the gastric juice was discovered by Schwann, he gave it the name of “pepsin.® From a commercial point of view, the history of pepsin in America begins with the introduction of Scheffer’s pepsin, in 1872. This preparation was made by a simple and practical method known as the “salt® process, and it was a great improvement over all of the older methods of obtaining the ferment from the stomach, A few years later, about 1879, the original form of pepsin in scales, “free from added substances or reagents,® was introduced by Fairchild, and the advent of this preparation of phenomenal strength had the effect of causing great activity in the manufacture and improvement of the commercial pepsins. The practical recognition and application of pancreas ferments is due to the efforts of Fairchild, who, in 1880, introduced the extractum pancreatis, containing diastase for the conversion of starch, trypsin for the conversion of albumen, and emulsifying fer¬ ment for the digestion of fats, and the milk-curdling ferment, a preparation which proved to be of great utility, especially in the artificial digestion of foods for the sick, and in the prep¬ aration of foods for infants. Basing his theo¬ ries upon the indigestibility of starch, Liebig proposed that the farinaceous foods which wˆere commonly used with milk as food for in¬ fants should first be digested into soluble form by the use of malt diastase, while, in 1884, Fairchild proposed a method by which cows’ milk might be modified and adjusted to a closer re¬ semblance to human milk by the conversion of caseine, by the use of trypsin, to the soluble and peptone-like bodies for which the latter milk is peculiar.

The first improvement upon the antiquated method of applying

plasters to the human body was the invention of an india-rubber porous plaster by Dr. Shecut, a naval surgeon. He sold his rights in the plaster to Thomas Allcock, and the latter, failing to make its manufacture profitable, sold it to Dr. Brandreth. At that time the only commercial plasters were made of isinglass and resinous mixtures, some of which were spread on cloth and plaster skins. It was about 1867 that Seabury & Porter began the experiments which finally resulted in the use of rubber in medicinal and surgical plasters.

It was in 1878 that Dr. R. M. Fuller, of New York, introduced another distinctively American form of medication under the name of “tablet triturates.® These were made by a method in which the active ingredient was triturated, or ground, with either plain sugar of milk, or with a mixture of sugar of milk and cane-sugar, into a paste which was pressed into tablets in suitable molds. By this process it was possible to administer small quantities of such potent remedies as alkaloids, concentrations, etc., in a convenient, palatable, and readily soluble form. Unique as the idea was, it immediately became so popular with the medical profession that the manufacturers began to produce them upon an enormous scale, one manufacturer alone having no less than 500 different varieties of these tab¬ lets on his price-list.

Great as have been the developments along individual lines, however, it is only by reference to statistics that we can gain any idea of the magnitude of the commerce to which the mod¬ ern drug trade has attained. The United States

government kept no record of the imports and exports in drugs until 1830, and even then the list was confined to a few items. In 1830, the exports from the United States were stated to be $130,238, while in 1835 they were reported as being about $200,000. In 1916 the exports of patent medicines alone amounted to a value of $8,397,971, and of roots, barks and herbs, a value of $768,977. These figures by no means show the total value of medicinal preparations sold abroad. The government reports include such commodities with ®chemicalsˆˆ in such a way that they cannot be separated. The im¬ ports may be traced somewhat closer, and, omit¬ ting the inorganic and mineral substances used both in medicine and the arts, the government figures for the fiscal year ended 30 June 1916, show an importation of crude drugs and drug plants of 69,379,724 pounds, valued at $6,914,658. In addition, antitoxins, serums and vaccines valued at $8,225 were imported. It should be noted in passing that previous to the European War the larger part of the drug supply of the world passed through the ports of London, Hamburg, and Trieste. The closing of the two latter ports almost completely demoralized the trade. In the United States prices speedily ad¬ vanced as stocks diminished, and in some cases reached figures 1,000 per cent above the ante-war prices. Movements to grow drug plants in the United States have been discouraged on the ground that the different climatic conditions would affect unfavorably the effective drug con¬ tent, and that with the end of the war prices will fall below a remunerative point. Never¬ theless the experiment is being made in several sections of the country.

Unfortunately there are no data from which we may estimate the number of druggists doing business in the United States at the beginning of the 19th century. The New York directory for 1786 mentions the names of only five. One druggist, Effingham Lawrence, was official apothecary to the Medical Society, a committee from which visited his store once every three months to certify that his drugs were genuine and his medicines properly prepared. Among the wholesale drug houses now in business in New York, one, founded more than a cen¬ tury ago, by Jacob Schiefflin, in 1794, is still under the control of his descendants. The firm of Powers & Weightman, of

Philadelphia, began business under the name of Farr & Kunzi, in 1818, while the first drug store in Washing¬ ton was opened by Frederick Miller in 1796. The oldest drug house in the West is probably that of T. ‘H. Hinchman & Sons, of Detroit, Mich. The earliest wholesale druggists in Chi¬ cago were Dr. Clark, Dr. Brinkenhoff — now Peter Van Schaack & Sons — and Dr. John Sears, while among the other wholesale houses doing business in New York three-quarters of a century ago one may mention the firms of Lawrence & Keese, J. A. & W. B. Post, Thomas S. Clark, John & William Penfold, John M. Bradhurst, R. & S. Murray, Silas Carle, Olcott Si McKesson, now represented by two firms, Dodge & Olcott and McKesson & Robbins, and John C. Morrison. Among the manufacturers of medicinal chemicals the following firms are worthy of mention : Rosengarten & Son, of Philadelphia; Charles Cooper & Company, of New York; Charles Pfizer & Company, of

New York; Mallinckrodt Chemical Works, of Saint Louis ; Larkin & Scheffer, of Saint Louis ; Herf & Frerichs Chemical Company, of Saint Louis, and the New York Quinine and Chemical Works.

In 1850 Haskell & Merrick put upon the market a select line of drugs, including mor¬ phine, chloroform, ether, galenical extracts, opodeldoc, mercurial and some other salts. At that time Philadelphia was the centre of trade for English chemicals, Boston for East India drugs, and New York for Spanish, French, Ger¬ man and Italian drugs and preparations. In the decade following many fluid extracts and some glycerine extracts were added to the list of ready made supplies. One of the pioneers in the manufacture of pharmaceutical preparations was Dr. E. R. Squibb, a past assistant surgeon in the United States Navy, who organized and ran the United States Naval Laboratory from 1854 until 1858. The enormous demand caused by the Civil War was the incentive for the es¬ tablishment of his remarkable laboratory. Among the other pioneer manufacturers are the Tilden Company, of New Lebanon, N. Y. ; Bil¬ lings, Clapp & Company, and the E. L. Patch Company, of Boston ; Sharp & Dohme, and the Burroughs Brothers Manufacturing Company, of Baltimore ; Henry Thayer & Company, of Cambridgeport, Mass. ; William R. Warner & Company, John Wyeth & Brother, and the H. K. Mulford Company, of Philadelphia ; Parke, Davis & Company, and Frederick Stearns & Company, of Detroit, Mich. ; the William S. Merrill Chemical Company, of Cincinnati ; Eli Lilly & Company,- of Indianapolis, and Charles S. Baker & Company, and the Searle & Hereth Company, of Chicago. The pioneer manufac¬ turer of

druggists' balances, or fine scales, was Henry Troemner, who came to this country from Marburg, Germany, in 1836, and, two years later, started business in Philadelphia. Prior to this time the scales which were required by druggists had been made to order by jewelers.

The present volume of the drug trade in the United States can only be approximately esti¬ mated, as the data are inextricably tangled with those of the chemical industry (q.v.). The most accurate survey to be made is with the aid of the figures recorded by the United States Census of Manufactures for 1914, which gath¬ ered separate statistics relating to the manufac¬ ture of ˆdruggists' preparations,® ˆˆpatent and proprietary medicines,® and ˆˆperfumery and cos¬ metics.® Reports were received from 4,082 es¬ tablishments whose combined products were valued at $172,008,946. Of the total number, 850 were located in New York, 391 in Illinois, 353 in Pennsylvania, 267 in Ohio, 234 in Mis¬ souri, 179 in Massachusetts, 155 in Michigan, 142 in California, 134 in New Jersey, 107 in Minnesota, and the remaining 1,109 scattered among 34 other States.

The manufacture of druggists' preparations was reported by 438 establishments with prod¬ ucts valued at $48,624,966. Liquid preparations, such as tinctures, fluid extracts, and medicinal syrups, were valued at $13,900,402; and of pills, tablets, powders, *etc.* at $10,903,0.56. The manu¬ facture of alkaloids and their derivatives, such as cocaine, codein, morphine, quinine and strych¬ nine, was reported by 142 establishments, with products valued at $11,493,168. The production

of synthetic medicinal preparations, such as acetanilid, saccharin, methylsalicylate, etc., was reported by 72 establishments, with an output valued at $1,384,996. Medicinal metals and their salts, bromides, citrates, bismuth, etc., were pro¬ duced at 47 establishments, their output being valued at $732,307. Serums, vaccines, toxins, and other biological products were prepared at 93 establishments, their output being valued at

$6,223,475.

The manufacture of patent and proprietary medicines and compounds, including household ammonia, insecticides, fire extinguisher com¬ pounds, etc., was reported by 3,085 establish¬ ments, with products valued at $105,665,611. These figures show an increase in the number of establishments since 1909 of 8.7 per cent, and an increase in the value of products by 26.1 per cent The larger part of this business was car¬ ried on in New York State by 617 establish¬ ments — as compared with 300 in Illinois, 275 in Pennsylvania, 209 in Missouri, and 156 in Ohio.

Perfumery and cosmetics, including cologne and toilet waters, face powders, cold cream, etc., were made by 559 establishments, their output being valued at $17,718,369. These figures show a large increase in both the number of estab¬ lishments engaged and the value of the prod¬ ucts, amounting to 30.3 per cent in the first in¬ stance and 24.7 per cent in the second. New York claimed the largest share in this industry with 175 establishments, followed by Illinois with 67, Pennsylvania with 45, and Ohio with 34.

The enormous increase in the consumption of medicines in the United States is indicated by the fact that while the population of the coun¬ try from 1880 to 1910 increased 83.3 per cent, the value of the patent medicine manufactured in the same period increased 740.5 per cent. Practically the whole of this production passes through the medium of the drug trade. These figures, however, represent but a small part of the actual consumption of medicines by the American people at the present day. As but one instance available of the dissemination of drugs outside of the patent medicine class, it may be mentioned that in the fiscal year ended 30 June 1916, an amount of quinine was im¬ ported into the United States sufficient to make 2,200,000,000 average doses — an equivalent of 22 doses for every man, woman and child in the population. The importation of opium and its alkaloids amounted to the equivalent of 1,200,000,000 average doses of morphine. It is worthy of note that in the case of morphine the importations are less than one-third of their normal volume before the war. A much larger effect is shown in the importations of ^^medicinal preparations® which in the year quoted amounted to a value of but $181,643, while in 1913 their value was $1,621,520.

One of the interesting features of the Amer¬ ican drug trade has been the introduction of the Chinese drug store, with the identical drugs

carried in stock in the Orient. A few of these are very closely allied to the drugs of the Amer¬ ican store, and with practically the same medic¬ inal value. Most of the ˆremedies,® however, are the grotesque collection of triturated deer horns, ginseng roots, curiously sculptured gourd seeds, and magical charms of various kinds and alleged potencies.

DRUGGET, a coarse and flimsy texture originally half silk and half wool, chiefly used for covering carpets. It was formerly exten¬ sively employed as an article of clothing by the poorer classes, more especially of females ; but this and similar fabrics are now almost wholly superseded by cotton goods, which in¬ duce greater cleanliness.

DRUID, a member of the Celtic priest¬ hood of ancient Britain and Gaul, which at the period of the Roman invasion existed chiefly in Brittany and along the valley of the Loire, and in the island of Anglesey, in Wales and in Ireland. Scattered throughout these regions, at Carnac in Brittany, at Stonehenge and Ave¬ bury in England and numerous other localities, are the stupendous stone structures, known as cromlechs, menhirs, dolmens, kistvaens, etc., ascribed by the older archaeologists to the druidical cult, and still popularly known as druidical temples and altars, but now assigned by scien¬ tists to prehistoric palaeolithic and neolithic predecessors, although it is probable these mega-lithic monuments were used by the Druids in their mystic rites to impress the populace. Welsh tradition relates that the Druids entered Gaul from the Orient with the Celtic Kymric race, and their religious practices have been va¬ riously described as of Hindu, Persian and Egyptian origin. Accurate knowledge of the sect is limited owing to their inviolable prac¬ tice of not allowing their history to be written, all their lore being committed to memory, and all instructions being imparted orally. The best ancient and contemporary account of the Druids is that by Julius Caesar, who thus de¬ scribes them : ®They attend to divine worship, perform public and private sacrifices and ex¬ pound matters of religion. A great number of youths are gathered round them for the sake of education and they enjoy the highest honor in that nation, for nearly all public and private quarrels come under their jurisdiction, and when any crime has been committed, when a murder has been perpetrated, when a contro¬ versy arises about a legacy or about landmarks, they are the judges, too. They fix rewards and punishments ; and should any one, whether a private individual or a public man, disobey their decrees, then they exclude him from the sacrifices. This is with them

the severest pun¬ ishment. The persons who are thus laid under interdict are regarded as impious and wicked people; everybody recoils from them and shuns their society and conversation, lest he should be injured by associating with them. They cannot obtain legal redress when they ask for it, nor are they admitted to any honorable office. All these Druids have one chief, who enjoys the highest authority among them. When he dies, he is succeeded by the member of the order who is most prominent among the others, if there be any such single individual ; if, how¬ ever, there are several men equally distin¬ guished, the successor is elected by the Druids. Som.etimes they even go to war about this su¬ premacy. At a certain time of the year the Druids assemble on the territory of the Car-nutes, which is believed to be the centre of all Gaul, in a sacred place. To that spot are gath¬ ered from everywhere all persons that have quarrels, and they abide by their judgments and decrees. It is believed that this institution was

founded in Britannia and thence transplanted into Gaul. Even nowadays, those who wish to become more intimately acquainted with the institution generally go to Britannia for instruc¬ tion's sake.

^^The Druids take no part in warfare ; nor do they pay taxes like the rest of 'the people ; they are exempt from military service and from all public burdens. Attracted by such rewards, many come to be instructed by their own choice, while others are sent by their parents. They are reported to learn in the school a great number of verses, so that some remain there 20 years. They think it is an unhallowed thing to commit their lore to writing, though in the other public and private affairs of life they fre¬ quently make use of the Greek alphabet… . Beyond all things, they are desirous to inspire a belief that men's souls do not perish but trans¬ migrate after death from one individual to an¬ other; and they hold that people are thereby most strongly urged to bravery, as the fear of death is thus destroyed.^^

Besides being priests and teachers of religion the Druids appear also to have been adept astrologers and magicians, and were versed in the

mysterious powers of animals and plants ; the oak-tree, the mistletoe when growing on the oak, the vervain, the hyssop and marshwort were held in especial reverence among them, and like the Romans, they drew auguries and prophecies from an inspection of the entrails of sacrificed animals and from the flight of birds ; their mysterious rites were usually per¬ formed in the depths of oak forests. The order was divided into three classes : vates or proph¬ ets, bards and priests ; with them were asso¬ ciated, but without sharing their prerogatives, three classes of prophetesses or sorceresses.

Before the advent of the Romans the auto¬ cratic powers of the priesthood aroused the antagonism of the warrior element of the tribes, and according to Caesar, the latter had deprived them of much of their political power. The Druids exerted all their powers to oppose the Roman' conquerors and continually incited the people to rebellion, until they were driven out of Brittany into Wales, and finally gathered in the island of Anglesey, where they were at¬ tacked by Suetonious Paulinus in 61 a.d., and in 78 A.D. were utterly subdued and almost ex¬ terminated by Agricola. (See Druids). Con¬ sult Rhys, ˆLectures on the Origin and Growth of Religion as Illustrated by Celtic Heathen¬ domˆ (London 1888).

DRUID STONES, a name given in Eng¬ land and other parts of the country to weather¬ worn, rough pillars of gray sandstone which are scattered over the surface of the chalk-downs in England, in Scotland and its islands, and which exist in great numbers in other coun¬ tries; generally in the form of circles or in detached pillars ; it is not certain, however, that the Druids had any connection with these stones.

DRUIDS, The United Ancient Order of.

This fraternal and benevolent society takes its name and nomenclature from the history of the Druids of Gaul and Britain. They were the religious guides of the people and the chief guardians and expounders of the law. They taught the immortality of the soul. Their

chosen retreats were groves of oaks, and the remains of their temples are circular cromlechs and dolmens of immense stones. They attained their greatest influence in Britain shortly before the Roman invasion, during the last century B.c. They were believed to have incited the patriotic revolt of the Britons against Roman rule; and Agricola, when governor of Britain, cut down their sacred groves and destroyed their temples, when the Druids who escaped fled to the island of Iona. Upon

the conversion of the Britons to Christianity, Druidism became only a venerable memory and tradition. Its nomenclature and traditions form the pictur¬ esque background of the ceremonies of the modern order of fraternity and benevolence. The modern order was formed in England in 1781 and its centennial was celebrated in Amer¬ ica by enthusiastic meetings and addresses in a number of cities. It was introduced into the United States about 1830, but the earliest so¬ ciety died out. A permanent beginning, how¬ ever, was made in George Washington Lodge, No. 1, instituted in New York in 1839. The order has reached now a membership in the United States of 30,968; in England, Austra¬ lasia and Germany, 302,247 ; total membership, 333,215. The order has paid since its introduc¬ tion in the United States in sick benefit and other relief the sum of $7,141,772.53. The relief granted during the fiscal year 1915 was $103,- 776.53. In the nomenclature of the order the name Grove is used commonly as the name lodge in other orders. The higher body in a State is called a Grand Grove and different Grand Groves are under the Supreme Grove, which is the head of the Order, with full power to make laws for its own government and for the government of its State, Grand and Sub¬ ordinate Groves. The Order is in union with the Order in England, Australia and Germany. The Order is a moral, social and beneficial society. Its principles and teachings are derived from Ancient Druidism and are founded on reason and sound morality. They do not con¬ flict with any of the established systems of religion and are perfectly compatible with the peace and welfare of the State. No oaths are administered by the Order binding its members to any creed or faction ; in becoming Druids they are still free men. Its so-called secrecy is not a cloak for evil but simply a protection against abuse of its beneficial provisions. Its objects are: to unite men together, irrespective of nation, tongue or creed, for mutual protec¬ tion and improvement ; to assist socially and materially by timely counsel and instructive lessons ; by encouragement in business and as¬ sistance to obtain employment for those in need; and to foster among its members the spirit of fraternity and good fellowship. Its well-regulated system of dues and benefits pro¬ vides for the relief of the sick and destitute, the burial of the dead and the protection of the widows and orphans of deceased ‘members. ‘ Members of subordinate Groves must be males of 18 years and upwards, of sound health and character, and are elected on the proposal of members. To promote the prosperity of the Order and cultivate the perfection of its mem¬ bers, Druidic Chapters have been organized. All members in good standing, who have at¬ tained the third degree, are eligible. In order

to provide women an opportunity to partici¬ pate in the benevolent work, Circles have been established, to which Druids in good standing and all acceptable women 18 years of age are eligible.

DRUILLETTES, drwe'yet, Gabriel, Jes¬ uit missionary: b. France 1610; d. Quebec 1681. He entered the order in 1629 and was sent to Canada in 1643. In 1646 he was sent on a mis¬ sion to the Abenakis and was the first white man to make the overland journey from Que¬ bec to the seaboard of Maine. In 1650 he was sent by the French authorities on a trade reciprocity and mutual defense mission to the United Colonies of New England and was cor¬ dially received at Boston. He returned in the following year with definite proposals for a treaty, which, however, were formally declined. On going back to Canada he resumed his mis¬ sionary work and in 1671 was in charge of the mission at Sault Sainte Marie.

DRUM, a musical instrument formed by stretching parchment animal skin over the heads of a cylinder of wood or over a bowl¬ shaped metallic vessel. There are three kinds of drums: (1) The long drum or bass drum with two heads, held laterally and played on both ends with stuffed-knob drumsticks. This is the ordinary drum used by an infantry or marching band. It is employed mainly to mark the time and also to increase the fortes. The big drum, or grosse caisse, of the modern orchestra, is a modification of the ordinary drum, with the diameter greatly increased and the length of the cylinder lessened. It is struck on one side only. (2) The side-drum, having two heads, the upper one only being played on by two sticks of wood; the lower head has occasionally strings of catgut stretched across its surface, and then it is called a snare drum. It is the side-drum of the fife and drum bands. It is occasionally employed in the orchestra for special effects. (3) These are either the small kettle-drums of the cavalry band, played on horseback, or the proper orchestral drums, larger in size but similar in construction. They are generally tuned to the tonic and dominant of the composition in which they are used, but this rule is not without exceptions. The tambour¬ ine is a species of drum, consisting of a single skin on a frame or vessel open at bottom. The heads are tightened by cords and braces or by rods and screws.

The drum was a martial instrument among the ancient Egyptians, as the sculptures of Thebes testify. Their long drum was like the Indian tam-tam and was beaten by the hand. It was about 18 inches long, had a case of wood or metal and heads of prepared skin, resembling parchment. These were braced by cords in a manner somewhat similar to the modern. The instrument was carried by a belt and was slung behind the back on a march. The invention of the drum, is ascribed to Bacchus, who, accord¬ ing to Polygoenus, gave his signal of battle by cymbal and drum. It was, however, known in very early ages and in some form or other among almost all nations.

DRUM, a Celtic word common in Ireland and Scotland, signifying a knoll, ridge or small hill, frequently found alone as the name of a village, farm, estate, etc., and often also as a

prefix, as in Drumalbin, Drumderg, Drumlaii-rig, Drummossie, *etc.* Irish geologists give the name to all elevations.

DRUMCLOG, Scotland, a place in Lanark¬ shire, on the borders of Ayrshire, 16 miles southeast of Glasgow. In 1675 Drumclog was the scene of a Lattle in which the Covenan¬ ters defeated the Royalists. The battle is de¬ scribed in Scott's ˆOld Mortality.ˆ A monu¬ ment marks the scene of the encounter.

DRUMFISH, or DRUM, certain fishes of the family Scicenidce (q.v.), so-called from the resonant sound which they produce in the water by forcing gas through the air bladder. In the United States the name is especially applied to the following. The common drumfish (Pogo-nias chromis) which has a short stout body, numerous barbels on the lower jaw. and large pavement-like teeth on the pharyngeal bones. It is one of the largest of food fishes, though the flesh is not highly valued. The drumfish is com¬ mon on saiMy shores south of Long Island and is caught on lines thrown into the surf. By means of its powerful dentition the shells of the stoutest mollusks and crustaceans are crushed and their contents devoured. At times schools of drumfish create great havoc on oyster beds. The red drum or red-fish {Scicenops ocellata) is a small fish, weighing from 10 to 75 pounds, and distinguished by the separate lower pharyn¬ geal bones, the absence of mandibular barbels, and the eye-like spot at the base of the tail. It is one of the most important game and food fishes of the southern United States, especially in Texas. The black drum (Scicena deliciosa) is a closely allied dusky bluish species found in the warmer parts of the Pacific coasts of Amer¬ ica. The fresh-water drum or

sheepshead (Ap-lodinotus grunniens) is closely related to the common marine drumfish, from which it differs in the absence of barbels. It ranges from the Great Lakes, where its flesh is coarse and rank and of little value for food, to Texas, where it becomes a fine-flavored and important food fish. It sometimes exceeds 50 pounds in weight.

DRUMLIN, a smoothly rounded oval hill of unstratified boulder clay, or till, formed be¬ neath the great ice sheets of the glacial period. Drumlins are most frequently found near what was the front of the ice sheet, and, by their peculiar form, are easily recognized. They are usually over half a mile long and from 100 to 200 feet high and occur with their longer axes parallel to the direction of ice movement. Drum¬ lins are of common occurrence in Massachusetts, particularly about Boston harbor, where some form islands. They are also abundant in western New York and in southern Wisconsin. Their method of formation is uncertain, though they plainly represent material gathered beneath the ice sheet and in some way piled up by it. See Drift; Glacial Period.

DRUMMOND, Sir George Gordon, Eng¬ lish soldier: b. 1772; d. London, 10 Oct. 185L He entered the British army as ensign in 1789; became lieutenant-colonel of the king's Liver¬ pool regiment in 1794. In 1795-96 he served in the West Indies and in the Egyptian cam¬ paign. In 1805 he became major-general and was appointed in command of a division in Jamaica, which post he held for several years. He was on duty in Canada 1808-11, and

promoicd lieutenant-general 1811. He was again ordered to Canada as second in coinmand under Sir George Prevost 1813; planned and effected the capture of Fort Niagara; planned the suc¬ cessful attack on Black Rock and Buffalo; led a combined military and naval force against Oswego and destroyed the American works and stores, May 1814. He was in command of the British forces at the battle of Lundy's Lane 25 July, and in August invested, but failed to capture. Fort Erie. After being promoted gen¬ eral in 1825, he was again transferred to the colonelcy of his old regiment.

DRUMMOND, Henry, Scottish geologist and religious writer: b. near Stirling, 17 Aug. 1851; d. Tunbridge Wells, 11 March 1897. He was educated at the universities of Edinburgh and Tubingen; entered the ministry of the Free Church, and having devoted much attention to science, was in 1877 appointed lecturer on natural science in the Free Church College, Glasgow, being made professor of theology in 1884. One of his most popular books was ˆTropical Africaˆ (1888), giving his own experiences in that part of the world. His most remarkable work, and the one by which his name became most widely known, is ˆNatural Law in the Spiritual Worldˆ (1883), which has passed through many editions and been translated into various languages. This work was written with the object of showing that such scientific doctrines and theories as those associated with the name of Darwin and his followers were not incompatible with re¬ vealed religion. He was author also of ˆTravel Sketches in Our New Protectorateˆ (1890) ; ˆPax Vobiscumˆ (1890) ; ˆThe Programme of Christianityˆ (1892) ; <The Greatest Thing in the Worldˆ ; ˆThe Ascent of Manˆ (1894). The last-named work is a semi-popular review of evolution theories which caused some contro¬ versy on its first appearance, mainly on account of its author's insistence on the recognition of altruism, or %he struggle for the life of others, as the most important factor in organic and es¬ pecially in social evolution. His facile and fervid style of composition suited the tastes of large numbers of readers. Consult ˆLifeˆ by G. A. Smith (1898).

DRUMMOND, James, English Unitarian theologian : b. Dublin,

Ireland, 14 May 1835. He was educated at Trinity College, Dublin, entered the Unitarian ministry and became professor of theology at Manchester New College in 1869, succeeding Rev. James Martineau (q.v.) as its principal in 1885. He removed with the college to Oxford in 1889, and retired in 1906. He has published ˆSpiritual Religion: SermonsH1870) ; ˆThe Jewish Messiahˆ (1877) ; Hntroduction to the Study of Theologyˆ (1884) ; ˆPhilo-Judaeus : or the Jewish-Alexandrian Philosophyˆ (1888); ˆVia, Veritas, Vitaˆ (1894); ˆThe Pauline Benediction> (1897) ; Hnternational Handbooks to the New Testamentˆ (ed. by Orello Cone) ; ˆThe Epistles of Paul the Apostle to the Thessalonianˆ (1899); ˆLife and Letters of Dr. Martineauˆ (with Upton 1902) ; ˆThe Character and Authorship of the Fourth GospeP (1904) • ˆStudies in Christian Doctrineˆ (1908); ˆJohannine Thoughtsˆ (1909) ; ˆLectures on the Composition and Delivery of Sermonsˆ (1910) ; <Paul: his Life and Teaching) (1911).

DRUMMOND, James, Australian journal¬ ist and author : b. New Zealand, 17 Oct. 1869. He was employed as a printer in the government office at Wellington; but he soon turned to journalism and has held important positions on the leading newspapers of New Zealand. He has written extensively on colonial history, natural history, and especially on ornithology. Among his published works are "ˆNature in New Zealand) (1902)'; ˆThe Animals of New Zea¬ land) (1905) ; in collaboration with F. W. Hut¬ ton, ˆLife and Work of Richard John Sheldon) (1906) ; ˆOur Feathered Immigrants) (1907) ; ˆJohn Rutherford) (1908) ; ˆLife of Samuel Marsden) (1914) ; and extensive contributions to English and colonial magazines and news¬ papers.

DRUMMOND, Thomas, Scottish inventor: b. Edinburgh, October 1797 ; d. Dublin, 15 April 1840. He went to Woolwich to receive special instruction in the duties of an engineer, and while pursuing his studies showed his in¬ ventive talent by devising a form of pontoon which recommended itself by its facility of transport as well as by its admirable adaptation to the immediate purpose for which it was in¬ tended. Having heard the incandescence of lime mentioned in a lecture, it struck him that the light produced by this incandescence might be advantageously applied to replace the Argand-lamps which were used in the surveys, and after devoting a good deal of attention to the subject, he found a means of effecting the desired object. (See Calcium Light). On the first occasion on which the light was

employed, in the Irish survey, it showed the position of a station 66 miles distant. While on the same survey he in¬ vented a heliostat which has always been em¬ ployed since in land-surveying, and with the aid of which observations can be taken at distances exceeding 100 miles. In 1835 he was appointed Undersecretary for Ireland, and in 1836 was chairman of a commission on railways in Ire¬ land, and gave a very valuable report of the proceedings of the commission. His services to Ireland were recognized by the erection of a statue by public subscription.

DRUMMOND, William, of Hawthornden, Scottish poet : b. Hawthornden House, near Edinburgh, 13 Dec. 1585; d. there, 4 Dec. 1649. He was graduated at the University of Edin¬ burgh in 1605, afterward studying at London, Bourges and Paris. He retired to Hawthornden, ^^a sweet and solitary seat, and very fit and proper for the muses,)) and gave himself up to the cultivation of poetry and polite literature. A dangerous illness fostered a serious and devout turn of mind, which was evinced by his first productions, ˆThe Cypress Grove,) in prose, containing reflections upon death; and ˆFlowers of Sion, or Spiritual Poems.) He was a friend of Drayton and of Montrose, and entertained Ben Jonson at Hawthornden for three weeks on the occasion of a visit which the English dramatist made to Scotland in the winter of 161ˆ19. To this visit a great deal of interest is attached from the fact that Drummond took notes of the conversations held with Ben Jon¬ son, which were afterward published, though not till long after the death of both. They first appeared in the folio edition of Drummond's works in 1711. These notes were republished separately by the Shakespeare Society in 1842.

As a historian, Drummond is chiefly remarkable for an ornate style, and a strong attachment to the High Church principles of the Jacobites. His ˆHistory of the Reigns of the Fivejamesesˆ was published several years after his death. An ardent Royalist, he was forced to sign the Covenant, and it is said that the news of the execution of Charles I hastened his death. He is now remembered only as a poet. Although

tinged with the conceits of the Italian school, there is much genuine imagery and truth of feeling in all his poetry, but particularly in his sonnets, which are replete with tenderness and delicacy. He wrote in English, and not in his native Scots. See his ˆPoems,ˆ edited with memoir, by Ward (1894) ; ˆLife,ˆ by Masson

(1873).

DRUMMOND, William Henry, Canadian poet: b. County Leitrim, Ireland, 13 April 1854; d. 6 April 1907. In early life he came to Can¬ ada ; was educated at McGill University, Montreal, and in 1884 was graduated in medicine at Bishop's College, Lennoxville, province of Quebec. Here for some time he taught medical jurisprudence. He established his practice in a mixed community of Indians, French-Canadians, Scotch-Irish and English, which to his unusual powers of observation offered a splendid field for character study. He is especially suc¬ cessful in portraying the French habitant of the forest and lumber camp. His works include ˆThe Habitant and other French-Canadian Poemsˆ (1897); ˆPhil-o-rum's Canoe and Madeleine Vercheresˆ (1898) ; ˆJohnnie Cour-teau and Other Poemsˆ (1901) ; ˆThe Voyageur and Other Poemsˆ (1905) ; ˆThe Great Fightˆ (1908). In 1912 appeared <The Poetical Works of William Henry Drummond,ˆ with an introduction by Louis Frechette and an ap¬ preciation by Neil Munro. Consult ®English-Canadian Literature,® on ˆCanada and its Provincesˆ (Vol VI, Toronto 1914).

DRUMMOND ISLAND, the extreme west of the Manitoulin chain, in Lake Huron, belongs to Chippewa County, Mich. It measures 20 by 10 miles.

DRUMMOND LIGHT. See Drummond, Thomas; Calcium Light.

DRUM O NT, dru'mon', Edouard Adolphe,

French journalist: b. Paris, 3 May 1844; d._ 4 Feb. 1917. He was in the government service before he became a contributor to the press. He published several works, many of which were violently anti-Semitic in character. His ˆMon vieux Parisˆ (1879) was crowned by the academy. In 1892 he founded La Libre Parole as an organ for his views. In 1898-1902 he sat for Algiers in the Chamber of Deputies. His works include ˆLa France julve devant I'opinionˆ (1886) ; ˆLa fin d'un mondeˆ (1888) ; <Derniere batailleˆ (1890) ; ˆTestament d'un antisemite' (1891) ; ˆSecret de fourmiesˆ (1892) ; ˆDe I'or de la bone du sangˆ

(1896), dealing with the Panama Canal expose; ˆLes Juifs et I'affaire Dreyfusˆ (1899) ; Wieux por¬ traits, vieux cadresˆ (1900). Consult ArnouHn, Stephane, <M. Edouard Drumont et les Jesuitesˆ (Paris 1902).

DRUNKENNESS, the mental and physical condition resulting from excessive drinking of intoxicating liquors. In law, it is not considered an absolute defense, although in some cases, de¬

pending on the nature of the act, and to what extent the person was under the influence of intoxicating drinks, the offense, when committed by a drunken man, is changed to one of less severity. The general rule is, that if a person voluntarily, by the use of intoxicating liquors, deprives himself of his reason, he cannot offer it as a defense for acts which he commits while intoxicated. If the intoxication is carried to such an extent as to be a disease, such as delir¬ ium tremens, or mania a potn, a different ques¬ tion is raised, and, in the first case, it will reduce the offense and in the second case there are some decisions which go so far as to hold that it is a complete defense.

The general rule is that contracts made by a person under the influence of liquor are voidable and not void; so that if a person while intox¬ icated makes a contract under which some inno¬ cent third person, for value, acquires rights, the contract is binding on the person making it, although he was under the influence of liquor at that time. If a person makes a contract when so far under the influence of liquor as to be de¬ prived of his senses, and the contract is so one¬ sided as to be unreasonable, the question of fraud may enter into the transaction. In cases where a person is tried for murder in the first degree, to prove that crime the evidence must show, according to the statute defining murder in the first degree, malice aforethought. Now it has been held that an excessive intoxication excludes the malice and only passion is shown and the crime is reduced below murder in the first degree. But the person accused must prove intoxication to such an extent that passion and not malice will be shown. Although if a per¬ son, while sober, makes all preparation to take a person's life, and then, before committing the crime, becomes intoxicated, doing an act when intoxicated which he was afraid to do when sober, it would be murder in the first degree. In cases of robbery, it is presumed the goods are taken with a felonious intent, but if the accused can prove sufficient intoxication, the felonious taking is not presumed. When a person is tried for an act and the defense is provocation, the amount of provocation to make a good defense would be less when the person

who gave the provocation was intoxicated than if he was sober and in his right senses. In itself drunkenness is not a legal offense, though drunken conduct in public may be a nuisance andˆ as such is often made a statutory offense, punishable by fine or imprisonment. Ha¬ bitual drunkenness may also render a drunk¬ ard liable to a judicial inquisition for the appointment of a guardian of him and his property. Such a proceeding is properly insti¬ tuted by wife or children or next of kin on the ground of his incompetency to look after his property or manage his business affairs. (See Alcoholism ; Dipsomania ; Intoxication ; Tem¬ perance). Consult Bishop, ˆCommentaries on Non-Contract Law> (Boston 1889) ; Kent, < Commentaries on American Lawˆ ; Pollock, ˆPrinciples of Contract in Law and in Equityˆ (2d Amer. ed. by G. H. Wald, Cincinnati 1885) ; Woodruff, ˆ Cases on Domestic Relations and the Law of Personsˆ (New York 1897).

DRUPE, in botany, a simple, succulent stone-fruit composed of a single monospermous carpel, of which the carpellar>ˆ leaf becomes

fleshy at its external division, and ligneous in its internal division, as in the peach, cherry, plum, olive, *etc.* The stone which encloses the kernel is the endocarp; the pulpy, or succulent part, the mesocarp. In the horse-chestnut and cocoanut, the mesocarp is not succulent, and in the date the endocarp is replaced by a mem¬ brane.

DRURY, Alfred, English sculptor: b. Lon¬ don. His art education was obtained at the National Art Training School, South Kensing¬ ton, and in Paris under Dalou. His principal works are ˆThe Triumph of Silenusˆ (1885) ; ˆCirceˆ (1893); ˆ St. Agnes ˆ (1894); ˆ The Age of Innocenceˆ (1897); ˆProphetess of Fateˆ ; ˆLittle Duchessˆ (1900) ; Hnnocenceˆ (1902) ; ˆKing Edward VII > (1903).

DRURY, Dm, English silversmith and entomologist: b. 4 Feb. 1725; d. 15 Dec. 1803. He was devoted to the study of entomology and to collecting exotic insects and published Hllustrations of Natural Historyˆ (1770-82), with upwards of 240 figures of exotic insects. His Hllustrations of Exotic Entomology > was edited in 1837 by Westwood and appeared with nearly 700 figures by Moses Harris.

DRURY COLLEGE, a coeducational insti¬ tution in Springfield, Mo. ; founded in 1873 under the auspices of the Congregational Church. In 1916 the college had 30 professors and instructors and 350 students. The library contained about 32,000 volumes.

DRURY LANE THEATRE, a famous place of amusement in London, located in Rus¬ sell Street, near Drury Lane. It was first opened in 1663, and was rebuilt by Sir Christo¬ pher Wren and reopened in 1674. It was again rebuilt in 1794. The present edifice was opened in 1812, with a prologue by Lord Byron, the advertisement for which gave rise to the famous ˆRejected Addresses.ˆ Garrick opened the theatre in 1747 with Dr. Johnson's prologue; and most of the great English actors have trod the boards which are now given over for the most part to pantomimes and spectacular pieces.

DRUSE, a surface covered with projecting crystals. Also a cavity lined with small crystals, in the latter sense a geode. The adjective drusy

means covered with small crystals.

DRUSES, a people of Syria, scattered over an extensive tract of country lying to the south¬ east of Beirut, and south of the country occu¬ pied by the Maronites; or, more particularly, they occupy the southern parts of Lebanon and Anti-Lebanon (the slopes of Hermon), while considerable numbers also inhabit the Hauran (south of Damascus), where the mountainous tract occupied by them is now often designated the Druse Mountain. The total Druse popula¬ tion is estimated at from 100,000 to 150,000. In the northern districts occupied by them they are mingled with the Maronites, but many towns and villages are peopled almost exclusively by the Druses. There are some circumstances which tend to show that the Druses are not in¬ digenous to the territory they now possess, although they have long since dropped their own language and adopted the Arabic. They were in Lebanon and Anti-Lebanon as early as the 11th century. The peculiar interest attaching to this people belongs, however, more to their political

constitution and their religion than to their origin. Politically the Druses are divided into two parties, that called the Jumblatiehs, with the family of Jumblat at their head; and the Yezbe-kiehs, with that of Abou-Nakod at their head. These two parties live in almost constant strife, except when they have a common foe to contend against, when they forget their internal dissen¬ sions and unite their strength for offense and defense. Their religion is a curious mixture of Judaism, Christianity and Mohammedanism. They believe in one God, who is the only being to whom worship ought to be paid. According to their religious books he cannot be defined by any of the qualities belonging to created beings. The doctrine of the unity of the Deity does not admit, in their view, even of the consideration of any quality or attribute existing in him.ˆ They profess to believe in the unity of God with the abstraction of every quality and mode of exist¬ ence, The Druses also believe that God has at different times appeared to men in a human form, and that his last appearance was under the name of Hakem, of Egypt, who announced himself at Cairo as a divine incarnation about 1030 A.D, They therefore regard Hakem as God, and they believe that he will one day re¬ turn to earth, cause their religion to triumph and punish the unbelieving. They have neither prayers, fasts, nor festivals and with the ex¬ ception of a privileged class, the Akals, or initiated, they have no worship. When they go among the Turks they behave as Mussulmans, and in the midst of the Christian community of the Maronites they enter the Christian

churches and imitate the Christian believers in the use of the holy water. The uninitiated, called Jahils, are exempt from all religious duties whatever.

The Druses have also a distinctive moral code. They have seven commandments, a number taken from the sacred writings of the Moham¬ medans. The following, according to Hamsa, are their seven commandments, or cardinal prin¬ ciples; (1) Truthfulness; (2) mutual defense; (3) renunciation of all other religions; (4) separation from evil spirits and perverse men plunged in error; (5) recognition of the unity of God at all times ; (6) contentment in all labors ; (7) patience in all circumstances. Polygamy is unknown. They are skilful cultivators ; the soil on the terraced hillsides has all been carried, with an infinity of labor, from the valleys beneath. At the end of the 16th century this people began to excite attention in Europe. In 1588 they were made tributary to Turkey by Amurath III ; but in the beginning of the I7th century recovered their independence under the renowned Emir Fakreddin and reached the summit of their power ; but this leader was in 1635 strangled at Constantinople, and although other princes were placed over them, they never recovered their former reputation. They endeavored, in¬ deed, by the assistance of the Russians in 1773, to regain their freedom ; but they were soon obliged to become again dependent on the Turks. Troubles have more than once broken out between the Druses and the Maronites, their neighbors. An outburst of this kind occurred in 1860 and fearful atrocities were perpetrated upon the unhappy Maronites, who, however, seem to have been also aggressive. About 12,000 Maronites were killed and a large number were driven from their homes. A French force was

sent out and tranquillity was restored. Disturb¬ ances occured also in 1895-96.

Consult Bell, ˆThe Desert and the Sownˆ (London 1907) ; Churchill, ˆThe Druses and Maronites under Turkish Ruleˆ (London 1863) ; Ewing, ˆArab and Druse at Homeˆ (London 1907) ; Oliphant, ˆLand of

Gilead^ (London 1880).

DRUSUS, Nero Claudius, Roman general: b. 38 B.c. ; d. 9 b.c. He was the first Roman general who penetrated the German Ocean. He became praetor (11 b.c.), but returned in the next spring to Germany, subdued many tribes as far as the Weser, and commenced the erection of fortresses. On this account he was appointed proconsul ; the army saluted him with the title of imperator, which was not, however, sanc¬ tioned by Augustus. In 9 b.c. he was made consul, but returned soon after to Germany, and penetrated as far as the Elbe. The canal uniting the Rhine with the Yssel (fossa Drusi) was his work; and the place called Drusenheim, in Alsace, where he encamped for some time, received its name from him.

DRUZHININ, droo'zhe-nm, Alexander VasiMvich, Russian critic and man of letters: b. 8 Oct. 1824 ; d. 1864. He received his early education in his father's home where he acquired a solid knowledge of foreign languages. At the age of 16 he joined the Page-Corps where he spent his free moments in writing humoristic verses depicting scenes of the school life. After graduation he was sent to the garrison in Fin¬ land but military life did not agree with him and, in 1851, he resigned and dedicated himself entirely to literature. His first attempt in the field of fiction ^Polinka Sachs^ (1847) was a masterpiece which had a brilliant success. En¬ couraged by that triumph the young author pro¬ duced in rapid succession three novels: ^The Story of A. Dimitrievich,^ ^Fraulein Wil-helmine^ .and ^Zhyuli.^ Soon afterward he be¬ gan writing criticisms in his famous ^Letters from an Out-of-town Subscriber^ which, al¬ though written in a humoristic and jocular tone, were eagerly read and earned for him the repu¬ tation of the greatest critic of his time. In 1850 his very humoristic work <A Sentimental Trip of Ivan Chernokozhnikov^ produced a scandal in the literary circles of the capital, but nevertheless gained great popularity for its author who often afterward took ^Chernokozhnikov (the ^Red-Skinned 'one^) as his favorite pseudonym. As editor of the magazine Bihlioteka Dlya Chteniya, he translated maga¬ zine dramas of Shakespeare and wrote a num¬ ber of essays on English literature. As a novelist he is profuse, verbose and heavy and shows a powerful, though not beneficent, in¬ fluence of English master novelists. But as a critic he is a stubborn defender of the ^^purely artistic^^ in literature condemning the didactic element which prevailed in a large measure in the Russian literature of his time. He asserts that the author's creation wing is criminally cur¬ tailed by a vain desire to educate his readers. By means of his elegant tone, unimpeachable im¬ partiality, subtleness and astuteness, he obtained even from his adversaries the epithet of ^^honor¬ able knight.® Consult Starchevski, A. B.,

ˆNabludatel,ˆ (1885, Nos. 4 and 5) ; Kip-richnikov, A. L, Hstorich, Vyestnikˆ (1884, No.

4).

DRY CARBON PROCESS OF ARMOR PLATE. See Armor Plate.

DRY DOCK. See Dock.

DRY FARMING. The phrase «dry farm¬ ing® is a misnomer, for it implies the growing of crops without the use of water, which is alto¬ gether impossible. But in United States terri¬ tory west of the 97th meridian, in that region once familiarly known as The Great American Desert, the phrase is popularly used to describe all those efforts that are made to produce crops without irrigation.

Dry farming is the careful culture of the soil to the end that as large a percentage as possible of the moisture that falls be made available for the growth of the plant, instead of passing off into the atmosphere by evaporation.

The assumption behind dry farming is that moisture sufficient falls, if it can be conserved in the soil, to produce a great variety of crops where it is commonly supposed that precipita¬ tion is inadequate to supply the moisture needed, by a growing crop.

It has been demonstrated after many years of experimental work in places widely scattered in what is known as semi-arid America that a very large percentage of the moisture that evaporates from the soil can be conserved by intensive cultivation of the soil. If the soil is tilled intensively 12 inches of precipitation are sufficient in the semi-arid portions of the United States to produce crops adapted to a particular locality. Over a very large portion of the semi-arid area of America the annual precipitation ranges from 12 to 24 inches.

The importance of dry farming in the eco¬ nomic development of the western part of the United States may be appreciated when it is known that more than one-third of the total land area of the nation is contained within the area once known as The Great American Desert and now called semi-arid America. There are upwards of 600,000,000 acres in this region, a goodly portion of which can be made useful for agriculture by now known methods.

There was formerly a popular idea to the effect that precipitation in

what is known as the semi-arid regions of the United States was not sufficient to make agriculture possible and profitable. This idea is erroneous. Over more than half the total semi-arid area — the north¬ ern half — the annual precipitation in form of both rain and snow is sufficient, when coupled with intensive soil culture and seed selection, to make general farming as great a success as it now is in the great prairie states of the Middle West.

Summer Culture. — The purpose of sum¬ mer culture is to store up in the soil one sea¬ son's moisture before a crop is planted, though it does not follow that no crop should ever be planted on newly-broken prairie. In fact a crop of peas does very well on such land and the same fall a crop of wheat may be planted with excellent results, if surface cultivation is carried on the following spring before the wheat is very high.

If the field is summer tilled for the purpose of storing moisture,ˆ it should be plowed again about eight or nine inches deep. This time the plow should be followed by an implement with wedge-shaped wheels turning on an axle known as the subsoil packer. It presses the soil down-

ward and sideways at the same time, but it does not pack the surface. It leaves this loose and open and the harrow completes the work of creating the soil mulch again.

This sub-surface packing is regarded as very important. All water moves in the soil as oil moves up a lamp wick, by what is known as the process of capillarity. If the solid soil column is interrupted or broken by large air spaces be¬ neath the surface, the movement of th- e moisture will be interrupted, and large air spaces in the subsoil tend to increase the evaporation, for they suck up the moisture from below.

It is not considered absolutely necessary to the success of dry farming to summer till for one whole season in advance of planting a crop as outlined here. But unless the farm-er in¬ tends to devote himself assiduously to the cultivation of the acreage which he plants after carefully preparing the seed bed, it would be far better to summer till — that is, produce no crop the first season but harrow the ground fre¬ quently and store the moisture that falls.

Fundamental Principles. — The principles that have been developed have undergone an evolution. It was at first believed by many that spring plowing was most advantageous, so as to open up the soil for moisture, but it developed that the best results were had by fall plowing, which allowed the snow and water to gather and lie in the furrows through the winter, and to follow with regular cultivation in the spring, especially after rains. It also developed that deep plowing secured better results than shallow plowing, and that the sooner after harvest the plowing was done, the more moisture was con¬ served.

As soon as the crop is harvested, in fact on the same day, the stubble should be disced so as to again create a mulch and check evapora¬ tion from below. When a hot July sun falls upon the open surface of a grain field that has been protected by the grain itself from the sun's direct rays for so long, the rapidity with which moisture leaves the soil and is absorbed by the atmosphere is incredible. As soon as possible aher the work of discing has been completed the field should be plowed to a depth of eight or nine inches, the sub-surface packer

again brought into use, the surface harrowed, and the crop planted.

Late winter seeding is now strongly urged, and is becoming the established practice. It has been demonstrated that thin seeding is far bet¬ ter than strewing plenty of seed, on the theory that the plants, having scanty moisture to draw upon, should not be crowded.

In western Kansas and Nebraska and east¬ ern Colorado and northern New Mexico fall wheat should be sown from the 1st till the 20th of September. Early the following spring the field should be harrowed several times till the wheat is large enough to shade the ground well. A light steel frame harrow with levers to ad¬ just the teeth should be used and the teeth should be set so they will lie nearly flat. This work of harrowing will not, as many suppose, destroy the growing wheat plants. ˆ On the con¬ trary, it loosens the surface, increases the rapidity of the movement of moisture to the roots of the plants and checks evaporation at the surface due to the creation of the soil mulch, and at the same time puts the soil in such condi¬

tion that it rapidly drinks in whatever moisture falls. For it is apparent that a much larger percentage of a rainfall will enter into the sub¬ surface of a field when the surface is loose than when it is hard and packed.

Experiment Stations. — The United States Department of Agriculture has established a series of experiment stations for testing methods and problems connected with dry farm¬ ing; several of the semi-arid States have made appropriations for assisting the work; the Agri¬ cultural Colleges have lent their aid and ad¬ vice; and a number of the great western rail¬ way companies have contributed funds to as¬ sist the scientific study of farming in these regions where the rainfall is slight and where artificial irrigation is impracticable. The dry farming experiment stations are increasing in number, as their value is shown. Utah has six, supported partly by the State and partl}ˆ by the Federal government. It costs about $3,000 a year to run a station, which is virtually a small farm, managed by an educated man, usually a graduate of an agricultural col¬ lege, whose time is devoted to whatever lines of experiment are laid out for him. The Depart¬ ment of Agriculture, which guides the work of these experiment stations, bends its energies mainly to soil management, cereal investigation, plant breeding, meteorological research, soil moisture determination, and bacterial studies. The bureau of plant industry has been of great assistance, and the more hardy cereals have been determined, and are

generally utilized. Very numerous tests have been made of foreign cereals, known to do well on poorly watered soils.

Those types of seed that have proven themselves drought-resistant are selected. What is known as the durum wheat, imported from the semi-arid regions of Russia, or the turkey red winter wheat, are the varieties that thrive best. Kherson oats, bald barley, emmer, proso, brome grass and native blue stem are all es¬ pecially well adapted to the soil and climatic conditions that prevail west of the 97th meridian.

To protect crops in flat regions, Gifford Pinchot strongly urges the planting of several rows of trees at intervals as windbreaks. This tends to decrease evaporation in the vicinity as well as affording a safeguard in heavy wind storms.

The following out of the theories thus scientifically developed has accomplished splen¬ did results in Utah, Colorado and Montana, where there are large areas of unirrigated lands that have been utilized by dry farming methods. A great deal of land, formerly held to be un¬ saleable, or offered at the nominal price of 50 cents or $1 an acre, has risen in value to $5 and $10 an acre simply because of the dernonstration of successful dry farming in the vicinity. In Colorado, with only a foot of annual rainfall, the 1915 wheat crop was over 12,000,000 bushels, the corn crop was nearly as great, and the oats production attained 12ˆ600,000 bushels, while the hay crop of 2,238,000 tons was worth $17,- 000,000. Utah, with 16 inches of rainfall, has an annual production of over 8,000,000 bushels of oats and $8,500,000 worth of hay. Montana, with a rainfall of 13 to 19 inches, produced in 1915 26,000,000 bushels of oats and nearly 31,-

000,000 bushels of wheat, besides over $15,000,- 000 worth of hay. Such results speak volumes for intelligent methods.

Dr. John A. Widtsoe, president of the State Agricultural College of Colorado, and author of the arid-farm law of Utah, advises that profitable farming by dry methods should be possible anywhere with 12 or more inches of rainfall. He is a strong advocate of deep plowing in the fall, and emphasizes the im¬ portance of cultivation of the soil in the early spring and after every rain, in order that the moisture may be well distributed and carry the plant food where it can be reached by the young rootlets. He mentions wheat, oats, bar¬ ley, rye and lucerne as the crops that yield best returns on dry soils.

A few years ago the government of British South Africa sent William Macdonald on a tour through the semi-arid regions of the United States to study dry farming, and report whether the methods used here were applicable to South Africa, where there is much semi-arid land. Mr. Macdonald was intensely impressed with the accomplishments here, and wrote an en¬ thusiastic report to his home government, com¬ mending the holding of annual dry farming congresses as is done in the States ; advising the establishment of five dry farm experiment sta¬ tions in Pretoria, modeled after the American stations ; ana urging the scientific study of crops suitable for South African soils.

DRY-GOODS TRADE, American. The

beginning of the dry-goods trade in America dates from the time when the first colonists landed upon American shores, for it was not long after the first effort toward the settlement of this country was made that the demands for trading facilities resulted in the opening of the first store. So far as the actual trade in Amer¬ ican textiles was concerned it is difficult to say just when or how it commenced, but as it is impossible to imagine any time when people who had been used to the advantages of civilization would not have felt the need of a place to pur¬ chase some kinds of dress fabrics, it is pretty safe to say that the original American shop¬ keeper was soon compelled to add such mer¬ chandise to his stock in trade, even if it did not figure in his opening announcement. Of course, in those days all stores were general stores, and merchants handled, or tried to handle, every

article for which there was any great demand. As the result their stock was of a most incon¬ gruous character. There wer-e cottons and silks from India; there were velvets and woolens from various parts of Europe, and, side by side with the most costly articles known to colonial commerce, there were groceries, hardware, *etc.*

In the early days of the colonies, and even for many years after the settlement of the coun¬ try had assumed quite respectable proportions, but little cloth was manufactured in America. The textile trade, such as it was, was almost entirely of an import character. In the begin¬ ning the retail dealers arranged for consign¬ ments of their own, and they were naturally of small value, but soon the wholesale merchant became the importer.

So far as actual wearing apparel was con¬ cerned, the greater part was made by the people in their homes. The men of the households raised the flax or wool, which was carded, spun.

and woven at home, for, at that period in our history, the distaff, the spinning-wheel, and the hand-loom occupied an important position at every well-regulated fireside. Moreover, it was by no means uncommon for the same hands that made the cloth to fashion the home-made fabrics into clothing for the use of the several members of the family. It was only the rich or more prosperous members of the community who were able to import their wearing apparel, to say nothing of their bed and table linen, and some years had passed before the customs tailor had assumed a position of any considerable commer¬ cial importance. Nowhere in America was the cultivation of cotton made a matter of much attention, and, when its manufacture in anything like an organized way began, it was, as in the case of wool, confined to a few establishments of crude construction and operation. They pro¬ duced certain kinds of fabrics, it is true, but the only importance that they can have for us to-day lies in the fact that they marked the beginning of the great industries which have since been developed.

Really to comprehend the fact that the great textile industry of our own time is a matter of comparatively modern development it is only necessary to remember that the inventions of Hargreaves, Arkwright, Paul, Crompton, and Cartwright, had scarcely become known in this country at the close of the 18th century. At this time our home products were confined to a few coarse woolen cloths ; a few laces, and some sundries, in silk, and nothing more than coarse sheeting and

toweling in linen. In fact, during the 18th century, even our imports of foreign textiles were of most moderate proportions, be¬ ing scarcely more than double the value of the home products, for it was not until some time after the close of the Revolutionary War that American imports of textiles began to show any marked increase in value. Prior to that time the value of the dry-goods imported from other countries ranged from $24,000,000 to $26,000,000 per annum, while the domestic product show'ed an annual value of between $12,000,000 and $13,000,000. Of course, the greater portion of this output represented the goods manufactured in the households of the country, very little of which ever appeared in the merchants' stock.

Comparatively populous as some sections of the country were, the village stores outside the centres of trade, were few and far between. Having but little demand for anything like costly grades of goods, the only textile products which they sold were the coarser textures in woolens, cottons and linens and these, with the usual supply of buttons and thread, were closely associated with the sale of rum, molasses, gro¬ ceries and some few articles of hardware. Peo¬ ple living in the small towns that were located upon the banks of the inland streams seldom had greater trading facilities than those that were offered by the flatboats which visited them from time to time with stock which was similar in character to that of the village stores. Ped¬ dlers also went through the country, thus af¬ fording the scattered inhabitants of the interior an opportunity to make some few purchases from their rneagre stock of wares.

In the cities, of course, there were both wholesale and retail dealers in the various com¬ modities. The wholesale establishments not

only imported such articles as were in most de¬ mand, but dealt in those products of home man¬ ufacture upon which they might realize the greatest profits. The shops of the retail deal¬ ers, however, resembled the country stores in that they sold almost everything that any cus¬ tomer might demand. It was only in the more pretentious establishments of the larger cities that there was any apparent tendency toward separate classification, in one or two instances dry-goods and notions being sold to the exclu¬ sion of everything else. In one sense of the ■vword these conditions were largely due to the circumstances of the people. The custom of supplying as many of their wants as possible by the use of articles manufactured at home naturally reduced the sale of shop-made prod¬ ucts, while the habit of trading by barter, in¬ stead of for cash, also had a tendency to retard the development of any large retail establish¬ ments.

During the five-year period prior to 1800, the imports of foreign merchandise paying ad valorem duties into the United States aggre¬ gated $212,000,000, of which the textile imports represented about two-thirds. New York then, as now, was the chief importing city of the country, and the kind and character of the im¬ portations were cottons, woolens, silks, velvets, linens, laces, edgings, hosiery, gloves and shawls, including damasks, dimities, callimancoes, du-rants, tabarets, platillas, listadoes, mamoodies, gurrahs, cossas, baftas, russets, satinets, duffels, britannias, *etc.* These goods came chiefly from India and China, and from the cities of Amster¬ dam, Hamburg, London and Liverpool, and the most important importing houses in New York were those of Bethune & Smith, Murray's Wharf; John Knox, 97 Water street; McCready & Reid, 97 William street ; Hector & Scott, 125 Pearl street; John & William Tabele, 260 Pearl street; Benjamin I. Moore, 103 William street; Charles J. Vogel & Company, 92 Maiden Lane; Richard & John Thorne, 141 Pearl street; Wil¬ liam Blackstock & Company, 163 Pearl street ; A. S. Norwood, 127 William street, and Robert & John Sharp, 93 Maiden Lane. Of these firms, A. S. Norwood dealt extensively in car¬ pets and rugs, besides handling dry-goods more largely, perhaps, than any other house, while, among the other firms that sold dry-goods in connection with other foreign

and domestic commodities, one must mention those of Archi¬ bald Grade, 52 Pine street; James Stuart, 10 William street; Eben Watson & Company, 36 Old Slip; Ferguson & Crichton, 84 Broad¬ way; Rogers & Lambert, 232 Pearl street; H. G. Rutgers & Company, 145 Pearl street; Rutgers, Seaman & Ogden, 93 Front street; Thomas Buckley, 241 Front street; Suydam & Wyckoff, 21 South street; Robert Weir & Com¬ pany, 16 Gold street; John Knox, 97 Water street; Thomas Warren, 61 Maiden Lane; John McGregor, 84 Broadway; as well as Minturn & Barker, Thomas Napier & Company, Robert Lennox, Frederick de Peyster, Gouverneur & Kemble, John Murray & Sons, and others.

The 15 years that elapsed between the beginning of the century and 1815 witnessed some trying ordeals for the trade and industrial interests of this country. These troubles began with the French complications ; they were accen¬ tuated by the Embargo and Non-Intervention

acts, and they finally culminated with the war with Great Britain. With such restrictions upon our import trade, the wholesale business of the country stagnated, but, as was quite nat¬ ural under such conditions, the effect had a tend¬ ency to foster our home industries. In 1803, our trade interests, both at home and abroad, were seriously influenced by the panic in Great Britain. In 1804 the first consignment of American cotton was made to Elijah Warren, of Philadelphia, Pa., by Almy & Brown, of Providence, R. I., and the former at once be¬ came their agent for yarns and thread, and finally, for stripes, plaids, checks, tickings, ging¬ hams, *etc.* During the next two years, however, the value of domestic cottons, produced by the New England factories and sold in Philadel¬ phia, amounted to only $17,670.

When the Embargo went into force, in 1807, our foreign trade, as a matter of course, was almost entirely suspended. At this time, how¬ ever, there were not more than 4,000 cotton spindles in use in the entire United States, for progress in this line of industry had been slow. Before the close of the year, however, the num¬ ber had doubled, and, by 1809, there were no less than 17 mills in operation in Providence, R. I., with 2,296 spindles, producing fully 510,000 pounds of yarn. About 1,000 looms were also in operation weaving cotton cloth.

The census report for 1810 gave some very clear evidence of the more or less rapid ad¬ vancement that had been made in all the branches of the textile industry, especially in the manufacture of cottons and

woolens. Ac¬ cording to the report of the Treasury Depart¬ ment, the American product in cottons and woolens, exclusive of clothing and other goods, amounted to scarcely less than $46,000,000, in 1810. Eli Whitney's invention of the cotton-gin had effected such a change both in the pro¬ duction and manufacture of cotton that it had suddenly become one of the nation's leading products.

During the period immediately following the war with Great Britain the importation of for¬ eign goods increased so enormously that the market was not only glutted, but both the cotton and the woolen industries were paralyzed. In fact, so great was the fall in prices that many of the leading importers were almost ruined, while there were but few merchants who were not seriously handicapped by the general stagna¬ tion in nearly every line of trade. While this condition of affairs was partly due to the result of the war and the sudden reopening of our ports to foreign trade, this was by no means the only or most serious influence which was at work. To tell the truth it is necessary to admit that the business woes of the republic were largely the result of a combined effort on the part of the foreign manufacturers to gain con¬ trol of our markets. The reopening of Ameri¬ can ports had given them the opportunity for which they had long been making preparations. The ad valorem rates of duty which then pre¬ vailed were low, and they seized the chance to unload the surplus stocks, which they had been quietly accumulating, upon the markets of the United States, with a view to crippling its tex¬ tile mills and thus securing the trade of the country. The plot, serious ˆ as its effect was upon American business affairs, was successful.

not only for the time, but for several years suc¬ ceeding 1815.

The census reports for the decades ending with 1820, 1830, 1840 and 1850, give little useful evidence respecting the advancement in the tex¬ tile industries. We may judge that it was both steady and gradual by the record given of the increased production of the spindles and looms of the country, especially so far as cotton and woolen products were concerned, but it was not until the year 1850 that these manufactures reached the point at which it was possible to plan for a broader national and industrial de¬ velopment. Many important processes andˆ in¬ ventions were also perfected during this time. Among these innovations there was the sewing machine, the power-loom, the knitting machine, and several other labor-saving devices which had a marvelous effect upon the future growth of the textile interests.

The history of American industries during the first half of the 18th century is a record of almost countless vicissitudes for which such events as wars, panics, financial depressions, conflagrations, and other adverse conditions were responsible, but, instead of being discour¬ aged by such experiences with unavoidable misfortunes they seem to have had a tendency to spur the manufacturers and merchants to more united efforts. In the latter years of this period the inauguration of improved methods, not only in the matter of manufacture, but also in the distribution and sale of all products, tended to bring about a finer classification of goods than had hitherto been carried out, and, for the first time in the history of trade in this country, both the wholesale and the retail dealer began to make more or less separate distinctions in the goods which they sold. Importers and wholesale dealers began to handle special or distinct lines, such as silks and dress-goods ; cloths, coatings and cashmeres; notions and small wares ; hosiery, underwear and gloves ; laces and embroideries ; white goods and linens ; or hats and caps. Gradually, moreover, the same well-defined distinctions came to be rec¬ ognized by the retail trade in the cities, al¬ though the stores in the various towns and vil¬ lages throughout the country continued to fol¬ low their original policy of carrying a miscel¬ laneous stock of merchandise. The inception of the clothing trade, and, later, of the ready¬ made articles for women’s and children’s wear, helped to make the classification still more minute, while the inauguration of the commer¬ cial traveler system, and the

general utilization of the commercial agency which followed, were important factors in helping to bring about the new conditions, the dawn of which was heralded in 1850. In this year the value of our cotton and woolen products amounted to fully $112,- 000,000, while the total output of our combined textile interests aggregated $129,000,000. At this time our imports of foreign dry-goods ap¬ proximated $59,000,000.

There were, of course, several factors which played a part in that betterment of conditions that began to be apparent about the middle of the century. The opening of the South and West, the establishment of new towns occa¬ sioned by the institution of new industries, and other evidences of prosperity, resulted in a larger and more diversified demand upon the

manufacturers. Prior to 1850, practically no domestic commission business had been done in New York. Transactions of this kind had been confined to Boston, Baltimore and Philadelphia. The bulk of the product of the New England mills went to Boston. Philadelphia, which had some 20 commission houses engaged in the sale of domestic goods, was the chief market for that product which was then designated as ®blue goods,® and which included denims, checks, stripes, *etc.* At this time large quantities of dry-goods were also sold at Hartford, Conn., but New York, which had always been the centre for imported goods, was not recognized by the domestic commission houses until the early fifties, when some of the Boston estab¬ lishments opened branch offices in that city. Immediately, however, these offices sprang into such importance that it was not long before they were doing a greater bulk of business than the parent houses, and it was due to this reason that, one by one, the great Eastern mills began to open regular agencies in New York. In those days New York was so confined as to area that there were no retail houses above Howard street, and all the wholesale and jobbing busi¬ ness was conducted further down town, largely on lower Broadway, Cedar, Pine, Liberty, and Broad streets.

In the memorable panic of 1857, when all the business interests of the country were paralyzed, the dry-goods business was one of those that suffered the most severely. The trouble started with the failure of the Ohio Loan and Trust Company, on 27 August, and it attained its most serious proportions in the month of Oc¬ tober, when the numerous failures and the hair¬ breadth escapes from ruin tried men's souls as well as their bank accounts.

According to the reports for 1860, the im¬ ports of dry-goods into the United States amounted to a little more than $112,000,000, while the total value of our own textile manu¬ factures were about $215,000,000. Compared to the figures for 1795, the former had increased nearly fivefold, while the latter was almost 18 times greater.

Then came the outbreak of the Civil War, and, during that memorable struggle for the preservation of the Union, the dry-goods inter¬ ests were again affected. Beginning in Decem¬ ber 1861 the value of cotton goods continued to increase, until, at the end of two years, the price of such products had risen nearly 300 per cent. The year 1863 showed a still sharper rise, and the increase in price culminated in the fall of 1864, when the average increase in the cost of cotton goods had attained a mark of nearly 1,000 per cent. Even raw cotton, in April 18ˆ sold at $1.90 per pound. In Europe this period is still remembered as the «days of the cotton famine,® for shipments of this-staple from the United States had been almost entirely sus¬ pended since the beginning of the conflict be¬ tween the cotton-using North and the cotton-producing South.

Lee surrendered on 9 April 1865, and bv 30 June the price of cotton had fallen to 40 cents per pound. So far as manufactured cottons were concerned, however, no proportionate de¬ crease in price was shown for some time. In October cotton was quoted at 64 cents per pound, but the price of prints, sheetings, etc.,

had fallen less than half from the price that had been current for them in 1864. It was dur¬ ing this year that one dry-goods jobbing house distributed goods broadcast throughout the country to the aggregate amount of $72,000,000. In 1870 the imports of dry-goods amounted to only $98,290,000, an increase of fourfold over the record for l795, while the aggregate product of the home manufacturers wˆas $520,000,000, or an increase of nearly 2,500 per cent.

There are several reasons that might be cited to explain why the dry-goods industry did not show a corresponding increase during the next decade in the history of the country. In the be¬ ginning, it must be remembered that American manufacturers were compelled to face some very serious vicissitudes. The period imme¬ diately following the war was a most uncertain one. Moreover, the increased production of the country, to say nothing of the improvement and cheapening of the facilities for manufacture, naturally had a tendency to bring about a de¬ cline in all classes and kinds of textile prod¬ ucts. Thus, while there was really a note¬ worthy increase in the quantity and variety of America's manufactures, the value of the out¬ put indicated but little augmentation. In 1880, therefore, the value of our textile products was but about $533,000,000, an increase of less than $13,000,000 over the record for 1870, w'hile the importations of foreign dry-goods amounted to almost $136,000,000, or an increase of nearly

$38,000,000.

It was during the next few years that the dry-goods industry began to attain a more stable position in the commercial world, and, with better financial conditions and more mod¬ ern methods, not only in the manufacture, but also in the art of transacting business, the growth of these interests was a steady record of prosperity. That it has since attained to con¬ siderable proportions one may easily discover by reference to the later census reports, for the value of the American output, which, in 1890, was $1,261,672,504, by 1900 had attained the still more enormous figure of $1,637,484,484.

In this review of the history of one of the nation's greatest industries, only the textile branch of the subject has thus far been consid¬ ered, whereas the dry-goods merchants of to¬ day handle a multitude of articles that cannot be included in this classification. In fact, the disposition that has been shown by the large retail houses to buy and sell promiscuous mer¬ chandise, intermixing dry-goods proper with many different lines of trade, makes it almost impossible to secure anything like exact figures respecting the value of the annual distribution of wares through these sources. The latest census report divides the American manufac¬ turing industries into 363 distinct classes, and, of these, fully one-sixth enter into the province of the modern dry-goods business.

The present tendency of the trade is away from the designation *dry goods. The United States census no longer makes returns under this title. The old-time dry-goods stores have developed into department stores, and the smaller concerns are notion stores, while men's clothing and women's cloaks and suits are sold in stores and by mail without any thought of being a part of the dry-goods trade. In the 1903 edition of this encyclopedia it was noted

that the number of dry-goods stores then was decreasing, and the decrease continues. Trade grows but it differentiates and much of it is no loneer denominated dry-goods. True, there are prosperous dry-goods journals, but the name is becoming a misnomer for them, as the}'^ are developing into costume journals, supported by the advertising mainly of manufacturers of all classes of apparel. The day of buying goods by the yard over the counter for household use, which characterized the dry-goods stores of the seventies, is gone. Nearly all textiles and fab¬ rics are now made up in factories and sold as the completed articles. There are still a few old-fashioned people who go and pick out the goods and have them made up to order, but the multitude like to buy made-up goods, be¬ cause they can see the finished article and can get it quickly. Because of the tremendous expansion of business and of new methods of manufacture and sale; because of the scientific development of advertising and frequent changes of styles ; and because of the vastly increased number of wants of modern civilized humanity, the dry-goods trade is being lost in a mutiplicity of subdivisions, and as an entity appears to be doomed, just as wet goods, as a designation of a class of business, has disappeared. See Clothing Industry ; Cotton ; Carpet and Rug Industry; Textiles; Lace; Loom ; Silk ; Weaving.

DRY PILE, a very interesting form of gal¬ vanic battery, invented by De Luc, so named from the fact of its requiring merely a slight moisture among its leaves. Various kinds of dry piles are constructed. A very excellent one, Zamboni's dry pile, is made in the follow¬ ing way: Some sheets of ^^silver® paper, cov¬ ered on one side with zinc foil, are moistened on the back with honey or glycerine and water, and then rubbed over with very finely-powdered black oxide of manganese. These are laid one on the top of the other, the silvered side of one being in contact with the oxide of manganese of the next. They are then cut with a punch into discs of about an inch in diameter and they are put into a glass tube, care being taken that the order just mentioned is preserved. The tube is varnished with shellac inside and cut and is fitted at each end with a brass cap through which passed a brass piston which is set down firmly against the paper discs in the tube and furnished with an outer knob. From 1,000 to 2,000 discs may be used. The knob at the oxide-of-manganese end will be found posi¬ tively electrified, the other negatively. A pile containing 2,000 discs will charge a Leyden jar. A pile of 40,000 discs was strong enough to emit a succession of sparks three-fiftieths of an inch in length, to charge a Leyden jar of 50 square inches capacity, and thence to fuse one inch of fine platinum wire. The honey wdth which the paper is saturated is intended for a hygrometric substance. If the pile be care¬ fully kept it will preserve its power for many years. A pile of this type with 20,000 discs has kept a pendulum vibrating between two bells so as to keep up a perpetual ringing for several years. If it be artificially dried it loses it, but will frequently regain it when a sufficient amount of moisture has been absorbed from the air. Its action is similar to that of a galvanic batter}^ but seems to have no chemical

effect, as saline solutions subjected to its cur¬ rent for several days remain unchanged ; and the most delicate vegetable coloring matters are unaffected. An examination of the pile shows that it resembles a conductor, neutral at the centre, one extreme negative and the other posi¬ tive. The activity of the instrument is in¬ creased by artificial

heat and is more marked in summer than in winter. The principle of the dry pile is made use of in Bohnenberger's elec¬ troscope. Two short dry piles are set side by side an inch or so apart, with opposite poles uppermost, the whole being covered with a bell glass. Through the top of the bell glass passes a rod having a knob at its upper extrem¬ ity and a strip of gold leaf at its lower end, hanging between the poles of the dry piles. Then any substance even feebly electric is brought close to the knob, the gold leaf in¬ stantly announces its electrical nature, whether positive or negative, by flying to the pile which presents the opposite phase 6f electrification. This electroscope is regarded as more sensi¬ tive than any other. See Electric Battery; Electricity; Electric Storage Battery.

DRY POINT, a sharp-pointed steel needle or instrument used by engravers to incise fine lines directly upon the copper plate without first coating it with etching-ground. The dry point does not cut into the metal but divides it, form¬ ing a sort of furrow with elevated ridges on each side. These are afterward scraped off where the effect is to be gray, but left standing for strong velvety blacks. This tool is much employed in working the more delicate portions of etchings or in making whole pictures on copper, called *dry-point® etchings, and very frequently also as a retouching tool on acid-bitten plates.

DRY POINT ETCHINGS. See En¬

graving.

DRY ROT, a popular name for the decay of seasoned timber and for certain forms of decay of the trees while still standing. The latter kind is caused mainly by species of shelf-fungi and toadstools, which also attack the stumps of various trees. Sap rot (Polystictis versicolor) is the most serious of all, destroy¬ ing 75 per cent of railroad ties in use. Eco¬ nomically, the former kind is the more import¬ ant, since it attacks timber after it has been put in place in buildings. In such cases the floors or walls may collapse with more or less damage to property, if nothing worse. The fungi producing this kind of dry rot are species of the genera Polyporus and Merulius, which produce similar effects. The most common is M. lacrymans. The spores germinate in the presence of moisture and the branching threads (mycelium) penetrate as far as thg wood is moist, later spreading into broad sheets and completely destroying the fibre of the wood. The fungus is at first white but later turns brownish-red, producing what is called ®red-striped® timber. Drying only temporarily checks growth, for when moisture again reaches the wood the fungus recommences its work of destruction. The wood exposed to frequent changes of moistening and

partial drying is most susceptible. But if properly seasoned and then protected by antiseptic treatment or good paint, will be exempt unless the fungus

has already gained entrance. In floors and walls only dry and non-alkaline sound-deaden¬ ing substances should be used, since these do not favor the germination and growth of the spores which may be present. Both Merulius and Polyporus are classed with the poisonous fungi.

DRY TORTUGAS, tor-too'gas, Florida, a group of small coral keys or islets, 10 in num¬ ber, at the western end of the Florida Keys, in the Gulf of Mexico, about 70 miles from Key West, lat. 24° 36' N. ; long. 82° 54' W. The principal keys are East Key, Bird Key and Loggerhead, and are a part of Monroe County. During the Civil War the Federal government confined prisoners at Fort Jefferson, on one of the islands, and this practice has been con¬ tinued. It also serves as a quarantine station. A marine laboratory has been located at Log¬ gerhead Key since 1904 and the entire group has served as a Federal bird station since 1908. *

DRYAD, in Greek mythology, a nymph of the woods ; a deity supposed to preside over the woods; a wood-nymph. Dryads differ from hamadryads in that the latter were attached to particular trees, with which they were born and died.

DRYANDER, drii-an'der, Ernst, German Protestant theologian ; b. Halle 1843. He re¬ ceived his education at Halle and Tubingen and was pastor of the Evangelical congregation at Bonn from 1879 to 1882. In the latter year he removed to Berlin as pastor of the Holy Trinity church and there attracted wide atten¬ tion through his eloquence in the pulpit. He was appointed court preacher in 1898, life member of the Prussian Upper House in 1901 and vice-president of the Evangelical Ober-kirchenrat in 1907. He wrote ˆPredigten fiber das christliche Lebenˆ (3d ed., 1890) ; and ˆDer erste Brief Johannis in Predigten ausgelegtˆ

(1898).

DRYAS, (1) a famous Spartan, slain by Diana in the Theban War; (2) a genus of rosaceous plants found in Alpine and Arctic regions ; they are small, prostrate shrubs with large white or yellow flowers; (3) a genus

of butterflies, of which one species is D. paphia.

DRYBURGH, the ruin of a Premonstratensian abbey in Berwickshire, five miles from Melrose, on the Tweed, if contains the tombs of Sir Walter Scott and his son-in-law, Lockhart.

DRYDEN, John, English poet, dramatist and critic: b. Aldwinckle All Saints, North¬ amptonshire, 9 Aug. 1631; d. London, 1 May 1700. His family were landed gentry, of Puri¬ tan affiliations. He was educated at West¬ minster School and at Trinity College, Cam¬ bridge, where he probably continued in residence until 1657. He then settled in London, which remained his home until his death. His life is exclusively that of a man of letters, and may be divided into three periods: 1657ˆ1, 1681-88, 1688-1700. In the first of these he is primarily a dramatist, in the second a satirist and con¬ troversialist, in the third a translator.

Dryden's first known work, a stilted elegy,

ˆ Upon the Death of the Lord Hastings.ˆ pub¬ lished in 1649, is written in a style marked by conceits of the school of Cowley, and with its harsh versification gives no promise of future

power. His real career opened with his resi¬ dence in London, when he began to eke out by literary work the scanty income (about £40) that he inherited from his father. In 1659 he published his ˆHeroic Stanzas consecrated to the Memory of His Highness Oliver, Late Lord Protector.ˆ The author was probably under the influence of his uncle, Sir Gilbert Pickering, who had stood high in Cromwell's favor. In 1660, however, Dryden joined the throng of poets who celebrated the return of King Charles II, and composed his ˆAstrsea Redux> (1660), and his poem, His Sacred Majesty, a

Panegyric on His Coronationˆ (1661). Hence¬ forth he was a consistent royalist, and with the possible exception of a short interval in 1680-81 a consistent member of the court party, until the revolution of 1688. His most important non-dramatic work of this period, ˆ Annus Mira-bilisˆ (1667), celebrates the naval victories over the Dutch and the great fire of London in 1666. Here as in his poem on Cromwell Dryden adopts the four-line stanza of Davenant's ˆGon-dibert,ˆ and shows the influence of Davenant's direct and simple style, to which he adds a vigor peculiarly his own.

After his change of politics Dryden formed new associations. He became intimate with the family of the Earl of Berkshire, and on 1 Dec. 1663 married his daughter, the Lady Elizabeth Howard, thereby gaining a substan¬ tial increase in his income. Scandal, uncon¬ firmed by any decisive evidence, reports that Dryden's bride had been guilty of misconduct, and that the marriage proved unhappy. Dry¬ den's numberless sneers at marriage may be only the reflection of a prevailing fashion ; and surviving letters of his wife show her to have been an affectionate mother. The three sons born to her and Dryden died within a few years after their father, leaving no descendants.

At the Restoration Dryden turned to the drama as the surest avenue of success for a young author. His first play, ˆThe Wild Gallant> (1663), a prose comedy, was a failure; his second, ˆThe Rival Ladiesˆ (1663 or 1664), a tragi-comedy in blank verse, with some scenes in rime, had better fortune. He then collabo¬ rated with his brother-in-law. Sir Robert How¬ ard, on 'ˆThe Indian Queenˆ (1664), a tragedy, or more

strictly a ˆheroic play® ; and encour¬ aged by his success, produced independently a similar play, ˆThe Indian Emperorˆ (1664 or 1665). These ˆˆheroic plays,® the one type of drama in which Dryden excels all other authors, are always written in the heroic couplet, are half operatic in tone, and with no pretense at realism attempt to reproduce on the stage the effect of an epic poem. ˆˆLove and valor,® to use Dryden's phrase, are the subjects of them; and their drawing of character is strongly affected by that of Tasso and other epic poets and by that of the French romances of Calprenede and Mile, de Scudery. These short-lived plays offend our present taste by their artificiality and insihcerity ; in their own time they pleased a public French enough to enjoy exaggerated gal¬ lantry, English enough to endure bombast and to love the sight of single combats and battles on the stage.

Dryden was now, with the possible exception of the veteran Davenant, who died in 1668, the most prominent English dramatist. About 1668

he became a shareholder of the King's Company, one of the two licensed companies of players in London, on condition of furnishing them three plays a year. This gave him an annual income of £350 or £400 until the burning of the theatre in 1672, when the profits of the company were much reduced. Though he did not fulfil his part of the contract, producing little more than one play a year, he apparently enjoyed the benefits of it until 1678, when he deserted his associates and gave his plays to their rivals, the Duke's Company. The great success of ˆThe Conquest of Granadaˆ (1670), his most famous heroic play, probably helped to reconcile his partners to his small production.

Dryden's eminence was now universally rec¬ ognized. In 1662 he had been chosen a member of the newly-founded Royal Society, and his early poems show his enthusiasm for natural science. In 1668 he was appointed to the posi¬ tions of poet laureate, to which in 1670 was added that of historiographer royal : the two positions yielded a salary of £200. At a later date he received an additional pension of £100. But in 1671 his dramas were assailed with keen ridicule in ˆThe Rehearsal,ˆ a witty farce by the Duke of Buckingham and some other writers. In 1673 he was humiliated by the success of a poetaster, Elkanah Settle, with a bombastic play called ˆThe Empress of Morocco.ˆ When Dryden joined Shadwell and Crowne in writing a pamphlet ridiculing this drama. Settle retorted with equally pungent satire on 'ˆThe Conquest of Granada.ˆ By the contest the laureate had

lowered his dignity and had gained nothing. Dryden's ideas were also affected by French critical works publi.shed at this time. Hence in L \ureng-Zebeˆ (1675), his next heroic play, he adopted a more natural style and then abandoned the type altogether. In ˆAll for Loveˆ (1677) he treated in blank verse the familiar subject of Antony and Cleo¬ patra, and imitated with real success the style and character-drawing of Shakespeare, but the dramatic technique of Corneille and Racine. This play remains the masterpiece of Restora¬ tion tragedy, the finest result of the French influence on the English serious drama. Of the plays that followed the most important is ˆThe Spanish Friar> (1680 or 1681), a tragi¬ comedy which has great merits of style and contains Dryden's best comic w'riting.

In 1668 Dryden had published his most im¬ portant prose work, ˆAn Essay of Dramatic Poesy. ˆ This is designed to uphold the repu¬ tation o-f English dramatists and to defend its author's principles of composition. Here and in numerous smaller critical writings, which he continued to publish all through his life, Dryden showed himself a perfect master of his ˆˆother harmony® of prose. In critical work his style has never been surpassed for ease, grace and unassuming dignity. It is of so modern a type that, with the exception of an occasional phrase, it might seem the creation of a great artist of our own day.

Already a man of 50, Dryden has as yet pro¬ duced none of the poems on which his perma¬ nent fame was to depend. In 1681 he turned from the drama, of which he was thoroughly weary, to political satire, and brought all his skill to the aid of the Tory government. After the defeat of the Whigs in their effort to ex-

dude the Duke of York from the succession in favor of the Duke of Monmouth, their leader Shaftesbury was accused of hiˆh treason and in November 1681 his case was brought before the London grand jury. At this time Dryden issued his ˆAbsalom and Achitophel.ˆ In this finest of political satires (written, like nearly all his later work, in the heroic couplet, and containing about 1,000 lines), under the trans¬ parent veil of a scriptural allegory, he gives portraits of the leading politicians of the time, among them his old foe, the Duke of Bucking¬ ham. Absalom represents Monmouh; Achitophel,

” For close designs and crooked councils fit,

Sagacious, bold, and turbulent of wit,”

Shaftesbury himself. Though the poem had a wide sale and probably affected public sentiment to some degree, it failed of its immediate ob¬ ject, since the grand jury refused to indict Shaftesbury. When the latter’s friends had a medal struck to commemorate his liberation, Dryden published a second satire, ˆThe MedaP (1682), hardly inferior to its predecessor. In reply, the Whig poet Shadwell, once Dryden’s friend, assailed him with scurrilous abuse in ˆThe Medal of John Bayes. ˆ Dryden now turned against Shadwell his tremendous powers of invective and in ‘ˆMac Fl’ecknoeˆ secured for him an unpleasant immortality. He closed this series of great satires by some 200 lines contributed to a second part of ˆAbsalom and AchitopheP (1682), by Nahum Tate, in which he again attacks Shadwell and his other enemy. Settle, under the names of Og and Doeg. At about the same time he turned to didactic poetry and in ˆReligio Laiciˆ gave a versified defense of the doctrines of the Church of England.

In February 1685, the Catholic James II ascended the throne. During the same year Dryden became a Catholic. For this conver¬ sion he has been denounced by judges whose opinion commands our respect as a hypocritical time-server. Perhaps he himself could not tell whether he changed his religion from convic¬ tion. Brought up a Puritan, he was by nature a sceptic. His morals were probably little bet¬ ter than those of the dissolute young noblemen whose associate he was proud to proclaim him¬ self. Such a man could have no clinging at¬ tachment to the Church of England. On the other hand, with his strongly logical, scholastic temperament, once he had admitted the element of mystery

in religion, he could find it possible to accept any of the Catholic dogmas. He would probably not have become a Catholic except for the pressure of external circum¬ stances ; on the other hand, in accepting the king's religion he probably was guilty of no moral obliquity. All his work shows a steadily increasing acceptance of the principle of au¬ thority, in literature as in religion. He gained no new offices or pensions as the price of his adoption of Catholicism : whether, without this change of faith he would have been deprived of those that he already possessed, it would be idle to discuss. After the revolution he was steadfast in his adherence to his new faith.

Dryden's conversion bore fruit in ˆThe Hind and the Pantherˆ (1687), his longest original poem. The scheme of the work, a polemic dia¬ logue between the Hind, representing the Cath¬ olic Church, and her adversary, the Panther, or

Church of England, is absurd enough ; but the book contains some of Dryden's best poetry. His defense of his own sincerity shows fervor and pathos, almost sublimity; it is his nearest approach to the ®grand style.

The revolution of 1688 brought ruin to Dry¬ den's wordly prosperity. Already an old man, he was deprived of his salary and his pension and except for a wholly inadequate income from his landed property, was thrown back on his pen for support. He met the situation with dignity, making no attempt to conciliate the new government, but refraining from any at¬ tack on it. He returned to play-writing, on which since 1681 he had done almost nothing. But his latest dramas, though one of them, ˆDon Sebastianˆ (1689), rivals 'ˆAll for Loveˆ in po¬ etic merit, had comparatively small popular success. He found a surer support in work as a translator. This he had begun in 1680 with three pieces in a small volume of ˆOvid's Epis¬ tles,ˆ and had continued by various contribu¬ tions to poetical miscellanies. He now under¬ took, with aid from other ˆeminent hands,® a complete version of Juvenal and Persius, which was published in 1692. Dryden himself trans¬ lated five satires of Juvenal and the whole of Persius, and wrote a long prose preface on ˆThe Original and Progress of Satire,ˆ compiled from Casaubon and other scholars. He next turned to what is perhaps his greatest single achievement, a complete translation of Virgil, which he began in 1693 and which ap¬ peared in a stately folio volume in 1697. This work was hailed with enthusiasm on its appear¬ ance, and has never been superseded as the standard English version of the greatest Latin poet. Dryden's ˆVirgiP has indeed none of the grace,

tenderness and ®high seriousness® of the original; in the ˆBucolicsˆ and ˆGeorgicsˆ it is markedly inferior. But his ˆ.<Eneidˆ is a masterpiece of animated narrative ; the easy, buoyant verse carries the reader forward with no thought of constraint.

In the same year Dryden produced his great ode, ˆAlexander's Feast, > the finest lyric poem of the period between Milton and Wordsworth. He adopts the irregular ˆPindaric® structure made fashionable by Cowley, but transforms it by his own genius. The poem is not easily appreciated by modern readers, who in lyric poetry instinctively look for either the expres¬ sion of moral ideas (Wordsworth), of intense passion (Shelley), or of sensuous beauty (Keats). Dryden gives none of these, but in¬ stead a rapid series of flashlight pictures, each expressed in verse that by its music suggests the scene described. No poem has a more youthful vigor than this ode by the weary dramatist and satirist of sixty-six.

Dryden next set to work on a volume of translations and adaptations from Chaucer, Boccaccio, Ovid and Homer that was published in 1700 under the title of ˆFables, Ancient and Modern.ˆ This last product of his pen has an enduring charm. Here the old poet is a teller of tales in clear, simple, melodious language, such as was not to reappear during the whole century that followed him.

Dryden died on 1 May 1700. After an im¬ pressive funeral he was laid to rest in West¬ minster Abbey, in the ˆPoets' Corner,® near the grave of Chaucer.

After the death of Milton in 1674 Dryden was the acknowledged chief of English men of letters. During the 18th century his fame even increased, so that when Scott wrote in 1808 that Dryden left ˆ<a name second only to those of Milton and Shakespeare,ˆˆ he merely echoed a received opinion. With the rise of roman¬ ticism, Dryden's reputation sank, until to-day he is probably the least read of the greater Eng¬ lish poets ; certainly far less than Pope, with whom it is most natural to' compare him. He indeed lacks the highest poetic qualities. He expresses no great moral or social ideas ; he had little sympathetic or intuitive knowledge of human nature, — hence the comparative weak¬ ness of his dramas, — and no feeling for the beauty of the external world. His greatness is primarily one of technique. He had a sense of style, a literary temperament, an ardent love for good literature, which increased in him with advancing years. Owing to this he gradually developed a poetic diction of his own, which, with its clearness, strength and genuine, though restricted melody, became the model for Pope, and so, directly and indirectly, for the whole 18th century.

As a critic, Dryden is of the highest rank. Himself familiar with contemporary French critics, he did much to introduce their ideas into England. Hence Dr. Johnson terms him ®the father of English criticism, the writer who first taught us to determine upon prin¬ ciples the merit of composition.® Yet, though the founder of English dogmatic criticism, Dry¬ den was himself no dogmatist ; continually shifting his point of view, he can be classed as a disciple of no one school. Unlike his suc¬ cessors, he distinctly recognized that literary ideas are necessarily modified by changing con¬ ditions of time and country. A lover of all the great English poets, he has left appreciations of Shakespeare and Chaucer that in their way have never been surpassed.

In person Dryden was short and plump ; he retained his rosy cheeks until past middle life. He was a man of kindly nature, whom his com¬ panions loved, and whom his enemies hated rather because of literary and political rivalry than for any personal reasons. He is best

remembered not as a successful writer of in¬ decent comedies or as a fierce controversialist, but as a genial old man, enthroned in his great chair at Will's Coffee House as ^^judge of wit.® See Absolom and Achitophel; Alexander's Feast; Hind and the Panther, The; Mac Flecknoe; All for Love.

Bibliography. — Editions: The only com¬ plete edition of Dryden's works is that of Sir Walter Scott (18 vols., Edinburgh 1808 and 1821), re-edited by Professor Saintsbury (Edin¬ burgh 1882-93). Saintsbury retains all Scott's material and makes numerous corrections and additions, but is not always trustworthy in de¬ tails. Of the poems aside from the dramas, there are four easily accessible editions. The most complete is the Cambridge edition, edited by G. R. Noyes (1 Vol., Boston 1909) ; it con¬ tains all Dryden's poems and poetical transla¬ tions, together with about half of his prose es¬ says. The Aldine edition (5 vols.,ˆ London) omits the Aˆirgil,> and the Globe edition, edited by W. D. Christie (1 vol., London 1870, and often reprinted) omits all the translations from

the Greek and Roman poets. These three edi¬ tions are all in modernized spelling; the^^ con¬ tain good notes and biographical introductions : the Cambridge edition includes the essentials of the commentary contributed by Scott and Christie. The Oxford edition, edited by John Sargeaunt (1 vol., Oxford 1910), reprints in the original spelling the poems and poetical translations, except the WirgiV but contains no memoir or explanatory' notes. The ˆVirgiP is included in the World's Classics series (1 vol., London 1903). Saintsbury has edited eight of the best dramas in the Mermaid series (2 vols., London 1904). G. R. Noyes has edited five of the best dramas, with Buckingham's ˆ Rehearsal,ˆ in ˆSelected Dramas of John Dryden > (Chi¬ cago 1910). W. P. Ker has edited the most important prose works in ˆEssays of John Drydenˆ ((Jxford 1900). The text of most of these is also given in Everyman's Library, No. 568. Biography: Sir Walter Scott's ˆLife of Dryden,ˆ in the first volume of his edition, remains the best. Dr. Johnson's (in his ˆLiyes of the PoetsD is still valuable for its admirable criticism. It is best read in the edi¬ tion of G. B. Hill (3 vols., Oxford 1905), the notes to which correct Johnson's frequent errors as to matters of fact. Malone carefully investigated all details of Dryden's life and published the results in the first volume of his edition of ˆThe Critical and Miscellaneous Prose Works of John Drydenˆ (London 1800). His work, itself unreadable, is the foundation of all later biographies. Saintsbury's account of Dryden in the EnglisU Men of Letters series contains good literary criticism. Criticism: There

are notable essays on Dryden by Macaulay, Lowell (in Among My BookD and J. C. Collins (in ˆEssays and Studies,ˆ London 1895). Beljame, in his ˆLe Public et les Hom-mes de Lettres en Angleterre au dixhuitieme siecleˆ (Paris 1883), gives an invaluable ac¬ count of the poet's work as conditioned by his environment. See also Frye, ˆDryden and the Critical Canons of the Eighteenth Centuryˆ (Lincoln, Neb., 1907). A bibliography finds a place in the ˆCambridge History of English Literatureˆ (New York 1912).

George R. Noyes,

Associate Professor of Slavic Languages, Uni¬ versity: of California.

DRYDEN, John Fairchild, American in¬ surance expert : b. near Farmington, Me., 1839 ; d. 1911. He was educated at Yale and entered the insurance business. He founded the Widows and Orphans' Friendly Society in 1873, which was succeeded in 1875 by the Prudential Life Insurance Company. Under his manage¬ ment this company became one of the great¬ est of its kind in the United States. In 1896 and 1900 Dryden was a presidential elector and in 1902-07 was United States senator. He be¬ came interested in several commercial and in¬ dustrial companies and helped to organize the Public Service Corporation of New Jersey. He published some lectures and speeches and the volume 'ˆAddresses and Papers on Life Insur¬ ance and Other Subjectsˆ (1909).

DRYDEN, N. Y., village in Tompkins County, on the Lehigh Valley Railroad, 36 miles southeast of Auburn ; noted principally as a health resort on account of its mineral springs. The Southworth Library is a public institution.

The waterworks and acetyleiie-gas plant are owned by the municipality. The village of Free-ville, noted for the George Junior Republic (q.v.), is nearby. Pop. 709.

DRYING MACHINERY. Drying ma¬ chines and processes have become

very com¬ mon in the industries. Time is always a valuable element in every factory, and artificial dryers supply methods of hastening production. One of the simpler methods of drying is by gravity, as practised in the recovery of metals from slimes, by settling tanks and vacuum filters. Absorption by temporary mixture or contact with a dry, absorbent substance, as sawdust, is accomplished on the blotting paper principle in some trades. The chemist often employs a desiccating substance, as quicklime, placing it in the same vessel, below the sub¬ stance which is to be dried ; large clay articles, as toilet fixtures, are dried on this principle. Condensation by refrigeration is another drying process, illustrated in Gayley's air-drying ap¬ paratus for blast furnaces. (See Blast Fur¬ nace). A familiar form of dryer is termed the hydro-extractor or centrifugal machine. A wet substance, as laundry, is rotated in a basket at high speed, and the water thrown out by centri¬ fugal force. Many sorts of drying mechanisms depend on natural evaporation, mechanically assisted. The atmosphere is capable of taking up moisture to the point of saturation. The more dry air can be placed in contact with a thing in a given time, the quicker will it take up the moisture so that it disappears. Therefore blowers and exhaust fans are utilized to dry wet and moist goods in a great number of manufacturing operations, on the same prin¬ ciple that the old-time washerwoman hung her clothes on a line in the wind. Another method is to move the goods through the air, and con¬ veyor dryers are especially economical when the goods have to be transported to another part of a factory for a following operation. Pressure is in many cases a satisfactory means of drying. It is used in garbage utilization works to expel the moisture, as for making a fertilizer from kitchen refuse.

The application of heat is of course the most natural process of drying, and is made use of in countless ways. The steelmaker heats air in great checkered stoves to assist the operations of the blast furnace with a hot blast ; boilers, radiators, stoves and heaters of practically end¬ less forms are used in the majority of trades for diying purposes. Kilns and roasting fur¬ naces are made with rotating cylinders through which material is passed until the last vestige of moisture is removed. Hot ovens and long heated tunnels are other devices for the same purpose. In both brickmaking and soap manu¬ facture the hot tunnel is serviceable. The papermaker runs the continuous strip of paper from the fourdriner machine between hot calendar rolls to dry thoroughly his product in a few seconds. The lumber dealer is satisfied with storing his lumber in specially constructed buildings where the drying up of the sap can be accomplished in a few weeks or months. Manufacturers of cotton and woolen cloths, bleachers, dr3ˆers and

practically all handlers of textiles have to resort to dryers to hasten their production. The printer has to put dryer in his inks, and keep his pressroom hot and his paper

dry. The brickmaker, cement manufacturer, tilemaker, etc., all depend on kilns of some sort to rid their material of moisture. It would re¬ quire a complete encyclopaedic account of all the manufacturing processes in use to exhaust the details of methods and mechanisms for drying.

DRYOPTERIS, a widely distributed genus of ferns, numbering upward of 500 species, of which more than a dozen are found in the United States, including the male fern. Their only economic use is in medicine. The active principles in the male fern and allied species are filicic acid, aspidin and-other phloroglucin-like bodies. The action is largely on the tape¬ worm, for which parasite this drug is given. Poisonous symptoms sometimes are produced. These are pain, muscular weakness, purging, collapse, and even death. Temporary blindness has been produced by male fern.

D'SA', Manoel Francis Xavier, Portuguese-Indian educator: b. Moira, Goa, 25 Nov. 1874. He was educated in the elementary schools of Moira, also at Mapuga, Saint Xavier's Col¬ lege, Bomba}ˆ Bombay University, and the Papal Seminary, Kandy, Ceylon. He was or¬ dained to the priesthood in 1904, was attached to Gloria Church and has been principal of the Antonio de Souza School, Mazagon, Bom¬ bay, since 1904. He has published ˆDocuments coricerning the Concordat of 1886ˆ (1907) ;

ˆDifficulties Solved concerning Double Jurisdic¬ tion in Bombayˆ (1907) ; ˆHistory of the Catho¬ lic Church in Indiaˆ (Vol. I, 1910). He is a contributor to ˆThe Catholic Encyclopedia,ˆ the Catholic Herald of Calcutta and the Anglo-Lusitano.

DUAL, in grammar, that number or inflec ¬ tion which is used in some languages when two things are spoken of, whilst another number (the plural) exists to express many. The dual in some languages is a firmly-established gram¬ matical form, as in the classical Greek; in other languages it is used only in certain cases with certain words, or only faint traces of it are to be recognized. The Sanskrit has a dual number. Of rnodern languages which have a literature, Arabic is the only idiom which has retained it. The Anglo-Saxon had a dual in the declension of the first and second personal pronouns; for example, wit, we two ; git,

you two ; uncer, of us two ; incer, of you two.

DUAL ALLIANCE. In international poli¬ tics, a league between two nations for the pur¬ pose of combined action in case of political or military necessity. One of the most ancient of dual alliances, still effective, is the Anglo-Portuguese Alliance, dating from 16 June 1373. The most prominent of modern dual alliances was that entered into by France and Russia in 1892 for mutual support in cas.e of any hostile action by other powers. It was a counter¬ move to the ˆTriple Alliance® of 1882 between Germany, Austriaˆ and Italy, which ostensibly was directed againstˆ any possible aggressive action of France or Russia. Other notable dual alliances are the Anglo-Japanese Alliance dating from 1902, renewed in 1905 and revised in 1911 ; the Anglo-French ˆEntente Cordiale® of 1903; and the Anglo-American Arbitration Al¬ liance of 1914. See Alliances.

DUAL PERSONALITY. See Personal¬ ity AND ITS Disorders.

DUAL PURPOSE CATTLE. See Cattle.

pUALINE, an explosive compound con¬ taining 30 parts of fine sawdust, 20 of saltpetre and 50 of nitroglycerin. Also called dualin-dynamite. See Explosives; Nitroglycerin.

DUALISM, the philosophical opinion that the ultimate components of the universe are two in number, or fall into two fundamentally dis¬ tinct classes. In modern times the line of cleavage between the halves of the dualistic world has usually separated the mental from the material. The 17th century view of the uni¬ verse under the aspect of substance naturally caused dualism to assume the form of a belief in the existence of just two fundamental sub¬ stances, mind and matter. This was the opinion of Descartes and of Locke. In the rationalistic school of the Continent as well as the empiricist school of Britain, it soon became obvious that the correspondences between the worlds of mind and of matter, as exhibited in experience and conduct, were not subject to an easy explanation on the basis of the existing type of

dualism. Accordingly the continental rationalism was either forced, as in occasionalism, to fall back upon the honesty and the continual intervention of God, or else, as in the philosophies of Spinoza and Leibnitz, to discard dualism altogether. The British school similarly progressed out of dual¬ ism, first by Berkeley's denial of the substantial character of matter, and later by Hume's denial of the substantial character of mind. A partial recrudescence of the dualism of substance is to be found in Kant's philosophy of things — in themselves. At present a substantive view of the mind is characteristic of the dualism of Wil¬ liam McDougall. However, it may be said in general that since the 18th century the notion of substance has come to play a progressively smaller part in the question of monism and dual¬ ism. The modern formulation of the question is : Are there two mutually exclusive orders of being, the one mental, the other material? While the agreement on this point is not by any means complete, there is a strong and growing tend¬ ency, not only among those of an absolute idealist trend of thought, but also among rela¬ tivists such as William James and realists such as Holt and Perry, to regard the elements en¬ tering into the combinations of the material world and the components of mental states as not necessarily different. Mind and matter, in a philosophy of this type, are complexes of the same subject matter, but are viewed from dif¬ ferent aspects or are ordered in a different manner.

The most interesting form of latter-day dualism is that of Bergson (q.v.). Bergson's philosophy is based on a sharp contrast between the mental, possessing the continuity of memory, which allows the present as it were to contain the past, and the material, the subject-matter of physical science, forming a kinematographic succession of spatial arrangements of particles. In his earlier writings, the distinctness of these two worlds is emphatically asserted, but more recently he has come to regard matter as an arrested, atrophied manifestation of the same vital impulse that constitutes life and mind. Bergson thus forsakes dualism for monism.

Dualism is not necessarily a cleavage along the mind-matter plane. Accordingly we find

that whatsoever manifestations of dualism exist in ancient philosophy depend on an en¬ tirely different principle. This principle is the distinction between form and matter. The first crude attempts at cosmology on the part of the Ionian School brought everything back to one fundamental principle — water or air or fire or the unbounded,

as the case might be. An¬ axagoras made the first step toward dualism by making reason — albeit a reason or order but imperfectly distinguished from the objects ordered — the principle of the universe. Plato carried this dualistic trend to its logical con¬ sequences, and distinguished between the ideas, representing order and form, and the evil prin¬ ciple of not being ordered and shaped by them. While Aristotle did not directly entify his forms, he made such a sharp distinction be¬ tween form and matter that he may justly be called a dualist. This dualism was accentuated in the excessive formalism of the scholastics.

Dualism is found in ethics as well as in ontology. Its ethical aspect is the recognition of separate fundamental principles of good and evil. It is especially characteristic of Zoroas¬ trianism, and elsewhere is usually a borrowing from Persian sources. The strife between Or-muzd and Ahriman becomes in Christianity the strife between good and Satan. Manichseanism, which was peculiarly under Zoroastrian influence had this dualism as its keynote, and Satan was not so subordinated to God as in the more nor¬ mal forms of Christianity. (See Monism). Con¬ sult McDougall, ˆBody and Mindˆ (New York 1911), and the bibliographies to Metaphysics and Philosophy.

Noreert Wiener,

Editorial Staff of The Americana.

DUANE, James, American jurist: b. New York, 6 Feb. 1733; d. Duanesburg, N. Y., 1 Feb. 1797. He established a settlement at Duanes¬ burg in 1765; took up the practice of law, and became prominent in his profession. Having bought a considerable amount of land in the territory known as the New Hampshire grants, now included in the State of Vermont, he was one of the principal advocates of New York's right to that territory; and when New York officials were driven out by Ethan Allen and his followers, Duane was the leader of those who induced the legislature to declare the Ver¬ monters traitors and outlaws. He was elected to the first Continental Congress, and was a member of the Congress throughout its exist¬ ence. He was a supporter of the conservative party, believing in the English form of govern¬ ment and opposed to republicanism, and he stood against the signing of the Declaration of Independence, striving to delay, and if possible prevent, separation from England. He returned to New York after its evacuation by the British, and was the first mayor under the new charter (1784-89) ; was a member of the committee to draft the State constitution of New York; sat in the State senate 1782-85 and 1789-90; and was United States district judge

1789-94.

DUANE, James Chatham, American mili¬ tary engineer: b. Schenectady, 30 June 1824; d. New York, 8 Nov. 1897. He was graduated from West Point in 1848, and was instructor there for a time. He was engineer in charge with the Utah expedition 1858, and served in the

Civil War with the Armv of the Potomac and the Army of the South. In 1865-68 he had charge of the construction of defenses at the eastern entrance to New York harbor; was lighthouse engineer for the northeast Atlantic coast, and superintendent of fortifications in Maine and New Hampshire; in 1886 he became chief of engineers with the rank of brigadier-general, and retired in 1888. From 1888 to 1897 he was one of the Croton aqueduct commis¬ sioners. He was the publisher of ˆManual for Engineer Troopsˆ (1862).

DUANE, William, American politician ; b. near Lake Champlain, N. Y., 1760; d. Philadel¬ phia, Pa., 24 Nov. 1835. He was educated in Ireland, learned printing, and in 1784 went to seek his fortune in India. He rapidly amassed property, and became editor of an Indian jour¬ nal, entitled the World. Having taken sides against the local government in a dispute with some of its troops, he was seized and sent to England, and his large fortune was confiscated. His attempts at redress were unsuccessful, and he remained in England as editor of the Gen¬ eral Advertiser, subsequently merged in the Lon¬ don Times. In 1795 he returned to America, and became editor of the Aurora, published at Philadelphia, which was made by his able man¬ agement the most influential organ of the Democratic party; so much so, that Jefferson attributed to its vigorous support his own elec¬ tion to the Presidency. The change of the seat of government from Philadelphia to Washing¬ ton caused the Aurora to decline in political importance. Jefferson appointed Duane lieu¬ tenant-colonel in 1805. In the War of 1812 he served as adjutant-general. Duane retired from its editorship in 1822, and then traveled through the republics of South America. On his return he published ˆA Visit to Colombiaˆ (1826). His other

works include ˆMilitary Dictionaryˆ (1810); ˆHandbook for Riflemenˆ (1813); ˆHandbook for Infantryˆ (1813), which were for some time standard authorities.

DUANE, William John, American politi¬ cian ; b. Clonmel, Ireland, 9 May 1780; d. Phila¬ delphia, 26 Sept. 1865. He was a son of Wil¬ liam Duane (q.v.). Appointed Secretary of the Treasury by President Jackson in 1833 he was removed from office the same year because of his refusal to allow the government deposits in the United States Bank to be removed without the authorization of Congress. He served also as a trustee and director of Girard College.

DUBAN, dii-ban, Jacques Felix, French architect: b. Paris, 14 Oct. 1798; d. Bordeaux, 20 Dec. 1870. He studied under Debret, and his first work of importance was the completion of the Palais des Beaux Arts, in the execution of which he is charged with having sacrificed harmony of proportion and strength to a fond¬ ness for ornamentation. In 1845 he was em¬ ployed in the restoration of the ancient chateau of Blois, and in 1848 was appointed architect of the Louvre. The fagade on the river side, and the Apollo Gallery, were restored from his plans.

DU BARRY, dii ba're', Jeanne Becu,

Comtesse, a French courtesan, mistress of Louis XV: b. Vaucouleurs, 19 Aug. 1746; d. Paris, 6 Dec. 1793. She was the daughter of Anne Becu Rangon, the wife of a domestic, and because of

her beauty succeeded in gaining the patronage of the Abbe Arnaud wh9 sent her to school at a convent. Here she gained a very slight edu¬ cation, and left when she was 15 years of age. Her first employment was as lady's maid to Madame de la (jarde, and next at a milliner's shop in the rue de Saint Honore. Here she lived as a courtesan under the name of Mile. Lange, and soon attracted by her charms the adventurer Jean, Comte du Barry, who made her his mistress. She presided over his gam¬ bling house with great brilliance until the fame of her beauty and wit rpched the ears of King Louis XV, who immediately became enamored of her. She was presented at court and in¬ stalled as his official mistress in 1769. For form's sake the king had her married to the brother of the Comte du Barry and her position was thus secured. Her influence at court be¬ came very powerful and for five years she reigned supreme. Important offices and privi¬ leges were in her gift and the courtiers abased themselves

to win her regard. After the death of Louis, she retired from court to a convent near Meaux, but at the intercession of the queen was restored to the magnificent chateau of Luciennes. Here a throng of leading men assembled to do her homage ; among them Franklin, and the Emperor Joseph H. She re¬ ceived also a pension from Louis XVI and her court was gay and brilliant. On the outbreak of the Revolution she fled to England, but re¬ turned to attend to the matter of her stolen jewels. She was immediately arrested by the revolutionary tribunal, condemned to death and executed. The conflicting estimates of the Du Barry are difficult to reconcile. She was gay, witty, of a frank and pleasing manner and seductive, sensuous beauty. It is doubtful whether her political intrigues had any deeper origin than her desire to please her favorites and gratify her own vanity. It is estimated that her luxuries and her liberality to the arts cost France . 35,000,000 livres. The ˆLettres et Anecdotesˆ ascribed to her are unauthentic. Consult Goncourt, ˆLa Du Barryˆ (Paris 1880) ; Viatel, C., ˆHistoire de M™® du Barry d'apres ses papiers personnelsˆ (Versailles 1880, con¬ taining a bibliography of sources) ; Douglas, R., ˆLife and Times of Mˆ® Du Barryˆ (London

1896).

DU BARTAS, dii'bar'ta, Guillaume Sal-luste, French poet: b. Montfort, in the depart¬ ment of Gers, 1544; d. Ivry, 14 March 1590. He undertook various diplomatic missions to foreign courts for the Huguenot cause; fought in the Huguenot army and was killed in the battle of Ivry. His fame rests upon two epic poems, the second unfinished, entitled <La semaineˆ (The Week) and ˆLa seconde semaine.ˆ The first, which is far the better of the two, describes the creation of the world ; the second the period from the creation to the in¬ carnation of Christ. These poems were very popular in France, and in 1598 Joshua Sylvester translated them into English.

DU BELLAY, Jean, zhon dii bel'la, French cardinal and statesman: b. 1492; d. Rome, 16 Feb. 1560. He enjoyed the favor of Francis I, and was sent as ambassador to Henrv VHI of England and the Pope, Paul HI. He became bishop of Bayonne in 1526, bishop of Paris in 1533 and cardinal in 1535. He was appointed

lieutenant-general of the kingdom during the absence of Francis, who was engaged against the Emperor Charles V in Provence. Falling into disgrace on the death of this king, he re¬ tired to Rome. Du Bellay protected and en¬ couraged letters, and it was at his suggestion that the College of France was founded. Rabe¬ lais was attached to his establishment.

DUBBS, Joseph Henry, American clergy¬ man: b. North Whitehall, Pa., 5 Oct. 1838; d. 1910. He was graduated at Franklin and Mar¬ shall College 1856, and at the Mercersburg Theological Seminary 1859. After several pas¬ torates in the Reformed Church he became in 1875 professor of history and archaeology in Franklin and Marshall College. He was a member of various ethnographic and historical societies in the United States, Great Britain and France, and published HBstoric Manual of the Reformed Church' (1885) ; ˆHome Ballads and Metrical Versions' (1888); Wˆhy am I Re¬ formed?' (1889); ˆLeaders of tne Reforma¬ tion' (1900) ; ˆThe Reformed Church in Penn- .sylvania' (1902), *etc.*

DUBLIN, capital of Ireland (Irish, Baile athd cliath, the town of the Ford of the Hurdles; Dubh-linn, Black Pool; Eblana of Ptolemy), is 60 miles west of Holyhead, 121 miles west of Liverpool and 334ˆ miles by rail and water from London. Up to 1891 the area was 3,733 acrˆs, and circumference about nine miles. In that year the boundaries were ex¬ tended. Present area 7,911 acres.

Geology. — The central parts of the city rest upon alluvial soil, and the remainder upon boulder clay. Beneath is the carboniferous limestone plain which so largely occupies the central region of Ireland.

Description. — Dublin is situate on the Liffey (formerly Anna Liffey, from the Irish Abhainn Liffe), which divides it into two nearly equal parts, amidst beautiful surroundings. Before it is the broad expanse of Dublin Bay about 10 miles in width, on the left Howth, a high rugged promontory, on the right Bray — a pretty seaside resort — and the Wicklow Mountains, which become a range of undulating hills

running down into beautiful fertile plains in the neighborhood of the city. Inland are the level prairie-like- stretches which make up the counties of Kildare and Meath. The river divides the city and is spanned by 10 bridges, the most important being O'Connell Bridge, the link between O'Connell street (or Sackville street) — a very wide thoroughfare — and Westmoreland street. College Green and Graf¬ ton street. These four streets form the heart of the city.

Public Buildings . — Dublin has many public buildings of architectural and historic interest. The Bank of Ireland, formerly the Parliament House, is a nearly semicircular structure cover¬ ing one and one-half acres. Its special feature is a noble Ionic colonnade 147 feet long. It is a good example of the beauty of simple classic severity. The Custom House on the Liffey is a fine granite pile in the Doric order, sur¬ mounted by a dome. The Four Courts is a cluster of buildings affording accommodation to the Courts of Chancery, Queen's Bench, Exchequer and Common Pleas. There is a central edifice with a dome ornamented by 24 graceful Corinthian columns, and various other

buildings separated by courtyards. The Na¬ tional Library of Ireland and Museum of Science and Art are twin buildings in the style of the 13th century classic renaissance. The other public buildings which deserve mention are the Royal Hospital, Kilmainham, a home for army pensioners; Birmingham Tower, and Chapel of Dublin Castle; Dublin University (q.v.) ; National Gallery; Mater Misericordiae Hospital; College of Surgeons; King's Inns; and Royal University buildings.

Monuments. — Nelson's Pillar is a column supporting a statue of Nelson, the whole being 134 feet high. A number of statues are from the chisel of Foley, the most important being those of O'Connell, Grattan, Burke, Goldsmith, Lord Carlyle, Stokes, Sir William Corrigan, Lord Gough, Lord Iveagh and the Prince Con¬ sort. There are statues by Sir Thomas Farrell, the most notable those of Sir John Gray, Sir Alexander M'Donald, Smith O'Brien and Barry Sullivan. A statue to Father Mathew, the tem¬ perance reformer, occupies a prominent place in O'Connell street. There is also the Wellington Testimonial in Pheenix Park, an obelisk 205 feet high. There are some curious statues of no artistic but great historic interest. The one to King William III is celebrated. Exciting political feeling by being erected in com¬ memoration of the battle of the Boyne, it has at various times been treated with indignity. It has been blown up with gunpowder, pulled

down with ropes, and once even tarred and feathered. At the instance of Mr. Sexton, when lord mayor of Dublin, it was painted and surrounded with an iron railing.

Churches. — The largest and most import-tant architecturally is Saint Patrick's Cathedral, a beautiful Gothic structure commenced be¬ tween 1220 and 1260 on the foundation of an older church of the same name. The design is a Latin cross of graceful proportions. The church consists of nave, choir and transepts — all of which have aisles — and a Lady chapel. Though frequently restored it retains the main features of the original buildin'g. Swift, its famous dean, watched over it with great care. Its present excellent condition is due to the late Sir Benjamin Lee Guinness, who in 1864 had it repaired at the cost of £150, (X)0. It is the chief place of Protestant worship in Dublin. Christ Church Cathedral, a beautiful example of early English Gothic passing from the Norman, was founded in 1038 by Sitric, Danish king of Dub¬ lin. Time played havoc with the original build¬ ing, of which the present is but a portion. Be¬ tween 1181 and 1225 it was remodelled, and the part of the older structure still in existence be¬ longs to this period. Between injudicious res¬ torations and natural decay it had fallen into a wretched state. The great restoration which took place in 1871-78 is due to a public-spirited citizen, Henry Roe. There are many fine mod¬ ern churches, but none possesses exceptional architectural merit. The Roman Catholic cathe¬ dral in Marlborough street is a large building of the Doric order. The Presbyterian church at Rutland square is handsome and ornamented with a fine steeple. The Augustiiiian church in Thomas street is remarkable for its tower and steeple 160 feet high. In the tower there is a richly carved, lofty arched recess and doorway which has a striking effect. Saint Audoen's

Church, High street, is — after the cathedrals

— of most note historically. Saint Mary's, Haddington road; Saint Peter's, Phibsboro; and the small Gothic chapel in Dublin Castle are buildings of merit.

Art and Literary Institutions.— The Pic¬ ture Gallery in Merrion square contains a good collection of pictures and statuary. It is a state institution and free to visitors. Native art is fostered by the Royal Hibernian Academy, in which there is a yearly exhibition of Irish work. The Museum of Science and Art, a state institution, possesses antiquities illustrating life in early Ireland from the Stone to the Bronze Age. Of special interest are the examples of gold work, the most notable being the Tara Brooch, the Cross of Cong and the cover or shrine of Saint Patrick's Bell. The ornamental work on these is remarkable for delicacy and beauty. The Royal Irish Academy, a literary and scientific society ; the Royal Dublin Society, agricultural and scientific ; Royal Society of An¬ tiquaries; and Dublin Naturalists' Field Club are important non-academic associations There is also a society for advancing the study of music, called the Royal Irish Academy of Music.

Libraries. — The following are the principal Dublin libraries, with an approximation of the number of volumes contained in the larger ones : Dublin University Library, 350,000 vol¬ umes, many valuable MSS., including the Book of Kells; National Library of Ireland, Royal Irish Academy Library, Marsh's Library and King's Inns Library. There are also small but useful municipal libraries.

Parks. — There are two of size, one. Saint Stephen's Green, being situate in the centre of the city, about one-quarter square mile in area, the other the Phoenix Park (from the Irish Fionn uisg\ clear water), on the west side and adjoining the city. The latter is very large and of great natural beauty. It is seven miles in circumference. The valley of the Liffey runs along one side, presenting, with the Dublin Hills in the background, a series of delightful views. In it - are the residence of the lord lieutenant of Ireland, the chief secretary to the lord lieutenant, and the under secretary, the Ordnance Survey barracks. Royal Irish Con¬ stabulary depot, Hibernian School for the Sons of Soldiers, Zoological gardens and a number of cricket and football grounds.

Municipal Affairs. — The local government of the city is carried on by the lord mayor, 20 aldermen and 60 councillors ; these represent 20 wards. Though the corporation has spent a good deal in providing cheap houses for the poorer citizens, and though private benefactors

— notably Lord Iveagh — have also helped, there is still a pressing need for suitable ac¬ commodation for artisans and laborers. Apart from the waterworks, the venture which has been attempted is the electric lighting of the city. Historical documents in the archives have been published in 10 volumes, entitled ˆThe Ancient Records of the City of Dublin.ˆ The city returns four members to Parliament. The first charter was received in 1171, and many since, in all 102.

Education. — Of first importance is Dublin University, with its one College of the Trinity, lodged in a large group of buildings in the heart of the city. Founded in 1591 by Elizabeth,

with funds derived from escheated estates, it has always been the chief teaching institution in Ireland and numbers among its students such famous men as Ussher, Swift, Burke, Goldsmith, Emmet, Moore, Lecky. Prior to 1873 the Provostship, Fellowship and Founda¬ tion scholarships could be held only by the members of the Protestant communion. The government, subject to Parliament, is in the hands of the provost and senior fellows, act¬ ing in conjunction with the visitors. The sen¬ ate consists of the chancellor and the doctors or masters, who keep their names on the books. The council consists of the provost, cr vice¬ provost, and 16 elected senators.

The Royal University of Ireland, a state in¬ stitution, is not a teaching body, but examines and confers degrees. Its graduates are mostly students from the Catholic University, a college controlled by the Jesuit Fathers, and from the Queen's colleges of Cork, Belfast and Galway, besides ladies from various conventual and pri¬ vate schools. It is governed by a chancellor, vice-chancellor and a senate of 35 members. Alexandra College, Saint Mary's College and Loreto Convent, Saint Stephen's Green, provide higher education for ladies. The Christian Brothers' schools, the Erasmus Smith schools, Saint Andrew's College, Wesley College, King's Hospital and convent schools are the chief agents for secondary education ; the more ele¬ mentary being supplied by state schools under the Board of National Education, with clergy¬ men as managers. There is a fine municipal technical school, a Royal College of Science and a smaller municipal technical school.

Commerce, Industries and Transit. — Dub¬ lin is not a city of great manufacturing activity. Brewing and distilling are its chief industries. The chief brewery is that of Guinness & Co., an immense concern covering over 40 acres. Its capital is £6,000,000, and its yearly output 1,500,000 barrels. Steam barges convey the beer from the brewery, which is situate on a shallow reach of the Liffey, to the vessels in the harbor. There are about 3,300 hands em¬ ployed. The chief distilleries are John Jameson & Co., and the Dublin Whisky Distillery Co. ; both do a large export trade. Jacob & Co., biscuit makers, are an important industry, with a large foreign trade, sending biscuits as far as San Francisco and employing thousands. The manufacture of Irish poplin is still a source of profit and has received an impetus lately from the general desire among Irish people to help native industries. There is a large export trade in provisions and live stock and there are wood and leather manufactures.

The four trunk railways of Ireland meet in Dublin and are connected. Two canals, which traverse the central plain, also terminate here. In tramways the city is well provided, having a most extensive electric overhead haulage sys¬ tem. It is connected by steam packet with Bel¬ fast, Glasgow, Liverpool, Holyhead, Bristol, Cork, Plymouth, Southampton, London and Havre. The docks, with the exception of Spencer dock, Ringsend basins and Royal Canal docks, are controlled by the Port and Docks Board. Alexandra Basin has a depth at low water of 24 to 26 feet.

History. — The early history of Dublin is the history of the stranger in Ireland. Before

the close of the 8th century Danish pirates be¬ gan their raids on the coast, the monasteries, which contained valuable vessels of gold, being their special prey. From the 8th to the 10th centuries they held Dublin, and early records are full of accounts of conflicts with the native Irish. In 1014 King Brian Boroihme [^^Borifl^] defeated the army of Sitric, the Danish king, at Clontarf, a place now a part of the city. This event seems to have been a severe blow to the prestige of the Danes. The arrival of the Normans in 1169 introduced a new element in Irish history. In 1170 the city was captured by Dermot Macmurrough, a native prince on bad terms with subjects and neighbors. In this he was aided by English allies. Dublin was subsequently attacked by Hasculf, the last of her Danish kings, and his defeat and death put an end to their dominion. From this time the city remained the stronghold of the English settlers ; the decayed castles studded over the counties Dublin, Kildare and Meath bear silent witness that the occupation was not a peaceful one. From Plantagenet to Stuart, history tells of innumerable battles and skirmishes between the inhabitants of Dublin and the septs of the Wicklow Mountains, the O'Byrnes, O'Tooles, Kavanaghs and others. How strenuous the life of a citizen must have been is evidenced by frequent record, such as — ®The Mayor and light-armed citizens marched out against the O'Tooles and were forced to retreat.^^ At the Reformation most of the English in Dublin conformed, though the descendants of the Nor¬ man settlers in other parts of Ireland, merged in the native races, adhered to the old faith. This intensified the hatred between the English in Dublin and their Celtic neighbors. The suc¬ cess of the military operations at the end of Queen Elizabeth's reign followed by the exten¬ sive confiscation, and the plantation of Scotch and English settlers, which beginning with Elizabeth was continued by James I and Charles I, helped to make the citizens more se¬ cure. The failure of the insurrection of IMl and the subsequent war increased this security. Till the Commonwealth Dublin remained a walled town with little change of appearance, but with the Restoration began its evolution from a mediaeval to a modern metropolis. After the Williamite wars the native Irish who re¬ mained in the country were without property or civil rights and sank into apathy and general

wretchedness. This state of things, as it en¬ sured peace, favored the growth of the city, and in the 18th century Dublin, as we now know it, grew. To this period belongs a spell of commercial activity which, however, owing to hostile legislation of the English Parliament at the instance of English manufacturers, did not continue. Before the union with England the Irish capital was a city of first importance, not only as a commercial centre, but also as a place of literary and dramatic activities — pro¬ ducing its own plays and its otvn operas. The union had a disastrous effect, the wealthy resi¬ dential classes following the Parliament to London. The abortive insurrections of 1798 and 1803 are indicative of the national unrest of the time. The history of Dublin in the earl¬ ier 19th century seems to be a record of con¬ tinued decline. Thackeray, who paid it a visit in 1842, says — ® A handsome town, with fewer

inhabitants, it is impossible to see on a summer day.^^ In 1847 occurred the attempted rising headed by John Mitchell and others, and in 1867 another resort to arms took place.

It is risky to generalize upon the composite population of a capital, but Dublin people may be fairly described as good-humored, unenthusiastic and not very energetic. Political or re¬ ligious acerbities do not interfere with social harmony. Wages in general among the labor¬ ing class are small, and there is much poverty of a depressing kind. Within recent years there has been a marked revival in library matters, and — apart from the Gaelic League — a school of new writers has arisen whose aspirations are of Ireland and for Ireland. The Gaelic League, a powerful organization, whose objects are the revival of the Irish language and the study of Irish history, and many of the members of which were deeply implicated in the rebellion of 1916, has its headquarters in the city. Pop. (1901) 290,638; (1911) 304,802, of whom 83 per cent are Roman Catholics.

The Revolt of 1916.— Coincident with the attempt of Sir Roger Casement (q.v.), with German assistance, to land arms and ammuni¬ tion in the west of Ireland, a serious revolt broke out in the capital, and in some other parts of the country. It was organized by the Sinn Feiners, the ultra-radical, physical-force nation¬ alist organization, and was begun on Easter Monday, 24 April 1916. A large body of rebels seized Saint Stephen's Green. The post-office was captured ; telegraph and telephone wires were cut; and houses in different parts of the city occupied by the insurgents. An Irish republic was proclaimed, and a provi¬ sional government appointed. An attack on

Dublin Castle was repulsed. The authorities, while cognizant of collusion between the Ger¬ man government and the Sinn Feiners and apprehensive of armed revolt, were taken un¬ awares by the suddenness of the outbreak ; mili¬ tary law was proclaimed, all available troops were hurried from the Curragh Camp, and the work of attempting to reoccupy the parts of the city taken by the rebels began. On the day fol¬ lowing the outbreak a gunboat on the Liffey shelled Liberty Hall, the headquarters of the rebels, and cavalry charged them in Sackville street. Severe fighting, great loss of life among soldiers, rebels and peaceful citizens alike, and many destructive fires ensued ; but on May 1 the revolt terminated with the surrender of Provi¬ sional President Pearse who at the same time advised the insurgents to lay down arms. In addition to this 1,000 arrests were made. The casualties among the military were 127 killed and 352 wounded, and among the non-rnilitary population there were 1,930 casualties, with 200 killed. The end of the revolt was followed by a visit to Dublin of Premier Asquith, and by an abortive attempt to settle by consent the Irish Home Rule controversy. For details of the rebellion, see Ireland.

Bibliography. — Cosgrave and Strangways, < Dictionary of Dublinˆ ; Falkiner, ˆThe Phoenix Park Proceedings of the Royal Irish Academy, 190P ; Gilbert, ˆHistory of Dublinˆ (3 vols.) ; Gilbert, ˆViceroys of Irelandˆ ; Halliday, ˆScan¬ dinavian Dublinˆ ; Harris, ˆHistory of Dublinˆ ; Lewis, ˆTopographical Dictionaryˆ ; Thom's ˆDublin Directory. Ancient Records of the City

of Dublinˆ (10 vols.) ; Warburton, Whitelaw & Walsh, ˆHistory of Dublinˆ (2 vols.) ; Saint Patrick's Cathedral, and Christ Church Cathe¬ dral, in Bell's Cathedral Series; article by Pro¬ fessor Dovvden, in Century Magazine, Vol. 7, p. 167 (1884) ; Gerald, ˆPictorial Dublinˆ

(1897) ; Chart, ˆDublin in the Mediaeval Towns Seriesˆ (1907).

John Condon,

Assistant Librarian National Library of Ireland.

DUBLIN, University of. The first Uni¬ versity of Dublin was founded in 1320 in con¬ nection with Saint Patrick's Cathedral. Hav¬ ing no endowment, and owing to changes in government and religion throughout the coun¬ try, the university gradually declined, until it ceased to exist in the reign of Elizabeth. The present university was founded in 1591, when a charter, or letters patent, was granted by Queen Elizabeth for the incorporation of the ˆˆCollege of the Holy and Undivided Trinity.® This col¬ lege is stated in the charter to be incorporated as the ˆˆmother of an university,® whence it ap¬ pears that it was intended to be only the first of a number of colleges to be afterward estab¬ lished in connection with the same university, the senate of which is incorporated by a char¬ ter distinct from that of Trinity College. Up to this time, however, no other such colleges have been established, so that Trinity College alone still enjoys the rights of the university. Al¬ though Elizabeth promised much, little was done by the Crown for the support of the institution. The suppressed monastery of All Hallows was given to the new university and a fund was raised among the Irish nobles. Under James I more aid in money and lands was given to the school. In 1637 changes were made in the con¬ stitution of the university.

The members of the corporation consist of a provost, 7 senior fellows, 27 junior fellows and 70 foundation scholars. The management of the college is entrusted to the provost and senior fellows in conjunction with the visitors and the council, the last named body consisting of the provost, four senior fellows, four junior fellows, four professors who are not fellows and four other members of the senate. The serrate of the university, as incorporated by roy2.\ charter, consists of ®the chancellor of the university, or, in his absence, of the vice-chan¬ cellor, and such doctors or masters of the uni¬ versity as shall have

and keep their names on the books of Trinity College.® ˆ The senate pos¬ sesses, under prescribed conditions, the right of electing the chancellor of the university. It is also the body which grants degrees, subject to the sanction of the college board and of the caput of the senate. This latter body consists of the chancellor or vice-chancellor, provost (or vice-provost), and the senior master non-regent, and every member of the caput has the right of refusing a degree by a veto. The fellows are appointed for life. The senior fellows are pro¬ moted from the number of the junior fellows in order of seniority, and every vacancy among the junior fellows is filled up by the provost and senior fellows after a strict examination for 12 days in mathematics, pure and applied, ex¬ perimental sciences, classics, with Hebrew and cognate languages, and mental and moral sci¬ ence. The scholars are chosen from among the undergraduates, after an examination in pure

and applied mathematics and logic or experi¬ mental science, or in Greek, Latin and English composition. Non-foundation scholars are not members of the corporation of the college. Scholars receive an annual salary of £20, have their commons free of expense, and their rooms for half the charge paid by other students. They hold their scholarships until the end of the June quarter of the fifth year following their election, or following the time at which they become or might have become masters of arts, whichever period terminates first. Stu¬ dents, before being admitted, must submit to an examination in Greek, Latin, arithmetic, English composition, history and geography. Students may enter as belonging to one of four classes. The first consists of noblemen, noblemen's sons and baronets. The second consists of the fel¬ low-commoners (who dine at the fellows' table). The third and most important is the class of pen¬ sioners, forming the great body of the students ; and the fourth is the sizars, who are partially maintained out of the college funds and are now admitted by competitive examination. These last are limited to 30 in number. The academical year is divided into three terms — Hilary, Trinity and Michaelmas term. To ob¬ tain the B.A. degree the student must keep eight terms in all, covering normally four aca¬ demic years. Terms are kept during the under¬ graduate course, either by lectures or by exami¬ nations, but terms in divinity, law, medicine and engineering must be kept by attendance on the lectures of the professors. The system of in¬ struction is superintended by the fellows, to¬ gether with a large staff of professors. Several of the junior fellows act as tutors, and every student must place himself under one of these on entering the college. The tutors during term deliver lectures on the subjects necessary to a degree. These are : In

the first year, mathe¬ matics, Greek, Latin, English composition ; in the second year, mathematics, mathematical physics, logic, Greek, Latin, English composi¬ tion ; in the third year logic, mathematical physics, English composition, Greek, Latin, ex¬ perimental and natural science, astronomy, his¬ tory, French. German; and in the fourth, as¬ tronomy, ethics, English composition, logic, mathematical physics, languages, experimental and natural science, history and political science. During the ˆ first academic year a student is called a junior freshman; during the second, a senior freshman; during the third, a junior sophister ; and during the fourth, a senior sophister. Students who have successfully passed all the necessary examinations in the course given above have the degree of B.A. conferred on them by grace of the senate in full congre¬ gation. Those who wish to obtain honors must pass through a more extended course of study. Honors are attainable in seven departments ; 1, mathematics and mathematical physics; 2, classics ; 3, logic and ethics ; 4, experimental sci¬ ence ; 5, natural science ; 6, history and political science ; 7, modern literature. Those who suc¬ cessfully pass the examinations in any of these departments are classed according to merit as senior or junior moderators and respondents. Noblemen and noblemen's sons are entitled to have the degree of B.A. conferred on them per specialem gratiam; and fellow-commoners are entitled to receive it with one term-examination

less than pensioners. The degrees are con¬ ferred on commencement days, of which there are four in each year. There are divinity, law, medical and engineering schools in connection with the university, and degrees or licenses in each of these branches are granted by the uni¬ versity senate on the completion of the pre¬ scribed courses. The degrees of D.Sc. and Litt.D. are pnferred on B.A.'s who have at¬ tained scientific or literary distinction. The de¬ grees of bachelor and doctor in music are also conferred.

The college possesses a fine library of about 350,000 printed volumes and 1,700 manuscripts. It has also a well-stocked botanic garden and

museum. The observatory, five miles distant at Dunsink, is the official residence in Ireland of the royal astronomer. In 1613 James I granted to the university the right of returning two members of Parliament. One was taken away at the Union, but was restored by the reform bill of 1832. The parliamentary constituency consists of the provost, fellows and foundation scholars, ex-fellows and ex-foundation scholars, masters of arts, surgery and engineering, and graduates holding all higher degrees.

DUBOC, du-bok, Julius, German author : b. Hamburg, 10 Oct. 1829; d. June 1903. He studied at Giessen, Leipzig and Berlin, and wrote much for the leading liberal periodicals, especially the National Zeitung. He published ˆGeschichteder Englischen Pressed (1873) ; ˆDie Psychologie der Liebeˆ (1874) ; ˆDas Leben ohne Gottˆ (1875) ; ˆGegen den Stromˆ (1877) ; a collection of his earlier essays, ˆDer Optimismus als Weltanschauungˆ (1881) ; ˆJenseits von Wirklichen' (1896) ; and ˆFunfzig Jahre Frauenfrage in Deutschland,ˆ a collection of essays on the woman question.

DU BOIS, du-bois', Constance Goddard, American author ; b. Zanesville, Ohio. She has been an active supporter of efforts to improve the condition of the Mission Indians of south¬ ern California. She has published ˆMartha Corey: a Tale of the Salem Witchcraftˆ (1890) ; ˆColumbus and Beatrizˆ (1892) ; L\ Modern Paganˆ (1895) ; ˆThe Shield of the Fleur-de- Lysˆ (1895) ; ˆA Soul in Bronzeˆ (1900) ; ˆRe¬ ligion of the Luiseno Indians of Southern Cali¬ forniaˆ (1908).

DU BOIS, William Edward Burghardt,

American educator : b. Great Barrington, Mass., 23 Feb. 1868, of negro descent. He was graduated at Fisk University 1888 and at Harvard 1890, subsequently studying at the University of Berlin. He has been a Fellow of Harvard, assistant in sociology at the University of Pennsylvania, professor of economics and history in Atlanta University, and since 1910 editor of The Crisis Magazine, New. York. Pie has published ˆThe Suppression of the African Slave Trade to the United States, 1638-1870ˆ (1896) ; ˆThe Philadelphia Negroˆ (1899) ; ˆSouls of Black Folkˆ (1903) ; ˆJohn Brownˆ (1909); ˆQuest of the Silver Fleeceˆ (1911); ˆThe Negroˆ (1915) ; editor of the Atlanta University ˆStudies of the Negro Problemˆ (15 monographs, 1896-1915).

DU BOIS-REYMOND, bwa-ra-mon, Emil, German physiologist: b. Berlin, 7 Nov. 1818; d. there, 26 Dec. 1896. He studied theology, geology and subsequently anatomy and physi¬

ology at Berlin under Johann Muller. At the age of 22 he began those researches in animal electricity which occupied him for nearly 40 years. His first experiments were published in ˆUntersuchungen fiber tierische Flektrizitatˆ (2 vols., 1848-49). His instruments were of his own invention, and with them he succeeded in demonstrating the electrical phenomena occur¬ ring in muscular activity and in nervous activity, and established the law now bearing his name : that it is the variation o*f a current density and not the absolute value of current density at any given moment that acts as a stimulus to a muscle or motor nerve. He succeeded Mfiller as professor of physiolog>' in the University of Berlin in 1858. In 1867 he became permanent secretary of the Berlin Academy of Sciences and later was appointed imperial privy coun¬ cillor. He also performed successful experi¬ ments proving that muscular reaction at rest is neutral or slightly alkaline and acid after death, and that acid is produced in the act of contrac¬ tion. His investigations include important research on the aperiodic state of the magnetic needle induced by high dampening powers. He also invented the method of reading messages over the Atlantic cable by watching the beam of light reflected from a mirror attached to the needle of a galvanometer. His reputation as a scientist is world-wide, and his researches form the basis of all further information on animal electricity. His other publications include ˆt)ber die Grenzen des Naturkennensˆ (6th ed., 1884) ; ˆGesammelte Abhandlungen zur all-gemeinen Muskel-und Nervenphysikˆ (2 vols., 1875-77) ; ˆ Reden ˆ (2 vols., 1886-87) ; and

Worlesungen fiber die Physik des organischen Stoffwechselsˆ (1899). Consult Engelmann, ˆGedachtnisrede auf Fmil Du Bois-Reymondˆ (Berlin 1898).

DUBOIS, du'bois', Augustus Jay, Ameri¬ can engineer: b. Newton Falls, Ohio, 25 April 1849 ; d. 19 Oct. 1915. He was graduated at Shef¬ field Scientific School in 1869; in 1874 was ap¬ pointed professor of civil engineering at Lehigh University, and in 1876 professor of mechanical engineering at Sheffield Scientific School. After 1884 he was professor of civil engineering at the last institution. He has published ˆElements of Graphical Staticsˆ (1876); ˆThe New Method of Graphical Staticsˆ (1876) ; ˆStrains in Framed Structuresˆ (1883; 11th ed., 1900); •ˆElements of Mechanicsˆ (1893-95).

DUBOIS, dfi-bwa, Clement Frangois Theodore, French musical composer: b. Ros-nay (Marne) 1847. He studied at the Paris Conservatory and won the Prix de Rome in 1861. He was organist at

the church of the Madeleine, professor of harmony, then professor of composition at the Conservatory and finally became director of that institution. The Legion of Honor and many other foreign orders were conferred on him. His compositions for the organ were very well received, his popularity as an organist greatly enhancing their favor. In 1894 he became a member of the Academy of Fine Arts. His compositions include the can¬ tata, ˆAtalaˆ ; the operas, ˆAben Hametˆ ; ˆXaviere' and ˆCirce' ; the oratorios, ˆThe Seven Words of Christ,ˆ and ˆParadise Lostˆ : ˆThe Baptism of Clovis,ˆ and a number of organ pieces, masses, *etc.*

DUBOIS, Edmond Paulin, French hydro-grapher: b. Brest, 12 July 1822; d. there, 11 Nov. 1891. He made voyages in the Indian Ocean and along the west coast of Africa, and in 1851 was made professor of the Ecole Navale in Brest. He invented a compass with a double needle to determine the variation due to the ship's ironwork, and wrote ˆCours d'astronomieˆ (1858); ˆ Etude historique et philosophique sur le mouvement du globe ˆ (1ˆ1) ; ˆLes passages de Venus sur le disque'solaireˆ (1883) ; ˆCercle nautiqueˆ (1888), and edited the ˆEphemerides astronomiques.ˆ

DUBOIS, Guillaume, French cardinal and statesman : b. Brives-le-Gaillard, Correze,

France, 6 Sept. 1656; d. Versailles, 10 Aug. 1723. He became tutor of the Duke of Chartres, after¬ ward Duke of Orleans, and when in 1715 the duke was declared regent Dubois was appointed by the duke councillor of state. He succeeded in overcoming the dislike of George I of Eng¬ land to the person of the regent, and in 1717 concluded the triple alliance between England, France and Holland. He was rewarded by the Ministry of Foreign Affairs and began to aspire to the highest dignities of the Church. The archbishopric of Cambrai having become vacant, Dubois ventured to request it of the regent, although he was not even a priest. As the king of England united with Dubois in his request, he obtained it and in one morning received all the orders and a few days after the archbishopric. By his consummate address he

obtained a cardinal's hat and in 1721 was ap¬ pointed Prime Minister. Consult ˆLe regent, I'abbe Dubois et les Anglaisˆ (Paris 1891).

DUBOIS, Jean Antoine, French abbe and missionary : b. Saint-Remeze, department of Ardeche, 1765; d. Paris, 7 Feb. 1848. He spent 32 years in the East Indies, and on his return published ˆLetters on the State of Christianity in Indiaˆ (1823), which produced much contro¬ versy in England from the fact of his having frankly expressed therein his disbelief in the possibility of the conversion of the Hindus. He wrote several works relating to the religion and the traditions of India and many contributions to the Bulletin des sciences and to the journals of the Asiatic societies of London and Paris. His most celebrated work on India was pur¬ chased by the East India Company, published at its expense in London in 1816 and afterward published in French under the title of ˆMoeurs, institutions, et ceremonies des peuples de I'lnde*

(1825).

DUBOIS, John, American Roman Catholic bishop: b. Paris, 24 Aug. 1764; d. 20 Dec. 1842. As student in the College Louis le Grand he had as fellow students Camille Desmoulins and Robespierre. In 1781 he was ordained priest. With several thousand other ecclesiastics he was forced to flee from France in the Revo¬ lution and came* to the United States in 1791. His first charge in this country was at Norfolk, Va., whence he was transferred to Richmond; there he was for a time a guest in the house of James Monroe and was the friend of prominent citizens, Patrick Henry undertaking his instruc¬ tion in the English language.ˆ From Richmond he was transferred to Frederick, Md., the only priest then stationed between Baltimore and Saint Louis. In 1809 he founded Mount Saint

Mary's College near Emmittsburg, Md., and was its first president, occupying at the same time two or three professorships. In addition he assumed the duties of chaplain and director of the house of the Sisters of Charity, then founded by Mrs. Seaton in the neighborhood of Emmittsburg. He was subsequently appointed bishop of New York, the diocese including that State and New Jersey, with a Catholic popula¬ tion of 150,000 souls, eight church buildings and 18 priests. Owing to old age and increasing in¬ firmities in 1838 he obtained a coadjutor in the person of John Hughes, who became his suc¬ cessor.

DUBOIS, Louis, Belgian painter: b. Brus¬ sels 1830; d. there, 28 April 1880. He was one of the most prominent painters of the realistic school and worked equally well as a painter of portraits, marines, still life and landscapes. Among his works are ˆThe Rice Eaterˆ ; ˆThe MeuseU ‘ˆPriests Preparing for Mass,ˆ and ˆThe Billiard Player.ˆ

DUBOIS, Paul, French sculptor: b. Nogent-sur-Seine, 18 July 1829; d. Paris, 23 May 1905. In 1837 he entered the College Louis le Grand and later took up the study of law, which he followed until his 27th year, when he became a pupil of Toussaint. In 1863 he exhibited ˆNarcissus at the Bath,ˆ now in the Luxem¬ bourg, and in 1864 a bronze of Uohn the Bap¬ tistˆ as a young man. ˆThe Florentine Min¬ strel,ˆ which won the medal in 1865, is also in the Luxembourg. Among his other produc¬ tions are a successful statue of Uoan of Arcˆ (in Rheims 1889) ; ˆAlsace and Lorraineˆ (1900) and portrait busts of Pasteur, Baudry, Gounod and others. The most elaborate of his sculptures was a tomb in Nantes Cathedral, dec¬ orated with many statues and bas-reliefs. He was also a painter. He was made an officer of the Legion of Honor in 1867 and became grand officer in 1889. He was a director of the Lux¬ embourg and also of the National School of Fine Arts.

DUBOIS, Pa., borough in Clearfield County, situated on the Buffalo, Rochester and Pittsburgh and the Pennsylvania railroads, about 80 miles northeast of Pittsburgh. It is in a coal mining region, and a large amount of min¬ ing and agricultural implements are manufac¬ tured. There are also glass and clay works, blast furnaces, large railroad repair shops, machine shops, a foundry, a tannery, an ice-cream fac¬ tory, *etc.* The United States census of manu¬ factures for 1914 showed within the borough 34 establishments of factory grade, employing 1,281 persons, of whom 1,105 were wage-earners, receiving annually $686,000 in wages. The cap¬ ital invested aggregated $3,296,000, and the year’s output was valued at $2,395,000: of this, $1,150,000 was the value added by manufacture. The borough contains a general hospital and owns ˆ its waterworks. Settled in 1873, Dubois was incorporated as a borough in 1881. Pop.

14,007.

DU BOSE, de boz’, William Porcher,

American theologian: b. Winnsboro, S. C., 11 April 1836; d. 1918. He was graduated at the South Carolina Military Academy; then re¬

ceived his A.M. at the University of Virginia (1859), and his theological education at the Theological Seminary of South Carolina. He

was chaplain of Kershaw's brigade in the Con¬ federate army during the Civil War (1861-65). In 1864 he was ordained deacon and in 1865 priest of the Protestant Episcopal Church. From 1866-67, he was rector of Saint John's, Wmnsboro, and from 1868-71 of Trinity Church, Abbeville, S. C. He became chaplain and professor of ethics and New and Old Testament languages and interpretation at the Univer¬ sity of the South in 1894, serving as dean of the theological department from 1894-1908, when he became dean emeritus. He holds the Adop-tionist theory of the purpose of Christ's life. He is the author of ˆThe Soteriology of the New Testamentˆ (1892) ; ˆThe Ecumenical Councilsˆ (1896) ; ˆ'The Gospel in the Gospelsˆ (1906); ˆThe Gospel According to St. PauP (1907); ˆHigh Priesthood and Sacrificeˆ (1908); <The Reason of Life> (1910); <Turning Points in My Lifeˆ (1912).

DUBOST, Antonin, French politician: b. Arbresle, Rhone, 1844. He was a contributor for some time of La Marseillaise, and became successively secretary-general of the prefecture of police in 1870, prefect of Orne in 1871, coun¬ cillor of state in 1879, president of the general council of Isere in 1893 and Minister of Justice in the Casimir-Perier Cabinet in 1893-94. He became a senator in 1897 and was elected presi¬ dent of that body in 1906. He was energetic in pointing out the effect on the school children of the country of the teaching of the religious orders, who were in the main opposed to the Republic. He is the author of ˆLes suspects en 1858ˆ (1867) ; ˆLes conditions du gouverne-ment en Franceˆ (1879) ; <Danton et la poli¬ tique contemporaineˆ (1880) ; ˆDanton et les massacres de septembreˆ (1ˆ5).

DUBOVKA, doo-bof'ka, Russia, city in the government of Saratov, on the Volga. The commercial importance of Dubovka has declined considerably, owing to the fact that the railway line from Kalach on the Don connects with Tzaritzin on the Volga. It was once an import¬

ant centre for trade in farm products. Pop. 16,900.

DUBUFE, dii'buf', Edouard, French painter: b. Paris, 30 March 1820; d. Versailles, 10 Aug. 1883. He was a pupil of his father, Claude Marie Dubufe, and of Delaroche. Among his works are portraits of the Empress Eugenie, Rosa Bonheur, Gounod, the younger Dumas and Emile Augier; also a number of religious paintings, including ˆThe Prodigal Son.ˆ In 1853 he became Chevalier of the Legion of Honor. The Salon of 1844 awarded him a first-class medal.

DUBUFE, Edouard Marie Guillaume,

French painter: b. Paris, 16 March 1853. He is a son of Edouard Dubufe (q.v.). Among his paintings are ˆSt. Ceciliaˆ ; ˆ Music, Sacred and Profaneˆ ; ˆAutumnˆ ; ˆThe Flight into Egypt ˆ ; and several portraits. He has also decorated the Hotel de Ville in Paris and the Salle des Fetes de I'Elysee.

DUBUQUE, doo-buk', Iowa, city, port of entry, county-seat of Dubuque County, on the Mississippi River, the Burlington, the Chicago Great Western, the Chicago, Milwaukee and Saint Paul and the Illinois Central and other railroads, 167 miles northwest of Chicago. It has steamer communication with the leading ports on the Mississippi and is connected with

the opposite shore of the river by three bridges. It has communication by boat with other points on the river. The city is built partly on a terrace, 20 feet above the river, and partly on the bluffs, which rise 200 feet high. The lower or business portion is regularly laid out and compactly built, and in the upper portion the streets rise picturesquely one above another. Among the prominent buildings are the United States government buildings, the Central Mar¬ ket, the Carnegie-Stout library. Saint Ra¬ phael's Cathedral (R.C.) and several other im¬ portant churches. The city is the centre of the lead and zinc region of Iowa, northwestern Illinois and southwestern Wisconsin, and con¬ tains large zinc works. In 1914 there were 139 establishments in operation, with a combined capital of $13,329,000, employing 6,109 persons, paying $3,851,000 for salaries and wages, and yielding products aggregating in value $14,- 714,000, made from raw materials valued at $8,188,0ˆ. It is also an important market for the agricultural produce of the district. The principal manufactures were packed meat, lum¬ ber, foundry and machine shop products, malt liquors, bread and bakery products, carriages and wagons, flour, boots

and shoes, agricultural implements, leather, furniture, toys, notions, bricks, oils, engines, steel ship hulls, barrels, brooms, buttons, sashes, doors, millinery and clothing. The national banks have a combined capital and surplus of over $1,000,000. There are State, savings and private banks. The city is the winter harbor for boats on the upper Mississippi. In 1893 it was created the see for an archdiocese of the Roman Catholic Church. It is lighted with electricity, has an extensive waterworks system, public library, several hospitals and asylums, electric street railways and an inclined cable road leading from the river level to the bluffs. Gunboats for the United States navy have been built here.

There are over 4,500 pupils enrolled in the public day schools ; about 140 teachers ; and public school property valued at $500,000. There are over 3,500 pupils enrolled in the private and parish schools. For higher instruction there are a public high school, the academies of Saint Joseph, Saint Mary, Saint Vincent and the Visi¬ tation, Wartburg Seminary (Lutheran), the (jerman Presbyterian Theological School of the Northwest and the State Institute of Arts and Sciences.

The city was named in honor of Julien Dubuque, a French trader, who with 10 others settled here in 1788 to mine lead. This was the first settlement in what is now the State of Iowa. The settlement was abandoned after Dubuque's death in 1810, and the site was not again occupied till 1833. This last was the first permanent settlement in Iowa. In 1839 it was incorporated as a town, and in 1840 received its charter as a city. Pop. 39,428.

DUC, diik, Joseph Louis, French architect: b. Paris, 25 Oct. 1802; d. 22 Jan. 1879. Win¬ ning the Prix de Rome in his 23d year, in 1840 he was chosen to assist in designing the monument in the Place de la Bastile. His chief work is the Palais de Justice in Paris, which occupied the greater part of 25 years in build¬ ing, for which the Emperor Napoleon HI gave him $20,000 as a special prize. The architect

devoted the greater part of this sum to estab¬ lish a prize for

excellence in architecture. (For a description of the Palace of Justice see Paris). In 1866 he became a member of the Institute and in 1871 inspector-general of all civic buildings.

DU CAMP, dii lean', Maxime, French writer: b. Paris, 8 Feb. 1822; d. Baden-Baden, 8 Feb. 1894. He wrote the history of the Paris Commune: ˆThe Convulsions of Parisˆ (1878-79), and other historical sketches; ˆEgypt, Nubia, Palestina and Syriaˆ (1852) ; but his greatest work is ˆParis : Its Organs, its Func¬ tions, and its Lifeˆ (1869-75). He likewise wrote some lyric poems: ˆModern Chantsˆ (1855) ; ˆConvictionsˆ (1858) ; and several novels, among them ‘ˆMemoirs of a Suicideˆ (1853) ; ˆThe Six Adventuresˆ (1857) ; ˆThe Man with the Gold Braceletˆ (1862).

DU CANGE, dii-kanzh', or DUCANGE, SiEUR Charles du Fresne, or Dufresne, French historian and philologist : b. Amiens, 18 Dec. 1620; d. Paris, 23 Oct. 1688. His family name was Dufresne, and Sieur Ducange was his title as lord of his paternal estates. He was an alumnus of the college of the Jesuits in his native town and after completing his studies there took up the study of jurisprudence, and in 1631 was admitted to practise as an advocate at the bar of the Parliament of Paris. Meeting with discouragement in his profession, he with¬ drew to to his native place and there devoted himself to the historical, linguistic and philo¬ logical studies which have made him illustrious as a scholar. He was indefatigable in research, and his linguistic attainments, critical acumen and various knowledge enabled him to digest and sort out of the infinite mass of material the facts of history and the points of philology which were necessary for the composition of the many solid memoirs of which he is author. And those works involved titanic labor even if we consider only the work of the pen in mak¬ ing ®copyˆˆ for the printer; for every word was penned with his own hand. Of the long list of his printed works the two which are most enduringly important — and frequent reference to these is imperative on whosoever studied the history of the Middle Ages at its sources — are his dictionaries of the Greek and Latin lan¬ guages in the period of their decline. Among other writings may be named ˆHistoire de I'empire de Constantinople sous les empereurs franqaisˆ ; ˆHistoria byzantina duplici com-mentario illustrataˆ ; ˆChronicon Paschale a mundo condito ad Heraclii imperatoris annum vigesimum.ˆ Consult Sandys, ˆA History of Classical Scholarshipˆ (Vol. II, Cambridge

1908).

DUCAS, doo-kas, Michael, Byzantine his¬ torian of the 15th century. He was a descend¬ ant from an imperial family, and himself held a high position at the court of Constantine Palseologus, the last emperor of Constantinople. After the conquest of that city by Mohammed II he took refuge with the Prince of Lesbos, Dorino Gateluzzi, and his prudence and skill succeeded in saving the independence of Lesbos for a time. It is probable that he wrote in his old age the history of the Byzantine empire. This begins with an outline of universal chron¬ ology, and does not becorne detailed and truly

instructive till the reign of John Palseologus I, and it terminates abruptly in the middle of a sentence, at the capture of Lesbos in 1462. It is the most difficult of all the Byzantine hi.stories, written in a barbarous style, but is judicious and impartial.

DUCAT, the name of certain gold or silver coins current in several countries, but is no longer the monetary unit in any country. It had its origin in 1140, and was formerly a favorite coin with the Dutch, and, owing to the excellence of the pieces struck, they were sought for and imitated by several other coun¬ tries, and especially Russia. Ducats now every¬ where circulate at a valuation, where _ they circulate at all, or are bought and sold simply as bullion. The following are some of the best known :

1. The gold ducat of Holland, weighing 3.494 grammes, .983 fine, value about $2.33. 2. The gold ducat of Russia, which is of precisely the same weight, fineness and value as the Dutch ducat. 3. The gold ducat of Austria-Hungary, weighing 3.4904 grammes, .986 fine, value $2.34. 4. The gold ducat of Sweden, weighing 3.486 grammes, .9766 fine, value $2.31. 5. The gold

ducat of Hamburg, valued at $1.85. 6. The

silver ducat of Sicily, weight 22.943 grammes, ,833 fine, value 84 cents.

DUCATO, Cape. See Cape Ducato.

DUCATOON, duk -a-toon’, or DUCA-STONE, formerly a Dutch silver coin worth 3 gulden 3 stivers, or $1.30. There were coins of the same name in Italy. In Tuscany its value was about $1.35, in Savoy slightly more, and in Venice about 97 cents.

DUCCIO DI BONINSEGNA, duch‘6 de bon-en-san’ya, Italian painter,

founder of the Sienese school : b. Siena about 1260 ; d. about 1320. He was doubtless trained at Byzantium or came into contact with a Byzantine teacher, as his skill in decoration indicates. In 1285 he was at Florence where he contracted to paint an altar-piece of the Madonna for the Santa Maria Novella. In 1298 he served as a mem¬ ber of the official board of the council of Siena. In 1301 he began a ˆMajestyˆ for the chapel of the Public Palace there of which no record remains. His great work is the altar-piece of the cathedral in Siena, which when completed was carried in a procession to the cathedral. It shows the Madonna surrounded by saints and angels ; on the reverse are 26 pictures of the Passion of Christ. Some of these are now in the galleries of the Berlin Museum, the Benson collection and the Na¬ tional Museum, London. Two other Madonnas at the Siena Academy are also attributed to him; likewise a ˆCrucifixion,ˆ in the possession of the queen of England, a ˆMadonna with Angels, Prophets and Saintsˆ (National Gal¬ lery, London) ; the ˆPreaching of St. John the BaptisD and ˆSaints Peter and PauP (Rambona Collection, Cologne). Of doubtful authenticity is the triptych of the ˆCrucifixionˆ in the J. P. Morgan collection. New York. It is as an illustrator that Duccio excels. His groupings and arrangement are admirable, his perspective good andˆ his ˆ drawing graceful and careful. But, despite his excellent dramatic sense and his imaginative force, he failed to inspire his figures with a sense of reality. They lack

weight, mass, solidity. Their movements are empty attitudes. There is no breath in the beautiful figures that fill his canvasses. Duccio was not an innovator. He perfected the models and types of the old school. His colors are rich and harmonious and he shows an under¬ standing of the handling of light and shadow. His principal pupil and follower was Simone Martini. Consult Berenson, ˆThe Central Italian Painters of the Renaissanceˆ (2d ed., London 1909) ; Wulff, ˆRepertorium fiir Kunstgeschichteˆ (1907) ; Crowe and Cavalcaselle, ˆHistory of Painting in Italy ˆ (ed. by Langton Douglas and S, A. Strong, London 1911).

DU CHAILLU, dii sha-yu’, Paul Belloni, American traveler: b. Paris, 31

July 1835; d. Saint Petersburg, Russia, 30 April 1903. He spent his youth in the French settlement on the Gaboon, on the west coast of Africa, where his father was a merchant, and received his educa¬ tion from the Jesuits there. In 1852 he went to the United States, of which he afterward be¬ came a naturalized citizen. In 1855 he began his first journey through western Africa, and spent till 1859 alone among the different tribes, traveling on foot upward of 8,000 miles. He collected several gorillas, never before hunted, and rarely, if ever, before seen by any Euro¬ pean. The result of this journey was his work ˆExplorations and Adventures in Equatorial Africaˆ (1861). This book contained much important information on the zoolog>', geogra¬ phy and ethnology of parts of the continent then unknown to Europeans, and by many au¬ thorities Du Chaillu's statements were received wdth suspicion ; but subsequent expeditions by others fully confirmed his substantial accuracy. A second expedition was made by him in 1863, an account of which, under the title ˆA Jour¬ ney to Ashango Land,ˆ appeared in 1867. ˆThe Land of the Midnight Sun,ˆ an account of a tour in northern Europe (1881), had a con¬ siderable success. He has also published a number of books intended for youth, and based on his travels. One of his later works is ˆThe Viking Ageˆ (1889), a treatise on the ancestors of the English-speaking peoples. In addition to the works named above may be mentioned his 'Stories of the Gorilla Countryˆ (1868) ; 'Wild Life Under the Equatorˆ (1869) ; 'Lost in the Jungleˆ (1869) ; 'The Country of the Dwarfsˆ (1872) ; 'The Land of the Long Nightˆ (1899) ; 'The World of the Great Forestˆ (1900) ; 'How Animals, Birds, Reptiles and Insects Talk, Think, Work and Liveˆ

(1900).

DUCHATEL, dii-sha-tel', Charles Marie Tanneguy, Count, French economist and poli¬ tician: b. Paris, 19 Feb. 1803; d. there, 6 Nov. 1867. Prior to 1830 he took an active part in editing the Globe, one of the leading organs of the Liberalists. He began his parliamentary career in 1832, was named secretary-general of the finances in 1833, and in 1835 was appointed to the Ministry of Commerce. He resigned with his colleagues in February 1836, and now became one of the most energetic leaders of the opposition. At the accession of the cabinet of SoLilt and Guizot in 1840 he came again into power as Minister of the Interior, and re¬ tained this position with but a short interrup¬ tion till the revolution of 1848, after which he

lived in retirement. The measures supported by him both as deputy and minister were gen¬ erally of a financial character, but he also took a prominent part in the establishment of rail¬ ways and telegraphs in France. He wrote several works on economics.

DUCHESNE, dii-shan', Andre, French historian : b. Touraine, Isle Bouchard, May 1584; d. 30 May 1640. History and geography were his favorite studies from his youth, and under RichelieLts ministry he was appointed royal geographer and historiographer. His most important works are 'Histoire d'Angleterre, d'Ecosse et dTrelandeˆ (1614) ; 'Histoire des Papes jusqua Paul (1616) ; 'Histoire des rois, dues, et comtes de Bourgogneˆ (1619-28), and his collections of the early Norman and French histories. His industry was extraordi¬ nary; he is said to have left more than 100 folios in manuscript. He is frequently styled "The father of French History.ˆˆ

DUCHESNE, Jacques Charles Rene Achille, French soldier: b. Sens 1837. He fought in the Franco-Prussian War of 1870-71, in which he gained distinction. He added to his fame in the Tongkin in 1883, w'as made brigadier-general in 1888 and a general of division in 1893. In 1895 he was commandant of the expedition sent out to conquer Madagas¬ car, of which his official 'Rapportˆ (Paris 1897) is the best account. In 1900 Duchesne was ap¬ pointed member of the Superior Council of War.

DUCHESNE, Louis Marie Olivier, French Roman Catholic Church historian : b. Saint Servan, France, 13 Sept. 1843. He was educated in Paris and Rome. From 1877 to 1895 he was professor of Church history and since 1895 di¬ rector of the French School at Rome. His most notworthy contributions to Church history have largely been produced as the result of his researches into the early history of the Christian Church. The best known in English are 'Chris¬ tian Worship; its Origin and Evolutionˆ (1902; 3d ed., 1910) ; 'Early History of the Christian Church from its Foundation to the End of the Third Centuryˆ (translated from the 4th ed., 2 vols., New York 1913). He edited 'Liber Pontificalisˆ with introduction and commentary (2 vols., 1896-98). Some years earlier he pub¬ lished the results of his study of these docu¬ ments.

DUCHESS, The, the pen-name of Mar¬ garet Wolfe Hungerford (q.v.).

DUCHESS OF DEVONSHIRE, English noblewoman, made famous by two beautiful por¬ traits, one by Reynolds and the other by Gains¬ borough. The latter, the more famous of the two, shows the lady wearing a broad trimmed hat with plumes that has come to be known

as the Gainsborough hat. The picture is in the gal¬ lery of the New British Institution,ˆ replaced in 1902 after having been concealed since 1876, when it was cut from the frame by a noted American thief since dead.

DUCHESS OF MALFI, The. One of

the mysteries of English theatrical history is the oblivion in which Webster's tragedy rested until it was resurrected by Lamb. The purest tragedy in English literature outside of Shakes¬ peare it possesses the best characteristics of

that writer's free and elevated imagination. Distinctly a play of «school,» by this meaning that it belonged to the revenge and blood type, it imbued the type with a veritable psychology that raises it above the class. Webster is to¬ day remembered only for his two tragedies, ˆThe White DeviP and ˆThe Duchess of Malfi.ˆ The latter play, written between 1609 and 1614, was taken from a novel by Bandello in the second volume of Paynter's ˆPalace of Pleasure.ˆ The play adds to a full catalogue of the elements of horror — tragedy, dark scenes, dead hands, dancing madmen and dumb-shows — other qualities of a higher order. These are clarity of purpose in the handling of the plot, beauty of verse and an insight into character amounting to revelation.

Basola, the most human and understandable in our gallery of villains, comes to his malefi¬ cence distraught in counsel. The awful and in fact insufficiently motivated revenge of Ferdi¬ nand is followed by a remorse more vital to the beauties of the play than the revenge itself. The Duchess is one of the first figures in the world's tragic literature, no unrelieved sombre figure, but woman, mother, wife and queen. With Cariola one says of her :

Whether the spirit of greatness or women

Reign most in her I know not.

The play as a whole contains many quotable passages of poetry and much impassioned phi¬ losophy. Editions : Dyce, A. (4 vols., 1830) ; Hazlitt, W. (4 vols., 1857) ; Sampson, M. W. (Belles-Lettres Series, 1904) ; Symonds, J. A., (Mermaid Series, 18ˆ) ; Thorndike, A. H., ˆMasterpieces of English Dramaˆ (1912). Con¬ sult Gosse, E., ˆSeventeenth Century Studiesˆ; Stoll, E. E., ˆJohn Webster, the Periods of His Workˆ ; Ward, A. W., ˆA History of English Dramatic Literatureˆ (3 vols., 1899).

Thomas H. Dickinson.

DUCK. Ducks are swimming birds, with short legs set far back and fully webbed feet. They are arranged in two groups or sub-families of the family Anatidce, which embraces also the mergansers, or shell-ducks, the geese and the swans. These constitute together the family Anatidcr, coextensive with the order Anseres, whose distinctive

feature is that the margins of the bill bear a series of transverse ridges, vary¬ ing to a semblance to teeth in the mergansers, between which mud and water may be squeezed out by the closing of the bill, while the edible parts of the mouthful are retained. This crushing-and-straining bill is usually broad and flat, often somewhat spoon-shaped, and contains a large, fleshy tongue with a horny tip. It is designed for crushing aquatic plants and other soft materials, for squeezing the nutrient out of mouthfuls of ooze and for picking up small, slippery animals.

Ducks spend most of their time on or about water, where they are powerful swimmers and so expert as divers that their name (i.e., the bird that ducks) refers to this characteristic. Cer¬ tain species descend to considerable depths in search of food, but are not able to stay long nor move far under water. Many species habit¬ ually sleep on the water, one foot dropped down and gently moving so as to keep the bird slowly turning about in nearly the same place. Adapted to this life, the plumage is exceedingly close.

and is underlaid by a coat of down that pro¬ tects the body from becoming wet or losing heat. In most species this plumage is different in the sexes, the male (or *drakeˆ0 having as a rule richly colored dress — often of gaudy beauty — while the female (or ®duckˆ0 is more soberly and protectively appareled. A distinc¬ tive feature of the dress is the speculum, a patch of conspicuous color in the middle of the wing which is often brilliant in color but sometimes is pure white. Molting occurs twice annually, once in summer, when most ducks pluck the loosened down from their bodies and lay it on their nests as a covering for the eggs. This is so copious in the large eiders that it has become an article of commerce. The summer or ˆautumnal® molt is usually succeeded by a coat for winter wear which, in the drake at least, is far less gayly colored than his spring dress, acquired in his southern winter residence; and it renders him safer from his enemies. The quills of the wings and tail are molted in pairs (one from each side) at intervals, so that the power of flight is not lost.

All ducks are very strong and swift on the wing, and many of them make semi-annual migrations between the tropics and the shore of the Arctic Ocean, and their flight is known to attain a speed of 100 miles an hour for short distances in the case of certain species; yet a duck’s wing is short and rounded.

Ducks naturally belong to all parts of the world except the Antarctic

continent, and many kinds are very widely distributed. About 125 species are catalogued, of which 35 are to be found in North America, not counting the mer¬ ganser, geese or swans. These fall into two groups distinguished less by structure than by habits and food. The first of these groups is that of the pond and river ducks (Anatince), wherein no webbing connects the hind toe with the foot. The second group, in which the hind toe has a lobe or web, is that of the sea-ducks and bay-ducks (Fuligulince).

The fresh-water or anatine ducks are better known than the others, for they visit or breed along rivers, lakes and ponds all over the country. They are not as expert divers as the sea-ducks, but prefer shallow and marshy waters, where they may pick up food from the bottom without serious diving, or gather it from the grassy margins. This food is chiefly vege¬ table, consisting of seeds, grasses and roots, but they devour snails, aquatic insect-larvae and any small, soft animal food met with. «The flavor of any duck's flesh,» remarks Grinnell, «depends entirely on its food, and a bird of what¬ ever kind which is killed after living for a month or two in a region where proper vege¬ table food is to be found will prove delicious eating.® Reverse conditions will spoil the taste of species highly reputed. «Thus the fine feath¬ ers of a canvasback are not necessarily a guarantee that the bird wearing them possesses the table-qualities that have made the species famous.®

The river and pond ducks, of which about a dozen species are native to North America, are most familiar ; and one of them, the mal¬ lard (Anas boschas) is the ®wild® duck of popu¬ lar speech, for it is well known throughout the whole northern hemisphere. Its head and throat are glossy green, varying to bluish black ;

DUCKS

>l -

iij?,*. •« * « w

‘ ii ■ I :%■:

r, • * if

s

1*

i

SS’^.clv

■ ‘ ••V*’ ‘ *■ ‘ ■■■•• < ^sl.’

>

t

• jrirv ■

‘5vj’ .’ V ; ■’

” • ■ -iJ- ■■’ ■’ -”’ ■ ‘

‘*T *”

“-”J ‘ ClC’ -‘-J-‘ ’f

I-‘..’ /r-

“ *1 •♦ BiQII *’ m

■ - •;<■’ <’ .J3|n, y«r

*** # V - • ^ -S. ‘ r” m” f • ‘B

«e • • ,• - •■ ; .« ,« a,’

… • -> .‘Vf

..>’ -• <.•? ■ ” • •r^Jr’T ^ ‘

• •* . . V ; - **v/jtiL

- . ‘V >

- ‘ ■’

■t

; A •<’

Nf

■_ • - i

/ < *•,'• Li 'vL

^v

V I

J!r

- ■ • ^ *0 ^

• ^

“ ‘ V ;

” i . ; • .

7”’ > ‘-”7‘4^ te’i * ■■‘•■••’ ■■ ‘ ‘

H. « 0 fc‘v:’ ■ > ,. ■■ “* .’

’ ^ ’ ‘ • ‘ *1 » . ^ ^ • ! “

,-., > 1 . *• •I’l

‘. .t

I

Tc

•• ^

v V •. -

‘ « ■ ^ *1 « J

• ” - ■ ‘ • ‘ • •’ L-v “^-V f’ . X’^

. ’ ■’ ‘ > ■‘i*?‘ **- ‘■ -i •L’^*”

* ^ S r • •• XL • , .

I i-* • ‘

<r ‘ff • * ^ -j

u

■a 4,

■ •. •; -.”•.v .,!^

^ ‘ »‘3^’ ^‘p., ■’•- ”■■ i’ V’ . ■ ‘*’ n

•-LJ M •

4 4 .

,H. ♦

1^. .”‘;?(i

\V;’ f, ‘. ■■*:’

ly. “■■’

“ ” > ■ ■<■ ‘> ” f

- ‘ •■.V

, j.- ,1 • lit

^ / l> ■ »• ,- • fc- ‘ »

-

• ‘V’

rir

V • *

＞L* iV

v»? ‘ . ‘ ‘ *

A* ‘ .

, ‘XL ^ ?’■

V’’- ‘^’

-T .

- w

• i’A^-‘.S’v

:v^ «”•?’

f^vv

r}x%‘v ,

‘ ^ ‘

■ .L ‘ ‘

L. ‘

, ^•-” c ^ r

V * • i -i-: ,” . ,- V-Tf . V*

r.yj‘ . J M 32

Jf ^ »| ,^r— «

• ^ • V

.‘*’ ^ >L

^ b*^

*-^ ■- -S

-. : - ‘ ‘ ‘

•!4,‘i ■

1.

> j*

‘ (.

r *V ‘4

.s.’.’. ,

• / ‘•■

I -

»

V

8Sep’ ‘ ‘ »r

y*’-*

pk

’ -v

t •

i

h ^

1*.

4.

V I

^ ,

4 ’ . LjtSt

,L J’-!*

a white ring surrounds the neck; the breast is chestnut ; the belly grayish ; back and tail brown to black; speculum rich purple edged by lines of white and black. The female has a much duller dress. The mallard is migratory, breeding from the northern United States to Alaska and Greenland, and wintering from the central United States southward. At these seasons it is found beside all the interior waters and for¬ merly was extremely numerous ; but the civiliza¬ tion of the coufitry, the draining of the marshes and wasteful shooting previous to the enactment of recent protective laws, have caused an alarm¬ ing decrease of this handsome and valuable fowl. Its nesting is after the manner of its race, which is described as follows by Dr. F. M. Chapman :

®A11 our AnatincB except the wood-duck, nest on the ground, lining a slight hollow with grasses, leaves, moss or rootlets, and with more or less down from the breast of the incubating bird… . The nesting-site is usually near

water… . The generally greenish, cream

or buff eggs number from 6 to 14 and hatch within a surprisingly short time of each other. Incubation is performed by the female alone… . Few birds show more concern for the

safety of their • offspring than do the wild ducks. When danger threatens, the young, evidently acting under direction, scatter and seek cover in every direction, while the female gives a remarkable and courageous exhibition of partial helplessness.®

The mallard is the original stock from which most of the domestic races of ducks have been derived ; and wild pairs of these ducks are still used to breed their race in cap¬ tivity in many parts of the United States and elsewhere. A considerable part of the market supply in eastern American cities comes from this source.

Another widely distributed and familiar species is the black duck or black mallard (Anas ruhripes), which is slightly smaller than the

mallard, is sooty brown with buffy mark¬ ings, and has a purple speculum edged at the end with white. It neither goes so far north to breed nor so far south in winter, so that it is present and numerous at most seasons in the United States east of the plains. The gadwall (Chaulelasmus streperus) is an important species of the Interior States, blackish in plum¬ age, marked with buff and white, giving a brownish, scaled appearance : grayish below ; wing chestnut, with a conspicuous white patch. The European widgeon frequently visits the American Atlantic coast. The American widgeon (Mareca americana) is better known as ˆTaldpate,® and is a handsome duck, ranging in its migrations all over the continent. Its general aspect is mottled brown and black, with the wings strikingly black and w'hite. The crown is white, below which the sides of the head and nape are glossy greenˆ — this ornament is lacking in the female. Their loud whistling cry is known to all gunners.

The teals are small, reddish, widely dis¬ tributed and favorite ducks of two Eastern species, the green-winged (Nettion caroltnense) and the blue-winged (Querquedula discors), noted for their swiftness of flight, expertness in dodging and mellow whistling notes. A third species, the cinnamon teal (Q. cyanoptera) , is

restricted to the Pacific slope, and takes its name from the color of its underparts. The shoveller (Spatula clypeata) is so called from its great ladle-like bill, likened to a double spatula. Its head, in the drake, is green; the breast and upper parts are white, divided by a wedge of brown on the back; the under-surface is chestnut, and the wings and tail are black and green, while the feet are coral red. The female is nearly plain reddish brown. This fine duck is most common in the Mississippi Valley and obtains its food from the bottom of shallow water. The pintail ' (Da/i/a acuta) is another duck known throughout the northern hemi¬ sphere, and easily recognized by the two greatly prolonged central tail-feathers of the male. In general color it is dusky brown, with a reddish head, white throat and breast, green tail and green speculum. Its long neck and tail make it conspicuous among other ducks in flight.

The fresh-water group ends with the most beautiful of all American waterfowl, the wood-duck (Aix sponsa). It is of moderate size and the upper parts are green with purplish reflec¬ tions, the breast is dull red, the sides buff and the lower breast white. The head has an elon¬ gated, drooping crest, which is divided length¬ wise by a white line and is edged with white ; and curving white lines ornament the neck,

shoulders and coverts of the wing, which dis¬ plays a speculum of steel blue. The female is equally ornamental in more quiet tones. This exquisite little duck was formerly extremely abundant, and is yet somewhat common throughout the whole temperate zone of the con¬ tinent and returns only into the southern States for the winter. His haunts are waters in the midst of woods, and he has the singular habit of making his nest in some hollow in a decayed tree, often at a great height from the ground and at a long distance from water. When the young are able to scramble up to the entrance of the cavity, they are encouraged to let them¬ selves drop off to the ground, and fall so lightly as to suffer no injury; but sometimes they are carried down by the mother, who then leads them carefully to the nearest water.

The sea and bay ducks (Fuligulincc) are mostly to be found in or near salt water, but mingle with the anatine species in river-mouths and brackish marshes. Fond of open waters, many in their migrations frequent the large interior bays and lakes and are among the best for the table. *Their food,® says Chapman, ^^consists chiefly of mollusks, crustaceans, and the seeds and roots of aquatic plants. They ob¬ tain it principallv by diving, sometimes descend¬ ing 150 feet or more… . With one exception they are northern-breeding birds, seldom nest¬ ing south of our northern tier of States.®

Prominent in this group is the canvasback (Marila vallisneria) , famous among epicures. It is rather large, has a reddish-brown head and neck, the breast and upper back black, the belly white, and the hinder half of the body covered with fine, wavy crosslines of black and white, whence Its name. It is seen in autumn on every large lake east of the plains as well as along the eastern coast; and although far less abundant now than in old times is still fairly numerous owing to legal protection. Its favorite food is the aquatic weed vallisneria, erroneously called ®wild celery.® Very closely related, and equally

good, when equally well fed, is the redhead {M. americana) , which has a much broader area of velvety black about the neck, and a brownish in¬ stead of a gray back; its range extends to the Pacific

coast. The scaups, greater (M. marila) and lesser (M. affinis), are dark-colored, white-bellied birds, very common along the coasts in bays and salt-marshes, deriving their name from their cry. The ring-neck (M. collaris) differs chiefly in having a distinct chestnut collar. The golden-eye {Clangula americana) migrates and breeds throughout the northern interior, and is singular in nesting in a ,hole in a tree, like the wood-duck. It has a glossy green head, with a puffed appearance, due to the length of the feathers, and marked by a large round white spot before the eye. Otherwise it is white with a black back, the female being all brown. The whistling noise of its wings in flight make it known to gunners as 'ffhe whistler.^^ The buffle-head, harlequin and old squaw are sea ducks with a highly varied and beautiful plumage, while the scoters are dull in plumage and the eiders (see Eider Duck) are big, black-and- white ducks of the north, of little interest to sportsmen, and not utilized in this country as is the case in Iceland and northern Europe. The pretty little ruddy ducks close the list.

Domestic Ducks. — The various races of domesticated ducks are derived from local wild stock. In Europe and North America the mal¬ lard has been the chief progenitor, but in the East and in Africa other species have con¬ tributed. The variation resulting from selective breeding and from the mingling of breeds has resulted in about a dozen well-marked varieties, 10 of which at least are recognized at shows. Of these the white Aylesbury and white Pekin, a Chinese duck (introduced to the United States about 1870), are the most popular as table ducks; but the handsomely colored Ruen, a favorite in France, the black Cayuga and the white and colored muscovies are considered profitable to raise. The muscovy duck is not of Russian origin, as its name would imply, but is a native of South America, and is noted for its ornamental plumage, which much re¬ sembles that of our wood-duck. It is therefore reared and kept mainly as an ornamental bird. The crested white is another purely ornamental bird, while several strains of pretty bantams are bred by fanciers in emulation at shows.

The breeding of wdld ducks in captivity is becoming a serious business, as well as an amusement of country gentlemen. The National Association of Audubon Societies has led the way by means of its experiment station in Con¬ necticut, and has shown it to be possible to rear a large variety of ducks not before attempted, including canvasbacks, black ducks, teals, gold¬ eneyes, *etc.*

Bibliography. — In addition to general works (see under Birds) may be mentioned Baird, Brewer and Ridgway, ˆWater Birdsˆ (2 vols., 1905) ; Dionne, ˆOiseaux de la Province de Quebecˆ (1889) ; Elliot, ˆWild Fowl of North Americaˆ (1898) ; Forbush, *ˆGame Birds, Water

Fowl and Shore Birdsˆ (1912); Grinnell, ˆAmer¬ ican Duck Shootingˆ (1901) ; Job, ˆ Among the Water FowP (1902) ; Leffingwell, ˆShooting in Upland, Mar.sh and Stream > (1890) ; Rich,

ˆFeathered Game of the Northeastˆ (1907).

Ernest Ingersoll.

DUCK ANT. See Termites.

DUCKBILL, or PLATYPUS, an aquatic

egg-laying mammal. (Ornithorhynchus para¬ doxus), native of the sluggish rivers of Australia, Papua and Tasmania. Its entire length from tip of bill to tip of tail is usually between 18 and 20 inches. Its body is rather long and covered with glossy blackish hair, close to the roots of which is a soft waterproof undercoat of fur similar to that of the beaver. The head is rounded, the eyes are small and bright and there are no external ears, despite which fact the creature's hearing is very acute. The feature which gives its name to the animal is the duck-like bill, which is the substitute for the muzzle of other animals. This bill is formed of the elongated jawbones covered with a highly sensitive, smooth skin ; when the teeth are shed, as they are at maturity, horny plates developed on both jaws take their place and do their work. The duckbill is well adapted to its aquatic and bur¬ rowing habits. Its legs are short, its feet webbed and furnished with sharp claws. In the fore-feet the web extends far beyond the claws, but can be folded back out of their way. The tail is broad and flattened, covered with coarse hair and nearly naked on the other side. In habits the duckbill is almost entirely aquatic, spending its life in or near rivers, but carefully avoiding stagnant or brackish waters. In swim¬ ming it propels itself mainly by the aid of its fore-feet, and it dives well. It is gregarious and sometimes congregates in considerable numbers, but is so shy that unless one watches quietly at evening he will not see a single member of the company. The least hint of danger sends them all to the bottom. The food is often collected in the large cheek pouches, where it can be stored and conveniently carried Home by. the animal. Each pair lives in a burrow in the bank — a gal¬ lery or passageway widened out at its interior extremity into a chamber, where the occupants sleep by day and whither the female retires to produce her young. She lays few eggs in her bed of dry grass, often only one, and hatches her young in a comparatively short time. When born they are naked and blind. The eggs are white, about three-

fourths of an inch long by one-half inch wide and, unlike birds' eggs, have a soft and somewhat flexible shell — though, in their having a large amount of food-yolk, they resemble birds' eggs. The food consists of aquatic insects, crustaceans and worms, which live in the water or in the mud and which are found not only by the tactile sense in the bill but also by the unusually keen sense of smell. The voice is like the growl of an angry puppy, but the disposition is quiet and gentle.

DUCKING STOOL, also known as ^^cucking stool® and «castigatory,» a chair in which com¬ mon scolds were formerly securely fastened to receive their punishment of being ducked in water. The culprit was placed in the chair with arms drawn backward; a bar was placed across the back and inside the elbows, while another bar held the body upright; in this uncomfort¬ able position the prisoner was securely tied with cords. The persons appointed to carry out the punishment by raising their end of the beam caused the unfortunate culprit to go overhead into the water. By pulling down their end with a chain the victim was once more brought to the surface. The ducking stool was generally

REPRESENTATIVE DUCKS AND GEESE

1 Goosander (Mergus merganser)

2 Brahminy Duck (Tadorna casarca)

3 Elder (Somateria mollissima)

4 Wood Duck (Aix sponsa)

5 Shoveler (Anas Clypeata)

6 Bernicle Goose (Branta bernicla)

used in Great Britain from the 15th to the 18th century, and one case was known as late as 1809.

DUCKWEED, a genus of plants by some botanists made the type of the small order LemnacecE. The species are small plants which float on the surface of stagnant ponds or slow running streams and are eaten by ducks and geese. The fronds take the place both of the stems and leaves, and are usually of a bright green color. The flowers arise from a slit just below the margin of the frond. Vegetable re¬ production rnay take place by budding. The family comprises the very smallest of the flower¬ ing plants and contains three genera, all of which are to be found in North America. C)f the 26 species in the family the most numerous in the United States are those of the genus Lemna, of which five are found. The other genera are Spirodela and Wolffia.

DUCKWITZ, duk ‘vits, Arnold, German politician: b. Bremen 1802; d. 1881. He made an extensive tour of England and the Netherlands and on his return became the fore¬ most promoter of shipbuilding in

Germany. He advocated a large merchant marine and a power¬ ful navy. He also advocated the establishment of a German customs unipn and proposed ex¬ tensive harbor improvements at Bremen. Through his efforts a steamship line was estab¬ lished between Bremen and New York and a favorable postal treaty concluded with the United States. In 1848 Duckwitz as Imperial Minister of Commerce and Naval Affairs laid ambitious plans for the construction of a great German navy. Returning to Bremen in 1849 he was elected burgomaster in 1857 and was re¬ elected in 1866. He retired from public life in 1873. He published memoirs under the title ˆDenkwiirdigkeiten aus meinem offentlichen Leben 1841-ˆˆ (Bremen 1877).

DUCKWORTH, Sir John Thomas, Eng¬ lish admiral : b. Leatherhead, Surrey, 28 Feb. 1748; d. Devonport, England, 31 Aug. 1817. Be¬ tween 1776 and 1779 he served in America. He distinguished himself in 1794 in the great naval victory gained by Lord Howe off Ushant, and in 1798 under Earl St. Vincent acquired new fame at the capture of Minorca. Some years later he set out in pursuit of a French fleet which had .sailed to the West Indies to succor Santo Domingo. He came up with it and succeeded in capturing an 80-and three 74-gun ships. For this service he received the thanks of both houses of Parliament and was presented by .the city of London with its freedom and a sword of the value of 200 guineas, and by the assembly of Jamaica with thanks and a sword of the yalue of 1,000 guineas. In 1807, having been appointed to watch the Turkish fleet, he forced the passage of the Dardanelles. Between 1810 and 1815 he was governor of Newfoundland.

DUCLERC, dii-klark, Charles Theodore Eugene, French statesman : b. Bagneres-de- Bigorre, France, 9 Nov. 1812; d. Paris, 21 July 1888. He took an active part in the Revolution of 1848, was a speaker in the Constituent Assem¬ bly and Minister of Finance for aˆ time. He was elected vice-president of the National Assembly in 1875, chosen a senator for life in the same year and became Premier in 1882.

DUCLOS, du-kl6’, Charles Pinot, French historian and novelist : b. Dinant, Brittany, 12

Feb. 1704; d. Paris, 26 March 1772. He was chosen member of the Academy of Inscriptions in 1739 and in 1747 member of the French Academy, of which he was afterward appointed permanent secretary. In 1750 he was appointed to succeed Voltaire as historiographer of France. Among the best of his novels are ˆ(Confessions du comte de

Bellipseˆ (1741). His ˆConsiderations sur les moeurs de ce siecleˆ are full of striking sketches of character and deep knowledge of human nature. His Hdistory of Louis XP is esteemed, but shows the hand of the novelist. Of more value are his ˆMemoires secrets sur les regnes de Louis XIV et XV. ˆ This work was composed in his char¬ acter of historiographer. He also distinguished himself in his ˆ Remarques sur la grammaire generale de Port RoyaP as a grammarian.

DUCORNET, dii-kor'na', Louis Cesar Joseph, French artist: b. Lille, 10 Jan. 1806; d. Paris, 27 April 1856. Born without arms he learned in early childhood to use his feet for hands and when 13 years old showed such skill in drawing with his toes that Watteau received him as a pupil in the Lille Academy of Design. There his ambition to become a painter received whole¬ some encouragement. At the end of three years he took the first prize for a drawing of the human figure from life and received a pension from the city, which the government subse¬ quently increased. He then went to Paris for more advanced study, painted ˆThe Parting of Hector and Andromacheˆ (1828) and presented it to his native city. He continued painting till within a few weeks of his death. His last work of note, ˆ Edith Finding the Body of Harold,ˆ was ordered by Napoleon III and exhibited in 1855.

DUCTILIMETER, an instrument invented by M. Regnier for ascertaining the relative duc¬ tility of metals. The metal to be tested is subjected to the action of blows from a mass of iron of given weight attached to a lever, and the effect produced is shown upon a graduated arc.

DUCTILITY, the quality of adaptedness of solid bodies, particularly metals, which ren¬ der them capable of being extended by draw¬ ing into wire; as malleability is for being beaten into leaves. The order of metals in these two respects is as follows: Ductility — platinum, silver, iron, copper, gold, zinc, tin, lead and nickel; malleability — gold, silver, cop¬ per, tin, platinum, lead, zinc, iron and nickel. By the device of coating a platinum wire one-one hundredth of an inch in diameter with sil¬ ver, and then drawing the two metals together as fine as possible, and then dissolving away the silver coating with nitric acid, a platinum wire three-one-hundred-thousandths of an inch in diameter has been obtained — so fine that one mile of it would weigh only one-twenty- fifth of a grain. This wire has entirely super¬ seded the spider's thread formerly used as the *cross hairs® in telescopes. The less ductile soft metals, such as magnesium, which cannot be drawn, are converted into the form of wire by the process of pressing or squirting the heated metal from a nozzle. One eft'ect of drawing metals into wire is to increase to a great degree their ultimate tensile

strength. Thus a wire of Swedish iron one-thirty-sixth of an inch in diameter has a breaking strain of 90,000 pounds per square inch; while a wire of

DUDE

one-tvvo-himdred-and-fiftieth of an inch will not break until the strain is 134,000 per square inch. When glass is subjected to a sufficient degree of heat it can be managed like soft wax and may be drawn out into threads ex¬ ceedingly long and fine. Ordinary spinners do not form their threads of silk, flax or the like, with half the ease and expedition the glass-spinners do threads of this ordinarily brittle matter. Some of them are made into plumes of filaments much finer than hair, which bend and wave, like hair, with every wind. Two workmen are employed in making them. The first holds one end of a piece of glass over a flame and when the heat has softened it the second operator applies a glass hook and draws out a thread of glass, which still adheres to the mass; then fitting his hook on the circumfer¬ ence of a wheel about two and one-half feet in diameter, he turns the wheel as fast as he pleases till it is covered with a skein of glass thread. The parts, as they recede from the flame, by gradually cooling become more cohesive, the parts nearest the fire are least cohesive and consequently must give way to the effort made to draw them toward the wheel. These threads are com¬ monly of a flat, oval shape, being three or four times as broad as thick; some of them seem scarcely bigger than the thread of a silkworm, and are surprisingly flexible. If the two ends of such threads are knotted together they may be drawn and bent till the aperture or space in the middle of the knot does not exceed one-fourth of a line or one-forty-eighth of an inch in diameter. The flexibility of glass increases in proportion to the fineness of the threads ; and, probably, had we the art of drawing threads as fine as those of a spider's web, we might weave stuffs and cloths of them. Fa¬ miliar instances of ductility in non-metallic sub¬ stances are the ˆffiairing® of boiling sugar syrup in candy-making; and the similar drawing out of ˆˆthreads® of glue from the carpenter's glue-pot.

DUDE, a modern word coined as a slang expression (but now, by constant use, dignified into semi-respectability) to designate a brain¬ less fop, whose whole business and aim in life are like those of Carlyle's dandy — to wear clothes. The term is said to have originated in London about 1882, at the .time of the so-called ˆaesthetic® movement in dress and manners among the ultra-society folk.

DU DEFFAND, Madame. See Deffand.

DUDEVANT, diid-van, Madame. See

Sand, George.

DUDLEY, Sir Edmund, English politi¬ cian: b. about 1462; d. London, 18 Aug. 1510. He was educated at Oxford and Gray's Inn, and in 1497 was appointed under-sheriff of Lon¬ don. He was an instrument of Henry VII in the arbitrary acts of extortion by the revival of obsolete statutes and other unjust measures practised during the latter years of his reign. In 1504 he was speaker of the House of Com¬ mons. On the accession of Henry VHI he was arrested for high treason and perished on the scaffold with his associate. Sir Richard Empson. His work in defense of absolute monarchy, en¬ titled <The Tree of Commonwealth,ˆ was pub¬ lished in 1859.

DUDLEY, Lord Guildford, English noble: d. London, 12 Feb. 1554. He was a son of John, Duke of Northumberland, and was mar¬ ried in 1553 to Lady Jane Grey (q.v.), whose claim to the throne the duke intended to assert on the death of Edward VI. On the failure of the plot Lord Guildford was condemned to death, but the sentence was not carried into effect till the insurrection of Wyatt induced Mary to order his immediate execution.

DUDLEY, John, Duke of Northumber¬ land and Earl of Warwick: b. 1502; d. Lon¬ don, 22 Aug. 1553. He was a son of Sir Ed¬ mund Dudley (q.v.). He was with Bedford's expedition in Scotland (1542) ; led the assault on Boulogne (1544); created Earl of Warwick (1546) ; distinguished himself at the battle of Pinkie in 1547 and suppressed Ket's rising in Norfolk in the same year; was created earl, marshal and Duke of Northumberland in 1551, and was instrumental in bringing Somerset to the scaffold. He manifested the most insatiable ambition. The illness of Edward VI, over whom he had gained complete ascendency, aroused his fears, and he endeavored to strengthen his interest by marrying his son. Lord Guildford Dudley, to Lady Jane Grey, descended from the* younger sister of Henry VHI, and persuaded Edward to settle the crown on his kinswoman by will, to the exclusion of the Princesses Mary and Elizabeth. The death of the king, the abortive attempts to place Lady Jane Grey on the throne and the ruin of all those concerned in the scheme are among the most familiar events in the annals of Eng¬ land. ®A consummate soldier, a keen politician and a skilful administrator,® he had neverthe¬ less the vices of avarice and unbounded per¬ sonal ambition, and despoiled the religious houses for his own enrichment.

DUDLEY, Joseph, American colonial gov¬ ernor of the province : b. 23 Sept. 1647 ; d. Roxbury, 2 April 1720. He was a son of Thomas Dudley (q.v.). He was graduated at Harvard College in 1665, served in the Indian War in 1675, was sent to England as agent for the province in 1682, appointed president of New England in 1686, superseded by Andros a few months later and made chief justice. He suffered imprisonment for malpractices 1689-90 ; was sent to England for trial, but the proceed¬ ings were quashed; was chief justice of New York from 1690 to 1693, then eight years lieu¬ tenant-governor of the Isle of Wight; was re¬ turned to Parliament in 1701 and finally gov¬ ernor of Massachusetts from 1702 to 17ll His character has been pithily summed up by the historian : ˆDudley united rich intellectual at¬ tributes with a grovelling soul. To his mean nature personal aggrandizement was the prime necessity.® ®He had as many virtues as can be consistent with so great a thirst for honor and power.®

DUDLEY, Paul, American colonial chief justice: b. 3 Sept. 1675; d. Roxbury, Mass., 21 Jan. 1751. He was a son of Joseph Dudley (q.v.). He was graduated at Harvard Col¬ lege in 1690, and afterward studied law in Lon¬ don. He returned to Massachusetts in 1702, with the commission of attorney-general ; in 1718 was appointed judge and in 1745 became chief justice. By his will he bequeathed £100

to Harvard College, the interest of which was to be applied to the support of an annual lec¬ ture course, named in his honor. He was well learned in natural history and was a Fellow of the Royal Society of London.

DUDLEY, Plimmon Henry, American metallurgical engineer: b. Freedom, Ohio, 21 May 1843. He was chief engineer of Akron, Ohio, 1868-72, and subsequently invented the dynagraph (1874), the track indicator (1880), and the stremmatograph for obtaining and reg¬ istering stresses in rails. In 1883 he designed the first five-inch steel rail used in the United States, and in 1892 introduced the first six-inch 100-pound rails. In 1902 he stated seven fun¬ damental principles which illustrate the Amer¬ ican theory and practice of railroads, in

refer¬ ence to the conjoint action of the locomotives, rolling-stock and permanent way. In 1916 he discovered a test method by which the flaws in steel rails may be found. He is a member of the American Institute of Mining Engineers and of many other societies.

DUDLEY, Robert, Earl of Leicester, Eng¬ lish courtier: b. 24 June 1532 or 1533; d. Corn-bury, Oxfordshire, 4 Sept. 1588. He was the fifth son of John Dudley, Duke of Northum¬ berland, and though involved in the criminal designs of his father and included in the sen¬ tence of attainder passed against him on the ac¬ cession of Mary, was pardoned and employed by that queen. After Elizabeth ascended the throne Dudley soon acquired the distinction of being her favorite. Offices, honors and wealth were showered on him. He was appointed master of the horse, knight of the Garter and privy councillor; and received grants of the princely domains of Kenilworth, Denbigh and Chirk Castle. In 1564 he was created Baron Denbigh and Earl of Leicester, and was the same year elected chancellor of Oxford Univer¬ sity, having previously been chosen to the same office at Cambridge. He commanded the ex¬ pedition to the Low Countries in 1585-87 in which he showed no military capacity; and in 1588 was appointed captain-general of the queen's forces to resist the Armada. Cordially de¬ tested by the old nobility, he was simply a crea¬ ture of the queen, who was for long credited with an intention to marry him; but who pro¬ posed a marriage (1563) between him and Mary of Scotland, In spite of Queen Elizabeth's fa¬ vor, he sent presents to the imprisoned Queen Mary and was privy to the Norfolk plot, antici¬ pating at that time the fall of Elizabeth. The tragic death of his first wife, Amy Robsart, who was found dead at the foot of the stairway at Cumnor Place, has been laid to his charge, with- . out, however, conclusive evidence. Consult Scott's ˆKenilworth. ˆ

DUDLEY, Thomas, American colonial gov¬ ernor: b, Northampton, England, 1576; d. Roxbury. Mass., 31 July 1652. After serving as page to Lord William Compton; captain in the English army which fought the French in 1597, he became a clerk to Judge Nicolls, about 1598, and steward to the Earl of Lincoln 1616-28. He came to Massachusetts in 1630 with the commission of deputy governor and he was afterward chosen governor in the years 1634, 1640, 1645 and 1650. He participated in the founding of Newton (now Cambridge, Mass.)

and of Harvard College. He was twice elected president of the United Colonies of New Eng¬ land. He was a man of integrity and piety, though intolerant, like most of his generation. Consult Jones, ˆLife and

Work of Thomas Dudley > (1899).

DUDLEY, Thomas Underwood, American Protestant Episcopal bishop: b. Richmond, Va., 26 Sept. 1837; d. New York, 22 Jan. 1904. He was graduated from the University of Virginia in 1858 and served in the Confederate army during the Civil War, attaining the rank of major. Completing his studies at the Virginia Theological Seminary he was ordained in 1868 and after filling the rectorship of Christ Church, Baltimore, was made assistant bishop of Ken¬ tucky in 1875, and became bishop of the diocese 1884. He has published ˆA Wise Discrimina¬ tion of the Church's Need.ˆ

DUDLEY, William Lofland, American scientist: b. (Covington, Ky., 16 April 1859; d. Nashville, Tenn., 8 Sept. 1914. He was gradu¬ ated at the University of Cincinnati in 1880, and from 1880 to 1886 was professor of chem¬ istry and toxicology at Miami College. His iridium process for electroplating is very suc¬ cessful. He discovered the most poisonous principle in tobacco smoke to be carbon monox¬ ide, which, when inhaled, deoxidizes the blood. He first discovered physiological effects from the use of the X-ray. He was professor of chemistry at Vanderbilt University, being also dean of the medical department, from 1886 until his death.

DUDLEY, England, city, parliamentary and county borough in Worcestershire, eight miles northwest of Birmingham. It is situated in the midst of the ®black countryˆˆ at an alti¬ tude of 600 feet, with extensive coal fields sur¬ rounding it. The principal manufactures are articles made from brass and iron; flint-glass, tanning and brewing, cycles and telegraph in¬ sulators. There are here the remains of a cas¬ tle, said to have been founded in the 8th cen¬ tury by a Saxon prince called Dudo or Dud, who has given the town its name. Pop. of county borough 51,079; of parliamentary borough, 102,506.

DUDLEY DIAMOND, The, a diamond found in South Africa in 1868, weighing origi¬ nally 89 carats, but reduced to half that weight in cutting. It receives its name from its owner, the Earl of Dudley, who bought it for $150,000. See Diamond.

DUDWEILER, dood'vi-ler, Germany, town in Rhenish Prussia, about 45 miles northeast of Metz. The coal fields near by are a source of wealth to the town ; and the chief manufac¬ tories are iron works, fireproof bricks and pot¬ teries. In the vicinity is Brennender Berg (Burning Mountain), a mountain composed largely of coal which has been burning for over 200 years. Pop. 21,932.

DUE BILL, a written acknowledgment of a debt by the debtor. Its familiar form is the I. O. U. with the signature of the debtor, as follows: ®I. O. U. twenty-five dollars. Benjamin Levine.® Another and more extended form is the following: ^^Due McDonnell and Heyburn twenty-five dollars; value received. Benjamin Levine.® Such an acknowledgment of indebted¬ ness is distinguished from a promissory note

by the absence of an express promise to pay. A due bill is not a negotiable instrument, al¬ though it is assignable by the payee.

DUE PROCESS OF LAW, law in its

regular course of administration through courts of justice. This term, due process of law, which occurs in the amendments to the Consti¬ tution of the United States (Art. V) and in the constitutions of nearly all of the States, is con¬ sidered by Coke as equivalent to the phrase •^daw of the land® (used in Magna Charta, Ch. 29), and is said by him to denote ^^indictment or presentment of good and lawful men.® Coke Inst. 50. Due process of law includes notice, hearing and judgment. The constitutions of the various States and the Federal Constitution contain no description of those processes which it was intended to allow or forbid. As a general rule they do not even declare what principles are to be applied to ascertain whether it be due process. It is manifest that it was not left to the legislative power to enact any process which might be devised. As used in the Constitution of the United States, the article is a restraint on the legislative as well as on the executive and judicial powers of the government and cannot be so construed as to leave Congress free to make any process ®due process of law® by its mere will. It has been held that the amendment to the Constitution of the United States does nothing more than declare a great common-law principle applicable to all govern¬ ments, both State and Federal, which has existed from the time of Magna Charta. It was held by the Supreme Court of the United States in Murray v. Hoboken Co., 18 How. 272, that the words ®due process of law® were undoubtedly intended to convey the same meaning as the words

‘daw of the land® in Magna Charta. Due process of law ordinarily implies and includes a complainant, a defendant and a judge, regular allegations, an opportunity to answer and a trial according to some settled course of ju¬ dicial proceeding. When applied to proceedings in criminal cases, the expression “due process of law,® or the “law of the land,® means that no person shall be deprived of life, liberty, prop¬ erty or privileges without indictment or present¬ ment by “good and lawful men,® selected, or¬ ganized and qualified in accordance with some pre-existing law, and a trial by a court of jus¬ tice, according to the regular and established course of judicial proceedings. It is to be re¬ gretted, however, that the constitutional meaning or value of the phrase “due process of law® remains to-day without that satisfactory pre¬ cision of definition which judicial decisions have given to nearly all the guarantees of personal rights found in the constitutions of the several States and of the United States. Consult Cooley, ‘Constitutional Limitationsˆ (6th ed., Boston 1890) ; Hare, ‘American Constitutional Lawˆ (Boston 1889) ; McGehee, ‘Due Process of Law under the Federal Constitutionˆ (Chi¬ cago 1906) ; McLaughlin and Hart, ‘Encyclo¬ pedia of American Governmentˆ (New York

1914).

DUEL AND DUELING (from duellum, derived from duo) is a combat between two, at a time and place appointed in consequence of a challenge, and so is distinguished from an encounter taking place without any previous arrangement. The custom of dueling was de¬

rived from the Germans, Danes and Franks, who carried the practice of the judicial combat so far that none were excused except women, sick people, cripples and such as were over 60 years of age. Even ecclesiastics and monks were obliged to maintain their controversies by a champion in arms ; and this singular species of jurisprudence was not confined to criminal accusations, but the titles to estates were decided in the same manner. At length, however, this mode of trial was limited to those accusations of capital offenses in which there was no other testimony and in which common fame pro¬ nounced the accused party to be guilty. The party vanquished was punished by hanging, be¬ heading or mutilation of members. A judicial combat was authorized by Gundebald, king of the Burgundians, as early as 501 a.d. The prac¬ tice of trying rights to land, as well as the guilt or

innocence of an accused party, by combat under judicial authority, very naturally sug¬ gested the decision of personal quarrels in the same way, and all cases in which there was no adequate redress provided in the ordinary tribunals.

The example «f Francis I of France and Charles V of Spain gave a sanction to this mode of arbitration. On the breaking up of the treaty between these sovereigns and the declaration of war by the French and English heralds at the court of Charles, 2 Jan. 1528, the emperor, in replying to the declaration of the French monarch, desired the herald to ac¬ quaint his sovereign that he would henceforth consider him not only as a base violator of pub¬ lic faith, but as a stranger to the honor and in¬ tegrity becoming a gentleman. On receiving this message Francis immediately sent back the herald with a cartel of defiance, gave the Emperor the lie iri form, challenged him to single combat and required him to appoint the time, place and weapons. Charles accepted the challenge; but after many messages concerning the arrange¬ ments for the combat, accompanied with mutual reproaches bordering on the most indecent scur¬ rility, all thoughts of the duel were given up. But this affair, though it thus terminated with¬ out any encounter, is supposed to have had a great influence in producing an important change in rnanners all over Europe. Upon every insult or injury which seemed to touch his honor a gentleman thought himself entitled to draw his sword and to call on his adversary to give him satisfaction. Dueling raged with the greatest violence in France, where it is calculated that 6,000 persons fell' in duels during 10 years of the reign of Henry IV. His celebrated minister. Sully, remonstrated against the practice; but the king connived at it, supposing that it tended to maintain a military spirit among his people. But afterward, in 1602, he issued a very severe decree against it and declared it to be punish¬ able with death; and at the same time com¬ manded any person who had suffered wrong or received an insult to submit his case to the gov¬ ernor of the province, in order that it might be considered by a tribunal consisting of the constables and marshals of France. This de¬ cree, however, accompanied by the institution of a tribunal of honor, did not put an end to duels in France. Richelieu was firm in carrying out all edicts by which he hoped to check the power of the nobility, and accordingly insisted

on the strict observance of those against duels. Under his ministry the Count of Bouteville-Montmorency suffered death in 1627 for having violated a decree of the French Parliament against dueling. This had for a time the effect of deterring others from engaging in this prac¬ tice. During the minority of Louis XIV the law was more feebly administered and more than 4,000 nobles are said to have lost their lives in duels. With the revolution of 1789 com¬ menced the period of legal impunity for duels and a new class of duels became common, those, namely, between men engaged in politics. Bills, with a view to put down the practice, were brought forward in the Chambers in 1829 and 1830 and a similar proposal was made to the Council of State in 1832 ; but they were not accepted. At last, in 1837, the Court of Cassa¬ tion determined to follow a new law with re¬ gard to duels, and protesting against the practice in the name of morality and law, it decided that in case of death or injury resulting from a duel the principal parties and the seconds should be proceeded against and punished in accordance with the general provisions of the code penal. The French courts, however, re¬ serve to themselves a discretionary power in dealing with cases of dueling, and the practice is by no means yet obsolete in France.

Single combats are said to have been intro¬ duced into England by the Normans. In the time of chivalry numerous single combats took place in England, which, in the proper sense of the term, can scarcely be called duels. It may be said that the duel, strictly so called, was introduced into England about the same time that it became common in France, such was the ‘ contagion of the example of Francis I and Charles V. In the reign of James I of Eng¬ land there were numerous cases of dueling, the most celebrated of which is that in which Lord Bruce and Lord Sackville (afterward Lord Dorset) were the principals and in which the former was killed. Cromwell was an enemy of the duel and during the protectorate there was a cessation of the practice. It came again into vogue, however, after the Restoration, thanks chiefly to the Gallican ideas that then inundated the court of Saint James. Some of the duels of that epoch are in perfect accord with the loose morality then prevalent. An instance of this is the duel in which

the Duke of Buckingham killed the Earl of Shrewsbury, while the wife of the latter, the cause of the duel, who had accompanied the duke to the ground, witnessed the encounter in the dress of a page. A striking thing is that as society became more polished in England duels became more frequent. They were never more numerous than in the reign of George III. Among the principals in the fatal duels of this period were Charles James Fox, Sheridan, Pitt, Canning, Castlereagh, the Duke of York, the Duke of Richmond and Lord Camelford. The last-mentioned was the most notorious duelist of his time and wˆas himself killed in a duel in 1804. Of all the duels which took place during the reigns of George IV, William IV and Queen Victoria, the most celebrated is that which was fought between the Duke of Wellington and Lord Winchelsea in 1829, the cause of which was certain animadver¬ sions which Lord Winchelsea had passed on the duke's conduct in connection with the Catholic VOL. 9 — 25

Emancipation Bill. The duel passed off with¬ out any injury being done to either of the parties engaged. The Duke of Wellington missed his aim, whereupon Lord Winchelsea fired into the air and apologized. Since 1844, when stringent regulations against the practice were passed, dueling has become extinct in the British army.

Generally on the continent of Europe the practice obtains among the great conscriptionist nations. An anti-dueling league has been formed, in which one of the leading spirits is the Infanta Alfonso, a member of the Spanish rojˆal house, and its operations embrace France, Belgium, Germany, Austria and Spain. Dueling is still practised in Germany and is recognized as having a defined position in the army. As an illustration of the military viewpoint the fol¬ lowing case may be cited. Dr. Sambeth, an army officer, in May 1912 was challenged by a brother officer, but as he was a Catholic he refused to accept it, the Church having pro¬ nounced against it. On the question being sub¬ mitted to him, the Emperor William decided as follows : ˆˆThe refusal to fight a duel based on religious conviction is not a subject for examination by a court of honor, but the med¬ ical officer who in this respect holds opinions contrary to those of his fellow officers, cannot be allowed to remain in the service. Accord¬ ingly, he was dismissed from the army. A reso¬ lution against dueling passed by the Reichstag in 1912 was negatived by the Bundesrath in 1913. There were 13 duels fought by army officers in the latter year. Dueling is still prac¬ tised at the universities in Germany and to a less extent in Russia, but these are very seldom serious affairs, being rather fencing matches with sharp weapons than duels proper. The combatants are generally

padded all over the body except the face and sword-arm. The late Emperor Francis Joseph of Austria exercised his influence against dueling, counseling (1913) aggrieved officers to seek redress in the law courts. General Kuropatkin is a notable op¬ ponent of dueling in Russia. Victor Immanuel III of Italy some years ago directed an officer who had provoked a duel to be dismissed from the army and sentenced the principals and seconds to terms of imprisonment.

Dueling has been known in the United States from the very beginning of their settlement, the first duel taking place in 1621, at Plymouth, be¬ tween two serving men. In 1728 a young man named Woodbridge was killed in a duel on Boston Common by another young man named Phillips. They fought without seconds, in the night time, and with swords. Aided by some of his friends, Phillips got on board a nian-of-war and escaped to France, where he died a year afterward. There were few duels in the Revo¬ lution, the most noted being those between Gen. C. Lee and Col. John Laurens, in which the former was wounded, and between Generals Cad-wallader and Conway, in 1778, in which the latter received a shot in the head from which he recovered. Button Gwinnett, one of the signers of the Declaration of Independence, from Georgia, was killed in a duel with General McIntosh, in May 1777. In 1785 Captain Gunn challenged General Greene twice, both being citizens of Georgia, and threatened a personal assault when the latter refused to meet him. Greene wrote to Washington, acknowledging

DUER

that if he thought his honor or reputation would suffer from his refusal he would accept the challenge. He was especially concerned as to the effect of his conduct on the minds of mili¬ tary men and admitted his regard for the opinion of the world. Washington approved of his course in the most decisive terms, not on moral grounds, but because a commanding offi¬ cer is not amenable to private calls for the discharge of his public duty.

Alexander Hamilton was killed in a duel with Aaron Burr in 1804, the latter being Vice-President and the former the greatest leader of the opposition. This duel is always allowed the first place in the history of American private combats. That which stands next is the duel between Captains Barron and Decatur, the latter being killed and Barron severely wounded. Henry Clay and John Randolph fought in 1826, and Colonel Benton, in closing his account of the fight, says ; ˆCertainly dueling is bad, and has been put down, but not quite so bad as its substitute — revolvers, bowie knives, black¬ guarding, and street assassinations under the pretext of self-defense.ˆˆ General Jackson killed M. Dickinson in a duel, and was engaged in other *ˆffiffairs.® Colonel Benton killed a Mr. Lucas and had other duels. In 1841 Mr. Clay was on the verge of fighting with Colonel King, then a senator from Alabama and elected Vice-President in 1852. Mr. Cilley of Maine fought with Mr. Graves of Kentucky in 1838, near Washington, and the former was killed. This duel caused nearly as much excitement as that between Hamilton and Burr. Both parties were members of Congress. Duels have been numer¬ ous in California, notably the combat between Terry and Broderick. Formerly they were very common in the United States navy and valuable lives were lost. It is related of Richard Somers, who perished in the Intrepid, and who is said to have been a mild man, that he fought three duels in one day. In 1830 President Jackson caused the names of four officers to be struck from the navy roll because they had been engaged in a duel. Since the Civil \Var stringent laws have been passed in all the States against dueling and the practice has become obsolete in this country.

Dueling in Upper Canada (now Ontario) was illegal and the person guilty of so taking life was liable for murder, but by the ˆhinwritten lawˆˆ the Crown counsel, if the combat was fairly conducted, did not press for conviction. Perhaps the most celebrated duel fought in the early days of the colony was that between Wil¬ liam Weekes and

William Dickson, and took place behind a bastion of old Fort Niagara, on the American side of the river, on 10 Oct. 1806. Weekes was killed; but as the duel had been fought in a foreign country, Dickson was never brought to trial. What is regarded as the last duel in Upper Canada took place on the banks of the river Tay at Perth on 13 June 1833 between John Wilson (afterward puisne judge of the Common Pleas of Ontario) and one Robert Lyon, in which the latter was mortally wounded; but following the customary practice, the fight having been a fair one, the jury did not convict.

Bibliography. — Douglas, ˆDuelling Days in the Armyˆ (1887) ; Massi, ˆHistory of Duelling in All Countriesˆ (1880) ; Milligen, ˆHistory of

Duelling> (1841) ; Sabine, ˆNotes on Duels and Duelingˆ (1855); Steinmetz, ˆThe Romance of Duellingˆ (1868); Truman, ˆThe Field of Honorˆ (1884).

DUER, du'er, John, American jurist: b. Albany, N. Y., 7 Oct 1782; d. Staten Island, 8 Aug. 1858. He commenced the practice of law in Orange County, N. Y., whence about 1820 he removed to the city of New York, where he resided until his death. In 1825 he was ap¬ pointed one of the commissioners to revise the statute law of the State and in 1849 was elected a justice of the Superior Court of New York, a position which he filled until his death. He published ˆLecture on the Law of Representa¬ tions in Marine Insuranceˆ (1845) ; ˆLaw and Practice of Marine Insuranceˆ (2 vols., 1845-46), which has become a standard authority in the United States.

DUER, William Alexander, American jurist: b. Rhinebeck, Dutchess Countv. N. Y., 8 Sept. 1780; d. New York, 31 May 1858. He was a brother of John Duer (q.v.). He was admitted to the bar in 1802, and between 1814 and 1820 was a member of the State assembly, taking a prominent part in the debates on the establishment of canals and other important questions. In 1822 he was appointed judge of the Supreme Court in the third circuit, an office which he held until the close of 1829, when he was elected president of Columbia College. He retired from this post in 1842. He was the author of. a treatise on the ˆConstitutional Juris¬ prudence of the United Statesˆ ; and also ˆLife of William Alexander, Earl of Sterlingˆ (1847) ; ˆReminiscences of an Old New Yorkerˆ (1867).

DUERO. See Douro.

DUEZ, dii'a, Ernest, French painter: b. Paris, 8 March 1843 ; d. there, 5 April 1896. He was a pupil of Pils, and his paintings include ˆThe Honeymoonˆ ; ˆSplendor and Miseryˆ ; ˆ Saint Cuthbertˆ ; ˆEvening in Viller-villeˆ ; ˆThe Pont-Neufˆ ; and Hn Summer.ˆ He painted some excellent portraits also. His work is realistic and colorful.

DUFAURE, dii'fdr, Jules Armand Stanis¬ las, French orator and statesman: b. Saujon, France, 4 Dec. 1798; d. Paris, 28 June 1881. He practised law at Bordeaux ; entered the Chamber of Deputies in 1834, and became an influential leader of the Liberal party. Under the Republic he was Minister of the Interior, but was driven from the public service by the coup d'etat of 1851, and for the next 20 years devoted himself closely to his bar practice and pamphlet writing. Under the government of Thiers he acted as Minister of Justice; and in 1876, and again from 1877 to 1879, he was head of the Cabinet.

DUFF, Alexander, Scottish missionary: b. Perthshire, 26 April 1806; d. Edinburgh, 12 Feb. 1878. He set out in 1829 for India as the first Church of Scotland Missionary to that country. He opened a school in Calcutta in which he sought to teach not only, the doctrines of Christianity, but also the English language and the science and learning of Europe. He subse¬ quently assisted in founding the University of Calcutta. His chief writings are ˆThe Church of Scotland's India Missionˆ (1835) ; Vindica¬ tion of the Church of Scotland's India Missionˆ (1837) ; Hndia and India Missionsˆ (1840) ;

<The Jesuitsˆ (1845); ˆ The Indian Mutiny : Its Causes and Resultsˆ (1858).

DUFF, Archibald, English biblical scholar; b. Fraserburgh, Aberdeen, 1845. He was edu¬ cated at McGill University and Andover Theo¬ logical Seminary, also at Halle and Gottingen, Germany. In 1864-69 he was a high-school teacher in Canada and in 1875-78 was theologi-pl tutor and mathematical tutor in Montreal; in the latter year he was appointed professor of Hebrew and Old Testament theology in the United College, Bradford. He was chairman of the Yorkshire Congregational Union in 1893, was one of the founders of the Athenaeum Club and coeditor of Bibliotheca Sacra from 1874 to 1894. tiis publications include ˆThe Use of the Old Testament in the Study of Origin of Doc¬ trineˆ (1879) ; ˆThe History of Atonement Among the Hebrewsˆ (1880); ˆOld Testament Theologyˆ (Vol. I, 8th Century b.c., 1891 ; Vol. II, Deuteronomic Reformation, 1900) ; ˆHebrew Grammarˆ (1901) ; ˆTheology and Ethics of the Hebrewsˆ (1902) ; ˆ First and Second Esdrasˆ (in ˆTemple Apocrypha, 1903) ; ˆAbraham and the Patriarchal Ageˆ (1903) ; ˆModern Old Tes¬ tament Theologyˆ (1908) ; ˆHistory of Old Tes¬ tament Criticismˆ (1910) ; a translation of Duhm's ˆEver-coming Kingdom of Godˆ (1911) ; and of ˆBook of the Twelve Prophetsˆ (1912) ; Hsaiahˆ and Frenssen's ˆStory of Jesusˆ (in ˆBrother Richard's Bookshelf,® 1913) ; and commentaries on Esther and Lamen¬ tations.

DUFF, Edward Gordon, English librarian: b, 16 Feb. 1863. He was educated at Chelten¬ ham College and Oxford and was librarian of the John Rylands Library, Manchester, 1893-1900. He was Sandars reader in bibliography in Cambridge University 1898-99 and 1903-04, 1910-11. He has published ˆEarly Printed Booksˆ (1893) ; ˆ Early English Printingˆ (1896) ; ˆThe Printers, Stationers and Bookbinders of Lon¬ donˆ (1899) ; ˆWilliam Caxtonˆ (1902) ; ˆA Century of the English Book Tradeˆ (1905).

DUFF, Sir Mountstuart Elphinstone Grant, English writer and politician : b. Eden, Aberdeenshire, 21 Feb. 1829; d. London, 12 Tan. 1906. He was educated at Balliol College, Ox¬ ford, was called to the

bar of the Inner Temple in 1854 and in 1857 entered the House of Com¬ mons as a Liberal. From 1868 till 1874 he held the office of undersecretary for India under Mr. Gladstone, and in that statesman's second minis¬ try he was undersecretary of the colonies from 1ˆ0 till his appointment in 1881 as governor of Madras. His tenure of this irnportant office was very successful and ended with his resignation in 1886. From 1889 till 1893 he was president of the Royal Geographical Society. His published works include ˆNotes of an Indian Journeyˆ (1876) ; ˆMiscellanies, Political and Literaryˆ (1878) ; < Memoir of Sir Henry Maineˆ (1892) ; ˆErnest Renanˆ (1893) ; ˆNotes from a Diaryˆ (1897-1900) ; ˆOut of the Pastˆ (1903) ; ˆGems from a Victorian Anthologyˆ (1904).

DUFFERIN, duf'fer-m, AND AVA, aVa, Frederick Temple Hamilton-Temple Black¬ wood, Marquis of, Irish diplomatist and author; b. Ireland, 21 June 1826; d. Clandeboye, Ireland, 12 Feb. 1902. On the death of his father in 1841 he succeeded to the title of Baron of Dnflferin and Clandeboye in the peerage of Ireland. He

first distinguished himself by contributions to literature and published the popular ˆLetters frorn High Latitudesˆ in 1859. He was suc¬ cessively undersecretary for India 1864-66 and for war 1866, was chancellor of the duchy of Lancaster 1868-72, in 1871 was created an earl and was governor-general of Canada 1872-78. His brilliant administration was remarkable for the wonderful development of the provinces and the beginning of construction of the Canadian Pacific Railway. From 1879 to 1881 he was Ambassador at Saint Petersburg, whence he was transferred to Constantinople. In 1884 he suc¬ ceeded Lord Ripon as viceroy of India, resign¬ ing in 1888. Lord Dufferin's tenure of office was made memorable by measures for strength¬ ening the Indian frontier, by the various at¬ tempts to delimit the Afghan frontier and, above all, by the annexation of Upper Burma in December 1885. He became successively Am¬ bassador at Rome, marquis (1888) and Am¬ bassador to France (1891-96). In addition to the volume named he published Hrish Emigra¬ tion and the Tenure of Land in Irelandˆ (1867) ; ˆSpeeches and Addressesˆ (1882) ; ˆSpeeches Delivered in Indiaˆ (1890). His mother, Helen Selina Sheridan (1807-67) was the author of ˆThe Emigrant's Farewell,ˆ Bay of Dublinˆ and other touching songs.

DUFFIELD, George, American Presby¬ terian clergyman and hymn writer : b. Carlisle, Pa., 12 Sept. 1818; d. Bloomfield, N. J., 6 July 1888. The son of a well-known pastor, he was graduated at Yale in

1837 and at Union Theo¬ logical Seminary, New York, in 1840. He held various Presbyterian pastorates and wrote the popular hymns ˆ Blest Saviour, Thee I Loveˆ (1851), and ˆStand Up, Stand Up for Jesusˆ

(1858).

DUFFIELD, William Ward, American civil engineer: b. Carlisle, Pa., 19 Nov. 1823; d. 1907. He was graduated at (Columbia in 1841 and served as lieutenant on the staff of General Pillow in the Mexican War 1847-48, and during the Civil War commanded the 4th Michigan In¬ fantry. He was brevetted major-general in 1863, elected State senator for Michigan in 1878, and appointed chief engineer for railways in Michi¬ gan, New York, Illinois, Texas; and United States engineer of improvements on Wabash and White rivers in 1892. In 1894-98 he was superintendent of the United States Coast and Geodetic Survey. In the survey ˆ Reportˆ for 1895-96 he published a valuable table of 10-figure logarithms to 100,009, newly calculated. His writings include ˆSchool of the Brigade, and Evolutions of the Lineˆ ; ˆTreatise on Logarithms. >

DUFFY, Sir Charles Gavan, Australian statesman: b. Monaghan, Ireland, 12 April 1816; d. Nice, France, 9 Feb. 1903. He took to jour¬ nalism and in 1842 assisted in founding a Dub¬ lin newspaper called the Nation. In 1843 he was convicted of sedition with O'Connell, but the House of Lords in the following year quashed the conviction. He played a prominent part in the founding and directing of the Irish Confed¬ eration and in 1848 he was brought to trial along with other members of that body on a charge of treason-felony, but the prosecution could not obtain a conviction. In 1852 he was elected to Parliament as representative of New Ross and

succeeded in forming an independent Irisli po¬ litical party. Dissensions arose, and in conse¬ quence he resigned his seat and went to Aus¬ tralia in 1856. For some time he practised as a barrister in

Melbourne. In 1857 he became Minister of Public Works in the first responsible Victorian government. In 1858 and again in 1862 he was Minister of Lands and became Premier of Victoria in 1871. In 1880 he re¬ turned to Europe. Several works from his pen have been published, including ˆThe Ballad Poetry of Irelandˆ (1845, about 50 editions) ; Woung Ireland: a Fragment of Irish History 1840-50ˆ (1880) ; ˆFour Years of Irish History 1845ˆ9ˆ (1883), a sequel to the preceding work.

DUFRENITE, du'fren-It, a native basic phosphate of iron. It occurs in small crystals of orthorhombic form, but usually it is in radiating-fibrous masses, sometimes with botryoidal or drusy surface. Its hardness is 3.5 to 4 and spe¬ cific gravity about 3.3. It is nearly opaque, has a sillˆ lustre and blackish-green color. It is found in Westphalia, Bohemia, France and in East Cornwall, England. In the United States it occurs as a fibrous coating in the Green Sand formation at Allentown, N. J. ; also in coarse greenish-brown radiating masses underlying lay¬ ers of lignite in Rockbridge County, Va. It was named in honor of the French mineralogist Dufrenoy,

DUFRESNE, Charles, sharl dii-fran. See

Du Cange,

DUFRESNY, diiHra-ne, Charles Riviere, French poet: b. Paris 1654; d. there, 6 Oct. 1724. He was appointed manager of the royal gardens on account of the strong love of flowers which he manifested, and in this capacity in¬ troduced into France the taste for gardens in the English style. Among his dramatic pieces may be mentioned ˆL'esprit de contradiction,ˆ a one-act play in prose; ˆLe mariage fait et rompu,ˆ in verse; and a second prose piece in three acts, called ˆLe double veuvage.ˆ He also wrote a romance in which he depicts the man¬ ners of the time after the fashion of Le Sage, ˆLes amusements serieux et comiques.ˆ

DUGAS, Louis Alexander, American physician: b. Washington, Ga., 3 Jan. 1806; d. 1898. His parents were of French ancestry and emigrated from Santo Domingo. He was edu¬ cated at home, studied medicine with Dr, John Dent, and in 1827 was graduated at the medical department of the University of Maryland. After attending lectures in Baltimore and Phila¬ delphia, and spending several years in study in Europe, he settled in Augusta, Ga., in 1831. In 1832 he united with five others in founding the Medical College of Georgia, in which he was for many years professor of surgery. In 1869 the degree of LL.D. was conferred upon him by the University of Georgia. For

many years he was president of the Medical Society of Augusta and president of the Medical Association of Georgia. During the Civil War he was vol¬ unteer and consulting surgeon of military hos¬ pitals. From 1851 to 1858 he was editor of the Southern Medical and Surgical Journal. His works include ˆ Rheumatismˆ ; ˆ Ophthalmiaˆ ; ˆColica Pictonumˆ ; ˆConvulsionsˆ ; ˆSurgical Operations during Mesmeric Insensibilityˆ ; ˆUse of Quinine in Feversˆ ; ˆDiagnosis of Shoulder Dislocations' ; ˆFractures of the

Scapula' ; ˆTransactions of the Medical Asso¬ ciation of Georgia' ; ˆPathological Peculiarities of Negroes.'

DUGDALE, Sir William, English an¬ tiquary: b. Shustoke, Warwickshire, 12 Sept. 1605; d. there, 10 Feb. 1686. He was, in 1640, made rouge croix pursuivant, and had apart¬ ments in the heralds' office, with ample oppor¬ tunities for his favorite study. With Dods-worth he prepared the ˆMonasticon Angli-canum' (1655-73). The principal work of which Dugdale had the sole merit is the ˆAntiquities of Warwickshire' (1656). At the Restoration he was appointed Norroy king-at-arms, and in 1677 Garter king-at-arms, with the honor of knighthood. Besides the works already men¬ tioned, he published the ˆBaronage or Peerage of England' (1675-76) ; ˆOrigines Judiciales, or Historical Memoirs of the English Law Courts of Justice, etc.' (1666) ; a ˆHistory of St. Paul's Cathedral' (1658) ; and various minor writings. His manuscripts are preserved in the Bodleian Library, the Heralds' College and some in the Ashmolean Museum.

DUGMORE, Arthur Radclyffe, American artist and author : b. England, 25 Dec. 1870, He studied painting at the Belle Arti, Naples; came to the United States in 1889, and has devoted himself to the study of ornithology, drawing, painting and illustrating by photography. He exhibited his paintings in London 1913, and lectured in the United States and England 1911-14. In 1914 he went to Belgium to investigate conditions of German warfare against the Bel¬ gians. He was taken prisoner by the Germans, but was afterward released. He was made lieutenant of the British army, March 1915, and was wounded at the battle of Alost. He has published ˆBird Homes' ; ˆHabits of the Land Birds Breeding in the Eastern United States' (1900); ˆNature and the Camera' (1902); ˆCamera Adventures in the African Wilds' (1910), which contains his experiences (many of them extremely hazardous) in photograph¬ ing African big game; ˆWild Life and the Camera' (1912); ˆRomance of the Newfound¬ land Caribou' 0913), in which he gathered the results of nine seasons of patient and

success¬ ful camera hunting of that wary animal ; ˆRomance of the Beaver’ (1914).

DUGONG, du’gong, or DUYONG, the

Malayan name for the genus Halicore of the order Sirenia or ®sea cows.” It is from five to seven feet long, occasional specimens attaining a length of nine feet. It is a marine animal, never ascending rivers, and feeds chiefly on sea¬ weed ; in which particular it differs from the related genus Manatus. It is found along the shores of Australia, of the Indian Ocean and around the Red Sea. Unlike the manatee it has a crescent-shaped tail, its nostrils are on the upper part of the muzzle and its flippers are quite without trace of nails. The skull of the dugong is characterized by the thickness of the beak and the lower jaw, both of which are bent sharply downward, almost at right angles to the axis of the skull. In the males the incisors are developed into large, straight tusks, pointing directly downward. In color the animal is grayish-blue, sometimes whitish below. The female is proverbial among the Malays for her maternal solicitude for her offspring, of which

but one is produced at a birth. And this is sup¬ posed to be one of the sources of the mermaid legend.

The flesh of the dugong is said to be ex¬ tremely palatable; but its chief value, from a commercial standpoint, is the fine oil yielded by the Australian species {Halicore australis). This has been in such demand for medicinal and other purposes as to have caused a wholesale slaughter amounting almost to the extermina¬ tion of the species. See Sirenia for structure.

DUGOUT, a cave dug in the side of a hill or mountain, used as a dwelling, partly built of logs as seen in some sections of Montana, or as a place of refuge from cyclones and tornadoes. These are frequently to be seen in some of the Western States. Also the name of a canoe or boat made from a log of wood, hollowed and shaped for use.

In military usage, a dugout is an artificial cave used for the purpose of cover from shells. It is either hollowed out and propped up from within, or is dug from the surface of the earth, and then covered with layers of earth and broken stone supported on a framework of steel rails. See Fortifications.

DUGUAY-TROUIN, dii-ga-troo-an', Rene, French seaman: b. Saint Malo, 10 June 1673; d. Par«is, 27 Sept. 1736. His various successful privateering expeditions attracted the attention of the government before he was 21, and Louis XIV sent him a sword. He captured great numbers of English and Dutch ships on the coast of Spain and Ireland; in 1696 he took a great part of the outward-bound Dutch fleet under Wassenaer ; in 1697 he entered the royal marine as a captain. He signalized him¬ self so much in the Spanish war that the king granted him letters of nobility, in which it was stated that he had captured more than 300 merchant ships and 20 ships of war. By the capture of Rio de Janeiro (1711) he brought the Crown more than 25,000,000 francs. Louis XIV made him lieutenant-general and placed him in command at Brest. Under Louis XV he rendered important services in the Levant and the Mediterranean.

DU GUESCLIN, du ga-klan, Bertrand, constable of France : b. Motte-Broon castle, near Rennes, 1320; d. 13 July 1380. He served first in the army of Charles of Blois (1342). He was knighted in 1354. Mainly to him must be attributed the expulsion of the English from Normandy, Guienne and Poitou. He was captured by Chandos at the battle of Auray in 1364, and ransomed for 100,000 francs. While serving in Spain against Peter the Cruel he was made prisoner by the English Black Prince, but was soon liberated. For his services in Spain he was made constable of Castile, Count of Trastamare and Duke of Molinas; and in 1370 he was made constable of France. In 1373 he occupied most of the fortresses of Brittany and died at the siege of Chateauneuf de Randon. Consult Luce, ˆHistoire de Ber¬ trand du Guesclin et de son epoqueˆ (1876) ; Stoddard, ˆBertrand Du Guesclinˆ (1897).

DUHM, Bernhard Laward, German Prot¬ estant biblical scholar: b. Bingum, Hanover, 1847. He received his education at Gottingen, where he taught from 1877-89. In the last-

named year he went to Basel in the capacity of professor of Old Testament theology. He is especially noted for his brilliant biblical criticisms. His works include ˆTheologie der Propheten ˆ (1875); ˆUber

Ziel und Methode der Theologieˆ (1889) ; ˆKosmologie und Re¬ ligionˆ (1892) ; ˆDas Geheimnis in der Re¬ ligionˆ (1896) ; ˆDie Entstehung des Alten Tes¬ tamentsˆ (1897-1906); ˆDas kommende Reich Gottesˆ (1909, translated into English by Duff, 1911) ; translations in the original metre of Oobˆ (1897) ; the ˆPsalmsˆ (1899) ; Oˆremiahˆ (1903) ; ˆHabakkukˆ (1906) ; and commentaries on these books and on the 12 minor prophets.

DUHRING, dii'rmg, Eugen Karl, German philosophical writer ; b. Berlin, 12 Jan. 1833. He studied at the University of Berlin, and prac¬ tised law for a time; he then became professor of philosophy and political economy at Berlin in 1864, but gave up the position on account of quarrels with the faculty. He has written 'ˆDer Wert des Lebensˆ (1865), which did much to introduce the positivism of Comte into Germany; UCritische Geschichte der Philos¬ ophies (1869) ; ˆLogik und Wissenchafts-theorieS (1878) ; ˆDie Judenfrage als Rassen-, Sitten-, urid KulturfrageS (1892) ; also a num¬ ber of works in political economy, including ˆKapital und Arbeit s (1865) ˆDie Verkleinerer Careys s (1867) ; and ˆKritische Geschichte der Nationalokonomie und des SozialismusS (1879). Consult Doll, ˆEugen DuhringS

(1883).

DUIKER-BOK, dl'ker-or doi'ker-bok, a genus of small antelopes (Cephalolophus) , native to southern Africa. They are character¬ ized by small, straight horns, generally present in both sexes ; and by an upright tuft of hair between the horns. The typical species (C. grimmi) is found in bush-covered districts from the Cape of Good Hope to the Zambesi River, and ranges even farther north along the west coast of Africa. It stands about 26 inches high ; its ears are long and narrow ; its color is yellowish-brown, with a tendency to gray; but the color is decidedly variable. The horns, in this species present only in the male, are from three to five inches long, and rise at a sharp angle to the face. Of the allied species the following are the most important : The red-buck of Natal (C. natalensis), which differs from C. grimmi in that its horns incline back¬ ward, and are present in both sexes ; and that its color is more reddish. The bluebuck of the jungle (C. monticola) is a tiny creature, only 13 inches high at the shoulder, that swarms in the Natal region. It is smaller and lighter in build than a hare; is bluish mouse-color, and has tiny straight horns. It feeds on berries and young shrubs. The zebra-antelope of West Africa (C. dorice) is distinguished by its coat of rich golden-brown, banded with eight or nine transverse

lines across the back loins. The wood antelopes, also West African, are nearly three feet tall, and are classed in two species, C. sylvicultor and C. jentinki.

The name ˆMuikeFˆ signifies *ducker® or ˆMiver,ˆˆ in allusion to the animal's rapidity of motion when in the thickets. Consult Schweinfurth. Heart of Africaˆ (Leipzig 1878) ; and other books by African explorers and natural¬ ists.

DUILIUS, Gaius, Roman general : b. about 300 B.c. He was trained to arms by his father, Marcus and rose to the highest rank as a naval and military officer. He became consul in 260 B.C., defeating the Carthaginians near Mylse in that year. In honor of this victory, Rome's first success on the sea, a magnificent column (columna rostrata) was erected.

DUISBURG, doo'is-boorg, Germany, city, an inland port of Prussia, in the Rhine prov¬ ince, about 13 miles north of Diisseldorf. The town has civic, educational and other institu¬ tions in keeping with its importance. The finest of the churches is the 14th century Saint Salvator, with fine wall-paintings. Duisburg has blast-furnaces, foundries and other works de¬ pending on the iron trade. Its chemical works, cotton-mills and commerce are extensive. It is an ancient place, early rose to be a free town, and became a member of the Hanseatic league. It possessed a university from 1655 to 1818. The tomb of Mercator, the famous geographer, is here. Pop. about 93,600.

DUJARDIN, dii-zhar-dah, Felix, French naturalist; b. Tours, 5 April 1801; d. Rennes, 8 April 1860. From 1827 to 1834 he delivered public lectures in Tours upon geometry and chemistry as applied to the arts. During the same period he published several geological works, in one of which he first made known the curious fact that artesian wells bring to the surface seeds and remains of insects, which have been taken from long distances and trans¬ ported through subterranean passages. In 1833 and 1834 he published descriptions of the flora of the region of the Loire, and of the geology and fossils of Touraine. He

then devoted him¬ self to zoological researches, and published ob¬ servations upon the rhisopodcu, for which he proposed a new classification. In 1839 he added extended annotations to the 3d volume of De Lamarck's ˆHistory of Invertebrate Animals,ˆ and among his later publications were his re¬ searches upon the brain of insects, and upon the instinct of bees. He was a professor at Rennes from 1839.

DUJARDIN, Karel, Dutch artist : b. Amsterdam 1640; d. Venice, 20 Nov. 1678. He went to Italy when young, and was a member of the Society of Painters at Rome, among whom he was called Barba di Becco. His works met with general approbation. His landscapes have spirit and harmony, his figures expression and his color the brilliancy which distinguishes his school. His paintings are rare and com¬ mand a high price. He also published 52 land¬ scapes etched with much spirit and ease. The Louvre possesses his masterpiece ˆThe Charla¬ tans.ˆ Amsterdam, Brussels, Berlin and the National Gallery, London, have specimens of his work.

DUK-DUK, in New Britain (formerly New Pommern) — the largest island of the Bis¬ marck archipelago in the Pacific Ocean — is a secret male society for the preservation of ancient observances among the Melanesian natives. The inculcation of respect and order among the youthful members of the community, the subjection of women and the enforcement of obedience to the chiefs are among its main objects; its mystic ceremonies, masked dances, etc., are picturesque. The society is analogous

to the West African negrital Mumbo Jumbo organizations, and is interesting sociologically as an uncivilized form of the Vehmgericht, lodges, bachelors' clubs, etc., of Europe and America. Consult Powell, ˆThree Years Among the Cannibals of New Britainˆ (1897).

DUKE, Basil Wilson, American lawyer and famous cavalry leader in the Confederate army; b. Scott County, Mo., 28 May 1838; d. New York, 16 Sept. 1916. He was educated at Georgetown (Ky.) College and Danville College and the Lexington Law School. Be¬ fore he had reached his majority General Duke was active in the group of men who fought to carry Missouri into the Confederacy. He was born in Scott County, Ky., in 1838, but saw his first military service in Missouri. Return¬ ing to Kentucky, he joined his brother-in-law, Gen. John H. Morgan, in raising troops for ihe Southern Army. From a lieutenant in the famous cavalry organization known as ®Mor-gan's

Raiders,ˆˆ he rose rapidly to the rank of colonel and led one of the hardest fighting cavalry regiments in the service. He was badly wounded at the battle of Shiloh, but recovered in time to participate in the operations of Morgan's troops in Tennessee and Kentucky, being present at the famous Ohio raid. With his chief and most of the command he was captured and imprisoned in the Ohio* peni¬ tentiary, from which General Morgan dug his way to freedom with most of his men. He frequently distinguished himself for gallantry and the unusual success of the military opera¬ tions he directed, and gained a reputation for daring second only to that of the noted cavalry leader with whom he was associated for the full period of the rebellion.

For more than 20 years Brigadier-General Duke was connected with the law department of the Louisville and Nashville Railroad, with headquarters at Louisville. He was the author of many books on finance and the Civil War, among the latter being the ˆHistory of Mor¬ gan's Cavalryˆ (1867) and ˆReminiscences of Gen. Basil W. Dukeˆ (1911). He also wrote the ˆHistory of the Bank .of Kentucky.ˆ

DUKE, James Buchanan, American to¬ bacco manufacturer; b. on farm near Durham, N. C., 1857. He was educated in the country schools; entered the tobacco business with his father and brothers at Durham under the firm name of Duke Brothers and Company. In 1884 he went to New York and in 1ˆ9 organ¬ ized the American Tobacco Company of which he was president until 1912. He is president of the Continental Tobacco Company and the Consolidated Tobacco Company and since 1912 chairman of the board of directors of the British-American Tobacco Company. He is a director of the Imperial Tobacco Company and of many other corporations.

DUKE (in French due, in Spanish duque, in Italian dnea, in Venetian doge, all derived from the Latin dux, leader, commander), a title belonging originally to a military leader. It seems to have cqrne into use when Constantine separated the military and civil commands of the provinces ; the title dux was then applied to the military governor of a province, and the ducal rank was made inferior to that of the comes (count). The Goths, Franks and other

northern tribes who invaded the vast Roman territories, adopted, if they had not before borrowed, the titles of duke and count. Among those warlike peoples, however, the dukes as military chiefs soon acquired a marked pre¬ eminence over the counts, whose functions in the eastern and western empires were more of a civil and judicial nature. Under Charlemagne, who was jealous of the increasing power of the higher nobility, the dignity was suffered to cease, but under his weaker successors the ducal governors of the provinces attained an almost absolute independence. The concession of hereditary power and independent jurisdiction, first tr the central province known as the Isle de France, and then to Aquitaine, extended itself under the Carlovingians to Burgundy, Normandy and Gascony, and on the accession of Hugh Capet to all the other subaltern ten¬ ures. It was not long until the dukes, feeling secure in the unlimited governing power of their provinces, proclaimed their title to be as good as that of the king. They coined money, assumed the crown and sceptre, gave law to their subjects, made war even against the king and reduced the royal jurisdiction to a few towns such as Rheims and Laon. From the time of Philip II (Philippe Auguste) to that of Louis XI, however, these duchies were grad¬ ually reunited to the crown, and those subse¬ quently accorded to the members of the royal family enjoyed none of the privileges of in¬ dependent sovereignty. Prior to the Revolu¬ tion dukes were created by letters patent of the king, and were of three kinds ; those desig¬ nated as dukes and peers held the first rank and had a seat in Parliament. The dignity of the second class descended to their male chil¬ dren, but that of the dukes by brevet ceased with themselves. The rank of duke in the royal family of France was superior to that of prince, and sometimes inferior to that of count. The ducal along with all other titles of nobility was abolished at the Revolution, but was restored by Napoleon in 1806.

In Germany the dukedom passed through phases similar to that exhibited in France. In 847 the Emperor Louis appointed a duke (Her¬ zog) of Thuringia to protect the frontiers against the Wendes, or Vandals, a Slavonic tribe. The power of the dukes gradually in¬ creased, their dignity became hereditary and they soon became powerful members of the Holy Roman Empire. An archbishop of Cologne, Bruno, was the first who bore (in 959) the title of archduke (Erzherzog), which since the time of the Emperor Frederick HI (1453) has been given exclusively to the princes of the house of Austria. All the Austrian princes are arch¬ dukes, as distinguishing title of the

imperial family.

In Great Britain th? title of duke ranks as a title of honor or nobility next below that of a prince or princess of the royal blood and that of archbishop of the Church of England. The first hereditary duke in England was the Black Prince, created by his father, Edward HI in 1336. The duchy of Cornwall was bestowed upon him, and was thenceforward attached to the eldest son of the king, who is considered a duke by birth. The duchv of Lancaster was soon after conferred on his third son, John of Gaunt, and hence arose the special privileges

which these two duchies still in part retain. Richard H was the first sovereign to make creations apart from princes of the royal house. Henry VHI and Edward VI made creations; but through attainders and failure of issue by the reign of Elizabeth in 1572 the ducal order became extinct, and was not revived till the creation of Villiers, Duke of Buck¬ ingham, and Ludovic Stuart, Duke of Rich¬ mond, by James 1. Charles H bestowed dukedoms on six of his illegitimate children — those of Monmouth, Grafton, Northumberland, Southampton, Richmond and Saint Albans. By William, Anne and George I lower dignities were advanced to the rank of duke — of the 26 dukes of the British peerage exclusive of those of royal blood, only two, those of Nor¬ folk and Somerset, were created prior to the Civil War. The coronet of a British duke consists of eight strawberry leaves of a con¬ ventional type on a rim of gold. In the Bible the word dukes is used, Gen. xxxvi, 15, for the duces, of the Vulgate.

DUKE OF EXETER'S DAUGHTER,

a rack in the Tower of London, so-called after its inventor, a minister of Henry VI. Accord¬ ing to Blackstone it was never put in use.

DUKE'S LAWS, so named from the Duke of York, afterward James H, were a code pro¬ mulgated by Col. Richard Nicolls, the English commander who took New Amsterdam from the Dutch in 1664 and became governor of the colonies under the Duke's patent. They applied first to the Dutch ; confirmed the patroon.s in their estates, which thenceforth were to be called manors; introduced jury trial; amended the criminal code, and provided for freedom of religion and equal taxation and militia service. There was no popular election of magistrates at first, but the code was afterward modified into the instrument of government of New York and New Jersey.

DUKES, Leopold, Hungarian scholar : b. Pressburg, 27 Jan. 1810; d. Vienna, 3 Aug. 1891. He spent the greater part of his life in research work in Jewish literature, fully 20 years being passed in the Bodleian Library and the British Museum. His books, largely of a critical char¬ acter, threw new light on mediaeval Hebrew literature, Hebrew grammarians and lexicogra¬ phy. He was also a frequent contributor to English, German and Hebrew ˆ publications. Among his works the most entertaining was his ˆRabbinische Blumenlese,ˆ a collection of rab¬ binical proverbs and their illustrations from the popular sayings of other races. He was at his best in his sketches of the Hebrew poets of the Middle Ages, Moses ben Esra and Ibn Gabirol in particular. He translated into German (1838) the famous Pentateuch commentary of Rashi.

DUKHOBORS, doo-ko'bor, DUKHOBORTSY. See Doukhobors.

DUKINFIELD, England, a borough in county of Chester, a few miles from Man¬ chester. Extensive collieries, cotton factories, engineering, brick and tile works give employ¬ ment to the greater part of the population. Pop. about 19,500.

DULAG, doo'lag, Philippines, a town on the eastern coast of the island of Leyte, at the mouth of the Catbassag River. There are large

deposits of sulphur in the vicinity. Pop. about

15,000.

DULANGAN, doo-lan'gan, or GULAN-GAN, a heathen tribe of the Philippines, living in the southern part of the province of Davao, island of Mindanao. It is uncertain whether they are of pure Malayan race or have an in¬ fusion of Negrito blood.

DULANY, Daniel, American colonial law¬ yer : b. Annapolis, Md.,

1721; d. 1797. He was educated in England, at Eton, Cambridge and the Temple, and was admitted to the bar of Maryland in 1747. He was deputy commissary-general from 1754 to 1761 and a member of the provincial council from 1757 to 1775. He also served as deputy secretary and secretary of Maryland from 1761 to 1773. In 1765 he wrote a powerful pamphlet against the Stamp Act, and his arguments against arbitrary taxation furnished material for Pitt's famous speech on behalf of the American colonies in 1766. He was, however, a staunch Royalist, refused to take part in the Revolution and lost nearly all his landed property by confiscation. Consult Tyler, ˆLiterary History of the American Rev¬ olutionˆ (New York 1897).

DULCAMARA. See Bitter-sweet.

DULCAMARIN (picroglycion or dulcarin, C22H34O10) a glucoside which is separated from the aqueous extract of Solanum Dtdcamara — bitter-sweet, and consists of a yellow, transpa¬ rent, resinous, easily powdered mass, readily soluble in alcohol, sparingly in ether, and very slightly in water. It has a slight alkaline re¬ action and yields to platinum salt. The nar¬ cotic alkaloid solanine is also obtained from bitter-sweet.

DULCE, dool'sa. (1) A lake of Guatemala, on the east coast, 100 miks northeast of Guate¬ mala City, communicating with the Gulf of Honduras by the lakelet el Golfete. It is about 30 miles long by 12 broad and from 20 to 60 feet deep. Also called Lake Izabal, it is the chief waterway of the state to the Caribbean Sea and the Atlantic Ocean, (2) A river in Argentina, rising in the province of Tucuman, and called in its lower course the Saladillo River. It flows northeast past Santiago and ends in the salt marshes of Lake Porongos. (3) A gulf on the coasts of Costa Rica and Panama, in Central America,

DULCE DOMUM, a famous song sung at Winchester College, England, on the eve of the break-up day for the summer holidays. The origin of both words and music is very uncer¬ tain — it is usual to ascribe the former to one Turner, probably him who became bishop of Ely, and was one of the seven bishops under James H; the latter, to Johannes Reading, or¬ ganist of the college from 1681 to 1689.

DULCIGNO, dool-chen'yo, Montenegro, a small seaport town on the Adriatic. The in¬ habitants, formerly notorious under the name of Diilcignottes, as the most dangerous pirates of the Adriatic, are now engaged in commerce or in the fisheries of the river Bojana. Pop.

5,102.

DULCIMER, an ancient musical instrument used by various nations, and, in shape and con¬ struction, having probably undergone fewer changes than any other instrument. In its earli¬

est and simplest form it consisted of a flat piece of wood, on which were fastened two converging strips of wood, across which strings were stretched tuned to the natural scale. The only improvements since made on this type are the addition of a series of pegs, or pins, to regulate the tension of the strings, and the use of two flat pieces of wood formed into a re¬ sonance-box, for the body. The German name, Hackhrett (chopping-board), points to the man¬ ner in which it was played, the wires being struck by two hammers, one held in each hand of the performer. The fact which makes the dulcimer of the greatest interest to musicians is that it is the undoubted forefather of our pianoforte. A modern grand pianoforte is, in reality, nothing more than a huge dulcimer, the wires of which are set in vibration by keys. It probably came from the East, brought by the Crusaders.

DULCINEA DEL TOBOSO. The ideal¬ ized peasant girl whom Don Quixote gives the romantic name (meaning sweetheart or lady¬ love), but who is commonly known as plain Aldoriza Lorenzo. The hero of Cervantes' novel adores this humble girl of Toboso madly and becomes her champion.

DULLER, Eduard (1809-53), a German historian, theologian and poet, born and edu¬ cated in Vienna, who had both literary and ec¬ clesiastical ambitions. Before he was 19, he wrote a religious drama, ˆMeister Pilgram,ˆ which was successfully performed. He took a prominent part in the (ˆrman Catholic movernent, strenuously espousing the cause of reli¬ gious liberty. Besides several distinctly literary productions and contributing the libretto to Mangold's opera of ˆTannhauser,ˆ Duller pub¬ lished these standard historical works: ˆVater-landische Geschichte,ˆ ˆGeschichte des Deutschen Volksˆ and ˆGeschichte der Jesuiten,ˆ

DULONG, Pierre Louis (1785-1838), French scientist whose name is associated with the law in physics known as the law of Dulong and Petit. Dulong was educated at the Ecole Polytechnique. Afterward (1820) he was made professor of physics at the same institution. In 1819, in conjunction with Petit, another French physicist, Dulong discovered the law that the specific heat of an element, multiplied by

its atomic weight, is the same for all solid elements. Although this law has been verified again and again, it has yet to receive a theoretical expla¬ nation. In recognition of his scientific achieve¬ ments, Dulong (in 1823) was admitted into the Academy of Sciences. He lost an eye while ex¬ perimenting in his laboratory.

DULSE, an edible seaweed growing on rocky seacoasts. In the British Isk dulse is a cheap article of food ; elsewhere it is rather ex¬ pensive and even a luxury. The name is also applied to another seaweed found in the south¬ west of England, which is also sometimes em¬ ployed as a food. Still a third brand of dulse is found in Alaska.

DULUTH, Minn., city and lake port, seat of Saint Louis County and third largest city of the State, is favorably situated at the ex¬ treme western end of Lake Superior. The scythe-like projection called Minnesota Point, with a similar peninsula from the Wisconsin shore, forms a harbor for the city and its twin

port, Superior (Wis.), 19 miles square with a shore line of 49 miles. This fine harbor is en¬ tered by two channels, one, natural, near the Wisconsin shore, the other, a canal, 250 feet wide, piercing Minnesota Point. The broad mouth of the Saint Louis River, nearly en¬ closed by other points of land, forms an excel¬ lent inner harbor. Federal improvements to the value of $7,500,000 have deepened the harbor from 9 to 22 feet and made 17 miles of chan¬ nels 22 feet deep and 200 to 600 feet wide. Overlooking the river, harbor and lake from steep and picturesque slopes, the city of Duluth stretches from the old Astor trading-post at Fond da Lac northeastward for more than 20 miles.

Improvements and Buildings. — The city owns its own waterworks and gas distributing system which it values at $4,756,218. It has 85 rniles of paving and 186 miles of sewers. The city has profited by the beauty of its surround¬ ings in its parking and boulevarding, having laid out spacious grounds along the banks of the several mountain streams that enter the lake at this point, and made roadways that command views of the lake and countryside. Altogether it possesses 21 miles of these drives, the most notable of which is Rogers Boulevard that fol¬ lows a most interesting course of 12 miles. There are 442 acres of parks including Lester, the largest, Congdon and Chester; and in ad¬ dition there are eight playgrounds. The Duluth-Superior Street Railway reaches all parts of the city and Superior, Wisconsin, using the Inter¬ state Bridge. It has 60 miles of track. Among the buildings that are noteworthy are the Cen¬ tral High School, Carnegie Library, Court¬ house, Pilgrim (Congregational) Church, Dar¬ ling's Observatory, the National Guard and Naval Militia Armory, Kitchi Gammi Club, Aid-worth Building and Soo Line Station.

Recreation Facilities. — Duluth is a favorite resort for tourists because of the variety of outings it suggests. Excursion steamers make regular trips to Fond du Lac and to Isle Royale, and other Lake Superior resorts. The Duluth Boat Club, with 2,000 members, has a high reputation for sportsmanship. There is abund¬ ant fishing both for Lake Superior and inland varieties. The curling rink has a capacity of

6,000 curlers and skaters; and the ski hills attract thousands annually. Other attractions for the visitor are the incline railway up the bluff 800 feet high that overlooks the centre of the city and the aerial bridge over the steamer channel through Minnesota Point.

Education. — Duluth has 41 school buildings, including tw'o high schools and three junior high schools. These buildings are valued at $3,533,218. In the system are enrolled 17,000 pupils. A state normal school located here en¬ rolls 400 students annually. The Roman Cath¬ olics support Villa Scholastica and also a train¬ ing school for nurses in Saint Mary's Hospital ; and the Episcopalians maintain a school for nurses in Saint Luke's Hospital. In the city there are 90 churches. The Duluth Carnegie Library and two branches circulated in 1916 236,166 volumes. The Duluth Bar Association has an extensive library.

Commerce. — The great advantage of pos¬ sessing a fine harbor has made Duluth the second port in point of tonnage in the United

States. In 1916 its outgoing tonnage of ore and grain equaled that of any two ports in the world. This tonnage has greatly increased dur¬ ing the past few years. In 1900 the total num¬ ber of tons shipped and received was 14,387,058, and the total number of vessels arriving and departing was 11,334; in 1917 the tonnage was 52,177,333 and the number of vessels 12,445. Four hundred and ninety-nine vessels make Duluth their home port. Less than three hours' run from the Mesabi Range, the city receives iron ore in constantly increasing volume for ship¬ ment to mills at Chicago, Gary and Pennsylva¬ nia points. In 1916 this business amounted to 38,374,953 tons. Ore trains run directly to the docks from which they are dumped into pockets which in turn discharge into ore steamers. One of these docks is 2,300 feet long and 50 feet wide and contains 3ˆ pockets. Usually it takes three hours to dump 10,000 tons. From the Red River Valley and the fields of Canada 65,072,940 bushels of grain were received at the Duluth elevators which have a capacity of ■33,125,000 bushels; and from the forest country of northern Minnesota 146,892,000 feet of lum¬ ber. The district supplying these products de¬ pends on Duluth for its coal as also do the manufacturing plants of Minneapolis and Saint Paul, and other points to the south. In 1916, 9,585,337 tons of hard and soft coal were re¬ ceived at Duluth. The coal docks are equipped with electrically operated machinery so that 1,000 tons can be unloaded in an hour. The docks have a storage capacity of 10,000,000 tons. For the transportation of this and other commodities the city has ample railroad facili¬ ties. With the Minneapolis and Saint Paul it is

connected by the Great Northern, Northern Pacific, Soo and the Chicago, Saint Paul, Minne¬ apolis and Omaha; with North Dakota, Mani¬ toba and Montana by the first three and the Canadian Northern; with the Mesabi Range by all of these, excepting the last, and by the Duluth, Mesabi and Northern. The Duluth and Iron Range connects the city with its subport, Two Harbors and with the Vermillion Range. The Duluth, South Shore and Atlantic and the Soo Line maintain service with eastern points ; and both the Soo and the Chicago, Saint Paul, Minneapolis and Omaha make direct connection between Duluth and Chicago. The Chicago, Milwaukee and Saint Paul maintains a freight service between Duluth and the Twin Cities by arrangement with the Northern Pacific Com¬ pany.

Manufacturing. — With its great commercial advantages the city has been enabled during the past 25 and especially during the past 10 years, to increase its manufacturing capacity very greatly. The largest plant is that of the Minnesota Steel Company (United Steel Cor¬ poration) in the western part of the city. It represents a capital of $25,000,000 and employs 4,000 men, for whom it has built a model city within the limits of Duluth. The Zenith Fur¬ nace Companv produces coke tar and ammonia, as well as gas for lighting and heating the city. Duluth also has many establishments working in iron, a cement factory of importance, flour mills, sash factories, clothing establishments and steamboat works. In all it has 243 establish¬ ments employing 12,000 people and producing annually a value of 5ˆ20,000,000, exclusive of the

value of the steel, of which $8,000,000 is added by manufacture. For this manufacturing there is available 120,000 horsepower of electric cur¬ rent from the Saint Louis River, of which 60,000 is already being utilized. The city is lighted by this power, the current being dis¬ tributed by the Duluth Edison Electric Company at a maximum rate of 6 cents per kilowatt hour

Finance. — Duluth has 10 banks — 4 national and 6 State — with a capital and surplus of $7,000,000 and deposits of $30,000,000. Its

clearings in 1916 were $283,812,916. Postal re¬ ceipts were $440,097. Its assessed valuation is $58,596,674. The rate of taxation is 37 mills.

Government. — The government of Duluth has been a model for other cities. Five com¬ missioners, each responsible for a single depart¬ ment of municipal activity, form a council under the presidency of the mayor, the commissionei of public safety. This department includes police, fire, health and harbor divisions. The commissioner for public affairs has charge of the library and welfare divisions; the commis¬ sioner of finance controls accounting and licens¬ ing; the commissioner of public works super¬ vises the engineering, street improvement and construction of water and gas mains ; the com¬ missioner of public utilities is responsible for the water and gas systems. The commissioners acting as a council appoint the city clerk, as¬ sessor, attorney and auditor ; but they them¬ selves have appoiative power within their own departments for all necessary employees. Through ownership of the gas distributing sys¬ tem the city has reduced the price from $1.90 to 75 cents a thousand cubic feet. The city is without saloons.

History. — Duluth has had an interesting his¬ tory. Radisson and Grosilliers, French traders, passed the site of the city in 1659. In 1679 Daniel Greysolon Sieur Du Lhut visited the head of Lake Superior and became very friendly with the Dakota Indians, whose lands then extended into what was later the Chippewa Territory. He was able to buy 50 canoe loads of fur. Later he rescued Father Hennepin from a band of Dakotas, who had captured him while he, with companions, was on his way up the Mississippi after leaving La Salle's party, and rather badly treated him. It is fitting that the city bear the name of one of the most intrepid and capable of the many Frenchmen who had to do with the Northwest. When the French lost control of America other traders made their way over the site of Duluth to the upper Mississippi, journey¬ ing by the Saint Louis and portages to Sandy Lake. This route made a post at Fond du Lac very important. Early in the 19th century the American Fur Company, under the direction of William Astor, established a station there, one building of which is still to be seen. As late as 1860, however, what is called Duluth was a forest except for a few huts on Minnesota Point. The partial improvement of the harbor called attention to the possibilities of a city, but the country at large was much of the opinion of Senator Proctor Knott, who said in a speech that rather than vote for a grant of land for a railroad at Duluth he should prefer that ®the freezing cyclones of the bleak Northwest bury It forever beneath the eddying sands of the Saint Croix.^^ The Saint Paul and Duluth, now a part of

the Northern Pacific system, arrived

in 1870, and the Northern Pacific built through from Duluth to North Dakota in 1874. Later the establishment of better connection with the Min¬ neapolis and Saint Paul and the discovery of iron in the Vermillion Range brought prosperity to the village. The first shipment from the Ver¬ million Range was made in 1884 from Two Har¬ bors; the first shipment from the Mesabi was made in 1892. Since that date, with the excep¬ tion of a brief period of depression following the panic of 1893, the progress of the city has been continuous.

Population. — In 1860 the total population of Saint Louis County, including Duluth, was 406. In 1870 this had increased to 3,131. In 1880 the population of the city was 3,483; in 1890, 33,115; in 1900, 52,969; in 1910, 78,466. In 1920 the population (U. S, census) was 98,917. The for¬ eign-born population is 39 per cent of the whole, the leading nationalities being Scandinavian, 14 per cent ; Canadian, 6 per cent ; German, 3 per cent ; Russian and Austrian, 3 per cent, and a scattering of Finns, Italians, Irish, English and Scotch.

Bibliography. — Parsons, E. Dudley, ˆThe Story of Minnesotaˆ (1916) ; Pollack, Hester, ˆOur Minnesotaˆ (New York 1917) ; Folwell, W. W., ˆMinnesotaˆ (1908) ; ‘ˆMinnesota in Three Centuriesˆ (1908) ; Pamphlets by the Duluth Commercial Club and by the Commis¬ sioner of Immigration; ˆStatistical Report of Marine Commerce of Duluth, Minn., and Su¬ perior, Wis., for the Calendar Year 1916ˆ ; ˆReport of Chief Engineer U. S. A. to Secretary of War, 1914ˆ; Lehnerts, E. M., ˆGeography of Minnesota.ˆ

E. Dudley Parsons, Author of ˆThe Story of Minnesota.ˆ

DULWICH (dul’ich) GALLERY, a collec¬ tion of paintings in Dulwich College, the first 371 of which were presented by Sir Peter Fran¬ cis Bourgeois, the English painter, with a dona¬ tion of £12,000 for the maintenance of the col¬ lection and the repair of a wing of the college. This original collection contained 22 paintings by Bourgeois. See Bourgeois, Sir Peter Francis.

DUMA, a Russian word signifying a council or assembly, from duma, thought ; duniat, to meditate, reflect. A town council or city hall is called gorodskaya duma, from gorod, town ; the national Parliament is termed gosudarst-vennaya duma, from gosudarstvo, state, empire. In Western literature Duma means the national Parliament of Russia, the

first of which was opened _ 10 May 1906. On 19 Aug. 1905 the Tsar Nicholas II issued a manifesto announcing that he had granted a constitution to Russia and that an imperial Duma would be created. This was the second attempt made by a Russian sovereign to introduce a semblance of popular government. Already in the 16th and I7th centuries the tsars of Old Muscovy convoked occasional ®Zemski Sobors,® with almost nuga¬ tory powers; and Ivan the Terrible once sum-rnoned an assembly to deliberate noon the ques¬ tion asˆ to whether a war with Poland should be continued. All that we know of this gather¬ ing is that its 399 members readily voted for the continuation of the war and at the same time begged the tyrant's pardon for having dared to express any opinion at all. Again,

in 1613, when a new dynasty had to be chosen in the place of the extinct Riirik dynasty, the boyars (aristocrats) convoked a kind of States-General which elected the House of Romanoff. After 300 years that house was swept away by the revolution of 1917. But it was the vaiii-gloriously ambitious Catharine II who first made a show of being imbued with the consti¬ tutional and humanitarian maxims of Mon¬ tesquieu and Beccaria. By a rescript dated 14 Dec. 1766 she announced a great legislative assembly which, though not destined to deal with the form of government, was otherwise left free to discuss the grievances of the people and to suggest remedies. On 30 July 1767 the assembly of 564 members met in Moscow. In December 1768 the majority were called into the army or sent home. A small remnant continued their innocuous sessions till 1774, when Catha¬ rine abolished them also. For the next 132 years Russia waited for representative government.

The Duma of 1906 was formally inaugurated by a speech of the Tsar. He promised that he would ˆunswervingly uphold the institutions he had granted.ˆˆ But the often-disillusioned con¬ stitutional democrats who formed the majority received his words with coldness and misgiv¬ ings. They soon discovered that the wish near¬ est their hearts — an amnesty for political of¬ fenders — would not be

realized. The first ses¬ sion was brief and stormy. The deputies, over¬ endowed with the gifts of oratory and possess¬ ing little or no experience of affairs, made mag¬ nificent speeches and magnificent demands. The Duma was thwarted at every turn by the gov¬ ernment and was finally dissolved after an existence of 10 weeks (22 July). ^^A cruel dis¬ appointment has befallen our expectations,^^ read the Imperial ukase ; *the representatives of the nation, instead of applying themselves to the work of productive legislation, have strayed into spheres beyond their competence, and have been making inquiries into the acts of local authori¬ ties established by ourselves, and have been making comments on the imperfections of the fundamental laws, which can only be modified by our Imperial will.^^ The Hnquiries^^ referred to concerned the massacres at Bialystok, whither the Duma had sent a commission ; its report created a profound and melancholy impression. It was also the drastic agrarian program of the majority of the Duma that helped to bring about the crisis. Indeed, unless the Tsar had con¬ sented to abolish the whole of the bureaucracy and appoint a responsible ministry, it is difficult to see how he could have allowed the Duma to continue. The cleavage was too deep between his officials and those whom he called ®the repre¬ sentatives of the nation. The second Duma was convened on 5 March 1907, and only lived till 16 June 1907. The third met in November 1907 and sat till 1912. The fourth Duma opened in November 1912. See Russia — Government; History; Revolution.

Henri F. Klein,

Editorial Staff of The Americana.

DUMANJUG, doo-man-Hoogr , Philippines, a town of the province of Cebu, situated on the west coa’^t at the mouth of the Dumanjug River, 37 miles southwest oi Cebu. Pop. about 20,000.

DUMAS, du-ma, Alexandre, The Elder, French dramatist and novelist; b, Villers-Cot- tf’rets. 24 July 1803; d. Puits, near Dieppe, 5

Dec. 1870. He was the son of a Republican gen¬ eral who bore the same name, and grandson of Marquis de la Pailletrie and a negress, Tiennette Dumas. He went to Paris at the age of 20 to push his fortune and was employed by the Duke of Orleans as a clerk at 1,200 francs a year. He now devoted his leisure hours to completing his education, and his ambition prompted him to shine in the field of literature. Some of his lighter dramatic works were rejected by the theatrical

directors, some were accepted and had more or less success, bringing but little fame or profit to their author. At last, in 1829, his drama of ˆ Henri HP appeared on the stage of the Comedie Frangaise. It was produced when the battle between the Romanticists and the Classicists was at its height and hailed as a triumph by the former school. The piece be¬ came popular and brought the lucky dramatist the sum of 30,000 francs and the post of assist¬ ant librarian to the Duke of Orleans. In the following year appeared his Christineˆ and in quick succession ˆAntonyˆ ; ˆRichard d'Arling-tonO ˆTeresaˆ ; ˆLe Tour de NesleC ˆCatha¬ rine Howardˆ ˆMlle. de Belle-Isle,ˆ *etc.* Du¬ mas had now_ become a noted Parisian charac¬ ter. The critics fought over the merits of his pieces and the scandalmongers over his prodi¬ gality and galanteries. Turning his attention to romance, and desirous of becoming the Walter Scott of his country he produced a series of historical romances, among which are ‘ˆLes deux Dianes,ˆ Hˆa Reine Margot,ˆ ˆLes trois mousquetairesˆ which, with its continuations, occupies eight volumes. The ˆ Comte de Monte-Cristoˆ and ˆMemoires d'un medicinˆ are also well known, through translations, to English and American readers. Several historical works also bear his name: ‘ˆLouis XIV et son siecle,ˆ ˆLe Regent et Louis XV,ˆ ˆLe drame de '93,ˆ ˆFlorence et les Medicis,ˆ *etc.* In 1840 he mar¬ ried Ida Ferrier, an actress, but the marriage appears to have severed the friendly relations that had long subsisted between them. In 1846 he accompanied the Duke of Montpensier to Spain as _ the historiographer of his marriage ; and on his return to Paris he opened a theatre for the purpose of producing only his own pieces and built a fantastic and costly country-seat, which was known as the Chateau de Monte-Cristo and on which he expended 450,000 francs.

It is difficult to come to a satisfactory conclu¬ sion as to the merits of this author. Some of his productions are little else than mere trans¬ lations from English and German sources. His first drama, ˆHenri HI,ˆ is but a skilful piece of patchwork, Walter Scott and Schiller fur¬ nishing him with the bulk of the material. Equally fatal to his reputation is our knowledge of the fact, gained from a lawsuit he had with the Presse and the Constitutionnel newspapers and from a work by Mirecourt entitled ˆFabrique de Romans, Maison A. Dumas et Cie.ˆ (Dumas & Company's Romance Factory), that he had arranged to supply those journals during the year with more novels than the most expert scribe could copy in the time, and that he had in his pay numerous hacks who did the serious part of the work. ˆˆHis brain worked faster than his hand or any human hand could obey its orders : the mine of his inventive faculty needed a commercial company and an army of diggers for its exploitation® ;

and he constituted himself ®the managing director of the company." The productivity of himself and his hacks extended to 1,200 volumes. Inaccurate in his hist9ry and superficial as his character drawing is, of the genius of Dumas there can be no reasonable doubt; he had great fertility of in¬ vention, much humor and gaiety and genuine dramatic power, as the works that v/ere un¬ doubtedly from his pen sufficiently testify; and it was not till he had secured a front rank in literature by his own exertions that he de¬ scended to the unworthy plan of employing as¬ sistants to manufacture novels to order. (See Count of Monte Cristo, The; Three Mus¬ keteers, The). Consult Blaze de Bury, ˆAlex¬ andre Dumas, sa vie, son temps, son oeuvreˆ (1885); Davidson, ˆAlexandre Dumas pere : his Life and Works, with Bibliographyˆ (New York 1902); Maurel, ˆLes Trois Dumasˆ (Paris 1896) ; Parigot, ˆLe Drame d' Alexandre Dumas ˆ (Paris 1898) ; and LMexandre Dumas pereˆ (Paris 1902) ; Spure, ˆLife and Writings of Alexandre Dumasˆ (1902); Wells, 'ˆA Century of French Fictionˆ (London 1898).

DUMAS, Alexandre, The Younger, French dramatist and novelist: b. Paris, 28 July 1824; d. there, 27 Nov. 1895. He was the natural son of Dumas the Elder (q.v.), and while a young-man shared his father's life in Paris and ac¬ companied him on his travels. In 1847 there ap¬ peared a collection of his poems under the title ˆPeches de Jeunesseˆ ; his first novel ˆAventures de quatre femmes et d'un perroquetP was published in the same year; others of his novels are ˆCesarineˆ (1848); ˆLa Dame aux Cameliasˆ (1848) ; H.e Docteur Servansˆ (1849) ; and ˆL'affaire Clemenceauˆ (1867). ˆLa Dame aux Cameliasˆ was dramatized in 1852, and marked an important event in the history of the drama — the introduction of realism in the treating of social and moral problems on the stage. His other dramas include: ˆ Diane de Lysˆ (1853); ˆLe Demi-mondeˆ (1855); ˆLa Question d'Argentˆ (1857) ; ˆLe Fils NatureP (1858) ; ˆLe Pere Prodigueˆ (1859) ; ˆL'Ami des Femmesˆ (1864) ; ˆLa Femme de Claudeˆ (1873) ; ˆLa Princesse de Bagdadˆ (1881) ; ˆDeniseˆ (1885); and ˆFrancillonˆ (1887). He has also written a few essays, discussing social problems; these are: ˆLettre sur

les choses du jourˆ (1871); ˆL'Homme-Femmeˆ (1872); ˆQuestion du Divorceˆ (1880) ; ˆRecherche de la paternite^ (1883). Dumas was made a member of the French Academy in 1874. Dumas brought the drama back from the exalted realms of poetry and romance to prose and sober realities and he was the chief creator of the modern ˆcomedy of manners." Beginning as a realist, he ended as moralist and sermonizer and in a series of what would now be called ˆffiroblem plays." His wit is sparkling and brilliant but acidulated, his dialogue clear and incisive ; his view of woman is somewhat ignoble; the hus¬ band, the wife and the lover form a trinity of types that are repeated in his works with a disagreeable and persistent iteration. See Lady OF THE Camellias, La ; Demi-Monde, Le.

DUMAS, Jean Baptiste Andre, French chemist: b. Alais, Card, 14 July 1800; d. Cannes, France, 11 April 1884. He studied at Geneva and going to Paris in 1821, was first a lecturer in the Bcole Polytechnique, then professor of

chemistry in the Athenee, the ficole Centrale des Arts et Manufactures (founded by himself), and finally, the Sorbonne. He now wholly de¬ voted himself to chemical studies and his views on chemical equivalents and especially his me¬ moir on the atomic theory, soon attracted at¬ tention over all Europe. His views on the laws of substitutions involved him in a long discussion with the great Berzelius. His re¬ searches in organic chemistry, especially his masterly papers on the ethers, ethereal oils, indigo and the alkaloids, placed him in the first rank of chemists. In 1849-51 he was Minister of Agriculture and Commerce and also held offices under the Second Empire. In 1875 he was called to fill Guizot's chair in the Academy. His chief works are ˆTraite de Chimie appliquee aux arts,ˆ and 'ˆLecons sur la philosophie chimique.ˆ Consult Maindron, ˆL'CEuvre de J. B. Dumasˆ (1886).

DUMAS, Matthieu, French soldier and military writer: b. Montpellier, France, 23 Nov. 1753; d. Paris, 16 Oct. 1837. He early entered the French cavalry, took part in the American Revolution and was emplo3ˆed in the Levant and in Holland. At the commencement of the French Revolution he assisted Lafayette in or¬ ganizing the National Guard. On the triumph of the extreme party in 1797 Dumas was pro¬ scribed, but made his escape to Holstein, where he wrote the first part of his ˆPrecis des fivene-ments militaires,ˆ a valuable source for the history of the period of which it treats (1798-1807). He served under Napoleon in the Austerlitz and Moscow campaigns and was taken

prisoner. On the return of the Emperor from Elba he was employed in organizing the National Guard. After the Restoration, Louis XVHI appointed him Councillor of State. In 1830 he aided in bringing on the revolution of July and after the fall of Charles X was given a peerage.

DU MAURIER, dii mo-re-a, George Louis Palmella Busson, English artist, caricaturist and novelist : b. Paris, 6 March 1834; d. London, 8 Oct. 1896. He belonged to an old French family -vyhich had been driven to England by the Revolution. He spent some years in France and Belgium and afterward went to school in London. He soon adopted art as a profession, working as a student in the galleries of the British Museum. Then, returning to Paris, he entered the studio of Gleyre and next went to Antwerp to continue his artistic training, where he lost the sight of an eye. Returning to Lon¬ don, he began to draw on wood for Once a Week, the Cornhill Magazine, etc., and also ex¬ hibited at the Royal Academy. He joined the Punch staff in 1864 and became famous through his weekly drawings of the fashionable and ar¬ tistic world for that publication. He also illustrated a large number of books, including Thackeray's ˆEsmondˆ and ˆBallads.ˆ A collec¬ tion of his Punch woodcuts was published in 1880 under the title ˆEnglish Society at Home.ˆ In 1891 appeared his first novel, ˆ Peter Ibbetson,> and it was succeeded in 1894 by ˆ Trilby,ˆ which was first published in HarpePs Maga¬ zine and was overwhelmingly successful. The novel was dramatized and successfully produced in America by Paul M. Potter and in London by Sir Herbert Tree. An incomplete novel, ˆThe MartianP was published posthumously,

also in Harper's Alagaˆinc. His novels can hardly be looked upon as very serious contribu¬ tions to literature, but his Punch drawings and ®Trilby® will have permanent value as portray¬ ing many of the peculiarities of contemporary society. See Peter Ibbetson ; Trilby.

DUMB AGUE, an irregular intermittent feyer, so named from the absence of shivering chills. See Malaria.

DUMB-BELL. See Gymnastics.

pUMB-CANE, a popular name for a West Indian plant (Dieffenbachia seguine) of the arum family. The acridity which is characteris¬ tic of most of the members of the arum fam¬ ily in this species causes a swelling of the tongue with excruciating pain, if the plant is chewed and for a time destroys the power of speech, whence its name. Some species and varieties of Dieffenbachia are in cultivation as foliage plants.

DUMBA, Dr. Constantine Theodor, Aus¬ trian diplomat: b. Vienna, Austria, 17 June 1856. Descended from a prominent and wealthy family, he was educated at the University of Vienna and the Ecole des Sciences Politiques et Morales, Paris. He entered the Austrian For¬ eign Office in 1879, was created a privy council¬ lor in 1908 and served for some years as Min¬ ister to Sweden. In March 1913 he was ap¬ pointed Austro-Hungarian Ambassador to the United States and assumed the office on 24 April. During the early stages of the European War Dr. Dumba, in conjunction with Count Bernstorff (q.v.), the German Ambassador in Washington, engaged in a widespread con¬ spiracy to foment labor troubles among the employees of the Bethlehem Steel Works and other plants making munitions for the Allies. The plot was revealed through the detention by the British authorities on 30 Aug. 1915 of an American journalist, J. F. J. Archibald, a passenger on the steamship Rotterdam, which put in at Falmouth. A number of documents found in Archibald's possession were seized. Among them was a long letter written by Dr. Dumba to Baron Burian, the Austrian Foreign Minister, stating that ^^we could, if not entirely prevent the production of war material in Bethlehem and in the Middle West, at any rate strongly disorganize it and hold it up for months, which, according to the statement of the German Military Attache (Captain von Papen), is of great importance,® amply out¬ weighing the ^^relatively small sacrifice of money.® Archibald was also the bearer of a dispatch from von Papen to the German War Office. The publication of these documents by the British government caused a sensation in the United States and evoked general con¬ demnation of the undiplomatic activities of Dr. Dumba in a country at that time both ^neutral and friendly® to the nation which he represented. On 5 Sept. 1915 Dr. Dumba de¬ fended his action as being ^ffiothing more than a very open and perfectly proper method to be taken to bring before men of our races (Hun¬ garians, Croats, etc.) … the fact that they were engaged in enterprises unfriendly to their fatherland.® Four days later Secretary of State Lansing announced that the American Ambas¬ sador in Vienna had been instructed to demand the recall of Dr. Dumba on account of his im¬

proper conduct. The Austrian government is¬ sued a formal recall on 28 September ; the Brit¬ ish government granted a safe conduct and Dr. Dumba sailed from New York on 5 Oct. 1915. Von Papen and Captain Boy-Ed, the German attaches in Washington, were dismissed from the United States a few weeks later. It sub¬ sequently transpired that Archibald had re¬ ceived $5,000 from the German Embassy in Washington on 24 April 1915. The full story of the Austro-German conspiracies in America is told in The World's Work, Feb., March, April, May, et seq. 1918. See War, European.

DUMBARTON (ancient Lennox or Le-VENix). (1) A maritime county of Scotland. Pop. 113,870. (2) A seaport, and the chief

town in the county, on the Leven; 13 miles northwest of Glasgow. Shipbuilding is the chief business, the six principal yards employ¬ ing about 4,000 men. The rock and castle of Dumbarton, a short distance from the town, are noted in history. The fortress was erected over a thousand years ago. It is one of the four fortresses stipulated to be kept in repair by the articles of the Union. It was the capital of the British district of Strathclyde. Under the Romans, a naval depot was established called Theodosia. It was made a royal burgh by Alexander II in 1221. Sir William Wallace was imprisoned here, and Mary, Queen of Scots spent her childhood at the castle. Pop. about

20,000.

DUMBNESS. See Deaf, The.

DUMDUM, India, town in the province of Bengal, seven miles northeast of Calcutta. It includes the municipalities of North and South Dumdum (pop. 10,000 and 11,000 respectively). North Dumdum including the cantonment. The town is famous as being the scene of the first open manifestation of the Sepoys against the greased cartridges which led to the outbreak of the mutiny of 1857, and is the site of the ammunition factory of the Indian ordnance de¬ partment.

DUMDUM BULLET, a bullet so named after Dumdum Arsenal, the place near Calcutta where it was first made. The British found in their frontier wars with the Afghans and the hill tribes, that the ordinary bullet, Lee-Metford, in spite of its immense penetrative power, had not sufficient stopping power, per¬ sons hit being known to fight on. The dumdum is a soft-nosed or expanding bullet' — one which instead of having its greatest strength at the point is weakest there, so that in

striking a bone it will flatten out and shatter it and not, like the modern steel-coated, sharp-pointed bullet, make a small hole and pass through without any other effect. At Santiago the Spaniards were charged with cutting off the brass tips of their bullets so that they had the same effect in in¬ flicting jagged wounds as the regular dumdum bullets. Dumdum bullets are now used to some extent by big game hunters. Their use was prohibited in warfare by The Hague Con¬ ference. In the war against the Boers in South Africa (1899-1902) the British were charged with using a modification of this bullet. In the Great European War the French — who used a solid copper-zinc alloy with no jacket and no lead and therefore incapable of expanding —

were accused of using soft-nosed bullets. See Bullet.

DUMERIL, dii-ma-rel, Andre Marie Con¬ stant, French physician and naturalist; b. Amiens, 1 Jan. 1774; d. Paris, 2 Aug. 1860. From 1801 to 1818 he was professor of anat¬ omy and of physiology of the medical faculty of Paris. His works on natural history and analytical zoology are distinguished both for accuracy of details and for philosophical treat¬ ment. In his most celebrated production, 'L'erpetologie generale (1835-51), which con¬ tains the first attempt at a systematic description of all known reptiles, he had Bibron as collabo¬ rator.

DUMERSAN, du-mar-saiV, Theophile Marion, French playwright: b. Issoudun, 4 Jan. 1780; d. Paris, 13 April 1849. He was em¬ ployed in the Paris mint. He wrote many plays, all marked by keen observation and comic spirit. His ˆ Angel and Devil, ˆ a five-act drama, had a ˆˆrunˆˆ of over 100 presentations ; still more suc¬ cessful was his ˆMountebanks,ˆ his master¬ piece and a classic in its kind. Other very suc¬ cessful plays written by him are ˆThe Wig-maker, or Heads a la Titus ˆ ; ˆRidiculous Eng¬ lishwomen.ˆ Worthy of mention is his volume of ˆNational and Popular Songs of France.ˆ

DUMFRIES, dum-frez', or DUMFRIES¬ SHIRE, a maritime county, Scotland, bounded on the southeast by Cuml3erland and Solway Firth. Long ranges of mountains enclose it on the north. The country is divided into Nith-dale, Annandale and Eskdale, named according to the three principal rivers, the Nith, the Annan and the Esk. There are a number of small locks; area 1,103 square miles. The sur¬ face is irregular; about one-half is good farm¬ ing and grazing land, and

valuable minerals are found in the hill sections. There are also im¬ portant salmon fisheries. The county is repre¬ sented by a member in the House of Commons. Pop. about 75,000.

DUMFRIES, Scotland, a river port, rail¬ road centre and parliamentary borough, capital of the county of same name, on the Nith, six miles from its junction with the Solway Firth. It is connected with the suburb Maxwelltown (in Kirkcudbright) by three bridges, one dating from the 13th century. It is built of red sand¬ stone and contains several fine public buildings. The town is especially associated with memories of Robert Burns. The house in which he lived is still preserved. His mausoleum stands in Saint Michael's churchyard. In the neighbor¬ hood are the ruins of Caerlaverock Castle, famous in connection with the Maxwells and Lincluden Abbey. Dumfries became a royal burgh in the 12th century. The Border Wars wrought much havoc to the town. The Young Pretender made this place his headquarters in

1745.

The principal manufactures are tweeds and hosiery. There is a brisk local trade in farm products. The modern buildings in¬ clude the County House, the post-office, Crich¬ ton Royal Institution (a lunatic asylum), Dum¬ fries Academy. In High street there is a fine tower erected by Inigo Jones. Pop. about

19,000.

DUMMER, Jeremiah, American scholar : b. Boston, about 1680; d. in Plaistow, England,

19 May 1739. He was graduated at Harvard College in 1699, where he was noted for the vigor and brilliancy of his genius. With the purpose of preparing for the clerical profession, he went abroad, and studied in the University of Utrecht. On his return to America he abandoned his chosen vocation, and soon after went to England, where, as agent of Massachu¬ setts, he rendered important services to his countrymen. He was an admirer of Lord Bol-ingbroke, in whose daring and reckless genius he found much that was congenial to his own character, and in intimacy with whom he adopted something of his moral and religious license. He published theological and philo¬ sophical disquisitions in Latin while at Utrecht, and his ˆDefence of the New England Char¬ ters,ˆ written in England (1728), is admirable both in style and matter. The traditions and records concerning him alike testify to his re¬ markable powers, and his easy command of them in speaking, writing and in intercourse with men.

DUMMER'S WAR, 1724-25, an episode in the long struggle of the French governors of Canada to check English settlement by inciting the Indians to raids and massacre of the border settlers. It was named after William Dummer, acting-governor of Massachusetts, who or¬ ganized the resistance against the Indian ex¬ peditions sent by Vaudreuil, governor of Can¬ ada, against the villages of Massachusetts and Maine, and of Vermont where Fort Dummer had been built on the site of Brattleboro in 1724. One of its chief incidents was the aggres¬ sive retaliation of Dummer and the victorious assault by the English on Norridgewock, Me., when Sebastien Rale, the Jesuit missionary and Indian leader, was killed with 26 Abenaki In¬ dians, 12 August 1724. The further crushing decimation in Lovewell's fight (q.v.) at Frye-burg. Me., 8 May 1725, led to four Indian chiefs signing a treaty for the Penobscots and other Abenakis at Boston in November 1725, which was ratified by the latter the following year. Consult Parkman, ˆA Century of Conflictˆ (Boston 1892).

DU MOND, Frank Vincent, American artist : b. Rochester, N. Y., 1865. He was a pupil of Boulanger, Lefebvre and Benjamin Constant. His works include a wide range of subjects, from popular magazine paintings to religious and ideal. Among them are ˆ Octo¬ ber,ˆ ˆThe Baptism,ˆ ˆPortiaˆ and 'ˆGrassy HilU He was elected to membership in the National Academy of Design in 1906, and be¬ came a prominent teacher at the Art Students' League.

DUMONT, du-mon, Albert, French archae¬ ologist: b. Scey-sur-Saone,

1842; d. 1884. He was educated in Paris, and devoting himself to the study of prehistoric, Byzantine, and Chris¬ tian archaeology, published ®De Plumbeis apud Graecos Tesseris^ (1870) ; ^Inscriptions ceramiques de Grece^ (1871) ; and Wases peints de la Grece propre^ (1873). In 1874, in Rome, and the following year in Athens, he lectured on archaeology and the history of art. In 1878 he was elected rector of the academy of Grenoble, in 1879 rector of the academy of Montpellier, and until his early death was a superintendent of higher education. The most important of his later works is ^Les ceramiques de la Grece

propre, vases peints et terres cuites^ (1882-90), prepared in collaboration with Chaplain.

DUMONT, dii-mon, Augustine Alexandre, French sculptor: b. Paris, 14 Aug. 1801; d. there, 25 Jan. 1884. He was a most prolific worker, and his statues are found on or in many of the public buildings and churches of his native city. His most noted productions are, the colossal statues of the ^Genius of Lib¬ erty^ on the Column of July, made in 1840, and the statue of Napoleon III on the Column Vendome.

DUMONT, Gabriel: b. Manitoba, 1838; d. Batoche, 1906. He acted as Riel's adjutant-gen¬ eral in the North West Rebellion of 1885, and was the organizing brain of the movement, showing great military skill in his conduct of the campaign. After the rising had been crushed at Batoche, he fled to the United States, but returned at a later date to Saskatchewan.

DUMONT, Pierre Etienne Louis, Swiss scholar: b. Geneva, 18 July 1759; d. Milan, Italy, 30 Sept. 1829. In 1785 he became tutor in Lon¬ don to the sons of Lord Shelburne. His supe¬ rior talents soon recommended him to the illus¬ trious Whigs of that period; with Romilly, in particular, he formed a close friendship. Dur¬ ing the early years of the French Revolution, Dumont was at Paris, where he became greatly attached to Mirabeau, regarding whom he has given

the world much valuable information in his posthumous ˆSouvenirs sur Mirabeauˆ (1832). In this work he claims to have com¬ posed for him many of Mirabeau's most elo¬ quent speeches. In 1791 Dumont returned to England, and formed an intimacy with Bentham (q.v.), of whom he became an ardent disciple and the greatest expositor of his philosophy. Deeply convinced of the value of Bentham"s views on legislation, he requested him to allow him to arrange and edit his unpublished writ¬ ings on this subject. Bentham gave him his manuscripts, which Dumont labored earnestly to abridge, elucidate, correct, and simplify. The results appeared in his ˆTraite de legisla¬ tion civile et penaleˆ (1802) ; ˆTheorie des peines et des recompensesˆ (1811) ; ˆTactique des Assembles Legislativesˆ (1816) ; ˆPreuves judiciaires> (1823); and the ˆOrganisation judiciaire et codificationˆ (1828). Dumont re¬ turned to Geneva in 1814, and became a member of the representative council.

DUMONT D'URVILLE, Jules Sebastien Cesar, French navigator: b. Conde-sur-Noireau, Normandy, 23 May 1790; d. near Paris, 8 May 1842. He entered the navy, in which he ulti¬ mately rose to be vice-admiral. He was twice wrecked and on both_ occasions owed his escape chiefly to self-possession and skilful seamanship. He rendered important service by his three years' search for the remains of the illfated expedition of La Perouse, the survey of long tracts of coast in New Zealand and New Guinea, the discovery of numerous islands and of an antarctic continent, and the exploration of very dangerous and still imperfectly known tracts of navigation, as Torres Straits, in Australia, and Cook's Straits, between the two large islands of New Zealand. To his contributions to geog-ranhy he was indebted for his nomination to the office of president of the Paris Geographical Society. One fruit of his voyages was the

ˆEnumeratio plantarum quas in insulis Archi-pelagi aut Littoribus Ponti Euxiniˆ (1822). After his second circumnavigation, he published the Woyage de I'Astrolabeˆ (1830-35), and Woyage pittoresque autour du mondeˆ (1834). He was killed in a railway accident.

DUMORTIERITE, a native basic silicate of aluminum, of somewhat uncertain composi¬ tion. In some specimens, notably those from Arizona, from 2ˆ2 to 5 per cent of the alumina has been displaced by boron. The average con¬ stitution is silica 30.5 per cent, alumina 69.5 per cent. It crystallizes in fibrous or columnar forms belonging to the orthorhombic system, and has a hardness of 7 and a specific gravity of about 3.3. It is transparent or translucent, with a vit¬ reous lustre and

a blue or greenish blue color, and is strongly pleochroic. Dumortierite occurs near Lyons, France, and also in certain parts of_ Norway and Silesia. In the United States it is found in upper Manhattan, New York City, and in Yuma County, Arizona. The mineral is named for Eugene Dumortier, a French palaeon¬ tologist.

DUMOULIN, dii-moo-lafi, John Philip, Canadian Anglican bishop : b. Dublin, Ireland, 1836; d. 28 Mar. 1911. He was educated at Trinity College, Dublin, and emigrating to Canada was ordained priest in 1863. He was appointed rector and canon of St. James's Cathedral, Toronto, in 1882, and in 1896 was elected third bishop of Niagara.

pUMOURIEZ, du-moo-re-a, Charles Frangois, French general: b. Cambrai, 25 Jan. 1739; d. near Henley-upon-Thames, 14 March 1823. He entered the army early in life and at 24 years of age had received 22 wounds, and was made a knight of Saint Louis. In 1772 Louis XV sent him with communications to Sweden, but he was arrested, and for a long time confined in the Bastile. In 1789 we find him a principal director of the Jacobin club, composed of all who aspired to be accounted the friends of lib¬ erty. He afterward became a minister of Louis XVI, when he strongly advised the monarch to yield the direction of the interior affairs of the kingdom to the council of the assembly then sitting, and to declare war against the foreign foes of France. The advice was disregarded and Dumouriez was dismissed. Still determined to devote himself to the service of the army, he proceeded to Valenciennes, where he soon gained fame by his valor and his firmness, dis¬ played at the head of the French soldiers, hav- ' ing succeeded Lafayette in the command of the Army of the North. He rendered very impor¬ tant service to his country by the stand he so skilfully made against the Prussian invaders in the forest of Argonne, in September 1792, the famous ˆUannonade of Valmy® taking place on the 20th of the same month. His rapid conquest of Belgium followed; but he was defeated at Nierwinden in January 1793. Notwithstanding his successes, the Directory, not without cause, entertained suspicions regarding his designs. Dumouriez, who had no sympathy with the Rev¬ olutionary government, had entered into secret negotiations with the enemy, and learning that an accusation of treason was to be brought against him, he fled to the Austrian headquart¬ ers. He refused, nevertheless, to serve against his country; wandering for some time through Europe and lastly settled in England. Consult

DUN

his ˆ Memoirsˆ (Hamburg, 1794) and the en¬ larged edition published at Paris; the HJfeˆ by Monchanin (1884); Griffiths, ˆFrench Revo¬ lutionary Generalsˆ (London 1891) ; Rose and Broadley, ˆThe Defence of England against Napoleonˆ (London 1908).

DUN Celtic dun, Irish dun, Gael dun, a hill, castle), a word used as a prefix or suffix in the jiames of cities as, in Augustodunum (Autun), and in many names in Scotland and Ireland, as in Dunblane, Dundee, Dundalk, Dunboyne, *etc.*

DUNA, or SpUTHERN DVINA, so

named to distinguish it from the northern Dvina, a west Russian river, which flows from a small lake near the source of the Volga, in the southwest of the government of Tver, and after a circuitous route of about 650 miles with a generally northwestern trend, empties into the Gulf of Riga, 10 miles below Riga. For some distance it forms the boundary between the governments of Vitebsk and Livonia on the north bank and Vilna and Courland on the south bank. Although obstructed by rocks and rapids, it is navigable for ocean vessels to Riga, for vessels of lighter draft to Diinaburg and for flat-bottomed barges almost from its source ; it commands a large river traffic; on an average it is icebound 115 days in the year. Canals con¬ nect it with the Volga, the Beresina, the Nie-men and Lake Ilmen.

DUNABURG, duna-boorg. See Dvinsk.

DUNANT, dii -nan, Jean Henri, Swiss phil¬ anthropist and founder of the Red Cross Society: b. Geneva, May 1828; d. 30 Oct. 1910. He early advocated the cause of suffering hu¬ manity and wrote a work on the slave systems of Mohammedan countries and the United States. While traveling near the battlefield of Solferino in 1859 he took part in the relief of those wounded in that battle and realized the inadequacy of the provisions for the work. As the result of his experiences there he wrote ˆUn souvenir de SolferinoP advocating more efficient care of the wounded on the field of battle. This work and his agitation directed public attention to the subject and ultimately brought about the Geneva Conference in 1863, followed by the Geneva Convention of the Great Powers in 1864 and the founding of the Red Cross Society (q.v.). Jointly with Fred¬ erick Passy in 1901 he received the Nobel prize.

DUNBAR, Paul Laurence, American au¬ thor: b. Dayton, Ohio, 27 June 1872; d. 10 Feb. 1906. He was of African descent, was educated in the public schools of Dayton and was gradu¬ ated from the Dayton High School in 1891, and from that time devoted himself to liter¬ ature and journalism. After 1898 he was on the staff of the librarian of Congress. He appeared in public as a reader of his poems. He published ˆOak and Ivyˆ (poems) (1893) ; ˆMajors and Minorsˆ (1895) ; ˆLyrics of Lowly Lifeˆ (1896) ˆFolks from Dixieˆ (1898) ; ˆThe Uncalled,ˆ a novel (1898) ; ˆLyrics of the Hearthsideˆ (1899) ; poems of ˆ Cabin and Fieldˆ (1899) ; ˆThe Strength of Gideonˆ (1900) ; The Love of Landryˆ (1900) ; ˆThe Sport of the Gods,ˆ a novel (1901) ; ˆThe Fanatics,ˆ a novel (1901) ; ˆLyrics of Love and Laughterˆ (1903) ; ˆLi'l GaP (1904) ; Lyrics of Sunshine and Shadowˆ (1905). Consult ˆCom¬

plete Poetical Works, ˆ with Introduction to Hˆyrics of Lowly Life,ˆ by W. D. Howells (New York 1913), and Wiggins, L. K., <Life and Works of Paul Laurence Dunbarˆ (1907).

DUNBAR, William, Scottish poet : b. Sal-ton, East Lothian, about 1465 ; d. about 1525. He was a Franciscan friar, but was often em¬ ployed by James IV in affairs of state. Among his works are the panegyric poem ˆThe Thistle and the Rose,ˆ written (1503) on the marriage of James with Margaret of England, and ˆThe Golden Targeˆ (1508), consisting of allegories in the fashion of the time and of Chaucer, among them a poem on -ˆThe Dance of the Seven Deadly Sins Through Hell.ˆ He is at his best in burlesque poetry, as witness the autobiographical ˆVisitation of St. Francis.ˆ He is as ®rich in fancy as Spenser; as homely and shrewd as Chaucer in the ˆMiller's Taleˆ ; as pious as Cowper in his hymns, and as wittily grotesque as Burns in ˆ Death and Dr. Horn¬ book.ˆ His works, edited by Laing, were pub¬ lished in London (2 vols.) 1834, and by Small and Mackay for the Scottish Text Society (Edinburgh 1884-93).

DUNBAR, Scotland, royal and municipal borough and seaport in Haddingtonshire, at the mouth of the Firth of Forth, 29 miles east of Edinburgh by rail. It is a place of great antiquity, having originated in a castle, once of great strength and importance, which under¬ went several memorable sieges; on one occasion being successfully defended against the English for 19 weeks by Black Agnes, Countess of Dunbar (1338). Queen Mary and Bothwell (1567) took shelter in this castle. In 1650 Cromwell, at the ˆTˆace of Dunbar, totally de¬ feated the Scottish army under David Leslie. The harbor, opened in 1844, is not very com¬ modious, but the town is an important fishing station.

Pop. 3,346.

DUNBIRD, a British sportsman's name for the female of the Pochard duck.

DUNCAN, Isadora, American dancer : b. San Francisco 1880. She was a teacher of dancing in New York and made an earnest attempt to revive the simple ancient Greek dances. Her efforts meeting with little success she went abroad and soon became very popular in Munich, Berlin and Paris. She established a dancing school at Griinewald, near Berlin, for girls from 4 to 14 years of age, who re¬ ceive free board and schooling. Miss Duncan I)opularized the barefoot dance in simple draper¬ ies. In 1913 her two children were carried by a runaway motor over the Seine embankment and drowned, after which she went into tem-Ijrorary retirement.

DUNCAN, James, American labor leader: b. Kincardine County, Scotland, 5 May 1857. He was educated at Aberdeen, Scotland, and removed to the United States. From 1873 he was a granite cutter, also granite statue cutter. He was secretary of the New York branch in 1881, of the Baltimore branch in 1884 and in¬ ternational president in 1895 of the Granite Cutters' International Association. He organ¬ ized and led a successful educational campaign in the union and ultimately the great strike in the granite-cutting industry for an eight-hour workday in 1900. After 1895 he was editor of the Granite Glitters' Journal; was vice-president

of the American Federation of Labor in 1894; represented the American labor movement to the British Trades Congress at Bristol, Eng¬ land, in 1898. He also represented the Ameri¬ can Federation of Labor at the International Secretariat Conference of Labor, Budapest, Hungary, in 1911. He is a member of the Ameri¬ can Academy of Political and Social Science.

DUNCAN, John, Scottish theologian and Hebraist; b. Aberdeen, 1796; d. 1870. He received his education at Marischal College, was ordained

in 1836, preached for some time in Milton Church, Glasgow, and in 1840. was sent to Pesth as a missionary to convert the Jews. His most celebrated converts were Dr. Edersheim and the Rev. Adolph Saphir. Re¬ turning from Pesth in 1843, Duncan was ap¬ pointed to the chair of Oriental languages in New College, Edinburgh, a position which he held until his death. Consult Brown, David, ˆLife of John Duncanˆ (Aberdeen 1872) ; Knight, ˆColloquia peripateticaˆ (1870; 5th ed., 1879) and Stuart, ˆRecollections of Duncan.ˆ

DUNCAN, Louis, American electrical engi¬ neer; b. Washington, D. C., 25 March 1862; d. Pelham Manor, N. Y., 13 Feb. 1916. He was graduated from the United States Naval Acad¬ emy in 1880, and served in the navy until 1887. During this time he pursued advanced studies at Johns Hopkins University, becoming a Ph.D. in 1885. He was major of the first volunteer engineers during the war with Spain. Later he began his connection with Johns Hopkins, be¬ ing associate in, and subsequently associate pro¬ fessor of applied electricity (1887-98). From 1902-04 he was head professor of electrical engineering at the Massachusetts Institute of Technology. He was elected president of the American Institute of Electrical Engineers in 1895. He wrote many articles on engineering topics in scientific journals and was a member of several scientific bodies. He specialized in electrical traction and as consulting engineer for the rapid transit commission of New York supervised the work of electrifying New York's first subway system. Under his direc¬ tion, from 1897 to 1901, the Third Avenue Street Railway system of New York was elec¬ trified. He also was prominently identified with the underground trolley system in Washington.

DUNCAN, Norman, American journalist; b. Brantford, Ontario, Canada, 2 July 1871; d. Fredonia, N. Y., 18 Oct. 1916. He was educated at the University of Toronto 1891-95, entered journalism and from 1897 to 1901 was on the staff of the New York Evening Post. In 1908-10 he was adjunct professor of English litera¬ ture in the University of Kansas. In 1907-08 he was correspondent for HarpePs Magazine in Asia Minor and Egypt, and in 1912-13 in the East Indies, Australia, New Guinea, *etc.* He has written short stories and sketches for the Atlantic Monthly, McClure's Magazine and others, and has published ˆThe Soul of the Street; Stories of the New York Syrian Quar¬ terˆ (1900) ; ˆThe Way of the Seaˆ (1903) ; ˆDoctor Luke of Labradorˆ (1904) ; ˆThe Motherˆ (1905) ; ˆThe Adventures of Bjffy TopsaiP (1906) ; ˆThe Cruise of the Shining Lightˆ (1907) ; ˆEvery Man for Himselfˆ (1908) ; ˆGoing Down from Jerusalemˆ (1909) ; <The Suitable Childˆ 0909) ; ˆHiggins' (1909) ;

ˆBilly Topsail and Companyˆ (1910); ˆThe Measure of a Manˆ (1911); ˆThe Best of a Bad Jobˆ (1912) ; ˆA God in IsraeP (1913) ; ˆThe Bird-Store Manˆ (1914) ; ˆAustralian Bywaysˆ (1915).

DUNCAN, Robert Kennedy, American chemist; b. Brantford, Canada, 1868; d. 1914. He was graduated at the University of Toronto in 1892 and studied also at Clark and Columbia universities. For several years he taught chemistry and physics in secondary schools and in 1901-06 was professor of chemistry at Wash¬ ington and Jefferson College. In 1906 he be¬ came professor of industrial chemistry at the University of Kansas and four years later was appointed director of industrial research and assumed similar duties at the University of Pittsburgh. In 1911 he was visiting lecturer at Clark University. He was editor of the ˆNew Science Seriesˆ and published ˆThe New Knowledgeˆ (1905) ; ˆThe Chemistry of Com¬ merceˆ (1907) ; ˆSome Chemical Problems of Todays (1911).

DUNCAN, Sara Jeanette. See Cotes, Sara Jeanette.

DUNCAN, Thomas, Scottish painter; b. Kinelaven, Perthshire, 24 May 1807 ; d. Edin¬ burgh, 25 May 1845. He began to exhibit at the Scottish Academy in 1828, and became an aca¬ demician in 1830. He became master of the Trustees' Academy, Edinburgh, in 1840 and an associate of the Royal Academy in 1843. The first picture which extended his fame beyond the Tweed, and helped to procure his admission as an associate of the Royal Academy (1843), was ˆPrince Charles Edward and the High¬ landers entering Edinburgh after the Battle of Prestonpansˆ (1840). Another famous picture of his is '^Charles Edward asleep after Cullo-den, protected by Flora Macdonald.ˆ His last exhibited work was the ˆMartyrdom of John Brown of PriesthilU now in the Corporation Gallery of Glasgow. He also executed many portraits.

DUNCAN, William Wallace, American clergyman; b. Ashland, Va., 20 Dec. 1839; d. 1908. He was graduated at Randolph-Macon College in 1858, joined the Virginia conference the next year and held several important charges. During the Civil War he was a chap¬ lain in the Confederate army. In 1875 he was transferred to the South Carolina conference, and elected professor of mental and moral phi¬ losophy in Wofford College. He was a meml)cr of the general conferences of 1878, 1882 and 1886, and a delegate to the Oecumenical Council of

1881 in London. In 1886 he was elected bishop of the Methodist Episcopal Church South.

DUNCANSBY HEAD, a picturesque prom¬ ontory, forming the northeastern extremity of Scotland, in the county of Caithness. It con¬ sists of a circular rocky eminence of about two miles in circumference, and is intersected by large ravines and remarkable fissures. About a mile and a half west stood the celebrated John O'Groat's house, of which no trace now remains.

DUNCE, a word introduced by the Thomists or disciples of Thomas Aquinas, in ridicule of the Scotists, or disciples of John Duns Scotus, schoolman, who died 1305 a.d., to denote

a subtle sophist given to caviling where he can¬ not refute. When the reaction against the schoolmen took place at the Reformation the merits of those acute metaphysicians were tem¬ porarily decried, and the celebrated John Duns Scotus came in for a more than ordinary share of disparagement, and he, though a man of very subtle intellect, was held by the more ignorant or prejudiced of the reforming party to be a man of invincible stupidity. He was, therefore, made to stand as the prototype of all modern dunces. Succeeding generations have the un¬ favorable verdict thus passed on the cultivators of scholastic philosophy.

DUNCIAD, The. This literary Satire, by Pope, is in the form of a mock-epic of 1,700 lines in heroic couplets, and was published in 1729. It is the monumental example of its kind in English. Though professedly a chastisement of the *dunces,^^ the ®Grub Street fry,® with whom Pope quarreled almost all his life, it really attacks all the writers who intentionally or otherwise, with or without cause, had wounded the poet's vanity. Pope always re¬ membered every line written, every word uttered against himself, and repaid it with interest. Hence, though the professed purpose of his ®epic of the dunces® is ^ho crush these common enemies of mankind,® his personal animosity is evident in every line. His protagonist, king of the dunces and the

realm of Dullness, was at first Theobald, who had attacked Pope's bad edition of Shakespeare, and had produced a better one, but he was afterward dethroned in favor of Colley Cibber, who in the meantime had ridiculed Pope's unsuccessful play. The Dunciad borrows its general scheme from ˆMacFlecknoeˆ (Q-v.), but enlarges the ac¬ tion, notably by the beastly games that cele¬ brate the coronation. Even with this, the ac¬ tion is slight and unimportant. With the third book, foretelling the reign of Dullness, the poem properly ends. In 1742 Pope added a fourth book, made up of fragments composed for an¬ other purpose, which realizes the reign of Dull¬ ness, and in which Bentley, the Greek scholar, is most unjustifiably made the protagonist.

The Dunciad is dedicated to Swift, whom Pope addresses as a successor to Rabelais. Swift's influence, though certainly not Ra¬ belaisian, is apparent throughout the poem ; but whether or not Swift ever really ˆlaughed and shook in Rabelais' easy chair,® Pope certainly fails in his own attempt to use the jovial method of the great French satirist. He ends by man¬ gling his enemies, covering them with showers ®f vile abuse, and then rolling them in mud of peculiar filth and malodor. Though most of his victims were, even as he asserted, of small importance, he has ˆpreserved his flies in amber.® Copious explanatory notes, which were needed even with the first edition, now alone render much of the satire intelligible to the modern reader. Yet it is uncritical to re¬ gard ˆThe Dunciadˆ as little more than a monument of malice. Only one English poet could have written it. Its verse is polished ; its expression is concise and incisive to the last degree; its wit is often brilliant; some of its lines, such as ®The right divine of kings to govern wrong,® have passed into the common stock. The concluding passage of the poem, depicting the universal empire of Dullness, at¬

tains the very sublime in mockery and is as sure of immortality as almost any other in English poetry. Among the innumerable imitations of ˆThe Dunciad,ˆ Byron's ˆEnglish Bards and Scotch Reviewersˆ is by far the ablest and most celebrated. Consult Warton, ˆ Essay on the Genius and Writings of Popeˆ (Vol. II, pp. 439-454) ; Paston, George, ˆMr. Popeˆ (Vol. I, pp. 351-364) ; for notes, illustrations, list of imitations, etc., consult Warton's edition of Pope's ˆWorksˆ (Vol. V, 1797) ; Aldine edition; Thorns, W. J., ˆNotes on Editions of the Dunciadˆ (n.d.).

Marion Tucker.

DUNCKER, doonk'er, Dora, German story-writer and humorist : b. 28 March 1855. The conceits Hncurableˆ (1893) ; ˆThe Sphinx,ˆ and other tales and comedies, have succeeded ; while in ˆModern Mastersˆ (1883) she has evolved excellent character studies.

DUNCKER, Maximilian Wolfgang, Ger¬ man historian: b. Berlin, 15 Oct. 1811; d. Anspach, 21 July 1886. Politics interested him in early years, but his later energies were given to elaborate historical investigations, of which the best fruits are ˆThe Crisis of the Reformationˆ (1845) ; ˆFeudalism and Aris¬ tocracyˆ (1858) ; and the masterpiece ˆAncient Historyˆ (1852-57).

DUNCOMBE, Thomas Slingsby, English politician: b. 1796; d. 13 Nov. 1861. He was elected member of Parliament for Hertford in 1826-32, and for Finsburg after 1834, assisted in carrying the Reform Bill, was prominent among the advanced Liberals, and, after visiting Canada, warmly defended Lord Durham's ad¬ ministration of that colony. In 1842 he pre¬ sented the Chartist petition, signed by 3,000,000 of the lower classes, in favor of universal suf¬ frage, vote by ballot, short Parliaments, *etc.* In 1844 the then Home Secretary having sanctioned the opening of the letters of Mazzini, Dun-combe, in the House of Commons, denounced, with scathing invective, the adoption of the post-office spy system on English soil. Consult his ˆLife and Correspondenceˆ (London 1868).

DUNDALK, dun-dak', Ireland, maritime town, capital of the county of Louth, on Castle¬ town River, 54 miles north of Dublin. It is an ancient place, has a splendid Roman Catholic cathedral, and in the battle of Faughart (1318) fought in its vicinity, Edward Bruce, the brother of King Robert Bruce of Scotland, was slain. Its manufactures are soap and leather, has shipbuilding and ironfounding, and the trade, chiefly in cattle and agricultural produce, is extensive. Pop. 13,128.

DUNDAS, Henry, Viscount Melville, Scottish statesman: b. Edinburgh, 28 April 1742; d. 28 May 1811. He studied at the University of Edinburgh and in 1766 was appointed solici¬ tor-general for Scotland, M. P. for Middlesex in 1774 and lord advocate in 1775. In 1782 he was appointed treasurer of the navy and made a member of the privy council ; but he continued only a short time in office. His resolution condemning the conduct of Warren Hastings in India led to the impeachment in 1786.ˆ In 1791 he was made Home Secretary, and in 1794 became Secretary of War. In 1802 he was created Viscount Melville. In 1804 he was appointed First Lord of the Admiralty

DUNDAS

under Pitt. Next year he was impeached, be¬ fore the House of Lords, ^^of high crimes and misdemeanors^^ in his former office of treasurer of the navy. As the evidence adduced against him did not directly implicate him in the malversation proved against his deputy, he was acquitted. He was long practically the manager of Scottish affairs in which he showed himself a reactionary, and gained notoriety by his rigorous prosecutions of the Scottish radicals in 1795.

DUNDAS, Sir James Whitley Deans,

English admiral; b. 1785; d. 1862. In 1799 he entered the navy and reached the rank of com¬ mander in 1806. He was flag captain to Sir Thomas Parker and afterward to Sir Philip Dunham. He was made rear-admiral in 1841, was commander in the Mediterranean in 1852 and in the same year became vice-admiral. During the Crimean War he was chief naval commander and had charge of transporting the army to the theatre of war. He was severely criticized for his operations against Sebastopol and was superseded by Sir Edward Lyon in 1855. In 1857 Dundas was made admiral.

DUNDAS, Robert, Lord Arniston, Scottish judge: b. 9 Dec. 1685; d. 1753. He was admit¬ ted to the Scottish bar in 1709, and soon be¬ came known as a successful lawyer with forcible and ingenious methods of pleading. In 1717 he received the appointment of solicitor-general, which was followed by advancing positions until in 1737 he became a judge, and in 1747 rose to the dignity, which he retained until his death, of lord president of the Court of Session of Scotland. His eldest son, Robert: b. 18 July 1713; d. Edinburgh, 13 Dec. 1787; was educated at Edinburgh University, studied law at Utrecht and Paris; in 1738 was admitted to the Scottish bar, and, like his father, rose through succes¬ sive Crown positions to that of lord president of the Court of Session of Scotland, which he at¬ tained in 1760 and occupied until his death. Ow¬ ing to his having given his casting vote as lord president against the claimant, Archibald Stewart, in the famous Douglas Cause, in 1767, he was intensely unpopular in Edinburgh.

DUNDAS, Canada, a town in Wentworth County, in the province of Ontario, situated on a bay at the western extremity of Lake On¬ tario. It is a manufacturing and shipping cen¬ tre. Pop. 4,299.

DUNDAS ISLAND, British Columbia, an island 40 miles northeast of Queen Charlotte's Islands, separated from Cape Fox, the southern¬ most point of the Alaskan panhandle, by Chat¬ ham Sound.

DUNDAS, or JUBA, ISLANDS, British East Africa, a group of about 500 coral islets off the east coast of Africa in lat. 1° S. The group has one safe anchorage near the mouth of the Durnford River.

DUNDAS STRAIT, Australia, a passage about 18 miles wide, separating Melville Island from Coburg Peninsula in northern Australia.

DUNDEE, Viscount of. See Graham, John.

DUNDEE, Scotland, parliamentary and county burgh and city in County Forfar, on the estuary of the Tay, 8 miles from the sea, and 5914 miles northeast of Edinburgh by

rail. It is the third city of Scotland and rises steeply from the water. Its linen trade is the largest in Scotland, and its jute manufactures are the largest in Great Britain. Shipbuilding is an important industry, and it is celebrated for its marmalade and confectionery. It is the centre of the seal and whale fisheries ; there are large wet docks and graving docks ; and an ex¬ tensive shipping trade. The number of vessels entering the port in 1916 was 1,906, with a registered tonnage of 540,826. The revenue from tonnage dues amounted to $99,597. The esplanade is nearly three miles in length. There is a fine old parish church, so large that three separate congregations worship under its roof. It has excellent educational facilities and University College is affiliated with the Univer¬ sity of Saint Andrews. The public utilities are municipally owned. There are some fine public parks, notably Baxter Park in the east end, presented by Sir David Baxter, and Balgay Hill in the west end. The Tay Bridge (railway) at the west end of the town, giving trunk rail connection with the south, was opened in 1887 to replace an older structure blown down in a hurricane, in 1879, and is two miles in length. Dundee was erected into a royal burgh by William the Lion about 1200; took a prominent part in the War of Independence; was captured by John of Gaunt in 1385; Robert Wishart, the first of the martyred Reformers, preached from its

gateway (still standing) ; it was sacked by Montrose in 1645, and later by General Monk, who put nearly 1,000 of its in¬ habitants to the sword; and from the burgh Viscount Dundee took his title, his estate of Claverhouse being north of the city, now on its outskirts. The city returns two members to Parliament. The boundaries were enlarged in 1913 to include the outlying suburb of B rough ty Ferry. Pop. 176,062.

DUNDONALD, Thomas Cochrane, 10th Earl of. See Cochrane, Thomas.

DUNDONALD INCIDENT. Douglas Bailie Hamilton-Cochrane, 12th Earl of Dundonald, a distinguished army officer, was ap¬ pointed in 1902 major-general commanding the militia in Canada. For a considerable time there was harmony between Sir Frederick Bor¬ den, the Minister of Militia, and the major-gen¬ eral ; but in June 1904, at a private banquet given by the local officers at Montreal to Lord Dundonald, he made a speech complaining of the interpolation of political considerations into militia problems, and in particular of the strik¬ ing out of the name of one of his nominees for a commission. The speech found its way into the press, and Lord Dundonald was dismissed on the ground that he had attacked the govern¬ ment under which he served. Lord Dundonald thereafter conducted a vigorous campaign in his own defense, and the question was one of the minor issues in the Dominion elections of

1904.

DUNDREARY, Lord, a prominent char¬ acter in Tom Taylor's well-known comedy of ˆOur American Cousin.ˆ The part originally contained but 47 lines, but it was enlarged by the actor, E. A. Sothern, who became famous in this role.

DUNE, dun, a low sand-hill ; an accumula¬ tion of sand; a hill-fort, or a regular building

commonly called a Danish fort. Sand dunes are made by the blowing of sand, this material having been produced by the grinding down of rocks under the influence of breakers on the seashore or coast, or any similar agency. Such sand dunes in many places skirt the shores of Holland, Great Britain, Spain and other coun¬ tries, in some places encroaching on and cover¬ ing what once was cultivated land. In Michi¬ gan, dunes have encroached on forests, com¬ pletely burying and killing the trees, and have then passed on, again uncovering the forest. In England and Germany, buildings have even been buried and unearthed. Originally the ^^downs^^ of England were similar to the dunes. The dunes along the Atlantic coast of the United States have changed materially the form of the coast line; some of these dunes are high hills, and still higher hills are on the coast of some of the islands of the Bahamas. See Geology and Eolian Deposits.

DUNE PLANTS, plants characteristic of dunes, those somewhat unstable sandy areas formed under the influence of wind. The species capable of withstanding these conditions are few in number and are marked by well-de¬ veloped underground parts, including extensive root and numerous root-hairs, and storage or¬ gans, especially rhizomes. They are capable also of being partially buried, without apparent injury. Since some dunes are migratory, or tend to extend over wider and wider areas, thus destroying the natural vegetation, crops and even orchards and forests, these plants are of special interest. Some of them, especially marram or beach grass, also known as sand reed (Amniophila arenaria), are widely planted upon beaches and dunes, to hold the sand and prevent its being blown by the wind. The United States Department of Agriculture, through its division of agrostology, has done immense service to landowners along the shores of both the Great Lakes and the ocean coasts, in the planting of soil-binding grasses, as the plants are called. In time the planted areas support other vegetation and the dune may be con¬ sidered conquered. In general the vegetation characteristic of dunes consists of xerophytes (q.v.), but the xerophytic character is due to the shifting of the sand and not to the condi¬ tions of growth. See Plant Geography.

DUNEDIN, dun-e'dm or dun-ed'in. New Zealand, town, capital of the province of Otago, on Otago harbor. It is about nine miles from its port. Port Chalmers, with which it is con¬ nected by railroad. It was founded by an as¬ sociation of Scottish Free Churchmen in 1848. It is reputed to be one of the finest residential towns in New Zealand. There is a university opened in 1871, with four faculties. Gold dis¬ covered nearby in 1861 has caused the recent rapid growth of the town. Wool and gold are the staple exports. Pop. 64,237.

DUNFERMLINE, Scotland, a royal burgh in Fife, 16 miles northwest of Edinburgh by rail. It is situated in a rich coal district, has brass-and ironworks, and important lines of manu¬ factures. Andrew Carnegie, the Pittsburgh iron¬ master, a native of the burgh, has furnished it with a public library and baths, presented it with the adjoining Pittencrieff Park and Glen, and otherwise liberally endowed k. Dun¬

fermline is a place of great antiquity; its palace was a favorite residence of the Scottish kings ; and in its abbey eight kings and seven queens were buried. The royal palace, now in ruins, is. said to have been built by King Robert Bruce. The abbey was founded by Malcolm Canmore and his consort. Saint Margaret, in 1072, rebuilt by David I in the early Norman style, burned by Edward I of England in 1303, and its ruin completed by the iconoclastic zeal of the Reformers on 28 March 1560. The body of King Robert Bruce was laid in front of the high altar, a location now occupied by the pulpit of the Abbey church. The burgh boundaries were extended in 1911 southward to the fringes of the Firth of Forth. Dunfermline gives its name to a group of parliamentary burghs re¬ turning one member to the House of Commons. The linen and linoleum factories of the Dun¬ fermline district are among the most important in Scotland. Two of the linen mills contain about 2,000 looms each and the other six from 600 to 1,800 looms each. The assessed valuation of the city for 1916-17 was $825,000, as com¬ pared with $755,000 for 1915-16. Pop. 28,103.

DUNG-BEETLE, a name borne by several lamellicorn beetles, of the genera Aphodius, Bolbocerus, Copris, Geotrupes, Phaneus and others. These beetles nest and lay their eggs in the droppings of cattle, and are found throughout America, Europe, Asia and Africa. An African species is the sacred scarabaeus of Egypt (Ateuchius sacer).

DUNGARVAN, Ireland, municipal bor¬ ough and seaport in the county of Waterford, 28 miles southwest of Waterford. It is a resort for sea-bathing. Its ancient castle, situated in the centre of the town, is now used as a barrack. The harbor is shallow and there is little trade. Fishing is the chief occupation. Pop. 4,977.

DUNGENESS, dunj'nes, a headland on the south coast of Kent, 11 miles southeast of Rye. It has a fort and government lighthouse.

DUNGLISON, dung'li-son, Richard James, American physician: b. Baltimore, Md., 13 Nov. 1834; d. Philadelphia, 4 March 1901. He was a son of Robley Dunglison (q.v.). He was graduated at the University

of Pennsylvania 1852j and from Jefferson Medical College 1856. During the Civil War he served as surgeon in the Philadelphia military hospitals. He soon gave up the practice of medicine in order to devote himself to literary work and it is by his contributions to medical literature that he is best known, having edited the College and Clinical Record (1880-99) and written con¬ stantly for the leading medical journals. He was also one of the original editors of the Philadelphia Medical Times. He revised and edited the following works of his father: ˆHis¬ tory of Medicineˆ (1872), and ˆMedical Lexi¬ conˆ (1874) ; translated Guersant's ˆSurgical Diseases of Childrenˆ (1873); .and was author of ˆThe Practitioner's Reference Bookˆ (1878) ; ˆElementary Physiologyˆ (1879) ; ˆThe Present Treatment of Diseaseˆ (1886).

DUNGLISON, Robley, American physi¬ cian: b. Keswick, England. 4 Jan. 1798; d. Philadelphia, 1 April 1869. He was educated in medicine at London and Erlangen, and ap¬ pointed professor of medicine in the University

DUNITE

of Virginia in 1824. In 1833 he was elected to the chair of therapeutics in the University of Maryland, and in 1836 professor of the insti¬ tutes of medicine in the Jefferson Medical Col¬ lege of Philadelphia. He published about 20 volumes treating of subjects connected with medical science. They were widely circulated and highly valued in their day, one of them, a ˆDictionary of Medical Science and Literature,ˆ being republished as late as 1874.

DUNITE, a heavy, dark, very basic igneous rock of the peridotite group. It contains no felspar and consists essentially of olivene and chromite. It is believed that most workable deposits of chrome iron ore were formed by local segregations of chromite in a cooling dun-ite magma, at least the chromite deposits of North Carolina probably had such an origin. Dunites in common with other rocks of the peridotite group change readily to serpentine, and most deposits of chromite occur in serpen¬ tine. See Peridotite.

DUNKARDS. See German Baptist Brethren.

DUNKIRK, dun'kerk (Fr. Dunkerque or Dunquerque), France, a strongly fortified town in the department of Nord, on the coast of the North Sea, 28 miles northeast of Calais, at the junction of several canals. Of the public squares, that of Champ de Mars and that adorned by a statue of Jean Bart (1845) are the most noteworthy. There are several inter¬ esting churches, among the chief being the church of Saint Eloi, built about 1560, with a fine tower about 300 feet high, now used as a belfry; the chapel of Notre-Dame des Dunes, founded in 1405 and restored in 1815; and the convent and church of Saint Jean-Baptiste. Dunkirk is well protected by several forts, both on the land side and on that of the sea. Its manufactures are extensive, comprising fishing-nets, ropes, sailcloth, straw hats, starch, soap, leather, earthenware, oil and chemicals, besides distilling, sugar-refining, shipbuilding and other industries. Dunkirk is the third seaport of France, has four dry docks and five miles of quajˆage, chief port of departure of the Iceland fishing fleets. The trade is extensive and im¬ portant. Dunkirk is the seat of a United States consular agent. Dunkirk was a town under its present name, which means ˆffhe church of the

dunes,® in the 9th century. It has played a prominent part in many wars, has been besieged on many occasions and successively held by Burgundy, Austria, Spain and France. Turennes victory of the dunes in 1658 brought it into the possession of France, by whom it was ceded to England. In 1662 it was bought back from Charles II. Under the Treaty of Utrecht (1713) its fortifications were to be de¬ molished; but these were subsequently rebuilt. It was unsuccessfully besieged by the Duke of York in 1793. The present commercial import¬ ance of Dunkirk dates from the period of the Second Empire. One of the most famous na¬ tives of the town is Jean Bart (1651-1702), the celebrated seaman. Pop. of commune 38,891.

DUNKIRK, N. Y., city and port of entry in Chautauqua County, 41 miles southwest of Buffalo, on Lake Erie, and on the Lake Shore and Michigan Southern, the Pennsylvania, the Erie and other railroads. Its lake trade is extensive.

facilitated by its fine harbor and breakwater. The important industries are the manufacture of locomotives, steel, axes, radiators, gas-engines, lumber, cotton goods, *etc.* The United States cenusus of manufactures for 1914 showed within the city limits, 62 industrial establish¬ ments of factory grade, employing 3,471 per¬ sons; of whom 2,989 were wage earners, receiv¬ ing annually $2,108,000 in wages. The capital invested aggregated $9,354,000, and the year's output was valued at $8,367,000; of this, $4,303,000 was the value added by manufacture. The chief buildings are the high school, the public library and the Brooks Memorial Hospi¬ tal. Gratiot Park and Washington Park are also attractive features. There are two national banks. The property of the town is assessed at approximately $10,000,000. The first settle¬ ment at Dunkirk was made in 1809. With the rapid increase in population, it was incorporated as a village in 1837, and in 1880 was chartered as a city. The government is conducted by a mayor, elected biennially, under whom appoint¬ ments are made to the civil service commission and to the board of health; and by a common council consisting of five members. The city owns and operates its own waterworks, electric plant and power plant. Pop. (1920) 19,336.

DUNLAP, William, American dramatist and painter: b. Perth Amboy, N. J., 19 Feb. 1766; d. New York, 28 Sept. 1839. He painted George Washington's portrait and for five years (1784ˆ9) worked under West in London. Re¬ turning to America he wrote several successful plays, including ˆThe Fatherˆ (1789), a com¬ edy; ˆLeicesterˆ (1794), a tragedy; ˆAndreˆ (1798), a tragedy. He also published ˆLife of George

Frederick Cookeˆ (1813) ; ˆLife of Charles Brockden Brownˆ (1815) ; ˆHistory of the American Theatreˆ (1832) ; ˆHistory of the Rise and Progress of the Art of Design in the United States > (1834) ; and similar works. He was one of the founders of the National Academy of Design.

DUNLIN (Tringa alpina), a bird of the genus to which the least and pectoral sand¬ pipers, knot and stint belong. It is smaller than the common snipe ; is in winter ashy-gray above, white below, with dark spots on the breast ; in the breeding season it is mottled with rufous above and the breast is crossed with black. The straight bill is adapted for boring in soft soil and its cavity reaches to the extremity, not, as in the snipe, stopping short of the tip. The dunlin is one of the most common shore birds in northern Europe and Asia, and some¬ times wanders into North America, where it is replaced by the closely allied redbacked sand¬ piper. In Scotland there are several local vari¬ eties, those of the east being a half larger than those of the Hebrides. It breeds on moors and marshes along with the snipe and plover, return¬ ing after the breeding season to the sandy and muddy reaches of the coast. See Sandpipers.

DUNMORE, John Murray, Earl of, Eng¬ lish colonial governor: b. 1732; d. Ramsgate, England, May 1809. He was appointed gover¬ nor of New York in 1770, and in addition gov¬ ernor of Virginia in 1771. He dissolved the Virginia assembly in 1772, and again in 1774 when it had resolved to keep the day of the closing of the port of Boston as a day of fast¬ ing and prayer. In 1775 he removed part of a

powder magazine to one of the English war ships, and the people, incensed at this, began armed resistance under the leadership of Pat¬ rick Henry. Dunmore was forced shortly after to take refuge on his fleet, whereupon the burgesses decided that he had abdicated his functions and refused to consult with him. He then kept up a predatory warfare against the colonists, burning Norfolk in 1776. He was driven from his position on Gwynn's Island and finally sent the fleet to the West Indies, and returned to England. He was elected a

Scot¬ tish representative peer in 1776 and was gov¬ ernor of the Bahamas from 1787-96. See Co¬ lonial Wars in America.

DUNMORE, Pa., borough in Lackawanna County, on the Erie and Lackawanna railroads, and two miles northeast of Scranton. It is the centre of a coal mining district, and has manu¬ factures of silk, iron and brick. Several public institutions are located here, the principal one being the State Oral School for the Deaf and Dumb. Under a charter of 1862 the government is vested in a burgess elected every four years, a borough council and administrative officials, the majority of whom are chosen by popular vote. Dunmore was settled in 1835 and incor¬ porated in 1862. Pop. (1920) 20,250.

DUNMOW, Great and Little, two parishes of England, in the county of Essex. The former (pop. about 3,000) contains the mar¬ ket-town of Great Dunmow, on a height above the Chelmer, 32 miles northeast of London. At Little Dunmow (pop. 320) are remains of a stately Augustinian priory, founded in 1104. The Dunmow flitch of bacon was a prize instituted in 1244, by Robert Fitzwalter, on the condition ^^that whatever married couple will go to the priory, and kneeling down on two sharp-pointed stones, will swear that they have not quarreled nor repented of their marriage within a year and a day after its celebration, shall receive a flitch of bacon.® The prize was first claimed in 1445, 200 years after it had been in¬ stituted. After 1751, up to which date only five presentations had taken place, the flitch was not again claimed till 1855 ; between 1860 and 1877 there were four awards ; and within recent years there have been recurrent awards. Consult Andrews, ˆHistory of the Dunmow Flitchˆ (London 1877).

DUNN, Andrew Hunter, Canadian bishop ; b. Saffron Walden, Essex, England, 1839; d. 1915. He was graduated at Corpus Christ! College, Cambridge, was ordained to the priest¬ hood in 1865 and elected Anglican bishop of Quebec in 1892. He was the author of ˆ Helps by the Wayˆ ; ˆThoughts for Quiet Moments.ˆ

DUNN, Gano, American electrical engi¬ neer: b. New York, 18 Oct. 1870. In 1889 he was graduated at the College of the City of New York and two years later from the engi¬ neering department of Columbia University. He was for some years in the employ of the Western Union Telegraph Company and subse¬ quently (1891) was with the Crocker-Wheeler Company, of which he was vice-president and chief engineer from 1898 to 1911. In 1911-13 he was vice-president in charge of engineering and construction of J. G. White and Company, New York, and since 1913 has served as presi¬ dent of the

J. G. White Engineering Corpora¬ tion. He was president of the New York Elec¬

tric Society in 1900-02; of the American Insti¬ tute of Electrical Engineers in 1911-12 and of the United Engineering Society 1913-16. He was American delegate and vice-president of the International Electrical Congress at Turin 1911. He has published various papers on electrical subj ects.

DUNN, Jacob Piatt, American journalist and author : b. Lawrenceburg, Ind., 12 April 1855. He was educated at Earlham College, Indiana, and Michigan University, and was State librarian of Indiana 1889-93, when he became an editorial writer on the Indianapolis Sentinel; city comptroller of Indianapolis, 1901, 1904-05, 1914-16; member Public Library Commission of Indiana 1899-1916; member Commission on Taxation of Indiana 1916. Since 1886 he has been secretary of the Indiana Historical So¬ ciety. He has published ˆMassacres of the Mountains, a History of the Indian Wars of the Far Westˆ (1886) ; ˆHistory of Indianaˆ (1888), in the ˆAmerican Commonwealth Seriesˆ ; ˆThe Tax Law of Indiana and the Science of Taxationˆ (1891) ; ˆThe Libraries of Indianaˆ (1892) ; ˆThe World's Silver Prob¬ lemˆ (1894) ; ˆTrue Indian Storiesˆ (1908) ; ˆHistory of Indianapolisˆ (1910) ; ˆThe Un¬ known Godˆ (1914).

DUNN, Samuel Grace, American editor : b. Bloomfield, Iowa, 8 March 1877. He was graduated at the Pratt (Kan.) High School in 1894. He learned the printer's trade in 1890-95; was editor of the Quitman (Mo.) Record 1895-96; associate editor of the Maryville (Mo.) Tribune 1896-1900; reporter of the Kansas City Journal 1900-02, and editorial writer on the latter journal in 1902-04. In 1904-07 he was railroad editor and editorial writer on the staff of the Chicago Tribune ; in 1907-08 he was man¬ aging editor of the Railway Age, and since 1908 editor of the Railway Age Gazette. He has published ˆThe American Transportation Questionˆ (1912) ; ˆGovernment Ownership of Railwaysˆ (1913), and contributions on trans¬ portation subjects.

DUNNAGE, a nautical term applied to loose wood or other miscellaneous substances used in the hold of a ship to lift the cargo above bilge-water. Also, such articles as old mats or sails stowed among casks and other cargo to prevent their motion and breakage. See Chock.

DUNNE, Edward Fitzsimons, American political leader: b. Waterville,

Conn., 12 Oct. 1853. He took a three-year course at Trinity College, Dublin, was admitted to the bar in 1877 and became circuit judge of Cook County, Ill., in 1892. He remained in this relation until 1905 when he resigned to become mayor of Chicago. He was engaged in law practice from 1907 to 1913, and in 1913 was elected governor of Illinois for a four-year term. He is vice-president of the National Civic Feder¬ ation and was president of the League of Amer¬ ican Municipalities in 1906-07.

DUNNE, Finley Peter, American journalist and humorist : b. Chicago, 10 July 1867. He was educated in the Chicago public schools and en¬ tered journalism in 1885. He was city editor of the Chicago Times 1891-92; was on the editor¬ ial staff of the Chicago Evening Post and Times-Herald 1892-97, and editor of the Chi-

cago Journal 1897-1900. His literary fame be¬ gan with his ^^Mr. Dooley® sketches which ap¬ peared first in the Tirnes-Herald. They con¬ sisted of monologues by Mr. Dooley, a saloon¬ keeper of Archey Road, on various topics of the day. His comments were witty, keen and penetrating, mellowed by a kindly, tolerant, philosophic interest in the weaknesses of his fellow creatures. Homely similes and character¬ istic Irish-American brogue and humor en¬ liven the essays. During the Spanish-American War, ®Mr. Dooley's® words attacked its politi¬ cal and social phases, and were widely read both in England and America. ^Mr. Dooley in Peace and War^ contains the best of these more satirical essays, whose popularity rank Dunne among the leading American humorists. He also published ^Mr. Dooley in the Hearts of His Countrymen^ (1898) ; ^Mr. Dooley's Phi¬ losophy^ (1900) ; ^Mr. Dooley's Opinions^ (1901) ; ^Observations of Mr. Dooley^ (1902) ; ^Dissertations of Mr. Dooley> (1906) ; and ^Mr. Dooley Says^ (1910).

DUNNET HEAD, a promontory of Scot¬ land, in Caithness, at the western entrance of and projecting into the Pentland Firth; the most northerly point of the mainland of Great Britain. It rises to the height of 400 feet above sea-level. On the northwestern extremity is a

lighthouse 346 feet high.

DUNNING, Albert Elijah, American ed¬ itor: b. Brookfield, Conn., 5 Jan. 1844. He was graduated at Yale University in 1867 and at Andover Theological Seminary in 1870. From 1871 to 1881 he was pastor of the Highland Congregational Church, Boston, and from 1881 to 1889 he served as general Sunday-school secretary for Congregationalist churches. From 1889 to 1911 he was editor-in-chief of the Congregationalist. He has at various times conducted parties of tourists to the Holy Land. He has published ˆThe Sunday School Li¬ brary' (1883) ; ˆBible Studies' (1886) ; ˆCongregationalists in America' (1894) ; ˆMaking of the Bible' (1911).

DUNNING, William Archibald, American educator : b. Plainfield, N. J., about 1859. He was graduated at Columbia 1881 and became successively Fellow 1886-88; prize lecturer in political science 1887-89; instructor in history 1889-91, and professor of history and lecturer on political theory since 1891. In 1894 he be¬ came managing editor of the Political Science Quarterly, to which he has contributed over 60 important articles and reviews. In 1913 he was president of the American Historical Associa¬ tion. He has published ˆEssays on the Civil War and Reconstruction, and Related Topics' (1898) ; ˆHistory of Political Theories, Ancient and Mediaeval' (1902); ˆHistory of Political Theories from Luther to Montesquieu' (1905) ; ˆReconstruction, Political and Economic' (1907) ; ˆCarl Schurz's Political Career 1869-1906' (1908) ; ˆPaying for Alaska' (1912).

DUNNOTTAR, dun-not'tar, a parish of Kincardineshire, Scotland, famous for its an¬ cient ruined castle perched on a great rock 160 feet sheer above the sea, one and one-half miles below Stonehaven. The older part of the ruins probably belongs to about 1394, when the castle was rebuilt by Sir William Keith, mari-schal of Scotland. During the Commonwealth

the castle was selected as the strongest place in the kingdom for the preservation of the Scottish regalia. Lambert, one of Cromwell's generals, besieged the place, which was starved into capitulation. The regalia had, however, been previously removed by a stratagem, in which Mrs. Granger, the wife of the minister of an adjoining parish, played the chief part. She brought away the crown hid among some clothes in her lap, her servant-maid carrying the sword and sceptre in a bag of flax on her back. In the Whigs' Vault of the castle 176 Covenanters belonging to the west of Scot¬ land, men and women,

were confined in 1685. In Dunnottar churchyard Sir Walter Scott met Robert Peterson, the original of ˆOld Mor¬ tality.' Pop. 2,255.

DUNOIS, dii -nwa', Jean, Count of Orleans AND OF Longueville, French soldier: b. Paris, 23 Nov. 1402; d. Saint Germain-en-Laye, near Paris, 24 Nov. 1468. He was a natural son of Louis, Duke of Orleans, and made the name ˆBastard of Orleans" illustrious by his military exploits in the war for the liberation of France, then completely in the power of England. Being besieged by the English he defended Orleans with the greatest courage until relieved by the Maid of Orleans. To Dunois belongs almost entirely the honor of expelling the enemies of his country from Normandy and Guienne. In 1450 he had completely freed northern France from the presence of the English, and in the following year, among other cities, captured Bordeaux and Bayonne. Charles VII was indebted to him for his crown. Dunois received from him the title of ®deliverer of his country," the county of Longue¬ ville and the dignity of high chamberlain of France.

DUNOON, dun-oon', Scotland, a celebrated watering-place in the county of Arpˆle, on the shore of the Firth of Clyde, 25 miles west by north from Glasgow. There is an immense pas¬ senger traffic here in the summer season, car¬ ried on by means of the Clyde steamers. On a hill are the ruins of Castle Dunoon, the ancient residence of the Argyles. A monument has been erected to the memory of Burns's ˆHighland Mary,' who was a native of Dunoon. Pop. 6,859.

DUNOYER,. dun-wa-ya, Charles, French economist: b. Carennac (Lot) 1786; d. Paris 1862. He studied law at Paris, then assisted in preparing Sirey's ˆRecueil de Jurisprudence.' He welcomed the fall of the Empire, though he only accepted the legitimist monarchy so far as it respected the liberties of the people. In con¬ junction with Charles Comte he established in 1814 the journal named Le Censeur. It was discontinued in 1816 but resumed publication after 18 months as Le Censeur Europeen. The increasing severity of the press laws, however, seriously hampered its editors and in 1820 it suspended publication. Thereafter Dunoyer de¬ voted his attention to economics. He gave at Paris in the Athenaeum Institute a course of lec¬ tures on political economy and moral science, which were afterward published as ˆL'industrie et la morale considerees dans leurs rapports avec la liberte' (1825). In 1830, on the issuance of the Ordonnances de Juillet Dunoyer protested and turned to Louis Philippe, whose accession to power he welcomed. Appointed prefect of

Allier he was transferred in 1832 to the pre¬ fecture of the Somme; this he quitted in 1838 to enter the council of state. This last post was better suited to his disposition, which, though calm, was full of energy and ill-adapted to the compromising attitude necessary to a practical politician. In 1830 he reprinted his volume of 1825 with many additions, under the title of ˆNouveau traite d'economie socialeˆ (2 vols.), but before the second volume was issued from the press a fire consumed nearly the whole edition. Extending the scope of the work Dunoyer re¬ issued the work in 1848 under the title ˆDe la liberte du travail ou simple expose des condi¬ tions dans lesquelles les forces humaines s'exercent avec le plus de puissanceˆ (3 vols.). He also contributed to the Revue Encyclopedique, the Revue Frangaise, Journal des Debats and the Journal des Economistes. The revolution of 1848 was a heavy blow to him ; he remained, however, on the council of state, and only relin¬ quished his seat there after the coup d'etat of 1851. Bitterly hostile to the second Empire, as he had been to the first, he wrote a work di¬ rected against the new order of affairs. This book, which was published after his death, and then only at Brussels, is entitled ˆLe second empire et une nouvelle restaurationˆ (2 vols., 1865). In 1832 he was elected member of the Institute and in 1845 president of the society of political economy. His miscellaneous works — 'ˆNotices d'economie socialeˆ — and the second edition of ˆLa liberte du travaiP appeared in 1886 (3 vols.). Dunoyer was one of the great economists of the 19th century. He was a sup¬ porter of Malthus on population, but he was no believer in the theory of rent, considering that there was but one factor in production, *i.e.* labor.

DUNQUERQUE. See Dunkirk, France.

DUNRAVEN, Windham Thomas Wynd-ham-Quin, 4th Earl of: b. Adare Abbey, Ire¬ land, 12 Feb. 1841, He was educated at Christ Church, Oxford; was war correspondent for the. Daily Telegraph in Abyssinia in 1867 and again in the Franco-Prussian war, and suc¬ ceeded to the title in 1871. He was under¬ secretary for the Colonies, 1885-86, 1ˆ6-87. He is a traveler and yachtsman and has pub¬ lished: ˆThe Great Divide: the Upper Yellow¬ stoneˆ (1874) ; ˆThe Irish Questionˆ (1880) ; ˆSelf Instruction in the Theory and Practice of Navigationˆ

(1900) ; ˆThe Legacy of Past Years ˆ (1911) ; ˆCanadian Nightsˆ (1914).

DUNS SCOTUS, Johannes, one of the greatest of the mediaeval schoolmen, b. either in 1274 or 1266, probably in Ireland; d. Cologne 1308. Early in life he entered the Franciscan order, and studied at Oxford under William Ware. He was also influenced by Roger Bacon. About 1294 he taught at Oxford and defended the dogma of the Immaculate Conception. In 1304 he went to Paris, and in 1308, by the order of his superiors, to Cologne. The extreme deli¬ cacy and intricacy of his dialectic won him the title of the Subtle Doctor. He was less a sys-tematist than a critic and attacked most of his contemporaries and immediate predecessors, especially Saint Thomas. He starts from the same initial stock of notions as Saint Thomas, but makes a different application of these no¬ tions. One of the most important principles of

Scotism is that theology, unlike philosophy, is not a speculative but a practical science — the science of conduct, and that philosophy is defi¬ nitely subordinate to theology. Scotism adds to the two forms of matter of the Thomists • — that possessing only primary qualities and that also endowed with secondary qualities — a third, unqualified, tabula rasa matter, the same in both spiritual and corporeal substances. There are a hierarchy of forms of increasing degrees of specification. The substantial character of whatever is individual has its origin in nature, while that of the universal is derived from rea¬ son. The faculty of will is pre-eminent over that of intelligence, and that it is always possi¬ ble to will the evil. This priority of the will applies to God himself, and the good consists solely of the decrees of the Divine will. The soul is the form of the body, but not the same form that endows it with its organic structure.

Scotus became the founder of the traditional philosophy of the Franciscans. Francis of Mayron (d. 1325) carried to a ridiculous ex¬ treme the excessive subtlety of his master. During the Revival of Learning the Scotists were strangely reactionary and opposed to the new studies, so that the word ˆˆDuns* or ®Dunce® came to mean first ‘ˆpedant® then «fool.»

Scotus’ most important work is the collec¬ tion of his commentaries known as the ˆOpus OxonienseJ The first complete edition of his works by one Luke Wadding appeared at Lyons in 1639 in 13 volumes (reprinted in 26 vols., Paris 1891-95). Consult De Wulf, M., ˆHistoire

de la philosophie medievale^ (Paris 1905; tr. London 1909) ; Hagenback, C. R., ^History of Doctrines^ (tr. 1880) ; Kahl, W., '^Die Lehre vom Primat des Widens der Augustinus Duns Scotus, und Descartes^ (1886); Pluzanski, ^Essai sur la philosophie de Duns Scotus^Paris 1887) ; Royce, <^Conception of God^ (New York 1898) ; Stockl, ^Geschichte der philosophie des Mittelalters^ (Mainz 1865) ; Werner, ^Duns Scotus^ (Vienna 1881).

DUNSINANE, one of the Sidlaw Hills in Perthshire, 1,012 feet high, seven miles north¬ east of Perth. On its top are remains of an ancient fort locally known as ^^Macbeth's Castle.® Here Siward defeated Macbeth in 1054. Shakespeare made use of this battle in his ^ Macbeth.^

DUNSMUIR, James, Canadian statesman : b. Fort Vancouver, Wash., 8 July 1851. He was educated at Nanaimo, and Dundas, Ont., and has built up the mining interests in British Columbia which he inherited from his father. He was a member of the provincial legislature from 1898 to 1902; premier of British Columbia, 1*^00-02; and lieutenant-governor, 1906-09.

DUNSTAN, Saint, English prelate and statesman : b. Glastonbury about 924 ; d. Canter¬ bury, 19 May 988. His family was a notable one and related to the royal line of the Anglian kings. He was educated in whatever of science and liberal arts existed in that time, by certain Irish scholars settled^ at Glastonbury, and he was proficient in rnusic (including music com¬ position), in painting and the mechanic arts. At an early age he entered the service of King Athelstan and continued in that of his successor Edmund, but his^ superior accomplishments pro¬ voked the enmity of his rivals ^at court, by

DUNSTER

whom he was set upon with outrageous violence and driven out. He then went to his uncle, ˆIphea, bishop of Winchester, and when con¬ valescent from an attack of brain fever, took the religious vows, became a monk and was noted for his rigorous asceticism.

At the age of 22 he was made abbot of Glas¬ tonbury by King Edmund, who also appointed him principal state treasurer. Under Edmund's successor Edred (946-55), who was of feeble constitution, Dunstan was in all but name ruler of the kingdom and a wise and vigorous admin¬ istrator. Under Edwy, who succeeded Edred, he courageously sought out the king while he was in the company of his destined bride, Elgiva, and to his face denounced the intended union as incestuous. For this action he was outlawed and spent two years in Flanders ; but when Edwy's brother Edgar, a youth, became king of Mercia and Northumberland, he chose Dunstan for his chief minister and at the same time (957) was appointed bishop of Winchester; also held the see of London from 959; and in 961 he was promoted to the primatial see of Canterbury. He dispossessed all married and concubinary priests, supplanting them with monks where he could, made the canons of his own cathedral chapter a monastic college and raised the standard of monastic life. It was part of his policy to make the Danish inhabitants an integral part of the nation; he introduced civil order and preserved external peace. Edgar's successor, Edmund, owed chiefly to Dunstan his elevation to the throne, and the archbishop continued still to be principal minister of state; but when Edmund was mur¬ dered, 979, the archbishop's influence, under his successor, Ethelred, ˆˆthe unready,® was small, and disasters befell the kingdom thick and fast ; the Danes ravaging the coasts and pillaging and slaughtering the people inland. _ The archbishop passed the closing years of his life in retire¬ ment, going back to the favorite studies and pursuits of his youth — music, painting, calli¬ graphy, the making of musical instruments, and bell-founding. Consult Stubbs, < Memorial of Saint Dunstanˆ ; Butler, ˆLives of the Saintsˆ ; Starr, < Patron Saintsˆ ; Wright, ˆBiographia Literaria,ˆ Vol. 1; Osbern; Eadmer.

DUNSTER, Henry, 1st president of Har¬ vard College : b. Bury,

Lancashire, England, about 1612; d. Scituate, Mass., 27 Feb. 1659. He was educated at Magdalene College, Cam¬ bridge, where he was associated with John Mil-ton and Jeremy Taylor. He came to Massachu¬ setts in 1640. He was inaugurated president of Harvard College 27 Aug. 1640, and held his office until 1654, when, having become a sup¬ porter of the principles of the modern Bap¬ tists, he was persuaded to resign his office. He was respected as a modest and pious man, and esteemed an excellent Oriental scholar. Con¬ sult Chaplin, ˆLife of Henry Dunster> (Boston

1872).

DUNTON, John, English bookseller and author: b. Graffham, Huntingdonshire, 4 May 1659; d. 1733. He was apprenticed to Thomas Parkhurst, bookseller, in London, but ran away. On his return he began to be very interested in his work, and his bookshop flourished. In 1686 he visited New England, where he sold books and made observations on the new country. After he returned to England, he reopened his

business and published the weekly Athenian Mercury (1690-96) and in 1717 planned to launch another weekly with Defoe. His accumulated debts and troubles unbalanced his mind slightly. He was the author of numerous political pamph¬ lets in support of the Whigs. His greatest claim to remembrance is his book <Life and Errors of Dunton^ (1705), a curious jumble of nonsense and valuable sketches of the literary and political life of the period. His ˆLetters from New Englandˆ (ed. by Whitmore, New York 1867) are of historical value also.

DUN WOODY, Henry Harrison Chase,

American meteorologist : b. Highland County, Ohio, 23 Oct. 1842. He was graduated at the United States Military Academy in 1866 and from the Columbia Law School in 1876 and having been detailed in 1872 for duty on the signal corps was appointed in 1891 to the weather bureau, then first constituted. His special work has been that of formulating of¬ ficial forecasts of the weather, and he originated the system of cold wave warnings ; in this con¬ nection he recommended the organization of State weather services. He is the author of many papers on meteorological subjects pub¬ lished by the

signal service. He was made colonel in 1898, and was retired as brigadier-general in 1904.

DUODECIMAL SCALE. See Arithme¬ tic.

DUPANLOUP, dii-pah-loo, Felix Antoine Philibert, fa-leks fe-le-ber, French prelate and theologian: b. Saint Felix, Savoy, 3 Jan. 1802; d. Lacombe, Isere, 11 Oct. 1879. He was for a time tutor to the princes of the house of Orleans. In 1837 he became one of the vicar-generals of the archdiocese of Paris, and head of the Petit Seminaire de Saint Nicolas de Chardonnet. Dupanloup took a lifelong interest in charitable projects and in measures for ex¬ tending to the masses the benefits of education. He combated the endeavors of that party in the Church which sought to displace in institutions of higher education the ancient Greek and Latin classics as pagan, and to substitute in their room the Fathers of the Church. He was made bishop of Orleans 1849 ; was elected to the French Academy 1854; but withdrew in 1871 when against his earnest protest Littre, the leader of the Positivists, was chosen to be a member; he became leader of the clericals in the National Assembly. In the Vatican Council he opposed the decree of infallibility, but was one of the first to make an act of submission. Nominated 1871 to be archbishop of Paris, he declined that office. He was a great pulpit orator, worthy of a place beside the great sacred ora¬ tors of France. His writings are voluminous, dealing almost wholly with questions of educa¬ tion and church interests. Two of his works which are in every good pedagogical library are ˆThe Childˆ and ˆThe Ministry of the Cate¬ chist.ˆ Consult Pelletier, ˆ Monseigneur Dupan¬ loup. ˆ

DUPATY, dii-pa-te, Charles Marguerite Jean Baptiste Mercier, French jurist: b. La Rochelle, France, 9 May 1746; d. Paris, 17 Sept. 1788. In 1767 he became advocate-general to the parliament of Bordeaux, and having written in its name against the Duke of Aiguillon, when this nobleman became minister (1770), he was

sent to Pierre-en-Cise (a fortress at Lyons, once a state prison), and

afterward banished until the accession of Louis XVL The memorial by which he preserved the lives of three inno¬ cent citizens of Chaumont who were condemned to the wheel deserves particular mention. His other works are ˆReflexions historiques sur les loix criminelles,ˆ a valuable work; various ˆ Discours academiquesˆ ; and ˆLettres sur ritalie en 1785,ˆ which appeared in 1788,

DUPATY, Louis Marie Charles Mercier,

French sculptor and painter: b, Bordeaux, 29 Sept. 1771 ; d. Paris, 12 Nov. 1825, He was a son of the preceding. He was a member of the Institute, and professor in the Lcole des Beaux Arts ; was at first an advocate, served during the Revolution as a dragoon, then as cartographer, and finally went to Rome, where he studied sculpture and made himself known by numerous works. His principal productions are ˆAjax Pursued by Neptune,ˆ his equestrian statue of Louis XHI (1816), and ˆOrestes Pursued by the Furies.ˆ

DUPERRON, du-pe-rofi, Jacques Davy, French ecclesiastic: b. Saint L6, Normandy, 15 Nov. 1556; d. Paris, 6 Sept. 1618. His father, a physician, having embraced the Re¬ formed religion, had to flee from France and settled at Bern in Switzerland, where he be¬ came a Protestant minister. The son, having received at Bern a superior education, came to Paris at the age of 20, and having been there received into the Roman Catholic Church was appointed reader to the king, Henry HI, and afterward adopted the clerical profession. He pronounced the eulogy of Mary Queen of Scots after her execution. He is said to have sup¬ ported the Cardinal de Bourbon's plot to suc¬ ceed to the throne after the death of Henry HI, and to have betrayed its secrets to Henry of Navarre (Henry IV). He was appointed bishop of Erreuse, and was the agent in bringing about Henry's conversion to the Roman Catholic faith. He successfully checked the advance of Cal¬ vinism in his own diocese and brought seceders back to the Church. He was in Rome in 1604 when Clement VHI died, and was largely instrumental in securing the election first of Leo XI and then of Paul V, who in less than a month succeeded Leo. He was now made archbishop of Sens and cardinal. Con¬ trary to the principles of Gallicanism, he was a zealous advocate of the doctrine of papal in¬ fallibility and of the papal supremacy over a general council of the Church. Consult Feret, ˆLe Cardinal Duperronˆ (Paris 1877).

DUPETIT-THOUARS, du-pe-te too-ar, Abel Aubert, French naval captain: b. Boumois, Saumur, 31 Aug. 1760; d. 1 Aug, 1798. When a mere boy he was so smitten with the love of a sea life by reading ˆRobinson Crusoeˆ that he ran away from the military school of La-

fleche and attempted to enter himself as a cabin-boy in a vessel at Nantes, but was discovered and sent back. At length, in 1778, he had an opportunity of entering the navy, and distin¬ guished himself in the West Indies. On the expedition to Egypt in 1798 he commanded an 80-gun ship. He foresaw the only result which could be anticipated if it was resolved to wait for Nelson's attack in the roads of Aboukir, and advised immediately to set sail. But though

his advice was disregarded he fought with un¬ daunted valor against the enemy, and fell in the struggle. His MSS. and correspondence were published under the title of ˆLetters, Memoires et Opuscules d'Aristide Dupetit-Thouars.ˆ

DUPIN, doo-pafi', Louis Ellies, French church historian: b. Paris, 17 June 1657; d. there, 6 June 1719. In 1680 he received the de¬ gree B.D. at the Sorbonne, and in 1684 the degree D.D., and then or previously commenced those researches into the history of the Church which resulted in his celebrated HJniversal Library of all the Ecclesiastical Writersˆ (Vol. I, 1686). The freedom with which in this volume he discussed the teachings of the Fathers of the Church brought upon the work its con¬ demnation by the archbishop of Paris and it was suppressed; but the author having made a retraction and changed ®universaPˆ in the title to ®new,ˆˆ he was permitted to continue the series, though later he was banished as a Jansen-ist and permitted to return only after a new retraction. He sought to effect a union between the Anglican and Gallican churches and had a correspondence to that end in 1718 with the Anglican primate. Archbishop Wake. He was now charged with endeavoring to subvert the dogmas of the Roman Catholic Church, and his papers were seized in 1719, in the expectation that they would give proof of the charge; but nothing was found that seriously compromised him. He seems to also have conferred with Peter the Great with a view to union of the Gallican and Russian churches. The ˆLibrary of Ecclesiastical Authorsˆ is a voluminous work of immense erudition, rich in biographical sketches and in bibliographical details of theo¬ logical literature in the Roman Church till the close of the 17th century; it was soon trans¬ lated into English.

DUPLEIX, dii-plaks, Joseph Frangois,

French colonial governor: b. Landrecies, France, 1 Jan, 1697; d. Paris, 10 Nov. 1764. In 1720 he was appointed to a seat in the council at Pon¬ dicherry. Ten years later he became superin¬ tendent at

Chandernagore in Bengal. The re¬ markable success of his administration here led to his being appointed, in 1741, governor-general of all the French Indies, with the title of Nawab. He now successfully pursued that policy of patient, skilful diplomacy among the native princes which at one time made the Carnatic almost a French province. When war broke out in Europe between France and Eng¬ land (1740), several brilliant engagements planned by Dupleix took place between the French garrison and the troops of the Nawab of the Carnatic, who endeavored to take pos¬ session of Madras, but was precipitately forced to raise the siege. An attack on the English at Fort Saint David failed, but Dupleix's science and courage were displayed in the defense of Pondicherry, which Admiral Boscawen in vain attacked for five weeks, with an apparently overwhelming force, but. was forced to retire discomfited, though the defense was conducted by a civilian, unsupported by a single general of repute. The ambitious mind of Dupleix had long formed the project of founding a French empire in India on the ruins of the Mogul monarchy, but his military designs, able as they were, were frustrated by the energy and military

genius of Clive and Lawrence. The struggle continued till 1754, in which year Dupleix was recalled by Louis XV.

DUPONCEAU, du-p6n'so, Fr. dii-poh-so, Peter Stephen, American lawyer and scholar: b. Saint Martin, Isle de Re, France, 3 June 1760; d. Philadelphia, 1 April 1844. For a time he was secretary to Count de Gebelin, and after¬ ward to Baron Steuben, with whom he came to the ˆUnited States in 1777. Receiving a cap¬ tain's commission he served with Steuben through the American Revolution and after its close settled in Philadelphia and became noted as a lawyer. For several years he was much interested in an effort to introduce into the United States the production and manufacture of silk. His writings are of a miscellaneous character, among which may be mentioned orig¬ inal treatises on points of law; translations from the Latin, German and French on similar subjects; various treatises on philology; numer¬

ous contributions to American history, includ¬ ing a translation of ˆA Description of New Sweden,ˆ by Thomas Campanius Holm. He was a member of more than 40 literary and scientific instiutions of Europe and America, including the American Philosophical Society, the Historical Society of Pennsylvania, and the Philadelphia Athenaeum, of which three insti¬ tutions he was the presiding officer at the time of his death.

DU PONT, du-p6nt', Henry, American manufacturer: b. Eleutherian Mills, near Wil¬ mington, Del., 8 Aug. 1812 ; d. 8 Aug. 1889. He was the second son of Eleuthere Irenee Du Pont de Nemours (q.v.). He secured his early edu¬ cation at Constant's Mount Airy Seminary, Germantown, Pa. ; in 1829 he entered the mili¬ tary academy at West Point, from which he was graduated in 1833. In the following year, however, in deference to his father's wishes that he should return to Delaware to master every detail of the powder business and so be well equipped to assist him, he resigned his commission and thereafter gave his attention to the powder industry. In 1850 he became head of E. I. Du Pont de Nemours and Com¬ pany, and by his executive ability soon extended the operations of the works until the industry had assumed enormous proportions. The war with Mexico called for large quantities of powder from the mills and when peace came general enterprises began to demand still larger quantities in industrial operations. The com¬ pany also supplied the English army during the Crimean War, and during the Civil War in the United States sold enormous quantities to the National government. Politically he was asso¬ ciated with the Whigs, but when the Civil War broke out he heartily supported Lincoln in all his measures to prevent the dissolution of the Union. He became one of the leaders of the Delaware Republicans and was a presidential elector in the campaigns of 1868, 1876, 1880, 1884 and 1888. He was appointed major-general of the Delaware forces in 1861 by Governor Bur¬ ton, and immediately upon assuming ˆ office ordered every man in the military service of the State to take an oath of allegiance to the United States or surrender his arms. There were many people in the State who were un¬ decided as to which cause to espouse and Du¬ Pont's order was calculated to compel the people

to declare themselves, but influences adverse to Du Pont succeeded in inducing Governor Burton to suspend the order. Du Pont thereupon applied to Gen. John A. Dix, commanding the Federal troops at Baltimore, and the latter sent a body of troops to Delaware to maintain the supremacy of the general government in that State. Like

his ancestors Henry Du Pont had a great attachment for rural life and agri¬ cultural pursuits, and was probably the largest individual landowner in the State. He was widely known for his many benefactions, took a lively interest in local affairs and was ever to be found in favor of public improvement.

DU PONT, Henry Algernon, American soldier and legislator : b. Eleutherian Mills, Newcastle County, Del., 30 July 1838. He is the son of Henry Du Pont and grandson of Eleuthere Irenee Du Pont (qq.v.). He entered the University of Pennsylvania in 1855, but spent only a year there and in 1856 entered the United States Military Academy, from which he was graduated in 1861, at the head of his class. Immediately after his graduation he was sent south, served in the defenses of Washington, May-July 1861 and in the 5th United States Artillery 1861-62, being promoted to adjutant in July 1861. In 1862-63 he was acting assistant adjutant-general of troops at Fort Hamilton, N. Y. In 1863 he was sent into active service in command of Light Battery B in the fields of Pennsylvania, Maryland, Virginia and West Vir¬ ginia. He was promoted captain of the 5th Artillery in 1864, and took part in the battle of New Market. He was soon afterward appointed chief of artillery of the department of West Virginia and during Hunter's campaign against Lynchburg he commanded the artillery at the battle of Piedmont, 5 June 1864, at the engage¬ ment at Lexington 11 June, the affair near Lynchburg 17 June, the battle of Lynchburg 18 June and the affairs at Liberty 19 June and Mason's Creek 21 June. He served next in Sheridan's campaign in the valley of Virginia, commanding the artillery brigade of Crook's corps and participating in the affairs at Cedar Creek 12 August and Halltown 23, 25 and 27 August, the action at Berryville 3 September, the battle of Winchester (Opequan) 19 Sep¬ tember, Fisher's Hill 22 September. For ˆdis¬ tinguished services at the battle of Cedar Creek® he was brevetted lieutenant-colonel and was also awarded a medal of honor by Congress for ®most distinguished gallantry and voluntary ex¬ posure to the enemy's fire at a critical moment® during the battle of Cedar Creek. After the war Du Pont continued in the army for a number of years, holding commands at Fort Monroe, Va. ; Camp Williams, near Richmond; Washington, D. C. and Fort Adams, Newport, R. 1. He was a member of the board of officers which assimilated the tactics for the three branches of the service. On 1 March 1875 Colonel Du Pont resigned from the army and after a year's absence in Europe went back to live in Delaware. In 1877 he became a director and in 1878 the president and general manager of the Wilmington and Northern Railroad Com¬ pany, then in very bad physical and financial condition. After 21 years of

incessant labor he was at last successful in putting the road into satisfactory shape. He also became associated with the celebrated powder mills established

near Wilmington, Del., by his grandfather, Eleuthere Irenee Du Pont, and which had proven an important factor in the Civil War. He retired from active business cares in 1902 and has since devoted his spare moments to agricultural pursuits. In 1895 he came into national prominence again because of the famous struggle with Tohn Edward Addicks in Delaware for a seat in the United States Senate, a struggle which lasted nearly 20 years and resulted in several deadlocks. The contest finally ended with the election of Du Pont in 1906 for the un¬ expired term beginning 4 March 1905, and he took his seat in the Senate 3 Dec. 1906. In 1911 he was reelected for the term ending 3 March 1917. Mr. Du Pont has published several contributions to the science of military tactics, among which are two volumes issued separately in 1875, entitled ˆCavalry Tactics U. S. A., Assimilated to the Tactics of Infantry and Artillery,ˆ and ˆArtillery Tactics, U. S. A., Assimilated to the Tactics of Infantry and Cavalry. > He is a member of numerous organ¬ izations including the Historical Societies of New York, Pennsylvania and Delaware, the American Philosophical Society, the American Geographical Society, the Society of Colonial Wars, the Huguenot Society and the Military Service Institute.

DU PONT, Samuel Francis, American naval officer: b. Bergen Point, N. J., 27 Sept. 1803; d. Philadelphia, 23 June 1865. He was the third son of Victor Marie Du Pont de Ne¬ mours. His parents removed to Louviers, Del., soon after his birth. In 1815 President Madi¬ son appointed him a midshipman in the navy. His first service was a voyage to the Mediter¬ ranean on the Franklin. In 1821-22 he served aboard the Constitution in the Mediterranean, and was next attached to the Congress for a cruise in the West Indies and off the coast of Brazil. He passed through the various grades reaching that of commander in 1842, when he was sent to China in the Perry, but ill health forced him to leave his ship at Rio Janeiro and return home. In

1845 he assisted in perfecting the organization and administration of the newly-founded Naval Academy at Annapolis. In the same year he was transferred to the Congress on the Pacific station under Commo¬ dore Stockton. On the outbeak of the Mexican War Du Pont was given command of the Cyane, and took a prominent part in all the operations on the California coast, clearing the Gulf of California of hostile vessels, and taking San Diego, La Paz and Mazatlan. He was ordered home in 1848, became a member of the LightHouse Board, and in 1855 was made captain and member of the naval retiring board. In 1857 he visited China, Japan, India and Arabia, and in 1860 was placed in command of the Phila¬ delphia navy yard. In September 1861 he was appointed flag officer and ordered to the com¬ mand of the South Atlantic blockading squad¬ ron. In conjunction with Sherman's land forces he took Port Royal in November and estab¬ lished 14 blockading stations along the coast. He was next ordered to attack Charleston, S. C., which he did on 7 April 1863, but was repulsed with considerable loss. This was the last im¬ portant engagement that occurred while Du Pont had command of the fleet, as he was. re¬ lieved from command 5 July 1863. Admiral

Du Pont was also favorably known as the au¬ thor of various papers on professional subjects, among which were those on corporal punish¬ ment in the navy and on the use of floating batteries for coast defense. In 1882 Congress provided that ®the circle at the intersection of Massachusetts and Connecticut Avenues® in the city of Washington should be called Du Pont Circle, and subsequently $20,500 was appro¬ priated for the erection there of a bronze statue of the admiral which was modeled by Launt Thompson and dedicated 20 Dec. 1884.

DU PONT DE NEMOURS, Eleuthere Irenee, American manufacturer : b. Paris, 24 June 1771; d. Philadelphia, 31 Oct. 1834; son of the French political economist, Pierre Sam¬ uel Du Pont de Nemours. He was a pupil of Lavoisier and entered the royal powder mills at Essonne to familiarize himself with the manu¬ facture of gunpowder with a view to succeed Lavoisier as superintendent of the government powder mills, but subsequently abandoned this in 1791 to take charge of the printing and pub¬ lishing house established by his father in Paris. Being a supporter of King Louis XVI, he was in the utmost peril after 10 Aug. 1792, and after being three times imprisoned and having his printing house sacked and destroyed, he emi¬ grated with his father's family to the United States in 1799, arriving at New London, Conn., 1 Jan. 1800. Not long after his arrival attention was called to the poor quality of gunpowder then made in this country and he

determined to enter into powder manufacture here. With this in view he returned to France, January 1801, to procure at Essonne plans and models of improved machinery, returning to the United States in August with some of the machinery. Thomas Jefferson, who was deeply interested in this development, urged that the works be built in Virginia, but owing to his views regard¬ ing slavery and its effect on the white race Du Pont was unwilling to make his venture either in Virginia or Maryland. In June 1802 he bought a tract of land with a fine water-power on the Brandywine River, near Wilmington, Del. On 19 July he arrived there with his family and began operations which were so suc¬ cessful that, at the time of his sudden death by cholera, his works were the largest of their kind in the country. Since his death they have been carried on by his sons and grandsons and are still among the largest gunpowder works in this country, while they are the centre of the industrial combination in this industry. He found time also to join every movement tending to_ promote agricultural and industrial enter¬ prises, and earnestly supported every measure looking toward local improvement. For some time he served as a director of the Bank of the United States; he took a prominent part in the work of the American Colonization Society, and also found time for other philanthropic labors and innumerable private benevolences.

DU PONT SMOKELESS POWDER, a

hard-grained porous powder, composed of nitro¬ cellulose of medium nitration which has been formed into grains by suspending the nitro¬ cellulose in an aqueous solution of barium and potassiumˆ nitrates to which amyl acetate is added, stirring the gelatinized material in the fluid until the grains are formed and hardening

them by steam until the amyl acetate is expelled. A certain amount of vaseline is incorporated during the drying process in the dense powders and these powders are practically proof against atmospheric moisture. The grains may be sepa¬ rated by sifting into the various desired sizes and colored to meet any taste by the addition of a very small amount of an organic coloring matter. The Du Pont smokeless

powders are offered in many kinds under four general classi¬ fications : (1) for high power rifles; (2) for black-powder rifles which have been adapted for smokeless powder; (3) for revolvers and automatic pistols at midrange and (4) for the same weapons at short range. See Explosives ; Powder.

DUPONT, dii-pon, Jacques Charles, surnamed De VEure, French statesman: b. Neu-bourg, Eure, Normandy, 27 Feb. 1767 ; d. Rouge-Pierre, Normandy, 3 March 1855. In 1789 he was an adyocate at the parlement of Normandy. During the republic and the empire he filled successively judicial offices at Louviers, Rouen and Evreux. He had adopted the principles of the Revolution and in 1798 he was a member of the Council of the Five Hundred, which was dispersed by Murat on the 18th Brumaire. In 1811 he was nominated president of the Court of Justice at Rouen and in 1813 vice-president of the Corps Legislatif. During the Hundred Days he was vice-president of the Chamber of Deputies and when the allied armies entered Paris he drew up the declaration in which the chamber asserted the necessity of maintaining the principles of government that had been es¬ tablished at the Revolution. He was one of the commissioners chosen to negotiate with the allied sovereigns. On the restoration of the Bourbons, Dupont signalized himself as a leader of the opposition. In 1830, after the revolution of July, he was made Minister of Justice, and after the fall of Louis Philippe became a mem¬ ber of the provisional government. In 1849 he failed to secure his re-election to the chamber and retired into private life and on the accession of Napoleon HI, in 1852, he ceased to take part in public affairs. His consistent firmness in the cause of constitutional liberalism during the many changes of his times gained him the esteem of his countrymen, by whorn he was styled ®the Aristides of French liberalism.^^

DUPONT, Pierre, French song-writer: b. Lyons, 23 April 1821 ; d. Lyons, 24 July 1870. His parents both died before he was five years old and he was cared for in the country by his godfather, a village priest. He was educated at the seminary of L'Argentiere and was after¬ ward apprenticed to a notary at Lyons. He went to Paris in 1839 and published some poems in the Gazette and the Quotidienne. In 1^1 he was saved from the conscription and through the help of Lebrun and a kinsman published his first volume, ^Les Deux Anges. > He was awarded a prize from the academy in 1842 and for a time was employed on the official diction¬ ary. Gounod's admiration of a peasant song determined Dupont in his vocation as a song¬ writer. He possessed no musical knowledge and had to engage Ernest Reyer to write down his airs. He sang his own songs at the workmen's concerts in the Salle de la Fraternite du Fau¬ bourg Saint-Denis. The public

performance of his famous <Le Pain^ was forbidden; <Le chant

des ouvriers^ was even more popular and in 1852 his becoming the poet laureate of socialism proved obnoxious to the new government and he was condemned to be banished for seven years ; but the intercession of friends soon procured his release and he withdrew for a time from participation in politics. He spent his later years in Lyons. His songs have appeared in various forms ^Chants et chansons^ (3 vols., with music, 1852-54) ; ^Chants et poesies^ (7th ed., 1862), The best known are ^Le Braconnier,^ ^Le Tisserand,^ ^La Vache blanche,^ and ^La Chanson du ble.^ Consult Baudelaire, Ch., ^Notice sur P, Dupont^ (1849) ; Dechant, ^Bi¬ ographic de Pierre Dupont^ (1871); Lenient, Ch., ^Poesie patriotique en France^ (1889) ; Sainte-Beuve ^Causeries du Lundi.^

DUPONT, Pierre Antoine, Count, surnamed De l'Etang, French soldier : b, Chabanais, 14 July 1765; d. Paris, 7 March 1840. He first served with Maillebois' legion in Holland and in 1791 was on the staff of the Army of the North under Dillon. By his skilful arrangement as a staff officer, he prevented Denmark from falling into the hands of the Duke of York and was promoted to the rank of brigadier-general. In 1797 he became general of division. After the proceedings of the 18th Brumaire, in which he took an active part, he was appointed head of the general etat-major of the army of reserve assembled at the foot of the Alps and dis¬ tinguished himself in Italy at the battle of Miarengo. In the campaign of 1805 on the Danube, he earned further distinction by pre¬ venting the escape of the Austrians from Ulm, thus contributing largely to the capture of Mack and his army. He also freed Marshal Mortier from Russian troops. He was active in the campaign of 1806 against the Prussians and in 1807 contributed to the victory of Friedland. He entered Spain in 1808 at the head of a corps. After the occupation of Madrid, Dupont was created count by Napoleon and dispatched to subdue Andalusia. He was pursued and cut off by Castanos, his corps was defeated and on 22 July 1808 he felt himself constrained to capitulate with 18,000 soldiers at Baylera. After his return to France, Dupont was sent before a court-martial, deprived of his rank and title and imprisoned from 1812 to 1814. On the fall of Napoleon he was released and was given a mili¬ tary command by Louis XVIII, which he lost on the return of Napoleon. He was restored once more to the army after the final downfall of Napoleon and became a member of the Privy Council of Louis XVIII. From 1815 to 1830 he was member of the Chamber of Deputies from Charente, He went into retirement in 1832. He wrote some poems

(1838) and verse translations from Horace (1836) and the military works ˆOpinioin sur le nouveau mode de recrutement> (1818) ; ˆLettres sur I'Espagne en 1808ˆ (1823) ; ˆLettre sur la campagne d'Autricheˆ (1826). Consult Titeux ˆLe (jeneral Dupont; une erreur historiqueˆ (Paris 1903).

DUPONT DE NEMOURS, Pierre Samuel,

French economist: b. Paris, 14 Dec. 1739; d. Eleutherian Mills, near Wilmington, Del., 7 Aug. 1817, He was educated under his mother's tutelage and at an early age gained distinction in his studies, which included literature, medicine, engineering and military science, *etc.* He lived almost unknown in Paris as a private man of

letters till 1763, where he gained notoriety by his pamphlets which criticized a new scheme of taxation then under considerati9n. In 1768 he was appointed editor of Les Ephemerides du Citoycn, the organ of the economists, and to this and other papers he contributed many interesting articles and editorials advocating the liberty of the press, the abolition of slavery, the removal of all restrictions from commerce and labor, the suppression of the oppressive tax called ˆˆCor-vee,ˆˆ and many other reforms. His efforts for reform fell under the displeasure of Abbe Ter-ray, the Comptroller-General, and he was obliged to leave France. Several foreign princes offered him a reception and conferred honors upon him. In 1774 he was appointed secretary of the Coun¬ cil of Public Instruction by King Stanislaus Au¬ gustus of Poland with a commission to organize a system of national education. He had been engaged on this work but a short time when, later in the same year, Turgot became comp¬ troller-general and Dupont was formally re¬ called to France and made inspector-general of commerce by Louis XVI. He now put into actual being many of the reforms which he had so long advocated, but was obliged to go into retirement when Turgot was succeeded by the Comte de Maurepas. In 1778 he was recalled to active duty by Necker, the successor of Maure¬ pas. He now entered upon a long period of active service and came to be entrusted with important and delicate matters. Having always been an ardent

advocate of the cause of American liberty, he w'as entrusted by the Count de Ver-gennes with the delicate mission of conducting the secret negotiations wdth the English repre¬ sentative, Dr. Hutton, which laid the basis for the peace treaty of 1783 by which Great Britain acknowledged the independence of the United States. Soon afterward Dupont was appointed a member of the Commission on Agriculture and in 1787-88 he was secretary-general of both assemblies of notables. At the beginning of the Revolution in France Dupont was a mem¬ ber of the States-General from Nemours and later represented that electorate in the Con¬ stituent Assembly, of which he was twice elected president. His chief work in the Assem¬ bly was the formation of radical fiscal reforms. After the dissolution of the Assembly he was for a time editor of the Correspondence Patri-otiqiie and issued several pamphlets upholding the new constitution and demanding the enforce¬ ment of the laws. Dupont and his son, Eleuthere Irenee, were among the defenders of the Tuileries on 10 Aug. 1792 when the populace attacked the palace clamoring for the overthrow of the king. He was now marked for destruction by the Jacobins, but managed to elude capture and finally retired to his home where he devoted himself to literary pursuits until his arrest on 20 June 1794. He was sen¬ tenced to the guillotine, and was saved from this fate only by the death of Robespierre, and was released on 24 August. He again attacked the Jacobins, in 1795 was elected a member of the Council of the Ancients, becoming president in 1797. When the Council was overthrown by the Jacobins Dupont was again imprisoned and his property confiscated. On his release in 1799 he emigrated with his family to America where he was received with great distinction. He esr tablished a banking house in New York which

failed within a few years because of the refusal of the French government to reimburse the firm for funds advanced. In 1802 Dupont returned to France, but did not at that time take any political office, notwithstanding the offers made him by Napoleon. He was, however, instru¬ mental in promoting the treaty of 1803 by which the United States purchased Louisiana and he was appointed one of the commissioners to ar¬ range the formal transfer. Later he became secretary of the Paris Chamber of Commerce, and in 1807 was appointed sub-librarian at the Arsenal. After Napoleon's first downfall in 1814 he became secretary of the provisional gov¬ ernment that prepared the return of Louis XVIII, and after the restoration of the Bour¬ bons he was again named councillor of state. After Napoleon's return from Elba, Dupont was again forced to flee, settling in the United States where his two sons had already become citizens. Besides

his political treatises he is likewise the author of a French translation of the first three cantos of the ˆOrlando Furioso.ˆ

DUPONT DE NEMOURS, Victor Marie,

American manufacturer: b. Paris, France, 1 Oct. 1767; d. Philadelphia, Pa., 30 Jan. 1827. He was a son of Pierre Samuel Dupont De Nemours (q.v.), and entered the diplomatic service as attache to the French legation in the United States in 1787 ; became secretary of legation in 1795 and was appointed French con¬ sul in Charleston, S. C., in the same year. In 1798 he was appointed consul-general of France in New York. He returned to France, was aide-de-camp to Lafayette, then commanding the national guard, later withdrew from the gov¬ ernment service and came to the United States in January 1800. He entered business in New York; removed to Wilmington, Del., in 1809, where he joined his brother and established a cloth manufactory. During the War of 1812 he was captain of a company of Delaware volunteers. He was for a time a member of the Delaware legislature, and a director of the Bank of the United States.

DUPPEL, diip'pel, Denmark, fortified vil¬ lage in the province of Schleswig-Holstein, Prussia, on the peninsula of Sundewitt, 16 miles northeast of Flensburg, on the coast of the Little Belt. The place has been the scene of some severe struggles between the Danes, to whom it formerly belonged, and the Germans. In 1848 the latter were defeated here by the Danes, then the nlace was retaken by the Prus¬ sians, and in 1860 was again in possession of Denmark. After a long siege it was captured by the Prussians in 1864 and held by Germany until after the World War when it was returned to Denmark under a plebiscite held in 1920. Con¬ sult Neumann, ˆUeber den Angriffˆ (1865).

DUPRAT, dii'pra', Antoine, French states¬ man, archbishop and cardinal : b. Issoire, 17 Jan. 1463; d. Rambouillet, 9 July 1535. He took high rank in the legal profession but on the death of his wife in 1507 entered the Church. Under Louis XII he was president of the Parliament of Paris, and in 1515, on the acces¬ sion of Francis I, became Chancellor and Prime Minister. The chief event of his ministry was the conclusion of the concordat, against great clerical and academic opposition, by which the Church and nobility became subject to the

Crown, and by which he nullified the desire of Pope Leo X to abrogate the Pragmatic Sanc¬ tion, which in 1438 had limited the spiritual power of the Pope in France and laid the foundation of the Gallican Church. In thus consolidating the power of the state he was the precursor of Richelieu and Mazarin. He was appointed archbishop of Sens in 1525 and car¬ dinal in 1527. Consult his biography by the Marquis du Prat (Paris 1857).

DUPRE, du-pra', Giovanni, Italian sculp¬ tor; b. Siena, Italy, 1 March 1817; d. Florence, 10 Jan. 1882. Among his works are ˆAbeP ; ˆCain> ; <Sappho^ ; ˆGiotto^ ; and ˆPieta^ ; the last representing the dead Christ, supported by his mother. He received the gold medal at the Paris Exposition of 1867. His monument to Cavour 1866-73 was the least splendid of his works, chiefly because he proved his inability to execute large pieces. His work is virile and forceful. Consult his autobiography (1879, translated by Peruzzi 1884) ; and Frieze. ˆGiovanni Dupre^ (London 1886).

DUPRE, Jules, French landscape painter: b. Nantes, 5 April 1812; d. L'Isle Adam, 6 Oct. 1889. He began his career as a painter of porcelain in his father's factory, but when 18 years old went to Paris where his talent soon became recognized. He sent his first picture to the Salon in 1831 ; was made a Chevalier of the Legion of Honor in 1849, and officer in 1870. He received a second-class medal at the Exposi¬ tion of 1867 and the same at the Exposition of 1883, and a medal of honor at the Exposition of 1889. In 1834 he visited England where he was greatly influenced by Constable. His studio for some years was in the Forest of Fontainebleau, and later in L'Isle Adam. A number of his pictures are owned in the United States. Dupre was one of the chief members of the Barbizon school. His favorite themes repre¬ sent nature in its dramatic phases. Consult Claretie, ˆPeintres et sculpteurs contemporains> (Paris 1899).

DUPRE, Julien, French painter: b. Paris 1851 ; d. 1910. His masters were Pils and Henri Lehmann. He has been very successful in portraying simple scenes from country life, farm animals and landscapes. His ˆMowers of Lucerne^ and ˆWhite Cow^ are in the Luxem¬ bourg. In 1904, at Saint Louis he exhibited one of his greatest works, ˆThe Return of the Herd,^ and also ˆEvening^ and ˆNear a Pool.^

DUPUIS, dii-pwe', Charles Frangois, French scholar: b. Trie-Chateau, near Gisors, 16 Oct. 1742; d. Is-sur-Tille, France, 29 Sept. 1809. In his 24th year he was made professor of rhetoric at Lisieux. His ˆMemoire sur rOrigine des Constellations et sur I'Explication de la Fable par I'Astronomieˆ (1781) is erudite, but rather sophistical. Later works of his are ˆOrigine de tons les Cultes, ou la Religion universelleˆ (1794), which gave rise to an em¬ bittered controversy; two works on the Pelasgi, which attracted great attention ; treatises on the zodiac of Denderah, and on the Phoenix; ˆMemoire explicatif du Zodiaque chronologique et mythologiqueˆ (1806).

DUPUIS, Nathan Fellowes, Canadian scientist: b. Portland, Ontario, 13 April 1836. He graduated at Queen's University, Kingston, in 1866; was professor of chemistry in his

alma mater, 1867-80, and of mathematics, 1880-1911. His published works include ˆEle¬ ments of Geometrical Opticsˆ (1868) ; ˆGe¬ ometry of the Point, Line and Circle in the Planeˆ (1889) ; ˆElements of Synthetic Solid Geometryˆ (1893).

DUPUY, dii-pwe', Charles Alexandre,

French statesman : b. Le Puy, Haute-Loire, 1851. He received his education at the Lycee of Le Puy and the Lycee Charlemagne, Paris. He was successively a professor of philosophy at the colleges of Nantua and Aurillac, and a teacher in lycees, school inspector for the academies of Lozere and Calvados and vice¬ rector of the college at Ajaccio, Corsica. In 1885 he entered the political arena, becoming deputy for Haute-Loire in 1885, and securing re-election in 1889. In 1892 he became Minister of Public Instruction and in the following year was chosen president of the Chamber of Deputies. He was twice Premier and Minister of the Interior, in 1893-95 and 1898-99. In 1900 he was chosen senator for Haute-Loire. He is the author of ˆLivret de moraleˆ (1891).

DUPUY, Jean, French journalist : b. Saint-Palais, Gironde, 1844; d. 31 Dec. 1919. In 1886 he became proprietor of the Sihle and two years later of the Petit Parisien, and afterward was head of the Paris press syndicate. In 1891 he took his seat in the senate as a Radical Re¬ publican and was prominent in the debates on agriculture and finance. In 1899-1902 he served as Minister of Agriculture in the Cabinet of Waldeck-Rousseau, and as Minister of Com¬ merce in that of Briand, 1909-11. From Janu¬ ary to March 1913 he served as Minister of

Public Works.

DUPUYTREN, du-pwe-tran, Guillaume,

Baron, French surgeon and anatomist ; b. Pierre-Buffiere, Haute-Vienne, 6 Oct. 1777 ; d. Paris, 8 Feb. 1835. In 1801 he obtained the situation of overseer of anatomical labors at Paris; and became in 1815 first surgeon to the Hotel Dieu. In 1823 he was appointed first physician to the king, Louis XVIII, and re¬ tained the same situation under Charles X. He possessed extraordinary acuteness in respect of diagnosis, united with remarkable skill and dexterity in the most dangerous operations, in performing which he had a firmness of nerve which was never shaken. He invented several surgical instruments and modesˆ of operation, and also made some discoveries in pathological anatomy. Some of his pupils united in pub¬ lishing his ˆOral Lectures on Clinical Surgeryˆ (1830-34); and his ˆTheory and Practice as to the Treatment of Wounds by Warlike Weapons,ˆ was published in 1834.

DUQUESNE, dii-kan, Abraham, French admiral: b. Dieppe 1610; d. Paris, 2 Feb. 1688. In his 17th year he was in the sea-fight off Rochelle, and distinguished himself during and after the year 1637 in the war against Spain. In 1647 he commanded the expedition against Naples. Bordeaux, which had rebelled, he re¬ duced, notwithstanding the assistance afforded it by Spain. In the Sicilian War he thrice de¬ feated the combined fleets of Holland and Spain, under the renowned De Ruyter, who was mortally wounded in the last engagement. After he had reduced Algiers and Genoa to the necessity of supplicating the mercy of Louis

XIV, the king conferred upon him the estate of Bouchct, and made it a marquisate, with the title of Duquesne. More than this he could not do, because Duquesne was a Protestant. He was, also, the only person exempted from the banishment of his sect, occasioned by the repeal of the Edict of Nantes.

DUQUESNE, du-kan'. Pa., borough, in Allegheny County; on the

Monongahela River and the Pennsylvania Railroad; about 10 miles from Pittsburgh. A Carnegie library and institute are located here. The chief industries are the manufacture of steel and iron products. The first settlement was made in 1885, and it received its charter in 1891. The government is conducted by a burgess, elected triennially, and a borough council. The city owns and operates its waterworks. Pop. (1920) 19,011.

DUQUESNOY, du-kan-wa, Francois, or ˆpRANgois Flamand,® Flemish sculptor: b. Brussels 1594; d. Leghorn, Italy, 12 July 1646. He was taught by his father and became cele¬ brated at an early age. His best works are child figures. Under the patronage of Urban VHI he carved the groups of children which adorn the altar at Saint Peter's, Rome ; likewise the statue of Saint Andrew in the same church. Saint Susanna for the Santa Maria di Loreto, at Rome, and numerous others. At the invitation of Richelieu, he set out to the court of Louis XIII of France, but died en route. The South Kensington Museum, London, contains several fine ivory reliefs by him.

DURA MATER, du'ra mMer, the outer en¬ velope or covering of the brain (q.v.).

DURAM, doo-ran', or DURAO, Jose de Santa Rita, Brazilian poet : b. near Mariana, province of Minas Geraes, 1737 ; d. Lisbon, Portugal, 1783. He qualified hims.elf for the service of the Church by his studies at Rio Janeiro and at Coimbra in Portugal, was gradu¬ ated doctor of divinity at the university of the latter city and joined the religious order of Saint Augustine. In the course of his travels in Spain and Italy he became acquainted with Alfieri and other eminent men of letters, and subsequently during his residence at Coimbra composed a poem founded upon the story of the Galician adventurer, Diego Alvarez Correa, surnamed Caramuru, the legendary hero of Bahia. This poem was published at Lisbon in 1781, under the title of ˆCaramuru, poema epico do descobrimento da Bahia, ˆ and a French version appeared at Paris in 1829. On its first appear¬ ance the poem was not highly estimated, but since then has risen to the rank of a national epic in Brazil.

DURAMEN, du-ra'men (a Latin word for hardness), the heartwood or central wood in the trunk of exogenous trees as found in dico¬ tyledons and conifers. (See Conifera). It is hard and dense, and often dark-colored, with its tubes dry and thick. Thus in the ebony the duramen is black and is the part used for fur¬ niture and fine cabinetmaking. The alburnum (q.v.), or outer wood, is pale. In the beech the heartwood is light brown ; in the oak deep brown; in the

Judas-tree yellow and in guaia-ctim greenish. The relative proportion of dura¬ men and alburnum differs in different trees. By ship-carpenters the duramen is known as the ®spine.®

DURAN, doo-ran', Augustin, Spanish scholar: b. Madrid, 14 Oct. 1789; d. there, 1 Dec. 1862. He was carefully educated in the classics, studied law at Seville, where he also practised. During the first Carlist War he served as sec¬ retary for the censorship of the press. In 1854-55 he was director of the National Library. He paid much attention to the study of foreign, especially to French literature, and edited a very important collection of Moorish, miscel¬ laneous and historical ballads, and ballads of chivalry (1828-32), a new edition forming part of the extensive ˆBiblioteca de autores Espanolesˆ (Madrid 1849-51). He also wrote a his¬ tory of the Spanish drama from its origin to the middle of the 18th century.

DURAN, Carolus (Charles Auguste Emile Durand). See Carolus-Duran.

DURANCE, dii-rans', a river in France, which rises in Mount Genevre, on the west slope of the Cottian Alps ; flows in a general direction south, and, after a course of about 220 miles, empties into the Rhone, four miles below Avignon. The stream is so full of debris that it is not navigable and often commits great ravages by inundation. Marseilles receives its water supply from the Durance by a viaduct over 50 miles in length.

DURAND, du-ran', Alice Mary Celeste Fleury (®Henry Greville®), French novelist: b. Paris, 12 Oct. 1842 ; d. there, 26 May 1902. In early life she went to Petrograd with her father. Professor Fleury. She there married M. Durand, a French law professor, returning to France in 1872. She visited the United States in 1886 and several of her novels, repub¬ lished in America, had a wide circulation here. Her published works, appearing under the pseudonym, ®Henry Greville,® include ˆA Travers Champsˆ (1872) ; ˆDosiaˆ (1876) ; 'ˆL'Expiation de Savelliˆ (1876) ; ˆLa Princesse Ogheroffˆ (1876) ; ˆLes Koumiassineˆ (1877) ; ˆSuzanne Normisˆ (1877) ; ˆSoniaˆ (1877) ; ˆLa Maison Maureges (1877) ; ˆLes Epreuves de Raissaˆ (1877) ; <L'Amieˆ (1878) ; ˆUn violon russeˆ (1879) ; ˆLucie Rodeyˆ (1879) ; ˆLe Moulin Frappierˆ (1880) ; ˆLa cite Menardˆ (1880) ; ˆMadame de Dreuxˆ (1881); ˆRose Rozierˆ (1882); ˆManuel d'ln-struction Civique et Morale des Jeunes Fillesˆ (1882); <Un Crimeˆ (1884); Hdyllesˆ (1885); ˆCleopatreˆ (1886) ; ˆFrankleyˆ (1880) ; ˆL'ave-nir d'Alineˆ (1889) ; < Chant de Nocesˆ (1889) ; ˆLe Passeˆ (1890) ; ˆUn Mystereˆ (1890) ;

ˆAu-rette> (1891); ˆPeriP (1891); <L'Heritiere> (1891) ; ˆUn vieux menageˆ (1893) ; ˆFidelkaˆ (1894), *etc.* Consult Ernest-Charles, ˆLes samedis litteraireˆ (Paris 1903).

DURAND, Asher Brown, American painter and engraver: b. South Orange, N. J., 21 Aug. 1796; d. there, 17 Sept. 1886. He was appren¬ ticed to the engraver Maverick, of whom he was afterward partner. For a long time his employment consisted in copying prints from English books and working on plates for bank notes. His engraving of Trumbull's ˆDeclara¬ tion of Independenceˆ brought him into general notice, and thenceforth for many years his grayer was in constant demand for portraits of various dimensions and figure pieces. He had always, howeyer, entertained the idea of ulti¬ mately becoming a painter and in 1835, having

for the previous 10 years been a regular con¬ tributor of portraits, small figure pieces or land¬ scapes in oil to the exhibitions of the National Academy of Design, finally abandoned engrav¬ ing as a profession. He devoted himself there¬ after mainly to landscape painting, in which department of art he became eminent. His subjects included General Jackson, Henry Clay and heads of all the presidents, from nature or copied. With Thomas Cole he founded the American landscape school. His landscapes are large sketches painted directly from nature. His composition was imperfect but his work is interesting in detail. The Corcoran Art Gal¬ lery at Washington contains his ˆMountain Forestˆ (1869), and the Metropolitan Museum, New York, contains four of his works, includ¬ ing ˆIn the Woods, ˆ one of his best landscapes. The New York Public Library has another fine example. He was one of the original members and president of the National Academy of Design. Consult the biography by John Du¬ rand (New York 1894) and Isham ˆHistory of American Paintingˆ (ib. 1907).

DURAND, E(dward) Dana, American statistician : b. Romeo, Mich., 18 Oct. 1871. He was educated at Oberlin College and at Cor¬ nell University. He was legislative librarian of the New York State Library in 1895-97; assistant professor of administration and finance, Leland

Stanford, Jr., University, in 1898-99; secretary of the United States Indus¬ trial Commission in 1900-02, and instructor in economics at Harvard in 1902. He served as special expert agent of the United States Census Office on street-railways and electric-lighting plants in 1902 and special examiner of the Bureau of Corporations 1903-07. In 1907-09 he was a deputy commissioner of corporations and was director of the United States census in 1909-13, since when he has been professor of statistics and agricultural economics at the University of Minnesota. He is author of ˆFinances of. New York Cityˆ (1898) ; ˆThe Trust Problemˆ (1915), and contributions on economics and political subjects to various journals, and reports of the Industrial Commis-mission, the Census Bureau, *etc.*

DURAND, William Frederick, American engineer : b. Bethany, Conn., 5 March 1859. He was graduated at Annapolis 1880; served in the United States Naval Engineer Corps (1880-87) ; was professor of mechanical engineering in the Michigan Agricultural and Mechanical College (1887-91), when he became associate professor of marine engineering at Cornell, and full pro¬ fessor in 1895. He continued his work at Cor¬ nell University until 1904 when he became pro¬ fessor of mechanical engineering at Stanford University, which position he now holds. In 1915 he was appointed by President Wilson member of the National Advisory Committee on Aeronautics. He also served as chairman of the committee of management for the Inter¬ national Engineering Congress held in San Francisco in 1915. He has published ˆFunda¬ mental Principles of Mechanicsˆ (1889) ; ˆRe¬ sistance and Propulsion of Shipsˆ (1898) ; ˆPractical Marine Engineeringˆ (1902) ; ˆ Motor Boatsˆ (1907), and many special articles in engineering journals.

DURAND, Wis., city, county-seat of Pepin

County; on the Chippewa River, about 20 miles from its junction with the Mississippi, and on the Chicago, Milwaukee and Saint Paul Railroad. It is the centre of an agricultural region, and its trade and industries are those that pertain to agriculture and stock-raising. Pop. 1,503.

DURANDUS, du-ran'dus, Gulielmus, French prelate and jurist: b. Puimisson, Languedoc, 1237 ; d. Rome, 1 Nov. 1296. He became pro¬ fessor of the canon law in the University of Modena, and there

acquired so high a reputa¬ tion for his learning that Pope Clement IV made him auditor of the Sacred Palace, and took him as his secretary to the General Council of Lyons (1274). In 1277 he was appointed lieutenant-governor of the patrimony of Saint Peter, under Nicholas HI; the following year he successfully asserted the sovereignty of the Pope over the provinces of Bologna and Ro¬ magna. These two provinces he then governed from 1283 to 1286, in the meantime carrying on a war against the people of Romagna, who were in revolt. He was appointed bishop of Mende in Languedoc in the latter year, and retired from the governorship. In 1295 he was again in public station, governor of Romagna and the March of Ancona ; but his strength was un¬ equal to the task of resisting the attacks of the Ghibelline faction, and he resigned his office. His greatest work, ˆSpeculum Jurisˆ (mirror of the law), called by himself ˆSpeculum Judi¬ cial, ˆ was for a long time a work of highest authority in Roman and ecclesiastical law ; be¬ tween the years 1474 and 1678 it passed through 38 editions. He wrote an informal history (commentarius) of the General Council of Lyons, the decrees of which were drawn up by him. His ˆRationale Divinorum Officiorumˆ published at Mainz in 1459, is a standard work on the liturgy of the Roman Church.

DURANGO, dii -ran'go, Colo., town, county-seat of La Plata County; on the Las Animas River, the Denver and Rio Grande, and the Rio Grande Southern railroads; about 20 miles north of the boundary line between Colorado and New Mexico. There is a Carnegie library. The town is the centre of trade for the sur¬ rounding region in Colorado and New Mexico which produces gold, lead and silver and carries on extensive stock raising and agriculture. The principal industries are the smelting and manu¬ facture of the mineral products, flour manu¬ facture, packing, coal and coke mining. Du¬ rango has been governed under the commission plan since April 1913. Pop. (1920) 4,116.

DURANGO, doo-ran'go, Mexico, an in¬ land state of the North, bounded by Chihuahua on the north, Coahuila on the northeast, Zacatecas and Tepic on the southeast and south, and Sina¬ loa on the west. Its area is 38,009 square miles. It is one of the largest and richest states in the republic. The Sierra Madre range (altitude 8,125 feet to 11,375 feet) traverses the western and southern portions. Less important ranges are the Copolquina, Topia, Cavelas, Amacuti, Tominil, Muinora, Guanaccoi and San Juan de Camarones ; these, as well as the isolated peaks, Cerro del Mercado, Panuco de Avino, etc., are ore-bearing. The Cerro del Fraile is an ex¬ tinct volcano. Among the rivers, the Nazas, in the northern part of the state, with its afflu-

ents, the Santiago and San Juan; the Tunal, which rises west of the city of Durango, and its affluent, the Stichil ; the Rio Chico, or Alaponeta and the Aguanaval, may be mentioned. There are small lakes, mineral springs, *etc.* Gold, copper and silver are the chief mineral products, and the best mining districts are those of San Dimas, Guarisamey, Buenavista, Gavi-lanes, Guanacevi, Mapimi, El Oro and Inde. In the San Dimas district is the celebrated Can¬ delaria mine, where the ore assays between $70 and $140 a ton. This mine is said to have yielded over $100,000,000 before the close of the 19th century. The Cerro del Mer¬ cado, near Durango city, contains an im¬ mense deposit of high grade iron ore and is estimated to contain 300,000,000 tons of that metal. Near it are iron and steel works. The mines are controlled chiefly by American capital. Sulphur, copper, iron, cinnabar, tin, coal and rubies are also found. With the ex¬ ception of silver, the mineral resources of the state have been but slightly developed owing to inadequate and costly transportation facilities. The Mexican Central Railroad crosses the east¬ ern side of the state from north to south, and the Mexican International crosses it from northeast to southwest, running through the capital and connecting it with the port of Mazatlan on the Pacific coast. The climate varies with the altitude of the different localities, being cool or cold in the mountainous western regions, and temperate, or warm, in the valleys extend¬ ing from the base of the mountains and in the Nazas basin. There is very little rainfall in the eastern part of the state. The climate is gener¬ ally dry and healthful, but hot on the western slope of the Sierra. The soil of the plateaus is generally of good quality and with irrigation could be made very productive. Cotton is pro¬ duced to a small extent. Wheat, maize, tobacco, sugarcane and grapes are also grown in certain districts, and stock-raising is successfully prac¬ tised in the higher valleys of the Sierras. Since the beginning of the 20th century manufactur¬ ing has been making considerable progress. There are several cotton mills in operation, con¬ suming annually about 500,000 kilos, and with an output valued approximately at 600,000 pesos. Soap and candle factories, tanneries, pottery works, etc., are also in operation. Durango originally formed part of the province of Nueva Viscaya. The capital is Durango (pop. 32,263), and among the principal towns are , Quanacevi (pop. 6,859), El Oro,

Nombre de Dios, San Juan de Guadalupe, San Dimas and Villa Terdo. Pop. 510,000, The inhabitants are largely of Indian blood, are almost entirely Roman Cath¬ olics, and about 84 per cent are illiterate.

DURANGO, Mexico. Capital of the State of Durango. It is situated 6,321 feet above sea level, has an average temperature the year round of 70° F, in the shade. Pop. 32,263. Founded in 1563 and decreed a city by Philip IV in 1621. It was long the capital of the prov¬ ince of Nueva Vizcaya and has been an impor¬ tant trade centre since a very early day, of a territory including the Mexican state of Chi¬ huahua and the southern portion of Texas and New Mexico. It is 540 miles from Eagle Pass, on the Texas border, by the International Rail¬ way, and 480 miles from Mexico City. It is a city of considerable wealth, the region round about

being very rich, both in minerals and agricul¬ ture. Many Americans are located here and are actively engaged in enterprises of various kinds, adding materially to the prosperity of the com¬ munity, Almost within the city's limits rises a wonderful hill of very nearly pure iron, the famous Cerro del Mercado, 640 feet high, 4,800 feet long and 1,100 feet wide, which has been estimated by mining engineers to contain 300,- 000,000 tons of that metal. Among the local industries are extensive ironworks, cottoix and woolen mills, foundries, sugarcane mills, to¬ bacco factory and flour mills. The stores and shops are particularly well stocked and credit¬ able. A local bankˆ — the Bank of Durango — with a capital of $2,000,000, and a branch of the National Bank and an agency of the Bank of London and Mexico provide for financial needs. The notable buildings are the Cathedral, which was begun in 1695 and completed in 1844; the new City Hospital ; the college formerly con¬ trolled by the Jesuits, founded in 1594; the Episcopal Seminary; the Methodist Episcopal Church; the Catholic churches of San Francisco, San Juan de Dios and San Agustin ; the government palace ; the market house and a magnificent theatre. A pen¬ itentiary and bull ring are located here also. It formerly had a mint, in which was coined annu¬ ally about $1,000,000 in gold and silver. An Alameda and several plazas tempt the lover of nature. Not far distant is an everflowing stream which is said to excel the famous one in the grounds of Chapultepec park, at the national capital, and from which the city receives its drinking water. Two electric light companies supply light and there are street railways and telephone service, Durango is called the ®Den-ver of Mexico.®

DURANT, Henry Fowle, American philan¬ thropist: b. Hanover, N. H.,

20 Feb. 1822; d. Wellesley, Mass., 3 Oct. 1881. He was gradu¬ ated from Harvard in 1842 and became a law¬ yer, changing his name from Henry Welles Smith to H. T. Durant. He practised with great success at the bar, but on the death of his only son abandoned his profession and devoted his energies to philanthropy. From 1864-75 he was a lay preacher in Massachusetts and New Hampshire. He founded Wellesley College (q.v.), opened in 1875.

DURANT, Okla., city and county-seat of Bryan County, situated on the Missouri, Okla¬ homa and Gulf, the Missouri, Kansas and Texas and the Saint Louis and San Francisco railroads, 20 miles northeast of Denison, Texas. The Southeastern State Normal School and a Pres¬ byterian College are located here. Agriculture is the chief industry and cotton, corn and ber¬ ries are raised. There are also flour and oil mills. The city owns its electric lighting plant and waterworks. The government is vested in a mayor and a unicameral council of six mem¬ bers, under a charter received in 1904. Pop.

(1920) 7,340.

DURATION, in plants, the period for which any given part of the plant remains alive. The duration of the plant as a whole is condi¬ tioned primarily by that of the roots ; an annual lives for only one vegetative period, a biennial for two and a perennial for a number of such periods. The same plant, such as wheat, may

be an annual if planted early and a biennial if planted late. Similarly, plants such as the cas¬ tor oil bean, which are perennials in an equable climate, are often annuals where there is a win¬ ter and vice versa. In ground left to itself the perennials tend to drive out the annuals. In biennials and herbaceous perennials, the part of the plant which survives the winter or dry season is generally underground and the leaves and stalks die away each year and are produced anew.

In shrubs or trees the duration of the stalks may be measured in centuries, or even in mil-lenia. However, the original live wood be¬ comes dead w'ood after a few years. Leaves are of much shorter duration, ranging from days in the case of cotyledons or some xerophytic leaves to perhaps ten years in the coni¬ fers. In deciduous trees the fall of the leaf is due to the formation of a special zone of frac¬ ture at the base of the leaf stalk, which gives a scar covered by cork before or after the stalk breaks. In such trees as the oak or beech this zone of fracture is imperfectly formed, so that the dead leaves remain on the trees throughout the winter. The duration of flowers is usually relatively brief and may be limited to a few hours, as is the case with the night-blooming cereus, but there are certain orchids such as odontoglossum which may remain open for almost three months if they are not pollinated. It will be noted that tissues which have a per¬ ennial duration are generally woody or other¬ wise mechanically strengthened and protected, whereas delicate, leafy or herbaceous structures are unable to survive periods of climatic ad¬ versity.

DURATION or PERSISTENCE IN TIME, one of the attributes of a sensory ex¬ perience or an emotional state. It is only with difficulty subject to further analysis, if at all. The flash or snap of a spark seems to carry vˆith its place in the scale, ˆflonger or shorter," as directly as in the quality scale of redder or yellower, higher or lower in pitch, or in the intensity scale of brighter or duller, louder or more quiet. One of the cardinal problems of sensory psychology, then, is the study of the properties of this intrinsic temporal relation be¬ tween experiences.

In the first place, by a historical development with which we are not here concerned, we have come into the possession of instruments which, through the mediation of what we know as periodic processes, enable us to assign a certain number as a temporal measure to the phenomena which we observe. This number stands in a very close relationship to our experience of duration ; in general that datum which we expe¬ rience as more lasting will have a greater tem¬ poral measure. The first task of the investigator of duration is to determine to what extent this rule holds good, ana what the exceptions to it are. It is found that the situation here isˆ in most respects parallel to that in other series. There is in each sense an initial limen (see Limina) below which a decrease in the tem¬ poral measure produces no decrease in the sen¬ sory duration. In the case of light, at any rate, although apparently not of sound, unlike the situation in the intensity series this lower lirnen of duration does not approximately ˆ coincide with the total evanescence of all sensation ; thus

an electrical spark of just noticeable intensity lasting 1/10,000 of a second, though still visible, cannot be distinguished from a spark likewise of just noticeable intensity lasting 1/100,000 of a second. In addition to the initial limen, dura¬ tion in each sense has a difference limen, or just noticeable difference in duration and there is a terminal stimulus beyond which increases in the temporal measure although they may be correlated with experiences which enable us to place them in our temporal system (see Time), are no longer registered by increases in the duration of a single sense-datum. The initial stimulus for a tone of 64 vibrations is 1/40 second; of 187 vibrations, 1/125 second; of 3,168 vibrations or over, 0.0063 second. Obser¬ vations on the initial limen, difference-limen and terminal stimulus for the duration of sense-data are relatively scanty, but these same sorts of quantity exist for temporal intervals and here the literature is much more rich. If the intervals are measured between sharp sounds, the initial limen, which here nearly coincides with the lower limit of observable intervals, is about 1/400 of a second. The difference limen is about 1/100 of the temporal measure of the stimulus when the latter is in the neighborhood of 0.3 second. For moderate stimuli Weber's Law (q.v.) is approximately obeyed. The ter¬ minal stimulus is about 0.5 or 0.6 second. The initial limen of visual intervals is about 0.005 second, of tactile (pressure) intervals about 0.0002 second. For intervals between sensa¬ tions of two kinds, the initial limen, which is between 0.1 and 0.02 second, varies with the order of the stimuli. While it is natural to suppose that the initial limen for sensation dif¬ ferences of a given sort is about the same as for sensations of the sort,

it should be noted that this is not an a priori law. Another quan¬ tity which is also of much the same size is the length of the liminal experience qua experience. This is the measure by the chronometer of the interval from the instant at which the subject is aware of the presence of the stimulus to the instant at which he is aware it is no longer pres¬ ent. For light Kiilpe has estimated that this period is about 1/20 second.

All the numerical values here are based on measurements which it is difficult, in fact almost impossible, to make with any high degree of ac¬ curacy. A rapid succession of like sensations as the speed is increased, does not at once fuse into a single sensation, but goes through the very complicated phases of ˆflicker" or ˆTattleˆˆ or ˆAibration," where there seems to> be superim¬ posed upon a sequence of experiences a new single experience. Just when the sequence com¬ pletely disappears is not easy to ascertain. For this reason, estimates as to least noticeable in¬ tervals are likely to have a probable error bigger than the measurement itself. (See Berg¬ son, Henri; Time). Consult Kiilpe, ˆOutlines of Psychologyˆ (tr. London 1901) ; Meumann, in Philosophische stndien (VIII Leipzig 1893) ; Stern, ˆPsˆThologie der Veranderungs auffas-sung' (Breslau 1898) ; Titchener, ˆExperimental Psycholoˆˆ (H, ii. New York 1905) ; Wever, in Philosophische Siudien (IX, Leipzig 1894) ; Wundt, ˆGrundziige der Physiologischen Psychologies (Leipzig 1908-11).

DURAZNO, doo-ras'no, Uruguay, a depart¬ ment bounded on the north by Tacuarembo,

east and southeast by Cerro Largo and Treinta y Tres, on the south by Florida and Flores, and on the west by Flores and Rio Negro. It is the most central of the departments, and in size the third. Area, 5,527 square miles. A range of hills divides it into two sections or basins, of which one extends northward to the Rio Negro, and the other southward to the Yi River, the department lying between these two rivers. Nu¬ merous streams, rising in the central chain of hills, flow toward the south or north; the entire surface is, therefore, well

watered, and furnishes grazing for a large number of cattle, sheep, horses and mules. Fop. about 50,000.

DURAZNO or SAN PEDRO DEL DU¬ RAZNO, Uruguay, capital of the department of Durazno. It is situated near the Yi River and is one of the principal stations on the Cen¬ tral Uruguay Railroad. As an active centre for the trading of the neighborhood, it has sub¬ stantial buildings, a church, hotels and shops. Pop, about 11,000.

DURAZZO, doo-rat'so (ancient Dyrrhach-lUM or Epidamnus), a seaport in the independ¬ ent state of Albania, on the Adriatic, 50 miles south by west of Scutari. A Catholic arch¬ bishopric has been located here since the time of Justinian. The chief exports are raw silk, wool, oil and grain. It was originally founded by a colony of Greeks from Corey ra, in the 7th cen¬ tury B.C., and was long under the name of Epi¬ damnus, the most important maritime town of Illyria, In the early part of the 3d century it fell into the hands of the Romans who changed the name of the city to Dyrrhachium. Caesar besieged the armies of Pompey here. The By¬ zantines gained possession of it at the end of the 4th century, and made it the capital of New Epirus. The Ostrogoths, Bulgarians, Normans, the house of Anjou and Venice owned it suc¬ cessively. It was finally taken by the Turks in 1501, who made it a part of the Vilayet of Scu¬ tari. In the Balkan War (1912-13) it was an important strategic point because the Servians desired it as an outlet for their commerce on the Adriatic. The final treaty left it in the hands of the new principality of Albania under the government of William of Wied. At the outbreak of the European War, toward the end of July 1914, the prince and the international commission left the province and a state of anarchy followed. Essad Pasha Topdani, the recently expelled Turkish ruler, attempted to establish a military government at Durazzo, but the effort ended in failure (5 Oct. 1914). The Austrians finally overran the country capturing Durazzo on 28 Feb. 1916. A few columns and marble are now almost the only remains of the ancient cit3ˆ The modern town is a poor place of about 5,000.

DURBAN, der'ban, or PORT NATAL,

town, the only seaport of Natal; situated on the northern shore of the landlocked inlet known as Bay of Natal, the south end of which is marked by the fortified bluff and its lighthouse. It is the only city of Natal, and the fourth sea¬ port in importance in British South Africa, Durban has become known as a w'atering place, and has electric street railways and all modern sanitary conveniences, including public baths. The centre of the town is occupied by fine pub¬ lic gardens ;

there are also botanical gardens.

a museum, an art gallery, a public library, a theatre, two parks and a racecourse. In 1910 a new group of municipal buildings was com¬ pleted at a cost of more than $1,500,000. Water is brought from a river 15 miles distant. The climate, although exceedingly hot during one or two months, is the most healthful of all African towns. The harbor, greatly improved by ex¬ tensive wharves and dredging, is well pro¬ tected and is sufficiently deep for vessels of 30-foot draft. The exports of the port in 1915 totaled $17,567,525 and the imports amounted to $23,811,955, Besides having a good harbor, Durban derives much importance from its position as the terminus of two railway lines leading into the Orange Free State and Trans¬ vaal provinces. The population of the borough on 7 May 1911 was 69,187, consisting of 31,783 European, 17,784 natives and 19,620 Indians and Asiatics. The city was founded by the Dutch in 1828, and received its name Durban from Sir James D'Urban, then governor of Cape Colony,

DURBAR, der'bar (Hind, and Pers., dur¬ bar, door of admittance), in India, Afghanistan and Persia, a state audience at which important public hearings are given, decrees or decisions announced, distinguished foreign visitors re¬ ceived, and treaties, etc., made. These func¬ tions are often of great splendor and under British rule there have been several famous durbars in India. The first after the downfall of the Mogul empire and the Mutiny was held 1 Nov. 1858 at Allahabad. Lord Canning then announced the sovereignty of Queen Victoria, and offered amnesty to all but actual murderers of the English. Each viceroy since has held them to impress the Hindus. One of the most magnificent was held by Lord Lytton in 1877, when Queen Victoria took the title of empress of India. The then Prince of Wales had just been visiting India, and been received with enthusiastic demonstrations, and the viceroy summoned the feudatory rulers and their re¬ tinues to a great durbar at Delhi, where the proclarnation of the new title was made, and festivities, including a grand ball, games, parades, fireworks, convocation of the Indian orders; etc., were held. Another of great splendor was given at the same city on 1 Jan. 1903, to proclaim the accession of Edward VH. The growing native unrest led King George V and his consort to visit India for their Im¬ perial coronation. The most brilliant durbar in modern times was held at Delhi on 12 Dec. 1911 in connection with the coronation cere¬ monies. Unexpected changes were announced for the administration of India, involving the transference of the capital from Calcutta to Delhi. The name ^^diirbaP^ is used also for the audience chamber, as

we speak of a church (building),

DUREN (ancient Marcodurum), Germany, town in Rhenish Prussia, on the Roer and the railroad from Aix-la-Chapelle to Cologne, 18 miles east by north of Aix-la-Chapelle. It is of Roman origin, and is mentioned under its ancient name by Tacitus. In 1543 it was destroyed by the Ernperor Charles V, at the head of 50,000 men. Diets were held here by Char¬ lemagne (775 and 779). The chief points of interest are the Gothic church of Saint Anna, containing numerous relics of the saint, which

are visited yearly by numerous pilgrims; the museum containing antiquarian and historical exhibits, and a fine public library. The prin¬ cipal manufactures are paper, sugar, linen, cotton goods, machinery and beer. Pop. 32,511. Consult Schoop, ˆGeschichte der Stadt Diiren bis 1544ˆ (Diiren 1901), and ˆBeschreibung des Begreviers Diirenˆ (Bonn 1902).

_ • •

DURER, Albrecht, German painter and en¬ graver: b. Nuremberg, Bavaria, 21 May 1471; d. there, 6 April 152ˆ His father, Albrecht Diirer, came to Nuremberg in 1455 at the age of 28. He was a goldsmith by trade, and it was not long before he found employment with a well-known burgher of the city and master goldsmith, named Hieronymous Holper. In his 40th year, Diirer, who had won the esteem of his master both because of his fine character and diligent devotion to his duties, married Holper's daughter Barbara, then 15 years of age. He became a citizen of Nuremberg, a master goldsmith in 1468, and moved to a back apartment in the house of Johanna Pirkheimer, a patron of arts and letters, who was an en¬ thusiastic lover of classical learning. Here the artist Albrecht Diirer was born, the second son and third child of the Diirer family. After the death of Holper, the elder Diirer acquired the property on the street called Unter der Vesten, since renamed Burgstrasse. Thither the family moved in 1475 and here a great part of the painter's life was spent. Eighteen children were born to the elder Albrecht, of whom two survived the painter. The others died before reaching any grown-up age. It was difficult work to support his numerous prog¬ eny. The younger Diirer speaks with the greatest admiration and affection of his parents who were marked by their piety, simplicity and earnestness of purpose which earned them the well-deserved esteem of their fellow-citizens. After attending school where he learned to read and write and understand a little of Latin, Albert, who was his father's favorite, worked with him in the goldsmith shop and learned that trade. But he soon manifested, at a very early age, a natural predilection for drawing and painting. A likeness of himself drawn with the use of a

mirror at the age of 13 is remarkable for its charming clarity of outline and its expressiveness. A year later, he made another drawing, of the ˆVirgin and the Child, ˆ which, in spite of defects of drawing, shows fine emotional promise in its tenderness and gracefulness. Accordingly, in 1486, the clever boy was apprenticed to the painter Michael Wohlgemuth for three years.

Painting and drawing in Germany at this period, especially at Nuremberg, were very pop¬ ular and distinguished crafts. Under the pat¬ ronage of the burgher and peasant classes, the woodcut and copper engraving began to turn toward the life and customs of the people for its inspiration. Pictures were used in books as a means of instructing the illiterate. Reli¬ gious paintings donated to the Church by the wealthy citizens made room on their canvasses for their donors in contemplative attitudes. Portrait and genre painting found its sources here. The artist was esteemed as a very clever artisan who wielded his tools for the benefit and glory of the people about him, rather than

as a soul aloof, superior and apart from the life of the time, painting or drawing under the pat¬ ronage of lords and high church. Each master artist had his apprentices and journeymen, as did other artisans ; and they assisted him in cutting his drawings, securing orders and selling prints. It was in this wholesome environment that Diirer worked. In 1490, his apprenticeship being over, he began his Wanderjahre. He went through Germany, stopping at the various studios, plying his trade and filling his sketch¬ book with studies of people, pictures and land¬ scapes. At Colmar, he probably came into con¬ tact with Schongauer ; and he studied also, it is said, at Basel and Strassburg. Late in 1493 or early in, 1494, Diirer arrived at Venice, at a time when the reawakening of the classical spirit w'as combining with modern theories of exact proportion to developing original forms of art in the work of Mantegna, the two Bel¬ linis and Jacopo de Barbari. In 1494, his jour¬ neys ended and he returned home. He then married Agnes Frey, the daughter of a wealthy burgher, Hans Frey, a very versatile and bril¬ liant man. The pictures of Diirer's wife repre¬ sent her as a modest, comely housewife. In spite of Pirkheimer's irascible testimony as to the sharpness of her tongue, and the shrewish¬ ness of her disposition, there is every reason to believe that the marriage was happy after the fashion of the quiet uneventful domestic life of the city. Diirer moved with his wife to the home of his aged parents and settled there as a master artist, busy with the pressing task of supporting both himself and his parents.

The products of this period (from the es¬ tablishment of his studio to 1505) are numer¬ ous, although there is some confusion as to the authenticity of a large number of engrav¬ ings and lesser paintings attributed to him. The doubtful ones cannot be mentioned here.

The example of Wohlgemuth is clearly seen in his earlier works, together with some dis¬ tinct traces of the influence of Mantegna and a conscious striving for the better grasp of per¬ spective and human proportions gained from Jacopo de' Barbari, an Italian painter practis¬ ing at Nuremberg after 1500. The large works of this period (prior to his second visit to Venice in 1505) are mainly altar-pieces. A comparison of some of the rough drafts with the final canvas show distinctly that the de¬ sign and the main figures are probably the only parts which can be rightfully assi.gned to Durer. The mass of detail was doubtless exe¬ cuted by the various members of his studio. The Dresden altar-piece, depicting the Virgin in the centre, with Saint Sebastian and Saint Antony on either side, shows extreme care in execution and is homely and naive in its simple representation of the life of the holy family. The Saint Viet altar-piece is inferior in per¬ spective and weaker in color effects. It is a crowded representation of the descent from the cross, too naturalistic in its suffering and in¬ harmonious. The Holzschuler ˆDescent from the Crossˆ in the Moritskappelle in Nuremberg gains in dignity and simplicity. The best of this group of studio paintings is the Paum-gartner altar-piece from the church of Saint Catherine in Nuremberg (now at the Pinakothek in Munich) depicting the nativity of Christ. In the wings are the figures of

knights in full armor, who are evidently the donors, representing Saints George and Eustachius. To this period of his art belongs also ˆThe Adoration of the Alagiˆ (Uffizi Gal¬ lery). It shows decided irnprovement in per¬ spective, composition and dignity. The colors are fresh and harmonious; the outlines deli¬ cate and clear. But it is in the portraits of this period that Diirer hints at the realistic di¬ rection which his later works were to take. Most striking are the two of himself. One, painted in 1498 (now at Madrid), shows a young man attired in the gay garb of the lav¬ ish fashion of the time. Long fair hair frames a gentle, refined and sensitive face. The other, dated 1500 (Alunich), depicts a more mature face with luxuriant beard and hair and direct, fixed eyes. Dignity and great sensitiveness are combined in the calm expression. Two portraits of his father, one in the Uffizi (1490) and the other at the National Gallery, London (1497), show but a passing resemblance to the artist. The sense of increased age is carried in the second by a realistic use of shade and in the now listless hands — which in the first por¬ trait are strong and vigorous. Other portraits are those of Frederick the Wise of Saxony (Berlin) ; of the ˆFiirlegerin,ˆ a lovely young girl with masses of rich golden hair (Royal Gallery at Augsburg), of which two copies of disputed authenticity exist at Munich and Frankfort; Oswald Krell (1499, Pinakothek at Munich) ; and the Imperial Councillor, Sextus Oelhafen (1503), copies of which are in the Derschau collection and in the library of the university at Wurzburg. Another unique painting of the year 1500 is ˆHercules Battling with the Stymphalian Birds ˆ in the Germanic Museum at Nuremberg. It is highly important as an indication of the struggle awakening in the artist as he began to be conscious of the wealth of material in theme and convention which was being rediscovered with the renais¬ sance of classical study.

Diirer’s first experiments in woodcuts were copied after Wohlgemuth. After a few pre¬ liminary pieces, there appeared his 16 illustra¬ tions for the ˆ Apocalypseˆ (1498), a German and Latin edition. The series is full of action, vivid in imagination and composition ; intensely realistic, even where incorrect in drawing. The whole is permeated by the awakening religious fervor of Germany — the intense desire to in¬ vigorate Christianity once more ; and is brim¬ ming with joyous youthful faith in the possi¬ bility of accomplishing that result. In the clarity of the prints, the artistic handling of light and shade and the subtle rendering of texture, Diirer sets a new standard for the en¬

gravers' art. Others of his cuts, though of a little later date, are seven of the series of the ˆGreat Passionˆ ; part of ˆThe Holy Familyˆ and part of the ˆLife of the Virgin. >

In his copper engravings, Diirer likewise shows the effect of various influences at work in his desire for self-expression by means of the conventions he had acquired both at Nuremberg and in Italy. The careful study of human proportions is the key to the copper plates of this period. Of special note are some early Madonnas, ˆ Saint Sebastian,ˆ the ˆOld Man's Dream, > ˆSaint Eustace,' ˆNem¬ esis,' ˆAdam and Eve,' ˆThe Great Horse'

and ˆThe Little Horse.' There are also a few mythological themes — woodcuts for class¬ ical books and for the private possession of the group of humanists who began to carry Italy's past treasures into Germany. From men, such as the old Dr. Hartmann, Schedel, Konrad Celtes and Willibald Pirkheinier, Diirer must have received constant stimulation and encouragement. With the last-named classicist, the artist formed a deep and lasting friendship, the influence of which cannot be overvalued.

Diirer made his second journey to Venice in 1505, to remain for nearly two years. There has been much dispute as to the cause of this journey, but sufficient proof has been brought forward to invalidate Vasari's assumption that the motive was the protection of an abused copyright on his woodcuts. The most prob¬ able reasons were his desire to escape a plague at Nuremberg, to find a market for his works and to execute an altar-piece for the church of Saint Bartholomew at the order of a German colony at Venice. For the fulfilment of this, Diirer painted his ˆFeast of the Rose Garlands' (Prague). The Pope and the em¬ peror are represented kneeling before the Vir¬ gin and Child, a crowd of saints kneel in the background, where the artist and donor are also depicted, while cherubs bearing garlands of roses float above. In Venice, Diirer met the elder Bellini for whom he had the warmest praise. Other large religious pieces painted during his Venetian visit are ˆThe Virgin and Child with the Goldfinch' (Berlin) ; and ˆChrist Disputing with the Doctors,' an unsatisfactory and hasty work. The best products of those eventful months are several smaller portraits of Italian types. From the letters to Pirkheimer, we receive an accurate account of the busy and, on the whole, happy time Diirer spent in Italy. His health profited by the milder climate ; and the admiring courtesy of the Italians afforded him great satisfaction. He had intended to visit Mantegna at Mantua, but the old master died before

his pupil ac¬ complished this pilgrimage, and Diirer returned in 1507 to Nuremberg.

The years from 1507-20 in his native town were filled with high honors and praise. His fame became widespread all over Europe and all the great men of the world sought his ac¬ quaintance. His paintings showed increased breadth of treatment, more delicate shading and coloring. ˆAdam and Eve' is a triumph in the study of the nude. The original dip¬ tych is now in the Pitti Gallery at Florence. The copies at Madrid and Mayence also lay claim to authenticity. In 1508 he painted <Th'e Massacre of the Ten Thousand Saints' (in the reign of Sapor II of Persia) which hangs now in the Imperial Gallery at Vienna. It was painted at the order of the Elector Frederick of Saxony. The ghastly subject is depicted with great truthfulness in anatomy against a lovely landscape background. The ˆVirgin with the Iris' is evidently a school picture, since the work is not uniform. It is on the whole inferior to the ˆAssumption of the Virgin,' a triptych painted for Jacob Heller of Frank¬ fort. This picture occupied the artist for a long time — he spent special pains to rein¬ force the colors and to execute the details with

all possible refinement and skill. It was hung in the church of the Dominicans at Frankfort, but was eventtially bought by Maximilian of Bavaria in 1615 and destroyed by fire in 1674. The Dominicans had replaced it by a copy which was faithfully and carefully rendered ; and from this, together with numerous studies left by the artist, we are able to form an esti¬ mate of the great value of this work. There is no doubt that the best effort of his varied training combined here to produce an effect at once realistic, delicate and spiritual. In the foreground the Apostles are gathered about the tomb of the Virgin, A broad landscape carries the eye into the distance, while above, the Virgin appears between Christ and God who lift the crown above her bent head. Gay little cherubs with variously colored wings sur¬ round them. Of great originality and preci¬ sion is the religious painting of 1511, ˆAdora¬ tion of the Trinityˆ now in the Imperial Gal¬ lery at Vienna.

In woodcuts, Diirer now completed his se¬ ries of the ˆGreat Passionˆ and ˆThe Life of the Virgin.ˆ The later ones are superior in design and in breadth of handling. The ˆMass of Saint Gregory,ˆ the ˆ Saint Christopher,ˆ the ˆHoly Familyˆ are single cuts of this period. The ˆLittle Passionˆ in 37 woodcuts appeared in 1511 and was executed likewise in copper in the succeeding year. Infinite variety of con¬ ception and splendid imagination mark these works.

In copper engraving, his three greatest masterpieces were achieved: ˆThe Knightˆ (1513) ; ˆMelancoliaˆ and ˆSaint Jerome in his Studyˆ (1514). Diirer reaches heights in vig¬ orous handling of the bodies and the depth of emotional expression and the carefully studied light effects. About this time also, Diirer be¬ gan his experiments in dry-point and acid etching and produced several notable studies. Under the patronage of the Emperor Maxi¬ milian he executed in wood ˆThe Triumphal Procession,ˆ ˆThe Triumphal Arch,ˆ in which work he doubtless employed many helpers. The pen sketches in the emperor's prayerbook are preserved at Munich and Besangon. A por¬ trait of Maximilian is also one of his finest works. Several smaller copper _ engravings conclude the work of the artist until the death of his

greatest patron and friend in 1519.

In 1520, Diirer journeyed with his wife to the Netherlands, in order to gain further patron¬ age. A journal of his travels supplies us with information concerning the various events. He visited Erasmus at Antwerp and throughout his travels was received with honor and ac¬ claim. After attending the coronation of Charles V at Aachen, his journey led him to Nijmwegen, Brussels, Ghent and Zealand. Diirer filled his sketch-book with studies of the things he had seen and notes of ideas for new works. In 1521 we find him back in Nu¬ remberg much enfeebled in health. Religious themes seem to have occupied him mainly in this last period. Numerous studies and sketches are preserved, showing his plans for ˆ new groups. These include drawings of the Virgin, a ˆCrucifixion,ˆ the ˆ Apostlesˆ (1523), Pinta-tothek, Munich), all admirable studies in ex¬ pression and temperament, which he pre¬ sented to the Council of Nuremberg in 1526

and was later sent to Maximilian of Bavaria (1627). ˆThe Adoration of the Magiˆ is also a fine pen-drawing, wonderfully simple, realis¬ tic and expressive. Copper-engraved portraits of Hieronymous Holzschuler, Pirkheimer, Melanchthon, Erasmus, Frederick the Wise and the Cardinal of Mainz are the best of his line engravings of his last years. Smaller woodcuts also survive — coats-of-arms, book illus¬ trations, etc., for his friends. Diirer was sym¬ pathetic with the Reformation and a warm ad¬ mirer of its leaders, especially of Melanchthon, but he remained aloof from the stirring contro¬ versies of the times and probably adhered to the Wittenberg confession of faith until his death.

Diirer busied himself also in this period with theoretical works on art, two of which were published during his lifetime, one on geometry and perspective (1525) ; and one on fortification (1527). A work on human pro¬ portions appeared posthumously. For a long time the artist had been suffering from an in¬ termittent fever, which began to sap his strength as early as 1507, He is represented in a drawing indicating the source of his dis¬ ease with his hand. The features are consid¬ erably wasted and wan and show the effect of great suffering, Diirer died suddenly. Pirk¬ heimer writes with great bitterness of the fact that his dear friend passed away without a final farewell. He was buried at Nuremberg in the vault of his wife’s family in Saint John’s cemetery.

The development of Ditrer’s style is interest¬ ing to trace. Throughout

his work there is apparent the constant struggle of the artist to free himself from the stiff formal conventions of the old school ; to enrich his art by con¬ scious striving for perfection of perspective and proportion. Continuous study of old and new forms, conscientious self-criticism and friendly intercourse with brilliant minds devel¬ oped that power for intellectual and artistic realism which characterizes those works on which his claim to renown is justly based.

The drawings of Diirer may be studied best at the Albertina Museum, Vienna. Good col¬ lections are to be found also at the Berlin Mu¬ seum and the British Museum. The rest are scattered through the museums of Germany; some are in the collections at Basel, Dresden, Florence, Milan and Oxford; numbers are in private collections.

Bibliography. — Diirer's letters and diaries were partly published by Von Murr in jour¬ nal zur Kunstgeschichteˆ (Nuremberg 1785-87) ; by Campe (ib. 1827); Thausing (1872); and fully in Lange and Fuhse's *ˆDurer's schrift-liche Nachlassˆ (Halle 1893). There is a great fund of separate works on the artist, of which there is a careful bibliography by Singer, H. W., ˆVersuch einer Diirer — Bibliographies (Strassburg 1903). The best are by Bartsch, ˆLe Peintre-GraveurS (Vol. VII, Vienna 1808) ; Thausing (2 vols., Leipzig 1884, English translation by Eaton), a scholarly work; Wolfflin, ˆDie Kunst Albrecht Durer'sˆ (Ber¬ lin 1907). His prints have been published in <The Publications of the Diirer Societyˆ (1898-1908) ; his drawings in the Albertina by Schonbrunner and Hader (Vienna 1895 et seq.) ; Colvin, in ˆNinety-Three Drawings of

Albrecht Diirerˆ (London 1898). His engrav¬ ings have been published by Galichon (Paris 1846-61); Diiplessis (ib. 1877); Copper-en¬ gravings by Liibke (Nuremberg 1876) and Leitschub (ib. 1900).

Rose Boochever,

Editorial Staff of The Americana.

DURESS, du’res or du-res’ (Ital. dnrezza, Lat. dnritia, deriv. of durus, hard), restraint of liberty, fear of personal injury, or restraint of the person or goods. In its widest sense duress is now said to include all instances where a condition of mind of a person caused by fear of personal injury or loss of limb or injury to such person’s wife, child or husband is produced by the wrongful conduct of another, rendering such person incompetent to contract with the exercise of his freewill power. (1) Duress of persons. This is exercised either by incarceration or by unlawful threats or menaces, duress per minas; in either case the overt act must consist in compelling an unwilling person to do some act, as to execute a deed or commit an offense ; in such cases the act is invalid and excusable. In a broader sense, duress is charged by the law when a person in extreme poverty or distress is induced to seek alleviation by assuming an obligation. Yet the deed signed or the contract made under duress is not void, though voidable at the will of the party compelled to execute or assume it. (2) Duress of goods refers to the case of one who is compelled to pay money for the release of goods unlawfuly detained. Duress may be charged to the collector of a port who charges unauthorized duties.

DURET, dii-ra’, Francisque, French sculp¬ tor: b. Paris, 19 (3ct. 1804; d. there, 25 May 1865. He studied sculpture in Paris ; in 1823 he won the Roman prize, and gained a gold medal in 1831 by his ˆMercury, Inventor of the Lyre,ˆ which recalled somewhat the refined modernity of Canova. Indeed, Canova seems to have been rather the source of inspiration to him than the models of the antique. In 1833 he produced ˆThe Neapolitan Fisher Dancing the Tarantula,ˆ a work of life-like realism, of perfect elegance and the most refined modeling, which is his masterpiece and stands in the Louvre. In the same gallery is his Hmprovisa-tore Singing a Love-Songˆ (1836), a replica of which is in the city museum of Leipzig. For the museum at Versailles he executed statues of Moliere, Dunois and Richelieu; for the Madeleine figures of Christ and Saint Cabriel. The gallery of seven chimneys in the Louvre is adorned by his ˆVictory,ˆ and for the foyer of the Theatre Frangaise he executed statues of ˆTragedy ˆ and ˆ Comedyˆ and a figure of Rachel, the actress. In 1860 he completed the monumental fountain on the Place de Saint Michel in Paris. It is surmounted by a figure of ˆSt. Michael the Dragon-Slayer.ˆ As professor in the ficoles des Beaux Arts, his energies were concentrated on the task of teaching and he pro¬ duced few original works ; those which he has left are good examples of modern French sculp¬ ture with its ease, its demonstrative fluidity and dramatic point, which take the place of the serenity and severe but flawless grace of the Creek masters. He was elected a member of the Institute in 1845.

DURFEE, Thomas, American jurist: b. Tiverton, R. I., 6 Feb. 1826; d. Providence, R. I., 6 June 1901. He was graduated at Brown Uni¬ versity 1846; was admitted to the bar 1848; reporter of the Rhode Island Supreme Court 1849-53; presiding judge of the Court of Mag¬ istrates 1855-60; speaker of the Rhode Island house of representatives 1863-65 ; associate jus¬ tice of the Rhode Island Supreme Court 1ˆ5-75, and chief justice 1875-91, when he retired. He was elected a trustee of Brown University 1875, and its chancellor 1879-88. He published ˆReports of Cases in the Supreme Court of Rhode Islandˆ (1851-53) ; ˆTreatise on the Law of Highwaysˆ (1857), begun by J. K. Angell ; ˆThe Village Picnic and (Jther Poemsˆ (1872) ; ˆCleanings from the Judicial History of Rhode Islandˆ (1883) ; ˆSome Thoughts on the Constitution of Rhode Islandˆ (1884), and sev¬ eral orations on public occasions.

D'URFEY, der'fi, Thomas, commonly known as ˆˆTom D'Urfey,® English dramatist and poet: b. Exeter, 1653; d. London, 26 Feb. 1723. He was a good-natured, simple-hearted, thoroughly vulgar and unliterary writer. His dramas, comedies, operas, tragedies and songs are like what Sancho Panza would have written if he had taken to letters. Many, like ˆThe Siege of Memphisˆ (1676), a tragedy, and ˆThe Plotting Sistersˆ (1691), a comedy, are verbose; others, like the ˆ Songs Completeˆ (1699), are of virginal simplicity, but not of virginal mod¬ esty.

DURGA, door'ga, or PARVATI (Sanskrit, *The Inaccessible One®), a Hindu divinity, one of the names given to the consort of Siva when she appears to inspire fear. She is generally represented with 10 arms. In one hand she holds a spear, with which she is piercing Mahisha, the chief of the demons, the killing of whom was her most famous exploit; in another a, sword; in a third the hair of the demon chief ; and in others the trident, discus, axe, club and shield. A great festival in her honor, the Dur-gapnja, is celebrated annually in Bengal with wild orgies about the beginning of October and lasts for about 10 days in all. See Siva, Devi.

DURGAH, The, a famous tomb built for the Sheikh Selim-Chisti, at Futtehpore, near Agra, in Hindustan. It was erected at a cost of 37 lacs of rupes, or $1,750,000. The tomb, as well as a canopy six feet high which covers it, is made of mother-of-pearl. The floor is of jasper and the walls of white marble inlaid with cor¬ nelian. The screens of marble surrounding the building are the most beautiful in India. They are single, thin slabs about eight feet square and wrought into such

intricate open patterns that they appear as having been woven in a loom.

DURHAM, John George Lambton, 1st

Earl of, British statesman : b. London, 12 April 1792; d. Cowes, Isle of Wight, 28 July 1840. He was educated at Eton, and was returned to the House of Commons as Liberal member for Durham in 1813. An ardent reformer, he was known as ˆRadical Jack,® favored in 1819 shorter Parliaments, was a supporter of Queen Caroline, and refused to accept a qualified Catholic emancipation. In 1828 he was created Baron Durham, and in 1833 Viscount Lambton and Earl of Durham. He held the office of Lord Privy Seal in the Cabinet of Lord Grey

(1830), his father-in-law, and took a leading part in framing the Reform Bill of 1832 and urged the creation of peers as a coercive meas¬ ure in the event of the House of Lords proving recalcitrant. In 1832 he was Ambassador Ex¬ traordinary to the courts of Vienna, Berlin and Saint Petersburg and Ambassador Extraordi¬ nary and Plenipotentiary at Saint Petersburg, 1835—37.

Durham was appointed on 30 March 1838 governor-in-chief of all the Canadian provinces and high commissioner in Lower and Upper Canada, and this post he held till 1 November in that year. The situation he had to meet on his arrival on 27 May was grave and menacing. The rebellions had been crushed, but in both provinces there was intense irritation against the authorities, and there was threatened trouble on the international border, which was abetted by the state governments. Durham succeeded in securing the cooperation of the Washington government in maintaining peace. He passed an ordinance on 28 June banishing to Bermuda certain of the prisoners taken in the Lower Canada Rebellion of 1837 ; but this measure was assailed in the British Parliament as beyond the powers of Durham's commission; the Prime Minister, Lord Melbourne, offered only a half¬ hearted defense, and in the end the ordinance was disallowed. Durham felt he had been be¬ trayed by the ministers who had appointed him, and at once resigned, issuing at the same time a proclamation vindicating his conduct. On his return he busied himself with the preparation of his ˆReport on the Affairs of British North America,ˆ perhaps the most important state paper ever issued on the principles of colonial government. For the evils that existed in the Canadas he proposed the introduction of re¬ sponsible government by the creation of an executive dependent on the majority in the elec¬ tive assembly, the union of the Canadas, munic¬ ipal government, state-aided immigration, the repeal of the laws on the clergy reserves and formation of an intercolonial railway. Dur¬ ham's policy in the extension of colonial self-government came to fruition under the adminis¬ tration of his son-in-law. Lord Elgin, and has since been applied to all the British overseas dominions. In 1839 Durham became chairman of the New Zealand Colonization Company and thus had a

part in the early settlement of that British colony. Consult the ˆLife and Letters of Lord Durham,ˆ edited by Reid.

DURHAM, one of the three English coun¬ ties called counties palatine. Area, 649,244 acres. The soil is productive and good crops of wheat, oats, potatoes and turnips are raised. There is more coal mined in Durham than in any other county of Eng¬ land, and lead and iron mines are worked. Some of its manufactories are ironworks, pot¬ teries, linen-and woolen-mills, glass and chem¬ ical works. Shipbuilding is an important in¬ dustry. For parliamentary purposes the county is divided into eight divisions. Pop. 1,369,860,

DURHAM (ancient Dunholme), England, city and parliamentary borough, capital of the county of the same name, on the river Wear, 14 miles south of Newcastle. It is celebrated for its noble cathedral, which stands m a fine situation on wooded banks of the river, the site of which was chosen as the resting-place

of the body of Saint Cuthbert by the monks of Lindisfarne, driven from Holy Island by Danish marauders, and who built a chapel here to re¬ ceive the body. The present building dates from 1093, with additions in all the styles down to the middle of the 16th century. It is 496 feet long, the greatest height within the build¬ ing is 84 feet and the central tower is 218 feet high. The venerable Bede is buried within its precincts. The castle was founded by William the Conqueror in 1072. The University of Durham was founded by Oliver Cromwell in 1646, suppressed at the Restoration and recon¬ stituted in 1833. The battle of Neville's Cross was fought close by, in 1346, resulting in the defeat of the invading Scots. Four miles west is the Roman Catholic College of Saint Cuth¬ bert, Ushaw, founded after the religious orders were driven from Douay during the French Revolution. The city is the seat of an Anglican bishropric and returns a member to Parliament. Pop. 17,550. Consult Leighton, ˆMemorials of Old Durhamˆ (1910) ; Kitchin, ˆ Story of the Deaneryˆ (1912).

DURHAM, N. C.,ˆ city in Durham County, on the Southern Air Line and the Southern rail¬ roads ; 26 miles northwest of Raleigh. It is a tobacco_ and cotton-growing centre, and the seat of Trinity College (Methodist Episcopal South). The city has also a school of fine art and a con¬ servatory of music, a public library and Watts Hospital. The government is administered under a charter of 1899 which provides for a mayor, chosen every two years, and a city coun¬ cil, elected on a general ticket. Settled about 1855, Durham was incorporated in 1869

with a population of 200. The manufacture of a fa¬ mous brand of smoking tobacco is the staple in¬ dustry of the place. There are also cotton rnills, sash and blind factories, foundries, a fer¬ tilizer factory and other industries. The United States census of manufacturers for 1914 showed within the city limits 62 industrial establish¬ ments of factory grade, employing 5,453 per¬ sons ; 4,764 being wage-earners, receiving annu¬ ally a total of $1,501,000 in wages. The capital invested aggregated $17,752,000, and the year's output was valued at $27,597,000; of this, $15,- 094,000 was the value added by manufacture. It was the scene of the treaty between Generals Sherman and Johnston at the close of the Civil War. It has a national bank, newspapers and good schools. Pop. 22,863.

DURHAM, University of, located at Dur¬ ham and which was originated in 1831 under Bishop Van Mildert by the appropriation of part of the property belonging to the cathedral chap¬ ter. In 1832 an act of Parliament was obtained sanctioning the erection of the proposed univer¬ sity; in 1833 the university was opened and in 1837 it was incorporated by royal ˆcharter. In 1841 the office of warden was permanently an¬ nexed to the deanery of Durham, a canonry in the cathedral was annexed to each of the pro¬ fessors of divinity and Greek, a professor of mathematics and astronomy appointed and fel¬ lowships founded. As at Oxford and Cam¬ bridge the students reside mostly within the university buildings, accommodation being pro¬ vided for them in University College and in Bishop Hatfield's Hall. The university awards the degrees of Bachelor and Master of Arts, Bachelor and Doctor of Literature, of Science

and of Divinity, the usual medical degrees, de¬ grees in music and the degree of Doctor of Civil Law. The academical year is divided into three terms — Michaelmas, Epiphany and Easter. No religious test is required from any member of the university unless he is a student in the faculty of theology. Science was taught from the first, but not to a satisfactory extent till 1871, when the Durham College of Science was instituted in connection with the university at Newcastle-upon-Tyne,

the name of which was changed in 1904 to Armstrong College. The medical department of the university is consti¬ tuted by the Durham University College of Medicine, founded in 1851 at Newcastle, an in¬ stitution which has greatly increased in effi¬ ciency in recent years by the establishment of additional chairs. Since 1895 all degrees except those in divinity may be granted to women. There are over 37,000 volumes in the library.

DURHAM BOOK, The, or SAINT CUTHBERT'S BOOK, a manuscript of the Latin text of the gospels, with an interlinear gloss in Saxon. The book dates from the last of the 7th century and is supposed ly some to have been written by Eadfrith, of Lindisfarne. It is one of the most beautiful of the manuscripts made by the old monks, and is one of the most highly prized treasures of the British Museum.

DURHAM CATTLE. See Cattle.

DURIAN, du'ri-an (Diirio zihethiniis) , a fruit tree of the family Bombacacece, generally diffused over the southeast of Asia, especially in the Malay Peninsula and neighboring islands. It is esteemed for the flavor of its fruit, which, however, is an acquired taste, the fruit having a strong, offensive odor and a somewhat tere-binthine flavor. The tree, which on an average yields 200 fruits annually, is about the size and the form of a pear tree, but with cherry¬ shaped leaves, except that they are entire and smooth at the edges. The flowers are large and of a yellowish-white. The fruit, of globu¬ lar or oval form, from 8 to 10 inches long, large in some species as a man's head, is not unlike the bread-fruit externally. It has a hard prickly rind, covered with warts and tubercles. When ripe it becomes of a brownish-yellow and opens at the top ; it must be eaten almost fresh from the tree, as it putrefies in less than^ 24 hours. The fruit contains five large longitudinal cells, each containing one to four seeds about the size of pigeon's eggs embedded in a custard¬ like pulp, which is the delicious part of the fruit. The seeds are roasted and eaten like chestnuts, ground into flour and also used as vegetable ivory. The pharmaceutical qualities of the fruit are aphrodisiacal.

DURIRON, a trade name for an iron-silicon alloy, containing about 14 per cent of silicon. The alloy is extremely hard and close-grained, of a gray color and white fracture, and is highly resistant to erosion and corrosion. It has a specific gravity of 7.00 and weighs 437 pounds per cubic foot. Its tensile strength is 10,000 to 12,000 pounds per square inch and its com¬ pression strength 70,000 pounds per square inch. Its electrical conductivity is one-fortieth of that of copper. It melts at about 2,500° F. and is very fluid in the molten state, permitting

casting in very thin sections. The metal is so hard that it cannot be machined, but is finished by

grinding. Duriron is not affected or but very slightly by 25 per cent sulphuric acid or 25 per cent nitric acid, sulphate of aluminum, hypo¬ chlorites of lime and soda, tannic and gallic acids, pyroligneous acid, caustic soda, copper sulphate, hydrofluo-silicic acid, tartaric acid and ammonium chloride. It is used for kettles, pumps, pipes, valves and fittings for use in acid and alkali manufacture.

DURKHEIM, durk'him, Emile, French writer on sociology: b. Epinal (in the Vosges), 15 April 1858. He was professor of philology at the Sens Lycee, the Saint Quintin Lycee and the Troyes Lycee (1882-87), professor of soci¬ ology at Bordeaux (1887-1902), since which time he has been in the University of Paris, where he is at present professor of the Faculty of Letters. He is a knight of the Legion of Honor and a member of the committee on historical works. Among his numerous published works are ˆLa Division du travail sociaP (1893) ; ˆLes Regies de la methode sociologiqueˆ (1897) ; ˆL'Annee sociologique' (1898) ; ˆLe Suicide, etude de sociologies (1897).

DURKHEIM, durk'him, or DURKHEIM AN DER HARDT, Bavaria, town in the Palat¬ inate, 14 miles southwest of Mannheim. Its annual sausage market, founded in 1494, is at¬ tended by large numbe: s of people. Durkheim has saline springs, in the water of which Bunsen and Kirchhoff by spectrum analysis first de¬ tected the metals rubidium and caesium in 1860. Durkheim was walled and fortified, so was an object of keen contest during the Thirty Years' War. Pop. 6,055.

DURLACH, door'laH, Germany, town in the free state of Baden, four miles southeast of Carlsruhe, at the foot of the Turmberg. It is of Roman origin. It has manufactures of iron, machinery, organs, sewing-machines, gloves and beer, and is celebrated for its fruit. Pop. about

14,000.

DURNING-LAWRENCE, Sir Edwin,

English politician and Baconian : b. London, 2 Feb. 1837 ; d. 21 April 1914. He was a graduate of University College, London, and was called to the bar of the Middle Temple 1867. He rep¬ resented as a

Unionist the Truro division of Cornwall in the House of Commons, 1895-1906. He published in 1910 an ingenious work, ˆShakespeare is Bacon, ˆ in which he attempted to prove that the plays of Shakespeare were written by Francis Bacon, of which an abridged version, ˆThe Shakespeare Myth,ˆ was pub¬ lished in 1912. He was created a boronet in

1898.

DUROC, dii-rok, Michel Gerard Christophe, Duke of Friuli, French soKlier: b. Pont-a-Mousson, 25 Oct. 1772; d. Bautzen, 22 May 1813. He served as aide-de-camp to Napoleon in the Italian and Egyptian campaigns. In 1805 he was made grand marshal of the palace and was frequently employed in diplomatic missions, though he still took his full share in the wars of France till the time of his death. He was a great favorite of Napoleon and was killed by his side at the battle of Bautzen.

DURRA, door'ra. See Sorghum.

DURRETT, Reuben Thomas, American lawyer: b. Henry County, Ky., 24 Jan. 1824; d. 1900. After studying at Georgetown (jollege.

Kentucky, he was graduated at Brown in 1849 and at the law department of the University of Louisville in 1850, and practised his profession in Louisville until 1880. From 1857 to 1859 he was editor and half owner of the Louisville Courier. He was the founder of the Public Library of Kentucky, of the Louisville Abstract and Loan Association and of the Filson Club of Louisville. He collected one of the most valuable private libraries in the Southwest. He published ˆThe Life and Writings of John Fil¬ son, the First Historian of Kentuckyˆ (1884), and contributions in various periodicals.

DURUY, du'rwe', Victor, French historian and statesman: b. Paris, 11

Sept. 1811; d. there, 25 Nov. 1894. He was professor of history in the College (afterward Lycee) Henri IV prior to 1861. In 1862 he was appointed inspector-general of public instruction and professor at the Lcole Polvtechnique, and in the following year Napoleon HI made him Minister of Public Instruction. During his six years' tenure of this office he carried out many important re¬ forms in spite of the determined opposition of the clerical party, and on resigning his office in 1869 he was nominated a member of the Senate. He was elected a member of the Academy of Inscriptions in 1873, and in 1884 a member of the French Academy. Besides many excellent school manuals, he wrote: ˆHistoire des Romains depuis les Temps les plus Recules jusqu'a LTnvasion des Barbaresˆ (1870-79), his most important work; ˆHistoire des Grecsˆ (1862); crovned by the Academy; ˆHistoire de Franceˆ i 1852) and other works. He was general editor of Hachette's great ˆHistoire Universelle.ˆ

DURWARD, Quentin. See Quentin Dur—

WARD.

DURYEE, diir-ya, Abram, American soldier: b. New York 1815; d. there 1890. He was educated in the common schools, and going into business made his fortune in mahogany furniture. He entered the State militia in 1833, was made colonel of the 27th Regiment in 1849 and was conspicuous as a maintainer of order during the riots that prevailed up to 1861. Dur¬ ing the Civil War he raised the regiment known as ®Duryee's Zouaves,® and was promoted to be brigadier-general of volunteers in August 1861, but resigned in Januaˆ 1863 owing to a dis¬ agreement over a question of rank. His gallant services at the battles of Cedar Mountains, Rap¬ pahannock Station, Thoroughfare Gap, (jrove-ton, Chantilly, South Mountain and Antietam gained for him the brevet rank of major-general in 1865. In 1874, as police commissioner of New York, he attacked and dispersed a body of communists seditiously gathered together in Tompkins Square.

DUSE, doo'sa, Eleanora, Italian actress: b. Vigevano, Italy, 3 Oct. 1859. Her childhood and early youth were filled with sorrow, aris¬ ing from poverty, hardships, the loss of friends and an unworthily bestowed affection. Hers was a lineage of actors, and her early environ¬ ment destined her for the stage. Her grand¬ father founded the Garibaldi Theatre in Padua. She was dragged about the minor theatres of Italy in her father's companies, playing Cosette in <Les Miserablesˆ at 7, and star of the little troop at 13 in ˆFrancesca da Rimini.ˆ When

she was 14 she played Juliet at Verona, in an open-air theatre, her performance compelling recognition as most extraordinarily brilliant. Still she had to wait for general recognition until 1879, when she played Zola's ˆTherese Raquinˆ in Naples in 1887. She appeared in Venice in 1892, and later in all the chief Euro¬ pean cities, making her debut at the Fifth Ave¬ nue Theatre in New York as Camille in Dumas' play of that name, January 1893. Among the roles which she has triumphantly essayed are Marguerite, Magda, Paula, La Femme de Claude, La Locandiera. She was married to an Italian actor-journalist. Signor Chechi, before she was 20, but they soon separated. Duse has remarkable emotional power and the ability to represent suffering and to make the most of tragic situations, at the same time possessing such versatility that she can play parts of oppo¬ site character the same evening. She pays little attention to the meretricious accessories of the stage makeup. Great simplicity and natural¬ ness, coupled with striking intensity, character¬ ize her acting. She has great excellence in dic¬ tion and in facial expression, the latter being continuous and minute. Her repertory is enor¬ mous, her art including the plays of Dumas, Scribe, Verga, Prega, Ibsen, Sudermann, d'Annunzio, and Shakespeare. Her association with D'Annunzio lasted for many years, and it was for her that a number of his plays were written. Her splendid interpretation made them great successes on the stage, and added to the fame of the author. After 1899, a disagreement arose between them, and although she often starred in his dramas, they ceased to be friends. Her tours in the United States, 1893, 1896, 1902-03, were very successful from the artistic and managerial point of view. After this she acted at intervals in Italy, but her health was such that she was compelled for the most part to live in retirement.

DUSKY DUCK, or BLACK DUCK, a

North American duck (Anas obscura), closely related to the mallard, but of a prevailing sooty hue in its plumage. It is peculiar in being con¬ fined to the eastern half of North America, breeding abundantly in Labrador, and appearing in the United States in winter, when it becomes one of the principal market ducks. Its nest, eggs and general habits are like those of the mallard.

DUSSEK, doo'shek, Jan Ladislaw, Bo¬ hemian composer and pianist: b. Czaslau, 9 Feb. 1761 ; d. Saint Germain-en-Laye, 20 March 1812. He was trained at Iglau, Kuttenberg and Prague, and afterward was organist at Mechlin and Bergenop-Zoom. At Amsterdam he met with much success, both as a teacher and per¬ former, and here he

produced his earliest works for the pianoforte ; he afterward resided at The Hague, and in Hamburg, Lithuania, Paris, Milan and London (1788-1800), where he was very popular. In 1803-06 he lived as instructor and boon companion with Prince Louis Ferdi¬ nand of Prussia, whose death called forth the beautiful and pathetic ˆElegie Harmoniqueˆ (op. 61) ; in 1807 he entered the service of Prince Talleyrand, and thenceforwardˆ devoted most of his time to composition. His works include 12 concertos, 53 piano sonatas, 80 sonatas for the violin, and many smaller com¬ positions.

DUSSELDORF

DUSSELDORF, Germany, city, the capital of the government of the same name, in the Rhenish province ; on the Rhine, here crossed by a bridge of boats, and on the railroad from Elberfeld, 24 miles north by west of Cologne by rail. It consists of the old town in the north, Karlstadt, the new town, and Friedrichstadt in the south, with the suburbs of Derendorf, Flingern, Oberbilk, Unterbilk and other small places. The chief public squares are the Cor-neliusplatz, with a fountain and a statue of Cornelius; Schadowplatz, with a monument of Schadow; the market-place, with an equestrian statue of the Elector Johann Wilhelm; and the Burgplatz, with the tower of the castle which was founded in 1710 and burned down in 1872. In 1896 a bronze equestrian statue of the Emperor William I was unveiled. The prin¬ cipal churches are Saint Lambert's, a 14th cen¬ tury Gothic building, near the Rhine, adorned with marble monuments of Wilhelm IV and Johann Wilhelm, the last two dukes of Cleves and Berg; and Saint Andrew's, completed in 1629. Other buildings are the Academy, a mod¬ ern building in the Renaissance style ; the court¬ house, with Schadow's last oil-paintings ; and a building of the 16th century, also with fine paint¬ ings. The Academy of Art was founded 1767 by the Elector Theodore, remodeled in 1821 and afterward directed by Cornelius and Schadow. This city has the honor of having founded a school of painting, which takes the name of Diisseldorf. While without the tradi¬ tions of cities like Cologne, Frankfort and Aix-la-Chapelle, not so distant, this metropolis of the lower Rhine, situated on both of its banks, has a fame of its own in history, com¬ merce, art, industry and education. Its name is derived from the brook Diissel which flows into the Rhine. More than 1,000 years old, it was for centuries the residence of the counts, later the dukes of Berg, then the electors of the Pfalz, and finally the grand duchy of Berg, created by Napoleon, until taken by Prussia on 3 May 1815. It owes to its electors its early fondness for art and later its Academy of Arts, which has richly developed within recent decades, containing, in 1910, 14,000 original paintings, 24,000 engravings, 248 water colors copying Italian originals. The expansion of German industry under the empire has had a marked influence on its commerce and trade. In 1850 the population was 40,000; in 1900, 210,000; 1914, 400,000. Its area is about half as large again as Paris. Within a circle of 50 kilometres are three and one-half millions of people. In 1883 the Diisseldorf State Railway stations sold 600,000 tickets; in 1911, 5,900,000. In 1883 the goods traffic reached 500,000 tons ; in 1911, 1,700,000. In 1882 were 8,000

shops with 26,000 employees ; in 1914 20,000 shops with 130,000 employees. Of the city's indus¬ tries in iron and steel manufactures 1,000 works are busy, employing a third of the popu¬ lation. In the machine industry 150,000 are engaged in all its ramifications. Its gun foundry has 5,000 workers. The city delivers half the gas pipes and one-third of the boiler tubes of Germany. In 1907 in the older oart of Diisseldorf were 21 rolling mills and forges, 27 iron foundries and enamel works and 3 tin plate works. Here too scientific and musical instruments are made, gold and silver articles, wire and safes. Here too are textiles manu¬

factured — spinning, weaving, dyeing. There are 10 paper and pasteboard factories; the booktrade is powerfully represented with l30ok-binding and artistic painting. The chemical industry has 50 works, with glass, porcelain, fire-clay and cement. Artistic carpentry has its many lines of work. The exhibitions of art and industry, which date from 1811, have greatly promoted the city's prosperity, with its vast wholesale business in ironware, chemical prod¬ ucts, technical requisites, groceries, oils, grain and wood. The export trade has direct rela¬ tions with the Mediterranean, with Russia and the Atlantic ports. No less rapidly has de¬ veloped the banking and credit business. The Dusseldorf Exchange was founded in 1884. The State Railways have 6 passenger and 11 freight stations. The spacious city harbor on the right bank has five basins and an extended water front, — in the service of its commerce are 50 electric traveling cranes with a 20-ton capacity and 5 grain elevators. There is regular direct steamship connection with the upper Rhine and the chief foreign ports. Leaving its commerce and trade, of what else can Dusseldorf boast? Here Heine was born in 1797. The old house where he was born on the Bolkerstrasse has been torn down and replaced by a more modern structure, but the site still attracts visitors who throng in greater numbers to the Academy of Arts and the Art Gallery with their superb treasures and memories of Cornelius, Schadow and Bendemann, as well as the Museum of Art and Trade and the School of Industrial Arts. Then come the theatres with their varied attrac¬ tions. Dusseldorf is famous also for its musical gatherings, to which the best soloists of the world find their way. The Conservatoire and College for Music Teachers are among the most famous in Europe.

The city does not neglect the intellectual side of life. It has the Country and City Li¬ brary with 50,000 volumes, including 1,100 incunabula and 500 manuscripts. There are five town public libraries, reading rooms of some private societies and a Heine Library in one

room, reminiscent of the poet. Special collections are found in the Historical Museum, the Natural History Museum, the Hetjens Mu¬ seum, the Observatory and the rich array of technical works in the library of the Society of German Ironfounders. The schools of Dus¬ seldorf are its special pride. There are 90 board schools, with 1,000 classes and 60,000 pupils. Those beginning a trade or in business are compelled to attend either a trade or a commercial continuation school. As voluntary schools are a trade school, a business school and for girls a commercial school. The School of Industrial Art is a higher professional one, and over all is the Royal Academy of Arts (1767). Other high schools are the town acad¬ emy for medicine (1907) and the academy for municipal administration. There is a police school for police employees. Then as a bridge iDetween board schools and the higher institutes is the Intermediate School for boys. The state supports a gymnasium and a reform gymnasium, the city supports two gymnasiums ; the town and the state support two Oberrealschule and one Realschulc. For the girls are three high schools, three intermediate, a school for modern science and_ a seminary for women teachers. There are high class private institutes for busi-DUST

ness, handwork, cooking, housekeeping, *etc.* Diisseldorf, too, has frequent public concerts as well as lectures — duly announced on the city's monthly program calendar. Academical courses for general culture are of much sig¬ nificance in developing the educational status of the citizens of all types. It is needless to add that the city, with its 50 or 60 papers, is supplied with every municipal need, — its mayor or manager has been in charge for years, so admirably does he fill his office. It owns its gas, electric and water supply plants, its coal yard and slaughter-house. It owns the tram¬ ways. With the better residences of the villa type, the fine public buildings and splendid churches, the many pleasure parks and gardens, the numerous well-equipped baths, the woods on the outskirts, Diisseldorf comes as near to being ideal as is possible nowadays. Among the celebrities associated with the city are J. G. and F. H. Jacobi, Varnhagen von Ense, Peter V. Cornelius, Wm. Camphausen, H. Von Sybel.

Bibliography. — Brandt, ˆStudien zurWirts. u. Verwalt. der Stadt D.ˆ (Diisseldorf 1902) ; Albrecht, D., ˆStreifziige durch das Diisseld. Schulwesen> (Diisseldorf 1912) ; Dr. Most, ˆDiisseldorf, the City of

Commence, etc.ˆ

(1912).

DUST, the fine particles of matter which float on currents of air or settle on surrounding objects. These particles consist of sand, soot, cotton fibre, pollen, fine hair, pulverized excreta of animals, parts of seeds, bacteria, molds, *etc.* This is the ordinary condition of things. Fre¬ quently, as was the case after the Krakatoa eruption in 1883, the atmosphere becomes widely and densely charged with volcanic particles of varied minuteness, the smallest and lightest par¬ ticles of which must take months, even years, in settling. The dust from this eruption circled round .the entire globe several times, and for two years it gave rise to extraordinary sunset glows and other remarkable optical phenomena. The finest particles are believed to have been raised to an altitude of 50 miles and to have remained buoyed up by air currents for several years. The presence of an abundance of pollen in the air accounts for the occurrence of ˆsulphur showers® or ˆgolden rain.® The ˆMry fog® of 1783, which covered Europe for three months, is regarded as having been due to an eruption in Iceland.

On 8, 9 and 10 March 1901 heavy dust storms arose in the desert region of southern Algeria, were carried north by a great cyclonic storm, leaving deposits as far north as Denmark, Rus¬ sia and Finland, the last traces of the storm settling in those countries on the 12th of that month. The extreme distance carried was 2,5(X) miles ; the total amount falling on the Continent being estimated at 1,800,000 tons, two-thirds of which fell south of the Alps, and as much more is supposed to have fallen in the Mediterranean. Off the west coast of Africa between the Canaries and Cape Verde Islands, haze dust due to storms from the Sahara Desert is frequently encountered by vessels. The dust storms in certain parts of India are occasioned by accumu¬ lations of whirlwind columns moving en masse or in rapid succession over the earth's surface in a direct or wavy line. When passing over the arid plains these whirl high into the at¬ mosphere great quantities of dust, which are

rolled onward in huge volumes, forming at times a sublime spectacle.

Conflagrations are responsible for the spreading of dust over very extensive areas. Forest fires along Lake Champlain and down to the

neighborhood of Ticonderoga caused a night-like darkness to fall on New England on 19 May 1780, the unusual phenomenon suggest¬ ing to the inhabitants the coming of the end of the world. Cinders from the great fire in Chicago spread over a very extended area, and reached the Azores 40 days after the outbreak of the conflagration. The burning of peatbogs in the barrens of Labrador is supposed to have been the cause of the ^^yellow day® in New England (6 Sept. 1881), when the atmosphere had an intensely brassy appearance. The dust of such meteorites as undergo complete combustion on contact with atmospheric air has been traced on the earth's surface ; fine ferruginous par¬ ticles are often found on the snowy summits of high mountains and on the icefields of Green¬ land and other northern regions. This is called by scientists cosmic dust.

The dust with which the atmosphere is im¬ pregnated, especially in cities, is not only in¬ jurious to health, but causes loss in business, in addition to which certain kinds are liable to explosion. Damage from dust and soot in departmental stores is a definite loss item, caus¬ ing depreciation in stock and high charges for dusting and cleaning. The drastic remedy lies in the washing of the air, warmed in winter and cooled in summer, with the humidity ad¬ justed for comfort and health. In such build¬ ings the windows will remain unopened — the open window being regarded as a source of contamination. Air was cleaned at first by passing it through a cheese cloth screen, but a common practice now is to subject it to water sprays, which remove as high as 98 per cent of dust and other impurities, after which it is circulated throughout the building. In the running of pneumatic hammers, drillers and riveters, dynamos and other machines, the elim¬ ination of dust where practicable is a great economy which materially lengthens the life of the machinery. In mines, flour mills and other places where dusty operations are carried on, there is constant danger from dust ex¬ plosions. The amount of dust that must be present to cause an explosion naturally varies to some extent. Among dusts which propagate flame readily and ignite so easily that an ex¬ plosion would certainly be produced by lighting a match in the dust-laden space are sugar, starch, rice refuse, fine wood dust, malt, oat husks and grain in flour mills. Dusts from leather, shoddy and shellac compositions and sawdust, while they are readily ignited, are not so dangerous, as they ordinarily require a source of heat of larger size and higher temperature or a source that acts for a considerable time.

Aitken, a Scottish savant, has shown that no condensation of moisture, as in rain, mist, fog (see Fog) could occur without nuclei such as dust particles. If the atmosphere were not impregnated with dust there

would be no cloud effects, no radiant sunsets, no soft afterglow ; the sun would go down instantaneously, the harmonious colorings which lend a halo to the quiet of eventide would never have been. Aitken has also devised an apparatus for gauging the number of dust particles in a given

sample of air or gas. He and others have made innumerable tests in all parts of the world. The number of particles varies from a few thousand per cubic inch over oceans and in mountain regions to 50,000,000 and upward in dusty towns. A room near a ceiling has been found to contain 88,000,000 to a cubic inch. Aitken regards that a cigarette smoker sends 4,000,000 particles into the air with every puff. A great amount of solid matter is sent into the air as the result of the imperfect combustion of fuel. The dust fall in English cities is esti¬ mated at from 200 to 2,000 tons per square mile per annum. Tests made in 1913 showed that 195 tons per square mile fell at Sutton in Surrey as compared with 650 per square mile in the East End of London ; in the centre of Leeds 242 tons and Leeds Forge 539; Glasgow and Coatbridge 1,330 and 1,939 respectively. Experiments made in 1914 by the Board of Health of the Department of the Seine on the Paris Underground Railway showed that in the metropolitan section of the road the average constitution of the dust embraced 46 per cent metallic iron, 14 per cent iron oxide, 12.1 lime and plaster, 1.12 grease, 12.6 water and organic matter.

But one of the most important and serious questions concerning dust-laden air is the danger it brings to human life as disseminating the bacteria of disease. Nearly one-fourth of all deaths are due to consumption. Now the expectoration of a consumptive may contain millions of germs. Falling on the sidewalk or carriage-way of a city, it is soon tracked over a large area and gradually mixed with the dust ; especially on asphalt pavements, where each wheel acts as a millstone, grinding everything into the finest powder, to be raised by passing vehicles into the air and sent into thousands of healthy lungs. The number of disease bacteria in the air has been calculated by many

analyses. Taking 10 litres of air for a basis : in the Boston City Hospital the number of living bacteria was found to be nearly 450, and of molds

225. In a model New York hospital, where everything is supposed to be clean, 12 living germs settled on the disc, and, after sweeping,

226. In a New York tenement-house carpeted living room, 75 living bacteria settled on the disc in an exposure of five minutes ; after sweeping, 2,700, and mold settled on a plate or disc three and three-quarters inches in diameter. Precautions are now taken in the majority of cities against the peril of dust-spreading disease by constantly flushing the streets and sweeping away all superficial dust into the sewers.

DUST-BRAND, or SMUT, a disease of certain plants, as oats, barley, corn and other cereals. It is caused by a parasite fungi called Ustilago, which causes a swelling that at length becomes a powdery sooty mass. The common forms are Ustilago segetum and IJ. carho; that which attacks Indian corn is Ustilago maydis. See Fungi.

DUSTIN, Hannah, American heroine; she was the wife of Thomas Dustin and was cap¬ tured by the Indians during their attack on Haverhill, 16 March 1697. Her youngest child, an infant one week old, was killed, but her husband, with their other seven children, was successful in escaping. The mother, with her nurse, Mary Neff, was carried off and put in

charge of an Indian family consisting of two men, three women and seven children. The captives on their way to a large Indian village halted at an island six miles above the present Concord, N. H. Here Mrs. Dustin and her nurse, assisted by an English youth, Samuel Leonardson, killed and scalped all the Indians in their sleep, excepting one squaw and a small boy, and after a difficult journey in which they endured many hardships reached home in safety.

DUSTY-FOOT COURT. See Piepowder Court.

DUSTY-MILLER, a common name of some of the plants of the genus Primula of the primrose family, from the white flour-like appearance of the leaves. The name is also applied to Sene do maritimus, a native of the Mediterranean region and much grown in gardens.

DUTCH, the anglicized form of the word Dietsch, Duitsch or Deutsch,

which in the Middle Ages was applied to the Teutonic people who spoke a language other than the Latin or the Romance languages. Dietsch means, *belonging to the common people; vernacular.^^ While the term Dutch was once applied by the Eng¬ lish, and in the United States is still popularly applied, to German-speaking peoples and things German, its use is properly restricted to the language and people of the Netherlands. The people of Holland call themselves Nederlandsch and use their forms Duitsch, Nederduitsch, as the Germans do Deutsch, Niederdeutsch. For Dutch language and literature, see Nether¬ lands.

DUTCH IN AMERICA, The. Set like a wedge at the meeting point of the Celtic and Teutonic races and at the mouths of the rivers flowing out from the continent, the evolution of civilization in the Low Countries proceeded notably on the lines of industry and democracy. By the sixteenth, the century of exploration, the 17 provinces, with their 216 walled cities, had become the richest part of Europe. After the struggles of the Renaissance and the Reforma¬ tion, the Netherlands were cleft in twain, form¬ ing two countries, the one becoming an appa¬ nage to the Spanish monarchy and the other an independent federal republic. The 10 southern provinces returned to their old allegiances, ecclesiastical and political, and all adherents of the Reformed faith were expelled. The ref¬ ugees, mostly skilled artisans and educated people, added notably to the wealth and power of other countries, especially to the Dutch Re¬ public, which quickly doubled in population and became a world power. It was from this country that the Dutch who settled New Netherland came. By this time the nation that was to give organic life to our four Middle States had developed men, women and institutions that were the wonder of the world. Representative government in Church and State — the judiciary being supreme — was a cardinal feature and free public education for both sexes was nearly uni¬ versal. These republicans led the nation in free¬ dom of conscience, of speech and of the press, as well as in public charities, prison reform, land distribution and registry, legal codes and municipal administration; as well as in several minor matters, such as the written ballot, the uniformity of road gauge, with the law of turn-DUTCH IN AMERICA

mg to the right, In making wedlock a civil ordinance with public

registry, equal distribu¬ tion of property to children, the protection of the rights of women, *etc.* On Holland's soil, in 1619, was held the first ecumenical council of the Reformed Churches of Europe. On the roll of her eminent sons were the names of Agricola, Gansevoort, Thomas a Kempis, Erasmus, Wil¬ liam the Silent, John of Barneveldt, Grotius and Maurice, besides painters, scholars, jurists, di¬ vines and musicians without superiors in Europe — a list to be mightily increased during the next two centuries following the beginnings of New Netherland.

After the triumph of the forces of union and nationality over those tending to disruption, col¬ onization began, the Dutch sons and daughters, in their youth, vigor and alertness, carrying their ideas, faith, customs and institutions with them. They did not go from home as political or religious exiles, for they had no need to be such. They were not in protest against their government in Church or State, for their free¬ dom of conscience and civic rights had already been won at a great price. In New Netherland the framework of order was first under a trading corporation and later under a system of manors and free towns ; but the semi-feudalism thus introduced had been outgrown in Holland and in the New World cut across the grain of the Netherland spirit. The story of the Dutch in America, apart from economics and agricul¬ ture, is that of two streams of movement and influence. The one was of a democratic bias, nurtured in the Church, and the other that of officialism and corporational life ; the one in¬ eradicable because entrenched in the traditions of free government guaranteed by charter. The other was of survivals of feudalism in the stronghold of aristocratic bureaucracy. One was to abide, the other was to pass away. On the first stream of tendency floated such figureheads as Van Twiller, Kieft and the able governor Stuyvesant, who detested popular freedom. On the other and permanent current arose such noble characters as Peter Minuit, Sebastian Krol, Domine Michaelius, Melyn and Kuyter, who all withstood Kieft; Adrian Van der Donck, who fought Stuyvesant's usurpations; Arendt Van Curler, founder of a free town; and Jacob Leisler, the people's champion against monopoly and aristocracy. When the chronic contention between these two forces was hottest came the English conquest. The question was never settled by the Crown lawyers as to whether the new province was proprietary or royal, but the people constantly resisted the invasions of royal prerogative and state-churchism. The Dutch, being in overwhelming majority, clamored for a franchise equal to that in force in Pennsylvania, where Penn had bor¬ rowed much directly from the Dutch Republic. In the first session of the Assembly in 1683, the people of New York, through their delegates,

formed the Charter of Liberties, in which first of all, in an American document, the words ˆffhe people,ˆˆ as holders of authority, was used. James as proprietor signed this enactment in 1684, but on becoming king he annulled the charter. The sequel was seen in Andros, and in Leisler, whose so-called usurpation was the holding of New York for Dutch ideas; that is, freedom of religion, the destruction of the flour

monopoly and the restoration of rights to which the Dutch Republicans had been accustomed. The Reformed churches secured charters from King William III, and aided by other ®dissenters,ˆˆ kept up the fight for freedom of conscience and the press, until the constitution of New York, in 1778, was formed. This led all others in eliminating the question of personal opinion on ecclesiastical subjects from the fundamental law — an example later followed by all the States. In the Revolution the chief battleground was in the middle region where Dutch were numerous, and no people, as a body, were more loyal to the Continental Con¬ gress or suffered more, the leading families throwing their weight of influence and example with the patriots, while the ministers and churches were especially marked for British vengeance. The Dutch guns at Saint Eustatius, where half of the war supplies were obtained, boomed out the first foreign salute to the American flag. New York, besides filling promptly her quotas of money and supplies, sent 43,645 men to the army, a number, in pro¬ portion to population, excelled by none of the other colonies. The Lansing family, as a specimen, furnished 73 soldiers. To Philip Schuyler belongs the real credit of Burgoyne's defeat and surrender. The constitutional fathers showed close familiarity with Dutch precedents and profited by them. In the cen¬ tury following, the names of Van Buren, Roosevelt, DeForest, Vanderbilt, Pennypacker and of hundreds of other eminent individuals and families prove the virility of the stock. After 1840 Dutch emigration, of a quality perhaps ex¬ celled by none, recommenced and in a few years 100,000 Netherlanders settled in the West, chiefly in Michigan, Wisconsin and Iowa. They cleared the forests, tilled the soil, initiated new enterprises and built schools and colleges. Dur¬ ing the four eras, under which the inhabitants of the middle region have dwelt under as many national flags or civic emblems, each one of the latter has been a symbol of union. The totems of the Iroquois stood for a forest republic, federated first of five, then of six nations. Following these was the seven-striped flag of the Dutch Republic — the historic basis of our own national ensign, in which each stripe rep¬ resents one of the original covenanting States. The oft-changed flag of crosses, from 1664 to 1775, was significant of the four nations of the British Isles.

Finally the world saw the 13-striped flag of 1775-77, and then ®01d Glory, of which the first actual use, known to docu¬ ments and contemporaneous written testimony, was at Fort Schuyler (Rome, N. Y.), 3 Aug. 1777. No wonder then that the middle region, first settled by the Netherlanders, has always been for union ! With the passing of time and fashions the descendants of the Dutch have changed their language and some old customs, but not the principles learned under the republic of their fathers, which gradually became the law of the new land. The Empire region has ever avoided the centrifugal tendencies so marked in the extremities — in New England until the Hartford Convention, and in the South when cotton was hailed as king. In this region, once called New Netherland, most of the ideas, institutions, economic advantages, great inven¬ tions, notable books and those contributions to

civilization, which are recognized as distinctively American, originated or were developed. The legend of immixed English culture in the making of our Republic which has so distorted Ameri¬ can historiography is not held by scholars familiar with the Dutch language and history and with the testimony of American witnesses. On the contrary it may be said that in matters linguistic, literary and human, the American people are as much the teacher of the British nation as they are the pupil of the Netherlands.

The Dutch in the United States. — The first book in English on America was a translation from the Dutch in 1520, and published in Lon¬ don by Laurent Andrew, a Dutchman. Besides printing, England was for nearly two centuries indebted to the Netherlands (100,000) refugees in 1567-for many of the economic features of modern civilization, as records, proverbs, obvious facts show. The animating motive of Henry Hudson, in a Dutch ship, was to obtain the reward of 25,000 gilders offered by the States-General for the finding of a new route to China. New York was cosmopolitan from the beginning — a true type of the American commonwealth — which is made up of all na¬ tions, yet with high ideals, that were nourished as well on the Continent, as on the islands of Europe. Its sea front was first discovered by an Italian on a French ship, and later by an Eng¬ lishman on a Dutch vessel. There is no such region as New Netherlands, nor ever was, but when the land between the Delaware and Con¬ necticut rivers had been explored and ®figuratively® mapped by Captain Ney, it was called New Netherland, that is, a new province, not of the Belgic but of the seven northern prov¬ inces of the Netherland, or the Dutch Republic, whose truce with Spain made in 1609 prohibited military occupation or settlement until after 1621. Ignoring fishermen, fur traders and temporary squatters who came for a season, the first home-makers in the region of the Middle States were refugees. Netherlanders from the southern or Belgic part of the old 17 provinces, who spoke French and were of the Gaulish race, or Walloons, g and w being interchange¬ able in the languages. They came in 1624 on a ship of the Dutch West India Company, named after the new province New Nether¬ land. After these people followed the Dutch in large numbers, every one of the seven prov¬ inces being represented, who settled within the limits of what are now the four Middle States, New York, New Jersey, Pennsylvania and Dela¬ ware, though a few found homes in western parts of Massachusetts and

Connecticut. The total number of emigrants from ®Patria,® as they called the Republic, from 1624 to 1664, was not over 15,000, with a probable increase by natural generation, which balanced the loss of the 5,000 or so of those who, not willing to live under the English rulers of the Stuart dynasty, returned to the ^^state without a throne2^ One great advantage enjoyed by the Dutch in North America, during the 40 years of their corporate political life, was that they were all under one social and governmental system, typical of the future American national commonwealth, with a single language and (the overwhelming ma¬ jority) of one religion. Whatever limitations these people were under, or whatever their ad¬ mirers or detractors allege, they brought to the

new continent the traits of character, habits, customs and institutions, to which they had been used for centuries, or which were nascent in a time of reformation and progress, during which the Republic led the world. Certainly no emigrant ship to America excelled in cleanliness of the ships, or the character of their human cargo, or in what they left in vitality behind them or imported on this continent. The Half Moon of 1609 and the New Netherland of 1624 had no superiors in personnel or prin¬ ciples represented, for the Dutch Republic was in the van of ideas now generally accepted by the modern civilized world. Some of these familiar facts were, toleration of religion, free¬ dom of printing, public schools (established since the 12th century by the Church and later sustained by taxation), the principle of treating aborigines as men — the purchase of land from the Indians being obligatory and set down in the charter — the rule of the road — turning to the right — the standard gauge for roads, marriages recorded by the magistrate as well as by the church, universal registration of deeds and mortgages, the equal division of property among children of the same family, and many other things not then known, or at least not in operation in England. That the Pilgrims gained much enlightenment and learned to do many things ^^ccording to the laudable custom of Holland® (as Bradford, before Longfellow, tells us) is patent to all critical students of historical perspective, i.e., of what existed, or did not exist, in the two countries of England or Hol¬ land before 1664. In the discussion as to how far the development of the American common¬ wealth has been influenced by the Dutch Re¬ public, the important point for the truth-seeker is to be familiar with what was known in the Netherlands and contemporaneously unknown in England, and vice-versa, during the days of exile of the Pilgrims, from 1609 to 1621, and during the time of the Tudors and Stuarts, also, when many if not most of the Puritan

leaders of New England found refuge within the Republic. It was in the Dutch armies, that every one of the military leaders in the Ameri¬ can colonies was trained. England, and her three insular peoples, Welsh, Scotch and Irish, had thousands of volunteers or regulars in the republican armies during the 80 years from 1568 to 1648, of the Dutch war for freedom. A large number of these veterans afterward came to America. The colonial fathers, revolu¬ tionary leaders and constitution makers of the American commonwealth, were far more gener¬ ous in acknowledging their debt to the Dutch Republic, than the historiographers of later times, under whom the legend of unmixed English culture grooved out the channels of American public notions and opinions. Washington Irv¬ ing's caricature of the < History of New Nether¬ lands — although he had never, before its writ¬ ing, seen but a small fragment of one or two Dutch southern provinces — has actually been taken for serious history. Its pictures have certainly colored the views of American writers to an extent almost equalling that of a German savant, who annotated, with comments in Latin, one of Irving's broad jokes, taken by the Teu¬ ton in all seriousness. John Adams declared that ˆffhe originals of the two republics are so much alike, that the history of one seems but

a transcript from that of the other.® When the first envoy of the sister republic, that sheltered Pilgrims and Puritans, came before our Congress, Benjamin Franklin, in his letter of commendation, wrote, ®in love of liberty and bravery in defence of it, Holland has been our great example.® Jefferson and Madison re¬ peatedly pointed to the Netherlands as a good example for American imitation.

Yet no scholar or even sensible man could imagine, in the 16th and I7th century, the stage of progress attained in the 20th century, while it is freely granted that in other nationalities there were elements of progress and features worthy of being borrowed. The main point to settle by comparative research is what actually existed in the formative days, on either side of the North Sea, when British exiles from home and intellectually sensitive, as the Pilgrims and Puritans were, were being prepared for their adventures and experiments beyond the Atlantic.

As a matter of fact, the English language overcame in the American colonies not only Gaelic, Erse, Welsh and dialectic Anglicisms and Briticisms (later supposed by the insulars to be ˆAmericanisms®), but also Dutch, French, German, Swedish. Hence the actual knowledge of what the Dutch contributed, as visible leaven or obvious reality to American life, sunk into oblivion. No historian or widely popular first-class writer of American history, except Brodhead, and possibly John Fiske, is known to have been a critical scholar in Dutch history or the language, or to be topographically or socially familiar with the Netherlands in America. It is certain that the treatment of neither Motley nor Fiske on the special points herein mentioned satisfies Dutch critical scholars. Nevertheless, in the revival of pride in Dutch ancestry and of the commercial recip¬ rocation of advantage, through the Holland Societies and Netherlands Chambers of Com¬ merce, and the relatively greater increase of population and prosperity of the Middle as compared with the Eastern States, there have come, since 1876, when our national origins were more inquired into, a new trend of opinion and a greater willingness to acknowledge our ancestral and ethnic debts. With the coming, since 1846; of over 100,000 Dutch

immigrants of high character and abilities to the United States, chiefly in the Middle West, and the establish¬ ment of the Holland-America line of steamers, stimulating visits to the old home and travel therein, with the endowment of professorships of the Dutch language and literature — ■ so long dis¬ gracefully absent from our universities — there has developed a more pronounced pride in Dutch ancestry. The history of human nature and the world shows that when men receive new light or knowledge on themes long neglected, they are apt to run to extremes of thought and expres¬ sion. The chronic trouble, in this particular line of truth-seeking, whether with the flam¬ boyant after-dinner orators or those who hold stalwartly to the legend of unmixed English' culture in the making of America, is a lack of accurate or abundant knowledge of the Dutch language and the real history of the Dutch people. The last sources for these are to be found in the average English histories, over which Dutch scholars have their fun. Besides,

a judicial mind is needed, above all things, to keep in view the fundamental fact of modern Dutch history — that ˆffhe state without a throne® (1579-1813) was created by the Church, and that independence and national evolution were the work of a people stirred to revolution and driven to creative energy by religion, even more than by economic or political pressure. Motley declared that in all Dutch history 'ffhe real hero is the people,® but neither he, in his brilliant narratives, nor the ordinary writer in English took right thought about the average man in mass, the actual people. Throughout the whole Netherlandish story, whether of the demo¬ cratic Belgic communes or the northern republic, local freedom was large, prolonged and per¬ sistent even till to-day. In every political organ¬ ism, it seems vital to real progress that there should be rivalry between two elements and an opposition of parties. Obvious' in a republic, this is visible to a degree even under more or less of apparently real autocratic form of gov¬ ernment. In the Dutch Republic, the city magis¬ trates and the office-holding class, generally, were on one side — the obvious one and the element almost exclusively represented in the documents and books, from which most closet historians take their ideas of reality. The other and numerically much larger class and, in the long run, most potei t, even after institutions had changed or passed away, were the people. Wil¬ liam the Silent knew this, for he appealed first to kings, then to nobles, and both failed him. He appealed then to the people and they responded and he won. In both the Old and the New ' Netherland, the people were in the Church and perdured through all changes. It is beyond all

controversy that it was the Dutch people, and not Maurice as against Barneveldt, that secured the national Synod of 1618, vindicating nation¬ ality, which in the near generation flowered in art and literature under the triumphant republic. When and for long afterward New Netherland became New York, things were slightly altered, but at the top only. The Netherlanders, who came to America from 1624 to 1664, were those of the Dutch heroic age, many of them veterans of the armies of freedom. Certainly they were the very antipodes of the sort caricatured by Irving, who, from selected specimens in peace¬ ful times and in back country districts over a cen¬ tury afterward, formed his lay figures and men of straw. As a matter of fact, after the English conquest, the people remained. Their rights being guaranteed by treaty, they elected their own church officers, kept out the Anglican state church officials from their pulpits and pale, and resisted every effort of the king's favorites, their royal governors, to establish a form of religion more or less influenced by political rulers. For 114 years, from 1664 to 1778, when full freedom of conscience for all was guaran¬ teed in the state constitution — which led all others in this respect — they kept up the good fight. It was on the soil of New York that the battle of religious freedom which resulted in victory for the nation was fought out and won.

It is only by knowing the spirit of the people and the interior history of the Reformed Church, in either one or both of the Nether¬ lands, that a clear perspective can be gained. It was in the Middle States, where the Dutch leaven and elements were so strong, that the

centrifugal tendencies of both the Eastern and the Southern States, as shown in secession or threats of it, was with the help of the West ultimately overcome and the ^more perfect union® of which the Dutch Republic, which had gone through all the experiences of National Supremacy vs. State Sovereignty, of secession and coercion, and of the ultimate triumph of national over all lesser elements, was a proto¬ type and. was forever established, even the king¬ dom of 1813 being a disguised republic,- fulfils the hopes of the old federation.

Bibliography. — ˆConsult Brodhead, ˆHis¬ tory of the State of New Yorkˆ (1859) ; Fiske, ˆThe Dutch and Quaker Colonies in Americaˆ ; Campbell, ˆThe Puritan in England, Holland and Americaˆ (1899) ; Griffis, ˆThe Influence of the Netherlands in the Making of the English Commonwealth and the American Republicˆ (1891); <Brave Little Holland> (1894); 'The American in Hollandˆ (1899), and the ˆStory of New Netherlands (1909) ; de Vries, 'Hol¬ land's Influence on English Language and LiteratureS (1916) ; The Year Books of the Holland Society of New York, 1877-1914.

William Elliot Griffis, Author of ˆBrave Little Holland and What She Taught Us; ˆThe American in Hol¬ land'ˆ ; ˆThe Story of New Netherlands

DUTCH CHURCH, the church to which the majority of the people of Holland adhere. In the 16th century the Dutch wavered for a time between the Lutheran Church, whose leader was the great reformer, and the Re¬ formed Church, whose leaders were Calvin and Zwingli. In 1571 they publicly professed their allegiance to the latter by embodying its doc¬ trines in the Belgic Confession of Faith, pub¬ lished in that year. As long as they were under the sway of the Spaniards they, however, ab¬ stained from the use of the word Reformed, which had been introduced by the French, and styled themselves "Associates of the Augsburg Confession,® the Spaniards considering Luther¬ ans more easy to govern than Calvinists. One of the most notable events in the history of the Dutch Church, after the yoke of Spain was broken, was the Synod of Dort, in 1618. James Arminius, professor of theology at Leyden, having rejected the Calvinistic tenets and adopted those which were destined to be called after himself, Arminian, a synod was convened at Dort to examine and, if need be, condemn his views. This was done, but with little effect, the views of Arminius prevailing to a greater extent after than they had done before their condemnation. The government of the present Dutch Church is Presbyterian. See Reformed Church in America; Luther; Netherlands; Reformation ; Zwingli.

DUTCH CLOVER, a common name for the white clover (Trifolium repens), a valuable pasture plant, very common throughout the United States, naturalized from Europe. It is also a native of Siberia and is found in all temperate regions. It has a creeping stem, the leaflets are broad, with a horseshoe mark in the centre, and the white or pinkish-white flowers form a roundish head. The plant is so well known that it has a variety of familiar names, the best-known English names being sheep's-gowan, honey-stalks, lamb-sucklings and occasionally shamrock. See Clover.

DUTCH CONCERT, the term applied to a social entertainment in which every man sings his own song at the same time that his neighbor is also singing his. Another form is that in which each person present sings in turn one verse of any song he pleases, some well-known chorus being used as a burden after each verse.

DUTCH COURAGE, false or fictitious courage, usually applied to the bravado excited by means of partial intoxication. The phrase probably originated in the I7th century, when England's wars with the Dutch, and especially the naval reverses England suffered at their hands in the reign of Charles H, rendered in England the name "Dutch® an offensive epithet.

DUTCH EAST INDIA COMPANY. See

East India Companies.

DUTCH EAST INDIES, the islands in the Malay Archipelago owned by the Dutch ; situ¬ ated between 6° N. and 11° S. lat., and between 95° and 141° E. long. The names, area and pop¬ ulation of the divisions are as follows :

Divisions

Area: English sq. m.

Population, 31 Dec.

1912

Java and Madura .

50,554

36,015,435

Sumatra, West Coast .

31,649

1,219,515

Tapanocli .

16,167

708,585

Sumatra, East Coast. .

35,312

769,265

Island of

Benkulen .

9,399

214,272

Sutnatra

Lampongs .

11,284

159,219

Palembang .

53,497

724,234

Djambi .

19,038

208,236

At jeh .

20,471

789,664

Riau-Lingga Archipelago .

16,301

184,460

Banca. .

4,446

113,653

Billiton

1,863

58,480

Borneo, West Coast .

55,825

467,158

Borneo,

tricts

South and East Dis-

156,912

905,301

Island of

’ Celebes .

49,390

1,977,455

Celebes \ Menado .

22,080

700,236

Molucca Islands .

43 , 864

561,062

Timor Archipelago .

17,698

950,067

Bali and Lombok…

4,065

1,207,310

New Guinea to 141° E. long… .

151,789

200,000

Total .

771,604

48,123,707

The areas given are accurate ; but, except for Java and Madura, the population is estimated. The figures, however, are approximately cor¬ rect, as the official records give the census every five years. The population of some unexplored sections is not included. The last official re¬ turns give the total population, approximately 48,000,000, or about seven times as large as that of Netherlands. The number of Europeans in Dutch East Indies in 1912 was 80,910; of Chinese, 563,000; of Arabs, 29,000; of people from parts of Asia other than China and Arabia, 23,000, and about 37,200,000 natives. The chief occupation of the people is agriculture. The greater part of the land of the island of Java is government property, but in the western part there are a number of private estates. Formerly the government or the private owners of estates were entitled by law to one day's gratuitous work each week from each laborer on the estate, or, instead, to the payment of one guilder per head annually. In 1882 the greater part of these enforced services was abolished, and the remainder in 1914 in return for an increased poll-tax. Since the passage of the "agrarian®

law in 1870, which granted waste lands on hered¬ itary leases for 75 years, agriculture has increased in Java and the other islands. At first the government raised all the most produc¬ tive articles as sugar, coffee, rice, *etc.* ; but since 1891 the government has ceased to cultivate sugar, and it is now grown on the lands hired by the natives or on lands held on emphyteutic tenure from the government. All the usual prod¬ ucts are cultivated on private estates. The annual production of sugar has greatly in¬ creased, amounting in 1914 to 1,363,380 tons; the amount of coffee produced has decreased, amounting only to 38,718 tons in 1914; cinchona has increased rapidly, amounting in 1914 to 1,626,970 pounds; tea, tobacco and indigo have increased steadily. The yield of the tin mines of Bilton and Riouw and of the coal mines of Java, Sumatra and Borneo have increased each year. Buffaloes, oxen, cows and horses are raised extensively. In India horses are not used for agricultural purposes.

Manufactories are increasing slowly; rice-mills, sawmills, soap factories, ice and soda water manufactories are in some of the towns. The principal articles of export are sugar, coffee, tea, rice, indigo, cinchona, tobacco, coprah and tin. Nearly all of the exports, except rice, go to the Netherlands. The railroad and the mail and telegraph service is fair and is becoming better each year. The local revenue derived from land, taxes on houses and estates, from licenses, custom duties, personal imposts, some indirect taxes, and from the government monop¬ olies of salt, opium and railroads and the sale of government products. About one-third of the annual expenditure is for the army and navy, another third for the general administration and the balance for the local government administra¬ tion. The ®Java Bank^^ is controlled by the government. There are two other Dutch banks, several branches of banks in Great Britain and a number of savings banks. The legal coins and the weights and measures are the same as for Netherlands. The local weights and measures are as follows ;

The Amsterdamsch Pound = 1.09 lb. avoirdupois.

“ Pikol =1334 lbs.

“ Catty = 14 lb. “

“ Tjengkal = 4 yards.

In the administration of justice the prin¬ ciple observed is that Europeans and those as¬ similated with them are subject to laws nearly similar to those in vogue in the Netherlands, and the natives are subject to their own cus¬ toms and institutions. The administration of justice for Europeans is in charge of European judges, while that for the natives is almost wholly in charge of native chiefs.

Schools are provided for all Europeans and natives. In 1913 there were 10 public interme¬ diate schools and 5 private intermediate schools. In 1914 there were for Europeans 191 mixed public elementary schools and 22 for girls only (24 for Chinese only), with 34 private schools; the elementary schools for natives were 834 government schools and 494 private schools.

Entire liberty of worship is granted to the members of all religious denominations. Chris¬ tianity is increasing among the natives. In Java and the outposts, in 1914, there were 600,- 000 Christians.

In 1602 the Dutch created their East India Company. This company conquered successively the Dutch East Indies and ruled them during nearly two centuries. After the dissolution of the company in 1798 the Dutch possessions were governed by the mother-country. The superior administration and executive authority of Dutch India rests in the hands of a governor-general. He is assisted by a council of five members, partly of a legislative, partly of an advisory, character. The members of the council, how¬ ever, have no share in the executive. The gov¬ ernor-general and members of the council are nominated by the queen. The governor-general represents not only the executive power of gov¬ ernment, but he has a right of passing laws and regulations for the administration of the colony, so far as this power is not reserved to the legislature of the mother-country. How¬ ever, he is bound to adhere to the constitutional principles on which the Dutch Indies are gov¬ erned, and which are laid down in the ˆRegula¬ tions for the Government of Netherlands India,ˆ passed by the king and States-General of the mother-country in 1854, and altered many times since. For administration purposes the various possessions are divided into residences, divisions, regencies, districts and dessas (villages), each governed by a resident governor of controleur, *etc.*

For defense there is a colonial army en¬ tirely separate from the home army. It con¬ sists of about one-quarter Europeans to three-quarters natives. Its strength in 1915 was 1,285 officers and 37,041 men, of whom 8,557 were Europeans. There is also a small colonial re¬ serve of both Europeans and natives. There is a navy, maintained by the mother country, consisting of 27 vessels, with a complement of 237 officers and 2,059 European and 1,329 native non-commissioned officers and sailors. There is besides the colonial navy consisting of 22 small ships, with 167 Europeans and 766 natives, employed for civil service duties. The expendi¬ ture for defense in 1915 amounted to $27,367,500.

DUTCH AND FLEMISH FURNITURE.

Under the rule of the dukes of Burgundy Flanders was brought to the zenith of perfec¬ tion in some branches of the industrial arts, especially tapestry weaving. But not until the 15th century do we find any pieces of movable furniture conforming to our idea of that word. Great coffers (hitches or bahiits) acted as chairs, beds and closets for holding the tapestries, clothing, bedding, *etc.* They showed rough carving in Gothic motifs, but more often were covered with floriated iron bracing and widespreading branched lock escutcheons. The churches and monasteries alone had artistically designed pieces consisting of pulpits, reading desks, choir-stalls, *etc.* We have a few extant closet doors, the recesses of which closets were built into the wall ; these doors were panelless boards held together with strap-hinges that straggled across the entire surface in Gothic scroll work and held them together. The tables were boards set on trestles. But the rise of the bourgeoisie with their powerful communes and the corporations and guilds brought not only peaceful conditions but a height of luxury and wealth that made Flanders the envy of her greater neighboring kingdoms. And, late in the I5th century, to the luxurious wealth of cush-436

ions, carpets, tapestries and stamped and gilded leather work are added pieces of furniture that afford both body comfort and artistic effect to a certain degree. And at last we arc able to discern a difference between the furniture of the church (hieratic) and that of the palace (profane) or dwelling of the wealthy. Carved and paneled pieces appear in the ladies' cham¬ ber, painted in red heightened with white ros¬ ettes; there was no bedroom, but the chamber had a bed, bench and armchair as well as a sideboard (dressoir). Still the bed was often a long chest on short legs, covered with a mat¬ tress and pillow and protected at the sides with curtains to keep off the draughts and above by a canopy suspended from the ceiling. In the lining of the walls were often closets, the win¬ dow frame afforded a seat, and there were set¬ tles and benches. Sliding doors, later, disclosed shelves in the wall, on which were books, glass, plate ware, clothes and food; thus they served as cabinets, bookcases, cupboards, wardrobes and larders. They were primitive artnoires. But the chair was still a chest with supports and a back added, and the sideboard (dressoir or credence) was also a chest but supported on legs and topped with a dais or canopy. The carving of the panels ran to ®linen fold^^ orna¬ ment, the rest to Gothic ®tracery.^^ But pan¬ eling was only done for churches till after the middle of the 15th century. The chimneypiece became quite ornamental (a number are extant) and had overmantles with arabesque carving on the supports and elaborate many-membered moldings in the overhanging cornice high above. Decorative Dutch tiles appear sometimes on the hearth and sides. Some of the mantles show painted decoration, generally armorial bearings. Brackets and consoles appear now, with carving, though immovable. Meals were taken in the great main hall, which was fur¬ nished with a dressoir (buffet), trestle table, forms for seats (no chairs except for the lord and ladies and the guests. Great buffets (dressoirs) are recorded of the Burgundian period. Thus we read that when Philip the Good married Isabella of Portugal ^ffhere was a dressoir 20 feet long on a platform, and it had five stages (gradins), the three upper ones loaded with vessels of fine gold, and the two below had great vessels of silver-gilt.® These dressoirs were beautifully carved in Gothic traceried doors and panels ; some had numerous doors and also compartments in the lower space. A three-legged stool appears about this time, having the rear leg extended and spread out and deflected back at an angle of about 40 degrees so as to form a back. The rear of the seat diminishes almost to a point.

Contem¬ porary pictures show cavaliers sitting straddle¬ legged and facing the back of these while using the back to rest the arms and hands upon ; there were also a few four-legged chairs — all had very heavy lathe-turned legs. A very heavy boxed seat was the hokker, which was provided with arms and had the sides and back boarded in to a considerable height and roofed with a pediment. Other pieces were the bedstool to mount to the high bedding; reading desk, wash-stand, framed mirror and fire-screen. The Flemish woodcarvers were becoming so skilled that their services were already called for in England, France, Spain, Italy and even Ger¬

many. Among the noted Flemish masters of the 16th century working in Antwerp we find the names of Hans and Adrian Collaert, Hans Liefrinck and Cornelis Matsys.

Renaissance. — By 1530 the Netherlands had developed their Italian influence, but they re¬ tained their ®linen fold® motif in carving into the I7th century. The earliest Renaissance Flemish furniture was, of course, copied from imported pieces, but the native woodworkers were soon greatly aided by the designs of Cor¬ nelis Bos, Frans Floris and Alaert Claas, Lucas van Leyden, Jean Vredeman (called de Vries), Theodore de Bry; Hugues Sambin and Pierre Coech also helped, as did the Italian designs of Serlio. The boxed seat and stiff perpendicular back gave way to open work chairs, the four legs are now clearly defined, the back loses its stiff uprightness and leans to the rear; it is a light, movable piece. But, as is always the case when styles change, we find many transi¬ tion pieces, modifications of the Gothic decora¬ tion, but not entirely representing the Classic. Another change is the partial displacement of the former universal oak by the use of walnut as a medium. In this 16th century product we later get the carved work decoration in high relief caryatids, grotesque figures, herms, acting as supports, often combined with columns draped with swags, etc., instead of the former prevailing motifs taken entirely from the vege¬ table kingdom. The closets obtain two doors, the dressoirs become a buffet, carved friezes take on scenes of native human life instead of panel work. The ®court® cupboards and buffets in this style are magnificent in their rich orna¬ mentation and are the admiration of connois¬ seurs. Large armoires are often on eight legs. The table, which had evolved the trestles at each end into heavy, carved supports in the form of eagles, chimeras, lions, mermaids and satyrs, now took on revolutionary forms. And we get legged side-tables, folding tables, telescope (ˆMrawing®) tables, even dumbwaiters. Besides carved work inlays were becoming a decorative

method, and before the I7th century the Flem¬ ish cabinetmakers were equalling if not excelling the Italian, German and other nations in this art. Noted Flemish Renaissance talent is found in the genius of Lucas Faydherbe, the Verbrug¬ gens and Albert Bruhl. The wonderful chim¬ neypiece at Bruges from the designs of Lancelot Blondel and Guyot de Beauregrant, with its armorial ˆ bearings, armorini and floral detail, was carried out by the carvers, Herman (jlos-encamp, Andre Rash and Roger de Smet. With the rapid advance of the artisan in inlay work by the 17th century came also the closer com¬ mercial relations of the Dutch with the Indies and the consequent importation of exotic woods. The veneered marquetry which the Flanders woodworker had e.volved from the thick inlaid Italian intarsia created a mighty influence. Flat surfaces gained an artistic treat¬ ment never before dreamed of. Large heavy wardrobes now came into being, often with columns at each side and in the centre, with rich square panels in the doors, their centres carved and framed in fine moldings. Philip and Theodore Galle belong to the second half of the Renaissance. The form and decoration are becoming more severe. The salient parts are held in restraint; columns begin to lose their

high reliefs of figures and appear fluted or grooved. Beds are so high steps are needed, and the bedstead comes out into the room, the canopy now resting on the carved or channeled posts. The posts are often of a style termed «distaffˆˆ (quenotiille) like the French; or «lanceˆˆ form. There are now regular dining tables, writing tables, card tables, chair tables, bench tables (tables d banc), round, square and oval tables, tables standing on one leg, on two and on three legs. They are made of walnut, oak, maple, cedar, cypress, marble and some even of silver. Their decoration consists of beautiful carving, mosaic work, marquetry and some are embel¬ lished with gold. The richly carved chairs often have spiral turned legs as well as the old baluster form with bulbed feet ; seats and backs are padded with stamped leather, velvet, silk or woolen fabrics, tassels border the seat coverings and large-headed nails add to the decorative appearance. Connecting rails (stretchers) are placed near the ground. It was the

age of Rubens, and he well defines in his paintings the furniture pieces in vogue. A peculiar style of ornamentation was the curved embossing exactly representing the human ear ; it was termed genre auriculaire. The chair with caned back and front is said to have had its birth in Flanders. But the grandest and most prized piece of furniture of the Netherlands was the cabinet. Numismatics was the rage and the coins and medals found repose in this unique chef-d'oeuvre ; it is the Kunstschrank of the Germans. The usual form consisted of two parts, the upper being of, smaller dimensions than the lower and being also set back some¬ what. Its construction was on architectural lines, and was surmounted by a pediment, usually the ˆbroken® style with a carved figure standing in the open space. Originally the cab¬ inet for curios was placed on a support (often of eight legs) or table ; the lower section was now closed in and had two panels as had the upper half. Lovely classical figures were carved on these panels; the subjects were frequently Nep¬ tune (for corals were one of the curio col¬ lectors' hobbies), also the Muses, Apollo, *etc.* The elaborate inlay decoration was truly lavish and of several varieties. Some had the Italian pietra dura or mosaic of encrusted stones, also amber, enamel work, even Venetian glass. The marquetry work is heightened with small pieces of ivory and mother-of-pearl. Ebony was used to enrich the finest pieces of this period, in fact some pieces were constructed entirely of ebony. Beautiful work was done by Hugues Goltz (Goltius). So renowned were the productions of the Flemish artisans that the French court sent cabinetmakers to learn this ebony and mar¬ quetry technique. On their return they were called ebenistes, and the term has lasted to this day for the French cabinetmaker. Artus Quellin did fine decoration, and some of his pieces are still extant ; Crispin van den Passe designed much furniture. But the day of decadence brought with it poorer work in the marquetry, lacking finish and delicacy of coloring; the veneers ranged from crude to gaudy. Early in the 19th century the School of Woodcarving still kept up the art to an excellence not equalled in other European centres, and Antwerp, Brus¬ sels, Liege and other Flemish centres maintained their precedence in woodcarving.

Bibliography — Claesen, J., ˆL'Art ancien au Pays de Liege ; nouveau Recueille de Meubles, Portes, Cheminees, etc., en Boisˆ (Liege 18 —) ; Singleton, E., ˆ Dutch and Flem¬ ish Furnitureˆ (London 1907) ; Sluyterman, K., ˆAlte Innenraume in Hollandˆ (Leipzig 1908) ; Same, ˆnterieurs anciens en Belgiqueˆ (La Haye 1913) ; Terme, G., ˆL'Art ancien au Pays de Liegeˆ (Liege 1907) ; Vogelsang, W., ˆHol-landische Mobel in Niederlandisches Museum in Amsterdamˆ (Amsterdam and

Leipzig 1910L

Clement W. Coumbe.

DUTCH GOLD. See Copper

DUTCH GUIANA. See Guiana.

DUTCH HARBOR, Alaska, a port in the northeastern part of the island of Unalaska, situated on Bering Sea. It is a port of call for steamers passing through the Unimak Pass. See Alaska.

DUTCH LANGUAGE AND LITERA¬ TURE. See Netherlands.

DUTCH LIQUID, an oily liquid, insoluble in water, known to the chemist as ethylene dichloride (C2HtCl2). It may be obtained by the action of chlorine gas upon ethylene, and also as a by-product in the manufacture of chloral. It is most commonly prepared by passing ethy¬ lene into a warm mixture composed of 2 parts manganese dioxide, 3 parts sodium chloride, 4 parts water and 5 parts sulphuric acid. When the mass has become yellow in color it is dis¬ tilled. It has anaesthetic properties, and is re¬ puted to be quite safe, but it is irritating to the throat and is therefore not used. The name relates .to its early preparation by the Dutch chemists.

DUTCH METAL. See Copper.

DUTCH OVEN, a spider, skillet or camp-oven used by those who cook by hot coals on the hearth, a mode yet common in the Western States of the Union, and unsurpassed in its results with skilful housewives. The pot stands in hot embers, and more of the same are piled on the dish-shaped lid. The phrase is also applied to a cooking-chamber suspended in front of a fire so as to cook by radiation.

DUTCH PINK, a yellow lake, prepared from bark of the quercitron (the dyer’s oak), used in distemper, for staining paper-hangings and for other ordinary purposes.

DUTCH REFORMED CHURCH. See

Reformed Church in America.

DUTCH RUSH, a common name for the scouring rush or shave grass (Equisetuin hyemale), a plant of the horsetail family, used for scrubbing floors in country places, and im¬ ported from Holland as an article of commerce, to be used in polishing hard woods and ala¬

baster. The stems are filled with silica deposited in a regular manner, forming an integral part of the plant. It is native throughout Europe Asia and nearly the whole of North America, where it is found in wet places and along the banks of streams. See Equisetum.

DUTCH SCHOOL. See Painting.

DUTCH SCHOOL OF FORTIFICA¬ TIONS. See Fortifications.

DUTCH WEST INDIA COMPANY,

The, an association of merchants of Amsterdam,

Zealand, the Meuse, North Holland and Fries¬ land, incorporated 1621, with a capital of 6,000,- 000 tiorins (about $2,500,000). Unlike the East India Company, which was primarily a trading association and in its conquests and colonies had no other purpose than to protect its commerce, the West India Company never had an extensive trade, but strove to injure the Spaniards, to conquer their establishments, to capture their ships and to break the intercourse between Spain and its American gold and silver mines. The design was conceived in the interest of the Bel¬ gians, when Spanish persecutions had driven more than 100,000 Protestant families from Bel¬ gium to the north. It was thought that the Spaniards would be compelled to evacuate Bel¬ gium when their resources had been thus de¬ stroyed. Large fleets were sent out, the com¬ pany possessing sometimes as many as 70 armed vessels. The prizes captured were of such value that during several years shareholders received 25 to 75 per cent interest. Twelve millions were added to the original capital. Spain and Portu¬ gal being united at this time (the union lasting from 1580 to 1640), the company not only cap¬ tured the Spanish silver fleet in 1628, securing a booty of more than 14,000,000 florins, but took Bahia (1624) and Pernambuco (1630) in the Portuguese colony of Brazil. The history of Dutch Brazil had a brilliant period (1636ˆ2) under the administration of Count John Maurice of Nassau. Curagao was taken about this time and the company's North American colony of New Netherlands grew more and

more pros¬ perous. But the fatal defect of the company's plan now became apparent. Not being supported by extensive trade, the military and naval tri¬ umphs cost much more money than they pro¬ duced. The financial condition of the company showed, after 1630, a terribly constant down¬ ward tendency; the government of Holland, moreover, was very slack in fulfilling its pledges of assistance. The beginning of the end was reached in 1641 when Portugal, having shaken off the Spanish yoke, devised means to regain Brazil. In 1654 the Dutch troops withdrew from that part of vSouth America. The death¬ blow was struck when New Netherlands, the last valuable possession of the practically bank¬ rupt company, was conquered by the English (1664). Consult Asher's ˆBibliography of New Netherlands and the Dutch West India Com¬ panyˆ (Amsterdam 1856-67).

DUTCH WEST INDIES, The. The

possessions of Holland in the West Indies are Surinam or Dutch Guiana and the colony of Curagao. Surinam is situated on the north coast of South America between 2 and 6° north latitude and 53° 50" and 58° 20" west longitude, and is bounded on the north by the Atlantic Ocean, on the east by the river Merowijne (which separates it from French Guiana), on the west by the river Coran tyn (which sepa¬ rates it from British Guiana) and on the south by inaccessible forests and savannas to the Turnac-Humac Mountains. In 1667 Surinam was assured to the Netherlands in the exchange for the colony of New Netherlands in North America. Since then it has been twice in the power of England (1799-1802 and 1804-16). Its area is 46,060 square miles and the population (1915) 85,536, exclusive of negroes living in the forests. The superior administration is in the

hands of a governor, assisted by a council of four members, all nominated by the queen. The Colonial States form the representative body of the colony; the members are chosen for six years by electors in proportion of one in 200 electors. There is entire religious liberty. At the end of 1915 there were Reformed and Lutheran, 10,157; Moravian Brethren, 26,136; Roman Catholic, 18,761; Jews, 882; Moham¬ medans, 11,559; Hindus, 17,633, *etc.* There were in 1915, 28 public schools with 3,679 pupils, and 40 private schools with 6,702 pupils. There is a government normal school. In 1915 sugar was produced to the amount of 14,747,100 kilo¬ grams, cacao 1,464,200 kilograms, coffee 609,700 kilograms, rice 5,280,200 kilograms, maize 1,867,- 900 kilograms. Rum and molasses were pro¬ duced to the extent of 1,693,500 and 112,000 litres, respectively.

In 1915 the export of gold, mostly alluvial, was 1,157,031 grammes. In this same year there entered 246 vessels of 209,418 tons and cleared 244 ships of 209,911 tons. Surinam is divided into 13 districts. Communication between these several districts is carried on by vessels and small steamers. Capital, Paramaribo (35,530).

The colony of Curagao consists of the fol¬ lowing islands: Curagao (area 210 square miles, pop. 33,675) ; Bonaire (area 95 square miles, pop. 6,592) ; Aruba (area 69 square miles, pop. 9,204) ; Saint Martin (southern part only, area 17 square miles, pop. 3,202) ; Saint Eustache (area 7 square miles, pop. 1,431) ; Saba (area 5 square miles, pop. 2,488), a total area of 403 square miles with a population on 31 Dec. 1915 of 56,754. The capital of Curagao is Willemstadt (pop. 11,000), which has one of the best harbors in the West Indies. There is a governor, assisted by a council of four members, nominated by the queen. The different islands, except Curacao, are under officials called ®gezaghebbers,^^ nomi¬ nated by the queen. The chief products are rnaize, beans, pulse, cattle, salt, phosphate of lime. The most important source of income is the shipping industry, which gives employment to_ numerous laborers in the work of trans¬ shipping goods and as sailors on the vessels that touch regularly at Willemstadt. No statistics are available as to the amount of money thus placed in circulation. The making of straw hats continues to be the industry second in import¬ ance. The exports of straw hats to the United States in 1916 was valued at $129,034. An oil refinery was established in 1916 for the refining of crude petroleum from the Venezuelan oil fields. In 1916 the exports were valued at $967,- 336 and the imports at $2,461,528. The revenue is derived from import, export and excise duties, taxes on land and some indirect taxes.

In 1916 the Dutch government sent a special¬ ist to Curagao to investigate the sanitary condi¬ tions on the island. As a result a department of public health was established under the direction of a Dutch pathologist, and this has rendered important serviceˆ in cleaning streets, wiping out mosquitoes and in the prevention of venereal disease by building a hospital for their treat¬ ment. Measures have been taken for the open¬ ing of a bacteriological laboratory and for the passage of quarantine laws suited to the climate. A modern sanatorium was completed in 1917.

DUTCHMAN, The Flying, a phantom ship which sailors believed could often be seen

about the Cape of Good Hope, The story is that a Dutch captain, Vanderdecken by name, being tossed about by adverse winds while try¬ ing to double the Cape, swore with many oaths that he would accomplish his purpose if he beat to and fro till the judgment day, and as a punishment his ship never touched land. An¬ other version of the legend is that the Flying Dutchman is condemned to wander the seas forever because a murder was committed on board his ship,

DUTCHMAN’S PIPE, a common name for Aristolochia macrophylla, a plant of the birth-wort family (Aristolochiacece) . It has a twining stem with very slender branches, the leaves broad and thin. The calyx tube is bent in such a manner that the flower suggests a pipe with a long stem. It grows in woods from southern Pennsylvania to Minnesota, Kansas and Georgia. See Aristolochia,

DUTT, doot, Michael Madhusudan, Indian poet: b, 25 Jan. 1824 at Sagandari, in the dis¬ trict of Jessore, Bengal, India; d. 29 June 1873. His father, Rajnarayan Dutt, was a lawyer in Calcutta. From his earliest boyhood Mad¬ husudan showed signs of future greatness. He received his education in the Hindu College of Calcutta. His teachers always spoke highly of his scholarship. Young Dutt refused to marry according to his father’s wishes and had to leave home ; he renounced the faith of his fore¬ fathers and embraced Christianity on 9 Feb, 1843. After his conversion he studied in Bishops’ College, Calcutta, and learned Latin, Greek, French and other languages. The study of the different literatures of the world in¬ spired him to take up a literary career. He moved to Madras in 1848 and began to write verses in English. He married a French woman, but they were separated not long after. He then married the daughter of an English educator and this marriage proved a happy union. The couple returned to Calcutta in 1856. Dutt then realized that if he sought lasting distinction in poetry he should write in Bengali. So he began writing in Bengali in Calcutta andˆ his first works, the ˆKrishna Kumari,ˆ <Sarmista,ˆ etc., were published between 1858 and 1861. The books were well received by the critics. As a great lover of Dante and Milton, Dutt wanted to introduce blank verse into Bengali poetry. His first book in blank verse was ˆYilottama Kabya.ˆ He then brought out his

masterpiece, <Meghnad-Badha Kabya,ˆ which has immortal¬ ized him as one of the master poets, not only of India but of the world. The story was taken from the Ramayana and the book was published in 1861. In 1862 Dutt went to England and studied for the bar. On his return to Calcutta in 1867 he began to practise law in the Calcutta High Court, but did not win success in his profession. Financial difficulties broke his health, and in extreme poverty Dutt, the greatest poet of Bengal, died in a charitable hospital at Alipur. After the award of the Nobel Prize to Rabindranath Tagore in 1913 a leading Bengali magazine took a vote as to which was the best book of poetry in Bengali and ˆMeghnad-Badha Kabyaˆ OThe Epic of the Death of MeghnadO won the first place.

DUTT, Romesh Chunder, East Indian scholar, civil servant and politician : b. Calcutta, 13 Aug. 1848. He was educated at Presidency

College, Calcutta, and University College, Lon¬ don, at which latter institution he became lec¬ turer on Indian historv. He joined the Indian civil service in 1871, becoming a divisional com¬ missioner in 1894, the first native of India to attain that position. In 1892 he was decorated for ability as an administrator and his literary researches. Beside a series of novels in Ben¬ gali and translations of the ˆRig Veda,ˆ etc., into Bengali, he has published in English ˆCivilization in Ancient Indiaˆ ; ˆLays of Ancient Indiaˆ ; ˆMahabharata,ˆ condensed into English verse; ˆ Ramayana,ˆ condensed into English verse; ˆEngland and India, 1875-85 U ˆFamines in Indiaˆ (London 1900) ; ˆEconomic History of British Indiaˆ ; ˆLake of Palms, ˆ a translation from his early Indian novel and an interesting story of Indian domestic life (London 1902).

DUTT, Toru, Hindu poetess: b. 1856; d. 1877. She received a good European edu¬ cation and translated into English many French poems — from Beranger, Gautier, Coppee, *etc.* A collection of these was pub¬ lished as ˆA Sheaf Gleaned in French Fieldsˆ (1876). She also rendered into English some of the ˆAncient Ballads of Hindustan.ˆ She wrote a story in French, ˆMiss d'Arvers' Diary. ˆ Consult Gosse, E. W., ˆCritical Kitkatsˆ (1896).

DUTTEEAH, doot'te-a, DATTIYA or

DATIA, India, city, capital of a state of the same name, in the Bundelkhand Agency, cen¬ tral India, on the route from Agra to Saugor, 110 miles southeast of Agra. It stands on a rocky height

surrounded by a stone wall and is well built, with an unusual number of stone houses. The chief of the Datia State dwells here. West of the town rises a palace of im¬ mense size and remarkable beauty, one of the best pieces of Hindu architecture in India. It is situated within a pleasure ground of about 10 acres, enclosed by a lofty wall, with embattled towers at each of its four corners. Four miles distant there are interesting Jain temples. Pop.

17,329.

DUTTON, Clarence Edward, American soldier and geologist : b. Wallingford, Conn., 15 May 1841 ; d. 1912. He was graduated at Yale in 1860, and two years afterward became captain of the 21st Connecticut Volunteers. He received a commission as second lieutenant in the United States army in 1863, was pro¬ moted to the rank of major in 1890. In 1875 he joined Maj. J. W. Powell in the United States survey of the Rocky Mountain region; in 1879-80 was secretary of the United States land system committee, and from 1880 to 1891 was a member of the United States Geological Survey. He was elected a member of the Na¬ tional Academy of Sciences in 1884, for which he made a thorough study of the Charleston earthquake of 1886. His report interpreting the results of his study were significant and stimulated a widespread scientific interest in the earthquake phenomena. His research also led him to important discoveries concerning the nature and speed of earthquake motion, and of the means of measuring the depths of the focus. (See Isostasy). His writings embrace the subjects of metallurgy, gunnery and geology, to which last he has devoted his main literary attention. His most

important geologic works are ˆGeology of the High Plateaus of Utahˆ (1880) ; ˆTertiary History of the Grand Canon Districtˆ (1882) ; ˆHawaiian Volcanoes’ (1884) ; ˆ Mount Taylor and the Zuni Plateau’ (1886) ; ˆEarthquakes in the Light of the New Seismology’ (1904).

DUTTON, Edward Payson, American publisher: b. Keene, N. H., 4 Jan. 1831. He was educated at the Boston Latin School, was a member of Ide and Dutton, booksellers of Boston, 1852-58, bought out Ide's interest and continued as E. P. Dutton and Company. He bought the retail business of Ticknor and Field in 1864, and also that of the General Prot¬ estant Episcopal Sunday School Union and Church Book Society of New York, and in 1869 moved the business to New York. One of the firm's notable enterprises has been the ˆEveryman's Library,' an important series of inexpensive reprinted classics in all departments of literature.

DUTTON, Henry, American jurist: b. Plymouth, Conn., 12 Feb. 1796; d. New Haven, Conn., 12 April 1869. He was graduated at Yale in 1818, and became professor of law in the same university in 1847, occupying this position for eight years, and in 1854 was elected governor of Connecticut. He was judge of the Superior Court, and Court of Errors 1861-66, and prepared many digests and com¬ pilations of State statutes, which are of perma¬ nent value to his profession.

DUTTON, Samuel Train, American edu¬ cator: b. Hillsboro, N. H., 16 Oct. 1849; d. 28 March 1919; graduated, Yale in 1873 (A.M. 1900). He was in charge of schools of South Norwalk, Conn., 1873-78; principal of Eaton School, New Haven, 1878-82; superintendent schools of New Haven, Conn., 1882-90; Brook¬ line, Mass., 1890-1900; professor of education and administration and superintendent Teachers' College schools, 1900-15; professor emeritus of Teachers' College after 1915; lecturer in peda¬ gogy, Harvard, 1895, 1896, 1897 ; exchange lecturer in Sweden, Norway and Denmark, 1910; chairman of the executive commit¬ tee of First National Arbitration and Peace Congress, New York 1907; honorary secretary of the New York Peace Society; honorary secretary Japan Society; director of the Con¬ gregational Board of Home Missions ; member (1913) of the International Commission to In¬ vestigate the Balkan Wars ; member of the Council Berne Bureau of International Peace; member of the Authors and Yale clubs, New York, Sociological Association, Institute of Social Sciences, *etc.* He wrote ˆSocial Phases of Education' ; ˆSchool Management' ; edited ˆHistorical Series' ; ˆWorld at Work Readers' (1906), and was associate editor of Christian Work.

DUTY. A course of conduct is a duty if abstention from it is evil. This definition would seem to make duty logically dependent on good and evil, but it is possible to define the good as that which it is one's duty to secure, so that the logical order of the notion of duty and of that of good and evil is not clear. The ques¬ tion as to which of the two

definitions repre¬ sents the real order of priority between duty and good or evil has played a considerable part in ethical discussions. The question may be

formulated as follows: are ethical values in¬ herent in things and courses of conduct, with¬ out reference to any moral agent — in which case good and evil are prior to duty — or do they consist essentially in the obligations of some individual? Greek philosophy, always realistic in the scholastic sense, displayed its hypostatic tendency in ethics as well as in meta¬ physics, and made good and evil more or less of the nature of independent entities. Thus for Plato, the basis of morality — the Idea of the Good — is not merely a real entity but the most real of all entities. An objective good of this sort must be free from all dependence on an individual. The Greek ethics, therefore, was an ethics of duty rather than ethics of good. The ethics of the Stoics first brought into any prominence at all the notion of duty : the Stoic good, though not dependent on its relation to an agent, was a course of conduct to be pursued by an agent, so that it was at the same time a duty.

The Greek systems of ethics, as has been said, laid the greatest emphasis on the actual results intended and attained by conduct in making their evaluations. Christianity, on the other hand, made the motive of a deed the most significant factor in the determination of its worth. The good deed, according to Christianity, is that which is done in obedience to God. This obedience constitutes duty, which is thus prior to the good. The original priority of duty has exhibited a continual tendency to lapse and disappear, and moralists of the type of Paley have attempted to point out various objective goods, the attainment of which fur¬ nishes an excuse for duty. However, with the philosophy of Kant, duty came into its own again. Kant based his entire ethics on the categorical imperative. The categorical im¬ perative is the injunction ®to act only on the maxim whereby thou canst at the same time will that it should become a universal law.” This is a principle of duty, and good and evil are merely adjectives applied to conduct that conforms or does not conform to the maxim.

The problem whether duty is prior to good and evil, or vice-versa, is in many respects parallel to the dispute between realism and idealism in epistemology. Just as realism claims the existence of reals apart from their relation to a percipient, the ethics of good and evil claim the existence of goods apart from their relation to an agent. Idealism and the ethics of duty correspond in a similar manner. It is a familiar

fact that the difficulty of realism lies in the demonstration of unperceived reals, with¬ out involving the absurdity of a being that per¬ ceives them. In the same way, as it is difficult to pass moral judgments without putting oneself in the position of at least a hypothetical agent, the issue between the two types of ethics is not easy of decision. However, owing to this fact that we can scarcely pass a moral judg¬ ment without feeling ourselves as one of the actors in the situation concerned, we shall miss very little of importance by adopting for pur¬ poses of argument the view that duty is prior to the good, and we shall be able to give full consideration to any possible way in which the agent is actually involved in the fundamental questions of ethics. Duty thus gains at least a pragmatic priority.

In accordance with the evolutionistic trend of modern ethics, Herbert Spencer traced duty to fear of revenge, *etc.* There is no doubt that the experiences of one who acts from duty have a certain measure of resemblance to those of one who acts from fear. However, the two experiences, notwithstanding their qualita¬ tive similarity, occupy different places in the life of the individual. Kant expresses this difference by contrasting the universality of the claims of duty with the manyness and partiality of the inclinations, which manifestly include such aversions as fear. Whether we go as far as Kant does, and regard duty as that motive to conduct which impels us to act in accordance with laws which we consider and w'ill as universal, w-e shall undoubtedly be right if we insist that the obedience of duty leads us into, not a chaotic assemblage of dif¬ ferent deeds, but a more or less unified course of behavior.

The manifoldness of the experiences of those who act from duty is familiar to all. One man does his duty gladly, another reluctantly. On the battlefield, one may act as a soldier though in utter fear of his tasks, while his comrade is inspired by religious emotions, and still a third is enraged at the misdeeds of the enemy. In short, it is hard to find any common factor in the consciousness of duty at different times, except in the mere fact that these consciousnesses lead to a definite course of conduct. All that can be said so far of duty, then, is that it con¬ sists of a group of experiences impelling to action, and in general having fruition in acting — for even the worst scoundrel neglects a thousand opportunities to do an evil deed for every one he uses — which tend toward a unified scheme of conduct. This alone, however, is enough to show that the consciousness of duty is a harmonization and, as it were, a codifica¬ tion, of our various impelling, approving ex¬ periences into a wˆorkable form. Whether it is anything more, and whether duty itself is prior to the consciousness of it, are issues too wide to be discussed here, but it may be said that this psychological definition of duty and of the consciousness of it is alone sufficient to furnish duty with most of the properties usually re¬ garded as its associates. See Ethics, and con¬ sult the bibliography of that article.

Norbert Wiener, Editorial Staff of The Americana.

DUTY (customary taxes; in the constitu¬ tional struggles of mediaeval England, so claimed by the sovereigns as of ancient usage and allowance), a tax or impost levied on the exports and imports of a state or district. Apparently, they were at first port fees for the use of the government quays, w'arehouses, weights and measures, *etc.* ; but in very ancient times they became a general source of revenue, and used for sumptuary purposes. The con¬ stitutional prohibition of export duties leaves it applicable in the United States to imports alone. Few countries now levy a tax on ex¬ ports and such a source of revenue no longer holds a place of importance in the fiscal sys¬ tems of modern nations. The South American states levy some duties on exports, such as that on shipments of nitrate from Chile and that on exports of coffee from Brazil ; and in 1901 Great Britain imposed a tax of one shilling per

ton on all coal exported. But, generally speak¬ ing, the term customs duties means duties on imports. In countries of developed commerce these have always been the favorite means of taxation wdth governments and subjects alike, by a rare and significant harmony. The latter prefer them to direct taxes, as distributing the burden in small unperceived amounts on their daily income, in place of a few severe annual exactions. The former prefer them as making it possible not only to raise a far greater revenue with far less criticism, but actually to win popularity by increasing the burden, in most countries — a unique feature in administrative policy. Direct taxes have been the fertile parent of rebellions ; customs duties have gen¬ erally been popular in proportion to their magnitude. The latter fact is due to two other traits inherent in import taxes ; that they furnish an apparent means of transferring the tax burden largely to the foreign producers, and of giving the native producer the monopoly of the ®home market.® It is obvious that the two are more or less self-contradictory — that the foreigner can share the payment only in proportion to his share of the market, and that if imports were annihilated all taxes would be direct; but the discussion of this subject belongs to the question of protective tariffs (see Pro¬ tection; also Free Trade; Great Britain — The Free Trade Movement and The Tariff Reform Movement). Here it need only be said that it is not necessary for dutiable articles to be such as are produced within a country, for a tax to be ˆprotective® in action : they may be high-grade articles needed in manufacturing, the charge upon which forces a resort to in¬ ferior native materials, or increase the price of the better goods. This

increase is always much greater than the duty, as it includes interest on the extra capital needed to carry on busi¬ ness with the costlier articles, and a further charge for the restricted market due to height¬ ened price.

Customs duties must belong to one of two classes : those charged on given units of weight or measure, as the pound, ton, yard, gallon, etc., called specific duties ; and those charged by a percentage on the estimated value, called ad valorem duties. On many kinds of goods the two are combined in wEat are called compound duties ; and a variant of the ad valorem system is v/hat is called the minimum duty, under which all goods costing less than a certain sum are assumed to have cost that amount and are taxed upon it. In the old English disputes between king and Parliament specific duties were called ˆtonnage® (so much per ton) ; and ad valorem duties ˆpoundage® (such a per cent on the esti¬ mated value in pounds sterling), though levied so as not to be purely ad valorem.

The merits of the two systems are not unani¬ mously agreed upon ; indeed, each has its spe¬ cial demerits and disadvantages, which are grave from the standpoint of national welfare. It is fair to say, however, that most of the difficulty of the specific duty lies in the attempt to use it for protective purposes, and that of the ad valorem duty in its enormous volume; that a specific duty for revenue only loses most of its objectionable features if levied on the proper articles, and that a low ad valorem duty would

be free from most of the objections of a high one. This will be evident from a glance at each.

Specific duties are simple to calculate, easy to collect, do not require a high grade of official skill and leave few loopholes for fraud. The great drawback is that they produce immense inequality of duty from the variation in cost and quality, and that inequality in exactly the wrong direction. That is, a certain number of cents on a pound or yard of cheap material may be very high or even prohibitory, while on expensive material the same may be trivial. Specific duties have an advantage over ad valorem duties in that they can be more suitably applied to raw materials and manufactures of a simple character, where there is uniformity of quality and where few opportunities are pre¬ sented for fraudulent entries of goods. Hence they are applied to customs taxes on cattle, iron and steel products, minerals, flax, hemp, wool, lumber, grain, sugar, spirits, wines and tobacco. Whenever the tariff is revised at¬ tempts are made to extend the list of specific duties and at times even the Democrats have favored such duties as a check to undervalua¬ tion — as in 1857, when President Buchanan expressed dissatisfaction with the exclusive use of the ad valorem rates of the Walker tariff of 1846, since they permitted a large amount of fraud by undervaluation. In order to adjust specific duties to value some tariffs have in¬ corporated a scale of rates, based upon value, which practically amounts to an ad valorem rate. Section 131 of the Payne-Aldrich tariff of 1909 provided a scale of duties on certain kinds of steel products as follows :

Valued at f cents or less per lb., 7/40 of 1 cent per lb.

Valued at | to 1.3 cents per lb. 0.3 of 1 cent per lb.

Valued at 1.3 to 1.8 cents per lb. 0.5 of 1 cent per lb.

Valued at 1.8 to 2.2 cents per lb. 0.6 of 1 cent per lb.

Valued at 2.2 to 3.0 cents per lb. 0.8 of 1 cent per lb.

Valued at 3.0 to 4.0 cents per lb. 1.1 of 1 cent per lb.

Valued at 4 to 7 cents per lb. 1.2 of 1 cent per lb.

Valued at 7 to 10 cents per lb. 1.9 of 1 cent per lb.

Valued at 10 to 13 cents per lb. 2.3 of 1 cent per lb.

Valued at 13 to 16 cents per lb. 2.7 of 1 cent per lb.

Valued at 16 to 24 cents per lb. 4.6 of 1 cent per lb.

Valued at 24 to 32 cents per lb. 6 cents per lb.

Valued at 32 to 40 cents per lb. 7 cents per lb.

Valued at above 40 cents per lb. 20 per cent ad valorem.

Ad valorem duties, theoretically the fairest of all, are full of practical difficulties as a revenue producer and highly unsatisfactory as a protective system, because such duties are levied according to the value of the imported commodities, instead of the weight, bulk or other unit of measurement of the commodity. In the former line the difficulties of fixing the value, the opportunities for fraud and under¬ valuation, the temptation to officials to connive and the expensive skilled officials needed to work it, all stand in the way of its usefulness to the government. The value is usually fixed at the point of export ; but that involves minute knowledge by the official of a vast number of trades and manufactures and the fluctuations of trade conditions ; and moreover, the market may have changed materially from the time the duty is assessed to the time the importer pays it, which shifts the burden from the gov¬ ernment to the merchant. Furthermore, the plenary powers assumed by the government to throw all the burden of doubt on the importer, to seize his goods on suspicion and confiscate them on proof satisfactory to itself, but not to

him, though partially remediable by the courts, and very likely necessary to secure the govern¬ ment, place the importer in a situation by no means free from peril. And the tedious, costly and vexatious red tape of invoicing and ap¬ praising and satisfaction of legal forms are bad at best, even if necessary; and when reinforced by the zeal of officials anxious to win laurels by harassing importers, and desirous of throw¬ ing difficulties in the way of even legitimate trade, make it impossible for small capitalists to bear the risks. Thus the small merchant is driven out of the business and the trade con¬ centrates in a few great houses. Under ad valorem rates protection is not assured to home producers since when a decline of prices occurs a corresponding drop of duties takes place, and when he most needs it

the producer cannot ob¬ tain protection. The Constitution provides that ˆffio preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another^^ and hence some argue that ad valorem duties do not conform to this requirement because preferences are in¬ evitable under such duties. Protectionists claim also that frauds through undervaluation are more prevalent under ad valorem rates than under specific duties and therefore the objects of a tariff bill are defeated. The statements of importers, even though made under oath, are not regarded as final evidence of the value of goods imported, which only tends to com¬ plicate the efforts to ascertain correct values, and therefore a complex and expensive system of obtaining information of valuations is neces¬ sary under tariffs containing ad valorem rates only. The Walker tariff of 1846 contained ad valorem rates exclusively and though in some instances the duties were as high as 75 per cent and the average 25 per cent, protectionists refer \o this as a free trade tariff because specific duties were excluded. Many specific duties were restored by the Morrill tariff of 1861 and retained for many years, and while an effort was made in the House to restore ad valorem duties in the Gorman-Wilson tariff of 1894, the Democratic protectionists of the Senate pre¬ vented such action. In the Underwood tariff of 1913, however, ad valorem rates were sub¬ stituted for specific rates in numerous instances.

Compound duties is the term applied to the combination of specific and ad valorem duties imposed upon the same article when imported. The object of a compound duty may be twofold — to shut out cheap grades of goods by adding a specific duty to the ad valorem duty, thereby increasing the amount of taxation, or to afford compensation by additional protection where a duty is imposed upon the raw materials used in the manufacture of the article. The tariff of 1824 was the first to levy a compound or mixed duty (on certain kinds of glassware) and the tariff of 1828 imposed a duty of four cents per pound on wool and an additional 40 per cent ad valorem. In this way the tariff makers hoped to restrict the importation of the coarser grades of wool and, by handicapping the manufacturer who depended on foreign coarse grades, to place the market under the control of those Americans who manufactured the finer grades. The tariff makers placed the compensatory duty at 12 cents per pound plus an ad valorem rate designed to protect the

manufacturing industry, basing their calcula¬ tions on the assumption that a pound of finished cloth required four pounds of imported wool, wherefore the duty should be four times the wool duty of three cents levied by the same act. Some later schedules levying duties on wool retained this same rate of four to one. During the Civil War period the list of commodities on which compound duties were imposed was greatly extended, so as to compensate for taxes levied on internal manufactures of the same nature, the list including iron and steel products, marble, cottons, carpets, cigars, mineral waters, soaps, perfumes, wines and liquors.

Drawbacks of duties are refunds of duties paid on goods that are re-exported ; they have been provided for ever since the first tariff act of 1789. If imported raw materials are used in a finished product exported a drawback of 99 per cent of the duties paid when ihe raw' materials wˆere imported is allowed if the ex¬ porter of the finished product can satisfactorily identify the raw materials according to Treas¬ ury Department regulations. Drawbacks are allowed of the internal revenue duties paid on alcohol that has been used in medical or toilet preparations subsequently exported. Duties on wheat, imported from Canada, may be re¬ funded if the flour made therefrom be exported. Drawbacks differ with the various tariff acts but the provisions are becoming more and more strict, so that the privilege is now limited to operations that can be thoroughly safe¬ guarded.

Maximum and minimum duties is a term employed to a scale of tariff duties levied on goods imported from countries that discriminate unduly against American products. The Payne-Aldrich tariff of 23 Aug. 1909 provided that after 31 March 1910 the duties specified in the act, which constituted the minimum rates, should be increased by 25 per cent of the value of the goods imported if this merchandise came from countries unduly taxing our products in their ports. European tariffs contain such provisions, which are designed to place nations on an equal commercial footing. The McKinley tariff act of 1890 contained a similar provision but its application was more limited, since the Presi¬ dent, -by proclamation, could only levy certain duties on goods imported from certain countries which imposed unreasonable duties on certain articles of American production. Under the act of 1909 undue discrimination might have been either by tariff rates, export duty or ex¬ port bounty or prohibition upon exports, and the President was given power to decide as to the existence of such

unreasonable tariffs and the measure of the discrimination. There w'as con¬ siderable fear that the enforcement of the plan of maximum duties might incite a tariff war and that complications would creep into the schedules regularly established in the act for certain definite ends. Though no such trouble arose, or at least became serious, the plan of maximum and minimum duties contained in the act of 1909 w'as abolished by the Underwood tariff of 1913. See also Internal Revenue System; Stamp Tax; Taxation; United States — History of the Tariff.

Bibliography. — Dewey, D. R., ˆFinancial Historv of the United Statesˆ (4th ed.. New York 1912) ; Goss, J. D., Hlistory of Tariff

Administration in the United Statesˆ (in ˆCo¬ lumbia University Studies,ˆ Vol. I, No. 2, New York 1891) ; Plehn, C. C., Hntroduction to Pub¬ lic Financeˆ (3d ed.. New York 1913) ; Stan-wood, Edward, ˆAmerican Tariff Controversies in the Nineteenth Century > (Boston 1903) ; Taussig, F. W., ˆTariff History of the United Statesˆ (6th ed.. New York 1914).

DUUMVIRS, du-um'vers, among the an¬ cient Romans, two magistrates, or officers, ap¬ pointed for a particular purpose. They were therefore of various sorts and were specially named from the nature of their functions. The duumviri hire dicundo were the highest magis¬ trates of colonies and towns, where they had the rank of consuls at Rome. The duumviri navales had charge of the construction and equipping and sometimes of the command, of fleets. The duumviri quin-quennales were the censors of municipal towns ; the duumviri sa-crorum had charge of the Sibylline books, *etc.*

DUVAL, dti-var, Alexandre, French dram¬ atist : b. Rennes, 6 April 1767 ; d. Paris, 1 Sept. 1842. He served in the French fleet during the American Revolutionary War, and on his re¬ turn to France was an engineer and architect; but finally devoted himself to writing plays, of which he composed more than 60, which won great favor from their skilful construction, in¬ teresting situations and fine dialogue. He wrote the text of the very successful opera, ˆJoseph in Egyptˆ (1807).

DUVAL, Claude, English highwayman: b. Domfront, Normandy, 1643; d. London, 21 Jan. 1670. He went to England at the Restoration, in the train of the Duke of Richmond. Taking soon to the road, he robbed many gentlemen of their purses and ladies of their hearts, till, hav¬ ing been captured while drunk, he was hanged at Tyburn and was

buried in the central aisle of Covent Garden Church.

DUVENECK, du'ven-ek, Frank, American artist: b. Covington, Ky., 18ˆ; d. 3 Jan. 1919. He began his artistic education as pupil in the the studio of Dietz, at Munich, he made a spe¬ cialty of portraits and genre. He formed a school there, composed mostly of Americans, whom he conducted on painting trips to Venice, Florence and other art centres. Many of his pictures are in this country, although he lived much abroad and after 1881 taught and painted at Florence, Italy. He was awarded a medal at the Columbian Exposition of 1893 and a special gold medal of honor at the Pan¬ ama-Pacific Exposition of 1915. He was for a time director of the McMicken Art School in Cincinnati. He was one of the first to intro¬ duce the Munich style into America. His most remarkable paintings are < A Circassianˆ (1875) ; ˆPortrait of Charles Dudley Warnerˆ (1877) ; <The Professorˆ (1878) ; ˆTurkish Page and Recumbent Figureˆ (Pennsylvania Academy) ; several paintings in the Cincinnati _ Museumˆ ; ˆThe Yacht Harborˆ and portrait of his mother (1903). Of his sculptures the most no¬ table is the monument to his wife in the Eng¬ lish cemetery of Florence, Italy. He became a member of the National Academv in 1906. Con¬ sult Heermann, ˆFrank Duveneckˆ (1918).

DUVERGIER DE HAURANNE, doo-ver-zhe-a de o-ran, Jean, French theologian: b. Bayonne 1581 ; d. Paris, 11 Oct. 1643. At the

University of Louvain, where he studied the¬ ology, one of his fellow students, and his most intimate friend, was Cornelius Jansen (q.v.)> after whom a certain system of theological views is named — ® Jansenism The two

friends, after both had left the university, con¬ tinued their intimate relations, first at Paris, then at Bayonne, where Duvergier had been appointed to a prebend. When Jansen left Bayonne Duvergier resigned his prebend and went back to Paris. All this time the two men had diligently been studying the ancient fathers of the Church, and in particular Saint Augus¬ tine, from whom Jansen claimed to have

drawn his doctrine of Divine Grace. In Paris Duvergier's winning personality and his reputation for austere views of religious and moral obli¬ gations commended him to the favor of the bishop of Poictiers, who gave up to him the monastery, or abbey, of Saint Cyran, and there Duvergier brought together a number of devout men, formed them into a convent of monks, under the ancient, unamended rule of Saint Benedict. But his zeal for reform of the monastic life was suspected of being in¬ spired by a secret hostility to the Church and the Church's rulers, and Duvergier was com¬ pelled to retire from Saint Cyran, whence he returned to Paris. There he was received with great favor by the highest society, especially the feminine element, and in particular he be¬ came the trusted counsellor of Angelique Arnauld, abbess of Port Royal, and all the mem¬ bers of the remarkable Arnauld family, those staunch defenders of Jansenism (see Ar¬ nauld). A sect was formed and Cardinal Richelieu had strong suspicions that the abbe of Saint Cyran was leader in a conspiracy against Church and State ; so he was arrested by order of the cardinal and committed to the castle of Vincennes 14 March 1638, where he was held in close confinement as long as Riche¬ lieu lived, or till December 1642; and he sur¬ vived his liberation only a few months. His biography has been written by Lancelot (Cologne 1738).

DUVERGIER DE HAURANNE, Pros¬ per, French publicist: b. Rouen, 3 Aug. 1798; d. Paris, 22 May 1881. He went to London and became in 1824 a constant contributor to the Globe. He was elected deputy from San-cerre, and in the National Assembly he sup¬ ported Casimir-Perier and Thiers, while oppos¬ ing Guizot, who had been his friend and asso¬ ciate on the Globe. After the coup d'etat of Napoleon HI he was imprisoned for a while and eventually sentenced to banishment, but was subsequently allowed to return to Paris. He became a member of the Academy in 1870 and among the works which won him reputa¬ tion is to be mentioned ˆHistoire du gouverne-ment parlementaire en Franceˆ (10 vols., 1857—

70).

DU VERNET, dii ver-na', Frederick Her¬ bert, Canadian bishop : b. Hemmingford, Que¬ bec, 20 Jan. 1860. He was educated at King's College, Windsor, Toronto University and Wy-cliffe College. He was ordained in 1883 ; con¬ secrated Anglican bishop of Caledonia, British Columbia, 30 Nov. 1904; and became arch¬ bishop and metropolitan of British Columbia,

1915.

DUVERNpY, du -ser-nwa, Georges Louis, French naturalist: b. Montbeliard, 6 Aug. 1777; d. Paris, 1 March 1855. In 1802 he was in¬ vited by Cuvier, to whom he was related, to assist in editing his treatise on comparative anatomy. With the aid of the notes and coun¬ sels of his master, he prepared the last three volumes of this work, embracing the organs of digestion, respiration, circulation, generation and the secretions. In 1827 he was elected pro¬ fessor of the faculty of sciences at Strassburg, where, during 10 years, he published a variety of papers on anatomical subjects; and after the death of Cuvier was engaged in arranging his papers for publication. In 1837 he was elected professor of natural history in the College of France. He published numerous works, which have furnished important materials to anato¬ mists and zoologists.

DUZINE (derived from the Dutch ˆMo-zijn®), of The Twelve Men, the 12 paten¬ tees in 1677 of the Huguenot settlement on the Walkill, now in Ulster County, N. Y., and known as New Paltz (New Palatinate) from their German refuge after escaping from France. The ®duzine® and their successors were the executive and legislative body of the settlement during a century.

pVINSK, or DUNABURG, dii na-boorg, Latvia, a town in the southeastern part of the republic, on the Diina, 112 miles southeast from Riga. It was formerly the capital of Polish Livonia. It is of great military im¬ portance, being a fortress of the first class, carries on a considerable trade and is the junction of three important railway lines. Pop. (including suburbs) 110,912, of which about 30,000 are Jews.

DVORAK, Antonin, an’ton-in dvor’zhak, Bohemian composer: b. Miihlhausen, Bohemia, 8 Sept. 1841 ; d. Prague, Bohemia, 1 May 1904. At first intended for his father’s trade of butcher, he showed such musical ability that he was sent to Zlonic to study. Here he found a friend in the village organist, A. Liehmann, who taught him elementary theory, organ and pianoforte playing. He next went to Kamnitz, where he studied under Hancke. In 1857 he entered the organ-school of the Gesellschaft der Kirchenmusik at Prague, where he worked for three years. The small financial aid heˆ received from his father soon ceased and Dvorak found himself thrown upon his own resources. For a time he played the tenor violin in a theatre orchestra in Prague, and was also organist for several churches. In 1873 he first made himself known as a com¬ poser by a patriotic hymn for chorus

and orchestra and not long afterward an opera of his, ˆThe King and the Collier,ˆ was success¬ fully produced. His first great success was his setting of the ˆStabat Mater, ˆ first performed in England in 1883, which at once raised him to the rank of a popular and widely-known com¬ poser. Among his subsequent works are songs, operas, dances, symphonies, a wonderful can¬ tata, JThe Spectre's Bride,ˆ first performed at Birmingham in 1885, the composer himself act¬ ing as conductor, and an oratorio, ˆ Saint Lud-rnilla,ˆ first performed at Leeds in 1886 under his own direction. Dvorak is characterized by a brilliant imagination, great originality and a

rare inventive power. His ˆStabat Mater, ˆ which betrays less of the Bohemian nationality than many of his other works, is regarded as one of the greatest works of its kind in modern rniisic. In 1892 he was called to New York as director of the National Conservatory of Music, where he remained three years. He became interested in the music of the Indians and negroes and many of the melodies of these races appear in his symphony ˆFrom the New World, ˆ and the overture Hn Nature.ˆ He settled in Prague in 1895, where in 1899 he produced the opera, ˆDer Teufel und die wilde Kathe.ˆ The universities of Prague and Cambridge conferred on him the degree of doctor of music, and he was elevated to the Austrian House of Peers. He wrote five sym¬ phonies, many sacred compositions and a num¬ ber of operas, which are very popular in Bohemia. He also composed several works for the pianoforte. To him we are indebted for calling our attention to the wealth of folksongs among the Slavs. Consult Hadow, W. H., 'Studies in Modern Musicˆ (Vol. II, New York 1904) ; Mason, D. G., 'From Grieg to Brahmsˆ (ib. 1902); Zubatky, 'Dvorakˆ (Prague 1886).

DWARF, a human being much below the ordinary size of man. Dwarfs are described by several ancient classical writers. Herodotus gives an account of a race of dwarfs living in Libya and the Syrtes, to which, Aristotle and Pliny also refer. Henry M. Stanley, in his journey across Africa in 1888, came on a dwarf¬ ish race which he thought might be descended from that mentioned by Herodotus. Philetas of Cos,

distinguished about 330 b.c. as a poet and grammarian, was jocularly said to have carried weights to prevent his being blown away. He was preceptor to Ptolemy Philadelphus. Julia, niece of Augustus, had a dwarf named Coropas, two feet and a hand's breadth high ; and An¬ dromeda, a freemaid of Julia's, was of the same height. The Negrilloes, occupying a belt six degrees wide in equatorial Africa the smallest known race, are supposed to have a cornmon ancestry with the Negritoes of Asia and Melanesia. The Akkas, a diminu¬ tive race, inhabit the country west of Lake Nyanza. In 1895 a dwarf tribe was discovered on the east side of the Upper Nile. This is regarded as the most primitive race on earth, having neither laws nor rules of conduct and destitute not only of clothing but of weapons of offense and defense. In Luzon, in the Philippines, the ZEtas, a pigmy race, has been discovered. Dwarfing, in races of normal size, is always a sign of stunted development and may be produced by maiming or malnutrition, by disease of the thyroid glands, rickets or spinal tuberculosis. Many dwarfs, however, are well formed in feature and physique and perfectly normal. They are as a general rule apt in intellect, but sensitive, quick-tempered and revengeful. Among dwarfs celebrated in history mention may be made of Jeffery Hud¬ son, page to the first Duke of Buckingham. At nine years of age he was only 18 inches high. When Charles I and his queen were the guests of Buckingham, Hudson was brought to table in a pie, out of which he stepped and he was adopted by Queen Henrietta Marie. He became a captain of horse in the Civil War, and figured in two duels, one with a turkey

cock and the other with one Crofts, whom, firing from horseback that he might be on a level with his antagonist, he shot dead. The best known of modern dwarfs was Charles S. Stratton, or, as he was popularly called, "Tom Thumb,^^ who was 31 inches high at the age of 25. He was born in Bridgeport, Conn., and traveled extensively abroad and at home under the management of P. T. Barnum. Wherever he went he attracted great attention even from such personages as Queen Victoria and Napo¬ leon III. Another modern dwarf was Francis Flynn, "Gen. Mite,^^ who was 21 inches in height at 16 years.

In Scandinavian mythology dwarfs (Dver-gar) are inhabitants of the interior of the earth and especially of large isolated rocks. They were imagined to be dark in aspect like the caverns in which they dwelt and were often styled "dark elves.^^ A dwarf was set by the gods at the corner of each of the four quarters of the earth to bear up the sky; and they were named East, West, North and South. All the dwarfs were

esteemed great artists in working metals and weapons of marvelous properties were said to be produced from their subterra¬ nean workshops. Like the Jotuns, they could not endure the sunlight and if its rays touched them they were turned into stone. If a man met a dwarf away from his rock and could throw steel between him and it, it was believed that thereby his habitation was closed up and that any thing in his power could be extorted from him. In the old Norse, echo is called the “dwarf language,® probably because it was thought to be produced by the dwarfs within mountains imitating the sounds which they heard without.

DWARF SNAKE, a common name for small snakes of many genera, given in the United States to species of the genus Carphio-phiops, which are found in the South in old logs. They are brown above and yellow or salmon below. The name is also applied to a pretty lit¬ tle snake of the genus Haldea, small and slender with coloring similar to the dwarf snakes of the first genus, but with a dark brown band across the head. It destroys insects and is harmless.

DWARFED TREES, a favorite ornament for dwellings among the Japanese and Chinese, who adopt a peculiar method of dwarfing. They choose some fruit-or flower-bearing branch of any tree of which they wish to produce a dwarf specimen, and cutting off a ring of the bark, surround the stripped part with clay, which they keep moist by means of a covering of moss, which is watered when it becomes dry. After a period, varying in different trees from about three months to two years, roots are sent out by the branch into the clay. The branch is then cut off below these artificial roots and planted in a poor soil, where it is kept scantily supplied with water. In this state the tree will remain for years, with vitality enough to produce leaves and even flowers annually, but never producing any but abortive shoots. Another method is to plant trees in flower pots with a shallow cover¬ ing of soil, supply them, as in the former case, very sparingly with water and pinching off all the strongest shoots. Still another method, which is caid to give good results when tried by amateurs, is to encircle a seed in a small

pellet of earth which is placed in the centre of a ball of absorbent moss, then is crowded into the interior of an orange from which the pulp has been removed. The moss is liberally sup¬ plied with water until the roots appear on the outside of the orange, when they are cut of¥ and the orange-skin covered with varnish, and placed in a flower-pot. Thereafter only enough moisture is applied to support the life of the plant.

DWARKA, dwar'ka, India, maritime town of the district of Guzerat, on the Arabian Sea, on the west side of the peninsula of Kathiawar, in the dominion of Baroda, 235 miles southwest of Amedebad. On an eminence overhanging the seashore stands a great temple of Krishna, visited annually by 10,000 pilgrims. Dwarka is claimed as the birthplace of Krishna. Pop.

6,548.

DWELSHAUVERS-DERY, dverzh6.'var'- da-re', Victor, Belgian engineer : b. Dinant 1836. He received his education at the univer¬ sities of Brussels and Liege and in 1869 was appointed professor of engineering at the latter seat of learning. He wrote extensively on the adjustment and regulation of machinery and on the theory of heat engines. In particular he reduced to exact figures the modern theory of steam power. He represented his government at several international expositions. His more important publications are ˆLe monde ou nous vivonsˆ (trans. by Austey 1871) ; ˆPrincipes de la resistance des materiauxˆ (1878) ; ˆExpose succinct de la theorie des moteurs-a-vapeurˆ (1880-82) ; ˆ Etude experimentale thermique de la machine-a-vapeurˆ (1892) ; ˆEtude experi¬ mentale calorimetrique de la machine-a-vapeurˆ

(1894).

DWIGHT, Harrison Gray Otis, American Congregational missionary : b. Conway, Mass., 22 Nov. 1803; d. Shaftesbury, Vt., 25 Jan. 1862. He was graduated at Hamilton College, Clinton, N. Y., 1825, and became a missionary of the American Board of Commissioners for Foreign Missions in 1830, to the Armenians, making Constantinople the centre of his field of opera¬ tions. He was abundant in his labors and met with great success in his work. He wrote ˆResearches of Smith and

Dwight in Armenia^ ; ^Christianity Revived in the East^ (1850) ; and compiled a ^Catalogue of Armenian Literature in the Middle Ages^ for the Journal of the American Oriental Society.

DWIGHT, Henry Otis, American mission¬ ary: b. Constantinople, Turkey, 3 June 1843; d. 19 June 1917. He entered Ohio Wesleyan University, but left it in 1861 to serve with the Union forces in the Civil War. In 1866-67 he was treasurer of the Northampton Street Rail¬ way Company, and in the following five years was business agent at Constantinople of the American Board of Commissioners of Foreign Missions. In 1872-79 he edited missionary pub¬ lications in the Turkish language, and served also as Constantinople correspondent of the New York Tribune from 1875 to 1892. In 1880 he was ordained to the ministry. In 1901 he resigned his commission as missionary and soon after became connected with various missionary societies in the United States. He edited ^Re¬ port of the Ecumenical Conference on Foreign Missions^ (1900), and the ^Encyclopedia of

Missions^ (1904). He is the author of ^Turkish Life in War Time^ (1881) ; ^Treaty Rights of American Missionaries in Turkey^ (1893); ^Constantinople and its Problems^ (1901); ^Blue Book of Missions^ (1905; 2d ed., 1907) ; ^A Moslem Sir Galahad^ (2d ed., 1914).

DWIGHT, Jonathan, American physician and ornithologist: b. New York, 8 Dec. 18.58. He was graduated at Harvard University in 1880 and at the College of Physicians and Sur¬ geons of Columbia University in 1893. From 1894 to 1904 he was assistant surgeon of the department of laryngology at the Vanderbilt Clinic. After 1886 he was a Fellow of the American Ornithologists' Union and treasurer after 1905. He is a member of the American Museum of Natural History and also served as president of the Linnsean Society.

DWIGHT, Joseph, American soldier : b. Hatfield, Mass., 16 Oct. 1703; d. Great Barring¬ ton, 19 June 1765. He was graduated at Har¬ vard University in 1722, became judge of the Court of Common Pleas of Hampshire County, Mass., and afterward of Berkshire County, and judge of probate. He was eminent both as a judge and a soldier. He commanded the Mas¬ sachusetts artillery at the reduction of Louisburg in 1745 with distinction, .and led a brigade at Lake Champlain in the second French War in 1756. He was also for 11 years a member of the general council of Massachusetts.

DWIGHT, Nathaniel, American educator : b. Northampton, Mass., 31 Jan. 1770; d. 11 June 1831. He was a brother of Timothy Dwight the elder (q.v.). He prepared and published the first school geography ever issued in the United States, and was also the author of ˆThe Great Question Answered,ˆ and ˆA Compendious History of the Signers of the Declaration of Independence.ˆ

DWIGHT, Sereno Edwards, American Congregational clergyman : b. Greenfield Hill, Conn., 18 May 1786; d. Philadelphia, Pa., 30 Nov. 1850. He was a son of Timothy Dwierht (1752-1817). He was graduated at Yale 1803 and practised law at New Haven until 1816, when he entered upon a clerical career. He preached in Park Street Church, Boston, 1817-26, and was president of Hamilton College, Clinton, N. Y., 1833-35. Among other works he published ˆThe Complete Writings of Jonathan Edwards with a Memoirˆ (10 vols., 1830).

DWIGHT, Theodore, American journalist: b. Northampton, Mass., 15 Dec. 1764; d. New York, 12 June 1846. He was a brother of Tim¬ othy Dwight, the elder. He was a well-known Federalist, a member of Congress and wrote ˆHistory of the Hartford Conventionˆ (of 1814), and ˆCharacter of Thomas Jefferson.ˆ He was editor also of the Hartford Mirror, the Albany Daily Advertiser and the New York Daily Advertiser.

DWIGHT, Theodore William, American educator, jurist and editor: b. Catskill, N. Y., 18 July 1822; d. Clinton, N. Y., 28 June 1892. He was educated at Hamilton College, and was pro¬ fessor of law there and subsequently in Colum¬ bia College, in each of which he founded a law school. He was elected (non-resident) profes¬ sor of constitutional law in Cornell University in 1868, and lecturer at Amherst College in

1869. He was interested in philanthropic work, and served as president of the New York Prison Association, vice-president of the New York Board of State Commissioners of Public Chari¬ ties and as a member of the ˆCommittee of Seventy,® of New York. In collaboration

with E. C. Wines he published ˆPrisons and Re¬ formatories in the United States,ˆ and was associate editor of the American Law Register, and editor of Maine's ˆAncient Lawˆ (New York 1864).

DWIGHT, Timothy, American Congrega¬ tional clergyman: b. Northampton, Mass., 14 May 1752; d. New Haven, Conn., 11 Jan. 1817. In 1769 he was graduated at Yale College and in 1771 became a tutor there. In 1783 he was ordained a minister at Fairfield, Conn., where he opened an academy. In 1795 he was elected president of Yale College, and he also held the professorship of theology. His chief works are ˆThe Conquest of Canaan, > an epic poem (1785) ; ˆTheology Explained and Defended, in a Series of Sermonsˆ (1818) ; ˆTravels in New England and New Yorkˆ (1821). Consult Sprague, Hfife of Timothy Dwight,ˆ (in Spark's ˆAmerican BiographyU—

DWIGHT, Timothy, American clergyman and educator: b. Norwich, Conn., 16 Nov. 1828; d. New Haven, Conn., 26 May 1916. He was graduated at Yale in 1849. He stayed at Yale as tutor, studied in the theological school and was graduated there in 1853. In 1855 he was licensed to preach as a Congregationalist, but was not ordained until 1861. After studying at Berlin and Bonn he returned to Yale in 1858 as assistant professor of sacred literature and New Testament Greek in the theological seminary. Three years later, at the age of 33, he became a full professor, a position he held until his elec¬ tion to the presidency. Although a famous scholar his early tastes were not entirely aca¬ demic. A Yale cartoon of the days when he was teaching theology pictures him studying a shot over a billiard table and saying ®0, carom me back to the days of my youth.® He suc¬ ceeded Noah Porter as president of Yale Uni¬ versity in 1886 and was succeeded by Arthur _T. Hadley in 1899. He resigned in keeping with his belief that a president should not serve after reaching the age of 70 years. After he resigned he lived in retirement, spending his winters in New Haven and his summers in Litchfield. He assumed direction of "V ale Uni¬ versity at a time when its needs were manifold, especially as regards financial support. His great task was the securing of money for build¬ ings and for additions to the faculty. In a particularly pernlexing period he turned his own salary back into the treasury, supplied the college pulpit himself and was treasurer as well as president. In response to his efforts Yale entered an epoch of unparalleled expan¬ sion. In the 13 years of his administration the permanent funds were increased from $2,111,189 to $4,554,827 — a greater increase than in all the 185 years since Yale College was founded. President Dwight's personal contributions amounted to about $100,000. At his request the Connecticut legislature in 1887 legalized the title ®Yale University.® Dr. Dwight then welded the college and the professional

schools into a coherent whole. His greatest work outside the campus was done when he was a member of

the American committee for the revision of the Bible, from 1878 to 1885. From 18ˆ to 1874 he was as.sociate editor of the New Englander. In 1870-71 he published a series of articles on ˆThe True Ideal of an American University.ˆ He edited several volumes of the American edition of Meyer's ˆCommentary on the New Testamentˆ ; translated Godet's ˆCommentary on the Gospel of Saint Johnˆ ; published ˆThoughts Of and For the Inner Lifeˆ (1889) ; and ˆMemories of Yale Life and Yale Menˆ (1903). He received the degree of doctor of divinity from Yale and the University of Chi¬ cago and the LL.D. degree from Harvard and Princeton.

DWIGHT, William Buck, American geol¬ ogist: b. Constantinople, Turkey, 22 May 1833; d. Cottage City, Mass., 29 Aug. 1906. He was graduated at Yale in 1854, at the Union Theo¬ logical Seminary, New York, in 1857, and at the Yale Scientific School in 1859. He filled several educational posts in a scientific capacity, served as principal of the officers' school at West Point (1867-70), and from 1878 till his death was professor of natural history and curator of the museum at Vassar College. In 1891 he invented and patented a rock-slicing rnachine for the scientific section of minerals, for which he was awarded a bronze medal at the Paris Exposition of 1900. His investiga¬ tions of the Cambrian and Ordovician strata and his studies of Dutchess County, N. Y., and the Wappinger Valley are extremely valuable.

DWINA, dwe'na, DVINA, sometimes called NpRTHERN DWINA, river of north¬ ern Russia, formed by the union of the Sukhona and Witchegda, in the government of Vologda. It flows in a northeastern course to the junction of the Witchegda, when it pursues a northwest course, entering Dwina Bay, an arm of the White Sea, about 25 miles below Archangel. The whole course, from the source of the Witchegda, is over 1,000 miles. Canals con¬ nect the Dwina with the Volga and the Neva. From the junction of the Witchegda to the sea is about 400 miles, all of which distance is navigable. The navaga, a kind of cod oeculiar to this river, abounds in its waters. •

DYAKS, dl'aks, or DAYAKS, the name given by the Malay invaders to the natives of Borneo. They are divided into innumerable tribes differing pretty widely in language, cus¬ toms and degrees of savageness. Their tradi¬ tional home was in the mountains of the in¬

terior. Physically they closely resemble the Malays, to whom they are doubtless akin, but are somewhat taller ; they are intelligent, hos¬ pitable and unsuspicious, and greatly excel the Malays in truthfulness and honesty. Many of the dialects spoken by them are little known. The coast tribes have adopted manv Malay words and some have completely adopted the Malay speech. Even the most uncivilized tribes have many ingenious arts and industries, weave cloth, make excellent steel weapons and erect most serviceable suspension bridges with bam¬ boo poles and withes. Their chief weapon is the blowpipe, not the bow. _ The barbarous custom of systematic head-hunting is dying out, though the heads of enemies are still cherished trophies of the warrior. See Borneo.

DYCE, Alexander, English Shakesperian scholar: b. Edinburgh, 30 June 1798; d. London,

15 May 1869. He was educated at Exeter Col¬ lege, Oxford; and, taking orders, held several curacies prior to 1827, when he settled in Lon¬ don, where the most of his life was passed. He was first brought to notice by his ˆSpecimens of British Poetessesˆ (1825), which was fol¬ lowed by editions of Collins (1827), George Peele (1828), Webster (1830), Robert Greene (1831), Middleton (1840), Beaumont and Fletcher (1843-46), Marlowe (1850), Shirley (1833), Skelton (1843), Wotton and Drayton, all of which were accompanied by notes and biographies of the authors. In 1840 he founded, in conjunction with Collier, Halliwell and Wright, the Percy Society, for the publication of ancient comedies and ballads. His chief labors, however, were devoted to Shakespeare, an edition of whose works he published in 1857 ; second edition, greatly improved, nine volumes (1864-67). In his ˆRemarks on Collier's and Knight's Editions of Shakespeareˆ (1844) he pointed out several errors into which the modern commentators on Shakespeare had fallen ; and in another work, entitled Few Notes on Shakespeareˆ (1853), he pronounced very strongly against the emendations of the text of Shakespeare published by Collier, and main¬ tained by him to belong to the first half of the

I7th century. His ˆGlossary of Shakespeare,ˆ which extended to 500 pages, is a standard work. His work is-at once learned and scholarly, accurate, sane and luminous.

DYCE, William, Scottish painter; b. Aber¬ deen, 19 Sept. 1806; d. Streatham, 14 Feb. 1864. In 1830 he settled at Edinburgh, where he soon became known as a portrait-painter and as a distinguished contributor to the exhibition of the Royal Scottish Academy. In 1827 he had exhibited at the Royal Academy his ˆBacchus Nursed by the Nymphs.ˆ About 1837 he settled in London. In 1836 he exhibited ˆThe Descent of Venus,' the subject of which was taken from Ben Jonson's ˆTriumph of Love' ; and in 1839 ˆ Saint Dunstan separating Edwy and Elgiva.' When the decoration of the interior of the new houses of Parliament was made a subject of competition Dyce exhibited his talents in a new light, namely, as a painter in fresco. His first fresco, ˆThe Consecration of Arch¬ bishop Parker,' was executed in Lambeth Pal¬ ace, and was followed by ˆThe Baptism of Ethelbert,' in the House of Lords (18ˆ). He was elected to the Royal Academy in 18ˆ and was also a member of the Academy of Fine Arts of Philadelphia. In 1848 he was com¬ missioned to paint a series of seven frescoes in the House of Lords, but he only lived to complete five. Among his other pictures are 'ˆJoash Shooting the Arrow of Deliverance' (1844) ; Wirgin and Child' (1846) ; ˆOmnia Vanitas' (1ˆ9) ; ˆMeeting of Jacob and Rachel' (1850) ; ˆKing Lear and the Fool in the Storm' (1851) ; and ˆJohn Leading Home the Virgin' (1860). His artistic sense finds best expression in his religious pictures, and he was in full sympathy with the Pre-Raphaelite movement. Notable also is his decorative work, both as a painter and as a designer of stained glass.

DYEA, di'a, Alaska, a former village on Chilkoot Inlet, the east fork of Lynn Canal, which was important during the gold-rush, as

being the starting-point of the Chilkoot Trail, a much traveled pathway to the valley of the Yukon and the Klondike fields. The building of the White Pass and Yukon Railroad from Skagway (q.v.) reduced Dyea to insignificance.

DYEING. Dyeing is the art of staining or coloring yarn or cloth in such a manner that the color is to a measurable degree permanent. The art was practised among the Eastern nations from time immemorial, and in the Scriptures we read of the vestments of the high priest being dyed purple and of linen cloths being dyed blue, purple and scarlet. The famous Tyrian purple is believed to have been discovered by the

in¬ habitants of Tyre 1500 b.c., and immediately afterward Tyrian purple became the badge of royalty and cloth dyed with it commanded a very high price. The Egyptians, Grecians and Romans practised the art of dyeing and it gradually became more widespread as civiliza¬ tion advanced. In earlier times dyeing was much more extensively followed as a domestic art than at present. The process, of dyeing is accomplished in two stages: (1) absorption; and (2) fixation. The first is a simple diffusion of the dye throughout the fibre ; the second is the result of a chemical action in which the dye becomes insoluble in the material of the dye bath. Where mordants are used it is tne mordant which is applied to the fibre in the absorption stage. The textile fibres upon which the dyer exercises his art are of two groups : (1) animal fibres, as wool and silk; and (2) vegetable fibres, as cotton, linen, jute, ramie and the artificial ®silks." Wool fibre is the most complex, being composed of three forms of cells. Silk has no cellular formation, being practically a long double cylinder. In cotton each fibre is a single hollow cylindrical cell, flattened and twisted. In linen and jute similar hollow cells are grouped in clusters to form the individual fibres. In chemical composition and reaction there are still wider and more signifi¬ cant differences.

If the various coloring matters used in dye¬ ing had an affinity for the fibre in its natural state the process would be very simple. It would be necessary only to make a solution of the dye drug and immerse the goods to ensure their being dyed. But so far from this being the case, if we except indigo and safflower, there is scarcely a dyestuff that imparts its color directly to goods. The greater part of the dye drugs have so weak an affinity, for cotton goods especially, that they impart no color suf¬ ficiently permanent to deserve the name of a dye. The reason for this is simple. For exam¬ ple, in a decoction of logwood the color matter is held in solution by the water. Upon putting a quantity of cotton into this solution the fibre becomes filled with the colored solution, and if the cotton has no power to render that coloring matter insoluble within its fibres it is plain that by taking out the cotton and putting it into water the coloring matter within it will be diffused in the water. In other words, the dye having no attraction for the fibre is washed out. This lack of primary affinity makes dyeing in¬ tricate and renders it more dependent upon sci¬ ence. Indeed, it is only by the careful arrange¬ ment _ of processes in accordance with certain chemical laws that the dyer is enabled to turn to advantage the various coloring matters of which

he IS in possession. When the dyer finds there is lio affinity between the goods and a coloring substance he wishes to use he endeavors to find a third substance which has a mutual attrac¬ tion for the fibre and coloring matter, so that by combining this substance with the fibre and then passing the cloth through the dyeing solu¬ tion the coloring matter combines with the sub¬ stance which is upon the goods and creates a color. This third substance used, which acts as a mediator, combining two inimical bodies, is termed a mordant.

All the mordants with one or two exceptions are found among the metallic oxides. In order that a substance may act as a mordant it must have an attraction for the coloring matter so as to form with it an insoluble colored compound, and it must be held easily in solution. It may also have an affinity for the fibre and a tendency to unite with it, but this property is not essen¬ tial. The first two properties limit the mordants almost entirely to what are termed the insoluble bases, that is, substances which are not by them¬ selves soluble in water. The bases or oxides which are in general use as mordants and which appear to succeed best are alumina and the oxides of tin, chromium and iron. An important part of all dyeing operations is the proper choice and ap¬ plication of mordants ; there being a chemical union between them and the coloring matter a new substance is formed, not only differing in properties but differing in color from any of the originals. Consequently, a very little alteration in the strength or quality of a mordant causes a decided variation in the shade of color. As, for example, logwood alone gives no color to cotton worthy the name of a dye, yet by ju¬ dicious application of a few different kinds of mordants all the shades, from a French white to a violet, from a lavender to a purple, from a blue to a lilac and from a slate to a black, are obtained from this substance. Before any chemical union takes place between bodies they must not only be in contact, but they must be reduced to their ultimate molecules. Mordants that are insoluble of themselves must be dis¬ solved in some appropriate menstrua before their particles can enter the fibres of the goods or combine with the coloring matter. In doing this the dyer must respect the degree of affinity between the solvent and the mordant to deter¬ mine what

force it will exert against the com¬ bining of the mordant with the fibres of the cloth. Otherwise, a powerful mordant may be weakened by the attraction of the solvent. For example, common alum even though much con¬ centrated is but a weak mordant for cotton goods, owing to the great attraction between the alumina and the sulphuric acid of the dye bath. But if acetic acid, which has comparatively a weak affinity for the alumina, be substituted for sulphuric acid it becomes a very powerful mordant.

It is with the vegetable coloring matters, however, that the greatest attention must be paid to the many conditions and properties of mordants. Bichromate of potash is largely used as a mordant for logwood and fustic for blues, blacks, browns and a variety of shades of color. Bichromate of potash, alum and oxalic acid as mordant on wool produce with logwood a very fine navy blue, but one that is not very fast to light. Sulphate of copper is the mordant

most largely used with logwood for making black on cotton. These mordants are used almost exclusively for the wool dyes. In dyeing wool, either raw, woven or as yarn, care has to be taken that the wool is thoroughly free from grease before being mordanted. This is done by passing it through either soap, sal soda or soda ash and then thoroughly rinsing to free it from the alkali solution. If this is not done unevenness in the dyeing is caused, as well as a rubbing off of the color. When the dyer is given a shade to match he has to take into con¬ sideration the degree of fastness required, as where goods have to be heavily fulled, unless the colors are sufficiently fast, they will full out and be spoiled. In this case only such dyes can be used as will stand this process. The quantity of dye to be used depends on the class of wool to be dyed, as the finer the quality of the wool the more dyestuff it takes to produce the same shade. The dyer also has to study to produce the result at the lowest possible cost, both for labor and dyestuff. Machines are now manu¬ factured which economize in the labor and a large quantity of goods are dyed at one time. It would be generally supposed that where the dyer carefully proportioned out his dyestuff to the weight of the material to be dyed and ob¬ served every care in reference to the mordant and heat that the shades would come out alike. However, this is not the case, and with the greatest amount of care the shades will vary and it is necessary to use extra skill after the shades get off the pattern to bring them again to the shade required. The d3ˆer, knowing full well that owing to difference in the

water and the stock in the goods, besides conditions that are not always understood, that the shade is apt to vary, begins his operation with a minimum quantity of the dyestuff and if he finds that he is not up to the shade required, he adds such dyestuff as is necessary to give the desired result. In fact, making the shade right when it is once off the pattern requires the highest skill on the part of the dyer. The dyeing of wool is the result of a chemical combination. On the other hand, the dyeing of cotton is a fixation of a colored substance in the pores of the cotton. Cotton is dyed in the raw state, pieces and yarns, and the amount of dye used to produce a given shade also varies somewhat according to the qualit}'^ of the staple. In using colors re¬ quiring a mordant sumac and antimony are used, and the amount employed is governed by the depth of the shade required.

Dyeing of Mixed Fabrics. — The coloration of textile fabrics composed of more than one kind of material generally requires two or more processes, as the plan pursued in dyeing wool is seldom capable of fixing the color upon cot¬ ton. The customary plan followed is to im¬ merse the fabric in the requisite baths to dye the wool and then to treat the partially dyed material in the manner found suitable for cot¬ ton. Occasionally the woolen thread of the cloth is dyed of one color and thereafter the cotton is treated so as to acquire a different shade or color. With some of the coal-tar colors mixed fabrics can be dyed in one bath, thus saving much time. The dyer is now able to produce by combination of different dyes a great variety of rich shades on mixed fabrics, and even to dye two shades in the same fabric by first

dyeing the wool in the hot bath with an acid dye, then cooling down his bath and adding his cotton dye and dyeing the cotton another shade from what was produced on the wool. In dye¬ ing silk care has to be taken to free the silk from all gums, and this is done byˆ boiling off in a soap bath. Most of the dyeing is done direct and under the boil.

In imparting deep indigo blue to woolen cloth and yarn a vat six or seven feet in diameter and eight to nine feet in depth is nearly filled with water, along with from 18 to 22 pounds of indigo finely ground in water, 10 to 20 pounds of madder, 7 to 9 pounds of bran and 9 pounds woad. After boiling and the addition of seven or eight pounds of lime to form the alkaline liquid necessary to hold the indigo solution, the whole is well closed over with tightly-fitting wooden covers. Within 24 hours the putrid fermentation of the woad and the bran abstracts the oxygen from the blue indigo until it assumes a yellowish color, and the solution then contains indigo white. If woolen cloth or yarn is now dipped in this liquid it comes out of a yellow tint from the attachment of the white indigo. But when exposed to the air the oxygen immediately begins to act on the white indigo, combining with it to form oxidized or blue indigo, and as the process of oxidation continues the 3’ˆarn or cloth becomes first of a greenish and then of a blue color. If the cloth be again soaked in the yellowish solution and subsequently exposed to the air the depth of the blue color may be increased, step by step, till it arrives at that deep shade of blue so well known.

In the dyeing of cotton with indigo the vat is prepared differently. The indigo is first ground into a thin paste with water and afterward placed in a vat with protosulphate of iron and milk of lime. The lime (CaO) takes the sul¬ phuric acid (S03)from the sulphate of iron (FeOSOa) forming sulphate of lime (CaOSOs), and liberating the protoxide of iron (FeO), which rapidly abstracts the oxygen from the blue indigo, reducing it to white indigo, and the latter dissolves in the excess of lime present in the vat, yielding a colorless solution. When cotton cloth or yarn is dipped in this it comes out of the vat almost colorless, but on exposure to the air the indigo becomes reoxidized and the cloth passes to a green and ultimately to a deep blue shade. The cloth or yarn is then washed in water and afterward soaked in a very dilute sulphuric acid to remove any oxide of iron remaining

attached and rewashed in water, when the blue color becomes more bright and clear. Fast fulling colors dyed either in the wool yarns or pieces are usually dyed with the alizarine colors on account of their being fast to fulling and light. These are usually mordanted with bichromate of potash and cream of tartar for one and a half hours at the boiling point. Then they are thoroughly rinsed in cold water and finished in another bath with the alizarine colors. Owing to the great affinity existing between the alizarine colors and the mordanted wool, great care has to be taken to enter the bath at a low temper¬ ature and very gradually bring to the boil to ensure the goods being dyed even. Extra care must also be taken that no more alizarine is added than is necessary to produce the shade.

Cotton is now largely dyed direct. Formerly dyers were obliged to give a number of baths and even then were not able, in a great many cases, to secure the brilliant shades that are now dyed in one operation. The color simply being fixed in the pores of the cotton, it is more diffi¬ cult to secure a fast color on this fibre than on wool. As in the case of wool, dyeing machines are now manufactured by which the cotton is dyed both in the raw state, yarns and pieces, which economize in the labor and enable the dyer to produce better results both as to shade and fastness. During the last few years, there has been a large addition to the coal tar dyes, thus giving cotton dyers a much better oppor¬ tunity to produce brighter and faster colors.

The yarns for carpets are dyed almost ex¬ clusively with the coal tar dyes. This is done direct by entering them in the dye bath, which has previously had added the color, with the proper proportion of sulphuric acid and glauber-salt and gradually brought to the boil, being turned by hand. The bath is generally exhausted in about three-quarters of an hour. The yarns as furnished to the dyer are frequently of a mixed material which is dark in color, and in this case he must choose the most brilliant of dyes to give the required brightness of shade. For the finer grades of carpets, the color must thoroughly penetrate and in matching shades the dyer usually cuts his yarn and matches from the centre.

Bibliography. — ®Badische Anilin and Soda Fabrik® (in ˆManual of Garment Dyeing,ˆ 1911) ; Beaumont's ˆColors in Woven Designˆ (1912) ; Carter's ˆBleaching, Dyeing and Fin¬ ishing Flax, Hemp and Jute Fabricsˆ (1911); Huebner's ˆBleaching and Dyeing of Vegetable Fibrous Materials > (1912) ; Matthew's ˆLabora¬ tory Manual of Dyeingˆ (1900); Fellow's ˆDyes and Dyeing> (1913) ; Wood's

ˆChemistry of Dyeingˆ (1913).

F. H. Prescott,

Expert in Dyes and Dyeing, Philadelphia.

DYER, di’er, Alexander Brydie, American soldier: b. Richmond, Va., 1817; d. 1874. He was graduated at West Point and joined the Third United States Artillery in 1837. He served in the Florida War of 1837-38 and in the war with Mexico in 1846-48, being brevetted captain for gallant conduct. During the Civil War he was appointed chief of ordnance at Washington with the rank of brigadier-general and in this office did much to increase the effi¬ ciency of the ordnance department. From 1861 to 1864 he was in charge of the Springfield (Mass.) armory and in 1865 he was brevetted major-general in the regular army.

DYER, Eliphalet, American jurist: b. Windham, Conn., 28 Sept. 1721 ; d. there, 13 May 1807. He was graduated at Yale College in 1740 and began law practice in 1745. During the French War of 1755 he commanded a (Con¬ necticut regiment ; was elected a member of council in 1762; chosen delegate to the Stamp Act Congress in 1765 and served as a member of Congress during the War of Independence. He was judge of the Superior Court 1776-93, and chief justice for the four last years of his service there,

DYER, George, English antiquary and scholar: b. London, 15 March 1755; d. there, 2

March 1841. He was educated at Cambridge through the kindness of his friends and from 1792 till his death lived by literary work in London. He edited ˆValpy's Classicsˆ and among other writings published a < History of the University and Colleges of Cambridgeˆ (1814). His great labors resulted in his total blindness. Lamb's essay ˆAmicus Redivivusˆ gives a fine picture of the eccentric, industrious, friendly old antiquary.

DYER, Henry, Scottish educator : b. 1848. He was educated at Anderson's College and at Glasgow University. He received the appoint¬ ment of first principal of the Imperial College of Engineering, Tokio, Japan, and served also as professor of civil and mechanical engineer¬ ing. In addition he became director of large engineering works; remained in Japan 10 years and was appointed honorary principal of the College of Engineering on retirement and honorary member of the Institutions of Civil Engineers, Mechanical Engineers and Naval Architects, Japan. After his return to Britain he took an active part in engineering, educa¬ tional and social work. He is a life governor of Glasgow and West of Scotland Technical Col¬ lege; a governor of the West of Scotland Agricul¬ tural College, of the Glasgow School of Art and other institutions. His publications include ˆDai Nippon; The Britain of the EastU ˆJapan in World Politicsˆ ; ˆThe Evolution of Industry' ; ˆScience Teaching in Schools' ; ˆEducation and National Life' ; ˆEducation and Industrial Training' ; ˆEducation and Citizenship' and numerous papers and articles on engineering, educational, literary and social subjects.

DYER, Isadore, American physician : b. Galveston, Tex., 2 Nov. 1865. He was grad¬ uated at the Sheffield Scientific School of Yale University in 1887, studied also at the Univer¬ sity of Virginia 1887-88 and received the degree of M.D. at Tulane University in 1889. In 1890-92 he served as interne at the New York Skin and Cancer Hospital; was lecturer at the New York Post-Graduate Medical School in 1891-92. In 1892 he began his long connection with the medical department of Tulane University, be¬ coming associate professor of diseases of the skin in 1905, professor in 1908 and dean

in 1908. Since 1896 he has edited the New Orleans Medical and Surgical Journalˆ and since 1913 the American Journal of Tropical Diseases and Preventive Medicine. In 1894 he founded the Louisiana Leper Home, of which he has been consulting leprologist since 1902. He is author of various articles in leading medical text and reference books.

DYER, John, English poet ; b. Aberglasney, Carmarthenshire, Wales, 1700; d. 24 July 1758. He was originally a painter and his sense of beauty in scenery is shown in his ˆGrongar Hill,' a poem published in 1727. He took holy orders in 1740 and received the living of Calthorpe, Leicestershire, in 1741, but eventually settled in Lincolnshire. He published ˆRuins of Rome' (1740) and ˆThe Fleece' (1757), by which latter poem he is best known.

DYER, Louis, American writer and lec¬ turer: b. Chicago, 30 Sept. 1851; d. 20 July 1908. He was educated in early years in Chi¬ cago, Switzerland and France, was graduated at Harvard in 1874 and afterward studied

at Balliol College, Oxford. He was assistant professor of Greek at Harvard (1881-87), and settled at Oxford in 1890, where he was lec¬ turer at Balliol College (1893-96). He lectured before the principal colleges of this country and published among other works ˆStudies of the Gods in Greece at Certain Sanctuaries Recently Excavated' (1891); a translation of Cossa's Hntroduction to the Study of Political Econ¬ omy' (1893); ˆThe Greek Question and An¬ swer' (1884); ˆOxford as it is' (1902); ˆMachiavelli and the Modern State' (1904).

DYER, or DYAR, Mary, American mar¬ tyr: d. Boston, 1 June 1660. She was a victim to the persecution which befell the Quakers in the early history of Massachusetts. She and her husband, William Dyer, came to Boston from London in 1635, but were forced to retire to Rhode Island in 1638. She was again in England from 1652 to 1657 where she became a convert to Quakerism. She came to New Haven in 1657, but was expelled therefrom in the following year. The government of Mas¬ sachusetts by a statute excluded Quakers from the bounds of that colony and sentenced to death any one of that sect who should be guilty of a second visit there. The statute was little regarded, or rather was construed as an invi¬ tation instead of a menace by the enthusiastic and devoted believers against whom it was di¬ rected. Mary Dyer had departed from the jurisdiction of the magistrates upon the enact¬ ment of the law, but soon after returned

on purpose to test its legality. She was arrested, went willingly to prison, and there wrote a remonstrance in which she denounced the in¬ justice of the proceedings. She received sen¬ tence of death, and with a rope around her neck witnessed the execution of her friends Robinson and Stephenson, and then was banished from the colony. Seven months later she returned, and for exciting ˆrebellious sedition" was pub¬ licly hanged on Boston Common. Consult Jones, ˆThe Quakers in the American Colonies' (New York 1911) ; and Rogers, ˆMary Dyer, the Quaker Martyr' (Providence 1896).

DYER, Nehemiah Mayo, American naval officer: b. Provincetown, Mass., 1839; d. 27 Jan. 1910. He enlisted in the navy in 1861 and was promoted for gallantry in the Civil War, having attained the rank of volunteer lieuten¬ ant by 1865. He rose steadily through the grades to that of captain in 1897 and as com¬ mander of the protected cruiser Baltimore took part in the battle of Manila Bay, 1 May 1898; was promoted rear-admiral in 1901 and retired the same year. He was chairman of the com¬ missioners of the Massachusetts Nautical Train¬ ing School in 1903-04.

DYER, Thomas Henry, English historian : b. London, 4 May 1804; d. Bath, 30 Jan. 1888. He traveled and studied for years to prepare a ˆHistory of Modern Europe' (1861-64) ; ˆHis¬ tory of the City of Rome' (1865); ˆPompeii' (1867) ; and ˆAncient Athens' (1873), all mon¬ uments of learning and critical insight.

DYER, Sir William Turner Thistleton, English botanist; b. Westminster, London, 28 July 1843. He was educated at Oxford, and beside holding other professional posts was director of the Royal Botanic Gardens at Kew from 1885-1905. He has edited ˆ Flora Capen-

sisˆ ; and <The Flora of Tropical Africaˆ ; and is joint author of ˆThe Flora of Middlesexˆ (1869). He was created K.C.M.G. in 1899.

DYER'S BROOM; GREENWEED WOADWAXEN. See Dyeweed.

DYER'S-MOSS, a lichen, called also archil or orchil. See Archil.

DYER'S ROCKET, DYER'S WEED; or WELD, a plant {Reseda luteola), of the mig¬ nonette family (Resedacece) . It is an erect herb, sparingly branched, with long, narrow spikes of greenish-yellow flowers. The plant is exten¬ sively cultivated in Europe for the beautiful yellow dye it yields, and was originally grown in American gardens for the same purpose. It now grows wild in waste places, on Long Island, and in various spots near the eastern sea¬ board. It is known also as woad.

DYER'S WEED. See Dyer's Rocket.

DYERSBURG, Tenn., city, county-seat of Dyer County, on the north fork of the Deer River, navigable as far as Dyersburg; on the Illinois Central and other railroads, and about 80 miles northeast of Alemphis. The neighboring country is very fertile, yielding large crops of cotton, corn and wheat. The manufacture of cotton, wagons, flour, brick, tile, staves and headings and the sawing and planing of lumber supply the chief occupations of the town. To¬ bacco, iron goods, machines and wooden bowls are also made here. The city owns its own elec¬ tric-light and waterworks plants. Pop. 6,444.

DYES, substances employed to impart colors of a measurable degree of permanence to fabrics. They are classified according to their origin as (1) natural organic dyes — in two groups, vegetable and animal ; (2) mineral

dyes and (3) artificial organic dyes. The first class includes such vegetable coloring agents as indigo and logwood, and such animal dyes as cochineal. The second class includes such mineral coloring agents as chrome yellow and Prussian blue. The third class is by far the largest and most important, as it embraces the thousand and more coal-tar colors, synthetic indigo, *etc.* With the exception of indigo and logwood, few of the natural organic dyes are in extensive use, having been in large part superseded by coal-tar dyes of simpler appli¬ cation and more brilliant color. Those still in considerable use are as follows :

Annatto or arnotto, prepared from the fermented seed of Bixa orellana, a tree grow¬ ing in Central America, the Antilles and the East Indies. The dye principle is known as bixin. It is insoluble in water but dissolves readily in alkalis. It is used on cotton direct or with a tin mordant, and gives a hue of bright orange. At present it is used chiefly in tinting butter and cheese.

Archil or orchil is developed by fermenta¬ tion with ammonia

principally from the lichens Roccella and Lecanora; the first growing in the Canary and Cape Verde islands, the East Indies, Madagascar, Central and South Amer¬ ica; the second on the coasts of Norway and Sweden, Scotland, Ireland and Wales : The active principle is orcein, an alkali salt of orcin. This dye is used in large quantities for ˆbottoming® indigo, and in conjunction with other dyes, on silk and wool, especially for

carpet yarns. The color is of great body, and includes shades of red, magenta and violet. The dye appears in the market as a thick liquid called ˆˆarchil,® a paste called ®persis,* and a brownish or purplish powder called ˆcudbear.ˆˆ

Berberine is found in the root of the bar¬ berry and several other plants. Its active prin¬ ciple bears the same name, and it is the only natural basic dye. It imparts a golden yellow to silk and leather, and also .to cotton if mordanted.

Brazil Wood appears in the market as chips, raspings and extract, of various species of Ccesalpinia, natives of the West Indies, Central America, and of tropical South America, Africa and Asia. The wood yields two active dye principles, hrasilin and brasilein, producing shades of pink, purple and crimson, which, how¬ ever, are not fast in the laundr*.

Camwood, and its allies barzvood 2ind sandal¬ wood, yield the coloring principle santalin, used chiefly in conjunction with logwood and fustic for producing compound shades, especially browns, on wool. The colors obtained range from dull red to claret-brown. It is also used to give ˆˆbottom® to woolen fabrics to be dyed with indigo later.

Cochineal, as marketed, consists of the dried bodies of the females of the coccus cacti, an insect found in ˆlexico and Central America and other tropical countries living on the opuntia cactus. The ®black® cochineal of commerce is produced when the insects are scalded before drying, the ˆˆsilver® cochineal when they are dried in stoves without scalding. The coloring principle is carminic acid. Carmine is obtained by precipitation from the cochineal extract with acid salts. This dye is still much used for bright scarlet and crimson on wool ˆ with tin and alum mordants respectively. With chro¬ mium and iron mordants cochineal gives purple and with a copper mordant, claret shades.

Cudbear, see Archil.

Cutch, also known as catechu and gambier, is the dried sap of the green wood and pods of the acacia and mimosa trees, and also of the Areca palm. The gambier cutch is obtained from the leaves of the Uncaria gambier, and is called ^^cubical cutch® because it is marketed in small cubes. The coloring principles in cutch are catechin and catechu-tannic acid. Both are used in the production of olives and browns on cotton and infrequently on wool. Catechu-tannic acid dyes silk plush a rich seal brown, and with an iron mordant ˆfields a fine black. It is also used as a ˆbottom® for some of the basic coal-tar colors.

Fustic, also known as Cuba wood and yellow wood, is obtained from the Morns tinctoria, a tree growing in the West Indies, Central America and tropical South America. The best quality comes from Cuba and Mexico. The wood is marketed in chips or ground, and an extract also is prepared which is sometimes re¬ duced to a soft paste or solid form — often adulterated with glucose and quercitron. Fustic yields to two color principles, jnorin and maclurin, and gives bright yellow with an alum mordant, olive yellow with chrome and bright orange-yellow with tin. It is used more on wool than on cotton. At its best it is not fast

to light. Its largest use is with logwood to produce a dead black and with cutch to produce catechu shades.

Indigo is obtained by fermentative steeping of the stems and foliage of several species of the Indigofera family, arid to a less extent of some others. Its characteristic blue color prin¬ ciple is indigotin, but indigo contains also an¬ other dye principle, indirubin or indigo red. It is used very extensively in dyeing both wool and cotton, and is employed also as a ^^bottom® for compound shades — olives, browns and blacks. Indigo extracts are produced by the action of sulphuric acid on indigo. They are, chemically, indigotin sulpho-acids, and are freely soluble in water, and dye wool with rapidity, and a brighter color than ordinary indigo ; but the color fades on exposure to light.

Logwood or Campeachy wood is the prod¬ uct of the large and rapidly growing tree, HcEniatoxylon Campechianum, a native of tropi¬ cal and ^subtropical America, Cuba, Haiti and the West Indies. The best qualities now come from Jamaica and Honduras, the Campeche (Mexico) supply being practically exhausted. Logwood is white in color when first cut, the brown-red hue being developed by exposure to the air. It is marketed in the form of a concentrated extract made from the chips or raspings after ageing and fermenting. The coloring principle is hcEmatein. It is used in the dyeing of silk, as it renders the fibre opaque, a quality lacking in coal-tar dyes. It is employed also in the production of cheap blacks on wool and cotton. On wool it is used with a chrome mordant, producing a bluish-black, and with a tin mordant, producing a violet tone. In con¬ junction with other dyes it produces blues, greens, olives and browns.

Madder, as marketed, is the ground cortex of the root of the madder plant, Rubia tinc-toriim, a native of Asia Minor. It has been cul¬ tivated many years in Italy, France and Hol¬ land. It yields the dye principles, alizarin, pnr-piirin, psendo-purpurin, xanthin and chlorogenin. Madder is used in dyeing woolen cloth and carpet yarns, but for few other purposes. With chromium it gives bluish-red to crimson; with iron, reddish-brown to maroon ; with aluminum, scarlet to pink; with copper, yellow-brown; with tin, reddish-orange.

Persian Berries are the dried fruits of several species of Rhamnus (buckthorn) growing wild in Asia Minor. They are also cultivated in southern Europe and the East. They yield two color principles, rhamnetin and rhamnazin. They are used chiefly in printing cotton fabrics, with aluminum mordant for bright yellow, tin mordant for orange and chromium mordant for brown. With cochineal, they produce orange and scarlet, giving redder and deeper shades than fustic or quercitron — but at increased cost.

Quercitron is the inner bark of the Querciis tinctoria, an oak native to America, and grow¬ ing in large numbers in Pennsylvania and the South Atlantic States. It appears in commerce as the ground bark, and its extract. It con¬ tains two color principles, quercetin and qtier-citrin. A purified or concentrated dry extract in powdered form has the trade name of ˆTavine.® Quercitron imparts a bright yellow to wool and mordanted cotton and silk. With

cochineal it produces bright orange shades, and with logwood gives blacks. With aluminum it produces greenish yellow ; with chromium, dull yellow; with tin, bright orange; and with iron, olive to greenish black.

Robinia, a new natural dyestuff, was dis¬ covered in 1915, in the Yellow Locust, Robinia pseudacacia. The extract is similar to that of quercitron. It is still in the experimental stage.

Safflower, the dried flower head of Cartha-mus tinctoria, cultivated in India and Egypt. Its active principle is carthamin, which produces shades of pink on bleached cotton. The color is not fast either to light or the laundry.

Saunders-wood or Sandalwood, see Cam¬ wood.

Turmeric or Indian Saffron, is the ground root of the Curcuma tinctoria, a plant growing abundantly in China and the East Indies. The coloring principle is known as ctircumin, and dissolves out of the turmeric freely with alcohol, and less freely with hot water. It imparts yellow to cotton, wool and silk, but is used prin¬ cipally in combination, as its color is not fast. Although mordants are not necessary, their use produces modified shades of yellow, orange and olive.

Weld is the dried top and seeds of Reseda luteola, cultivated generally throughout Europe. The coloring principle is called luteolin. It is

regarded as the best and fastest of the natural yellow dyes for silk, and is used chiefly on alumi¬ num and tin mordants, yielding greenish yellow and bright yellow. With other mordants are secured shades of olive-yellow.

Young Fustic, the ground wood or extract of the Venetian Sumac (Rhus cotinus), a tree growing in southern and eastern Europe, the Levant, Jamaica, *etc.* The coloring principle is fisetin. Young fustic, which is not ˆTustic® at all, imparts shades of yellow which are so fugi¬ tive to light and the milling processes as to bq seldom used.

Mineral dyes, though formerly in extensive use, have been largely displaced by the coal-tar dyes. However, they are generally very fast to light and the laundry, and being cheap are still employed to a considerable degree. Their dyeing qualities are due to the deposit of insoluble pigments in the fibres of the fabric dyed.

The few mineral colors now in use are the following :

Bistre, see Manganese Brown.

Chrome Yellow, chemically chromate of lead, is used on cotton only. The fabric is first impregnated wdth nitrate or acetate of lead, which is then changed to the oxide by ammonia, or to the sulphate by sodium sulphide. It is then passed through a weak solution of potas¬ sium bichromate. All the chrome colors are poisons, and they are continued in use chiefly because they weight the fabric heavily.

Chrome ‘Orange is produced by first dyeing the fabric with chrome yellow, and then passing it through boiling dilute limewater.

Chrome Green is usually produced by first dyeing the goods with a light shade of indigo blue, and then with chrome yellow.

Khaki is produced on cotton by passing the cloth, after scouring, through a mixture of ferrous and chromic acetates and drying; then aging and passing through a boiling mixture

of caustic soda one part and carbonate of soda three parts.

Manganese Brown, or Bistre, is produced on cotton by impregnating the fabric with a solution of manganese chloride, and then passing it through a hot solution of caustic soda — < which precipitates the manganese hydroxide in the fibre. On exposure to the air this oxidizes to a brownish hue, and the color is improved and finished by immersion in a weak solution of chloride of lime.

Iron-buff, or Nankin Yellow, is produced by precipitating a ferric salt with an alkali, or alkaline carbbnate. It is used principally on cotton.

Prussian Blue is produced on cotton by first mordanting the fibre with ferric oxide, and then immersing it in yellow prussiate of potassium. It is also used in weighting silks which are afterward to be dyed black.

The coal-tar colors which constitute the class of artificial organic dyes are practically in¬ numerable. Several thousand of these dyes have been prepared and hundreds of them have been named. New ones are continually being discovered in new combinations, and many which formerly were highly esteemed have been super¬ seded by better ones.

From the dyer's point of view, these multi¬ tudinous dyes have been thus classified :

I. Direct Cotton Colors, or Salt Colors — which, in a neutral or weakly alkaline bath con¬ taining common salt or Glatibersalt, dye cotton in full shades without mordants.

II. Sulphide Colors, or Sulphur Colors — which, dissolved with the aid of sodium sul¬ phide, dye cotton in full shades from a sulphide bath without mordants.

III. Basic Colors — those having the quali¬ ties of bases, dyeing animal fibres without mor¬ dants, and vegetable fibres with tannin mordants.

IV. Eosins and Rhodamines — 'of excep¬ tional brilliancy; the first for silks, the second for silks, wools and tannin-mordanted cotton and cotton-mixed goods.

V. Acid Colors — salts of color acids, dye¬ ing animal fibres without mordants.

VI. Mordant Colors — which require me¬ tallic mordants to fix their colors.

VII. Acid Chrome Colors — requiring an acid bath ; they dye on wool with chrome mor¬ dants.

VIII. Miscellaneous Colors — including ani¬ line black ; indigo and other vat dyes ; and the insoluble azo-colors, known as ® ice-colors.®

Space does not permit specification of even the coal-tar colors in commonest use. For a condensed review of upwards of 900 of the more prominent of these dyes the student is referred to Arthur C. Green's ˆOrganic Colour¬ ing Matters.ˆ See also Coal-Tar Colors.

Production. — The United States census of manufactures for 1914 reported 112 establish¬ ments of factory grade manufacturing dyestuffs and extracts in the United States in that year. They employed 3,551 persons, of whom 2,839 were wage earners, receiving annually a total of $1,613,000 in wages. The capital invested aggre¬ gated $21,283,974, and the year's output was valued at $20,620,336; of this, $7,382,341 was the value added by manufacture to the $13,237,-995 worth of materials used. In addition, there were 22 establishments which reported dyestuffs

and extracts as subsidiary products. Their value for the year specified was $764,353. Consult Cain, J. C., and Thorpe, J. F., ˆThe Synthetic Dyestuffs> (London 1913) ; Fay, I. W., ˆChem¬ istry of the Coal-Tar Dyesˆ (New York 1911) ; Knecht, E., Rawson, C., and Loewenthal, R., Manual of Dyeingˆ (London 1910).

DYEWEED, DYER'S BROOM GREEN¬ WEED, or WOADWAXEN, a plant. Genista tinctoria, of the family Fabaceee. The genus comprises about 80 species, natives of Europe, northern Asia and Africa. The dyeweed is a low-branching shrubby plant, with a few yel¬ low nearly sessile flowers. It was originally cultivated in New England gardens because of the green dye it produced and escaping is found from Maine to eastern New York. Its medicinal value is small, although it is used in popular practice in Russia as a specific for hydrophobia.

DYING DECLARATION, a deposition made by one who is near to death. Such declarations are admitted as evidence' both in England and Scotland.

DYING GAUL, a famous work of ancient sculpture, representing a

dying Galatian and supposed to be one of a series of figures illustrating the incursion of the Gauls into Greece. The work is now preserved in the museum at Rome. It is not known whether the statue is an original or a copy, the work of Cresilas, a Grecian sculptor and contemporary of Phidias. The right arm of the statue has been restored and it is not positively known by whom this restoration was made. The work has been credited to Michelangelo.

DYKE, or DIKE, a wo rd variously used to represent a ditch or trench and also an em¬ bankment, rampart or wall. It is specially applied to an embankment raised to oppose the incursions of the sea or of a river, the dykes of Holland being probably the most notable examples of works of this kind in the world. Owing to the possibility of great loss of prop¬ erty and of life, the punishment of all neglect or for malicious mischief to dykes is extremely severe, one ®placaat® of Feb. 1726 regulating the inundation in the province of Staten, proclaiming that ˆanyone cutting dams, dykes, quays, etc., will be punished with death and confiscation of all his property.® The dykes which protect the Netherlands and the German coasts of the North Sea go back to the old Roman times. Apparently even before the Romans appeared the Batavians at the mouth of the Rhine protected themselves by dykes. Drusus after the conquest of Holland, 10 b.c, built an elaborate system of artificial canals and dykes. Pliny the Elder gives interesting de¬ scriptions of the artificial hills which were erected as places of refuge during the floods.

Among the provinces in North and South Holland which have been protected by dykes may be mentioned the province of Hanover, 618 miles, protecting 770,000 acres of marsh land. On the left bank of the Oder River there is a dyke which protects more than 170,000 acres of land. The dyke at the delta of the Vistula protects 134,000 acres of land. On the lower Rhine, between the Weser and Holland are 115,000 acres protected by d3ˆkes. Along the Loire River are 280 miles protecting

230,000 acres. Along the Po there are 310 miles protecting 850,000

acres. In England there are 1,750,000 acres protected by dykes. Many of the dykes of Holland are raised 40 feet above high-water mark and are wide enough at the top for a general roadway or canal, sometimes for both.

In the United States the term dyke is almost wholly restricted to the structures of more or less permanence built in various ways in the bed of a stream to regulate its flow, narrow the low water cross-section, concentrate the cur¬ rent, increase its local scouring effect and thereby deepen the river channel. The earthen em¬ bankments designed to restrain the flood waters are called levees. The most notable examples are found along the Mississippi River. These levees are placed some little distance back from the river and according to the local conditions vary in height from 2 or 3 feet to over 20 feet. Levee building began many years ago along the lower part of the river and it has been carried on practically continuously ever since. See Mississippi Levee System, and Reservoir.

DYKES, James Oswald, Scottish clergy¬ man: b. Port Glasgow, 14 May 1835; d. 1 Jan. 1912. He entered the Presbyterian ministry in 1859, and in 1869 became minister of the Re¬ gent Square Church in London. From 1888 to 1907 he was principal in the theological college of the Presbyterian Church of England. He was the author of ˆBeatitudes of the Kingdomˆ (1872) ; ˆLaws of the Kingdomˆ (1873) ; ˆRela¬ tions of the Kingdomˆ (1874) ; ˆ Daily Prayers for the Householdˆ (1881) ; ˆ Plain Words on Great Themesˆ (1892); <The Christian Minis¬ ter and His Duties^ (1908) ; ˆThe Divine Worker in Creation and Providenceˆ (1909), *etc.*

DYKES, John Bacchus, English composer and theologian : b. Hull, 10 March 1823 ; d. 22 Jan. 1876. He was graduated at (Cambridge, where he won distinction as a musician. He was ordained in 1847 and was appointed minor canon and precentor of Durham Cathedral in 1849. In 1862, being appointed vicar of Saint Oswald's in Durham, he resigned the precentor-ship, retaining the minor canonry. Becoming involved in 1874 in a dispute with his bishop on questions of church ritual, he was brought to an ecclesiastical trial, after which his health broke completely and his death soon followed. He was buried in the churchyard of Saint Oswald. As a testimonial of affection for him, a fund was raised for the care of his family and within a few weeks reached the notable sum of $50,000. He was a joint-editor of ˆ Hymns Ancient and Modern,ˆ and composed, besides many services and anthems, a large number of hymn tunes remarkable for har¬ monic beauty and of striking individuality; most of which are to be found in all English collections. Among these are Bonar, Dominus Regit Me,

Gerontius, Hodnet, Hollingside, Horbury, Lux Benigna, Melita, Nicaea, Saint Aelred, Saint Anatolius, Saint Bees, Saint Cross, Saint Cuthbert, Saint Godric, Saint Sylvester — to mention only a few of those which have become famous. See Lightwood, J. T., < Hymn-Tunes and Their Story ˆ (Lon¬ don 1908). Besides his musical works he left many literary remains in the line of sermons and contributions to religious periodicals.

DYNAGRAPH, an apparatus used in mod¬ ern railroading for recording the oscillations of the car, variations in the level of the rails, con¬ dition of the rail joints, the alignment of the track and the elevation of the outer rail on curves. These conditions are recorded on a paper ribbon in such a way that any one of them may be accurately located on the ground afterward. The action of the instrument is through gearing to the wheels of the car in which it is mounted. By electric connections a record may also be made of the amount of coal and water consumed by the locomotive hauling the train, the varying pressures of steam in the boiler, the tension on the draw¬ bar and the distance traveled in any particular group of seconds, minutes or hours during which the train is running. The dynagraph is in constant use on all the principal railroads.

DYNAMETER, an instrument in the nature of a micrometer tube attached to the eye¬ piece of a telescope for measuring its magnify¬ ing power. This power is the ratio of the solar focal distance of the object glass to the focal distance of the eyepiece considered as a single lens. This being the same as the ratio of the diameter of the aperture of the telescope to the diameter of its image formed beyond the eye¬ piece, the object of the instrument is to measure the exact diameter of this image.

DYNAMIC METAMORPHISM. See

Metamorphism.

DYNAMIC UNITS. See Units of Meas¬ urement.

DYNAMICS OF MACHINERY. When an engine has been proportioned to sufficient capacity and strong enough in all its parts to transmit or develop a given amount of power there still remains the problem of dynamic de¬ sign which deals with the engine in operation. The requirements in dynamic design are free¬ dom from vibration, constant speed for a given load, and automatic adjustment of the

energy developed to the work to be done. Vibrations are produced by the forces which arise from the accelerations of moving masses. An engine or motor in which these forces are counteracted is said to be balanced. The speed for a given load is controlled by means of a flywheel ; a governor adjusts the supplied energy to the load.

Rotating Balance. — A particle of weight IE revolving with an angular velocity w radians per second in a circular path of radius r exerts a force called the kinetic reaction, where

tng = W, on the constraint which deflects it from a rectilinear path. If the kinetic reactions on a rotating shaft are not in equilibrium, which is usually the case for very high speeds, the shaft will bend and therefore whirl and wear its bearings out of shape. An elementary account of whirling, which lack of space for¬ bids here, is given in Stodola's ˆ Steam Tur¬ bines.ˆ The problem has been investigated ex¬ perimentally by Dunkerly, ˆOn the Whirling and Vibrations of Shaftsˆ (Phil. Trans. Vol. CLXXXV) in which earlier references are cited; for a rigorous theoretical discussion consult Chree, ˆThe Whirling and Transverse Vibrations of Rotating Shaftsˆ (Proceedings of Physical Society, London, Vol. XIX). Tor¬ sional vibrations are discussed by Chrec and

others in Proceedings Inst. Civil Engineers (Vol. CLXVI), Frahm, Zeit. d. Verein deut. Ing. (1902, pp. 779, 886) and Roth (ibid. 1904, p. 564).

When a number of masses all move in one plane perpendicular to the axis of rotation as.

in Fig. 1 the criterion for a balanced system of kinetic reactions is found as follows : Assume the centroid C of all the masses to lie at ro from the axis. Any infinitesimal element of mass nil, situated at (n, «i) exerts a force along n. The reaction normal to OC in the plane of rotation is

{miTi sin + nizYi sin -f ...).

Since the centroid lies on OC the parenthesis is zero, hence there is no force normal to OC. The force along OC is

a > 2 ˆ;nr cos d = uˆ ro 2w, . , . whence the resultant kinetic reaction of a sys¬ tem of masses rotating in one plane normal to the axis is the same as if the total mass were concentrated at the centroid. Therefore if the resultant is to vanish, i.e., if the system is to be in running balance, the centroid must lie on the axis of rotation ; from a viewpoint more convenient for the solution of problems, the system is balanced when the kinetic reactions are in equilibrium, o may be taken as unity. But when the centroid is on the axis the system will remain in any position into which it is turned. This is called standing balance. Thus rotating parts such as armatures, turbine runners and flywheels that are constructed to be in standing balance will also be in running balance at any speed provided the centroids of all the parts are coplanar. This condition is usually not fulfilled; furthermore although perfect balance is inde¬ pendent of w, unbalanced forces increase as so that deviations from equilibrium so small as to be unnoticed when the system is at rest may yet have an appreciable effect at great speeds. For example, if a system of 1 lb. weight is mounted eccentrically 0.0001 inch, the turning moment due to gravity is only 0.00009 ft.-lb., while at a speed of 1,500 r.p.m. the un¬ balanced radial force is almost 0.7 lb., at 2,500 r.p.m. about 1.9 lb.

Fig. 2 shows the general caso of rotating balance where the masses are not coplanar ; i is the projection on a plane through the shaft and one arm r, and ii is an end view of i. If the kinetic reactions on the shaft are denoted by C, Ci, C2, … along r, ri, rz, … in ii, the conditions for equilibrium are found by resolving along and perpendicular to r in ii and by taking moments about a perpendicular

to both r and the shaft, and also about r itself. There results

C — Cl C05 (b — C2CosOˆ- … . = 0 (1)

Cl sin 0ˆ -f Ci sin 6ˆ — =0 (2)

Cih cos 0ˆ fl-C2I2 cos _ =0 (3)

Ci/i sin 0ˆ C2I2 sin 6ˆ _ =0 (4)

Four unknowns can be determined from these four equations; but not more than two of them can be lengths *because only tvyo equa¬ tions contain* . The most convenient un¬ knowns for practical work are two pairs of reaction components, one pair at each of two arbitrarily selected points. The reactions themselves may then be found and the proper masses and radii selected accordingly. In short, any S3ˆstem of revolving masses can be balanced by two masses properly placed; the positions of their radii along the shaft are arbitrary but their directions are not. The foregoing solution may be carried out graphi¬ cally. Suppose that in Fig. 2 the magnitudes and positions of Mi, Ms, Mi are known and it, is required to find C = mrc? and C2 = msTsiJ in magnitude and direction. Equations (3) and (4) show that if the moment of each force

about an axis perpendicular, at any point, to the plane through the shaft and the force be regarded as a vector having the direction of the force, the vector sum of all the moments will be zero. Two like forces on opposite sides of the axis have opposite moments which must have opposite senses. By taking the origin first at one unknown force and then at the other and drawing the vector polygon of the moments, the moments of the required kinetic reactions can be found. These determine the forces themselves since the lever arms / are known. The work may be checked by constructing thq force polygon corresponding to Fig. 2, ii. The method of procedure will now be illustrated. Example. Two cranks at right angles are of 10 inch radii,

the distance between them being 1.5 ft. The mass at each crank weighs 320 lbs. Find the balance masses at 1 ft. outside of each crank.

Take w = l, then mro)”^ = 8.33. Fig. 3 shoves a perspective view of shaft as a free body; H, V and fT, are the horizontal and

vertical components of the required forces. H and IP will evidently point away from the reader. For equilibrium

F+F^ = 8.33, // + H^ = 8.33 3.5 = 8.33 X 2.5, 3.5 ^ = 8.33 X 1

H^ = S.96, H = 2.37, V^2.3S, F=5.95.

The results were obtained on a slide rule; evidently V — H', H.

The resultant C oi H and V is inclined at arctan 5.95/2.37 = 68° 10' heloiv H.

To solve the problem graphically select an origin at the point of application of each un¬ known force and take the moment of each force about an axis normal to the plane through that force and the shaft. The moment poly¬ gons are shown in Fig. 4.

Now find C and (P and from them calculate what masses at the given radii will balance the two cranks.

Unfortunately the subject of revolving bal¬ ance is not disposed of so easily. A locomotive wheel-pair or a crank shaft may be symmetrical in form and may even be in standing balance v/ithout however being in running balance. A disc carefully turned on a lathe is not neces¬ sarily in balance because the metal might not he homogeneous. Even if its centroid is on the axis it is quite possible that the material on one side of a plane through the body and perpen¬ dicular to the axis may not be dynamically SA'mmetrical with the material on the other side, or the plane of the wheel might not be exactly perpendicular to the axis. The above mathematical methods are indispensable in ar¬ ranging the positions of cranks and balance weights but the final adjustments must be made experimentally. For this purpose the part to be balanced is mounted and run on a movable platform which can respond to the unbalanced reactions produced by rotation. The platform is sometimes supported by a spring at each corner and

vibrates unless running balance exists. In the Norton Balance Indicating Machine, made by the Norton Grinding Com¬ pany of Worcester, Mass., the axle holding the piece to be examined is mounted on two pendulums which oscillate in response to the motion of unbalanced masses. For details of the method consult a pamphlet on Dynamic Balance issued by the Norton Company, For the Akimoff machine consult Akimoff, ˆRecent Developments in Balancing Apparatusˆ Gn Journal of the American Society of Mechanical Engineering, December 1917), also ˆTransactions American Societv of Mechanical Engineeringˆ (Vol. XXXVIII, p. 367). The Lavaczeck machine is described in Jour. A. S. M. E. (March 1916) and in Zeitschrift Ver. deut. Ing, (Vol, LX, Nos. 1, 2, 1916).

Reciprocating Balance — Fig. 5 represents the connecting rod mechanism, P being the crankpin and C the crosshead.

If the angular velocity o) — 6 of the crank is assumed constant the acceleration of C is the second time-derivative of x and is negative because x decreases as h increases. Now

X = r cos d I cos <}> but since sin (p = rf I sin 0 = ijn sin 0

/ , sinˆ

C05 ˆ = (1

\ nˆ

W sinˆd

j 2w2 ’

approx.

x — r cos

a . ; sinˆd

d -f-l r

2n

approx.

11

1

H ‘

II

‘ . ˆ , sin 2d \ 2n /

approx.

3

II

: «

1

II

0

ˆ , cos 2d \

cos d -| -)

n /

approx.

If the mass of all reciprocating parts is m then ma is the kinetic reaction in the line of stroke transmitted by the connecting rod to the crankpin, But the connecting rod also has mass ; if we neglect rotation and consider only trans¬ lation its mass may be divided into two parts, one reciprocating with C and one rotating at P. Their centroid must coincide with that of the rod. If m thus includes the piston and' crosshead system and the proper part of the rod, a variable force

mr'ˆ

mreZ' cos h {2o)pcos 2d, approx.

acts at P in the line and direction of the stroke. This force is transmitted to the shaft and produces to and fro vibrations. There are other terms containing cos'ˆq, cos6g, *etc.* but they do not contribute more than about ˆ2 per cent to the expression. The first or primary term equals the component, in the line of stroke, of a mass m rotating at the crankpin with velocity it may be equilibrated by at¬ taching an equal mass diametrically opposite P at radius r. But the vertical component mr(Zsin d of the kinetic reaction exerted by the attached mass will be unbalanced. It pro¬ duces the so-called hammer-blow on the rails of a locomotive. Perfect primary balance of a single cylinder engine is therefore impossible ; any attempt results in compromise. It is cus¬ tomary to balance only two-thirds of the re¬ ciprocating masses. That is, all the parts actually rotating, two-thirds of the parts actually reciprocating, and the proper part of the connecting rod are regarded as concentrated at the pin and then balanced for rotation.

The secondary term equals the stroke com¬ ponent of a mass m

rotating at radius r 2/4/ with velocity 2w; this secondary crank makes twice the angle with the line of stroke that the actual crank does. It is impossible to balance the secondary force in a single cylinder unless some auxiliary mechanism is introduced to rotate the secondary imaginary crank. The secondary

effects are always large enough to produce de¬ cided vibrations such as occur in the usual type of four-cylinder automobile engine in which the primary disturbances are counter¬ acted.

Since the above process reduces reciprocating to rotating balance the necessary conditions to be fulfilled for a multicylinder engine are
Primary ˆmr = 0, ˆmrx = 0 rˆ rˆ

Secondary 2m = d, 2m — x = 0

where x is the distance of any crank from any assumed origin. This is Schlick's method of balancing a multicylinder engine. Consult Schlick in Zeit. d. Verein Deut. Ing. (1894). For a general discussion consult Schubert, Mitt, math. Gesell. (Hamburg Bd 2, Heft 8, 1898) ; Schlick in Trans. Inst. Naval Arch. (Vol. XLII, 1900). The subject is thoroughly treated in Lorenz, ˆDynamik der Kurbelgetriebeˆ (1901) ; Dalby, ˆBalancing of Enginesˆ (2d ed.) ; Sharp, ˆBalancing of Enginesˆ (1907). In a two-crank engine with equal reciprocating weights and cranks at 180 degrees the primary forces are balanced but there is an unbalanced primary moment about a vertical axis; secondary ef¬ fects cannot be balanced. For three cranks at 120 degrees the forces of both orders vanish but not the moments. Primary and secondary balance will obtain in a four-crank engine when two of the cranks are coplanar; this arrangement is not practicable ; in the usual arrangement all except the secondary moments vanish. Five-and six-cylinder engines will be in complete balance when the cranks are 120 degrees apart, no two being coplanar; in the former the first and fourth cranks must be parallel and also the second and fifth ; in the latter the first and sixth, second and fifth and third and fourth. The rotational motion of the connecting rod is

only partially allowed for above. To find its exact effect imagine the rod replaced by two particles mi and ms, mi being at the crosshead and ms at some distance tfs beyond the centroid G as in Fig, 6. If the new system is to have the same mass m, the same centroid, and the same moment of inertia mkˆ as the rod, di being the distance from mi to G, and dz from G to ms

mi-f m2 = m, m\di = m-id2, mid\ˆ -- m'id-?—mkˆ i . '. didi = so that (/i

+ds is the length of the equivalent simple pendulum which can be found experimentally. The position of G is got by weighing the ends of the rod. Let ai and Os be the accelerations of mi and ms; then the forces Ft and Fs producing at and Os will have a resultant F causing the actual motion of the rod. Hence F must be parallel to a and con¬ current with Ft and Fs. In kinematics (q.v.) it is shown how to find the accelerations graph¬

ically. To find the effect of the kinetic reaction exerted by the rod resolve F, reversed, into components P and Q, P being perpendicular to the crosshead guides and Q passing through the crankpin. F tends to lift and rock the engine and Q exerts a perturbating moment around the shaft.

The Flywheel. — The driving moment exerted by a piston engine varies throughout the stroke on account of the obliquity of the connecting rod, the varying steam or gas pressure and the kinetic reactions of the accelerating masses. If P is the resultant steam force on the piston at

any instant and m the mass of the reciprocat¬ ing parts, the effective piston force at the cross¬ head is F=F — ma. P is obtained from indi¬ cator diagrams and is the difference between the forward and the back gas forces ; the accel¬ eration diagram of the crosshead (see Kine¬ matics) gives ma. These, together with F, are shown in Fig, 7 for half a revolution or one stroke. To find the driving moment produced by F consider Fig. 8. The thrust along the rod is T=F sec <p and its lever arm is d = h cos (j>

.-. Td=Fh

where h is to be found graphically from the intersection of the connecting rod with a ver¬ tical through the shaft as in Fig. 8. To allow for the inertia of the rod the moment of Q about the shaft, see Fig. 6, must be subtracted from Fh; the resultant D is the effective driv¬ ing moment and is shown roughly in Fig. 9, where, however, Q is neglected. It is usually

considered accurate enough to neglect the rota¬ tional effect of the rod and to assume, as in balancing, that part of it reciprocates with the crosshead. The work done by the driving mo-

ment in a single revolution equals the work done by the resistance, for otherwise the engine would speed up or slow down progressively. If the resisting moment, say R, is constant, as it nearly is in dynamos, blowers, spinning machines, etc., it may be represented by the ordinates of the rectangle in Fig. 9 whose area equals that under the curve. Even if the re¬ sistance is variable, R is the average moment

D = rh

per cycle ; no work is gained or lost on account of changes in kinetic energy because the motion repeats itself after each revolution. The kinetic energy changes only the distribution of the work put in. R is obtained from the brake horsepower. Friction losses have not been con¬ sidered but they are comparatively small in a well-designed engine and are best found exper¬ imentally.

The area of the D curve above the rectangle equals the area below and is the change in kinetic energy. From (1) to (2) RˆD and the engine slows down; from (2) to (3) RcˆD and the motion is accelerated. The energy acquired from (2) to (3) is used up from (3) to (5) and then acceleration begins again. The velocity is greatest at (3) and (6) and least at (2) and (5) ; suppose it to be larger at (3) than (6) and less at (2) than (5). Now if E is the kinetic energy of the moving parts at any instant, ˆE = Ez — E2 is the energy stored in them and equals the work done by D — R from (2) to (3), *i.e.* the shaded area. ˆE is called the fluctuation of energy. If the moment of inertia of all rotating parts is I, and if for a first approximation the reciprocating masses are neglected

ˆE = ■ˆ{lA — 0

where w is the crank velocity. Usually the change in speed is not large so that approxi¬ mately -f- ˆ2 = 2w, where is the mean speed. If the

mean energy is E = /<ˆV2

(4)3 — 0)2 A Et

0) 2E

which is the coefficient of fluctuation of speed and is half the coefficient of fluctuation of energy. In piston pumps and shearing and stamping machines it may be as high as 0.05 ; in dynamos for lighting purposes it may be 0.01 and even less. By means of this formula a fly¬ wheel can be designed to keep the extreme speeds within specified limits ; AE is to be got from Fig. 9. In multicylinder engines the moment curves for the separate cylinders are superposed; the resultant has smaller fluctua¬ tions from the mean than the components.

Governors. — The function of a governor is so to regulate the supply of power according to the varying work an engine has to do that the mean per revolution speed changes as little

as possible. The flywheel on the contrary equalizes the driving moment during one revo¬ lution. If the load is constant no governor is required although of course a flywheel is neces¬ sary. The governor controls the energy sup¬ plied to a steam engine, for example, by changing the point of cut-off to alter the quantity of steam or by operating the throttle valve to alter the pressure; It should act only when the change in speed is greater than the cyclic fluctuation. A governor which operates during the small cyclic variation which it is the function of the flywheel to smooth out is too sensitive ; it will oscillate or hunt and by actuat¬ ing the valve or cut-off mechanism it will change the power so as to reinforce the oscillations and thus produce irregularities in speed which it was designed to correct. The speed of an engine cannot be kept absolutely constant be¬ cause a governor acts only through a change in speed ; moreover since the action is not in¬ stantaneous the supply of power always lags behind. The most that can be expected is to keep the variation of speed within sufficiently narrow limits.

Centrifugal governors, which are commonly used, operate by means of the kinetic reactions of revolving masses. The first governor was invented by Watt and was merely a double conical pendulum ; as the balls rose or fell they actuated a suitable mechanism for controlling the supply of power. The general principles will be explained in connection with the loaded governor, a modification of the Watt form

due to Porter. The vertical spindle is geared to

the shaft, the sleeve at the bottom being linked to the power controlling mechanism. This may be taken as the type of all centrifugal gov¬ ernors in some, e.g., the Proell and the Hart¬ nell, the load is replaced by a spring; in others such as the Hartung the revolving weights are directly connected by a spring without the aid of oblique arms. When the governor is in equilibrium at speed (ˆ, each ball is acted on by the forces shown ; for brevity we shall suppose the arms to be of negligibly small mass. Then

T cos Q = T C05 ˆ -i-w w

(r + r) 0 = —

w ro)”ˆ w

2 r’ = - : -

g sin 0 cos g

If the sleeve weight is IV then 2T’ cos <I> = W

W

whence — rw2_ g When the speed

increases or decreases the sleeve tends to move up or down and a friction force F acts at the sleeve to oppose the motion. Fric¬ tion F will consequently permit a certain change in speed Ao without a change in configuration,

IV

Hence — r {o) ± Aw)2 = {w F) tan a

S.

which by the previous equation becomes

w

— r (2 w A o -f-A o2) tan g

g

where Aw is the change on each side of mean speed which the governor will allow without acting. If 2Aw is less than the fluctuation within a cycle the governor is too sensitive to be useful. Suppose now that the speed changes by more than Aw, increases, say, from w to w'; the balls will fly outward and the sleeve will rise. Unless the sleeve load is sufficiently in¬ creased, as in the spring-loaded form, the sleeve will overshoot the position corresponding to and oscillations will be set up. We are dealing only with the statical theory ; for a discus¬ sion of the kinetic theory consult Lecornu, ˆDynamique appliqueeˆ (1908) ; Kroener, ˆDie Geschwindigkeitsregler der Kraftmaschinenˆ (1912), and for an exhaustive treatment, Tolle, ˆDie Regelung der Kraftmaschinenˆ (1910). But the rise of the sleeve is accompanied by the work of operating the valve; this produces an average force P on the sleeve, P being called the effort. The work done by P is usually called the power of the governor, but powerfulness is a better name, because ®powerˆˆ is used in a different sense in mechanics. Sensitiveness is measured by the rise or fall of the sleeve for a given percentage change in speed. A gov¬ ernor is stable when each configuration corre¬ sponds to a definite speed and vice-versa. When equilibrium exists for only one speed the governor is isochronous and is then infinitely sensitive. Isochronism will obtain when the balls are so linked that they rise and fall in parabolic paths; it is not desirable, since it causes hunting.

The functioning of a governor is exhibited most clearly by means of diagrams. The ki¬ netic reaction exerted by the balls of any cen¬ trifugal governor is called the controlling force and is denoted by C where C — mrojˆ, m being the mass of the two balls. Now plot C as ordinate and r as abscissa; the curve, Fig. 11, so obtained is the characteristic and was sug¬ gested by Hartnell (Proc. Inst. Mech. Eng. 1882) and developed by Tolle (Zeit. d. Verein deut. Ing. 1895). For the Porter governor C is twice the value of w rwˆ/g given be¬ low Fig. 10. Friction is omitted. The power or powerfulness is by definition, see above, the area under the C curve. The properties of the characteristic are usually stated without suffi¬ cient proof ; the necessary details are as fol¬ lows. From C = mro2

dr

C

— - h 2wrw

r

dw

dr

If o is constant for all values of r the gover—

d C C

nor is isochronous. In this case-T-‘= — and

dr r

the locus is a straight line through the origin. If r increases with increase of w the sleeve is lifted and reduces the power input. Then since do *dr is positive, dC*dr'y C/r whence the condition for stability is that the slope of the characteristic curve at any point must be larger than the slope of the line through that point and the origin. If r decreases for an in¬ crease in o then do/ dr is negative and dC/dr C/r, which implies instability. The coefficient of fluctuation of speed can be found from Fig, 11. Let C correspond to the normal

Fig. It.

configuration at mean speed, and Ci and C2 to the extreme speeds. Draw a vertical at any point and radii through Ci, C, C2 to cut it at Ci, c, C2. If b is the abscissa to the vertical, c = 6m and as o=(o)2-- of) /2 approximately, the co¬ efficient of fluctuation is

Ci - Cl _ 6>f - o\ 6>2 - Oi

C oˆ 0)

We have excluded friction; its effect is to shift the characteristic up or down as the balls fly out or in. The controlling force at the balls produces an effort P at the sleeve where there is also a static force A' due to the load or spring and the power regulating mechanism. L. Rith (Les Regulateurs a force centrifugal. Memoirs de la Soc. des Ing. Civ., September 1905, No. 9) plots the (P, o2) and (S, oˆ) curves for several positions of the 'balls. These loci are all straight lines and are useful in studying the behavior of a governor. Consult Dalby, ˆ Steam Power> (§ no, 1915) for the details.

Richard F. Deimel,

Assistcint Professor of Mechanics, Stevens

Institute of Technology.

DYNAMITE (from Greek dynamis, power), an explosive invented by Nobel in 1866 and originally consisting of infusorial silica or

diatomaceous silica, called <ˆkieselguhr,» and nitroglycerin. The kieselguhr, being composed of the siliceous skeletons of micro-organisms, is a very fine, dry powder with a great capacity for absorbing and holding liquids, and it will absorb and retain three times its own weight of nitroglycerin, so that the product contains 75 per cent by weight of the nitroglycerin, and is known as dynamite No. 1. Other grades are made by adding less nitroglycerin to the absorb¬ ent or dope. The name has now been extended to cover a great variety of pulverulent or plas-

tic solid mixtures of which nitroglycerin is a component.

Dynamite is fired by means of a detonator or blasting cap. As the percentage of nitroglycerin in dynamites with inert bases is reduced, they become more difficult to detonate until when the nitroglycerin is below 30 per cent they can¬ not, according to Howe, be detonated at all. This does not hold true for dynamites with active bases. Dynamite is usually put up in cylindrical brown paper wrappers, closed at each end and coated with paraffin. These cartridges or ˆsticks,® as they are called, are usuallv from one to two inches in diameter and eight inches long, and they are packed for transportation in sawdust in wooden cases, there being 50 pounds in each case. The sticks are paraffined to pre¬ vent water reaching the dynamite, as this drives, the nitroglycerin out of the kieselguhr dyna¬ mites and dissolves the nitrate of soda in the nitro-lignin dynamites, thereby diminishing their efficiency. Good dynamite is of about the con¬ sistency of fresh mold. It varies greatly in color according to the absorbent used, magnesia pow¬ der being snow white, kieselguhr dynamite No.

1 pearl gray to red, carbo-dynamite black, the lignin dynamites about the color of coarse brown sugar. There is usually a little sodium, calcium, or magnesium carbonate, mixed with the dope. Dynamite keeps as well as the nitroglycerin, from which it is made. It is safer than the lat¬ ter, because it avoids the liquid state, while from its softness it will bear blows better. Its sensitiveness to blows increases very rapidly with the temperature, so that, according to Eissler, ˆ‘ˆat

350° F., the fall upon it of a dime will explode it.® At ordinary temperatures it may be exploded by firing musket balls into the mass. The firing point of dynamite is about 180° C. (356° F.), and at this temperature it either burns or explodes. If free from all pres¬ sure, jar, vibration, or force of any kind, it burns; otherwise, it explodes. If a thin layer be placed on a plate of tin and heated over a burner the nitroglycerin volatilizes or takes fire. If the layer is of any considerable depth, say over a quarter of an inch, it explodes. This is a dangerous experiment. When heated to any temperature less than this, it is exploded by a detonator, blow, jar, or vibration with an ease dependent on the temperature and time of ex¬ posure. When ignited in comparativelv small quantities dynamite simply burns away fiercely, but with moderate and larger amounts ignition causes explosion. To safely destroy dynarnite it should be treated with a solution or emulsion of an alkaline sulphide such as the spent lime from gasworks. High temperatures, much be¬ low the ignition or explosion temperature, cause the nitroglycerin to exude, or in technical terms, ˆffhey will make the powder leak,® hence a dynamite should be made to resist exudation at the highest temperature to which it may be exposed.

Dynamite freezes at about 40° F., and re¬ mains frozen at temperatures considerably ex¬ ceeding this. If solidly frozen it cannot be detonated except with great difficulty and uncer¬ tainty, but if loose and pulverulent it may be de¬ tonated, though the efficiency is much dimin¬ ished, hence when frozen it is practically useless as a blasting agent, and must be thawed or ˆtempered® for use. This operation requires great care and the instructions issued with each

case should be closely followed. Many persons suppose that since cartridges of unfrozen dyna¬ mite may sometimes be set on fire and burned without exploding, it is safe to warm it upon a shovel, or in an oven, or to boil it over a stove, or in various other ways which usually lead to a verdict of ˆˆaccidental death.® It cannot be too strongly impressed upon the minds of those handling it that if dynamite or other nitro¬ glycerin preparations are gradually warmed up to a temperature approaching their explosion temperatures they become extremely sensitive to the least shock or blow, and once that point is reached they do not simply ignite, but they ex¬ plode with great violence, and further that, owing to the poor conductivity of the mass, a portion of it may become raised to this tem¬ perature and explode the whole.

Dynamite has a specific gravity of 1.5 to 1.6. In his earlier experiments with absorbents Nobel in 1863 placed gunpowder in a zinc case and filled the interstitial spaces with nitroglycerin. This might be called a dynamite with an active base, but that the nitroglycerin was greatly in excess of that existing in dynamites. See Ex¬ plosives; Nitroglycerin; Powder.

Charles E. Munroe,

The Columbian University, Washington, D. C.

DYNAMO ELECTRIC MACHINERY.

See Electric Machines ; Generators, Electric.

DYNAMOMETERS AND THE MEAS¬ UREMENT OF POWER. In designing a modern industrial plant or manufactory and in estimating the amount and cost of power for its operation, an accurate knowledge of the amount of power absorbed by the different ma¬ chines is not only desirable, but essential to economy and efficiency.

If the power required is not known the engine or motor provided may prove incapable of doing the work; or, on the other hand, the motive power may be largely in excess of that required : in either case there is an unnecessary expense — in the first case, in remedying the deficiency; and, in the second, in the daily ex¬ penditure for excess of power to overcome fric¬ tion and other losses. If a more accurate knowledge of the power required to drive machine-tools were known, there would be a greater economy in running them. Moreover, the increasing use of electric motors and in¬ ternal combustion engines for various purposes has created a demand for accurate determina¬ tions of the power developed so that exact methods must be employed in measuring the power.

The attempt to determine the amount of horse power given up by a motor, or required to operate a machine, by considering the velocity and width of belt used in a similar machine is futile and very misleading results are ob¬ tained; for while this method will give a close approximation to the amount of power a belt of a given width ought to transmit at a given velocity, there is nothing definitely known about the actual stress in the belt, therefore there cannot be anything definitely known about the power transmitted by it.

The only satisfactory method of ascertaining the amount of power is by the use of some form of dynamometer — by which is meant an in¬ strument or machine for measuring the power

exerted by a prime mover, or the amount of power consumed by a machine or group of machines. Among the many machines and de¬ vices for measuring power one of the simplest

is the Prony friction brake. Primarily this consists of a lever L, Fig. 1, connected to a revolving shaft or pulley in such a manner that the friction induced between the surfaces in contact will tend to rotate the arm in , the direc¬ tion in which the shaft revolves. This rotation

lever is maintained in its horizontal position, while the revolutions of shaft per minute re¬ main constant. That this measure of the fric¬ tion is equivalent to a measure of the work of the shaft will be seen when one considers that the entire driving power of the shaft is ex¬ pended in producing this friction at the required number of revolutions per minute — and this driving power is equal to the mechanical effect of the shaft when running at the same speed in the performance of useful work.

A regulator or dash-pot attached to the end of the lever-arm or scale-beam may be used with the Prony brake — and other various forms of dynamometer in which the pressure is weighed, in order to maintain a more even balance and to prevent vibrations and sudden shocks due to momentary slip of the belt or inefficient lubrication of the brake.

Instead of hanging weights in a scale-pan, as in Fig. 1, the friction may be weighed on a platform-scale ; in this case the direction of

is balanced by weights P, hung in the scale-pan at the end of the lever. A counterpoise attached to the brake-arm is often used in order to balance it before adding weights in the scale-pan. If not balanced, the

weight of the lever-arm must be ascertained and its moment added to the total moment of the weight to obtain an accurate measure of the friction. In order

rotation being the same, the lever-arm will be on the opposite side of the shaft as shown in Fig. 2.

This brake consists of a flexible metal strap to which are fitted blocks of wood forming the rubbing surface; the ends of the strap are con¬ nected by an adjustable bolt clamp, by means of which any desired tension may be obtained. A small stream of water constantly discharges

Fig. 3 — Alden Brake.

to measure the power for a given number of revolutions of pulley, weights are added to the scale-pan and the bolts tightened, until the friction induced balances the weights and the

into the pulley rim which is provided with in¬ ternal flanges; a waste pipe p, with its end flattened, is so placed in the trough that it acts as a scoop, and removes all surplus water.

The horse power or work of the shaft is determined from the following: Let W = work of shaft in foot-pounds per minute, equals work absorbed per minute ; P = unbalanced pressure or weight in pounds, acting on lever-arm at distance L; L = length of lever-arm in feet from centre of shaft; V=' velocity of point in feet per minute at distance L, if arm were allowed to rotate ; N = number of revolutions

per minute; H. P. = horse power. Then will W = PV = 2 L N P; therefore since

2:r L N P.

H. P. =

PV

If L

H. P. will equal NP

33,000

33 then H, P. will equal

33,000

1,000

Fig. 4 — Section of Alden Brake.

It will be evident that leather belts and ropes may be used as friction brakes to absorb the

power of a shaft or mo¬ tor. In such cases it be¬ comes necessary to ascer¬ tain the back tension in the belt or rope and sub¬ tract this from the total weight or pull on the other side.

A disc absorption-dy¬ namometer, by which any desired constant load can be maintained on the en¬ gine, or motor, is the in¬ vention of Mr. George Alden, of Worcester, Mass. This dynamome¬ ter is essentially a fric¬ tion brake in which the pressure causing the fric¬ tion is distributed over a comparatively large area, thus giving a low intensity of pressure between the rubbing surfaces.

This friction is produced by the pressure of water acting upon two copper plates in con¬ tact with a smooth cast-iron disc, keyed to the shaft which revolves in a bath of oil between the plates. These latter are secured by a water-tight joint to a cas¬ ing which does not

revolve, and to which is bolted a lever-arm carrying weights as in an ordinary Prony brake. The shell or casing is so constructed that it permits an equal pressure upon both sides of the disc — a sufficient quantity of the water being allowed to pass through the machine to carry off the heat due to the energy absorbed.

An interesting application of the Al¬ den brake has been made in the Experi¬ mental Laboratory of Purdue University by v/hich the power of a locomotive is absorbed. In this arrangement. Fig. 5, the locomotive is mounted with its drivers upon heavy supporting wheels free to revolve in either direction by contact with the drivers : the prolonged axles of the supporting wheels are each provided with a large flat cast-iron disc keyed to the shaft and allowed to rotate in a closed case between plates of copper, which can be forced against the rotating disc by hydraulic pressure as in the Alden dynamometer. The locomotive is free to move forward or backward only through a verv small dis¬ tance (about a quarter of an inch), its

tendency to motion in either direction be¬ ing measured by a system of levers and weights connected to the draw-bar by which the traction of the engine can readily be weighed. Any desired load and speed can be maintained by means of the friction brakes which are bolted securely to stone foundations

— in this respect differing from the Alden dynamometer, which is free to rotate through a small arc. A modification of this mounting has been constructed for use in the railway laboratory of the University of Illinois. In this case there are eight supporting wheels arranged on four shafts each provided with a brake at both ends of the shaft. These brakes contain three cast-iron discs which run between copper plates arranged as in the Alden brake. Each of the eight brakes is capable of absorbing 450 horsepower.

Another form of absorption dynamometer is that of Froude originally designed to measure the power of large marine engines. The re¬ sistance in this dynamometer is obtained by the reaction of a series of fluid jets maintained at a high velocity by a modified form of turbine which revolves in a casing filled with water, both turbine and casing being mounted on the end of the screw shaft in place of the propeller

— the turbine revolving while the casing is dynamometrically held stationary. In a dyna¬ mometer of this type the reactions which tend to stop rotation of the turbine and give motion to the casing vary as

the square of the speed of rotation of the shaft to which they are attached; and, further, by comparing two similar but differently-dimensioned turbines, the respective moments or reaction for the same speed of rota¬ tion will be found to vary as the fifth power of their respective diameters.

An earlier form of hydraulic brake was an ordinary centrifugal pump, the resistance to ro¬ tation being regulated by a valve placed in the outlet pipe. This apparatus was rather cumber¬ some, particularly at low speeds, and the range

Fig. 5 — Locomotive Testing.

and method of regulation were not very satis¬ factory.

The present type of Froude dynamometer which is almost universally used in England for factory purposes, consists of a rotor revolving in water contained in a casing, suitably mounted on friction rollers, and connected to a water

supply. The rotor is fixed on the shaft, which projects on either side of the casing, so that the engine or motor to be tested may be readily coupled to it. Motors running in either direc¬ tion can thus be tested by coupling to either end of the brake shaft. Each face of the rotor is formed with a semi-elliptical annular channel divided into a number of compartments by means of oblique vanes. The corresponding faces of the casing are also formed with similar channels divided in the same way. When in action the water in each annular channel is ro¬ tated continuously by the centrifugal force im¬ parted to it by the rotor, and passes consecu¬ tively from one compartment into the next. An extremely high speed of rotation of the water may thus be obtained and the power put into the dynamometer is by this means converted into heat which passes away in the water leaving the machine. Incidentally it is interesting to note that Osborne Reynolds

used one of these dynamometers to check the mechanical equiva¬ lent of heat and found it to equal 778 foot¬ pounds — the value now in use. The motion of the water causes the rotor to react on the casing, which tends to turn on the friction rollers. This is prevented by means of an ex¬ tension arm, working between stops, at the end of which are the balance weights.

The Alden friction brake and the Froude hydraulic brake suggest another form of dyna¬ mometer especially useful for absorbing the power developed by high speed machinery such as steam turbines. This machine, which was designed by Prof. J. B. Webb, consists of a series of steel discs, such as old circular saws, connected to a rotating shaft having separating washers between the discs. The shaft and discs rotate within a fixed casing to which a series of annular discs is secured in the rim ; these are so spaced that they alternate with the rotating discs on the shaft but are not in contact with them. The casing is filled with water which acts as a drag and tends to rotate the stationary discs and hence the casing. The tendency to rotation can readily be determined by placing weights upon an arm attached to the casing from which the power of the tur¬ bine or other motor may be found by the usual methods. The temperature of the water may be regulated as desired by controlling the flow through the dynamometer.

All of the preceding dynamometers absorb the power delivered to them ; in order to trans¬ mit the power from a prime mover or other source, to a machine or group of machines, some form of transmission dynamometer must be used.

Morin, one of the early users of dyna¬ mometric apparatus, gave as the requirements of a dynamometer the following :

®First. The sensibility of the instrument should be proportioned to the intensity of efforts to be measured, and should not be liable to alter¬ ations by use. Second. The indications of flexures should be obtained by methods inde¬ pendent of the attendance, fancies or prepos¬ sessions of the observer, and should conse¬ quently be furnished by the instrument itself, by means of tracings, or material results^, re¬ maining after the experiments. Third. We should be able to ascertain the effort exerted at each point of the path described by the point of application of the effort, or, in certain cases.

at each instant in the period of observations. Fourth, If the experiment

from its nature must be continued a long time, the apparatus should be such as can easily determine the total quantity of work expended by the motor.^^

To meet these conditions Morin made the spring-dynamometer, in order to obtain the magnitude of a force, as for instance, the trac¬ tion of a horse on a loaded wagon or canal-boat.

In this dynamometer a force was measured by the flexure produced by it on two springs connected at their ends and loaded in the mid¬ dle. The force is applied at the centre of spring, and its magnitude is determined by the increase of the distance between the two springs when one of them is attached to its load at the centre. In order to meet the second, third and fourth requirements Morin designed a self¬ registering recording dynamometer, by which the work performed was traced upon a continuous roll of paper set in motion by suitable wheel-work. Such dynamometers are in^. use at the present time to determine the tractive efforts of animals or gas tractors in the field or with loaded wagons on roads of different character.

When required to determine the force of rotation of a shaft or nulley this form of dyna¬ mometer requires modification; the essential features, however, remain the same. In this case a pulley, free to rotate on a shaft, is con¬ nected to it by means of two parabolic springs which are fastened to the shaft and also to the rim of pulley. These springs turning with the shaft deflect more or less, according to the re¬ sistance encountered, and when the resistance to bending overcomes the resistance of the machine, motion is transmitted through the springs to the pulley and thence to the machine under load.

Using the same notation previously given, and substituting R — radius in path in feet — for, L the work done is W = 2 tt RNP ; where P = resistance overcome in the machine driven by the dynamometer. P can be readily ascer¬ tained when deflection of spring is known.

Another form of transmission dynamometer, sometimes called the differential dynamometer, has long been in use. In this machine it is as¬ sumed that it requires as much power to hold a weighted radius arm horizontal as it does to lift the same weight through the distance which would be traversed by it in any given number of revolutions if rotated in the circle and in the time required for such number of revolu¬ tions, This it will be seen is similar in prin¬ ciple to the method used in determining power by means of any friction brake, or absorption dynamometer ; but while the latter absorbs the power, the

differential dynamometer measures or weighs the power transmitted through it.

Still another form of transmission dynamom¬ eter by which the tendency to rotation is weighed is that designed hy Prof. S. W. Robinson. ˆ This machine consists essentially of a supporting frame, or pedestal, a T-shaped arm carrying the driving mechanism, and a graduated scale or weighing apparatus. In use, the lower pulley of the dynamometer is belted to the machine to be tested, while a second belt connects the upper pulley with the one on the power shaft. The two pulleys of the dyna¬ mometer are mounted on a strong cross-tree bar so that they both overhang and can be

swung around to any position. These pulleys have each a gear on the end of the hub, both of which mesh into a smaller gear between, the latter being supported on a pin made fast as a crankpin in an arm attached to a shaft which passes through the centre of the hub of the cross-tree. To the opposite end of this shaft the poise-bar is made fast by a set screw in a boss to which the poise-bar is secured. As work is transmitted from one pulley to the other through the intermediate gear on the crankpin, the latter will be thrust to one side with a force proportional to the effort trans¬ mitted; this tends to tip the poise-bar which is prevented by adding weights. The equilibrat¬ ing weights on the poise-bar, together with the speed, furnish data for calculation of the work being transmitted.

The Briggs and Tat-ham dynamometers are well-known forms of belt dynamometers but these are now seldom used since in most forms of belt dyna¬ mometers there is a tendency of the belt to produce excessive vi¬ bration at high speeds which causes very ir¬ regular readings. Not¬ withstanding this dis¬ advantage, the belt dynamometer may be very satisfactorily used in certain cases.

It is quite feasible to measure the power transmitted to a ma¬ chine or given out bv a motor by supporting the machine upon trun¬ nions and directly weighing its turning effect. This method of supporting a

machine on its trunnions and determining its torque has been utilized' by the Sprague Electric Works in the design of an electric dynarno-meter, for testing auto¬ mobile and other motors, which consists of an electric generator supported on its bearings and connected by a flexible coupling to the motor to be tested. The pull is weighed di¬ rectly on a scale-beam which can be .calibrated with great accuracy. By weakening the field of the dynamometer the speed of the engine under test and the dynamometer can be varied and in this way values obtained for plotting the power curve of the engine. With this form of dynamometer it is possible to return the gen¬ erated energy into the shop line'instead of wast¬ ing the power as is usual with dynamometer work. It is to be noted that in this machine the electrical readings have nothing to do with the measurement of power. In this respect it differs from an ordinary electric motor which may be used as a dynamometer with a very high degree of accuracy, where suitable current is available, provided^ the motor be properly calibrated and the efficiency factor thus obtained

used in determining the power transmitted to the machine to be tested.

In the Brackett cradle dynamometer the torque is determined by suitably mounting the machine to be tested upon a swinging platform suspended from knife-edges and supplied with a scale-beam and sliding weight ; the tendency of the driving belt to rotate the machine may be weighed on the scale-beam, and this will give a measure of the power when the speed is known. This dynamometer consists essentially of a strong stiff platform, furnished with two rigid uprights carrying steel knife-edges from which the platform is suspended. These knife-edges rest upon firm supports bolted to the floor and so constructed that a slight swinging mo¬ tion is allowed to the platform upon which the machine to be tested is mounted. To one of

the swinging uprights, near the knife-edge, is fixed a graduated horizontal lever which car¬ ries a sliding weight. Adjusting screws are provided, by means of which the axis of rota¬ tion of the armature of any given machine may be made to coincide with the axis of oscillation of the cradle, viz., the line which passes through the two knife-edges. In this way machines of various makes and sizes can

readily be put in position and their data determined. It is obvi¬ ous that the cradle dynamometer can be used to measure the work absorbed by any machine which can be conveniently mounted on the swinging platform.

Among other forms of dynamometer not already discussed is the Emerson power-scale — an instrument which is connected directly to the revolving shaft without the interposition of belts, except that used to drive the shaft itself. The machine in principle is a rotary scale, and its construction closely resembles the well-

Fig. 6 — Brackett Cradle Dynamometer.

known Fairbanks platform-scales. This dyna¬ mometer is largely used in cotton-mills to deter¬ mine the power consumed by the individual machines, and when used with care forms an excellent instrument for the purpose, being self-contained and readily applied. In this machine

the pulley which receives the power is loose on the shaft, and is connected with the latter by means of a spider which is keyed to the shaft, the hub of the spider forming one of the guides to the position of the pulley. Around this spider is a loose rim from which studs project and serve to connect it to the pulley. In trans¬ mitting power from the shaft to the loose pul¬ ley the tendency of the rim to rotate on the spider is resisted by a system of levers which communicate with a pendulum balance-weight.

Another form of shaft-dynamometer is the power meter devised by Franklin Van Winkle. This is a rotary transmitting dynamometer shown in Fig. 7, in which helical pull-springs are employed for weighing the amount of force transmitted from the driving to the driven por¬ tion of the dynamometer. This instrument is especially

adapted for adjustment to any shah or pulley for measuring power transmitted by a shaft to a pulley, or vice versa, -in this respect resembling the Emerson power-scale.

A portable d3mamometer capable of giving a continuous autographic record, designed by the writer with especial reference to the meas¬ urement of power required to drive machine tools, is illustrated in Fig. 8. <

In its latest form, this machine consists essentially of three pulleys carried by a hollow shaft which runs upon roller bearings mounted on a stiff frame as shown. The pulley on the right is fixed to the shaft and may be used for the belt which connects the dynamometer to the machine to be tested, or it may be used for a brake-band ; the middle pulley is an idler and runs loose on the shaft; while the one to the left receives the driving belt and is free to

turn only within given limits. This latter pul¬ ley is connected to the shaft through the hydraulic cylinders and cylinder carrier. The cylinders and shaft are filled with oil, so that any resistance to turning produces a pressure in the cylinders. This pressure is transmitted by the oil through the hollow shaft, and is recorded by the movement of an indicator-piston which is fitted into the end of the shaft ; the pres¬ sure is also shown by the gauge at the opposite end. In addition to the force curve traced by the indicator pencil, the zero or datum line is traced by another pencil which is adjustable in position and may be located at pleasure on a line parallel with the axis of the shaft. Thus one is enabled to measure the total power required to run a given ma¬ chine or any subdivided part of it. Springs of various intensities are used to transmit the pressure from the shaft to the indicator pencil, de¬ pending upon the pressure to be recorded. These springs are changed as in any ordinary steam engine indicator. One of the interesting features about this machine is its adaptability to either transmit or absorb power. In either case an autographic record is traced upon a roll of paper which can be stopped or started at pleasure.

An examination of a diagram from this dynamometer shows that the power required to drive the machine empty can readily be determined if desired, for all that is necessary is to run the machine at the same speed without

Fig. 8 — Flather Transmission and Absorption-Dynamometer.

any pressure on the cutting tool, and the re¬ sulting diagram will give a measure of the work. The same is true of the power required

Fig. 7 — Van Winkle Power Meter.

to opergitc the feed mechanism of the machine, or the dynamometer itself. The actual value of the power is obtained by methods which will be obvious.

For many years the attention of engineers and power users has been directed to the practicability of using the twist or torsion in a shaft as a means of determining the horse power transmitted by it. When power is ap¬ plied to one end of a shaft the amount of twist varies directly as its length, directly as the rnoment of the applied load, inversely as the rigidity of the material, and inversely as the fourth power of its diameter all of which is

expressed in the formula or. for

TT G

hollow shafts e =

the angular displacement in radians, M< = twist¬ ing moment in inch-pounds, L = length of shaft in feet, G = the modulus of rigidity, or modulus of transverse elasticity, D = outside diameter of shaft and d= inside diameter if hollow, both taken in inches. Various methods have been developed for determining the magni¬ tude of the twist in the shaft by means of tor¬ sion metres or torsion indicators, most of which have been designed with especial reference to marine service. The rapidly increasing use of steam turbines in ships and the necessity of determining the power of the turbines — for which the steam engine indicator is not adapted — has created a demand for an accurate, easily operated torsion dynamometer, since the use of some form of torsion meter is the only known method of obtaining the desired in¬ formation. The principle of operation in gen¬ eral consists in the observation of the twist between two given points on the shaft and this has been frequently accomplished by means of beams of light in combination with. rotating discs ; in other cases electrical observations are used to determine the distortion : in any case the horse power is obtained from: H. P. =

D*N ...

0 in which 0 is the angle of twist in de¬

grees, D = diameter of shaft in inches, N = revolutions per minute, L = length of shaft in feet between which 0 is determined, and C = a constant depending upon the modulus of transverse elasticity, and other numerical factors.

It should be noted that tensile tests and per¬ centages of elongation of the metal are of little use in obtaining the transverse modulus of elasticity. This modulus may vary in apparently identical shafts all the way from 11,500,000 to 12,500,000 so that in order to obtain accurate results the modulus for each shaft must be separately determined.

The Bevis-Gibson flashlight torsion meter will serve to illustrate the general method of determining the power exerted by a propeller shaft. Two blank discs are mounted on the shaft at a convenient distance apart. Each disc is pierced near its periphery by a small radial slot, and these two slots are in the same radial plane when no power is being transmitted and there is no twist on the shaft. Behind one disc is

fixed a bright electric larnp masked, but having a slot cut in the mask directly opposite the slot in the disc. At every revolution of

the shaft therefore a flash of light is projected along the shaft toward the other disc. Behind this disc is fitted the ^torque finder,® an in¬ strument fitted with an eyepiece and capable of slight circumferential adjustment. The end of the eyepiece next its disc is masked except for a slot similar and opposite to the slot in the disc. When the four slots are set in line, a flash of light is seen at the eyepiece every revolution, and if the shaft revolves qiiickl}'- enough the light will appear to be continuous. This effect is apparent at anything over 100 revolutions per minute. At lower speeds the flash is seen to be intermittent, but this in nowise affects the accuracy and reliability of the result. At each end of the shaft section, therefore, there exists what is virtually an in¬ stantaneous shutter fixed directly to the shaft, and the only connecting link between the discs is the beam of light which flashes once in each revolution clear through the two shutters. Sup¬ pose the shaft to be transmitting power. One disc lags behind the other by a definite amount, and although three of the slots are still in line the one in the lagging disc is not in line and

Fig. 9 — Torsion Dynamometer.

therefore effectually breaks the flash and no light is seen at the eyepiece. To pick up the light again the eyepiece of the torque finder must be moved by an amount equal to the cir¬ cumferential displacement of the lagging disc. This is accomplished by manipulating the micrometer of the torque finder on which is a scale and vernier graduated in degrees. While the scale is fixed its vernier moves with the eyepiece, and the graduations are so marked that by the aid of a simple microscope con¬ veniently hinged, differences of 1/100 of a degree can be readily discerned. For shafts of ordinary size the scale is set at 14.325 inches radius from the centre of the shaft, so that the degrees are j4-irich apart. Since an ordinary shaft twists 1 degree in 10 feet at full power it is quite possible to get the shaft horse power to within 1 per cent of full power; but as it is frequently possible to fit the discs 40 or 50 feet apart even this accuracy may be improved upon, and the power determined to within ^ of 1 per cent of full power.

One type of the torsion dynamometer de¬ scribed by Amsler is

illustrated in Fig. 9. In

this form it is intended to he coupled directly by its flanges between the driving and driven shafts. It is also made, however, to receive and transmit its power by belt, in which case the dynamometer is provided with a belt pulley at each end. The two flanges are coupled to¬ gether by a central shaft G capable of trans¬ mitting all the power without being stressed beyond its elastic limit. The flange at the end H carries a disc M, to the outer edge of which an engraved celluloid scale U is at¬ tached. From the flange at the end F a tube A extends toward the other end and is carried by a ballbearing within the flange at H. This tube carries two discs N and O, in each of which slits T and P are cut. A lamp is hung be¬ hind the scale and a mirror may be arranged, as shown, to facilitate the reading.

It will be understood that when the shaft twists under the influence of the power trans¬ mitted the scale U moves relatively to the line through the slits PT. With each revolution of the shaft, therefore, a momentary glimpse of the scale division is seen by the eye at Q as the slits PT cross the line of sight. If the speed be sufficiently great and the torque con-

cast in halves so that it can be bolted together around the shaft; the head section, or so-called stump, is provided with a standing arm and is securely bolted to the shaft and turns with it. The tube section carries a corresponding stand¬ ing arm which is free to rotate relative to the fixed arm within the limits of the angle of twist, the other end of the tube being fixed to the shaft. When the shaft is twisted the sleeve re¬ mains untwisted, so that the twist produces a relative but small movement between the arms of the stump and sleeve. This movement is multiplied by means of gearing at the end of the arms, and converted into longitudinal motion of a light aluminum traveler adjusted to run upon the outside of the sleeve. This is accom¬ plished by a flexible wire rope which passes around a pulley connected to the

shaft and secured at both ends to a drum on the multi¬ plying gear; the traveler is also securely fastened to the wire. All the wheels and pulleys are mounted on ball bearings, and are practically frictionless, so that when the shaft is revolving the ordinary vibration insures accuracy of position. The flange of the traveler is thus made to move along the tube by the twist im-Fig. 10 — Denny-Edgecombe Indicating and Recording Meter.

stant, a continuous impression is received of a given scale division. This reading, in conjunc¬ tion with the speed, gives data from which the power being transmitted is calculated. This type of dynamometer is usually made for speeds of about 4,500 revolutions per minute ; it has, however, been used in cases where the speed was as high as 8,500 revolutions.

In the torsion dynamometers just described the measurement covers the average angular displacement for a given load with fair accuracy but it is obvious that where reciprocating engines are used, and even with steam turbines, the torque undergoes various changes in a com¬ plete revolution; this is e.specially so when the shaft carries a propeller, in which case the com¬ plicated fluctuations cause irregular oscillations in the angle through which the shaft is twisted. To determine these variations in twist through¬ out a revolution various modifications of the torsion meter have been employed, by which instantaneous readings are obtained throughout a revolution. Several types have been arranged to record the twist graphically. Among these the Denny-Edgecombe torsion indicator merits attention. This instrument. Fig. 10, consists of a cast-iron sleeve made in two sections and

parted to the shaft. If this were measured directly, however, the result would be subject to serious error, for there always is some longi¬ tudinal movement of the shaft itself due to thrust or expansion. This is eliminated by means of a turned base or dummy flange cast upon the sleeve. The traveler flange is made to fit accurately against this base flange for setting in position, and is then drawn along the tube and secured to the wire rope at a con¬ venient distance from the base flange. The variation of distance between these two flanges will thus be an exact measure of the variation of torsion of the shaft.

An indicator is applied to these two flanges to further magnify the

movement and make it easily readable. If it be desired to obtain a permanent diagram, a recorder may be attached to the front of the indicator. This recorder has drums which are driven by means of small double-worm gears from the spindle of the wheel which runs on the base flange. Change gears, actuated by a small lever, are provided, so that the drums can be kept revolving in the same direction whether the ship is going «ahead» or ^^astern.® A diagram paper is thus made to move with the drums, upon which pens attached

to the fixed scale and to the movable rack, mark respectively a zero line and a torsion line. In addition to this a clock is fitted \vith an elec¬ trical arrangement for marking half seconds and another pen is provided which can be con¬ nected electrically with a make-and-break fitting on the revolution counter of the engine; a dia¬ gram of simultaneous revolutions per minute and torsion is thus obtained.

Another form of the Denny-Edgecombe tor¬ sion meter, especially useful for marine service with turbine or reciprocating engines, operates by transferring the movement electrically to an ammeter which may be fitted up in the engine room or in any part of the ship. Duplicate ammeters may also be fitted so that it is pos¬ sible to read torsioin simultaneously in the engine room, the chief engineer's cabin and captain's cabin. The instrument is a robust electro-mechanical combination which is as simple to read as a pressure gauge. By pressing a button the torsion of the shaft may be read immediately and the corresponding shaft horse power obtained from tables or charts.

John J. Flather,

Professor of Mechanical Engineering, Uni¬ versity of Minnesota.

DYNAMOTOR. See Motors and Dyna¬ mos.

DYNE, din (Gr. ^^poweE^), the unit of force in the centimeter-gram-second system of units. It is defined as the force that must be exerted

upon a gram of matter for one second in order to give it an acceleration of velocity of one centimeter per second. The attractive force that the earth exerts upon a milligram of mat¬ ter is somewhat different in different latitudes, but for the sake of illustrating the order of magnitude of the dyne, it may be said that at the latitude of New York a body falling freely acquires an acceleration of 980.266 centimeters per second. Hence the force of gravity at New York is equivalent to 980.266 dynes per gram of weight; that is, 444,641 dynes per pound. For many purposes the dyne is too small a unit for convenience, and a larger unit, called a ®megadyne® and defined as equal to 1,000,000 dynes, is often used in its place. It is com¬ monly expressed in the form, 10® dynes. In the English system of foot-pound-second notation, the unit of force that produces an acceleration of one foot per second upon a massˆ of one pound, known as the foot-pound (or in some textbooks as the ˆˆpoundaPˆ), is the equivalent of 13,825.5 dynes. See Force; Units of Meas¬ urement.

DYRRHACHUIM, dir-raki-um. See Dukazzo.

DYSART, di'zart, Scotland, seaport in the county of Fife, on the Firth of Forth ; 28 miles northeast of Edinburgh by rail. Dysart pos¬ sessed great importance in the I5th century, and was famous for collieries and salt-works. Shipbuilding and linen weaving are among the industries. Pop. 3,022.

DYSENTERY, a general term connoting a series of diseased conditions of the large intestine or colon (q.v.). These rnay be of an infectious, nervous or chronic inllammatory origin. At the present time, it is becoming

recognized that most cases of dysentery are due to different micro-organisms, and within recent years a bacillus has been described by a Japanese observer, Shiga, which is thought to be respon¬ sible for a number of the cases of dysentery, both in adults and in children. Certain mild cases of dysentery have been shown to be de¬ pendent upon the pernicious activities of certain bacteria belonging to the genus Proteus. And it has now been known for a long time that a certain lowly organized animal form, the Entamoeba, can induce a peculiar type of dysen¬ tery known as amcebic dysentery. Thus the dysenteries may be divided into (1) Animal parasite dysenteries: (a) Protozoa; (b) Pla-thelmint, Schistoma, etc.; (c) Nemathelminth ; (d) Arthropods. (2) Bacterial dysenteries.

The general mode of onset of dysentery of the non-amoebic form, that is particularly epi¬ demic dysentery, is rapid, with diarrhoea follow¬ ing perhaps a mild constipation or alternating constipation and diarrhoea with a mucous or serous discharge. Symptoms of indigestion fre¬ quently precede the attack, and it is character¬ istic that diarrhoea is accompanied with much wind. The fsecal movements are large, loose, very fetid and usually mixed with blood and mucus. The movements are accompanied with great pain of a colicky or gripy nature. Tenes¬ mus, or straining, is a very frequent symptom. There is usually much general pain, some rise in temperature, loss of appetite, nausea, restless¬ ness and irritability. In favorable cases formed faeces commence to reappear in the stools and there is disappearance of the griping and strain¬ ing. In the patients in whom the disease be¬ comes more acute, the passages become looser, watery, slimy and of a dark red color. The odor is mawkish, and in later stages may even become putrid. The fluid that is passed consists largely of an albuminous serum with epithelium blood cells, pus cells, tissue fibres and small sloughs, and if the disease becomes even more pronounced the stools become dark brown in color, with sloughs and blood clots, and have a distinctly gangrenous odor. These sloughs from the intestine usually indicate an extremely severe form of the disease and ofttimes the patient dies with completely relaxed anus, with subnormal temperature, shrunken features and in complete collapse.

Amoebic dysentery is, as a rule, a more grad¬ ual form of disease. It is extremely inter¬ mittent in its course and much protracted, run¬ ning on sometimes months and even years. It very frequently begins with painless diarrhoea, alternating with constipation ; the stools being loose and yellowish, containing much mucus and a little blood. The patient commences to lose flesh, becomes weak and aniemic, and the compli¬ cation of abscess of the liver is extremely com¬ mon. Chronic dysentery is a form of chronic colitis and can be found under that head. The treatment of dysentery consists in rigid hygiene and skilled medical attendance, as the different type of parasites must be recognized by the microscope and appropriate remedies for each type administered. See Amoeba ; Cholera ; Colitis; Enteritis; Enteroclysis ; Intestine; Parasitism and Animal Parasites.

DYSLYSIN (Gr. ˆfliard to dissolveˆU, yn amorphous, resinous substance, having the for¬ mula C24H;i.i03, and obtained from cholalic acid

by heating to about 600° F. or by prolonged boiling with dilute hydrochloric or sulphuric acid. It is soluble in ether, slightly soluble in boiling alcohol and insoluble in water ; and it is reconverted into cholalic acid by boiling with an alcoholic solution of caustic potash. It is found in small quantities in the contents of the large intestine of herbivorous and carnivorous animals, and also in their faeces, being in such case the result of bacterial processes upon the cholalic acid of the bile.

DYSMENORRHCEA, dis-men-o-re'a, pain¬ ful menstruation. To constitute dysmenorrhoea, the pain accompanying menstruation should be very distinct and persistent. Inasmuch as dys¬ menorrhoea is found accompanying a vast va¬ riety of abnormal conditions of the uterus and ovaries, it seems not improbable that this affec¬ tion has various pathologies, but may be asso¬ ciated with almost any abnormal condition within the generative apparatus of women. A vast variety of forms of dysmenorrhoea have been described, the most important of which seems to be that of obstructive dysmenorrhoea, or a mechanical form supposed to be due to some interference in the escape of the men¬ strual fluid. Those who suffer from dysmenor¬ rhoea are apt to be anaemic, which anaemia in itself may be a sufficient cause for the disease, fl'hey are apt to be extremely nervous and run down. Many cases of dysmenorrhoea are psychic in origin, how great a proportion it is impossible to say, but probably 25 per cent. A large group are due to under developed organs. Here endocrinous gland disturbances are to be found. Treatment should be directed to the supplying of the deficiency of the iron in the blood to overcome the anaemia, and the use of cod liver oil and other reconstructives for the anaemic forms and proper psychotherapy for the psychogenic types. The endocrinous types need internal glandular or opotherapy. Pronounced ovarian disease, usually found only in older patients, requires surgical therapy. Of the various drugs that have been used for the temporary treatment of dysmenorrhoea those that relax muscular fibres and arterial walls seem to give the best results. This is true of a number of the newer synthetic drugs that have been employed very widely of late. As no two cases of dysmenorrhoea are due to precisely the same cause, general directions for treatment would be out of place in a work of this char¬ acter, but rest in bed, free movements of the bowels and hot water in the form of hot-water

bags, or hot-water enemata, are very useful household remedies. See Menstruation ; Ovary; Womb.

DYSON, Edward, Australian poet; b. Morrison's Diggings, 4 March 1865. He has been in journalistic work since 1883. Among his published, works are 'Rhymes from the Mines' (1896) ; 'The Golden Stanty' (1898) ; 'Below and on Top' (1898) ; 'The Gold Steal¬ ers' (1901) ; 'In the Roaring Fifties' (1906), and 'Fact'ry 'Ands' (1907).

DYSPEPSIA is that combination of symp¬ toms that results from interference with the proper digestion of food in the stomach. Be¬ cause of the taking of too much food or un¬ suitable food, the mucous membrane of the stomach becomes irritated and there is set up an

acute or subacute gastric catarrhal condition which prevents the proper digestion of the food. This food is apt to ferment and to decompose, and as a result the familiar picture of acute dyspepsia may arise. In mild cases there may be nothing more than an uncomfortable feeling in the stomach, with a certain amount of de¬ pression, headache, loss of appetite and perhaps belching of wind and occasionally vomiting. There may also be accompanying intestinal symptoms, such as diarrhoea and colic, particu¬ larly in children. There may be only the fa¬ miliar heartburn, due to the over-dilatation of the stomach, from the excessive gases of fer¬ mentation or putrefaction. In the more severe cases, those that last over a day or two, the symptoms enumerated may be much more in¬ tense. The distress may be marked, and the general constitutional symptoms more evident. Vomiting, loss of appetite and mental depres¬ sion are much more pronounced. This is par¬ ticularly true of acute gastritis, due to the excessive use of alcohol.

Very frequently, from continued errors in diet, the acute or subacute condition may be¬ come chronic, so that there is a continual indi¬ gestion. Here the symptoms persist for an indefinite period, the appetite is very apt to be variable, although at times very good. Oppres¬ sion after eating, which may amount to actual pain, is one of the most constant symptoms. Occasionally the pain may be pronounced when the stomach is empty. Heartburn is frequent, if not constant, the stomach is painful on pres¬ sure, the tongue is coated, there is bad taste in the mouth, there are changes in the amount of salivary secretion. Frequent belching of gas is a very common accompaniment of chronic dys¬ pepsia, particularly of the flatulent variety. Here also the intestines suffer from distention. Nausea is more

pronounced, particularly in the morning hours, and vomiting is common in the morning. Constipation is usually present, although diarrhoea may alternate with consti¬ pation, and mental depression is almost char¬ acteristic. The treatment of acute and chronic dyspepsias constitutes one of the most difficult problems in modern medicine, particularly as few patients are willing to undergo the ordeals of a rigid dietary regimen. Most cases of dyspepsia can be cured if the diet is looked after, although each case needs careful con¬ sideration from the standpoint of causation. Proper eating and proper amounts of food are the two most important features in the treatment. Most people eat too fast and eat too much. If the food is taken slowly, observ¬ ing the old-fashioned rules of counting between mouthfuls and small amounts are taken, many patients suffering from indigestion can treat themselves with success. More than one-half of the dyspepsias are really mental in origin. They are produced by worry and by impatience, and are best treated by proper psychotherapy. One group of recurring dyspepsias which come on in attacks lasting a few weeks or a few months, with slight depression, are mild forms of a manic-depressive psychosis. These are amenable to psychotherapy also. They get well by themselves, but are apt to recur without proper therapy. As to the details of the dietary and as to the medicinal treatment of the condition, medical advice is absolutely necessary.

One of the most pernicious of all practices in the treatment of dyspepsia is the taking of many of the patent medicines which are so blatantly advertised in the religious and lay press. As most of these so-called tonics are hardly more than alcoholic beverages, it is evident that their use is not unattended with a great deal of dan¬ ger. The treatment of the constipation that is so frequent an accompaniment of chronic dys¬ pepsia by means of the many patent pills, pow¬ ders, teas and liquids is positively suicidal. See Constipation ; Enteritis ; Gastritis.

DYSPHONIA, roughness of sound; in pathology, a difficulty in speaking. The dis¬ order known as ^^clergyman’s sore throat® is a

common example. Rest of the vocal organs, tonics, muscular exercise, change of scene, are generally needed to aid recovery.

DYSURIA, dis-u'ria, difficult or painful urination, a symptom of temporary disorder, or of deep-seated disease. When dysuria is merely the result of a slight cold it can often be re¬ lieved by a dose of sweet spirits of nitre or linseed tea. Sometimes this symptom is the result of a stricture, or it may be caused by gravel, or stone, in which case the services of a physician should be obtained, and that with¬ out delay.

DYVEKE, dii've-ke, mistress of Christian 11 of Denmark: b. Amsterdam, 1491; d. 1517. She was the daughter of an innkeeper at Ber¬ gen and Christian met her for the first time in the inn of her father. She accompanied the king to Denmark in 1507 and was constantly with him for the 10 years following. She is one of the most romantic figures in Danish history and has frequently been celebrated in poetry and fiction as the victim of royal passion and the insane jealousy of the nobility, who resented her exaltation. She was poisoned by her ene¬ mies, but Christian allowed her mother to remain at court as his chief counselor for the remainder of his reign.

DZEREN, dze'ren, the %oitred® yellow antelope of China {Gazella or Procapra giittu-rosa), with unusually pale horns and a protrud¬ ing goitre-like crop in the males during the rutting season. It is indigenous to the deserts of Central Asia, China and Tibet, and is noted for its fleetness. The name ^^dzeren® is Mongolian.

DZIGGETAI, dzig'ge-ti, the native name for the Mongolian wild horse or wild ass (Asinus or Equus hemionus), also known as the Kiang (q.v.), and sometimes compounded with the Kulan (Equus or Asinus onager).

E

Ethe fifth letter of the English alphabet, as also of the alphabets of Greek and Latin, and of all the European lan¬ guages except those which, as the Russian, use the Cyrillian alphabet, where the E has sixth place The character corre¬ sponding to E in Hebrew and other Semitic languages, as Phoenician, Samaritan, Chaldaean, holds the same relative place in the alphabets of those languages. The form of the letter & in early Hebrew and early Phoenician was 3 and from that is derived the Greek E (epsilon), which is the Phoenician character reversed, with stem shortened and made perpendicular ; this character represented in the Hebrew and other languages of western Asia, not the vowel sound E but the soft breathing. Taken into the Greek alphabet it was at first used to represent the vowel sound e whether short or long; but after¬ ward the character H was employed in Greek for the long e and was called eta, while the E received the name epsilon. The Latins used the E for both the long and short vowel and adopted the H of the Greek alphabet to denote the aspirate. The name and sound of this letter in all European languages except English is eh, as in our interjection of inquiry: long e in those languages is invariably equal to a in 7tiate, and short e equal to e in met: the long E of English is in those other languages expressed by the third vowel, I : thus, English he, me, lee, would in those languages be written phoneti¬ cally hi, mi, li. In the standard alphabet em¬ ployed in linguistic science the vowels a, e, i, 0, u, are taken to represent the sounds ah, eh, ee, oh and oo, and are named accordingly. The letter E occurs in English words far more fre¬ quently than any other letter of the alphabet : compared with A, I, O, U, its frequency of occurrence is as 1,000 to 728, 704, 672, 296 re¬ spectively; compared with various other letters it is as 1,000 to 770 (/), 670 (n), 392 (d), 280 (c), 236 (/), 120 (b), 22 (x:). In frequency of occurrence as an initial letter it ranks only as eleventh and is to T as 340 to 1,194. One reason of the greater frequency of E in general use is that it often takes the place, in modern English words, of the vowels a, o and u of Anglo-Saxon words ; another reason is that final e is largely employed to lengthen the vowel of a preceding syllable, as in there, here, cape, pane: it is employed even where it serves no purpose of pronunciation at all, as in gone, live, give.

E as an abbreviation is used for East, editio, emeritus, and ergo; *e.g.* and e.c. for e.vempli gratia, and exempli causa.

In music E is the third tone in the key of C, and the fifth semitone in the chromatic scale. Consult Soames, ˆ Hntroduction to the Study of Phonetics,ˆ and Sweet, ˆHistory of English Sounds.ˆ See Alphabet.

E. C. SPORTING POWDER is a super¬ ficially hardened, soft-grained, smokeless sport¬ ing powder, consisting, according to an analysis by C. E. Munroe, of 53.57 per cent of soluble cellulose nitrate, 1.86 per cent of insoluble cellulose nitrate, 3.12 per cent of unconverted cellulose, 34.26 per cent of barium nitrate, 4.55 per cent of potassium and sodium nitrates, 1.17 per cent of volatile matter, and 0.55 per cent of aurine, the latter being an organic coloring matter, used to impart an orange color to the grains. The manufacture, as carried out by the Explosives Company, after the method in¬ vented by Reid and Johnson, consisted in plac¬ ing the moistened, pulped cellulose nitrates and metallic nitrates in ˆTarrels® where, by rotation, the ingredients were mixed and then broken up into rounded grains, which were dried and then sprayed with ether-alcohol which at first gelatinized the surfaces of the grains, and then by evaporation left a hard skin about the grains. The coloring matter was added in the solvent. The grains are then dried and passed through a sieve in order to separate any grains which have stuck together during the gelatinizing process. No. 2 E. C. powder con¬ tains a little camphor and is treated through¬ out the graining with ether-alcohol. This re¬ sults in a harder and denser powder which burns more evenly and yields a higher velocity than No. 1 powder.

E PLURIBUS UNUM, e ploo'ri-bus u'num (ˆˆone from many®), the motto of the United States; chosen for its Great Seal 10 Aug. 1776, by Franklin, Adams and Jefferson, as a com¬ mittee. It has been part of the motto of the Gentleman's Magazine, founded 1731 ; appar¬ ently taken by it from a sentence in Virgil's (?) ˆMoretum,ˆ ®color est e pluribus uniis."

EADMER, or EDNER, a mediaeval church man, historian of his own times and biogra¬ pher: he flourished in the 11th and 12th cen¬ turies; d. Canterbury, about 1124. He was a Benedictine monk and was the companion, counsellor and friend of Saint Anselm, Arch¬ bishop of Canterbury, whose life he wrote. He held a like relation to Saint Anselm's suc¬ cessor, Radulphus, or Ralph, till 1120 when, invited to Scotland by King Alexander I, he was nominated bishop of Saint Andrews ; but went back to his monastery because of a con¬ troversy having arisen over the king's right to nominate and the pretensions of the arch¬ bishops of Canterbury to primatial

jurisdiction over the bishops of Scotland, which pretensions Eadmer upheld. He was even wont to say that he would refuse the highest see in Scotland if he must divest himself of his character as a monk of Canterbury. He wrote ˆHistoria Novorum,ˆ that is, history of recent occur¬ rences of his own times. Besides the life of Saint Anselm he wrote the lives of three of

Anselm's predecessors in the primatial see — Saint Odo, Saint Dunstan and Saint Bregwyn ; also the lives of Saint Wilfrid and of Saint Oswald of York; all of which writings have been printed in Wharton, <Angla Sancta.> Consult Grub, ˆEcclesiastical History of Scot¬ landˆ (Edinburgh 1861).

EADS, edz, James Buchanan, American en¬ gineer: b. Lawrenceburg, Ind., 23 May

1820; d. Nassau, New Providence, 8 March 1887. He began as a clerk in a dry-goods house in Saint Louis in 1833, and then secured work on a Mississippi steamboat in 1839. He early designed some useful boats for raising sunken steamers, and in 1861, when called to advise the Federal government, constructed within 100 days eight ironclad steamers for use on the Mississippi and its tributaries. He after¬ ward built a number of other ironclads and mortar-boats, which were of considerable serv¬ ice to the North. He built an arch bridge across the Mississippi at Saint Louis 1867-74. His works for improving the South Pass of the Mississippi delta were successfully completed in 1875-79 ; and his great plan for deepening the river as far as the mouth of the Ohio by means of jetties has been demonstrated to be entirely practicable. A later suggestion, for the construction of a ship-railway across the Isthmus of Tehuantepec, attracted much atten¬ tion. In 1884 he received the Albert Medal of the Society of Arts, being the first American citizen to whom this honor had been awarded. Consult How, ˆJames B. Eadsˆ (Boston

1900).

EAGAN, Charles Patrick, American mili¬ tary officer: b. Ireland, 16 Jan. 1841; d. 2 Feb. 1919. In 1862 he entered the Union army as first lieutenant ; in 1874 was promoted captain and commissary of subsistence; in 1892, major; in 1897, lieutenant-colonel ; on 1 1 March 1898, colonel, and on 3 May following, brigadier-gen¬ eral and commissary-general. In January 1899, he made remarks concerning General Miles, in his testimony before the War Investigation Com¬ mission, for which he was tried by court-martial and sentenced to dismissal from the army. His sentence was commuted by the Presi¬ dent to suspension from duty and honors for six years. On 6 Dec. 1900, he was restored to duty and immediately afterward retired.

EAGLE, as a popular name, includes several raptorial birds which vary in some respects from the strictly defined groupˆ in which sci¬ ence has been wont to place it. The order Accipitres, to which it belongs, is broad enough in definition to include all the vultures, the typical eagles, and the buzzards. Recent osteo-logical demonstrations, however, have led to the separation of American vultures from the Old World vultures, including the latter in the family Falconidw, to which eagles and vultures belong. This family, which embraces 300 spe¬ cies of diurnal raptores, is characterized by imperforate nostrils, legs of medium length, and, except in the Old World vultures, a feathered head, a bill decidedly hooked, the hind toe inserted on a level with the three front ones, and the claws roundly curved and sharp. The sub-family Aquilince makes promi¬ nent the cutting edge of the upper mandible, the bony shield over the eye, the feet heavy and short, either scutellate or feathered. The Lam-mergeier (Gypaetus barhatus), lamb-killer, or bearded vulture of the Alps, the Pyrenees, and the Himalayas, finds its nearest affinity here. The AquilincE are naturally divided into two genera: Aquila, land eagles, and Haliaetus, sea¬ fishing eagles. The former is feathered to the toes, the latter half way to the toes.

The leading specimen of Aquila is the golden eagle {A. chrysaetus) one of the largest and most magnificent of its kind, dark brown with purple gloss ; head and neck brownish-yellow ; tail rounded and dark brown, ending in light and dark tints. The length is about three feet, the extent of wing seven feet. In North America its range is from Mexico north. It is very scarce in the United States but more abundant in Canada, where it is distinguished as canadensis. It is regarded as a variety of the European species, which seldom occurs in Eng¬ land, though more prevalent in Scotland, where the demand for its eggs has favored its in¬ crease. The nest is usually placed on some inaccessible

cliff, the eggs are spotted and do not exceed three. Closely allied to the golden eagle are the imperial eagle (A. mogilnik) of southwestern Europe and of Asia, and the king eagle {A. hiliaca) of the same range. The smallest of the kind is the dwarf eagle. (A. pennata) which measures less than two feet and is native in Southern Europe, North Africa and in India.

First in interest among the sea-eagles stands the bald-headed eagle {Haliaetus leucocephalus), selected as the national emblem of the United States. Its markings are familiar, though the term ˆffiald® is to be referred not to the absence of feathers, but to the effect produced by the white feathers on the head. In size, it_ corresponds nearly to the golden eagle, but it differs in its habits, living mainly upon the fish which it seizes along the seashore and around lakes and rivers. The nest is built on a high tree top or upon a rocky cliff. A finer specimen than this is the northern sea-eagle {Haliaetus ˆ pelagicus) of northeastern Asia. It is conspicuous by its large form and bill, and by the contrast of its main color, brown,ˆ with the white of its shoulders, rump and tail. The African sea-eagle {H. vocifer) is a fish-eater, about half the size of the ®bald-head,® remarkable for its color-markings, being white on the head, neck and breast, while the under parts and wing coverts are chestnut, and the upper parts are black or brown. Nearly related to the Haliaetus is the fishing-eagle {Polioaetus ichthycetus) of India and the East Indies, with extremely curved talons, and liv¬ ing entirely on fish. In countries bordering on the Mediterranean and ranging into India and Central Europe, is the serpent-eagle {Circaetus gallicus) with short toes, white, brown-spotted under parts, and dark brown upper parts. It feeds upon reptiles, which it kills and carries away, not eating the game on the spot, as do other eagles. A buzzardlike genus, Helotarsus, is represented in Southern Africa by H. ecaii-datus, the short-tailed eagle, oramented with maroon and black plumage, and bright red, very short legs.

The buzzard-eagles include some species which command notice from their great size and powerful action which fairly entitle them to their name. South America, in the dense forests of the Amazon, is the habitat of the

Guiana eagle {Morphntis guianiensis) relatively small, but with a tail longer than that of almost any other species. The wings are short and rounded, adapting it to swooping down with great force upon its prey, rather than for lofty or prolonged flight. From southern Mexico through the forests of Brazil, the harpy-eagle (Thrasaetus harpyia) has its home, and for muscular power is scarcely surpassed by any bird of prey in the world. It is larger than the golden eagle, gray in color, with long crest feathers, a stout, vicious bill, and talons of extraordinary force and sharpness. Though rapacious and apparently destructive, the eagles are useful in killing many other birds which venture nearer to farms and human habita¬ tions, in reducing the number of injurious rep¬ tiles and small mammals, and in helping to preserve the balance of the animal world. From the most ancient times the eagle has been regarded as the emblem of might and courage. Its great power of vision, the vast height to which it soars in the sky, the wild grandeur of its abode, have likewise commended it to the poets of all nations. It was associated with Jupiter in Roman mythology and was used on the standards of several Roman legions, whence it has descended to the national ensigns of Ger¬ many, Russia and the United States. See Bird, and consult authorities there given.

EAGLE, a gold coin of the United States of the value of 10 dollars, or £2 Is. \d. sterling in British currency, the rate of international exchange. An eagle weighs 258 grains troy, 900 fine. It was first coined in 1795, in accord¬ ance with an act of Congress, dated 2 Jan. 1792. There are also half eagles (first coined in 1795), quarter eagles (first coined in 1796), and double eagles (first coined in 1849), of proportionate values.

EAGLE, Black, a term applied to the golden eagle, Aquila chyrsaetus, also to the young of the bald-eagle. See Eagle.

EAGLE, Black, Order of, a Prussian order, founded by Frederick II in 1701. The number of knights in the order was originally limited to 30, exclusive of the princes of the blood royal ; and unquestioned nobility used to be required of all members. The order is now conferred also for distinguished military or civil service. The badge is a Maltese cross of blue enamel having in the centre a circle with the monogram F.R. (ior Fredericus Rex) ; the four arms are enameled red with the eagle of Prussia in black enamel between each two arms. It is worn on a broad ribbon of orange hung across the left shoulder, and it is accom¬

panied by a silver star on the left breast. The eagle is also depicted on the star, with a laurel wreath, a thunderbolt and the same super¬ scription,

EAGLE, Red, Order of, originally called Order of the Red Eagle of Baireuth, and also called Order of Sincerity; founded by the Mar¬ grave of Baireuth in 1705,_ The badge is an eight-pointed cross, having in the centre a me¬ dallion with a red eagle bearing the arms of the Hohenzollern family.

EAGLE IN ART AND SYMBOLISM.

The Persians and other ancient nations such as the Assyrians and Egyptians all utilized the eagle's form in art. Xenophon tells us that

eagles were on the Persian ensigns. The ancient armies of the Romans had the eagle carried as a standard, hence they used the term ^^eagle® to designate their legions. In the Greek mythology we find an eagle as attendant on Zeus ; it held in its claws the god's lightning bolts (fulnicn), and it was an eagle that car¬ ried off Ganymede on its wings. In ancient times the eagle was often considered as symbol of the soul's flight after death. In early Chris¬ tian art the eagle was used to personify Saint John the Evangelist, with his wonderful divine vision and spiritual flights. Strange to say, the early Christians often adopted the pagan carved gems containing representations of the heavy-bearded Zeus and his eagle as symbols of God the Father and his Apostle, whether wittingly or not is matter for conjecture. One favored form in Christian iconography represents the Evangelist in human form but with an eagle's head.

When Rome became an empire the eagle's form was used in picturing an emperor's apotheosis. Probably for this reason Napoleon Bonaparte made prolific use of the majestic bird as a decorative motif in his palaces when he became ernperor ; in 1804 he adopted it as ensign for his victorious armies. The eagle to this day is almost inevitably present in war and triumphal trophies.

In America, the eagle has long since figured as symbol of the republic, and a ten-dollar gold coin is named after it.

. In heraldry, the eagle became an armorial charge quite early (about the period of Char¬ lemagne). For this purpose its appearance had to be considerably transformed. It took on a very attenuated form, the displayed wing feathers becoming few and distinctly separated, so

that, depicted on the shield of a knight, its outline would be visible a long distance off. In this heraldic form, Germany, Austria, Prussia, France (as empire) adopted the eagle.

The double-headed eagle device is a bearing in Russian, Austrian and German arms. In the latter two cases the twin heads refer to the assumption of power, both east and west. This double-headed heraldic bird (Doppeladler) is held in such reverence by the Teutonic race as sometimes to figure *nimbed,^^ that is with the Catholic halo surrounding each head. In Christian iconography a double-headed eagle represents Elisha, the prophet.

In ecclesiastical art the term ^^eagle® is applied to a piece of church furniture — the lectern (q.v.) ˆ (reading desk) of brass or carved wood in the form of an eagle with wings displayed to hold the Bible on its back. It represents, of course. Saint John the Evangelist. See Lectern.

Clement W. Coumbe.

EAGLE HAWK, or HAWK EAGLE is

the name for a group of some rather small and some large raptorial birds, closely related to Aquila, and chiefly represented by the genus Spizaetus. They are beautifully crested' and range ˆ in South Africa, Central and South America. A notable specimen is the crowned eagle (N. coronains) of South Africa, of me¬ dium size, its under parts buff, banded with black, the head furnished with a crest of long, brown ˆ feathers. Of the same geographical range is a species of N. (Lophoaetns) occipi-

The Golden Eagle (Aquila chrysaetus) The Black Eagle (Aquila melanaetus) The Pomarine Eagle (Aquila pomarina) fhe Oriental Eagle (Aquila orientalis) The Dwarf Eagle (Aquila pennata)

The Wedge-tailed Eagle (Aquila audax) The Striped Eagle(Aquila fasciata)

8 The Crested Eagle (Spizaetus occipitalis)

9 The War Eagle (Spizaetus bellicosus).

10 The Harpy Eagle (Harpyia destructor)

11 The Screech Eagle (Haliaetus vocifer)

12 The White-tailed Eagle (Haliaetus albicilla)

13 The Baldheaded Eagle (Haliaetus leucocephalus)

14 The Osprey (Pandion Haliaetus)

falis, a small bird with a crest four inches long. In Central and South America are crested members of the group, .S'. (Lophotriorchis) isidori and S. omatus.

EAGLE OWL, an owl of the genus Bubo (family StrigidcB, horned owls, ovdˆv Accipitres) , represented in nearly all parts of the world ex¬ cept Australia. Of rare occurrence in Great Britain, it is common in the foothills of the Ural Mountains, and throughout Siberia as far as China. In the northern Old World B. ignavus is one of the largest owls,

of unsur¬ passed strength and daring. The colors are black, brown and white, mottled. A grown specimen weighs about eight pounds and meas¬ ures 26 inches from bill to end of tail; the wing is 18 inches long, and the plume feathers, con¬ stituting the horns, are nearly four inches in length. It is the boldest and most ravenous owl, and is a match for the eagle. To the superstitious people of the north, its weird call-note sounded at night in the depths of the for¬ est announces the presence of evil spirits. The great horned-owl of America {B. virginianus) bears a general likeness to its European con¬ gener, though smaller in length of body and wing. The colors are the same but differently arranged. The lower parts are barred rather than spotted, the breast and throat are marked with a large white patch, and a black ring is stamped on the disc of the face. Like the European species, it preys upon hares, large ground birds, rats, mice, reptiles and fish, and besides on the young of the American turkey.

EAGLE PASS, Tex., town, county-seat of Maverick County; on the Rio Grande River, the Mexican International and the Southern Pacific railroads; about 15 miles southwest of San Antonio. The principal occupations are coal-mining, agriculture by irrigation, stock-raising, and the manufacture of lumber and bricks. There is active trade in hides, wool and cattle. Eagle Pass is the port of entry for the Saluria district, and as such engaged in exten¬ sive trade with foreign ports during the Civil War. The chief structure is the Federal build¬ ing. The government is under the commission plan. Pop. (1920) 5,765.

EAGLJE RAY, a fish of the order Raics, of which the torpedo and the string-ray are fa¬ miliar members, and associated with the sea-devil in the family Myliobatidce. It is a flat fish with a very broad disc distinguished by pec¬ toral fins which continue to the snout and then reappear at the extreme end of the head. The tail is long and slender like a whiplash. The teeth are flat for crushing crabs and for grind¬ ing shells. Though much smaller than the sea-devil, which is sometimes immense, the eagle ray often attains a considerable size. It brings forth its young alive and inhabits tropical or subtropical “waters.

EAGRE, a Norse word signifying a fomi-dable influx and surging of the tide, the same as bore in a river, as in the Severn and Houghly rivers and the Bay of Fundy. See Bore.

EAKINS, ek’inz, Thomas, American artist; b. Philadelphia, 25 July 1844; d. 25 June 1916. He was a pupil of Gerome. He was professor in several art schools, lecturing on. anatomy and painting. Among his works are many pictures of American domestic scenes, out-of-door

sports,

portraits and several large canvases, such as Dr. Gross and Dr. Agnew at their clinics. His best work is conceded to be the ˆClinic of Pro¬ fessor Grossˆ (now at Jefferson Medical Col¬ lege), painted with careful attention to detail and good imagination. Other noteworthv works are ˆChess Playersˆ (Metropolitan Museum, New York) ; ˆThe Crucifixionˆ (Overbrook Seminary) ; ˆThe ’Cello Plajˆerˆ (Pennsylvania Academy of Fine Arts) ; ˆThe Motherˆ ; ˆA Bohemianˆ (1913). He did some minor pieces for sculptor models, and also designed the horses of the Brooklyn Soldiers and Sailors Monument and the relief designs on the Battle Monument at Trenton.

EALING, H’mg, England, town, and also a parliamentary division of Middlesex, the for¬ mer a few miles west of London. The town has a free library, science and art schools and a training college for teachers of the deaf. Pop. of town 33,031 ; of the parliamentary division about 72,000.

EAMES , emz, Charles, American lawyer and journalist: b. New Braintree, Mass., 20 March 1812; d. Washington, D. C., 16 March 1867. He was graduated at Harvard in 1831, and began the study of law. After accepting a position in the Navy Department at Washington in 1845, he took editorial charge of the Wash¬ ington Union. He was sent by President Polk as United States Commissioner to the Sand¬ wich Islands and afterward became United States Minister to Venezuela, under President Pierce. Returning in 1858 he gained a great reputation as a lawyer in admiralty cases.

EAMES, Emma, American operatic prima donna : b. Shanghai, China, 13 Aug. 1867. She studied music in Boston and Paris, singing in churches and concerts in the former city and makjng her debut in grand opera, Paris, 13 March 1889, in Uuliette,ˆ appearing in grand opera at the Covent Garden, London, 1891, and in New York the same year, since which time she has been a popular member of grand opera companies in Europe and America. She mar¬ ried the well-known artist, Julian Story, 1891. but was divorced in 1907. In 1911 she married Emilio de Gogorza of Paris. She created the role of Colombe in Saint-Saens’ ˆAscanioˆ and the title part in ˆ Zaire ˆ by De la Nux. Her repertoire includes roles in French, Italian, Spanish, German and English.

EAMES, Wilberforce, American bibliog¬ rapher: b. Newark, N. J., 12

Oct. 1855. He has long been prominent in bibliographical matters, having been assistant at the Lenox Library, New York, 1885; assistant librarian 1892; libra¬ rian 1893-95, when upon the consolidation of the Astor Library and Tilden Trust as the New York Public Library, Astor, Lenox and Tilden Foundations, he became librarian of the Lenox branch. He edited volumes 15-20 of ˆSabin's Dictionary of Books relating to Americaˆ (1885-92). Among his works are ˆBibliog¬ raphies of the Bay Psalm Book> (1885) ; of ˆPtolemy's Geographyˆ (1886), and of ˆSir Walter Raleighˆ ; bibliographic notes on ˆEliot's Indian Bibleˆ (1890), reprinted from ˆRifling's Indian Biographies,ˆ and a bibliographic ac¬ count of the early catechisms of New England (1898). He edited ˆJohn Eliot's Logick Primer 1672ˆ (1904); ˆHumble Request of

Governor Winthrop and the Company, 1630ˆ

(1905). He contributed a list of catalogues, etc., published for the English book trade from 1595-1902 to Growoll's ˆThree Centuries of English Booktrade Bibliographyˆ (1903). He compiled for the New York Public Library a list of maps of the world (1904).

EAMES, William S., American architect : b. Clinton, Mich., 4 Aug. 1857 ; d. 5 March 1915. He received his education at Washing¬ ton University and at the Ecole des Beaux-Arts, Paris, and at Rome. He settled at Saint Louis, Mo., and there practised his profession after 1862, where he also served as deputy commissioner of public buildings in 1881-83. In 1904 he represented the United States at the International Congress held at Madrid, Spain. In 1904-05 he was president of the American Institute of Architects.

EAR, Anatomy, Physiology and Disorders of the. In most of the animal creation the vibrations which we term sound have special portions of the body for their recognition, more or less precise ; although in the lower forms every part of the simple organism may respond to them in some degree. The earliest separation of a distinct organ of equilibrium rather than of hearing is seen in the M'edusae, of which the common

nettle of the salt waters is a well-known example. Here we find certain of the tentacles provided with delicate cells hav¬ ing hair-like projections and enclosing a chalky concretion, the otolith (Fig. 1). This struc¬ ture of a tiny vesicle with single or multiple otolithic contents (Fig. 2), connected with the more sensitive or distinctly nervous portions of the organism may be regarded as the funda¬ mental form of the ear; but it must be ques¬ tioned whether the otolith apparatus has a really auditory function or is wholly concerned with the equilibrium or static sense, the gtony

Fig. 1. — 1. Hairs of the hair-cells; 2. Otolith; 3. Sensient

(nerve) cells.

concretions serving like plummets to indicate the direction of gravitation. As it develops, it takes on more and more complicated forms of fluid-containing sacs deserving the name of ˆflabyrinth,ˆˆ in which chalky particles (often of special crystalline form) lie in close relation to ˆ‘hair-cells, — as we term these structures with their delicate prolongations. A nerve, more or

less defined, passes to the sac (Fig. 3) and connects it with the sensory centres, which in the vertebrates and some of the higher inver¬ tebrates may be called brain-centres. This apparatus is in the vertebrates embedded in the cartilage or bone on either side of the head; and in those creatures which do not live in the water, accessory apparatus is present to help

Fig. 2. — 1. Otolith; 2. Hair-cells directed toward cavity;

3. Nerve-cells.

transmit the air-vibrations to the fluid (ˆˆendo-lymphˆU of the labyrinth. As we pass up the scale of animal life the organ of equilibrium is found more distinct from that of hearing; and thus in the lowest fishes we find that the sac assumes a ring-form (Fig. 4) by reason of the formation of a semicircular canal with a pear-shaped widening or ampulla at either end. In these the nerve terminates in hair-cells without otoliths ; while between these a large portion of the sac receives the main nerve-supply at a prominent ˆmacula® supplied

with hair-cells and otoliths. A second and a third semicircular canal, each with its own ampulla and nerve, is found in the higher forms, and the main sac divides into two increasingly sep¬ arate portions with separate nerve-supply. One of these portions communicates with the semi¬ circular canals while the other is connected with a tubular outgrowth, which in the high¬ est forms coils into a spiral and is encased in a snail-shell covering, which gives it the name of ˆTochlea.® The nerve passing to this becomes highly developed and the end-organ is greatly elaborated into an apparatus generally called after its discoverer, ®Corti's organ (Fig. 7). Around this essential apparatus more and more complex protective envelopes and spaces filled with ˆperilymph® have been developed; while accessory apparatus, called middle and external ear, have been formed to aid in the conduction of sound-waves to the percipient contents of the labyrinth.

The development thus roughly traced in the ascending scale of animals can be still more perfectly seen in the development from the ovum of the embryo of the higher forms. Here we see a portion of the external surface dip in¬ ward as a pit, become separated as a closed sac beneath the surface, undergo the elaboration described, secure nerve-connection with the brain and at_ such points of communication de¬ velop its hair-cells and otoliths. Originally a spherical sac, its complexity soon merits its name of labyrinth and this membranous laby¬ rinth gives form to a surrounding labyrinth of cartilage or bone, which has been longer known and studied (12, Fig. 9).

Taking the human ear as representing that of all the higher vertebrates and as an elab- (wation of that of lower animals, we find an acoustic nerve emerging from each side of the

pons or lower back of the brain, to pass, in close association with the nerve giving motion to the face, into the stony-hard innermost part of the temporal bone which encloses the ear. The facial nerve passes on through and prac¬ tically has but accidental relation to the ear, but may be paralyzed by involvement in tympanic disease. The acoustic nerve, containing nerves for the equilibrium-organ, divides and is dis-

I

2

3

Fig. 3. — 1. Otolith; 2. Hair-cells; 3. Nerve-trunk.

tributed to the various parts of the labyrinth. At each point of its distribution cells with hair-like projections form end-organs through which impressions are received to be conveyed to the brain. Three of these points are in the three pear-shaped swellings of the semicircular canals, each of which is at right angles to the others, so that motion of the head in whatever direction can act upon the fluid in one or more of these canals and thus be analyzed and re¬ ported to the equilibrium center in the brain. Two are in the two vestibular sacs, and the most elaborate is where the real acoustic nerve enters the base of the snail-shell (Fig. 8), and is distributed to the highly elaborated organ of Corti, here located. This consists of a fairly orderly arrangement of hair-cells without otoliths, supported by curiously modified cells of like origin (Fig. 7), all resting upon a deli¬ cate ˆbasilar membraneˆˆ narrowest below and broadest above, which winds spirally from the bottom to the top of the shell-like cochlea, and is formed of parallel transversely stretched fibres. Here we have an apparatus comparable to the strings of a harp or piano; and just as each string of a musical instrument can vibrate in accord with those attuned to it in another and can even repeat the tones of an inaudibly distant instrument with which it is connected by a wire ; so there is much to support Helm¬ holtz's claim that each fibre of the basilar membrane is a cord tuned to a certain pitch and vibrating responsive to any tone of that exact pitch which reaches it. This serves to excite a special hair-cell resting upon it and send a nerve-impulse along the ultimate nerve-fibril of which this forms the terminus. Cer¬ tainly the apparatus in form and elaboration meets most of the requirements of such a theory and its partial destruction by disease has

caused loss of hearing for certain tones — low tones if the apex, high

if the base, be injured.

Outside of the labyrinth or percipient ap¬ paratus we find a conducting apparatus of ex¬ ternal and middle ear (Fig. 9). The outer ear is formed by the in-growth of a pit of the skin-surface to constitute an external auditory canal, around the edge of which gristly projec¬ tions raise the skin-covering into the prominent but unimportant feature to which the name ^^eaF^ is commonly applied. The inward growth of the canal brings its bottom into close relation with the middle ear, so that only a thin parti¬ tion, ^Hhe drumhead,^^ intervenes. The middle-ear is an outward development of the mouth-cavity, which hollows out the tissues between the external and internal ears — forming the Eustachian tube as its inner portion, the drum-cavity or tympanum just within the drumhead at the bottom of the external canal, and other air-spaces, ®mastoid cells,^^ of less constant pres¬ ence and form and of doubtful value, but notable because of serious disease-conditions to which they are subject. Two ^^windows® make communication between the middle and internal ear, both closed by membranes shutting in the fluids of the labyrinth — that closing the lower ^Tound window^^ being called the secondary U^mpanic-membrane. The upper or ^^oval window® is occupied by the foot-plate of the stirrup-bone, which with the little hammer and anvil forms (Fig. 11) a compound lever be¬ tween the drumhead and the labyrinth-fluids. This serves to increase the force while lessen¬ ing the amplitude of the vibrations of the drum¬ head and thus aids the transmission of waves of sound, especially of low tones, from the air to the internal fluids. The higher animals move the external ears as an aid in locating sounds, but the muscles effecting this are rudimentary in man and the external ear can be lost with little recognizable impairment of hearing. More important, although of ill-determined working, are the muscles moving the little bones of the drum-cavity; one, the drumhead tensor, draw¬ ing in the hammer-handle and thus tightening the drum-membrane to which it is attached, and

Fig. 4. — 1. Acoustic nerve and macula in vestibular sac which communicates with (2) the anterior and (3) posterior ampulla of (4) the semicircular canal.

one acting on the stirrup. Even the drumhead and chain of little ear-bones can be actually or virtually destroyed with preservation of a large part of the hearing; but their presence in dam¬ aged condition may be a serious obstacle to use¬ ful function by impeding sound-conduction.

The upper and lower limits of human hear¬ ing are somewhat in dispute, but it is fairly safe to say that tones of 32 double vibrations per

second and up through 10 octaves, should be au¬ dible to a healthy ear. If a cog-wheel touching a card or other elastic plate be turned with in¬ creasing speed the individual strokes or vibra¬ tions can be distinguished up to 16 per second;

Fig. 5. — Developing labyrinth dividing into two sacs with separate areas of hair-cells. >

then they blend and a continuous tone is pro¬ duced; but the tone heard may be an overtone and not that of 16 per second as is often claimed. Through the thin young drumhead or one having an opening in it, still higher tones can be heard, possibly up to 55,000 vibra¬ tions ; but age and disease easily effect changes which bar out these high and relatively weak tones ; yet it is striking to note how well they may be heard by those deaf to ordinary speech. Those unable to enter general conversation by reason of impairment of the conducting appa¬ ratus may often hear the same voice readily over the telephone, which transposes it to a higher key; and some much-advertised hearing-helps have their value as portable telephone lines : Human speech, the hearing of which is in civilized life the most important use of the ear, has a range from near the lowest limit of perception in the sound of R to some 4,000 vibrations per second in the sibilants S and X. We have in speech, therefore, with its easy gradations of intensity from faint whispers to loud shouts, a ready means of testing the hear¬ ing and measuring its defects. Variable as are voices or even the same voice within its range, it constitutes our best practical test of the de¬ gree of deafness. Generally the faintest articu¬ late whisper should be heard at arm's length and a loud ®stage whisper® 50 feet or more.

The numbers up to 100 make good tests if rightly Selected and should be spoken clearly with the ˆTeserve-air® which can be expelled from the lungs after an ordinary ˆˆtidal expira¬ tion® ; and they should be repeated by the per¬ son examined in evidence that they have been correctly heard. The watch is a very variable, limited and imperfect test, which may be ill-heard by ears otherwise perfect, well-heard by

some with little useful hearing and imagined or falsely claimed to be audible when it is not, in a way not always easy of detection. All measurements of hearing for sounds or speech should be made with the eyes screened from seeing the approach of a sounding body or ˆTending the lips® as many deaf persons do most successfully, yet at times uncon¬ sciously. Medically, the best tests of hearing are by speech and by tuning-forks — the latter serving not only to measure the hearing or loss of it, but to locate the seat of trouble as a prime requisite to successful effort for its re¬ covery. A ˆˆcontinuous tone-series® of tuning-forks or other instruments may be used by the expert to test the entire 10 or more octaves ; and the aurist should always have several forks, although much may be learned with a single one. A fork of 200 to 500 double vibrations per second is the most useful and should be seven or more inches in length and weigh as many ounces : the latter is important as the loudness and duration of tone depend upon it. One of 30 to 5C and one of 2,000 double vibra¬ tions should also be used, while intermediate tones have value. The lower forks should have thickened ends or clamps or pieces of rubber¬ tubing on the tips to damp the ˆˆovertones,® which may be heard by ears to which the funda¬ mental note is inaudible. The fork should be struck by falling of its own weight through its own height upon a rather dead surface such as the top of the knee, and will thus give a tone of fairly constant strength ; and testing a num¬ ber of normal ears will show for each fork at what distance or for how many seconds it

Fig. 6. — Diagram of the cochlea in section with the chan¬ nels for its nerves and the perilymph spaces which surround the cochleal canal in its windings.

should be heard after a standard blow. Thus if a fork which a normal car hears at 15 inches or for 100 seconds is heard by a deaf ear only 5 inches or for 30 seconds, 5:15 or 30:100 fairly represents the fraction of hearing remaining.

*Note. — Strictly, the hearing is as the squares of such numbers.

Ears with impairment of the percipient appa¬ ratus of the internal-ear hear high sounds rela¬ tively less as a rule ; those with the more usual conduction-defect hear low tones worse. A case of ˆhierve-deafness® may hear no sound from the 2,000 fork — a case of tympanic catarrh none from the 50 fork; although all other tones are fairly or even perfectlv heard.

Fig. 7. — Scheme of human cochleal canal in section show¬ ing Corti's organ and its nerve connections.

A whistle devised by Gabon giving tones from 4.000 up to 32,000 double vibrations is a practical and useful aid in studying the upper limits of hearing, as are the steel rods suspended by threads introduced by Koenig, since tuning-forks of such a pitch are unusual and costly. All of these tests should be made at the side of the head, but not so near that they may be felt instead of heard. The other ear may need to be closed with a down cushion or other ade¬ quate cover and we must avoid several ®deaf-spotsˆˆ nearly opposite the opening of the canal where the sound-waves by interference are weakened or lost.

Thus far we have considered tests of the hearing for sounds coming through the air in the usual way; but if the handle of a vibrating tuning-fork or other sounding instrument be rested upon the head it will be heard through the bone, and the sound will generally be much louder if the fingers are stuck into the ears. If only one ear be stopped, it will be heard louder in this ear — so much so that the other generally fails to recognize its vibration, even though the fork is resting close behind or above it Normally this ˆTone-conductionˆˆ is only half as loud as ˆˆair-conduction* — the fork which should be heard for 100 seconds through the air in front of the ear is heard but 45 when resting behind it. It can usually be heard from the bridge of the nose or the teeth after it has become inaudible back of the ear ; but when unheard here it should be audible for a further period if held close outside of the canal-open¬ ing. Yet disease-conditions can

affect the mat¬ ter like stuffing the fingers in the ears ; the obstructions in the conducting apparatus which bar out in greater or less degree the outside air-vibrations shut in and echo back upon the percipient apparatus sounds produced or con¬ ducted within the head. The deafer ear may hear the sound by bone-conduction better than its fellow. More than this — it can often hear better than a normal ear, perceiving through the bone for 55 seconds, perhaps, the vibrations which ought to be heard for only 45. With this generally goes a marked loss of hearing

through the air, which may be reduced from 100 seconds to 40, 20 or less. Under such con¬ ditions bone-conduction will be better than air-conduction and the sound will be louder as well as longer when resting on the head. This con¬ stitutes Rinne's or Schwabach's test and is simplified by resting the handle of the lightly vibrating fork back of the ear and then plac¬ ing it outside the opening with the question ˆffouder back or front, front or back?* The perception through the bone, especially at the bridge of the nose, ought to be nearly the same in duration as the feeling of the vibrations by the examiner's fingers; and Gardiner Brown saved time and confusion by noting how many seconds before or after his fingers lost the vibration, it ceased to be heard in the ear. Bone-conduction may greatly preponderate, in evidence of the conductive defect in an ear with marked loss of air-conduction, and yet this test or Schwabach's timing will show that the perceptive apparatus is also defective and loses the sound sooner than normal, instead of having it exaggerated. So we must test the actual, as well as the relative, perception through the bone.

Another delicate and important test may be here mentioned. The drum-cavity communi¬ cates with the throat back of the nose by a trumpet-shaped tube called after its describer Eustachius. This serves as a drain for the removal of any mucus from the drum-cavity and as a ventilating passage for maintaining equal air-pressure on each side of the drum¬ head. It is really a slit habitually closed, but opens in the act of swallowing or yawning, from the-action of the muscles lifting the palate. If a sounding tuning-fork, then, is held before the nostrils as the patient swallows there should be a brief opening of these tubes permit¬ ting freer passage of the sound to the ear. We thus determine the normal action or its

Fig. 8. — Cut through the cochlea, showing its nerve (4) passing to the

turns (2.7) of the cochleal canal, above which are those of the vestibular scala (5) and below the tympanic (6); the facial nerve (3) is seen in close relation to the auditory.

lack in these very essential parts of the apparatus.

This proper ventilation of the drum-cavity is needful for perfect function. It is said that the head of the military drum will split if there is no opening in the side ; and certainly a stuffed Eustachian tube makes all concussions painful if not damaging to the drum-membrane. Any

excess of pressure within interferes with the freedom of the windows, while any lack of air makes pressure on the outside preponderant, forcing in the drumhead and through the chain of bones pressing upon the labyrinth. More than this, if the partial vacuum in the drum-cavity is increased through absorption of the unrenewed air by the moist lining, the drumhead becomes stretched until it collapses into contact with the inner wall, or the walls congest and swell to fill the space or else fluid is poured out to occupy the cavity. Generally all of these

Fig. 9. — Section through external ear with its pinna (1) and (4) canal and the middle ear with its drumhead (7) and Eustachian tube (10), showing the labyrinth with its cochlea (12) and semicircular canals.

results are present in varying degree and from this comes the large majority of ear-diseases. So, too, interference with the freedom of the breathing through the nose unfavorably affects the ears. If one holds the nose and blows, air will be forced up the tubes into the drum-cavi¬ ties, and swallowing motions have to be made to relieve the distention. If this swallowing is done while the nose is held closed, strong suc¬ tion is exercised, making partial vacuum in the drum-cavity, and this occurs when cold-taking stuffs up the nose or tonsillar enlargement nar¬ rows the upper throat just behind it. It is not surprising, then, to find that two-thirds of ear-patients have middle-ear trouble, only one-fourth external-ear affections and in hardly one-tenth is I the percipient nervous apparatus at fault. This explains why much of the treat¬ ment of ear-diseases must be directed to or through the nose and throat in the effort to restore free ventilation and repair the injury due to the lack of it. The unfavorable influences are often slow and insidious in action; deafness may be advanced in one ear without attracting the notice which any defect of the second ear quickly forces upon the attention ; and treatment must be long continued if it is to retrace much of the course by which the affection has passed to its later stages. Discouragements are fre¬ quent, and the conscientious aurist has to tell his patient that only the recent losses can prob¬ ably be recovered, and that ill-health or recur¬ rent cold-takings may offset his best efforts. Yet many of these cases tend to grow steadily worse unless judiciously treated and a gain, however slight, is better than a loss. Mere in¬ flation of air up the Eustachian

tube by the Politzer bag or the catheter can aid the earlier stages ; but in chronic conditions intratympanic medication must be used to stimulate the lining

of the drum-cavity and retrace the steps by which it has become thickened and stiffened.

Accompanying the defect of hearing for out¬ side sounds there may be greatly increased hear¬ ing of noises within the head. Every one hears a singing in the ear when a shell or other resonator is held against it ; and similar results often follow any thickening and stiffening of tke conducting apparatus. Tinnitus, as the sub¬ jective sound is called, may be due to many causes, however, and its relief is often difficult. Generally a perception of the sounds of the blood-circulation, it may be caused by changes in the blood itself in anaemia, by overaction of the heart, by brain-pressure due occasionally to stuffiness of the upper nasal passages, as well as to more local affections. It is usually worse when lying down and in a silent place, since outside noises and occupation of mind and body make it less noticeable ; but it is in some cases unceasing and intrusive, seeming to bar out other hearing, and may be almost maddening. In its milder forms it is annoying and excites apprehension of deafness or of brain-disease, with which it is known to be sometimes asso¬ ciated; but its many causes, often wholly trivial, must be remembered and rational measures em¬ ployed for its relief. As stuffing of the Eus¬ tachian tubes or tension of the drumhead and chain of bones are its common causes, much re¬ lief can often be gained by simple hot gargling to free the former, or gentle massage of the drum-structures, as may be well done with the hands.

A curious characteristic of conduction-de¬ fects is the ability to hear better in a noise, often better than normal ears. A person deaf to ordi¬ nary speech in a quiet place will hear on a train much that is inaudible to persons nearer the speaker. One with nerve-deafness will be un¬ duly disturbed by other noises, although perhaps unconscious of defects in a still place.

Fig. 10. — Developing ear with cartilage in the partition between external and middle ear, which are beginning to form.

Only less important than freedom of the Eustachian tube is a healthy

free condition of the external canal. This is lined with skin and supplied with glands like the sweat-glands else¬ where, but furnishing the ear-wax or cerumen, which consists of the dead skin-scales and oily material. The purpose of this seems to be to arrest by its stickiness the entrance of dust, small insects, etc., from outside; but it serves a more useful purpose in cleansing the ear. The growth of new skin is most active at the centre

of the drumhead and is there rapid enough to spread out over the membrane, moving the older cells before it by a glacier-progress which car¬ ries them beyond the margin and out upon the walls of the canal before they become effete enough to be thrown off. Hence the normal drumhead is self-cleansing and needs no officious aid. The loosening scales of dead skin pass out along the walls of the canal and about its middle become a pasty mixture with the secretion of the cerumen-glands. This clings to the fine hairs of the canal, but is gradually worked out¬ ward by the motions of the jaw-joint, which presses upon the canal, and drying into un¬ noticed scales, it escapes from the exit. Under diseased conditions, including those of the throat and middle-ear, the wax tends to diminish in quantity and grow harder, escaping less readily or collecting in firm plugs. So long as any crack remains for the sound-waves to pass be¬ tween it and the wall, hearing may be unaffected by an almost total filling of the canal ; but jarring may force it down upon the drumhead and moisture may swell it into complete closure. Marked and sudden deafness results, often with dizziness, tinnitus or coughing. The plug may dry or crack away from the wall, quickly re¬ lieving the trouble, but only for the time ; and it becomes so molded to the irregular curves of the canal as to make it difficult to remove. Most of the sponges and spoons offered in the drug-stores are good only for ramming in the wax more firmly and pressing it down upon the drumhead. They should never be used. The best solvent for ear-wax is hot water, and it should be syringed in with gentle force until the last particle of the plug has been removed. Dropping in of oil or other fluids rarely does much to loosen the collection — they can often increase the distress caused by its presence — they certainly cannot remove it, although some hope that they will do so seems present to many that use them. Any violence in digging out the plug or too vigorously working even with the syringe is to be condemned. Underneath it skin-flakes have been forming which are often partly incorporated in its mass, partly still fast to the walls — ˆ ready like ®hang-nails® to tear down into the quick and leave open wounds, very easy of infection. One-seventh of the cases of the aural surgeon require removal of this ear-wax, rather especially of those of his private patients who seek to he too clean. It is easy to do

it skil¬ fully and promptly, yet it is often not so re¬ moved. If spoon-like instruments be used at all they should be sharpˆ — they will thus be more efficient, while a mistaken idea of harm¬ lessness will make dull instruments doubly dan¬ gerous. It is true of many a thing besides a firearm that a man ˆMid not know it was loaded.®

Seeds, beads and other foreign bodies are sometimes put into the ears. If they are let alone they may remain for many years without doing the least harm ; but forcible removal has often done great or fatal injury. If the ear is directed downward they will often fall out, espe¬ cially with a little rotary rubbing in front of the ear. The syringe will almost invariably bring them away promptly and safely. ˆ If they have been rammed in and fixed, it is really gentler to remove them by laying forward the soft parts under ether and operating in the bony canal, even chiseling it wider at need.

Two other affections of the external ear make up much of the 25 per cent of diseases in¬ volving this part — the diffused and the circum¬ scribed inflammations of the canal. The first may be broadly called eczema — the latter furuncle or boil. Gout and many general condi¬ tions can predispose to the eczematous inflam¬ mation, which by its heat and moisture makes the ear a hot-bed for the growth of the molds and bacteria which maintain or increase the trouble ; and it may have an intensity verging into erysipelas. The milder, chronic forms are generally responsible for furuncles, for they furnish the itching which leads to scratching and the germs which punish this. ˆˆWhat did you scratch it with?® will generally bring con-

Fig. 11. — Inner surface of drumhead (9), to which is at¬ tached the handle (7) of the hammer, the head (5) of which is hinged to the anvil (4), the long arm (6) of which connects with the stirrup (10) the chain pivots on the horizontal arm (3) of the anvil and conveys vibrations to rhe labyrinth.

fession of a hairpin or a match-stick according to the sex; and boils are more common on the right-hand side. The suffering caused by a boil may be extreme, sometimes keeping the patient walking the floor all night. They are rarely serious matters, but each tends to cause others, so they cannot be made light of. They consist of an infective

inflammation of the glands of the skin lining the canal and are apt to be trivial when the superficial sebaceous glands are in¬ volved, but more severe if a deeper cerumen-gland is the seat. These glands extend into the subcutaneous tissue, possibly into the periosteum, so their inflammation can excite a periostitis pressing the ear out of place and perhaps strongly suggesting mastoid inflammation. Pres¬ sure or motion of the parts, as in chewing, is acutely painful ; but firm pressure on the bone can be comfortably borne if all motion of the canal be avoided. Hot douching (110° F.) is usually comforting and if fully used has an ex¬ cellent tonic effect ; ‘warmth and moisture often increase and renew the trouble. The infection should be fought by mercurial oxide ointment and, if bearable, a firm plug covered with it should be passed into the swollen canal where it will exercise pressure, secure a useful massage from each jaw-motion and continue throughout the day and night the rubbing in of the salve.

Bony outgrowths of the walls sometimes narrow or close the external canal and less often cancerous growths involve it and the external ear. The bony growths are curiously common in the ears of ancient Peruvian and Mound-builders' skulls and in modern times in Hawaii and in England. The London surgeons among their private patients see and remove more of these bony outgrowths than are reported from all the hospitals of the world. Their causes are not clear, and bathing has been suggested as influencing their formation. As seen in other than Englishmen, the great majority seem due to long-continued discharge from the ear; and this suppuration must be cured or the growth removed, lest the confinement of pus may lead to serious or fatal complications.

The suppurative inflammations of the middle-ear form the most important phase of our sub¬ ject, not only because of their malign effect in producing deafness and deaf-mutism, but from their serious menace to the life. Thousands are known to die annually from ear-diseases, and the records of large numbers of post-mortem examinations show that a large proportion usually escape recognition during life. The prevalence of influenza for many years past has hugely increased the frequency of serious out¬ comes, as well as served to bring them to notice ; but even before that the record was long and grim. All the eruptive fevers, especially scar¬ latina, measles and typhoid, are apt to bring involvement of the ears. These should, there¬ fore, be closely watched and generally guarded in some measure by coverings, especially in chil¬ dren, who may never call attention to their ears and yet if they lose hearing are prone to become deaf-mutes.

It is well known that discharge from the ear is apt to lessen or cease at the onset of serious extension and that bottling up of the flow may give rise to such results ; but the somewhat prevalent view that such suppuration should be ®let alone and it will be outgrown^^ is as mis¬ taken as is the idea that it is dangerous to bring it to an end. To ®stop it up® is wholly different from stopping it by cure; and the chronic cases of slight discharge, often hardly noticeable, are those from which fatal diseases such as brain-abscess, pyaemia and sinus-clotting are generally recruited. Few good insurance companies will have anything to do with a man having a long¬ standing running ear — the risk for the indi¬ vidual may not be very frightful, but it is enough in

any large aggregate to consume all the profit of insuring lives.

Suppuration of the middle-ear is ushered in by pain, and the severity of this ®ear-ache® is at times some measure of the seriousness of the attack. The onset may be insidious or mislead¬ ing, however, and relief may be sought of the dentist ; while in children the fever, delirium or convulsions may draw attention away from the ears. Stains on the pillow or visible moisture in the canal may be the first indications that the ears are involved. But every such case, how¬ ever stormy or mild its beginning, may go on immediately or remotely to the worst of issues ; and it is our duty to take reasonable precautions from the start, lest we have reason later to reproach ourselves. Mere external protection as by ear-tabs or a night-cap may conserve the recuperative powers ; gentle hot douching with

clean water may relieve the pain by reducing the inflammatory congestion ; and spray and gargling may strike at the root of the trouble in nose and throat. However ill the patient may be in other respects, it is mistaken kindness to withhold these simple yet often effective meas¬ ures of treatment. The tendency is to a ^^gath¬ ering in the ear,® which may be watery or mucous or may be purulent and infective. If the simple measures named, with dry heat from a salt-bag or hot. water-bottle fail, there is need for surgical aid. Drainage by the natural Eustachian channel can only sometimes be gained; but after good cleansing of the nose and upper throat, it should be gently attempted by the Politzer method or the catheter. Abuse of these means is rightly condemned; so only the expert can maintain his right to use them if ill results follow — in spite rather than because of them. If they fail and the drumhead is seen to be bulging, especially with yellowish fluid, it should be delicately cut along its back margin to furnish a free escape for the collected fluid. If the swelling is marked at its upper portion, the knife should be carried up into this region, coming out in a sweep to the bone along the upper back wall. Free bleeding may be en¬ couraged by warm douching and is more effec¬ tive from such a cut than from external leech¬ ing; yet since much of the blood-exit from the drum-cavity is along the front wall of the canal, leeching in front of the ear may be almost as good, but should remove not less than four to eight ounces. A wick of gauze or absorbent cotton, dry or moistened with carbolic or boric glycerine, should be inserted deep into the canal and the protective covering replaced. ^^But if you cut the drumhead you destroy the hearing !® is a fallacy which is still repeated. The opening of the drumhead is a delicate operation, often very painful so as to require ether or other

anaesthesia and capable of doing injury to the structures beyond it ; but it only forestalls the opening which would occur spontaneously, makes a free and well-placed opening and really saves a drumhead from ulcerating through. Far more important is its influence for good in relieving the injurious pressure in the drum-cavity and it may be really life-saving in pre¬ venting fatal extension of the suppuration.

It is impossible to foresee how mild or serious any case is going to prove ; and without panicky fighting of shadows, it is only reason¬ able to press home all due precautions. The patient is best in bed, especially if feverish, and all exposure and stimulating diet should be avoided. Constipation must be relieved, for straining of every sort is not only painful but increases the congestion.

With the opening, artificial or spontaneous, of the drum-membrane, there is generally relief of the pain ; yet this is almost sure to recur, especially at night, but with lessening severity, duration and frequency. The fever, which is commonly marked in children, declines and some of the lost sleep is made up. The tension within the drum-cavity is lessened by the escape of the ^^gathering® and obtains continued relief by the persistence of the discharge. This is thin and_ bloody at first, then thicker and prob¬ ably stringy. Its amount is often surprising, so that hourly cleansing is needful, and it may excoriate the skin in and about the canal, call-

ing for protective ointments. The ideal treat¬ ment is thoroughly to cleanse before cutting the drumhead and thereafter as frequently as the flow demands to change the sterile wicks of cotton in the canal. If these are prepared by the hundred, each wrapped in a waxed paper and the package of them baked, the patient can readily remove the moist plug and substitute a clean one without contaminating it. Practi¬ cally, frequent syringing with boiled water at 110° F. or more and a clean soft-rubber bulb, better relieves the pain and cleanses the deeper parts of the canal. The heat can penetrate where the water cannot and is the best astrin¬ gent and stimulant. After two or three weeks the discharge should cease, and another week or two should bring cure ; but the cardinal fact in these cases is the infected character of the inflammation, which endangers serious destruc¬ tion in the drum-cavity and adjacent more vital regions. Often worse than the destruction is the scarring which results from nature's effort at repair. An opening in the drumhead gener¬ ally heals and may leave no visible scar ; in an important minority of cases the edges are skinned over, preventing its closure and graft¬ ing skin upon the mucous surfaces within. Nature is prepared to sweep away fluid waste material in the drum-cavity, but skin-flakes forming there are difficult of removal ; they tend to collect and by their presence excite more exaggerated scaling. Onion-like masses may thus form, constituting ˆAholesteatomaˆˆ or pearly tumor, and these can do much dam¬ age by their pressure as well as maintain or renew the suppuration. The bony walls and the little ear-bones may be destroyed by pres¬ sure or decay ; and while an exit may thus be made for the cholesteatoma-mass, it too often works inward instead of outward, dam¬ aging the labyrinth and may carry the infective process into the brain-case. Just under the thin floor of the drum-cavity is the head of the jugular vein, its intracranial part is equally vulnerable just behind, and an even thinner roof alone protects the brain-membranes above. It is not surprising, then, that symptoms of brain-inflammation are not unusual in ear-diseases ; and while these may be merely irri¬ tative and transitory, they are at times of deadly meaning. Where the bone suppurates and decays the mastoid-projection just behind the ear is apt to be involved, forming a ˆˆmastoid abscess, and may need to be

chiseled open to give exit to the matter and dead bone. Even without this, the inner wall of bone can decay and an abscess-collection form on the outer surface of the brain-membrane. Yet this is strong and firm and ma}ˆ thicken to better pro¬ tect all within ; so such ˆffixtra-dural abscessesˆˆ have but a fraction of the danger of a collec¬ tion upon or in the brain itself. Even this can now be often recognized in time by its subnor¬ mal pulse and temperature, and located suffi¬ ciently by its s3'mptoms to permit of surgical relief ; and nearly 50 per cent of the reported operations have been followed by cure. The infection can penetrate the adjacent great blood-vessels and cause clotting within them, with, general blood-poisoning and formation of abscesses in the lungs or other parts of the body; but the septic clot can be recognized and safely removed in many cases even when ex¬ tending down almost to the heart.

Disease of the nervous apparatus of the internal ear is met in hardly 10 per cent of ear-patients. Some of these 'are due to injury and fracture at the base of the skull, others to cerebrospinal meningitis or other severe fevers, more still to the extension inward of the catarrhal or the suppurative middle-ear inflam¬ mations. Mumps, too, or diphtheria may be followed by sudden total deafness. Inherited syphilis is one of the insidious and slowly acting causes, generally also giving rise to clouding of the cornea of the eye and marked by typical malformation of the second teeth. In any of these conditions the main hope of relief is through the absorption by mercury and iodine of the exuded material, which in the meningitis cases may be in the brain itself and not in the labyrinth. Of notable interest are the cases of ˆToiler-makers' deafness,ˆˆ as we sometimes call a group of occupation-disorders, usually lo¬ cated in the internal ear, and affecting those subject to persistent clangor — a condition which may compel change of work, if freeing the Eustachian tubes and good plugging of the external canals fails to relieve the advance of deafness. Important too are the cases of ver¬ tigo, due to ear-disease. Meniere called atten¬ tion to some of these as caused by labyrinthine apoplexy and they are often called by his name ; but the recognizable disease mav be of different nature and often is located in the drum-cavity, indirectly affecting the organ of equilibrium in the semicircular canals. Influ¬ enza has caused a number of these cases in which the hearing for more or less of the scale has been suddenly lost and the patient made' incapable for days or weeks of lifting the head from the pillow. Absorption is here also the best hope ; but in some extreme cases advantage has been taken of the damaging effect upon the ear of large doses of quinia, and the irritative condition has been by it

changed to a destruction with cessation of the vertigo.

The systematic development by Barany and others of tests of the equilibrium-apparatus has given us a most valuable power to stimulate chosen portions of the labyrinth and thus to investigate not only the end-organ, but the brain-centres and the paths which convey im¬ pressions to them. Revolving the patient in a pivoted chair or using a cold or hot douche in the ear can elicit marked and definite oscillation of the eyes, technically known as ˆffiystagmus^^ ; and this, which may be varied at will in the normal, is modified or prevented by diseased conditions. Vertigo is usually produced by such stimulation and the perverted equilibrium-sense causes the patient to point astray, to fall in known direction or to be made ®sea-sick.^^ Interruption of transmission along this path or that may clearly point to the exact site of disease and furnish information of far-reaching value to the brain-specialist and the surgeon for life-saving intervention.

Finally we may mention the brain-affections in which the hearing-centres, especially that for speech, are involved, when we may have ^^word-deafness,^^ which prevents recognition of the spoken word, although the hearing is perfect for tones of every pitch ; for while the ear itself is uninvolved, it is only through ear-examination that one can by exclusion reach a correct diag-

nosis and perhaps point the way for the surgical removal of a brain-tumor.

Bibliography. — Bacon, G., ˆManual of Otol-ogy> (New York 1918) ; Barany, ˆPhysiology and Pathology of the Earˆ (ib. 1910) ; Bean, ˆRacial Anatomy of the Philippine Islanders … with a Classification of Human Earsˆ (Philadelphia 1910) ; Cunningham, ˆTextbook of Anatomyˆ (New York 1913) ; Dench, ˆDis¬ eases of the Earˆ (ib. 1909) ; De Schweinitz and Randall, ˆAmerican Textbook of Diseases of the Eye, Ear, Nose and Throatˆ (1899); Gegenbaur, ‘ˆVergleichende Anatomic der Wirbelthiereˆ (Leipzig 1898) ; Halliburton, ˆKirkes’

Handbook of Physiology^ (Philadelphia 1907) ; Helmholtz, H., ^Die Lehre von den Ton-empfindungen^ (1863) ; Hovel, AI., ^Treatise on Diseases of the Ear^ (1898) ; Hyrtl, J., A^ergleichende anatomische Untersuchungen fiber das innere Gehororgan des Menschen und der Wirbelthiere^ (1845) ; Lang, ^Comparative Anatomy^ (New York 1896) ; Leidy, J., ^The Anatomy of the Temporal Bone^ (1878) ; Aleyer, Hntroduction to the Alechanics of the Inner Ear^ (Columbia, Mo., 1907) ; Politzer, A., ^Textbook of Diseases of the Ear^ (1902) ; Randall and Morse, ^Photographic Illustrations of the Anatomy of the Ear^ (1887); Retzius, G., ^Das Gehororgan der Wirbelthiere^ (Stock¬ holm 1884) ; Schwalbe, G., ^Lehrbuch der Anat¬ omic der Sinnesorgane^ (1887) ; Schwartze, H., ^Lehrbuch der Ohrenheilkunde^ (1892) ; Whit¬ ing, ^The Alodern Mastoid Operation^ (New York 1911); Wiedersheim, ^Comparative Anat¬ omy of Vertebrates^ (ib. 1897; latest German ed., Jena 1902) ; Jones, Isaac H., ^Equilibrium and Vertigo^ (Phila. 1918).

B. Alex. Randall, M.A., M.D.

EAR COCKLE, a disease peculiar to wheat caused by the presence in the grain of worms belonging to the family Vibria. In some parts of Europe the disease is known as purples.

EAR OF DIONYSIUS, a famous quarry near Syracuse, in which the slightest whisper was audible at a great distance. It was con¬ nected by a secret passage to the palace of Dionysius, the Elder, who died 367 b.c. The cave was afterward used as a prison. Also an acoustic instrument with a large mouthpiece to collect the sound, which a flexible tube conducts to the ear.

EARRINGS. Primarily the earring is a ring for adornment of the ear. More broadly it implies any ear ornament. . Usually the ring is attached to the ear by passing through its pierced lobe. A gracefully curved hook is often the attaching part where the ornament is composed of more than one piece (pendant). In modern times the earring is frequently fastened to the ear by screwing firmly to a small plate at the back of the ear, thus avoiding the piercing of the lobe. Earrings date back to prehistoric times. In Homer's Hliad^ we read that Juno ^^put in her ears, skilfully pierced, earrings worked and ornamented with a triple precious stone.^^ The ancient East Indians, Aledes, Persians, Egyptians, Arabians and He¬ brews wore earrings. The Egyptians wore them of various artistic forms. The Etruscans made gold earrings, showing a tendency to those of the Egyptians, of delicate filigree work and minute granulation. They took the form of flowers, fruits, vases, shields, rosettes.

crescents, cornucopias, tassels, peacocks, swans, cocks. Medusa heads, *etc.* The Greeks excelled in the art of making gold earrings and gave them numerous beautiful forms; the simpler form was a ring and these were termed ellobia or enotia. Their stalagma were pendants in the form of drops of water, as the name implies; their crotalia were composed of little rows of pendant forms (usually pitcher shape) and their name was derived from the fact that they rattled as they struck one another on the motion of the wearer. Even the statues of the god¬ desses (whether of stone, wood, ivory or precious metal) had golden earrings; the Athena of Phidias, ancient writers tell us, wore such adornment. Men did not wear earrings after adolescence. The Romans adopted the Greek fashion, but their earrings were of a heavier, more elaborate form; the Roman ladies' inanres were often gems of great value. Seneca (1st century a.d.) wrote scathingly of the fashion in his day : ®Thy wife carries in her cars the revenue of a rich family.® Elsewhere he says : see pearls, not one only for each

ear; the ears are now strained to carry heavier

Earring (Roman Imperial Spiral earring (4th or 5th Period). century B. c.).

weights. The pearls are in a cluster ; they are superposing one another in rows. The folly of women never before so subdued the wish of men ; it is two, it is three patrimonies that they suspend from their ears.® The Republican Romans despised the use of earrings by men, and the comic poet Plautus rails at the Car¬ thaginian men that wore one. Later, however, the men took to this adornment so popularly that the Emperor Alexander Severus (3d cen¬ tury A.D.) had to forbid their use bv men in an edict. The Byzantines appear to have abstained from earrings, in spite of the strong influence of Asia. The ancient Gauls and Germans adorned themselves with bronze earrings after East Roman prototypes. At the time of the rnigration of the nations the wearing of ear¬ rings had become a universal custom. The oldest earring extant, probably, is of gold pierced like filigree work ; it is in the Germanic Museum at Nuremberg, where are also ˆome East Gothic earrings reminding one forcibly of present-day pendants. A thin wire hoop (to thrust through the ear) has a richly or-ANCIENT EARRINGS

namented part attached, and a precious stone or pearl hangs from the centre. Superstition was attached to the earring by the Northern races at least, for, as the sagas tell, earrings prevent evil sounds and malicious suggestions from entering the ear, hence their ornamenta¬ tion with mysterious talismanic signs.

Earrings and figure of goddess, Cyprioti.

In the Middle Ages earrings were generally termed ^^rings for the ear,^^ clearly indicating their form. Men wore them later on in one (the left) ear. Laborde quotes from 1452 thus: ^^Gift of Monseigneur the Dauphin for two circlets of gold, which were hanging and at¬ tached to the ears of Mitton, the fool of Mon¬ seigneur the Dauphin, 9 livres. Royal Ac¬ counts.® Later, the custom of wearing the hair over the ears caused earrings to fall into disuse, coming again into vogue in the 15th and 16th centuries. A change took place in jewelry by the I7th century, and earrings, like the rest, were valued for their precious stones more than the richness of their material and the beauty of their handwork which the Renaissance afforded.

Our great-grandmothers wore extremely long earrings with dangling tassel or pitcher forms, but we now restrict the earring to diamonds, single gems or coral, mostly. Earrings for men had a short vogue at the court of Henry II of France, and have since never been popular. We see only gypsies, sailors and a few Latins (Italians and Spanish) yet wearing gold circlets in their ears. And the medical authori¬ ties have renounced their former belief that piercing the ears was an aid to that organ.

Bibliography. — Hadacsek, Karl, ^Der Ohr-schmuck der Griechen und Etrusker^ (in ^ Archaologisch-epigraphisches Seminar ^ der Universitat zu Wien,^ Treatise V, 14, Vienna 1903) ; Hendley, T. H., Hndian

Jewellery^ (in Journal of Indian Art and Industry, Vol. XII, 1907) ; Kunz, George F., ^The Magic of Jewels and Charms^ (Philadelphia 1915) ; Marshall, F. H., ^Catalogue of the Jewellery, Greek, Etruscan and Roman, in the British Museum^ (London 1901) ; Rucklin, R., ^Das Schmuckbuch> (Leipzig 1871) ; Smith, H. C., ^Jewellery^ (New York 1908) ; Vernier, E., <Note sur les boucles d'oreilles egyptiennes^ (Bulletin Inst, frangais d'Archeol. (Jrientale, Cairo 1911) ; Vernier, E., ^La bijouterie et la joaillerie egyptienne^ (Vol. II, Paris 1907) ; Viollet-le-Duc, E. M., ^Dictionnaire raisonne du mobilier frangais^ (Vol. IV, Paris 1872).

Clement W. Coumbe.

EAR-SHELL, a much flattened univalve mollusk of the family Haliotidco, allied to the

keyhole limpets. It takes its name from its rough resemblance to the human ear, and is known as ormer and oreille de mer in the Channel Islands, where one species is exten¬ sively used in making ornaments. These mollusks in various species occur on rocky shores in all warm regions, and in California are called abalones. Their richly nacreous shells are used extensively for the making of buttons and fancy articles ; and in China and Malaya the animals are eaten fresh and also preserved as food in large quantities. Consult Cooke, ^Mollusks^ (New York 1895).

EAR-TRUMPET, an instrument used to strengthen the sensation of sound in the par¬ tially deaf. The first mechanical contrivance for the purpose of improving the hearing was made by Dr. Yeardsley of London in 1848. Since that time, numerous curious devices have been invented. The unpopularity of these is due to their awkwardness in size and shape for portability. Before advising the use of such mechanical aids a careful diagnosis of the ear should be made, and the condition of the middle ear should be especially ascertained. In general these aids are apt to induce only temporary improvement and result eventually in more serious complications. The object of the ear-trumpet is to collect the sound waves and throw them into the ear in parallel waves. The curve of the collector or resonator — the reflector — must be more or less parabolic so as to give the maximum amount of sound at the entrance of the tube. For hearing at short distances Currier's conico-cylindrical tube is considered the best. It consists of a tube three and one-half feet long, which has a bone or hard rubber tip at one end while at the other is a bell-shaped mouthpiece made of the

same material. The tip and mouthpiece are con¬ nected by an elastic spiral wire tube covered with rubber and over-spun with silk or mohair. The tube is conical, and the speaker must place his lips close to the mouth of the tube. The London hearing dome is made of metal, of the same variety as that used in musical instru¬ ments; the Akou concentrator intensifies as well as concentrates sound, and is made of bell-metal ; the Hearwell churchphone is of hardened rub¬ ber and partly collapsible. It is of great use in long distance hearing, as are also the audiat, of black japanned tin; the folding fan trumpet, a tin horn attached to a folding black fan to conceal its use ; and the Lorgnette hearing horn, of hardened rubber. The otophone has been used to teach articulation to deaf-mutes, because it carries low tones extremely well. The denti-phone conveys sound through the medium of the teeth and is worn at tension in the mouth. The acousticon is a modification of the telephone principle, extremely complex, showing on its surface the battery, earpiece, transmitter and connecting cord. It is the most perfect and most expensive of ear-trumpets. The aiiris is a modification of the acousticon, simpler and less expensive. Countless other instruments have been developed. In general their use is to be discountenanced and other aids for deafness should be used, such as lip reading, and insist¬ ence on being addressed in clearly enunciated tones.

EAR-WORM. See Corn Insect-pests.

EARL, a degree of the British nobility be¬ tween marquess and viscount. Until 1357 it was the highest title in England. The name came into use in the reign of Canute as jarl, which was transposed in English to eorl, and was applied to the officials who presided over the counties and who supplanted the old Saxon ealdorman. The title was made hereditary by William the Conqueror, who also assigned its judicial powers to the sheriff or vicecomes, ap¬ pointed by himself. After William's reign, nu¬ merous earls were created and for a time the name was used interchangeably with count, the corresponding title on the Continent. The name of the earldom was derived from the

name of the shire. The title was granted by investiture at first and it was not until the reign of Edward III that earls were created in Parliament and invested without ceremony by charter or letters patent. The last method is the one still employed. There are more than 200 earls in the United Kingdom, although the sovereignty of the title over the county has in some cases disappeared. The wife of an earl is still called a countess. The eldest son is called viscount, the younger sons honorable and the daughters lady. An earl's coronet is composed of eight pearls raised upon points, with small leaves between, above the rim. (See Heraldry). Consult Pike, ˆConstitutional His¬ tory of the House of Lordsˆ ; Selden, ˆTitles of Honorˆ (London 1614).

EARL MARSHAL, the eighth great officer of state in Great Britain, who had, anciently, several courts under his jurisdiction, as the Court of Chivalry and the Court of Honor. He is the head of the College of Arms (Herald's College), grants armorial bearings and deter¬ mines all claims in connection with them. The office is hereditary in the family of the Howards.

EARLE, Alice Morse, American writer : b. Worcester, Mass,, 27 April 1853; d. 1911. She was married to Henry Earle in 1874. She wrote extensively upon the manners and cus¬ toms of the colonial period in New England and New York and in her various books pre¬ sents a mass of quaint and interesting infor¬ mation. Her published works are ˆThe Sab¬ bath in Puritan New Englandˆ (1891) ; ˆCus¬ toms and Fashions in Old New Englandˆ (1893); ˆLife of Margaret Winthropˆ (1894); ˆ Diary of a Boston School GirP (1894) ; ˆCos¬ tumes of Colonial Timesˆ (1895) ; ˆColonial Dames and Goodwivesˆ (1895) ; ˆOld Narragansettˆ (1896) ; ˆCurious Punishments of By¬ gone Daysˆ (1897); ˆColonial Days in Old New Yorkˆ (1897) ; ˆHome Life in Colonial Daysˆ (1898) ; ˆ Child Life in Colonial Daysˆ (1899) ; ˆ Stage Coach and Tavern Daysˆ

(1900); ˆOld Time Gardens; Sundials and Roses of Yesterdayˆ (1903) ; ˆSun-Dials and Roses of Yesterdayˆ (1902) ; ˆTwo Centuries of Costume in Americaˆ (2 vols., 1903).

EARLE, Franklin Sumner, American agri¬ culturist and botanist : b. Dwight, Ill., 4 Sept. 1856. ˆ He was educated at the University of Illinois and made special studies, chiefly in bot¬ any and biology, at the Alabama Polytechnic Institute. In 1886 he was connected with the University of Illinois, doing special mycological work, the results of which were published, with the title ˆThe Erysiphaceae of Illinois,ˆ in col¬ laboration with T. J. Burrill. In 1894-95 he

investigated Mississippi fungi for the Missis¬ sippi Agricultural Experiment Station. In 1895-96 he was assistant pathologist in charge of the mycological herbarium of the United States Department of Agriculture. From 1896 to 1901 he was professor of biology at the Ala¬ bama Polytechnic Institute. In 1897 he was appointed assistant curator in charge of the mycological collections of the New York Bo¬ tanical Gardens; he was sent to Cuba and Ja¬ maica to make scientific investigations and in 1903 to Porto Rico for the same purpose by the United States Department of Agriculture. In 1904 on the recommendation of the depart¬ ment he became director of the Estacion Cen¬ tral Agronomica of Cuba. From 1908 to 1911 he was consulting agriculturist to the Cuban-American Sugar Company and after 1911 served as president of the Cuba Fruit Ex¬ change. He is the author of ˆSouthern Agri¬ cultureˆ (1907).

EARLE, John, English philologist : b. El¬ ston, Devonshire, 29 Jan. 1824; d. 31 Jan. 1903. He took his B.A. at Oxford in 1845 ; was pre¬ sented to the rectory of Swanswick 1857 and was professor of Anglo-Saxon in the Univer¬ sity of Oxford 1876-1903. His chief publica¬ tions are ˆGloucester Fragmentsˆ (1861) ; ˆTwo of the Saxon Chronicles ParalleP (1865) ; ˆA Book for the Beginner in Anglo-Saxonˆ (1877) ; ˆEnglish Plant Names from the Tenth to the Fifteenth Centuryˆ (1880) ; ˆAnglo-Saxon Literatureˆ (1884) ; ˆEnglish Prose: its Elements, History and Usageˆ (1890) ; ˆThe Psalter of 1539: a Landmark in English Literatureˆ (1894) ; ˆA Simple Gram¬ mar of English Now in Us€ˆ (1897) ; ˆThe Alfred JeweP (1901).

EARLE, Mortimer Lamson, American classical scholar: b. New York, 14 Oct. 1864; d. New York city, 26 Sept. 1905. He was edu¬ cated at Columbia College ; was instructor in Greek at Barnard College for six years begin¬ ning 1889, and was then appointed associate professor of Greek and Latin in Bryn Mawr College ; 1898 to 1900 was lecturer in Greek at Columbia; and in 1900 was appointed pro¬ fessor of classical philology in Barnard Col¬ lege. Among other literary work he edited Euripides' ˆAlcestisˆ (1895) and Sophocles' ˆQEdipus Tyrannusˆ (1900). His lesser works were published in collected form in <The Class¬ ical Papejs of Mortimer Lamson Earle, with a Memoirˆ (New York 1912).

EARLE, Pliny, American inventor : b. Leicester, Mass., 17 Dec. 1762; d. there, 19 Nov. 1832. In 1785 he became engaged in the manufacture bv hand of machine and hand cards for carding cotton and wool and in¬ vented in 1790 a machine for the manufacture of

such cards by which the .labor of one man for 15 hours could be performed in as few minutes.

EARLE, Pliny, son of the preceding, American physician: b. Leicester, Mass., 31 Dec. 1800; d. Northampton Mass., 18 May 1892. He was educated at the Friends' School, Provi¬ dence, R. I., and was graduated as M.D. at the University of Pennsylvania in 1837. He was resident physician of the Asylum for the In¬ sane at Frankford, near Philadelphia, 1840-42; physician to Bloomingdalc Asylum, New York,

1844—49; elected professor of materia medica and psychology in the Berkshire Medical In¬ stitution at Pittsfield, Mass., in 1863, and Avas superintendent of the Massachusetts State Hospital for the Insane 1864-85. In the years 1837-39, 1849 and 1871, he traveled in Europe visiting the most important insane asylums. He is the author of ˆMarathon and other Poems' (1841) ; institutions for the Insane in Prussia, Germany, and Austria' (1853); <An Examination of the Practice of Blood-letting ,in Mental Disorders' (1854).

EARLE, Thomas, American lawyer : b. Leicester, Alass., 1796; d. 1849. Early in life he removed to Philadelphia, where he was a member of the Constitutional Convention of 1837. His advocacy of the extension of suf¬ frage to negroes antagonized many Democrats and in 1840 Earle was the vice-presidential nominee on the ticket of the Liberty party. Not succeeding in politics he abandoned it for literary work and subsequently published ˆEs¬ say on the Penal Law' ; ˆ Essay on the Right of States to Alter and Annul their Charters' ; ˆTreatise on Railroads and Internal Commu¬ nications' (1830) ; ˆLife of Benjamin Lundy'

(1844).

EARLE, William, English soldier : b. Liver¬ pool 1833; d. 10 Feb. 1ˆ5. He received his education at Winchester, entered the army in 1851

and distinguished himself in the Crimean War. In 1872-76 he served as military sec¬ retary to Lord Northbrook, viceroy of India. He commanded the garrison of Alexandria in the campaign against Arabi Pasha and in 1884 was division commander in the expedition hurried to the relief of Gordon at Khartum. He was killed while leading his troops against Arab entrenchments at Kirbekan.

EARLHAM COLLEGE, a coeducational institution in Richmond, Ind., founded in 1847, under the auspices of the order of Friends. It is located on a tract of 120 acres, adjoining the western limits of the city of Richmond. The campus has an area of 40 acres, is shaded by native forest trees and is tastefully laid out with walks and drives. The college has eight buildings and grants the degrees of B.A., B.S. and M.A. The endowment amounts to about $750,000 and the value of buildings and grounds to about $375,000. The annual income is about $140,000. The total number of students in 1916 was 430, and the instructors numbered 30. The library contained 15,000 volumes.

EARLINGTON, Ky., city in Hopkins County, on the Louisville and Nashville Rad-road, 55 miles south of Evansville, Ind. It is an important coal-mining centre and has ex¬ tensive coke manufactories. The government is invested in a mayor, elected for four years, and a council of six members. The city has two public libraries. Pop. 3,931.

EARLY, John, American clergyman and publisher: b. Bedford County, Va., 1 Jan. 1786; d. Lynchburg, Va., 5 Nov. 1873. In 1807 he entered the ministry of the Methodist Epis¬ copal Church. Among those who attended his early ministry were the slaves of President Jefferson. He was agent for Randolph-Macon College, 1833-40. When the Church divided he went with the Southern faction and aided in forming the Alethodist Episcopal Church South.

In 1846, he was elected the first publishing agent of the Church and began the business in Richmond, Va. In 1854 it was removed to Nashville, Tenn. In the same year he was elected bishop, serving until 1866 when he re¬ tired from active service.

EARLY, Jubal Anderson, American sol¬ dier: b. Franklin County, Va., 3 Nov. 1816; d. Lynchburg, Va., 2 March 1894. He was gradu¬ ated from the United States Military Academy in 1837, fought in the Seminole War (1837-38), and having resigned from the service, entered legal practice at Rocky Mount, Franklin Co., Va., in 1838. A member of the Vir¬ ginia house of delegates in 1841-42, he was also

attorney to the Commonwealth in 1842-47 and 1848-52. During the Alexican War he was major (1847-48) of volunteers; and at the outbreak of the Civil War, although strongly opposed to secession, he received the appoint¬ ment of colonel in the Confederate forces. Promoted brigadier-general for services as a brigade commander in the first Bull Run, he fought with distinction at Williamsburg, the second Bull Run and Antietam. He was in command of a Confederate division at Gettys¬ burg, and in 1864 of an army for the invasion of Alaryland. He crossed the Potomac, de¬ feated Lew Wallace at Monocacy Junction (9 July), threatened an attack on Washington, D. C., but on the arrival of a considerable Union reinforcement, withdrew to the Shen¬ andoah, possession of which he contested with Sheridan, then commanding the Federal army in the valley. On 19 September he was de¬ feated at Opequon Creek, with the loss of 3,000 prisoners and five guns, and on 22 September at Fisher's Hill, where he lost heavily and from which point he was driven to the moun¬ tains. On 19 October he surprised the Federals in the morning at Cedar Creek, but the tide of victory was turned by Sheridan's arrival from Winchester, and he was completely routed. After his defeat by Custer at Waynesborough (March 1865), he was removed from his com¬ mand. He attained lieutenant-general's rank. Subsequent to the war he practised law in Vir¬ ginia, and was, with General Beauregard, a di¬ rector of the Louisiana lottery. He never took the oath of allegiance. He is ranked high in the list of Confederate officers, and by some authorities was considered not inferior to ^^Stonewall Jackson." His chief publication is a ^Memoir of the Last Year of the War for Independence in the Confederate States of America' (1867). Consult ^Battles and Lead¬ ers of the Civil War,' edited by Johnson and Buell (1887).

EARLY ENGLISH ARCHITECTURE,

the name generally given to the first pointed Gothic used in England. This style of archi¬ tecture began to be used in England about the end of the 12th century and lasted for about 100 years. It immediately succeeded the Nor¬ man and finally merged in the Decorated style. It is characterized by long lance-shaped win¬ dows, which are often gathered into clusters and enclosed by a large arch, the space between which and the tops of the windows is often pierced with circular, trefoil or quatrefoil ornaments. The molding consists of alternate rounds and deeply cut hollows, separated by small fillets. The doorways are often divided

into two by a single shaft. The stones used were large and massive ; the windows small. Later the entire structure was made lighter and thinner. The vaults were low and the flying buttress and arch were for the most part replaced by side-aisle roofs. Of this style are the choir of Canterbury (1175-84) ; Salis¬ bury Cathedral (1220-58); and the choirs of Chester, Gloucester, Worcester and portions of the choirs of Ely and Winchester. Consult Moore, ˆMedieval Church Architecture in Eng¬ landˆ (New York 1912) ; Prior, ˆHistory of Gothic Architecture in Englandˆ (London 1900) ; Bondy. ˆGothic Architecture in Eng¬ landˆ (ib. 1907).

EARMARK, a slit or notch on one or both ears of cattle made when the calf was being branded and to serve as a means of identifi¬ cation. It was much used in the Western States of the Union in the halcyon days of the great ranches. Earmarks could be distin¬ guished at a greater distance than the brand as the cattle when approached by a cattleman turned and faced him, thus permitting him to decipher the earmark readily.

EARTH, The. The earth is at once the subject and the object of many sciences. Of these the most elementary are geography and physiography, which deal primarily with the salient surface features of our planet. Next in order of difficulty are geodesy and geology, which deal more minutely with the shape, the size, the constitution, the mechanical properties and the material history" of the earth. The science of meteorology is concerned with the phenomena of the atmosphere ; and our theories of the tides and terrestrial magnetism must be added to the list of purely physical sciences of the globe. All of these sciences are intimately related, and they are sometimes grouped under the single term geophysics. In a broad sense, also, these sciences may be regarded as branches of astronomy for astronomy is founded on, and hence includes, geophysics. This article is written from the point of view of geophysics and deals especially with the physical and me¬ chanical properties of the earth.

THE SHAPE AND THE SIZE OF THE EARTH.

First Approximation. — The form and the dimensions of the earth

have presented a prob¬ lem of the greatest interest and difficulty to men of science for more than 20 centuries and they promise to tax the resources of the ablest physicists for some centuries to come. The first approximation to a solution of this prob¬ lem, of which we have definite record, was made by Eratosthenes of the Alexandrian school of astronomers. Assuming the surface of the earth to be spherical, he measured the length and the angular amplitude of an arc of a great circle extending from Alexandria to Syene. He observed that at Syene, which is about 500 miles south of Alexandria, the sun shone vertically downwards into deep wells at noon on the day of the summer solstice, prov¬ ing thus that at that place and time the sun was in the zenith. On the same day at Alex¬ andria he observed, by means of the gnomon, that the sun at noon was south of the zenith b}— one-fiftieth of a circle, or 7.2 degrees. The principles involved in these measurements and in the calculation of the size of the earth are

very simple, but they are so fundamental as to justify a full explanation. They assume, first, that the earth is spherical in shape ; sec¬ ondly, that the plumb-bob at any point of the earth's surface is directed toward the earth's centre; and, thirdly, that the sun is so distant that lines drawn to it from different parts of

the earth are sensibly parallel. Thus, in Fig. 1, if A and B indicate the relative positions of Alexandria and Syene and C the centre of the earth, lines from A and C to the sun will be parallel ; and hence the angle ZAS, or the meridian zenith distance of the sun at Alexan¬ dria, will be equal to the angle ACB. Know¬ ing this angle and the distance AB, the rule of three gives the entire circumference.

Second Approximation. — No substantial ad¬ vance beyond this first approximation was made until Newton showed that the gravitation and the rotation of the earth ought to make it somewhat flattened at the poles, or that the surface of the earth should have the shape of an oblate spheroid of revolution. The proof of this theoretical conclusion of Newton con¬ stitutes the second approximation to the figure and the size of the earth. Such a figure, how¬ ever, is much more difficult of measurement than a spherical figure. This is seen by a glance at Fig. 2, representing an ellipse, which, if re¬ volved about its shorter axis PP', will gener¬ ate an oblate spheroidal surface. The prin¬ ciples of mechanics show that when such a sur¬ face is due to the attraction and the rotation of a fluid mass, the plumb line at any place will not

in general point toward the centre of the

Fig. 2.

mass, but will pass somewhat to one side of it, as shown by the line LQ in the figure.

Newton's conception, therefore, involved the difficulties of the more complex spheroidal fig¬ ure and of the hypothesis that the earth was primatively a fluid mass. Two ways of testing Newton's views were proposed. One was to

THE EARTH— ITS ANNUAL REVOLUTIONS AND THE SEASONS OF THE YEAR

Declination of the Sunˆ/

4, 5, 0, 7. Nebul® as shown by Lord Rosse's Telescope. 8. The Dumb-bell Nebula. 10. The Spiral Neoula. 9, 11. Nebul® as shorvn by Lord :nt periods. 15. Halley's Comet as departing from the sun, 1836. 16. Encke's Comet as seen in 1828. 17. Great Comet of 1811. 18. As seen de—

19. Comet of 1680. 20. Comet of 1807 as seen by Bessel. 21. As seen by Schroeber.

;

\ ^ _ r^ T

' l:

•>

r'j

i'

<r: •

■■■ -.'i' ii -':■■■

- i

w|S-w ■■?• fr, 'Z' ' ■ .'J;,":

I'll"' KfV«' V- " " ':-'^rt- . V" .. ' -v:^:- • ;■ <5^-. - - ' ' ''V^W

- • ■• %■ . . !• v.c',"' •:' '■•■/> ""V..' .• :'•* .wj

■r

r < ’a‘ •

‘• ■! ;

r

; ^ 71^i’ i.

.,m

■^r

Tf-’^

t

U >’ i

i ‘. i

<

I , •

■ ’»■• ■ ‘.• <

T ‘♦■

I

* >

. k

w-.

‘ •*

.. •

■ > ‘*• . - .#

, . f

! < » . .’ i -

tV’i: . •’ ‘ 1/ ••fi .•■*• • ”’•T-

• > I * ‘

V OJ“i - . • ‘■ ..yj ••fi .-■■• • 5 > T-

“f t ■ -“‘A, •

V ^ .‘H’, Vv

■t’-

I •. «.

-nU

■ I

> J2.

1

^ I « ••

* ■ iL** !*’ •« V.’ ! 1 **

** I •■’^ li - ‘>f

•Ck ’

f ‘ ij<;: .’■ ■-^”

■ ;;■ * > 5%^ .u«^- ^

- -Vv ‘■•v if;* < ’

_ ’^’ •■■’ « V ”*

i. . ?

-“tii

f

♦ ‘I

L ■ *1* ■ > -■ … ■ ^ \

, ^ 1 • • ^ , .-‘,-1*. . ’ ‘ ‘ ■ \ ■ ‘ XBi ” ^ ‘ i

t. *. , : i ■’-. ••■ . ‘S ^ i

^ g£’;i ‘ -

-■

4 f -• ‘

■ >.■ ■ • *4 • itf

, I . ‘ —

* <

I

,■’ f’A

-‘• ‘ »J I’*..

■M’”’ fc

^ >;T

^ J ’ ^

“T. ■%■■’ “■ c jsef‘ ‘ ‘ •■ ‘

^-i;£| 4 ^ .Jy-^

,’ ^”’■” ■ i-ii; ‘. A,. ” ‘• ” ” -fV-

■ ‘ i .f 4”!, ■ ^

‘ ». - I’V ’“if. V” ‘.r*. Ss4” ” ‘ -►

• -. W..V • • ■:: . ” ‘ -r^ ‘ . J ■ …-> >’■■ ;‘J

• ., *Wi’-W »* • *rV . J* ‘

. ; *‘4* •’■ . . -*‘ll* •■’. ‘ - ‘ ■ - ■/.

■ p-fa0-‘^ “■ ‘■ ■-‘ ‘ “4^’ ‘•

\v •1’^*

%.. . < ‘ ‘i

t:’ v..,^ J ‘ .V ■ *—m-V ‘: ;* ■

■’•■, a. . ■ ** . ‘ • . S\Tm 1… -’i

f . •. ”•‘i J -s’ ^ ■ ••?*” <vi> i-P’ . w- . ■ • ’V -

I <

- ^ ■ ■■■ - -

. • ^ ■, •■ 4:-,^ ‘ VV-‘- - ■ - - V-4 «’ •- , •*•^1

i ■ ‘4’^^ ;;;:_■■ x3jib

measure the meridional lengths of a degree of latitude at different places on the earth's sur¬ face. If the earth is an oblate spheroid, it is seen from Fig. 3 that the meridional distance along the surface intercepted by two plumb lines which make an angle of one degree (or any constant angle) with each other is greater at the poles than at the equator, or in general, greater in high than in low latitudes. The other method proposed to measure by means of the pendulum the varying acceleration to which a body is subject in different latitudes on the earth's surface. If the Newtonian view is cor¬ rect, that acceleration, which is the resultant of the effects of attraction and rotation of the earth, and hence the weight of a body, must in¬ crease in passing from the equator to the poles.

But the Newtonian theory was neither read¬ ily accepted nor easily verified. In the early part of the 18th century, in fact, the theory was hotly opposed by the justly distinguished Cassinian school of French astronomers, whose er¬ roneous interpretation of a carefully measured arc of a meridian in France indicated that the earth is an oblong rather than an oblate spher¬ oid. The question was permanently settled by the famous Lapland expedition sent out by the Academy of Sciences of Paris, in 1735, under the auspices of Maupertuis and Clairaut. They proved beyond doubt that the earth's surface is very closely that of an oblate spheroid, thus ˆflattening the poles and the Cassinis,® as Vol¬ taire remarked at the time.

A vast amount of labor has since been de¬ voted to the determination of the dimensions of the spheroid which best fits the earth's surface. This is, indeed, the principal problem of the precise geodesy of to-day. The dimensions of the earth which have been provisionally very generally adopted are those of Gen. A. R. Clarke published in 1866. The theory of a spheroidal surface requires a knowledge of the lengths of the longer and the shorter axes of the generating ellipse, or equivalent data. Gen¬ erally the half axes, or the equatorial and the polar radii, are given. The values of these are as follows :

those derived from computations carried out to the nearest foot. More approximate values will be determined from computations now in prog¬ ress, and they may possibly show Clarke's val¬ ues to be in error by a few hundred feet.

The following derived values appertaining to the earth's spheroid are often referred to :

Equatorial diameter of the earth . = 7,926.6 miles

Polar diameter of the earth . = 7,899.6 miles

Difference of diameters . = 27.0 miles

Circumference of equator of earth . = 24,902.0 miles

Meridian perimeter of earth . = 24,859.8 miles

f = 196,940,000 square miles Area of the surface I = 510,071,000 square kilometers of the earth 1 = 197 x 10® square miles (about)

1 = 51 X 10ˆ square kilometers (about)

Volume of earth

= 259,880,000,000 cubic miles = 1,083,200,000,000 cubic kilometers = 260 X 10ˆ cubic miles (about)

= 108 X 10’® cubic kilometers (about)

The following table gives the length of a degree of a meridian in different latitudes ; the length of a degree in longitude measured along a parallel of latitude ; and the areas of quadri¬ laterals of the earth’s surface of one degree ex¬ tent in latitude and in longitude. The latitude in the first column of the table is that of the middle point of the corresponding meridional arc or quadrilateral.

Latitude

Length of 1° of

meridian

Length of 1° of

parallel

Area of quad¬ rilateral 1 ° X 1 ° in latitude and longitude

Statute

Statute

Square

miles

miles

miles

0°

68.703

69. 171

4752.3

10

68.725

68.128

4682 . 0

20

68.786

65.026

4472.8

30

68.879

59.956

4129.6

40

68 . 993

53.063

3661.0

50

69.115

44.552

3079.2

60

69.230

34.674

2400.5

70

69.324

23.729

1645.0

80

69.386

12.051

836.2

90

69.407

00 . 000

From the second column of this table it is seen that the length of a degree of a meridian is about seven-tenths of a mile greater at the poles of the earth than at the equator.

Third Approximation. — A third approxima¬ tion to the figure of the earth may be briefly referred to here. Imagine the mean sea-level, or the surface of the sea freed from the undu¬ lations due to winds and to tides. This mean sea surface, which may be conceived to extend through the continents, is called the geoid. It does not coincide exactly with the earth's spheroid, but is a slightly wavy surface lying partly above and partly below the spheroidal surface, by small but as yet not

definitely known amounts. The determination of the geoid is now one of the most important problems of geophysics. Its solution will be accomplished by means of gravimetric surveys, or by meas¬ uring the acceleration of gravity at a great number of points on the earth's surface.

Equatorial semi-axis = a, polar semi-axis = b. a = 20,926,062 feet = 3,963.3 miles = 6.378,259 metres. b — 20,855,121 feet = 3,949.8 miles = 6,356,635 metres.

It should not be inferred from these figures that the semi-axes are known ˆ to the nearest foot or metre. The values given above are

PHYSICAL PROPERTIES OF THE EARTH.

The Atmosphere. — Adopting the conven¬ ient terminology of geologists, the earth may be divided into four parts, namely; the atmosphere; the hydrosphere, or oceans; the lithosphere, or

crust; and the ceiitrosphere, or nucleus. These are considered in turn without encroaching on the fields of the meteorologist or of the geol¬ ogist.

The atmosphere is a gaseous envelope cover¬ ing the earth to an extent not yet fully deter¬ mined. The pressure it exerts at the surface of the earth is easily measured and is definitely known to be about 14.7 pounds per square inch, or about 1,033 grams per square centimeter.

The pressure, density and temperature of the atmosphere are observed to decrease rapidly with increase of height above the earth's sur¬ face, but the exact laws of decrease are not yet known. Hence it is impossible in the pres¬ ent state of science to assign a height to the atmosphere. It appears certain, however, that it is more than 200 miles high, since it is dense enough to set meteorites on fire at that height.

Many investigations of the properties of the atmosphere have been made during the past century. These are all too technical for presen¬ tation, even in abstract, here. But their results may be summarized as follows :

(a) If the earth did not rotate and if the atmosphere were of the same density through¬ out as at the earth's surface, its height would be 26,200 feet, or about five miles.

(b) If the earth did not rotate, and if the adiabatic law (pressure proportional to the 1.4 power of the density) held in the atmosphere, it would be about 17 miles high.

M

Fig. 4.

(c) But the earth rotates and the atmos¬ phere must be supposed to rotate with the same angular velocity. From this fact, and from the assumption that the atmosphere be¬ haves like a fluid, Laplace concluded that it must be limited by a lenticular-shaped envelope as indicated in Fig. 4. The revolution of this figure about the axis LM, which is supposed to be coincident with the axis of rotation of the •earth, E, will generate the envelope and the earth in their true relative dimensions. The polar and equatorial axes LM and AB are, re¬ spectively, 4.4 and 6.6 times the diameter of the earth. According to this theory, therefore, the atmosphere may be about 17,000 miles high above the poles of the earth and about 26,000 miles high above the equator. The latter lim¬ iting height is that at which the centrifugal force due to rotation is just balanced by the attraction of the earth. The volume of the envelope is 156 times theˆ volume of the earth. Whether the atmosphere actually extends to the limits thus defined has not been determined either by La¬ place or by subsequent investigators.

A question of great interest is that of the

quantity of the atmosphere, since the oxygen thereof is essential to the existence of all higher forms of life on our planet. By quantity is meant the amount of mass of the atmosphere. If the law of distribution of this mass within the Laplacian envelope were known the total quantity could be computed. But the law is not known, and hence it is only possible to at¬ tain an approximation, or to set limits, to the actual amount. A lower limit may be found from the adiabatic distribution of (b), above, for a non-rotating earth. This distribution does not differ widely from the actual distribution near the earth's surface; but since it is limited to a height of 17 miles it will give too small an amount. A computation on this basis makes the mass of the atmosphere 1-1 170000th part of the total mass of the earth ; or, in round num¬ bers, one millionth part of the mass of the earth. This result is also reached, substantially, if it is assumed that the mass of the atmosphere is the same as the mass of a uniform layer of water, or mercury, which would produce the same pressure at the earth's

surface. On the other hand, if the adiabatic distribution is sup¬ posed to hold within the Laplacian envelope, of (c), above, an upper limit of about l-1200th of the mass of the earth is obtained. The actual value of the mass of the atmosphere is undoubt¬ edly much closer to the lower than to the upper limit ; how much closer is still a miatter for investigation.

The Hydrosphere. — It is well known that about three-fourths of the earth's surface is covered by oceans and seas. Precise measures of the relative areas of land and sea are difficult to obtain, and the present state of knowledge does not justify the use of more than three sig¬ nificant figures in defining these areas. The values given below are derived from H. Wag¬ ner's ˆLehrbuch der Geographie.ˆ They do not differ widely from the values given recently by other German authorities, though they make the total ocean area about 1 per cent greater than the earlier estimates of the distinguished British geographer, Sir John Murray. The table below gives the continental areas along with their average heights and the total oceanic area along with its average depth :

Continent

Area in square miles

Average height or depth, in feet

Europe .

3,860,000

980

Asia .

17,100,000

3 , 120

Africa .

11,500,000

2,130

North America .

9,260,000

2,300

South America .

6,840,000

1,970

Australia .

3,440,000

1,310

Total continental area .

52,000,000

2,300

Total oceanic area .

145,000,000

11,480

The total area of the continents is, therefore, 26.3 per cent of the total surface of the earth; leaving, with the same degree of precision, for the total area of the sea surface 73.7 per cent of the surface of the earth.

The average depth of the oceans according to Wagner is 3,500 metres or 11,480 feet, or, in round numbers, 2.2 miles.

The data thus given show that the volume of the oceans is 315,000,000 cubic miles, or in

round numbers l-800th of the entire volume of the earth. Assuming the density of sea water to be 1.03 times that of pure water, and the den¬ sity of the latter to be 62.3 pounds per cubic foot, the mass in the oceans is found to be 1.49X10ˆ** tons of 2,000 pounds, or one and one-half million million million tons.

It is interesting to contrast this mass of the oceans with the mass of the continents which lies above the sea-level. The average heights of the continents given in the above table require an average height for the entire land area of about 2,300 feet. This combined with the area of the continents gives for the volume of the continents above sea-level 22,500,000 cubic miles. If to this mass a density of 2.75 times that of water be attributed, the resulting mass of the continents above sea-level is 284X10ˆ“ tons. This is about one-fifth the mass of the hydro¬ sphere or oceans.

The Lithosphere. — The lithosphere is the special province of the geologist, and is treated in detail under Geology. It is here considered, therefore, only in its broader physical aspects.

No precise value of the thickness of the shell which is called the crust can be assigned. The estimates of geologists make it 5 to 10 miles thick. It is the shell to which are confined the great rock movements and transformations with the attendant phenomena of crust crumpling, folding and faulting. For the present purposes it may be assumed to be 10 miles thick.

In its mechanical aspects the most important fact presented by the crust is that it rests on the centrosphere, or nucleus, in substantially the same manner as a fluid crust would. In other words, the crust is essentially, in view of the forces to which it is subject, a viscous mass, which may be likened in its behavior to sealing wax. This conclusion is reached when one compares the compression to which the crust would be subjected if it were self-supporting, like a dome, with the crushing strength of rocks. That compression is about 30 times the crushing strength of the finest steel and 500 to 1,000 times that of the best building stones. Hence we must infer that at a depth of a few

miles there can be no such thing as a cavity in the crust. An¬ other conclusion of great importance, also, is that the surface shape of the earth must con¬ form very closely to the shape it would have if it had been originally fluid, as assumed by nearly all geodesists and geologists, many of whom adduce that shape as a proof of primitive fluidity. Given time enough, and the amount of time available is ample, as seen below, the viscous earth will assume the same shape, es¬ sentially, as a fluid earth.

Since the lithosphere, the hydrosphere and the atmosphere are the theatre of the principal activities, physical and biological, of our planet, it is of interest to know their volume, mass and chemical constitution. The volume of the shell 10 miles thick below sea-level is 1,969,400,000 cubic miles. Adding to this the volume of the crust above sea-level, namely, 22,500,000 cubic miles, there results for the volume of crust and hydrosphere down to a depth of 10 miles below sea-level 1,992,000,000 cubic miles. Of this, as stated above, 315,000,000 cubic miles are sea water, leaving for the solid matter of the crust to the depth in question 1,677,000,000 cubic miles. Attril)uting to this volume a density 2.75

times that of water, the mass of this solid part of the shell is 21X10' *tons of 2,000 pounds. This is about 14 times the mass of the oceans. These two masses and that of the atmosphere give, in round numbers, a total of 23X10'* tons, the contribution from the atmosphere being taken as 7X10'^ tons.

Prof. F. W. Clarke, making use of the above data, has worked out the relative abundance of the chemical elements in the combined mass of the atmosphere, the hydrosphere and the litho¬ sphere. His results are given in the following table. (Consult Bulletin of the United States Geological Survey, No. 78). It is interesting to note that nearly one-half of that part of the mass of the earth visible to us is oxygen, the next most abundant contributions being, in or¬ der, silicon, aluminum, iron and calcium.

CHEMICAL COMPOSITION OF THE LITHOSPHERE, HY¬ DROSPHERE AND ATMOSPHERE.

Element

Solid

crust

Oceans

Mean,

including

atmosphere

Oxygen .

47.29

85.79

49.98

Silicon .

27.21

25 30

Aluminum .

7.81

7 26

Iron .

5.46

5 08

Calcium .

3.77

0.05

3.51

Magnesium .

2.68

0. 14

2.50

Sodium . ‘. .

2.36

1.14

2.28

Potassium .

2.40

0.04

2.23

Hydrogen . .- .

0.21

10.67

0.94

Titanium .

0.33

0.30

Carbon .

0.22

0.002

0.21

Chlorine .

0.01

2.07

0.15

Bromine .

0.008

Phosphorus .

0.10

0.09

Manganese .

0.08

0 07

Sulphur .

0.03-16.09

0.04 +

Barium .

0.03

0.03

Nitrogen .

0.02

Chromium .

0.01

0.01

‘

100.00

100.00

100.00

The Centrosphere. — Since the crust of the earth, as seen above, rests like a viscous fluid on the centrosphere, the latter, whatever its tem¬ perature and other properties, must be subject to great internal stress. Indeed, the mechanics of celestial bodies of large mass leads inevitablv to the conclusion that pressure is the dominant factor in the earth at no great depth below the surface. Given time enough, therefore, the dis¬ tribution of pressure will be essentially the same as if the mass of the earth were fluid. This justifies the application of the laws of hydro¬ statics to the earth as a whole, whether it was originally fluid or not. With this concept, and with the law of gravitation, several facts enable us to determine within narrow limits what must be the constitution of the earth as regards dis¬ tribution of density, gravity and pressure. The principal of these facts are (1) the surface density, (2) the mean density, and (3) the sur¬ face value of the acceleration of gravity. In ad¬ dition to these facts, there are some others of less importance depending on the attraction of external bodies of the earth. Laplace correlated all these facts by means of a hypothesis with regard to the compressibility of matter. This asserts that the pressure in the earth increases as the square of the increase in density.

Adopting the indications of Laplace the fol

lowing table showing the variation of density, acceleration of gravity and pressure with depth below the surface of the earth has been com¬ puted. The relatively unimportant effect of the rotation of the earth is ignored in the calcula¬ tion. The assumed values of the surface density and the mean density are 2.75 and 5.5, respec¬ tively, times that of water. In the third column of the table g represents the average surface value of the acceleration.

DISTRIBUTION OF DENSITY, ACCELERATION AND PRESSURE IN THE EARTH.

Depth in fractions of earth's radius

Density relative to water

Acceleration of gravity

Pressure in millions of pounds per square inch

0.0

2.75

l.OOg

0.1

3.9

1.04

3.09

0.2

5.0

1.04

7.24

0.3

6.2

1.00

12.42

• 0.4

7.2

0.94

18.37

0.5

8.2

0.84

24.53

0.6

9. 1

0.72

30.61

0.7

9.8

0.55

35.99

0.8

10.3

0.38

40.30

0.9

10.7

0.20

43.04

1.0

10.8

0.00

43.96

It is seen from this table that the acceleration attains a maximum value. This value is 1.05 times the surface value and it is attained at a depth of about 610 miles. At this depth a given mass would have a greater weight than at any other distance from the earth's centre. A more extended table, computed by the author from slightly different data, is given in the article on Geology.

The variation of the density, acceleration and pressure are shown graphically in the following diagram. Fig. 6, in which these quantities are all measured horizontally from the line AO, repre¬ senting the earth's radius, to the right. The curves have different horizontal scales and are designated, respectively, D.C. (density curve), A.C. (acceleration curve), and P.C. (pressure

curve). The pressure curve intersects the axis OQ at right angles at Q.

Another interesting question in this connec¬ tion is what total radial compressibility is com¬ patible with this Laplacian distribution of den¬ sity, acceleration and pressure. The answer may be stated in convenient form thus; If the pressure of the atmosphere were to be doubled the radius of the earth would be shortened everywhere by about 2 metres, or 6.5 feet. This explains how mere inequalities in surface load¬ ing of the earth may account for some of the great observed movements of the earth's crust.

The Rigidity of the Earth. — It cannot be doubted (as shown below) that the temperature of the nucleus of the earth is very high, probably sufficiently high, under normal condi¬ tions, to melt and even render vaporous the materials of which it is composed. But if the figures of the last column of the above table are examined, it will appear reasonable to sup¬ pose that the behavior of the central mass under such great pressures may be very dif¬ ferent from that ordinarily associated with fluids. The first attempt directly to measure the rigidity of the ball of the earth was made by G. H. and Horace Darwin in 1880. They employed for this purpose a horizontal pendu¬ lum, but the results were not conclusive. Their method has since been

successfully employed, however, by several observers (Ehlert, Hecker, Kortazzi, Schweydar and Orloff), who arrived at definite and consistent results. All of these observations, as well as the classic investigation of G. H. Darwin based upon the phenomena of the tides, concur in showing that the nucleus of the earth is solid throughout and that it is somewhat more rigid than if composed of steel.

A most promising investigation of the re¬ sistance which the earth offers to change of shape was recently begun by A. A. Michelson. (Consult The Astrophysical Journal, Vol. XXXIX). The method is based essentially on a very accurate measurement of the tides pro¬ duced in the water level in two buried pipes, each 500 feet long, one running in an east and west and the other in a north and south direc¬ tion. It is the intention to measure the varia¬ tion with the interferonieter, the observations being carried on continuously for a long time.. Though this has not yet been done, the meas¬ ures thus far having been secured with a microscope merely, it is evident that even the preliminary results are of a very high order of accuracy. They indicate that the rigidity of the earth, or its resistance to change of shape, is about one-third greater than the rigidity of steel.

Acceleration at Surface of Earth. — ˆWhat is commonly called the acceleration of gravity at the surface of the earth is the resultant of the accelerations due to the attraction and to the rotation of the earth. This quantity has been measured with considerable precision at many points of the earth's surface by means of the pendulum, and the results have been combined in the following formula, g being the accelera¬ tion at any point of the sea-level whose latitude is

0 = 978.00 + 5.22 siffi <P centimeters / (seconds)* = 32.087 + 0.171 siffi </> feet / (second)*.

Mean Density and Mass of the Earth. —

Since the volume of the earth is known accu-

rately, the mass can be computed if its density can be ascertained. The author has recently shown {The Astronomical Journal, No. 424), that the product of this mean density and the gravitation constant may be derived with a pre¬ cision comparable to that of the value of the acceleration just given above. The gravitation constant is the quantity essential to convert the proportionality of Newton's law of gravity into an equality. That is, if m and m' are two masses, D their distance asunder, F the force of attraction they exert on one another, and k the gravitation constant, then

mm'

F = k - .

It is thus seen that k is not a mere number, but a quantity such that the second member of the equation is force as well as the first member, k is, in fact, the cube of a length divided by the product of a mass and the square of a time.

Denoting the mean density of the earth by p, it is found in the paper referred to that

yˆP = 36797X10~"/ (second)%

this quantity being the reciprocal of the square of a time. In a more interesting, as well as a more intelligible, form this relation may be written

where tt is the number 3.1415+ and T is the time it would take an infinitesimal satellite to pass around the earth under the law of gravi¬ tation, just grazing the equator, if there were no atmosphere to impede its progress. This time is seen to be 1 hour, 24 minutes, 20.9 seconds.

It is clear then that p will be given by the above equation if k is known. This quantity has been measured directly by several observers.

A mean of the most recent and most trustworthy determination, is in C.G.S. units (see ˆThe Century's Progress in Applied Mathematics,ˆ Science, N.S., Vol. XI),

yˆ=6673X10”””” .

Thus p is found to be 5.514 times the density of pure water. The uncertainty of this value as shown by the computation is about four units in the last place of decimals. In view of this fact, and of the great difficulties in measuring the quantity k, we shall use the round number 5.5 as hitherto.

From the volume of the earth given above the following results are derived for its mass :

(=1,311 X 1021 pounds

Mass of earth -ˆ = 6,552 X IQis tons (of 2,000 pounds)

(= 5,945 X 1020 kilograms

For convenience of reference the masses that have been given above are here collected and expressed in tons of 2,000 pounds.

Mass of earth . = 6,550 X lOi*

Mass of centrosphere . = 6,529 X 10’*

Mass of lithosphere . = 21 X 10’*

Mass of hydrosphere . = 1.49 X 10’*

Mass of atmosphere . = 7 X 10’*

The Internal Heat of the Earth. — That the earth has a great store of heat a few miles be¬ low the surface is amply proved by a variety of geological phenomena. Wherever deep wells, or bore holes, have been sunk the temperature is observed to increase with depth at a rate of

about a degree F. for 60 feet. This shows that heat is being conducted from the interior to the surface of the earth and is thence radiated into surrounding space. The amount of this heat is sufficient to melt a layer of ice six to eight milli¬ meters (or one-fourth inch, say) thick, covering the globe, per annum, or more than 800 cubic miles of ice. It seems most probable (though it is by no means certain) that the

temperature of the centrosphere is high enough to melt all known rocks, although the lower strata of the crust do not assume the molten or viscid form of lavas except on relief from the great pres¬ sure to which they are subject. This was, es¬ sentially, the view of Fourier, the earliest physi¬ cist to investigate this question, and it is still regarded as the most plausible hypothesis with respect to the actual state of the earth.

Whether this hypothesis is exact or nofi how¬ ever, the theory of heat conduction founded by Fourier enables us to draw with certainty two important conclusions with respect to the earth, namely: (a) that the heat conducted from the interior to the surface escapes as if there were neither atmosphere nor oceans; and (b) that a million years is the smallest unit of time con¬ venient for measuring the historical succession of thermal events.

With less certainty it may be affirmed that the earth is shrinking in bulk as it cools, and that this is one of the principal causes of the grand crust crumplings and volcanic activities to which geologists pay special attention. This cubical contraction goes on exceedingly slowly, however; requiring, so far as one can infer from present indications, nothing short of thousands of millions of years for its completion.

The Earth as a Time Keeper. — The time of rotation of the earth is the most trustworthy unit of time man has discovered. The present value of this unit is 86164.1 mean solar seconds. That the earth must rotate with great steadi¬ ness is at once apparent when the immense amount of its energy of rotation is considered. This energy is about 156X10^^ foot-pounds, or 2X10’*^ ergs. It is more than will be developed at Niagara (at the present rate of 5,000,000 horse power, say) in a million million years. Nevertheless, the period of rotation of the earth is subject to variation from four obvious causes. These are (1), secular contraction of the earth’s mass; (2), the influx of meteorites, or meteoric dust; (3), tidal friction; and (4), shiftings in position of the surface load of the earth, as in the processes of sedimentation, glaciation, *etc.*

The effects of the first two causes have been investigated, (Astronomical Journal, No. 502). Contraction tends to shorten the day, and may possibly cause a diminution of as much as 6 per cent of the present length. The change goes on very slowly, however, and will not be per¬ ceptible in any such, interval as that of human history (20 centuries, say). Meteoric dust tends to lengthen the day, hut at the present rate of influx (about 20,000,000 meteorites daily) the effect will not amount to so much as a quarter of a second in less than a

million million years. During this interval of time the total effect, siubstantially, from secular contraction will have accrued.

The effects of the other causes named have not been evaluated, though the last one is prob¬ ably the most important of all of them ; since

it may be easily shown that such shif tings of the surface load as are now taking place on the earth may modify the length of the day hy an amount which, if cumulative, might in a few centuries seriously disturb astronomical reckon-ings.ˆ

Bibliography. — Laplace, ˆMecanique Celesteˆ and ˆSysteme du Mondeˆ ; Todhunter, ˆHis¬ tory of the Theories of Attraction and the Figure of the Earthˆ (1873) ; Clarke, ˆGeodesyˆ (1880) ; Helmert, ˆDie Mathematischen und Physikalischen Theorieen der Hoheren Geodasie> (1880, Vol. I ; 1884, Vol. II) ; Wood¬ ward, R. S., Smithsonian Geographical Tablesˆ (published by the Smithsonian Institution, Washington 1894) ; Thomson (Lord Kelvin) and Tait, ˆTreatise on Natural Philosophyˆ

(1890).

Robert S. Wˆoodward,

President of Carnegie Institution, Washington, D. C.

EARTH-HOUSES, a name generally given throughout Scotland to underground buildings, also known as ˆPiets' houses® or ˆˆPicts' dwell¬ ings.® The earth-house in its simplest form consists of a single irregular-shaped chamber, formed of unhewn stones, the side walls gradu¬ ally converging toward the top until they can be roofed by stones of four or five feet in width, all covered in by a mound of earth rising slightly above the level of the surrounding dis¬ trict. In the more advanced form of these structures two or three chambers are found. Earth-houses are frequent in the northeast of Scotland, occasionally 30 or 40 being found in the same locality. Very similar structures, known as bee-hive houses, occur in Ireland. In the United States modern earth-houses are to be found in Nebraska, Kansas and other Western States, and are commonly called ˆMug-outs.® In Arizona and California certain dwell¬ ings of adobe may be designated as earth-houses. See Adobe.

EARTHENWARE, vessels or objects of clay, as distinguished from porcelain, is opaque; as distinguished from stoneware the body is dull and earthy. The clay is baked or fired in a kiln, or more rarely

sundried. The glaze de¬ pends on the quality of the ware ; generally it is of a readily fusible character and contains lead ; but a simple salt glaze is employed for common articles. Occasionally the unglazed body is employed, as for water-bottles, cream-jugs, vases and ornaments ; these have generally a reddish brown color, due to iron. The finer kinds of earthenware, such as Majolica, Delft ware, Faience and Palissy ware, are not only glazed, but are besides elaborately colored and enameled and ornamented with raised figures of various kinds. See Faience; Pottery.

EARTHLY PARADISE, The, the great narrative poem of William-Morris, was writ¬ ten in the years 1865 to 1870, the height of his career as craftsman and business man. The scheme that holds together this strange medley of Greek myth, Norse saga, French romance and Arabian tale is amazingly simple. The scene is laid at the end of the 14th century in ^^a nameless city in a distant sea,® inhabited by descendants of the Greeks. Hither came a band of Norse wanderers, driven into years of voy¬ aging by those two recurring mediaeval motives : fear of the dread Black Death and hope of an

Earthly Paradise, of endless life._ Here the wanderers linger on, finding, not immortality, but rest, and at last, release from fear; and here, month by month, each company tells the other a tale — one classic, one mediaeval, till the 24th ends the year. This scheme is suc¬ cessful, not only because out of the most diverse material it builds a single, simple struc¬ ture, but because it justifies an equally single and simple treatment. Differences of tone there inevitably are. Such a tale as ^^The Lovers of Gudrun,® taken direct from an Ice¬ landic saga, moves with a swift relentlessness, a tragic intensity ; ^^The Land East of the Sun and West of the Moon® carries out the dream device in its dreamlike leaping and lingering. But the unity that links such variety as ^Uupid and Psyche® and ^^The Man Who Never Laughed Again® (from the ^Arabian Nights^ goes deeper than any narrative scheme or re¬ currence of metric form. It is the spirit of Morris himself — master story-teller — that unites these stories of lovers fair and strong, of great things dared and endured. And for those who weary of this endless revel of love and adventure, of sunshine and color, there is the subtler lyric beauty of the interludes, in which the artist's own imagination is most surely revealed. It is not simply that these brief interludes — one for every month — are among the loveliest of English landscape poetry; but that in them, from the famous Prelude to the mLOving Envoi to his master Chaucer, the poet utters his deepest feeling about his life and his art. A ‘^Mreamer of dreams, born

out of my due time,® a hater of death, ˆhiot know¬ ing what it meant,® but a lover of life, ˆfihrough green leaf and through sere,® he has learned with his wanderers and his Norse heroes to face life and death heroically. Consult ˆThe Collected Works of MTlliam Morrisˆ (ed. by May Alorris, London 1910) ; Mackail, J. W., ˆThe Life of William Morrisˆ (2 vols., 1904).

Frances Cutler.

EARTHNUT, a common name for many unrelated plants. The most common are prob¬ ably the following ; Buniimi flexuosum and B. bulbocastanmn, both members of the natural order Unibelliferee, the latter referred by some botanists to the genus Caruni (caraway). Cer¬ tain species of Cantm, Oenanthe and Chcero-phylhim of the same natural order, also bear this common name. All these species are na¬ tives of Europe and all bear tubers which have been used to some extent for human food, but are more valued as food for swine, since the animals can be turned loose to root them out of the ground. ˆ They are also known as earth chestnuts, pig-nuts, *etc.* Certain species of Cyperus of the order Cyperacece are also called earthnut (See Nut-grass), and so are various species of - the natural order Leguminosce, es¬ pecially Arachis hypogcea (see Peanut), Apois apios, or tuberosa (see Ground-nut), known also as wild bean.

EARTHQUAKE. Earthquake denotes a shaking of the earth's crust, due to the passage of elastic waves, depending on some internal cause.. These waves are principally of two classes : longitudinal, in which the particles vibrate as in sound ; and transverse, in which the}'ˆ vibrate as in light; but near the origin of disturbance both classes of vibrations coexist

and the movement of the earth particle is a combination of the two oscillations. A cubical element of the earth's crust has its volume com¬ pressed and its form distorted, with the pas¬ sage of each successive wave and the rapid recurrence of this movement constitutes the trembling called an earthquake. The velocity of this wave propagation varies according to the elasticity and average density of the rock, the observed values lying between a few hun¬ dred feet and about five miles per second, as in the recent San Francisco earthquake, which was propagated across the continent with great speed. Powerful earthquakes are now recorded all over the world by means of very sensitive seismographs and it is found that the greater the distance of propagation the more the waves are separated, the compressional waves out¬ pacing the distortional ones.

The record of a South American earthquake, like that of Valparaiso, 16 Aug. 1906, occupies from two to three hours when registered upon seismographs in the United States and Europe ; and moreover the further the disturbance is prop¬ agated the slower the earth movement becomes, so that from a violent agitation near the origin it becomes a gentle swaying of very slow char¬ acter in the distance and may not be felt by men nor animals, though faithfully recorded on delicate long-distance seismographs. As more than 60 world-shaking earthquakes occur each year, one of these disturbances on the average is due each week and by the investigation of the propagation of these waves through the earth seismologists have drawn important con¬ clusions regarding the constitution of the globe. In this wa}'- Mr. R. D. Oldham shows (Quar¬ terly Journal of Geological Society, 1906) that the earth is fairly homogeneous throughout until we reach a distance of about 0.4 of the radius from the centre, when a change takes place, the cause of which is not yet understood.

Moreover, it is possible for a seismologist to calculate from his record of an earthquake how far off the disturbance was. The em¬ pirical formula given by Professor Omori of the Imperial University at Tokio, for very-distant earthquakes is as follows (Publi¬ cations Astron. Soc. Pacific, 10 June 1906) :

XKm. = 6.54YRee_720km. ;

where X, in kilometers, denotes the actual dis¬ tance between the centre of disturbance and the place of observation ; and Y, in seconds, the total duration of the first and second prelim¬ inary tremors. When the distance is small the formula becomes

XKm. = 7.27YSee_38km. ;

From the records obtained at the Lick Observa¬ tory Professor Omori calculates that the most central part of the San Francisco earthquake was 80 or 90 miles to the west of Mount Harn-ilton, which places the origin under the margin of the Pacific Ocean.

The motion of the earth ppticle usually is only a small fraction of an inch and houses resting on solid ground do not suffer greatly; but where the land is made by the filling in of soft earth it remains loose and by the pas¬ sage of the earthquake waves is thrown into billows like the sea, so that all structures on such foundations are frequently destroyed. This was observed to be the effect at Lisbon as long ago as 1755 and illustrated again very clearly

at San Francisco and at Valparaiso in 1906. Even the steel frames of brick buildings were destroyed on the made land at Valparaiso, though houses standing on rock foundation suf¬ fered but little. Observations by Professor Omori and the writer at San Francisco show that on the made land the oscillations did not exceed about three inches. Owing to the rapidity of vibrations of this amplitude, however, few structures are able to withstand them. But on hard ground, where the vibrations were about a quarter of an inch, the worst that would result would be a cracking of the plastering and perhaps of the walls.

There are many modern investigators of earthquake phenomena. The names of Milne, Omori, Dutton, Oldham, Wiechert and many others are familiar; and in Europe and Japan many earthquake observatories are in active operation. Several such observatories have been established in the United States and now that the Seismological Society of America has been founded at San Francisco, no doubt the study of earthquakes will become an important object of attention. The Seismological Society of Japan has done much for the investigation of earthquakes in the Orient and elsewhere.

The distribution of earthquakes is very similar to that of volcanoes, but there is a quite definite earthquake zone encircling the whole

earth, only a part of which is distin¬ guished by volcanic activity. This zone in¬ cludes the Mediterranean Sea, the Azores, the West Indies, Central America, Japan, China, India, Persia and Asia Minor. This may be regarded as a main earthquake zone from which there are many branches following the coast line of the continents and thus, in gen¬ eral, nearly coinciding with regions of vol¬ canic action. In many cases it is, indeed, evi¬ dent that volcanic eruptions and earthquakes which accompany them are closely related, both being due to explosions of steam, with a con¬ sequent readjustment of pressures and mate¬ rial within the immediate region. A great volcanic eruption is thus usually preceded by earthquakes which are frequently felt for a great distance from the volcanic zone; upon the actual commencement of the eruption, how¬ ever, the earthquakes diminish greatly in in¬ tensity or wholly cease, doubtless because the interior steam pressure has been relieved by a passage through the outlet formed. Yet these disturbances are only very local compared with the effects of really great earthquakes. Nor is it true that a very large proportion of the heavier earthquakes, even in these regions, are closely associated with volcanic activity; the original centre of the disturbance is usually found to lie at a distance, where there are no volcanic rocks.

A second and more widespread cause of earthquakes is a sudden settling, faulting or bending of the earth's crust owing to the strains which are set up within it. The slow secular contraction of the earth's interior must set up such strains in the material resting upon it ; though the rocks may withstand this strain for a considerable period, yet ultimately they may suddenly give way, causing a rock fracture many miles in length, the rock on one side sinking down and causing a ˆB'ault,ˆˆ — or there may be a general jarring subsidence under a territory of

considerable extent. These phenomena are most frequent along the greater mountain ranges which border the oceans and are closely asso¬ ciated with regions of present folding and upheaval or subsidence of the earth's crust. Both they and volcanoes are obviously

asso¬ ciated with lines of weakness in the crust of the earth. Similarly, earthquakes may be pro¬ duced by continued deposition of sediment on an ocean bed, which latter being overloaded (and possibly heated and thus weakened by the superimposed material), may suddenly yield.

We have thus far no accurate data for esti¬ mating accurately the number and situation of earthquakes which occur under the sea but dis¬ turbances there are not unfrequently more vio¬ lent than under the land. ()ne of the most frequent phenomena noticed to accompany severe earthquakes along the ocean shores is the violent disturbances of the sea, giving rise to enormous waves which sometimes prove more disastrous than the earthquakes themselves. These seismic sea waves are divided into two classes : First, those in which the water is noticed slowly to withdraw from the shore some time after the earthquake and later return as a great wave carrying everything before it ; and second, those in which the water rises sud¬ denly and overflows the coast, without any pre¬ vious recession from the shore. In the first class are to be included the waves which inun¬ dated Lisbon after the great earthquake of 1 Nov. 1755; Callao, 28 Oct. 1746; Conception, 20 Feb. 1835; Arica, 13 Aug. 1868; and Iquique, 9 May 1877. In all these cases the water retired some little time after the earthquake, say from a quarter to half an hour and sometimes after longer intervals ; and moreover the withdrawal is gradual, so that ships at anchor simply settle down upon the sea bottom laid bare by the slow withdrawal of the water. Then after an inter¬ val of 20 minutes, or half an hour, the sea re¬ turns as a great wave, which is said to have been 80 feet high at the overflow of Callao in 1746 and from 50 to 60 feet high at the inunda¬ tions of Arica and Iquique. The wave is naturally made higher with a more vertical front as it approaches the shore, owing to the resistance to propagation in shallow water.

The slow draining away of the water some time after the earthquake shows that the sea bottom has sunk and the water rushes in from all sides to fill up the depression ; the currents meet at the centre and raise a ridge where there was formerly a depression and the ridge then collapses and sends ashore the first great wave. After this has swept the shore the sea slowly withdraws again to fill up the depression, leav¬ ing bare the land as before and after the same interval again returns and sweeps the coast. At Arica in 1868 and at Iquique in 1877 it is said that the sea continued to oscillate for nearly two days before it finally quieted down and meanwhile the waves were propagated around the world.

In seismic sea waves of the second class, where the water rises suddenly without recession from the shore, the cause is an upheaval of the ocean bed, which also lifts the water resting upon it. The result is the sudden appearance of a great wave. This class of waves appears to be less frequent than the preceding class and therefore is not so famous as those in which

the water first withdraws from the shore. At great distances from the origin, waves of the first class, in being propagated round the world, resemble those of the second class ; so that to classify sea waves intelligently a careful inves¬ tigation must be made of the place of origin of the disturbance.

A quite different theory of earthquakes, which includes also the cause of volcanoes and the mode of mountain formation, has recently been very fully developed by Prof. T. J. J. See. This is in brief, that under the enormous pressures existing at the bottoms of the ocean beds a portion of the water is forced down¬ ward to a considerable depth within the earth's crust ; here, becoming diffused among the molten rocks and having its explosive power greatly increased through superheating, it penetrates under the lands along the coast lines where it may elevate mountain ranges parallel to the coast, giving rise in its explosive pressure to faults, volcanic outbreaks, and, as a consequence of each of these, to earthquakes. Admitting the possibility of water penetrating the crust in this way, this theory explains the situation of the great mountain ranges of the earth, the general absence of seismic disturbances beneath the interior of continents (since here the seep¬ age of the water would be less), the observed fact that the density of mountain masses is often small and many other associated phenomena. Consult ˆThe Cause of Earthquakes, Mountain Formation and Kindred Phenomena Connected With the Physics of the Earth, ˆ (Proceedings of the American Philosophical Society, 1906).

Bibliography. — Dutton, ˆEarthquakes in the Light of the New Seismologyˆ (London 1904) and numerous memoirs in the ˆTransactionsˆ of various learned Societies and Government Surveys; Humboldt, ˆCosmosˆ ; Judd, Wolcanoesˆ ; Lyell, ˆPrinciples of (jeologyˆ (12th ed.) ; Milne, ˆEarthquakesˆ (1903), and ˆSeismologyˆ ; Russell, Wolcanoes of North Americaˆ and numerous other works on Geology and related subjects; Hobbs, ˆEarthquakes, an Introduction to Seismic Geologyˆ (London 1908) ; Suess, ˆFace of the Earth. ˆ Papers by Milne and others in the Philosophical Transac¬ tions and Proceedings of the Royal Society, the papers of See above referred to, and the Re¬ ports

of the British Association ; Publications of the Seismology Society of Japan; Beitrage zur Geophysik.

EARTHQUAKES, Instruments for Re¬ cording. The first record of an earthquake really worthy of being regarded as accurate and complete was obtained by Prof. James Ewing at the University of Tokio, on 3 Nov. 1880, by the aid of a new seismograph of his own in¬ vention. This great epochmaking result was dimly foreshadowed, no doubt, by earlier crude attainments, yet Ewing's work was far in ad¬ vance of that of the times, and his records were the first and only ones from which the approximate amplitudes, periods, and accelera¬ tions of the motions of the ground could be deduced.

In order that a seismograph may faithfully record the motion of the ground during an earthquake it is in general a necessity that some portion of the instrument must remain relatively at rest throughout the disturbance. It

1 Horizontal Pendulum Seismograph with Mechanical Registration

2 Details of Horizontal Pendulum Seismograph

I

%

• ;

* ■•y

t

ˆ ■

«

I* •

L* £

»

‘t

a..

1 I

(

V-‘

V

» .-¥ ‘/V,

*. H

f

►* ■

M’ .

‘ • ‘ :x

I

I

t

I

f

\

:i

seems to the writer that to Ewing more than any other is due the credit of having formu¬ lated the kinetic basis of all modern seis-mornetry. He was the first to show how to realize and utilize the principle of the steady rnass in the measurement of earthquake motion. There is scarcely any type of seismograph now in use that does not find its prototype among the large number of devices and arrangements either described or actually constructed and employed by Ewing at the University of Tokio from 1880 to 1883. We cannot attempt to de¬ scribe in this brief account any of his early work/ or the equally important contributions to seismology by Milne, Gray and others^ of that period.

Within the past 25 or 30 years seismographs have multiplied very greatly throughout the civilized world, and by their records it is found that any considerable earthquake literally sets the entire crust of the globe vibrating and its tremors are measurable at almost any point on the surface by the aid of the sensitive instru¬ ments now employed.

Nature of Earthquake Motion. — A short statement explaining the motions of the ground will aid in understanding the instruments and their records. The commonly current concep¬ tion that earthquake motion is a comparatively simple vibratory displacement of the ground in some particular direction is shown to be de¬ cidedly erroneous by the actual records. The motion, in fact, is exceedingly complex; the vibrations in a horizontal plane take place in all conceivable directions and are compounded with motion in the vertical. With this complex sort of vibratory displacements there may also coexist certain twisting and tilting rotations. No single instrument can possibly produce the record of such highly intricate motions. They

must be separated or resolved into elementary components for satisfactory registration. It is generally recognized that no less than six dis¬ tinct and separate components require to be measured, namely, three displacements in direc¬ tions at right angles to each other, that is, one north and south, one east and west and one vertical ; also, three components of rotation about the same three axes. The turning on the vertical axis may be called a twisting corn-ponent. The turnings on the horizontal axis are tilting effects. Seismologists have not yet succeeded in recording all of these elementary components. Unfortunately most of the instru¬ ments thus far employed are influenced by more than one component of motion, and the records cannot therefore be entirely interpreted.

Seismographs. — The seismographs chiefly employed up to the present time are those de¬ signed to register the horizontal vibratory dis¬ placements of the ground. In a limited num¬ ber of cases efforts have been made to register the vertical component of motion. In still fewer cases the tilting motions of the ground have been the subject of special measurernents. The writer is not aware that the twisting component has thus far ever been recorded, although forms of apparatus for the purpose have been proposed.

1 Memoirs of the Science Department, University of Tokio, No. 9. — 1883.

2 Publications of the Seismological Society of Japan, since 1880.

Vertical Component. — Instruments for ver¬ tical motion are not so easy to design, and the results obtained by their use have been less satisfactory than with other types either be¬ cause the vertical motion of the ground is rela¬ tively very small, or because it may be absent altogether. In seismographs for vertical motion the so-called steady mass must, in general, be suspended by means of very flexible springs, or their equivalents, in order that it may remain at rest in the vertical sense while the ground may rise and fall beneath it. If the springs are too stiff the steady mass fails to remain at rest but is made to rise and fall with the move¬ ment of the ground. On the other hand, if the springs are too weak, very slight variations of strength, due to temperature and prolonged ex¬ cessive stress, cause the steady mass to wander slight amounts from its normal position of rest. As the motions are generally greatly magnified, these slight progressive

displacements often carry the tracing entirely off the sheet designed to receive it, or otherwise prove fatal to the de¬ sired result. These characteristics of ordinary springs constitute serious limitations in the con¬ struction of seismographs for vertical motion. What is needed in this connection is some sort of available material for springs that, under very great extension, does not exhibit with the lapse of time any minute slow, progressive, after¬ deformations and is unaffected by variations of temperature.

Horizontal Motion. — A simple pendulum consisting of a massive bob, weighing several hundred pounds in some cases, suspended by a steel wire from a massive support has been extensively employed especially in Italy and Spain as the ˆsteady mass® for a seismograph. The motions of the ground with respect to such a mass must be magnified from 10 to 100 or more times if we are to produce satisfactory records of small distant earthquakes. The means of doing this will be shown later.

A simple pendulum of this character fails to provide a reliable steady mass for two or three reasons. If the length is short, 10 or 20 feet, the mass very quickly responds to the earthquake movements and presently the pendulum is itself swinging in a more or less violent manner. A long pendulum (several hundred feet) cannot be supported with suffi¬ cient rigidity. The top of a lofty tower, even during the absence of an earthquake, wanders all about a fixed point within it, due to the influence of temperature, wind, etc., on the tower, and the effects of moisture, temperature, rainfall, etc., upon its foundation and the adjacent earth. During an earthquake the motions of the top of such a tower cannot be the same as those of the ground and are doubtless much greater, thereby seriously in¬ fluencing the steady mass, notwithstanding the great length of its support.

The Horizontal Pendulum. — The type of pendulum employed first by Ewing for the measurement of earthquake motion in the hori¬ zontal plane is commonly called the horizontal or conical pendulum. A modern design of this form of seismograph is shown in Figs. 1 and 2. The steady mass C (about 40 pounds) is sup¬ ported upon the massive column A by a hori¬ zontal strut and the diagonal wires W. W. so that it is exceedingly free to swing about a

pivot point at D and another at B. The two points D and B are not quite in a vertical line, hence the steady mass is in slightly stable equilibrium and if disturbed oscillates like a very long pendulum. As ordinarily adjusted at the Weather Bureau the pendulum illustrated, makes a complete oscillation in about 35 sec¬ onds. This is equivalent to a simple pendulum about 4,000 feet long. The record is made upon the clock-driven drum R by means of the lever L, carried in the heavy yoke piece G. For this purpose the surface of the drum is closely covered with a piece of smooth white paper which is uniformly coated with soot from a wide-flame, smoky, kerosene lamp. The drum makes one revolution an hour, and each minute of time is electrically marked on the record sheet by the time-ticker magnet M. The distant end of the drum-shaft is cut with a coarse thread which causes the drum to move endwise about 3-16 of an inch with each revo¬ lution, thus separating the lines traced by the stylus.

The manner in which the registration of the earth motion is effected is more clearly seen in

The Milne seismograph used in the English work records photographically without the use of mirrors. A small steady mass is suspended on a horizontal strut only an inch or two long, but the strut is prolonged beyond by a very light boom to a length of nearly three feet or more. This long boom at the outer end carries a light aluminum vane pierced with a narrow radial slit. The photographic paper, in the shape of a long ribbon, is placed in a box just under the vane. The box has a slit in its top at right angles to that in the vane. Light from a lamp is thrown upon the aluminum vane and passes into the box at the point where the two slits intersect, thus making the photographic record.

Magnetographs. — It has been found that the delicately suspended magnetic needles em¬ ployed for the purpose of recording continu¬ ously the small diurnal and other changes going on in the earth's magnetism are nearly always disturbed by even very small earthquakes. These are not seismographs at all, in the ordi¬ nary meaning of the word, and the records give very little information except the time at which

Record of San Francisco Earthquake as made by the Seismograph at the U. S. Weather Bureau, Washington, D. C.

Fig. 2. The lever L is pivoted very freely in the stirrup F. The short end of the lever is forkedˆ and engages the slender steel staff f, which is pivoted in the most delicate manner in the frame F, rising from the steady mass C. Observing now that the steady mass is free to remain at rest with respect to the lateral mo¬ tions of its pier and the yoke piece G, it is plain that the stylus at the long end of the lever will trace a magnified record of all the lateral dis¬ placements of the pivot d, because the point of the fork which engages the steady mass at f must remain at rest with the mass. The amount of magnification depends upon the ratio of the lever arms. In instruments of the kind illus¬ trated a 10-or 15-fold magnification is usual. Owing to the fractional resistance offered by the soot and at the pivot points greater mag¬ nifications require proportionately greater mass in the pendulum, if the same period is retained.

Very similar devices to those shown are quite generally employed in all instruments with mechanical registration.

Two separate ˆpendulums installed at right angles to each other are required to register both components of horizontal motion.

Photographic Registration. — Much less massive horizontal pendulums can be employed to register photographically by the aid of light reflected from a mirror in the usual manner.

the needles were disturbed. The needles act like any other small, light pendulum and simply suffer certain mechanical agitation during the earthquake. In some less frequent cases there appear to be certain distinct magnetic effects that occur with the earthquake, but these are only imperfectly understood at the present time.

Interpretation of Records. — Serious com¬ plications are likely to enter into the records of seismographs especially of the horizontal pen¬ dulum. This instrument is more and more sensitive to minute tilting motions the greater its period of oscillation. If the ground at the Weather Bureau instrument tilts as little as only one inch in a mile the stylus of the seismograph will be thrown out of the line nearly one-

quar¬ ter of an inch. Furthermore, the instrument is sensitive to the twisting component of motion and finally we cannot feel entirely sure the steady mass has remained quite at rest. If the earthquake motion synchronizes with the free motion of the pendulum, the latter is quite certain to be set swinging. In the face of these complications it is hardly possible, as yet, to interpret exactly the records obtained. Great improvements in the instruments are constantly being made and it appears as if the horizontal pendulums are likel}?' to be displaced in the future by better types of apparatus.

Records. — The interesting features of the Weather Bureau record of the San Francisco earthquake appear in Fig. 3. The small pre¬ liminary tremors began ®at 8 h. — 19 m. — 20 s., A.M., that is 6 minutes 42 seconds after the strong motion recorded at the University of California. The stronger motion begins at ^'b®, on the record at Washington and at 8:32 to 8:35 the pen was deflected off the sheet by the very strong motion, producing a gap in the record which, however, was resumed when the motion subsided a little. The original record sheet is 36 inches long and vibratory motion is perceptible for fully four hours. The com¬ plete period of the larger waves was from 20 to 30 seconds. Such vibrations are very slow and appear to be entirely imperceptible to human beings, nor do they affect buildings or other structures injuriously, so far as can be ascer¬ tained. C. F. Marvin.

Chief of the United States Weather Bureau.

EARTHS, a term applied by alchemists to substances which were considered elementary bodies, but since the researches of Lavoisier and Sir Humphry Davy, defined as metallic oxides or compounds of oxygen with metals similar to potassium and sodium. Earths are seldom found in a state of natural purity, but constitute chiefly the component parts of gravel, soil or strata. The more important earths are divided into two classes ; alkaline earths, lime, baryta, strontia and magnesia ; and proper earths, alumina, zircoma, glucina, yttria and thorina; most of these are treated under sepa¬ rate titles, to which

refer. The alkaline earths resemble the alkalis. They are soluble in water; baryta and strontia readily, lime spar¬ ingly, and magnesia very slightly. Their solu¬ tions affect vegetable colors similarly to the alkalis. They combine with acids, forming neutral salts, some of which are readily soluble in water and others insoluble. The proper earths are insoluble and infusible, and by ex¬ posure to heat lose the property of easy solu¬ bility in acids.

EARTHWORKS, in military parlance, are permanent or temporary defenses chiefly of earth forming a shield against the enemy's fire. For the various forms of military earthworks see Fortifications.

EARTHWORM, any terrestrial annelid of the order Oligochceta. Although certain fami¬ lies of Oligochceta are strictly aquatic and others exclusively terrestrial, still others con¬ tain both aquatic and terrestrial species, and aside from peculiarities which are obviously adaptations to the mode of life no sharp dis¬ tinctions can be drawn between these two classes. The earthworms generally are larger and more robust, with shorter setae than the waterworms and have dorsal pores. Within recent years the earthworms haye attracted much attention from S3ˆstematic writers and no less than 800 species, of which upward of 90 inhabit North America, are now known. ˆ Ex¬ ternally they look much alike, but in their in¬ ternal anatomy exhibit an astonishing variety. The common earthworms of Europe apd America, of which a dozen or more species may be found in almost any suitable locality, belong chiefly to the genera Lumbricus and Allolobophora which have the setae arranged

in four pairs on each somite, a well-developed girdle or clitellum occupying a variable num¬ ber of segments toward the anterior end, the female and male genital pores on the 14th to 15th segments respectively and various com¬ plex internal peculiarities of the reproductive organs. While our species rarely equal a foot in length, several South African and Austra¬ lian species reach five feet. Earthworms in¬ habit nearly all parts of the earth except the frozen regions of high latitudes and altitudes, dry sandy soils and some portions of the North American prairies. Their habits are everywhere much alike. They burrow in damp earth, which the common kinds penetrate to the depth of about two feet. They swallow the soil and after digesting its nourishing elements reject the rest in the form of castings from the mouths of their burrows. At night they partly leave their burrows and draw to them the petioles of leaves, etc., on which they feed and with which they close the openings in cold weather. In

this way they also seek one an¬ other's company and copulate, as hermaphrod¬ ites mutually fertilizing each other. A cocoon is formed by secretions of the clitellum and re¬ ceives the eggs and spermatozoa in a quantity of albumen as it slips past the openings of the genital ducts toward the head, from which it passes and remains in the earth. During the winter they burrow to a depth beyond the reach of frost, but some species at least will survive actual freezing. The importance of earthworms as cultivators of the soil can scarcely be overestimated. By their burrowing they render it porous and permeable to the rain and air; they continually turn the earth by bringing up soil from beneath the surface and they add to its fertility by burying vege¬ table matter and by their secretions. Darwin has estimated that earthworms bring to the sur¬ face in rich meadow lands not less than one-fifth inch of soil per annum, and recent labor¬ atory experiments demonstrate most emphat¬ ically the beneficial influence on plants of the presence of earthworms.

The body wall of earthworms consists of an epidermis, one layer thick except on the clitellum; a layer of articular muscles; and an inner layer of longitudinal muscles. The chae-tae are shaped like a large S. The nervous system consists of a pair of dorsal cerebral ganglia, connected with a ventral ganglionated cord. Special sense-organs are absent, except for tactile cells, but touch, sensitivity to light and color-sense exists. There is a definite body-cavity, split up into separate compart¬ ments for each segment. It communicates with the outside through dorsal pores. The vascular system is closed and consists primarily of a dorsal contractile vessel and ventral non-contractile one, communicating by transverse contractile trunks in front and capillaries be¬ hind. The excretory system consists of vari¬ ously modified nephridia opening into the coe-lum and to the outside. The digestive tube is usually 'straight and consists of a ventral mouth, a buccal cavity,ˆ a rnusctilar pharynx, an oesophagus and an intestine opening by a terminal anus. Various glandular appendages exist and the whole system is often compli¬ cated in several respects. The reproductive glands lie in the wall of the coelum ; their com¬ plicated ducts are probably modified nephridia.

Consult Beddard, < Earthworms and their Allieˆ (New' York 1912) ; Darwin, < Forma¬ tion of Vegetable Mouldˆ (London 1881).

EARWIG, an orthopterous insect, forming type of a family, Forficulidcs. This insect has generally a habit of concealing itself in cavities, endeavoring to reach their innermost recesses and in some rare cases may have sought a hid¬ ing place in the ear, but its passage into the in¬ ternal ear would be stopped either by the waxy secretions or by the tympanic mem¬ brane. In any case, there is not much basis for the legend that it is in the habit of creep¬ ing into the ears of sleepers. The common earwig (F. auriciilaria) is found throughout Europe, in North Africa, Asia Minor and North America. It has a length of from two-fifths to two-thirds of an inch ; the antennae are thread-like, and the number of joints is 15. The fore wings are short, horny and some-W'hat rectangular, but the larger hind wings are thin and mainly membranous and fold up some¬ what like a fan under the fore wings. The last segment of the abdomen carries a pair of curved, horny, pincher-like appendages, which in the male are toothed at the base. The eggs are laid in spring, about 20 at a time, and are carefully protected by the female. The young earwigs differ little except in size from the mature insects ; they are guarded by the mother during the first period of their exist¬ ence. Earwigs shun light as far as possible and this habit is taken advantage of by gar¬ deners to catch them and destroy them. How¬ ever, their partly predatory habits benefit the gardener by destroying more obnoxious in¬ sects. In the daytime they may be found in various situations, such as beneath the bark of trees, under stones, in the soil, or in any suit¬ able hole. They feed on fruits, seeds, leaves and flowers, and at times on animal refuse. Eight other species of this genus are found in Europe. In the genus Chelidnra, repre¬ sented in Europe by nine species, the wings are altogether wanting. Labia is another genus with only one European species (L. minor), which is common in Great Britain about ma¬ nure heaps and similar habitats. See Orthop-TERA.

EASEMENT, a legal term, denoting a privilege comprising a permanent public or per¬ sonal ri-ght as legal owner of one parcel of land, to use, or forbid its use, for some special purpose, with regard to a parcel of land belong¬ ing to another owner. This definition includes easements strictly so called, which are always appurtenant to land, public easements and ease¬ ments in gross or such as are attached to the person. In more general terms it is said that the right of making use of the land of others, whether it be that of the public or individuals, for a precise and definite purpose, not incon¬ sistent with

a general right of property in the owner, especially where it is for the public use, is in legal contemplation an easement or fran¬ chise, and not a grant of the soil or' general property. In the civil law the land against which the privilege exists is called the servient tenement; its proprietor the servient owner; he in whose favor it exists the dominant owner; his land the dominant tenement. And, as these rights are not personal and do not change with the persons who may own the respective estates,

it is very common to personify the estates as themselves owning or enjoying the easements. Easements have these essential qualities. There must be two tenements owned by several pro¬ prietors : the dominant, to which the privilege is attached; the servient, upon which it is im¬ posed. Considered strictly, easements exist only in favor of, and are imposed only on, corporeal property. They confer no right to any profits arising from the servient tenement. They are incorporeal. At common law they may be tem¬ porary; by the civil law the cause must be per¬ petual. They impose no duty on the servient owner, except not to change his tenement to the prejudice or destruction of the privilege. Easements are of various kinds. They are -as various as the exigencies of domestic conven¬ ience or the purposes to which buildings or land may be applied. The following attach to land as incidents or appurtenances, to wit : The right of pasture on other land; of taking game on other land ; of fishing in other waters ; of taking wood, minerals or other produce of the soil from other land; of receiving air, light, or heat from or over other land; of receiving or discharging water over, or having support to buildings from other land; of going on other lands to clear a mill stream, or repair its banks or draw water from a spring there, or to do some other act involving ownership ; of carry¬ ing on an offensive trade ; of burying in a church or a particular vault, *etc.* Some of these are affirmative or positive, that is, authorizing the commission of acts on the lands of another actually injurious to it, as a right of way — or negative, being only consequentially injurious, as forbidding the owner from building to the obstruction of light of the dominant tenement. Easements of every kind must originate in a grant or agreement, express or implied, of the owner of the servient tenement. By the com¬ mon law, the evidence of their existence may be by proof of the agreement itself, or by pre¬ scription, requiring actual and uninterrupted en¬ joyment immemorially, or for upward of 20 years, to the extent of the easement claimed from which a grant is implied. Easements of the negative kind do not admit of possession and by the civil law they cannot be acquired by prescription and can only be proved by grant.

Use is not essential, therefore, to their existence. Easements may be extinguished by release ; by merger, when the dominant and servient tene¬ ments are united under the same title and to the same person ; by necessity, as by a license to the servient owner to do some act incom¬ patible with its existence ; by cessation of en¬ joyment, when acquired by prescription — the non-user being evidence of a release where the abandonment has continued at least as long as the user from which the right' arose. A shorter time will answer in some cases. Interference with a right of easement is an action of tres¬ pass, or of case, where the offense is one of consequential damages. Redress may be gained through a court of equity for the infringe-ment of easement.

Consult Holland, ˆThe Elements of Juris¬ prudenceˆ (9th ed., New York 1900) ; Goddard, ˆEasernentsˆ (4th ed., London 1900) ; Jones, ˆTreatise on the Law of Easementsˆ (Boston 1898) ; Innes, ˆ Easementsˆ (London 1893) ; Washburn, ˆEasementsˆ (4th ed., Boston 1885) ; Gale, Easementsˆ (7th ed., London 1899).

EAST, Sir Alfred, English artist : b. Ketter¬ ing, Northamptonshire, 15 Dec. 1849; d. 28 Sept. 1913. He studied in Paris at the ficole des Beaux Arts and under Julian and Bouguereau. He was knighted in 1910 and was elected a Royal Academician 1913. He has exhibited at the Royal Academy for many years and among his works are ˆA Passing Storm, ˆ ˆA Haunt of Ancient Peace,ˆ ˆThe Nene Valley,ˆ ˆAn Idyl of Spring;ˆ ˆLondon at Night ˆ ; ˆThe Morning MooiP ; < Autumn in the Valley of the Seine. ˆ

EAST AFRICA, British. See East Africa Protectorate.

EAST AFRICA, German (now Tan¬ ganyika Territory), former German colony acquired inˆ 1885-90, lying immediately to the south of British East Africa, and having an, esti¬ mated area of about 384,000 square miles and population (1913) of 7,678,132, of whom 5,536 are Europeans. It is bounded on the north by a line running northwest from the Umba River to the eastern shore of the Victoria Nyanza and continuing west from this lake to the Congo State. Lake Tanganyika

forms the western boundary and thence a line to Lake Nyassa and the river Rovuma form the southwestern and southern boundaries. In September 1894 it was agreed that the German-Portuguese frontier should follow parallel lat. 10° 40’ S. from the coast to its intersection with the river Rovuma, leaving Kionga and the mouth of the Rovuma to Ger¬ many and Cape Delgado to Portugal. Several stations were established by the German East Africa Company. Two railway lines — the Usambara (223 miles) completed in 1912; and the central railway (780 miles) from Das-el- Salaam, the seat of government, to Ujiji on Lake Tanganyika, completed in February 1914 — are the main arteries of communication. The revenue for 1914 was £825,500 and expenditure £1,188,500. In 1912, 1,034 vessels of a total of 1,913,743 tons entered the various ports. The products of the country are coffee, tobacco, cot¬ ton, ivory, caoutchouc and gum. The highest mountain is Kilimanjaro, reaching 19,600 feet. Among the chief rivers are the Rovuma, Rufiji, Kingani, and Pangani, flowing to the Indian Ocean; the Kagera, Shimiyu and Ruwara flow¬ ing into Victoria Nyanza; and the Malagarazi flowing into Tanganyika. In the north there are several small lakes and in the southwest the larger salt lake, Rukwa or Hikwa. On the coast the chief towns are Mikindani, Lindi, Dar-es-Salaam, Bagamoyo, Pangani, Wanga, and the English mission station Saadani. In¬ land there are Mpwapwa, Kanyenye, Tabora (Kazeh), Urambo and Ujiji. The country is under a civil administrator. After the out¬ break of the great European War the colony was attacked by the Entente Powers, the chief forces being the British and South African troops led by General Smuts, who attacked from the north, while Belgian and Portuguese troops attacked from the south and east. Its conquest was completed 23 Nov. 1918. For ˆdetails see War, European.

EAST AFRICA, Portuguese, or MOZAM¬ BIQUE. The possessions of Portugal, com-prismg three distinct entities : the province of Mozambique (293,580 square miles), the Companhia do Mogambique (59,840 square

miles) ; and the Companhia do Nyassa (73,292 square miles). The first-named is divided into five districts, with Lourengo Marques as the capital. Its coast line extends south from Cape Delgado, the southern extremity of the coastline of Ger¬ man East Africa to Kosi Bay, just below Delagoa Bay, at a point separating British from Portuguese territory, as fixed by the Anglo-Portuguese agreement of 1891 ; the northern boundary is the river Rovuma, running west from Cape Delgado to Lake Nyassa. The frontier between German and Portuguese East Africa runs along parallel lat. 10° 4()’ S. from the coast to its

intersection with the river Rovuma, leaving the mouth of the Rovuma and Kionga to Germany and Cape Delgado to Portugal. The eastern boundary is the lake and British Central Africa, or the Nyassa Pro¬ tectorate down to the junction of the Shire with the Zambesi; while from that point Rho¬ desia, including Mashonaland and Matabeleland and the Transvaal form the boundary. Its total area is 426,712 square miles, and the population is estimated to be between three and four millions. The principal exports are sugar, oilnuts and seeds, caoutchouc, ivory and min¬ ing products. The Mozambique Company ad¬ ministers Sofala and Manica, the Nyassa Com¬ pany has jurisdiction in the northern part be¬ tween Lake Nyassa, the Rovuma and the Lurio, Bulawayo. The railway from Delagoa Bay (57 miles in colon}ˆ) connects with Pretoria ; and that from Beira (204 miles in colony) with Bulawayo; and there are three smaller lines. There were in 1912 2,959 miles of telegraphs. The coast-lands are lowlying and not very healthy, but in the region of the Namuli Moun¬ tains there is one of the finest and most beauti¬ ful tracts of country in the whole continent. There are several important rivers, including the Zambesi, Limpopo, Rovuma, Sabi, Pungwe, Lurio, Mtepwesi, Lukuga and many others. The most important towns are Lourengo Marques (pop. 9,849; 4,691 Europeans), Mozambique, Ibo, Zumbo, Tetet and Sena. Gold is found in the Manica region on the west and has been worked by British capitalists.

EAST AFRICA PROTECTORATE,

a British dependency, extending from the Umba to the Juba River, and as far inland as Uganda. It includes certain lands rented at an annual fee of £17,000 from the Sultan of Zanzibar; namely, the Lamu Archipelago ; a strip 10 miles inland reaching from the German frontier to Kipini ; and the area for 10 miles around the fort of Kismayu. The rest of the country is divided into seven provinces, and an extraneous unorganized piece of land in the north, as fol¬ lows : Seyidie, Ukamba, Tanaland, Jubaland, Kenya, Naivasha and Nyanza. The area is estimated at 250,000 square miles; the popula¬ tion at 4,038,000. The various nationalities which go to make up the Protectorate are dis¬ tributed as follows : Arabs and Swahilis along the coast ; Bantu tribes further inland, and still further, non-Bantu tribes. The Asiatics num¬ ber some 25,000, and the Europeans and Eurasians 5,000.

Agriculture is extensively carried on, the products grown being rice, maize, grains, casava, cocoanuts, sisal hemp, Ccara rubber, cotton, etc.,

in the lowlands ; and on the highlands, oats, barley, wheat, potatoes and various products of truck farming. Coffee growing is a rapidly increasing industry. In the uplands cattle grazing is becoming most important. Sheep, cattle and ostriches are profitably farmed. There is also some dairying. There are more than 3,000 miles of forest land, a deep tropical forest occupying about 180 square miles of the lowlands. Ebony, copal and rubber trees are found near the coast, while the upland countries yield valuable cedars, yellow woods, camphor, jarrah, cork, iron-wood, pillar-wood and olive. The entire timber resources are not yet com¬ pletely explored. The mineral resources like¬ wise have not been fully developed. In the Rift Valley, near German East Africa, gen¬ erous deposits of natron and diatomite have been found. A little gold has been mined in South Kavirondo ; graphite, marble, limestone and manganese have been produced in appre¬ ciable quantities, and some fine opals have occasionally been unearthed in the Rift Valley. The chief imnorts are clothing, provisions, building materials, iron and steel products and leather goods. In 1916-17, the imports amounted to £3,024,123; the exports £1,613,853, and the tonnage entered and cleared, to 1,441,877 tons. The State Railway is called the Mombasa-Victoria or Uganda Railway, and is 618 miles. There are competent telegraph, telephone and postal services.

The government of the Protectorate is under a governor and commander-in-chief under the Colonial Office. An executive and legislative council are also provided. The principal cities are Nairobi, where the administrative head¬ quarters are located ; Mombasa, the chief port (pop. about 30,000; 230 Europeans) ; Kilindini, a splendid harbor on the east coast; Jubaland, Kenya, Nawasha and Kiseemu. The expendi¬ ture of the government for 1917-18 is estimated at £1,484,075; and the revenue for 1916-17 amounted to £1,533,783, derived from licenses, dues, taxes, court fees, railways, customs, *etc.* A railroad was built by Col. J. H. Patterson for the government, in 1899, from Mombasa to Nairobi. Consult Lugard, ˆBritish East Africa and Ugandaˆ (London 1892) ; Eliot, ˆEast Africa Protectorateˆ (ib. 1905) ;

the ˆOxford Survey of the British Empireˆ (Vol. Ill, London 1914) ; and the publications of the Colonial Of¬ fice of Great Britain.

EAST ANGLIA, an ancient kingdom of England, its territory corresponding to what is now Norfolk and Suffolk counties. Redwald was its first historical king (593-615).

EAST AURORA, N. Y., village in Erie County, on the Pennsylvania Railroad, 18 miles southeast of Buffalo. The place is noted as the home of the colony of Roycrofters (q.v.), who produce the principal manufactures of the vil¬ lage : hand made furniture, pottery, de luxe editions of books, *etc.* Roller mills and agricul¬ tural implement works are located here. There are also mineral springs and a covered race track. The village' owns its waterworks and sewage plant. It is a residential suburb of Buffalo. Pop. 3,703. See Roycrofters.

EAST BRIDGEWATER, Mass., town in Plymouth County, 25 miles south of Boston, on the New York, New Haven and Hartford Rail¬

road. It contains an iron foundry and a cotton gin. Pop. 3,363.

EAST CAPE, the name of the southeastern extremity of New Guinea, in Goschen Strait, and of the most easterly headlands of Madagas¬ car; also on the North Island of New Zealand; also in Siberia, on Bering Strait, in long. 169° 44' W., in the eastern extremity of Asia. The latter is a bold, rocky promontory, almost cut off from the mainland by swamps and shallow lakes. On the north side is a village, Uedle, of less than 100 huts, with a population of about 260.

EAST CHICAGO, Ind., city located in Lake County, on the southeasterly shore of Lake Michigan, 19 miles from the central busi¬ ness district of Chicago, but only two miles from the east line of Chicago's city limits. It contains three railway stations, known on the maps as East Chicago proper, or as called locally, ®The West Sideˆˆ ; Calumet, one mile east of the old town; and Indiana Harbor, on the lake front.

In 1853 title to the land where the city is now built passed from the United States gov¬ ernment to the State of Indiana. The following year State patents were given at the rate of $1.25 per acre. During the year 1888 the city of East Chicago was laid out, the town starting two and one-half miles inland from Lake Michi¬ gan, it being the idea that the development toward and at the lake would be rapid when once started, owing to natural advantages. It was incorporated as a town in

1889 and char¬ tered as a city in 1893. The panic of 1893 retarded the progress, so the first 10 years' growth was slow and fraught with difficulties. The population in 1900 was 3,400. In 1901 the development of that part of the city known as Indiana Harbor was commenced. Owing to the unlimited rail and water shipping facilities and other natural advantages this development has been phenomenal and with its growth the older section of the city has kept pace. The city has the following excellent transportation facilities : The Lake Shore and Michigan Southern ; Pitts¬ burgh, Fort Wayne and Chicago ; Chicago, In¬ diana and Southern; Baltimore and Ohio; Wabash, Pere Marquette and The Chicago Lake Shore and South Bend trunk lines, all of the ˆ above passing through the city ; and the Elgin, Joliet and Eastern; Baltimore and Ohio Chicago terminal; and the Indiana Harbor Belt Railway lines encircling Chicago and terminating at this point. In addition to the rail facilities the lake shipping facilities are unsurpassed. A harbor 350 feet wide and 22 feet deep, protected by the most modern breakwaters, forms the entrance to the Indiana Harbor Ship Canal, which has been completed from the lake south to the Calumet River to a width of 200 feet and a depth of 21 feet. In addition thereto, a branch of the canal extends west to Lake George; so there is a total of 10 miles of dockage within the city limits which can be reached by the largest vessels on the lake.

This canal connects with the Calumet River so when the latter is improved it will increase the available deep water dockage to 22 miles, and upon completion will give the city one of the best and most extensive commercial harbors in the country. At no other point on Lake Michigan is it possible for three belt railroads

to come into direct connection with navigation. These three belt railroads cross every trunk line entering Chicago, and inasmuch as Chicago freight rates apply to and from this city, it enjoys the best shipping facilities that can be had at any point. In addition to the shipping facilities and trunk line services mentioned, there are three interurban and street car systems in operation in the city and this

affords ample accommodation for local transportation. There are 44 industries in full operation, employing 15,000 men, with an annual pay-roll of over $15,000,000. In addition to the plants now in operation, one $5,000,000 plant has been con¬ structed and approximately $12,000,000 more has been spent in additions and improvements. In 1917 it was estimated that there would be em¬ ployed 5,000 additional men, with a corre¬ sponding increase in pay-roll and popula¬ tion. The manufactured articles consist of iron and steel products taken from the raw material and finished to a complete state, embracing everything of iron and steel manufacture from a small bolt to the largest locomotive ; also, fire brick, soap, chemicals, liquid air, conduits, hay and cotton presses, auto trucks and cements. The city has seven banks, eight public schools, five parochial schools, four public parks, 20 churches, three public libraries, 50 miles of paved streets, 70 miles of cement walks, 45 miles of sewerage, 35 acres in parks, 350 ornamental light pools, four newspapers, a fine city hall and one of the largest electric power plants in Indiana. There are 105 daily trains to and from Chicago. Over $4,000,000 is invested in bascule bridges across the canal and the city is directly connected with the immense coal fields of Illinois and Indiana and cheap fuel oil supply. The per cent increase in population during the decade ending in 1910-was 559, the largest per cent increase of any city in the United States.

The city is the hub of the great Calumet dis¬ trict in Indiana, and the centre of a population of 120,000 people. Adjoining on the northeast is beautiful Lake Michigan, on the west the city of Whiting, on the west and south the city of Hammond and on the east the city of Gary, all of these cities being within a radius of five miles from the centre of East Chicago, which thus forms a natural hub for the entire Calumet district. The government is vested in a mayor and a council of six members. Pop.

(1920) 35,967.

Frank L. Evans,

Secretary East Chicago Chamber of Commerce.

EAST. GRAND FORKS, Minn., city of Polk County, at the junction of the Red and the Red Lake railways, opposite Grand Forks, N. D., and on the Northern Pacific and the Great Northern railways. It is surrounded by a fertile farming and wheat-raising district. The chief

manufactures are lumber and beer. Pop. 2,533.

EAST GREENWICH, R. I., town, county-seat of Kent County, 14 miles south of Provi¬ dence, on Greenwich Bay and on the New York, New Haven and Hartford Railroad. It is a summer resort and residential town, and has manufactures of cotton and woolen goods, dry salter works, dextrin, soap and chemicals. Greenwich Academy is situated here, and the town has a public library, public water and

electric lights. It was the birthplace of Gen. Nathanael Greene. Pop. 3,064.

EAST HAMPTON, N. Y., town in Suffolk County, in the eastern part of Long Island; on the Long Island Railroad, about 102 miles east of New York. The town is picturesquely situ¬ ated and enjoys some reputation as a summer re¬ sort. It contains the Clinton Academy building, erected in 1784, which has been transformed into a town hall and library. After the war with Spain the volunteer troops were mustered out of the Federal service at the camp nearby at Montauk Point. Every two years town meetings are held. The first settlement was made in 1649 and the place was considered as belonging to Connecticut from 1657 to 1664 when it came under the jurisdiction of New York. During the Revolution it was frequently pillaged by the English. It was the home of John Howard Payne (q.v.). Pop. 4,852. Consult Gardner, ˆRecords of East Hamptonˆ (Sag Harbor 1886-89) ; Hedges, ˆHistory of the Town of East Hamptonˆ (Sag Harbor 1897).

EAST HARTFORD, Conn., town in Hart¬ ford County, on the New York, New Haven and Hartford Railroad, and on the Connecticut River, two miles east of Hartford. The town contains the Raymond library, a town library and a cemetery over 200 years old. It was first settled in 1640 but was not incorporated as a town until 1783. It is the birthplace of William Pitkin, Colonial governor. The form of gov¬ ernment is by town meetings. The railroad shops and paper-mills give employment to a number of people. Large quantities of tobacco and garden vegetables are raised on adjacent farms. Pop. (1920) 11,648.

EAST HUMBOLDT MOUNTAINS, Ne¬ vada, a forested range of mountains principally in Elko County, separating on the east and west, respectively, the Ruby and Huntingdon valleys. Fremont’s Pass is in these mountains.

EAST INDIA COMPANIES, the various European trading companies

chartered by their respective governments for the control of their trade in India and the adjacent countries and islands. From an early period, the Italian re¬ publics had established a flourishing trade with these Eastern dominions, which was interrupted by the Moslem conquest of Egypt and Con¬ stantinople and the establishment of Turkish rule in Africa and Europe. Under these cir¬ cumstances arose that spirit of maritime ex¬ ploration in the I5th century for the discovery of a new passage to the Indie's which resulted in the discovery of America by Columbus while seeking a westward route, and in Vasco da Gama sailing around the Cape of Good Hope and reaching the Malabar coast in 1498. This latter discovery gave a new impulse and direc¬ tion to commercial enterprise, and in nearly all the leading nations of Europe steps were taken to participate in the advantages pros¬ pectively revealed in the opening up of this new ocean highway. The 16th century was marked by the Portuguese establishing themselves in India ; by English efforts to discover overland and northern passages to India, which while fruitless in the latter direction gave rise to commercial relations with the northern coast of Russia; by the union of Portugal and Spain in 1580, and in the war with England which closed

the Spanish-Portuguese avenues for Indian produce to that country; and by the revolt of the Netherlands against Spanish dominion which gave a parallel check to the Dutch Indian trade. These two latter events compelled Holland and England to seek direct communication with In¬ dia; in 1582, a Captain Stephens was the first Englishman to reach India via the Cape of Good Hope, and in 1586 Thomas Cavendish followed by way of Cape Horn. In the following decade the great historical commercial corporations known as the Dutch and the English East India companies were organized, and later were fol¬ lowed by Danish, French and Swedish enter¬ prises.

The Portuguese East India Company was organized in 1587, when, owing to laxity in the official management of the trade developed since 1498, it was entrusted to a company of Portuguese merchants in consideration of an annual payment. The company had a turbulent existence, chiefly of conquest by the Dutch until its dissolution in 1640, since which time the un¬ important Portuguese settlements have been under Crown administration.

The Dutch East India Company was formed at Amsterdam in 1595 as ®a company for remote parts,® in 1602 amalgamated with several minor companies and received a charter conferring the exclusive privilege of trade to the East Indies for 21 years, with the necessary civil and mili¬ tary powers. It had a wonderfully prosperous career and its charter was extended to 1644, when French and English competition had made itself so felt that the Dutch company had diffi¬ culty in raising the government subsidy for a 21 years' renewal of the charter.

The Peace of Westphalia in 1648, ensuring the independence of Holland, inaugurated a new era of prosperity; the company colonized the Cape of Good Hope between 1650 and 1670 ; in 1658 captured Ceylon from the Portuguese ; the same year took Formosa, from which they were driven three years later by a Chinese adventurer; in 1663 obtained possession of the chief Portuguese settlements along the Malabar coast, and in i666 monopolized the spice trade by the capture of Macassar. Their charter was renewed periodically until 1776; in 1781, owing to the expenses of the prolonged struggle against English encroachment, the company had to be assisted with a government loan, and in 1795 the proclamation of the Batavian republic

terminated its existence; in 1798 the mother-country assumed the administration of the company's former possessions.

The English East India Company formed in 1599 and chartered by Queen Elizabeth in 1600, under the title of the ˆGovernor and Company of Merchants of London trading with the East Indies,® was the most important, commercially and historically, of the East India companies. The trading limits assigned by the charter for 15 years were ˆˆall the islands, ports, havens, cities, creeks, towns and places of Asia, Africa, and America, or any of them, beyond the Cape of Bona Esperanza to the Straits of Magellan, with the exception of such places as are already in possession of any Christian prince in league or amity with the British Crown who shall re¬ fuse his consent to such trade.® The company comprised 125 stockholders, including a gover¬ nor and 24 directors elected annually to super¬ vise the company's business. The early voyages

of Lancaster, Beal, Best and others resulted in large profits ; in valuable commercial treaties being entered into with native princes ; and in English prestige being considerably enhanced throughout the Orient by naval and political successes over the Portuguese. The establish¬ ment of factories in various stations, however, excited the jealousy of the Dutch, who in 1624 massacred the members of the English factory at Amboyna, an atrocity for which Cromwell in 1654 compelled the Dutch government to cede an island and to pay a sum of $1,500,000 as compensation to the victims' families. This incident inaugurated the struggle which re¬ sulted in the loss to the Dutch of all their pos¬ sessions on the Indian peninsula. With periodi¬ cal renewals of its charter, the company, over¬ coming all rivalry and opposition, maintained its position. From 1745 to 1761 it was engaged in a crucial fight throughout the Carnatic for supremacy with the French company established in 1664, and which under La Bourdonnais and Dupleix had obtained almost paramount power in India; Clive (q.v.) brought it safely through the struggle. It was with reluctance, however, that the company accepted the position which their victories over the French and the native states was forcing upon them of territorial mag¬ nates and unconsciously of founders of the British empire in India; especially when their growing political importance inspired the home government with a desire to control their company.

In 1766 the right of the company to acquire territorial possessions formed a subject of in¬ quiry in the British Parliament ; and a year

later a resolution of the proprietors to raise their dividend to 12ˆ/2 per cent was vetoed. The ques¬ tion of political rights of the company be¬ ing thus raised, the British ministry acted on their view of it by sending a Crown plenipo¬ tentiary to India, and after a protracted strug¬ gle, a regulating act was passed in 1773 remod¬ eling the powers of the company and placing it under the control of Parliament. The con¬ stitution of the councils of the presidencies was regulated and their superintendence assigned to a Crown official, Warren Hastings (q.v.) being appointed first governor-general. A further act introduced by Pitt in 1784 modified the politi¬ cal power of the company by establishing a board of control to superintend, direct and con¬ trol all acts, operations and concerns relating to the civil and military government or revenues of India. From this time the political power of the company was little more than nominal; the right of nominating its officials still remained with the directors, but the absolute right of recall was vested in the Crown. The company's charter was renewed with a few changes in 1793 and subsequently at intervals of 20 years; in 1813 it lost the monopoly of the Indian trade, which under certain restrictions was thrown open to all British subjects; its right of exclu¬ sive trade was restricted to China, but in 1833 this monopoly was also abolished. Its charter was renewed for the last time in 1853; the Indian mutiny, 1857-58, discredited the com¬ pany's administration, and in November 1858 a proclamation at Calcutta announced that Queen Victoria had assumed the government of India. The cornpany continued to receive and distribute the dividends guaranteed by the government

CCi

*?iq ‘IS CWe&f’JlX i59

}|ˆ Sˆsisg CT/cfPjjGfi fisrS

20

1, 2 Muscial Instruments

3 Bangle

4 Pendant of a Necklace

5, 6 Vases of Glazed Pottery

7 Earring

8 Engraved and Gilded Bottle

9 Spearhead

10 Dagger; from Khuttar

11 Saw-edge Sabre

12 Flint Matchlock

13 Wooden Spoon ˆ

14 Border of a Mat

15 Symbol of Juggernaut

16 Nose Ornament

17 Printed Cotton

18 Cotton Carpet

19 Emblem of Jain Sect

20 Illuminated Manuscript

until the East India Stock Dividend Redemp¬ tion Act became operative in 1874 when the company was dissolved.

The Danish East India Company, founded in 1618, dissolved in 1634, reconstituted in 1670, again dissolved in 1729, was succeeded in 1732 by the Danish Asiatic Company. This com¬ pany had a prosperous career until the war be¬ tween Great Britain and Denmark in 1801, when its trade declined and ended with the cession of Tranquebar and Serampore to Great Britain in 1845.

The French East India Company, known as ^^La Compagnie des Indes Orientales,^^ was founded in 1664 by Colbert, Minister to Louis XIV. It had extensive privileges, and in 1675 made a settlement at Surat, and in the follow¬ ing year at Pondicherry. It had a long and prosperous career, notwithstanding the loss of trading privileges at various periods and its connections with the Mississippi Bubble (q.v.). It reached the height of its prosperity under Dupleix (q.v.) and La Bourdonnais, extend¬ ing its operations until the Deccan and the Carnatic were practically under French control, when antagonism with the English under Clive, the recall of Duplex, and practical abandon¬ ment by the French government, led to the dis¬ solution of the company by royal decree in 1769.

The Swedish East India (Company, founded at Gothenburg in 1741, was reorganized in 1806.

Bibliography. — ^Charters granted to East-India Company from 160P ; Macpherson, ^His¬ tory and Management of East India Company^ (1779) ; Bruce, ^Annals of the East India Com¬ pany > (1810) ; Stevens, ^Dawn of British Trade to the East Indies (1886) ; Foster, ^Letters re¬ ceived by East India Company from its servants in theEast^ (6 vols., 1902) ; Castonnetdes Fosses, ^LTnde Frangaise avant Dupleix^

(1887).

EAST INDIES, or MALAY ARCHI¬ PELAGO, the double chain of islands which extends from the southeastern corner of Asia to the northern extremity of Australia. On the Pacific side there are the islands of Borneo, Celebes, Buton, Sula Island, Burn, Morotai, Jilolo or Halmahera, Amboyna, Ceram, Banda, Waigeu, Misol, Salwati and New_ Guinea. The Sulu Archipelago and the Philippines are a northward extension of this chain, the connect¬ ing links being Sangir and Talaut groups of islands. Next the Indian Ocean the southern chain includes Sumatra, _ Singapore Island Riouw-Lingga, Banca, Billiton, Java, Madura, Bali, Lombok, Sumbawa, Sandalwood, Flores, Timor and the Tenimber, Kei and Aru groups. All these belong to the Netherlands, except the Philippines and Sulu Islands (property of the United States), the northern part of Borneo (British), the eastern half of Timor (Portu¬ guese), the eastern portions of New Guinea (British), and Singapore Island (British). Sev¬ eral of the islands (e.g., Java, Sumatra) are studded with active volcanoes. The entire archi¬ pelago seems to represent the surviving frag¬ ments of an ancient land connection between Asia and Australia, the evidence in support of this view being especially strong in Borneo and (Celebes. The inhabitants are mostly of the Malay race; though Chinese, Arabs, indigenous tribes and various Europeans are also present. As these islands lie on each side of the equator, their climate is equably hot; and it is also moist.

for they fall within the influence of the mon¬ soons. Consult Angier, A. G., ˆThe Far East Revisited,ˆ with a preface by Sir Robert Hart (London 1908) ; Day, C., ˆThe Policy and Ad¬ ministration of the Dutch in Javaˆ (New York 1904) ; Gomes, E. FI., ˆSeventeen Years Among the Sea Dyaks of Borneoˆ (London 1911) ; Swettenham, F., ˆBritish Malayaˆ (London 1907); Taunton, H., ˆAustralind: Wanderings in Western Australia and the Malay Eastˆ (London 1903) ; Robson, J. H. M., ˆMotoring in Malayaˆ (London 1911) ; Wallace, A. R., ˆOn the Physical Geography of the Malay Archi¬ pelagoˆ {Royal Geographical Soc. Jour., Lon¬ don 1863, V. 33) and ˆThe Malay Archipelagoˆ (London 1869 and 10th ed., London 1906).

EAST INDIES, Dutch. See Dutch East Indies.

EAST LIVERPOOL, Ohio, city in Colum¬ biana County, on the Ohio River, and on the Pennsylvania Railroad, 45 miles west of Pitts¬ burgh. It has freight packet connections with all important Ohio River ports, extensive china, porcelain, earthenware, terra cotta and glass

works, foundries and machine shops. East Liver¬ pool is the most important centre in the United States for the manufacture of porcelain, in¬ cluding porcelain dinner ware, floor tile and porcelain electrical supplies. The United States census of manufactures for 1914 showed within the city limits 80 industrial establishments of factory grade, employing 5,180 persons, 4,830 being wage earners, receiving annually $2,935,000 in wages. The capital invested aggregated $6,593,000, and the year's out¬ put was valued at $7,093,000; of this $4,251,000 was the value added by manu¬ facture. It has the largest pottery works in the United States, natural gas furnishes light and fuel, and the waterworks are owned by the city. It has a Carnegie library and three parks. Two bridges connect the city with Chester and Newell, W. Va. It has good schools, one business college, three national banks and daily and weekly newspapers. Under the Ohio Code of 1902, the government is vested in a mayor and a board of public service, elected for two years, and a council. The board of public safety is appointed by the executive and council. East Liverpool was settled in 1795 and was incorporated in 1834. Pop. 21,877.

EAST LYNNE, a novel by Mrs. Henry Wood, which appeared in 1861. It takes its name from the ancestral home of the heroine. Lady Isabel Vane. Several years after marriage, mis¬ takenly doubting her husband's fidelity, she leaves him for another, but later returns in dis¬ guise as nurse to her own children, and on her deathbed receives his forgiveness. Although ˆEast Lynne ˆ has little literary merit, it secured immediate popularity, has been through many editions on two continents, and proved extremely successful as an emotional drama.

EAST MAIN, Canada, region of the Do¬ minion which formerly belonged to the Hudson Bay Territory, but which is now in the Ungava District, province of Quebec. It is a bleak and desolate country, yielding little to com¬ merce but fish oil and a few furs. The East Main or Slade River crosses its southern sec¬ tion, entering James Bay, the southern exten¬ sion of Hudson Bay, about lat. 52° 15" N. The river has a length of about 400 miles.

EAST ORANGE, N. J., city in Essex County, on the main line of the Lackawanna Railroad, and on a branch of the Erie Rail¬ road, about 12 miles west of New York. It is a residential city, its population being made up largely of people who do business in New York and Newark. The city contains many hand¬ some churches and private residences, a public library, municipal playgrounds, an orphan asy¬ lum, a woman's club, high and graded schools, a national bank and weekly newspaper. Its industrial plants include electrical works and manufactories of pharmaceutical supplies, brass and iron casting and bread. The United States census of manufactures for 1914 showed within the city limits 51 industrial establishments of factory grade, employing 2,610 persons, 1,949 being wage earners, receiv¬ ing annually a total of $1,130,000 in wages. The capital invested aggregated $6,618,000, and the year's output was valued at $5,407,000; of this $3,018,000 was the value added by manufac¬ ture. The government is administered by a mayor, elected biennially, and a city council. All municipal officials are appointed by the ex¬ ecutive with the consent of the council. The waterworks are owned by the city. East Orange was part of Orange until 1863, when it was incorporated as a separate township. In 1899 it was chartered as a city. Pop. 50,710. Consult Whittemore, ˆThe Founders and the Builders of the Orangesˆ (Newark

1896).

EAST PROVIDENCE, R. I., town in Providence County, on the Seekonk River, and on the New York, New Haven and Hartford Railroad. It lies directly opposite the city of Providence. East Providence and the town of Seekonk, Mass., were once a part of the old town of Rehoboth. It was set off from See¬ konk when the Massachusetts-Rhode Island boundary line was fixed and was incorporated in 1862. The town has extensive chemical works, electrical and wire works, bleacheries, linen manufactures and other industries. The government is administered by a town council, which elects a majority of the local officials. The council members are elected annually by popular vote. Pop. (1920) 21,793.

EAST RIVER, the strait connecting Long Island Sound and upper New York Bay. The East River receives the waters of the Harlem River, which is connected with the Hudson by the Harlem Ship Canal, thus making a complete waterway around Manhattan borough, which the East River separates from Brooklyn and Queens boroughs on the Long Island shore. The designation covers a length of about 16 miles having

a width of from 1,000 yards to three miles. Blackwell's, Randall's, Ward's, Rikers, and North Brother islands are on the East River. Between Ward's Island and Long Island there are rapids known as Hell Gate ; long a danger to mariners they have been ren¬ dered safe for the, largest vessels by blasting the sunken reefs. The River is spanned by the Williamsburg, Queensboro, Manhattan, the old Brooklyn, and the new Hell Gate bridges.

EAST SAGINAW, Mich. See Saginaw.

EAST SAINT LOUIS, Ill., city of Saint Clair County, located on the l-eft bank of the

Mississippi, opposite Saint Louis, Mo., with which it is connected by several bridges.

Communications, *etc.* — East Saint Louis is served by 27 trunk line railroads, all connected by four terminal belt lines. One hundred and twenty-five passenger trains and 150 freight trains are at the daily service of East Saint Louis. The total mileage of all railroads enter¬ ing the city is 64,000. The list of steam rail¬ roads is as follows : Rock Island ; Chicago, Peoria and Saint Louis ; Burlington ; Chicago and Eastern Illinois; Chicago and Alton; Wa¬ bash; Illinois Central; Big Four; Toledo, Saint Louis and Western ; Cotton Belt ; Saint Louis, Troy and Eastern; Litchfield and Madison; Pennsylvania ; Baltimore and Ohio ; Saint Louis and O'Fallon; Southern; Louisville and Nash¬ ville; Mobile and Ohio; Iron Mountain; Frisco; and Missouri Pacific.

In addition to the steam roads there are also the Illinois Traction Company, known as the McKinley System, the East Saint Louis, Col¬ umbia and Waterloo Railway, and the Alton, Granite and Saint Louis Traction Company, Saint Louis and Belleville Electric Railway, and Southern Traction Company, all electric roads. These roads tap the large and prolific agricultural district around East Saint Louis. There are 75 miles of paved streets and 35 miles of electric street railways.

Public Buildings, Educational Facilities, *etc.* — The noteworthy public buildings are the city hall, high school and public library. The city maintains 38 primary and secondary schools, two business colleges, and there are 40 churches of various denominations and four theatres. There are four amusement parks and eight public parks, including Jones Park, with an area of 47 acres.

Commerce and Industry.— East Saint Louis is an important

manufacturing centre, manu¬ facturing everything from nails to locomotives. Its industrial interests are aided by the valuable bituminous coal deposits of Illinois, 10,000,000 tons of which are mined annually in the vicin¬ ity of ˆ East Saint Louis. The city has manu¬ factories of baking powder, oxide of alumina, roofing paper, malleable iron, glass, railroad frogs and switches, white lead, paint, car trucks, bridges, vehicle springs, forgings, pneumatic tools and silica, and there are several grain elevators, flour mills, foundries, a rolling mill and fertilizer plant. It is the largest alfalfa stock feed producing centre in the United States, and there are also stock yards, a horse and mule market, the largest in the world, and pork and dressed beef packing industries. The live stock receipts of the National stock yards of East Saint Louis during 1912 filled over 84,000 cars. The live stock sales during 1915 exceeded $150,000,000. In 1915 the report shows that the National stock yards received 991,709 cattle, 2,591,768 hogs, 642,141 sheep, 270,612 horses and mules. (Dver 5,000 men are em¬ ployed in and around the National stock yards. The freight charges paid on live stock received at the yards exceed $4,000,000 per annum. The yards maintain a railroad of 36 miles, operating 14 first-class locomotives. East Saint Louis has 25,000 industrial workers. The annual pay¬ roll of the city manufacturers is $20,000,000. Thirty million tons of freight are handled every year. Its factories consume 3,000,000 tons of coal every year. The mortality rate of East

Saint Louis is 11.58, lower than the mortality rate of the United States, which is 15.00. It has six banks with combined resources of $15,0(ˆ,000.

History, Public Improvements, *etc.* — The city was incorpora'ted as a town in 1861 and received its city charter four years later. It is a progressive municipality, having expended up¬ wards of $65,0(X),000 in street and other im¬ provements, principally for flood protection and drainage. The flood protection includes a river front levee along the Mississippi, 31 miles in length and seven feet higher than the flood

record of 1903. The Cahokia Creek, which formerly passed through East Saint Louis, is Ixiing converted into a drainage sewer, most of its headwaters having been diverted to the Mississippi River through a channel four and one-half miles long and 18 miles north of the city. A three-mile limestone wharf is being constructed along the Mississippi River in front of the city. Water, gas and electric power are supplied by private corporations. Hydro-elec¬ tric power from the Keokuk Dam plant is available at very low rates. A fine quality of well water for manufacturing purposes can be obtained anywhere at a depth of 100 feet.

Government, Population, *etc.* — The gov¬ ernment is vested in a mayor, elected for two years, and a city council, of which the mayor is a member ex-officio. The people elect the city treasurer, city attorney, justices of peace, tax assessors, city clerk and City Court judges. The city has adopted the Commission form of gov¬ ernment which becomes operative April 1919. The growth of the city has been very rapid. East Saint Louis had a population of 5,664 in 1870; 58,547 in 1910; and 66,740 in 1920.

D. Walter Potts, Superintendent of Schools.

EASTBOURNE, England, county, borough and bathing place in Sussex, near Beachy Head, and between Brighton and Hastings. It con¬ tains a fine park of 13 acres and several other smaller recreation grounds. A fine esplanade skirts the shore for over two miles. In 1886 the town hall was erected. The town was in¬ corporated in 1883 and became a county borough in 1911. The electric-lighting plant, omnibus lines, technical institute and hospital are the property of the borough. Its excellent water supply and sewage system and its healthful sit¬ uation combine to make it one of the most popular resorts on the famed south coast. Pop.

52,544.

EASTCHEAP, London, England, formerly a large market in the east of the city occupying what is now Billingsgate and Leadenhall market. Several streets or roads converged at the great square, then called Eastcheap. Two of those highways were the old Roman roads which extended northeast and northwest out of the city. Some of the old taverns, notably ^^Boar's Head,^^ mentioned by Shakespeare and other English authors, were at Eastcheap. At the north end of London Bridge there is now a small street called Eastcheap.

EASTER, the Christian spring festival commemorating the Resurrection. The term in Teutonic and Anglo-Saxon languages is derived from Ostara, the divinity of spring of^ the ancient Norsemen, who was welcomed in a

festival of celebration on her annual return, reclothing the earth with greenery and flowers, after each winter and night of death had stripped the world of its faded robes and hid¬ den them away, the sun even in the northern¬ most inhabited regions disappearing during the coldest winter months. In the Greek and Latin and in the languages derived from them, the spring festival is called Pascha, Pasch, Pasqua, Pascua, Pdques, etc., from the Chaldee word Pascha, signifying passing, the equivalent of the Hebrew Pesach, that name recalling the *passing oveP^ of the Hebrew households, when Death smote the firstborn of the Egyptians, as recorded in Exodus xii. To the Norsemen the festival of the divinity of spring which they called Ostara or Eastre (whence Easter) was especially the season of new birth. From this festival arose the symbols of the Easter egg and of the Easter rabbit, as pro¬ lific reproducers of species; the decoration of springs and wells with flowers in token of the returning flow of water as a life-giving necessity; and the custom of baptismal clean¬ liness, purification and regeneration. Every rite has a physical basis. The coloring of the Easter eggs, red, blue, yellow, etc., was bor¬ rowed from the rays of the Aurora borealis — the northern lights — and the dawning hues of the Easter sun. At Easter the hearth fire was lighted afresh. Easter bonfires were kindled on the hills, dispersing the germs of evil so far as an Easter fire shed its light. Around these purifying fires young men and maidens who desired marriage during the coming year sang and danced three (or nine) times or gave three leaps over the flame. The foundation of drama is found in these early myths and attendant songs, for example, the desire to express the two great emotions attributed to Nature, her sorrow when the sun is withdrawn and her joy when the fruitful season of growth begins again, is poetically developed with repetition in the Greek dramatic myth of Demeter and Per¬ sephone — Latinized as Ceres and Proserpine. While gathering flowers on the plains of Enna in Sicily, Persephone was abducted by ^^gloomy Dio® — Pluto, the god of the dead — and reigned in Hades as his wife, the majestic queen of the underworld. Her mother. Demeter or Ceres, seeking her, hurries over the earth with a torch in her hand and at last gains the con¬ cession from the gods of Persephone's return for a third part of every year. In later years, with the development of agriculture, the festival came to be overshadowed by the rejoicing of the harvest season and by the autumn celebra¬ tion

of the cereal mysteries of the earth-god¬ dess. In the beginning she was not separated from the divinity of spring, who, having wan¬ dered for nine months, at last returns, bringing new life and warmth and sunshine to the wait¬ ing earth. Therefore at ®Eleusis,® a general term for a ®place of coming or assembly,® and not originally a name attached to a special locality, the Greeks celebrated their festivals with the mysterious processions of veiled figures with torches moving from side to side in mimic search for the lost Persephone. The modern Maypole dances have their origin in these same Eleusinian spring celebrations, for the rhythmic interlacing circles of figures holding the brightly colored ribbons recall inevitably the measured

torch-light dance of Eleusis, the search from side to side for lost Persephone. The resem¬ blance between spring festivals throughout the history of the world discloses the universal inclination to worship and reverence, to natural piety. Following the Mosaic injunction of ®rites of remembrance^^ to keep alive the origins of faith, in Catholic countries and communities the Easter hearth fire is commemorated by candles carried to be lit and blessed at the altar, the flame being guarded so that the lowly home fire may be rekindled on Easter morning. Where once the image of Demeter-Ceres in pre-Chris¬ tian days was borne, that of the Virgin in the Middle Ages was, and in some localities still is, carried about to bless the £elds for a fruitful yield. On Rogation Days — days of prayer — between Easter and Ascension, headed by the priest, choirs and congregations of churches also make solemn procession with chanting and garlands to nearby springs and fountains, usually bearing the name of some saint, and celebrate the ancient ceremony of decorating with fresh flowers the springs and wells in token of grateful thanksgiving for the return¬ ing flow of the life-giving waters.

Besides being commemorative of the Resur¬ rection of Christ from the dead, the Easter festival of modern times is a memorial of the Christian passover from the Old Dispensation of the moral law to the New Dispensation, wrought by the sacrifice for unity or atone¬ ment in the innocent death of Jesus Christ upon the cross. At first the Christian passover was celebrated on the same day as the Hebrew, the 14th day of the month Nisan (April). But the Church at Rome and other churches of the Latin world soon transferred the observance to the Sunday next after the 14th Nisan, primarily to mark the difference between Judaism and Christianity. The churches of Asia and some in the West which were founded by missionaries from the East were slow to adopt the usage of Rome and the diversity of usage gave rise to great controversy; the Westerns deprecating subservience to Judaic custom and the Easterns accusing the Westerns of innovation and depar¬ ture from the ways of Jesus Christ and his apostles. It was not till the year 325 that a general law of the Church was enacted at the famous Council of Nice prescribing for the universal Church a day for this solemnity. To the bishops of Alexandria was committed in perma¬ nence the task of computing for all the churches the time of Easter, that city being the metropolis of science in those times. (See Christian Doc¬ trine, Development of; Canon Law). But the Alexandrine paschal

cycles fixing the date of Easter for a long course of years were unsatis¬ factory, being both obscure and incorrect and hence were not accepted generally. As a result, in 444, Rome observed 26 March as Easter Day, while Alexandria observed 23 April ; and earlier in 387 Easter Day in France was 21 March, in Italy 18 April, in Egypt 25 April. The churches in Great Britain and Ireland were, like those of France and Egypt, at variance with the Mother Church of Rome and from that circumstance has been inferred an Oriental origin of the Gaelic, Scotic and pre-Saxon Brit¬ ish churches ; whereas in fact, those churches were but adhering to an antiquated rule which they had received from Rome, but which Rome

herself had abandoned, having reformed her calendar. In 669, Theodore, archbishop of Canterbury, established the reformed Roman calendar in England. The movable feasts of the Catholic, the Lutheran, Anglican and Prot¬ estant Episcopal churches ‘are determined by the day of the month upon which Easter Day falls. (See Calendar). Easter Day is now de¬ termined as the first Sunday after the paschal full moon, that is the 14th day of the calendar moon, or the full moon which matures upon or near after the 21st of March. If the full moon matures upon a Sunday, Easter Day is the first Sunday following.

Charles Leonari > -Stuart, Editorial Staff of The Americana.

EASTER ISLAND, WAIHU or RAPA-NUI, the easternmost inhabited of the Poly¬ nesian group of islands in the South Pacific Ocean, long. 109° 17’ W. ; lat. 27° 6’ S., 1,400 miles east of its nearest neighbor, Pitcairn Is¬ land, and 2,000 miles east of Chile, to which it was annexed in 1888 and since made a penal settlement. Its area, triangular in shape, is 42 square miles and contains craters of three extinct volcanoes, one nearly 2,000 feet high. At one time wooded, decayed tree trunks of considerable size are still found, but only a few bush plants now thrive from 10 to 12 feet high. The soil is fertile and different kinds of tropical fruits are grown, including sweet potatoes, bananas and sugar cane. A fair number of cattle, sheep, goats and fowl are reared by the natives who number about 150. The climate with one wet and one dry season is healthful; the water supply consists of some brackish springs and pools inside the volcanic craters. As the ˆUnsolved mystery of the Pacific,® the importance of the island is archaeological. In its confined area no less than 550 statues, some of them of colossal size, cut out of gray trachitic lava are found ; as well as Cyclopean platforms of masonry 30 feet high, and from 200 to 300 feet long; stone houses over 100 feet long with walls 6 feet thick built

like forts, and tablets curiously inscribed with hiero¬ glyphics. Of the statues, 40 are standing inside the crater of one of the volcanoes, as many more outside, at the foot of the slope, where they were placed ready for removal to the different platforms. These statues represent various stages of formation, some finished, others nearly completed, and others just com¬ menced. In size they range from three and four feet to nearly 80 feet in length. The largest found in an unfinished state measures 70 feet in length, smallest three feet. What race of men carved these statues and for what purpose is still a matter of speculation. Easter Island is supposed to be the remnant of a greater land which was overwhelmed by the sea after some great earthquake and volcanic eruption, investigation showing some of the largest statues buried to the neck in ashes and scoriae. Recent scientific analysis and de¬ duction places the race of sculptor-builders as of a proto-Samoan character, inhabiting the land when the seismic catastrophe overwhelmed them probably less than 1,000 years ago, or at a period approximating with the Norman Con¬ quest of England. Alvara Mendana, according to Spanish geographers, was the first of modern

navigators to discover the island in 1566; it is marked Davis Island on some maps from Ed¬ ward Davis, buccaneer and adventurer, who re¬ ported it in 1686; but the Dutch Admiral Jacob Roggeveen sighted it in 1722 on Easter Day and in commemoration gave the island its present name. The natives then numbered about 3,000 and according to their traditions came from Oparo, one of the Austral group. In 1864 the island was almost depopulated by Peruvians who kidnapped and transported the bulk of the inhabitants to work the guano dig¬ gings on the Chincha Islands. Consult Sand¬ berg, H. O., ˆEaster Island, the Mystery of the Pacificˆ ; Pan-American Union Bulletin, Vol. XXXV, pp. 897-910 (Washington 1912) ; Churchill, W., ˆEaster Island, the Rapanin Speech and the Peopling of Southeast Poly¬ nesiaˆ (Washington 1912).

EASTER SUNRISE PILGRIMAGE.

The annual ^^Easter Sunrise Pilgrimaged^ to the Father Serra Cross (so called from Father Juniper Serra, the founder of the Californian missions), on Mount Rubidoux, about 70 miles from Los Angeles, Cal., is an unusual cere¬ monial, inaugurated by the late Joseph Riis on Washington's birthday, 1909. This annual serv¬ ice developed until, in the Easter of 1914, over 6,500 people, including many distinguished Americans, attended to hear the reading of a poem by Mr. Henry VanDyke, ^^God of the Open Air,dd and to watch a pageant representing some chapters in the history of the valley.

EASTERN EMPIRE, the ancient empire lasting from 395 a.d. to 1453 a.d., which had its metropolis at Constantinople as distinguished from the Western empire with its capital at Rome. It is known also as the Byzantine em¬ pire, the Roman empire of the East and the Greek or Later Roman empire. The separa¬ tion was created by the death of Theodosius in 395, when the Roman empire was divided be¬ tween his two sons, Arcadius taking the eastern half with his capital at Byzantium or Con¬ stantinople, and Honorius the western half with Rome as the capital. See Byzantine Empire.

EASTERN QUESTION, The. The rivalry between the Great Powers for control of the Balkans and the political struggle among the Balkan states themselves constitute the East¬ ern Question. Prior to the 19th century the rivalry between the Great Powers turned upon religion as an ostensible motive, while politics remained at the same time the underlying cause for interference in Balkan affairs. The young and recalcitrant national states of the Balkan Peninsula have always been striving to gain self-government and religious autonomy. The liberation of Serbia was acknowledged in 1804, that of Greece in 1827. Rumania and Bulgaria secured their independence by Rus¬ sia's support in 1878.

Before the Congress of Paris political con¬ trol of the Balkans rested largely in the hands of Turkey; after that date the Balkan Ques¬ tion concerned not only Turkey but all Europe. Russia's interest was identified with the pro¬ tection of Orthodox Christians and the gaining thereby of a route through Constantinople to the Mediterranean Sea; France pretended to protect Roman Catholics in the Levant, in order to maintain there her trade-hold ; Austria worked for aggrandizement of her empire

through economic and political supremacy con¬ sistent with her policy Drang nach Osten, which in this case meant Drang nach

Salonika. Great Britain regarded the safety of the route to her Asiatic possessions as paramount, and Germany planned a commercial outlet through the Balkans to the Persian Gulf.

From the end of the 18th century to the Treaty of Paris (6 March 1856), Russia's policy with Turkey in regard to the Balkans was of the character of the ˆclosed door.® She began by allying with Turkey (Unkiar-Skelessi, 8 July 1833), a mov€ which in 1840 was ob¬ jected to by France, England and Austria, and which Russia opposed in 1850 only to find that Turkey was on the side of her enemies. In 1853 the Russo-Turkish War showed England and France as Turkish allies, and Austria and Germany were neutral till the war had reached the point where the latter two powers threat¬ ened to join the Turkish allies if Russia proved intractable. The Treaty of Paris (1856) consequently left Constantinople in the hands of the Turks. Russia gained Sebastopol but she was humiliated to a strict limitation of her armaments in the Black Sea, to withdrawal from the mouth of the Danube by the partial retrocession of Bessarabia, and finally to a renunciation of all special rights to protect Christians in the Ottoman Empire.

Turkey, possessor of the field, continued a Balkan policy of massacre and torture ; a massacre of Christians in Syria occurred in 1860, an insurrection in Crete followed, and finally in 1875 an insurrection broke out in Herzegovina. Russia held consistently to her policy, that of Catharine H, to expel the Turks from Europe, but England was split by two parties, that of Gladstone which favored the liberation of the Balkan nations, and that of Lord Beaconsfield which sanctioned Turkish policy. In 1876 the clash came. Serbia and Montenegro arose against Turkey on behalf of oppressed Serbians in Bosnia-Herzegovina. The sympathy of Europe was won for the valiant Balkan fighters. Tennyson in Eng¬ land idealized the Montenegrins as a nation of ˆˆwarriors beating back the swarm of Turkish Islam for 500 years.® Gladstone said: ®The Balkans for the Balkan peoples.® This was answered later on in Turkey by : ˆTurkey for the Turks.® In 1877-78 Russia carried the cause of the Balkan nations further by march¬ ing her army to the very walls of Constanti¬ nople and dealing a defeat to Turkey. The Russian forces now sat down with the repre¬ sentatives of the Sublime Porte and dictated the Peace of San Stefano (3 March 1878), by which was declared the complete independence of Serbia, Rumania and Montenegro. Bosnia and Herzegovina were left to the European powers for future decision, yet Austria being the contiguous power was recognized to have a predominating voice in the disposal of the latter. Bulgaria was made an ˆautonomous principality,® which extended from the Black Sea to the Albanian Mountains, and from the Danube to the JEgezn.

Thus appeared the complexion of Balkan politics on the eve of the Congress of Berlin (13 July 1878). At this Congress Russia and Austria did not enter with free hands, for previously each had made a secret treaty with the other (at Reichstadt, 8 July 1876) whereby

for Austria's lack of participation in Russia's Turkish imbroglio Russia granted Austria the ultimate disposal of Bosnia and Herzegovina. By the Treaty of Berlin Serbia gained four districts, Nish, Vranye, Pirot and Toplitsa. Montenegro was to receive compensation in lands, accession to the sea and complete in¬ dependence. Bosnia and Herzegovina fell as spoil to Austria, according to article 25, of the ˆdionest broker's dispensation.ˆˆ Austria justi¬ fied this stipulation by the need of making peace in that territory. Serbia, not knowing of Austria's secret understanding with Russia, naturally resented the disposal of Bosnia and Herzegovina. A new insurrection broke out in Bosnia (Hadji-Loja), and Bismarck was known to have exclaimed that all the Balkans were not worth the bones of a single Pomera¬ nian grenadier.

The Treaty of Berlin, the Magna Charta of the Near East, did not b3ˆ any means succeed in securing the peace of the Balkan states. Al¬ most without exception each signatory power violated some provision of this solemn inter¬ national agreement. Great Britain occupied Cˆˆprus, the third largest island in the Mediter¬ ranean, Austria-Hungary annexed Bosnia-Herzegovina, Russia closed and fortified Batum, and Turkey did not introduce promised reforms into Armenia and Macedonia. Even the Balkan states themselves were guilty of violating the treaty, for Bulgaria annexed eastern Roumelia, and Serbia, jealous at seeing the Balkan equilibrium upset, declared war upon Bulgaria, 14 Nov. 1885. Yet the war, lost by Serbia to Bulgaria, brought no issue other than status quo ante-bellum, which gave prominence to the alliances existent at that time, of Austria with Serbia, and Russia with Bulgaria — alliances which within the next generation were to be completely reversed.

In Turkey political events following the Congress of Berlin were coincident with the reign of Sultan Abdul-Hamid H, who cen¬ tralized his government to a great extent. Pan-Islamism ran apace with Pan-Germanism and Pan-Slavism. An alliance was cemented be¬ tween the sultan and Germany, which was anxious to hold and control the Bagdad Rail¬ way (1902). In fact even from 1888 this pact had been growing, while Great Britain since her occupation of Egypt was becoming indif¬ ferent to Turkish interests, no longer needing the latter as a foil to Russian aggrandizement in the Middle East. Disturbed by the German advance in the East, however, she came to a

rapprochment with Russia in 1907, opposing bitterly Germany's aspirations toward the Persian Gulf. More perilous to European peace, however, than any of these issues was the perennial unrest in Macedonia, which threatened again to open up the whole Eastern Question. The situation was due to the in¬ ternecine struggle of the rival Balkan nationali¬ ties ; Serbian, Greek and Bulgarian, which aimed at securing the right to reversion of territories not yet derelict. But behind these lesser issues loomed as ever the great rivalries of the Triple Entente (France, Russia, Eng¬ land) and the Triple Alliance (Germany, Austria and Italy). Beyond the European powers the unknown forces of the Moham¬ medan world were also ominously stirring. The very vastness of the perils involved in any

attempt at a definite settlement compelled the powers to accept a compromise which, it was hoped, would restore tolerable conditions in the wretched countries. But the ®Murzsteg programme,^^ concerted between the Austrian and Russian emperors, and imposed upon the Porte by diplomatic pressure did not produce the effect hoped for. In 1908 the powers were still united in bringing pressure to bear on Turkey to make the reforms effective, but the proposal of Great Britain to commit the ad¬ ministration of Macedonia to a Mussulman governor appointed by the Sultan and remov¬ able only by consent of the powers, met with little favor either at Constantinople or among the powers whose ulterior aims might have been hampered by this arrangement.

Such was the condition of affairs when in 1908 the revolution in Turkey altered the whole situation. The easy and apparently complete victory of the Young Turks took the whole world by surprise. The question of the Near East seemed in fair way of settlement bj^ the action of the conflicting races themselves, who in the enthusiasm of new-found freedom ap¬ peared ready to forget their ancient internecine feuds and to fraternize on the common ground of constitutional liberty. The European powers received the proclamation of the constitution with unanimous approval. Whatever views, however, may have been openly expressed, or secretly held, as to this revolution so far as it affected the Ottoman Empire itself, there could be no doubt that its effects on the general situation in Europe would be profound. These effects were not slow in revealing themselves. Prince Ferdinand proclaimed himself king (tsar) of Bulgaria 5 Oct. 1908; and two days later Emperor Francis Joseph issued a rescript announcing the annexation of Bosnia-flerzegovina to the Hapsburg monarchy. What¬ ever cogent reasons there may have been for

altering the status of these countries in view of the changed conditions in Turkey, there could be no doubt that the method employed was a cynical violation of the public law of Europe. The other powers, confronted with the fait ac¬ compli, protested, but the astute statesman, Baron von Aehrenthal, then Foreign Minister of the Dual Monarchy, gauged his opposition with Napoleon's dictum ^^Providence is with the big battalions.® The discordant Balkan states were quick to grasp this truth, and they tempo¬ rarily reconciled themselves with circumstances. They realized that it was the immense armed power of Germany that had made Austria the arbiter in a question vitally affecting the in¬ terests of the Balkan states. Germany alone emerged from the crisis with prestige enor¬ mously enhanced ; without her intervention Aus¬ tria could not have resisted the pressure of the powers.

But Germany being on the side of Austria earned the animosity of the Triple Entente, es¬ pecially Russia, which urged the Balkan states to form a confederation. Such a confederation should expel the Turks from Europe and, on the other side, be a bulwark against the German drive eastward. ^ The alliance between the Bal¬ kan states, Serbia, Bulgaria, Greece and Monte¬ negro, was consumrnated (1912). Turkey, en¬ tangled with Italy in Africa, was not able to meet the demands of the Balkan Allies whose forces marched victoriously on to Constanti-

nople. Austria and Germany, calling a halt, in¬ sisted on the London Conference (1913), a con¬ ference which gave quasi-autonomy to Albania and put a German vassal selected by the powers upon the Albanian throne. Serbia viewing herself bereft of Albania and the Adriatic coast, while all of Thrace remained in the hands of the Bulgarians, swallowed her resentment for the moment and continued to place confidence in her Greek alliance to the extent of making a new treaty in May 1913. But Bulgaria, secretly prompted by Austria, suddenly attacked Serbia, vyhich was backed by Russia and the active par¬ ticipation of Rumania. The Peace of Bucharest (10 Aug. 1913),

concluding the second Balkan war, tried to solve the intimate jealousies and antagonisms by giving Serbia a part of Mace¬ donia, allowing Salonika to Greece, and satisfy¬ ing Rumania with added territory in Dobrudja. As a matter of fact the Balkan nationalities are never allowed to w'ork out their own destinies ; some superior power is always waiting to take a hand. The event which precipitated the Great War of 1914 was the Sarajevo assassina¬ tion and Austria immediately used it as a casus belli against Serbia. The partial refusal of the Austrian ultimatum by Serbia caused war on 28 July, although it has not been proved that Franz Ferdinand's death served Serbian or general Southern Slav ambition at that time.

The entrance into Balkan lands, occurring in August 1914, and the second invasion of northern Serbia in November 1914, marked the defeat of Austrian arms, with Belgrade taken and retaken. Only in November 1915 did Austria and Germany, reinforced by Bul¬ garia's entry into the war, succeed in bringing about the general retreat of the Serbians through Albania. The arrival of the French and the British in the peninsula which had already begun in August was unable to fore¬ stall the fate of their retreating allies, the Serbs and Montenegrins. It was, in fact, the attitude of Greece which paralyzed any for¬ ward military moves of the Allies. Venizelos, the Greek Premier, realizing the necessity of allied advance, invited the protection of Greece by the Entente Allied Powers, but the king insisted that the Great Powers were violating Greek neutrality by their presence in that ter¬ ritory. The Greek treaty with Serbia for mutual protection was now fancifully read by Greece to mean ˆprotection against Balkan powers® instead of being construed in its gen¬ eral sense, protection against any power. Greece remained obdurate until the Entente powers forced the resignation of King Con¬ stantine on 12 June 1917, after which she en¬ tered the lists against the Central Powers. The Allied armies reconquered Serbia from the Cen¬ tral Powers in 1918 and forced Bulgaria to an unconditional surrender in the last days of Sep¬ tember. At the Peace Conference of 1919, Bul¬ garia was divested of her Aegean littoral and other territory. Greece received part of Mace¬ donia and Thrace. Rumania was also given ad¬ ditional territory at the expense of Bulgaria and Russia. Serbia became the dominant partner in the Serb-Croat-Slovene State (Jugoslavia) and practically forced Montenegro to join that con¬ federation. A bitter contest with Italy resulted over Fiume and just as this was being settled another difficulty arose with Greece, whose king.

Alexander, died of a monkey bite in November 1920. His father,

Constantine, was still power¬ ful enough in Greece to overthrow the Venizelist party in the elections of January 1921, and re¬ turned to the throne from which he had been driven less than four years before. The new division of spoils in the Balkans, far from re¬ moving racial animosities, leave that region still, as it has been for generations, ®the powder magazine of Europe.®

Bibliography. — Seignobos, C., ˆHistoire pol¬ itique de I'Europe contemporaineˆ (Paris 1897) ; Skrine, F. H., ˆExpansion of Russiaˆ (London 1915) ; Songeon, Guerin, ˆHistoire de la Bulgarieˆ (Paris 1913) ; Stanoyevich, M. S., ˆRussian Foreign Policy in the Eastˆ (Oakland 1916) ; Stanoyevich, S., Hstorija Srpskoga Narodaˆ (Belgrade 1910) ; Stead, Alfred, ˆServia by the Servianˆ (London 1909) ; Stevenson, F. S., ˆA History of Montenegroˆ (London 1913) ; Taburno, I. P., ˆVopros o Raspredieleniy Zavoyevanoy v Turtsiy Teri-toriy mezhdu Bolgariey i Serbieyˆ (Petrograd 1913) ; Treitschke, H., ˆGermany, France, Rus¬ sia and Islamˆ (New York 1915).

Milivoy S. Stanoyevich,ˆ University of California.

EASTERN RITE, Churches of, a name given to various bodies of Eastern Christians who are members of the Roman Catholic Church but who have been permitted to retain many of their ancient customs, which differ from those in general use throughout the world. The Armenians, Coptics, Greeks, Maronites and some others belong to the Eastern Rite. They differ from the Latin Church in nothing doctrinal, only in some matters of discipline. Their liturgy is in the language first used by their bishops and priests, and in no case is the mass said in their vernacular of to-day. For instance, the Syrians use now the Arabic lan¬ guage (in some places modified) but the Maronite liturgy is in the old Syriac language, as used at the time of Christ. (See Maronites). They differ as to the manner of administering communion; some using for consecration only the leavened bread, others only the unleavened, and some giving communion to the laity under the form of both bread and wine, others using only one of the species as in churches of the Latin Rite. The discipline of marriage for the clergy differs from the Latin Church. Candi¬ dates for the priesthood may marry before be¬ coming deacons, not after. All points of dif¬ ference between the Eastern and Latin Rites are of discipline, not of faith.

EASTERN SHORE, a name given to all that part of Maryland lying east of Chesapeake Bay, and also the counties of Accomac and Northampton in Virginia. Delaware is some¬ times included in the Eastern Shore. The country is noted for its fruit and for its mild climate. Great quantities of oysters are taken annually from the waters

of the Eastern Shore lands.

EASTERN STAR, Order of the, corn-posed of members of Freemasonry, their wives, sisters, daughters, mothers and widows, may justly be termed a monster fraternity. The membership in 1916 was about 800,000, with a trifle over 8,000 chapters, an estimated gain of about 50, OCX) a year. In addition to the United States there are chapters in Alaska,

Canal Zone, Cuba, Hawaiian Islands, Philip¬ pines, Manitoba, New Brunswick, Quebec, Ontario, Yukon, New Zealand, Australia, Scot¬ land and England. The Order is rapidly ex¬ tending to all parts of the globe. The largest chapter is Peninsular of Grand Rapids, Mich., with 1,073 members. Illinois has the largest membership, viz., 87,000 with nearly 800 chapters, New York has 60,000, with a little over 500 chapters and all other States have a proportionate membership. Miriam Chapter of Chicago, Ill., the oldest chapter known, was organized as Miriam Family No. Ill 6 Oct. 1866, and emerged into a chapter 4 March 1869. New York city, however, has the honor of the birth of the chapter system. Alpha Chapter No. 1 beginning 28 Dec. 1868. Masonic his¬ tories state that the Order was introduced into the colonies in New York city in 1778 by, it is supposed, French officers. In the system of 1774 (France) was an emblem of a five-pointed star, presumably copied from the Masonic em¬ blem called the Blazing Star. From an old ritual is evidence that certain members on 18 May 1793 in Boston, Mass., met and formulated a ritual. This work also states Lafayette was interested in the Order. In 1850 Rob Morris, a prominent Masonic lecturer, arranged the degree, calling the bodies constellations. Later he changed the system to families, and still later (1866) the lecture system was adopted. In 1868 Robert Macoy, a Masonic publisher, arranged the chapter system, at the suggestion of certain female members of a society known as ®Alpha Sisters of the Eastern Star,^^ with the first meeting as before stated (Alpha No. 1, 28 Dec. 1868). To show how the Order has gained in the Empire State, in 1880 there were 29 chapters, 1,367 members ; in 1900, 41 chap¬ ters,

2,448 members, and in 1910, 438 chapters and 38,774 members. In New York State the Order has a home and an infirmary for indigent and sick members, with a hundred thousand dollars as a reserve fund to maintain these institutions.

The Grand Chapters of 23 States are jointly interested with the Masonic bodies in the main¬ tenance of homes, and every State has its auxiliaries of societies engaged in some special line of charity. The object of the Eastern Star is principally social and about on the same lines with Freemasonry. It is a secret order; the degrees are imparted with great care ; all modern devices are introduced to make the same attractive and effective.

EASTERN STATES, in popular parlance, the six New England States — Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut; in the Mississippi Val¬ ley and in the States to the west of it the in¬ habitants refer to the Eastern States as that section lying east of the Alleghany Mountains.

EASTHAMPTON, Mass., town in Hamp¬ shire County, on the New York, New Haven and Hartford and the Boston and Maine rail¬ roads, 12 miles northwest of Springfield and in the valley of the Connecticut. The chief manu¬ factures are cotton goods, yarns, buttons, shoe-web, felt, rubber and elastic goods. There is a large dyeing and mercerizing plant and a public library. Williston Seminary, a prepara¬ tory school for boys, is located here. Easthampton was settled in 1665, and on 13 May

1704 an Indian attack upon the settlement re¬ sulted in 19 killed and much loss of property. It was incorporated as a district in 1785 and was organized as a town in 1809. The govern¬ ment is administered by annual town meetings. The waterworks are owned and operated by the municipality. Three villages are included in the town of Easthampton. Pop. (1920) 11,261.

EASTLAKE, Sir Charles Lock, English artist: b. Plymouth, 17 Nov. 1793; d. Pisa, Italy, 23 Dec. 1865. He entered the schools of the Royal Academy, where Haydon supervised his education. In 1810 his ˆRaising of Jairus's Daughterˆ brought him to the attention of the public. In 1816 he went to Italy, and for 14 years his home was at Rome, his Italian life being broken by visits to England and Greece. Pictures of banditti and other subjects exhibited in England procured him the associateship of the Academy in 1827. ˆPilgrims Arriving in

Sight of Rome^ (1828) became so popular that the artist became tired of repeating it in differ¬ ent versions. In 1830 he was made an R.A., his diploma picture being ^Hagar and Ishmael.^ ^Escape of Francesco Carrara^ (1834) ; ^Gas¬ ton de Foix^ (1838) ; ^Christ Blessing Little Children^ (1839), and ^Christ Weeping Over Jerusalem^ (1841), were next among his note¬ worthy productions. ^Helena^ (1849); Hppolita Torelli^ (1851) ; Wiolante^ (1853), may also be mentioned. He translated Goethe's ^Theory of Colors^ (1840) and published in 1847 ^Ma¬ terials for a History of Oil-painting.^ He be¬ came president of the Royal Academy in 1850, being knighted on the occasion ; was keeper of the National Gallery in 1843-47, and director of the same institution from 1855 onward. His ^Life> was written by Lady Eastlake (London

1870).

EASTLAKE, Charles Locke, English art criticv?^b. Plymouth, England. He studied in the Royal Academy schools, but subsequently devoted himself to literary work and design, and was keeper and secretary of the National Gallery 1878-98. He has published ^History of the Gothic Revival in England^ (1871) ; ^ Hints on Household Taste^ (4th ed., 1874), a book which exerted much influence in its day ; ^Lectures on Decorative Art Workmanship^ (1876) ; ^The Present Condition of Industrial ArC (1877) ; ^Our Square and Circle^ (1895) ; ^Pictures at the National Gallery^ (1898).

EASTLAKE, Lady Elizabeth (Rigby),

English author: b. Norwich 1809; d. 1893. For some years^ she resided in Germany and at Reval, Russia. Her first book appeared in 1841 ; it was an account of her sojourn at Reval, en¬ titled ^A Residence on the Shores of the Baltic.^ Through a meeting with Lockhart she became a regular contributor to the Quarterly Review. In 1848 she married Sir Charles Lock Eastlake, and with him traveled extensively in Italy. In 1848, in the columns of the Quarterly she at¬ tacked Bronte's ^Jane Eyre,^ the episode being one of the least pleasant of her literary career. She was the author of ^The Jewess^ (1843); ^Livonian Tales' (1844) ; <Music and the Art of Dress' (1852) ; <Life of John Gibson, R.A. Sculptor' (1870) ; <Life of Mrs. Grote' (1880) ; ^Five Great Painters' (2 vols., 1883). She edited her husband's works (1870) and his edi¬ tion of Kugler's ^Handbook of Painting;

Italian Schoolsˆ (18ˆ4)> and translated Brandi's ˆSamuel Taylor Coleridge and the English Romantic SchooP (1886), and Waa-gen's ˆTreasures of Art in Great Britainˆ (4 vols., 1854-55).

EASTMAN, Charles Alexander (Ohiyesa),

American homceopathic physician and author: b. Redwood Falls, Minn., 1858. His father was a Santee-Sioux Indian, Many Lightnings (Jacob Eastman), and his mother a half-breed Sioux, Nancy Eastman. He was graduated at Dart¬ mouth College 1887 and at Boston University School of Medicine 1890. He married the poetess, Elaine Goodale, 1891. He served as government physician at Pine Ridge Agency 1890-93, where he had charge of the wounded prisoners at the time of the Ghost Dance Out¬ break, being Indian secretary of the Y. M. C. A. 1894-97. He acted as attorney for the Santee-Sioux at Washington 1897-1900, later becoming government physician at Crow Creek, S. Dak. (1900-03). In 1903 he received an appointment to revise Sioux family names, fie became widely known as a lecturer on In¬ dian history and life. He has published Hndian Boyhoodˆ (1901) ; ˆRed Hunters and the Ani¬ mal Peopleˆ (1904) ; ˆOld Indian Daysˆ (1907) ; ˆWigwam Eveningsˆ (1909) ; ˆThe Soul of the Indianˆ (1911) ; Hndian Scout Talksˆ (1914) ; ˆThe Indian Todayˆ (1915). Founder and director of a camp for girls at Munsonville, N. H., 1915.

EASTMAN, Charles Rochester, American paleontologist: b. Cedar Rapids, Iowa, 5 June 1868; d. 27 Sept. 1918. He was graduated at Harvard in 1890; received the degree of Ph.D. from Munich University in 1894; was ap¬ pointed the same year instructor in geology and paleontology at Harvard and Radcliffe colleges, and became curator of vertebrate paleontology at the Harvard museum. In 1910 he was made professor of paleontology at the University of Pittsburgh, and at the same time curator at the Carnegie museum in that city. In 1914 he accepted a similar position at the American Museum of Natural History, New York, where he is now engaged. He is author, editor and translator of numerous scientific publications.

EASTMAN, George, American inventor : b. Waterville, Oneida County, N. Y., 12 July 1854. As an amateur photographer in Roch¬ ester, N.

Y., he turned his attention to the production of dry plates, which achieved an instantaneous success. In 1881 the Eastman Dry Plate Company was organized, which developed later into the Eastman Kodak Company. East¬ man companies have also been established in London, Paris, Berlin and elsewhere, and the business has now reached vast proportions. The various companies under his management em¬ ploy upwards of 11,000 hands and over $40,-000,000 of capital.

EASTMAN, John Robie, American astron¬ omer: b. Andover, N. H., 29 July 1836; d. 26 Sept. 1913. He was graduated at Dartmouth College in 1862 and became assistant in the United States Naval Observatory. In 1865 he was appointed professor of mathematics in the navy. Retired in 1898 with the rank of cap¬ tain, he was in 1906 promoted rear-admiral. He was a member of several astronomical ex¬ peditions in the United States and accompanied

one to Sicily in 1870. He conducted a party to Cedar Keys, Fla., to observe the transit of Venus and subsequently became president of the Wash¬ ington Academy of Sciences. His works in¬ clude, besides many reports, ˆSecond Washing¬ ton (Catalogue ˆ (covering the results of about 80,000 observations made between 1866 and 1891) ; ˆTransit Circle Observations of the Sun, Moon, Planets and Cometsˆ (1903), and a ˆHistory of the Town of Andover, N. H., 1751-1906ˆ (1910).

EASTMAN, Max, American editor and lecturer: b. Canandaigua, N. Y., 4 Jan. 1883. He was graduated at Williams College in 1905, and then pursued a post-graduate course at Columbia University (1907-10), during which time he was also assistant in philosophy. In 1911 he was associate professor at Columbia, but abandoned teaching for literary and social reform work after that year. Mr. Eastman, as editor of The Masses, has been prominently connected with the Socialist party. He is also active as a lecturer and as a promoter and actor in the Provincetown Players. When the publication of The Masses was suppressed in 1918, the company with Mr. Eastman at its head was reorganized for the publication of The Liberator. He is also the founder of the first Men's League for Woman Suffrage in the United States (1910-12). Besides contribu¬ tions to his own and numerous other magazines, Mr. Eastman is the author of ˆ Child of the Amazons and Other Poemsˆ (1913) ; ˆEnjoy¬ ment of Poetryˆ (1913) ; ˆJournalism Versus Artˆ (1916) ; ˆUnderstanding Germany, … and

Other Essays^ (1916).

EASTMAN, Seth, American soldier: b. Brunswick, Me., 1808; d. 1875. He was gradu¬ ated at the United States Military Academy in 1829 and became a lieutenant in the First In¬ fantry. He performed frontier duty at forts Crawford (1829) and Snelling (1830), and in 1831-33 was on topographical duty. From 1833 to 1840 he was assistant instructor in drawing at the Military Academy. He served in the Bureau of Indian Affairs in 1850-57 as illus¬ trator of ^The Histop^, Condition and Future Prospects of the Indian Tribes of the United States.^ In 1861 he was made a lieutenant-colonel of infantry, was retired two years later and brevetted brigadier-general in 1866. He published ^Treatise on Topographical Draw¬ ing^ (1837).

EASTON, Morton William, American philologist : b. Hartford, Conn., 18 Aug. 1841. He was graduated at Yale in 1863 and at Co¬ lumbia in 1866, and afterward studied at the University of Vienna. He was for several years professor of comparative philology in the University of Tennessee and later (1^2-1912) in the University of Pennsylvania, and pro¬ fessor emeritus since 1912. His writings in¬ clude ^Observations on the Platform at Persepolis^ (1892) ; ^Readings in Gower^ (1895), and numerous papers on Phonetics, Sanskrit, Iranian and English to The Journal of the American Oriental Society, The American Jour¬ nal of Philology and other periodicals.

EASTON. Nicholas, American colonial statesman: b. Wales 1593; d. Newport, R. I., 15 Aug. 1675. Emigrating to America in 1634, he was the first settler in Agawam, now New¬ bury, Mass., 1635. He built the first English

house in Hampton, N. H., 1638, and the first one on the site of Newport, R. I., 1639, and was elected president of Providence Plantations 1649 and 1654. He was deputy governor of Rhode Island for four years, and governor 1672-75. His son, John Easton, was governor 1690-95, and wrote a ˆNarrative of the Causes which led to King Philip's War,ˆ edited by F. B. Hough (Albany 1858).

EASTON, Mass., town in Bristol County, on the New York, New Haven and Hartford Railroad, about 25 miles south of Boston. The town includes several villages and has import¬ ant manufactures of shovels, thread, foundry and machine-shop products, hardware, automo¬ biles, shoes, shoe heels and wire. It has a public library and some fine public buildings, gifts of the Ames family, showing some of the best work of H. H. Richardson and John Lafarge. Pop. 5,083.

EASTON, Md., town and the county-seat of Talbot County, on the Philadelphia, Baltimore and Washington, and the Baltimore, Chesa¬ peake and Atlantic railways, about 28 miles southeast of Annapolis, 50 miles south-south¬ east of Baltimore, near a navigable inlet of Chesapeake Bay. It is the seat of a Protestant Episcopal bishop and has a fine county building, high school, churches, *etc.* It is the market centre for a rich grain and fruit-growing country. The manufactures are chiefly iron machinery, fertilizers, carriages, wagons, hand¬ les and spokes, lumber, bricks and tile, flour, canned fruits, furniture and shorts. It is con¬ nected with Baltimore by steamship lines. Easton is governed by a mayor and council. The waterworks, electric-light plant and sew¬ age system are owned by the city. Pop. 3,442.

EASTON, Pa., city, county-seat of North¬ ampton County, situated at the extreme east¬ ern part of the State, on the banks of the Dela¬ ware River, at its confluence with the Lehigh River and the Bushkill Creek, 74 miles west of New York and 65 miles north of Philadel¬ phia, scarcely two hours distant by rail from each city.

Railroads and Canals. — Through Easton pass the two great trunk lines, Lehigh Valley and the Central Railroad of New Jersey, and the smaller local roads, Lehigh and New Eng¬ land, Easton and Northern, Easton and Western and the Bangor and Portland railroads. Im¬ mediately across the Delaware River from Eas¬ ton is located the thriving city of Phillipsburg, population about 18,000. Through this

town run the Belvidere and Delaware division of the Pennsylvania Railroad, and the Lehigh and Hudson Railroad, which make direct connec¬ tions with the Hudson River Valley and the New England States, also the Delaware, Lack¬ awanna and Western Railroad. Seventy-seven passenger trains arrive and depart from Easton daily and 159 freight trains. There are two canals, Morris and Essex from Phillipsburg, N. J., to New York, traversing the entire State of New Jersey, and Lehigh Clanal; offering direct com¬ munication from the anthracite coal regions to Philadelphia and its tide water points, connect¬ ing at Lambertville with the Delaware and Raritan Canal. The Atlantic Deeper Waterway Commission of the United States is dredging the channel of the Delaware River from Tren¬

ton to Easton, so that ocean-going barges of 1,000 tons capacity can load and unload at Easton and ultimately at Martin's Creek and Bethlehem.

Electrical Roads. — The Easton Transit Company has a splendid suburban system reach¬ ing all local points and interurban lines out to Alpha, N. J., where large cement works are located, and to Bethlehem, South Bethlehem and Nazareth. These lines make direct con¬ nections with all points in the Lehigh Valley and at Allentown for Philadelphia. Another system, the Philadelphia and Easton, extends from Easton to Philadelphia, via Doylestown and Willow Grove, traversing the right bank of the Delaware River for 15 or 18 miles and affording scenery unsurpassed by any trolley road in the United States. Two other roads, the Northampton Traction Company and the Northampton, Easton and Washington Traction Company (familiarly known as the Hay Lines), extend both in Pennsylvania and New Jersey from Easton. The first named extends from Easton to Nazareth, the centre of the cement belt of the United States, and to Bangor, the centre of the slate producing region of this country, thence to the Delaware Water Gap and Stroudsburg, reaching the very heart of the Pocono Mountains, the famous mountain resort of the Eastern States. The Jersey road, called the Northampton-Easton and Washington, ex¬ tends from Phillipsburg due east through the Musconetcong Valley almost to Hackettstown, through the important points. New Village and Washington. It is intended in the near future to connect this line with Lake Hopatcong. When finished it will be possible for passengers start¬ ing anywhere in the Lehigh Valley to proceed by trolley, all the way to New York, Boston and far off Maine, and from Philadelphia to the Pocono Mountains.

Climate and Surroundings. — The climate of Easton is particularly good. The great Blue Mountain Range shuts off the harsh winter winds which have so sorely injured other places. The summers are fine. The rivers offer bath¬ ing and boating for its young people. The rivers cutting through the mountain chains give it a scenic setting not surpassed by any city in this broad land. The soil immediately sur¬ rounding Easton is wonderfully fertile and Northampton, of which Easton is the county seat, is far famed for the wealth of the farms' resources of its soil.

Manufactures. — The industries are wonder¬ fully varied and Easton is signally fortunate in the character of its labor. At least 60 per cent of its men wage earners own their homes. This gives Easton a class of skilled men and fine citizens, foremost in every, good work and public cause. The factories make almost every¬ thing from pig iron and steel castings and ma¬ chines down to delicate silk underwear, hosiery, silks and small articles of every day use. Among the industries and their products are Ingersoll-Rand Company, mining machines, air compress-ers, drills, etc., Taylor Wharton Iron & Steel Co., steam railroad and electrical supplies, frogs, switches, special work, etc., Treadwell Engi¬ neering Company, steel casings, mining machin¬ ery, separators, etc., Victor Balata Textile and Belting Company, machinery belts. The silk industry is very large. Over 5,000 operators

work in the silk mills of Easton and Phillipsburg, making broad silks, velvets and ribbons. C. K. Williams Company, ground paints and ground stone ; General Crushed Stone Com¬ pany, crushed stone, among the largest in the United States. Many flour mills. Charles Chipman Sons, hosiery ; a very large cpncern ; H. Lehr & Company, pianos ; Lehman Brothers, silk and cotton underwear for ladies. Rinek Cordage Works, cordage; Binney & Smith, pen¬ cils and crayons, one of the largest in the world; Easton Finishing Company carton finishers ; American Flag Company, flags and bunting; Fitzgerald, Speer & Company, doors and sash ; American Horse Shoe Works, horseshoes; Can¬ ister Company, making cans and packages for grown products ; General Chemical Company (Baker & Adamson Branch), and J. T. Baker Chemical Company, general chemicals and acids ; Tippett & Wood, stand pipes and reservoirs. The repair shops of the Lehigh Valley employing about 750 men. Northern Ore Company have one pig iron furnace within a mile and a half of Easton. The Kuebler Foundries, malleable, cast iron and general iron works and the Easton Brass and Finishing Works. Within a radius of 10 miles there are 10 cement plants with a very large output. There are numerous other industries of various kinds, all uniting to make Easton a great manufacturing centre.

Business Conditions and Stores. — Easton is a natural trading centre for a large surround¬ ing country both retail and wholesale. Over 200 commercial travelers leave Easton every Monday morning representing the large wholesale grocers, produce, dry-goods," boots and shoes, hardware, stoves, confectionery and other local houses. There are three large department stores, selling not only to Easton people, but the surrounding country about 40 miles north and south; 30 miles to the east and 12 miles to the west, with an aggregate business of $2,500,000 per annum. The art, jewelry, drug, piano, phonograph stores, clothing, confectionery, books, millinery and other trades are important.

Banks and Trust Companies. — Easton has three national banks and two trust companies, and Phillipsburg, N. J. (across the river), has two

national banks and one trust company. Phillipsburg, N. J., and Easton, divided by an arbitrary .and imaginary State line and the Del¬ aware River, are to all intents and purposes one commercial community. Many doing business in Phillipsburg reside in Easton, and vice-versa. The combined capital of the banks and trust companies is $1,550,000; the combined surplus and undivided profits are $1,786,917 ; the com¬ bined deposits of these banks and trust com¬ panies are over $18,000,000. One of these banks, the Easton National, celebrated its 100th anni¬ versary a year ago, still retaining its old name *Easton,® it being originally a State bank.

Colleges and Schools. — Easton is the seat of Lafayette College founded and named after the Marquis de Lafayette at the time of his second visit to America. It has a national repu¬ tation ; over 700 students enrolled, with numer¬ ous and well-equipped departments in every branch of science and literature. Easton is the birthplace of Governor Wolfe, long deceased, founder of the public school system in Pennsylvania, and father of the public school system in the United States. A beautiful me¬ morial arch in front of the high school building

commemorates this fact. The public schools are unsurpassed and Easton has a number of private, preparatory and parochial schools and is a noted centre of learning, culture and education with a splendid public library, supported by local taxation, an original Carnegie foundation.

Newspapers and Magazines. — There are two daily, old and largely circulated news¬ papers ; all evening papers published every day except the Sabbath ; each of these papers has a semi-weekly and weekly edition ; one Sunday paper called the Sunday Call, of large circula¬ tion and great importance, with a weekly edi¬ tion, the Easton Sentinel; a German paper, the Northampton Demokrat ; a number of trade journals issued semi-monthly and monthly, par¬ ticularly the Easton Labor Journal, Chemical Journal, Lafayette College Weekly, Lafayette College Monthly and a number of periodicals of special trades.

Churches and Clubs.— Easton and Phillips¬ burg being one community interchange their church people, and with a combined population of about 50,000 have the following churches : Lutheran 11, Presbyterian 9, Reformed 5, Meth¬ odist Episcopal 6, Protestant Episcopal 2, Mo¬ ravian 1, Baptist 5, Evangelical 4, Roman Catholic 4,

Christian Science 1, Jewish syna¬ gogues 2, Mennonite 1, Salvation Army 1 bar¬ rack, Italian Missions 2. The services in these churches are held in English, German, Italian, Hebrew and Slovak, indicating the diversity of the nationalities of the worshipers. The re¬ ligious and charitable element of Easton have a spendid hospital which they are about to re¬ build at a cost of $250,000. Also a Y. M. C. A. and Y. W. C. A., old ladies' home and a home for friendless and orphan children and a charity organization society. Fraternal orders and societies are numerous and strong and Eas¬ ton has a number of social clubs; the Pomfret Club, the Northampton Country Club; the Mc¬ Kinley Club, the Northampton Republican and Jacksonian Democratic Clubs, all owning their own homes; the Triakas Club, and numerous others. The club and social life in Easton is ideal, pleasant and extensive.

History. — Easton is an old «Penn» town. It was an original outpost and trading place of the early settlers with the Indians. Within its borders were enacted many important treaties with the aborigines. In 1739 David Martin built his ferry house at the foot of the present Ferry street to convey passengers across the Dela¬ ware River. The entire site of the town was then covered with forests and bushes. The only signs of life were the few settlers, white men, and their neighbors, the Indians. The Delaware and Lehigh rivers were the channels of transportation for the Indians in their canoes. It was the garden spot of the Lenni Lenape and Delaware Indians. The landing point for their canoes was a long sandy place at the junctions of the Delaware and Lehigh rivers and still retains its name ^^The Point.® The Delaware and Lehigh rivers were filled with shad in running season. The Indians caught them by the thousands. On the peninsula formed by the Bushkill and Lehigh rivers with the Delaware, William Parsons, the surveyor-general of Pennsylvania and confidential man of the ^^Penns,® located the present city of Easton. In 1752 it was formally laid out, with wide streets, north and south, east and west and

as in all ®Penn® towns, with a small square or public commons, now

ˆCentre Square,ˆˆ in the centre of the small level area which the new town afforded, hemmed in then as now by great hills. In 1789 it was incorporated as a borough. Easton was always the banking and trading centre of a large section. As far north as New York and Canada its venturesome traders and merchants sold their goods and as far west as the Susquehanna and Ohio rivers. It has not lost any of its commercial and trading instincts ; it is still essentially a trading town. In the last few years only Easton has awakened to full conception of its wonderful advantages and pos¬ sibilities, and has become a great railroad and great manufacturing centre. In 1887 it was chartered as a city. Since 1913 it has been ad¬ ministered under a commission form of govern¬ ment. Electrically lighted streets are well paved with brick, asphalt and amiesite, and a salaried fire department and efficient police force afford ample protection. Pop. (1900)

25,238; (1910) 28,523; (1920) 33,813.

Thomas A. H. Hay, Secretary Easton Board of Trade.

EASTPORT, Me., city and port of entry in Washington County, on Moose Island, in Passamaquoddy Bay, and on the Maine Cen¬ tral Railway, 190 miles east-northeast of Port¬ land. A bridge crosses the narrow channel to the mainland. It is the northeast frontier city of the United States, and has a fine harbor, which on account of its high tide, 25 feet, is clear of ice all the year, and has daily steam¬ ship service with Boston, Calais and Portland. Eastport and the island of Campobello, on the opposite side of the harbor, are popular sum¬ mer resorts. The city has extensive fishing and shipbuilding interests, and is the centre of the American sardine-canning industry, with 20 factories. It also manufactures shoes, box hooks, *etc.* It has a customhouse, public library, the Boynton high school, churches, na¬ tional and savings banks, weekly newspapers, and is lighted by electricity. Eastport was set¬ tled about 1782. The islands in Passamaquoddy Bay were long under dispute and claimed by Great Britain. The town was captured by an English force 11 July 1814 and held under strict martial law until 30 June 1818. Its trade was severely crippled by the Embargo Act, and the town was for several years, especially during 1807-18, notorious as a smuggling centre. The government is administered under a charter of 1893, by a mayor, elected annually, and a board of aldermen. Consult Kilby, ‘ˆEastport and Passamaquoddyˆ (Eastport 1888). Pop. 5,000.

EASTWARD HO! a comedy written by Marston, Chapman and

Johnson, and produced in the season of 1604-05. It is best known for its satire on the Scotch, which caused the im¬ prisonment of its authors.

EASTWICK, Edward Backhouse, English Orientalist and diplomatist : b. Warfield, Berk¬ shire, 13 March 1814; ,d-Ventnor, Isle of Wight, 16 July 1883. After studying at Merton College, Oxford, he became professor of Hin¬ dustani at the college at Hailebury and as¬ sistant political secretai*y in the India office in 1859. He served as secretary of legation in Persia (1860-63) ; commissioner for the Venezuelan Loan venture, and as private secre¬

tary to Lord Cranborne, Secretary of State for India. He was a voluminous writer on Oriental (especially East Indian) subjects, and rendered very important service to English literature by many translations from Persian and Hindu, for example: Sadi's ˆGulistan,ˆ or ˆThe Rose, Gardenˆ (1852) ; and the version of Pilpay's fables called ˆAnvar-i-SuhailP (1854). He also wrote a ˆJournal of a Diplomat's Three Years' Residence in Persiaˆ (1864) ; and ˆVen-ezula,ˆ or ˆSketches of Life in a South Amer¬ ican Republicˆ (1868). Between 1878 and 1882 he brought out a sumptuous edition of the ˆKai-sar-nama-i-hind,ˆ or <Lay of the Empress.ˆ He was a frequent contributor to literary journals,

EATON, Amos, American scientist: b. Chatham, N. Y., 1776; d. 1842. He was gradu¬ ated at Williams (College 1799; settled in Catskill, N. Y. ; practised law, and engaged in civil engineering, while prosecuting studies in chemistry, geology and mineralogy. He made a survey of Albany and Rensselaer counties 1820, and later of the Erie Canal region. In 1824 he became senior professor of the Rens¬ selaer School of Science in Troy, now the Rensselaer Polytechnic Institute. Among his works are ˆAn Index to the Geology of the Northern Statesˆ (1818) ; ˆA Manual of Botany of North Americaˆ (1833) ; and ˆGeological Note-Bookˆ (1841).

EATON, Arthur Wentworth Hamilton,

American clergyman and author: b. Kentville, Nova Scotia, 1859. He was graduated from Harvard in 1880, entered the university of the Protestant Episcopal Church, and served at Chestnut Hill, Mass., 1885-86. He then settled in New York, where he taught literature, wrote and preached. Since 1907 has lived in Boston. He is the author of many books : ˆThe Heart of the Creeds ; Historical Religion in the

Light of Modern Thought^ (1888) ; ^Acadian Legends and Lyrics^ (1889) ; ^The Church of England in Nova Scotia and the Tory Clergj' of the Revolution^ (1891) ; ^Tales of a Garrison Town^ (with C. L. Betts, 1892) ; ^Acadian Ballads^ (1905) ; ^Poems of the Christian Year^ (1905) ; ^The Lotus of the Nile and Other Poems^ (1907) ; ^The History^ of King's County, Nova Scotia, Heart of the Acadian Land^ (1910) ; ^The Famous Mather Byles^ (1914). Also various books compiled and edited (1890-1901) ; and many historical and biographical monographs (1885-1917). Degrees: B.A. Harvard 1880; M.A. Dalhousie (Halifax) 1904; D.C.L. King's (Windsor, Nova Scotia) 1905.

EATON, Charles Warren, American artist : b. Albany, N. Y., 22 Feb. 1857. He studied at the National Academy of Design, and the Art Students' League, New York and in London; and is a'member of the American Water Color Society, New York. He exhibited at the Paris Exposition 1900; the Pan-American Exposition 1901. He received the Proctor prize 1901, the Inness prize 1902 and Shaw prize 1903 at the Salmagundi Exhibition. He received a silver medal at the Saint Louis Exposition in 1904. Among his landscapes are <The Forest^ ; <October's Tints ^ ; and ^Connecticut Pines ^ ; ^Gray Dunes^ and ^Forest Lands^ (1911) ; ^The Val¬ ley of Sunset^ (1912) and ^Gathering Mists^

(1913).

EATON, Dorman Bridgman, American lawyer: b. Hardwick, Vt., 27 June 1823; d. New York, 24 Dec. 1899. He was graduated at the University of Vermont in 1848 and at the Harvard Law School in 1850; was admitted to the New York bar; and later became widely known by his advocacy of civil service reform. In 1883 he was appointed a commissioner of the United States Civil Service Commission, resigning in July 1885. He was reappointed in November of the same year, but again resigned in April 1886. In the latter year he drafted the laws which created the Metropolitan Board of Health of New York; subsequently those on which the present police courts were organized; and in 1883 the National Civil Service Act. His publications include ˆThe Independent Movement in New York> (1880) ; ˆCivil Gov¬ ernment in Great Britainˆ (1880) ; ˆThe Term and Tenure of Officeˆ (1882) ; ˆThe Problem of Police Legislationˆ (1895) ; and ˆThe Gov¬ ernment of Municipalitiesˆ (1899).

EATON, Edward Dwight, American edu¬ cator: b. Lancaster, Wis., 12 Jan. 1851. He was graduated at Beloit College in 1872, from Yale Theological School three years later and studied also at the universities of Leipzig and Heidelberg in 1875-76. He was ordained to the Congregational ministry in 1876, was pastor at Newton, Iowa, 1876-79 and of the First Congregational Church at Oak Park, Ill., from 1879 to 1886. He was president, Beloit College, 1886-1905; pastor. Saint Johnsbury, Vt., 1905-7; president, Beloit College, 1907-17 ; president emeritus after 1917. He was member of a dele¬ gation sent in 1898 to inspect Congregational missions in .China. He was Southworth lecturer at Andover Theological Seminary in 1904 and Pond lecturer at the Bangor Theological Semi¬ nary in 1906. Since 1910 he has served as vice-president of the American Board of Commis¬ sioners for Foreign Missions, and since 1911 as chairman of the Wisconsin (College Association.

EATON, John, American educator : b. Sut¬ ton, N. H., 5 Dec. 1829; d. Washington, D. C., 9 Feb. 1906. He was graduated at Dartmouth College in 1854; studied theology; and in 1862 became chaplain of the 27th Ohio Volunteer Infantry. Subsequently he was appointed super¬ intendent of freedmen for Mississippi, northern Louisiana, Arkansas and west Tennessee, and remained on duty till May 1865. He was brevetted brigadier-general of volunteers in 1865. He was editor of the Memphis (Tenn.) Post in 1866-67, and State superintendent of

public instruction for Tennessee (1867-69). ˆ In 1871-86 he was commissioner of the United States Bureau of Education; from 1886-91 he served as president of Marietta College; in 1895 became president of Sheldon Jackson Col¬ lege at Salt Lake City ; and in 1898 was ap¬ pointed a special commissioner to arrange for the establishment of the American system of education in Porto Rico. His publications in¬ clude ˆHistory of Thetford Academyˆ; ˆMor¬ mons of To-dayˆ ; ˆThe Freedmen in the Warˆ (report) ; ˆSchools of Tennesseeˆ (report) ; and reports of the United States Bureau of Education.

EATON, John Henry, American states¬ man: b. Tennessee, 1790; d. 1856. He practised law in Nashville, and was Secretary of War

1829-34, when he became governor of Florida. He was appointed Minister to Spain 1836, and published a ˆLife of Andrew Jacksonˆ (1824).

EATON, Margaret O'Neill (ˆTeggy O'Neill®) ; b. Washington, 1796; d. 1879. As the wife of Maj. J. H. Eaton, Jackson's Secre¬ tary of War, she was the subject of a social war in government circles owing to certain charges connecting her name with that of Major Eaton, while she was still wife of purser Timberlake, her first husband. It was said that from this social disturbance arose an es¬ trangement between General Jackson and Cal¬ houn, leading to the nomination of Van Buren for the presidency 1836. After the death of her second husband she married a third, an Italian dancing-master, much her junior, from whom she was divorced.

EATON, Seymour, American author : b. Epping, Ont., 1859 ; d. Lansdowne, Pa., 13 March 1916. After seven years of district school teaching he became a resident of Boston. He started later in Philadelphia the Booklovers Library and the Tabard Inn enterprise. The feature of the Booklovers Library was a de¬ livery system whereby subscribers received the latest literature at their homes. Branches were opened in American cities and in Europe, and the business increased until Mr. Eaton felt it necessary to organize a subsidiary system called the Tabard Inn Library, which permitted purchasers to get books at the regular retail price and to ex¬ change any volume for another on payment of five cents. Mr. Eaton founded

next the Book¬ lovers Magazine, which made a specialty of the reproduction of famous paintings. Then drug¬ gists' specialties and food preparations were taken up, and finally Tabard Inn undertook the manufacture of artistic house furnishings. Tabard Inn became a $12,000,000 corporation and sold a good deal of stock before going into the hands of a receiver in 1905. After the in¬ surance investigation of 1906 he became secre¬ tary of the international policyholders' com¬ mittee, but resigned after a dispute with the committee's managers. For five years he was director of Drexel Institute in Chicago and for four years a daily contributor to the Chicago Record. He wrote ˆThe Teddy Bears Musical Comedy,ˆ ˆPrince Domino and Muffles,ˆ ˆThe Telepathˆ ; ˆBarzillai Brown,ˆ ˆBachelor,ˆ ˆThe Mysterious Giver, ˆ and a series of pamphlets setting forth short cuts to business success. He was long credited with being the ˆcreator of the famous teddy bears.® The fact is that the toy bearing that name was originated in Germany by Margaret Steiff, a poor woman, who became prosperous through the success of these toys and now has factories employing 5,(XX) persons. When first imported here the bears were not called ®teddy bears.® That name became at¬ tached to them a year or two later, after illus¬ trated verses by Mr. Eaton, dealing with the adventures of the ˆRoosevelt Bears,® or the ®Teddy Bears® were printed in the Sunday newspapers. So apparently Mr. Eaton is to be credited with the name, but not with the figures themselves.

EATON, Theophilus, American colonial governor: b. Stony Stratford, Buckinghamshire, England, about 1591 ; d. New Haven, Conn., 1658. He came over to Massachusetts with the

Rev. John Davenport, 1637, founding with Dav¬ enport the town and colony of New Haven, in 1638. He was chosen governor October 1639, and reelected annually as long as he lived. He was prominent in the organization of the New England Confederation 1634, and the so-called Connecticut ˆˆBlue Laws® were drawn up by him, assisted by Davenport, 1655.

EATON, Timothy, Canadian merchant : b. Clogher, Ireland, October 1835; d. Toronto, Canada, 31 Jan. 1907. While a boy he was ap¬ prenticed to a draper at Portglenone, but hav¬ ing served his five-year term and received his wages of about £100, in 1857 he emigrated to Canada. He first opened a store at Kirkton, in Huron County ; later went to Saint Mary's ; and finally settled in Toronto, where, in 1869, he opened the store which has since expanded into one of the largest department stores in America, with a branch at Winnipeg.

EATON, William, American army officer: b. Woodstock, Conn., 23 Feb. 1764; d. Brimfield, Mass., 1 June 1811. He served in the army 1780-83, and then went to Dartmouth College, where he was graduated 1790. Becoming cap¬ tain in the United States army in 1792, he served in campaigns against the Indians till 1798, when he was sent to Tunis as American consul. During the war against Tripoli in 1801 he resolved to re-establish Hamet Caramelli as Bey of Tripoli, but was not supported in his attempt by the American naval officers. He re¬ turned to America in 1803 and was subsequently appointed naval agent of the United States for the Barbary powers. Returning to Africa he captured the city of Derne 27 April 1805, but when the United States concluded a treaty of peace with the usurper Yussuf, Eaton returned to America. See Derne Expedition.

EATON, Wyatt, American painter: b. Phillipsburg, Quebec, 1849; d. 1896. He came of American parentage, removed early in life to New York and studied at the National Acad¬ emy of Design and under Gerome at the Bcole des Beaux-Arts, Paris. He also associated with Millet at Barbizon and his work was greatly influenced by this artist. Eaton dis¬ sociated himself from the various schools and went to the old masters for his inspiration. His portraits form the most notable part of his work, in which he almost invariably caught much of the personality of the subject. The best known are the series of American poets, engraved by Cole for the Century Magazine. Notable portraits are those of Cole, Mrs. Rich¬ ard Watson Gilder, W. C. McDonald and Archie Gordon. He was one of the founders and first secretary of the Society of American Artists. Of his subject pictures the most widely known are ˆHarvesters at Restˆ (1876, Smith College) ; ˆReverieˆ and ˆHarvest Scene, ˆ in the Montreal Gallery.

EATON, Ohio, village, countyˆseat of Preble County, on the Pittsburgh, Cincinnati, Chicago and Saint Loui§ Railroad, 58 miles northwest of Cincinnati. Its industrial estab¬ lishments comprise glove factories, cigar fac¬ tories, and cement plants. It has also extensive agricultural interests, a library, and a water-supply system. Nearby are many remarkable springs. The town saw here the struggle-be¬

tween the Indians under Little Turtle and the white pioneers led by John Adair. Pop. 3,187.

EATONTON, e't6n-t6n, Ga., city, county-seat of Putnam County; on the Central of Georgia Railroad; on the Oconee River, about 68 miles southeast of Atlanta. The city has extensive agricultural, cotton and fruit-growing interests. Its industrial establishments include cotton factories, gins, and compresses, and creameries. The fruit trade is considerable. The city owns the water supply system and sewage disposal plant. It is the birthplace of Joel Chandler Harris, of Uncle Remus fame. Pop. 2,036.

EAU, o, a French word signifying water, and used in English with some other word for several spirituous waters, and particularly per¬ fumes : (1) Eau de Cologne, a fragrant water

made originally and in most perfection in Co¬ logne. It was invented by Farina. It is manu¬ factured by adding to distilled alcohol a few aromatic oils. Although there are three firms which claim the original invention, the general process of manufacture is known. The impor¬ tant factors are the quality of spirit used and the amount of time allowed for maturity. Dis¬ tillation produces equally good effects. The synthetic oils used by various perfumers are in the typical combination as follows : 30,000

grams spirit ; 100 neroli oil ; 30 rosemary oil ; 100 Mitchem lavender oil ; 300 lemon oil ; 300 bergamot oil ; 50 petit-grain oil. (2) Eau Creole, a highly esteemed cordial made in Mar¬ tinique, West Indies, by distilling the flowers of the mammee apple with spirit of wine. (3) Eau de Javelle, a preparation of chloride of soda, used as an antiseptic, and a bleaching agent. (4) Eau de Luce, invented ty a person named Luce, at Lille, in Flanders, is a volatile preparation, made from oil of amber, alcohol, and ammonia. It is a milky fluid, powerfully antispasmodic, and stimulant. Mixed with ni¬ tric acid it forms a substitute for musk. (5) Eau de Paris, a substitute for cologne, and which is sometimes taken in sweetened water as a cordial, and stimulant. (6) Eau de Vie, a brandy; specifically the less perfectly purified varieties, the best being called cognac. (7) Eau de vie de Dantzig, a white liqueur, or cor¬ dial, sweet and strong, in which are introduced for ornament small particles of gold-leaf. (8) Eau de vie dˆHendaye, a sweet French cordial, of which there are three varieties — white, green and yellow. Consult Otto, ˆLes Parfumsˆ ; Mann, ˆDie Moderne Parfumerie.ˆ

EAU CLAIRE, o klar, Wis., city and county-seat of Eau Claire County, at the mouth of the Eau Claire River, and the head of navi¬ gation of the Chippewa River, and on the Chi¬ cago and Northwestern; Chicago, Milwaukee and Saint Paul, and several other railroads; 85 miles east of Saint Paul and 150 miles north¬ west of Madison. It is the commercial centre for northwestern Wisconsinˆ and the outlet of the Chippewa lumber district, with extensive water power. It has a great trade in lumber and manufactures over 300,000,000 feet annu¬ ally. There are extensive manufactures of iron and linen goods, furniture, refrigerators, boxes, harness, sashes and doors, machinery and shoes. The city is noted as a summer resort, and has electric railroads and street lights, waterworks, public library and high school, Sacred Heart

Hospital, Norwegian Lutheran Hospital, na¬ tional and sayings banks, daily and weekly newspapers. Eau Claire adopted the commis¬ sion form o-f government in April 1910, being the first city in the State to do so. Pop. 20,880.

EAUX-BONNES, o-bon, France, a cele¬ brated watering-place, department of Basses-Pyrenees, at the bottom of a narrow gorge, about 25 miles south of Pau. There are seven hot springs, which have a temperature of about 90°, are strongly impregnated with sulphur and considered of special efficacy for throat diseases and tuberculosis. About 6,000 to 10,000 visitors resort hither in the course of the season, which lasts from June to October. A short distance away is Eaux-Chaudes, with sulphur springs.

EAUX-CHAUDES, o-shod, France, a watering-place in France, three miles southeast of Eaux-Bonnes. Some of its springs have the same properties as those of the Eaux-Bonnes, and others are more strongly impregnated with sulphur.

EAVES or CLIFF SWALLOW, one of

the familiar North American swallows (Petro-chelidon lunifrons)

common about buildings where, as explained under Barn-Swallow, it has taken up its residence as fast as the coun¬ try became settled. It is to be recognized by the squareness of the tail (not deeply forked as in its larger associate, the barn-swallow), the chestnut rump, whitish belly and blue spot on the breast. It is most peculiar, however, in its nests, which are always attached to the out¬ side of the building, and usually in close row under the protection of the eaves. These nests are made of pellets of mud ; are shaped like bulbous flasks with a curved neck forming an entrance ; and are attached by their base to the wall. In the primitive wilderness these nests are attached in crowded colonies to the faces of cliffs, where whole masses would frequently scale off by reason of the weight or of the loosening action of rain. Much safer and bet¬ ter conditions are found under the protection of the eaves of buildings ; and not only has this swallow everywhere taken advantage of this fact, but striking modifications in their architecture have followed. The eggs closely resemble those of the barn-swallow, and two broods are usually raised. The species abounds in suitable localities all over the continent, mi¬ grating to the tropics in winter.

EAVESDRIP, an ancient custom, or law, corresponding to the well-known urban servi¬ tude of the Romans called stillicide, where a proprietor was not allowed to build to the ex¬ tremity of his estate, but must leave a space regulated by the charter by which the property was held, so as not to throw the eavesdrop on the land of his neighbor.

EBAL, e'bal, a mountain in Palestine, nearly 3,000 feet in height; 35 miles north of Jerusa¬ lem, situated north of Mount Gerizim, from which it is separated by a narrow valley con¬ taining the town of Nablus, anciently Shechem. Here the Israelites were commanded, on their entrance into the Holy Land, to set up an altar to Jehovah of hewn stones. The fulfilment of this is recorded in Joshua (viii, 30-35). From Mount Ebal the curse for disobedience to the,: law. was pronounced, the blessing for obedience being given from Mount Gerizim,

which lies across the valley. The modern Ara¬ bic name of Ebal is Jebel Eslamiyah.

EBELIANS, German sect, named after Ebel, a Prussian archdeacon, one of the found¬ ers. It arose in Kdnigsberg, Prussia, about 1836, the Archdeacon Ebel and Dr. Diestel be¬ ing its leaders. They believed in

spiritual mar¬ riage. In 1839 sentence was passed against their leaders, who were charged with unsound doctrine and impure lives, but it was removed in 1842. Their enemies called the sect Mucker, that is, in German, hypocrites.

EBELING, a'be-lmg, Christoph Daniel,

German scholar : b. Garmissen, near Hildesheim, Hanover, 20 Nov. 1741 ; d. Hamburg, 30 June 1817. He was noted for his extensive knowledge of Oriental languages, of classic and foreign literature, and of history and geog¬ raphy. He. published a history and geography of North America (1796-1816), for which he received the thanks of the United States Con¬ gress. He paid special attention to the geog¬ raphy of the New World, and collected about 10,000 maps and nearly 4,000 books, all relating to America. This library was purchased in 1818 by Israel Thorndike of Boston, and pre¬ sented by him to Harvard College.

EBENEZER, eb-e-ne'zer (Heb. ®the stone of help®), commonly used as any memorial of divine assistance, originally the name of a field where, at Samuel's request, the Lord discom¬ fited the Philistines with thunder, *etc.* On this occasion Samuel set up a stone and gave it this designation, to indicate that the Lord had helped them. The site has never been defi¬ nitely ascertained.

EBENSBURG, Pa., borough and county-seat of Cambria County; on a branch of the Pennsylvania Railroad, about 113 miles east of Pittsburgh and 16 miles west of Altoona. The manufactories include woolen-mills, tanneries, a foundry and sawmills. It is about 2,300 feet above sea-level and enjoys some reputation as a health resort. It is situated in a rich bitu¬ minous coal region. Pop. (1920) 2,179.

EBERHARD, a'ber-hart, Christian August Gottlob, German poet and descriptive writer : b. Belzig, 12 Jan. 1769; d. Dresden, 13 May 1845. His idyl ˆLittle Hans and the Chickensˆ (1822) has been translated into many languages and still enjoys a wide popularity. His long poem in hexameters, ˆThe First Man and the Earthˆ (1828) is distinguished by its noble diction.

EBERHARD, Johann August, German philosophical writer ; b. Halberstadt, 31 Aug. 1739; d. there, 6 Jan. 1809. He was a preacher first in Berlin and then in Charlottenburg, and was appointed to the chair of philosophy at Halle in 1778. He first attracted attention with a ˆNew Apology of Socratesˆ (1772), an attack upon the narrow theology of the day, to which succeeded ˆUniversal History of

Philosophyˆ (1788) ; ˆHandbook to yEstheticˆ (1803-05) ; and other works from a Wolffian standpoint, in harmony with Leibnitz and in opposition to Kant.

EBERHART, Adolph Olson, American public official : b. Sweden, 23 Tune 1870. He Is a son of Andrew Olson and in 1898 by permis¬ sion of the court changed his name' because of several Adolph Olsons living in same town.

He came to Minnesota in 1881. After graduat¬ ing from Gustavus Adolphus College in 1895 he studied law and was admitted to the bar two years later. He served as deputy clerk of the United States circuit and district courts 1897-1906, and as United States commissioner for the district of Minnesota for the same period. In 1903 he was elected State senator and re¬ elected in 1905. He was elected lieutenant-governor in 1906 and reelected in 1908. Upon the death of Gov. John A. Johnson in 1909 he succeeded him as governor by virtue of his office. At the expiration of this term he was elected governor in 1910 and reelected on 5 Nov. 1912. As governor he has been a con¬ sistent advocate of the conservation of the State's natural resources, consolidation of the rural schools and of many social and economic reforms.

EBERLE, a'ber-le, Robert, German artist : b. Meersburg, 22 July 1815; d. Eberfing, near Munich, 19 Sept. 1ˆ0. He was a pupil of Biderman and later of Van de Velde. His talent was particularly displayed in painting sheep. One of his works, ˆA Shepherdess,ˆ is in the Modern Gallery, Munich.

EBERLEIN, Gustav, German sculptor ; b. Spiekershausen, Hanover, 1847. His chief work is a long frieze ornamenting the fagade of the Ministry of Cults, Berlin, with 50 figures attending religion. He did other decorative work for the University of Kiel. Among his works are ˆDrawing out a Thorn ˆ ˆ Greek Flute Playerˆ ; ˆPsycheˆ and the ˆArcher.ˆ From his hand also are five allegorical groups at Stuttgart, and monuments of William I at Elberfeld, Geisslingen, Mannheim,

Altona and Ruhrort, of Frederick I and Frederick William III in Berlin, of Bismarck at Krefeld, Wagner in Berlin and Goethe in Rome. He is the author of ˆAus Eines Bildners Seelenleben, Plastik, Materie unde Poesieˆ (1892).

EBERS, a'bers, Emil, German genre painter : b. Breslau, 14 Dec. 1807 ; d. Beuthen, 18ˆ. He studied at the Academy of Dusseldorf and early turned his attention to dramatic subjects such as scenes of battle in the Middle Ages, brigand¬ age, sailors, fishermen, *etc.* In later years, after traveling much and visiting the shores of the North Sea, Holland and Normandy, he devoted himself to marine painting exclusively. Among his works are ˆSmugglers About to Landˆ (1830), in the National Gallery, Berlin; ˆFish¬ erman's Hutˆ (1831) ; ˆSmugglers Surprisedˆ (1832) ; ˆSmugglers in Tavernˆ (1835) ; ˆRe¬ pressing Revoltˆ ; ˆ Dutch Smugglers on the Coast of Normandyˆ (1842) ; ˆPrussian Hussars Maltreating French Peasantsˆ (1843) ; ˆLife Boatˆ (1844) ; ˆPilot Boatˆ (1845) ; ˆStorm on Inland Seaˆ (1845) ; ˆMutiny on Brig> (1848) ; and some historical paintings, such as ˆ Saint Goar converting the Rhine Provinces.ˆ

EBERS, Georg Moritz, German Egyptolo¬ gist and novelist : b. Berlin, 1 March 1837 ; d. Tutzing, Bavaria, 7 Aug. 1898. About 1859 he began to devote himself almost exclusively to Egyptological studies, and in' 1869 was appointed extraordinaty professor of language, history and antiquities of ancient EgA-ˆpt at Jena. In the following year he traveled in Egypt, Nubia and Arabia, and on his return in 1870 became ordinary professor of Egyptology at Leipzig. Another visit to Egypt in 1872-73 re¬

sulted in the discovery of the important medical papyrus known by his name, now in Leipzig, and of which a facsimile was published in 1875. Among his published contributions to Egyptol¬ ogy are ˆDisquisitiones de Dynastia vicesima sexta Regum ˆgyptorumˆ (1865); ˆAgypten und die Bucher Mosesˆ (1868); ˆDurch Gosen zum Sinaiˆ (1872); ˆPapyrus Ebersˆ (1875) ; ˆEine Galerie antiker Portraitsˆ (1889) ; ˆDie hieroglyphischen Schriftzeichen der Agypter (1890) ; and ˆAgypten in Bild und Wortˆ (1878-79), translated into English as ˆ Egypt, De¬ scriptive, Historical and Picturesqueˆ (1880). Besides these works he published many novels, mostly dealing with Egyptological subjects, among which are ˆEine Agyptische Kdnigstoch-terˆ (ˆAn Egyptian Princessˆ 1864); ˆUardaˆ (1877); ˆHomo Sumˆ (1878); ˆDie Schwes-ternˆ (ˆThe Sistersˆ 1880); ˆDer Kaiserˆ (1881) ; ˆSerapisˆ (1885) ; Uosuaˆ (1889) ; ˆPer Asperaˆ (1892) ; ˆKleopatraˆ (1894) and

ˆArachneˆ (1897). He also published a poem called ˆElison> (1888), and an autobiography (1892), entitled ˆDie Geschichte meines Lebens.ˆ A collected edition of his works in 25 volumes was published at Stuttgart (1893-97).

EBERSWALDE, a-berz-val'de (ancient Neustadt-Eberswalde), Germany, town on the Finow Canal, about 28 miles northeast of Ber¬ lin. It is a busy industrial centre, having a number of machine-shops, sawmills, car and locomotive works, and doing a considerable trade in lumber and coal. The paper for the notes of the Imperial Bank is here manu¬ factured and there is a royal academy of forestry. Eberswalde, set in a finely wooded district, is a favorite summer resort for the people of Berlin. Pop. 26,064.

EBERT, a'bert, Karl Egon, Austrian poet and dramatist : b. Prague, 5 June 1801 ; d. there, 4 Oct. 1882. He began with dramas of Bohe¬ mian history, many of which were staged but only one printed, ˆWratislav and Juttaˆ (1835). As a lyric poet and balladist he was more suc¬ cessful; his ˆPoemsˆ (1824) contain fine lyrics, and ˆSchwerting the Saxon Dukeˆ is still high in popular favor. His longer poems — ˆWlasta, ein bomisch-nationales Heldengedicht in drei Biichernˆ and ˆDas Klosterˆ are fluent in style as well as pure and elegant in language. ˆEin Denkmal fur Karl Egon, Fiirsten von Fiirstenbergˆ (1885), consists of a garland of sonnets; ˆFromme Gedanken eines weltlichen Maimeˆ (1859) is a diactic poem.

EBERTH, a'bert, Karl Josef, German

anatomist and bacteriologist: b. Wurzburg, 1835. He was educated at the University of Wurz¬ burg; was appointed to the chair of pathologi¬ cal anatomy at Zurich in 1865, and to a similar chair at Halle in 1881. The results of his anatomical researches, including ˆUeber den Peitschenwurmˆ (1859) and ˆUeber Nemato-denˆ (1863), appeared in Virchow's Archiv fiir pathologische Anatomie. His bacteriological investigations were chiefly concerned with the bacillus of typhoid. He published ˆDie Untersuchung des Answurfs, auf Tuberkelbazillen' (1891) ; <Die Thrombose,ˆ with Schimmelbusch (1888) ; ˆMikroskopischer Technikˆ (19(X)).

EBIONITES, e'bi -6n-Tts, a sect composed of Jewish believers in Jesus of Nazareth as be¬ ing the Christ or Messiah, who nevertheless re¬ tained many of the practices and beliefs of their

ancestral religion. Their name, Ebionites, seems to be formed from the Hebrew word ebionim, poor folk; but some of the ancient writers, un¬ acquainted with the history of the primitive church of Jerusalem and Judea and with the Hebrew language, derive the name from that of a supposititious heresiarch Ebion. If the name was originally ebionim, «the poor,ˆˆ the sect will have chosen for itself in effect the same name as the medieval sect of the Poor Men of Lyons. The Ebionites are by many authors con¬ founded with the Nazarenes or Nazarites, an¬ other body of Christians Jewish by race and in a measure also Jewish in religion. The rise of the Ebionite sect is commonly referred to the tirne of Trajan, when, the whole Jewish race being excluded from .ˆlia Capitolina (as Jeru¬ salem was named anew), these people, despised alike by Jews, Christians and pagan Romans, migrated to Peraea, the country beyond the Jor¬ dan, and there freely developed their religious tenets and practices. They were Jewish rigorists, zealots, with some tinge of Christian belief, in that they held Jesus to have been the Mes¬ siah ; but they held him to be only man and begotten like other men. The Mosaic law they believed to be of everlasting obligation upon all believers in Jesus Christ whether of Jewish or Gentile race. Saint Paul they regarded as a traitor and arch-apostate for his having declared Mosaism superseded by the law of Christ. Of the Christian sacred books they held the Hebrew gospel of Saint Matthew to be the only one given through Divine inspiration.

EBLIS, or FATHER OF DEVILS, ip

Arabian mythology, the ruler of the evil genii or fallen angels. Before his fall he was called Azazel or Hharis. When Adam was created, God commanded all the angels to worship him ; but Eblis replied : *Me thou hast created of smokeless fire, and shall I reverence a creature made of dust?® God was very angry at this insolent answer, and turned the disobedient angel into a Sheytan (devil), and he became the father of devils. He is described as of enor¬ mous size, with a red-striped skin, a ring-pierced nose, long hair, large flapping ears and a very long tail. See Devil.

EBNER-ESCHENBACH, ab’ner esh’en-baH, Barones Marie von,

Austrian author: b. (Countess Dubsky) Castle Zdislavic, Moravia, 13 Sept. 1830. In 1848 she was married to an of¬ ficer of the Austrian army. Her whole life was spent between Castle Zdislavic and Vienna. Her early products were dramas long since forgotten. She began in 1860 as a playwright with ˆMary Stuart in Scotlandˆ (1860), and the tragedy ˆ Marie Roland,ˆ with the one-act dramas ˆDoc¬ tor Ritter, > ˆViolets, ˆ and ˆThe Disconsolate One,ˆ all of which were but moderately success¬ ful. Her fiction beginning with ˆThe Princess of Banaliaˆ (1872), a satiric tale, made little im¬ pression; but ˆTwo Countessesˆ (1885), a story of Austrian high society, met with strik¬ ing favor. Her other writings include ˆTales of Village and Castleˆ ; ˆThe Child of the Parishˆ (1887); ˆThe RivaP ; ˆAphorismsˆ (1880); and ˆParables, Stories and Poemsˆ (1892); ˆMargareteˆ (1891); ˆDrei Novellenˆ (1892) ; ˆGlaubenslosˆ (1893) ; ˆDas Schad-licheˆ and ˆDie Totenwachtˆ (1894) ; ˆRitt-meister Brandˆ and ˆBertram Vogelweidˆ (1896); ˆAlte Schuleˆ (1897); ˆAus Spathers-bttagen> (1901); ˆAgaveˆ (1903); <Die arme Kleineˆ (1904) ; ˆDie unsiegbare Machtˆ (1905) ; ˆMeine Kinder) ahreˆ (1906) ; ˆEin Buch Fiir die Jugendˆ (1907) ; Wolksbuchˆ (1909); ˆ Altweibersommerˆ (1909); ˆGenrebil-derˆ (1910). Her collected works were pub¬ lished in 1893-1911. She is a writer with a re¬ markably polished style, marked with wonderful powers of description and a facility in charac¬ ter delineation equal to the best. Her plots ate well woven and the proportion is just. For her biography, consult Necker (Berlin 19(X)) and Bettelheim (ib. 1900).

EBONITE. See Vulcanite.

EBONY. See Diospyros.

EBORACUM, e-bor'a-kum, the Latin name of York. See York.

EBRO, a'bro (Lat. Iberus), a river in Spain, once the boundary between the territory of Rome and Carthage, has its source in the province of Santander, 10 miles west by north of Reynosa. Pursuing a southeast course of about 500 miles, it flows into the Mediterranean by two mouths. It is navigable for boats up to Tudela, about 180 miles from its mouth, but is obstructed by shoals and rapids, to avoid which a canal, about 100 miles long, has been con¬ structed south of and nearly parallel to the river.

EBULLITION, eb-il-lish'6n, the bubbling up or agitation which results from the action of heat on a liquid. The escape of vapor from water depends not merely upon the temperature, but upon the presence of gases and other bodies, upon the vessel, and a variety of circumstances, so that a strict definition is necessary. The usual

statement is that ebullition is the conver¬ sion of a liquid into a vapor or gas having the same tension or elastic force as the air. This conversion takes place at different temperatures for different substances, but it is so constant for each substance that the fixity of the boiling-point of a fluid is regarded as a very good test of its purity. In determining what that point is, it is of course necessary to ascertain what the atmospheric pressure is, to see that it does not vary during the experiment, and to fix upon some standard pressure for comparison of re¬ sults. The pressure is estimated by the ba¬ rometer. It is possible to heat water 20° F. above its boiling point without ebullition. See Heat.

EQA DE QUEIROZ, ˆsa-da-kˆros, Jose Maria, Portuguese novelist : b. P6voa do Var-zim, 25 Nov. 1845; d. Neuilly, France, Septem¬ ber 1900. At first a journalist, he traveled and was in the consular service at Havana, New¬ castle, Bristol and Paris. He introduced the naturalistic school into Portugal. His powers of observation and description are extensive, and in his novels — ˆThe Crime of Father Amaroˆ (1874, rewritten in 1880) ; ˆThe First Monk of Saint BasiP (1877) ; ˆA Relief (1886) — he portrays in master strokes the failings of Portuguese society. His strange, half realistic, half fanciful story, ˆThe Relic, ˆ weaves into a narrative of Oriental travel a dramatic repre¬ sentation of the Passion of Christ in the form of a dream. In collaboration with Ramalho-Ortigao he wrote the spirited tale of adventure, ˆThe Mystery of Cintra Street.ˆ Several of

his works have been translated into English by Edgar Prestage,

ECARTE, a”kar-ta’, from the French, mean¬ ing discard, a game at cards for two persons. The game is played with a piquet pack, that is 32 cards, the small cards, from 2 to 6, being ex¬ cluded. For convenience of dealing, two packs are generally used. The players cut for the deal; the lowest card (in France the highest) deals. The dealer gives 5 cards to each player, 3 and 2 at a time, and turns up the 11th card as trump (French, atout). If the turn-up is a king the dealer scores 1, and if a king turns up in the hand of either player the holder may

score 1, but in each case this must be announced before the first trick by saying, mark king.® The king is the highest card, the queen next, then knave, ace, 10, *etc.* Trump takes all other suits. The non-dealer leads, if satisfied with his hand. If not, he proposes, i.e., he states that he wishes to exchange some of his cards for new ones in the stack. The dealer may or may not accept the proposal. If he does, each one discards as many cards as he chooses and takes fresh ones, the non-dealer receiving them first. This may continue until the non-dealer is satisfied. After the non-dealer had led the other player must follow suit, and take the trick if he can ; if he cannot follow suit, he must play trump, if he holds one. The winner of the trick leads again till the 5 tricks are exhausted. Three tricks count 1 point, 5 tricks 2 points. Five points make a game. The player, ac¬ cording to the French game, must announce the suit he plays, and if he plays differently, can be compelled to play as he announces, or if he cannot, as his adversary pleases. If the non¬ dealer fails to score 3 tricks, the dealer scores 2. The rules of the game are varied in different countries. Pool ecarte is played by more than two players ; the extra player serving in the capacity of adviser and replacing the loser in turn, until one player wins two or three success¬ ive games. The loser must always leave the game, unless he has guaranteed to take all bets, which is called playing ^^a chouette.®

ECBATANA, the ancient metropolis of Media, built by Seleucus. It was the summer residence of the Persian and Median kings and existed in great splendor at a very early period in the history of the world. There are no traces now remaining of the site of this once celebrated city. Herodotus (I, 90), and Poly¬ bius (X, 20) are the main sources of informa¬ tion attesting its magnificence. In the absence of excavations, these must be regarded as authentic. The city was built on a hill, on top of which was a splendid temple of the sun. Seven concentric walls circumscribed the city, — the innermost of gold, — the next of silver, the next orange, blue, scarlet, black and white, respectively. The stronghold and the palace were richly ornamented and carved. It fell successively into the hands of Alexander, the Seleucidae, and Antiochus the Great. Finally the Parthians gained possession of it, and it gradually diminish-ad in splendor. The present Hamadan is generally conceived by scholars to have been the original site of the city. Consult De Meynard, B., ^Dictionnaire geographique de la Perse^ (Paris 1861) ; Crawshay-VVilliams, ^Across Persia^ (New York 1907).

ECCE HOMO, ek’e ho’mo («Behold the Man®), the rendering, in the

Latin Vulgate, of the words with which Pilate presented Christ, in scarlet robe and crowned with thorns, to the populace. The figure of Christ in this scene is the subject of a celebrated painting by Correg¬ gio which is preserved in the National Gallery of Painting in London. Other great painters have chosen the same subject, among them Guido Reni, whose ˆEcce Homoˆ is in the picture gallery of Dresden; Titian, in the Scuola di San Rocco, Venice; Souonia, in the Petti Palace, Florence, and Tintoretta, in the Munich Gallery.

ECCENTRIC, or ECCENTRIC CIRCLE,

in ancient astronomy a circle whose centre was supposed to be displaced from the centre of motion. It was a makeshift to try to account for the motions of the planets before Kepler's discovery of their true motion in ellipses with the centre of attraction at one of the foci of the ellipse. Also, in mechanics, a term applied to contrivances for converting circular into recipro¬ cating rectilinear motion, consisting of variously shaped disks attached to a revolving shaft.

ECCENTRICITY, deviation from a center; the state of a circle with respect to the non¬ coincidence of its centre with that of another circle. The eccentricity of an ellipse is the fractional quotient (always less than unity), which is obtained by dividing the distance from the focus of the curve to its center by the half length of its greater axis. The greater the eccentricity is, the longer the curve becomes in proportion to its width ; as the eccentricity di¬ minishes the form of the curve approaches that of a circle : the eccentricity of the circle is zero. The eccentricity is one of the most im¬ portant of the so-called ˆElements® of the orbits of the planets and of the double-star sys¬ tems.

ECCHYMOSIS, ek-T-m5'sis, a subcuta¬ neous hemorrhage due either to bruising or some form of external injury, or occasionally the result of a peculiar blood disease haemophilia. Ecchymoses usually result in varying grades of discoloration, and are best treated by means of hot water, locally applied.

ECCLEFECHAN, ek-l-fen'an, Scotland, village of Dumfriesshire, near the main line of the Caledonian Railroad, 20 miles northwest of Carlisle. It is the birth-and burial-place of Thomas Carlyle, and is unmistakably the ˆEntepfuhl® of his famous spiritual autobiog¬ raphy, ˆSartor Resartus.ˆ The house in which he was born, 4 Dec. 1795, still stands, and in the west corner of the churchyard around the United Presbyterian church, which represents the old Secession church, he was laid, as he wished to be, beside his father and mother.

Pop. 670.

ECCLES, Robert Gibson, American chem¬ ist : b. Scotland, 1 Tan. 1848. He came to the United States in 1862 and became chemist in the Bureau of Indian Affairs and professor and dean in the Brooklyn College of Pharmacy. He has discovered calycanthic acid and the alka¬ loids calycanthine, glaucosine, etc., and devised the official method of assaying pepsin and in¬ vestigated the effects of drugs on peptic diges¬ tion. He also, exposed numerous fraudulent medicines, among them the Scotch oats essence.

He has written more than 100 articles on philo¬ sophic and scientific subjects, including ˆFood Preservativesˆ (1905); ˆDarwinism and Dia¬ betesˆ (1908) ; ˆLetters from Foreign Landsˆ (1908) ; ˆDarwinism and Malariaˆ (1909) ; ˆParasitism and Natural Selection > (1909) ;

ˆTouring the Lands where Medical Science Evolvedˆ (1909) ; ˆDarwinism and Anaphy-laxisˆ (1911).

ECCLES, England, a municipal borough in Lancashire, four miles west of Manchester, of which it is a suburb. There are here numerous cotton-mills. Pop. 41,944.

ECCLESFIELD, England, a parish in the West Riding of Yorkshire, six miles north of Sheffield. The chief manufacture is cutlery, then flax, linen, paper and nails; while in the vicinity there are coal and iron mines. Pop.

22,404.

ECCLESIA (ˆˆconvocation®), a popular as¬ sembly, especially that of Athens, where the people exercised full sovereignty and at which every citizen of 20 years of age was entitled to vote. In early times, the ecclesia met once in each prytanig, a period of 35 days, into which

the year was divided. Later they met four times during that period. They were called by the prytanes and presided over by the epistates. Later they were governed by a committee of nine. The people voted either by show of hands or occasionally by ballot, the latter method being by white and black pebbles. Be¬ sides the legislative powers of the assembly, it could make inquisition into the conduct of magistrates, and in turbulent and excited times exercised a power resembling that of impeach¬ ment, as in the cases of Demosthenes and Phocion. The assembly was sometimes sud¬ denly broken up at the occurrence of an un¬ favorable omen, as thunder and lightning, sud¬ den rain or any unusual natural phenomenon. During the 5th and 4th centuries they met at the Pnyx, and after the 3d century at the market place or theatre. In Sparta, all the citi¬ zens in possession of full civic rights were en¬ titled to take part in the deliberations of the assembly from their 30th year onwards. It was convoked once a month at the full moon. Its business was to accept or reject proposals made by the senate. It made its will known by ac¬ clamation or by separation and actual counting of the parties. The right of bringing forward proposals and speaking in the debates was re¬ served to the kings, the ephors and the senators. The assembly elected the officials and senators to decide on the regal succession, on war and peace, treaties, legislation, *etc.* The term was also applied to any group acknowledging Christ as their Saviour and Lord. The word thence was adopted by the New Testament writers to designate “church.®

ECCLESIASTES. One of the books of the Old Testament. The title in the Greek Bible, transliterated in the Latin and some modern versions, is a rendering of the Hebrew Qoheleth. Plato (ˆGorgias,ˆ 452 E) and Aristotle (ˆPoli¬ tics, ˆ iii, 1) use the term for “a member of the assembly.® The Hebrew word is a feminine participle in the simple stem of a denominative verb derived from qahal, “assembly.® It occurs nowhere else than in this book, and in the present text is clearly a designation of Solomon,

probably invented by the author on the basis of 1 Kings viii. Iff, where the king assembles the elders of Israel and addresses them (accord¬ ing to 2 Chronicles vi, 13 from a specially con¬ structed brazen scaffold), to describe the wise monarch on whose lips he places his diatribe as the orator par excellence. Luther’s translation “Der Prediger® and the English alternate title “The Preacher® have a somewhat different con¬ notation. Less probable ar6 the views that the word indicates “collector of wisdom, theoreti¬ cal and practical® (Rashi, Ibn Ezra, Ibn Ghiyyat, Tanchum), or “collector of the opinions

of the wise® (Grotius), or “gatherer of an assembly of sages® (Jepheth ben Ali, Delitzsch) ; or that “wisdom® is understood as the speaker (Griecus Venetus, Baruch ibn Baruch, Ewald, Hitzig, Kleinert, Derenbourg) ; or that the title means “popular sayings,® or “words in¬ tended for public use® (Kamenetzky).

In the Hebrew manuscripts and printed edi¬ tions Ecclesiastes is one of the five megilloth, or “rolls,® and is placed between Lamentations and Esther. This position is probably not much older than the 12th century when it apparently began to be read at the feast of tabernacles. In the Talmud ˆBaba bathraˆ 14b, 15a, the five rolls are not put together, and in the Greek Bible the book follows Proverbs and precedes Can¬ ticles, an order that has been adhered to in the later versions. When it was first read in the synagogue as “Scripture® is not known. That it was quoted as such by Simon ben Shetach in the reign of Alexander Jannaeus, by Baba ben Buta in the time of Herod, and by Gamaliel I is vouched for only by late and scarcely re¬ liable testimony (Pal. Talmud ˆBerakothˆ vii, 2; Bab. Talmud ˆBaba bathraˆ 4a). Questions as to its canonicity arose in connection with the Pharisaic innovation of washing the hands after contact with sacred books. The school of Shammai held that it did not defile the hands, consequently was uncanonical, while the school of Hillel maintained that it did. The council of Jamnia, c. 90 a.d., was in doubt, but the majority seems to have admitted its canonicity; yet a cen¬ tury later Jehuda ha-nasi declared: “Qoheleth is disputed® (Mishna ˆYadaimˆ iii, 1; ˆEdu-yoth > V, 3).

The critical apparatus bv which it is gen¬ erally possible to restore, at least tentatively, the original text of a biblical book is, in the case of Ecclesiastes, regrettably limited. It has been seriously questioned whether a Greek trans¬ lation existed before the 2d century a.d. Following a suggestion of Freudenthal, Gratz reached the conclusion that the version in our manuscripts was made by Aquila, and this view was accepted by Renan and Konig. Dillmann maintained that the original Greek text had only been worked over by the aid of Aquila’s, and this was also the opinion of Klostermann. But McNeile has convincingly shown the im¬ probability of this theory. Since Jerome refers to two editions of Aquila’s version, he assumes that the text in our manuscripts is the first of these and that Origen inserted it in the column devoted to the so called Septuagint, because the Alexandrian version did not contain this book, while the second edition was placed in the Aquila column. These conclusions have been adopted by Barton. Swete (introduction to the Old Testament in Greek, ˆ 1900) and Reider assign the present text to “the school of Aquila.®

Since the Syro-Hexaplaric version represents our Greek text, there can be no doubt that it essentially goes back to Origen, and the problem is how this critic, who must have recognized ^^the school® as quickly as the master, could have substituted it for the Alexandrian version, if one was known to him, or in any case how he could have been silent about the matter. An earlier version might conceivably have been lost, as has that on which Theodotion's recension is supposed by many scholars to be based. If the author of Wisdom of Solomon ii, 1-9, whether he lived in the 1st century b.c. or at the time of Caligula, really undertook to cor¬ rect certain sayings of Ecclesiastes or misinter¬ pretations of their trend, as appears probable, it is likely that he had before him a Greek translation, and it is not inconceivable that Aquila may have used it to some extent in his first edition, before he began to apply his prin¬ ciples more rigorously. Unfortunately, there are no quotations of the book in Philo, Jose¬ phus or the New Testament, and few in early patristic literature. It is thought that the frag¬ ments from the Aquila column represent Aki-ba's recension of the Hebrew text, while the first edition of Aquila may have preserved readings of a pre-Akiban text. Among the early versions, the Syriac Peshita and the Latin Vulgate are derived directly from the Hebrew; the Old Latin, Sahidic, Arabic, Armenian, and Slavonic are translations of the Greek text. In the Sahidic, ix, 4— x, 3 is lacking, probably because this section did not harmonize with the prevailing ascetic sentiment among Coptic Chris¬ tians. Of the Syriac version, made from the Greek by Paul of Telia, a photolithographic re¬ production was published by Ceriani, in 1874. The integrity of the book was not questioned by those who in earlier times were struck by its apparent contradictions and conflicting senti¬ ments. Pope Gregory I and many mediaeval writers assumed that thoughts not approved by the author were given expression only to be corrected, so that the work had something of the nature of a dialogue. This interpretation was naturally favored by scholars who under¬ stood the title as designating a ^^collector.® When the difficulty of ascribing the book to Solomon began to be realized, speculation in¬ creased as to the origin of the sentiments in¬ troduced to be corrected. If already Jerome, Gregory I, and Bar Hebraeus had suggested a similarity to Epicurus, Empedocles, Aris¬ tippus, and the Cyrenaic philosophers, Luther thought of actual extracts from writers in the library of Ptolemy III Euergetes in Alexan¬ dria : Grotius apparently had Oriental philoso¬ phers in mind; Yeard supposed the book to be a

dialogue between a sensual worldling and a God-fearing Jew; Herder heard two voices in it, one of a somewhat audacious seeker, and another of a teacher who sets him right; Bergst found in it a dialogue between a modern Qoheleth who had become a Greek sophist and an orthodox teacher represented by Solomon ; and Bertholdt adopted a similar view. This tendency inevitably led to a denial of the unity of the book. Van Limburg-Bouwer believed that two different works were united by an editor who interpolated the original with long excerpts from another document written by a sceptic. In addition to the idea of dislocations, already put forth by Vafi der Palm in 1784,

Bickell and Haupt also accepted the theory of interpolations on a large scale, but supposed the sceptic to be the original author. Bickell's no¬ tion of dislocated leaves has been shown to be archaeologically untenable, and although Haupt's view is not subject to the same objec¬ tions and the book of Ecclesiasticus reveals the possibility of such dislocations, it is not easy for even the most ingeniously and tastefully arranged anthology to win recognition as a reliable reconstruction of a lost original. Sieg¬ fried supposed that the original book was inter¬ polated by an Epicurean Sadducee, a pious Chasid, a wisdom-teacher, and at least three others. While Dillon and Lauer have adopted this analysis, it has been modified by McNeile who assumes that the book was edited by an admirer employing the guise of Solomon, and interpolated by the annotations and criticisms of two contemporary thinkers, one adding more or less isolated apophthegms bearing on life and nature, another a pious Jew following the calm and untroubled path of religious convic¬ tion, and substantially the same position has been taken by Barton, though he somewhat re¬ duces the number of interpolations. On the other hand, Kuiper found it unnecessary to re¬ move gnomic sayings that did not contradict the thought of the original author. Proceed¬ ing on the assumption that the bulk of the book constitutes the commentary of a later writer on a collection of popular proverbs, Kamenetzky tentatively sought to restore this collection, in¬ cluding i-iii and single verses in the later chap¬ ters.

That the epilogue, xii, 9-14, is a later addi¬ tion to the book has been maintained by Doederlein, J. E. C. Schmidt, Bertholdt, Umbreit, Knobel, Hitzig, Kleinert, Krochtnal, Gratz, Bloch, Vatke, Renan, Van Limburg-Bouwer, Bickell, Cheyne, Smend, Schmidt. Baudissin, Haupt, McNeile, Barton, Budde, Bennett, Gun-kel. Driver, Sellin, Gigot, and others, and al¬ though such scholars as De Wette, Bleek, Ewald, Herzfeld, Rosenmiiller, Kuenen, Cornill, Tyler, Genung, Wright,

Condamin, and Zapletal have sought to explain these verses by an intentional dropping of the Solomonic mask, their sec¬ ondary character is highly probable. It does not necessarily follow, however, that all pas¬ sages in the book referring to the fear of God and retribution, or all proverbial sayings inter¬ spersed in the text must be regarded as inter¬ polations. The analogy of other biblical books renders it indeed altogether likely that there are editorial additions, glosses, and inter¬ polations. Even in xi, 7-xii, 1, regarded by Schmidt on account of its highly poetical char¬ acter as a song quoted by the author, xi, 8b, 9b; xii, 1, 2a, seem to be additions, both on metrical grounds and for reasons already sug¬ gested by Luzzato, Geiger, Gratz and Bloch. But whatever his views of the divine being may have been, the author was obviously still a theist. A wholesome fear of natural conse¬ quences is not of necessity connected with a definite scheme of retribution, either here or hereafter. An essentially sombre, disillusioned, and fatalistic outlook upon life is not incompat¬ ible either with the earnest search for some fruit of human labor or an emphasis on the value of work and moderate enjoyment. It is not necessary to assume, with Margoliouth, that the author, like AbuJ Ala al Maarri, re-ECCLESIASTES

sorted to a sprinkling of pious utterances to conceal his heresy. It would be natural for a Hebrew sage, particularly if he wrote in the name of Solomon, to indulge his taste for quot¬ ing wise saws, even if they fitted loosely in the context, and to give to some sayings a subtle turn. Aside from the epilogue and a limited number of glosses in the text, Ecclesiastes is probably the work of one author, who, how¬ ever, quoted some songs and sayings of others.

According to Jewish and Christian tradition the book was written by Solomon. The Tal¬ mudic statement (<Baba bathraˆ 15a) that the men of Hezekiah wrote it, probably suggests only some kind of editorial activity. Even the heretics mentioned by Philastrius of Brescia, Theodore of Mopsuestia, who was condemned by the Fifth Ecumenic Council for failing to recognize its divine inspiration, and Abu'l Faraj Bar Hebraeus, who held a similar view, did not doubt the Solomonic authorship. This was apparently first done by Luther (Worrede auf die Bucher Salomonisˆ 1524; ˆTischredenˆ IV, 400) ; Grotius (1644) ; Le (21erc (1685) ; Von der Hardt (1716) ; Lowth

(1753) ; Voltaire (1759; 1769) ; Gibbon (ˆDecline and Fall of the Roman Empireˆ c. xli; 1776-88); Eichhorn (1779) ; Herder (1780) ; Doederlein (1784) ; Zirkel (1792) ; J. Jahn (1793) ; J. E. C. Schmidt (1794) ; Nachtigall (1798) ; Bergst (1799) ; Bertholdt (1815); Umbreit (1818); Rosenmiiller (1830) ; Koster (1831) ; Knobel (1836) ; Ewald (1837); Herbst (1840); Hitzig (1847), and a host of later interpreters, including con¬ servative Protestants like Hengstenberg, Vaihinger, Havernick, Keil, Stuart, Zoeckler, Cox, and Wright; Jewish scholars like Geiger, Luzzato, Gratz, Herzfeld, Seinecke, and Derenbourg, and such Catholic interpreters as Zirkel, Jahn, Herbst, Movers, Cardinal Newman, Veith, Kaulen, Bickell, Grimme, Loisy, Von Hiigel, Zenner, Durand, Prat, Zapletal, Gigot, and Peters. The traditional view has been recently defended by Wordsworth, Milman, Glaire, Pusey, Wangemann, Hahn, Bohl, Bullock, Schafer, Von Essen, Lesetre, Gietmann, and Comely, but on insufficient grounds.

It has been urged against the traditional view that the pretended Solomon says: *I was king over Israel in Jerusalem® (i, 12), *I have gotten me great wisdom above all that were before me over Jerusalem® (i, 16), and ®I was great and increased more than all that were before me in Jerusalem® (ii, 9) ; that he complains of wickedness in the place of judg¬ ment (iii, 16), oppression with no comforter (iv, 1), tyranny and corruption of judges (v, 8; vii, 7), and the dangers of espionage (x, 20) ; and that there is no sign of repentance or warning against idolatry. In view of Ps. Ixxxviii, 4 it is quite possible that we should translate ®I, Qoheleth, am king over Israel in Jerusalem,® though Solomon himself would cer¬ tainly not have used the verb at all any more than the form of the pronoun employed. There would be no impropriety in Solomon mentioning his capital. N or would there be any psychological improbability in a reference by Solomon to his great wealth and wisdom, so much admired by the Queen of Sheba, or his comparing himself with' former kings in Jerusalem of whom we are beginning to learn something, even though Jerome observes that it is not greatly to his glory that he boasts his superiority over his

father. It is not clear why a wise king should have hesitated to express his sympathy with the poor and oppressed, and his indignation at the corruption of judges,, or should have failed to recognize the limitations of royal power to alleviate social distress and prevent such insur¬ rections as troubled his reign. There is no evidence that Solomon repented of his sins or regarded his polygamy and worship of other gods as sins. The Chronicler, who made other kings repent, left

out of his record the deeds of Solomon of which he disapproved. The most important arguments against the Solo¬ monic authorship have been derived from the language, style, and thought of the book. It is not merely the vocabulary, with its Persian and Aramaic words, and Hebrew terms occurring as a rule only in post-Christian times, but the regular use of the shorter relative, the form of pronouns, prepositions and conjunctions, the abandonment of the characteristic waw consecu¬ tive, in general the deteriorated syntax and the cumbrous construction of sentences clearly point to the latest stage of biblical Hebrew. This development has obviously advanced be¬ yond that found in Daniel, Chronicles and Esther. Neither the Hebrew of Ecclesiasticus nor that of the Zadokite documents (c. 100 B.c.) reveal so much affinity with the language of the Mishna. Even when the difference of sub¬ ject matter is duly considered, the style is widely removed from that of the Law and the Prophets, and there is a marked change even from that of such late books as Job and Proverbs.

With some scholars one of the determining factors in assigning a very late date has been the assumed influence of Greek thought in gen¬ eral, or specifically that of some of the philo¬ sophical schools. Such an influence seems to have been felt by Luther. Zirkel pointed out what seemed to him translations of Greek phrases, and in the case of some of these he was probably right. Especially Tyler and Plumptre have endeavored to show the presence of ideas peculiar to the Peripatetic, Stoic, and Epicurean schools, and Ed. Pfleiderer that of Heraclitian conceptions. The objection that some notions equally or more characteristic of these schools are absent, or that a somewhat strained interpretation has now and then been resorted to, is not altogether sufficient to off¬ set the impression of their arguments. A cer¬ tain eclecticism is to be expected; a grafting of new ideas on a traditional conception of life is unmistakable, and the author can scarcely be regarded as a logical thinker. Havet called at¬ tention to some striking similarities between passages in Ecclesiastes and the Festal Dirge ascribed to a king of the 11th dynasty, published by Goodwin (ˆRecords of the Past,ˆ 1st series, iv, 115ff) and the Song of the Harper from the 18th dynasty, published by Stern (id. vi, 127ff), and Grimme noted the analogy of senti¬ ment and language to a cuneiform document of the Hammurapi period, published by Meissner (ˆMitteilungen der Vorderasiatischen Gesellschaft,ˆ 1902), quoted also by Barton to show that Ecclesiastes developed motives early extant In Semitic thought. But such expressions of sen¬ timents common not only to Semites and Egyp¬ tians but to men of all lands and ages in certain moods do not constitute the most significant points indicated by Tyler and Plumptre. Dillon

finds analogies to Buddhist ideas ; but Margoliouth rightly queries why there should have been so little of this, if there had been any knowledge at all of the congenial thought of India. The moderate view of Kuenen, Kleinert, Cornill, and Cheyne, who find a general ac¬ quaintance with Greek ideas that were in the air in the Hellenistic age rather than an attachment to a particular school, seems to commend itself.

The text of the book has been closely scrutinized for possible historical referenceˆ that might throw light upon the real author and his time. Luther thought of Sirach as the author, Grotius of Zerubbabel, Von der Hardt of Joshua ben Joiada, Leimdorfer of Simon ben Shetach, Winckler of Alcimus and Grimme of Jehoiachin. But this search for his name is an unprofitable ˆchasing after wind.® Hitzig saw in iv, 13ff ; x, 16f allusions to Ptolemy IV and Ptolemy V ; Gratz to Herod the Great and his son Alexander; Winckler to Antiochus IV and Demetrius I ; Haupt to Antiochus IV and Alexander Balas; Barton to Ptolemy IV, Ptolemy V and Antiochus HI (so already Bdttcher, ˆNeue Aehrenlese,ˆ 1865). Haupt's conjecture is most probable. The little city saved by a poor wise man (ix, 14ff) was sup¬ posed by Hitzig to be Dor, though the account in Polybius v, 66, would then have to be in im¬ portant respects supplemented by that of Ec¬ clesiastes. Ewald thought of Athens and The-mistocles, Friedlander of Syracuse and Archi¬ medes, though neither of these places could be spoken of as a little city, and neither of these men was soon forgotten. Haupt supposed Bethsura was meant (I Macc., vi, 31ff ; 2 Macc., xiii, 19f). This is not improbable, though in that case also the remark of Ecclesiastes that ®no one remembered that poor man® would be justified by the silence of the historians. While many scholars in the early part of the 19th century assigned the book to the Persian period, the great majority in recent times have reached the conclusion that it must have been written about 200 B.c. Zirkel, Renan, Kleinert, Winck¬ ler, Leimdorfer, Haupt, Schmidt, and Peters would descend still another century. To this the objection has been made that Jesus son of Sirach was familiar with Ecclesiastes. But none of the passages that led Noldeke somewhat hesi¬ tatingly to change his former view on this point is at all conclusive, as Peters has shown, and those adduced by others in addition have little weight. Less probability attaches to the con¬ jecture of Gratz, adopted by Havet and Cheyne, that the book was written in the time of Herod the Great. The scruples in regard to

oath¬ taking would be as characteristic of the Essenes in the time of Alexander Jannaeus as later. Ecclesiastes may have written his work c. 100 b.c.

That the book, though substantially written in prose, contains some scraps of poetry “was seen by Desvoeiix in 1760, and Lowth inclined to the same view in the second edition of his ˆPraelectiones,ˆ 1763. Nachtigall attempted to show a strophic structure throughout, and Koster assumed that the entire book was writ¬ ten in the parallelisms characteristic of Hebrew poetry. Ewald returned to the idea that certain parts only had this literary form. Derenbourg supposed that reminiscences of a rich apoph-thegmatic literature were occasionally inter¬ spersed by the author after the fashion of the poetic fragments introduced in their works by

Arabic writers ; and Renan recognized the metrical character of these insertions and, in rendering them, imitated the style of the ancient quatrains and rhymed proverbs of Marculfe, Pibrac, and Chatonnet. Grimme {Zeitschrift der Deutschen Morgenldndischen Gesellschaft, 1897) assumed that the whole book (except xii, 13, 14) was written in metrical form. Schmidt (in The Coming Age, 1899) maintained that the ˆSong of Youth and Ageˆ (xi, 7-xii, 7 except some interpolations) was an elegiac poem in a regular metre quoted by the author. Sievers (ˆMetrische Studienˆ 1901) treated i and ii as poetry. Zapletal and, independently, Haupt in 1904 reached the conclusion that practically all parts of the book were written in metric form. The contention of Genung and many other scholars that the work is throughout written in prose can scarcely be maintained. While a large part seems to present to us a prose strug¬ gling to free itself from the traditional vehicle of gnomic literature and create an instrument more suitable for philosophical discussion, the marks of poetic diction are unmistakable, not only when the author enriches his work with quotations, but also when he feels the demand of a more elevated style.

Concerning the purpose and character of the book there has been much difference of opinion. Jerome who read it to Blesilla and wrote his commentary at her suggestion regarded it as intended to show the worthlessness of mundane existence and to bring home the need of an eternal life. This was typical of early interpre¬ tation. Some mediaeval Jewish exegetes recog¬ nized in it a serious testing of the foundations of belief and were encouraged by it to philo¬ sophical speculation. Luther laid stress on the injunctions to a simple enjoyment of the

pleasures of life in the fear of God. But the dominant note of sadness in reflecting upon the transitory and apparently profitless course of man's life and the hopelessness of any future reward could not be missed when the allegoriz¬ ing tendencies were discarded and the literal sense alone was sought. Hence the impression of a pervading pessimism and scepticism that appealed to Voltaire who regarded it as *un monument precieux® and dedicated his render¬ ing of it in verse to Madame Pompadour and Frederic the Great; to Heinrich Heine who styled it ^^Das Hohelied der Skepsis® ; to Eduard von Hartmann (ˆDas Lied yom Ewigen,ˆ 1889) who defined it as *ein Brevier des allermodern-sten Materialismus und der aussersten Blasirt-heit® ; and to Renan who called it ^^un des ouvrages des plus charmants que nous ait legues I'antiquite.® Theologians like De Wette, Kno-bel, Umbreit, Bruch, and Plumptre emphasized its scepticism. But whatever influence of Greek philosophy or free and fearless speculation may have been felt in the book, the frequent mention of God did not seem to allow the inference that the author had lost completely his childhood's faith. The careful avoidance of the name Yahwe is indeed, as Bergst saw, a sign of a late date, but not of a diminished faith in a living God, as many of the Psalms and Daniel prove. It is important, however, to notice the character of his references to God. A certain resentment against the power of God, checking with ap¬ parent jealoiisv every effort of man, has been discerned by McDonald and others. ®At bottom more religions,® says Renan, «the author of Job

is more audacious in his language ; Qoheleth has no longer the strength to be indignant at God ; it is so useless.® Kleinert observes that the thought of an immanence of the supramundane God in the world and in history, the heroic con¬ fidence, the expectation of impending judgment, the imperishable hope, the fervent prayer, the sense of sin and the need of atonement are gone ; there are no anthropomorphisms, but neither is there any breath of warm life; the conception of an inscrutable and inexorable omnipotence approaches the lifelessness of Fate.

It is true that the attitude of Ecclesiastes toward death does not differ essentially from that of his ancestors. But the question: ®Who knows whether the spirit of the sons of man goes upward and whether the spirit of the beast goes downward to the earth?® seems to show that the somewhat strenuous denials of immor¬ tality are made in view of contemporary asser¬ tions, probably reflecting foreign speculation, that the spirit does not go down to Sheol, but up into the empyrean. The recognition of a fixed cosmic order does not lead to a discussioa of the freedom of the will: good counsel is given on the assumption that, within certain limits, man can determine his own conduct. Against the conception that theoretically Ec¬ clesiastes reaches no other conclusion than that of the essential worthlessness of existence and that, in view of this, he adopts an opportunist hedonism, Genung strongly emphasizes his scientific spirit, advancing by the inductive method in the search for truth, his restraint when confronted with theories still lacking a basis of verifiable fact, his discernment of rela¬ tive values, and his stress upon character and recognition of the intrinsic importance of work and pleasure. There is much justice in these observations, even if at times they leave the im¬ pression of a subtlety that discovers aims and ideas which may not have been present in the author's mind. Struck by the circumstance that in the proto-canonical books ^^from Genesis to Paul® the fall of man is not mentioned except by Ecclesiastes (vii, 29), McDonald has assigned to this doctrine, which appears to be as casually referred to, if at all, as in Ecclesiasticus xxv, 24, or Wisdom of Solomon ii, 23, 24, a larger place than seems to be warranted by the rest of the book. The value of the poetic insertions has long been recognized. In the Song of Youth and Age with which the work fitly closes, the deep sense of the desirability of life, the in¬ trinsic worth of human existence, adds to the pathos ; it touches every heart because it sings the universal fate of man ; it is at once a chant of death's advance even in the midst of life and life's affirmation of its joy even in full view of death.

Bibliography. — The commentaries by Greg¬ ory of Neo Caesarea, Gregory of Nyssa, Greg¬ ory I, Jerome, Olympiodorus ; Rhabanus Mau-rus, Bonaventura, Lyranus; Abu Ali Jepheth, Rashi, Ibn Ezra, Ibn Ghiyyat, Tanchum Jerus-halmi, Baruch ibn Baruch; Brentius, Luther, Melanchthon, Beza; Maldonatus, Jansenius of Gand, Pineda, a Lapide, Drusius, Grotius, Mercer, Geier, Yeard, Sebastian Schmidt, Cal-met, Hardouin, Le Clerc, Desvoetix, Moses Mendelsohn, Van der Palm, Doederlein, Spohn, Zirkel, J. E. C. Schmidt, Nachtigall, Bergst, Umbreit, Rosenmiiller, Koster, Knobel, Ewald, Herzfeld, Hitzig, Heiligstedt, Stuart, Burger,

Elster, Wangemann, Von Essen, Vaihinger, Hengstenberg, Hahn, Ginsburg, Noyes, Zockler, Kleinert, Castelli, Gratz, Delitzsch, Tyler, Motais, Lesetre, Bullock, Renan, Wright, Now-ack, Plumptre, Cox, Salmon, Wildeboer, Gietmann. Buhl, Siegfried, Haupt, Zapletal, McNeile, Barton, Martin. The introductions by Carpzov, Eichhorn, Jahn, Bertholdt, De Wetje, Bleek, Havernick, Herbst, Glaire, Davidson, Kuenen, Keil, Vatke, Kaulen, Lesetre, Comely, Konig, Cornill, Baudissin, Sellin, Budde, Gau¬ tier, Gigot, Bennett, Gray, and Moore. LeClerc, J., ˆSentimens de quelques theologiens de Hol¬ lander (1685) ; Hardt, H. von der, ˆSchediasma de libro Cohelethr (1716) ; Rambach, J. J. in Michaelis, J. H., ˆ Annotationes uberiores in V. T.r (1720) ; Michaelis, J. D., ˆPoetischer Entwurf der Gedanken des Predigerbuchsˆ (1751) ; Lowth, R., ˆPraelectiones de sacra poesi Hebraeorumr (1753) ; Voltaire, J. F. M. Arouet de, ˆPrecis de I'Ecclesiaster (1759) ; ˆSalomonˆ (1769) ; Bergst, B. H., in Eichhorn's Allgemeine Bibliothek (1801) ; Geiger, A., in Judische Zeitschrift (1862) ; Gratz, H., in Monatsschrift des Judentums (1869) ; Derenbourg, J., in Revtie des etudes juives (1880) ; Van Limburg-Brouwer, P. A. S., in De Tijd-spiegel (1870) ; Havet, E., ˆLe christianismer (1878) ; Palm, A., ˆCoheletr (1885) ; Pfleiderer, E., ˆDie Philosophie des Heraklitr (1886) ; New¬ man, J. H., in The Nineteenth Century (1884) ; Bickell, G., ˆKohelet's Untersuchung fiber den Werth des Daseinsˆ (1886) ; Cheyne, T. K., ˆJob and Solomonˆ (1887) ; Menzel, S., ˆDer griechische Einfluss auf den Prediger^ (1889); Euringer, S., ˆDer Masorahtext des Koheletfir (1890) ; Lods, A., ˆL'Ecclesiaste et la philoso¬ phie grecqueˆ (1891) ; Leimdorfer, D., ˆKohelet im Lichte der Geschichter (1892) ; Dillmann, A., in Sitzungsberichte der Akademie der Wissenschaften zu Berlin (1892) ; Klostermann, A., ˆDelibri Cohelet versione Alexandrinaˆ (1892) ; Haupt, P., ˆThe Book of Ecclesiastesr (1894) ; id., ˆKoheleth oder Weltschmerz in der BibeP (1905) ; Dillon, E. J., ˆThe Skeptics of the Old Testamentr (1895) ; Winckler, H., ˆAltorien-talische Forschungenˆ (1896) ; Kuiper, A. K., in Theologisch Tijdschrift (1899) ; Barthauer, W., ˆOptimismus und Pessimismus im Buche Koheletr (1900) ; Condamin, A., in Revue Bib-lique (1899, 1900) ; Noldeke, T., in Zeitschrift fur alttestamentliche Wissenschaft (1900) ; Margoliouth, D. S., ˆEcclesiastesr (1903) ; Grimme, H., in Orientalistische Literaturzeitung (1905); Kleinert, P., in Theologische Studien und Kritiken (1909); Kamenetzky, A. S., in Zeitschrift fiir alttestamentliche Wissenschaft (1909) ; McDonald, D. B., in ˆA Standard Bible Dictionaryˆ (1909); Schmidt, N., ˆThe Mes¬ sages of the Poetsˆ (1911) ; Fowler, H. T., ˆA History of the Literature of Ancient IsraeP (1912) ; Reider, J., ˆProlegomena to Aquilar (1916); Creelman, H., ˆAn Introduction to the Old Testamentr (1917) ; Buttenwieser, M., in Journal of Biblical Literature (1917).

Nathaniel Schmidt,

Professor of Semitic Languages and Literatures, Cornell University.

ECCLESIASTICAL ARCHITECTURE.

See Architecture; Byzantine Architecture; Roman Architecture.

ECCLESIASTICAL ART. The science of ecclesiology consists of two entirely distinct

and separate branches of religious work. One of these concerns itself with the organization and development of the Church body, the polity of the Church community, all from the side-point of the clergy or prelates. The second branch of ecclesiology treats of Christian church edifices, the churches' contents, including all* that goes into the furnishing of the interior of the building, such as its decoration, every¬ thing that pertains to the material or articles used in the religious ceremonies. This article devotes itself entirely to the category of sub¬ jects pertaining to the latter branch of ecclesi¬ ology. Few writers appear to have attacked this subject as a whole in a monograph. The sculptured mural decorations of the different periods have been expatiated on in works on ˆChristian Architecture® ; the sculptured statu¬ ary and bas-reliefs of the world's Christian churches have been written on by laymen and clerics under the title of ˆChristian Icono¬ graphy® ; the painted mural, altar and other polychrome decoration of Christendom's churches has been treated by works on ˆˆChristian Art.® Church furniture has found numerous writers to expound the topic of the construction and carved decoration of altars, pulpits, choir-stalls, altar services, embroid¬ ered art work on priestly vestments, deco¬ rative lighting apparatus, *etc.* Many of such works are written in a lucid and popular style, devoid of all clerical Latin terms unin¬ telligible to the lay reader. But the works entitled ˆChristian Art® include in their text and illustrations paintings and sculpture de¬ picting religious subjects created for public buildings other than ecclesiastical, such as courts of justice, city halls, public galleries, *etc.* As the entire subject of Ecclesiastical Art in its various branches is quite volumi¬ nously covered in the volumes of the Encyclo¬ pedia Americana, this article necessarily avoids long repetitions of such treatments. Articles on the church edifices, their groundplans, fagades, etc., will be found under the different specific titles as cross-referenced in the body of the text, such as Architecture, Roman¬ esque; Basilica; Byzantine Architecture, *etc.* The same can be said of altars and their furnishing, which are fully discussed under the titles Altar; Chalice; Corona; Chandelier; Crosses and Crucifixes ; Costume, Ecclesi¬ astical; Art Enamels, *etc.*

An exceedingly interesting feature that con¬ fronts the student of ecclesiastical art is the fact that practically all art talent of Christen¬ dom up to, and perhaps inclusive of, the 14th century was dedicated to the Church. And until the last few years of the Middle Ages all art

was either carried on by the Church or under the supervision of the clergy. Much of the early art work was created in the cloisters (manuscript writing and illumination exclu¬ sively, of course) by the monastic orders. And under the tutelage and patronage of such prel¬ ates as Abbe Suger and Saint Eloi of France, Bishop Bernward of Germany, etc., schools of art were established and the Fine Arts sus¬ tained while all the lay world was battling in dynastic and baronial feuds.

Art of the Catacombs and of the Primitive Christians.-ˆThe more distinguished among the early Christian dwellers in Rome received in¬

terment in the Catacombs in specially contrived chapels dug out from the sides of the innu¬ merable subterranean passageways of the vast series of excavated galleries then existing. These mortuary chapels usually took as ground plan a Greek cross (-f) ; the roof was scooped out to form a dome or cupola (generally painted over in blue), the entrance of the recess was surmounted by conch-shells, the sides covered with symbols and devices of Christianity. (See Symbolism). In the re¬ cessed spaces dug out at the extremity and two sides were placed the sarcophagi of confessors, bishops, martyrs, *etc.* The sar¬ cophagus at the furthest end was used as an altar or communion table. There are a number of these in the Catacombs of Rome. These subterranean specimens of architecture and the art of the earliest Christian believers remained forgotten for many years after Constantine I was converted and the secret assemblage of the persecuted believers became unnecessary. In 1578, by accident, the presence of these under¬ ground passages was discovered by laborers and public interest was excited to investigate these very ancient remains. Antonio Bosio spent 35 years exploring the intricate cavernous laby¬ rinth and making plans of its ramifications and producing copies of sculptures and paint¬ ings ; the work resulted in the monumental ˆRoma sotterraneaˆ (1632). Aringhi (1659) and others continued the work. These acts of devotion preserved to us a view of these in¬ teresting works which have since decayed and perished. With the freedom of worship ac¬ corded the Christians by Constantine grew up, by the 4th century, three forms of buildings in which to perform religious ceremonies : baptisteries for Christian initiation ; churches for the congregations' worship ; sepulchral chap¬ els for prayers in commemoration of the ®departed.® The architectural plan adopted for a building in which the devout could worship was that of the pagan basilica (see Basilica) with its atrium

(front court), narthex or portico, nave, cancellum (choir), amhone (pulpit with entrances on both sides), ˆtriumphal arch® (entrance to sanctuary), transept, presbytery (sanctuary), altar, ahsis (tribune) with its bishop's throne (suggestus), side aisles. A crypt beneath the sanctuary contained the tomb or shrine of the saint or martyr to whom the church was dedicated. It is frequently claimed by authorities that this crypt was added to the pagan plan of basilica as reminder of the cata¬ comb location of the first Christian church ; in fact, a number of the early churches had preten¬ tious subterranean quarters for worship. The steeples were later additions of the Lombard architects about the 8th century, when bells were introduced from Greece. Some writers recognize a resemblance in the early baptisteries to the ancient Roman baths. Mostly they are octagonal buildings. Some claim that the octa¬ gon form is symbolic of regeneration; very ap¬ propriate for the rite of regeneration by bap¬ tism. By early orientation the baptisteries were placed in front of the central entrance to the cathedral; symbolic of the initiation before en¬ trance in the Church (see Baptistery). The font was located in the centre of the building, which was surmounted by a dome. The font was reached by descending three steps to the

Rose-window, 13th Century

Typical 13th Century rose-window

Octagonal Church of I'Aiguille, at Puy-en-Velay, France (10th or 11th Century)

Baptismal font in Basle Cathedral

Tomb of Henri I, Count of Champagne (1180)

Statuary of 13th Century with “ tabernacles ” Pulpit, dated 1586, in a church at Basle, Switzerland

shallow octagonal basin ; the early rite was one of submersion. Even when they built baptis¬ teries in circular form the font persisted in its octagonal shape. Baptisteries continued to be distinct, if not always detached, buildings for eight centuries after Constantine's time, but later the fonts (still octagonal) were placed in the church near the main entrance to maintain the idea of initiation to the convert.

Funeral chapels were a common purtenance of the church buildings, but have long since become obsolete and the old structures have decayed, so we know little of them. They were termed memories and commemorated certain saints or martyrs. Two extant (both at Ra¬ venna) are the mausoleum erected by Galla Placida for the remains of herself and her two sons, the Emperors Honorius and Valentinian; the other erected to the memory of Thcodoric the Goth, raised by his daughter Amalasuntha. Most of the art productions of the catacombs and ancient Christian Rome have been obliter¬ ated by time, the extant remnants are in the Museum Christianum (Vatican) and in the descriptive work ˆRoma Sotterranea.ˆ Art compositions were mostly confined to symbol¬ ism. Our Saviour, the Good Shepherd, is found invariably depicted in the central space in the Catacomb domes, the others distributed around the walls. There were the Saviour on the Sym¬ bolic rock, or mountain of Paradise with four rivers (mostly found on fronts of sarcophagi) ; ®The Fall,® Adam and Eve standing to right and left of the Tree of Knowledge, round which the Serpent coils; Noah and the Ark; Abra¬ ham's sacrifice; Passage of the Red Sea; Moses striking the Rock; Jonah swallowed by the Whale; Jonah disgorged; Daniel in the Lions' Den; the Nativity; Adoration of the Magi; Saviour turning Water into Wine, *etc.* Some 40 have traditional form. These pictures were continued by the Latin Church in sculpture and painting for many a,ges, probably under special sanction.

Byzantine Art. — The Byzantine church plan was a modification of the Roman basilica (see Basilica) and we now have four naves of

Byzantine mosaic of Empress Theodora entering the Temple, m S.

Vitali, Ravenna (6th century).

pillared avenues instead of one; they are of equal length and breadth, at right angles, form¬ ing a cross.* In the centre, combining the terminations of the naves, arose the dome or cupola. (See Byzantine Architecture). The Byzantine church edifice was adorned with mosaics. The floor was paved in the style

termed opus Gr<rcanicum (or Grcncum), while finer incrustations covered the ciboria (domes) and reading desks. A peculiarity of Byzantine (and contemporary) depiction is the representa¬ tion of personages of superhuman power being given superhuman stature. Thus we see the devout paying homage in diminutive forms and

Byzantine mosaic of St. Maximinianus and Emperor Theo¬ dosius in S. Vitali, Ravenna (6th century).

the courtiers in pictures of emperors are pig¬ mies. Monuments of Byzantine mosaic art are the 6th century work of the Holy Eucharist in the basilica of S. Apollinari di fuori (Ravenna) ; Transfiguration in the tribune of the same church ; another in S. Apollinari di dentro, ˆApproach of the Three Kingsˆ ; Justinian and Theodora in the wall of the tribune of S. Vitali, Ravenna. The mosaics in the nave and triumphal arch of S. Maria Maggiore, Rome (5th century). Other noted Byzantine mosaics in Rome are in S. Pudenziana, S. Prassede (9th century). Two centuries of war and barbarism in Italy intervene, while in Greece work was being done by such artists as Georgius, Pantaleo, Nestor, Menas, Symeon, the Blachernae on the illumination of the vellum Menologion for Emperor Basil II (10th cen¬ tury), now in Vatican. Beautiful work had already been done on such manuscripts as Book of Joshua, in Vatican; Genesis, in Im¬ perial Library, Vienna; Syriac Gospels, in Laurentian Library, Florence. A 9th century fresco in Byzantine work adorns an absis wall in S. Cecilia in Trastevere, Rome. By the 11th century decadence had set in, but fine work was done on such pieces as the ivory tablets inserted in the missals binding presented to Bamberg Cathedral by Saint Henry (emperor), now in Munich Library, and the bronze gates, done at Constantinople in 1070, for the basilica of S. Paolo fuori le mura (Rome). To this period belong the S. Marco pala d'oro and ciborium. Byzantine art revived in the

12th century; examples are the mosaic in San Clemente, Rome (1112) ; others in San Marco, Venice; in the tribune of the Duomo at Murano and those at Torcello. The Latin conquest (1206) and that of the Turks (1453) stifled and killed Byzantine art. Beautiful work was done in goldsmithing and enamels (see Art Enamels; Goldsmithing; for church plate, altar-pieces, see Altar) ; the emperors made great gifts of such work to the dif¬ ferent churches. Carved ivories show more freedom of expression than, perhaps, other mediums. In viewing the work of the Byzantine

artists \vc find a primitive method of expression which often belies the perfection of execution. Draperies are apt to hang in folds suggestive of a series of ropes ; the facial expression is

Merovingian moldings in S. Maria-Trastevere, Rome.

often crude to extortion. They are methods laid down rigorously by the church and rigid conventions are still, more or less, maintained in oriental ecclesiastical art in Russia and the Greek Church.

Romanesque (Lombard or Italo-Byzan¬ tine). — ‘This is a cruciform groundplan for churches ; the nave or arm continuing west from the sanctuary is lengthened, transform¬ ing into a Latin cross (+) the former Greek cross (+) plan. Three entrance doors are usual on the western front, mostly covered wdth sculpture. Over the central door a ˆ“Saint Catherine wheel® window is usual. Galleries of pillars or trefoils range themselves all around beneath the roof’s eayes. Galleries of such pillars sometimes cover the western front, rising tier on tier reaching even to the pedi¬ ment and engirdling the cupola. They are mostly for purely decorative purposes. The baptistery and the campanile (bell tower) belonging to Lombard cathedrals are detached adjuncts of the church edifice. The arch is always round in pure Lombard architecture. (See Archi¬ tecture). Early style is seen in the fagade of S. Michele at Pavia ; Victory of Saint George over central door; Jonah vomited by whale (right and left doors) ; diverse dragons, grifhns eagles, sphinxes, snakes, centaurs, etc., all very crude. Better work is found to the left of the doorway of S. Zenone, Verona (two warriors charging) and King Theodoric to the right. Next period improves, as shown in monsters introduced in church pillars, often of admirable execution. Two lions on porch of S. Cyriaco, Ancona, perhaps are the finest in this style. Sometimes monsters appear on cathedral roofs,

as the Imonze hippogriff was, that is now in the Campo Santo, Pisa. All this was Teuton ele¬ ment. Byzantine influence is shown in the

work of Wiligelmus at Modena : the King Arthur bas-relief in the doorway near the Campanile; story of S. Gimignano on southern side of cathedral ; Passion of Our Lord in the chapel. Contemporary is the Last Judgment bas-relief in the fagade of the cathedral at Ferrara; Biduino's work (flourished about 1150) over baptistery door at Pisa; bronze door to Cathedral of Monreale (Sicily) by Bonanno (flourished 1174-86). Antelami's (flourished 1178-1206) Deposition in Parma Duomo is greatly admired. Mosaicists were considered as painters and held chief positions in art depiction till the Dominicans and Franciscans patronized the actual painters — Guido of Siena, Giunta of Pisa, Cimabue of Florence (master of Giotto), *etc.* Guido did the Madonna of S. Domenico (1221). Giunta did the decora¬ tion of the Upper Church of the Franciscans at Assisi. Margaritone (architect, sculptor and painter) belonged to this period. Cimabue did the Virgin and Child in the gallery of the academy, Florence ; worked on the Assisi Upper Church fresco decoration; did the crucifix now in the S. Croce sacristy, Florence, and painted the noted Madonna for the chapel of S. Maria Novella. Other painters were BufiPalmacco, Florence (1311-55) ; Tomaso de Stefani, Naples (about 1230-1310) ; Filipo Tesauro, Naples (about 1260-1320) ; Bertolino of Piacenza and Niccolo of Reggio (flourished about 1260). Noted in this period were Fra. Giacomo da Turrita, the Cosmati, Pietro Cavallini, Andrea Tafi, Gaddo Gaddi, Andrea Orcagna, *etc.*

Merovingian molding in St. Irene, Lyons.

France. — Nothing remains in France in the way of church buildings dating from the 4th, 5th and 6th centuries. The only extant ecclesi¬ astical mementoes in stone of this Merovingian

period are numerous gravestones, capitals, mold¬ ings, *etc.* A predominating motif in such carv¬ ings is the complex interlacing lines like wattle-work termed ˆdacertineˆˆ ornament. This method of intertwining and curving of numerous paral¬ lel lines in rounded bas-relief is contrived in gnilloches (opposed waves intertwining to pro¬ duce a series of circles, etc.), rosettes, even crosses. Crude foliation and floriforms inter¬ mingle with conventional bird forms (the sym¬ bolic peacock is frequent), contorted interlacing dragon and dog forms. The vaults and walls of the church edifices as well as the paving sometim.es consisted of mosaics. Altars, while mostly of stone, were sometimes of wood. (See Altar). In the Carlovingian (spelled also Carolingian) period (752-987) the powerful genius of Charlemagne becomes felt but, as Viollet-le-Duc says, our ideas of the primitive churches are very vague and it is only after the 10th century that we gain some concep¬ tion of them. (See Architecture). The frag¬ ments of ecclesiastical stone carving would make it appear that the same motifs as in the former period were in use : the interlaced ornament, the birds and other symbolic animals, but the loz¬ enge (diamond) form is frequent. The treas¬ uries of the church were becoming very rich in objects of art. Altar and ceremonial pieces, such as chalices, patens, crosses (see Chalices, Crosses, Goldsmithing, etc.) were liberally donated by kings and nobles. These gold ob¬ jects were often encrusted with garnets and ruby-colored glass paste in cloisons (bezels). Of such were the gold goblet and plateau re¬ cently discovered at Gourdon and the chalice and paten of Saint Goslin, bishop of Toul, green and blue enamel (see Enamel) figuring in the latter. Textile fabrics of this period and the former are very rare, most of those discovered in France being attributed to Byzantine manu¬ facture, but found in a number of French churches. With the 11th century we commence the second French Romanesque period. As the 9th century found but few of the Merovingian edifices still standing, it is likely they were built of very perishable material. But the buildings of the period in consideration were more stable, stone being the main substance used. The prophecy of the end of the world

Mosaic paving (10th century) of Cruas, Ardeche (France)

having lost its discouraging effect with the pass¬ ing of the 10th century, when the disaster was to arrive, the perspective broadened. Their ground plans differed, many copying the form used by Charlemagne at Aix-la-Chanelle,ˆ which, in tuni, was a reproduction of S. Vitali of

Ravenna and others. (For further information see Architecture). The ornament is becom¬ ing more and more enriched with carvings of birds pecking at fruit, strapwork, geometric re¬ peat forms (ˆˆdog-tooth,® lozenge, ˆ‘pearl and button®) and acanthus leaf. The tympanum

Carlovingian “ lacertine ” decoration.

over the door begins to obtain quite elaborately carved subjects as groups of ecclesiastical sym¬ bols of the Evangelists, full figures of Christ, 2tc. In the second half of the 12th century ˆˆwheel-windows,® with columnar radiations starting from a circle in the centre and reach¬ ing to the periphery, appear at the extremities of the transepts above the western portal ; these round windows are found on a number of churches of this century. Belfries are rare be¬ fore the middle of the 12th century. The plac¬ ing of vanes in the form of a cock, acting as wind indicators, dates very far back, the poet Wolstan (end of the 10th century) mentions the cock on Winchester Cathedral, and the Bayeux tapestry shows one on Westminster Abbey. Many were gilded. They were a sym¬ bol of the church to be ever watchful. The iconoclasts had done much to hinder the artistic expression of Christian sculptors and painters and former crude and unnatural de¬ piction was largely due to fear of beauty in statuary or pictures leading to idolatry. But, by the 12th century, the figures coming from ecclesiastical artists were speaking a new lan¬ guage, besides displacing zigzags, lozenges, meanders and other geometric designs on archi-volts and voussures over doors where human forms are now found. High relief stone carv¬ ing of large size figures are now seen on the fagades and on the decorations at the sides of doorways, representing personages of the Old and New Testament. They are done by the best sculptors available. Most of them are clothed in long tunics surmounted by a kind of mantle opening in front and disclosing richly adorned materials, often edged with gold or silver lace. A peculiar

feature of these statues is the extreme length of bust, protruding eyes, arched eye-brows, stiffness of movement, all vestiges of the Byzantine style ; the same char-532

acteristics prevail in bas-reliefs and paintings. They also retain the same Byzantine treatment of Christ enthroned, the right hand in bene¬ diction ; symbolic representations of the Evan¬ gelists surround Him (eagle, angel, lion and ox). His feet rest on a stool (scabellmn) ; waves like water figure sometimes at the side of the stool. In other cases Christ is accom¬ panied only by two angels, one on either side, holding censers and in the attitude of prayer. An altar dedicated to the archangel Michael is sometimes found in large churches, above the central doorway, or above the porch where the latter does not exist. Where the fagade boasted two towers we sometimes find one has an altar dedicated to the archangel Gabriel and the other one dedicated to the archangel Raphael. All such holy personages are found nimbed (see Nimbus), as also is the lamb (usually carry¬ ing a cross), when representing Christ cruci¬ fied, and also the dove, when representing

the Holy Spirit. Other subjects of iconography of the period are the Sirena (terminating as a fish), Manicora (human head, globular body, tail of fish), elefans (elephant), and numerous other fantastic creature symbols as shown in the contemporary illustrations of the ˆBestiary® books. Mural painting was successful in the Romanesque period. The walls and vaults were covered with fresco polychrome work. Un¬ fortunately few have escaped the renovator, but the remnants afford some idea of the work done. Some columns were painted red, some capitals green; the vaults were, of course, sky-blue. Proofs survive that often bas-relief figures were painted in a different color to the background, also that clothing was painted and gilded. Scriptural scenes were usual. We find in the church of Saint Savin, in Poitou, de¬ pictions of the Holy History and the Apocalypse, history of Saint Savin and of Saint Cyprian, combat of Saint Michael with the dragon. Other mural paintings are at the churches of Saint Julien at Tours, Notre Dame de Rivieres, near Chinon; at Tavan, near Ile-Bouchard, *etc.* Per¬ spective is absent.

Germany and England. — While France is devoid of Romanesque ecclesiastical buildings, a number still remain in Germany, such as those found in Cologne, Lorsch, Aix-la-Chapelle, Gernrode, Worms, Hildesheim (see Architec¬ ture). In England, Edward the Confessor determined to rebuild Westminster Abbey after Norman style (he had

lived in exile in Nor¬ mandy) and it was finished in 1065. Part of the monastery still exists. There are also other Norman churches in England.

Illuminated Manuscripts. — The manuscripts of the Romanesque period naturally partake of the very numerous motifs found in the Roman¬ esque plastic art. In the luxuriously illumi¬ nated liturgical books are found border and

initial decorative motifs such as palmettes, acanthus leaves, vines, meanders (Grecian key pattern) and wattle work (ˆlacertine®), or combinations of foliage and geometric figures. This complex interlaced work decoration of manuscripts is quite universal, spreading from the Lombard, Merovingian, Carolingian, West¬ ern Gothic manuscript right into the 16th cen¬ tury. Mingled with this involved interlacing is foliation, figures of humans, dogs, fishes, birds, dragons, *etc.* Repeat motifs, true copies of moldings taken from church edifices are often utilized in the manuscripts. The use of architectural motifs includes pillars, capitals, etc., and even extends to the point of absorbing the arch above the pillars. We find also the Oriental horseshoe form of arch in these il¬ luminated works of the period. Pointed arches also appear in these works centuries before in actual use in buildings (Humann). Finally, we have whole sectional views of church inte¬ riors, frequently with active human groups displayed. Among the most beautiful Caro¬ lingian MSS. are the Sacramentary (about 750) in the National Library, Paris; Ada Codex (about 775) in Municipal Library, Treves; Psalter of Dagulfus (about 780) in Imperial Library, Vienna. In Saint Gall, Switzerland, a magnificent collection of illuminated MSS. is in the Abbey and the Town Hall Library. Some of the masterpieces are the Sacramentary of Gelassius (8th century) ; Golden Gospels of Saint Gall (9th century) ; Evangelarium Lon-guin (10th century). Evangeliary of Abbot Angilbert of Centula (about 793) is in Abbe¬ ville; Evangeliary of Saint Medard of Sois̆ons (8th centuiy) is in the National Library, Paris; Alcuin Bible (about 800) is in British Museum as is also the Golden Gospels of Athelstan (about 850).

Altar fronts (antependia) of the richer churches are frequently of gold or silver and made detachable ; magnificent examples are that of Saint Ambrose at Milan; in S. Marco, Venice, Basel Cathedral. (See Altar). The Eucharist was preserved in receptacles shaped like towers or doves either suspended or kept in armoires (cupboards) ; they were very beau¬ tifully enameled and embellished with relief-work. Altars

of the 11th and 12th centuries often were dedicated to several saints and enclosed a number of relics. The credences consisted of niches built into the wall, and are frequently elaborately carved; they are often on the epistle side, sometimes on both sides of the altar. They held the altar vessels, litur¬ gical books, *etc.* The piscina into which the water was poured after washing the chalice, etc., was also sometimes in the wall, at other times it stands on legs free near the altar. Baptismal fonts were mostly of stone, a few being of bronze or of lead. They are more or less tub-shaped; some round, some oval, others quarterfoil. They were frequently carved with bas-reliefs, some with columns. Some fonts are mounted on shafts. A peculiar custom of this period was that of erecting very substan¬ tial towers in the centre of the large ceme¬ teries surmounted by a lantern in which light was burned at night, a species of beacon. In the base of these towers was a truly orientated altar at which mass for the buried was read. Some of the tombs of this period were very large elaborately carved architectural monu-

ments, their sides consisting of arched colon¬ nades ; examples are seen in that of Treves Cathedral erected to Cardinal Ivo (1142), and that of Henry I, Count of Champagne, for¬ merly in the church of Saint Ltienne at Troyes. In the 12th century commenced the practice of carving an effigy of the deceased for the tomb. Of such are those of Richard I (Coeur de Lion), Henpˆ II and his queen at Fontevrault; painting brings out clearly the draperies of their costume. Some tombs are heightened with enameled copper or silver, as those of Henry I, forrnerly at Saint Ltienne at Troyes. Great chandeliers or ˆcrowns of light® were fre¬ quently suspended in the churches of this period, such as those still existing at Hildesheim and Aix-la-Chapelle. See Chandelier; Corona.

Gothic Period. — The Gothic style of archi¬ tecture is frequently termed pointed or ogival, on account of its pointed or ogive arches. (See Architecture). In the 12th century this style is in its transitional stage and, therefore, we find moldings, capitals and column shafts in Romanesque decoration. The groundplans become more and more complex, with numer¬ ous excrescences in the interiors, buttresses, flying buttresses, *etc.* A great change in the treatment of architectural ornament in this style is noticeable. Oriental plant life, chiefly

acanthus, that prevailed during the Byzantine and Romanesque periods, now gives place to motifs taken from the European vegetable kingdom, and conventionalization of such forms ; we now see ivy-leaves, oak-leaves, roses, willows, leaves of the water lily, straw¬ berry plant, ranunculus leaves, and the rounded leaves of the trefoil, conventional violets. Crockets break the continuity of lines on angles or edges, sometimes these crockets terminate in human forms or the heads of animals. ^^Rose® windows take the place of the former ®wheel® windows, and their open spaces are enclosed in cusps or in trilobate piercing. The

Twelfth century arcade work.

human form, facial expression and drapery, by the 13th century, takes on softer and more nat¬ ural depiction. Generally carved out of the architectural stone itself, very salient parts (such as forearms, etc.) are frequently done separately and attached and fastened by iron cramps. Statues are usually placed in re¬

cesses (niches) and are supported on consoles {ctil-de-lampes) an architecturally designed canopy projects over the head; the combina¬ tion is termed a ^^tabernacle.® The stone-carv¬ ing of this period discards former simplicity and becomes very rich and complex. A favo¬ rite subject for treatment is the ®Tree of Jesse®

” Tree of Jesse ” in carved wood, 15th century.

in which by means of the different branches of a tree the descent is portrayed of Christ from the House of David, son of Jesse; this subject is found in numerous cathedrals in stone or stained glass windows. The single dove formerly representing the Holy Spirit is now sometimes pictured multiplied as several (usu¬ ally seven) birds framing or surrounding the image of Christ; the Holy Spirit even takes on human form at times in this period. Of the three archangels (Michael, Gabriel and Raphael), Saint Michael figures most fre¬ quently, often combating the Devil, but in pic¬ tures of the Last Judgment (so often repeated in the tympana of 13th century churches) he is always presented in the act of weighing souls. Another favorite subject is the repre¬ sentation of the synagogue in the form of a woman and the triumphant Christian religion as a crowned person

receiving the blood of Christ in a chalice. Other chosen subjects are: The Four Rivers of Paradise (four overflowing urns); the four Evangelists; the four great prophets; the 12 minor prophets ; the Sibyls; the 12 Apostles with their appropriate symbols ; the virtues and vices; the zodiacal signs (repre¬ senting agricultural work of the seasons), *etc.* In the 14th century the quatrefoil becomes a predominating ornament ; while the former plant life motifs are continued the wild vine leaf is added. From the 14th century the Holy Virgin is pictured standing with the

child in her arms, whereas before she was usually seated, the child resting in her lap. In the 15th century sculptured work becomes more pretentious as to pose and drapery but shows ˆMryness^^ in execution. The ^^Father Eternal®, is frequent, clothed in the costume of the Pope and wearing his tiara. He holds a large crucifix before him, a dove appearing between the head of the Father and summit of the cross ˆ — evidently symbolic of the Trinity. Baptismal fonts assume, for the most part, four pillars as corners, in the 14th century, and, whereas in the 13th and 14th centuries those of octagonal exterior had round interiors, they are in the 15th century given octagonal interiors conforming to the outside form. The fonts of the 15th and 16th century have the basin com¬ posed of two parts, one only to hold water; the custom of infant submersion w'as no longer practised, so the child, placed in the empty sec¬ tion, was sprinkled with water from the other. Some fonts of this period have a form some¬ what resembling a great chalice, the exterior of the basin flares out upward into octagonal cup shape, an octagonal short length of shaft beneath supports the basin on a flaring base. One of these, in Basel Cathedral, is elaborately carved; eight panels disclose biblical subjects in relief, with a border above of foliage, the shaft is pierced with octagons, the base has Gothic mullioned traceries and eight reclining human figures at the corners. Saint Sebald's

Bronze font in St. Sebald's church, Nuremberg (15th century).

church, Nuremberg, has ,a beautifully deco-mted font of circular form, the member serv¬ ing as shaft or support having the full-length figures of the four Evangelists standing equi¬ distant, their feet supported by the base. Some fonts have conical highly decorative covers. Some time after the 14th century jnbe screens appear in churches, higlfl - decorative barriers

separating the nave from the choir and sup¬ porting the rood-loft or gallery. One of the most magnificent is that at Alby, constructed of white stone; other noted ones are at Fol-goat, Brou, Troyes and other

French churches. Some are constructed of carved wood. Until the I5th century but few pulpits are met with, such as those of Strassburg and Freiburg; those of Saint Lo and Vitre (France) are outside the church for outdoor exercises. They have very elaborately carved canopies in architectural de¬ sign. Among the most prominent of the inte¬ rior fittings of the church are the ˆstalls.® They are generally of intricately carved woodwork, and served as seats for the members of the choir. They are separated by arms, and the seats are constructed so as to be turned up during that part of the ceremonies in which the celebrants are in standing posture. Beneath the seat is a flat-topped projection which, when the seat is upturned, serves as a slight rest dur¬ ing prolonged standing. These console-shaped rests are termed ˆmisericordes,® and had, gener¬ ally, carved work of the most grotesque char¬ acter. The backs of the stalls reached high up, to keep off draughts, and were also treated architecturally and had beautiful canopies or hoods. Examples of great beauty exist at Amiens, Saint Martin-des-Bois, Rouen. For some unknown reason, both the monks and lay woodcaryers allowˆed themselves much license in depicting grotesque figures, both human and animal, in uncouth postures, little appropriate to the solemn ceremonial occasions for which they served. Another important piece of church furniture, usually of carved wood, was the lec¬ tern or reading desk. It generally took the form of an eagle whose spread wings acted as support for the book.

Stained Glass Windows. — Up to the Gothic period the painted mural decoration required a fairly strong light, and that colorless as pos¬ sible, for its appreciation ; therefore stained glass was not in over-frequent use. Now, how¬ ever, the talents of the artist in glass work come into full use. Stained glass in windows from the 13th century and for a long time thereafter were of medallion form, such as quarterfoil, lozenge, circular, elliptic, etc., sym¬ metrically disposed over a ground of mosaic, with borders of strapwork, crockets of foliage. Green, red and blue predominated, yellow, brown, etc., being used sparingly. ˆGrisaille® decoration also appears (this is a pattern of gray or black strapwork, on white). The fashion spread rapidly and human figures soon were the usual motifs; bishops, abbots, barons and knights who were the donors were com¬ monly depicted, their appended names acting, at the present day, as date, authentications. Stained glass windows dating from the later centuries are, of course, the more common ; and the date of production is the easier of verifica¬ tion from the fact that much of the detail is given over to architectural decoration, which changes as the Gothic periods advanced from primitive or (Early), Pointed (or pure), to Florid (or Flamboyant). Fine examples are the follow¬ ing: Of the 13th century

(Early (Gothic), those at Chartres Cathedral; those in the cathedrals of Le Mans, Bonrges. Poitiers, Rouen, Chalons-sur-Marne, Angers, Laon, Coutances, Beauvais, Rheims, Sens, Tours, Auxerre, Troyes, Amiensˆ Notre Dame de Semur, Sainte Chapelle and

Notre Dame, in Paris; the Becket windows in Canterbury Cathedral and those of York, Lin¬ coln and Salisbury. Of 14th century (or mid¬ dle Gothic), are those in Gloucester Cathedral, Tewkesbury Abbey, Merton Chapel and Saint Michaels (both in Oxford), in the churches at Willesborough, Selling, Chartham, in York Minster, cathedrals of Bristol, Exeter, Wells, Hereford, Lincoln, Ely, all in England. In France are windows of that century in the cathedrals of Evreux, Sees, Beauvais, Nantes, Narbonne, Toulouse, *etc.* In Germany are those at the cathedrals of Cologne, Strassburg, Regensburg, Augsburg, Erfurt, *etc.* In Italy are examples in the cathedral of Saint Francis of Assisi, and Santa Croce and Maria Novella in Florence, *etc.* Of the 15th century (or Late Gothic) specimens of note are those in the Minster, All Saints, Saint Michael's, Saint Martin-le-Grand, all in York; in Winchester Cathedral ; Saint Stephen's Chapel, Westmin¬ ster (London) ; Saint George's, Windsor; and in many county churches. In France are those in Rouen Cathedral, Le Mans Cathedral, Lady Chapel of Evreux Cathedral, Bourges Cathe¬ dral, church of Saint Severin, Paris. In Ger¬ many they are found in the cathedrals of Munich and Ulm and Saint Lorenz at Nuremberg.

Paintings and Sculptures. — Niccola Pisano, who founded the Pisano school, did the sculp¬ tured ˆDeposition® at the cathedral of Lucca (1233), then the pulpits of the Baptistery at Pisa and the cathedral at Siena ; the shrine (area) of Saint Domenic at Bologna. Ar¬ nolfo, Niccola's pupil, did the Gothic ciborium at S. Paolo fuori le Mura, Rome (1285) ; Gio¬ vanni Pisano did the marble shrine of S. Donato in the cathedral of Arezzo, the pulpit of Pistoja Cathedral (1301) and that at Pisa Cathedral. Andrea Pisano did the bronze doors of the Baptistery of Florence (now removed and replaced by Ghiberti's ˆGate of Paradiseˆ) and many bas-reliefs on the Campanile. Or¬ cagna started the shrine of the Madonna of Orsanmichaele, to be finished by Ugolino. Agostino and Agnolo of Pisano did the tomb of Guido Tarlati, bishop of Arezzoˆ (in the cathedral) in 1330. Pietro de Stefani did the Gothic altar of Minutoli, Naples. Andrea Cic-cione created the Gothic tombs of Ladislas of Hungary (1414) and of Ser Gianni Caraccio, both at S. Giovanni a Carbonara. _ Giotto did the mosaic in the Navicella di

S. Pietro, Rome, painted the wall decorations in the chapel (Bargello) at Florence (ˆHistory of St. Mary Mag¬ dalenˆ), also the frescos in the chapel of the Arena, Padua, 28 large frescoes in the Assisi Upper Church and five in the Lower Church; ˆCoronation of the Virginˆ in S. Croce, Flor¬ ence; ˆ Agony in the Gardenˆ in the Uffizi gal¬ lery; the crucifix in the chapel of the Ognissanti, *etc.* (d. 1337). Pietro Cavallini, of Rome (1259-1334), did the ˆ Crucifixion > in Lower (Thurch of Assisi ; Taddeo Gaddi created the frescoes in the chapterhouse of S. Maria Novella (now Capella degli Spagnuoli) and others in the southern sacristy of the S. Croce. Giovanni di Milano did the great altar-piece in Ognissanti, as well as the frescoes (about 1371). Duccio di Buonensegna (1310) painted the cathedral altar at Siena; Simon de Memmo, in 1332, started painting fresco in

chapterhouse of S. Spirito, Florence, in 1333 did the L\nnunciationˆ for Siena Cathedral (now in Uffizi palace) assisted by Lippo di Memmo; in 1317 he did the fresco Madonna in Sala dei Consegli, S. Gimignano. Pietro and Ambrogio di Lorenzo flourished middle of the 14th century; the former did the ˆFathers of the, Desertˆ fresco in Campo Santo, Pisa, and Ambrogio did the allegorical frescoes of the Sala delle Balestre (Palazzo Pubblico). Taddeo di Bartolo did the painting in the chapel of the Palazzo Pubblico (1414).

Bells. — Pope John IX, about 900, ordered bells to be used in churches. Early so-called ˆˆTheophilus® bells are in Augsburg Cathedral, Halberstadt, *etc.* That at Erfurt dated 1497 weighs 13 tons 15 cwt. The greatest bell, called ˆUzar Rotokol,® at Moscow, was cast in 1736, but fell to the ground and broke in 1737 ; it serves as a chapel. The weight is about 193 tons. But most of the very large bells are for

Bell now in the church of St. Pierre at Gaillac (France),

dated 1499.

municipal or other civil, not ecclesiastical, pur¬ poses. An interesting 15th century bell is that to-day in the church of Saint Pierre at Gaillac, but formerly in Candeil Abbey (France). Its upper inscription is in beautiful Gothic letters, nearly two inches high, starting with a Paschal lamb in bas-relief and above it a cross pattee in a circle ; the second inscription is in smaller letters, also Gothic. In the middle of

the body is the monogram of Christ (IHS) encircled by 14 flames.

Manuscripts. — Of illuminated manuscripts of this period the most noted German Gothic are; The Salzburg Missal (about 1350) in Munich Royal Library ; Passionate of Abbess Cunigunde (1312) in University Library, Prague ; Orationale (same date) in same librar>^; Bible of Emperor Wenzel in Imperial Library, Vienna; Gospels of John of Oppavia (1368) in same library; Wurzburg Bible (about 1400) in British Museum; Missal of Emperor Frederick III (1448) in Imperial Library, Vienna; Gos¬ pels (1498) in Public Library, Nuremberg; Choir Book of SS. Ulrich and Afra, Augsburg

(1489), in Augsburg Library; Prayer Books of Albert of Brandenburg, William IV of Bavaria; Horae (late 16th century) in British Museum. Anglo-French works are Psalter of Queen Inge-burga (1193-1236) in National Library, Paris; Psalter of Queen Blanche (about 1220) in

Ambone (pulpit) in Ravenna. (A — Epistle side,

B — Evangel side).

Arsenal Library, Paris ; Psalter of Saint Louis (about 1250) in National Library, Paris. Eng¬ lish illustrated manuscripts of note are Alfonso Psalter (done in Blackfriars, London, about 1284) in British Museum; Ormsley Psalter (about 1295) in Bodleian Library, Oxford; Hours of John, Duke of Berry (1380) in Brus¬ sels Royal Library; Bedford Breviary (about 1430) inˆNational Library, Paris.

Renaissance Period. — The discovery of the manuscripts of Vitruvius, the work of Alberti and of Brunnelleschi and other Italian archi¬ tects together with other influences brought into favor a revival of the Classic antique in art. It really meant the rebirth of Paganism in Christendom, and as such the ecclesiastic world accepted few religious structures to be so built in the 15th century; in fact, even in the I7th century Gothic architecture was employed largely in church construction, though civil buildings were erected in the new style. As to church plans, they will be found treated in the article Architecture. Concerning orna¬ ment in the places of worship, the most lovely stone carving was done on designs of the great¬ est delicacy and perfect artistic character. Panels and friezes, pilasters and other architectural members were all covered with a profusion of decoration in animal and vegetable motifs in conventional form scrolled and interlacing in capricious but entrancing beauty. They are the Mohammedan Arab conceptions transferred to Italian art ideals and termed by them arabesques. They have not the slightest tend¬ ency to the canons of ecclesiology, nor do they touch upon Biblical lore. The 16th century pul¬ pit in Basel, Switzerland (see illustration), af¬ fords a good conception of the blending of Gothic cusps, flamboyant traceries, quatrefoils. etc., into a Renaissance adaptation for a beauti¬ ful piece of church furniture. The arts of painting and sculpture of this period are repre¬ sented by such transcendent genius as that of Raphael and

Michelangelo. But such art sub¬ jects are treated in other articles as painting, sculpture, *etc.* ; they scarcely belong to the present topic. For further special church equin-ment see Altar, Basilica; Ghalice; Crosses

AND Crucifixes; Corona; Chandelier; Cathe¬ drals AND Churches; (Jostume, Ecclesiasti¬ cal; Goldsmithing.

Bibliography. — Armengaud, J. G. D., ˆLes chefs-d'oeuvre de I'art chretienˆ (Paris 1858) ; Barr, J., ˆAnglican Church Architecture, with some Remarks on Ecclesiastical Furnitureˆ (Oxford 1846) ; Bertaux, E., ˆL'Art religieux de la fin du moyenageˆ (in Gazette des Beaux Arts, Paris 1909) ; Biirckner, ˆGeschichte der kirchlichen Kunstˆ (Freiburg im Breisgau 1902) ; Bushnell, A. J., de Havilland, ˆStoried Windowsˆ (London 1914) ; Cox, J. C., and Har¬ vey, A., ˆEnglish Church Furnitureˆ (London 1907) ; Cutts, E. L., ˆHistory of Early Chris¬ tian Artˆ (London 1893) ; Cahier, C., and Mar¬ tin, A., ˆMelanges d'archeologie (Paris 1847-49); Day, L. F., ˆWindows; a Book about Stained and Painted Glassˆ (London 1897) ; Didron, A. N., Hconographie chretienneˆ (Paris 1843) ; Diehl, C., ˆManuel d'Art byzantinˆ (Paris 1910) ; Detzel, H., ˆChristliche Icono¬ graphies (Freiburg im Breisgau 1894-96) ; De Caumont, M. A., ˆArchitecture religieuseS (Caen 1870) ; Frantz, E., ˆGeschichte der christlichen Malereiˆ (Freiburg im Breisgau 1887-94); Gonse, L., ˆL'Art gothique ; I'architecture, la peinture, la sculpture, le decorˆ (Paris 1890) ; Gradmann, ˆGeschichte der christlichen Kunsts (Stuttgart 1902) ; Humann, G., ˆDie Beziehun-gen der Handschriftsornamentik zur romanischen BaukunsD (Strassburg 1907) ; Jackson, T. G., ˆByzantine and Romanesque Architec¬ tures (Cambridge 1913) ; Kinkel, J. G., <Geschichte der bildenden Kiinste bei den christ¬ lichen Volkerns (Bonn 1845) ; Kraus, F. X., ˆGeschichte der christlichen Kunsts (Frei¬ burg im Breisgau 1896-1908) ; Lethaby, W. R., ˆEarly Christian Arts (Cambridge 1911) ; Lind¬ say, Lord, ˆSketches of the History of Chris¬ tian Arts (London 1847) ; Luebke, Dr. W., Worschule zum Studium der kirchlichen Kunst desˆ MittelaltersS (Leipzig 1866) ; id., ˆEcclesiastical Art in Germany in the Middle Agess (transl., Edinburgh 1876) ; Muentz, E.,

Choir -stall, 15th century.

ˆfitudes sur I’histoire de la peinture et de I’iconographie chretienneS (Paris 1886) ; Passa-vant, J. D., <DIe chrlstllche Kunst in SpanienS (Leipzig 1853); Poole, G. A., ˆChurches; their Structure, Arrangement and Decorations (Lon¬ don 1850) ; Rio A. F., ˆDe I’Art chretien.s

(Paris 186(>-67) ; Texier, M. TAbbe, ˆDictionnaire de I’orfevrerie, de gravure, et de la ci-selure chretienneˆ (Paris 1857) ; Tyrwhitt, Rev. R. St. J., ˆGreek and Gothic Progress and De¬ cay in the Three Arts of Architecture, Sculp¬ ture and Paintingˆ (London 1881) ; Weale, J., ˆ Works of Early Masters in Christian Decora¬ tionˆ (London 1846).

Clement W. Coumbe.

ECCLESIASTICAL COMMISSIONERS, for England, are a body corporate with a com¬ mon seal, perpetual succession and power to hold real estate, constituted by acts 6 and 7, Will. IV, chap. Ixxvii, 3 and 4 Viet. chap, cxiii and 13 and 14 Viet. chap. xciv. It consists of all the bishops of the Church of England, the deans of Canterbury, Saint Paul’s and West¬ minster; the chief justices, five cabinet minis¬ ters and other legal dignitaries and 12 lay members appointed by the Crown and the arch¬ bishop of Canterbury. This body has exten¬ sive powers in regard to the organization of churches, the distribution of episcopal duties, revenues, *etc.* The schemes adopted by the commission, on being laid before the king in council, approved* of and gazetted, acquire the force of acts of Parliament. They derive their revenue from an endowment furnished by the wealthiest sees. Consult Whitehead, ˆChurch Lawˆ (London 1892).

ECCLESIASTICAL COSTUMES. See

Costume, Ecclesiastical.

ECCLESIASTICAL CROSSES. See

Crosses and Crucifixes.

ECCLESIASTICAL TITLES ASSUMP¬ TION ACT, a law of the British Parliament, enacted in 1850 (14 and 15 Viet. chap. 60) to prohibit, under penalty, the assumption of eccle¬ siastical titles (for example: Archbishop of Westminster, bishop of Clifton, dean of Shef¬ field) by any persons not duly appointed to such stations according to the laws of the realm touching the Church establishment. There was already in the statute book a law of 10 Geo. IV, chap. 7, which provided that any person who should assume or use the name, style or title of archbishop of any existing ecclesiastical province, or bishop of any existing diocese, or dean of any existing deanery of the Established Church of Great Britain and Ireland, the same not having due legal right to such name, etc., should for each violation of the act forfeit £100. But in the year 1850 Pope Pius IX, _ by apostolic brief, instituted an ˆ ecclesiastical province or archbishopric comprising all Eng¬ land and Wales, with Nicholas Wiseman (after¬ ward cardinal) as archbishop, with the style and title of archbishop of Westminster and with 12 suffragan bishops presiding over dioceses named : Beverley, Birmingham, Clifton, Hex¬ ham, Liverpool, Newport and Menevia, North¬ ampton, Nottingham, Plymouth, Salford, Shrewsbury and Southwark; none of these towns was then the see of any bishop of the Established Church; and therefore the prohi¬ bition of the statute of George IV did not apply. But the announcement of the setting up of these Roman Catholic dioceses provoked a fierce anti-popery agitation and the Prime Minister, Lord John Russell, introduced in the Parlia¬ ment a bill, which was speedily passed, extend¬ ing the penalty of the act of George IV to per¬

sons who should assume the titles archbishop, bishop or dean ˆ‘in respect of any places within the United Kingdom.® The new dignitaries ig¬ nored the act, assumed their titles, braved pros¬ ecution and not one of them was’ ever called into court for contumacy. After the act had stood on the statute book as the law of the realm during 20 years it was amended by the act of 34 and 35 Viet. chap. 53. The penalty was dropped, but the so-called repealing act re¬ cited again the legal grounds for the penal en¬ actment and declares that ˆˆno ecclesiastical title of honor or dignity derived from any see, province, diocese or deanery recognized by law, or from any city, town, place or territory, within the realm can be validly created® ; and that *no pre-eminence or coercive power can be conferred otherwise than under the authority of Her Majesty®; decisions of law that had never been impugned in England since the time of Henry VIH.

ECCLESIASTICUS. One of the deutero-canonical books of the Old Testament. It is found in the Greek Bible and its daughter-versions, in the Latin Vulgate, and in Syriac manuscripts, and recognized as a part of the canon of the Roman Catholic and the Oriental churches, but not included in that of the Palestinian Jews, and therefore counted as apocryphal by Jerome and other Church fathers as well as by the Protestants, and with¬ drawn from public use in the Greek Orthodox churches of Russia, Serbia and Bulgaria. The title is a Jransliteration of the Greek ekklesias-tikos which is the superscription in Cod. 248. It has been plausibly explained, on the basis of a statement by Rufinus, as derived from the custom of referring to books used in the Church, but not in the synagogue, as libri ecclesiastici, or ^^ecclesiastical reading-books,® this designation attaching itself permanently to the one especially employed in the moral instruction of the catechumens. In the Greek Bible it is called ®The Wisdom of Jesus son of Sirach® or ®The Wisdom of Sirach® ; Clement of Alexandria and others speak of it as ^^The Pedagogue® or ®The Teacher of all the Virtues® (Panaretos) . From the prologue to the Greek translation we learn that it was originally written in Hebrew. Jerome states, in his preface to the Solomonic books, that he found a Hebrew copy of Ecclesiasticus, united in one volume with Canticles and Ecclesiastes, entitled ˆProverbs.® Rabbis of the Talmudic period frequently refer to it under this title, or as ^^The Wisdom of Ben, Sira,® or simply as ®Ben Sira.® About 80 quotations, many of them from the Babylonian Talmud, five from the Palestinian Talmud and a number from other Jewish sources down to the 11th century, have been gathered. Not infrequently it is quoted as ˆScripture,® showing that, in spite of its exclusion from the Palestinian canon, it still had some sort of recognition, especially in Babylonia, similar to that which it enjoyed in the Church. Saadia the Gaon, who quoted the book, knew of copies provided with vowel-points and accents like the biblical books. Too much must not be inferred from this, how¬ ever, as he alludes to other writings similarly treated and mentions it in defense of having thus pointed one of his own books. As late as in the 11th century the Hebrew text was known

to Nissim ben Jacob of Kairawan who spread in the West the traditions of Sura. The so-called ˆAlphabet of Ben Sira/ˆ translated by Fagius and published with a commentary by Drusius, is only in part composed of genuine quotations from the book. For many centuries neither Jews nor Christians had any further knowl¬ edge of the Hebrew original ; and some scholars ventured the opinion that the passages quoted had been translated from the Greek or the Syriac.

The recovery of extensive portions of the lost Hebrew text between 1896 and 1900 was, therefore, as unexpected as it was welcome. Fragments of four manuscripts, covering ap¬ proximately two-thirds of the work, were dis¬ covered. Though the first leaf was brought from Palestine by Mrs. Agnes Lewis Smith, the discovery is rightly connected with the name of Solomon Schechter who surmised whence it came, gained permission to examine the geniza, or ˆˆhiding-place® for wornout copies of the Scripture and books not approved for public use, in the synagogue at Cairo, car¬ ried to Cambridge a large part of its contents, and identified most of the leaves. The manu¬ scripts seem to come from the llfh and 12th centuries. It is of considerable value that they occasionally overlap, so that in some cases two, for four verses three, are available, especially as they have the appearance of exhibiting to some extent two different recensions of the text. On the other hand, it is to be regretted that so many parts are still missing. Among these is the fine poetic description of wisdom in chap, xxiv, the Hebrew text of which was conjecturally restored by Lowth and Fritzsche; of chap. 1, Fritzsche's -translation can now be compared with the original, and the measure of success and failure is highly instructive. The contention of Margoliouth that the dis¬ covered manuscripts represent a translation from the • Greek made by a Persian Jew slightly acquainted with the Syriac version has not commended itself to other scholars. But though they are, no doubt, descendants of the Hebrew original, they are late copies and have manifestly suffered much in transmission. It is not inconceivable that some changes and additions may be due to a version but it is more likely that they originated in a second recension of the Hebrew text be¬ fore the Syriac translation was made. The Persian glosses in the margin of one manu¬ script only indicate the home or nativity of the copyist.

For some partsˆ we are still wholly depend¬ ent upon the versions ;

and the earliest Greek translation remains our oldest testimony to the original text of the whole book. It is possible to show that the translator had insufficient knowledge of both Hebrew and Greek, a failing he shared with other translators of biblical books, but there is less reason for charging him with negligence or arbitrariness than for crediting him with quite unusual efforts to master the Greek language and to acquire a distinct literary quality. Nor should it be for¬ gotten that we are far from having an auto¬ graph copy of his work. It can only be ap¬ proximately restored by a critical use of the Greek manuscripts, such versions as the Old Latin, Coptic, Ethiopic, Armenian, Syro-Hexa- plaric and Old Slavonic, and patristic quota¬

tions. When this material is closely examined, three peculiarities come to view that dcmmid an explanation. All extant Greek manuscripts (including Cod. 248, as Ryssel and Bollig have verified), as well as the Coptic, Ethiopic, Armenian and Syro-Hexaplaric, have suffered from a dislocation of xxxiii, 13 be; xxxiv, 1-xxxvi 16a from their original place between XXX, 24 and xxx, 25 ; while the Old Latin and the Old Slavonic (probably influenced by the Latin Vulgate) have preserved the order ex¬ hibited in the Hebrew and the Syriac Peshita. A number of Greek minuscles headed by Cod. 248, printed in the Complutensian Polyglot, the Old Latin, and quotations in Clement of Alex¬ andria and Chrysostomus present a longer text, while the uncial codices and another group of minuscles are free from these additions. Yet in some other respects the former group comes much nearer to the original than the latter, Ndldeke first suggested, and Smend, Hart and Oesterley have developed, a theory that may explain these remarkable facts. It is supposed that a second Greek translation was made, pos¬ sibly in the 1st century a.d., based on the earlier version, but containing also a consider¬ able number of additions freshly translated from the second, expanded edition of the He¬ brew text. This would account for the presence of these additions both in the Old Latin and in the manuscripts and versions having the dislocation. The manuscript in which two layers of 160 stichi were put in a wrong place would be later than the Old Latin, and of such authority as to affect all subsequent copies. It may be surmised that it was Origen's, and that he allowed the additions to stand, though indicating with his usual sign that he did not regard them as belonging to the original He¬ brew text. In the uncials and a group of minuscles they were not copied in deference to his direction ; ˆ in other manuscripts his sign was wholly disregarded. The relative excel¬ lence of Cod. 248 in other respects would be due to some good codex from which it was copied.

Concerning the date of the first translation we are unusually well informed. In his preface the translator tells us that he came to Egypt in the 38th year of King Euergetes. Ptolemy HI Euergetes cannot be meant, for he reigned only 26 years (247-221 b.c.). Ptolemy IX Euergetes came upon the throne in 170 b.c., and though his reign was twice interrupted, he counted his regnal years from the original ac¬ cession. There is nothing peculiar about the phrase that is used, as it is found elsewhere in the Greek Bible and in Egyptian papyri of the time, and the objection of Hart that, on ac¬ count of this king's hostility to foreigners, no Jew would be likely to emigrate to Egypt in his reign is not of sufficient weight to throw doubt upon the national import of the state¬ ment. It was consequently in 132 b.c. that the translator arrived in Egypt, His sojourn there had ˆsynchronized® with the remainder of Euergetes reign, when he *found a book of no little learning® or a work similar to the biblical books that had been translated which seemed to him of no small pedagogic value. It ap¬ pears, therefore, that it was in the time of Ptolemy X Philometor, called Lathyrus (117-108 B.C.), that he undertook to translate this book which he ascribed to his grandfather,

into Greek, fully realizing the difficulties of such a task. His preface is invaluable as a means of determining approximately the date of the original work, and also because it shows that in the time of John Hyreanus (134-104 B.c.) not only the Law, but also some prophets and other religious books had been rendered into Greek. His description of his grand¬ father's intention to write a book of the same kind as those he had mentioned, and calculated to serve the same end, and his own manifest purpose to give his translation a place among the books revered by his countrymen in Egypt, throw an interesting light on the slow development of the idea of a canon. In the Complutensian Polyglot another preface of an unknown author was printed. As substantially the same text has been found in the synopsis of biblical books wrongly ascribed to Athana¬ sius, it has been supposed that it was taken from this source. But the reverse is also pos¬ sible. It is of uncertain age. The translator's name may have been Jesus, and his grand¬ father's work may to some extent have been a compilation, but the statements in this preface have no evidential value. The Old Latin was not made from the Hebrew, as Sabatier and Bengel attempted to prove. In this version, chaps, xliv-li were not translated by the same man, or in the same country, as the first part of the book. This section is not found in the Armenian version ; and there are other indi¬ cations that it once circulated separately. That the Syriac was made from the Hebrew was already suggested by Cornelius a Lapide and seen more clearly by Bendtsen in 1789; but Bickell and Smend have recognized that it has frequently been corrected with the aid of the Greek. The order of the text in the Old Slavonic renders it probable that this transla¬ tion has been corrected with the assistance of the Latin Vulgate. This version itself repre¬ sents only the Old Latin, since Jerome con¬ fesses that he ®spared^^ his pen when he came to Ecclesiasticus. The Arabic ˆ version was translated from the Syriac Peshita.

The first translator distinctly states that his grandfather's name was Jesus. He prob¬ ably also wrote the superscription designating the work as ®The Wisdom of Jesus, son of Sirach.^^ Before the Hebrew text was dis¬ covered, it had been inferred from 1, 27 that Jesus was

the son of Eleazar, and that Ben Sira was the family name. The Syriac read¬ ing in this passage: *Jesus, son of Simeon Bar Sira® was puzzling, and even more so Saadia's reference to the author as ˆSimeon, son of Jesus, son of Eleazar Ben Sira.® But the lat¬ ter is precisely what we find three times m the Hebrew text (1, 27; li, 30 a b). Most inter¬ preters explain ˆˆSimeon, son of® as due to the carelessness of a copyist who, having Simeon on his mind since he wrote 1, 1, absentmindedly inserted the words three times in the colo¬ phons before the name of the author of the book, and some editors have had such confi¬ dence in this explanation that they have sim¬ ply removed the name of Simeon frorn the Hebrew text. On the other hand, Schmidt in 1903 proposed to accept the statement in the colophons on the assumption that it referred solely to the Praise of Famous Men (xliv-1) which may have circulated separately at an early time in Palestine as it did afterward

elsewhere and may have been written by Simeon a generation later than the original work composed by his father, Jesus Ben Sira. He was confirmed in this view by the very close correspondence between the description of Simon the high-priest in 1, 1 ff. and that of Simon, the Hasmonaean high-priest, in 1 Macc. xiii-xiv. The achievements of the former are also recorded of the latter, and the language used is strikingly similar. Simon is called in Ecclesiasticus ˆ'the greatest of his brothers, the glory of his people® (cp. 1 Macc. xiv, 4, 5, 26, 29) ; in his days ˆHhe house was glorified® (cp. 1 Macc. xiv, 15) and ˆˆthe temple was forti¬ fied® (cp. 1 Macc. xiii, 52) ; ˆHhe wall was built® (cp. 1 Macc. xiv, 37) and 'ˆthe battle¬ ments of the fortress on the temple hill were constructed® (cp. 1 Macc. xiii, 52) ; '4ie cared for his people against the spoiler® (cp. 1 Macc. xiv, 4) and ˆfortified his city against the enemy® (cp. 1 Macc. xiii, 33; xiv, 37) ; and he was entitled to wear ®robes of honor® and ˆVestments of beauty® more glorious than those of his predecessors (cp. 1 Macc. xiv, 43, 44). If Simon the Hasmonaean is meant, the closing prayer for the preservation of the high-priesthood in his family and the refer¬ ence to the promise given to Phinehas are significant. The priests and the people had made Simon's pontificate hereditary (1 Macc. xiv, 41). But a high-priest marching sword in hand against the enemy was a new type that had to be justified by the example of Phinehas (Num. xxv, 6). The promise of an everlasting priesthood as a reward for such zeal helped to legitimatize the new pontifical family, and the emphasis shifted for a while from Aaron and Zadok to Phinehas (1 Macc. ii, 26; Ps. evi, 30). The Hebrew text in xiv, 24 ff. even suggests that the pact with Phinehas included also the covenant with David, consequently

such a union of princely and high-priestly dignity as was first ac¬ corded to Simon the Hasmonaean. Against this interpretation it may be urged that this Simon was the son of Mattathias, son of Johanan, while the Simon of chap. 1 is, accord¬ ing to the Hebrew text, son of Johanan (Greek Onias). But the Syriac has Nethaniah, and in the Ethiopic the father's name is not given at all. The original may have read only ®Simon, the high-priest.® Scholars generally, however, have identified him either with Simon I, who is supposed to be a contemporary of Ptolemy I, or with Simon II, who lived in the time of Antiochus III. The former has, as a rule, been identified with Simon the Just, and it has been thought that he may have repaired the temple and built some wall destroyed by Ptolemy I. Of this there is no evidence, and a man who came to Egypt in 132 b.c. cannot have had a grandfather who lived in the be¬ ginning of the 3d century b.c. Simon II may indeed have been a contemporary of Jesus Ben Sira. Josephus (ˆAntiquities,ˆ xii, 138 ff.) quotes a letter from Antiochus Hi to Ptolemy V, in which he informs hitn that he is re¬ solved to confer certain gifts on the Jews for sacrifices and repairs of the temple, and to exempt them from certain taxes. But he does not even suggest that these promises were ever kept, and makes no mention of Simon in con¬ nection with them. Gratz deemed it impossi¬ ble that this ˆ'Law-despising Hellenist® could

have been the object of so much praise; but some scholars have recently denied the exist¬ ence of Simon I, and maintained that Simon II earned by the deeds recorded in Ecclesiasticus the surname of *the Just.ˆˆ In reality Simon the Just is a very shadowy figure. The Talmudic statements concerning him are so con¬ tradictory and mixed with obvious legends as to be wholly unverifiable. Grotius supposed that chap, li was written by the grandson of Jesus Ben Sira; and the colophon at the end of chap. 1 certainly indicates that it is a later addition; but as it exists in the Hebrew, it is more likely to come from some earlier owner of the manuscript. The hymn interpolated after vs. 13 may have been written much later. Gal-met and others have been struck by the ap¬ parent allusions in ch. xxxvi to the persecu¬ tions of

the Maccabaean period ; they may have come from the hand of Simeon. That the work of Jesus Ben Sira, probably com¬ pleted about 175 B.C., had received more or less extensive interpolations when it was found by his grandson in Egypt, is now widely recog¬ nized. It was suggested in the second preface that the book was a compilation, and this view has been held by many scholars. It is sup¬ ported by the analogy of Proverbs, Gfrorer maintained that ch. xxiv was copied by the author in Egypt. Ewald thought that only one of the three parts into which he divided the book was written by Jesus Ben Sira, Some sections have the appearance of being anthol¬ ogies of gnomic sayings. They may have been taken from the lips of the people, heard in the conversation of sages, remembered from earlier reading, or copied from manuscripts; but the author undoubtedly wrote much himself, and his work became impressed with his own view of the world. Lowth recognized its poetic character, and its metrical structure has been recently studied by Bickell, Schloegl, Peters and others. Jesus Ben Sira was a diligent student of the older biblical books. He was well acquainted with Proverbs and Job, but apparently not with Ecclesiastes. His theo¬ logical views are substantially those of the Sadducees. He has no place for angels. Those mentioned in Job xxxiii, 26, 2 Kings xix, 35, and Deuteronomy xxxii, 8, become, in his rationalistic interpretation, respectively a physi¬ cian, a plague, and a ruler. He recognizes no devil or demons. He thinks that ˆMivinations, soothsayings, and dreams are vain® (xxxiv, 5). He indulges in no speculations as to the future ; he has no Messianic hope. He is con¬ vinced that *the son of man is not immortal.® In his conception of God, his wisdom revealed in all his works, his goodness that leads to re¬ pentance, and his fatherhood are emphasized. In xliv-1 an interest in the pomp of the cult, and an enthusiastic loyalty to the high-priest-hood, manifest themselves that are not seen elsewhere in the book. The author of these chapters probably lived to see a most glorious high-priest through whom the promises to David had also been fulfilled. Ecclesiasticus is the most complete textbook on morals pre¬ served to us from Hebrew antiquity. It teaches a man how to govern his wife, his children and his slaves ; how to deal with his friends and his foes, his superiors and his in¬ feriors, his creditors and his debtors, the rich

and the poor; how to behave at the banqueting table and in the house of mourning, in the temple and in the market-place; how to control his passions, practise moderation, cultivate nobler tastes, emulate the example and seek the company of the wise. His moral philoso¬ phy is utilitarian and individualistic. The mo¬ tive is the happiness a certain

line of conduct will bring, while the welfare of others is not urged as a consideration. He lays down rules rather than principles, and his work is a noble attempt to commend to the young a righteous and well-ordered life.

Bibliography. — The commentaries of Vener¬ able Bede, Rhabanus Maurus, Lyranus; Jansenius of Gand, Camerarius, Palacios of Salazar, Hoeschel, Drusius, de Pina, a Lapide, Grotius, Calmet, Bretschneider, and especially Fritzsche, O, F., ˆDie Weisheit Jesus Sirach'sˆ (1859) ; Reuss, E., ˆL'Ecclesiastiqueˆ (1878) ; Bissell, A., ˆThe Apocryphaˆ (18ˆ) ; Lesetre, P,, ˆL'Ecclesiastiqueˆ (1880) ; Edersheim, A., ˆThe Apocryphaˆ (1888) ; Zockler, O., ˆDie Apokryphen des Alten Testamentesˆ (1891) ; Levi, I., ˆL'Ecclesiastiqueˆ (1898-1901) ; Rys-sel, V., in ˆApokryphen des Alten Testamentesˆ (1900) ; Knabenbauer, J., ˆCommentarius in Ecclesiasticumˆ (1902) ; Peters, N., ˆDer jiingst wiederaufgefundene Hebraische Text des Buches Ecclesiasticusˆ (1902) ; Schmidt, N., ˆEcclesiasticusˆ (1903) ; Smend,

R. , ˆDie Weisheit des Jesus Sirachˆ (1906-07) ; Oesterley, W. O, E,, ˆEcclesiasticusˆ (1912) ; Box, G. H,, and Oesterley, W, O. E., ˆSirachˆ in Charles, R. H., ˆThe Apocrypha and Pseud-epigrapha of the Old Testamentˆ (1913). The introductions by Jahn, Eichhorn, Bertholdt, De Wette, Herbst-Welte, Glaire, Konig, Vatke, Comely, Kaulen, Bertholet, Gigot. Bendtsen, B., ˆSpecimen exercitationum in V, T. libris apocryphisˆ (1789) ; Gfrorer, A., ˆPhiloˆ (1831) ; Ewald, H., in Jahrbiicher fiir die bihlische wissenschaft (1864) ; Gratz, H., in Frankel's Monatsschrift (1872); Cowley, P,., and Neubauer, A., ˆThe Original Hebrew of a Portion of Ecclesiasticusˆ (1897) ; Schechter,

S. , and Taylor, C., ˆThe Wisdom of Ben Siraˆ (1899) ; Herkenne, H., ˆDe Veteris Latini Ecclesiastic! capitibus i-xliii > (1899) ; Noldeke,

T. , in Zeitschrift fu alttestamentliche Wissen¬ schaft (1900); Hart, J. H. A., ˆEcclesiasticusˆ (1909) ; Buttenwieser, M., in Journal of Biblical Literature (1917).

Nathaniel Schmidt,

Professor of Semitic Languages and Litera¬ tures, Cornell University.

ECCLESIOLOGY, the science of the Church as an organized society, a branch of knowledge which deals with ecclesiastical an¬ tiquities, buildings, rites, vestments, organiza¬ tion, principal features and divisions.

EGGLESTON, Samuel, American Roman Catholic prelate; b. Kent

County, Md., 27 June 1801 ; d. Georgetown, D. C., 21 April 1851. He was educated in Saint Mary's (College, Balti¬ more, and ordained to the priesthood of the Roman Catholic Church 1825. He subsequently served Saint Mary's College as vice-president and president; became archbishop of Baltimore in 1834;ˆ and established the College of Saint Charles in 1850. He was president of five pro¬ vincial councils and inaugurated the movement which resulted in the laws for the transmis-

sion of church property from a bishop to his successor and for the excommunication of any Roman Catholic who, after being divorced by the State, should marry again.

ECDYSIS, the process of casting the skin (see Molting). The term is used mainly in reference to the exuviation of the pupa of in¬ sects and of the outer cuticle of lower inverte¬ brates, as crabs.

ECHARD, or EACHARD, Laurence,

English clergyman and historian : b. Barsham, Suffolk, 1670 (?); d. Lincoln, 16 Aug. 1730. His ˆHistory of England from the First En¬ trance of Julius Caesar and the Romans to the End of the Reign of James the First ˆ (1707) contains a wealth of information, including the particulars of Cromwell's interview with the Devil on the morning of the battle of Wor¬ cester. Other historical and scholarly works increased his reputation.

ECHEGARAY, Jose, ho-sa' a-chalga-ra'e, Spanish dramatist : b. Madrid, March 1833. He is author of several treatises on mechanics and civil engineering, and was for a time Minister of Commerce and of Public Instruction. Since 1874, when the production of ˆThe Avenger's Brideˆ opened a new and brilliant life for the Spanish stage, he has given himself wholly to the drama ; producing in a few years 70 plays rich in imagination, dramatic force, and lyric talent. In 1904 he was presented with the Nobel Prize for literature by the Swedish Academy. Of his greatest pieces may be named ˆThe Great Galeottoˆ ; ˆMadman or Saintˆ ; ˆCon¬ flict Between Two Dutiesˆ ; ˆA Merry Life and a Sad Deathˆ ; ˆMarianaˆ (1892) ; ˆThe Son of Don Juanˆ (1892), based on, and identical in theme with Ibsen's < Ghostsˆ ; ˆThe Stigmaˆ (1895) ; ˆThe Madman Divineˆ (1900) ; to Americans the best-known work with ˆE1 gran Galeotoˆ (Eng. trans. by Charles F. Nirdlinger). It was produced on the stage by Mr. and Mrs. William Faversham, under the title ˆThe World and his Wife.ˆ (See Great Galeotto, The; Son OF Don Juan, The). Consult Vezinet ˆLes maitres du roman espagnoP (Paris 1907) ; L. Anton del Olmet and A. Garcia Caraffa, ˆEchegarayˆ (Madrid 1912) ; H. de Curzon ˆLe theatre de Jose Echegarayˆ (Paris 1912) ; A.

Zacher, ˆDon Jose Echegarayˆ (Berlin 1892).

ECHELLENSIS, Abraham, Maronite scholar: b. Ekhel in the Maronite country of Mount Lebanon; d. 1664. He was a graduate of the College of the Maronite nation at Rome, and was called to the chair of Syriac and Arabic in the College of the Propagandists and later at the College of France. From 1630 till 1642 he was engaged at Paris in making Arabic ver¬ sions of books of Scripture for a Polyglot Bible; afterward, from 1652 till his death, he was employed in similar work under the aus¬ pices of the Congregation de Propaganda Fide at Rome. He made Latin translations of nu¬ merous works in Arabic.

ECHELON, esh'e Ion (Fr. «a ladder or stepping stone®), used in military language. A battalion, or regiment, marches en echelon, or par ichelon, if the divisions of which it is com¬ posed do not march in one line, but on parallel lines. The divisions are not exactly behind each other, but each is to the right or left of the one preceding, so as to give the whole the appear¬

ance of a stairway. This order is used if the commander wishes to bring one part of a mass sooner into action and to reserve the other. If the divisions of the echelon are battalions, these are generally from 100 to 200 steps from each other. An echelon is said to be direct if its head maintains a position perpendicular to the original line, as in direct attack or retreat; it is said to be oblique when it deviates from the line, as in changing the order of formation.

ECHENIQUE, a-cha-ne'ka, Jose Rufino, Spanish-American soldier and statesman : b. Puno, Peru, 1808; d. Arequipa, 18 Oct. 1879. He joined the Patriotic party as a boy, rose to the rank of colonel and induced the revolted troops of Gamarra and Bermudez to return to their allegiance in 1833; at the battle of Yungay 1839, he fought on the side of Vera Cruz; in 1845 was a member of Castillas council of state, and in 1851 was elected President of Peru. In 1854 he was charged with financial irregulari¬ ties and Domingo Flias led a revolt against him which terminated in the battle of Saraija 1854. He was defeated in a second revolt at the bridge of Iscuchacha, 2 Aug. 1854, retired to Lima, was again defeated at the battle of La Palma, 5 Jan. 1855, and driven into exile. He was permitted to return in 1862, was elected deputy and later chosen president of the senate. He was even a Presidential candidate in 1872, but spent the last years of his life in retirement.

ECHEVERRIA, a-cha-va-re'a, Esteben, Argentine poet : b. Buenos Aires, Argentina, 1809; d. Montevideo, Uruguay, 1851. He was educated in France, and his early works showed that influence, but he afterward became more national. He was exiled by the Dictator Rosas and went to Montevideo, where he died. Among his works, which are in great repute among his countrymen, are ˆConsuelosˆ (1834); ˆRimasU ˆCautivaˆ (1837), containing delightful descrip¬ tions of the pampas; ˆGuitarraˆ (1842) ; and ˆLa Insurreccion del Sudˆ (1849). His complete works were published at Buenos Aires in 1874, in five volumes, under the direction of Juan Maria Gutierrez, an Argentine man of letters.

ECHIDNA, or SPINY ANTEATER, an

Australian monotreme animal of the family Echidnidee or Tachyglossidce, closely related to the duckbill, but very different in outward ap¬ pearance. Echidnas are spiny, porcupine-like creatures, 12 to 18 inches long, with broad bodies, stout legs terminating in large, strong claws well suited for digging, and a small head, ending in a slender snout. The male has spurs like those of the duckbill. The mouth is tooth¬ less but the palate bears a number of recurved spines, which answer the purpose of teeth,ˆ the tongue is extensile and glutinous. The animal resembles the hedgehog in that it curls up when in danger, presenting its long spines, and pro¬ tecting by this method its naked belly. ˆ It lives in burrows and feeds chiefly on the juicy larvae of ants, into whose hill it digs with its great claws. Like the duckbill, the echidna lays eggs. The period of gestation is about four weeks. The eggs (rarely more than two), when laid, are carried in an abdominal pouch. In another two weeks they hatch, and the young are carried in the pouch for a considerable period there¬ after. The creatures are docile and are easily tamed, becoming playful in captivity and exhib-

iting considerable intelligence. They are noc¬ turnal in habits, and spend periods of drought curled up in their burrows. The common echidna (£. aculeata) is found in Tasmania and New Guinea. It is so variable in color and size that it is sometimes held to form two species, differentiated by their general size and habitat. The "nodiak® of Papua (Proechnida bruijni) is a kindred animal hunted by the

natives for food. See Monotremata; Prototheria.

ECHINADES, e kin'a-dez (modern Kur-zoLARi), a group of islands at the entrance of the Gulf of Patras, and now in part united to the mainland by deposits brought down by the Achelous River. It was near these islands that the battle of Lepanto was fought in 1571. See Lepanto, Battle of.

ECHINOCACTUS, e-kl-no-kak'tus, a genus of plants of the natural order Cactacecs, charac¬ terized by globular or shortly cylindrical forms with prominent ribs and strong spines. Over 200 species, mostly Mexican, have been de¬ scribed; about 40 species are natives of the southwestern portion of the United States, ex¬ tending as far north as southern Utah, Colo¬ rado and Nevada. The flowers, which are highly colored, mainly in shades. of yellow and red, are borne just above the areas producing the youngest spines and are succeeded by dry or succulent fruits of no economic use. The plants are raised with comparative ease from seeds, given abundant light, but not direct sun¬ light, which tends to dry the little seedlings, supplied moderately with water before the soil has a chance to bake and kept in a temperature of about 60 degrees. When about two inches in diameter they may occupy single pots as specimens. About 50 species are cultivated in American greenhouses and are among the favor¬ ite plants of their order.

ECHINOCEREUS, a genus of plants of the natural order Cactacece, with generally low, thickly clustered stems, mostly short funnel-formed, brilliantly colored flowers of various tints and globose or ellipsoidal fruits which are spiny until they reach maturity. By some bot¬ anists the genus is united with Cereus, from which it is distinguished mainly by technical characters that are present in some species of each group. About 25 species are general favor¬ ites in American greenhouses. They are culti¬ vated in about the same way as Echinocactus and Cereus (qq.v.).

ECHINOCOCCUS, e-ld-no-kok'us, a small tapeworm (T<Fnia echinococcus) , to which is due the disease called ˆhydatids® in man and in various animals. See Tapeworm.

ECHINODERMATA, e-ki-n5-der-ma'ta, or ECHINODERMA, one of the most dis¬ tinct phyla of the animal kingdom, embracing the crinoids, sea cucumbers, sea urchins and starfishes. On account of a predominating radical symmetry Cuvier united them with the Ccelenterata in his type Radiata. Leuckart was the first to clearly perceive that only a super¬ ficial resemblance exists between the

members of these two great groups and to him is due the elevation of the Echinodermata to the impor¬ tance of a distinct phylum. The skin is always more or less indurated by the deposition of cal¬ cium carbonate in the form of variously shaped spicules, spines, discs or plates, either isolated

or united to form a reticulum or a continuous test. There is a principal axis around which most of the organs of the body are repeated five times in a radial manner. While this pentam-erism is generally predominant, certain organs (madreporic plate, stone canal, ^^hearU) occur in but one radial axis which, therefore, lies in a median plane to which all other organs are bilaterally related. Of the repeated organs the digestive glands, radial canals, nerves, various vessels, the eye-spots and some others, are ra¬ dial, the genital organs (single in Holothuroidea) and polian vesicles interradial in position. The partial suppression of one ray or two rays, and among the starfishes a multiplication of rays, may take place; furthermore, in some Echinoidea and Holothuroidea certain of the organs or rays may shift so extensively with regard to the principal axis and the median plane that the original pantamerism becomes obscured. There is a well-developed coelom or body cavity and a closely connected ®blood® or pseudohsemal system which consists of an axial organ or ®heart,^^ a circumoesophageal ring, radial vessels and a more or less extensive sys¬ tem of lacunae. In addition to the blood vascu¬ lar system there is a very characteristic water-vascular system which, when typically devel¬ oped, consists of a median madreporic or sieve plate and stone canal, a circumoesophageal canal bearing polian vesicles and other diverticula, and giving rise to radial canals which in turn bear rows of ampullae and tube feet. The latter are the chief organs of locomotion, and the most important function of the water-vascular system is to provide for their distension by means of the water which is strained through the madreporic plate and enters the stone canal. In some cases the tube feet assume an exclu¬ sively respiratory function. With few excep¬ tions the sexes are separated and, following fer¬ tilization in the water external to the body, a free swimming larval form develops, except in a few cases, from the egg. This is always bilaterally symmetrical, has a curved alimentary canal with mouth and anus, and a more or less complicated ciliated tract or cilia or separate circles of cilia and a pair of coelomic pouches. Older larvae often develop irregular processes and a larval skeleton. The larvae of the several classes differ considerably in structural details and have been named auricularia, bipinnaria, pluteus, *etc.* The Echinodermata are exclusively marine. The following classes may be recog¬ nized :

Crinoidea, usually fixed to the sea bottom by the aboral surface; the mouth uppermost and the viscera all contained in the central disc or theca. When arms are present they are solid and usually branched.

Stone or crinoids. Here belong also the ex¬ tinct blastids and cystids which are often re¬ garded as forming separate classes.

Stelleroidea, never fixed to the sea bottom; the mouth or oral surface always in contact with the surface over which they are moving; tube feet confined to the oral surface; form stellate. There are two quite distinct subclasses, the Ophiuroidea, or brittle stars, serpent stars and basket stars, and the Asteroidea or true star¬ fish.

Echinoidea, never fixed to the sea bottom ; ambulacral areas with the tube feet extending

ECHINODERMS

1 Cidaris tribuloides 2, 3 Cidaris baculosa

4 Dorocidaris papillata

5 Strongylocentrus nudus

6 Phyllacanthus annulifera

7 Phyllacanthus baculosa

8 Psammechinus miliaris

9 Centrostephanus longispinus 10, 11 Sphaerechinus esculentus

more or less over the aboral surface; form compact, more or less discoid or spheroidal. Subclasses, Regularia, or regular sea-urchins; and Irregularia, or irregular sea-urchins.

Holothuroidea, never permanently fixed to the sea bottom ; water-vascular system with a circle of oral tentacles ; more or less elongated along the principal axis to a cucumber or worm¬ like form; skeleton in the form of separate plates or sometimes totally wanting. See Cucumbers.

Cystoidea, Pelmatozoans with saclike body enclosed in an irregular box. The arms are poorly developed. The mouth is central. The primitive members of the class are spherical. Some genera tend to the Crinoid type ; others resemble the echinoids. They appear in the rocks of the Upper Cambrian Age, being the earliest group of echinoderms. They disap¬ peared at the close of the Paleozoic.

Blastoidea, a small, extinct specialized group derived from the cystoids, which became extinct at the close of the Palaeozoic age.

Bibliography. — Consult Lankester, E. R., ˆTreatise on Zoologyˆ (Part III, London 1900), and articles on the several classes. Consult also Clark, W. B., ˆThe Mesozoic Echinodermata of the United Statesˆ (In Bulletin of the United States Geological Survey, No. 97, Washington 1893) ; Ludwig, ˆMorphologische Studien an Echinodermenˆ (Leipzig 1882) ; Lang and Ber¬ nard, ˆTextbook of Comparative Anatomyˆ (New York 1896) ; Parker and Haswell, ˆText¬ book of Zoologyˆ (London and New York 1910) ; Zittel and Eastman, <ˆTextbook of Pale¬ ontologyˆ (ib. 2d ed., 1913) ; Bell, ˆOn the Arrangements and Interrelations of the Classes of the Echinodermata, (in Annals and Magazine of Natural History, Ser. VI, Vol. VII, London 1891) ; Neumayr, ˆDie Stamme des Thierreicheˆ (Vienna and Prague 1889). Consult also Agassiz, Alexander, < Paleontological and Em-bryological Developmentˆ (in Proceedings of the American Association for the Advancement of Science, Boston meeting, Cambridge 1880), and Carpenter, ˆ Notes on Echinoderm Mor¬ phologyˆ (in Quarterly Journal of the Micro¬ scopical Society (N. S. Vols. XVIII-XXVIII, London 1878-87).

ECHINOIDEA, ek-i-noi'de-a, or SEA URCHINS, a class of Echinodermata with a more or less spheroidal or discoidal body en¬ closed in a continuous test or shell composed of polygonal pieces of various shapes accurately fitted together and arranged in radial rows. Alternating ambulacral and interambulacral areas, usually repeated five times, may be recog¬ nized. The former exhibit rows of perforations for the tube feet, generally reaching to the aboral pole. The skeletal plates support movable spines which sometimes attain a great size and are used in defense and to a certain degree in locomotion. In addition, the integu¬ ment bears the remarkable structures known as pedicellaria, which are three-iawed pincers borne on movable stalks, which by continually snapping and bending carry away particles of faecal matter and secure cleanliness. The be¬ ginning of the digestive canal is frequently provided with a complicated masticatory ap¬ paratus known as Aristotle's lantern, and the canal itself is tubular and looped, usually not pouched. The gonads are interradial with out¬

lets to the exterior near the aboral pole. Development may be direct or through the larval form called pluteus, which is provided in its later stages with long processes supported by movable spicules. The

number of known Echinoidea is very great, many of them being fossil. There are two subclasses : Regularia, form regular, spheroid; mouth and anus at opposite poles of the central axis, and the latter usually surrounded by small skeletal plates ; in only a few cases are external gills present. Here belongs the common sea-urchin (q.v.). Irregularia, form markedly bilateral ; anus al¬ ways displaced from the apical pole into the posterior interradius and the mouth frequently in the opposite direction, in which case the form is sometimes heart-shaped. Examples are the sand-dollar and heart urchin (q.v.).

ECHINORHYNCHUS, e-kl-no-rin'kus, a parasite worm. See Roundworms.

ECHO, from the Greek, meaning ®sound,^^ noise ; a sound repeated by reflection, or a sound heard again at its source. The waves of sound on meeting the surface are turned back in their course according to the same laws that hold for reflection of light. Even clouds are capable of producing echoes, as is observed at sea when a gun is fired off under a dense cloud. Echoes from the clouds also, in all likeli¬ hood, play an important part in the long rolling of thunder. In order that the echo may return to the place from which the sound proceeds the reflection must be direct and not at the angle to the line of transmission, otherwise the echo may be heard by others but not by the transmitter of the sound. This may be effected either by a reflecting surface at right angles to the line of transmission-or by several reflecting surfaces which end in bringing the sound back to the point of issue. To make a distinct echo the reflected sound must be concentrated rather than diffused. To this result a degree of con¬ cavity in the reflecting body is conducive. If the sound is repeated several times, which is the case when it strikes against objects at different distances, many echoes are heard. The reflect¬ ing surface must be at a certain distance, in order that the echo may come to the ear after the sound and be distinctly separated from it. Sound travels about 1,100 feet in a second; con¬ sequently, an observer standing at half that dis¬ tance from the reflecting object would hear the echo a second later than the sound. Such an echo would repeat as many words and syllables as could be heard in a second. This is called a polysyllabic echo. If the distance is less, the echo repeats fewer syllables ; if only one is re¬ peated, then the echo is monosyllabic. The most practised ear cannot distinguish in a second more than from 9 to 12 successive sounds, so that a distance of not less than 60 feet is needed to enable a common ear to distinguish between the echo and the original sounds. Echoes at least distances, as from the walls of churches and public halls, are liable to mix with and destroy the distinctness of the original sound.

ECHO, in classical mythology, a nymph (one of the Oreads), who, according to fable, was changed by Hera (Juno) into a rock, be¬ cause her loquacity prevented Hera from listen¬ ing to the conversation of Zeus with the nymphs. The use of her voice, however, was left her so far as to be able to repeat the last word which

she heard from others. Another account is that Echo fell in love with Narcissus and because he did not reciprocate her affection she pined away until nothing was left but her voice.

ECHO CANON, Utah, gorge formed by the Weber River, in the northern part of the State, not far from Salt Lake, through which the Union Pacific Railroad passes. The high, almost vertical walls of the canon have fantas¬ tic carvings made by the elements, principally water. The peculiar echo heard within the gorge has given it its name.

ECHTER, en'ter, Michael, German painter : b. Munich, 5 March 1812; d. there, 4 Feb. 1879. He studied at the Munich Academy, as a pupil of Hess, Zimmerman and Olivier. He assisted Kaulbach in work on the mural paintings in the Berlin Museum, painted the ˆBattle of Lechfeldˆ for the Maximilianeum ; the ˆBe¬ trothal of Frederick Barbarossa with Beatrice of Burgundyˆ and ˆThe Burial of Walther von der Vogelweideˆ for the National Mu¬ seum in Munich; and 30 scenes from the ˆNibelungenliedˆ for the royal residence. He was appointed professor in the School of In¬ dustrial Arts and was a member of the Munich Academy.

ECHUCA, e-choo'ka, Australia, town and river port of Victoria, on a peninsula at the junction of the Campaspe with the Murray River, 157 miles north of Melbourne. It is opposite Noama, in New South Wales. A road¬ way and railroad bridge, 1,905 feet long, of the Murray River Railway, connects Noama and Echura. It has a trade, partly by the river, in timber, wool and wine, and the vine is culti¬ vated in the neighborhood. Pop. about 5,000.

ECIJA, a'the-ha (Rom. Astigi; Agusta Firma), Spain, a city in the

province of Se¬ ville, on the Genii, 42 miles northeast of Se¬ ville. It is of very ancient origin and according to tradition was visited by the apostle Paul. At a very early period it became an episcopal see, and its importance under the Romans is at¬ tested by many ancient remains. The climate is so hot that Ecija is often called the ^^Oven of Andalusia.® It has hospitals, asylums, bar¬ racks, theatres. Its principal manufactures are shoes, woolens, leather, silk, flour. Pop. about

25,000.

ECK, Ernst Wilhelm Eberhard, German jurist: b. Berlin, 1838; d. 1901. He received his education at the universities of Berlin and Heidelberg; was professor at Berlin (1871), Giessen (1872), Halle (1872-77), Breslau (1878-81) and thereafter at Berlin. Of his numerous works the principal are ^Die soge-nannten doppelseitigen Klagen des romischen und gemeinen deutschen Rechts^ (1870) ; ^Die Verpflichtung des Verkaufers zur Gewahrung des Eigentums nach romischem und gemeinem deutschen Recht^ (1874) ; ^Die Stellung des Erben,^ etc., in Bekker and Fischer, ^Beitrage zur Beurteilung des Entwurfs eines biirger-lichen Gesetzbuchs^ (1890).

ECK, Heinrich, German geologist: b. (jleiwitz, Silesia, 1837. He received his educa¬ tion at the University of Breslau ; took part in the geological survey in Thuringia and Silesia in 1^2, from 1866 to 1871 he was lecturer at the mining school in Berlin and in the latter year was appointed professor of mineralogy

and geology at the Stuttgart Polytechnic Insti¬ tute. He made numerous investigations deal¬ ing mostly with Triassic deposits, the results of which appeared in the publications of the Ger¬ man Geological Society. His principal works are ^Ueber die Formationen des bunten Sand-steins und des Muschelkalks in Oberschlesien und ihre Versteinerungen^ (1865) ; H^uders-dorf und Umgegend,® in ^Abhandlungen zur geologischen Spezialkarte von Preussen^ (Vol. I, 1872) ; ^Das Erdbeben in der Gegend zwi-schen Strassburg, Forbach … am 11 June

1887^ (1892); W^erzeichnis der mineral—

ogischen, geognostischen, vorgeschichtlichcn und balneographischen Litteratur von Baden, Wiirttemberg, Hohenzollern^ … (1880; with

additions in 1901).

ECK, Johann Maier von, a Catholic theo¬ logian, lifelong adversary of Luther : b. Eck, Suabia, 13 Nov. 1486; d. Ingolstadt, 1543. His father, a peasant named Maier, assumed the name Maier von Eck or Maier of Eck, after be¬ coming bailiff of his village. Johann, at the age of 11 years, entered the University of Heidelberg whence he passed to the University of Tubingen and there at the age of 14 years took the degree of master of arts. Success¬ ively at Tubingen, Cologne and Freiburg uni¬ versities he studied divinity, jurisprudence and mathematics and at the same time was in¬ structor in philosophy. He was appointed pro¬ fessor of theology in th-e University of Ingol¬ stadt (1510). ‘ˆTile on his travels in Italy (1515) he took part in a public’ disputation in the University of Bologna and won high dis¬ tinction; in 1516 on a similar occasion at Vienna he had a like success. In 1518 he published a pamphlet, ˆObelisci,ˆ in defense of the Catholic doctrines attacked in Luther’s celebrated ˆThesesˆ of 31 Oct. 1517. Eck was now chan¬ cellor of the University of Ingolstadt and Lu¬ ther put forward Carlstadt as a defender of the ˆThesesˆ ; Carlstadt not only replied to Eck in print, but challenged him to a public disputa¬ tion. Eck accepted the challenge and the dis¬ putation was held at Leipzig, with Eck as the champion of Catholicism against both Carl¬ stadt and Luther. The disputation was com¬ menced 27 June 1519 and lasted till 15 July. More than a year previously Luther in a letter to one of his friends credited Eck with eminent scholarship and great natural gifts, but after the disputation he was for Luther ®a pitiful theologian® and ˆˆa miserable sophist.® The numerous audience and the townsmen with unanimity awarded the crown of victory to Eck, and Luther, in a private letter to his in¬ timate friend Spalatinus, confessed defeat. Eck, stimulated by his success, devoted him¬ self thereafter wholly to working for the over¬ throw of his adversaries. He procured from the universities of Cologne and Louvain a con¬ demnation of Luther’s writings and was hon¬ ored at Rome with the commission to publish in Germany Pope Leo’s bull Exsurge Domine .against Luther. But he was received with manifestations of popular enmity almost every¬ where; even at Leipzig the bull was solemnly committed to the flames by the students and the populace. On several notable occasions afterward — at the diet of Augsburg (1530), the conferences at Worms (1540) and those at Ratisbon (1541), he was again a principal

champion of Catholicism. Some of his works are a Gerrnan translation of the Old Testament, and a revision of Luther's translation of the New Testament. His pamphlets and books against the doctrines of Luther are included in ˆOperum Johannis Eccii contra Lutherum.ˆ Consult Wiedemann, <Dr. Johannes Eckˆ (Re¬ gensburg 1865).

ECKERMANN, Johann Peter, yo'han pa'ter ek'er-ma, German poet : b. Winsen, Hanover, 21 Sept. 1792; d. Weimar, 3 Dec. 1854. He has a permanent place in literature through his record of ˆConversations with Goethe in the Last Years of His Lifeˆ (1823-32), which has been translated into nearly all the languages of Europe, even Turkish. He edited the posthumous as well as the 40-volume edition of Goethe's works (1839-ˆ0).

ECKERT (Friedrich Eduard), Max,

German geographer ; b. Chemnitz 1868. He received his education in Lobau and Berlin ; taught some time at Lobau and Leipzig and in 1903 became privatdozent at Kiel University. In 1907 he was appointed to the chair of geog¬ raphy in the Royal Technical High School of Aachen (Aix-la-Chapelle). He has published ˆSchulatlasˆ (45th ed., 1912) ; ˆWesen und Aufgabe der Wirtschafts-und Verkehrsgeographieˆ (1903) ; ˆGrundriss der Handelsgeographieˆ (1905) ; ˆLeitfaden der Handelsgeographieˆ (3d ed., 1911) ; ˆNeue Entwurfe fiir Erdkartenˆ (1906) ; ˆDie Kartographie als Wissenschaftˆ (1907) ; ˆThe New Fields of Geography, espe¬ cially Commercial Geographyˆ (1907) ; ˆGeographisches Praktikum,ˆ with Kriimmel (1908) ; ˆFortschritt in der geographischen Erschliessung unsern Kolonienˆ (1908 et seq.) ; ˆDie Karten-projektionˆ (1910) ; ˆDeutsche Kultur-geographieˆ (1912) ; ˆWirtschaftsatlas der deutschen Kolonien> (1912) ; ˆDie wirtschaftliche Bedeutung des Panama-Kanalsˆ (1913) ; ˆDie Metallverbreitung und Metallgewerbe der Welt> (1913).

ECKERT, Thomas Thompson, American telegrapher : b. Saint Clairsville, Ohio, 23 April 1825 ; d. 20 Oct. 1910. In 1852-59 he was super¬ intendent of the telegraph line between Pitts¬ burgh and Chicago; in 1859-61 superintendent of a gold-mining company in North Carolina; and in the latter year was appointed superintendent of the military telegraph department of the Potomac. Subsequently he

was general superintendent of the military telegraph of the army, and was brevetted brigadier-general of volunteers for his services. In 1864-66 he was Assistant Secretary of War; in 1866-75 general superintendent of the eastern division of the Western Union Telegraph Company; in 1875-81 president of the American Union Telegraph Company, and in 1892 became president and general manager of the Western Union Tele¬ graph Company. He retired in 1902.

ECKFORD, Henry, American naval archi¬ tect; b. Irvine, Scotland, 12 March 1775; d. Con¬ stantinople, 12 Nov. 1832. He became a ship¬ builder in New York, in 1796; designed and constructed a fleet of war vessels for the United States government in 1812-14; built the Robert Fulton, which made the first voyage by steam from New York to New Orleans and Havana ; became naval constructor at the Brooklyn navy yard in 1820; and built several war vessels for European and South American

governments. At the invitation of the sultan he became chief constructor in the Turkish navy, and established a navy yard at Con¬ stantinople.

ECKHART, ek'hart, Johannes (ˆMeister Eckhart®), the first of the German mystics in order of time and among the foremost in rank; the probable place of his birth is Cologne, and the year 1260 or a little earlier ; d. 1329. He studied philosophy and theology in the Univer¬ sity of Paris and joined the order of the Preaching Friars, or Dominicans, in which he was promoted to offices of high responsibility, for example, that of vicar-general of the Do¬ minicans for Bohemia, provincial of the order in Saxony. In these places he effected many reforms in the houses of the order and was in high estimation as a preacher notwithstanding the abstruseness of his mystical speculations. Toward the end of his life this dissemination of his mystical views touching the nature of God and the relations between Deity and the human soul brought him under suspicion of being in sympathy with the Beghards, the Brethren of the Free Spirit, the Apostolic Brethren and other fanatics, and 1327 he was cited before the Court of Inquisition at Cologne to make answer to charges of heretical teaching based on passages in his sermons. There he defended the inculpated propositions as entirely orthodox, but expressed his readiness to repudiate them if in the judgment of the head of the Church they were in conflict with the Church's creeds. In 1329 the decision arrived from Rome : 28 prop¬ ositions contained in his sermons were con¬ demned as heretical and Eckhart was ordered

to recant ; but he was now dead.

Whether these 28 propositions were or were not formally heretical, contradictory of the ex¬ press teachings of the Church, they certainly contain doctrines that never have been put forth in any of the Church's formularies. However extravagant, they might have been tolerated or ignored had they been entertained or discussed merely in the schools of theolog}'^ and philos¬ ophy ; but proclaimed from the pulpit and ad¬ dressed to the common people, some of them ignorant, they were incitations to rebellion against all Church authority in teaching. His doctrine concerning the (jodhead is plainly pantheistic. For him there is no real being but God. God is the unknown and the unknow¬ able. We cannot validly affirm anything of the Godhead ; to predicate anything of Deity is to limit infinity. Yet though God is unknown and unknowable, and though we cannot predi¬ cate anything of him, still we can know the true God, the personal God, the Father; in this personal God, the Godhead itself. The triune God, Father, Son and Spirit, is evolved ffom the (jodhead. And the Father comes to know himself in the Son ; the return of the Son into the Father is the Spirit. In begetting the Son — who is coeternal with the Father — the Father brings into existence the universal world of things. His death occurred a little while before the arrival of the Pope's condemnation of his doctrines.

ECKHEL, ek'el, Joseph Hilary, Austrian numismatist : b. Enzersfeld, Austria, 1737 ; d. 1798. After becoming a member of the Society of Saint Ignatius he was appointed keeper of the imperial cabinet of medals and

professor of archaeology at Vienna. Eckhel may be regarded as the founder of the science of numismatics, tne principles of which are elaborately developed in his treatise, ^Doctjina Nummorum Veterum^ (8 vols., 792-98). He also published catalogues of the ancient coins and gems in the imperial cabinet.

ECKSTEIN, ek-stin, Ernst, German humor¬ ist, poet and novelist: b.

Giessen, 6 Feb. 1845; d. 1900. From the university he went to Paris, and there completed his comic epos, ˆ Check to the Queen> (1870), and wrote ˆ Paris Sil¬ houettesˆ (1873), the grotesque night-piece ˆThe Varzin Ghostsˆ and the ˆMute of Seville.ˆ Later he wrote the stories ˆMargheritaˆ ; ˆAt the Tomb of Cestiusˆ ; ‘ˆThe Mosque at Cor¬ dova.ˆ He was editor of a literary and critical journal. Hall of Poets, and of a humorous weekly. The Wag, at Leipzig, for some years, and in 1885 settled in Dresden. He also wrote ˆThe Claudiiˆ ; ˆAphrodite, a Story of Ancient Hellasˆ; ˆDecius the Flute-player: a Merry Story of a Musician in Ancient Rome.ˆ He is distinguished by a polished literary style and careful handling of plots.

ECLAMPSIA. See Puerperal Eclampsia.

ECLECTIC SCHOOL OF MEDICINE.

See Medicine, Eclectic.

ECLECTICISM (from the Gr. out of, and ˆeyelv , to choose or select) is a term that may be applied to any body of theories or doctrines that are combined without regard for their systematic coherence and real unity. We may thus find eclecticism in theology, in philos¬ ophy, in medicine, politics or in the sphere of any of the theoretical sciences. The eclectic is usually guided by practical motives : he adopts from the various conflicting systems what seems to him the most plausible and useful opinion on this point or that, drawing now from one school, now from another. He is not con¬ cerned primarily with the systematic connection, or even the logical consistency, of these various doctrines with one another, but rather with the plausibility and practical applications of the views taken singly.

In philosophy there have been many men, both in ancient and in modern times — some of them writers of great popularity and influ¬ ence — who, without attaching themselves to any particular system or forming one of their own, undertook to select from various quarters the particular doctrines that appeared to them to be true and to combine them in their teaching. This eclectic tendency was most prominent in the ancient world during the later period of Greek philosophy, when the theoretical interest of earlier times had greatly declined and when skepticism had infected many of the best minds. The differences between the three principal schools (Platonists, Peripatetics and Stoics) began to be less emphasized and elements from one school were adopted by adherents of an¬ other. Moreover, a form of eclecticism ap¬ peared in Alexandria also, where thinkers like Philo sought to unite Hebrew theology with Platonic and Neo-

Pythagorean conceptions. Cicero, who did more than anyone else to ac¬ quaint his fellow countrymen with Greek philos¬ ophy, was a thorough-going eclectic, troubling little about the systematic connection of the doctrines and selecting freely from the various schools what seemed to him true. In modern

times, the school founded by the French philos¬ opher, Victor Cousin, is known as eclecticism. Cousin sought to unite German idealism, as represented by Kant and his successors, with the Scottish philosophy of ^^common sense^^ and the doctrines of Descartes. Consult Zeller, ^Eclecticism in Greek Philosophy^ (Eng. trans., 1883) ; Janet, ^Victor Cousin et son ceuvre^ (1885); Simon, ^Victor Cousin^ (1887).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell U niversity.

ECLECTICISM IN MEDICINE. See

Medicine, Eclectic.

ECLIPSE (Gr. eK^-ei-ipig from eK^eirreiv to forsake the accustomed place, to fail to ap¬ pear), an obscuration of the light of a heavenly body by another, effected either, directly, by its intervention between the body and the observer, or, indirectly, by its interception of the source of light which illumines the body. The earth, by means of its shadow, may indirectly cause an eclipse of the moon. Similarly, eclipses of the Jovian satellites are caused by immersion in the shadow of Jupiter, and for the system of Saturn a more complicated result arises on account of its ring When the shadow of a satellite falls upon either of these planets it is called a transit of the shadow. Eclipses are not observable in the other planetary systems, since, in the case of Mars, the satellites dis¬ appear in the light of the planet, and with the more distant planets the shadow cone extends too slight a distance beyond the disc. Again, our moon can by its direct interposition between the sun and the earth produce eclipses of the sun. The moon may interpose itself between the stars or planets and occult them (see Occultation), and the other bodies of the solar system may act similarly. The most important of these phenomena are the eclipses of the sun and moon.

Eclipses of the Moon. — A lunar eclipse is caused by the interposition of the earth between the sun and the moon and the moon’s consequent immersion in the shadow of the earth. This can occur only

when the moon is in opposition to the sun in the heavens, that is, at the time of full moon, and is only possible when both the sun and the moon are near the moon's nodes, i.e., the points where her orbit crosses the plane of the ecliptic. Let the sun, earth and moon be regarded as spherical bodies and their centres ranged in a right line. Then the sun will project beyond the earth a conical shadow called the umbra, in which the moon is centrally imrnersed. The surface of this cone will be described by a line tangent to the same side of both sun and earth and moving about the line joining their centres. The apex of the shadow cone, or of the umbra, is on the average about 857,000 miles beyond the earth's centre, and the diameter of the umbral cone at the point where the moon crosses it on the average about two andˆ two-thirds the diameter of the rnoon. If, again, two lines tangent on opposite sides of the sun, and crossing between sun and earth, move about the line joining the centres of these bodies, these lines will describe the surface of two cones of which the one extend¬ ing beyond the earth is that of the penumbra. Unless the moon be near one of her nodes at the time of full moon, she will not strike the

shadow, but pass below or above it. If the sun is less than eight days from a node of the moon's orbit, an eclipse must occur ; if more than 15 days from a lunar node, an eclipse is irnpossible. These are called the lunar ecliptic limits. Since the moon must be quite near her node to produce a lunar eclipse, it may happen that an entire year may elapse without an eclipse of the moon. The lunar eclipses may be either partial or total according as the moon is immersed either partly or entirely in the earth's shadow cone.

The phenomena of a total lunar eclipse are of a simple character. The immersion of the moon in the penumbra can be observed only with difficulty. The edge of the shadow itself presents a hazy outline when seen in a telescope and the times of contact cannot be observed with accuracy. When completely within the earth's shadow, the moon is usually still plainly visible ; it is then usually of a dull copper color, although it may be greenish or even of a deep red; usually the moon's disc appears mottled by patches of different colors. The cause of this coloration is the sunlight shining through the earth's atmosphere, suffering absorption of its higher tints and experiencing deflection into the shadow cone through refraction. Lunar eclipses have, however, occurred in which the moon was entirely invisible during the total phase. The obscuration of the earth's atmos¬ phere by clouds accounts for these dark eclipses. The most interesting physical observations effected during its eclipse concern the luminous and heat radiations of the moon. Valuable astronomical observations then possible are the determinations of the times of occultation of faint stars whence precise values of lunar position, diameter and parallax may be derived.

Eclipses of the Sun. — Solar eclipses can occur only at the time of new moon. If the sun be more than 19 days from a node of the moon's orbit an eclipse is impossible, if less than 13 days, a central solar eclipse is in¬ evitable. These are the solar ecliptic limits. The sun causes the moon to project toward the earth at new moon, umbral and penumbral shadow cones differing in the rnain only in size from those which the earth projects toward and beyond the moon at full moon.

The shadow cone of the moon may strike the earth's surface, but on the average it does not. Two distinct cases may arise. First, the axis of the shadow cone may strike the earth's surface, and upon it the right line joining the centres of the solar and lunar discs traces the curve of centrality. Here three cases result: (1) The apex of the shadow cone reaches the earth's surface and a central total eclipse occurs. (2) The apex of the shadow cone does not reach the earth's surface and there occurs a central annular eclipse. (3) The apex of the shadow cone reaches the earth's surface only at a middle stretch of the curve of centrality and there occurs a central annular-total eclipse. Second, the axis of the shadow cone may not strike the earth's surface but the earth may still enter the shadow cone, or shadow cone produced, and there occur total, annular and annular-total eclipses, all of which are of a non-central char¬ acter. The path of a total eclipse on the earth may traverse a length from west to east of several thousand miles. An annular eclipse has also a ^^path of the annulus® in which the

annular phase is visible. Outside of both of these paths the sun is only partially eclipsed. The least number of eclipses, solar and lunar, which can occur in a year, is two, and these must be central eclipses of the sun, while the maximum number occurring is seven, two of the moon and five of the sun or four of the sun and three of the moon. A simple record of the date and character of eclipses revealed to early astronomers the fact that after a period of about 18 years eclipses again recur in the same order and kind whether solar, lunar, total or partial. This cycle, called the Saros, is one of 223 lunar months, each of a little more than 29.5 days, and is precisely 6,585.32 days in length. Depending on the number of leap years, 5 or 4 intervening, this is equal to 18 years 10.32 days or 11.32 days. At the end of the Saros the relative positions of the sun, moon and node of the moon's orbit are nearly the same as at the beginning, and other favoring factors of the motions of the sun and moon also recur, as Newcomb first pointed out, to nearly original values. The excess of one-third of a day in the cycle causes the eclipse to be thrown about eight hours of longitude farther west on the earth's surface. Hence only after three cycles does the eclipse again recur in approximately the same longitude. If the inter¬ vening leap years be regarded, the application of the Saros to various series of solar eclipses of the following table may readily be made.

Ancient eclipses are chiefly of value in his¬ torical and chronological investigation (see Time). The records of the supposed eclipses of the ancient historians are usually very un¬ certain as to place, time and

character of the occurrence, and hence have proved of question¬ able value to the astronomer. The precise cir¬ cumstances of an eclipse occurring centuries ago can readily be computed from the modern tables, but the comparison with the vague his¬ torical references has apparently contributed but little to science. Ginzel has, in his ˆSpecial Canon of Eclipses,ˆ collected a splendid array of ancient eclipse literature, and this has been used to derive corrections to the lunar tables, but Newcomb seems justly to question the validity of the results. The eclipses observed by the older astronomers and carefully recorded are of great value. And in later times the description of eclipses has been so accurately interwoven with even historical accounts as to furnish unquestionable data for chronology. The terror and apprehensive uncertainty asso¬ ciated with an eclipse in ancient times has given place to a lofty appreciation of the grand occa¬ sion and to a careful and inspiring scientific study of the phenomena.

The annexed table is a complete list of all the eclipses of the century having a total phase, however brief. The first column gives the date for the point on the earth where at noon the eclipse is central. The second column gives the Greenwich civil time of the conjunction of the sun and moon in longitude. The next column states the greatest interval in minutes during which the most favored place may ex¬ perience the total phase. The fourth column gives the latitude and longitude of the place where the eclipse is central at noon. The last column indicates the areas traversed by the moon's shadow. Several of the eclipses, occur¬ ring in the polar regions, have no noon-point

and hence, for these, the place of the beginning or end of the eclipse, lowest in latitude, is placed in the fourth, and the corresponding time, sun¬ rise or sunset, in the last column. The eight annular-total eclipses of the century are indi¬ cated by a *, and in these the duration of total phase may be but a few seconds. Two of the list, namely 1928 and 1967, are non-central in character, the moon's shadow just grazing the pole of the earth.

The Phenomena Observed in Total Solar Eclipses. — As totality approaches, a pale purple coloring spreads over the landscape. Within a minute of the total phase the phenomena begin to succeed each other so rapidly that no single observer can note them all. By those glancing at the landscape in the direction of the ap¬ proaching shadow a majestic darkness will be seen to sweep forward with a swiftness truly impressive. Those looking at the earth, and away from the eclipsing sun, will see a succes¬ sion of flitting bands, alternately dark and bright, known as the shadow hands, which for many decades remained an unexplained puzzle. About 15 seconds before the total phase, the moon, with its sharp irregular outline, due to the elevations and depressions in its surface, will have diminished the solar crescent to such an extent that the remnant of it usually begins to be crossed by black lines, — the mountains on the moon's edge connecting the limbs of moon and sun. Then it rather suddenly presents the appearance of a string of detached brilliant points, irregular in size and spacing. The ap¬ pearance is due to irradiation which alike ex¬ aggerates the length and thinness of the pro¬ jected lunar mountains and the size of the resulting bright points of the disappearing solar crescent. Totality, the appearance of the prominences, whether red or white, along the moon's edge, and the presence of the radiant, outspreading corona, are simultaneous. The phenomena of the earlier eclipses were recorded in the most general manner. Hasty drawings of the streamers of the corona, accompanied by descriptions reflecting but the dawn of scientific method, are the chief results. It was not until the application of the spectroscope and the photographic camera that the astronomer attained real insight into the stupendous phenomena.

The great eclipse of 8 July 1842 may be said to mark the beginning of serious and ac¬ curate attention to the complex physical fea¬ tures of total solar eclipses. Then the path of totality swept from Spain across

France, Italy, Austria, Russia and central Asia and thus per¬ mitted many expert European astronomers to view and record the marvelous phenomena. It is noteworthy that in reports of this eclipse the red solar prominences were first described with precision, three large ones having been seen on the upper edge of the moon. The corona was also described as of a brilliant white luminosity and extending at least 15 minutes from the moon's edge. Among the many phenomena ob¬ served, the objects of special speculation were the newly discovered red flames or protuberances which Baily considered as ˆTorming a portion of the corona,® and Airy, who observed the eclipse through clouds, attributed to ®some irregularity in the density of the cloud's edge.®

During the total solar eclipse of 28 July 1851

both the corona and the prominences were ob¬ served in greater development than in 1842, and by several observers a scarlet sierra or reddish arc of light was noted near those parts of the lunar disc where the rays of the sun had dis¬ appeared, or else were about to appear. The observers for the most part became certain that the prominences were true solar append¬ ages, because they were apparently uncovered by the moon's edge on the western edge of the sun, and extinguished on the eastern limb. A precious photographic achievement was the single successful daguerreotype taken by Bar-owski with a telescope of 2.4 inches aperture, attached to the Konigsberg heliometer, and with an exposure of 84 seconds. It distinctly pictured the corona and several prominences, and thus became the first unchallenged record of these features of an eclipse.

It was, however, at the eclipse of 18 July 1860 which traced its total path across northern Spain, the Mediterranean and northeastern Africa, that photography was first applied with marked scientific success. Mr. Warren de la Rue and Padre Secchi each secured good representa¬ tions of the prominences; the former also faint traces and the latter good portrayal of the corona. Comparison of these photographs set at rest, once for all, any doubt still existing as to the true solar character of the promi¬ nences. The photographic method of attacking the problems arising in total solar eclipses was from this time firmly established. Its progress¬ ive development was determined chiefly by three elements : First, increase in the sensitive¬ ness of the plates ; second, knowledge of the exposure time required ; and third, necessary advancement in practical optics. The gelatin emulsion process introduced bv Maddox in 1871, and given the touch of great

sensitiveness by Bennett, in 1878, secured the first. Successive failure and success, coupled with scientific method in photometric study, brought the sec¬ ond. And, finally, refined theoretical discus¬ sion of the principles of optics as applied to celestial photography, coupled with marked im¬ provements in optical manufacture, supplied the third. So that now by separate and regulated exposures, with specially designed instruments, either the outer long, delicate coronal wings may be pictured to an extreme limit, or the intensely brighter parts of the inner corona, shown with all their involved filaments and rich tracery, and with many a curious relation to the prominences and chromosphere.

The application of the spectroscope to the study of the brilliant red prominences during the total solar eclipse of 18 Aug. 1868 will al¬ ways be memorable. Tracing its course across the Indian and Malayan peninsulas, and afford¬ ing a total phase of more than five minutes and a half, this eclipse was spectroscopically ob¬ served by Janssen, Major Tennant, Lieutenant Herschel, Pogson and Rayet. The light of the prominences was recorded by each of these ex¬ perts as consisting of several bright lines clearly indicative of the gaseous nature of those remarkable objects. The hydrogen lines C and F were certainly identified, and a yellow line, thence to figure famously in astronomy as Ds and as due to helium, was too hastily assigned to sodium. Another notable result of this eclipse was the discovery by Janssen of a

TOTAL ECLIPSES OF THE SUN OCCURRING DURING THE TWENTIETH CENTURY

Date of eclipse, central at noon

Greenwich M. T. (Civil) of

conjunction in longitude

Maximum

duration

of

total

phase

Locality of eclipse central at noon lat. long.

h

m

m

1901,

May 18 .

5

38

6.7

2°

S

97°

E

1903,

Sept. 21 .

4

30

2.3

70

S

101

E

1904,

Sept. 9 .

21

08

6.3

5

S

133

W

1905,

Aug. 30 .

13

13

4.0

45

N

12

W

1907,

Jan. 14 .

5

57

2.6

39

N

89

E

1908,

Jan. 3 .

21

44

4.5

12

S

145

W

1908,*

Dec. 23 .

11

49

0.4

53

s

3

E

1909,

June 17 .

23

29

0.5

88

N

173

W

1911,

April 28 .

22

26

5.4

1

S

155

W

1912,*

April 17 .

11

40

0.2

46

N

1

W

1912,

Oct. ■ 10 .

13

41

2.2

35

S

33

W

1914,

Aug. 21 .

12

27

2.4

71

N

2

E

1916,

Feb. 3 ….. .

16

06

2.9

16

N

62

W

1918,

June 8 .

22

03

2.5

51

N

152

w

1919,

May 29 .

13

12

6.9

4

N

18

w

1921,

Oct. 1 .

12

26

84

S

19

w

1922,

Sept. 21 .

4

38

6.4

12

S

106

E

1923,

Sept. 10 .

20

53

3.8

38

N

128

W

1925,

Jan. 24 .

14

46

3.3

42

N

44

W

1926,

Jan. 14 .

6

35

4.4

10

S

82

E

1927,*

Jan. 3 .

20

29

0.1

52

S

125

W

1927,

June 29 .

6

32

1.0

78

,N

84

E

1928,

May 19 .

13

14

50

S

30

E

1929,

May 9 .

6

32

5.5

1

S

89

E

1930,*

April 28 .

19

10

0.2

45

N

113

E

1930,

Oct. 21 .

21

47

2.2

36

S

155

W

1932,

Aug. 31 .

19

55

1.9

78

N

109

W

1934,

Feb. 14 .

0

44

2.0

19

N

168

E

1936,

June 19 .

5

15

2.7

56

N

101

E

1937,

June 8 .

20

43

7.3

10

N

131

W

1938,

May 29 .

14

00

4.3

52

S

27

W

1940,

Oct. 1 .

• 12

41

5.9

19

S

16

W

1941,

Sept. 21 .

4

39

3.7

30

N

114

E

1943,

Feb. 4 .

23

31

2.8

47

N

176

W

1944,

Jan. 25 .

15

25

4.4

7

S

49

W

1945,*

Jan. 14 .

5

07

0.0

51

S

108

E

1945,

July 9 .

13

36

1.4

70

N

20

W

1947;

May 20 .

13

44

5.6

2

S

25

w

1948,*

May 9 .

2

31

0.2

44

N

138

E

1948,

Nov. 1 .

6

03

2.2

37

S

82

E

1950,

Sept. 12 .

3

29

34

N

115

W

1952,

Feb. 25 .

9

17

3.5

22

N

39

E

1954,

June 30 .

12

27

2.7

62

N

5

W

1955,

June 20 .

4

12

7.3

15

N

117

E

1956,

June 8 .

21

30

4.9

40

S

141

W

1958,

Oct. 12 .

20

52

5.4

26

S

139

W

1959,

Oct. 2 .

12

31

3.3

23

N

6

w

1961,

Feb. 15 .

8

11

2.9

53

N

53

E

1962,

Feb. 5 .

0

11

4.3

4

S

179

E

1963,

July 20 .

20

43

1.8

62

N

126

W

1965,

May 30 .

21

14

5.6

4

S

137

W

1966,*

May 20 .

9

43

0. 1

41

N

31

E

1966,

Nov. 12 .

14

27

2.2

38

S

43

W

1967,

Nov. 2 .

5

48

54

S

15

W

1968,

Sept. 22 .

11

09

42

N

90

E

1970,

Mar. 7 .

17

43

3.9

25

N

88

W

1972,

July 10 .

19

39

2.8

67

N

111

w

1973,

June 30 .

11

39

7.2

19

N

6

E

1974,

June 20 .

4

56

5.4

32

S

107

E

1976,

Oct. 23 .

5

10

5.0

31

S

95

E

1977,

Oct. 12 .

20

31

2.9

16

N

127

W

1979,

Feb. 26 .

16

47

3.0

61

N

77

w

1980,

Feb. 16 .

8

52

4.4

1

N

48

E

1981,

July 31 .

3

53

2.2

54

N

127

E

1983,

June 11 .

4

38

5.5

7

S

111

E

1984,*

May 30 .

16

48

0.0

38

N

74

W

1984,

Nov. 22 .

22

57

2.2

39

S

170

w

1985,

Nov. 12 .

14

20

52

S

146

w

1986,

Oct. 3 .

18

55

.

66

N

26

w

1987,

Mar. 29 .

12

45

0.4

17

S

6

w

1988,

Mar. 18 .

2

03

4.1

28

N

146

E

1990,

July 22 .

2

54

2.7

73

N

142

E

1991,

Tuly 11 .

19

06

7.2

22

N

105

w

1992,

June 30 .

12

19

5.5

26

S

5

w

1994,

Nov. 3 .

13

36

4.6

36

S

31

w

1995,

Oct. 24 .

4

37

2.4

10

N

no

E

1997,

Mar. 9 .

1

15

2.9

71

N

154

E

1998,

Feb. 26 .

17

27

4.5

6

N

81

W

1999,

Aug. 11 .

11

08

2.6

46

N

18

E

Course of moon’s shadow

Sumatra, Borneo, New Guinea.

Indian Ocean, Antarctic Ocean.

Polynesia, Pacific Ocean.

Canada, Spain, Egypt.

Russia, Chinese Empire, Siberia.

Polynesia, Pacific Ocean.

South Atlantic Ocean.

Siberia, Arctic Ocean, Greenland.

Australia, Polynesia, Pacific Ocean.

Spain, France, Germany, Russia.

Ecuador, Peru, Brazil.

Scandinavia, Russia, Persia.

Pacific Ocean, Isthmus of Panama, Venezuela, West Indies.

Pacific Ocean, United States.

Peru, Brazil, Central Africa.

Antarctic Ocean.

Indian Ocean, Australia.

Pacific Ocean, United States, West Indies.

United States, Atlantic Ocean.

Central Africa, Sumatra, Borneo, South America. Pacific Ocean, South America.

England, Scandinavia, Siberia.

At sunset; Antarctic Ocean.

Sumatra, Malay Peninsula, Borneo.

United States, Canada.

Pacific Ocean, Patagonia.

British America, United States.

Borneo, Celebes, Pacific Ocean.

Greece, Russia, Siberia.

Pacific Ocean, Peru.

South Atlantic Ocean, Antarctic Ocean.

Colombia, Brazil, South Africa.

Central Asia, Pacific Ocean.

Yezzo, Pacific Ocean, Alaska.

Peru, Brazil, North Africa.

South Atlantic Ocean, Indian Ocean.

United States, Canada, Scandinavia. Russia. Argentina, Paraguay, Brazil, Central Africa.

Chinese Empire, Yezzo, Pacific Ocean.

Central Africa, Indian Ocean.

At sunset; Arctic Ocean, Siberia.

Central Africa, Arabia, Central Asia.

United States, Canada, Scandinavia, Russia, Asia. India, Siam, Philippine Islands.

South Pacific Ocean, Antarctic Ocean.

Pacific Ocean, Argentina.

Atlantic Ocean, Morocco, Central Africa, Abyssinia. France, Italy, Austria, Siberia.

Borneo, Celebes, New Guinea, Polynesia.

Alaska, British America.

Pacific Ocean.

North Africa, Greece, Asia Minor, Central Asia.

Chile, Argentina, Brazil. _

At sunrise; South Atlantic Ocean.

At sunset; Russia, Nova Zembla.

Mexico, Yucatan, Florida.

Alaska, British America, Labrador.

Venezuela, Central Africa.

Indian Ocean, Southwest Australia.

Central Africa, Indian Ocean, Australia.

Pacific Ocean, Venezuela.

United States, British America.

Central Africa, India, Chinese Empire,

Russia, Siberia, Pacific Ocean.

Indian Ocean, Sumatra, New Guinea, Pacific Ocean. Mexico, United States.

South Pacific Ocean.

At sunrise; Antarctic Ocean.

At sunrise; Arctic Ocean.

Atlantic Ocean, Central Africa.

Sumatra, Borneo, Philippine Islands.

Russia, Nova Zembla, Arctic Ocean, Siberia.

Mexico, Yucatan, Venezuela, Brazil.

South Atlantic Ocean.

Pacific Ocean, South America, South Atlantic Ocean. India, Malay Peninsula, Polynesia.

Central Asia, Siberia.

Pacific Ocean, Panama, Venezuela, Atlantic Ocean. Germany, Russia, Chinese Empire, India.

* Annular total eclipses.

method by which the bright lines of the promi¬ nences could be observed apart from any eclipse whenever the sky was sufficiently clear. On the day following the eclipse he was able suc¬ cessfully to apply the new method ; to demon¬ strate beyond controversy that the bright lines of hydrogen prevailed in the protuberances; and to make a third discover}ˆ always to be asso¬ ciated with this great Indian eclipse, namely, that of pronounced and rapid changes of form occurring in the prominences. Lockyer in Eng¬ land had for some time been at work on the same method for observing the bright promi¬ nence lines, and his final success was reported to the French Academy at the same meeting at which Janssen's achievements were announced. The coincidence was evidently rather deter¬ mined by the progressive advancement of spec¬ troscopic science than by accident. The spectrum of the corona of this eclipse was generally ob¬ served as a faint continuous one without lines dark or bright. Rayet, indeed, noticed a cer¬ tain bright line near E as extending above the prominences. The polariscopic observations of Lieutenant Campbell and Captain Branfil proved that the coronal light was polarized in planes passing through the sun's centre. The infer¬ ence thus seemed doubly plain that some solar light was reflected by the corona, although the absence of the dark Fraunhofer lines required explanation.

During the total eclipse of 7 Aug. 1869 spectroscopic observations established the exist¬ ence of a bright green line crossing the continu¬ ous spectrum of the corona. It was at that time estimated as coincident with a bright chromospheric line of approximately the same wave-length, and the name Coronium was given to the element from which the light which was the source of the line came. The photographic records of the powerful spectro¬ graphs applied to the eclipses of 1896 and 1898 furnished data, however, which definitely sepa¬ rated coronium from its neighbor in the chromosphere.

The eclipse of 22 Dec. 1870 was of particu¬ lar interest to the American observers who had studied that of 1869. This resulted in the despatch of two large parties to Europe, one directed by the United States Naval Observa¬ tory and the other by the officers of the Coast Survey. If there remained any doubt as to the gaseous nature of the inner corona it was to be dissipated by the fine drawing and descrip¬ tion of the inner corona furnished by Professor Watson of Ann Arbor,

stationed at Carlentini, Sicily, and observing this gaseous shell to an elevation about 5 minutes ; and by Professor Young's observations in Spain of the now familiar green line of coronium, visible plainly in this area, and traceable as far as 16 minutes from the solar limb. This eclipse will always be peculiarly famous for Professor Young's discovery of the reversing layer as a thin shell lying immediately above the photosphere. The existence of this reversing layer has since 1870 been repeatedly verified visually, and more re¬ cently by photographic records. It comprises an envelope of glowing vapors of an estimated depth of about 600 miles lying at the base of the chromosphere. Its thinness causes the bright lines to appear for but a few seconds, or as a brief flash, unless the observation be made

at some station near the edge of the lunar shadow.

The eclipse of 12 Dec. 1871, whose path lay across southern India, and northern Australia, was photographed according to a consistent plan, and photographs were subsequently studied with consummate skill and the delicate results reproduced in detail with masterful accuracy. (Vol. XLI, ˆMemoirs Royal Astronomical So¬ ciety. U Here for the first time was available a representation of the corona in all its com¬ plex glory of spaced polar rays, dark rifts, filaments straight, curved, and interlacing, and of stupendous synclinal structures with rich nebulous mottling. The delicate portrayal of the wet-plate process was only equaled by the scientific and artistic manner in which the re¬ sults were integrated.

The eclipse of 16 April 1874 was visible only in southern Africa, and observed at Klip-fontein by Mr. E. J. Stone, the astronomer royal of the Cape Observatory. He confirmed Young's observation of the reversal of the Fraunhofer lines near the photosphere, and traced the main, green coronal line to more thˆn a degree from the moon's edge. The corona exhibited extended equatorial wings, covering in some parts more than three lunar diameters. The spectroscopic character of the corona, and its unchanged features, as viewed from different stations in Africa, led Stone to insist on the solar origin and cosmical nature of the outer corona.

The path of the total solar eclipse of 29 July 1878 lay diagonally across North America from Bering's Strait to the Gulf of Mexico, and afforded a memorable opportunity to many American and foreign astronomers. The di¬ rection of the line of totality across the Rocky Mountains permitted several astronomers to observe the phenomena

at extraordinary alti¬ tudes. Langley on Pike's Peak, at an altitude of 14,100 feet, traced the corona in the direction of the ecliptic for a distance of at least 12 lunar diameters, and felt great confidence in saying that this, though covering a range of over 10,000,000 miles, was ®but a portion of its extent.® The polar rays and filaments of the inner corona received careful study from such experienced observers as Ormond, Stone, Boss, Paul, Trouvelot and Upton. The dry-plate photographs obtained by Professor Hall's party at La Junta, and by Professor Harkness' party at Creston, were in remarkable agreement as to the details of the inner corona, the same in¬ tensities of shading, to great delicacy, being in common, and the pronounced filamentous char¬ acter of the polar rays, as well as the marked curvature and brightness of .the equatorial ex¬ tensions being clearly shown in both sets of plates. It was the concurrent opinion of many observers that although the corona exhibited vast wings, it lacked, particularly in its inner portions, the brilliancy of the corona of 1869. As to the spectroscopic observations, the gase¬ ous corona manifested, as it seemed, a pro¬ nounced sympathy and intimate relation Avith the 11-year sun-spot period, giving faint spec¬ troscopic lines at the minimum, 1878, and bril¬ liant ones at the maximum, 1869, 1870, and 1871, of the period. It was also discovered that a greater development of the corona in the equatorial than in the polar regions is one of

the characteristics of coronas which have been observed during periods when there were few sun-spots.

Thus, during total eclipse of 17 May 1882 the photographs of the corona reproduced the forrn which it had in 1871, near a sun-spot maximum, being most extended at points away from the solar equator and with no special structure at the poles. It was thus distinguished from the coronas of 1878 and 1867: near sun¬ spot minima, which were greatly elongated along the sun's equator and of marked struc¬ ture at the poles.

During the eclipse of 29 Aug. 1886 Prof. W. H. Pickering, of the Harvard College Ob¬ servatory, made a valuable investigation on the photographic photometry of the corona, the re¬ sult of which led Holden to employ a similar metlmd in the two eclipses of 1889. The values obtained by these two observers are stated in the following table. From this eclipse also, a study of the largest prominence of the eclipse, which rose in a somewhat spiral form to the altitude of 150,000 miles, the Italian astrono¬ mer Tacchini was enabled to verify the dis¬ covery of white prominences and immediately announced to the Academy of the Lincei at Rome : ®That during a total solar eclipse of the sun there may be seen most beautiful

eclipse and of the following total eclipse four years later, Professor Schaeberle deduced his ˆMechanical Theory of Solar Coronaˆ — that the corona is caused by light emitted and reflected from streams of matter ejected from the sun, the stream lines of the corona coincid¬ ing with elliptical areas having one focus at the sun's centre, the origin of the streams being, in the main, confined to the spot-zone regions. Professor Schaeberle applies his theory to the location of half a dozen solar areas productive of _ the actual streamers photographed in the eclipse of 1893. Whatever the merit of the par¬ ticular theory, it has had the advantage of point¬ ing out the importance of dynamical and spatial study of the coronal streamers.

In the eclipse of 16 April 1893 it was shown that the_ lines of hydrogen and helium, seen hitherto in the corona by a number of observers, must be attributed to a scattering of the promi¬ nence light by the earth's atmosphere and pos¬ sibly by the corona itself, but not to the intrinsic coronal light. An attempt was also made to determine the rotation of the corona by photographing its spectrum on both sides of the sun ; the H and K lines only were employed and a speed was found almost equal to that of the solar surface and corresponding to a dis¬ tance of 20 minutes from the limb.

Photographic photometry of the solar corona

August

1886

January

1889

Holden

December

1889

Holden

Intrinsic actinic brilliancy of the brightest parts of the corona .

Ditto of the polar rays . .

0.031

0.079

0.053

60.8

1 to 3043

16 to 1

2.3

0 029 0.016 26.2

1 to 1285

32 to 1

Total actinic light of the corona .

Ratio of total coronal to total sky light (actinic) .

Ratio of intrinsic brilliancy of the brightest parts of the corona to that of

the sky (actinic) .

Magnitude of the faintest star shown on the eclipse photographs .

1 to 1400

44 to 1

prominences not visible in full sunlight ; that the prominences visible only during totality are white, especially in their more elevated parts, and have a special filamentous character, the threads being thin, long and blunt at the top ; that the luminous intensity of the white prominences is feeble, and for this reason they are not visible to the naked eye, unless their height surpass that of the more brilliant parts of the corona; and that the other prominences visible in full sunlight appear much wider and higher in a total eclipse, and, when of a con¬ siderable height, have their summits white.®

The total eclipse of I Jan. 1889 was visible in a path that lay across California and Ne¬ vada, and was successfully observed by many American astronomers. The photographs taken are notable alike for the fine detail of the inner parts of the corona registered, and for the im¬ mense extent of the streamers imprinted.ˆ A particularly fine negative by Barnard permitted Holden to trace rays similar in typical char¬ acter to the polar rays all around the limb of the sun and to present a detailed study of the filamentous character of the corona. An inter¬ esting feature of several of the photographs consisted in their showing the outline of the moon's black disc projected on the corona be¬ fore totality had begun.

From a study of his photographs of this

The eclipse of 9 Aug. 1896 was visible in its total phase in Norway, Nova Zembla and northern Asia, while the path of the following eclipse, that of 22 Jan. 1898, lay across east cen¬ tral Africa, India and the Chinese Empire. Each of these eclipses was successfully observed by a great number of astronomers and furnished a great wealth and variety of photographic material. In the second eclipse Campbell, of the Lick Observatory, employed an objective¬ grating spectograph which was so arranged as to give a continuous photographic account of the changes in the solar spectrum at second and third contacts. Many interesting results of differences of level and of intensity of radiation in the lines were obtained. The photographs obtained by Campbell with a lens of 40-feet focal length showed also a

great wealth of de¬ tail. One of two seconds' exposure clearly indicates the ultimate relation of the promi¬ nences with the synclinal structure of the corona; another, of eight seconds, gives a fine representation of the polar rays and rifts with a coronal form already clearly influenced by the approaching sun-spot minimum.

The total solar eclipse of 28 May 1900 will always be famous for its long course through civilized territory, its path crossing the United States from Texas diagonally to Virginia, and finally threading its way across Spain. It is

chiefly memorable for the fine weather which prevailed along the track of totality and for the magnificent array of optical and physical ap¬ pliances employed in its observation. The chief American parties were those of the Lick, Yerkes, Allegheny, Smithsonian, Princeton, Brown, Harvard and United States Naval observatories, conducted respectively under the direction of Campbell, Hale, Wadsworth, Langley, Young, Upton, W. H. Pickering and S. J. Brown. Long focus telescopes either directly pointed at the sun or fed by coelostats for coronal photography, huge Rowland grating spectrographs for photo¬ graphing the flash and the delicate bolometric appliances of Hale and of Abbot characterized the instrumental attack. A great prominence was seen in the southwest quadrant, whose white summit was in eruptive activity. Striking changes in this prominence and in others were seen on comparing the American photographs with those taken at Ovar, Portugal and in Spain about two hours later. • The study of the form of the corona as presented by the photographs was of special interest as a test of a ®polarization theory^^ of its streamers developed by Bige¬ low some 10 years previously. According to this theory the coronal lines should lie in the direction of the lines of force surrounding a spherical magnet. Such magnetization of the sun, although suggested, was then not neces¬ sarily assumed. The progress of physical science later made it probable that matter on the solar surface was electrically ionized after the man¬ ner of the cathode streams of the Geissler tubes. And these electrified particles, or electrons, re¬ quire then only to be directed by a supposed magnetic field of the sun. Bigelow's ^^Magnetic Theory of the Corona,^^ supported by Eberts' experiments, seems likely both from the natural assumptions made, and from the deductions allowable, to furnish the master-key to the mysteriously definite arrangement of the corona at the sun's minimum of activity.

The spectroscopic observations were mani¬ fold and in the main successful. Professor Evershed, observing in Algiers, just outside of the path of totality, obtained photographs of the flash spectrum in high solar latitudes, and concluded that, in its main features, it is the same as in low latitudes. He verified the essen¬ tial identity of the flash spectra as photographed by Shackleton in 1896 and those obtained in 1898 and 1900, and inferred that ^^the flash spec¬ trum is probably as constant a feature of the solar surface as in the Fraunhofer spectrum.® In discussing the detailed spectroscopic results of the flash layer,

Evershed infers that the ab¬ normal intensities of the enhanced lines charac¬ teristic of all levels and all latitudes of the flash is due to a continuous circulation of the solar gases in a radial direction, while the cooler, more diffused gases, in their subsidence, deter¬ mine the character of the absorption spectrum. His final conclusion is ®that the flash spectrum represents the emission of both ascending and descending gases, while the Fraunhofer spec¬ trum represents the absorption of the descending gases only.® Professor Deslandres, by means of spectrographs with optical parts of Iceland spar and quartz, photographed the entire ultra-violet spectrum of the reversing layer from 4000 to ˆ 3000, the entire ultra-violet spectrum of the upper chromosphere and the entire spectrum of

the corona with two new coronal rings. Des¬ landres, observing visually with a powerful grating, inferred from the inclination of the green coronal line on the east side of the equa¬ tor that the corona appeared to have a more rapid rotation than the disc. Professor Turner secured photographs, in polarized light, of the corona, permitting of a quantitative investiga¬ tion. The polarization of the corona was radial and was %ot only shown in the outer streamers, but right up to the moon's limb.® An important bolometric measure of the heat of the corona was conducted by Abbot and Mendenhall, of the Smithsonian Observatory, which led to the con¬ clusion that the corona neither reflects much solar light nor in the main gives light of its own on account of high temperature, ˆTut seems rather to be giving light in a manner not asso¬ ciated with a high temperature, or at least with the preponderance of infrared rays usual in the spectra of hot bodies.® This result plainly points to the electrical character of the coronal light and is also in harmony with Bigelow's magnetic theory. ˆ Deslandres, using ˆˆa very sensitive Melloni pile® for detecting the heat of the corona, reports positive indications which are in strange contradiction with Abbott's re¬ sults and intensify the regret at the accident which befell Hale's bolometric appliances at the critical moment. The heat measures in future eclipses will have a great interest in relation to coronal theory.

The total eclipse of 18 May 1901 traced its path across southern Madagascar, the Indian Ocean, Sumatra, Borneo, the Celebes and New Guinea, and, on account of its long duration of over six minutes and the high altitude of the sun at the best points of observation, attracted expeditions from many countries. The general weather conditions unfortunately proved to be unfavorable; at a few of the eclipse stations, however, observations of great value were made. Professor

Perrine, observing at Padang, Sumatra, through a partly clear sky, obtained excellent results. His photographs showed ^^conspicuous series of coronal hoods,® and also ®a remarkable coronal disturbance resembling an inverted cone of considerable angle® and unlike anything preyiously recorded. This disturbance associated with a long thread-like prominence. Professor Perrine, subsequently, by means of the Greenwich solar negatives taken at Dehra Dun, India, traced to a sun-spot and associated faculae, near the solar limb on the day of the eclipse, and thus plainly exhibited faculae, prom¬ inences, coronal disturbance, and sun-spots in a common origin and intimate relation. This wonderful phenomenon was without doubt due to a solar eruption which took place near the solar limb and at, or just prior to, the time of the eclipse. The photographs of Mr. Peters, of the United States Naval Observatory, taken at Fort de Kock, Sumatra, confirm Perrine's re¬ sults as to the formation of hoods and en¬ velopes above some of the prominences, and are replete with structural detail. The corona, ac¬ cording toˆ Perrine's photographic negatives, was polarized in the portions 10 minutes beyond the solar limb in all position angles including the polar regions. In negatives of the English astronomer, Newall, some of tKe streamers .showed greater extension in the polarized than in the unpolarized light. In the special work

on the corona contemplated by Professor Bar¬ nard's long exposure of a very large plate, and by Dr. Abbott's second attempt to measure the coronal heat bolometrically, there was uni¬ versal interest among astronomers and univer¬ sal regret at the compulsory postponement to a future eclipse on account of the clouds. A photographic search for an intra-Mercurial planet was conducted by Perrine using four lenses covering a stretch of 19 degrees on either side of the solar equator. The faintest stars on the plate range from 6.5 to 9.3 visual magnitude, and Perrine infers that ˆhmlcss at the time of the eclipse the planetary bodies were directly in line with the sun or with the brightest portion of the corona, there is no planetary body as bright as 5.0 visual magnitude within 18 degrees of the sun, whose orbit is not inclined more than degrees to the plane of the sun's equator."

In the total eclipse of 30 Aug. 1905, the shadow swept over the earth from central Brit¬ ish America, across Labrador, France, Spain and northern Africa, finally leaving the earth at southeast Arabia. This was a very favor¬ able eclipse, the maximum duration being nearly four minutes, and the path of totality unusually accessible. For these reasons, great numbers of parties were organized to observe it, no less than 80 stations being established. It was hoped that a comparison of photographs taken toward the west end of the path with those of Spain and Arabia, taken nearly two and one-half hours later, would throw much light on the changes of the corona during this interval and upon the alteration in appearance of it and of the chromosphere due to the rota¬ tion of the sun. Unfortunately it was cloudy in Labrador, but hundreds of beautiful photo¬ graphs were taken from stations in the Old \Vorld. Fabry during this eclipse made a care¬ ful determination of the total light emitted by the corona and found that altogether we re¬ ceive from this object almost exactly as much light as from the moon when this is full.

The shadow in the eclipse of 21 Aug. 1914 swept from the northern boundary of North America across eastern Europe to India. Sev¬ eral parties were formed to observe this eclipse, notwithstanding the very unsettled condition of the countries through which the shadow passed,

but the results were, very unfortunately, al¬ most nothing, due to cloudy weather. It was planned to test from this eclipse for the first time the new theory of Relativity, according to which a ray o? light passing through a gravi¬ tational field should suffer a minute deflection. The measurement of this deflection seems at present to be about the only physical observa¬ tion which can be made to test the theory, though even with a star which appears at the edge of the sun the deflection should amount to but ninety-three hundredths of a second, and to less than four-tenths of a second for a star 20 minutes away. If found, a deflection would be complicated by the refraction of the rare matter of the corona, the density of which in different portions was also to be investigated by photometric methods.

The eclipse of 8 June 1918 was of special in¬ terest to astronomers in the United States be¬ cause the path of totality extended entirely across this, country in a diagonal direction from

Washington to Florida. The duration of total¬ ity exceeded two minutes in Washington, but this time diminished to less than one minute in Florida, and as the sun was very low in the west when the eclipse occurred to Eastern ob¬ servers, nearly all eclipse parties were stationed in the far Western States. Owing to world conditions, these were exclusively American. Observers from the Allegheny Observatory, the Chamberlain Observatory, the Lowell and Sproul observatories, the observatory of Drake University and others were located in Colo¬ rado; from the Mount Wilson Solar Observa¬ tory and from the Yerkes Observatory, the par¬ ties were in Wyoming, while the party from the Lick Observatory (whose elaborate instru¬ ments, employed in the eclipse of 1914, were still detained in Russia), were in Washington. The party farthest east was from the Smith¬ sonian Astrophysical Observatory: this lo¬ cated in Kansas in order to ensure the spread¬ ing out of observers along the path as much as possible and so to increase the chance of avoiding bad seeing, which might be purely local. Observations were made for determin¬ ing the rotation of the corona, while photo¬ metric measures of its light and many photo¬ graphs of its form were obtained, the weather being favorable almost throughout the entire path. Photographs were also secured to test the theory of relativity, but the results of this work cannot yet be given.

Bibliography. — The general theory of eclipses and the methods for their computation have been developed by Bessel in the ˆAstronomische Nachrichten,ˆ Nos. 151 and 152, but with the utmost

rigor in his ˆ Astronomische Untersuchungenˆ (Vol. II) ; a full development of Bes¬ sel's method is given in Chauvenefls ˆSpherical and Practical Astronomyˆ (Vol. I), and in ˆThe Theory of Eclipsesˆ by Roberdeau Bu¬ chanan. The most reliable general tables for the computation of eclipses are those of New¬ comb, ˆAstronomical Papers of the American Ephemerisˆ (Vol. I). Oppolozer's ˆCanon der Finsternisse,ˆ published as Vol. LII of the ˆDenkschriftenˆ of the Vienna Academy con¬ tains the elements of 8,000 solar and 5,200 lunar eclipses occurring between the dates — 1207 Nov. 10 (Julian) and 2161 Nov. 17 (Gregorian), and the accompanying charts show the approxi¬ mate path of each eclipse on the earth's surface. A valuable accessory to Oppolzer's ˆCanonˆ is found in Dr. R. Schram's ˆTafeln zur Berech-nung der naheren Lˆmstande der Sonnen-finsternisse,ˆ published in Vol. LI of the Vienna ˆDenkschriften.ˆ Ginzel, in the ˆSitzungsberichteˆ of the Vienna Academy, LXXXV, LXXXVII and LXXXIX, and in his ˆSpezieller Canon der Finsternisse,ˆ published by the Berlin Academy, has brought together a large array of references to ancient eclipses and compared them with computation. The papers of Airy, Williams, Maguire and S. J. Johnson in the Monthly Notices of the Royal Astronomical Society are of interest. The physi¬ cal data and problems of total solar eclipses are treated in a vast modern literature mostly is¬ sued by the observatories and learned societies. A highly important compend of physical in¬ formation concerning total solar eclipses is that of Ranyard, Alemoirs of the Royal Astronomical Societyˆ (Vol. XLI). For the

later eclipses the most valuable discussions are to be found in the publications of the United States Naval, Harvard, Lick, Yerkes and Smithsonian observatories, in the ˆAstronomische Nachrichten,ˆ the ˆ Memoirsˆ and the ˆMonthly Noticesˆ of the Royal Astronomical Society and in the Astrophysical Journal.

Revised by Eric Doolittle.

ECLIPTIC, in astronomy, the sun's path, the great circle of the celestial sphere, in which the sun appears to describe his annual course from

west to east. The constellations on the ecliptic give their name to the 12 signs of the zodiac (q.v.), each of which covers 30 degrees. The Greeks observed that eclipses of the sun and moon took place near this circle; whence they called it the ecliptic. The sun does not always rise to the same height in the merid¬ ian, but seems to revolve round the earth in a spiral, and is in the equator twice a year, about 21 March and 23 September. The points of the equator in which the sun is on these days are at the intersection of the equator with the ecliptic. On 21 June the sun reaches its great¬ est height in the heavens, and 21 December it descends the lowest. The position of the equi¬ noxes on the ecliptic is changing about 1 degree 24 minutes per century. (See Equinox). The ecliptic has two poles, 90 degrees from it, which appear to revolve about the north and south celestial poles, respectively, every 24 hours. What appears to be the path of the sun, however, is in reality the path of the earth. The planets and the moon revolve in different planes ; but these are inclined at only a very small angle to the plane of the ecliptic ; hence these bodies can be but a small distance from the ecliptic. The plane of the ecliptic is very important in theoretical astronomy, because the courses of all the other planets are pro¬ jected upon it and reckoned by it. By the obliquity of the ecliptic we understand its in¬ clination to the equator, or the angles formed by the planes of these two great circles. This angle is measured by the arc of a third great circle, drawn so as to intersect the two others perpendicularly, in the points at which they are farthest apart. The ancients endeavored to measure the obliquity of the ecliptic. Accord¬ ing to Pliny, it was first determined by Anaxi¬ mander. The most celebrated measurement of this obliquity in ancient times was made by Pytheas, at Marseilles. He found it, 350 b.c., to be 23 degrees 49 minute? 23 seconds. A hundred years later, according to Ptolemy, Eratosthenes found it to be 23 degrees 51 min¬ utes 13 seconds. In 1900 the obliquity was 23 degrees 27 minutes 8 seconds; it is diminishing at the rate of nearly half a second a year and is expected to reach a minimum value of 22 degrees 15 minutes in about 15,000 years. It will increase thereafter to about 25 degrees. See Day; Nutation.

ECLOGITE, ek’lo-jlt, or EKLOGITE, a

crystalline rock composed of the grass-green amphibole called smaragdite and red garnet. Another variety of eclogite is composed of omphacite, a grass-green granular variety of pyroxene and garnet. Eclogite is not an abun¬ dant rock; it is usually associated with the older crystalline schists, but as a rule is not itself schistose. It is found in Norway, Greece and in parts of the German Empire.

ECLOGUE, ek'log, in poetry, at first a term applied to a section of choice poems. Later the word, from its application to the collection of Virgil's pastoral poems, the ˆBucolica,ˆ came to connote a pastoral composition, in which there is a dialogue between two or more shep¬ herds ; and thence, more loosely, any short, highly finished pastoral poem. See Literary Forms.

ECOLE DES BEAUX-ARTS, a-kol-da-boz-ar' (School of Fine Arts), the French gov¬ ernment school at Paris, officially called the Lcole Nationale et Speciale des Beaux-Arts de Paris. In 1648 Mazarin, under the patronage of Louis XIV, founded the Academy of Paint¬ ing and Sculpture, and in 1671 Colbert com¬ pleted Mazarin's work by establishing the Acad¬ emy of Architecture with its school. The two schools were united under their present title in 1793, although lessons in architecture had actu¬ ally been given at the former school by Fran¬ cois Blondel as early as 1671. Competition for the Grand Prix de Rome was instituted in 1666, and the same year witnessed the establishment of the College de France at Rome by Colbert and Charles Errard. In 1819, the school re¬ ceived its charter, the administration being left in the hands of the Academie des Beaux-Arts. In 1863 it was taken from the control of the Institute and placed in the charge of a govern¬ ment official, since when the management has remained practically the same.

The school is free to men and women from the ages of 15 to 30 and the courses extend over a period of 8 to 10 years, generally Courses are given in painting, sculpture, archi¬ tecture, copper-plate engraving and engraving of medals and precious stones ; and supple¬ mentary classes are held in drawing (both frorn the antique and living model), building, architecture (theory and history), design, deco¬ ration, history of art, aesthetics, general his¬ tory, geometry, perspective, science, *etc.* There are severe examinations for entrance and, like¬ wise, competitive examinations which are held every six months. This competitive system governs the grading of all pupils. In addition to more or less regular attendance at these reg¬ ular courses, the students work in the various ateliers, or studios, under different professors, to whom they are obliged to pay a small fee.

The location of the school is at the old con¬ vent of Petit Augustin, between the rue Bona¬ parte and the rue Saints-Peres. The present Palais was designed by Debret and enlarged and completed by Felix Duban, the construction being finished in 1863. Opportunities for study are found in the splendid collections, which in¬ clude all the

works which have been awarded the Grand Prix, numerous portraits of the pro¬ fessors, classical copies and originals and valu¬ able drawings by the old masters. The library, whose origin dates from the beginning of the school, is rich in valuable books, engravings and photographs. Statistics show some 2,000 students (1913) and 50 teachers (including those in the ateliers). The governing board and adrninistrator are selected from among the best artists of France.

American students are predominant among the foreigners at the school and American architecture has been greatly enriched as a re¬ sult of their training. The Congressional Li-

brary, Washington, D. C., the Tribune Building, the University Club and the new model tene¬ ment dwellings in New York city, besides nu¬ merous palatial residences throughout the country, testify to the practical knowledge and artistic skill of the French-trained American architects. (See Institute of France). Con¬ sult the ^^Beaux Arts Numberi^ of the Archi¬ tectural Record (New York, January 1901) ; Delaborde, ^L'Academie Royal de Peinture et de Sculpture, Etude historique^ (Paris 1861) ; Lenoir, ^Histoire des arts en France^ (ib.

1895).

ECOLOGY, that phase of biology that con¬ siders plants and animals as they exist in na¬ ture, and studies their interdependence, and the relation of each kind and individual to its en¬ vironment. It is the study of the actions and interactions of living things, and their reactions toward external influences. Although there al¬ ways have been observers of organic nature, and collectors and recorders of facts — the material for the generalizations of biology' — this information has for the most part con¬ sisted of isolated facts only slightly correlated with the circumstances surrounding each case : and it has rarely been studied in the light shed by other sciences, as chemistry, meteorology, geology, etc., on the physical processes attend¬ ing

growth, individual success and group-devel¬ opment in nature. It is in this wide, synthetic method that ecologists seek to work, including in any problem all the influences that combine to produce and modify an animal or a given fauna, and thus to account for its existence and peculiarities in the place where it is found. Ecology, then, is more than merely a study of life-history, or of habit and behavior, for it seeks to ascertain and interpret the causes of, and reason for, observed facts by gaining a knowledge of the complex influences to which the animal or plant in question is exposed, and the nature of its reactions.

It is only within recent years that this field of study has been recognized in its full value, and scientifically utilized, but the very illumi¬ nating results obtained have converted to it many naturalists who were at first openly skep¬ tical of its practical value. The American Ecological Society now contains more than 300 members, and in many universities and mu¬ seums formal instruction in ecological methods is now given to students of zoology and botany. An excellent account of the subject, by Prof. Charles C. Adams, may be read in the American Museum Journal (Vol. XVII, November 1917, pages 491-494).

ECONOMIC GEOLOGY. Economic geol¬ ogy is that branch of geology which treats of the distribution, mode of occurrence, mineralogic content and origin of the economically valuable mineral substances occurring within the earth. The most generally recognized classification of these is into non-metallics and metallics. With the non-metallics are classi¬ fied all those substances that are not metals in the form in which they are used. Clay, for ex¬ ample, is placed with the non-metallics, though it contains the metal aluminum. All those sub¬ stances used directly for their metal content are classed with the metallics, such as ores of lead, iron, *etc.*

Non-metallics. — Following are listed the more important members of this group. The natural fuels include coal, peat, petroleum and natural gas. Important building stones are granite, marble, slate, sandstone and limestone. Clay and cements may be included under ma¬ terials of construction. Salt, borax, potash and related compounds are considered under the head of salines. Closely related to these is gypsum. The fertilizers include apatite, rock phosphate, marl, greensand and potash. Among the abrasives are novaculites, corun¬ dum, emery, grindstones, pumice and volcanic ash, tripoli, garnet and quartz. The gems or precious stones include diamond, emerald, beryl, garnet, opal, ruby, sapphire, peridot, to¬ paz, turquoise and many

others. Minor un¬ classified non-metallics embrace asbestos, bar¬ ite, diatomaceous earth, feldspar, fluorite, ful¬ ler's earth, glass sand, graphite, magnesite, mica, monazite, sulphur, soapstone, talc, water and numerous others of lesser importance. See Abrasives; Building Materials; Coal; Corun¬ dum ; Diamond ; Petroleum ; Slate.

Metallics. — The major metals are iron, copper, lead, zinc, gold and silver. Minor metals include aluminum, cobalt, manganese, mercury, nickel, platinum, tin, tungsten and many more. See Copper; Iron; Tungsten, *etc.* ; also Ore Deposits ; Placers ; Magmatic Segre¬ gation; Vein, *etc.*

Each of the above substances is treated in a separate article which includes the mineral¬ ogy and geology of the product.

Bibliography. — Bacon, R. F., and Hamor, W. A., ˆThe American Petroleum Industryˆ (New York 1916) ; Bain, H. F., and others, ˆTypes of Ore Depositsˆ (San Francisco 1911) ; Beck, R., ˆLehre von den Erzlagerstat-tenˆ (3d ed., Berlin 1909. An earlier edition has been translated into the English) ; Bey-schlag, F., Vogt, J. H. L., and Krusch, P., <The Deposits of the Useful Metals and Rocksˆ (trans. by J. S. Truscott, London 1914) ; Cotta, B. von, L\ Treatise on Ore Depositsˆ (trans. by F. Prime, New York 1870) ; Eckel, C. E., Uron Oresˆ (New York 1914) ; Economic Geology (Lancaster, Pa., 1905 to date) ; Em¬ mons, S. F., and others, ˆOre Depositsˆ (New York 1913) ; Emmons, W. H., ˆThe Principles of Economic Geologyˆ (New York 1918) ; The Engineering and Mining Journal (New York 1866 to date) ; Gunther, C. G., ˆThe Examination of Prospectsˆ (New York 1912) ; Hilgarde, E. W., ˆSoilsˆ (New York 1912) ; Johnson, R. H., and Huntley, L. G., ˆPrinci¬ ples of Oil and Gas Productionˆ (New York 1916) ; Keilhack, K., ˆLehrbuch der Grund-wasser-und Quellenkundeˆ (Berlin 1912) ; Kemp, J. F., ˆOre Deposits of the United States and Canadaˆ (3d ed.. New York 1901) ; Lindgren, W., ˆMineral Depositsˆ (New York 1913) ; Merrill, G. P., ˆNon-Metallic Mineralsˆ (2d ed.. New York 1910) ; Phillips, J. A., and Louis, H., ˆTreatise on Ore Depositsˆ (London 1896) ; Potonie, H., ˆDie Entstehung der Steinkohleˆ (Berlin 1910) ; Richardson, C. H., ˆEconomic Geologyˆ (New York 1913) ; Ries, H., ˆEconomic Geologyˆ (4th ed., New York 1916) ; Spurr, J. E., ˆGeolog>ˆ Applied to Min¬ ingˆ (New York 1904) ; Stutzer, O., ˆDie Wichtigsten Lagerstatten der Nicht-Erzeˆ (Berlin 1911) ; Tarr, R S., ˆEconomic Geology of the United Statesˆ (New York 1894);

Transactions of the American Institute of Min¬ ing Engineers (New York 1871 to date) ; Woodward, H. B., ˆThe Geology of Water Supplyˆ (London 1910) ; also the publications of the United States Geological Survey, Wash¬ ington, D. C., and of the various State geologi¬ cal surveys. C. L. Bake,

Professor of Geology, University of Missouri.

ECONOMIC HISTORY. It is a truism that each generation must rewrite the history of the past for its own study. This is because each generation views with particular interest those aspects of life and progress in the past which are of greatest present importance. From the I5th to the 18th centuries rnen were primarily interested in religious questions and the history written during that period was tinged with theological controversy. During the latter part of the 18th and the greater part of the 19th centuries the formation and devel¬ opment of constitutional government claimed chief attention, arid history was written over again from this standpoint. To-day, especially in the United States, our interests have grown to be preponderantly social and economic, and the result is that emphasis is now being laid upon what is called economic history.

By this is not meant what is generally termed the economic interpretation or the ma¬ terialistic conception of history, which holds that economic factors alone can furnish an ade¬ quate explanation of human development. This doctrine of economic determinism was set forth with great force by Karl Marx and has been generally accepted by other socialists. Accord¬ ing to them economic activity is the fundamen¬ tal condition of all life, and consequently all changes in the development and structure of society, whether intellectual, religious, social or what not, must be traced in the last analysis to purely economic causes. Few writers hold this view and it must not be confused with the re¬ cent development of economic history.

Writers other than the Socialists assign, in¬ deed, a much humbler role to economic his¬ tory than that of such a comprehensive expla¬ nation of all social phenomena. According to some its chief mission seems to be to hunt up illustrations which the economic theorist may then use to illustrate principles which he has deduced without

recourse to historical evi¬ dence. Others admit that it is often useful to test the limits of the actual applicability of theoretical economic doctrines. While still an¬ other group, notably the German historical school of economics, hoped that by the use of historical research they could establish new economic truths of a theoretical character, ar¬ rived at by the inductive method. This last hope has on the whole proved fallacious and the economic historian to-day is content with a less ambitious program than the complete recon¬ struction of economic science.'

What then is economic history? It may be defined as an explanation, as complete as may be, of the economic life of a period. Such an explanation is very difficult and for certain pe¬ riods all but impossible, because of two facts. The first is that the records of the past in so far as they concern economic phenomena — the everyday business of earning and spending one's income — are very meagre ; and the sec¬ ond is that the Industrial Revolution (q.v.) so

completely changed the course of economic de¬ velopment that even a complete explanation of the past throws little light upon present prob¬ lems. Economic history is more than a narra¬ tive, or an account of an industry or an insti¬ tution ; it is an economic analysis and causal explanation of the facts and their interrela¬ tions. Such an explanation is not easy, for economic life is very complex; economic phe¬ nomena are never isolated, but work together. The special task of economic history is thus a reasoned explanation of causes and tendencies.

Bibliography. — Callender, G. S., ˆThe Posi¬ tion of American Economic Historyˆ (In American Historical Review, XIX, 80-97) ; Cossa, L., ˆAn Introduction to the Study of Political Economyˆ (London 1893, p. 23) ; Keynes, J. N., ˆ Scope and Method of Political Economyˆ (London 1891, pp. 252-280) ; Rogers, J. E. T., ˆThe Economic Interpretation of Historyˆ (London 1888) ; Seligman, E. R. A., ˆThe Economic Interpretation of Historyˆ (New York 1902).

Ernest L. Bogart,

Professor of Economics, University of Illinois.

ECONOMIC THEORIES OF LABOR.

See Labor.

ECONOMICS. Economics may be defined as the science of the production and distri¬ bution and consumption of wealth. It is con¬ cerned with the activities of man in the process of earning a living and of applying his income to the satisfaction of his wants. As a science economics is scarcely more than a century old, but economic phenomena must have attracted attention and caused reflection as long as think¬ ing beings labored to gain a living. At first economic thought was inchoate and confused, finding expression chiefly in the moral codes of priestly lawgivers. And when economic doctrines began to be differentiated from moral or political precepts, they were still conditioned by the religious, industrial and social environ¬ ment in which the thinker lived. With every important social change new economic theories have arisen which have sought to explain the existing situation. Hence economic progress has been accompanied with the development of economic thought and the rise of new the¬ ories. And as society came to be organized primarily for economic rather than for mili¬ tary or religious purposes greater attention has been directed to economic problems and to their theoretical explanation. The development of thought shows a progressive comprehension of economic phenomena and a steady develop¬ ment in scientific treatment. To understand the scope and content of the science of eco¬ nomics to-day we cannot do better than to trace its historical development.

Ancient Thought. — The earliest expres¬ sions of economic thought are to be found in the moral codes of Oriental peoples, of which the Mosaic and Brahminic codes may serve as illustrations. These were primarily religious and economic concepts and were com¬ pletely dominated by theological considerations. Spiritual perfection was the end to be achieved and economic well-being or poverty were held to be ordained by divine will. Everyday life was minutely regulated; custom ruled and change was avoided; the individual was entirely subordinated to society. Under such circum-

stances there was little opportunity for the development of economic progress or of eco¬ nomic theory.

While the Greeks ‘ resembled the Oriental people in their confusion of economics with morals, in conceding the dominance of ethical motives and in emphasizing the importance of the state, they yet appreciaied more fully the importance of material wealth and analyzed the nature of economic wants more carefully. It has been said that every one is a follower of either Plato or Aristotle, the two leading Greek philosophers. Plato described an ideal state in which the individual is completely subordi¬ nated to the state, community of property and of wives and children is established, population is regulated. Aristotle opposed this extreme communism, approved of personal freedom, private property and individual initiative. His analysis of economic activities was rational in contrast with the metaphysical Oriental specu¬ lation or the idealism of Plato and marked a considerable advance in economic method.

There was little advance made by Roman writers. As their interests were military and political, industrial activities were regarded as ignoble — with the exception of agriculture- — and consequently little thought was directed to these subjects. The chief who di¬

rected their attention to economic matters were Cicero, Cato, Varro and Columella, but all of them concerned themselves rather with techni¬ cal advice about agriculture and laments at its decline than with national economy. In gen¬ eral the Romans followed the Greek writers. Their chief contribution lay after all in the development of the science of jurisprudence.

The slight development of economic thought in antiquity was due to several reasons. In the first place practical economic activities were not far developed. War absorbed a great part of the energy of the people. Agriculture was rude, manufacturing and commerce were in a still more primitive state. Owing to the insecurity of life and property there was little incentive to or possibility of the accumulation of capital. The system of slavery, upon which all ancient societies were

based, led to a con¬ tempt for labor and prevented real economic progress.

Mediaeval Thought. — The ill-defined period known as the Middle Ages (400-1500) was one of transition and adjustment. After the down¬ fall of Roman civilization there was a stormy period in which Roman institutions, Christian theology and Germanic customs were blended into a new catholic ecclesiastical and civil sys¬ tem, followed by another period in which the Western world had to defend itself against the invasions of Eastern nomadic tribes. From the 11th to the 15th century the typical mediaeval institutions of scholasticism and feudalism de¬ veloped and dominated life and thought. Throughout most of this period society was disorganized and broken into fragments. The typical economic unit was the independent domestic economy, self-sufficient and practically without intercourse with the outside world. Agriculture was the main and in fact almost the only industry, domestic manufactures being confined to supplying local wants, and commerce was practically unknown for all but river or seaport towns. There was, however, during the later Middle Ages a transition from this domes¬

tic economy to a broader town economy, if not to a national economy. Manufactures and com¬ merce encroached gradually upon agriculture ; the ancient institution of slavery was modified into serfdom. Feudalism, however, prevented any considerable economic advance, as its chief office, which must be recognized as beneficent in the chaotic conditions of the times, was to preserve order and defend existing institutions.

Under such circumstances but little contri¬ bution could be expected to the world of economic thought. Men's speculations during this period were primarily theological and economic doctrines were controlled by religious considerations. The best exposition of the economic theory developed during the Middle Ages, if we may designate as theory a body of rules of conduct, is to be found in the canon law. Based upon a mass of ecclesiastical legis¬ lation and decisions, this was codified in the 12th century. Prescribing as it did rules of right conduct and of atonement for wrong, it necessarily made inquiry into economic relations and activities. The keynote of the economic doctrines may be found in the conception of a just price; this was determined by the cost of production, but to the canonist cost was meas¬ ured only by the labor involved, as there had not yet developed an adequate conception of capital as an agent of

production. A just price then was one that secured a fair return to the worker. Similarly, because of their lack of ap¬ preciation of the role played by capital in pro¬ duction, they condemned usury or the taking of interest, though this doctrine came to be modi¬ fied with the growth of trade. But avarice, the pursuit of wealth as an end in itself, was con¬ demned as one of the seven deadly sins. This stands in strange contrast with the modern conception of self-interest as the motive power of economic action. Manifestly there could be no great development of economic activity or of theory so long as such conceptions prevailed.

The Middle Ages were followed by a period of two or three centuries marked by profound change in the world of economic enterprise and by the rise of new ideas in the world of eco¬ nomic thought, which paved the way for modern systems of industry and theory. In this transi¬ tional period we may distinguish two systems of thought or of policies, namely. Mercantilism and the Physiocratic system. The first of these was a body of economic policies rather than of theory, but the second comprised a coherent system of thought.

Mercantilism. — By Mercantilism is meant the prevailing economic views entertained by European statesmen from the 16th to about the middle of the 18th century. These concerned themselves mostly with money and foreign com¬ merce and were the result of the new economic forces that were making themselves felt in the world. Foremost among these was the importa¬ tion of gold and silver from America, which facilitated the change from payment in services and kind to a money economy, and helped to break up the old feudal regime. The growth of court expenses, of standing armies and of other governmental expenditures necessitated heavier taxation, which led to the encouragement of manufactures and trade by the central govern¬ ments ; heavier taxation on the other hand was made possible by the greater security and in¬ creased production of wealth in the towns.

At the same time a struggle was going on between the local units of government and the central power. As the old feudal economy began to be supplanted by a national economy it was felt that the state must be made strong. It was a period of struggle between nascent states, and Mercantilism, which is defined by Schmoller as state-making, aimed to make the nation strong. In international relations, says this author, those states gained the supremacy ®which understood how to put the might of their fleets and admiralties, the apparatus of customs laws and navigation laws, with rapidity, bold¬ ness and clear purpose at the service of the economic interests of the nation and state.^^ The Mercantilists, therefore, emphasized the encouragement of foreign commerce and domes¬ tic manufactures, of agriculture and fishing. Seeing that those nations were strong which possessed large amounts of the precious metals, they laid great stress upon the importance of amassing and retaining within the national boundaries a store of money. Indeed wealth and money were often confused by the typical Mercantilist, though it can no longer be held that they identified them. This was the funda¬ mental Mercantilist doctrine, and as a means of securing bullion, foreign trade was encouraged and regulated so as to secure a favorable bal¬ ance. As a merchant marine was necessary to carry on trade, all measures that would develop a navy were approved, from navigation laws granting a monopoly of the carrying trade to home shipping to laws requiring the eating of fish so as to encourage fishing and thereby the training of sailors.

But since a nation must have commodities to trade with manufactures were also encour¬ aged within the country, while agriculture was to be developed sufficiently to make the nation self-sufficient. A dense population was desired as an element of military strength. It was an all-around system of protection, regulation, price fixation and state control, which should not be thoughtlessly condemned, as it was admirably suited to the spirit and needs of the times. Charles V is said to have introduced it, but its best-known exponents were Cromwell in Eng¬ land, Colbert, the Minister of Louis XIV, in France, and Frederick the Great in Prussia. Among the best-known English Mercantilist writers were Mun, Child, Davenport, and Temple.

The Physiocrats. — Toward the end of the 17th century, and more markedly in the 18th, protests began to be urged against the extreme and burdensome restrictions of the Mercantilist policies. This system

had performed its work and was outliving its usefulness. The agricul¬ tural revolution, already being coilsummated in England, was demonstrating the profitableness of agriculture when conducted scientifically with sufficient capital and rotation of crops. The growing manufacturers of the towns, too, felt themselves burdened and restricted by obso¬ lete regulations and the monopoly of the guilds. It was in France particularly, where the bur¬ dens of taxation upon both agriculture and manufactures were especially onerous, that the protests found expression in a new system of thought. This was Physiocracy, which might be defined negatively as a revolt against Mer¬ cantilism, though it was much more than this.

At the basis of the Physiocrats' doctrines lay

their nature philosophy, as indicated in the name they gave themselves Kpdroq = rule^ of

nature). By this they meant that social activi¬ ties were subject to natural laws in the same way that nature is subject to physical laws. National well-being could be secured only by obeying these natural laws. The political appli¬ cation of this philosophy led to the social con¬ tract theory, according to which governrnent exists for the benefit of the members of society and rests upon their consent. In the economic sphere this reasoning led them to approve of individual freedom and initiative. The func¬ tions of government should be limited to the protection of life, liberty and property, and the individual should be permitted to pursue his own interests and make the most of his labor. There should be freedom of exchange and competition, and all monopolies or restrictive privileges should be abolished. This idea was embodied in their famous maxim, laissez-faire et laissez-passer (let things alone, let them take their own course). Thus far the Physiocratic doctrine was negative and aimed to break down the restrictions of Mercantilism. But it contained also positive contributions to economic theory.

The central doctrine of the Physiocrats was that of the product net or net surplus. Only ag¬ riculture and the other extractive industries, as mining and fishing, are productive, that is, yield a surplus over the cost of production, and thereby increase the wealth of a nation. Manu¬ factures and commerce are non-productive, for they merely give a new form and location to the materials produced by the extractive indus¬ tries; the higher value of the manufactured articles is offset by the costs of production, the labor, provisions and materials

used up in the process, and therefore there is no net surplus added to existing wealth. Artisans, merchants and the professional classes were regarded by the Physiocrats as sterile or non-productive. This doctrine led, of course, to a demand for the .encouragement of agriculture by the state and the abolition of all measures mistakenly de¬ signed to encourage manufactures or commerce. These should be left to develop naturally. In criticism of the doctrine of productivity it may be pointed out that to the Physiocrats produc¬ tion meant an addition of material goods to the wealth of society. According to them, nature worked in a peculiar way in cooperation with the farmer; he alone added to the stores of material wealth. But the manufacturer or trader, who added only a form or place utility, was denied the name productive. This is con¬ trary to modern economic theory.

From their doctrine of the product net fol¬ lowed logically their theory of tht impost unique or the single tax. Since land was the sole and ultimate source of wealth, all' taxes should be levied directly upon it. If they were imposed upon other branches of industry, they would necessarily be shifted as there was no surplus out of which to pay them, and they would all ultimately rest on the land. A single tax on the net income from land was therefore the simplest way to secure the revenue of the state.

The historical mission of the Physiocrats was to break the fetters of Mercantilism and to free industry and trade from the restrictions which were preventing its normal development. It was therefore in large measure a system of reaction and negativism. In its insistence upon

the sole productivity of agriculture it went too far, and a broader system had later to be de¬ veloped by Adam Smith which should give man¬ ufactures and commerce their rightful place. Their doctrine of freedom of industry has exerted a powerful influence upon subsequent theory and economic policy. They also made positive contributions to the theory of taxation. The best-known writers among the Physiocrats were Frenchmen, Quesnay, Turgot, DuPont de Nemours, Mirabeau and Gournay, though the Englishman Cantillon had anticipated some of their doctrines.

Adam Smith. — Adam Smith has been called the father of political economy, and his book ˆThe Wealth of Nations,ˆ published in 1776, has undoubtedly had a greater influence and won for its author greater fame than any other book on this or allied subjects that has ever been printed. It was justly famous, for it marks an epoch in the development of economic thought and for the first time presented a dis¬ tinct systematic and comprehensive treatise on economics. Smith was not wholly original, for he built upon the labors of his predecessors, — and under the Physiocrats the science had al¬ ready made considerable progress, — but he avoided their errors and added much that was his own. He embodied in his work many of the ideas of the Physiocrats, though he avoided their extremes, and was also greatly influenced by contemporary English writers, notably Hume. The great merit of his work lies in its eminent saneness, breadth of view and catholicity.

In his treatment of economics Smith in¬ troduced a new viewpoint. Hitherto all writ¬ ers had considered the production of wealth as the end and aim of economic endeavor. But, though he dealt largely with production. Smith emphasized theˆ importance of consump¬ tion : ˆˆConsumption is the sole end and pur¬ pose of all production and the interest of the producer ought to be attended to, only so far as it may be necessary for promoting that of the consumer.® This is the modern standpoint. It was, however, often lost sight of by his immediate followers. Starting with the idea that the labor of a nation is the source of its annual income, ˆThe Wealth of Nationsˆ opens with a

classical discussion of the division of labor. Upon this division of labor depends in great measure its productiveness, but when this is introduced each member ˆ of society depends upon others for the satisfaction oi most of his needs ; hence arises the necessity for exchange and the use of money. The exchange of goods necessitates their compari¬ son and hence the idea of value arises. From this point Smith is led to study the component elements of price, wages, profits and rent. These researches fill the first_ two books and constitute his general economic scheme. The third book is historical in character and con¬ tains an account of the economic development of Europe; while the fourth book is devoted largely to a polemic against Mercantilism and Physiocracy; the fifth deals with public finance.

Smith's work, like that of the Physiocrats, was largely destructive; he had to overthrow before he could build up. He advocated the ˆsimple and obvious system of natural liberty® and paved the way for free trade in England. He taught that when each individual pursues

his own self-interest the best economic in¬ terests for society will be secured. While he stood for freedom of trade and personal lib¬ erty and initiative of the individual, he ad¬ mitted certain modifications in this doctrine, as in his approval of the navigation laws, of a protective tariff for retaliatory purposes and in certain other cases of government interference. There is little doubt that if he could have seen some of the evils which followed this doctrine of non-interference after the develop¬ ment of the factory system, he would have modified his views still more. Indeed one of the criticisms later urged against Smith is his theoretical absolutism. He is also criticized on the ground that he was unduly individual¬ istic and materialistic, but in these respects he reflected the general philosophy of his age. He showed his breadth of view and judgment by taking what was best in the prevailing theories of his predecessors and combining this into a unified system, to which he also made original contributions, notably in his dis¬ cussion of value.

One reason for the success and popularity of Smith's work was that he wrote just at the be¬ ginning of a great industrial revolution. Be¬ fore this time the system of industry in Eng¬ land was the so-called domestic system, under which the work of production was carried on in the home of the worker by hand methods, though middlemen operating on a considerable scale had already appeared. But beginning about 1760 there occurred a remarkable series of inventions which affected many lines of in¬ dustry — cotton spinning and weaving, coal

mining, iron smelting, manufacture of earthen¬ ware, and the improvement of transportation by the construction of roads and canals. The epochmaking change of this period lay, how¬ ever, not in this series of inventions, import¬ ant as they were, but rather in the substitution of non-human power for human muscles. This was first made possible on a commercial scale by Watt's improvement of the steam engine. A vast expansion of industry now took place, the factory system supplanted the domestic system, capital found new applications and be¬ gan to play a more important role, while new labor problems arose with the new conditions of industry. New industrial forces were lib¬ erated which demanded freedom from old restrictions and the new industrial leaders ap¬ proved highly of Smith's doctrine of non-in¬ terference. This accordingly became the corner stone of English economics for the next gen¬ eration or so, until the evils of this policy be¬ came so apparent as to lead to reaction. We may note some of the followers of Adam Smith.

Malthus. — By 1798 many of the evil effects of the Industrial Revolution were showing themselves and unemployment, poverty and dis¬ ease were already problems that called for remedial treatment. Thomas Robert Malthus (1766-1834) had his attention directed to these evils while discussing a socialistic scheme of William Godwin and wrote his ^^Essay on the Principle of Population® to refute such utopian cures. In this he held that population tends to increase faster than the means of subsist¬ ence ; that this tendency is restrained only by certain ^positive® checks in the form of fam¬ ine, disease and war, or by a ^preventive®

check in the shape of moral restraint, such as the postponement of marriage. Any social¬ istic society, he therefore held, in which there was universal well-being and in which these checks did not operate, would be speedily broken down by his single principle of pop¬ ulation. Malthus' essay has given rise to an enormous amount of discussion and has had an important practical influence in the attitude of economists and others to various schemes of social reform. His principle of population must be held to have stated an important truth, though it was not original with Malthus and was greatly exaggerated by this writer and his followers.

Ricardo. — David Ricardo (1772-1823), an¬ other follower of Smith, is best known for his theory of rent. While this was not original with him it was so fully developed in his ˆPrinciples of Political Economy and Taxa¬ tionˆ that it has generally been known since as the Ricardian law of rent. Briefly stated the theory is that rent is due to the difference in cost of production on any given piece of land and the poorest land under cultivation. Rent is therefore a differential return which is due to the necessity of resorting constantly to poorer lands. It is a result of high prices and of the niggardliness of nature, which yields smaller and smaller returns to successive ap¬ plications of labor and capital to the cultiva¬ tion of the soil. This idea of a resort to infe¬ rior soils and of diminishing returns in agri¬ culture, combined with Malthus' principle of population, gave rise to a most pessimistic theory of wages, known as the ®iron law of wages.ˆˆ As stated by Ricardo, ˆffhe natural price of labour is the price which is necessary to enable the labourers, one with another, to subsist and to perpetuate their race, without either increase or diminutioiflˆ (Ch. V, § 1). If wages rise temporarily population will tend to increase and this will cause a fall again in the rate of wages. Nor will it help the labor¬ ing class to exercise thrift or self-restraint, for then wages will fall to the new level nec¬ essary for their subsistence. The remedies proposed by Ricardo himself were the abolition of the poor laws and the development among the laboring classes of a higher standard of living. Ricardo made important contributions to the theory of money, to which subject his rigidly deductive method and his analytical skill were well adapted. In this respect his influence was unfavorable, for economic method was for many years diverted from the combination of inductive and deductive rea¬ soning employed by Adam Smith to a purely deductive one. A false impression of accu¬ racy and finality

was thus given to economic theory.

Perhaps no writer went further >than did Nassau William Senior (1790-1864) in nar¬ rowing the scope of political economy and treating it as an abstract science. His name is usually associated with the abstinence theory of interest, which was his contribution to eco¬ nomic thought. Ricardo liad stated that the value of goods was fixed by their labor cost, but Senior pointed out that cost of production includes the ˆabstinence® of the capitalist in saving his capital for production, for which he must be rewarded. His new term was some¬ what unfortunate because negative in meaning.

but his emphasis of the contribution of capital to production constituted a real advance in theory. Most of the other English writers between Ricardo and John Stuart Mill were of minor importance and may be dismissed with a mention of their names. The principal ones were R. Jones, James Mill, J. R. M'Cul-loch, Robert Torrens and W. T. Thornton.

The Classical School in France. — The in¬ fluence of Adam Smith and of the so-called English classical school of political economy was, however, not confined to England, but affected France and Germany. The writer who most undeviatingly followed Smith was the French writer, J. B. Say p767-1832). In his ˆTraite d'Economie Politique,ˆ published in 1803, he popularized ˆThe Wealth of Nations,ˆ but in so doing he reorganized and simplified the subject matter. His work was more than that of a mere popularizer, however, and he made some original contributions of his own. In his hands economics became a purely theo¬ retical and descriptive science, being divorced from the practical politics of the Mercantilists and Physiocrats. Writing a generation later than Smith he witnessed the introduction and spread of the factory system and consequently emphasized manufactures and machinery more. He is probably best known for his theory of markets in which he argued that money is only an intermediary: ˆˆproducts are given in ex¬ change for products.® Hence he concluded that a general overproduction is impossible and that foreign trade is advantageous. He, there¬ fore, advocated free trade.

A later French writer, who even more em¬ phasized the doctrines of laissez-faire and indi¬ vidualism was Frederic Bastiat (1801-50). His most ambitious work was his ˆHarmonies Economiques,ˆ in which he argues that there is an essential harmony of interests between labor and capital and between various economic interests. ®It will always

be historically inter¬ esting,® says Ingram, ®as the last incarnation of thorough-going economic optimism.® Already however the logic of events had brought about a reaction against such extreme individualism and this book made little impression. More important for their practical effects were his shorter pamphlets against protection and so¬ cialism, which were characterized by a lively and vigorous style.

Other French writers of this period were Augustin Cournot (1801-77), who was one of the first to apply mathematics to the treat¬ ment of economic questions, and Charles Dunoyer (1786-1862). In general the French school simply reaffirmed and developed the principles of economic individualism laid down by the English classical school, but were char¬ acterized by an optimism' which contrasts strongly with the pessimism of Malthus and Ricardo.

The Classical School in Germany. — German expositors of Adam Smith displayed more in¬ dependence and originality than did the French writers. Of these may be mentioned K. H. Rail (1792-1870), F. B. W. Hermann (1795-1868), F. Nebenius (1784-1857) and J. H. von Thiinen (1783-1850). Ran exercised consider¬ able influence through his encyclopaedic ˆLehrbuch der Politischen Oekonomie,ˆ which com¬ bined Adam Smith's political economy with much historical, statistical and technical infor-

mation. His contribution to economic theory consists in his separate analysis of the entre¬ preneur's gains or ^^wages of management.^^ Nebenius wrote on public credit and Hermann on a number of special subjects, which he treated with great ability. But von Thiinen rnade the most important contributions. In his work ˆDer Isolirte Staatˆ he studied the effect upon rent of situation with respect to the market ; he thus supplemented the Ricardian theory which had emphasized differences in fertility. He also made a study of wages and drew up a formula to express natural wages, which he thought should be proportional to the amount of the product.

Critics of the Classical School. — The work of Smith, Malthus and Ricardo had a certain air of finality and it seemed to their immediate followers that the science of political economy was complete. But even before their task was accomplished the new system of thought was subjected to criticism and attack. The critics or opponents belong to various groups accord¬ ing as they attacked one feature or another of the classical school. There were first those who opposed the extreme doctrine of individualism and unrestricted competition for which Smith stood ; second, those who were antagonized by the broad cosmopolitanism of the classical school and who advocated a national program; and third, those who disapproved of the un¬ ethical features in the principle of self-interest and the institution of private property.

(1) Critics of Individualism. — In the first group fall Lord Lauderdale (1759-1830), John Rae (1786-1873) and J. C. L. Simon de Sismondi (1773-1842). The first two of these writers pointed out that there is no necessary identity between the interests of the individual and those of society as a whole, and approved of govern¬ ment interference in many cases. According to them a distinction must be made between public wealth and private riches ; the increase of the latter does not necessarily mean that the nation is better off. Sismondi called himself a disciple of Adam Smith, but he disagreed with the method, the aim and the practical conclusions of the classical school. He insisted that the method should be more historical and the aim more ethical. Finally he rebelled against the undue emphasis upon the mere

production of wealth and the neglect of human suffering in¬ volved in the introduction of new processes and machinery. He agrees with the two former writers in insisting that there is no necessary identity between private and social interests. In his theories of overproduction and crises indeed he almost approaches socialism.

(2) Critics of Free Trade. — Of all the doc¬ trines of the classical school the one which was most widely accepted was the theory of free trade. In every country this idea had been accepted by economists. And yet it was not long before opponents of this doctrine sprang up, no one of whom, however, was English. The first to give expression to this nationalistic reaction was Adam Muller (1779-1829), a Ger¬ man, who advocated the policy of protection to home indust^ on the ground that it promoted national feeling. For the same reason he even approved of government paper money and of war. He attacked the atomistic individualism of Smith and insisted upon social welfare.

Much more important was Friedrich List

(1789-1846), who was born and died in Ger¬ many, but who spent a number of years in the United States where he accumulated a fortune. The title of his principal work, ^Das Nationale System der Politischen Oekonomie,^ gives the key to his position. It is really a treatise on international trade in which he attacks the free-trade principles of the classical school. His chief contribution was his theory of the stages of economic development. Every nation, he says, passes through the stages of pastoral life, agriculture, commerce and manufacturing, but not all nations are in the same stage of develop¬ ment at a given time. Hence the government should assist a people who wish to pass from a lower to a higher stage against the competi¬ tion of those nations which had already attained their full industrial growth. Practically he ad¬ vocated protection for undeveloped (Germany against industrial England. His doctrines had great influence upon German thought.

Henry C. Carey (1793-1879), an American writer, was also a protectionist and a nationalist, and on both these grounds criticized the teach¬ ings of the classical school. The best ex¬ position of his views is to be found in his *^Principles of Social Science.^ His main argu¬ ments in favor of protection are, first, that rnanufactures would develop association and diversity of interests, by which civilization would be better promoted than by agriculture alone. His second

argument was more original, and is based on the necessity of returning to the soil what is taken from it. If a country exports foodstuffs and raw materials in ex¬ change for manufactured goods, it depletes the soil and the land soon becomes exhausted; the ideal is a community where manufactures and agriculture are carried on side by side. He also attacked the Ricardian theory of rent and the Malthusian doctrine of population. Carey exer¬ cised considerable influence in the United States by his writings.

0) Socialist Critics. — The third group of critics of the classical school was the early socialists. Most of these were French. Ortho¬ dox economists had always treated private property as an inevitable and necessary institu¬ tion. Now, however, we meet a group of writers who attack the ideas of private property and of competition. The Industrial Revolution had wrought sweeping changes in society since the time of Adam Smith and had been followed by many economic maladjustments and evils, such as child labor, low wages and crises. In seeking an explanation of these phenomena the socialists were led to attack the existing system of industrial organization and the economic school which defended it. The most important of these writers were C. H. Saint Simon (1760-1825), Robert Owen (1771-1858), Charles Fourier (1772-1837), Louis Blanc (1813-82) and P. J. Proudhon (1809-65). The first three of these wished to organize the labor force of the country for productive purposes into small associative or cooperative groups by voluntary action. Blanc proposed that the government should assist the establishment of such associa¬ tions by advancing capital. Proudhon would have abolished government. They all attacked the existing institutions of competition, which Blanc insisted was the cause of every economic evil, and of private property which Proudhon said was theft. While often utopian and vision-562

ary they were important as critics of existing economic theory by their attacks on institutions which had been accepted as matters of fact, while their insistence on the social nature of production was a valuable corrective to the uidividualistic tendencies of the classical school.

Mill's Restatement. — Modern economic sci¬ ence had first been formulated by Adam Smith; since his time Ricardo had added his theory of rent, Malthus his theory of population and Senior that of abstinence. On the other hand various writers had attacked certain phases of his teachings or had modified certain conclu¬ sions. And more than all the Industrial Revo¬ lution had completely changed the economic world which Smith described and had brought new problems to the front. The time was now ripe for a restatement of the principles of economics which should take account of all these changes. In John Stuart Mill (1806-73) such an expositor was found. His book, ˆPrin¬ ciples of Political Economy, with some of their Applications to Social Philosophy, > published in 1848, combined and organized all that was enduring in his predecessors' work. It is ex¬ tremely logical and well written, but contains little that is original. As the clearest statement of English classical economics we may note its main teachings.

Self-interest was accepted as the motive to economic activity. Since each individual is the best judge of his own interests individual liberty is essential to economic progress ; state inter¬ ference was therefore disapproved of save in exceptional instances. Value is determined in general by demand and supply. Mill distin¬ guished between normal and market value; at any given time demand and supply determine market value, but in the case of freely re¬ producible goods their normal value is set by the cost of production. His theory of value is therefore a cost theory. The Ricardian theory of rent and the Malthusian doctrine of popula¬ tion were fully accepted, and Mill often de¬ clared that there was no hope of improvement in the lot of the working class unless they checked the growth of population. His theory of wages is essentially that of the wages-fund, which may be stated as follows ; there is a determinate number of laborers who must work and a determinable amount of capital uncon¬ ditionally destined to the payment of wages (i.e., the wages fund) ; this fund is distributed among the laborers solely by means of com¬ petition, and

the rate of wages depends on the proportion between capital and population. Only by encouraging the growth of capital by means of saving, or by discouraging the growth of population, can the equation be favorably modi¬ fied and wages raised. Mill made a real con¬ tribution to economics by his development of the Ricardian theory of trade — it is not the difference in absolute costs of production as be¬ tween two countries, but in comparative costs, that determines international trade ; foreign trade is therefore an advantage to all countries, but especially to backward ones. He did not give any space in his book to the subject of consumption, which finds a large place in mod¬ ern works, but he showed himself very sym¬ pathetic with the demands and aspirations of the working classes. Indeed in his later years he recanted the wages-fund theory and took a long step toward socialism.

With Mill's ˆPrinciples' the teachings of the classical school reached their climax and from now on we meet with increasing dissent from and modifications of its ideas. Exceptions may be made in the case of J. E. Cairnes (1824— 75), whose chief contribution lay in his theory of non-competing industrial groups, which limited the scope of competition to a much smaller area than that usually assigned it; of Michel Che¬ valier (1816-79) of France, and of the Swiss A. E. Cherbuliez (1797-1869). The reaction showed itself most prominently in Germany where the teachings of the classical school had never been accepted as fully as they had been in England and in France. To Germany, there¬ fore, we must look for the next forward move¬ ment in economics. This was contributed by the historical school.

The Historical School. — Three names are usually associated with the rise of the historical school in Germany, those of Wilhelm Roscher (1817-94), Bruno Hildebrand (1812-78) and Karl Knies (1821-98). They expressed their disagreement first of all with the abstract de¬ ductive method of the older school and insisted that the proper method was inductive and his¬ torical. Later writers of this school, as Gustav Schmoller and Karl Bucher, have laid less stress upon this point, and modern scholars no longer concern themselves with this barren con¬ troversy. As Schmoller says, ˆTnduction and deduction are both necessary for the science, just as the right and left foot are needed for walking.®ˆ Another point of disagreement was their denial of the existence of economic laws. Influenced by Hegelian philosophy and later by the theory of evolution they emphasized the relativity of such generalizations, and pointed out that so-called economic laws are provisional and conditional. On this point there would be little

disagreement to-day; the only question would be as to what name to apply to such economic tendencies. The historical school also criticized the hedonistic psychology of the earlier writers and asserted that man is influ¬ enced even in economic activities by other con¬ siderations than those of self-interest. Perhaps it is putting the case too strongly to say, as M. Rist does, ˆflhis newer historical conception came to the rescue just when the science was about to give up the ghost, . . , infusing new life into the study,® but they certainly offered a valuable corrective to the abstract tendencies of the classical school and have led to a great interest in economic history.

The Psychological School. — Another school which has played a very important part in the development of recent theory is the Austrian or psychological school. They em¬ phasize the importance of subjective factors and analyze value on the basis of utility. While the first economists to emphasize' these features were a German, H. H. Gossen (1810-58), and an Englishman, W. S. Jevons (1835-82), it remained for an Austrian group to apply their subjective theory of valuation to all the factors of production, and to develop consistent theories of interest, wages and profits. The foremost members of this school are Carl Menger, F. von Wieser and E. von Bohm-Bawerk (1851-1914). Their main contribution has been their analysis of value, which they have clarified by the concept of marginal utilitv. Value rests on utility and relative scarcity, or to put

it in the words of Wieser, *the value of a single good out of a store is determined by that useful service which is the least important among those afforded by the store.® Mill's cost of production theory of value is rejected, or at most cost has only an indirect influence ; value rests on subjective utility. The Austrian school also extend their theory of value to the means of production and even to problems of distribution. The application of the utility theory to the problem of interest was made by Bohm-Bawerk, but it has remained for Ameri¬ can economists to apply it to problems of money, wages and profits. Among these may be men¬ tioned J. B. Clark, I. Fisher, S. Patten, T. N. Carver and F. A. Fetter. This school has con¬ tributed to the advance of economic science .by emphasizing the subjective elements in con¬ trast with the classical school, but in sympathy with them and in contrast with the historical school they have reverted to the usq of the deductive method. Out of the discussion be¬ tween these various groups however it has be¬ come clear that, just as both inductive and deductive methods are needed, so both objectiye and subjective factors must be considered in the problems of economics. '

Modern Socialism. — As critics and antag¬ onists to all these schools stand the socialists, who since the day of Karl Rodbertus (1805-75) have become more scientific and less utopian. Rodbertus propounded a notable theoryˆ of crises, which he thought were due to insufficient purchasing power on the part of the laboring classes ; poverty and crises can be avoided only by the socialization of property. More import¬ ant was Karl Marx (1818-83) whose book ˆDas KapitaP became the veritable bible of the socialists. He held a labor theory of value, which led him to conclude that profits and in¬ terest and rent are robbery, and that socialism is both inevitable and necessary. Socialistic criticism has been valuable in overthrowing the conception of a natural order, in develop¬ ing the social viewpoint, and in leading to greater emphasis upon distributive justice, which, while never overlooked even by the classical school, had not received the attention it merited.

Economic Thought in the United States. —

Recent years have seen in the United States a development of economic thought not surpassed in any country. With the exception of H. C. Carey, American economists had usually fol¬ lowed the teachings of the classical school, until the brilliant writings of F. A. Walker (1846-97), who attacked the wage fund theory and developed the idea of enterpriser's profits. The formation of the American Economic Associa¬ tion in 1885 was a sign of the growing interest, and this has been followed by the establishment of half a dozen journals devoted to economic affairs. As might be expected in a new country, which was rapidly developing and whose natural resources were being exploited, there was con¬ siderable revolt against the pessimism and ab¬ straction of the classical school. Many of the members of the rising group of writers had received their economic training in Germany and were in sympalhv with the historical school. And finally the theories of the Austrian school have been accepted and carried forward by still another group. So that the development of economic thought in the United States parallels

that which has taken place elsewhere, but has been characterized by much that is original and noteworthy. Among those who may be mentioned as having established a claim to recognition are H. C. Adams, T. N. Carver, J. B. Clark, J. R. Commons, R. T. Ely, H. J. Davenport, D. R. Dewey, F. A. Fetter, I. Fisher, A. T. Hadley, E. J. James, D. Kinley, J. L. Laughlin, S. Patten, E. R. A. Seligman, F. W. Taussig and T. Veblen.

Conclusion. — It is difficult to draw any con¬ clusions from an account of the development of the science of economics, for the one outstand¬ ing fact in this study is that it has been full of change and that the end is not yet. Out of the conflict of ideas however there has de¬ veloped a body of knowledge which affords a common ground for all and constitutes the science of economics of to-day. The subject matter of this science, so far as it is a pure science, has moreover narrowed, having sloughed off such subjects as political science and soci¬ ology, now treated independently. In one re¬ spect it seems to have completed the circle ; start¬ ing with theological conceptions it gradually eliminated all motives but the purely economic ; but recently, under the influence of the social¬ ists and of a greater humanitarianism, ethical considerations are being given more emphasis, at least in the practical application of economic principles.

Bibliography. — Cannan, E., ˆA History of the Theories of Production and Distribution in English Political Economy from 1776 to 1848ˆ

(London 1893; 2d ed., 1903); Cossa, L., ˆAn Introduction to the Study of Political Econ¬ omyˆ (translated from the Italian by L. Dyer, London 1893) ; Davenport, H. J., ˆValue and Distribution, a Critical and Constructive Studyˆ (New York 1908) ; Eisenhart, H., ˆGeschichte der Nationaloekonomieˆ (Berlin 1881; 2d ed., 1891) ; Gide, C., and Rist, C., ˆA History of Economic Doctrines from the Time of the Physiocrats to the Present Dayˆ (translated from the French by R. Richards, Boston 1915) ; Higgs, H., ˆThe Physiocratsˆ (London 1897) ; Haney, L. E., ˆHistory of Economic Thoughtˆ (New York 1911); Ingram, J. K., ˆA History of Political Economyˆ (Edinburgh 1893) ; Price, L. L., ˆA Short History of Political Economy in Englandˆ (London 1890; 4th ed., 1903) ; Roscher, W., ˆGeschichte der Nationaloekonomie in Deutschlandˆ (Leipzig 1874) ; Schmoller, G., ˆThe Mercantile System and Its Historical Significanceˆ (New York 1896).

Ernest L. Bogart,

Professor of Economics, University of Illinois.

ECONOMICS AND THE WAR. When in the early autumn of the year 1914 the Great World War was forced upon the world by the joint action of Germany and Austria-Hungary, the great powers had been at peace with each other for a period of nearly 50 years and during this interregnum of the war lords, economic conditions, including especially domestic production, monetary and banking systems, international trade and the various other institutions of an organized economic life had become stabilized by the relatively un¬ changing demands of a world at peace. The mobilization for war radically changed, almost in the twinkling of an eye, the conditions under which the economic life was thenceforth to be

carried on, and as a necessary consequence the economic life itself. Economic customs and institutions hoary with age and venerated and perpetuated because they had been useful under other conditions were continued without ques¬ tion, then questioned, then abandoned as the requirements of war were found to differ from those of peace. While war is destructive of human life and the savings of the past, it is also and in no less measure the destroyer of outgrown institutions and customs and the creator of new ones, some of which may prove permanently beneficial, while others may be dis¬ carded as mistaken attempts to meet the changed conditions. When the German War Council met at Potsdam on 5 July 1914, it was attended by the great bankers, railway directors and the captains of industry as well as by the war lords and the representatives of the state. The representatives of every line of activity, finance, transportation, trade and industry as well as the army and navy were solemnly asked by the Kaiser if they were ready for war, and all except the financiers replied in the affirma¬ tive.* The financiers were not ready, they must have two weeks to make the final prepara¬ tions for the great war. The reason given by Wangenheim in his account of this historic conference was that the bankers must have time to sell foreign securities and to make such loans as might be necessary to prepare their banking institutions and their other financial interests for the initial shock of the war. The request of the financiers was granted and the Serbian ultimatum postponed for the period named to give the banking institutions time to arrange their loans and to convert their foreign securities into gold or credits as nearly liquid as they might find feasible. This financial moratorium while not so important as many events which took place during the war clearly illustrates an important principle. War separates or tends to separate the nations en¬ gaged in the conflict from each other, severing the economic ties which bind them, and forcing them to adopt either one or both of the follow¬ ing plans : first, they may seek to establish eco¬ nomic relations with countries other than those with which they have been trading, or second, they may attempt to provide for all their own wants by diversifying their own industries until as nations they have become entirely self-suffi¬ cient. During the World War both of these expedients were adopted. For the past half century, Germany has, by the conscious effort of her government, adopted the policy of using economic pressure to force her citizens to pro¬ vide more and more fully and com.pletely for their own wants. During a much longer period, England has

specialized as a producer of a limited number of commodities and has relied upon her ability as an international trader to exchange a part of her products for such other commodities as she needed for a fully developed economic life. When war was declared, Ger¬ many ordered her navy and merchant ships to seek safety in the most convenient ports and thereafter she and her allies telied upon their own diversified production together with such neutral trade as was able to gain access to her markets to provide for the wants formerly sup¬

plied by imports from all parts of the globe. England, France and the United States on the other hand adopted, partly by necessity, partly by choice, the policy of keeping the seas open to their merchantmen and developing their inter¬ national trade as never before. As the war developed Germany built both battleships and merchantmen as a preparation for the trade competition that she felt would follow the con¬ clusion of the war. The allied nations were forced to do the same as a necessary condition of carrying on the war at all. This in itself caused a profound change in the economic life of the United States and intensified the most marked economic characteristic of English in¬ dustry and trade. The change referred to quite early began to have its immediate effects and its after effects were even more significant. To carry on international trade, ships are necessary and if a nation is to be at all independent, it must provide its own. At the beginning of the war, the United States possessed a fairly strong navy and a considerable fleet of ships suitable for coastwise traffic. During the first two years and a half of the war, the United States was called upon to supply the warring nations with food, raw materials and such manufactured products as she was able to supply in ever-increasing quantities. It is of course stating a self-evident fact to say that the United States could not grow wheat and build ships with the same identical labor and capital ; that as she built more ships she must grow less wheat and mine less iron and coal and that consequently her creative power was diverted by the demands of war from the production of food and materials to the building and sailing of ships.

That the after-effects of the increase in tonnage and the new avenues of international trade thus opened up by the war will prove to be permanent factors in our economic life is hardly open to doubt. Our ships, built to help win the war, are being used in promoting the interchange of goods between the United States and other nations, which by reason of their geographical situation, soil and climate, or the peculiar training of their people, are able to produce for us goods that we cannot so well produce for ourselves. International trade pro¬

moted by the war did not cease with its termi¬ nation. This is shown by the fact, that the foreign trade of the United States according to import and export returns increased from $4,258,- 504,805 in 1914, $4,442,759,085 in 1915, $6,531,-

366,390 in 1916, $8,949,403,579 in 1917, $7,865,-

366,774 in 1918, $10,328,002,754 in 1919, to $13,- 349,661,401 in 1920.

The first effect of the war was to check in¬ ternational trade, but not for long. Soon the demands of the nations at war for war ma¬ terial began to be felt and with this demand in¬ ternational trade began to revive but at the same time its character changed both in quan¬ tity, in direction of flow and in kind. In the

case of the United States the war checked ex¬

ports to such an extent that for August 1914, the balance of trade was against us by over $19,000,000. Late in September foreign buyers began to appear and gradually exports began to flow out in ever-increasing quantities until limitations imposed by lack of shipping served to cause a temporary check. In September 1914, the balance of trade was again in our

ˆ Morgenthau the World's Work, June 1918.

favor and for the last five months of the first year of the ˆ war the total excess of exports from the United States over imports was $264,- 000,000. Despite the submarine warfare, the lack of shipping and the high rates for freight and insurance, both exports and imports con¬ tinued to increase year by year and generally month by month until in July 1918 the total of our foreign trade approached $10,000,000,000 per year with an excess of exports of over $3,250,- 000,000. The following table shows the import¬ ant facts in regard to the quantity of our in¬ ternational trade during the war years :

International Trade of the United States

(In millions of dollars)

	1914				
	Aug.-Dee.	1915	1916	1917	1918
Exports .	913	3,559	5,481	6,226	5,928
Imports .	649	1,779	2,392	2,952	2,946
Excess of exports.	264	1,776	3,089	3,274	2,982

If now we compare our exports and imports during the war with those of the period of equal length immediately preceding the out¬ break of hostilities, it is possible to show how much and in what ways our external trade has been affected.

International Trade of the United States

(In millions of dollars)

Exports

Raw materials .

Food stuffs .

Manufactures .

Miscellaneous .

1 July 1910 to

30 June 1914

2,961 1,738 4,212

173

1 Aug. 1914 to

31 July 1918

2,733 4,852 11,526 563

Change per cent

*8

179

174

225

Total .

9,084

19,674

116

Imports

Raw materials .

Food stuffs .

Manufactured goods. , Miscellaneous .

2,336

1,661

2,829

61

3,913

2,521

3,058

1,066

67

52

8

1,647

Total .

6,887

9,558

38

Balance .

2,197

10,016

355

* Decrease; all others

increases.

From these tables it may be noted that while our imports increased in each of the four great classes into which the commodities are here grouped, the marked increases are confined to raw materials and food. With re¬ gard to the exports the effect of the war was to lessen the export of raw materials and to increase measurably both foodstuffs and manu¬ factured goods. Comparing the two periods with respect to the quantity of international trade, it may be noted that while the total of both exports and imports more than doubled, the balance of trade for the four years of the war was almost five times that of the preceding four years. The change in the character of the trade necessarily affected our industries by throwing new burdens upon those where the bal¬ ance of trade in our favor increased most rapidly. How well our agricultural classes and our manufacturers met the call upon them is evidenced by the partial failure of the railroads and the shipping facilities to move the goods to the ports and across the Atlantic as fast as they were made ready for the transportation agencies.

The increasing balance of trade in our favor, proving our power to assist in feeding, clothing and arming the nations at war while at the same time providing for our own needs, raised questions in international finance that before the war had been thought to be of little practical importance. Writers on international trade have generally taught that exports from any country are limited by its ability to pur¬ chase goods in exchange, for the reason that otherwise the country exporting becomes short of goods and overstocked with money, thus making goods dear and money cheap. The exporting country then becomes an importer, exchanging its surplus money for

the goods which it needs and the balance of trade then turns against it. Before the war the United States was using the credit due it from the ex¬ cess of its exports in various ways. In the first place, it was hiring its goods freighted across the water in the ships of other nations and it was also to a large extent purchasing insurance of the English and German com¬ panies. In the second place, it was paying in¬ terest on approximately $6,000,000,0(X) of Euro¬ pean capital that had been invested in American railways and other industries. In the third place remittances to friends and travel in European countries accounted for another portion of con¬ siderable size; and in the fourth place, it im¬ ported regularly a small amount of gold the last resort in settling foreign trade balances. When the balance in our favor continued to grow despite the use of the ordinary methods of settle-rnent it become evident to the American finan¬ ciers as well as to those representing the various European countries with which we were trading that other means of adjusting our growing credit must be employed. The first means actually used was the repurchase of American securities. At first it was feared that securities held abroad would he dumped in quantities upon the market at a time when conditions for their purchase were so unfavorable that the prices would break far below intrinsic levels and to guard against such a catastrophe the stock exchanges in all the leading commercial countries were closed for a time. It was, however, found that the Euro¬ pean holders were loth to part with their Amer¬ ican securities and when after borrowing and purchasing a considerable quantity for the pur¬ pose of securing a loan the English government thought it desirable to support sterling exchange by the further sale of securities it was found necessary to impose a special tax of 10 per cent upon the income of all foreign securities held in England in order to encourage their holders to part with them and thus help settle the debts arising from the excess of imports. Mr. Loree's investigations showed that of the $5,000,000,000 to $6,000,000,000 of American securities held abroad at the beginning of the war only about $1,000,000,000 were repurchased before 30 June 1915, and not over $1,250,000,000 were sold here during the period 1 Aug. 1914 to 31 Jan. 1917. The difference between the value of the exports and the value of the imports, plus freights, in¬ surances, remittances to Europeans, travel in foreign countries, the value of purchased securi¬ ties, and the importation of gold, notably in the latter part of the year 1916, was paid for out of the proceeds of loans placed in this country directly or through the medium of the United State government.

Within a country at war, the changes in its economic life are pronounced and permanent From the economic standpoint, the human life that is sacrificed by war either permanently or for the period of the conflict reduces the pro¬ ductive power of the nation by the amount thus sacrificed. With regard to capital the same prin¬ ciple holds true. Land, labor power and capital united into working units are the producing agencies in every stage of economic activity. War has a double effect upon all these. It de¬ stroys and it diverts. It uses land for war pur¬ poses, thus preventing its use for productive ones. Land devoted to camps, cantonments and aviation fields cannot at the same time grow corn and wheat; land over which a battle has raged for some length of time is thereby ren¬ dered temporarily unfit for agricultural pur¬ poses, as witness northern France and parts of Belgium. War first diverts a considerable por¬ tion of the labor power from the work of crea¬ tion to that of destruction, and during the process the labor power thus diverted is ac¬ tively engaged in destroying the labor power of the enemy and the capital of both. With capital the same general conditions prevail. A considerable portion of our capital was during the four years of the war exclusively em¬ ployed by and devoted to the claims of war. An excellent illustration is furnished by the cotton situation. The 1914 crop was an un¬ usually heavy one and the sudden interruption of industry caused by the war lessened the normal demands of the trade so much that a cotton pool was formed for the purpose of loaning $135,000,000 to those wishing to hold their cotton and thus prevent the ruinously low prices that would be likely to result. As soon as the war was well under way the demands for cotton for war purposes became sufficiently urgent to counteract the lessened demand from the ordinary trade so that the pool was dissolved after having loaned only $28,000.* After 1915 the price of cotton, owing to its use for ex¬ plosives as well as for clothing, rose to new high levels and the problem became one of furnishing cotton rather than of providing an artificial market to prevent prices falling below the cost of production.

When land, labor and capital are working together in proper proportions and the units thus formed are wisely directed, ‘not only is pro¬ duction at a maximum, but, what is almost if not quite of equal importance, the three factors of production share the results of their joint efforts in fairly equitable proportions. War as a destroyer does not always act impartially. Sometimes it destroys men faster than it

de¬ stroys capital. Sometimes the reverse is true. In almost every case, land as a factor of pro¬ duction suffers less than either of the other two factors. When men, and consequently labor power, are destroyed faster than capital, the labor element in production becomes deficient in quantity and hence in response to the urgent demand for more labor power, wages rise rela¬ tively to the rate of interest; conversely, when capital is destroyed or diverted from produc¬ tive uses faster than labor power embodied in man, then the interest rate rises faster than the rate of wages. Attention should be called to the fact that it is always the net available

* Bulletin, National City Bank, March 1915, p. 8,

supply of labor and capital that is referred to. If the productive power of the laborers is augmented by an increase of speed, if machines are operated more continuously, each of these methods of increasing efficiency will counteract the absolute loss of men and n ichines. During the World War, the diversion and destruction of men and capital caused both wages and in¬ terest to rise, while rents in relation to wages and interest, except in areas crowded as a re¬ sult of peculiar conditions, relatively fell. Whether wages rose more rapidly than interest or the reverse has not yet been demonstrated owing to the inherent difficulties of determining the rate of wages.

A. The direct effect of the unprecedented destruction of capital was reflected in the rate of interest. A somewhat less direct but none the less important effect was observed in the speeding up of industrial establishments and the increased efficiency with which capital was used. A third effect was found in the various expedi¬ ents adopted to prevent the investment of new capital in any industries except those which were essential to the successful prosecution of the war.

(1) Immediately after the outbreak of the war interest rates were not only high but were also unduly fluctuating and as a result various means of stabilizing the rate and preventing its rise to abnormal heights were discussed and some attempts to control the rate were in a measure successful. In general, however, the fears of financiers and the large borrowers were never realized, for while the rate of interest advanced as a result of the destruction of capital by the war, the advance was much less than was early predicted. Take for example the discount rate of the Federal Reserve Board; 31 Dec. 1914, the New

York rates were as follows: for 30-day paper, 4ˆ2 per cent, for 60-and 90-day paper, 5 per cent ; on 24 Miay 1918, the rates were: for 16-to 90-day paper, 43/4 per cent. In the commercial paper market the advance was somewhat marked especially during the year 1917-18. In August 1917, the rate for standard commercial paper was 5 per cent ; one year later, it was 6 per cent. The bond market also showed a gradual increase in the interest rates. In December 1915, 40 standard bonds, selected for comparison by the Wall Street Jownal, were selling at an average price of 94.03 per 100. In December 1916, the same bonds were selling at 94.97, a slight advance. In October 1917, they had fallen to 86.73 and on 29 April 1918 to 83.61. During the same period, the return on standard government bonds advanced from an average of less than 4 per cent to an average of nearly 5 per cent.

(2) While it is practically impossible to m.ake any complete estimate even of the in¬ creased productivity of industrial establish¬ ments resulting directly or indirectly from the threatened shortage due to the destructive effects of the war, it is, however, easily demonstrable that during the Great World War, as during those of preceding generations, our own in¬ dustries as well as those of Germany, Austria, Italy, France and England renewed their youth as it were and in many cases increased their productive power rapidly enough to more than neutralize the loss of capital resulting from the war. When the second great English war loan was floated, at that time called the greatest

financial transaction in history, it was generally assumed in England and feared in this country that a flood of American securities held in Eng¬ land for investment would be thrown upon the market and that as a result our own security market would be thrown into confusion and values established by years of favorable earn¬ ings would be suddenly sacrificed. As a mat¬ ter of fact the loan was floated at per cent and sold at par without seriously affecting the domestic or international market. So great was the productive power of the people of the United States that during the year 1916 they not only financed their own industries at a fairly reasonable rate of interest, but in addi¬ tion purchased approximately $1,000,000,000 of foreign securities and repurchased a much larger amount of securities* of American corporations formerly held in European countries. And after the United States became a participant in the war, she financed her own loans and assisted her allies without at the same time disturbing either her savings bank deposits or her invest¬ ment in foreign enterprises. Indeed so much had the net income of the United States in¬ creased during the war, largely as a result of increased efficiency of capital and labor and their rnore harmonious cooperation that when the third Liberty Loan of ˆ,170,079,065 was taken in May 1918 by over 17,000,000 subscrib¬ ers it was generally remarked that the money market was scarcely ruffled while the price of standard bonds was quoted as firm and advancing.f In addition to the repurchase of securi¬ ties and the subscriptions to foreign and domes¬ tic loans, the American investment market ab¬ sorbed during the year 1916, according to the tables compiled by the Journal of Commerce, over $3,500,000,000 par value of domestic capital issues.

(3) The increase of production and the maintenance of reasonably low interest rates was not achieved without conscious effort on the part of both citizens and the government. Our citizens quite generally eliminated unneces¬ sary expenditures and confined their consump¬ tion to the essentials of an efficient life. They were thus enabled to produce more while con¬ suming less. Those who were able to save something each month and each year quite gen¬ erally used better judgment in investing their earnings, although there was, as always in

the past, a strong tendency to take a chance on en¬ terprises supported wholly or almost wholly by the glowing promises of their promoters. It was, however, chiefly by organized effort that the investment of new capital was more wisely di¬ rected. Early in the war, bankers' associations, chambers of commerce, clearing-house associa¬ tions and other organized groups of the smaller as well as the larger investors began to preach the doctrine that to win the war every dollar must be placed where it could do the most good. In this work the Investment Bankers' Association performed a most valuable service. It first formed a capital issues committeet and then entered upon a campaign to secure the cre¬ ation by the government of a commission whose function was to be to prevent the invest¬

*From 1 July 1915 to 30 June 1916 a conservative estimate was SI. 500, 000, 000.

f Bulletin of the National City Bank, June 1918. j/. B. A. of Bulletin, vols. IV, V and VI.

ment of new capital in non-essential lines. This movement to conserve capital by directing its investment into the more needed lines was in¬ augurated by the British government early in the war and through the efforts of the bankers and the Secretary of the Treasury* the Federal Reserve Board established in the latter part of the year 1917 a voluntary plan for passing upon capital issues of $500,000 or over in the case of corporations and $250,000 or over in the case of States, counties and municipalities. This Capital Issues Committee of the Federal Re¬ serve Board was, however, not intended to be a permanent feature, for in the annual report of the Secretary of the Treasury for 1917 a plan for a war finance corporation was outlined, an institution which was intended to assist in the financing of essential industries as well as toˆ restrict the flow of new capital into the non-essential ones. The plan of the Secretary of the Treasury met with some opposition but after its purposes were fully explained, it was passed by Congress early in April and on the fifth day of the month was approved by the President.f The War Finance Corporation Act created a corporation with $500,000,000 capital stock, all subscribed by the government, and empowered it to borrow on its own bonds. not more than six times its paid-in capital. With the funds thus secured it was authorized to loan under conditions stated at length in the act to bank¬ ing institutions and in certain exceptional cases

directly to corporations. As a supplement to its financing power, the act authorized the President of the United States to appoint a Capital Issues Committee, three of whose mem¬ bers should be chosen from among the mem¬ bers of the Federal Reserve Board. This committee was authorized by the act to ®investigate, pass upon and determine whether it is compatible with the national interest that there should be sold or offered for sale or for sub¬ scription any issue or any part of any issue of securities hereafter issued by any person, firm, corporation or association, the total aggre¬ gated par or face value of which issue and any other securities issued by the same person, firm, corporation or association since the passing of this act is in excess of $100,000.$® After the creation of the War Finance Corporation with its auxiliary capital issues committee it may be affirmed that comparatively little of the new capital created by American industry was squan¬ dered, and conversely that substantially all of it was devoted to industries essential to the effective prosecution of the war.

B. As in the case of capital, war diverts labor from productive industries to the work of de¬ struction and after having accomplished its immediate purpose proceeds to kill, maim and invalidate a portion of those whom it has thus diverted. In this respect the effect of war on labor is entirely similar to that which it has on capital. There is, however, one marked difference that must not be overlooked, viz., the longer period generally required to replace the labor power which has thus been destroyed. A fleet of ships or a squadron of airplanes can be created from existing raw material within

♦Hearings before the Committee on Finance, United States Senate, 65th Congress, 2d Session, on S. 3714, p. 9. t Public. No. 121, 65th Congress, S. 3714. t Public. No. 121, 6Sth Congress, sec. 203, p. 9.

a period of from one to two years — ‘ but for a new army a nation must wait for its children to grow to men. As a necessary consequence of this well-known fact, the rate of wages is ordinarily more vitally affected by a war than the rate of interest and the World War was no exception. At the beginning of the war, in¬ dustry was necessarily disorganized and during the period of readjustments that followed a large number of workingmen were laid off and unemployment threatened to become a serious menace to industrial peace. Just as gold pools and cotton pools were formed by the financial interests, so commissions on un¬ employment were formed in the larger cities to study the questions involved and to formulate plans for providing the unemployed with op¬ portunities for earning a living. So early in the war as the winter of 1915 it was estimated that 2,000,000 wage-earners in the United States were without employment, although, as a result of the war, immigration from Europe had al¬ most entirely ceased. This situation was, how¬ ever, only temporary. By June 1915 the call for skilled mechanics exceeded the supply and common labor began to be short in the mines and the shops of Pennsylvania and West Virginia. By August, labor troubles began to loom up seriously, owing to the scarcity of labor, the consequent high wages offered to secure laborers by rival industries and rival plants, and the failure to advance wages of employees that had been continuously employed by individual establishments for a period of years. In England the labor situation became so menacing to national efficiency that in De¬ cember 1915 a joint conference was called to consider the labor question and the demands of the wage-earners for increased pay. This conference was participated in by representa¬ tives of the government and of the labor unions and served to call attention to the underlying principles of the whole question of rising wages and the effects of such increases upon prices of products. Fortunately for England and the cause of the allied nations the labor situation was considered at this and other similar meet¬ ings in connection with its relationship to the national efficiency and the problems of war and as a result a system was gradually adopted of basing wages upon the general average of prices of commodities from month to month. After the early part of 1916 the expansion of the industries in the United States was lim¬ ited more by labor shortage than by the lack of necessary capital. The shortage of labor was especially felt by the railways and seizing the favorable opportunity the railway trainmen be¬ gan a campaign to secure an advance in wages as their fellows in the steel and textile

mills had already done. In the spring of 1916, the shortage of labor extended to the farms and by May of that year it was generally considered that the labor shortage was the most important question in the industrial world. The advance in wages granted by the United States Steel Corporation for the 10-year period ending with the summer of 1916 is illustrative of the move¬ ment of wages in an expanding industry in response to a rising price level and an increas¬ ing shortage of labor due to the war. On 1 Jan. 1907 the United States Steel Corporation increased wages by 7 per cent ; in 1910 by 6ˆ4 per cent; in February 1913 bv 10 per cent; on

1 February, on 1 May, and again 1 Nov. 1916, 10 per cent ; on 1 May and again on 1 Oci. 1917, 10 per cent; while in March 1917 the steel companies generally advanced wages of common labor by 15 per cent. Advances in other lines were perhaps less frequent and in some cases less rapid, but in every line the ad¬ vance was marked, especially so in the essential industries, such as the railways, textiles and the mining of coal. As already stated the railway trainmen began their campaign for an increase in wages early in 1916 and in April of that year a conference between their represen¬ tatives and those of the railways was held for the purpose of considering the demands of the railway labor unions, which, stated in its simplest terms, was for an eight-hour day. The demands translated into actualities really amounted to an increase of wages owing to the obvious impossibility of rearranging the runs of the trainmen in such a way that each could be given a working day of eight hours. _ The result of granting the demands of the railway trainmen's unions must necessarily be to in¬ crease their pay by increasing the amount of overtime work, a result that was actually achieved in September 1916 by the passage of the Adamson bill and its subsequent approval by the Supreme Court of the United States. In the copper industry, one of those most af¬ fected by the war, the demand for labor ex¬ ceeded the normal supply and after April 1917 especial efforts were made to prevent the shortage of labor from interfering with the supply of copper necessary for the suc¬ cessful prosecution of the war. For the first three years of the war a plan of basing wages upon the price of copper was followed with favorable results. During the year 1917, owing to German propaganda on the one hand and to the artificial control of the price of copper by the government on the other, the wage situation became alarming in certain dis¬ tricts in the West ; strikes and their attendant incidents becoming the order of the day, with the result that a serious shortage of an essen¬ tial article was feared. Fortunately here as in other industries the good sense and patriotism of our citizens, laborers and

managers alike, re-established peaceful relations and the threat¬ ened disaster was averted. As for the other industries, such as the manufacture of brass goods not directly used in war, automobiles, hardware, etc., the demand for men in the war industries was so abnormal that every em¬ ployer of labor in the less essential occupations was obliged to advance his scale, following often somewhat behind that established by the essential industries in order to hold his force at all.

The shortage of labor power caused by the demands of the war had the direct effect of checking production and advancing wages. The economic effects however did not end here. There were other results, less direct but none the less important, that followed. The more important of these indirect effects were, first, the speeding up of labor's pace; second, the introduction of women into various voca¬ tions hitherto exclusively or almost exclusively occupied by men; and third, the forced di¬ version of labor from the less essential voca¬ tions to the more essential ones by the action of the various governments engaged in the war.

Each of tliese movements is so important that anything approaching a clear and comprehen¬ sive discussion of its causes and results would call space beyond the limits permissible here and on ˆ this account those interested in such economic developments are referred to the books and pamphlets on the several sub¬ jects,*

ˆ It is, however, not in international trade, nor in the relationships of capital and labor to each other and to the other economic activities , that the World War has had its most far-reaching effects. Of all the economic phenomena, prices of commodities are most easily affected by economic changes and on this account it is here that war accomplishes its most important economic results.

The Civil War, it will be recalled, was ac¬ companied by a rapid increase in the price level and was followed for a period of 30 years by a continuous decline. Beginning about 1896, as a result of

improvements in smelting and the opening up of new mining districts, the output of gold increased so rapidly that the downward trend was converted into an up¬ ward movement that still continues. By 1904 prices had ascended to a level substantially equal to that of 1860 and by 1914 the general level was approximately 50 per cent above the low point of 1896. After the outbreak of the World War prices continued to rise at an unprec¬ edented rate until at the time of the armistice, November 1918, the general level was estimated by the United States Bureau of Labor Statistics to be somewhat over 90 per cent above that prevailing in 1914. The basic causes of the rise in prices both before and during the war are well understood. Prices are the rates at which goods exchange for money and conse¬ quently anything that makes goods relatively scarce and money relatively plentiful causes prices to rise. The primary economic effect of war it must not be forgotten is to cause com¬ modities to be used up more rapidly than be¬ fore and at the same time to lessen the pro¬ ductive power of the nations at war. Com¬ modities then become less plentiful with respect to wants and prices begin to rise. Under nor¬ mal conditions the rise in prices induces pro¬ ducers to work harder and as a consequence goods become more abundant and then prices fall. In times of war, and pre-eminently in a war making such unprecedented demands for arms, munitions, aircraft and other offensive and defensive instruments of warfare, a con¬ siderable portion of the productive forces are engaged in war activities and the remainder are incapable of fully answering the calls made upon them. Food and clothing then become relatively scarce and despiteˆ the efforts of those producing the commodities needed for a comfortable and efficient life, prices continue to rise except where the government inter¬ venes and fixes a maximum beyond which they may not legally go. When the government fixes maximum prices it must at the same times establish priorities, classifying industriesˆ into the essential, the less essential, the desirable and the superfluous, and then by the creation of food commissions and fuel administrations not only see that its scales of prices are observed

♦ Cf. Miss Helen Frazer's recent report on " Women in British industry."

but also that production is stimulated or consumption curtailed or both as the occasion demands.

While commodities continued to grow, relatively speaking, scarce and dear, money as a direct result of the war became relatively plentiful

and cheap. It will be remembered that a part of the balance of trade in our favor was ˆ settled by the importation of gold, thus making the supply of the basic money more abundant than ever before. From the begin¬ ning of the war, our financiers as well as those of England and France exerted themselves to prevent the importation of gold by the United States for the reason that such action caused prices to rise and thus interfered with the sale of our foodstuffs and other commodi¬ ties which we desired to sell and the European nations at war desired to buy. It was for this reason that the British and French govern¬ ments sent a joint commission to this country in the autumn of 1915 to confer with our gov¬ ernment and our financiers with the result that arrangements were concluded by which a series of secured loans were provided for, thus per¬ mitting the sale of our exports without at the same time drawing gold from England and France into this country. Notwithstanding all efforts made to check the flow of gold toward the United States, so strong were the natural economic forces that the importation of this precious metal, while seriously interfered with, was never entirely stopped. Between 8 Jan. 1915 and 22 June 1917, over $1,600,000,000 in gold was imported into the United States from various foreign countries, the larger part of it coming from the nations at war. From the beginning of the war to 31 Dec. 1918, the net gain in our stock of gold resulting from the large excess of imports over exports was one billion dollars worth. The following table shows the imports and exports of gold by the United States during the war years :

(In millions of dollars.)

Period

Imports

Exports

Excess of imports

Jan. 1 to Dec. 31, 1914. .

66 . 538

112,038

*45,500

Jan. 1 to Dec. 31, 1915 . .

171,568

146,224

25,344

Jan. 1 to Dec. 31, 1916. .

494,009

90,249

403 , 760

Jan. 1 to Dec. 31, 1917. .

977,176

291,921

685,255

Jan. 1 to Dec. 31, 1918. .

124,413

190,852

*66,439

1,833,704

831,284

1,002,420

* Excess of exports.

Maurice H. Robinson,

Professor of Economics, University of Illinois.

ECONOMY, Pa., village in Beaver County, on the Ohio River, and the Pennsylvania Rail¬ road, 20 miles northwest of Pittsburgh. The first settlements were made by a colony of ^^Harmonists® who had formerly lived in Penn¬ sylvania, then moved to Indiana, but returned and founded Economy in 1825. Pop. 860. See Harmonists.

ECORCHE (French ˆffiayed®), a figure used for purposes of art study and in which the muscles are represented uncovered by the skin. The ancients appear to have made use of such figures, surviving examples being the statues of Marsyas fla3ˆed by Apollo. Modern artists use ecorche figures of both plaster and papier-mache.

ECOSSAISE, a dance of Scottish origin originally played upon the bagpipes in 3-2 time. Schubert wrote several pieces for the piano.

oUl)

ECREVISSE, the French name for cray¬ fish (q.v.)

ECSTASY, an intense emotional state in which the scope of consciousness appears on introspection to lack all differentiation. It is characteristic of religious devotees. Mysticism is the opinion that ecstasy is a cognitive state, and mystics usually assert that the truest knowl¬ edge, or even the only true knowledge, is that acquired in a state of ecstasy. Ecstasy is not confined to any one religion nor to any one state of civilization — it is shared by the Budd¬ hist monk, the Hindu yogi, the Moslem dervish, the Neo-Platonic sage, the Jewish cabalist, the early Christian martyr, the Swedenborgian and the medicine-man of the Amazonian savage. It is of the most varied nature as to its causes, its physiological and psychological concomitants, and the interpretation which it receives. Intoxi¬ cants, wild orgiastic dances, intent gazing at the navel or crystal globe, the mortification of the flesh, strange postures, the droning repeti¬ tion of sacred words — all these devices and many others are employed to sweep from the field of consciousness all sharply-bounded ideas of particular things, and to lead the soul into a contemplation which finds all its demands satisfied within itself. The state of ecstasy attained by any of these means shows in its concomitants an intimate association with hyp¬ notic phenomena — it is accompanied in certain cases by anaesthesia, the stigmata of the saints, loud irrepressible cries or frenzied dances and visions of the most varied kinds. In the Occi¬ dent, ecstasy is oftenest interpreted as a direct communion with God, an unmediated entrance into the inmost heart of things. The less theistically inclined Hindu regards his ecstatic state rather as a sloughing off of the appear¬ ances of Being and even of the will to be, so that the soul floats away into the blissful non¬ existence called Nirvana. There are many cases where states of an essentially ecstatic character have been attributed to demoniac possession.

Ecstasy is closely related to other forms of very intense emotion. The ecstasy of the Mos¬ lem fanatic is above all a warlike passion, a desire to carry jehad into the lands of the un¬ believer. Ecstasy of the orgiastic variety has very commonly a strong sexual element, as the cult of Dionysos bears witness. The deliberate evocation of ecstasy as a means of inducing a pleasurable excitement is by no means unknown even within the Christian faith, as is shown by the circumstances of many religious revivals. Ecstasy may be associated with objects other

than those of religion. Intense aesthetic con¬ templation often leads to an absorption of the spectator in the work of art so complete as to deserve the name of ecstasy. In such a case the emotional effect of the work becomes so intense as to blot out all thought of the detail by which this effect is conveyed.

The cognitive value of ecstasy is very diffi¬ cult to determine. It is certainly impossible to refute by recourse to the processes of con¬ secutive thought what purports to be the object of a knowledge higher than thought and inde¬ pendent of its norms. Nevertheless, this logical irrefutability of mysticism is by no means a proof of its validity. The fact that the mystic believes with the utmost faith that he has been in communion with God does not in the least show that his mystical experience has not merely

been a general sense of well-being, combined with the apparently amorphous mental content of one in a state of partial auto-hypnosis. So long as the mystic keeps his worlds of descrip¬ tive knowledge and of revelation sharply dis¬ tinct, whether to follow him is a matter for each to decide for himself. However, much of the discursive knowledge that the mystic accepts as guaranteed by his mystical experi¬ ence is not contained in the mystical experience itself, which is for the most part non-discur- sive in nature. The transition between the mystical vision, such as that which appeared to Moses on Sinai, and its interpretation in dis¬ course — the Ten Commandments — is subject to a criticism on the part of reason, to precisely the same extent as any other transition from one item of knowledge to another. The weak¬ est link in the chain that leads from the state of ecstasy to the dogma which claims to have been revealed in this state is the first step from direct immediacy to descriptive knowledge.

Ecstatic states appear frequently as psycho¬ pathic phenomena. Trances are characteristic of hysteria and catalepsy. In general, mystical experiences are most common among those who are abnormal in their mental make-up, or are weak by constitution or long illness, or have recently undergone some strong emotional shock. (See Mysticism; Trance). Consult Achelis, T., ˆDie Ekstaseˆ (Berlin 1902) ; Granger, F., ˆThe Soul of a Christianˆ (London 1906) ; Inge, W. R., ˆChristian Mysticismˆ (Oxford 1899) ; James, ˆVarieties of Religious Experi¬ enceˆ (New York 1902) ; Janet, P., ˆL'etat men¬ tal des hysteriquesˆ (Paris 1893-94; tr. New York 1901) ; Recejac, E., ˆEssai sur les fonde-ments de la connaissance mystiqueˆ (Paris 1897) ; Ribot, ˆLes maladies de la memoireˆ (Paris 1881) ; Starbuck, E. D.,

ˆPsychology of Religionˆ (London 1899) ; Underhill, E., ˆMysticism > (London 1911).

Norbert Wiener.

ECTHYMA, ek-thl'ma, a complication of a number of general disorders manifesting it¬ self as a form of pustular inflammation of the skin, particularly distributed on the extremities, the lower especially, the neck and trunk also often being affected. As a rule the affection begins as a small pimple which takes a rounded outline unless scratched. This pimple develops into an ulcer which is covered with a thick dark crust. The ulcer heals slowly and there is a small scar resulting. The development of the disease is slow, usually running a fort¬ night, and the pimple may be single or appear in crops. There is burning and pain. The comrnon cause of ecthyma is diminished bodily re¬ sistance, such as is found in starvation or in syphilis, tuberculosis, diabetes or anaemia.

ECTODERM, the outer cellular layer of the embryo. See Embryology.

ECTROPION, or ECTRpPIUM, a Greek term meaning an everted eyelid, a turning out¬ ward; an abnormal eversion of the eyelids. It is most frequent in the lower lid. Acute ectropion is due to swelling of the conjunctiva or spasm of the orbiculosis palpebraum muscle. Chronic ectropion is due to scare, paralysis of the seventh nerve or projection of the eye¬ ball. ˆ Senile ectropion is due to shrinking of the tissues of the eyelid. While in acute cases due to swelling ectropion may be treated by

means calculated to reduce this swelling, in chronic cases a plastic operation is the only means of relief.

ECUADOR, a South American republic, bounded on the north and northeast by Co¬ lombia, and on the southeast and south by Peru, and on the west by the Pacific Ocean. The area, including the Galapagos Islands, is about 120,000 square miles.

The cordilleras of the Andes traverse Ecuador, running nearly north and south, with elevated plains between the eastern and west¬ ern mountains, some of the latter forming a sequence that has suggested to geographers two parallel chains. Though there are not here the highest single peaks in the world, or even in South America, there are nowhere else so many peaks of very great height, forming a group. Their equatorial situation gives to these masses of granite, gneiss, schist, trachyte, por¬ phyry, volcanic detritus wholly exceptional con¬ trasts in temperature. This region has been in the past, and is probably to-day, more subject to volcanic disturbances than any other in South America. As an offset to the group of high peaks, the Andean ridges sink downward, forming the lowest pass at any point between Colombia and the southern division of the Andes. The principal rivers of the lowlands of western Ecuador, running from the central region of mountains and high plains to the Pacific, are the Guayas and the Esmeralda. The former empties into the Gulf of Guayaquil. In the ‘eastern lowlands, the Napo and its tribu¬ taries belong to the Amazon River-system. There are numerous small lakes.

The mean temperature of the coast at Guayaquil, etc., is 80° F., that of the interior ranges from 95° F. in the lower valleys to 65° F. or even 50° F. on the plateaus, according to the altitude. The lower slopes of the mountains are torrid ; the highest crests are snow-clad. The elevated valleys of the Andes have a very salubrious climate. They lie at an altitude of from 7,500 to 9,000 feet, where the temperature is moderate and fever unknown. The climate of the capital is temperate and springlike throughout the year, with little vari¬ ation and it is said to be one of the best in the world for the cure of tuberculosis. There are two seasons only, the rainy lasting from Decem¬ ber to

May, and the dry from June to Novem¬ ber. The first meteorological station in Ecua¬ dor was established in 1915. It has* since been in successful operation at the Quinta Nor¬ mal (Agricultural School), near Ambato. Sub¬ stations are now established at Sangolqui, Saquimalag, Latacunga, Pansaleo, Mulalillo, Pil-laro, Palate, Pelileo, Banos, Pilahuin, La Vic¬ toria and El Puyo. They are in charge of the director of the Quinta Normal, where the data are computed and reduced to tables each month, which are published in the Bulletin of the school.

Petroleum, sulphur, gold, platinum, coal, cop¬ per, mercury, lead and iron are plentiful in Ecuador, but of these gold alone figures in the list of principal exports. The Zaruma mines, province of El Oro, are worked on an exten¬ sive scale by an American company. That dis¬ trict contains numerous gold-bearing quartz veins, which were worked by the Spaniards 100 years ago. Along the Santiago, Cochabibi and

Uimbi rivers in the province of Esmeraldas there are placer deposits of gold and platinum is found in conjunction with gold in the Esmeraldas washings. Silver is exported to a small extent.

History. — The Quito Indians, who held the country near the present capital, were con¬ quered, perhaps in the 10th century, by a more warlike race led by chiefs called Scyris. These in turn yielded to the Incas of Peru. On the death of Inca Huayna-Capac, the empire was divided between his two sons, Atahualpa and Huascar. The former, whose mother was a Scyri princess, received the Quito kingdom ; Cuzco and the southern empire were given to the latter. War broke out between the brothers shortly before the Spaniards under Francisco Pizarro arrived upon the scene, and this civil strife made possible the conquest of a great nation by a handful of foreign adventurers. (See Peru). Benalcazar, the famous Spanish captain, completed the conquest of the Scyri kingdom and seized the city of Quito (1534). Between 1564 and 1820 this region was ad¬ ministered as a presidency; and 36 presidents exercised authority there as representatives of Spain before the series of ˆpresidents of the republicˆˆ began. Quito's first demonstration in favor of independence, 10 Aug. 1809, was quickly and savagely repressed. Guayaquil was more fortunate in her belated attempt (9 Oct. 1820). A campaign which resulted in the cap¬ ture of Quito, after the battle of Pichincha, was organized by a triumvirate whose mem¬ bers were the poet, Jose Joaquin de Olmedo, the merchant, F. Roca, and the soldier, Rafael Jimena. The battle of Pichincha was won for the patriots by the

Venezuelan general, An¬ tonio de Sucre, Bolivar's lieutenant. The territory thus liberated was naturally drawn into the Colombian federation, which Bolivar dominated for a time. (See Colombia). In 1830, after the dissolution of that greater Colombia, Ecuador became an independent re¬ public. The convention of Riobamba placed Gen. Juan Jose Flores at the head of the government. His successor (1835-39) was Vicente Rocafuerte. Flores was again in power from 1839 to 1845 and, with the approval of many partisans, tried to secure a much lon¬ ger term and dictatorial powers. A second triumvirate, composed of Olmedo, Roca and Noboa, carried on the government until a con¬ vention was held at Cuenca. This convention elected Vicente Ramon Roca, who served as President from 1845 to 1849. Vice-President Acasubi assumed the Presidency when Congress and the country could not agree upon a candidate; the country, however, continued to be disturbed until 1851, when Diego Noboa was chosen by a constituent assembly. In the fol¬ lowing year he was displaced by Gen. Jose Maria tJrvina, at the head of a successful revolution. Urvina was President until 1856. Slavery was abolished during his term. Gen. Francisco Robles followed (1856-59). During the next two years the country had a varied experience ; war with Peru, the dictatorship of General Franco and the provisional govern¬ ment of Gabriel Garcia Moreno. The conven¬ tion of Quito elected Garcia Moreno to the Presidency (1861-65). Geronimo Carrion, elected in 1865, retired in 1867. Javier Espinosa served from 1868 to 1869. Garcia Moreno, as

the leader of an insurrection, took office again (1869-73), and in 1873 secured re-election by the use of force. He was assassinated 6 Aug. 1875. Antonio Borrero, his successor, was driven from office by General Ignacio de Veintemilla in 1876. After the expiration of the legal period. President Veintemilla made himself dictator. Jose Maria Placido Caamaho was President from 1884—88. He was suc¬ ceeded by Antonio Flores 1888 to 1892; Luis Cordero from 1892 to 1895 — when hˆe resigned to put an end to bloodshed. General Alfaro, at first ˆˆsupreme chief,® was legally elected in 1897. Gen. Leonidas Plaza Gutierrez succeeded him in 1901. In 1904 all religions were made equal before the law and eventually the nation was declared to be the owner of all church property. In 1905, the clericals elected their candidate for the Presidency, Lizardo Garcia, but he was overthrown in January 1906 by ex-President Alfaro, who was himself assassinated in Quito, together with a number of leaders. The President elected in 1912 was Gen. Leonidas Plaza Gutierrez, who had been chief executive 1901-05. In 1913 contracts were made for the sanitation of Guayaquil. In 1914 gov¬ ernment forces attacked the port of Esmeraldas, which the rebel leader, Colonel Concha, was holding, and a large part of the city was destroyed by fire. In 1915 difficulties of a serious financial character were discussed in connection with delayed payment of interest on bonds of the Guayaquil and Quito Railway and the lien on the entire customs receipts of the country held by European investors in that railway enterprise. Plaza, was succeeded in 1916 by Alfredo B. Moreno, ex-Minister of Foreign Affairs and president of the Senate.

Government. — Congress meets at Quito every two years, usually on 10 August, for a period of 60 days, which may be extended for another 30 days. The President of the republic may also call an extraordinary session when deemed necessary or expedient. There are two chambers: the Senate of 32 members (two senators from each province; term four years) and the Chamber of Deputies of 48 members (one deputy for each 30,000 inhabitants; term, two years). Both senators and deputies are elected by direct popular vote, every citizen over 21 years of age who can read and write being entitled to vote. The President of the republic, elected for four years by direct vote of the people, cannot be reelected until eight years have passed after expiration of the term of office. The Constitution now in force, dating from 23 Dec. 1906, is the twelfth promulgated since 1830.

According to its provisions, Ecuador is a centralized republic. In the event of the death or disability of the President, the president of the Senate or of the Chamber of Deputies, in the order mentioned, exercises the executive power. The President's Cabinet is composed of the Minister of the Interior and Public Works, the Minister of Foreign Rela¬ tions and Justice, the Minister of the Treasury and Public Credit, the Minister of Public In¬ struction, Post Offices and Telegraphs and the Minister of War and Navy. In addition to this Cabinet, there is a council of state which is consulted by the President in all important mat¬ ters and which represents Congress when that body is not in session. It includes members of

the Cabinet, the president of the Supreme Court, the president of the Court of Accounts, two senators, two deputies and three other citizens, the last s-even members being elected by Congress. Under the Constitution foreigners enjoy the same guaranties and civil rights as the citizens of Ecuador. Freedom of thought, of worship and of the press is assured. Women may exercise all the rights granted to Ecuadorians, and also have the free administra¬ tion of their property, even when they are mar¬ ried. Aliens may acquire property, also public lands, and may establish banking institutions under the same conditions as Ecuadorians. Public credit is guaranteed and funds set aside for the payment of public debt cannot be used for other purposes.

The local government is controlled by the central government. The local administrators, from the governors of the provinces down to the lieutenants of the parishes, are all ap¬ pointed by the President. Chief towns of cantones nave municipal councils, commonly of five members. There are rural (mounted) and urban police, with a director or chief in each provincial capital.

Ecuador's courts are the Supreme Court, at Quito (five justices, elected by Congress for a term of six years, attorney-general, two secre¬ taries) ; Superior Courts at Quito, Guayaquil, Cuenca, Riobamba, Loja and Puertoviejo, the first two being composed of six judges and the last four of three judges each, all elected by Congress for the same term as the members of the Supreme Court ; Court of Accounts at Quito (seven judges) empowered to audit and_ in¬ vestigate all public accounts and expenditures, its members being elected by Congress for a term of similar length to that of the justices; municipal civil tribunals of the first instance at Quito, Guayaquil and Cuenca; fiscal judges for each province; judges of commerce in large towns; judges of

mines, police and parishes. In the republic there are 33 cantonal and 359 parochial justices, and 85 solicitors admitted to practice. In criminal cases, trial by jury is provided for, but only in the larger towns.

Education. — Primary instruction is gratui¬ tous and obligatory for children between 6 and 12 years of age. Among the subjects taught beside the familiar elementary branches are morality, religion and urbanity. In the boys' schools the Constitution of Ecuador is added; in those for girls, sewing and domestic economy. In 1916 there were about 1,600 public schools of primary grade, with 98,400 pupils. Secondary instruction is provided in 37 ˆcolleges,® with 371 professors and 4,500 students, the school year beginning 10 October and ending 30 July. The University at Quito, with associate universities at Cuenca and Guayaquil, has faculties of philosophy, belles-lettres, law, medicine, physical and nat¬ ural sciences, mathematics and agriculture. There are nine schools of higher education with about 1,228 students. Schools of arts and crafts are found in the provinces of Pichincha, Leon, Chimborazo, Azuay, Loja and Guayas. Bahia has a commercial school. About $600,000 is expended yearly by the gov¬ ernment on education. There are also numer¬ ous private schools in the republic.

ECUADOR

MT. CHIMBORAZO

ECUADOR

1 Old Church at Quito

2 A Pass in the Andes; Guayaquil and Quito Railway

Jose Joaquin de Olmedo (b. Guayaquil 1780) and Juan Montalyo (b. Ambato 1833) are by Ecuadorians esteemed, the former the greatest poet, the latter the greatest prose writer of South America. Ecuador was also the birth¬ place of Jose Mejia, the ® American Mirabeau,^^ and of many historians, theologians, poets, ro¬ mancers and critics whose works are highly regarded in Spain. The Ecuadorian Academy (founded 1875) is the chief of the literary as¬ sociations of the republic.

Commerce, Finance and Agriculture. — The value of imports in 1914, the last normal year before the effect of the European War was felt in all Latin-America, was $8,402,767 ; of exports, $12,464,333 ; and the principal exports were: cacao, 47,210 tons; coffee, 2,980 tons; gold (in bars or dust), $365,324; ®Panama» hats, $972,215; cattle hides, 811 tons; ivory nuts, 8,583 tons ; rubber, 147 tons. The exports in 1915 were $12,740,000. The United States took exports valued at $3,588,130; France took $4,438,226; Germany, $860,302; United King¬ dom, $1,230,555. Ecuador imported from the United States goods valued at $2,770,599; from the United Kingdom, $2,414,662; from Germany, $1,203,566; from France, $326,770. The value of imports in 1915 was .$8,422,881 ; of exports, $12,882,402. The principal exports were cacao, 81,712,773 pounds, valued at $9,706,981 ; ˆPanama® hats, 300,375 pounds, valued at ˆ39,- 027 ; gold, $530,591 ; ivory nuts, 20,094,925 pounds valued at $526,519; coffee, 5,116,161 pounds valued at $463,413; cattle hides, 1,971,- 243 pounds valued at $289,333 ; rubber, 564,943 pounds valued at $196,447 ; leaf tobacco, 5ˆ,868 pounds valued at $89,825 ; leather, 163,803 pounds valued at $27,410; bananas, 3,522,475 pounds valued at $33,575. The exports to the United States amounted to $5,674,291, to the United Kingdom $2,669,280, to France $1,175,- 972, to Spain $582,834, to the Netherlands $982,- 410, to Italy $598,590. Textiles other than silk formed the principal import item in 1915, amounting to $1,795,101. (Dther important arti¬ cles imported were gold and silver coin to the value of $1,416,232, foodstuffs $1,257,294, hard¬ ware $581,521, clothing $301,418, mineral prod¬ ucts $327,315, machinery and parts $277,970. The imports from the

United States in 1915 totaled $3,209,608, those from the United King¬ dom $3,353,333, those from Italy $399,961, Spain $330,867, France $246,728. United States ranked first in purchases from Ecuador for 1915, with the United Kingdom second and France third, while in imports the United King¬ dom occupied first place, the United States a close second and France a distant third. Heavy purchases of materials for the sanitation of Guayaquil from the United Kingdom were largely responsible for the increased value of shipments from that country. Great increases were made by the United States in the sales of cotton piece goods, laundry soap, readymade clothing, straw hats, drugs and chemicals, paper, crackers and a number of others, in¬ cluding canned goods, which have secured a permanent entry into this market.

There were 185 vessels of 318,742 tons and two sailing vessels of 1,737 tons entered the ports of Ecuador during 1915, as compared with 162 steam vessels of 335,561 tons and seven sailing vessels of 12,125 tons during 1914. The exports from the port of Guayaquil in

1916 to the United States included 37,227,400 pounds of cacao, 175,143 pounds of coffee, 1,829,200 pounds of hides, 592,997 pounds of ivory nuts and 121,317 pounds of rubber. Of cacao the United Kingdom took 23,772,000 pounds, of hides 143,730 pounds and of ivory nuts 62,362 pounds. France took 10,095,225 pounds of cacao, 599,938 pounds of coffee, 29,378 pounds of hides and 219,205 pounds of ivory nuts. Spain took 4,242,700 pounds of cacao, 558,956 pounds of coffee, 42,091 pounds of hides, 78,375 pounds of ivory nuts and 10,683 pounds of rubber. Holland took 4,325,000 pounds of cacao and Chile 2,528,834 pounds of coffee. The total exports of the port were 81,756,910 pounds of cacao, 4,645,218 pounds of coffee, 2,044,399 pounds of hides, 1,101,017 pounds of ivory nuts and 132,000 pounds of rubber.

The monetary system is based on the gold standard, the unit of value being the sucre (weight 0.8136 grammes of gold .900 fine, or 0.73224 grammes of pure gold). The value of the sucre is. $0.48665, currency of the United States; and the value of $1.00 American in terms of Ecuadorean currency is therefore $2.05484. The actual currency of the republic is gold, silver and banknotes, but the only legal tender is gold. The new coinage consists of the gold condor of 10 sucres, weighing 8.136 grammes of gold .900 fine, or 7.3224 grammes of fine gold, equivalent to $4,866 in currency of the United States, or one pound sterling, English money. (Consult Cosby, J. T., ˆ Latin-Ameri¬ can Monetary Systems and Exchange Condi¬ tions,ˆ New York 1915).

Ecuador has four banks of issue : In Guayaquil, Banco del Ecuador (capital 3,000,000 sucres) and Banco Comercial y Agricola (capital 5,000,000 sucres) ; in Quito, Banco de Pichincha (capi¬ tal 1,500,000 sucres) ; in Cuenca, Banco del Azuay (capital 400,000 sucres). Other banks are the Banco Hipotecario (capital 1,0(X),000 sucres) and the Banco Territorial (capital 750,000 sucres). These are only mortgage loan banks. The fiscal revenues of Ecuador before the European War amounted to $10,(XX),000 American gold, derived chiefly from customs duties (on imports of $4,000,000 and on exports $2,600,000, alcohol tax $480,000, salt monopoly $360,000) and internal resources. (Consult ˆProceedings of the First Pan-Ameri¬ can Financial Conference,ˆ Washington 1915). The debt of the government to the local banks is partly consolidated, to be liquidated in 1927, and partly in current account. Beside this, the government owes a million of 6 per cent internal bonds and $1,500,000 of floating debt, making a total debt of about $6,500,000. The foreign debt proper amounts to $1,0()0,000 and the guarantee of the bonds of the Guayaquil and Quito Railway, Ecuador Central Railway and French Railway Company of Ecuador. The total debt of the republic in 1916 was $23,615,000.

The cultivated area is limited, owing to the lack of laborers ; nevertheless Ecuador has con¬ siderable agricultural resources. A large vari¬ ety of crops are grown and the soil is exceed¬ ingly fertile. Ecuador produces more cacao than any other country except the Gold Coast in Africa. It is grown principally in the prov¬ inces of Guayas, El Oro and Manabi. In 1914, 47,210 and in 1915, 40,000 metric tons were pro¬ duced. Over 40,000,000 pounds of tagua (ivory

nut) are exported annually. Coffee is cultivated in several districts to the extent of several mil¬ lion pounds a year and considerable quantities are exported. Sugar cane and tobacco are grown on the lowlands of the coast. Of the former about 16,000,000 pounds are produced yearly, an amount which about satisfies the domestic demand. Rice, quina, maize, wheat, barley, oats and a number of medicinal and industrial plants are also grown to supply the home market and some are exported. The rubber tree is plentiful and this industry is growing fast, the rubber exported annually reaching nearly $1,000,000 in value. Alfalfa is cultivated and the pastoral industries are thriving.

Communications. — Sixty miles of the rail¬ way from Guayaquil to Quito were built before 1880, that is, from the coast to the village of Chimbo, at the base of the cordillera. A com¬ pany organized in the United States completed the road (25 June 1908) ; passenger trains make the trip (297 miles) in two days. The line starts from Duran, across the Guayas River from Guayaquil and ascends the Andes to a height of 11,841 feet, when it descends to a height of about 9,000 feet and continues on to Quito, The gauge is 3 feet 6 inches and the rolling stock consists of about 25 locomotives and several hundred passenger and freight cars. The Central Railway, from Manta on the coast to Santa Ana, is in operation as far as Puertoviejo, 25 miles, and when complete will be 35 miles long. A railway connects Bahia, Caracas and Quito (186 miles). A number of other lines are authorized, among them being a 125-mile line from Ambato to the Curraray River, a line from Ambato to Banos, a line from Quito to a port on the Esmeraldas coast and one from Guayaquil to the coast. The total extent of the telegraph system is 5,482 miles with 204 offices. The Ecuadorian landing-station of the Central and South American Telegraph Com¬ pany's cable is at Salinas, which was declared open as a minor port by executive decree 21 Aug, 1902. Quito and Guayaquil have telephone services ; the latter a street car system. There are six wireless telegraph stations — two main ones at Quito and Guayaquil each, one on the coast to the north of Guayaquil and one on the Galapagos Islands and one each at Bolivar and Bahia, A score or more passenger vessels ply on the Guayas River and between Guayaquil and other coast towns. English steamships of the Pacific line and vessels of the Chilean line plying between Valparaiso and Panama call regularly at Guayaquil. There are about 200 post offices in the country and they

handle yearly over 6,000,000 pieces of postal matter. The postal service is being gradually extended.

Some 20 steamers, as well as a number of sailing vessels, steam yachts, steam launches and gasoline launches maintain an active coast and river service, most of the numerous rivers of the country being navigable for considerable distances inland and affording excellent means of transportation. The Guayas River, at the mouth of which is the city and port of Guaya¬ quil, is the most important of these waterways, being navigable for river steamers as far as Bodegas, 40 miles from Guayaquil, while smaller vessels can, during the wet season, reach Zapotal, some 200 miles inland. The Daule River is navigable for some 60 miles, the Vinces

for 50 miles, while the Esmeraldas, Naranjal, Santa Rosa, Santiago and Mira rivers are all navigable during the rainy season for short distances, varying from 10 to 60 miles or more. The Amazon, which in Ecuador is given the name of Maranon River, is navigable almost in its entirety and thus the eastern slope of the Ecuadorian Andes may be reached by way of Brazil and the Amazon River and its tributaries.

Army and Navy. — In time of peace, the army consists of 7,810 officers and men, and re¬ serves numbering possibly KX),000. The regular force is composed of 13 battalions of infantry, one regiment of cavalry, and 12 batteries of artillery, besides some departmental troops. These serve one year and then pass to the re¬ serve and second line. The second line armjy has 135 infantry battalions, seven artillery regi¬ ments and 44 cavalry squadrons. The regular infantry have the Mauser rifle ; the artillery have old-fashioned Krupps. Military service is obligatory from 18 to 32 years of age in the army, and from 32 to 45 in the national guard. The compulsory law, however, is not generally enforced. A mining and torpedo section, a sani¬ tary section and a telegraph and telephone corps were created in 1910. The national guard in¬ cludes companies of firemen — organizations which are especially numerous and influential in Guayaquil. The naval vessels are one cruiser of 600 tons, one torpedo gunboat of 56 tons, one torpedo boat destroyer of 1,000 tons and a transport, with three launches, with a total equipment of about 200 men.

The boundaries of the republic being in dis¬ pute, and a large part of Ecuador's claim being unexplored territory, estimates of the total number of inhabitants vary ; but the republic contains about

2,000,0(X). Of these from one-half to three-fourths are Indians, about 600,000 half-breeds and only 205,000 pure whites. There is a small number of negroes.

The provinces of Ecuador, with their capitals and populations, are as follows :

Provinces

Capital

Azuay .

Cuenca .

Bolivar .

Guar an da .

Canar .

Azogues .

Carchi .

Tulcan .

Chimborazo .

Riobamba .

Esmeraldas .

Esmeraldas .

Galapagos .

San Cristdbal .

Guayas .

Guayaquil .

Imbabura .

Ibarra .

Leon .

Latacunga. .

Loja .

Loia .

Manabi .

Puertoviejo .

Oriente .

Archidona .

Oro .

Machala .

Pichincha .

Quito .

Los Rios .

Babahoyo .

Tungurahua .

Ambato .

Inhabitants

50,000

6,000

5,000

20,000

22,000

5,000

300

105,000

10,000

18,000

14,000

10,000

6,000

5,000

80,000

5,000

10,000

Bibliography. — ˆE1 Ecuador; Guia Com¬ mercial, Agricola e Industrial de la Republican (Quito, annually) ; Enock, C. R., ˆEcuadorˆ (New York 1914) ; Mozans, H. J., ˆAlong the Andes and Down the Amazonˆ (New York and London 1911) ; Pan American Union, ˆ Ecuador n (Washington 1915) and ˆLatin Americaˆ (Washington 1916) ; Saville, M. H., <The An¬ tiquities of Manabi, Ecuadorˆ (New York 1907-10) ; Velasco, J. de, ˆHistoria del Reyno

de Quitoˆ (3 vols., Quito 1841-44) and a French translation of that work in H. Ternaux-Compans' ˆVoyages, relations, et memoires> (2 vols., Paris 1ˆ0) ; Suarez, F. Gonzalez, <Historia general de la republica del Ecuadorˆ (7 vols., Quito 1890-1903) ; Whymper, E., ˆTravels Amongst the Great Andes of the Equatorˆ (New York 1892).

Marrion Wilcox.

ECUMENICAL CpNFERENCE. An

ecclesiastical body meeting once in 10 years. It is composed of representatives of the various Methodist bodies throughout the world. It has no legislative powers. The first one met in London, 7-20 Sept. 1881 ; nearly 400 delegates represented 28 bodies. The second met in Washington, D. C., 7-20 Oct. 1891. Twenty-nine bodies were represented and the total dele¬ gation numbered 485. The third conference met in London, 4-17 Sept. 1901. Twenty-four bodies sent 471 delegates. The fourth confer¬ ence met in Toronto, Canada, 4-17 Oct. 1911. Twenty-one denominations were represented by 500 delegates. The procedings include the read¬ ing of papers on denominational history, polity and outlook and discussions of the same.

ECZEMA, ek'ze-ma, an acute or chronic disease of the skin, showing a vast variety of changes in the skin itself, and usually accom¬ panied by intense itching, burning or pain. The changes in the skin at first are usually marked by redness, papules, then small vesicles or pus¬ tules which later become crusted and dry ; or the surface is weeping. Infiltrated and scaly patches are common. All of the different forms of eczema (and no less than a dozen varieties are described by skin specialists) have certain definite changes occurring in the skin. There is usually swelling, congestion and increase of temperature locally. There is almost invariably an exudation of fluid into the tissues, with the formation of vesicles and pustules, as described. There is further a certain amount of plastic exudation which produces in the skin papulous areas that are thickened and infiltrated. Finally there are the

subjective symptoms of itching, which may be only a slight tingling .or prickling sensation, or mav be so* intense as to demand continued and (leep scratching until bleeding or oozing takes place. This itching is, as a rule, intermittent in character, being almost invariably worse at night when the patient is covered, the heat of the body causing the ag¬ gravation. Sometimes exposure to cold brings about intense itching. The disease usually runs an acute course, and may be limited to one region of the body, or may be general. Its general tendency is to progress rather than to get well. It is perhaps one of the most ob¬ stinate of all skin diseases, and at the same time one of the most difficult to diagnose and to treat. The causes are probably many. In gen¬ eral the fundamental pathology seems to be an overactive function of autonomic nerve stimuli going to the skin. This over-autonomic (para¬ sympathetic) acrivity may be a primary one

or be an imbalance from subacting sym¬ pathetic stimuli.ˆ The study of this lack of balance may involve a wide search for physicochemical, sensori motor or phychic dis¬ turbances, and a truly helpful therapy must take into account these underlying features. Inas¬ much as orthodox medicine has found the dis¬

order very intractable it would seem to indi¬ cate the lack of deep consideration of the dynamic factors in human pathology — notably the importance of mental as well as so-called physical factors. The treatment of each case is a particular study. Sometimes the disease is beyond the power of the best skin specialist ; usually such cases are psychogenic in their origin and the average skin specialist is too uneducated to know anything about menta: causes. At other times corrections of minute errors in diet will bring about cure. So far as household remedies are concerned, only those that can relieve the itching are deserving of notice in this place. One of the best of these is carbolic acid in weak solution — 2 to 3 per cent. This may be applied on a bit of absorbent gauze, special care being taken not to enclose a particular part completely with the weak car¬ bolic acid. Bland non-irritating powders, such as calamine and oxide of zinc are often useful. When the disease becomes chronic it is apt to be extremely obstinate. Many of the chronic cases rest upon an endocrinopathic basis, which in its turn often depends upon neurotic dis¬ turbance.

EDAM, e’dam, Holland, town 12 miles north-northeast of Amsterdam, and about a mile from the western shore of the Zuyder-Zee, with which it is connected by a canal. This place is chiefly noted for its trade in cheese, of which nearly 1,000,000 pounds are annually sold

in its market. Other industries are shopbuilding, leather man¬ ufacture, rope and sail making. The town was once fortified, and has still a wall with seven gates. Its Reformed Church of Saint Nicholas, with large painted windows, is among the finest in North Holland. Pop. 6,444.

EDDAS, The. The name given to two col¬ lections of early Icelandic literature, very un¬ like in character. The ˆPoetic Edda> consists of a series of lays in various metres, most of them celebrating the deeds of gods and heroes ; the ˆProse Eddaˆ is a manual of instruction for poets, in which information in regard to the matter and form of poetry is given in prose, with some illustrations in verse. The ˆPoetic Edda> is the work of different authors, no one of whom is known by name. Internal evidence shows that the lays which compose it date, in their present form, from the 9th to the 12th centuries inclusive ; most of them belonging, perhaps, in the 10th. They were united into a collection by an unknown Icelander in the early 13th century. His transcript is lost, but the material is extant in later copies. The best and oldest manuscript is the Codex Regius, now in the Royal Library at Copenhagen. This dates from the end of the 13th century, but was not recovered until the I7th century, by the Icelandic bishop Brynjolf Sveinsson. He called it the ˆEdda of Saemund the Wise,ˆ because he thought that a. learned Icelander of the 12th century, Saemund Sigfusson, might be the au¬ thor or collector of the pieces. Modern criti¬ cism has shown this to be impossible, but the term ˆSaemundar Eddaˆ is still sometimes er¬ roneously used. The author of the ˆ Prose Edclaˆ was the Icelander Snorri Sturluson, (1178-1241), a literary man of great distinction. Hence the ˆProse Eddaˆ is often called the ˆSnorra Edda,ˆ and sometimes the ˆYounger Edda,> to distinguish it from the Elder or

Poetic collection. The term ®Ldda^^ belongs properly only to the work of Snorri. It prob¬ ably means *the book of Oddi," — a little place in Iceland where Snorri and Saemund lived. •^^Edda" also signifies ^^great-grandmother-‘ ; hence the collection has been fancifully inter¬ preted as tales told by an old woman to her descendants. Again, it has often been under¬ stood as ®a system of poetry." Whatever its origin, the term has won its way to the best modern usage.

The ˆPoetic Eddaˆ falls roughly into two divisions, treating respectively of gods and heroes. The Lays of the Gods differ a great deal from each other in character and technic. The Woluspa,ˆ or ˆProphecy of the Sibyl, ˆ is an account of the creation and fated destruction of the world. ˆBalder's Dreams' has a similar setting; the prophetess gives Odin information about the future, explaining the evil dreams that have afflicted the god Balder. The ˆLay of Thrym' is a humorous piece, narrating the stealing of Thor's hammer and its recovery by Loki. Similar in character is the ˆLay of Hymir,' in which Thor goes out fishing on the wintry sea with the giant Hymir, and catches the world-serpent which lies at the bottom, en¬ circling the earth. In the ˆWord-Combat of Loki,' the treacherous god recalls, at a banquet from which he has been excluded, disreputable incidents in the lives of the deities, until silenced by Thor. The ˆLay of Skirnir' relates a love-affair of the god Frey. Several pieces consist of moral reflections, set in a narrative frame¬ work. In the ˆLay of Hoarbeard' and the ˆLay of Vafthruthnir,' Odin shows his supremacy in contests of wisdom; in the ˆLay of Allwise' the victory is with Thor, who keeps the dwarf Allwise above ground after sunrise, so that he is turned to stone. In the ˆLay of Grimnir' Odin utters wisdom in disguise. The ˆHava-mal,' the AVords of the Mighty One,' is a collection of gnomic material. The ˆLay of Rig' and the ˆLay of Hyndla,' of minor im¬ portance, and the ˆLay of Swipdag,' with the setting of a love-story, but uniting the prophecy and the word-contest, complete the collection, except for material of little significance.

With the exception of the ˆLay of Weland,' the celebrated smith, and three ˆHelgi-Lays,' the second section is concerned with the person¬ ages connected with the great story of Sigurd, the German Siegfried, which is here much extended. A short prose section, ˆSinfjotli's Death,' and the ˆProphecy of Gripir.' lead to the ˆLay of Regin' and the ˆLay of Fafnir.' Sigurd slays the dragon and gets the Nibelungen gold. In the

ˆI.ay of Sigrdrifa' (Bryn-hild) his meeting with the Valkyrie is de¬ scribed; and the well-known story is continued in two lays centering about Sigurd, three con¬ cerned with Gudrun and two describing the tragedy at the court of Atli. The ˆLament of Oddrun' deals with the love of the sister of Atli for Gunnar. The ˆExhortation of Gud¬ run' and the ˆLay of Hamthir' describe events after Gudrun's marriage to Tonakr, particularly the pathetic tale of Swanhild. The ˆLays of the Heroes' often attain a high level of tragic power. Dramatic moments are emphasized and details omitted and the stanzaic structure height¬ ens the effect of intensity, much as in the tra¬ ditional ballad-verse. The whole is very differ¬ ent from the tranquil and ample narrative of

Anglo-Saxon poetry. Mythological interpreta¬ tions of the poems as allegories of the proces¬ ses of nature must be received with caution. The hypothesis of Sophus Bugge that many of the lays have their origins in classical and Christian traditions has not met with general acceptance.

After a Prologue, the ˆProse Edda' narrates the ˆBeguiling of Gylfi,' in which, under a nar¬ rative disguise, information about mythology and cosmogony is set forth. In the ˆNarratives of Bragi,' the god of poetry tells stories of Odin and Thor. The section entitled ˆThe Poesy of Skalds' treats of methods of poetic expression; and in order to illustrate metaphor and allusion, much of interest in Scandinavian mythology and story is given to the reader. The concluding portion, the ˆHattatal,' consists, besides ex¬ planatory material, of a poem on King Hakon Hakonarson in more than a hundred stanzas, each in a different metre. This latter section is without much interest for the modern reader, but earlier parts of the work, though intended mainly for technical instruction in the making of skaldic verse, are often highly picturesque and of great value in the study of Scandinavian traditions.

Bibliography. — The Lays of the Gods have been translated by Olive Bray (Viking Club, London lf08) ; the second volume to con¬ tain the Lays of Heroes, has not yet appeared. The German translation by H. Gering of the entire Poetic Edda may be used in default of an English version. The best portions of the ˆProse Edda' have been translated by A. G. Brodeur (New York 1916).

William Witherle Lawrence, Professor of English, Columbia University.

EDDY, Clarence, American organist and composer: b. Greenfield,

Mass., 23 June 1851. He studied under Buck in Hartford, counter¬ point under Haupt, and piano under Loeschhorn in Berlin. In 1874-76 he was organist of the First Congregational Church, Chicago; after¬ ward organist and choirmaster of the First Presbyterian Church for 17 years and from 1875 to 1908 was director of the Hershey School of Musical Art. In 1877-79 he gave a series of 100 organ recitals, with entirely different pro-grarns, a memorable achievement in American rnusical annals. He has played at several exposi¬ tions in America and abroad and has given recitals in the principal American and European cities. He has composed several works for the organ and has written <The Church and Con¬ cert Organist' (3 vols., 1885) ; ˆThe Organ in Church' (1887) ; ˆConcert Pieces for the Organ' (1889), and a translation of Haupt's ˆCounterpoint, Fugue, and Double Counter¬ point' (1876).

EDDY, Henry Turner, American scientist: b. Stoughton, Mass., 9 June 1844. He was educated at Yale and later took a further scientific course in Berlin and Paris. After holding a professorship in mathematics, as¬ tronomy and civil engineering at the University of Cincinnati 1874-90, and acting as dean of the academic faculty of that institution (1874—77, 1884-89), he became its president in 1890. He was also president of the Rose Polytechnic In¬ stitute at Terra Haute, Ind., from 1891 to 1894, when he accepted the chair of engineering and mechanics at the University of Minnesota. He

became dean of the Graduate School of the latter university in 1906, and professor and dean emeritus in 1912. He published ˆAnalyti¬ cal Geometryˆ (1874); Hvesearches in Graphi¬ cal Statics' (1878) ; ˆThermodynamics' (1879) ; ˆNeue Constructioncn aus der graphischeu Statik' (1880) ; ˆMaximum Stresses under Con¬ centrated Loads' (1890) ; ˆTheory of the Flexure and Strength of Rectangular Flat Plates Applied to Reinforced Concrete Floor Slabs' (1913) ; ˆConcrete Steel Construction' (1914) ; and numerous scientific and technical papers.

EDDY, Mary Baker, discoverer and founder of the religion (theology and practice) which she named Christian Science, and founder of the Church of Christ, Scientist. Mrs. Eddy (at first Mary Baker) was born at Bow, near Con¬ cord, N. H., 16 July 1821, the sixth and young¬ est child of Mark and Abigail Baker. One of her ancestors, John Baker, was among the earliest settlers of the colony of Massachusetts Bay (at Charlestown in 1634). One of her great-grandfathers was Capt. Joseph Baker, who earned his title and gained an honorable name in the service of the colony of New Hampshire. Other soldiers of renown among Mrs. Eddy's relatives were Capt. John Lovewell, hero of a war with Indians during the colonial period, Gen. Henry Knox of the War for American Independence, and Gen. John McNeil of the War of 1812. Her immediate family were people of considerable prominence and prosperity: her father a large landholder and well-known citizen ; one of her brothers. Col. George Sullivan Baker, a public man and member of the staff of the governor of New Hampshire ; another brother, the Hon. Albert Baker, a lawyer and member of the New Hamp¬ shire legislature; a cousin, the Hon. Henry M. Baker, a lawyer and member of Congress from New Hampshire.

The home in which Mrs. Eddy was reared was one of refinement and religious devotion. Her parents were members of the Congrega¬ tional Church, and their hospitality was fre¬ quently enjoyed by the clergy of this and other denominations; and in the discussions of re¬ ligious subjects which often occurred in the home Mrs. Eddy took an interest and partici¬ pated in a manner that was seen to be unusual and far in advance of her years. To her mother and her brother Albert, however,

Mrs. Eddy gave the most credit for her early train¬ ing. Her mother was a woman of evident gentility and marked spirituality; her brother Albert a graduate of Dartmouth College, studied law with Franklin Pierce (afterward President of the United States), and became a young man of extraordinary promise before his decease at the age of 31.

As a child, Mrs. Eddy was frail and subject to illness. This kept her from attending school regularly; yet she was studious, and with the aid of tutors she gained an education equal to that which was then regarded as liberal. One of her tutors was the Rev. Enoch Corser, pastor of the Congregation:!! church at Tilton, N. H., who supplemented his pastoral duties, sometimes by teaching in the local academy and sometimes bv tutoring. Mr. Corser's con¬ tact with Mrs. Eddy began soon after she re¬ moved with her parents from Bow to Tilton in

1836 when she was 15 years old, and continued for six or seven years. He departed this life before she became famous, but an interesting and significant expression of his opinion was preserved and related by his son, Mr. S. B. G. Corser. Writing from Boscowan, N. H., in 1902, the younger Mr. Corser said : ˆWly father, the Rev. Enoch Corser, was pastor of the Con¬ gregational church at Northfield and Tilton (then Sanbornton Bridge) from 1837 to 1843, with which the Baker family was connected. If I remember rightly Mrs. Eddy was about 15 when I first met her, she being several years younger than myself. I well remember her gift of expression, which was very marked. As her pastor, and for a time her teacher, my father held her in the highest esteem ; in fact he considered her, even at an early age, superior both intellectually and spiritually to any other woman in Tilton, and greatly enjoyed talking with her. She and my father used to converse on deep subjects frequently. I remember her admiration for him, and she stands out in my recollection as his brightest pupil. He pre¬ dicted for Mrs. Eddy a great future and spoke of her as an intellectual and spiritual genius."

From her childhood or girlhood until more than a decade after her discovery of Christian Science, Mrs. Eddy was a member of the Con¬ gregational Church. Applying for membership at Bow when she was 12 years old, she was examined and given some assurance of accept¬ ance in spite of the issue she took with the then-prevalent doctrine of unconditional elec¬ tion or predestination. Whether she was formally

admitted to membership at this time, or not until five years later at Tilton, is a ques¬ tion left uncertain by the records of these churches. It was at this earlier time, when Mrs. Eddy was about 12 years old, that she first ex¬ perienced the power of prayer to deliver from sickness. Perturbed by the teaching that her brothers and sisters and she were already numbered among those who were to be saved or lost, she became ill with what the family doctor pronounced a fever. In her autobiography, ˆRetrospection and Introspection' (p. 13), Mrs. Eddy thus related her healing: ®My mother, as she bathed my burning temples, bade me lean on God's love, which would give me rest, if I went to Him in prayer, as I was wont to do, seeking His guidance. I prayed; and a soft glow of ineffable joy came over me. The fever was gone, and I rose and dressed m3"self, in a normal condition of health. Alother saw this, and was glad. The physician marvelled ; and the ˆhorrible decree' of predestination — as John Calvin rightly called his own tenet — for¬ ever lost its power over me."

Airs. Eddy was married three times: first to Maj. George W. Glover, a native of New Hampshire who had removed to Charleston, S. C., and become a successful contractor and builder. His military title was gained by serv¬ ice in the militia and on the governor's staff in South Carolina. This marriage occurred in 1843, when Mrs. Eddy was 22 years old. It was dissolved in less than a j"ˆear by the death of Major Glover. Ten years later (in 1853) Mrs. Eddy married Dr. Daniel S. Patterson, a dentist of Franklin, N. H. In 1873, after her removal to Lynn, Mass., and her discovery of Christian Science, she obtained a divorce from him on account of long-continued desertion due

to his infidelity. In 1877, after she had begun the practice and teaching of Christian Science, Mrs. Eddy married Asa Gilbert Eddy of Lon¬ donderry, Vt., the first of her students to en¬ gage in the public practice of Christian Science healing. He died five years later (in 1882) after having helped to sustain Mrs. Eddy dur¬ ing the period in wEich the Church of Christ, Scientist, -wˆas organized and the Christian Science movement encountered its first active opposition.

During Mrs. Eddy's first widowhood (1844-53) she developed her fluency of expression and her earning capacity by writing occasional verses and by contributing articles for periodi¬ cals on topics of public interest. Her ability of this kind was recognized by an offer of $3,000 a year (a large salary at that time) to become associate editor of the Odd Fellows Magazine, then edited by the Rev. Richard Rust, and by the inclusion of two poems from her pen in an anthology of poems and essays by New Hamp¬ shire authors which was published first at Man¬ chester in 1850 and again at Boston in 1856. During the same period, Mrs. Eddy served as substitute teacher in the Tilton Academy and experimented with a school for children some¬ what like the modern kindergarten. The period between Mrs. Eddy's second marriage and her discovery of Christian Science (1853-66) was one of following the fortunes of an inconstant or faithless husband and enduring the com¬ bined difficulties of desertion and ill health.

The course of events that led to her dis¬ covery of Christian Science was described by Mrs. Eddy as follows: ˆDuring twenty years prior to my discovery I had been trying to trace all physical effects to a mental cause; and in the latter part of 1866 I gained the scientific certainty that all causation was Mind, and every effect a mental phenomenon. My immediate recovery from the effects of an injury caused by an accident, an injury that neither medicine nor surgery could reach, was the falling apple that led me to the discovery how to be well myself, and how to make others so® (ˆRetro¬ spection and Introspection,ˆ p. 24). The acci¬ dent here spoken of occurred in the evening of 1 Feb. 1866, as Mrs. Eddy was returning from a Good Templars meeting in Lynn, Mass., to her home in the suburb of Swamscott. The contemporaneous account of it furnished by the Lynn Reporter said that she fell on the ice, was taken in an insensible condition to a near-by residence, where she was examined by a physi¬ cian and cared for during the night ; that the doctor found her injuries to be internal and

of a serious nature, and that she was removed to her home the following afternoon in a critical condition.

Mrs. Eddy has described her recovery from this injury as follows: ^^On the third day there¬ after, I called for my Bible, and opened it at Matthew ix, 2. As I read, the healing Truth dawned upon my sense ; and the result was that I rose, dressed myself, and ever after was in better health than I had before enjoyed. That short experience included a glimpse of the great fact that I have ever since tried to make plain to others, namely. Life in and of Spirit; this Life being the sole reality of existence® (^Miscellaneous Writings,^ p. 24). This in¬ cident was the occasion for beginning years of

profound study of the Scriptures. Of this search and research she has said : H must know the Science of this healing, and I won my way to absolute conclusions through divine revelation, reason and demonstration. The revelation of Truth in the understanding came to me gradually and apparently through divine power. When a new spiritual idea is borne ' to earth, the prophetic Scripture of Isaiah is renewedly fulfilled: ^Unto us a child is born, … and his name shall be called

WonderfuP ® (^Science and Health,^ p. 109).

The next events of major importance in the life of Mrs. Eddy were the writing and the printing of the textbook of Christian Science, 'Science and Health with Key to the Scriptures.^ After writing a statement of her discovery and finding no publisher for it, she became her own publisher and brought out the first edition of 1,000 copies (at Boston in 1875). Copies of this edition now sell at many times their original pric€, then they were difficult to sell at all, and were not always welcome as gifts. Yet the uncompromising idealism and absolute spirituality of the book demanded and gained attention. A. Bronson Alcott was the first to give Mrs. Eddy a comforting assurance for_the future of her book, and Wendell Phillips said: ^^Had I young blood in my veins, I would help that woman.®

At the outset, it was Mrs. Eddy's expecta¬ tion, and for years her hope, that the existing churches would welcome her interpretation of Christianity, proved as it was by the restoration of Christian healing. A considerable number of ministers did accept her offer to this profes¬ sion of free admission to her classes, and some of them invited her to speak in their pulpits. In course of time, however, it became evident to

Mrs. Eddy that a distinct church was neces¬ sary to preserve Christian Science intact, for the benefit of that and future generations. Ac¬ cordingly, the First Church of Christ, Scientist, was organized at Boston in 1879. Four years later another step was taken when Mrs. Eddy founded the first of the Christian Science periodicals. The Christian Science Journal. During the ensuing years, the teaching of eight classes of students annually, weekly preaching to eager congregations, editing the monthly organ of her church, and heading all the activi¬ ties of the expanding Christian Science move¬ ment, made her life one of the most eventHil in the annals of men. And though Mrs. Eddy, in her later years, trained others to relieve her of some detail and duty and to become the directors of Christian Science affairs, she con¬ tinued to be the active leader of the movement she instituted until her decease (at Newton, Mass., 3 Dec. 1910). It was characteristic of Mrs. Eddy that she devised the bulk and residue of her estate to be used ®for the purpose of more effectually promoting and extending the religion of Christian Science as taught by me.® Her principal writings are ˆScience and Health with Key to the Scrintures^ (1875) ; ˆPeonle's Idea of God^ (1886) ; ˆChristian Healing^ (1886) ; ˆRetrospection and Introspection^ (1891); <Unity of Good> (1891); <Rudimental Divine Science^ (1891) ; <No and Yes^ (1891) ; ˆChurch ManiiaP (1895) ; ˆMiscellaneous Writings^ (1896); ˆChrist and Christmas^ (1897); ˆChristian Science versus Pantheism'

579

(1898) ; ˆPulpit and Pressˆ (1898) ; ˆMessages to The Mother Churchˆ (1900, 1901, 1902) ; <Poerns> (1910) ; ˆThe First Church of Christ, Scientist,ˆ and ˆ Miscellanyˆ (1913). Consult ˆLifeˆ by Wilbur (4th ed., Boston 1913).

Clifford P. Smith.

EDDY, Thomas, American philanthropist : b. Philadelphia, Pa., 5 Sept. 1758; d. New York, 16 Sept. 1827. He entered the insurance busi¬ ness in 1790, in which he made a large fortune. With Philip Schuyler and Ambrose Spencer he presented a bill for establishing a penitentiary system in 1796, which was passed. He had charge of erecting the first building and for four years was its director. In 1793 he was appointed by th« Society of Friends to visit the Indians in New York State; was one of the governors of the New York Hospital; and in 1815 one of the founders of the Bloomingdale Insane Asylum. He was also one of the orig¬ inators of the New York Savings Bank and the New York Bible Society, and a conspicuous promoter of the Erie Canal. He received the title of the ˆAmerican Howard® for these labors, and in 1801 published ˆ State Prison of New York.ˆ

EDDY CURRENTS. See Foucault Cur¬ rents.

EDDYSTONE LIGHTHOUSE. The

frequent shipwrecks on Eddystone rocks off the coast of Cornwall, England, led to the erec¬ tion of a lighthouse on them by Henry Winstanley in 1696-1700. It was a wooden polygon, 100 feet high, with a stone base ; but the great storm of 20 Nov. 1703, completely washed it away, with the architect. Another lighthouse was built in 1706-09, also of wood, with a stone base, and 92 feet high, by Mr. Rudyerd, a silk-mercer. This erection was burned in 1755. The next, noted for its strength and the engi¬ neering skill displayed in it, was constructed by Smeaton in 1757-59, on the model, it is said, of the trunk of the oak tree. It was built of blocks, generally one to two tons weight, of Portland oolite, encased in granite. The granite was dovetailed into the solid rock, and each block into its neighbor's. The tower, 85 feet high, had a diameter of 26ˆ feet at the base and 15 feet at the top. The light, 72 feet above the water, was visible at a distance of 13 miles. As the rock on which this tower was built became undermined and greatly weakened by the action of the waves, the foundation of another was laid on a different part of the reef in 1879. The new

lighthouse, completed in 1882 by Sir James N. Douglass, is, like its predecessor, ingeniously dovetailed throughout. Its dioptric apparatus gives, at an elevation of 133 feet, a light equal to 159,600 candles, and visible in clear weather to a distance of I7j4 miles. See Lighthouse.

EDELFELT, a'del-felt, Albert Gustav Aristid, Finnish painter: b. Helsingfors, Fin¬ land, 21 July 1854; d. 1905. He began his artis¬ tic studies at Antwerp and afterward became a pupil of Gerome, in Paris, where he developed a high skill in draughtsmanship, in the depart¬ ment of ' genre and portrait painting. He gained a second medal in the Paris Salon of 1882, and a medal of honor in the Paris Expo¬ sition of 1889. Two of his pictures have been purchased by the French nation for the Luxem¬

bourg. Of his paintings the best are ˆThe Laundryˆ (1893) ; ˆChrist and the Magdalen' and ˆThe Women in the Churchyard' (Hel¬ singfors Museum) ; and ˆDivine Service on the Seashore' (1882). He became commander of the Legion of Honor (1901).

EDELWEISS, ed 'el-wis, Ger. a'del-vis, (®Noble-white" ; Gnaphalhtm or Leant op odiiun alpinuin), a perenial plant of the order Com-positce, growing at great altitudes, in the Alps, the Pyrenees and also in parts of Austria and Siberia. Its flower is white and somewhat star¬ shaped, the heads surrounded with a character¬ istic woolly involucre, and its leaves also hav¬ ing the same woolly character. It is compar¬ atively scarce ; generally grows in inaccessible positions ; is eagerly sought by Alpine tourists, and has become so rare in some of the Swiss cantons that it is protected by law. The sup¬ posed difficulty of gathering it is the ground¬ work of various legends and poems ; as the emblem of purity, it is given by the Tyrolese youth to his affianced bride. It is not difficult to cultivate and is found in American and Eu¬ ropean gardens, but is apt to lose its distinctive woolly character under cultivation.

EDEMA. See Dropsy.

EDEN, Sir Robert, last proprietary gov¬ ernor of Maryland : b. Winderstone Hall, l3ur-ham, England; d. Annapolis, Md., 2 Sept. 1784. As captain in the Coldstream Guards he served in the Seven Years' War. He was appointed governor of Maryland in 1768, where he re¬ mained until 1776, when that State committed itself to the principles of the Revolution, and virtually declared the proprietary governorship

at an end. He left in an English warship, but returned a few months before his death. Con¬ sult Steiner, ˆLife and Administration of Sir Robert Eden' (in the ˆJohns Hopkins Univer¬ sity Studies in Historical and Political Science,' 16th series, VH-IX, Baltimore 1898).

EDEN, William, 1st Lord Auckland: b. Durham, April 1744; d. there, 28 May 1814. He was educated at Eton and at Oxford, where he received his M.A. in 1768. He studied law and published in 1772 ˆPrinciples of Penal Law.' In the same year he was chosen Under¬ secretary of State. In 1774 he entered the House of Commons and was again chosen in 1778, when he was one of the five commission¬ ers to America. He published a report on his return in the form of ˆFour Letters to the Earl of Carlisle.' In 1780 he accompanied Lord Carlisle as Chief Secretary to Ireland. In this capacity he was instrumental in establishing the National Bank of Ireland. In 1783 he became Vice-Treasurer of Ireland and a member of the privy council. He was a staunch supporter of Pitt, resigning with him in December 1783 and returning with Pitt's ministry in the following year. Eden was made Lord of the Committee of Council on trade and plantations, and was sent to France to negotiate the commercial treaty, which was finally consummated in 1786-87. He served as special Ambassador to Madrid in 1788; to the United States and to Holland in the succeeding years. In the latter country he was especially active during the years 1790-93 as Ambassador extraordinary. In the last named year he retired and was created a peer of Great Britain as Lord Auckland of West

Auckland, Durham. His support of Pill con¬ tinued, and in 1798, he returned to office in the capacity of joint Postmaster-General. His final resignation came in 1801, when the Pitt minis¬ try collapsed under the disapproval of the king in regard to their Irish policy. The love of Pitt for Auckland's eldest daughter who later married the Earl of Buckinghamshire strained the relations between Pitt and Auckland, and resulted in the latter's refusal to join Pitt's second ministry. In 1796 he was chosen to be chancellor of Marischal College. Besides the publications already mentioned, he wrote ˆHis¬ tory of New Hollandˆ

(1787), and ˆRemarks on the Apparent Circumstances of the War.ˆ His ˆJournals and Correspondenceˆ were edited by his son, Robert John, bishop of Bath and Wells (4 vols., 1860-62).

EDEN, the garden of paradise. It would be difficult in the whole history of opinion, to find any subject which has so invited and at the same time so completely baffled conjecture, as the Garden of Eden. The three continents of the Old World have been subjected to the most rigorous search; but no locality which in the slightest degree corresponded to the de¬ scription of the first abode of the human race has been left unexamined. Philo Judaeus (flourished about 20) first broached the allegor¬ ical theory of interpretation, teaching that para¬ dise shadowed forth the governing faculty of the soul, and that the tree of life represented religion, the true means of immortality. Ori-gen, adopting a somewhat similar view, regarded Eden as heaven, the trees as angels, and the rivers as wisdom ; and Ambrosius considered the terrestrial paradise and the third heaven, mentioned by Saint Paul (2 Cor. xii, 2-4), as identical. Luther taught that Eden was guarded by angels from discovery and conse¬ quent profanation until the Deluge, when all traces were destroyed. Swedenborg, who re¬ garded the first 11 chapters of Genesis as con¬ stituting a divine allegory, taught that Eden represented the state of innocence in which man was originally created and from which he degenerated in consequence of the Fall. The account given in Genesis of the situation of Eden is not such as to enable us to identify it with any existing locality. It is said to have had a garden in the eastern part of it, and we are told that a river went out of Eden to water this garden, and from thence it was parted into four heads, which were called respectively Pison, Gihon, Hiddekel and Euphrates (Phrat). The Pison is said to compass the whole land of Havilah ; the Gihon that of Ethiopia (Cush) ; and the Hiddekel to go toward the east of Assyria. Of the rivers mentioned the Phrat of the original seems to have been cor¬ rectly identified with the Euphrates, and the name Hiddekel appears elsewhere in Scripture (Dan. X, 4) to be applied to the Tigris; but it is impossible to say what rivers or places were meant by the names Pison, Gihon, Havilah and Cush.

EDEN, the principal river in the county of Cumberland, England, rising in the hills of Westmoreland, near the northwest boundary of Yorkshire; flows northwest, passing Appleby and Carlisle, and empties into the Solway Firth. Total course, about 65 miles.

EDEN OF AMERICA, a fanciful name bestowed on the island of

Aquidneck, on which is situated the city of Newport, R. I., on ac¬ count of its great fertility.

EDENHALL, the ancient seat of the Mus-graves in Cumberland, four miles northeast of Penrith, England. Here is still preserved the famous ®Luck of Edenhall,® an old painted glass goblet, said to have been snatched from the fairies, on the safety of which the welfare of the house depends. It is supposed to have been a chalice, and its leathern case bears a sacred monogram. Uhland's well-known bal¬ lad, ˆThc Luck of Edenhall,ˆ and Longfellow's translation of it has carried its fame beyond the British islands.

EDENTATA, e-den-ta'ta one of the smaller orders of mammals, most of which are found in South America. It includes the South America sloths, anteaters and armadillos, and two Old World groups, all of which are char¬ acterized by an absence of front teeth, and in a few instances by completely toothless jaws, whence the generic name. Where teeth are present they are without enamel, and lack dis¬ tinct roots, are all alike and generally are not preceded by a set of milk teeth. These animals are ranked comparatively low in the scale of mammals, not only on account of their defi¬ ciency in teeth, but also because their brains are relatively small and lack the convolution charac¬ teristic of the more highly developed orders. With two exceptions, the armadillos and pan¬ golins, the Edentata are clothed with coarse hair, and they never are completely hairless. The armadillos are peculiar among mammals, in that their bodies are covered with an armor of bony plate ; and in the pangolins the entire body is protected by a coat of overlapping, horny scales. The typical edentates are the sloths {BrodypodidcE) , the anteaters (Mynneco-phagidcc) and the armadillos {Dasypodidce) , all of which are American ; the two groups in the order, native to Africa and Asia, are the pan¬ golins (Squamata) and the aard-varks (Tubuli-dentata), although Lydekker questions the cor¬ rectness of placing the last two among the edentates, preferring to consider the present and extinct forms as an entirely American order. The sloths live on vegetable food ex¬ clusively, the other group chiefly on insects or animal matter softened by decay.

Fossil Edentates. — Of the large and nu¬ merous edentate fauna which lived in South American during the Tertiary and Quaternary periods, some (Mylodon, Megalonyx, Glyptodon) spread to North America during the jPliocene and Pleistocene epochs; the armadillo is still found as far north as the Mexican bor¬ der of the United States. Their earliest an¬ cestors were, perhaps. North American, but their development was exclusively in the south¬ ern continent during most

of the Tertiary period. The earlier stages in their evolution were less divergent from the normal mammals than the present edentates, and were of small or moderate size ; later on they became of huge size and very highly specialized. The most remark¬ able among them were the Mˆgatheriidce, ground-sloths, distantly related to the modern anteaters and true sloths, but terrestrial animals, very heavily proportioned, with massive hind quarters and tail, and immense digging claws;

and the Glyptodonts, related to armadillos but much larger, with massive un jointed carapace like that of a tortoise and with hoofs instead of claws. Besides these were numerous true armadillos, both large and small, some ancestral to the rnodern species, others of extinct races. No fossil anteaters have yet been discovered, and fossil tree-sloths are almost equally un¬ known ; but the fossil beds of South America have been so imperfectly explored that this fact is not surprising. See Aard-vark; Anteater; Armadillo ; Ganodonta ; Glyptodon ; Manis ; Megatherium ; Mylopon ; Sloth.

EDENTON, N. C., town and county-seat of Chowan County; on the Albemarle Sound near the mouth of the Chowan River ; on two branches of the Norfolk and Southern Rail¬ road ; about 90 miles north of Beaufort and 115 miles northeast of Raleigh. Four steam¬ ship lines enter Edenton, thus making it a good shipping point for the trade of the northeast part of the State. The shallow waters of the Albemarle Sound are a hindrance to more ex¬ tensive shipping. The name given to the town when founded in 1712 was Queen Anne's Creek, but this was changed to Edenton in honor of a governor of the colony, Charles Eden. In less than one year after the ˆˆBoston Tea Party,® on 24 Oct. 1774, 52 housewives of Edenton re¬ solved not to assist in supporting England by paying a tax on tea ; and they formed them¬ selves into an organization, none of whose members should conform ®to that pernicious custom of drinking tea® and ®would not promote ye weare of any manufacture from England.® In addition to being first among those who held Revolutionary tea parties, they seem

to have been pioneers in America in the formation of organizations for women. Its in¬ dustrial establishments include cotton mills, peanut factories and lumber mills. The herring and shad fisheries are also important. A fish hatchery is maintained here by the government. The municipality owns the waterworks and lighting plants. Pop. 3,000.

EDER, a'der, Joseph Maria, Austrian chem¬ ist : b. Krems on the Danube, 16 March 1855. He taught photo-chemistry at the Technical School, Vienna, and in 1882 was made professor of chemistry at the Industrial School in that city. He has made great contributions to the development of the art of photography, par¬ ticularly with reference to the use of chloride or bromide of silver. He also invented a photo¬ meter for measuring the invisible ultra violet rays by the oxalate of mercury, and the now extensively-used aristo papers (chloro-gelatin papers). Among his works are ˆPhotographie aux sels de chromeˆ ; ˆEtudes sur Taction de la lumiere coloreeˆ (1879) ; ˆManuel de photo¬ graphies (1882) ; ˆDie Momentphotographie in ihrer Anwendung auf Kunst und Wissenschafts (2d ed., 1886) ; ˆArleitung zur Herstel-lung von MomentphotographienS (1887) ; ˆPhotographie mit BromsilbergelatineS (l890) ; < System der Sensitometrie photographischer TrockenplattenS (1899-1902) ; ˆBeitrage zur Photochemie und Spektralanalyse,ˆ with Valenta (1903); ˆAtlas typiert SpektienS (1911). He was from 1887 to 1911 editor of the Jahrbuch fiir Photographie und Reproduktiunstechnik.

EDERSHEIM, ad'ers-him, Alfred, English biblical scholar : b. Vienna, 1825 ; d. 1889. He

was of Jewish extraction and received his edu¬ cation at the university of his native city. He became a tutor in Pest and was there con¬ verted to Christianity by John Duncan. He studied theology at Berlin and Edinburgh ; was ordained to the Presbyterian ministry in 1846 and soon afterward appointed to the Free Church, Aberdeen, where he continued until 1858. Years later (1884-85) he was select preacher to the University of Oxford and Grin-field lecturer on the Septuagint in 1886-90. He published ˆBible Historyˆ (7 vols., 1876-87) ; Qewish Social Life in the Days of Christˆ (1876) ; ˆThe Exodus and the Wanderings in the Wildernessˆ (1876), and ˆThe Life and Times of Jesus the Messiahˆ (1883), his prin¬ cipal work.

EDES, Robert Thaxter, American physi¬ cian : b. Eastport, Maine, 23 Sept. 1838. He was graduated at Harvard 1858 and at the Har¬ vard Medical School 1861 ; served as surgeon in the United States navy

1ˆ1-65 ; was professor of materia medica 1870-84, and professor of clinical medicine 1884-86 at the Harvard Medi¬ cal School. He was physician at the Boston City Hospital 1872-86 and at the Garfield Me¬ morial Hospital, Washington, 1889-91, and resi¬ dent physician at the Adams Asylum 1891-97, Among his works are ˆNature and Time in the Cure of Diseasesˆ (1868) ; ˆPhysiology and Pathology of the Sympathetic or Ganglionic Nervous Systemˆ (1ˆ9) ; ˆTherapeutic Hand¬ book of the United States Pharmacopoeiaˆ (1883) ; ˆTherapeutics and Materia Medicaˆ (1887), and many contributions to medical publications.

EDESON, Robert, American actor: b. New Orleans, La., 1868. He was educated in the public schools of Brooklyn and made his first appearance in ˆFascinationˆ at the Park Theatre, New York, in 1887. Later he appeared in ˆA Night Offˆ ; ˆThe Dark Secretˆ ; Hncog.,ˆ and ˆUnder the Red Robeˆ in 1906, He was leading man in ˆThe Climbersˆ and starred in ˆSoldiers of Fortuneˆ (1902-04) ; ˆRansom's Folly U ˆStrongheartˆ (1905-07); ˆ Classmatesˆ (1907) ; <The Call of the Northˆ (1908) ; ˆThe Noble Spaniardˆ (1909) ; ˆFine Feathersˆ (1913). He also played the role of Ma-Wo-Cha-Sa in his own play, ˆ Where the Trail Divides> (1910).

EDESSA, the name of two ancient cities. (1) The ancient capital of Macedonia and the burial place of its kings, now Vodhena. It is probably the same with the still more ancient JEgx. (2) An important city in the north of Mesopotamia, which, subsequent to the estab¬ lishment of Christianity, became celebrated for its theological schools. During the centuries which were affected by the Christianizing of Rome, Edessa became the centre of learning of Syria. (See Syria). The modern city of Urfah or Orfa stands on the site once occupied by Edessa. In 1098, in the first crusade, Edessa came into the hands of Baldwin I, but ultimately became part of the Turkish empire in 1637. It was one of the greatest four cities of Syria, the other three being Antioch, Damascus and Nisibis. The modern city has a population of about 30,000, mostly Mohammedans. The Mo¬ hammedans consider it a sacred city, and main¬ tain that Abraham at one time lived there.

EDFU

Consult the article, ®Edessa in Osroene,ˆ' by Meyer (in Pauly-Wissowa, ˆReal-Encyclopadie der klassischen Altertumswissenschaft,ˆ Stutt¬ gart, 1905).

EDFU, ed'foo, Egypt, town situated on the Nile, 54 miles southeast of Thebes. It con¬ tains the remains of two temples, the larger of which is the best preserved monument of its kind in Egypt. It was fdunded by Ptolemy III Philopator more than two centuries before Christ and added to by his successors down to Ptolemy XIII Dionysus, a period of 170 years. The general plan of the temple re¬ sembles that of Dendera. Its length is 451 feet, the breadth of its fagade is 250 feet. Its en¬ trance is by a gateway 50 feet high, between two immense truncated pylons, 37 feet wide at the base and 115 feet high, the whole surface covered with sculptures and inscriptions in low relief. This splendid fagade is visible from a great distance and is one of the most com¬ manding sights in the Nile valley. Passing through this entrance, a court is reached 161 feet long and 140 feet wide, enclosed by a splendid colonnade of 32 columns of every variety of capital, and surrounded by walls be¬ tween which and the pillars there is a stone roof, forming a covered portico. From this court opens a hypostyle hall of 18 columns, joined by an intercolumnal screen, through which access is obtained to an inner hall of 12 columns, leading to the sanctuary, where a great monolith of gray granite was evidently intended to encage the hawk, the sacred emblem of Hor-Hud, the local Horus, to whom the temple was dedicated.

The sanctuary and surrounding chambers, together with the outer and inner halls, are sep¬ arated by an open corridor from the outer wall of the temple, and both sides of this passage are covered with elaborate reliefs and numerous inscriptions, which present a sort of encyclo¬ paedia of ancient Egyptian geography, ritual and ecclesiastical topography, with calendars of feasts, lists of divinities in the various names and cities, and even a species of church direct¬ ory, including the names of singers and other temple officials. The smaller temple, erected by Ptolemy Physcon and Lathyrus, consists of only two chambers. Previous to 1860, both court and temple were inlaid with rubbish, fallen stone, *etc.* Nomad Arabs built lean-to sheds against the walls until Mariette, with the consent of the Khedive had all these disfigurements removed and established a semblance of order. Consult Mariette, ˆMonuments of Upper Egypt ˆ (Lon¬ don 1877) ; Breasted,

ˆAncient Records of Eg>‘ptˆ (Chicago 1907). The manufactures of Edfu at present are blue cotton cloths, and earthenware similar to the ancient Egyptian pottery. Pop. 2,500.

EDGAR (*The Peaceable®), one of the most distinguished of the Saxon kings of Eng¬ land, was the son of King Edmund. He suc¬ ceeded to the throne in 958, and managed the civil and military affairs of his kingdom with great vigor and success. He maintained a body of troops to control the mutinous Northum¬ brians, and repel the incursions of the Scots, and fitted out a powerful navy to protect his subjects from the Danes. During the reign of Edgar, wolves were nearly extirpated from the southern parts ot the island, by exchanging a

tribute from Wales for payment in the heads of these animals. He married Elfri, daughter of the Earl of Devonshire, in 965. It was dur¬ ing his reign that Dunstan (q.v.) was primate of England. He died in 975, and was succeeded by his son, Edward the Martyr.

EDGAR, Sir James David, Canadian states¬ man and author ; b. Hatley, province of Quebec, 10 Aug. 1841 ; d. 1899. He was admitted to the bar of Ontario 1864. In 1872 he was elected to the Dominion Parliament ; served in 1874 on an unsuccessful mission to British Columbia on the dispute between that province and the Dominion as to the terms of construction of the trans¬ continental railway; and was elected speaker of the Commons in 1896. He was the author of ˆThe White Stone Canoeˆ (1887) ; ˆThis Can¬ ada of Ours and Other Poemsˆ (1893), *etc.*

EDGAR ATHELING, Anglo-Saxon prince : b. Hungary about 1057 ; d. toward the end of the 11th century. He was a grandson of Edmund Ironside, and his life may be epitomized as a series of abortive attempts. Selected by Ed¬ ward the Confessor as his prospective heir, he was kept out of the throne by William the Con¬ queror (1066) ; having twice engaged in the northern revolts against the Normans, he was twice compelled to take refuge in Scotland, with Malcolm Canmore, who married Edgar’s sister, Margaret; then, embracing the cause of Robert, Duke of Normandy, against William Rufus, he was driven away (1091) from the duchy to Scotland; then he embarked (1099) in a boot¬ less crusading expedition to the East ; and finally was taken prisoner at Tenchebrai (1106) fighting for Duke Robert against his brother Henry I. Almost the only successful achieve¬ ment of his life seems to have been that of reseating his nephew Edgar on

the throne of Scotland (1097), which had been usurped by Donald Bane. His last days were spent in obscurity; the date of his death is not precisely known. Consult Freeman, ˆHistory of the Norman Conquestˆ (Vols. III-V, Oxford 1873).

EDGARTOWN, Mass., town, county-seat and port of entry of Duke's County; situated on the eastern shore of the Island of Martha's Vineyard, 27 miles southeast of New Bedford. At present it is a summer resort, but it was once a whaling station of importance. The town was settled in 1642 and was incorporated in 1671. Its harbor is small but well-sheltered. It contains a Carnegie library. Pop. 1,191. Con¬ sult Banks, ˆHistory of Martha's Vine3ˆardˆ (Boston).

EDGCUMBE, ej'cum. Sir Edward Robert Pearce, English traveler: b. 13 March 1851. He was educated at Cambridge, was mayor of Dorchester 1891, and sheriff of Cornwall 1896. He has published ˆZephyrus, or Travels in Brazil and on the river Plataˆ (1887) ; ˆBastiat's Popular Fallaciesˆ (4th ed., 1893) ; < Popu¬ lar Fallacies Regarding Bimetallismˆ (1896) ; <The Parentage and Kinsfolk of Sir Joshua Reyndsˆ (1901), *etc.*

EDGE, Walter Evans, American public of¬ ficial: b. Philadelphia, Pa., 20 Nov. 1873. He was educated in the public schools and began life as a printer's ˆffievil® on the Atlantic Re-viezv of Atlantic City,ˆ N. J. Later he estab¬ lished a national and international advertising agency, acquired the proprietorship of the At-

lantic City Daily Press and the Evening Union of that city. He also became identified with banking-and other lines of business. In 1897-99 he was journal clerk of the Senate of New Jersey and from 1901 to 1904 served as secretary of that body. In 1904 he was a Republican presidential elector and in 1908 was alternate delegate-at-large to the Republican National Convention at Chicago. In 1909 he became a member of the Assembly of New Jersey and served two terms in the Senate, from 1910 to 1916, becoming Republican leader in 1912 and president of the Senate in 1916. He was chairman of the

economy and efficiency com¬ mission and a leader in securing passage of the Workmen's Compenˆdtion Act and the Central Purchasing Bureau Act. During the Spanish-American War, Mr. Edge served as second lieutenant in the 4th New Jersey Volun¬ teer Infantry and afterwards was made captain National Guard. Mr. Edge was governor of New Jersey 1917-19, when he resigned to enter the United States Senate.

EDGEHILL, ej'hil, England, an eminence in Warwickshire, 12 miles south of Warwick. On its northern slope was fought the first battle of the civil war, Sunday, 23 Oct. 1624, between the Royalists under Charles I and the forces of the Parliament under the Earl of Essex. It was an indecisive engagement.

EDGEWORTH, ej werth, Maria, English novelist : b. Hare Hatch, near Reading, Berk¬ shire, 1 Jan. 1767 ; d. Edgeworthtown, Ireland, 21 May 1849. In 1782 her father, Richard Lovell Edgeworth, succeeded to the family es¬ tate of Edgeworthtown, in the county of Long¬ ford, Ireland, and thither he proceeded and took up his abode. In 1802 she established her posi¬ tion as an author by her ˆCastle Rackrent,ˆ a novel of Irish life, in which the manners and customs of a by-gone generation are most graphically and humorously described. A 'ˆTreatise on Irish Bullsˆ appeared in 1803; ˆEnnuiˆ (1809); ˆThe Absenteeˆ (1812); ˆ Ormondˆ (1817). About 1803-04 she began to write stories with pointed morals, both for children and adults. Among these may be men¬ tioned ˆMoral TalesU ˆPopular TalesU /Tales of Fashionable Lifeˆ ; The Parents' Assistant,ˆ a collection of tales for children, and the well-known series of ˆ Early Lessonsˆ ; ˆ Harry and LucyU ˆFrankU and ˆRosamond.ˆ Belonging to the class of regular novels are ˆ Belindaˆ (1804) ; ˆLeonoraˆ (1806); ˆPatronage > and < Harrington.ˆ Miss Edgeworth's lively style and vivid imagination made her extremely popu¬ lar in her day. In her pictures of Irish and English life she was the precursor of the genre literature of the succeeding generation. But her strong tendency to moralize has led to her eclipse in popular favor. It is on the excellence of her vivid representation of the life of her generation that her place in literature is justly based. (See Castle Rackrent). Consult Ritchie, Thackera}'-Anne, ˆBook of Sibylsˆ (1883) ; Zimmern, ˆLife of Maria Edgeworthˆ (1883) ; Howells, W. D., ˆHeroines of Fictionˆ (New York 1901) ; Hill, ˆ Maria Edgeworth and her Circleˆ (New York 1910).

EDGREN, Anne Charlotte Leffler, an sha-lot'te lel-ler ed'gren, Swedish novelist and dramatist: b. Stockholm, 1 Oct. 1849; d. Naples, 24 Oct. 1892. A volume of short tales, ˆBy

Chance,ˆ and the dramas, ˆThe Actressˆ ; ˆThe Curate,ˆ were a great success anonymously; and she then put her own name to three success¬ ive volumes of short stories called ˆFrom Life,' followed by ˆA Summer Story' ; ˆWoman and Erotism' and many others. Hdeal Women' ; ˆThe Struggle for Happiness' ; and ˆA Rescu¬ ing Angel' (the most successful of her plays), are notable among her later dramas. Consult Key, Ellen, ˆLife of Edgren' (1893).

EDHEM PASHA, pash-a' ˆr pash'a, Tur¬ kish soldier and statesman : b. Chios, 1813, of Greek parentage ; d. 1893. He studied in Paris, and on returning to Turkey was attached to the staff of the army with the rank of captain, rapidly attained that of colonel, and was appointed a member of the Council of Mines at the time of its formation. Having been appointed aide-de-camp to the Sultan in 1849, he soon was placed at the head of His Majesty's household troops. In 1856 he resigned the functions which he had fulfilled at the pal¬ ace, and was appointed a member of the council of the Tanzimat, and afterward Minister of Foreign Affairs, with the rank of muchir. Sub¬ sequently he played an important part in the affairs of his country, where he was nominated president of the council of state. He was also for some time Ambassador at Berlin. At the conference of Constantinople (1876-77) he acted as the second Turkish Plenipotentiary, and was appointed to succeed Midhat Pasha as grand vizier, 5 Feb. 1877. From 1879 to 1883 he was Ambassador at Vienna.

EDHEM PASHA, Turkish soldier: b. 1851 ; d. 1909. In 1877 he held the rank of colonel in the Turkish army and rose rapidly during the war with Russia. He was appointed governor-general of the Vilayet of Kossowo, and was later made adjutant-general and field marshal. In the war with Greece (1896-97) he had the chief command of the Turkish army. In three weeks he collected an army of 55,000 men, met and defeated the Greeks at Maluna Pass, in¬ vaded Thessaly and occupied Larissa. In this campaign he displayed great skill as a com¬ mander and was no less successful in organizing the sanitary and hospital services of his armies.

EDICT, a public proclamation of laws made by a ruler or superior magistrate. In ancient Rome, the higher officers of state, who were elected annually, publicly declared, at their en¬ trance upon office, the principles by which they should conduct their administration. This was done particularly by the aediles, who superin¬ tended buildings and markets, and by the prae¬ tors, as supreme judges. These annual procla¬ mations, by which the deficiencies of the general statutes

were supplied, and the laws were adapted to the peculiar wants of the period, gradually acquired a certain permanency, as each officer retained, unaltered, most of the regula¬ tions of his predecessor (edictum tralatitinm) ; and they became, in fact, the source of that branch of Roman law which, being founded on the official authority of the authors, was called JUS honorarium, and was opposed to the strictly formal law, jns civile. However, according to Roman jurists these usually indirect forms of legislation had their object in rendering the civil law more expedient to the public welfare, and always received the seal of the people's ap¬ proval. Edicts were sometimes made for some

special occasion, in -which case they were called edicfa repentina. It was against the abuse of this kind of edicts that the Lex Cornelia in 67 B.c. was directed. Those which were applicable in all cases during the tenure of office of the magistrate who issued them were called edicta perpetua. The name of edictum perpetuiim was also given to a collection and arrangement of the clauses which the praetors were accustomed to put into their annual edicts, made under the Emperor Hadrian by Salvius Julianus about 131 A.D. What the exact nature of the work thus done by Julianus was is not known, but the edict prepared by him, and sanctioned by Imperial au¬ thority, had unquestionably a special force, and it is likely that it restricted in future the right enjoyed by magistrates of issuing edicts, to such cases as were not provided for in the edict of Julianus. Only a few fragments of the ancient Roman edicts have been preserved by Wieling in ˆFragmenta Edicti Perpetuiˆ (Frankfort 1733). See Civil Law.

EDICT OF NANTES, a decree of Henry IV, king of France, published 13 April 1598, by which he conceded to the Huguenots, or Protes¬ tants of that kingdom, toleration for their reli¬ gious beliefs, teachings and practices ; freedom of public worship and liberty to erect churches, except at Paris and the royal residences, and to maintain the four Protestant universities of Saumur, Montauban, Montpellier and Sedan; admission as members to the parliament of Paris and the right

to special chambers in the parliaments of Grenoble and Bordeaux ; further, the right to hold provincial and national synods. In 1620 the Huguenots in their political con¬ gress at La Rochelle confiscated all the prop¬ erty of the Roman Catholic churches and con¬ stituted throughout France a military and civil organization for Huguenot ends.

Before the formal revocation of the Edict of Nantes the liberties of the Protestants were largely restricted by partial acts of revocation, which precluded them from office in the govern¬ ment, from membership in trade corporations, etc., and from marriage with Roman Catholics. The edict was formally revoked by a decree of Louis XIV, 18 Oct. 1685. It ordered the churches of the Huguenots to be destroyed, for¬ bade the holding of religious meetings and of synods by Protestants on penalty of confisca¬ tion of goods; banished all Protestant minis¬ ters; ordered the children of Protestants to be baptized and brought up as Roman Catholics.

EDINBURGH, ed'in-bur-u (Edinboro), the metropolis of Scotland and one of the finest cities in the British Isles, is built on ridges and hollows that run east and west. It is pictur¬ esquely situated on the southern shore of the Firth of Forth, 47 miles east of Glasgow, and 400 north of London. From the Firth the ground slopes somewhat unevenly upward to the top of the Castle Rock, 438 feet above sea level. The Central Ridge, which constituted the site of the old town, is terminated on the west by the Castle Rock, and by Holyrood Palace on the east. Arthur Sea (822 feet high) overlooks the whole of the eastern and southern part of the city, and between it and the Palace are the elevations known as Salis¬ bury Crags. The new town lies between the old town and the sea. The houses, streets, squares and gardens are all handsome, built of

beautifully dressed freestone found in the neighborhood of the city. The principal streets -of the new town are Princes street, George street and Queen street, running paral¬ lel with each other.

Geological Formation. — The geological formation upon which Edinburgh is built is of a very interesting character. The rocksˆ which underlie the town belong to the lowest divisions of the carboniferous system, but here and there in the neighborhood, such as in the rocks of the Pentlands, Blackford Hill, and a portion of Arthur Seat, there are several veins of igneous rock. The district has always been an inter¬ esting one for the geologist, and several -u-rit- ers of standing

have dealt with the subject, among whom may be named — Hutton, Play¬ fair, Forbes, Millar, McLaren and Geikie.

Principal Buildings, Galleries, Museums, *etc.* — In Princes street there are some notable buildings, and on the Mound connecting it with the old town is the National Gallery, while near at hand to the east is the Scott Monument. The old town has suffered very much at the hands of the improver, but there are still ®closes,ˆ' ˆdands,® and ®wynds,'ˆ which are interesting to the visitor. From the Castle to Holyrood House there is one continuous street, known at different parts as the La-wnmarket, the High street, and Canongate. It is upward of a mile in length, and is frequently termed *The Royal Mile.ˆˆ Among the notable buildings in and around this ®Royal Mile'ˆ are the Tolbooth Church, the meeting place of the General As¬ sembly of the Church of Scotland ; the United Free Church Assembly Hall, Saint Giles' Cathe¬ dral, Parliament House, the Advocates' Library, the Signet Library, and the municipal buildings. The Tron Church is at the junction of South Bridge with the High street. Continuing down the Canongate on the left is the house of John Knox, the great Reformer, while on the right further down is Moray House, once occupied by the Regent Murray, in the garden of which stood, till quite recently, a tree said to have been planted by Queen Mary. In the garden is still existing a summer-house where it is averred the Treaty of Union was -signed. There are other interesting buildings in the Canongate, such as the Tolbooth and Queensberry House. To the north of the ˆˆRoyal Mile® there are such buildings as the Bank of Scotland in Bank street, and the Scotsman Buildings in North Bridge. From the head of the Canongate a particularly good view can be had of the Calton Hill, with its Nelson Monu¬ ment and the never-to-be-finished National Monument. To the south the public buildings in George IV Bridge are the County Buildings, the Sheriff Courthouse, and the Public Library (the latter erected in 1887 at a cost of i50,000, given by Andrew Carnegie ; total stock now is 165,000 volumes) ; while in Chambers street there is the Royal Museum of Science and Art, the Heriot Watt College, and the University (q.v.). Near at hand are the Students' Union, M'Ewan Hall, Heriot's Hospital, and the Royal Infirmary, all of which are distinctive buildings. The Castle contains accommodation for 2,000 soldiers, and the Armory has places for 30,0(X) stands of arms. The regalia of Scotland is kept in an apartment by itself. Another attrac¬ tion to visitors, besides this, is Queen Mary's

EDINBURGH

ij’iiji I I I 1 1 M4:

iTTiTfrllll

1 The Castle and Museum

O

The Old Town, from Princess Street

* ■ *►

: ‘-i ■:

V” < iVKf^’ I

t -

V

A ^ ■ M d • .’ * ‘

T ;

C •

% ‘

. t ‘- j

* »

•v

;*v ♦

» . •

*

•’ ■■

(

‘ ** • ‘• »,

? >

I -T »

•■’;;v:^’‘: ‘i

v<,. ‘

«. * «

r‘

I**

i— t?Ski .’. ‘ ■ ■’ ” ■■ ‘ ■ -

*?-, » ■■ ‘??? ‘ A . ■;A”jiKWd ■ .

■> ■’ ‘ ’ |i - ’ . , ‘ ■ ‘ -v’ - ‘ < -

■ ft?’ ■ ‘•=^ ■’ ‘■<’ • •”’ ■

.’si’ , ; ;, -■

IT •

’4’ T-;’ • ‘ ‘^.a; ••; ‘ ■ •’.’^ ‘■-. ■•»’-/ *s^

. ^p-. .L. ‘-cvm ■^ .’ ^^.r\ 0^. ‘ ■ ‘ V’ti

‘■ ‘X” - ‘■ . ‘ ■.*;• 4/ ” ’■ ’ ^ ’■ •> ‘ d

-••I^ •: ; ., \ ■ ;4;{!, ^ ,j: xi’

’ ■-:V’r ’T.-‘o.-x ‘ i1

r-

‘* !(•’:«•■ •-

♦: i

’ ‘•» ‘■/ y -

w

f’ ^ V* ^mtama , .^ov :.^r

• ‘•’■ ■* ‘■’, ^ s f J< -.* 1 •■ » W ■*’ 4 ^ *

^ . ■’ ‘■- . ■• • ■*-. ‘ - ■’ •- ‘: ■ • ,-.■■”••

V/’ ,. ■ ■ • , ■ I ■.... r . - ■ ■ ■

Mi

< w

‘■%’*- V-

‘ *

f.. ‘

♦

,*■

<h *

,r’ >• *.. •’•■ • ,-

t?’- .x ;.v*t’x ■. ■ymi::’

:%»>: -K ;. ■.‘; , v, .•

v - ■•?

«< ’. j». «’ •

*i”*T

#■

H., , ’• •

7

J ,.’. r.

… ^ f

■‘j

■i.w ^ ’%■ ■ ‘♦ • * > ’,

f.

•t I

“‘i

- ■ •”■?’ ‘■■”•- ■ > .-.-‘-v„ ■ \aPr if*’ •■,’■-3

‘. -‘ .’ , A,

• -.. . V ■- …. ”^’.-‘.d’^ ■‘iS_ x i

.vr-^‘V > ?’ .KJi ■ ‘y.‘i .’■ v” -v j

‘• 31’ ‘ d. • ■• » ‘ *i. “it* ’fl ^- ‘ ^

1.

i ■

- ^Y” * ^<^3^

*J » -•

■ » ‘

\ ,

■ / # ♦ •«

“’ ^J1«K ■ • (k •’» ■’ Wf*;’ ■

■o.

r4 » .♦

Si’

♦v . <

■ .■■■.^, . J ^4 rsw.k” ‘ • f

c- ^ .’/ \ *jVli*.....r^’

v-;.^ ‘

, rf

^ r*’ ’;• ‘ • ‘• :xti’

j> I i • ‘ ■ • ♦

* 1’

n’

<:> ‘ • •■

, I

> A*

»

»

room, which is visited annually by large num¬ bers. Holyrood Palace and Abbey stand at the east termination of the ^^Royal Mile,^^ and the former is only now used on the occasion ot the visit of the royal commissioner to the gen¬ eral assembly. It was begun by James IV near the end of the 15th century, suffered destruc¬ tion in Hertford's invasion in 1544, with the exception of portions built by James V in 1528; was destroyed by fire during the Cromwellian occupation»in 1650; and the greater portion of the present building dates only from the time of Charles Second. The apartments occupied by Queen Mary are in the northwest corner of the building, and in very nearly the same state as that in which they were left by that unfor¬ tunate princess. The Abbey is supposed to have been founded by King David I in 1128; it suffered at the hands of the English in 1544 and from the iconoclastic zeal of the reformers about 1558; in 1688 the chapel, which had again been set apart for worship in accordance with Roman rites, was completely destroyed by a Protestant mob. Other interesting buildings are the Royal Museum of Science and Art, the National ˆ Portrait Gallery and Antiquarian Museum in Queen street; Fettes College, Daniel Stewart's College, and the Cathedral of Saint Mary (Episcopal). Saint George's Church in Charlotte square is a notable modern ecclesias¬ tical building. Along with the University the more prominent educational institutions are the New College, the School of Medicine, Heriot-Watt College, Fettes College, the High School, the Academy, Daniel Stewart's College, and George Watson's College. The southern part of the city is modern, but extends now to the foot of the Pentland Hills, including the Braid hills, the golf course of which is one of the best inland courses in Scotland.

Manufactures. — The principal manufactures in Edinburgh are printing, type-founding, coach building, ale brewing, and cabinetmak¬ ing. It is the seat of the principal government departments for Scotland, and the headquarters of the book trade.

Government. — The town council consists of lord provost, magistrates known as bailies, treasurer, a dean of guild, and 41 ordinary councillors. Edinburgh was a royal burgh as early as the time of David

the First, its desig¬ nation at that time being Edwinesburgh. The outlying suburb of Portobello on the northeast was added in 1896.

Railways. — The two principal railways con¬ necting Edinburgh with other parts of the country are the Caledonian and North British railways. There are 25 miles of cable tram¬ ways throughout the city._ The system has been municipally owned since 1893 ; and in 1910 a beginning was made with an overhead electric system in one of the suburbs. To this system there was at one time a rooted aver¬ sion, due to a desire to preserve the amenity of Princes street; but on the expiry of the present operating company's lease in 1919, it is certain that the whole system will be electrified.

Electricity. — The city is beautifully lit bv an electric installation, which has been one of the most successful in the Kingdom.ˆ Not only is the public supplied on an extensive scale, but all the private houses of the modern parts of the town have electricity as the domestic light.

Parks. — ■ Edinburgh is particularly well off with open spaces. The King's Park, including Arthur Seat, Salisbury Crags, etc., is one of the most handsome in the Kingdom, although ver}ˆ little is done to adorn it either by the govern¬ ment or the local authority. The Braid Hills and Blackford Hill, on the latter of which is the Royal Observatory, are picturesque resorts in the summer time, while in the very centre of the town there are the Calton Hill, East and West meadows and Bruntsfield links. Invor-leith Park on the north, and Saughton Park on the western outskirts, are recent additions • — the latter a noteworthy one. A fine zoological garden has been opened on Constorphine Hill, west of the city.

Climate. — Robert Louis Stevenson, who was constitutionally ill adapted for the bracing and somewhat rigorous climate of his native city, has said that Edinburgh ˆˆpays cruelly for her high seat in one of the vilest climates under heaven,ˆˆ and has described the east winds that prevail in spring as making of the city a ˆmeteorological purgatory. Despite these strictures the city is a healthy one, with an annual mean temperature of 47° F., and a rain¬ fall of 27 inches.

Churches. — Edinburgh is noted for its churches. It is distinctively a Presbyterian city, there being in connection with the Church of Scotland some 46 churches, and with the United Free Church, about 66.

Population. — The population in 1901 was 316,479; in 1911, 320,318. The ratable value of the city in 1915-16 was $16,633,100.

Charitable Institutions and Libraries. — Among benevolent institutions are the Royal Infirmary; Donaldson's Hospital; Deaf and Dumb Institution ; Royal Blind Asylum and many others. There are four large libraries situated in the centre of the old town: the Ad— vocates' Library, 550,000 volumes, the Univer¬ sity Library, the Library pf Writers to the Signet, 110,000 volumes, and the Public Library.

History. — The history of the city is largely the history of Scotland. Before the 11th cen¬ tury it did not figure more than as a fortified town, but in the time of David I it begins to be mentioned in charters under the name of Edwin'sburg. In 1128 the Abbey of Holyrood was founded by David I and between it and Edinburgh was the Canongate, which had a separate municipal authority down to 1856. The old wall of the city is said to have been built in 1450, and was extended after the battle of Flodden in 1513. The English under Hertford in 1544 burnt the city to the ground, with the exception of Saint Giles Cathedral, and 17 years later, Mary, on her return from France, took up her residence at Holyrood Palace. The modern history of the town is more asso¬ ciated with literature than with commercial and industrial enterprise.

Bibliography. — Maitland's ˆHistory of Edin¬ burghˆ (1753); Arnot's ˆHistory of Edin¬ burghˆ (1758) ; Cranford's ˆHistory of the University of Edinburghˆ (1808) ; Bower's ˆHistory of the University of Edinburghˆ (1817) ; Chambers' ˆTraditions of Edinburghˆ (1824) ; Steven's ˆHeriot's HospitaP ; Wilson's < Memorialsˆ (1890) ; Grant's ˆOld and New Edinburghˆ ; and ˆ Burgh Record Society Pub-licationsU Williamson, ˆEdinburgh: An His¬ torical and Topographical Account of the City'

(1906) ; Blaikie, ˆEdinburgh at the Time of the Occupation of Prince Charlesˆ (Vol. II of Old Edinburgh Club's Publications, 1909) ; Geddie, ˆRomantic Edinburghˆ ; Fulleylove and Masson, ˆEdinburgh Painted and De¬ scribedˆ (1905) ; Watkeys, ˆOld Edinburghˆ (1913) ; Wierber, ˆStory of Edinburgh Castleˆ (1913) ; and for its antiquities the annual vol¬ umes of the Old Edinburgh Club from 1907.

Hew Morrison,

Chief Librarian, Edinburgh Public Library.

D. S. Douglas,

Fˆditorial Staff of The Americana.

EDINBURGH, University of, the youngest of the four Scottish universities, was originally known as ˆˆthe College of Edinburgh,® or ˆˆthe Town's College,® having been founded in 1583.

King James VI. in 1582, granted to the town council of Edinburgh a charter, confer¬ ring upon that body certain powers and privi¬ leges, and under this charter the Town's Col¬ lege, which afterward became known as ˆˆthe College of James VI,® was founded by the town council as a degree-conferring institu¬ tion, and the University of Edinburgh re¬ mained under the control of the town council until 1858, when, by the Universities Act, all the universities of Scotland were made prac¬ tically autonomous. From 1858 to 1889, the senatus academicus (that is to say, the prin¬ cipal and the professors) was the governing body of the university, but, by the Universities (Scotland) Act of 1889, the university court became the governing body, having full con¬ trol of all the property belonging to the uni¬ versity. The senatus, however, still regulates the teaching and discipline of the university. The university court consists of the rector (the chosen representative of the undergrad¬ uates) ; the principal; the lord provost of Edinburgh for the time being; three assessors nominated by the chancellor, the rector and the town council, respectively; four assessors elected by the general council ; and four assess¬ ors elected by the senatus.

The university has six faculties, videlicet ■ — divinity, law, medicine, arts, science and music, each presided over by a dean elected by the

separate faculties. In 1918 an ordinance con¬ stituting a degree in commerce (B. Com.) received the consent of the Privy Council, London.

The general council of the university con¬ sists of the chancellor, the members of the uni¬ versity court, the professors and the graduates. The council does not exercise any direct control in the government of the university, but ^may make reports to the university court on all matters affecting the well-being and prosperity of the university, and the university court shall consider the same, and return to the council their deliverance thereon.® The general coun¬ cil, together with the general council of Saint Andrews University, return a member of Parliament, who represents the two universities jointly. The chancellor of the university is appointed for life by the general council, and acts as president of that body. The general council is represented on the university court by four assessors elected every four years, two retiring biennially.

A students' representative council, elected annually, was founded in 1884, to represent the

students in matters affecting their interests, and to afford a recognized means of communication between the students and the university author¬ ities, as well as to promote the social life of the undergraduate community.

Enrolment as a student in one or more classes, the payment of the fees for such classes, the signing of the university album and the payment of a matriculation fee of one guinea per session (or half a guinea for a summer session only) are conditions precedent of matriculation. The matriculation fee entitles students to the use of the university library. The rector of the university, who presides over the university court, is elected by the matricu¬ lated students.

The university buildings consist of (1) the college or university (old building) in South Bridge Street; (2) the new buildings (school of medicine) Teviot Place; (3) the music class¬ room, Park Place; (4) the John Usher Institute of Public Health, Warrender Park Road, and (5) the engineering department. Infirmary Street. The old buildings of the university which were erected on the site of ®Kirk o' Field,® the scene of the murder of Darnley, con¬ tain the library and reading-rooms, the class¬ rooms of the faculties of arts, divinity and law, the natural history and some of the science classrooms, the examination

hall, the physical, geological and pathological laboratories, the Fulton Engineering Laboratory; the physical, geological, fine art and natural museums ; the senate hall; the university courtroom and the officers of the senatus, the court and the students' representative council. The new buildings, begun in 1878, were partly opened for teaching purposes in 1880, being completed in 1888. They contain the lecture-rooms of the faculty of medicine (excepting those of botany, natural history and public health) ; the various museums connected with the medical faculty; a students' reading-room and common room ; the faculty of medicine reception and reading-rooms, and the offices of the faculty.

Immediately contiguous to these new build¬ ings, there was erected in 1901 the Hughes Bennett Physiological Laboratory, in memory of a former professor of physiology. The laboratory is connected directly with the other physiological laboratories and has been de¬ signed on the most modern lines.

The M'Ewan Hall was built between 1888 and 1897, and is a spacious hall of the early Italian renaissance style, capable of holding 2,600 people, and is used for all academic func¬ tions.

The John Usher Institute of Public Health was opened in 1902, and is equipped with the most niodern appliances for teaching and re¬ search in bacteriology and chemistry. It is the gift of Sir John Usher, baronet, and was erected at a cost of over £21,000.

The new block of buildings for the en¬ gineering department was completed in 1905, and provides extensive accommodation for carrying on the work of that department.

The School of Music was built in 1858 from designs by the late Mr. David Cousin, and con¬ tains, 'in addition to the music classroom, an excellent organ, and museum of musical in¬ struments.

The University Union, with extensions, has

cost over £37.000. It is situated in Park Place, near the M'Ewan Hall, and is held by trustees for the students.

The University Library, which contains over 270,000 volumes, and about 8,000 MSS., many of great valuo, was founded in 1580 by the trans¬ ference from the town council to the univer¬ sity of a collection of books left to ^^Edinburgh and Kirk of God, thair to reman,^^ by Mr. Clement Little. In addition to the University Library proper, there are separate libraries in connection with the following departments: Theological, classical, philosophical, historical, physiological, astronomical, modern languages, natural philosophy, engineering and music.

The income of the university is derived from benefactions and bequests for the founda¬ tion of bursaries, scholarships and prizes; from matriculation, graduation and other fees; from funds bequeathed for general purposes and for the endowment of chairs; and from parlia¬ mentary grants. The salaries of the principal and professors are paid from a fee fund ac¬ count, the whole of the fees being pooled. The total net annual revenue is about £100,000.

Bibliography — Bower, < History of the Uni¬ versity of Edinburgh^ (3 vols., Edinburgh 1817-30) ; Cranford, ^History of the University of Edinburgh, from 1580 to 1646^ (with Appendix, Edinburgh 1818) ; Dalzel, ^History of the Uni¬ versity of Edinburgh from Its Foundation^ (edited by David Laing, 2 vols., Edinburgh 1862) ; Grant, ^ Story of the University of Edinburgh During Its First 300 Years^ (2 vols., London 1884).

John Minto,

Librarian of the Signet Library, Edinburgh.

EDINBURGH REVIEW, the first of the great critical periodicals of the 19th century. It first appeared in October 1802, being started by Francis Jeffrey, Sydne^^ Smith, Francis. Horner and Henry Brougham. The original publisher was Constable and the printing was done by Willison. Of the first number 750 copies were printed; the demand soon ex¬ hausted this edition and 750 more were struck off. In six years the periodical reached a circulation of 9,000 and in 1813 it had about 13,000. Sydney Smith edited the early numbers but was soon succeeded by Jeffrey who made the Review a potent influence in Whig politics and also in the literary field. Its writers ex¬ hibited remarkable keenness of criticism, wit and brilliancy of style and the Review caused a sensation in the world of literature. Among the least

pleasing episodes of its early period are its treatment of Southey, Wordsworth and other writers of the Romantic school. After the early period Macaulay was the most bril¬ liant contributor. The Review is now pub¬ lished in London. Consult Napier, ˆLife and Correspondenceˆ (London 1862).

EDINBURGHSHIRE, or MIDLO¬ THIAN, a maritime county of southeastern Scotland; area, 234,329 acres. The Pentland Hills cross the county from the southwest, and the Moorfoot Hills are in the southeast. The uplands in the south are devoted to pasture ; dairying is carried on in the west ; and on the lowlands toward the Forth the soil is of remark¬ able fertility. Oats — for which the county is famous — wheat, barley and potatoes are the principal crops ; paper, ale and brick are among

the manufactures; coal and shale are exten¬ sively worked, and there are important quarries. The county returns one member to Parliament. Pop. 507,6ˆ, or exclusive of Edinburgh, Leith and Musselburgh, 80,922.

EDISON, Thomas Alva, American elec¬ trician and inventor: b. Milan, Ohio, 11 Feb. 1847. His family moved to Port Huron, Mich., when he was seven years of age, but he ob¬ tained no schooling, and at the age of 12 be¬ came a trainboy on the Detroit and Port Huron branch of the Grand Trunk Railway. While in this capacity, in 1862, he bought a small hand press and edited, printed and published a small paper of his own, naming it the Grand Trunk Herald. It had a circulation of 300 among the employees of the road. For the rescue of the son of a station agent he was taught telegraphy by the father and later became an operator at Mount Clemens, but, owing to his dislike of routine work, his fondness for reading and his inventive genius, he lost several subsequent posi¬ tions and became a ®tramp operator, although known to be remarkably proficient. While in Indianapolis in 1864 he invented an automatic telegraph repeater, the first of a long series of improvements and inventions. He soon after went to Boston, where he invented a commer¬ cial stock indicator, which he sold to New York capitalists for $40,000. This gave him the long-cherished opportunity of establishing an exten¬ sive laboratory, which he did at Newark, N. J., for the special manufacture of electrical print¬ ing, automatic and other apparatus. In 1876 his health failed and he gave up manufacturing, confining his labor to investigation and inven¬ tion. He established his laboratory at Menlo Park, N. J., and later at West Orange, N. J., gave employment to hundreds of workmen and became

known as one of the greatest inventors of the 19th century. Alore than 300 patents have been issued on his inventions and he has besides produced hundreds of minor contri¬ vances and improvements not covered by pat¬ ents. Among his more important .inventions may be named the phonograph, a telephone for long-distance transmission, a system of duplex telegraphy (which he subsequently developed into quadruplex and sextuplex transmission), the carbon telephone transmitter, the microtasi-meter, the aerophone, megaphone, the incan¬ descent electric lamp, the kinetoscope and a storage battery for street railway cars and automobiles. There is not an electrical instru¬ ment or an electrical process now in use but bears the mark of some great change wrought by the most ingenious of Americans. In 1878 he was made Chevalier of the Legion of Honor by the French government, a commander of the .Legion in 1889 and was the recipient of the in¬ signia of a grand officer of the Crown of Italy bestowed the same year by King Humbert. In 1892 he received the Albert medal of the So¬ ciety of Arts of Great Britain.

Among his commercial ventures were the magnetic treatment of iron ore and a Portland cement plant. The greatest of his later inven¬ tions is the nickel-iron storage cell, which is extremely rugged, is almost incapable of electri¬ cal injury and has a very high capacity per unit of weight. Its special use is the propulsion of vehicles and railway cars. Edison also invented a disc phonograph with a diamond-point repro-

ducer and other improvements. In 1913 by synchronizing his phonograph and kinetoscope he produced realistic talking motion pictures.

Edison is a man of remarkable personality. To those who believe his work is the product of an inspiration given by nature to but few, the story of the manner in which he achieves success will seem shockingly unromantic. In the genius who works by inspiration Edison has no great faith. ˆGenius is 2 per cent inspiration and 98 per cent perspiration,® is the incisive, epi¬ grammatic answer he once gave to

a man who thought that a genius worked only when the spirit moved him. Not being given to scientific rhapsodies, Edison does not concern himself with what may be of service a century hence; he confines himself rigorously to the needs of the present. Knowing full well that he is probably not the first who has set for himself the task in the performance of which he is engaged, he reads all that is pertinent to his subject in the vast library which forms an important adjunct of his laboratory. Not content with the infor¬ mation gathered from his own shelves his lit¬ erary agent is ordered to send him more. After a thorough review of his subject, Edison begins laboratory work — an expert keenly alive to the failures of his predecessors, careful to avoid useless repetitions of old experiments. It is now that the 2 per cent inspiration gained by exhaustive reading, and the 98 per cent perspira¬ tion which he is ready to expend, are applied. Experiments are made ; not a few, but hun¬ dreds and even thousands. Model after model is built. Failure upon failure is met with, until further efforts seem hopeless. Undismayed, Edison performs more experiments, builds more models. Failure spurs him on. At last an ex¬ periment is performed or a model made which gives faint encouragement. So far from being elated, he regards the promising result with great suspicion. The failures have been too many; the apparent success after all may be due to an accidental combination of circumstances that may never occur again. Only after the par¬ tial triumph has been confirmed by many trials does complete assurance come. Edison knows exactly what he wishes to accomplish, and how his end is to be attained. Absolute certainty of purpose and of method saves him from fritter¬ ing away his time in useless experimentation. Chance has given perhaps an occasional idea, but it has not lightened his work. Tireless per¬ severance and long hours of work are the se¬ crets of Edison's success. In 1897 Edison de¬ voted his exclusive attention to the invention of a new storage battery, on which problem he had been engaged for some five years. For over a year he worked harder than a day laborer. He was in his laboratory at 7.30 in the morn¬ ing. His luncheon was sent to him. In the evening he left for dinner, but returned at 8. At 11.30 at night his carriage called for him; but often the coachman had to wait for three or four hours until the inventor came out of his laboratory. Yet when vacation time comes, and with it a chance to leave his laboratory, Edison plays just as he works, with his whole heart and soul. He will hear nothing of business. Sci¬ ence is thrown to the winds. Consult Dyer and Martin. ˆEdison: His Life and Inventionsˆ (2 vols., New York 1910) ; and Jones, ˆThomas Alva EdisoiF (ib. 1908).

EDISTO, a river in South Carolina, which has its rise in the southern part of the State and which flows in a general direction south¬ east into the Atlantic Ocean. Its source is at the junction of two streams called North and South Forks of Edisto River. The river is 150 miles in length and navigable for 100 miles.

EDITOR, The, (Redaktoren), a play by Bjornstjerne Bjornson, appeared almost simul¬ taneously with ˆA Bankruptcy.ˆ Both plays had been written in Italy and were published in Norway in 1875. They signaled the beginning of Bjornson's career as an author of social dramas. In this respect he came a little earlier than Ibsen. While 'ˆA Bankruptcyˆ met with a favorable reception both at home and abroad, ˆThe Editorˆ was ill received. Since it was a fierce attack upon modern journalism, it nat¬ urally roused the ire of the newspaper world, for it shows how the press exerts a most per¬ nicious influence when in the hands of unscrupu¬ lous men. Bjornson injects much personal feeling into the play. He was himself a liberal and had often been stung by the attacks of the conservative press. The ˆeditor® is therefore represented as a conservative of the conserva¬ tives, and the author takes perhaps too keen a delight in pointing out the selfishness of the man. The ˆeditor® is held forth as the very incarnation of evil, while his opponents, the liberals, appear like the angels of light. The standpoint of the author is that of tolerance, and the old doctor in the play is the spokesman of this philosophy. Bjornson combats the doc¬ trine that we must become hardened to the criticisms that are directed against us through the press or otherwise. Consult Jaeger, Henrik, Hllustreret norsk literaturhistorieˆ (II, 589-639 and 711-768) ; Brandes, Georg, ˆDet Moderne Gjennembruds Maendˆ (pp. 1-ˆ9, tr. by Mary Morison in a volume entitled ˆHenrik Ibsen. Bjornstjerne Bjornson. Critical Studies. By Georg Brandes,ˆ 1899).

Joseph Alexis.

EDMONDS, Richard Hathaway, American journalist: b. Norfolk, Va., 11 Oct. 1857. His parents were Virginians of English descent. His father died when he was an infant and his mother removed to Lancaster County, Va., where the family suffered many bitter experi¬ ences during the Civil War. In 1871 she re¬ moved to Baltimore where the boy received an education at private schools, and for two years at the City College of Baltimore. In 1875 he became clerk in the office of the Journal of Commerce, and was successively bookkeeper, reporter and editor until 1881, when he became identified with the founding of the Manufac¬ turers' Record, devoted to the industrial and commercial interests of the South. As its editor he has been the author of its wonderful growth and powerful influence. Realizing the vastness

of Southern resources and grasping their possibilities, he planned and labored ably and successfully for their development. As editor of the Journal of Commerce he wrote on the world's grain trade, becoming an au¬ thority on grain statistics. For the Interna¬ tional Review he wrote a noteworthy history of the American grain trade after 1820. He is a trustee of the Southern Baptist Theolog¬ ical Seminary of Louisville. He has pub¬ lished numerous pamphlets about the South

and its resources; also < Facts about the bouth an historical review of business con¬ ditions of the South before and after the Civil War. He has been active in advocating techni¬ cal schools for the South. He is a member of the American Association for the Advance¬ ment of Science, and the American Academy of Political and Social Science.

EDMONDSON, Thomas William, Ameri¬ can rnathematician : b. Skipton-in-Craven, Yorkshire, England, 26 June 1869. He was graduated at London University in 1888, and at the University of Cambridge in 1891, study¬ ing later at Clark University, Worcester, Mass. He was assistant professor of physics and associate professor of mathematics at New York University from 1896 to 1905, when he became full professor of mathematics. He has published ˆWorked Examples in Co-ordinate Geometry > (1891) ; 'ˆMensuration and Spherical Geometry > (with W. Briggs, 1893) ; 'Deduc¬ tions in Euclid> (1901), also other mathematical textbooks.

EDMONTON, Canada. The city of Edmon¬ ton, capital of the province of Alberta, stands at an altitude of 2,158 feet, and is situated on both banks of the North Saskatchewan River about 800 miles west by north of Winnipeg and 946 miles east of Prince Rupert. It is approximately 300 miles north of the interna¬ tional boundary and lies a few miles south of the middle of the province. The site is pictur¬ esque, as the Saskatchewan at this point flows between banks 200 feet high and densely wooded. The name Edmonton is derived from the little town near London, England, to which John Gilpin took his famous ride. Throughout the 19th century the place was an important trading-post of the Hudson's Bay Company and it was only in 1916 that the

moldering tim¬ bers of the old fort were finally demolished. With the advent of railway communication with Calgary in the early nineties, the town began to develop, and this development has proceeded steadily ever since.

On account of its strategic position at the old cross roads of north and south and east and west trade, Edmonton has become a re¬ markable railway centre. Thirteen lines of railway, operated by the Canadian Pacific, Grand Trunk Pacific, Canadian Northern, Ed¬ monton, Dunvegan and British Columbia and Alberta and Great Waterways enter the city. Two of these are the transcontinental lines of the Grand Trunk Pacific and the Canadian Northern. The new northern railways leading to the Peaceˆ River country and to the Mc-Murray district, celebrated for its tar sands, have already made Edmonton the distributing point for the rapidly growing commerce of the northern section of Alberta. Communi¬ cation between the north and south sides of the city is provided by four steel bridges, the most important of which is an imposing structure crossing the river at a height of 200 feet. The legislative assembly is housed in a fine stone building.

Government. — The city government is com¬ posed of an elective mayor and council and a board of appointed commissioners. Munici¬ pally, Edmonton has become known as the ex¬ ponent of the single tax and public ownership of all municipal utilities. The city owns and

operates its own street car service, telephones, hospitals and waterworks. Whilst distributing and selling its own light and power, the city has recently surrendered to a private corpo¬ ration the manufacture of power.

Religion and Education. — All the better known religious bodies are represented by sub¬ stantial edifices. Edmonton is the seat of a Roman Catholic archbishop and an Anglican bishop.

The schools are managed by an elected board of trustees, and education is free and com¬ pulsory. There are two high schools, one on each side of the river, and a flourishing tech¬ nical school. Higher education is provided by the Provincial University, a handsome build¬ ing occupying a beautiful site of some 250 acres' on the south side of the river. Commo¬ dious residential buildings for students and staff have also been provided. Robertson Col¬ lege and Alberta College, occupying its own building on the university grounds, are re¬ spectively the theological seminaries of the Presbyterian and

Methodist churches and are in close affiliation with the University of Alberta. Edmonton is the site of an important meteoro¬ logical station.

Industrial Progress. — The most important industry is perhaps coal mining. Lignite coal of a good quality is mined within the city limits and in the adjoining country. This sup¬ plies the local coal market, and a large trade is being developed in shipments to remoter centres. Stock-raising provides raw material for three extensive packing establishments, and in connection with these stock-yards have been established. The milling of cereals grown jn the rich surrounding country is also a flourishing business and sure of healthful growth. Amongst other _ industries that have made a good start are brickmaking, for which the local clays offer excellent material ; dairy products, the manufacture and export of which are assuming large proportions; clothing, soap andˆ biscuits. Natural gas has been found at Viking in territory close to Edmonton and the city will at an early date be furnished with this commodity. Cheap power is soon to be supplied from an extensive hydro-electric plant situ¬ ated on the Saskatchewan west of the city Pop. (1911) 24,900; estimate in 1916. 55,000.

William A. R. Kerr, Dean of the University of Alberta.

EDMONTON, England, town in the county of Middlesex, on the New River, eight miles north of London. The “Bell at Edmontonˆˆ has become famous by association with the adven¬ tures of John Gilpin, the hero of Cowper’s poem. Charles Lamb died at Edmonton in

1834.

EDMUND, Saint, king of the East-Angles : b. Nuremberg, 841; d. Oxen, now Hoxon, Eng¬ land, 20 Nov. 870. Edmund belonged, by blood, to the English-Saxon kings, but was not a direct heir to the throne. When Edmund was only in his I5th year he was crowned by Hum¬ bert, bishop of Lima, on Christmas Day 855, at Burum, a royal villa on the Stour, now called Bures. In the 15th year of his reign the land was attacked by the Danes, and they laid waste all the country through which they passed. The king tried to protect his people, but the Danes outnumbered them and spared none.

He was captured at Oxon and terms, prejudicial to religion, were offered and rejected. Hinguar, the Dane, ordered most terrible tortures to be inflicted. Again he was offered terms of sur¬ render, and again he refused. Hinguar at last ordered his head to be cut off.

EDMUND, Saint, archbishop of Canton-bury: b. Abingdon, England, about 1190; d. Soissy, France, 16 Nov. 1240. His first studies were made at Oxford and from there he was sent to Paris, where he devoted himself to the study of theology and the Scriptures, and for a time taught the Scriptures in Paris. Returning to England, after his ordination, he became a teacher at Oxford from 1219 to 1226; he was the first who taught Aristotle's logic at Oxford. He desired to work among the poor, and at his own request was transferred to Salisbury Cathedral. While at Salisbury he received a commission from the Pope to preach the cru¬ sade against the Saracens, which he did with effective results. In 1234 Pope Gregory IX appointed Edmund as archbishop of Canter¬ bury. He at once entered upon a series of reforms in courts, monasteries and among his clergy. His ˆConstitutionsˆ in 36 canons, deal¬ ing with matters of reform, are still extant. Troubles arose between Edmund and the king, when the king's greed sought various means to secure Church revenues. Both the archbishop and the king appealed to the Pope, who, failing to finally settle the disputes, left the archbishop almost powerless to cope with adversaries. Fearing that by remaining he might seem to sanction what he could not redress, he left the country secretly and went to France. He was canonized in 1246, only four years after his death. Some of his works extant are ˆConsti¬ tutions,ˆ to be found in ˆEditions of the Coun¬ cilsˆ by Linwood, Spelman, Wilkins, Johnson and Labbe; ˆSpeculum Ecclesiae,ˆ or ˆMir¬ ror of the Churchˆ ; and several of his works in manuscript, one on the Sacraments, are in the Bodlein Library, Oxford. Consult Wood, ˆHistory and Antiquityˆ ; Tanner, ˆNotitia Monasticaˆ ; Butler, <Lives of Saints,ˆ and the 'Life> by Ward, (1903).

EDMUND I, or EADMUND, king of England : b. about 921 ; d. 26 May 946. He was a son of Edward the Elder and succeeded his brother Athelstan in 940. At the battle of Brunanburh, in 937, he distinguished himself. He subdued Northumbria and the Five Danish Boroughs in 944, and in the following year con¬ quered Cumbria, which he

bestowed on Mal¬ colm, king of Scotland, on condition of homage. He was killed at a banquet by Liofa, an outlaw.

EDMUND II, or EADMUND (surnamed Ironside), king of England: b. about 981 ; d. 30 Nov. 1016. He was a son of Ethelred H, and on the latter's death in 1016 was chosen king at London, whilst Canute was elected to the same dignity at Southampton. Edmund several times defeated the forces of the Danish ruler, but was hirnself defeated at Assandun (now Ashington) in Essex. A compromise was then effected, by which the midland and northern counties were assigned to Canute and the southern to Edmund. On Edmund's death, a few weeks after this treaty, Canute became king of England. Consult Oman, ˆEngland before the Norman Conquestˆ (London 1910).

EDMUNDS, Albert Joseph, American librarian : b. Tottenham, Middlesex, England, 21 Nov. 1857. In 1877 he entered the Univer¬ sity of London, was secretary to T. W. Back¬ house, the astronomer, from 1879 to 1883, and emigrated to the United States in 1885. From 1887 to 1889 he was assistant librarian of Haverford College; in 1889-90 he classified the Philadelphia Library and since 1891 has been cataloguer of the Historical Society of Penn¬ sylvania. He has published ˆEnglish and American Poemsˆ (1888) ; ˆ Songs of Asia

Sung in Americaˆ (1896) ; ˆMarvelous Birth of the Buddhasˆ (1899) ; ˆ Hymns of the Faith ˆ (Dhammapada 1902) ; ˆBuddhist and Chris¬ tian Gospelsˆ (1902; 3d ed., Tokio 1905; 4th ed., Philadelnhia 1909, with important postscripts in 1912, 1914; Italian translation, Palermo 1913) ; ˆBuddhist Bibliographyˆ (1903) ; ˆBuddhist Texts in Johnˆ (1906; 2d ed., 1911) ; ˆFair-mount Park and Other Poems ˆ (1906) ;

ˆBuddhist Loans to Christianityˆ (1912) ; ˆDuet with Omarˆ (1913) ; ˆHistory Simplifiedˆ (1914) ; ˆHoag's Visionˆ (1915).

EDMUNDS, George Franklin, American lawyer: b. Richmond, Vt., 1 Feb. 1828; d. 27 Feb. 1919. He was educated in the com¬ mon schools and by a private tutor; studied law, and began its practice in 1849. In 1851 he removed to Burlington, Vt. He was a member of the Vermont legislature 1854—59, being speaker 1856-59, and was a member of the State senate, and its president 1861-62. He was by this time very prominent in Vermont politics, and at the opening of the Civil War, when a State con¬ vention assembled with the intention of uniting war Democrats and Republicans, he outlined the resolutions which the convention finalU adopted as the principles of union. On the death of

Solomon Foot, in 1866, Edmunds was elected to the United States Senate to fill Foot's unexpired term, and was thrice reelected for full terms, resigning in 1891. During his quarter-century in the National Senate he served on many important committees, display¬ ing the qualities of an able, accomplished states¬ man. He was a member of the electoral com¬ mission in 1877, and was the author of the act of 22 March 1882 known as the ^^Edmunds Act® (q.v.), which provided for the suppression of polygamy in Utah and the disfranchisement of any person convicted of practising it. He was also the author of the ® Anti-Trust Law® of 1890. During the term of President Arthur he was president pro tempore of the Senate. In 1897 he became chairman of the monetary'' commission which had been appointed by the executive committee of the Indianapolis mone¬ tary conference. After his retirement he de¬ voted himself to his profession, and gained wide fame as a constitutional lawyer.

EDMUNDS ACT, passed by Congress 22 March 1882 ; an act to root out polygamy in-Utah, not only by direct punishment but by barring out votes, public careers and official action from polygamists. Mormons held con¬ trol of the Territory not only through the local offices, but Horn the fact that all juries were composed of Mormons who would not convict their fellows or admit evidence of polygamy; and the act not only disfranchised but excluded from juries all who either practised polygamy or believed it rightful. The disfranchisement was even more effective, as Utah had woman

suffrage, and each polygamous wife was dis¬ franchised also. The act made the living with more than one woman in marital relations a ˆmisdemeanor.

EDMUNDSON, George, English clergy¬ man and historian: b. Redcar, Yorkshire, 1848. He was educated at Magdalen College, Oxford, and entered the ministry of the Church of Eng¬ land in 1874. He is best known as a student of the history of the Low Countries and of South America. From 1901 to 1904 he was engaged in the preparation of the British case in the Guiana-Brazil boundary dispute. He was a

contributor to the ˆCambridge Modern Historyˆ and published ˆMilton and VondeP (1885) ; ˆArchbishop Laud and his Workˆ (1905) ; ˆAnglo-Dutch Rivalry in the First Half of the 17th Centuryˆ (1910) ; ˆThe Church in Rome in the First Centuryˆ (1ˆ3).

EDOM, e'dom, in the New Testament, IduMyEa, in ancient times a country lying to the south of Palestine in the region of Mount Seir. The Edomites are said in Genesis to be the descendants of Esau. They were subdued by King David, and after the separation of the 10 tribes remained subject to the kingdom of Judah till the reign of Jehoram, when they re¬ volted and secured their independence for a time. They were again subdued by Amaziah and again in the reign of Ahaz, recovered their independence, which they maintained till the time of the invasion of Judea by Nebuchadnez¬ zar. They fell under the rule of the Persians, and latterly their fortunes were merged in those of Arabia.

EDRED, king of England: d. Frome, Eng¬ land, 23 Nov. 955. He was a son of Edward the Elder, and succeeded to the throne on the murder of his brother, Edmund I, in May 946. He quelled a rebellion of the Northumbrian Danes, and compelled Malcolm, king of Scot¬ land, to renew his homage for his English pos¬ sessions. Edred died after a reign of nine years, and left the crown to his nephew, Edwy.

EDRISI. See Idrisi, Abu Aballah Mo¬ hammed.

EDSALL, Samuel Cook, American Prot¬ estant Episcopal bishop : b. Dixon, Ill., 4 March 1860; d. 17 Feb. 1917. He was educated at Racine College; read law and began practice in 1882. He soon abandoned this profession, en¬ tered the Western Theological Seminary and was ordained to the Protestant Episcopal min¬ istry in 1ˆ9, becoming rector of Saint Peter's Church, Chicago, in the same year. After 10 years in this charge he became missionary bishop of North Dakota; in 1901 was elected coadjutor bishop of Minnesota and in the same year was translated as bishop. He wrote ˆPrayer Book Preparation for Confirmation.ˆ

EDSON, Cyrus, American bacteriologist: b. Albany, N. Y., 8 Sept. 1857; d. 1903. He was graduated at the New York College of Physi¬ cians and Surgeons in 1881 and in the following year was appointed a sanitary inspector. In 1893-95 he was health commissioner of New York. He discovered a new treatment for con¬ sumption, malaria and other germ diseases, in 1896, which he named aseptolin. His publica¬ tions include about 80 papers on medical and sanitary subjects. Lie was the inventor of many surgical instruments.

EDUCATION, Abnormal. See Educa¬ tion OF Feeble-Minded and Mental Defec¬ tives.

EDUCATION, Adult. The conviction that the duty of society in the education of its mem¬ bers does not cease with the completion of a school or college course has gained ground during the last decade. Because of this, wide¬ spread efforts to educate the adult have been made with varying results. On the whole the progress has been satisfactory, yet a co-ordina¬ tion of effort and a scientific plan is still lack¬ ing. The National Society for Broader Edu¬ cation, organized in New York 1910, is the only organization for adult education that has a definite plan and actually covers the entire country. The Society with its headquarters at Carlisle, Pa., has, however, because of lack of funds, limited its activities to economic, so¬ ciological, literary and musical fields. In 1917 it gave 7,796 lectures, concerts, talks. It gave 32 addresses for every day of Society's work¬ ing year of nine months. Its audiences, includ¬ ing classes, numbered 1,339,907, or 5,583 per¬ sons every working day. In addition to its field work, the National Society for Broader Edu¬ cation maintains scholarships in many colleges and universities. Its staff in 1917 numbered 176 persons. Adult education has been ham¬ pered by the lack of suitable meeting places. Satisfactory halls existed but the rental charged precluded their use. The National Society for Broader Education organized a country-wide campaign for the open schoolhouse. Various educators either working with the Society or independently aided the movement. As a result of the effort, a canvass* of 603 cities of over 5,000 inhabitants made by the Russell Sage Foundation showed that schoolrooms in these cities were used after class hours for the in¬ struction of the adult. In 294 cities for mis¬ cellaneous educational activities, in 219 for lec¬ tures, in 207 for meetings of Parent Teachers Association, 129 as social centres and in 39 for vacation schools. In 11 States in 1917 grants were made for the education of the alien adult but these efforts have only been a beginning of a needed work. Minnesota and Wisconsin are the most active and most suc¬ cessful States in adult education and New York city has for years stood pre-eminently first among the cities in its provision for adult instruction. The 25th annual report of the supervisors of lectures of the New York Board of Education showed that in 1917 there were 174 lecture centres, 676 lecturers speak¬ ing on 1,695 topics before 5,405 audiences. Total aggregate audience was 1,154,066, an average of 214 per lecturer. For 25 years these lectures have cost the city of New York about $150,000 annually. The University of Minne¬ sota has carried the University atmosphere over the State, reaching 25 towns on each year's circuit.

University week is a six-day program conducted in each of the towns listed through¬ out the State, during which effort is made to present in epitome as many as possible of the widespread activities of the University. Mem¬ bers of the University faculty lecture on a great variety of subjects, the glee club gives concerts, debating societies hold debates, the dramatic club gives performance as do musi¬ cal organizations and there are talks to business

men at noonday luncheons and women's clubs in the afternoon. The University of Wiscon¬ sin is a pioneer among educational institu¬ tions in establishing a school film exchange as one of the means of solving the motion pic¬ ture problem. Motion pictures are used by sev¬ eral churches, among 'them the Grace Methodist Episcopal Church and Saint Bartholomew's Episcopal Church of New York city. They give on Sunday afternoons pictures of travel through Palestine, biblical scenes and events in the history of the Church. It is generally con¬ ceded that the public has in its hands the ulti¬ mate development of the motion picture. The public has been importuned to demand a high grade of pictures. Many public schools and other educational institutions are now furnish¬ ing films to students and sending them out to the general public when centres are organized for their reception and exhibition. In 1891 New York State appropriated $10,000 for adult education, it was the first State appropriation. \york was classified under title ®Home Educa¬ tion® and included ^^Study clubs, exchanges, traveling libraries, public libraries and library schools.® Similar work was begun in Chicago in 1892 but quickly abandoned when the Uni¬ versity of Chicago incorporated this work as part of its activities. In December 1891 a National Congress on Adult Education and Uni¬ versity Extension met in Philadelphia, at which it was reported that in the four years, 1887-91, 28 States and Territories had begun adult edu¬ cation in some form. This work was relatively unorganized and there was no organized adult education before 1892, and in that year organi¬ zation in two institutions only. University of Chicago and University of Wisconsin. Between 1906-13, 28 institutions organized adult educa¬ tion and 21 institutions

reorganized the work in addition to 12 institutions which had begun the work between 1892 and 1906. Modifica¬ tions and gradual change of methods have taken place in the last 10 years. It has been decided that the English plan of lectures, class work, syllabi, collateral reading and more or less rigid examinations was not well adapted to the larger part of the adult student body in America, whose need was great for educational opportunities offered out of work hours. Modi¬ fications were introduced and in quick succession departments were added including the educa¬ tional bulletin and package library, and of wel¬ fare work covering the entire field of civic and social betterment. Adult education now in¬ cludes all extra-mural university service, and certain types of intra-mural work. Under the latter head are included institutional short courses and conferences and opportunities to attend classes or lectures out of work hours as are offered sometimes with and sometimes without the customary entrance requirements. Of institutions offering education to adults, 20 give degrees. ˆ In addition to the above-men¬ tioned institutions with organized work in adult education, 52 colleges and universities give more or less attention to the subject.. In adult education great service has been done by the General Federation of Women's Clubs, with its 9,000 clubs, its 50 or more federations, and 3,000,000 members working through 12-15 departments. The Federation stands for bet¬ ter homes, better schools, better things for men,

women and children and a broader vision of life. Among its departments are art, music, literature, civics, library extension, conserva¬ tion of public health, social and industrial con¬ ditions, social hygiene, child hygiene, legislation, home economics and education. One praise¬ worthy activity is the rural welfare service through which town club women invite the farm women to a ®get acquainted meeting® at which informal discussion of school and other problems is subordinated to visiting and gen¬ eral social enjoyment.

Correspondence has played an important part in adult education. Though organized as busi¬ ness enterprises several of the schools of cor¬ respondence may be classed as private educa¬ tional institutions. As a factor in the educa¬ tional problem they are of great importance. Several of the correspondence schools serve at one time anywhere from 1,000 to 35,000 stu¬ dents, with faculties running as high as 350 persons, with, in addition, as many as 400 text and lecture writers and examiners. The aver¬ age age of those taking course is about 30. Music, through the Music League of America and other musical organizations, and drama, through such societies as the Drama League

of America, have done much for the aesthetic side of adult education. The Drama League of America, now in its seventh year, was founded on the belief, according to Richard Burton, its president, in 1914, that the drama is fast becom¬ ing an appreciable and important part of Amer¬ ican literature. The league refuses to censor or attack bad plays. It believes that it is most effective to call attention to that which is good. This is done through the agency of a playgoing committee reporting through a bulletin system inaugurated in Chicago, the birthplace of the League. The National government is perhaps the most active agency in adult education and this chiefly through public documents. Dur¬ ing year ending 30 June 1915, 34,714,186 copies of government publications were mailed free and 3,252,919 copies were sold. These publica¬ tions report legislative, executive, financial, postal, military and naval functions common to all governments, comments on world activities and the results in popular printed form, for the instruction and practical use of all the people, of scientific investigation, covered by the United States.

Guy Carleton Lee,

Managing Director, National Society for Broader Education, New York.

EDUCATION, Agricultural. The methods of scientific instruction in all branches of farming.

Historical. — Most of the early attempts to establish systematic agricultural instruction were made through schools of secondary grade. This was the natural consequence of the fact that the early development of agriculture was largely dependent on the development and ap¬ plication of chemistry. The two earliest col¬ leges of agriculture to be established were at Hofwyl in Switzerland and Krumau in Bo¬ hemia. They were started in 1797. The former exerted a marked influence upon the develop¬ ment of agricultural education, especially that of a secondary grade. Its influence was felt m this countryˆ through the pupils that were drawn from this country and by the work of

ˆ‘Association of the Fellenberg System of Education.

The first professorship of agriculture in a collegiate institution in this country was held by Samuel L. Mitchill of Columbia College. He also held chairs in natural history and chemistry at the same time. The position was established in 1792. Just when the first school devoted largely to the interest of agriculture was es¬ tablished in this country is difficult to determine. During the early part of the 18th century a large number of agricultural societies were active and many of these organizations were interested in promoting systematic instruction in agriculture. The writings of Washington, Franklin and Jefferson bear testimony to their interest in the subject.

In spite of the fact that it is difficult to determine the beginnings of schools of agri¬ cultural instruction, it is relatively easy to de¬ cide upon the first institution in this country that attained such a measure of success that it attracted general attention. This honor be¬ longs to Gardiner Academy which was estab¬ lished at Gardiner, Me., in 1821. In the leg¬ islative act providing for its incorporation it is stated that it was ‘designed to prepare youth by scientific education to become skillful farm¬ ers and mechanics.® In 1823 the legislature made provision for some aid from the State treasury. This was undoubtedly the first State aid that was ever granted to an agricultural school in the United States. This institution had a fair measure of success for several years but was finally forced to close its doors in 1823, because of decline in student body and a lack of financial support. Many other attempts were made with varying degrees of success to found schools during the first half of the 19th century, but none met with a marked degree of success. All declined after, at most, a few years of existence. Among these institutions may be mentioned Agricultural Seminary, Derby, Conn., 1824; Cream Hill School, West Cornwall, Conn., 1845 ; Farmer’s College, College Hill, Ohio, 1833; Fellenberg School, Whitesborough, N. Y., 1831 ; and Mount Airy Agricultural Col¬ lege, Mount Airy, Pa., 1847.

The movement for agricultural education be¬ gan to assume more serious proportions when efforts were made to secure State and Fed¬ eral aid for the support of agricultural col¬ leges. To whom the credit belongs for these suggestions is impossible to say with certainty. It is agreed, however, that through the influ¬ ence of far-seeing men in several sections of the country pressure was exerted in behalf of State and Federal support of colleges of agri¬ culture at about 1850.

In Pennsylvania the present State College is due to the activity of the State Agricultural Society that took definite steps in 1850-51 to secure an agricultural school. In New York State several attempts ˆ were made but all of the early ones were without great measure of success. To the State of Michigan belongs the honor of having the oldest college of agri¬ culture in North America. This institution is also the first to be established entirely on the basis of State support. The State Constitu¬ tion adopted in 1850 made provision that the State legislature should establish and maintain a college of agriculture. The law providing

for its establishment became effective 12 Feb. 1855. Immediately a bitter fight followed over the location of the institution. There was a decided effort made by those who were in¬ terested in the State University to have the College of Agriculture made a part of that insti¬ tution. This movement was opposed by the State Agricultural Society and this organiza¬ tion was successful as the college was finally located at East Lansing. This location, apart from a literary institution, is of considerable interest because of the influence that it exerted upon the establishment of “separate® colleges of agriculture after the passage of the Land Grant Act. In the early years of the agricultural col¬ leges the separate institutions had a more sub¬ stantial development than did those that were made a part of existing colleges or parts of State universities. The colleges that were made a part of a university were very slow to find themselves, but their growth in recent years has been of such a nature as to justify the views of those who believed they should be a part of a university.

On 16 Feb. 1857, the State legislature of Michigan appropriated $40,000 for the erec¬ tion of buildings, instruction and maintenance for the years of 1857 and 1858. The institu¬ tion opened to receive students 13 May 1857. State supported colleges of agriculture were es¬ tablished in Pennsylvania and Maryland in 1859.

Land Grant Colleges. — Undoubtedly there would have been a gradual development of col¬ leges of agriculture on the basis of State sup¬ port, but even before the establishment of the Michigan College of Agriculture there had been proposed plans for Federal aid. To whom the credit for this suggestion belongs is in doubt. Probably it had independent origin in the minds of several men. The first bill introduced in Congress touching on this subject was of¬ fered by Justin P. Morrill in 1857. At that time Mr. Morrill was a member of

the House of Representatives from the State of Vermont. This bill made provision for granting to each State 20,000 acres of land for each senator and each representative in Congress. It was finally passed 7 Feb. 1859. It was, however, vetoed by President Buchanan. The matter then rested until after President Lincoln's election, when Mr. Morrill again introduced a bill, drawn on lines similar to the previous measure except that it made provision for granting 30,000 acres of land to each State for each senator and representative in Congress. This measure be¬ came a law on 2 July 1862, when President Lincoln's signature was affixed.

It provides that the income from these lands shall be used by each State which accepts the benefits of the act "to the endowment, support and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and in¬ cluding military tactics, to teach such branches of learning as are related to agriculture and mechanic arts, in such manner as the legisla¬ ture of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the sev¬ eral pursuits and professions in life.® A sup¬ plementary act was passed in 1866 bv which provision is made so that when any Territory becomes a State it is entitled to the benefits of

the Act of 1862, or the First Morrill Act as it is commonly called.

The Second Morrill Act became a law 30 Aug. 1890. This act provided for an initial allotment to the States of $15,000 per year with an automatic increase of $1,000 annually until the sum of $25,000 was reached in 1900. The purpose of this legislation was for the ®more complete endowment and support of the col¬ leges for the benefit of agriculture and me¬ chanic arts established under the provisions of an act of Congress, approved July second, eighteen hundred and sixty-two.^^ Under the terms of this law, there is provision for the division of the funds between colleges for white and colored students in States where separate institutions are maintained.

The Nelson amendment was approved 14 March 1907. This provided for an increase gf $25,000 a year to the allotments made under the Second Morrill Act. The initial grant was $5,000 and was subject to an annual increase of $5,000 until the maximum of $25,000 was at¬ tained. Under the two acts, the Second Mor¬ rill Law and the Nelson Amendrnent, the an¬ nual grant to each State is $50,000.

Through the provisions of the three acts there has been a marked developm'ent of State colleges of agriculture. As a result there are at the present time 67 of these institutions in¬ cluding those for colored students. There are 17 of these. In 1915 the total income of the land grant colleges was $31,961,765, of which amount only $3,552,077 ' came from Federal sources. According to a report from the United States Bureau of Education there were in 1915-16 private colleges to the number of 16, giving instruction in agriculture.

The debates that took place in Congress at the time of the passage of the First Morrill Act showed no clear conception as to what these colleges when established were to accom¬ plish. It is also true that much diversity has been shown in the use of the funds by the States. In some of the eastern States the land grant was turned over to privately endowed colleges that were in need of funds and in the Middle West in some cases the grants were used as a basis for the establishment of State universities. In spite of these facts in the half century that has elapsed since the passage of the first act strong institutions have been devel¬ oped that have come to have clearly defined aims and fairly definite means of attaining those ends. At present, in most of the insti¬ tutions three lines of activity are clearly de¬ fined: viz., resident teaching, research and' extension.

Teaching. — The courses offered by the in¬ stitution are usually of two classes ; long courses, four years of the usual length of a col-i lege year; and short courses which are com¬ monly two years in length but of only 10 or 12 weeks duration each year In addition most institutions make special provision for the adult student who cannot meet the entrance standards.

The admission requirements to the four-year courses are in general as high as those for ad¬ mission to other college courses. The comple¬ tion of the course leads to the degree of B.S. or B.S. A. The subjects taught include such basic sciences as chemistry, botany, zoology, mathematics, geology and meteorology. In addition English and political economy are usu¬

ally required subjects. The applied subjects are represented by farm crops, farm manage¬ ment, rural engineering, soils, breeding, agron¬ omy, animal husbandry, rural or ‘agricultural economics, poultry husbandry, rural education, entomology, fruit growing, vegetable garden¬ ing, floriculture, forestry, landscape art, dairy industry and agricultural chemistry. The rela¬ tion between the basic and applied subjects varies in the different institutions but usually it comes between the limits of one-third and one-half.

During the year of 1915-16 there were 16,008 students in the four-year courses and in addition 10,332 students in one-and two-year courses. To these figures should be added 2,053 four-year students in agricultural col¬ leges for negroes. This is quite in contrast with the early experience of the colleges when they had almost no student body. Statistics from bulletin number 10 of the Carnegie Foundation show the student body in these institutions grew rapidly from 1894-95, 2,712, to 1914,

14,844.

Since the land grant colleges are supported by the State and National governments, they have felt the need from an early date of pro¬ viding instruction through short or winter courses for students who did not have the time to attend during the regular academic year or who may have . lacked entrance requirements. Many early attempts were made at courses of this character but the University of Wisconsin is generally credited with having established the short course on its present day basis. This course was opened in 1888 and has run each year since that time. These courses vary in length at different institutions’ but usually they are from 4 to 12 weeks in length and continue for one or two years. The work that is offered is of -an extremely practical nature. That it is meeting a demand is attested by the fact that there were 14,108 short-course students in the colleges of agriculture during the year of 1915-16. It is quite likely that with the development of agricultural instruction in the public high schools and special secondary schools that this phase of the work may decline at the colleges.

In recent years many of the colleges are offering summer courses of 6 to 12 weeks’ dura¬ tion to teachers. The need for this work has been especially pronounced as a result of the development of agricultural instruction in the elementary and secondary public schools.

Research. — Almost from the beginning of instruction in the colleges of agriculture some of the instructors devoted a portion of their time to investigation. This was made necessary by the relatively small body of agricultural knowledge that _ was established on a scientific basis and organized for teaching purposes. As a result of provisions of the Federal acts en¬ couraging agricultural research most of the ex¬ periment stations are organized at the State colleges of agriciilture. Commonly, the inves¬ tigator is a member of both college and experi¬ ment station staffs. The results of the experi¬ mental work are usually distributed by means of bulletins that are published both in technical and popular form. See Agricultur.\l Experi¬ ment Station.

Extension. This term is usually applied to the instructional work that is conducted with students who are not resident at the college.

It covers a wide range of activities such as cor¬ respondence courses, which have been espe¬ cially developed in Pennsylvania and California, demonstration schools, farmers' institutes, demonstration plots, lectures, reading courses, county agents, home demonstration agents and boys' and girls' club work. Almost from the beginning colleges of agriculture have felt the. pressure for such work, because they are State supported and also as they had to establish themselves with the farmers.

The first State law making specific appro¬ priation for extension work was probably the Nixon Act which was passed by the New York State legislature in 1894. At the present time practically every college of agriculture has an extension department with a head who is usu¬ ally designated extension director. There are approximately a thousand extension specialists

home economics to persons not attending or resident in said colleges in the several com¬ munities, and imparting to such persons infor¬ mation on said subjects through field demon¬ strations, publications,

and otherwise; and this work shall be carried on in such manner as may mutually be agreed upon by the Secretary of Agriculture and the State agricultural col¬ lege or colleges receiving the benefits of this act.^^

By the provisions of this act, $480,000 were appropriated for the first year, $10,000 of which went to each State accepting the provisions of the act. For the succeeding year there was an appropriation of $600,000 and this will increase annually at the rate of $500,000 until the sum of $4,580,000 is attained. These grants, except the $480,000, are ˆallotted annually to each State by the Secretary of Agriculture in the

FUNDS AVAILABLE FOR COOPERATIVE AGRICULTURAL EXTENSION WORK. CLASSIFIED BY ORIGINAL

SOURCES

1914-15

1915-16j

1916-17

1917-lSj

Federal government :

Farmers' cooperative demonstration work. Other bureaus .

$905 . 782 105,168 474,935

$914,290

157,621

1,080,005

$943,088

121,609

1,580,000

$1,037,501

182,708

2,080,000

Federal Smith-Lever .

Total .

$1,485,885

$2,151,916

$2,644,697

$3,300,209

Within the State:

State:

Offset .

$459,046

696,405

$904,090 597 , 105

$1,241,266

530,564

Other State .

$711,516

Total .

$711,516

$1,155,451

$1,501,195

$1,771,830

County: ‘

Offset .

$68,004

939,668

$83,614

1,246.288

$202,846

1,544,366

Other county .

$815,732

Total …

$815,732

$1,007,672

$1,329,902

$1,747,212

College:

Offset … .

$38,099

209,682

$63,910

142,524

$83,101

198,644

Other college .

$346,750

Total …

$346,750

$247,781

$206,434

$281,745

Other:

Offset… .

$34,850

273,951

$48,384

372,546

$72,784 443 , 307

■ Miscellaneous .

$247,352

«

Total .

$247,352

$308,801

$420,930

$516,091

Total within States .

$2,121,350

3,607,235

$2,719,705

4,871,621

$3,458,461

6,103,158

$4,316,878

7,617,098

Grand total .

on the faculties of the agricultural colleges. Much of the stimulus for this work and plans for its organization have come through the Smith-Lever Act which became effective 8 May 1914. This law differs from the previous acts in which Federal funds were granted to the States for the development of agriculture, in the fact that the National government retains a larger measure of control than in any pre¬ vious legislation. This is done by making the funds available only for cooperative extension work that is carried on by the land grant col¬ leges of agriculture and the United States De¬ partment of Agriculture. The nature^ of this cooperative work is set forth in section 2 of the law as follows;

^Cooperative agricultural extension work shall consist of the giving of instruction and practical demonstrations in agriculture and

proportion which the rural population of each State bears to the rural population of all the States as determined by the next preceding Federal census.® In order to secure the bene¬ fits of the act an amount equal to that coming from the Federal government must be appro¬ priated from sources within the State. The law is administered through the States Rela¬ tions Service of the United States Department of Agriculture.

The most notable developments under this act have been the systems of county agents home demonstration agents, and boys' and girls' club leaders. March 1, 1918, there were co-operatively emplo^"^ed 2,645 county agents 1,514 home demonstration agents and 441 boys' and girls' club workers. Not all of these per¬ sons are employed on permanent funds as 2,950 are emergency agents put into the cooperative

work for the purpose of stimulating agricul¬ tural production and food conservation after our entrance into the war with Germany. This act was made possible by an emergency appro¬ priation of $4,350,000. The table on the preced¬ ing page, furnished through the courtesy of the States Relations Service, shows the growth of the cooperative extension work since the pas¬ sage of the Smith-Lever Act.

The various Federal acts relating to instruc¬ tion, research and extension in agriculture have resulted in the development of a group of strong institutions that are making their influ¬ ence felt throughout the entire country. In 1918 there were 67 state and federally supported institutions of college grade giving instruction in agriculture, 17 of which were for negroes. In 23 States and Porto Rico the college of agri¬ culture is a part of the university. Tuition is free to residents of the State in which the col¬ lege is located in most cases. There were 7,066 persons engaged as instructors or inves¬ tigators in these institutions.

Foreign Countries.— The most widely known college of agriculture in Canada is the Ontario Agricultural College at Guelph. This institu¬ tion was established in 1874. Several other colleges have been established since that time. In addition to its collegiate instruction in agri¬ culture Canada has done much to encourage the introduction of agriculture into the rural high and elementary schools.

The first chair of agriculture in England was established in the University of Edinburgh in 1790. In 1838 the Albert Agricultural College was founded at Glasnevin, Ireland, as a state-supported institution. The Royal College of Agriculture was established at Cirencester, Eng¬ land, in 1845. There have been other colleges opened for the purpose of giving instruction in agriculture and in addition there are a consider¬ able number of other colleges giving agricultural instruction. National aid is given to this work through the Board of Agriculture and Fisheries.

The Institut National Agronomique de Paris, which is supported by the national government, stands at the head of the French system of

collegiate instruction in agriculture. In addition there are three national schools, one each at Grignon, Rennes and Montpelier. France has an excellent system of secondary schools of agriculture, some of which are specialized in their work and others give general instruction. There are also chairs of˜ agriculture in many lyceums and colleges. Since 1879 instruction in elementary agriculture and horticulture has been obligatory in the normal and primary schools. Institutions for giving instruction in agriculture both of college and secondary grade are to be found in most of the civilized coun¬ tries of the world.

Secondary Schools. — As has been noted most of the early efforts to give instruction in agriculture were made in schools of secondary grade. Numerous attempts were made to estab¬ lish ®farm schoolsˆˆ in the East and Middle West during the first half of the 19th century. While some of these met with a measure of suc¬ cess, sooner or later they were compelled for one reason or another to close. It was not until 1888 that a permanent secondary school of agriculture was established. This was the Minnesota State School of Agriculture, located •V. Saint Anthony's Park, in connection with

the State College of Agriculture. Following the opening of this school there came a period in which there was considerable development of special secondary agricultural schools. In 1915-16 there were 28 such schools maintained by State colleges of agriculture, 74 special agri¬ cultural schools receiving State aid, and 12 private agricultural schools of secondary grade. These special schools have in some cases been supported entirely by State aid and in other in¬ stances by a combination of State and local funds. The unit of territory that they attempt to serve varies greatly. In some cases, e.g.. New York and Minnesota they have been sup¬ ported entirely by the State, and no boundaries set from which students may come, within the State. In Wisconsin the county has been made the unit and the schools are supported by State and county. In Georgia and Alabama a school was established in each congressional district, in Oklahoma the judicial district was made the unit, while in Arkansas the State was arbitrarily divided into four districts.

The length of the courses varies from one to four years with the most common length two years except in the district schools of Alabama and Georgia where the four-year course is the rule. The admission requirements very properly are not high for most of these in¬ stitutions. Completion of the elementary school is expected, except for

students over 16 who_ are commonly admitted regardless of previous academic preparation. In most of these schools the instruction is designed to meet the needs of boys who have come from the farm and who expect to return to it without further opportunity for study. In addition to the instruction in such agricultural subjects as farm crops, soils, animal husbandry, farm management, fruit growing, poultry husbandry, and dairying, the students have work in English, civics, arithmetic, and some basic science work. In these institutions the tendency has been to follow too closely in the footsteps of the col¬ leges of agriculture so far as organization and presentation of the work are concerned. Most of the schools are provided with a farm.

It was noted in connection with the ^^separate^^ colleges of agriculture that in the early stages they developed more rapidly than did those that were a part of a university. When the later class finally started they had a more substantial growth. A striking parallel occurs in the development of agriculture in¬ struction of secondary grade. The first few years^ of its growth the special schools were prominent and^ there were few agricultural de-partmerits in high schools. These, however, are developing rapidly in recent years. In 1915-16 there were 421 State-aided vocational depart¬ ments of agriculture in public high schools and 2,981 public high schools teaching agricul¬ ture. In the vocational departments the course of study is commonly four years in length al¬ though frequently _ short courses are also offered. In other high schools the courses com¬ monly run from a half year to two years.

February 23, President Wilson signed the Smith-Hughes bill for vocational education. This measure which makes provision for Fed¬ eral aid to the States for vocational education in agriculture, trade and industrial subjects, and home economics, is certain to exert a marked influence upon the development of secondary

agriculture. Like the Smith-Lever Act this law makes the development of vocational education in agriculture a cooperative enterprise between the various States and the Federal govern¬ ment. The law

went into operation 1 July 1917 and provides Federal funds to the amount of $500,000 for the stimulus of vocational educa¬ tion in agriculture. This amount is increased by $250,000 annually until $2,000,000 is reached when it is increased to $3,000,000, which is the maximum, by annual increments of $500,000. This money is appropriated among the States in the proportion that the rural population of each State bears to the total rural population of all the States. In order to receive the benefits of this act there must be expended from sources within the State an amount equal to the amount received from the National government. The instruction must be designed for pupils over 14 years of age but it must be below college grade. The law further provides that the funds must be expended through State supported or supervised schools, and arrangements must be made so that pupils obtain at least six months of practical experience each year. The law makes provision for the preparation of teachers of vocational agriculture.

This act is administered by the Federal Board for Vocational Education which con¬ sists of a representative of labor, a representa¬ tive of agriculture, a representative of trade and industry, and the following ex-officio mem¬ bers ; secretary of agriculture, secretary of com¬ merce, secretary of labor and the commissioner of education.

In all of the early attempts to develop agri¬ cultural instruction in secondary schools it was considered necessary to maintain a farm. In recent years the home project plan, which has been developed largely through the efforts of R. W. Stimson of Massachusetts, has proved more satisfactory as a means of affording voca¬ tional experience. The home project is or¬ dinarily a productive enterprise that is an out¬ growth of the school instruction but is carried on by the pupil at his home under the super¬ vision of the agricultural instructor. The next 10 years are certain to witness a marked de¬ velopment and extension of the home project method in agricultural teaching in high schools.

Elementary Schools. — Agricultural instruc¬ tion in the high schools raises many problems that are difficult of solution but the problem is even more serious in the rural elementary school. There are a number of States in which such instruction is required by law but in a large measure it has failed to function because it has been too bookish. This is chiefly due to the fact that in most States there is no adequate system for the preparation of rural teachers. They are unable to go into the school and utilize the experiences of the country child and the opportunities of the farming community for educational purposes. However, some very good results have been attained in spite of the many difficulties. The consolidation of schools has greatly increased

the possibilities of instruc¬ tion in agriculture for pupils of the upper grades. This is also true of the intermediate schools of agriculture and mechanic arts of New York State; and the junior high schools to be found in the rural communities of Ver¬ mont. The latter have had a very marked de¬ velopment since 1915 when provision was made

for them by special legislation. (See Agricul¬ tural Colleges; Agricultural Experiment Station). Consult Bailey, L. H., ˆCyclopedia of American Agriculture^ (New York 1910-11) ; Carney, M., ˆCountry Life and the Country SchooP (Chicago 1912) ; Bulletins of United States Department of Agriculture and of State Experiment Stations.

George A. W^orks,

Rural Education Department, New York State College of Agriculture, Cornell University.

EDUCATION, Catholic. See Catholic Education in the United States ; Catholic Education in Canada ; Catholic Church and Science; Parish Schools, *etc.*

EDUCATION, Commercial, a general system of modern education to prepare youth for commercial pursuits which follows the usage of many European schools and colleges, where the selective courses for pupils on entry are designated as either ^^commerciaP^ or ˆclassical.^^ The commercial high schools of the public system of education of the United States are organized with industrial aims to give ®a general education of such a nature as best fits youth for commercial pursuits. Sup¬ plemental or higher commercial education is furnished by extended scientific training in university departments, in schools of technology, or in independent trade and business schools and colleges.

About one-third of the pupils in high schools in the United States in 1917 were taking com¬ mercial courses. Government reports from 31 cities of 100,000 population and over show that from 10 to 60 per cent of all high school pupils take commercial courses, and that of these Bos¬ ton and Milwaukee have the largest, and Cincin¬ nati, Cleveland, Columbus and Dayton have the lowest per cent. There were special high schools in 1916 in Boston, Cleveland, Columbus, New York, Portland (Ore.), San Francisco, Springfield, Syracuse, Washington and Worces¬ ter. The pupils who receive special commercial instruction in the government high schools, and even in the special commercial high schools, continue the study of related

academic work with the other pupils from which they are not separated; for commercial instruction is looked upon as general education and is treated as such. While the private business schools have had very definite, if narrow aims, to which they have adhered strictly and logically, the commercial education of the government sec¬ ondary schools has been more or less a con¬ cession to the demands of business interests and practical life ; and of late educators have begun to insist that the commercial education of government institutions should be better or¬ ganized and that its aim be more definitely stated. At present (1918) pupils taking com¬ mercial courses in secondary schools give only about 25 per cent of their time to technical commercial education. Another 25 per cent is devoted to ˆrelated workˆˆ and 50 per cent to ˆgeneral culture.® The private business schools, on the other hand, go direct to the goal they have set for themselves. The result is that they cover, in from six months to one year, the same commercial work that the sec¬ ondary schools require from two to four years to accomplish ; and the pupils of the private business colleges are taught in a more exact

and businesslike way. Hence the popularity of the latter, though they charge comparatively high fees. In other words, commercial educa¬ tion in the government schools has not yet become individualized, as it has in Germany, where it has developed into a system by itself and not a comparatively unimportant part of a general system, as it still is in the United States. Hence the need of a general reorgan¬ ization of commercial education along pedagogic and practical lines ; for the necessities of busi¬ ness life continue, from year to year, to make more imperative and extensive demands upon the public .school system. Owing to the fact that commercial education forms a part of the ordinary school curriculum of secondary im¬ portance, most public schools are poorly equipped as to organization and the other ma¬ chinery necessary to meet the ever-increasing demands made upon them by the business world, which is still pinning its faith to the private business college, which to exist has to keep its ear close to the ground.

The commercial courses of the government secondary schools may be divided as follows : General office work and bookkeeping; stenog¬ raphy, typewriting and the operation of office appliances ; secretarial work, which requires more careful training and higher academic re¬ quirements on the part of the pupils; and sales¬ manship. The program of the commercial edu¬ cation of the secondary schools is theoretically good; but in practice it has a decided tendency to be too technical at the expense of accuracy and practicability. On the other hand the pri¬ vate business schools aim, above all things, at speed, accuracy and practical results, and trouble themselves very little over questions of a technical nature, when they are not abso¬ lutely necessary to the end in view. The de¬ mand being made upon secondary schools is, therefore, that they study more carefully the needs of commercial life and that they impart more intensive instruction and practice in each individual section of commercial education so that their pupils may be enabled to step from the schools into subordinate positions in busi¬ ness concerns. To this end it is necessary to increase and improve the office appliance de¬ partments of the secondary schools and to place them in the hands of trained practical teachers, as the better class of business colleges have al¬ ready done.

Commercial high schools in the United States are confined, for the most part, to the larger cities. They differ very little except in name and the number of pupils taking commer¬ cial courses, from the ordinary secondary school with attached commercial courses. Not one of them is primarily a commercial school whose aim is, first and foremost, the teaching of com¬ mercial subjects and the preparation of pupils for business life. Even in these schools the equipment of other departments is generally favored at the expense of the commercial. In other words, the commercial education of the United States secondary schools has no tradi¬ tions to live up to and no definite aims to as¬ sure definite results. Until these are attained it must continue to live on sufferance, with other branches of education which have tradi¬ tions and aims. But little improvement can be hoped for in the teaching of commercial sub¬ jects in the government schools until such time

as the ordinary high school and the commercial school are divorced and the latter is allowed to follow its own life and maintain a teaching staff trained to keep the needs of commercial education constantly in view.

Students. — There were, in 1917, approxi¬ mately half a million students in commercial courses in the United States. The Bureau of Education had the names of more than 1,300 independent commercial and business schools, exclusive of the hundreds of other business schools forming departments of normal schools, private schools and other institutions. Only 843 of the independent business schools in 1916 responded to the request of the Bureau of Edu¬ cation for statistical information. The reports thus furnished show that there were in the 843 business schools reporting 183,286 students, an increase of 15,223 over the preceding year. The reports of 762 private high schools show that they had, in 1916, 17,706 students in business courses. The 2,863 public high schools of the country, during the same period, had 208,605 students in their commercial departments. Of the pupils reported in the private business schools 130,431 were in day and 52,855 in night courses. The total number of students reported to the de¬ partment as in commercial courses was made up as follows :

Number	Males	Females	Total
Private high schools . .	762	9,360	8,346 17,706
Public high schools…	2,863	92,226	116,379 208,605
Commercial schools . .	843	94,870	88,416 183,286
Total .	4,468	196,456	213,141 409,597

Thus it will be seen that the hundreds of business colleges and other institutions having commercial courses, but not reporting them to the department, should easily have increased the number of students in commercial courses to 500,000 in 1917, when the demands of the war had given an added impulse to this ever¬ growing department of education. Massachu¬ setts led with the highest number of pupils in the public high schools, 28,489, New York com¬ ing second with 27,887 ; but as the latter had more students than the former in private high schools and academies, the total of students of commercial courses, exclusive of the regular pri¬ vate business colleges, was New York, 29,563; Massachusetts, 29,485. Pennsylvania reported 17,544 commercial students in the public high schools, and 2,539 in private high schools and academies, a total of 20,083; Illinois, 13,923 in public high schools, and 1,349 in private high schools and academies, total 15,272; New Jer¬ sey, 12,444 in public high schools, and 319 in private high schools and academies, total 12,763 ; California, 11,567 in public high schools, and 582 in private high schools and academies, total 12,149; Ohio, 10,191 in public high schools, and 995 in private high schools and academies, total 11,086. Michigan and Wisconsin had each about 8,000 commercial high school students; Connecticut about 7,000; Indiana, Minnesota, Iowa, Missouri and Washington between 5,000 and 6,000; Maine, Rhode Island and Kansas between 3,000 and 4,000; New Hampshire, Ne¬ braska, Maryland, Texas, Colorado, Tennessee and Oregon between 2,000 and 3,000; while Ver¬ mont, Virginia, West Virginia, Georgia, Ken¬ tucky, Louisiana, Oklahoma, Montana, Utah and the District of Columbia had each over

1,000.

EDUCATION, COMPULSORY

The trend of business education in the pub¬ lic schools is shown by the reports of the Bu¬ reau of Education for sections of the country as follows; In the North Atlantic States, in 1915, 1,066 high schools are reported as having 109,298 commercial students; the North Cen¬ tral States, 1,424 schools and 70,406 students; Western States, 564 schools and 26,690 stu¬ dents; South Central States, 315 schools and 10,551 students; and the South Atlantic States, 256 schools and 9,369 pupils.

In 1916 there were 54,871 students and 1,511 teachers in the 241 private commercial schools of the North Atlantic States; 76,709 pupils and 1,664 teachers in the 344 schools of the North Central States ; 22,926 pupils and 530 teachers in the 110 schools of the Western States; 16,515 pupils and 318 teachers in the 84 schools of the South Central States ; and 12,265 students and 286 teachers in the 64 schools of the South At¬ lantic States. The total number of students reported taking commercial course in public and private high schools and business colleges, in 1915, was: North Atlantic States, 164,169; North Central States, 147,115; Western States, 49,616 ; South Central States, 27,066 ; South Atlantic States, 21,631. Everywhere, except in the North Atlantic and Western States, the pri¬ vate business schools were turning out more commercial students than the government insti¬ tutions. The 843 private business colleges and schools reported to the government as in their employ 4,309 teachers in 1916.

In the fiscal year 1914-15, 19,019 students graduated in commercial courses; 27,826 in amanuensis courses ; 14,588 in combined courses ; 1,729 in English courses ; and 980 in telegraphy.

Higher Commercial Education. — In 1915 there were over 10,000 students studying com¬ merce in the colleges and universities of the United States. At the head of these was New York University with 2,260 students. The Uni¬ versity of Pennsylvania had 916 students of commercial subjects; North Western Univer¬ sity, 790; University of Wisconsin, 484; Uni¬ versity of Illinois, 423; Boston University, 378; University of California, 320; University of Chicago, 220; University of Pittsburgh, 213; and Saint John's, Ohio, 207. In all 60 colleges and universities were reported as having in¬ struction in commercial education; and of these 25 had 100 or more pupils each.

By the middle of the last century, owing to the vast increase of business throughout the civilized world, business men had already come to feel the need of special technical commer¬ cial education for their employees. As early as 1855 Gustav von Mevissen, the great Euro¬ pean financier, in a report to the Chamber of Commerce of Cologne, advocated the higher education of business men with the surplus capital of the commercial world. But though the business men of Europe felt the need of business education for their employees they struggled vainly against the traditions of the schools, colleges and universities;ˆ and it was in the New World that the business college first came, in a measure, to supply the needed business education. But it was not until the universities turned their attention to this field that the dream of von Mevissen might be said to be in a fair way to become realized. He him¬ self began the good work by founding a com¬

mercial college at Cologne. But the real pio-

■ neer in higher commercial education was the University of Pennsylvania which in 1881 es¬ tablished the ˆWharton School of Finance and Commerce. Seventeen years later the Uni¬ versity of California founded a similar course leading to the degree of B.S. And in the same year the University of Chicago also added a commercial department with the degree of B.Ph. In 1900, New York University, and in the following year, Columbia University, and in 1902, the universities of Illinois, Indiana and Michigan established commercial courses with the bachelor's degree. Now (1918) most of the important universities of the United Stgites have more or less complete commercial depart¬ ments. The Harvard Graduate School of Busi¬ ness Adminstration, established in 1908, and the Amos Tuck School of Administration and Fi¬ nance, opened in 1900, in connection with Dart¬ mouth (College, go further in this respect than the other universities, admitting to their courses only college and university graduates whom they train for business and public affairs.

Bibliography. — Allinson, Mary, ˆThe Pub¬ lic Schools and Women in Officeˆ (Boston 1914) ; Eaton and Stevens, ˆCommercial Wo*rk and Training for Girlsˆ (New York 1915) ; Farrington, F. E., ˆCommercial Education in Germanyˆ (New York 1914) ; Herrick, C. A., ˆMeaning and Practice of Commercial Educa¬ tion > (New York 1904) ; Hooper and Graham, ˆCommercial Education at Home and Abroadˆ (London and New York 1901) ; Kahn and Klein, ˆPrinciples and Methods in Commercial Educationˆ (New York 1914) ; Thompson, F. N.,

ˆCommercial Education in Public Second¬ ary Schoolsˆ (Yonkers-on-Hudson 1915) ; Rich-

■ ter, K. E., ˆCommercial Colleges in Germanyˆ (New York 1913) ; ˆReport of Conference on Commercial Education and Business, in the University of Illinoisˆ (Urbana-Champaign 1913) ; UReport of the. Commissioner of Edu-

. cationˆ (Washington 1917).

John Hubert Cornyn, Editorial Staff of The Americana.

EDUCATION, Compulsory. The doctrine of the democracy of Calvinism from the begin¬ ning of its teachings contained the fundamental principle that -each person should be able to read. Under that doctrine religious matters were held to be of vital concern to every person as well as to the nation and each individual was held to be personally accountable for his own conduct. The Bible contained the rules of conduct which should regulate the lives of all people. Each person was, therefore, ex¬ pected to be able to read that book and not to be dependent upon others for a knowledge of its.- teachings and of the personal obligations which such teachings imposed. In the countries, therefore, which were under the control of the Calvinists, the basic principles of compul¬ sory education laws, so general in all the progressive countries of the world at the present time, were first established. The general feeling of the people in the Netherlands in re¬ lation to education was such that for more than l50’years before the Dutch began to make settlements in America public schools had been maintained in that country. The education of the masses through these schools which were public schools had been the bulwark of the

liberties of the people and the national freedom of the country. The country was prosperous and happiness prevailed among its people. When the Calvinists settled in America they brought with them the spirit and life of the social in¬ stitutions of their native country and wherever the Dutch settled in America they established schools which

were of the type of the schools in the fatherland. These schools were adminis¬ tered on the same general plan on which the schools of Holland had been operated. All children were required to receive instruction. This instruction was provided by members of the family at the home in many cases, often at private schools but generally in the schools es¬ tablished by the authorities of the company who were responsible for the regulation of the affairs of the settlement. The West India Company which made settlements at Manhattan and at Albany adopted an ordinance in 1629 providing that all colonists ®shall endeavor to find out ways and means whereby they may supply a minister and a schoolmaster.® Under this or¬ dinance, schools were maintained and children were required to attend them. The Dutch, therefore, during their period of control in the colonies planted the germ of the foundation on which compulsory attendance laws are based.

The General Court of the Massachusetts colony issued a decree in 1642 which has also exercised an important bearing upon the de¬ velopment of compulsory attendance statutes. The decree of the Massachusetts court and the preamble upon which it is predicated were as follows :

“ Forasmuch as the good Education of Children is of Singular behoofe and benefit to any Commonwealth, and whereas many Parents and Masters are too indulgent and negligent of their duty in that kind;

“ It is Ordered, that the Select men of every Town, in the several Precincts and guarters where they dwell, shall have a vigilant eye over their brethren and neighbours, to see. First that none of them shall suffer so much Barbarism in any of their families, as not to endeavor to teach, by themselves or others, their Children and Apprentices, so much learning, as may enable them perfectly to read the English tongue, and knowledge of the Capital Lawes; upon penalty of twenty shillings for each neglect therein.”

This law did not specify where the children were to be instructed and such law was amended in 1647 by specifically providing that in each township containing 50 families an instructor should be employed to teach all children to read and to write, and the law further provided that in a township containing 100 families, a gram¬ mar school should be maintained and masters employed who were able to fit young people for entrance to a university.

Thus, there were in the very beginning of the establishment of organized society in this country two great forces, one Dutch, and the

other, English, in different sections of the country, which enacted decrees or statutes which are the basis upon which compulsory edu¬ cation laws of the several States have been established.

When the Republic was founded, no provi¬ sion was made for a national system of educa¬ tion. Education, therefore, became a subject which was controlled and administered by the several States. It took a long period of time for the development of public opinion which required the establishment and maintenance of public schools. When school systems were es¬ tablished in a State under general laws, and when independent schools were organized under

special acts in various communities, provisions were not generally incorporated in such laws or acts which made attendance upon school com¬ pulsory. The parent of a child generally as¬ sumed that the education of such child was a matter entirely personal with such parent. Dur¬ ing the early years of the nation there was a common feeling which was repugnant to all mandatory statutes. The opposition to the en¬ actment of such laws must not be regarded as a lack of interest in public education. The leaders of the nation had an appreciation of the value of education and the national neces¬ sity for its promotion and development.

The economic and industrial conditions of the country were passing through a stage of de¬ velopment which influenced the whole social organization of the state. The cities were in¬ creasing in population. The number of cities and large villages were also increasing. The industrial and commercial affairs of the country were expanding and developing. Children were being employed in the industries. The increase in immigration was bringing large numbers of foreigners into the country. Young children under the apprentice system were bound out to labor which deprived them of school privileges. These conditions prevailed quite generally in the New England and Middle States. Great evils grew out of these conditions. Hardships wˆere imposed upon children of tender ages. These conditions could be remedied through legislation only. The first effort along this line appears to have been in Connecticut in 1813 when a law was enacted providing that all chil¬ dren employed in factories should be taught reading, writing and arithmetic. In 1836 Massachusetts enacted a law prohibiting the employment of children under the age of 15 in manufacturing establishments unless they should have attended a public or private school for at least three of the 12 months during the year preceding such employment. The law did not place adequate

responsibility upon parents, the period of instruction was too short and the penalty of a fine of $50 imposed upon owners, agents or superintendents of factories was in¬ effective, as no provision was incorporated in the statute defining who should prosecute viola¬ tions of the law.

The statutes of Connecticut and Massachu¬ setts were undoubtedly modeled somewhat after the English factory laws. Laws regulating the employing of children in factories and provid¬ ing for the education of children thus employed were enacted in England in 1802 and in 1833. Under the first act all apprentices in the cotton and woollen mills were required to be taught reading, writing and arithmetic ®or either of them® during the first four years of their ap¬ prenticeship upon every working day and dur¬ ing the hours of work. The employer was re¬ quired to provide the teacher. In the provi¬ sion of this act is the germ of the modern con¬ tinuation school. The act of 1833 greatly strengthened this law. It provided for factory inspectors to enforce the provisions of the act. The employment of children under nine years of age was prohibited. Children between 9 and 13 years of age were required to attend school two hours each day for six days each week. The parent possessed the right to select the school, If the parent failed to make such selec-EDUCATION, COMPULSORY

tlon the factory inspector made it. Parents who violated the law were subject to a tine of 20 shillings. Employers who violated such law were subject to a fine as high as £20. In this legislation of Connecticut and Massachusetts the right of the State to require a child to at¬ tend school, to compel the employer of a child to provide educational facilities for such child and to penalize a parent or the employer of a child for failing to provide a child with educa¬ tional facilities is first asserted in this country. These laws were not general compulsory educa-ton statutes but they were a step in that direc¬ tion.

The next important legislation in this coun¬ try bearing upon compulsory education were the truancy laws of Massachusetts enacted in 1850 and 1852 and of New York in 1853. The Massachusetts Act of 1850 conferred power upon the cities and towns of the State to pre¬ scribe ordinances to provide for the education of children who were habitual truants or who were not attending school and who were not

employed in regular or lawful occupation. The law applied to children between the ages of 6 and 15. The statute was indefinite and cumber¬ some. The general purpose was to compel chil¬ dren who were not receiving instruction and who were not employed in accordance with the provisions of the factory laws to attend school. The ineffectiveness of the law was recognized and in 1852 a broader and more effective law was enacted. Under the provision of the act of 1852 certain definite provisions were made man¬ datory. Parents were made responsible for the education of their children. All children be¬ tween the ages of 8 and 14 were required to attend some public school in the town for at least 12 weeks and 6 of these must be consecu¬ tive. A penalty of $20 was prescribed for vio¬ lation of the law. The statute, however, con¬ tained one clause which expressed conditions under which a person who had not complied with the law should not be regarded as having violated it. Children who were ^^otherwise fur¬ nished with the means of education for a like period of time® were regarded as having com¬ plied with the terms of the law. Attendance upon private or parochial schools for the re¬ quired period of time was held to be a com¬ pliance with the law. It was not required that the instruction should be the equivalent and as thorough as that given in the public schools. The burden of enforcing the penalty for vio¬ lating the law was placed upon town treasurers, and these officers generally refrained from mak¬ ing prosecutions. The New York Act of 1853 followed somewhat the lines of the Massachu¬ setts law. It provided that ^fif any child be¬ tween the ages of 5 and 14 years, having suffi¬ cient bodily health and mental capacity to at¬ tend a public school, shall be found wandering in the streets or lanes of any city or incorpo¬ rated village, idle and truant, without any lawful occupation,® such child and its parents were required to be brought before a magistrate for examination. The court possessed the power to put a parent under written obligation to cause such child to be sent to school for four months. Provision was also made in the Massachusetts and the New York law for the commitment of truants in suitable institutions. These laws were written upon the theory that children who were not truants did attend school and that it

was necessary to enact laws relating to the attendance of those children only who were truants. The experience of the States which first enacted truancy laws was that it was diffi¬ cult to enforce such statutes because of defec¬ tive machinery provided for their administra¬ tion. These defects were gradually remedied and the laws gradually strengthened. The experience of the country also showed that laws aimed solely at truancy could not be effectively enforced.

This experience further showed that a statute on this subject to be made effective must be a clean-cut law requiring every child within certain ages to attend upon instruction for a definite period of time.

The only American States which enacted a compulsory education law previous to the Civil War were Massachusetts and New York. In 1874 New York substituted an entirely new act for the act of 1853. This law was not denomi¬ nated a law relating to school attendance or to truancy but it was given the following significant title, ®An act to secure to children the benefits of elementary education.® It was mandatory in its terms. It required every parent and every guardian of a child between 8 and 14 years of age ‘to require such child to attend school or receive instruction at home for 14 weeks each year and 8 weeks of this attendance must be consecutive. The law speci¬ fied spelling, reading, writing, English gram¬ mar, geography and arithmetic as the subjects in which the children should receive instruc¬ tion. Children were exempt from the pro¬ visions of the law for physical or mental un¬ fitness. The law contained the required restric¬ tions with penalties to prevent the employment of children in labor \yho had not received the instruction required thereunder. The act con¬ tained all the necessary provisions to make it effective except one and this one defective feature resulted in the act not being enforced. That one defect was the conferment of duties in the collection of fines for the enforcement of the law upon city treasurers and supervisors of towns. These officers were elected an¬ nually by the people and they were unwilling to incur the displeasure of their constituents and neighbors by the perforrnance of a dis¬ agreeable duty in no way logically associated with the functions of the offices to which they had been elected.

The general trend of the development of public education in the United States, the set¬ tled policy in America that public education is a State function and that public policy re¬ quires the maintenance of public schools, the extension of public school work so as to in¬ clude modern high school courses, and the further action of the several States in making these educational facilities free to every child in the land, inevitably meant that the authority of the State would be exercised to compel all children to attend school. If the welfare of society and the State depends upon an edu¬ cated citizenship and if the State possesses the legal authority to tax the property of all its citizens for the accomplishment of this result, then the State must also possess and must ex¬ ercise the authority to compel the children who are to become its future citizens and upon whom its welfare in the future depends to attend upon the instruction provided for them.

Following the Civil War, which had exer-

cised a liberal influence upon the country, there was a general development of educational systems in the several States on the principles above outlined. In this same period there was a great increase in the immigration of foreigners and there was a large development in manufacturing and industrial affairs. The use of the unskilled labor of children had grown to an alarming extent. These condi¬ tions created social and economic problems of vital importance. There was a general de¬ mand for more stringent laws regulating the employment of children and providing for their education. Labor unions which were honestly endeavoring to improve social condi¬ tions and to give to labor the protection and dignity to which it is entitled gave cordial support to measures intended to correct the evils growing out of these conditions. State and National conferences under the direction of labor commissioners and factory inspectors dealt courageously and effectively with the problem. The enforcement of child labor laws and truancy acts in certain States had the effect of driving families from these States to the States where such laws had not been enacted. The social and economic living standards were being lowered ahd this condi¬ tion gradually became understood by the pub¬ lic generally. This fact became an effective agency which enabled society to cope with the ignorant and unscrupulous parent willing to impose improper burdens and even hardships upon his children for financial profit and with the greedy employer who was anxious to avail himself of the cheap labor obtainable through the employment of children. Thus we find that immigration, labor and the industries have been important factors in procuring the enact¬ ment of compulsory education laws.

The ordinance of the West India Company in New York in 1629, the decree of the General Court of Massachusetts in 1642, the enactment of the truancy laws of Massachusetts in 1850 and 1852 and the enactment of a similar law in New York in 1853, the amendments to the Massachusetts law in 1867 and 1873 and the new act in New York

in 1874 show that these two States assumed the leadership in the at¬ tempt to enforce school attendance in America. The statutes of these States have been the models upon which attendance laws in the other States of the Union have been con¬ structed.

There is now an effective compulsory at¬ tendance law upon the statute books of every State in the Union except Mississippi, and in Mississippi a compulsory attendance law, per¬ missive in character, was enacted in 1918. The law confers upon the school authorities of any county in that State power to enforce compul¬ sory attendance. The large number of illiter¬ ates in the country and the social and economic conditions existing because of the lack of these laws and of proper child labor laws aroused the public conscience and enabled the leaders of the nation who espoused social re¬ forms to obtain the enactment of these laws. It was not, however, until within the last quarter of a century that these laws were made effective or were properly enforced. The official action of Governor Pattison of Penn¬ sylvania in 1891 and in 1893 illustrates to some

extent the public feeling toward laws of this type. In those years he vetoed compulsory attendance measures upon the ground that they . were un-American in principle and interfered with the personal liberties of the parent. The effect of the enactment of compulsory educa¬ tion laws in the American States has been to reduce rapidly and materially the number of illiterates in these States.

Compulsory attendance laws have generally been enacted in most of the Latin states of North America and in Central America but they have not been enforced. Such laws are practically dead letters in those countries.

England, Ireland, Scotland, France, Switzer¬ land and the Netherlands have effective com¬ pulsory attendance • laws, and they are gen¬ erally well enforced in these countries. The compulsory ages are from five or six years of age to 13 or 14 years of age. Japan is the only country in Asia which has a compulsor>ˆ education statute and such law applies to chil¬ dren between the ages of 6 and 12. While Italy has a compulsory education law its pro¬ visions are not enforced. This is also true of Turkey.

The Balkan states have each declared elementary education compulsory and some progress had been made previous to the out¬ break of the War in their enforcement.

The number of illiterates in a country indi¬ cates to some degree the effectiveness of its compulsory education laws. In the countries having a military system requiring service from all men there will be found few illiterates. In these countries, however, an illiterate is ‘given special instruction before he enters upon his military service. The mandatory features of the military training laws therefore are in effect compulsory education provisions.

The latest available statistics of certain European countries enforcing compulsory school attendance show the percentage of illiterates in the population of these countries to be as fol¬ lows : German Empire, .03 ; Denmark, .2 ; Sweden, .3 ; Switzerland, .5; Netherlands, 1.4; Great Britain, 1.5; France, 2.97. On the other hand,_ the latest statistics available also show that in those countries not enforcing compul¬ sory school attendance there are large per¬ centages of the population who are illiterate. The percentage of illiterates of the whole population in such countries is as follows ; Russia, 70; Spain, 59; Italy, 48; Hungary, 40; Austria, 26. The percentage of the population of certain European countries which are en¬ rolled in the elementary schools is as follows : Russia, 2.5; France, 14.24; Great Britain, 16; Germany, 16.87. The general result in the European countries and in the American States has been that the adoption of an effective com¬ pulsory education law has greatly increased school attendance and rapidly reduced the num¬ ber of illiterates.

Compulsory attendance laws have been in operation in Prussia for more than two cen¬ turies. Such laws and child labor laws have been more effectively enforced in all parts of the German Empire than in any other country in the world. Frederick the Great’s general law of 1763 clearly asserts the principle of compulsory education. The law of 1794 re¬ duces the terms of such statute to two very

simple provisions : First, «Every inhabitant who cannot or who will not provide the necessary instruction for his children in his own household is required to send them to school after completion of the fifth year.® Sec¬ ond, ®The school instruction must be continued

until a child in the discretion of his spiritual guide, has obtained the knowledge necessary for an intelligent person of his station in life.® The authority to determine the amount of instruction which a child shall receive was transferred in 1872 from the ^^spiritual guide® to the ˆschool inspector.® In some of the Ger¬ man states the attendance of children upon school is controlled by regulation and not stat¬ ute enactment. The Prussian Act of 1891 and the acts and regulations of the other German states, in relation to compulsory education and to child labor, are stringent measures and are rigidly enforced. There are practically no illit¬ erates in Germany, and in many of the leading cities of that country the number of persons who do not complete the eight-year-elementary course of instruction is less than one-half of 1 per cent. The largest percentage of the popu¬ lation of the people in any country in the world which is in attendance upon school is in Germany.

There are two modern movements in con¬ nection with compulsory education statutes. These are for enforced attendance upon con¬ tinuation schools and enforced attendance of adult illiterates upon evening or other schools. The forces most active in support of these schools are the mercantile and factory associa¬ tions and organized labor. In many cases the large industrial and mercantile establishments have maintained continuation schools at their own expense for the education of their em¬ ployees. In many of the German states and of the cantons of Switzerland, attendance upon continuation schools is compulsory for boys between the ages of 14 and 18, and for girls between the ages of 14 and 15.

The English education bill before Parlia¬ ment seeks to establish compulsory attendance for all young persons under the age of 18. It provides for an increase in the number of secondary schools and for the establishrnent of part-time secondary schools. It provides that children between the ages of 14 and 18 shall not be employed in the industries unless they have attended a full-time secondary school until they become 17 years of age, or unless they attend a part-time secondary school for not less than nine hours per week.

There has been such a large increase in the number of adult illiterates in this country and the total number of such illiterates has assumed such proportions that there has been much pub¬ lic agitation for the enactment of a compulsory education law which will apply to these illiter¬ ates. There are more than 3,000,000 adult white illiterates in the country. Of course, the Congressional act of 1917 which prohibits illiterate immigrants from coming to this country has modified this proposition some¬ what. The problem now is to educate the

3,000,000 adult illiterates which are in the country. Massachusetts has a law which com¬ pels all illiterate minors to attend upon instruc¬ tion if they have not a knowledge of English sufficient to admit them to the fifth grade of a

public school. New Jersey ‘also has taken ad¬ vanced action on this subject. The most recent action, however, is the mandatory statutes en¬ acted by the legislature of New York in 1918. Under this law, all illiterate minors are com¬ pelled to attend upon instruction. Penalties run against minors’ parents and employers who do not conform to the provisions of the law.

The experience of America as well as the experience of the European countries shows that a compulsory attendance law to be effective and accomplish the results sought must contain the following provisions :

1. The law must be supervised by the State educational authorities. These authorities must be given broad powers in the disciplining of local officers who fail to perform their duties.

2. Each local administrative school unit must be charged with the responsibility of en¬ forcing the law and with the authority to ap¬ point and remove attendance officers. The local administration must be under the general direc¬ tion of the school authorities and not the municipal authorities.

3. There must be a registration of all chil¬ dren above four years of age. The addresses of these children must also be recorded. School authorities must know the number of children becoming of school age each year, so as to make provision for their entrance in school. This registration must be constantly revised so that there shall be at all times an accurate rec¬ ord of the names, ages, addresses and parents of children within compulsory ages.

4. The attendance of children within the prescribed ages must be rigidly insisted upon. A child must be compelled to account for a single day’s absence. Physical disability or some other reason equally satisfactory should be the only excuse for an absent pupil.

5. Attendance should be required from the time the child becomes of school age until the child has completed in a satisfactory manner the prescribed elementary school course.

6. Provision should be made for attendance upon cooperative

continuation schools for a period of at least two years beyond the com¬ pletion of the elementary course.

7. Provision should be made for the imposi¬ tion of fines upon parents or guardians who fail to respect the law.

8. A city, town or school district which fails to enforce the law satisfactorily should be re¬ fused grants of State funds until said law is properly enforced.

9. Attendance laws should be operative dur¬ ing the entire period in which a public school is in session in a city or other local administra¬ tive unit.

10. These laws must contain restrictive pro¬ visions in relation to employment of children within compulsory ages in mercantile, manufac¬ turing and other occupations.

11. In America, instruction in English in the entire curriculum for the compulsory at¬ tendance period should be mandatory, and the subjects in which instruction is required should be specified.

12. When instruction is given a child within compulsory ages at home or in a private or parochial school, such instruction must be sub¬ stantially the equivalent of that given in the public school and by qualified teachers.

13. Attendance officers and other represen¬ tatives of the school authorities must be given the right to enter shops, factories and other in¬ dustrial and commercial places, to ascertain full information in relation to the employment of children, to determine whether or not em¬ ployers violate the attendance and labor laws.

14. Provision should also be incorporated in such laws requiring all adults who are unable to speak and write the English language to attend evening or other schools until they have acquired such

attainments.

Thomas E. Finegan,

Superintendent of Public Instruction for the State of Pennsylvania.

EDUCATION, Courses of Study in. The

course of study which forms the outline of work in the best schools of to-day is a broad, socialized program, having little resemblance to the brief course in the schools of 50 years ago. Reading, writing and arithmetic were then the subjects of instruction covered in the elementary schools. In the ˆ‘academiesˆˆ Latin and Greek were the principal subjects with some mathe¬ matics, as the purpose of the instruction was preparation for college. In many States there are now certain statutory requirements rela¬ tive to the course of study such as the teaching of physiology and hygiene and instruction in reading, writing, spelling, arithmetic, geography and history. The emphasis to be given to these different subjects, the assignment of time al¬ lotments, and the teaching of other subjects such as music, drawing or science are fixed largely by local superintendents and boards of education.

During recent years courses of study have been ˆ‘ˆenriched® and ˆGitalizedˆˆ by the introduc¬ tion of many new subjects. Some have held that too much new matter has been added with the result that thorough work is no longer pos¬ sible. On the other hand, the vast changes in the social and economic life of the day demand a closer relation between the program of studies and the immediate daily life of the child. The scientific study of the progress of pupils has established the fact that there has been considerable waste in useless repetition in the elementary grades. The activities which have been introduced through play and games, story¬ telling, dramatization, handwork, weaving, sew¬ ing, cooking, woodworking, modeling, garden¬ ing and other means have been added largely because of their interest. They were considered helpful devices in the monotony of the daily routine. Only recently has their social value been appreciated. The recognition of the im¬ portance of these activities in the growth and development of the child has given them a definite place in the course of study. The evi¬ dence of waste in effort and of undue time allot¬ ments for the fundamental subjects makes the articulation of the new work more easily ac¬ complished. The schools are an important part of the social life of the community, not apart from it. In the process of education the course of study must present in rational sequence type forms of life experiences. The vast changes in

our social conditions have reacted on the whole theory and practice of education. Courses of study are, therefore, not definite and final, but subject to constant modification.

Health education was not thought of yesterday, but is all-important to-day. Physical training, supervised playgrounds and recreational centres are provided in the educational program of every progressive community. The school day is being lengthened, and the time is not far distant when the course of instruction will be continuous throughout the year.

Too often this enrichment has resulted in mere multiplicity of subjects and congestion of the program. It should not mean this if the entire course is unified and the common aims of the instruction determined. The study of the relative values of the different subjects of instruction and the elimination of useless ma¬ terial has resulted in the consensus of educa¬ tional leaders that six years is ample time in the elementary grades to be given to the study of the so-called common branches. At least it is thought that the problem in the first six years has been too much a mere pouring in process to give the child a vast accumulation of facts; that he should master the fundamental processes of reading, writing and arithmetic, and form a proper mental attitude toward his social environment.

The thought has been held for several years that many of the so-called secondary subjects should be begun before the ninth year. The several reports on this subject which appeared around 1900 emphasized the unreasonable rigidity of the system which fixed eight years for the elementary course and four years for the secondary course. These discussions largely centred on the necessity of economy of time and a more thorough instruction in subject matter. The epochmaking treatment of the subject of adolescence by Hall was a new and compelling factor in the consideration of the reorganization of the course of study. It be¬ came clear that the psychological break came too late ; that the eight and four plan for the elementary and secondary school work was illogical as well as uneconomical ; that the de¬ velopment of the youth, physically as well as psychologically, demanded the reorganization of the school work on the six and six or the six-three-three plan, by which some differentiation in the course of study and methods of instruc¬ tion might be made after the sixth school year. The great elimination of pupils in the seventh and eighth grades and the failure of the course of study to function compelled remedial action. Hall's complete discussion of adolescence and

Dewey's emphasis on the relation between the course of study and the social environment have resulted indirectly, if not directly, in the de¬ velopment of the intermediate school, covering the seventh, eighth and ninth years. In the six-three-three plan the elementary work is fol¬ lowed by ˆ a three-years' intermediate course, and that in turn by the secondary course of three years. The course of study in the inter¬ mediate school, or junior high school as it is sometimes called, is to assist the boys and girls to find themselves; the work is slightly dif¬ ferentiated into groups to meet individual needs and to give an acquaintance with the first prin¬ ciples of a few fundamental occupations. The work is departmental and promotions are made by subjects. The courses are in a sense prevocational in that the pupil has the opportunity to test his inclinations and capacity through the socialized grouping and co-ordination of

subjects. He is given more freedom than in the elementary school but is not left on his own resources as in the secondary schools. The organization of the intermediate school with the development of the course of study best suited to the peculiar needs of the pupil in his relation to his social environment is only a step in the solution of a large educational problem ; it is far from being solved.

In the secondary field courses of study are still largely dominated by the college idea. The college preparatory aim persists not only in the course of study but in the treatment of sepa¬ rate subjects of instruction. In very few of the courses of study in the secondary schools has there been any complete correlation of work or definite aim. The subjects are too often unrelated to each other and bear little relation to the social environment. The mortality in the secondary schools is very high, as only 20 to 25 per cent of first year pupils complete the course. While no one factor is responsible for this condition, the failure of the course of study to function has been a determining element.

School courses have been planned for the graduate, not for the pupil who goes part way through, notwithstanding the fact that the great

majority do not complete the course. The aim of the eight-year elementary course has been the completion of the requirement for ^^admis¬ sion to high school. The aim of the high school course has been the ^^college^^ or professional school requirement. The needs of scarcely 5 per cent of secondary pupils have determined the course of study for the other 95 per cent. The relation of the school work to the social en¬ vironment has been almost entirely overlooked in both the general outlines of courses of study and in the method of treatment of the subjects of instruction.

The solution seems to be in the shortening of the elementary course and in the modification of the work in the seventh, eighth and ninth grades, or intermediate school, so that a slight differentiation in work may begin before the adolescent period, and that the secondary course of three years furnish opportunities for the development of the different types of individual pupils. Each course should be based on definite needs and have a definite and specific aim. It should furnish the pupil the opportunity to carry forward the particular work in which he showed or developed interest in the inter¬ mediate school.

The more logical break which comes at the end of the three-year period at the close of the intermediate courses does not leave the pupil wandering aimlessly. He has been given an opportunity to find his bent. The diversified course of study in the intermediate school holds the pupil much better, and even if he should leave school at the end of this period, he has had the advantage of an additional year beyond the eight grades, with a course of in¬ struction planned to meet his needs.

A reconstruction of the secondaryˆ course is under way. In part the needs of pupils are being met through the organization of techni¬ cal high schools, commercial high schools, vo¬ cational and continuation schools, and in some high schools special courses in technical, com¬ mercial or vocational subjects are offered along-with the so-called academic work. There are two schools of thought with regard to the voca¬

tional courses ; one, that there should be set up an independent educational organization for this vocational work, and the other that such a program is undemocratic, that the courses in vocational, technical and academic subjects should be carried along side by side with no separate educational administrative organization.

This adjustment with the environment is being worked ou<: and

courses are being evolved with definite social aims. There will be no fixed courses of study, as they will always be subject to modification as the needs change. There will be no final differentiation between academic and vocational, as technical or cultural training will depend upon the needs of the pupil rather than on any mere arbitrary classification of studies. Courses of study must be adjusted with the whole environment in terms of indi¬ vidual and community needs.

Bibliography. — Bagley, William C., ˆThe Educative Processˆ ; Dewey, John, ˆDemocracy and Educationˆ ; Dewey, John, ‘ˆThe Child and the Curriculumˆ ; Hall, G. Stanley, Wouth: Its Education, Regimen and Hygieneˆ ; Harms, Paul H., ˆEducational Aims and Valuesˆ O’Shea, M. V., ˆEducation as Adjustmentˆ ; Na¬ tional Society for the Study of Education, Four¬ teenth Yearbook, Part I; Fifteenth Yearbook, Part HI.

George M. Wiley,

Director, Division of Examinations and Inspec¬ tions, State Education Department, Albany, N. Y.

EDUCATION, the Development of the Office of School Superintendent. Supervision of schools by educational experts is an Amer¬ ican idea. In ancient Athens, it is true, the teachers were to some extent under the super¬ vision of the State. Overseers were appointed to enforce the laws respecting morality. The State, however, exercised but little supervision over the qualifications of tutors dr their methods of teaching. Charlemagne visited the school of the palace and placed the schools for the edu¬ cation of the clergy under the care of the bishops and the parish schools under the care of the priests. They had so many other duties that they could not exercise a close oversight over the teaching in the schools which were thus placed under their care. Luther and Melanchthon visited schools and churches under the direction of the Elector of Saxony, but their time and strength were devoted to duties other than those of supervision. When the king of England and the nobility made liberal subscriptions for the establishment of a system of charity schools, in which the German chil¬ dren of Pennsylvania might be taught English, and thus through the instrumentality of lan¬ guage be attached to the English Crown, Rev. Michael Schlatter was in 1754 made superin¬ tendent of those schools at an annual .salary of ilOO. He was succeeded by Dr. William Srnith, who was outspoken in his loyalty toˆ the British government. The former was a missionary of the Reformed Church, and the latter was pro¬ vost of the university. Hence neither of them could devote much time to the work of super¬ vising the schools under their care.

City Supervision. — The idea of appointing a person who was to devote all his time to school supervision first took shape in Buffalo, N. Y., and Louisville, Ky. In the winter of

1836-37 a law was passed by the legislature of New York authorizing the appointment of a superintendent of common schools in Buffalo. R. W. Haskins received notice of his appoint¬ ment on 10 Jan. 1837. He accepted the office, but finding the law defective, he resigned before the expiration of the year, and was succeeded by Oliver G. Steele, who has always been known as the father of the public schools of Buffalo.

The city of Louisville, Ky., appointed a su¬ perintendent of schools in 1837. He was called Agent of the Board of School Visitors and be¬ gan his work in the month of September. Two years later Saint Louis, Mo., and Providence, R. I., appointed superintendents. The last of the great. cities to create the office of superin¬ tendent was Philadelphia.

State Administration and Supervision. — New York also led the way at a still earlier date in provisions for State administration and supervision of schools. The law of 1795, which appropriated for school purposes $100,000 each year for five years, provided for the annual election of not less than three, nor more than seven, commissioners in each town who were to supervise and direct the schools. By the act of 1787 the regents were empowered to charter col¬ leges and incorporate academies, and to exercise supervision over them, being authorized and required to visit and inspect them, to examine into the condition of education and discipline in them, and to make an annual report thereof to the legislature.

On 14 Jan. 1813 Gideon Hawley was elected superintendent of common schools of New York and retained the office until 22 Feb. 1821, meanwhile having been appointed secretar}ˆ of the board of regents, 25 March 1814, and con¬ tinuing in that capacity until 1841. When he was removed by the ˆˆCounsel of Appointment® just prior to the expiration of its own life, as provided by the constitution of 1821, public in¬ dignation ros-e to such a pitch that the legisla¬ ture

promptly abolished the office of superin¬ tendent and devolved the duties upon the secre¬ tary of state. But the offic-e has been continu¬ ous from 1812 to the present time and has been held by several of the most distinguished men of the State.

Maryland had a State superintendent in 1825, and Vermont in 1827, but in neither was the office continuous. In Pennsylvania the duties of State .school administration were, in imita¬ tion of New York, devolved upon the secretary of the commonwealth, and Thomas H. Burrows achieved lasting fame by his work for the com¬ mon schools wffiile serving as secretary of the commonwealth. Most of the time, how'ever, the function of school administration was assigned to a clerk or deputy until 1857 when the office became independent of and co-ordinate with the other departments of the State government. Michigan created the office in 1836, and Massa¬ chusetts in 1837 with Horace Mann under the title of secretary of the State Board of Educa¬ tion. Kentucky came next (also in 1837), and then Connecticut with Henry Barnard under the same title as that adopted in Massachusetts. His office was abolished in 1842, but resumed by himself in 1849. Since that time the ptab-lishment of the office has been rapid, and in the newer States the office dates from the beginning

of their organization, either as a Territory or as a State.

County and Local Supervision. — In 1841 New York passed a law for the appointment, by the Board of Supervisors of each county, of a deputy State superintendent of common schools for the county, except that in counties having more than 200 school districts they were to ap¬ point two deputies. These deputies came to be known very soon as county superintendents, and the arrangement lasted until 1847. In 1843 provision was made for the election of town superintendents and this lasted till 1856. In 1854 a State Department of Public Instruction was again established, and the office of super¬ intendent of public instruction was created. In 1904 the Department of Public Instruction and the Board of Regents were consolidated, and at the head was placed a State commissioner of education. The powers lodged in this depart¬ ment of the State government have been sur¬ prisingly large. Its decisions cannot be ques¬ tioned and reviewed in any court or in any other place. Thus school disputes can be set¬ tled promptly and without much expense.

In Massachusetts there have been several great epochs in the

development of the policy of school supervision. The ordinance of 1647 obliged all towns of a given number of house¬ holders to provide and support schools. The law of 1789 authorized the employment of a school committee to look after the schools. In 1826 such oversight was made obligatory by law. The people of Massachusetts have always been jealous of their rights and correspond¬ ingly slow to delegate power to persons in office. The high-water mark of democracy and the low-water mark of the Massachusetts school system was reached when prudential committees and district committees began to be in collision or collusion. The law of evolution under which the people gradually demand the best in educa¬ tion for their children brought on the period of supervision by experts. At first school commit¬ tees appointed one of their own number to in¬ spect the schools. The school committee of Cambridge in 1836 and of Gloucester in 1850 delegated to one of their members certain super¬ visory duties and designated him superintendent of schools. The first instance of the appoint¬ ment of a superintendent other than that of a member of the school committee in Massachu¬ setts was in Springfield in 1840. He remained in office but two years. The first permanent appointment of such an official was made in Bos¬ ton in 1851. The experiment was successful, and in 1854 a law was passed (amended in 1857 and 1860) authorizing towns and city councils to require the school committee to appoint a superintendent who should have the care and supervision of the public schools. The cities and large towns, one after another, adopted the plan until in 1879, 25 years after the permissive bill was passed, 35 cities and towns employed superintendents for full or nearly full time. In 1888 a law was passed permitting the employ¬ ment of a superintendent by two or more towns, the expense therefor being largelv borne by the State. Permissive measures were followed by mandatory laws, and the legislature of 1900 passed an act obliging the school committees of all towns and cities to employ a superintendent of schools after 1 July 1902. the towns having a valuation of less than $2,500,000 to be governed

by theˆ under which two or more districts could join in the employment of a superintend¬ ent. New York and Massachusetts are typical States, and their example was followed else¬ where, especially in the Northwestern States and in Pennsylvania. In the latter State the office of county superintendent was created in 1854. Popular indignation rose to so high -a pitch over the creation of so many new offices that it helped to defeat Governor Bigler when he came up for re-election. But his successor. Governor Pollock, took a bold stand in favor of school supervision, and the superintendent of schools whom he appointed, Henry C. Hickok, made it his chief aim to show the people that they would get more in I'eturn for their school taxes if the schools Vere placed under the super¬ vision of men fitted for the office by literary and professional qualifications. The law in Pennsyl¬ vania has always been a schoolmaster of public opinion, and in no long time the advantages of school supervision were recognized, and the policy of electing county superintendents at a convention of school directors specially called for the purpose has been left unchanged al¬ though the term has been lengthened to four years. The requirement that the superintendent must possess literary and professional qualifica¬ tions in order to fill the office has been adopted in other States.

Ohio created the office of county superin¬ tendent in 1914. He is elected for a period of from one to three years by a county-board of five members who are themselves elected by the presidents of the district boards.

Salary. — The higher compensation which the superintendent receives, as compared with the teachers under him, has raised in the public mind the question: ®How does the superin¬ tendent earn his salary?® To answer the ques¬ tion the school system may be likened to a manufacturing establishment whose operating expenses exceed the income by $20,000. The deficit caused the stockholders to employ a more efficient superintendent, who by organizing the workmen, rearranging the work and saving the waste or raw material not only prevented this loss but made a profit of $50,000 by the end of the next year. Did the new superintendent earn the $5,000 salary which he received? To ask the question is to answer it. But in school work there is waste far more serious than the waste of raw material. The most valuable asset of a commonwealth is brains, and this goes to waste through inefficient teaching. The time and ef¬ fort of pupils is too valuable to be wasted dur¬ ing the most plastic period of human life. It is the function of the superintendent so to or¬ ganize and oversee the work at school that the people may get the largest return for the taxes gathered for educational purposes. The results of school

supervision have established in public favor the office of superintendent and the policy of school supervision in every State of the Union.

Duties of the Superintendent. — Various functions are assigned to the superintendent. If he is to be held responsible for the efficiency of the schools he must have a voice in the selection, suspension and dismissal of teachers, the pro¬ motion of pupils, the making of the course of study, the selection of the teˆttbooks, the pur¬ chase of apparatus and the location, erection, and condemnation of schoolhouses. In smaller

towns difficult cases of discipline are referred to him for adjustment; in the cities and larger towns such cases go to the principal who then assumes many of the functions of a supervisor. Where a superintendent's powers are based upon statute it is easy for him to exercise these func¬ tions. When he must exercise them through committees the situation becomes very complex and requires the greatest tact and personal force.

Methods of Teaching. — The superintendent is everywhere expected to improve the methods of teaching. Hence he is charged with the duty of conducting teachers' meetings, and in some States he has charge of the annual teachers' in¬ stitute. He makes reports to the Board of Edu¬ cation, stands between the schools and the news¬ paper reporter bent on mischief, between the teacher and the unreasonable parent, as well as between the schools and the ill-advised reformer. It is also the duty of the supervisor to protect the child from overpressure in school work and from other unreasonable demands on the part of the teacher. He may, by ill-advised and too frequent examinations, ruin the methods of teaching and unnecessarily worry the minds of teachers and pupils. It is now recognized that children have rights as well as duties, that one of these rights is the right to be happy at school, that children cannot be happy unless the teachers are happy in their work, and that n9 teacher can be happy if he or she is con¬ stantly annoyed by rude or unreasonable de¬ mands from the superintendent. Hence the educational leaders of America have insisted that the superintendent shall be courteous in manner, always pleasant to parents, teachers and pupils and capable of sending them away satis¬ fied, even when he must refuse their requests.

Assistant Supervisors. — Where the adminis¬ tration of schools

absorbs most of the time of a superintendent it has become imperative to ap¬ point supervisors who take charge of special lines of work, like drawing, music, manual train¬ ing, primary instruction. In the selection of these assistants it is important to get experts who can get things done. Mere inspection for the purpose of reporting what is done falls far short of the real purposes of school super¬ vision.

From the nature of the case, county super¬ intendents cannot exercise as close supervision as is possible in cities and towns. Various duties have been assigned to them inˆ different States, namely, to examine teachers, issue certificates, visit schools, conduct the annual institute, make reports to the Department of Public Instruc¬ tion, see that the schools are kept according to law, that the State school appropriation and other school funds are wisely expended, and that schoolhouses unfit for use are replaced by modern structures. The preparation of ques¬ tions for the examination of teachers and the employment of talent for the annual institutes has in many States been delegated to the State superintendent and his assistants.

The Selection of Superintendents and Public Opinion. — Of the various plans for the selection of State or county superintendents, that by popular vote is least satisfactory. Nominat¬ ing conventions are apt to select candidates for geographical reasons or political services and not on the basis of fitness for the duties of the office. This may be prevented by public opinion.

The superintendent has no duty more important than that of creating educational sentiment. The schools cannot be made better than the people want them to be, nor will they be allowed to lag far behind the demands of public opinion. See School Supervision.

Nathan C. Schaeffer,

Late Superintendent, Department of Public In¬ struction, State of Pennsylvania.

EDUCATION, Elementary. — In all the

elementary schools of the United States, public and private, there were enrolled in the year 1914 over 19,000,000 pupils, — 17,500,000 of these in public schools. The average number of days attended by each pupil enrolled in the public or common schools and including rural schools was 115.6 days, and the average length of the school term 158.1 days. The total expendi¬ ture per pupil was $38.31 for sites, buildings, salaries and all other purposes as compared with $15.91 for the same items in 1875.

Rural Schools. — By the increasing concen¬ tration of industrial and commercial life and the concurrent growth of railways and other modes of rapid transportation during the past 50 years, the suburbs of cities were greatly ex¬ tended, the urban population vastly increased and the rural population diminished. Rural schools suffered correspondingly. Within later years, however, a reaction has set in favor of agricultural life by which rural schools haye be¬ gun to profit. There still are rural schools in sparsely settled districts that continue the old practice of holding winter schools with limited sessions of 50 to 90 days and taught by ill-prepared makeshift teachers. Yet lingering shortcomings are steadily yielding to the estab¬ lishment of union schools, to the consequent more generous extension of school terms and to increasingly successful efforts to secure more adequate preparation of prospective teachers through special normal courses in State and county normal schools and in high schools. In the union schools a number of districts are con¬ solidated; the children are conveyed to these at public expense ; the courses of instruction are graded; the teachers comparatively well pre¬ pared and more permanent. Moreover, they offered rallying points for the people of the community for lectures, entertainments, dis¬ cussions, exhibitions, institutes, social gather¬ ings, *etc.* In a number of instances, increased interest in education was stimulated and led to the establishment of township and county high schools. Township high schools are common in New England and in some of the Middle Atlantic and Middle Western States; Kansas and Oklahoma and several of the Middle West¬ ern States have county high schools.

Much fresh stimulus, too, has come from the extension and increased stringency of compul¬ sory school attendance laws. Since 1899 such laws have been passed or amended in the di¬ rection of greater stringency by all the States save two, and 28 of these require attendance during the full school year for from 6 to 9 years. The beneficial effect of such legislation will appear in the fact that the percentage of illiteracy has sunk from 7.1 per cent in 1900 to 4.1 per

cent in 1910. Furthermore, it appears that out of 100 persons enrolled, approximately 92 pursue elementary studies, 6 are enrolled in

secondary schools, and 2 are in higher insti¬ tutions.

From the general character of courses of study, it is fair to assume that the average schooling in all but the most backward rural district is sufficient to secure for each normal person enough to enable the future citizen to read and write and cipher within the practical needs of life, and to enjoy in addition some geographical knowledge, some acquaintance with the history and political organization of his country and, in many instances, some skill in singing, in drawing and other handwork, and a measure of literary taste.

Trained Teachers. — Consideration of the reasons for increasing the length of the term of the elementary school and the adoption of a graded course of study, reveals the most im¬ portant item of improvement in the recent his¬ tory of American schools, namely the introduc¬ tion of professionally trained teachers. The first normal school in the United States was established at Lexington, Mass., in 1839. The number of normal schools supported by state or municipal governments has increased since that year to 235 ; in addition there are 46 private normal schools and a number of courses for the training of teachers in high schools and col¬ leges. The advantage of professionally edu¬ cated teachers above others lies in the fact that they have learned to use methods and devices intelligently and in thoughtful adjustment to the needs and interests of children. They have learned to distinguish between the essential and the accessory in the subjects of instruction and know how to lead the pupil to inspiring uses of his knowledge in deliberate research and in successful application to varied purposes of achievement.

But much is yet to be done, if teaching is to become a profession with adequate permanence of tenure on the part of its votaries. Thus, with regard to rural schools, Harold W. Foght, rural school specialist of the United States Bu¬ reau of Education, reports that the average rural school teacher remains in the profession less than four years of 140 days each. < <This means that the entire personnel must be re¬ newed every four years or that about 92,000 new teachers must be provided annually.^^ Now, the normal schools of the country had enrolled in 1913-14, 94,455 students and graduated only 19,438.^ The burden of providing for the largest immediate supply of rural teachers falls upon the training departments of high schools and upon county

and township training schools in some of the States. Nor do these sources seem to be adequate in view of the fact that in 1913, according to the commissioner's report, there were in the teachers' training courses of pub¬ lic and private high schools only 3,767 boys and 23,284 girls. Nor is the dearth of satisfactorily trained teachers confined to rural schools; for of 1,350 cities reporting to the Bureau of Edu¬ cation in 1914 only 474 require elementary teachers to be normal school graduates, 630 re¬ quire only a high school education, and the re¬ mainder fail to specify what qualifications are demanded.

Probably the most serious obstacle to the professionalizing of teachers is to be found in the comparatively low salaries paid them. In 1914 the average wage of elementary teachers

in cities o£ 25,000 and less than 50,000 in¬ habitants was $641 ; in cities of 5,000 and less than 10,000 inhabitants the average wage was $533 ; both wholly inadequate to secure normal graduates and continuous tenure. With similar import, the investigations of the National Edu¬ cation Association committee on teachers' sala¬ ries discloses the fact that the annual wage of farm laborers in 1913 was $257, while the aver¬ age wage for rural teachers was but slightly more, although the exact figure was not avail¬ able. At the same time, the average wage of rural mail carriers was $1,150. The average salary of elementary teachers in cities of 100,- 000 and fewer than 250,000 population in the same year was $791, and in cities of 5,000 and fewer than 10,000 population the average salary reached only $533.

Under such conditions permanence of tenure and the choice of teaching as a life work be¬ come almost unthinkable. One-third of the men and one-half of the women ' engaged in teaching are under 24 years of age. One-half of the teachers have had but four or fewer years j of experience, and one-fourth can claim only ' one year of experience. At the same time, be¬ cause of the more varied and wider opportuni¬ ties for profitable vocational employment, men are more and more turning to other pursuits and leaving the field of teaching to

women. Thus it has happened that the percentage of men teachers, which in 1870-71 amounted to 41, has steadily declined so that in 1911-12 it had fallen to 20.9, leaving practically four-fifths of the field to women. Unfortunately, this situ¬ ation is still further complicated by the fact that, all but universally, married women are excluded from eligibility. Consequently, to the characteristic of the great majority of elemen¬ tary teachers there has to be added the qualifi¬ cation that they are unmarried women. This qualification each teacher, up to a certain age, hopes to escape, thus adding a new factor to the uncertainty of tenure and a new limitation to the growth of professional spirit.

Sex Problem. — The modern reorganization of the elementary school which will be dis¬ cussed later on in full, presents among other welcome features the fact that it brings into the life of the child at an earlier period the in¬ fluence of men teachers. The value of this can¬ not be overestimated. It furnishes the boy realizable ideals and examples he can emulate, and to the girl it furnishes the opportunity to gain respect for the masculine factors in life on the ground of merit. I direct attention to this without prejudice to the equally valuable influence of women in the school ; for I am aware of the fact that the allˆ but exclusive employment of men as teachers in former days had as weakening an influence upon the effect¬ iveness of schools as their excessive feminiza¬ tion has upon the schools of to-day. As in the ideal family we find mother and father, sister and brother, so in the school both elements should be found in vital proportion, if the children are to grow into ideal relationships in a social organization involving both women and men.

Under the circumstances indicated, it is evi¬ dent that small rural districts cannot secure professionally trained teachers. Such, indeed, find ready employment in cities and villages ;

for these, too, as a whole cannot show in their graded schools an average of more than one teacher in three that holds the diploma of a normal school.

Urban Schools. — Another great advantage belongs to the schools of the village or city. They are graded schools, have a regular course of study, proper classification of pupils and uniformity of textbooks. In the small district school 15 to 40 pupils are brought together under

one teacher. Their ages vary from 4 to 20, and their degree of advancement ranges from beginners to those who have attended for 10 or 12 winters and attempt secondary studies. It still may happen that there is no unformity of textbooks except, perhaps, in the speller and reader, each pupil bringing such arithmetic, geography or grammar as his family may pos¬ sess. This was the case universally in the old time district school — such as existed in 1790, when 29 out of 30 of the population lived in rural districts, and 50 years later when only 1 in 12 lived in a city. As the railroad has caused villages to grow into cities, so it has vir¬ tually moved into the city a vast population liv¬ ing near railway stations in the country by giv¬ ing them the morning newspaper and rapid transportation. In 1890 one-third of the popu¬ lation was living in cities of not less than 8,000 inhabitants. But the suburban populations made urban by the railroad swell the city population to one-half of the whole nation. Hence the great change now taking place in methods of building schoolhouses and in organizing schools.

With this change in the condition of the pop¬ ulation, the method of individual instruction was supplanted by class instruction. The indi¬ vidual did not gain much under the old plan, for the reason that his teacher had only 5 or 10 minutes to examine him on his daily work. In the graded school each teacher has her grade divided into two sections and hears one recite while the other prepares a new lesson. All pupils learn more by such class recitation than by individual recitations, for in the class each can see the lesson reflected in the minds of others, and understand the teacher's views much better when drawn out in the form of a running commentary on the recitation.

Textbook and Oral Teaching. — It is sup¬ posed that the chief work of the pupil is the mastery of textbooks containing treatises that give the elements of branches of learning taught. The evil of memorizing words without understanding their meaning or verifying the statements made in the book is incident to this method, and is perhaps the most widely preva¬ lent defect in teaching to be found in the schools of the United States. The oral method escapes this evil almost entirely, but encounters another. The pupils taught by the oral method exclusively are apt to lack power to master the printed page and to get from it the full mean¬ ing; they need the teacher to explain technical phrases and definitions. The American method of textbook instruction, it is claimed, throws the children upon the printed page and holds them responsible for its mastery. The pupil is taught to assume a critical attitude toward the state¬ ments of the book and to test and verify them or to disprove them by appeal to other authori¬ ties or by actual experiment. It is evident that this system of instruction is feasible only

graded village and city schools and can find no place in the ungraded small rural school. Where such schools have made the attempt to classify their pupils, e.g., in arithmetic or geog¬ raphy, they were obliged to unite in one class children of very different degrees of attain¬ ment with unavoidable injury to the dull by overpressure, to the gifted by neglect, and with but doubtful benefit to the average.

The chief objections to this method of work in graded schools has been found in its tend¬ ency to degenerate even in the hands of well-equipped teachers into spiritless ˆmachine® work and mass-teaching with their disregard and suppression of individual needs and inter¬ ests, as well as of the claims of spontaneous social intro-ordination. It proved to be eco¬ nomical financially, it is true, but wasteful edu¬ cationally. The shortcoming is further empha¬ sized in 24 States by the fact that these have made uniform textbooks mandatory. In some of these States the adopted books must be used as basic texts in all schools, elementary and secondary, and in all districts; in others, high schools are permitted to select for themselves ; and in still others, city districts and special tax districts may adopt whatever books they may desire. In a few instances, where the State prints its own texts and modifies them from time to time on the basis of advancing profes¬ sional insight, possible evils of the measure are greatly mitigated.

A concomitant of the ˆˆmachine® work and mass-teaching to which large graded schools have been subject is found in so-called disci¬ pline or government. The establishment of order, regularity, silence, concerted action and general obedience to authority offered great difficulties and invited measures that seem arbi¬ trary, out of relation with the object in view, and without even indirect appeal to the chil¬ dren's good will and insight.

The New Pedagogy. — However, under the inspirations of Froebel and Herbart, of Spencer and Whmdt, of Dewey and Hall, and many others, a new psychology and a new pedagogy are coming to the rescue. More

and more, in the life of the school, the needs of the child with reference to his individual and social de¬ velopment are coming to the front. The treat¬ ment of subjects of instruction is learning to adjust itself to these needs; the very textbooks, more especially in elementary schools, reflect the new tendencies, place stress upon touching interest on the basis of the learner's experience, upon stirring the desire for independent re¬ search, upon utilizing new knowledge in fresh individual achievement or generous social en¬ deavor. Similarly, disciplinary measures are judged more and more by these considerations. Incentives are adapted to individual nature and need. Encouragementˆ is taking the place of relentless pedantic criticism. Good will, insight and self-respect are appealed to and, in grow¬ ing proportion, deliberate self-control and even organized pupil-government take the place of ostentatiously vigilant government by teachers.

Much is due in the gradual reorganization of the elementary school to the influence of the kindergarten, of manual training, drawing and certain phases of nature study. In all of these the value of the hand as man's chief organ in exploring his world and in adjusting it to his needs is fully revealed. With their introduc¬

tion the motto, ®learn by doing and in order to do,ˆˆ acquired appreciable meaning. At last, the whole child — hand, head and heart of hirn — went to school. The liberal and the practical lost their antagonism, became indeed the two indispensable poles of full culture which car¬ ries men, as Goethe has it, ˆˆfrom® the useful, through the true, to the beautiful. The prog¬ ress of the kindergarten as a factor in element¬ ary education has been quite rapid. The first public school kindergarten was established in Saint Louis in 1873. In 1892 the Commissioner of Education reported 459 public and 852 pri¬ vate kindergartens in the United States. In 1898 there were in 389 cities of 8,000 inhabit¬ ants or over 1,365 kindergartens supported by public funds. The number of teachers em¬ ployed in these was 2,532, and under their care were 95,867 children. ˆ At the same time, infor¬ mation had been obtained concerning 2,998 pri¬ vate kindergartens, with 6,405 kindergartners and 93,737 children. Thus the total nurnber of kindergartens, public and private, in this year was 4,363 with 8,937 teachers and 389,604 chil¬ dren. Kindergartens were authorized in 14 States, but a number of cities had established kindergartens through powers conferred in their charters. For 1914 the commissioner re¬ ports that in all States but one the establish¬ ment and maintenance of kindergartens is either required Dy law under certain conditions,

specially permitted by law, or permitted under general authorizations. There were reported in this year 7,254 public kindergartens in 1,135 cities with an enrollment of 391,143 children. In addition there were reported in 677 cities and villages 1,571 private kindergartens with an enrolment of 74,725 children ; yielding for this year a grand total of 8,825 kindergartens with an enrolment of 465,868 children.

It is the general consensus of opinion on the part of superintendents, principals and primary teachers that the kindergarten child has advan¬ tages over the non-kindergarten child, other things equal, in good school and life habits, in wealth of ideas and power of expression, in powers of observation and concentration, ˆin perseverance in a task once begun, in control of the hand in manual work, in social co-oper¬ ation and sense of responsibility in common work, in responsiveness and obedience and a number of other minor points. So beneficial, indeed, has been the influence of the kinder¬ garten upon the spirit and work of the primary school that deliberate movements for the mu¬ tual adjustment or even coalescence of the two are becoming more and more urgent. It is proposed — and sporadically carried out- — that the transition from one to the other be made less abrupt and that in normal schools student teachers for the kindergarten and others for primary work be taught together in all essential things; in short, that the kindergarten be no longer treated as a separate department, but be made an integral part of primary instruction.

A further development brought to the ele¬ mentary school by the kindergarten is found in the fact that it directed favorable attention to the value and need of modeling, drawing and other forms of constructive and creative handwork in connection with the educative ac¬ tivities of the school. This prepared the way for slojd and other forms of manual training which later on came to the upper grammar

grades and to secondary schools, largely under the pressure of the growing industrial needs of the country.

Certain of these forms of manual training had been advocated long ago by Locke and Franke, by Rousseau and Pestalozzi ; but the recognition of its full value as a factor in edu¬ cation was reserved for Froebel. He, first, fully and clearly revealed the law that the end of mental activity is not knowledge, but the use of knowledge in some sort of self-expres¬ sion or doing; that as the acquisition of -knowl¬ edge rests largely upon the activity of the ex¬ ploring hand, so the application of knowledge to the needs of life is largely dependent upon the activity of the achieving hand; and, fur¬ thermore, that full normal interest in learning can be stimulated only by the achievements it serves. To Froebel, the manual training he had in mind was not a new subject of instruc¬ tion, nor was it a concession to the industrial need of the time, but an immanent factor in every part of the educational work, adding meaning to intellectual effort, substance to ethical and esthetic aspiration. In a measure, then, it includes all the workshop and sketch¬ ing-room, the kitchen and sewing-room features of current manual training departments of the elementary school, but it also includes the manual work of the kindergarten and of the modern primary school, the laboratory, the studio and the schoolgarden. In a broader sense, looking upon the hand as the symbol of deliberate muscular activity, it even may in¬ clude the new attitude of the school to physical training, to play and playgrounds, to dramati¬ zation, to song and rhythmic motion.

Inspiration for manual training of a techni¬ cal and industrial character came to European countries from Finland and the Scandinavian countries. To Uno Cygnseus, whom his coun¬ trymen fondly name ˆfather of the schooVˆ belongs the honor of first introducing work of a technical character in the urban schools and slojd in the rural schools of Finland in 1866. Similar and almost simultaneous movements for the extension of slojd and home industries in the schools of the people were carried on successfully in Sweden and Norway and more particularly in Denmark. In our own country, what goes by the specific name of manual train¬ ing is traced to an exhibit of a Russian insti¬ tution at the Centennial Exposition in Philadel¬ phia in 1876. The value of the system of man¬ ual training; there suggested, appealed to such men as John D. Runkle and C. M. Woodward who introduced it into the institutions under their charge and became forcible advocates of its value. The advanced technical features of this phase of manual training — including vari¬ ous forms of woodwork and ironwork — are confined to high schools and, in some instances, to the upper grades of the grammar schools. The manual training of grades below the 7th deals with extended kindergarten material, with paper and cardboard work, plastic mate¬

rial, raffia, bookbinding, simple forms of slojd, *etc.*

Industrial Vocational Training. — Within recent years the problem of manual training has been much complicated by movements for the establishment of courses for industrial and vocational training which involveˆ more orˆ less complete preparation for distinct callings,

coupled with the opportunity for the pupil to find under so-called vocational guidance what particular vocation or group of vocations it is most profitable for him to choose. While in the original manual training, which still per¬ sists in elementary schools, the stress is upon its cultural value, industrial and vocational training emphasize the distinctively practical outcome in fitting the pupil for some definite calling, for some domestic, agricultural or other industrial work. In 1898 manual training was an important feature in the public school course of 149 cities. In 359 institutions other than city schools, there was training that partook more or less of the nature of manual training. These institutions embraced almost every class known to American education, and the manual features varied from the purely educational manual training of the Teachers' College in New York city to the specific trade instruction of the apprentice school. In 1914 there were approximately 1,200 public high schools that offered courses in manual or technical training, in agriculture, and domestic economy. No re¬ ports are available as to the extent of educa¬ tional or other hand-training in the elementary schools at this time.

Within the last two decades, the attention of legislative activity has been directed to the im¬ portance of hand-training, more especially with reference to industrial and vocational needs. To Massachusetts belongs the honor of leading the way in this matter in a law 20 years old, re¬ quiring every city of 20,000 inhabitants or over to maintain manual training courses in both elementary and high schools. Later on, Massa¬ chusetts again led in legislation aiding the establishment of industrial and vocational schools. By 1915 24 States and the District of Columbia had found it necessary to pass laws providing for courses in a variety of vocational work : for continuation schools, evening schools, trade schools, special classes, *etc.* Thus, by way of illustration, New York provides for courses in agriculture and home-making in her con¬ solidated rural schools, for continuation schools, for trade schools, and for evening vocational schools; New Jersey provides for all-day indus¬ trial schools for boys over 14, household-arts schools for girls over 14, part-time continuation schools for boys over 14 employed as appren¬ tices, evening industrial classes for boys

or girls over 16 who are employed as apprentices, evening household-art classes for girls over 17, and vocational agricultural classes. Indiana makes provision for ˆfitting each individual in the State for some useful form of workˆ in the public school work of the State ; for this pur¬ pose, the law requires that elementary instruc¬ tion in domestic science and in the industrial arts be given as a part of the regular course of instruction in all the schools — in the 7th and 8th grades and in the high schools — of the State. Moreover, the law provides for voca¬ tional departments and schools conducted for the sole purpose of preparing for efficient and productive work in the shop, in the home, and on the farm.

The highly organized graded school of to-day is quite young. The War of Independence and the subsequent need for organizing and extend¬ ing the new territory and of establishing means of intercommunication and other economic fa¬ cilities had deflected attention to the scanty

provisions for public education. At the same time immigration brought many poor and igno¬ rant families, and illiteracy was growing apace. A new enthusiasm and an intensely popular movement, however, set in when in 1837 Horace Mann and Henry Barnard began their educa¬ tional work, the one in Massachusetts, the other in Connecticut and later (1843) in Rhode Island. From these beginnings and within less than 80 years, the elementary division of our public school system has been evolved. Within the past 40 years, there have come to our public elementary schools among many other com¬ mendable features grouping by grades, trained teachers, enrichment of studies, care for the health of the children and for their general well¬ being. The most significant steps in the func¬ tional reorganization of the elementary school came within recent years : in the first place through efforts of the college to shorten the time required for college graduation by re¬ ducing the elementary school period to six years instead of eight or nine ; and, subse¬ quently, to free the public school generally from its all but exclusive subservience to college ideals in order that it might be enabled to serve also the needs of industrial, commercial,

agricultural and domestic life. With this in view, the course of the elementary school is being more and more generally shortened to six years, to be followed by an intermediate course of two or three years and by a high school course of four or three years.

Six-three-and-three Plan. — Among the vari¬ ous plans proposed and set in operation for the purpose indicated, the six-three-and-three plan is probably the most favored. It reduces the elementary school to six years, establishes an intermediate school, or ® Junior High School, of three years and a full-fledged high school of three years. In both the intermediate and the high school the courses are flexible and promotion is by subjects not by grades. In¬ struction throughout is departmental and in the hands of persons who combine the qualities of the teacher with those of the expert. The curriculum of this intermediate school affords much opportunity for differentiation. All, it is true, share in pursuits that reveal the duties of citizenship and open avenues to the appre¬ ciation of the refinements of life. Yet, for each one there is opportunity to emphasize what talent, genius, necessity, or even inclination may demand. This flexibility of the course with its wealth of opportunity enables the student under the teacher's guidance to ®find himself, his capacities and enthusiasms with reference to the choice of a life-career. Thus the intermedi¬ ate schools of Los Angeles offer five distinct courses : the literary-scientific course, the engi¬ neering preparatory course, the mechanic arts course, the home economics course, and the commercial course. Aside from its many inter¬ nal advantages, this coming intermediate school confers the great boon of holding the children under instruction for a longer period and of "bridging the fatal chasm between the ele¬ mentary and the high school, leading a greater number of children into the high school proper in its academic, scientific, technical, commercial and other quasi-professional departments. The work assigned to the elementary grades re¬ mains practically the same. Courses of study deal with reading, writing, arithmetic, spelling.

the use of the vernacular, nature study, the his¬ tory of our country (biographical and chrono¬ logical), some geography, hygiene, physical culture, music, drawing, and some phases of manual work, mostly in connection with other subjects of instruction or with the plays of the pupils.

Problems. — The problems of truancy, re¬ tardation and varying endowment are destined to become important factors in the reorganiza¬ tion of the elementary school. These problems became,

urgent with the sincere and consistent enforcement of compulsory education laws about 1890. It soon became evident that the physical and mental conditions of children are not uniform and that individual differences in children demand serious consideration in their education. The fact that children vary widely in their natural gifts and inclinations and the clear discovery of eye, ear and motor-minded-ness in children, forced upon the school de¬ mands of greater flexibility in method and or¬ ganization. At first, the attention was chiefly upon mere truancy and certain disciplinary faults. Then, and until quite lately, the stress was upon the needs of laggards; ungraded rooms, so-called industrial schools, special help devices, shorter promotion intervals and promo¬ tion by subjects came to be applied as remedies; for abnormal children special schools were es¬ tablished. At last it has come to be fully realized that retardation is an individual mat¬ ter, that it threatens the specially gifted through lack of interest as much as it falls to the lot of the less favored through lack of ability, and that it was necessary to make provision for all the various phases of individual capacity. In 1911, therefore, it became possible for the Com¬ missioner of Education to report that provisions for backward children had been made in 220 cities, for mentally defective children in 99 cities, and for exceptionally gifted children in 54 cities. Prominent among the last were Balti¬ more, Indianapolis, Lincoln, Rochester, and Worcester. The provisions of all these cities were based upon the desire to furnish these chil¬ dren opportunity in the 7th and 8th grades to do advanced work for which they could receive credit when entering the high school. Many educators, however, doubt the wisdom of singling out such children and separating them from the classes of normal children. They em¬ phasize the social value of joint training upon the development of character. They point out the fact that children have likenesses as well as differences and that in the school they should learn to work together as they will have to do subsequently in life; that, therefore, they should be trained together, although each in his own way and according to his ability in common work. Teachers are deeply interested in the problems involved, since from their study valua¬ ble contributions to the progressive reorganiza¬ tion of the elementary school cannot fail to flow.

Gary Plan. — A new departure in school management which is attracting much attention proceeds from Gary. Ind., under the direction of Superintendent William A. Wirt. The city of Gary is located on the shore of Lake Michigan, about 30 miles southeast of Chicago. When it was founded in Tune 1906 the site was a waste of shifting sand dunes dotted with marshes. To-day it is a flourishing city of approximately 50,000 inhabitants, with all the public utilities

and aspirations of a modern city. In 1906 four teachers taught 120 pupils in its first schoolhouse; in 1916 the number of teachers had risen to nearly 200 and that of pupils to more than 6,000. The Gary plan of a school plant is ^^a playground, garden, workshop, social centre, library and traditional school combined under one management.^^ For these purposes the new Froebel School, erected at a cost of $350,000, stands upon a tract of 10 acres; one-half of this is used for playgrounds, two acres for schoolgardens, and three acres for park. There are also two conservatories for nature-study work, the botany work in the high school, and for supplying plants for the schoolrooms. Among the striking features of the work, the following are the most noteworthy:

1. The schools are open the year round, or for four quarters of 12 weeks each. Pupils are held to attend school for three of these quar¬ ters, choosing for vacation the one that suits them and the home best. During the free quar¬ ter the pupil may attend voluntarily any of the activities of the school or, with the help of the school, find emploj^ment in the industrial life of the city.

2. The elementary school and the high school are in the same building. This, it is claimed, removes the chasm between the two depart¬ ments and tends to hold pupils in the school for longer periods. Moveover, it establishes the same standard of discipline for all grades, increasing sense of responsibility on the part of the older pupils and stimulating worthy ideals on the part of the younger.

3. Throughout, the teaching is departmental. This renders it possible to promote pupils by subjects, to employ skilled special teachers and to do away with supervisors.

4. The school plant is open on Saturdays. Pupils come and go as they please, work or play as they choose under teachers who receive extra pay for this work. The responsibility placed upon pupils who avail themselves of this stimu¬ lates initiative and has a tendency to ^^transform the play impulse into the work impulse.®

5. Similarly, certain schools are open four evenings per week for continuation school work and for ˆ‘social and recreational centre® activi¬ ties.

6. Constant utilization of the school plant by double the number of classes as compared with the number of available classrooms. This in¬ volves the constant use by successive classes of the auditorium, the basements, the library, the gymnasium, and various portions of the play¬ grounds in such a way that no part of the plant is ever idle during the entire schoolday.

Other phases of the work, still in progress of evolution promise equally valuable contributions to school management. Indeed, theˆ results already attained by Superintendent Wirt have induced a number of cities to seek at least par¬ tial enjoyment of the benefits of the Gary plan. Prominent among these is New York which is making extensive experiments with it under the direction of Superintendent Wirt, not without prospects of success.

Among a number of other features in the progressive development of schools within the past two decades, a prominent place belongs to increasing attention to sanitation, to the care for atypical children, the organization of parent-

teachers associations, the use of schools as community centres.

Sanitation. — With reference to sanitation, it is reported that in 1914 there were over 500 open-air .schools in the United States and that throughout open-window ventilation is gaining ground. Forty States have enacted laws relative to the sanitation of school plants, involving the inspection of schools and approval of plans for new buildings, and the right to compel improve¬ ments. In a number of instances, these laws extend to rural schools empowering the county superintendent to condemn faulty structures and to inspect and pass on plans for new buildings. Medical inspection laws relate to compulsory health supervision of school children ; to exami¬ nation of teachers and janitors and to regular inspection of buildings, premises and drinking water in order to insure sanitary conditions ; inspection to control contagious diseases ; an¬ nual tests for sight and hearing; provision for the employment of school nurses; penalities or other provisions for the enforcement of the laws. That steady gain is being made in cities appear, from a summary of returns made by 1,406 cities to a questionaire, sent out by the Bureau of Education in 1914. These

returns show, among other things, that 750 of these cities have some form of medical inspection ; that 570 have inspection of ears, eyes and teeth, 62 of ears and eyes only, 90 of eyes only, and 29 of teeth only; that 268 have school nurses, and that in all 923 school nurses are reported; that 130 cities have dental clinics and 195 treat the teeth of school children through other agencies ; that 74 have general clinics and 33 psychological clinics under expert direction. On the other hand, the sanitary condition of rural schools still is described as deplorable. Indeed, it is pointed out on the basis of comparative statis¬ tics concerning defects of school children of the cities and rural districts of five of the older States that for all defects except two, the preva¬ lence of defect was much greater among the children of the rural schools. This is attributed largely to low architectural and sanitary stand¬ ards in rural regions ; ignorance regarding the physical, mental, social, and moral effects of unattractive and insanitary school buildings ; false economy of school boards; and lack of State supervision and assistance. However, as indicated above, inroads are being made by means of suitable legislation, by normal schools and educational associations, so that improve¬ ment cannot tarry long.

Surveys. — The tendency to secure improve¬ ment of schools in both rural and urban districts through the agency of careful surveys of exist¬ ing conditions and needs is steadily extending. In tracing the development of the movement in an address delivered in 1915, Dr. Leonard P. Ayres, director of the division of education of the Russell Sage Foundation, gave an account of the important features of the 30 surveys made up to the time. The following data are culled from this report. These surveys were carried on : seven by individuals, six by univer¬ sities, five by bureaus of municipal research, three by State departments of education, three by foundations, two by the United States Bu¬ reau of Education, two by municipal depart¬ ments, and two by national societies. The directors of the surveys were professors of education, 13; special investigators, 11; direct-614

ors of foundations, four ; the United States Commissioner of Education, one; superintend¬ ent of schools, one. The cost figures for the different surveys varied from $500 (Montclair, N. J.) to $125,000 (New York city). The time required varied from three months to two

years and two months. From 1 to 12 individuals were engaged in each survey; and the published re¬ ports varied from six pages to 2,573 pages in size. Much good has come to the systems thus surveyed in the relation of supervising and teaching forces to each other and to boards of education ; in the vitalizing of courses of study and methods of work; in securing minimum standards for drill work, notably in the three R's, setting free much time for work of greater value. As a result many new surveys are being called for by city and rural school authorities. A number of cities, indeed, have established permanent bureaus of efficiency. Notable among these are Boston, Detroit, Kansas City, New Orleans, New York and Oakland.

Parent-teachers' Associations. — Ideally, the public school is an organic factor of our democ¬ racy. By it the coming citizens are to be fitted in knowledge and character for the performance of their duties. On its work depends the politi¬ cal and economic welfare of the state, as well as the individual and social welfare of each coming citizen. It is obvious, therefore, that fathers and mothers should feel a direct and personal interest and civic responsibility in the organization and work of the school, an interest and responsibility that cannot wholly be dele¬ gated to representatives. To such considera¬ tions the school owes the organization within recent years of mothers' clubs, parents' guilds and parent-teachers' associations which by their very existence have been and are exerting a highly beneficial influence upon the progressive development of the school. In a general way, the object of these associations is cooperation between the home and the school, to induce the school to consider in its work the needs of the home and to induce the home to aid the school in its attempts to meet new conditions and civic needs. In a city of 100,000 inhabitants in the Middle West such associations provided pianos, valuable art objects, stereoscopic lanterns and slides, and other physical apparatus, thereby de¬ claring emphatically and in most amiable fash¬ ion that in the opinion of the people music, art and science had a legitimate place in the cur¬ riculum. Elsewhere the schools owe to such organizations in a large measure the establish¬ ment of kindergartens, the teaching of domestic arts, the enrichment of school libraries, the in¬ troduction of school luncheons, the encourage¬ ment of schoolgardens, of school festivals and school exhibits. They arrange for round table discussions of topics relating to the children's health, their conduct in and out of school, the nature and value of play, the influence of en¬ vironment and every phase of child-study (q.v.). They invite experts to lecture on similar and other timely topics.

Social Centres. — Of deep significance for the further development of the elementary as well as for the other departments of the public

school is a correlated movement of recent origin, namely, the wider use of school buildings for ^^social centre^^ and ^^community centre® activi¬ ties. Aside from the fact that it utilizes the costly school plants for worthy purposes of

public import at times when they are not needed for the direct purposes of the school, this move¬ ment means that the people are begining to realize the deeper fact that the school has not completed its work when it has dismissed its pupils to enter upon some way to earn a living and that these young people still need oppor¬ tunity for further social and character develop¬ ment as well as for additional instruction under wholesome conditions. The movement origi¬ nated in efforts to vitalize the work of rural schools by a variety of social occasions interest¬ ing to parents and in the needs of parent-teachers' associations in cities ; but within less than a decade it has assumed wider proportions. In 1915 the Bureau of Education received re¬ ports from 603 cities of 5,000 inhabitants and over, detailing the more lor less extended adoption or admission of social, civic and edu¬ cative activities in their schools. Among the activities mentioned the following are promi¬ nent : meetings of mothers' clubs, parent-teachers' associations, women's civic clubs, mu¬ sical organizations, art clubs, Chautauqua circles. Boy Scouts, Campfire Girls, gymnastic clubs, dramatic and literary clubs, debating societies, lectures, evening schools for a variety of pur¬ poses. Already 18 States have secured legis¬ lation permitting the use of schools for the purposes indicated.

The management of these activities still is in an inchoate condition. In Youngstowm, Ohio, the local playground association provides for supervisor and supports social centres in the schools. In Trenton, N. J., it is the Social Centre League, assisted by the principals and teachers. In Plainfield, N. J., there is a citizens' committee on evening recreations in which the Board of Education is represented by its presi¬ dent and the superintendent of schools. In Grand Rapids, Mich., the park and school boards together maintain a department of municipal recreation. Philadelphia has a municipal recrea¬ tion commission and in Kansas City, Mo., the public welfare board cooperates with the board of education. Quite steadily, however, the re¬ sponsibility is passing into the hands of school-boards and its employees. Thus, in Pittsburgh, Pa., the direction is in the hands of the director of evening schools ; Cincinnati has a special director of social centres ; in Boston, a similar official works directly under the superintendent of schools and has the advisory assistance of the Women's Municipal Leapˆue; in Milwaukee, a special department of

school extension controls the after-school activities.

Increasingly, too, we find in new elementary school plans adaptations to the new uses of the buddings. Prominent among these are audi¬ toriums, gymnasiums, lunchrooms, plunges, li¬ brary rooms, swimming pools, in one case a pair of bowling alleys. In the equipment movable the Women's Municipal League; in Milwaukee, the social centre directors are provided with amply furnished private ofiices ; many of the rooms intended for recreational work are in the basement and have been made attractive through the use of paint, pictures, book cabinets and a supply of suitable chairs and tables. The assembly rooms are provided with large electric, lamps of high power and stoutly screened to adapt the room for basket ball and similar games. In most of these large rooms there are

also trough footlights and sliding curtains, as well as motion picture booths.

Bibliography.— Bunker, Frank Forest, < Re¬ organization of the Public School Svstem> (Bulletin of the Bureau of Education, 1916, No. 8) ; Bulletins of the Bureau of Education: 1911, Nos. 4 and 14; 1912, Nos. 16 and 21; 1913, Nos. 13, 31, 39; 1914, Nos. 2, 4, 6, 18, 48; 1915, Nos. 24, 28, 36, 41 ; 1916, Nos. 3 and 8; Reports of the Commissiorrer of Education for the years 1910-15. Cole, Percival A., industrial Edu¬ cation in the Elementary SchooP (1915) ; Eliot, Charles W., ˆThe Tendency to the Concrete and Practical in Modern Educationˆ (1916) ; Hanus, Paul H., 'ˆSchool Efficiencyˆ ; Weeks, Ruth Mary, <The People's SchooP (1915) .

Rural Schools : Betts, Herbert George, ˆNew Ideals in, Rural Schoolsˆ (1913) ; Dexter, Edwin Grant, History of Education in the United States > (1914); Cubberly, Elwood P., ˆThe Improvement of Rural Schoolsˆ 0912) ; Bulletins of the Bureau of Education : 1912,

Nos. 21 and 28; 1913, Nos. 2, 8, 32, 42; 1914, Nos. 12, 25, 27, 28, 30, 44, 49; 1915, No. 20; 1916, Nos. 2 and 8; Reports of the Commis¬

sioner of Education for the years 1910-15.

William N. Hailmann, Professor of History of Education, Broadoaks School, Pasadena, Cal.

EDUCATION, Engineering. One of the

most marked features of recent educational his¬ tory is the increasing attention given to engi¬ neering education. Engineering has been de¬ fined as the direction and control of the forces of nature for the use and convenience of man ; but until comparatively recently there was no systematic attempt to formulate the principles of engineering nor any organized effort to in¬ struct beginners in these principles.

Engineering education, the application of the sciences to the needs of man, in this coun¬ try has been a growth entirely within the past 100 y-ears. At the beginning of the 19th cen¬ tury organized instruction in engineering was confined to two or three schools on the con¬ tinent of Europe. The United States Military Academy was founded in 1802, and for about 30 years was the only organized agency for en¬ gineering education in America. For three-quarters of a century a surprising proportion of the graduates of this institution practised en¬ gineering in civil life, not because the education there given was what would now be called en¬ gineering instruction, but because it was the best preparation for engineering practice that could then be obtained. At Troy, N. Y., be¬ tween 1825 and 1835 was established the first institution in the world for giving instruction in engineering not military. In the next 30 years only four engineering schools were founded, of which only two were really entitled to the name engineering. At the close of the Civil War the graduates of the engineering schools, exclusive of West Point, numbered less than 300.

In 1862 Congress passed an act giving to the several States public lands for the benefit of ˆinstruction in the arts and sciences relating to agriculture and the mechanical arts® ; and short¬ ly after the close of the Civil War many of our engineering schools were organized under this act. Never was there a movement more timely or more successful than this, since it has

resulted in the establishment of 64 technical col¬ leges — at least one in each State and Territory. Fifty of these give instruction in one or more branches of engineering.

At present there are something over 100 institutions claiming to give

instruction in engi¬ neering, of which more than 100 give more or less complete courses in one or more branches of engineering. Of these institutions, 67 offer complete courses in civil engineering, 61 in me¬ chanical engineering, 49 in electrical engineer¬ ing, 21 in mining engineering, 15 in architecture,

2 in naval engineering and 2 in sanitary en¬ gineering. The number of students in these courses has increased with astonishing rapidity in recent years; in 1889 there were 3,043; in 1899, 9,659; in 1900, 11,874; in 1901, 13,753; in 1910, 30,329. The rate of increase is most re¬ markable ; during the first decade above the average annual increase was about 660, while during the last three it is practically 2,300. The increase in the number of students pursuing an engineering course is much greater than the in¬ crease in the number of male students pur¬ suing a non-engineering collegiate course; in 13 3ˆears the former increased 444 per cent, while the latter increased only 48 per cent. At present the engineering students constitute 21 per cent of the total number of male students pursuing a collegiate course.

But the most significant fact connected with the growth of engineering education is the im¬ provement in the methods employed and in the scope of instruction. The teaching force of the engineering schools has been increased and the material equipment has' been extended, thus permitting a radical change in the methods em¬ ployed and in the scope of the instruction given. The best engineering colleges of America are offering unexcelled opportunities for the ac¬ quisition of the fundamentals of an engineering education. Few, if any, Americans now attend European engineering schools, for it is generally conceded that the American schools, in equip¬ ment, methods and scope of instruction, are superior to any European schools — at least for American engineers. German and British en¬ gineers quite generally concede the greater ef¬ fectiveness of American methods of engineering instruction, particularly in the use of fully i equipped laboratories and shops and in the value of various forms of practical instruction. The curriculum of the engineering college at present consists of about 10 per cent of English or modern foreign language, usually the latter; 30 to 40 per cent of indirect technical studies, as mathematics, physics and drawing; and 50 to 60 per cent of technical work. Over half of the engineering students are in institutions requir¬ ing for entrance the completion of a four-jˆear high-school course, and another quarter require a three-year high-school course.

At the beginning of the specialization of engineering education practising engineers doubted or denied the value of a technical train¬ ing for young engineers, and distrusted the en¬ gineering graduate ;

but now general managers and chief engineers prefer technical graduates, since they have been trained in scientific meth¬ ods of working, and have a knowledge of the fundamental principles underlying all engineer^ ing practise, and look out upon the world of truth from the viewpoint of a man of science. The national engineering societies now give

credit for training in the engineering school toward the requirements for admission to mem¬ bership, and the most cordial relations now exist between practitioners and the schools of engineering. Within recent years, largely if not mainly through the influence of the technical colleges, engineering has ceased to be tradi¬ tional and has become scientific ; and engineer¬ ing has come to be recognized as a learned pro¬ fession.

The wonderful growth of engineering educa¬ tion is of interest to the young man who is try¬ ing to choose a lifework; but it is of vastly greater importance to the citizen who is inter¬ ested in the continued growth and prosperity of the country. For the past few years our newspapers and our magazines have had much to say about our rapidly increasing foreign trade, chiefly in the way of recording its mar¬ velous growth, but with little attention to the factors that make such success possible. Of course, such a result depends upon many ele¬ ments, among which are: (1) the peculiarities of our national ancestry, which has peopled this country with the brightest minds of all nations ; (2) our political constitutions, which make it possible for the humblest to rise to the highest position; (3) the fact that we are a great na¬ tion, speaking one language, with no barriers in the way of the freest social and commercial intercourse; (4) our great and varied natural resources of mine, forest and soil; (5) the high price of labor, which stimulates the intro¬ duction of labor-saving machinery ; and (6) the general dissemination of education, which made possible the effective use of labor-saving ma¬ chinery and permitted the nation to profit by the capable and ambitious workers of all classes.

But since 1900 we have entered upon a new phase of national and

industrial life. Until then we had been engaged in subduing the great West, in establishing homes, in founding cities, in building railroads. By legislation we barred out foreign competition and preserved the home market for our own products ; but now the new land in the West is occupied and there is no longer an outlet in that quarter for our surplus labor and our industries have outgrown the home market. If prosperity is to continue in the future as in the past, we must have new markets ; and in these markets we must meet the competition of the world. What are the conditions necessary for success in that field? The modern commercial history of Germany and Great Britain is significant.

For many generations Great Britain was pre¬ eminent in manufactures and in commerce. In 1870, she did one-quarter of the world's busi¬ ness, and the English believed that their indus¬ trial supremacy was secure ; but in a single gen¬ eration they were awakened to the fact that they were rapidly losing ground and in some respects were already third in the race. With Germany the almost exact reverse was true. Thirty years before she had a comparatively unimportant place in the commercial world, but in a single genera¬ tion all this had been changed. The power em¬ ployed in manufacture had increased four times as rapidly as the population, and the tonnage of the ships engaged in foreign trade had in¬ creased ten-fold. From 1870 to 1895 German foreign trade increased 42 per cent, while the English increased only 13 per cent; and from 1895 to 1900 German foreign trade increased

$200,000,000, while England's increased only $30,000,000. Why is it that Germany, with one of the poorest seaboards in the world, with a poor soil and with a dangerous military posi¬ tion, was thus able in a single generation to outstrip England — the mistress of the sea and the foremost manufacturing nation of the world?

The modern marvelous industrial develop¬ ment of Germany was coincident with and de¬ pendent upon the development of industrial education. About 30 years ago Germany reor¬ ganized and strengthened her technical schools and established many new ones, until the provi¬ sion for technical education became the wonder and admiration of all who know the facts. In the number and equipment of her technical schools Germany led the world. She was fully alive to the commercial importance of scientific investigation and technical education.

England a few years ago, confident in the superiority of her own manufactures, passed a law that all foreign-made goods should be la¬ beled with the name of the country from which they came. This stamp was intended to be a mark of inferiority ; but, to the surprise of the British, the label ®Made in Germany^^ appeared on the highest grade of goods, which the Eng¬ lishman had assumed to be of home manufac¬ ture. England received another shock when she found her street railroads being supplied with electrical apparatus made in America, and when she discovered that her manufacturers were importing American machine tools, and when America obtained the contract for bridges in her African and Indian colonies. After vainly endeavoring to convince herself to the contrar}^ England is ready to admit that she is being distanced in the industrial and commercial race, because she has not kept alive to the intimate relation between science and industry, and that in neglecting the technical education of her peo¬ ple she has failed to train her industrial army. In these days of sharp competition and small margins, when the entire world is in the market, the nation that most carefully trains its indus¬ trial army will gain industrial supremacy. Of course, there are other factors, as wages, labor unions and tariff ; but not one of them is of such transcendent importance as that training of the individual which enables him to produce the most in the least time and at the smallest cost.

What is the lesson for the United States? It is, that if this country is to extend or main¬ tain its foreign trade it must look carefully to higher education. We already have a goodly number of technical colleges, but in number and equipment they are inferior to those of Ger¬ many, although in method they are better adapted to American conditions than would be the German type. Most of our technical schools are in need of additional equipment and more instructors. Technical education in this coun¬ try was inaugurated about .30 years ago, and the engineering education given now is vastly bet¬ ter than that of 25 years ago ; but there is still opportunity for improvement. The one thing necessary is adequate financial support. Tech¬ nical education, especially engineering educa¬ tion, is very expensive. A large and costly equipment is required, and machines and appara¬ tus wear out or become antiquated and must be replaced by nev\^. Our technical schools need a more generous support, so that they may add to

their facilikes and extend their courses. Any money given for this purpose is wisely ex¬ pended, for experience has abundantly proven that money given to technical education is re¬ turned many fold in the increased productive¬ ness of the nation's industries.

To be most effective, technical education must be practically free. Unless it is, many will be debarred from its privileges, and society will be dependent upon a few workers from a favored class. One of the main reasons why the United States has been so prosperous in the past is that education has been free, and conse¬ quently the higher ranks have been continually recruited from the lower. The way should be open that the humblest may rise from the low¬ est to the very highest rank. Education should not be bestowed as a charity, nor as a means for helping the recipient to earn a livelihood, but because the proper education of the people is the only basis for social security, economic prosperity and the highest national develop¬ ment. The conclusion almost certainly follows that only the government has the ability to make provision for the adequate technical education of the people. The Federal government and the States, particularly the North Central ones, have made magnificent provisions for technical education ; but the numbers seeking it require increased equipment and the change in industrial life demands a higher grade of work.

At present the engineering college is en¬ gaged chiefly in giving the rudiments of an engineering education, but it should do more than simply impart elementary instruction. There are numerous scientific and practical sub¬ jects that are very much in need of investiga¬ tion. The practising engineer frequently encounters problems which ought to be investi¬ gated experimentally, but it is seldom that he can command the necessary laboratory equip¬ ment or find the time for such work. There should be some place where such problems could be sent for solution ; and where is a better place than a research laboratory established in connection with a technical school? Much of the equipment required in the work of instruc¬ tion could also be used in research work. The professors now do more or less such work, but they are usually, and rightly, employed because of their ability to teach and the impartation of instruction consumes so much of their time and energy that they cannot do much in the way of investigation. There should be trained corps of men engaged in original research in matters re¬ lating to engineering and manufactures, much as is the case with agricultural experiments and investigations now being

carried on at most agricultural colleges. Many such investigations are returning to the public each year benefits equal to more than a hundred times their cost. Of these a few are: The breeding of cotton and of corn, the prevention of smut in oats, and the spraying of apple trees for the destruction of harmful insects. Why should not similar aid be given to our manufacturing interests?

The following are the words of a prominent practising engineer: ^^The cost of duplicating the land, buildings, equipment and endowment of the largest and most complete technical school in the United States, training more than 1,500 young men, is little more than half the cost of one of the latest battleships, and the running expenses of one of the largest technical schools

are about the same as for keeping a battleship in commission. The technical school has a use no less important than the battleship in the ˆfirst line of national defense.ˆ The time has already come when the commonwealth and the nation should contribute more liberally to the burden of its support and help it to ever broader usefulness. The demonstration of its great value to the prosperity of the state is already complete. With the increasing numbers of students and with the rapidly increasing cost of laboratory facilities needed for the best training, the need of funds is greater than private mu¬ nificence can be relied upon to meet. In the re¬ awakening of the old spirit of commercial ad¬ venture in foreign lands, we must to-day base our hope of success on superior excellepce and economy of manufacture and in the calling of our engineers to foreign lands. The growth of our cities is laying a burden of new and larger problems on our departments of public works, a burden which only those trained in the schools of engineering can carry wisely and well. Th” business man, when he comes to see these mat¬ ters clearly, will urge again and again a gener¬ ous support to schools of engineering by city,, state, and nation when private munificence fallS’ short.^^

The increase in the number of engineering students attending college has not been as great in recent years as in the period covered by the statistics in the earlier part of this article. The number of engineering students reached a maxi¬ mum about 1910, and fell off about one quarter during the next five or six years. This falling off occurred in all engineering courses, but was most marked in civil engineering; and was due to legislation affecting the rates of railroads and public utilities and the development of water powers which caused a curtailment of expendi¬ tures in those lines. However, in the

meantime, the number of engineers finding employment in other lines greatly stimulated the demand for engineers in new fields ; and before the world war disturbed industrial and financial con¬ ditions in this country, the demand for engi¬ neers exceeded the supply. It is generally and confidently believed that after the close of the war there will be a greatly increased demand for technically trained engineers.

Since the assault of Germany on the peace of the world, there has been a general tendency to look with suspicion upon anything of Ger¬ man origin ; and hence a few' words concerning the reference above to German technical educa¬ tion may not be out of place. Unquestionably Germany for a generation _ before the great war had a marvelous industrial and commercial development, and also unquestionably it was largely due to the attention given to higher technical education. The rest of the world may profit from a study of the causes of Germany's great development without approving some of the commercial methods and social results or her military motive.

Ira O. Baker, C.E.,

Professor of Civil Engineering, University of Illinois.

EDUCATION, Health. See Health Edu¬ cation.

EDUCATION, Higher, in the United States. In the transit of civilization from the Old World to the New, higher education played

an early and conspicuous part. The proportion of university men among the colonists of Massa¬ chusetts Bay was large. Between 90 and 100 English university men were among the emi¬ grants prior to 1648, or 1 in each 200 or 250 of the total population of the colonies. Seventy were graduates or former students of Cam¬ bridge, 20 of them from the able Puritan founda¬ tion, Emmanuel College, and had there learned the love of truth and sense of duty that signally characterized their later lives.

These men became the leaders in church and public affairs in New England, and one of their earnest desires was the creation of a new Cambridge University near Boston. It was only six years after the founding of Bos¬ ton that their dream had partial realization in the founding of Harvard College, for on 28 Oct. 1636, the General Court ^^agreed to give 400 pounds towardsˆ a school or colledge.^^ ® After God had carried us safe to New England,^^ writes the chronicler, *and wee had builded our houses, provided necessaries for our livelihood, rear'd convenient places for God's worship and settled the Civil Government : One of the next things we longed for and looked after was to advance learning and per¬ petuate it to Posterity : dreading to leave an illiterate Ministery to the churches, when our present Ministers shall lie in the Dust.^^ Two years later John Harvard, a clergyman who had been a year in the colony, died and be¬ queathed one-half of his estate and his precious library of 300 volumes to the enterprise. This, with other gifts, enabled Plarvard College to open.

Founding of the First Colleges. — Attempts to found a college in Virginia began before the Mayflower sailed to Plymouth, in the grant of 10,000 acres for a university made by the Vir¬ ginia Company, but it was not until 1693 that the planters, suffering from sickness, poverty and massacre, were able to obtain sufficient aid from England to found their ^^place of univer¬ sal study.® The entire population of the col¬ ony, if gathered together from the scattered plantations, would hardly have filled a sizable city, and the college could hardly have pros¬ pered without the liberal aid which it received as a child of the Church of England : aid to which the dissenting colleges of the northern colony could not appeal. Had the English sovereign and the High Churchmen who lent substantial assistance been able to foresee the infant college becoming the mother of rebellion and the ˆtraining ground of democracy,® in¬ spiring the students, Jefferson, Monroe, Tyler and Marshall and their colleagues with faith in the inalienable rights of man, and granting Washington his surveyor's license, they had perhaps been less prompt with their gifts.

Tradition has it that the third American col¬ lege, Yale, had its origin in the bundles of books which the founders are reputed to have carried to Branford as endowment for the little collegiate school that held its commencement at Saybrook. A child of Harvard, the school was founded in 1701, that the youth may ®be instructed in the Arts and Sciences, who … may be fitted for Publick employment both in Church and Civil State.® The college found a permanent home in New Haven after more than a decade of migratory existence. It re¬

ceived firm foundation in the liberality of Gov. Elihu Yale, a wealthy English colonial official born in Boston and resident in London, who shipped consignments to be sold for the benefit of the college and gave also many books to the college library. Equally generous was the great English philosopher, George Berkeley, who gave nearly 1,000 volumes, ˆˆthe finest col¬ lection of books ever brought to America at one time® as well as the ˆDean's® farm which he had occupied in Rhode Island. The colo¬ nists gave from time to time as they were able, sometimes land, sometimes books, material, labor or physical apparatus, and the general assembly appropriated annually £100 or £200 besides special appropriations. Successful foundation came to Yale, as to all the other colonial colleges, only at the price of common sacrifice, and liberal public policy at home, and generous aid from England.

Benjamin Franklin in his ˆProposals Re¬ lating to the Education of Youth in Pennsyl¬ vaniaˆ laid the framework of the future Uni¬ versity of Pennsylvania. The narrow curric¬ ulum of the New England college and the Latin and Greek declamations and recitations seemed insufficient to Franklin. ˆTt would be well,® he wrote, ˆfif they (the pupils) could be taught everything that is useful and everything that is ornamental. But … their time is

short. It is therefore proposed that they learn those things that are likely to be most useful and most ornamental, regard being had to the several professions for w'hich they are in¬ tended.® Twenty-four citizens of Philadelphia undertook to establish an academy of the type suggested and to lay foundation for posterity to erect a more extensive and suitable semi¬ nary. In January 1751 the academy formally opened. It embraced an English, a Latin, and a mathematical school with wide range of studies.

William Smith, author of a broad plan of education for an Utopian college of ˆˆMirania,® was chosen provost of Franklin's academy, and guided the institution through its notable, if tumultuous, early history. He bitterly disap¬ pointed Franklin, quarreled with the provincial assembly, and was believed a Tory at heart, but he built into fact enough of his own and Franklin's early ideals to make the college of Philadelphia a model for all later American colleges.

Princeton, founded in 1746 as the College of New Jersey, had for predecessor the Log Col¬ lege of William^ Tenant, near Philadelphia, a college of the simplest type where, with Ten¬ ant's fouV sons, future clergymen of the Pres¬ byterian Church received instruction and coun¬ cil.^ Princeton influence was active in the foun¬ dation of Brown University in the Rhode Island colony, organized by the Philadelphia Baptist Association under the agency and pres¬ idency of the Rev. James Manning, a graduate of the New Jersey College.

Kings (College in New York (now Colum¬ bia) owes its origin to the joint interest of the colonial assembly and Trinity Church. The assembly declared its belief that a proper and ample foundation for the regular education of youth would greatly tend to the welfare and reputation of the colony and voted an annual •appropriation of £500, in addition to author-

izing lotteries, believing «so good and laud¬ able a design must readily incite the inhab¬ itants to become adventurers in a lottery.® Trinity Church offered «any reasonable quan-Uty of the church farm® for the college build¬ ings on condition that the president be forever a member of the Church of England and that the litur^ and collect of the Church be used. Bitter dispute ensued between the Episcopal party and the minority who seem to have had in mind the erection of a non-sectarian univer¬ sity under the direct control of the assembly. If the plan for the new college was not as lib¬ eral as the minority wished, it was in practice less sectarian than any college yet erected.

Dartmouth, established by the Rev. Eleazer Wheelock in 1769, was an outgrowth of Moor's Indian Charity School. Ten thousand pounds were collected for it in England. Situated on the frontier of the Indian country, remote from populous towns and white settlements, it early worked out a rough sort of vocational training that was prophetic of a later day.

Rutgers, established by royal charter as Queens College, in New Jersey

in 1766, com¬ pletes the list of the nine living colonial col¬ leges. Twelve were founded in the colonies prior to the Revolution, but the others did not survive.

The colonial colleges were not mere copies of English prototypes. Each has an individu¬ ality of its own. Each smacks of the soil of its own primitive community. Each retained permanent characteristics given by the groups of able and independent men that founded and presided over them. Their achievement is a great one. They realized the hopes of their founders that learning might not perish in the new world and that able leaders in church and civil affairs might not be wanting, but they did more.

They furnished the leadership in the great debate with England in legislature, in pamphlet and newspaper that preceded the Revolutionary War; they furnished a notable proportion of military leaders and soldiers in the terrible struggle, and they supplied largely the practi¬ cal statesmanship that joined the discordant colonies into united resistance and later into one nation. Without the colleges the Revolu¬ tion could not have succeeded or would have been deferred for a generation.

The colleges paid the price. All but one or two were forced to close their doors for a time. For a time Harvard's dormitories resounded with the heavier footsteps of provincial troops. Washington took command within a few rods of the college yard and occupied the president's house as his headquarters. The scientific ap¬ paratus was removed to Andover and instruc¬ tion was given in Concord. Yale found her work interrupted and resumed for a season a migratory life. Her president was subjected to indignities and the students suffered from shortage of food.

Princeton was the scene of a crucial battle of the war: Nassau Hall still bears the scars of battle and gave shelter in turn to provincial and British troops. Brown's Hall was used as a barracks and hospital. Kings students drove the Tory president into exile, but the col¬ lege buildings were later occupied by British troops and no commencement was held be¬

tween 1777 and 1786. William and Mary was used by Washington as a hospital, and Queens College was forced to remove to the north branch of the Raritan to escape active hostili¬ ties. Remote Dartmouth alone seems to have continued undisturbed in her scholastic pur¬

suits, but suffered the loss of her Indian stu¬ dents, allies of the British. These colleges all, however, survived the struggle and before the century closed their number was increased by 17 new foundations, among which were Hampden-Sidney (1776), Washington and Jefferson (1787), Dickinson (1783), Georgetown (1791), Williams, (1793), Bowdoin (1794), Union (1795), University of North Carolina (1789), University of Vermont (1791), and Middlebury

(1800).

Government Aid. — Although generally founded as independent, self-governing corpo¬ rations closely related with some religious de¬ nomination, practically all the early colleges received generous aid from the colonial or home government either in gift of money, grant of land, lottery, privilege or special tax. The provision was, however, pitiably small. The total property of the colleges at the end of the 18th century has been estimated as not in excess of $1,000,000 in value. The present property of the colleges and universities is nearly 800 times as great. The equipment of the early colleges was of necessity of the sim¬ plest. A few books were the first essential, as the gifts of John Harvard, Elihu Yale and Bishop Berkeley abundantly indicate. Food and dormitories for the students, a house for the president, simple apparatus for those col¬ leges which offered courses in natural philos¬ ophy and astronomy, and an unpretentious col¬ lege hall were the other usual requisites. Wil¬ liam and Mary had for the time a notable build¬ ing designed by Sir Christopher Wren. Nas¬ sau Hall was esteemed one of the finest build¬ ings in the colonies. College Hall in New York was ^^exceedingly handsome, the most beautifully situated of any college in the world.® But these were the exceptions. The president's house often served as place of recitation. He was often the sole member of the faculty, teaching all the subjects of the curriculum. The faculty and tutors were always few in number.

A New Era. — The close of the Revolution ushered in a new educational era. Some of the colleges, as Kings, were virtually defunct and required refounding. Others had suffered so severely that larger appropriations were needed than the impoverished States could well afford. But chiefly significant is the new patriotism that preferred education at home to education in Europe and the new conception of education as not primarily a church function but as an instrument of national spirit and national life. The new impulse came 'n part from France and Vv^as in part the natural result of newly-won national independence.

The University of the State of New York was founded 1784-87 to ensure an organized system of higher schools adequate to the needs of the State. The State of Georgia provided in 1784-85 that all public schools instituted or to be supported by funds or public money shall be considered as parts or members of the Uni¬ versity of Georgia. Thomas Jefferson be-

lieved profoundly in the new educational faith. As press of other duties permitted, he con¬ cerned himself with the project of developing in Virginia, as a model for all the States, a true organized system of schools crowned and controlled by a State university. The plan was proposed in 1779 and partly carried out in 1796. It was not until his old age that he found time to incarnate his idea in the founda¬ tion of the University of Virginia. Jefferson founded in the university a new type of insti¬ tution. The purpose of a State university he considered to be (1) To form statesmen, leg¬ islators and judges; (2) to expound the prin¬ ciples and structure of government, the laws which regulate the intercourse of nations and a sound spirit of legislation; (3) to promote industry, agriculture, manufacturing and com¬ merce; (4) to develop the reasoning faculties of the youth, enlarge their minds, cultivate their morals and instil in them the precepts of virtue and order; (5) to enlighten them with mathematics and physical sciences.

Washington in his plan for a national uni¬ versity was moved by the same impulse. He thought a national foundation the surest way to establish an American education equivalent to that formerly sought by many American youths of good family in the English universities, and he believed that the gathering of students from all the colonies into one institution would foster a common national spirit. The plan of Washington has never yet been realized but has found support in the opinion of many of our wisest Presidents and most experienced educators.

So strong was the democratic impulse and the influence of Jefferson's university that pri¬ vate foundations came to be viewed with some¬

thing like distrust. In some States the legisla¬ ture vainly sought to obtain control of existing colleges by offer of financial support. In three States, at least, the colleges were for a brief period converted into public institutions, but soon reverted to their original character. The famous Dartmouth College Case put an end to this attempt, it being decided that the charters granted educational foundations were inalien¬ able. The effort had greater success in the States where private and church foundations had not a firm foothold. Provision was made in the constitutions of most of the new States for the establishment of State colleges or uni¬ versities to crown the system of public schools. The national government laid substantial foun¬ dation in land grants. The grants of the Con¬ tinental Congress in 1787 reserved perpetually two entire townships to the States to be erected in the Ohio country for the purpose of a uni¬ versity. One or two townships of public land were granted each of the newer States for education and were usually devoted to the es¬ tablishment of a State university. The Morrill act granted public land for instruction in agri¬ cultural and mechanical subjects in propor¬ tion to population: 30,000 acres for each mem¬ ber of Congress representing the State. By the acts of 1890 and 1907, $50,000 was given each State annually for the same purpose, and by acts of 1887 and 1906 $30,000 annually was granted each State for Agricultural Experi¬ ment Stations, which were usually made part of the State university or agricultural college. The

effect of these grants was to stimulate the growth of State institutions and to broaden their curriculum. The great universities of California, Illinois, Minnesota, Nebraska, Ohio, among others, owe their origin to the Morrill act. In other States agricultural colleges were established, as in Massachusetts, Michigan and Iowa ; and in others the proceeds were de¬ voted to the maintenance of departments in con¬ nection with existing institutions. The effect of the national policy, joined to liberal State ap¬ propriations, was the creation of ˆffhe most com¬ prehensive university foundation the world has ever seenˆˆ in the newer Western States. The annual appropriation of several exceeds $1,000,- 000 each for current expenses. In some States the proceeds of a permanent mill-tax assures a fixed minimum of income. Generally no tuition fee is charged residents of the State, in no case is the fee more than nominal except for pro¬ fessional study. These institutions are coedu¬ cational. Of the 100,000 women attending colleges and higher schools about 30,000 are in State universities. The State universities are maintained as an integral part of the State sys¬ tem of public schools and graduates of standard high schools are admitted

without examination. Thus the States provide a democratic system of education aiming to make available to each of its future citizens as complete a training as the mental equipment of each makes possible.

Recently the State universities have taken upon themselves much greater tasks. They have attempted to see to it that the expert knowledge of which they are the accredited custodians shall become embodied in the prac¬ tical affairs and industry of the State: that the current practice of agriculture shall apply the expert knowledge of the agricultural sciences ; that actual government shall embody the prin¬ ciples of political and social science ; that actual teaching shall embody the principles of peda¬ gogy and hygiene.

They further interpret their obligations to the State to include not only the student body in the university but all residents of the State with intellectual interests and aptitudes. The attempt is made to extend the university over the entire State and carry knowledge directly to the peoplfe. University centres are organized • wherever a sufiicient number of people can be interested and instruction and lectures are given far from the campus by members of the university staff. Instruction is given by cor¬ respondence and an information service is op¬ erated by which any resident may consult the experts of the university in reference to his practical difficulties. The intelligent discussion of public questions is fostered, music, pageants and libraries are made available to any com¬ munity.

Recently ^^surveys® have been made of several State universities. A survey is a thorough¬ going but sympathetic and constructive exami¬ nation of the equipment, administration, stand¬ ards, methods and ideals of the institution to determine the relative efficiency of its organiza¬ tion, the value of its service to the community and the potency of its ideals. Surveys may at times degenerate into ^investigations, but when true to their mission are practical and con¬ structive. The State universities investigated not only have stood fairly well the test of the

searching examination of the survey experts, but have been quick to adopt their suggestions for securing a greater «return» from the edu¬ cational plant. A survey may extend to the entire educational

resources of a State, and sug¬ gest a new alignment of educational institu¬ tions.

The Municipal University. — A type of college of recent development, akin in spirit to the State university, is the municipal uni¬ versity. The most conspicuous and purest ex¬ amples are the College of the City of New York and the University of Cincinnati. The College of the City of New York was organized as an Academy or College^^ ‘in 1847. Under the presidency of John H. Finley it was de¬ veloped into a great institution of collegiate standards supported by direct appropriation from the municipality. Nearly $6,000,000 was appropriated for new buildings, grounds and equipment and the annual appropriations are over $600,000. The college is distinctly city minded, and takes as its chief function the task of producing a higher type of citizen for the great city-state.

The University of Cincinnati is organized more closely after the pattern of the new State university. Its relation to the city government is very close. The political science department of the university conducts a municipal refer¬ ence bureau in the city hall ; the college for teachers uses the public schools for the train¬ ing of students and cooperates with the su¬ perintendent of schools in the supervision of teachers and in investigations and reports. The department of psychology cooperates with the schools in the study of backward children. The department of social science cooperates with the city department of charities and the courts. The college of medicine conducts a free dis¬ pensary, maintains milk supply stations and sends out visiting nurses. It also conducts the laboratory of pathology of the City Hospital. The engineering college conducts a city testing bureau and coOperates with the various city departments doing engineering work. These are a few typical cooperative activities. Stu¬ dents study in the university and do practical paid work in city departments and manufac¬ turing plants in alternate weeks. Eighty-five per cent of the men and 30 per cent of the women earn the whole or part of their own support. They participate in the things they are studying. The university conducts evening and external courses, and makes eveiy effort to reach the larger number of men and women who but for the university would be debarred from an adequate education.

The rapid growth of city universities is evi¬ denced by the organization in 1914 of a na¬ tional association of urban universities consist¬ ing of 14 institutions. Seven of these are properly public municipal colleges.

There are now nearly 100 State and munici¬ pal colleges and

universities. In them are edu¬ cated approximately 40 per cent of the college and professional students of the United States. Sixty per cent still attend colleges of private foundation, of which there are 4/4 offering in¬ struction of college grade or higher as meas¬ ured by the United States Bureau of Educa¬ tion.

European Influence. — The evolution of the

college of private foundation has been as phe¬ nomenal as the evolution of the State university. The colonial college has developed into the modern university chiefly under European in¬ fluence. German influence in American higher education began with George Ticknor, Edward Everett and George Bancroft who were stu¬ dents at Gottingen early in the 19th century. They were followed by an increasing number of American students who pursued advanced studies at the great universities, especially at Berlin, Gottingen and Leipzig. On their re¬ turn to America these men introduced the new methods of research into their advanced classes and through the influence of their students profoundly affected the methods, structure and ideals of the American university. The lecture system was developed. Productive scholarship became the common aim. The University of Michigan was remodeled in 1852 on the conti¬ nental plan. Johns Hopkins was in its funda¬ mental ideas founded on foreign practice and many of its professors were foreign trained. It was primarily a graduate school devoted to the development of research and publication, in science, history and medicine.

Organization and Work. — The chief marks of a complete university are (1) that it is a place of universal studies representing the en¬ tire field of knowledge; (2) that it is devoted primarily to research or the training of men for research from which follows (3) that it is de¬ voted largely to experimentation and the elab¬ oration of methods of research and the tech¬ nique of the science; (4) that it offers the high¬ est possible training for the great professions, law, medicine, theology and engineering. The university thus becomes a ˆAentre of free in¬ quiry, a ˆ'ˆseat of true learning, a place where ˆffhought is freed from all fetters,ˆˆ where ˆflife takes cognizance of science to the advancement of both.ˆˆ

The international character of the higher learning is reflected in the development of in¬ ternational exchange of professors. Harvard and Berlin entered into such reciprocal relat¬ ions in 1904. Harvard and the Sorbonne be¬ gan a similar exchange in 1911, followed by Columbia and Berlin and The University of Chicago and Gottingen.

®On the maintenance of the university,® says Daniel Gilman, former president of Johns Hop¬ kins University, ^^modern civilization depends. No tradition, no dogma, no hypothesis and no theory can escape from scrutiny, and none can long survive if it is found to rest upon false premises, imperfect knowledge or fallacious rea¬ soning. The universities are the discoverers and explorers of new domains. They are the modern judges of the world. The very proc¬ esses they employ in ascertaining the truth are favorable to the development of critics and the education of acute and independent intellects… . Rare minds will first perceive the truths,

and then will teach others. In due time the advanced positions of the philosophers and scholars will be occupied by the multitude and onward will go the forces of the universities to make new conquests in the dark continents of ignorance and uncertainty till there are no new fields to conquer.®

The Association of American Universities represents fairly those institutions that have

approached to the requisite facilities for univer¬ sal studies and the advancement of learning. The Association includes 22 institutions, one-half of which are State universities. The uni¬ versities of private foundation holding mem¬ bership are Johns Hopkins, Columbia, Harvard, Cornell, Chicago, Yale, University of Pennsyl¬ vania, Princeton, Leland Stanford, Clark and the Catholic University of America. These great endowed universities make and maintain the highest intellectual and scientific standards of the present. The higher degrees granted by the universities are usually the M.A. degree and the Ph.D. degree. The M.A. degree usually rep¬ resents one year of

graduate work and passing of a general examination and the writing of a brief thesis. The Ph.D. degree represents three or more years of graduate study, one, at least in residence, the passing of an extended exam¬ ination and the writing of a dissertation based on individual research and constituting a con¬ tribution to knowledge. In 1861 the first doc¬ torate was conferred; in 1914 over 500.

The richer private institutions have es¬ tablished numerous scholarships and fellowships. In this policy they have been influenced by the desire to make the private college a real democ¬ racy of talent as the State universities do by free tuition. The University of Chicago reports over 1,000 scholarships and fellowships, Yale over 400, Harvard 600, the University of Penn¬ sylvania nearly 700. The State of New York has established a comprehensive system of State scholarships, yielding each $100 for four years in the approved colleges of the State, awarded to those who obtain the college-entrance diploma with highest rank. Seven hundred and fifty scholarships are awarded each year, making 3,000 in force, at a cost to the State of $300,000 a year. The motive in this important legis¬ lation is the same that influenced the Western States in the establishment of State universi¬ ties.

The general establishment of graduate and professional schools has placed the college proper in a position of real danger. The develop¬ ment of the university has complicated its prob¬ lem and confused its status. Many colleges are in organization not colleges but low grade uni¬ versities. Properly speaking the college has its place between the high school and the graduate university or higher professional school. It may be an independent institution or one of the several schools forming a university group. A college of standard grade requires for admis¬ sion the equivalent of eight years' elementary school work and four years of high school work. It requires for the bachelor's degree a four-year course or its equivalent. This brings the normal student to the higher professional school or graduate school at an age of 22 or 23, and delays the practice of his profession to the age of 26 or 27. There has been constant com¬ plaint of the length of the educational sequence and repeated efforts have been made to save time somewhere in the process. Differentiation between a junior college and senior college, by which college work may be ultimately limited to two years and university work begun in the senior college, is an interesting experiment. A three-year college course has been tried, and in some institutions a system of ^^combined® courses permits professional work in the fourth college year, but defers the granting of the

bachelor's degree until the end of the fourth 3ˆear.

Course of Study. — The influence of the university has operated to introduce into the college a greatly modified curriculum. Until 1870 most colleges provided a four-year course of prescribed studies. So rapid was the growth of the sciences, natural, social, political and applied, as well as history and philology, that the old course of study did not serve to orient the student into the modern world of thought. The problem was met by the multiplication of courses, the multiplication of professors and instructors and the introduction of a greater or less liberty of election between courses. The larger colleges offered in 1914 10 or perhaps 20 different courses for every one offered in 1875. The extreme elective system is generally recognized to have been a failure in the college as it has been a success in the university. The present tendency is to prescribe those subjects which are regarded as essential to a liberal edu¬ cation, to permit election between groups of related courses rather than between individual courses and chiefly in the last two years of the college course. Much has been done to intro¬ duce a greater degree of unity, continuity, breadth and system into the curriculum. A promising venture was the establishment of the perceptorial system at Princeton and since adopted in part by a number of colleges. The preceptors enter into close relationship with small groups of students, guide their reading, give personal attention to their difficulties and are able to influence their choice of studies from personal knowledge of individual aptitudes and' deficiencies. Honors courses are provided in some colleges for students desiring to attain high rank in carefully selected sequences of courses. A general examination is sometimes substituted for term examinations and tests a more permanent deposit of knowledge.

The position of the college, however, is not yet secure. Its final articulation with the high school below and the graduate and professional school above has not been finall}'ˆ determined. That it is destined to have a permanent place in the educational system seems certain, and the solution of the crucial time problem may come with a real unification of the educational proc¬ ess now arbitrarily divided into four distinct and different educational stages and four types of schools, elementary, secondary, college and university.

Professional and Technical Schools. — There is space but for a few brief sentences concern¬ ing the professional and technical schools. Dur¬ ing the colonial period many American-born lawyers sought a

legal education in the English inns of the court. Equal interest in jurispru¬ dence was not manifested after the Revolution for even the great ability of James Kent failed to attract students to Columbia University aHer his first year of service in 1794. The Harvard Law School was not successful until Justice Joseph Story in 1830 lent the enterprise the influence of his great name. Not until after 1890 was it firmly established that the appren¬ ticeship system of legal education was inade¬ quate to the increasing volume and complexity of the law, and that adequate preparation could be had only in the better law schools connected with the large universities. There are now ap¬ proximately 122 law schools with over 20,000

students. Not more than one in four of these students has taken a college degree, although many have had the one or two or three years required for admission by some of the better schools.

Medical education did not attain a high standard until the founding of the medical school of Johns Hopkins University in 1893. There are now about 100 medical schools with about 17,000 students, of whom approximately one in six hold collegiate degrees. The course is usually four years. The efforts of the Car¬ negie Foundation and other institutions to raise the minirnum standard of medical education has resulted in a considerable decrease in the total number of medical colleges and of medical students. Some of the weakest institutions have been eliminated. In 1900 there were over 150 medical schools; in 1914, 100. In 1900 there were 25,000 students; in 1914 not quite 17,000. In addition there are 50 schools of dentistry with about 9,000 students; 72 schools of phar¬ macy, with nearly 6,000 students, and of more recent establishment 1,250 schools for nurses with 36,000 students. The theological faculty is not as generally developed in the American university as in the German, but schools of theology abound. In 1914 there were 176 theo¬ logical schools with 11,000 students and nearly 2,000 graduates annually. Less than 50 were integral parts of colleges and universities. About half the schools require a college degree for admission, and the length of the course is

usually three years.

Education in engineering begins with the foundation of Rensselaer Polytechnic Institute in 1824. The creation of the Lawrence Scientific School in 1847 at Harvard and Sheffield Scien¬ tific School at Yale a little later brought a much higher standard. The influence of the National Land Grant Law in 1862 on engineering educa¬ tion was profound. Able schools are connected with most of the larger State universities. The leading school is the Massachusetts Institute of Technology affiliated with Harvard University. Most technical schools require four years of residence and grant degrees of like time-value with the B.A. and B.S. degree.

There are more than 200 public training schools and colleges for teachers with over 90,000 students, but in only a few of the States are the requirements for admission sufficiently high to permit their classification as of college or university grade. In addition there are 46 private normal schools with nearly 6,000 stu¬ dents and a few teachers' colleges of high grade, of which the most notable are at Columbia University and at the University of Chicago. The rapid advance in the application of peda¬ gogical principles to educational practice is due in considerable part to these teachers' colleges.

The deep popular interest in higher educa¬ tion has tangible expression in private gifts to various institutions. In the decade from 1890-1900 an amount was given equal to the entire estimated value of the college property and productive funds in 1890, or $115,500,000. In 1914 gifts from private sources aggregated $31,- 357,398. Nearly $600,000,000 have been given since 1870.

Mention has been made of the fact that State universities are almost universallˆ co¬ educational. Most of the colleges of private foundation in the Central and Western States

also admit women in equal terms with men. Oberlin Collegiate Institute, now Oberlin Col¬ lege, admitted women from its opening in 1833. In the Eastern and Southern States colleges for women grew from the female seminaries founded in large numbers before the Civil War. Elmira College in New York was the first insti¬ tution for women to receive a college charter in 1855. Vassar began a notable history in 1865. Wellesley received recognition as of college grade in 1877. Smith College opened in 1875. There were in 1915 nearly 19,000 undergradu¬ ates attending women's colleges.

The problem of military education has fre¬ quently demanded the attention of the Congress, the colleges and the people of the United States. Out of the experience of the Revolutionary War and the recommendation of Washington came the military academy at West Point, founded in 1802, now a college and engineering school of the highest type for the training of officers for the United States army. The Naval Academy at Annapolis, founded in 1845 by George Bancroft, the historian, performs a like purpose for naval officers. The number of cadets is strictly limited by Congressional and Presidential appointment. The present law (1916) provides for the designation of three midshipmen to each member and delegate of Congress, and in addition 10 at large and 15 from the enlisted men of the navy to the Naval Academy. Appointment to West Point will be on the basis of two cadets to each member and delegate of Congress, four from each State at large, 80 from the United States at large. The President may appoint, in addition, not to ex¬ ceed 180, from the enlisted men in the army. The government maintains in addition a num¬ ber of special military schools for the training of soldiers in various branches of the service.

Out of the early experience of the Civil War came the provision of the Morrill act re¬ quiring military drill at the ®land-grant colleges.^^ The National Defense Act of 1916 reorganized the provisions for military education at the State universities and agricultural col¬ leges. Reserve officers liable for service in case of war are to be trained in reserve officers' training corps units by United States army offi¬ cers detailed as professors of military science and tactics. Adequate instruction in military science as part of the regular course of study is provided. The college training is supplemented by the six weeks' summer training camps con¬ ducted by the War Department. Similar pro¬ vision is made for private colleges which agree to maintain at least a two-year course of mili¬ tary training. College regiments or batteries exist at many universities either as independent organizations or as units of the State militia. The demand for more adequate recognition of military science and military practice by the colleges has its origin largely in the student body and is receiving much attention from the college faculties. The introduction of an ele¬ ment of military discipline into the free life of the college is looked upon with favor by many college presidents.

In the history of higher education in Amer¬ ica the first 15 years of the present century represent an area of criticism and reconstruc¬ tion. Out of this era our universities and col¬ leges emerge confident, potent, alert, with a quickened sense of their high responsibilities, a

‘clearer vision of their mission and an immensely increased knowledge of educational methods. A new world epoch in educational history will doubtless begin with the close of the European War. What the characteristics of the new epoch will be no one can foretell, but it is a reason for confidence that America can enter the new era with great universities and noble colleges re¬ shaped and strengthened by 15 years of thought¬ ful self-examination and wise experimentation.

Bibliography. — Angell, J. B., ˆSelected Addressesˆ (New York 1912) ; Association of American Universities, ˆProceedings of the An¬ nual Conferencesˆ (Cambridge) ; Blackmar, F. W., ˆHistory of Federal and State Aid to Higher Education in the United Statesˆ (United States Bureau of Education, Circulars, 1890, No. 1, Washington 1890) ; Boone, R. J., ˆEducation in the United Statesˆ (New York 1894) ; Butler, N. M., ed., ˆEducation in the United States,ˆ includes ˆThe American College,ˆ by A. F. West, ˆThe American Universityˆ by E. D. Perry (New York 1910) ; Cattell, J. M., ˆUni¬ versity ControP (New York 1913) ; Dexter, E. G., ˆHistory of Education in the United Statesˆ (Part II, Higher and Special Educa¬ tion, New York 1904) ; Draper, A. S., ˆAmer¬ ican Educationˆ (Boston 1909) ; Flexner, A., ‘The American College: A Criticismˆ (New York 1908) ; Foster, W. T., ‘Administration of the College Curriculumˆ (Boston 1911) ; Gil¬ man, D. C., ‘University Problems in the United Statesˆ (New York 1898) ; Harper, W. R., ‘The Trend in Higher Educationˆ (Chicago 1905) ; Kingsley, C. D., ‘College Entrance Require¬ mentsˆ (United States Bureau of Education, 1913, No. 4, Washington 1913) ; MacLean, G. E., ‘Present Standards of Higher Education in the United Statesˆ (United States Bureau of Edu¬ cation, 1913, No. 4, Washington 1913) ; National Association of State Universities in the United States of America, ‘Annual Transactions and Proceedingsˆ ; Risk, R. K., ‘America at Col¬ legeˆ (London 1908) ; Snow, L. F., ‘College Curriculum in the United Statesˆ (New York 1907) ; Thwing, C. F., ‘History of Higher Edu¬ cation in Americaˆ (New York 1906), ‘College Administrationˆ (New York 1900) and ‘The American College, what it is and what it may becomeˆ (New York 1914) ; United States-Bureau of Education,

‘Annual Reportsˆ (Vol. I, 1867-68 date, Washington) ; United States Bureau of Education, ‘Contributions to Ameri¬ can Educational Historyˆ (edited by Herbert B. Adams, written by various authors. Nos. 1-36, 1887-1903, Washington) ; West, A. F., ‘Short Papers on American Liberal Educationˆ (New York 1907).

Frank L. Tolman, New York State Library, Albany, N.

EDUCATION, History of. The history of education begins with primitive man — in fact even with the lower animals, for any trainings which is given by one being to another to en¬ able it to do something better than it would otherwise be able to do may be designated edu¬ cation. We rnight distinguish between the edu¬ cation which is given by animals, which is in¬ stinctive, and that which is given by human be¬ ings, which is partly instinctive and partly con¬ sciously and deliberately worked out into a system.

The earliest system, if it may be called suchj.

that of primitive man, had, perhaps very much of it instinctively, as its end the object of teaching others, particularly the young, meth¬ ods of protection from enemies and of obtain¬ ing food, clothing and shelter. In other words, savage education adapted itself to the immedi¬ ate needs of life. To estimate how widely it extended itself along such lines one only has to think of the actually widely extended domain of savage activity: the making of arms, boats, clothing, huts, the manufacture of articles used in the catching and preparation of food, fish¬ hooks, spears, traps and pottery of all sorts.

From the first times of which we know anything, considerable attention was given by primitive man to self-adornment, sometimes with a sex motive, at others with motives of protection and religious belief. The training given in making gaudy articles of decoration did not have that close relationship to the most immediate needs of life, and thus almost at the beginning of things education was unconsciously divided into training for the doing of those things which were useful and those which we may denominate as luxuries or superfluous — though where one merges into the other it is difficult to determine.

As man progressed from his extreme sim¬ plicity, and great industrial changes gradually took place, such as came with the domestica¬ tion of animals and the discovery of agricul¬ ture, new things for which

training or educa¬ tion was to be given arose. The more com¬ plex civilization has become, the more numer¬ ous have become the various elements for which the individuals have had to be trained, and thus every educational or training system should have adapted itself to the needs of the civilization in which it was existing. The nat¬ ural conservatism of man has, however, as his¬ tory shows, led him frequently to cling to an educational system adapted to earlier ages.

The influence of religion among all early peoples was so great that those of the commu¬ nity into whose hands the religious ceremonies gradually fell exercised an enormous influence. Training for their particular class became an end in itself and those who succeeded in becom¬ ing members not only determined the training which future entrants should have, but also by virtue of the peculiar influence of their profes¬ sion succeeded in influencing all other training given — even for ends other than religion.

So powerful has been the influence of re¬ ligion on education that beginning with the earliest people, of whose history we know much, the Egyptians, it continued to be the dominantly determining and usually reactionary and conservative factor right down through the middle of the 19th century, in a measure ac¬ counting for the fact that systems of education have so frequently lagged far behind the de¬ mands of civilization, and have given a training in one century of a sort adapted to a condition of man's development of some centuries before.

The earliest teachers were with primitive peoples the parents, and they continued to be a very large factor in all ages. The professional teacher, however, had already come into exist¬ ence at the dawn of history in Egypt. The priests were the most important of them, though there were man}ˆ private teachers for teaching practical trades and professions. The methods employed in teaching were those largely of mem-

orizing and imitation. Writing by the stylus on wood or with ink on

papjˆrus was taught as was always reading and numbers. The disci¬ pline was severe, corporal punishment resorted to and the teacher held in respect.

Variations of the system in vogue among the Egyptians were to be found among the Chinese and Hindus. The Semitic peoples — the Babylonians, Assyrians, Hebrews, Phcenicians, showed less rigidity and fixity in their systems, probably due to less attention to caste in the social organization than was the case with the former peoples. The studies given were reading, writing, arithmetic, history, re¬ ligion, psalms, domestic arts, music, dancing and trades. Law, ethics, astronomy and geog¬ raphy were studied by those who went above the ordinary trades and went into the profes¬ sions. The teaching was dominated by the priests and they exercised, a restraining influ¬ ence on that breadth of education which might have come from bringing in Greek and Roman methods.

The history of Greek education extended over many centuries and during that time the educational system, beginning in Homeric times and closing with the Roman conquest, under¬ went many changes in ideals and content. Even over the period when the Greek world was su¬ preme there were within its boundaries states that had very divergent systems of education. The two extremes are usually represented by Athens and Sparta and the difference between their educational ideals may be in a measure ac¬ counted for by differences in tribe and environ¬ ment. The Athenians, sprung from the lonians, were highly imaginative, artistic and literary. The Spartans, sprung from the Dorians, were lacking in imagination, were extremely prac¬ tical and highly military. The former lived near the sea and in their maritime trade got a breadth of view and culture by trading with foreign nations, while the latter lived in the in¬ terior surrounded by their mountains, cut off from the broadening influence of contact with others. The educational ideal of the Athe¬ nians therefore came to be that of leading a complete life, beautifully and happily. The in¬ dividual and his opinion were made much of. Ever with the idea of beauty in mind the young were taught grammar, poetry, style, oratory, rhetoric, music, mathematics, physics, econom¬ ics and politics. The teachers, who were more or less free lances, overdeveloped themselves in their individualism and brought their pupils up to be unduly forward and disputatious and lacking in reverence for the state and religion.

In Sparta the ideal was to develop strength, courage and obedience — to subordinate the in¬ dividual to the state. Much less stress was laid on the literary and the artistic. To accomplish this ideal the state was

turned into a military school, and each citizen was trained accordingly. As the individual was not trained as such he was lacking in moral force.

It was from Athens rather than Sparta then that the first greatest teachers and writers on educational systems and theories came : rates, Xenophon, Plato and Aristotle, and probably no four men from any one people have exercised greater influence on educational historv than these.

The Romans by nature were much more similar to the Spartans than to the Athenians.

Their early educational work was very practical and centred in the home in which the father was the dominating and all-powerful factor. Training was thus given in the Laws of the Twelve Tables, in business, farming, civic du¬ ties, reading, writing and arithmetic. Girls re¬ ceived instruction in household duties.

After the conquest of the Greeks by the Romans the former began to exert a powerful influence on Roman education. Greek teachers came over in large numbers and the former purely practical education of the Romans be¬ gan to take on a literary and artistic turn. The study of Greek prose and poetry was introduced even for the younger children, and in the higher schools training in history and science, philosophy, oratory, declamation and debate was given. Rome like Athens produced some profound students of education, the most im¬ portant being Cicero, Seneca and Quintilian. Schools were multiplied and state support widely and generously given. With the incom¬ ing of the barbarian Teutonic hordes from the north and the disruption of the Roman Empire, the culture and the educational work of the Greeks and Romans largely disappeared. Edu¬ cation suffered a shock from which it did not recojver for centuries and the world had in a way to begin all over-again.

The Church assumed leadership not only in matters of religion but also in matters of state. For a time very little could be done about gen¬ eral education. As the ideal of life was ascetic and all things which pertained to man's life on this earth looked down upon, the education which was given was, in the ideal at least, to prepare men for the life to come. In the mon¬ asteries, where such teaching as was

given was carried on, time was devoted to prayer and con¬ templation. The past was revered for its spiritual and religious teachings and books con¬ taining them were carefully copied. To this end largely the novices were taught reading, writing, singing, the church service and a little arithmetic. Then they were given the trivium (grammar, rhetoric and dialectic or. logic) and the quadrivium (arithmetic, geometry, astron¬ omy and music) which made up the Seven Lib¬ eral Arts.

Though some outside of the religious order might enjoy the privileges of this education, the chief object of all of this instruction was reli¬ gious. Even the attempts of Charlemagne in his Palatine School under the headship of Al-cuin could not make the educational ideal very-different. After his death as during his life the only educated class was the clergy. The people generally and even the nobility received very little education in the ordinary acceptance of the term in ancient and modern times.

Such training of the noble classes as was given that might be called educational is to be described under the title of chivalry. A youth was trained as a page in attendance on a knight or lady, was given some instruction in music and poetry, and taught how to play chess. Later as a squire he was given rnilitary training and instruction in hunting, riding, jousting, swimming, religion and singing. As a knight he was taught ethics, to practise-the virtues, to defend the Church and protect women. * See Chivalry; Ethics.

Out of the monastic schools there grew up a certain type of scholarship known as scholas-

ticism (q.v.), wh9se object was to use Greek knowledge for religious ends. Great stress was laid by its devotees on dialectics, the object of which study became not to discover new but to prove old truths. Aristotle and his works be¬ came to these students the chief source of knowledge.

During the 11th, 12th and 13th centuries there was a remarkable growth of cities, due to the activities of the artisan and commercial classes. These people were organized into trade and merchant guilds and it became the object of each guild to have its prospective members educated. The guilds employed teach¬ ers, usually drawn from the clergy, to give the children of members instruction in reading, writing, arithmetic. Even the cities as char¬ tered bodies established schools for the same purposes. In each of the guilds there was a system of teaching boys a trade by the system of apprenticeship.

Toward the end of the 11th century and dur¬ ing the course of the 12th, universities began to grow. At first these were groups of students banded together for a common purpose, such as the study of medicine at Salerno or for law at Bologna. In Paris the university grew out of a school attached to the cathedral and was an organization of masters or teachers. The instruction there was at first mainly in theology. A university in our sense, with a large plant and numerous buildings, these were not. The students met for lectures in private houses or rented halls.

During the Middle Ages art, love of beauty, literature, poetry, science thrived as contribu¬ tions to the support of religion and the Church. One important result of the Crusades (q.v.) was that they broadened men's minds, and sub¬ jects of study which had been formerly con¬ demned because of the influence of the Church and the clergy came to be taught during the Renaissance. The study of the Greek and Latin languages for the knowledge of the lit¬ erature and wealth of learning which the Greeks and Romans had was revived. The de¬ velopment of the individual became an object. The Church ceased to be everything and the men now thought of fame and glory for them¬ selves. Teaching still remained in the hands of the clergy, but the subject matter of in¬ struction was broadened. These Renaissance teachers in their turn fell into narrow ways and came to emphasize linguistic training to the exclusion of physical, social, artistic and scien¬ tific elements. Petrarch was such a teacher, whereas his fellow countryman,ˆ Vittorino da Feltre, emphasized history and civilization.

The Reformation and Counter-Reformation (qq.v.) brought about considerable changes in education as well as in religion. Luther and Melanchthon both demanded that education should be provided for all and that the state should maintain and control the schools and see that children attended them. ˆ Thus the idea of compulsory education was initiated. Stress was laid on teaching the vernacular, on pro¬ viding simple instruction in the elementary schools to meet the immediate needs of the people. In the secondary schools, or Latin

schools as they are called in England, instruc¬ tion was given in the classics, history, mathe¬ matics, grammar, rhetoric, logic, music and gymnastics. Though in theory these schools

were to supply leaders of thought, in practice they became preparatory schools for the univer¬ sities, whose main object was the preparation of teachers and ministers. The liberalism in education which was at first promised by the Renaissance failed to materialize during the Reformation and education took on the form of supporting the various sects which had grown up after the revolt from Roman Cathol¬ icism. Corresponding to the Protestant schools were those of the Jesuits whose insistence on thoroughness and on well-trained teachers has become proverbial.

During the last half of the 16th and the whole of the 17th century this religious control and formalism dominated education. In con¬ tent the curriculum was humanistic, but in spirit it was almost as ascetic and scholastic as in the Middle Ages.

This kind of education met with protests from certain scholars like Rabelais, Milton, Montaigne and Sir Francis Bacon, who have been denominated realists because they insisted on the study of thought and substance in lit¬ erature, instead of the words and grammar, and on the study of nature, law, arts and trades by means of actual observation. The curriculum of studies, however, still remained literary and linguistic and this met with little opposition. The object of its supporters came to be to jus¬ tify it and this they did through the theory of formal discipline, so well enunciated by the Englishman, John Locke. According to him it is not so much what is learned as how it is learned. The value to the pupil is in the dis¬ cipline obtained in the process of learning.

The stiffness and formalism which had held sway in religion and education for so many centuries led, in the 18th, to a revolt best il¬ lustrated by Rousseau. His was a cry ®back to nature® — to doing things in a natural way — to permitting the development of a child ac¬ cording to its nature.

The influence of Rousseau was not immedi¬ ate, but it left an indelible impression on the educational progress of the 19th century. Formalism gradually gave way to a natural treatment of the child and training was adapted to age and individuality. Following him came ; Pestalozzi, who preached that in order to give proper education the

psychology of the pupil taught must be studied and his needs, interests and abilities taken into consideration; Herbart, who emphasized the importance of education as a science and of the proper training of teachers to teach ; Froebel, who was responsible for the establishment of the kindergarten and the development of the ideas that self-activity, initiative and individuality are important ends of education.

In the 19th century there has been a steady if slow development toward the theory that the proper education is that which enables the stu¬ dent to turn that which he acquires by learn¬ ing to immediate use — that mental power is best developed by learning those things which are of most use in life. Herbert Spencer was the best exponent of this ®turn to use® educa¬ tion. Children should be taught those subjects which will enable them to earn a livelihood and be good citizens. His influence was responsible for bringing science into the school curricula and for an attack on the formal discipline the¬ ories of Locke.

Down to the 19th century education had been generally considered from the point of view of the individual. The great growth in industries and in democracy during that cen¬ tury emphasized the need of educational sys¬ tems which should take into consideration the position of the individual in society. The indi¬ vidual must be educated mentally, physically and morally, and he must be trained for the professions, or the trades, or in agriculture or commerce, for if he is not he will in a way be a drag on society and the body politic. For such an education all means known must be placed at the disposal of the child and citizen : schools, elementary and secondary, manual and vocational, colleges, academic and technical. Nor is the question as to whether the indivi¬ dual shall take the education one for voluntary action. Society has the power and the right to compel him to get an education.

To justify its place in the curriculuni a study must be shown to have some immediate and practical relation to life. In the first quar¬ ter of

the 20th century a visit to our schools and colleges shows the extremely practical turn which education has taken. In addition to in¬ struction in the mother tongue, reading, writ¬ ing, arithmetic, geography, history and other subjects familiar in earlier centuries, are to be found an array of such subjects as woodwork, ironwork, cooking, sewing, printing, drawing, architecture, engineering of all kinds, agricul¬ ture, horticulture, forestry, dairying, book¬ keeping, business practice, civics, commercial law, stenography, typewriting, economics, banking, finance, transportation, insurance, so¬ ciology, carpentry, blacksmithing, molding, plumbing, machine-shop work, bricklaying, plastering, textile industries and many others. Thus the authorities in charge of public schools and universities have taken over many studies formerly left to private employers or agencies, and now by the establishment of playgrounds, nurseries, recreation centres, camps and many other activities are tending toward a control by the state in the interest of society which is cramping the freedom of action by the indi¬ vidual. The latest innovation advocated along such lines is that of compulsory military train¬ ing in a democracy like the United States. This has been brought about by the Great War which began in 1914. How far this sociological method in education will go only the future can tell. See Education, Theological; Relig¬ ious Education in the United States; Edu¬ cation, National Systems of; and related subj ects.

Bibliography. — ˆAspinwall, William B., ˆOut¬ lines of the History of Educationˆ ; Hall, G. Stanley, and Mansfield, John M., < Hints to¬ ward a Bibliography of Educationˆ ; Monroe, Will S., < Bibliography of Education > ; Monroe, Paul, textbook in the History of Educa¬ tionˆ ; Columbia University Library, books on education; Bibliography of education in the Education Review 1899-1907, continued by the Bureau of Education annually 1907-11 and monthly 1912-18.

James Sullivan,

State Historian, The State Education Depart¬ ment, Albany, N. Y.

EDUCATION, Indian. See Indian, Edu¬ cation OF,

EDUCATION, Industrial. Industrial edu¬ cation aims directly at training men and women, both youths above 14 years of age and adults, for progressively intelligent, skilful and eco¬ nomic production of food, clothing luxuries, machinery, structures and all the conveniences of life. It is distinguished from ordinary ele¬ mentary or

secondary education and from technical education by the fact that its purposes and methods are primarily dictated by the need for increased production through developed skill and experience, rather than by a desire to add breadth or culture to the future citizen and producer. Its organization in the United States is very recent and still incomplete and unsystematized.

In a century the United States has changed from a country of less than 10,000,000 people, essentially agricultural, in 1820, to a complex industrial and agricultural nation of 110,000,000, with unmeasured resources. With the develop¬ ment of a complicated factory system of pro¬ duction, machines took the place of much skilled hand labor, and the old apprentice system for training workers broke down. The sub¬ stitution of school instruction for the former shop methods of training young workers in this country grew up slowly and uncertainly, lagging far behind European provisions for in¬ dustrial training. The demand for some form of industrial education was expressed very early in the period of the ˆ“industrial revolu¬ tion® in the United States, in fact before the end of the first quarter of the 19th century. But up to 1860 not more than four schools were giving instruction in applied science and two in agriculture. (See Education, Agricultural). The movement which led to the founding of Rensselaer Polytechnic Institute (q.v.) in 1824 was later supplemented by the beginnings of agricultural education in the foundation of in¬ stitutions like the Michigan Agricultural Col¬ lege (1857) and the “Illinois Industrial Univer¬ sity® (now the University of Illinois), The latter was the result of agitations of the Illinois Industrial League between 1850 and 1860 for the purpose of “bringing education home to the people of the State — -the great industrial classes® or, in more concise terms, to produce “thinking laborers® rather than “laborious thinkers.® The passage of the great Morrill act in 1862, which stands to-day as the most im¬ portant Federal legislation affecting education, provided Federal aid to the States “for the en¬ dowment, support and maintenance of at least one college whose leading object shall be … to teach such branches of learning as are related to agriculture and the mechanic arts … in order to promote the liberal and practical educa¬ tion of the industrial classes in the several pursuits and professions of life,® and gave the movement for industrial and technical educa¬ tion its greatest impetus.

While nearly all of the 51 institutions, not exclusively for colored students, which receive aid as land grant colleges, started with the idea of preparing young men and women for agri¬ cultural and mechanical industries, they de¬ veloped, during the 30 years between 1870 and 1900, into technical, rather than industrial, in¬ stitutions

training men for engineering or technological professions. On the other hand the 16 institutions exclusively for colored

students still devote their energies mainly to literary instruction and to training in both agri¬ culture and the mechanic arts and not at all to technical education.

Along with this evolution of the aim and organization of the land grant institutions, many experiments in industrial education for both men and women were tried in a great variety of schools and courses which were de¬ signed to fit students for immediate betterment of their condition as wage earners and inde¬ pendent producers. Both technical and indus¬ trial types of education were at first considered as competitors with the general or liberalizing education of the elementary or secondary schools; both suffered from the lack of spe¬ cially trained teachers and of a body of organ¬ ized and tested materials for instruction. The ne¬ cessity for using teachers trained in the old order caused many a failure but ultimately both types have been recognized as auxiliaries or supplements, not rivals, to the older types of schools and both now receive liberal support on the same basis, namely, the common differenti¬ ated service of the whole community in the promotion of an industrial efficiency in America equal to the best in Europe without class dis¬ tinction and without closing the door of oppor¬ tunity to any student.

The centennial exhibition of 1876, especially the Russian exhibit, stimulated the introduction of manual training or manual arts into the elementary and secondary public schools of the United States. (See Manual Training). The object of this form of education, however, was not the production of marketable material, but the training of the pupil's hand and eye, as well as his brain, as vitally related to his full per¬ sonal development. But the demands of the in¬ dustries in a rapidly expanding, competitive order, which was no longer provided with an apprenticeship system, could not be met by this form of training, and institutions sprang up to provide various forms of special training for vocations like agriculture, carpentry, cooking,

ironworking, machine work, painting, plumbing and stenography. By 1900, 144 manual and in¬ dustrial training schools reported to the United States Bureau of Education from 38 States and Territories showing 41,736 pupils under in¬ struction. From 1900 to 1917 the number of schools devoted primarily to industrial and trade education greatly increased, both through tax-support and through private foundation on a generous scale, for example, the Dunwoody be¬ quest of approximately $3,000,000 for the Dunwoody Institute for free instruction in indus¬ trial and mechanic arts for the youth of Minneapolis and Minnesota, a worthy successor in the long line in which Girard College (q.v.) was a pioneer. In 1917 public and private high schools to the number of 2,610 reported 130,734 students in technical and manual training courses. Three thousand five hundred and ninety schools reported 260,413 students in com¬ mercial courses and 145,727 students in courses in domestic economy. In the same year, 912 private commercial schools or business colleges enrolled 192,388 students.

The following courses of instruction in Wentworth Institute opened in Boston in 1911 as a purely industrial, endowed school ˆTor the purpose of furnishing education in the me¬

chanical arts,'ˆ will illustrate the scope and method of an extremely and immediately prac¬ tical type of industrial education confined to building and manufacturing and to printing and graphic arts. Admission to the one-year day course is open to students 'ˆat least 16 years of age … thoroughly in earnesPˆ ; to the two-year day courses, to those who pass examina¬ tions in arithmetic and English. • One-year day courses are offered in carpentry and building, electric-wiring, plumbing, machine-work, pat¬ tern-making, foundry practice, forging, harden¬ ing and tempering. The weekly schedules for three terms in the course in machine-work calls for 20 hours of shop practice in machine-tool work, machine construction, bench-work and tool-making; 6 hours of mechanical drafting and blue-print reading; 9 hours of practical mechanics, materials of construction, power transmission, *etc.* ; 5 hours of practical mathe¬ matics, machine shop computations. The two-year day courses are for persons who wish to become master mechanics, foremen, etc., and provide instruction in machine construction and tool design, electrical construction, steam and electrical power plant practice, foundry manage¬ ment and operation, and architectural construc¬ tion. Evening shop courses are provided for persons employed during the day, and are selected from the list just given, together with tool-making, foundry chemistry and

advanced plumbing; evening technical courses are for persons employed in building and manufactur¬ ing industries and give instruction in practical mathematics, mechanical drawing, machine design, architectural drawing, architectural de¬ sign, practical mechanics, reinforced concrete and modern fireproof building, applied elec¬ tricity, care and operation of steam boilers and engineering. There are also day and evening courses in printing and graphic arts, including typographic printing and composition, block printing and etching. Similarly detailed curri¬ cula would be found in specialized schools in cities like Lowell, Mass., where textile industries predominate, and Scranton, Pa., in the mining region.

Another form of industrial education is found in the 101 State industrial schools, which reported in 1916 36,976 males and 9,567 female students learning some trade or occupation. Of the type wholly supported by the State are the Iowa Industrial School for Boys and the New Jersey State Home for Boys; of the coopera¬ tive type, privately managed but subsidized by the State, for the care and instruction of orphans and delinquents, is the Roman Catholic Home of the Good Shepherd in New York, in which girls are prepared for various occu¬ pations.

Still another important group of schools for industrial education is that for special groups or races, as schools for negroes and Indians. The increase of industrial facili¬ ties in colored schools, however, has not been equal to that in white institutions. Among the most notable of these industrial schools is the Hampton Normal and Agri¬ cultural Institute of Virginia, opened in 1868 under the great leadership of Gen. S. C. Armstrong for training of negroes in academic, industrial and agricultural subjects. The insti¬ tution has national recognition ^^as a pioneer in

the development of the educational value of manual labor and in the correlation of academic subjects with industrial training.^ An offshoot or imitator is the Tuskegee Normal and In¬ dustrial Institute of Alabama (q.v.), built up, under the leadership of Booker T.

Washington, from nothing to a plant and endowment worth $4,000,000, an attendance of nearly 1,400, and a teaching staff, all colored, of 184. These two have been followed in some degree by the 16 land grant schools for negroes and by more than 200 smaller institutions scattered all over the South. One hundred and sixty-three counties in Southern States provide county industrial teachers. Washington, D. C., Charleston, S. C. and Columbus, Ga., are the only cities which maintain industrial schools for negroes. Im¬ portant among the 109 boarding schools under Federal management, for the general and in¬ dustrial education of Indians, are the Indian In¬ dustrial School of Carlisle, Pa., The Haskell Institute of Lawrence, Kan., and Sherman Institute, Riverside, Cal., in all of which the industrial element is kept strongly predominant.

Other forms of industrial education in proc¬ ess of organization and standardization are the special schools, continuation schools and corporation schools for workers in service. The motto of these schools is ^^Learn while earning, and earn while learning.^^ They are conducted as day schools, evening schools or correspondence schools, frequently as parts of the public school system of cities, and have for their four objects (1) the advancement of the individual by special training for more techni-nal work, (2) the prolongation of the period of education for those who would otherwise not go to school at all, (3) the increased efficiency of the student in his present position, (4), the discovery for each student of the kind of work for which he is best fitted. The lower age limit for all of these schools is 14 years. The cooperation between school and employer takes varying forms. In some instances the student is detailed from his regular task to the school for certain hours on his employer's time; in other cases instruction is in the shop with the aid of a paid instructor in addition to the shop superintendent. In still others like the recent ^'vestibule schools^^ the employee is intensively trained for a brief period before admission to the regular service of the employer. Twenty-four big corporations in 1917 had special train¬ ing schools for men in preparation for service of the corporation, the largest of these schools being that of the General Electric Company, which admits 250 to 300 college men per year for a training period of 12 to 15 months. In a similar manner the American Bridge Company receives about 60 college men per year for a course in bridge engineering from one to two years in length. The Boardman Apprentice Shops, part of the public school system of New Haven, Conn., provides industrial education in cooperation with corporations in that city on a plan providing for eight hours of instruction per day, 5^/2 days per week, and 50 weeks of the year for a two-year period, approximately one-

quarter time being devoted to academic sub¬ jects and three-quarters to actual trade practice under the instruction of skilled mechanics for the production of salable articles. In some cases in this school, as in others, the boys in pairs alternate between school and the factory in

which they are employed, one working in the factory while the other is in school. The sig¬ nificance of this form of industrial education is attested by the formation of the National As¬ sociation of Corporation Schools in 1913, which had in 1917 104 company members, including such corporations as the Atchison, Topeka and Santa Fe Railway, which reported 37 rail¬ way shop schools for apprentices ; the American Telephone and Telegraph Company and the International Harvester Company.

The incorporation of industrial or vocational education into the State systems, with provision for State subsidies to vocational or industrial schools, had been provided for in 10 States in 1916: Massachusetts (Department of Vocational Education), New York (Division of Agricul¬ tural and Industrial Education), Connecticut (State Superintendent of Trade Education), Pennsylvania, Wisconsin, New Jersey, Indiana, California, New Mexico and Maine.

The movement for industrial education received its greatest recent reinforcement in the passage of the so-called Smith-Hughes Act of Congress, 23 Feb. 1917 ®to provide for the promotion of vocational education ; to provide for cooperation with the States in promotion of such education in agriculture and the trades and industries ; to provide for cooperation with the States in the preparation of teachers of vo¬ cational subjects,^^ which made an initial appro¬ priation in 1917 of $1,860,000 to be gradually increased to an annual grant of $7,367,000 after 1926. The allotments to the States for the various purposes of the act are made in the proportion which the rural, urban and total population of each State bears to the corre¬ sponding totals for the United States, the allot¬ ments to be administered through State boards in accordance with plans approved by the Federal Board for Vocational Education.

Bibliography. — Annual Reports of the Com¬ missioner of Education (especially chapters on Vocational Education®) ; Bulletins of Bureau of Education (especially 1916, No. 39, ®Negro Education,® 2 vols.) ; Bulletins of the Federal Board for Vocational Education (especially No. 1, “Statement of Policies®) ; Annual Reports of the National Society for the Promotion of In¬ dustrial Education ; The Report of the Com¬

mittee on Industrial Education, American Fed¬ eration of Labor (Sen. Doc. No. 36, 2d sess., 62d Congress, 1912) ; Reports of the meetings of the National Association of Corporation Schools.

Kendric C. Babcock,

Dean • of the College of Liberal Arts and Sciences, University of Illinois

EDUCATION, Junior High School. See

Junior High School.

EDUCATION, Kindergarten. See Kin¬ dergarten.

EDUCATION, Medical. See Medical Education.

EDUCATION, Moral. Instruction in morals, whether merely informally by parents or formally by teachers, dates from earliest antiquity. This is true largely because of the nature of the subject, for morals, strictly de¬ fined, comprise as subjects the customs (Latin mores), laws and precepts which have grown up among a tribe, people or race.

Out of this kind of moral instruction grew another which went beyond a content which had only included those things as moral which were customary. This new kind of teaching questioned certain moral standards which had grown up and, taking a more advanced ground than that which made mere custom determine a moral standard, declared that certain rules of conduct should be followed because they were better than custom. The determination of what was better was generally arrived at by the experience of realizing that a con¬ demned custom was detrimental to general physical or mental welfare.

Moral instruction along this higher plane became most prominent among the Hebrews and the Greeks, was carried on by the Romans and has continued down to our own day.

It was quite natural that from earliest times moral instruction should become closely interwoven with religion and the clergy. The latter as a class were the preservers of custom and the speculative philosophers on improve¬ ment. Great moral teachers other than the clergy did arise and brought about what were sometimes considered great revolutions in moral ideals, but generally throughout ancient and mediaeval times the dominating import¬ ance of religion and the priesthood made the religious organization the determining factor in moral instruction. Particularly in the Mid¬ dle Ages the close association of education with ecclesiastical institutions made the clergy the almost sole teachers of morals.

Beginning with the Renaissance and the Reformation there began to grow almost im¬ perceptibly and very gradually a separation between religion and education which has cul¬ minated in their practically absolute divorce in the public schools of France and the United States. In the course of this long movement moral instruction largely remained in the hands of the churches, as those in control of state-supported schools felt that because of the variety of religious sects no form of religion should be taught. The close connection hitherto existing between the teaching of reli¬ gion and the teaching of morals, and a feeling that the two were difficult to separate, were probably responsible for permitting the teach¬ ing of morals to drop out of state-supported institutions.

In countries like England and Prussia, where the church and state maintained and still maintain a close relationship, and the public schools are still strongly under the reli¬ gious influence of the Church, moral instruc¬ tion was continued. The tendency to drop it from the state-supported schools of the former country led in 1906 to the formation of the Committee on Moral Instruction and Training in Schools for work both in the United King¬ dom and in the United States.

In France the government in 1882 put into operation a course of study in morals for use in the public schools. In the United States the Religious Education Association, organized in 1903, has begun an agitation for the intro¬ duction of moral instruction in the public schools and its efforts have been seconded by a recently established (1911) National Insti¬ tution for Moral Instruction with headquarters at Washington, D. C.

These movements in the United States have

had particular reference to the public schools. Schools, conducted by or in conjunction with churches or religious sects, and ethical culture societies, and many, though not all, private schools, consciously attempt to give moral in¬ struction. The colleges, generally speaking, the public elementary and the public high schools, do little or nothing in an avowedly formal way with moral instruction.

The problem presents great difficulties par¬ ticularly in the United States. The hetero¬ geneous character of the school population, comprising as it does children from scores of different peoples foreign to each other in lan¬ guage, religion, institutions and moral ideals, makes it extremely difficult to .get a common meeting ground. A course of study in morals comparatively easy to carry out in a New Eng¬ land or Southern village, where all of the people are of a common ancestry for genera¬ tions, encounters unexpected difficulties in New York city. A course now used in France, for example, can, in some particulars, be shown to be ill adapted to the United States.

Again, the teachers, though all agreed that something along the lines of moral instruction ought to be done, are in no agreement at all as to how it should be done. Those who believe that formal lessons in morals with a definite allotment of school time ought not to be given seem to be in a majority. They feel that some suggestive course of study ought to be drawn up so that teachers would be enabled to give training in character and morals in conjunction with the studies already in the cur¬ riculum, particularly those of English, history and civics. ' They feel, however, that each study may be made to answer the purpose, when skilfully and deftly handled, and that every¬ thing in connection with school life should be utilized: the playground, sports, the assem¬ bly, the school city, self-government, dramat¬ ics, pageants, home visits, parents' meetings, *etc.* They lay emphasis on the personality of the teacher and on the necessity that normal schools and other teacher training agencies are under, to develop teachers who will exer¬ cise a good influence on pupils by their person¬ ality, spirit and example. They also urge that those who employ teachers should place the element of personality more strongly to the fore than formerly.

The teaching body as a whole may be said to be passive with reference to moral instruc¬ tion. Though perhaps acknowledging its worth they are willing to do nothing active to bring it into the course of study. Some meet¬ ings of the National Education Association (1907 and after) have had papers read upon it and they have met with a favorable reception. In some communities the courses of study in the elementary schools point out the opportu¬ nity for giving moral

instruction, but this is not general.

A considerable negative element is found which doubts the utility of moral instruction. Members of this group maintain that it can¬ not be shown that the moral condition of the people in countries where religious and moral instruction is given is any higher than in the United States. They say that it cannot be shown that the graduates of church and private schools, where more or less formal moral in¬ struction is given, are superior to those of

the public schools, where virtually no or very informal instruction is found. They maintain that it is only through the personal influence of the teacher that good results are obtained and that all efforts should be directed toward the preparation of the teachers. They seem to overlook, however, the fact that the teacher is an outgrowth of the boy or girl, and that to get effective teachers a system of moral instruc¬ tion for the children is necessary, as the pupil of to-day is the teacher of to-morrow. In spite of this negative attitude on the part of some the outlook at present is that courses of study for morals and character building will have a great growth in the future. See Ethics ; and related topics on Education.

Bibliography. — Griggs, E. H., ˆ Moral Edu¬ cationˆ (pp. 297-341) ; Martin, E. G., ˆMoral Training of the School Childˆ ; Rugh, C. E., and others, ˆ Moral Training in the Public Schoolsˆ ; Sadler, M. E., ˆ Moral Instruction and Training in Schools in Great Britain and Irelandˆ (Vol. I, pp. 480-489) ; and ˆSchools of Other Countriesˆ (Vol. II, pp. 351-369) ; Na¬ tional Education Association, indexes to volumes of Proceedings; Religious Education Association, Index to all publications to 1909 — see under Schools, Morals, etc., and particu¬ larly Vol. Ill, pp. 137-146; South Dakota Edu¬ cation Association, ˆList of Books Useful in Class Work.ˆ

James Sullivan,

State Historian, The State Education Depart¬ ment, Albany, N. Y.

EDUCATION, National Systems of. The

system of education maintained by any nation must be the result of three groups of factors ; (1) a group of national ideals; (2) a group of fundamental conceptions of the relationships of citizens in their economic, political, social and religious activities, and (3) an accepted attitude toward childhood and a group of ac¬ cepted views with reference to the nature of educational processes. All of these may be vague and ill defined or they may be clearly formulated, — the result of a philosophy of life, consciously worked out in a more or less scientific way. The first two groups of factors are most influential in determining a nation's educational aim and in guiding the selection of the content, or material to be taught; the second and third groups contribute most to the form of organization perfected for carrying on educational work; to the third group we look for the explanation of the methods of instruction employed. In order to fully under¬ stand a nation's education, then, there must be taken into account facts with reference to its history, industrial life, government partic¬ ularly in its legislative and administrative phases — temperament of the people, organiza¬ tion of society, religion, and, finally, the de¬ gree to which scientific principles have been developed and applied to problems of education.

Such completeness is impossible here. With these facts in mind, however, we may in a general way characterize the leading national educational systems of the present by present¬ ing their most prominent characteristics and in¬ dicating the conditions upon which they de¬ pend. France, Germany and Great Britain, be¬ cause of their size and importance, deserve the

fullest treatment. We shall treat them first, following with very brief sketches of other European nations, then of the two principal nations of the far east, China and Japan, and finally, of Latin-American countries.

France. — France possesses a national svs-tem of education in the truest sense. Its most marked characteristic is centralization. Polit¬ ically, the country is made up of 89 *departments,® each under a prefect appointed by the President, a small advisory council and a general council of elected members. Each de¬ partment is divided and subdivided again into* arrondissements,® ^^cantons® and ˆcommunes.® For educational purposes the country is marked off into 17 ˆacademics.® The authorities in all these divisions, both political and educa¬ tional, play

a part in carrying into effect the educational laws, all of which are national. Some of the characteristics of the system re¬ sulting from these laws are (1) opportunity for free elementary education: (2) compulsory attendance; (3) absence of religious instruc¬ tion in public schools; (4) required instruc¬ tion in morals; (5) a completely organized system of normal schools ; (6) recognition of teaching as State service and provision for teachers' pensions.

Administration centres in a government de¬ partment under a Minister of Public Instruc¬ tion. Assisting him are four directors ; one each for elementary, secondary and higher education and one for accounts, under each of whom are a number of bureaus with special functions. In each academy except Paris a rector has charge of educational affairs in general, though prefects hire elementary teachers on recommendation of academy in¬ spectors, and certain other affairs are left to a departmental council of teachers, inspectors and general councillors. In the academy of Paris the Minister is nominally rector, but a vice-rector performs the duties of the office. Inspection of the system is organized to the last detail. For example, in case of primary education there are general, academy, depart¬ mental and arrondissement inspectors, each of whom must possess special qualifications.

Instruction may begin at a very early age in the maternal schools (ecoles maternelles), where children from two to six years of age attend. Infant classes for children from five to seven years are provided in some places. Schools of primary and secondary grade are not closely co-ordinated. The former are practical and are directed toward life work; the latter (the lycees and colleges) are pointed more in the direction of higher training.

Lower primary schools, adapted to fit the compulsory school period (ages 6 to 13), are organized wherever possible as elementary, in¬ termediate, and higher grades. The funda¬ mental elementary subjects are taught, stress is put upon manual work, and the teaching of morals is compulsory. Special classes are organized in many places for backward and subnormal children. Where necessity warrants it, books, pencils and even food are provided. Supplementing the primary instruction de¬ scribed above are various courses. There are: (1) the ^^supplementary courses® (cours com-plementaire) provided in some places; (2) the ^^higher primary school,® which is a separate school with a practical course; (3) profes-

sional schools offerinp-special instruction, as agriculture; and (4) continuation schools which are somewhat similar to the evening classes in American cities.

A normal school for each sex in each de¬ partment, except where departments are al¬ lowed to combine their efforts, provides a three-year course for training elementary teachers. The work includes theoretical pedagogy and practice teaching. A higher normal for men and one for women are provided for the preparation of teachers to supply the depart¬ mental normals.

Secondary instruction is given in the state institutions called lycees, and in the communal colleges, which may receive state aid. Both may charge tuition fees. They admit boys at the age of 10 or 11 years and give courses of seven years. Most have preparatory schools for boys under 10 associated with them, so they do not draw their attendance, ordinarily, from the primary schools. The first ®cycle® of four years is arranged to allow a choice of a classi¬ cal course or a modern language and science course. The second ˆAycle® of three years offers four possibilities: (1) a Greek-Latin ; (2) a Latin-modern language; (3) a Latin-science, and (4) a science-modern language course. Completion of any course of the four gives a baccalaureate degree. Teachers in these institutions must have special training along both academic and pedagogical lines. Secondary instruction for girls is carried on in lycees and colleges for girls, but the course is of five years instead of seven. They too have their own preparatory schools.

For higher education a university has been established in each of 15 of the academies, but they do not all have the complete four facul¬ ties. Appropriate degrees for higher work are given in the name of the state. There are also some special institutions, among which are the College de France, which dates from 1530, cer¬ tain private institutions, and some ®free facul¬ ties® of the Roman Catholic Church. Private institutions may not take the name of univer¬ sity.

Great Britain and Ireland. — England, Scotland and Ireland may best be treated in a group because all are more or less directly under the control of Parliament and all receive contributions from parliamentary

money grants. Let us take them up in the order given above.

England's education is best understood when approached from the historical viewpoint. Its organization has been slow and only in recent times has begun to warrant the use of the term ˆsystem.® The leading universities and some of the secondary schools are several centuries old, and still maintain curricula which suggest the Renaissance. They have always been the fitting schools for the best classes of English society. For a long period the education of the common people was, in accordance with accepted views, the business of the Church. Schools were controlled by ecclesiastical au¬ thorities. Two or three centuries of change along industrial, social and political lines, how¬ ever, brought a change of view. Education began to be thought of as the business of the state, as is shown bv various bills presented in the Parliament, appropriations and the ap¬ pointment of a special committee for adminis¬ tering educational grants. But the first of a

series of really effective measures was the educational act of 1870.

Under this act, existing voluntarily estab¬ lished denominational schools were to be recog¬ nized as public elementary schools and receive apportionments from parliamentary grants on condition that they (1) conform with regula¬ tions of the education department, (2) submit to government inspection, and (3) reserve reli¬ gious instruction for hours outside those of the regular school day. They might charge fees but could not share in any local tax. The act provided further for a school in every district not already supplied, provided the electors re¬ quested it. Such a school was to be established by a local elective school board, and came to be designated a ˆToard school.® It might, on meeting government requirements, receive sup¬ port from both parliamentary grants and local taxes. Thus was laid the foundation upon which has been built England's dual system of schools, supported by moneys from fees, en¬ dowment incomes, parliamentary grants and local taxes. A summary of some of the most important characteristics resulting from legisla¬ tion since 1870 would include (1) compulsory attendance; (2) abolition of fees for elemen¬ tary instruction and provisions for free tuition; (3) the right of voluntary (denominational) schools to participate in local tax funds ; (4) abolition of the old committee and organization of a central board of education; (5) elimina¬ tion of local boards and placing of local school affairs in the hands of the ˆAounty councils® ; (6) extension of government support and in¬ spection to include secondary schools of all classes. Government schools are now

called ^^provided® schools, while others are called ^^nonprovided® schools. Supervision is left to supervisory boards, and in case of ^^nonprovided® schools a majority of the members may represent the Church under which the schools were established. Secularization is therefore not complete.

In the elementary schools, the lower grades, or ˆinfant schools,® for children of five or less to eight years of age, lead up from play exer¬ cises to easy reading, writing and number work. Upper grades, for ages 8 to 15, carry work in the usual elementary subjects. Additional classes for vocational training may be organ¬ ized under certain conditions. Where a need for them exists, ^^higher elementary schools® of three grades may be established for the continu¬ ance of instruction along the lines of elemen¬ tary subjects with special vocational training added. Children who attend must be 12 years old and must have completed at least two years of elementary school work. They may not re¬ main after completing the third year of the course nor after attaining the age of 16, except to complete a grade.

Technically, among secondary schools are included all day and boarding schools main¬ taining courses of wider scope and more ad¬ vanced degree than elementary schools and at¬ tended by scholars up to and beyond the age of 16. Pupils may enter as early as the age of eight or nine. These schools may charge fees but also receive parliamentary aid on meeting government requirements. Breadth of training is insisted upon and Latin may be omitted from the course only with the consent of the school board. Considerable variation in organization

and means of support exists. The best known types are the classical ^^grammar schools® and ˆ‘public schools,® many of which rest upon very old endowments. (ˆTublic school® does not mean free, to the public. It is the designation for secondary boarding schools like Rugby, Harrow, etc.). These schools fit boys from the best classes of society for the university. Sec¬ ondary schools for girls are very modern insti¬ tutions. During the last few decades many have been

established with financial foundations and study courses similar to those in institu¬ tions for boys.

Elementary and secondary schools are not closely co-ordinated. Most children who attend the broader secondary schools prepare under tutors or in special preparatory schools, then enter at an early age. Some pupils go from elementary to the secondary schools, but the number is small, and there has been official ex¬ pression of the opinion that preparation in ele¬ mentary schools for transition to the secondary is a ˆsubsidiary object.® When made, the transition should be early, not at the end of the course. That is. to say, the two groups of schools differ in aim and are designed to meet the needs of different classes of society. Most children who go through and beyond the ele¬ mentary schools enter day or evening continu¬ ation schools or vocational or technical schools.

Universities, university colleges and higher technical and professional schools provide for advanced training. They are not free institu¬ tions, but may receive government financial aid.

Teachers in secondary schools usually come from the universities. Elementary teachers get their training through a kind of apprenticeship known as ˆˆpupil teacher training,® or by a method of ˆstudent teacher training® in which secondary training to the age of 16 or 17 is followed by a year of practical work and one to four years in teacher training colleges which are maintained in connection with universities or may be established by county or city councils.

Scotland's education is under supervision of a separate board of education, with committees for secondary education in large educational districts and local elective school boards. Ele¬ mentary education is generally free. Compul¬ sory attendance is demanded of children be¬ tween the ages of 5 and 14. Practically all types of schools may receive parliamentary aid on compliance with government standards.

Primary schools (infant, junior and senior divisions) carry the child to the age of 12, when a ˆˆqualifying examination® is given. Be¬ yond this he may enter a supplementary course or he may begin an intermediate course. The latter is a kind of lower secondary course of three years, broader in scope than the primary and including a foreign language. On com¬ pleting it a child receives an intermediate cer¬ tificate. A secondary school parallels the inter¬ mediate course and adds two more years, and may give a choice of more than one course. On completing such a course a child receives a ˆleaving certificate.®

Higher training^ is given in the universities and technical institu¬ tions.

Teachers prepare under the direction of committees for the training of teachers, of which there are four, and must take work in both academic and professional subjects, usu¬

ally in selected institutions, not in separate nor¬ mal schools.

The educational history of Ireland is simi¬ lar in some respects to that of England. A group of voluntary elementary schools has been placed under control of a National Board, which administers education, supervises inspec¬ tion of schools and distributes parliamentary grants of money. Elementary education is free and compulsory. Religious teaching is per¬ mitted, but may not be enforced by any denom¬ ination upon a child against the wishes of his parents. Teacher training is provided for in denominational colleges. Little progress has been made in providing higher elementar}" schools. Most secondary schools, known in Ireland as intermediate schools, are endowed, private or denominational. These have been brought partly under supervision of an inter¬ mediate board, which cares for distribution of grants of money to those schools which con¬ form with government standards and submit to inspection. Denominational contentions have retarded the progress of higher education. However, there are a number of denominational colleges, and reorganizations of rather recent origin have resulted in the combination of some colleges into universities with a view to securing greater financial aid from parliamen¬ tary appropriations.

Germany. — ■ Germany is a federation of some 25 states, in which are included mon¬ archies, grand duchies, duchies, free city repub¬ lics and small principalities. The King of Prussia holds the title of Emperor. Imperial legislation covers only affairs with wffiich the states are jointly concerned. Other affairs, — and education is included among them, — have been left largely to the control of individual states. Education is sometimes affected by actions of imperial authorities, but there has never been an imperial educational code. There has therefore been no ^system® of education in the empire, but systems, provided and adminis¬ tered by the several states, with consequent lack of uniformity in methods of providing and supporting schools. On the other hand, there has been similarity though not identity of edu¬ cational aims ; other states have tended to fol¬ low the example of Prussia; and since the his¬ torical background

has been nearly the same for all, their schools bear remarkable similari¬ ties of content and organization and serve the various classes of society in much the same way.

Some states have series of educational laws, others only general legislative provisions sup¬ plemented by ordinances or decrees of central authorities. Administration has been highly centralized, particularly in Prussia. Most of the larger states combine education with re¬ ligion under one ministry. This is true in Prus¬ sia, Bavaria, Wurtemberg and Saxony. Some others include education in the Interior or in the Department of Justice. Central authorities may be assisted by local bodies, sometimes civil authorities, sometimes special provincial and local school councils.

Military training is universal, but the re¬ quirement decreases with increase in educational accomplishment. School attendance is compul¬ sory, usually to the age of 14. Religion is taught in elementary schools. Much has been

done to raise efficiency of teaching and to in¬ duce persons to make it a life work. Pensions for aged teachers are common. Great progress has been made along the lines of hygiene and the sanitation of school buildings.

As stated, schools are similarly organized in the several states, though there are variations. Those of Prussia come nearest to being typical, and may be briefly characterized as follows: A longitudinal separation prevents continuity and keeps distinct the schools patronized by different classes of society. A child's school and the length of his course is determined al¬ most entirely by the class of society into which he is born. Transition, after the first two or three years, is very difficult.

The *Volkschule,^^ or people's school, is a free school of eight grades admitting children at the age of six, in which are taught the ele¬ mentary subjects and religion. It is patronized by the lower classes of

society. Most children go from here into industrial life. Supple¬ mentary courses in evening or Sunday ®continuation schools® exist in many places, and there has been a movement in the direction of mak¬ ing attendance a requirement, up to the age of 18, wherever possible. Teacher training is thorough, including three years in preparatory classes above the Volkschule, three in a normal school, and then practical work, aside from the passing of various examinations.

Secondary institutions are tuition schools of nine grades, or classes, admitting boys (girls very rarely) at the age of nine or 10 years. Preparation for entrance is either privately or in a special preparatory ^^Vorschule.® There are three types : (1) the ˆGymnasium,® character¬ ized by its strictly classical course; (2) the *Realgymnasium,® with a Latin — modern lan¬ guage — science course; and (3) the ®Oberrealschule,® with a science — modern language course. A special examination at the close of the gymnasial course (the Abiturientenprue-fung), if successfully passed, fulfils the re¬ quirements for entrance to the university, in part the requirements for state service, and in addition secures certain privileges with refer¬ ence to army service. The same is true for the courses in the ^^Realgymnasium® and ®Oberrealschule,® except that language deficiencies must be made up in order to enter certain uni¬ versity courses. Communities unable to main¬ tain nine-year courses have six-year courses, paralleling the first six years of the schools just described, under the names, ˆProgymnasium,® ®Realprogymnasium,® and ®Realschule.® Sec¬ ondary schools for girls, similar in organization to those for boys, but with less extensive courses, are found in many places. Secondary schools are patronized only by the aristocracy and the professional classes. Secondary school teachers must have thorough training, including university work and special pedagogical train¬ ing, both theoretical and practical.

Between the lower and the secondary schools are the ˆmiddle schools,® with courses some¬ what longer than that of the lower, or people's school. They are somewhat exclusive, charge tuition and are attended by children of the mid¬ dle classes. But they do not articulate with the secondary schools.

Universities and higher technical institutions are state institutions, controlled by the state and maintained largely by state funds.

Austria and Hungary. — The educational systems in these countries

are very similar to those of the larger German states. Hungary has included denominational schools under an arrangement similar to that in England, but in both these countries the organization of classes and the curricula in elementary, secondary and higher institutions parallel very closely those in the schools of Germany.

Denmark. — Administration of schools in Denmark is in the hands of the Minister of Ecclesiastical and Educational Affairs, with a school council in each county and a school board in each local subdivision. There is also a group of inspectors, assisted by the bishops of the state (Evangelical Lutheran) church. Education is free and compulsory between ages seven and 14 years. Religion is taught.

The school system includes (1) the ele¬ mentary school (ˆFolkeskole®) for children of six to 14 years, supplemented by continuation schools; (2) the middle school (ˆˆMellem-skole®), with a four-year course which may be entered from the elementary school after the age of 11, and supplemented by a ®real class® leading into a group of ˆˆmiddle professional schools® ; (3) the three-year ˆGymnasium,® of¬ fering three courses based on the classics, mathematics and modern languages, and leading to the higher technological schools and the uni¬ versity. The university is considered a part of the state system. Schools above the elementary are not free. Middle and secondary schools for girls exist, but they are fewer than those for boys. Normal schools, both public and private, give courses of from one to three years for the training of elementary teachers. Teachers are considered as in state service, and teachers' pen¬ sions are provided on a graded scale. Denmark deserves the credit for originating the special supplementary school for adults known as the ˆpeople's high school.® It gives a short course, for men in winter, for women in summer, for which a tuition fee is charged, but there are no examination requirements.

Sweden. — Education in Sweden is con¬ trolled through the ecclesiastical department of the government, working in cooperation with the popular assembly.

Elementary education is compulsory for children from seven to 14 years of age. Schools are subdivided into ˆinfant schools® (ages 7 to 9, and elementary schools (ages 9 to 14). Teachers are prepared in training colleges with four-year courses. Continuation schools, held usually in the evenings, ˆffiigher elementary schools® and ˆˆpeople's high schools,® modeled after those of Denmark, supplement the ele¬ mentary schools.

Secondary institutions are (1) the practical six-year ®realschool® ; (2) the four-year ^^gym¬ nasium® for boys, offering both classical and modern courses; (3) the higher girls' school, usually a private school with preparatory classes attached; (4) the special technical school. A lower secondary examination is given at the close of the realschool course, and a higher secondary examination at the close of the gym¬ nasium course. Children may go from ele¬ mentary to realschool, also from this to the gymnasium at the end of the fifth year of the course.^ ^^Middle schools,® in some communi¬ ties, give a practical four-year course which

may include the work of the higher elementary school.

Three state universities and two private uni¬ versities, known as high schools, provide for higher training.

Norway. — In Norway schools are under general control of the Department of Education and Ecclesiastical Affairs, but much control is left to county and local school boards in which the state (Lutheran) church is well represented. Primary education is free and compulsory to the age of 14 and religious instruction is re¬ quired. A well co-ordinated system allows con¬ tinuous progress from primary school through, first, a lower secondary school of four classes (®Middelskole^^), and a higher secondary school of three classes ("Gymnasium®), to a higher professional school or a university. Secondary schools may be state, municipal or private. Most of them are coeducational. Continuation schools supplement the primary schools. Lower secondary courses articulate with technical courses of lower professional schools. Train¬ ing colleges are provided for preparation of teachers. A number of special state institutions provide for abandoned and delinquent children and for defectives.

Netherlands. — Administration here is under the Minister of the Interior, under whom are ranged groups of general, district and arrondissement inspectors. Some local affairs are regulated by local civil authorities and com¬ munal school boards.

Classed as elementary schools are : day schools for children 7 to 13 years old — the compulsory school age, — continuation schools and evening schools.

Secondary institutions are both public and private. They include burgher schools with a two-year practical course, higher burgher schools with a five-and a three-year course, agricultural schools, industrial and technical schools, and a group of very special training schools. Higher burgher schools are the only ones giving broad training. They close with a state examination giving admission to higher institutions and to various kinds of state service.

Gymnasia, with courses for ages 12 to 18, and fitting for the university, are classed along with the university as higher institutions.

Training of teachers is carefully supervised and the law provides for minimum salaries of elementary teachers and for pensions in cases of disability and long service.

Belgium. — Belgium, like a number of other European nations, has had a long denomina¬ tional struggle. There is an educational de¬ partment under the Minister of Science and Art, who is assisted by general directors and a corps of inspectors, but in each commune there is a board possessing considerable author¬ ity, and in these denominational influence is considerable. Local independence accounts for considerable variation in the schools. Above the elementary schools, there are lower and higher secondary schools. The lower are Prac¬ tical schools maintained by the government and give courses of three years. Separate schools for boys and girls are established^ The higher are seven-year schools (the athenees and a few colleges), and lead up to the university. Aside from these two groups, secondary schools may be established by local authorities. Higher

education is provided for in four universities, two of which are state institutions, and in numerous special institutions.

Switzerland. — Because each of the 25 Swiss cantons controls its own educational affairs there results considerable lack of uni¬ formity in the school system. Free education is provided for in the constitution. Some cantons provide free books and material. Com¬ pulsory education is common, sometimes for seven, sometimes for eight years, beginning usually at the age of or 7 years. Con¬ tinuation schools are provided in all can¬ tons. Various kinds of schools above the

elementary grade exist, some giving general, others technical courses. Commercial educa¬ tion is stimulated by giving federal grants. The universities, of which there are seven, and the “Federal Polytechnikum® are institutions known world wide for their standards of work.

Italy. — Administrative machinery for con¬ trol of Italian education is very complex. Under the Minister of Public Instruction are an undersecretary of state for public instruc¬ tion and a higher council with the Minister as chairman, A vice-president of the council is appointed by the king. The council is divided into different permanent and special com¬ mittees. There are also a number of special bureaus. In each province there is a special administrative head and an educational council. Some localities have a degree of independent control.

Elementary schools vary in number of grades from two to six, and may or may not be free. Under certain conditions they may receive state aid. Attendance is compulsory to the age of 12, or, in communities with the poorer schools, through the grades which are provided. Many evening and Sunday schools for illiterate adults have been established.

Secondary schools provide classical, tech¬ nical, nautical and normal training in courses ranging from two to five years in length. An examination, for which a fee is charged, ad¬ mits children to secondary schools at the end of the fourth elementary year. Few limits are placed upon the establishment of secondary schools, but government credit may be had only by taking the government examinations.

Universities are state institutions with sepa¬ rately organized administration and govern¬ ment. Various other higher special schools and institutes for higher training may receive contributions from state funds.

Spain. — The Spanish government seems to have taken over for inspection and support many schools, whether founded by the state itself, the provinces, towns or religious cor¬ porations. These it controls through a gen¬ eral director, who, with an advisory council, is under the Minister of the Interior. A num¬ ber of inspectors are employed, and in each province and town there is a school board which has considerable authority.

Attempts have been made to classify the elementary schools, but they

are poorly graded, except in a few cases, and in such a state of transition that few definite statements con¬ cerning them may be made. “Institutes® ad¬ mitting boys at the age of 10 and giving courses leading to the bachelor’s degree, and “colleges® with shorter courses from which boys may go into the “institutes,® are classed as secondary

institutions. Secondary and university educa¬ tion are closely related, the two being under the control of ®rectors,^^ of which there is one for each ˆuniversity district.® Professors in both types of institution are appointed by the king and must be university graduates. Education of girls has been for the most part in private schools or in convent schools.

Oriental Countries. — Oriental education was for centuries characteristically memoriter, imitative, nonprogressive. The two most im¬ portant nations, Japan and China, have for a number of decades been making a transition to a more progressive education, largely on ac¬ count of western influences.

Japan started the movement first. For about half a century she has been busy with the problem of modernizing and ˆwesternizing® her education. At present education is controlled entirely by the state, through a Minister of Education who is a member of the Cabinet, and an educational council. Much of the regula¬ tion is by means of imperial ordinances.

Parents are compelled to send their children through a primary school, which it is the duty of the community to provide. Above the primary schools are middle schools and sec¬ ondary schools of various types. The former are practical and lead toward technichal schools or toward the secondary. The secondary schools are pointed toward the university, special colleges, or other higher institutions. Some provision has been made for the educa¬ tion of girls in special girls’ higher schools. The problem of the proper co-ordination of the various institutions is not yet completely solved. A fairly well organized

system of normal schools for training elementary teachers has been developed, and also a method of certifica¬ tion, either on graduation from one of these schools or by examination.

China's transition has been made almost within the present century. An ancient educa¬ tional system consisting for the most part of memorization of a group of Chinese classics and the passing of a series of state examina¬ tions has been overthrown. A system modeled somewhat after the western systems has been put in its place, but many of the problems are yet unsolved. Teachers educated under the old system tend to fall back into a memoriza¬ tion method, disregarding the teaching of the meaning of material. Governmental changes and the changes incident to rapid adaptations being made make definite statements difficult. In general it may be said that China is fast developing elementary, middle and secondary, and higher institutions to meet the needs of education throughout the nation.

Both China and Japan find difficulties aris¬ ing out of the nature of their written language (a character for each word), and both meet the difficulty of finding the proper place for the classical Chinese, which bears a similar relation to their modern life that Greek and Latin do to the modern life of western nations.

Latin-American Countries. — Space per¬ mits only a general characterization of edu¬ cation in Latin-American countries. In all of them the development of public educational systems has been slow. The causes for this are found in their extended territory, scat¬ tered rural population, differences in the grade

of culture of the several classes of inhabitants, and the tendency to patronize private institu¬ tions. Early schools were almost entirely those of the Catholic Church, and there is still a large measure of Church control. With the acquisition of independence and establishment of republican forms of government, most of these countries began building systems of pub¬ lic education. The majority of them have pro¬ vided ministries of education, although educa¬ tion may be administered, in individual cases, through the Department of Interior or Depart¬ ment of Justice. Usually much power lies in the hands of provincial and local authorities, but in Chile there is government support of all classes of schools and the control is highly centralized under a system somewhat similar to that of France. Many of the countries have taken steps to provide free elementary educa¬ tion, and there have been a few partially suc¬ cessful attempts at

compulsory attendance. Co¬ education is not the rule, even in elementary schools, but exists in tJhe lower grades of gov¬ ernment schools in a number of cases. Ele¬ mentary education is liable to be of a low standard in rural districts, but in the larger cities, and especially in the government capi¬ tals, much has been done to build up model in¬ stitutions and stimulate the development of efficient schools. Normal schools have also re¬ ceived much governmental attention. In prac¬ tically all of the leading countries some form of government secondary school may be found, supported by national, provincial or municipal funds, but much of the secondary education is carried on in private or Church schools. Sec¬ ondary schools are liable to articulate poorly or not at all with the elementary schools, as is ‘ the case in some European countries. Univer¬ sities are also found in most countries, although in a few cases higher training has been given by special faculties — of medicine, law, *etc.* — the instructors being professional men who gave part time only to teaching. The influence of the world’s modern industrial development has been felt in these southern countries, and the old literary and classical tendencies have tended to give wˆay to more practical edu¬ cation, as is shown by the efforts of educational ministers to introduce reforms into the school systems. Education of North American and European countries have been studied, some¬ times by special commissions, and in some cases scholarships have been provided to allow young men to study abroad. See Latin America.

United States, in Relation to Other Na¬ tions. — In both the period of their establish-lishment and the later periods of development the schools of the United States have been greatly influenced by the educational situations in the various European countries. Their aims, methods and forms of organization have in a way been echoes of those in the countries whose people first settled America. The de¬ velopment of our Federal government, however, with its characteristic democratic spirit, has made for an educational system in which the paternalism and social distinctions characteristic of so many nations in Europe are almost en¬ tirely lacking. And so it is that the business of education is left for the most part to the several States, and is only indirectly influenced by the Federal government. The way in which all of the States have set themselves the task

of providing a co-ordinated system of elemen¬ tary, secondary and higher institutions through which any child of ability may go is remark¬ able. Schools which parallel the ^^middle schools^^ of European countries have been slow in coming, but in recent decades have been making their appearance rapidly, as have also those similar to European ˆdower® or ˆmiddle technical schools.ˆ What will be their effect upon American life and society is a question full of interest and deserving careful thought. A_ similar and perhaps more vital problem arises from a tendency present in many quarters to push specialization down into the elementary grades.

The Present Situation. — Practically every nation's educational system is disturbed, even reorganized temporarily just at the present, as a result of the European War begun in August, 1914. Undoubtedly the outcome of that war will bring radical changes in many a nation's economic, political and social philosophy, fol¬ lowed by changes in both educational philosophy and educational practice. The foregoing state¬ ments are based upon conditions as they were at the beginning of the conflict and, in so far as known, as they have continued since. But habit is strong, and the probability is that any changes in national educational systems result-

certain other callings are so well-organized as to their materials and methods that education for them might be included in the professional group. In this latter class belong journalism; commerce and business organization, including banking, insurance, transportation, foreign and domestic trade and accounting; public service, including expert service in federal, state, mu¬ nicipal, and diplomatic administration ; and social service, comprising charities, corrections. Red Cross, welfare work and sociological research.

At the close of the American Revolution there were, besides the semi-ecclesiastical col¬ leges like Harvard and Yale, only two profes¬ sional schools in English-speaking America — the medical college of Philadelphia, now a part of the University of Pennsylvania, and the medical department of King's College, now Columbia University. The law school of Har¬ vard University, the oldest of existing law schools in this country, was opened in 1817 ; the Baltimore College of Dental Surgery dates from 1839; the oldest school of veterinary medicine

(Iowa State College) began as late as 1880. From these early beginnings the present long list of American professional schools has grown. The recent expansion of these institu¬ tions in the five clearly recognized professions.

Comparative Statistics of Professional Education for 1900 and 1916

Class

Schools

Students

Graduates

With A.B. or B.S.

Endowments

Reported bene¬ factions

1900

1916

1900

1916

1900

1916

1900

1916

1900

1916

1900

1916

Theology .

154

169

8,009

12,051

1,773

2,090

2,338

4,454

$19,979,565

$40,. 395, 681

$1,123,802

$2,171,624

Law .

96

124

12,516

22,993

3,241

4,323

2,166

4,451

567,900

2,091,592

105,500

352,027

Medicine .

151

92

25,213

14,767

5,219

3,436

2,477

3,086

2,236,087

23,227,896

49 , 239

2,485,501

F)pnt.iRt,ry .

54

48

7,928

4,042

10,715

6,034

2,029

1,130

1,852

1,796

192

167

105,000

461,915

500

Pharmacy .

Veterinary medi-

53

71

51

44

19,202

205 , 000

1,700

4,324

cine .

13

22

362

3,064

100

759

14

47

5,064

4,000

597

ing from the war will be in the nature of modi¬ fications and gradual evolutions, not sudden breaks from the old habitual courses. The general outlines here given will probably in the main hold true, therefore, for a number of years after the conclusion of the just peace for which the world waits.

Arthur K. Beik,

Instructor in Education, State College for Teachers, Albany, N. Y.

EDUCATION, Negro. See Negro Edu¬ cation.

EDUCATION, Professional. Professional education as distinguished from elementary, secondary, industrial or liberal education, is that form of higher education specially de¬ signed as a preparation for ˆlearned,ˆˆ tech¬ nical, commercial, or social professions or callings in which men and women deal with their fellows, with institutions, pr with material things, according to abstract principles, with an understanding of natural or social forces and the ways in which they have been or may be applied. To the three “learned professionsˆˆ of the older time, other professions have been added to meet the need of a developing civiliza¬ tion. Hence professional education takes ac¬ count of dentistry, chemistry, engineering, edu¬ cation, pharmacy and veterinary medicine, while

as published by the United States Bureau of Education for the years 1900 and 1916, is shown in the accompanying tabulation, from which

are omitted statistics of schools which train for the professions of engineering (see Technical Education), chemistry, commerce and social service, for the reason that such training is still carried on largely in the usual four-years undergraduate course, either in close co-ordina¬ tion with other undergraduate divisions or in parallel separate schools, with the inclusion of a considerable amount of fundamental or but¬ tressing material of a non-professional char¬ acter in the quasi-professional curriculum. Sta¬ tistics of training schools for nurses are like¬ wise omitted because these institutions are not, by organization, faculty, curriculum or special equipment, quite comparable with professional schools which are independent establishments, not merely adjuncts or accessories to major enterprises like hospitals which exist for an en¬ tirely different purpose.

The standards of admission, instruction and graduation in professional schools have rnark-edly improved since 1870, notably in medicine, engineering and education. In the case of medicine the changes since 1904 have been almost revolutionary under the firm and states¬ manlike guidance of the Council on Medical

Education of the American Medical Association and the Association of American Medical Col¬ leges, two voluntary organizations within the medical profession, which have neither legal nor coercive authority over schools, licensing boards or individual teachers or students. Or¬ ganizations quite similar to these two have exercised in a smaller degree an elevating in¬ fluence on corresponding forms of professional education during the last two decades. Legis¬ lation by the states now regulates more or less effectively the practice, and hence the educa¬ tion to practice, of the last five of the six tabu¬ lated professions, and in some degree also the quasi-professions of accountancy, nursing, *etc.*

Several specific examples are here given to illustrate the progress just described and the present state of certain forms of professional education. The law school of Harvard College required no previous course of study in 1857 ; male students, 19 years of age and of good

moral character, were eligible for admission. Not until 1870 was the course extended to two years ; in 1877 it was raised to three years ; since 1899 only graduates of approved colleges are eligible for admission. Yet in 1916 this law school had 791 students, more than any other law school in the country except certain evening schools in Chicago and in Washington, D. C. By 1916 all but 20 of the 124 law schools re¬ porting to the Bureau of Education prescribed three-year courses and only one remained on the one-year basis ; all but 26 maintained a standard year of at least 35 weeks. The re¬ quirements for admission, until after 1870, were merely a knowledge of English and the common branches ; by 1880 they were made the comple¬ tion of a four-years' high school course ; at the present time nearly all the better schools require the completion of at least two years of work in a college of liberal arts. Though the content of the work of these two years is not prescribed, students are urged to choose such subjects as history, politics, English literature, logic, philos¬ ophy, economics and public speaking.

The professional curriculum in law is usually quite closely prescribed during at least the first year, including contracts, torts, personal property, real property, domestic relations and criminal law ; for the remainder of the course a varying degree of freedom is accorded the stu¬ dent. The methods of instruction have been re¬ modeled along with the changes just noted; the original lecture system was succeeded by the textbook system, and this in turn by the ®case system,® in which the student makes analytical studies of actual cases decided in courts, dis¬ cusses these cases in the classroom, and passes examinations on them^ and upon lectures deal¬ ing with the principle involved. The degree of bachelor of laws (LL.B.) is generally conferred upon^ the completion of the regular course; certain schools, e.g., the universities of Chicago, Michigan and Yale, confer instead the degree of doctor of law (J.D. or J.U.D.) upon those graduates who entered with an A.B. or B.S. degree from an approved college. For a fourth or graduate year the degree of master of laws (M.L.) is sometimes given.

Medical education has undergone even more striking evolution than law. The early medical schools were usually connected with colleges, but, beginning in the early 19th century, came a

period of about 75 years when the independent proprietary medical school flourished, to the grave detriment of the profession. In about a century 437 medical schools appeared in the United States and Canada, of which 162 were in operation in 1906 when the campaign

for im¬ provement began to prosper. The famous Flexner report on ˆMedical Education in the United States and Canada,® published in 1910 by the Carnegie Foundation for the Advance¬ ment of Teaching, is a landmark in both medi¬ cal and professional education in North Amer¬ ica. Concerning the majority of these numer¬ ous schools the report states :

Nothing was really essential but professors. The labora¬ tory movement is comparatively recent… . Little or

no investment was therefore involved… . Occasional

dissections in time supplied a skeleton — in whole or in part — and a box of old bones. Other equipment there was practically none. The teaching was, except for a little anatomy, wholly didactic. The schools were essentially private ventures, money-making in spirit and object… .

Many of the schools had no clinical facilities whatever… . The schools had two sessions of 16 to 20 weeks

each; the course was ungraded and the two classes met together. The student had two chances to hear one set of lectures — and for the privilege paid two sets of fees… . State boards were not yet in existence. The

school diploma was itself a license to practice.

From this chaotic and almost standardless condition, medical education moved up in 25 years so that the best American schools are quite the equal of the best European schools. The universities have resumed actual and vigor¬ ous control ; graded courses of medical studies, adequately based on two years of college train¬ ing, including chemistry, physics and zoology, and covering four school years of approxi¬ mately nine months each, are the rule. Six medical schools have already taken still more advanced ground by requiring before graduation the satisfactory completion of a fifth year to be spent in an approved hospital or in other ac¬ ceptable clinical work — Minnesota, Stanford, Rush, California, Northwestern and Vermont, and six State boards have established a re¬ quirement of one year’s internship for licensure to practice. Numerous full-time salaried teach¬ ers have replaced the volunteer practitioner-lecturer, even in important clinical chairs. Great laboratories for instruction and research, supplemented by extensive hospitals for clinical teaching, have been built at enormous expense, sometimes by individual gifts, as in universi¬ ties

like Harvard, Cornell, Washington and Leland Stanford Jr., and sometimes by State or municipal appropriations, as in universities like Minnesota, Michigan, Iowa and Cincinnati, thus setting the highest standards now known in the profession. ˆ The degree of doctor of medicine (M.D.) is almost invariably con¬ ferred upon graduates. A special degree in public health (Dr.P.H. or Gr.P.H.) is given by several institutions, e.g., Michigan, Harvard and California.

Such progress meant inevitably the death of many weak and scandalous schools; by 1917 the roster of medical schools showed 96 names, of which 29 wereˆ integral parts of State uni¬ versities. Proprietary, profiteering schools clearly could not live when the amount spent annually on each student in 82 schools for which an estimate was made in 1917 was $419, and the corresponding return from the student m fees was about $150. the fees ranging from $25 in Oklahoma to $275 in Columbia

Out of 48 schools of dentistry only 12 are independent institutions. The dental curricu¬ lum covers three years of professional work based upon four years of high school, and leads to the degree of doctor of dental surgery (D.D.S.). A movement to raise the course to four years, comparable with medicine, has at¬ tained considerable momentum with the cordial support of the leaders of the profession. Tuition fees range from $60 to $200, averaging about $150.

The schools of theology represent a wide variety of standards, from the ®full salvation® school (in Kentucky) to the great group of seminaries about the Catholic University of America, the Union Theological Seminary of New York, Princeton Theological Seminary, or Boston University School of Theology, all of which as a rule require a bachelor’s degree or its equivalent for admission and a three-years course for graduation. The degree usually conferred is bachelor of divinity (B.D.) or bachelor of sacred theology (S.T.B.). The theological schools reporting to the bureau of education in 1900 and 1916 are summarized in the accompanying table. The attendance of 11,291 in 1916 included 760 women, but these figures do not include the

considerable number of students in semi-professional Bible schools and institutes for training evangelists, mission¬ aries and other church workers. Theological schools in 1916 were located in 32 States, New York, Pennsylvania, Ohio and Illinois having each more than 15. By denominations the dis¬ tributions of 1900 and 1916 were :

Roman Catholic .

Presbyterian .

Lutheran .

Methodist . .

Protestant Episcopal . .

Congregational .

Baptist .

Non-sectarian. …….

Christian and Disciples

Reformed .

Universalist .

Hebrew .

Miscellaneous .

1900

1916

29

27

23

20

22

24

18

19

13

13

11

9

11

13

3

11

7

9

6

6

3

3

2

2

6

13

154 169

All but 15 of the 71 schools of pharmacy have university or college connection. Admis¬ sion requirements to the two-years course are two to four years of high school; to the four-years course, usually the full high school course of four years. The former leads to the title of graduate in pharmacy (Ph.G.) or pharmaceutical chemist (Ph.C.), the latter to bachelor of science in pharmacy (B.S. in Phar.)

One of the chief reasons for the rapid de¬ velopment of veterinary medicine is found in the great demand by the Federal government for inspectors of food animals and by the farmers for the prevention or cure of swine and cattle diseases. Nineˆ of the 22 veterinary schools are connected with state agricultural colleges. The course of four years is generally based on a high school education and leads to the degree of doctor of veterinary medicine (D.V.M.). The largest schools are those of Iowa, Cornell, Ohio, and Kansas City.

The training of teachers for the elementary schools does not fall under the heading of professional education, but the last decade has seen a gradual standardization of really pro¬

fessional training of teachers, comparable with the other professions

in scope and severity of requirements. Few of the normal schools and colleges of education do more than incorporate into the regular undergraduate curriculum con¬ siderable courses in psychology, history of edu¬ cation, educational organization, and practice teaching in neighboring schools, or in college-controlled or laboratory schools as at the Uni¬ versities of Wisconsin, Missouri and Minrtesota. The better institutions limit the specialized studies in education to the last two years. Teachers College of Columbia University, which has been a graduate school since 1914, and the education divisions of graduate schools like those of Chicago, Harvard and California, are the best examples of professional courses in education, though they may not, with the exception of the first, be known technically as professional schools. The volume and signifi¬ cance of the researches of this group of insti¬ tutions augur well for the further development of the profession.

Illustrative of the newer type of profes¬ sional schools which require more than a four-years high school course for admission, are the Graduate School of Business Administration of Harvard University, the richly endowed New York School of Philanthropy, the Tuck School of Administration and Finance of Dart¬ mouth College and the Yale School of Forestry.

So enormously expensive has the mainte¬ nance of professional education of all kinds be¬ come, that it must more and more depend upon tax-support or upon generous endowment, and less and less upon student fees and the free services of lawyers, doctors and dentists. No first class professional school can be content with mere teaching; it must engage in investi¬ gations of new conditions and new problems, in medicine, theology and education as well as in journalism, chemistry and social service, in the strenuous endeavor to master alike the social and natural forces which affect human welfare. Hence the graduate professional school and the research institution or endow¬ ment are new integral parts of professional education at the present time. Examples of these are the Graduate School of Business Administration of Harvard, medical endow¬ ments for research in cancer at Columbia and Harvard and in urology at Johns Hopkins, the Mayo Foundation for Medical Education and Research at Minnesota, the Veterinary Investi¬ gation Department of Iowa State College, the Engineering Experiment Station of the Uni¬ versity of Illinois, and the Mellon Institute of Industrial Research and School of Specific In¬ dustries of the University of Pittsburgh.

To meet these multiplying ˆ and mounting needs of professional education, men and states have poured out during the last two

decades a veritable stream of gifts and appro¬ priations as evidence of approval of the sound¬ ness and progressiveness of the management of such schools. In 1917 the University of Chi¬ cago received nearly $5,500,000 for its medical schools. Vanderbilt, Washington, Johns Hop¬ kins and Yale have each recently received $1,000,000 or more for medical work; Penn¬ sylvania received more than $1,000,000 for den¬ tistry; the Pulitzer donations to Columbia for journalism were $2,000,000. The endowments

of eight theological schools arc above $1,000,- CK)0 each, three passing $2,000,000 and one (Princeton), passing $3,000,000, while the grounds, buildings and library of the General Theological Seminary of the Protestant Epis¬ copal Church are reported at more than $2,000,- 000. The building and library of the law school of the University of Chicago are estimated at $500,000, and the properties of the Harvard Law School (including $600,000 of endowment) at $2,000,000.

Bibliography. — Annual Reports of the United States Commissioner of Education; United States Bureau of Education (Bulletin, 1913, No. 4, G. E. MacLean, ˆPresent Standards of Higher Education in the United States®) ; Annual Educational Numbers of the Journal of the American Medical Association (in re¬ prints) ; Annual Reports of the Conferences of the Council on Medical Education; Annual Re¬ ports of the Carnegie Foundation for the Ad¬ vancement of Teaching; Bulletins of the same; Flexner, ˆ‘Medical Education in the United States and Canada® (No. 4, 1910) ; Redlich, ˆˆThe Case Method in American Law Schools® (No. 8, 1914) ; Annual Reports of the Meetings of the Religious Education Society.

Kendric C. Babcock,

Dean of the College of Liberal Arts and

Sciences, University of Illinois.

EDUCATION, Psychology of. In some branches of the subject, educational psychol¬ ogy is differentiated clearly from the general science of psychology, while in other branches the two subjects overlap. The investigation of the laws of memory, of learning, of the deter¬ minants of attention or of individual differen¬ ces in endowment, has been carried on by psy¬ chologists whose interest is in the theoretical development of the science, as well as by those whose interest is in the application of psychol¬ ogy to education. But even in such cases, in which there is an overlapping in subject matter, the aim of the educational psychologist, which is to discover how mental growth may most effectively be promoted, usually causes him to emphasize different questions than those upon which the pure psychologist dwells. Certain branches of educational psychology, such as the psychology of learning to read, write and spell, or the construction of tests of proficiency in the school subjects, or the technique of tests of in¬ telligence or maturity, belong wholly to this field.

The education of the child is the product of the - sum of the external influences which are brought to bear upon him, and of the reactions which he makes to these influences. The study of these reactions and of their laws is the scien¬ tific foundation for rules of practice in attempt¬ ing to guide and modify them. In so far as these reactions are mental their study consti¬ tutes the subject matter of educational psy¬ chology.

The differences in the child's interests and Capacities as he advances from babyhood to maturity are important factors in his reactions. For the treatment of this phase of educational psychology, see the article on Child Psy¬ chology.

Principles of Learning. — In the second place the child's reactions are governed by the laws of learning, — both those which are gen¬

eral in their application and those which depend upon the child's stage of development. The effect of practice upon skill or excellence of performance has been studied in the case of a variety of types of learning. One of the earliest and most valuable studies was made upon the growth of ability in the telegraphic language. A number of studies have been made of the somewhat allied process of typewriting. Some light has been thrown on human learning by studies of the behavior of animals in escaping from a cage or learning to find their way through a maze. In the field of sensory dis¬ crimination and the development

of perception a number of studies have been made — as, for example, in learning to discriminate between tones or colors, to overcome illusions, to appre¬ hend and draw unusual figures. The progress in learning a foreign language has been traced. Numerous studies have been made of associa¬ tive learning and memorizing. Memorizing has been investigated to discover the best mode of presentation, the best way of dividing material — e.g., into large or small parts, the effect of the learner's attitude, the permanence of memory under various conditions, *etc.* Finally the process of problem solving, as in the solu¬ tion of puzzles, has been subjected to analysis.

One of the characteristic features of the study of learning is the construction of the practice curves, which represents graphically the rate of progress at different stages. The form of some practice curves indicates a rapid progress in the early stages, followed by a gradually decreasing rate until progress almost ceases. In other cases, however, the progress is nearly uniform while it lasts ; while in a few the progress is slow at the beginning and more rapid later on. The difference may perhaps be explained b3ˆ the varying ease with which old habits may be adapted to the new task.

There are various sorts of fluctuations in the curve of progress, some of short duration and some lasting over weeks or even months. A cessation in progress over a number of prac¬ tice periods has been termed a plateau. Plateaus have been found to exist in several forms of learning. A number of explanations have been suggested. The earliest was that the learner develops first certain simple habits and later more complex ones, and that while he is perfecting the simpler habits as a preparation for the complex habits no apparent progress is rnade. Another explanation is that the learner either spurts and hence makes errors and becomes confused, or becomes lazy and fails to push ahead.

The extent to which practice or learning produces not simply special habits or ability but also general habits, attitudes, abilities or ideas which are operative in other fields than the one in which the training has taken place has been the subject of many experiments and much debate. It is now generally agreed that there is some transfer of the effects of practice, but the amount, the nature and conditions under which it occurs and the importance of transfer are matters of considerable divergence of opinion.

Among the factors which influence the rate of progress is the distribution of the practice time.ˆ In the case of the rather simple types of learning in reference to which this has been studied rather short periods of 10 to 15 minutes

have proved favorable, but it is unsafe to apply this rule very widely.

The importance of mental fatigue in hinder¬ ing progress in learning or in impairing mental work has been variously estimated. A dis¬ tinction must be made between true mental fatigue, as represented by an actual falling off in ability to do mental work, and the mere feel¬ ing of weariness, which may or may not indi¬ cate real reduction in ability. What has often been thought to be mental fatigue may be merely loss of interest or suggestion. But the modicum of true mental fatigue which remains when this illusory fatigue is allowed for, prob¬ ably hinders learning and interferes with the more difficult mental operations.

Learning in the School Subjects. — The third branch into which education psychology may be divided deals with the processes of learning which are characteristic of the school subjects. Important studies have been made of reading which reveal the nature of the behavior of the eye and of the perception of reading matter. The eyes are shown to move along each line of print intermittently, the words being perceived during the pauses only. The pauses vary in number and duration according to the subject matter, the size of print and arrangement of the lines, and the training and individuality of the reader. It is probable that the increase in the scope of perception during a reading pause and the consequent reduction in the number of pauses is a close correlate of efficiency. The most important fact about per¬ ception in reading is that it is by word wholes or groups of words. Some attention to the letters must be given in the early stages of learning, but the letters are soon subordinated by their organization into words. A factor in this organization is the association of printed with spoken words, and even in silent reading there is a more or less distinct accompaniment of inner speech.

The writing movement has been studied chiefly by making records of the movements of the fingers, hand and arm as they contribute to the total movement as it appears at the pen point, and by measuring the speed of the pen movement and the pressure which it exerts. The

fingers, hand, forearm and upper arm unite in various ways in different individuals to form a very complex and difficult movement co-ordi¬ nation. Some diversity among individuals is desirable. Changes in pressure and in the speed of the stroke accompany the production of the particular letter forms. The speed changes determine the rhythm of writing, which is closely related to ease and good form.

In the field of number some work has been done, particularly with the early stages of learning. The child gets his abstract idea of number through such concrete experiences as counting, measurement and manipulating grouped objects, and there has been a good deal of discussion of the relative advantage of these experiences. Among other subjects of discussion are imagery types and their bear¬ ing on number operations, the nature of the mental process in calculation and the amount and conditions of improvement in reckoning. Little study has been made of the mental process in solving complex problems.

The problem of spelling has been attacked

from several angles, to determine, for example, the relative advantages of the drill method and the incidental method of learning, the best method of presentation of spelling words, the advantage of class study in comparison with individual study, *etc.* Elaborate studies have also been made of adult writing vocabularies in order to discover what words should be taught.

Studies of drawing have been directed chiefly toward the development of drawing ability and interest in the child. They have shown that the young child uses drawing as a language to express his ideas with a great deal of freedom, and have led to the acceptance of much crudity in his early work, in the knowl¬ edge that greater faithfulness of representation will come later.

There has been discussion of the psychology of other subjects, such as language and litera¬ ture, history, geography and science, but little experimental investigation.

Tests in the School Subjects. — Besides ex¬ periments which are designed to discover the nature of the learning process in school sub¬ jects there have been in the past few years — for the most part since 1910 — many attempts to devise standard methods or tests to make

possible comparable measurement of the pro¬ ficiency of children in the school subjects. These tests in some cases are made by the help of ˆ“scales® or series of specimens of pupils’ products in the subject in question, graded so as to represent regularly ascending degrees of excellence, with which the products to be graded may be compared. Of this sort are several handwriting scales, a scale for judging English composition and a scale for drawing. Such scales do not by any means eliminate judgment in grading, and it is found necessary to give graders training before their scoring is uniform or comparable to the scoring of other grades ; but it is possible by the use of such scales to obtain more accurate compari¬ sons of the work of different groups of pupils than without them. The handwriting scales have proved the most successful on ac¬ count of the greater ease with which excellence can be defined in handwriting than in such sub¬ jects as composition or drawing.

The other type of test consists of a series of tasks which are carefully selected so as to rep¬ resent essential phases of a subject of study, and which elicit responses from the pupils which can be definitely and objectively graded. The units which enter into such a test are care¬ fully graded by preliminary application. Some¬ times they are made of as nearly equal diffi¬ culty and sometimes of progressive difficulty. The latter arrangement is desirable when pupils of a wide range of ability are to be tested. Tests of this general nature have been used chiefly in the subjects of arithmetic, reading, spelling and algebra, while beginnings have been made in some of the other subjects.

Among the questions which are being vigor¬ ously attacked by the use of tests are individual differences in the attainment of pupils in their mastery of the school subjects and the accom¬ panying large overlapping in the ability of pupils of different ages and school grades, the large variation in the results obtained in dif¬ ferent classes, schools or school systems, the causes of these variations and the relation of

methods of teaching or of supervision to the pupil’s attainments.

General Tests. — Finally a branch of edu¬ cational psychology which has been energeti¬ cally pursued within the past 10 years and in which there has already been considerable de¬ velopment both in methodology and in out¬ comes, consists of tests which are designed to measure some phase of a mental function of a more general sort than is involved in one of the school subjects. Tests of sensory acuity — as of vision and hearing — and of keenness of sensory discrimination have been developed and used for a much longer puriod than 10 years. But apart from the detection of special sensory defects, for which elaborate technique and special instruments have been devised, and from the interests of theoretical psychology, the study of these elementary mental functions has in large measure given place to the attempt to measure the higher mental processes. Excep¬ tion should perhaps be made of tests of pitch discrimination, which has proven significant as a means of detecting capacity for musical edu¬ cation, and of some other simple processes which may be important as means of determin¬ ing vocational fitness. But in general the bur¬ den of opinion is that tests which involve such processes as memory, association, reflective thought and originality in meeting problems give much more valuable insight into intel¬ lectual capacit3ˆ

The recent revival of mental tests is due in large measure to the work of the French psy¬ chologist, A. Binet. Binet was given a com¬ mission to prepare a method of selecting chil¬ dren from the schools of Paris who were to be put into special schools for retarded pupils. In collaboration with T. Simon he arranged a series of tests graded in difficulty and desig¬ nated certain points in the series as correspond¬ ing to the capacity of children at particular stages of development. In the first revision of the series in 1908 a group of tests was chosen to represent each age from 3 to 13. A still further revision in 1911 brought some rear¬ rangement but no change in the principle of construction.

The Binet-Simon graded tests have stimu¬ lated very extensive trial of the series itself and very many attempts to standardize other single tests or groups of tests. The fundamen¬ tal principle, which is that the child's advance¬ ment with age is accompanied by the attainment of the ability to perform tasks of regularly in¬ creasing difficulty and that the ability of a child to perform tasks above those which are found to be typical for his age indicates superior in¬ telligence, while his inability to perform tasks which are typical for his age or for a lower age indicates inferior intelligence — this principle of age standards has proven to be ver}ˆ fruitful, although many questions of detail have arisen in the application or interpretation of the tests.

A more radical reconstruction is represented in the Yerkes-Bridges point scale which uses almost entirely Binet tests but discards the ar¬ rangement by ages. The child is given a certain number of points of credit for successfully passing each test (or partial credit for partial success) and his score is obtained by adding all his points of credit. The score is then inter¬ preted by comparison with age, sex, etc., norms.

It is obviously of advantage to have con¬

venient means of determining in an examination of an hour or less the degree of intelligence of the child. Imperfect as the methods thus far developed admittedly are, they are already very useful in selecting children for special educa¬ tion, either because they are retarded or ad¬ vanced — and in examining delinquents in the courts to determine whether the delinquency is due primarily to intellectual defect.

The very extensive recent experimentation with single tests has resulted largely from the use of tests of the higher mental processes as already noticed and from the derivation and adoption of the more refined methods of calcu¬ lating correlation. The significance of a test can onl3ˆ be determined by working out the relation between ability in the test and ability in some other test, or general ability as meas¬ ured for example by the estimate of teachers or acquaintances. A test is useful according to the closeness of the correlation between attain¬ ment in the test and some other attainment rep¬ resenting the ability which it is designed to measure. Besides tests of general intelligence some attempt has been made, with only limited success up to the present, to devise tests of the special sorts of ability which are reciuired in the various vocations. Tests of general intelli¬ gence themselves have proved to be of some value for vocational guidance.

Bibliography. — Binet, Alfred, and Simon, Th., ˆMentally Defective Childrenˆ (authorized trans. by W. B. Drummond, New York 1914) ; Ebbinghaus, H., ˆ Memoryˆ (trans. by H. A. Ruger and Clara E. Buseniiis, New York 1913) ; Freeman, F. N., ˆPsychology of the Common Branchesˆ (Boston 1916) ; Huey, E. B., ˆThe Psychology and Pedagogy of Readingˆ (New York 1908) ; Judd, C. H., ˆThe Psychology of High School Subjectsˆ (Boston 1915) ; Meumann, E., ˆVorlesungen zur Einfuhrung in die experimentelle Padagogik, etc.ˆ (Leipzig 1911-14) ; Monroe, Walter S., De Voss, J. C., and Kelley, F. J., ˆEducational Tests and Measure¬ mentsˆ (Boston 1917) ; Swift, E. J.,

ˆMind in the Makingˆ (New York 1908) ; Terman, L. M., ˆThe Measurement of Intelligenceˆ (Boston 1916) ; Thorndike, E. L., “Educational Psychol¬ ogyˆ (New York 1913) ; Whipple, G. M., ˆMan¬ ual of Mental and Physical Testsˆ (Baltimore 1914) ; Yerkes, R. M., Bridges, J. W., and Hard¬ wick, Rose S., ˆA Point Scale for Measuring Mental Ability (Baltimore 1915).

Frank N. Freeman,

Associate Professor of Educational Psychology,

University of Chicago.

EDUCATION, Public School Organiza¬ tion. See Public School Organization ; Pub¬ lic OR Common Schools.

EDUCATION, Retardation. See Educa¬ tion OF THE Feeble-Minded and Mental De¬ fectives ; Retardation of Pupils.

EDUCATION, Religious, in the United States. See Religious Education in the United States.

EDUCATION, Rural. When school sys¬ tems were first organized in America, the people of this country were almost wholly engaged in agricultural pursuits. The social and civic life of the people was extremely simple. The in¬ crease in population, our great development in industrial and commercial activities, the rise

of great cities in all parts of the country, and the advancement in science and invention have been the means of establishing advanced stand¬ ards of civilization which require complicated services from the social and civic institutions of the country.

Administration of Rural Schools. — The great agency in America which is to prepare our citizens for the highest possible kind of service and which is to enable them to meet successfully the great problems of a democracy, is the public school system. This enlarged scope of the

function of the school has brought prominently to the attention of the public many problems which affect the economic and efficient administration of our school systems. One of the most difficult of these problems and one of paramount importance to the country at large is the proper organization and administration of rural schools. This question is, of course, one of primary importance to the agricultural sections of the country and, yet it is not exclu¬ sively related to the interests of rural commun¬ ities. The number ,of people residing in the cities of the country has constantly increased until nearly one-half of the entire population now reside in cities. The number of the cities in the country and the population of these cities will constantly increase. There has been a decrease in the population of the agricultural sections of nearly every State in the union. The prosperous and growfing cities and villages with their increasing millions of people and their great industrial plants turning out bil¬ lions of dollars' worth of manufactured pro¬ ducts to be distributed throughout the civilized world are placing additional burdens and afford¬ ing greater opportunities and advantages to those w'ho are living upon the farms.

The agricultural lands of America must sup¬ ply not only the food products for the people living in the cities as well as the country and certain raw' materials which are needed in the great manufacturing establishments, but they should also be able to reap the financial reward which will come from supplying the demands of foreign trade. To accomplish this result, there must be more intelligent, scientific man¬ agement in our agricultural pursuits. The ad¬ ministration, therefore, of rural schools must have a direct and vital bearing upon the eco¬ nomic, industrial and commercial activities as w'ell as upon the social and civic progress of the nation. The interdependence of the people living in the cities and of those living in the rural sections must be recognized, and the schools maintained in the rural or agricultural sections must be administered from the broad standpoint of the general needs of the nation.

There has not been the same measure of im¬ provement in the rural schools of the country that there has been in the advancement of the schools of the cities and populous sections of the nation. The general trend of educational movements in the cities for a long period of years has been to enable the schools main¬ tained therein to meet the living conditions and necessities of the people whom such schools serve. Unfortunately, this general object has not been in view in the administration of rural schools. There has, however, been^ a great change in school administration and in public sentiment in this respect within the last 15

years. Many of the leaders in national move¬ ments have come to see that the rural school problem is one of the great constructive prob¬ lems in the public affairs of the country. Great energy is now being devoted to an effort to make the country schools the equal of the city schools. There has been much legislation in all parts of the country to accomplish this result. The school term has very generally been extended ; compulsory education laws have been made more effective; there has been an enlarged use of school buildings and grounds with the idea of organizing the school itself as a social center; provision has been made for organizing instruction in agricultural courses in all schools ; consolidation of small schools has been encouraged by the pa3'ment of larger quotas of state funds ; medical inspection of school children has been authorized as a means of conserving life in agricultural communities, and provision has been made in various ways to afford boys and girls living in the remote farm sections the advantages of academic or high school training. This is a long list of im¬ portant legislative measures which have been considered in many of the States. The effect of the enactment of these law's upon the effi¬ ciency of rural schools is now yielding results. However, to make the work of the rural school as efficient and as w'ell adapted to the needs of the people as the city schools are, several im¬ portant things must be done. Among these are :

1. The courses of study maintained in the rural schools must be adapted to the social and economic conditions of rural life.

2. The schools maintained in the rural sec¬ tions must be in operation for a period of time equal to that which schools are maintained in the city or more populous sections.

3. The same care must be taken to conserve the life of the child in the rural community v/hich is now generally exercised in the city.

4. The school buildings, grounds and equip¬ ment of the rural school must be as adequate and as attractive as those of the city schools.

5. The teachers employed in the rural schools must be the equal in culture, scholar¬ ship, professional training and experience of the teachers employed in the city schools.

In recent years there has been a great ex¬ pansion in the courses of study intended to meet the conditions of industrial centers. The theory is that the school is not only to teach children the fundamentals of an

education but it is intended to train them so that the instruc¬ tion which they receive shall be of service to them when they leave school to assume their obligations of citizenship. To meet the neces¬ sities of boys and girls who go into industrial life, manual training, industrial and vocational schools have been authorized. If courses of study are to be maintained in populous centres for the purpose of meeting the needs of the industrial workers, the obligation rests upon the State to make provision for equal opportunity in the education of boys and girls who are to assume the responsibility of the future opera¬ tion and management of the agricultural in¬ terests of the country. Instruction in industrial and vocational courses may be given as satis¬ factorily in the rural schools as in the city schools. Agriculture is the greatest industry of the nation. The schools maintained in the

agricultural regions contain the great bulk of recruits for farm life in the nation. Practical courses should be given in these schools along the lines of scientific agriculture. Potato clubs, corn clubs, canning clubs and other similar clubs related to agricultural work should be organized in every rural school. Home pro¬ ject work will be an important feature of a modern, efficient rural school. To illustrate: the pupils in a corn club could be shown what soil is adapted to the growing of corn and what fertilizer is essential. They could be shown how to prepare the soil for planting corn ; the selection of seed could be carefully determined; the planting could be done at the proper time, and the crop could be properly cultivated; the value and necessit)'^ of frequent cultivation and of rotation in crops could be illustrated. The harvesting could be done at the proper time and under the best approved methods and the method of placing the crop in the market with the least expense and the greatest advantage to the producer could be learned. The farms located in every school district in the country should be made the great laboratories on which experimental work in farming could be carried out. The parents of children in the schools will generally be willing to cooperate with a successful teacher in the experiments which such teacher desires to make in the real live, active management of a farm. The same pro¬

cess could be pursued in sections where potatoes are the principal crop. Similar experiments could be made in relation to all farm products, fruit growing, *etc.* Matters pertaining to the management and care of the home will interest the girls; the canning of fruit, preserving vege¬ tables, making bread, etc., are activities in which they may be interested and given in¬ struction. In most of the great agricultural States, a State college of agriculture is main¬ tained at public expense. These institutions are all doing great research work and are making scientific experiments and are producing information for the benefit of the farmer. This information, however, will not be of great service to the State unless there is some me¬ dium able to bring it to the general knowledge of the farmers of the State and to make of such information a practical application. Fruit exhibits and contests, vegetable exhibits and contests, similar exhibits and contests in grain and other products, the common rules to be observed in caring for poultry, and a dairy are matters which may be included in courses of study in rural schools and increase the in¬ terest in school work and make the work of the school more effective, practical and effi¬ cient. In the year 1917 800 boys pursued in the schools of New York State what is known as home project work. After paying all ex¬ penses incurred in their experiment and being assigned for their own labor $20,000, these 800 boys had a net profit of $40,000. Each of these boys earned on the average $75. Of course, some of them earned more than $75 ; some re¬ ceived less; and some sustained a loss. Is not this, however, the rule in the actual affairs of life including farming? Does not this experi¬ ment present the opportunity to show the boy who failed the causes for such failure, to point out to him how such failure may be turned to success, and to offer to him the necessary en¬ couragement to achieve this result? These il¬

lustrations are sufficient to indicate the type of work which is to form a prominent feature of the courses of study in the future work of the rural schools of America.

It is not the custom in any of the States to maintain rural schools for the same period of time which schools are maintained in the cities. In most of the States there is a pro¬ vision of law which requires the school to be maintained in every district and city of the State for a certain number of months. This period of time varies from four months to nine months. It is the custom, however, in cities to maintain school for ten months. Four weeks is usually considered a month. It is not possi¬ ble to give the boy or girl in the country dis¬ tricts the same opportunity to obtain an edu¬ cation which is afforded

to the boy or girl in the city unless the period of time which school is maintained in the country district is equal to the period of time that the school is main¬ tained in the city.

Supervising and directing the health inter¬ ests of children is now regarded as essential as the supervision and direction of matters per¬ taining to their intellectual development. This work has been organized as a part of the regu¬ lar school work in nearly all the cities of the country. It should be extended to all rural schools. The conditions of children in the country districts is generally at a lower stand¬ ard than the health of children in cities. The child who is compelled to attend a country school is just as much entitled to the benefits of health instructions as the child residing in the city. A child in the country district is sub¬ jected to the danger of contracting a con¬ tagious disease and is, therefore, entitled to every precaution which the State can afford to protect him from this danger. There is not the same careful supervision of the physical condition of children living in the country that there is of those living in the cities. The rural school should, therefore, be made the great agency not only in the development of health regulations, but of a knowledge of sanitary principles in all rural communities. Physical training should form a part of the curriculum of every rural school. The children in the coun¬ try undoubtedly have more open air exercise than children living in the cities. This does not mean, however, that they do not need physical training which is provided for the children in the cities. The children in the country districts are generally in greater need of systematic training in physical education than the children living in the cities.

The chijdren of the cities are afforded grpter facilities for play purposes than the children of the country. It is argued that children of the country have the entire farming area in which to play and to obtain recreation. They niay not obtain these privileges, how¬ ever, without becoming trespassers. The chil¬ dren living ˆ in the country are entitled as a rnatter of right to playground facilities. The sites on which country schools are erected should contain a sufficient amount of land so that a playground, croquet ground and other necessary recreation and play may be organ¬ ized and maintained for the benefit of the children attending such school. These facilities may be provided without large expenditure. It is entirely within the financial ability of school ’

districts to provide these facilities for the children. The most progressive communities are giving this subject attention. The tendency throughout the country is to erect attractive school buildings in the country districts. It costs but little more to make a country school building attractive, sanitary and to conform to the modern principles of lighting, heating and ventilating. The State school authorities of each State in the Union should possess the au¬ thority to approve the plans and specifications of every rural school building which is con¬ structed. The grounds should also be made attractive.

There is no factor in a rural school so im¬ portant as the teacher. Proper courses of study, suitable and attractive buildings with adequate equipment, the maintenance of schools for a longer period of time will not lead to the progress required in the administration of the rural schools unless teachers of better qualifi¬ cations are employed in such schools. Lower standards of qualifications are now maintained for the teachers employed in rural schools than in the city and village schools. The chil¬ dren in attendance upon these schools will not receive the efficient instruction to which they are entitled until teachers are employed in these schools who have qualifications substantially equivalent to the qualifications provided for teachers in the populous centres. The teachers in these schools should, therefore, be required to show the completion of a four years' aca¬ demic course of training and thereafter the completion of a professional course of two years which relates especially to the conditions and needs of rural life.

Consolidation of Rural Schools. — To effect the general change in the administration of rural schools to enable these institutions to accomplish the purposes which are now de¬ manded of them, there must be a reorganiza¬ tion of rural school systems. Two elements are essential for the maintenance of successful rural schools. There must be a sufficient num¬ ber of children to create the interest essential to the school and a sufficient amount of prop¬ erty to support such school without the taxa¬ tion becoming burdensome. The modern idea in all parts of the country is to consolidate small rural schools into central schools so that these schools may be properly graded and ad¬ vanced instruction be provided. The daily rural free delivery, the telephone, electric lights, good roads, the automobile, the auto bus

and the trolley line are the advance agents of the consolidated rural school.

The first State in the Union to enact a law providing for the consolidation of school dis¬ tricts was New York. That State took such action as early as 1853. The action taken, _ how¬ ever, applied to cities and villages. It did not extend to country districts. Massachusetts pro¬ vided for the consolidation of schools as early as 1869 and made provision at the same time for the transportation of pupils. The consoli¬ dation act of Massachusetts related to rural schools. About 1890 Massachusetts paid less than $23,000 for the tranportation of children who lived so remote from schools that they could not walk to and from school daily. Twenty-five years later Massachusetts was pay¬ ing for the same purpose $500,000. The move¬ ment for the consolidation of schools and the

transportation of children has gradually ex¬ tended until it has reached every State in the Union. Indiana, North Dakota, Ohio and many of the central western States have been leaders in this movement. Indiana has undoubtedly done more in the matter of consolidation of rural schools than any other State. The suc¬ cess of the great effort which is now being made throughout the country to improve the rural schools depends very largely upon the the consolidation of schools and the transporta¬ tion of pupils. It has been established in all parts of the country that it is feasible without injustice to the taxpayer or hardship to the children to organize consolidated rural schools which will afford the country children prac¬ tical, cultural and advanced courses of instruc¬ tion which are the equivalent in every particular of courses which are maintained in cities and villages. It is just as feasible to maintain courses in these schools which will prepare a boy for admission to college or for industrial or professional life, as it is to maintain such courses in the cities and villages. Agricultural and industrial arts and home economic courses should form an important part of the curricu¬ lum of a school of this type, and the boys and girls desiring to pursue vocations along these lines are entitled to the same aid and encour¬ agement that is given to the boys and girls who desire to pursue the long established traditional courses.

Transportation. — There is now an extended system of transportation of school children in operation in all parts of the country. Many agencies are now utilized extensively in taking children to and from school when these chil¬ dren reside too far from the school to walk to

and from it daily. Boys and girls go to school portions of the year on bicycles. Various types of individual conveyances are used. The automobile has been brought into extensive use for this purpose. Automobile busses are em¬ ployed in several communities. Electric lines, steam lines, motor boats, etc., are also em¬ ployed. Where transportation is provided sys¬ tematically and with good business regulations and supervision, the objections that have been raised are generally overcome. A child may ride from two to four miles in a comfortable wagon or other conveyance in order to attend a good school without hardship. Lffider proper regulation it is just as safe for children to be conveyed to school as it is for them to walk to school. Where busses or conveyances are em¬ ployed for the transportation of children, they must be operated under definite regulations which are strictly observˆed. There should be an established route with scheduled hours for arrival and departure and drivers should carry watches and be required to meet this schedule. It is possible to arrange schedules so that chil¬ dren will be on the road the minimum period of time and be required to travel a minimum distance. These matters are beinˆ arranged in all parts of the country without inconvenience to the home and without interfering with the established hours which regulate farm life. No person should be employed as a driver to carry children to and from school who has not the full confidence of the community. He should be made responsible for the conduct of the children during the time they are under his care to the same extent that a teacher is re-646

sponsible for their conduct while they are in school. Transportation should be provided at public expense. In many States appropriations are made to communities which provide trans¬ portation.

Highways and the Schools. — There is another modern factor which enters into the ability to provide better educational facilities in country districts and this is the improved system of highways which is being established in many of the States. Not only are the States developing improved highways, but the national government is making appropriations for the construction of highways. These roads have made rural life more attractive, have made agricultural pursuits more profitable by bring¬ ing the farm in closer touch with the markets, and they afford those living in the rural re¬ gions the

opportunities of social life which prevail in the village and city. These roads have also enhanced the value of farm property. We may, therefore, confidently expect that im-: proved State roads will be extended and de¬ veloped in the future.

The greatest obstacle in the way of better rural schools is the increased cost involved in their maintenance. The relation of the coun¬ try district to the city and to the State at large is such that States may with propriety and \vith justice to all parts of the State appropriate more money in proportion for the maintenance of rural schools than it does for the mainte¬ nance of schools in cities. The relation of the maintenance of proper rural schools to the needs of the nation itself is such that the national government has instituted a plan which contemplates national aid for rural education. The results which could be accomplished for the national service through appropriations by the national government justify the government in making such appropriations. The rural school systems of the several States should be made as practical and as efficient as the schools maintained in any of the populous centres of the country.

Thomas E. Finegan,

Superintendent of Public Instruction for the State of Pennsylvania, Formerly Assistant Commissioner for Elementary Education, State Department of Education, Albany, N. Y.

EDUCATION, Secondary, in America.

The history of American secondary education presents three stages of development : First, the colonial period, with its Latin grammar schools; secondly, the period extending from the Revolutionary War to the middle of the 19th century, with the ˆacademy® ; and, thirdly, the period down to the present, chiefly charac¬ terized by the growth of public high schools.

THE COLONIAL PERIOD.

1. The Founding of Grammar Schools. —

The influences which most vitally affected the early development of secondary education in America were the example of the ˆˆgrammar schools® of England and the ri.sing spirit of democracy, which was largely Calvinistic in its modes of thought and kept in touch with Cal¬ vinistic portions of Europe.

Early in the history of the colony of Vir¬ ginia. funds were raised and

lands set apart for thp endowment of n T.atin grammar school. But these promising beginnings were swept

away by the Indian massacre of 1622 and the school seems neyer to haye been opened. The town of Boston set up a Latin school in 1635, which has had a continuous existence down to the present time. This school was established by vote of the citizens in a town meeting; it was supported by private donations and by the rent of certain islands in the harbor, desig¬ nated by the town for that purpose ; and a town rate seems to have been levied when nec¬ essary to make up a salary of $244.50 a year for the master. Other Massachusetts towns followed the example of Boston. School fees were commonly collected. A town rate, which was depended upon at first only to supplement other sources of revenue, gradually came to be the main reliance; and by the middle of the 18th century most of the grammar schools of Massachusetts charged no fee for tuition, Latin schools were early established in Con¬ necticut; one at New Haven in 1641 and one at Hartford not later than 1642. A notable be¬ quest of Edward Hopkins, sometime governor of Connecticut colony, available soon after the middle of the 17th century, was devoted to the maintenance of Latin grammar schools in Hart¬ ford and New Haven, and also in the towns of Hadley and Cambridge in Massachusetts. The Dutch at New Amsterdam opened a Latin school in 1659, continued for some years after the colony passed under English rule. Secon¬ dary schools were established in Pennsylvania in the latter part of the 17th century. One of these, the William Penn Charter School at Philadelphia, has continued down to the pres¬ ent day. King William's school at Annapolis was erected by the legislature of Maryland in 1696, and similar schools were established in dif¬ ferent sections of the same colony. The 18th century saw schools of like character opened, partly by legislative enactment, partly by pri¬ vate initiative, in these and in the remaining colonies. Some of the number, like the Uni¬ versity Grammar School in Rhode Island and the Free School at New York, were the fore¬ runners or the accompaniments of colonial colleges.

2. Character of the Grammar Schools. —

The chief emphasis in these colonial schools was laid on preparation for the college en¬ trance examination and the requirements for admission to college determined the course of study. The colonial grammar schools accord¬ ingly taught Latin, a little Greek, religion and little else. Both grammar schools and colleges were intended especially for the directive and professional classes and had little

connection with such elementary schools as there were. In Massachusetts, towns which maintained grammar schools were not required to main¬ tain reading schools. Sometimes pupils were taught to read in grammar schools, but the grammar school teachers objected to this bur¬ den ; and, too, the mixing of the two grades of instruction in one school was recognized as an evil. The grammar schools exercised a kind of selective function, discovering latent ca-pacitv for the higher studies and starting tal¬ ented vouth on the wav to college. Those who showed capacity of a lower grade or of a dif¬ ferent sort received little attention or encour¬ agement.

3. The Organization of Colonial Systems.—

In the organization of colonial systems of sec-

oiidary education important beginnings were made. In 1647 the colonial legislature of Mas¬ sachusetts decreed that an elementary school should be maintained in every town of 50 fam¬ ilies; and that in every town of 100 families there should be a grammar school, in which students might be fitted for the university. This provision was copied by the colonies of Connecticut and New Hampshire, and in Con¬ necticut the provision was afterward changed to require a grammar school in each county town. These New England colonies maintained and enforced such provisions down to and after the Revolution. Maryland also established by law a system of county grammar schools. When the colonies were transferred into States, after the Declaration of Independence, the sys¬ tems of schools in the four colonies mentioned were continued with little change, but no other of the 13 States had anything that could be called a system of public instruction.

THE PERIOD FROM THE REVOLUTIONARY WAR TO THE CIVIL WAR.

1. The Founding of Academies. — As we ap¬ proach the Revolutionary period, we find new social conditions giving rise to a

new order of schools. With the growth of sectarian differ¬ ences there appeared a decided tendency to¬ ward the separation of governmental from ec¬ clesiastical affairs and thus the position of edu¬ cational institutions was disturbed. This change lessened the prestige of colonial systems of edu¬ cation among the adherents of the religious de¬ nominations and a growing distrust of the col¬ leges appeared among those who were most in accord with the secularizing tendency of the time. The old grammar schools were weakened by these influences and in their stead there grew up a new type of secondary school, com¬ monly known as the academy.

Both the name and the character of the new institution were suggested by precedents in Eng¬ land, where the Dissenters were excluded from grammar schools and universities. In the lat¬ ter part of the I7th century the nonconformist bodies ‘first established ^academies,® schools in the main secondary, which, however, undertook to prepare candidates for the nonconformist ministry. The fame of these English acade¬ mies seems to have influenced the thought of the American colonists in the matter of public edu¬ cation ; first the strong theological bent of their English prototypes reappeared in the new Amer¬ ican schools ; and then the resemblance was more obvious in the wide range of studies of¬ fered, for the Engldsh academy had been more practical and technical than the university. But the American academies soon came to have a well-defined character of their own, apart from any conscious imitation of English models.

In 1726, a school for classical and theologi¬ cal studies was established by a Presbyterian minister at Neshaminy, in Pennsylvania. It was commonly known as the ^Log College,® as its home was a building made of logs. This school in the wilderness was the centre of deep and widespread interest in classical studies as well as in the religious life. It sent out large numbers of zealous pastors and teachers, who established *log colleges® all over the highlands of the middle and southern colonies. The Neshaminy Log College itself was later in¬ corporated with what is now Princeton Uni¬

versity. Through the efforts of Benjamin Franklin, a school was established at Philadel¬ phia, legally incorporated as an academy in 1753, and probably the first institution in Amer¬ ica formally designated by that title. It was under the control of a self-perpetuating board of trustees. A fund raised by private subscrip¬ tion for its establishment and maintenance was supplemented by a grant from the city treasury and by tuition fees, which were re¬ mitted in the case of

those unable to pay. This academy organized in three departments or schools ; namely, the Latin, the English and the mathematical, put little stress on the theological element and much on English language and lit¬ erature and the mathematical sciences. The school ultimately developed into the University of Pennsylvania. Within two or three decades after the founding of this school at Philadel¬ phia, a number of schools somewhat similar in character, and some of them bearing the name academy, were established in the middle and southern colonies. In New England the two Phillips academies, one at Andover in Massa¬ chusetts and the other at Exeter in New Hamp¬ shire, were incorporated in 1780 and 1781, re¬ spectively. The influence of these two schools extended to remote States, especially in the growing West ; and they still rank among the strongest and most influential secondary schools. The academy movement begun in Revolutionary times grew apace even down to the period of the Civil War. More than 150 were incorporated in Massachusetts alone between 1780 and 1865. Dexter in his ˆHistory of Education in the United Statesˆ tabulates 6,085 academies in the United States in 1850, employing 12,260 teach¬ ers and giving instruction to 263,096 pupils.

2. The Character of the Older Academies. — The old academies were generally endowed in¬ stitutions, organized under the control of self-perpetuating boards of trustees or of religious bodies, established to serve the need of a wide constituency and not merely of a single com¬ munity, and often located in small country places. Many of them made provision for boarders as well as for day pupils. They were not intended in any exclusive sense for the training of future members of the learned pro¬ fessions, although many of them developed into preparatory schools. In the Western States preparatory schools attached to colleges were commonly called ˆˆacademies.® But such was not the earlier purpose of the academies, which were largely schools for the middle classes and answered to a growing desire after learning for its own sake, or for the increased efficiency it would give in other than profes¬ sional pursuits.

Their training was more ˆpractical® than that of the colleges, wider and more liberal than that of the grammar schools, or of some of the colleges. They laid new stress on the study of the English language, together with grammar, rhetoric and public speaking. They taught mathematics, often including surveying and navigation ; began the study of natural science, especially of natural philosophy (phys¬ ics), of which astronomy constituted an import¬ ant division ; gave courses in geography, an¬ cient history, English and above all American history, French often and German seldom. T.atin and Greek were the substantial core of the instruction offered. In the earlier days, the

course of study was not well defined. In Eng¬ lish, Latin and mathematics a good degree of continuity of work was apparently maintained, but in others, classes were formed at irregular periods, because of the exigencies of rural life which demanded certain courses be confined to a short winter term not interfering with farm labor. When finally definite courses of study were laid out, they varied in length from three to four or five years. Parallel courses were of¬ fered. That including classical studies and covering the required preparation for admis¬ sion to some college was commonly regarded as the standard course of the school. With this might be found an English course. Afterward a scientific course was often provided.

Many of these schools were established by religious bodies. Catholic secondary schools began to appear in this period, established by the several teaching orders. The Society of Jesus founded institutions of secondary and higher education in the United States after the Revolutionary War; the Brothers of the Chris¬ tian Schools opened their first school in Amer¬ ica at Montreal in 1838; soon after set up estab¬ lishments within the United States, at Balti¬ more and New York, and followed these ele¬ mentary schools with secondary courses ; and besides many conventual schools for girls were established, v/ hich drew a large clientage from other than Catholic families. The academies established by Protestant bodies usually termi¬ nated their formal connection with ecclesiasti¬ cal societies upon their legal incorporation. The religious instruction which they carried on con¬ cerned itself for the most part with the broad underlying principles of Christianity, so that the non-Catholic academies, even such as had arisen from the initiative of religious societies, tended toward the non-sectarian character which has been more fully exemplified in the public schools of later times.

The grammar schools had been exclusively for boys. Such was the case with many of the academies. But others were coeducational, and there grew up also a large number of acad¬ emies for girls, which were all too often weighed down with the title of ˆfemale seminary.ˆˆ The last

two prepared the way for two types in higher education, appearing in the fourth decade of the 19th century; namely, the coeducational college and the college for women exclusively.

The academies broadened the intellectual horizon of families and communities and re¬ inforced the protest which was arising against the narrow curriculum of the American col¬ leges. In the absence of special schools for the training of teachers, the better elementary schools were for a long time in the hands of academy graduates. Special classes were or¬ ganized in New York and Pennsylvania acad¬ emies for instruction in the art of teaching and a seminary for teachers was opened in con¬ nection with Phillips Academy at Andover. When State normal schools began to be estab¬ lished in Massachusetts in the year 1839, sug¬ gestions for their organization and management were drawn from this seminary and from the current practice of academies. With the intro¬ duction and subsequent rapid growth of normal schools in this country a new means of sec¬ ondary training of considerable importance was

added, since these institutions began and con¬ tinued to devote a large share of their time to work essentially academic in character and of secondary rank.

3. The Rise of the Public High School. —

In the early part of the 19th century there appeared a strong demand for schools under the exclusive control of the State. The Calvinistic view of the civil power had prepared the way for State agency in education, and the steadily advancing separation between Church and State kept alive the question as to the relation of the schools to both. The well-established theory that the State should grant charters to colleges, authorizing them to man¬ age their own affairs under close corporations, with incidental aid from the State in the shape of gifts of land or money, was long applied to secondary education as well. ' The first step in the establishment of public secondary schools was taken by the larger towns and municipali¬ ties, under the lead of Boston, where in 1821 was established an ^^English Classical School,® which soon took the name of ^^English High School,® probably imitating the style of the Edinburgh High School. The report to the school commit¬ tee made at the time of its founding said : ^^The mode of education now adopted, and the branches of knowledge that are taught at our English grammar schools are not sufficiently extensive nor otherwise calculated to bring the powers of the mind into operation nor to

qualify a youth to. fill usefully and respectably many of the stations, both public and private, in which he may be placed.® A three-year course was adopted, embracing English lan¬ guage and literature, mathematics, navigation and surveying, geography, natural philosophy (including astronomy), history, logic, and moral and political philosophy. Latin and modern languages were added afterward and the course was extended to four years. Students were received into the high school from the elemen¬ tary schools of the city, but at first were not prepared for admission to college, that being the function of the Latin school. But with the addition of foreign languages to its course of study the English High School fitted its stu¬ dents for admission to certain higher institutions.

Other Massachusetts towns followed the lead of Boston in this matter. Philadelphia, in 1838, established the Central High School, under special authorization from the Pennsylvania legislature. Baltimore followed with the estab¬ lishment of a ^^city college.® Providence opened a public high school in 1843. Hartford, in 1847, transformed her old grammar school into a school of the newer type. New York opened a ®free academy® in 1848, the name of which was afterward changed to the College of the City of New York. This school was estab¬ lished in accordance with a special act of the State legislature, ratified by vote of the people of the city. The growth of public high schools prior to the Civil War was not rapid. The exact number established in the first 40 years of the movement has not been accurately de¬ termined, due to the inaccuracy and meagerness of data upon the question. Inglis, compiling from data giyen in the report of the United States Commissioner of Education for 1904, estimates the total number established prior to 1860 at 321, indicating, however, that the esti-EDUCATION, SECONDARY

mate is probably very inexact. Cubberley, fol¬ lowing a table prepared by William T. Harris while United States Commissioner of Educa¬ tion, says that as late as 1860 but 69 of our present cities are regarded as having organized a clearly defined high-school course of study. Prior to the Civil War, and for a long time after it, the public high school movement en¬ countered hostility from those who regarded the academy as the final or best solution of the problem of public secondary education. It also encountered hostility from those who

were op¬ posed on principle to the recognition of sec¬ ondary education as a proper field for govern¬ mental agency.

4. The Beginnings of State Systems of Secondary Edudation. — Soon after the close of the Revolutionary War, new State systems of education began to be established, in which special provision was made for secondary schools. The University of the State of New York, erected in 1784, is a notable example of the strong influence which French thought then exercised in American affairs, as it realized the conception of a university put forth by Diderot and others of the great French writers of the latter half of the 18th century. It em¬ braced the whole provision for secondary and higher education within the State, with the exception of schools of a purely private charac¬ ter. Its control was vested in a Board of Regents, consisting of the governor and the lieutenant-governor, ex officio, and 19 members elected by the State legislature. The reorganiza¬ tion of 1787 made the Board of Regents distinct from the Board of Trustees of Columbia Col¬ lege, with which it had been identical. This ^^university^^ exercised great influence on later systems ; and in Georgia, by an act passed in 1785, ®A11 public schools instituted, or to be supported by funds or public moneys in this State, shall be considered as parts or members of the university®; and in the territory of Michigan an act was passed in 1817 instituting a university of imposing character. The latter establishment existed mainly on paper, and the act incorporating it was repealed in 1821. The Georgia ^^university® also never amounted to much in its original form. But although the comprehensive type of university organization was not widely adopted, there was a general desire in the early part of the 19th century to establish complete and well-rounded systems of public instruction. The legislature of Ten¬ nessee declared in 1817 that ˆInstitutions of learning, both academies and colleges,ˆ should ever be under the fostering care of this legis¬ lature, and in their connection with each other form a complete system of education.® Even more significant is the provision of the consti¬ tution of Indiana, adopted in 1816, that ®It shall be the duty of the general assembly, as soon as circumstances will permit, to provide by law for a general system of education, ascend¬ ing in regular gradation from township schools to a State university wherein tuition shall be gratis and equally open to all.®

For the most part, however, actual State agency in secondary education was as yet lim¬ ited to the subsidizing of privately managed academies. In Massachusetts the provision for grammar schools under town control was con¬ tinued after the colony became a State, but the law was so changed that only the larger towns

were left subject to this requirement. At the same time academies established by private initiative were endowed by the legislature with grants of public lands. In Kentucky the State legislature granted 6,000 acres of public lands to an academy in each county. In Pennsylvania colleges and academies received financial aid from the State for many years, culminating in 1838 in a general State system of educational subsidies. Five years later such aid was dis¬ continued. In other States the granting of State subsidies, in money or lands, to secondary and higher schools was customary for many years. For the most part there was but little system or consistency observable in the distribution of such aid ; and the State-aided institutions were not subjected to any sort of State control.

It would seem an easy transition from the State policy of granting subsidies to private secondary schools to the policy of providing by law for the establishment, and even the support, of such institutions. This transition was not, however, readily made, since, as has been men¬ tioned, many objected to the principle involved regarding secondary education as a proper field of governmental agency. The legal questions wrapped up in this latter contention were not settled until 1874, when the Supreme Court of Michigan, in what is known as the ˆKalamazoo Case,® decided: ˆˆNeither in our State policy, in our constitution, nor in our laws do we find the primary school districts restricted in the branches of knowledge which their officers may cause to be taught, or the grade of instruction that may be given, if their voters consent, in regular form, to bear the expense and raise the taxes for the purpose.® The principle in¬ volved was applied long before this decision, however. As early as 1798 Connecticut author¬ ized the opening of higher schools by the local authorities (ˆschool societies®). In Massachu¬ setts the law requiring grammar schools in the towns was so far weakened, in 1824, that towns having a population of less than 5,000 were allowed to substitute therefor an elementary school. But three years later, 1827, it was enacted that every town having 500 families should provide a master to give instruction in the history of the United States, bookkeeping, geometry, surveying and algebra ; and every town having 4,000 inhabitants a master capable of giving instruction in Latin and Greek, his¬ tory, rhetoric and logic. Due to the strong entrenchment of the ˆdistrict system,® this law was modified and even weakened manv times prior to the Civil War; but in the revision of 1859 all of the essential provisions were re¬ enacted and even bettered. Iowa adopted a provision in 1849 expressly permitting the aid¬ ing of higher grades to the public schools ; and in 1858 authorized the establishment of county high schools. In New

York, systematic grading of schools went steadily forward ; and the ^^academic departments® of these schools corre¬ sponding to the high schools of other States, formed a part of the University of the State of New York and received financial aid from the literature fund. In Maryland, the county academies, which had displaced the grammar schools of colonial days, continued for many years to receive financial aid from the State. Prior to the Civil War, therefore, all later types of State interest in secondary schools of a public character were at least represented :

the ˆpermissive® type ; the obligatory type ; and the type in which a complete and well-rounded system was sought.

THE PERIOD FROM THE CIVIL WAR TO THE PRESENT.

1. Statistics of Growth. — From the Civil War to 1890 data upon this point are very in¬ complete and inaccurate. The United States Bureau of Education, formally established in 1866, almost immediately began to collect sta¬ tistics regarding secondary institutions. Diffi¬ culties were at once met in classifying such institutions and in getting reports from them. Work of secondary character was done in schools bearing all sorts of titles : academies, high schools, seminaries, female seminaries, in¬ stitutes, grammar schools, preparatory schools, colleges, universities, schools of science and nor¬ mal schools. It was well into the eighties before the public high schools began to rival their competitors in numbers of students. Since 1890 the growth in such schools as well as in the number of students enrolled in them has been phenomenal. The following table is compiled from the report of the United States Commis¬ sioner of Education for the year 1914 :

Year

Public

Private

Schools

Teach¬

ers

Stu¬

dents

Schools

Teach¬

ers

Stu¬

dents

1889-90.

2,526

9.120

202,963

1,632

7,209

94,931

1894-95.

1899—

4,712

14,122

350,099

2,180

8,559

118,347

1900.

6,005

20,372

519,251

1,978

10,117

110,797

1904-05

7,576

28,461

679,702

1,627

9,850

107,207

1909-10.

10,213

41,667

915,061

1,781

11,146

117,400

1913-14.

11,515

57,909

1,218,804

2,199

13,890

154,857

The tremendous growth shown has been the result of a large number of factors. In the first place, social changes of great significance have been taking place since the Civil War period. A number of these changes peculiarly important in their bearings upon secondary edu¬

cation need but be mentioned : the rapid in¬ crease of population containing a large per¬ centage more or less unacquainted with our political conditions ; the growth of science with resultant discoveries and inventions ; and, largely in consequence of these, the multiplication of industries and vocational opportunities requiring special training. Along with these, the increase in wealth, both public and private, the growth of cities, the systematization of business and the opportunities afforded for leisure have produced far-reaching results upon secondary and higher education. In the second place, education as a study has taken a place among the sciences. In this development secondary education has re¬ ceived attention, especially in the field of adolescent physiology and psychology. G. Stan¬ ley Hall's notable work on ˆAdolescenceˆ (q.v.), published in 1905, started a new interest in both the kind and the extent of education which youth should receive. All of these factors are extremely complex in their bearings ; and in spite of the great advances so far made, the principles of secondary education both in their administrative and theoretical aspects constitute problems rather than fixed conclusions. Some

of the most important of these problems may be reviewed.

2. The Relation of Secondary to Higher Education. — While the public high school grew up primarily to serve the students who did not plan to enter college, the new institution did not long remain uninfluenced by the demands of higher institutions. In the seventies and eighties, much discussion took place relative to the wisdom of high schools emphasizing prep¬ aration for college ; but the question was soon dropped and the problem of adjusting the rela¬ tion between these institutions became probably the most important question in secondary educa¬ tion for the ensuing three or four decades.

One of the earliest methods of adjusting this relationship, and one which remains to-day as probably the most effective, is the so-called ˆaccrediting system.® This system was inaugu¬ rated by the University of Michigan in 1871. Effider it the university admitted to its fresh¬ man class, without examination, such graduates of approved secondary schools as were especially recommended for that purpose by the prin¬ cipals of those schools. It depended upon a purely voluntary agreement between the sec¬ ondary schools and the higher institutions, so that the school rather than the individual was examined; and the inquiry related chiefly to the vitality, intelligence and general effective¬ ness of the instruction. A large number of other

State universities have adopted this gen¬ eral plan; some have developed elaborate and rigid means of inspecting the secondary schools, while others have failed to do so because of the large amount of work and expense involved. Some have relied to a large extent upon written reports ; others have insisted upon first-hand in¬ spection by a university officer. In 1914, ac¬ cording to the bulletin of the United States Bureau of Education on ˆAccredited Secondary Schools in the United States® (Bulletin, 1915, No. 7), at least 19 State universities relied upon lists prepared by their own authorities. A num¬ ber of private universities and colleges likewise build their own lists ; some examples of these are University of Chicago, Johns Hopkins Uni¬ versity, Catholic University of America and Saint John's College.

In a considerable number of cases State laws have empowered their own State departments of education to classify and standardize sec¬ ondary schools. Some erect very elaborate systems of grading and employ an adequate in¬ spection force. _ In 1914 New York had an inspections division under the Board of Regents consisting of a chief and 13 assistants, of whom 10 at least gave their whole time to the work. Ohio and Minnesota are other notable examples of this system, but with a less highly developed technique than New York. In many cases. State universities accept the lists of accredited secondary schools made by the State departments ; such is the practice at present in at least 10 States. In some of the Southern States the success of this system has been made possible through cooperation with the General Education Board of New York city. These State lists have served other ac¬ crediting boards throughout the country and have exerted a powerful influence toward rais¬ ing standards within the States preparing them.

A third series of agencies influential in de¬ veloping the accrediting system may be found

in a number of associations formed in different sections of the country and made up of repre¬ sentatives froni both secondary schools and

higher institutions. These grew up primarily to bring these representatives together for the pur¬ pose of discussing common problems ; and while retaining the original purpose, they have added the work of preparing lists of accredited secondary schools for the use of the institu¬ tionsˆ represented. The parent society of this sort is the New England Association of College and Preparatory (now Secondary) Schools or¬ ganized at Boston in 1885. This organization prompted the establishment of The New Eng¬ land College Entrance Certificate Board in 1902. This is now made up of representatives from all the leading colleges and universites of New England and has a list containing the names of more than 400 accredited secondary schools. The Association of Colleges and Preparatory Schools of the Middle States and Maryland came into existence in 1892. Out of this grew the College Entrance Examination Board in 1900. While this board relies for the most part on the examination of the individual student, its influence upon the relation between sec¬ ondary and higher education is essentially the same as that of the accrediting system. The North Central Association of Colleges and Secondary Schools was formed at Evanston, Ill., in 1895 ; and The Association of Colleges and Preparatory Schools of the Southern States at Atlanta, Ga., in the same year. Both of these associations have extensive lists of accredited schools.

The criteria used by these different accredit¬ ing bodies differed widely in the demands they made upon secondary schools, and they still continue to do so. For example, at the present time the College Entrance Examination Board recognizes but 11 subjects as permissible in a standard high school course while the Univer¬ sity of Minnesota recognizes 22. Some means of securing uniformity, therefore, became a significant problem ; and this problem remains as vital to-day as it was in 1890. Inasmuch as no mechanical adjustment between secondary schools and colleges can settle this problem, the important attacks that have been made upon it have attempted to go to the bottom of the edu¬ cational questions involved in order to get a basis for determining the details of relationship.

The first and one of the very most significant attempts at solution was made by the Com¬ mittee on Secondary School Studies, appointed by the National Education Association in 1892 and known as ˆˆCommittee of Ten.® Nine sub-committees of 10 members each were appointed to prepare reports on the several ordinary departments of secondary school instruction ; namely, Latin, Greek, Eng¬ lish, other modern languages, mathematics, physics (with astronomy and chemistry), nat¬ ural history (biology, including botany, zoology and physiology), history (with civil government and political economy),

geography (physical geography, geology and meteorology). The Committee of Ten, having secured carefully prepared reports from its sub-committees and having examined a large number of the courses in actual use in secondary schools, drew up a report which was published by the United States government in December 1893, together with the reports of the several sub-committees.

Great stress was laid on the correlation of studies in secondary schools, the unifying of rnany subjects into a well-knit course of instruc¬ tion, through the recognition of their numerous interrelations. The committee would have continuous instruction in the four main lines of language, mathematics, history and natural sci¬ ence. In particular they recommended that in the first two years of a four-year course each student should enter all of the principal fields of knowledge, in order that he may fairly ^^exhibit his quality and discover his tastes® ; and urge the postponement of the beginning of Greek to the third year, in order that the student may not find himself at the bifurcation of the course into classical and Latin-scientific courses before he is ready, or his advisers sufficiently informed as to his capabilities, to make an intelligent choice. The committee would re¬ quire in each course a maximum of 20 recita¬ tion periods a week; but they would have five of these periods devoted to unprepared work; and would reserve double periods for laboratory exercises whenever possible. With reference to requirements for admission to college, the committee recommend ˆffhat the colleges and scientific schools of the country should accept for admission to appropriate courses of their instruction the attainments of any youth who has passed creditably through a good secondary school course, no matter to what group of sub¬ jects he may have mainly devoted himself in the secondary schools.® ®A good secondary school course® they describe as consisting of any group of studies from those considered»by the sub-committees, ˆprovided that the sum of the studies in each of the four years amounts to 16, or 18, or 20 periods a week, — as may be thought best, — and provided, further, that in each year at least four of the subjects presented shall have been pursued at least three periods a week, and that at least three of the subjects shall have been pursued three years or more.® The next attempt at an adjustment of the relations of secondary schools and colleges, to the educational advantages of both, is contained in the report of the Committee on College En¬ trance Requirements, appointed in 1895 by the National Educational Association and consisting of 14 members, representing the high schools and universities of different sections of the country, under the

chairmanship of the super¬ intendent of high schools of the city of Chicago. The first important service rendered by the committee was the preparation and publication of a table showing the actual entrance require¬ ments of 67 representative colleges, universities and higher technical schools in the United States. The committee's final report, presented at the meeting of the National Educational As¬ sociation in July 1899, is mainly devoted to the attempt to establish ˆnational units, or norms,® in the several subjects taught in the secondary schools as preparatory to the college course. The fundamental problem ˆfis to formulate courses of study in each of the several subjects of the curriculum which shall be substantially equal in value, the measure of value being both quantity and quality of work done.® In the determination of these norms the committee received assistance from several bodies of ex¬ pert scholars in the several branches of instruc¬ tion. The supplemental papers received from these bodies arc published in connection with

the committee's report. The committee adopted 14 resolutions, of which the following are of the greatest general significance :

1. That the principle of election be recog¬ nized in secondary schools.

4. That we favor a unified six-year high school course of study, beginning with the seventh grade.

6. That while the committee recognizes as suitable for recommendation by the colleges for admission the several studies enumerated in this report, and while it also recognizes the prin¬ ciple of large liberty to the students in sec¬ ondary schools, it does not believe in unlimited election, but especially emphasizes the impor¬ tance of a certain number of constants in all secondary schools and in all requirements for admission to college.

12, That we recommend that any piece of work comprehended within the studies included in this report that has covered at least one 3ˆear of four periods a week in a well-equipped sec¬ ondary school, under

competent instruction, should be considered worthy to count toward admission to college.

In more recent times a number of attempts have been made to solve the problem of the relation between secondary and higher institu¬ tions. One of these has accomplished consid¬ erable good on the side of the mechanical aspects involved in the adjustment; namely, the National Conference Committee on Standards of Colleges and Secondary Schools, formed in 1906. This committee is composed of represen¬ tatives from the accrediting associations men¬ tioned earlier in this section, together with rep¬ resentatives from the National Association of State Universities, the Carnegie Foundation for the Advancement of Teaching and the United States Bureau of Education. This comm'ittee has defined the ^^uniU for purposes of accredit¬ ing as follows : ® A unit represents a year's

study in any subject in a secondary school, con¬ stituting approximately a quarter of a full year's work. This statement is designed to afford a standard of measurement for the work done in secondary schools. It takes (1) the four-year high school course as a basis, and assumes that (2) the length of the school year is from 36 to 40 weeks; that (3) a period is from 40 to 60 minutes in length ; and that (4) the study is pursued four or five periods a week; but under ordinary circumstances a satisfactory year's work in any subject cannot be accom¬ plished in less than 120 60-minute hours, or their equivalent.®

The Carnegie Foundation for the Advance¬ ment of Teaching gave very serious considera¬ tion to the question of the relation of high school to college in the annual reports of 1910, 1911 and 1912. These reports make rather severe attacks upon certain practices in both the high school and the college. The former is criticized for superficial work — the covering of too many subjects with thoroughness in none. The college is criticized for insisting upon too rigid prescriptions in traditional subjects for admission ; they ignore changing social condi¬ tions. The burden of solving the problem is placed primarily upon the higher institutions : they must insist upon solid four-year high school courses, but must permit a wider range in the subject-matter in them.

The National Education Association has been giving renewed attention to the problem in the past five years. In 1910 the Committee of Nine on the Articulation of High School and College was appointed. The report was presented to and adopted by the Secondary Education

Department of the Association the following year. In basic principles this report is in sympathy with the position of the Carnegie Foundation. Adopting the ˆˆunit® set by the National Conference Committee on Standards of Colleges and Secondary Schools, it recom¬ mends the following standard high school course : Nine specified units ; three of English, two of one foreign language, two of mathe¬ matics, one of social science, including history, and one of natural science ; two additional academic units, and four units left as a margin for whatever work best meets the need of the individual. A much more radical and funda¬ mental solution of the question has been under consideration for the past four years by a com¬ mittee of the National Education Association known as the Committee on Economy of Time in Education. A report of this committee was published by the United States Bureau of Edu¬ cation in 1913 and remains essentially unchanged as it is being discussed to-day. So far as the question here at issue is concerned, the follow¬ ing of its recommendations are most significant: The elementary school should take the child from 6 to 12; the high school period should be from 12 to 18 or 12 to 16, and the college period from 18 to 20 or 16 to 20. ®The proposi¬ tion,® says the report, ®to make the high school period 12-18 or 12-16 and the college period 18-20 or 16-20 will adjust itself in the following ways: (1) It begins high school work at the proper time and continues it to the recognized age of college admission or of beginning life (12-18) ; (2) it provides for a large number who will enter vocations at 16 and adjusts itself to the idea of an intermediate industrial school (12-16) ; (3) it provides for the contingency that the college course in the reorganized scheme will end with the sophomore year and that the two years of college may be done in the uni¬ versity or in the larger high schools, and that the independent colleges may make a four-year course (16-20), admitting from the smaller high schools at 16.®

3. Relation of the High School Course to Social Conditions and to the Needs of the Student. — In spite of the so-called ˆMomination® of the college over the high school, the latter institution has at no time in its history sup¬ pressed its original ideal of serving the youth of all classes. The lack of an energetic re¬ sponse on the part of the high school to chang¬ ing social demands has been due in part to a basic principle of social psychology; namely, custom. The Renaissance ideal of a liberal education was the ideal of secondary education everywhere. It was well into the last half of the 19th century before the modern social view of education affected practice to any significant extent. Certain important changes in the course of study responding to this view have been made ; many others are in the process of adoption.

One of the earlier movements of this charac¬ ter was the manual training movement, in¬ augurated by the foreign exhibits at the Phila-

delphia Centennial Exposition in 1876. The first manual training high school established in the United States was that opened in 1880 in con¬ nection with Washington University at Saint Louis. In 1884 the Commercial Club of Chi¬ cago established the first private independent manual training high school in the country; the first public high school of this character was opened the same year at Baltimore. By 1890 at least 38 cities had such high schools; and by 1905 at least 63 cities had followed the example. Besides these, many academic courses had in¬ cluded the subject. In these schools and courses the idea of manual training for the purpose of general culture was usually uppermost, their projectors disclaiming any intention of estab¬ lishing schools for the teaching of trades. At present there is a tendency to view the sub¬ ject from the social and practical standpoint rather than from the disciplinary.

The commercial branches had their first ap¬ pearance in secondary school courses very early in the form of bookkeeping and commercial arithmetic. In the second quarter of the last century, private business schools began to flourish; and during the period from 1850 to 1890 they multiplied rapidly and furnished prac¬ tically all of the training demanded for purely clerical positions. The first Commercial High School, now in existence, was established by the city of Pittsburgh in 1872 ; the next was the Business High School of Washington, D. C., established in 1890; Los Angeles, Cal., came third in 1895. Other large cities followed : Louisville, Ky. ; San Francisco, Cal. ; Philadel¬ phia, Pa.; Syracuse, Brooklyn and New York City. Commercial courses were multiplied in academic high schools, and private business colleges waned in popularity for a time. In 1914 the United States Bureau of Education reported 2,914 public and private high schools offering commercial courses to 178,707 students. Very recently criticism has begun to the effect that commercial courses in public high schools do not after all really fit students for business; they approach their work

from a point of view too academic. Some of the better commercial high schools are attempting to overcome this weakness by articulating the courses directly with commercial life ; Boston and Cleveland furnish good examples of this tendency.

Preparation for agricultural pursuits through the high school began about 20 years ago, when Alabama established a school of this character in each of the nine congressional districts of the State. Five years later Wisconsin instituted its system of county schools of agriculture and domestic economy. This movement has gone steadily forward, and there are now at least 1,677 high schools, either public or private, giv¬ ing courses in agriculture to 34,367 students.

At present there is no more important prob¬ lem facing secondary school administration than that relative to the extension of vocational work in the high schools. States, cities and even the National government are taking an active in¬ terest in the question. Some States are encour¬ aging the establishment of such courses by means of appropriations; many of the larger cities have already established them and are making elaborate vocational surveys looking toward their extension ; and the question of Federal support to the movernent in smaller places is being discussed. This whole move¬

ment centers for the most part in the secondary school period; and in this country the fixing of this period between the ages of 14 and 18 and the almost universal provision for it of a type of education essentially liberal in character cause the movement to be attended with tre¬ mendous difficulties which bid fair to produce far-reaching and fundamental reorganization within the whole secondary system. Significant steps in this reorganization have already been ventured. One of these may be found in the newer type of technical or vocational high schools. In these the older kinds of manual training work have been given a distinctly new turn toward the practical ; trade courses of a high order have been added; and the academic subjects retained have in large part been treated from the standpoint of their bearing upon the practical work. Notable examples are the Al¬ bert G. Lane Technical High School of Chicago, opened in 1908; the Technical High School of Cleveland, opened in the same year; the Techni¬ cal High School of Newton, Mass., opened in 1909, and the High School of Practical Arts for Girls, opened in Boston in 1907. A second type of readjustment, which has received at least a trial, is the so-called ˆPart-Time Cooper¬ ative Plan,ˆˆ well illustrated in the High School at Fitchburg, Mass. In 1908 a number of manu¬ facturers

together with the school authorities agreed upon the establishment of a combined shop and school course four years in length. During the first year the student spends his whole time in the school ; for the next three years, he alternates weekly between shop and school, getting pay for the time he spends in the former. By this method the student gets actual shop training under shop conditions and secures a type of school work bearing directly upon the problems to be faced later in the call¬ ing. The Continuation School, so prominent in Germany, seems to offer a third type of desirable reorganization suitable to the needs of this country. Under this plan the employers permit their employees to attend vocational courses from four to six hours a week without loss of pay. Cincinnati began a high school course of this character in 1909. A fourth form of readjustment seems destined to give prom¬ inence to a kind of secondary school which is at total variance with the traditional ideals; namely, the Trade School. Such schools take boys and girls 16 years of age or over and, with little regard to their previous training, aim to provide them with skill in a particular trade. Examples are the Manhattan Trade School for Girls in New York City; the Philadelphia Trades School; the Milwaukee Trade School for Boys and a like one for girls, and the Wor¬ cester Trade School in Massachusetts.

Another form of adjusting the relation be¬ tween secondary education and vocational life is so significant that it deserves special mention. For a long time it has been a question among educators whether our secondary school period did not begin too late; evidences of this feeling have been mentioned in connection with the dis¬ cussion relative to the articulation of high school and college, notably the report of the Committee on Economy of Time in Education. In more recent times, studies in retardation and elimination have brought the question distinctly to the foreground. If boys and girls who need it most are to get any school training at all

which is directly correlated with the demands later to be made upon them, they must begin before the close of the elementary school

period as it now exists. To meet this situation, what is known as ˆprevocational workˆˆ has been established in the seventh and eighth grades. In some schools a ninth grade has been insti¬ tuted and shares in this kind of work. At present there is a strong movement toward giving these grades, in whole or in part, a dis¬ tinctive organization and name. So far as the titles are concerned, two are struggling for distinction, ®The Intermediate SchooPˆ and the ˆJunior High School.ˆˆ According to Briggs's treatment of the movement in the report of the United States Commissioner of Education for 1914, at least 193 cities have effected an organ¬ ization of the upper grades in some ways cor¬ responding to the ideas contemplated in the movement. By many it is hoped that the next step in the movement will be the general adop¬ tion of a junior high school, taking the student from 12 to 15, to be followed by a senior high school carrying the work on to the 18th year. By this organization the differentiated courses of the one school would be directly articulated with those of the other. Just what this differ¬ entiation shall be is now under discussion ; four types of courses are already prominent : the academic, the commercial, the household arts for girls and the industrial arts for boys.

Numerous as the difficulties of mechanical adjustment are in this whole movement for vocational training, they by no means exhaust the problems. The internal make-up of the courses is hard to effect, due to the lack of texts and to the lack of first-hand knowledge regarding the demands of the numerous call¬ ings ; teachers who combine teaching ability with wide vocational experience are rare; and the relative amounts of attention to give to theory and to practice are very difficult to de¬ termine. Experience in the field has led to an increasing number of new needs and possibili¬ ties. The Vocational Guidance movement may be cited as one of the most significant. For the student to decide upon a calling he needs to have a rather wide knowledge about the de¬ mands of numerous vocations as well as a knowledge of his own capabilities and tastes. His location in a proper position, too, requires caution and direction. The course of study must provide for the first and a capable director is needed for guidance, in the latter two. A few cities have made great advance already in at¬ tacking the question; the best known of these are Boston, Mass., and Grand Rapids, Mich. The vocation bureau of the former city was established in 1908 by Mrs. Quincy A. Shaw under plans worked out by the late Dr. Frank Parsons. Meyer Bloomfield, the present di¬ rector, has extended the work greatly and has described the results and problems in his ˆ Youth, School and Vocation.ˆ The develop¬ ments in Grand Rapids have been largely due to the work of the principal of the high school, Jesse B. Davis, whose book on

ˆVocational and Moral Guidanceˆ is exceptionally strong on the side of the educational aspects of the question.

The traditional secondary school course has not remained uninfluenced by the social and vocational movements in education; the course of study is receiving severe attacks from many quarters. The older problem of articulating

high school and college is being supplanted by the problem of adjusting courses of study to the needs of individual students and to social and civic life. The conception of liberal educa¬ tion is undergoing change ; and in partial re¬ sponse to it, the ˆˆgeneral courseˆˆ is appearing among the parallel groups. Certain new studies have begun to appear, likewise, such as ˆgeneral science,® ‘ˆcommunity civics,® art, his¬ tory of art and music appreciation. Two very significant criticisms of the high school course have been issued recently by the General Educa¬ tion Board of New York city: one prepared by Charles W. Eliot, entitled Changes Needed in American Secondary Education,ˆ and the other by Abraham Flexner, entitled ˆA Modern School.ˆ . The former would, aside from the introduction of vocational subjects, have more emphasis placed upon sense training through the sciences and drawing and more time for music. The latter article would have four fields represented in the curriculum — science, industry, aesthetics and civics ; and within some of the subjects, radical reforms are contem¬ plated in the way of bringing them into more direct bearing upon cultural and social life. Such reforms are proposed in particular for mathematics, ancient history and the modern languages ; grammar, Latin and Greek would be eliminated entirely.

4. Problems in Method and Management. —

The great changes in the aim and course of study have been accompanied by changes equally significant in method and management. The laboratory method which came with the introduction of the sciences, needs but mere mention. Means for vitalizing these subjects, as well as of others, have multiplied greatly: pictures, charts, diagrams, museums, models, and moving picture appliances are examples. For the past 10 years New York State has ap¬ propriated annually $20,000 for visual aids to instruction. ˆ Theˆ numerous criticisms of the results obtained in modern language instruc¬ tion have led to the partial adoption of the ˆˆDirect Method® in these branches. Dissatis¬ faction with results in English have led to

an interest in the ®Cooperation Plan,® whereby all of the teachers in a given school submit part of their written work to the English teachers. Analytic and drill methods in history and litera¬ ture are felt to be overdone and the so-called ^^Appreciation Lesson® is receiving a place in the newer books on high school method. Wider reading, fewer technical questions, dramatic presentation and more flexibility in general are required in this type of recitation. The learner, finally, is coming to be looked upon as a more important item in discussions of method than the teacher, and ^ffeaching the pupil how to study® has come to be one of the newer efforts in the high school. A part of this involves library instruction or how to use books. All of these advances in method are virtually attempts to avoid a part of the cramming procedure which grew up while college entrance was looked upon as the chief purpose of the high school.

Changes quite as important are taking place in the field of management. The rapid growth of high schools has resulted in the bringing to¬ gether of a large number of students in a single school; and athletic associations, dramatic so¬ cieties, debating teams, fraternities, and all kinds of clubs have grown up. Both the social

and educational philosophy of the past two or three decades have pointed to the ^^Self-govern- ment^^ scheme as the wisest solution of most of the questions of control involved. In New York city, a ^General Organization^^ has been effected to which a large number of the high schools of the city have subscribed. Each student in a given school, upon payment of twenty-five cents, becomes a member of this organization as effected in his own school. Such student members then adopt a constitu¬ tion and a set of by-laws which govern all the societies and clubs of the school. In some high schools, school savings banks are instituted and placed under the management of students. Co¬ operation with the home, wdth the authorities of the local government, and with other asso¬ ciations or societies in the community may be cited as added evidences of the ideal to bring the high school into close connection with all the better forces in society.

5. The Preparation of Secondary School Teachers. — A committee of the National Edu¬ cation Association — the so-called Committee of Fifteen on elementary education — reported in 1895, among other topics, on the training of teachers for secondary schools. The commit¬ tee declared that, ^^The degree of scholarship required for secondary teachers is by common consent fixed at a collegiate education.® They proposed a course of special training for such teachers, consisting of instruction during the senior year of the college course in psychology, methodology, school systems and the history, philosophy and art of education ; and a gradu¬ ate year of practice in teaching, under close supervision, supplemented by advanced studies in educational theory. That this proposal is far in advance of common practice or require¬ ment no one acquainted wfith general conditions can doubt. To just what extent States and cities are tending in the direction of this early proposal — which still remains the ideal — can be determined only through a study of the widely varying and detailed laws and regula¬ tions now in force. Some of the larger cities closely approximate these ideals with the excep¬ tion of the graduate study requirements ; and the latter are often rewarded though not required. The very general ^^experience® requirement in large cities makes practice teaching unneces¬ sary. One State — California — has very nearly met all of the requirements set forth in the proposals of 1895 ; a college degree from a recognized institution, graduate study both academic and professional amounting to one year or its equivalent, and practice teaching in the absence of experience are demanded. The State Board of Education is empowered by law to fix the details of certification regulations. In a considerable number of States, professional study of an undergraduate character is required of applicants qualifying under certain condi¬ tions. In general, the teaching force in the smaller high schools is not specifically prepared for the work it has to do. In New York State in 1914 very nearly one-half of all the high school teachers in the towns (as opposed to the cities) were holding normal school diploma licenses. In most sections of the country a strong tendency exists to employ only college graduates for high school teachers ; but definite and serious study in the pedagogy of secondary training appears very rarely as a requirement

either through custom or law. What pedagogy that is required is usually of the general kind. About 50 per cent of the high school teachers of Vermont in 1914 had not even had this. The State Commissioner of Education for Massa¬ chusetts in the report of 1912-13 complains that w'hile most of the high school teachers of the state are college graduates and that while many have taken

pedagogical courses in such insti¬ tutions, they ^^are, in relation to the work they are expected to do, deficient in professional training® and ^^approach their work as learners, as apprentices, to whom practical means and methods of effectively teaching boys and girls are as yet almost wholly unknown.® Definitely planned systems for the training of secondary teachers do not exist in this country. Aside from the State College for Teachers at Albany, N. Y., w'hich makes the preparation of high school teachers its main purpose, and several specific courses in other normal schools of the country looking in the same direction, the only means generally prevalent is that of the college and university departments of education, of which there are now some 350 of recognized standing. These, however, emphasize for the most part the general courses in education ; secondary method in some of the branches taught in the high school receive attention, but usually from the professors in these subjects in the college ; and few have well-organized prac¬ tice teaching. Other means in the improve¬ ment of secondary teachers are summer school courses, reading circles, teachers' associations, teachers' meetings within a given school, travel bureaus, sabbatical years, and the like; but these must be considered only a very small part of the solution to the larger problem to be faced in the systematic professional training of in¬ structors for high schools.

6. Tendencies in the Organization of State Systems of Secondary Education. — Nothing closely approximating the highly centralized system of French and German secondary edu¬ cation exists in this country. While the State is the legal unit of educational administration in this country, powers with reference to detail in organization are usually delegated to State boards of education, cities, counties, or even smaller units. The real test of the centralizing tendency in this country, therefore, resides in the extent to which the State, either by law directly or indirectly by delegation to the State Board of Education, takes a hand in the vital detail of organization in schools. The applica¬ tion of this test to current practice shows re¬ sults of a widely var > 4ng character so far as secondary education is concerned. A large number of the States provide for inspection of schools of this kind through an officer usually called ^^high school inspector® ; in a few States deputy commissioners of education are ap¬ pointed and assigned to secondary schools ; in some cases, inspection is little more than a formality, while in others it is very careful and results in approved lists of schools that are accepted by the State universities ; some half-dozen States employ systems of classifying high schools into grades and set minimal course requirements for each; in very few instances, are actual courses of study directly controlled by State

boards. The laws relative to the e.slablishment of high schools are in most of the States ˆpermissive® in character; and while

State aid is quite general for schools in rural districts, it is usually small in amount and cautiously guarded. Complete State certifica¬ tion of secondary teachers seldom exists. Large cities constitute a class by themselves, and cen¬ tral control is almost unknown to them. Neither uniformity nor the centralized systems of Europe would necessarily mean efficiency in America. What is most needed are State boards of education, free from political in¬ fluence, composed of men with large views and expert knowledge, and devoting themselves to vital questions of policy and vital questions of organization too large for the local adminis¬ trative units.

A number of States began early to take certain steps toward efficient control, and recent times have added to the number; three or four among these may be mentioned. Massachusetts has already been discussed; the compulsory establishment of high schools. State aid to the poorer districts, and minimum course require¬ ments of earlier years have persisted; and new extensions have been made in the way of State certification of teachers in the State-aided schools. State support for vocational education and inspection. Minnesota began a State sys¬ tem in 1881, headed by a State high school board which still exists and exercises such powers as approving courses of study, inspect¬ ing all high schools once a year, and determin¬ ing what institutions shall receive aid. Cali¬ fornia and New Jersey have made notable ad¬ vances in methods of certifying teachers and prescribing requirements for the same. New York, however, represents the most complete State system of control yet developed in this countiy. This system has been described in part already. Under it, all incorporated secondary schools are controlled by a Board of Regents serving as members of the University of the State of New York. This board manages the State funds to be distributed to secondary schools. Such funds, amounting to nearly $60,000 as early as 1832, have been added to by the legislature until in 1913 the total sum con¬ tributed

to secondary schools was $650,000. Approximately $140,000 of this was given for books and apparatus and $322,398 for the pay¬ ment of non-resident tuition, the remainder being apportioned on the basis of attendance of academic pupils. The Board also prescribes rules for awarding the State scholarships of $100 each to graduates of high schools to aid them in pursuing college work. Ultimately there will be 3,000 of such scholarships ; in 1914 awards were made to 750 secondary school graduates. A large force of inspectors, as¬ signed mostly according to branches of study, exercises supervision of instruction ; and an assistant commissioner of secondary educa¬ tion devotes his whole time to this branch of education. For the purpose of instituting a uniform basis for the apportionment of the so-called ˆliterature fund,® the Regents adopted in 1864 a system of examinations of elementary pupils. In 1878, this system was extended to the academic branches ; and in 1913, such ex¬ aminations were held in 889 schools, with 404,576 papers written, of which 288,194 were accepted. These papers were first graded at the schools and then regraded under direction of the Regents at Albany. A special examina¬

tion board under control of the Regents now prepares the questions. Each school falling under control of this central Board of Regents must report yearly to it and gets a rating in the annual report. By these four means — ap¬ portionment, examinations, inspection and re¬ ports — the Board of Regents exercises most of its far-reaching control over the secondary schools of the State.

Elmer Elsworth Brown, Chancellor of New York University.

EDUCATION, Secretarial. See Secre¬ tarial Education.

EDUCATION, The State Universities.

See State Universities.

EDUCATION, Study of. The study of education is, on the one hand, the study of a profession — the profession of the teacher, of whatever grade ; and, on the other, the study of a social force — the force that preserves and improves the civilization of each generation, and transmits it to the next — and of the insti¬ tutions which society has developed for the or¬ ganization and administration of this force. It goes without saying that these two aspects of the Study of Education are not independent of each other. Further, it is clear that the study is either a professional or a ˆliberal® study in accordance with the object

with which it is pursued. In this article no pains will be taken to keep these two aspects of the subject dis¬ tinct. The context will make clear which aspect is under consideration, and also when both aspects are considered together.

The systematic study of education is now carried on in the United States chiefly in nor¬ mal schools (State, city or private) and in colleges and universities. Less extended but often valuable opportunities for the study of education are afforded by county training schools for teachers, by classes in some high schools and academies, and by some other institutions : as, for example, training schools for kindergartners ; some departments of the so-called ˆInstitutes® (like Drexel Institute of Philadelphia, Pratt Institute of Brooklyn) ; and by ˆTeachers' Institutes.® Teachers' in¬ stitutes are carried on in towns or counties, for a few days or weeks, usually during the _ long summer vacation, and commonly receive support from the State treasury; they have been described as normal schools with very short courses of study. This article deals only with the study of education in normal schools, and in colleges and universities ; be¬ cause the work done by them is typical, and sufficiently comprehensive to cover the special work done in the other institutions mentioned. It may be said, however, that in general, the normal school aims only at the professional study of education ; that the college or .univer¬ sity department of education aims at both a professional and a ˆliberal® study of the sub¬ ject, but of a higher grade than that of the normal school; and that the university ˆˆSchool of Education® aims at a professional study of education only, but, at present, of the grades undertaken by both the normal schools and the university departments of education. Univer¬ sity schools of education are of recent origin, but they are already numerous.

Normal Schools. — The systematic study of education in this country has a rather brief his¬ tory. Although some beginnings had been made in the academies of New York and New England, the study of education really began in the State normal schools for the training of

ele¬ mentary school teachers, of which the first was founded in Lexington, Mass., in 1839. It began there with the study of methods of teaching the common branches of the elementary school cur¬ riculum, and the methods of governing or man¬ aging a class or a school. That is to say, the study of education began with the study of methods. For a long time the study of methods comprised the whole of the study of education, although it did not cover the whole work of the normal schools. Most of these schools gave, from the very beginning, and many of them still give, more attention to the study of the branches that the prospective teachers are to teach, and to extending the range of their scholarship be¬ yond those branches, than they gave and give to the study of methods. At the same time they naturally emphasized the study of methods from the beginning, and they still do so. This was natural, and, within reasonable limits, de¬ sirable. . It happened, however, that many nor¬ mal schools pursued the study of methods with such exaggeration of emphasis and such minute¬ ness of detail that they are chiefly responsible for the development of an erroneous conception — namely, that the study of education is still practically identical with the study of methods ; and this conception has done much to discredit the proper study of education and to prevent its appropriate development. How narrow and in¬ adequate this conception is has already been suggested. It is not strange that the normal schools should emphasize the study of methods. Their function is to train teachers ; and to teach well and govern wisely is the first duty of the teacher. But a good teacher not merely pos¬ sesses a good method ; he uses that method with discriminating insight into its efficacy, and with careful adaptation to the needs of every pupil. He not only commands the technique of his art, but he understands the principles on which his art is based, and has a clear conception of the ends which his methods are to serve. More¬ over, the study of methods was, too often, merely the study of a particular way of doing a particular thing — how to teach reading, spelling, writing, arithmetic and so on ; or how to secure conformity to this, that or the other rule of conduct; and this was (and is still) too often done in such a way as to convey the im¬ pression to the neophyte that there is no other correct way. The tendency of such instruction is, of course, to mechanize and not to vitalize instruction. In the hands of the less capable the study of education becomes under such cir¬ cumstances the inculcation of a mere routine ; individual initiative and self-criticism are sup¬ pressed or discouraged. In the hands of the more capable the result is not so bad ; but even in their hands the study of methods is elevated into an importance that enables it to obscure other fundamental aspects of the study of edu¬ cation and of the right training of teachers. Instruction in methods did, however, develop

systematic teaching where before there had been loose or haphazard procedure. By and large, the teachers trained in the normal schools proved their superiority over their untrained VOL. 9 — 42

predecessors and contemporaries. The normal school study of education, in spite of its nar¬ rowness, did bear good fruit. But the results were still unsatisfactory. The means and methods of education were studied, but the tendency to use them blindly and mechanically was too obvious to be overlooked. The study of education, thus far, had not penetrated to the root of the matter.

The conventional scheme of education as ex¬ pressed in existing programs (ˆcourses®) of study, and equally conventional methods of teaching and discipline, had been accepted with¬ out critical analysis of what it was all for, and to what extent the means and methods em¬ ployed were adapted to the nature of the chil¬ dren to be taught and to the demands of mod¬ ern life. Accordingly, it began to be clear that the study of education must mean more than the study of methods — the devices of teaching and governing. It was perceived that the mere acquisition of these devices often failed to im¬ part life and purpose to the teacher's work. Gradually it was perceived that what was lack¬ ing in the study of education was the assimila¬ tion of guiding principles which should forever prevent the teacher from conceiving his work as a mere routine, but should enable him to con¬ ceive it throughout as a rationalized endeavor. It was natural that these guiding principles should be sought, first of all, in psychology, which, as the science of mind, should reveal the process of learning; and by implication should therefore give an insight into the process of teaching. ˆˆAs we learn, so must we teach.® Moreover, the Prussian normal schools, which had served as models for our own, had long incorporated the study of psychology into their programs of study, and this feature of their programs, which, to be sure, had also found its way into our own but had been without special significance, was now seized upon as the chief source of the guiding principles we were seeking. This was about 1885. Before that time , psychology or ˆ %ental philosophy® had been pursued in our normal schools as an in¬ dependent study without vital relation to the study of education. Now, however, this rela¬ tion was perceived, and an extraordinary devo¬ tion to psychology as the key to all educational problems was the result. Before long, also, cer¬ tain phases of psychology or particular psy¬ chological theories, notably the Herbartain theory of ˆapperception® and the derived theo¬ ries of the "concentration® or "correlation® of studies, were heralded as the very gospel of

educational salvation. There is truth in the theory of apperception and of the correlation of studies ; but these theories were pursued and applied for a time with such extravagant and misguided enthusiasm, particularly in the Middle West, that they became “fads® ; and many sins were committed in their names by large numbers of well-meaning but not well-in¬ formed teachers and other students of educa¬ tion. Naturally, also, educational charlatans saw their opportunity in this conspicuous pop¬ ularity of psychology, and were not slow to grasp a profit from it by the sale of their wares in the form of lectures and books ; and much useless or misleading talk and trivial and un¬ scientific psychological literature was abroad in the land.

The most extravagant development of the

study of psychology by students of education was ‘^child study^^ which swept the country over from border to border some years ago. Parents, teachers or other students of educa¬ tion were discredited unless they endeavored themselves to make some contribution to the psychology of childhood, and these contribu¬ tions were actually attempted by teachers of all grades and by other persons of all degrees of intelligence. This excitement was, however, short-lived — it lasted 10 years at most. This was because a large part of the data which had been so enthusiastically collected, together with most of the ^^scientific® conclusions to which it was alleged they pointed, were held in slight esteem by the real psychologists. Such a result was inevitable. The psychology of childhood can be developed as a science only by persons trained for that purpose, just as physical sci¬ ence can be developed only by trained scientists. It was then seen that the chief advantage to be derived from the study of children by untrained observers was the effect on the observers them¬ selves. Not to extend the boundaries of the science of psychology, but to interest the ob¬ servers in children, to enable them to get into relation with child-life — that is the real value of child-study for most persons. And wherever this conception of its value prevails the study of children is to-day rendering good service to students of education. The acute stage of

extravagant devotion to psychology as a part of the study of education is now happily past ; and only good can be expected of the saner pursuit of it, which is fast becoming the rule.

From the foregoing it is already clear that far more was expected of psychology than could be realized. But more needs to be said on this point. Psjˆchology is even yet in its formative stage as a natural science, and 30 years ago was just emerging from its thralldom to metaphysics. It was, however, assumed to be a perfected science — a complete and accu¬ rate account of mental phenomena and their interdependence ; and hence the extravagant ex¬ pectations entertained of its value in giving in¬ sight into educational problems and a command over teaching processes. These expectations could not be realized; for, as has just been said, psychology is still a formative science and can¬ not therefore guarantee the complete insight into mental life — especially the mental life of children, which it was believed to yield ; and even if it were to-day all that it was then thought to be — a perfected science of mental life, and particularly of mental development — the acquisition of that science would not necessarily ensure technical skill on the part of the teacher. Insight and the practical application of insight are two very different things. Nevertheless, the widespread devotion to the study of psychology in normal schools and by teachers was a great gain to the study of education. It established the fact once for all that methods of teaching and governing have a rational basis in the constitution of human nature, and that it is the duty of the student of education and the teacher to ascertain what this basis is as nearly as he can. The study of edu¬ cation in normal schools had now progressed beyond the study of methods as mere devices to a study of these devices as based on the nature of the minds subjected to them. That is to say.

the study of education had gradually come to include ˆeducational psychology, and in par¬ ticular the psychology of childhood and adolescence.

Meanwhile, again following the lead of the Prussian normal schools, light for the path of the student of education was also sought in the records of the past. The history of education was appealed to for guidance in solving con¬ temporary problems of teaching and governing. It was only natural that a narrow conception of the significance of the history of education should have been entertained, because the study of education itself was still quite gener¬ ally interpreted as the study of methods. Nat¬ urally, therefore,

educational biography and ^^educational classics® or monographs setting forth the educational theories of individuals ot the past — both usually without reference to their social setting in the general history of their time — constituted nearly all that was studied as the history of education. In spite of this narrow interpretation of the history of education the study of that subject, like the study of psychology, was a great gain to the study of education. The recognition of the kinship of contemporary education with that of tlie past necessarily broadened and dignified the concep¬ tion generally entertained of the meaning of education itself and naturally enhanced the value of the study of that subject. For, although the history of education was at first in¬ adequately conceived and taught, it was inevi¬ table that it should ere long be recognized at its true value, namely, as a part of general history ; and hence that the student of education should come to realize that in studying the history of education he was studying nothing less than the history of culture — of the training of each generation to assume its share in preserving, improving and transmitting to the oncoming generation the resources of our civilization, and in so doing actively to promote the progressive solution of its problems. This true conception of the history of education is, how¬ ever, of very recent development. Although some of the normal schools have contributed to its development, many of them still adhere to the older conception, and it has remained for colleges and universities to give form and sub¬ stance to the new conception and to dis¬ seminate it.

Meanwhile, also, the study of education was gradually extended to include an examination into the adequacy and effectiveness of contem¬ porary schools and studies as a means of pro¬ moting the normal development of each indi¬ vidual as an individual and also as a means of adapting him to the civilization of his time — the twofold aim of all general education ; and this questioning, together with the formulation of the more or less satisfactory replies to it, sometimes alone but more commonly closely associated with educational psychology, consti¬ tute what is now often called ^^Science of Education,® ^^Philosophy of Education,® or more appropriately ^Educational Theory® or ^General Principles of Education.® In the light of the foregoing description of the his¬ torical development of the study of education in normal schools the present scope and aims of that study in those schools may be briefly summarized as follows :

It includes (1) Theory of Education or General Principles of Education, sometimes called ˆScience of Educationˆˆ or ˆ<Philosophy of Education,® pursued as a means of awaken¬ ing interest in and developing insight into the general problems of education (often not dis¬ tinct nor separable from (4) below) ; (2)

Methods; (3) Kindergarten Theory and Prac¬ tice ; (4) Psychology and the Study of Chil¬

dren, pursued as a source of information about the development of mental life and the proc¬ esses of learning and as a rational basis for methods of teaching and discipline — that is, psychology pursued as a science on which the art of teaching and managing children might be based and the study of children pursued chiefly as a means of developing a comprehending and sympathetic attitude toward children on the part of future teachers; (5) The Study of Teaching by observation and practice in ®model schools® or ˆˆtraining schools® ; (6) School

Organization and Management, chiefly internal organization and class management; (7) The History of Education, usually pursued as a source of suggestions for planning contempo¬ rary studies and methods of teaching and man¬ agement and, to a limited extent also, as a means of developing a broader professional outlook over and better professional insight into educational problems as problems of social evolution ; (8) School Hygiene ; (9) School

Laws as a source of practical information con¬ cerning the teachers' legal rights, privileges and duties.

As was pointed out above the work of nor¬ mal schools is not confined to the study of edu¬ cation ; but so far as that study itself is con¬ cerned the foregoing enumeration covers the ground, although not all of it is necessarily found in all normal schools. The foregoing de¬ scription also reveals the aim of the study of education in normal schools. That aim is primarily the technical preparation of the class¬ room teacher. Finally, it should be said that many normal schools are far inferior to others in the adequacy with which they conceive the study of education and in the thoroughness with which that study is carried on.

Colleges and Universities. — Great as the services are which the normal schools rendered it gradually became clear that they were alone unable to cope with the rapidly growing need of a more comprehensive as well as a more in¬ tensive study of education than they could sup¬ ply, Some time before the end of the 19th cen¬ tury the normal schools had made clear the great distinction between a trained and an un¬ trained teacher, as was pointed out above; and they had, accordingly, made good progress in the gradual transformation (still going on) of the calling of the elementary teacher from a mere routine into a profession. But the in¬ crease of the native population and the growth of cities, the enormous and steadily increasing influx of foreign immigrants, the geographical expansion and the much more important and very great commercial and industrial develop¬ ment of the country have been followed by our huge modern schools, our varied and complex programs of studies, our immense city school systems ; and hence a host of new educational problems have come into the field, — problems with which the mere classroom teacher of lim¬

ited academic training and narrow, even if thorough, technical training, is manifestly un¬ able to cope satisfactorily. We have, fortu¬ nately, many efficient grammar school principals and superintendents to-day who have had only a normal school training; but in no case are they etficient because their training was origi¬ nally limited, but in spite of that fact. More¬ over, the general public, particularly the edu¬ cated and the reading public, now take an interest in educational problems heretofore un¬ known, and this interest is increasing daily. This interest demands satisfaction and seeks educational leaders among the teaching pro¬ fession as well as good classroom teachers. At the same time it had long been apparent that many college-bred men of excellent scholarship were poor teachers. The college offered them no opportunity to learn how to teach. The problem was to secure, in addition to adequate scholarship, appropriate insight into education and technical skill in teaching. This the col¬ lege graduate could not and cannot ordi¬ narily secure in the normal school — first, be¬ cause the normal school was and is naturally and properly concerned chiefly with the train¬ ing of teachers for elementary schools and, therefore, has generally neither the teaching force nor the equipment to deal separately with college graduates who usually seek preparation to teach in secondary not elementary schools ; and second, because it was not and cannot be profitable in most cases to teach in the same classes college graduates and normal school students. The college-bred students are too far ahead of the normal

school students in maturity and scholarship to make a satisfactory combina¬ tion class. For similar reasons the normal schools are generally unable to provide ade¬ quate opportunities for teachers already in service who seek preparation for work as prin¬ cipals or superintendents of schools. Out of these considerations arose the university depart¬ ment of education which has undertaken to provide the college graduate with the opportu¬ nities he needs for the study of education — whether as a neophyte he is about to begin his professional career as a classroom teacher, or whether as an experienced teacher he returns to the university for the study of his profession under direction with a view to becoming a prin¬ cipal or a superintendent; or whether as an in¬ terested layman he seeks enlightenment as to the meaning of education and the means and methods of organizingˆ and directing it as a branch of State or municipal affairs.

The history of the stucfy of education in the colleges and universities of the country is even more brief than the history of that study in the normal schools, for it does not really begin until 1879, when the University of Michigan founded a chair of ®the science and the art of teaching® of co-ordinate rank with other chairs or departments. Education before that time (from about 1850) had been studied in ˆnormal departments® established at a number of col¬ leges and universities (more commonly of the Middle West than elsewhere), in which the study of education did not differ materially from that pursued in the normal schools. Such a normal department, for example, existed at Brown University from 1851 to 1854. It was discontinued ®in consequence of the establish-

ment in Providence of the Rhode Island Nor¬ mal School, so says the university catalogue for 1854-55. Another example was the normal department of the University of Iowa, which was, at first (1855), a department of the pre¬ paratory school of the university. It had a varied career and was gradually transformed into the present ˆˆSchool of Education® of the university. It exemplifies a not uncommon

process of development of these ˆnormal de¬ partments® into the university Departments of Education or Schools of Education or ˆˆTeachers Colleges® of to-day.

Not infrequently the courses in education instead of being grouped in a department or school of education or teachers college were, and are still, associated with and made a part of the department of psychology or philosophy, usually to the disadvantage of the study of education. This affiliation followed the lead of the German universities and dates from the time — not far back — when ˆpedagogy® rather than education was the subject studied. It has been found possible, however, in only a few college or university departments of education to solve the problem of technical training for neophytes. Teachers of experience and other persons who resort to the university to study the history and theory of education and the or¬ ganization and administration of school sys¬ tems find the instruction of any good professor of education decidedly profitable. But begin¬ ners who need to learn how to teach under di¬ rection usually fail to get what they most need — the laboratory work of actual teaching and management under the usual conditions that prevail in the classroom. A few college and university departments of education, like the department at Harvard University, have pro¬ vided such opportunities from almost the very beginning; but, except in some of the larger urban universities, it has generally been found impracticable. But the university department or chair of education has accomplished and is accomplishing a most important task, quite apart from what it may or may not accomplish in the training of young teachers, or in the training of principals or superintendents. It has made education in all its phases a university study. Apathetic and even hostile faculties have slowly yielded the false position that they once held, namely, that among all the fields of human thought and activity education is the only one it is not profitable to study; and this is a great gain. The gradual abandonment of false views concerning the study of education by members of the faculties of our higher in¬ stitutions has naturally been followed by similar progress on the part of the students. To-day university courses in education are attended by an increasing number of future lawyers, doc¬ tors and business men who do not care for the technical courses pursued by future teachers or school officers, but who wish to study the his¬ tory, theory and, to some extent, the organiza¬ tion of education, just as they study the history and theory of economics — that is, as a part of the proper equipment of a liberally educated man. The university department of education has, therefore, accomplished several important things. It has, at its worst, given college-bred teachers an insight into their future profession

which they formerly could not get at all ; that

is, it has helped to determine a professional at¬ titude and temper of mind of great importance for immediate efficiency and steady professional growth; and, at its best, it has done and is still doing this, and provides, also, actual laboratory work for the young teacher — classroom teaching under direction amid normal surround¬ ings, over a sufficiently long period of time ; and it provides suitable training for principals and superintendents of schools on the basis of good instruction and a comparative study, un¬ der direction, of schools and school systems in actual operation ; and, finally, it has established the study of education among the branches of a liberal education. At the present time more than half of the colleges and universities of the country make more or less provision for the study of education, and many more are prepar¬ ing to do so. But the development of this .study has naturally been more rapid in the State universities than elsewhere, save in the few cases noted above, that is, in the universi¬ ties that have developed ˆSchools of Educa¬ tion® of co-ordinate rank with their other pro¬ fessional schools. The scope and general aims of the college or university study of education, as now carried on, may be summarized as fol¬ lows : (1) To study education as an important

function of society as well as of individuals, and hence of interest to all university students whether they intend to become teachers or not. (2) To offer to university students who look forward to teaching the necessary technical training for their vocation ; and to teachers al¬ ready in service, an opportunity to study their profession under direction. (3) To offer to university students who have already had ex¬ perience as teachers, and to all teachers of suit¬ able age and attainments, appropriate training for future activity as principals or superintend¬ ents of schools. (4) To offer opportunities to advanced students for research in the field of education.

While the courses of study offered for the realization of these aims vary greatly, they may be briefly described as courses in: (1) Educa¬ tional Theory or General Principles of Educa¬ tion, sometimes called ˆˆPhilosophy of Educa¬ tion,® or ˆˆScience of Education.® The specific aim of these courses is to enable the student to gain a just conception of the scope and meaning of education and to make a critical examination of such generally accepted educational prin¬ ciples as will serve to guide him in his further study of educational questions. (2) Educational Psychology and Child Study. While this sub¬ ject could be appropriately regarded as a sub¬ division of the

preceding topic, it is usually offered in separate courses, the special aim of which does not differ materially — although the method of treatment does — from similar courses in normal schools. The work done in such courses in colleges and universities is usu¬ ally more scientific and thorough than in the corresponding normal school courses. (3) Gen¬ eral principles of method and special methods of teaching the several school studies, without and with practice teaching, particularly the methods of teaching secondary school rather than ele¬ mentary school studies. The instruction in the courses in special methods is sometimes given by instructors belonging to the department of education, but often by specialists chosen from

other departments of the college or university. (4) History of education studied as history. The purpose is to trace the historical develop¬ ment of modern schools and universities, with especial reference to their ideals, studies, modes of teaching and organization; together with the effect of economic, political, social and religious ideals on the spirit and direction of education ; and the influence upon school methods and cur¬ ricula of the general progress of the arts and sciences. Such a course should therefore give the student a view of the subject in its relation to the history of civilization, as well as a his¬ torical basis for sound criticism of the more important elements of modern schools and school systems. (5) The educational import¬ ance of play and recreation. (6) Education in practical arts for boys and for girls. (7) The education of exceptional (anaemic or tubercular, crippled, deaf, blind, truant and delinquent, men¬ tally defective) children. (8) Vocational (in¬ dustrial, commercial, agricultural) education. (9) The vastly important allied subject of vo¬ cational and educational guidance for school and college youth and for young people al¬ ready at work. (10) Organization and manage¬ ment of schools and school systems. The pur¬ pose of courses covering this last subject is to study both the internal organization and management of schools and school systems with special reference to the duties of prin¬ cipals and superintendents within a given school or school system, and also the organ¬ ization and management of education as

a branch of State and municipal affairs, at home and abroad. Accordingly, they deal with the appointment or election, organiza¬ tion, powers and duties of State and city boards of education ; the powers, duties and opportunities of superintendents, principals and teachers in cities and towns; the work of ele¬ mentary and secondary schools, including the construction of programs (^courses^) of study; and, in general, everything pertaining to the organization and efficient administration of our vast, complex and costly provision for public education ; and sometimes also a similar study of foreign schools and school systems. Such courses sometimes also cover the organization and management and the work of private and endowed schools. (11) School hygiene; the hygiene of school buildings and the hygiene of the pupils. (12) Seminary courses or research courses. Such courses offer opportunities to the most advanced students for prolonged study of particular educational questions. As the whole field of educational theory and practice abounds in unsolved problems and vast areas in the history of education are as 3'et un¬ touched, it is easy to see how important such courses are. Not all of these courses are found in every college or university department of education, but they are all found in some of them ; and in the university schools of educa¬ tion, to which reference has been made, all these courses are offered and elaborated with a minuteness of differentiation that should eventu¬ ally promote a very thorough study of the top¬ ics involved.

Progress in the study of education has been greatly facilitated in recent years by the rapid growth of a considerable body of good educa-cational literature both in books and periodicals

is still common, a large number of good books have been published in recent years and sev¬ eral periodicals have appeared worthy of a place beside the best educational literature that has been produced anywhere.

In addition to the study of education al¬ ready described, mention should be made of the study of education carried on by educational associations. The National Educational Asso¬ ciation is not only a vast forum for the discus¬ sion of educational questions, but since 1893 it has stimulated and subsidized educational re¬ search through committees appointed to report on selected problems. Several of the reports submitted by these committees have been of great value and more ma^^ be expected in the future. The State teachers' associations and other local associations throughout the country also occasionally carry on educational investiga¬ tions of more than local significance.

Mention must also be made of the studies in education now undertaken by associations of laymen and by some of the non-professional magazines.

Recent and very important developments in the study of education may be described as statistical and experimental studies of educa¬ tional procedure and approximately scientific studies (quantitative measurements) of educa¬ tional results. The purpose of these studies is to obtain objective standards whereby con¬ temporary educational procedure can be di¬ rected and results measured with an accuracy approximating the direction and measurement of results in the natural sciences ; and thereby to confirm or refute (as the case may be) educa¬ tional opinion. Such standards, when attained, constitute unassailable guidance for educational practice, which, for the most part, we now lack. The most promising standards thus far attained are in the field of elementary education — arith¬ metic (computation with whole numbers), pen¬ manship, spelling and reading. The study of education in the past has been based almost wholly on individual experience, and especially on the opinions of prominent individuals — lay¬ men and teachers. Such individual experience and opinion will always be worth studying, but the conviction that scientific research in educa¬ tion is essential to satisfactory progress, which has been slowly forming during the past decade, is now firmly established in the professional mind; and the statistical and experimental studies and the measurement of educational re¬ sults above referred to are the result. The literature of this important development in the study of education is growing rapidly. Apart from books, such studies are energetically pro¬ moted by several contemporary periodicals and by researches carried on by colleges and univer¬ sity departments and schools of education, work¬ ing independently, but often in cooperation with progressive supervisory officers and teachers in neighboring school systems. The conviction that such studies are essential to progress in educa¬ tion has also led to the establishment of depart¬ ments of research in about a dozen of the larger school systems of the United States. Such departments serve the same purpose in school activities that research departments and departments of design serve in industry and commerce. That they do serve such purposes, several of them have already proved.

Many important studies of entire school sys-

terns, called school surveys, have been made by specialists usually not connected with the sys¬ tems studied on the invitation of State, city and rural school authorities. The reports of these surveys, now numerous, constitute a vast mine of information for all students of educa¬ tion; indeed, the student of education in the United States will find no more important body of educational literature than is embodied in those reports.

Paul H. Hanus,

Professor of Education, Harvard University.

EDUCATION, Supplemental. See Sup¬

plemental Education.

EDUCATION, Technical. Technical edu¬ cation is a very modern form of educational en¬ terprise which is concerned with the training of men to make an organized practical applica¬ tion of a knowledge of the principles of chemis¬ try, physics (especially mechanics, heat and electricity), mathematics, astronomy and bacte¬ riology to the design, construction and opera¬ tion of machines, structures of all kinds, and the material conveniences of life. It aims to produce men of broad understanding of the field of applied science, who have insight, organizing power and leadership, not merely surveyors, draughtsmen or superintendents. Viewed in this light it is an important new phase of profes¬ sional education (see Education, Profession¬ al), always mindful of the need of increased production, but distinguished from industrial education (see Education, Industrial), which is designed primarily to prepare men and women for maximum production with a mini¬ mum expenditure of time and human energy. Broadly speaking, technical education is engi¬ neering education, but the term engineering now includes a variety of divisions which would have been entirely incomprehensible to the founders of the early schools of applied sci¬ ence; it applies rather to the expert direction of organizations which utilize the forces and materials of nature through large combinations of human units than to the actual labor of pro¬ duction. In addition to the usual branches of engineering — civil, electrical, mechanical, min¬ ing and architectural — there must now be in¬ cluded chemical, railway, marine, ceramic, sani¬ tary, textile,

agricultural, metallurgical and aeronautic engineering. ˆ

The scheme of technical education for all of these specialized engineering professions pro¬ vides for firm grounding of the student in the processes of the fundamental pure sciences ap¬ propriate to the specialization, whether chemi¬ cal, ceramic, textile or aeronautic. In the usual four-years technological course leading to a Bachelor's degree this is accomplished largely in the first two years, in which instruction in mathematics, chemistry, physics, surveying, etc., is given, sometimes by basing the two-years engineering curriculum upon two years of liberal arts, as in the University of Missouri. In the case of five-years engineering courses or six-years combination courses the fundamentals may occupy the first two years or the first three years as in the Columbia School of Mines, in which the three-years technological courses in mining, engineering and chemistry are based upon the three years of study in a collegiate or scientific school. After these fundamental sciences and additional instruction in English,

economics, politics, etc., the curriculum of the last two or three or four years of technical courses follows divergent lines of study pre¬ paratory to the practice of specialized engineer¬ ing professions, which aim to meet correspond¬ ing specialized demands arising out of the un¬ paralleled development of mechanical, struc¬ tural and industrial needs of a nation of 110,- 000,000, complex in its interests, rich in its re¬ sources and impatient in its development.

The first school of engineering in the United States was the Rensselaer Polytechnic Insti¬ tute (q.v.), founded at Troy, N. Y., by Stephen van Rensselaer in 1824, as a School of Theoret¬ ical and Applied Science, to furnish ˆinstruc¬ tion in the application of science to the common purposes of life.ˆˆ No further provision of the kind was made until 1847 when the Sheffield Scientific School at Yale and the Lawrence Sci¬ entific School at Harvard were founded. In the same year the University of Michigan voted to establish a course in civil engineering. These four schools, concerned almost exclusively with civil engineering, were the only schools of the kind opened before the Civil War. After the passage of the Morrill act in 1862 (see Educa¬ tion, Agricultural) many States accepted the provision of the act and proceeded to organize new schools of agriculture and the mechanic arts, or to add these types of technical educa¬ tion to existing schools. Many of the State universities, like Illinois, Wisconsin and Cali¬ fornia, which now offer strong and well-equipped instruction in technical lines received very large impulse from the Morrill act. The

great expansion of construction and industry after the Civil War caused the rapid multiplica¬ tion of engineering schools. The four schools of 1860 increased to 17 in 1870, 41 in 1871, 70 in 1872, 85 in 1880 and 126 in 1917 ; the grad¬ uates numbering 100 in 1870 reached 4,300 in 1917. Besides these schools there are 43 other institutions giving more or less attention to engineering work, either in the form of ^two years of engineering® or of single courses like civil engineering in connection with other curric¬ ula. Of the 126 schools of 1917, 46 were con¬ nected with land grant colleges, 44 were pro¬ fessional schools in universities, 20 were at¬ tached to colleges and 16 were independent. Midway between the group of technical schools and industrial schools are to be found certain excellent institutions giving more or less tech¬ nical or engineering education to men and women, for example, Pratt Institute in Brook¬ lyn, Lewis Institute in Chicago and the Cogs¬ well Polytechnic Institute in San Francisco.

Following the period of rapid multiplication of technical institutions from 1870 to 1890 came a period of standardization of requirements for admission and for graduation, for it was clear that technical education was not a simple prob¬ lem with an easy and uniform solution, espe¬ cially if the engineer was to become the profes¬ sional equal of trained lawyers and doctors. The formation of the Society for the Promo¬ tion of Engineering Education in 1893 and the organization of the joint committee on engi¬ neering education of the national engineering societies in 1908 promoted the process of eleva¬ tion and standardization of curricula. By 1917 practically all of the first class technical schools required at least four years of high school work

for admission and at least four years of colle¬ giate work for the specialized degree, whether that of B.S. in some division of engineering, as Bachelor of Science in Mechanical Engineer¬ ing (B.S. in M. E.), Bachelor of Civil Engi¬ neering (B.C.E.) or Civil Engineer (C.E.). With few exceptions, e.g., Massachusetts In¬ stitute of

Technology, the technical schools, like other colleges, receive their students out of the great system of public secondary schools by certificate rather than by examination. Stu¬ dents thus received are given approximately the same work during the first year with later dif¬ ferentiation as discussed above. The extent of this specialization is illustrated in the curricula offered at the University of Illinois and the Massachusetts Institute of Technology,

UNIVERSITY OF ILLINOIS.

Degree of B.S. in special curricula : archi¬ tecture, architectural engineering, ceramic engi¬ neering, civil engineering, electrical engineering, mechanical engineering, mining engineering, municipal and sanitary engineering, general engineering, physics, railway civil engineering, railway electrical engineering and railway me¬ chanical engifieering.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

Degree of B.S. : civil engineering, mechan¬ ical engineering, mining engineering and metal¬ lurgy, architecture, chemistry, electrical engi¬ neering, biology and public health, physics, gen¬ eral science, chemical engineering, sanitary engineering, geology, naval architecture and marine engineering, electro-chemistry and engi¬ neering administration. Further specialization is permitted within these courses in the Massa¬ chusetts Institute of Technology, for example, in mechanical engineering along the lines of engine design, locomotive engineering, mill engineering and steam turbine engineering.

A summary of the requirements for admis¬ sion and the curricula for graduation, for the course leading to a degree in mechanical engi¬ neering in the Massachusetts Institute of Tech¬ nology, the Rensselaer Polytechnic Institute and the University of Illinois will serve as an illustration of the standardized technological course in an institution of the highest class. The specifications for admission are given in terms of units (one unit is approximately one-fourth of the work of a high school year).

ADMISSION REQUIREMENTS.

Massa-Rensselaer University chusetts Polytechnic of Illinois — Institute of Institute — Admission Technology Admission by certifi- Admission by certificate or by exam-cate or examination

ination

examination

Algebra .

4

Plane geometry… .

1

1

Solid geometry …. ■

1

i

English Composi¬ tion and Literature .

3

3

Physics .

1

• *

Laboratory science.

• •

1

French .

2

• •

German .

2

Foreign Language . .

. •

2

History .

• »

1

Electives .

3-4

4

Electives (five from

history, foreign languages, mathematics and science) .

• •

• •

CURRICULUM IN MECHANICAL ENGINEERING.

Massachusetts Institute of Technology

Rensselaer

Polytechnic

Institute

University of Illinois

Mathematics English .

Foreign Languages Chemistry Physics Drawing Mechanics Electrical Engi¬ neering

Mechanical Engi¬ neering (about 20 specialized courses)

General Studies (History, Eco¬ nomics, Busi¬ ness Law)

Mathematics English French Chemistry Physics Drawing Mechanics Electrical Engi¬ neering

Mechanical Engi¬ neering

General Studies (Astronomy, Contracts) Metallurgy Surveying Hydraulics Naval Architecture Summer Shop Work Theses

Mathematics English Comp. Language Chemistry Physics Drawing Mechanics Electrical Engi¬ neering

Mechanical Engi-gineering (about 16 specialized courses)

Non-technical elec¬ tives

The proportions between shop work, or practice work, and theoretical work in the cur¬ riculum of technical schools, vary widely in different institutions and at different times. The most progressive have abandoned the re¬ quirement of many hours of manipulative laboratory work and the production of com¬ pleted machines, and now require sufficient shop work for an understanding of the processes and tools, but without insistence upon the attain¬ ment of skill. On the other hand there is stronger and stronger emphasis upon the mas¬ tering of the fundamental subjects and theory behind the technical courses. Many strong institutions like those whose curricula are given above require also a considerable proportion of liberal, non-technical study in order to de¬ velop the man as well as the engineer, so that the student who graduates from the institution shall understand the importance of both the human and the technological factors which enter into the practice of his profession. In place of the narrow technical education of 1890 or 1900 with slender foundation in the sci¬ ences and the inclusion of large quantities of shop practice, technical schools now seek to develop at the same time an accurate working knowledge of the principles and practices of engineering subjects and personal qualities of judgment, initiative, responsibility and an understanding of men. Such a curriculurn as that noted above in engineering administration requires quite as much knowledge of ®human engineering® as of mechanical or chemical engi¬ neering.

The cooperative type of technical education, sometimes known as the Cincinnati cooperative plan, is the most recent attempt to co-ordinate theory and practice under conditions approxi¬ mating those of the shop and of the field. First formulated in 1899 by Hermann Schneider when instructor at Lehigh University, it had its be¬ ginning in 1906 at the University of Cincinnati which established under his direction a co-oper¬ ative agreement with industrial plants, railways, etc., by which students who are admitted to the university, as are other students, work on a schedule by which, during bi-weekly periods, one-half of the class is at the university, and one-half is in the factory. During the next pe¬ riod of two weeks the sections change about. The cooperative course is of five years' dura¬ tion, 11 months in the year. While in factory or

shops students are regular employees, receive regular pay and must report satisfactory serv¬ ice in the shops as well as in the classrooms in order to be continued in the university. The cooperative plan has been adopted at other technical institutions, and in some cases by sec¬ ondary institutions, which are advantageously located near shops and industrial plants of vari¬ ous kinds, with which cooperative arrange¬ ments may be made. It is claimed that this combination of scientific and theoretical study at the university with practical experience re¬ sults in a better mastery of facts and of man¬ ual skill since it is secured under conditions which compel a maximum of independent think¬ ing along with an appreciation of the social significance of the studies and the practice.

Technical education has its upward reach into graduate courses for professional degrees like Civil Engineer (C.E.), and Master of Civil Engineering (M.C.E.) organizations for re¬ search like the Engineering Experiment Station of the University of Illinois, the Federalˆ Forest Products Laboratory located at the University of Wisconsin and the Mellon Institute of the University of Pittsburgh; and investigations in subjects like industrial chemistry leading to the Ph.D. in great graduate schools which are not organically parts of a technological college, as at Cornell University and the University of Chi¬ cago. The steady emphasis of the stronger technical schools upon investigation and con¬ tributions to the solution of intricateˆ new problems is one of the latest and most signifi¬ cant aspects of technical education in the United States and in Europe.

Bibliography. — Annual Reports of the United States Commissioner of Education (especially, 1916, chapter on ˆEngineering Edu¬ cation,® C. R. Mann) ; Proceedings of the Soci¬ ety for the Promotion of Engineering Educa¬ tion; Bulletin of the Carnegie Foundation for the Advancement of Teaching (®A Study of Engineering Education,® C. R. Mann, 1918) ; Bulletins of the United States Bureau of Edu¬ cation, especially 1916. No. 31, ˆˆThe Co¬ operative System of Education,® C. W. Park; 1913, No. 4, ˆPresent Standards of Higher Edu¬ cation in the United States,® G. E. MacLean. Catalogues of Massachusetts Institute of Tech¬ nology, University of Illinois, Rensselaer Poly¬

technic Institute, University of Cincinnati.

Kendric C. Babcock,

Dean of the College of Liberal Arts and Sci¬ ences, University of Illinois.

EDUCATION, Theological.- A system of training for the work of the ministry. From remotest times religion centred in ritual acts and gave rise to a system of training men to fill the office of the necessary priesthood. The priests of the great temples in ancient Babylonia, Egypt and other lands, as well as those at the prehistoric shrines, naturally took pains to train young men to perform the duties of the sacred office which eventually they had to surrender. When religion consisted in the main of the public performance of ritual acts the training of the priest was a simple affair. It consisted, of course, in imparting a knowledge of the principles underlying established practices but mostly it was a course of ritualistic instruction. The case of Samuel (1 Samuel c. i ff) brought Up at the shrine of Shiloh is an illustration

of this early sort of training for the priesthood. When religious systems clashed in a strife for supremacy in the world, the priest had not only to administer the ritual of the altar but to defend and proclaim the doctrines of his faith with converting power. This was conspicuously the situation when Christianity sought to get a foothold. Among the early Christians the preaching of doctrine outranked the perform¬ ance of ritual. With the increasing importance of doctrine a fuller and more thorough instruc¬ tion on the purely intellectual side of religion necessarily entered into the preparation for the ministry. During the first few centuries of Christian history individual enthusiasm was so intense that the ministry was adequately sup¬ plied by men who in a sense were self-educated, self-prepared. As churches multiplied and the need of uniformity in Church teaching and practice became more urgent, systematic efforts had to be made by the bishops to train men to fill the priestly offices. The simplest and surest way was for the bishops to take young men into their own homes and educate and train them. In New England it was for a long time quite the common thing for young men who thought of entering the ministry to takeˆ up residence with a regularly ordained clergyman and read divinity with him very much as a young man preparing for the law entered the office of a lawyer and read law there. Eventually the monasteries became the training schools for priests and the universities naturally

became a place of theological education. Down to as late a time as the Council of Trent theological training was in an exceedingly chaotic condition, a condition greatly emphasized by the events of the Reformation. One of the steps taken by the Catholic Church to meet the situation of this stormy period was the establishing of the theological curriculum for the diocesan sem¬ inaries, a curriculum which has continued prac¬ tically unchanged to the present time. In Europe where the Protestant religion became the religion of the state Protestant theological education was from the first provided by the great public universities. The Protestant de¬ nominations dissenting from the established ■Church provided schools of their own.

The United States. — The earliest educa¬ tional institutions in New England were theo¬ logical in purpose and inspiration as is evident from a contemporary account (1643) of the founding of Harvard University : ®After God had carried us safe to New England and wee had builded our houses, provided necessaries for our livelihood, rear'd convenient places for God's worship, and settled the civill govern¬ ment : One of the next things we longed for and looked after was to advance learning and perpetuate it to posterity; dreading to leave an illiterate ministry to the churches, when our present ministers shall lie in the dust.® That this purpose might be doubly ensured against mis¬ carriage free tuition was offered to candidates for the ministry, while students for other pur¬ poses were charged a fee. This practice has been almost universally followed. These early institutions did not confine themselves to the teaching of theological subjects and by the end of the 18th century secular students had so outrun divinity that it became necessary to create within these old universities separate schools of theology, When toward the end of

the 18th and the beginning of the 19th centuries different denominations began to establish their own theological seminaries there was manifest a widespread desire to isolate these schools from all institutions of higher learning by building them at considerable distances from such insti¬ tutions. This guarded against secularization

and helped to make the minister a more ardent denominationalist. Of the existing theological schools three were established before the 19th century: the seminary at New Brunswick, N. J., of the Dutch Reformed Church, founded in 1784; the Roman Catholic Seminary of Saint Mary's, Baltimore, Md., 1791 ; and the United Presbyterian Seminary, established 1794, at Service, Beaver County, Pa., and later removed to Xenia, Ohio. Later other denominations established seminaries. The first Congregational seminary was opened in Andover, Mass., 1808 (now located in the neighborhood of Harvard University). The Protestant Episcopal Church founded its first seminary in New York city in 1819. At Hartwick Seminary, N. Y., the Evan¬ gelical Lutherans built their first theological school in 1815; Colgate Seminary, now a part of Hamilton College, was established by the Baptists in 1820; at Newbury, Vt., the Methodist Episcopal Church opened its first theological school in 1841 ; this school is now a department of the Boston University. In 1819 the divinity school of Harvard University was organized as a separate institution and became the first non¬ sectarian divinity school in the country. During the first 25 years of the 19th century 18 sem¬ inaries were organized representing 11 denomi¬ nations. Four of these were Presbyterian; three Congregational ; Baptist and Protestant Episcopalian 2 each. The period of greatest activity in establishing theological schools was from 1850 to 1875, 71 being the number of new schools founded. Of the 169 theological schools reported by the United States (Com¬ missioner of Education for the year 1916 26 were organized after 1899. Of the 165 seminaries reported in the statistics of 1899, 38 are not found in the statistics

for 1916, having disappeared by amalgama¬ tion or otherwise. The 169 theological schools reported in 1916 represent 27 denomina¬ tions. (For statistics see Education, Pro¬ fessional). In 1916, seven were listed as non-sectarian, four as interdenominational, three had no sectarian designation. Since the beginning of the 20th century three important theological schools have abandoned sectarian designation: Union Theological Seminary, New York city, changed its designation from Presby¬ terian to interdenominational; Yale from Con¬ gregational to undenominational ; the theological school of Vanderbilt University, Nashville, Tenn., from Methodist Episcopal to non-sec-larian. Of these 169 schools 41 admit both men and women. In 1898 1.693 were graduated from 165 schools and in 1916 2,088 were graduated from 169 schools. The practice generally fol¬ lowed for over a century was to establish theo¬ logical schools fairly remote from other institu¬ tions of higher learning. It has come to be recognized that this practice has seriously im¬ paired the scholastic

and practical value of these schools. The past 20 or 25 years has witnessed an increasing movement toward bring¬ ing these schools into closer touch with colleges and universities, As instances of this, the mov¬

ing of Andover Theological Seminary to Cam¬ bridge, Mass., and its affiliation with Harvard; the affiliation of the Chicago Theological Semi¬ nary with Chicago University; the arrangement effected by the Meadville, Pa., Theological School to send its students to the Chicago Uni¬ versity for a part of their course may be cited. A century ago the importance of this plan was recognized by Thomas Jefferson and advocated by him in his report as rector of the University of Virginia.

Roman Catholic. — In the diocesan semi¬ naries for the training of men for the priest¬ hood the curriculum of to-day is but little changed from that outlined by the Council of Trent. The course extends over a period of six years divided into a philosophical course of two years followed by a theological course of four. Candidates for admission to the seminary must offer a B.A. from some college of recog¬ nized standing or a satisfactory equivalent. This latter provision is made so that the Church may not lose the services of a man peculiarly fitted by nature for the office of priest who has not been able to secure a collegiate training. Un¬ like Protestant seminaries, where the courses of like subjects are by no means the same even in schools of the same denomination, the courses are alike in all Catholic seminaries though the quality of scholarship may not be uniform. The first two years are devoted to logic, ontology, psycholoˆ, natural theology. Church histoˆ, general history. Old and New Testaments. Latin, Hebrew, Greek, science, biology and chemistry. The purpose of science in this curriculum is well explained by Leo XIII: *It is-enough that their (the seminaries') pupils have an accurate knowledge of the main principles and summary conclusions (of physical and natural sciences), so as to be able to solve the objections which infidels draw from these sciences against the teachings of Revelation.'ˆ These two years are designed to furnish a sufficient preparation for the rigorous and intensive study of theo¬ logical subjects of the next four years. The subjects pursued are apologetics (an exposition and defense of the grounds of Catholic beliefs), dogmatic and moral theology (the aim of moral theology is to prepare the future priest for the competent and practical care of souls, teaching him how to judge and estimate the morality of the actions of those who may fall within the province of his direction as a priest and con¬ fessor), pastoral theology (the proper care and government of the charges entrusted to him and the faithful and successful discharge

of his sacred ministry), homiletics, canon law. Church history, biblical exegesis. Sociology is a sem¬ inary subject and is intended to afford an op¬ portunity for the students who so wish to secure a thorough knowledge of modern social and economic problems and movements. By constant participation in the ritual the young priest is trained to the proper administration of the Church's sacraments. Similarly the student is prepared to organize and manage the Church's many social activities through service in those societies which have to do with the immediate work of human helpfulness.

Jewish. — Theological education for the Jewish ministry differs somewhat from the Christian scheme. The course at Hebrew Union College extends over a period of nine years — four years preparatory and five years in the

collegiate department. In the preparatory de¬ partment the students are given a thorough grounding in the grammar and vocabulary, which enables them to read the unpunctuated text of the Pentateuch and other Hebrew litera¬ ture. A general knowledge of Rabbinical litera¬ ture and history of the prayerbook and Psalms and the doctrines and ceremonies of Judaism is also aimed at. The collegiate department is divided into two parts, ®the three lower grades being devoted to the acquisition of material and the upper two to systematic and specific theological knowledge.^^ The principal sub¬ jects of study are Bible Exegesis and the Tal¬ mud and all the important Hebrew literature, as well as the New Testament; the history of the Jewish people. The study of the origin and development of Mosaic and Rabbinical Juda¬ ism paves the way to systematic theology. The study of comparative religions is pursued to give a foundation for Jewish apologetics. Practical theology divides itself into the study of homiletics and the rites and ceremonies of Judaism. Ethics and pedagogy are important subjects, the latter being designed to prepare the student for the task of religious instruction. Applied sociology or the science of philan¬ thropy forms a part of the curriculum, and is

of the New Covenant and the precise word of the latest inspiration.ˆ" Dogmatic theology ˆweaves into a single system the separate strands of truth gathered from Scripture" and tradition. Apologetics is studied that the preacher may go out equipped to defend ˆˆthe established doctrines against critics and here¬ tics." The study of Church history acquaints the student with ˆ"the way in which previous dogmatic theologians have done their work; in¬ cluding the forms and institutions in which the Christian truth has found embodiment." Homi¬ letics ˆfis the art of fitting a doctrine to a text and proclaiming it convincingly." Practical theology is studied to prepare the student to conduct and administer properly the services of the particular Church the ministry of which he is to enter. While in a considerable number of theological schools this is the extent and char¬ acter of the education given in these days, the modern minister must come to his position pre¬ pared to manage, initiate, inspire many secular or semi-secular enterprises as well as fill the place of a spiritual administrator. The services of worship and spiritual instruction have become the smaller part of a minister's activities. There are men's clubs, girls' socie¬ ties, boys' clubs, reading-rooms, gymnasiums.

Autumn

Beginnings of Old Testament, literature and history.

Church history — The ancient Church.

Practical sociology — The Church and society.”

Practice in observation and public speak¬ ing.

NewTestament — Jesus in Jewish history.

Systematic theology I.

Practical theology — Theory of preach¬ ing.

Winter First Year

Old Testament, history and prophecy.

Church history — The Reformation.

Practical theology — Religious educa¬ tion.

Public speaking and music.

Second Year

New Testament — Primitive Christian life and literature.

Systematic theology II .

Practical theology — Preparation and delivery.

Spring

Old Testament, history and Judaism.

Church history — The development of modern Christianity.

Practical theology — The organiza¬ tion of the Church.

Public speaking and music.

New Testament — Teachings of Jesus.

Systematic theology III.

Practical theology — Problems and methods of Church extension.

Third Year

Sequence courses in the student's principal department and electives under the direction of his faculty adviser.

designed to teach the rabbi ^^how to combine the new method with the ancient spirit of Judaism in the field of practical righteousness and Social Service."

Protestant. — In the education for the Protestant ministry the strictly theological sub¬ jects differ little from the major subjects in the Catholic curriculum. Systematic, dogmatic, practical theology, exegesis, church history and homiletics — these for many generations were the sum of Protestant theological education. A recent writer has summarized the instruction given in the leading theological schools until recently in such a way as to indicate the dif¬ ferent values assigned to these subjects. Out of a possible 1,'536 hours of study the time is actually divided in this way: Theology and apologetics, 480 hours; Hebrew and Old Testa¬ ment, 288 hours; Greek and New Testament, 224 hours ; ecclesiastical and Biblical history, 256 hours ; preaching and social problems, 96 hours ; rhetoric and elocution, 144 hours. A word or two by way of explanation will help to a better understanding of the actual signifi¬ cance and purpose of these studies. The study of Hebrew is designed to enable the student to get the text of ®the divine law and covenant." Greek is required that he may get ^ffhe letter

banquets, sociables and many other activities designed to aid in the development of com¬ munity life. In response to these new demands the theological seminaries are radically chang¬ ing their curricula, not by abolishing the old subjects but by the addition of new ones, or rather by changing the rank of the subjects — studying the old subjects from an entirely dif¬ ferent angle. To quote from one seminary's catalogue, «The social teachings of the Old and New Testaments are studied with the purpose of estimating the nature of the contribution of Biblical history and theology to moral and social progress." The sociological now ranks with and in some cases ahead of the theological in an increasing number of schools. The much-debated question whether Hebrew and Greek should be_ required is being answered by putting these subjects in the elective groups. In some

instances students are allowed to present them¬ selves as candidates for the degree of B.D. by offering as substitute for Hebrew and Greek a satisfactory ˆacquaintance with scientific, philosophical, or historical method.” The coupe on ˆSocial Ethics” offered by the Divinity School of Harvard University is a good illustration of how the theological schools are trying to educate the minister to meet the

problems which confront the clergyman of to-day. The subjects explain . themselves. ˆˆSocial Problems in the Light of Christian Ethics,® ®The Development of Modern Philan¬ thropic Theory and Practice,® < <The Minister’s Relation to Social Agencies,® ® American Popu¬ lation Problems,® ˆˆThe Housing Problem,® ˆUnemployment and Related Problems,® ˆˆRural Social Development.® The intimate associa¬ tion of the theological schools of Chicago with the Chicago Commons Social Settlement and the Chicago Institute of Social Service are indicative of the attempts now made to educate the minister by introducing him while in the seminary into the midst of the complex human problems — a sort of sociological clinic. The preceding table presents a brief survey of the course of study planned out for a candidate for the ministry in some of the leading Protestant seminaries .

The emphasis in much of theological educa¬ tion to-day then is put on ˆPsychology, soci¬ ology, philanthropy, legal principles, and practi¬ cal problems involved in applying the ‘Spirit of Christianity to modern life.® In some schools the comparative study of religions is given an important place, on the ground that the more one knows of the religious systems of the world the sounder is one’s understanding of his own religion.

Two recent developments deserve fuller mention than can be made here. A few words from the charter of the Hartford Seminary Foundation (1913) are to the point (this is the reincorporation of the old Hartford Theologi¬ cal Seminary). The object of the Seminary Foundation in addition to preparing men for the ministry is said to be ®to train men and women for the work of religious education in all its

branches and for such other callings and forms of service as seek to promote Christian worship and work; to train men and women for service in such institutions as are estab¬ lished for the social welfare of mankind in the name and spirit of the Christian faith; to train men and women for service in the foreign field.® To this end there has been added to some of the seminaries a school of religious pedagogy which aims to offer its theological student fuller opportunities to prepare himself on the Sunday school and social service work of the church, and also to educate men and women to fill what might be called the office of assistant to the pastor. A school of missions has been added to give those who plan to enter the foreign field a chance to specialize in studies peculiarly fitted to that end. Another feature is the summer schools of theology, which offer to men already in the regular work of the ministry an opportunity to pursue the old seminary studies or take up new ones in the hopes of better fitting themselves for the tasks met with in their parishes. The work pursued in these summer schools, conducted by several of the leading seminaries, may be credited toward a degree. Another and not less useful innova¬ tion is the correspondence courses in theology carried on by a few of the seminaries. These correspondence courses afford the man in the field an opportunity to secure .the education he feels in need of under the guide of competent instructors. In some instances the work done in these courses may be credited toward a de¬

gree. All this is simply indicative of the desire on the part of the seminaries to create a finely educated ministry for the churches.

The question of educational qualification for admission to theological seminaries has been pretty thoroughly debated for many years. While there is evidently a constant stiffening of these requirements, a college training being more and more in demand, it is felt now, as it has been all along, that the terms of admission should be flexible enough to let in persons who, lacking collegiate training, nevertheless have intellectual and spiritual qualifications which make them desirable additions to the ministry. To compensate for this lack of scholastic prep¬ aration most of the seminaries provide courses in essentially preparatory subjects, and so pass these students on into the regular courses or else the students are admitted to special courses. However, many of the seminaries award de¬ grees only to those who enter with a collegiate degree; though usually any student is allowed to present himself as a candidate for the de¬ gree if he submits evidence of scholarship fully equivalent to a college training. In most in¬ stances tuition is free in the theological schools, and financial assistance is

readily granted to needy students. This has been severely criti¬ cised. But whether it deserves the criticism or not, it is difficult to break up a long established custom and one that has been productive of some excellent results.

Rev. Charles Graves.

EDUCATION, United States Bureau of,

a bureau under the Department of the Interior since 1868, whose chief activities are given to the collecting and dissemination of educational information. It was originally created a de¬ partment by act of Congress 2 March 1867. But the opposition of the States was so pronounced against the interference of Congress in educa¬ tional matters that the newly-created depart¬ ment was reduced to a bureau the following year and its province limited almost altogether to the encouragement of education through the collection and dissemination of educational in¬ formation. The work of the bureau naturally fell far short of that done by the Department of Education in countries where such bodies are given the direction of educational matters for the whole nation. In 1864 efforts were made by teachers and others interested in the advance¬ ment of education for the establishment of a Bureau of Education. But owing to the attitude of Congress and the various State legislatures, which were unanimous in their agreement to leave all educational matters in the hands of the State officials, the Bureau of Education was not taken very seriously by the United States government and its efficiency was hampered by a lack of funds and of freedom of action. The bureau began to make its efforts more con¬ crete and effective by the issuance of ˆAnnual Reports.ˆ In 1870 a series of ‘ˆCirculars of In¬ formation,ˆ dealing for the most part with the history of educational progress in the various States of the Union, more especially from 1888 to 1903, indicated increased activities. A step in advance was made in 1906 by the institution of the ˆ Bulletinsˆ dealing with a wider variety of interesting educational subjects. In 1910 the bureau broadened the scope of its work still more by the publication of ˆCirculars of Infor-668

mationˆ containing digests of current legislation and interesting accounts of new educational features of city and State school systems.

The work of the bureau is divided among six sub¬ departments or administrative divisions and its activities cover higher education, school admin¬ istration, rural schools, vocational education, kindergartens, home education, immigrant edu¬ cation, civics, education of racial groups, home and school gardening, commercial education, school hygiene, community organization and foreign educational systems. The necessities of the European War increased the activities of the bureau and broadened its field of action. At the close of the fiscal year 1916-17 the staff of the bureau consisted of .76 regular employees in Washington, five in Seattle and 118 special collaborators. The office force included at this date a commissioner of education, chief clerk, specialist in higher education, editor, statistician, specialist in charge of land-grant college statistics, two translators, collector and compiler of statistics, specialist in foreign educational systems and another in educa¬ tional systems. The Congressional appropria¬ tion made to the bureau for the year 1916-17 was $405,500 and for the following fiscal year $431,800, a sum inadequate for the proper extension of its work.

The Annual Report of the Commissioner of Education is issued in two parts. Part one consists of ^^a comprehensive, interpretative review of the more important phases of the progress of education in the United States and all other countries® ; while part two is a statistical summary of the schools and other educational agencies of the United States.

Under the control of the United States Bureau of Education, through its commis¬ sioner, is the administration of the schools for natives in Alaska, to the maintenance of which goes more than half the appropriation received by the bureau.

During the fiscal year 1916-17 the bureau collected statistics from 48 States, and 1,241 city school systems, 574 universities and col¬ leges, 530 professional schools, 1,322 training schools for nurses, 278 normal schools, 734 summer schools, 12,003 public high schools, 2,203 private high schools and academies, 912 com¬ mercial schobls, 397 schools for negroes, 121 State industrial schools and reformatories, 61 institutions for the blind, 159 schools for the deaf and 178 schools for the feeble-minded.

The library of the Bureau of Education claims to be the most extensive library in the United States, devoted exclusively to educa¬ tion. It contained in 1917 about 150,000 volumes and pamphlets ; and these were being added to yearly to the extent of 15,000 or more. Consult Report of the Commissioner of Education (Washington, published

annually).

John H. Cornyn,

Editorial Staff of the The Americana.

EDUCATION OF THE BLIND. See

Blind, Education of the; Education of the Physically Handicapped.

EDUCATION BOARD, General. This board was founded in New York city in Feb¬ ruary 1902 and chartered by Congress on 12 Jan. 1903, its object being the promotion of edu¬ cation throughout the United States, without distinction as to race, sex or creed. Beside

gifts from several philanthropists, the board received, when chartered, a special gift of $1,0(X),000 from John U. Rockefeller for carry¬ ing on the work in the Southern States. Upon the assurance of the success of this movement, on 30 June 1905 he made an additional gift of $10,000,000 and in 1907 a further sum of $32,000,000. See General Educa'jion Board.

EDUCATION OF CRIPPLES. See Ed¬

ucation OF THP Physically Handicapped.

EDUCATION OF THE DEAF. See

Deaf; Deaf, Education of the; Deaf-Blind; Education of the Physically Handicapped.

EDUCATION OF DEFECTIVES. See

Blind ; Deaf, Education of ; Education of Feeble-minded, *etc.*

EDUCATION OF THE DUMB. See

Deaf; Education of the Physically Handi¬ capped.

EDUCATION OF FEEBLE-MINDED OR MENTAL DEFECTIVES. In the

classification of children of this type it is neces¬ sary to 'distinguish the mentally retarded or backward child from the feeble-minded or men¬ tally defective child. There is a large percentage of the children in attendance upon school who are behind the grades in which

children of their ages should be found in school work. There are legitimate reasons for many of these chil¬ dren being behind their proper grades. Some are foreigners and were not able to use the English language when they entered school. Others started in school late. There are those who have poor sight or defective hearing or who are suffering from some other physical defects as adenoids, poor health, etc., which in¬ terferes with the performance of their school work. When there is no apparent reason for a child being three years below his proper grade or when he fails to make progress after the removal of such physical defects as he may have had, the probabilities are that such child is feeble-minded. When the mental develop¬ ment of such child is so arrested as to render him unable to advance in his school work, he is regarded as feeble-minded or mentally defec¬ tive. It is, therefore, a serious matter to classify a child as feeble-minded. Such classification places a stigma upon the child which may be unjust and from which he may never recover. The average classroom teacher or school prin¬ cipal should not, therefore, undertake to deter¬ mine that a pupil is feeble-minded. The study of the mental development of children by per¬ sons scientifically trained for that purpose has resulted in the establishment of certain tests which are now quite generally accepted as the measure of a child's mentality. No child should, therefore, be classified as feeble-minded who has not been examined by an expert and found to be of such type. If any question of doubt exists the child should be given the bene¬ fit of that doubt. By the application of these tests it may be found that a child 12 years of age has the usual mental development of a child of four; or a man of 40 years of age may have the mind of a child eight years of age, *etc.* The feeble-minded are, therefore, classi¬ fied as children .of various ages. From these tests three general classes have been established. These are the idiot, the imbecile and the moron. The idiot is the lowest in the scale of intelli-EDUCATION OF FEEBLE-MINDED

geiice, the imbecile is the next higher and the moron is the highest.

The importance of the subject of feeble¬ mindedness will be appreciated by considering the number of feeble-minded in the country. There has been no general census in Europe or in this country which reveals the exact number of feeble-minded adults or children. Various studies and surveys have been made, however, under

government direction and by reliable or¬ ganizations interested in the subject which show the number of feeble-minded persons within a given area and a specified population. From the information which has been obtained through these investigations and surveys, it is possible to make a fairly accurate estimate of the number of feeble-minded people and also the number of feeble-minded children in the country.

The Royal Commission of Great Britain made surveys in several sections of England, Ireland and Scotland and gave the subject care¬ ful thought for four years. Its report was made in 1909 and showed that, on the basis of its study, 1 in every 217 persons in England was feeble-minded. Surgeons of the United States Public Health Service completed a survey of the feeble-minded school children in Porter County, Ind., in 1915, which showed that .955 per cent of all the children in that county were feeble-minded. The same authority made a survey of Newcastle County, Delaware, in 1916, which showed tjiat 1.3 per cent of all the children examined were feeble-minded. A sur¬ vey made by the Nassau County Association assisted by the National Committee for Mental Hygiene, the United States Public Health Serv¬ ice and the Rockefeller Foundation, in Nassau County, N. Y., in 1916, showed that on the basis of its study, 1 person in every 183 of that county was feeble-minded. The investiga¬ tion by the Massachusetts Society for Mental Hygiene in that State in 1914 indicated that there was one feeble-minded person in every 278 of the population. The estimates made by such experts as W. E. Fernald, H. H. Goddard and E. R. Johnstone place the number of feeble¬ minded in the United States at 1 in every 250 persons. Applying these figures and the esti¬ mate of the Committee on Mental Hygiene and the New York Committee on Feeble-Mindedness to the population of the United States, we should have in this country about 400,000 feeble¬ minded persons and about 100,000 feeble-minded children. The presence of this large number of feeble-minded children in the country at large is a condition which demands that every effort possible be made to educate and train as many of these as may be possible in order that they may be self-supporting. It is estimated by Mr. George Hastings, secretary of the New York Committee on Feeble-Mindedness, that about ^^one-third of the feeble-minded break the law and nearly one-third of the law breakers are feeble-minded.®

About 1850 the States began to give consid¬ eration to the education of the feeble-minded child. State institutions were organized and the care and education of this type of child has received extended consideration since that tirne. Many State institutions and several private in¬ stitutions have been established for the care, education

and training of children of this type.

It is not feasible to undertake the education of

the classes of mental defectives known as idiots or imbeciles in the public school. These types of mental defectives must generally receive their training in institutions established in accordance with modern scientific standards for the educa¬ tion and care of such children. The children who are classified as morons may be segregated and educated in special classes provided for them in the public schools. Mentally defective chil¬ dren who come from homes which are able to give them proper care when they are not under the influence of the school and who may be trained to become either wholly or partially self-supporting may generally be afforded necessary educational facilities for their proper education in the public school system of the city or dis¬ trict in which they live. All mentally defective children who come from homes which cannot give them the protection and care which is essential to the best interests of society should be educated in institutions organized for this type of children. The tendency throughout the country is to utilize to the greatest extent pos¬ sible the public school system for the education of this type of children.

There has been recent legislation upon this subject in the States of New Jersey and New York. In 1911 the legislature of New Jersey enacted a law making it the duty of the State board of education to ascertain the number of children in the public schools of the State who were three years or more below the normal grade. This law further provides that in each district in which there are 10 or more such children the board of education for that district shall establish such special classes as may be necessary for the education of these children. No class may contain more than 15 of such chil¬ dren. An important feature of the New Jersey law is the State aid which is accorded each dis¬ trict in the State which organizes one of these classes. The State authorizes an apportionment of $500 for each teacher employed in giving instruction to a class of children of this type. This State aid offers great encouragement to a community to organize such classes and enables a community to meet the expense of maintain¬ ing such classes without burdensome taxation. The commissioner of education for that State reported that, for the school year ending 31 July 1917, 162 classes had been organized. The establishment of these classes in New Jersey is compulsory. This appears to be the first State in the Union which has enacted a statute mak¬ ing it mandatory upon the local school author¬ ities of an

administrative unit to organize classes for children of this type. The training school for subnormals at Vineland, N. J., is one of the notable institutions of the country for this type of children.

The New York law enacted in 1917 is also a mandatory statute and is modeled somewhat after the New Jersey act. The commissioner of education is authorized to prescribe regula¬ tions to govern the taking of a census by the school authorities by each city and each school district. The local school authorities must take such census. The law further provides that each city and each union free school dis¬ trict shall establish such special classes as may be necessary to provide instruction adapted to the mental attainments of children who are three years or more below normal. This, of course, requires provision for all mentally

defective children as well as for the retarded children. No more than 15 pupils may be placed in one of these special classes. The school au¬ thorities of a city or district which has less than 10 children are required to provide for their instruction in another city or district which establishes classes or schools for such children. The financial aid given by the State is $300 for each class organized in a city or district.

The major work in a course of study for this type of children is industrial training. This type of child may be trained to become an effi¬ cient domestic worker and may be also trained to do very satisfactory work in agricultural lines. The institutions and the public schools which maintain courses for these children have demonstrated that large numbers of them may be trained to become self-supporting. To illus¬ trate the type of course of instruction which is maintained for such children, I quote the fol¬ lowing from the official report of the superin¬ tendent of the Rome Custodial Institution :

^^Kindergarten ; sense training ; form, color, co-ordination and numbers ; articulation and language ; weaving ; sewing, knitting and crochet¬ ing ; sloyd ; carpentry ; painting ; gardening ; farming; domestic arts (dressmaking) ; music (vocal and instrumental) ; dancing; entertain¬ ment ; Sunday School ; chapel ; farm colonies ; domestic colonies; parole; discharge (or failure and permanent custody).

The institution located at Waverley, Mass., the one at Vineland, N. J., the Rome Custodial Institution, Rome, N. Y., and the State Normal School at Oswego, N. Y., maintain courses for the training of teachers for this type of school. Undoubtedly other institutions for this type of children also maintain such courses.

Consult Preyen, W. T., ^The Mind of the Child, ^ translated by H. W. Brown (2 vols., New York 1893) ; Tredgold, A. F., ^Mental Deficiency^ (2nd ed., New York 1914) ; Bald¬ win, J. M., ^Mental Development in the Child and the Race^ (New Ed.).

Thomas E. Finegan,

Superintendent of Public Instruction for the

State of Pennsylvania.

EDUCATION OF IMMIGRANTS. Dur¬ ing the 14 years preceding the outbreak of the European War 11,726,606 immigrants over 14 years of age were admitted to the United States. Of this number 3,116,182 or about 25 per cent were illiterate. During a year of ordinary im¬ migration preceding the war more than 1,000,000 immigrants ca'me to this country. In the year 1914 the number was 1,218,480. Illiteracy has been on the increase in 18 States in the Union. These States are the leading industrial and mining States, and include New York, New Jersey, Massachusetts, Connecticut, Pennsyl¬ vania, Illinois and California. - These are the States in which the great majority of immi¬ grants settle. Under the first selective draft law 1,243,801 alien males registered who are between the ages of 21 and 30. Under the military ages fixed in the amended draft law, 18 to 45, there are 3,(X)0,000 unnaturalized alien males in this country. About 20 per cent of these cannot speak English, When they enter the United States army they will be unable to understand the commands of their officers until they are taught to understand English. There

are 5,500,000 people in the United States who are unable to speak English.

In the last decade there has been a large decrease in the number of illiterates under 14 years of age. Under compulsory attendance laws illiterates under this age have practically disappeared. The number of negro illiterates is rapidly decreasing. The number of native-born white illiterates is also rapidly decreasing. The only class of illiterate which has been in¬ creasing during recent years is the foreign-born. This large number of citizens unable to speak the language of the United States exceeds the number of soldiers which the government ex¬ pects to send to Europe to fight in this war. The number equals about one-twentieth of the popu¬ lation of the country. These immigrants come to the United States for the purpose of obtaining larger opportunities for themselves and their children. They naturally drift to the sections of the cities which are inhabited by former residents of their native lands. Thus there are to be found in all the large American cities a particular section inhabited by Italians and known as the Italian section, another in¬ habited by Poles and known as the Polish section, *etc.* These immigrants do not get the spirit of the life of American or democratic institutions. They retain to a very large ex¬ tent the customs and habits of the country from which they emigrated. It is difficult for them to learn to speak English and they

are not able to communicate readily with Americans. This fact is to their disadvantage in obtaining employment. Then, too, they do not acquire so readily a knowledge of the laws of the United States, of their rights in and their obligations to the country. About one-third of the prisoners in penal institutions in the United States are aliens. The number during the decade preced¬ ing the war had constantly increased. They have in many instances been here but a short period of time and have committed minor offenses. They are in many cases the leaders in riots and in other movements of disorder and lawlessness.

President Wilson in addressing several thousand aliens made the following statement ; ®You cannot become thorough Americans if you think of yourselves in groups. America does not consist of groups. A man who thinks of himself as belonging to a particular national group in America has not yet become an American… . America was created to

unite mankind by those passions which lift.^^

Immigration is a national affair and has always been regulated by the Congress. The action of the Congress in passing a measure over the veto of the President in 1917 prohibit¬ ing immigrants from coming to this country who are illiterate has simplified in a measure the question of adult illiteracy. While no addi¬ tional illiterates will be admitted to this country there will still be large numbers of immigrants admitted who are not able to read or write English. In the problem therefore of immi¬ grant education there are two types of alien who must have consideration. First, the illit¬ erate alien, and second the literate alien who is unable to speak English. It is as important toˆ educateˆ the non-English-speaking literate alien as it is to educate the illiterate alien for preparation for citizenship, by informing him upon the fundamental features of the social.

industrial and civic questions upon which the progress and prosperity of a democracy depends.

This subject has never been approached as one of the great national problems which the country must solve. For many years various charitable, philanthropic, religious and civic organizations, in various parts of the country, have done very much toward the education of the illiterate alien. The North American Civic League for Immigrants, The Baron De Hirsch Fund, The Educational Alliance, The Young Men's Christian Association and many civic, religious and charitable societies have done much pioneer work of great value in this field of education. The great railroad corpo¬ rations and many of the industrial and manu¬ facturing corporations of the country have maintained schools at their own expense for the education of their alien employees. In many cases large corporations have found it to be a matter of economy to maintain such schools and therefore reduce the number of accidents, thus saving in industrial insurance and increas¬ ing the efficiency of the employees. The de¬ velopments of this field of education are similar to the developments in all the new fields of education, which are ultimately assumed by the State. Charitable and religious societies usually take the initiative in such fields. Over half a century ago some of the American States, which had begun to realize the im¬ portance of this problem, because of the number of immigrants co;ming into such State, author¬ ized the establishment of adult schools and of evening schools. The establishment of such schools was not mandatory but was wholly in the discretion of the community or its educa¬ tional officers. This type of legislation has increased until most of the States having large numbers of aliens have authorized such schools. In most States attendance upon these schools is free. In some States small appropriations are made by the State but very generally the bur¬ den of the maintenance of such schools is placed upon the city or district.

The problem is not a local problem and local authorities should not be compelled to meet the expense of maintaining such schools. The problem is a National problem and a State problem. The National

government should make appropriations which, supplemented by appropriations by the States, would be ade¬ quate to provide schools where all aliens might receive the degree and type of education which is essential for newcomers from other coun¬ tries who intend to make America their adopted home. An effort has also been rnade to reach the alien through the organization of camp schools. In cases where cities and municipali¬ ties have been engaged in large_ constructive problems, notably in New York, in connection with the construction of the Barge Canal, the building of State roads and of the Ashokan Dam, where large numbers of aliens have been employed for long periods of time, temporary or camp schools have been established for the education of such aliens. The aliens ˆ ern-ployed in these labor camps do not remain in one place a sufficient period of time for the establishment of permanent schools. Experi¬ ence in maintaining camp schools shows that if such schools are to be made effective there should be portable school buildings with equip¬

ment which may be moved from one place to another. The expense of maintaining these camp schools should be borne by the munic¬ ipalities or the corporations or jointly by the agencies employing such aliens.

Massachusetts, New Jersey and New York have done pioneer work in alien education. Massachusetts enacted a law on the subject in 1887 requiring all illiterates between the ages of 14 and 21 to attend some school if they were continuous residents in the city or town where an evening school was held. An examination was prescribed to be given after the close of the instruction as a literacy test. In 1906 this test was that which was required in reading, writing and spelling for admission to the sec¬ ond grade in the public school. In 1907 for admission to the third grade and in 1909 to the fourth grade. The requirement now is admission to the fifth grade. The law pro¬ hibited the employment of a minor unable to pass this test unless he attended an evening school. The New Jersey law of 1907 provides that the board of education ®may establish and maintain a public evening school, or evening schools for the instruction of foreign-born residents of said district over 14 years of age in the English language in the form of gov¬ ernment and the laws of this State and of the United States.^^

The most recent and comprehensive legisla¬ tion on this subject is that of the State of New York. Three laws were enacted in 1918 by that State. One provides for the training of special teachers to instruct illiterate adults, under the supervision and direction of the State

Education Department and an appro¬ priation was made by the State for the pur¬ pose of holding summer institutes in which teachers so adapted to this work might receive instruction on the most natural and modern ways of approaching the foreigner and teach¬ ing him not only the English language but his relations and obligations to the government. Another of these laws makes it mandatory upon the cities and school districts to maintain night schools on three nights per week for two hours each night. In cities of the first class these schools must be maintained during the duration of the period that day schools are maintained. In cities of the second class such classes must be maintained for 100 nights. In cities of the third class they must be main¬ tained for 80 nights. In school districts out¬ side of cities and which have 20 or more per¬ sons above the age of 16 years who desire in¬ struction, such school must be maintained for 75 nights. Attendance upon these night schools must be free. The purpose therefore of these two acts is to provide the necessary facilities for the maintenance of schools where illiterates may receive instruction and also to provide trained teachers who may give such instruc¬ tion. The third law makes it obligatory upon certain minor illiterates to attend these schools. An illiterate minor who cannot speak, read and write the English language sufficient for ad¬ mission to the sixth grade of the public school if he is in proper physical and mental condi¬ tion must attend the evening school or a day school until such minor is able so to use the English language. Unless a minor satisfies these requirements of the law he may not be

employed in industry. Provisions, with suit¬ able penalties for the failure thereof, run against such minor, his parents or guardian and an employer.

In the State of California a plan has been adopted intended to reach the imniigrant women and through them the home. This plan involved the establishment of a Home Educa¬ tion Department under the direction of the State authorities. Through this plan visiting teachers go to the homes of all the immigrant women who are illiterate and who need in¬ struction in modern home making and in the customs and practices of this country. If laws similar to the statutes in New York and Cali¬ fornia could be enacted in every State and the National government and each State would make appropriations upon an equitable basis illiteracy in America could be practically eliminated within the next decade.

Thomas E. Finegan,

Superintendent of Public Instruction for the State of Pennsylvania, Formerly Deputy Com¬ missioner of Education, State of New York.

EDUCATION IN THE LAW. See

Counsellor at Law.

EDUCATION OF MENTAL DEFECT¬ IVES. See Education of Feeble-Minded and Mental Defectives.

EDUCATION IN MUSIC. See Music,

Education in.

EDUCATION AND NATIONAL DE¬ VELOPMENT. Education has been an im¬ portant factor in influencing our national de¬ velopment, our institutions, ideals, habits, effi¬ ciency, and general mental attitude. It has in turn been influenced by those permanent fac¬ tors that determine, in large part, the nature and progress of any civilization — the geo¬ graphical, physical and racial factors — and the institutions resulting, particularly those of a political, economic, religious, and social char¬ acter. It is the interaction of all these factors that accounts for the peculiar relation of our education to our national

development.

Nations that have a national system of edu¬ cation, directly controlled by the central gov¬ ernment, have the power to influence conspicu¬ ously the character of education so as to pro¬ duce a definite type of national life. Many of the important nations of the past have, through state aid, established, encouraged, and con¬ trolled to a greater or less extent their educa¬ tional institutions, — elementary, secondary, and especially higher. They have likewise fostered and protected libraries, art, literature, and science. Their purpose was to raise the tone of national life, to train leaders for service in church and state, and to teach men their duties to the state, to each other, and to themselves.

In the United States, however, from the founding of the colonies until the present time, education has not been in the hands of the central government. During the colonial period of our history each colony acted independently, in this matter, and when our Constitution was framed the States retained the power to regu¬ late education. Moreover, during the colonial period and until the second quarter of the 19th century, with few exceptions, both colo¬ nies and Slates left the subject almost wholly in the power of the local units of govern¬

ment, of which the district was the most char¬ acteristic, or trusted to private or other agericies. This led to extreme variations in educational ideals, institutions, and practices, with the re¬ sult that the direct influence of education on national, as distinguished from State or local life, was small. By this we mean there was little tendency to educate the individual in a way to prepare him for efficient citizenship, with an appreciation of his duties and obliga¬ tions toward the nation. Indeed this was hardly possible until there was a realization that the local communities were to become parts of a great whole or until the national spirit was born. Since a political basis for national edu¬ cation was lacking schools were maintained largely for the moral and religious development of communities, and the preservation of learn¬ ing for its own sake. After the State systems were formed there was some improvement, but educational policies and institutions were neces¬ sarily largely determined by local or sectional needs.

In spite of this diversity, it is true that gradually the spirit of American education, and to a considerable extent its forms, have tended toward uniformity, with a correspondingly greater influence on national development. This tendency is due to the action of much the same

forces that led to the substitution of the principle of union and nationalism for particu¬ larism. In the case of education the process has been voluntary, without the compelling force of general laws issued by the central government. In other words the individual States have been guided by similar ideals and forms of education, because they best express the needs of their people. The more the vari¬ ous sections of the country became one in spirit and institutions, the more the State systems of education have tended to become similar in spirit, practice, and form.

Before the American Revolution two move¬ ments or forces prepared the way for a greater influence of education on national development. First, the tendency to recognize the respon¬ sibility of the state for education, rather than some other agency like the Church or agencies of a private character. This notion appeared first in 1647, in the legislation establishing the educational system of Massachusetts. Second, those forces tending toward the sentiment for and feeling of nationality, based on common political institutions and language, literature, habits of thought, aspirations, and especially on the influence of environment in producing democratic tendencies.

The American Revolution was the first great event which increased the influence of educa¬ tion on national development. It stimulated a desire for institutions which would express na¬ tional rather than local needs, and placed emphasis on subjects expressing national rather than local sentiments. The Revolution has¬ tened the decline of the Latin Grammar School, already an institution failing to meet the needs of the generation before the Revolution, and ushered in the Academy, a secondary institu¬ tion, better suited to the needs of the people and more democratic in aim, type and distri¬ bution than was the Latin Grammar School. The Academy was the forerunner of the still more democratic institution of the next gen-

eration, the public High School. The Revolu¬ tion also stimulated an interest in English, the mother tongue, which was the beginning of serious study of this subject. It stimulated patriotic sentiments which led to an interest in our national history and hence the study of history and civics, the foundation of political education.

With the formation of our first national government, the Congress of the Confederation passed the first act that emphasized the national aspect of education. This was the Grayson land ordinance of 1785, which provided for the reservation of lot number 16 of every town¬ ship as surveyed, in the newly-acquired western territory, for the maintenance of public schools within the township. The ordinance for the government of the Northwest Territory, 13 July 1787, contained an important article, num¬ ber three, which reads, — ^^Religion, morality, and knowledge being necessary for good gov¬ ernment and the happiness of mankind, schools and the means of education shall forever be encouraged.^^ On 23 and 27 July Congress not only provided for the sale of land to the Ohio Company and authorized the reservation of land, lot number 16, in each township, for schools, but also provided the two townships demanded by the company ®for the support of a literary institution.^^ The precedent thus es¬ tablished was followed, and in all territory later included in the public domain, reservations for elementary and higher education were made in a similar manner. Thus provision was made for the endowment of the State universities, a type of educational institution that has had great influence on national development.

Later the Congress of the national govern¬ ment granted additional tracts of land to the western States for educational purposes, culmi¬ nating in the Morrill act of 1862. This act pro¬ vided for large grants of land to each State to endow ®at least one college where the lead¬ ing objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learn¬ ing as are related to agriculture and the me¬ chanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical edu¬ cation of

the industrial classes in the several pursuits and professions in life." The im¬ portance of this attitude of the Federal gov¬ ernment toward education consists in the fact that it is an acknowledgment that the Federal government has a right and duty toward na¬ tional education, notwithstanding the delegation of the power to the States. The educational institutions resulting from these acts have had great influence on our national development.

In the second quarter of the 19th century the forces engendered by the industrial revolu¬ tion reacted on education. The rise of manu¬ facturing, the factory system, the new grouping of population, and the humanitarian and demo¬ cratic movements following, brought insistent demands for free elementary and secondary education at public expense. It is principally from this period, 1830 on, that education has had an increasing influence on national life. This relationship was further stimulated by improvements in intercommunication, by means of the steamboat and the railroad, and in agen—

cies for the transfer of intelligence, the news¬ papers, libraries, telegraph and telephone.

The public school has been the chief instru¬ ment for influencing national life. The State systems of public instruction have as their basic idea, that it is the duty of the State to make education available and free for all, at public expense. Other principles gradually adopted include State support and administra¬ tion, compulsory attendance and supervision, and fixed standards for the subject matter of the curriculum and for qualifications of teach¬ ers. The tendency toward uniformity in these matters has made it possible for public educa¬ tion to influence greatly national development. One important effect, for example, has been the secularization of public education, and hence a marked decrease in the religious element in the curriculum, and a decline in the influence of church supported schools. After the middle of the 19th century legislation prevented public funds, with few exceptions, from being used to promote sectarian education.

Public education has also reacted in a way to give a certain mental attitude to the nation. As America has been a synonym for opportunity, and freedom for the development of the human spirit, public education has ab¬ sorbed this spirit and emphasized methods

of instruction which encourage individual initiative and independence of thought. This attitude tends to perpetuate the spirit of democracy and opposition to autocratic political systems.

The development and extension of the notion of public democratic education “has been most important in its influence on national life. The reasons for, and justification of, the prin¬ ciple are as follows : First, the basis of free institutions in any nation is the intelligence and integrity of its citizens. Our government in the last analysis is based on public opinion, and it is only through an enlightened public opinion that the permanency and success of the Repub¬ lic are possible. The more universally the peo¬ ple are educated, the less need there is of re¬ straint, and the greater is the check against corruption or unwise legislation by representa¬ tives.

Public education directly affects national de¬ velopment, because through this agency national interests are best promoted. With the exten¬ sion of the suffrage and the tendency to place the government more and more on the hands of the people, or their directly elected repre¬ sentatives, both voters and leaders needed edu¬ cation to act intelligently. Again, public edu¬ cation promotes national well-being, because it leads to greater economic efficiency, and hence greater national wealth. It promotes industry because it awakens desires for more and better goods. It promotes discoveries and inventions. It leads to greater social efficiency because it reduces crime, and turns thought in the direc¬ tion of social service. As patriotism is essen¬ tial for the preservation of the nation, public schools become the principal means of teaching pupils their duties and obligations to the State, as well as their rights and liberties. Public education leads to more rapid progress, as civilization can advance permanently only as the mass advances. Public schools give oppor¬ tunity to teach the masses to appreciate and desire the best in literature, art, and music. In

short national life as a whole could hardly be enriched to any great extent except through public education. Finally, education has as its chief aim the formation of character, and hence the national character can be best formed through the public school. It has for its aim the promotion of the educational and moral development of the masses — the ethical as well as the material aspects of life. ,

In spite of the many ways in which public education has influenced national development, it falls far short of what is possible. After all is said, the State systems of public instruc¬ tion, in their origin, development and present conditions, tend to express very largely the local or sectional needs of the communities in which they are placed. The educational poli¬ cies adopted are not primarily national in char¬ acter, nor in harmony with each other. .There is too much variation in types of educational institutions, emphasis or lack of emphasis on various kinds of education, and attention paid to the problems of national life. This nation, like others, was developed through conflicts, three in particular; the American Revolution, the Mexican War, and the Civil War. Each left prejudices which have been perpetuated in our educational system, the first against England, the second against Mexico and Latin America in general, and the third the antago¬ nism between the North and the South, still perceptible in certain features of the education in the two sections. The first two prejudices interfere with our international relations and intercoifrse, causing a lack of sympathetic knowledge of the progress and problems of England and Latin America. These .prejudices affect teaching of history in the public schools, as well as geography, and lead to provincialism from the standpoint of the relation of the United States to world conditions. The third prejudice affects particularly the teaching of his¬ tory and tends to perpetuate the disintegrating force of the Civil War, because it interferes with national unity. All these difficulties are inherent in the State systems of public instruc¬ tion, but could be remedied in large part through greater national control or by the plac¬ ing of emphasis on problems of national life.

Another serious fault of our public system of education is its failure to give equal oppor¬ tunity to all sections and classes. The more backward sections, or those less fortunate in their economic life, cannot give the same oppor¬ tunities for education as the more advanced and wealthy sections. From the standpoint of the influence

of education on national life this is unfortunate. To nationalize education in this respect, it is proposed that the national government should equalize these variations so that part of the wealth of the whole people will be available for those portions of the coun¬ try not able to develop public education to the highest standard.

It is proposed that the national government should consider not only the matter of support but also that of control, at least so far as to establish minimum standards of education and teaching, and to develop the principles on which public education should be based. For to pro¬ mote national in place of local, provincial, and sectional development and interests, the princi-rnust be determined at one centre, and

not at 48 centres. It is recognized that this will be even more necessary in the future, because of the revolution in the industrial and social systems of the country, and the great importance of national development and life in connection with the world interests and responsibilities of the nation. As the old notions of State rights have been overthrown in the economic and po¬ litical world, and as the nation has taken over many of the early powers of the States in these respects in order to gain greater efficiency in national development, so it is proposed that the same policy should be pursued in the mat¬ ter of education. For it is only through the resources of the whole nation that the expense of nationalizing education can be met, and only through national control can those principles and minimum standards be established which will best promote national interests.

A third weakness of the public school sys¬ tem under individual State control is the failure to hold a good proportion of the pupils for the full course in both elementary and secondary schools, and to train them efficiently. About two-thirds of the pupils, boys and girls, leave the public school before they reach the age of 14, and enter industrial, commercial, and agri¬ cultural pursuits poorly trained. Hardly 1 per cent of the 12 or more millions of persons engaged in agriculture have received adequate training for this pursuit. Much the same can be said of the 14 millions engaged in manu¬ facturing and mechanical pursuits. Similarly the State systems make for great inequality in the teaching force. Of the 212,000 teachers for rural schools nearly one-third have an educa¬ tion in quality below the ninth grade, and an¬ other one-third not above the 10th grade. That is, 150,000 out of 212,000 rural teachers have inadequate preparation for teaching and the remaining one-third have only an average high school course with

one or two years of normal school training. Here again it is only through greater national aid and control that we can secure the greatest influence of public educa¬ tion on national development.

Recent tendencies in American public edu¬ cation have tended to emphasize still further the close relationship of education and national life. There is more and more effort to make education richer and broader; to provide more opportunities for the masses for a complete education frorn the kindergarten through the university; to increase the number and variety of agencies and institutions for education and development, such as playgrounds, lectures, continuation schools, correspondence, evening, and summer schools; to use school plants as community centres; to extend the benefits of free education not only to all children but to all the people ; to pass beyond the older conceptions of moral and book education, to new types ; to emphasize physical education, involving not only physical training but free medical examination and care of health — in short, to develop the physical as completely and with as rnuch care as the mental being; to give opportunity not only for general education but also for types that will fit for specific vocations, and to provide special teachers for vocational guidance in order to help pupils select the voca¬ tion for which they are best adapted. A demand for a special type of education, military educa-EDUCATION OF THE PHYSICALLY HANDICAPPED

tion, is due to the emergency brought on by the world war; but it is advocated by many as a necessary and permanent kind, in order to provide for national safety. It is evident that these tendencies are certain to have im¬ portant effects on our national life. The effort to extend the control of the national government over education, through the pro¬ posal to create a department of education with a cabinet officer, is another plan to relate edu¬ cation still more closely to national life.

Bibliography.— Blackmar, Frank W., < His¬ tory of Federal and State Aid to Higher Edu¬ cation ill the United States^ (Washington 1890) ; Carlton, Frank T., ^Economic Influences upon Educational Progress in the United States, 1820-1850^ (Madison, Wis., 1908) ; Jenks, Jere¬ miah W., ^Citizenship and the Schools^ (New York 1906) ; Judd,

Charles H., ˆEvolution of a Democratic Systern of Educationˆ (Boston 1918) ; ˆNew Possibilities in Educationˆ (An¬ nals of American Academy of Political and Social Science, Vol. LXVII, Philadelphia, Sep¬ tember 1916) ; articles by various authors.

Marcus W. Jernegan,

Associate Professor of History, University of Chicago.

EDUCATION IN PAINTING. See

Painting, Education in.

EDUCATION OF THE PHYSICALLY HANDICAPPED. For a long period of years, a child who was born deaf or blind or who did not possess the full normal use of any of the organs or members of the human body has been called a defective. It has also been the practice to classify children who have lost the use of any of the organs or members of the body through disease or other causes over which they have no responsibility as defective children. This classification is not regarded by those who have had the largest experience with these types of children as either wise or proper. A child who has not the full normal use of any of his organs or of any part of his body is generally sensitive about his condition and needs the sympathy of his fellows who have not suffered the loss and disadvantages that grow out of such physical conditions. If there is a psychological or other advantage in the terminology which may be used in speaking of children of these types, it seems wise and de¬ sirable to employ such terms in all references to or discussions of such children. It is not generous nor fair to these children to speak of them as defectives. The common meaning which such term conveys is too broad. Such term has a tendency to bring a degree of re¬ proach upon such children which they do not merit. This is especially true when considera¬ tion is given to the general view which pre¬ vailed until within the last century and a half, in the civilized countries of the world, in re¬ spect to these children. One hundred and fifty years ago they were generally looked upon as children who did not possess the mental capacity for training or for citizenship, who were not generally capable of self-support and who must remain a burden upon society. The belief that the deaf and blind could not be educated was so universal that within the last century they were actually referred to as children of ˆˆsilence,® ˆˆsolitude® and ˆffiark-ness,® ˆsorrow-stricken children of silence,®

^^abandoiied to his hard fate of wandering in darkness, the pitiable object of dismal despair.®

The results achieved by extending to these children their inherent rights to an education and the standing which the deaf and the blind have attained for themselves in the general affairs of life, when given the same opportuni¬ ties which have been afforded other children, have led to the adoption of an entirely different policy on the part of society and the state in relation to them. It is now universally recog¬ nized that these children are entitled to certain privileges as a matter of right which must be respected by the state and that there are cer¬ tain definite obligations imposed upon the pub¬ lic which must be discharged. These children should not therefore be classified as defectives or wards of the state. The modern and the most appropriately just classification for these children is to designate them either as deaf children, blind children, or crippled children, or under the general term, physically handi¬ capped children.

The most reliable information obtainable shows that there are in the United States ap¬ proximately 46,000 deaf persons and 60,000 blind persons. More than 35 per cent of the deaf are born in that condition and about 75 per cent of the deaf become so before they reach legal school age, which is generally, in the American States, five years. Eighty per cent of the deaf children are not able to speak. Less than 2 per cent of the blind are born in that condition and about 12 per cent become blind before they reach the age of 20 years. Statis¬ tics show that these several classes of physically handicapped children are distributed through the several States fairly proportionate to the population thereof. The number is so large that it is necessary to provide a comprehensive, well-organized system of education adapted to their needs and conditions, if they are to be afforded the opportunities to prepare them-selyes for the responsibilities of citizenship which are at all comparable with the opportuni¬ ties which are afforded the children of the country who labor under no physical handicap whatever.

There is not that uniformity of policy pur¬ sued in the several American States in rela¬ tion to the education of these types of children that is pursued in relation to the education of normal children. There are two fundamental questions which have not been definitely settled in America in relation to the education of these physically handicapped children. These questions are: 1. What is the legal and moral obligation of the State in providing educational facilities for these types of children? Is the education of these children to be looked upon as a matter of charity or a matter of State

obligation?

2. Are the facilities which shall be provided for these types of children to be institutional or as nearly like those provided for normal children as may be possible?

The schools first organized for these types of children were established largely through the efforts of men and women interested in such children either from the charitable or philan¬ thropic standpoint. Men and women interested in the subject, ˆ persons of means with the philanthropic spirit, civic organizations desir¬ ing to promote social welfare and religious

organizations were the first promoters of insti¬ tutions for the education of children of these types. In 1907 the State of Oklahoma incor¬ porated into its constitution the following pro¬ vision : <‘The legislature shall establish and maintain a system of free schools wherein all the children of the State may be educated.® (Section 1, article 13).

The constitution of nearly every State in the Union contains a provision similar to that of the State of Oklahoma. This mandatory pro¬ vision of the fundamental law of each State makes no discrimination between types of children. The provision is that these schools shall be maintained for the purpose of educat¬ ing all the children and not simply the normal children. There should be therefore a settled policy on the part of every State in the Union to rnake suitable provision at State or com¬ munity expense for the education of these children. Children who are so unfortunate as to be afflicted as these children are should be relieved to the same extent that normal chil¬ dren are relieved of the stigma of receiving their education as a matter of charity. The administration of public schools • for normal children in every State in the Union is upon the basis that such schools are institutions of the State and must be supported and main¬ tained by public taxation. The same principle should be applied in the maintenance of institu¬ tions in which children of these types are edu¬ cated. The institutions which are maintained for the education of these children should be regarded in every way as educational institu¬ tions and they should not be classified nor grouped with charitable, reformatory, cor¬ rectional or other institutions of this character which are maintained by the State.

The purpose in educating these children is to make them self-respecting, self-supporting and law-abiding citizens of the State. They are to be trained to assume their positions in or¬ ganized society as other children are trained for that purpose. If this is the conception of the State in authorizing the maintenance of institutions for the purpose of educating these children then it is the obligation of the State to divest from such institutions every element which signifies that such institutions are a part of the charitable system of the State and that the persons educated therein are therefore objects of charity. To instill into their char¬ acters the element of independence essential to success in life the State must avoid the main¬ tenance of

institutions for their education which compel those who are trained therein to feel and believe that they are dependents.

There are many reasons why these types of children should be afforded edu¬ cational facilities in the public schools of the city or district in which they reside when¬ ever it is possible to do so. This is the modern trend in connection with the education of these children. Of course, this was not possible in the early history of the development of institu¬ tions for the education of these children, when such children were so sparsely distributed throughout the country. In large numbers of the cities of the country, there are now a suf¬ ficient number of children of each of these types to warrant provision for special classes in the regular public schools. It is not possible to provide for the establishment of such

classes in the States which do not have large cities or in the territory of many of the States outside of their large cities. It will be neces¬ sary therefore to maintain institutions for the education of such of these children as live in these remote or more sparsely settled parts of the country. In about one-third of the States however there are public day-schools for chil¬ dren of these types. They have the advantage therefore of association with normal children and the personal consciousness that they are being educated for citizenship under the identi¬ cal plan provided for the education of other children. The thought that these children are different from other children is thus largely avoided. An argument of great weight in favor of this mode of educating these chil¬ dren is that they are afforded the opportunity of remaining at home and therefore of having the influences and pleasures which home life pro¬ vides. The feeling generally is somewhat re¬ pugnant to the idea of taking children at these tender ages, who possess such afflictions, from their relatives and homes and placing them among strangers in an institution. Such action must be avoided whenever it may be. It will also be more economical to provide for the education of these children in the regular pub¬ lic day-school than to pay for their education in institutions especially maintained therefor. The whole trend in modern school organization is in favor of this idea. The introduction into the schools of industrial education makes it possible to provide the facilities for the edu¬ cation of children of these types which are afforded in the special institutions.

The most advanced expression of public opinion upon this subject will be found in the law enacted in the State of New York in 1917. This

law requires the board of education of each city and of each union free school district to take a census of all the physically handi¬ capped children in such city or district. In those cities or districts in which there are 10 or more children of one of these types, the law makes it obligatory upon school boards to es¬ tablish a special class and to provide instruc¬ tion adapted to the mental attainments of the children and to their physical condition. This law also authorizes the school authorities of a city or district in which there are less than 10 children of one of these types to contract with the board of education of another city or dis¬ trict or with an established institution in the State for the education of such children.

Deaf Children. — There are recorded many early efforts on the part of individuals to teach some deaf friend or relative. The earliest rec¬ ord is probably that of a deaf person taught by Bishop John of York in 691. It is also re¬ corded that Girolamo Cardona, a distinguished physician of Pavia, invented the first manual alphabet about the middle of the 16th century. The first organized class of deaf pupils to re¬ ceive instruction, of which there is a record, was probably in the convent of San Salvador de Ona in Spain, and was taught by Pedro Ponce de Leon in 1550. It is claimed that his pupils became proficient students in arithmetic, Spanish, Latin, Greek and astrology. It was not however until about 1750 that the education of the deaf began to receive general attention in the countries of Europe. Schools had been established in England, Scotland, France, Ger-EDUCATION OF THE PHYSICALLY HANDICAPPED

many, Italy, Switzerland, Spain and Holland before the demand for their organization in America was created. In America as in Europe, the first effort was in an individual case when Philip Nelson of Rawley, Mass., was taught by Isaac Kilbourne in 1679. John Nar¬ rower, a teacher in Fredericksburg, Va., wrote in his diary that from 1773 to 1776 he had a deaf boy in his school. The real foundation of the education of the deaf in the United States was begun in the city of New York in 1810. John Stanford, a minister, had discovered sev¬ eral deaf children in the city almshouse. He readily recognized the need of these children and believed that they could be taught. He undertook to give them instruction. Interest in behalf of deaf children was growing and, in 1816, a census showed that there were 66 deaf

children in the city of New York. Public meet¬ ings were held for the purpose of stimulating interest in these children and one of the meet¬ ings took place in Tammany Hall. Private funds were collected to aid in this work. The legislature authorized a charter for the New York Institution for the Instruction of the Deaf and Dumb in 1817 and in the following year the school was organized. The city of New York showed its special interest in this work by making an appropriation to support it and pledging the city to maintain a limited num¬ ber of pupils. The city also provided rooms for carrying on the work without cost to the institution. In 1819 the legislature made a special appropriation to aid the school and later appropriated a per capita sum for the support of each pupil. It was the initial work of the Rev. John Stanford therefore which led to the establishment of this institution.

Previous to this, Americans, who possessed the means and who had deaf children, sent such children to England or Scotland to be educated. Two families had controlled the education of the deaf in these countries and had found it profitable employment. They were the Braid-wood and the Watson families. One of the former, who had become involved in certain scandals, left Scotland and came to America in 1815 to organize an institution in this country for the education of the deaf. Various at¬ tempts were made by him to organize an insti¬ tution in New York, Baltimore and different places in Virginia. However, he did not suc¬ ceed.

The man who did the great pioneer work in America in the development of institutions for the education of the deaf was Thomas Hopkins Gallaudet (q.v.). He was a young minister in Hartford, Conn., and in that city lived a young deaf girl by the name of Alice Cogswell. Her father was a physician. Because of her fam¬ ily's standing and of her intelligence, many per¬ sons in that cit}ˆ had become interested in her. This interest led to a census of the comrnunity and more than 80 deaf children were discov¬ ered. It was estimated that there were 400 deaf children in New England and 2,000 in America. The knowledge of thisˆ condition led to an effort to organize an institution to provide for the education of these children. Gallaudet was sent to Europe to investigate the subject and when he returned he brought with him Lau¬ rent Clerc, a deaf teacher who had been em¬ ployed in teaching the deaf in Paris. Upon his return Gallaudet undertook to raise the nec¬

essary funds for the organization of a school. The principal cities of

the country were visited, including New York, Philadelphia, Albany, New Haven and Boston. The legislature of Connecticut authorized the organization of an institution in 1816 by granting a charter. That State also appropriated $5,000. This was prob¬ ably the first appropriation in America of pub¬ lic funds for the education of deaf or other physically handicapped children. Twelve thou¬ sand dollars had been raised by subscription previous to the opening of the school at Hart¬ ford, on 15 April 1817, and soon after an addi¬ tional $12,000 was raised by the same method. The institution soon obtained a national repu¬ tation. Gallaudet went to Washington in 1819 to interest Congress in the movement. He met Henry Clay and, through the influence of that Southern statesman. Congress appropriated 23,000 acres of public land. From this appro¬ priation the institution realized the sum of $300,000. The school was particularly regarded as a New England institution. Massachusetts instituted the policy of sending its deaf chil¬ dren to this school to be educated. Each of the other New England States followed the exam¬ ple of Massachusetts. Georgia and South Carolina did likewise and many private pupils were sent to the school from different parts of the country. Within the next decade institu¬ tions were founded in New York, Pennsyl¬ vania, New Jersey and Kentucky. These were all organized as private institutions. In 1823 Kentucky established an institution which was the first State school for the deaf in the coun¬ try and this may be regarded as the beginning of a change of policy in the education of the deaf. Congress gave aid to this institution. For many years the deaf children from the Southern States and from many of the Western States were sent to this institution to be edu¬ cated. From this time on the State recognized its obligation in providing for the education of these children by the establishment of institu¬ tions as State institutions in nearly all the States of the Union. The schools thereafter established, except in Maryland, New England and some of the Eastern States, have been or¬ ganized as State institutions.

Every State except Delaware, New Hamp¬ shire, Nevada and Wyoming maintain an insti¬ tution for the education of the deaf. Because of their small population these States find it more economical to provide for the education of their deaf children in the institutions of other States. There are 65 State institutions in the United States. Forty-eight of these are owned by the States which have erected them. In Connecticut, Massachusetts, Vermont, New York, Pennsylvania and Maryland there are 17 institutions owned by private corporations but under the general supervision and inspection of the State. Many of these institutions have been endowed. Appropriations are made by the State for the construction of new buildings for these institutions and

for repairs and improve¬ ments to their plants. A per capita allowance is also appropriated by the State to the institu¬ tion for the maintenance of students.

When institutions were first organized by the States it was the policy to restrict the num¬ ber of students who might attend to a certain number of indigent pupils from a political divi¬ sion. The number was gradually increased and

the language modified which classified them as indigent pupils. Finally no limitations were imposed but the right of any deaf child in the State to attend was clearly specified in the law and provision made for meeting the expense.

An examination of the census of the United States shows that the deaf are generally em¬ ployed in the chief industries of the country known as trades and in about the same propor¬ tion as hearing people. The number of deaf employed in the occupations which are classed as manufacturing and mechanical are much greater in proportion than the number of hearing persons so employed, while the num¬ ber employed in mercantile and commercial pursuits is much less. The percentage of the deaf who either own or give direction to the business in which they are employed is about the same proportion as the hearing people. There appears to be no discrim¬ inatory action on the part of the employer in employing the deaf. He is employed under the same conditions and at the same compen¬ sation that others are employed. About 80 per cent of the deaf are employed in gainful occu¬ pations and about 90 per cent are self-support¬ ing. The character of the instruction which the deaf should receive therefore does not differ from the instruction essential to a well-trained normal child. The courses of instruction in reading, language, history, arithmetic and all book-work as well as courses in vocational work for children are suitably adapted to the needs of deaf children. The method of in¬ struction must, of course, be different.

The sign language has been used in the in¬ struction of the deaf since special schools have been organized for their education. This sys¬ tem is called the manual or sign method. There is also a method known as the oral method. Many teachers employ a combination of the two methods. The sign language has always been the chief vehicle through which the deaf express themselves. There is a great disad¬ vantage in this method since the public is not generally able to use it or to interpret it. The deaf have therefore been unable to communi¬ cate readily with those with whom they must transact their business affairs. There have been advocates of another method from the very beginning almost of the period when in¬ struction was provided for the deaf. Dr, John Bulwer of England wrote in 1648, ˆPhiloco-phus, or the Deaf and Dumb Man’s Friend, > in which he describes a method of articulation and lip-reading for the deaf, and in 1669, Dr. William

Holder published a work on the ˆEle¬ ments of Speech.ˆ In this work Dr. Holder ad¬ vocated the teaching of the deaf by a process of articulation. At this early date the foundation of the two rival methods of the present day for the instruction of the deaf was established.

Samuel Heinicke opened a school in Ham¬ burg in 1754 and in 1778 on invitation of the government he removed the school to Leipzig. The State supported the school and this appears to be the first public school for the deaf. He was one of the great deaf teachers, was an advocate of the oral method and influenced the method of teaching the deaf in European coun¬ tries and in America. Charles Michel, Abbe de I'Epee, was the founder of the first school in Paris which he organized in 1755. He prob¬ ably exerted a greater influence on the instruc¬

tion of the deaf in America than any other teacher.

The New York institution is said to have been organized as a day school in protest against the alphabet method of instruction and to have been conducted as a school using the oral method for 11 years. In 1869 the Boston Horace Mann school was organized as a day school and since that time day schools for the deaf have been established in 14 States, Such schools have been organized extensively in Wisconsin and Michigan. In the former State such schools have been organized in 24 cities or villages with an enrolment ranging from 5 to 146. In the latter State schools have been established in 14 cities or villages. The large cities are organizing such schools and they will be found in New York, Chicago, Cleveland, San Francisco, Los Angeles, Saint Louis, Saint Paul, Newark, Atlanta, New Orleans and others.

About 72 per cent of all the deaf pupils are taught the combination method, 26 per cent the oral method and 2 per cent the manual or al¬ phabet method. About 83 per cent of all the deaf children under instruction or about 12,000 are in attendance upon institutions, about 14 per cent of these children or 2,000 are in at¬ tendance upon day schools and about 4 per cent or 600 in private schools.

High school courses for deaf students are generally provided. Gallaudet College, an in¬ stitution for the deaf and named in honor of the American champion of the rights of the deaf, was organized in Washington in 1864 and is supported by the national government. See also Deaf; Deaf, Education of the; Deaf-Blind.

Blind Children. — The efforts to develop a system of education for the blind have paral¬ leled in many ways the efforts to develop a system of education for the deaf. For cen¬ turies the blind were regarded as objects of pity and as unfortunate beings. There is au¬ thority for the statement that a hospital for the blind was established by Saint Basil at Caesarea in the 4th century and that a refuge for the blind was established in Syria in the 5th century. There is no record of considera¬ tion of any importance having been given to this type of unfortunate beings from the 7th century until the middle of the 13th century. It is recorded that King Louis IX of France established an institution for the blind about 1260. There are numerous records of individ¬ ual efforts to teach the blind to read in the early centuries. These records show activities in Italy, Austria, Switzerland, France, England and Germany. It was not, however, until the close of the 18th century that success was at¬ tained in efforts to establish schools to be de¬ voted to the teaching and training of the blind.

The one pioneer in this great work, to whom the blind are indebted most for the laying of a foundation for a system of education which has resulted in training thousands of blind people to become self-supporting and to get pleasure out of life, is Valentin Hauy, a French¬ man, who was born in Picardy in 1745. M. Haiiy became interested in a blind boy by the name of Frangois l.esueur. He had been much interested in the blind because of various experiences which he had with them. He had even made an investigation as to the methods employed by other persons who had attempted

to teach the blind. M. Haiiy is the inventor of the first system of embossed printing for the blind. It was through an experience with the boy, Lesueur, who was employed in his office, that led to the invention of this system. When engaged in sorting papers on M. Hairy's desk, the boy obtained a card which had been deeply indented by type. The boy was able to trace out several of the letters on this card with his finger and was, of course, greatly delighted to show his master what he had discovered. M. Haiiy then made several experiments with the boy and in this way obtained the idea of devising a system of training for the blind. He submitted to the Academy of Science at

Paris in 1785 a plan outlining his method of

giving instruction to the blind. A committee was appointed by that body to examine into the matter, and, after making due investigation, they gave M. Haiiy credit for inventing the

relief printing for the blind. In submitting its

report, the committee slated :

"We propose to the academy to give its approbation to the method which M. Hatiy has presented to it and to ex¬ hort him to make it public and to assure him that it will willingly receive any account that he may give of his efforts to carry it to the degree of perfection of which he is sus¬ ceptible."

He undoubtedly established the first school in the world for the education of the blind. This school was known as L'Institution Nationale des Jeunes Aveugles and was established in France in 1784. In 1791 this institution, due to the Napoleonic wars, was discontinued and was not again opened until 1815. Doctor Guillie was then made the head of this institution. In¬ dustrial education was the basis of instruction given in this early school and it was continued under a larger and more practical plan by Dr. Guillie. He obtained much new equip¬ ment for the institution. The principal handi¬ crafts which

were taught in this school were spinning, weaving, sewing, knitting, chair caning, rope making, shoe making, harness making, *etc.* When the institution was closed under Napoleon's rule M. Haiiy accepted an invitation from Tsar Alexander I to go to Saint Petersburg for the purpose of organizing an institution for the blind in that city. On his journey to Saint Petersburg, he spent some months at Berlin. King Frederick William III became interested in the blind and through the work of M. Haiiy the foundation for an institu¬ tion was laid. He spent 11 years in Russia but did not succeed in establishing an institution.

Soon after the efforts of M. Haiiy to estab¬ lish an institution for the blind in France, Edward Rushton began the education of the blind in England. J. Christie, a blind man in Liverpool, and a clergyman by the name of Dannett cooperated with him. Subscriptions were obtained for the enterprise and a school for the indigent blind was organized in Liver¬ pool in 1791. The organization of this school created great interest in the blind people in England, and another school was organized at Bristol in 1793, and at London in 1799. Schools followed in Edinburgh, Scotland and Dublin, Ireland. At the beginning of the 19th century Herr Johann Wilhelm Klein became greatly in¬ terested in the blind children of Austria. He had observed many pitiable cases of the un¬ fortunate blind children of that country. He received much encouragement, as did M. Haiiy

of Paris, from Maria Theresia Von Paradis, a blind Austrian singer, w'ho had inspired these men in the belief that through a system of education the blind could be relieved of much of their misery and raised to a high degree of cultural standing. It was through the influ¬ ence of these men and the schools which they established that institutions for the education of the blind were established throughout the countries of Europe between 1790 and 1810.

Maria Theresia Von Paradis had an import¬ ant part in developing interest in this subject. She came from an influential family. She pos¬ sessed musical talent which her parents recog¬ nized and provided the best teachers obtainable for her. An interesting plan was devised in teaching her to read. Pins were placed in a cushion so as to form the several letters of the alphabet. By placing her fingers on the pin heads constituting these forms, she was able to recognize the different letters and learn to read. Later similar letters were formed by making perforations in stout paper with a pin. She was able to determine the letters from the raised rough edges of the paper which these

perforations made. Later a special press was made for her and with this she was able to print German characters in relief. As a child she was _ an efficient organist and became a notable singer in church choirs at an early age. The Empress Maria Theresa became attached to this young blind girl and provided a pension sufficient for her maintenance. As early as 1784 she traveled through Europe and captivated the whole world through the great musical talent which she exhibited.

Another blind person of an earlier period even than this blind girl, who aroused great interest in the need of educating blind children, was Nicholas Saunderson. He was an English¬ man, born in Yorkshire in 1682. He became totally blind at the age of two. He attended a regular public school with seeing children and acquired a fine classical education. He later met distinguished teachers and through them became much interested in mathematics. He invented the abacus. He used this in determining mathe¬ matical problems. He later became a professor of˜ mathematics at Cambridge. Other distin¬ guished blind persons who exerted a powerful in¬ fluence in developing interest in the education of the blind were Milton, the Scottish preacher Blacklock, and the engineer John Metcalf.

Schools were well organized throughout Europe before ˆ America gave this question much consideration. There were three schools in this country where the pioneer work in the education of the blind took place. The first school in America opened for the education of blind children was the New York Institution for the Blind. This institution was chartered by the State legislature in 1831 and has been in continuous operation since that date. A group of citizens in New York recognized the need of providing educational facilities for blind children. The founders of the school desired to provide facilities for the children whose parents were unable to pay for their education and at the same time to receive students whose parents were able to pay for their instruction. The school was started as a charitable institu¬ tion. Its doors were opened 15 March 1832 with only three blind children. Soon after two other children were admitted. The prime

movers in the foundation of this school were Dr. Samuel Akerly and Samuel Wood, a well-known philanthropist. Dr. John D. Ross had discovered several blind children in the alms¬ house of the city and he was taking measures to organize a school when he learned of the work which the other two men had already done in this direction. He cooperated with them and was chosen as the head of this primi¬ tive school for the blind in America.

Dr. John D. Fisher of Boston was pursuing medical studies in Paris and he frequently vis¬ ited L'Institution Nationale which had been or¬ ganized by M. Haiiy. He became interested in the subject and was desirous of establishing a similar school for the benefit of blind children in America. He returned to Boston in 1826 and began to urge the plan upon his friends. A meeting of those interested in the subject was held in 1829. A committee was appointed by this meeting which applied to the legislature of Massachusetts for a charter for an institution to be called the New England Asylum for the Blind. This charter was granted 2 March 1829. It appears, however, that no action was taken toward the organization of the school until 1831. Dr. Samuel G. Howe was then elected superintendent. He was sent abroad to familiar¬ ize himself with methods of instruction. He returned in 1832 and opened a school at South Boston with a class of six children. The school in New York had been opened a few months before the one in Boston was opened by Dr. Howe. In 1833 the Pennsylvania Institu¬ tion for the Instruction of the Blind was estab¬ lished in Philadelphia. These institutions were organized by contributions from private sources but have for years received appropriations from the State.

In 1830 the United States government took its first census of the blind. This census showed that there were 5,444 blind persons in the country. The superintendent of the blind schools at New York, Boston and Philadelphia took groups of their pupils to different parts of the country to demonstrate to the people the feasibility of educating the blind. These tours created a profound impression upon the people all over the country and developed a sentiment which resulted in the establishment of other institutions. In 1837 an institution for the blind was established in the State of Ohio. This was the first school organized purely as a State institution. Other States followed in the estab¬ lishment of such institutions until at the present time there are about 50 State institutions at¬ tended by more than 5,000 blind

children. The last Federal census shows that there are about 60,000 blind people in the United States and that 10 per cent of these are of school age. In nine of the States provision is made for the edu¬ cation of the blind children who are under school age. The best modern thought is that children who are born blind should be placed under in¬ struction at the earliest moment possible and that all children who become blind before they reach school age should also be placed under in¬ struction as early as possible. The institutions for the blind are generally under the control of local honorary boards of trustees. This board selects the superintendent or principal of the in¬ stitution. The institutions generally are subject to inspection by the State educational authorities.

Great interest has been manifested all over

the country in the education of the blind within the last 20 years. The modern trend of thought is to provide for the education of blind children in the public school system. The first city in this country to try this experiment was Chicago. In 1900 that city organized a special class for the blind in one of its public schools. The ex¬ periment was a success. Additional classes were organized in that city and soon thereafter other cities began to incorporate into their school systems special classes for the blind. Such classes are now maintained in the schools of Cincinnati, Milwaukee, New York, Racine, Newark, Jersey City and many others. Chicago has three schools located in different parts of the city so as to make them the most accessible possible to all the blind children in the city. In New York city special classes have been organized in 12 of the different public schools of that city. When a blind pupil enters a special class in a public school he is assigned to a special room with a special teacher. The number of pupils in a class varies from 5 to 15. In this special class the pupils are taught to read and write in American Braille. When the child becomes able to read and write, he takes his place in the regular school classes and re¬ cites with the seeing children. He takes his turn in reading, writing, and in reciting in other sub¬ jects. After the recitation is concluded, the blind child goes to a special room to prepare his lessons under the direction of a special teacher. The theory is to arrange the work of the blind child so that he will continuallv spend more and more time with the seeing children.

The course of study for the blind is quite similar to the regular courses of the public schools. The tendency is to start the blind child in the kindergarten. The blind children who have kindergarten training

make better progress in their work than those who have not had it. The course includes reading, writing, numbers, history, geography, physiology, nature study, *etc.* Physical training and music are two vital features of every well-regulated course of study for the blind. The setting-up exercises, the usual games for children in the classroom and on the playground, folk dancing, skating, rope jumping, ˆ and all the usual games and sports for seeing children are adaptable to the blind children. These physical exercises are essential to their proper physical development and to their health. They also aid materially in developing independence, comradeship, and community interest in the blind child. The courses of study extend through the elementary school and the high school. Eighteen blind chil¬ dren who completed the course of instruction in the elementary schools in New York city in the school year ending 1 July 1916 entered the high schools of that city in September of that year. These children are now trained for more extended service than in former years. In addi¬ tion to the manual occupations, they are now trained for business positions, for teachers, for salesmen, typewriters, and several have taken up the profession of osteopathy. Many of them become fine musicians, organists, piano tuners, *etc.* That the blind have the capacity to obtain leadership is demonstrated by Huber, the nat¬ uralist ; Prescott, the historian; Rodenbach, the Belgian statesman ; Fawcett, the English states¬ man; and Gore, United States senator from Oklahoma. The names of Dr. Howe, Dr. Moon,

and Dr. Wait will always be associated in America with the development of methods for teaching blind children. They did a great work in this field of education.

The line alphabets which were used for many years in giving instruction to the blind have been abandoned. The point systems have come into general use. These are known as ˆbraille.® The base is a cell of six points. The characters used are made by various combinations of these six points ; 62 characters are used. These char¬ acters each represent a letter, a mark of punc¬ tuation or a contraction standing for several letters. The system is named after its author, Lewis Braille, who devised it in 1825. There has been a long controversy between teachers of the blind as to whether the braille system or certain modifications devised by American teachers is the better. There appears to be no great fundamental difference in these systems. The American modification of the system differs from the other simply in the assignment of the letters to the various combinations. The Amer¬ ican idea was that such letters as E, O, R, S, T, which occur most frequently in words, should be made with the fewest dots. One of the most noted teachers of the blind states that the New York point differs from braille by its characters being two points high and three wide instead of three points high and two wide. This author states that while the New York point system has many advantages, it has many disadvantages.

Most attention in the education of the blind has been given to the education of blind chil¬ dren. Although the great majority of the blind become so after reaching 20 years of age, there has been an apparent neglect in the education of the adult blind. Various organizations have been formed in recent years which are giving the needs of the adult blind special attention. State commissions have been organized by legis¬ lative authority in certain States supported by State funds, to provide for the education of the adult blind. In some instances, as in New York, the commission makes provision for home teach¬ ers. Under this method a teacher goes from home to home and gives instruction to the blind adult in his home.

A potent factor in the education of the blind adult is the work done through libraries. In March 1896 a library section for the blind was incorporated in the New York State Library. In the same year the Detroit Public Library selected 110 volumes and made these available for the blind of the city. The Library of Congress at Washington established a read¬ ing-room for the blind in 1879. There are now (1918) about 70 libraries maintaining divisions which contain embossed type books which are circulated among the blind people.

Crippled Children. — It was not regarded necessary to provide separate schools for crippled children until many years after schoolsˆ had been founded for the other types of physically handicapped children. In recent years the num¬ ber of crippled children has increased, owing to the prevalence of tuberculosis and infantile paralysis and to other causes.

In 1832 Bavaria established at Munich the first institution in the world for the education of crippled children. Up until 1890 only five institutions had been established in the United States. Three of these were in New York city and two in Philadelphia. Since 1890, 31 institu¬

tions for the education of crippled children have been established in this countr>\

Children's hospitals and orthopedic insti¬ tutions have been organized from private con¬ tributions for the treatment of crippled children. In many of these institutions, provision has been made for their instruction during the period of time they have been under treatment therein. In Massachusetts, New York, Nebraska and Minnesota State hospitals have been established, and graded schools maintained by the State in connection with such institutions. However the means afforded for the education of this type of unfortunate children are not adequate to provide for the treatment and the education of the crippled children of the country. There is a large class of these children whose parents cannot afford to meet the expense of their main¬ tenance in private institutions, and whose educa¬ tion is'being neglected. Many crippled children who are physically able have always attended the public schools. A crippled child, possessing his mental faculties and being physically able to attend school, will make better progress by associating with normal children than by at¬ tending a special institution. In many of the large cities of the country, special schools are maintained by the municipality and in some cases

in cooperation with contributed funds, for the education of this ‘ype of children. In ether cities, the public school authorities set apart rooms in the public school buildings for the purpose of providing educational facilities for these crippled children. Each city and school district in the State of New York in which there are 10 or more crippled children is obligated, under the law of 1917, to establish a special class and to provide instruction adapted to the mental attainments of the children and to their physical condition. In a city or district in which there are less than 10 of these children, the school authorities are authorized to con¬ tract with the board of education of another city or district, or with an established institu¬ tion in the State, for the education of such children.

The cities of Chicago, Cleveland, Boston and New York maintain day school buildings which have been designed, constructed and equipped with special reference to the needs and comforts of crippled children. These buildings are not all of the same type, but in them will be found such conveniences as inclines and elevators in¬ stead of stairways, movable chairs instead of desks, rubber or cork floors and handrails at low levels. Special chairs and seats accommo¬ dated to the physical defects of the children, couches, air cushions, folding chairs, blankets, sweaters, etc., are also provided. The Crippled Children’s East Side Free School of New York city accommodates 200 and is the largest in¬ stitution of the kind in the country.

Provision must be made for taking these children from their homes to the schools and for returning them to their homes. They can¬ not, of course, return home at the noon hour and it is necessary, therefore, to provide lunch¬ eon for them. The transportation and the lunch¬ eon are items of additional expense to the main¬ tenance of these schools. In most cities the chil¬ dren are taken to and from the schools which they attend in large omnibuses drawn by horses. The tendency now is to change to the auto-bus. The seats in the buses used for this purpose are

constructed to meet the physical defects of the children. Attendants accompany all buses to see that the children are properly taken in and out of the buses, the school buildings and their homes and that they

have safe transportation.

In the larger cities, where rooms in the public school buildings are set apart for these children, an orthopedic surgeon or a nurse is provided to give such special treatment to the children as may be needed. The city of New York maintains 60 schools or classes for the crippled children of that municipality.

Those children who are suffering from bone tuberculosis should be segregated from the other children and provision should be made for their maintenance, if possible, in a separate building. Open-air schools should be estab¬ lished for all children of this type.

All these different agencies for the educa¬ tion of the crippled children still fail to pro¬ vide facilities for some of these unfortunate children. There are many children who are so badly crippled that they are prevented from attending institutions or schools even with all the comforts and conveniences which are pro¬ vided for them. The only way by which such children may be instructed is through a teacher who visits them at home. To meet the needs of these children it is proposed in New York city, through funds provided by the Associa¬ tion of Public School Teachers, to employ visiting teachers who will go among the homes of the children and given them instruction.

Through private funds provision is made by some of the organized institutions for the care and education of crippled children whereby such children are given an opportunity to spend a few weeks in the country. Summer homes have been established for this purpose by some of these institutions in New York, Baltimore and other cities.

The work in these special classes for crippled children is based upon that of the regular ele¬ mentary school work of the city in which the classes are organized. This work includes a large amount of handwork such as basketry, weaving, sewing, *etc.* Only in exceptional cases is there an effort made to carry the pupils be¬ yond the elementary grades.

This movement of recent years to provide special classes in the public schools and home teachers for those unable to go to school, thus making an elementary education accessible for all the physically handicapped children of the country and at the same time affording them the associations and influences of home life, is a manifestation of the broad, humane, demo¬ cratic spirit of the philosophy upon which American public education is founded.

Thomas E. Finegait,

Superintendent of Public Instruction for the State of Pennsylvania, Formerly Deputy Com¬ missioner of Education, State of New York.

EDUCATION OF TEACHERS. See

Teachers, Professional Training of.

EDUCATION IN THE UNITED STATES. Every nation has its social ideals and believes in the maintenance of those ideals. Education is the instrument by means of which a nation hopes to realize its ideals. Because different nations have different ideals, there ex¬

ist different systems of education. In Europe the ideals are the resultants of historic forces. Society has developed in strata and the classes in control of the destinies of the various na¬ tions believe in the maintenance of these strata. As an individual is born into a class of society his education is organized chiefly to fit him for the various vocations of that class. This con¬ ception of education has been successfully maintained not only because of the organiza¬ tion of society into castes, but because of the relative stability of the population. Most peo¬ ple live in the community in which their parents lived and it is natural for their children to take up the Vocation of their parents. These tw^o factors explain to a great extent the remarkable success of the industrial education movement in Germany. Neither difference in political ideals nor in th-e age of a national system of education seems to affect this attitude toward education. Prussia with its autocratic concep¬ tion of government and its century-old system of education, is but little more representative of this t)^pe of education than is England which is organized politically as a democracy and which developed a national system of education but a generation ago.

Theory of Education in the United States.

— The theory upon which education is organ¬ ized in the United States is the very opposite of that which holds in Europe. There are as yet no castes here and few parents are content to have their children continue in the ^station^^ in life in which they were born. For the first time in history there is an attempt made to realize the educational ideal portrayed by Plato in his ^ Republic,^ viz: That every individual should be doing that in life for which he is best fitted ; that education should be so organ¬ ized as to discover for what the individual is best

fitted, and then to provide him with the proper and ne'cessary training. This is done, it must be admitted, crudely and haltingly, but the American democracy is practically the only great state in which there exists an educational ladder reaching from the kindergarten to the university, in which all parts, elementary, sec¬ ondary and higher, are so articulated that an individual may freely pass from one to the other. In the European systems of education only elementary education is free and it does not articulate with secondary education. The elementary school carries the child to 12 or 14, giving him a rounded elementary education. The secondary school begins at nine and commences to teach subjects not considered in the element¬ ary school, such as mathematics and foreign languages. Even should a child of the masses when he completes the elementary school, then have the ambition and money to continue his education, he would be unprepared to enter the secondary school. There is nothing for him to do but to enter one of the vocational schools for training in some trade or industry. And that is what is expected of him. The American democracy is by no means perfect in all its as¬ pects ; but as far as education can accomplish it. it aims to give every individual the opportunity to make the most of his native abilities and to assume the place in society which his abilitRs justify. This was not always so, and to un¬ derstand the American system of education as it exists to-day it is necessary to make a brief survey of its development since colonial times.

THE COLONIAL PERIOD.

History of Education in the United States. — The Reformation principle that the individual should be guided in life by the Bible had as an educational corollary that he should at least be taught to read it. Where the Reformation was chiefly a religious movement and was carried to logical conclusions, the effect upon the devel¬ opment of universal education was quite direct, but where the Reformation was political and ecclesiastical rather than religious, and halting rather than thorough, the attitude toward edu¬ cation was one of comparative indifference and neglect. The former condition was true wher¬ ever Calvinism prevailed, as in the Netherlands, Scotland and among the Puritans in England. The latter condition was true in England gen¬ erally, where the Anglican Church was in the nature of a compromise. The United States was settled in the 17th century when religious antagonisms were most bitter and, moreover, it was largely settled by groups of people who fled from Europe because of religious persecu¬ tion and because of their desire to worship in their own peculiar way. The kind of educa¬ tional system that would be established in any part of the new land would be determined chiefly by the kind of religious opinions held by the people settling there. We find three fairly distinct types of education developing in the colonies :

1. The Selective Type prevailed in the south¬ ern colonies where distinctions of classes de¬ veloped and the Anglican Church was estab¬ lished. The gentry employed tutors for their own children or sent them to England to be educated. They were not only not interested in the education of the masses who were in many instances indentured servants and convicts, but believed solely in the system of apprenticeship as a preparation for the trades which were to be the lifework of these lower classes. ‘ Hence, down to the Revolution, the character that was early impressed upon education in the southern colonies remained, *i.e.* fair provision for sec¬ ondary education through the voluntary and haphazard establishment of Latin schools, and little provision for elementary instruction be¬ yond the system of

apprenticeship.

2. The Parochical School Type prevailed in the middle colonies. These colonies were set¬ tled chiefly by various Calvinistic sects like the Dutch Reformed in New York and the Presby¬ terians in New Jersey, or by other sets of the advanced Protestant type, like the Quakers and Mennonites of Pennsylvania. They all believed in the need of everyone to read the Bible, and all, therefore, favored elementary education. But as each sect denied the efficiency of any other's way to salvation, this elementary edu¬ cation took the form of parish schools attached to the church. In all the middle colonies in addition to the parochial schools for elementary education there existed ^^grammaP^ schools for secondary education.

3. The Tozvn School Type prevailed in New England. The people who settled there were more homogeneous than in any other part of the country. There was little distinction of classes among them as in the southern colonies and there was no distinction of sects as in the middle colonies. They were mostly of the middle class socially, were generally well edu¬

cated and had university graduates for leaders ; were thorough believers in democratic govern¬ ment and were strong upholders of the Calvinistic-Genevan principle of the church-state form of government. Holding firmly to the necessity of everyone being able to read the Bible, the General Court, i.e., the legislature of Massa¬ chusetts, passed the famous law of 1647 by which ®the Puritan government of Massachu¬ setts rendered probably its greatest service to the future.® The law provided that every tovv^n that contained 50 families should maintain an elernentary school and a town that had 100 families should maintain in addition a ^^grammar® school to fit the youth for the university. The religious motive that prompted the law is stated in the preamble, namely, to prevent ®that old deluder, Satan, keeping man from a knowledge of the Scriptures.® Unfortunately, subsequent developments resulted in the de¬ cline of education in New England and the decay of the town school. The chief cause was the spread of population into unsettled regions and the attainment of local govern¬ ment by districts within the town. The houses of the early settlers were clustered around the meeting house of the town, partly for better protection against Indians and partly because of religious _ devotion. As religious fervor de¬ creased in the 18th century and fear of the Indians passed away with their diminution in numbers, settlers moved into parts of the town that

were inaccessible to the town school or they moved into entirely new regions that had no town school. Hence arose the ˆMistrict® school, which could afford only a poor teacher who ®kept® school a few months in the year. In all the colonies the colleges that had been founded, such as Harvard and Yale in New England, Columbia, Princeton and Pennsylvania in the middle colonies and the College of Wil¬ liam and Mary in Virginia, supplied the higher education needed by the members of the learned professions.

THE PERIOD OF TRANSITION.

The Revolution had both a bad and a good effect upon education. The war bankrupted not only the central government, but many of the state governments. The British fleet had destroyed colonial commerce ; its blockade had brought industry to a standstill and thousands were reduced to poverty. In hard times educa¬ tion is generally one of the human activities that is first to suffer. Moreover, other obstacles to the development of a national system of free schools existed. (1) One was the practice of granting public moneys to private schools. This practice was general throughout the colonies but can be best illustrated in connection with the kcademy movement. The decadence of the town school and of the Latin grammar school in New England due to the growth of the dis¬ trict school was much hastened by the poverty resulting from the Revolution. But the well-to-do classes would not let their children go without secondary instruction and the policy was inaugurated of establishing private second¬ ary schools called academies. Though these academies were private corporations, through the influence of their supporters they were usually able to secure subsidies of public moneys either from the State government or the towns. They performed a splendid service, for they

were generally well organized and administered, were responsive to the needs of their con¬ stituents and introduced modern subjects like English literature and science. But they were pay schools and hence not open to the children of the masses ; they withdrew the attention of the influential people from public education, just when it was most needed; and they created vested interests which were often opposed to public interests. When one considers that by 1840 Massachusetts alone had 50 such private academies subsidized with public funds and that the movement had spread throughout the coun¬ try, one can realize the extent to w'hich they w'ere a hindrance to the growth of public secondary schools. (2) A second obstacle to the development of a system of free public schools was the existence of sectarian religious jeal¬ ousy. Nearly all the sects opposed a movement which would prevent the teaching of their own peculiar form of religion and which would also render valueless the school property which they had accumulated. (3) A third obstacle was the prevalence of the idea of public education as pauper education. The idea that free schools were only for the poor prevailed generally throughout the country south of New England. ■(4) Another obstacle was the claim that the public school was based upon an undemocratic principle, that it was unjust to compel people without children to pay for a service from which they received no benefit, or to compel parents who sent their children to private schools to pay for the education of other people's children. This view explains the ˆpermissive® legislation of the early decades of the 19th century by which local areas were per¬ mitted to decide how much support they would give to public schools. For example, in 1831 an act was passed by the legislature of Indiana which permitted the voters of school districts into which the counties were divided to decide the amount of local tax to be levied for the sup¬ port of public schools. But the act contained the proviso ˆˆno person should be liable for taxation who does not or does not wish to participate in the benefits of the school fund.®

But if there existed numerous obstacles to the development of a system of free public education, there developed counter movements stimulating its development. (1) The principles of liberty and equality for which the Revolution was fought combined with the growth of a new political and social order to develop a be¬ lief in the need of universal education to realize those principles and that order. With the opening up of the West there developed a con¬ dition of society in

which social influence, reli¬ gious affiliation and wealth counted for much less than in the East. (2) Moreover, the Fed¬ eral government, even before the adoption of the Constitution, adopted a policy the influence of which in the development of American edu¬ cation cannot be overestimated. The northern territory which had been ceded to the Federal government by the various States claiming parts of it and from which the States of Ohio, Indiana, Illinois, Michigan and Wisconsin were carved, was organized under the famous Ordinance of 1787. In accordance with the provisions of that act the entire territory was divided into townships six

miles square, and of the 36 sections into which each town was subdivided, section 16 was reserved for the support of public schools. Moreover, two whole townships were reserved for the support of a State university. This admirable policy was continued in all the ter¬ ritory secured by the United States through pur¬ chase or conquest. (3) The introduction from England of Lancaster's system of monitorial teaching whereby one teacher with the assist¬ ance of older pupils (monitors) could instruct hundreds of children was one of the greatest stimuli to the establishment of public school systems, because its cheapness was influential in securing appropriations from legislatures for the establishment of public schools. (4) The infant school movement and the Sunday school movement were also steps in the direction of accustoming people to think of education for all. Though, as the result of the interplay of these opposing influences, education was everywhere becoming less aristocratic and sectarian and more democratic and secular, the advent of a public school system came only as the result of a great awakening.

THE PUBLIC SCHOOL REVIVAL.

Massachusetts established its State Board of Education in 1837 and Horace Mann, with whose name the public school revival is in¬ separably associated, was made its first sec¬ retary. As a result of his 12 years of service in that position and by means of his annual reports, his Common School Journal and his speaking tours throughout the State, he was able to secure reforms in the public school sys¬ tem of Massachusetts which were little less than amazing in their extent and value. These included the establishment of normal schools for the proper training of teachers, the exten¬ sion of the school year by a month, the gradual substitution of the, public high school for the private academy, the doubling of appropriations for public education, the increase in pay for the teachers by more than 50

per cent and the adoption of new agencies for improving the efficiency of instruction such as teachers' insti¬ tutes and school libraries. These admirable reforms were not secured without bitter opposi¬ tion from conservative schoolmasters and sec¬ tarian religious interests. But the movement spread to other States and under the leadership of Henry Barnard of Connecticut, David Page of New York, and a number of enthusiastic educators in the Middle West, by the close of Reconstruction it had resulted in all the States of the North organizing a public educational system providing free elementary and secondary education and in many States higher education also. In the South, the principle upon which the movement was based was adopted but its real¬ ization was delayed by the deplorable condi¬ tions resulting from the Civil War.

A National System of Education. — The period since Reconstruction has been one of edu¬ cational expansion. In the newer western States sectarian jealousy and the conception of free public education as fit only for those who could not pay tuition fees never appeared and the first constitution of each of those States provided for a complete system of free education extend¬ ing from the elementary school to and includ¬ ing the university. Everywhere the principle

of unification and centralization won out. This victory for centralized State control was due to a great many causes, but chief among them were the following; (1) The appropriation by the Federal government of millions of acres of land directly to the State for the support of elementary schools and of higher institutions for agricultural and technical education, (2) The distribution of State moneys by the State educational department to the local geographi¬ cal areas, provided the latter would meet re¬ quirements laid down by the former. (3) The unifying and standardizing influence of the State university into whose hands the control of secondary education has in some States been placed, (4) The growing faith of the American people in public education to solve the political, social and economic problems which confront them and hence the necessity that it should be centralized in order to be efficient.

In a Federal state like the United States, each State has exclusive control of its educa¬ tional affairs and the question naturally arises whether there exists in the United States a national system of education. The Federal Constitution adopted in 1789 makes no mention of education, that being one of the governmen¬ tal activities reserved to the States, But the policy of the central government ever since its organization has been to assist the extension and development of education in every way pos¬ sible. It has done this in two chief ways. (1) By means of gifts of land to the several States for educational purposes. This has amounted to 81,064,000 acres with an original value of $103,- 000,000 for elementary schools alone and 14,- 775,475 acres for higher education. In addition to this munificent gift the National government by act of Congress in 1887 provided for a per¬ petual appropriation of $15,000 a year for each agricultural experiment station connected with a State agricultural college and by the Act of 1890 appropriated $25,000 a year to each of the colleges themselves. (2) By means of the Bureau of Education established in 1867 by act of Congress largely through the efforts of Henry Barnard ®for the purpose of collecting such statistics and facts as shall show the con¬ dition and progress of education in the several States and Territories and of diffusing such in¬ formation respecting the

organization and management of school systems and methods of teaching as shall aid the people of the United States in the establishment and maintenance of efficient school systems and otherwise promote the cause of education throughout the country.® Barnard became the first United ‘States Com¬ missioner of Education and organized the Bureau upon the lines along which it has ever since been administered. The Bureau has no control over the educational policies of the States and must work entirely _ through the force of suggestion and exposition. But by means of its collection of statistics, its com¬ parison of systems, domestic and foreign, its description and evaluation of experiments in edu¬ cation, it has wielded an enormous influence in securing improvements simultaneously through¬ out the country and unifying the State systems of education. It is relevant here to mention that the great confidence everywhere displayed in the work and recommendations of the Bureau is due to a great extent to the splendid personal and professional influence of Dr. Wil¬

liam T, Harris who was Commissioner from 1889 to 1906.

Another unifying influence upon education in the United States is the National Education Association (q.v.). The 25,000 members are en¬ rolled in every State of the Union and repre¬ sent all parts of the educational system, ele¬ mentary, secondary, higher and professional. The meetings of the association which are held alternately in the East and the West provide an opportunity for exchange of opinion upon the results of educational experiments, for the put¬ ting forth of new ideas upon organization, ad¬ ministration, curricula and discipline and for decision as to the policies and principles which shall guide the teachers of the country in their efforts to prornote the public welfare. One of the most efficient contributions of the asso¬ ciation to educational progress consists in the reports made on particular problems by special comrnittees which have studied them in the interim between annual meetings. The report of the Committee of Fifteen has become the basis of the course of study for elementary schools in every State of the Union and the report of the Committee of Ten similarly for .high schools. It can be readily understood why as the result of the influence of a number of agencies, chief among which are the National Educational Association and the Bureau of Education, there exists in the United States a truly national system of education. In their general features and in many of their details tjhe State systems of education show a remark¬ able resemblance. A comparison of the cur¬ riculum of a city school system in the East with one in the West or North or South would show alrnost an identity. Where differences

exist it is usually due to the willingness of progressive communities to undertake experi¬ ments which, if they turn out successful, will be rapidly imitated by other communities.

SUPPORT OF SCHOOLS.

The munificence of the support given to public education in the United States is as great a source of amazement to foreigners as it is of gratification to Americans. We have already described the generosity of the Federal gov¬ ernment to this activity, but the large sums given by it are small in comparison to the amounts raised for it by local and State taxa¬ tion. The major part of the money devoted to education is raised by local taxation and aver¬ ages from 20 to 25 per cent of the total amount. What this means for the cause of education is made clear when one learns that the appro¬ priation for school purposes by the municipal government of New York city in 1916 was $ˆ42,000,000, The State government adds to the local appropriations grants for a variety of purposes provided the localities maintain standards demanded by the State Department of Education. In the case of New York State this amounted in 1912 to over $5,000,000, distrib¬ uted in such a way that poor or small dis¬ tricts receive an advantage over large and wealthy ones, and New York State is no more generous in this respect proportionally than other northern States. What the total amount spent for public education in any year is would be difficult to say accurately, because uniform standards of estimating costs have not been adopted by all States or localities, e.g., some

local areas include interest on bonds and others do not. But according to the reports of the United States Bureau of Education (from which all statistics appearing in this article have been taken) the total estimated cost of educa¬ tion in the United States for 1914 was $794,-459,968. What is undoubtedly true is that there has been a remarkable increase in the cost of education during the past two decades, amount¬ ing according to conservative estimates to 100 per cent. This has been due not only to the high cost of buildings and equipment and to increase in salaries, but to improvements in school organization and equipment to which we must now turn our attention.

EDUCATIONAL ORGANIZATION.

There were, in 1914, 19,561,292 children in the elementary schools, of which 17,934,982 were in public schools. The school curriculum under which these children are taught is practically the same everywhere in the United States. The elementary school maintains a course of eight years preceded in many cities and towns by a year in the kindergarten. The child usually enters the elementary school at six and gradu¬ ates at 14, if he passes through according to rule. But careful studies of elementary educa¬ tion made by experts during the past decade have demonstrated the existence of excessive retardation and elimination of pupils. This dis¬ covery has resulted in two movements which are gaining in strength daily. One is a change in the subject matter of the elementary school curriculum \vith the object of emphasizing the useful and eliminating the purely academic. The amount of time allotted to the so-called disciplinary subjects like formal grammar and arithmetic has been reduced in favor of such subjects as manual training and domestic science. The other movement which is a corollary to the first, is to complete the gen¬ eral elementary course in six years and devote the last two years to vocational courses, com¬ mercial, industrial and academic, leading re¬ spectively to business, the trades and the pro¬ fessions. This in turn has caused, as we shall now see, changes in the organization of the secondary education.

About 7 per cent of the children who enter the elementary school pass on to the high school. In 1914 ther-e were 1,373,661 pupils in the secondary schools, of which 1,218,804 were in public high schools. Until about the beginning of the 20th century the curriculum of the

high school was everywhere the same, being organized for the few who intended to go to college. In other words, the high school was a preparatory school whose content of study was dictated by the college, although less than 10 per cent of those who entered the high school went to col¬ lege. As a result of the strong movement in favor of industrial and vocational education that arose about 15 years ago, most of the large cities now maintain, in addition to the regular academic high school which prepares for col¬ lege entrance, a commercial high school and a manual training high school designed respec¬ tively for business and technical pursuits. Smaller cities and towns maintain in their high schools commercial and technical courses in ad¬ dition to the academic course and most States are now supporting agricultural high schools.

Until about six years ago, the standard high school course of all kinds was four years in length and was built upon the eight-year elemen¬ tary school course, but as a result of the move¬ ment mentioned above in connection with the elementary school, *viz.* : to finish the general elementary course in six years, another move¬ ment has arisen in the past few years which bids fair to have an important influence. This is the junior high school movement sometimes referred to as the six-and-six plan. The prin¬ ciple at the basis of this movement is excel¬ lent pedagogically as well as as administratively. It is felt that the study of certain subjects should be begun earlier than in the present aca¬ demic high school, e.g., algebra and geometry, and particularly languages in order to take ad¬ vantage of the greater plasticity of the vocal organs. Our practice would then conform to that of the European countries. It is also maintained that were the courses leading to vocations differentiated at 12 years of age and their elements well organized for a three-year period, many boys and girls who find the ordi¬ nary academic course unattractive would re¬ main to the close of the period and perhaps be induced to continue their studies in the three years of the senior high school. In a large city the junior high school would also have the ad¬ ministrative advantage of relieving the conges¬ tion in many elementary schools by removing the boys and girls who must stay under com¬ pulsory education laws until they are 14 into a few buildings scattered about the city. Although the junior high school is a very recent experiment in secondary education and chiefly popular in the West, it is in accord with present tendencies and will probably be generally adopted in its present form or in some modified form.

Higher education in the United States is closely articulated with

secondary. In 1914 there were 216,493 students in the colleges and universities of the United States, of which but 87,820 were in public institutions. Of the 67,066 students in professional schools, but 12,289 were in public^ institutions. The graduate of the or¬ dinary high school who wishes to continue his education may go to college where he spends another four years in general education before taking up his professional studies or he may go directly to the professional school and finish his scholastic career in three or four years and enter upon his life work at 21 or 22. A few of the large universities of the East demand the bachelor's degree for admission to their professional schools, which means that the student can hardly enter upon his career until 25 or 26. In conformity with the recent de¬ mand that young men and women be prepared to earn a livelihood at an earlier age, some of these universities permit the first year of the professional course to be elected as the senior year of the_ undergraduate course, and Colum¬ bia University now grants both the bachelor and the professional degree for a six-year course. This has given additional stimulus to the junior college movement started some years ago by a number of Western universities particularly Chicago and California. According to this plan the first two years of the college course is formed into a junior college with a pre¬ scribed course of study looking toward pro-EDUCATION IN THE UNITED STATES

fcssional studies. The junior college movement has also afforded an opportunity to some small and poorly endowed colleges to restrict their efforts to the work of the freshman and sopho-rnore years and affiliat'e with a large institu¬ tion having a senior college, e.g., a considerable number of colleges in the Mississippi valley have entered into junior college relations with the University of Chicago.

The development of the junior college is only one evidence of the spirit of social service that animates the higher institutions of educa¬ tion in the United States to-day. The college is no longer content to be a place devoted solely to giving students culture and mental discipline, and the university a place to train men for the learned professions. Curricula and organization are constantly undergoing revision in order bet¬ ter to meet the needs of society and to solve its problems. The development of graduate schools, research departments, schools of com¬ merce and finance, summer schools,

extension work, correspondence schools and seasonal courses, show the extent to which the college and university are being socialized. Although this is particularly true of the State universities which exist west of the Alleghanies, it is be¬ coming increasingly true of the urban institu¬ tions that have grown up in the East whether under private or public support.

One of the most important features of pub¬ lic education in the United States is the training of teachers. This is done chiefly by the State normal schools, city training schools and de¬ partments of education of colleges and univer¬ sities. In 1914 there were 95,286 students in the normal and training schools, of which 89,537 were in public institutions. In every State, public school teachers must be certified under State laws, and, although in some of them positions in the rural elementary schools may be secured with a minimum of preparation, the tendency is everywhere to demand professional training. This training is becoming uniformly a two years' pedagogical course based upon high school graduation. Until a decade ago the only requirement to teach in the public high schools was an ability to pass an examination in the subject which the applicant wished to teach. But the National Education Association has gone on record in favor of requiring the bachelor's degree and most of the larger cities now require that and some professional training in addition. In 1914 in all departments of edu¬ cation there were 706,152 teachers, of which number 537,123 were women and 169,029 were men.

Parochial and Private Schools. — In the United States there is no monopoly of educa¬ tion by the State. Churches, corporations and individuals are permitted to maintain schools, the State merely demanding that these schools maintain a certain standard of work. Several of the religious denominations have thoroughly organized systems of schools, especially the Iˆoman Catholics and Lutherans, both of which maintain that religious and secular education must be given at the same time and by the same agency. In support of this principle the Roman Catholics spent last year approximately $35,000,-000 for the instruction of a million and a half of its children in 67 colleges and 985 schools, and the Lutherans a proportionately large sum

for the instruction of one quarter million chil¬ dren. The Roman Catholic schools are most numerous and strong in the New England and the Middle Atlantic States, the Lutherans in the Middle West. Until the beginning of the 20th century, the appropriation of public

funds for the support of these sectarian school systems was in many States a burning question, but in almost every case where it came to an issue it was defeated, and now more than half the States have constitutional provisions prohibit¬ ing the appropriation of public funds for any sectarian purposes.

There is no general system of private schools in the United States such as exists in England, and the number of private schools engaged in elementary education is comparatively small. But about one-fifth of all schools engaged in secondary education are under private endow¬ ment. Though a few of these are vocational in character, the great majority are preparatory schools fitting young men and women for col¬ lege. In higher education the proportion of public and private institutions is reversed, less than 20 per cent being upon public endowment, though among these are the great State uni¬ versities like Wisconsin and California. Of the 800 institutions in the United States which bear the name ˆAollegeˆˆ but 261 have an endow¬ ment of more than $100,000 and a student body of more than 100. About half of the others are glorified high schools which may in time be¬ come junior colleges. Too much credit cannot be given to the remaining small colleges scat¬ tered throughout the country which give a higher education to the young men and women of the immediate locality who would have been unable to go to a university at a distance. For this and other reasons there will probably al¬ ways remain an important place for the small college in American education despite the im¬ mense growth of the State universities and of the endowed universities.

One of the most significant features of American education as compared with foreign systems is the immense sums of money given for educational purposes by private benefactors. Because of the splendid public support of ele¬ mentary education, practically none of this money goes to that form and only a compara¬ tively small per cent to secondary education. But in 1915 almost 25 per cent of the entire income of the 550 institutions deserving the name of college or university came from private benefaction. What is still more remarkable is that for the past 20 years the average annual gifts to education amounted to 50 per cent of the gifts to all forms of philanthropy in the United States. These gifts vary in size from a few hundred dollars to the many millions necessary to establish a fully equipped univer¬ sity like Chicago, founded by John D. Rocke¬ feller, and Leland Stanford, founded by Mr. and Mrs. Leland Stanford. The amount contributed during 1914 was $31,357,398, the largest in our history. Not all this money has been given to teaching institutions. In some instances new education agencies have been established, like the

General Education Board organized in 1903 by Mr. Rockefeller with an endowment of $32,000,000 for its work in helping education in the South and assisting higher education gen¬ erally; the Carnegie Institute (1902) with an endowrnent of $12,000,000 to encourage research

and discovery; the Carnegie Foundation for the Advancement of Teaching (1905) with an en¬ dowment of $15,000,000 to pay retiring pensions to college professors; the Russell Sage Foun¬ dation (1905) with an endowment of $10,000,000, a large portion of which is devoted to educa¬ tional purposes. These and similar organiza¬ tions have had an incalculable influence in fostering education in the United States.

Illiteracy. — It may seem very strange after reading this story of public and private mu¬ nificence to education to learn that according to the Federal census of 1910, the percentage of il¬ literacy in the whole United States is 7.7 per cent considerably higher than the percentage of illit¬ eracy in the countries of northern and western Europe with which the United States is usually compared in matters educational. Two things, however, should be remembered in connection with this matter, viz., that whereas the illiteracy among native-born whites is but 3 per cent, among foreign-born whites it was 12.8 per cent and among negroes it was 30.5 per cent. The South is working heroically to reduce illiteracy among negroes, and the North is spending im¬ mense sums of money for the same purpose with the newly arrived immigrants. The latter bur¬ den can readily be appreciated when one con¬ siders that of the 838,172 immigrants who came to the United States in 1912, over 177,000, or 20 per cent, were unable to read or write any language and very few were well educated. Fortunately the immigrants have so far shown a great desire to have their children go to school and the statistics of 1910 show that the per¬ centage of illiteracy among the children of native-born parents is greater than among the native-born children of foreign-born parents. The fear of an ignorant citizenship which has been one of the great impelling forces to the generous support of education in the United States will continue to be a necessary incentive, now that our hordes of immigrants come almost exclusively from the ignorant population of southern and eastern Europe.

The Outlook. — In no country is education so active and vital an element in the life of the people as in the United States. Nowhere else do teachers show so strong a desire for self-improvement, parents so great a determination that their children shall take advantage of the opportunities offered, or citizens so great a willingness to bear the necessary expense. Edu¬ cation is everywhere marked by experiment :

to determine the best system of organization, as the Gary System, or the best method of teach¬ ing, as the Montessori Method. And these ex¬ periments are not without philosophical justifi¬ cation, for in no other country is so much attention being given to the reorganization of educational theory as in the United States by such thinkers as John Dewey, G. Stanley Hall, E. L. Thorndike, C. H. Judd and others. Not only has astonishing progress been made in providing proper education for those who differ widely from the normal, such as the blind, the deaf, the dumb, the crippled, and the feeble¬ minded, but the experiments of to-day have as their object the discovery of the best methods and organization to meet the different needs of individual normal children. In other words, real progress is being made toward the realiza¬ tion of the American educational ideal, viz., so to organize education that the capacities of

every child shall be discovered and the neces¬ sary training given to develop those capacities to the utmost, to the end that every individual shall be doing that in life for which his native abilities fit him.

Bibliography. — Brown, E. E., ˆThe Making of Our Middle Schoolsˆ (New York 1902) ; Chancellor, W. E., ˆOur Schools; Their Direc¬ tion and Managementˆ (Boston 1908) ; Cubberley, E. P., ˆChanging Conceptions of Educa¬ tionˆ (Boston 1909) ; Cubberley, E. P., ˆPublic School Administrationˆ (Boston 1916) ; Dewey, John, ‘The School and Societyˆ (Chicago 1899) ; Draper, A. S., ‘American Educationˆ (Boston 1909) ; Dutton, St. and Sncdden, D., ‘Administration of Public Education in the United Statesˆ (New York 1908) ; Eliot, Charles W., ‘University Administrationˆ (Bos¬ ton 1908) ; Monroe, Paul (Editor), ‘Cyclopedia of Educationˆ (New York 1911) ; Pritchett, H. S., ‘Reports and Bulletins of the Carnegie Foundation for the Advancement of Teachingˆ (1905 to date) ; ‘Annual Reports,ˆ National Education Association; ‘Annual Reportsˆ and Special Bulletins, United States Bureau of Education.

Stephen Pierce Duggan, Professor of Education at the College of the City of New York.

EDUCATION AND THE WAR. The

present European War is affecting education to a far greater extent than wars of the past. This is inevitable because never before have the foundations of world civilization been so shaken. Inasmuch as

education, its philosophy, institutions, and practices must in the long run express the spirit and forms of the civilization on which it acts, any far-reaching changes in the nature of that civilization will be reflected in education. The immediate effects of the present war on education are similar to those of previous wars, but on a much larger scale, due to the magnitude of the conflict. The es¬ sential external elements of education are teachers, pupils, and money needed to carry on the work of educational institutions. War de¬ mands the service of teachers and pupils for the_ army and navy and for the industries upon which these fighting forces depend — agricul¬ tural, manufacturing, and extractive. The im¬ mediate result is a shortage of teachers, a de¬ crease in the enrollment of pupils in all classes of schools, particularly in secondary and higher institutions; and an actual decline in the num¬ ber of institutions) for not a few have been obliged to close their doors entirely for the period of the war at least. The increased cost of carrying on education in a regime of rising prices, a common phenomenon in war time — the cost of labor, supplies, salaries, *etc.* — affects education adversely. Moreover, the shifting of labor to those industries where wages are high draws from educational institutions both teach¬ ers and others connected with the schools. The rise in the cost of living also prevents parents from keeping their children in school, so that there is a tendency for fewer pupils to pass out of the elementary to the secondary higher schools. These factors tend to decrease the quantity and quality of education and the num¬ ber of courses and subjects available for study. In the higher institutions less promising ma¬ terial remains from which the leaders of the

future must be trained. Thus the war has brought on a national emergency in education which has led to earnest efforts to provide, in part at least, adequate remedies.

Higher institutions of learning, for example, have very generally modified existing and in¬ troduced new courses. Examples of modified courses, taught with a view to making them contribute directly to the war, are those in topography, chemistry, physics, medicine, engi¬ neering, psychology and French. In these sub¬ jects emphasis is laid on the construction and interpretation of military maps, telegraphy and telephony, war surgery and infectious diseases common in war, sanitation and hygiene, bridge and highway engineering and surveying, chem¬ istry of foods, gases used in warfare, dietetics, psychological tests, and military conversational French. New courses, not before customary, include those in military tactics, ordinance, storekeeping, military history and historical courses directly on the war, both from the European and American point of view. A large amount of research work along special lines has been carried on as a result of direct re¬ quests of the government.

Remedies suggested by the government to meet the emergency, in many cases already adopted, include appeals to elementary, second¬ ary and higher institutions to fit their educa¬ tional policies to war needs. That of the Com¬ missioner of Education, 22 May 1917, is notable, ˆSuggestions for the Conduct of Educational Institutions During the Continuance of the War,®' urging enforcement of school attendance laws in elementary and high schools, suggesting continuation classes and evening schools for minors and adults, requesting normal schools to double their efforts to train teachers, and advising higher institutions to reduce expenses, keep open all the year, to lay special emphasis in summer schools on courses adapted to war needs to stimulate research, and to prevent the scattering of the faculty or student body so far ss possible

The President, on 20 July 1917, urged col¬ leges and technical schools to maintain their courses on the usual basis in order that every opportunity might be given for the training of the leaders on whom

must fall the serious work of reconstruction. Likewise we may note the appeal of March 1918, signed by the Secretary of War, Secretary of the Navy and others, urg¬ ing that boys and girls be kept in elementary and secondary schools until 18 years of age, because the future requires that these pupils have more and better education to cope with the problems of peace.

A second remedy is the plan to use the school plants to their maximum capacity, that is, all the year around, with the year divided into four quarters of 12 weeks each. Moreover greater use of school plants is urged for late afternoon and evening classes, both for minors and adults and the use of assembly rooms for lectures connected with the problems of the war, such as conservation, production, savings and thrift. Numerous school plants have been used for the training of those entering the war, for both military and industrial services and for Ae production of war materials — for use of the Red Cross, for example. There is also greater use of the school plant as community

centres and as meeting places for the various organized bodies directly or indirectly connected with the school, whose work contributes to the war. This intensive extension of the functions of the school is seen in the formation of such organizations as the Junior Red Cross, Boy Scouts, War Savings, Liberty Loan, and War Garden clubs.

A third remedy is to change the point of view in teaching so far as it centres on local. State, or sectional interests rather than on na¬ tional interests. President Wilson, in his letter of 23 Aug. 1917, asked the school officers and teachers of the country to stress the prob¬ lems of community and national life because they are the most pressing problems now before us and will be still more so in the future. This tendency to emphasize national ideals is one of the most important of the changes brought on by the war. The fact that we do not have a national system of education has tended to divert attention from national interests and ideals. One of the immediate effects of the war, however, is to place emphasis on the duties and obligations of citizenship rather than on the privileges and rights of the individual. Con¬ sidering the origin of the nation, the importance attached to individual rights in the period of the American Revolution, the slow growth of the national ideal, and the fact that education itself is under State control, it was natural that this point of view was neglected. But war is one of the greatest integrating and unifying forces, and tends to

counteract racial, religious, party, sectional and class divisions, the disinte¬ grating forces in national life, in order that the whole strength of the people may be used to overthrow the common foe. It places first the interests of the largest group, the nation, in¬ stead of individual interests, or those of a group seeking some selfish or local end.

Another principle affecting education is the new conception of the relation of the individual to the nation because of the immediate demands of the war. As public opinion changes, as the lessons forced on the people by the war are learned, education necessarily reflects these changes. The war has emphasized not only the matter of duties and obligations, but the prin¬ ciple of obedience and the performance of defi¬ nite and often disagreeable tasks. This is in contrast to the notion present in the educa¬ tional philosophy of the past generation, that pupils should do only those things which in¬ terest them. The exacting demands of war and the performance of uncongenial tasks required as a part of the training to gain skill and knowl¬ edge ; the subordination of the individual to the group, to gain efficiency and success — these principles tend to react on educational philos¬ ophy, methods of instruction and the require¬ ments made of the pupil. The effect on public opinion of the campaign for saving and econo¬ mizing in money, time, food and clothing tends also to influence school practice and ideals.

Broadly speaking, the war has emphasized two types of education which compete more and more with the older cultural variety. The first grows out of the emphasis on national ideals and interests, and the duties and obliga¬ tions of citizens to the nation in peace and war. This may be called the new social-civic education which has for its basis the socializa-

tion of the pupil through the study of the social sciences, history, civics, economics and sociology. It is through emphasis on these subjects that the pupils can be taught to take the social rather than the individual point of view ; to become interested in, and to sacrifice for, the interests of the group. The new in¬ terest in history and civics is the first outcome of this force. It is agreed that the subject of history assumes great importance because the ideals for which we are fighting must neces¬ sarily be taught to the present generation. This calls for a revaluation of our own history as well as a broader study of the origin and de¬ velopment of our cultural and political insti¬ tutions, and the development of democratic ideas. It also calls for a more complete knowl¬ edge of the history of the nations opposed to us, their psychology, philosophy, political sys¬ tems and aims. It calls for a broader study of the history of those nations with whom we are allied in the war. It calls for a restudy of our own history, especially with respect to an understanding of our indebtedness to Eng¬ land for the origin of many of our institutions and much of our culture, to remove false prejudice and to show how under the forms of monarchy England is a democracy. The final attitude of the United States at the peace con¬ ference and in future efforts to preserve the world peace must, in the last analysis, be de¬ termined by public opinion. An enlightened public opinion is impossible unless historical conceptions are present in the minds of the people, sufficient for them to recognize what is just and right for the future existence of the nations and peoples who are concerned in the world peace. If the people of the United States are to help safeguard the world for democracy, it is obvious that the historical background of the struggle for democracy in the past and the manner in which nations have reacted to that struggle must be thoroughly understood.

Similarly, the necessity of studying civics, economics and social science is acknowledged, because citizens must know something of these subjects in order to react intelligently to the serious problems brought up by the war, to choose representatives who will vote for wise laws, and devise machinery for the solution of the great questions growing out of the war and reconstruction. Because of the war, our democ¬ racy is confronted with the need of more in¬ telligent and better educated citizens in the political and social sciences than ever before were needed. For already the political, in¬ dustrial and social practices and institutions of this country have been

greatly changed. Whether the process will go on or whether we shall retrace our steps is a question which the generation now in our schools must help to decide. It is agreed that pupils must have a comprehension of the problems, difficulties, and tendencies facing us, in order to arrive at a wise solution and avert possible disaster. No more important questions could confront the people than those which relate to the permanent control of public utilities, railroads, telegraphs, telephones ; the production, distribution, and consumption of food and fuel ; the regulation of prices, and government control or ownership of other resources or agencies, and its relation to capital and labor.

The second type of education emphasized by the war is the industrial-scientific. The deeper causes leading to the war, especially those of an economic character, have called attention to the fact that industrial nations like those of western Europe, and even the United States, cannot prosper in peace or war without great attention to that phase of education which de¬ velops exact knowledge of and skill in the trades and processes on which an industrial civilization is based. The United States, broadly speaking, has been living on its capital, on the stored-up wealth represented by the natural fertility of the soil and the bountiful supplies of minerals and raw materials such as coal, iron, copper, lumber, *etc.* With such readymade wealth, little technical skill, effi¬ ciency, or knowledge was needed for the supply of immediate needs or even for accumulating wealth. This era, however, has passed and this country, even now, must increasingly conserve its wealth and even depend on other lands for part of its raw supplies. It must^ apply more skill, knowledge, and efficiency in obtaining wealth from the soil, and in transforming raw materials into finished products. This condi¬ tion, in connection with the competition of other racial groups who have attained still greater knowledge than we have, is at bottom the basis for the emphasis on technical, scien¬ tific, and vocational education. The 6,000,000 farmers in this country, and those who take their places, cannot succeed without more scien¬ tific and technical knowledge involving the chemistry of soils, problems of fertility, the science of growing larger crops, knowledge of the enemies of plant life and how to overcome them, the care of farm machinery, the produc¬ tion of better food and service animals, and the principles of scientific management of farms from the viewpoint of profit and loss. The reason for a great extension of agricultural education is obvious. But this means a very different rural system for education from that now prevailing, one that can only be introduced at great cost, and with the aid of the resources of all the people administered by the national

government.

The intricacy of modern industrial processes, the greater and greater skill needed to obtain the required amount of wealth out of resources continually growing less, and the necessity of providing -the great mass of industrial work¬ ers with the kind of education which will not only increase their skill and earning power, and hence the wealth of the nation, but also give them that broader vision and wider knowl¬ edge of their position and work, their privi¬ leges, duties, and obligations — all this is at the foundation of the demand for vocational educa¬ tion. It is significant that Congress passed the Smith-Hughes bill for Federal aid to vocational education in 1917, under the influence of the war and because of its effect on the type of education needed for a great industrial nation. This bill provides for the appropriation of large sums from the Federal treasury to stimu¬ late the teaching of agricultural and industrial education, and home economics, and calls for an equal appropriation from the States taking advantage of the bill. It also created a Federal board for vocational education which has im¬ portant powers of supervising the systems

established. This bill, if not directly a result of the war, was greatly influenced by it. It is the beginning of a new era in the United States, and must have important effects on national life, such as providing for the in¬ dustrial skill needed for national defense, and for industrial competition likely to follow the war. It also lays the foundation for the voca¬ tional education of those soldiers who return. Particular subjects in the curriculum, such as geography, have been affected by the war. The result is a new interest in world geography, both as to the ownership of land areas and especially the economic resources of nations and their trade and commerce. The decline in the study of German in schools and colleges, and the increased attention to French and Span¬ ish, is another important effect of the war on education.

The problems developed by the war, and the preparation for it, have led to increased study of the defects of our educational system with proposals to remedy them. One of the first results of the medical examination of those called to the colors was to reveal the fact that a larger proportion of our population than we realized, suffer from physical defects and dis¬ eases. That many of these could have been prevented by early attention, by medical inspec¬ tion of school children, by greater care of their health, and by more attention to physical train¬ ing by the schools is admitted. The question of the duty of the State to pay equal attention to both the physical and the mental well-being of its future citizens is more and more recog¬ nized. If this view is not one of the direct re¬ sults of the war at least we may say that it has been greatly stimulated.

A second discovery growing out of the war was the fact that there was a large element of our population which had not only not been Americanized, but could neither read nor write English. The newly arrived immigrants who later became voters, as well as those who from choice remained aliens, were hardly touched by our public school system. The absurdity of granting citizenship and the franchise to one class, and allowing both classes to perpetuate their own foreign languages and culture, and even to pass these on to their children to the exclusion of our own language and culture, is now seen and

appreciatedˆ To expect that such a policy would make the United States safe for democracy, or to expect as a result of this policy that the nation would become unified in spirit, language, and ideals, so that it could act as a unit in a great crisis for its own self-protection, was foolish. Accordingly it is recognized that the function of the school must be extended so as to pre¬ vent such a condition in the future ; that the school must extend its opportunities to immi¬ grants and aliens, and indeed that education of emigrants must be made compulsory through continuation schools.

The problem of a teaching force that will be all American, loyal, and in sympathy with the ideals of this country has been brought to light by the war. The tendency to require public teachers to be citizens, and to be free from any taint of disloyalty or antagonism to the ideals of America, is an effect of the war. To teach successfully the ideals for which

America now stands as well as the relation of these ideals to our historic past is obviously pos¬ sible only for one who believes in no other ideals.

Finally there is the relation of education to the reconstruction period following peace. New political, economic and social conditions inevitably mean a new philosophy of education. The old order has even now actually passed, and it is hardly possible for it to return, be¬ cause the conditions on which the old order was based have disappeared. The real pro¬ pelling power of education is the prevailing political, economic and social forces of a period, plus environment. As these change so must education, its philosophy, curriculum, ideals, institutions, and practices. The war has already forced changes which must inevitably affect the future. Those changes which have taken place, such as governmental regulation of production, distribution and consumption of food and fuel, the principle of cooperation between the government and private industry, governmental regulation of labor supply and wages, and control of transportation facilities — all these mark the beginning of a new political, social and economic order, and hence a new order of education for ˆhe future.

National development in the immediate fu¬ ture will be determined largely by the educa¬ tional plans and practices set in motion by the war — a new physical, industrial, and social training, extension of the principle of universal elementary to universal secondary education, so

far as possible, with a corresponding increase in the proportion of those receiving a higher education, and the attempt to reach the whole adult population, through extension of the use of the school plant, various types of education, and continuation schools. This program may be supplemented in peace times by use of the great cantonments established by the govern¬ ment, for training men for the problems of peace as well as war, and for the rehabilitation of the disabled soldiers of the war. The pro¬ posed national department of education would do much to correlate existing agencies, to lay down the guiding principles which would standardize minimum requirements and make proposed improvements.

Bibliography. — Dean, Arthur D., ˆOur Schools in War Time and Afterˆ (Boston 1918) ; various articles in ˆProceedingsˆ of Na¬ tional Educational Association (Washington 1917, 1918) ; ˆReport of United States Com¬ mission of Educationˆ (Vol. I, pp. 1-19, Wash¬ ington 1917) ; ˆEducation and the War,ˆ six articles by various authors in Educational Ad¬ ministration and Supervisionˆ (Vol. IV, no. 1, pp. 1-53, January 1918) ; publications of the Bureau of Education, especially ˆLessons in Community and National Life,ˆ and the series called ˆˆTeachers Leaflets,® ˆSecondary School Circulars,® and ˆHigher Education Circulars,® all of which bear directly on education and the war (Washington 1917, 1918) ; ˆThe National Emergency in Education,' a pamphlet issued by the National Education Association, contain¬ ing a statement of the nature of the crisis in education and a program for readjustment dur¬ ing and after the war (Washington, June 1918).

Marcus W. Jernegan,

Associate Professor of History, University of Chicago.

EDUCATION OF WOMEN. The changes during the 19th century include none more sig¬ nificant than those in the history of education for women. So swift has been the transition that it is difficult to realize that until after the Revo¬ lution practically the only opportunities for a girl's education were found in the so-called ˆ'Dame Schools,® where she was taught to read and sew, the ˆNew England Primerˆ being the chief textbook. Even the art of writing was not universal, as is shown by the number of wills, left by women of property, which were signed with a cross. The grammar schools, pro¬ viding instruction sufficient to prepare young men for college, only occasionally admitted girls until the beginning of the 19th century. The exceptions were less than 12 in the first century of our colonial history, as shown by the records of nearly 200 towns in New England. The town of Medford, Mass., voted in 1766 that ˆˆThe Committee have power to agree with the School Master to instruct girls two hours in a day after the boys are dismissed® ; Dorchester in 1784 voted "that such girls as can read the psalter be allowed to attend the grammar school from the first day of June to the first day of October; and Gloucester in 1790 passed the fol¬ lowing resolution ; "And also that the master be directed to begin his school from the first day of April to the last day of September at 8 o'clock in the morning and close at 6 o'clock in the afternoon, or any 8 hours in the 24 as shall be thought the most convenient, but that two hours, or a proportionate part of that time, be devoted to the instruction of females — as they are a tender and interesting branch of the Community, but have been much neglected in the Public Schools of this town.®

In Norwich, Conn., they were admitted "from 5-7 A.M.®; and Nathan Hale, schoolmaster in New London in 1774, writes, "I have kept dur¬ ing the summer, a morning school between the hours of 5 and 7, of about 20 young ladies : for which I have received 20 shillings a scholar by the quarter.® This admission of girls at times during the day and year, when the schools were not needed for the boys, seems to have been common during the last years of the 18th century. Northampton, which had voted in 1788 "not to be at any expense for schooling girls,® four years later voted "by a large ma¬ jority to admit girls between the ages of 8 and 15 to the schools from May 1st to October 31st,® and Boston, in 1790, opened the schools to girls during the summer months, when there were not enough boys to fill them.

One of the first advocates of education for girls was a graduate of Yale College in 1780, William Woodbridge, who took for the subject of his graduating essay, “Improvement in Fe¬ male Education,ˆˆ and afterward opened an even¬ ing school for them in which he dared to teach such abstruse subjects as grammar, geography, and the art of composition. The founding of academies, to which girls as well as boys were admitted, is another evidence that in the latter part of the 18th century and the early part of the 19th, there was a new sentiment concern¬ ing their education. The first quarter of the 19th century might well be called the “Acad¬ emy Age,® since the most distinctive advance was in the founding of these institutions. The first one was at South Byfield, founded by be¬ quest of a certain William Dummer, who died

in 1761. Leicester, incorporated in 1784, Westford (1793), Bradford (1803), Monson (1804), were all coeducational at the beginning, although Bradford later excluded boys and has been for many years a school for girls. The so-called Academy at Medford, Mass., founded in 1789, is said to have been the first in New England for girls only, but was followed by others which became more famous such as Adams Academy in Derry, N. H., (1823), Ipswich Academy, in Massachusetts (1828), and Abbot Academy in Andover (1829).

Before the close of the I8th century there were efforts for the education of girls in other parts of the country; by the Friends in Rhode Island, by the Friends and Moravians in Penn¬ sylvania, the latter founding schools in Nazareth, and as far south as Lexington, Ky. None of these institutions, however, aimed to give higher education to women ; the academies prepared boys for college, but 200 years after the found¬ ing of Harvard College there was not a college for women in the country.

A movement for the higher education of women began about 1820. The Rev. Joseph Emerson, principal of the Academy at Byfield, had become noted for his championship of the cause and had attracted to the Academy women like Zilpah Grant and Mary Lyon, whom he inspired with zeal for learning as a preparation for service. In 1820 Emma Willard’s ˆPlan for Improving Women’s Educationˆ attracted the attention of Governor Clinton of New York, who secured the passage of two acts, one the incorporation of a proposed seminary at Water¬ ford, and the other, “To give female academies a share of the literary fund,® probably the first law passed by any legislature, expressly favor¬ ing women’s education. The seminary was opened in 1821, not

at Waterford, but at Troy, N. Y., as the Troy Female Seminary, later known as the Emma Willard School.

In 1822 Catherine Beecher opened a semi¬ nary at Hartford, Conn., in the upper room of a store. Beginning with 7 pupils, it soon grew to more than 150, and attracted students from all the States, but after 10 years was discon¬ tinued on account of Miss Beecher's removal to Cincinnati. Her interest in education was thus transferred to the Middle West, where for a generation she helped to mold public opinion on the subject.

From 1830-39 several institutions for the edu¬ cation of women were established, most of them in the South, the Wesleyan Female College at Macon, Ga., being authorized io grant degrees. In 1835 Wheaton Seminary in Norton, Mass., was founded by Judge Wheaton in memory of his daughter. His daughtcr-in-law, Mrs. Eliza Wheaton, instrumental in the founding of the school, lived until June 1905, its constant bene¬ factor and a significant figure, as representing the last of. the little group who, in the 30's, were laying the foundation of higher education for women.

Adviser and helper in the founding of this school was the woman who holds a foremost place among pioneers of higher education. Mary Lyon's reputation as student and teacher had al¬ ready been won in the academies at Byfield, Am¬ herst, Ashfield and Derry, and with Miss Grant in the seminary at Ipswich, but her chief work was in the founding of Mount Holyoke Seminary, Incorporated in 1836, and opened in 1837, in the

town of South Hadley, Mass., the seminary realized the ideal for which the founder had been working for years, that of a permanent in¬ stitution for women which should furnish ^^every advantage that the state of education in the country will allow. The first curriculum, in¬ cluding the natural sciences, higher mathematics, logic, moral philosophy, ancient and modern his¬ tory, evidences of Christianity and Butler's ˆ Analogy,ˆ shows a decided advance since the days when Mr. Woodbridge was considered ec¬ centric because he believed that women should be allowed to study grammar, geography, and composition. It marks an era in higher educa¬ tion, in the establishment of a permanent en¬ dowed institution, which should furnish to women, at m.oderate rates, as good educational opportunities as the colleges for men then of¬ fered. Its founding is not less significant in its influence as the ˆmother of schools. Among the institutions established on the same plan, with its graduates as principals and teachers, are the Western College at Oxford, Lake Erie College at Painesville, Ohio, and Mills College in California. Michigan Seminary at Kalama¬ zoo and the Cherokee Seminary, in what is now Indian Territory, were also Mount Holyoke schools, while across the water they were founded in Persia by Fidelia Fisk; in Turkey at Marsovan and at Bitlis ; in South Africa, where the Huguenot Seminary now Huguenot College, at Wellington, Cape Colony, is the most famous ; and in Spain, in the form of the International Institute of Madrid, founded at San Sebastian, by Alice Gordon Gulick. Miss Lyon's influence is seen also in the establishment of Wellesley College, for Mr. Durant was a friend and trustee of Mount Holyoke and included many of its features in his own institution.

The intervening period before the Civil War saw the rise of numerous schools for the edu¬ cation of women, but only two of full col¬ legiate rank to-day, Rockford College in Rock¬ ford, Ill., opened as a seminary in 1849 and chartered as a college in 1892, and Elmira Col¬ lege in Elmira, N. Y., founded in 1855 and authorized from the beginning to confer de¬ grees. It is interesting to notice that most of these institutions were in the Southern States, a development cut short by the war. Within the last 30 years, three colleges for women of

collegiate rank have been established in that section: Randolph-Macon College for Women at Lynchburg, Va. (1893), Agnes Scott_ Col¬ lege at Decatur, Ga. (1889) and Sweet Briar at Sweet Briar, Va. (1906).

The last 35 years of the 19th century were marked by an advance movement in women's education such as the world had never before seen. During this period three types of insti¬ tution were developed : —

1. The separate women's college.

2. The women's college affiliated with the university or with the college for men.

3. Coeducation in the universities for men.

The first and second types are characteristic

of the East and the third of the West, although the distribution is not entirely along sectional lines.

The Separate Women's College. — The

conviction of Matthew Vassar, that «woman, having received from her Creator the same in¬ tellectual constitution as man, has the same right as man to intellectual culture and development,^^

led in 1861 to the incorporation of Vassar Col¬ lege, opened in Poughkeepsie (1865) with more than 300 students, the first of the distinctive col¬ leges for women authorized to confer degrees, with curriculum and endowment sufficient to realize its ideal of collegiate work. In 1875 two other colleges for women followed, Welles¬ ley College at Wellesley, Mass., founded by Mr. and Mrs. Henry F. Durant, in memory of their son, and Smith College of Northampton, found¬ ed by Sophia Smith of Hatfield.

Within another 10 years a fourth college was established, Bryn Mawr at Bryn Mawr, Pa., founded by Joseph W. Taylor, and opening its doors to students in 1885. In 18^ Mount Holyoke Seminary was incorporated as Mount Holyoke Seminary and College, and in 1893 be¬ came Mount Holyoke College, the seminary course being withdrawn. The development of these colleges for women has been phenomenal. Each one has a beautiful campus, with fine academic buildings and residence halls, is well equipped, and offers a wide

choice of elective courses, in addition to the required work, which varies somewhat in the different institutions. The faculty of each includes both men and women, with the latter in the majority. Two, Smith and Vassar, have had only men for presi¬ dents; two, Wellesley and Mount Holyoke, have had only women ; and one, Bryn Mawr, had a man for the first president and a woman, the present executive, for the second holder of the office. The large number of applicants for ad¬ mission has made it possible for these colleges to maintain a high standard of entrance require¬ ments. Bryn Mawr admits only on examina¬ tion ; the other four colleges have admitted on certificate from accredited schools, a system which will be discontinued in 1919, in order to substitute the Comprehensive Examinations of the College Entrance Examination Board, al¬ though the Old Plan Examinations will also be allowed.

Other colleges in the East, somewhat smaller, but of high collegiate rank, are Goucher College in Baltimore, founded in 1888 as a Methodist institution, and Wells College in Aurora, N. Y., beginning as a seminary in 1868, but chartered as a college in 1870. The Western College at Oxford, Ohio, Lake Erie College at Painesville, Ohio, Milwaukee-Downer in Wisconsin, and Mills College in California, all beginning as seminaries but later chartered as colleges, are doing excellent collegiate work, although their numbers are small, as might be expected in sec¬ tions of the country where coeducation is al¬ most universally accepted.

More recent foundations in the East are Sim¬ mons College and the Connecticut College for Women. Simmons College, established by the will of John Simmons of Boston ^^as an institu¬ tion in which might be given instruction in such branches of art, science and industry as would best enable women to earn an independent liveli¬ hood^^ was granted a charter in 1899. Its course of study is arranged in ^^programs — grouped in seven schools^^ — ,including Household Eco¬ nomics, Secretarial Studies, Library Science, General Science, Social Workers, Industrial Teaching and Salesmanship. The plan of in¬ struction provides* a four year program for students meeting its entrance requirements, a one or two year technical training for college graduates and provision for special students.

The Connecticut College for Women, located at New London, received its charter from the Connecticut legislature in 1911 and was opened in 1915. Its course for the degree of Bachelor of Arts or Bachelor of Science includes several branches of technical training, thus standing midway between the college of liberal arts and the more distinctive vocational colleges like Simmons. The college ®owes its foundation to the wish and purpose of people of Connecti¬ cut to provide within the State adequate facili¬ ties for the higher education of women.® The movement for its establishment was begun by members of the College Club of Hartford.

Another New England College for Women receiving its charter since 1910 is Wheaton Col¬ lege, formerly Wheaton Seminary.

The Women's College Affiliated with the University. — The college for women affiliated with the university, although the latest develop¬ ment, holds a place midway between the college on a separate foundation and coeducation.

The first to be established (1886) was the H. Sophie Newcomb Memorial College for Women, affiliated with Tulane University in New Orleans. Under the same board of trus¬ tees as the university, its buildings are in a different part of the city, its productive funds are in part separate, and it has a distinct fac¬ ulty, including the president. The graduate de¬ partment of the university has been entirely open to women since 1890.

The Women's College of Western Reserve University, Cleveland, is the outgrowth of an informal system of coeducation, established at Adelbert College, the undergraduate department of the university, in 1872. Sixteen years later women were excluded from Adelbert College, and provision made for them by the establish¬ ment of the Women's College. The fine build¬ ings of the college, although separate, are near the other university buildings, and some of the laboratories of the men's college are open to women. The faculty, with the exception of the president, is distinct, but the university con¬ fers the degrees and opens all its graduate work to women.

Barnard College, affiliated with Columbia University, was opened in 1889, although 10 years before that President Barnard had urged the adoption of coeducation at Columbia Col¬ lege. As a result of his

efforts and of a large popular petition in 1883, asking for the admis¬ sion of women to Columbia College on the same terms as men, a system was inaugurated known as the ^^Collegiate Course for Women,® which proposed to grant degrees to those who passed the college examination, but made no provision for instruction. The unsatisfactory character of this arrangement led to the establishment of the college, which, with a separate charter and an administrative autonomy, received Columbia degrees, took the university examinations and had university instructors, or those approved by the president. In 1900 another change was made by which Barnard bears the same relation to Columbia University as Columbia College, having its own faculty, endowments, and examinations, but receiving the university degree and being represented on the university council.

In 1891 the corporation of Brown Univer¬ sity voted to admit women to the university examinations, but made no provision for in¬

struction and took no action concerning the conferring of degrees. Unofficial instruction, however, was given by some of the faculty of the university during the first year and at least one woman was admitted to the regular class¬ room, a beginning which resulted in a vote of the corporation in June 1892 opening the de¬ grees and all graduate courses to women. At the beginning of the second year a dean was appointed and a building for recitation purposes secured, where regular undergraduate classes were conducted by members of the university staff under the name of ®The Women's College in connection with Brown University.® The numbers had largely increased and four classes were graduated before the corporation formally recognized the college, by constituting it in 1897 a department of the university. The affil¬ iation is a close one, since the faculty is com¬ posed of members of the university faculty, and the requirements, courses, examinations, and degrees are the same, thus carrying out the plan of the founder. President Andrews, who designed it not as an ®Annex,® but as ®part and parcel® of the university.

Radcliffe College, in affiliation with Harvard University, although of the five colleges of this class, the last chartered to confer degrees (1894), was one of the first to make some provision other than coeducation for the admission of women to university privileges. Following the precedent of the English universities at Cam¬ bridge and Oxford, in 1879 the ^Society for the Collegiate Instruction of Women® was organ¬ ized in Cambridge, Mass., ^Tor the purpose of

providing systematic instruction for women by professors and other instructors in Harvard University.® The students who completed the course received not a degree, but a certificate stating that the holder *had pursued a course of study equivalent in amount and quality to that for which the degree of Bachelor of Arts is conferred in Harvard College, and has passed in a satisfactory manner examinations on that course corresponding to the college examina¬ tions.® There was no official relation with the university until 1894, when the society commonly known as ^^Harvard Annex,® was incorporated as Radcliffe College and authorized to confer Bachelor's and Master's degrees, subject to the approval of the president and fellows of Har¬ vard College. The president and fellows con¬ stitute the Board of Visitors having the general administration of the college, but the imme¬ diate government is in the hands of a council and an academic board, chosen mainly by the . associates, who form the corporation. Thus its management is, in general, distinct from that of Harvard, although its instructors are entirely from the university staff.

To the list of affiliated colleges should be added William Smith College of Geneva, New York, opened in 1908 as a ®co-ordinate® college. William Smith College is under the board of trustees and the president of Hobart Collesre, the same faculty teach in both colleges, with the exception of instructors in the department of household arts and the degrees are the same. It has its own dean, and its classes, collegiate activities, and commencements are entirely separate.

In 1910 Tufts College in Massachusetts par¬ tially gave up the system of coeducation and opened Jackson College as a ^^co-ordinate® col-

lege, with general segregation the first two years of the course.

The affiliated colleges show certain differ¬ ences in the character of their connection with the university. The chief administrative is gen¬ erally the dean, only Radcliffe and the H. So¬ phie Newcomb Memorial College having a pres¬ ident distinct from the president of the univer¬ sity. All these universities open their graduate courses to women, and all, with the exception of Harvard, grant degrees on the completion of that work. In their development much has been accomplished by advisory boards or coun¬ cils of women, who have collected funds for endowments, erected buildings, acted as advisers, and in many ways promoted their interests.

Coeducation in the Universities for Men. — To Oberlin College, Oberlin, Ohio, belongs the honor of being the first institution of col¬ legiate rank to admit women. Opened in 1833 as Oberlin Collegiate Institute, it was coeduca¬ tional from the start, although at first women entered the so-called ˆLadies' Course,® and were not candidates for degrees until 1837. The new departure aroused less comment, since ˆTrom the outset the new institution stood for so many unpopular ideas, social and theological, that the mere fact of the admission of both sexes at¬ tracted little attention.® Its example was not followed for two decades, the second institu¬ tion in this pioneer work being also in Ohio, Antioch College at Yellow Springs, founded by Horace Mann in 1853, and coeducational from the beginning. The movement, however, did not gain before the period of the Civil War; various reasons have been suggested for its rapid development since that time, such as the growth of the public school system, generally co¬ educational, and thus influencing public opinion in favor of the same policy in higher education, and the rise of the factory, relieving the home of many duties and leaving women more free for other interests. Throughout the country the demand for ˆpractical education® was felt and the passage of the Land Grant Act in 1862, appropriating 10,000,000 acres for the endow¬ ment of colleges ®to teach such branches of learning as are related to agriculture and the mechanics arts® is most significant in its influ¬ ence upon women's

education, since it was in¬ terpreted as providing for them as well as for men.

The West and the State universities have been the leaders in coeducation, only, three of the latter, Virginia, Georgia and Louisiana, being still closed to women; but the East is not with¬ out representation in this class. When Cornell University was opened at Ithaca, N. Y., in 1868, the interest of Mr. Cornell and President White in favor of giving equal advantages to young women resulted in the offer from Henry W. Sage of a generous endowment on condition that ˆinstruction shall be offered to the young women by the Cornell University as broad and thorough as that now offered to young men.® In 1872 this offer was accepted and C6rnell became coeducational.

The movement, however, had spread further east than the State of New York. In 1868 Boston University was opened, welcorning young women on precisely the same conditions as young men, the first institution in Massa¬ chusetts to take this step and, according to the report of the president, ˆffhe first in the world

to open the entire circle of post-graduate pro¬ fessional schools to men and women alike.®

Several other universities and colleges in the East are coeducational, among them Johns Hopkins, the universities of Pennsylvania and Maine, New York, Rochester and Syracuse, and Swarthmore, Adelphi, Bates and Colby colleges.

The opening of the University of Chicago in 1892 added another endowed institution of rank to ‘coeducation ; but in 1902, by the so-called ˆˆsegregation® policy, which means sepa¬ rate instruction for women during the first two years of their undergraduate course, the uni¬ versity provision for them comes partially under the head of the affiliated college. This action, together with the limitation of the number of women admitted to undergraduate work at Leland Stanford Jr. University in Cali¬ fornia and at Northwestern University, Evan¬ ston, Ill., might be interpreted as a certain reaction in the West against coeducation were these policies not explained by the institutions themselves as efforts simply to preserve a pro¬ portionate relation in the undergraduate body. In the light of statistics the fear that the women students may outnumber the men is not unfounded.

The Commissioner of Education reports that in the academic year

1915-16 there were in the United States 144 colleges for men, with 43,851 undergraduate students; 89 colleges for women, with 20,638 undergraduate students ; 341 institutions for both sexes, with 109,009 undergraduate men and 69,543 undergraduate women — in all, 574 institutions, with a total of 152,860 undergraduate men and 90,181 under¬ graduate women. The degrees conferred upon women by universities, colleges and technologi¬

cal schools in 1915-16 were as follows:

First degrees —

Arts and Sciences . 9,309

Agriculture . 135

Architecture . 4

Commerce . 46

Education . 591

Fine Arts . 14

Household Economy . 639

Journalism . 17

Music . 368

Oratory . 74

The higher degrees conferred upon women were as follows :

Master of Arts . 909

Master of Science . 56

Doctor of Philosophy . 81

The total number of bachelors' degrees re¬ ceived by women was 11,240; by men 20,586. The total number of graduate degrees received by women was 1,062; by men 3,462.

In professional schools the numbers were as follows :

School

Num¬ ber of schools

Students

Graduating in

1916

Men

Women

Men

Women

Theology…

169

11,291

760

2,023

67

Law .

124

22,306

687

4,220

103

Medicine…

92

14,105

662

3,316

120

Dentistry. .

48

10,521

194

1,831

21

Pharmacy . .

71

5,688

346

1,667

129

696

The tendency toward the utilitarian is more marked in the coeducational institutions than in the separate women's colleges, a difference easily explained, since the step is a natural one, from the opening of a workshop for the men students to the establishment of courses in domestic science for the women. The uni¬ versities endowed by the land grant were the first to introduce the last-named subject and now form the majority of the institutions which include it in their curricula.

Early specialization is also more common in the coeducational college, the separate college placing greater emphasis in its undergraduate course upon liberal culture. The general tend¬ ency to-day, however, is away from unrestricted elective toward more required work, a *group® system, or a system of ^majors,® by which the student may have in her undergraduate course something more than a purely technical and hence one-sided training.

The results of education for women are shown in the large increase of numbers in the professions, the census of 1890 giving the num¬ ber of women in professional service as 311,689, that of 1900 as 430,576, that of 1910 as 733,885, 44.1 per cent, of all the people in professional service. One of the chief reasons urged by the early champions of the movement was that they might be better qualified to become teach¬ ers and to-day their representation in that pro¬ fession outranks all others.

The number of women who are given the higher positions in the profession of teaching, however, is not in proportion, as the following report for 1915-16 shows :

Professors and instructors in universities, colleges and technological schools :

574 institutions Men Women

Preparatory departments . 2,399 1,418

Collegiate departments . 19,140 4,246

Professional departments . 7 , 653 95

Total (excluding duplicates) . 28,472 6,397

Within the last few years there has been a large increase in the number and variety of employments which college women enter. They are not only teachers and physicians, but also nurses, superintendents of hospitals, secretaries, registrars and keepers of records, librarians, social workers, in settlements and associated charities, professional housekeepers, assayers and poultry-raisers. They have opened labora¬ tory kitchens, laundries and greenhouses, have engaged in scientific and historical research, published books, become musicians and artists, deans and presidents of colleges. Nor has their interest been confined to the professions by which they might earn a living. A recent writer says that ^^between the two broad oceans there is hardly any significant movement outside of trade and politics which is not aided by un¬ paid women who work purely out of ideal mo¬ tives.® Educated women are interesting them¬ selves in the problems of the cities in which they live, serving on boards of education and of sanitation, making possible public playgrounds and vacation schools, agitating the questions of improved tenements, pure water supply and clean streets. The experiment of college train¬ ing for women has already justified itself by what they have accomplished in promoting pub¬ lic health and morals.

The Great War has intensified this call for

college women. Laboratories which two or three years ago had no place for them, are de¬ manding more trained workers than the colleges can supply. Positions as draughtsmen, account¬ ants, social workers, government employees, farmers, dietitians, nurses and organizers for different kinds of work, are opening faster than the colleges can send out graduates to fill them. Never was there such real need of the educated woman.

The fear that academic training would unfit women physically and divert them from the home by the attraction of other careers has proved unfounded. The women's colleges and many of the coeducational institutions provide gymnasiums and regular physical training, re¬ quire out-of-door exercise, and have careful physical examination. These provisions, to¬ gether with the regular hours and systematic life of the college, mean a better physical con¬ dition than in the case of the average non¬ college woman.

To those who know the college woman in her home the question concerning her fitness for it is not debatable. The supreme result of the college training is the development of char¬ acter and the cultivation of self-control, of con¬ sideration for others and of a more rational outlook, means preparation for the home as well as for the profession.

Bibliography. — Boone, ˆHigher Education of Womenˆ (ˆEducation in the United States,ˆ pp. 362-382) ; Dexter, ˆThe Education of Wo¬ menˆ (ˆHistory of Education in the United States,ˆ pp. 424-453) ; Freeman, Wassar Col¬ legeˆ (ˆEducation, ˆ VIII, 73) ; Hooker, Wlount Holyoke Collegeˆ New England Magazine, XXI, 545) ; North, Wˆellesley Collegeˆ (Histor¬ ical Address, 1900) : Palmer, <The Higher Edu¬ cation of Womenˆ {Forum, XII, 28, 1891) ; Putnam, ˆRise of Barnard Collegeˆ (Colum¬ bia University Quarterly, June 1900) ; Seelye, ˆSmith College' (in ˆCelebration of the Quarter Centenary of Smith College' 1900) ; Small, ˆGirls in Colonial Schools' (ˆEducation,' XXH, 552); Smith, ˆCoeducation' (ˆReport of Com¬ missioner of Education, 1917,' Vol. H) ; Stow, ˆHistory of Mount Holyoke Seminary, 1837-87' ; Thomas, ˆEducation of Women' (But¬ ler's ˆEducation in the United States,' 1900, Vol. I, 319-358) ; Warner, JRadcliffe College' (Harvard Graduates Magazine, March 1894).

Mary E. Woolley, President of Mount Holyoke College.

EDUCATIONAL ASSOCIATIONS. The

beginnings of educational associations in the United States antedated the public school sys¬ tem. Long before the organization of State school systems and before the days of the rail¬ road when travel was of necessity by stage¬ coach, the great need of conference and ex¬ change of thought was slowly being realized and in several States, particularly in New Eng¬ land and New York, county or other local gatherings of teachers and those interested in education were organized.

Of the educational associations in the United States having a national character, the American Institute of Instruction is probably the earliest. This association was organized in August 1830. The first meeting was held in the State House, Boston, Mass., and President Francis Wayland of Brown was the presiding officer. The first

seven meetings were held in Boston. They were marked by the presence of great leaders and educational statesmen rather than of those actually engaged in classroom teaching. Horace Mann, who was then a member of the Massa¬ chusetts legislature, attended the first meeting at Boston and became greatly interested in the discussions. The program attracted his atten¬ tion and active support. As a result he turned from the law and from legislative halls and be¬ came one of our greatest educational leaders. Among those in frequent attendance on the early meetings were Horace Mann, Thomas H. Gallaudet, Henry Barnard, Samuel G. Howe, Asa Gray, Ralph Waldo Emerson, Theodore Parker, Charles Sumner, David P. Page, Edward Everett and many others whose names are equally familiar. The first few years these rneetings in Boston were epochmaking, but discordant elements brought about a change in plans and for the next seven years the annual meetings were held in various New England cities. Through the influence of Horace Mann Massachusetts made an annual appropriation, at first $300 and later $500 for the expenses of the meetings. This was discontinued-in 1874. With the rise of the State associations in 1845 the interest in the organization declined. It was desired to make the new State organizations more representative and popular but the dynamic influence of the great leaders who had been active in the meetings of the institute was lost. The interest in the institute was con¬ tinued through the efforts of Rhode Island leaders. It was commercialized through the excursion idea which was made a feature of the meetings, and thus was enabled to continue from year to year, but unusual expenses and a very limited income from the membership proved a serious embarrassment. More re¬ cently, however, the membership has increased and the expenses have been reduced so that the period since 1900 has been more encouraging than at any time since the great leadership of its early days. The contributions of the Ameri¬ can Institute of Instruction through the edu¬ cational statesmen who were in attendance at the early meetings were beyond measure in de¬ veloping public thought toward a rational edu¬ cational program. In comparison with the larger State and national meetings the annual meetings of the institute have been small. It has seldom exceeded 2,000 members in enrol¬ ment.

Although its history has been largely associated with New England, yet its member¬ ship has been drawn in part from many other States.

The Western Literary Institute and College of Professional Teachers which was organized in 1831 drew its membership largely f-rom the four States — Ohio, Indiana, Illinois and Ken¬ tucky. Of the 15 annual meetings, 12 were held in Cincinnati, and 3 in Louisville. This association was very active and was supported by the strongest teachers in this section of the country. The spirit and thought of the meetings were progressive. The remarkable development of the new country reacted on the educational thought. There was a freedom from conser¬ vatism and women were permitted to take active part in the deliberations. The association con¬ tinued until 1845 and exerted a wide influence on the schools.

The American Lyceum Association held its

first national convention in New York city in 1831. It continued for nine years, when the last meeting was held in Philadelphia. The association was interested in general educational problems but more particularly in advancing improved methods, in creating an interest in the study of the natural sciences, in providing the schools with books and apparatus, and in emphasizing the importance of the education of women. Among the papers discussed on the programs were ‘^Manual-Training Schools,® “The Education of the Blind,® “Vocal Music,® “Eye Training,® “Education of the Deaf,® “Geology >® “Female Education,® “The Embellishment and Improvement of Towns.® The programs were prophetic in character. The association created a wide interest in libraries and “lyceums.®

The American Association for the Advance¬ ment of Education was organized as the result of a meeting of the “National Association of the Friends of Education® which held its first meeting at Philadelphia in October 1849. The conference was presided over by Horace Mann, then a member of Congress from Massachusetts. The purpose was to discuss the administration of public education in its relation to the needs in different sections of the country. The second meeting, also held in Philadelphia, convened in August 1850, under the presidency of Eliphalet Nott, president of Union College. At this meeting a new constitution was adopted, and the organization became the American Association for the Advancement of Education. The eighth, and probably the last, meeting of the association was held at Detroit in August 1856 under the presidency of Chancellor H. P. Tappen of the

University of Michigan. The various meetings of the association were marked by the attend¬ ance of superintendents, supervising officers and college presidents. The representation from the actual teaching staff was probably small. A close relation is observed between the Ameri¬ can Association for the Advancement of Edu¬ cation and the new State school systems which were being organized at that time.

The National Teachers' Association, organ¬ ized in Philadelphia in 1857, absorlDed the American Association for the Advancement of Education. The purpose of the new association was to include in one organization "all the teachers of our whole country.® The original "call® was made "to all practical teachers in the North, the South, the East, the West® and was signed by the presidents of 10 of the State associations. It was to be an organization of the rank and file of the teaching profession, to bring together into one unit the common thought of the practical teachers in the schools, and through the national association to bind all the State associations together into one structure. The spirit of the new organization was in every sense in harmony with the efforts of the earlier associations both State and national. It conceived the need of a national conference representing the popular teaching body. A pregnant phrase in an address by William Rus¬ sell at the first meeting at Philadelphia — "har¬ monious cooperation of educational skill with scientific progress and parental interests® — in¬ dicates the breadth of view of these early leaders. Two conditions made this the psycho¬ logical time for the organization of the National Teachers' Association; the growing strength of

the several State associations, and the liberal legislation by which systems of public education had been established in several States. More¬ over, the rapid economic development of the country through the application of scientific dis¬ covery and invention to the everyday life of the people, such as the marvelous extension of steam railroads and telegraph lines as well as the use of industrial machinery for the farm and home, made possible a real national confer¬ ence and furnished a greater opportunity for the interpretation of the common thought. The strength in the association was in its appeal to popular membership. Its weakness was due to lack of educational leadership and statesman¬ ship. The great impending national crisis over¬ shadowed the activities of the embryo organiza¬ tion. There was, therefore, lack of popular in¬ terest and no conventions were held in 1861, 1862 and 1867. In 1866 an important change was made in the constitution whereby women were admitted to full membership on the same terms as men, and in 1869 two women were elected on the executive board of 35.

At the meeting in Cleveland, Ohio, in August 1870, D. B. Hagar of Massachusetts, who drew up the call for the convention of teachers in Philadelphia in 1857, was president of the as¬ sociation. In his opening address he outlined certain changes in the organization as a result of which a new constitution was adopted and the following departments were created ; normal schools, school superintendence, elementary edu¬ cation, and higher education. By this action the American Normal School Association and the National Association of School Superintend¬ ents became, under the new constitution, depart¬ ments of the National Education Association. From time to time other departments have been added until there are now 21. The breadth of activity is indicated by the names of some of the departments more recently organized : vocational education and practical arts, rural and agricultural, child hygiene, physical, school administration, library, special, promotion of wider use of schoolhouses. The growth, how¬ ever, was slow. The registered membership at the Cleveland meeting in 1870 was only 170, and for several years the attendance continued small. The funds were frequently insufficient to print the proceedings. In 1884 an unusually successful meeting was held in Madison, Wis., with an enrolment of 2,729. This marked the beginning of a new era for the association. From that time it has properly been regarded as a leader in national

educational matters. In 1886 the association was incorporated for 20 years. The following year at the Chicago meet¬ ing the membership totaled 11,297; at Los Angeles in 1899, 13,656; and at Boston in 1903, 34,953. In 1906 an act was passed by Congress incorporating the National Education Associa¬ tion. A permanent fund founded in 1884 has grown to nearly $200,000.

At the Philadelphia meeting inˆ 1891, Dr. W. T. Harris, United States Commissioner of Edu¬ cation, presented a noteworthy paper on the organization and functions of the association, in which he reviewed its purpose, to ˆˆconcentrate the wisdom and power of numerous minds, and distribute among all the experiences of all,’ˆ out¬ lined its progress and growth from a few hun¬ dred to as many thousand, mentioned the great ˆˆadvantage of personal contact of mind with

mind,» and pointed out the salutary influence of the departments provided for the needed specialization of work with the suggestion that others should be added.

Since 1898 there has been a permanent paid secretary who gives his entire time to the serv¬ ice of the association, and since 1917 the secretary’s office and the headquarters of the asso¬ ciation have been located at Washington, D. C. It has always been the policy of the organiza¬ tion to support broad national policies. To formulate a program of education during and after the war, the association designated a Corn-mission on the Emergency in Education. This commission contemplates no ‘less a program than a national department of education, with a secretary who shall sit in the President’s cab¬ inet, and the transfer of all bureaus or agencies relating to educational affairs to the new de¬ partment.

There have been organized in recent years several societies interested in the scientific study of education. The National Herbertian Society for the Scientific Study of Teaching was organ¬ ized in 1895, and in 1902 it was reorganized and the title changed to the National Society for the Scientific Study of Education. The National Society for the Promotion of Industrial Educa¬ tion, organized in 1906, has also made large con¬ tribution to educationalˆ thought and progress.

Local teachers’ associations had become gen¬ eral before the organization of the National Teachers’ Association in 1857. A teachers’ association was organized in New York city as early as 1798. An association of teachers known as the School Association of

Middlesex County was formed at Middletown, Conn.,ˆ in 1799. The earliest record of a State gathering of teachers is that a ˆˆState Convention of Teachers and Friends of Education® was held at Utica, N. Y., in January 1831. It was not until 1845, however, that there was a formal organization. Actively interested in the work of the State associations were many educational leaders. These men gave strength to the or¬ ganizations, and every effort was made to secure a large attendance on the part of practical teachers. In Rhode Island, Massachusetts and New York State associations were organized in 1845. The Ohio association was organized in 1847; Connecticut, in 1848; Vermont, in 1850; Michigan and Pennsylvania, in 1852 ; Wisconsin, Illinois and New Jersey, in 1853; Iowa, New Hampshire and Indiana, in 1854; Missouri, in 1856. The meetings* of some of the State asso¬ ciations soon became large and enthusiastic. Dr. Hagar of the State Normal School at Salem, Mass., stated that the attendance at the meetings of their association in the late 60's was from 2,500 to 3,500. He attributed this_ in¬ terest to the reorganization of the meetings into special sections. There is now a State teachers' association in every State except Delaware. The meetings are usually held annually. In the larger organizations the program generally cov¬ ers several days. At the general sessions the topics are of broad interest, while the sectional meetings are given over to the discussion of spe¬ cial activities. In New York the State associa¬ tion is very strongly organized. Every effort is made to enroll a large membership. The cities, villages and the supervisory districts are the separate units of the State organization and are represented by delegates who control the poli-EDUCATIONAL ASSOCIATIONS

cles of the State organization. Previous to the reorganiption of the New York State Teachers' Association in 1913, the meetings were largely representative of the locality where the annual meeting happened to be held. The renewed inter¬ est and enlarged activities of the new organiza¬ tion have fully justified the change made in 1913. The association is now representative of the entire State and every supervisory unit, city village or rural community, has a representative voice in its annual meeting.

In some States the interest in the State asso¬ ciation is much greater than in others. This is indicated in part by attendance and

membership, which varies from nearly zero to 90 per cent of the teaching body of the State. Most of the associations are growing much stronger and teachers are becoming alive to the opportunities of an active professional organization. The economic conditions are rapidly becoming better for the teacher in those States in which the as¬ sociation is supported by a loyal membership. The indifference so often found is due in part at least to the short professional life of the teacher.

In general there are two types of teachers' voluntary associations : (a) the general associa¬ tions which aim to promote all the interests of teachers, such as the National Education Asso¬ ciation and the State teachers' associations, and (b) specialized associations which are limited to some special subject or to some particular ac¬ tivity of school work, such as kindergarten, in¬ dustrial training, English, music, agriculture, do¬ mestic arts, science, health and hygiene, play¬ grounds, or others.

The early associations were largely cultural. They were not subdivided-into sections, in fact, the attendance was so small that this was not possible, even if it had been considered. In re¬ cent years the national and State associations have differentiated their work until the sections have become highly specialized. Women play a much more prominent part than formerly. In 1911 the National Education Association had its first woman president. It was an incident worthy of mention that in the same year the National Union of Teachers of England and Wales had a woman presiding officer for the first time. Little thought was given at first to the economic and material needs of the teacher. In the State associations there is a great inter¬ est in educational legislation and also in the raising of professional standards. The teach¬ ers' associations in some of the larger cities are largely concerned with the economic betterment of their membership and related legislation.

Teachers' voluntary associations, both gen¬ eral and special, have made a large contribu¬ tion to educational progress. To the teachers these associations mean renewed enthusiasm, professional growth and material improvement. To the State they are often the ^^greatest single educational factor.® Active teachers' associa¬ tions are essential to progressive educational policies.

In England a much larger percentage of teachers is represented in the associations than in America. The National Union of Teachers, which was organized in 1870, has a membership of over 70,000 teachers. More attention is given to economic conditions and material needs. It

has actively supported candidates for Parliament and for a time its secretary was a

mernber of Parliament. The membership was originally limited to teachers in elementary schools, but more recently the Union has been open to other teachers.

The Headmasters' Conference, organized in 1869, and the Association of Headmasters, or¬ ganized in 1890, give special attention to ques¬ tions relating to school management and pro¬ fessional matters. The Assistant Masters' As¬ sociation is an organization of secondary school teachers and is interested in part in the eco¬ nomic betterment of its membership.

The largest general association in Scotland is the Educational Institute of Scotland. The Scottish Class Teachers' Association also has a large enrolment. The Association of Head¬ masters of Secondary Schools and the Second¬ ary Education Association of Scotland are organized in the interests of teachers in the sec¬ ondary schools.

There are various types of educational asso¬ ciations in France. Many of them illustrate the power in cooperation between teachers and others interested in educational problems. The League of Doctors and Families organized in 1902 for the improvement of scientific methods and hygienic conditions in the school includes in its membership teachers, parents, physicians and others. The Society for the Psychological Study of the Child, which was organized for the study of child psychology and general educa¬ tional methods, includes not only teachers but scientists and others interested in a theoretical as well as practical study of educational ques¬ tions. The work of these associations has brought about the organization of international congresses for the scientific study of educa¬ tional questions. Associations of teachers and instructors in France have a wide influence. The discussions as to instruction, curriculum and discipline brought out in the meetings are published in their bulletins and principals are quite free as to the adoption of new methods in their schools.

The largest organization of its kind in Ger¬ many is the German Teachers' Association formed in 1871'. Over 90 per cent of the teach¬ ers in the elementary schools are members of the association. It is highly organized through¬ out the country, including local associations of a general character and sections for teachers in special

subjects. The chief interest is the pro¬ fessional and economic betterment of teachers. Its strength is in theˆ centralized organization. There is also an association of secondary school teachers, the aim of which is to improve the conditions of teachers in schools of secondary grade. Associations which enlist the interests of the public-spirited citizen as well as the teacher and which aim to promote general edu¬ cational activities are not found.

Bibliography. — Foos, C. S., ˆ State Educa¬ tional Associationsˆ (United States Com. of Ed. Report 1909) ; Kandel, I. L., ˆTeachers' Voluntary Associationsˆ (in ˆCyclopedia of Education') ; Monroe, Will S., ˆEducational Associations' (N. E. A Fiftieth Anniversary Volume, 1905) * Winship, Albert E., ˆThe American Institute of Instruction' (N. E. A. Anniversary Volume, 1905).

George M. Wiley,

Director, Division of Examinations and Inspec¬ tions, State Education Department, Albany, N. Y.

EDUCATIONAL ATHLETICS. At the

outset It must be borne well in mind that ath¬ letics in an educational institution is not an end but a means to an end. The end in view is to furnish a healthy habitation for a healthy mind, for without a sound body to carry out its work the mind certainly cannot do what nature in¬ tended it to do. Certain minds incorporated in crippled bodies, it is true, have risen fo remark¬ able heights in the various fields of human activity, but not on account of deformities, but in spite of them. Perhaps there is nothing so detrimental to a good healthy body — not even the use of stimulants — as excessive sedentary pursuits. When a young man is bent on win¬ ning scholastic honors, he unconsciously falls into this excess. Of course the natural result follows. Good rich blood is denied the parts ; they become starved, and in a short time degen¬ eration sets in throughout the entire body. Then it is that we have a terrible spectacle of a strong intellect unable to do even ordinary work on account of a pain-racked body.

It is to counteract this tendency to starve the body in order to feed the mind, that school authorities have encouraged physical as well as mental training among students. Thus we see that to-day the gymnasium is as important a part in a group of school buildings as a hall of science or of arts.

Although educational athletics is found at its best in the university, and there is little dif¬ ference between the systems employed in our leading institutions of learning, the question is far from settled as to the best way of exercis¬ ing the boy in the elementary and high school. It is a generally accepted fact that the exercise — we can hardly dignify it by the name ˆGthlet-icsˆˆ — in the elementary school is the one which, apparently, has the least system about it.

Athletics reduced to a system is for the first time found in the high school. The games played are much the same as in the college, namely, baseball, football, track sports, tennis and basketball, while in some of the high schools we find indoor baseball. As a rule all inter¬ scholastic competition is under ’the control of the school principal, or a member of the teach¬ ing force appointed by the principal.

All over the country there are interscholas¬ tic associations made up of high schools in ad¬ jacent counties. The winners in the respective

meets compete in larger meets under the aus¬ pices of the athletic associations of some nearby university. In many of the Western States, State high school track meets are held annually by the various State universities. Beside the rivalry between high schools located in the same section, there have been contests between the champion football teams of the Middle West and those of the East.

Generally spealdng, every university in the United States has the same routine. Each stu¬ dent is required to undergo a physical exam¬ ination, so that a correct knowledge of his bod¬ ily condition is obtained and proper exercises prescribed. Regular classes are formed for drill in ordinary arm, body, leˆ and wand cal¬ isthenics, and then on the various gymnasium appliances and apparatuses. During the fresh¬ man year at least, gymnasium work is compul¬ sory. Exceptions, however, are made in the cases of those who make athletic teams. Be¬ sides the exercises themselves, lectures are

given on personal hygiene. If the college is a coeducational institution, the female students take phˆˆsical training under a competent woman instructor. In several institutions young women have taken part in basketball, and in rarer cases in track athletics, and on several occasions have made enviable records.

All competitive athletic games are given un¬ der direct faculty supervision, and examination is required to show that the membership on any team will not cause injury to the student, but will tend to improve his physical condition. No student, whose class work is unsatisfactory, is allowed to play on a university team. No stu¬ dent is permitted to play on an athletic team more than four years. All those who take part in collegiate sports must be amateurs.

Of all intercollegiate sports the most popular and the one most distinctively a college sport is football. The football season begins in the middle of September and ends with Thanks¬ giving day. Intercollegiate contests begin about the first of October, since the last half of September is taken up with the training and conditioning of the players. Football, as it is played in colleges to-day, is a modification of the Rugby game. This country first saw it at Harvard in 1875. A match was arranged with Yale that year, and the latter was beaten. However, the lesson seemed to have been a good one, for since then Harvard’s victories over Yale have been few and far between. To Walter Camp, Yale 1880, sometimes called ˆhhe father of football,® do we owe much for foot¬ ball as it is played to-day. It was

due princi¬ pally to Mr. Camp's efforts that the number of players on a team, and positions were fixed in their present condition. Without going into a discussion, on the roughness of the game, let it be considered that what is rough — nay, bru¬ tal — for a man in no condition to play, is merely a trial of strength, courage and clever¬ ness, in which all unnecessary roughness is eliminated, for the trained athlete.

After the football season is over, beside work in the gymnasium, there is nothing done in the way of exercise until after the holiday vacation, when the various indoor or gymna¬ sium sports are taken up. The principal winter sport is basketball and gymnasium work. It is very important, among other things, in that it brings out a part of the student body which takes no part in the other branches of sport. Gymnasium teams practise in tumbling, trapeze, horse and bar work. Many of the students also take special interest in wrestling, fencing and boxing. Although there is none or little intercollegiate competition in handball, this beneficial exercise is the principal mode of recreation for a great many of the student body.

Although it is long before the season of competition, the training season of both the baseball and ˆ track teams start immediately after the Christmas holidays. Baseball brings out more candidates than any other branch of sport, and the reason for this may readily be seen. Although there are many boys in col¬ lege who have never played football, or sprinted, there is hardly one, physically able, who has not played the national game. The indoor work in this branch consists of batting, throwing, picking up grounders and pitching. The squad, which in some instances numbers

more than a hundred men, is gradually cut down, so that when they are able to play out of doors, in March, there remains probably enough men to make up two teams, beside the men who are trying for pitching positions.

In the East, Brown, Yale, Harvard, Prince¬ ton, Georgetown and Holy Cross have always been among the leading schools in baseball. The baseball squads in almost all of these col¬ leges are coached by professional players. In the West, Illinois and Michigan have divided all the diamond honors in recent years.

Training for a track team starts in the win¬ ter. Almost every university gymnasium is fitted up with a running track. There, day after day, the candidates for the team get out and run under the eye of the trainer. Inter¬ collegiate indoor track matches begin as early as February. They take place in the gymna¬ sium, and consist of short dashes, hurdle races, middle and long distance runs, shot put, pole vault and high jump. To this list is often added a relay race. As soon as the weather is warm enough the track candidates are taken out on the athletic field. During the spring dual meets are held, and in June, at the end of the collegiate year, a meet is held to which all the track teams of the colleges of a section are invited to compete.

Harvard, Pennsylvania, Yale and George¬ town do the best work on the track in the field among the Eastern colleges. In the West Michigan and Chicago usually fight it out for leadership.

The following are the best records made in the respective events by the college track ath¬ letes of the country in collegiate meets :

too yards — 9 4-5 s. — W. W. May.

220 yards — 21 1-5 s. — B. J. Wefers, Georgetown.

One-fourth mile — 47 2-5 s. — J. E. Meredith, Pennsylvania.

One-half mile — 1 m. 53 s. — J. E. Meredith, Pennsylvania.

One mile run — 4 m. 14 2-5 s. — J. P. Jones, Cornell.

Two mile run — 9 m. 23 4-5 s. — J. S. Hoffmire, Cornell.

120 yard hurdles — 15 s. — F. S. Murray, Leland Stanford.

220 yard hurdles — 23 3-5 s. — A. C. Kraenzlein, Pennsyl¬ vania.

Running high jump — 6 ft. 4ˆ in.— W. M. Alex, Yale.

Running broad jump — 24 ft. 4ˆ in. — A. C. Kraenzlein, Pennsylvania.

Pole vault — 13 ft. 1 in. — R. Gardner, Yale.

Putting 16 lb. shot — 48 ft. 10| ins. — P. Beatty, Columbia.

Beside the sports already mentioned, row¬ ing takes an important place in the athletic cat¬ alogue of many universities. Perhaps a man has to train longer and more strenuously to make a college crew than if he went into any other branch of sport. Often the man on the crew starts to work in September and con¬ tinues throughout the entire college year. The swimming tank in the gymnasium leads_ to many water games, such as racing, diving, water polo, etc., all of which tend to mould a man along healthful lines. Lawn tennis occu¬ pies a very important place in college athletics. It is one of the most beneficial sports we have, but as it is not a game which is very interesting to spectators, it will never rank with football, baseball, rowing or track athletics as an inter¬ collegiate sport. Golf is being taken up more and more by the colleges and this most excel¬ lent game will increase in popularity, and we will hear of many intercollegiate matches where now there are but few.

The good of athletics in institutions of learn¬ ing is incalculable. Between classes and lec¬ tures. when there is nothing to take up the

student's mind, the temptations are manifold. If he is of a studious disposition, there is the danger of excessive sedentary life. If he is not studiously bent, there are many tempta¬ tions to attract the idle. If he is of a weak constitution, disease and its consequences soon follow; if he is robust, although he may stave them off longer, the consequences are the same. Then again, the athletic field is a place where all classes of students can meet on a common ground. It is the place where they can get rid of a superabundance of youthful enthusiasm. As a result, the town and gown riots, which formerly characterized every college town, are things of the past. One is thus inclined to agree with an eminent college president when he said, *the athletic field does more toward keeping order in the student body than all our rules and regulations combined.^^

EDUCATIONAL LAND GRANTS. See

Land Grant Colleges ; Education, Agricul¬ tural — Land Grant Colleges.

EDUCATIONAL PERIODICALS. Pro¬ fessional publications designed for the use of teachers first appeared in the early part of the 19th century. Their development has been closely associated with the organization and growth of educational associations. The pioneer educational magazine of America was the Academician, a small semi-weekly edited by Albert and John W. Picket and published by the Incorporated Society of Teachers of New York. The first number appeared 7 Feb. 1818. It published a series of articles on grammar and another series on mathematics; articles on Pestalozzi's methods and accounts of various institutions of learning. It continued for two years, the last number appearing on 29 Jan. 1820. The second in the field. The American Journal of Education, a monthly periodical edited by William Russell, W. C. Woodbridge and William A. Olcott, was begun in January 1826, and until 1838 exercised marked influence on the educational thought of the country. In the latter year, Horace Mann, then secretary of the Massachusetts State Board of Education, commenced the publication of the Common School Journal. As the mouthpiece of the great educational reformer this magazine did much to advance the teaching profession. It was discontinued in 1852. In the meantime several minor educational publications had sprung up in different States. Most of these exerted but a local and transitory influence. The most remarkable educational periodical ever pro¬ duced in this country was Henry Barnard's American Journal of Education, which was started in 1855. This was more than a maga¬ zine ; it was rather a compendium of the edu¬ cational thought of the day. It continued with some irregularity until 32 volumes had been completed. The plates were preserved and the whole work was reprinted for library use. With the expansion of the teaching profession edu¬ cational periodicals have multiplied until every department of education has its special journal. The best known of the current journals cover¬ ing the general pedagogical field in America are The Educational Reznew, (1890), Education (1880), The School Revietv (1893), Journal of Education (1875), School Bulletin (1874), American Education (1897), Catholic Educcb-tional Reviczv (190'D. Among the magazines

covering special phases of educational work the following have a prominent place : Administra¬ tion — American School Board Journal (1863), Educational Administration and Supervision (1915); elementary — The Elementary School Journal (1900) ; Primary Education (1892), American Primary Teacher (1870), Normal In¬ structor and Primary Plans (1891) ; psychology — The Journal of Educational Psychology (1910), The Pedagogical Seminary (1896), The Psychological Clinic (1906) ; physical edu¬ cation — American Physical Education Review (1896) ; kindergarten — The Kindergarten Mag¬ azine (1888), The Kindergarten and First Grade (1916). In addition to these there are many state and local educational periodicals of much merit. Consult Bardeen, C. W., ˆThe History of Educational Journalism in the State of New Yorkˆ (Syracuse 1893) ; ˆReport of Commis¬ sioner of Education, U. S. Bureau of Education, 1910ˆ ; Severance, H. O., CV Guide to the Cur¬ rent Periodicals and Serialsˆ (1914).

Horatio M. Pollock.

EDUCATIONAL TEST FOR SUF¬ FRAGE. See Electoral Qualifications.

EDWARD, The Elder, king of England: b. about 870; d. Farndon, Northamptonshire, 925. He was a son of Alfred the Great, and succeeded his father in 901. Ethelwald, the son of his father's elder brother, claimed the crown ; and an insurrection took place in his favor, but it ended with the death of Ethelwald in battle. The reign of Edward was further distinguished by successes over the Anglicized and foreign Danes. He fortified many inland towns, ac¬ quired dominion over Northumbria and East Anglia, and subdued several of the Welsh tribes. Consult Oman, ˆEngland before the Norman Conquestˆ (London 1910) .

EDWARD (surnamed the ˆˆMartyrˆQ, king of England: b. about 963; d. Corfe Castle, 18 March 979. He was a son of Edgar, and suc¬ ceeded his father in 975. His stepmother, Elfrida, wished to raise her own son, Ethelred, to the throne, but was opposed by Dunstan, through whose exertions Edward was peace¬ ably crowned. His short reign was chiefly distinguished by the disputes between Dunstan and the foreign monks on one side, and the sec¬ ular clergy on the other. Hunting one

day in Dorsetshire he was separated from his attend¬ ants, and repaired to Corfe Castle, where El¬ frida resided. He requested a glass of liquor, and as he was drinking on horseback one of Elfrida's servants gave him a deep stab behind. He immediately set spurs to his horse, but, fainting from loss of blood, was dragged in the stirrup until he died. The pity caused by his innocence arid misfortune induced the people to regard him as a martyr.

EDWARD (surnamed the ®Confessorˆ Q , king of England : b. Islip, Oxfordshire, about 1004; d. 5 Jan. 1066. He was an elder son of Ethelred the Unready. On the death of his ma¬ ternal brother, Hardicanute the Dane, in 1041, he was called to the throne, and thus renewed the Saxon line. He was not the immediate heir, as his brother, Edmund Ironside, had left sons; but as he received the support of Godwin, earl of Kent, on condition of marrying his daughter, Editha, his claim was established. Edward was a mild and virtuous prince, who acquired the love of his subjects by his sanctity and care in

the administration of justice. It was under his reign that Westminster Abbey was built. Hav¬ ing been educated in Normandy, he introduced so many natives of that country to his court that the French language and manners became prevalent in England, to the great disgust of Earl Godwin and his sons. A rebellion took place, and Edward was forced to dismiss his foreign favorites. Perceiving that the youth and weakness of his chosen heir, Edgar Athel-ing (q.v.), would not secure the succession against the power and ability of Harold, the son of Godwin, he turned his eyes upon his kinsman, William of Normandy, in whose favor it has been asserted that he executed a will. He died leaving the point of the succession unde¬ termined ; and with him ended the Saxon line of kings. He caused a body of laws to be com¬ piled from those of Ethelbert, Ina, and Alfred, which is the supposed source of the common law of England. He was canonized by Alexan¬ der HI in 1166. Consult Hodgkin, ˆHistory of England to 1066ˆ (London 1906).

EDWARD I, king of England: b. West¬ minster 17 or 18 June 1239; d. Burgh-on-Sands, near Carlisle, England, 7 July 1307. He was a son of Henry HI (his mother being Eleanor of Provence, the wife of Henry), and the contests between his father and the barons called him early into active life. In 1252 he became Lord of Gascony, and after his marriage to Eleanor of Castile in 1254, his father made him ruler of Ireland and Wales, and the towns of Bristol, Stanford and Grantham.

The officials whom he appointed in Wales were resented by the inhabit¬ ants who revolted with the Scotch. Further discontent was manifested by the barons who were likewise indignant at the favors granted to foreigners. King Henry and Edward were finally forced to consent to the Provisions of Oxford which limited the royal power in regard to such appointments and war was declared in 1263. Edward finally quelled all resistance to the royal authority by the decisive defeat of Leicester, at the battle of Evesham, in 1265. In 1268 he joined the Crusade to Palestine, where he inspired so much terror that an as¬ sassin was employed to despatch him, from whom he received a wound in the arm. In 1271 he set out toward England, stopping at France to acknowledge his homage to Philip HI for his French possessions. He was crowned King of England with Eleanor on 19 Aug. 1274. On assuming the government he acted with great vigor in the repression of the lawlessness of the nobles and the corruption in the administration of justice; but often evinced an arbitrary and grasping disposition. In 1274, and again in 1276, he summoned Llewellyn, prince of Wales, to do him homage, and upon his refusal, except on certain conditions, began the war which ended in_ the annexation of that principality to the English crown in 1283. Edward then spent some time abroad in mediating a peace between the crowns of France and Aragon, and on his return commenced his attempts to destroy the independence of Scotland. After his return fromˆ the Scottish expedition, in 1296, which terminated in the capture of Baliol, he became involved in a quarrel with his clergy, who, sup¬ ported by the Pope, refused to submit to a tax which he had imposed upon them. Edward forced their compliance by placing them out of the protection of the law. His frequent expe-EDWARD II — EDWARD III

dients to raise money at length produced great discontent among the nobles and people also, which obliged him to confirm the great charter and charter of forests, and also to give other securities in favor of public liberty. He then made a campaign in Flanders against France, which terminated with the recovery of Guienne and his second rnarriage with Margaret, the sister of King Philip. Meantime new commo¬ tions took place in Scotland under the guidance of the celebrated William Wallace. These transactions recalled Edward from Flanders, who hastened to the border with an army of 100,000 men. The ignominious execution of the brave Wallace, in 1305, as a traitor,

forms a blot in the history of Edward. Neither did it avail, since Robert Bruce was able, in 1306, to place himself at the head of a new confederacy. Indignant at this determined spirit of resistance Edward vowed revenge against the whole Scot¬ tish nation, and, assembling another army, was on the point of passing the border when he was arrested by sickness and death. Few princes have exhibited more vigor in action, or policy in council, than Edward I. His enterprises were directed to permanent advantages rather than to mere personal ambition and temporary splendor. Nor was he less intent upon the in¬ ternal improvement of his kingdom than its external importance. The laws of the realm obtained so much additional order and precision during his reign that he has been called the ^^English Justinian.® He passed an act of mort¬ main, protected and encouraged commerce, and in his reign first originated the society of mer¬ chant adventurers. The manners of this able sovereign were courteous, and his person ma¬ jestic, although the disproportionate length of his legs gave him the popular surname of ^Longshanks.® He left a son and three daugh¬ ters by his first wife, Eleanor, who died in 1290, and two sons by his second wife, Margaret of France. Consult Stubbs, ^The Early Plantagenets^ (1877) ; Tout, ^Edward P (1893) ; Jenks, ^Edward Plantagenet^ (New York

1902).

EDWARD II, king of England : b. Carnar¬ von Castle in 1284; d. Berkeley Castle, 21 Sept. 1327. He was the first English Prince of Wales and succeeded his father, Edward I, in 1307. He was of an agreeable figure and mild dispo¬ sition, but indolent and fond of pleasure. His first step was to recall Piers de Gaveston, a young (jascon, whom his father had banished, and whom he created Earl of Cornwall, and married to his niece. He then went to France to espouse the Princess Isabella, to whom he had been contracted by his father, leaving Gaveston guardian of the realm. Soon after his return the barons associated against the favorite, whom they more than once obliged the king to send away. He was, however, as constantly recalled when the immediate danger was over, until an open rebellion took place, and Gaveston was captured and executed as a public enemy. In 1314 Edward assembled an immense army to check the progress of Robert Bruce, but was completely defeated at Bannockburn. After the death of Gaveston he selected another favor¬ ite, Hugh le Despenser, upon whom he lavished favors of every kind, until the barons again rebelled, and the Parliament doomed Despenser and his father to exile. The king was obliged to confirm the sentence.

Edward, however, on

this occasion, in concert with the Despensers, contrived to raise troops and attack the barons, at the head of whom was his cousin, the Earl of Lancaster, who, being taken prisoner, was executed at Pomfret. Edward subsequently made another fruitless attempt against Scotland, which ended in the conclusion of a truce of 13 years. In 1324 Queen Isabella went to France, and while there entered into a correspondence with several English fugitives, in whose hatred to the Despensers she participated. Among these was Roger Mortimer, a young baron of the Welsh marshes, between whom and Isabella a criminal intercourse followed, in consequence of which the queen was still more determined upon the ruin of her weak and unhappy hus¬ band. Having formed an association with all the English malcontents, and aided with a force by the Count of Hainault, she embarked for England in September 1326, and landed in Suf¬ folk. Her forces seized the Tower of London and other fortresses, captured and executed both the Despensers without trial, and at length took the king prisoner. Edward was confined in Kenilworth Castle, and in January 1327 his deposition was unanimously voted in Parlia¬ ment, on the ground of incapacity and misgov-ernment. A resignation of the Crown was soon after extorted of him, and he was transferred to Berkeley Castle, where Mortimer dispatched two ruffians, who murdered him, in the 20th year of his reign and 43d year of his age. Con¬ sult Vickers, ˆHistory of England, 1272-1485ˆ (London 1912).

EDWARD II, an historical tragedy by Christopher Marlowe (1598). It follows his¬ tory closely in its main lines and is a powerful representation of the tragic history of that king.

EDWARD III, king of England: b. Wind¬ sor, 13 Nov. 1312; d. Richmond, Surrey, 21 June 1377. He was a son of Edward II, and on his father's deposition in 1327, was proclaimed king under council of regency, while his mother's paramour, Mortimer, really possessed the prin¬ cipal power in the state. The pride and op¬ pression of Mortimer now became so intoler¬ able that a general confederacy was formed against him. The result was the seizure of Mortimer, who was tried and condemned by a parliament at Westminster, and was executed 29 Nov. 1330. The queen, although treated with outward respect, never again during the remaining 28 years of her life recovered any degree of authority. Edward now turned his attention to Scotland. Assisted by some prin¬ cipal English nobles, Edward Baliol, son of the John Baliol to whom the crown had been awarded

by Edward I, raised a force, and de¬ feating the Scots in a great battle, set aside David Bruce, then a minor, and was crowned at Scone in 1332. Baliol being driven away on the departure of his English auxiliaries, applied to Edward, who defeated the regent, Douglas, at the famous battle of Halidon Hill, in July 1333. This victory produced the restoration of Baliol, who was, however, again expelled, and again restored, until the ambition of Edward was called off by a still more splendid object. The crown of France, by the Salic law, having devolved to Philip de Valois, cousin-german to the deceased king Charles the Fair, Edward was induced to claim it in right of his mother,

that monarch's sister. Edward, in order to ob¬ tain supplies, made concessions to Parliament which he never intended to keep; and finding his territory of Guieiine threatened, sent over a force for its defense, and quickly followed himself, accompanied by his son Edward, the famous Black Prince, all his chief nobility, and 30,000 men. The memorable battle of Crecy followed, 25 Aug. 1346, succeeded by the siege of Calais. In the meantime, David Bruce, hav¬ ing recovered the throne of Scotland, made an incursion, at the head of a large army, into England; but being met at Durham by a much inferior force, raised by Queen Philippa, and headed by Lord Percy, was totally defeated and taken prisoner, with many of his principal no¬ bles. Philippa went over to her husband at Calais, and, by her interference prevented the barbarous execution of Eustache de Saint Pierre and five other citizens, whom Edward, on the capitulation of the place, had determined to execute, in revenge for his long detention in the siege. In 1348 a truce was concluded with France. The year 1349 was distinguished by the institution of the order of the Garter, which soon became one of the most illustrious orders of knighthood in Europe. Philip, King of France, dying in 1350, was succeeded by his son John, the commencement of whose reign abounded with intestine commotion, and in 1355 Edward again invaded France on the side of Calais, while the Black Prince at the same time led a large army from Gascony. Both these expeditions were attended with much plunder and devastation ; and Edward, being recalled home 'by a Scottish inroad, soon repelled it, and retaliated by carrying fire and sword from Berwick to Edinburgh. During this time the Prince of Wales had penetrated from Guienne to the heart of France, where he was opposed by King John, at the head of an army nearly five times more numerous than that of the Eng¬ lish. The famous battle of Poitiers ensued, in which the French monarch was taken prisoner. Edward held at the same time in captivity the kings of France and Scotland, the most dan¬ gerous of his enemies. John was taken to Eng¬ land and treated with the greatest respect; and David was soon after liberated upon ransom. A truce had been made with France after the battle of Poitiers, at the expiration of which, in 1359, Edward once more passed over to Calais with a large army, but at length con¬ sented to a peace. Besides the stipulation of a large ransom for King John, several prov¬ inces and districts in the southwest of France and neighborhood of Calais were jdelded to Edward, who in turn resigned his title to the crown of

France and duchy of Normandy. Quarrels with his Parliament, the opposition of the Black Prince and personal affairs dissipated the rest of his reign. The successor of John, Charles V, invaded the provinces entrusted to Prince Edward, and Edward had the mortifica¬ tion of witnessing the gradual loss of all his French possessions, except Bordeaux and Bayonne, and of all his conquests except Calais. Consult Longman, ˆLife and Times of Edward IIP (1869) ; Mackinnon, ˆHistory of Edward IIP (1900) ; Vickers, ˆHistory of England, 1272-1485 > (London 1912).

EDWARD IV, king of England : b. Rouen, France, 29 April 1441 ; d. 9 April 1483. His

father, Richard, Duke of York, was grandson of Edward, Earl of Cambridge, and Duke of York, fourth son of Edward III, while the Lan¬ caster branch descended from John of Gaunt, the third son. The York line had intermarried with the female descendants of Lionel, the sec¬ ond son, which gave it the preferable right to the crown. Edward, on the defeat and death of his father at the battle of Wakefield, as¬ sumed his title, and having entered London after his victory over the Lancastrians at Mortimer's Cross in February 1461 was declared king by acclamation. Soon after his accession he had to fight for his crown against an army of 60,000 Lancastrians, assembled in Yorkshire; and the field of Towton confirmed his title by a decisive victory. Although the high-spirited Margaret was enabled by the aid of Louis XI of France again to take the field, the result of the battle of Hexham, in May 1464, obliged her to return to Flanders, and leave her hus¬ band, the imbecile Henry VI, a prisoner in the hands of his enemies. By a marriage with Elizabeth Woodville, widow of Sir John Grey of Groby, a Lancastrian, Edward plunged him¬ self into very serious difficulties, since at the same time he had despatched the Earl of War¬ wick to negotiate a marriage for him with Bona, sister to the Queen of France; so that he at once offended two royal houses and his powˆerful friend Warwick. Aided by France, Warwick, who had contracted his daughter to the Lancastrian Prince Edward, landed with Clarence and some other lords at Dartmouth; and quickly saw himself at the head of 60,000 men, with whom he marched to encounter Ed¬ ward. The king left Warwick in full posses¬ sion of his kingdom, 11 days after he had set his foot in it. Henry's title was again recog¬ nized by Parliament, and Warwick and Clar¬ ence were declared regents of the kingdom. Edward subsequently landed at Ravenspur, in Yorkshire. Here his forces were reinforced by partisans from all quarters, and he was soon enabled to march to London, where he obtained entrance as king, and

the unfortunate Henry again became prisoner. Warwick advanced against him as far as Barnet, where, on 4 April 1471, another great battle was fought, which ended in the death of Warwick, and a decisive victory on the part of Edward. On the same day Queen Margaret and her son landed at Weymouth, and marched into Gloucestershire, where she was met by the victorious Edward, who totally defeated her at Tewkesbury. The story is told that the queen and her son Edward being taken prisoners and brought into the presence of the victor, Edward asked the latter how he dared to invade his dominions. On re¬ ceiving a spirited answer he basely struck the captive prince on the face with his gauntlet — the signal for immediate massacre by the king's brothers and other nobles attendant. Margaret was thrown into the Tower, where Henry VI soon after died, but whether by violence or by disease is uncertain. The latter part of his reign was disturbed by his jealousy of his brother Clarence, whom he put to death, it is said, by drowning in a butt of Malmsey wine. He had ten children, seven of whom survived him. His reign was marked also by commer¬ cial enterprise, notably the introduction of printing and silk manufactures; and by prog-EDWARD V — EDWARD VII

ressˆ in legal methods, especially in the adoption of indirect pleading. Consult Ramsay, < Lan¬ caster and Yorkˆ (2 vols., Oxford 1892) ; Vick¬ ers, < History of England 1272-1485' (London

1912).

EDWARD V, king of England; b. West¬ minster, 2 or 3 Nov. 1470; d. London 1483. He was the eldest son of Edward IV, and was in his 13th year when he succeeded his father in 1483. He fell into the hands of his uncle, the Duke of Gloucester, the regent who caused the young king and his brother to be sent to the Tower, and, it is said, had them smothered by ruffians. Two bodies, answering their descrip¬ tion, were found buried at the foot of the stairs of their apartment in the reign of Charles II and were taken up by that king's order, and deposited in Westminster Abbey.

EDWARD VI, king of England: b. Hamp¬ ton Court, England, 12 Oct. 1537 ; d. Greenwich, 6 July 1553. He was the son of Henry VHI by

Jane Seymour. At his father's death he was only 10 years of age, and as he did not live to attain majority, the public acts of his reign are to be deemed those of his counsellors. His education was entrusted to men of the first character for learning, among whom was Sir John Cheke. He was studious, somewhat re¬ tiring, devout, and showed a decided prefer¬ ence for the reformed doctrines, and antipathy to those of the Roman Catholic Church. Prot¬ estantism made rapid advances in the kingdom. The churches were divested of images, Henry's ˆBloody Statute' was repealed; Crammer and Ridley were ordered to prepare a new service book which was authorized for use in the kingdom. After his father's death his mater¬ nal uncle, the Duke of Somerset, became pro¬ tector. He sent forces against Scotland under Seymour to punish that government for its re¬ fusal to consent to the marriage of Mary Queen of Scots to Edward. The Scots were defeated at Pinkie, 1547. Somerset's administration raised up such powerful enemies, among them John Dudley, Earl of Warwick, that he was brought to the scaffold with the king's consent (1552). After his death, Dudley, who had been created Duke of Northumberland, became all-powerful, and through his influence Ed¬ ward, in a declining state of health, was in¬ duced to set aside the succession of both his sisters, and to settle the crown upon Lady Jane Grey, claiming through his father's youngest sister, the Duchess of Suffolk. Edward's principal benefit to the kingdom was in the res¬ toration of the grammar schools. Consult Innes, ˆEngland under the Tudors' (London

1905).

EDWARD VII (Albert Edward), King of Great Britain and Ireland and Emperor of India: b, Buckingham Palace, 9 Nov. 1841; d. 6 May 1910. He was the eldest son and the sec¬ ond child of Queen Victoria and the prince con¬ sort, Prince Albert of Saxe-Coburg. After re¬ ceiving a careful education under private tutors he studied at the universities of Edinburgh, Oxford, and Cambridge. In the summer of 1860 he visited Canada, where he was enthusi¬ astically received and by special invitation of President Buchanan extended his visit to the United States, where his reception was no less cordial. He was appointed a brevet-colonel in the army in 1858 and three years later was at-VOL. 9 — 45

tached to the Curragh Camp in Ireland. In October 1861 he was made

a bencher of the Middle Temple. In 1862 he was promoted to the rank of general and in the spring of that year he set out on a visit to Egypt, Palestine, Syria and Athens. After the Prince's return from the East he was introduced at the privy council, in 1863 he took his seat in the House of Lords and about the same time formally gave up his right to succeed to the Duchy of Saxe-Coburg-Gotha. On 10 March 1863, at Saint (jeorge's Chapel, Windsor Castle, he was mar¬ ried to the Princess Alexandra, eldest daughter of the King of Denmark. Near the end of 1871 he was attacked by typhoid fever and for a time it seemed as if his death were imminent. In 1875-76 he made a tour in India and was everywhere received with the utmost cordiality and respect. With the Princess he made an extended tour through Ireland in 1885. The establishment of the Imperial Institute as a me¬ morial of the jubilee of Queen Victoria (1887) was mainly due to his suggestion and exertions. In 1893 he sat on the Poor Law Commission. In the diamond jubilee year (1897) he estab¬ lished the Prince of Wales Hospital Fund for the better financial support of the London hos¬ pitals. By the death of his mother on 22 Jan. 1901, he became King of Great Britain and Ire¬ land and Emperor of India and elected to be known as Edward VII.

Elaborate national and international prepara¬ tions for the coronation ceremonies in West¬ minster Abbey were made for 26 June 1902; but owing to sudden illness these had to be post¬ poned and were carried through in a modified form on 9 August.

The new king thus came to the throne in his sixtieth year. He found foreign opinion alien¬ ated by the Boer War and he set himself strenu¬ ously to promote international amity. In some measure at least the growing friendliness be¬ tween his countiy and France and Russia was due to his efforts to promote good will and in his last years he viewed with deep concern the coolness that was springing up with Germany. Owing to his close family kinship with most of the crowned heads in the Old World, French wits styled him the ˆffincle of Europe." Brought up on a ver}'- narrow system of education in which even the perusal of Sir Walter Scott's novels was banned, he never acquired a taste for reading, but possessed uncommon natural powers of observation. Denied intercourse with boys of his own age and disciplined with a spartan severity, it was only natural that when manhood and freedom came he should travel far from the rigid traditions in which he had been reared. The breath of scandal did not leave him unscathed, but his charm of manner, his frankness of disposition and his punctilious discharge of the somewhat formal duties that fell to him as Prince of Wales endeared him to the British public. During the long years of Queen Victoria's widowhood, her

growing isola¬ tion from public life made of her throne a ˆflonely splendor," and the state of tutelage in which she kept the heir-apparent, denying him access to confidential documents, prevented him from developing any aptitude for affairs of state. When he came to the throne he re¬ vived in a very real sense the ceremonial splendors of the monarchy; he was fond of pagentry and the observances associated with

the stately ordering of court functions, and dur¬ ing his brief reign he completely won the hearts of his people and the respect of the civilized world. His last years were clouded by the feud between L.ords and Commons over the rejection by the former of the Budget of 1909 and his unexpected death (6 May 1910), due to heart failure supervening on an attack of bronchitis, evoked a wave of sympathy that was world¬ wide. He had an ideal consort in Queen Alex¬ andra, who performed the duties of her high station with a grace, sympathy and tact that won her a special place in the hearts of the British public. Consult Sir Sidney Lee's con¬ tribution to Vol. I of the second supplement to the H)ictionary of National Biography ˆ (1912) ; also Legge's HCing Edward in His True Coloursˆ (1912). To King Edward and Queen Alexandra were born Albert Victor Christian Edward, Duke of Clarence and Avon¬ dale, b. 8 Jan. 1864; d. 14 Jan. 1892; George Frederick Ernest Albert, who succeeded to the throne, b. 3 June 1865, married 6 July 1893, to the Princess Victoria Mary of Teck; Princess Louise Victoria Alexandra Dagmar, b. 20 Feb. 1867, married 27 July 1889, to the Duke of Fife; Princess Victoria Alexandra Olga Mary, b. 6 July 1868; and Princess Maud Charlotte Mary Victoria, b. 26 Nov. 1869, married 22 July 1896, to Prince Charles of Denmark, now King Haakon VH of Norway.

EDWARD, Prince of Wales, surnamed the Black Prince, English prince: b. Woodstock, 15 June 1330; d. Westminster, 8 June 1376. He was the eldest son of Edward HI and Philippa of Hainault, and at the age of 15 accompanied his father in his invasion of France, and received from him the honor of knighthood. The victory of Crecy, 26 Aug. 1346,

which King Edward left principally to the exertions of the force under his son's command, to use that warlike king's language, ˆshowed that he merited his spurs.® It was on this occasion that he assumed the motto of Ich dien (I serve), used by all succeed¬ ing princes of Wales, and derived, it is said, from the crest of the King of Bohemia, slain in that battle, which tradition, however, later anti¬ quaries seem disposed to discredit. In 1335 he commanded the army which invaded France from Gascony, and the next year fought the great battle of Poitiers, and distinguished him¬ self by the courtesy with which he treated his prisoner. King John. By the Peace of Bretigny his father had obtained the provinces of Poitou, Saintonge, Perigord, Limousin, etc., which he annexed to Guienne and formed into a sover¬ eignty for his son, under the title of the Princi¬ pality of Aquitaine, There the prince took up his residence ; and at his court Pedro the Cruel, the deposed king of Castile, sought refuge, when driven from his throne by his natural brother, Henry of Trastamare. Edward un¬ dertook the re-establishment of this tyrant, which he accomplished. Disappointed by the perfidy of Pedro, of the stipulated reimburse¬ ments, the taxes he was obliged to levy on his new subjects rendered his government unpopu¬ lar; and an appeal was made to the king of France, as his liege lord, who summoned him as his vassal to appear at Paris. ®I will come,® replied the angry prince, ˆdˆut it shall be at the head of 60,000 men.® His health, however, was too far declined to enable him to take the field.

when the king of Fratice invaded his dominions; and having suffered the mortification of seeing his generals defeated, he withdrew into Eng¬ land, and after lingering some time died in his 46th year, leaving an only son, afterward RicTK ard H. He was buried in Canterbury Cathe¬ dral, where portions of his armor are still sus¬ pended above his tomb. Consult Dunn-Patti- son, <The Black Princeˆ (London 1910) ; Vick¬ ers, ˆHistory of England 1272-1485ˆ (ib. 1912).

EDWARD, Thomas, Scottish naturalist : b. Grosport, 1814; d. 27 April 1886. As the ap¬ prentice of a shoemaker he spent the early part of his life in Aberdeen, and in 1837 married and settled in Banff. Here he struggled for 40 years in a ceaseless effort to acquire a close knowledge of natural history, while at the same time he supported his wife and-11 chil¬ dren on wages that never exceeded 15 shillings a week. Apart from his laborious work as a shoemaker he collected, described and exhibited numerous specimens of natural history notably of birds and of Crustacea. In 1866 he was elected an associate of the Linnaean Society of London. A biography of Edward, written by

Samuel Smiles (q.v.), appeared in 1876, ˆLife of a Scotch Naturalist,ˆ and being thus promi¬ nently brought before the public, a pension of i50 a year was conferred upon him by the queen.

EDWARDES, Sir Herbert Benjamin,

British soldier and administrator: b. Frodesley, Shropshire, 1819; d. 1868. He received his edu¬ cation at King's College, London, and entered the Indian army in 1840. He served on the staff of Sir Hugh Gough in the First Sikh War in 1845-46 and in 1847 became first assistant to Sir Henry Lawrence, the British resident at Lahore. In 1848 he suppressed an uprising in Mooltan and for his services received the thanks of Parliament and was brevetted major. He rendered splendid services during the Indian Mutiny of 1857 by securing the neutrality of Afghanistan, thus permitting troops to be with¬ drawn from the northwest border and rushed to the relief of Delhi and Lucknow. Because of failing health he was obliged to decline the gov¬ ernorship of the Punjab, tendered him in 1862, and to return to England. He was promoted a major-general a short time before his death. Banu, Punjab, was renamed in his honor, Edwardesabad.

EDWARDS, Amelia Blandford, English Egx'ˆptologist and novelist : b. London, 1831 ; d. Weston-super-Mare, Somerset, 15 April 1892. Her novels include ˆMy Brother's Wifeˆ (1855) ; 'ˆHand and Gloveˆ (1859) ; ˆHalf a Million of Moneyˆ (1865) ; ˆLord Brackenburyˆ (1880) ; ˆBarbara's History,ˆ and Hn the Days of My Youthˆ (1873). Later she achieved great celebrity through her writings and lectures in Europe and the United States on the antiquities of Egypt ; her best-known works in this field are ˆA Thousand Miles Up the Nileˆ (1877) ; and ˆPharaohs, Fellahs and Explorers' (1891). She also translated Maspero's work on ˆEgyp¬ tian Archaeology,ˆ and was secretary of the Egyptian Exploration Fund.

EDWARDS, Arthur, American clergyman and editor: b. Norwalk, 1834; d. 1901. In 1858 he was graduated at Ohio Wesleyan University and in the same year entered the ministry of

EDWARD VII

r “•

. *

1

F I

’ f ,V -. *

‘:”>f-‘ .

W , ^*1 ^ > |i ||

V^lf

‘*’ ■,’ s ji>i ■ - ^ Jl

y> • . ‘ • . ■> • •:■’ fH

* .

^.Mi’

*>•

fr% ^ ,

pr,

V’

■ * ^ ^

■‘Si iD

I

wr*

^ t

, «

^,*5:

1 1 n? ’I ■*

■ *i’**

»•»”

«

r*

1’.”:,

-vV * ” \

‘V,,.. v:

I’t *^- .-ir* , ‘

* k.j ^ j • •

** ♦r • •• ?i4 ■

P •-• . -‘T , W S % ^

» T • -

M’H ^ *

. >

* r”

4 .* •

i-:*

. V*-

* .’‘

s

the Methodist Church. In the Civil War he served as chaplain of the First Michigan In¬ fantry until after the battle of Gettysburg. In the following year he was made assistant editor of the Northivestern Christian Advocate of Chi¬ cago and from 1872 until his death he was editor. He attended seven general conferences of his Church and the ecumenical Methodist conference at London in 1881, before which he read a paper on ˆThe Status of Methodism in the Western Hemisphere.ˆ In 1876 he was a member of the committee which revised the Church hymnal. He also served as secretary of the Detroit Conference for about 12 years. At the general conference of 1868 he edited the Daily Christian Advocate.

EDWARDS, Bryan, English historian of the West Indies : b. Westbury, Wiltshire, 21 May 1743; d. Southampton, 15 July 1800. On the death of his father he was taken under the care of an uncle in Jamaica, who left him a large fortune. After a successful mercantile career he returned to England, and in 1796 took his seat for the borough of Grampound, which he represented until his death. He is remem¬ bered for his ˆHistory, Civil and Commercial, of the British Colonies in the West Indiesˆ (1793). A new edition of this work (1801) includes a history of San Domingo. He also published ˆProceedings of the Governor and Assembly of Jamaica in regard to the Maroon Negroesˆ (1796).

EDWARDS, Charles Lincoln, American scientist: b. Oquawka, Ill., 8 Dec. 1863. He was graduated at Lombard University in 1884 ; Indiana University, 1886; and the University of Leipzig 1890. He was fellow of biology in Clark University, 1892-93; associate professor of biology in the University of Texas, 1893-94; professor of biology in the University of_ Cin¬ cinnati, 1894-1900; professor of natural history in Trinity College, 1900-10; and associate pro¬ fessor of biology in the University of Southern California, 1911-12; professor of embryology and histology, medical department. University of Southern California, 1912-13; director of nature-study, Los Angeles city schools after 1912. He was president of the American Folk-Lore Society in 1899. He has published < Ba¬ hama Songs and Storiesˆ (1895), and many papers

and monographs on subjects in biology, embryology, folk-lore, *etc.*

EDWARDS, Clarence Ransom, American military officer: b. Cleveland, Ohio, 1 Jan. 1860. He was graduated at West Point in 1883; pro¬ fessor of military science and tactics at Saint John's College. Fordham, 1890-ˆ93; commis¬ sioned first lieutenant, 1891; captain, 1898; lieu¬ tenant-colonel of volunteers,ˆ 1899 ; served on the staff of General Lawton in the Philippines, and was recommended for brevets of major, lieutenant-colonel, and colonel in the regular es¬ tablishment, anˆbrigadier-general of volunteers ; accompanied General Lawton's ˆ body toˆ the United States; chief of the division of insu¬ lar affairs. War Department, 1900-02 ; com¬ missioned colonel, 1 July 1902, and chief of the bureau of insular affairs and director of its publications, until 1912. He became brigadier-general 30 June 1906; transferred to line in 1912, and later commanded the Sixth Brigade, Second Division at Texas City, Tex., and the First Hawaiian Brigade at Honolulu, H. I. In

1915 he was placed in command of the troops in the Panama Canal Zone.

EDWARDS, George Wharton, American artist and author : b. Fairhaven, Conn., 1859. He was educated in Antwerp and Paris, and has received many medals and honors for his work at American and European exhibitions. His watercolors are particularly praiseworthy and his magazine illustration is well known and of a high quality. He has published ˆThumbnail Sketchesˆ (1886) ; 'ˆP'tit Matinic and Other Monotonesˆ (1887) ; ˆThe Rivalries of Long and Short Codiacˆ (1888) ; ˆ Break o' Day, and Other Storiesˆ (1889) ; ˆHolland of Todays (1910); H'i.eading Journey in the Hol¬ low Land, Chautauquaˆ (1910) ; ˆBrittany and the Bretonsˆ (1911) ; ˆMarken and its Peopleˆ (1912) ; ˆSome Old Flemish Townsˆ (1913) ; ˆThe Forest of Ardenˆ (1914) ; he has illus¬ trated Oliver Wendell Holmes' ˆLast Leafˆ (1885) ; Austin Dobson's ˆSun DiaP (1892) ; Spenser's ˆEpithalamionˆ (1895) ; ˆOld English Love-Songsˆ (1896) ; ˆOld English Balladsˆ (1897) ; ˆHans Brinker and the Silver Skatesˆ (1915). He is a member of The American Society Water Color Painters; New York Water Color Club ; The Authors Club, and the Society of Arts. He painted the mural deco¬ ration ˆHenry Hudsonˆ in the West Point Military Academy.

EDWARDS, Harry Stilwell, American journalist and novelist: b. Macon, Ga., 23 April 1855. He was graduated from the law depart¬ ment of Mercer University but in 1881 entered journalism in his

native city. He is well known as a writer of magazine stories most of which relate to life in the South, and of numerous songs and poems. Among his works are ˆTwo Runaways and other Storiesˆ (1889) ; ˆHis Defense and other Storiesˆ ; ˆ Sons and Fathersˆ a novel that won a prize of $10,000 in a world¬ wide contest over 800 manuscripts; and ‘ˆThe Marbeau Cousins.ˆ His lullaby song ˆMammy’s Little Boyˆ and poem ˆThe Vulture,ˆ have a more than national reputation. In 1904 at Chi¬ cago he seconded the nomination of Theodore Roosevelt in a notably eloquent oration. He was referee in Georgia for the seven years of Roosevelt’s administration and seryed as post¬ master at Macon, Ga., for 13 years, to which office he was appointed first by President Mc¬ Kinley. He is a member of the National Insti¬ tute of Arts and Letters.

EDWARDS, Henri Milne-. See Milne-Edwards.

EDWARDS, James Corson, American poet: b. Philadelphia, Pa., 17 July 1802; d. Macon, Ga., April 1861. He moved to Georgia in 1821, and was a poet at one time extensively quoted in the South; author of ˆAn Ode To Musicˆ and much verse preserved chiefly in southern school readers ; also of many cam¬ paign songs in Whig circles.

EDWARDS, James Thomas, American educator: b. Barnegat, N. J., 6 Jan. 1838; d. Randolph, N. Y., 20 Aug. 1914. He was grad¬ uated at Wesleyan University in 1860. He served in the National army in the Civil War, was afterward principal of several schools, and in 1892-93 was field-secretary of the Chautauqua System of Education. He was a senator in the Rhode Island legislature, 1865-69, and a mem-

ber of the New York legislature, 1892-93; was chairman of the committee on education of both bodies, and was the author of the Uni¬ versity bill and Library and Traveling Library bills. He was a trustee and director of the departments of physics and chemistry of the Chautauqua summer schools 1883-93, and was prominently identified with other educational movements. He published ˆThe Grass Familyˆ (1872) ; ˆThe Silva of Chautauqua Lakeˆ (1892); ˆAddresses — Educational, Political, Scientific, Religiousˆ (1896) ; ˆPen and Pic¬ tureˆ (1896) ; ˆRhymes from a Reclining Chairˆ (1902) ; ˆThe Edwards Familyˆ (1903) ; and articles to various periodicals.

EDWARDS, John Passmore, English newspaper proprietor: b. Blackwater, Cornwall, 24 March 1823; d. Hampstead, 22 April 1911. The son of a carpenter, he began life as a pub¬ lisher's clerk, became absorbed in public ques¬ tions, and was a delegate to peace conferences at Brussels, Paris and Frankfort, 1848-50. His early publishing ventures were failures ; but success came to him after he acquired in 1876 the London Echo, the first halfpenny evening journal in London, which he edited with marked ability for 20 years, and kept ®clean® of all doubtful matter and betting news. He represented Salisbury as a Liberal 1880-85, but seceded from Mr. Gladstone on the Home Rule issue, and retired from politics. He showed a wise discrimination as well as generosity in the use of his wealth, and founded upwards of 70 public institutions, including libraries. His au¬ tobiography was privately printed in 1905, under the title ˆA Few Footprints.ˆ

EDWARDS, Jonathan, American theolo¬ gian: b. in South (then East) Windsor, Conn., 5 Oct. 1703; d. Princeton, N. J., 22 March 1758. His father, the Rev. Timothy Edwards, a graduate of Harvard, was parish minister at Windsor for nearly 60 years. His mother, Esther Stoddard, a daughter of the Rev. Solo¬ mon Stoddard, minister in Northampton, Mass., is celebrated for force of character and native vigor of intelligence. There were 10 other children in the family, all girls. Jonathan, the fifth child, was brought up with his sisters in an environment peculiarly adapted to his devel¬ opment. The quiet beauty of the landscape about Windsor and the outward simplicity of the life in the village and the home, where the interests of recognized supremacy were those of the spirit and the mind, exerted congenial influence on a character pre-eminently disposed to reflection and to

the feeling and practical acknowledgment of things invisible. Religion, both in its experimental and in its theoretical aspects, early became his absorbing preoccupa¬ tion. The precocity of his intellectual develop¬ ment is shown in his first essays, a metaphysical tract on the nature of the soul, written when he was 10, and a paper, remarkable for accuracy of observation and acuteness and breadth of reasoning, on the habits of the ˆflying spider,® written sorne two years later. At 13 he entered the Collegiate School at Saybrook, afterward Yale College, from which he graduated at New Haven, with the valedictory in a class of 10, shortly before his 17th birthday (1720). The event of greatest intellectual significance for Edwards, and one which may even be said to mark a turning-point in the history of philoso¬

phy in America, was his reading, in his sopho¬ more year in college, of Locke's ˆ Essay on the Human Understanding.ˆ The book made on him a profound impression. He read it, he tells us, with a pleasure far higher than that of the greediest miser gathering up handfuls of silver and gold from some newly discovered treasure. He began now, or shortly afterward, a series of notes designed as material for an exhaustive treatise on the mind. He also wrote a series of notes with a view to a correspond¬ ing treatise on natural science. These notes, some of which probably belong to the years im¬ mediately following his graduation, though some of the most important almost certainly go back to an earlier date, throw a flood of light on the whole subsequent development of his thinking, as well as on the character and work¬ ings of his mind at the period of their compo¬ sition. The notes on natural science, indeed, valuable as they are as evidence of his genius, express in their main contents only an incident in his thinking. But the psychology and philos¬ ophy of both series of notes, especially the notes on the mind, are intimately connected with his theological interests. Here the influence of Locke is marked, but more striking still the originality of the writer's response to it. Ed¬ wards accepts Locke's empiricism only in part. He makes all our ideas ®begin from® sensation; he recognizes distinctly the fundamental import¬ ance of the mechanism of association and the part played by ˆimages® in the higher intel¬ lectual processes. But he is very far from re¬ garding mind as constituted of passively re¬ ceived impressions and their copies. He em¬ phasizes rather the intellectualistic elements in Locke's doctrine; his tendency is toward Kant rather than toward Hume. The mind is, in his view, essentially active, in pleasure and pain, in sentiment and emotion, as well as in judgment and choice. In its intellectual constructions, moreover, the mind is guided by intuitively cer¬ tain principles (being, cause, finality, etc.) and is ˆ capable, by

reflection, of rising above all things sensible to the contemplation of things spiritual and eternal. Universals are not all of pragmatic origin and merely nominal im¬ port; the most considerable species have their foundation in ®the order of the world.® The most noteworthy metaphysical advance beyond Locke lies in the idealistic theory of matter. The general conception was not new; already in the 18th century, before the earliest of these notes were written, Norris, Collier and Berkeley had propounded similar views. Edwards may have heard of their writings, but it is doubtful if he had read any, and practically certain that he had not then read Berkeley. However sug¬ gested, Jhe doctrine is worked out in a thor¬ oughly independent fashion and the expression of it is wholly original; the true substance of the material universe is declared to be God and its esse not_ percipi, but an ˆinfinitely exact and precise divine idea, together with an answerable, perfectly exact and stable Will, with re¬ spect to correspondent communications to cre¬ ated minds, and effects on their minds,® In a later note in his diary he desires as clear a con¬ ception of the relation to God of finite minds. In one of the notes on the mind, he rejects Locke's notion that personal identity consists in identity of consciousness. The whole trend of his metaphysics pointed to another solution.

With him the fundamental ontological verity is ˆHhat God and Real Existence are the same,® ˆHhat God is® and that ˆˆthere is none else.® Created spirits are ˆˆemanations® or ˆˆcommuni¬ cations® of his Being. What other conception then for him is possible, but that they, too, like material things, consist in God's distinguishing Thought and stable Will?

Edwards seems to have had no occasion to refer in his later writings to the idealistic the¬ ory of matter so pronounced in these notes of his youth. But there is no reason for thinking that he abandoned a view so congruous with his general philosophical position. Other of his most distinctive teachings are here already expressed or indicated. Here, for example, is the doctrine that the will, which is regarded as identical with inclination so far as the latter has lespect to the mind's immediate actions, is al¬ ways determined by motives inherent in the mind's apprehension of the greatest apparent good. Here, too, are the doctrines that ˆ'ex¬ cellency® consists in "the consent of being to being® ; that virtue, or the excellency of minds, consists in "love to being® ; that the type of this excellency is God's mutual love of himself in the eternal process of the Trinity; that God's love to himself "includes in it, or rather is the same as, a love to everything, as they are all communications of himself® ; and that, since God is "universal Being,® true virtue in finite minds consists in love to him. These are the positions elaborated in the treatises on the 'WilP and on the 'Nature of True Virtueˆ and in the recently (1903) published essay on the 'Trinity.ˆ And the most speculative of Edwards' works, the treatise on 'God's End in Creation,ˆ is essentially but an application to a •special problem of the conceptions here ad¬ vanced concerning the nature of God as "uni¬ versal Being® and as "Love,® of finite spirits as "emanations,® "communications® or "creations® in his likeness and of the sensible world as in its order and harmony, a "shadow® of his excellency.

Edwards then remained two years in New Haven studying for the ministry. He then preached for several months to a small Pres¬ byterian church in New York. But he again returned to New Haven,

took his master's de¬ gree, and for two years (1724-26) was tutor in the college. He had declined several invita¬ tions to a settlement in the ministry and seemed definitely committed to the academic career, for which by training and intellectual gifts he was eminently qualified, when the call came to him from the church in Northampton, Mass., to become the colleague of the venerable Solo¬ mon Stoddard, his grandfather. He was in¬ stalled at Northampton, 15 Feb. 1727. A few months later he married Sarah Pierrepont, of New Haven, then 17, of whom four years be¬ fore he had written an admiring description, celebrated as one of the most perfect and charming of its kind in literature.

The moral and religious development of Ed¬ wards up to this period was as remarkable for richness of experience and intensity of spiritual energy as was his intellectual development for originality, acuteness and speculative power. In a "narrative of personal experience,® written for his own use, we have the intimate record of his religious life from its early beginnings, when as a boy he built with other boys a booth in a

swamp for daily prayer and had other places for his own devotions besides, through its de¬ cline and revival — his "conversion,® it has been called, though, as he notes with some misgiving in his diary, he was never converted in the man¬ ner traditionally expected — to its culmination in a state of settled conviction, with great in-wˆard delight in the truth and beauty of the objects of religious faith, including at times marked exaltation of sentiment and something akin to ecstasy. His diary, in which, after the fashion of the time, he watches, with almost morbid intensity, the daily fluctuations of his spiritual state, tells the same story for a part of the period. And in his 70 'Resolutionsˆ we have a most striking expression of the lofty moral purposes of his life and of the ideas which actually governed it. For example : "To live with all my might while I do live® ; "when I think of any theorem in divinity to be solved, immediately to do what I can toward solving it, if circumstances do not hinder® ; "never, henceforward, till I die, to act as if I were any way my own, but entirely and altogether God's® ; "on the supposition that there never was to be but one individual in the world, at any one time, who was properly a complete Christian, in all respects of a right stamp, hav¬ ing Christianity always shining in its true lus¬ tre, and appearing excellent and lovely, from whatever part and under whatever character viewed: resolved, to act just as I would do, if I strove with all my might to be that one, who should live in my time.® It is the

combina¬ tion of this rare emotional susceptibility, this high reverence and moral enthusiasm, this strict, unrelaxing conscientiousness, with ex¬ traordinary subtlety and perspicacity of intellect and an unrivaled capacity for logical analysis and abstract reasoning that gives to Edwards his distinction and is the secret of his power.

On the death of Mr. Stoddard in 1729, Ed¬ wards, then 25, became sole pastor of the church in Northampton, which was reputed the largest and wealthiest in the colony outside of Boston. In 1731 he preached in the "public lecture® in Boston the sermon, "God Glorified in Man's Dependence,® with which he achieved a notable success. The sermon is an eloquent and impressive proclamation of one of the most fundamental articles of his creed, the doctrine of God's "absolute sovereignty® in the work of salvation : it was a prophet's call to the Puri¬ tan churches to return to the old high Calvinistic faith. The counterpart to it is the sermon, published in 1734, on the 'Reality of Spiritual Light, ˆ which proclaims the mystical principle of a supernatural illumination directly imparted and experienced. The emphasis on religious ex¬ perience becomes still more pronounced in the two great revivals with which the fame of Ed¬ wards as a preacher is especially associated. He wrote the story of the earlier revival, that of 1735 in Northampton, in his 'Narrative of Sur¬ prising Conversionsˆ (1736), with confident, even exultant, assurance; the excesses of the "Great Awakening® of 1740-42, more extensive and tumultuous, led him to reflect on the differ¬ ence between a genuine and a false experience ('Distinguishing Marks of a Work of the Spirit of God,ˆ 1741), and then to an apologetic de¬ fense of the movement against the objections of its opponents ('Thoughts on the Revival,ˆ 1742). It was in the height of the excitement

that he preached in Enfield, Conn., his sermon on ˆSinners in the Hands of an Angry Godˆ (1741), the extreme representative of a type not uncommon with him, indeed, yet not the most common nor the most representative even in his revival preaching (consult for example, the sermons ˆJustification by Faith,ˆ etc., 1738). More noteworthy and far more original was the treatise on the ˆReligious Affectionsˆ (1746), in which the distinctively new note in Edwards, the new emphasis on subjective experience, re¬ ceives its fullest systematic expression.

In the reaction which followed the revival, a case of discipline arose in his parish — many of the young people being charged with read¬ ing and circulating immoral books — the unfor¬ tunate management of which caused strong re¬ sentment and permanently undermined his in¬ fluence. This was in 1744. Four years later, on his attempt to set aside the established cus¬ tom — an extension of the old ®Half-way Covenant® of which Mr. Stoddard had been the chief advocate — and require for full com¬ munion a credible profession of godliness, the disaffection became a bitter and determined opposition. The controversy ended finally in his dismissal, 22 June 1750, after a ministry of 23 years, perhaps the most laborious and dis¬ tinguished in the annals of the American churches. His ˆFarewell Sermon,ˆ the greatest of his discourses, is a noble expression of his character and the dignified ˆˆapclogia® of his ministerial life. Early in the following year he removed with his family to Stockbridge, Mass., then a settlement on the frontier, to do the double work of pastor of the village church and missionary to the Indians. It was while thus engaged that he wrote, during the seven years of his residence in Stockbridge, the theo¬ logical treatises and essays which are the solid foundations of his fame. In the autumn of 1757 he accepted, with some misgivings, a call to the presidency of the college in Princeton, N. J., made vacant by the death of his son-in- law, the elder Aaron Burr. He had scarcely entered on the duties of this office when he fell a victim of inoculation for smallpox, 22 March

1758.

The least episodical of thinkers, Edwards wrote no system of

philosophy or body of divin¬ ity. The connected scheme of his ideas has to be gathered from the large proportions of his various writings on special topics, mainly con¬ troversial. The professed aim of the major part of these writings is to defend the dis¬ tinctive doctrines of Calvinism against the ris¬ ing tide of Arminianism in the churches in¬ heriting the Calvinistic tradition. He brought to this task a power of keen and relentless dia¬ lectic that left no loophole of escape to one who accepted his premises and that fairly wearied and overwhelmed the opponent with the multitudinous array of the argument. He brought also, what more contributed to the originality of his thought, the spirit and pro¬ found insights of the speculative philosopher, seeking to ground his theology in metaphysics. Finally, he brought the solid character and the rich religions experience which gave the sys¬ tem for him perpetual practical verification and which certainly, with his moral enthusiasm and vivid imagination, gave it, in his hands, much of its vitality. The central conception about which all his thinking moves is the conception

of the absolute sovereignty of God. Metaphys¬ ically, God is the sole Reality. Neither Par¬ menides in ancient, nor Spinoza in modern, phi¬ losophy, is more emphatic in the assertion of the One Absolute Reality than Edwards. He, however, does not stop here. God, the Abso¬ lute Reality, is with him — it is easy to see that the tradition here blends with his metaphysics — spiritual, personal — tripersonal — and su¬ premely excellent. In his ˆ Essay on the Trin¬ ityˆ (1903) he develops the doctrine that the Father is the Deity in prime subsistence, the Son the Deity subsisting in the act of God's Knowledge of himself and the Holy Ghost the Deity subsisting in the act of God's infinite Love and delight in himself. This Love of God, which is thus his consummating, essen¬ tial Excellency, is primarily the love of corn-placency in the perfection of his Being; but it may be viewed also as benevolent, so far, namely, as it embraces the complete content of the divine Idea in God's Knowledge of him¬ self, and so far as that Idea includes within itself the creative plan of the world and the evolution of its history. Now it is the pro¬ found thought of Edwards' dissertation on the ˆEnd for Which God Created the Worldˆ (written 1755), the most speculatively philosoph¬ ical treatise of the 18th century, that such is, in truth, the fact. God finds in himself a disposi¬ tion to produce an emanation from himself in which to reflect his glory and express outward¬ ly his delight in his own excellency. The final end of creation is, therefore, the manifestation of the divine glory in a perfect spiritual soci¬ ety. In his ˆHistory of Redemption,ˆ Edwards endeavors with, to be sure, very inadequate knowledge and, for us, impossible

dogrnatic as¬ sumptions, but with a genuine philosophical pur¬ pose, to trace the process through which this end is realized in time. The ˆemanation,® or passage into time, of the eternal world-plan, he represents, in his essay on ˆDecrees and Election,ˆ as an act of divine Will, the preser¬ vation of the world being a perpetual and con¬ tinued creation. Beyond this indication of a nexus in the divine Will between the world-plan in idea and in process of realization, Ed¬ wards does not go ; he develops no theory of the metaphysical relation of the temporal and eternal. He is very clear, however, in teach¬ ing that the divine Decree conforms to, indeed is determined by, the divine Wisdom — what must evidently be taken into account in interpreting the many passages in his writings in which he speaks of God's ˆarbitrary® Will and of his ˆˆmere good pleasure.® Edwards' early idealism with respect to matter is in thorough agreement with this doctrine of creation, but is not now in question. His whole concern now is with the divine plan relative to man. The problem of supreme interest here, of course, is the problem of moral evil. No one has depicted the nature, extent and consequences of sin in stronger lan¬ guage than Edwards. Sin is with him literally a guilty disposition inherent since the Fall in man's very constitution, as that even infants, that seem innocent to us, ˆˆare in God's sight young vipers,® so that the whole race merits and, in the absence of ˆspecial® grace, which is bestowed onlv on the definite number of the elect, inevitably tends to horrible and everlast¬ ing destruction. Notwithstanding that all this is held to be included in the creative plan, Ed-EDWARDS

wards nevertheless strongly insists on the sin¬ ner's responsibility. In his treatise on ˆOrig¬ inal Sinˆ (1758), he brushes aside the legal fictions with which that doctrine was com¬ monly invested, and boldly advances to the Augustinian position that the whole race was really present and really participated in Adam's transgression — a notion which involves him in curious and intricate speculations concerning personal identity. The most celebrated of his writings, the treatise on ˆFreedom of the WilP (1754), discusses from other points of view the same general problem of the relation of the creative Decree to the moral life of man. His object in this work was to refute the notion that the will in choosing is so undetermined with re¬ spect to its motives as to be able to initiate acts really contingent and, therefore, incapable of being included in God's determinate

foreknowl¬ edge and decree. He does not deny the fact of choice ; ˆTaculty of choice,® indeed, is his defi¬ nition of will. But he contends that this faculty is always determined in its preferences by the strongest motive, ˆ4s always as the greatest good is.® The connection of such motive and choice is necessary. But the necessity of this connection is quite consistent, in his view, with the liberty to do as one pleases, without hin¬ drance or impediment. He modifies, indeed, the usual Calvinistic doctrine, declaring in one of his letters that man now, even after the Fall, has all the liberty that he ever had. His chief attack is against the notion that will is self-de¬ termined, that is, that it determines itself to will, a notion which, thus stated, leads, as he shows, to the infinite regress. But there is noth¬ ing in his contention to preclude the idea that it is the whole concrete nature of a self which determines the act of choice. His whole argu¬ ment, in fact, is based on the thorough-going application of the law of sufficient reason. Each act of will has its reason, or, as Edwards, sug¬ gesting a naturalistic interpretation not in¬ tended, says, its ˆTause,® from which it follows with ˆlogical® or ®moral® necessity. God's Will even is no exception. Human responsibil¬ ity for sin is not dependent on the way the vo¬ lition is motived, but on th-e evil nature of the disposition. The ultimate ground or reason of all volition is the divine Idea, comprehending the world-plan, within which every finite being has his place and the realization of_ which is the effect of the divine decree. God is thus, in a sense, the author of sin, ˆˆet not so, as in the case of the human will, that his Will is evil, but so that He, being sovereignly good and perfect and creating the world for a supremely good end, permissively decreed the evil foreseen as comprehended in this purpose.

Thus Edwards, absolutist in metaphysics, ever comes back in his theology to the concep¬ tion of God as sovereign Power, Wisdom and Love, whose ˆdecrees,® determining that the world-plan shall be realized, are the foundation of an all-inclusive optimism. Had he devel¬ oped his thought as a pure philosopher, his sys¬ tem would doubtless have assumed a very dif¬ ferent character in details and in some of its main conclusions. As it was, he blended his philosophy with his theology and his theology with his philosophy and both with a conception and interpretation of Scripture that modern criticism regards as untenable. And although the sharp antitheses in which his system abounds

are all reconciled in his thought of God's good¬ ness and eternal decrees, as he lacked the medi¬ ating conceptions with which some

more mod¬ ern doctrines have made us familiar, this recon¬ ciliation is apt to appear to us as one of faith rather than of reason. These defects, how¬ ever, will not blind the sympathetic student of opinion to the essential strength and largeness of his general scheme of thought. His histori¬ cal influence extended mainly in two directions. On the one hand, the speculative and logical power with which he worked cut his funda¬ mental conception made him the chief of a school of theologians in New England — Hop¬ kins, Emmons, the younger Edwards, Dwight, *etc.* — who, with less logical acumen and less speculative ability, sought to carry out his prin¬ ciples and particularly so to formulate the Cal¬ vinistic system as to make it appear better ac¬ cordant with popular notions of the goodness of God and human responsibility. On the other hand, by his doctrine of ^^spiritual light® and by the emphasis he put on conversion and the religious affections, he powerfully furthered the movement which, laying special stress on reli¬ gious experience, tends to discard dogmatic as¬ sumptions altogether and to seek the solution of the religious problem in the consciousness of this experience itself. See Freedom of the Will.

Bibliography. — The best editions of Ed¬ wards are the Worcester (8 vols. 1809, re¬ printed with additions, 4 vols.. New York 1858) ; Dwight, with a memoir (10 vols., 1829-30). Consult also Gardiner, H. N., ^Selected Sermons of Jonathan Edwards^ (New York 1904). E. C. Smyth has edited fragments from Edwards from the manuscripts. The best biographies are contained in Dwight's ^ Memoir^ and in A. V. (j. Allen's '^Jonathan Edwards^ (Boston 1889).

Harry Norman Gardiner, Professor of Philosophy, Smith College.

EDWARDS, Jonathan (the younger), American theologian: b. Northampton, Mass., 26 May 1745; d. Schenectady, N. Y., 1 Aug. 1801. At the age of six years he went with the family of his parents to Stockbridge, where there was but one school, and that comnion to the children of both the Indians and white in¬ habitants, of the latter of whom there were so few that he was in danger of forgetting the English tongue. He so thoroughly learned the language of the Stockbridge Indians, that, as he tells us, all his thoughts ran in their dialect. This knowledge of their language he retained through life. In 1761 he entered the college at Princeton, N. J., at which he was graduated in 1765. After leaving college he studied divinity, and in 1776 was licensed as a preacher of the gospel. In 1769 he was ordained as pastor of the church in White Haven, in the town of New Haven, Conn., where he continued till May 1795. Resigning this charge, mainly on account of difference in doctrinal views be¬ tween

himself and some of his people, he was settled in 1796 as pastor of the church in Cole-brook 1796-99, where, in addition to profes¬ sional duties, his time was devoted to his favorite studies, and to an extensive corre¬ spondence which he had long carried on with learned men both in this country and in Europe. In May 1799 he became president of Union College, Schenectady, which office he

filled at the time of his death. He was the author of a treatise on ˆLiberty and Necessityˆ (1797); and ˆDiscourses on the Atonementˆ (1785), which were published with a memoir by Tryon Edwards (2 vols., Andover 1842).

EDWARDS, Matilda Barbara Betham-.

See Betham-Edwards, Matilda.

EDWARDS, Ninian, American political leader: b. Montgomery County, Md., March 1775; d. Belleville, Ill., 20 July 1833. He was graduated at Dickinson College, moved to the Green River district, Ky., studied law and was admitted to the bar in Kentucky and in Ten¬ nessee. He rose rapidly in his profession, was judge of the General Court of Kentucky, of the Circuit Court and of the Court of Appeals, and chief justice of the State Supreme Court. In 1809 he was appointed governor of the newly organized territory of Illinois, and held that office till Illinois was admitted as a State. During his administration he organized com¬ panies of volunteer rangers and built a line of stockade forts which were of special value in the border wars with the Indians and in the War of 1812. In 1816 he was one of three com¬ missioners appointed to treat with the Indian tribes. In 1818 he was elected to the United States Senate from Illinois and served six years ; and in 1826 he was elected governor of the State, holding that office till 1830. ˆ Con¬ sult Edwards, ˆHistory of Illinois and Life of Ninian Edwardsˆ (1870).

EDWARDS, William, American inventor : b. Elizabeth, N. J., 11 Nov. 1770; d. Brooklyn, N. Y., 1 Dec. 1851. After receiving a common school education he learned the tanning trade and built his own

tannery at Northampton, Mass., but eventually settled in Hunter, Greene County, N. Y. Here he opened a model tan¬ nery, with improvements in manufacturing ap¬ pliances originated by himself. His principal invention was a leather-rolling machine which saved the labor of hammering. H _ invented other machines and utilized water power to such an extent as practically to revolutionize the tanning business in the United States, im¬ prove the quality of shoe leather and cheapen its cost. His ˆ Memoirsˆ were published in Washington (1897).

EDWARDSVILLE, Ill., city, county -seat of Madison County, on the Illinois Terminal, the T., St. L. and K.,C. and the Wabash rail¬ roads, about 70 miles southwest of Springfield and 20 miles northeast of Saint Louis, Mo. It is the centre of a coal mining and agricultural region. The chief industries are the manu¬ facture of tools and hardware. Edwardsville was the former location of the Kickapoo Agency, which was the instrument in accom¬ plishing the transfer of a large part of the present central United States from the Indians. Pop. (1920) 5,336.

EDWIN, king of Northumbria: b. about 585 ; d. 633. He was the son of Ella, who seems to have ruled that kingdom from 559 to 589. Being an infant at his father's death the crown was seized by Ethelfrith of Bernicla. The young prince was sent for protection to the court of Redwald, king of East Anglia, by whose aid he was eventually put upon the throne (617). He organized the kingdom of Northumbria and greatly extended his do¬

minions, until they reached Edinburgh on the north. He married Ethelburga, daughter of Ethelbert of Kent, and by her influence and that of Paulinus, a Roman missionary whom she had brought from her father's court, was led to embrace Christianity and make it the religion of his people. He was baptized in 627 at York, where he built the first church of wood. The Mercians, under Penda, revolted against the supremacy claimed by the Northumbrians, and the war which ensued was closed by a battle at Heathfield or Hatfield in Yorkshire, in which Edwin was defeated and slain. Consult Green, ˆThe Making of Englandˆ (London and New York 1881).

EDWIN DROOD. See Mystery of Edwin Drood.

EDWY, or EADWIG, king of England: b. about 938; d. 958. He was the son of Edmund I and succeeded his uncle Edred in 955. Taking part

with the secular clergy against the monks he incurred the confirmed enmity of the latter. Having called Dunstan to account for his share in the administra¬ tion in the preceding reign the latter refused to attend the summons and was, in consequence, banished. His party was, however, so strong that a rebellion was excited and Edwy driven from the throne to make way for his brother Edgar. Consult Oman, ˆEngland Before the Norman Conquestˆ (London 1910).

EECKHOUT, ek'howt, 9r ECKHOUT, Gerbrand van den, Dutch painter : b. Amster¬ dam, 19 Aug. 1621; d. there, 22 July 1674. He was one of the pupils of Rembrandt and in some measure successful in imitating his man¬ ner, especially in the early part of his life. He excelled chiefly in painting portraits and these as well as his historical pictures abound in the best collections of Holland, while several of them are to be found in Germany. Among his most representative portraits are ˆA Man and a Woman in Blackˆ (Darmstadt Gallery) ; and the portraits of Dapper, the historian (Frankfort), and Jan de Witt (Grenoble Mu¬ seum). Of his religious subjects may be men¬ tioned ˆThe Presentation in the Templeˆ (Dresden Gallery) ; Uˆcob's Dreamˆ (ib.) ; and ˆThe Raising of Jairus' Daughterˆ (Ber¬ lin Museum).

EECL'OO, a-kl5ˆ Belgium, town in prov¬ ince of East Flanders, 11 miles northwest from Ghent, near the Lieve. The manufactures are chiefly woolens, cottons, lace, hats, tobacco, chocolate, soap and starch ; and it has breweries, distilleries, salt-refineries, dye-works and oil-mills, and an active trade in grain, linen, cattle and timber. Pop. 13,536.

EEDEN, a'den, Frederik van, Dutch au¬ thor : b. Haarlem, 1860. He w'as educated at the University of Amsterdam and settled as a practising physician at Biisum. His first work, <De kleine Johannes > (1887; 6th ed., 1900), was a very popular story of animal life. Other im¬ portant works from his pen are the poems Uohannes Viator> (1892); <Ellen> (1891); ˆDe passieloose Lelieˆ (1901); ˆEnkele Verzen' (1898) ; Wan de Koele meren des doodsˆ a novel (1900) ; and the dramas Wsbrandˆ (1910) and Wiobaˆ (1912).

EEKHOUD, ek'howt, Georges, Belgian novelist and poet : b. Antwerp, 27 May 1854. He

first published two volumes of poetry, ˆMyrtes et cypresˆ (1876) and ˆLes pittoresquesˆ (1877); then became a newspaper literary critic in Brussels and wrote several short stories. His first noteworthy novel, ˆLes milices de Saint-Frangoisˆ (1886), is a masterly por¬ trayal of Flemish peasant life, especially its naive mystic religiousness. His masterpiece, ˆLa nouvelle Carthageˆ (1888), paints Antwerp life in its naked actuality. Still other works of his are ˆLes fusilles de Malinesˆ (1890), a story of the peasants' uprising against the French in 1798, and ˆLa faneuse d'amourˆ (1900), and ˆL' Autre vueˆ (1905). In poetry he has de¬ veloped from romanticism to pronounced realism.

EEL, the general name given to a variety of teleostomous fishes of diverse structure and resembling one another chiefly in their elongated form, soft rayed fins and the tendency for the paired fins to become reduced in size. Although their seclusive habits render the eel-like fishes liable to be overlooked, and it is evident that many remain undiscovered, the number and diversity of those already known are very con¬ siderable. Ichthyologists have arranged them in numerous families and several orders, which Prof. E. D. Cope regarded as forming a series degenerate in respect to the gradual loss of the paired fins and certain ossifications of the skull, and in the simplification of the gill arches. Ac¬ cording to the classification of Jordan and Evermann, most of the eels fall within the order Apodes, the others chiefly within the Plecto-spondyli Symbranchia and Carenchelyi. The common eel or fresh-water eel (Anguilla chryspa) belongs to the first order and the fam¬ ily Anguillidae. It is doubtfully distinct from the European fresh-water eel (Anguilla an-guilla). Both species are characterized — in addition to the serpent-like elongated body, the absence of ventral fins and the continuity of the dorsal and anal fins round the extremity of the tail — by the wide interval between the dorsal fin and the head, the projecting lower jaw, well-developed pectoral fins, well-ossified jaws and gill covers and nearly perfect gill arches. Con¬ trary to the common belief, eels are not scaleless but numerous small scales are embedded in the skin. The life history of the eel is very remarkable and in some respects unique. Dur¬ ing the spring and early summer multitudes of young eels several inches long migrate up the rivers from the sea and distribute themselves throughout every accessible body of water, whatever its size or character, frequently travel¬ ing overland to reach these. Here they remain concealed in the mud or beneath stones and feed on all kinds of animal matter, living and dead, in the pursuit of which they are

relentless. Many eels appear never to leave the fresh waters in which they have developed, but most of them after several years return to the sea and enter comparatively deep waters, where sexual maturity and spawning takes place. From the egg a peculiar, compressed, transpar¬ ent, pelagic larva (Leptocephalus brevirostris) is produced, which in due time generally meta¬ morphoses into the young eel which in turn leaves the sea. Some individuals, however, ap¬ pear to remain permanently in salt as others do in fresh water.

Both in America and in Europe eels are an important and very excellent food fish, and great

quantities are caught in a variety of ways. In the United States use is made of hand and set lines, eel-spears, eel-pots and weirs. The last is the most efficacious method, but owing to its serious destructiveness of shad and other fishes its use is frequently prohibited by law. A V-shaped fence or net is arranged across the stream with a basket placed in a small opening at the apex, into which the eels are guided by the leads and from which they are unable to extricate themselves. In England river eels are caught in great numbers by means of eelbucks, or eel-pots, traps consisting of a kind of basket with a funnel-shaped entrance composed of wil¬ low rods converging toward a point, so that the eels can easily force their way in but cannot return. A stocking or tube of coarse cloth hanging from an aperture of a box down into the interior is also used. A kind of trident, called an eel-spear, is used also for taking them. A fisherman wades to the shallows, and, strik¬ ing his spear in the mud in every direction around him, the eels reposing on the bottom are caught behind the prongs. Except a few other species of the same genus as the common eel, all eels are strictly marine and are especially numerous in tropical seas where, in the inter¬ stices of coral reefs, as also in the deep sea, some very remarkable kinds occur. For an ac¬ count of the species consult Jordan and Davis, ˆReport United States Fish Commission for 1888ˆ ; Jordan and Evermann, ˆBulletin United States National Museum, No. 47, Part I,ˆ and Goode and Bean, ˆOceanic Icthyology.ˆ See also articles Conger Eel; Electric Eel; Snipe Eel; Morays ; Pelican Fish; Snake Eel, *etc.*

EEL-GRASS, or GRASS-WRACK, a

common name for a marine plant, Zostera marina, of the pondweed family (N aiadacece) . The leaves are narrow and ribbon-like, blunt at the end, sometimes six feet in length. The flowers are crowded in a

spadix. It is found in bays or streams along the Atlantic coast from Greenland to Florida, and on the Pacific from Alaska to California, also on the shores of Europe and Asia. The genus Zostera (from the (jreek, referring to the ribbon-like leaves), comprises six species, of which two besides the eel-grass are found in America. They are all marine plants, and are found on the coasts in the north temperate zone.

EEL-POUT, the name of various fishes. It is applied in the United States to the burbot or ling of the Great Lakes and to the mutton-fish ; in Great Britain to the burbot and in northern Africa to the electric catfish (Malap-terurus) .

EELWORM, or VINEGAR EEL (An-guillula aceti), a small Nematoda worm of the family Anguillulid<F, often found in immense numbers in good cider vinegar or in sour paste, where it feeds on the mucilage and organic fluids. It is just visible to the naked eye and wriggles very actively. Like many related species it is very resistant to dessication and other influences ordinarily destructive to animal life. A vast number of similar species live in the earth and feed on decaying organic matter, others are parasitic on plants, in which they are at least the partial causes of certain very serious diseases; thus Tylcnchus devastatrix causes the ˆclover disease^^ and Heterodera schachtii the still more destructive ^^beet sickness,® which

sometimes devastates the sugar beet crop of Ger¬ many. Consult Neal, ˆUnited States Department of Agriculture, Bulletin 20 > (Washington 1889).

EFFENDI, a title of respect among the Turks, bestowed on civil officials and on edu¬ cated persons generally, in contradistinction to the military title of aga. It is nearly equivalent to Mr., Sir, or the French Monsieur, but is suf¬ fixed to the personal name. It is often attached to official titles.

EFFICIENCY. See Internal Combustion Engine.

EFFICIENCY, Mechanical. See Loco¬ motive.

EFFICIENCY ENGINEERING. Effi¬ ciency, a word comparatively modern in use, for which there is no equivalent word in French, Italian, Russian, Swedish, German, can be defined as the industrial relation be¬ tween what is and what ought to be, between the actual and the standard. To find time efficiency divide the standard time by the actual time. The standard time for a trotting record is 2 minutes. If the actual time is 2 minutes 30 seconds, the efficiency is 80 per cent. To find output efficiency, divide the actual by the standard. If for an hour the walking standard for a man is four miles and the actual per¬ formance is five miles, the man's walking efficiency is 125 per cent. Another definition of efficiency is to do the standard performance in the standard time, at the standard place, for the standard cost.

To an almost incredible degree railroads operate to efficiency standards. The time table sets up thousands of time standards for standard performances at standard costs, reaching particular places with standard equip¬ ment. Efficiency standards can be applied to all the seven great divisions of human activity, which are : Production commanding a price ; manufacture taking a profit ; transportatioai exacting a toll, rate or tariff ; storage, for which rent is charged ; exchange, earning a commission; personal service, exacting a fee; parasitism, which steals or robs.

Efficiency engineering belongs in the per¬ sonal service group. There is a subclass in this group, the ethical class, whose service con¬ sists in lessening the wastes in the use of the already appropriated resources of the universe, in order that humanity may be better. The prophets and priests, by inculcating morality, have tried to lessen the wastes due to wicked¬ ness and sin. The physicians and surgeons have tried to lessen the wastes due to sickness, disease, early decay and death, bodily defects. The scholars, students, teachers have tried to lessen the wastes due to ignorance. The effi¬ ciency engineers have tried to lessen the wastes due to unscientific control and direction of the great divisions of activity in their three elements of materials, personnel and equipment. Everybody realizes the immense wastes due to wickedness. They are exemplified in the great war brought about by recent diplomacy, by violations of treaties, by ambitious and un¬ scrupulous men, by disregard of what we had come to believe were accepted principles of humanity, of religion, of civilization. Every¬ body realizes the immense wastes due to disease which again and again has almost depopulated the world, which to-day makes infant mortality

a greater dra’n on human life than the casual¬ ties of the battcrfields and of the seas. Every¬ body realizes that an illiterate and unschooled population produces little wealth. Before the World War, the daily preventable losses in the United States, due to industrial inefficiency, amounted to not less than $40,000,000. In a manufacturing plant the difference in produc¬ tive value between two men, one of 50 per cent efficiency and the other of 120 per cent efficiency, quite usual variations, may amount to $4,000 a year, even if each is using similar equipment.

Modern efficiency is much lower than that of former ages. By this is meant that although modern man has much more at his disposal than his ancestors, he nevertheless uses his greater resources far more wastefully. The Chinese coolie delivers a maximum all the time. The cause of modern inefficiency is the operation of the law of dependent sequences. Many modern operations are in dependent sequence. In printing with one color 10 per cent of the sheets may be spoiled. Add another color and in the second run we have another loss of 10 per cent. If there are four printings the efficiency falls to 90 x 90 x 90 x 90 equals 65.61 per cent. If there were eight colors the end result would be only 40 sheets. Ninety per cent is a very high efficiency yet in repeti¬ tion it sinks. The remedy is possible also through dependent sequence. Improve each step 5 per cent and for four operations of 95 per cent in sequence we have the end result of 81.45 instead of 65.61. Increase the sequences to eight of 95 per cent and the end result is 66.34 instead of 43. A gain in efficiency of 5 per cent gives an end gain of more than 50 per cent.

It is the function of efficiency engineering to eliminate or at least lessen industrial losses, especially those due to dependent sequence. Efficiency engineering, the accomplishing of results with less materials, less human effort, less equipment, is very old. Jethro, a rank outsider, gave M,oses excellent efficiency coun¬ sel : ®Thou shalt teach them ordinances and laws, and shalt show them the way wherein they must walk and the work they must do. So Moses harkened to the voice of his father-in-law and did all that he had said.^^ Christ constantly both by precept and example showed how to accomplish much with a minimum of effort. Hideyoshi, the great Japanese reformer of the 16th century, originated and put into practice many efficiency engineering methods, reducing the castle fuel cost to one-third; building a wall in three days instead of three weeks, although he abolished overtime and paid a bonus; conquering a strong castle single-handed, although his lord had lost 5,000 men in a previous futile attempt.

Efficiency engineering began to emerge as a distinct branch of science when the doctrines of the correlation of forces and conservation of energy were accepted. It acquired solid footing when Joules experimentally and Meyer deductively established that 774 foot pounds could be converted into a rise of temperature of one degree Fahrenheit in a pound of water, or, vice-versa, that this amount of heat would raise 774 pounds one foot. Yet when either of these feats v/as attempted experimentally, there was great loss. It became the duty of

the efficiency engineer to discover the losses, then to minimize them. The standard had been established, accepted. This was the aim or ideal. The next step was to examine and set forth the actual conditions, so different from the standard. The next step, the peculiar function of efficiency engineering, was so to better actuality, so continuously and intel¬ ligently to remove the friction and other losses, as to force the actual gradually to approximate the ideal. The standard was there. It could be realized to the extent of 30 per cent, 60 per cent, perhaps 99 per cent, an efficiency of 30, of 60, of 99 per cent could be attained.

There are a definite number of heat units in a pound of coal, but how much energy is there in a man? A horse power is convention¬ ally stated as 33,000 foot pounds a minute. The weight of the horse, an all-important item, is not given. Let us assume it as 1,200 pounds. The potential energy of all animals is in pro¬ portion to the daily calories eaten and this again is often proportional to the weight. A man weighing 120 pounds is capable of deliver¬ ing 3,300 foot pounds a minute or one-tenth of a horse power. Can a man climb a moun¬ tain 5,000 feet high in three hours? He can. Could he do more? By studying heart beats, respiration, muscle fatigue, it was ascertained that without undue strain a man could for any period up to 12 hours do about one-half of the maximum ‘attained for the same period. The reasons for short hours are not that the man will wear out from overstrain or fatigue, but to give him time for other than working interests. There are outputs of energy so severe that they can be endured but a few seconds a day, as running 100 yards in 10 seconds. There are other occupations so quiescent, as that of a watchman at a gate, that even 16 hours a day would not exhaust nor brutalize. It is one of the chief functions of the efficiency engineer to set physiological and physical standards, also with due con¬ sideration of the psychological. A man can do more when he is interested, when he is stimu¬ lated, when he is well, when he is skilled, when he works in form.

The efficiency engineer is the opposite of the accountant. The

accountant is concerned with authority, with allotment of charges and credits and with accuracy. No one can open an account in a bank until authority has been granted. The deposits must be most carefully credited to the right account and similarly all checks must be charged to the right account. Finally by long tradition and correct practice both deposits and withdrawals must be most accurately summed up. The accountant is much concerned when the two sides of his statement do not balance to a cent. The effi¬ ciency engineer is very little concerned with either authority, allotment or accuracy. _ He wants to know the aim. It may be to obtain a horse power from one pound of coal, an aim much below what is theoretically possible. In establishing this aim he uses not theory but common sense. The aim may have been already attained, sometime, somewhere. It may al¬ most have been attained under conditions that could be bettered. He next_ wants to know the actual state of the art which may be using five pounds of coal. The actuality is subjected

in its every step to close and intelligent investi¬ gation. All along the line from coal in mine to ash pile and escaping smoke, through all the dependent sequences of faulty equipment, transportation, furnace, boilers, piping, engine, transmission members, there are a series of little wastes. By patient elimination or at least improvement of the successive steps wastes are cut down to such an extent that the aim is realized. The first question should, however, always be — Is the aim worth while? Should power be produced? The Eskimo who floated up the estuary on the incoming tide, who crossed by means of a sail and who came down on the ebb utilized in succession moon, sun and earth as his motive powers and neither of his prime movers could be improved in efficiency. The white man, too impatient to wait for tide and wind, uses coal, utilizes at best only one-fifth of its power.

The efficiency engineer regards all results as made up of material contributions, personal contributions and equipment contributions. These three different elements are subject to very different laws and cannot be treated in the same manner. Materials require storage and careful use. Equipment requires storage, careful use, and in addition continuous, high-grade maintenance. Personnel requires housing, direction, high-grade maintenance, but in addition a far-reaching psychological con¬ trol. Everyone owning a motor car knows that the fuel, the car and the chauffeur are differ¬ ent problems.

In the subclass United States railroads of the larger division of transportation, the rela¬ tion of materials, personnel and equipment

charges are 3 :5 :7. In the packing industry materials (cattle, hogs) are overwhelmingly important, personnel comes next and equipment last. Because of these differences railroads turn over their capital once in five years, have to operate at low ratio, 60 per cent to 75 per cent, and are lucky to pay 5 per cent or 6 per cent dividends, while the big packing in¬ dustry turns over its capital five to six times a year, operates on a margin between cost and sales of 2 per cent or 3 per cent and can pay 20 per cent dividends. In these combinations of material, personnel, equipment, any one or more may be high in efficiency, any one or more may be low. A first class man may be running a very poor machine or vice-versa. To a good furnace poor coal may be fed or good coal may be fed under a poor boiler. But the combination to be controlled and regulated is not only of materials, personnel and equip¬ ment, it is as to each a further combination of quantity and quality, each with its own efficiencies. This leads to the universal formula for production, a formula that equally applies to all the battling hosts of Europe, or to the operations of all the railroads or to the making of a pin.

UNIVERSAL formula

Costs = = Materials + Man Costs + Equipment Charges Costs = QP + TW + tR Materials = QP in which Q is quantity of units and P is price per unit.

Personnel = TW in which T is total hours of work of all men for the period and W is average rate of wages per hour.

Equipment = IR in which t is hours each day and R is rate per hour for all equipment for the period.

When the efficiency engineer has thus stated

his problem he attempts to bring about that combination of Q and P, of T and IV, of t and R which will make the cost of each group a minimum. What combination of materials, of personnel, of equipment is under the cir¬ cumstances most rational? Shall it be little equipment and many men or shall it be much equipment and few men? The sand along the Suez Canal was removed in part by young women, digging with their bare hands, carry¬ ing the load in baskets on their heads and dumping it on the bank. At Panama immense steam dredges were used, scraping 10-ton loads at a stroke, yet the cubic yard of exca¬ vation may have cost more at Panama than at Suez. Which was the better method? The cheapest transportation the world has perhaps ever known was of ivory, hides, etc., from the interior of Africa to the sea coast. But it was one-way traffic. The means of transport, slaves, bought for a few dollars in the interior, were worth hundreds of dollars each at the coast. In this case in the universal equation PQ, materials is very small, tR, equipment, is less, TIV, wages is negative, since the sale of the slave brought a revenue. But after the questions of relative proportion of materials, of personnel and of equipment have been set¬ tled the next problem is to determine whether large quantity and low quality is better than small quantity and high quality. Is it cheaper to build a bridge out of cast iron blocks at $20 a ton or out of piano wire at $200 a ton? Efficiency engineering is immediately concerned with industrial wastes not with moral wastes. It may be a great moral shortcoming to use up frivolously the coal, the natural gas and the crude oil of the world but from the point of view of the efficiency engineer the Diesel engine in a submarine may be efficient and a burden bearing Bhudda be inefficient. Is it cheaper to walk 500 miles barefoot in 25 days or to go through in a night on a fast train ? If wages are $0.10 a day and meals cost nothing it would be cheaper for some men to walk, as the tramps do. With board and lodging at $0.25 a day and wages at 0.40. a day it is cheaper to ride.

Usually economy is secured by increasing the quality iterns, price, wage rate, equipment rate, thus reducing the quantity items of weight and of time. The best result is when the value produced is a maximum with QP, T, and tR very small, but IV very large. An infinitely bad result is when QP, TV/ and tR are a maximum, millions of costly shells, millions of hours of time daily with low wages, 24 hours a day of almost infinitely costly equipment, all to produce unmeasured* and

unmeasurable de¬ struction. There are different summarized efficiencies for each of the six factors Q, P, T, IV, t, R. There are different efficiencies for each separate part of each. Each of a thou¬ sand men in a plant will have a different average efficiency and each man will have a different efficiency for each different item of work. To check all these million possibilities of wastes and leaks becomes as necessary as to have every joint tight in a 100-mile pipe line, to have every rail in a 1,000-mile road, sound and in line, or to have every item right in the deposits and withdrawals from a bank, or to have every word, every letter, in a book proofread.

Nevertheless it has been found efficient to attack inefficiencies under group headings rather than individually on the same principle that it is better to prevent any yellow fever mosquitoes rather than to kill those that fly around. The systematic application of a few principles, some ethical, some practical, brings about general improvement: (1) What is the main ideal ? Stick closely to it. Eliminate clashes and interferences. Fast trains are run on the principle of the free and unobstructed track. (2) Is common sense being used? Mostly it is absent, as in the adoption of a cost plus profit plan by the United States gov¬ ernment, for its war orders. (3) Has the best advice been sought, been considered and been followed? (4) Is there the strict discipline, the spirit, that makes the difference between army and mob? (5) Is the fair deal practised toward all? (6) Is there a direct and tangible connection between individual excellence of per¬ formance and individual pay? (7) Are all operations minutely planned in advance? (8) Are they carefully and scientifically scheduled as to time and cost? (9) Are all operations dispatched, i.e., put through in accordance with plan and schedule? (10) Are all conditions standarized? (11) Are all operations standard¬ ized? (12) Are there permanent written stand¬ ard practice instructions? (13) Are there rec¬ ords, necessary, reliable, immediate, adequate, convenient? It is the method of group attack that has proved important rather than the particular principles for which others might be substituted.

An able teacher has enunciated the three principles of picking the right man, giving him power, letting him alone. This is excellent but it leaves us without means of analyzing re¬ sults. Not so many years ago, some black¬ smiths pretended to be able to smell the quality of iron and to judge of the heat by the color. To-day steel quality depends on alloy and heat treatment. We still depend on the good man but we check him and perpetuate his excellence by analysis and pyrometers, and for efficiency work a few principles are very useful.

In considering the human element in production it is important to encourage every man to make the most of himself, whatever the conditions. There are noble chiefs in Indian villages. It is not less important to so establish conditions that each man whether inferior, average or superior can accomplish most. The wise In¬ dian chief had he been in different surround¬ ings might have been a Lincoln, a Lloyd-George.

A diagram often used by teachers of effi¬ ciency consists of a series of rectangles illus¬ trating by their height the excellence of con¬ ditions and by dots above the base the achieve¬ ment of the individual.

Very Bad Conditions and an Averaged Group of Men.

Average Attainment 10 Per Cent.

EFFICENCY

SCALE

Each individual starts along the life line AD at A. Some get no farther than 1, others

progress as far as 2, still others press on to higher positions until the best man of all, a superman (9) makes D. The position on the line AD is determined by the characteristics of the individual, by heredity, is the same kind of difference as exists between the eagle and the rooster, in the egg scarcely distinguishable. If all the 9 men that entered at A were of the quality of number 9, they would all ultimately bunch about D.

Very Bad Conditions and a Group of Supermen. Aver¬ age Attainment, 20 Per Cent.

C D

EFFICENCY

r

%

I

»

\

\

1

!

SCALE

- 10

L 0

‘

A B

Under the same conditions the superior group of very unusual men will average twice as well as an average group of unselected men.

Best Possible Conditions and the Effect on an Averaged

Group of Men.

inPROVMENTS IN CONDITIONS

This diagram illustrates that owing to im¬ proved conditions each man will have risen perpendicularly so that the average efficiency

EFFICENCY SCALE

INDIVIDUAL IMPflOVEMENT

- w

Best Conditions and a Group of Supermen. Super¬ men Under Best Conditions.

EFFICENCY

SCALE

-90

/

/

-80

/

✓

✓

✓

-70

✓

-60

✓

✓

- 50

y

y

y

y

-40

y

y

y

- 30

/

/

/

- 20

/

/

/

/

-10

/

/

/

is now 50 per cent instead of 10 per cent. Under these bettered conditions it is no harder for man 9 to reach 100 per cent absolute than it was under bad conditions to reach 20 per cent absolute. Under both conditions this man is doing twice as much as a normal standard (half of the best record) and any unusual per¬ formance is not a matter for expectation or of requirement but of free will. Men ought not to be permitted to be slackers and we can con¬

sider all workers below the average of their class and group as slackers and near-slackers. Neither has the community any right to de¬ mand a performance above the average. In war when extra-hazardous work impends vol-iinteers are called for. Similarily in industrial life, it is a matter for the individual to decide whether he will be 20, 50, 100 per cent better than the average. The obligation of

the com¬ munity not to discourage, hinder and prevent super performance is even greater than to pre¬ vent slacking. The world owes its advances and the progress of civilization to the super¬ man, to the Columbus, the Newton.

It is of course possible to collect a group built of superworkers, as in a league base ball team, or in the best college foot ball teams, or in an orchestra, or in a circus, where every living performer is a star. Such groups will always be abnormal, but the superman of one age may be the average man of a better age. The performance of supermen under best conditions is about 10 times as productive as that of the average man under bad conditions.

It is as distinctly the province of efficiency to discover and state best industrial methods as is it the province of moralists to discover and attain universally highest morality, the prov¬ ince of educators to outline and attain uni¬ versally highest knowledge, the province of health specialists to outline and attain for us all highest physical soundness. Efficiency is nof a new phenomena, it has, however, only re¬ cently been clearly recognized and studied. Some of the best examples of efficiency prac¬ tice have been outside of industrial lines. An orchestra is one of the best instances of effi¬ ciency organization and efficiency attainment. The leader is a trained and experienced special¬ ist of great and unusual aptitude. Every worker is a superman, of special aptitude, train¬ ing and experience. He is equipped with mar¬ velously perfect tools or instruments. The work is also planned in advance, with written standard practice instructions, scheduling it most minutely not only as to time but as to quality. The work is dispatched and executed to the fraction of a second. No man plays in¬ dependently but all are exactly adjusted to each other, yet the players like it and thrive under it and the best are abundantly rewarded. But orchestras are very old.

A more modern example is that of the trot¬ ting horse. The trotting horse men, who may not know what the word efficiency means, have nevertheless elaborated the very best plans for attaining it: (1) They began with heredity, counting more on blood and descent as a foundation than on anything else; (2) the dam of the colt and the colt itself are given the best of environment; (3) the training begins early and is continuons ; (4) actual

experience and tests follow; (5) there is the most skilled leadership.

So much for the physiological and psycho¬ logical problems. Lastly, conditions are stand¬ ardized to the utmost. Harness in all its parts,

sulky in all its parts, shoes, track (shape, bank¬ ing and surface). Operations are then stand¬ ardized. The stop watch was first usedˆ on trotting horses. Race horse men were familiar with fifths of seconds and their valueˆ long be¬ fore time studies were thought of in industrial shops. The first photographic motion studies

ever made were by Muybridge of trotting horses. Since the record of 2.40 of Flora Temple about 1840, the improvement has been steady to the present record of 1.58. Probably one-half of this is due to improved heredity, the other half to improved environment, train¬ ing, education and accessories. As a conse¬ quence the performance of the trotter is the performance of the superhorse under best of conditions. The best trotting horse can travel at the rate of a mile in two minutes. Under the usual conditions of trail a horse or mule does well to travel a mile in 20 minutes.

The need of consistent application of mod¬ ern research methods to the problems of eco¬ nomic production and consistent improvement of basic units whether materials, personnel or equipment, have attained growing importance during the last 50 years.

Mr. Taylor thus outlines Functional Type of Organization. ^^Throughout the whole field of management the military type of organiza¬ tion should be abandoned and the functional type instituted. Functional Management con¬ sists in so dividing the work of management that each man, from the assistant superintend¬ ent down, shall have as few functions as pos¬ sible to perform. The most marked character¬ istic of functional management lies in the fact that each workman secures his daily orders and help directly from eight different bosses. Four of these are in the planning room. Four others are in the shop. The four shop bosses are gang boss, speed boss, inspector, repair boss. The four planning room bosses are order of work clerk, instruction card man, time and cost clerk, shop disciplinarian.®

In machine shop practice F. W. Taylor made epochmaking demonstrations of the gains to be realized from improvements in belt¬ ing, improvements in the girt of cutting metals, which virtually scrapped all the machine shop equipments of the world, and improvements of shop management. Taylor expanded from a shop man into a world teacher. It is not with¬ out importance that Taylor had had the bene¬ fit of French school training, the passion for the new, the logic and precisive. About the same time, 1900, as Taylor was breaking from the shop into world prominence, other men with the widest of world experiences were de¬ scending into the shop, carrying into it world ideals of principles, of organization, of admin¬

istration, of selection. Taylor rejected the old military line that had existed in shops, presi¬ dent, manager, superintendent, foreman, gang boss and substituted what he called functional management. He points out that whereas it. would be very difficult and expensive to secure any single man with all the nine qualities re¬ quired in a foreman, it is easier and cheaper to find a few men, each with some of the qualities, so that four men may cover and to spare the nine functions which in his work on shop man¬ agement Taylor defines. . The Emerson school developed the practical application, to modern industry, of natural organization as it occurs in the animal and plant life. Natural animal organization falls into four parts: (1) The fundamental organs of growth and upkeep, working continuously at low intensity and al¬ most automatically; (2) the counsellors, or the sense organs which look ahead and note both the exceptional and the infinitely minute; (3)

the central brain, which constantly counsels, correlates and directs; (4) the doers, creators, whose law of action is directed spasmodic in¬ tensity. Natural plant organization covers time and relations. A plant rooted to one bleak spot survives 3,000 years with 3,000 generations of leaves. The humble plants render service to in¬ sect and animal that in turn greater service may be rendered them. These facts are a source of inspiration and information only beginning to be recognized and utilized. The natural types of organization embody the principles of both functional and staff and line organization. The brain and the hands are in the line. The brain correlates and directs, the hands execute. The senses and the interior organs are func¬ tional therefore in the staff. A line man must know how to direct. A staff man must furnish all the knowledge available. The line man usually makes the mistake of thinking that he knows. The staff man makes the mistake of thinking that he can direct. It is no part of the plan or aim of efficiency engineering to overstrain materials, to break down equipment or to overwork men. There is a rational load for either of the three. A man can always do more foot pounds of work in 16 hours than in 12, 10 or 8. We deliberately prefer the shorter intervals because economy is subsidiary to human welfare.

Bibliography. — Brisco, N. A., ˆEconomics of Efficiencyˆ (New York 1913) ; Carpenter,

C. U., ˆProfit-Making in Shop and Factory Managementˆ (New York 1908); Church, A. H., ˆThe Science and Practice of Manage¬ mentˆ (New York 1915) ; Diemer, H., ˆFactory Organization and

Administration^ (New York 1914) ; Duncan, J. C., ^Principles of Industrial Management^ (New York 1911) ; Durell, F., ^Fundamental Sources of Efficiency^ (Phila¬ delphia 1914) ; Emerson, H., ^Efficiency as a Basis for Operation and Wages^ (3d ed.. New York 1912) ; Emerson, H., ^Twelve Principles of Efficiency^ (New York 1913) ; Ennis, W.

D. , <Works Management^ (New York 1911) ; Gantt, H. L., Wffirk, Wages and Profits^ (2d ed.. New York 1913) ; Gilbreth, F. B., ^Motion Study^ (New York 1911) ; Gilbreth, F. B., ^Primer of Scientific Management^ (New York 1914) ; Gilbreth, L. M., ^The Psychology of Management^ (New York 1914) ; Going, C. B., ^Principles of Industrial Engineering^ (New York 1911) ; Goldmark, J., ^Fatigue and Efficiency^ (New York 1912) ; Hine, C. D., ^Modern OrganizatioiP (New York 1912) ; Hoxie, R. T., ^Scientific Management and Labor^ (New York 1915) ; Kent, W., Hnvesti-gating an Industry^ (New York 1914) ; Kim¬ ball, D. S., ^Principles of Industrial Organiza¬ tion^ (New York 1913) ; Knoeppel, C. E., Hn-stalling Efficiency Methods^ (New York 1915) ; Knoeppel, C. E., ^Maximum Production in Machine Shop and Foundry^ (New York 1917) ; Miinsterberg, H., ^Psychology and In¬ dustrial Efficiency^ (Boston 1913) ; Nicholson, J. L., ^Nicholson on Factory Organization and Costs^^ (New York 1909) ; Parkhurst, F. A., ^Applied Methods of Scientific Management^ (2d ed.. New York 1917) ; Scott, W. D., Hn-creasing Human Efficiency in Business^ (New York 1912) ; Shepard, G. H., ^Application of Efficiency Principles^ (New York 1917) ; Tay¬ lor, F. W., '^Principles of Scientific Management> (New York 1911) ; Taylor, F. W., <Shop

Managementˆ (New York 1912) ; Webb, Sid-ney, ˆThe Works Manager of To-dayˆ (New York 1917); ˆScientific Managementˆ 1911 (Hanover, N. H., 1912) ; ˆTransactions of Effi¬ ciency Society: Proceedings on Industrial Management> (Vol. 1, New York 1913).

Harrington Emerson, Efficiency Engineer, New York.

EFFICIENCY SOCIETY, a nation-wide movement, not for promoting efficiency in the field where engineers have already done so much, but rather for extending the principles of efficient engineering to all other relations of life. The 18th was the theologic century, when man's chief thought was his relations to the Deity. The 19th was the scientific century, when man was much concerned with his rela¬ tion to nature and its forces. The 20th century will be known as the efficient century, when the world demanded of every man and institution, as it demanded of every approved machine, that its work be done better, quicker or cheaper, under penalty of discard, and this meant raising the ratio of results achieved to efforts expended, which is the engineer's definition of efficiency. From creation whenever any man made a dis¬ tinct effort to improve his methods or his tools so to get greater results from the time and labor spent, he had in him the elements of the efficiency expert. Steam is as old as the first hot fire under water, and electricity is coeval with the lightning, but the age of steam and electricity is recent. This is the century of efficiency ; for in its early years attention was widely drawn to the fact that the progress to which the world aspired was possible only by applying to all of life the lessons learned from machines. Every method, man or institution that maintains its place must prove ability to do something that the busy world wants either better or quicker or cheaper. America leads the world because she studied profoundly her ma¬ chines. She standardized, and thus both im¬ proved output and greatly reduced cost. She cut out every useless part and every needless pound. She added power and speed and elim¬ inated every false motion. As a result she made thousands of useful articles at 50 per cent, 20 per cent, 10 per cent or even 1 per cent of their previous cost in time and labor, i.e., she in¬ creased that efficiency 2 to 100 fold. Man with his

machines became as a god. Instead of a birch bark canoe he built ships that would carry all the inhabitants of 20 villages of 400 people each and cost as much as all the land and houses of 100 such villages. He sent trains carrying a thousand people through tunnels and solid rock, under cities and rivers, at 10 times the speed of a footman. He sails under the sea or through the air with the speed and accuracy of fish and bird. He talks as if in the same room across a continent or under the Atlantic. He omits the wire and in a few seconds can send his message to every part of the boundless sea. In his phonograph we hear the familiar voices of those long dead, and on the screen their pictures move exactly as they did in life. Man saw these miracles of effi¬ ciency on every side and began to question strongly everything in life: ^^Are we giving this more time, thought, labor or capital than absolutely necessary to produce results fully up to efficiency standard, or what the golfer

would call bogey Modern life is more or less a race or struggle in which only the fittest can survive the fierce competition between individ¬ uals, corporations, communities, states or na¬ tions. They keep adding speed and power and looking for any useless pound of weight that can be thrown overboard. In the great contests of life the leaders strip like athletes in the Olympic games. But still in a time of coal famine experts startle us with their claim that we often really use only 5 or 10 per cent of the heat locked up in the coal we burn. Many food supplies yield the farmer who produces perhaps half what he should have, yet the laborer who buys in small quantities pays double what he can afford for that same article. This means low efficiency in the farm-to-family machine. See Farmers' Cooperative Move¬ ment.

College graduates often show unfitness to transact simple business after giving 16 years to training for life, and we cry for more effi¬ cient education. We have countless millions in our churches and they have done great good, yet in great crises of war, panic or plague, we deplore that more of the efficiency of the Amer¬ ican machine is not found in our churches. We hear of millions dying for lack of food and shelter _ and learn that with our boasted effi¬ ciency in many lines we are the most wasteful nation the world has known. The new idea was that by persistent, systematic study and comparison of experiments and experience we might approximate in the manifold relations of life an increased efficiency comparable to that so obvious in our machines. This great idea appealed to leaders and thinkers in many fields. Over a thousand joined the Efficiency Society organized at a national convention held in the Engineering Building, New York, 18

March 1912. J. G. Cannon, president of the Fourth National Bank, was president, and its officers and committees included many of the best-known men in America. Its constitution says ®its object is to promote efficiency or percentage of results obtained relative to effort expended in every activity of man and in everything he employs.^' On 12 Feb. 1916, the National In¬ stitute of Efficiency was incorporated in Wash¬ ington to supplement the work of the older society by making widely available throughout the country the results of research and experi¬ ments as developed and focalized by its com¬ mittees. On its board of governors were lead¬ ers from a dozen different States. The general absorption in the Great War led both Society and Institute to defer much of the work planned, and later they were combined in a single National Efficiency Society incorporated in Washington but with headquarters at 119 West 40th street, New York, where fuller in¬ formation can be had. It publishes a quarterly and has made The Independent its official jour¬ nal, sent weekly to all members. It also pub¬ lishes efficiency monographs from time to time and provides free or at reduced cost books and pamphlets of special interest to its members. It plans meetings and provides speakers, and through its officers and committees tries to focalize and disseminate for the public good anything likely to be widely useful to those specially interested in increasing efficiency. It does not assume to go into details of special callings, which are best treated by their own

local and national associations. It is thus a union of those willing to turn over for the common good the results of their own studies, and all such are welcomed to its membership. In friendly cooperation with the leaders of other enlightened nations its ultimate goal can be safely prophesied as ^^The Federation of the World for Greater Efficiency.

Melvil Dewey,

President, National Efficiency Society.

EFFIGY, formerly EFFIGIE, (1) a copy or imitation of an object, an image or likeness; in sculpture frequently applied to the figures on sepulchral monuments ; (2) to execute or degrade, as the execution or degradation of a condemned criminal, when he cannot be per¬ sonally apprehended, by subjecting his image to the formalities of an execution; for instance, affixing the image with a rope around the neck to the gallows (hanging in effigy). This prac¬ tice is not

altogether extinct in Prussia and in other countries, but in England it has become merely a mode in which the populace expresses its feelings respecting an obnoxious personage, such as the English custom of parading and burning the effigy of Guy Fawkes on 5 No¬ vember.

EFFINGHAM, Ill., city, county-seat of Effingham County, on a branch of the Wabash River, about 240 miles south by west of Chi¬ cago, and on the Illinois Central, the Wabash and Vandalia railroads. The city is the trading point of an agricultural region and has some small manufactories. It contains Austin College and a large photographic school. Pop. 4,024.

EFFLORESCENCE, a term applied to crystals, which, on exposure to the air, lose their water of crystallization and crumble down into a powder. The most familiar instance is that presented by the glassy crystals of washing soda, which become white and pulverulent in the air. The same phenomena is also presented by phosphate of sodium, borax and other com¬ pounds. Another application of the word is to the fine white, feathery crystallization of sul¬ phate and carbonate of sodium which appears on porous walls, or similar crystallizations on the surface of the earth, in decomposing rocks, *etc.* These exudations are due to the crystalliza¬ tion of the saline solutions existing in the pores of the surface on which the efflorescence ap¬ pears. Another use of the term is to designate the creeping up of crystals on the sides of a vessel containing a saline solution, often over¬ running the edge and down the outside. This action is very noticeable with sal ammoniac as used in battery jars. Efflorescence is in some respects the opposite of deliquescence, and the difference is shown by placing an efflorescent and deliquescent body under a bell-jar. The former gives up its water, which the latter absorbs, becoming thereby fluid. See Crystals.

EFFUSION (Lat. ®to pour ouP), in physics and chemistry, the escape of a gas into a vacuum, through a small opening (such as a pin-hole) in a thin partition. So long as the temperature of the gas is constant, the velocity of effusion is independent of the pressure. For the same gas at two different temperatures (but at the same density), the velocity of effusion varies directly as the square root of the absolute temperature. The velocities of effusion of two

different gases (both at the same constant tem¬ perature) are

inversely proportional to the square roots of the densities of the gases; the densities being determined by comparison under convenient but identical conditions of temper¬ ature and pressure.

EFT, the name given in Great Britain to several species of newts, especially to the com¬ mon smooth newt (Lissotriton punctatiis). The eft is very common in the ditches and ponds of Europe, especially where the water is clear. Its food consists principally of aquatic insects, larvae, worms and mollusks. Though usually spending most of their time in the water, the young in June, and the adults in summer and autumn, become terrestrial ; they appear to attain their full size the first year. See Newt.

EGAN, Maurice Francis, diplomat; b. Philadelphia, 24 May 1852. Mr. Egan's family came to Ipswich, Mass., in 1765. His father Maurice Egan of Philadelphia, came when quite young to Philadelphia in 1825. Mr. Egan was educated by private tutors and in the Latin School of Saint Philips, at Philadelphia. He was graduated from LaSalle College — A.B. and A.M. — his doctor's degree was given to him by Georgetown University. Mr. Egan studied law under John I. Rogers in Philadelphia, but after the success of his first novel, ˆThat Girl of Mineˆ (1879) and his little volume of poems, ˆPreludesˆ (1880), he adopted literature as a profession. He has almost 30 books to his credit, the best known of which are ˆ Songs and Sonnetsˆ (1886) ; ˆThe Wiles of Sexton Magin-nisˆ ; ˆEverybody's Saint Francisˆ (1912); ˆThe Ivy Hedge ˆ and the translation of the sonnets of Jose de Heredia. Mr. Egan was professor of literature and English at the University of Notre Dame and at the Catholic University at Washington. He was Minister to Denmark 1907-18. The United States bought The Virgin Islands during his term of office. He declined an appointment to Greece by President Cleveland and twice declined the Ambassadorship to Vienna, tendered by Presi¬ dents Taft and Wilson.

EGAN, Patrick, American politician: b. County Longford, Ireland, 1841; d. New York, 30 Sept. 1919. He became identified with the Nationalists and the Home Rule Movement in 1871, and helped organize the Irish Land League. He was tried in Dublin in 1880 for conspiracy and sedition, but was acquitted. He came to the United States in 1883, and was president of the Irish National Land League of America 1884—86. He testified before the Parliamentary Commission 1889, and was in¬ strumental in securing the failure of the case of the London Times against Parnell. He was appointed Minister plenipotentiary to Chile as a reward for his speeches in the campaign of 1888. In Chile his espousal of the cause of Balmaceda, the Liberal dictator, brought upon him severe criticism. Later he left the Repub¬

lican party, becoming what was termed a Free Silver Democrat, and taking part in the sub¬ sequent campaigns in favor of that issue.

EGAN, Pierce (The Elder), English sport¬ ing writer: b. London, 1772; d. there, 3 Aug. 1849. A prolific ˆhistorian of the ringˆˆ and

kindred institutions, he wrote ˆBoxianaˆ (1818) ; and the widely popular <Life in Lon¬ donˆ (1821), which was illustrated by Cruikshank. He edited in 1824 Pierce Egan's Life in London and Sporting Guide, which was later absorbed by Bell's Life in London.

EGAN, Pierce (The Younger), English ˆvehst : b. London 1814 ; d. there, 6 July 1880. He was a son of the preceding. At first an artist and illustrator, he turned to fiction, win¬ ning fame with < Robin Hood> (1840) ; <Wat Tyler ˆ (1841), and similar conceived romances; while his later and more sensational tales, Imogenˆ ; ˆFair Liliasˆ ; and others, appeared for the most part as serials only.

EGANA, Juan, hoo-an' a-gii'na, Chilean author and statesman : b. Lima 1769 ; d. Santi¬ ago, Chile, 13 April 1836. After being gradu¬ ated from the College of Santo Toribio, he was made professor of philosophy at the age of 16; and at 21 succeeded to the chair of theology and law. He practised the latter profession at Santiago and was chosen to the professorship of oratory at San Felipe. He took an active part in the revolution, was a member of the first Chilean Congress, was captured and imprisoned on Juan Fernandez Island, but was liberated in 1817, after which he was made professor of literature at the National Institute and a mem¬ ber of the Board of Education. He was again a member of Congress until elected President of the Republic in 1823. He was a voluminous writer, both of poetry and prose, his works in¬ cluding several educational textbooks. He ex¬ ercised great influence in shaping the character of the people and the policy of Chile. He pub¬ lished a translation of his own work in English under the title of ˆPehuenchan Lettersˆ (1819).

EGBERT, king of Wessex: b. about 775; d. 837. On the death of Alcmund, the former king, Brihtric, a powerful noble, succeeded in ousting Egbert, who had the best claim to the throne, and was compelled to take refuge first in the court of Offa of Mercia, then in that of Charlemagne. On the death of Brihtric he succeeded him as king of Wessex, in 800. He reduced the other kingdoms, and rendered them dependent on him in 827, and is thus consid¬ ered the first king of all England. He was defeated by the Danes in 835, but reconquered

them in 837. Consult Green, ˆThe Making of Englandˆ (London and New York 1881).

EGBERT, James Chidester, Roman archae¬ ologist and epigraphist : b. New York, 3 May 1859. He was graduated at Columbia Univer¬ sity in 1881, and held a prize fellowship (1882-85). He began to teach in the university in 1885 and was adjunct professor of Latin 1885-90. In 1890 he was appointed professor of Roman archaeology and epigraphy in Columbia, and has done much to promote the study of these special subjects. He has published Hntroduction to the Study of Latin Inscriptionsˆ (1895) ; and has also edited ˆCicero de Senectuteˆ (1895) and written ˆMacmillan's Shorter Latin Courseˆ (1892) ; ˆLivy XXI and Selections from XXII to XXXˆ (1913). Pro¬ fessor Egbert was appointed director of the summer session at Columbia University in 1902 and subsequently directed the extension lectures of the same institution.

£GEDE, a'ge'de, Hans, Danish missionary, termed the apostle of Greenland: b. Harstad, Norway, 1686; d. Falster, Denmark, 1758. In 1707 he became a preacher at Wogen. Having heard that Christianity had been once estab¬ lished in Greenland, but had become extinct in the country for want of teachers, he resolved to visit the country, and to preach the gospel to the inhabitants. Having received from the Danish government the title of royal missionary to Greenland, with a small pension and three ships, he sailed on 21 May 1721 with 46 persons under his command. Egede landed on 4 June, and the conversion of the Greenland Eskimos was now undertaken, but offered great diffi¬ culties. Egede took up his residence with his two sons among the natives, in order to learn their language, and so be able to carry out his project of conversion. He carefully noted down every word of which he discovered the meaning; often performing long journeys, at the peril of his life, to visit the remotest (Green¬ landers, for the purpose of gaining their con¬ fidence, in which he succeeded by a thousand acts of kindness. He succeeded in winning many converts, established trade relations with Denmark and founded the colony of Godthaab. After spending 15 years in Greenland, amid innumerable discouragements, he returned in 1736 to Copenhagen, to make new exertions for the support of Christianity in that country. For this purpose a seminary was founded at which missionaries were trained for work in Greenland. He served as principal of this school for six years. The government ap¬ pointed him director of the Greenland

missions, and established his son Paul in the office of missionary there. His writings are in Danish, and relate to the natural history of Greenland, and his sufferings and adventures there.

EGEDE, Paul, Danish missionary: b. 1708; d. Copenhagen 1789. He was a son of Hans Egede and was his assistant from the time he was 12 years old. Notwithstanding a strong inclination for the naval service, he submitted to the wishes of his father, studied divinity, joined the mission in Greenland in 1734, and remained there till 1740. He then returned to Copenhagen, and afterward was appointed bishop of (Greenland. We have from him an ˆAccount of Greenland,ˆ extracted from a jour¬ nal kept from 1721-88; ˆDictionarium Grcen-landicumˆ ; ˆGrammatica Groenlandicaˆ ; and translation of the Gospels, the Hmitation of Christ,ˆ etc., in the Greenland tongue.

EGELHAAF, a'gel-haf, Gottlob, German historian : b. Gerabronn, Wiirtemberg, 1 March 1848. He has published ˆA History of Ger¬ many During the Reformationˆ (3d ed., 1893) ; ˆEmperor Williamˆ (3d ed., 18ˆ) ; ˆA His¬ tory of Germany During the Sixteenth Century until the Peace of Augˆburgˆ (1888-92) ; and other works.

EGER, a'ger, Bohemia, town in the north¬ west, on a rocky eminence above Eger, 91 miles west of Prague. It was once an important fortress, founded in the 12th century. Six lines of railroads converge at Eger. There are vari¬ ous industries, including machinery, wool, cot¬ ton and leather manufactures, and a flourish¬ ing trade. The celebrated Wallenstein was assassinated at the Stadthaus here (1634). Franzensbad, a watering place, is connected

with Eger by an avenue three miles I@ng. There is an interesting ruin of a castle built by Frederick Barbarossa ; and the inn in which Schiller wrote his ˆWallensteinˆ is still stand¬ ing. Pop. of the commune about 25,000.

EGER, a river which rises in Bavaria, in the Fichtelgebirge, 12 miles northwest of the town of Eger, flows first southeast, then takes a

northeasterly direction into the Elbe, near Leitmeritz in Bohemia, after a course of about 190 miles.

EGERIA, e-je' ri'a, (1) a nymph who re¬ ceived divine honors among the Romans. Her dwelling place was near the Porta Capena, Rome, where a grove was consecrated by Numa to the kindred Camenaean goddesses. Numa is said to have had secret conversations with her and to have received from her the laws which he gave to the Romans. Some say Egeria was the wife of Numa. (2) A genus of spider crabs of the family Maiidˆe; (3) a genus of bivalve shells of the family Donacidce ; (4) in astron¬ omy the thirteenth planetoid, discovered by De Gasparis at Naples (1850).

EGERTON, ej'er-ton, George (psuedo-nym of Mrs. Mary Chavelita Dunne Mel¬ ville Clairmonte Bright), English novelist: b. Australia, 14 Dec. 1860. She was married in 1888 to H. Melville, who died in 1889 ; in 1891 to Egerton Clairmonte, who died in 1901 ; and in 1901 to R. G. Bright. She has pub¬ lished ˆ Keynotesˆ (1893) ; ˆ Discordsˆ (1894) ; Woung Ofe'se Ditties ˆ (1895) ; ˆSymphoniesˆ (1897) ; ˆFantasiasˆ (1898) ; ˆThe Wheel of Godˆ (1898) ; ˆRosa Amorosaˆ (1901) ; ˆFlies in Amberˆ (1905) ; and several plays and adaptations.

EGERTON, Hugh Edward, English his¬ torian : b. 19 April 1855. He was educated at Rugby and at Corpus Christ! College, Oxford. In 1885 he was assistant private secretary to the Hon. E. Stanhope, M.P., and from 1886 to 1906 he was a member of the managing committee of the Emigrants' Information Office. In 1905 he was appointed Beit professor of colonial his¬ tory at Oxford. His publications include ˆA Short History of British Colonial Policyˆ (1897; 4th ed., 1913); ˆSir Stamford Rafflesˆ (1900) ; ˆOrigin and Growth of the English Coloniesˆ (1902) ; ˆCanada under British Ruleˆ (1908); ˆCanadian Constitutional Develop¬ ment,ˆ with W. L. Grant (1907) ; 'ˆFederations and Unions Within the British Empireˆ (1911) ; an edition of 'Sir W. Molesworth's Speechesˆ (1903), and of the 'Royal Commission on Loyalists' Claims 1783-85ˆ (1915). He con¬ tributed to Palgrave's 'Dictionary of Political Economy,ˆ Poole's 'Historical Atlas of Modern Europe,ˆ 'Cambridge Modern Historyˆ (Vols. IV and IX), 'The Oxford Survey of the Brit¬ ish Empire,ˆ 'The American Cyclopaedia of Government,ˆ English Historical Review and other publications,

EGG, Augustus Leopold, English genre painter: b. London, 2 May 1816; d. Algiers, Algeria, 26 March 1863. He became a con¬ tributor to the Academy exhibition in 1838 and was elected a member of the Royal Academy in 1860. He painted a great number of pictures illustrative of humorous scenes from Shakes¬ peare, Le Sage and

Walter Scott.

EGG. The fundamental cell, technically called the ovum, from which each individual living animal of every species is developed. The egg is the product exclusively of the female organism. It may or may not be developed into another individual being, but the potency of such development is inherent in the egg. It is not to be understood, however, that a single egg may develop into but one individual. In many known instances the single egg divides and subdivides before it reaches the stage of de¬ veloping the individual, so as to produce from 8 to 16 individuals — as in Aurelia; or even 32 individuals ■ — as in varieties of Natica. Seg¬ mentation previous to individual development has been observed also in the frog, the rabbit, the guinea pig, the dog and the deer, as well as in some birds, reptiles, fishes and lower animals.

So far as minute observation goes all eggs of every species are alike in structure and com¬ posed of the same primary elements, and at the beginning develop by the same processes of growth. There comes a time, however, in this progressive growth when each egg assumes a character peculiar to the species to which it belongs in the scheme of animated nature. The egg-cell has a constant form of structure. There is an outer sac of cell wall containing a spongy network, filled with a more or less trans¬ parent fluid, in which is suspended an interior sac known as the nucleus, filled with a different network and a clearer fluid, and within this the germinal “doU or “spot^^ called the nucleus. As the purpose of this article is the discussion of the production of the egg the reader is re¬ ferred to the article Embryology for the con¬ sideration of the processes by which the egg is developed into the specific animal.

Animals in which the egg passes out of the body before it is hatched, that is, before the maturity and escape of the embryo, are said to “lay eggs,® or to be “oviparous® ; those in which the egg remains inside the body to hatch are called “ovoviviparous® ; those whose eggs are retained in connection with the parent by means of a placenta and an umbilical cord, so that the young are brought forth alive, are called “vi¬ viparous.® These distinctions, and especially the first two, are of secondary importance, and in some cases it is difficult to classify an animal according to them ; or varying conditions may lead to change in the same species or individual at different times. In practically all the mam¬ malia the egg after being produced by the ovary attaches itself to the body of the mother and is developed directly by the vital

processes of her system. The only exceptions are a few lowly mammals (the Monotremes, q.v.). All birds and most other animals “lay® their eggs. The ovoviviparous ones are to be found chiefly among reptiles and fishes. The production of eggs by an individual female varies within the limits (so far as known) of one at a time, as in the human race ; the horse, cow and many other species of animal ; the penguins and many other seabirds ; to the 9,000,000 laid by the cod and 14,000,000 laid by the turbot. Science has offered an explanation of this great disparity in egg production by advancing the theory that as the object of the egg is the perpetuation of the species the number of eggs produced corre¬ sponds to the natural danger of destruction of

EGGS

either the eggs or the young in the particular environment of each species. This theory seems well established by the observed facts, but it is_ evident that nature in so providing for the continuance of all her living creatures failed to take into account the depredations of man. It is easy to mention a dozen species which have suffered complete extinction within his¬ toric time because their reproductive functions were not gauged to make good the wholesale nest robbing and slaughter perpetrated by the human species.

Eggs of Birds. — The eggs of birds are so much more in evidence than those of other liv¬ ing creatures that it seems the natural procedure to discuss them as first in order.

The eggs of birds are larger in proportion to the size of the niature parent than is the case with any other division of the animal kingdom. This peculiarity has been ˆexplained^^ by saying that the bird ®must be^^ hatched at an advanced stage of development and therefore much food for it while it is growing ®must be^^ stored within the shell of the egg, and that for this the comparatively large space is required. The matter is mentioned here only to point out that the statement of these facts does not constitute a ˆreason® and also to remark that no reason is necessary — it is the normal fashion of develop¬ ment for the bird ; that is all there is to it. The egg of a bird originates in the ovary of the female parent. At the very beginning of its course toward the oviduct it is surrounded with a larger or smaller envelope of yolk. Chemi¬ cally this is an emulsion containing varying percentages of fat, lecithin, lutein (the coloring matter), cholesterol, the phosphoprotein vitellin and a small quantity of the coagulable protein livetin. The vitellin and lecithin are in some form of combination and are generally joined (for discussion) under the term lecitho-vitellin. This yolk lies in concentric layers about the whitish germinal vesicle or ®tread® of the egg, which is the protoplasmic part where alone de¬ velopment proceeds. This vesicle floats on the surface of the food-yolk and remains on top by reason of its lightness no matter how the egg is turned. The eggs of many of the lower ani¬ mals contain food-yolk, but it is usually color¬ less. The egg of a hen or other bird is further

furnished with layers of albumin (the ®white^^) placed upon it in the narrow upper part of the oviduct. Chemically the white of the egg is a coagulable protein fluid of a slightly yellowi.sh tint enmeshed within a network of fibrinous matter. It is feebly alkaline and is 85 to 86 per cent water. Of the solid matter 12.2 per cent is protein — mostly albumin, with smaller propor¬ tions of egg-globulin and ovo-mucoid, — glu¬ cose 0.5 per cent, inorganic salts 0.66 per cent and traces of fat, lecithin and cholesterol. Out¬ side of this there is next deposited upon the albumin a fibrous membrane in two distinct layers (the ^^egg-pod®), the separation of which later forms the ^^air-chamber® at the end of the egg where the head of the chick lies. The stages of advancement to this point occupy a period of about four hours. In a further stage of the descent along the oviduct there is deposited in and upon the egg-pod an external covering or ^^shell,® calcareous in various degrees. The process of depositing the shell occupies 18 to 20 hours. This shell is oorous so as to admit air

to the embryo, which also exposes it to bacteria so that eggs are liable to quick decay when living influences cease to operate within it.

Eggs of birds differ greatly in size, color and rnarkings, and this is true even as to differ¬ ent birds of the same species. Although the yolk of the egg is spherical the outer shell is rarely so. It ranges from nearly elliptical or ovoid to a shape almost conical, known as conoid. It is to be noted that eggs which are laid in exposed places, on rocky ledges or on the bare ground, are much more sharply pointed than those which are laid in deep nests or in holes in trees, and this goes to bear out the theory that the shape of eggs is protective — to prevent their rolling away from the nest. In color as a rule they are white, but many are tinted with cream, pink, blue, green or brown, and they may be plain or spotted, speckled or blotched. These blotches and markings are of varying colors and sometimes of several colors on the same egg. They are deposited in the shell of the_ egg by certain pigment ducts active as it is making; and while the eggs of the whole species have a close general resemblance, so that an ornithologist recognizes them at once, the eggs of individual birds of the species have an individuality of markings. There is often to be observed a double spotting, as if a second layer of shell with another system of spots had been deposited outside of a first layer, It has been _ suggested that the theory of protective coloring will not fully explain these markings, and that the individuality of their patterns should be ascribed rather to the fact that it affords the mother-bird opportunity for in¬ stant recognition of her own nest. The widest variation in this respect has been noted as to

the guillemot, 30 distinctly different patterns of markings being shown in some collections. It has been observed also that the markings on the eggs of birds in captivity vary with the state of health and as to conditions of mind, as fear, anger and the like. It is notable that eggs which are laid in dark places are as a rule with¬ out markings. It is to be expected as a matter of course that eggs would differ in size just as do the parent birds. A novice in the study of bird lore, however, is not prepared lor the wide disparity in relative size when the eggs of dif¬ ferent species are compared. The smallest egg known among birds is that of the humming bird, the smallest of the birds. This is quite as one would expect. But the cuckoo lays an egg which is but one-fifth of the size of that laid by the jackdaw, although the two parent birds are of the same size. The mature guille¬ mot is about the same size as the raven, but its egg is three times larger. The egg of the New Zealand wingless bird, the kiwi, has a pro¬ digious weight, fully one-fourth that of the parent, while the egg of the ordinary barnyard hen, which may be taken as typical, weighs about one-thirtieth as much as the adult fowl. The largest known bird's egg is that of the now extinct epyornis of Madagascar, which -was 10 inches in its smallest diameter. The largest egg of species now in existence is that of the ostrich. Variations in the size of eggs, moreover, may occur in the same species in a different habitat. Thus the eggs of the great white heron in Europe are 40 per cent larger than those of the same species in India.

The number of eggs laid in each clutch is constant fof the individuals of the same species, but differs widely for different species. Many of the sea-going water birds lay but one egg a year — occasionally two. Those waterfowl classed as game birds lay from 10 to 14. The song birds and field birds generally lay four or five eggs in each clutch, but some few species do not lay more than two (as the pigeon) or three, while a few lay more — ˆ up to 10 or 12, or even 20, as is the case of the common partridge. Where two broods are raised in a year, of course the yearly production is doubled ; and this, too, may happen in the case of birds which commonly rear but one brood, if the first nesting is destroyed by accident or otherwise. In several cases on record birds have laid the regulation clutch number again and again until exhausted, in the persistent endeavor to raise the yearly brood. The case of the common hen is in point : under natural conditions she would raise two broods of chicks during the year, from 13 to 15 eggs at a time. But under the exploitation of the poultr3mian, who removes the eggs from day to day, she continues laying for months at a time, producing up to 200 eggs per year.

Notable differences are found also in the texture and relative thickness of the shells of birds' egs. Some are so highly burnished as to resemble polished metal ■ — as the tinamous. The eggs of kingfishers and of some wood¬ peckers are glossy; those of ducks are waxen in appearance. Some are chalky and others are coated with a chalky crust of a different color from the hard smooth shell underneath — as with the cormorants and gannets, in which the egg is blue and the incrustation white. The shell of the ostrich's egg has the pecularity of being deeply pitted. Reference to the accom¬ panying plate will give a clearer idea of the principles cited than can be conveyed by mere explanation. See also Eggs.

Eggs of Reptiles.— Reptiles, like birds, are distinctly oviparous, with few exceptions. Their eggs are, however, hatched by the heat of the sun, or of the fermentation of decaying vege¬ table matter. In the few exceptional in¬ stances referred to the young break out of the eggs as soon as they are laid, and in at least one instance — the stump-tailed lizard of Australia — the young complete their development and leave the eggs before they are laid. Among the snakes, too, most of the boas bring forth their young alive, and so do some of the deep-sea snakes. An exception is to be noted in the case of the python, which lays from

15 to 100 eggs at a time and broods them until the young emerge.

The eggs of reptiles differ from those of birds in two respects — they are without a cal¬ careous shell, having a parchment-like skin in¬ stead, and in shape they are spherical or ellip¬ tical, not ovoid nor conoid. In size they are much smaller proportionally to the parent than is the case with the birds. The egg of the crocodile, for example, is about as large as that of a goose. Those of the giant tortoises of the Galapagos are spherical and about the size of hens' eggs, and in contrast to those of other reptiles have hard calcareous shells. Croco¬ diles as a rule lay their eggs in sand, in some cases digging out a pit two feet deep and de¬

positing the eggs in two layers, with sand in between. The whole ®nest^^ is then smoothed over and leR to the sun's heat for hatching. The mother crocodile not infrequently digs up the eggs a day or two before they hatch, excited thereto probably by hearing the young piping in the shells. Sea turtles lay their eggs in holes scraped out of a sandy shore well above the reach of high water. The number laid some¬ times reaches 100, and they are carefully cov¬ ered with sand. The eggs of marine turtles are generally esteemed as food in the countries where they are plentiful.

Eggs of Amphibia. — Among the frogs and toads the eggs are spherical, with a thin mem¬ branous envelope, in which the embryo is dis¬ tinctively visible surrounded with the yolk and with one or two outer coatings of a gelatinous substance. The latter is not noticeable when the eggs are first laid, but as they are laid in water the gelatinous substance swells into a relatively thick layer of slippery, non-soluble jelly. The eggs vary in size from one-twenty- fifth of an inch (with the ordinary toad) to nearly one-half an inch in diameter with the Megalophrys longipes of the Malay Peninsula, the eggs of which are not laid in water but hid in damp moss, the little frogs emerging in a condition of complete development. The number of eggs laid by those frogs and toads which lay them in shallow pools is very large, reaching 12,000, and, as might be supposed, the destruction of these unprotected eggs in enor¬ mous. Some species of tree-frogs lay their eggs in a mass of froth on the leaves of branches which overhang a pool. When the young hatch out they drop into the water to complete their development. These frogs lay about 200 eggs at a time. A small New Guinea frog lays 12 to 18 eggs enclosed in a small elliptical sack which is set adrift in the waters of a running stream. Several of the toads and frogs are noted for carrving their eggs about

with them, in the water or on land, as the case may be, until they hatch.

Among the tailed batrachians, which include the animals popularly called ˆlizards® and more correctly, newts and salamanders, the aquatic species lay their eggs in water. They are de¬ posited one in a place, or in small clusters, and generally attached to water-weeds or bits of wood or stone on the bottom of the pool. The land varieties lay their eggs in a damp hole in the ground or in a hole in a tree trunk, some¬ times as high up as 30 feet above the ground The eggs are spherical for all species and gen¬ erally about one-fourth of an inch in diameter. The giant aquatic salamander of Japan and China lays up to 500 eggs, which are in several separate clusters, the members of each being connected together by a membranous ˆˆstring.ˆˆ This same peculiarity has been noted in the case of a small water salamander common in the streams of the eastern United States. There are, however, quite a number of species of these animals which do not lay eggs but bring forth their young alive.

Eggs of Fishes. — ˆˆMost species of fish are oviparous, some are viviparous and a few ovoviviparous. Owing to the obvious difficulty of observing animals whose habitat is deep water, there are many species about which nothing is known concerning their modes of reproduction.

EGGS OF FISHES AND LOWER ANIMALS

1 Egg of Shark

2 Egg of Cristiceps

3 Egg, with embryo of Goby

4 Spawn of parastic Fierasfer

5 Egg with embryo of Stargazer

6 Egg of Garfish

7 Spawn of a nudibranch

8 Spawn of Squid

9 Spawn of Sea-snail

10 Spawn of Octopus

1 1 Egg of Cuttlefish

12 Egg of a flat-worm

13 Egg-capsule of Mantis

14 The same in cross-section

15 Egg of a butterfly

16 Egg of Bedbug

17 Egg of Beetle-mite

18 Structure of eggshell of a phyllo—

pod crustacean

19 Egg of branchipod crustacean

T V

-“IPPO

‘■■« ■

ikV’

o*

, O’* ” ”!!

! m

m: . ■’■

‘< .

* \

.y ? .r.fx

• .’V*’ I

4

t.- ,

V «

‘*V . ■ ♦

w*’ • V,

<X\^-

‘■ r

■f. ^ . .‘. . -• ■ * ^ w .- ^ ■■ .7 > .4^

-*» . ■ ■ .,^ ‘-‘Ij , ‘• • ^ ^

€ JL. ^..‘•• < * i ^ ‘ ■- ■% ^’ ‘ r A •/* ■ f^’

/■J‘ ‘•’ > ’

^ k.’

^ A-~‘s. < f 4

!» 1 .

tr

‘ W’ ‘ ”

T •)

.*.v

* A

-i

k •^•t hit.

j*

• /

?

4 •^.‘jC”,

(V T

■id’

• -1 ’.*

” r.

“rX

… /

■ V

w ‘A,*!, ‘ . ■*•.

,*’,• f A, •

■” - ‘ ‘ i

• . * m :»a

JTf 1

-<r7* ■•■:

•S’

ji-

(%

4 t

‘ ‘ ,-: f—.Fˆ

r h

ˆifefcvV/

3fcV”¥“-

fc’ T*”’!

> ˆ

•‘ >•

. U #•

■ ‘W-

L* - *•

jJ

* >

- V:. .C’v ■

^f.. A • • . •*, •^;*

. ..• , - ■’

i

% ‘

<

/

’ • • • •

• . ^ v > V * \ …• ‘

’ r “• ‘ * - L

■W * VM ^ •”a’V - ‘

V . . ‘. i VS’k ‘t

“’ ^ ».f ‘

t i’ - . —v^’ - — I . .•- . i • v-..^

1 ■ I ■ -‘• ’ ‘ I . ‘ ’ f

■ :. • *4.* ’

• •*-•* -•*■’ ” ■•^^•’^-* - # “ ** — — — •

• ‘ K

h

■.m- ˆ :

■ 1’ ˆ

•• ‘ 4gP

4|

• ‘ .4. ’ -• . V

5’k ■

I • 4«

f .iL

■* ˆ.jfs*.

Most of the shark-like fishes are viviparous, but in those cases in which they do lay eggs the latter are of considerable size, and, as with the common ground dog-fish, they are provided with a ®shelP^ of tough, horny structure. Within this is found a yolk surrounded with an albuminous layer, so that there is a close resem¬ blance to the eggs of birds. The shell of the dog-fish egg is quite a well-known seashore object, with its oblong cushion shape and the long spinous hooks at each corner. It is only in fishes of this class that an envelope worthy of the term ^^shell® is produced. The eggs of other fishes have only a thin membranous cov¬ ering, although in some cases this is hard to a degree and often adhesive, fixing itself to the first solid object that it comes in contact with. A few species lay their eggs on rocks or in clumps of weeds between high and low water, so that they are exposed to the atmosphere twice a day by the fluctuating tides. Others, among which are some of our common catfishes, lay but a few eggs and carry them around in the mouth until they are hatched. Reference has already been made to the great fecundity of the cod and turbot. In the same classification belong the salmon, shad and her¬ ring and many others who come up from deep water to lay their eggs in a wholly unprotected condition in the shallow shore or inland waters. The eggs of the herring, like those of the perch, are adhesive, and in this respect have a certain advantage against destruction. Most of the deep-sea fishes, however, lay egg-masses which are buoyant and float about on the surface sub¬ ject not only to the appetites of other dwellers in the sea but also to those of sea birds, so that comparatively few eventually reach maturity.

The eggs of several kinds of food fishes are esteemed as food delicacies, notably the roe of shad and herring, and caviar (q.v.) made from the eggs of sturgeon and other fish.

Eggs of Insects. — When it is recalled that there are upwards of 300,000 known species of insects it will readily be seen that no befitting mention of the well-nigh innumerable varia¬ tions in egg production and egg forms can be attempted within the necessary limits of this section. The student must be referred to the appropriate

volumes noted in the bibliography below.

Most insects are oviparous, but within a few species the eggs are hatched within the body of the mother. The number of eggs laid as a ®brood® ranges from one or two up to thou¬ sands. As a rule the number laid by the com¬ moner insects is from 100 to 300. They are laid generally in groups of detached eggs or in small masses, though often singly, and attached to a leaf or twig of the plant which will fur¬ nish suitable food to the newly-hatched larva. The habits of bees and wasps in this respect are well known, and it needs only this passing mention to bring to mind the combs of wax or paper or the mud cells in which these insects lay their eggs and raise their young. The cluster of eggs rolled up in silk bv the common house and garden spiders is a familiar sight.

Undoubtedly the eggs of the butterflies and moths are the most interesting of all arnong the insects. They are very small, and within the outer membranous coating they contain the egg-cell and a supply of liquid food for its de¬

velopment. In form there is the greatest possi¬ ble variety — globular, thimble-shaped, pear-shaped, cylindrical, purse-like, lens-shaped, turban-shaped and a multitude of other forms for which no simile can be found. Under the microscope they exhibit a wonderful variety of flutings, sculpturings, lacework and other forms of decorative surfaces. Although most of them are white or greenish their colors range into cream, yellow, red, blue and brown. Generally but one laying is made, but there are a few species which produce two or even three broods in the season. In tropical countries there may be several more than this during the longer life of the adult females.

Eggs of Crustacea. — The eggs of the Crus¬ tacea are notable as containing a larger quantity of yolk in proportion to their size than do those of any other animal. In nearly all species the eggs are carried around by the female during the early stages of their development, either attached to some portion of her body or in a brood pouch. They do not always hatch into the complete form, but may advance, like many of the crabs, by changes with each moulting of the shell to the final adult form. With this large measure of protection the number of eggs laid as a *brood® is generally few.

Eggs of Mollusks. — As a rule the mollusks are oviparous, but there is a considerable num¬ ber, among them many of the land and fresh

water snails, which are ovoviviparous. The number of eggs laid at a time varies greatly. Helix aspersa lays from 40 to 100 in a little de¬ pression hollowed out between the roots of a tuft of grass and covers them with earth. The oyster lays from 300,000 when young to 60,000,- 000 when a full-grown adult. These eggs are almost microscopic in size, and they are de¬ voured in thousands by fish and other marine animals. Some of the tropical mollusks lay eggs as large as those of pigeons, but with a ^shell® of tough membrane without a lime de¬ posit to harden them. One of the peculiarities of egg production among the mollusks is their fashion of laying them in small clusters in cap¬ sules or egg-pods. These capsules are usually joined together in curious ways by fibrous bands or strings or ribbons, which sometimes are three feet in length and in others are an inextricably tangled snarl. One of the rnost curious of all is the cochlostyla of the Philip¬ pines, which lays its eggs in a folded leaf at the tops of the highest forest trees. For an intimate study of this most interesting section of animal life the books mentioned below are of advantage.

Eggs of Lower Animals. — Among the higher worms may be mentioned the leech, which burrows into the soft mud above the level of the edge of the pool in which it lives and lays several eggs with yolks in a capsule. The tiny leeches upon hatching find their way instinctively out of the burrow and into the water. The tapeworm develops a clutch of eggs in each of the lower joints of its long body. As the eggs approach the larval stage the joints break loose and become simply egg-pods, similar to those of the mollusks. Many of the lower worms lay eggs which are rela¬ tively large and are protected by an enveloping capsule. The starfish and sea-urchin pass their eggs out through pores at the base of the arms

or spines, and there they are held in small hol¬ lows between the armor plates until they are so far developed that they push themselves loose of their own accord and swim off independ¬ ently. The egg production of the crinoids is similar, the eggs being retained within the body cavity until they have reached the larval form, when they are released. The ophiuroids carry their eggs about with them in a pouch, where the young develop. In the sponge the egg forms in a cell within the body and undergoes considerable development, so that at the time when it is thrown off by the parent body it has become a larva capable of independent exist¬ ence.

Bibliography. — Caiman, W. T., ˆ Crustaceaˆ (London 1909) ; Comstock, J. H., ˆThe Spider Bookˆ (New York 1912) ; Cunningham, J. T,, ˆReptile, Amphibia, Fishes, and Lower Chor¬ dataˆ (London 1912) ; Dugmore, A., ˆBird Hornesˆ (New York 1900); Pelsener, P., ˆMollusksˆ (London 1906) ; Pycraft, W. P., ˆA History of Birdsˆ (London 1910) ; Reed, C. A., ˆNorth American Birds' Eggsˆ (New York 1904) ; Rogers, J. E., ˆThe Shell Bookˆ (New York 1908) ; Sanderson, E. D., and Jackson, C. F., ˆElementary Entomologyˆ (New York 1912) ; Step, E., ˆMarvels of Insect Lifeˆ (London n.d.).

EGG INDUSTRY. From an economic point of view eggs constitute one of the most important commodities in commerce, and the egg industry, both in the production and dis-trilDution, is of notable proportions. Although eggs are used to some extent in the arts, it is as an esteemed food product that they maintain their importance.

In the United States the egg industry is continually growing. Formerly this country re¬ lied largely upon importation for its supply of eggs, but now it exports far more of them than it obtains from foreign ports. The increasing use of incubators has led to a large increase in the number of eggs laid by native fowls, which need ®no longer waste their time in hatching them, but may devote it to the more profitable labor of producing them.ˆˆ It is said by experts in this branch of American industry that al¬ though the number of fowls kept in this country is now relatively smaller than formerly, yet by the adoption of labor-and time-saving machines there has been a constantly increasing output of eggs.

The production of poultry and eggs is one of the most profitable

industries. A statistician of authority estimates that a hen may realize 4(X) per cent of profit for her owner. In 33 States and Territories the value of eggs exceeds the value of the poultry product. The egg product in the United States amounts to more, when measured by dollars and cents, than the com¬ bined gold and silver production.

According to the figures of the 1910 census, taken for the year 1909 (the latest so far com¬ piled for this industry), the total production of eggs for that year as reported from 4,883,507 farms (out of the 6,361,502 farms at that time in the United States) amounted to 1,457,385,772 dozen, valued at $281,157,980. Of the entire pro¬ duction only 926,465,787 dozen (63.6 per cent) were sold on the market, the remainder being consumed on the farms or used in hatching. Among the several States, Missouri held the

lead in market production, selling, a total of 71,886,145 dozen. Iowa was second, with a market production of 70,835,349 dozen. Then followed in the order of their contributions to the grand total : Ohio, 69,575,637 dozen ; Il¬ linois, 62,036,857 dozen ; Indiana, 53,899,416 dozen; Kansas, 52,833,166 dozen; Pennsylvania, 52,446,077 dozen; New York, 48,074,481 dozen; Michigan, 38,568,386 dozen ; Minnesota, 34,347,- 776 dozen; Wisconsin, 32,268,836 dozen. These 10 States produced nearly three-fifths of the entire output of the country.

The average value per dozen of the 1909 egg production was 19.3 cents. They were cheapest in Texas (15 cents) ; Oklahoma and Arkansas (16 cents) ; Louisiana, Kentucky, Tennessee, Nebraska, Kansas and South Dakota (17 cents) ; and dearest in Arizona, Nevada and Massachusetts (30 cents), and Rhode Island and Connecticut (29 cents). The average prices in 1917 ranged from 28ˆ4 cents in March to 56 cents in December in the New York market, and from 24J/2 cents to 43 cents in the Saint Louis market. The average wholesale prices all over the country in 1917 varied from the low of 14 cents in Alabama, Arkansas and Texas, and of 28 cents in Massachusetts, Connecticut and New Jersey for April to the high of 30 cents in Alabama and 63 cents in Rhode Island for De¬ cember.

By far the larger percentage of eggs used for food are those of the hen. There are, how¬ ever, a considerable and constantly increasing proportion of duck eggs on the market and a few goose eggs. The average hens' eggs weigh 24 ounces to the dozen, and as food it is cus¬ tomary to regard a dozen eggs as equivalent to a pound of lean

beef. This is a very close approximation with the balance somewhat in favor of the eggs. A dozen duck eggs weigh 30 to 42 ounces, and a dozen goose eggs about 80 ounces. Pound for pound, eggs contain the same amount of fat as beef, and about half as much protein but being more digestible when properly cooked, their food value cannot be gauged exclusively by their chemical constitu¬ tion. The yolk of the egg is the more nutritious portion, containing all the fat of the egg and the important phospho-proteid lecitho-vitellin. The white is chiefly albumen and water. In the general make-up of the egg the shell constitutes about one-tenth, the yolk about three-tenths and the white six-tenths. The yolk and white taken together, as ordinarily eaten, show a composi¬ tion of proteids, 13.5 per cent; fat, 10.8 per cent; water, 73.8 per cent, and mineral salts, 1.6 per cent. The eggs of ducks and geese have a higher fat content, reaching 14.5 per cent, with a correspondingly smaller percentage of water. When fresh, eggs have a specific gravity be¬ tween 1.08 and 1.09, growing slightly less day by day when kept in the open air; so if an egg sinks in a salt solution of 1.07 specific gravity the egg is fresh.

Preservation — Eggs freshly laid will re¬ tain their fine qualities for several days if kept in a cool place. The nearer this temper¬ ature approaches 40° F. the better, for eggs which have' been fertilized develop a certain amount of internal heat due to the vital proc¬ esses which are beginning, and a low tempera¬ ture is necessary to halt these changes. For this reason unfertilized eggs, if they can be had, are

much easier to keep in perfect condition. Where eggs are to be preserved for long periods cold storage offers the most effective method, but beyond a certain limit — from five to six weeks at the longest — the fresh flavor cannot be retained. In ordinary household preserving the customary methods are in the line of filling up the pores of the shell in such a way that bacteria-laden air cannot enter and set up fer¬ mentations. They are usually rubbed over with butter, lard, gum-water, etc., or, which is still better, they are placed in layers, small end down, in very dry ashes or fine dry salt, packed in tubs and boxes and put in a dry, cool place, protected from severe cold in winter. A slightly more expensive but a highly recommended plan is to dip the eggs into a solution of silicate of soda, or ^^water glass,^^ allowing them to drain until dry, before packing in salt. If the dipping is thoroughly done, the salt packing may be dis¬ pensed with. An alternate method is to pack the eggs closely in an earthen jar or crock and pour over them the silicate solution, allowing them to reniain in the solution until used. The proportion in which the solution is made up is one part of the ^^water glass^^ as obtained from the druggist to 10 parts of water for the dipping process or to 12 parts of water where the eggs are kept in the solution.

Marketing. — It is estimated that the losses in marketing eggs in the United States amount to not less than $50,000,000 a year. This enor¬ mous loss is nearly all due to carelessness in the first handling — that by the producer. In a lot of 706,000 eggs bought recently in Kansas, more than 66,000 eggs were what are called in the egg trade *rots® ; that is, they were bad when sold by the farmer — carelessly gathered, perhaps from long abandoned nests, or im¬ properly kept after gathering, or kept too long before selling. Further losses on this one pur¬ chase of eggs, mostly through thin shells, which broke in transport, brought the total loss up to 14.3 per cent of the amount paid for the lot. Obviously nine-‘tenths of this loss could have been avoided with proper care. Such experi¬ ences have led to the establishment of a trade rule among merchants who buy eggs in quan¬ tities for shipment that they are to be paid for ®loss off^^ ; meaning that no eggs which come under the classifications of *rots,^^

®spots,® ®blood rings,® or ˆleakers,® — terms which ex¬ plain themselves — shall be paid for. This rule, where enforced, has already operated to reduce materially the number of bad eggs in consigned shipments.

The considerably larger price commanded by really fresh-laid eggs in most markets has stim¬ ulated marketing in several channels outside of the regular commercial routine. One of the most successful of these plans has been the marketing through creameries. The farmer who delivers milk or cream daily or semi-weekly, as the case may be, may without anv extra labor deliver the surplus eggs raised on his farm within a day or so of their laying. The cream¬ ery, gathering from many farms, can ship daily an egg product of the highest market value. The cost of such handling in connection with the regular business of the creamery has been proved to be not above one cent per dozen eggs shipped. In other localities where creameries do not exist, associations known as ˆˆCommunity Egg Circles® have been formed especially for

this cooperative shipping of strictly fresh eggs, bringing their members from five to eight cents per dozen above the current prices for ordinary trade eggs.

Another avenue open to the individual pro¬ ducer is the parcel post. Eggs packed in con¬ tainers approved by the Post Office Department can be sent direct to the individual consumer and the highest prices realized. Some of these approved containers are substantial, and may be returned empty at a nominal cost and so used many times, distributing their first cost over several shipments. However, the special pack¬ age need not be used if the eggs are securely packed with excelsior, or other similar material, in strong baskets or boxes.

Eggs are also marketed in bulk after being broken, either in the liquid form or in a powder after drying. These methods are in use where very large supplies of eggs are produced at a long distance from the point where they can be sold at a reasonable profit, and where the prob¬ ability is that they would suffer a serious loss through breakage during transport. In the preparation of eggs for this method of mar¬ keting the utmost care must be taken that they are not contaminated by any dirt in the process of breaking. _ When the cans are full they are frozen, and in this condition are transported and delivered to the consumer — generally some large wholesale cake-baking establishment. In some instances borax is added to the liquid eggs as a

preservative, but this is highly objec¬ tionable where they are to be used as food. These liquid eggs are also used in certain leather ˆ dressing processes. The drying and powdering of eggs is done by forcing the liquid eggs through tiny apertures in a plate into a drying chamber at such temperature that the egg spray is dried to the condition of meal be¬ fore it reaches the collecting tray at the bottom.

Cooking. — The cooking of eggs has the effect of rendering their valuable proteins more or less indigestible, according to the degree of the cooking. While this is largely a matter of indifference to the person in good health, it is often of some importance to an invalid or con¬ valescent. In the latter event the less cooking the better. Many times the egg is simply beaten up, perhaps with the addition of wine, and eaten raw. Another approved method of pre¬ paring eggs for persons of delicate digestion is to ˆ‘ˆjelly® them by pouring a quart of boiling water upon an egg or two and letting the vessel stand on the back of the stove where it will keep hot but not boil. In about 10 minutes the egg will be turned into a soft semi-transparent jelly, in which condition all its protein is readily assimilable.

Poisoning by Eggs. — In some persons eggs when eaten produce symptoms of poisoning. This is to be considered an abnormal condition. But in several instances unmistakable indica¬ tions of poisoning from eggs have been observed in persons who are not usually affected by such diet. This kind of poisoning is attributed to the presence of toxic bacteria, and is considered to be of the same nature as ptomaine poisoning and to be treated in the same way. Fortun¬ ately such cases are rare. See Poultry.

Foreign Trade in Eggs. — Notwithstanding the very large domestic production, the United States imports a ver};- large quantity of dried and frozen eggs annually. In 1917 this im-

portation amounted to 17,268,379 pounds, vah’ied at $3,589,504. During the year the exports were also large, aggregating 19,886,079 dozen, valued at $7,270,543, and canned eggs valued at $171,112.

Bibliography. — Meyer, A., ˆEggs in a Thousand Waysˆ (Chicago 1917) ; Minnesota Agricultural Experiment Station, ˆTechnical Studies in Egg Marketingˆ (Saint Paul 1913) ; United States Agricultural Department, Farm¬ ers' Bulletin 445, ˆMarketing Eggs Through the Creameryˆ (Washington 1911), Farmers' Bul¬ letin 594, ˆShipping Eggs by Parcel Postˆ (1914), and Farmers' Bulletin 656, ˆThe Com¬ munity Egg Circleˆ (1915) ; United States Bu¬ reau of Chemistry Circular 98, ˆPractical Sug¬ gestions for the Preparing and Marketing of Frozen and Dried Eggsˆ (Washington 1912), and the chapter on ˆHandling and Marketing of Eggs® (in the ˆAgricultural Yearbook,ˆ 1911).

EGG, or EIGG, eg, one of the Hebrides Islands, belonging to Inverness-shire, Scotland. It is south of Skye. Its length is a little less than seven miles.

EGG-BIRD, or SOOTY TERN {Sterna fuliginosa) , a member of the gull family {Lar-idce) famous for its edible eggs and breeding societies for ®wide-awake fairs.® It is found about warm seas throughout the world and abounds in the West Indies. Ascension Island is one of its most frequent breeding places. Occasionally it wanders at far as New Eng¬ land. The adults have beautiful black and white plumage, but the young are of a light, sooty color. The nests are rough excavations in the sand, in which three eggs are usually deposited. They are much valued and the gath¬ ering of them in the spring months forms an important West Indian industry. The name egg-bird is also commonly applied to other marine birds of the gull family, as guillemots, murres, etc., whose eggs are of economic value.

EGG DANCE, a once popular diversion in England, Scotland, Holland and some other parts of Europe ; now confined chiefly to Spain, among the people of Valencia. A number of eggs were arranged in a prescribed form upon the dancing floor, and among them a blind¬ folded dancer moved as best he might, to music ; the object being to execute an intricate dance without breaking the eggs. The music, like the arrangement of the eggs, was also prescribed.

EGG-EATING SNAKE, the Dasypeltis scahra, a tree-climbing species of coluber found in Central and South Africa. It is about two feet in length and is unique in its adaptation to the diet from which it derives its name. While the jaws are almost destitute of teeth and capa¬ ble of great distension, a substitute for the teeth is found in the elongated hypophyses or ventral processes of several of the cervical ver¬ tebrae, which project into the interior of the oesophagus as a series of saw-like teeth tipped with very hard cement substance. This mechan¬ ism

enables the snake to secure the entire con¬ tents of an egg as large as a hen's without losing a drop, for it is swallowed entire and only broken by contact with the oesophageal teeth when safely within the throat, when the contents are swallowed and the shell regur¬ gitated. Consult Fitzsimmons, ˆSnakes of South Africaˆ (Cape Town 1912).

EGG-FISH, any of various plectognath ˆˆglobe-fishes,® which swell themselves into the shape of an egg. See Globe-Fish.

EGG-PLANT, GUINEA SQUASH, or AUBERGINE (Solanum melongena) , a plant of the family Solanacece. Its original home is sup¬ posed to be the East Indies, where it has long been cultivated and from whence it has been introduced into all tropical countries and many temperate ones for the sake of its egg-like white, yellow or purple fruits, which are used as a vegetable. In the United States it is cultivated as far north as Long Island and southern Mich¬ igan. In the North the plants must be started under glass and transplanted to the field or garden after danger of frost has passed. They do best upon rich deep loams well exposed to the sun. Their principal insect enemies are practically the same as those of the potato and are combated similarly. (See Insecticide). Their fungus diseases are few and rarely dev¬ astating. The principal ones are a bacterial disease caused by Bacillus solanacearum, for which there seems to be no satisfactory remedy; anthracnose (Glceosporium melongence), which appears as pink-spotted sunken areas upon the fruits; leaf-spot (Phyllosticta hortorum), which turns the affected leaves brown and pro¬ duces holes in them, and a mold (Botrytis fasci-cularis), which produces soft spots with gray moldy surfaces upon the fruits. Each of these parasites may appear upon any of the green parts, but the parts mentioned are the usual ones. They may all be controlled by timely applications of any standard fungicide.

EGG-TOOTH, the hard calcareous pro¬ tuberance at the tip of the beak or snout of a chick or young reptile which is born within an egg having a tough shell, designed to assist the embryo in escaping. It wears a hole through the lining membrane of the egg, and then acts as a file to bore through the outer shell or wedge apart any crack. It is possessed by all birds and by such reptiles (turtles, lizards and snakes) as develop in eggs with hard coverings. Soon after the embryo goes free this excrescence falls off, and in this special temporary provision for a special non-recurring exigency, Darwin found an example, in his view, of the results of natural selection.

EGG-URCHIN, or SEA-EGG, any of the

typical globose sea-urchins, especially those of the genus Echinus. Similarly, the flat, bun¬ shaped echinoderms are called *cake-urchins,® the cockle-shaped (spatangoids) ^^heart-urchins,® and so on. See Echinodermata ; Sea-Urchin.

EGGA, eg'a, West Africa, town of Gando, in the Niger territories on the Niger. Pottery, iron, gold and wooden-wares, thick cloth, gen¬ erally dyed blue, and leather are manufactured, and an active river trade is carried on, especially in ivory. Pop. 12,000.

EGGAR-MOTH. See Egger-moth.

EGGELING, Julius, English philologist : b. Hecklingen, Germany, 12 July 1842. After studying at Breslau and Berlin, he went to Eng¬ land in 1867, and on account of his knowledge of Sanskrit was appointed secretary and librarian of the Royal Asiatic Society 1869, becoming pro¬ fessor of Sanskrit at University College 1872 and filling the same chair at the University of Edinburgh three years later. Among his publi-

cations are ^The Catapatha-Brahmana, Trans¬ lated according to the Text of the Madhyandina SchooP (1882-85) ; '^Catalogue of Buddhist Sanskrit Manuscripts in the Possession of the Royal Asiatic Society^ (with Cowell 1875) ; ^Catalogue of Sanskrit Manuscripts in the Li¬ brary of the India Office^ (1887-89) ; and edi¬ tions of ^ Vardhamana's Ganaratnamahodadhi^ (1879-80) ; the ^Katantra^ (1874-78), and of the ^Kanva Satapatha Brahmana^ (1902).

EGGER-MOTH, the name of certain species of Lasiocampid moths, allied to the silk¬ worm moths. Several species are found in European countries. The American species is the lappet-moth or Americana gastropacha.

EGGLESTON, Edward, American novel¬ ist and miscellaneous writer:

b. Vevay, Ind., 10 Dec. 1837; d. Joshua's Rock, Lake George, N. Y., 3 Sept. 1902. He entered the ministry of the Methodist Church and was more or less engaged in pastoral work for a number of years, at the same time contributing to various period¬ icals. He became literary and afterward super¬ intending editor of the New York Independent ; later, editor of Hearth and Home. From 1874 till 1879 he was engaged in the work of an independent church founded by himself (the Church of Christian Endeavor, Brooklyn), but in the latter year his health failed and he re¬ signed his position as pastor. Subsequently he devoted himself entirely to literary work. Among the most important of his works are ˆThe Hoosier Schoolmasterˆ (1871) ; ˆThe End of the Worlds (1872) ; *ˆMystery of Metropolis-villeˆ (1873) ; ˆSchoolmaster's Stories for Boys and Girlsˆ (1873); ˆThe Circuit-Riderˆ (1874); ˆChrist in Literatureˆ (1875, edited) ; Christ in Artˆ (1875, edited) ; ˆRoxy> (1878) ; ˆThe Hoosier Schoolboyˆ (1883); ˆThe Graysons: a Story of Illinoisˆ (1887) ; History of the United States and Its Peopleˆ (1888) ; ˆHouse¬ hold History of the United States and Its Peo¬ pleˆ (1888) ; ˆThe Faith Doctorˆ (1891) ; ˆDuf¬ fels, ˆ a series of short stories (1893) ; ˆThe Be¬ ginners of a Nationˆ (1896) and ˆThe Transit of Civilizationˆ (1900). His work as an histor¬ ian possessed much merit, in that it was based upon careful investigation and exhibited sound judgment. Yet it is by his early stories of the Middle West that he will always be best known. These stories gave to those who read them at that time a real delight. They were written without the slightest trace of literary art ; but their themes were wholly novel, and the un¬ studied simplicity of their narrator made them so natural and so life-like as at once to charm and surprise all sorts of readers. ˆThe Hoosier Schoolmasterˆ may be regarded as the first of a class of stories of which ˆ David Harumˆ and ˆEben Holdenˆ are much later examples. The book in reality marked a new departure in our national literature, for it owed absolutely noth¬ ing to any model, but was a tale told directly from life, and from American life of a primitive kind which had not before made its way into printed books. He became in 1900 president of the American Historical Association. See Hoosier Schoolmaster, The.

EGGS OF AMPHIBIA. See Egg.

EGGS OF BIRDS. See Egg.

EGGS OF FISHES. See Egg.

EGGS OF INSECTS. See Egg.

EGGS OF LOWER ANIMALS. See

Egg.

EGGS OF MOLLUSKS. See Egg.

EGGS OF REPTILES. See Egg.

EGHAM, England, an urban district in the county of Surrey, on the Thames, about 21 miles west of London. It contains the Royal Indian Engineering College, the Royal Hollo¬ way College for Women, and the Holloway Sanatorium. Runnymede, where King John signed Magna Charta, is in Egham parish. Pop.

12,551.

EGHERT, eg-ert. Saint, an English saint : b. Northumbria; d. Iona, 24 April 729. While studying in Ireland at the convent of Rathmel-sing he was afflicted by the plague prevalent in 664. He vowed that if he recovered he would leave his country and preach to the German pagans, recite his psalter daily and fast a day and a night in every week. In 686 he started out but was compelled to return by a storm. He then took up his residence on the Island Hy from which he sent Witbert, an Englishman, to the Frisians in 690. In 692 he sent forth Willibrord and his companions. He introduced the Roman method of celebrating Easter and the Roman tonsure. In 716 he went to Iona and persuaded the monks to follow the same customs.

EGIL SKALLAGRIMSSON, rgil skM-la-grim's6n, Icelandic bard or skald of the 10th century. He distinguished himself by his war¬ like exploits and adventures in Norway, Den¬ mark and England. Having killed in combat the son of Erik Blodox, King of Norway, he was doomed to death on being subsequently taken prisoner by that prince in Northumbria, but was allowed to redeem his life by giving a specimen of his powers as an improvisatore. He immediately composed and recited a poem in praise of Erik, known as ˆHofudhlausenˆ (The Redemption of the Head), which pro¬ cured him his life and liberty. Other works by him are ˆSonatorrek,ˆ composed on the death of his favorite son; ˆArinbjarnardrapaˆ con¬ cerning the life and deeds of his friend Arinbjorn, and the ˆSkjaldardrapaˆ (970). The Icelandic poem ˆEgill's Sagaˆ tells his story and contains his poems. The ˆSagaˆ was edited by Jonsson (1884-86 and 1894) and translated by N. M. Petersen (1862).ˆ The latest edition is by Dahlerup and J6nsson

(1901).

EGILSSON, Sveinbjom, svin'bern a'gilz-s5n, Icelandic critic: b. Gullbringasysla, 24 Feb. 1791 ; d. Reikiavik, 17 Aug. 1852. He studied at Copenhagen and became rector of a Latin school at Reikiavik. He investigated the native antiquities, edited a series of Icelandic histori¬ cal works, and completed a ˆPoetic Lexicon of the Ancient Tongue of the Northˆ (1855-60), published posthumously.

EGINHARD, a'gm-hard, or EINHARD,

In'hard, German historian : b. East Franconia, now the grand duchy of Hesse-Darmstadt, about 770; d. Seligenstadt, 14 March 840. He was educated in the schools of the abbey of Fulda. When about 25 he entered the service of Charlemagne and thereafter was in all things

the confidant of the emperor and one of the principal ministers. One of his great charges was the construction and repair of the public buildings. He was inseparable from the em¬ peror, residing in the palace and accompanying him in all his journeys and expeditions: the only time when they were temporarily separated was when, in 806, the secretary — for such he has always been called — went to Rome to obtain the approval of the Pope of a provision of Charle¬ magne's testament or will for a division of the empire among his sons after his death. That Eginhard possessed considerable learning appears from his extant writings. During his many years of study at Fulda he acquired all the secular knowledge obtainable in his time, and in the palace of Charlemagne enjoyed the advantage of converse with the celebrated Alcuin. It was on the advice of the secretary that Charlemagne in 813 made his eldest son, Louis, his partner in the empire ; and when Louis, on his father's death, became sole emperor, he retained Eginhard in all his high offices and appointed him tutor of his son Lothair. In 830 he withdrew from the court and retired to his large estates at Mulinheim, where he had erected a splendid basilica and founded various

religious institutes, and there passed the remainder of his life. He changed the name of the place to Seligenstadt (City of the Saints, namely, of Saints Marcellinus and Petrus). In this basilica he was entombed, be¬ side his wife, Emma, who died four years be¬ fore him. According to an old legend Emma was a daughter of Charlemagne, and as time went on the story of their love adventures was added to from the fount of romantic imagina¬ tion : in fact, Charlemagne had no daughter named Emma, and the lady Emma who was Eginhard's wife was the sister of Bernharius, bishop of Worms. Eginhard's ˆLife of Charle¬ magne (Vita Caroli Magni), written in Latin in a style and imitative of Suetonius' ˆLives of the Caesars,ˆ is one of the most notable literary monuments of the Middle Ages ; it was long used as a manual of school instruction and hence has survived in a multitude of manu¬ script copies. Another work of his is a history of the Franks, ˆAnnales Regum Francorum, Pippini Caroli Magni et Hludowici Imperatorisˆ (Annals of the Frankish Kings Pippin, Charle¬ magne and Louis the Emperor). There are extant 62 of his ˆLettersˆ (Epistolce) , and a narrative of the translation from Rome to Seligenstadt of the relics of Saint's Marcellinus and Petrus (ˆHistoria Translationis Beatorum Christi Martyrum Marcellini et Petriˆ). To the narrative he appends a poem on the same subj ect.

EGLANTINE, eg'lan-tm or -tin, the name of the sweet-brier rose (Rosa rubiginosa) , in the poetry of Chaucer, Spenser and Shakes¬ peare. The name is common among the English poets ; the earlier ones applied it to any wild rose, and Milton seems to confound several different species, among them the honeysuckle, *etc.* The flower is a native of Europe and Asia, but was easily naturalized in America and, being hardy, it withstood the severe winters, and now grows in profusion in the territory from Nova Scotia to Ontario, south to Tennessee, and east to the shores of Virginia. It is from four to six feet high,

sometimes growing as a long spine-covered wand. The pink or white flowers are a marked feature of the flora of this region, during the months of June and July. A climbing-shrub, native of Asia (Rosa eglanteria) , with yellow, ill-smelling flowers, is also sometimes called eglantine.

EGLESTON, Thomas, American mineral¬ ogist: b. New York, 9 Dec. 1832; d. there, 15 Jan. 1900. He was graduated at Yale College in 1854, and at the School of Mines in Paris in 1860. He returned to the United States in 1861 ; and soon afterward was appointed director of

the mineralogical collection and laboratory of the Smithsonian Institution in Washington. He established the School of Mines as a depart¬ ment of Columbia College, New York; and was professor of mineralogy and metallurgy there 1864-97. He was a United States commissioner to examine the fortifications of the Atlantic coast in 1868; and one of the jurors of the In¬ ternational Exposition at Vienna in 1873. He became a member of the Legion of Honor (1890) ; president of the American Institute of Mining Engineers, of which he was also a founder, and vice-president of the New York Academy of Sciences 1869-81. He published ˆThe Metallurgy of Gold and Silver in the United Statesˆ ; ˆA Catalogue of Minerals and Their Synonymsˆ ; Life of Major-General Pat¬ erson, of the Revolutionary army.

EGLI, a'gle, Johann Jakob, Swiss geog¬ rapher : b. Uhwiesen-Laufen, canton of Zurich, 17 May 1825 ; d. 1896. He was made professor of geography at the University of Zurich 1883, after teaching in several schools, and did much for the accuracy, precision and uniformity of the nomenclature of geography. Among his earlier works are a thesis on the ˆDiscovery of the Sources of the Nileˆ ; and a ˆGeography of Switzerland.ˆ Later works in¬ clude ˆNomina Geographica : Versuch einer all-gemeinen geographischen Onomatologieˆ ; ˆGeschichte der geographischen Namenkundeˆ ; ˆNeue Erdkundeˆ ; ˆNeue Handelsgeographieˆ ; and ˆDer Volkergeist in den geographischen Namen.ˆ

EGLON, A king of Moab mentioned in the book of Judges (iii, 13, iv, 20). He formed a confederation with the Amalekites and Am-morites ruling over them for 18 years until assasinated by Ehud, the Benjaminite, who de¬ feated his leaderless peoples and gave them deliverance and a peace which lasted for 80 years. Eglon is also the name of a place mentioned in the book of Joshua (x, 1-27, xii. 12) located not far from Lachish. Its king Debir joined the Confederation opposed to Joshua's advance into Canaan. After the battle of Ajalon it was destroyed. It has been identi¬ fied by leading archaeologists with Tell Nejleh.

EGMONT, Justus van, Flemish painter: b. Leyden 1602: d. Antwerp, 8 Jan. 1674. He was a pupil of Kaspar Van den Hoeck (1651) and later of Rubens. He established himself at Paris where he became court painter to Louis XHI and Louis XIV, and was also one of the founders of the Royal Academy of Painting and Sculpture 1648. Among his works are ˆPortrait of Archduke Leopold Williamˆ ; two ˆPortraits of Philip IV of Spainˆ (Vienna

Museum) ; ˆ Maria de Mediciˆ (Schleissheim Gallery) ; and ˆPortrait of Queen Christineˆ

EGMONT, Lamoral, Count, Dutch states¬ man: b. La Hamaide, Hainault, 18 Nov. 1522* d. Brussels, 5 June 1588. He entered the mili¬ ary service, and gained a high reputation under Charles V ; distinguished himself as general of cavalry under Philip II ; and was made stadtholder of the provinces of Flanders and Artois. His connection with the Prince of Orange and his most distinguished adherents made him an object of suspicion to the Spanish court, and Egmont, with Philip of Montmorency, Count Hoorn, became the victims of hate and fanati¬ cism. The Duke of Alva sent by Philip II to the Netherlands in 1567 to reduce the insurg¬ ents, had Egmont and Hoorn treacherously seized, and caused them both to be executed at Brussels. Egmont died with heroic firmness. He had before written to Philip H, that ®he had never joined in any undertaking against the Catholic religion, nor violated his duties as a loyal subject.ˆ But the Prince of Orange hav¬ ing taken the field as the champion of his country's wrongs, an example was thought necessary to strike terror into the insurgents. There can be little doubt that the Spanish king unnecessarily dreaded the influence of the gal¬ lant soldier but incapable politician. When the troubles in the Netherlands broke out, Egmont, moved by generous sympathy for his injured countrymen, rather than by any fixed principle of ˆ action, was found side by side with the Prince of Orange, in the van of the malcon¬ tents. But in opposition to the popular move¬ ment came his strong feeling of loyalty to Spain, and his still stronger devotion to the Roman Catholic faith. Thus, the opposite forces by which he was impelled neutralized each other, and, ever acting from impulse, he did not calculate the consequences of his con¬ duct. Consult Motley, J. L., ˆRise of the Dutch Republicˆ (London 1861) ; Juste, T., ˆLe Comte d'Egmont et le Comte Hoornˆ (1862) ; Goethe, ˆEgmont,ˆ a drama; Brunelle, ˆLloge du Comte Egmontˆ (1820).

EGMONT. Goethe began work on his tragedy of ˆEgmontˆ (1788) as early as 1775, in the period of his ˆˆstorm and stress®; and as in 'ˆGdtz von Berlichingenˆ he had represented a champion of liberty and self-

reliance doomed to defeat in a time of all-powerful tyranny, so in the revolt of the Netherlands — which he carefully studied — he was especially attracted by another victim of despotism, another prophet of a better age. Goethe's ˆEgmontˆ is, however, an historical character in hardly anything but his execution at the hands of the Spaniards. He is, rather, like Goethe himself, young, demoniacal, improvident, trustful — a lover and a patriot, the idol of the people, but in no sense their leader. This character Goethe presents in a setting of popular turmoil and political intrigue, revealing itself in its abhor¬ rence of both, but particularly in its serene self-abandonment to love of an humble maiden. Egmont's Klarchen is, if it be possible, as naive a martyr to purely human impulse as Gretchen in ˆFaust.ˆ And this play, otherwise quite realistic, ends with an operatic apotheosis of Egmont's beloved : in a dream he sees her as the goddess of liberty, ready to crown him with a wreath.

Scjiiller rightly defined ˆEgmontˆ as a tragedy of character. There is no development of qualities in the hero, there is no dramatic conflict ; there is merely a stratagem in which he allows himself to be ensnared. Egmont's very being is fatal, not his conduct; for he does not act. The whole piece is rather po¬ tentially than actually dynamic. There are cu figures and popular scenes of truly

bhakespearean vividness, but the prevailing qualityˆ isˆ picturesqueness — else, perhaps, Bee¬ thoven s incidental music would not be so ap¬ propriate. Completed in Italy, the play reveals Goethe's later classical tendencies chiefly in the scrupulous finish of its prose style. Translated by F. Boott (Boston 1871), and by Sir Walter Scott (London 1850). Edited by Max Winkler (Boston 1898).

William G. Howard.

e'go-izm (Fr, egoisme; Lat. ego.

D), an ethical term used in the sense of selfish¬ ness; it is specially opposed to altruism. The word is sometimes used to denote a meta¬ physical system of subjective idealism, in which the Ego is the sole reality. See Altruism ; Ethics.

egoist. The ˆ (originally published in 1879), may be described as the quintessence of Meredithisrn. That ®acute and honorable mi¬ nority,® which in the eighteen-nineties made it their business to ˆdiscover® the great obscure novelist, with James Thomson,

Stevenson and Henley, as their earliest proselytizers, pro¬ claimed ˆThe Egoistˆ as the supreme and oc¬ cult masterpiece of its author. Appreciation of it was made the touchstone of literary intelli¬ gence, much as the later novels of Henry James, a decade or so afterward, were regarded by ®the precious® of the day. When one says that in those novels of Henry James we have the method and manner of ‘ˆThe Egoistˆ run to seed, we go far toward characterizing the book from which James learned not wisely but too well. ˆThe Egoistˆ is an exceedingly elabor¬ ate, and so to say microscopic, study of a sort of sophisticated modern Lovelace, Sir Willoughby Patterne of Patterne Hall, handsome, culti¬ vated, rich, charming, and yet dissected under the pitiless eye of that ˆˆComic Spirit,® which Meredith invokes as his muse, a muse that loves ®to uncover ridiculousness in imposing figures,® supremely and mathematically absurd in his very perfection and complacency. ˆComedy,® says Meredith by way_ of prelude, *is a game played to throw reflections upon social life, and it deals with human nature in the drawing¬ room of civilized men and women, where we have no dust of the struggling outer world, no mire, no violent crashes, to rnake the correct¬ ness of the representation convincing.® In other words, the atmosphere of ˆThe Egoistˆ is one of intense social rarefaction, and the drama, such as it is, that of ˆFire Shades, only per¬ ceptible by the highly specialized beings accus¬ tomed to draw health in that social ether. _ The hard brilliancy of ˆThe Egoistˆ is undeniable. It is more like one of Congreve’s comedies than anything else in English, but it is Congreve psychologized; for instead of human beings for dramatis personce, we have highly attenuate states of mind; and the philosopher takes the place of the man of the world. The style and mood also too frequently remind one of John

Donne, fantastically metaphysical and perversely obscure. While we admit that it is an amazing tour de force, one cannot but ask whether it was worth doing, after all? That such great powers should have expended themselves, with such an array and exuberance, upon so slight a theme — a theme, of course, so essentially human, but in the case of ˆThe Egoist,ˆ at¬ tacked in so frivolous a manifestation. It is probable, as time goes on, that ˆThe Ego¬ istˆ will be regarded chiefly as a ˆˆcuriosity of literature,® one of those cryptic great books such as the ˆTitanˆ of Jean Paul Richter — a writer who, with Carlyle, exercised great influ¬ ence for the bad on Meredith's style. Booklovers here and there may pick out this and that fine thing and passage, but posterity, on the whole, will scarcely have time or patience to read ˆThe Egoist.ˆ

Richard Le Gallienne.

EGRET, e'gret, a name given to those spe¬ cies of white herons which have the feathers of the lower part of the back elongated and their w €bs disunited owing to the absence of barbules at certain seasons of the year, so that they form a soft and flowing train reaching to the tail or beyond it. Their forms are more graceful than those of the common herons. The name is properly applied to two American and two Eu¬ ropean species. The American egret (Ardea egretta) has the plumage white, or partly of a

creamy color. The bird is found breeding from Florida to New York and along the shores of the Mexican Gulf to Texas, but ranges much beyond these limits at other seasons. Its food consists of the smaller quadrupeds, small fishes, frogs, lizards, •snakes and insects, and it breeds like other herons. The long silky filaments of the back are hardly to be seen, except about the love season, which varies from early spring to midsummer according to climate ; both sexes possess this train and many are shot to obtain these feathers for ornamental purposes. The little white egret or snowy heron of America {A. candidissima) is much smaller and has a crest on the head which the large species lacks. In habits and distribution it is similar. The European egret (A. alba) is about 40 inches long, of a pure white plumage. It is common in southern Europe, but comparatively rare in

the northern and central parts. The little egret (A. garsetta) is about 22 inches long from bill to end of tail; the plumage is white; from the hinder part of the head spring two narrow feathers four inches long. This species is most abundant in southern Europe and northern Africa; it occasionally wanders as far as Eng¬ land. The Louisiana heron (A. tricolor) and the reddish egret (A. rubescens) are often given the name, but the latter is white in winter only, and the former is partly colored at all seasons. Both are maritime birds, chiefly of the Gulf States.

‘T1

4’

V

mkˆ ’ . ■ ‘■ ‘-ˆi* ■■ -iˆ-” ”:/”»W ‘ I,

ˆ■W , _ .V • r, »;■

.J

r.ˆ, n

■ A-

KT

‘ “’♦* ‘V ■ ‘|,* •<»; • ‘ ,

*■ v;3”;vs>? <-‘

fcflwtˆ‘rN ˆt>M luvc

yxm m •amty #tnd ˆb€rtU34«. *6’ f<%hnt *w‘if 1

M’SO. lB”* ft* ■«!»« of EgoK’ ■«*-‘ Jh* ,t».-\ˆˆc%i:>IlT ft ’a!!w ˆ i

ft-‘ st-owtslv***!! (tevaitoM’OT, ftit •‘TJit ■I’ko’- ‘T’ ■.

t.

unay ».h»v

. . Mid dn iW

iv -ˆhoW time ®r pati«ce to

nKtn {A’ Qiijˆ ˆ

ˆ ˆ Pˆ VˆJlitt piutaaip:. 1>!» i7y ItmiVrn Eurt>pf» brtt-vcjy

the n»Tiiie rjl Mtd centra! p» rtv Tat

the nˆTihe ni «>d centra! p» rtv ˆ ˆ .

(>f. b 4»bout 22 mcheˆi

(0 «d the pitimageˆu ˆ‘tiiˆi 4i«mi4h*c.

hiRtkr tA*‘f iuad “ˆ‘pring Tˆ>iuri5piˆ

I‘hU jspeeˆ vˆ most

AfeKt4fr?w»

ir (/i, AfCˆ’pfJˆn

giVtiˆ ihr . hw» rV K»i«*ˆr |5 m_ >Tt«#er

. >• ˆ ot piˆny pf ˆ *he

, „ .ˆr’ . ;: /Hˆ.r n:

‘ ˆT’ˆlwBiHIIˆBi 1 1 ! *1,’ .. _ ‘i. ‘xi *

«»iˆ, tV jfˆˆrˆiw.!* iˆ iw»rUv t.c*f>rˆ at ˆ#orir , ˆI6th4fiu’« m’»ptim« Urˆ amajt ol (he CjuU SuteA.

ˆi’ˆ’ ‘i’l*/’ ■ ‘ ”“**11ˆ ”’

IT-JT . .’ /rt ‘ -‘ .IV •- ■ . ;■ •> -,’ iˆmm

rm§m

Vol. 10, EGUSQUIZA TO FALSETTO

Americana

V*V.':;. •>

h J *, V^BB & # 1 V 9^*8

I

i

1

1

!

\

1

|

I

I

I

1

1

THE

ENCYCLOPEDIA

AMERICANA

JT

Unjvehsal

MgOWLEDCE;

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK CHICAGO

I

I

I

l

i

‘i

I

1

§

%

i

; «a$M2S»;

Copyright, 1918

BY

The Encyclopedia Americana Corporation

Copyright, 1922 by

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, EINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN I p $22

©(3.A654 317

PARTIAL LIST OF CONTRIBUTORS TO VOLUME X

ALDEN, RAYMOND M., Ph.D., Litt.D.

Professor of English, Leland Stanford Junio- Uni¬ versity

ESSAY

BERRY, GEORGE R., Ph.D., D.D.

Professor of Old Testament Interpretation and Semitic Languages, Colgate University

ESTHER, BOOK OF

BOGART, ERNEST L., Ph.D.

Professor of Economics, University of Illinois

FACTORY SYSTEM, THE

BOTHNE, GISLE, A.B.

Professor of Scandanavian Languages and Literature, University of Minnesota

ERASMUS MONTANUS

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

ENGLISH LITERATURE, VICTORIAN PERIOD— POETRY AND PROSE
ESSAY ON MAN, THE

BUCK, H. W., E.E., Ph.D.

Consulting Electrical Engineer, New York

ELECTRICAL ENGINEERING

BUELL, MARCUS D., S.T.B., D.D.

Professor of New Testament Greek and Exegesis, Boston University School of Theology

EPHESIANS, EPISTLE TO THE

BUTLER, AMOS W., A.M., LL.D.

Zoologist and Anthropologist, Indianapolis

ETHNOLOGY

CAIRNS, WILLIAM B., Ph.D.

Associate Professor of American Literature, Univer¬ sity of Wisconsin

ELSIE VENNER

FALL OF THE HOUSE OF USHER

CAJORI, FLORIAN, Ph.D., LL.D., Sc.D.

Professor of History of Mathematics, University of California

EQUATIONS, GENERAL THEORY OF

CANFIELD, ARTHUR G., Ph.D.

Professor of Romance Languages, University of Michigan

ELLE ET LUI

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

EMBRYOLOGY OF PLANTS

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of Cincinnati

ELECTRA

EXEMPLARY NOVELS

CHEYNEY, A. R.

Philadelphia, Pa.

ELECTRIC ALTERNATING CURRENT MACHINERY

CHITTENDEN, FRANK H., Sc.D.

Entomologist, in Bureau of Entomology, United States Department of

Agriculture, Washington, D. C.

ENTOMOLOGY

CHUBB, PERCIVAL

Leader of the Ethical Society of Saint Louis

ETHICAL MOVEMENT AND ETHICAL SOCIETIES

CLARK, L. PIERCE, M.D.

New York City

EPILEPTIC CONSTITUTION

COCHRANE, CHARLES H.

Author of “ Modern Industrial Progress ”

ENGINE

ENGINEERING TERMS

COOPER, LANE, Ph.D.

Professor of English Language and Literature, Cornell University

ENGLISH MAIL COACH, THE

COUMBE, CLEMENT W.

Technical Art Expert

ENAMELS AND ENAMELING

ENGRAVINGS

FAIENCE

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell Uni¬ versity

EMPIRICISM

EPISTEMOLOGY

DARTON, NELSON H.

Geologist, United States Geological Survey

EXPLOSION CRATERS

DEIMEL, RICHARD F., B.S., M.A.

Assistant Professor of Mechanics, Stevens Institute of Technology

ELASTICITY

DEWEY, JOHN, Ph.D., LL.D.

Professor of Philosophy, Columbia University

ETHICS

EGLIN, WM. C. L., E.E.

Second .Vice-President and Chief Engineer The Philadelphia Electric Company

ELECTRIC DIRECT CURRENT

EISELEN, FREDERICK CARL, Ph.D., D.D.

Professor of Old Testament Interpretation, Garrett Biblical Institute

EXODUS, BOOK OF

Contributors to Volume X — Continued

ERSKINE, JOHN, A.M.

Adjunct Professor of English, Columbia University

ENGLISH LITERATURE, ELIZA¬ BETHAN PERIOD— NON-DRAMATIC

POETRY

FARQUHAR, HENRY H.

Consultant in Industrial Management and Instructor in the Harvard Business School

FACTORY MANAGEMENT

FERRIS, RICHARD, C. E., Sc.D.

Editorial Staff of The Americana

ETHER

FORD, J. D. M., Ph.D.

Smith Professor of French and Spanish Languages, Harvard University

EL SOMBRERO DE TRES PICOS FABULAS OF TOMAS DE IRIARTE

FOWLER, HENRY THATCHER, Ph.D.

Professor of Biblical Literature and History, Brown University

EZEKIEL, BOOK OF

GARNER, JAMES W., Ph.D.

Professor of Political Science, University of Illinois

ENEMY ALIEN PROBLEMS

GAUSS, CHRISTIAN, Litt.D.

Professor of Modern Languages, Princeton Uni¬ versity

EMILE

GREENLAW, EDWIN, A.B., A.M., Ph.D.

Kenan Professor of English in the University of North Carolina

FAERIE QUEENE, THE

HALE, EDWARD E., Ph.D.

Professor of English, Union College, Schenectady, N. Y.

ENGLISH LITERATURE ESSAYS OF BACON

FAIRY TALES OF HANS CHRISTIAN ANDERSEN

HALLER, WILLIAM, Ph.D.

Instructor in Englisti, Columbia University

ENOCH ARDEN

HAMLIN, ALFRED D. F., A.M., L.H.D.

Professor of Architecture, Columbia University

EGYPTIAN ARCHITECTURE ENGLISH ARCHITECTURE

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

ESSAYS OF ELIA EXCURSION, THE

HARRY, JOSEPH E., Ph.D.

Author of “ The Greek Tragic Poets.”

EURIPIDES

HAYES, DOREMUS A., Ph.D., S.T.B.

Professor of New Testament Exegesis, Garrett Biblical Institute, Evanston, Ill.

EXEGESIS

HIBBEN, JOHN GRIER, Ph.D., LL.D., L.H.D.

President of Princeton University

EPICUREANISM

HOWARD, WILLIAM G., A.M.

Assistant Professor of German, Harvard University

ELECTIVE AFFINITIES, THE

INGERSOLL, ERNEST

Naturalist and Author

EYESIGHT IN THE LOWER ANIMALS

IN GERSOLL,’ HELEN

Naturalist

EVERGREENS

JACKSON, DUGALD C., C.E.

Professor of Electrical Engineering, Massachusetts Institute of Technology

ELECTRICAL MEASURING INSTRU¬ MENTS

KELLOGG, VERNON, A.B., M.S.

Professor of Entomology, Leland Stanford Junior University, California

EVOLUTION

EVOLUTION, THEORIES OF

KENNELLY, A. E., Sc.D.

Professor of Electrical Engineering, Harvard Uni¬ versity

ELECTRICAL TERMS

KRAPP, GEORGE P., Ph.D.

Professor of English, Columbia University

ENGLISH CHRONICLES

LAWRENCE, WILLIAM WITHERLE, Ph.D.

Professor of English, Columbia University

ENGLISH LITERATURE, MIDDLE PERIOD

LINDQUIST, DAVID, E.E.

Chief Engineer, Engineering Department, Oth Elevator Company.

ELEVATORS

MARTIN, THOMAS C., E.E.

Secretary National Electric Light Association

ELECTRICAL MANUFACTURING INDUSTRY

MAVER, WILLIAM, Jr., C.E.

Consulting Electrical Engineer

ELECTRIC MACHINE ELECTRIC SIGNALING ELECTRIC TRANSMISSION OF ENERGY

ELECTRIC UNDERGROUND CABLES AND CONDUITS

ELECTRICITY, ITS HISTORY AND PROGRESS

McGREGOR, JAMES H., Ph.D.

Professor of Zoology, Columbia University

EMBRYOLOGY EMBRYOLOGY, HUMAN

Contributors to Volume X — Concluded

MEADER, JOHN R.,

Editor and Author

EMPLOYMENT MANAGER EMPLOYMENT MANAGEMENT

MOSES, MONTROSE J., B.S.

Dramatic Critic

FAITH HEALER, THE MUNROE, CHARLES E., S.B., Ph.D.

The George Washington University, Washington, D . C.

EXPLOSIVES

RISTEEN, ALLAN D., Ph.D.

Director Technical Research, The Travelers Insur ance Company

ELECTRON THEORY ENERGETICS

PIERPONT, JAMES, Ph.D., LL.D.

Professor of Mathematics, Yale University

EQUATIONS, GALOIS' THEORY OF

RINES, IRVING E.

Editor of " History of the United States "

ELECTIONS

ELECTORAL QUALIFICATIONS EXECUTIVE

ROUSH, G. A., A.B., M.S.

Assistant Secretary, American Electrochemical Society

ELECTROCHEMICAL EQUIVALENTS ELECTROCHEMICAL INDUSTRIES ELECTROCHEMISTRY ELECTROLYSIS

SAMUELS, BERNARD, M.D.

New York City

EYE, THE

SANBORN, F. B., A.B.

Author of a “ Life of Emerson ”

EMERSON, RALPH WALDO

SCHMIDT, NATHANIEL, A.M.

Professor of Semitic Languages and Literature, Cornell University

ENOCH, BOOK OF ESCHATOLOGY

SCHULMAN, A. G., B.A.

Department of Art, College City of New York

ETCHING: ITS TECHNIQUE AND GREAT MASTERS

SELLARS, ROY WOOD, Ph.D.

Professor of Philosophy, University of Michigan

EUCKEN, RUDOLF CHRISTOPH

SHERMAN, STUART P., Ph.D.

Professor of English, University of Illinois

EMPEDOCLES ON ETNA EOTHEN, ALEXANDER WILLIAM KINGLAKE

SINGLETON, ESTHER

Author of “ French and English Furniture,” “Art in Belgian Galleries,” etc.

EMBROIDERY

SMITH, EDWARD WANTON, Ch.E.

Factory Engineer, The Electric Storage Battery Company, Philadelphia

ELECTRIC STORAGE BATTERY

SPINGARN, J. E., Ph.D.

Major, Infantry, U. S. A., formerly Professor of Comparative Literature, Columbia University

ENGLISH LITERATURE, ELIZA¬ BETHAN PERIOD— PROSE

STEINMETZ, CHARLES P., Ph.D.

General Electric Company, Schenectady, N. Y.

ELECTRICITY

/

TASSIN, ALGERNON, A.M.

Assistant Professor of English, Columbia University

ENGLISH LITERATURE, VICTORIAN PERIOD — DRAMA

TENNEY, ALVAN A., Ph.D.

Assistant Professor of Sociology, Columbia Univ.

EUGENICS

THOMSON, ELIHU, Ph.D., Sc.D.

General Electric Company, West Lynn, Mass.

ELECTRIC WELDING

THORNDIKE, A. H., Ph.D., L.H.D.

Professor of English, Columbia University

ENGLISH LITERATURE, ELIZA¬ BETHAN PERIOD— THE DRAMA

TOUSEY, SINCLAIR, M.D.

New York City

ELECTROTHERAPEUTICS

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Univ.

ELEGY WRITTEN IN A COUNTRY CHURCHYARD

TUCKER, MARION, Ph.D.,

Professor of English, The Polytechnic Institute of Brooklyn

EPISTLE TO ARBUTHNOT EPISTLE TO AUGUSTUS FABLE FOR CRITICS, A

UNDERHILL, JOHN GARRETT, Ph.D.

Representative of the Sociedad de Autores Espanoles in the United States and Canada

EL GRAN GALEOTO ELECTRA

VAN DOREN, CARL, Ph.D.

Associate Professor of English, Columbia University

EVANGELINE

VEAZIE, WALTER B., Ph.D.

Department of Philosophy, Columbia University

ESSAY ON THE HUMAN UNDER¬ STANDING, AN

WALSH, JAMES J., Ph.D., M.D., Litt.D., Sc.D.

Author of “ The Thirteenth the Greatest of Cen¬ turies ”

EIGHTEENTH CENTURY EIGHTH CENTURY ELEVENTH CENTURY

WILCZYNSKI, ERNEST J., Ph.D.

Professor of Mathematics, University of Chicago

EQUATIONS

KEY TO PRONUNCIATION.

a

far, father

n

Span, h, as in canon (can’yon) p in on (pen’yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

*■

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

a

all, fall

o or 5

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

‘ 9

book, look

e

her, over: also Fr. e, as in de ; eu, as in neuf ; and oeu, as in

oi

oil, soil; also Ger. eu, as in beutel

boeuf, coeur; Ger. o (or oe), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

ii

between u and e, as in Fr. sur,

Ger. Muller

i or 1

him, it

i

between e and i, mostly in

V

of, very

Oriental final syllables, as, Ferid-ud-din

y

(consonantal) yes, young

j

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents, to indicate

point, Jean, temps

syllabic stress

GUSQUIZA, Juan Bautista, hoo-an’

ba-tes’ta a-goos-ke’tha, Paraguayan statesman : b. Asuncion, 1845. He was a lieutenant-colonel in the war with Uruguay, Brazil and the Argentine Republic, later being appointed Secretary of War and attaining the rank of general. He was president of Paraguay from 1894 to 1896.

EGYPT. (Greek, AZytmros, Aiguptos ; Hebrew, Mizraim or Tl¥D Mazor ; also called Dima , Pathros (Is. xi, ii) and DH pK Erez- Ham, <(The land of Ham® (Ps. cvi, 22). Assyrian , Muzri; Arabic t°Z ,Misr or Masr. In Hieroglyphics, ˆ Kamt). Its, present

name is derived from the Greek, Aiguptos (meaning obscure). The Hebrew name Miz¬ raim, is the dual form of Mazor (a fortified or walled-in place or country), viz., two Mazor s, <(Upper and Lower Egypt.® But its principal name upon the monuments and in the papyri is Kami or Kamt ((Black land®, an appropriate name, owing to the black alluvial soil in the Nile Valley, in contradistinction to the reddish soil of the neighboring land on both sides of the Nile.

Modern Egypt is a vast country extending from the Mediterranean Sea, lat. 31° 35′ to parallel 22° N. 1., called Egypt Proper, thence southward to the British possessions in equato¬ rial Africa, which latter region (known as the Egyptian Sudan) is jointly governed by Great Britain and Egypt. The eastern boundary is the Red Sea, and on the extreme northeast, Wady- el-Arish, Syria. The western boundary

runs northwest to Tripoli, and thence southeast through the Libyan desert, to a point 200 miles west of Wady-Halfa. The area of Egypt (ex¬ clusive of the Sudan) is about 363,181 square miles, the country extending 675 miles north and south, and 500 miles east and west.

Topography. — In modern as in ancient times Egypt was always divided into the Upper and the Lower, or the Southern and Northern countries. At a very early period it was fur¬ ther subdivided into a number of departments, called nomes, varying in different ages; 42 was probably the usual number. A third great di¬ vision, the Heptanomis, <(seven nomes? pre¬ served in the modern (Wustani) <(Middle Egypt,® was introduced at the time of the geographer Ptolemy (first half of the 2d century a.d.). Each nome had a separate local government. In the 5th century a.d., Egypt was divided into six eparchies. Augusta Prima

and Secunda on the east, 2Egyptiaca on the west, Arcadia (the former Heptanomis), The- bais Proxima as far as Panapolis, and Thebais Supra to Philae. Under the Mohammedans, the triple division, Misr-el-Bahri (Lower Egvpt) ; el-Wustani (Middle) ; and es-Said (Upper) has prevailed, but the number of subdivisions has varied. At present there are altogether five governments of principal towns, and 14 provinces subdivided into districts.

Egypt is connected with Asia by the Isthmus of Suez, across which runs the great canal, about 100 miles long. The inhabited portion of Egypt is mainly confined to the valley and delta of the Nile, the widest part of which does not exceed 120 miles, while in many parts of the valley it is only from 3 to 15 miles wide, and at the southern frontier of Egypt proper, only two miles. West of the Nile are several oases. Two ranges of lofty mountains, the Arabian Hills on the east and the Libyan on the west, enclose this valley. The delta of the Nile is traversed by a network of primary and secondary channels and is also intersected by numerous canals.

Seven principal channels or mouths were usually recognized in ancient times, the names of which, going from east to west, were the Pe- lusiac mouth, the Tanitic, the Mendesian, the Pathmitic, the Sebennytic, the Bolbitine and the Canopic. Now only the Bolbitine (called Ro¬ setta) and the Pathmitic (Damietta), are in ex¬ istence. The Nile has a current running sea¬ ward at the rate of 2*4 or 3 miles an hour and the stream is always deep enough for naviga¬ tion. The water becomes a reddish-brown dur¬ ing the annual overflow ; it is esteemed highly salubrious. Near the sea are the lakes Men- zaleh, Birket-el-Mariut and other extensive but shallow lagoons.

The openings or lateral valleys of the hills confining the valley of the Nile are compara¬ tively few, or, being little frequented, are not well known. Those on the east side with which we are best acquainted are the Wady-el Tili, <(Valley of the Wanderings® (of the children of Israel), leading from the neighborhood of Cairo to the head of the Gulf of Suez, and that through which passes the road from Koptos to Kosseir on the Red Sea. A short distance west of the Nile and above the Delta is the fertile valley of Fayum, in the northwest and lowest part of which is the Birket-el-Kerun Lake, fed by a canal or branch from the Nile. The level of the lake is now 130 feet below that of the

Mediterranean. This lake, formerly known as Lake Moeris, covered a far larger area, and by means of sluices and other works was utilized for irrigation purposes. The deserts on the west bank of the Nile generally present to view plains of gravel or of fine drifting sand; on the east, the scene is varied by rocks and moun¬ tains.

Climate. — The atmosphere in Egypt is ex¬ tremely clear and dry, the temperature regular and hot, though the heat is tempered during the daytime for seven or eight months of the year by the strong wind which blows from the north and which enables sailing vessels to ascend the river against the stream. The winter months are the most delightful of the year, the air being cool and balmy and the ground covered with verdure; later, the ground becomes parched and dry, and in spring the suffocating k ham- seen, or simoon, frequently blows into the Nile valley from the desert plains on each side of it, raising lofty clouds of fine sand and causing great annoyance, until the rising of the river again comes to bless the land. It rains but rarely, except near the seashore. At Mem¬ phis the rain falls perhaps three or four times in the course of a year, and in Upper Egypt only once or twice, if at all ; showers of hail sometimes reach the borders of Egypt, but the formation of ice is very uncommon. Earth¬ quakes are occasionally felt and thunder and lightning are neither frequent nor violent. Egypt is not remarkably healthy, especially in the delta, where ophthalmia, diarrhoea, dysen¬ tery and boils are somewhat prevalent. But many invalids now winter in Egypt, especially in the neighborhood of Cairo, or higher up the river, where the air is dry and pure.

The Nile, Irrigation and Agriculture. — The great historic river Nile, Greek Neilos; Latin Nilus; Hebrew Yeor or Shihor; Arabic En- Neel (black), is 3,400 miles in length, the long¬ est in Africa and one of the

great rivers of the world.' It divides at lat. 30° 15', just below Cairo, into two main streams, the one entering the sea by the Rosetta mouth on the west, the other by the Damietta mouth on the east. These two streams carry the bulk of the Nile water to the Mediterranean and enclose a large por¬ tion of the territory known as the delta, from its resemblance to the Greek letter A and which owes its existence to the deposits of alluvial matter brought down by the stream. The most remarkable phenomenon connected with the Nile is its annual regular increase, arising from the periodical rains which fall within the equatorial regions and the Abyssinian Mountains. As rain rarely falls in Egypt, the prosperity of the country entirely depends on this overflowing of the river. On the subsiding of the water the land is found to be covered with a brown slimy deposit, which so enriches the soil that with a sufficient inundation, it produces twq crops a year, while beyond the limits of the inundation there is no cultivation. The Nile begins to rise about the middle of June and continues to increase until about the end of September, overflowing the lowlands along its course, the water being conveyed to the fields by artificial courses where natural channels fail. After remaining stationary for a short time, the river rises again but subsequently begins to subside, showing a markedly lower level in

January, February and March and reaching its lowest in April, May and early June. The over¬ flow water is now to a great extent managed artificially by means of an extensive system of reservoirs and canals, so that after the river subsides it may be used as required. A certain proportion of the fields, after receiving the over¬ flow and being sown, can ripen the crop without further moisture; but many others always re¬ quire artificial irrigation. Steam pumps are now largely used in northern Egypt. Latterly the government has tried to make the farmers less an'd less directly dependent on the inunda¬ tion, and the great barrage of the Nile below Cairo, the largest weir in the world, is one means to this end, the great dam or barrage at Assouan being another.

The native methods of raising water for irri¬ gation are chiefly by the sakich, or water wheel, and the shddouf. The first consists of a hori¬ zontal wheel turned by one or two oxen, which sets in motion a vertical wheel, around which are hung a number of earthen jars, this wheel being sunk into a reservoir connected with the river. The jars thus scoop up the water and bring it to a trough on a level with the top. Into this trough each jar empties itself in suc¬ cession and the water is conducted by an in¬ clined channel into the cultivated ground ad¬ joining, which may have been previously divided into compartments of 1 or 2 yards square by raising the mold into walls or

ridges of 5 or 6 inches in height. Into these compartments the cultivator forms an entrance for -the water by depressing a little space in the ridge or wall with the sole of his foot; and this overlooking of the channels of irrigation and adjustment of the openings from one compartment to the other with the foot is continued till the culti¬ vator is assured by the growth of the plants that each compartment is daily and duly sup¬ plied with its proper quantity of water. The second means of raising water, namely, the shddouf, consists of a leather bucket slung at one end of a pole which has a weight at the other and sways up and down on a vertical sup¬ port, a contrivance by which the cultivator is enabled to scoop up the water considerably below his feet and raise it with comparative ease to the mouth of a channel on a level with his breast. The latter mode of raising water is of great antiquity and is depicted on the walls of the ancient tombs of Egypt and also in the sculptures of Nineveh. A sufficient rise of the river (the rise varies at different points) is essential to secure the prosperity of the country; and as the water subsides, the chaplet of buckets on the sakieh is lengthened, or several shad oafs, rising one above the other on the river bank, are required. Should the Nile rise above the requisite height it may do great damage ; on the other hand if. it should not attain the ordinary height, there is a deficiency of crops; but with rare exceptions, the inundations are regular and nearly uniform. See Delta ; Irrigation.

The Nile Barrage. — One of the greatest wonders of modern times, rivaling the Pyra¬ mids of the ancients, is the Nile Barrage. Thanks to Lord Cromer and Lord Kitchener, the stupendous work at Assouan and Assiut of taming the Nile, is an accomplished fact. Egypt is no more subject to the caprices of the Nile. The precious fertilizing fluid coming down from

Damietta Mouth >->. (Phatnltic Mouth)

Korn. Mastara

>urg Mghezil

Fort St. Juliei

iiuuiettu

Kafr Lizwaui , Kafr 1

i Abu-Ghalib J

I. BA Y * OF , ABUKIR f:

V ˆ

\ 0- v i jl Uii. J/, f 03

1 — *“ — „ – \ -2L. “ tv ■— l ~ V > A

/■grˆTr- . 1 – tˆ-kom elVjin V

°’£z_ Dam’ru”* p < 0M‘-ˆ§

fifcˆsllamib S®1 Hamul a /

»m\el o*ra (- J 1 Kafr Abu Arab 1

BA/$ FAzabet Keleshl X A a 1

Ybu\ Abta ? Kafr el -Shark 1

\l°TiJ‘ ˆfe.EL’ Beik».

7 Yv E.fkjd 06.,blˆ-§S” T|““1‘j

[> «* XVb-i’f

Khai ’El Mandai

■ˆJEdfinu]

IF eiaraTZ

r Rahamlna

(Oasabl

lellaha

Labru A EL Wandui

, KK1 . a,‘ ˆˆlˆ-ˆrir <

elaˆ — A_

r r / Berlmbal el

//y,:ˆJˆ7Celat Nil. A®3Krˆ JJJˆrˆwon Daraksa c V/ 2*

TjEKBaildala rTVllt el-Nosarah

7y Pekagnejl a°T1 Megnuna

r Pumenne ’ˆMUFires ‘ *ˆEd-

Iansura

~ Es Solahatˆ/Azabet

Derur

Alexandri;

El Meksˆ El-D«]

LAKE ■SlaX MARIUT I

Behut

Ebshttn

J vˆV:Semˆharal > ˆˆllWˆˆk, Rabinanlveyfeˆˆ S

‘sbnhSy” H*"

Ve» sl“!-‘;a\6

\ _ Knot \

£1 Hedud

y/Nabaro,

BosbJˆTlrtˆ tbul VE1 Attaf) r°a B«hbltel-Ha, Mehallet Zjyado / _ Wlfltf el flag

Tel union LMouth

Damanhur

Bet u res

// Jfusa-el-X ATt

V«ql

iirˆfcDlraa BhubravUur yˆWit Abu il Uares\

S»fiuibul el Alit Demses

[Mehallet el K*bl

A k lidarj _ / —

0Z£wietSakr El Harm ˆHosh Isa0 HararaJ

°Zan el H iger

Dimat N. El KunaylsahS- *i ‘Shefnwa Curvin’ lehallet Aleiiuf

“t^_ˆS“daka

lut Ab Rated „E1 Bagaaieh ssaina/ ° _ >® Es-8ufiy&

_a£l Afalaken , Tel Rak -AtTu Shcquq E1 Qh

7/\ rtn Nauifao o j.

V Mltafr Sakr u’antir0 / fabri.A E1 I!uha Kant,r

1/ \ Ilarbet \E1 Arln o El

t/Ifa 1 o \ _ _ .

J o / JˆGhubfˆ

Jklubaeber >/Abu Kebirˆ

oTukbˆQarmi ra /Xt o Tawila>-

Galgresoy.

■”’-^^DerSˆ-El’To ■’%. — .X abudiyah D

V’te„ n/ \Kaft Ziad

-EKManagat

0el-Kabra

jUKalV e* Zaty; “vEFBerkemun v

J-

r/VEkwa el He»(

iˆil V-Srs1

\Tanub(E» B«“/l

)) \ -TalnX;,,

1/aAmrus

(El Bˆtanumˆ V, A°Abu Kels\ SHIBIN-feLrl lYˆWatX

‘Barbeia

L/tu/mal, 0/1

Ta(!ita |Gx J

A (k«ft S/ebtS’

i- Saittnˆ dJ

.Balia,

,akets

aw*flklyaHMZ -Setlamun ˆ j ikurn Hai

EmNegeisT

Waked\AN

Ks-Suws*f – .MbgbnhA Etˆ Taryar Abu el|Kau\

Mahdlya, j Fnrsls /

Sawaleh

P? /.r 0 Karalm „s5\t >

Abu ilammad

yˆ.Vcnslreˆ v Abu Ricbah

c Abalua

Mfl.a d i

-SheblbDf

El AkHmas

b iFIsha c.) . j Sugra

■Ramlet el (e

Ax v8etnl:\ ^\X Ash mu

nanab AˆOB«,b«lT

v.» ^■yiSˆhetahi,.. [° o/^Jnsaaˆr—MW/i,.

JffashtuJ-es-Suk /ijvibi n cl -Qanater. .

” pA El.JVI enai r y ˆ %

\ *E1 Khatateba

Bitter

\Lake

f. ˆ ? y

■ WA-flehnefeh’

r’Ea-Siryaqus ,, m?’

I fa A °£1 Kalng ’” .«w\v.v>

> / Station

, mm*,

Shalur

.FtˆAjrwd

“tVJfftV’

LAT PETRIFIEO

v*‘ ;.v.‘W

•”“AVANW’

Ras elˆV |# ˆAdabieh ˆ >?.

Helwan Baths #

l^livnn

■^llelwah'i

MaFazik

k:

Barnaclit

%Behh^t

- Kafr el Ayyat

Baiulia °l

RAM IDS OF LISHT^a >

Manarraqa

11/Hubiat ^ Ml. PYRAMID/ | ' MEDDM

- iLyr***'

• — * – j Abuxa ° 'Pademln

~ _ Ibshwai)/ -Si^tA f

'Ahu Ganchu&_ > Q , \ \ / \ El Agamyine/del > -^-^sn % [Medinet-el-fayum^ \ %SGa rad u 0 c De3aieh |

oQytas

Biahuiu

/El-Edwa

jller^el Meinun ^shment.

Etaah

3£l Labun DaUi Khelad o

, ZetuDy

I Ebsbanna Bush- A oKal o 7/

sbieh oBeliffa //

o _ Beni Bekhit // j

Kalamshah ˆ

V _ o 1 1» /

Tutun ˆ/Mi

-7 Bahˆl’y”ˆ No

Ahna8i|irel-Medyˆ Maianeˆ‘alha?ˆ

B*rawaSEd Der ˆ ; /NˆJo Ta: Desfiasha \ ˆBrarf °/cDa3htut /

El-Marazl

i-niiWˆxwv

r Bibba el-Kul Sits/; Tala f/fe

Bindar

l,

?1-Gahil

.A\wr

%Iel-el-Kufara

‘EsrSurariya

Binbah

Rosetta Mouth (Bolbitinie Mouth)

T E R R0 A N E A

Esh Slˆckjrˆˆiniriya’

Ramlehˆ Sidi Gabe,

w-

wB/Mp.

“Wlm, >.

■ W

ˆ ˆ ‘r’Eciitcu

1 ‘£• ef Augffunˆ>\‘E lf(i >nra,

\ “*• /. ‘it V.vBir Ho

-11111111 Kwt .//w/niiw

*ˆ«

\ L. U Moulouk “V.Bir Hooker \ li

SaBMigJ -t ‘A,. :.= % '5s*a?sWi./r„A bi-ki.ˆ. . >

•% . . ’7ˆ%v>„. 0—

s ‘//At ttv,”. ‘ ‘r •

ˆ / ”’s 11 V Bulakea Bakrurr

ˆ * Q ABU ROASH ltsitA>iifDE . 1)J*>- /CAIRO

.d’ $&’%/$’■ JW-~, Kanduia ‘®l2EVlW V JEBCLMOKA

r – * — 5 – - !=% — o M.kktA

W’ MlttHt”1

. i V** , v Vˆ\Tura ,w„ “A _ / 7C»ˆ ˆ

% ^%JamIDS‘u2 ABCSIRˆV^^1 Masiar“ f 4 ˆx.. W-., ˆ

. “S’:

i Av” J. ˆ

JEBEL •ujif”’ 0/^4$ J _ ˆ

RAIAN f ; ˆ ad y ,R a i a n * :£1 Ghmk

Ci\y’^

1. ˆ vy y- f’\

i \x

ˆe’

Alqaim V/ DameghUi Es-SabrigatV Kafr Dawˆud’ s iGiz

7ABU ROASH.ptfbAIVtW / _ 1 \®5/C A I R O

d

? V KAˆIIDS OF DAHSHUR

” ■ ‘ “^.Esh Shob

LloEl Hai foEl Menshiya ElˆFahiniya Matanieh Es Saf

6 Dˆyad’tl”‘W/7/’-“m •’ ˆ /

Der el Adra ˆTnnuga

Port Said

cnrAV-a-*

“～‘%.Esh ShoWk/ˆ Et-Tabbin „f t H C ‘ O ’fe ˆ

„EfAtlat ■” V’,|l“y”” Z/ t :!U t “‘li

•srElChorafiˆ /

V./BilS/iaˆV ,vtf

Ferdanehˆl ˆ‘BirABuAruk

/ /

ˆAtabet cbGisVf ./ ˆ

Chalet of the Kliedive f .,i

•*r n./j

L’ake Tim sail „

h

Tussuin

IScrapeum

El Ambek

\ , v,

1 \ ‘• y

‘ r»C-

E ?

*Atfi 7 ˆw»w～

bEljHelf ˆ .„,o®“ll!,1 y

. , MedubnG El Masgul

Hastaiy.Sol ee |

ˆkom Abu\RˆJi’ /cEZawjya =

1 ,Ai.fa*t Ben.diabbeit.0 ˆBro’mbel

La pyramid of hawara a \Z[, ?Tri‘ˆaˆ”,iii .＜}!＞’««? ,

PYRAMID -• AtiiTMrSx11* Hodeir H» ˆ.\H///* “ A“1

BeniiHassan J?

■P°,i

_ .elawl /’-

aO AlEl Masara

e. el-Amarna

Am8lmlˆflmˆruˆ esh-Sherif %

S«o»Bu° Hau»iyJ(W ™«i» f

U’mm eiˆgAbufeda J

Gu»ur ˆsViSHegalqil ˆ

ManfaluVˆLoˆAbhub £

Man kabadˆCs. El,, XX’ asta AsslutOl Matmar

AbS Tiˆk,E > BedaSy-

Sadfeˆ-Rabbama

t a. ˆ ”■dt‘/t,,.

She k h i. A bjdlˆu c

v%.

ˆtiWietk.

EGYPT

SCALES

Statute Miles, 20Sfc -1 Ineh.

%tf\

/ / I f

” i 1

?* ˆ Eˆasqalum

ˆdfrKojh el-Ahmar|

Esh -SJ rekiy M a£ud o

-

J. ˆBiTdebat

. Abu

Sharona

w *

/ “tH AWyO3ˆ®1111 Fˆllu-

/Mai

m: r 1 K/m

, El-Medall “A

4 DSrjˆ’®ˆW iebfor.Medinet

_ jr i, v

l-Jefat W’| %

\ .,1# | AVkVf»; x#

/ f . r

f

% A

ned el-Kofur (A bu—Aqis v, ˆ

Kharga’

r//£ G/?£ˆr

°Bulaq

Tam.v\oQasu ei-Keb’irˆ

Herjf

T

SOUTHERN EXTENSIONˆ! OF NILE RIVER.

Scales.

Statute Mllee, 58 = 1 Inch.

10 ?0 30 40 SO so

Kilometres. 93 = 1 Inch.

0 10 20 30 40 50 60 ?0 80 90 100

yitayainf-Bel-Ketkata » \ *

MatighaOc). f'Su '"X f X 4

Gul.eni? .'iloSiflaqfi /

\ t V /

*X Sutusg 'Cl0 Kawam'il el-Qadima E,

p- r= H » r

M>t \y $r'

El Minshatirt ˆ LahaiwaH

*-,'//>v/45*e. c,w'"' Samhud

Farslhi

OyflS/S

LV-4W EC'KHARGEH

ezlet esh-Shekh Hasan

t \

Kilometres, 33 = 1 Inch.

«*®W!l|i,'st1

Nazlet-Abit El-Howarta /

Rand McNally's New 11 x 14 Map of Egypt Copyright by Rand McNally & Co,

Tahu ˆAinudKn

ˆ EdinO®ˆ \»v i-Linowurut ˆ

? \ ui\ °Pawadiya f

Longitude East from Greenwich.

i

OASIS OF/’ KURKUR

neb

YW uTT.Haiw

| NerMi/fKus A

? Ed Det1«.AvS1ic?h > iT

ˆ •Kr.’ˆKhoS“1

ˆ Dabij* jfˆAsltshi ■ < K izqat -Tr T ud

X ‘ Asfun°ljGer4

f Vjf&ne < 3L Ft rielleh f: t Kclat.ijadlX. Sharien i ? V Adunljjˆkj Chewa

I x. -kh

s ˆ KarnakTˆ‘Ia6‘1ˆFl*c‘1

AˆOtwarti 2*

1 Qala

4Kurkur

i 1-j Longitude East from Greenwich, ajo

£n Nakh ˆHassaya \

ˆEb«a

Koin er-Resras ˆ

jfAgid

_ . JiKom Ouibo

Raqaba nL Darau

Qermila & Shekh Batonli vVASAb. el Kebita |

1st Cataract)

ShelTam

430

EGYPT

3

equatorial Africa by way of Bahr-el-Ghazal and Bahr-el-Abyad are halted and stored in an im¬ mense reservoir 200 miles long, with, since 1912, a holding capacity of 9,000,000 cubic feet. By the giving of perpetual irrigation two or three crops may be raised annually, and the productivity of the soil is increased by 50 per cent. Millions of acres on both sides of the river have been reclaimed. Other works have been constructed within the past 10 years, show¬ ing equally marvelous results. Egypt's pros¬ perity always depended upon the Nile. The (

Oases. — The fertile spots peculiar to the deserts of Africa are found in Egypt along the hollow region of the Libyan Desert, parallel to the general direction of the valley of the Nile, and above 80 miles west of it. The Great Oasis or Wah-el-Khargeh, lies immediately west of the Thebaid, and has a length of 100 miles. About 50 miles west of the northern extremity of this oasis lies the Wah-el-Dakhileh 24 miles long and 10 miles broad. West by south from the Fayum the date groves of the Little Oasis, or Wah-el-Baharieh, display their unusual ver¬ dure. In this fertile spot artesian wells are numerous and some of ancient construction have been discovered which have a depth exceeding 400 feet. On the road between this oasis and that of El Dakhileh, inclining to the west, occurs half way the Wah-el-Farafrah of small extent. West of the Fayum and about 200 miles from the Nile, lies the oasis of Siwah. The inhabitants of this secluded spot, though tributary to Egypt, are in language and manners wholly Libyan. The region of the oases termi¬ nates toward the north in the desert of the Natron lakes. See Oasis.

Fauna. — Owing to the absence of forests in Egypt there are few wild animals, the principal species being the fox, jackal, hyena, the wild ass, the ibex in the Red Sea hills and several kinds of antelope. The chief domestic animals are camels, horses, asses, horned cattle and sheep. The hippopotamus is no longer found in Egypt, though it is met with in the Nile above the cataracts and the crocodile is found in

Upper Egypt. Among the birds are three species of vultures (one of which is very large, individ¬ uals sometimes measuring eight feet across the wings), eagles, falcons, hawks, buzzards, kites, crows, linnets, larks, sparrows and the beautiful hoopoe, which is regarded with superstitious reverence. Pigeons, quail and various kinds of poultry are very abundant and numerous aquatic birds and pelicans. The ostrich is found in the deserts. Among the reptiles are the horned viper (cerastes) and the asp (naja ha jet) , both poisonous. Fishes abound in the Nile and lakes and furnish a favorite article of food. Water- fowl are plentiful and were anciently, prepared and salted like fish. The sacred ibis is still a regular visitor during the inundation and the pelican is found in the northern lagoons. Among the countless insects are the sacred beetle (Ateuclnis sacer) and the migratory locust.

Flora. — The few trees found in Egypt in¬ clude the date-palm, tamarisk, sycamore, Christ's-

thorn, carob and two species -of acacia. Many trees have been planted in recent times, espe¬ cially about Cairo, such as the lebbek (Albizzia Lebbek) and the eucalyptus. The papyrus plant, once so important, is now to be found only in one or two spots. A paper was manufactured from it, which was supplied to all the ancient world. Boats, baskets, cords and shoes were also made from it. Wine was abundantly pro¬ duced in ancient Egypt and the sculptures bear ample testimony to the extent to which the an¬ cient Egyptians indulged in wine and beer or other intoxicating beverages. The vine is still much cultivated, but little or no wine is made, as it can easily be imported. The following plants are sown immediately after the inundation be¬ gins to subside and are harvested three or four months later : wheat, barley, beans, peas, lentils, vetches, lupins, clover, flax, lettuce, hemp, cori¬ ander, poppies, tobacco, watermelons and cucum¬ bers. The following plants are raised in summer chiefly by means of artificial irrigation : durra, maize, onions, henna, sugar-cane, cotton, coffee, indigo and madder. Several varieties of dates and grapes are the most common, but other fruits such as figs, pomegranates, apricots, peaches, oranges, lemons, citrons, bananas, mul¬ berries and olives are plentiful. The lotus or water-lily is the chief species of flower found in Egypt. There is a high coarse grass called Haifa and various kinds of reed and canes.

Geology and Mineralogy. — Granite, eocene limestone and sandstone are the principal rock formations found in Egypt. But in the Nile Valley from 25° North Latitude to the Fayum, sandstone predominates. At Syene, the southern extremity of Egypt proper, granite predomi¬ nates. Its quarries have supplied the materials for the obelisks and

many colossal statues of Ancient Egypt. A great extent of the country is covered with moving sands; the soil bordering the Nile, owing to the encroachment of. the shifting sands of the desert, consists of an argil¬ laceous earth or loam, more or less mixed with sand. This sedimentary deposit shows no trace of stratification. In addition to those already mentioned, there are various other minerals, which were employed in architecture, sculpture, etc. These include syenite, basalt, alabaster, breccia and porphyry. Among other valuable products of Ancient Egypt were emeralds, gold from the mines in Upper Egypt, iron from the desert plains of Nubia and natron from the lakes in the Oasis of Ammon (hence named Am¬ monia, Latin sal-ammoniacum) . Bitumen, salt and sulphur are also among the minerals of Egypt.

Government. — Egypt, in modern times has been held as a suzerain of Turkey under the rule of a Khedive. In 1879 it came under the joint control of Great Britain and France as security for the European bondholders. During the rebellion organized by Arabi Pasha in 1882 France refused to inter¬ vene and after his defeat and the restoration of the Khedive's authority the dual control came to an end and the government of the country was effectively controlled by the British authori¬ ties, but still under Turkish suzerainty. Since the beginning of the British occupation great reforms have been carried through in every department of the public service; the finances have been placed on a sound basis; extensive public works have been carried through; the

Sudan (q.v.) has been reconquered and the fear of incursions from the south brought to an end.

In 1883 an organic law was promulgated by the Khedive creating a number of representative institutions whose functions were almost wholly consultative. In July 1913 this law was repealed by an act bringing into operation a legislative assembly consisting of 85 members, 66 of whom are elective and in which the ministers sit. Provincial councils have been organized with powers of regulation over markets, local admin¬ istration and elementary vernacular education and trade schools.

Justice. — The administration of Egyptian justice is extremely - complicated. There are four classes of courts: (1) The mehkemmehs,

or Mohammedan courts, conducted according to the precepts of the Koran and the principles of the Mohammedan religion, and retaining jurisdiction in matters of personal law only. (2) The so-called native tribunals, composed of 90 summary tribunals, 8 central tribunals and a court of appeals at Cairo. These deal with crimes committed by natives and civil actions between natives. The most recent addition in this category has been the creation of village or cantonal courts, having powers analogous to those possessed by English justice of peace courts. (3) The consular courts, which deal with civil cases between foreigners of the same nationality and also try criminal cases in which the accused are foreigners not within the jurisdiction of the mixed tribunals. (4) The mixed tribunals, dating from 1876, which have jurisdiction in all matters civil and commercial between natives and foreigners or between for¬ eigners of different nationalities. These courts are admittedly successful. A code of laws has been published for the greater systemization of native jurisprudence.

Education. — The chief seat of Koranic edu¬ cation is the famous University of El Azhar, founded by Saladin about 1170 and still em¬ ploying the same methods of instruction that were originally in use. The faculty numbered in 1918 about 300 moulahs or priests, many having wide reputation for scholarship ; the students, some 10,000, are from India, Turkey, Syria, Afghanistan and other Mohammedan countries. There is no regular university or¬ ganization nor arrangement for the endowment of departments or founding of chairs. Anyone who can collect a class is allowed to lecture. Frequently the professors practise law, hold clerkships or are connected with mosques, in Cairo. There is no charge for instruction. Three- fourths of the students study theology, though other ˆologies® and geography, philoso¬ phy and astronomy are also taught. There are also in Cairo eight colleges and professional schools of excellent grade. The Egyptian Min¬ istry of Public Instruction has under its direc¬ tion schools for engineering, medicine, law and agriculture, technical schools and normal train¬ ing schools for teachers. A military school is under the management of the war office. The number of indigenous schools under control of the provincial councils on 31 Dec. 1915 was 3,666, with a total enrolment of 250,575 (225,073 boys). Higher educational institutions under the board of education have an enrolment of 26,662. (20,507 boys, 6,115 girls). Of native Egyptians, according to the census of 1907, 85

per 1,000 males were able to read and write and three per 1,000 females.

Technical Training. — In 1907 the authori¬ ties introduced a new

system of technical edu¬ cation in Egypt under the direction of Mr. Sidney Wells, which has made remarkable progress despite peculiar difficulties in a coun¬ try where a technical or an industrial career carried with it a social stigma. It was divided into three branches — industrial, agricultural, commercial. In the first two branches, obvi¬ ously, the most important three sections have been organized, corresponding with the social grades of the people and the needs of the various classes of either branches. In the gen¬ eral educational scheme are the Kittabs or vil¬ lage schools, the primary and the secondary schools. The new plan provides for manual workmen, foremen and managers and skilled professional workers. Under industrial educa¬ tion are comprised trade schools, a technical school and a school of engineering; under agri¬ cultural are included farm schools, intermediate schools and a school for agriculture. The trade schools — some called model workshops — pro¬ vide a system of apprenticeship in trades that are in demand and of local interest; the ap¬ prentices, all of the poorer classes and from the age of 12 and with but a very rudimentary knowledge, are taught a four years' course in carpentry, furniture-making, plumbing, shoe¬ making, tailoring, saddlery, etc. They accept outside work, and in 1914 17 such workshops executed orders valued at $150,000. The 11 farm schools afford practical training in ele¬ mentary agricultural matters to the poorer class.

Demanding primary certificates the. Boulac technical and the intermediate agricultural schools deal with the middle classes. The first has three sections in a four-year course — me¬ chanical and electrical engineering, building trades and scavenging, artistic crafts. The second, in a three-year course, creates in the first case draftsmen, architects, assistant engi¬ neers, builders, clerks and lecturers on techni¬ cal topics ; and also to improve the knowledge of landed proprietors and to train pupils to fill managers' positions. The highest schools — those of engineering and agriculture — form, with the schools of medicine and law, the nucleus for the future university. The course is four years and conditioned on the secondary certificate. Irrigation, engineering and archi¬ tecture, with very advanced agricultural educa¬ tion, are taught. Graduates are fitted to fill vacancies in the ministries of public works and agriculture, to become expert lecturers and oc¬ cupy higher technical posts outside government service. Besides mere instruction the depart¬ ment encourages local industries and introduces modern methods in carpet making or weaving and will provide new industries after the pres¬ ent war. A specialty has been made in Upper Egypt of the manufacture out of natural col¬ ored wools of carpets of much beauty and unique

design.

Commercial education, the third branch of technical training, is more recent. Evening classes for shorthand and then in typewriting, commercial arithmetic and bookkeeping (in English, French and Arabic) were established in Cairo, Alexandria and Mansura. Later two

schools of commerce were opened, to include specializing in accountancy, secretarial work and general commerce. The authorities, too, co-operate with the training of girls at the Cairo Trade School where dressmaking, em¬ broidery and stocking-making are taught, the articles being sold at an adjacent shop. Fur¬ ther five economic schools are operated. In the 51 schools imparting various kinds of in¬ struction are over 5,500 pupils; nine years ago there were 1,029 pupils in eight such schools. Efforts will be made not to neglect the many native industries in the encouragement of cer¬ tain European trades. Consult London Times Educational Supplement, 7 Sept. 1915.

Religion. — At the present day about 91.84 per cent of the people in Egypt profess the Sunnite (Mohammedan) faith, and 7.81 per cent Christian. The Armenians also have a church and a bishop at Alexandria and Cairo. There is an American mission in both cities, but the natives are conservative and not inclined toward religious beliefs other than their own.

Commerce and Industry. — To-day the one branch of industry for which Egypt is pecu¬ liarly adapted by nature is agriculture and large quantities of cereals, cotton and other agricultural produce are raised ; yet, generally speaking, agriculture is still in a very low state, the necessary consequence of the wretched con¬ dition and extreme poverty of those engaged in it. The Egyptians still adhere to their ancient custom of uniting the followers of each busi¬ ness or profession into a guild, governed by their sheikh, who acts, if need be, as their rep¬ resentative. These guilds are exceedingly nu¬ merous, as might be expected among a people whose social organization dates from a remote antiquity.

Among the crops which the Egyptians grow with success, cotton is the most popular and profitable. (See Cotton). The cotton plant of Egypt differs materially, in one respect at least, from that of other countries. In America it has been found unprofitable to allow the plants to

continue in the ground longer than one year. In Egypt, however, the case is different, for the cotton plant yields five, and sometimes six, con¬ secutive crops before replanting is found to be necessary. This being the case, a cotton field once planted is a secure investment for at least five years, and as peasants of the Nile do not love labor, more cotton is grown in Egypt in proportion to the population engaged in agricul¬ ture than in any other part of the world. In both Upper and Lower Egypt cotton is there¬ fore the standard crop, and as it is not troubled with weevils as in America, and by the method of irrigation the farmer can give it exactly the right portion of moisture and no more, the crop is tolerably reliable. Boats transport the prod¬ uct to Cairo or to Alexandria, the leading cotton markets. The exchange in the former city is located on one of the principal streets, while the market proper is in a public square opposite the great mosque of Hassan. The time of the river journey to Alexandria is from six days to six months, but, as the Mohammedans say, ((God is great, and there is no hurry. M

The business of tanning is also one of the in¬ dustries in which the Egyptians perfectly suc¬ ceed, by a process peculiar to themselves. They make excellent morocco leather, which is goat¬ skin dressed and dyed in a particular manner.

The pottery of Egypt also deserves a word of praise, chiefly for the merit of the bardaks or water-jars. Coarse cotton cloths, and cloths of mixed cotton and wool, are largely made in the country ; silk is cultivated to some extent ; and the cultivation of the sugar-cane received a great impulse from the viceroy, Ismail, who, at a great expense, erected a number of mills. Goods carried by the Suez Canal do not form part of the commerce of the country, and the transit trade proper is of little importance. In 1915, 4,590 steamers of registered tonnage of 12,353,- 573 cleared at Egyptian ports and 1,465 sailing vessels (foreign and coastal) of 85,726 tons. The produce of cotton had increased from 5,001,000 kantars (1 kantar — 99.05 lbs.) in 1909-10 to 6,878,000 kantars in 1914-15. In 1915 the area sown and yield of wheat were 1,592,085 acres and 1,060,000 tons; barley 462,- 577 acres and 300,000 tons ; maize and millet, 2,194,031 acres; rice, 330,923 acres. In the same year the sugar exports amounted to 26,257 tons, valued at $2,868,075, and of the cotton exports to 6,899,12 2 kantars valued at $95,728,220. The imports for 1915 were valued at $96,644,965 (of which Great Britain sent $43,692,990) and exports at $135,234,360 (of which Great Britain took $69,678,125).

Finances. — The unfortunate financial situa¬ tion under the former khedives, becoming bankrupt in the time of Ismail Pasha, was in

reality a blessing in disguise for the laboring classes, since it led to the reform of conditions which had become well-nigh intolerable. The taxes were exacted with brutal rigor, even torture being resorted to in their collection and they were moreover excessive. The principal taxes were the Kharagh or territorial tax, W erka or income tax and Himl or tax on com¬ merce. From the start the property of the khedive and his higher officials were exempted. The English regime has lowered the imposts by over £2,000,000 ($10,000,000) annually and has abolished altogether the hated tax on salt, also the bridge and port tolls on the Nile and those collected from trading barks and fishing vessels. The registration tax on land sales has been reduced from 5 to 2 per cent, also those on water transport, and the customs duties on coal, combustible liquids, building wood, petro¬ leum, meat and foodstuffs. The inland fisheries have been relieved of the vexatious restrictions under which they formerly labored. The postal, telegraph and railway rates have also under¬ gone a material reduction. Thus it may be said that at present the Egyptians, especially those dwelling in the cities and towns, are unburdened by imposts of any kind. Up to 1888 the finances of the country were piling up a yearly deficit. This condition has been remedied until there is now an annual surplus and each year there ap¬ pears less and less necessity of imposing special taxes for the various public works which the country needs imperatively and the government's reserve fund has increased and also the sum set aside for the amortization of the foreign debt. There has been established a Farmers' Bank which has advanced over £9,000,000 ($45,000,- 000) to the cultivators of the soil through the medium of co-operative societies under the patronage of the government. Until 1885 resi¬ dent Europeans were exempt from taxes, oc¬ cupying a privileged situation, thanks to the capitulation privileges granted at the time the

Turks were defeated. In the year mentioned, however, the several powers interested declared resident Europeans subject to several taxes, such as the house tax, stamps and licenses, etc., but these provisions were not enforced until 1891. The 1913 budget estimated the revenues from all sources at $8,065,000 and the disburse¬ ments at $78,150,000. The chief sources of revenue are land taxes, about $27,500,000 annu¬ ally, railways ($19,000,000), customs ($11,000,- 000) and tobacco ($19,000,000). The chief items of disbursement are : administration costs (about $25,000,000 yearly), the debt service ($17,500,000 yearly) and the railways ($10,000,- 000 yearly). The

foreign debt of Egypt dates from 1862 when loans were made to wipe out the floating debt. Other loans followed and finances were subject to the joint direction of France and England until 1879. In 1876 the several issues were consolidated into one debt of $455,000,000. The administration of the finances is almost entirely in British hands. In 1912 the foreign debt consisted of the 3 per cent guaranteed loan of $36,592,500, the 3}4 per cent privileged debt of $155,638,900, the unified 4 per cent debt of $279,859,800 and the 4j4 per cent dominion loan of $1,017,100, a total foreign debt of $473,108,300, with yearly interest of $17,803,475. Reserve fund estab¬ lished in 1880-90 amounted in 1911 to $29,- 238,060. At the beginning of 1913 the for¬ eign debt was reduced to $471,748,400. The revenue for 1915-16 was $73,780,000 and the expenditure $79,500,000. In January 1915 the public debt stood at $470,144,200, the charges for interest and sinking fund amounting to $17,-

756,330.

Money, Weights and Measures.— By de¬ cree of 14 Nov. 1883 the monetary unit of Egypt is the Egyptian pound, divided into 100 piastres, weighing 8.5 grammes, .875 fine and containing therefore 7.4375 grammes of pure gold. Therefore £ E = il — 0s — 614“ $5-00. The piastre (kush or kurush) equals 5 cents, and is divided into 10 parts called ochrel guerche.

The principal pieces in circulation are the pound; 20, 10, 5, 2 and 1 piastre pieces (silver) ; 1, 14, 1/5 and 1/10 of a piastre (nickel), and J4 and 1/40 piastre for copper pieces.

The unit of capacity is the ardeb, equal to 43.759 English gallons or 5.44739 bushels. Its approximate weight is 315 rotls for wheat and maize, 320 rotls for beans, 250 rotls for barley and 260 rotls for cotton seed. Weights are the okieh = 1.3206 English ounces, the rotl — 0.99069 English pounds, the Oke— 2.7513 pounds and the Kantor — 100 rotls or 36 okes or 99.0492 pounds. Linear measures are the diraa baladi = 22.8350 inches; the diraa-mimari = 29.5281 inches, and the kassaba = 139.7663 inches. For square measure : the feddan = 7.468 square pics ; pic — 0.562 square metres = 0.936 inches.

Railways, Telegraphs and the Post-Office. — On 1 Jan. 1915 there were 2,065 miles of rail¬ way under state control (exclusive of the Sudan Military Railway) and 816 miles of light railways privately owned. In 1914, 3,594,049 tons of freight were carried, and 24,215,000 passengers, with net receipts of $1,061,912. Telephones and telegraphs belonging to the Egyptian government on 1 Jan. 1915

had a total length of 9,250 kilometers, the length of the wires being 21,882 kilometers. The Eastern

Telegraph Company has (by concessions) lines across Egypt from Port Said to Suez and from Alexandria (via Cairo) to Suez. There were in 1914 1,937 post-offices and stations in Egypt.

Army and Navy. — On 19 Sept. 1882, the organization of the Egyptian army was placed in the hands of a British officer, with the title of Sirdar. Military service is compulsory, but since a very small army is maintained only a very small portion of the men of military age are in the ranks. The term of service is three years. . The forces consist of administration officials, music corps, four squadrons of cavalry, nine Egyptian and seven Sudanese battalions of infantry, a camel corps, artillery and sanitation corps, engineers and railway corps, and a veterinary corps. There is a total of 138 Eng¬ lish officers, 709 Egyptian officers and 18,381 Eng¬ lish soldiers. The army of occupation, or the English garrison, consists of a cavalry regiment, a battery of artillery, a mountain battery, a com¬ pany of engineers and four battalions. It is stationed in the Delta. Moreover, in the Sudan, there is a battalion of infantry and a detach¬ ment of artillery. The total English force numbers 6,067 men of all arms. The Egyptian government makes an annual budget provision of $750,000 for the maintenance of the English force. The navy consists of a steamer for coast and lighthouse service, five revenue cut¬ ters, two of which are steam vessels, five skiffs, 11 schooners and one school ship. On the Upper Nile are three steamers and eight gun¬ boats. No details are available since the out¬ break of the European War, when the defense of the country was undertaken largely by troops from the overseas Dominions, aided by British warships in the Suez Canal. See section His¬ tory — Egypt during the European War.

Ethnology. — The origin of the Egyptians is unknown. Ethnologists have endeavored to establish a relationship with the peoples of the south, any differences being accounted for by variations of environment. Philologists have looked to the East for their next of kin as re¬ gards descent as well as speech. It has been thought by some that an Eastern' origin is indi¬ cated by the fact that the Egyptian oriented himself by looking to the south, but this is rather due to the direction of the Nile. Be¬ tween the results thus reached there is an evident conflict, with no obvious means of harmonizing them. It has been suggested that the facts can best be reconciled upon the theory, not of a migration of a whole people, but of an incursion of a smaller band who suc¬ ceeded in establishing their rule over the original people and in gradually forcing their own language, as that of a ruling

class, upon those whom they had subjugated, while still the ancient _ ethnological type persisted. This theory is merely a working hypothesis, and it has reference to a time long anterior to any historical monuments or traditions, for long before the earliest extant inscription Egypt was a united country under the rule of native kings, and possessed of a well and independently de¬ veloped government and of well-defined classes of society. Judging from the language and the physical condition of the mummies of ancient Egypt, the population appears to have been of mixed origin, part Asiatic and part Nigritic; and there seems also to have been an aboriginal race of copper color, with rather thin legs,

large feet, high cheek-bones and large lips ; both types are represented on the monuments.

A national name for the people as such never seems to have existed. Among them¬ selves they were Romet, men, par excellence ; all others were inferior races, ˆmiserable® Cushites, Libyans, Asiatics, Shasu. They themselves were the wards of the great gods, and Pharaoh was descended from Ra, who had himself once ruled in Egypt. Other peoples were descended from the enemies of their deities, and when Ra had overthrown them at Edfu a portion escaped, those southward became Ethiopians, northward Asiatics, westward Libyans, eastward Bedouin.

Personal experience has warped the judg¬ ment of observers as to their character. Herodotus praises the cleverness of the Egyp¬ tians and their excellence of memory; Diodorus declares them to be the most grateful of people; the Emperor Hadrian characterized them as <(thoroughly frivolous, unstable, following every rumor, refractory, idle and libelous.® The modern notion is that they were so occupied with the thoughts of the future as to be ob¬ livious of the present. There is undoubtedly a degree of truth in all of these estimates, but a broader survey shows that they were energetic in their undertakings, as is evidenced by their temples and the Pyramids, still the wonder of the world; possessed of sufficient skill to per¬ form by force of numbers labors which would test modern mechanics severely, practical in their methods of utilizing the forces of nature; peaceable as compared with other nations, and little given to love of novelty ;

artistic in their execution and accurate in their observation; a people given to realism, unversed in literary arts, devoted to agricultural pursuits, developed within narrow limits, and little affected by external and foreign influences.

The peasant class, or Fellahin, is the most numerous class in the population of the present day and is indigenous. They are to a certain extent descendants of the ancient Egyptians, but they have been subjected to crossings and have embraced Mohammedanism. Next in number are the Copts, the descendants of the ancient Egyptians who embraced and still cling to the Christian religion. (See Copts). Though comparatively few in number (about 700,000), their education and useful talents en¬ able them to hold a respectable position in society filling the posts of clerks, accountants, etc. With these aboriginal inhabitants are mingled in various proportions Turks, Arabs (partly Bedouins), Armenians, Berbers, negroes, and a considerable number of Jews, Greeks and other Europeans. The Turks hold many of the principal offices under the government. The great bulk of the people are Mohammedans, the Christians being only about 7.5 per cent. The Egyptians in the mass are quite illiterate, but under the supervision of the Ministry of Public Instruction progress is being made..

The language in general use is Arabic.

The Fellahin, the most superior type of the Egyptian, are a fine race, handsome, of excellent physique, and courteous in their manners. In northern Egypt they are of a yellowish com¬ plexion, growing darker toward the south, until the hue becomes a deep bronze. Mr. Lane, the best authority upon the subject, speaks highly of their mental capacity, and gives them credit

for uncommon quickness of apprehension and readiness of wit. They are highly religious, and are generally honest, cheerful, humane and hospitable. But these are exceptions in a mixed population of Bedouins, negroes, Abyssinians, Turks, Syrians, Greeks, Armenians, Jews and Europeans.

Population. — The population, according to the census of 1907, was 11,189,978, and is esti¬ mated at present to be about 12,500,000. Of this total 5,667,074 were males, and 5,620,285 females. The population was divided by nationality as follows : Egyptians, 10,903,677 ; Ottomans, 69,725 ; Sudanese, 65,162 ; Greeks, 62,973; Italians, 34,926; English, 20,653; Fre-nch, 14,591; Austro-Hungarians, 7,704; Russians, 2,- 410; Germans, 1,847; Persians, 1,385; all others, 4,925. In 1800 the French estimated the popu¬ lation at 2,460,200. In

1821 the census returns showed 2,536,400; that of 1846 4,476,440; of

1882 6,831,131; 1897, 9,734,405; 1907, 11,189,978.

According to its religious beliefs the population is divided as follows : Mussulmans, 10,269,445 ; Copts, 706,322 ; Orthodox Greeks, 76,953 ; Roman Catholics, 57,744; Protestants, 12,736; Jews, 38,635; others, 28,143. Of the Egyptian popula¬ tion over 10 years 62.65 per cent was engaged in agriculture and of the foreign element less than 1 per cent; 16.27 per cent of the natives engage in commerce and industry, in which are employed 47.85 per cent of the foreigners.

History. — The history of Egypt and its civilization covers a period that the most recent studies estimate as extending over 10,000 years. From this, according to Petrie, should be de¬ ducted the 3,500 years that witnessed the first stumbling prehistoric effort at expression, and in addition the centuries of Graeco-Roman domination, and the period from the beginning of Christianity down to our days. This leaves a period of over 50 centuries during which the religious, artistic, social and political ideas of the people underwent little change, and did not absorb any elements of the civilization of Asia and the rest of the Mediterranean littoral. Egyptian chronology, to which reference is constantly made in treating of the monu¬ ments executed during the 30 dynasties deemed historical, arrives only at exact historical certi¬ tude from the period of the conquest of Alex¬ ander the Great (about 340 b.c.). The divi¬ sions established by historians and archaeolo¬ gists are based chiefly on the fragments of Egyptian history written in Greek in the 3d century b.c. by Manetho, priest of Heliopolis. It contained the lists of the kings, from the 1st dynasty down to Alexander. But unfor¬ tunately only about one-third of the original has come down to us. (The fragments and lists of kings were published in Muller's (Frag- menta historicorum graecorum, > Paris 1848). The exactitude of the periods at which began the several dynasties varies greatly. The Egyptians divided the solar day into 24 hours, the latter they subdivided into minutes, seconds and thirds of seconds; 10 days formed a week, and 3 weeks one month, 12 months (360 days) and 5 complementary days formed the Egyp¬ tian year. In remote times the year consisted of 360 days, but the premature arrival of the seasons being noted, in the reign of Pepi II (6th dynasty), the five complementary days were added. The year was divided into three

seasons: the first (Shat), commenced 19 July, terminated about 15 November and corresponded to the period of the inundation of the Nile; the second (Pert) from 15 November to 15 March, and the third (Shmu) from 15 March to 19 July. There is as we have noted above consid¬ erable difference among Egyptologists in re¬ gard to fixing the dates of the various dynas¬ ties. Myer and Sethe have assigned the begin¬ ning of the 1st dynasty to a date correspond¬ ing approximately to the year 3400 B.c. Breasted, Erman and Steindorff also favor this date. A noteworthy circumstance in this con¬ nection is the complete lack of any reference to eclipses in the Egyptian texts so far interpreted. The history proper divides itself into six great periods: (1) The Pharaohs or native kings; (2) the Persians; (3) the Ptolemies; (4) the Romans; (5) the Arabs; (6) the Turks.

The Pharaohs. — The main sources of its his¬ tory under the Pharaohs are the Scriptures, the Greek writers Herodotus, Diodorus and Eratos¬ thenes, and fragments of the writings of Mane- tho (an Egyptian priest in the 3d century b.c.). From the Scriptures we learn that the Hebrew patriarch Abraham went into Egypt because of a famine that prevailed in Canaan. He found the country ruled by a Pharaoh, Egyptian per da, meaning ((Great house, the Egyptian term for king. The date of Abraham's visit, accord¬ ing to the chronology of the Hebrew text of the Bible, was 1920 b.c. ; according to the Sep- tuagint, 2551 ; while Bunsen fixed it at 2876. Nearly two centuries later Joseph, a descendant of Abraham, was sold into Egypt, as a slave to Potiphar, the captain of the guards of another Pharaoh, whose prime minister or grand vizier the young Hebrew eventually became. Joseph's father, Jacob, and his family, to the number of 70, accompanied, as Bunsen conjectures, by 1,000 or 2,000 dependents, followed their for¬ tunate kinsman into Egypt, where they settled in a district called the land of Goshen. There they remained until their numbers had multi¬ plied into two or three millions, when under the lead of Moses they revolted and quitted Egypt to conquer Canaan.

Ptolemaic Period. — When Alexander's army occupied Memphis the numerous Greeks who had settled in Lower Egypt found themselves the ruling class. Egypt became at once a Greek kingdom, and Alexander showed his wisdom in the regulations by which he guarded the preju¬ dices and religion of the Egyptians. He founded Alexandria as the Greek capital, which became the emporium of commerce and centre of learn¬ ing for several centuries. Ptolemy I was suc¬ ceeded by Ptolemy II, Philadelphus. He was successful in his external wars, built the Mu¬ seum, founded the famous library of Alexan¬ dria, purchased the most valuable manuscripts, engaged the most celebrated professors, and had ordered 70 Hebrew sages to translate

the Hebrew Scriptures into the Greek language, hence known as the Septuagint, and the Egyptian his¬ tory to be written by Manetho. His successor Ptolemy III, Euergetes, pushed the southern limits of his empire to Axum. Ptolemy IV, Philopator (221-204 b.c.) warred with Antio- chus, persecuted the Jews and encouraged learning. Ptolemy V, Epiphanes (204-180 b.c.) experienced repeated rebellions, and was suc¬ ceeded by Ptolemy VII, Philometor (180-145

b.c.) and Euergetes (145-116 b.c.) by Ptolemy X., Soter II and Cleopatra, till 106 b.c. and by Ptolemy XI, Alexander I (87 b.c.) under whom Thebes rebelled; then by Cleopatra, Berenice, Ptolemy XII, Alexander II (80 b.c.), and Ptolemy XIII, Neos Dionysius (51 B.c.), and finally by the celebrated Cleopatra. After the battle of Actium (31 b.c.) Egypt passed into the condition of a province of Rome, governed always by a Roman governor of the eques¬ trian, not senatorial, rank.

The' Egyptians had continued building tem¬ ples and covering them with hieroglyphic in¬ scriptions as of old ; but on the spread of Chris¬ tianity the older religions lost their sway. Then the Christian catechetical school arose in Alex¬ andria, which produced Clemens and Origen. Monasteries were built all over Egypt ; Chris¬ tian monks took the place of the pagan hermits, and the Bible was translated into Coptic. See Egyptian Archaeology and Exploration ; Egyptian Architecture; Egyptian Arts; Egyptian Language and Writing; Egyptian Literature; Egyptian Music; Egyptian Reli¬ gion and Sociology; Moses; Pharaoh; Ptol¬ emy; Cleopatra.

Christian Era. — On the division of the great Roman empire by Theodosius (337 a.d.) into the Western and Eastern empires, Egypt became a province of the latter, and sank deeper and deeper in barbarism and weakness. It then be¬ came the prey of the Saracens, 'Amribu-el-asr, their general, under the Caliph Omar, taking Alexandria, the capital, by assault. This hap¬ pened 641 a.d., when Heraclius was the emperor of the East. As a province of the caliphs it was under the government of the celebrated Abbassides — Harun el-Rashid and Al-Mamon and that of the famous Sultan Saladin. The last dynasty was, however, overthrown by the Mamelukes (1240), and under those formidable despots the last shadow of former greatness and civilization disappeared. Selim, Sultan of the Turks, eventually (1516-17) conquered the last Mameluke sultan, and Egypt became a Turkish province, governed by a pasha. After this it was the theatre of internal wars by the Mameluke beys against the Turkish dominion, which was several times nearly extinguished. Confusion and civil war between the different factions of the Mamelukes continued to prevail till 1798, when the French invasion under Napoleon Bonaparte united

their chiefs in self- defense; but the Mameluke army was all but annihilated in the battle of the Pyramids. The French then conquered the whole of Egypt and held it till 1801, when they were driven out by the British under Abercromby and Hutchinson.

On the expulsion of the French the Ottoman Porte effectually urged its claim to sovereignty, and the accession of the Albanian soldier Mo¬ hammed ’Ali to the pashalic in 1805 imparted a galvanic prosperity to Egypt by the merciless destruction of the turbulent Mamelukes (whom a disastrous British expedition in 1807 vainly sought to restore), the formation of a regular army, the increase of security, the improvement of the irrigation and the introduction of the elements of European civilization. In 1816 Mohammed ’Ali reduced part of Arabia, brought it under his sway by the generalship of his son, Ibrahim ; in 1820 he annexed Nubia and part of the Sudan; and from 1821 to 1828

his troops, under Ibrahim, occupied various points in the Morea and Crete, to aid the Turks in their war with the insurgent Greeks. The Egyptian fleet was annihilated at Navarino, and Ibrahim remained in the Morea till forced to evacuate by the French army, under Maison, in 1828. In 1831 Ibrahim began the conquest of Syria, and in the following year totally routed the Ottoman army at Koniya, after which the Porte ceded Syria to Mohammed ‘Ali on condition of tribute. War breaking out again, the victory of Nisib in 1839 would per¬ haps have elevated him to the throne of Con¬ stantinople; but the quadruple alliance in 1840, the fall of Saint Jean d’Acre to the British and the consequent evacuation of Syria, compelled him to limit his ambition to the pashalic of Egypt. In 1848 Mohammed ’Ali became im¬ becile (he died in 1849), and his son Ibrahim sat on his throne for two months, when he died, and ’Abbas Pasha, Mohammed Ali’s grandson, succeeded him, and was succeeded in turn (1854) by Sa’id Pasha, youngest son of Mohammed ’Ali. M. de Lesseps then obtained the co-operation, hitherto withheld, of the Egyptian government in his scheme of the Suez Canal, which was opened in 1869. Sa’id was succeeded (1863) by his nephew, Ismail, son of Ibrahim, who by a firman purchased from the Sultan (1866) the hereditary title of Khedive. He obtained the hereditary title of Khedive to the throne of Egypt, direct from father to son, instead of descending, according to Turkish law, to the eldest male of the fam¬ ily, and in 1872 the Sultan granted to the Khe¬ dive the rights (withdrawn in 1879) of con¬ cluding treaties and of maintaining an army, and virtually gave him

sovereign powers. Thus secure on an hereditary throne, Ismail began a series of vast internal reforms, built roads, bridges, lighthouses, railways and telegraphs, reorganized the postal service, improved the harbors at Suez, Port Sa'id and Alexandria, supported education, and introduced mixed courts of law. Extending his dominions southward, he annexed Dar-Fur in 1874, and in that and the following year further conquests were made. The condition of the finances led to the establishment of (

followers soon became numerous, defeated Egyptian troops that opposed them, and threat¬ ened the existence of all the Egyptian garrisons in the Sudan. In 1883 they annihilated an Egyptian force under Hicks Pasha near El Obeid in Kordofan, and in 1884 Osman Digna, as representing the Mahdi, defeated another force under Baker Pasha near Suakim. British troops were now dispatched to Suakim, and at El Teb and Tamai severe defeats were inflicted on the Arabs by General Graham. Meantime General Gordon had been sent to Khartum to withdraw the garrisons from the Sudan, but he was shut up in the town for nearly a year, and perished before the relief expedition under Sir Garnet Wolseley could reach him (January 1885). The Sudan was then given up, and the southern boundary of the Egyptian dominions fixed at Wady-Half a.

In 1892 Tewfik died, and was succeeded by his son, Abbas Hilmi, who became the seventh viceroy and third khedive of Egypt. In 1896 an Anglo-Egyptian expedition for the reconquest of the lost provinces was dispatched under Sir Herbert (afterward Lord) Kitchener. Dongola was soon occupied. Abu Hamed was captured in the following year, and (8 April 1898), the insurgents were defeated in a battle near the confluence of the Atbara. Finally (2 Sept. 1898) the forces of the Khalifa, as the Mahdi's successor was called, were defeated with great slaughter at Omdurman, near Khartum. The territory thus reconquered was placed under a governor-general, and was rapidly organized. A subsequent attempt of France to occupy Fashoda and enforce a claim to the Bahr-el- Ghazal <(Blue River® Valley led to some friction with Great Britain.

Egypt During the European War. — Owing to the entrance of Turkey into the war on the side of the Central Powers, and to the adhesion of the khedive to the king's enemies, a British protectorate was declared and the Khedive Abbas Pasha deposed on 18 Dec. 1914. Prince Hussein Kamil, the eldest living prince of the family of Mohammed 'Ali, a former viceroy of Egypt, was appointed in his stead, under the title of Sultan of Egypt. Two un¬ successful attempts at his assassination have been made (8 April and 9 July 1915). Sir Ar¬ thur

McMahon was appointed British high com¬ missioner. Turkish armies under German leader¬ ship made successive attempts to attack the Suez Canal as preliminaries to an invasion of Egypt. The most dangerous of these incur¬ sions were: (1) On 2 Feb. 1915 the Turks at¬ tempted to cross near Toussoum, 35 miles north of Suez; (2) on 23 April 1916 an attempt was made at the Quatia Oasis, 25 miles east of the canal, on the road to El Kastara; (3) the most formidable effort was made on 4 Aug. 1916 when 14,000 Turks attacked the British position near Romani, 22 miles east of Port Said and just north of Katia, on a front of seven or eight miles. The British troops, under the command of Sir Archibald Murray, and com¬ posed mainly of Australians and New Zealand¬ ers, succeeded by a strategic retirement in in¬ volving the Turks in the sand-dunes, and then fell upon their rear, and succeeded in taking 2,500 unwounded Turkish and German prison¬ ers. See War, European. See also Alexan¬ dria ; Cairo; Cromer; Emin Pasha; Gordon,

Gen. C. G. ; Khedive; Mad Mullah; Moham¬ medanism; Napoleon; Sudan; Suez Canal; Tewfik; Wady-Halfa.

Bibliography.— (Annuaire Statistique de l'Egypte) (Cairo Annual) ; Arminjon, P., Sit¬ uation economique et financiere de l'Egypte* (Paris 1911) ; Artin, Y. P., (England in the Soudan > (London 1911) ; Balls, W. L., (Egypt of the Egyptians) (London 1915) ; Brehier, L,, (L'Egypte de 1789 a 1900> (Paris 1901); Colvin, A., (The Making of Modern Egypt* (London 1906) ; Cromer (Earl), (Modern Egypt , (London 1908), (Abbas IP (London 1915) ; Weigall, A. E. P., (History of Egypt from 1763 to 1914) (London 1915).

Samuel Augustus Binion, Author of (Ancient Egypt or MizrainR ; Revised by Editorial Staff of the Americana.

EGYPTIAN ARCHEOLOGY AND EXPLORATION. The attention of the world was drawn to Egypt as a rich field for scientific exploration in the early part of the 19th century. M. Boussard, a French officer under Bonaparte (1799), discovered at Fort Julien, near Rosetta, a large block of black granite, with the remains of three inscriptions, the first in hieroglyphs, the second in demotic characters, the third in Greek. This Rosetta Stone was taken to England after the capitula¬ tion of Alexandria (1801), and presented by George III to the British Museum. It con¬ tains a decree promulgated at Memphisˆ in honor of Ptolemy

V, Epiphanes, by the priest¬ hood of Egypt in synod assembled, thanking that sovereign for the benefits which he had conferred on them. They ordered it to be sent to all the temples of the first, second and third rank, there to be engraved on stelae in the three forms of writing then used through¬ out the land. When found, half of the hiero¬ glyphic portion of the Rosetta copy was want¬ ing, but the demotic and Greek were nearly com¬ plete, and the work of decipherment began with them. The French orientalist Silvestre de Sacy made out in the demotic some of the proper names mentioned in the Greek ((Let- tre au Citoyen Chaptal sur ˆinscription egyp- tienne du monument du Rosette* Paris 1802) ; and the Swede Akerblad, following in his steps, assigned phonetic values to most of the signs employed in the proper names ((Lettre sur l'inscription egyptienne de Rosette adressee au Citoyen S. de Sacy,* Paris 1802). In 1814 Thomas Young, the English mathematician, succeeded in isolating a number of groups which express common names, and even in translating some fragments of demotic phrases. Turning to the hieroglyphs he tried to determine the power of the characters, which being en¬ closed in cartouches or rings, were known to indicate the names of kings. Thus he read the names of Ptolemy and Berenice, but he failed to analyze them exactly; five only of the values which he proposed for the signs turned out to be true. The problem with which Young had such poor success was solved four years later by Jean Francois Champol- lion, who had felt attracted to the study of the Oriental languages from his early youth and published at 24 the famous work (L'£gypte sous les Pharaons) (2 vols., Paris 1814), on the civilization and history of Egypt. Guided by his thorough knowledge of the Coptic, he

applied himself to the decipherment of the inscriptions, and ascertained very soon that the three kinds of characters found on the monuments, far from representing three inde¬ pendent systems, were three successive develop¬ ments of one system of writing, of which the hieroglyphs were the prototype, the hieratic and demotic the cursive forms. ((De l'ecriture hieratique des anciens Egyptiens,* Grenoble 1821). He then dissected the cartouches which had been studied by Young and proved that the hieroglyphs in them were always taken al¬ phabetically, and that the alphabet thus em¬ ployed for the rendering of the Greek royal names was the same that had been used from the time of the first dynasties, not only for proper names, but for the common parts of the language. He gave a general outline of his system to the Academie des Inscriptions on 22 Sept. 1822, a day famous as marking the foun¬ dation of Egyptology. Then he completed his revelations, and explained fully his method in his (Precis du systeme hieroglyphique des an¬ ciens Egyptiens* (Paris

1824; 1828). He spent the last eight years of his life in working out the principles which he had. established for the resurrection of the old Egyptian world. In 1828-30 he searched Egypt from Alexandria to Wady-Halfa with the help of other French and Italian archaeologists. Upon his return he was made professor of Egyptian literature at the College de France. He died 4 March 1832, having overtaxed his strength during the jour¬ ney to Egypt. His rapid success had raised up a host of detractors and opponents. Klaproth criticized his work with a bad faith and viru¬ lence which even death did not abate ; Spohn and Seyffarth started a rival system, which was rejected in Europe by 1855, but continued to find some degree of acceptance in the United States until about 1880. The general public, however, had received his labors with delight and after his death men of every nation took up his teachings and advanced the work he had so well begun. Nestor Lhote, Charles Lenor- mant and Dulaurier in France; Salvolini, Rosel- lini, Ungarelli, in Italy; Seemans in the Neth¬ erlands ; Wilkinson, Birch and Osborn in Eng¬ land. Champollion-Figeac devoted himself to the memory of his younger brother and pub¬ lished the most important of his unfinished books, his (Lettres ecrites d'Egypte) (Paris 1833); and his (Grammaire Egyptienne* (ib. 1836-41) ; his (Dictionnaire Egyptien en ecriture hieroglyphique) ib. 1841-46) ; < Monuments de l'Egypte et de la Nubie) (ib., 1835-75), com¬ pleted by Maspero. Since then the story has been a perpetual record of success and discov¬ eries. Lepsius analyzed critically in his (Lettrc a M. Rosellini sur l'alphabet hieroglyphique * (Rome 1837) the structure of the old language, and elucidated the origin and mechanism of the syllabic characters, the existence of which had only been surmised by Champollion. Lepsius, however, early left philological for historical and archaeological researches. From 1837 to 1885 nearly every year was marked by the ap¬ pearance of some important work from his pen: (Das Todtenbuch der Agypter* ; (t)ber die XII iigyptische Konigsdynastie* ; (Einleitung in die Chronologie* ; (Uber den ersten agˆptischen Gotterkreis) ; (K6nigsbuch der alten Agypter,* etc. Large portions of these have become anti-

TOMB IN THE VALLEY OF EL ASSASSIF, THEBES, EGYPT

quated, but they formed the solid ground upon which the chronology and history of ancient Egypt have been built up. His three years' stay in the Nile Valley at the head of a com¬ mission of German scientists (1842-45) pro¬ duced the gigantic (Denkmaler aus Agypten und

Athiopien) (12 vols., Berlin 1849-59), in which all the historical texts known at the time were reproduced by the skilful hand of Weidenbach. Bunsen popularized the ideas of Lep- sius in his (Agyptens Stelle in der Weltge- schichte) (Hamburg 1849) ; Brugsch applied himself to the demotic texts ((Scriptura Aegyp- torium demotica,* Berlin 1848) ; (Grammaire demotique) (ib. 1885). While things went thus in Germany, Emmanuel de Rouge commenced his labors in France with his (Examen critique de l'ouvrage de M. le Chevalier de Bunsen, > in which the merits of Bunsen's and Lepsius' work were fully recognized, while their errors and fallacious hypotheses were pointed out with a vigor of method and a certainty which placed the young author at the head of Egyp¬ tologists. He remodeled the grammar in his (Chrestomathie f£gyptienne) (Paris 1867-76), he called back to life the first dynasties in (Re- cherches sur les monuments qu'on peut attribuer aux six premieres dynasties de Manithon) (ib. 1866), and in his pamphlets, he was the first who really translated whole Egyptian books and inscriptions, both hieroglyphic and hieratic. He gave a new impulse to the study not only in France, where Chabas, Deveria, Pierret and Maspero followed him, but also in England, where his influence was felt by Birch, Hincks, Renouf, Le Page and in Germany, where Brugsch, Diimichen and Ebers seconded the ef¬ forts of Lepsius. Brugsch left many monu¬ mental works, the great faults of which are lost in greater merits. With the exception of Weidemanp the more recent German school in¬ clines more and more to grammars and phi¬ lology under the lead of Adolf Erman. The French school, while not neglecting philology, has directed much of its strength toward his¬ tory and archaeology. Young Egyptologists are sent every year to Egypt to excavate, draw, copy and publish the monuments. They are helped in the work of finding and preserving the remains of antiquity by an Anglo-American society, the Egypt Exploration Fund, the first secretary and real promoter of which was Amelia B. Edwards (1882-92). _ In 1883 they sent out their first agent, E. Naville of Geneva, and he cleared the site of Pithom in the land of Goshen. Since then Naville, Flinders Petrie, Griffith, Gardner and Newberry have been at work. Naucratis has come to light, Tanis and Bubastis, the Pyramids of the Fayum, the tombs of Beni-Hasan and El-Amarna have yielded unexpected treasures of archaeological and historical lore. The last few years have seen wonderful discoveries in Egypt, for the tombs of the kings of Abydos have been opened and the treasures which have been found bring us face to face with archaic history. Among the remarkable finds were a carved slate slab showing King Nar-mer smiting his enemy, an ebony table, a bar of gold, gold jewelry, in¬ cluding bracelets, and a royal sceptre. The old¬ est group of jewelry in the world is undoubt¬

edly the four bracelets of the queen of King Zer or Teta (4366 b.c.), which was discovered

with a portion of the mummy in a hole in a wall. This is 1,500 years earlier than any other jewelry thus far identified. The bracelets show a wonderful perfection in the soldering of gold. They also snow the turning point in the development of Egyptian art ; the finest brace¬ lets are formed of alternate plaques of gold and turquoise, each surmounted with a royal hawk. The turquoise hawks are clumsy, of a more archaic form than those on the gold pieces.

An American archaeologist, Theodore M. Davies, has made one of the most interesting discoveries of recent years in excavating the tomb of Thothmes IV of the 18th dynasty. The tomb contained the chariot in which he rode at Thebes. Like other royal tombs it consisted of a gallery cut in the heart of the mountain. After sloping downward for a considerable dis¬ tance it is interrupted by a deep square well ; on one of the walls is a band of paintings. On the farther side of the wall the passage turns back, and finally opens into a large chamber, at the extreme end of which is a magnificent sarcopha¬ gus of granite covered with texts from ((The Book of the Dead.}) On either side are smaller chambers ; the floor of one of them was covered with the offerings made to the dead king, con¬ sisting of mummified loins of beef, legs of mutton and trussed ducks and geese. Clay seals with the name of the Pharaoh had been attached to the doors of the chambers, and it is stated the raised portions of the seals had been smeared with blue ink before being pressed on the clay. A great many of the objects in the tomb of Thothmes were found to be broken, and this was explained by a hieroglyphic inscription on one of the paintings which adorn the walls of the vestibule to the chamber in which the sar¬ cophagus was found. That inscription states that the tomb was plundered by robbers, but that it had been restored as far as possible to its original condition by Hor-em-heb, the reigning Pharaoh. The floor was covered with vases, dishes, symbols of life and other objects in blue faience. Unfortunately, nearly all of them had been wantonly broken, though in some cases the breakage had been repaired in the time of Hor- em-heb. Equally interesting is a piece of textile fabric into which hieroglyphic characters of dif¬ ferent colors have been woven with such won¬ derful skill as to present the appearance of painting on linen. The chariot is one of the finest specimens of art that have come down to us from antiquity. Along with the chariot was found the leather gauntlet with which the king protected his hand and wrist when using the bow or reins.

Later excavations at Abydos have brought to light the royal tomb of

Menes, of the first dynasty, in which was found a large globular vase of green glaze, with Menes' name inlaid in purple. Thus polychrome glazing is taken back thousands of years before it was previously known to exist. There are also several pieces of delicately carved ivory of that age. One repre¬ sents the figure of an aged king, which, for sub¬ tlety of character, stands in the first rank of such work, and ranks with the finest work of Greece and Italy. A camel's head modeled in pottery takes back its relation to Egypt some 4,000 years. Hitherto no trace of the camel had appeared before Greek times. The ivory carv-

»

ing of a bear also extends the fauna of early Egypt.

Records begin to appear with the 3d dynasty of Manetho. The Sphinx of Ghizeh is cer¬ tainly older, but being uninscribed, it is not known to which king or dynasty it belongs. A few stelae bear the name of Sondon (2d dy¬ nasty), and the step pyramid of Sakkarh pur¬ ports to be the tomb of Tosiri (2d dynasty). These, however, are isolated instances and an unbroken line of monuments only begins under Snofroni, the last Pharaoh of the 3d dynasty, about (4300 b.c.). From his time to the death of Pepi II (about 3800 b.c.) the necropolis of Ghizeh, Sakkarh, Dashour and Midoum, tombs of feudal families at Zawret-el-Maietin, at Sheik-said, the rock graffiti of Wadi-Magharah in the Sinaitic peninsula, furnish material enough to trace the succession of the kings and call back to life the whole civilization of those primaeval ages. The series breaks off after Pepi II, but a few scarabs and other objects are the only records we possess of the Heracleopolitan house. With the 11th dynasty the monu¬ ments came to light again in great numbers and are dispersed all over the Nile Valley, in the grottoes of Beni-Hasan, Bersheh, Siut, Assouan, in the tombs of Thebes and Abydos, in the temples of Nubia and in the Delta cities, in the Fayum pyramids and the inscriptions of Sinai. There are many inscriptions and statues of the 13th and 14th dynasties, and the area of ground they cover from the fourth cataract to the sea shows the extent of the Egypt of that day. The invasion of the Hyksos suspended for at least 400 years the production of monuments (about 2100 b.c.) , and nothing remains of their kings except a few names scratched on the statues of the old Pharaohs. Egypt revived after their expulsion and the three Theban dy¬ nasties of the New Empire (1750-1100 b.c.)

en¬ riched by the spoils of Asia and of Ethiopia, covered the banks of the Nile with temples and palaces, the remains of which are counted to¬ day in hundreds. The Roman Caesars con¬ tinued the constructions and the feigns of the Flavians and Antonines are recorded by many monuments. The impulse died out about 250 a.d. ; Philippus is the last emperor whose name is engraved officially in the hieroglyphic char¬ acter. The English have recognized French intervention in the direction of the Cairo Mu¬ seum which has a right to one-half of all dis¬ coveries of antiquities, etc., made in Egypt. Gaston Maspero was appointed director in 1899 of the Service of Antiquities, as this branch is known, and was succeeded in October 1914 by Pierre Lecau. Several permanent commissions are at work in various parts of the country. Consult Champollion, (Monuments de l'Egypte) (1843) ; Mariette, (Monuments of Upper Egypt > (1877) ; Petrie, (History of Egypt } (1894) ; Rawlinson, (History of Ancient Egypt* (1881).

EGYPTIAN ARCHITECTURE. The

most ancient monuments of the world's archi¬ tecture in stone are those of the Nile Valley. The ruins of some ancient Chaldean buildings are probably of earlier date, but they are almost formless piles of sun-dried brick, while the tombs and pyramids of the early Egyptian dynasties are many of them in excellent preser¬ vation. The people who built them were prob¬ ably of Asiatic origin but long-settled along

the Nile, and were a highly civilized race thou¬ sands of years b.c. It is customary to divide the history of ancient Egyptian art into five periods: (1) the Ancient (or Memphitic) Em¬ pire, cir. 3400-2160 b.c., comprising ten dynas¬ ties of kings; (2) the Middle Empire, with Thebes as capital, 2160-1 788 b.c., two dynasties; (3) the Second Thebaic or New Empire (1588- 1150 b.c.) , comprising the dynasties xvii-xx, and separated from the Middle Empire by the artistic interregnum of the Hyksos or Shepherd kings (Arabs) ; (4) the Decadence or Saitic period of six dynasties, 1150-324 b.c., which in¬ cludes the Persian conquest in 525 b.c., and (5) the Ptolemaic and Roman period (324 b.c.-300 a.d.) . Then followed a period of over three centuries during which the only architectural works were Coptic churches and monasteries. The Arabs conquered Egypt in 642 a.d., since which date the architecture has been of the Arabo-Moslem or <(Saracenic® style, an archi¬ tecture of mosques, tombs, palaces, baths, foun¬ tains and city gates. As this last period, with its infiltrations of Turkish influence since 1517, is treated of under Moslem Art (q.v.), the present article will be confined mainly to the

ancient art of the five periods, with brief ref¬ erence to the Coptic development.

Materials and Character. — There is evi¬ dence that the primitive architecture of the Egyptians was of mud (((crude® or sun-dried brick) and wood, but the monuments that have survived to our time are of stone, except for scanty remains of brick. The stones employed were granite of various kinds and limestone ; the coarser stone being often furnished with a thin layer of stucco to receive painted decora¬ tion. The architecture was almost entirely of tombs and temples, although remains of palaces of the New Empire have been excavated, and there are vestiges of fortifications at Semneh and Gournah. The civilization of Egypt was distinctively monarchical and religious and this is clearly shown in the architecture. There is little change of style until the time of the Ptolemies ; what variations there were came about by imperceptibly slow degrees, and an air of changeless duration marks every work of ancient Egypt. Yet earthquakes and the de¬ structive invasions of Persians and Arabs have wrecked partly or completely nearly every one of these massive structures.

All the Egyptian monuments of antiquity were built on the post-and-lintel or wall-and- lintel principle, the arch being used only in minor constructions of brick. But one form of cornice is found — 'the ((cavetto-cornice® — in all the wide range of the ancient monuments through more than 3,000 years. There were no (

HALL OF COLUMNS IN THE TEMPLE OF KARNAK

(Restored)

■» ' ; **

1.

r

Tombs. — The religion of Egypt, with its insistence on a future life, assigned an enor¬ mous importance to the arts of sepulture, and the tombs are far more numerous than the temples. They are of two chief kinds : the hypogeum or excavated tomb, cut in the rock of the western bank of the Nile, with many .passages, chambers and shafts; and the struc¬ tural or built-up tomb. Of this class there were two

chief types, the pyramid (see Pyramid) and the mastaba or “bench.® This latter type, rectangular in plan, had usually sloping walls and a flat top, and contained a variety of chambers and passages, with one or more serdabs or secret chambers, and wells or shafts leading to deep chambers, in one of which the sarcophagus was deposited. Statues of the de¬ ceased (“ka-statues®) were secreted in the serdabs in order to assist in preserving the life and identity of the “ka® or spirit while in the tomb, while the walls were covered with pic¬ tures of his daily life and sports in order that the ((ka® might by their help enjoy the same pleasures until admitted by Osiris and his as¬ sessors to the final home in the underworld. Two fine tombs of this type have been taken down and re-erected in the Metropolitan Mu¬ seum at New York.

Temples. — The fundamental scheme of the Egyptian temple was early developed and re¬ mained unchanged in essentials for over 3,000 years. It appears to have been an expansion of the ancient Oriental house-plan, with its en¬ closing wall, gate, fore-court, reception-hall and living rooms. These became respectively the enclosing wall (sometimes of crude brick), the pylon-gate with its twin truncated pyramid towers or pylons, the fore-court flanked or surrounded with colonnades, the hypostyle or columnar hall for the princes and magnates, and the sekos or sanctuary, with its shrine or “holy of holies® and its surrounding rooms for the priests. These various parts might be dupli¬ cated or variously elaborated, but they are to be found in all the temples, large or small.

Historic Monuments. — From the Ancient or Memphite Empire there have been preserved to us innumerable tombs and a few temple-ruins. Of the greatest importance are the pyra¬ mid-tombs, of which there are nearly a hundred in six groups. They are all royal tombs, but vary in size and shape, some having stepped sides, some being built with two slopes — the lower part steeper than the upper; the re¬ mainder are built with a single slope from the square base to the apex. Three of these, at Ghizeh, are far larger than the rest; they be¬ long to the 4th dynasty. The largest is that of Cheops or Khufu, with a base 764 feet square and an original height of 482 feet. The second, of Chephren or Khafra, is slightly smaller; the third, of Mycerinus or Menkhaura, rises 218 feet from a base 254 feet square. The stepped pyramid of Sakkara is older, dating possibly from the First dynasty; it is about 350 by 400 feet at the base and not quite 200 feet high. All of these, and most of the others, were built of limestone with a facing of gran¬ ite which, however, has in most cases disap¬ peared; they all contain corridors and chambers of elaborate construction. There are also many mastabas and many excavated tombs cut in the rock of the

cliffs; the ka-paintings of some of these (e.g., the tomb of Ti) are extraordinarily

detailed and interesting. The temples of this period are all connected with or adjacent to the tombs, to which they served as chapels. The best preserved is that of Chephren, known as the Sphinx Temple, having square piers in¬ stead of columns.

The Middle Empire has left us only scanty monuments, of which the most interesting are tombs cut in the cliffs of Beni-Hassan, with columnar porches whose columns somewhat re¬ semble the Greek Doric, hence called “proto- Doric.® There have been found scanty remains of temples of this period at Bubastis and at Karnak.

The New Empire was the great age of Egyptian architecture as well as of political greatness under a succession of mighty rulers — the Thutmoses, Amenhoteps, Setis, Rameses and others of the 18th dynasty, of whom Rameses II was the greatest builder. The tombs of this period are all, or nearly all, deep tunnels cut in the rock, with many chambers and corridors ; the temples are the largest in Egypt, especially that of Karnak, over 1,200 feet long and 340 wide, whose hypostyle hall with 16 rows of colossal columns, is the grandest ruin in Egypt. Not far away is the great temple of Luxor, next to which in size and splendor is the Ramesseum. Others of almost equal extent and splendor are at Abydos and at Medinet Abu ; while at Deir-el-Bahari are the remains of the stupendous hemispeos of Queen Hatshepsut, a sepulchral temple partly excavated and partly structural. At Ipsambul (Abu Simbel) are two colossal temples of Rameses II and III, entirely hewn into the rocky cliff. Many smaller tem¬ ples, as of Khonsu at Karnak, are in good preservation.

The Ptolemaic-Roman age created the two temples of Hathor and Isis at Denderah, built by Cleopatra ; the temple of Edfu and the superb group at Philae ; and the Roman-built temples of Esneh and Koom Ombos, with others in Nubia. All these late temples have screen-walls between the front columns of the hypostyle hall, crested with carved serpents — a new feature; and the capitals of columns are very complex and elaborate.

Coptic Architecture. — This is unimportant except in its relations to later Arabo-Egyptian art and to the architecture of Christian Europe and Asia of the same period (4th-7th century). The Copts are the Christian descendants of the ancient Egyptians, and erected, during the above period, many churches and monasteries, mostly of small size. These are interesting chiefly for their use of the arch, of the dome

over the sanctuary, and of minutely-detailed surface carving and elaborate wooden screens. It was the Copts who built the earliest Arab mosques in Cairo, and the Arabo-Egyptian style owes much of its character to their work. See Architecture; Obelisk; Pyramid; Sphinx.

Bibliography. — -Consult for history in gen¬ eral, Breasted, J. H., (A History of Egypt from the Earliest Times* (London 1906). For the architecture, any of the general histories of architecture; also Maspero, G. C., (Egyptian Archaeology* (Paris 1910) ; Perrot and Chipiez : (History of Art in Ancient Egypt,* and the works of Flinders Petrie, Mariette, Prisse d'Avennies, Rossellini and Wilkinson.

A. D. F. Hamlin,

Professor of Architecture, Columbia University .

EGYPTIAN ARTS. Sculpture, Painting and Minor Arts.— Sculptors were numerous and very prolific. Several great collections of extant works have been made in modern times ; of these the greatest is that of the Museum of Ghizeh, next come those of the Louvre, British Museum, the Vati¬ can, Florence, Turin, The Hague and Berlin. Many works, however, are still in situ, in the temples and tombs, both colossal statuary and series of reliefs. Of the Old Empire all the sculptures have been found in tombs. They are realistic and are of value as portraits. In the Middle Empire the official and colossal style was developed in connection with temple archi¬ tecture reaching its greatest period under the Rameses and Setis of the New Empire. Plastic art was early employed to illustrate the daily life of the subject. Each tomb contained a representation in detail of the person, family and occupation of the deceased, and near the tomb were statues of him or her as they ap¬ peared in life. Under the New Empire sunken relief and outline relief come into vogue. Methods of quarrying, carving, polishing and finishing sculptures are represented in these styles together with others. Wood was used in sculpture as is testified by the number of wooden statues remaining, some dating from the Old Empire, the most noteworthy being the famous figure, Sheik-El-Beled. Red granite and basalt were favorite material for statuary, while limestone and sandstone were used more in relief. Red porphyry was especially popular in the later periods. The representation was purely conventional, for the purpose of con¬ veying an idea and not creating an illusion. Perspective was avoided in scenes where several

planes of figures appear, the rows being raised one above another. Despite their lack of real¬ ism the sculptors were careful of detail. The earliest work of sculpture is the famous Sphinx of Ghizeh now disintegrating under the changed climate. A common portrait is the seated group of husband and wife, found through all the remains of the Old and Middle Empires. The representation of divinities was usually effected by placing an animal's head on a human body, a jackal's head for Anubis ; a hawk's for Horus, etc. The gods were worshipped on the opposite walls of a temple and the image of the god was repeated several hundred times on the walls and columns and on the outer pylons. There were also small images of the gods in bronze, glazed earth, etc., used for objects of devotion. Another theme might be termed the political ; consisting of the giant king, at whose feet cower many captives. There, was little variation in the several representations during long periods. Of particular interest are. the reliefs and paintings on the tombs of private persons. A tomb of the Middle Empire repre¬ sents the migration of a tribe in all its details showing how traveling was done in the age of Moses. Under the New Empire there was a change to the stiff and colossal. Greek art was introduced under the Ptolemies and had a pro¬ found influence on Egyptian forms. Painting in ancient Egypt can hardly be called an inde¬ pendent art, being largely an adjunct to archi¬ tecture. Wall paintings were popular from the 5th to the 13th dynasty and closely resemble the reliefs of the same period in theme and treat¬ ment. In portrait sculpture the Egyptians at¬

tained extraordinary perfection at an early date, the skill with which they worked in hard stone, such as diorite and basalt, being surpris¬ ing. Some of the early statues are of colossal size, but a higher style of art is shown in those of ordinary size, though a certain conventional treatment is always apparent. The most usual kind of mural sculpture, a kind peculiar to the Egyptians, is that known as hollow or sunk re¬ lief (cavo-rilievo) . The general outline of the object intended to be represented is cut into the smooth surface of the stone, while at the same time the minor forms and rotundity are represented within the incised outline. By this contrivance the details of the sculptures are pro¬ tected. Sometimes the outline is excessively deep, at others the surface of the figures is alto¬ gether much lower than the general surface of the wall, and in others the outline is but slightly incised with a corresponding flatness within. Wherever the Egyptians practised the true bas- relief the sculpture is almost invariably in very low relief. The back view of the human figure is never represented in the sculptures excepting in the case of an enemy, and then rarely; the figure is generally represented in profile, and there are but few

attempts at delineating the front view of the foot or of the face; however, whether the face be represented in front or side view, a profile eye is never found. The figures of the king in battle-pieces, and of the landed proprietor in domestic scenes, are always on a much larger scale than the other actors in the piece. Statues and reliefs were always painted, and when wall painting is employed it is always as a substitute for sculpture. There is no proper perspective, and certain conventionalities of color are employed. The Egyptians are repre¬ sented with red and yellow complexions, red ochre for the men and yellow for the women. The hair of the king is frequently painted blue, but that of ordinary men black. In represent¬ ing the various nations with whom Egypt had intercourse, the artists seem to have endeavored to imitate the complexions peculiar to each. Ammen-Ra, the chief divinity of Thebes, is al¬ ways painted blue, and he is further distin¬ guished by two high feathers which he wears in his cap. The inferior divinities are not un¬ commonly of the complexions of mortals. The sky or heavens are invariably indicated by a strip of blue coming downward at the lower side of each extremity, and occasionally having upon it a row of five-pointed stars. Water, seas and rivers are represented by zigzag lines of a blue or green color. Mountains have a yellow color, with red spots upon it. Egyptian art was at its highest during the period between the 4th and 6th dynasties, and notwith¬ standing its defects it was superior to that of Nineveh and Babylon. Gold and enamel jewelry with rich necklaces and pectorals of a very early period have come down to us. Ar¬ tistic design was skilfully applied by the Egyptians to articles of furniture, ornament and articles of domestic use — mirrors, spoons, chairs, etc. Wood, ivory and various metals were used. The Phoenicians and Greeks spread these works along the Mediterranean littoral where they exerted a very great influence on design. (See Art; Sculpture). Consult Lep- sius, (DenkmaIer) (1874) ; Perrot and Chipiez, ˆHistory of Art in Ancient Egypt5 (1883).

Russell Sturgis.

HATHORIC COLUMN, TEMPLE OF DENDERA

(Restored)

‘■ .V/:*

EGYPTIAN BEAN, a name sometimes given to the bean-like fruits of the Nelumbium speciosum, the sacred loftus, found in Asia and Africa.

EGYPTIAN BLUE, a brilliant pigment consisting of the hydrated protoxide of copper mixed with a minute quantity of iron.

EGYPTIAN LANGUAGE AND WRIT¬ ING. To formulate an opinion in regard to the group to which the ancient language of Egypt belonged, it is best to follow step by step the gradual process of interpretation and secondly the translation of the numerous texts existing in inscriptions and papyri. By so doing one is led to the conclusion that the language of old Egypt belonged to the Semitic family, an opin¬ ion objected to until quite recently. The first modern studies tending to elucidate the myste¬ rious tongue locked up in the Egyptian hiero¬ glyphics were those of the learned Jesuit Athanasius Kircher (1601-80), but they, like those of other savants of the 17th and 18th centuries, were without result until the discov¬ ery of a tablet inscribed in three languages fur¬ nished the key to the history of an ancient civ¬ ilization, whose annals extended over 40 centu¬ ries. A French military officer, Captain M. Boussard, found in 1798 or 1799 in the fort of Saint Julien de Rosetta an inscription drawn up by the priests of Egypt gathered at Mem¬ phis, in honor of Ptolemy Epiphanes (196 b.c.). The first inscription was carved in hieroglyph¬ ics, the second in demotic characters and the third in Greek. The inscriptions were copied and copies sent to several academies. The Rosetta tablet came into the hands of the Brit¬ ish in 1801 and now rests in the British Mu¬ seum. The first Greek translation was that of Du Theil and Weston in 1801-02, and about the same time Akerblad, a Swedish Orientalist connected with the embassy at Paris, deciphered several demotic phrases, identifying the equiv¬ alents of the names of Alexander, Alexandria, Ptolemy and others, being guided principally by the position they occupied in the Greek text. Subsequently Thomas Young published in 1819 the result of his labors in this field, formulat¬ ing some rudiments of an Egyptian vocabulary from the Rosetta Stone and from other monu¬ ments. Warburton, Barthelemy, Zcega and others indicated the possibility of the existence of a hieroglyphic alphabet. Finally Champollion the Younger, prepared by his studies of history and philology, brought an almost complete light to bear on the subject, revealing the contents of hieroglyphic writing on many inscriptions. His (Precis du systeme hieroglyphique) was fol¬ lowed, after his death in 1832, bv the publication of a grammar and dictionary of the Egyptian tongue. Lepsius, Birch, Rouge, Chabas and others continued the work but without success in establishing the grammatical structure of the works on a solid basis. Gaston Maspero and Revillout added considerably to the collection of translation, but

the admirable scientific pre¬ cision of the modern translations was first reached in 1880 when Louis Stern published his Coptic grammar, and when Erman published his in 1902. This last-named work is based on wide study of the linguistic variations during the time that the ancient Egyptian tongue was a living idiom. It shows the changes of dif¬ ferent periods and permits that those who study

this old tongue may now do so with as great security as those who undertake the study of Latin or of Greek. The investigations of the German school, which counts illustrious mem¬ bers in England, Denmark, the United States, Italy and France, are published in the annals of the Berlin Academy of Sciences. From the most recent studies it appears that the ancient Egyptian belonged to the Semitic branch. Until recently and because of the biliteral roots of the Coptic, it was supposed that the Egyptian language should be classified with the three sub-families of the Hamite group previous to the formation of the Semitic, of which the triliteral root is characteristic. But it was shown that the biliteral roots of the Coptic had originated from triliteral roots of the early Egyptian and other similarities were shown which prove conclusively that ancient Egyptian belonged to the Semitic branch. The ancient language had four periods: (1) that of the Ancient Empire, employed until some centuries previous to our era; (2) colloquial Egyptian, employed by merchants and in social inter¬ course, and which existed from the 6th to the 17th or 18th dynasty; (3) the popular tongue from the 18th dynasty to the end of the period of Roman domination, and (4) the language of the country from the propagation of Christianity until it ceased to be spoken three centuries ago, except in the liturgy of the Coptic Christians.

Ancient Egyptian writing had three forms : (1) the Hieroglyphic, the most ancient, em¬ ployed on inscriptions on temples, tombs, pillars and statues; (2) the Hieratic, the abbreviated form of the former. It was employed by the priests from the 4th to the 16th dynasty; (3) the Demotic or popular form, which began about the end of the 22d dynasty and consisted of conventional signs. The hieroglyphic writ¬ ing was employed with small variation from the 4th dynasty until the 3d century of our era. The signs were employed in three ways — 1st, representing in themselves an ob¬ ject, idea, a word or root; 2d, representing a syllable or part of a word; 3d, limiting the sense of a word already expressed by one or more signs. Phonograms were few, about 100 in all, of which 70 or 80 were in current use. The most important signs are those represent¬ ing a single letter; in the Old Empire there were 24 of these. Signs representing two let¬ ters were about 50, and those which represented three letters were formed by combinations of this and the first group. Ideographic signs were

represented by hieroglyphs symbolizing an idea, viz. : V a sceptre signified prince or ruler ; the moon ; 0 the. sun ; an inclined wall represented the action of falling, etc., etc. Hieroglyphs were written horizontally or per¬ pendicularly, reading in the direction in which the signs figuring birds were faced, which was generally from right to left of the reader, ex¬ cept in cases where the horizontal direction was changed to conform with the sides of a door, pylon, etc. To preserve a symmetrical appearance the . scribes were accustomed to group the signs in squared areas and by adopt¬ ing syllabic notation when the signs hindered such symmetrical disposition. Only the con¬ sonants were represented,, thus adding mate¬ rially to the difficulty of interpretation, which

is also complicated by the fantastic writing of various scribes and their errors. See Hiero¬ glyphics; Egyptian Literature.

EGYPTIAN LITERATURE. The advance that has been made in recent years in the de¬ cipherment of the ancient writings of the world enables us to deal in a very matter-of-fact way with the Egyptian inscriptions. Their chief mysteries are solved, their philosophy is almost fathomed, their general nature is understood. The story they have to tell is seldom startling to the modern mind. The world was younger when they were written. The heart of man was given to devious ways then, as now and in the days of Solomon, — that we can affirm full well; but his mind was simpler; apart from knowledge of men and the conduct of affairs, the educated Egyptian had no more subtlety than a modern boy of 15, or an intelligent Eng¬ lish rustic of a century ago.

To the Egyptologist by profession the in¬ scriptions have a wonderful charm. The writ¬ ing itself in its leading form is the most at¬ tractive that has ever been seen. Long rows of clever little pictures of things in heaven and earth compose the sentences ; every sign is a plaything, every group a pretty puzzle, and at present, almost every phase well under¬ stood brings a tiny addition to the sum of the world's knowledge. But these inscriptions, so rich in facts that concern the history of man¬ kind and the progress of civilization, seldom possess any literary charm. If pretentious, as many of them are, they combine bald exaggera¬ tion with worn-out simile, in which ideas that may be poetical are heaped together in defiance of art. Such are the priestly laudations of the kings by whose favor the temples prospered. Take, for instance, the dating of a stela erected under Rameses II on the route to the Nubian gold mines. It runs : —

On the fourth day of the first month of the season of winter, in the third year of the Majesty of Horus, the Strong Bull, beloved of the Goddess of Truth, lord of the vulture and of the uraeus diadems, protecting Egypt and restraining the barbarians, the Golden Horus, rich in years, great in victories. King of Upper Egypt and King of Lower Egypt, Mighty in Truth of Ra, Chosen of Ra, the son of Ra, Rameses Beloved of Amen, granting life for ever and ever, beloved of Amen Ra lord of the " Throne of the Two Lands" in Apt Esut, appearing glorious on the throne of Horus among the living from day to day even as his father Ra; the good god, lord of the South Land, Him of Edfu Horus bright of plumage, the beauteous sparrow-hawk of electrum that hath protected Egypt with his wing, making a shade for men, fortress of strength and of victory; he who came forth terrible

from the womb to take to himself his strength, to extend his borders, to whose body color was given of the strength of Mentu; the god Horus and the god Set. There was exultation in heaven on the day of his birth; the gods said, “We have begotten him” ; the goddesses said, “ He came forth from us to rule the kingdom of Ra”; Amen spake, “I am he who have made him, whereby I have set Truth in her place; the earth is established, heaven is well pleased, the gods are satisfied by reason of him.” The Strong Bull against the vile Ethiopians, which uttereth his roaring against the land of the negroes while his hoofs trample the Trog¬ lodytes, his horn thrusteth at them; his spirit is mighty in Nubia and the terror of him reacheth to the land of the Kary; his name circulateth in all lands because of the victory which his arms have won; at his name gold cometh forth from the mountain as at the name of his father, the god Horus of the land of Baka; beloved is he in the Lands of the South even as Horus at Meama, the god of the Land of Buhen, King of Upper and Lower Egypt, Mighty in Truth of Ra, son of Ra, of his body. Lord of Diadems, Rameses Beloved of Amen, giving life for ever and ever like his father Ra, day by day. [Revised from the German translation of Professor Erman.]

As Professor Erman has pointed out, the courtly scribe was most successful when tak¬

ing his similes straight from nature, as in the following description, also of Rameses II : —

A victorious lion putting forth its claws while roaring loudly and uttering its voice in the Valley of the Gazelles. . . . A jackal swift of foot seeking what it may find,

going round the circuit of the land in one instant, . his mighty will seizeth on his enemies like a flame catching the ki-ki plant with the storm behind it, like the strong flame which hath tasted the fire, destroying, until every¬ thing that is in it becometh ashes; a storm howling terribly on the sea, its waves like mountains, none can enter it,*every one that is in it is engulphed in Duat.

Here and there among the hieroglyphic in¬ scriptions are found memorials of the dead, in which the praises of the deceased are neatly strung together and balanced like beads in a necklace, and passages occur of picturesque nar¬ rative worthy to rank as literature of the olden time. We may quote in this connection from the biographical epitaph of Ameny, who was governor of a province in middle Egypt for 25 years during the long reign of Usertesen I (about 2716 b.c.). This inscription not only recounts the achievements of Ameny and the

royal favor which was shown him, but also tells us in detail of the capacity, goodness, charm, discretion and insight by which he attached to himself the love and respect of the whole court, and of the people over whom he ruled and for whose well-being he cared. Ameny says : —

I was a professor of favor, abounding in love, a ruler who loved his city. Moreover I passed years as ruler in the Oryx nome. All the works of the house of the King came into my hand. Behold, the superintendent of the gangs of the domains of the herdsmen of the Oryx nome gave me 3,000 bulls of their draught stock. I was praised for it in the house of the King each year of stock-taking. I rendered all their works to the King's house: there were no arrears to me in any of his offices.

The entire Oryx nome served me in numerous attend¬ ances. There was not the daughter of a poor man that I wronged, nor a widow that I oppressed. There was not a farmer that I chastised, not a herdsman whom I drove away, not a foreman of five whose men I took away for the works. There was not a pauper around me, there was not a hungry man of my time. When there came years of famine, I arose and ploughed all the fields of the Oryx nome to its boundary south and north, giving life to its inhabitants, making its provisions. There was not a hungry man in it. I gave to the widow as to her that possessed a husband, and I favored not the elder above the younger in all that I gave. Thereafter great rises of the Nile took place, pro¬ ducing wheat and barley, and producing all things abun¬ dantly, but I did not exact the arrears of farming.

Elsewhere in his tomb there are long lists of the virtues of Amenemhat, and from these the following may be selected both on account of picturesqueness of expression and the apprecia¬ tion of fine character which they display: —

Superintendent of all things which heaven gives and earth produces, overseer of horns, hoofs, feathers, and shells.

. . . Master of the art of causing writing to speak.

. . . Caressing of heart to all people, making to prosper the timid man, hospitable to all, escorting [travelers] up and down the river. . . . Knowing how to aid, arriving at

time of need; free of planning evil, without greediness in his body, speaking words of truth. . . . Unique as a mighty

hunter, the abode of the heart of the King. . . . Speak¬

ing the right when he judges between suitors, clear of speak¬ ing fraud, knowing how to proceed in the council of the elders, finding the knot in the skein. . . . Great of favors in the house of the King, contenting the heart on the day of making division, careful of his goings to his equals, gaining reverence on the day of weighing words, beloved of the officials of the palace.

The cursive forms of writing — hieratic from the earliest times, demotic in the latest — were those in which records were committed to papyrus. This material has preserved to us documents of every kind, from letters and ledgers to works of religion and philosophy. To these, again, “literature® is a term rarely

to be applied ; yet the tales and poetry occasion¬ ally met with on papyri are perhaps the most pleasing of all the productions of the Egyptian scribe.

It must be confessed that the knowledge of writing in Egypt led to a kind of primitive pedantry, and a taste for unnatural and to us childish formality; the free play and naivete of the story-teller is too often choked, and the art of literary finish was little understood. Sim¬ plicity and truth to nature alone gave lasting charm, for though adornment was often at¬ tempted, their rude arts of literary embellish¬ ment were seldom otherwise than clumsily em¬ ployed.

A .word should be said about the strange condition in which most of the literary texts have come down to us. It is rarely that mon¬ umental inscriptions contain serious blunders of orthography; the peculiarities of late archaistic inscriptions which sometimes produce a kind of ((dog Egyptian® can hardly be considered as blunders, for the scribe knew what meaning he intended to convey. But it is otherwise with copies of literary works on papyrus. Some¬ times these were the productions of schoolboys copying from dictation as an exercise in the writing school, and the blank edges of these papyri are often decorated with essays at exe¬ cuting the more difficult signs. The master of the school would seem not to have cared what nonsense was produced by the misunderstand¬ ing of his dictation, so long as the signs were well formed. The composition of new works on the model of the old, and the accurate under¬ standing of the ancient works,

were taught in a very different school, and few indeed attained to skill in them. The boys turned out of the writing school would read and write a little; the clever ones would keep accounts, write let¬ ters, make out reports as clerks in the govern¬ ment service, and might ultimately acquire con¬ siderable proficiency in this kind of work. Apparently men of the official class sometimes amused themselves with puzzling over an ill written copy of some ancient tale, and with trying to copy portions of it. The work, how¬ ever, was beyond them ; they were attracted by it, they revered the compilations of an elder age and those which were <(written by the finger of Thoth himself® ; but the science of language was unborn, and there was little or no syste¬ matic instruction given in the principles of the ancient grammar and vocabulary. Those who desired to attain eminence in scholarship after they had passed through the writing school had to go to Heliopolis, Hermopolis or wherever the principal university of the time might be, and there sit at the feet of priestly professors; who we fancy were reverenced as demigods, and who in mysterious fashion and with nig¬ gardly hand imparted scraps of knowledge to their eager pupils. Those endowed with spe¬ cial talents might after almost lifelong study become proficient in the ancient language. Would that we might one day discover the hoard of rolls of such a copyist and writer!

There must have been a large class of hack- copyists practised in forming characters, both uncial and cursive. Sometimes their copies of religious works are models of deft writing, the embellishments of artist and colorist being added to those of the calligrapher; the magnifi- vol. 10 — 2

cent rolls of the (Book of the Dead) in the British Museum and elsewhere are the admira¬ tion of all beholders. Such manuscripts satisfy the eye, and apparently neither the multitude in Egypt nor even the priestly royal undertakers questioned their efficacy in the tomb. Yet are they very apples of Sodom to the hieroglyphic scholar, fair without but ashes within. On comparing different copies of the same text, he sees in almost every line omissions, perversions, corruptions, until he turns away baffled and dis¬ gusted. Only here and there is the text prac¬ tically certain, and even then there are probably grammatical blunders in every copy. Nor is it only in the later papyri that these blunders are met with. The hieroglyphic system of writing, especially in its cursive forms, lends itself very readily to perversion by ignorant and inattentive copyists ; and even monumental inscriptions, so long as they are mere copies, are usually cor¬ rupted. The most ridiculous perversions of all date from the Rameses epoch when the dim past had lost its charm, for the glories of

the 18th dynasty were still fresh, while new im¬ pulses and foreign influence had broken down adherence to tradition and isolation.

In the 8th century b.c. the new and the old were definitely parted, to the advantage of each. On the one hand the transactions of ordinary life were more easily registered in the cursive demotic script, while on the other the sacred writings were more thoroughly investigated and brought into order by the priests. Hence, in spite of absurdities that had irremediably crept in, the archaistic texts copied in the 26th dy¬ nasty are more intelligible than the same class of work on the 19th and 20th dynasties.

In reading translations from Egyptian, it must be remembered that uncertainty still re¬ mains concerning the meanings of multitudes of words and phrases. Every year witnesses a great advance in accuracy of rendering ; but the translation even of an easy text still requires here and there some close and careful guess¬ work to supply the connecting links of passages or words that are thoroughly understood, or the resort to some conventional rendering that has become current for certain ill understood but frequently recurring phrases. The Egyptolo¬ gist is now to a great extent himself aware whether the ground on which he is treading is firm or treacherous, and it seems desirable to make a rule of either giving the public only what can be warranted as sound translation, or else of warning them where accuracy is doubtful. A few years ago such a course would have curtailed the area for selection to a few of the simplest stories and historical in¬ scriptions ; but now we can range over almost the whole field of Egyptian writing, and gather from any part of it warranted samples to set before the reading public. The labor, however, involved in producing satisfactory translations for publication, not mere hasty readings which may give something of the sense, is very great ; and at present few texts have been well ren¬ dered.

We may now sketch briefly the history of Egyptian literature, dealing with the subject in periods :

1. The Ancient Kingdom, About 4400 B.C.- 3000 B.C. — The earlier historic period — from the 1st dynasty to the 3d, about 3766 b.c.

— has left no inscriptions to any extent. Some portions of the (Book of the Dead) (q.v.) pro¬ fess to date from these or earlier times, and

probably much of the religious literature is of extremely ancient origin. The first book of

Another, later but hardly less important, is on the fagade of the tomb of Hehrhuf, at As¬ wan, and recounts the expeditions into Ethiopia and the southern oasis which this resourceful man carried through successfully. In Hehr- huf's later life he delighted a boy king of Egypt by bringing back for him from one of his raids a grotesque dwarf dancer of excep¬ tional skill ; the young Pharaoh sent him a long letter on the subject, which was copied in full on the tomb as an addition to the other records there. It is to the 5th dynasty also that the second collection of (Proverbs) in the Prisse Papyrus is dated. The 7th and 8th dynasties have left us practically no records of any kind.

2. The Middle Kingdom, 3000-1600 B.C.— The Middle Kingdom from the 9th to the 17th dynasty shows a great literary development. Historical records of some length are not un¬ common. The funerary inscriptions descrip¬ tive of character and achievement are often remarkable.

Many papyri of . this period have survived: the Prisse Papyrus of Proverbs,* a papyrus discovered by Mr. Flinders Petrie with the (Hymn to Usertesen III, } papyri at Berlin con¬ taining a dialogue between a man and his soul, the (Story of Sanehat,* the (Story of the Sekhti,* and a very remarkable fragment of another story; besides the (Westcar Papyrus of Tales* and at Saint Petersburg the Ship¬ wrecked Sailor.* The productions of this pe¬ riod were copied in later times ; the royal (Teaching of Amenemhat* and the worldly (Teaching of Dauf> as to the desirability of a scribe's career above any other trade or pro¬ fession exist only in late copies. Portions of the (Book of the Dead> are found inscribed on tombs and sarcophagi.

3. The New Kingdom, etc. — From the New

Kingdom, 1600-700 b.c., we have the (Maxims of Any,* spoken to his son Khonsu Hetep, nu¬ merous hymns to the gods, including that of King Akhenaten (Amenhotep IV) to the disc of the sun, and hymns to Amen Ra. Inscrip¬

tions of every kind, historical, mythological and funereal, abound. The historical inscrip¬ tion of Piankhi is of very late date. On papyri are the stories of (The Two Brothers, * of (The Taking of Joppa, * of the (Doomed Prince.)

From the Saite period (26th dynasty, 160 b.c.) and later, there is little worthy of record in hieroglyphics ; the inscriptions follow ancient models. In demotic we have the (Story of Setna,* a papyrus of moralities, a chronicle somewhat falsified, a harper's song, a philosoph¬ ical dialogue between a cat and a jackal and others.

Here we might end. Greek authors in Egypt were many; some were native, some of foreign birth or extraction, but they all belong to a dif¬ ferent world from the ancient Egyptian. With the adaptation of the Greek alphabet to the spelling of the native dialects, Egyptian came again to the front in Coptic, the language of Christian Egypt. Coptic literature, if such it may be called, was almost entirely produced in Egyptian monasteries and intended for edifica¬ tion Let us hope that it served its end in its day. To us the dull, extravagant and fantastic (Acts of the Saints,* of which its original works chiefly consist, are tedious and ridiculous ex¬ cept for the linguist or the Church historian. They certainly display the adjustment of the ancient Egyptian mind to new conditions of life and belief.

Some Modern Texts and Translations.—

The bulk of the Egyptian literature has been preserved in papyri, nearly all of which are scat¬ tered in the various museums of Europe. Nine papyri out of 10 contain the religious books and rituals which were placed with the mummies in the coffins or in the sepulchral chambers. The most famous of them is the (Book of the Dead,* a compilation of prayers and magical in¬ cantations intended to ensure the security of the soul in the other world, and to serve it as a sort of password in the travels it was compelled to undertake before reaching the Hall of Judgment and the Elysium Fields. Several copies of this book have been reproduced in facsimile by Lepsius ((Das Todtenbuch der alten Agyptep Berlin 1842) and by E. de Rouge ((Rituel funeraire des Anciens figyptiens,* Paris 1861-64) but the standard edition is that projected by the International Congress of Orientalists in London (1874) and executed in part by Naville in (Das thebanische Todten¬ buch der XVIII bis XX Dynastie> (Berlin 1886). It gives, however, only those chapters which are to be found in the manuscripts of the Theban period. Translations of the whole book exist in English, prepared by Birch (in Bunsen's (Egypt's Place in Universal History,* Vol. V, 1866) and by Le Page-Renouf in Pro¬ ceedings of the Society of Biblical Archaeology.* Rituals proper, that is collections of the cere¬ monies of prayers performed in the temples and tombs — are very numerous; such are the ritual for the cult of the Theban Amon. The Open¬ ing of the Month and the other rites performed on the day of burial have been preserved to us in the pyramids of the 5th and 6th

dynasties and in the private and royal vaults of the The¬ ban cemeteries. The texts in the pyramids have been collected and translated by Maspero and those of the Theban hypogees by Schiaparelli ((I1 libro dei Funerali degli Antichi Egiziani,*

Rome 1880-90). Books of magic abound, though they are not as numerous as the ritual¬ istic or religious works. Most of them are un¬ published as yet, but the translation of Chabas ((Le papyrus magique Harris,5 Chalons-sur- Saone 1861); Pleyte ((Etude sur un rouleau magique, etc.5) and Lefebrure ((Un chapitre de la chronique solaire5) give a sufficient idea of the ways in which Pharaoh's magicians were wont to conjure the demons. That they were sometimes prosecuted as adepts in the black art is proved by the proceedings of a trial for high treason at Thebes during the reign of Rameses III. Magicians often acted as physicians or surgeons, and no remedy could be properly applied without their help. About 20 treatises on medicine are known to exist, of which a few have been published ((Papyrus medical de Berlin5). Ebers studied and published com¬ ments upon portions of his papyrus which relate to the diseases of the eye. No papyrus treating of astronomy has yet been discovered, but the calendars, zodiacs, astronomical and astrological tables which abound on the walls of temples and tombs at Ombos, Esneh, Edfu, Denderah the Ramesseum, the Memnonium of Abydos and others, furnish a large quantity of material. Three mathematical papyri have been found, one of Roman times and one from the 12th dynasty and one at Thebes. There are several works on philosophy, which was limited to a rendition of moral precepts and aphorisms on the conduct of life. Some are very ancient — the (Papyrus Prisse5 seems to have been writ¬ ten in the 12th dynasty and has been called (

this field of uncovering the ancient literature of Egypt consult the notes, pamphlets, papers, etc., inserted in the various journals of Europe and America. Consult also transactions and Pro¬ ceedings5 of the Society of Biblical Archaeology and (Memoirs of the Egyptian Exploration Fund5 in England; the (Zeitschrift der Deutschen Morgenlandischen Gesellschaft5 and the (Zeitschrift fur Agyptische Sprache und Alterthumskunde,5 in Germany; and the Jour¬ nal Asiatique, Revue de VHistoire des Religions, the Revue Egyptologique, in France; (Prince) Ibrahim-Hilmy, the Literature of Egypt and The Soudan5 (2 vols., London 1886-88). See Hieroglyphics.

EGYPTIAN MUSIC. Our knowledge of the music of ancient Egypt is very meagre. We have short accounts of it in Greek authors and we find specimens of their musical instru¬ ments and there have survived numerous illus¬ trations of others, together with scenes repre¬ senting the singing of odes to the gods, or their heroes, funeral dirges, and we know that musi¬ cians and dancers formed a part of all enter¬ tainments. In general their instruments are of the same character as those of the Hebrews and Assyrians, from which we infer that their music was of the same general type as that of these neighboring civilized peoples. Their first music was merely an accompaniment to the dance, as we find representations of singers clapping their hands in rhythm to the motions of the dance. Vocal music was made up of solos and choruses. Women often sang without musical accompaniment, but it appears that men rarely did so. Many songs have been preserved, one of the oldest being that of the oxen thresh¬ ing out the corn. The Egyptians had no clear or fixed ideas of harmony and possessed no system of notation although they had many treatises on music. The harp, lyre, flute, trumpet, drum, cymbals and tambourine were their principal instruments. We find notices of the harp prior to 3000 b.c. At first it had but 7 strings increasing gradually to 22. The strings were of catgut. It had no pedals and could be played in but one key. The lyre was also a popular instrument of from 6 to 20 strings. Flutes were in use at an early period. About 500 b.c. the te-bouni, a kind of banjo, came into use. It generally had but one string, although some specimens have two or three. A shoulder harp was also in vogue about this time ; it was played when resting on the shoulder. It was a medium between the harp and guitar. All these instruments underwent considerable de¬ velopment in the course of time and there were also a number of derived instruments. Both women and men played on these, although cer¬ tain instruments appear to have been peculiar to each sex. Consult Engel, (Music of the An¬ cients5 (London 1864) ; Mathews, (Popular History of Music5 (Chicago 1894) ; Smith, (World's Earliest Music5 (London 1904).

EGYPTIAN RELIGION AND SOCI¬ OLOGY. Religion. — No satisfactory treat¬ ment of ancient Egyptian religion has ap¬ peared, though the subject was one of the first to awaken interest in modern times. The names

of the deities of the Pantheon are well known and their general characteristics are sufficiently defined, but the gradations between them and the conceptions which gave them force are ob¬ scured not only by the most curious inconsisten¬ cies but by the fog of mythology which is for the most part unknown to us. Religious con¬ ceptions existed during all periods, but never a religion in any true sense. It is plain enough that the differences in religious belief and prac¬ tice corresponded to the primitive condition of the land, each district having its chief object of veneration. It was a condition of Henotheism out of which, in consequence of the closer con¬ tact produced by the union of the nomoi under a central government, there grew up a system of national polytheism in which the principal god of the capital gained pre-eminence. The original deities were objects of nature, but their development was various in the different nomoi. Only at a later date did gods appear who represented abstract or cosmogonical ideas. When intimate association occurred there was a resultant confusion of attributes and names. The hegemony of the god of the capital contained in itself the motives of Mono¬ theism, but there is no indication that Mono¬ theism was the original form of the Egyptian religion or that the people ever advanced to it, in spite of such phrases as (

The forms of many of the deities are ex¬ tremely grotesque. It may be a human or ani¬ mal shape but frequently it is a mixture of the two ; the human trunk being surmounted by an animal head. Thus Ptah appears as the Apis- Bull ; Hapi, Amon and Chnum as rams ; Sebek as a crocodile-headed man; Nechebt as a ser¬ pent; Mut as a vulture; Anubis as a jackal¬ headed man ; Bast as a cat-headed woman ; Sechmet and Tefmut as lion-headed; Hathor as a cow; Horus as a hawk, or hawk-headed man; Thoth as an ibis. The Phoenix is possibly de¬ rived from Benu of Hieropolis, which appears as a heron.

In various periods of the history certain deities appear as deifications of the powers of nature : Ra, the sun, the ruler of the world, having his sanctuary at Heliopolis, was even in prehistoric times conceived as a person; Horus, the bringer of light, is represented in conflict with Set, the god of darkness; Ra-Harmachis was the rising sun ; Ra-Tum the sun at evening. Thoth was also worshipped as the moon. The number of mythological beings, such as Nun, the original ocean, out of which Ra proceeded,

is beyond number. Mat, the goddess of truth, represents a large class which symbolizes abstract notions. Deities are also portrayed in pairs, such as Aeb, god of earth, and Hut, god¬ dess of Heaven, Shu and Tefnut, Osiris and Isis. In these pairs is seen the family relation which

is carried out in numerous ways, not without great confusion. Much of the religion has its explanation only in connection with the future life. When the soul or ˆdouble® (ka) left the body, the latter was preserved with ex¬ treme care and deposited in a secure tomb, for the personal existence of the disembodied spirit depended upon the absolute preservation of the mummy. The future of the individual was de¬ termined by a judgment which is represented as weighing of the heart by Horus, who coun¬ terbalances it with the symbol of the truth. Mat, the goddess of truth, watches the opera¬ tion, and Thoth, scribe of the gods, registers the result. In the earliest periods specific beliefs as to their nature, qualities and powers, clustered about the individual deities, but these did not become a true mythology till the amalgamation of variant views under the influence of the national union of the nomoi. The confusion which resulted led to attempts at harmony. But little is known of this mass of mythology, which must have been very extensive if one is to judge by the allusions abounding in every religious text.

The ancient Egyptian religion was, there¬ fore, a kind of philosophical pantheism, the various attributes of the deity being divided among the different gods of the Pantheon. Un¬ like the Greek, where a god was honored in a separate temple, each Egyptian divinity was accompanied by a pant, or “company® of com¬ panion-gods.

A few foreign deities became at the close of the 18th dynasty engrafted upon the religious system — as Bar, Baal; Ashtarata, Ashtaroth; Anta, Anaitis; Ken, Kiun ; Reshpu, Reseph; Set, or Sutekh, sometimes identified with Baal. All the gods had human passions and affections, and their mode of action was material ; they walked on earth, or sailed through ethereal space in boats. First among the deities comes Ptah, the opener, represented as the creator of the world, the sun and moon, out of chaos (ha) or matter, to whom belong Sekhet, “the lioness® and Bast, Bubastis, lion-headed goddesses pre¬ siding over fire, and Nefer-Tum, his son, a god wearing a lotus on his head. Next in the cosmic order is Chnum — worshipped at Elephantine — the ram-headed god of the liquid element, who also created the matter of which the gods were made ; and connected with him are the goddesses Heka the Frog, or <(primeval formation,® Sati, or “sunbeam® and Anuka, alluding to the gene¬ sis of the cosmos. The Theban triad comprised Amen-ra, <(the hidden® power of the <(sun,® the Jupiter; Mut, the “Mother® goddess of “Mat- ter® the Juno; Nit, the “Shuttle,® the Minerva; and Khons, <(Force® is Hercules, a lunar type. A subordinate type of Amon is Khem or Amsu, ((the enshrined,® who, as Harnekht, or Powerful Horus, unites beginning and end, or cause and effect.

A great variety of abstract principles and even animals and vegetables were, however, worshipped by the multitude, though the doc¬ trine of one God was privately taught by the priests to a select few. Many of the ani-

mals, birds and reptiles were hejd sacred by the • Ancient Egyptians; whoever killed a sacred animal, an ibis or a hawk, was put to death. If a cat died a natural death every per¬ son in the house shaved his eyebrows ; if a dog died, the whole body and the head were shaved. The cats were sacred to the goddess Bast and were buried at Bubastis and the dogs in the vaults of their own cities, field-mice and hawks at Buto, the ibis at Hermopolis and other ani¬ mals where they were found lying. Of all animals the sacred bull, Apis, was the most revered. His chief temple was at Memphis. The cow, being sacred to Isis, was thrown into the Nile, which was considered sacred; and the Apis bull was buried in the Serapeum near Memphis.

Of the doctrines of the Egyptian religion little is accurately known. The existence of the spirit after death was believed and a future state of rewards and punishments inculcated, in which the good dwelt with the gods, while the wicked were consigned to fiery torments amid perpetual darkness. It was believed that after the lapse of ages the spirit would return to the body, which was therefore carefully em¬ balmed. See Book of the Dead; Embalming; Mohammedanism; Idolatry; Pantheism.

Social Organization, Manners and Cus¬ toms. — The monuments are fuller than the enumeration of Herodotus and Diodorus, who name seven and five classes respectively. Herodotus gives priests, warriors, cowherds, swineherds, tradesmen, interpreters and boat¬ men ; Diodorus, priests, warriors, husbandmen, shepherds and artisans. All these existed, but the enumeration is defective. True caste was unknown. The population was divided into two great parts — nobles and slaves — while the middle class has left its traces from the Middle Empire onward. The upper class in¬ cluded royalty and those in the service of the state or religion, a ruling class, far removed from the slave population, foreign and native. They formed the backbone of the state, filled all the higher offices and were obeyed by all their social inferiors. At the head of the gov¬ ernment stood Pharaoh, <(King of the Upper and Lower Egypt, son of Ra, eternal.® Rameses II is bombastically called ((Horus, the mighty bull, beloved of the Goddess

of Truth, pro¬ tector of Egypt, subduer of barbarians, rich in years, great in victory, chosen of Ra, Rameses, beloved of Ra.® Similarly the queen is called ((the consort of the God, mother of the God, the great consort of the king® — god and king being interchangeable terms. She was usually of royal blood, often own sister of the king, his equal in birth and place — <(Mistress of the House.® Crown prince and princes came next in order. The upper classes consisted of ((the nearest friend® of the king and friends of various grades, generals, high priests, officers, physicians, overseers, district chiefs, judges, keeper of the seal, master builders, treasurers, fan-bearers, scribes and others. Officialdom ramified in numberless class gradations, whether the order was priestly, military, literary, archi¬ tectural or agricultural. Advancement went by royal or other favor. The middle class remained in the background and is less known because its members could not, like kings and nobles, erect those enduring tombs from which our knowledge of the times is obtained. After the removal of the necropolis from Memphis to Abydos during

the Middle Empire and owing to the increasing practice of erecting memorial stelae, the monu¬ ments of untitled persons begin to appear, giv¬ ing a conception of their number and position. They possessed households similar to those of officials and in many ways appear to have been their equals. They were merchants, traders, artisans, free workmen, weavers, potters, car¬ penters, joiners, smiths, etc. The lowest class was composed of the slaves, native or taken in war, who were hewers of wood and drawers of water, performing all menial offices. They were mere chattels, belonging to temple, necropolis, or landed estate and were often organized as a part of the military establishment. Closely allied to them were the shepherds, the pariahs of Egyptian society.

Agriculture, manufacture and trade were carried on in Egypt in the very earliest days. Upon the ancient monuments we find repre¬ sentations of the mechanical arts, where we see the blow-pipe, bellows, siphons, press, balance, lever, saw, adze, chisel, forceps, syringe, har¬ poon, razors ; we have also glazed pottery, the potter's wheel and the kiln ; and dated specimens of glass of the time of (Thothmes III, 1445 b.c.). Gold-beating, damascening, engraving, casting, inlaying, enameling, wire drawing and other processes were practised. Weapons and other instruments of war, shields, cuirasses of quilted leather, helmets, spears, clubs, maces, daggers, bows, battle-axes, pole-axes, hatchets and fal¬ chions are shown. The testudo, ladders, torches and lanterns were also in use. In agriculture the plow, hoe, sickle and other implements were employed. The processes of growing and pre¬ paring flax and making it into thread, string, ropes

and cloth, as well as the looms em¬ ployed, are all depicted. Mats and baskets were beautifully made, either of the halfa grass or palm leaves, or of the outer rind of the papyrus plant, which was used in making paper. Cof¬ fins or wooden sarcophagi were chiefly of sycamore or cedar, covered with stucco and richly painted. The ordinary boats of the Nile were planks of the acacia and had two rud¬ ders or large oars, with a sail of cloth frequently painted or worked in colored patterns. Many of the vessels of burden were of great size. The boats made of papyrus were mostly punts for fishing, or for gliding through the canals of the Delta. Implements for painting ladles, bells, crucibles and surgical instruments have also been found. The commerce of the Egyptians with neighboring nations enriched the country with slaves, cattle, gems, metals, rare animals and objects of curiosity. The Egyptians ex¬ pended enormous wealth on the tombs and fur¬ niture of the dead, and the paintings acquaint us fully with the various ceremonies followed. In embalming they excelled. Each administra¬ tive department had its own troop of laborers under its own overseer, who kept minute tally of work performed, rations distributed and of absentees. The troop, not the individual, was the unit. All artisans as well as the slaves were regarded superciliously by the scribes and held in lower repute than the agriculturists, though the products of their skill still command admiration. Weavers working with papyrus reeds or with linen thread, produced baskets, boats, mats, or the finest linen cloths; joiners though handicapped by lack of good raw material, nevertheless produced creditable work

by the use of instruments most simple in their character. Potters through all periods repro¬ duced patterns tenaciously and with little varia¬ tion, but atoned for the rudeness of much of their work by the fineness of their products in faience, the glazing of stone objects being es¬ pecially noteworthy. Metal workers used gold, silver, bronze, iron and tin, the source whence tin was derived being problematical. A bronze is mentioned which was an alloy of six metals. Objects in bronze and iron have been found among the remains of the Old Empire, though the earliest bronze statue is one of Rameses II. The sources of most metals were the mines of Nubia and Sinai. In value silver exceeded gold and a mixture of the two is frequently mentioned. The processes of agriculture are well portrayed on the walls of the tombs. The plow was simply a sharpened stick dragged through the ground by oxen ; the hoe a broad blade fastened to a handle, a second cord mid¬ way of each preventing too great a strain. The seed once

scattered was trampled in by ani¬ mals. Harvesting was done by a short sickle ; the grain was carried in sheaves to the thresh¬ ing floor, where the hoofs of cattle performed the required labor. Winnowing was done with shovel and wind and the grain was stored in conical receptacles open at the top, to which the bearers mounted on ladders. Supplement¬ ary irrigation was by a well sweep similar to the modern shadouf. These labors were so essential a part of Egyptian life that the future life was portrayed under exactly the same cir¬ cumstances, happiness consisting essentially in the degree in which personal performance could be avoided. Cattle of all sorts, asses, sheep, pigs and goats existed in great herds and were tended by slaves and peasants whose occupa¬ tions in marshy districts so far removed them from civilization that they were regarded with detestation. Their disrepute is the more re¬ markable in view of the evident pride with which landed proprietors enumerated their flocks.

The schools, “bookhouse® or “house of in¬ struction® presided over by a scribe, was an institution of the Old Empire, which received all classes alike and prepared them for the technical education of the special bureau. In the New Empire both branches were combined in the departmental schools. Orthography, cali- graphy, style and the formulae of etiquette comprised the known curriculum ; the rest was learned by practice. Many corrected school exercises have survived, containing various specimens of literature; tales, religious and magical texts, poems, codes of rules, or “instruc¬ tion® of ancient sages for the proper regulation of daily life and statements of the unlovely condition of soldiers and laborers as contrasted with the beauty of the scribe’s life, at once inciting to industry on the part of the pupil and to profound respect for the teacher. These papyri are of great value in affording a knowl¬ edge of orthography, language, and literature. The tombs of the Old and Middle Empires represent the various operations of large landed estates in all their complexity. Such private ownership of the soil, of large tracts and even of whole villages, seems to have been a survival from the time when the princes of the nomos were at the head of the independent districts

which collectively constituted Egypt. A de¬ cided change is seen in the New Empire when the title to all land except that attached to temples was vested in the king and when it was worked for the state by slaves or let out at an annual rate per cent. The change came about during the Hyksos period or in the transition to the revived native dynasties. The biblical account of Joseph is of interest in this connection. The dwellings of the common peo¬ ple probably resembled those of the fellahin of to-day, being mud hovels, whose destruction accounts for the formation of the tells which mark city

sites. The dwellings of nobles and kings were more pretentious, but no remains have survived. The only models by which to judge are some ancient sarcophagi of house¬ like form and some mural representations. Rec¬ ord has survived of a palace which stood 300 cubits square.

Family Life. — The position occupied by woman was quite extraordinary. In the house¬ hold there was generally only one wife, though there might be several concubines or female slaves. Actual polygamy was infrequent, though the royal harem often contained 200 women. Private persons also maintained harems, the number of inmates depending on the financial ability of the individual. Inheritance and geneal¬ ogy were reckoned by the mother, not the father, and while a man's possessions might descend to his sons, the line might also pass through the daughter to her sons. Sometimes marriages were contracted upon these considera¬ tions. It was a father's ambition to hand down his official position to his sons, and the title of "hereditary prince® is often met with. The practice of marriage with a sister is met with in early periods, but under the Ptolemies it was quite the rule, and the marriage contracts speci¬ fied the amounts which the husband engaged to give annually to his wife for family purposes.

Costume. — There is a constant development observable in the dress of the upper classes. Royalty set the fashions, and they were followed at intervals by those standing on the various social levels. There was a distinction between king and noble, and between noble and plebeian. The simple apron bound about the loins was always the essential garment. To this the king added a lion's tail, and the noble a panther's skin during the period of the Old Empire. Dur¬ ing the Middle Empire the apron took a pointed triangular shape and became longer ; next comes a double apron, a short one beneath, opaque, and a long and transparent one outside. The priest continued to wear the short apron, how¬ ever, while the king had advanced to a mode of dress which covered the whole body and was complex in structure. That which before was holiday attire became the garb of every day. The dress of women was more uniform. It consisted at first of a close-fitting garment which extended from the breasts to the ankles, and was fastened by straps over the shoulders. Only in the latest periods were sleeved or sleeveless mantles worn. Transparent cloth was used for female wear, as for the outer apron of males, but without the inner garment. The dress of peasants consisted simply of the apron, which in some cases amounted only to a band with pendant ends. These simple articles were made of papyrus mats, leather or cloth.

The hair was worn short, blit the shaving of the head does not appear to have been practised daily. Wigs of various forms and sizes were used as ceremonial head coverings. Specimens of them are not infrequent. Natural beards were not worn except by shepherds and similar persons but an artificial ((imperial)) beard was one of the marks of royalty and divinity in the tomb representations. Sandals of various sorts completed the costume. Egyptian garments of the better class were of linen, wool being re¬ garded as filthy. The food of the lower classes consisted largely of bread and vegetables. The principal vegetables were kidney beans, lentils, turnips, radishes, carrots and spinach. Milk and cheese were also common articles of food. Pomegranates, dates, figs and grapes were plen¬ tiful. The flesh of the goat, ox, gazelle, ante¬ lope and other animals formed part of the diet of the middle classes, the flesh of the hog was not in use, this animal being considered unclean. Geese, ducks, turtle doves and hens were abun¬ dant and even to-day are a source of consider¬ able income to the laboring classes. Salt was extracted from the coast marshes and from some deposits in the Libyan desert. The na¬ tional beverage was beer, seasoned with vari¬ ous plants. The wealthy classes drank wine of the grape and the common people the fer¬ mented juice of certain palms.

Recreations. — The dance to the accompani¬ ment of the lute was a popular diversion. Acro¬ bats and clowns performed in the royal and princely palaces. Checkers and chess much in the form of our day were also popular amuse¬ ments. As regards furniture chairs and tables resembled closely those of the present day. Other articles appear to have been of simple construction. The hunting of wild animals was by coursing with dogs and the use of lasso and spear. The bow and arrow were seldom employed. Fishing was with line or net. Fowling was done in the marshy districts in boats, the weapon used being the boomerang. Traps and nets were also used. Wrestling matches and gymnastic exercises, ball-playing and juggling are often represented in paintings. Singing and music were the accompaniment of work and play, and at feasts, music and danc¬ ing, performed by members of the harem, en¬ livened the scene. The instruments used were the flute and a sort of whistle, the guitar, the harp, the lyre, the last two having sometimes nearly 20 strings. Assistants beat time by hand¬ clapping. Bow practice was engaged in and a game similar to quoits is represented, along with other games which cannot be understood in their details. T-shaped boards divided into squares like

checker-boards have been found, but how they were used is uncertain. The children were not forgotten, for the tombs have yielded several specimens of their toys.

Government. — When the king was simply the first among equals, Upper Egypt was di¬ vided into 30 administrative departments of dif¬ ferent grades, each having its nomarch or gov¬ ernor who stood as the head in everything — chief judge, district chief, military commander, tax collector, architect, treasurer, etc. As judge he was also chief priest of Mat, the goddess of truth. So long as the king retained supreme power this arrangement continued, but upon the decay of royal prestige each district chief aspired to leadership. This probably explains

the periods of confusion in the history indicated by the blanks between the 7th and 11th and the 13th and 17th dynasties. A new order came in during the period of the New Empire. The nomarch surrendered all his functions to the military official appointed by the king to look after his interests and to gather the taxes in kind, peaceably or forcibly as the case might be. Royal stewards and messengers, the “mouths® or “speakers® of the king appear as intermedi¬ aries. Some of the more important additional offices were those of chief judge, governor, building-master, treasurer, overseer of gran¬ aries, etc. The chief judge was a man of high standing, a prince or noble, or perhaps a priest. Beneath him were several grades in the office. Several sat as a court and before them com¬ plaint was made, prosecution and defense heard and judgment pronounced or referred to the king, according to the gravity of the complaint. The prosecutor might be a private person or a public official with whom the complaint was lodged. Confessions were forced with the bastinado. The severest punishments were the loss of ears and nose, or death by impaling, compulsory suicide, or poisoning. Accounts of trials are frequent, but no legal code has sur¬ vived. In the earliest periods there was no standing army. Each nomos had its own mili¬ tia and each temple its soldiers, who appear rather to have been police. This arrangement continued through the Middle Empire. The chief service rendered by soldiers in these peri¬ ods was to escort expeditions to the quarries of Syene and Hammamat and to the mines of Sinai and Nubia. They also rendered service as laborers. Under Pepi (6th dynasty) a mili¬ tary expedition was undertaken against the Bedouin of the east. Ethiopian mercenaries formed the bulk of this force. Under Amenemha III (12th dynasty) expeditions to Nubia were undertaken and a stele of the period, now in Berlin, records the wailing which attended the visits of the conscripting officer, the “military scribe® who came “to choose out the likely youth.® About this time the king

came to have a body guard and during the contest with the Hyksos the armies were increased. Mercena¬ ries, however, were constantly employed as con¬ scription was little employed. Bowmen formed the principal arm of the mercenaries ; the chariot coming into use after the Hyksos wars, was con¬ structed to contain two persons, driver and warrior. Border garrisons were maintained to the east and south. The native weapons were the spear and shield, the axe, lance, dagger and sling. Naval warfare was little practised.

Bibliography. — Binion, { Ancient Egypt or MizraitrP (1888) ; Birch, (Egypt from the Ear¬ liest Time) (1875) ; Brugsch, (Egypt under the Pharaohs> (1874) ; Budge, (History of Egvpt> (8 vols.) ; (The Gods of the Egyptians) (1904) ; Champollion, (L'Egypte sous es Pharaons) (1814); Erman, (Life in Ancient Egypt* (1894) ; Mahaffy, (Empire of the Ptolemies> (1895) ; Renouf, (The Religion of the Ancient Egyptians* (Hibbert Lectures 1880) ; Wiede¬ mann, (Religion of the Ancient Egyptians) (1897) ; Wilkinson, (Manners and Customs of the Ancient Egyptians) (1879).

EGYPTIAN SUDAN. See Sudan.

EGYPTIAN VULTURE (Neophron perc- nopterus), a well-known bird which frequents

both shores of the Mediterranean, southern India and, during the winter, South Africa. It is the scavenger of Egyptian villages, collect¬ ing in numbers where carrion or garbage is deposited, but feeding also on frogs, lizards and small mammals found in cultivated fields. The birds usually go in pairs, however, and addict themselves to particular localities, being only drawn together in numbers by abundance of their favorite food. The name, as also that of Pharaoh's hen, is given because of the frequent representation of this bird in Egyptian sculp¬ ture. See Vulture.

EGYPTIANIZED CLAY is the name in¬ vented for the purpose of describing a certain treatment of clay by which a clay weak in strength and in plasticity is made stronger and more plastic. In this process the clay is treated with extract of straw, tannin and other plant products. The treatment reduces the particles of clay to a state so fine that they will pass through ordinary filter paper, and will remain permanently suspended in water. The employ¬ ment of the

extract of straw to make the clay stronger suggested to Edward G. Acheson (q.v.), the discoverer of the process, the name <(Egyptianized clay® because . of the Biblical story of the use of straw in the making of bricks.

EGYPTOLOGY, the science of Egyptian antiquities. See Egypt.

EHEBERG, a'e-berg, Karl Theodor von,

German political economist: b. Munich 1855. He received his education at the University of Munich and in 1882 was appointed professor of political economy at Erlangen. He is best known through his masterly presentation of the subject of finance in his

EHLERS, a'lers, Ernst Heinrich, German zoologist : b. Liineburg 1835. He received his education at Gottingen and Munich and in 1860 became professor of zoology at Erlangen. In 1874 he became professor of zoology and com¬ parative-anatomy at the University of Gottingen. With A. von Kolliker he edited the Zeitschrift fur wissenschaftliche Zoologie. He wrote (Zoologische Beitrage,' with W. Keferstein (1861) ; (Die Borstenwiirmer) (1868) ; (Hypo- phorella Expansa) (1876) ;

EHLERS, Otto Ehrenfried, German trav¬ eler; b. Hamburg 1855; d. 1895. He studied at the universities of Jena, Heidelberg and Bonn. In 1887 he went to East Africa, and later traveled through India, the Andaman and Nicobar islands, Siam, ..French Indo-China, Korea, Japan, the Hawaiian Islands and the United States. In a second tour he again visited India, and went to Samoa, Kaiser Wil¬ helm's Land and New Guinea. In an effort to traverse the latter country he was slain by his guides. He wrote (An indischen Fiirstenhofen' (2 vols., 1883; 5th ed., 1898) ; (Im Sattel durch

Indochina) (1894) ; (Samoa, die Perle der Siidsee) (3d ed., 1896) ; (Im Osten Asiens) (4th ed., 1900).

EHLERS, Rudolf, German theologian : b. Hamburg 1834; d. 1908. He received his edu¬ cation at the universities of Heidelberg, Berlin and Gottingen. For some time he was pastor at Stolberg, near Aachen, and in 1864 removed to the Protestant Reformed Church at Frank- fort-on-the-Main, where he exercised a wide influence as a theologian. In 1878 he was made consistorial councillor, and in the following year became one of the editors of the Zeitschrift fur praktische Theologie. He published, among other works, (Evangelische Predigten' (1873) ; (Das alte Gesetz und die neue Zeit' (1877) ; (Bilder aus dem Leben des Apostels Paulus' (1886) ; (Richard Rothe) (1906), and a philo¬

sophical work in Latin.

EHNINGER, an'ing-er, John Whetton,

American artist: b. New York 1827; d. 1889. He studied under Couture in Paris and later studied at Diisseldorf. He left a number of portraits, and landscapes and figure subjects, including (Peter Stuyvesant' (1850) ; c Death and the Gambler) ; (Autumn Landscape' (1867); 'Twilight from the Bridge of Pau) (1878) ; illustrations for Longfellow's (Miles Standish' (1858) and for Irving's (Dolph Hey-linger) and 'Ye Legend of St. Gwendolyn)

(1867).

EHRENBERG, a'ren-berg, Christian Gott¬ fried, German scientist : b. Delitzsch, 19 April 1795; d. Berlin, 27 June 1876. After studying theology, medicine and natural history at Leip¬ zig and Berlin, he joined in 1820 an expedition to Palestine, Egypt and Abyssinia, returning to Berlin in 1825. In 1829 he accompanied Hum- bolt to the Ural and Altai ranges and to cen¬ tral Siberia. In 1839 he was appointed full professor of medicine, at Berlin. His great work on 'Infusoria' ((Die Infusionstierchen als vollkommene Organismen') appeared in 1838, and was at once recognized as the highest authority on the subject. It was followed in 1854 by his (Microgeology.' Ehrenberg's work gave an enormous impetus to the study of microscopic organisms. He was the first to show that the phosphorescence of the sea is due to the presence of hosts of animalcules. Con¬ sult Lane, 'Life' (1895).

EHRENBREITSTEIN, a'ren-brlt'stln, Prussia, town and fortress on the right bank of the Rhine, opposite Coblenz with which it is connected by a bridge of boats and a railroad bridge. Tobacco, flour, leather, soap, bricks and wine are manufactured and there is a large trade in corn, wine and iron. There are several large fairs held annually. The fortress is on a steep, rock, 385 feet above the river. It has massive fortifications and until the advent of heavy siege artillery was deemed impregnable. In 1799 after repeated assaults had failed and after a siege of 14 months the French succeeded in capturing it. In . 1801 they destroyed the fortifications and retired. In 1826 new fortifi¬ cations were completed. Pop. 5,302.

EHRLE, ar'le, Francis, German Catholic scholar; b. Isny, Wurtemberg, 17 Oct. 1845. He was educated at the Jesuit College, Munster, Westphalia, at the Maria-Laach in Freiburg, and at Ditton Hall, Lancashire, having been ad-

mitted to the Society of Jesus in 1861. After sev¬ eral years in mission work he was transferred to Rome, where he devoted himself to historical studies. In 1890 he became a member of the administrative council of the Vatican Library, of which he was appointed prefect in 1895. He retired in 1914. He received honorary degrees, not only from Munster (1902) and Louvain (1909), but from Oxford (1899) and Cam¬ bridge (1905). His (History of the Church and its Literature in the Middle Ages) (in Ger¬ man) is based on extensive researches in the archives of Germany, England, Spain and Italy. It is on this work that his reputation largely rests ; but he has further written a Latin history of the Papal Library from 1200 to 1417, and (with Stevenson) a history of the Vatican. He was placed in charge of the Papal exhibit at the Louisiana Purchase Exposition, Saint Louis. His principal works are mono¬ graphs on the frescoes of Pinturicchio in the Borgia_Chambers at the Vatican Palace (French 1897; Italian 1899); editions of the more im¬ portant manuscripts in the Vatican Library and (Beitrage zur Geschichte und Reform der Armenpflege) (1881).

EHRLICH, ar'liH, Heinrich, German writer on music : b. Vienna 1822 , d. 1899. He studied under Henselt and Thalberg, and for a time was court pianist to George V of Hanover. He removed to Berlin in 1862 and taught the pianoforte at the Stern Conservatory there in 1864-72 and 1886-98. He also wrote musical criti¬ cisms and other articles in the Berliner Tage- blatt, Die Gegenwart and the Neue Berliner Musikzeitung. He published (Wie iibt man am Klavier) (2d ed., 1884; Eng. trans.) ; (Die Ornamentik in Sebastian Bachs Klavier- werken) ; (Dreissig Jahre Kiinstlerlebens 1862- 92 > (1893) ; (Schlaglichter und Schlagschatten aus der MusikwelD (1872) ; (Aus alle Tonar- ten) (1888) ; (Die Ornamentik in Beethovens Sonaten) (1896) ; (Musik-Aesthetik von Kant bis auf die Gegenwart J (1881); (Modernes Musikleben> (1895).

EHRLICH, Paul, German medical scien¬ tist : b. of Jewish parents at Strehlen, Silesia, 14 March 1854; d. Bad Homburg, 20 Aug. 1915. He was educated at the universities of Breslau, Strassburg, Freiburg and Leipzig. After gradu¬ ating in medicine in 1878 he began his researches into the relationship existing between scientific medicine and chemistry, experimenting on the effects of various chemicals upon living tissue. He first chose the aniline dyes, on account of their effects being visible when injected into animals. With these dyes and their derivatives his whole life's work was concerned and his most brilliant

triumphs were gained through their employment. By staining the tubercle bacillus with dyes he found that certain of them possessed a peculiar affinity for this bacillus and this accorded with the view on which he based his whole philosophy — that of the spe¬ cific affinity of particular chemical substances for particular tissues, more especially for the organisms which cause disease. He next dis¬ covered a method of testing the potency of the anti-diphtheria serum by experimenting on guinea-pigs, which made it possible to standard¬ ize the serum and accurately measure the dosage. Ehrlich then found a dye called ˆtry¬ pan redw which cured fatal trypanosome in¬

fection in mice. A further series of experi¬ ments resulted in his greatest discovery, that of salvarsan (q.v.) or 606, a specific drug with power to destroy the spirochcete pallida, the specific organism of syphilis. This epoch-mak¬ ing discovery has been described as the most potent therapeutic weapon in existence. Ehrlich laid the foundation of modern haematology and also performed some notable researches in con¬ nection with cancer; he formed the theory ((that the growth of cancer depended on food stuffs.ˆ Almost every university and learned society throughout the world honored the great scientist; the Nobel Prize was divided between him and Metchnikoff (q.v.) in 1908; the number of his decorations conferred by monarchs and princes was greater than he professed to be able to remember. <(He opened new doors to the unknown and left the world his debtor.”

EHUD, one of the judges of Israel, men¬ tioned in Judg. iii, 12-30; 1 Chron. vii, 10 and viii, 3 ; he delivered his people by stabbing to death their oppressor, Eglon, king of the Moabites. Doubt has been cast on the his¬ torical character of this hero. Consult Kittel, (Geschichte des Volkes IsraeP (Vol. II, Gotha 1909) ; Moore, (Judges) (New York 1895) ; Noldeke, (Untersuchungen zur Kritik des alten Testaments) (Kiel 1869) ; Wellhausen, (Israel- itische und j iidische Geschichte > (7th ed., Ber¬ lin 1914) ; Winckler, (Geschichte Israels) (Leip¬ zig 1895).

EIBAR, a’e-bar, Spain, town in the prov¬ ince of Guipuzcoa, 35 miles south of Bilbao. Small arms and metal articles for decorative purposes are the chief manufactures. Pop.

9,659.

EIBENSTOCK, i’ben-stok, Germany, town in the southeast of Saxony, near the Mulde, 17 miles southeast of Zwickau, with important manufactures of lace. Its principal edifice is a Romanesque church

dating from 1864. It is an industrial centre, the chief seat of the tambour embroidery manufactures, has manufactures of chemicals, brush handles, leather, beer and tobacco and is a cattle market. The tin mines nearby have been worked for about eight cen¬ turies, but are now practically worked out. It is connected by rail with Chemnitz, about 40 miles distant. Pop. 9,528.

EICHELBERGER, I-nel-berg-er, William Snyder, American astronomer : b. Baltimore, Md., 18 Sept. 1865. He was graduated at the University of Johns Hopkins in 1886; was assist¬ ant in the Nautical Almanac office in 1889-90 and 1896-98, and from 1890-1896 served as in¬ structor in mathematics and astronomy at Wes¬ leyan University, Connecticut. Since 1900 he has been professor of mathematics in the United States navy. He was head of the division of meridian instruments in 1902-07, and of astro¬ nomical observations in 1907-08 at the United States Naval Observatory. In 1910 he became director of the Nautical Almanac. He has at various times been in charge of eclipse stations, notably at Fort de Kock, Sumatra, in 1901 and Daroca, Spain, in 1905. He is a Fellow or mem¬ ber of several astronomical societies and has contributed papers to government publications and to the Astronomical Journal.

EICHENDORFF, l'Hen-dorf, Joseph Baron von, German poet: b. Castle of Lubo- witz, Silesia, 10 March 1788; d. Neisse, 26 Nov.

1857. He served in the War of Liberation, 1813-15, and held a position (1831-45) in the Prussian Ministry of Education. He was one of the most gifted and original romantic lyrists of Germany. His principal works are (Presage and Presence) ; (War to the Philistines,) a dramatic story; (The Life of a Good-for- NothingP idealizing vagabondage; the tragedies (Ezzelin von Romano, } (The Last Hero of Ma- rienburg) ; and other plays, and a number of histories of German literature, including (The Ethical and Religious Meaning of the New Ro¬ mantic Poetry in Germany) (1847) ; (German Romance of the Eighteenth Century in Relation to Christianity) (1851) ; 'History of German Poetry* (1857).

EICHHORN, iH'horn, Johann Gottfried

German theologian and Orientalist : b. Dorren- zimmern, 16 Oct. 1752; d. Gottingen, 25 June 1827. In 1775 he became professor of

Oriental languages at Jena, and in 1788 at Gottingen. He is considered the founder of scientific criti¬ cism of the literary and historical aspects of the biblical Scriptures. He edited a (Repertory of Biblical and Oriental Literature) (1777-86) ;

(Universal Library of Biblical Literature) (1787-1803) ; and wrote (Historico-Critical Introductions) to the Old and to the New Testa¬ ment, and to the Apocryphal Books of the Old Testament; a 'Latin Commentary on the Apoc¬ alypse.)

EICHHORST, m'horst, Hermann Lud¬ wig, German physician : b. Konigsberg 1849. He received his education at the university of his native city and in 1877 became director of the Medical Polyclinical Institute at Gottingen. Seven years later he was appointed to the chair of pathology and therapy at the University of Zurich. He has published many important works, including 'Lehrbuch der physikalischen Untersuchungsmethoden innerer Krankheiten) (3d ed., 1889) ; (Handbuch der speziellen Pa- thologie und Therapie) (5th ed., 1895-96) ; 'Handbuch der speziellen Pathologie und Ther¬ apie innerer Krankheiten) (1904) ; (Hygiene des Herzens und der Blutgefasse im Gesunden und Kranken Zustande) (1906) ; 'Pathologie und Therapie der Nervenkrankheiten) (1907).

EICHLER, m'ler, August Wilhelm, Ger¬ man botanist: b. Neukirchen 1839; d. 1887. He was educated at the University of Marburg and in 1871 was appointed professor of botany and director of the Botanical Garden at Graz. Two years later he became professor of botany at Kiel and in 1878 was appointed to a similar chair at the University of Berlin. He wrote extensively on the Coniferse, Cycadaceae and other plant groups of Brazil. His principal work is (Bliitendiagramme) (1875-78), a de¬ scription of the comparative study of flowers. Other important works are 'Syllabus der Vor- lesungen fiber spezielle und Medizinisch-phar- mazeutische Botanic (1883) ; 'Beitrage zur Morphologie und Systematik der Marantaceen) (1884) ; 'Zur Entwickelungsgeschichte der Palmenblatter) (1885).

EICHRODT, m'rot, Ludwig, German poet: b. Durlach, Baden, 2 Feb. 1827; d. Lahr, 2 Feb. 1892. He studied at Heidelberg and Frei¬ burg and published in 1848 in Fliegcnde Blatter his comic songs, 'Wanderlust,) which had great popularity. Among his works are 'Gedichte in

allerlei HumoreiP (1853) ; (Leben und Liebc) (1856) ; 'Hortus Deliciarum) (1875) ; 'Gold* (1880). His collected works were published in 1890 at Stuttgart.

EICHSTATT, m’stefi, or EICHSTADT,

Middle Franconia, Bavaria, an old town in a deep valley of the Altmfihl, 67 miles north- northwest of Munich. Its principal edifice is a fine Gothic cathedral, founded in 1259. It has a number of very interesting monuments in marble and bronze and here also is the tomb of Saint Wilibald. Saint Walpurgis’ Church is renowned as a place of pilgrimage, great numbers congregating there annually on 1 May. Other noteworthy features are the town-hall, the ancient episcopal palace, now converted into barracks, the episcopal lyceum, seminary and municipal theatre. It has manufactures of shoes, matches, lithographic stone, etc. It is said that the city grew up about a military sta¬ tion of the Romans. In 908 it was chartered as a city. It suffered greatly in the many wars of the 18th and 19th centuries, being burned repeatedly by the French. The episcopal see was secularized in 1802 and added to the diocese of Bavaria but was re-established in 1817.

EIDER, i’der, a river of the province of Schleswig-Holstein, which rises about 12 miles from Kiel, flows generally northwest, and after a course of 112 miles, of which 69 are navigable, empties into the North Sea at Tonning, where it forms a bay. It is connected with Kiel by the Schleswig-Holstein Canal.

EIDER DUCK, a bird of the sub-family Fuligulince , or sea ducks, genus Somateria , dis¬ tinguished by the peculiar form and feathering of the bill, and closely allied to the scoter ducks. The several species are confined to the northern regions. The American eider {S. dresseri) and the European eider (S. mollissima) are closely similar species which breed on solitary rocky shores and islands from Maine and the Fame Islands, respectively, northward, the former spe¬ cies wintering as far south as the Delaware River. They are most abundant in Labrador, Newfoundland, Greenland, Iceland and Nor¬ way, where they are stringently protected by law.. Both species breed gregariously and in particular spots their nests are so abundant that a person can scarcely walk without treading on them. Their nests are usually formed of grass, dry sea-weed, etc., lined with a quantity of down which the female plucks from her own breast. In this soft bed she lays five eggs, which she covers over with a layer of down; then the natives, who watch her operations, take away both the eggs and the down, and this removal is repeated as often as she lays until the close of the season, when the last lot of eggs is allowed to hatch and the down removed from’ the nest only after the young have left. The drake does not, as is often stated, furnish any of the down. One female generally furnishes a few ounces of down. This down, from its superior warmth, lightness and elasticity, is preferred by the luxurious

to every other article for beds and coverlets; and, from the great demand for it, those districts in Norway, Greenland and Iceland where these birds abound are regarded as the most valuable property and are guarded with the greatest vigilance. Proprietors en¬ deavor to attract them by supplying artificial nests and otherwise, and when they settle in

an island off shore, cattle and herdsmen are removed to allow them to breed undisturbed. The down from dead birds is little valued, hav¬ ing lost its elasticity.

The length of the eider duck is about two feet three inches, extent of the wings three feet, weight from six to seven pounds; the head is large and the bill of singular structure, being three inches in length, forked at the base of the upper mandible in a remarkable manner, run¬ ning high up on the forehead, and having the feathers on each side descending nearly to the nostrils ; the whole of the bill is of a dull, yel¬ lowish horn color, somewhat dusky in the mid¬ dle. The male is black beneath, head and back white, with a black crown. The female is red¬ dish drab, spotted with black, with two white bands across the wings. Eiders associate in flocks, diving to great depths for shell-fish, which constitute their principal food. They live much on the water, retiring to the shores to rest, particularly on the appearance of an approaching storm. Their flesh is eaten, but tastes strongly of fish. The eggs, however, are esteemed. These and the down are both fre¬ quently obtained at the hazard of life by people let down by ropes from craggy steeps.

Other species are the Pacific eider (.S'. v-nigra), and the remarkable king eider (.S'. spectabilis) of high Arctic regions. The now extinct Labrador duck (q.v.) is closely related.

EIFEL, i'fel, The, a barren and bleak plateau of Rhenish Prussia, between the Rhine, Moselle and Roer rivers, showing extensive traces of volcanic action. Its surface is diver¬ sified by crater-like depressions and volcanic peaks and ridges. It is 40 miles long and 20 wide, averaging from 1,500 to 2,000 feet in height.

EIFFEL, a-fel or i'fel, Alexandre Gus¬ tave, French engineer: b. Dijon, 15 Dec. 1832. He was educated at Dijon and Sainte-Barbe, and at the Central School of Arts and Manu¬ facture. In 1858 he was entrusted

with the con¬ struction of the large iron bridge over the Garonne at Bordeaux, and was one of the first to introduce caissons worked with compressed air. The bridge over the Douro at Oporto, the great viaduct of Garabit, in Cantal, and that over the Tardes, near Montluqon, and the gi¬ gantic locks designed and partly prepared for the Panama Canal are among later triumphs of his engineering skill; while in the huge frame¬ work erected for Bartholdi's (Statue of Liberty) may be seen the germ of the idea which afterward assumed the form of the colossal iron structure (1887-89) on the Champs-de-Mars in Paris, with which his name is identified. He also constructed the Aerodynamic Laboratory at Auteuil. He is a member of the Legion of Honor and has received decorations from Russia, Austria, Portugal and Spain. See Eiffel Tower.

EIFFEL TOWER. A notable structure in Paris. The plans for the exposition of 1889 included a monstrous iron tower, to be raised on the Champs-de-Mars, 1,000 feet high. The de¬ signer, Gustave Eiffel, constructed it of iron lat¬ tice-work, with three elevators giving access to the summit. The uses of so stupendous an undertaking are many, and it became one of the chief permanent ornaments of the city. Its im¬ portance from a meteorological point of view

cannot be overestimated, the tower enabling meteorologists to study the decrease of temper¬ ature at different heights, to observe the varia¬ tions of winds, and to find out the quantity of rain that falls at different heights, and the den¬ sity of the clouds. Now used as wireless station.

EIGENMANN, i'gen-man, Carl H., Ameri¬ can zoologist : b. Flehingen, Germany, 1863. He was graduated at Indiana University in 1886 and studied at Harvard 1887-88. Between 1888 and 1892 he continued his scientific inves¬ tigations in San Diego Biological Laboratory, the Woods Hole Marine Stations, and in the explorations undertaken for the British Mu¬ seum in California, Oregon, Idaho, Montana, Dakota and western Canada. He was ap¬ pointed professor of zoology in Indiana Univer¬ sity in 1891 and in 1895 founded and assumed the direction of the Biological Station of Indi¬ ana University. He made scientific explora¬ tions in Cuba in 1902-04 and in British Guiana in 1908. He has contributed more than 100 papers to the proceedings of scientific societies and to scientific journals, including (Catalogue of Fresh-Water Fishes of Central America and Southern Mexico y (1893) ;

EIGG. See Egg.

EIGHT-HOUR DAY. In the struggle for the shortest hours of labor

compatible with the highest efficiency, begun in Great Britain early in the 19th century, the first great landmark was the Ten Hours' Bill of 1847, enforcing in all trades what had come about in many. But the golden ideal since 1824 (announced as such by Robert Owen in 1817) has been eight hours; possibly in remembrance that such was the rule in mediaeval England; partly perhaps from the tempting threefold division of the day into equal parts, as in the rhyme fight hours for work, eight hours for play, eight hours for sleep, eight

Union was organized to secure an eight-hour day. A six weeks' strike in New England and New York, April-May 1866, attempted to secure it, but failed. In 1867 Connecticut and Illinois passed laws making eight hours a legal day ((unless otherwise agreed.® Pennsylvania fol¬ lowed in 1868 and New York in 1870. On 24 June 1869 the United States enacted an eight- hour day for its establishments ; but the mana¬ gers reduced wages correspondingly, allowing those who wished to work 10 hours at the old wages, which aroused such wrath that the Pres¬ ident revoked the order. All these laws were rendered nugatory by the contracting-out clauses. In 1872 eight-hour leagues were formed in various places, and in Connecticut and New York a mass of strikes among the wood-working trades won this goal for a while; but the great depression from 1873 on pre¬ vented pressing such questions. Since 1880 nearly all the States have enacted eight-hour laws, subject to conditions, usually restricted to work for the State, county or municipality. The first great concerted effort for eight hours was in 1886, when 200,000 workmen went on strike ; it was at an eight-hour meeting in Hay- market Square, Chicago, that the anarchist bomb was thrown. A general strike was an¬ nounced for this object in 1890, but was only partially successful ; several hundred thousand workmen struck, and many employers yielded, but soon advanced the hours. The first really efficient national law was of 1 Ang. 1892, en¬ forcing eight hours upon all laborers, mechan¬ ics or contractors in the District of Columbia on public works, under pain of fine and im¬ prisonment.

Unquestionably the shorter workday move¬ ment, which began in Great Britain about the same time as in America, had its inception in the desire to protect women and children from being overworked. Soon the labor unions rec¬ ognized that it was better to ask for shorter hours than for higher wages, and so in various industries there has been a steady persistent effort for an eight-hour day, at the same

wages paid for 9 or 10 hours. Widespread strikes in the building trades, the printing industry, etc., were won by the employees, and the num¬ bers in the unions steadily increased. By 1912 it was popularly understood, both in Great Britain and America, that eight hours was a fair day's work, and liberal employers granted it very generally without pressure. However, some large industries continued to work 10 hours, notably the railways and common car¬ riers.

In 1916 the various unions of railway work¬ ers, affiliated through the American Federation of Labor, made a concerted demand for eight hours at the same wages that were being paid for 10 hours, and threatened a general strike and tie-up of the railwavs of the entire United States unless their demands were acceded to. After some months of discussion, and endeavor to obtain settlement by arbitration, no agree¬ ment was reached, and President Wilson held conferences with leaders on both sides. He finally succeeded in getting a promise from the unions that the strike would be declared off if Congress passed a law providing for an eight- hour day, and a bill was hastily prepared and rushed through both houses with very little

discussion, being passed by the Democrats, by a nearly strictly party vote. It was signed 3 Sept. 1916 by the President, but its constitu¬ tionality was promptly challenged by the rail¬ way interests. The law provides: (1) An eight-hour day from 1 Jan. 1917, by common carriers and railways, excepting street railways, short independent railways and interurban rail¬ ways ; (2) a commission of three to be ap¬ pointed to study conditions and report to the President; (3) that, pending the report of the commission, it shall be unlawful for the rail¬ ways to reduce wages because of the shortened hours, in other words, they shall pay the 10- hour price for the eight-hour day; (3) a fine of $100 to $1,000 or imprisonment not to exceed a year or both are the penalties provided for violation. See Labor Legislation.

EIGHT-HOUR LAW, an act adopted in 1868 by the United States Congress, providing that in all government employment eight hours shall constitute a day's work. It originated in the agitation which had begun in England in 1833 by the proposition of eight hours as a legiti¬ mate working day. The agitation spread itself among the industrial classes throughout the civilized world, and first bore fruit in Australia in 1856, where it was adopted by several trades. The National Labor Union of the United States demanded it in 1866, and it came into effect in the government navy yards in 1869, and shortly afterward in all departments of govern¬ ment work. Its universal adoption, however, is still unrealized, and it is the source of persistent agitation among the labor organizations and parties throughout the

United States, the Brit¬ ish Empire and on the continent of Europe. Consult Rae, (Eight Hours for Work) (1894). See Eight-Hour Day.

EIGHTEENTH CENTURY, The. Car¬ lyle made the 18th century for readers who accepted his ideas, and they were legion, a period of extreme decadence and even deg¬ radation of interest in all that was best for humanity. He called it <(the age of prose, of lying sham, the fraudulent bankrupt century, the reign of Beelzebub, the peculiar era of Cant.® Frederic Harrison came in defense of the period with the suggestion that <(invectives against a century are more unprofitable than indictments against a nation,® and pointed out that almost all of Carlyle's heroes of the modern times apart from Oliver Cromwell are <(chil- dren and representatives of that unspeakable epoch® from Frederick of Prussia, Mirabeau, Danton and George Washington to Samuel Johnson, Burns, Watt, Arkwright and others. The century was so low in its interest in ar¬ chitecture that it is not surprising that Ruskin thundered against it that ((Satan must have had a hand in the designing of the churches of the Georgian era,® and there is no doubt that its art and education were far below the standards of preceding centuries, but on the other hand it is the greatest of musical centuries, the pioneer in physical science development, and its sad history of utter neglect for the poor is redeemed to a great extent by the upward movements which made themselves felt very widely at the end of the century in politics, economics and social welfare, especially as re¬ gards the insane, prisoners and the defectives.

The last 25 years brought about more social

changes than any other corresponding period in human history. Perhaps the reason for this was, as has often been suggested, that about the middle of the 18th century a great many of the highest and best human interests, especially those concerning fellow-men who needed sym¬ pathy and aid, were lower than they had ever been before. Humanity had reached a nadir in social life from which there had to be an ascent and fortunately the reaction against the lamentable conditions which existed was strong enough to set up a humanitarian countermove¬ ment toward the end of the century which made itself felt during the course of the 19th cen¬ tury and has not been lost even yet. This makes the 18th century a pivotal period in modern history and therefore of ever so much more interest than man}' another century that represents greater immediate

achievements.

What is particularly notable in the history of the 18th century is its wars in almost un¬ broken succession dictated by royal ambition or for dynastic reasons, while during much of the time king's mistresses or licentious women rnonarchs ruled the internal affairs of king¬ doms. The war of the Spanish succession (1701-14) began with the century. The same first year of the new century saw the active carrying on of what was called the Northern War, lasting from 1700 to 1721. In 1718 war broke out between Spain and Austria, in the midst of which there was a formal declaration of war by England against Spain, and peace was not made until 1720. In the meantime the rebellion in favor of the Pretender, as he was called, the heir of the Stuarts who assumed the name of James III, came in Scotland in 1715 and was not suppressed until the following year. The Treaty of Utrecht (1714), which concluded the War of the Spanish Succession, changed the map of Europe as no previous treaty, not even that of Westphalia at the end of the Thirty Years War (1648), had done, but instead of settling the politics of Europe es¬ tablished a number of foci of irritation emi¬ nently calculated to unsettle them. Naples and Milan were given to Austria and the Austrian rule in Italy thus begun was to continue for a century and a half, always the subject of serious disturbance from within and without. Austria received the Spanish Netherlands, now to be called the Austrian Netherlands and to be a similar focus of disturbance. The Bourbon Philip V was allowed to rule in Spain on condi¬ tion that the French and Spanish possessions should never be under the rule of a single in¬ dividual. Great Britain received Nova Scotia and Newfoundland and the Hudson Bay region, thus preluding the expulsion of French from North America, and Gibraltar which brought with it the command of the Straits but has been a frequent subject of political irritation ever since. These wars of the first quarter of the century were only typical of the period. There was scarcely a year during the century when two important European powers were not at war; there were long series of years when a number of the states were embroiled with each other. The War of the Spanish Succession had its counterpart in what is known as the War of the Polish Succession (1733), between Austria, Russia and Denmark, with France, Spain and Sardinia becoming involved. When the Emperor Charles VI of Austria died (1740),

he left no sons, but had negotiated a treaty, the Pragmatic Sanction (1731), to secure the succession of his daughter Maria Theresa. The very year of his death saw the War of the Austrian Succession. In 1739 England and Spain were at war and in 1745 Charles Edward Stuart, the Young Pretender as he was called, encouraged by France, led an

insurrection of the Highlanders. This was terminated by the bloody battle of Culloden under (

The rnonarchs of the century whose names are best known are the Georges I, II, III, in England and Louis XV in France. The Eng¬ lish were ruled for nearly 100 years by kings who could not speak their language, or but as a foreign tongue, and whose interests were much more in their German Hanoverian dominions and mistresses than their English people. Perhaps the political conditions of the time are best illustrated by the fact that their rule caused comparatively little disaffection in England itself, though fortunately it provoked the American Revolution, which brought in¬ dependence to the United States. Louis XV, succeeding to the magnificent dominions created by the genius of Louis XIV, whose personality subjugated the French people and set an un¬ fortunate example for other European mon- archs, proved utterly unworthy of his great position and allowed himself to be ruled by designing mistresses. His reign increased the debt and the taxes of the French nation until Louis XVI fell heir to an impossible situation. In spite of Louis XV's weakness, France at the end of his reign (1774) had even more ter¬ ritory than at the death of his grandfather, Louis XIV (1715). Social conditions had how¬ ever sunk to a level almost indescribable and the reaction against them was inevitable and could not be long delayed.

Certain great political changes which took place in the 18th century had far-reaching effects on subsequent generations, some of which are only working out to legitimate conclusions in our own time. Apart from the creation of the American Republic, itself of greatest signi¬ ficance for the course of civilization, the three most important political changes were the estab¬ lishment of Prussia as a kingdom (1701), the rise of Russia to be a great European power which began under Peter the Great (d. 1725), and the establishment of British power in India which led eventually to the erection of the British Empire. In the light of recent events probably the first of these must be considered the most

important. The electorate of Brandenburg, whose ruler was one of those privileged to elect the emperor, came under the Hohenzol- lern family late in the Middle Ages. It was a narrow strip of territory less than 50 miles east and west of the little town of Berlin. It is the special pride of the family that each one of the reigning heads added

something to his ancestral domain. The ruler was known only as Margrave and was considered of no special importance in German life. Prussia which fell to them by inheritance at the beginning of the 17th century had been originally ruled by the Teutonic Knights who had conquered its pagan inhabitants in a Crusade in the 13th century and continued to rule it through their grand master. At the time of the religious revolt in Germany in the early 16th century the Teutonic Order was dissolved, and their lands were secularized and out of them the duchy, of Prussia erected, the grand master of the time occupying what had hitherto been an elective office now becoming the Duke of Prussia with the right of inheritance. He was a relative of the Elector of Brandenburg and when this branch of the Hohenzollerns died out the duchy was united to Brandenburg, the Hohenzollerns now ruling over such distant provinces as Cleves and Mark in the Rhineland and Prussia far to the east. The great elector as he is called suc¬ ceeded in welding these widely separated ter¬ ritories into a strong state. His son, Frederick I, obtained from the emperor, for military aid rendered, permission to change his title from elector to king though he was but king in Prussia as he did not rule over the whole of Prussia, but he preferred this title because his Prussian dominions were outside the Imperial limits and he was more independent. After the partition of Poland his title became King of Prussia.

His son, Frederick William I, though noted more for his eccentricities and for his rude boorish manners than for interest in anything higher, consolidated the Prussian dominions, created an army of nearly 100,000 men, drilled and trained probably better than any other sol¬ diers of the time. He was almost miserly in his penuriousness with regard to anything except military expenses, reduced the number of his court servants, coined the family silver and sold most of the royal jewels at auction. He left his son, Frederick II, a magnificent army and a well-filled military chest. Frederick II, to be known in history as the Great, whose in¬ terest in literature and the arts had disgusted his father in his youth, had no sooner ascended the throne (1740), at the age of 28, than he proceeded to use the military advantages which his father had secured for him to the utmost. Maria Theresa having ascended the throne in Austria the same year, Frederick, taking ad¬ vantage of the expected weakness of a female ruler, without any reasonable grounds laid claim to Silesia and began the War of the Aus¬ trian Succession. He enlarged his territories in every way that he could, showed great military genius in his campaigns and devoted himself to the encouragement of arts and sciences, the building of public structures for music and libraries and built a series of palaces, not all of them in good architectural taste, but not behind that of the

century in which he lived. He especially enriched the city of Berlin with

public buildings and though he encouraged French more than German literature did much for the intellectual life of the Prussian people. Under him Prussia became an important power in Europe.

The second of these great political changes of the century was the rise of Russia. This was mainly due to one man, Peter, to whom history has given the title of The Great. The house of Romanoff came to the throne of Russia on the extinction of the dynasty of Rurik 1598. The 1 7th century was spent in breaking the power of the nobles, encouraging mining, manufactures and commerce and increasing Russian territory in the west at the expense of Poland. Peter the Great came to the throne in 1699 and reigned till 1725. He insisted on introducing the ways o-f European civilization, shaving off the beards of his nobles and cutting short their long gowns himself when they re¬ fused to obey his order in the matter, for he declared that people so dressed and bearded could not be good soldiers. He made war on the Turks and conquered Azov. Just at the beginning of the 18th century, Peter made his way to Holland because he felt that Russia must have an outlet to the sea and that Holland could teach her lessons in shipbuilding. He worked as a ship carpenter for a while at Zaandam in Holland and studied the shipbuild¬ ing methods of the English on the Thames. He returned to put down an insurrection in Russia and the Cdssacks under Mazeppa (1707), and then proceeded to take territory away from Sweden which would allow him an outlet to the Baltic Sea. He established nearby his capital, Petersburg, his desired <(window into Europe, ˆ at immense expense, setting it up on piles in the swamps. In spite of the fact that Peter was succeeded by his wife, Catherine, who reigned for several years, and that between Elizabeth and Catherine II for most of the rest of the 18th century Russia was ruled by women of the most licentious personal character, whose favorites had much to do at least with the internal affairs of the empire, the country con¬ tinued to gather strength and importance in Europe until at the beginning of the 19th cen¬ tury it was one of the strong factors against Napoleon on many occasions. German intrigue riddled the country, however, and especially under Elizabeth and Catherine II succeeded in Germanizing the nobility to a great extent and especially the bureaucracy and keeping the Rus¬ sian people in the worst possible condition of serfdom and subjection.

The third important political event of the 18th century was the subjection of India to England. About the middle of the . 18th cen¬ tury the French, owing to the genius of Dupleix who had been

governor of Pondicherry since 1741, came into, prominence in Indian affairs. Dupleix dreamed of a French empire in India following the lines of the old Mogul Empire which had fallen at the beginning of the 18th century. Robert Clive who went to India as a clerk took on himself to make head against Dupleix who was unsupported by his own gov¬ ernment. In the midst of the wars between England and France which occurred around 1750, the American events of which are Brad- dock's defeat and the French and Indian War, and during the Seven Years War, Clive grad¬ ually built up the Indian Empire, often under

conditions that would not have been approved at home but that once concluded were accepted as accomplished facts. As a result at the be¬ ginning of the 19th century some 300,000,000 people in India were under English rule.

The American Revolution beginning ap¬ parently as a revolt on the part of scattered rather disconnected colonies with less than 3,000,000 of inhabitants and even those by no means strongly welded together, and with a very large party among them who remained loyal to England, so that success seemed almost impos¬ sible, ended with a triumph that gave genuine democracy almost its first great oppor¬ tunity in the world's history. In a new land far from the disturbing political conditions of European countries and with magnificent re¬ sources to develop, the American Republic proceeded to exemplify what government of the people, by the people and for the people may mean. De Tocqueville's (American Democ¬ racyˆ written 50 years later, is the tribute of a young enthusiastic European republican to America's success. Undoubtedly the colonists owed their successful termination of the Rev¬ olution to the aid of the French, though the kingdom of France under Louis XVI was tottering to its fall and that fall was hastened by the very success of the spirit of democracy in America. From Lexington to Yorktown represented seven long years of the severest trials borne with magnificent courage and per¬ sistency by the colonists, hampered by a large royalist contingent among them, and these virtues had their own reward. The result was a solidarity of feeling owing to sympathy and union in suffering which more than all else served to bring the colonists together. The 13 colonies had been anything but homogeneous in race and character and they were almost in¬ finitely dissimilar in attitude toward religion and life. The Puritan of New England and the Cavalier of the Virginias and

Carolinas represented opposite poles of feeling in almost every way. It was hard enough indeed after the Revolution to bring them together or secure a working modus vivendi for their government, but it would have been quite impossible only for the long years of bloodshed and the severe vicissitudes through which they had passed in the period of travail from which the new Republic of the West was eventually born. It has well been called the greatest fact in modern history; the greatness of that fact has been en¬ hanced by the part which the American Re¬ public, now one of the largest of the nations, has taken in the World War for democracy.

The greatest man of the 18th century was beyond all doubt George Washington. It was the custom sometimes to speak of him as owing his reputation to a series of happy ac¬ cidents rather than to innate genius. Having been chosen the general of the Colonial forces, it was said that he succeeded in holding out against the British whose mistakes were so great as to facilitate this until the alliance with France and then with Spain finally brought that combination of regular military strength and organization which made Yorktown possible and brought a happy ending to the Revolution. Any such view, however, is contradicted by definite knowledge of the man. When scarcely more than a youth he had saved Braddock from total defeat in spite of that general's utter

errors. The campaign around Boston added further to his military reputation. The battles of Princeton and Trenton have been acknowl¬ edged by modern- military experts as one of the greatest series of strategical combinations under the most discouraging circumstances that have ever been made. The official documents of Washington show clearly how large and noble was his mind. His advice is still the best policy of the republic in spite of its broad extension beyond anything that he could ever have imagined in his wildest dreams. His dec¬ lination of the presidency for the third time and the consequent tradition of but two presi¬ dential terms was a precious heritage for the nation, and the final proof of his magnanimity. Time instead of lessening his prestige has added to his reputation and made it clear that he was a great man raised up to fit a great occasion.

The saddest chapter of the 18th century is that of the social conditions. In order to ex¬ plain the French Revolution so much attention has been devoted to social conditions in France that there has come to be a very general im¬ pression that social abuses were at the worst in that country. As a matter of fact with the exception of England the poorer classes were better off in France than anywhere else in Europe. The awful picture of the Ancien Regime is true, but it

should be remembered that the German lower classes were in still worse condition and the Russian serfs were quite literally slaves and life and death was practically in the hands of their masters. The nobility in all the countries apparently felt them¬ selves to be of quite different clay from the human beings below them in the social order and treated them accordingly. With the coming of the capitalist class as the result of the in¬ dustrial revolution something of this same feel¬ ing was to develop on the part of rich employers to employees. Whenever human nature has the chance it imposes on those below it and it must not be forgotten that the Declaration of Inde¬ pendence in the last quarter of the century was written and most strongly upheld by men who thoroughly believed in the institution of negro slavery and insisted on maintaining it for nearly a full century.

The most shocking element in social condi¬ tions was the utter neglect of the wards of the state, prisoners, the insane, feeble-minded and the poor. The awful conditions which existed in prisons and hospitals were described by John Howard toward the end of the century who brought about a beginning of reform. The prisoners were huddled together utterly regard¬ less of their influence on each other, the young and the old, the first offender and the hardened criminal, and the treatment of women was al¬ most worse than that of men. Hundreds of women in London prisons were crowded to¬ gether, some of them women of the streets and some accused of little thefts to keep their children alive, and with many of the prisoners children were allowed to be there because there was no one else but their mother to care for them. Nearly 250 crimes were called felonies and were subject to punishment by hanging. Poor women were often hanged for having passed a counterfeit pound note which sometimes they themselves did not know was a counterfeit and the fact that they had children at their breast or were

in an early stage of pregnancy was no mitiga¬ tion of their offense. The insane who had ever shown any sign of violence were shackled and were seldom allowed to be free again. The quarters in which the insane were cared for were filthy beyond description and thty were often confined in cells underground or chained to the walls of dark rooms into which the sunlight never penetrated. Quaker philanthro¬ pists in England began a crusade for the re¬ form of insane asylums which slowly gained ground and the movement spread to America. It had been the custom to permit visitors in search of amusement to

stand at windows where they could view the antics of the insane, a small sum of money being collected for this privilege. This amusement became so popular that many thousands indulged in it every year and the fee constituted an important source of revenue. Pinel in France dared to strike the shackles off the insane in the great asylum and hospital at Bicetre though a great many even of his medical colleagues were convinced that it was a dangerous proceeding. The care for the defectives and for the poor in the poor- houses continued to be almost unspeakably bad until well on into the 19th century, and indeed in some cases until our own time. The serious idea of reform in these matters, however, began to take hold of thinking people before the end of the 18th century. The United States was a leader in these reforms. When de Tocqueville visited America and gathered the material for his book on Democracy he was here as a mem¬ ber of a commission to investigate our prison system in order to secure the reform of French prisons.

Personal liberty on the Continent had sunk to a very low ebb indeed. Most of the rulers were absolute monarchs and there being no written guarantee of rights men had almost no redress against the monarch's ill will in their regard if he wished to exercise it. In France particularly the king might order the imprison¬ ment of a subject no matter what his rank and keep him in prison for any length of time that he wished. This process was accomplished under a sealed document issued by the king called a Lettre de Cachet. This mode of im¬ prisonment had been very much abused under Louis XIV, but the abuse reached a climax under Louis XV when it is said that over 150,000 sealed orders were issued. Sometimes men thus imprisoned would be entirely forgotten and the reason for their imprisonment be quite unknown. A clause of Magna Charta made any procedure a violation of the rights of Englishmen, but in other countries the practice was quite common. When the Bastille fell (1789) some of these prisoners were found for whose imprisonment no reason could be discovered.

A profound reaction in social matters was due in Europe. It came with the French Revo¬ lution, in 1789. Begun as an attempt to dis¬ tribute the burdens of taxation more equally on the French, or indeed to solve the problem of the bankruptcy of the country, it developed into a great outburst of the oppressed classes. As Hilaire Belloc who probably knows the period better than anyone in our time suggests it was an organized effort to win back for men some of the privileges which they had enjoyed in the Middle Ages. In that sense it continued

to make itself felt all during the 19th century and down to our own time. It is this aspect of the movement that has until now not been

prop¬ erly appreciated. Hailed by all the liberal think¬ ers of Europe as a new dawn for civilization the Revolution degenerated into the saddest of butcheries, and gave place to utter anarchy until the French people themselves, tired of bloodshed, welcomed a military dictator with power to maintain public order. In 1789 the States-Gen- eral were summoned for the first time since 1614. This was changed shortly into the National Assembly. A new constitution was proclaimed in 1790. In 1792 the monarchy was abolished and the next year the well-meaning but unfortunate Louis XVI was put to death and Marie Antoinette, his queen, Maria Theresa's beautiful but imprudent daughter who had been the admiration of Europe, followed. These events alienated all Europe and the new republic fought them all in combination and won battles that enabled her to extend her territory but finally brought her under the heels of a military despot.

The most compelling figure of the 18th cen¬ tury is Napoleon Bonaparte and his career is the index that French affairs had reached a point where reaction was inevitable. This product of the time was, to quote Freeman, <(nearer to being the master of Europe than any other man had been before.® ((He called himself consul and an old Greek would have said that he had made himself tyrant, but he was a more absolute ruler than ever Louis XIV had been.® One of the last reflections made by Gibbon, the historian of the Roman Empire, whose wide knowledge of world history would seem to give him a right to an opinion on the subject, was that the world would never again see a great conqueror arise who like Alexander or Caesar might threaten to have the world under his domination. Gibbon died in 1794. Had he lived but a scant 10 years more he would have been able to witness the utter con¬ tradiction of this opinion, though there is no doubt now that most of the learned men of his time and especially those familiar with history would have accepted his reflection as almost so obvious as to be an axiom. In this after all Gibbon differed very little from many a serious student of history of a century later who would not have hesitated to say that he now felt sure that a great prolonged European war shared by most of the civilized nations of the world was an utter impossibility.

Bonaparte was carried to the height of power on a flood of military success. Arrived there he proved to have a genius for adminis¬ tration that enabled him to maintain himself and that has stamped his influence on all modern legislation. He came to the front in the Italian campaigns of the wars of the French Revolution when his victories in Italy forced the Emperor Francis of Austria to surrender the Austrian Netherlands to France and to with¬ draw from northern Italy with the

result that Piedmont and Savoy were annexed to France. France was a republic, but there was no re¬ publicanism in the spirit of French conquests once the mania of victory developed. Republics were sacrificed quite as readily to French ambi¬ tion, or rather to the ambition of French mili¬ tary leaders, as were monarchies. In return

for his surrender to France of these large territories the Austrian emperor was permitted to join the French .in destroying the ancient commonwealth of Venice, which with all that was oligarchical in its government had at least some show of self-ruling about it. The French and the Austrians divided the Venetian terri¬ tories between them. When in 1798 Bonaparte planned his expedition to Egypt and the French needed money to finance it the Directory of France calmly proceeded to attack Switzerland, for some six centuries a republic, for no better reason than because the town of Berne was known to possess a large treasure. The French Revolution would seem then utterly to have failed in its purpose, but it was only -an eclipse for a time and in spite of many vicissitudes its spirit was to work for good for more than a century later. Napoleon came to be the hammer by which a great many of the presumedly most firmly established things of the old order in Europe were smashed upon the anvil of war to be made over for the better, though the betterment was often not immediate.

The greatest woman character of the century in the best sense of the word was Maria Theresa, queen of Austria or “king,® as her Magyar subjects loved to call her, and finally Austrian empress. Her father had anticipated trouble for his daughter’s rule and made the treaty called the Pragmatic Sanction to secure it, but his worst portents were confirmed and Maria Theresa was scarcely seated on the throne before she became embroiled in a series of wars for the preservation and integrity of her states. Probably no woman in history has ever taken her duties as sovereign more seri¬ ously. On the other hand as the mother of 17 children she took her domestic duties quite as seriously and was a model wife and mother. Her letters to Marie Antoinette during the French troubles show her maternal solicitude at its best and her wisdom as a ruler and administrator. She treated her subjects very much as she did her family, with the most loving care and profound wisdom. She prac¬ tised strict economy, encouraged manufactures and commerce, reformed the army with the idea of preventing bloodshed by being prepared for war, and organized a system of military colonies on the frontiers so as to prevent in¬ vasion and save

her subjects from the worst hardships of war, that of having the enemy in their midst. Above all Maria Theresa won the love of all the different peoples who com¬ posed her multilingual kingdom. It has always been a historical mystery why the heterogeneous peoples who constitute the Austrian Empire have hung together and it has often been sup¬ posed that it was a mere question of armed force and repression. There can be no doubt, however, that there was real attachment to the house of Hapsburg and that above all Maria Theresa's long reign of nearly 50 years had much to do with creating a spirit of solidarity among these peoples. Her readiness to do for the suffering among her people was literally unbounded. It is said that once she was driving through a part of the country where famine was rife and people were starving. Passing by a mother seated at the roadside trying to nurse her child, and evidently unable to supply it with food, the empress threw a piece of vol 10 — 3

money into her lap and told her to get some¬ thing to eat, but the mother with tears in her eyes insisted that it would be too late to save her baby. The mother of 17 children might well be expected to be in a condition to supply for lack of infant food, and so the starving baby nursed at the Imperial breast and its life was saved. It is easy to understand that among peoples who had traditions of acts of this kind on the part of their empress queen, deep feel¬ ings of affection would be aroused to become a tradition in favor of the family of which she was a member.

The one thing that stains the reign of Maria Theresa is the partition of Poland. There is no doubt at all that she entered upon it with great unwillingness and felt that she was forced to take part lest there should be such a dis¬ turbance of frontiers and the balance of power in central Europe as would leave her kingdom and people open to attack under unfavorable conditions. Perhaps another fault was the as¬ sociation of her son Joseph II in the govern¬ ment. Maria Theresa was a woman of heart and high administrative powers. Her son Joseph was an intellectual prig who was quite sure that humanity could be made better by rules and regulations and that men could be governed by sweet reasonableness and intel¬ lectual reform. His career as a ruler was an utter failure. He tried to make himself a benevolent autocrat for the benefit of his sub¬ jects and was so terribly disappointed by his failure that he died a broken-hearted man be¬ fore he was 50.

Women were destined to play an extremely important role in 18th century history. The reign of Queen Anne is a great period in English history but unfortunately unworthy women were to be the most

influential char¬ acters of the time. The most noteworthy of these whose career is typical in many ways of the lamentable political influences that were at work was Catherine II, the empress of Russia, who reigned from 1762 to 1796. She was not a native Russian, but a princess of Anhalt- Zerbst in upper Saxony. Her name Sophia Augusta was changed to Catherine on her ad¬ mission into the Greek Church just before her marriage with Peter who had been selected to succeed his aunt, the Empress Elizabeth, on the throne of Russia. She was not the first thus to be lifted from obscurity to the high posi¬ tion of empress of the Russians, for her earliest predecessor in the 18th century, Catherine I, the wife of Peter the Great, who reigned for two years after his death, 1725 to 1727, was the natural daughter of a country girl in Livonia. The first Catherine, after having been the mistress of a series of Russian gen¬ erals, attracted the attention of the tsar and became his mistress and subsequently his wife. She died at the early age of 40, her end being hastened by dissipation. She never learned to read or write, but she knew how to manage men. The second Catherine was quite as dissi¬ pated, and had even more administrative ability, but she had devoted herself to her own educa¬ tion until she came to be looked up to as orte of the scholars of the time. She was a friend of Voltaire and of the Encyclopedists. She was a great believer in the new social philos¬ ophy which they preached, and maintained cor-

respondence with them. Her husband frittered away his life in senseless dissipation, but while the Empress Elizabeth lived, Catherine main¬ tained some show of respectability and acquired deep influence over her. Her mode of life, however, soon became such as to make the paternity of her children a matter of grave doubt. With the death of Elizabeth the half¬ imbecile Peter, her husband, soon got into serious difficulty with his people and his nobles, and Catherine through her lovers took advan¬ tage of this to secure the throne.

All during her life Catherine continued to live most licentiously. One lover succeeded another, though one favorite, Potemkin, main¬ tained his influence over Catherine for some 15 years, supplying her with new favorites when his mistress's personal inclination for himself suffered an interval or ceased entirely. Cath¬ erine's lovers are said to have cost Russia over $100,000,000 at a time and under circumstances when money was worth at least five times as much as it is now. In spite of this utterly de¬ praved personal character Catherine

ruled Russia for Russia's advantage though not for the benefit of her subjects. She pursued relent¬ lessly the policy of giving Russia an egress for its commerce by sea. She succeeded in bring¬ ing Courland with its Baltic coast line into the Russian Empire, had Poniatowski, an old lover, elected to the throne of Poland, and finally brought about the infamous division of Poland — Catherine obtaining about two-thirds of the Polish territory. An insurrection of the people under Kosciusko, the Polish hero of the Ameri¬ can Revolution, failed, the Russian army stormed Warsaw and the last trace of Poland as an independent country was obliterated (1794). It was the foulest deed in history. War with the Turks led to Catherine's conquest of Bessarabia and other countries down to the Caspian and came near realizing the Russian empress' dream of driving the Turks entirely from Europe and the establishment of her own empire at Constantinople. She was com¬ pletely alienated from all sympathy for French ideas by the progress of the French Revolution and prohibited the publication of French works in Russia. French admirers used to call her the Semiramis of the North and her career, political and moral, amply justifies the com¬ parison, with the moral balance in favor of the ancient ruler who anticipated Catherine by some 2,500 years. It was the presence of such rulers as herself and Louis XV during the 18th cen¬ tury that brought about the reaction against monarchical government which was to attract so much attention during the 19th century.

This century contains the most important chapter in the history of music. Scarlatti (1659-1725) who wrote some hundred operas, a number of oratorios and an immense amount of ecclesiastical music, introduced three novel¬ ties destined to influence music deeply. The two principal of these are the Sinfonia or Overture and the accompanied recitative. Every country in Europe took up music and made distinct contributions to it. Purcell's work in the 17th century in England had finely prepared the public mind, and Handel and Bach com¬ pleted the organization of the art of music on a firm footing. It has been said that <(these two great composers of the 18th century, wrote

every combination of musical notes that down to our latest times has ever been employed with good effect.® . . . <(The more the works of these masters are studied the more are they found to foreshadow the supposed novelties in harmony, employed by subsequent artists.® (MacFarren, Encyclopaedia Britannica)). The period includes also the life and works of Gluck who did so much to unite music and plot in opera into one harmonious whole. Piccini, Gluck's rival in the famous musical war in Paris, was a much less important musi¬ cian, but he had dramatic power and real musical talent. Haydn, often spoken of as

the father of the symphony, contributed greatly to the development of music and some of the sons of the great Sebastian Bach have an en¬ during place in the history of musical art. Mozart w'hose untimely death at the age of 35 cut him off in the flower of his achieve¬ ment is one of the greatest musicians of all time. Before the end of the century Beethoven had rounded the symphony into its modern form and left the world eternally his debtor for his marvelous command over notes. The opera comique of the French which dates from early in the 18th century, the distinction from grand opera being that there was spoken dialogue interspersed with the music, provided opportunity for the development of lighter music that was to occupy so much attention in modern times. What is noteworthy, however, in the 18th century is the depth and serious¬ ness of interest of even the general public in music. Handel's oratorios were given to crowded houses and as Frederic Harrison has said <(the ill designed churches of the period wer$ often crowded with people who were deeply touched by the sacred music given and whose emotions were heartfelt and not at all the result of any fashionable or con¬ ventional feeling.®

The literature of the 18th century, opening with (The Rape of the Lock> and closing with Goethe's

Education reached a very low ebb in the

18th century so that Cardinal Newman suggests the middle of the century as representing prob¬ ably the lowest period in the history of uni¬ versity education, when the students at Oxford and Cambridge scarcely more than <(ate their terms, : ® that is, lived in residence to receive their degrees, while Winckelmann, wanting to teach Plato at the end of the century, had to have manuscript copies of the author because no Greek edition had been issued in Germany for over 100 years. Philosophy, however, was the subject of a good deal of attention and exploitation usually on the part of men not directly connected with the universities. It is the age of Locke, of Hume and of Bishop Berke¬ ley in England, whose stay in America in¬ fluenced Jonathan Edwards, of Voltaire and the Encyclopedists in France and of Kant in Ger¬ many. The work of these men lived to in¬ fluence the 19th century. Religion was at a low ebb and it was an age of scepticism. The work of the devoted John Wesley in England, which proved the incentive for the Oxford Movement of the succeeding century, was the first index of reaction. French philosophy in its

atheistic aspects was curiously enough a child of English scepticism. Voltaire and the French Encyclopedists (see Encyclopedia) at¬ tracted attention rather by the brilliancy of their style, the keenness of their wit and their biting satire than by depth of thought. Vol¬ taire himself pronounced the period an <(age of trivialities.® Rousseau suggested the abandon¬ ment of artificial culture and refinement and the going back to the primitive state of nature because it seemed hopeless to guide men by reason. Adam Smith's (Wealth of. Nations) represented the English philosophy of inde¬ pendent morality applied to practical life.

The 18th is above all the century of the fundamental organization of the physical sci¬ ences in their modern form. The period crystal¬ lized the data of scientific information, till then held in solution, and gave the physical sciences the form they have maintained since. Physics, chemistry, botany, zoology, comparative anat¬ omy, electricity and psychology as well as the elements of social science both in history and in statics took shape. Lancisi at the beginning of the century in Italy and at the end of the cen¬ tury Hunter and Bichat in England and France revolutionized methods and .results in the sciences related to medicine. Morgagni founded pathology. Jenner's- discovery of vaccination marked the dawn of a new era in therapeutics. Auenbrugger initiated clinical diagnosis, and the example of such men as Percival Pott, after whom Pott's disease (q.v.) and Pott's fracture are named, gave a new impetus to accuracy of surgical diagnosis. The Vienna School of Medicine began its work as an in¬ heritance from some great students of Boer- haave at the beginning of the century, and such men as Cullen, Heberden, Currie, Fothergill. Huxham left an indelible impress upon med¬ ical history. Franklin, Galvani, Volta laid the foundations of the science of electricity while Priestley, Lavoisier and Scheele were doing similar work in chemistry. Laplace, La Grange and others were adding to the magnificent work that Newton had accomplished at the beginning of the 18th century, recognizing very clearly the surpassing value of their predecessor's work. La Grange declared that Newton, whose (Prin-

cipia> received its final form in this century, (twas the greatest genius that ever existed.® Beside -him deserve to be named' such men as Halley of the comet, Euler, the Bernouillis, the elder Herschel and Legendre. The century was also particularly fruitful in mathematical genius. In the biological sciences Cuvier, Buffon, Geoffroy St. Hilaire and Lamarck, most of whose work was accomplished before the cen¬ tury closed, did work that was destined to leave its impress deeply upon their sciences. It re¬ quired much more than merely talent and ap¬ plication to make the first great steps in these sciences and only

positive genius could have done what these men achieved.

The greatest heritage of the century to succeeding generations was what has come to be called the industrial revolution. Up to the latter half of the 18th century men had paid very little attention to mechanical inventions and their development. The people of western Europe did their farming, made their cloth and continued to do most of the domestic manu¬ factures at least almost in the same way as the ancients had done. It has been said that ((if a peasant, a smith or a weaver of the age of Caesar Augustus had visited France or England 1800 years later he would have recognized the familiar flail, forge, distaff and hand loom of his own day.® (Robinson). All this was to be changed in the course of a single generation, however. A series of machines came to replace hand labor and accomplish ever so much more in vastly shorter time than before. The essen¬ tial processes remained the same, only now by the aid of machinery they were accomplished more rapidly.

In 1767 Hargreaves, an English spinner, in¬ vented what was called the spinning jenny. With this a single workman by the help of a wheel could spin 8 or 10 threads at once and thus do the work done formerly by as many spinners. In 1768 Arkwright invented a machine for rolling threads. Some 10 years later Crompton combined Hargreaves' spinning jenny and Arkwright's roller machine into what was called the spinning mule. With this as many as 200 threads could be spun at once, and when the steam engine came and power was applied a few hands could do the work of hundreds. The gradual improvement of the steam engine by James Watt, who had been called in to repair a model of a steam engine made more than half a century before by an English mechanic named Newcomen, greatly facilitated the development of industry. In 1785 a steam engine was first employed to run spinning machinery, Arkwright adopted it in 1790, and after this such engines became ex¬ tremely common and the factory system re¬ placed the old domestic system of manufacture almost completely.

This so called labor-saving machinery threw many out of employment, though it brought together a great mam'- workmen in the employ of a new class that now developed in the popU' lation, the capitalist. John Stuart Mill about the middle of the 19th century, when he could see clearly the result of the industrial revolu¬ tion, declared that all our labor-saving ma¬ chinery in spite of its name had never saved mankind an hour of drudgery, but on the con¬ trary had made it possible for a large number of workmen to work for a few and usually to

work long hours in unsanitary, ill-ventilated factories, compelling them to live in crowded slums not far from the factories becaus-c their long working day did not allow them the time to go or come farther to their work. The in¬ dustrial revolution worked an immense amount of social harm, led to the employment of women and children for such long hours and under such unsuitable conditions as proved seriously detrimental to health, and it took more than a century before humanity wakened up to the necessity for regulating industry in such a way as to conserve the rights of man.

James J. Walsh,

Author of {The Thirteenth the Greatest of Centuries?

PRINCIPAL EVENTS OF THE 18TH CENTURY.

1701. Frederick (III) Elector of Brandenburg is crowned first King of Prussia, 18 Jan.

1702. Anne, Queen of Great Britain, begins her reign.

1703. St. Petersburg is founded by Peter the Great.

1704. Battle of Blenheim.

1707. The union of Scotland with England is ratified and the first parliament of Great Britain assembles.

1708. The British defeat the French at Oudenarde.

1709. Charles XII of Sweden is defeated at Pultowa, 30 June. Battle of Malplaquet, 11 Sept.

1713. Treaty of Utrecht signed, 30 March.

1714. George I, Elector of Hanover, becomes King of Great Britain.

1715. Scotland revolts; the Stuart Pretender appears, but his supporters are defeated at Sheriflmuir. Louis XIV of France dies.

1717. The Turks are defeated at Belgrade.

1718. Charles XII of Sweden is killed at the siege of Fred- erickshall,

Norway.

1720. The South Sea Scheme, 7 April-29 September, col¬ lapses. Victor Amadeus, duke of Savoy, becomes King of Sardinia.

1722. Peter the Great assumes the title of Tsar of Russia. 1725. Death of Peter the Great. Persecution of Protestants

in France.

1727. George II becomes King of Great Britain.

1728. Rise of Methodism in England.

1733. France and Poland at war.

1736. Kien-Lung ascends the throne of China. He receives embassies from Russia, Holland and Great Britain.

1739. Nadir, Shah of Persia, conquers the greater part of the Mogul Empire.

1740. Frederick the Great begins to reign. Maria Theresa becomes Queen of Hungary.

1743. The Allies defeat the French at Dettingen.

1744. Great Britain declares war against France, 31 March. Commodore Anson completes his voyage around the world.

1745. Battle of Fontenoy, 30 April. British forces take Cape Breton, N. S. Rebellion in Scotland. English forces defeated at Gladsmuir, 21 Sept.

1746. English forces defeated at Falkirk, 17 Jan. Scottish forces defeated at Culloden, 16 April and the rebellion suppressed.

1747. Defeat of the allied army at Lafeldt. British victory over the French fleet. The Prince of Orange becomes Stadtholder.

1748. Treaty of Aix-la-Chapelle between Great Britain, Spain, Austria and Holland.

1752. Calendar revised in Great Britain, Sept. 3 becoming Sept. 14.

1756. Seven Years* War begins. Rupture between Great Britain and France.

1757. Damien's conspiracy against Louis XV. Prussian vic¬ tory at Rosbach over French and Austrians, 5 Nov. King of Prussia becomes master of Silesia.

1759. France loses Canada in the final battle of the Heights of Abraham.

1760. George III begins his reign.

1763. Seven Years' War ends with Frederick victorious. Peace ratified at Paris between Great Britain, France and Spain.

1764. The British Parliament grants Mr. Harrison $50,000 for discovering the longitude by his chronometer.

1766. American Stamp Act repealed.

1769. Captain Cook's discoveries in the Pacific Ocean.

1772. First Partition of Poland by Russia, Prussia and Austria. Revolution in Sweden.

1773. Captain Cook's voyage to the Antarctic, reaching 71° 10′ south latitute.

1774. Louis XVI of France begins his reign.

1775. The American Revolution begins, 19 April. Battle of Bunker Hill, 1 7 June.

1776. The American Declaration of Independence pro¬ claimed, 4 July.

1777. The surrender of Burgoyne at Saratoga, N. Y., 7 Oct.

1778. Alliance of the French and Americans, 30 Oct.

1779. Siege of Gibraltar. Captain Cook killed at Hawaii.

1780. British naval victory over the Spaniards near Cape St. Vincent, 16 Jan. American defeat at Camden, 16 Aug.

1781. The surrender of Cornwallis at Yorktown, 18 Oct.

1783. Treaty of Peace between Great Britain and the United

States. . . ,

1786. Warren Hastings impeached for misrule m India. Shay s rebellion in Massachusetts.

1787-88. United States Constitution drafted at Philadelphia and ratified. .

1789. The States General meets in Paris. The French Revo¬ lution begins. The King accepts the declaration of the Rights of Man. France divided into 83 departments. Washington elected President of the United States.

1790. Titles of nobility suppressed in France.

1791. Coalition between Austria and Prussia, 27 Aug. The French Constitution ratified, 3 Sept.

1792. Peace of Jassey, 9 Jan. Gustavus III of Sweden assassinated, 16 March. The September massacres in France. France declared a republic, 22 Sept.

1793. King Louis XVI beheaded, 21 Jan. Queen Marie Antoinette beheaded, 15 Oct. War declared by England against France, 1 Feb. Toulon captured by the English, 28 Aug. Reign of terror in France.

1794. Robespierre beheaded. English defeat the French fleet. Battle of Fleurus, 26 June.

1795. Holland invaded by the French. Belgium annexed to the French Republic. The remainder of Poland par¬ titioned between Russia, Austria and Prussia. Jay's treaty between United States and Great Britain.

1796. Bonaparte's campaign in Italy.

1798. Irish Rebellion. Bonaparte's campaign in Egypt. The Battle of the Pyramids.

1799. The siege of Acre. Bonaparte made First Consul. Death of Washington.

1800. United States capital removed from Philadelphia to Washington. Union of Ireland with Great Britain ratified by Parliament.

EIGHTH CENTURY, The. The 8th cen¬ tury is a cardinal epoch in modern history be¬ cause it witnessed the culmination of the strug¬ gle in the east and west of Europe by which it was decided that

European civilization should be Christian rather than Mohammedan in char¬ acter. The failure of the Saracens to capture Constantinople in the early part of the century (718) and the decisive defeat inflicted upon the Moors at Tours (732) by Charles Martel fol¬ lowed by Charlemagne's successful campaign (777) which pushed Moorish dominion below the Ebro in Spain definitely settled that Chris¬ tianity was to have an opportunity for free development in Europe. It was the fashion a generation or two ago to suggest the possibility that civilization might have advanced more rapidly under Mohammedan dominion than act¬ ually proved to be the case under Christianity. The opinion was dictated primarily by the love of paradox though undoubtedly supported by the tendency to minimize the really great work of the Middle Ages through ignorance of their genuine achievement and to exaggerate the place of the Moors in education, literature and, especially, in science. What actually happened in the Mohammedan countries in spite of the magnificent incentive afforded them by their close touch with Greek civilization in the East is the historical demonstration that their definite repulse in the 8th century was for the benefit of humanity.

At the beginning of the 8th century the caliphs ruled from India over Persia, Arabia. Syria, . Armenia, Egypt, Morocco, Spain and what is now France beyond Narbonne, as well as most of the islands of the Mediterranean and not a little of southern Italy. The backward¬ ness in civilization of all of these regions that remained under Mohammedan rule is the an¬ swer of history to the insinuations of Gibbon and his imitators as to the benefits the Arabs might have conferred on humanity. Fortunately in the 8th century there came a division of the caliphates which greatly diminished Moham-

medan power and reunion never took place. The raising of the siege of Constantinople (718) was due more to one man, Leo, known as the Isaurian, than to any other factor. Leo was the son of a shoemaker who rose by mili¬ tary and administrative genius to be emperor and founded a dynasty. Like self-made men at all times he was confident that he could solve all problems since he had solved so many, and his interference in Church matters separated Christianity into two parts that in spite of many well-directed attempts have not united again. Leo and his son Constantine Coprony- mus declared against the worship of images in religion and encouraged the so-called icon¬ oclasts or image breakers who did so much to disturb both religion

and art in the East during this century.

Defeated in their attempts on Constantino¬ ple the Mohammedans forced their way along the northern shore of Africa, crossed the Straits of Gibraltar and succeeded in conquer¬ ing Spain. In 711 they won a great victory over the Visigoths which made them masters of the country, and by the end of the first quarter of the century they had overrun the peninsula and were crossing the Pyrenees to menace Gaul. The Duke of Aquitaine held them in check for a time, but they defeated him near Bordeaux in 732 and advanced toward Tours. Between Tours and Poitiers their im¬ mense host was met by Charles Martel (the Hammer) and completely defeated in one of the decisive battles of history. There are few authentic details of the battle though it would seem to have been, as far as we know, the con¬ flict with the greatest numbers engaged ever fought between men at any time in history ex¬ cept in the late Great War. Charles Martel was the mayor of the palace of the western Frankish king. The Merovingians had ruled since Clovis' time, but weaklings ascended the throne and the Prime Minister, who was called the mayor of the palace, became the real ruler. Charles' son Pepin, surnamed the Short, ac¬ quired even more power than his father and finally put to the Pope the question whether the king should reign when his power was gone, received the answer that it seemed better that he who had the power in the state should be king, and so Pepin began the Carolingian dynasty. Pepin was the father of Charlemagne who was destined to consolidate France, con¬ quered the surrounding countries, including a portion of Spain from the Moors, put down the barbarians on the north and acquired dominion over northern Italy.

Charlemagne is the heart of the 8th century. The only man in history with whose name the adjective great has become so thoroughly incor¬ porated that most people think of it as an essential part of his name, and he thoroughly deserves that distinction. At his accession Charlemagne's kingdom was the bulwark of the Christianity of the West. At his death his empire included most of western and southern Europe. Thought of usually as a warrior his greatness is reflected much more in his success¬ ful pursuit of a far-reaching constructive policy. He put an end to the process of political dis¬ integration which had been at work in Europe since long before the fall of the Roman Empire, and he made it possible for men to think of

progress and civilization in place of being con¬ stantly occupied with resistance to barbarian aggression which for three centuries had been their one preoccupation. It was a fitting con¬ summation of his work that he was crowned emperor of the Romans by the Pope at Rome on

Christmas Eve of the year 800. It was a striking omen of the new outlook for Europe when in the first year of the 9th century and of the Imperial reign an embassy arrived with precious Oriental presents from the great caliph of the East whose name is as well known in history and romance as Charlemagne's own — Haroun al Raschid.

Charlemagne lives in romance through his expedition into Spain, whither he went to put an end to the menace of the Moors to his king¬ dom by attacking them in their own stronghold. After some years of war, begun at the instance of an embassy from Spain, in the year of the mystical number 777, he succeeded in conquer¬ ing all the district north of the Ebro, and estab¬ lished there the Spanish March, a name given to outlying districts of his domain whose rule was committed to special officials called mar¬ graves, or counts of the marches, or marks, from which our word marquis. Charlemagne's defeat of the Moors was the first step in the gradual expulsion of the Mohammedans from Spain which was not to be accomplished in its entirety for over 700 years. On the return from his victorious expedition to Spain the rear guard of Charlemagne's army was attacked and cut to pieces by the Basques in the pass of Ronces- valles, in the Pyrenees. The battle of that name, fought by Roland and his Paladins with surpassing courage to the bitter end, was cele¬ brated in song and story for many centuries afterward. The prodigies of valor there done tinged even the tales of chivalry which were to occupy so much Spanish attention in the later Middle Ages and whose influence was felt until Cervantes laughed the romances of chivalry away.

Charlemagne lives in history much more as a lawgiver, an organizer of the civil functions of his great empire and of education and oppor¬ tunities for intellectual development than even for his success in arms. At his invitation Al- cuin, called a Saxon monk by Charlemagne's earliest biographers, but claimed an Irishman (Albinus) by many writers, was invited to organize the schools all over Charlemagne's dominions. He was given the powers of Im¬ perial Minister of Education. He well deserved Charlemagne's confidence. As Duruy says : <(A1- cuin was truly a scholar; he was familiar with Pythagoras; often cites Aristotle, Homer, Plato, Virgil and Pliny, and is one of the most notice¬ able instances of the union of those elements so difficult to harmonize, the spirit of ancient lit¬ erature with the spirit of Christianity.® It is interesting indeed to read of his founding in the palace of Charlemagne an academy in which the emperor and all his family and all the nobility at court were members. In this acad¬ emy the emperor bore the name of David, Alenin took the name of Flaccus, while other members took such names as Homer, Plato and Virgil. We have some 300 of his letters ad¬ dressed by this modern Aristotle to

the -Alex¬ ander of the West.

Charlemagne’s efforts for the provision of

education for his people included women as well as men. His own daughters as well as those of the nobility attended the Palace School, and there are letters of Alcuin which show that they were deeply interested in the intellectual problems of the time. The em¬ peror also recognized the social obligations of the ruler and ordered that there should be hos¬ pitals in connection with all cathedrals and monasteries. At this time the word hospital included also refuges for the infirm, the old, the deformed and defective, and even the insane as well as for the homeless wayfarer.

In spite of many vicissitudes, wars, political disturbance and human incidental frailties, Charlemagne’s work for civilization bore fruit down the generations, though his empire broke up and internal dissensions arose mainly through the custom of dividing the realm among his sons which Charlemagne also followed. He deserves such expressions as that of John Fiske : <(When we think of all the work big with promise that went on in those centuries which modern writers in their ignorance used once to set apart and stigmatize as the Dark Age; . . . when we think of the various work of a Gregory, a Benedict, a Boniface, an Alfred, a Charlemagne, we feel that there is a sense in which the most brilliant achievements of pagan antiquity are dwarfed in comparison with these.®

While Charlemagne was reigning gloriously in Europe at the end of the 8th century a ruler in many ways scarcely less worthy than he and equally famous, Haroun A1 Raschid (Aaron the orthodox), occupied the Eastern caliphate. Haroun was the fifth of the Abasside caliphs, an accomplished scholar, a poet of distinction, who gathered wits, poets and musicians around him. It is for this reason that he is so widely and favorably known for it is to the Arabian Nights rather than to history that his fame is due. How much of the real greatness of his reign was due to Yalya, his vizier of the Barmecide family, is difficult to say. Ha- roun’s personal character is revealed by his murder of his sister and his nephews when he learned of her marriage to the brother of his vizier. While all his life he occupied a posi¬ tion of bitter hostility to the Greek emperors, there is a well-established tradition that he sent presents to Charlemagne and endeavored to cultivate his

friendship though perhaps only with the idea of thus making less of the rulers of the Eastern Empire.

Europe had freed herself from the danger of Mohammedanism attacking from the east and South, but before the end of the century was to witness an invasion of almost more serious nature from the opposite quarter. The Vikings or Norsemen invaded Britain in the last decade of the century and were to prove a serious foe to civilization for the next three centuries in many countries of Europe. Bri¬ tain and Ireland had succeeded in developing education and culture, and Gaul had made a magnificent beginning under Charlemagne, but the Danes were to prove a serious detriment and obstacle. Alfred overcame them in the next century for a time in Britain, but the northern coast of France had to be given over to them and they obtained a foothold in Sicily and southern Italy. They represent a much more

serious impediment to the evolution of civiliza¬ tion at this time than any internal factor.

The 8th century was the scene of the career of one of these men who, forgetting them¬ selves in life, are never willingly forgotten. This was Boniface, the apostle of Germany. His name was Winfrid (A. S., (

One of the most interesting of Boniface's developments in Germany was his invitation to English nuns to help him in his mission. He recognized that the German women still swayed that influence in the communities which has been described by Tacitus and realized that women auxiliaries would be of great help on the mission. Thecla and Lioba, to whom the title of Saints has been accorded, accepted this invitation and exercised great influence. Boniface's letters show how thoroughly he ap¬ preciated the nuns as intelligent fellow-laborers in his apostolate. The education of the chil¬ dren of the Germans was confided to them and a greater influence was thus brought to bear on the Teuton women than could otherwise have been exercised. It was to the rising generation that Boniface looked for the exhibi¬ tion of genuine Christianity for it had proved extremely difficult to bend the savage natures of the Germans to the milder virtues of the Gospel. Saint Thecla particularly did much to organize the rising generation of young German women to carry on her missionary work.

The 8th century is usually considered one of the low periods of intellectual life in history and yet it contains the careers of three men famous ever after for their intellectual work. The greatest of these is undoubtedly the man who, within two generations of his death, came to bear the title of Venerable Bede, by which he has been known ever

since. Something of the place that he secured for himself in Chris¬ tian scholarship will probably be best appre¬ ciated from the fact that in November 1899 Pope Leo XIII decreed to him the title of Doctor of the Church. Bede's influence was very great in his own time, not only in England but throughout all of western Europe, and in spite of the incursions of the Danes which dis¬ turbed English Christianity and its influence so

much, Bede's work came to be widely known. He has come to be recognized as the greatest scholar of his time — a writer whose style and critical judgment have made him a favorite author even in modern times. With a literary propriety seldom exhibited in his time he re¬ ferred all his materials to their sources and insisted on copyists giving all the references. His critical, historical judgment has given him a distinct place among the historians. His life was a round of study and prayer with oc¬ casional visits for a few days to friends and is the ideal scholarly writer's life at all times. The surprise is to find it so well exemplified in the England of the first half of the 8th century.

The second of these great scholars, John of Damascus, or Saint John Damascene, also had the distinction of being enrolled among the Doctors of the Church by Pope Leo XIII. His intellectual distinction is that of being the first of the scholastic philosophers and his (De fide orthodoxa) is often hailed as the first work of scholasticism. He undoubtedly had a deep influence upon the Arabian scholars of his time, and their philosophy owes much to his inspiration for they admired him as much as his Christian colleagues. The most important of his works is that one known as the ˆFoun¬ tain of Wisdom. > It has a special significance in the history of theology because it is the first attempt at a Summa Theologica that has come down to us, though there were to be many such in all the centuries of the Middle Ages after¬ ward. Damascene's work for the Church is due to Leo the Isaurian's attempt to be head of both Church and state and dictate the beliefs of his people in the matter of the veneration of images. When Leo issued his first edict, John was chief councillor of the city of Damascus and not a cleric, but he took up the defense o f Church traditions, and then, recognizing his lack of knowledge for Christian apologetics, he en¬ tered a monastery, gave himself to study and became the great leader of the Christian thought of the time. He suffered bitter pros¬ ecution at the hands of the emperor and his satellites, but he was vindicated by the Seventh General Council of

Nice (787) and came to be known after the Greek fashion of adding a title of admiration as John Chrysorrhoas, that is, «John of the Golden Stream, }) because of his golden flow of words in defense of Christianity. Damascene is besides one of the world's great writers of hymns, and modern hymnologists have even spoken of him as the prince of Greek hymnodists. Three of his hymns, (Those Eternal Bowers,* (Come, Ye Faithful, Raise the Strain* and ('Tis The Day of the Resurrection,* are widely known and admired in their English version.

The third of the scholars of the 8th century whose name is often still mentioned was Ver- gilius, bishop of Salzburg, who had been an Irish missionary of the name of Fergal or Ferghil. He was received with great favor by Pepin, then mayor of the palace, and his talents and learning led to his being made abbott of Saint Peter's at Salzburg. He was deeply interested in mathematics and astronomy and his teachings that there were antipodes led to his being tried in the ecclesiastical courts, not, however, because of the scientific doctrine,

but because it was said that this involved the denial that men had all come from a single origin. Vergilius succeeded in showing that his teaching was not contrary to Scripture and it was after this that he was made bishop of Salzburg. He was canonized in the 13th cen¬ tury by Gregory IX. There seems no doubt that his belief in the existence of people on the other side of the earth and that the earth itself was a sphere was due to his knowledge of the accounts of some of the Irish expeditions that had probably found their way in times of storm if not voluntarily across the Atlantic.

The century closed with a woman, Irene, the only woman who ever occupied the position of empress, in the fullest sense of the word, Basileus, in the Eastern Empire. While she had taken a determined stand against the Icono¬ clastic party which was disturbing both Church and State, she is distinctly one of the least worthy rulers of history. French historians have not hesitated to declare that she was as given to intrigue as Catherine de Medici, and spared not even her own son in her ambition. She schemed against his marriage to Rotrud, a daughter of Charlemagne, and forced him to marry an Armenian totally unsuitable to become his consort. She sanctioned his bigamy with a woman of the court in the hope of ruining his career, and is even said to have blinded him before confining him to prison where he died. She did not long enjoy the fruit of her ambition (797-802), but was deposed by Nice- phorus and passed the end of her life on the island of Lesbos in poverty and contempt.

The Pope and the people of Rome took ad¬ vantage of the accession of Irene as the formal empress to repudiate the Eastern Empire and to make a formal break with Constantinople. They declared that a woman could not be Caesar and Augustus, and thus the path was laid open for a new era and a Western Empire. Pepin, as king of France, had come at the request of Pope Stephen III to save Italy from the Lombards, and was hailed as ruler though he received only the name of patrician which Charles inherited from him. This office was changed to that of emperor, and Pope Leo crowned Charlemagne as emperor in the last days of the 8th century.

James J. Walsh,

Author of (The Thirteenth the Greatest of Cen¬ turies. *

PRINCIPAL EVENTS OF THE 8TH CENTURY.

710. The Saracens conquer Spain.

714. Charles Martel, natural son of Pepin the “ major domo,” or chief of the Franks, succeeds his father.

719. Boniface of England begins his civilizing mission in Germany.

721. The Saracens invade France.

726. Leo the Isaurian interdicts the worship of images.

731. Bede the Anglo-Saxon scholar completes his great work * Historia Ecclesiastica Gentis Anglorum.’

732. Charles Martel defeats the Saracens at the Battle of Tours, and compels their retreat to Spain, which they almost entirely occupy, driving the Goths to the Asturias.

737-741. Charles Martel, having also subjected several Ger¬ man tribes, becomes duke and prince of the Franks.

752. Pepin the Short, son of Charles Martel, succeeds him and is made King of the Franks.

754. Constantine V of the Eastern Empire suppresses mon¬ asteries.

755. Archbishop Boniface, apostle of Germany, is murdered by pagan Frisians at Dokkum.

756. The Lombards of Baltic origin, occupying the north of Italy, are defeated by Pepin, son of Charles Martel and father of Charlemagne.

768. Charlemagne begins to reign in Western Europe.

774. Charlemagne conquers the Lombards; and Upper Italy

is ruled by the Franks; Middle Italy by the Pope;

Lower Italy by the Greeks.

777. Charlemagne invades Spain.

778. The battle of Roncesvalles.

782. Northmen invasion of England and massacre of the

Saxons.

787. The Danes establish themselves in England.

794. Charlemagne holds a great Council at Frankfort.

795. Pope Leo III is acknowledged first bishop of the West. 797. Irene begins her short reign as Empress of the East.

EIGHTH NERVE. See Auditory Nerve.

EIKON BASILIKE, i'kon ba-sil'i-ke (Gr. ((that is, <(imagebreaker55) appeared the same year by order of Parliament. Gauden professed to have begun the work in or about the year 1647, and to have submitted a MS. copy of it to the king. On the other hand, those who maintain that the work was by Charles, assert that he had written the first six of its 28 chap¬ ters before the battle of Naseby (1645). The question is one of much complexity. His¬ torians generally, from Lingard to Green, have pronounced against Charles ; while some of those who have sifted his claims are in his favor. (See Gauden, John). Consult Almack, /Bibliography of the King's Book) (1896) ; Doble, in the Academy (1883) ; Scott, E. J. L., (Comments in Edition of the Work5 (1880) ; Wordsworth, Christopher, (Who Wrote Icon Basilike?) (1824-25) ; Tucker,

EILDON, el'don, HILLS, three peaks be¬ longing to a single mass, south of Melrose, in Roxburghshire, Scotland. The highest attains an elevation of 1,385 feet above sea-level, and all command a splendid prospect and are rich in historic and legendary associations.

EILENBURG, i'len-boorg, Germany, town of Prussian Saxony, in the government of Merseburg, mainly situated on an island of the Mulde, 14 miles northwest of Leipzig. It has manufactures of calico, woolen cloth, yarn, dye¬ stuffs, vehicles, basketwork, tobacco, chemicals, celluloid, beer and agricultural implements. Franz Abt, the song writer, and M. Rinckart, the poet, were born here. Pop. 17,401. Consult Gundermann, (Chronik der Stadt Eilenburg5 (Eilenburg 1879).

EILETHYIA (hieroglyph, Nekheb ; city of Lucina, now called El-Kab), a city of ancient Egypt, situated on the right bank of the Nile, a little below Edfu. The present ruins consist of the remains of small temples dedicated by Ram- eses II to Ra; a Ptolemaic temple dedicated to the eponymous goddess Lucina by Physcon or Euergetes II, with additions

by Ptolemy Alex¬ ander I and the elder Cleopatra ; and an ancient

temple dedicated by Ainenophis III to the local deities. The names of other monarchs are also found in the ruins ; but the most interesting and important remains are the rock-tombs, some as early as the 13th dynasty, excavated in the hills. That of Aahmes, tne “captain of the sailors,® records his services in the wars of the early monarchs of the 18th dynasty against the Hyksos or Shepherds, and other Asiatic and Nigritic races. Another, that of Pahir, is decorated with rich and elaborate paintings, representing the pursuits of agriculture, fowling, fishing, etc. The city was an outpost against the southern tribes, and its fort, a large enclosure of crude brick, was of importance as early as the Shepherd War. The goddess Suben (Eilethyia or Lucina) was a special protectress of Upper Egypt. Consult Brugsch, ˆReiseberichte5 (Leipzig 1855), and (Egypt Under the Pharaohs) ; Wilkinson, An¬ cient Egyptians5 ; Mariette, (Ancient Egyptian History5; Quibell,

EIMBECK, Im’bek, William, American geodesist: b. Brunswick, Germany, 29 Jan. 1841. He was for two years professor of mechanics and engineering, Washington University, and a member of the government solar eclipse expedi¬ tions to Illinois 1869 and to Italy 1870. After 1871 he was an assistant on the United States Coast and Geodetic Survey. He has been a Fellow of the American Association for the Advancement of Science since 1879, and is the inventor of the invariable reversible pendulum and the duplex base apparatus of coast and geodetic survey. His chief work has been in connection with the western divisions of the 39th parallel triangulation across the continent.

EINBECK, In’bek, or EIMBECK, Ger¬ many, town of Prussia, in the province of Han¬ over, on the lime, near its junction with the Leine, 40 miles south of Hanover. In the Alexander-kirche are remarkable old choir stalls, a bronze baptismal font of exquisite design and the tombs of the Prinzen-Grubenhagen. The town has vocational departments attached to its school system and maintains a school for police. Belts, linen, carpets, felt, sugar and tobacco are the principal articles of manufacture. The formerly celebrated Eimbecker bier ((

EINHARD. See Eginhard.

EINHORN, in’horn, David, American rabbi: b. Dispeck, Bavaria, 10 Nov. 1809; d. New York, 2 Nov. 1879. His first rabbinical position was at Hopstadten, Bavaria, and shortly afterward he became chief rabbi of the grand duchy of Mecklenburg-Schwerin. In 1851 he was called to Pesth, but his progressive tend¬ encies aroused sharp opposition

and his temple was closed by order of the government. In 1855 he was invited to become rabbi of the Har Sinai Congregation, of Baltimore, Md. His activity was now to be rapidly developed, for he issued his prayerbook, which was warmly received by many reformed Jewish congrega¬ tions, and he began the publication of a schol¬ arly monthly magazine in German, entitled Sinai, in the interests of advanced reform.

His vigorous onslaughts on slavery in 1861 led to his removal from Baltimore to Philadelphia, where he became rabbi of the Kenesseth Israel Temple and published his catechism. In 1866 he was elected rabbi of the Adath Teshurun Temple in New York, where he continued a zealous, impassioned and scholarly advocate of reform and the leader of the then radical school, until his retirement in July 1879.

EINSIEDELN, in'ze dein, Switzerland, (place of the solitaries or hermits), a small town in the canton of Schwyz, 2,895 feet above sea-level and 26 miles southeast of Zurich, seat of a renowned abbey of Benedictine monks since the middle of the 9th century. It is a famous resort of pilgrims who visit the place in thousands to venerate an ancient miraculous image of the Blessed Virgin. For the accom¬ modation of the pilgrims the little town has more than 50 inns or houses of entertainment. Those pilgrimages are made throughout the jˆear, but the great annual pilgrimage culmi¬ nates on the anniversary of the dedication of the abbey's church, 14 September. The pres¬ ent abbey is the successor of four previous edi¬ fices which were destroyed by fire ; it was erected in the first quarter of the 18th century and is an imposing pile in the Italian style. The place was visited by Edward Gibbon, the histo¬ rian, 1755, who writes that he was ((astonished by the profane ostentation of riches in the poorest corner of Europe ; amidst a savage scene of woods and mountains a palace appears to have been erected by magic and it was erected by the potent magic of religion.® The abbey which Gibbon then saw is still in exist¬ ence and is annually visited by more than 150,- 000 pilgrims. It was plundered of its vast treas¬ ure of silver and gold and precious stones by the French (1798), but it is still very rich, es¬ pecially in literary monuments, possessing a li¬ brary of 61,000 volumes, 1,190 manuscripts and more than 1,000 productions of the printing press in its early period. The leading industry is the manufacture and sale of religious objects, statues, crucifixes, altar vessels, etc. The mon¬ astery has many historical and religious

associa¬ tions ; a great chandelier was donated by Na¬ poleon III. The monastery was founded by Meinrad, who built a lady chapel here to house the statue of the Virgin given him by Hildegard. Pop. 8,438.

EINSTEIN'S THEORY. See Relativity.

EISELEN, i'ze-len, Wilhelm Bernard,

German gymnast: b. Berlin, 27 Sept. 1792; d. Misdroy, 22 Aug. 1846. His early studies be¬ gan in Berlin and he was the pupil of the emi¬ nent gymnast Jahns. He soon became promi¬ nent among the young gymnasts of Berlin and in 1819 began to teach gymnastics at a. school in Berlin. He opened a fencing school in 1825 in Berlin and a gymnasium in 1828, and had a vast number of pupils. The first gymnasium for young girls was instituted by him in 1832. He published many works on gymnastics and fenc¬ ing, including (Deutsche Turnkunst' (in col¬ laboration with Jahn, 1816) ; (Abriss des deutschen Stossfechtens) (1826).

EISENACH, I'ze-naH, Germany, town in the state of Saxe-Weimar, at the northwest end of the Thuringian Forest, at the con¬ fluence of the Nesse with the Horsel, 17 miles

west of Gotha. The neighborhood is remark¬ ably picturesque, being ornamented with splen¬ did gardens and residences. In the market¬ place there is a monument to the memory of those from the neighborhood who fell in the war of 1870-71, and in the Karlsplatz stands the Luther memorial, unveiled in 1895. It con¬ tains many old buildings of historical and archi¬ tectural importance. Among the educational institutions of Eisenach, the most prominent is the gymnasium formerly a Latin school, which Luther and Bach once attended, a school of forestry, a school of design and a teachers' seminary. It has some well-developed manu¬ facturing interests which comprise coloring materials, white-lead, woolens, beer, leather, pottery, tobacco, cigars, cement pipe, alabaster ware, cabinet-work, lumber, oil, machinery, etc. The town has many interesting historical as¬ sociations. Luther was at school here, and Se¬ bastian Bach, to whom there is a statue, was born here. Near it is the Wartburg, where Luther resided for a time for safety. Eisen¬ ach was formerly the capital of a principality of the same name. Consult Scheller, (Eisenach und Umgebung,' ed. by Kiihner (Eisenach 1898). Pop. 38,362.

EISENACH CHURCH CONFERENCE.

See Evangelical Church Conference.

EISENBERG, I'zen-berg, Germany, town in the province of Saxe-Altenburg, of great an¬ tiquity, birthplace of the philosopher Krause, whose statue is set up there. It is near the junction of the Saale and Elster, 36 miles south¬ west of Leipzig. It possesses a famous castle, Christiansburg, and is the seat of many manu¬ factures, including woolens, velvet, pottery, furniture, pianos, porcelain and agricultural machines. Statues have been erected to Bis¬ marck and to Duke Christian of Saxe-Eisen- berg, in addition to that of the philosopher Karl Friedrich Krause. Pop. 10,749. Consult (Chro- nik der Stadt und des Amtes Eisenberg) (Eisenberg 1843).

EISENERZ, i'zen-ertz, Austria, mining town in the north of Styria, 20 miles northwest of Bruck. It stands in a narrow mountain valley at the foot of the Erzberg (5,000 feet), a mountain so rich in iron ore that the miners, instead of cutting mines into it and following the metal in veins, quarry the rock from the outside. About 5,000 miners are employed in the quarries on the mountain in summer and 2,800 in winter, the annual output being about 1,000,000 tons, of which about 40 per cent is metal. The Gothic church of Saint Oswald, founded in 1279, is an exellent example of the fortified type of ecclesiastical architecture. Aragonite of the purest white, and resembling coral branches in form, and of the most beau¬ tiful white is found in caves in the mountain. Pop. 6,494.

EISENMENGER, i'zen -meng-er, August, Austrian fresco painter: b. Vienna, 11 Feb. 1830. He studied in the Vienna Academy and early gained the first prize in drawing (1845). In 1863 he was appointed teacher of drawing in the Protestant Real-schule of Vienna. His first work of importance was the fresco which he executed in the hall of the Society of Musi¬ cal Amateurs (Musik Freande), (Apollo with the Muses' ; but he has painted many notable frescoes in other public buildings. He was

appointed professor of the Vienna Academy in 1872, remaining until 1901, and at the same time opened a private school of fresco painting. His more important works included the frieze medallions in the Museum of Art and Industry, Vienna; a series of historical pictures illustra¬ tive of the reign of Emperor Maximilian I, in Castle Hornstein, near Vienna (1872-79), and the decorative painting in the session room of the Chamber of Deputies in the Reichsrat building at Vienna (1885).

EISENSTADT, I'sen-stat, or KISMAR-

TON, Hungary, town in the County of Oden- burg, at the foot of the Leitha Mountains, and 25 miles southeast of Vienna. It contains the magnificent palace of Prince Esterhazy, erected in 1683 and restored in 1805. Fine grounds surround the palace, in the library of which is housed a fine collection of musical manuscripts. Nearby is the pilgrim shrine of Maria-Einsiedel, also the burial place of the composer Joseph Haydn. Pop. 3,073.

EISLEBEN, Is'la-ben, Germany, town in Prussian Saxony, 18 miles to the west of Halle, famous as the place where Martin Luther was born and died. The royal gymnasium, origin¬ ally founded by Luther, was rebuilt in 1883. The house in which Luther died has been re¬ cently restored. In 1883, on the occasion of the celebration of the 400th anniversary of Luther's birth, a statue of him was unveiled in the market-place. In the church of Saint Andrew are busts of Luther and Melanchthon, the tombs of the counts of Mansfeld, and Luther's pulpit. Other Lutheran relics are in the church of Saints Peter and Paul. Copper and silver are mined in the neighborhood of Eisleben, which has several smelters. A con¬ siderable trade in flower and vegetable seeds is carried on. In the 10th century the place was called Islebin. Soon after the year 1100 it fell to the counts of Mansfeld, in whose possession it remained until 1780, when it was given to Saxony. In 1815 it was transferred to Prussia. Pop. 24,629.

EISTEDDFOD, I-stet'vod, the name of an assembly of Welsh bards for the purpose of musical and poetical contests. They were held at different places for the minstrels of their respective neighborhoods ; two noted ones were held at Caerwys, at Aberfraw in Anglesea and at Mathravel in Powys. The judges were ap¬ pointed by commissions from the native princes, and, after the conquest, from the Eng¬ lish kings. The last was issued in 1568 by Queen Elizabeth, but the ancient custom has been again revived by the Gwynedigion and Cambrian societies, and annual meetings for the recitation of prize poems and performances on the harp are now held under the name of Eisteddfod. The Eisteddfod proper was an¬ nounced a year and a day beforehand at an assembly called a gorsedd, at which prizes for the previous competition were awarded. At the present time yearly eisteddfods are held alternately in the north and south of Wales, and in some parts of the United States, es¬ pecially throughout Pennsylvania, and other sections settled by the Welsh people. Annual meetings take place, in every way similar to the rite in their native land. During the Co¬ lumbian Exposition at Chicago probably the

most notable Eisteddfod held in America took place there.

EJECTMENT AND EVICTION. Eject¬ ment in law is a mixed action, as it is resorted to in order to recover the possession of land and damages for the wrongful with¬ holding of it, though the damages are nominal. Originally, it was a possessory action — that is, adapted to the recovery of the possession of land. It ultimately became a convenient means of testing the title by a series of fictions. The supposition was (and this was the substance of the fiction) that a lease for a certain num¬ ber of years had been made to a tenant, (

(New Commentaries' (1903) ; Powell, (The Law of Ejectment' (1911).

Eviction. — Depriving a person of his lands or tenements. Technically, the dispossession must be by judgment of law; if otherwise it is an ouster. Eviction may be total or partial. Total eviction takes place when the possessor is entirely deprived of his rights in the prem¬ ises. Partial eviction takes place when the possessor is deprived of only a portion of them, as if a third person comes in and ejects him from a portion of his land, or establishes a right to some easement over it, by an older title than that under which he holds. See Dispossess.

EKATERINBURG, e-ka"te-ren-boorg', or IEKATERINBURG, Russia, town, in the government and 170 miles southeast of Perm, on the east side, and in the mining district of the Ural Mountains. It was founded in 1723 by Peter the Great and was named after Em¬ press Catharine I. It has a mint, arsenal, cus¬ tom-house, mining-school, hospital, meteoro¬ logical observatory and botanic garden. The art of cutting, polishing and engraving gems, which are found in the neighboring mountains, is here carried to great perfection, and, to¬ gether with mining and metallurgy, and a commerce in cattle and cutlery forms the chief occupation of the inhabitants. In the neighbor¬ hood are several platinum mines and also the famous gold mines of Beresov and Niviansk. Pop. 52,230.

EL BRACITO (N. M.), Battle of (Doni¬ phan's name Brazito, Mexican Temascalitos), 24 Dec. 1846, in the Mexican War. Colonel Doniphan, marching from California to Chi¬ huahua, was assailed at a bend of the Rio Grande, some 25 miles from El Paso, by a bat¬ talion of Mexicans under Antonio Ponce. The Mexicans fired at long range as they charged; the Americans waited till they came close, then broke

them with a destructive volley, and a company of 20 horse scattered their cavalry, which fled to the mountains. American loss, 7 wounded; Mexicans, 43 killed and 150 wounded.

EL BURLADOR DE SEVILLA. Tirso de Molina's drama, (E1 Burlador de Sevilla y Convidado de Piedra' ((The Gay Scoffer of Seville and Feast of the Statue'), is the parent source in literature of the famous legend of Don Juan Tenorio, the unscrupulous gallant and blasphemer, subsequently presented vari¬ ously by Moliere and Byron as Don Juan, by Mozart as Don Giovanni, and; in Spain itself at a more recent date, by Jose Zorilla as Don Juan Tenorio in the most popular of all Spanish plays. Few characters in the history of letters have attracted the attention of so many writ¬ ers of genius, or have been reproduced so universally and in such multiplicity of styles. In itself, however, Tirso's play is a structure¬ less aggregation of amorous adventures, in the course of which the hero seduces a Neapolitan lady, a fisher-girl, a young peasant, and, by a base deception, Dona Ana de Ulloa, whose father he slays. The blasphemous feast which follows, at which the statue of the Commander Don Gonzalo de Ulloa dines with Don Juan, dragging him down afterward with the tomb from which it has descended and the chapel containing it to perdition, is wholly distinct

from the other episodes, which Tirso conceives after the manner of the chronicle play in a succession of loosely related incidents, without regard either to consistency of character or to dramatic action. His Don Juan is a mere vul¬ gar seducer, by after-thought a blasphemer, whose overthrow does not rise above the sphere of melodrama. Although Tirso must be held to rank with Lope de Vega and Cal¬ deron at the head of the Spanish romantic theatre, even the pastoral elements in this play are devoid of picturesqueness and lack the author's customary mellowness and sober im¬ aginative charm. The story had been utilized previously by Juan de Cueva. While of un¬ certain origin, prevailing Spanish authority traces it to Seville, where Don Juan Tenorio is said to have died at the foot of the statue of the Commander, whom he had killed, as in the play. The Feast of the Statue is derived from independent sources. The play was first printed in 1630, but has never been translated into English. Consult Cotarelo y Mori, E., in his introduction to the (Obras de Tirso de Molina' (in the Nueva Biblioteco de Autores Espmoles, Vols. IV and IX, Madrid 1906-07) ; Menendez Pidal, R., (Sobre los origenes de El Convidado de piedra' (in Cultura Espahola, Madrid, May 1906).

John Garrett Underhill.

EL CANEY, el ka'na, Cuba, town, on the main road, four miles

northeast of Santiago de Cuba. During the Spanish- American War it was the scene of a battle between 525 Spaniards under General Vara del Rey, and 4,400 Ameri¬ cans under General Lawton. The Spaniards made a desperate resistance, but were finally overcome by the American infantry. The Spaniards lost 320, and 100 were taken pris¬ oners ; the Americans lost 440. This battle oc¬ curred 1 July 1898. In 1901 the United States government purchased the battlefield and ap¬ proaches for a public reservation. See United States — Spantsh-American War.

EL DORADO. See Eldorado.

EL DORADO, Ark., city and county-seat of Union County, 30 miles southeast of Camden, on the Chicago, Rock Island and Pacific, the El Dorado and Wesson, and the Saint Louis, Iron Mountain and Southern railroads. It has cot¬ ton oil and planing mills, railroad repair shops, an iron foundry and bottling works. It contains also a courthouse and a county jail. In 1908 it was chartered as a city. The surrounding dis¬ trict is devoted to cotton and peach growing. Pop. 4,202.

EL DORADO, Kan., city, county-seat of Butler County; on the Walnut River; the Atchi¬ son, Topeka and Santa Fe, the Missouri Pa¬ cific, and other railroads ; about 25 miles east of Wichita. The city is situated in a rich agricul¬ tural region, and its principal trade is in grain, livestock and farm and dairy products. There are extensive oil-fields nearby. The city has machine shops, wagon works and quarries of limestone. It was settled in 1858 and was first incorporated in 1870. The city has a Carnegie library, and the water supply system is the prop¬ erty of the municipality. Pop. (1920) 10,995.

EL GRAN GALEOTO. Jose Echegarav's (The Great Galeoto,' certainly the most famous Spanish play of the 19th century beyond the

limits of Spain, and the work upon which the international reputation of its author is founded, is an exceedingly effective example of the tra¬ ditional Calderonian drama of jealousy, in which the honor of the husband is attacked by a peculiarly insidious enemy. Gossip here be¬ comes the Galeoto, or go-between, which unites the lovers, the use of the title having been suggested by its appearance in the episode of Francesca in the fifth canto of Dante's in¬ ferno,) where it has reference to the relations of Galahad (Galeoto) with Lancelot and

Guine¬ vere. Echegaray is an adept in stage effect, yet his drama is never deficient in a certain weight and dignity which, when tempered with re¬ straint as in this play, impart to his fervid emotionalism a distinction uncommon in the theatre of his time. These qualities, together with a faculty for realistic detail, have led foreign critics to regard him as a psychologist, and the play as a study of the effects of gossip on the lives of innocent persons, who are in¬ fluenced by its suggestions to their ultimate ruin. From this point of view, however, the work is curiously incomplete and unsatisfying; in Spain it has been recognized since its appear¬ ance in 1881, as an excellent stage play, which conforms only superficially to the canons of Ibsenism. The mediocre verse of the original has diminished its popularity and importance of late years upon the Spanish-speaking stage.

The best English translation is that by Eleanor Bontecou, included in (Masterpieces of Modern Spanish Drama> (New York 1917). Other versions are by Hannah Lynch (Lon¬ don 1895), and by Jacob S. Fassett, Jr., (Bos¬ ton 1914). (The World and His Wife,* a free adaptation made through the German, has been played widely throughout England and the United States. For criticism of Echegaray, consult Bueno, Manuel, (Teatro Espanol con- temporaneo) (Madrid 1909).

John Garrett Underhill.

EL-KHARGEH. See Khargeh.

EL PASO, el pa'so, Texas, city, port of entry and county-seat of El Paso County; on the Rio Grande, the Atchison, Topeka and Santa Fe, the Texas and Pacific, the Rock Island, Southern Pacific and other railways; on the Rio Grande River in the extreme western part of the State. It is opposite Ciudad Juarez, Mexico, the north terminus of the Mex¬ ican Central Railway. El Paso is about mid¬ way between the tide water of the Atlantic (Gulf of Mexico) and the Pacific oceans, about 3,800 feet above sea-level and is central to the rich tributary regions of western Texas, New Mexico, Arizona and the northern section of old Mexico; it is 600 miles from any railroad centre that may compete with it. It is the cen¬ tre of a rich fruit and vegetable growing region, the great Elephant Butte Dam (q.v.), costing nearly $10,000,000, furnishing ample water for irrigation. By it 200,000 acres are . reclaimed. El Paso's unequaled railway facilities, the proximity in New Mexico of inexhaustible sup¬ plies of fuel coal and the demand for supplies and machinery from the mines, ranches and growing towns of its neighborhood make it one of the most important manufacturing cities of the Southwest. Its most important industry is

smelting the valuable ores of- the neighboring region. The El Paso smelters have a capacity

of about 40,000 tons of ore a month. The monthly payment to miners for ores brought in averages nearly $2,000,000, a large part of which finds its way into the stores and fac¬ tories of the city; the monthly pay-roll of the smelters and other manufactories and the rail¬ ways centering in the city is nearly $300,000; and these together give to the financial inter¬ ests a stability that is little affected by condi¬ tions in other parts of the country. It has one of the largest custom smelters in the world, giving employment to from 2,500 to 3,000. Other industrial establishments are a wood¬ finishing and box factory, foundries and ma¬ chine shops, cement plant, railroad repair shops, brick and tile works, sash and door, macaroni and cigar factories, brass works and flour mills. The United States Census of Manufactures for 1914 showed within the city limits 117 indus¬ trial establishments of factory grade, employ¬ ing 2,815 persons, 2,347 being wage-earners, re¬ ceiving annually $1,663,000 in wages. The capi¬ tal invested aggregated $8,666,000 and the year's output was valued at $6,135,000; of this, $3,262,- 000 was the value added by manufacture. Many eastern manufacturers, especially of machinery, have large warehouses here. The city carries on an extensive trade in copper, silver and lead, machinery, livestock, wool and hides and has important wholesale and jobbing interests. El Paso has 10 national banks, with resources amounting to over $27,660,719, and deposits over $22, 660,485, as contrasted with $1,500,000 and $750,000 respectively 30 years ago. El Paso is pre-eminently a city of homes. The streets are lighted by gas and electricity, and a well- planned electric street-railway system places all parts of the city within easy reach of the busi¬ ness section. The more notable buildings are the Federal building, county courthouse, city hall, post-office, high school, the State School of Mines, Fort Bliss, Carnegie library, Knights of Columbus Home, Masonic Temple. There are 13 public parks. The city has several pub¬ lic schools and parochial (Roman Catholic) schools, a business college, and is the seat of the Saint Joseph's Academy and of the Rio Grande Congregational Training School and Theological Seminary. There are several handsome churches and two well-equipped hos¬ pitals. El Paso is a noted health resort, hav¬ ing many excellent hotels, some of which are open during the entire year. The assessed valu¬ ation in 1916 amounted to $48,736,645. There are within the city limits nearly 60 miles of asphalt streets, 82 miles of concrete sidewalks and 97 miles of sewers. The city adopted the commission form of government in 1907. Its receipts amount annually to about- $2,000,000, while its payments reach about $1,800,000. The

waterworks system, costing $1,500,000, is owned by the city. The Spanish explorers vis¬ ited the site at an early time. The first settle¬ ment was made in 1827, and the town incorpo¬ rated in 1869. During the Civil War it was occupied alternately by Federal and Confederate troops and for a time was the base for opera¬ tions against New Mexico and Arizona. The present charter dates from 1889 with revisions of 1891 and 1907. El Paso has grown more rapidly than any other city in Texas or the Southwest. The city has had no boom, its in¬ crease being healthy and substantial, and in ac¬ cordance with the demands of commerce and

the development of the natural resources of the country tributary to the city. The total imports in 1915 had an appraised value of $9,149,410, of which cotton, cattle, copper, silver, zinc and lumber formed the principal items imported. Exports were valued in 1915 at $6,146,655, of which coal and coke, shoes, bleached cotton and cotton prints comprised the bulk. Pop. 77,543.

EL RENO, Okla., city and county-seat of Canadian County; on the Rock Island Lines, junction main lines north and south, and east and west, being operating headquarters for the second district of the system ; terminal for Saint Louis, El Reno and Western Railway, and also for Oklahoma Railway Company — Interurban. Near the geographical centre of State, it exploits a rich agricultural district pro¬ ducing alfalfa, corn, kaffir, wheat, oats, broom corn, fruits and vegetables. The industries of the city are varied and growing rapidly. They include five lumber yards, two flour mills (daily capacity 3,000 bbls.), vitrified brick and tile factory, two ice plants, incubator factory, washing machine factory, broom factory, cigar factories, foundries, machine shops, tent and awning factory, granite and stone works, plan¬ ing mill, gas and electric plants, ice cream fac¬ tory, steam laundry, wholesale groceries, etc. El Reno has 15 churches and 7 public schools, the new High School costing $100,000; school enrolment of 1,600 and a teaching force of 45. The Sacred Heart Institute (Catholic) has ail enrolment of 200, with graded, high school and music courses. There is also a business col¬ lege, Carnegie Library and two hospitals. The Masons and Elks possess fine buildings and the El Reno theatre has a seating capacity of 1,400. The new office building of the Rock Island system cost $150,000, and the city hall cost $50,000. New Federal building cost $120,000. The El Reno Country Club has a fine club¬ house and maintains one of the finest golf courses in the State. The Grand Lodge Masons maintain the State Masonic Home at this point, owning 640 acres which the United

States government sold to that body recently ; fine buildings already built and plans for one of the finest homes in the country are being laid. Old Fort Reno, nearby, has been con¬ verted into a remount station, where horses are gentled and trained for cavalry purposes for use in United States Army. In 1911 El Reno adopted the commission form of government, the executives being commissioner of public affairs — ex-officio mayor, commissioner of finance and commissioner of highways. The city owns its own water plant and extensions, with a capacity of 1,500,000 gallons daily, has 10 miles of paved streets and 15 miles of sewers. The taxable valuation is about $7,000,- 000. The city has four banks, with a capital and surplus of $175,000 and average deposits of $1,500,000. It was first settled in 1890, made a borough the same year and a city of the first class in 1892. The population has increased very fast, being 7,737 in 1920.

EL SABIO, Alfonso X, king of Leon and Castilla : b. 23 Nov. 1221 ; d. 21 April 1284. He was the son of Ferdinand III and Beatriz, daughter of Philip of Suabia and sister of Fred¬ erick II of Germany. Most carefully educated, he succeeded his father to the throne in 1252, bringing with him to his administrative tasks the

reputation of successes gained in several cam¬ paigns against the Mohammedans. His reign was cursed with insurrections led by powerful nobles, financial troubles and warlike move¬ ments on the part of the Mohammedans. On the death of William of Holland, emperor of Germany, Alfonso laid claim to the throne as the direct heir. He was opposed in this by most of the nobles of Germany and by the Pope. Nevertheless he maintained the struggle against superior powers for 18 years. In this struggle he was often opposed by some of the most powerful ruling dukes of Spain. Notwith¬ standing all his reverses he fought stubbornly on, claiming for himself the ancient title of king of the Romans ; and signing his official documents with the great seal belonging to that dignity. He made ready several times to in¬ vade Italy and Germany, but trouble at home withheld his arm when he was ready to strike. Finally the united efforts of his powerful ene¬ mies and the threat of the Pope to excommu¬ nicate him, combined with ever-increasing trouble at home, forced Alfonso, in 1275, to re¬ nounce his claims upon the ancient throne of the Romans. The opposition of the successive popes to the claims of Alfonso on the crown of Germany was due to the fact that he was the representative of the Suabian princes, long the bitter and uncompromising enemies of the papacy. Alfonso was the more inclined to make peace with his enemies abroad in 1275 be¬ cause of

the increased trouble which the Mo¬ hammedans were giving him at home. In Gra¬ nada, Murcia, Andalucia, Algarve and all the populous centres from Murcia to Jerez the Moors rose up against the Christian king in an effort to drive Christianity out of Spain. Al¬ fonso besieged and captured Jerez, Medina- Sidonia, Rota, Santucar, Lebrija and Arcos ; and the Castile fleet, under the command of Don Juan Garcia de Villamayor, took Cadiz. In 1264 Jaime of Aragon came to the aid of Al¬ fonso. The former captured the province of Murcia while Alfonso carried on the war against Andalucia. These constant wrars and the struggle against Italy and Germany forced the king to increase the taxes. This estranged many of the nobles upon whom fell this burden of increased taxation; and Alfonso was forced to make concessions to his underlords which gave them great facilities for the oppression of their tenants. Thus the king ultimately lost the goodwill of nobles and peasants alike. The former, deserting the Castilian king, joined hands with the Moorish sovereigns of Granada, Mahomed I and Mahomed II. The treaty of peace with the Pope and with Germany in 1275, however, strengthened Alfonso and enabled him to make temporary terms with his insurgent nobles. Alfonso departed for Rome (1275) for an interview with the Pope, leaving the cares of his kingdom in charge of his eldest son, Prince Fernando de la Cerda. The latter sent an army unter Nuno Gonzalez de Lara into Cordoba. There the invading forces met with considerable success at first; but in a short while they were surrounded by a greatly supe¬ rior Moorish force and defeated with heavy loss, among the dead being Nuno and over 400 of his bodyguard. The survivors took refuge in the town of Ecipa (May 1275). The regent died in July while on his way to the relief of the besieged Castilian,

forces ; and Sancno, second son of King Al¬ fonso, a boy of 18, at once took charge of the expeditionary force which he managed with considerable skill. Alfonso, on his return from Italy, made a two years' peace with the Moors, on the conclusion of which the latter again made an attempt to conquer the Christian pos¬ sessions in Spain. Don Sancho led an army into Granada where he fell into an ambuscade and suffered defeat, losing over 3,000 of his fin¬ est knights. Sancho continued with the remain¬ der of his forces on into the heart of Granada, burning villages and towns and laying waste the country he traversed. But the Castilians were forced to retreat to Cordoba (1281). The fol¬ lowing year Alfonso and Sancho quarreled over the succession to the throne and the son de¬ clared himself in open

insurrection against the father. Sancho stirred up the towns of the country against the king and even sought the aid of the enemies of Christian Spain. But the Pope threw his influence in favor of Alfonso and most of the nobles, obeying the spiritual head of the Church, returned to their alle¬ giance (1282). Alfonso disinherited his son and carried the war on with the aid of Yacub, ruler of Morocco. The insurrection lost ground rapidly, but just as everything was turning in his favor Alfonso died.

Alfonso the Wise occupies a prominent place in Spanish history as a legislator. He gave uniformity to the laws of his united kingdom, which were, on his coming to the throne, a con¬ fused mass of privileges and local observances, often at variance with one another, and fre¬ quently subversive of the order of the nation. Out of this confused mass of privileges and local laws he succeeded in creating a certain uniformity of legal observances whose influ¬ ences were felt in Spain for centuries. He wrote the (Septenario,} a work wonderful in its day and for the political conditions under which it appeared. This is a sort of political, moral and religious compilation which has served as the basis of numerous legal works which have developed the law of Spain. In this and other works of a like nature Alfonso shows an intuition of the spirit of law and a knowledge far ahead of his time. His (Libro del Especulo 6 Espejo de todos los derechos) and (Fuero ReaP are works scarcely less not¬ able than the ˆeptenarioP They were the re¬ sult of much thought and investigation. They both appeared together in 1255. The (Libro del Especulo* (Book of Laws) is a summing up of what appeared to Alfonso to be the most just statutes or custom laws of Leon and Castile, and they were compiled to be used in adjudging all cases brought before the king's court. The (Fuero ReaP (royal law, in contradistinction to municipal or community law) was a compila¬ tion of the laws and usages of the different communities of the kingdom, for use in the courts of the common people. Alfonso's in¬ tention in writing the (Fuero ReaP was to do away with the anarchy in local law which reigned everywhere throughout his dominions. As these laws prohibited countless abuses, their enforcement was bitterly opposed by the nobles and others in high office throughout the land. These works were followed by the **Libro de los Leyes) (Book of Laws), also known as (Las Siete Partidas** (Seven Parts) on account of its being divided into seven sec¬

tions. It was the first great legal code of the Middle Ages. In this and his other works Al¬ fonso shows exact knowledge and appreciation of the laws of the Romans, of the Justinian Code and of Spanish and foreign laws of his day and of the ages preceding him. In addition to these virtues, his works have been long con¬ sidered as literary

models in their field. They form a wonderfully interesting and useful expo¬ sition of the laws, morality and religious uses, observances and practices of the age iff which they were written. The ability, industry, powers of assimilation and excellent judgment of the king are evidently shown in his writings which called for a mastery of three great fields of knowledge, common and royal law, canonical law and theology. In his work he had, no doubt, helpers and investigators, but he was himself the heart and soul of it all; and his was the master mind that brought order out of confusion and conceived plans whose broad¬ ness were a century ahead of their time. Al¬ fonso was a great lover, not only of everything relating to law, but also of literature and sci¬ ence; and the extent of his knowledge is often surprising. He was a poet of no mean talent and he encouraged the troubadours of Provence and Catalonia. His knowledge of history was very broad and exact ; and he had mastered the extensive mathematical knowledge of the Arabs, so that, even among the Moors, he had acquired a reputation as a mathematician. It is not strange, therefore, that he should have done much, by his example and his influence, to ad¬ vance the general culture of his kingdom. Of the many debts that Spain owes to him, one of the greatest and of most far-reaching conse¬ quence, is the fact that, for years, he labored to make the tongue of Castile the language of the whole country. This tended to create the national unity for which he strove. Though he was disappointed in the result of his work in his lifetime, it bore abundant fruit in after days. He encouraged education and estab¬ lished schools of higher learning in Toledo, Cordoba and Sevilla, and he welcomed to his court the troubadours. He ordered the Bible and various other works translated into Span¬ ish, among them books on scientific subjects written in Hebrew or Arabic. In addition to his (Cantigas) numerous other works of a non- legal nature have been attributed to him, in some cases apparently with considerable rea¬ son, among these being (Estoria de Espanna 6 Cronica GeneraP and (Grande y General Esto- riaP Consult Ticknor, (History of Spanish Literature > (New York, 1854) ; any good his¬ tory of Spain, or history of Spanish literature.

John Hubert Cornyn, Editorial Staff of The Americana.

EL SOMBRERO DE TRES PICOS (The Cocked Hat). The journalist and novel¬ ist Pedro Antonio de Alarcon (1833-91) met with little acclaim for his more ambitious liter¬ ary performances; in fact, he attained to no measure of success in his novels. With his short stories, however, he gained a well- deserved repute, and with two of them, the (Sombrero de Tres Picos) and the (Capitan VenenoP which are really long enough to be termed novelettes, he won his permanent place in

the annals of Spanish prose fiction The (Capitan Veneno> is entirely of his own de-

vising; the (Sombrero de Tres Picos,* on the other hand, is the result of his refashioning an old narrative previously decked out in prose form by the Italian Boccaccio in his De¬ cameronˆ (VIII, 8) and refurbished for French readers in the (Cent nouvelles nouvellesP Alar¬ con may have known these versions of the story, but he certainly derived his direct in¬ spiration from the treatment accorded to it in two popular Spanish ballads which may be seen in the (Romancero general, > and he drew upon his own powers of invention for factors and embellishments which are not present in these verse sources. The subject of the Som¬ brero de Tres Picos* is one which required delicate handling if the unduly scabrous was to be avoided in the telling. It would have been easy for any author to run aground on the shoals of what the literary critics now call naturalism in the treatment of a theme which, like this, involves attempted adultery as a neces¬ sary element. But there is no indulgence shown here for the vicious, and whatsoever elements of the unbecoming are inherent in the popular tradition and are perforce adopted in Alarcon's story are sufficiently countered by the firm way in which the Corregidora, safeguarding her own honor and rescuing that of the peasant woman sena Frasquita, dispenses poetic justice to her own recreant husband. Humor of incident is rife in the work. It may be noted that Alar¬ con's redaction of the old legend has been utilized for operatic purposes in both French and German.

J. D. M. Ford.

ELZEAGNUS, el-e-ag'nus, a genus of shrubs or small trees of the family Elceagnacece. The species, of which there are about 40, are natives of the northern temperate zone, and are characterized by deciduous or persistent entire leaves covered with silvery or brownish scales, solitary or clustered apetalous axillary flowers and one-seeded drupaceous fruits. They are valued in ornamental gardening for their foliage, usually decorative, fruits, and mostly fragrant flowers. The deciduous members are hardy in the north ; the evergreen ones, which mostly come from Japan and China, only in the south. They are easily propagated by means of seeds, cuttings and layers, and succeed upon almost any well-drained soil in a sunny situation. The best known species probably are: (1) E. angustifolia, the oleaster or white olive,

which attains a height of about 20 feet. It has been introduced from southeastern Europe or adja¬ cent Asia, and has proved hardy in the bleak and cold prairie States. It is one of the most ornamental species. (2) E. argentea, the silver- berry, a native of the colder parts of Canada and the northern border of the United States. It seldom attains a height exceeding 15 feet, and is perhaps the most popular native species. (3) E. multiflora, the gumi, a species intro¬ duced from eastern Asia. It is gaining in favor. It attains a height of about six feet and, like the preceding, bears edible, slightly acid fruit of pleasant flavor. This last species became of horticultural importance during the last 25 years of the 19th century because it produces good crops of fruit in climates too rigorous for most of the other fruit-bearing shrubs and trees.

ELZEIS, e-le'is, the name given to a genus of palms. The seven species are dioecious or monoecious, the flowers, especially the males, in dense masses, packed very closely together; the fruit is partly three-sided, but somewhat irregular. E. guineensis , the maba or oil-palm of the West African coast, has heads of large fruits. The outer or fleshy part of the fruit is boiled in water, when the oil rises to the sur¬ face and may be skimmed off. In its native country it is used for butter. It constitutes one of the chief commercial products of west¬ ern Africa. E. melanococca also furnishes oil. Both species }neld by manufacture palm-wine.

ELZEOCARPUS, e-le-6-kar'pus, a genus of plants of the Elceocarpaccre. The species are shrubs and trees and are found chiefly in New Zealand, Australia and southeastern Asia. From the seed-stones of E. ganitrus the natives of Australia make necklaces. The New Zealanders find a rich black dye in E. lunau, and in India several species furnish one of the ingredients of curry-powder.

ELZEODENDRON, e-le-6-den'dron, a genus of the staff-tree family (Celastracecz) . The plants of the genus are generally trees, natives of southern Asia, western and southern Africa and South America. The drupes of E. kubu are eaten at the Cape of Good Hope while the bark of E. roxburgliii, rubbed with water, is used by the Hindus as an external application to swellings of all kinds. E. glau- cum, a native of Ceylon, is sometimes called the Ceylon tea-tree. Saffronwood is the product of E. croceum, and an oil in com¬ mon use in Africa is made from E. argan.

ELAGABALUS, e-la-gab'a-lus, or HELI- OGABALUS, he"li-o-gab'a-lus, Roman em¬ peror : b. Emesa 204 a.d. ; d. 222. His real name was Varius Avitus Bassianus, but when a youth he was appointed high

priest of the Syro- Phoenician sun-god Elagabol and assumed the name of that deity. Soon after the death of his cousin Caracalla, Elagabalus was proclaimed emperor by the soldiers in opposition to the legitimate sovereign, Macrinus. The rivals met in battle at Antioch 218 a.d., Macrinus was de¬ feated and Elagabalus assumed the purple. His reign of three years and nine months was in¬ famous for the debaucheries of every kind in which he indulged. He instituted ceremonies in honor of the god Elagabol and it is believed made human sacrifices to him. He was murdered in an insurrection of the Praetorians and was succeeded by his cousin and adopted son, Alex¬ ander Severus, whose assassination he had twice attempted. Consult Butler, O. F., (Studies in the Life of Heliogabalus> (New York 1908).

ELAINE, e-la'in, or ELAIN, the oily prin¬ ciple of fat, obtained by submitting fat to the action of boiling alcohol, allowing the stearin to crystallize and then evaporating the alcoholic solution ; or by the simple process of pressing any oily or fatty substance between folds of blotting paper, the oily matter or elaine is absorbed, while the. stearin remains. The paper being then soaked in water and pressed, yields up the elaine. It possesses much the appear¬ ance and properties of vegetable oil, and olein (q.v.) ; is liquid at the temperature of 60° F. and has an odor derived from the solid fats from which it has been extracted.

ELAM, the ancient name of a country or region in Asia, east of the Lower Tigris. The cuneiform inscriptions record that a king of Elam conquered Babylonia and Assyria about 2300 b.c. The later ancient writers call this country Susiana, the name being derived from its capital, Susa or Shushan, one of the most ancient cities of the East. It is now known as Khoozistan. Both the country itself, which seems to have been of considerable importance at an early period, and its capital, Shushan, are mentioned in the Bible. Consult Sayce, in¬ scriptions of Mai Amir*; Loftus, (Travels and Researches in Chaldaea and Susiana) ; Biller- bach,

13).

ELAND, e'land, the largest antelope (Oreas canna) found in Africa. It is as big as a fully grown horse, weighs 1,000 pounds or more and stands fully six feet high. The early settlers in South Africa called it ˆelk.** The eland has a short, smooth coat of rich fawn color; strong,

straight horns about 20 inches long, and a broad fringed dewlap falling about to the knees. The hide makes excellent harness leather and the flesh is decisively palatable. The elands move so slowly and are such gentle creatures as to be easily caught, and hence have been nearly exterminated in their native haunts. At pres¬ ent very few are found. In the equatorial region of western Africa is found the still larger species (Oreas derbianus).

ELAPHURE, name for David's deer (Cer – vus davidianus), whose habitat is Northern China and Manchuria. It is commonly kept in parks by wealthy Chinese and even in Europe. Little is known of its habits in the wild state. It has long shaggy hair and has no brow tine to its antlers.

ELAPINZE, e-lap'i-ne, a subfamily of Colubridce, including venomous snakes having a short, rounded head covered with plates. They are more nearly related to the harmless colubrines than to the vipers, but have a poison- apparatus of the proteroglyph type. The group is a large one and is found in most parts of the world, but is most numerous in the tropics. Nearly all the snakes of Australia are elapine, the whole race of cobras (q.v.), and others. The genus Elaps is entirely _ American and is represented by a single species in the United States, the coral or harlequin snake of Florida. See Coral Snake.

ELASMOBRANCHII, e-las-mo-brang'ki-T, a sub-class of fishes, containing the sharks and rays. The skull is cartilaginous with only su¬ perficial calcifications and no true dermal hones ; the gills fixed and shaped like pouches ; the upper jaw is the pterygo-palatine bar, and the lower jaw Meckel's cartilage, attached to the skull by a large hyo-mandibular element ; the exo-skeleton consists of tooth-like granular tubercles or spines ; and the trunk endoskeleton is cartilaginous. The ventral fins are far back and bear claspers in the males ; the heart has but one auricle and one ventricle; and the in¬ testine. is provided with a spiral valve. The group is nearly coextensive with Cuvier's Chon-

dropterygia or cartilaginous fishes and the Placoidei of Agassiz, and has received various other names such as Selachii and Plagiostomi, Cope distinguishes as orders the Selachii, which includes all living as v/ell as many ex¬ tinct forms; and the I chthyotomi, which are exclusively carboniferous and have simple claspers and extensive cranial calcifications. See Dog-fish ; Ray ; Sawfish ; Sharks ; Skate, etc.

ELASMOSAURIANS, e-las-mo-sa'rianz, gigantic marine fossil reptiles of the order Sauropterygia, found in cretacean beds. As a living animal

it was contemporaneous with Plesiosaurus, of the same order, which abounded in the eastern hemisphere, and as a fossil has been found in Europe and New Zealand. Elasmosaurus had a lizard-like, elongated body, sometimes 45 feet long, flat¬ tened limbs which served as oars, and a long, paddle-shaped tail which assisted its motion through the water. The head was proportion¬ ately small and with the neck performed twist¬ ing motions much like the corresponding parts of the swan. The contents discovered in the body indicate that this sea-saurian lived on other rapacious fish, which it was able to seize with its crocodile-teeth. The fossil has been raised from cretaceous beds in New Jersey and in Kansas.

ELASMOTHERIUM, e-las-mo-the'ri-um, an extinct rhinoceros which inhabited Siberia, Russia and Germany during the Pleistocene Epoch. It exceeded the Indian rhinoceros in size and bore an enormous horn on the frontal bone of the skull, but no nose-horn. The teeth are very long-crowned, with the enamel ridges strongly crenulated, indicating grazing habits. Some of the native Siberian legends are sup¬ posed to refer to this animal ; it was a con¬ temporary of early man in that region. See Rhinoceros.

ELASTIC LIMIT. See Strength of Ma¬ terials.

ELASTIC TISSUE, fibrous tissue in most cases mixed with the fibres of areolar tissue. It occurs in the ligaments of the vertebrae, that of the jaw, etc., also in connection with ar¬ teries, veins and lymphatics. It is found in the animal structure whenever an extensible and highly elastic material is required.

ELASTICITY. Every solid, no matter how rigid we may think it to be, will have its dimensions changed upon the application of force. If the resulting distortion does not ex¬ ceed a certain amount it will disappear when the force is removed. Bodies which recover from the distorting effect of force and resume their original configurations are said to be elastic. The relation between force and the deformation it produces is studied under the title elasticity; the harmful effects of distor¬ tion and the proportioning of materials safely to resist given forces belong to the strength of materials (q.v.). The behavior of gases comes under thermodynamics, of liquids under hydro¬ dynamics. In the mechanics of rigid bodies forces are represented bv arrows placed at points ; actually, they are distributed over sur¬ faces. We are concerned here with the area of action as well as with the magnitude of the

lorce, and shall therefore use the word stress to denote force per unit area. Stress, con¬ trary to this usage, is generally regarded as synonymous with force, and what we here call stress is commonly called ((intensity of stress® or <(unit stress.® Stress as defined in this arti¬ cle is not force ; its dimensions are FL~2 or ML~ lT~ 2 and the unit is the pound or ton per square inch and the dyne and kilogram per square centimeter. A force oblique to a sur¬ face can be resolved into normal and tangential components. The resulting normal stress is ac¬ companied by change of length. The change of length per unit length is called linear strain ; there are likewise areal and volumetric strains. Strain is a pure number without dimensions. Tangential stress or shear stress produces an¬ gular distortion due to the sliding of one layer of material with respect to the adjacent layers. For instance, if the two covers of a book are shifted parallel to each other there will be relative sliding of the leaves. Any straight line drawn on the top or bottom end of the book will change its inclination ; the change of a right angle is called shear strain. It is the prov¬ ince of the theory of elasticity to investigate mathematically the consequences which result from an experimentally found relation between stress and strain. The first experiments — on the rupture of beams — were made by Galileo, (Discorsi e Dimostrazioni matematiche> (1638). His results were of no value because he supposed the fibres of a beam to be inexten- sible, yet his work was the impulse to subse¬ quent inquiries. It was not until 1678 that any relation between stress and strain was pub¬ lished. In that year Hooke in his (De potentia restitutiva,' announced the law known by his name in the form of an anagram ceiiinossttuu containing the letters of Ut tensio sic vis, i.e., the force varies directly as the extension. He claimed to have discovered it in 1660. Until the end of the 18th century only special problems on beams, columns, and plates were attacked; this period was almost barren of experimental work. The foundation of the mathematical theory was laid by Navier, (Memoire sur les lois . . . des corps solides elastiques,'

Memoires de VInstitut, Vol. VII, which was read to the Academie des Sciences in 1821. Progress was rapid after this in the hands of such masters as Cauchy, Clapyron, Green, Lame and Poisson, and culminated in the life¬ long labors of Barre de Saint-Venant (1 797—1886). For the detailed history of the subject through the time of Saint-Venant consult Tod- hunter and Pearson, (History of the Theory of Elasticity and of the Strength of Materials' (Cambridge 1886) ; subsequent investigations are noted in the introduction to Love, (The Mathe¬ matical Theory of Elasticity' (2d ed., Cam¬ bridge 1906).

Strain. Before taking up the relations be¬ tween stress and strain, we shall study the small displacements suffered by an infinitesimal ele¬ ment dx dy dz within a medium in any state of stress. Fig. 1 shows the projections of two concurrent edges on the xy plane before and after displacement; the yz and zx diagrams are omitted for brevity. Let (x, y, z), the cor¬ ner nearest the origin, be displaced u, v, w, where u, v, w are small compared with x, y, z. Then, to terms of the first order, the ends of

VOL. to — 4

dx and dy receive the axial displacements shown. For if a variable increases infinites¬ imally, the function will increase differen¬ tially ; thus if the left end of dx, distant x from the origin, moves u parallel to x, a point

infinitesimally further from the origin will

du

move infinitesimally more, i.e., u + — dx, the

derivative being partial to indicate that the in¬ crement was due only to a change of x. The ˆ•-projection of the elongated length of dx is

dx + d£dx'

which,

since x is infinitesimal,' is

itself the new length of dx. Hence the stretch du

of dx is — dx and if the linear strain at x, y, z

is denoted by eXx du dv

exx— 7T dx

eyy—fy

ezz-

dw

dz

(1)

the other two components being derived by cyclic permutations of the letters. By defi¬ nition the shear strains are the decrements of the right angles formed by the concurrent edges at (x, y, z). If they are denoted by eXy, eyz, ezx in the co-ordinate planes it is evi¬ dent from Fig. 1 that exy — ax -f ny. Since ax is infinitesimal by hypothesis, it equals its

tangent likewise ay = ˆ .

_ dv du

exy-Tx + Sy _dw , dv es'-ty + dz du .dw dz dx

• (2)

The six quantities exx , . , exy . are

the components or constituents of strain at the point (x , y, z) . The shear strain suffered by an element rotates it as a whole, the amount being measured by the rotation of its diagonal.

du

Consider the effect of a partial strain — all other displacements being zero. There will be

no loss in generality if we take a square in¬ stead of a rectangle in Fig. 2. because the strain components are independent of the mag-

dx — dy

Fig. 2.

nitudes of dx, dy, dz. From Fig. 2 dy = ydx + ˆ~dyj tan (45 — dd) du

Now — dy is small compared with dx because ay

u is by assumption small compared with x ; then as dy — dx, the equation reduces to

de-

2 ay

dv

In the same way \ ˆ is the countercloekwise

rotation of the diagonal due to shearing of the right side of the element. The resultant posi¬ tive (X toward Y) rotation about the Z-axis is

likewise

_ i

(dy

du\

(j)z~

“2

dy)1

/ dw

drA

(jix—

= 2 1

\d~y~

dz) ’

/ du

0W\

0)y-

~ 2 1

\Hz~

dx)

being

obtained

by

(3)

tion. These are the component rotations ; when they vanish the strain is irrotational or pure. There are always at least three orthogo¬ nal lines whose directions remain unaltered by strain ; they are called the principal axes and the planes normal to them the principal planes. If u, v, w are eliminated from equa¬ tions (1) and (2) there will be three equations of the form

d2eXx , d2eyy _ d2e

xy

dy 2 dxdy dxdy

(4)

and three of the form

2 (‘ > 2exx = — (dexy — 4- dezx\ (ay

dydz dx \ dz dx dy) ’ .

the others being written by permuting x, y, z. These are the equations of compatibility and must be satisfied by every solution of a prob¬ lem in elasticity. Many of the formulas de¬ rived in the strength of materials are not com¬ patible with theory although they may be rea¬ sonably in accord with experiment.

Stress. — A stress will be denoted by a capi¬ tal letter to indicate its direction, with a sub¬ script to show the normal to plane on which it acts. Thus Xx is parallel to X on a plane (FZ) normal to X and is a normal stress; Yz is a shear parallel to Y on the XY plane. Fig. 3 shows an element under coplanar stress,

dy.

y > zfdy yxˆdx

\ d Xy j

Jy~dy

Xx +

dXx

dT

dx

all stresses parallel to Z being zero. It will be seen from the theorem about to be derived that there can be no shear on planes parallel to the paper if there is none normal to the paper. Taking moments of the forces about the upper right-hand corner (edge) we find, after rejecting terms which vanish in the limit,

X„= Yx;

it is to be observed that the weight and the moment of inertia of the element are vanish¬ ingly small. The diagram shows that the shears on two orthogonal faces both point away from, or both toward the edge, hence the

Theorem : Shear stress on any plane is accompanied by equal shear stress on a per pendicular plane, both acting away from or to¬ ward the edge of intersection and both being normal to it.

This is due to Cauchy. For the other shears

Y Z — — : Zy , Z%=Xz

The translations of the element in Fig. 1 are u, v, w, whence the axial accelerations are d2u d2v dhv . .

~dt2 ' dt? ' Hi?' the denvatlves are partial be¬ cause they must denote only time-changes and not space-changes. From the general free body of which Fig. 3 is a special case we get by resolving the forces axially

dXx , dXv

■ – +

dx d Yx dx

dy

+ dS1+9X=d

dy

d2u

df2

4- a v a ˆ

az +aK=aaF

dz d Yz

(5)

dZx dZy dZz

+ a? + Tz + °z

d'hv

dx ‘ dy ‘ dz ‘ ~~ ” dt2

where d is the density and X, Y, Z are the components of the applied forces (e.g. weight) per unit mass.

At the surface the internal stresses Xx, . . • , Xy — must be in equilibrium with the external or applied stresses.

Relations between stress and strain. A ma¬ terial is . elastically isotropic when it resists stress with equal intensity in all directions. Crystals, fibrous materials, and metals which

have been heavily rolled or otherwise worked are unequally strong in different directions ; they are colotropic. It has been found by ex¬ periment that for many bodies

stress = C X strain ;

C is called the modulus of elasticity. It is con¬ stant for a given isotropic material but de¬ pends upon the kind of stress; an eolotropic body has several moduli for each type of stress. The law takes the following special forms.

(1) For normal stress p and linear strain e in the direction of p

p — Ee;

E is called Young's modulus after Thomas Young who introduced it in 1807. For granu¬ lar materials like cast iron and stone a more accurate form is p—Een where n lies between 1 and 1.1 ; we shall assume that n=l. (See Strength of Materials).

The longitudinal strain e is always accom¬ panied by a strain e' of the transverse dimen¬ sions ; for a given material

ef=oe

where a is constant for isotropy. Thus if a rod receives a longitudinal strain e the strain of any straight line in a cross-section is ce: c e is not an areal strain. In engineering 1/ m is used for c. c is called Poisson's ratio after Poisson, who in 1828 calculated it to be lY for all materials ; experiment has not verified his prediction.

(2) For shear stress q and strain

Q=P;

p is the modulus of shear or of rigidity. Young was the first to point out that resistance to Metrusion,® as he called shear, was different from resistance to stretching. But he did not introduce the shear modulus ; this was done by Navier in 1833. The symbol p was first used by Lame in 1852; in books on the strength of materials N and G are used for p.

(3) A constant normal stress p over the entire surface of a body produces a volumetric strain A, called the dilatation, where

P = k A,

k being the bulk modulus or modulus of com¬ pression.

For isotropic bodies there are thus four constants of elasticity: E, p, a, k. It will be shown later that only two of them are inde¬ pendent. Stokes in 1845 (Mathematical and Physical Papers, > Vol. I, p. 75) pointed out- that p and k are of basic importance in theo¬ retical work; in engineering E and p are more convenient.

For eolotropic substances we may still as¬ sume the stress to be a linear function of the strain, in which case the generalized forms of

Hooke's law are

Xx = CneXx + Cn eyy + C i3 ezz -f Cu eXy + C v, eyz + Cˆ ezx
Yy = CneXx + Cn eyy + Cn ezz + Ci\ exy + C 25 eyZ + C 20 ezx
and so on for Zz, Xy, Yz, Zx, the j6 coeffi¬ cients, Cn to Ccc, being the elastic constants. Green in 1837 proved that for conservative systems Cmn = Cnm whereby the constants re¬ duce to 21 for eolotropy. For isotropy they reduce to 2. To express the stresses in terms of strains for isotropy consider the effect of a single tension Xx. By Hooke's law it pro¬ duces a strain Xx/E in its own direction, and

according to Poisson's ratio, a lateral com¬ pressive strain cXx/E. Hence if a parallele¬ piped is acted on by tensions Xx, Yy, and Zz, the resultant axial strains will be given by

Eexx = Xx — c(Yy f Zz)

Eeyy = Yy — a{Zx + Xx) ... (6)

Eezz — Zz — a(Xx j Yy) ; exx, eyy , ezz are called the equivalent simple

strains, and when multiplied by E, the equiva¬ lent simple stresses. By addition E(exx + eyy + ezz) = (Xx + Yy f Zz) (1 — 2a) ;

the first parenthesis is the volumetric strain because the change of volume is

(1 + exx) dx (1 + eyy) dy (1 + ezz) dz — dx dy dz

= (exx T eyy T ezz) dx dy dz

if the strains are so small that terms above the first order are negligible. The volumetric strain or dilatation A is then

A = exx f eyy + ezz

Now it is obvious from Fig. 2 that the infinites¬ imal shear ˆ does not change the area of dy

the face dx dy ; if one does not, none will, so that shear does not change areas. In the same way it follows that infinitesimal shear will not alter volumes ; this is why the dilatation contains only linear strains.

If the stresses in the equation following (6) are all equal to Xx

3(1 — 2cr) Xx = EA whence, as p = k A

k 3(1 — 2 a)

If p2, k is negative whence volumes would be increased by compression and decreased by tension ; as this does not occur a cannot ex¬ ceed Yz. Furthermore a negative a would mean lateral expansion under tension ; this is not true of isotropic materials. Therefore a is a positive fraction not larger than JZ ; ex¬ periment verifies this.

If the first equation of (6) is written Xx = Eexx + a(Xx f Yy -f-Zz) — aXx

and the parenthesis eliminated by means of the equation below (6), there results Xx = XA j 2 pexx\

similarly Yy = 7A + 2peyy . (7)

Zz=7A j 2 pe$z

where

oE E

""(1 r)(l— 2c) ' ^ 2(1 a)'

It will be proved later that p is the modulus of shear as defined above; hence

Xy — pexy , Yz=peyz , Zx=pezx , . (8)

Navier, Poisson, and Cauchy, the founders of the theory of elasticity, derived their equations from a hypothesis of intermolecular actions the consequences of which demanded that X =p\ then c = l/A contrary to experiment. They belonged to what Pearson has called the rari-constant , as opposed to the multi-constant, school of elasticians. The weight of evidence is in favor of the necessity of two constants for specifying the elastic properties of isotro¬ pic materials. To interpret p in the equations just found, consider a cubical element under

tension p on one pair of faces and compres¬ sion p on a perpendicular pair, as on the full¬ line square in Fig. 4. By taking as a free-body the

shaded corner cut off by a 45-degree plane and resolving the forces (stressXarea) par¬ allel and normal to the oblique surface, we find

that a stress q=p on the oblique face is neces¬ sary and sufficient for equilibrium. That is, orthogonal, equal, unlike normal stresses pro¬ duce pure shear of equal magnitude on any plane at 45 degrees. Take now the dash-line square as a free-body: it is in pure shear of magnitude q=p. Since the change of a right-

angle is the shear strain 0, the change of $(=45°) is 0/2. As the sides of the inner square are not altered in length, D is constant in

D=l cos whence

= dOctnO

But

0=45° and

By eq (6)

and as

d0=\

P + a±

E^ E

dl

l

0

2

dl

l

0=

E

fl =

2(1 + G)

For the purposes of integration it is con¬ venient to eliminate the internal stresses from equations (5). Substituting equations (7) and (8) in (5), replacing the strains by their values in (1) and (2) and using the symbolic abbrevia¬ tion – — the Lapacian operator —

we find

ffl_ d2ˆ Ox2 dy 2

02

+ s’

n , x 94 d2u

V + ˆ oi + w “ + px = ” Up

f)A (fly

a+fj.) — + w*v +py = p —

(* + fl) 7ˆ + + pz = p

.(9)

The internal motions specified by these equa¬

tions are vibratory since they arise from small elastic displacements within the medium. The fact that they can be verified experimentally furnishes complete evidence of the correctness of Hooke’s law, of our assumption that the displacements are small, and of the validity of the analysis.

Applications. — We shall now solve a few typical problems in order to show the use of the’ foregoing equations. Most problems un¬ fortunately give rise to extremely difficult partial differential equations ; the general methods of integration are fully discussed in the works by Love and Riemann-Weber cited at the end of this article.

(1) A cylinder of density p and length l is suspended from one end and hangs verti¬ cally.

Take the F-axis vertical with the origin / below the upper end. Since Yy, the tensile stress at any point, is due to the weight of the material below that point, Yy = gpy, the five remaining stresses are zero.

There are no surface forces except at the upper end where the entire weight of the cylinder is uniformly distributed over the supporting surface ; there the internal and external stresses balance. Hence

Eeyy — gpy, exx — ezz — °eyy, e%y — eyz — ezx — 0

Now

gpy

E

ppy2

v= JrVo .... (a)

where v0 is a function of jt and z because the derivative is partial. Since there is no shear, v must satisfy

exy :

whence

dv du dx dy du _ dy

= 0.

dvo

dx

dw , dv eyz — -7— + — dy dz

= 0

dw

dy

dvo

dz

(b)

By differentiation,

d2u

d2Vo dhv

dh

dxdy

dx2 ‘ dydz

dz2

•

But

du

dw Ogpy

dx

dz E

so that

d2Vo

dx2

IN

II

^ |*N

?bl^

II

• • • •

. (c)

The value

Vo =

°gP 2 E

(* = +

z2) + ax + cz + k .

• • •

C d)

will satisfy equation (c) ; substitution in (a) gives

v = ~~ (y2 + ox1 + 0-32) ax + cz f k

upper end a 2

The solution must be correct when the rod is rigid; in this case E = 00 and z > = 0 so that a = 0, c—0.

Hence

+ »** + «■*•) .... (e)

The formula obtained in books on the strength

ELASTICITY

53

of materials is (y 2 — l2)

2 E

which is therefore correct only along the axis ; it is, however, approximately true at any point when the cylinder is very long compared with the radius.

Integrating (b), substituting (d), and sup¬ posing as above that E = oo,weget

ogpxy u- –

w—-

cgpzy

E

if the upper end is free to contract.

(2) A straight uniform rod is twisted by couples applied at the ends.

Saint-Venant was the first to solve the gen¬ eral problem in his great memoir on torsion, 1855, although Coulomb had previously, 1784, succeeded in finding the twisting moment offered by a circular cylinder. The following is a brief sketch of Saint-Venant's method.

Let the cylinder, of any cross-section, have its axis along Z. Since there is no shear on the mantle, Xy = 0 and ery= 0

dv _ _ dii

‘ ‘ dx~ dy • • • W

As there are no external normal forces the normal strains vanish and

du dv dw

dx dy dz

Equations (5) with Xx= Yy=

dXz_dZy

0

dz

= ^=°

... (b)

Zz=Xy= 0 become ... (c)

where Xz=» g + g , Z„^ (g +|) • • . W

By equation (b) w does not contain z and by (c) and (d) u and v are linear functions of z. All the above equations will be satisfied only by

u= —• ryz , v = txz , w = T(j> ... (e)

where 0 is a function of x, y. The values of u and v show that since u2 --v2 — t2 (x2 y2)z2 and u/v= — y/x, the displacement in the plane of the cross-section is (1) normal to the radius vector; (2) proportional to the radius vector; (3) proportional to the distance of the cross-section from the origin. Therefore radial straight lines remain straight and of constant length and the boundary of any section is not

distorted in transverse planes. If 0 is not zero these lines will be warped in the direction of the cylinder axis ; 0 is therefore the warp¬ ing function, r is the angle of twist.

Equations (e) substituted in (d) give

Xi = flT ® ~y) ‘ Yz = (I + *) ■■■ U)

As there is no shear on the mantle the resultant of X?and Yz must be normal to the boundary of

. . Yz dy

any section, i.e. — = —

si. z OX

> ‘ . from (/) /d

dy

T x) dx

dy ... (g)

This is the differential equation of the boundary curve of any section.

The twisting moment equals the sum of the moments of the shear forces on any section, i.e.,

M = f(x Yz — yXz) dxdy

^ ^x2 + y2 + x— ’ — y^j dx dy ...(h)

The angle of twist, found by differentiating (/)

d2

and eliminating

dxdy

1 is

-m-f)

The differential equation of a circle is xdx = — ydy; equation (g)

reduces to this when ˆ is constant. As there is no lengthening of the cylinder there is no translation of a cross-sec¬ tion and 0 = 0. Now if 0 —ax- f- by (g) is the equation of a circle, but as the centre of the circle is at the axis of the cylinder it will be found that a and b must vanish. Hence for a circular section 0= 0 and cross-sections remain plane. In this case equation (h) gives the well-known engineers' formula.

Equation (g) will represent the ellipse

a'

b2

provided

b2—a 2

0 = Co ; xy

b 2 + a2

Since w = r0, the contour lines found by giv¬ ing 0 a series of constant values are equilateral hyperbolas ; in the first and third quadrants of the ellipse the displacements will be negative and in the other quadrants positive. Equation (h) gives

a3b3

M — flTTT -------

a2 + b2

(3) Vibrations in an infinite elastic medium.

If there are no external forces, X=Y=Z=0. Let all quantities in the XY plane be constant so that the same state exists throughout that plane ; then the x and y derivatives in equa¬ tions (9) are zero, whence

dw 0A d2w

A =

dz

dz dz2

Likewise

, d2u , dh dhv

7%=-ˆ , v% = 3j2 , •

The equations of motion thus reduce to

d2u d2u

p — =/i —

1 dt2 dz2

d2v

d2v

• . • • (fl)

9 dt2 M dz2 d2w . . d hv

9 ~dt2 ˆ ’dz2

.... (b)

Equations (a) are satisfied, as substitution will

verify, by any function of 2 + V – 1. This

function must be periodic for otherwise the displacement would become infinite in course of time or would remain as a permanent set. Experiment contradicts both of these supposi¬ tions, hence the motion is vibratory. Equation (b) is satisfied by a similar function. If at a point z + dz at a time t + dt the displace¬ ment is in the same phase and of the same magnitude as it was at z at a time t

z + dz + c (t T dt) — z f ct

where c 2 =— for (a) and c2 = ■ — for (6) ;

p p

which is the velocity of propagation of the dis¬ turbance : not the

velocity of a material point but of a state of motion. Equation (b) defines the longitudinal, and (a) the transverse waves in an infinite elastic medium.

Bibliography. — Love,

1901).

R. F. Dei mel.

Assistant Professor of Mechanics , Stevens In¬ stitute of Technology.

ELASTIN, an insoluble proteid substance, of which the elastic fibres of connective tissue are composed. It may be conveniently prepared from the ligamentum nuchce, by boiling with ether and alcohol (to remove the fats) and afterward by prolonged boiling, successively, with water, strong acetic acid and concentrated caustic soda and subsequent successive treat¬ ment with weak acetic acid, water, hydrochloric acid and water. When so prepared, elastin is not soluble (without decomposition) in any known solvent. It dissolves with decomposition in concentrated sulphuric acid, however, yield¬ ing leucin, but not tyrosin. Elastin is digested both by pepsin and by trypsin and it contains no sulphur. Its percentage composition, accord¬ ing to Muller, is C — 55.45; H = 7.41; N —

16.19; 0 = 20.89.

ELATEA. See Cithˆeron.

ELATER, el'a-ter, a genus of beetles in the pentamerous sub-order, type of the family Elateridce. They are familiarly known as <(click-beetles® or ˆskip-jacks,® from their habit of jerking themselves with a slight noise into the air when they land or are placed on their backs. The body is arched upward and suddenly straightened with a violent muscular exertion, which lifts the animal from the ground. The legs are too short for the ordinary method of righting the body. The larvae are only too familiar as (

ELATERIDiE, el-a-ter'i-de, a family of Coleoptera (click-beetles), tribe Pentamera, sub-tribe Sternoxia. It contains the insects placed by Linnaeus in his great genus Elater, now broken up into many genera. See Fire¬ flies; Elater.

ELATERIN, a neutral chemical substance having the formula CooH-sCb and obtained by alcoholic extraction of the greenish precipitate thrown down by the juice of the slightly un¬ ripe squirting cucumber,

Ecballium elaterium. It crystallizes in hexagonal tablets which melt at 400° F. and are insoluble in water, but soluble in chloroform and in hot alcohol. Elaterin has a bitter taste and is a powerful purgative, the dose being from the 40lh to the

10th of a grain. A crimson color, changing to a scarlet, is produced when sulphuric acid is added to a solution of elaterin in carbolic acid ; this reaction serving as a test for its presence.

ELATERITE, an elastic, asphalt-like min¬ eral, known as ((elastic bitumen.® In color it is dark brown, with a specific gravity ranging from 0.9 to 1.2. It occurs abundantly in Derby¬ shire, England, and a mineral closely allied to it. 'has been found at Woodbury, Conn.

ELATERIUM, el-a-te'ri-um, a mixture of principles formed as a precipitate, occurring spontaneously in the juice of the fruit of the wild or squirting cucumber, Ecballium elate¬ rium, the active principle of which is elaterin. The squirting cucumber is a small perennial, of the cucumber family, indigenous in Persia, India and the warmer Oriental countries, and has been extensively cultivated even as far north as England. The fruit itself is \l/2 to 3 inches long by 1-3 to 3-4 of an inch, oblong or oval in shape, covered with soft bristles and yellowish green in color. It is firm exter¬ nally. As the fruit ripens fermentation takes place in the interior with the formation of gas. This accumulates in sufficient quantities to exert considerable pressure, bursting the fruit at its base and squirting the seeds some dis¬ tance. In this manner the fruit is distributed. Elaterium has been used for centuries as a cathartic, the phenomena of the squirting seeds having suggested its function. Elaterin itself is a neutral principle of the formula C2oH2s05. It. forms in minute white prismatic crystals, without odor and with a slightly gritty and bitter taste. Elaterin is one of the most active of all the hydragogue cathartics. It operates with violence even in minute doses. It is par¬ ticularly of service in conditions in which there is general dropsy and no inflammatory condi¬ tion of the intestinal tract. Elaterin is given in doses of from 1-40 to 1-10 of a grain.

ELBA, Italy (Lat. llva, Gr. Aithaleia), small island in the Mediterranean Sea, off the coast of Tuscany, and with several much smaller isles, lying at the mouth of the Gulf of Piom- bino. The island of Elba is 18 miles from east to west, with a width varying from 2Y/2 to 12 miles in its widest part. The mountainous dis¬ tricts of the island yield large quantities of superior iron, copper, tin, lead, marble, lode- stones and alum, besides wines and fruits. Tunny and sardine fishing and the extraction of sea salt are other important industries. On the first

abdication of Napoleon in 1814, Elba was assigned to him as a residence and empire. Here he accordingly took up his residence, in the month of May; and on 26 Feb. 1815, he secretly left the island, and, landing in France, began that brief and final career, known in his¬ tory as the <(Hundred Days.® During his sojourn here Napoleon lived at the Villa San Martino in the town of Porto Ferrajo. It still stands. He caused a road to be constructed between Porto Longone and Porto Ferrajo. Elba has had a chequered history; it belonged successively to Pisa, Genoa, Sora and Piom- bino. After 1815 it was given back to Tuscany, and in 1860, with the latter it became part of the Kingdom of Italy. Consult Fatichi, (Isola d'Elba5 (Florence 1885). Elba was a place of celebrity in the time of the Romans, and famed

then, as now, for its yield of iron. It has a mild and healthful climate and the soil is fertile. Mining, however, occupies the attention of the inhabitants to the exclusion of agriculture. Two good ports are Porto Ferrajo and Porto Lon- gone, both well fortified. Pop. 25,480.

ELBASSAN, el-bas'san, Albania, town on the Scumbi, 35 miles east of its mouth. It stands in the centre of a fertile plain and nearby are a number of hot sulphur springs. There are small manufactories of iron and copper. Pop. about 15,000.

ELBE, el'be (ancient Albis; Bohemian, Labe), a river of Germany, one of the largest in Europe. It rises on the southwest slopes of the Schneekoppe or Snowcap, one of the Riesengebirge, between Bohemia and Silesia. From this point it flows nearly due south into Bohemia for about 50 miles, when it turns to the west, and after about 40 miles takes a general north-northwest direction till it empties into the North Sea, intersecting Saxony, a considerable portion of Prussia, and in the latter part of its course separating Holstein on its right from Hanover on the left. The length, including windings, is upward of 780 miles. The principal affluents are on the right, the Iser, Schwarz-Elster and Havel ; on the left, the Alder, Moldau, Eger, Mulda and Saale. In the lower part of its course the river is divided by five large and seven small islands into several arms, which unite again about five miles below Hamburg. The mean depth is 10 feet, average breadth 900 feet. It is more or less navigable for about 470 miles, but its estuary at Cuxhaven is much encum¬ bered with sandbanks. It is well stocked with fish. On 1 July 1870, the navigation of the Elbe was declared free from Hamburg to Melnik in Bohemia. There is an important system of

canal navigation in connection with the Elbe, Hamburg, for instance, being in this way connected with Berlin.

ELBERFELD, el'ber-feld, Germany, town in the Prussian Rhine province, 15 miles east of Dusseldorf, in the beautiful valley, and on both sides of the Wupper, enclosed by lofty hills. It has no historical or antiquarian im¬ portance. Its prosperity has been acquired mostly within the last century and is due to the cotton manufacture, of which it is the central locality in Rhenish Prussia. The old town was irregularly built with a maze of narrow streets, but the new portion has fine modern streets with buildings of the latest style bordering them; the principal of these are the courthouse and the Rathaus. The city has some fine public monuments. It is an important industrial cen¬ tre, especially dealing in textiles, their manu¬ facture and dyeing. In addition to cotton, silks, woolens, etc., it manufactures chemicals, leather, furniture and carpets, firearms, rubber goods, paper, machinery and glass. It is also a great commercial centre and has many foreign con¬ sulates. It contains a gymnasium, polytechnic school, school of industrial drawing, an institute of music and a school for mechanics. Seven railroads serve the city and in addition there are electric roads to nearby centres. During the Middle Ages the town grew around Elber¬ feld Castle and became a city in 1610. Silk manufacturing and dye-works were introduced toward the close of the 18th century and there¬

after Elberfeld grew rapidly. It was early part of the Duchy of Berg and in 1815 was united to Prussia. It has a unique poor-relief system, which has been copied in many parts of the world. Pop. 170,195. Consult Schnell, (Geschichte der Stadt Elberfeld* (Elberfeld 1900) ; A. Shadwell, (Industrial Efficiency* (London 1906) ; Jorde, (Fiihrer durch Elberfeld und seine Umgebung* (Elberfeld 1902).

ELBERFELD SYSTEM, a system of

poor-relief which originated in the appoint¬ ment of six visitors in 1800, to investigate appli¬ cations for aid, in the manufacturing town of Elberfeld, Prussia. The city was subsequently divided into districts, the number of visitors was increased and the operations developed, until by 1852 what has become known univer¬ sally as the Elberfeld System was adopted. Its main features are the division of the city into 26 districts subdivided into 364 precincts, each precinct being administered by an almoner who investigates each application, in case of emer¬ gency provides immediate assistance and as long as aid is afforded, visits the applicant twice a month. Money relief is granted fortnightly ac¬ cording to a fixed schedule, any earnings in the

meantime being deducted; when needed, work¬ ing implements are provided. A meeting of the almoners under the presidency of an overseer takes place every fortnight to discuss cases and to vote necessary relief, a report of the meeting being laid the next day before the directors who are chosen from four councilmen and four citizens with the mayor as chairman ex officio. The directors superintend and advise on the whole city's work. The positions of almoners, overseers and directors are of a purely honor¬ ary character. The advantages of the system in the improvement of the condition of the poor have been strongly apparent, the ratio of persons assisted in 1889 being 7 per 1,000 as against 17 per 1,000 in 1855. See also Charities.

ELBERON, N. J„ sea-coast summer resort in Monmouth County, on the Pennsylvania and the Central Railroad of New Jersey. Pop. about 250. Here President James A. Garfield (q.v.) was taken after he was shot by Guiteau, 6 Sept. 1881, and died here 19 Sept.

ELBERTON, Ga., city and county-seat of Elberton County ; on the Southern and the Sea¬ board Air Line railroads ; 90 miles northeast of Atlanta. It is in a cotton-growing section, and the chief industries are connected with the cultivating, shipping and manufacturing of cot¬ ton. It contains manufactories for cottonseed- oil, cotton goods, compressing cotton, fertilizers, harness, carriage and wagon shops, ironworks, etc. The quarries nearby give employment to a number. The city contains a public library and owns the waterworks and electric-lighting plant. Pop. 6,483.

ELBEUF, elffief, France, town in the de¬ partment of Seine-Inferieure, 11 miles south- southwest of Rouen, situated in a beautiful valley on the left bank of the Seine. It con¬ tains two great churches, Saint Stephen's and Saint John the Baptist's, both of which have fine ornamental glass. In the town and also in the nearby communes there are several cloth manufactories, mostly flannels, double-twilled cloth and waterproofed cloth and light woolens. There are schools for instruction in all the

branches of the local industry. Until the revo¬ cation of the Edict of Nantes there were up¬ ward of 60 cloth manufactories here, but the dislocation caused at that time was not remedied until 1790, and the industry did not recover fully until about 1840. Pop. 18,290.

ELBING, seaport town, in the province of West Prussia, on the Elbing, near its entrance into the Frisches-Haff, 32 miles east-southeast of Dantzig. It is divided into the old and new towns, the former of which was once sur¬ rounded by turreted walls and gates, but these for the most part have been removed. It has shipbuilding yards, which do a considerable trade in building and repairing vessels. Its manufactures include machinery, chicory, lum¬ ber, flax and hemp yarn, woolen and cotton cloth, leather, soap, tobacco and beer as well as trade in agricultural products. There are also oil manufactories, iron foundries, dye and print works and the famous Schichau shipbuilding works for the construction of war vessels. Elb¬ ing has excellent railway facilities and is in steamboat communication with Dantzig and Konigsberg. By means of a canal it has connec¬ tion with the Vistula, and the harbor was im¬ proved by the opening in 1884 of a mole 3,500 yards long. The town was founded in the early 13th century by colonists who were natives of Bremen and Lubeck. The town grew up around the fortress of the Teutonic Knights. It became a Hanse town but Poland took it in 1454. During the religious wars the place was in turmoil and also suffered much during the wars between Poland, Russia and Sweden. In 1772 it was annexed to Prussia. For many decades it declined but within the present gen¬ eration has once more become a thriving centre. Pop. 58,636.

ELBOW. See Arm.

ELBOW JOINT. See Arm.

ELBOW PIECES, a mediaeval armor, the plates used to cover the junction of the pieces which covered the upper and lower half of the arm. These plates were mostly disc-formed, cup-formed, or articulated. Consult Ashdown, ‘Arms and Armor’ (New York 1909).

ELBRUZ, el’brooz, or ELBURZ, (1) A mountain range of Persia, running for 450 miles along the southern border of the Caspian Sea. It has a number of subordinate parallel ridges, enclosing extensive and fertile valleys ; and unlike most Persian ranges, it has numerous prominent spurs, the highest peak being Mount Demavend (q.v.). The principal traversing river is the Kizil Uzen, which flows into the Caspian Sea. The average altitude is 5,000 feet. (2) Elbruz is also the name of the loft¬ iest summit of the Caucasus.

ELCESAITES, el-se’sa-Its, or ELKE- SAITES, a sect founded in the 2d century, dur¬ ing the reign of Trajan. They derived their belief from the teachings of the Book of Elkesai, supposed to have been inspired by an angel. Their system seems to have been a commingling of

Oriental philosophy with Sudaism and early Christianity, probably put into practice with the idea of satisfying the want of those persons seriously troubled by the religious chaos of the day caused by the mighty conflict of greater creeds. The followers of Elkesai or Elxai are often confounded with Ebionites (q.v.). The

best account we have of the Elcesaites. is given by Hippolytus in his chief work, (Philosophu- mena.)

ELCHE, el'cha, Spain, town of the province of Alicante, 13 miles southwest of the town of that name, on the railway joining Alicante and Murcia. The surrounding groves of palm trees supplies all Spain with palm leaves for Palm Sunday, and the dates are exported in large , quantities. There is also a trade in pomegran¬ ates. Brandy, oil, wˆoolens, shoes and sandals of esparto grass, mats of the same material, soap and leather are the principal manufactures. The town has a fine, lofty-domed church, a bishop's palace and a hospital. Elche is of Roman origin and was early a place of import¬ ance. In the middle of August every year Elche is the scene of a mediaeval religious drama — (La Festa 6 Misterio de Elche. } In some respects it resembles the (Passion Play,* at Oberammergau and deals with the Assump¬ tion of the Virgin Mary. For the festival con¬ sult Paris, Pierre, (Les Fetes de l'Assomption a Elche, l'Espagne* (in Lc Correspondant, Vol. CXCII, p. 156, 1898). Elche has a population of about 30,000.

ELCHINGEN, el'mng-en, Bavaria, village on the Danube, nine miles northeast of Ulm, which gave the title of Duke of Elchingen to Marshal Ney, who here defeated the Austrians 14 Oct. 1805. In the neighborhood are the ruins of a Benedictine Abbey of the same name, founded in 1128. There are two villages, Ober and Unter Elchingen, the former on the same hill with the abbey, the latter to the northeast of it. The hill on which the abbey stood was occupied by Mack, who had his headquarters in Ulm; while Ney, on the right bank of the river, repaired the bridge of Elchingen, forced the passage of the river, and took Elchingen by storm.

ELDER, John, Scottish engineer : b. Glas¬ gow 1824; d. 1869. Educated in Glasgow, he was first employed as director of the drawing office of Napier's establishment, becoming later a member of the great ship-building firm which was known after 1860 as Randolph, Elder & Company, employing more than 4,000 men. His fame rests upon his invention of the com¬

pound or combined high and low pressure en¬ gines, saving nearly 40

per cent of fuel.

ELDER, William Henry, American Roman Catholic prelate : b. Baltimore, Md., 22 March 1819; d. 31 Oct. 1904. When 12 years old

he entered Mount Saint Mary's College, Mary¬ land, and at 18 was graduated and sent to Rome, where he was ordained priest 29 March 1846. Returning to America, he accepted the profess¬ orship of theology at Mount Saint Mary's, be¬ came its president, and remained here until

consecrated bishop of Natchez, 3 May 1857. On one occasion, when the Federal authorities, who had taken possession of the city, bade

Bishop Elder offer certain public prayers and command his clergy to do likewise, he stoutly refused, declaring that in thus ordering him they were usurping the right of religious lib¬ erty, and rather than comply he accepted im¬ prisonment ; when the case was reported at Washington he was promptly released. In 1878 Natchez was visited by an epidemic of yellow fever and the bishop fell a victim to the plague, which carried him to the point of death.

ELDER

In 1880 he left Natchez to assume the duties of coadjutor to Archbishop Purcell, of Cincin¬ nati, Ohio, who at once retired, leaving Bishop Elder to settle the perplexing difficulties that disturbed the diocese. Upon the death of Arch¬ bishop Purcell, in 1883, Bishop Elder succeeded to the archbishopric of Cincinnati.

ELDER, Sambucus, a genus of shrubs or small trees and a few perennial herbs of the natural order Caprxfoliacece. There are about 20 widely distributed species characterized by opposite, pinnate leaves, small white flowers usually in compound cymes, and black, red, white or green, juicy fruits (berries or drupes). Many of the species are used in ornamental planting, since they are readily propagated by root and stem cuttings, succeed well upon nearly all soils, are of rapid growth, graceful form, and are attractive both in flower and fruit. The best-known species in America is S. canadensis , the common or sweet elder, which is frequently seen in fence-rows, along roadsides, and on the margins of woods throughout southern Canada and the greater part of the United States. It attains a height of 10 feet or more, bears abund¬ ant fragrant flowers in midsummer and black berries in early autumn. These fruits are used where they can be obtained plentifully for mak¬ ing pies and elderberry wine. Several

horti¬ cultural varieties have been introduced for their golden or variegated foliage, and one variety with large fruits was introduced in 1890. The flowers are used for making a wine, a perfume, and a <(water® used in confectionery. Eco¬ nomically this species ranks as a minor fruit. Like some other members of its genus, it has also been used in medicine, but is rapidly giving place to other drugs. Probably 5\ nigra, the common European elder, ranks next in im¬ portance. It is much larger, often attaining a height of more than 20 feet. The yellow, hard, tough wood is readily polished and is used for making skewers, fishing-rods, needles for mak¬ ing fish-nets, and as a substitute for boxwood. It is also employed for the same horticultural and economic purposes as the preceding species, and has numerous fancy-leaved varieties. Other well-known species are the scarlet elder (S. racemosa) , an Old-World species, and the red- berried elder (S. pubens), a native of North America, considered by some botanists to be identical. There are also several unrelated plants which are popularly known as elder, as box elder (Negundo aceroides) , wild elder (Aralia hispida), also known as bristly sarsapa¬ rilla, and marsh-elder (Iva frutescens).

ELDERS, in certain churches, a body of men elected by the communicants from among their number to aid the minister in portions of his work. With the minister, they consti¬ tute the executive body of the congregation. Among the Jews the elders were the rulers or magistrates of the people. The instinct of mankind considers the old fitter than the young to rule, and at first probably every ((elder® was really pretty well advanced in life; but the designation ultimately came to be used more of office than of age. ((The elders of the con¬ gregation, or simply <(the elders,® are men¬ tioned as early as Lev. iv, 15. Seventy of them were appointed as associates of Moses (Num. xi, 16). They are combined with the officers (Deut. xix, 12), with the princes (Ezra x, 8),

with the priests (Lam. i, 19). In the New Tes¬ tament they are described as having given cur¬ rency to traditions (Matt, xv, 2), and taken a chief part in compassing the death of Jesus (Matt, xxvi, 59; xxvii, 20), etc. There were elders, also, of single towns, as of Succoth (Judges viii, 14), and of Jezreel (2 Kings x, 1). The churches of the Reformation found this form of lay assistant well adapted to their sys¬ tems of church government. Where the Church and State have some interrelation, the election of such officers is regulated by civil law. In the Baptist churches, the pastors were called elders, but the name came to be applied exclu¬ sively to the missionaries later on. In the

Pres¬ byterian Church, the ruling elders have the function of assisting in the government of the Church, under the supervision of the Presby¬ tery. In the Dutch and German Reformed churches, the elders and deacons assist the clergyman and there is also a ruling elder. The Methodist Episcopal Church has a similar of¬ fice, but the ruling elder is an ordained clergy¬ man appointed by the bishop. The Shakers have four elders, two male and two female. The elders in the Mormon Church are the Melchizedek priesthood. The apostles, the sev¬ enty, the patriarchs and the high priest are in¬ cluded in their number, and it is their duty to preach, ordain other priests and deacons, to lead meetings, baptize and bless.

ELDON, John Scott, 1st Earl of, English jurist and Lord Chancellor: b. Newcastle, 4 June 1751; d. London, 13 Jan. 1838. He was educated at Oxford, at University College, re¬ ceiving his M.A. in 1773. In 1771 he won an English prize by his essay on (The Advantages and Disadvantages of Travelling into Foreign Countries.) He had intended taking clerical orders, but gave up the idea in order to marry Elizabeth Surtees, the daughter of a wealthy banker of Newcastle-upon-Tyne (1772). Scott was readmitted to the university and entered the Middle Temple in 1773, where he began the study of law and supported himself by tutor¬ ing. His success in the law was rapid. He be¬ came a member of the bar in 1776, a bencher in 1783, and in the same year was made one of the king's counsels. His sound knowledge of the law atoned for his ineffective oratory and he entered Parliament in 1783, where he soon made his mark as an independent and serious thinker. He supported the Pitt ministry and in 1788 was knighted. In the same year, he was made solicitor-general. On Thurlow's dis¬ missal from the new Parliament he offered his resignation to Pitt, but was induced to return, and in 1793 succeeded Sir Archibald MacDon¬ ald as Attorney-General. His association with the rigorous administration made him exceed¬ ingly unpopular. His measures in the state trials, his strict interpretations of the treason laws and the vigorous laws he assisted in pro¬ mulgating heightened the effect of his severity. In 1799 he was chosen to succeed Sir James Eyre as lord chief justice of the Common Pleas, and also became sergeant-at-law and a member of the privy council and board of trade. He was also raised to the peerage as Baron Eldon of Eldon, in the county of Durham, where he had bought an estate. He became Chief Justice in 1801, and Lord Chancellor of England. Throughout the king's illness he

administered affairs with great surety and force. After the death of Pitt, he was forced to with¬ draw, but was returned in 1807 in the Port¬ land administration, where he soon became the foremost member of the Cabinet. He bent all his able energies to the subjugation of Napoleon. He was the king's strongest ad¬ herent and served him with all his powers. In 1811, when the king's lunacy became chronic, Eldon immediately undertook to gain the confidence of the prince. In spite of attacks by his enemies, he succeeded and by assisting in the formation of the Liverpool cabinet, re¬ entrenched the Tory policies. He arranged for the marriage of the Princess Charlotte with Prince Leopold of Saxe-Coburg. His resist¬ ance to the queen's plans rendered him again unpopular with the mass of people, but gained him the loyalty of the Prince, who just before his coronation as George IV bestowed on him the titles of Viscount Encombe and Earl of Eldon. However, this marked the highest point of his career. After the death of the queen, Canning's party came into power and Eldon resigned from the Cabinet. He continued to take an interest in politics and his opinions were highly esteemed by his fellow Tories. He survived to take oaths of fealty to Queen Victoria.

Eldon was an able jurist and administrator, of fascinating personality and an agreeable com¬ panion. His faults lay in his adherence to the strict letters of the law, his sophistry and his insistence on hair-splitting definitions and dis¬ tinctions. His decisions were never hasty nor ill-founded. Consult Townsend, (Lives of Twelve Eminent Judges > (London 1846) ; Twiss, (Life of Lord-Chancellor Eldon) (ib. 1844) ; Surtees, (Sketch of the Lives of Lords Stowell and Eldon) (1846) ; Campbell, (Lives of the Chancellors) (1874).

ELDORA, Iowa, city, county-seat of Har¬ din County, near the Iowa River, on the Iowa Central, and the Chicago and Northwestern railroads; 122 miles west of Dubuque. The city is the seat of the State Industrial School for Boys, has a Carnegie library and a public park. Agriculture and stock-raising are its chief in¬ terests, but fire and brick clay and coal are found nearby. It has manufactures of brick, tiles, flour, foundry products and lumber. The waterworks are the property of the municipal¬ ity. Pop. (1920) 3,189.

ELDORADO, Ill., city in Saline County, eight miles northeast of Harrisburg, on the Cleveland, Cincinnati, Chicago and Saint Louis, the Illinois Central, and the Louisville and Nashville railroads. It has coal mines, flour mills, bottling works, a machine shop and foundry, lumber yards and manufactories of medicines, candy, cigars and brick and tile. Pop. (1920) 5,004.

ELDORADO (from the Spanish El Do¬ rado, the Gilded Man), the region of undis¬ covered treasure in South America. In the article Dabaiba we have traced the famous Eldorado myth back to those stories which, at the beginning of the 16th century, were cur¬ rent among the Indians of Darien about (a temple lined with goldP and have shown why the Spanish explorers failed to recognize in distant Cuzco, with its temple of the sun-god, the real basis of such accounts. The name Eldo¬

rado, however, with which the ever-receding or shifting territory, the subject of all those stories, has been stamped, was at first not the name of a place but of a person; and the name-giving addition to the myth is localized very precisely in the table-land of Bogota, as follows : Lake Guatavita (north of the present capital of Co¬ lombia and nearly two miles above sea-level) was regarded by Indian tribes dwelling in that neighborhood in the 15th century as a holy place, and pilgrims who resorted to it often cast their offerings of gold and emeralds into its waters. Whenever a new chief of Guatavita was chosen, nobles and priests of his tribe bore him to the lake, as Mr. Bandelier (in work mentioned be¬ low) has written (upon a barrow hung with discs of gold. His naked body was anointed with resinous gums and covered all over with gold-dust. The chief plunged into the lake; spectators made the usual offerings of gold and jewels; and, on the conclusion of this ceremony of consecration, the new ruler and his subjects went down to dance and feast in Guatavita village. The Chibchas (q.v.) conquered Guata¬ vita about the end of the 15th century, and under their general government this extraordi¬ nary local custom had been discontinued for a number of years before the first Spanish settle¬ ments were made on the Caribbean coast — there was no longer an independent Guatavita chief to signify his acceptance of the local religious beliefs in a fashion so dramatic ; but native folk-lore continued for a century, at least, to make much of this glittering symbolic figure and the sacred lake. In 1529, Dalfinger, governor of the German colony in Venezuela, set out from his little capital of Coro, and probably reached the edge of the high plain of Bogota by way of the Magdalena River; there the resistance of the Indians obliged him to turn back. Four years later the report of the vast treasure secured by the conquerors of Peru (Atahualpa's (ransom) alone was officially valued at 3,933,000 ducats of gold and 672,670 ducats of silver) appeared to justify ventures undertaken in reliance upon the wildest Eldo¬ rado tales. It is also true that a fresh outbreak of the gold-fever affected the Spanish colonists everywhere in America, more or less, but especially those in the agricultural settlements; and that leaders of those colonies, in order to retain their

men, were obliged to make fresh efforts to find treasure. In Santa Marta, an expedition was organized to ascend the Mag¬ dalena River to the highlands; at Coro, Georg von Speyer organized a campaign for the ex¬ ploration of the Meta plain, far inland. The former expedition under command of Quesada in 1537 reached the old home of the gilded chief ; and although Guatavita either hid its gold or was actually poor (40 years having passed since it had ceased to be a place of pil¬ grimage), the treasure collected in this neigh¬ borhood, principally at the villages of Tunja and Iraca, was officially valued at 246,676 pesos in gold, or about $1,200,000, besides 1,815 em¬ eralds. Von Speyer Went astray among the trib¬ utaries of the upper Orinoco, but his lieutenant, the German, Nicolaus Federmann, leading a company from Coro, reached the Bogota high¬ lands in time to meet there not only Quesada but the conqueror of Ecuador Benalcazar, who came up from the south, having also heard the

story of the Gilded Man. Each of these leaders considered himself the discoverer of the country, and they proceeded together to Spain, to submit their claims to the Spanish court, leaving their forces to hold the Eldorado which had been despoiled by the Chibchas, ransacked by them¬ selves.

We are, therefore, unable to agree with the distinguished American archaeologist when he says that, after this time, “Transplanted by the over-excited imagination of the white men, the vision of the dorado appeared, like a mirage, enticing, deceiving, and leading men to destruc¬ tion on the banks of the Orinoco and the Ama¬ zon. ® His “Gilded Man® had been located, and that part of the myth was buried. Subsequent explorations were planned to discover rich countries which were Eldorados only in the modern sense of the wrord; and we find that the W’ord was used with nearly its present significa¬ tion at the time when the Amazon River re¬ ceived its name. The legend is especially note¬ worthy in connection with the history of the Venezuelan settlement under the direction of the German Welsers. Having received the prov¬ ince from the Spanish crown practically as a mortgage security for money loaned, Welscr and his associates tried to recover the advances they had made from the revenues of the dis¬ trict ; and since the coast lands were found to be less profitable than they had expected, they engaged in one Eldorado expedition after another. Dalfinger, Federmann, and Von Speyer have been mentioned ; before the utter ruin and failure of the

colony at Coro, Von Hutten's expedition penetrated to Omagua, a region near the Amazon, west of Rio Negro and the Cassi- quiare. The Spanish conquerors of Peru and Ecuador were led by the search for further stores of wealth to make the most important geographical discoveries east of the Andes. Gonzalo Pizarro set out from Quito to explore the forests (1539-42), hoping to find spices there, and also "wealthy regions in which the people went around adorned with gold.® His lieutenant, Francisco de Orellana, with 53 men in a bark, becoming separated from the main body of the expedition, went on down the Amazon to its mouth. The Dominican Car- vajal, Orellana's chronicler, relates that women took part in the fighting against the Spaniards, and that a captive Indian spoke of a tribe of Amazons rich in gold living north of the river. (Compare Prescott's (Conquest of Peru,* II, 164-65, note). Wandering Indians brought to Peru about the middle of the 16th century reports of countries rich in gold^ and silver, which lay far eastward; and the viceroy made use of the Eldorado fever thus excited to rid Peru of a large number of disorderly persons. In 1560 a company of criminals and desperadoes, with women, set out from Santa Cruz de Capa- coba, proceeding in boats, canoes and even upon rafts, down a tributary of the Amazon, under the leadership of Pedro de Ursua. In January 1561, Ursua was murdered by conspirators and eventually Aguirre, chief conspirator, trans¬ formed the remnant of the expedition into a piratical band ; captured the island of Mar¬ garita and invaded Venezuela. At least four Eldorado expeditions proceeded from the north coast toward the interior before the end of the century, in addition to that one which Sir Wal¬

ter Raleigh led in 1595. Consult Bandelier, A. F. A., (The Gilded Man> (New York 1893) ; and Brinton, D. G., (The Myths of the New World) (New York 1868 and 1896).

Marrion Wilcox.

ELDORADO SPRINGS, Mo., city in Cedar County, 100 miles southeast of Kansas City, on the Missouri, Kansas and Texas Rail¬ road. The principal industry is the bottling of water from the mineral springs. Farming and stock raising are carried on also. The water¬ works are owned by the municipality. Pop.

2,503.

ELDRIDGE, Shaler W., American aboli¬ tionist: b. West Springfield, Mass., 1817; d. Lawrence, Kan., 17 Jan. 1899. He removed to Kansas in 1855, and became proprietor of the American House in Kansas City,

soon recog¬ nized as the headquarters of Freesoilers. In 1856 Eldridge opened the Free-State Hotel in Lawrence, but soon afterward a pro-slavery court issued a writ of indictment, declaring the place a nuisance, and it was destroyed by a posse led by Sheriff Jones. This occurrence caused great excitement among the Freesoil men, who commissioned Eldridge to visit Wash¬ ington with a petition in their behalf and also to sit in the convention that nominated Fre¬ mont. Later he became a member of the National Republican Committee and agent to promote immigration into Kansas. Under the last authority he led a large number of settlers to Kansas. During one of these trips, with a party of 350 men, he was taken prisoner by United States troops. Subsequently he re¬ cruited a party of Freesoilers, who retook the arms from the United States officers at Lecomp- ton. He was instrumental in giving much aid to the Free-State cause by smuggling large amounts of ammunition and provisions into Kansas Territory. During the Civil War he served in the Union Army.

ELD'S DEER, a deer (Cervus eldi) native to the Malayan region. It is about four feet tall, lives in swampy places and is often found in large herds. Its habits are like those of the Indian swamp-deer. The antlers are peculiar in that the brow-tine sweeps down over the fore¬ head and that the upright part has numerous points.

ELEANOR OF AQUITAINE, queen of France and afterward of England: b. 1122; d. Fontevrault, France, 1 April 1204. She was the eldest daughter and heiress of William IX, Duke of Guienne or Aquitaine, and was mar¬ ried 2 Aug. 1137, to Prince Louis, who in the same year succeeded to the throne of France as Louis VII. She was gay, frivolous, a lover of poetry and art, and could not sympathize with the ascetic spirit of her husband. She accompanied him on the second crusade to the Holy Land in 1147. At that time he com¬ plained of her preference for other men, and on their return from Asia they were divorced 18 March 1152. A short time afterward she bestowed her hand upon Henry Plantagenet, the future Henry II of England. This alliance, which made Henry master of Eleanor's vast possessions in France, produced pernicious and protracted wars between France and England. She bore him many children, but his infidelities and neglect changed her love into hatred. She

incited her sons Geoffrey and Richard Coeur de Lion to rebel against their father, was im¬ prisoned in 1174, and remained in confinement

until after Henry's death in 1189, when she was released by his successor, Richard I, who placed her at the head of the government on his departure for the Holy Land. She nego¬ tiated his marriage with the daughter of the king of Navarre, and went to Germany with his ransom from captivity. She afterward re¬ tired to the abbey of Fontevrault and surviving Richard, lived to see him succeeded by one of her other sons, John Lackland, the signer of Magna Charta. She was a favorite personage with the troubadour poets of the day and ap¬ pears in a very different light in their works from that in which she is represented by French and Norman chroniclers. Consult Adams, (History of England, 1066— 1216) (London

1905).

ELEANOR CROSSES, memorials of Eleanor of Castile. She was the wife of Ed¬ ward I of England, and d. Lincolnshire 1290. Her body was taken to London by her sorrow¬ ing husband who subsequently erected a monu¬ ment, terminating in a cross, at every spot where her funeral train had rested. These places were Lincoln, Grantham, Stamford, Ged- dington, Northampton, Stony Stratford, Wo¬ burn, Dunstable, Saint Albans, Waltham, East Cheap and Charing Cross, but the list varies slightly as given by different authorities. The crosses at Geddington and Waltham remain, although considerably altered by restoration in the latter case. That at Charing Cross, de¬ stroyed in 1647, was replaced in 1863 by a new one reproducing the original.

ELEATICS, e-le-at'iks, a Greek sect, so called because founded at Elea, in Sicily, by Xenophanes of Colophon, about 538 b.c. Zeno, who flourished 464 b.c. ; Empedocles, 435 b.c. ; and Melissus 428 b.c., were leading philosophers of this school. That which from the commence¬ ment distinguished the Eleatic school from the Ionic was its method, which in the one case was dialectic, in the other empirical. Starting from the observation of external nature, the Ionians endeavored to discover some elementary prin¬ ciple, as water, air, fire or a combination of elements, by the action of which the phenomena they observed might be accounted for. The Eleans made the abstract idea of Being or God, deduced from the contemplation of the universe as a whole, their starting-point; and their reasonings sometimes led them to deny the reality of external phenomena altogether. This was the result of the development which the principles of Xenophanes received from his fol¬ lowers Parmenides and Zeno, the latter of whom denied the existence of variety in any form. See also Ionian Philosophy; Ionian School; Xenophanes; Zeno. Consult Windelband,

ELECAMPANE, el-e-kam-pan' (Inula helenium) , a plant of the

sunflower family (Composites) . The stem is three or four feet high, thick, pubescent and branching above ; the radical leaves are often two feet or more in length ; the flowers are large and yellow. The plant is a native of Europe and Asia, naturalized in the United States. It grows abundantly along roads and in waste places. The root is perennial

and has a bitter aromatic taste. Elecampane is cultivated occasionally as an ornamental plant and the flowers are sometimes used to adulterate arnica. The root was formerly much employed in medicine, but has fallen into disuse. It con¬ tains a number of active principles, the most im¬ portant being a volatile oil, a camphor, inulin and helenin. By reason of the camphor and the oil the action of the drug is somewhat stimulant and stomachic. Elecampane was once very much used in the treatment of bronchitis and amenorrhcea. As a hot infusion it sub¬ serves practically the same purpose as camomile tea, being a good diaphoretic.

ELECTION, in law , the voluntary choice between two or more permissible lines of con¬ duct. In equity the choice is between two or more alternative rights or claims which were plainly intended by the person who has granted them to be mutually exclusive. In criminal law it is the choice incumbent on the prosecution to proceed on one of a number of independent felonies of the same degree. In the law of wills the widow's election is her choice whether she will make her claim under her husband'o will or under the statute, which gives her a right to a specified part of her husband's estate. An election may be explicit and announced, or it may be implicit in the conduct of the person bound or entitled to elect. In neither case is the election binding unless made with a knowledge of all the relevant and material facts ; but if these facts are known, the election is final.

ELECTION, in politics, the mode of deter¬ mining the person who is to fill an office by the votes of the qualified electors. Alternative methods are selection by someone already in authority or by lot. The electors may be the entire body of those of the citizens of the region concerned who fulfil certain very general requirements, as is the case in the various State elections for governor or the election of sena¬ tors and representatives, or may be some rela¬ tively small body of officials, as in the in¬ direct® election of senators by the State legisla¬ tures, which was alone legal until 1913, when the Seventeenth Amendment to the Constitution was ratified. In the case of the elected kings of Poland and Hungary and of the Holy Ro¬ man emperor, the election was in the hands of a greater or smaller group. The election of the President of the United States, though nominally entrusted to a

representative body of men — the electoral college is now to all intents and purposes of the direct type, as by custom the electors are mere mouthpieces of the popular vote. The honesty and fairness cf elections is secured by stringent laws and by various devices to secure secrecy of the ballot. These are discussed under the head of Ballot. See also Elections; Corrupt Prac¬ tices Acts ; Electoral Frauds and Safeguards Against; Vote, Voters, Voting.

Election is a very old political device. While election by acclamation has always been a recog¬ nized means of determining the chief in certain savage communities, it was in the citv-states of Greece and in republican Rome that the ballot first became the basis of the government of a highly organized civilized community. This right was limited to some more or less restricted class of free citizens, and was goner-

ally exercised in an open assembly not unlike the N ew England town meeting — the Ecclesia of Athens or the Roman Comitia. From the period when the empire first made the comitia a mere form and then abolished it altogether to the reappearance of the assembly of the people as a custom of the northern barbarians, election ceased to play any important part in politics. It survived in a measure in the Church and it reappeared in a very limited form as the method of selecting the Holy Roman em¬ peror. The first renascence of a genuinely popular election after the races of the north had lost almost all memory of their original custom of settling disputes and electing their chiefs in the council of the warriors, was in the form of the election of the officers of the guilds and of the free towns. (See article, Elections and cross-references thereunder). Consult Aristotle, (Politics) ; Freeman, Com¬ parative Politics) (London 1873) ; Jones, head¬ ings on Parties and Elections in the United States) (New York 1912) ; Stanwood (History of the Presidency* (Boston 1912) ; Woolsey, (Political Science) (New York 1877).

ELECTION, in theology, the word (singu¬ lar) is applied to the act of God in selecting some persons from the race of man to be re¬ generated by his spirit, to be justified, to be sanctified, and to receive other spiritual gifts in this world, with eternal life in the next. The Calvinistic doctrine makes this election take place by God’s mere good pleasure, with¬ out any foreseen merit in the individuals chosen. The Arminian one considers that God chooses those whom he foresees will

accept the offer of the Gospel and act as true Christians till death. The third chapter of the Westminster Confes¬ sion, entitled (

ELECTION DISTRICT. See District.

ELECTIONS. As defined by the courts an election is the act of choosing a person to fill an office by any manifestation of preference but usually by the vote of those . entitled to exercise the elective franchise, as distinguished from appointment to office by a single person or officer, as a king, president, governor or mayor. See Appointments.

Classification of Elections. — If the great body of the voting population decide between candidates, the election is said to be popular or direct. If limited to a small number who themselves have been chosen by the mass of voters, the election is said to be indirect or representative. The choice of United States senators by the State legislatures until the 17th Amendment became law is an example of indirect elections. Theoretically the President is elected by the Presidential electors chosen in the various States but in practice these electors vote for the party candidate. (See Electors, United States Presidential). Elections are also classified as national, State and municipal, according to the status of the office to be occu¬ pied by the successful candidate.

Early Colonial Elections. — From the earli¬ est colonial days, local officials in New England

were chosen in a meeting of the “freemen,® much as they are to-day in town meeting. Prob¬ ably the first elections held in America were of the delegates who attended the Virginia legislative assembly in 1619. The earliest date specified is that of the election of John Win-tnrop as governor of Massachusetts “by the general consent of the Court,® 18 May 1631. The next in order is the election at Plymouth, 1632-33, although elections were authorized in this colony in 1620 and in the colony of Massa¬ chusetts in 1630, and undoubtedly they were held from that time onward. A few years later the records show that elections were conducted by proxy, chosen deputies casting the votes of the freemen at the “court of elections.® Ac¬ cording to some authorities proxies meant us¬ ually the carriage of the votes, at first the bal¬ lots themselves (slips of paper or grains of corn, etc.), and later the records. The history of the process is hard to interpret. In New Hampshire elections were held from 1633 on¬ ward, and in Rhode Island after 1636-38. In Connecticut the earliest election was in 1639; in Maryland 1638. All the southern colonies except Georgia

elected assemblies almost from the start, and summonses for one session were issued in Georgia. In New Amsterdam (now New York) the right to elect its own magis¬ trates was long withheld by Director Stuy- vesant. <(If,® he said (1653), <(the nomination and election of magistrates were to be left to the populace who were the most interested, then each one would vote for some one of his own stamp, the thief for a thief, the rogue, the tippler, the smuggler, for a brother of iniquity, that he might enjoy greater latitude in his vices and frauds.® In New Jersey elections did not begin till 1668, although authorized in 1665. The first election in Pennsylvania was in 1683. In the Carolinas the first recorded elections were in 1691, but minor elections probably were held as early as 1663. In Georgia all officials were appointed up to 1754.

Authority to Hold Elections. — To be valid an election must have some lawful author¬ ity behind it ; unless the power be expressly granted by the constitution or by the legislature acting under constitutional authority, the right to hold an election cannot exist or be lawfully exercised. The legislature may prescribe the forms to be observed in the conduct of elec¬ tions. Laws enacted to ascertain the will of the people at free popular elections mav be mandatory (such as those setting the day of election, requiring the vote to be by ballot, or establishing places within the designated pre¬ cincts where the election shall be held), or directory (such as provisions prescribing the conduct and return of an election). Minor irregularities in observing the directory laws which do not prevent electors from freely and fairly exercising their right of suffrage or from having their votes properly counted do not vitiate an election, providing such irregularities do not constitute infractions which the law de¬ clares shall nullify an election. Statutes pro¬ viding for the holding of a local election us¬ ually require the presentation to some local authority of a petition signed by the prescribed number of qualified persons; when properly presented, the authorities appointed to call the election have no discretion and after the order is issued it is not open to collateral attack.

The time and place of holding regular elections are generally appointed in the public laws, and therefore, as electors are supposed to know the law and accordingly would receive notice from the statutes themselves, no proclamation or notice, is mandatory, but proclamations for special elections must be issued by the authority

named in the statutes and in strict accordance with those statutes. This notice is particularly important in cases of special elections to fill vacancies caused by death, resignation or re¬ moval, where the statutes do not require that the vacancy be filled at the next general elec¬ tion. Usually the statutes require that, for a certain time before election day, notices of a coming election shall be published in one or more newspapers or posted in the form of hand¬ bills either at the polling places or at a number of public places. In elections to determine specific questions, the notices must fully inform the voters of the questions to be decided and such notices must not only clearly show the authority for the order but also that they themselves have been signed by the proper officers.

Time and Place of Holding Elections. —

To be legal the time and place of holding an election must be fixed in advance, either by law or by legally authorized officials ; and votes cast differently will avail nothing regardless of the eligibility of the candidates voted for. If the time be fixed by general law no other time will be legal, save where the statutes provide for special elections ; if the statutes fix the time, no power may adjourn the election to a subse¬ quent day, unless the constitution or statutes permit such adjournment, though legislatures are within their province in postponing elections in order to do away with frequent and unneces¬ sary elections. A slight change in the voting place should not invalidate otherwise properly conducted elections, provided no voter is mis¬ led or deprived of his vote by reason of the change. Under some circumstances the voting place may even be outside the election district, but the electors of the district who vote thereat would not be disfranchised on that account. Congress has power to determine the time of choosing the Presidential electors and on 1 March 1792 enacted that the choice should be made within 34 days preceding the first Wednes¬ day in December. On 23 Jan. 1845 Congress en¬ acted that Presidential electors be chosen on the Tuesday following the first Monday in Novem¬ ber in each quadrennial year, and later (2 Feb. 1872) provided that, beginning with 1876 mem¬ bers of the House should be elected on the same day in biennial years (ˆeven® years), though some exceptions were allowed under the amend¬ ing act of 3 March 1875, whereby certain States were permitted to continue holding their elec¬ tions at an earlier date. Amendment XVII to the Constitution (effective 31 May 1913) pro¬ vides for the election of senators by the direct vote of the people but makes no stipulation as to the time of election, merely providing that ((when vacancies happen in the representation of any State in the Senate, the executive author¬ ity of such State shall issue writs of election to fill such

vacancies : Provided, That the Leg¬ islature of any State may empower the execu¬ tive thereof to make temporary appointments until the people fill the vacancies by election as the legislature may direct. ˆ Presumably, there¬

fore, elections of senators are held the year preceding the expiration of the incumbent's term of office, the time being designated by the State legislature. Most of the State elections, and in many cases local and municipal elections, are held on the same day as the national elec¬ tion, but in many States minor officials are not elected in the same year as the governor and lieutenant-governor. All the States hold their elections in November with the exception of Louisiana, Maine and Vermont, the election of the first named occurring in April and of the latter two in September. If a vacancy occur in an elective office, the governor of a State may call a special election or hold the choice over until the next regular election.

Classification of Votes and Voting — In¬ dependent, Popular, Preferential, Compul¬ sory. — See Vote, Voters, Voting.

Electoral Qualifications, Colonial and Modern. — Details respecting the franchise rights and privileges of the various States will be found in the articles Aliens; Citizenship in the United States; Electoral Qualifi¬ cations; Naturalization; United States — Suffrage in the; Votes, Voters, Voting; Woman Suffrage.

Terms of Office, Age Limits and Quali¬ fications for Office. — See Electoral Quali¬ fications, Terms of and Qualifications for Office.

Party Nominations, Primaries, Etc. — The

four principal methods of choosing candidates are by the delegate convention system, the direct primary, the non-partisan primary, which is used in many municipalities, and nomination by peti¬ tion only. The term ˆprimary® is usually ap¬ plied to the preliminary elections held by the political parties to nominate candidates or to choose delegates whose duty is to nominate candidates to compete in the following regular election. In either case party members only are allowed to vote in the primaries. Originally candidates for local offices announced their own candidacy or perhaps were nominated by an informal caucus ; the legislative caucus nomi¬ nated candidates for State offices; and aspirants for the Presidency were nominated by the Con¬ gressional caucus (see Caucus) ; but the latter two caucuses were soon discarded and by 1832 the convention system had been generally adopted. (See Convention, Political). This system was so indirect and

complicated and so flagrantly abused that regulation of nominations became imperative and by 1900 party elections had been placed under the same legal restric¬ tions as the regular elections. Beginning with 1900, however, the convention plan has been rapidly supplanted by the direct primary, under which candidates are selected by the direct vote of the party. Some States also allow each party a direct vote on choice for Presidential nominees. (See Primary, Direct; Primary, Presidential Preference; and in this connec¬ tion see also Initiative; Referendum; Recall). Under the non-partisan primary (which really is not a primary at all) the whole electorate participates in the selection of candidates later to be voted upon at the regular elections. This system has been developed in connection with the commission form of government (q.v. See also City Manager) as worked out in Des Moines, Iowa, and other places. The two can¬ didates for mayor and the eight candidates for

the four commissionerships receiving the high¬ est number of votes may participate in the second and final election. In all elections, party emblems, circles, or other designations are pro¬ hibited in connection with candidates' names. In some cities (as Berkeley, Cal), if any candi¬ date receive a majority of all the votes cast, a second election is unnecessary so far as that particular office is concerned. In some locali¬ ties preferential voting has been adopted so that national political parties will be eliminated from local elections. If any number of persons not constituting a political party be entitled to make nominations in the usual way and to have the names of their candidates placed upon the official ballot, they may present to the proper officials a petition containing the required number of signatures of qualified electors and their nomi¬ nees may enjoy the same privileges on the official ballot as accorded to those regularly nominated bv an existing party. Nominations by petition are used chiefly in local elections, and, unless required by statute, no party em¬ blems or designations are used in connection with the names of candidates. Under a law passed in 1907 Wisconsin permits nominations to be made by petition only; but after nomina¬ tions are filed upon petition of 5 per cent of the electors a preliminary election may be called to select the two candidates for each office and those two only are voted upon at the final election. In many States a declaration of party affiliation is necessary under the pri¬ mary law. Illinois further prohibits the partici¬ pation in a primary of anyone who has voted in the primary of another party within the pre¬ ceding

two years. Some States (as New York) use a system of party registration similar to that used for general elections. When the voter registers at that time an opportunity is presented to him to declare his party affiliation, if any, and from these declarations a list of party voters is compiled which is used as the registration for the ensuing primary election. The California law of 1899 and the Oregon law of 1901, which allowed electors to vote for either party without divulging party preferences, were declared unconstitutional. Under the Wisconsin law of 1903 the ballot is absolutely secret and the voter may vote for the candi¬ date of whichever party he may choose, but he may not vote with more than one party at any election. The ((open primary® eliminates the party test which is applied in the <(closed primary.® In the non-partisan primary no party test can be applied since the elector votes for any candidate he may choose regardless of party ties.

Campaign Expenses and Contributions. —

See Ballot ; Bribe ; Congress ; Corrupt Prac¬ tices Acts ; Electoral Frauds ; Lobby, Etc.

Voting Districts. — So that participation in elections may be easy, counties, cities and towns are divided into small precincts or election dis¬ tricts, each containing a few hundred voters and operating under the supervision of an elec¬ tion board. Whether composed, as at different periods and in different States they have been, of counties, cities, townships, boroughs, wards of cities, or of precincts, election districts al¬ ways indicate subdivisions of the State's terri¬ tory marked out by known boundaries prear¬ ranged and declared by public authority. As nearly as possible, city precincts contain an

equal number of voters; they must lie entire wards or contained wholly within one ward or one town and cannot be composed of parts of adjacent wards or districts. The election dis¬ trict, however, is never used as a unit of repre¬ sentation in local government nor as an admin¬ istrative division in the conduct of municipal business. See District.

Polling Places. — The law designates the manner of the internal arrangements of polling places so that the voter will have perfect free¬ dom in marking and depositing his ballot. Where the Australian ballot is used, the statutes require that polling places contain booths of sufficient size to accommodate one voter and so constructed that the voter will be screened while preparing his ballot. Booths should be shut off by guard rails and no un¬ authorized person allowed to go

within these confines. In most States no official ballot may be taken outside the polling place. Official bal¬ lot boxes are required at all elections, and prior to the opening of the polls these boxes must be opened for public inspection. During primaries and elections the polls are policed in accordance with the law (though the presence of a police officer at each polling place is not authorized by express statutory provision), and in some cases election officers may exercise the authority of justices of the peace and punish election offenders. Stringent laws have been passed in many States to protect the voter from undue influence while in the act of voting. In most States electioneering is prohibited within a certain distance from the polling place; in some States polling places must be a certain distance from saloons; and in the advanced States saloons are closed on election days. Oregon requires that no Apolitical badge, button, or other insignia shall be worn at or about the polls on any election day.®

Registration of Voters. — All persons possess¬ ing the constitutional qualifications of electors may be and in nearly all the States must be officially registered on the voting lists in the districts wherein they reside in advance of each election, the period varying in the several States. If a State constitution or statute make registration a specified time before election day an imperative prerequisite to the right to vote, those not so registered cannot vote even if their other qualifications comply with con¬ stitutional requirements. Nevertheless the courts have held several times that even if a person be not a qualified voter under the con¬ stitution on the day the registration books are closed, yet if he acquire the necessary quali¬ fications before election day his vote cannot lawfully be rejected merely because he has not registered. While the constitutional quali¬ fications must be left intact, without excisions or additions, the legislature may prescribe reg¬ ulations to determine if the prospective voter possess the required qualifications; hence the passage of a registry law requiring registration as a condition precedent to the right to vote is not unconstitutional ; where such a law exists an election held without such registration is void, but if the State constitution provide that the legislature shall enact a registration law and the legislature fails to do so, an election without registration is valid. Arkansas and Texas do not require registration ; in Oklahoma registra¬ tion is required in all cities of the first class;

in Kansas and Ohio in cities of the first and second classes ; in

Kentucky in cities of the first, second, third and fourth classes; in Washington in all cities and towns and in voting precincts with a voting population of 250 or more ; in North Dakota in cities and villages of 800 or more inhabitants ; in Maine in cities and towns of over 2,000 inhabitants; in Iowa and Ne¬ braska in cities of 3,500 and 7,000 or more in¬ habitants, respectively; in Missouri in cities of 100,000 or more inhabitants ; and in all cities of Pennsylvania. In all incorporated cities, vil¬ lages and towns of Illinois which have adopted the election commissioner act of the State, un¬ registered persons may not vote, but elsewhere they may swear in their votes if they produce a creditable witness to prove their electoral quali¬ fications. In Rhode Island non-taxpayers are required to register each year before 30 June. In the larger cities voters must appear in per¬ son before the registering officers, but in rural districts the voter often is registered by official declaration and the registration list is compiled by local authorities, subject to revision on de¬ mand of interested parties. In order to prevent false registration some of the large cities have personal identification laws. The old suffrage laws of the Southern States and the compli¬ cated registration laws practically eliminated the negro vote, and even under the recent suffrage amendments to the constitutions, voting by negroes is a difficult task since registrars must determine whether an applicant possesses the required suffrage qualifications, can <(read the constitution, or understand it when read to him, or give a reasonable interpretation thereof,® or understands <(the duties and obligations of citizens under a republican form- of govern¬ ment.®

Registry Boards. — The election process is controlled by official (and usually compensated) boards of registrars, who must be qualified voters in the election districts wherein their duties are to be performed ; their duty on the days designated as registration days is to pre¬ pare lists of qualified electors to be used as check lists at the polls. If registration officers wrongfully and wilfully refuse to enter the name of a qualified elector on the voting list they are liable in a civil action for damages. The boards are usually bi-partisan and are gen¬ erally supplemented by watchers from the various parties which have nominated candi¬ dates. At election time each party usually has one or more challengers who endeavor to pre¬ vent election frauds by challenging those ille¬ gally attempting to vote or those whose right to vote is considered doubtful. Generally, any citizen who believes an elector is attempting illegally to cast a ballot has the right to chal¬ lenge him and to state his objections. In Massachusetts cities and towns, at specified times preceding elections, the registry boards are in session for the purpose of allowing ap¬ plicants to prove their

possession of the re¬ quired suffrage qualifications, but in Boston the police, under the supervision of a special listing board, make a house-to-house can¬ vass to enroll voters. Under the New York law of 1908 the registry boards in cities of over 1,000,000 inhabitants must very carefully examine the voter, not only as to name, age, birthplace, address, occupation, years of resi¬ dence in State and at address, and where and

when he last voted, but also if he be married, if he occupy the entire house, or only a floor or room and which one; and they must obtain the name of lessee of the building, etc. Hence, if challenged when voting, a comparison of the voter's answers with the data previously sup¬ plied will quickly and quite dependably prove his identity, which can also be more accurately determined by a comparison of signatures, since those who can write must sign the registry book. All lists of registered voters are public records and are open to reasonable inspection by the public.

The Voting Process. — The names and resi¬ dences of voters are recorded in the pollbook in numerical order as they enter the polling places, after which the election official gives the voter a ballot usually corresponding in num¬ ber with his number in the pollbook, though the courts have decided that, where a State constitution requires that popular elections shall be by secret ballot, any statute requiring the numbering of ballots with figures correspond¬ ing with the figures placed opposite the voter's name on the poll list is unconstitutional and void, since it utterly destroys the secrecy of the ballot. The voter then retires to the booths provided so that the ballot may be marked secretly, but should he be unable to read or write or be physically incapacitated he may request assistance from one of the election offi¬ cials. All members of the election board (but no one else) may witness the preparation of the ballot of such voter, but must not reveal the name of the person for whom the elector has voted. After marking the ballot the voter folds it so that the contents may not be seen and hands it to the designated election officer, who deposits it in the ballot box, which is kept locked, the key being in the custody of the chairman of the board; this completes the proc¬ ess and a clerk records in the pollbook the fact that the elector has duly voted. Should a ballot be mutilated, the elector may obtain a perfect one from the election officers on sur¬ rendering the defective one. Legislatures may prescribe official ballots and prohibit the use of any other; they may also provide for printing on the ballots the names of regularly nominated candidates or of independent candidates, pro¬ vided in so doing they do not violate the voter's constitutional right to vote for the per¬ son of his choice. No legislature is empowered to restrict

electors in their choice of candidates or to prohibit them from voting for others than those whose names are on the ballots. Nominations entitle nominees to places on the official ballot, printed at public expense but the voter may write or paste on his bal¬ lot the names of eligible candidates (whether nominated or not by any convention, cau¬ cus or meeting) other than those printed ihereon, and this right is generally recog¬ nized since blank spaces next to the printed names, are left for such writing or pasting. The right of an elector to vote may be chal¬ lenged if his qualifications appear to be de¬ fective or if he be suspected of some fraudulent practice. An oath or affirmation is then admin¬ istered to the challenged elector under which he swears truthfully to answer all questions respecting his qualifications, but if the elector refuse to be sworn and examined he loses the right to vote. If the answers to these ques-

tions seem to establish the elector's right to vote and the challenge be withdrawn, the elector, again under oath, must declare that he possesses all the legal requirements. He may then vote but the act of voting, after taking the oath, renders him liable to criminal prosecu¬ tion if his declarations be proven false.

The Ballot. — See Ballot.

Voting Machines. — See Voting Machines.

Counting the Vote. — Usually the polls are open from early in the morning until a desig¬ nated hour at night, after which no more voters are admitted. Immediately after the last bal¬ lot has been deposited the counting begins (sometimes publicly, sometimes in a private room), the details being recorded on the official and standard tally sheets with which each poll¬ ing place has been furnished. The chairman unlocks the box, extracts the ballots, one by one, opens each and announces the candidate for whom the elector has voted. If mutilated or illegally marked by the voter the ballot may be rejected; though ballots should not be re¬ jected because of tearing or of slight irregulari¬ ties in marking unless such mark or mutilation appear to have been made for corrupt purposes; all rejected ballots are set aside and returned with the valid ballots so that, in case of a con¬ test, the proper judicial authorities may ex¬ amine them. All valid ballots are recorded by the clerks as announced by the chairman and are then filed in the form required by law. The clerks keep two or more

independent tally sheets which are totalled at the end of the counting and the results officially announced. The pollbooks and the tally sheets (properly authenticated by the election officials of the dis¬ trict) are then sealed and turned over to some designated official, such as the county clerk or in larger cities to a special board. The ballots are locked and sealed in the ballot boxes which are then delivered to the proper authorities, in some cities, as New York, to the police who preserve them for a stipulated period so that a recount may be made in case of a contested election. After the tally sheets have reached the election board or other designated official, such as the county clerk, they are reviewed to ensure absolute correctness and the results are officially published. In State elections, county or municipal results are usually dispatched to the secretary of state who reviews them with the aid of a State board of canvassers. In some States the individual voting districts send their returns direct to the secretary of state ; in other States these returns are sent to the pre¬ siding officers of the two branches of the legis¬ lature and are opened and canvassed in their presence. In other States the returning boards consist of certain specially designated officers. It is the duty of the canvassers to issue a cer¬ tificate of election to the person whom the face of the returns indicates to have been elected. Should a candidate (who may or may not have been present at the count of the ballots) be¬ lieve he has been defeated by fraud, illegal voting or incorrect counting, he may file a con¬ test notice with the court having jurisdiction, which not only may order a recount but may also enforce its judgment as against the con¬ clusion of the election official. Unless a specific grant of power be made in the State constitu¬ tion or by the legislature in conformity with constitutional provisions, the duties of county

and State canvassing boards are wholly minis¬ terial ; they are not empowered to go behind the returns, to decide upon the legality of the votes cast nor to throw out the votes of a pre¬ cinct or district in which fraud is alleged.

Duty to Accept Office. — Under the com¬ mon law every citizen, in peace as well as in war, owes his services to the State when re¬ quired ; hence, after having been regularly elected and duly appointed, persons may be compelled to take the oath and qualify them¬ selves as public officers under pain of indict¬ ment or any pecuniary penalty ; the only de¬ fenses are illegal election or appointment, legal disqualification to hold the office or proof that the office is incompatible.

Contested Elections. — See Elections, Con¬ tested.

Federal Control of Elections. — See Elec¬ tions, Federal Control of.

Electoral Frauds and Safeguards Against.

— See that title.

Minority and Proportional Representa¬ tion. — See that title.

Majorities and Pluralities. — There is no legal, philological or popular agreement as to the use of the word ˆmajority® in matters of election. In computation it may mean the amount by which the greater number exceeds the lesser, if but two numbers are compared ; or the amount by which the greatest number ex¬ ceeds the total of the lesser numbers ; or the amount by which the greatest number exceeds the next to the greatest. For the last case we customarily use the word ˆplurality,® but in England the normal designation is <, and candidates have been elected with regard only thereto from time immemorial. The weight of American usage restricts ˆmajority® to excess of the greatest number of votes over the total of the rest, and we say that for a majority a total of one more than half is neces¬ sary. This practice dates from colonial times. In Massachusetts, New York, New Jersey, South Carolina and Georgia, a majority seems to have been required; in other colonies as a rule a simple plurality sufficed. New York put the plurality rule into her constitution of 1777 and most of the other States followed her ex¬ ample, but the belief in the virtues of an abso¬ lute majority lingered in the New England States till the middle of the following century. Propositions to go back to the absolute majority plan are now very rarely heard, and in the mat¬ ter of popular elections the subject still has importance only because the Constitution of the United States requires an absolute majority of electoral votes for the choice of President. In conventions the majority rule yet prevails, occasionally entailing hundreds of ballots, and in the Democratic national conventions a two- thirds vote is required to nominate. In pri¬ maries and caucuses the plurality plan prevails by almost invariable custom, voters everywhere being unwilling to give the time required for repeated ballots.

Under the Constitution a majority vote in the electoral college may elect a President who did not receive either a majority or a plurality of the popular votes cast, though probably the framers of the Constitution intended that no President should be elected without substantial support in a considerable number of States. Often delegations are divided under the system

of State-wide popular vote. This is possible it a State legislature should decide that the electors of that State be chosen by districts. This system was followed by Maryland up to 1832 and in 1892 the Michigan legislature changed the districts and thus divided the State electoral delegation. But as a rule all electors, save those chosen by legislatures, have been chosen by general ticket since 1836, for which reason the ticket that obtains a plurality of the popular votes elects all the electors of that State. Sometimes, however, when the vote is close, the electors with the highest vote on one ticket may defeat the electors with the lowest vote on another ticket. This happened in California in 1880 when, of the 161,000 votes cast, the difference on the head of the ticket was only 78, with the result that one Republi¬ can and five Democratic electors were chosen. In the same State in 1912 two of the Demo¬ cratic electors overran the lowest two on the Progressive ticket, so that the State sent a divided delegation to the electoral college of 11 Progressives and two Democrats. Often the electors represent a minority of the State votes, and sometimes the majority of the elec¬ toral vote may represent a minority of the popular vote. In 1824 Jackson received 50,550 votes more than Adams, but received 40,300 votes less than his three opponents combined. In 1844 Polk received 38,000 votes more than Clay but the combined vote for Clay and Bir- ney put him in a minority of 24,100. In 1848 Taylor had a plurality of 139,000 but a minority of 151,500. In 1856 Buchanan had a plurality of 497,000 but a minority of 377,000. Lincoln received nearly 500,000 more votes than Douglas but nearly 950,000 votes less than all his opponents combined. In 1876 Hayes, though chosen President by one electoral vote, not only had a minus plurality of 251,000 but was in the minority by about 345,000. In 1880 Garfield had a plurality of 7,000 over Hancock but was in the minority by over 310,000. In 1884 Cleve¬ land received about 62,000 votes more than Blaine but was in the minority by about 230,000. In 1888 Cleveland received nearly 100,000 more popular votes than Harrison but the latter was elected even though he was in a

minority of 500,000. In 1892, however, Cleve¬ land received a plurality of 380,000 over Har¬ rison but was in a minority of 950,000. In 1912 a striking discrepancy occurred between the electoral and popular votes, Wilson carry¬ ing 43 of the 48 States and having a clear majority of 339 in the electoral college, while he had a plurality of 2,150,000 over his nearest opponent, but was in the minority by 2,500,000. Hence, with the exception of Hayes and Har¬ rison, all the Presidents would have been elected by at least a plurality if the election had been directly popular. On the other hand a small popular majority for the electors in one State may swing the election, as was the case in New York in 1884 and 1888; in the former year Cleveland carried the State by 1,047 which gave him the 36 electoral votes of that State and decided the election in his favor; in 1888 these votes were turned over to Harrison by a plurality of about 15,000, thus electing him President. In 1916 was cast the largest vote till then in the history of A.merica. Wilson had a plurality of nearly 570,000 over Hughes but an electoral vote of only 276

against 255 for Hughes, this being the nar¬ rowest margin of electoral votes determining an election since 1876. So even was the voting in some of the States that Wilson won New Hampshire by only 56 votes, New Mexico by 2,400, North Dakota by 2,600, California by 3,700, and Nevada by 5,600, whereas Hughes gained the electoral votes of Minnesota by 392 votes, Delaware by 1,273, West Virginia by 2,721, and South Dakota, Maine and Rhode Island by about 5,000 each. In spite of the closeness of the election no split delegations of electors were sent to the electoral college. See United States-Disputed Presidential Elections; Electoral Commission.

Bibliography. — Ashley, R. L., (The Ameri¬ can Federal State5 (New York 1908) ; Beard, C. A., (American Government and Politics ' (ib. 1914), and (The Ballot's Burden5 (Boston 1909) ; Bacon, E. M., and Wyman, M., (Direct Elections and Law-Making by Popular Vote) (ib. 1912) ; Bryce, James, (American Common- wealth) (rev. ed., New7 York 1914) ; Burch, H. R., Conditions Affecting Suffrage in Colonies5 (Philadelphia 1902) ; Bullock, E. D., (Short Ballot5 (New York 1915) ; Becker, Carl, dominations in Colonial New York5 (in American Historical Review, Vol. VI, pp. 260-275, Lancaster, Pa., 1901) ; Brooks, R. C., Corruption in American Politics and Life5 (New York 1910) ; Bishop, C. F., (History of Elections in American Colonies5 (ib. 1893) ; Commons, J. R., (Proportional Representation5 (ib. 1907) ; Childs, R. S., (Short Ballot Princi¬ ples5 (Boston 1911) ; Clarke, J. H., Che Pith of the Short Ballot5 (Cleveland 1912) ; Cooley, T. M., Constitutional Limitations5 (7th ed., Boston 1903) ; Dougherty, J. H., Che Elec¬ toral System of the United States5 (New York

1906) ; Dallinger, F. W., dominations for Elective Offices5 (Cambridge, Mass., 1914) ; Dickey, F. W., Che Presidential Preference Primary5 (in American Political Science Re¬ view, Vol. IX, pp. 467-487, Baltimore 1915) ; Fanning, C. E., (Selected Articles on Direct Primaries5 (Minneapolis 1911) ; Ford, H. J., (Rise and Growth of American Politics5 (New York 1898) ; Glasson, W. H., Che Australian Voting System5 (Durham, N. C., 1909) ; Gar¬ ner, J. W., (Introduction to Political Science5 (New York 1910) ; Griffith, E. C., (Rise and Development of the Gerrymander5 (Chicago

1907) ; Hart, A. B., (Exercise of the Suffrage5 (in Political Science Quarterly, Vol. VII, pp. 307-329, 1892) and (Actual Government5 (New York 1908) ; Haworth, P. L., Che Hayes- Tilden Disputed Presidential Election of 18765 (Cleveland 1906) ; Haynes, F. E., (Third Party Movements since the Civil War5 (in The Nation, Vol. Cl II, pp. 511-512, New York 1916) ; Haynes, H. G., Che Election of Senators5 (New York 1906) ; Humphrey, J. H., (Proportional Representation5 (London 1911) ; Jones, C. L., (Readings on Parties and Elections in the United States5 (New York 1912) ; Laprade, W. T., Che Nominating Primary5 (in North American Review, Vol. CC, pp. 235-243, New York 1914) ; Lowell, A. L., (Public Opinion and Popular Government5 (ib. 1913) ; Lowrie, S. G., Corrupt Practices at Elections5 (Madi¬ son, Wis., 1911) ; Luetscher, G. D., (Early Political Machinery in the United States5 (Philadelphia 1903) ; Ludington, A. C., Ameri¬ can Ballot Lawrs, 1888-19105 (Albany 1910) ;

Mechem, F. R., ‘Law of Public Offices and Officers) (Chicago 1890) ; McCrary, G. W., ‘American Law of Elections) (ib. 1897) ; McKinley, A. E., ‘Suffrage Franchise in the Thirteen English Colonies’ (Philadelphia 1905) ; Macauley, Ward, ‘Reclaiming the Bal¬ lot’ (New York 1916) ; MacMillan, D. C., ‘Elective Franchise in the United States’ (ib. 1898) ; Macy, Jesse, ‘Party Organization and Machinery’ (ib. 1912) ; Macy, Jesse, and Gan¬ naway, J. W., ‘Comparative Free Government’ (ib. 1915) ; Meyer, E. C., ‘Nominating Sys¬ tems’ (Madison, Wis., 1902) ; Merriam, C. E., ‘History of American Political Theories’ (New York 1910) and ‘Primary Elections’ (Chicago 1909); Michael, W. H., ‘Elections’ (in ‘Cyclopedia of Law and Procedure,’ Vol. XV, pp. 268-465, New York 1905) ; and also the articles ‘Vote’ (in id., Vol. XL, pp. 224-228, New York 1912) and ‘Ballot’ (in ‘Corpus Juris,’ Vol. VI, pp. 1173-75, ib. 1916) ; Ostro- gorski, M., ‘Democracy and the Party System in the United States’ (New York 1910) ; Potts, C. S., ‘The

Convention System and the Presi¬ dential Primary' (in American Review of Reviews, Vol. XLV, No. 5, pp. 561-566, New York 1912); Rhodes, J. F., 'History of the United States,' Vol. VII (ib. 1906) ; Ray, P. O., 'Introduction to Political Parties and Prac¬ tical Politics' (ib. 1913) ; Reinsch, P. S., 'American Legislatures and Legislative Meth¬ ods' (ib. 1907) ; Shaw, A., 'National Lesson from Adams County' (in Review of Reviews, Vol. XLIII, pp. 171-180, New York 1911) ; Shepard, E. F., 'Compulsory Voting' (ib. 1891) ; Schaffner, M. A., 'Corrupt Practices at Elections' (Madison, Wis., 1906) and 'The Recall' (ib. 1907) ; Stanwood, Edward, 'His¬ tory of the Presidency' (Boston 1912) ; Sloane, W. M., 'Party Government in the United States' (New York 1914) ; Taft, G. S., 'Senate Election Cases' (Washington, D. C., 1903) ; Throop, M. H., 'Law Relating to Public Offi¬ cers' (Chicago 1892) ; Tyson, R., 'Various Voting Systems' (in The Arena, Vol. XXXIX, pp. 59-64, 1908) ; Woodburn, J. A., 'Political Parties and Party Problems' (New York 1914) ; West, V. J., 'Nominations and Elec¬ tions' (in National Municipal Review, Vol. Ill, pp. 577-581, Philadelphia 1914) ; Wilcox, D. F., 'Government by all the People' (ib. 1912) ; Wigmore, J. H., 'The Australian Ballot Sys¬ tem' (Boston 1889) ; Woodruff, C. R., 'Elec¬ tion Reforms' (in National Municipal Review, Vol. V, pp. 611-619, Philadelphia 1916) ; 'Recent Experiments with the Primary' (in World's Work, Vol. XXIII, November 1916).

Irving E. Rines,

Editor of ' History of the United States .'

ELECTIONS, Contested. Under the Constitution, when the electoral college fails to cast a majority vote, the election of Presi¬ dent is referred to the House and of Vice- President to the Senate. The former decided the election of Jefferson in 1801 and of J. Q. Adams in 1829, and the latter elected R. M. Johnson Vice-President in 1837. But in 1876 a dispute arose over the validity of the elec¬ tion of rival groups of electors in four States (see Electoral Commission) and in 1887 Congress enacted a law providing that each State under its own laws should designate a tribunal to determine the legality of its elec¬

toral votes ; but should no such tribunal have been appointed in case of double returns, the vote of the State is lost unless the two houses agree as to which electoral votes from the State are the legal votes. Under Art. I, Sec. 5, 1

of the Constitution, each branch of Congress is the judge of the election, returns and quali¬ fications of its own members. Although

the law may be disregarded, the House usually conducts its investigations of contested elec¬ tions under sections 105 to 130 of the “Revised Statutes.” If an election is to be contested, notice must be given within 30 days after the result of the election has been determined; the same period is allowed for an answer; and the testimony must be taken within 90 days. In the House the task of investigating these con¬ tests is assigned to three committees, but in the Senate this work is performed by the com¬ mittee on elections. The investigating com¬ mittee is always controlled by the party which has a majority in that branch of Congress and its report is seldom rejected. In most of the States each branch of the legislature judges the elections and qualifications of its own mem¬ bers, and this power is granted also to the councils of many cities. As these bodies are supreme within their respective spheres of ac¬ tion, courts are without jurisdiction to hear and determine contested elections of their members. In half the States, the legislature is empowered to decide gubernatorial contests and contests over one or more of the other State offices, but in California, Delaware and Pennsylvania these contests are tried by a joint committee of both houses. In some States all elections are virtually decided by the legisla¬ ture sitting as the supreme canvassing board. If a specific mode of contesting elections has been provided by statute, that method alone can be employed. In the absence of any statutory proceeding the only common-law remedy is quo warranto proceedings, under which the court demands proof of the authority by which a person exercises the functions of an office and ousts him if he cannot show proper and legal authority. Strictly speaking a quo warranto proceeding is not a contest between two per¬ sons for the same office but merely determines if the person holding the office be or be not a usurper. If the incumbent be proved a usurper, the judgment is that he be ousted, whereupon the proper officials will execute the supposed will of the people by placing the candidate actu¬ ally elected in possession of the vacated office. Consult Michael, W. H., ‘Elections’ (in Cy¬ clopedia of Law and Procedure,’ Vol. XV, pp. 268-465, New York 1905) ; Mechem, F. R., ‘Law of Public Offices and Officers’ (Chicago 1890) ; McCrary, G. W., ‘American Law of Elections’ (Chicago 1897) ; Rammelkamp, C. H., ‘Contested Congressional Elections’ (in Political Science Quarterly, Vol. XX, pp. 421— 442, Boston 1905) ; Reinsch, P. S., ‘American Legislatures and Legislative Methods’ (New York 1907) ; Rowell, C. H., ‘Historical and Legal Digest of Contested Election Cases in the House of Representatives, 1789-1901’ (Wash¬ ington 1901) ; Taft, G. S., ‘Senate Election Cases’ (Washington 1903) ; ‘Compilation of Senate Election Cases, 1789-1913’ (‘Senate Document’ 1036, 62d Congress, 3d session, 1913) ; and authorities cited in article Elec¬ tions.

ELECTIONS, Federal Control of. Under the Constitution the Federal government pos¬ sesses a large measure of control over elections at which senators and representatives are chosen. Each State legislature possesses the power to prescribe the times, places and man¬ ner of holding Congressional elections but Con¬ gress is authorized to make entirely new regu¬ lations or to add to, modify or alter such regu¬ lations, save those relating to the choosing of senators (Art. I, Sec. IV, HI). In 1842 Con¬ gress provided that members of the House should be chosen by districts and this proce¬ dure is still in vogue ; an act passed in 1866 pre¬ scribed the manner of choosing senators by the State legislatures. On 31 May 1870 Congress enacted a law providing that all persons other¬ wise qualified should be granted the right to vote at all elections, irrespective of race, color or previous condition of servitude, this act being supplemented by another (28 Feb. 1871) relating particularly to the election of repre¬ sentatives. This act stipulated that voting should be by ballot and also provided for the appointment by circuit judges on application of election inspectors in cities, the main object being to break up the prevailing corrupt prac¬ tices. Federal courts subsequently declared un¬ constitutional some parts of this law and in 1894 the sections providing for Federal super¬ vision were repealed. On 2 Feb. 1872 Congress definitely established the Tuesday following the first Monday in November . (starting in 1876) as the date for Congressional elections but some exceptions to this rule were allowed under the amending act of 3 March 1875. Since that time (apart from the direct election of senators by constitutional amendment) the Federal gov¬ ernment has concerned itself chiefly with legis¬ lation pertaining to party activities, and pass¬ ing acts relating to corporation contributions to campaign funds, publicity of campaign funds, corrupt practices acts, etc. See Corrupt Prac¬ tices Acts ; Electors ; Elections, Contested.

ELECTIVE AFFINITIES, The. Goethe’s

The story deals primarily with a wedded couple into whose domestic circle two other persons are introduced; but of these four, the young girl Ottilie is the one upon whom our

attention is focused. The others, even the wife, persons of experience in the world, may be left to accommodate themselves to changed conditions; with Ottilie we profoundly sympa¬ thize ; for she, a being of celestial purity and devotedness, becomes unwittingly involved in

the toils of earthly life to which she is a stran¬ ger, and must by renunciation and death atone for an involuntary fault. Conceived in dra¬ matic terms, the theme might be said to be the conflict of individual right with social conven¬ tion. But Goethe's concern is not with any moral question or any dramatic demonstra¬ tion ; it is with the martyrdom of a hap¬ less maiden, considered in its psycho¬ logical aspect. The work, too restricted in scope to be called a novel, too diffuse to be a Novelle, is a study of singular penetration and completeness in the inner life of a beautiful soul. Translated by J. A. Froude and R. D. Boylan, London 1854. Consult (The German Classics) (New York 1913, Vol. II).

William G. Howard.

ELECTIVE AFFINITY, a term formerly used in chemistry, in connection with the sup¬ posed fact that when a given chemical substance is mixed with two or more others with which it is capable of combining, it will exhibit a preferential affinity for one of them, and com¬ bine with that to the exclusion of the others. This view of chemical action is now known to be incorrect. See Equilibrium, Chemical.

ELECTIVE COURSES and ELECTIVE STUDIES, as applied to colleges and univer¬ sities in particular, and to all schools in gen¬ eral, may be defined broadly as that principle in education which permits the student to choose his own subjects of study during the time of attendance at school.

The "elective® or "optional® feature of edu¬ cational systems is not new: it was in exist¬ ence in many of the leading schools of the Me¬ diaeval Ages, and even earlier. In the United States the principle first appeared in the cur¬ riculum of the University of Virginia in 1819. Harvard introduced it in 1826, and from that time on it received more or less recognition throughout the country. However, so few availed themselves of the privilege of making the elective choice that more and more it came to be required that students should pursue certain studies in order to obtain the degree of bachelor of arts ; and such restriction eventually led to the exclusion of all studies that did not contribute to the obtaining of the desired de¬ gree. Gradually the secondary schools adopted compulsory courses of study preparatory for colleges, and crowded out many of the studies that might fit the student for business life without going the college road. The special commercial, scientific and art schools came into existence to meet the wants and needs of a large number of students. In the meantime, the addition of many new branches of study so enlarged the educational resources of the larger institutions that a selection of studies became a

necessity, and it seemed wise to al¬ low the student to elect a course which should definitely aid him in preparing for a chosen occupation after leaving college. The difficulty experienced in the extension of the elective course has been found in the fact that the choice made by the untutored mind of the average

student was likely to be ill-balanced. This de¬ fect is overcome where able instructors, those who understand human nature and its needs, guide the immature student ; or, to use the mod¬ ern term, where there are wise <(advisers.** Present practice shows a wide variation from administrations where the entire course is rigidly prescribed to those where every study is elective. In most colleges a part of the course is prescribed and the remainder elec¬ tive. The tendency, however, is toward a system in which, while there are prescribed courses, the student is encouraged or perhaps required to concentrate his energies on some special line of study, and to round out his course with studies wholly elective, with the advice of the professors. In order to ascer¬ tain what colleges and universities sanction elec¬ tive courses it is necessary to obtain the lat¬ est changes direct from the college authorities. As an illustration of the policy of the edu¬ cational institutions in the United States the following summary gathered from 29 State uni¬ versities and 55 other colleges and universities is of interest. English is required in 78 of these institutions: it is elective in 6. One (at least) foreign language is required in 68; elective in 14. Mathematics is required in 61 : elective in 23. Natural science is required in 52 : elective in 32. History is required in 41 : elective in 43. Physical education is required in 38: elective in 46. Philosophy is required in 32: elective in 52. Psychology is required in 21 : elective in 63.

Consult Adams, (Evolution of Educational Theory * (1912) ; Baker, (American Problems-* (1907) ; Burns, (Elective System of Studies in Colleges* (Catholic World, Vol. LXXI, 366) ; Eliot, (Educational Reform* (1905) ; and As¬ says and Addresses* (1909) ; Foster, Adminis¬ tration of the College Curriculum* (1911) ; Hanus, (Problem of Electives* (Popular Sci¬ ence Monthly, Vol. LVIII, 58) ; Phillips, (Electives in American Education* (Pedagogi¬ cal Seminary, Vol. VIII, 206) ; Shaler, Thur- ber and others. (Elective Studies in Second¬ ary Schools* (Educational Review, Vol. XV, 417) ; Thurber, (Some Problems of the Elec¬ tive System* (School Review, Vol. IX, 79).

ELECTIVE MONARCHY. See Mon¬

archy.

ELECTORAL COLLEGE. See Electors.

ELECTORAL COMMISSION, 1877. The

electoral vote in the presidential election of 1876 showed 184 undisputed votes for Tilden; 163 for Hayes; four States with 23 votes — South Carolina, 7; Florida, 4; Louisiana, 8; Oregon, 3 — Sent in conflicting returns. If the Republi¬ cans won all the contests, Hayes was elected by one vote. Of these States, the first three re¬ turned popular majorities for Tilden electors; but the ((carpet-bag** governments in each had constituted (

Democrats ousted a Hayes elector on a techni¬ cality and replaced him by a Tilden one, as a basis of compromise or a menace. Obviously, the Republicans could not compromise anything and win ; and as they held the administration and the army, they could defy threats. The Senate was Republican, the House Democratic; there was therefore a deadlock on the admis¬ sion of returns, as the 22d Joint Rule, throwing out disputed States, had been repealed by the Senate 20 January for this very emergency. Finally, as an alternative to a most dangerous anarchy, both sides agreed on a joint commis¬ sion to pass on all the contests ; the Democrats being confident that it could establish no guid¬ ing principle whatever, of going behind the returns or not, accepting or rejecting State cer¬ tificates as conclusive, which would riot give them at least one of the disputed States. They underestimated the intellectual resources of their opponents. The act creating the commission was approved 29 Jan. 1877 ; its decisions could only be reversed by concurrent action of both Houses. The body was to be composed of five members of each House and five associate jus¬ tices of the Supreme Court; the latter as indi— cated were two Republicans and two Demo¬ crats, and were to select a fifth. The Senate appointed three Republicans, — G. F. Edmunds of Vermont, O. P. Morton of Indiana and F. T. Frelinghuysen of New Jersey; and two Democrats, — T. F. Bayard of Delaware and A. G. Thurman of Ohio, the latter taken sick and replaced by Francis Kernan of New York. The House appointed three Democrats, — H. B. Payne of Ohio, Eppa Hunton of Virginia and J. G. Abbott of Massachusetts ; and two Re¬ publicans, — J. A. Garfield of Ohio and G. F. Hoar of Massachusetts. Obviously, therefore, the odd justice would have the deciding voice. The Republican judges were William Strong and Samuel F. Miller; the Democratic, Nathan Clifford and Stephen J. Field; they chose Joseph

P. Bradley as the fifth. The counsel were — Democratic, Charles O'Connor of New York, Jeremiah S. Black of Pennsylvania, Ly¬ man Trumbull of Illinois, R. T. Merrick of the District of Columbia, Ashbel Green of New Jersey, Matthew H. Carpenter of Wisconsin, George Hoadley of Ohio, W. C. Whitney of New York; Republicans, W. M. Evarts and E. W. Stoughton of New York, Stanley Mat¬ thews and Samuel Shellabarger of Ohio. Other lawyers appeared on special points. The States were taken up in alphabetical order, — Florida, Louisiana, Oregon, South Carolina, — and the vote upon each was eight to seven for the Re¬ publicans, on every contested point, Mr. Justice Bradley sustaining all the contentions of that side and the Republican candidate was de¬ clared elected. The broad decision was, that Congress cannot, as it had done repeatedly be¬ fore, go behind the returns and take evidence as to the manner in which State majorities for electors have been obtained. On other points the decisions varied with the cases. In partic¬ ular, the Democrats contended that the question as to the eligibility of an elector who is also a government official — a combination forbidden by the Constitution — was decided in two dif¬ ferent ways within two days, on the Florida and Louisiana cases, in both to the profit of the Republicans; and Judge Bradley published a defense of his action. The court adjourned

sine die on 2 March. The peaceful acceptance of the decision was much helped by the Demo¬ cratic speaker, Randall of Pennsylvania, who firmly checked all Democratic attempts to ˆfilibuster.® The proceedings of the Commis¬ sion may be found in the Congressional Record* (Vol. V, Part IV, 1877). Consult Haworth, (The Hayes-Tilden Disputed Presi¬ dential Election of 1876) (Cleveland 1906).

ELECTORAL FRAUDS AND SAFE¬ GUARDS AGAINST. The most common electoral fraud is bribery (q.v.), consisting of the gift of money or the promise of some re¬ ward either to vote (< right® or to remain away from the polls. Employers of labor have been accused of attempting to influence the votes of their employees by threats of loss of work, re¬ duced wages, etc. ; physical violence has been used many times ; and sometimes the threatened loss of social caste has operated to sway the voter. Priests have no right, either in or out of the pulpit, to influence electors to vote a particular way, by threats of excommunication, refusal of the sacrament and the like, and if they do so, it is, according to court decisions, an undue influence which may

vitiate the elec¬ tion. The insertion of fictitious names on the roll, the registration of non-residents or non¬ citizens, etc., is almost impossible under present methods of registration. One source of election evil is found in faulty methods of identifying voters. The fraud that results takes the form of ((impersonation® (voting on another man's name), or ((repeating® (voting more than once). Sometimes forged naturalization papers are issued to prevent the discovery of fraudulent voting. Floaters are employed in many cases, especially in the crowded districts where elec¬ tion officials do not know the individual voters. Where a party has too many votes in one precinct and too few in another, colonization is sometimes practised (see Blocks of Five; and in this connection see also Gerrymander) ; groups of actual voters may be transferred from a (

they tally with the number of ballots in the box. Various methods are employed to destroy the efficacy of a ballot after it has been marked by the voter. False counting of ballots has been an easy and common way to vitiate elec¬ tion results. Knavish counters may nullify bal¬ lots by adding marks or altering them ; ballots may be rejected on trivial grounds; and some¬ times ballot boxes may be stuffed before the polls open. Defective ballots may be printed by omitting or shifting the position of candi¬ dates' names.

Election frauds developed early, and an es¬ pecial abuse was the temporary conveyancing of lands, so as to enable the grantees to vote for a certain candidate. The election laws of Rhode Island, New Jersey and Virginia for the decade 1760-70 declared penalties for these frauds. The illicit use of money in elections began almost at the beginning of political his¬ tory in America. Rhode Island, for instance, found it necessary to pass a general act against bribery and corruption in 1737, and 10 years later replaced it with one even more stringent. Judging by its provisions the evil must have been persistent in that colony. On 14 Oct. 1643 the General Court of Massachusetts ordered <(that if any freeman shall put in more than one paper or beane for the choyce of any officer, he shall forfett 10s Id for every offence; and any man that is not free, putting in any vote, shall forfett the like somme of 10s Id.® The other New England colonies found no such laws necessary, but all the others had them save New York and Maryland. In England the pur¬ chase of votes was for centuries as natural a thing as the sale of boroughs, and no serious attempt to prevent it was made until 1854, when the Corrupt Practices Prevention Act defined bribery, forbade certain petty expenditures and required publicity of election expenses of a certain character. Despite this and other legis¬ lation, the evil did not greatly diminish and in 1883 a more drastic measure was adopted, which has served as a

model for legislation else¬ where. In England and Scotland if the number of electors does not exceed* 2,000, the Parlia¬ mentary candidate's maximum allowance for expenses is £380, with an additional £30 for every 1,000 electors above 2,000. In Ireland (which contains many small borough elec¬ torates), where the number does not exceed 500, £200; exceeds 500 but does not exceed 1,000, £250; exceeds 1,000 but does not exceed 1,500, £275. After this number has been reached, the rate is the same as in England. In the coun¬ ties where the number of electors does exceed 2,000 (in England and Scotland) the maxi¬ mum allowance is £650, with an additional £60 for every complete 1,000 above 2,000. In Ireland, for the same number of electors, the maximum allowance is £500 and £540 respect¬ ively, with an additional £40 for every com¬ plete 1,000 above 2,000. These items do not include returning officers' fees or the personal expenses of candidates. In the United States all the States have enacted laws penalizing those who commit offenses against the suffrage. Most of the States have provided means to control the use of money in elections, some limiting the amount that may be expended by each candi¬ date and compelling a sworn statement of re¬ ceipts and expenditures ; some defining the ob¬ jects for \vhich money may be spent; some re

quiring campaign financial committees to render a detailed statement of sources of receipts and objects of expenditures; and many prohibiting absolutely the gift of money or property to any political party, committee or organization by any corporation or joint-stock company. The more recent enactment of direct primary, initia¬ tive, referendum and recall measures (qq.v.) has also done much to rid politics of corrupt influence. Moreover, if at all possible, the courts prefer to give effect to elections, particu¬ larly if they give evidence of having been con¬ ducted fairly and honestly; and even the most glaring irregularities not actually constituting fraud have been held not to invalidate an elec¬ tion. See Corrupt Practices Acts; Ballot, etc. Consult Brooks, R. C., Corruption in American Politics and Life) (New York 1910) ; Ford, H. J., (Rise and Growth of American Politics) (ib. 1898) ; Griffith, E. C, (Rise and Development of the Gerrymander (Chicago 1907) ; Lowrie, S. G., Corrupt Practices at Elections) (Madison, Wis., 1911) ; Shaw, A., (National Lesson from Adams County* (in Review of Reviews , Vol. XLIII, pp. 171-180, New York 1911) ; Schaffner, M. A., Corrupt Practices at Elections* (Madison, Wis., 1906) ; and authorities cited under article Corrupt Practices

Acts.

ELECTORAL QUALIFICATIONS; TERMS OF AND QUALIFICATIONS FOR OFFICE. — The theory that suffrage is a natural, inherent right, belonging to every man, is now generally discredited. Political rights are not essential to citizenship, and in a dissenting opinion in the case of Amy vs. Smith (1 Litt. [Ky.], 326, 333, 342), one judge said :

“A State may deny all her political rights to an individual and yet he may be a citizen. The rights of office and suffrage are political purely, and are denied by some or all the States to part of their population, who are still citizens. A citizen, then, is one who owes to government allegiance, service, and money by way of taxation, and to whom the government, in turn, grants and guarantees liberty of person and of con¬ science, the right of acquiring and possessing property, of marriage and social relations, of suit and defence, and security in person, estate and reputation. These, with some others which might be enumerated, being guaranteed and secured by government, constitute a citizen.”

Again the Supreme Court has held that —

“The fact that one is a subject or citizen determines nothing as to his rights as such. They vary in different localities and according to circumstances. Citizenship has no necessary connection with the franchise of voting, eligi¬ bility to office, or indeed with any other rights, civil or political. Women, minors, and persons non compos are citizens and not the less so on account of their disabilities.” (United States vs. Rhodes, 1866, Abb. U. S. 28, Fed. Cas. No. 16,151; see also Minor vs. Happersett, 1874, 21 Wall. 162).

That suffrage cannot be termed a “right** is obvious since no community can ever enfran¬ chise all its citizens, two-fifths of whom are ex¬ cluded from participation in governmental affairs because legally they are infants and, as such, unfitted to cope with government prob¬ lems to the benefit of the State. Hence there is no necessary relation between citizenship and the right to vote. Minors and women (the lat¬ ter save in those States having woman suffrage) do not usually possess the right to vote, al¬ though they are citizens ; and on the other hand, some States and many municipalities permit persons to vote who have no claim to citizenship merely because they are residents and possess the other qualifications. Such a thing as the “popular vote® does not exist since millions of

women have not yet been vested with full suf¬ frage ; in many States

bigamists, bribers, idiots, insane persons, etc., cannot vote ; certain classes of foreigners may never exercise the elective franchise; paupers, as dependents, do not participate in shaping the government on which they are a burden and to which they contribute nothing; and the criminal, by his very acts, has exhibited his total incapacity to understand his citizenship privileges. Nevertheless, and in spite of the above restrictions, the suffrage is gradually widening and broadening, partly due to the progress of woman suffrage.

The Right to Vote and the Power to Con¬ fer It. — As previously stated, the elective fran¬ chise is a privilege rather than a natural right; its extension to any excluded class is a ques¬ tion of political expediency; it may be taken away by the power which conferred it and if this be done no vested right is violated nor bill of attainder passed. Subject to the restric¬ tions of the national Constitution as to race, color and previous condition of servitude, each State possesses the supreme and exclusive power to regulate the right of suffrage and to define the qualifications of its voters, however unwise, unjust or even tyrannical its regula¬ tions may be or seem to be in this regard. Hence the clauses in some State constitutions requiring of voters the ability to read, under¬ stand or interpret reasonably any section of such constitutions are not in contravention of the United States Constitution. Once granted by a State constitution, the right to vote can¬ not be abridged by the legislature; if they be fixed by the constitution that body cannot add to the qualifications of voters nor create other classes of voters, nor dispense with any of the constitutional qualifications nor enact provisions ipiposing upon a particular class of citizens conditions and requirements not imposed upon all others. On the other hand, the legislature may enact laws to regulate the exercise of the elective franchise, if those laws do not deny the right of the franchise itself. Under the national Constitution Congress cannot prescribe the qualifications of electors in the States, but Congress may penalize a criminal by forfeiting his United States citizenship, and if under the State constitution only United States citizens are allowed to vote, Congress may thus deprive a person of the opportunity to enjoy a right which belongs to him as a citizen of the State, even the right of voting, but cannot deprive him of the right itself. The Constitution does not confer the right of suffrage upon anyone indi¬ vidually nor upon any class of persons — the United States has no voters of its own creation in the States. It is true that the Fifteenth Amendment is usually interpreted as giving the negro the right to vote, but it merely exempts from discrimination in the exercise of the elective franchise and no negro possesses the right to vote unless he conform to all the qualifications and restrictions

imposed by the State constitutions upon white voters. But Congress may punish any State official who re¬ fuses to perform the duties necessary to qualify all colored citizens. Thus the right to vote in the States is conferred by the States but the right of exemption from the prohibited dis¬ crimination comes from the national govern¬ ment.

The Constitution says that Congressmen

shall be chosen by the people of the several States and that ((the electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legis¬ lature® (Art. 1, § 2, 1). The States do not

define who shall vote for Congressmen but merely prescribe the qualifications of those who vote for the popular branch of their own legis¬ latures and the Constitution says that the same persons vote for Congressmen. Hence Con¬ gressional electors do not owe their right to vote to the State law in any sense which makes the exercise of the right exclusively dependent on the law of the State. Since the right to vote is not natural, the State, unless expressly prohibited by its constitution, may confer the right only on those who pay taxes for the sup¬ port of the government ; and even though the constitution' fix the qualifications of voters at general elections, yet the legislature, in grant¬ ing municipal charters and providing for special local elections, may make the payment of taxes a condition precedent to the right to vote at such elections. If United States citizenship be a requisite qualification of an elector, a for¬ feiture of that citizenship will disqualify him, provided a regular legal trial and conviction be shown. Many of the State constitutions pro¬ vide that persons convicted of infamous crimes or crimes of a high degree lose the privilege of voting and it has been held also that a convic¬ tion of crime of a disqualifying nature in a Federal court has the effect to exclude the per¬ son convicted from office and suffrage the same as if he had been convicted in a State court. A general absolute pardon of the executive re¬ stores the convicted person to the full enjoy¬ ment of his civil rights, including the right to vote, and a Presidential pardon likewise re¬ stores the right to those convicted in Federal courts, but while a Presidential pardon restores the criminal to the rights and privileges of a citizen of the United States, it does not, without the assent of the State, restore him to the ex¬ ercise of that right if the sovereign power of the State has excluded him from the

right of suffrage. Unless pardoned by the executive, ex-convicts continue to be disfranchised. In this connection the existence of a double citizenship in the United States should be men¬ tioned. One authority says :

“There is a clear distinction between national citizenship and State citizenship. ... A person who is a citizen of the United States and a resident of a particular State is necessarily a citizen of that State. On the other hand a person may be a citizen of the United States and not a citizen of any particular State. This is the condition of citizens residing in the District of Columbia, and in the territories of the United States, or who have taken up a residence abroad. So a person may be a citizen of a particular State and not a citizen of the United States, as an alien who has declared his intention to become a citizen and who is by local law entitled to vote in the State of his residence and there to exercise all other local functions of local citizenship, such as holding office, the right to poor relief, etc., but who is not a citizen of the United States. Nothing which a State can do will invest a foreigner with the rights and privileges of a citizen of the United States.” (‘Corpus Juris,’ Vol. XI, p.

777).

Colonial Electoral Qualifications. — The

principal qualification required of the early colonial electors was that they should be ((free- men,® a term of various interpretations even in the colonies themselves, but held generally to mean persons of recognized responsibility. In Virginia and North Carolina, Indians and negroes were not allowed to vote. In South

Carolina and Georgia the privilege was re¬ stricted to white men, but the law was not rigidly enforced, for free negroes were re¬ corded as voting in South Carolina in 1701. In Pennsylvania only natural-born subjects of England could vote; in Massachusetts, after 1664, only Englishmen could vote. In South Carolina, however, the French Huguenots had equal franchise with the English <(freemen.® In general, the voter was required to be of goo'd moral character and obedient to the laws ; immoral behavior might result either in tem¬ porary or permanent disfranchisement. In Ply¬ mouth voters were to be ((orthodox in the fundamentals of religion.® Massachusetts in 1631 demanded also, <(to the end that the body of the freemen may be preserved of honest and good men,® that ((henceforth no man shall be admitted to the freedom of the com¬ monwealth but such as are members of some of the churches within the limits of this juris¬

diction.® This provision, however, lasted only until 1664 or 1665. Massachusetts excluded Quakers, but they were permitted to vote in Rhode Island and Connecticut, which colonies did not specify church membership; while in the other colonies their reluctance to take oaths usually operated to debar them from the fran¬ chise. In most of the colonies Roman Cath¬ olics were not allowed to vote, New Haven and, for a time, Maryland being notable ex¬ ceptions. New York excluded Catholics in 1701 and Jews in 1737. Virginia was the only colony specifically debarring women from the franchise, though they were effectually ex¬ cluded in South Carolina, Georgia and Dela¬ ware; but the others incidentally excluded them by according the vote only to (

ELECTORAL QUALIFICATIONS

73

Broadening of the Suffrage. — When the Constitution was framed in 1787 suffrage quali¬ fications were so divergent in the various States that no attempt was made to impose restric¬ tions and the States were allowed to modify their electoral qualifications as they deemed wise, the only restriction being that contained in Article I, § 2, ft 1 which provides that Con¬ gressmen shall be elected by people in the vari¬ ous States (

Modern Electoral Qualifications. — Most of the States have uniform laws for electors of every officer to be elected in the State, though this statement must be qualified as to those States which permit women to vote in the election of school boards or committees, or which allow women who are taxpayers to vote upon financial measures. Unlike some Euro- pean countries, such as Germany, the vote of the lodging-house dweller, the loafer, etc., in

the United States carries as much weight in the election as the vote of the wealthiest or most distinguished citizen. Most of the States require that their voters be full-fledged United States citizens. As a rule the State constitu¬ tions require that a voter be a male, at least 21 years of age, who is a citizen of the United States, either native or naturalized, and can

read or write English or both. The ˆmale® provision, of course, is inoperative in those

States wherein women enjoy the suffrage. Some States, particularly those that are anxious to obtain immigrants as agricultural laborers,

extend the privilege of voting to an alien who has declared his intention of becoming a citi¬ zen and has resided in the State a certain

period of time before election — usually six months to a year. Such a voter is not bound ■by an oath of allegiance to the United States nor has he foresworn allegiance to his native land; hence a situation might arise under

which this voter would help elect the officers of the United States government and the next day the United States might become involved in a dispute with the government of his native country over some question respecting his citi¬ zenship. Courts have ruled that if a father become a naturalized citizen of the United States before his son shall have attained his majority, the latter, though alien-born, ipso-facto becomes a citizen and need not undergo the formality of naturalization if dwelling within the United States ((Revised Statutes,) Title XXX, § 2172) ; but the son of an alien cannot be vested with citizenship by implica¬ tion merely because the father declared his in¬ tention of becoming a citizen prior to the time the son attained his majority. Basing his state¬ ments on court decisions, one authority says :

“While it has been held that citizenship will not be pre¬ sumed merely from the fact of having owned real estate, having voted, or having held an elective office, it seems that having participated in elections and having held elective offices are facts strongly tending to establish at least a prima facie case of citizenship; and it has been held that, where the State confers the right of State citizenship on aliens who have declared their intentions to become citizens of the United States, the act of voting is conclusive proof of an acceptance of such State citizenship by them.” (‘ Corpus Juris,’ Vol. XI, p. 787).

Some States enfranchise men of Indian de¬ scent, native of the United States, while others grant the privilege to Indians who have been declared citizens of the United States by act of Congress and to civilized Indians, not mem¬ bers of any tribe. As a rule, idiots, insane per¬ sons and felons are not allowed to vote and sometimes vagrants, paupers, persons convicted of treason, bribers, embezzlers, bigamists, Chi¬ nese, etc., are excluded. Some constitutions state that United States soldiers and seamen gain no voting residence by being stationed in the State, while the residents of the District of Columbia, when it became the seat of the general government, lost the right to vote therein for national officers or on matters of national concern.

Educational and Other Tests. — The edu¬ cational, property, tax, and

good character tests, grandfather clauses, etc., have operated to exclude many thousands of voters — particu¬ larly the negro voters of the South. Connecti¬ cut in 1854 and Massachusetts in 1856 led the other States in requiring of voters the ability to read the constitution and (in Massachu-

setts) to write their own names. To some extent the national naturalization laws have offset the effects of these tests since an appli¬ cant for citizenship must sign the application in his own handwriting and when taking out his final papers must be able to speak the Eng¬ lish language. (See Aliens; Citizenship in the United States; Naturalization). The exclusion of the negro in the South was undertaken to assure permanence of white rule, since the negro, during the Re¬ construction period, had displayed a total unfitness to govern. Constitutional amend¬ ments were adopted to attain this end by law rather than by force, intimidation or fraud. In addition to a new registration law, already in vogue, the Mississippi constitution of 1890 required that a prospective voter be registered, a payer of a poll tax, and, after 1 Jan. 1892, able to read any portion of the constitution or to understand it when read to him, or to render a reasonably accurate interpretation of it. The South Carolina constitution of 1895 permitted the registration of an otherwise qualified per¬ son, ((provided that he can both read and write any section of this constitution submitted to him by the registration officer, or can show that he owns and has paid all taxes collectible during the previous year on property in this State assessed at $300 or more.® The Louisiana constitution of 1898 contained similar clauses, but for would-be voters, who might be excluded by these tests, the constitution pro¬ vided that any male person ((who was on 1 Jan. 1867, or at any date prior thereto, entitled to vote under the constitution or statutes of any State of the United States, wherein he then resided, and any son or grandson of any such person not less than twenty-one years of age at the date of the adoption of this Constitution® should be allowed to register and vote at all elections without possessing the educational or property qualifications. In 1901 Alabama incorporated a provision requiring that voters be of <(good character® and <(under- stand the duties and obligations of citizenship under a republican form of government.® Vir¬ ginia has imitated this qualification. (See also United States — Suffrage in the). The consti¬ tutionality of these provisions has not been definitely decided by the Supreme Court, though several cases have been

considered. Re¬ garding the Mississippi constitution (Williams vs. Mississippi, 170 U. S. 213), the Court de¬ clared that the qualifications did not (

On 21 June 1915 the Supreme Court de¬ clared void the <(grandfather clauses® of the Maryland and Oklahoma constitutions. In Maryland the clause was inserted in laws gov¬ erning elections in various cities. In 1908 it

was inserted in the lav/ governing municipal elections in the city of Annapolis. It author¬ ized the registration as voters of all taxpayers of the city assessed for at least $500; all duly naturalized citizens, all male children of nat¬ uralized citizens 21 years of age, and (

“No person shall be registered as an elector of this State or be allowed to vote in any election herein unless he shall be able to read and write any section of the Constitution of the State of Oklahoma; but no person who was on Jan. 1, 1866, or at any time prior thereto, entitled to vote under any form of government, or who at any time resided in some foreign nation and no lineal descendant of such person shall be denied the right to register and vote because of his inability to so read and write sections of such Constitution.”

The contentions of the election officers as plaintiffs in error, really setting forth the posi¬ tion of the State, are thus outlined by the chief justice :

“It said the States have the power to fix standards for suffrage and that power was not taken away by the Fifteenth Amendment, but only limited to the extent of the prohibitions which the amendment established. This being true, as the standard fixed does not in terms make any discrimination on account of race, color or previous condition of servitude, since all, whether negro or white, who come within its require¬ ments, enjoy the privilege of voting, there is no ground upon which to rest the contention that the provision violates the Fifteenth Amendment. This, it is insisted, must be the case unless it is intended to expressly deny the State’s right to provide a standard for suffrage, or what is equivalent thereto, to assert: (a) That the judgment of the State exercised in the execution of that power is subject to Federal judicial review or to supervision, or (b) that it may be questioned or be brought within the prohibitions of the amendment by attributing to the legislative authority an occult motive to violate the amendment or by assuming that an exercise of the otherwise lawful power may be invalidated because of conclusions concerning its operation in practical execution and resulting discrimination

arising therefrom, albeit such discrimination was not expressed in the standard fixed or fairly to be implied, but simply arose from ineaualities naturally inhering in those who must come within the standard in order to enjoy the right to vote.”

The government insisted, on the other hand, that the ((real question involved is the repug¬ nancy of the standard which the amendment makes, based upon the conditions existing on 1 Jan. 1866, because on its face and inherently considering the substance of things, that stand¬ ard is a mere denial of the restrictions imposed by the prohibitions of the Fifteenth Amend¬ ment and by necessary result creates and per¬ petuates the very conditions which the amend¬ ment was intended to destroy.®

The chief justice summed up the opinion of the court in these words :

“There seems no escape from the conclusion that to hold that there was even possibility for dispute on the subject would be but to declare that the Fifteenth Amendment not only had the self-executing power which it has been recognized to have, from the beginning, but that its provisions were wholly inoperative because susceptible of being rendered inapplicable by mere forms of expression embodying no exercise of judgment and resting upon no discernible reason other than the purpose to disregard the prohibitions of the amendment by creating a standard of voting which on its face was in substance but a revitalization of the conditions which, when they prevailed in the past, had been destroyed by the self-operative force of the amendment. . . It

is true it contains no express words of an exclusion, from the standard which it established, of any persons on account of race, color, or previous condition of servitude prohibited by the Fifteenth Amendment, but the standard itself inher¬ ently brings that result to existence, since it is based purely on a period of time before the enactment of the Fifteenth Amendment and makes that period the controlling and domi¬ nant test of the right of suffrage.

“We are unable to discover how, unless the prohibitions of the fifteenth Amendment were considered, the slightest reason was afforded for basing the classification upon a period of time prior to the Fifteenth Amendment. Cer¬ tainly it cannot be said that there was any

peculiar necromancy in the time named which engendered attributes affecting the qualification to vote which would not exist at another and different period unless the Fifteenth Amendment was in view."

The Court took the view that under ordi¬ nary circumstances the State should decide the question whether the nullification of the excep¬ tions of the grandfather clause would at the same time make void the general literacy test to which it was appended. In the absence of a decision by a State court the Chief Justice, however, said that the Federal tribunal would pass upon the question. Ordinarily a provision like the literary test, which is legal in itself, would not be destroyed by the wiping out of an illegal accompanying provision. But the plain meaning of the Oklahoma constitution was that the reading test should not be used to disqual¬ ify lineal descendants of voters prior to 1866. As this would be accomplished in many cases by continuing the reading test without the of¬ fensive exemptions, the whole provision was stricken out. Accordingly in 1916 the Oklahoma legislature passed a proposed constitutional amendment (approved by the governor 21 Feb. 1916), which prohibited any property qualifi¬ cation ; it contained the reading and writing clause but this clause was inoperative if, prior to the adoption of the amendment, a prospec¬ tive elector had served in the land or naval forces of the United States or of any State or foreign nation, or in the Revolution, War of 1812, Mexican War, or on either side in the Indian wars or the Civil War; and all lawful descendants of such persons were included. But this amendment was rejected at the election of August 1916 and now the only restriction on suffrage in Oklahoma is a universal registration act passed by a special session of the legisla¬ ture in 1916.

Residence and Absentee Voting. — Gener¬ ally speaking, an elector must vote in the pre¬ cinct wherein he resides, if he have a fixed place of abode. As employed in the statutes and constitutions in defining political rights, a residence is synonymous with home or domicile, denoting a permanent dwelling place to which the party when absent intends to return. An absence for months or even years, provided the party intended it merely as a temporary ar¬ rangement, after which he would occupy his former home, would not constitute an abandon¬ ment of such residence or home or deprive the party of his right to vote thereat. But the mere act of abiding in a place for a definite time and for a specific purpose, with no present intention of remaining and making it a per¬ manent home, would not constitute a residence entitling the party to . vote. A person who re¬ moves from the jurisdiction, intending to re¬ main, thereby loses his residence, even though he may afterward change his intention and return ; nor can he vote until he has re-estab¬

lished his residence by remaining in the juris¬ diction the statutory period. Courts have held, however, that where a person is a bona-fide resident of a county but has no fixed residence or domicile in any particular precinct therein, he may vote in any precinct wherein he may happen to be on election day. In 1915 Vermont enacted a law permitting a voter who changed his residence within 15 days prior to election to vote in the town to which he moved ; conversely Connecticut and California allowed the voter to retain a voting residence in the town from which he moved. Colorado, Iowa, Michigan, Montana, Washington and Wisconsin passed laws permitting voters absent from their home precincts to vote elsewhere in the State. In 1916 Virginia and Oklahoma provided for ab¬ sentee voting, the former allowing absent elec¬ tors to vote by registered mail and the latter permitting an elector absent from his county to vote in another precinct. Absentee voting occurs sometimes when large bodies of citizens are called into some branch of governmental service, such as the arm}' ; this happened in the elections of 1916 and 1917 when the National Guard troops were on the Mexican border, or in France or in cantonments preparing for serv¬ ice abroad, special provisions being made for the balloting at the camps. In the election of November 1917 Massachusetts adopted an amendment enabling the legislature to establish arrangements for absentee voting.

Voting in Territories and Dependencies. — As previously stated, residents of the Dis¬ trict of Columbia do not vote, the government being in the hands of a board of commission¬ ers appointed by the President. From 1802 to 1855 white taxpayers were permitted to vote for local officers ; subsequently the taxpaying qualification was eliminated ; in 1867 all adult male citizens white or black were granted the franchise if not disqualified by the Fourteenth Amendment; but in 1874 all suffrage rights were abrogated. Prior to becoming a territory of the United States, Hawaii required that electors of members of the senate be possessed of a substantial amount of property, but under the organic act of 1900 all persons may vote who are duly registered citizens of the United States, 21 years of age, resident in the islands one year or more, and who can speak, read and write either the English or Hawaiian language ; hence Chinese* and Japanese are excluded. In Porto Rico all male citizens, 21 years of age or over, who had resided in the island one year might vote if they passed a property or an edu¬ cational test similar to that of South Carolina, but in 1904 a law was passed renewing the property qualification and requiring that after 1906 all registrants should be able to read and write, but permitting those who already were voters to continue their exercise of the voting privilege. In 1907, in his

proclamation for an election of delegates to the Philippine assem¬ bly, President Roosevelt denied the right of representation to the Moros and other non- Christian tribes, and required that each voter be capable of reading, writing or speaking Eng¬ lish or Spanish, that he be an owner of prop¬ erty or a taxpayer, and that he take an oath of allegiance. In Alaska both men and women enjoy full suffrage rights.

ELECTORAL QUALIFICATIONS

c/3

03

4->

03

>

'•P

Cd

G

u

o>

CO O

SI

4~>

.20

03 rH Vi

> c o

Sz

G

cd oo

BG:

Vi

03 c/2

•go

O v

rG C/2

,5f c

P4

V-T

r- crj

gs

p.y

p *

*H

8U

4_,P 00

P cd h

^•S o o °

~i £ S

di

a^.e

PP c/d c -i 7

a ^

n.^

(/}

Vh

cd 0)

•?-S

6 53

« £3

- «

g-g

.2 03

•2 6 £ <

Vh

O

> >

o

as

Vi

0)

CD

rG

a

P

C/3

rG

4- >

C/3 + - > G aj

73

G

5< (1)

O CJ „ C/3 C/3 T

73

°«§

3

w-r) t-. d) g dl •H Sx! o c« y

2 05 y

53.2 3

p -b.9* °t3p«««

g 0

OP N g

a;-”

y,

■y ca

•n.o

a> cd

2 2

O cd

y

— . cd u-.

PIP? tS

tS

5 ^ k-J

g O^1

G’

o

c/3

Vi

(13

O G

aJ

C/3 O

g ug

(n’t

2 2 5 ’4? y :

y O 3 (j a • O 2 . Soti £ u £ & o cd S

CO

C/3

CD

Vi

03

CU

o

Vi

a

Vh

O

X

aJ

H

7? rH U Q3

g O CD

- 3’^

7~{ <41 ^ (

tj 1) o 1 0

y a p

4^,^-H O

o’mfl ^

co _C .. I- 4-> +J OJ (U w

35 c £ 2^ & >> 2 wop

oo), p cd X * C py rtpq O

£ G c

x o-

■2 *->p

aJ r-j LM CD 7

o >>42

P 2P<« g.S o

S’d

p 03 c/D >» O 03 Cd 03 Vi

_ y go

c/D cd < + i

3*

5?p y o aS

03

$ g

y o

°>.S

4-> Vh

... Vi O 03 g~ -M Pi 2 cd O o

■p VfO

C/3 P < 4&

C/3

Vi

OS

03

o

vO

03

Vi

03

£

rH C/3

^ Tj

O’ i:

r-H 03

sl

y o

4)

M oj

O, 5 in

O ° —

a2 _ o c C > O

° >,‘D’

% g-s’

X g °

o3

■y 0 O

O

C/3 ►. C/3

teˆS

«» a O.

ˆ . O C/3 +-> w P

03 <13

3 2

X

o3

O

P.

P

03

a

> *

o3

0-

03

Oj

P

O

*-P

cd

o

p

W

Tj^ G

P 1 1 i

T)°p

S-§.2

vi.y

° b.-s

^ C/3

> > b y ■y 2 ° 3 rto

X) 4)

.

- feco

> > 4.-0

TP S “■

yi2 y

3 –

m y *.

2 £ c

O

•d w 2

S-2 >«

tf ‘i o

H’O G

lag

w S2

U ‘ O’d

4 >

0 a;

2 &

o3 > *j

a o

y + >

« u

y y

O Q. • M u b c. as O d; d)

oi cC ˆ ol © bt

© C r >

fl bfl.H

C d) o.-y ‘■P fc y >

.■y «

+i x)

oi y

gS

°y

. 01

toy G£

T3 rt o

IU-«

a:

m D

43,-y

i~1 Vi

oi >S

y ˆ

Bp

01

”3)

*d y

d M ©w

a

dJ

a

£ , ca >.— >

2 > > 2p

01

2 o

5«

42.-2

■ay

5 c*

CO

*« ˆ

o

d)

loo

o3 4_>

c a o 2 43 o

03 ryj-ri

fl) O

4-> O

p bo

d cd * .

m ■* s

S a

4H cd

o p Vi

-So

- nj

ojo o P a 03 01 C

2

o

u

T3

d)

-a

y

d> GO cS oi

xoy di y 01 w y o

CO

Vi

03

Ph

in G

03 8

Q< cd ••

d3 cn Vh 03

§rg

y op

rt _,

t/iTJˆH

.2ˆ

_o

• – > di

■2 op

o o +J .y o o

TJ

4 o

o-2

utS

d>

o

oi

Vh

ftO

C/3 rri c/3

ell

2.2 2

bfi ><£

cˆ

G

•2

*3

G

t-H

TJ

G

cd

C/3

G

03

y

. _ cd

tn r.

a s

r2 °

03 ˆH «+h cd C/3

03 ►

p W

ca y

oi .2

y -d

r.-s. 01 w

•2oq

ts

G

o

03

g 2

o °

S “

l- $

03 03

cˆ O

03.

G ˆ

■G 03

Vh hj

Cd 03

a* >

W oco

g §

03

> p

y

y

o

03

y

o

2 o

h

.2 a»

W

03 C

G

2 -id

y

03 >

+j c O O

X °

Op

° a

e°

‘6 S w i

o’g .

2 042

§p -o

c e y

• G 03 cp

C/3

G

O

03

G

cd

C/3

G

03

O

G

03

jd

C/D

03

Vh

C/D

P

o

•

0

Vh

Ph

I I

.2, p

Vi cd

03

a1*”

C/3 0 Vh 4

03 0

bfl’P

Vi 7

o 2

C/3

Vi

03

£

‘u

1

a) si

O

p

P

P

P

t5

4-.S

2

0

O

O

0

0

Cl

0

CO

CO

CO

CO

CO

rH

C/3

^5

0

t5

P

0

0

2

0

0

e>»

O

S

H

CO

CO

CO

vO

> >

4->

.

•

C/D

•

.

y

Vh

“d

c

p

T3

y

>»

•M

0

2

0

0

•P

O

0

0

0

o>

03

4->

cd

4->

•

w

Vi

>>

>.

u

U

U

G

>»

Vh

>1

CO

CN

rH

rH

i—4

rH

rH

G

03

2

03

Vh

• *H

P

cr

03

Vh

js

C/D

G

03

N

O

CN

in G L

S 03 G

cd • *h 03

03 75 -M

Vh * ^

-®-d r di co y « -42

“m!d o

d >

2 y’o

03 03

OO Oi

_r o y

©yy o

*rt O ^‘4?

y

d >

N

wco

s

»su

2 °P ca TS oj 1£

^co

»h . 01

oir^ y

^

». N

^ o;?

oj ‘ (j

g§

03 n

u-* r*

u.-a 1

O °.2

. x

©2 “ *ca

§

o C/3 C/3

‘ C ^

03 ‘p

.2 cd

VP 03

2^ 00

o y

2 c y ca

B 00 r ^

P <

01 ^

cc

o o

in y”13

b o - P t ca

ˆCOTj

03

CN ˆ . “1 n 03 °P

d)

13

g S o oi •2.bP y

a ˆ 2

b’G ‘ + 3

° c y

dj-a.2ˆ

ca o

ca.S

13

Vh ‘

c

03

03

Vh

o

‘H-t

•JB

C/3 I I

N 03

03

> > yj ca

rH . P

y

o > >

- PE?

y y ˆ > <

vˆ 03 G cd

iJJ n O’d

H-J O 0-£ 0 >

ca o y +4

d > 1

> C o

w s

P.2 , oP £ p o ca

2

c «

op ˆ

id. 2?

2 ‘-‘O

u*° y o 2 3

F3 GT3 <33

O 03 Vh

« -la’s

«

03

cd

<13

- ri Vh

y 5. a o

o gp y

43 ca ’5 O

01

01 §

S 6

ca ’c ˆ

Ills

.+-> j£ ,0

y’G

o g y +j

£ © o

y *» di

r – • v – « < f'1 , |

ca o ca.S

y

o

tup.

12

cd

03

H««

“p

di” ˆ

o

c

ca

§

O u

ˆ2

la *3

s

r > W

° H ˆ S o

t/i f-.

u » H oi < oi H W

mf,

j

<

z

o

N

2

«i

t/i

V)

?;

<

u

oi

<

z

oi

o

h

—

J

<

V

o

Q

g

O

J

o

o

Male

ELECTORAL QUALIFICATIONS

77

•h a *,

5 **-• G o O i O h

^ oU 55

*geor,S °

f* >— ! -CO

g to G

G £-u o 43 . G<4 $

> 033

n G ^ 4

&.S v. £<2 ;

£ | ;

i_ aj

<<•5^ cu h-5 ^ cd p-p

- o.2<£*

Q

•p 4J I p

go G G O*” o G t3 4 v>“1 Co

aS ,

Tj -M

8”

C

a)

o

O P p5

c — a

p tj o

<4_, £? 4

P o-SP

’ ‘gS

- ° 4

to . ‘d y

rH 1h n’U

” 1) ^ d

O +j w H

aJ

o

a

41

E

G

4

i » n ^

p y m P > S y g.y « ° 2ft, !3 •S-S*60

O .G G.C<4 >* O’d to O

w

m

G

O

• H 4->

a

• rH

a

G

O

G

aj

6 x

>, rt

G*4

ft

I L—

P 45

U-i

in aj

x

IS 6

G°

« g

»H

ˆ Q

U (D O c/D t-< in

»8

3 8

— 4.

o

G ‘-‘

§ 2ˆ

G-ptˆ

g 2 00 ff ˆ a,

■8«

Ss*

G C

4) ,r*

yd tj

‘in S3 — , y g h If 4 33 o G

4

o

G O

— o

LO

> .o >

43

0)

^ P’S

4 C/5

4 P‘43

11 u 61 H

£ c c

G T3 W 5

G c

2 8 d.a

° „-2j3

V-I O f-. 4->

oj On

a? rH o g

>. 4 &

- c‘5’d

M 4) C

•— > in d

+->

C

&

s &§

2 8

bf G

4 3)

G *3 Cl O

1 > o

“jss

g a”’-

W- ■

•

O t/5

G S G

0-2

‘ O

c

C/3 .

C!

n! PiO . »rt

C •- t > C

.5 CO ^ G

o T3 44 f” ... C3

4-4 _i O nj •

c 2*r* C c3

. Qi ^ Gf_< w

‘d

1 1 • ~ »

C d 52 aj a) C ^

#r3 8

§°

bo 2*

^ V

G G PC

in . _

C o ,

0*5?

14 G o

aT o

G a;

2 «

a _

,_’ w

4->

V-,.^

a3 Y1

gs.s s g

4 C/J 4J3) +J

CL,

TT-J • –

G ^ ^ cj

n Lj

Vh d

O

V-4 •

vg w

v m

M V,

a

<0 rd

t3 So

n

o g 0

• y* I N

> 2-d

c-2 G

8 £ §

in

ih

“ G p

g g i ^ § G a^‘S.o

CO CO I 1

-4 G o +2 •s o o G -£.2d3 o

G -4 O 4

n G — , O –

P o

3.yc

O to CO

„ o c “3

grG O 2

gI

44 L 4 4 |

jLQofl

I&8 9.S

- – +3.S

G

o

ft:

.t5 &

4 p

o 4 -d °

8 43 m

t-.“3 g

4*1 11

8w^2

ft

C/2

4)

CO

G

_o

“o

o

G

G

co

G

co

•4

O

G

G

*3

G

P

to

G . to Tp G «

4

■d;2

C’d

P’rt

.. > to p

CO

G o ft “5 w 3r 4 co jC 4/ 4 CO ft

CL,

w

a

O-

» V U (U

B~ 0 8 «•§ c

ftj2x

>. .sU, at3 §

5 C G ..

JJˆ.SPIS G 43 <2

c 6 £

1 S

4 O 4 C 4P61G ft

‘ C

g 4 o

O o G ˆ-4 9

o B

4 c.2

o +JTJ G G

C/D

O W •*

e-Sw

1) 4 .

»gL

• rH 1

tH O rH

O bD.S

4-> I

O 03 £j ‘cu

Vh

>

ctS t?

rH Co

o ^

”d p oj •d 4 G O •

4 CO .

p CO CO

o c G poo

H CO C

G 4 G O o G

CO ft4

CO CO 4

■2 s

*d ‘4 ^ o g Oi

CO B

^ p

o W d ^

G.e

O Vh

o 0

0 e

a

Z O.S

m

G

G 8 C0 4 . O

CO 0,4 4 O

.-

■G CO

2 a/— ,

c Gˆ M‘4 ˆ G O’

02

G‘ >

30 d.

3 mos.

N

30 d.

‘d

0

CT)

*d

*d

Csi

0

0

r

VO

in

in

in

0

0

0

•d

■d

B

B

E

0

0

ftl

On

VO

vO

in

in

C

c

0

O

> <

>.

> >

B

B

rH

rH

O

vO

2^.S

G O

I

G 05”5

G G ‘4 OBCji «4 N O co *4 ip “p

4.13 ft^

o o So •p rt E

OCO 8

CO

4

G

>.

— 02 CN .

JP >

« < 4

G ©

6 g

Si

o’d

GO

co

4

G

O

>,

< 02

CN .

J3

g3 o

S c S w

4

o’y

cu’d

r— H 1— H

G O

G

t»

— 02 ts .

o i-j

G O

6 g

«£ 8

4 1

o y

4) T2

•So

to

4

G

4)

＞1

-02

CN .

y«« g o

B e

y 8

4, N

4

o’y

4) ˆd

IB’S

s

4

G

4)

-02

CN .

JP

y«4 G O

E g 0) <1ˆ N

• rH

o’G

4) ‘d GO

to 4 , • 1 4 0C/2 y g -o

4) .- .

*ˆ02-1 co Oj

ˆ.S’C”W

«■ o-g|.2

isTl

y 8 to — .rt ® rt C 4 £: 4) •->

go >-o

y g y odL y ja

gog o’y

u

0:

<

<

J

w

p

c

Q

>-H

CB

O

P

—

o

0!

O

w

O

c

a

o

33

<

Q

w

>-H

o

z

4

p

p

78

ELECTORAL QUALIFICATIONS

Michigan1 . IMaleor female, 21 years old, I 6 mos. I 20 d. i 20 d. I 20 d,

ELECTORAL QUALIFICATIONS

79

< — in

o

i- u d O dˆ a3 «

d

t <4-4 °

c ° ° b

+4 2 o

c ?.S

o

rj 23 C3 t

‘3

03

PL

in

oj

t-.

o > >

< 4-4

ft bt)

s.s

n > 43 2? o 43

> - I- > 4

M S’o

t/1

(13

P

c

a

o

& « d * >

!i&

° ft

** i-..S

o

5 o B*. in d 3 ft O

s*

H

to

tf^ft o3 ^

75

£

AG

»-H (V)

c £

Pnr— !

bfl 1 ft!

C/3 ^ Vh +_>

o O

•c

o

0

CO

« u o 2 ° °rG o

> > «

4) “ > + >

v- > »— H ►-« t, -•— >

13 4) 4) E O

2

a3

O

ft

o o

ft 03

43

cd *:

C/3

X a? o

03 ＋*

＋* .

C/3 £*

a .2

’ Vh

fi. Q|

＜42 be O ˆ tH

4-3 03

Gft Si

H; 1) •

BC/3 Jh

W ˆ o

s. CD O.y W‘～ ˆ

ft

J « [3 J

dˆ.2 O

C/3

2

£

‘3

CD

73

- g’I

- 2 * § Ot) o

ft d

h„ 43 2 4) b£— t-1 t> fl 4) o (3

laS*

“2-S’s

CQ

a;

JJ 8

,D 4jrn

G to c a! o3 q 2 +J 43. y O C/3 V-I +4

c

.2

‘-*3 43

3+2

.ft 4-1 in ˆ B-d

2 c

O ctJ

43 rG

43 in o3 ft ft bo 03 p

,H

aJ C

*d

a

aJ

co

Vh

3

CO

CO

1-4

• 2h

2

o

CO *

CO

CO CO 4-» Vh

o.2 .

’■3 *8 S

rd o

+ 1 * *

u 1/3 •r c

to

fS c to

^ 4->

43

ft

6.2

“ u

. 03

£

^ c C— o“i5 in C n

d rt,2

43 w-r-.

U E g

g w

l§

‘oS ^

H-i ^

.-..£

PS-8

^ 4-> * ~

CO

Vh

C/3 4_> ^0

O Vh

fe I o| g

Elk’ll

> > d 2 o . S 0 . w T

V-H

03 4-3

O O.

S.£cd I

.2 !^c

- a c “

w 43 -e p « £ C « fttc o o

C/3 O 4-3

ft

a.2n O d O ft W

• – CO O Vh

a o

aJ ,*d oo a3 C3 to

co •- L.

CO

.22 s

T3 O • -4 tn

G . •2^

43

ft

to u G O 2

S c.2 u

feSSf

ftti 0,5

43 «1 g

-i3 . 3

43ˆ02 g

G 03 ctf CO

’> G O GO —

p 43 d 0<4H (A

• ftj 4-<

o

CO V-.

C O

° rn 73 Vh Wh O (D CO n, cJ O

t-H

SJmh ft! O cd

co d • tft 4-> . .2 >. • – > G to G o

4-> r —

o R.2

CJ <-*— i

d

73

ft!

O

a >

ft!

a3

73

.£ to Vh

43

.-ft

(O H

O ««« .2 ft x)

in

ft

0

Vh

> >

CH

CH

ft

O

CO

TJ

O

f*b

o

fO

u

o

to

•D

o

o

X)

o

•d

o

CO

o

to

to

o

£

＞o

to

o

£

VO

o

o

d-

•d

o

CO

to

o

to

o

G

vO

to

t-.

> >

»-.

> >

u

to

o

£

o

to

O

£

vO

to

o

vO

to

o

E

to

G

. 03

— 4-3

dw

ft* pi

o.S

*‘d

IX) 03 . JOJ >— J to

h-» 03 Vh

Si’S-

t.‘d n

.2d S

t-. d > ft— ‘y r tO-d •- £ G c g d O

£

.‘O’

co . • ”-4

gog

o 10

-

S’®

N O

‘-M rft!

‘u ˆ CM 00 ’u

aJ

d ˆ ir?1r2 co-zj

O ˆ.20 g > 5° gftl o

G « o o.S ft to

— . ho -d o.t;

CO c w G*d n – — Ch dˆ

> — \ d o r~! p 2 toˆ

43 « £ g’d

i-. q. d d C ft ft d

- N +j c ,d O C

S.O’Sf o

d 43 G 44 > > 4-3

I I <44

O d O •c ft .

43 14

>3.°

03 .

to ft d i2 43 Uft «.

ft-d op o o

cd

o*?;

n ft

d>

£•

43

> G

‘ /W

M d

?is

>3 O

c

43

dˆ

ft ’d

• -ft <13

2

o G ft p

NO Gft’o

G-f

41 -C to 44 G O 43 N

43 ‘d

<

H

O

a

Z

z

to

t4

d

43

— ai

CN .

0.44

d 0

gs

ft ,N ft

^4-71

o 0

43 ‘d

’d’o

s

K3 J. £ 0 43 2

«3 U

(D •

r oj

CO

03

‘

,2 d O ’d 03 >

o

+4

CN

d

£ c

CO

H-H 4ˆ

°ft7

43 . ,

to

14

44 43

1; 43 O ft

S.Nft GO

■’ ˆ.2 43 ■H rl

ft! C S 03 03

-*ft Vh 1 — ■ » — < »—» rl o cd o cd.S«£

c

o

c3d.2 ‘M

-hC/3 CN .

-i! M-d

cd 0

5 ft!

o

V- >

o‘3

Q)d

r3ro

CO Vi rr-J Vh

H O 0 O

Vh * ■

01

Vh

(D

. C13 CO

aB||

|°lg|

ego – •s.sf

-M &

°‘c g’-S C

- 03 43 d 43Td.2 4-3 „

. — ‘ — 4-4 r < O

d o d.G ft

to o G 43

2 «

Oh

Pj

33

C/3

3!

i/i

-4

Vr4

ft

H

D

O

CO

(0

•

H

J?

O

to

3

n

w

32;

to

Ih

d

43

— c/3

CN .

-to

.2 <44

d O

i s

C*_< N

43ˆ

v~—> r—i

cd O

CO

Vh

2”.

>,w

CS

V*H

. o ft e

d 43 £.2 o.t; *« S

>

w

w

CA

5

to

G

ffi

Id

to

H

d

43

> *

». — c/3

CH .

-2 *44

d O £ G

43 43

<— N

• H V4.ft

O o

43 ft

T-H T— 1

d O

2

> <

w

to

oc

u

v— 1

•

Id

80

ELECTORAL QUALIFICATIONS

\

c/3

a >

4- >

-p

aJ

P

1-4

c/3

O

u

CD

04

o

V-«

p,

o

X

rt

N in O

ft r fc ^ ° q ^ 00 03 P, o V-. – H 5 Wft.O

a Bo.’sf % 8 p,

cS 5 u Stti

tu

= ‘C rtft P.

3 >- o’P

w ft n tu 3 h C«2 c O Sfft

|2|„ 8 5^8

mill’s2

^ 35 nj ft ft •

n ft ft <« 43 rt ft O ftft rt wo > ft ^32 p’mP oQ o S o Ol’D fc * o 35 10 3.

m

4-> r! .

o.g o ■Jf +->

O

a I

-ft? +■>

2 d >

853 3

S?81 w 0) m m ai

cd O4 w

CD

+-> C/3 I

£8 5 “

S po o 5

x 3 a) _ _ _

o > c

3 3 0 5

Cpp.s

o

ft

P’S o

rS2ti

QJ

O Or5 C/3

0

r >*.2

o r c/3 ˆ

>. 6

CD

cc

<5 tv

K2 o o V-* q,

^ W OO 33 .R lx IT)

£3 53 P.

p* o o£ ft

Vi

p,

£ 35

o 0

■*x £ 3 1- >

Oft to 53 53

O £

be

C

>.

rt

lx

55 a)

.

O gUs

ti'Oiuo

3 lx O

JJ O On R

CO

a)

c3

C

O

-M

ai

o

P

*d

W

c

04 o

e.b

ai

e.«

.2 6

c/3 c CD CD

- 6′

c/3 _zr

^ jd O *C 0^30

35

H

to

C

o

o

03

*3 ft to¬ ft. 2

ft 53 l-

35 3

.S>a> ”

h-P c

° o

o >

35 ft

~ 3’S

*+-i i_

O to o

o

+-> tu (U

S3 2 o

2.3 E

600

C *-C 3^” S’?

3 C m 35 w Oft, TO +J

o c

ft efi to „. ft

n

°‘C U-l o •»■> b o tie > c« > >

? +j bp’ft t_, C’r O

‘3 c ■ S o

“o P u o

l-c

o

+J

c

5

oft ai To cfl o . C 35 3 <3 tu •" 55 m be -O 5fiC o 2 O

rt c c

*0.2.2

a3 * >

CD O 3 U V P

in .r;

O 4->

rs a}

^ 0

>.00

s *

55 to ft O Oft <£.3-e m ^ c $ C * tSC/3 W

ca o

*-1 a

ft «

S

6%

Oft I 5].W ■ <->

? 2 rH rf

Wd o • 0. C/3 . Mtuˆ

ft

o

u

53

o

53

p

o be a

o p to w C o

to

o

ft,

to

p

o

X .. ctj o C

ct! O to c C ˆ

•H tO

C

cfl

if-i

.2JS

53

£2 ft O

;-■ G g

H c/3 H

Ih

ft

c

.2 to

4-> V,

o o o

ft

o to 6 -2 55

S S 32ft

?*4 r— < TT r-i M-4

^ ai >* 2 ^ ” 2^ P ^ 3

^ £ cs1

to JJ o to

5 ftft TT^ ft O o?+->53^3

_o o O 4J

M 3 O

42 to bft P

CCcfi- ‘-• o 0 o g

to to o O

ˆ 3 ft 4_, ft O v. U

c ft ft O P.

> > p ft 2 > > PO

3i°&i

g-S||

°.2 o •*-’ ft R P ‘ o £

to b1

- – S J o ~ –

& £.5ˆ

- ■ 00 o P.ftO

be ‘

C

o

in

v +

S –

Pi 1

-> «4ft

ˆ o

bo

PD

O

m

v«

CD

C/3 1-,

P O o

C/3 — • »— >

v-i o*d

P O .

P rr-(ft ˆ to ft ft R

to

o

S3

s

R O

• r-t 4-»

o

m

ai

£ J2 §1

>

ˆ a_.„

o O (D ai .y uˆw w ‘d

R ˆS5W’?

O ‘

oh

to p • ft ft s_, ft)

g,-C

-ft3

0

CD o P U a _ o

C/3 Tj

P (D

ai

C/3 •- Wi

in o CD P＝i

G c5

P W3

Vh

O

b 1 3 E i

•r 0 Q.2J.S

jg cC 62 h o Q ˆ

ai

o x R rt Q c

• r-< O PiM-4 C/3 C

CD

o

p

(D

“d

• H

C/1

CD

Wi

C/3

P

O

• rH > O t-

ft

in

i 0

53

‘d

0

55

53

^ 3

0

0

a

0

0

ˆ 0

PO

fO

rj,

On

CN

C/3

>

0

t5

53

0

tM

a

0

0

H

5*t

Ot

CN

4-»

•

Cˆ

in

R

T?

O

0

0

53

P

O

0

6

a

a

0

O

Os

5(t

0

0

CO

(D

4-*

P

u

in

P

P

oi

+->

>>

>.

>.

>>

m

tH

cs

4-H

T-4

R

o

P

o

R

‘3

o*

o

lx

p,

ft

to

p

tu

N

o

to

u

n)

>‘n.

xhC/2

cn .

JP

ftox P O

6 g

J5 8

4-*

O w (D’d

f—i »— •

ai O

C/3 Vi Vi rj

S°-2g

ft

CNft cjft O’h O&H

T3

p Pft _ tt tu tu c

ft N N O

O ft

0 ft

+j

rt lx

‘Oft

pS .

■0 CD 00 «s >ft

O Ot

ft ft

CtJ O

lx t”

. 3

®2«o n! o R +->

. u ˆ u

‘tE go) » p.2ˆ

o)”’’

CD

ai

CD

> >

C/5

R o

6 p

ft _N

Vxft o o

ft 53 ‘rt’o

to

s

> *”§

ft ft O 2 0 to g R P m R o

1 0

■|

o’? aˆ

_-55 3

ct! O

2 ˆ

w

ai

> >

O w

£ a

ˆ .2

m ‘P

Or2 ‘43

^ SP

^“3

J5 3

rD

*n h

C/3

V-.

ai

CD

^hU5 CN .

CD

*3 o

I 8

73 ’o

O w

§S

«: a; . o

St

H 0! ■< Oi H W tflfx

O

U

>— I

X

a

S

£

a

£

a

a

o

>4

£

a

£

<

►X

a

o

a

<

O

ffi

H

a

o

£

c

H

O

a

<

Q

K

H

a

o

o

s

o

Oklahomai . [Male or female, 21 years! 1 yr. I 6 mos. I 2 I 30 d

ELECTORAL QUALIFICATIONS

81

ri.S

_ O

>

Ot3

.C 4)

&

S. VO Z o

00

- *H

pi

XJ O ‘ O

o g S3 * >

r2_ ft-p

03 ˆ »G 4) C r; bC

ˆ rttiT

J” C S 4) 2 O X

Ah – **7** 4*_< 4_J

-H -H q

Cd ˆ

O G ˆ 4

•§ c s’® * .sp-Sˆ

1h 4 g

o in 5

O OJD 4JH 03

+ - > 4 — 1

£ 2-e ■3

N”1 « fi

g c.S o

cd .G g2 o >

cm 0) i

O +S o

cd jw

03

3 4i + >

cd x cd

o C

.a Sˆx!

oca d? rt O

x3 u ˆ

S ° o cd +j.2

. > >-g

4-3 • •— < + _)

.2.0 W

bo cd G

£.H8

CN

bo v

•S’d

.a *

3*° •°1

0.2

ON P

■y § 2 tj S ˆ <2 S – a

a 5- 2 cd 2

cti O «-*x cj

o’g-B

8 O G O >

U A

o

c/3 u-,

’-3 o

1°

c;a

O 4

+S.G

03

. G

a 5 a m

efi cd

4) ”’•H cd Oh U _ o-C

Gh H . cdr.c;OOrC0

s-B 03 8 sˆ-2 « « * «’

■ x * c a t> co ,2 o ˆ 1 lo-H rt p cd 73 4>XJ C c

GrS C *0 £ “ G-S §c!.2Gi)Oo«‘mV) P+J!d!2p!;c!0o

b Cd G u a.S u 0

. , PiU bfirf o _ .O

ˆ-v’d cc CH,!j ,*d • a

+-> O +0 ’HMH O Ch +3 4) . Q

g w-2

ˆ S M

O c i 0 rP oJ- C CD 2

CO P < P OVn + ˆrtn P

W

£2°

G « S

g_xj c

r-j |

d d e

o’o ˆ Co.

J3 a.b

a c« c

xt”1

C Vh

o

•G

+ >

j”G-a

cd O

“A

\Q -M

a

“d-r 5 •55. £.2 t-O ’

4)

•5ˆ 2

3 c. ¥ OOP

Co & H-1 o C «

Oj

o ® ®

o o c

a* ‘ — 1 H

o c _ »- ■ rd

05 O

cd o

&

‘5.0.2

o

, o —

2

05 S ˆ3

•-* P < + J

(D T3.

>: c UJtd

C -g

o.2 be- c «.

o

cn On

O 05

cd.C

o o

a B c/3 a

o *u o rj .a +j ■i Cd cd a-H

-

O 4)

^ > cd

cd

C.G S2

*-33 4

o 2 >v

(2 «0«N o o _G

CN (D -tn

£

rdrdrp

$ Cd §

Vi 2 c

03 rC H

rt c-

2 O +J – G g cn 4

>.

4->

A +J ^

5 S P

(D

O nj—i Orˆ Tj U

In .4-) Oj

5 SJ.H o

Go «

C/5 hQ

§ <

4 <ˆ

00

CD

o p

Cti

(D-TJ.‘P

Z, • »- <

“‘‘11 °S6*

a-o o o ■a o c

*72 C/3

£ h

Vh (V)

C t/3 ,— . V- ˆ cd cd c

05

2 x o s

artˆ

O x

ˆ 05 2

o ra

C _ cd p,”

£ o ■” o

0* o o

P 4-3 l/N

P

O o

££,

•3.»

G 4

” s sj

CD 2 C/3 C/3 r’H

CD CD C/2 Pi Vh

P G

G 8

.tf CD Vh tj ˆ G

G M-i G O

T3

cd

4

PC

G

c.2 2 a

0.13

CD 4J

02 C/3

• I C/3

P

£ £

ˆ M O

Srtˆ-2fe fe art:3‘3

< GtD'g

/ o p

.0

W. 05

OHj-

•H Q-Td

ij§

rt

C

2 10

c .. o

03 ”

O

4ˆ S 12

•ˆˆ0.2 cn

g

h o-a

„ a

0 -2 ob

o

.a 0.3G cd oCiCO

aˆ3 £ o.

“ C cd

4 ‘

C

cd

03

c

03 ??

W. O

4 G

M’S ’2

4_) r—< CCj

.2 8 6

X)

C/3

P

o

C/3

lx

CD

£

’£

m

o

w <

c/3

H

oS

CD

*hC/5 cq .

^3 o

6 S

vP M

si

oxd

r-x »-x

03 O

2

C/2 4- >

b ^

CO

CD . > > C0

CN ►

•2 o c

cd O

e S a jj.a «

+3 G Wi o O 0 +j oxd cd ’cd’oˆi

C/3

CTJ

05

c

cd w

03

G . •

~S2S

.. 4 G

gS’S

o o d

u “ ®

cd

0)

.. G 05 cd

TJ i.

§■’■ C

I 855

,2 CD

■p ˆ

CO rj C/2 2

. ˆ Vh

C/2 p< o 2 Vx *-X p

Sfs

C P •- CD C/3 rj CD c/2

• oj P P

C/^ p ccJ co P IK

bn

u

GO

c

VO

lx

CN

• CD • CD

2 > S 2

°’+3 b 5

| G*～’S)

4 u oij »;

N.«3 03 ˆ4 8, 43. • C O

rd [D cd G G

G y p be

aˆs o’s

t s O 2.2

?.a t >.«

ˆJ.+d OH cd‘4 a cd +j

03

Wl

rt

43

>»

CN .

JP

u

cd O

a c

• H

6*1

4-d

73 *3

o

o

§

5

>

J

><

1/3

I

a

o

o

►X

pˆ

o

H

oi

o

a

a

8

►j

0:

3— I

B

Q

O

a

PC

VOL. 10 — 6

82

ELECTORAL QUALIFICATIONS

ELECTORAL QUALIFICATIONS

83

G

8

<

fC

o I . G

® o

O’ c/3

C&

o

+3 43

.2 ”

DO > >

0) C

Pi

*0

Q

fS o

o

o

a,

G DO “5 —

O C

*3 g -b

’ V ** 2

Si

.2 e c wee «s «

•b «>•- 2 G DO a

2 g _ >J.S G

P* > -2 4J +J O

• 520 t» .S 3 rt £

Do Jr; w b Do 43

• a y .52 E «

• OV; tjn DO > B-g a? Do G a£ £ G43

>X) d

0 0

05 H 10ˆ3 O

05

C • G

Pi

*. ®

PQ

0

o

G

• *H

C/3

PP

8^

■*■ >

CO 05

■*ftg

3 3

O DO

a g

B 0)

043

DO*— G”* *b ^

0

D 2

£«^ a > 4- < -B O ^ —

2 £

s > *

4) G

3*3 a

-g g A

ca

m

■b 5 0 ro a cd

43

■B > *— G G

043 43 +0

G

6 G g

o.Ea

o +j 05

g G O

O ■-> -B 14-1 B

.Igg

rG

.£ T3

cs « 2

DO 0 43 G «

B

a,

43 £ b o w G-?

Qi P’S 4? C/3 > > P

g

pC

&

V*H

o

03

ft

Se

_* * H

§o

to*”

Cd

G G

a2

* + .£ A

O 13

O -G

^ G >

O

• • r-«

G -M _

►*3*

- g£

2**0

O rt C r

o g Jp ,£ a

“«S3 i Eoo

~ dots. a c o 0 G C w O £ ’-b G g ‘33 -b G G w, D0’ + 3 W £ – 3*2

■ $th

.£ 0 g

iD *ri D

*SS|

G O .

01

D . .

DO G DO S 3 G in Tj G ‘ aJ Ih

o

2 a; cd ˆ 2

£ g 3

£ g a*c «

•3 D *13 Vi D H .

£ & o

pˆo

c >

t<2>*

G «’§

•£ o

rt T3 id p G v?

>> g a

D

rG

4c! D cO DO D rt

a 3

05 00

c

G-S

‘DO

TJ G

GM

D M

Pi

cnˆ

＋0

O

‘3

rd

£ “

g£

3ˆ

C D

52 G

C ts

G 05

*3 .£

G

05

c

•§■0

*o

°t > c

O

U c n *C u £ „

C C/3

O Wi

c^ o

C/3

tn W

° ^

& w ► > lg 5^ c2 r,r^ 5? C

8 £.-2 8 nj D in .

G

«•§

G

‘ w B _o

|g ‘3

G 05

*D . • >« in « »- 2 D C

, ,’«H *H

cn ‘Q

4_> r-H c»j

.2 2 £

T)

c

*G

o

•o

o

c^5

o

o

>.

o

*0

>v

T<

O

v-

>>

05

(1

G

D

>>

CN .

S'*

G O

Is

sl

4 > 2

GO

05

I1

G

«

> »

— 03

CN .

.13

G ©

I £

* + 1 N

o y

— 2*

22

D 33

o

2ˆrO cu’O ˆ n

U -ˆ00

2 “3w?g fe

CS

Vi

JP c

,sii3

.3m

GCO

rG n

V 0)

—Q

. £ V

‘ V-. u w 3

g 8 ˆ

£

G O

£ G – S D cs

i3 ’-

G c

c . d dog

2<»-2 G 2«

C O -4J o c

r /> tJ M

O O .

_r u d) ‘d o

ct3 O Q

03

W *2

FT-» U_(^ ^

h 2 *2 * > *0 > > JSˆJS y G G ‘ G

n — n r .Dn ■£ < > •’* 2 uU G3 ‘*- <

o gnh

2:

O

H

U

z

»

(/)

<

>

<

z

►H

o

«

H

(A

w

C/3

z

o

u

(/)

G

O

—

3

+0

+3

05

G

O

O

D

+->

G

+0

C/3

*d

G

D

Pi

P c

... G

G£

2 o

D 33 **-* G

. . 01

D .

G C/5

G .

W.2 05

G d

T.o-£

05 Ol ˆ

4-> C3

.£cˆ 6

‘d

c

u

C/3

t-

cd

0)

ˆCO cs .

.p

cd O

6 c

5 q>

tsj

• pH

S’O

D’O

GO

2

o

z

§

o

■*J c

3 B D G B Go O DO*-1 2

ct P Gag

G DO c

^ B C D

P* > G B

oofeN C.Eod

3 Oi / >1 B +j

■B“ + J + J’G .BDcO Gcj32MGr;p

o _

V3 D G – — m •H 43 P o .d n

r* in to rr +-»

gP«3

G o

B B >

°3

o ^

o G

CJ

ofe

D

*- >

. . G

S2’0 c”

G D D G

— (U m p 3 g*S

° j2*‘Q u D £

r30oD°2 + J2 .O G2 O ■*■? Do.ti £

g £ x

.2 g;S 8’S

-G.£ © Om

G d -u 43 . Oˆ

2 °

c c

• H 7?

H u

B *—

o o

G

- b.2

>

D GjO

2 3 £ G*d v £ ®

05 ^ G ^

l §'^

S°^1

D DTJ ‘ G G G S«v,

B – D

C 03

S g HZ

• 0 <

r MO OtO £ 1,1 5 C/] rH 4J -H d)

o c.S o J3 m Si + * >*.2^2.1^13 ^ ctS-s 4JrG£H'£ >,

C o v-« ^ ^

,H ^-p cd w o

P c ^ G o

Vh

a; ^ TJ cd.

a p

cd

£

-2 ‘S b

3 ag2 gP g p

>. D

m CD

VG G G D

33

G”05

o 8

4J ”

TTO D G

£, D O* B

> >P

G S

& ® S 8

2 +* ° “G > G (D — d) 4J O

Edrt cd o 8.^43

9.02

s > -p

H

■S3 « B G g O-

G D °2 O G D-g

2h ^ *— < 'w

O’ (jo .. 3 jD

£ £ 8- o«SU

o a

G

Sills’s!”

j«050gxiJjG43 Q) _, o c * •“* cd O

^ g & S £ 0 u

C -P

0)

E-S

. 05 05

B 05

B

3

G 43 D CD

£ 13

O D

, 0) 7 WJ Q fl)

g g 8-d § § &2

g S2 w « M

M G Oˆ B

O

S’g’g cˆ

O-Hˆ s 0 ““Gw?

«S « ˆ ˆ

G o ˆ

0 c -2

2 DO G *B

9 2 g.a

G « O

a4

£‘d G

a’S g «— O

gssoo

C c« DO O B

-p a

h43

°io jg-g 1o G43

33tt3 d § b 2 § 0

&3 8a 5 a8.c

o 5

Sgˆ

b g 5 C »’ “.sg

cs p G—.

JG O rnˆ

2 & gs:

“S X) 43 ‘_l

> 05O*B

OltG G °

■BIG 05 s.

05*0 w is D o

G

fl) no

— -.2

Id O *43

O ˆ —

*o X,

G

ˆ d)

0?ˆ

cd

is

p

t 4-J

cx

u

.24 d) ˆ ˆCQ-S’O (D ˆ o G

■4-* « ” ■

C/3

cd

pQ

n-oj W

tv curl h

eˆ-H d3

G ˆ

ˆ § .2 o* 3 8-J

Ofl Gˆ5 > C G * i-« cd ˆ

3 d)

cˆ’E y

g’^G-fi

p o y G 05 D . a d b

o 2 ^ 01

tS g “S

fll - ‘T?

g2 y

- ~ n G-O o

Oh § G

> >g is

T3 D

•a-

2*0

g D

^GwG1

C/3»7« cG

O ^

2 £

d) o

°i£

g D ° – .2 a c g

-B 05 . G G

£0^0 D o B> .G C/3 V G B j. Zi D 3 ^ » Op

_, -o O 03 B G CD 3 B -B i”

g w c-

Ts > c w

G

B 43

O

3 B”’’

2 O

% o >. g a*p a ˆ o 2 ac

8 GO D

**H G rG

0 4ˆ

U

ao G*a

g k y w

S*y £•§ O cB

ˆ 3

CT

B O

b – *b 34

o|cg b

.3 D C O G P G

84

ELECTORAL QUALIFICATIONS

TERMS OF AND QUALIFICATIONS FOR OFFICE.

Federal. — Presidents are elected for four years, senators for six years

and representa¬ tives for two years. Article VI, If 3 of the Constitution requires that senators and repre¬ sentatives, members of State legislatures and all executive and judicial officers, State and National, <(shall be bound by oath or affirma¬ tion® to support the Constitution, but (

states that <(no person except a natural born citizen, or a citizen of the United States at the time of the adoption of this Constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years and been fourteen years a resident within the United States.® (Art. II, § 1, H 5) . Hence, foreign-born citizens are excluded from this of¬ fice but children born of parents residing abroad temporarily are not considered foreign-born. No restriction is placed by the Constitution upon the number of terms a President may serve but Washington's precedent of two terms has always been followed. A senator must be at least 30 years old, nine years a citi¬ zen of the United States and at the time of election an inhabitant of the State represented. A member of the House must be at least 25 years of age, seven years a citizen of the United States and at the time of election an inhabitant of the State represented (Art. I, § 2, H 2, § 3, tf 3) . This does not prevent their estab¬ lishing homes in Washington while maintain¬ ing their legal residences in the States repre¬ sented. Article I, § 6, ft 2, says: <(No Senator or Representative shall, during the time for which he was elected, be appointed to any civic office under the authority of the United States which shall have been created or the emolu¬ ments whereof shall have been increased during such time ; and no person holding any office under the United States shall be a member of either House during his continuance in office.® Accordingly, if a senator or representative accept any Federal office, his seat in Congress thereby becomes vacant, but if an office-holder be elected to either branch of Congress he may retain his position until his active duties in the legislature begin, whereupon the other office becomes vacant. Regarding the judiciary the Constitution makes no stipulations, the justices being appointed by the President with the ad¬ vice and consent of the Senate. The same pro¬ vision holds true of Cabinet officials, save that no one interested in the import trade may be¬ come Secretary of the Treasury; though all members of the Cabinet are expected to sever all business or outside connections. (See Cabi¬ net and Cabinet Government; Executive). All other Federal offices are filled by appoint¬ ment, which is subject only to the restrictions and limitations of custom or Congressional en¬ actments. Appointive offices may be held by women, minors or aliens. See Appointments to Office; Tenure of Office.

State. — The States quite effectively control their office-holders. The only stipulation in the Constitution as first adopted regarding State

office-holders was that they should (

“The government set up by many a constitution, despite the principle announced in its preamble, was that of a class. Nowhere, save in Vermont, did manhood suffrage exist. Elsewhere no man voted who did not pay a property tax, or rent a house, or own a specified number of acres of land, or have a specified yearly income. Each one of the State constitutions guaranteed liberty of conscience; but the man who did not exercise that liberty of conscience in such wise as to become a Protestant or a Catholic, a trinitarian or a believer in the divine inspiration of the Old and New Testa¬ ments must give up all hope of political preferment. Even to such as could subscribe to creeds and doctrines, the way to public office was barred by property qualifications, which increased with the dignity of the office until it became abso¬ lutely impossible for a poor man to become a candidate for the State senate or the governorship.” (McMaster, J. B., ‘ History of the People of the United States,’ Vol. V,p. 377).

Most of these requirements have been elim¬ inated, though eight States still retain rem¬ nants, among them being South Carolina, whose constitution of 1895 (Art. IV, § 3) provides that no one may be governor (

importance of the office determined the amount of property. According to the South Carolina constitution of 1775 governors and lieutenant- governors “shall have in this State a settled plantation or freehold in their and each of their own right of the value of at least ten thousand pounds currency, clear of debt,” while the estate of a senator must be valued at £2,000 currency and of a representative £3,500. The Massachusetts constitution of 1780 provided that senators must possess a freehold of the value of £300 or personal estate of at least

must be possessed and continue to be possessed in fee simple or for life of a freehold of 100 acres of land; in Georgia he must own 250 acres of land or property worth £250. Usually the qualifications for membership in the upper house were the same as those for the lower house, save that values were twice as great. Some of the recent

constitutions of the South¬ ern States contain provisions regarding prop¬ erty or payment of taxes incorporated with the object of excluding negroes from voting and holding office.

States

Governor

Senators

Representatives

Term

of

office

Age

limit

Resi¬ dence in state

Term

of

office

Age

limit

Resi¬ dence in state

Term

of

office

Age

limit

Resi¬ dence in state

Alabama .

4

30

7

4

25

3

4

21

3

Arizona .

2

25

5

2

25

3

2

25

3

Arkansas .

2

30

7

4

25

2

2

21

2

California .

4

25

5

4

21

3

2

21

3

Colorado .

2

30

2

4

25

1

2

25

1

Connecticut .

2

• 30

    •

2

    •

    •

2

    •

    •

Delaware .

4

30

6

4

27

3

2

24

3

Florida .

4

t

5

4

t

t

2

1

t

Georgia .

2

30

6

2

25

4

2

21

2

Idaho .

2

30

2

2

t

t

2

1

t

Illinois .

4

30

5

4

25

5

2

21

5

Indiana .

4

30

5

4

25

2

2

21

2

Iowa .

2

30

2

4

25

1

2

21

1

Kansas .

2

21

•

4

t

6 mos.

2

t

6 mos.

Kentucky .

4

30

6

4

30

6

2

24

2

Louisiana .

4

30

10

4

25

5

4

‘

5

Maine .

2

30

5

2

25

1

2

21

1

Maryland .

4

30

5

4

25

3

2

21

3

Massachusetts .

1

-

7

1

-

5

1

-

1

Michigan .

2

30

2

2

t

t

2

1

t

Minnesota .

2

25

1

4

t

1

2

1

Mississippi .

4

30

5

4

25

4

4

21

4

Missouri .

4

35

7

4

30

3

2

24

2

Montana .

4

30

2

4

24

1

2

21

1

Nebraska .

2

30

2

2

t

1

2

1

Nevada .

4

25

2

4

t

t

2

t

New Hampshire .

2

30

7

2

30

7

2

2

New Jersev .

3

30

7

3

30

4

1

21

2

New Mexico .

2

30

5

4

25

3

2

21

3

New York .

2

30

5

2

21

-

1

21

-

North Carolina .

4

30

2

2

25

2

2

21

-

North Dakota .

2

30

5

4

25

2

2

21

2

Ohio .

2

-

t

2

-

t

2

3*C

t

Oklahoma .

4

30

3

4

25

t

2

21

t

Oregon .

4

30

3

4

21

1

2

21

1

Pennsylvania .

4

30

7

4

25

4

2

21

4

Rhode Island .

2

t

t

2

t

t

2

t

t

South Carolina .

2

30

5

4

25

t

2

21

t

South Dakota .

2

30

2

2

25

2

2

25

2

Tennessee .

2

30

7

2

30

3

2

21

3

Texas .

2

30

5

4

26

5

2

21

2

Utah .

4

30

5

4

25

3

2

25

3

Vermont .

2

-

4

2

30

-

2

F

2

Virginia .

4

30′

5

4

t

t

2

t

Washington .

4

t

t

4

t

t

2

t

West Virginia .

4

30

5

4

25

5

2

1

Wisconsin .

2

t

t

4

t

t

2

t

Wyoming .

4

30

5

4

25

1

2

21

1

- Not stated in constitution.

t Merely a duly qualified elector. Sec preceding table.

J No specified time required.

£600; representatives must have a freehold of £100 or ((any ratable estate" to the value of £200; and a governor <(must be seised, in his own right, of a freehold, within the commonwealth, of the value of £1,000." In New Hampshire eligibility to the lower branch of the legisla¬ ture consisted of being a Protestant and pos¬ sessing an estate worth £100; a freehold of £100 above all debts in New York; a "personal estate" in New Jersey; a freehold of £500 in Maryland; in North Carolina an assemblyman

Some of the early constitutions required that a governor should be

native born, but Connecti¬ cut (1818) merely required citizenship, Massa¬ chusetts (1817) a citizenship of 20 years and Illinois (1818) a citizenship of 30 years. At the present time citizenship is almost univer¬ sally required of a State office-holder but the term of residence varies widely — from the bare fact of residence to residence for 10 years next preceding the election. The same vari¬ ance is seen in the age requirements, ranging

from 21 to 35 for governors, 21 to 30 for sena¬ tors and 21 to 25 for representatives while in some States the only requirement for the last two offices is to be a duly qualified elector and some constitutions contain no limitations what¬ ever. The preceding table gives the terms of office of governors and State senators and rep¬ resentatives, together with their age require¬ ments and the necessary period of residence in State or district.

Few of the State constitutions place any limitations on the judiciary, though some con¬ tain exceptional provisions. Oregon requires that her judges be citizens, residents of the State for three years and residents of the dis¬ tricts wherein they discharge their official du¬ ties. California stipulates that members of the Supreme Court shall be attorneys licensed to practice before the court, while in Colorado and New Mexico the attorney-general must be a lawyer licensed to practise before the Su¬ preme Court. Until 1920 in all States, save those having woman suffrage, the constitutions re¬ stricted voting to ((male citizens® but many con¬ stitutions were silent regarding office-holding and therefore women gradually established their right to hold elective offices. But this privilege was denied them in States the constitutions of which expressly provided that elective office¬ holders must possess the qualifications of elec¬ tors. Most of the minor State offices are not subjected to constitutional provisions but are regulated by legislative enactment, many of them coming under the civil service laws.

Bibliography. — Adams, M. J., (History of Suffrage in Michigan) (in XIV, pp. 38-59, 153-180, New Haven 1905) ; Blackmar, F. W., (History of Suffrage in Legislation in the United States) (in Chautauquan, Vol. XXII [N. S. Vol. XIII], pp. 28-34, Meadville, Pa., 1895) ; Baldwin, S. E.,

(Early History of the Ballot in Connecticut 5 (New York 1890) ;

Beard, C. A., (American Government and Politics5 (New York 1914) ; Bassett, J. S., (Suffrage in the State of North Carolina, 1776-18615 (in (Annual Report) of the American Historical Association for 1895, pp. 271-285, Washington 1896) ; Burch, H. R., Con¬ ditions Affecting Suffrage in Colonies® (in (Annals of the American Academy of Political and Social Science,) pp. 78-101, Philadelphia 1902) ; Baker, F. E., Rrief History of the Elective Franchise in Wisconsin (in Rro- ceedings) of the Wisconsin State Historical So¬ ciety for 1894, Vol. XLI, pp. 113-130) ; Bishop, C. F., (History of Elections in American Colo- nies) (New York 1893) ; Beard, C. A., and Beard, M. R., (American Citizenship) (ib. 1914) ; Chandler, J. A. C., (History of Suffrage in Virginia5 (in ˆJohns Hopkins University Studies in Historical and Political Science,5 Ser. XIX, Nos. 6-7, Baltimore 1901) ; Caffey, F. G., Suffrage Limitations at the South5 (Boston 1905) ; Donaldson, W. T., Compul¬ sory Voting> (in National Municipal Revieru, Vol. IV, pp. 460-465, Concord, N. H., 1915) ; DuBois, W. E. B., (Disfranchisement) (New York 1912) ; Dougherty, J. H., Che Electoral System of the United States 5 (ib. 1906) ; Fox, I). R., (The Negro Vote in Old New York5 (in Political Science Quarterly, Vol. XXXII,

pp. 252-275, Lancaster, Pa., 1917) ; Guentzer, J. W., Citizenship and How to Obtain It) (New York 1901) ; Hamilton, J. A., (Negro Suffrage and Congressional Representation5 (ib.

1910) ; Hemphill, J. C., Che South and the

Negro Vote) (in North American Review, Vol. CCII, pp. 213-219, New York 1915) ; Hart, A. B., (Exercise of the Suffrage5 (in Political Science Quarterly, Vol. VII, pp. 307-329, 1892), (Actual Government 5 (New York 1908), and Realities of Negro Suffrage) (in Proceed¬ ings 5 of the American Political Science Asso¬ ciation for 1905, Vol. II, pp. 149-166, Lancaster, Pa., 1906) ; Haynes, G. H., Representation and Suffrage in Massachusetts, 1620-1691) (in XII, Nos. 8-9, Balti¬ more 1894), and educational Qualifications for the Suffrage in the United States5 (in Political Science Quarterly, Vol. XIII, pp. 495-513, New York 1898) ; Jones, C. L., Readings on Parties and Elections5 (ib. 1912) ; McMaster, J. B., Che Acquisition of Political, Social and In¬ dustrial Rights of Man in America5 (Cleveland 1903) ; Mechem, F. R., Raw of Public Offices and Officers5 (Chicago 1890) ; McCrary, G. W., < American Law of Elections5 (ib. 1897) ; Mc¬ Kinley, A. E., (Suffrage Franchise in the

Thirteen English Colonies in America5 (Phila¬ delphia 1905) ; MacMillan, D. C., (Elective Franchise in the United States5 (New York

1898) ; Michael, W. H., ‘Elections5 (in Cyclo¬ pedia of Law and Procedure,5 Vol. XV, pp. 268-465, New York 1905); Munro, W. B.,

‘ Government of American Cities5 (New York 1913) ; Mellor, F. H., Regal Qualifications for Office in America, 1619—1899 5 (in ‘ Annual Re¬ port5 of the American Historical Association, 1899, Vol. I, pp. 87-154) ; McGovney, D. O.,

1911) ; Mann, E. C., Rights and Duties of Citizens of the United States5 (New York

1894) ; Phillips, J. B., ‘Educational Qualifica¬ tions of Voters5 (in Rniversitv of Colorado Studies,5 Vol. Ill, pp. 51-62, Boulder 1906) ; Remsen, D. S., ‘Suffrage and the Ballot5 (New York 1892) ; Rose, J. C., ‘Negro Suffrage5 (in American Political Science Review, Vol. I, pp. 17-43, Baltimore 1906) ; Steiner, B. C., Citizen¬ ship and Suffrage in Maryland5 (Baltimore

1895) ; Shepard, W. J., ‘Theory of the Nature of Suffrage5 (in Rroceedings5 of the Ameri¬ can Political Science Assocation for 1912, pp. 106-136, Baltimore 1913) ; Smith, W. R., (Negro Suffrage in the South5 (in ‘Studies in South¬ ern History and Politics,5 New York 1914) ; Smith, J. A., Che Spirit of American Govern¬ ment5 (ib. 1907) ; Tucker, H. St. George,

(Woman’s Suffrage by Constitutional Amend¬ ment5 (New Haven 1916) ; Thompson, R. H., ‘Suffrage in Mississippi5 (in ‘Publications5 of the Mississippi Historical Society, Vol. I, pp. 25-49, 1898) ; Van Dyne, F., Citizenship of the United States5 (Rochester, N. Y., 1904), and ˆTreatise on the Law of Naturalization5 (Wash¬ ington 1907) ; Wise, J. S., (Treatise on Ameri¬ can Citizenship5 (Northport, L. I., 1906) ; Wolfman, N., ‘Status of a Foreigner Who Has Declared His Intention of Becoming a Citizen of the United States5 (in American Law Re- viezv, Vol. XLI, pp. 498-514, Saint Louis 1907) ; Wolfe, A. B., (Manhood Suffrage in the United States5 (Chicago 1913) ; ‘Just a Few Ways in Which the South Will Still

Prevent Negroes from Voting) (in Everybody’s Magazine, V ol. XXXIII, pp. 251-252, New York 1915). The provisions of the various State constitutions adopted up to 1907 will be found in Thorpe, F. N., (Federal and State Con¬ stitutions, Colonial Charters and Other Organic Laws of the States, Territories and Colonies) (7 vols.,

Washington, D. C., 1909; issued as (House Document* 357, 59th Congress, 2d Session). Books relating to woman suffrage will be found under that title. Various phases of the qualifications, rights, powers, duties, liabilities, etc., of public officials will be found in the articles ((Officers,® ((States,® <(Term,® ((Terri- tories,® <(United States® and the cross-refer¬ ences appended thereto in (Cyclopedia of Law and Procedure, * Vols. XXIX, pp. 1356-1471; XXXVI, pp. 844-869; XXXVIII, pp. 184-187, 198-208; XXXIX, pp. 693-728. Distinctions between citizenship and suffrage and court de¬ cisions regarding these points will be found in the article <(Citizens® in (Corpus Juris, > Vol. XI, p. 774 et seq. (New York 1917) and for certain phases of alien citizenship the article (< Aliens® ibid, Vol. II, pp. 1039ˆ-1132.

Irving E. Rine9.

ELECTORAL REFORM. See Elections.

ELECTORAL SYSTEM of the United States. All elections, whether for city, State or Federal offices, are in all States conducted by ballot. To save the expense of distinct pollings, it has been long usual to take the pollings for a variety of offices at the same time. The details of the procedure previous to, during and after election are thoroughly covered by posi¬ tive enactments. These deal specifically with registration, the election process, counting of the votes and the various safeguards instituted for the purity of elections.

Registration. — Official lists of voters are prepared in advance by registering those eligi¬ ble to vote. Personal registration, usual in the larger centres of population, requires the per¬ sonal appearance of the prospective voter at the registration office. Registration by official declaration is common in the less densely popu¬ lated regions ; the local authorities make up the list, but a revision may be demanded by any interested party. A personal identification law is in force in some large cities in order to pre¬ vent false registration. Counties and cities are divided into small parts, each with a few hun¬ dred votes. The election is controlled by official boards made up of the two parties standing highest at the previous election. The ballot is printed at the public expense and except in Georgia and South Carolina the secret ballot has been adopted. In general the ballot con¬ tains the names of all candidates which are placed in party columns, although the Massachusetts ballot includes the names of all candidates under the title of the several offices. The voter on entering the polling office states his name and address, which are entered in the pollbook by a clerk. He is next handed a ballot which is often numbered to correspond with the number on the pollbook, the voter enters the

enclosed space provided in the polling place, prepares his ballot, folds it as required by law so that the markings are concealed. He next hands it to the election officer who deposits it in the ballot box. The right of an elector to vote may be challenged for cause, in which case he is put under oath to answer certain questions regard¬

ing his qualifications as a voter. When the polls are closed at the legal hour tally sheets are taken up by the election officers. The ballot box is opened and the ballots are withdrawn one by one. The chairman announces the names of the candidates voted for and the officers duly mark their tally sheets. At the close of the' count, the results are officially announced. Tally sheets and pollbooks are next sealed and delivered to the custodian designated by law to guard them. The ballots are also sealed and sent to some central authority where they are kept for a certain time in case they may be needed if an election be contested in the courts.

Bribing or bestowing gratuities to influence voters at elections, the acceptance of such gratuities, voting by a person not properly qualified, threats, violence or intimidation of voters, voting more than once, ˆcolonizing,® inducing voters to remain away and any other attempt to influence the proper course of an election are severely punished by statute in all the States. Considerable legislation has been enacted in recent years in an effort to control the use of money at elections, many States re¬ quiring a sworn statement of all campaign ex¬ penses from each and every candidate. See Ballot ; Elections ; Electoral Qualifica¬ tions ; Corrupt Practices Acts ; Electoral Frauds ; Vote, Voters, Voting ; Woman Suf¬ frage; Alien; Citizenship; Caucus; Conven¬ tions, Political; Initiative; Referendum; Recall ; Primary ; Voting Machines ; and consult Beard, C. A., (American Government and Politics) (New York 1914) ; Bryce, (Ameri- can Commonwealth * (ib. 1914) ; McLaughlin and Hart, (Cyclopedia of American Govern¬ ment (ib. 1914).

ELECTORAL VOTES, the votes cast by the presidential electors or electoral college for President and Vice-President. Prior to 1804 each elector voted for two candidates for Presi¬ dent. The one who received the largest num¬ ber of votes was declared President; and the one receiving the second largest vote was elected Vice-President. The votes for the first President were: George Washington 69; John Adams (Mass.) 34, John Jay (N. Y.) 9, R. H. Harrison (Md.) 6, Jno. Rutledge (S. C.) 6, John Hancock (Mass.) 4, Geo. Clinton (N. Y.) 3, and scattering 7. In 1912 the electoral votes cast by the electoral college were as follows : For President, Woodrow Wilson 435, Theodore Roosevelt 88, William H. Taft 8; for Vice- President, Thomas R.

Marshall 435, Hiram Johnson 88, Nicholas M. Butler 8. Consult McClure, (Our Presidents) (New York 1905) ; Stanwood, (History of the Presidency from 1788 to 1897* (Boston 1898) ; (History of the Presidency from 1897 to 1912) (ib. 1912). See Electors; Electoral Commission.

ELECTORS, German Imperial (Ger. Kur- f first) , certain princes of the old Holy Roman Empire who had the right of electing the em¬ perors. The number of the electors was early fixed at seven by the Golden Bull of 1356, in¬ cluding the archbishops of Mainz, Cologne and Treves, the king of Bohemia, the Count Pala¬ tine of the Rhine, the Duke of Saxony, and the Margrave of Brandenburg. An election as king of the Romans was held by the German princes to include the imperial title of Holy Roman emperor, but this was contested by the popes, who claimed the exclusive privilege of

granting the title. In 1648, by the Treaty of Westphalia an electorate was given to Bavaria; and in 1710 to Hanover. In 1802 the Bavarian electorship had expired, the archbishops of Co¬ logne and Treves were excluded, and the num¬ ber of electors was increased to 10 by conferring the rank on the rulers of Baden, Wurttemberg, Hesse-Cassel and Salzburg. In 1806 the em¬ peror gave up the imperial title, and the elec¬ tors gradually adopted other titles. Consult Bryce, (The Holy Roman Empire* (London

1892).

ELECTORS, United States Presidential

(as a body, termed the Electoral College, a term informally used since about 1821, prob¬ ably suggested by the College of Cardinals; (

At the meeting of the State electoral col¬ lege no organization is required; but it is cus¬ tomary to organize and elect a chairman. Separate ballots (which remain the property of the State) are cast for President and Vice- President. In the first three elections, each

simply voted (as required by the Constitution) for two persons, ‘one a resident of a differ¬ ent State, without designating the office ; the one with the highest vote became President, the next highest Vice-President. Obviously, as soon as parties gained firm organization, mere party loyalty would invariably produce a tie; and in 1800

Jefferson and Burr were so tied (see Jefferson-Burr Imbroglio), the resulting scandal and danger leading to the 12th Amendment, which obliges the electors to designate the office voted for.

The constitutional provision as amended in 1804 and in force now is as follows :

The electors shall meet in their respective States and vote by ballot for President and Vice President, one of whom at least shall not be an inhabitant of the same State with themselves ; they shall name in their ballots the person voted for as President, and in dis¬ tinct ballots the person voted for as Vice President ; and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice President, and of the number of votes for each, which list they shall sign and certify, and transmit, sealed, to the seat of the Government of the United States, directed to the President of the Senate ; the President of the Senate shall, in the pres¬ ence of the Senate and House of Representa¬ tives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers, not exceed¬ ing three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President.

<(But in choosing the President, the votes shall be taken by States, the representation from each State having one vote ; a quorum for this purpose shall consist of a member or members from two-thirds of the States, and a majority of all the States shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the 4th day of March next following, then the Vice President shall act as President, as in the case of the death or constitutional disability of the President. The person having the greatest number of votes as Vice President shall be the Vice President, if such number be a majority of the whole number of electors appointed, and if no person have a majority, then from the two highest numbers on the list the Senate shall choose the Vice President; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice President of the United States.®

After voting, they make three lists of the persons, offices and number

of votes, and the names of the State electors certified by the “executive authority® of the State; seal them, and certify each; transmit two to the president of the Senate, one by messenger and one by mail, and deposit the third with the Federal judge of the district. They have then no further functions.

ELECTRA

89

On the second Wednesday in February, in the Representatives Hall and in presence of both Houses of Congress assembled, the presi¬ dent of the Senate opens and counts the State returns, and announces the result. In case of a tie the House decides by a majority of States, each having one vote ; on a tie for Vice- President, the Senate decides in the same way. If no one candidate has a majority, the Houses decide in the same manner, choosing from the three highest candidates on the list. Thus, in 1824, John Quincy Adams was elected President by the House; in 1837 Richard M. Johnson was elected Vice-President by the Senate. But sup¬ pose the third and fourth are ties. This quite probable contingency has not been provided for, and may cause trouble. There was formerly a custom, when a State sent in conflicting elec¬ toral returns, of announcing the final result (

In order to obtain the electoral votes of a State, a party must carry the State. In other words, the electoral vote of a State is deter¬ mined by the highest popular vote cast in that State. The popular vote for electors is counted, but there is no electoral vote to count unless a State is carried. Consequently, the smaller parties which have not had a large enough popular vote to carry a State have not had the State votes in the electoral college, and must therefore be counted by popular vote only, having no representation in the electoral college at all.

The electoral system, despite its wide di¬ vergence from the intent of its originators, and its undeniably undemocratic character, is never seriously menaced, because of its practical utility in settling the presidential question at once on the counting of State votes. With direct popular vote, where parties are closely balanced, the result could not be known per¬ haps for months.

In accordance with the Reapportionment Act of 1911 the number of electors in the sev¬ eral State colleges is as follows :

Alabama . 12

Arizona . 3

Arkansas . 9

California . 13

Colorado . 6

Connecticut . 7

Delaware . 3

Florida . 6

Georgia . 14

Idaho . 4

Illinois . 29

Indiana . 15

Iowa . 13

Kansas . 10

Kentucky . 13

Louisiana . 10

Maine . 6

Maryland . 8

Massachusetts . 18

Michigan …..’ . 15

Minnesota . 12

Mississippi . 10

Missouri . 18

Montana . 4

Nebraska . 8

Nevada . . . 3

New Hampshire . 4

New Jersey . 14

New Mexico . 3

New York. ._ . 45

North Carolina . 12

North Dakota . 5

Ohio . 24

Oklahoma . 10

Oregon 5

Pennsylvania . 38

Rhode Island . 5

South Carolina . 9

South Dakota . 5

Tennessee . 12

Texas . 20

Utah . 4

Vermont . 4

Virginia . 12

Washington . 7

West Virginia . 8

Wisconsin . 13

Wyoming . 3

The whole number of electors in the United States, until another reapportionment is made, will remain at 531, and the majority

necessary to secure an election to the presidency will be 266. See Apportionment.

Consult Dougherty, J. H., (Electoral System of the United States) (1906).

ELECTRA, in Greek legend, the name of several personages. (1) One of the Oceanides, wife of Atlas, and mother of Dardanus by Zeus. (2) A daughter of Atlas and Pleione, who be¬ came one of the Pleiades. (3) A daughter of Agamemnon, king of Argos, who incited her brother Orestes to avenge their father's death by killing their mother, Clytemnestra. Orestes gave her in marriage to his friend, Pylades, and she became the mother of Strophius and Medon. She is the subject of a number of dramas, both ancient and modern.

ELECTRA. Benito Perez Galdos' drama Plectra,* one of the most conspicuously success¬ ful, as well as one of the shortest-lived of modern Spanish plays, was performed for the first time in the face of violent protest at the Teatro Espanol, Madrid, in 1901. Constructed with the author's customary skill, it is written in a spirit of broad tolerance, the didactic touch never being entirely absent from its pages. Yet as a thesis drama the play is unconvincing. In particular, the solution of the conflict be¬ tween the scientific spirit and the Church, typi¬ fied in their struggle for the soul of a young woman, is precipitated at the denouement by means of an apparition which effects a recon¬ ciliation between the demands of science and religion through supernatural aid. Undoubtedly this evasion was not without utilitarian justifi¬ cation, and made the performance of the play possible. Galdos had been associated for many years with a program of social, political and literary reform, which, had brought to his aid a host of admirers, among whom the great body of the more intelligent of the youth of his coun¬ try was included. In

An English translation was published at Chicago, 1911. Authoritative criticism of Galdos may be found in Alas, L., (Galdos) (Madrid 1912) also Martinez Ruiz, J. (Azorin), (Lecturas espanolas> (Madrid 1912).

John Garrett Underhill.

ELECTRA. Although Hugo von Hof¬ mannsthal possesses no original genius, he is the most musical of poets who in recent times have contributed to the drama in German. His power of verbal expression, rather than his dramaturgic skill or his understanding of char¬ acter, entitles him to praise. A Viennese, he is an cesthetic cosmopolite. In (Venice Pre- served) he has reworked the English tragedy of Otway

and in

Burg Theatre in Vienna of yEschylus, trans¬ lated into German by Wilamowitz-Mollendorff, and by the suggestion of the critic Paul Schlen- ther that modern playwrights should render classic themes in a free fashion.

The piece is in one act and dispenses with the classic chorus, partly because this would be counter to our stage conventions, and partly because it would detract from the lyrical fervor of the individual characters. The Sophoclean story of Electra's yearning for the return of her brother Orestes to whom she may confide the task of avenging her mother's murder of her father is repeated, with the weakness of her sister Chrysothemis, the appearance of Orestes as a messenger come to announce his own death, and his slaying of his mother, Clytemnestra, and her paramour, Hfgisthus. Von Hofmannsthal, however, has mad-e no effort to achieve the noble dignity of the Greek. Instead, he has sensualized Electra, whose lust for vengeance on her guilty mother becomes hysterical and insane. Hatred, she says, has been her bridegroom ; curses and despair have been her children. When Orestes finally slays his victims, Electra dances in very ecstasy of joy. As an American critic, Mr. W. P. Eaton, has remarked : <(Pity and fear are not aroused by von Hofmannsthal's play, but curiosity and horror. The emotions are not purged, but scraped, irritated, made to shiver and creep.® The best account of von Hofmannsthal is Dr. August Kollmann's monograph in German (1907) ; he is discussed in English by Elizabeth Walter in Poet Lore (1915), and by Ashley Dukes in (Modern Dramatists> (1912).

Frank W. Chandler.

ELECTRIC ALTERNATING CUR¬ RENT MACHINERY. A loop of wire re¬ volving in a magnetic field is the simplest form of an alternating current generator. The direc¬ tion of induced electromotive force in the two halves of the loop, which cut the magnetic flux in opposite directions, is such that the combined electromotive force at the terminals is double that of either revolving conductor alone. This induced electromotive force is proportional to the rate of cutting the magnetic lines, and there¬ fore to the sine of the angle by which the plane of the coil differs from the plane midway be¬ tween the poles and normal to the magnetic flux. At its zero position, or when the

planes coincide, the coil is cutting no lines of force and we have sine a — 0. The electromotive force, however, grows as we depart from this zero position, assuming uniform speed, until, when 90 degrees is reached the rate of cutting of the lines becomes a maximum, sine 90 degrees — 1. Passing on, the electromotive force dies away until 180 degrees is reached, when the value again is zero. From this to 270 degrees we have an increasing electromotive force, but of opposite polarity and at the end of the revolu¬ tion, or 360 degrees, again reach zero. Thus we have in one revolution in a two-pole field two waves of pressure of the same form but of opposite sign. The one is called the posi¬ tive wave and the other the negative. One such

revolution, or one positive wave and one nega¬ tive wave, constitute what is called a cycle, or period, which in technical literature is desig¬ nated by the symbol v —•> =one sine wave. The great majority of systems have a frequency be¬ tween 60 ‘ — ■> and 25 1 — >. Both of these fre¬ quencies are standard practice in this country, and the values between are chosen for special cases. Owing to the high frequency of commer¬ cial systems, alternators are built with more than one pair of poles, in order to keep the re¬ volving speed within reasonable limits.

Average and Effective Values. — If we plot the values of the instantaneous pressures as ordinates, with time as abscissa, we have a cor¬ rect representation of the generation of alter¬ nating currents, and the shape of the wave. When the total number of lines cut per revolu¬ tion by a coil revolving at constant speed re¬ mains the same, the average induced electro¬ motive force remains constant, regardless of the distribution of the magnetic flux. The effective value, however — the value read by the metre and the value which corresponds in its heat¬ ing effect to the direct current value — is not independent of this distribution.

The Place of Alternating Current Sys¬ tems. — The direct current for the railway at 550 volts, and for the lighting and power systems of the densely populated centres of our large cities in the Edison three-wire system 110 to 220 volts, seems to have become standard practice. Nevertheless the low radius of distribution with¬ out excessive cost of copper, even in the 550- volt railway system with a grounded return, makes necessary a great multiplicity of moder¬ ate-sized or small plants, operating at low effi¬ ciency. It is here that the alternating current comes to the front. While commutators (q.v.) can be built for collecting direct current for 1,000 volts, alternators can be built for 12,000 volts and step-up transformers of high economy are quite possible at 75,000 to 100,000 volts. Re¬ membering that the copper

cost is inversely as the square of the voltage, the great possibilities of the alternating current system are at once seen.

Energy from Waterfalls. — Electrical energy from waterfalls that a few years ago were merely points of scenic interest is now supplied to hundreds of cities in North America. There are numerous power plants of from 50,000 to 200,000 horse-power capacity, sending currents with voltage from 25,000 to 150,000 to distances up to 250 miles. See Hydro-Electric Develop¬ ment and Electric Transmission of Energy.

The Alternator. — Small alternators and those of moderate potential usually collect their current from insulated rings mounted on the shaft and connected to the ends of the armature winding. Through brushes, the current is taken to the external circuit. In some machines a rec¬ tifier is added for supplying sufficient undimen- sional current to produce the necessary addi¬ tional field to overcome the drop due to increase of load. All commercial alternators are sup¬ plied with an exciter, or direct current dynamo, whose function is to supply current to the field windings. The field spools are usually con¬ nected in series. The amount of current thus necessary on a full non-inductive load varies from 1ˆ2 to 3 per cent of the total output of the alternator. Owing to the difficulty of collecting

ELECTRIC ALTERNATING CURRENT MACHINERY

Fig. 1 Diagram of simple alternating current generator. N S poles of magnet. ABCDEFGH loop of wire

Q-

V

o-

Fig. 3 Diagram of simple three-pln se alternator

-f

PHASE 3

PHASE 2. PHASE «

Fig. 5 Diagram showing winding of a two-pole, three- phase rotating motor field

Fig. 7 Diagram showing “signs ” of rotor bars under the influence of

inductance

N

Fig. 2 Diagram of simple two-phase alternator

mr

(ism&Mwr)

s

Fig. 4 Diagram showing step-up (left) and step-down (right) transformers. P P primary coils; S S second¬ ary coils

Fig. 6 Diagram showing “signs” of rotor bars if there were no inductance

Fig. 8 Diagram showing winding of two-pole two-phase rotating motor field. Aj is the return wire of phase A, and Bx the return wire of phase B

large currents by means of brushes and of pre¬ serving good insulation between the rings and shaft, the revolving field type of machine is now used in almost all large installations, the field current from the exciter being supplied through cast-iron rings mounted on the shaft, or in the case of the inductor type, consisting of an annular ring surrounding the inductor or re¬ volving element, which consists of laminated iron poles suitably spaced and keyed to the shaft. The windings being stationary, there are no moving connections, either for the field current or the main current of the machine. In either type the alternating current is taken from the terminals of the windings, usually at the bottom of the frame.

Polyphase Machines. — If two armatures, of the same number of turns each, be connected to the shaft at 90 degrees from each other, and re¬ volved in a bi-polar field, and each terminal be joined to a collector ring, we have two separate electromotive forces differing in phase by 90 degrees or a two-phase machine. With 120 degrees phase difference and three sets of arma¬ tures we have a three-phase winding. By prop¬ erly interconnecting the three circuits, we may use but three wires for transmission, or four, in accordance with the

system used. The con¬ struction of multiphase machines is similar to that of the single-phase type, excepting that in the former we have as many armatures, series connected, as there are phases.

In the two-phase three-wire system, the wire from the common junctions of the phases car¬ ries 1.414 times the current of the outer wires. The electromotive force between the outer wires is also V2 E, when E is the electromotive force per phase, or between either outer wire and the common return. When this system is used it is important that the load be carefully balanced on the phases and that the power factor be kept as high as possible in order to keep the voltage on the phases nearly alike at the receiving end. Single phase motors or lamps may be connected to either or both phases, but it is very import¬ ant that no load be connected between the outer- wires, as the effect is to badly unbalance the voltages on the different phases.

In the three-phase star connected system the line voltage is V 3 = 1.732 times the voltage on the coils of the machine, or the machine volt¬ age, which is the pressure between any one of the three line connections and the common neu¬ tral. The line current in this system is the cur¬ rent that flows through any one of the machine windings. In the delta connection, the line voltage is the same as the voltage across any phase of the machine, while the line current, being the resultant of two currents, is V 3 = 1.732 times the current flowing through any phase of the machine.

Energy Polyphase. — In a two-phase cir¬ cuit, whether three or four wire, the energy flowing is the sum of the products of each phase current by the phase pressure. Two wattmeters are used. In the three-phase system when E = volts between lines; I = amperes on lines; W = total watts output of machine, — then, whether the connection be star or delta, the total

output

is

3E X 1 V3

= 1.732 El, always supposing

the system be balanced. Thus the output of the

machine is not changed by changing the con¬ nections from star to delta. In the balanced three-phase system, one wattmeter will register the total output if its constant be multiplied by 1.732. Two wattmeters

are usually employed.

Regulation of Alternators. — The regulation of modern alternators varies from 5 to 6 per cent, which means that in case the full, non-inductive load of an alternator be taken off, the speed and excitation being kept constant, the terminal pressure will rise by an amount corre¬ sponding to from 5 per cent to 6 per cent of its full load voltage. Close regulation means a much better voltage-regulation on the system and stronger synchronizing power. A certain amount of armature reaction is necessary to avoid large cross currents on changing the field of one or more machines operating in parallel, in the attempt to preserve the same terminal voltage. The efficiency of large alternators is about 96 per cent to 97 per cent.

Frequency. — In regard to the frequency best adapted to transmission work, or to local distri¬ bution, various factors enter into the problem. At 60 both arc and incandescent lamps can be operated satisfactorily. The transformers are smaller and cheaper than at 25 *v/ and motors are very satisfactory both as to low first cost, range of speed, and good starting torque (q.v.). Frequencies over 60 have been aban¬ doned. The line drop, due to reaction, increases with the frequency: a change of frequency from 25 ‘V/ to 125 would, on the same

line, more than double the line drop. While as a rule 60 **J apparatus is cheaper than that for 25* /\/ yet the increase in polar speed often becomes difficult without increasing the number of poles to an undesirable extent, which, in 60 A apparatus, may be sufficient to make the parallel operation of low speed direct-con¬ nected alternators quite difficult.

Self-induction. — When a current is intro¬ duced into a circuit a magnetic field is produced, surrounding the conductor, the rise of which causes a counter electromotive force. This elec¬ tromotive force is called the electromotive force of self-induction. The effect of self-induction upon electric currents is directly comparable to the effect of inertia on a material .body. It is that quality that tends to hinder the introduction, variation or extinction of the current in a cir¬ cuit. As this effect is greatest at times of most rapid change of magnetism set up by the current, in alternating current circuits, it becomes a maxi¬ mum when the inducing current is passing through zero, and, therefore, the counter elec¬ tromotive force of self-induction lags 90 degrees behind the current in the circuit. It also follows the sine curve provided the current flowing is sinusoidal.

In a circuit containing several impedances in series, the joint

impedance is not the sum of the individual impedances, but is obtained by taking the square root of the total added reactances squared plus the total added resistances, squared. That is, Impedance = = _

V fR. + R2< + Rs)2 + (2?r ffi -fi 2rr fl2 + 2n fl3)*

The joint impedance of several impedances in parallel is found as follows. Construct a parallelogram from the reciprocals of two of the impedances, each expressed in its proper phase relation. The direction of the diagonal will give the phase of the resultant im-

pedance and its reciprocal amount will give the reciprocal of its length. For more than two, the method of the polygon of forces is applied. The effect of self-induction varies with the fre¬ quency of the current supplied, and as the square of the number of turns in a circuit. The self-induction in the armature of an alternator has two effects. The first is to produce a lag¬ ging current and thus lower the terminal volt¬ age, and the second is a demagnetizing effect. The current is thrown into such a phase that it produces lines of force directly opposed to the field and thus lowers the voltage by reducing the total flux. The effect of armature reaction depends upon whether the current is leading or lagging in phase. A lagging current lowers the voltage of an alternator and a leading current raises it.

Capacity. — All insulated conductors have the quality of being able to hold, stored on their surfaces, a certain quantity of static elec¬ tricity, and are thus condensers. The charg¬ ing and discharging of an alternating current circuit causes the current to flow from the generator into the line and then back into the generator again, with the frequency of the alternator, in order to keep up the static poten¬ tial on the line. As this charging current is greatest when the rate of change of electromo¬ tive force is greatest, a sinusoidal wave of capacity electromotive force with 90 degrees difference in phase from the machine electromo¬ tive force is produced. This leads the active electromotive force by 90 degrees and is thus directly opposite to the electromotive force of self-induction. If we have a circuit in which the electromotive force of self-induction is just equal to the capacity electromotive force, and these two parts of the circuit are in series, the effect of both is neutralized and we have, as in direct currents,
W = EXC.

The Transformer. — The one piece of ap¬ paratus that more than all else has made pos¬ sible the electrical transmission of energy to long distances is the transformer. This is the apparatus that receives in one set of coils the dangerous potential of the line and transforms it into whatever potential is desired for lights or motors, which are supplied from an entirely separate winding. The transformer consists of a magnetic circuit of laminated iron or mild steel interlinked with two electric circuits, one, the primary, receiving electrical energy and the other, the secondary, delivering it to the con¬ sumer. The effect of the iron is to make as many as possible of the lines of force set up by the primary current cut the secondary wind¬ ing and there give rise to an electromotive force of the same frequency, but different vol¬ tage.

Not only does the transformer make pos¬ sible the transformation of voltages, but it also permits of changing from one system to an¬ other. Thus a single-phase primary may sup¬ ply a three-wire Edison system, of course, with alternating current. A two-phase system can be changed to a three-phase or vice versa ; a four-wire two-phase may make a three-wire two-phase, and many other useful combinations may be effected. The Scott connection for changing two-phase to three-phase, or the op¬ posite, uses but two transformers. One has a ratio of, say 10 to 1, with a tap at the middle

of its secondary coil. The other must then have a ratio of 10 to .866— 10 to V 1 . One ter¬ minal of the secondary of this transformer is connected to the middle of the other secondary, and the remaining free ends of both seconda¬ ries form the three terminals of a three-phase

circuit. The value V I is the altitude of an

equilateral triangle of which the base is unity, and thus' we may consider the current to be taken from the corners of an equilateral tri¬ angle, which represent, in phase and potential difference, a true three-phase system. The cur¬ rent in the transformer of secondary, .866 being the resultant of the other two-phases, is greater than under normal two-phase conditions ; and, therefore, the windings must have about 15 per cent more copper. If two similar transformers are used the secondary of each has taps giving 50 per cent and 86.7 per cent of full voltage. In many large installations, notably at Niagara Falls, we find two-phase generators feeding three-phase lines through Scott connected step- up transformers. In small systems standard transformers may be used having ratios of 10 to 1 and 9 to 1 respectively, and the results will be quite satisfactory.

The Induction Motor. — Acting upon the well-known fact that a copper disc could be made to revolve by rotating a horseshoe magnet so that the lines of force cut the disc, Ferraris, Tesla, Dobrowolsky and others have developed the present type of induction motor. The credit for the first commercial application of the ro¬ tating field caused by currents of displaced phase probably belongs to Tesla. At the pres¬ ent day the value of these discoveries in the transmission and distribution of power can hardly be estimated. The induction motor is somewhat similar to the direct-current shunt motor. Both motors have field and armature windings. In both cases, also, the field is con¬ nected directly across the mains. In the shunt motor the armature current is supplied through brushes and a commutator to the windings, while in the induction motor the armature cur¬ rent is an indirect current, the field acting as the primary of a transformer of which the armature is the secondary. In both motors the efficiency is inversely proportional to the arm¬ ature resistance, as is also the speed regulation of the motors. The less the armature resist¬ ance the higher the efficiency and the closer the regulation of speed between no load and full load. In practice, either element may be the one to revolve. The rotation is produced by the reaction of the armature, or indirect current, on the revolving magnetic field, which results in dragging the moving element around in order to keep up with the field flux, as it passes around the face of the primary windings. This field, being the resultant of two or more alternating fields of different phases, rotates with the polar frequency of the supplied voltage. The secondary winding is made up of copper bars set in slots in a laminated iron core and running across the armature parallel with the axis of rotation. This separating of the old copper disc into narrow bars constrains the current to flow into the best direction for pro¬ ducing torque and avoids the waste of the un¬ constrained Foucault currents in the Arago disc, and thus makes the motor much more

efficient. Sometimes the secondary windings are joined to heavy short-circuiting rings at both ends, resulting in the squirrel-cage type of motor; and in other cases the secondary wind¬ ings are taken out through collector rings, if the secondary be the rotating element, and start¬ ing resistances are inserted in series to lessen the reaction due to excessive starting current and thus improve the starting torque. When up to speed these resistances are cut out and the terminals short-circuited as in the squirrel-cage type.

The Asynchronous Generator. — If the

motor be driven by power from an outside source up to true synchronism, no current will flow in the secondary, and the primary current or field current will be wholly made up of the wattless exciting current, just as in a trans¬ former at no load. The slip, or amount by which the motor speed at full load differs from synchronous speed, may be as little as 2 to 2ˆ2 per cent of the speed of synchronism in large motors, and in small motors may be 5 per cent or more. If the motor above mentioned be forced above synchronism the motor becomes a generator, provided the connection to the mains is left closed, and when a negative slip of the same amount as full load slip as a motor is reached, the generator will be giving out its full output at the same frequency as the exciting circuit. The possibilities of this system are interesting.

The Synchronous Motor. — The synchro¬ nous motor is merely an alternating current generator of special design. Both motors and alternators have a direct current field and an alternating current armature. The operation of a synchronous motor, when once brought up to speed and thrown into circuit, is the same as that of an alternator in parallel with one or more alternators. When the back pressure of the motor is equal and directly opposed to that of the line no current can flow. The friction, however, causes the revolving element to lag slightly behind the line pressure, and a cur¬ rent is driven through the motor by the gener¬ ator. This current increases directly with the lag behind the central-phase position caused by increased load. A good synchronous motor, while always revolving at the same polar speed as the alternator supplying the line current, will carry a load of five or six times full load be¬ fore it breaks out of step, and becomes prac¬ tically a short circuit on the system. The cur¬ rent which passes through such a motor on short circuit, while held down by the induct¬ ance of the windings, is yet sufficient to rapidly damage the insulation if not cut off. The great advantage of the synchronous over the induc¬ tion type of motor is that the power factor can be raised or lowered at will. By raising the field strength of a synchronous motor the cur¬ rent taken by the motor may be made leading and hence help keep up the line voltage on a heavy inductive load. This, is of the greatest importance in practice. It is good practice to set the field strength for a good power factor at full load. At light loads the motor is as¬ sisting the generator to maintain the required pressure. Another advantage of the synchro¬ nous motor is that it can easily be built for very high voltage, especially the revolving field type — a 12,000 volt motor is not at all unusual

practice — thus the use of transformers may be dispensed with.

The Rotary Converter. — The rotary con¬ verter is a specially designed direct-current generator provided, at proper points in the winding, with taps to collector rings, from which, if the machine is run as a motor from the direct-current side, an alternating current may be taken. Usually the alternating current is taken from the secondaries of suitable trans¬ formers and supplied to the rings, driving the rotary as a synchronous motor, the direct cur¬ rent being taken from the brushes on the com¬ mutator. As the reaction of the incoming al¬ ternating current about balances that caused by the outgoing direct current, the armature reac¬ tion of such a machine is very small and the brushes can be always kept in one fixed posi¬ tion. If the taps from the armature are taken off at points differing 180 degrees from each other, electrically, we have a single-phase rotary. If connections are made 90 degrees apart we have a two-phase rotary, using four collector rings. Taking 120 degrees around the armature for our taps we have a three-phase rotary, using three collector rings. By adding to the number of taps and therefore to the num¬ ber of rings we may have a six-phase rotary. The output of a rotary is greater than its out¬ put as a direct-current generator, chiefly on account of the absence of armature reaction and because at certain positions the current flows straight from collector ring to commutator and thus avoids the loss due to heating. The rotary converter, with its step-down trans¬ former, is the most efficient means we now have of transforming the high tension polyphase cur¬ rents of our large central stations to direct current for the Edison system, and for railway purposes. This piece of apparatus is wound either shunt or compound, in accordance with the use for which it is intended. As in the case of the synchronous motor, the rotary is a valuable help to the central station by running at a very high power factor. By overexciting the fields the current taken by the rotary be¬ comes leading and helps to hold up the voltage of the central station in case of a heavy load of induction motors by means of the armature reaction of the generators. Owing to* very high commutator speeds at the higher frequencies, rotaries are not much used on frequencies above 60 degrees. At this frequency they operate satisfactorily. At lower frequencies, however, rotaries are at their best, and will stand enor¬ mous overloads, sudden changes in load and other disturbances, with perfect satisfaction. The voltage of the direct current end of a rotary is that of the peak of the sine wave of the alternating pressure, and thus a voltmeter

across the collector rings would read

V? ““here

E is the direct-current electromotive force in single and two-phase rotaries. In the three- phase system the ratio between the alternating current pressure and the direct current at the

vr

commutator brushes is ■•■■■■■■—=. — .612. Thus in the

2\/2

Edison system operating at 250 volts we should have to transform down to 250 X. 612=1 53 volts at the secondary of the transformers. While rotaries can be started up without field, from

the alternating current side, it is not good prac¬ tice, excepting in certain special cases. Gen¬ erally they are started up exactly like a shunt motor, synchronized, and then thrown upon the alternating current line. When a rotary is started up from the alternating current side, on closing the field switch it is impossible to tell what the polarity will be. Rotaries operate in parallel with perfect satisfaction, as a rule, on both the alternating current and the direct sides. The storage battery is always used in a large rotary installation to ensure against any possible contingencies. On compound rotaries the equalizer must be used, just as in the case of direct-current compound generators. See Electric Machine.

A. R. Cheyney,

Station Superintendent Philadelphia Electrical

Company.

ELECTRIC ANNEALING, a process of annealing by the heat generated by the passage of an electric current through the body to be annealed, or in which heat generated by an electric current is used in place of ordinary heat. The heat developed in a conductor by an electric current is equal to the product of the square of the current by the resistance of the conductor=C2R. An interesting experiment showing the fusing power of the electric cur¬ rent is made in the following manner : Provide a glass or porcelain vessel containing a mixture of sulphuric acid and water. Introduce a lead plate electrode suitably connected with the positive pole of a continuous-current generator.

Connect by a flexible wire the negative pole to a stout pair of metal pliers. When, by means of the pliers, a metal rod is immersed in the acid solution, the liquid is seen to boil near the rod, which is brought to a dazzling whiteness in a few moments, and presently begins to melt. The heating is so quickly produced that the liquid or the body of the rod has not time to become hot. In a short time a temperature of 7,000° F. may be developed, and with a very strong current a temperature of 14,000° F. has been produced.

ELECTRIC ANNUNCIATOR, a form of annunciator used in private houses, offices and hotels. They are used to call messengers, to announce an alarm and to indicate the source of the alarm in connection with electric bur¬ glar-alarm apparatus, and for numerous other purposes. In some forms of annunciator the source of the call is indicated by the movement of a needle on the face of the case opposite a given number; in others a shutter drops, dis¬ closing the number or name of the room or office. See Electric Signaling.

ELECTRIC ARC, the intensely hot bright flame that forms where an electric current jumps a gap between two electrodes: called also voltaic arc. It tends to curve in an arc following the lines of force, hence the name. This is the source of light in an arc lamp. (See Electric Lighting). The lamp carbons, which constitute the electrodes, are usually en¬ closed to retain the carbon vapors. The car¬ bons have to be set at a slight distance apart, and as they burn down require to be moved so as to maintain the correct distance for permit¬ ting a good arc. In burning, the carbons create carbon vapor, which is a conductor, and the

current flows along this vapor conductor in an arc of visible flame. If the electrodes are im¬ pregnated with metallic salts and a powerful current passed across the gap, the so-called ((flaming arc® results, of varying color, accord¬ ing to the salts employed. Vacuum tube light¬ ing is also accomplished in a somewhat similar principle. See Electric Lighting and Electric Furnaces — Arc Furnace.

ELECTRIC AURA, a current or breeze of electrified air employed as a mild stimulant in electrifying delicate parts, as the eye.

ELECTRIC AUTOMATIC FIRE- ALARM. See Electric Signaling.

ELECTRIC BALANCE, an instrument for measuring the attractive or repulsive forces of electrified bodies; a form of electronometer, consisting of a graduated arc supported by a projecting plate of brass which is attached to a perpendicular column. A wheel, the axis of

which is supported on anti-friction rollers, and is concentric with that of the graduated arc, carries an index. Over this wheel, in a groove on its circumference, passes a line, to one end of which is attached a light ball of gilt wood, and to the other a float, which consists of a glass tube about one-fifth of an inch in diameter, terminating in a small bulb, so weighted that the index may point to the centre of the graduated arc. The difference between the weights of the float when in and out of water is known, and the diameter of the wheel carrying the index is such that a certain amount of rise or fall of the float causes the index to move over a certain number of graduations on the arc. See Electrometer.

ELECTRIC BATH, a solution in a vat or

tank containing a salt of some metal, as copper, silver, gold, etc., and connected with the nega¬ tive pole of a battery or dynamo. A current being passed through, the metallic salt is de¬ posited on the negative pole, or more strictly speaking, on the object to be plated, connected with the pole. The process is called electro¬ deposition. (See Electro-Plating; Electro- Chemistry). The name electric bath is also sometimes applied to a hot water bath through which a weak electric current is sent, for the treatment of patients. Its therapeutic value is questioned by many.

ELECTRIC BATTERIES. The electric battery is a device by which electric energy is derived directly from chemical action. There are two types of electric batteries: (1) primary, and (2) secondary. Secondary batteries are usually called (

The battery unit is called a (

The chemistry of the primary cell is thus

explained : When a piece of metallic zinc is placed in sulphuric acid diluted with water, a chemical union takes place, the acid and the zinc combining to form the new substance, zinc sulphate. In order that this may be brought about a certain amount of oxygen must be obtained to complete the combination, and as neither the acid nor the zinc can supply it, it is taken from the water lying next to the zinc, and which is thus decomposed — the hydrogen formerly in combination with the oxygen being set free in little bubbles which cling to the zinc. These bubbles eventually cover the zinc and slow down the formation of zinc

sulphate until it nearly ceases. If now a strip of copper be placed in the same vessel, but not in contact with the zinc, the conditions re¬ main as they were; but if the ends of the pieces of zinc and copper above the level of the water are leaned together so as to touch above the water, the chemical action is vigorously re¬ newed, but the hydrogen bubbles now appear on the copper. The action of the acid upon the zinc so reduces its electric potential that when contact is made with the copper an electric current immediately moves to restore the elec¬ trical equilibrium. This being restored, the chemical action — the formation of zinc sul¬ phate — is free to go on, and thus the cycle continues until the zinc has been entirely trans¬ formed into sulphate. And all the time the action is proceeding the electric current is con¬ tinually flowing to preserve the equilibrium. If, instead of tipping the two metals in the cell until they touch, a metallic conductor is placed so that one end touches the zinc and the other the copper, the current will traverse the whole length of the conductor; and this conductor may be cut and a machine inserted, so that the passing current may be made to expend part of its energy in work. The current is observed to flow from the zinc anode to the copper cath¬ ode within the battery. Outside of the bat¬ tery the current flows through the conductor from the copper toward the zinc. From this external movement the copper has received the title of the positive pole and the zinc of the negative pole.

The force or pressure which causes the current to flow is called the electromotive force (commonly abbreviated to E.M.F.). It should be understood that the words “current” and “flow” are not used in the same sense as with a liquid, like water. A better understanding is obtained from the illustration of a steam boiler carrying a high pressure of steam. When a valve into an empty pipe is opened, the pres¬ sure of steam in the boiler is transmitted to the further end of the pipe. In this case the steam fills the pipe carrying the pressure with it. In the case of the electric current passing along a conductor only the pressure (E.M.F.) is transmitted, there being no flow of any known material substance.

The electromotive force of a cell is depend¬ ent to a large degree upon the kind of acid used to dissolve the zinc. When the two plates are immersed in other acids than sulphuric, a con¬ siderable variation is found in the difference of electric potential set up in the cell, and it is to be borne in mind that it is upon this differ¬ ence that the strength of the current depends. The electric energy produced or released by a cell depends on the number of pounds of zinc

and acid consumed in the formation of zinc sul¬ phate. The zinc is the

battery fuel and is oxidized just as coal is oxidized in a furnace. The sulphuric acid does not dissolve the zinc itself, but dissolves the oxide as fast as it forms, thus making the action of the cell continuous.

If a simple cell is put in circuit with a galvanometer, it is observed that the current gradually diminishes in strength, due to the film of hydrogen bubbles which adhere to the copper. This condition is called "polarization." If the bubbles are brushed away, the current resumes (nearly) its former strength. It be¬ comes necessary then to establish some mechan¬ ical means of removing the hydrogen or to use some chemical substance in the cell which will combine with it and so remove it as fast as it forms. Mercuric chloride is sometimes used for this purpose. In the bichromate cell the oxygen of the bichromate seizes upon the hydro¬ gen and combines with it to form water. In the Leclanche cell the depolarizer is manganese dioxide. Another method of avoiding polariza¬ tion is a cell construction which admits of using two separate liquids, the metal on which the hydrogen collects being placed in a solution of some chemical which combines with the hydro¬ gen as it forms.

Another phenomenon which affects the strength of current passing through a cell and thence through the conductor which connects the two dry poles of the battery is what is called "resistance." This is of two kinds or divisions : internal and external. The former is that within the cell itself — the metals and the liquids ; the latter in the outside conductor. If this conductor is of some substance which has a low degree of electric conductivity, like lead; or even if of high conductivity, like copper, but is very long, or of very small cir¬ cumference, or both, the electric current will move along it very sluggishly, as if being held back by some obstacle — a resistance. This has the effect of slowing down the chemical action in the cell, and the result is what is termed a "weak current." With a short and comparatively large conductor of a high degree of conductivity the external resistance is re¬ duced to a minimum. The internal resistance of a cell is increased by polarization, as already mentioned, and this is remedied by using a depolarizer. The internal resistance may also be further reduced by giving the metallic com¬ ponents large areas and placing them quite close together, making the travel of the current through the electrolyte as short as possible.

Primary electric batteries are classified as wet batteries and dry batteries. In the first group liquids are used as electrolytes ; in the second, chemicals which retain moisture for a long time take the place of electrolytes.

WET BATTERIES.

Wet batteries are divided into one-liquid bat¬ teries and two-liquid batteries. The former are those which contain one homogeneous elec¬ trolyte ; the latter have two distinct electro¬ lytes, and the cell is usually divided into two parts by a porous cup which contains one of the metallic electrodes and one of the electro¬ lytes.

One-Liquid Batteries. — Among the prin¬ cipal one-liquid batteries now in use for

economic purposes and in general laboratory work are the following:

Smee. — A cell consisting of a platinum plate hung between two zinc plates in an elec¬ trolyte of dilute sulphuric acid. The platinum plate is roughened by an electro-deposit of platinum, forming a surface to which hydrogen bubbles will not adhere. The platinum is often substituted by silver, which, however, is roughened by depositing a skin of platinum. A variation of this cell has a grid of carbon rods instead of the platinum plate, the surface of the rods being made hydrogen-proof by carbonizing on them jackets of velveteen.

Bichromate, consisting of a zinc plate sus¬ pended between two carbon plates, which are gripped together at the top above the jar. The electrolyte used is a mixture of separately pre¬ pared solutions of sulphuric acid and of po¬ tassium bichromate. With this cell the zinc plates have to be raised out of the electrolyte when the battery is not in use, to prevent con¬ tinuous chemical action, and therefore waste of energy.

Lcctanche has a solution of sal-ammoniac (ammonium chloride) as the electrolyte, and into this dips a zinc bar in one corner of the square glass jar. The other pole is a bar of carbon within a porous jar, the space within being closely packed with a mixture of manganese dioxide and powder coke. The whole is immersed in the electrolyte. The oxy¬ gen escaping from the dioxide prevents polar¬ ization of the cell, and the porous jar prevents the oxygen from reaching the zinc, while op¬ posing no barrier to the passage of the electric current. This cell is useful only for inter¬ mittent work, such as ringing bells and buzzers.

Harrison. — The negative (internal) pole or cathode is a rod of hard

lead around wdiich is compressed a jacket of lead peroxide. The other pole or anode is of zinc, cast in the form of a very thick tumbler which is supported by an amalgamated copper rod running down through it and riveted in the centre of the bottom. Around this rod the tumbler is partly filled by pouring in melted zinc amalgam. The electrolyte is dilute, sulphuric acid, or a solution of potassium bisulphate, or of sodium bisulphate. This is a very powerful battery.

Caustic Alkali or Copper Oxide Cells. — This type of cell was introduced in 1881 by Lalande and Chaperon, France. Their cell con¬ sisted of a glass jar, in the bottom of which the oxide of copper was contained in an iron cup ; the zinc plate was supported in the solution of caustic potash by a wire, from the cover of the jar. To prevent the carbonic acid gas of the air from combining with the caustic potash, the solution was covered with a layer of petroleum oil. This cell has undergone many modifica¬ tions at the hands of Edison, Gordon and others.

Edison Primary Battery. — An oxide of copper battery. The elements employed in it are zinc and black oxide of copper. The solu¬ tion is of high grade caustic soda, in the pro¬ portion of 25 parts of caustic soda to 100 parts of water. The initial electromotive force of these cells is .98 volt ; on closed circuit, 0.7 volt. Their internal resistance varies with the size of the plates from .09 ohm to .02 ohm. The capacity of these cells, as commercially

constructed, ranges from 50 to 600 ampere- hours. The oxide of copper cell has the ad¬ vantage that its internal resistance falls with use, inasmuch as the continued reduction of metallic oxide from the oxide of copper in¬ creases the conductivity of the plate; in prac¬ tice, however, a film of metallic copper is de¬ posited in advance on the copper oxide plate to ensure a low resistance at the start.

The containing vessel of the Edison cell is a porcelain jar having a porcelain cover, through which the connecting wires or rods of the plates enter the cell. The copper oxide plate is obtained by roasting copper turnings, which are then ground to a fine powder and mixed with 5 to 10 per cent of magnesium chloride. The oxide is then molded into plates, which are held in a copper frame in the cell, as at cc, Fig. 1 ; this frame being attached to the cover of the cell and forming one of the terminals, zz are the. zinc plates, one on each side of the copper oxide plates. Batteries of the oxide of copper

Fig. 1. — Edison Oxide of Copper Battery.

type are extensively emploj^ed in connection with spark coils for gas-engine work, and for numerous other purposes requiring continuous current, as these are eminently closed circuit batteries. They can also be used as open cir¬ cuit batteries.

Gordon. — A copper oxide cell used exten¬ sively for working fire, police and railway sig¬ nals, and of economical use anywhere. Al¬ though designed for closed circuit work it does well also on open circuits. The outer jar is of glass, porcelain or enameled ware, with a cover of the same materials, or of tin, or com¬ pressed fibre. A perforated cylinder of tin¬ plate is suspended in the centre of the cell by an iron rod. This cylinder is filled with black oxide of copper. On the outer circumference of the cylinder at equal distances are attached three L-shaped lugs of porcelain which support a heavy zinc ring, and at the same time insu¬ late it from the tin cylinder. The electrolyte is a solution of caustic soda, and the surface of the cell is covered with a layer of heavy paraffin oil, which prevents the creeping over

of the caustic. As commonly used these cells give six months' service before renewal is nec¬ essary.

Two-Liquid Batteries. — Although the one- liquid cells have proved to be adequately non¬ polarizing, several forms of two-liquid cells re¬ tain a hold on the market, and for some of them there is a large demand.

Daniell , an annular vessel of copper in the bottom of a jar is piled with crystals of copper sulphate, and within it stands a jar of porous earthenware in which is suspended a zinc bar. The electrolyte in the porous jar is dilute sul¬ phuric acid, or, sometimes, zinc sulphate. The electrolyte in the outer jar is a saturated solution of copper sulphate. This is a closed- circuit battery which has been used extensively for telegraph work.

Gravity, a cell with the same components as the Daniell cell, but without the porous jar. The copper element is a spider-like form of sheet copper spreading its legs over the bot¬ tom of the jar. This copper form is completely covered with crystals of copper sulphate, or sometimes there is a perforated copper disc laid upon the spider and the copper sulphate is piled upon the disc. In the upper part of the jar is hung a thick seven-toed crowfoot of zinc — from which this form of

cell is often called the crowfoot battery. The electrolyte is of dilute sulphuric acid. A concentrated so¬ lution of copper sulphate will soon occupy the lower part of the jar, and above it will float the lighter zinc sulphate solution — with, how¬ ever, some little diffusion where the two solu¬ tions meet.

M motto, a cell in all respects like the Grav¬ ity cell, but with a flat mat of cloth stuffed with sand or sawdust fitted snugly above the copper sulphate to keep the two solutions quite separate. This battery is much used for rail¬ way signal work, in spite of the fact that its internal resistance is very high — from four to six times that of the Gravity cell.

Fuller, the approved cell for telephone work consisting of a carbon cathode hung in a depo¬ larizing liquid, a combination of dilute sulphuric acid and a solution of potassium bichromate. A porous inner cup or jar has suspended in it the zinc anode and a little mercury is placed in the bottom. The electrolyte in the porous cup is usually pure water; occasionally a very little sulphuric acid is added.

Grove, a cell consisting of a hollow cylinder of zinc, within which is a porous jar containing a strip of platinum. The electrolyte in the porous cup is strong nitric acid, and in the outer jar is dilute sulphuric acid. This cell is used chiefly in laboratory work.

Bunsen, a cell very similar to the Grove cell except that it has a bar of carbon in the porous jar instead of the strip of platinum.

DRY BATTERIES.

The ordinary commercial dry cell is vir¬ tually a Leclanche cell in which the electrolyte is in the form of paste instead of a liquid. It is, therefore, not accurately a dry cell but a moist cell. It is made inside of a cup or cylinder of sheet zinc which forms the anode. This zinc cylinder is lined generally with ab¬ sorbent pulpboard or layers of blotting paper which are saturated with the electrolyte, a con-

centrated solution of sal-ammoniac. Through the centre of the cell runs a carbon bar consti¬ tuting the cathode, and around this is packed the depolarizing paste. The composition of this paste is a trade secret, each manufacturer hav¬ ing his own formula. It is pretty well under¬ stood that the absolutely essential ingredients and their usual proportions are as follows : manganese peroxide, 100 parts ; powdered coke, 80 parts ; vitrified graphite, 20 parts ; sal-am¬ moniac, 20 parts;

zinc chloride (30° Baume), 7 parts. Other ingredients which are known sometimes to enter the composition are glucose, dextrine, common salt, lime, arsenic, mercury bichloride, hydrochloric acid and plaster of Paris.

After the paste is firmly packed in nearly to the top, the lining is folded down upon it, a thin layer of sawdust is laid in, a snug collar of corrugated pulpboard is fitted, a layer of sand is spread on ; and upon this is melted in the asphalt cover or seal. Some makers of dry cells place next to the zinc, instead of the pulpboard lining, a prepared paste of flour, dextrine and gum tragacanth, with possibly other ingredients.

A strictly dry cell is made in the same way of dry materials without moisture. This cell is inert until it is wet, and provision is made for the wetting by making the carbon bar hollow and perforating its sides. The end is closed with a rubber cork. When the battery is wanted for use, the cork is removed and water poured in. These absolutely dry batteries are made par¬ ticularly for shipping long distances across the ocean, as in the Egyptian and African trade. (See Electric Storage Batteries). Consult Cooper, W. G., (Primary Batteries: Their Theory, Construction and Use) (London 1916) ; Schneider, N. H., (Modern Primary Batteries) (London 1905).

ELECTRIC BELL, any bell made to ring by the making and breaking of an electric cir¬ cuit. Common forms are here illustrated. A familiar design has two electro-magnets, paral¬ lel and in series, having at their extremity a vibrating armature in close proximity pivoted between them ; fixed to this armature is a clap-

Magneto Bell. Door open.

Electric Door Bell.

per vibrating between two gongs. The current passes through the fields, magnetizing the cores, and in generating an alternating current vi¬ brates the armature and rings the bell. A bat¬ tery bel! employs a small cell battery for

power, and frequently a single coil of wire, wound around an iron core; a vibratory arm¬ ature, pivoted at one end, is arranged to oper¬ ate the clapper.

Two coils are used in the electric door-bell shown in the illustration. For a more technical description see Electric Signaling.

ELECTRIC BLUE-PRINT MAKING,

a modern process of wholesale photographic printing by the aid of machinery, the electric light and the blue-print (q.v.). One of the best machines is continuous in its operation, and is fed by the operator with great lengths of tracings and blue paper in much the same man¬ ner as the washerwoman feeds the wet clothes into a wringing machine. The large wooden drum, around which the tracings and printing paper pass, is moved either by a connection with the shafting or by an electric motor mounted on the apparatus, the speed of the drum being regulated by a device shown on the top of the machine. A traveling apron of transparent material takes the place of the glass in the printing frame of the ordinary type, and as it is under tension at all times, it ensures an even and close contact at all points. This apron is wound on a small drum at the top and after passing along the large drum where the contact and exposure take place, it is wound up on the drum below; after the printing operation has been completed it is rewound by hand back on the upper drum. In the rear of the machine are three arc lamps with reflectors, which concen¬ trate the light on the tracings which, with the exposed prints, drop out into the box in front. The blue paper may be kept in a roll ready for use on the upper front part of the machine, or may be fed in small sheets with the tracing's where the work being done is of ordinary size.

The machines are made in two widths, 30 and 42 inches ; the apron supplied with them is 70 feet long, and prints of this size can be made as readily as smaller ones where it is desired. The ability to make prints of this size greatly enlarges the sphere of usefulness of the blue-print.

ELECTRIC BREEZE, a breeze or stream of particles of air repelled from an electrified point.

ELECTRIC BURGLAR-ALARM. See

Electric Signaling.

ELECTRIC CABLE. See Electric Un¬ derground Cables and Conduits.

ELECTRIC CALL-BOX SYSTEM. See

Electric Signaling.

ELECTRIC CANDLE, a modification of the arc form of electric light, in which the carbon pencils are parallel and separated by a layer of plaster of Paris. It was invented in 1877 by Jablochkoff, a Russian engineer. This invention is noteworthy as having revived an interest in electric illumination. See Electric Lighting.

ELECTRIC CLOCKS. See Clock.

ELECTRIC CONDENSER, a construc¬ tion for accumulating electricity, through the effect of mutual induction between conducting plates, as of tinfoil, separated by a dielectric, as of oiled paper; or some similar device as a Leyden jar. When an insulated conductor is

charged with electricity by friction, a battery or other source of electromotive force, it will excite or “induce® in any neighboring conductor a charge of electricity. If the electricity in the first body be “positive,® that induced in the neighboring body will be “negative.® Thus, in Fig. 1, in which a and b are metal plates separated by air, glass, mica or other insulating material, if a be charged by the positive pole of battery b it will induce a charge of negative, electricity on the plate b. Such an arrangement of plates is termed an elec¬ tric “condenser,® and in various forms it is one of the most useful instruments em¬ ployed in multiplex, printing, automatic, wire¬ less and other systems of telegraphy. It is also indispensable in telephony and has found a field in electric light and power circuits. The elec¬ tricity held or “bound® in the plates is termed static electricity. The quantity of electricity or “charge® accumulated at the plates is equal to the product of the electromotive force of the charging source by the “capacity® of the condenser. In fact, however, what the con¬ denser holds is electrical energy, which, when discharged, is given up as work and heat. The total amount of energy (expressed in foot pounds) thus stored up by the condenser is

Fig. 1. Fig. 2.

(KXE2) -ˆ2.712, where K is the capacity of the charged condenser in farads, and E is the charged electromotive force in volts. It can be shown that the charge of a condenser rests on opposite sides of the dielectric, and that in charging the condenser as much electricity leaves plate b as enters plate a. The capacity of a condenser varies with the distance between its opposite plates, being greater the nearer they are together, and increases with the surface of the plates. The capacity also varies with the insulating material or dielectric used to sepa¬ rate or insulate the plates. The property of di¬ electrics to which this so-called inductive effect is due is termed specific inductive

capacity. The property which this inductive capacity seem¬ ingly imparts to conductors is termed electro¬ static capacity, or “capacity.® The inductive capacity of air is taken as the standard. Air being unity, the specific inductive capacity of paraffin is about 2 ; vulcanized India-rubber, 2.94; gutta-percha, 4.5; mica, 5; flint glass, 6.5 to 10. The Leyden jar is a well-known type of condenser. The most common form of con¬ denser is generally constructed of many sheets of tinfoil, separated by thin sheets of insulating material, such as paraffin paper, mica or glass ; the alternate sheets of tinfoil are connected to¬ gether metallically at their ends as indicated in Fig. 2.

In making a condenser for radiography, the glass plate type is recommended as inexpensive and durable, and also much lighter than oil-

immersed types. Photographer’s negative glass, tinfoil and shellac are the materials. The foil should be cut to the required size (6X8 inches is convenient), and carefully smoothed to take out all wrinkles., The glass should be cleaned with alcohol and coated with shellac, then covered with the foil, and rolled or ˆsqueegeed® so as to be perfectly smooth. In assembling the plates lugs should be placed between them. A unit may be made of 10 plates which are bound together with wire or suitable tape, and immersed for one hour in a bath of equal parts of hot melted rosin and beeswax, then allowed to drain and dry. This gives a con¬ denser unit thoroughly moisture proof, with a capacity of .01 microfarad, which is suitable for the ordinary half-kilowatt wireless trans¬ former for the standard 200-metre wave-length. It is good practice to make four such units, placing two multiple sets of two in each series ; this reduces the strain on the condensers, with¬ out altering the capacity. They may be mounted in substantial open-side wooden boxes to protect the plates from injury.

ELECTRIC CONDUCTIVITY, the

property that a substance, as a metal, pos¬ sesses of conducting an electric current, that is of permitting a current to flow more or less readily : called also conductance. It is the opposite of electric resistance. All the metals possess some degree of conductivity and some degree of resistance, iron being conspicu¬ ous in presenting an almost equal degree of these opposite qualities. It will be seen by the following table of comparisons that silver is the best and mercury the

poorest conductor.

Electric resistance Relative

Metal. in Microhms Electric conductivity,

at 0° C ‘ Mercury = i.

Silver . 1.52 66

Copper . 161 62

Gold . 2.08 48

Aluminum 2.94 34

Iron . 9.82 10

Lead . 19 85 5

Mercury . 99.74 1

ELECTRIC DIRECT CURRENT, as

distinguished from the alternating current, is so-called because of the fact that it travels in one direction along a conductor. If this con¬ ductor joins the terminals of a source of energy, as a dynamo, the current is said to flow from the positive pole of the machine along the conductor to the negative pole.

Probably the first man to detect current elec¬ tricity was Galvani about the year 1786. To Volta (q.v.), however, is certainly due the credit of first developing a practical electro¬ chemical cell. In the year 1800 Volta exhib¬ ited a cell known as the (

zinc and copper, constitute the elements of the Daniell cell very frequently used for telegraphic purposes. The changes which would readily suggest themselves in Volta’s first cell would be, increasing the amount of corroding liquid and placing the elements, zinc and copper, in a vessel which would properly contain the fluid.

The theory as given by Gore of the electro¬ chemical cell is as follows :

((The essential cause is the stored-up and ceaseless molecular energy of the corroded metal and of the corroding element or liquid with which it unites, while contact is only a static condition ; and chemical

action is the process or mode by which the molecular motion of these substances is more or less transformed into heat and current.®

The electromotive force of chemical genera¬ tors is small, rarely exceeding two volts per cell. This necessitates a large number of cells connected in series ; that is, the positive ter¬ minal of one connected with the negative ter¬ minal of the adjoining cell, the electromotive force thus produced being the product of the electromotive force of one cell by the number of cells. By connecting the two positive and the two negative terminals of two rows of cells, an increased quantity of current can be ob¬ tained, at the potential of one row. The first method is called joining battery cells for inten¬ sity, and the second for quantity. It is known that the energy generated in a chemical cell is produced by the consumption of zinc. The cost of this energy must necessarily be high, as both the zinc and the chemicals are expensive, so that the use of current electricity was quite limited until the introduction of the dynamo electric machine, which might be called the me¬ chanical method of transforming energy from some source, such as a steam-engine, into cur¬ rent electricity, as contrasted with the chemical method.

In the year 1831 Faraday discovered and an¬ nounced the principle of electro-magnetic in¬ duction. This opened up the field of what might be called the commercial generation of current electricity. The principle discovered by Faraday, which forms the basis of all dynamo electric machines, is that if a wire is moved in a magnetic field, so as to cut the lines of force, a current will be generated in the wire, and it is upon this principle that all dynamo electric machines depend for their action. The con¬ verse of this law he also announced, namely, that when an electric current is applied to the dynamo by some external source such as a bat¬ tery or another dynamo, the machine will fur¬ nish mechanical power. Hence a dynamo elec¬ tric machine may be considered either as a generator or as a motor.

All dynamos consist of two essential parts, one, the field magnet, which is usually station¬ ary, and the other, the armature on which the copper conductors are mounted and which re¬ volves on a shaft between the poles of the field magnet. This armature is so arranged as to cut the lines of force flowing between the mag¬ netic poles. The lines of force are imaginarjˆ lines flowing from the north pole to the south pole of any magnet. They can easily be traced by placing a piece of paper above the mag¬ net and sprinkling on this paper iron filings.

If the paper be covered with mucilage the fil¬ ings will maintain a permanent position so that they may be studied at the leisure of the student.

The field magnets may be made of steel, magnetized, or preferably they may be electro¬ magnets made of soft iron over which a coil of wire is wound carrying a current of elec¬ tricity which induces magnetic lines in the iron. It is to be noted that if the ends of the mag¬ net are bent in the form of a horse-shoe, the lines will be intensified by the reduction of the air space between the poles, and as the amount of current induced in the wire depends on the number of lines of force cut, the current induced will be greater, the greater the strength of the field magnets.

Considering first the ideal simple dynamo : This would consist of a single loop of wire mounted on centres, and rotating between the poles of a magnet, placed horizontally, each end of the loop being connected to a collector which in direct current machines is called a commutator, and is mounted on the shaft out¬ side of the poles, and insulated therefrom. If the loop is placed at right angles to lines of magnet force, in a vertical position and re¬ volved through 180 degrees, each side will pass through the whole number of lines of force flowing between the poles which will induce a current in one direction in the loop. If the ro¬ tation is maintained in the same direction dur¬ ing the next 180 degrees, the loop will cut the lines of force in the opposite direction, that is, the lines of force will be passing through it in the opposite direction to that in the first case. This will induce a current which will be in the opposite direction from the current induced through the- first half of the revolution; so that the current will be pulsating, first in one direction and then in the other, during each revolution. If the collector or commutator be cut into two halves parallel with the shaft and the ends of the loop be connected one to each half, and if a pair of brushes be supplied to collect the current, one above and one below the com¬ mutator, then when the loop is vertical the brushes will change contact from one end of the loop to the other, and as no current is then being generated, the change is made with¬ out sparking and current flowing in the same direction continuously can be obtained from the brush terminals. During the moment of chang¬ ing from the one contact to the other, the cir¬ cuit is momentarily opened or interrupted. This would cause sparking at the brush or col¬ lector, were it not that the brushes are placed at a point at which the current is practically zero. This is found in practice to be slightly in advance of the theoretical

neutral point on account of lines of force being dragged in the direction of rotation by the conductors.

To advance from the ideal simple dynamo: — the next step is to reduce the air gap between the poles of the field magnet and concentrate the lines of force in the effective space. This is accomplished by placing an iron core on the armature which in the first place reduces the magnetic resistance of the air gap and thus in¬ creases the number of lines of force through the armature conductors, and also serves as a support, for them. Other machines were built with shuttle wound armatures, the arm¬

ature consisting of an iron shuttle cut out with grooves longitudinally to take the con¬ ductors. These were usually wound with a number of turns of copper wire, the ends being brought out to a two-part commutator. (See Electric Alternating Current Machinery). The next step was to add to the num¬ ber of coils on the armature so that during each portion of a revolution some part of the armature conductors would be doing maximum work. Should an additional coil be added to the ideal generator, at right angles to the first coil, the capacity of the machine will be doubled. This complicates, to some extent, the collector rings and may necessitate the opening of the circuit when current is flowing so as to cause sparking and burning of the brush. A machine built on these lines would, therefore, be better adapted for generating small currents as the sparking at the brushes would be otherwise very destructive to the commutator. Machines of this type are known as open coil.

The next important step was made by Gramme and Pacinotti, which was to close the coils with themselves so as to form a con¬ tinuous circuit in the armature and connect one collector section to each coil at its junction with the next one, the number of sections being the same as the number of coils. In the four- coil armature, the current generated can either pass to the collecting brush directly, or when it moves out of position so that the contact is broken and made with the next section, the current can flow through the armature coils to the same brush if necessary, and when that coil passes from one polar position to another and is giving current of opposite polarity this current can flow directly to the other brush, and so continuous current is generated. There is also no point at which the circuit is open. There may be a slight sparking as the section moves from the brushes, but violent sparking is reduced as there is always another path for the current to flow to either brush.

The drum armature is distinct from the ring armature in that the wires

are wound on the outside of the core and do not pass through it. This type is frequently called the “Siemens® armature on account of the number of suc¬ cessful machines built by Siemens. Of the whole number of lines of force passing between the poles and through the core, there are very few lines passing in the inside, they being di¬ verted by an iron core so that they pass through the wires on the outside of the core ; the con¬ ductors inside of the core are thus of little use, their only function being to complete the cir¬ cuit and carry current between the successive turns on the outside of the core; so that by winding the wires on the outside surface only, the amount of idle wire is reduced, the only material that is not active being the cross-con¬ necting pieces at the ends.

The Gramme ring was used very largely on early machines for the reason that it afforded means for easier mechanical construction, and machines of this type were generally successful, on account of their simplicity. Pacinotti de¬ signed a core having teeth similar to a gear wheel. In this way the air gap between the armature and pole pieces could be reduced somewhat, resulting in an increased number of lines of force. It also afforded an additional

support to the coils and added to the mechan¬ ical strength of the machine.

To be considered next are the field magnets: There are a number of constructions which may be employed. (1) The so-called permanent steel magnet which consists of a bar or bars of steel bent to the shape desired, tempered and magnetized. The method of magnetizing these magnets consisted of placing them in contact with other magnets or with an electro-magnet. The present method would be to insert the steel bar into a helix carrying a heavy current and in a short time the bar would be magnetized. The dynamos built with permanent steel mag¬ nets of this type are what is known as magneto lynamos. The chief objection to this form of magnet is that a steel magnet cannot be* made as powerful as an iron magnet which is ener¬ gized or, as it is commonly called, excited from a source of electricity. In the first generators permanent magnets were used, but a great step in advance in dynamo design was to arrange the magnet poles so as to be self-excited. A portion of the current generated in the arma¬ ture is sent around the coils wound around the cores of these field magnets so as to excite them. At first, however, magnets were substituted consisting

of soft iron upon which was wound a coil of copper wire, the current for energizing these pole pieces being first supplied from a small magneto generator or a voltaic battery. Sometimes the machine will not generate on starting up not having sufficient current to ex¬ cite the magnets and it is necessary to excite them from some external source so as to give the initial strength to the magnets and allow them to build up from the current gen¬ erated in the armature. It is usually found that there is sufficient residual magnetism left in the iron of the field magnets, after the machine has once been in operation, to start the current in the machine and properly build up the fields.

In regard to field windings, two distinct types are used: (1) the series winding, in which all the current generated in the armature passes around the field poles and thence out to the line or circuit; and (2) the shunt winding in which a portion only of the current is used in the field, the connection being made across the main terminals of the generator. In the first case the wire on the field windings is necessa¬ rily large so as to carry all the current for which the machine is designed and in the sec¬ ond case it is a small wire of many turns, the product of amperes and turns being about the same in either case. In another design, both a shunt and a series winding of a few turns is employed, constituting a compound winding.

It will be seen that in the first case, that of the series winding, the field strength will de¬ pend upon the resistance of the total circuit, including the resistance of the armature, the field winding and the external circuit. In a machine of this type, the voltage or pressure generated will vary in proportion to the de¬ mands. This is the standard winding for the series arc machines used for city lighting, such as the Brush and Wood types. In the case, of the shunt-wound machine the current flowing in the field coil depends upon the pressure be¬ tween the generator terminals, so that with an increased output and consequent loss in the

armature the voltage will fall off slightly, thus reducing the field strength. This necessitates some means of varying the field current so as to maintain a uniform pressure at the gener¬ ator terminals. This is usually accomplished by means of an external resistance in the field circuit composed of German-silver or iron wire which can be varied by means of a switch-head so arranged as to cut out certain portions of this resistance step-by-step and so increase the current through the fields, thus preserving a uniform voltage.

In a combination of series and shunt wind¬ ings commonly called the compound type, as the output of the generator is increased, there is a

greater flow of current through the series windings and consequent increase of magnetic strength of field so that it is possible to com¬ pensate for the loss due to the resistance of the armature windings and maintain a uniform voltage at the generator terminals. The vol¬ tage as well as the output of the dynamo de¬ pends upon the strength of the field magnets, the magnetic permeability of the material and the rate at which the lines of force are cut by the armature conductors, so that the higher the speed the greater the voltage output of the dynamo. In the early machines very high speeds were common, armatures of small diam¬ eters being employed. These were objection¬ able for mechanical reasons so that the design was changed in order to increase the number of pole pieces. Instead of the field being com¬ posed of two poles, it was arranged so that a greater number of poles could be used, this type of machine being known as the multipolar dynamo. As each conductor would pass be¬ tween a number of poles during each revolu¬ tion the speed could be proportionally reduced.

The dynamo, as previously stated, is a ma¬ chine for converting energy in the form of mechanical power into electrical power, or vice-versa, so that a motor is a machine for convert¬ ing energy in the form of electricity into me¬ chanical power. The early types of motors were based on the principle that a magnet would attract the opposite pole of another mag¬ net, and if one set of magnets is arranged on a wheel, and the other stationary, the movable magnets will be drawn around. To make this effective it will be necessary to interrupt the forces at what might be called the dead centres so that the wheel would have continuous mo¬ tion. This is accomplished by either introduc¬ ing a screen, or, more satisfactorily, by the use of electro-magnets with a movable contact so that the magnets are energized intermittently, allowing the wheel to revolve in accordance with impulses received from the magnetic poles.

When we consider the dynamo as a motor, the current supplied to the terminals may take two paths, one through the armature and the other through the field coils. The field current energizes the pole pieces, and the current trav¬ eling in the armature is similar to another mag¬ net inasmuch as a coil carrying the current will be attracted or repelled by a magnet according to the direction of the current through the coil, so that the wire will be forced around by at¬ traction and repulsion. By considering the effect of the commutator the motion is seen to be continuous. When the armature starts to revolve the conditions then existing will be

similar to the armature in action as a dynamo, and an electromotive force will be generated in the armature wires, which will be in the oppo¬ site direction to the incoming current. This is what is called the counter electromotive force of the motor, and will tend to reduce the amount of current which will flow through the armature conductors. It is, therefore, evident that when a motor is started there will be a rush of current through the armature, as the resistance is very small, and as there is no counter electromotive force while the machine is not in motion to check the flow. For this reason, in the direct current motor it is neces¬ sary to introduce an external resistance into the armature circuit to hold back the current which would flow, until the machine approaches full speed. The resistance is then gradually re¬ duced until full speed is obtained. The effect of this counter electromotive force when the resistance is cut out entirely is materially to assist the self-regulating qualities of the ma¬ chine. Any load applied to the motor would tend slightly to reduce the speed, which effect, by also reducing the counter electromotive force and allowing more current to flow through the armature, tends to keep the speed from falling much below normal in the shunt motor. Motors can be built either with a plain shunt field winding or with a series and shunt winding, depending on their requirements. The direction of rotation depends on the direction of the current through the armature. To re¬ verse the rotation, therefore, it is only neces¬ sary to reverse the current in the armature, leaving field connections as they are. If the current is changed in both field and armature, the result would naturally be that the machine will continue to revolve in the same direction as before.

To reduce the speed of the direct current motor it is only necessary to add resistance to the armature circuit so as to limit the current flowing therein, and by so doing almost any de¬ sired speed may be obtained, from 1 per cent up to full rate of speed. There are a number of other methods by which variable speeds can be obtained, one of them being by varying the field strength. Any motor, however, operating at a lower field or armature current than nor¬ mal conditions would require is naturally oper¬ ating at reduced power. On account of the valuable features in relation to speed control, reversibility and the automatic speed control inherent in the shunt machine, together with the large torque of the series machine, the di¬ rect current motor fulfils more nearly than any other the practical requirements in machine- shops, textile mills and general manufacturing establishments.

For electric railway work, in which the di¬ rect current is employed (see Traction, Elec¬ tric), the compound wound generator and series motor is the usual standard practice. Often this type of generator is overcom¬ pounded so as to more than overcome the drop through the armature resistance and allow higher voltage at full load than at no load, so as to overcome, in a way, the drop of potential on the feeders and preserve the uniform vol¬ tage over the system. In lighting and power work the shunt and compound dynamos are both used. (See Electric Lighting). And

in the business centres of our large cities where the direct current is generally used, the rotary converter fed from a high tension alternating central station is very often employed, together with storage battery.

Direct current was more generally used in the earlier installations of electric distribution, in preference to alternating current, for the reason that the direct current motor was de¬ veloped before the alternating current motor; and the earlier motors possessed many advan¬ tages in their ability to be operated at any speed from slow speeds up to the maximum speed for which the motor was designed, and also permitted the use of storage batteries di¬ rectly connected to the system, thus ensuring continuity and reliability of service.

The shunt and series motor each has its own field of usefulness. When a very powerful starting torque and rapid acceleration are nec¬ essary the series motor is used, as in the case of street railway, electric locomotives, electric cranes ; and on steamships where the direct current alone is used, as on the Kentucky and Kearsarge , of the United States navy, not only is electricity used for lighting, but also for operating ammunition hoists, hoisting anchors, operating boat cranes, and even the steering gear of the ship itself.

In machine-shops and manufacturing estab¬ lishments where a more or less constant speed may be required, and in elevator work, the com¬ pound and the shunt motor are commonly em¬ ployed. The shunt motor is very well adapted for operating at any speed desired, and for ma¬ chine tools it is at present without a peer for an efficient and easily regulated source of power. Unlike the series motor, where the speed varies with the load, the shunt motor is practically a constant speed machine. When thrown on the lines it rapidly comes up to normal speed, and then from no load to full load will not greatly deviate therefrom unless purposely thrown to a slower point by the controller. As a series motor would run away if left in a circuit with a load suddenly removed, the shunt motor, or sometimes the compound

(which is used in order to preserve an absolutely uniform speed from no load to full load, and is necessary in a few places where absolutely constant speed is required) is the standard motor for driving textile machinery in large mills, factories and other establishments.

Direct current generally meets all of the re¬ quirements of the consumers, as it is available for motors of any size; for lighting; for chemi¬ cal action, such as charging storage batteries or in electro-plating; or for electric heating.

With the large increase in the requirements of individual consumers, the advantages of direct current over alternating current are not as important to-day, for the reason that trans¬ lating devices have been simplified so that alternating current may be converted, without serious difficulty, into direct current, for any special requirements.

Wm. C. L. Eglin,

Second Vice-President and Chief Engineer, The Philadelphia Electric Company.

ELECTRIC DISCHARGE, th e escape of electricity, whether slowly and silently, or more quickly and violently, from any receptacle or generator.

ELECTRIC DOOR-BELLS. See Elec¬ tric Bells ; Electric Signaling.

ELECTRIC DRILL, a drill for metals or rock worked by an electromagnetic motor. For metals a rotary motion, for rocks a recipro¬ cating or percussive action, is imparted.

ELECTRIC EEL (Electrophoms elec- tricas), a great eel inhabiting the marshy waters of the llanos in South America. It belongs to the family Gymnotidce and order Plectospondyli (q.v.), and with a few allied species is distinguished from all other eels by the partial coalescence and modification of the anterior vertebrae. It is remarkable chiefly for the great size of its electric organs, which con¬ sist of two pairs of longitudinal bodies between the skin and the muscles of the caudal region, divided into about 240 cells and supplied by more than 200 nerves. The eel can discharge sufficient electricity to kill an animal of

con¬ siderable size, and is said to possess power, when in full vigor, to knock down a man and benumb the limb affected, in the most painful manner, for several hours after communicat¬ ing the shock. By frequent use of this faculty it becomes impaired, and a considerable interval of rest is required to recruit its electrical prop¬ erties. According to Humboldt the natives of South America make use of horses in taking the electric eel. The animals are driven in a body into a stream or pond where the fishes abound, and the latter, having exhausted their stores of electricity by repeated attacks upon them, are then easily taken. The horses are sometimes so severely stunned by the shocks that they fall and are drowned. Specimens of the Electro¬ phones electricus are reported to attain the length of six or seven feet, but ordinarily they are about three and one-half or four feet long. See Electric Fishes.

ELECTRIC EGG, an ellipsoidal glass ves¬ sel, with metallic caps at each end, which may be filled with a feeble violet light by means of an electric machine acting on it after a vacuum has been made inside the glass.

ELECTRIC ELEVATORS. See Ele¬ vators.

ELECTRIC ESCAPEMENT, a device actuated by electric impulse which intermittingly arrests the motion of the escape-wheel and re¬ strains the train to a pulsative motion — acting, in fact, in the place of a pendulum.

ELECTRIC FARMING. The greatest agent for the advancement of agriculture is electricity. It is the emancipator of the toiler. A motor of even diminutive dimensions accom¬ plishes more work than a man — at less ex¬ pense — since the power developed by the human machine is the most expensive that man uses. In supplanting manual labor, electricity has a most appreciable effect upon agriculture, due to the fact that agriculture requires great labor with a minimum of skill. In reducing manual labor by the use of electricity, the farm operatives, with the exercise of but little mechanical knowledge, may direct the opera¬ tions of numerous large electrical units and ac¬ complish an aggregate of work that would be absolutely impracticable under ordinary condi¬ tions.

In the installation of electricity on the farm, it is necessary, • however, that the farmer —

user of many and infinitely varied implements and mechanical devices — should avail himself of the co-operation of the engineer; taking ad¬

vantage of the skill and experience of the latter in adapting the new method to his needs, in order to increase the production of his land. Rural industry in general must look to the engineering profession more and more for the most available utilization of our natural re¬ sources through the medium of electrical energy.

Industrially considered, the farm is a large user of power, but the sources from which it is derived are at present uneconomic and inade¬ quate in comparison with industrial standards in other lines. Of the 33,000,000 persons en¬ gaged in gainful occupations in the United States, not less than 10,000,000 devote their energies to agriculture. In addition, upward of 90 per cent of all the horses and mules in this country are devoted to farm labor. The sub¬ stitution of electric power, therefore, for even a small proportion of the work of farm animals will result in great national economy.

There is no form of service that can sup¬ plant manual and animal labor on the farm or country estate as expeditiously from every standpoint, considering expense and conven¬ ience, as electricity, and it will be found superior to steam or to any internal combustion engine. In fact, there is no other existing agent that is able to supply the three necessities — light, heat and power — from one and the same source. Due to this fact, hours of labor on the farm or in rural communities may be regulated, as are those of the manufacturing and commercial in¬ dustries. In consequence, life in rural com¬ munities may be made attractive, as much or more so than that of the cities, where the struggle for existence is incessant, and living accommodations — or what corresponds to home life — fall short of the pleasant and healthful surroundings of the countryside.

The giant industries of the country are of recent origin and were started in a humble way, but they now surpass any branch of the agrarian pursuits. This is a condition readily explained, due to the employment of the services of the trained engineer to the advantageous upbuilding of the great manufacturing industries. On the other hand, farming — the oldest of all indus¬ tries, and the most basic — has been neglected, even to the point of being abandoned in many places.

The machines and implements of use on a farm are manifold — ploughs, rollers, reapers, threshers, corn shellers and grinders, shredders, fodder cutters, wood saws, pumps, horse and sheep clippers, and apparatus for unloading and hoisting hay, corn fodder and like products. Another phase of farm life in which a great saving of labor is effected by the use of electric¬ ity is in the operation of

washing machinery, carpet cleaners, sewing machines, fans, cooking and laundry appliances, none of which could well be served by any other agent than electric¬ ity. Besides the preceding partial enumeration of the possible applications of electricity, for power, the electric energy — supplied to its motors either from an outside source or from its own central plant — may be used for light and heat.

Where connection cannot be made with a local electric distributing concern, the farmer should have his own generating station, which

may be operated by water, steam, gas, gasoline, oil or windmill power. Where a stream runs through a farm, or is in the neighborhood, cheap power, both as regards first cost and operating expenses, may be derived from this natural source.

In generating the current by steam power, the cost per kilowatt hour is comparatively high. Somewhat better results may be obtained with a gas-producer plant, which, instead of burning the coal in a steam boiler and using the steam for driving the engine, burns the coal gradually in a producer, generating gas for operating the gas engine.

Gasoline, oil and alcohol engines work on the same principle as the gas engine, as all are of the internal combustion type. Great strides have been made during the past decade in this type of engine, so that it operates with an economy and a precision that requires but lit¬ tle attention.

Another source of energy for the generation of electric current for farm and country resi¬ dences is the windmill. The early Dutch wind¬ mills were built with sweeps of from 50 to 100 feet in diameter, while our modern American windmills have a sweep of only from 12 to 18 feet, but generate more power than the earlier type, with less attention.

All of the above primary powers may be connected to the electric generators by belt, gearing or couplings, and their control may be regulated automatically, so that they require but little attention. There are, of course, cer¬ tain matters in their operation that experience has shown to be of advantage. For instance, the greatest quantity of energy being required for the daytime, and the load for illumination being small and wanted principally in the even¬ ing, it is therefore not profitable to operate the prime movers other than during the day.

The use of the storage battery is therefore of great service in supplying electric energy at periods of small demand, when the generators are shut down. In connection with the storage battery, and with the development of the low-voltage Tungsten lamps, the cost and size, as well as the maintenance expense, may be considerably reduced by proper engineering.

The great advantage, in which lies the su¬ periority of a farm operated by electricity, is in the fact that the farmer has at all times under his direct control the entire supply of electric energy available, whether obtained from a public service enterprise or supplied by his individual plant.

Electric farming, while in general use in Germany for the past 20 years, has recently made rapid strides in the United States, particu¬ larly in the West and on the Pacific Coast, where central station enterprises encourage the use of electricity for agricultural purposes. There are, however, to be found in the State of New York several notable water-power in¬ stallations on farms. For instance, there is a 100-acre farm near Oriskany Falls, Oneida County, N. Y., devoted to hop raising, mixed farming and dairying, on which has been in¬ stalled a 17-horse-power hydro-electric plant, supplying electricity for lighting the farm buildings and for operating various electric motors. The power-dam, of timber-crib con¬ struction, is 36 feet long, raising the water four feet, is carried on heavy concrete sills cast in a

2Xl-5-foot ditch dug across the stream bed. A row of 12-inch flash-boards held erect by chains positioned by pins removable by a capstan, dropping the boards in case of high water, is above the crest of the dam. There is also pro¬ vided a supplementary 40-foot spillway, its crest being slightly higher than the main dam, per¬ mitting the discharge during heavy floods. A 60-foot canal and forebay lead from the dam downstream to the power-house, where a 17-horse-power turbine wheel has been installed. The latter, by means of belt drive, operates a 12.5 kilowatt generator at 1,100 revolutions per minute. The power-house is 12X16 feet in size.

The drainage area of Oriskany Creek at the point utilized by this plant is 14 square miles, ensuring a supply of water the year round suf¬ ficient to drive the plant at full load under the available head of six feet. The distance from the power plant to the farm buildings is 1,700 feet, the current being carried on an aluminum wire stretched on 20-foot poles, 100 feet apart. From the power generated, practically every bit of machinery on the farm is operated, compris¬ ing a circular saw, machine lathe and drill press, vacuum cleaning system, adapted

likewise for the operation of the milking machines in the 25-stall cow-house, a cream separator, churn, grindstone, ventilating and cooling fans, electric iron, sewing machine and pump. In addition, besides lighting the premises, five elec¬ tric heaters are operated, maintaining a constant temperature of 75° throughout the winter. En¬ gineering estimates place the cost of the entire equipment at about $1,800 — dam, power-house, line and equipment — but in its efficiency it is worth many times this sum.

A system that has been adopted much abroad is the installation of a rural central station capa¬ ble of supplying a number of farms, local in¬ dustries and country estates with electric current. This may be supplied with power generated by steam, water, gasoline, oil or gas, the co-operative feature resulting in a great sav¬ ing in the production of electric energy. An example of the service supplied by a single central station in supplying a farming com¬ munity may be seen in that of Lottin, Germany. Here a water power of 300 horse power is utilized. However, during certain seasons of the year, when the water is low, a steam gen¬ erating set of 180 horse power is put into use to keep up the service. It is obvious that this supplemental power may be pressed into use at any time, should the demand for power ex¬ ceed the capacity of the hydro-electric station.

The distributing system of the Lottin sta¬ tion is 82 miles long. The electric energy is used on 61 farms, including rural industries, and five villages, a total of 24,700 acres. Alto¬ gether, 102 consumers are served, these having some 150 motors with a total of 1,500 horse power, the lighting equipment comprising 4,850 incandescent and 20 arc lamps. In one year the consumption amounted to 440,000 kilowatt hours. There are 50 farms, with an acreage varying from 60 to 1,800 acres per farm, under cultivation by the plough, with a total of 275 horse power in motors, 1,200 incandescent lamps and 20 arc lamps. Of these farms, 12 contain from 300 to 600 acres each, using 12 motors with a capacity of 122 horse power.

In order to give in concrete form the amount of electric energy necessary on a farm, the fol-

1 Portable Motor Driving Corn Sheller

2 Milking Machines Operated by Motor-driven Vacuum Pump

ELECTRIC FARMING

lowing figures from a 100-acre farm are given. It is assumed that two-thirds of the products are of a stalk nature, and that the live stock consists of 3 horses, 10 cows, 15 swine, etc. The figures are an average, taken from the actual experience of a number of farms. It is also assumed that electric energy for power pur¬ poses is 5 cents per kilowatt hour, which is a reasonable figure for current used for power purposes only, when purchased from a public service corporation.

The average amount of water consumed on a 100-acre farm is as follows: for the house, for each person per day, 5 to 6 gallons; for cattle, from 12 to 15 gallons per head; for swine and sheep, 1 to 2ˆ> gallons. For pumping 1,000 gallons to a tank elevated 35 feet, the power necessary is about one-eighth kilowatt hour, so that the yearly average energy for 3 horses, 10 head of cattle and 15 swine is about

$4.

For a threshing machine of the smaller size, capable in 10 hours of threshing, cleaning and sacking, ready for the market, 80 to 200 bushels, 3 to 5 electric horse power are required. For machines of from 160 to 240 bushels capacity, 5 to 7 horse power are necessary; and from 300 to 800 bushels, from 10 to 20 horse power are required. The energy required for the various products to be threshed and cleaned, per 100 bushels, is, for rye, 25; wheat, 22; oats, 19; and barley, 21 kilowatt hours, or on the average, 22 kilowatt hours, costing $1, which is at the rate of $0,011 per bushel. If hay-baling machines are attached to the thresher, from four to six additional horse power are required.

Fodder cutters, varying from one to two horse power, consume 1.8 kilowatt hours per 100 pounds of fodder, costing 1/16 cent a cut, and as 10 head of cattle consume per year 60,000 pounds of cut beets, etc., the total cost annually for the energy used to operate the fodder ma¬ chines is 50 cents per head.

One of the by-products of cotton-seed or linseed-oil mills is sold as meal or as cake, and to break it up a special machine is necessary. Such a machine often has a capacity of from 2,000 to 3,000 pounds per hour. The average amount of food per head of cattle is from 2 to 3 pounds per day, which amounts, for 10 head, to about 9,000 pounds per year. The cost of electric energy for operating this machine is 25 cents per year for each animal.

As the cattle are fed from 2 to 3 pounds of crushed grain per day per head, and as there are 10 altogether in the 100-acre supposition, a motor-driven grain-crusher is required, capable of crushing some 9,000 pounds per year. This might be prepared at one operation by a large mill, but for the purpose at hand a motor vary¬ ing from 3 to 5 horse power, according to the size of the mill employed, will do the work conveniently. To grind 100 pounds costs $0.03 for the energy consumed, or for the 9,000 pounds, $2.70 per year.

For running the cream separator, a small motor of about one-fourth horse power can operate 300 quarts of milk per hour, consuming three-tenths of a kilowatt hour, at an expense of $0.01 As the average production for 10 cows is amout 30,000 quarts per year, the yearly cost of operating the separator is $1.50.

A churn for 200 quarts of milk, assuming average conditions, requires from one-fourth to

one-half horse power, as also does the butter- kneader, and the cost is negligible.

A washing-machine, including wringer, op¬ erated by a one-fourth horse power motor, cost¬ ing complete $165, is used 260 hours per year, or some 5 hours per week. As other work may be done by the woman operating it, her time amounts to but 65 hours during the year. The machine turns out three washes an hour, and the total expense of the whole 780 washes is $35.41. This includes all labor, power and every expense, including overhead charges, and the same applies to the figures for the following machines.

A horse-groomer, costing $75, operated by a one-horse power motor, cleans 4 horses in 36 minutes. It is used 328.5 hours during the year, or 2,190 groomings, and requires the services of but one man. The cost amounts to $72.93, or $0.03j/2 per horse per grooming.

A cream-separator having a capacity of 1,350 pounds per hour is operated by a 1ˆ2 horse¬ power motor, and costs complete $350. It is used 183 hours during the year, separating 237,900 pounds of milk at a cost of $88, or $0,037 per 100 pounds.

A butter churn having a volume of 300 gal¬ lons and a capacity of 100 gallons per churning, operated by a 2-horse-power motor, cost $118.50. It is operated 88 hours per year, churning 15,000 pounds of butter at a cost of $36.60, or $0,002 per pound. This includes churning, washing and working the butter ready for packing.

A root-cutter with a capacity of 6 tons of turnips an hour costs $26.30, and is operated by a 2-horse-power motor costing $86. It is used 52 hours per year, principally during the winter months, cutting 300 tons of beets and turnips at a cost of $35.94, or $0,119 per ton.

A fodder-cutter, having a capacity of 3 tons per hour of dry fodder, costs $128.10, and is operated by a 10-horse-power motor costing $118.50. The outfit is used 88.70 hours per year, and will cut 180 tons of fodder at a cost of $54.85, with one operative, at a cost of $0.30 per ton.

One of the means by which the farmer may secure his electricity at a low rate is to make his consumption as nearly uniform as possible during the whole 24 hours. The cost of elec¬ tricity is based on the cost of fuel or water power, attendance and the amount of capital invested in the installation, including generators and transmission system. It will be seen that if all the farmers on a line demand electricity during the same few hours of each day, larger and more expensive machinery must be installed for its generation than would be necessary if the requirements for the same amount of elec¬ tricity were spread over a greater part of the day.

Consequently, by using power for food-chop- ping, meat-grinding, dairy purposes, wood-saw¬ ing, cooking, washing and general purposes during certain hours of the day, light for morn¬ ing and evening, and pumping water for irriga¬ tion and the household during the night, the farmer may, under the direction of a central station, so consume his electricity that it may be generated at the lowest cost possible.

It is the custom of the central station concerns to deliver electricity to the consumer's premises, where usually the user installs his own dis¬ tributing system through his house, barns, etc.,

inasmuch as the majority of farmers can as a rule afford to buy their own machinery, par¬ ticularly the smaller sizes. In the case of large installations, however, a number of methods may be availed of to secure the benefits of such machinery without its outright purchase, usually through the co-operation with the central station concern. Many such enterprises are only too willing to furnish electric motors, and make wire installation on the farm premises — for both light and

power — at a small yearly rental or on low instalment payments. In consequence, the farmer may have the cost of his machinery spread out over a number of years, the saving effected in both manual and animal labor being far more than sufficient to pay for the invest¬ ment. He will eventually become the owner of the equipment, the while making a handsome profit through its use. It has already been demonstrated that farm efficiency can be ac¬ complished in no way more advantageously than through the extension of the use of electricity on the farm.

ELECTRIC FIELD, any space wherein electric force exists. See Electricity.

ELECTRIC FIRE-ALARM. See Elec¬ tric Signaling.

ELECTRIC FISHES, several quite un¬ related fishes which possess the extraordinary property of communicating an electric shock to animals with which they come in contact. The organs which are the source of this power have been much studied by both anatomists and physiologists. They are in all cases — with the possible exception of Malapterusus — formed by the modification of muscular tissue, and consist of a mass of numerous closely packed prisms, each divided into a series of compartments filled with a gelatinous substance. One surface of the fibrous discs thus formed receives a rich nerve supply and is electrically negative, the opposite surface being positive. The entire organ may therefore be likened to a group of voltaic piles. Among the Elasmobranchii (q.v.), many of the skates possess rudimentary electric organs, which reach a high degree of development in the torpedo and an allied genus (Hypnos) . In these two genera the organs occupy a large area on each side of the head and the prisms are arranged ver¬ tically and are supplied by large nerves, four pairs of which arise from a special electrical lobe of the hinder part of the brain, while a fifth is a branch of the trigeminal. In the elec¬ trical catfish (Malapterusus electricus) of the Nile, and some allied species, the entire body is enveloped by an electric layer beneath the skin and the muscles. In the electric eel (q.v.) and all other electrical fishes the organ is placed by the side of the tail and the prisms are dis¬ posed longitudinally. Not alone in structure but in the phenomena of rest and activity these or¬ gans bear a striking resemblance to muscles, which also normally exhibit weak electrical currents.

ELECTRIC FLUID THEORY. To ex¬ plain electrical phenomena this theory was pro¬ pounded in 1759 by Du Fay and Symmer. The <(theory of electric fluids,® as it is called, is as follows : That every

body contains an indefi¬ nite quantity of an imponderable subtle fluid,

that this fluid is composed of two fluids which are self-repulsive but mutually attractive. When a body is in its natural state, the two fluids are in combination, and neutralize each other. The act of electrification consists in the forcible separation of the two fluids, whereby one is diffused over the body rubbed and the other over the rubber, one kind of electricity never appearing without an equal quantity of the other. This theory, however, must be regarded as a mere provisional conception, and not a proved scientific truth. See Electricity.

ELECTRIC FURNACES. These furnaces are devices for localizing the heat of an elec¬ tric circuit and utilizing it. In the usual tech¬ nical use of the term it signifies a device or receptacle in which a comparatively high tem¬ perature is developed for the purpose of effect¬ ing a chemical reaction or producing a change of state in the substance to be treated, such, for instance, as the reduction of an ore, the forma¬ tion or disruption of a compound, or the fusion or volatilization of a metal or compound. Elec¬ tric furnaces comprise means for developing the necessary heat at the point or points desired, and for subjecting the material to be treated, technically known as the ˆcharge,® to the influ¬ ence of this heat. The several types or classes of electric. furnace will be briefly described ac¬ cording to the principles employed. The heat development in any given portion of a circuit is proportionate to the resistance offered to the passage of the current ; hence those portions of the circuit external to the furnace proper are always composed of metals which conduct the current well, and generally of copper or alumi¬ num, whereas the resistance of those portions of the circuit in which the heat is to be localized is relatively high. These latter portions of the circuit may consist of gases, in which case an arc is formed and the localization of the heat is extreme ; of substances of high melting and boiling points, in a state of fusion, when an electrolytic effect, to be hereinafter more fully referred to, usually supervenes ; or of solids, such as platinum and other difficultly fusible metals, carbon, graphite and carbonaceous mix¬ tures, or such bodies as the oxides of the alka¬ line earths which become conductive when heated. These three classes of furnace, wherein the heat is localized in a gas, a liquid and a solid, respectively, may be conveniently desig¬ nated by the terms arc furnace, electrolytic furnace and incandescent furnace, although as will appear it is not always easy to apply one or another of these names to the actual construc¬ tions. Although electrically developed heat is relatively costly, the fact that it can be locally applied, within

the interior of the charge if so desired, is an important advantage, and the utilization of the heat is often so complete that its use represents a real economy. The heat lost is that which is carried from the furnace by the escaping products of the reaction, and that which is conveyed by radiation, convection or conduction, from the walls, the electrodes and other exposed portions of the structure. Inasmuch as the exposed surfaces of a furnace are roughly proportionate to the square of its dimensions, whereas its capacity varies as the cube, it is evident that, other things being equal, the larger the furnace the less will be the percentage of total heat which is lost and the

greater will be the efficiency. This indicates the employment of large units. It is always pos¬ sible to reduce the expenditure of electrical energy by making use of heat otherwise gen¬ erated, such heat being employed for raising the temperature of the charge previous to its intro¬ duction into the electrically heated zone, or for heating the exposed surfaces of the furnace structure in order to check conduction from within. Furnaces in which chemical reactions are conducted, as, for instance, those in which calcium carbide is produced, often yield gaseous products which are not only themselves very highly heated, but are capable, by combustion, of further heat development. It has frequently been proposed to utilize this heat by conducting such gases through or around the incoming charge or by burning them in flues surrounding the furnace, but the greater complexity of the structure and the difficulty of purifying the large volume of dust-laden gas constitute prac¬ tical difficulties of a serious nature.

The Arc Furnace.— When an electric arc is formed in air between carbon terminals there is observed to be a definite limit to the length of arc which can be maintained with a given current strength ; furthermore this limit, which at first increases almost in proportion to the current strength, increases very slowly as the current density reaches higher values. The maximum length of the arc is therefore limited. The temperature of the carbon terminals may attain 3,500° C., at about which point, under atmospheric pressure, carbon volatilizes. The temperature of the incandescent gases of the arc is perhaps a thousand degrees higher. It follows that the arc furnace, in its simplest form, is adapted particularly for subjecting small charges to extremely high temperatures, and its value for experimental work is apparent. For use upon a commercial scale it is generally necessary so to distribute the heat from the arc that a comparatively large body of the

charge may be acted upon at a given time. This result may be accomplished by establishing a plurality of arcs in adjacent portions of the charge, by exposing the charge to the heat radiated from one or several arcs not in contact with it, by causing the arc to move relatively to the charge, or by moving the charge through or past the arc. The temperature of that portion of a charge which is in immediate contact with an arc may be practically that of the arc itself and is uncontrolled; the operations for which this method of procedure is suitable and economical are relatively few. The high temperatures which the electric furnace is capable of produc¬ ing have opened a new field to chemistry, but in order to insure the formation, in theoretical quantity and in a state of purity, of many com¬ pounds, a careful regulation of the temperature is essential ; for the highest attainable tempera¬ tures are capable not only of giving rise to new combinations but also of breaking them down, resolving them into similar bodies or even into their elements. A single instance of the import¬ ance of heat regulation may be offered : If a mixture of sand and coke be cautiously heated in an electric resistance furnace a partial reduc¬ tion of the sand occurs, and a product contain¬ ing silicon oxygen and carbon and known as «siloxicon® is formed ; at. a somewhat higher temperature the reduction is complete and there

results an amorphous body having the essential composition of carbid of silicon and technically called ((white stuff® ; at somewhat higher tem¬ perature ranges this amorphous body passes into the crystalline carbid of silicon Carborun¬ dum,® a compound approximating in hardness the diamond itself; and at still higher tempera¬ tures, approximating those of the arc, this car¬ borundum is broken down, its silicon escapes as a vapor, and its carbon remains in the form of graphite. The effect of high temperatures upon reactions is twofold : in the first place the velocity of the reaction is increased, so that chemical changes which at lower temperatures occur slowly or not at all take place rapidly or even with explosive violence ; in the second place new conditions of equilibrium are estab¬ lished, and the chemical elements, entering into that combination which, under the circum¬ stances, is the most stable, sometimes give rise to compounds not before known. To produce a given result, however, it is usually necessary to work within definite temperature limits, and since the heat of the arc cannot well be con¬ trolled, it is necessary to govern the tempera¬ ture of the charge by limiting the duration of its exposure to this heat. As above pointed out, this may be accomplished by moving the arc through or near the charge or by moving the charge through or past the arc, the duration of contact being so adjusted to the quantity of charge and to its specific heat as to bring it to the

desired temperature. As a rule, however, the arc as a source of heat is both wasteful and inefficient.

The Electrolytic Furnace. — When a direct current of sufficient volume is caused to pass through a molten salt not only will the salt be maintained in fusion by the heat developed by its own resistance, but it will be <(electrolyzed,® that is to say, it will be decomposed in such manner that one of its component parts, which may be a metal, will tend to accumulate at one electrode, while another component, which was before in combination with the metal, will ap¬ pear at the other electrode. The electrode at which the current is assumed to enter the molten bath, and at which the negative or non- metallic portion of the compound appears, is called the ((anode,® while the other electrode, which receives the positive or metallic element and at which the current is considered to leave the bath, is designated the ((cathode.® Thus if common salt, sodium chloride, be fused and traversed by a direct current, the negative ele¬ ment chlorine will appear at the anode and the metal sodium at the cathode. If the substance of either electrode be such that the element liberated in contact with it can combine with or dissolve in it, the corresponding compound or solution will be formed: If, for instance, the fused sodium chloride be electrolyzed with an anode of carbon and a cathode of molten lead, chlorine will be evolved at the anode and escape from the bath, while sodium, dissolving in the lead, will yield an alloy from which the metal sodium, or its hydroxide caustic soda, may be obtained. In electrolytic furnaces also it is essential carefully to regulate the temperature, not only because an unnecessary high tempera¬ ture means a waste of energy, but because of losses arising through volatilization of the bath and the recombination of the separated prod-

nets of the electrolysis. So important is this last factor that in certain cases, as, for instance, in the separation of metallic sodium from molten caustic soda, it is absolutely essential to the success of the process that the temperature be maintained within limits of a few degrees only.

The Incandescent Furnace. — This term is commonly applied to those furnaces wherein the heat is developed by the passage of the current through a body which initially at least is solid. Such body may comprise a rod or core of car¬ bon or corbonaceous mixture ; a

granular bed or core consisting of fragments of coke, retort carbon or graphite ; the charge itself, often admixed with a quantity of carbon sufficient for its reduction ; the furnace product when this is conductive and possesses a volatilizing point sufficiently high to permit the necessary tem¬ perature to be attained; or a pyroelectrolyte, that is to say, an oxide or mixture of oxides which is normally non-conductive or substan¬ tially so, but which while remaining unfused becomes capable at temperatures considerably above the normal of carrying the current. Each of these resistance materials possesses its ad¬ vantages for particular lines of work, but all have in common the advantage of permitting accurate and ready adjustment of the tempera¬ ture by varying the amount of current passing. These incandescent furnaces have, therefore, the widest applicability, and in case the resist¬ ance material used is carbon the maximum tem¬ perature attainable is probably not inferior to that of the terminals of the electric arc. The above defined types are not always sharply dis¬ tinct, but under certain conditions the operation proceeds under two or perhaps all three of the methods. Thus if the resistance consists of fragments of carbon, the current may traverse the interspaces in the form of minute arcs; and if this fragmentary carbon be commingled with a suitable ore or compound there may be present also an electrolytic effect; the primary fusion of an electrolyte is often accomplished by means of a resistance rod connecting the electrodes, or this fusion may be accomplished by the arc. Furthermore a given furnace struc¬ ture is often capable of either mode of opera¬ tion according to the character of the charge and the adjustment of the electrodes with refer¬ ence thereto. The most important as well as the most characteristic applications of the elec¬ tric furnace have relation to certain elements and compounds which cannot be produced directly, if at all, by other means. See Electro¬ chemistry; Electrochemical Industries.

Commercial Furnaces. — The carborundum furnace employs a continuous core of coke be¬ tween the electrodes. This core of broken coke constitutes the resistance, and a high tempera¬ ture is obtainable. The material for making the carborundum is finely divided coke, sand and sawdust. These being packed around the core, the current is turned on at about 200 volts pressure, and when the furnace heats this may be reduced to less than half the voltage. The coke core changes to graphite and the mixture into crystalline silicon carbide in from 30 to 36 hours. The great Acheson carborundum fur¬ naces at Niagara Falls are over 15 feet long, and 42 feet cross section. For electrodes car¬ bon rods two feet long and three inches diameter are grouped in bundles of 60. The resisting

core of coke is nine feet long and two thick. About 1,000 horse power are required to run such a furnace, and the product is about one-quarter pound of carborundum per kilowatt hour. There is a considerable by-product of graphite, and the principle of this furnace is made use of in the manufacture of graphite, for which there is an increasing demand.

For the manufacture of calcium carbide, furnaces with carbon electrodes are employed, or sometimes one of the electrodes is of metal. One electrode may be formed of a mixture of broken coke and lime in a crucible, while a car¬ bon or a set of connected carbon rods may constitute the other electrode. Alternating cur¬ rent is usually employed. An arc being formed, the lime begins to give off oxygen, which com¬ bines writh some of the carbon, forming carbon monoxide, which gasifies and passes away, leav¬ ing the pure calcium to unite with the remain¬ ing carbon as calcium carbide. A temperature of about 2,000° C. is desirable for the process, though calcium carbide can be formed at a considerably lower heat. The King furnace is described under Electrochemical Indus¬ tries.

A similar type of furnace answers for the manufacture of phosphorus; the materials sup¬ plied are phosphoric acid and coke. The phos¬ phorus comes out as a vapor and is caught in a flue and condensed. Both calcium carbide and phosphorus may be made continuously, by pro¬ viding fneans for feeding the furnace with new material and carrying off the product.

In the aluminum furnace a continuous cur¬ rent is employed, the positive electrode being at the top, so that the current may pass downward through the fused mass to the negative elec¬ trode, which may be of either iron or carbon. The liquid is thus electrolyzed on the wet prin¬ ciple. The metallic oxide alumina is fed into a fused mass of fluoride of aluminum and sodium (cryolite, Na3 A1F6), the fluoride being electrolyzed. The oxygen uniting with carbon at the negative electrode the metal collects at the bottom, and may be drawn off through a tap-hole, the process being continuous. Over 150,000,000 pounds of aluminum are annually produced by electrical furnaces in the United States, and large factories have recently been built at Whitney, N. C.

The electric furnace has been tried for smelting a great variety of ores, with many in¬ teresting results. Several concerns announce success in smelting zinc ores in the electric fur¬ nace, one being at Keokuk, Iowa, where there is cheap hydroelectric power. It is practically certain that within a few years there will be considerable electrolytic

smelting in localities where electricity is obtainable in large quantity at low cost.

The smelting of iron ores in an electric fur¬ nace was begun in Italy, where Captain Stassano patented a furnace in 1898, and by 1900 ferro¬ alloys were being produced commercially, and to-day ferro-alloys are generally and preferably made in electric furnaces, of which 114 were known to be in operation and 30 building in different countries just before the European war of 1914. Of these 14 were in the United States, and the majority in Germany, Austria, France and Sweden. These electric furnaces do not pretend to compete with the great blast furnaces in cheap production of iron and steel,

but their product is superior in the case of alloys of known exact percentage, and the de¬ mand for such steels being constant and increas- ing, the future of the electric furnace is assured. As the cost of electrolytic iron becomes lowered there is a tendency to introduce the furnaces for commercial iron in regions where coal is scarce, as in California. There are large de¬ posits of iron ore in Southern California which are liable to become of commercial importance when electrolytic reduction is better developed, as they have the advantages of cheap oil as a reducing agent.

The first electric iron-making furnace at Shasta, Cal., was completed in 1907, being of the Heroult type, 1,500 kilowatt, three-phase re¬ duction furnace. It had to be rebuilt and rebuilt again, and was not deemed a commercial success until 1911. The furnace proper is a

well-burned lime and 1 pounds of quartz. With coke at $6 a ton and power at $16 a kilo¬ watt year, the cost of these items and for con¬ sumed electrodes is $6.87 per ton of pig iron product.

New electric furnaces under construction have an average capacity of tons. A 25- ton furnace and another of 22 tons were com¬ pleted at Bruckhausen, Germany, just before the war broke out. In 1911 Germany produced over 60,000 tons of electrolytic iron or almost as much as all other countries combined. The United States production is now (1916) nearly as large. The Heroult furnace, developed in France, is the most popular type and is used in California, South Chicago, Worcester and other places in the United States. The first Swedish furnace was the Kjellin, which was superseded by the Rochling-

Rodenhauser, and

All dimensions in millimeters

Arrangement of electric-furnace steel plant, Oberhausen, Germany.

steel shell 27 feet long, 13 wide and 12 high. The bottom slopes toward the tap-hole which is centrally placed in front. There are five 24-inch stacks, extending 15 feet above the roof. Cylin¬ drical graphite electrodes are used one foot in diameter and four feet long. They last about 30 days, but the working is made continuous by fastening a new one to the stump of the one partially consumed. Three service transformers supply three-phase current at 40 to 80 volts to the electrodes. They are each 750 kilowatts, and are water-cooled and oil-immersed. The metal is drawn off three times in every 24 hours. It is not necessary to shut off the current during the charging, so the operation is continuous. The charging is done by cars, running to a plat¬ form at the level of the top of the shafts. A normal charge is 500 pounds of magnetite iron ore, 140 pounds of charcoal, 3J/2 pounds of

is especially adapted to refining molten metal. It is built in sizes up to 15 tons capacity, some¬ thing like a great steel converter, having an enormous steel tank, mounted on rollers and tipped sideways for pouring. One of these has been installed at Landstown, Pa., and uses 300 kilowatts, furnished by a 25-cycle current at 480 volts.

The success of the electric furnace in the iron and steel industry is due to the fact that the product of these furnaces is much purer than the blast furnace, and this notwithstand¬ ing the blast furnace product has been vastly improved in purity. Pure iron is essential to making alloy steels with a known percentage of this or that other metal, required for pro¬ ducing certain results. For further details con¬ sult (Electric Furnaces for Making Iron and Steel,) issued by the Bureau of Mines.

ELECTRIC GAS-LIGHTING, a method of igniting illuminating gas by which one or a large number of jets may be lighted simultane¬ ously by an electric spark. In the figure a sim¬ ple form of electric gas lighter is shown. A

metal tongue t, insulated from the burner, is sup¬ ported near the tip as in¬ dicated. A metal rod carried on suitable levers brushes across

the tongue t when the knob k is pulled down, thereby clos¬ ing and opening, as it does so, an electric circuit which includes the rod r, tongue t, battery b, of two or three dry cells, and a spark coil m, consisting of a bundle of iron wires surrounded by a coil of copper wire. At the reopening of the circuit a spark occurs at tongue t igniting the gas. For lighting the gas jets in large halls an electric circuit is carried from one jet to the next and two terminals of the circuit are upheld over the gas tip. The spark jumps across from one terminal to the other when the spark coil or static machine is operated, thereby igniting all the jets in the cir¬ cuit. In this arrangement the terminals of the circuit are arranged in multiple.

ELECTRIC GENERATOR. See Elec¬ tric Machine; Electric Alternating Current Machinery; Electric Direct Current.

ELECTRIC HEATER. If a wire of more or less resistance is wound on a frame, and a current sent through, the resistance encountered by the current develops heat, and this is the principle of the electric heater. The hot wire or metal is surrounded by some non-inflam¬ mable substance that is a good conductor of heat, as porcelain. In a well-known type a metallic paint is fired upon mica strips, which are formed into groups or sets, so that a heater can be built up of any size from these units. For heating an electric car some six sets of conducting wires are coiled around porcelain tubes, the current being supplied with the motor. The cost is stated at about 60 cents a car per day. The method of heating is waste¬ ful where the source of heat is coal, and it cannot be generally substituted for house heat¬ ing; but it is excellently adapted for small in¬ dividual heaters, where the cost is less import¬ ant than the convenience, as for flatirons, ket¬ tles, saucepans, dinner plates, soldering tools, toasters, dishwashers and cookers. The indus¬ try of manufacturing such small heaters already runs into several million dollars annually in the United States. A recent new use for the electric heater is the stimulation of petroleum wells that are running dry. Heating coils are lowered into the well to melt out the heavy oil accumulation and cause it to flow freely. In the manufacture of armatures, time has been re¬ duced by the use of electrically heated ovens to dry out the moisture. The temperature can be regulated so accurately that there is no danger of melting the solder. In enameling iron the electric heater has also found a field of use¬ fulness, because it maintains a high and uni¬ form heat. The same quality of uniformity has caused the manufacturers of linotype machines

to make an electric heater for their melting pots.

ELECTRIC INDUCTION. See Induc¬ tion.

ELECTRIC LIGHTING. In 1800 Sir Humphry Davy discovered that if two pieces of carbon are joined by conductors to a source of electric current, and such pieces momentarily touched together, so that the circuit is complete and a flow of current established, upon their separation for a short distance, a flame is emit¬ ted, and, if the current be sufficiently powerful, this flame will continue, the carbon points will become intensely hot and emit a brilliant light. In separating the carbon points, the extra po¬ tential induced by the self-induction of the cir¬ cuit is sufficient to leap the small air gap and thereby vaporizes a small quantity of carbon. Carbon vapor, being a conductor, allows the current to flow across the gap. The vapor is of high resistance, and therefore it is heated to a high temperature, in 1809, Davy exhibited his arc light before the Royal Institution of London, his carbon points being charcoal from the willow, and his source of current a voltaic pile.

We do not know in which direction an elec¬ tric current flows through a circuit, and there are many reasons for believing that it flows both ways at the same time. It is usual, how¬ ever, to assume that it flows in one direction only, namely — from what is called the (

Davy used wood charcoal for his electrodes, and while they were of excellent quality, on account of their softness they lasted only a short time. As the arc would burn away, it was necessary continually to adjust them, or the arc would go out. Therefore it was found nec¬ essary to have carbons of sufficient density to last a reasonable time, and purity so that the light might be steady. Also to have a mechan¬ ism automatically to feed the carbons, and keep them a constant distance apart, as well as auto¬ matically bring them together in order to start the arc. Refined petroleum coke, ordinary gas coke, or lamp black is now taken for the base material, thoroughly ground and mixed into a stiff paste, dried and carbonized out of contact with the air. A very hard and uniform carbon is thus obtained, in any desired size, the usual length being 12 or 14 inches, and diameter

7/10, Yi or 54 inch. Broadly, the lamps may be divided into two classes : series and multiple ; each system into two sub-divisions : the open and the enclosed.

The electric energy loss from the point of generation to the lamp may be expressed, W — C2R; where W is energy in watts, dissipated as heat in conductors, C is current in amperes, and R is resistance of circuit in ohms.

From the equation it may be noted that the loss is in proportion to the square of the cur¬ rent, so long as R remains constant. Therefore, in distributing electric energy to a number of arc lamps, it is more ■economical to keep the cur¬ rent constant, and have the lamps joined in series.

Two types of lamps were evolved to meet these conditions as well as a generator to keep the current at a constant quantity, (1) the dif¬ ferential lamp; (2) the shunt lamp. In the differential lamp, the current must remain at a constant value. The main current is carried to a pair of lifting magnets, over which, but wound in opposition thereto, is a coil of high resistance called the shunt magnet, the terminals of which are cut around the arc itself. When current is thrown into the lamps, the main cur¬ rent pulls the carbons apart until sufficient potential is obtained at the arc to force current through the shunt magnet, which neutralizes the main magnet, thereby securing a balance, and maintaining the potential at the arc constant. In the shunt type lamp, the shunt magnet cir¬ cuit is so arranged as to trip the clutch holding the carbon rod, thereby allowing the carbons to come together, should the potential around the arc exceed the predetermined amount. This lamp will burn upon any current strength, pro¬ viding it is enough to operate the main magnet.

The conditions common to both types of series lamps are: (1) As the carbons burn away, they must be fed down gradually and not allow the potential around the arc to exceed a certain voltage. (2) Should the carbon rod stick, or anything happen to disarrange the lamp, protective devices called cut-outs come into operation, so the lamp will not be burned up, or the circuit opened. These open types of lamps are now practically obsolete.

The Enclosed Arc. — The open arc was superseded by what is called the enclosed arc. It was discovered that if the arc be surrounded by a narrow, nearly air-tight globe, it greatly modified the character of the light and the car¬ bon would last much longer. The small globe prevents the air from having access to the car¬ bon, thus diminishing its oxidation. When the lamp is started, it soon exhausts the oxygen contained in the globe, and if the globe is tight, the carbons will last from 80 to 175 hours. This type of lamp held the market for some years and then the flame arc lamp became popu¬ lar. This was based

on the principle of intro¬ ducing oxides into the carbons, to secure an in¬ creased flame arc, somewhat as the Welsbach mantles increase the luminosity of a gas-flame. Calcium chloride, and the oxides of iron, titan¬ ium, chromium, etc., were employed with more or less success. In the making of the car¬ bons (which are commonly of petroleum coke ground fine and mixed with tar, forced through dies and dried), the metallic oxides, are either mixed with the mass or introduced in a metal¬ lic core. An increased voltage is required, as

the electrodes are drawn farther apart to get a long flame ; in some forms, as the magnetite lamp, the lower positive electrode is simply a permanent knob of copper, while the upper negative electrode carries the mineral salts. Such lamps give a large body of arc or flame and do not burn a crater in the carbon, but consume a comparatively flat surface when di¬ rectly opposed. In one form two carbons are employed, positioned like the sides of a V. The quantity of vapor given off by the flame arc lamps necessitated an open globe at first, but later it was found possible to draw out the vapor by a draft and largely to enclose them.

Glowers and Vapor Lamps. — The Nernst lamp was the next popular favorite. Instead of carbons it employs what is known as a glower, this being a little. tube, something over an inch long, and made of the oxides of tho¬ rium, zirconium, yttrium, etc., mixed with a binding paste, and baked into a condition re¬ sembling porcelain. This tube is coated with oxides and provided with platinum terminals. On passing a current it emits a soft white light. The glower has to be heated to start it, and a coil called a heater is provided for the purpose; there is also a ˆballast® or resistance to avoid overheating. After the lamp glows it provides its own heat and the coil is automatically switched out. These glowers are of about 50 candle power and when more light is demanded, several glowers are included in one lamp. The life of a glower is about 600 hours on direct circuit and 400 on alternating current, thus far outclassing the arc lamps. They are made for both 110 and 220 volt circuits.

A distinct advance in durability and long life of the working parts of an electric lamp has been scored by the so-called vacuum tube lamps, in which a long tube is exhausted of air and then supplied with a small quantity of me¬ tallic vapor, as of mercury, which lights up when an electric current is passed through, emitting a very soft diffused light, that does not trouble the eyes with its glare, as is the case with most strong lights. The Cooper-Hewitt mercury vapor lamp was first tried out in 1903, at the office of the Evening Post, in New York, and has since been largely introduced for gen¬ eral indoor use.

The typical house-lamp em¬ ploys a tube from 20 to 50 inches long and of perhaps an inch diameter, backed by a metallic reflector. At one end of the tube is an iron mercury cup serving as the positive electrode, while a glass bulb at the other end is the nega¬ tive terminal. Platinum wires supply the cur¬ rent. The air is exhausted from the tube, which is then sealed. When the current flows, a little mercury is allowed to vaporize in the tube and a soft greenish-white light of great intensity is obtained. Induction coils are placed in the body of the fixture, also an adjuster resistance, shunt resistance and. cut-out. Pulling a hand- chain operating a switch starts the light, and if the current fails and it goes out through any accident, an automatic device can be had for relighting it. Lamps are made for both direct and alternating current. A tube gives normally 3,750 hours' service, or the equivalent of 10 hours a night for one year. These Cooper- Hewitt mercury vapor lamps are also manufac¬ tured with tubes of a great variety of lengths and doublings, for use in factories, mills, ma¬ chine shops, stores, photograph and moving-pic-

ture studios, etc. They bring illumination wherever it is wanted commercially, closely re¬ producing daylight conditions and obviating strain on the eyes from glaring lamps. For outdoor use the Cooper-Hewitt quartz lamp is supplied, which employs a short tube of fused silica (or quartz glass), permitting a high tem¬ perature and stronger current for brighter il¬ lumination, as in railway yards, parks, etc. Such lamps have lasted for months without at¬ tention.

The Moore vapor tube glow lamp is manu¬ factured in various forms, and is much valued for matching colors, owing to its close ap¬ proximation to daylight conditions. By the em¬ ployment of different vapors it can be made to yield blue, white, yellow or rose light. It re¬ quires renewal of carbon dioxide after 1,000 hours' use, but the tubes will last four or five thousand hours. It is run on 110-volt circuits at 23 amperes.

The Incandescent Lamp. — The great ob¬ jection attending the use of the arc system of lighting was that the light was too intense for most purposes required inside. It could not be readily subdivided. From the earliest days of electric lighting, various inventors endeav¬ ored to subdivide the light. The idea of using continuous conductors, instead of the discon¬ tinuous as in arc lighting, was tried in almost every conceivable form. These conductors were to be heated to a white heat

and rendered in¬ candescent by the passage through them of an electric current. The great difficulty arose from the fact that to give useful results, the working temperature of the material was so near its melting point, that any slight increase in the current would destroy the conductor. In 1878 a great improvement was effected in the platinum filament incandescent lamp, which was obtained in a condition safely to withstand a much greater current strength. The filament was placed in a vacuum, and slowly heated therein. The occluded gases were slowly liberated, and it was discovered that if a high vacuum were maintained and the wire raised to a point just below its melting point, the point of fusion was raised, and the physical character of the metal was considerably changed. This lamp, how¬ ever, was never a commercial success.

Various inventors experimented with the platinum lamp, enclosed in vacuo, but the great¬ est improvement was made by the substitution of carbon filaments for platinum. This was done by an American, J. W. Starr, who em¬ ployed plates inside a glass vessel containing a Torricellian vacuum. Many patents were taken out in all countries for lamps of various types, but none were commercially successful ; many, perhaps, for the want of a cheap method of generating the electrical energy, as well as through fault of the lamp itself.

The advent of the first successful incandes¬ cent lamp dates from about 1879, when Edison gave us the carbon incandescent lamp, and from that time the growth of the incandescent electric lighting industry has been extremely rapid.

Every such incandescent lamp consists of a carbon filament attached to two platinum wires, a glass bulb in which a vacuum is formed, and finally a threaded base attached to the bulb, and designed to hold the lamp in its socket.

The following is in a general way the method by which the lamps are made. The bulbs are

blown at the glass factory whence the manu¬ facturers obtain them directly. The first ma¬ nipulation consists of preparing them for the filament. The nature of the filament varies with different systems. There are three kinds employed. Some (Swan) employ cotton threads; others gelatine or vitrified cellulose (Khotinski Lave-Fox) ; and others use vegetable fibres (Edison-Siemens). Finally, some employ a natural fibre submitted to a chemical process fLanghans Cruto Seel). Form is given to the filament according to its nature, either by means of a die, or between cylinders, or by cutting it out while in a plastic mass. The fibre thus obtained is transformed into compact carbon by prolonged baking at a high temperature in a crucible or by heating with the electric current itself. To give the filament homogeneity and the desired resistance a layer of carbon should be deposited on its surface. This deposit is affected in many ways. A very simple method termed “flashing® consists in immersing the fila¬ ment in petroleum and raising it to a red heat in that liquid. The filament being cut to the desired length, Edison clamps the carbon with platinum wires and covers the points of attach¬ ment with a layer of electrolytic copper; Lave, Fox and Swan deposit a greater quantity of carbon there, while other manufacturers employ a special cement or solder. The filaments may be fixed in the bulb in two ways : either the two wires are fused into a piece of glass called the budge, which is next fused into the

neck of the bulb ; or else the wires are fixed sep¬ arately on the edges of a glass socket, which is then fused into the bulb. A small tube is also fused to the top of the bulb in order to provide for the production of a vacuum. The exhaustion of the lamps takes place by means of mercury pumps. The vacuum obtained, the lamp is tested. Then the luminous intensity and the resistance when cold are measured. The dimensions of the filaments vary with the luminous intensity of the lamp ; they should be proportionately greater as the normal intensity of the lamp is higher. These dimensions depend also upon the specific resistance of the carbon¬ ized substance. As to the form of the section of the filament, the circular one is preferable because it presents the minimum resistance for a given surface.

The reason for withdrawing the air from the bulb is that if the filament were heated in the air the oxygen of the air would combine with the carbon, causing combustion and consequent destruction. Even enclosed as it is in a vacuum the filament is slowly destroyed by the intense heat at which it is operated. Aside from the advantage named is the fact that there is no heat-conducting medium between the filament and the globe, practically all the heat that is emitted being that which radiates from the filament (a small amount is lost by conduction through the leading-in wires). If there were any gas or vapor within the bulb it would con¬ duct additional heat to the glass walls, and also dissipate heat by convection, so that with a given current in a given filament the temperature of the filament would be reduced, and, therefore, less light would be obtained. The destruction of the filament referred to is not due to com¬ bustion because as just explained there is no oxygen left in the bulb. There is a disintegra¬ tion of the filament by some process that has

never been positively identified or explained, the results being that impalpable particles of carbon are deposited on the inside surface of the bulb, causing a gradual darkening of the glass that is readily discernible.

The leading-in wires are made of platinum because that metal has the same coefficient of expansion by heat as that of glass. Were the coefficient different, small cracks would form in the bulb and the vacuum would be spoiled. Carbon is an exception to the general rule that almost all conductors increase in resistance when the temperature is raised. Its resistance decreases rapidly with an increase in tempera¬

ture up to the red point. Thereafter, up to the white, the resistance decreases more slowly. The ordinary carbon filament, when at its work¬ ing point, has about one-half the resistance as when cold. The standard filament gives out a mean illumination of 16-candle power at right angles with the axis of the lamp from base to top.

The power required for the usual 16-candle power standard lamp varies from 50 to 64 watts, depending upon the temperature at which the filament is operated. The higher the tem¬ perature of the filament the higher the efficiency in watts per candle power, and also the shorter will be the life. The life of the filament in this way limits the efficiency of the lamp. The candle power of the incandescent lamp may be greatly increased by simply increasing its fila¬ ment temperature by the simple expedient of increasing the current, but thereby its life is shortened. The increase in candle power is not directly in proportion to the increase in current but in a considerably higher ratio.

It is important to maintain the potential on the terminals of an incandescent lamp at the normal working point. Any slight excess ma¬ terially shortens its life. The resistance of an incandescent lamp filament is much lower when hot than cold, approximately in the ratio of two to one; that is, the resistance is twice as high cold as when hot when at normal burning temperature. The illumination is rated in candle power and power consumed in watts per candle measured when the lamp is giving its rated candle power, but this condition is not obtained with any incandescent lamp through a large portion of its active life. When a new lamp is placed in circuit it will usually give the full candle power or a trifle more at the start, and the candle power will rise to a value from 5 per cent to 11 per cent higher than the rating. It soon, however, begins to fall off with a constant diminution up to the breaking point.

The rise and fall of candle power are due to changes in the structure of the filament. The resistance at first decreases, allowing more cur¬ rent to flow and consequently higher tempera¬ ture and more light. This is indicated by the rise of the curve from 16.2 candle power to 17.3 candle power during the first 50 hours. Then the diminution of resistance ceases and is fol¬ lowed by the gradual wasting away of the filament, which causes a gradual increase in resistance, by reducing its cross section. The current thus gradually falling off, taken together with the decreased surface of the ‘filament and the deposit of carbon upon the globe, causes the fall in candle power indicated. The decrease in candle power is not directly proportional to the decrease in current, thus the energy per vol. 10 — 8

candle power increases rapidly after the first few hundred hours.

The Tungsten Lamp.— The tungsten fila¬ ment has revolutionized the incandescent light¬ ing industry and is reducing the use of arc lamps. The carbon filament is rapidly going out, and the old-fashioned arc lamps are being replaced either by groups of tungsten lamps or Nernst or vapor lamps. The tungsten filament has a life of 1,000 hours, and some have been made of twice that durability, whereas 125 to 200 hours is long for other filaments and arc lamps. The tungsten also has the advantage of diffusing the light more, there being more turns in the filament, and it is closer to day¬ light in its coloration. The tungsten is a truly automatic light, requiring no attention beyond an occasional dusting. Tungsten is not so rare a metal as once supposed, and its great resist¬ ance to heat — it melts at 3200° C. — renders it a most fit metal for filaments. At first it was found exceedingly difficult to form it into the minute diameter wire form needed. It is ex¬ ceedingly brittle and fragile, and early attempts to draw it through fine dies, such as are used for making the most delicate strands of copper and steel wire, were failures. Kuzel solved the problem. by making a solution of tungsten, evaporating the surplus moisture and squirting the residuum through a* die, getting a thread which would bear handling. Such a filament is ˆflashed® in a mixture of steam and hydro¬ gen, and as the steam decomposes the oxygen unites with the carbon of the filament. Later a method of drawing the metal was worked out successfully and is preferred to the squirted film. The character of tungsten is such that a very long and frequently lapped filament is required to give the necessary light. This is an advantage, reducing the glare.

In recent tungsten lamp practice nitrogen gas is introduced in the bulb after extracting the air as fully as practicable. It has been demonstrated that the pressure of the gas re¬ tards the wasting of the filament, more than off¬ setting the heat lost by its introduction to the bulb. As tungsten lamps can be made of 1,000 to 2,000 candle power, and show a life of 1,000 to 2,000 hours, they have naturally become very popular.

Wiring and Fixtures. — The building regula¬ tions of all large cities contain more or less stringent regulations as to the wiring of build¬ ings, the result of somewhat numerous fires caused by careless wiring in the early stages of introducing electric lighting. Cables carrying street wires are now abundantly insulated, and the individual wires entering buildings are care¬ fully insulated and protected from accidental abrasion. At the point of entering a building, a switch-box is usually placed, with accommo¬ dation for one or more fuse-wires.

These are short connections made of easily fusible wire, as a mixture of lead and zinc, so that when by accident a strong current reaches the switch, the fuse is instantly burned out, and the cur¬ rent can go no further, having no wire conduc¬ tor. Wires for incandescent lighting are usu¬ ally covered and boxed in, under certain regula¬ tions of safety, and led to the various points of use — to ceiling fixtures, pendants, electroliers, brackets, portable lamps, etc. The pendant, with flexible cord, that can be swung to any convenient point within its radius, is easily the

most popular lamp. The modern idea of inte¬ rior lighting of dwellings involves the use of a semi-transparent inverted half globe, as of thin porcelain, within which the light is hidden, casting its full glare upward toward a white ceiling, from which a soft radiance is reflected downward over the surroundings. This plan diffuses the light in a most acceptable manner.

The low value of the common radiants is due to the fact that they are based upon the incandescence of carbon.

If the conversion of – coal into light is through the medium of the incandescent lamp, we throw away 95 per cent of theoretical energy, and secure as light only 95/100 or prac¬ tically 1 per cent of the energy of the coal.

However, the incandescent light is almost a perfect light. Since it gives off no waste prod¬ ucts of any kind, it has no deleterious effects upon the atmosphere of the rooms or buildings in which it may be utilized. Its light is white, soft and brilliant, yet not dazzling. The lamp itself is rather ornamental than otherwise, and lends itself readily to external ornamentation without danger of fire, since of course it gives off no flame. Nevertheless, by way of caution it may be noted that, comparatively insignificant as is the heat which the incandescent lamp gives out through the glass bulb, it cannot be allowed to rest for an undue time in touching proximity to inflammable materials, since experiments have shown that when such a lamp is encased in two thicknesses of muslin for about six min¬ utes, and fresh air is admitted to the interior, the muslin has burst into flame. Again, an arti¬ cle of celluloid pressed against the lamp for three minutes has ignited; and a newspaper, under similar conditions, ignited in three-quarters of an hour.

ELECTRIC LOCOMOTIVES. See

Traction, Electric.

ELECTRIC MACHINE, or Dynamo Static Machine (now extensively employed in therapeutics), for exciting electricity by fric¬ tion or by static electric induction, as distin¬ guished from dynamo electric machines in which electricity is excited by cutting magnetic lines of force. The excitation of electricity by friction was observed by the ancients, and the word electricity is derived from the Greek word electron signifying amber, in which the at¬ tracting power of electricity after friction was first noticed. See Electricity, Frictional.

It was subsequently found that a glass rod or a rod of sealing wax also possessed this elec¬ trical property when rubbed. Later on, other methods of exciting static electricity, such as by the electrophorus, were discovered. Such methods were, however, slow and laborious and better devices were sought for, resulting in the development of two general types of dynamo static machines, namely, frictional machines and induction machines, the first representing the rubbed glass rod or wax type ; the second, the electrophorus type. These machines pro¬ vided means whereby the rubbing and the in¬ duction might be performed continuously and mechanically.

Frictional Electric Machine. — The first continuous frictional machine, due to Nairne, consisted of a glass bottle, or hollow cylinder, mounted on a horizontal axis, well insulated, and turned by a winch or handle on suitable

supports. (See Fig. 1). On one side of the cyl¬ inder and pressing firmly against it, is placed the ˆrubber,® a cushion of leather, c, stuffed with horse-hair, and sometimes faced with amalgam. From the upper edge of the cushion a silk flap, s, passes over the cylinder, reaching half way round. A brass cylinder, or a wooden cylinder plated with metal, p, termed the prime conductor, supported by a glass or ebonite rod, r, is placed as shown. A metallic comb is at¬ tached to the left end of the prime conductor, as indicated in figure.

Before the machine is set in operation an amalgam of zinc and tin or other suitable metals, is sprinkled or pasted on the surface of the rubber. When the cylinder is turned elec¬ tric sparks are seen and heard to play on the cylinder from the edge of the flap, negative elec¬ tricity being accumulated on the amalgam sur¬ face and positive electricity on the surface of the cylinder, due to the friction between the glass and the amalgam coated surface of the rubber. As the

cylinder is a non-conductor of

Fig. 1. — Cylinder Frictional Machine.

electricity this positive charge is held on its sur¬ face until the cylinder in revolving brings it be¬ neath the comb, where it acts inductively on the prime conductor, p, attracting negative electricity to its near end and repelling positive electricity to its far end; the negative electricity escaping across the points of the comb as an electrical breeze, or brush discharge, uniting with and neutralizing the positive electricity on the glass cylinder opposite the comb, which portion of the cylinder is then ready to take a positive charge as before when it again reaches the rub¬ ber. When the prime conductor by these suc¬ cessive charges of positive electricity has at¬ tained a high potential, sparks several inches in length will jump from its far end to the hand or any other ground connection. To ob¬ tain a continuous supply of electricity from the prime conductor, p, it is necessary to connect the rubber, c, to the ground, which is usually done by allowing a metal chain attached to a steel plate on the back of the cushion to lie on the floor or table, this permitting the negative electricity excited in the rubber to escape to earth. In this way also a negative stream of electricity may be drawn from the machine. The use of the amalgam on the rubber has the effect of largely increasing the conductivity of the cushion, and also provides a substance, b, be¬ tween which and glass the surface friction for the exciting of static electricity is greater than that between leather and glass.

The quality of the glass used in electrical machines is important, that containing most silica, such as the material from which ordi¬ nary pale green bottles are made, being most suitable for this purpose.

Plate Electric Machine. — This is another form of the frictional machine. The principle of its operation is the same as that of the cylin¬ der machine just described. It consists of a circular plate of glass, or ebonite, e, Fig. 2, in place of the cylinder. Two sets of rubbers, s, s,

are placed on opposite sides of the plate, and as the plate is rotated positive electricity is devel¬ oped on the glass, and is collected by the prime conductor, p, virtually as in the case of the cyl¬ inder machine.

Static Electric Induction Machine. — These machines depend for their

action upon static in¬ duction as exemplified in the case, for instance, of the electrophorus which may be briefly de¬ scribed here.

Electrophorus. — A. simple electrophorus consists of a cake of resin or vulcanite 12 or 15 inches in diameter and one inch thick, resting on a tin or iron plate. A disc of metal, termed the cover or carrier, somewhat smaller than the cake of resin, is provided with an insulating handle. When the cake is rubbed with dry flan¬ nel it becomes negatively electrified. If now the cover be placed on the cake, its positive electricity is attracted to the side of the cover next the cake. The electric charge on the resin is not discharged into the cover, however, be¬ cause, on account of the slight accidental irreg¬ ularities of the two surfaces, the cover will be in actual physical contact with the resin at only a few points, — perhaps at not more than three. The electricity residing in the resin at the points of true contact will be discharged, but not that at other points, because the resin is a non-con¬ ductor, and so its electricity cannot pass directly to the covering plate by conduction. Now if the cover be touched by the finger, its negative elec¬ tricity will escape to earth. If now the cover be lifted from the cake it will contain free posi¬ tive electricity which may be used for charging a condenser or Leyden jar. The cover may again be placed on the cake and the foregoing process may be repeated a number of times be¬ fore the charge in the resin will be entirely ex¬ hausted. The cake when electrified, with the disc in its place, and undisturbed, will retain its charge for weeks.

A number of induction machines based on the foregoing principle have been devised, among the best known being the Holtz and the Wimshurst, which are sometimes termed con¬ tinuous electrophori.

Holtz's Electric Induction Machine.— This consists of two glass plates or discs about two feet in diameter, placed side by side and sep¬ arated by a very small air space. One plate is fixed; the other is rotated, the fixed plate being slightly larger. The moving plate is mounted on a well-insulated axle. On diametrically opposite points of the fixed plate there are two sector-shaped holes or windows. On the back of the fixed plate, at the windows, are glued paper inductors or armatures, blunt tongues from which they are caused to pass through the windows until they nearly touch the moving plate, which must be rotated in the direction opposite to that in which the tongues point. Opposite the inductors there are placed metal combs attached to brass rods or electrodes, which carry brass balls that at their terminals are movable to and from one another. In start¬ ing the machine the two balls are brought to¬ gether and a negative charge from a rubbed ebonite rod is given to one of the inductors; then when the plate is

rotated and the balls are separated, sparks jump across the space. The action of the machine is very complicated and need not be gone into here further than to say that in effect it is virtually similar to that of the electrophorus, the initial charge imparted to the armature inducing opposite electricity in the rotating disc, which in turn delivers a charge to the metal comb, which charge by successive ad¬ ditions as the disc rotates is augmented until it attains a potential of 50,000 volts and more. These discs are rotated at a speed varying from 120 to 450 revolutions per minute. See Elec¬ trotherapeutics.

Wimshurst's Influence Machine.— This machine, due to Mr. James Wimshurst, is one of the most efficient and reliable of the induc¬ tion electric machines. It consists of two glass discs, which in practice have varied in size

Fig. 3. — Wimshurst Electric Machine.

from 14J4 inches to 7 feet in diameter. These discs suitably mounted on insulated axles are placed side by side and both are rotated, but in opposite directions. On the outer surface of each disc thin metal strips, or sectors, m, are glued, as indicated in Fig. 3. Two adjustable

metal "neutralizing® rods, r, R, terminating in small brushes that glide over the metal strips, are supported as shown, at oblique angles to one another; one opposite each disc. 17-shaped col¬ lectors, u u, carrying metal combs, diametri¬ cally opposite to one another, are metallically connected to the electrodes or prime conductors, c c. These collectors are supported on metal rods that rest in what are practically Leyden jars or condensers, j j. The best position of the brushes on rods, r r, relatively to each other and to the combs is microphone, found by actual test to be virtually as shown in the figure.

The object in employing condensers, j J, is to add capacity to the prime conductors, thereby increasing the amount of electricity that can be accumulated, and hence increasing the energy of the discharge, and this use of condensers is common to all static electric machines. The action of this machine in operation is also com¬ plicated. The Wimshurst machine is self-excit¬ ing, that is, it starts without any externally applied electric charge, as is requisite with the Holtz machine. It has been thought that the initial charge is due to the

friction of the air in the space between the two oppositely re¬ volving plates, this space not exceeding one- eighth of an inch. Apparently the metal sec¬ tors are the equivalent of the inductors in the Holtz machine; the neutralizing rods serving to allow the repelled electricity in one sector to escape to a diametrically opposite sector on the same plate, where it in turn acts inductively on the opposite sector on the opposite plate, the free electricity when it reaches the collectors being carried off as a discharge by the prime conductors. Frequently a small Wimshurst ma¬ chine is used to excite a larger Holtz machine.

All static electric machines, owing to the high potentials which they develop, require ex¬ tra precautions as regards insulation, even the damp atmosphere of a room preventing their successful operation. Some other insulating materials, such as ebonite and gutta-percha, are less hygroscopic than glass, but these materials are not so durable as glass ; hence the latter is given the preference for the plates of these ma¬ chines. But to add to their insulating quali¬ ties they are always covered with a shellac var¬ nish, and are enclosed in a glass chamber or box from which moisture is extracted by sul¬ phuric acid or other desiccators, contained in suitable vessels within the chamber. These ma¬ chines are now usually operated by electric mo¬ tors. Although the electro-motive force devel¬ oped by these machines is very high, the current, owing to the high resistance of the machines, is comparatively low. Thus tests have shown the output of a Holtz machine to be, with a six- inch spark, 71,000 volts and .00048 ampere, equal to 34 watts, and with a spark of 18 inches, 180,- 000 volts and .0002 ampere, equal to 36 watts (Sheldon). The efficiency of the machine is, in the first instance, 27 per cent, and in the second 19.5 per cent. The current is approximately directly proportional to the rotation of the plates. The Holtz machine and others of its type are continuous current machines, and at a given speed their current output and electro¬ motive force are constant. By efficiency is meant the energy given out by the machine as compared with that expended in driving it. (The

efficiency of a dynamo electric machine is often over 90 per cent.) The electric power ex¬ pended in driving these machines, under test, was, in the first case, 126 watts, and in the sec¬ ond case, 180 watts. Later tests by Sheldon on other static machines show an efficiency of 40 to 46 per cent, with an output of 10 to 12 watts.

To increase the volume of current from static electric machines, the number of plates is increased. Hence machines of the Holtz and other more or less similar types are constructed with, from say 6 revolving and 6 stationary plates to 16 revolving and 16 stationary plates, or

more as may be desired. In many cases the stationary plates are square or oblong sheets of glass. For therapeutic purposes, machines, giv¬ ing at least a 12-inch spark, are considered ad¬ visable. Plates made of micanite have been tried for static machines, but with some doubt as to their durability. See Electrotherapeu¬ tics. William Maver, Jr.,

Consulting Electrical Engineer.

ELECTRIC MICROPHONE. The prin¬ ciple of this instrument was discovered by Prof. David E. Hughes, an American resident in London, who announced the discovery in a paper delivered before the Royal Society, London, in 1878. The microphone, as the name implies, largely amplifies sounds. It consists of a verti¬ cal carbon pencil pivoted loosely at both ends in solid carbon receptacles which are fastened to a thin sounding board, which board is suit¬ ably upheld by one edge on a solid block or base. When the carbon pencil is made part of an electric circuit in which are also a small battery and a telephone receiver, sounds are many times amplified ; even a small cotton ball dropped on the block is heard in the telephone like a bullet falling on the floor. A number of theories have been advanced to explain the ac¬ tion of the microphone; one, adopted by the courts in America in a case in which the validity of the Berliner telephone transmitter was an issue, being that the action is due to the remarkable effect of sonorous vibrations in varying the electrical resistance at a loose con¬ tact between solid electrodes. The most com¬ mon form of carbon telephone transmitters in use to-day are varieties of the microphone. It may be added that Professor Hughes gave this instrument to the world gratis. The principle of the microphone has also been utilized in a stethoscope and in a telephonic relay.

ELECTRIC MOTOR. The electric motor is simply a dynamo reversed, a machine for transforming electrical energy into mechani¬ cal power. It takes its power from off a wire, as sent by a dynamo from the source. To un¬ derstand the technique of its construction and operation, consult the articles on Electric Direct Current; Electricity and Elec¬ trical Alternating Current Machinery. The small- electric motor has displaced the steam engine in a great many uses, and con¬ tinues to supplant it. In 1909 there were more than half a million small motors made for man¬ ufacturing establishments in the United States, with a total horse power of nearly 3,000,000 and a valuation of $32,000,000. More and more power is being produced in large plants utiliz¬ ing some waterfall to rotate dynamos, and sending out current, much of which is used for

small electric motors, driving individual ma¬ chines. Users of machinery in almost all lines now accept it as the best practice to equip all large machines with individual motors, and in this way not only make their operation inde¬ pendent of other machines, but also save the ex¬ pense of surplus power and of running shaft¬ ing and belts when the machines are idle. While electric motors have cost more in some cases than steam or gas engines, and while the charge for electric power in many localities is higher than for direct steam power, yet the convenience and the doing away with cum¬ bersome overhead shafts and belts has more than offset these. The individual motor per¬ mits machines to be located without reference to shafting lines, and makes for greater effi¬ ciency and output. With each added machine a new motor comes, and there is no throw¬ ing out of central engine plants to make way for larger. The small electric motor may be built in as a part of the machine, or it may be bolted to the floor or ceiling. It may be di¬ rect-connected if the speed of the machine is appropriate, or it may be connected by reducing gears, rendered nearly noiseless by introducing rawhide. Belt connection is often used direct or through cone pulleys, and where the power transmitted is light, a friction connection is made satisfactory by covering the smaller of the opposed pulleys with a leather face. Where machines are small it is common to group them for motor-driving; four or six machines will all be coupled to one motor, conveniently located in the centre of the group.

Manufacturers wind motors in an almost in¬ finite number of ways to suit an endless variety of conditions. By placing resistances in the shunt circuit, a considerable variety of speed is permitted. For printing presses a motor is made with a continuous current transformer of variable ratio. This permits a slow speed with¬ out loss, as a small current at full pressure is instantly convertible to a large current at low pressure. Continuous current series motors are preferred when the work is irregular, as in starting under heavy load, as with a crane-hoist, or when encountering extra load from fric¬ tion or dampness, as with cotton spinning ma¬ chines on a day of high humidity. Single-phase alternating current motors have special uses, but are not well adapted to sudden changes of load. Motors that are both shunts and series wound are in large demand. This type is used on passenger elevators. The driving drum that carries the wire rope that hoists and lowers the elevator is commonly driven by this type of motor. To secure the needed gear reduction without grinding noise, a steel worm

and gun- metal spur gear are run in oil. When the operator pulls the rope or lever in the elevator he turns the starting switch or controller on or off. A band-brake on the motor shaft guards against racing, and is normally held out of operation magnetically. Thus if the current fails the brake slows up the elevator. An au¬ tomatic switch is placed to shut off the current at the top and bottom of the elevator's travel. See Electrical Manufacturing Industry.

ELECTRIC NAVIGATION. Vessels of small draft are now propelled by electricity. The power drives a motor, which actuates a screw propeller. The current is generally sup¬

plied by a storage battery. From their noise¬ lessness electric boats are peculiarly available for nocturnal torpedo operations, and the uni¬ versal equipment of modern warships with elec¬ tric lighting and power plants makes their use possible at all points. This type is often termed an electric launch, and most of all electric boats fall under this category.

ELECTRIC PEN, a pen invented by Thomas A. Edison, bearing on its head a small magnet, arranged to rapidly reciprocate a needle so that it protrudes and withdraws from the point. When connected with a battery this pen may be used to write or make drawings which appear on the paper as a series of per¬ forations. The paper so perforated can be used for stencil printing, and several hundred copies struck off.

ELECTRIC PENDULUM, a form of electroscope consisting of a pith ball suspended by a non-conducting thread.

ELECTRIC PHONOGRAPH. See

Phonograph.

ELECTRIC POLICE SIGNALS. See

Electric Signaling.

ELECTRIC POWER. See Electric Ma¬ chine; Power.

ELECTRIC RAILROAD. See Traction, Electric.

ELECTRIC RAILROAD BLOCK SIG¬ NALS. See Electric Signaling ; Block Sig¬ nal System.

ELECTRIC REPULSION, the mutual tendency of similarly electrified bodies, or similar electric charges, to repel one another.

ELECTRIC RESISTANCE, that non¬ conducting property of a substance that resists or limits the passage of an electric current ; the characteristic that goes to make a good non¬ conductor or insulator ; sometimes called re¬ luctance. It is defined mathematically as equal to the electro-motive force divided by the cur¬ rent-strength. All metals present some resist¬ ance to an electric current, mercury being the most resistant. For the relative resistance of metals see table under Electric Conductivity. The resistance of a conductor varies directly as its length and inversely as its cross section. A box containing coils that are designed to resist or impede a current is called a resistance-box or rheostat. The starting-box of an electric car and the controllor of a machine run by motor are based on this principle. The unit of electrical resistance is the ohm. See Electrical Units.

ELECTRIC SIGNALING. While it is true in a broad sense that any method of com¬ municating intelligence to a distance is em¬ braced in the term telegraphy, in the present in¬ stance the term electric signaling will be em¬ ployed to cover the signaling systems and meth¬ ods described in this article. This term is per¬ haps the more appropriate inasmuch as certain of the systems to be outlined in reality partake more of the nature of mere signals than of a means of transmitting intelligence as that term is generally understood. Almost without excep¬ tion electro-magnetism is employed in the op¬ eration of electric signals. See Electro-Mag¬ netism.

The Electric Door-Bell. — This is perhaps

the best known and one of the simplest methods of electric signaling In its operation it em¬ ploys a primary battery, a push button at the door, a vibrating bell within the house, and a wire connecting the push button and the bell. The bell and its armature, the connecting wire, the push button and the battery, comprise the electric circuit. The push button is merely a key consisting of two strips of metal which when pressed together allowed the current to flow. The electric bell consists of a coil of wire wound around a soft iron core. Its armature carries at its free end a small hammer which, when the armature is attracted, strikes against a small gong, ringing it. The vibration of the hammer is brought about by a very simple device. Normally the armature rests against a contact point which is a part, of the circuit; the armature itself also being a part of the circuit. The circuit is normally open at the push button. When this button is

pressed the circuit is closed and the armature of the bell is forthwith attracted, its hammer striking the gong at that instant. In the act of moving forward, however, the armature leaves the con¬ tact point against which it had been resting, with the result that the circuit is opened at that point. This has the effect of permitting the magnet of the bell to lose its magnetism, where¬ upon the armature falls upon its contact point, again closing the circuit with the result that the armature is again attracted, which action is continuously repeated so long as the push button is pressed in. A small spiral or tension spring suffices to keep the push button normally open. See Electric Bell.

Annunciator Signals. — The “annunciator® or call-bell systems so generally used in hotels and offices utilize the principle of the door bell. Annunciator systems in fact might be termed multiple electric door-bell systems. Usually a wire runs from each room to a central point or office where the annunciator is placed. This annunciator contains within its case a small electro-magnet for each room. One battery is caused to supply the current for all the circuits by simply connecting the wire from each room to the terminals of the battery. In a similar way one bell at the annunciator is caused to respond to all the calls that come. The arma¬ ture of each electro-magnet within the case carries a small shutter, on which is placed the number or letter of the room with which it is connected. This shutter is held out of sight by means of a small catch hook attached to the armature of the magnet until the push button in a given room is pressed, where¬ upon the armature is attracted, releasing the shutter, which instantly drops, showing the number. At the same time the annunciator bell rings, directing the attention of the clerk to the call. In other forms of annunciators the fall¬ ing of the armature is caused to deflect a small arrow on the face of the case, beneath where is marked the number, name or letter of the room. There may be almost any number of rooms for 1 up to 100 or more connected with one annunciator. In practice a single wire, called the “common return® wire, is usually run from the battery and annunciator to all rooms. From each room a separate, individual wire is then run, from the “common return® in the room, through the push button and then down to the electro-magnet in the annunciator, there¬

by supplying a separate circuit for each room. In order to restore the shutters to their normal position after the call has been received, a rod is provided with a knob at its lower end which projects below the under side of the case con¬ taining the annunciator magnets. By pushing up the rod a cross-bar within the case is raised and this cross-bar in turn lifts up and resets the shutter and armature for the next call. In the later form of annunciators which are now frequently

operated by alternating current of low voltage, the shutters of the annunciator are electro-magnetically reset by merely push¬ ing g button, thereby closing the circuit of an electro-magnet.

Burglar Alarm Signals. — For simple do¬ mestic purposes the arrangement employed for burglar alarm signals is also closely akin to the systems just described, the main difference being that the finger push button is displaced by a circuit closing contact in the frame of a window or the jamb of a door. To bring about the result desired the circuit closer is placed on the frame of the window in such a way that the movable portion of the circuit closer projects beyond the surface of the window frame. The contacts of the circuit closer are held apart normally by a simple spring. In order that when the window is closed this projection may not be depressed, a piece is cut out of the window sash at a point directly opposite the projecting circuit closer. In an analogous manner the circuit closer is attached to a door jamb. The wires leading to the circuit closer are concealed behind the woodwork. When a window is raised or a door is opened by an intruder the contact points of the circuit closer are brought together, whereupon the annunciator bell is rung, giving the alarm, and at the same time the room where the door or window has been opened is indi¬ cated by the dropping of the corresponding shutter in the annunciator. The annunciator is located in any desired part of the house, usually in a bedroom. The method described is termed an open circuit method. In such sys¬ tems what is known as open circuit batteries, such as the ordinary dry batteries, may be used. In some cases, to guard against a momentary opening of a door or window, such as would only occasion a short ring of the alarm bell, not sufficient perhaps to arouse a sleeper, an auxiliary arrangement is provided at the an¬ nunciator consisting of a drop arranged to close the bell circuit continuously until the drop is reset. A small switch is provided near the annunciator by means of which the alarm cir¬ cuit may be opened during the daytime so that needless alarm may not be given by the ordi¬ nary opening of windows. Other switches are also used for the purpose of testing the vari¬ ous circuits to see that they are in proper working condition. See Electric Annunciator.

Central Office Burglar Alarm System. — This system, as the name implies, relates to one in which the ringing of an electro-magnetic alarm in a central office will announce the presence of intruders in the building or build¬ ings in which the protecting apparatus is in¬ stalled. The central office may be any con¬ venient distance from the protected buildings. These systems are frequently termed electric protective systems. The plan usually adopted is to run a net-work of wires through parti-

lions, across floors, skylights, etc. These wires are part of a circuit extending to the central office, and the said wires are so connected with the circuit that any interference with them, after they have been “set,® will cut out a high resistance, consisting of a coil of wire, suitably placed in the circuit of the protected building. The cutting out or short-circuiting of this re¬ sistance will so increase the strength of the current in the circuit as to operate a ((double- balanced® instrument in the central office. If on the other hand the resistance is not ((cut out,® but instead the wires of the circuit be cut or broken, by accident or design on the part of intruders, the consequent absence of current, or even a slight decrease of current, will likewise cause an alarm in the central station. The doubled-balanced instrument at the central office is usually a relay, the armature of which carries a needle that normally stands at a zero point, from which point it may be deflected in either direction. An increase of current on the circuit deflects it in one direction — a decrease of current allows a spring or weight to deflect it in the other direction. In either case, the alarm is given when the needle moves and an attendant is despatched to the premises from which the alarm has emanated. Each relay is of course suitably numbered or otherwise desig¬ nated in the central office so that the building with which it is connected is known.

Telegraph Message Service or Emergency Signals. — This service relates to the supplying or calling of messengers, policemen, firemen, etc., at the call of or by a <(subscriber,® in whose house or office a <(call box® has been placed. This call box is electrically connected by means of a wire with a central office at which the messengers are located, and from which office communication with police and fire headquarters can quickly be made. Each call box is numbered and is supplied with what are termed (

spring which is also part of the said circuit rests on the periphery of the break-wheel in such a manner that when the wheel is making its revolution the spring falls into the slots on the said periphery and opens the circuit as many times as there are slots provided. If, for instance, the number of a given box is 24, there will be cut on the periphery two slots in close succession, then an interval of unbroken metal surface followed by four slots in succession. The circuit in such a case, as the wheel rotates, will be opened twice in succession, closed for an interval, and then opened four times in succes¬ sion, with the result that a bell at the central office will give out, first two strokes,

and then four strokes, on its gong. A large number of such boxes can be placed on one circuit without causing confusion. The call box just described suffices to send in a swift call for a messenger. When it is desired to make it possible to call a policeman, doctor or fireman by the same type of box, it is provided with a <(stop® that projects through the cover in such a way that the crank cannot be moved beyond a certain point. The ordinary position of the <(stop® would be at the messenger call, in which case the number of the. box only would be sent in when the crank is turned. If, however, a doctor should be desired, the stop is moved to a point marked ((doctor,® on the cover of the box, and in turn¬ ing the crank it is moved up to that point. This farther movement of the crank has the effect of bringing into operation one or more additionel slots on the periphery of the break- wheel in consequence of which the box number is preceded by one or more single strokes on the bell, which indicate to the central office attendant that a doctor, fireman or policeman, as the case may be, is desired.

Fire Alarm Telegraph Signals. — The im¬ portance of electricity as a time saver in an¬ nouncing the existence of a fire can scarcely be overestimated. A special feature of the electric fire-alarm system is that it not only gives the alarm, but also indicates to the firemen the lo¬ cation of the fire, or within a very short dis¬ tance thereof. It may be noted that a simple fire-alarm system is in many respects similar to the systems just described, in that it consists of a central office or station in which alarm ap¬ paratus and battery are located, and of signal boxes in the street and elsewhere by which to transmit alarms to the central office. A wire connects the central station with the various sig¬ nal boxes in the streets and fire-engine stations. In each signal box is placed a break-wheel, practically similar to that used in the call-boxes of the district messenger or emergency service ; the main difference being that owing to the more exposed position of the fire-alarm boxes and their greater relative importance, more sub¬ stantial boxes are employed. In general these signal boxes are supplied with an inner and outer door to protect the apparatus from the elements. The signal boxes are provided with a crank or a hook which on being operated causes an alarm to be sent to the central sta¬ tion giving' the number of the box from which the call has emanated. The signal box is also provided with a small electric gong, which rings each time the circuit is opened. This in¬ timates to the one sending in the alarm that the alarm is being properly transmitted. It also

serves the purpose of intimating to anyone who might open an adjacent box to send in an alarm therefrom, that the alarm is already being sent, thus preventing interference. At the central station and the various fire stations a gong is struck a number of times corresponding with the number of the box from which the alarm emanates. In the same circuit also an ink-re¬ cording register in the central office marks on a paper strip the number of the signaling box, thus giving a permanent record of such alarm. Inasmuch as it is not good practice to put more than 25 or 30 signal boxes on one circuit, but yet is very important that all the fire sta¬ tions in a given district should receive the alarm, a repeating device is utilized at the cen¬ tral station which receives the alarm from any one of the circuits and thereupon repeats it au¬ tomatically or manually to all the other cir¬ cuits. It frequently happens that two or more street boxes on the same circuit are pulled si¬ multaneously by different people. To prevent the confusion of signals that this would ordi¬ narily entail special arrangements have been devised, termed the non-interfering succession signal fire-alarm boxes. These boxes not only prevent interference with the signals already in process of transmission by any given box, but also permit every box that may have been pulled simultaneously to send in its signal in rotation, automatically.

Automatic Fire-Alarm Signals. — In many of the large cities of the United States an aux¬ iliary to the regular fire-alarm system, consist¬ ing of some form of thermostat included in a circuit in the building to be protected, is em¬ ployed. This system again is somewhat analo¬ gous to the messenger telegraph system de¬ scribed, the chief difference being that in the one case the signal box is manually operated, while in the other case an increase of tempera¬ ture, due to fire, by affecting the thermostat causes the alarm to be transmitted. Thermo¬ stats are of different types. One type consists of a crescent-shaped spring, made up of two strips of metal, steel and copper, one over the other. One end of the spring or strips is fas¬ tened to a support, the other end is adjacent to a contact point of an electric circuit. As the metals named do not expand equally under in¬ creased temperature the spring as a whole bends or buckles when the temperature in¬ creases, and the movable end makes connection with the contact, thereby closing the alarm cir¬ cuit with the result desired. Other types of thermostats are made of easily fusible alloys. Still another form of thermostat consists of a drum-shaped box, holding substances which have a high expansion under increased temper¬ ature. The expansion causes the ends of the box to bulge, thereby closing an alarm circuit.

Police Electric Signals. — These may be considered as more or less

amplified fire-alarm systems, consisting as they do of signal boxes placed on poles and in booths along the routes of the policemen; from which boxes signals of all kinds may be transmitted to and from police headquarters. The signal boxes are connected by a suitable wire with headquarters ; and each box has a break-wheel, carrying the number of the box. A telephone outfit is also placed in the box by means of which the policemen may con¬ verse with the main station. In fact the tele¬

phone is used nearly exclusively, the policeman as he arrives at a signal box sending in a signal which intimates to the attendant at headquarters the number of the box at which he has arrived in the course of his beat, whereupon the at¬ tendant communicates with the policeman and takes his number, thus getting a record of his whereabouts. If the officer desires to send in a special signal of any kind, as for an ambulance or wagon, or for assistance, he can do so by a special ar.rangment within the box. In some cities certain citizens are supplied with keys of the signal boxes. Such citizens are authorized to send in signals for police assistance in cases of emergency, and thus the police force is prac¬ tically augmented by a volunteer service. In many cities also the police signal apparatus is kept in a kiosk or sentry-box on the sidewalk curb. On the top of these boxes an electric colored lamp is placed and so connected that it may be lighted from police headquarters to call a policeman to the post for instructions.

Railway Electric Block Signals. — A block system in brief consists of a means of showing manually or automatically certain signals which indicate to the engineer of a train that a cer¬ tain portion or section of the track before him is “clear® or occupied. The road is divided into sections or blocks which are of various lengths depending in a great measure on the topography of the route and the amount of traffic. The length of a block varies from 600 feet to several miles. The signals employed in a “block® are either “safety,® “caution® or “danger,® repre¬ sented by a white light or sign, a green light or sign and a red light or sign, respectively. The sign usually consists of the well-known sema¬ phore arm or blade. In automatic electric sys¬ tems the circuits and apparatus are generally so arranged that the entrance, of a train into a “block® sets the danger signal and that signal is displayed until the train passes out of that block into the next, when the danger signal is lowered and the caution signal is shown. When the train passes into a second block ahead the cau¬ tion signal is lowered and safety is shown. The part assigned to electricity in the operation of these signals consists in actuating electro-mag- nets which are placed in circuits capable of being opened, closed or short-circuited by the car

wheels of a train, which electro-magnets are caused directly or indirectly to operate the signals. In what is known as the Hall Block Signal system the blades are operated against gravity by an electric motor placed in a case at the top or foot of the pole supporting the signals ; suitable battery being provided for the operation of the motor. Thus when a train enters a given block a circuit is. closed which starts the motor which in turning, by a system of cog-wheel gearing, raises the blade to a pre¬ arranged point, at which time the motor cir¬ cuit is automatically opened and the signal is held in position by an electro-magnet until the train moves out of the block, when the blade is released and falls by gravity, means being provided to graduate and safeguard the fall of the blade by means of friction, due to the action of a centrifugal governor. Another electric block system uses a disc enclosed in a drum¬ shaped box on the top of a pole. This disc is operated by an electro-magnet, the latter being attracted by an electric current which is under

control of the engine, the latter operating, as it passes, a heavy circuit closer by the side of the track. There is one of these circuit closers at the beginning and end of a block. The engine thus sets the signal to danger as it comes into a block and sets it at clear as it leaves the block. A device named the Miller Cab signal is different from the foregoing systems. It consists of suitable apparatus and battery for operating certain electric lights in the engine cab. Normally a white light is burning, but when there is another train on the block in which the train enters, the circuits are so oper¬ ated that the white light is cut out of the cir¬ cuit and a red light is lit up in its place. This notifies the engineer of the near proximity of another train. See Block Signal System.

For a more detailed and illustrated account of the foregoing systems, the reader may be re¬ ferred to the author's (American Telegraphy and Encyclopiedia of the Telegraph. >

William Maver, Jr., Author of c American Telegraphy.)

ELECTRIC SMELTING. See Electric Furnaces; Metallurgy.

ELECTRIC STORAGE BATTERY, The. Electrical energy is developed in com¬ mercial quantity at the present day almost exclusively by means of a dynamo-electric machine, driven in turn by a steam engine, gas

engine, water wheel or other prime mover. A plant of either of these kinds is somewhat complicated, so as to require skilled care in its operation ; the electrical energy is available only while the machinery is in actual motion, and at such points as are connected with the gen¬ erating plant by suitable electrical distributing circuits.

A device to supply electrical energy, under isolated conditions, and in such form as to be instantly available over long periods of time is therefore an almost imperative necessity and the device which science has developed for this purpose is known as the electric storage battery.

The storage battery does not, as its name might imply, store energy in the electrical form, but rather in the chemical, and hence it belongs to the general family of electro-chemical apparatus.

Electro-Chemistry of Storage Battery. —

The essential <(working parts® of a battery, broadly speaking, are three in number, namely, active material of the positive and negative plates, respectively, and the electrolytic solu¬ tion, surrounding and electrically connecting the first two.

For the purpose of causing these working parts to function as a battery, there are required a number of subsidiaries, equally necessary, whose duties are mainly mechanical and elec¬ trical in their nature. The active material con¬ sists of a more or less cemented mass of powder, possessed in itself of very little mechanical strength. To retain this material in working condition there are required the ((grids,® which, as the name implies, are in most cases flat metallic plates of very open grid-like structure, with projections or (

Note. — The scale of sizes of the various figures refers in all cases to linear dimensions.

Since the plates of opposite polarity would quickly discharge themselves if allowed to touch, they must be kept apart, and this is invariably accomplished by the insertion of ˆseparators® between them.

As the electrolyte is almost invariably a liquid, rarely a jelly-like substance, there is required a retaining vessel, glass or hard rub¬ ber jar, lead lined tank or steel jar, according as the case may be.

Reference to Figs. 24 and 25 will make clear the general construction ; the plates, alternately positive and negative side by side, with sep¬

arators between, and resting or hanging in a jar which holds the electrolyte. A very neces¬ sary detail of design is that there shall be left sufficient clear space beneath the plates so that the sediment which gradually collects may settle there without contacting with the plates and causing a short circuit.

While attempts have been made to utilize all sorts of materials as ˆworking parts,® the successful combinations have narrowed down, until to-day there are practically only two in commercial operation.

The older and far the most generally used is known as the lead-sulphuric acid type ; the newer as the alkaline , or, more generally, the Edison type. A description of each type sep¬ arately will be followed by a brief analysis of its characteristics.

Equations of the Alkaline Battery. — The

Edison battery is chosen as the representative of the alkaline type because, although other varieties have been developed, and have met with limited success in Europe, yet Mr. Edison has carried the development of the type so much beyond any of the others that to-day his is the only alkaline battery of commercial importance.

The positive active material consists of nickel peroxide ; the negative of spongy, metal¬ lic iron; the electrolyte of caustic potash or caustic soda solution. The chemical affinity of the sponge iron for oxygen constitutes the chief working force of the cell, diagrammat- ically represented in Fig. 1, in which A and B are the positive and negative plates and C the active material, immersed in the electrolyte within the retaining vessel.

The reaction of discharge may be explained thus : KOH readily splits up into the two <(ions® OH and K; the former tending to travel to the negative plate, and there combine to form Fe304 and H20 ; while the K ion tends to travel to the positive plate, and there com¬ bine with part of the oxygen of the Ni02 and with water from the electrolyte, thus forming again KOH, exactly equal to the initial quantity.

The reaction may be represented as follows :

3Fe + 8K0H + 6Ni02 = Fe304 + 8K0H + 2Ni304.

It will be seen that the net result is a trans¬ fer of oxygen from the positive to the negative, accompanied by a concentration of caustic potash at the positive and a dilution at the negative ; the total amount

of caustic in solu¬ tion remaining constant throughout. The re¬ action of discharge is held in check, and the electricity is furnished to the electrodes much as in the lead cell, described more fully on a subsequent page. During the process of charge the reactions are exactly reversed, with metallic

iron as the result at the negative plate and nickel peroxide at the positive.

The reaction on charging, however, does not lake place directly in proportion to the amount of current, with the result that the charge must always considerably exceed the discharge in order to restore the cell to its initial condition. Moreover, the active materials in discharge are never completely converted according to the reactions shown; there always remain large proportions of metallic iron and nickel peroxide, even in a discharged cell.

Description of Edison Cell. — Caustic potash solution has but slight effect upon steel and none upon metallic nickel ; hence nickel plated sheet steel constitutes an ideal material for almost all the structural parts of an alkaline cell, and is used for positive and negative plates, as well as for retainer.

The positive plate, Fig. 2, consists of a number of thin-walled -steel tubes placed side by side and united by a surrounding frame,

— — Pmcr/on or

Fig. 1.

Diagram of Edison Cell.

likewise of sheet steel, nickel plated. Each tube is made up of a spirally wound, and double seamed, strip of thin sheet steel very finely perforated and filled with the active material, nickel peroxide. This material, however, hap¬ pens to be an extremely poor electrical con¬ ductor, and in order to give it the necessary conductivity the material within the tube is interspersed with extremely thin transverse discs of metallic nickel, about 80 of them per inch length of tube. The nickel is prepared in the shape of extremely thin flakes, and a meas¬ ured quantity of these is fed into the tube, alternately with a measured quantity of nickel hydroxide (which is later converted into nickel

peroxide). After each double charge of flake and hydroxide a ramrod enters the tube and

compresses the contents which are thus grad¬ ually built up till the tube becomes full, when it is pinched off and later assembled with others

Fig. 2.

Edison Positive Plate — Vehicle and General Service — 1/3 size.

into a complete plate. The usual diameter of the tubes is about one-fourth inch, though lat¬ terly a smaller size is also used to some extent. In assembling the plates right and left wound tubes are used alternately to eliminate twisting

Fig. 3.

Edison Negative Plate — Vehicle and General Service — 1/3 size.

tendencies, and each tube is strengthened by a number of tight-fitting steel rings at frequent intervals.

The detail with which the manufacture of this plate has been worked out is extremely in¬ teresting, but limitations of space preclude a full description.

The negative plate (Fig. 3) is somewhat similar in design, with the difference that the active material, in this case metallic sponge iron, initially introduced as oxide of iron, is con¬ tained within small rectangular pockets or boxes of perforated sheet steel. The surface of the boxes is corrugated to give strength, but as the iron inside is a good conductor there is not required the mechanical pressure which necessi¬ tates the cylindrical form of the positive tubes. The pockets are about one-eighth inch in thick¬ ness and are locked by pressure into a surround¬ ing frame of sheet steel very similar to that of the positive.

Positive and negative plates are assembled alternately, with small hard rubber insulating strips between ; and the plates of each kind are united by a bolt extending across the whole group, through the holes at the top corner, as shown in Fig. 4. Hard rubber frames around

Fig. 4.

Edison Cell — for Vehicle and General Service. Plates lifted to show method of assembling.

About 1 /5 size.

the edges and bottom of the group insulate it effectively from the steel case which holds the electrolyte and retains the whole cell as a working unit.

The steel case is closed by a cover of the same material, which is welded all around so as to be perfectly air tight. This feature is

necessary in order to exclude the carbonic acid of the atmosphere, which is readily absorbed by caustic solution, and which if allowed thus to enter into an alkaline cell exercises a very detrimental effect upon its operation. A check valve in the cover permits the egress of oxygen and hydrogen liberated during charge, while it

— — i > /Rccr/oH or EM.fT

CHA/zqcp Le*t > Ceu.

\L =

p

1

= J-

S04 2HjO PbS

,v

t > iSCHAeqcc > Leap Cea.

Fig. 5.

Diagram of Lead Cell.

excludes all atmospheric air with its contamina¬ tion of carbonic acid.

The Edison cell of to-day is a very highly developed piece of electro-chemical apparatus, bearing ample witness to the genius of its inventor. The fact of its being built of nickel plated steel throughout

gives it a ruggedness and a finished appearance which can hardly be matched by other types. If operated under favorable conditions it will last for a long time, often upwards of 1,000 cycles of charge and discharge.

It possesses on the other hand certain ap¬ parently inherent properties which very much limit its application, and which absolutely ex¬ clude it from many of the fields to which storage batteries are applied ; under the heading of characteristics these points will be more fully brought out.

Electro-Chemical Equations of the Lead- Sulphuric Acid Battery. — The oldest and most generally used type of storage battery employs as its active materials peroxide of lead for the positive plate, spongy metallic lead for the negative, and for the electrolyte an aqueous solution of sulphuric acid, of about 25 to 40 per cent strength.

A cell of this kind is diagrammatically shown in Fig. 5, in which A and B are the positive and negative plates, respectively, each with a coating or cake, C, of active material, held in contact with it, while both plates are immersed

in the sulphuric acid electrolyte, held in a suitable containing jar.

Between sulphuric acid and metallic sponge lead there exists a strong chemical affinity, which constitutes the basic operating force of the lead cell.

So soon as the internal reactions are per¬ mitted to take place, by the closing of the external circuit, the sulphuric acid, H_2SO_4, be¬ gins to split up, SO_4 going to the negative plate, there combining with the sponge lead to form lead sulphate, PbS_04, and in so doing liberating at the negative plate a quantity of minute nega¬ tive charges carried by the individual SO_4 <(ions® (as these disengaged groups are termed) ; and at the same time the hydrogen, H_2, pro¬ ceeds to the positive plate, there combining with one part of the oxygen of the lead per¬ oxide to form water, and giving up an equiva¬ lent quantity of minute positive charges, carried on the individual H <(ions.® Simultaneously the PbO, which results from this action, unites with another part of H_2SO_4 to form lead sulphate and a second molecule of water.

The reaction may be represented as follows : Pb
+2H2S04+Pb03=PbS04+2H30+PbS04.>

The discharge thus results in the formation of lead sulphate at both plates, the disappear¬ ance of sulphuric acid, and the formation of water at the positive. It may be said, in brief, that these reactions are held in check by the fact of the charge upon the negative plate acting to repel the negatively charged SCh ions ; while the charge upon the positive plate in like manner repels the positively charged H ions. Immediately the respective charges upon the two plates are lessened by closing the ex¬ ternal circuit (i.e., the potential difference be¬ tween them is reduced), the equilibrium between electrical and chemical forces ceases and the ions rush to the respective plates and discharge their minute unit charges, thereby maintaining the potential difference of the cell nearly constant.

But if there be applied to the cell terminals a potential difference slightly greater than that of equilibrium, the chemical forces are over¬ balanced by the electrical, with the result that these various internal movements are reversed, so that the original condition of the <(working parts® is restored, as indicated in Fig. 5.

During charge there are thus restored to the electrolyte the two parts of H2SO4, ab¬ sorbed by the plates in discharge, and simul¬ taneously there are removed the two parts of water given off in discharge ; at all times there iemains a surplus of H2S04 in solution.

It is to be noted that in charge these re¬ actions are quite complete, so that the active materials are entirely converted into metallic lead and peroxide of lead, respectively; but that on discharge they are never in practice carried to the theoretical limit, and a large proportion, usually above 60 per cent; of the metallic lead and lead peroxide remains even after a cell is completely discharged. The fully charged condition, however, is not accomplished with 100 per cent efficiency; the charge (in ampere hours) must exceed the discharge by 10-15 per cent, the loss manifesting itself by the evolution of hydrogen and oxygen.

Brief Historical Sketch of the Lead Bat¬ tery. — The lead storage battery of to-day exists in several distinct types, and as each is the

survivor of many unsuccessful attempts, and as development has been gradual, it is con¬ venient to treat it historically.

About the year 1860 Plante, experimenting with a number of

electrolytic cells, placed a couple of lead plates in a vessel containing weak sulphuric acid, through which, in series with a galvanometer, he passed an electric current. After the current had flowed for some time in one direction, he stopped it, and, bringing the two cell terminals together, was surprised to find from a reverse swing of the galvanometer, still in circuit, that the cell gave back some of the electrical energy that had been applied to it. Repetition of the experiment showed that the cell slowly but steadily gained in capacity for storing energy, while occasional reversals greatly accelerated the gain.

The explanation of the phenomenon as we now understand it is this : Metallic lead, when placed in sulphuric acid, is immediately at¬ tacked, with the formation of a thin skin of lead sulphate, which, being insoluble, protects the metallic lead inside and prevents further action. Electrolysis, however, converts the •sulphate upon the positive to peroxide of lead and permits the sulphuric acid to work a little further into the metal beneath ; and it is thus that the action is cumulative and the amount of lead in a porous or (factive® state con¬ tinually increases. Electrolysis affects the nega¬ tive, however, merely in reducing the lead sul¬ phate to metallic lead, so there is here but little cumulative action, and hence occasional reversal is necessary to build up the thin skin of <(active material® on both plates together.

Months of charge, discharge and reversal were required to build up a layer sufficiently thick to make a battery of useful capacity. Hence other inventors set about to shorten this arduous process, known as ˆformation,® and finally Faure, in France, and Brush, in America, about simultaneously discovered that they could apply to the plates a thick coating of lead oxide, made into a sort of putty-like paste with sulphuric acid, which, by means of a single slow charge, was converted into thoroughly porous active material.

Subsequent improvements on Plante's proc¬ ess have shortened it until now it is about as quick and as cheap as Faure's process, so that at the present time both are successfully em¬ ployed, the Faure very much the more extensively.

Plante and Pasted Types Compared. —

The Plante and <(pasted® types as now used differ very distinctively in their design, though electrically the difference is much less than would be expected. The Plante plate consists of pure lead, upon the surface of which there is <(formed® a thin layer of <(active material® having a thickness of the order of a few hundredths of an

inch. The layer is necessarily thin in order to prevent its peeling off readily; hence a very large surface is required, and this is usually obtained by making the lead plates in the form of a number of parallel transverse leaves, as shown in Figs. 13 and 14.

The surface is increased by this construc¬ tion anywhere up to 8 or 10 times that of a plain sheet of equal superficial area.

The ((pasted® (Faure) type, on the other hand, is characterized by a relatively thick mass of porous active material, retained by an open-

work grid or lattice of lead-antimony alloy, as shown in Figs. 6, 7 and 8.

Both types of plate can be used as either positive or negative, but certain characteristics make the one or the other better suited to particular classes of service, as will appear hereafter.

Negative Plates. — Exide Negative. — The negative plate of a lead storage battery, at least theoretically, is quite a simple matter ; the sponge lead which constitutes the active ma¬ terial has considerable mechanical tenacity and is therefore relatively easy to hold in place upon the skeleton frames or ((grids,>) to which it is applied. There is no destructive action upon the lead-antimony alloy of which these grids are made, and they may therefore be as light as methods of manufacture will permit. Fig. 6 shows a negative grid of the type which is now standard in the United States, and which is still best known under its original name of the <(Exide.)) Fig. 7 shows a cross-section of the same grid, and shows how the active ma¬ terial occupying the interior spaces is locked

Fig. 6.

Exide Negative Grid.

About 1/5 size.

in place so as to be both retained and protected, while Fig. 8 shows the finished plate, the active material filling all the interior spaces. This type of plate is used in sizes from about three square inches surface up to 700, in thickness

Fig. 7.

Cross Section — Exide Grid.

from three-thirty-seconds to one-fourth inch, and for every variety of purpose for which lead batteries are employed.

Box Negative. — For some purposes, how¬ ever, it is desirable to have a plate which will give the maximum possible life, consequent in¬ creased weight being a secondary consideration. To meet this requirement the ˆbox® negative

shown in Fig. 9 is used. This plate may be considered as a development of the exide type, inasmuch as the active material is held within

Fig. 8.

Exide Negative Plate — ■

Vehicle and General Service.

Approx. 1/5 size.

two protecting surfaces, which, in the case of the box plate, consist of finely perforated lead sheets, while in the exide type they consist of parallel bars with relatively large openings between.

The box plates are used almost entirely where long life is the main consideration, but the greater weight of grid, with consequent greater cost, has caused them for most purposes to be superseded by the Exide type.

The grids of the Exide type are castings of antimony-lead alloy, made as light as possible consistent with necessary mechanical and elec¬ trical conductivity. The box grids are com¬ posite, consisting of perforated lead sheets, upon which are cast intersecting ribs, or bars, of antimony-lead alloy, which gave the necessary strength ; and each plate consists of two parts riveted together, with the active material en¬ closed between them.

Fig. 9.

Box Negative Plate — General Stationary Service — 1-10 size.

While any oxide of lead may be used for the active material of negative plates, a long process of elimination has finally resulted in

the universal adoption of litharge PbO, for this purpose, applied as a putty-like mass, made by mixing the litharge with dilute sulphuric acid. An initial charge, or ((formation,® converts the litharge into metallic sponge lead, giving the plate a characteristic light slate color.

Plante Negative. — There are still a few Plante negatives used, in America only, such a one being shown in Fig. 10, but their weight and cost are against them, and they are to-day almost a thing of the past.

Positive Plates. — The positive plate offers a more complicated problem, chiefly because lead peroxide, under the conditions which exist in a storage battery, does not possess much sustained mechanical strength, but gradually becomes soft, and in time is loosened from the plate, falls to the bottom of the cell and thence¬ forward plays no useful part in the life of the battery.

To maintain the capacity over an extended period of charges and discharges three distinct methods are employed.

Fig. 10.

Plante Negative Plate for Train Lighting — 1/6 size.

Pasted Positive. — In the pasted type of plate, when new, only a part of the lead peroxide is available for entering into the chemical re¬ actions of the cell, as the acid penetrates only partially into the interior of the mass. As the surface wears away the action penetrates far¬ ther in, and thus the inner part of the mass acts as a reserve and maintains the capacity for a number of cycles, roughly stated at 300 to 500. By making the plate very thin, say of the order of one-eighth inch, the reserve of active material is cut down to a minimum, hence giving a plate of maximum capacity per unit of weight, but of relatively shorter life.

Positive plates of the pasted type are uni¬ versally employed where lightness, or maximum capacity for given weight, is the primary con¬ sideration, and the correct balance between thick, heavy plates of long life and thin, light ones of shorter life, to meet special conditions, is a continual problem to the designer. The general trend of modern practice, however, is toward much thinner plates than were thought practicable a few years ago, a thickness of three-thirty-seconds inch being quite common.

The Exide type of pasted plate, Fig. 11, which has become standard in the United States, and largely so in Europe, is very similar to the negative plate, except as to its active material. The grid, Fig. 12, is, however, more substantial

in its design than the negative, in order to withstand the greater corrosion and mechanical stresses to which it is subject. While various oxides, or mixtures of such, are used by differ-

S. B, CO. 2S?

Fig. 11.

Exide Positive Plate — Vehicle and General Service.

Approx. 1/5 size.

ent manufacturers as positive active material, the usual material is red lead, Pb304, mixed to a putty-like mass with weak sulphuric acid, or ammonium sulphate solution. The initial charge, or formation, converts this into lead peroxide, a material which when dry has about the consistency of plaster of Paris and a very characteristic dark chocolate brown color.

Plante Positive. — The Plante plate is also subject to the continual, slow washing away of its lead peroxide, but the original layer is more durable than the peroxide made from red lead, so it lasts a considerable time in spite of its

Fig. 12.

Exide Positive Grid.

About 1/5 size.

thinness. Moreover, all the while that the original layer is disintegrating and falling away, the electrolytic action is penetrating farther into the metallic lead of the plate and forming

fresh active material, in the manner of the Plante formation, and thus there is a balance between loss and gain, and the capacity of the plate is maintained for a long period, say about

B

» g Section at AA

Fig. 13.

Cross-Section Tudor Positive Plate. Not to scale.

two or three times as long as in the case of the pasted plates. For effecting this extended life, however, there is required a large reserve of pure lead ; so that in actual practice the Plante plates weigh from two to three times as much as pasted plates of equal capacity.

Figs. 13 and 14 show a Plante type of plate known in this country as the ˆTudor,® used largely in Europe, and consisting of an integral one-piece casting; while Fig. 10, though actually a negative, may be used as illustrating the Gould type, made from rolled sheet lead, by a spinning process.

In this country and in England a modified Plante plate, known as the ((Manchester,)) has largely superseded all of the above, chiefly on account of its superior mechanical construction. The Plante plate is made of pure lead, because this metal is attacked by the electrolytic action at about the right rate to replace the loss of lead peroxide ; but pure lead is very soft, hence these plates are much subject to buckling and breaking. The Manchester plate (Fig. 15) differs in that a rigid grid, or frame, of anti-

Fig. 14.

Tudor Positive Plate for Train Lighting. 1/5 size.

mony-lead alloy furnishes mechanical strength, while small, pure lead, spirally wound (

performs the electro-chemical function of the plate.

The combined mechanical and electrical en¬ durance of This type of plate has given it a very broad field of application; its weight, roughly triple the pasted type, and its consequent cost constitute its chief limitations.

E.S.B.CO ZS*

Fig. 15.

Manchester Positive Plate —

General Stationary Service.

‘ I.J 1/10 size.

Ironclad Type. — During the past five years a third type of positive plate has come into prominence in this country, founded on the principle first successfully developed by Phili- part, in France, about the year 1898. This

Fig. 16.

[Manchester Button. About 1/2 size.

plate, known as the ˆIronclad,® is shown in Fig. 18, and differs from those heretofore dis¬ cussed in that a porous exterior envelope retains the active material in place, so that the large reserve necessary with other types is here unnecessary.

Fig. 17.

Section of Manchester Plate. Approx. 2/3 size.

The plate consists of a number of cylindrical pencils, one of which is shown in section in Fig. 19; a central-lead antimony core fur¬ nishes support and conductivity for the sur¬ rounding mass of active material, itself again enveloped by the perforated hard rubber tubes (Fig. 18). The perforations in the tube consist

of minute saw cuts of the order of one one- hundredth inch wide; and so effective are these tubes as <(relainers® that the plates which em¬ ploy them have a life approximating 1,000

Fig. 18.

Ironclad Positive Plate — Vehicle and General Service.

Approx. 1/5 size.

cycles of charge and discharge, being two to three times that of the flat plates, Fig. 11, in which the active material is left exposed.

The life of the Ironclad plate is thus about the same as that of a Tudor or Manchester plate, while its capacity-weight ratio is about on a par

with the pasted types.

With the Ironclad plate loosening and wash¬ ing out of the active material is reduced to a

Fig. 19.

Vertical Section Ironclad Tube Approx. 1/2 size.

minimum, and, contrary to what might be ex¬ pected, the protective rubber tube offers but very slightly increased resistance to the passage of the electric current.

This type of plate, in conjunction with an exide negative of suitable thickness, is fast becoming standard in this country in all portable service where durability is a prime factor.

Separators. — Thus far we have limited our¬ selves to the question of the plates of the lead battery; but though they undoubtedly constitute the greater problem of storage battery design, yet the manner in which they are assembled is almost as important as the design of the plates themselves; and next in order of importance

come the ˆseparators.® Considerations of space, weight and electrical resistance all demand that adjacent positive and negative plates be main¬ tained as close together as possible, yet without touching anywhere. To fulfil these require¬ ments spacers or separators of some sort are inserted between them. Here again countless schemes have been tested out, but to-day prac¬ tically only two types have survived, and these often used in conjunction.

The older of the two is the perforated rub¬ ber separator, shown in Fig. 20, as a flat sheet of perforated hard rubber, and often, when used alone, provided with a series of parallel ridges on one side, to afford sufficient acid

Fig. 20.

Flat Perforated Rubber Separator Approx. 1/5 size.

space between plates. When so used, however, even though the holes be small, <(trees® of lead are very apt to develop on the negative plates, which in time find their way through to the positives and cause short-circuits.

The perforated rubber separator used by itself is therefore not

satisfactory and has been almost entirely replaced by the wood separator, examples of which are shown in Figs. 21 and 22.

Fig. 21.

Grooved Wood Separator — Vehicle and General Service. 1/5 size.

In the one case the separator is a veneer about one-sixteenth inch thick, with split wood dowels slipped over it to give the necessary space between plates ; in the other it is made of a

thicker piece, grooved, and in either instance treated by a special chemical process. The dis¬ tinctive feature of the wood separator is that it is not perforated, with the result that short- circuits are practically eliminated, while its electrical resistance is nevertheless almost neg¬ ligible.

Fig. 22.

Flat Wood Separator General Stationary Service. 1/10 size.

In many cases the grooved separator and plain perforated rubber are used together, the flat of the wood against the negative plate, this making an excellent combination, used in most of the vehicle propulsion and many other port¬ able batteries.

The flat veneer with split dowels is used chiefly in large stationary batteries, where the grooving would constitute too great a wastage of wood.

Containers. — The vessels which contain the complete element — plates, separators and acid — are of three different kinds: hard-rubber jars, where lightness and ruggedness are required, that is, for all kinds of portable service; glass jars for stationary service in the smaller sizes; lead-lined wooden tanks for the larger station¬ ary installations.

Electrolyte. — The electrolyte in lead bat¬ teries is dilute sulphuric acid of the highest available purity and of strength varying ac-

Fig. 23.

Assembled Plate Groups for Auto Starting Battery of Fig. 26. 1/6 size.

cording to conditions. Where space and weight are of utmost importance, stronger acid, about 1.280 specific gravity, is employed, but where these items are non-essential a greater bulk of weaker acid, say 1,200 specific gravity, answers better, in that it causes less loss from local action, especially on the negative plates. vol. 10 — 9

General Assembly. — So much variety ex¬ ists in the details of assembly employed by dif¬ ferent manufacturers and for different purposes

Fig. 24.

Ironclad Exide Cell for Vehicle and General Service. About 1/5 size.

that it will be possible to mention only a few of the controlling factors and to give a few illustrations of complete cells (Figs. 24, 25 and 28).

In all present-day designs, positive and nega¬ tive plates are placed alternately side by side, all of like polarity being firmly united into ˆgroups® by means of <(lugs® which project from the upper corners. Fig. 23 shows a posi-

Fig. 25.

Manchester-Box Stationary Cell. 1/10 size.

tive and a negative group as used in the small auto starting battery of Fig. 26; and these illus¬ trations also show the general manner in which

the plates are united, by a lead welding process, to the connecting straps which form the termi¬ nals of the cell.

The corrosive action of the acid electrolyte makes this lead welding necessary, and in most instances it is applied, not only in fastening the plates to the cell terminals, but also in fasten¬ ing adjacent cell terminals together, so that

Fig. 26.

Three-cell Auto Starting Battery. Approx. 1/6 size.

there is a solid metallic contact from cell to cell throughout the whole

battery.

Between the plates, and thus keeping them apart, lie the separators ; the whole element so proportioned as to fill the container, tightly in portable batteries, somewhat loosely in station¬ ary ones.

The plates are usually either supported upon ridges projecting upward from the bottom of the jar (Fig. 24) or are suspended from the top of the jar (Fig. 25) or from the lid or in some equivalent manner.

Tight covers for the containers have to be provided only for portable service ; stationary cells are generally left open for ready inspection and access.

General Principles of Complete Battery Assembly. — Till now we have dealt with only the single cell, which forms the electrical unit of which a battery is built up. This unit has a current output dependent upon the number and size of plates which it contains, while its electro-motive force has a fixed value, roughly two volts, virtually independent of its size. Hence the current requirements of a given bat¬ tery determine the size of cells to be employed, and the voltage requirements the number of

Fig. 27.

Inter-cell Connector — Auto Starting Service. Approx. 1/4 size.

cells to be used in series. As the field of the storage battery is very broad, so the design varies greatly, including almost every con¬ ceivable combination from the small three-cell battery for auto starting (Fig. 26) to the large central station battery of 150 cells, as shown in Fig. 30.

Inter-Cell Connectors. — For connecting the individual cells together electrically various forms of ˆconnectors® and ((bus bars® are in use, usually made of lead or lead-antimony alloy, occasionally of copper, protected by a coating

of electro deposited lead. In Fig. 27 is shown a. connector as used, not only for auto starting batteries, but for most other portable and semi-

Fig. 28.

Large Stationary Cell. Stand-by Service. Contains 45 plates as in Fig. 29. Approx. 1/20 size.

portable types. Composed of lead, or alloy, it is made to fit over the tapered terminal posts (Fig. 23), to which it is permanently secured by means of a hydrogen flame, or its equivalent, which melts the lead of both post and connector till they flow together and become united In Fig. 25 there are no connectors proper, the pure lead straps to which the plates are attached having prolongations adapted to be bolted together from cell to cell.

£.S.B.CO.S73,

Fig. 29.

Large Exide Plate for Stand-by Service. Each plate 150 amp.

1 hour. 1/15 size.

In the large stationary batteries the plates of adjacent cells are as nearly as possible welded directly together, each plate (Fig. 29)

having a projecting «lug» which reaches part way over the edge of the cell where all are united to a substantial lead bus bar, as in Fig. 30 and at <(D® in Fig. 28. The bus bar ((C® in this figure is one of the battery terminals, and the lead is reinforced by a large tapered plate of copper, to which is bolted the copper bar that connects the battery to the switchboard.

In Fig. 30 are shown a number of these terminals with the large coppers leading off. In this instance the battery is so arranged that the number of cells in circuit may be varied

Fig. 30.

Large Stand-by Battery, 150 Cells, 167 Plates (Fig. 29) each.

Capacity 12,400 amp. for one hour. Each cell stands about four feet high.

by means of a motor operated <(end cell switch,® so as to vary the voltage at will, or more usually to maintain the voltage constant by throwing in additional cells as the E M F of each falls off during the progress of discharge.

Insulation. — In the small portable batteries, such as the auto starting

type, insulation of the individual cells is easily accomplished by the rubber jars themselves, which accordingly are placed side by side in a box of suitable size. When, however, a number of such cells, say 40 or more, are connected in series, as in Fig. 36, it is found necessary to divide the series amongst a number of boxes, or ((trays,® each one preferably containing not more than 8 or 10 cells.

In small stationary batteries a flat glass tray under each cell is often used, as shown in Fig. 25, a little sand being placed in the bottom to give an even seat for the glass jar. Larger stationary cells are usually provided with double insulation of some kind ; thus in Fig. 28 the tank rests upon a glass-oil insulator, (

Characteristics of the Storage Battery. —

The primary useful quantities furnished by a storage battery are electromotive force , or P.D. (measured in volts), and current (meas¬ ured in amperes) ; since the time during which a given current may be maintained is frequently of controlling importance there arises a third quantity called the capacity, the product of the current and the time which the battery can fur¬ nish it. Frequently the relation of these three primary attributes to the weight of the battery is a vital factor; while the effects of internal resistance and temperature are scarcely less

important. The characteristics of a battery therefore consist of the relations of these quan¬ tities one with another. In the following dis¬ cussion the unit considered is in every case a single cell.

In speaking of the discharge of a battery, the term discharge rate is very frequently used, commonly expressed in terms of the time dur¬ ing which the discharge can be maintained ; the four-hour rate for instance being that rate which the battery can hold for four hours. The so-called ((normal rate,® originallv that for which the battery was intended, is actually of but little significance, since the modern battery may be discharged at almost any rate without injury.

The capacity is limited by the fall of voltage to a point where usefulness ceases, this point being again arbitrary, but through large experi¬ ence fairly well defined as about 1.60-1.80 for the lead cell, about 0.6-1. 0 for the Edison type.

Many variations exist in the design of mod¬ ern storage batteries, and each design possesses its own characteristics ; the curves which fol¬ low are chosen as fairly representative, but of course cannot pretend

to fit all cases.

Characteristics of the Edison Cell. — Capacity — Temperature. — The capacity of a given Edison cell is very nearly a constant quantity independent of the rate of discharge, amounting under ordinary conditions to about 11.5 ampere hours per pound. The capacity is, however, very markedly dependent upon tem¬ perature, to an extent which varies with the discharge rate. This variation with tempera¬ ture is so great that there results a critical point, below which the Edison cell becomes practically inoperative ; and since this point is from 30-50° F., depending on conditions, it constitutes one of the chief limitations to the usefulness of this form of battery. If given a chance to discharge rapidly, when slightly below the critical temperature, the battery will grad¬ ually warm itself ; but for immediate action at low temperatures it is unworkable.

Voltage — <(P.D.® — Fig. 31 shows a typical voltage curve of an Edison cell during its ((normal® or five-hour rate of discharge, and during the corresponding charge. At lower rates of discharge the voltage is higher, while at higher rates it becomes lower. Fig. 32 sum¬ marizes a number of discharge curves by giving the initial, the mean and the final voltage at rates up to six times the normal. It is notice¬ able that the voltage falls off very rapidly with increasing discharge rates and that the maxi¬ mum current obtainable is only about 14 times the normal, while the maximum watt output is reached at about seven times the normal rate.

It is of interest to notice that the mean volt¬ age of the Edison cell is about 60 per cent that of the lead type and that the percentage drop during discharge is about triple with the Edison. It is thus necessary to employ at least 65 per cent more cells of Edison type for a given discharge voltage ; and still more than this if the discharge rate be high.

Efficiency. — Comparing the mean values of the two curves of Fig. 31 we arrive at the value — 72 per cent — as the mean volt effi¬ ciency ; the corresponding ampere hour efficiency is approximately 88. per cent, while the watt hour, or energy efficiency, the product of these two, is 63 per cent.

In actual practice, the charging is frequently done from a fixed source

of voltage equal to or slightly exceeding the maximum, 1.75 in the present case ; hence under these conditions, the Commercial® voltage efficiency is but 68 per

cent. . .

Also, in practice the charge required is greater than that shown in Fig. 30, so that

show that at ordinary temperatures and mod¬ erate discharge rates the Edison battery may give excellent service At high rates, or low temperatures, however, its performance is so limited that it is now seldom used where such conditions prevail. It is these conditions which have excluded it entirely from the field of auto self-starting; while on the other hand, in other

Houes

TYPICAL CHAPqC \ DISCHARGE COPVPS OP P&SO/V CPLL -/ V0PMAL PATP

Fig. 31

actually the ampere efficiency is about 80 per cent. The commercial watt hour efficiency of the Edison battery, where worked to its full capacity and charged from a source of constant voltage, is thus found in actual practice to average hardly above 55 per cent. Where charged from a source of variable voltage, and where worked to partial capacity only, the effi-

service, as for instance, train lighting and mine lamps, it has proved very satisfactory.

Characteristics of the Lead Cell.— – Capacity. — The capacity of a given lead cell is mainly dependent upon two variable factors :

(1) the rate at which it is discharged, and

(2) its temperature.

1. The effect of varied discharge rates is

Ampeees //V Multiples op Nopmal P/scHAeqE Pates

/OLTACELLS Fig. 32

ciency may be much higher, depending on actual conditions.

Capacity and Weight. — The energy capacity of the Edison cell at normal rate and tempera¬ ture is about 14 watt hours per pound. With higher rates, or lower temperatures, this value falls very markedly.

Summary. — The characteristics noted above

shown by the curved line in Fig. 33, from which it will be seen that the capacity varies inversely wdth the rate, though not in direct ratio. While the abscissae of this figure show the discharge rate in terms of the normal, vertical lines at intervals give the rate in terms of the duration of discharge.

The shape of this curve is very characteris-

tic of all lead batteries, though differences in design modify it appreciably. Thinner plates tend to give a flatter curve, thicker ones a more sloping one.

A very important corollary of the variation of capacity with rate exists in the fact that a lead cell which has been completely dis¬ charged at a high rate, if allowed to stand for some hours, will largely recover, so as to give a considerable further discharge. In the case of a continuous discharge of diminishing rate, the ultimate capacity approaches that which would have obtained had the final rate been maintained throughout. In the operation of an electric vehicle the rates on starting, up grades, etc., exceed the normal rate by five to one or more ; yet owing to the periods of rest, or low rate, the capacity attainable is practically identical with that of a continuous normal rate discharge. The normal rate for batteries of this kind is usually that corre-

proaches a slanting straight line. Referring again to Fig. 33, the three upper lines, with the scale of ordinates at the right hand side, summarize the effect upon voltage of various discharge rates up to 10 times the normal. It is of interest to note that at 10 times normal the mean voltage has lost but 20 per cent ; that the maximum watt output occurs at about 25 times normal; and that short circuit gives about 50 times normal discharge current. Com¬ parison between these curves and the corre¬ sponding ones for the Edison battery, Fig. 32, is very significant. The Edison battery is inferior (a) in that it has a much greater per¬ centage drop in voltage during discharge at any given

rate, and (b) in that the lead battery can discharge at about three times as high a rate as the Edison.

2. Acid Change (<(Gravity)}). — It has been pointed out in discussing electric-chemical equations, that the amount of free sulphuric

l/oLTAtfE AfJt> Capac/tY C/iAPAcrceur/cs' or Uap Cru

Fig. 33.

sponding to a continuous discharge of four or five hours.

2. Temperature at time of discharge exer¬ cises a direct influence upon capacity to the extent of about 6ˆ4 per cent per 10 degrees F. It thus comes about that at 0° the lead battery has about 54 per cent normal capacity, and that it is perfectly workable at temperatures much lower even than this, especially where the discharge rate is lower than normal.

Discharge Phenomena. — 1. Voltage {or PD). — Of equal importance with the capacity of a battery is its voltage characteristic, a typical curve of which is shown in Fig. 34. Starting off at approximately two volts, there is a gradual falling off, till the end approaches, when the voltage rapidly drops below a use¬ ful value. The curve shown is for the normal rate, but is fairly indicative of the general behavior of a lead cell on discharge. With higher rates, however, the curve is lower throughout its length, and more nearly ap-

acid varies as discharge proceeds, and the third curve of Fig. 34 shows for a particular case what this change amounts to. Barring the fact of a lag at the start, the change of acid, measured by hydrometer, varies directly with the ampere hours drawn from the cell ; but the amount of change depends so entirely upon the relative volume of acid contained in a given cell, that the numerical values of this curve in Fig. 34 have no general significance.

3. Temperature Change. — The lead cell to a slight extent is a thermo-electric accumu¬ lator, inasmuch as a slight disappearance of heat accompanies the discharge. This phe¬ nomena is graphically shown in the lower curve of Fig. 34, where it is seen that the tempera¬ ture dropped 9° F. during discharge. At higher rates, the heat generated by internal electric friction overbalances that absorbed, and at the one hour rate the temperature rises about to the same amount as it dropped at normal rate. The absorption of heat on dis-

charge, while of much theoretic interest, is of little practical value.

Internal Resistance. — One of the most valuable attributes of the lead battery is its high conductivity, which enables it to yield up its stored energy at extremely high rates. It is impossible to state the resistance definitely owing to variation of design ; but by way of illustration it may be said that a cell of the type from which Fig. 34 was taken, having a normal rate of 35 amperes, has an internal re¬ sistance of about .0014 ohms at beginning, and .0028 ohms at end of discharge. Since it is mainly through its influence upon voltage that internal resistance is of interest, the data fur¬ nished by the curves of Fig. 33 give the prac¬ tical information required better than an at¬ tempted formula for calculating resistance.

Efficiency. — During charge, the P. D. of a lead cell starting at about two volts rises gradu-

ditions, the volt efficiency is about 75 per cent, the watt hour efficiency about 65 per cent. These conditions are the most prevalent, except when a battery is charged directly from a generator, whose voltage is made to vary ac¬ cording to the charging curve.

Capacity Weight Ratios. — The capacity per unit weight of lead storage batteries varies all the way between 1.4 ampere hour per pound of cell in the heavier stationary types, such as Fig. 25, to about 5.5 in the lightest thin plate types for portable service, Fig. 26. These figures, as a basis of comparison, refer in all cases to a discharge rate approximating the five-hour. To find the corresponding values for other rates, reference should be had to the capacity curve of Fig. 33, bearing in mind that 100 per cent in this figure corresponds to an actual capacity of 4.6 ampere hours per pound.

Since the mean discharge voltage under

PI

I -t

P

:i-

ff-

i dir

!:*!■

rrr-

LLLJ. I L”]

- — 1

rm

34

,iU

iff

3

3l

I .: j

Sr.:

■nr:

ff* –

•mil

irtˆ

tSI

ffffi

TI

,-:ripr ±:ir

T-.T jr-j- ffltffT

L

r’

fff:;

r.,:

t : :

ffl

fee

T

id

• r

:-;gf |pf|5= —

ffiff — H~ p-g I

jh!;;!: ill

h*.

ff:

ff

iai

Tiff

Si

ikf

ffHl

Hrr

•ff

rrrr

!rl”

fflff

P

r-f

led

::

iff:

■~rr

tttl rrtr

rtr- fr

• | . f. !* — H

l-ff

rrilifF.

... — . *.

■pff

■X*

TT

— *■.

x . ..

.

jrtr

TT

jffr

TT

■ff –

T7

J- —

ffff a-

1 ■ 1 ■ r H 1 1 1 1 1

I : .

-fff |

1 1 [;

Ti j’tl

77 K.

j Ti

l ± ~

li

iiffiLff

iiff

i -■

TI

7J!t

M 4

~ : h

\t 7.”!

iff

■ 7

ffv

3- J

T7

ff j

TT

TT

T?

ffff*

TT

ffj

. : —4

vi ZQ >

^ ZA

V

kj

^ ZZ

20

%

1.3

1.7

• 1 ; :

. ■ : .

• i ! : t

i **-]•

Lh.

i!*’

FT

-Of

-;r

i~ i

LdE

n

TT

rff-

ff t

cT:

-1

}-rr?:

‘ – – ■ -r :* — 3T4

iXlLL

hT*

i

rT

gir

{Jw

.•u-.

IF

% ff

i

ff

M

FFr

:::

M

m

iH ±

firtT

ff >

•

;q:.

•ijd

jfff

•riFl

Ti Jiff

if

ill;

’TT

f

fflff

!irj Sri

:ifj

p

I

Tjrr-

f

fT

rb

Hr i

ff

?rj

:

T;

P

Tffhil

rlffif ;:f ff

1 ; ;

Jnj

1

i

iff.

iS

ff

§

j

55

JeS

^r. Iff

iff

p

•- rH

if

g

• 1

f

41-

jM.

ilfl

1

ff

ff.

m

ff

r = r

nr:

1

1

: : :

ff

1

ff

1

TT

5T

ffn

ff

ff

|

1

ZA

P

j

Jiff

• ■

H

IS®

-

1

is

it

•

; + itr Mr

1

“tH

%

4

nr.

I

ff ff

if

I

I

I

i

!

i

I

I

i

ff

ll

P

M

V

8

|

i

ff

it

TA

:In:

p

1

§

ffit.

fftl

%

ff

s

Bill Si!

1

TT

1

pfs

ili

Kp

I

i.r.

ff

ff-

§i

tt

JFr

1

IT

Si

r7

1

.ffir|||ff tnj

ffffn

—

tt

I

F FrT

- j i

vU

Trrt Till

ff ff

J— > 1,

tig

su:

tic

3 j i * .

jg

1:1

ff

ff

ffi il

tTB-

I: ff

i f i-»

ffti

J TI ; ; *. r ff::. il:-

IZ80

§ IZ40 \

ˆ (ZOO

& 1160

ˆ 1120

1

ilH:

e i rr_

ff

H;

&

iff

jfil

ijjjj

St

ff.

w

tI

ff

ffff

I: FT’

^*ff: 3ffrt‘-;I ff:: ff::

Fr

Iff

[iff ffu

ip

ff

jS

Ji::

BE

ff 3

ss

m

fetr

-T

a: : :

.

P

jffTui

|

|

1

p

ijl

gig

1

ff

M

1 1

m

7

tt *r

ff:

1

1

Ttff

:r..

Ig

“l

• ; ; r

§1 if-

iff

ac

FIT

J ff

$

a

||

ui

7.

S3

k

1

ft

“I

if

irff

ipjpP

fill 16

: ■ ‘ ;

I ”

jiff

■ -ff -1

t, ft?

ff

TFtJ vlt

- a ff

1 j.

Sj

Ini-

iff

r ;/

T}-

;

-■j!.’

r-ff

ff

ff

: : : :

Hi

.

Iff ffiffffjp

ff ff

Sg

- ff£ %

if

NT*

-iff

:;:r

ff

-Iff

^ff

ijtr

TI

. 41 ffff (4I*

n

34

1

■at 3

tail

Lit

k

tt]

m

m

ffii

rji

{Jljj

ff

ff

M

1

I

P

i

I

irff

:

ˆiffjjffF P

ff ffpff|S

tUf

m

k

- f FT;

ff

T;

tjj*-

U: r

Hr,

ff

rtrl;

Thff

Htr

i , – r

IT

TT

ftilftif

ffJfFTffg

II: TTiniffT

; ff :

! ** v::’:

rvrt u rff

l;{^~

iff

Iff

ff

ffSa

r:::

i

|I

;F

I3J tt

M

ff

tU

•i i

iff iff

ff

-r

n

rii;

ff

ff

1

7X17

ffVC

‘II

ii

11 T till

iff

fff|ggS|ggg

ffq. d

u. 14 j

T4 1 1

Hr -‘.I

‘.4

444

OTIilXIU LLXU

iux

*4 F-

5715

Hu.

. .1

flff-l’ff Ifli

1 : ; H ff ‘ ■ i ” . H I; * ~ — 1

SE

q + f TTF

fff ffj

^ rj: . 3

ifft

ff

n –

TTlT.

74

■ ,2

TI

T Tfr -rnr IHt

Is

iT

mi

rjff -Iff

Cff .

U!:

fiH

ijr;

J] a

ff

M

iff:.

I:’.

u SO

1 70

1

I

n

i

rfc

ff

ill

Fit ˆ3″

ff

u

M

m

M

E j

—

fi

f

tiff

M

iiir

IE|

gpl

ImH

p

ff.ff

§1

Si

If s

Iff

rrrr

fPf

1U! il-

•A

TV

4

M

1

(

1

;A

3

S

II

i

ff

7—

ini

i

ppff

iiiil

|

|

M

usiSii

ffxr F

MT

11

ib

r*-

1

m

-

ff

p

1

T

P

1

1

ff

i

8

ff:!

1

TT

ff

ff

ff

45ff

i

ih;

rrf:

li”

Ife

fe

TT

■;-l

mil

pn ±T tpt :fft ˆ

ff

,

p

I

m

:[|i?

ff

4k gt

ilj

ff

ff

ff

ff

1

ff

ff

ff

1

M

ff

lff

rr~

•

if +1 f

ljffr ifeP pfe ^

n

fg

H

ESt

rrftff;

in

jj.

a

II

I

i

1

I

ff

M

8

M

1

j

Is

1

l Z 3 4 5

Hours

Typical Cweqe’% Oischaege Coeves or leap cell -Noehal /Pate

Fig.

ally and finally becomes constant at a rather indefinite value, from 2.5 to 2.6 volts, follow.- ing the general trend of the upper curve of Fig. 34. The mean height of this curve is 2.3 volts; that of the discharge curve 1.95 volts. Hence the volt efficiencv is 85 per cent.

In commercial operation, it is found neces¬ sary that the charge exceed the discharge by about 15 per cent, so that the ampere hour efficiency is about 87 per cent, the watt hour efficiency about 75 per cent. When worked to less than 100 per cent capacity, both voltage and current efficiency are higher; so that in such cases it may reach or even exceed 90 per cent, as in regulating service, where charge and dis¬ charge succeed each other rapidly and for a few minutes duration only.

Where a battery is charged from a fixed voltage, on the other hand, this voltage must at least equal that at the end of the charge ; hence where worked to full capacity under these con-

these conditions is approximately 1.95 it fol¬ lows that the energy capacity of a conserva¬ tively designed battery for portable service (as in Fig. 24) is about 9 watt hours per pound ; for the lightest types in commercial use (Fig. 26) about 11.

It is a prevalent and quite natural idea that because the ordinary storage battery is made of lead, it is therefore unduly heavy. But when it is stated that each pound weight of battery can store up 24,000 foot-pounds, it may be readily appreciated that the electric storage battery of to-day is by far the most effective piece of mechanism known for storing energy. Put in slightly different form, it may be stated that the modern battery of conservative and substantial design, as in Fig. 24, can give out, in the space of five-hours, electrical energy sufficient to lift itself approximately five miles high.

Care and Operation. — To give a complete treatise on battery operation, covering the whole

varied field to which batteries are applied, would be beyond the scope of this article; but a few fundamental principles which are applicable to all cases may be briefly stated.

1. Care of Electrolyte. — Evaporation of the water of the electrolyte is constantly taking place, especially while the cell is gassing freely at the end of charge; this must be made up by periodic additions of water. Since the amount of water thus added during the life of a bat¬ tery is many times the original amount con¬ tained, any impurities in the water accumulate quite rapidly. Hence it is very important to use only pure water for this purpose, and among the impurities commonly present chlorine and iron in any form are especially to be avoided. Addition of acid should be avoided.

2. Regulation of Charge. — If a battery be habitually charged too little, the active material becomes gradually more and more converted into lead sulphate, until in time it ceases to function. Very long continued charge is then necessary to restore it to a working

condition. If on the other hand it be charged too much, the gas bubbles liberated from the plates give rise to a softening and eroding action upon the positive material, which detaches it from the plates, and in time leaves the grids bare, and no longer workable. Experience has demonstrated that best results are obtained when each charge exceeds in ampere hours the previous discharge by about 15 per cent.

Several methods are in use for determining the correct amount of charge, as follows: (a) The (

When three successive readings covering a period of about an hour show no change in gravity, it means that chemical action between plates and electrolyte has ceased, and hence that the charge is complete, and should be stopped.

This method of determining charge is far the most reliable, and should be used wherever possible; and in any case should be used from time to time, to check up and make certain that charging is being done correctly. A single cell is usually selected as a ˆpilot® for taking read¬ ings with this method.

While the life of a battery may be much in¬ creased by careful regulation of the charge, according to the above principles, yet many hundreds of thousands of batteries are in suc¬ cessful operation, where the only care observed in charging is to arrange that it is ample, re¬ gardless of other considerations.

The strength of electrolyte used in. storage batteries is not standardized, but varies with different makes and designs, and even with the individual cells of a given battery. In general where weight is a prime factor, higher, gravity, usually about 1.280 specific gravity, is used; where weight and bulk are not important lower gravity, 1.200 or even 1.180, are preferably em¬

ployed. In the former case the voiume of acid is small, and the drop of acid during discharge is correspondingly large, so that in discharged condition it may be 1,150; in the case of a stationary cell, where there is no close limit to bulk, the acid which reads perhaps 1,200 on charge will drop during discharge to about the same point as the other, namely, 1,150-1,170. It is thus impossible to give any generally ap¬ plicable values for the specific gravity of the electrolyte, but the theory of charging till a maximum is reached holds universally true.

The specific gravity of sulphuric acid of the concentration used in batteries varies with temperature, a rise of 10° F. causing a drop of

.003 specific gravity; and as a matter of refer¬ ence it is usual to correct all readings to 70° F.

Applications of the Storage Battery. — The field of the storage battery to-day is so broad that a few of the most important appli¬ cations only may be enumerated, as follows :

Propulsion of Automobiles and Commercial Trucks. — Usually 40 or 42 cells, capacity of 100-250 ampere hours, type of cell as per Fig. 24.

Propulsion of Mine Locomotives. — 40-88 cells, 200-300 ampere hours capacity. Fig. 36.

Propulsion of Small Industrial Trucks. — Usually 12-16 cells, 100-200 ampere hours capacity, type of cell as per Fig. 24.

Propulsion of Submarine Torpedo ‘ Boats, while running submerged. — Usually 120 cells, 4,000-14,000 ampere hours capacity.

Electric Lighting of Railway T rains. — Each car equipped with a battery, usually 16 cells, 150-350 ampere hours capacity. Fig. 35.

Fig. 35.

Two Cell Unit of Train Lighting Battery, which consists of 16 Cells in all. Approx. 1/10 size.

Starting and Lighting of Automobile. — Usually 3 cells, designed to give 150-250 am¬ peres for short intervals of a few minutes du¬ ration. Fig. 26.

Airplane Motor Ignition. — Usually 4 small cells, to insure motor reliability.

Mine Lamps. — One or two cells, 8-12 am¬ pere hours capacity.

Railway Signal Service, for operating the signals which control the movements of trains.

Wireless Telegraphy as the source of power, both ashore and afloat, in army and navy, as well as commercial service.

Telephone Stations furnishing power for the telephone systems. Practically every central is provided with a battery, charged from a small dynamo, and for the purpose of assuring con-

tinuity of operation. Batteries from 15 to 2,400 ampere hours capacity; Fig. 25 shows a typical cell.

Light and Power Plants, in great variety. Fig. 37 shows a small 16 cell battery, charged from a low power gasoline engine and dynamo,

Fig. 36.

Electric Locomotive Battery, 48 Cells, 21 Plates each, capacity 210 amperes for 1 hour. Approx. 1/25 size.

and suitable for lighting the buildings on a form. Fig. 30 shows a mammoth size central station battery, used as a reserve or stand-by in connection with a large central power station.

Between these extremes, batteries of all kinds and sizes are employed, in steam, water and oil operated power plants.

As an indication of the importance of the storage battery in the United States, it may be

Fig. 37.

[16 Cell Battery for Small Isolated Lighting Plant —

Capacity 8 amperes for 8 hours. About 1/30 size.

stated that their manufacture gives direct em¬ ployment to some 14,000 persons, with many more indirectly employed; that it is among the three largest consumers of lead in the country; and that the annual output approximates 2,- 000,000 horse power hours capacity.

Bibliography. — Dolezalek, (Theory of the Lead Accumulator (tr. by Van Ende, 1904) ; Lyndon, Lamar, (Storage Battery Engineering* (1911) ; Morse, Harry W., (Storage Batteries* (1916) ; Wade, E. J., Secondary Batteries) (London 1902).

Edward Wanton Smith, Ch.E., Factory Engineer, The Electric Storage Battery Company, Philadelphia.

ELECTRIC STORM, a sudden and violent change in the normal magnetic currents of the earth, with oscillations of potential, interfering with the action of telegraph and telephone in¬ struments, sometimes suspending their opera¬ tion and even diverting the current so as to stop trolley cars; called also magnetic storm. Without

any advance warning the magnetic nee¬ dles will swing a long way out of normal posi¬ tions, because of the disturbed earth currents. The electric potential of the earth is ordinarily stated as zero, and all electric currents are meas¬ ured from that basis or standard, which repre¬ sents the balance that electricity seeks. The earth is a huge dynamo, with magnetic currents continually flowing, and it will absorb any amount of electric current that the machines

of man can collect without any apparent effect on this vast storehouse of nature. But the sun is also a natural dynamo, of vastly greater ac¬ tivities and subject to electric stresses of a vio¬ lence far transcending anything we have or can experience on this earth. One of the ap¬ parent effects of the electric and chemical ac¬ tivities of the sun is displayed in the sun-spots, which occur there with irregular frequency, ap¬ pearing to come and go in undetermined cycles. The cause of these sun-spots is largely conjec¬ tural, but the view is generally accepted that they represent openings or vortices in the outer gaseous envelope of the sun. However this may be, it is apparent that they are in some way connected with the electric storms or violent changes of magnetism that occur on the earth. These electric stresses occur at intervals that cannot be predicted, but are comparatively fre¬ quent, and perhaps once or twice a year the violence of the magnetic changes is sufficiently abnormal to be characterized as a great storm, which for a short time paralyzes the action of more or less electric machinery, much as a great storm of wind and rain paralyzes the traffic of a large city.

For the past 25 years or longer many scien¬ tists and a number of observatories have been more or less engaged in studying the phenomena of these storms and have striven to formulate a correct theory of their origin and progress. The difficulty is not that reasons cannot be found for such irregularities of the earth's po¬ tential, but rather that there are so many plaus¬ ible explanations which cannot all be true, that the investigators are puzzled which clues to follow. Early observations disclosed a periodic¬ ity in the electrical storms, that clearly tended to follow the displays of sun-spot activity. If these spots were the direct cause it would be reasonable to expect the following electrical storm on the earth to come at a definite interval ; but the fact is that an electric storm always lags behind the sun-spot activity, and lags all the way from a few hours to a few days. While the average lag is about 38.4 hours, the lag in great storms is only about 20 hours, indicating that the more violent the influence the swifter the travel.

Another sort of evident periodicity in elec¬ trical storms is their

recurrence at periods of about a month. Some observers have figured numerous intervals corresponding with the lunar month, while others have noted a close correspondence with the synodic months of 29 and a fraction days, this synodic month repre¬ senting the dates on which the earth, sun and moon come almost or quite into a direct line. This suggests that the storms are influenced by the sun and moon jointly, or that in some way the moon directs these extraordinary electric activities of the sun toward this planet.

Certain other well-established phenomena have been established with reference to these storms. Not only are they coincident with sun-spots to a marked degree, but also with dis¬ plays of the aurora borealis or <(northern lights.® Evidently the aurora is but a visual evidence of magnetic disturbance. Another pertinent fact discovered is that the magnetic storm is about twice as apt to occur in the night¬ time as in daylight, which is accounted for on the supposition that the rays strike the earth's atmosphere at a great height and are deflected

•

by the earth's magnetic currents, being mainly manifest on the hemisphere opposite the sun. They are by no means confined to the dark hemisphere; in fact they frequently strike the earth and circle it several times before their force is spent. Prof. L. A. Bauer, of the Car¬ negie Institute at Washington, discovered that in two great electrical storms (in 1902 and 1903) the magnetism circled the earth at a speed of about 7,000 miles a second, requiring 3ˆ/2 to 4 seconds only to complete the cir¬ cumference. It had previously been supposed that all magnetic needles felt the storm at the same instant. He not only demonstrated this travel, but showed that some storms traveled from west to east, others from east to west. Other things we know about electric storms are that the smaller storms are comparatively local, being termed equatorial storms and polar storms according to the portion of the earth's surface affected. There are also types recog¬ nized as positive and negative storms.

Within recent years a new theory has de¬ veloped, which may be summed up with the idea that pencil-shaped emanations or shafts of Roentgen or cathode rays, or perhaps of nega¬ tively charged particles, are shot out by the sun during periods of sun-spots, and that when the earth runs into one of these the effect here is an electric

storm. This hypothesis assumes that the same electric activities that produce sun-spots also produce these pencil-shaped shafts of rays and not that the sun-spots are responsible for them. Professor Bauer points out that the fact that electric storms may travel in either direction around the earth is against this pencil-like shaft theory, as these should intercept the earth always in the same way. The professor has also noted that these storms seem to break at a height of about 75 miles in the earth's atmosphere and that as they come closer to the surface their effects are felt more severely. He contends that the energy of elec¬ tric storms is supplied by the earth itself and not by the sun or sun-spots; that the same ac¬ tivities in the sun that cause sun-spots, set in motion the electric storms very much as a trig¬ ger sets in motion the activities of the powder in a gun.

Prof. Kr. Birkeland, of Christiania, has made exhaustive experiments with vacuum tube apparatus of his own designing, in the effort to prove the theory of cathode ray origin or something similar. He has succeeded in dupli¬ cating much of the phenomena of the electric storm and made many valuable records, but his theories have not been generally accepted.

ELECTRIC STRESS, the force that causes the deformation of the surface of a sub¬ stance within an electric field.

ELECTRIC SUNSTROKE, a stroke that prostrates a person in a manner resembling sunstroke, brought on by prolonged exposure to a strong electric light.

ELECTRIC TELEGRAPH. See Tele¬ graphy.

ELECTRIC TELEGRAPH CABLE. See

Cable; Telegraphy.

ELECTRIC TELEPHONE. See Tele¬ phone.

ELECTRIC TENSION. See Electric Batteries; Electricity; Electro- motive Force.

ELECTRIC TORPEDO, a torpedo oper¬ ated by electricity. There are various kinds of electric torpedoes. The Sims-Edison torpedo is driven by an electric motor and its motions are controlled from the shore by electricity. The torpedo proper is carried some distance below the surface of the water by a vessel immediately above it, from which it is suspended by two rigid bars. In the torpedo is a cable reel on which the conducting cable is disposed. An electric motor and controlling

gear are also contained within the torpedo. In its front the explosive is placed. It is driven by a screw propeller actuated by the electric motor. As it moves it pays out cable so that it has no cable to draw after it through the water, the cable lying stationary in the water behind it. This avoids frictional resistance to its motion. The maintenance of the torpedo at a proper depth is one of the advantages of the system over other methods.

ELECTRIC TRANSMISSION OF EN¬ ERGY, Long Distance. An electric trans¬ mission of energy obviously occurs when the relay of a Morse telegraph circuit, or the sensi¬ tive mirror used in submarine cable telegraphy, responds to the feeble current impulse origi¬ nated at the transmitting end of the wire. It is also obvious that we have the electric trans¬ mission of power in the ordinary use of electric light or electric motors even when the generator is stationed in the building in which that light or power is used. But generally speaking the term electric transmission of energy denotes the transmission of energy on a large scale by means of overhead or underground conductors or cables and its transformation into light, heat, chemical energy or mechanical power at the remote end of the conductors. When the dis¬ tance to which this electric power is trans¬ mitted exceeds say 15 or 20 miles it is usually spoken of as the long distance transmission of electric energy or power.

In cities like New York where electric energy for lighting, power and railway traction is trans¬ mitted distances ranging from less than a mile to 15 or 18 miles from the power house the conductors are usually placed in cables in under¬ ground conduits and the maximum electro¬ motive force transmitted is about 11,000 volts. This pressure is directly generated by a steam- driven alternating current generator and is transmitted over the conductors to sub-stations, where by means of step-down transformers the pressure is dropped to say 600 volts alternating current which when direct current is desired by rotary converters is converted into direct current for the street mains, the feeders of the railway system and for charging storage bat¬ teries which in turn give out direct current at times of heavy demand or when otherwise re¬ quired; or when alternating current is required for service mains the 11,000 volts is transformed to say 240 volts. When water power is avail¬ able, as at Niagara Falls and innumerable other places in this and other countries, the electric transmission of power on a large scale to dis¬ tances of 25, 50, 100 and 200 miles from its source is not uncommon.

In order that electric power may be trans¬ mitted economically to long distances the use of high electric pressure or tension is essential,

since otherwise the cost of copper in the con¬ ductors would be excessive. For example; It

has been calculated, on the basis of 5,000 volts, that to transmit 2,356 kilowatts a distance of 100 miles would require about 22,862,737 pounds of copper in the conductors, assuming a line drop of 750 volts, or 15 per cent of the total electro-motive force, whereas with 40,000 volts the total amount of copper required would be about 357,230 pounds. Even doubling the pres¬ sure would quarter the amount of metal re¬ quired for a given distance and given line drop. In the electric transmission of power to long distances the use of alternating current is gen¬ eral, and transformers are utilized to increase the electro-motive force on the transmission line and for reducing it at the points of distribution. Where the electro-motive force on the line does not exceed 10,000 volts generators developing that electro-motive force may be employed. When that line voltage is exceeded the station voltage adopted is about 2,300 volts; this being stepped up by transformers to the electro-motive force desired on the line. This moderate voltage admits of the use of lighter copper wires or conductors in the station apparatus than higher voltages would require. In present day prac¬ tice, however, the use of 150,000 volts is not uncommon and line insulators and transformers to withstand this pressure are now employed. Indeed, manufacturers are prepared to supply transformers capable of operating at 200,000 volts. In North Carolina and South Carolina over 1,000 miles of 100,000-volt transmission circuits are in operation on the system of the Southern Power Company, which derives its power mainly from hydro-electric developments. In California there is a 150,000-volt circuit from Big Creek to Los Angeles, a distance of 240 miles, on the system of the Pacific Light and Power Corporation. The conductors of this circuit are supported on steel towers. In addi¬ tion this company has in operation 105 miles of 60,000-volt circuits, 240 miles of 50,000-volt cir¬ cuits and 831 miles of 15,000-volt circuits. These last circuits are supplied with current from the 150,000-volt circuits at various distribution points by means of step-down transformers in sub-stations.

Modern usage in the matter of type of alter¬ nating current employed leans largely toward three-phase. (See Electric Alternating Cur¬ rent Machinery). For each circuit this re¬ quires three conductors which are arranged on the poles and cross-arms usually in an equilat¬ eral triangle, the wires being separated from one another by a distance of

six or eight feet. The wires are in some cases transposed on the poles, to form in effect a long horizontal spiral. This is generally done to prevent inductive effects on the telephone wires used for signaling on the same or adjacent poles, although some engineers also think that spiraling the con¬ ductors diminishes the impedance of the cir¬ cuit. So far as the telephone line belonging to the transmission company is concerned the sim¬ plest way to avoid inductive effects is to spiral the telephone circuit. While, as just intimated, the long-distance transmission of energy is car¬ ried on chiefly by means of the alternating cur¬ rent, transformers, etc., high potential trans¬ mission in at least one instance in Europe has been effected with continuous current. In this instance the line pressure is 60.000 volts, which is generated directly on the line by six dynamo

machines in series, each generating 10,000 volts. At the point of distribution six motors are con¬ nected in series and each motor is caused to drive a generator which in turn develops elec¬ trical energy of a desired potential and current output.

For the supports of the transmission line the choice is practically between the use of wood poles or steel towers. The kind of wood employed for the poles varies somewhat with the locality, cedar being used in the northern States and redwood in the Pacific Coast States. These poles must be of sufficient height to afford ample clearance from ground and sufficiently strong to withstand wind strains, etc. Poles fitted to meet these requirements and to carry two three-wire circuits should be at least 35 to 40 feet in height, set 5 to 6 feet in the earth and be 12 to 14 inches in diameter at the butt and at least 8 inches at top. The use of steel towers permits longer spans and conse¬ quently diminishes the total number of insu¬ lators necessary. With wooden poles the maxi¬ mum length of span is 180 feet ; minimum 80 feet. With steel towers using 12 to the mile the span between towers is 440 feet. On one long-distance transmission the towers are made up of four galvanized angle iron posts 40 feet in length, 3 inches by 6 inches with three-six¬ teenths inch angles, the .posts being stayed with suitable angles and cross rods.

For the very high potentials used on long¬ distance transmission lines extra precautions as to insulation are requisite, both where the wires leave the power-houses and on the poles or towers. For insulating the conductors from the poles or towers large porcelain discs are now commonly used, in a series of four or more (arranged somewhat like Japanese dinner gongs), termed suspension insulators, the upper disc of which is attached to the pole or tower. The conductor is attached to the lowest disc. Much care is required in the manufacture of these

insulators. This series arrangement of insulators has largely increased the amount of electro-motive force that can be successfully

Power House Terminal of Transmission Line.

employed in electrical transmission of power as the electric potential is divided between the individual discs. Other types of insulators for high tension service consist of large petticoat insulators about 12 inches in diameter across the top, 12 inches in height and weigh 18 to

20 pounds. They are supported on the cross- arms or on the pole itself by wooden or iron pins. For pressures up to about 25,000 volts wooden pins are found fairly satisfactory, but above that pressure they are found to char by a peculiar action of the current, and it is ad¬ visable on this account, as well as for mechanical reasons, to employ cast iron or metal composi¬ tion pins. These pins are from 15 to 17 inches in height and they maintain the insulator about 12 inches from the pole or cross-arm. (See illustration, which shows an iron tower, a three- wire circuit, with cross-arms, pins and porcelain insulators ; also the openings in the gable of power-house by which the high tension con¬ ductors pass out).

The choice of metal for the conductors in this service is virtually confined to copper and aluminum. It is known that there is a tendency to a brush discharge, termed corona, in the air between conductors conveying currents at high pressures that leads to a waste of electric energy when with wires of given diameter a critical electromotive force is reached. The critical electromotive force also varies with the dis¬ tance between the wires. It was at one time thought that this effect would constitute the limiting factor in the long-distance transmission of electric power, but in Prof. Harris J. Ryan's paper, Conductivity of the Atmosphere at High Voltages > (consult (Proceedings> American In¬ stitute Electrical Engineers, Vol. XXI, No, 3), he shows that, regardless of the metal employed, by increasing the diameter of the conductors, whereby the electric gradient is kept below the breaking down point of the air in the vicinity of the wire, this effect is avoided. For example, to avoid atmospheric losses between conductors separated by an air space of four feet, with barometric pressure of 29.5 inches of mercury, temperature 70° F., the conductors must have, for an operating electromotive force of 50,000 volts, a diameter of at least .058 inch; for 100,000 volts, .192 inch; for

150,000 volts, .430 inch; for 250,000 volts, .990 inch. On this account it ’has been deemed advisable in numer¬ ous cases to employ aluminum conductors, since weight for weight its diameter is much greater than that of copper.

For instance, on a 150-mile line in California transmitting 745 kilowatts (10,000 horse power) at 40,000 volts, aluminum conductors seven- eighths inch in diameter are used. In a 100-mile, 60,000-volt transmission line in Mexico a copper wire three-eighths inch in diameter is used. The transmission line from Shawanigan Falls to Montreal, Canada, employs aluminum con¬ ductors carrying 12,000 horse power at 50.000 volts. Steel-cored aluminum conductors are also used for this purpose and in some of the latest high tension transmission lines steel-cored copper conductors are utilized.

To provide a system that will be as nearly absolutely reliable as practicable duplicate cir¬ cuits are in the majority of cases constructed, in order that if one circuit becomes inoperative the other may immediately be brought into service. In some cases the two circuits are erected on one set of poles. In others two separate pole lines are built.

Wherever possible private rights of way are obtained for the transmission line and it is of advantage to have this way so wide that danger from falling trees shall be avoided. Rights of

way along steam railway tracks are not con¬ sidered desirable for the reason that the smoke from the engines very soon so impairs the insulating quality of the insulators that frequent cleaning and washing of the insulators is rendered necessary. Even on private routes the cleaning of the insulators is at times essential to maintain the insulation.

The distance to which electric energy can be profitably transmitted from a source of elec¬ tric power is not yet definitely determined. Much depends on the cost of fuel at the dis¬ tributing points and the amount of energy to be delivered. In California, where coal is dear, electric energy is now being commercialiv trans¬ mitted from a number of water-power plants in that State to an amount exceeding 100,000 horse power at a pressure of 40,000 to 60,000 volts and to distances ranging from 50 to 230 miles. In Switzerland electric energy from water power is transmitted to the point of consumption and sold at $20 per horse-power hour per annum. There the price of coal is $6 to $8 per ton, but labor is cheap. Electric energy gen¬ erated by the force of falling water and trans¬ mitted 85 miles by wire is sold in

Montreal, Canada, at $15 per horse power per annum at a profit. But while as stated the distance to which electric energy may be commercially transmitted is yet undetermined, calculations have been made by reputable electrical engineers which indicate that under proper conditions electric power may ultimatelv be profitably transmitted in large quantities, say 200,000 kilo¬ watts, and at a pressure of 170,000 volts, to a distance of 500 miles. This transmission would entail the employment of copper wires of a diameter so large that the dissipation of energy by brush discharges between the conductors would be avoided. Should this conception be realized it would obviously bring New York, Chicago and other large cities within reach of the electrical energy developed at Niagara Falls. Indeed the calculation just referred to was based upon the amount of mechanical power utilized in New York. Consult Proceedings American Institute of Electrical Engineers, De¬ cember 1904. } See Power, Transmission of.

William Maver, Jr., Consulting Electrical Engineer.

ELECTRIC UNDERGROUND CABLES AND CONDUITS. In the first attempts to operate the electric telegraph, over 60 years ago, both in America and in Europe, the wires were placed in cables underground ; but owing to imperfection in the methods of in¬ sulating the wires, as well as in the type of conduit or pipe employed, and of the manner in which the conduits were laid in the earth, the cables and conduits failed after compara¬ tively short service and the use of overhead wires supported on poles was resorted to and became the universal practice, which continued almost without interruption for a quarter of a century.

Beginning about 1890, however, there has been a movement in all the principal cities of America and Europe to place all electric wires underground in order that the streets may be * freed from the encumbering poles and overhead wires. In New York city, especially, the move¬ ment to this end was carried on vigorously and persistently, with the result that for many years

there has not been a pole supporting telegraph, telephone, electric light or trolley wire in any part of Manhattan borough, such wires all being placed ’in cables in conduits under the surface of the streets.

Electric Underground Cables. — The type of underground cable used for telephony, teleg¬ raphy and electric light and power purposes varies greatly. For example, the conductors used in telephony have a diameter of .040 inch ; those for telegraph purposes about .080 inch ; those for electric light and power range from one-quarter of an inch to one inch and over in diameter. The smaller electric power wires are employed in high potential and comparatively light current work; the larger wires in low tension and heavy current work. It is thus feasible to place about 400 telephone conductors, or 100 telegraph conductors, in one cable in a three-inch underground duct or pipe, while it is only practicable to place two, three, or, at most, five electric light or power conductors in a similar duct. The insulating material used for telephone conductors is usually a wrapping of tissue paper in narrow strips, laid on spirally over each conductor. The insulating material of telegraph underground cables is usually a rubber compound or strips of paper saturated with oils, the thickness of the wall of which is about .038 inch. The insulating material of electric light and power cables is usually a rub¬ ber compound, oil paper or varnished cambric, which is from one-eighth of an inch to nearly half an inch thick, depending on the electric pressure to be withstood, which, in the case of low potential circuits, is about 220 to 600 volts, and in the case of high potential circuits may range from 1,000 to 30,000 volts. Gutta-percha, which has been employed for the insulation of long submarine cables, is not used for under¬ ground cables, owing chiefly to its low softening point under heat, 120° F., which temperature is not infrequently encountered in subways in cities.

Cables designed for underground work are encased in a lead envelope to protect the in¬ sulating material from water, moisture and the effects of gases, acids, etc., in the underground conduits. For crossing rivers such cables are also armored with iron wires in addition to the lead covering, as a mechanical protection.

The term cable includes the conductor (<(core):>), the insulating material, the lead cov¬ ering and the armor when the latter is em¬ ployed. Copper is practically the only metal used for the conductors of electric cables. Aluminum is not used because of its bulk for a given conductivity, which bulk is about 1.6 greater than copper. The increased amount of insulating material and lead covering, as well as space in the conduits, that would be required in the case of aluminum for a given con¬ ductivity would be virtually prohibitive of its use for underground cables.

The copper wire used in cables is drawn to the required size in the wire factory. If the wire is to be insulated with a rubber compound it

is ˆtinned® to prevent any chemical action between the sulphur used in the rubber com¬ pound and the copper. When the covering is paper, linen or fibre the wire is not tinned. The tinning process consists in passing the wire through a vat of molten tin. For electric light and power cables, when the conductors do not

exceed .204 inch diameter, they are usually solid, or of one wire; above that size they are generally stranded to obtain flexibility. The wires are stranded in a stranding machine in one process, the wires being wound on reels, which are held on suitable spindles on the frame of the machine. A single wire is held in the centre of the frame and is slowly drawn through a guide. The wires for the first layer are wound spirally around the central wire; the wires for the second layer are held on another frame and are laid over the first layer in an opposite direction, and so on for the additional layers required. The strand is wound upon a drum and is then ready for the insulating process.

Rubber Insulation. — The rubber used in the insulating material for cables is pure Para rubber. After the rubber has undergone treat¬ ment by washing and kneading to remove the impurities which it always contains in its crude state, it is then mixed, by suitable machinery, with the ingredients that go to make up the compound, such as litharge, whiting, blue lead and sulphur. The compound is then ready for placing over the wire. There are two general methods by which this is done, termed, re¬ spectively, the seam and seamless methods. In the seam process the rubber compound is calen¬ dered into a sheet of any required thickness, which is then cut into long strips. These strips are then passed between two grooved rollers having sharp cutting edges. The wire to be covered also passes in the centre of the grooves of these rollers, and as it does so the rubber strips are pressed closely around it, the knife edges of the rollers cutting off the surplus rubber strip. The wire thus insulated is fre-

Fig. 1. — Rubber Covering Machirfe.

quently wrapped spirally with a tape, after which it is placed in a vulcanizing oven and vulcanized. In the seamless method the com¬ pound is placed in a plastic condition around the conduits by pressure, while passing through a die. The conductor, c, Fig. 1, is drawn through a metal chamber or box, b, which con¬ tains the plastic compound. A worm gearing, w), within the chamber, pushes the compound toward the opening or die, d, in the end of the chamber. The compound is fed into b at the aperture a. The chamber is kept at a desired temperature by a hot water or steam jacket. After leaving the

chamber the insulated wire is drawn slowly along a table, through powdered talc to prevent sticking, to a drum, on which it is then taken to the vulcanizing box or re¬ ceptacle, unless it is first to be taped. The taping process is somewhat analogous to that of stranding the wire. A vertical taping ma¬ chine is shown in Fig. 2, in which the insulated wire w is seen coming through the floor to the guides c c, in each of which there is a slot through which tape from the small reels R R passes to and around the wire. The wheels on which the reels r r are carried revolve in oppo¬ site directions, this action laying the tapes on

;he wire in reverse spirals. The wire thus taped passes to the ((take up® drum t, thence to the reel d. In the case of rubber-covered wires the next proceeding is to immerse them in a water tank for 12 or 24 hours, after which they

Fig. 2. — Taping Machine.

are electrically tested for defects in the insula¬ tion that may be due to air-holes, foreign sub¬ stances in the insulation or any other cause.

The vulcanizing process consists in placing the insulated wire in an oven, where it is kept

Fig. 3. — Paper Covering Machine.

at a temperature of 250° to 300° F. until the rubber compound is brought to a desired degree of hardness and tenacity, the proper time for effecting which is a matter of experiment and varies with different compounds. Sulphur is the

chief ingredient in the compound that brings about these results. The compound usually enters the oven a yellowish compound and comes out a dark-blue color. This color may be varied by using different ingredients in the

Fig. 4. — Telephone Cable, Paper Covered.

compound, and in some cables certain of the conductors are colored by this means to act as ˆmarkers,® or distinguishing wires for testing purposes.

Paper Insulation. — The conductors intended

for telephone work are covered very loosely with two layers of dry, soft paper, laid on spirally, in practically the manner in which tape is placed over the rubber insulated wire. This type of insulation is found to be the most

Fig. 6. — High Tension Cable.

satisfactory yet devised for telephone cables, its capacity being quite low, about .080 microfarad per mile of conductor. The insulation resistance of each conductor is about 500,000,000 ohms per mile. The wires thus insulated are twisted in

Fig. 7. — Duplex Cable, Electric Light.

pairs with a lay of about three inches, the pairs being laid up in reversed layers and built up into cables of 50, 100 and 200 pairs, after which they are lead covered as a protection against moisture. Paper cables for electric light

and power and telegraph service are made up of reversed layers of strips of manila paper to a desired thickness by means of a paper-covering machine such as is indicated in Fig. 3. In this figure w is the wire moving in the direc¬ tion of the arrow. By suitable motive power the reels R carrying the paper strips are revolved in opposite directions around the wire.

When thus covered the conductor is wound on a reel and placed in an oven until all moisture is driven out of the paper. The reel, with the insulated conductor, is then immersed in a vat of boiling oil for several hours until the paper is thoroughly impregnated with the oil.

Varnished cambric insulation consists of strips of varnished and oiled linen cambric, which are placed over the conductor in as many layers as may be desired, varnish being applied between the layers.

When insulated the conductors are ready for their lead covering, if to be used as single con¬ ductors; or if to be employed in cables, they are now ready for cabling. In the latter case the number of conductors in a cable will vary with the purpose for which the cable is designed. Telephone cables for underground use may con¬ sist of as many as 400 conductors, which are first twisted in pairs and are then cabled by

a cabling machine virtually similar to a stranding machine. For telegraph uses single conductors, to the number desired, are laid up spirally in

Fig. 9. — A Jacketed 7,000 to 10,000 Volt Paper Cable.

the cable. For long underground telegraph working a special type of cable has been devised to avoid the effects of static induction between conductors. This is termed a screened cable from the fact that each conductor after being insulated is covered with a thin copper ribbon laid on spirally and overlapping. The con¬ ductors thus screened are cabled in practically

the usual way. The copper ribbon over each insulated conductor is grounded by connecting it with the lead covering of the completed cable. The static lines of force set up by the telegraph currents in the conductor expend their energy in setting up induced currents in the copper ribbon and thus the conductors proper are protected or screened from the effects of parallel static induction.

For electric light and power purposes, espe¬ cially for high potential circuits, three conduc¬ tors in one cover are now generally used. These conductors are laid up spirally and taped, the spaces between the conductors being filled with jute rope, in the act of cabling. In other in¬ stances the three conductors are bunched and a ˆjacket® of paper is laid over them. This is termed a jacketed cable or split insulation. The cable thus laid up is then taped after which it is ready for the lead covering.

The process of lead-covering cables is as follows : The cable is drawn through a die in a die-block, and, as it passes through this die, hot lead in a semi-plastic state is pressed in a uniform thickness around the insulating material by pressure from a hydraulic ram. The pres¬ sure exerted on the end of this ram sometimes amounts to 500 tons.

Illustrations of various types of underground cables are given in the accompanying figures. Fig. 4 represents a telephone cable ; Fig. 5 a telegraph cable ; Figs. 6 and 7 a one-conductor and two-conductor cable for high tension elec¬ tric light and power circuits, respectively ; Fig. 8 a low tension, heavy current cable for electric light and power ; Fig. 9 a three-con¬ ductor electric power cable for 10,000-volt cir¬ cuits. In this cable each conductor c is made up of a strand of 37 copper wires, each .082 inch in diameter, p is the oil-saturated paper or varnished cambric around the conductor, .17 inch thick, f is the jute filling, j is the paper jacket, also .17 inch thick, l is the lead

cover¬ ing, .13 inch thick. The lead is usually alloyed with 2 or 3 per cent of tin. The outside diameter of this cable is 2.56 inches. The weight of each conductor is 4,000 pounds per mile ; the weight of the lead covering is about 13 tons per mile.

Rubber and paper cables are now made to withstand pressures of 25,000 volts, and some miles of cable carrying current at this pressure are to-day in operation in underground con¬ duits, but the ordinary operating pressure to-day is from say 2,000 to 11,000 volts for under¬ ground cables.

Electric Underground Conduits. — The

most obvious method of placing wires under- ground'would be to provide a tunnel under the streets, in which not only the electrical con¬ ductors but also the gas and water pipes of a city might be placed. . This method is, how¬ ever, so expensive that it has only been adopted in two or three places in the world, and then for only comparatively short distances in very crowded thoroghfares. For instance, there are several such tunnels in London, England, namely, the Holborn Street tunnel, about seven feet in height by 12 wide; the Queen Victoria Street subway and the Victoria Embankment tunnel, seven feet by nine feet. The total length of these London tunnels is about six miles and they cost approximately $140,000 per mile, in¬ cluding ventilators, side passages and entrances.

In some of these tunnels, water and gas pipes, pneumatic tubes and telephone, telegraph and electric-light wires have been placed. In Paris at one time some of the sewers were utilized for the same purpose, but this plan was not greatly favored and has not been followed else¬ where. Tunnels for electrical conductors were also built in Detroit, Mich., the longest of which is about 232 feet in length. It is six feet six inches by three feet six inches in the cross-sec¬ tion.

Solid Conduits. — Another plan which has been utilized for this purpose is one in which the conductors are well insulated and laid di¬ rectly in the earth ; or in which the conductors are laid in notches in a tube or duct, by which means they are kept apart. The tube is then filled with an insulating compound, which, when it hardens, holds the conductors securely in po¬ sition. This is termed a "solid" conduit. One of the earliest forms of solid conduit was that used by Morse,

between Washington and Balti¬ more. This consisted of five wires insulated with cotton and placed within a lead tube which was laid directly in the earth. In different parts of Europe, in the middle of the last century and afterward, wires were laid directly in the earth without other covering than the insulating material around them, which was usually a bitu¬ men compound or gutta-percha. Insulation laid in this way is not long lived. One of the first solid conduits used in America for electric lighting was one in which a lead-covered cable is laid directly in a wooden trough, the cable being uncoiled directly from a cart reel, the box being then filled with an insulating compound. To protect the cable from injury, a thick plank was placed over the box.

In many European cities solid conduits are placed under the sidewalks. The cables c are

Fig. 10. — Sidewalk Conduit.

laid on a bed of sand, s, as. indicated in Fig. 10. A galvanized iron wire netting, k, is placed over the sand, separating it from a bed of concrete, N, upon which the asphalt, a, of the sidewalk is laid. The object in using the wire netting is to warn workmen of the presence of the cables.

Edison Solid or Iron Tube Conduit. — This is the conduit adopted by Edison for the dis¬ tribution of electric current by the three-wire system, for light and power in cities. It con¬ sists of an iron tube about 20 feet in length, into which the three conductors, usually copper

Fig. 11. — Edison Junction Box.

rods, separated from one another by hemp or jute cords, are inserted. An insulating com¬ pound is then forced, under heavy pressure, into the tube at a temperature of about 300° F. The copper rods project about two inches at each end out of the tube. The tubes are laid end to end in the earth, when the conductors in one tube are connected to those in the next by a flexible copper strand. A split iron box is then jointed and clamped over the ends of the tube and the box is then filled with an insulat¬ ing compound through an opening, which is then closed by a screw plug. In this system no manholes are employed, but instead, at suitable distances, water-tight junction boxes are used, into which the conductors are led, as outlined in Fig. 11. This is really a switch-box, by means of which the current from the “feeder” conductors is distributed to the “mains” or “service” conductors. These

boxes are also utilized to break up the mains into shorter sec¬ tions ; to open the circuits for testing and other purposes.

The disadvantage of “solid” conduits is that in case of defects in the cables there is no means of repairing them short of tearing up the streets. Neither is it convenient to add to or take from or to increase or diminish the size of conductors used in the “solid” system. These disadvan¬ tages do not exist in the case of what is termed the “drawing in” conduit system, to be described presently.

Bare-wire Conduits. — Still another plan utilized in some parts of Europe, and known as the “bare wire” conduit, consists of uninsu¬ lated, or bare, strips or rods of copper placed in tubes underground and held in position by insulators, or else the conduit itself is com¬ posed of an insulating material and is protected from moisture. This plan is not in extensive use. ‘

Drawing-in Conduit. — The method which is now most generally employed in this country is that known as the “drawing-in” conduit. In

this system as many ducts as may be necessary are laid in a trench side by side and in layers, and manholes are built at intervals of 200, 300 or 400 feet to give access to the conduits and to afford means by which the cables may be

Fig. 12. — Standard Manhole.

drawn into the ducts. In a <(drawing in® con¬ duit system the ducts containing the “feeder® cables or cables for arc circuits are termed “trunk® ducts and are usually the lower tier or layer of ducts. The ducts carrying the distrib¬ uting cables are termed “distributing ducts® and are placed at the top. So-called “hand-holes® are laid flush with the surface of the street every 40 or 50 feet to give access to the distrib¬ uting ducts and cables for electric light and power service. One type of manhole is shown in Fig 12. This is a brick manhole ; others are made of concrete. The hand pump shown is used to provide fresh air where gas is prevalent in the streets. The size of the manholes and number of ducts varies with the requirements of a given locality. Some manholes are from 4 to 5 feet square; others are 12 to 15 feet deep and 6 to 8 feet wide. The number of ducts in a conduit may range from 2 to 3 ducts to 200 or 300 ducts; the larger number usually

being near the powder-house or the telephone or tele¬ graph headquarters. The manholes and hand¬ holes are provided with double iron covers. Some of the covers are designed to make the manholes air- and water-tight ; other covers are perforated to ventilate the conduits, to pre¬ vent the accumulation of gas from adjacent gas-mains, which occasionally causes explosions in the subways. The respective conductors in the

cables are joined together by twisting or by copper sleeves, in the manholes ; the conductors being separated from one another by insulating material. A lead sleeve is then placed over the joints and soldered to the main cable. A hot insulating substance, as wax or paraffin, is poured into the sleeve through a small hole in the sleeve, the holes being soldered thereafter. For telegraph and telephone distribution, pipes are run from the manholes into the vaults of an adjacent building, from which point the wires are led to the subscribers' offices in the block.

The cables are drawn into the ducts by means of a rope and windlass ; they are usually too heavy to be drawn by hand. Electric mo¬ tors carried on wagons are also used to draw in the cables, the current for the motor being sup¬ plied by a storage battery, an adjacent power wire or a portable gas engine. In order to get the rope through the duct, a wire is sometimes placed in the duct as it is laid. More frequently, however, the ducts are rodded by means of a stiff steel wire, or by means of screw and socket rods, similar to those used by chimney sweeps, one rod being screwed into its predecessor, which is then pushed along the duct until the distant manhole is reached, when a rope is at¬ tached to one end of the rods and drawn through the duct.

For the ducts used in the drawing-in sys¬ tem different material and varying lengths of pipe or tube are employed. At one time, wrought-iron pipe, 3 inches in diameter and 20 feet in length, joined together by thread coup¬ lings and laid in hydraulic cement, was exten¬ sively used in this country. About 5,000,000 feet of such pipe were laid and are still in service, but in recent years earthenware, terra-cotta or vitrified brick, stone and cement-lined pipe are mostly employed. The iron pipe and cement- lined ducts are round, about three inches in di¬ ameter. Many of the holes in the vitrified brick ducts are square, with an opening of about three inches. Fig. 13 illustrates a section of cement-lined pipe under construction. These tubes are of riveted sheet wrought iron and lined with five-eighths of an inch of pure ce¬ ment. The tubes are six to seven feet long and two to three inches in diameter, as required. A large quantity of these tubes are in use in this

country and Great Britain.

Fig. 13. — Cement-lined Conduit.

In Fig. 14 is shown a 12-duct vitrified clay conduit entering a manhole. Conduits of this type are made in blocks of two, three, four and six ducts. The four- and six-duct blocks are six feet long; the two- and thrce-duct blocks

are three feet in length. These blocks are laid in cement, end to end, and are held in position rela¬ tive to one another by dowel pins. The walls of these blocks are five-eighths of an inch thick. A wrapping of wet muslin is laid around each joint and over the muslin cement mortar is placed. Earthenware conduits are also made in single ducts, 18 inches in length.

Wood pipe conduits consisting of wooden tubes which have been especially prepared to withstand decay are used quite largely. The single tubes are about eight feet in length and have socket joints. The tubes are laid in the trench in tiers, the lower tier resting on plank¬ ing. In the various types of underground con¬ duits mentioned and others the ducts are ˆbroken® to add strength to the structure. Care is taken in laying these ducts to exclude cement, stones or any other obstacle that would ob¬ struct or injure the cables in the <(drawing in» process.

Fig. 14. — Vitrified Clay Conduit.

In the case of conduits for electric traction, the ducts are laid at the side of the tracks, underground, and wide manholes are provided at street intersections. For the ˆfeeders® and other cables of the New York subways, conduits are laid in the wall of the structure and access is given by openings in the wall at suitable in¬ tervals.

It is well known that frequent interruptions to overhead telegraph and telephone lines are occasioned by severe wind, snow and sleet storms in this country and Europe, and in con¬ sequence the question of placing all such wires in underground conduits has frequently been raised. The great cost of such an undertaking, however, together with the fact that the speed of telephoning and telegraphing would be greatly diminished, owing to the increased electro-static capacity of the cables as compared with overhead lines, combined with other

elec¬ trical obstacles, has been prohibitory of the at¬ tempt to carry out such a plan in this country on a large scale. In Great Britain an emer¬ gency underground cable system has been laid between Birmingham, London and Edin¬ burgh. For this purpose an iron pipe contain¬ ing a 76-conductor telegraph cable, with open¬ ings at certain intervals to give access to the cable, is employed. In the United States long stretches of underground telephone cables have been constructed, notably between New York, Philadelphia and Washington, D. C. The suc¬ cessful operation of underground telephone (metallic) circuits at such distances has been made possible by the use of the Pupin induct¬ ance coils placed at certain intervals along the

circuit and by the use of the audion telephone repeater.

William Maver, Jr.,

Ex-Electrician, Consolidated Telegraph and

Electrical Subway Co., New York.

ELECTRIC VEGETABLE GARDEN¬ ING. Experiments carried on at the govern¬ ment agricultural station at Amherst, Mass., since 1900, show that the use of electricity by the farmer is a distinct and valuable stimulus to nature and exerts a marked influence upon the germination of seeds and the growth of farm products. Scientists argue that roaming around loose in the atmosphere there is a vast fund of electrical force, which, by means of specially devised apparatus, can be attracted to the earth and distributed through the ground where the gardener has sown his seeds. The apparatus by means of which the electricity is caught and harnessed has been tested at Am¬ herst and has proved to be a complete success. Briefly described it consists of a number of copper spikes which are elevated at the top of a 50-foot metallic pole. These spikes gather the electric fluid from the atmosphere and convey it to the foot of the pole, where it is caught by wires buried a few feet beneath the ground and distributed over as large a section as the gardener desires. Each of the poles will gather and distribute enough electricity to cover sev¬ eral acres of ground. With this apparatus ex¬ periments have been made which may be sum¬ marized as follows: After seeds have been subjected to the electric treatment for a period of 24 hours, it was found that over 30 per cent more seeds were germinated by the aid of electricity than in a like quantity of seeds sown in ground that lacked the electrical stimulant. As the scientists in charge of the experiments wished to make a very complete test, the electric cur¬ rent was applied to seeds

that were allowed to stay in the ground for 48 hours. In this case it was found that 20 per cent more seeds had germinated in the electrified ground than in the soil where the seeds had been left to sprout under normal conditions, and in 72 hours this percentage had dropped to 6, thus showing that the use of the current for the purpose of stimulating germination under all the tests was a decided success.

In the various tests seeds subjected to only a temporary current of electricity have been found to show the effect for a few hours and then resume their normal growth. In one in¬ stance, to produce a constantly beneficial effect it was necessary to apply the electricity every hour to germinate growing plants or seeds.

Another interesting experiment, made in 1902, was planting in two sections of ground, the soil in both of which had been carefully se¬ lected to ensure it being exactly alike, seeds of the following vegetables : parsnip, lettuce, carrot, turnip, radish and onion. To one of the sec¬ tions of ground a mild current of electricity was applied. The following day the plants in the electrified plot began to appear, the turnips sprouting first. The rapidity of growth of those planted in the electrically treated ground was far in advance of those treated in the ordinary ground. The second day plants broke through the surface in both plots, those in the electric garden showing considerably the more rapid growth; the foliage was rank and when har-

vested was nearly twice as high as that of the non-electric plot. The roots also were larger and showed a marked difference in favor of electricity. One peculiarity was that in the elec¬ tric plot for every pound of roots very nearly a pound of tops was produced, while in the other case for every pound of tops there grew 1.43 pounds of root, but the difference in the total was all in favor of electricity. With reference to the other vegetables, the lettuce proved a failure in both plots. The carrots showed a marked superiority in the electric bed over those in the non-electric. The onion plants came up in both beds and grew finely for a time, then blasted and not one developed, neither electric nor non-electric.

Besides the electric treatment of the soil, ex¬ periments have been made with the electric light for stimulating the growth of plants and the general effect has been to hasten the maturity of lettuce, spinach and similar products. It has been found that the electric light has the

stimu¬ lating effect of daylight upon the plants and crops thus encouraged by light from arc lamps have showed 50 to 60 per cent increase. In short it has been clearly demonstrated that by means of electricity nature can be forced to do double duty without lessening the worth of her products. See Electroculture of Plants.

ELECTRIC VEHICLES. The first vehi¬ cles operated by electric power from a storage battery appeared in 1892, but they failed to attract the attention of the general public until 1900, when the very superior performance of the electric carriage in a winter parade in the city of Cleveland, Ohio, gave them immediate prominence. The chain-drive models appeared in 1904, and continued to be the prevailing type until 1908, when the shaft-drive for the smaller vehicles was adopted. Up to that time electric vehicles were equipped with pneumatic tires. By 1912, however, solid rubber tires had been generally substituted and the battery had been enlarged to 40 cells. These two changes were the cause of a great improvement in the quality of the metal used in constructing the electric car, in order that the jars of the road might be completely absorbed and the additional weight safely carried. The result has been that the electric vehicle is one of the best of all self-propelled cars.

For city use and for the short haul, the electric possesses many advantages over steam and gasoline vehicles, the most considerable being its simplicity of construction. There are only three parts to the mechanism ; the battery, the motor and the controller — no gears, no clutch and no engine as in the gasoline and steam driven cars. The motor is an engine of the rotary type, delivering a continuous torque at any desired speed up to 25 miles per hour, without the crude and bulky mechanism which controls the two or three speeds between which choice must be made with the gasoline car. Moreover the operation is noiseless. There are no nauseous odors of gasoline and burnt oil, and there is no danger from fire. The car can be started instantˆ and surely by simply throw¬ ing a switch and there are no jerks or jolts in either starting or stopping abruptly. No chauffeur is needed, the car practically taking care of itself and seldom needing any repairs or expert attention. The great drawbacks are

two — the weight of the storage battery which supplies the current and the limited radius of operation from a single charging of the battery, about 30 to 35 miles. In some European vehi¬ cles the radius of travel is as high as 60 miles, the weight of the battery being doubled. The usual type of battery constitutes about one- third of the weight of the car and costs about $350. The lead battery is good for 10,000 miles and then has to be replaced with a new one. The Edison

battery costs a good deal more, but is guaranteed for four years, during which a car may easily make 60,000 miles, so that while the Edison battery costs more to in¬ stall it is very much more economical in the long run. The average consumption of energy is about 100 watt-hours per ton mile.

But it is not as the passenger or pleasure car that the electric vehicle demonstrates its greatest utility. This lies rather in the com¬ mercial world, where the small truck of mode¬ rate capacity is widely in use, in as many as 124 lines of trade. As taxicabs in cities where the speed limit is 15 miles per hour, the elec¬ tric excels, showing almost no delays for derangement of machinery, no tire trouble, great elasticity in movement in crowded thor¬ oughfares, no repair account and the cheapest motive power. The last-named feature has be¬ come still more marked as the cost of gasoline goes up and the cost of electric current is con¬ tinually diminishing. An electric taxicab on trial in Detroit made the remarkable record of 12,000 miles in one year without any repair whatever. Another field in which the elec¬ tric has made good is as the light delivery wagon, especially for the large department stores. For this use the slow-speed type of motor is in favor, running about 800 to 900 revolutions per minute, at 80 volts and 28 amperes, 4 pole series type, unsaturated. The winding is arranged for either 60 or 80 volts on larger trucks, to be used with a 60-cell Edison or 42-cell lead battery, respectively. These motors run without attention except an oc¬ casional renewing of the brushes and lubrica¬ tion, for from eight months to a year. The control most generally in use is the horizontal lever, and there is a motor brake besides an efficient foot brake. The standard battery equipment is 42 cells of 15 plates each for the lead type, or 60 Edison cells of the G-7 type. For the establishment which runs its own electric plant the matter of charging the bat¬ teries becomes merely a matter of adjustment to the other work of the plant. In several cities the battery rental plan has proved popu¬ lar with owners of electric vehicles. The cars can be bought without the battery and this be supplied at a stated rate per month, the battery being charged as often as exhausted. The cost of such service is not excessive, being about half the initial cost of a new battery, and there are no delays while the battery is being charged — the exhausted battery being lifted out and the fresh one put in its place.

The electric type, however, is not limited to the lighter service, as five-ton trucks are oper¬ ated successfully in the transportation of coal, ice, flour, sugar, lumber, beer, etc. Fire engines Jo run at a speed of 25 miles per hour are in use in some cities, a particularly effective ladder truck being able to divert its motive power to

raising a 90-foot ladder, which is accomplished in 10 seconds. In several of the larger cities the Post-Office Department uses two-ton electric trucks to move mail in bulk, there being 20 of these in New York alone. For motive power for baggage and freight trucks in railroad terminals and on docks, electricity has been proved highly efficient. These little vehi¬ cles have a speed of seven to eight miles per hour when empty, and five to six miles per hour when loaded and cost to run about one cent per mile. Other adaptations of the electric vehicle are the truck crane for loading and unloading and moving materials in foundries and other manufactories of heavy products and in workshops and their yards, as road machines and road tractors, as warehouse trucks for moving goods and deliver¬ ing them to gangways, as mine locomotives and in place of hand trucks in loading and unload¬ ing vessels.

One of the incidental advantages of the electric vehicle is the very considerable saving in insurance costs, both for the vehicle itself and for the premises in which it is stored.

In 1916 there were 40 concerns engaged in building electric vehicles and the number in use in the United States was estimated at above 60,000.

ELECTRIC WAVES, a motion or dis¬ turbance of the ether or medium in which elec¬ tricity manifests itself and appears to move, of a character similar to light waves, of varying length, according to the nature of the dis¬ charge but with a velocity similar to that of light. The wave theory was early held by Clerk Maxwell, Lord Kelvin and others, but was first demonstrated by Heinrich Rudolph Hertz (q.v.), who began experimenting about 1883. He discovered that electric waves would produce a slight sparking between metals when very nearly in contact. About 1887 he ex¬ hibited a special form of condenser, which he termed a radiator, but which would now be called an oscillator, as it discharges across a spark gap with oscillations. In connection with this he employed what he termed a resonator, but which would now be styled a wave-detec¬ tor. By radiating electricity at different oscil¬ lations and detecting the waves at certain har¬ monious distances, while demonstrating their non-appearance at intermediate points, Hertz proved the theory of wave action and that electricity travels in the same way as light, and paved the way for the later invention of wire¬ less transmission. Hertz also

reflected and re¬ fracted and polarized the waves, thoroughly demonstrating their action under the same laws as light waves. For a time the waves were referred to as Hertzian waves in honor of his contribution to science. The study of the waves was at once taken up by numerous students of electrical phenomena, and Lodge, Kelvin, Poin¬ care and others made investigations which in¬ creased knowledge of the subject. Bose de¬ signed an instrument for producing very short electrical waves so they should be more easily studied. Later Brady of Paris devised an im¬ proved form of detector, and E. Rutherford brought out a magnetic detector. These were outclassed later by William Marconi's coherer, and that has yielded place to still more accurate detectors now used in radiography. See Tele¬ graphy, Wireless.

ELECTRIC WELDING. The heat of an electric arc may be employed in fusing or welding metals, or the heat given out in the body of metal acting as a resistance to the passage of a heavy current, without any arc or spark, may effect that result. The arc method appears to have been first employed by De Meritens in 1881. In this instance leaden pieces designed to be united in the form of storage battery plates were arranged together as an extended positive electrode, and an arc was drawn between them and a negative carbon rod manipulated by means of an operating handle. Part of the heat energy of the arc served to melt the lead and cause union of the adjacent pieces, but much the larger proportion of the energy escaped by radiation and convec¬ tion. The electric arc was thus akin to a gas blowpipe as commonly used in lead-burning in the construction of tanks for the chemical in¬ dustries. Following De Meritens, heating by electric arcs has been applied to the fusing and welding of metals, notably of iron and steel, by Bernardos and Olszewski, Coffin and others. When, as in the Bernardos and Olszewski method, the carbon electrode is made positive to the work, carbon is transported through the arc and is likely to enter the metal undergoing the process, which constitutes the negative pole. This addition of carbon may render iron or steel hard and unworkable, and cause cracks to be formed during the cooling of the fused mass at the joint or filling. By the employment, in¬ stead of carbon, of an electrode of the same metal as that of the work, Slavienoff overcame this difficulty. The gradual melting of the metal electrode furnishes metal for forming joints, or for repairing or supplementing cast¬ ings which are defective ; such as those which are incomplete or contain blowholes. More recently the work is made the positive pole and this results in a greater proportion of the energy than formerly being expended in heating the metal undergoing the operation. Inasmuch as the conditions of energy supply for sus¬

taining the arc are but little different from those often found in the commercial operation of arc lamps from constant potential mains, arc welding may often be practised by connec¬ tions made to such mains. A choking or steady¬ ing resistance is put in series with the fusing arc in a branch from direct current lines at a potential difference of 200 volts or thereabout. With work such as that to which the Bernardos and Olszewski method has been found to be applicable, the current in the arc may vary from 150 amperes up to 500 or more. The potential across the arc itself will generally be from 100 to 150 volts. With the metal elec¬ trode used by Slavienoff the current needed will be greater and the arc potential less than the above amounts. It appears that in certain cases the current may even surpass 4,000 am¬ peres.

While a moderate application of these arc processes for fusing and welding iron and steel has been made, the range of operations to which they are suited is somewhat limited and their success depends largely upon the skill of the workman. He must protect not only his eye¬ sight from the glare of the large arc, but also the surface of his body, and must avoid the irri¬ tating vapors which arise from the flame. At the same time vigorous ventilation cannot

be employed, for motion of the air tends to dis¬ turb the arc and render the work more difficult. A large proportion of the energy is radiated or carried off in the hot gases from the arc. To these energy losses must be added that due to the use of the steadying resistance for obtaining stability in the current of the arc. On the other hand the appliances needed for arc fusing or welding are simple and the source of current energy often conveniently found in existing elec¬ tric circuits. One of its most recent uses has been in adding metal to rail surfaces where worn at the joints, particularly street railway rails in situ. A considerable extension of the use of arc welding has recently taken place, owing to improvements in materials and meth¬ ods and to increasing demand for its use in original construction and repair work.

Werdermann, in 1874, proposed to deflect an electric arc formed between the usual carbons by a jet of air, forming thereby an electric blow¬ pipe. More recently Zerener has in a similar way employed an arc deflected by a magnet as a sort of blowpipe for welding iron. In addition, the curious electric heating action first published by Hoho and Lagrange has been proposed for welding metals. If a negative

electrode of a direct current circuit having a potential of 100 to 150 volts is of small surface relatively to that of the positive electrode when both are im¬ mersed in a liquid bath, such as a solution of potassium or sodium carbonate, the surface of such negative electrode, where immersed, glows with light, gas bubbles arise from it, and the electrode itself heats rapidly in spite of its im¬ mersion in cold liquid. A bar of iron used as the negative electrode may thus be brought to incandescence and removed for welding, or it may even be melted under the liquid of the bath. The loss of heat in such a liquid heating process is necessarily somewhat great.

The Thomson process of electric welding, which differs radically from the arc heating operations above described, was first announced in 1886. It has since gone into extensive com¬ mercial use. No electric arc is employed, but the heat which effects the welding is solely due to the resistance of those parts of the metal pieces at the contact where they are to be welded together. This resistance is, of course, extremely low, and the delivery of sufficient energy for heating and welding is the result of the passage of relatively enormous currents. Their potential is only two or three volts, more or less. The metal pieces to be welded together are held respectively in massive clamps or vises of highly conducting metal such as copper, with a slight portion only of each piece projecting to form the joint. These projections of the pieces are brought together in firm contact, for which purpose at least one of the clamps is made mov¬ able toward and from the other, both of them being mounted on a firm support. The pieces having been adjusted to meet in correct relation for the subsequent formation of the weld uniting them, an electric current sufficient in amount to heat the meeting portions of the pieces to the temperature at which they soften and unite, is passed from clamp to clamp, thus traversing the joint and the short projecting portions of the pieces between the clamps. So heavy is the current at command that a solid bar without break spanning the space between the clamps' could be heated and melted. The completion of

the weld after heating is effected by pressure exerted to force one clamp toward the other, which results in a slight upsetting or extrusion of metal at the weld called a burr. For copper a pressure of about 600 pounds per square inch of section is usual, while with iron it is 1,200 and with tool steel 1,800 pounds or more. Nearly all of the metals, even those like antimony and bismuth which are brittle and crystalline, may be united by this process, and many different metals and alloys joined one to another. In some cases as with high carbon steels, a flux such as glass of borax, is employed to facilitate union at tem¬ peratures not high enough to burn or destroy the texture of the

metal. Mild steel and iron welds are usually made, as in ordinary forges, at weld¬ ing heat, or that which melts or fluxes the or¬ dinary black oxide scale upon the metal. The heavy welding currents cannot be conveyed without great loss to distances of even a few feet unless conductors of prohibitive section and cost be used. The welding clamps are in practice carried directly upon the secondary terminals of a special welding transformer. The Thomson welding transformer is a construc¬ tion like a lighting transformer in which the usual secondary circuit of numerous turns is replaced by a very massive conductor constitut¬ ing ordinarily only a single turn around the iron magnetic core. The primary or inducing cir¬ cuit is similar to that of the ordinal trans¬ former for alternating current and it is sup¬ plied from alternating current dynamos or lines as usual in such work. It will be seen that the secondary conductor is unique in character, be¬ ing often a bar or casting of many square inches of section of copper of short length. The circuit of this single turn secondary is completed only by the meeting ends of the work pieces in the clamps. It will thus be evident that the chief resistance or opposition to the flow of the low voltage current in the single secondary turn will be at the proposed joint or weld between the clamps. Here it is then that the trans¬ formed energy is for the most part given out as heat, the section of metal which can be welded depending upon the scale of the appara¬ tus used and the energy of the primary source which is available. The welding transformer has found convenient application in the heating of metal pieces for forging, bending, shaping, brazing or the like, in addition to welding. It has also in the Lemp process been divested of its welding clamps and applied to the local annealing of the hardened face of armor plates, so as to facilitate drilling and tapping, or cut¬ ting into desired shapes. The welds made by the Thomson process are usually butt welds, though lap welds are also made with almost equal facility. In butt welding there is of course an upset, burr, or extrusion of metal at the joint. In many cases this is not removed, and it renders the joint stronger than other adjacent sections. Oftentimes the joint is pressed or forged while still hot so as to remove the burr at the joint. In other cases the joint is fin¬ ished by filing or grinding. The welding clamps are modified in form and disposition to suit the shape and size of the pieces to be held, and the pressure used to effect the weld is either manually applied by levers or is obtained from a strained spring, or again, in large work, by hydraulic means under control by suitable valves. The heating effects of the electric cur-

rent are so perfectly adjusted by regulating ap¬ pliances that most of the metals formerly re¬ garded as unweldable, yield good results with the process. Even leaden pieces, such for ex¬ ample, as sections of lead pipe, may be joined together with great ease. The operation of the electric welder is characterized by uni¬ formity, rapidity, flexibility, cleanliness, neat¬ ness, accuracy and economy. It has found extensive application to repetition work; single machines making sometimes as many as 2,000 welds per day of 10 hours. It is used widely in the wagon and carriage industry for tires, axles, bands, fifth wheels, etc., and for wire bands for affixing rubber tires to wheels. Many parts of bicycles and automobiles are built up by electric welding. In the construction of tools and parts of machinery and particularly in the wire industry it plays an important part. An¬ other important field is in the welding of wire or strip into hoops or bands for barrels, tubs, pails, etc. Machines are in operation producing electrically welded wire fencing, in which the wires which in the fence are horizontal are welded to verticals at intervals, the action some¬ what resembling that of a loom. In joining pipe into continuous lengths or coils, and also in welding in situ street railway rails into a con¬ tinuous track the electric weld possesses a spe¬ cial adaptability. An interesting application of the electric welder is found in the production of steel tubing by the progressive welding of a longitudinal seam. A long strip of flat sheet or skelp is rolled up so as to cause the lateral edges to meet. It then passes between welding rolls whereby the heating current locally traverses the meeting edges and welds them. The operation is progressive from one end of the pipe to the other as it is fed through the machine. The result is a pipe of uniform diameter with walls of even thickness, having a delicate bead along one side where the weld has been made. This bead is removed if the pipe be subsequently mandrel drawn with a re¬ duction of its diameter. In the earlier electric welders the operations of clamping the pieces in place, applying and cutting off the electric cur¬ rent and exerting mechanical pressure, were usually manually controlled. Machines more or less automatic are now frequently employed. In recent types adapted for rapid repetition of work upon identical pieces, the action is en¬ tirely automatic ; the machine runs continuously and its sequence of actions is definitely deter¬ mined by its construction. These machines are power driven, movements being imparted for clamping the pieces as they are fed to the ma¬ chine, for closing the current switch, for exert¬ ing pressure to complete the weld, for cutting off the current and for releasing the pieces from the clamps after the operation. In wire fence and chain machines the stock is itself fed auto¬ matically and the welding continued until the machine is stopped or the material exhausted. The energy required to

effect electric welds naturally varies with the size of the pieces and with the material. It also depends upon the time consumed in the work, which time may be made shorter or longer even with exactly simi¬ lar pieces. The following table gives the results of some tests made upon different sections of iron, mild steel, brass and copper in the form of bars. The figures are only approximate and would vary considerably if the welds had been

made in times different from those given. In general, working at a greater rapidity would lessen the total power used but require larger apparatus for the increased output required dur¬ ing the welding:

ENERGY USED IN ELECTRIC WELDING BY THE THOM¬ SON PROCESS.

Section, Sq. in.

Kilowatts

Time

Total kilo-

in primary

in

watt sec-

of welder

seconds

onds

0.5

8.5

33

280.5

1.

16.7

45

751.5

1.5

23.5

55

1292.5

Iron and Steel . ■

2.

29.

65

1885.

2.5

34.

70

2380.

3.

39.

78

3042.

3.5

44.

85

3740.

4.

50.

90

4500.

0.25

7.5

17

127.5

.5

13.5

22

297.

.75

19.

29

551.

Brass .

1.

25.

33

825.

1.25

31.

38

1178.

1.50

36.

42

1512.

1.75

40.

45

1800.

i

2.00

44.

48

2112.

. 125

6.

8

48.

.25

14.

11

154.

■ 375

10.

13

247.

Copper .

.5

.625

25.

31.

16

18

400.

558.

.75

36.5

21

766.5

.875

43.

22

946.

1.00

49.

23

1127.

One of the recent and most important devel¬ opments of electric welding by the Thomson process is known as (

Projection welding is a modification of spot welding in which the

sheet metal pieces are first given small projections by stamping or otherwise. In other cases small pieces of metal are placed between the sheets at spots where the weld is to occur. Then the whole is pressed between the current carrying electrodes which may now be of such spread as to cover a num-

ber of such projections or spots at once, all being welded simultaneously. Spot welding in its various forms finds a large and rapidly extending application, particularly to sheet steel structures, such as steel car bodies, automobile bodies, metal containers, etc. It has become the general method of uniting stamped metal pieces which subsequently are to be enameled. For¬ merly, for example, handles were riveted to sauce pans before enameling and the rivets were plainly to be seen under the enamel. By spot electric welding the union is effected without visible change in the metal surfaces and the covering of enamel is in consequence uninter¬ rupted and without projections.

The process is capable of further great ex¬ tensions in its application to the union of over¬ lapped sheets or plates. Riveted joints, always more or less unsightly and often disadvan¬ tageous to construction by taking up room and giving an irregular surface, can often be abol¬ ished and the spot weld substituted therefor with benefit. Besides its advantage of leaving a smooth surface, it effects a great saving of time and economizes material. As in the case of electric welding generally, the spot weld gives rise to new modes of construction of metal objects and greatly assists the substitu¬ tion of pressed steel for castings or forgings.

Elihu Thomson.

ELECTRIC WIRELESS TELEGRAPH.

See Deforest Wireless Telegraph System ; Marconi; Telegraphy; Telegraphy, Wireless.

ELECTRICAL ALARM, or THER¬ MOSTAT, an instrument arranged to give an alarm or announcement when the temperature in its vicinity reaches a pre-determined degree. (See Electric Signaling, Automatic Fire Alarm Signals). Thermostats are also employed to automatically maintain a given temperature by opening and closing drafts, through the medium of electro-magnetically operated de¬ vices. Thermostats

are operated on open or closed circuits, as desired. There are electro¬ pneumatic and mercurial thermostats which operate by expansion of a gas or mercury, re¬ spectively.

ELECTRICAL DIAPASON, a tuning fork the vibration of which is maintained by means of electro-magnetism virtually on the principle of the electric door-bell. (See Electric Signaling). This instrument, provided with a resonator, was employed by Helmholtz in his notable experiments on the composition of sounds.

ELECTRICAL ENDOSMOSIS. See

Osmosis.

ELECTRICAL ENGINEERING. Elec¬ trical engineering is probably the youngest of all the professions, for it has hardly been recog¬ nized as a regular profession for more than 15 years past. As a result, the men who have reached prominence in it to-day have attained their positions from widely different courses of preliminary training; many of them are men who started life in other lines of work and afterward turned to electrical pursuits on ac¬ count of the sudden growth and importance of the business. In consequence of this, all meth¬ ods of preliminary education are represented

and their relative values can be estimated. The argument runs largely between two classes of men — one represented by the so-called (

In its present state electrical engineering is the most scientific of all engineering profes¬ sions. A man must be to a great extent a physicist, a chemist and a mathematician, as well as be familiar with machinery and its de¬ sign, in order to be a worker in the broadest field. Many of the problems connected with other branches of engineering can be solved by common sense and by one's sense of proportion as guided by experience and by the eye. But most of the problems in electricity are invisible, so to speak, and can be understood only through their expression in the form of symbols. Probably no one will dispute to-day that the preliminary education of an electrical engineer demands a special training in those theoretical branches, mathematics, physics, chemistry and mechanics, sufficient to train his mind into ac¬ curate methods of thought and reasoning and to supply him with the actual technical informa¬ tion which he will need in the practice of his profession. But theory alone is not all. The human mind is such that it works with difficulty in pure theory without a series of mental pictures to fix and co-ordinate the ideas, and

the study of theory is likely to make little last¬ ing impression unless the physical meaning of the theory is brought out by constant associa¬ tion with actual apparatus which demonstrates the application of the physical law. The best course of training for an electrical engineer would seem to be a broad course of education in general subjects at the preparatory school before entering college, with practical work, if possible, along lines of simple mechanics, such as carpentry, in order to train the mind into a sense of proportion and the relations of parts, which is the basis of all engineering. Next, a college course with general subjects the first year, and afterward, for the remaining years of the course, those general and theoretical sub¬ jects which have a direct bearing upon the prac¬ tice of the electrical profession, such as mathe¬ matics, mechanics, physics, chemistry, theoreti¬ cal electricity, and magnetism and thermo¬ dynamics. This should be supplemented by actual daily practical work with machinery operating by the principles covered by the theory studied and demonstrating all the phe¬ nomena incident to the theory. After gradua¬ tion an apprentice course should be pursued in some large electrical manufacturing establish¬ ment where the commercial relations of the knowledge acquired in college can be clearly set forth. Large machines can be operated which are not available at a college and experience in the installation of large plants can be obtained, and experience gained in the designing depart¬ ments where all kinds of commercial apparatus are laid out.

After a few years of this training specializa¬ tion may begin along the lines selected for the life work but preferably not before. A man makes a mistake to consider himself a qualified electrical engineer after he has been graduated from college, for he is not one. His mind has been trained into a condition where he can readily absorb the principles of the electrical profession, but that is all, and the subsequent apprentice training is as important as the col¬ lege course, in order to acquire the broad view¬ point from which to make the correct start in the direction in which a man is best fitted. It perhaps means a smaller income the year after graduation from college, but it means much more at the end of five years. But theory and practice are not the only elements necessary for ihe successful engineer. There are many qual¬ ities required in common with other profes¬ sions; executive ability, business knowledge, presence of mind and ability to handle men; nerve and resourcefulness in handling machinery in times of emergency, are all neces¬ sary to the successful engineer. These

elements cannot be acquired in the study of theory and practice alone, and many men who have stood high in their college courses have failed after¬ ward in the practice of their profession because of a lack of these qualities. The study of chemistry becomes more and more important as the profession advances, for the branch of electro-chemistry is rapidly developing and is likely to become one of the largest fields in the application of electrical science. And almost above all comes a training in the English lan¬ guage. No man who cannot express himself clearly and concisely in writing or in conversa¬ tion can hope to attain a prominent position in

his profession. The education of an electrical engineer, however, must never be considered as completed. The art advances so rapidly that constant study is necessary, even to keep up with the progress of the times. But an elec¬ trical engineer should be willing to do more than this. He should study to keep ahead of progress and do his share toward the instruc¬ tion of others.

H. W. Buck,

Consulting Electrical Engineer, New York.

ELECTRICAL MANUFACTURING INDUSTRY. The conditions as to the elec¬ trical manufacturing industries in the United States are fairly well revealed in the sta¬ tistics of the Bureau of the United States Census for 1914, giving the latest authentic figures available, although these can be supplemented by later data in various ways that bring the information up to 1917 and that illustrate the swift and enormous expansion of the various electrical arts and applications. Electrical applications divide themselves into two large groups. One of these comprises the production of apparatus ; and the other, many times larger, embraces the utilization of the apparatus chiefly through the agency of what are known as ((public utilities,)) such as teleg¬ raphy, telephony, electric lighting and power supply and electric traction. One group of in¬ dustries manufactures operating materials; the other group manufactures ˆservice.® In the United States, as sharply contrasted with Europe, these agencies are in the hands of private capital to an overwhelming degree, and the comparative figures of efficiency, economy and earning power are equally on the side of individual initiative and enterprise.

As to the production of electrical machinery, apparatus and supplies, the data are given here¬ with for 1914, when the total output for 1121 establishments was placed at a value of $359,- 412,676, against which may be placed the fact that in 1916, three concerns billed a

total sales of not less than $305,000,000. The very lowest estimate for 1917 is $600,000,000 and in view of the enhanced cost of raw material it would not be surprising if it ran in excess of that amount. These figures are revelatory of many new con¬ ditions governing the electrical arts, such as the change from steam engines to steam tur¬ bines in the generation of electrical energy, the increased use of water power, the invasion of electricity into many new fields of supply, in¬ dustrial, commercial and domestic ; the greater use of the electric motor; the advance of elec¬ tric heating; the supersession of the arc light by the larger incandescent ; the complete con¬ quest of the incandescent lighting field by the tungsten filament lamp ; the irresistible intrusion of the electric locomotive, not only into steam railway terminals but into the operation of long stretches of main line, where cheap water power is available for the generation of cur¬ rent.

It will be noted that generators have greatly increased in size, and have fallen off in value, owing to this fact. In the early days of the elec¬ tric-light and power industry it was customary to employ high speed, single valve automatic steam engines for driving belted generators, as the best regulation of speed could be obtained

with engines of that type, for incandescent lighting. The steam economy of those engines was usually as low as a consumption of 40 pounds of steam per one horse power per hour. The mechanical efficiency was rarely as great as 85 per cent and the electrical efficiency of the generators was rarely 75 per cent. Corliss type engines were used for arc light circuits where the load was uniform and close regulation was not so essential. Their economy rarely exceeded 30 pounds of water per one horse power. For incandescent lighting there was an average con¬ sumption of at least 10^4 pounds of coal per kilowatt hour and for arc lighting 8 pounds of coal per kilowatt hour. This compares with the present Interborough Rapid Transit 50,000 kilowatt steam turbo generators requiring as little as one and one-half pounds of coal per kilowatt hour ; while it is understood that the Connell Creek station of the Detroit Edison Company has an economy even superior to that. There is a 60,000 k. v. a. triple steam turbine under construction for the Interborough sys¬ tem, which will have an actual capacity of 70,000 k. v. a. and is expected to have an economy of 11 pounds of steam per kilowatt hour. The increase in the size and economy of hydro-electric generating units is equally notable. The largest water turbines for

elec¬ trical service are the three single runner units installed in the plant of the Tallassee Power Company on the Yadkin River, North Carolina, with a guaranteed rating of 31,000 horse power under an effective head of 180 feet, and 27,000 horse power under 165 feet at 154 r. p. m. The turbine runner weighs 20,000 pounds, is a single piece of solid bronze and is probably the largest casting of its kind ever made.

It is to be understood, however, that the manufacture and production of electrical ap¬ paratus and material is but a small part of the electrical industry as a whole. The total capitalization is placed as high as $12,000,000,- 000, the gross sales and earnings are rated at above $2,500,000,000, and the number of persons employed at more than 1,000,000. The ac¬ companying figures were published during 1916 which while based on earlier data can be shown to be in many respects far short of the actual¬ ity. A conservative estimate for the total service and output value of electricity in 1917

made and published by the writer is as follows :

ELECTRICITY IN UNITED STATES, 1917

Central stations . $550 , 000 , 000

Electric traction . 800 , 000 , 000

Telephony . 425,000,000

Telegraphy . 175,000,000

Isolated plants . 150 , 000 , 000

Electrical manufacturing . 600 , 000 , 000

Miscellaneous . 125, 000 , 000

Total . $2,825,000,000

As to the production of apparatus alone, three concerns reported a total around $300,- 000,000, and one concern reported at the end of 1917 orders on hand to the value of $240,- 000,000. The increase is by no means wholly in output but must take into consideration the increase in prices as exhibited in the following table which, while applying principally to elec¬ tric street railway material, is pertinent in many respects to the electrical field as a whole :

1914-16 PER CENT INCREASE IN PRICE IN TWO YEARS.

Material

Use

Approxi¬ mate per cent in¬ crease in present price as compared with price of two years ago

Copper .

Overhead system, stations and

cars .

220

Steel .

Track and shops .

300

Tin .

Babbitt, solder, cables and over-

head .

110

Lead .

Babbitt, solder, cables and over-

head .

2C0

Spelter .

Alloy metals.

All galvanized material .

Tool steel, special work .

200

200 to 800

Lumber ....

Poles, ties and shop work .

125

Leather .

Belting .

125

Rubber .

Belting, hose, insulation .

110 to 125

Cotton .

Fabrics, insulation, waste .

130 to 150

Glass .

Windows .

125

Varnish .

Car work .

135

Paint .

Cars, buildings and pole line .

125

Fibre .

Insulation .

133\

Rattan .

Seats and sweepers .

120 to 200

Paper .

Stationery and printed matter . . .

150 to 250

Dry colors . .

General paint shop work .

400

Linseed oil . .

Shop work, buildings and pole line.

250

Gears and pinions . . .

Motors and air-brake equipment. .

125

ESTIMATE OF ELECTRICAL INDUSTRIES OF THE UNITED STATES 1916.

Central electric stations .

Isolated electric stations . .

Street and electric railways — power generation, distribution

and application . . .

Street and electric railways — railway operation .

Electrified divisions of steam railroads .

Telephone . . .. i ....

Telegraph (land and ocean) .

Electric machinery, apparatus and supplies (including electric

products of other industries) .

Electrical dealers and contractors .

Electrical jobbers . . .

Investment or

Persons

Annual earnings

capitalization

employed

or sales

$3,038,000,000

104,000

$403,300,000

1,519,300,000

52,000

201,600,000

2,681,800,000

165,000

350,500,000

2,681,800,000

165,000

350,500,000

204,700,000

15,000

30,300,000

1,262,760,000

237,000

329 , 900 , 000

231,600,000

44 , 000

75,300,000

469,100,000

185,000

383.300,000

15,000,000

50,000

120,000,000

25,000,000

6,000

80,000,000

$12,129,660,000 1,023,000 $2,324,700,000

In general, mcst of the estimates are based upon returns of the United States Bureau of the Census. A comparison of the estimates in different sections of the industry on isolated electric stations made it apparently reasonable to assume that the totals for this branch are one-half of those for central stations.

Statistics for the electrified mileage of steam railroads are based upon the latest available figures of miles of track to which were applied the approximate averages of electrio and steam railroad statistics. The very costly terminals were not taken into account.

Winding the Armature of a Large Direct Current Generator, General

Electric 2 Building up a 1100 K. W. Transformer, Westinghouse Works, Pittsburgh, Pa.

Works, Schenectady, N. Y.

1 Operators Reading at the Testing Tables, General Electric Works

2 Dynamo Electric Machinery Under Test, in the Testing Department) Schenectady, N. Y.

Schenectady, N. Y.

, General Electric Works

f

jsijUL,

(UAL * nuj inJ u a* mi i jin

miim

SSI

llUJU

iiu

i fttJUUj

i mu t – .tt.u 1 1

rx

Am

■ -«£

? ?*!; ♦ **

- •
- ■ * ■

4*1 *&§ *« **! «il

P 8. If

f 1 m

mm i \

i-l». i i

Ufty

WORKS OF GENERAL ELECTRIC COMPANY, SCHENECTADY,

Departments (1) No. 18; (2) No. 60, Works of General Electric Company, Schenectady, N. Y

ELECTRICAL MANUFACTURING INDUSTRY

153

PRODUCTION IN UNITED STATES OF ELECTRICAL MACHINERY, APPARATUS AND SUPPLIES —

COMPARATIVE STATISTICS: 1914 AND 1909

Number of establishments .

Products

Total value .

Dynamos, value . . .

Direct current —

Small dynamos and automobile starter-generator sets —

Number .

V alue .

All other, including generators for direct connection to steam turbines —

Number .

Kilowatt capacity .

Value .

Alternating current, including generators for direct connection to

steam turbines —

Number .

Kilowatt capacity . ■ .

Value .

Dynamotors, motor-generators, boosters, rotary converters, double¬ current generators, etc. —

Number .

Kilowatt capacity .

Value .

Parts and supplies .

Transformers, value . . . .

Under 50 kilowatts —

Number .

Kilowatt capacity .

Value .

50 to 500 kilowatts —

Number . . .

Kilowatt capacity .

Value .

500 kilowatts and over —

Number .

Kilowatt capacity .

Value .

Rheostats, resistances, controllers, motor-starting and speed-controlling

devices, feeder-potential regulators, and reactances .

Generator- voltage regulators . . . _ . .. .

Rectifying apparatus (including rotating commutators, electric valves,

mercury rectifiers and vibrating commutators) .

Switchboards, panel boards and cutout cabinets for light and power .

Motors, value .

Direct current for industrial power and railways —

Number .

Horse power .

Value .

Alternating current for industrial power and railways —

Number .

Horse power .

Value .

For automobiles — 5

Number .

Horse power .

Value .

For fans .

For miscellaneous uses .

Motor parts and supplies .

Batteries, parts and supplies, value . . .

Storage —

Value of batteries .

Weight of plates, pounds .

Value of parts and supplies .

Primary —

Liquid and testing — ‘ M ■*” *

Number .

Value .

Dry —

Number . . . , . . .

Value . . .

Value of parts and supplies . , .

Carbons (including furnace, lighting, brushes, battery and miscellaneous) . .

1914 i

1909 i

Per cent of in¬ crease,2

1909-1914

1,121

1,151

—2.6

$359,412,676

$240,037,479

49.7

$23,233,437

$17,231,804

34.8

208,545

$5,933,273

13,882

414,222

9,633

$4,710,524

221,221

$2,967,465

2,512

2,909

— 13. G.

1,188,005

991,728

19.8′

$7,437,445

$8,370,524

—11.1

8,393

2,291

266.3′

780,009

295,079

164.3-

$5,367,895

$3,154,733

70.2-

$1,527,359

$996,023

53.3

$13,120,065

$8,801,019

49.1

110,177

72,776

51.4

762,707

577,408

32.1

$7,316,615

$4,184,832

74.8

4,857

544,443

$2,625,414

3,953

43.3

1,058,021

77.9

809

$4,616,187

25.7

1,337,644

$3,178,036

-

$9,543,224

3 $2,674,963

$245,154

(*)

$147,965

(4)

$8,989,111

$5,971,804

50.5

$44,176,235

$32,087,482

37.7

133,492

980,820

$13,316,489

257,223

62.5

2,410,369

19.6

284,500

$24,604,938

31.2.

1,901,975

$18,969,660

~i >

11,880

2,796

36,858

12,471

$1,351,442

$294,152

$4,835,850

$2,450,739

97.3

$1,190,564

$1,942,874

—38.7

$4,512,230

$2,794,779

61.5

$23,402,455

$10,612,470

120.5

$10,615,150

$4,243,984

150.1

41,079,047

23, 119,331

77.7

$2,465,814

$434,225

467.9

306,351

344,650

—11.1

$802,525

$729,513

10.1

71,092,438

33,988,881

109.2

$8,719,164

$4,583,082

90.2

$799,802

$621,666

28.7

$3,602,741

$1,934,864

86.2

154

ELECTRICAL MANUFACTURING INDUSTRY

PRODUCTION IN UNITED STATES OF ELECTRICAL MACHINERY, APPARATUS AND SUPPLIES —

COMPARATIVE STATISTICS: 1914 AND 1909 — Concluded

•t

19141

19091

Per cent of in¬ crease,1 2 3

Arc lamps:

With luminous or metallic arcs —

Number .

Value .

1909-1914

22,846

$441,992

With flame arcs —

Number .

Value .

With carbon arcs —

Number .

Value .

Searchlights, projectors and focusing lamps . .

Incandescent lamps, value .

Tungsten —

Number . ; .

Value .

Carbon filament —

Number .

Value .

Gem, vacuum and vapor, nitrogen, glower and tantalum .

Decorative and miniature lamps, X-ray bulbs, vacuum tubes, etc ....

Sockets, receptacles, bases, etc. . . . . .

Electric lighting fixtures 6 .

Telegraph apparatus, value . .

Intelligence (key, sounder, etc.) .

Police, fire, district, etc .

Wireless apparatus . _ . .

Switchboards and telegraph parts and supplies .

Telephone apparatus, value .

Substation instruments —

Central battery, value .

Magneto, value .

Interior systems —

Number .

Value .

Central switchboards —

Manual —

Central battery, value .

Magneto, value . . . . .

Automatic .

Private branch exchange switchboards —

Number .

Value .

Parts and supplies .

Electric heating apparatus, value .

Air heaters, including those for cars .

Cooking devices —

Stoves and ranges .

Miscellaneous cooking devices .

Flat irons .

Welding apparatus (not including the motor-generator set) .

Electric measuring instruments, value . , .

Station apparatus . . .

Testing and scientific .

Meters for consumers' circuits .

Electric locomotives, mine and railway:

Number .

Value .

Electrical therapeutic apparatus . .

Magneto-ignition apparatus, sparks, coils, etc . .

Electric switches, signals and attachments .

Annunciators .

Electric clocks and time mechanisms .

Insulated wire and cables 7 ....

Electric conduits (underground and interior) .

Lightning arresters . .

Fuses . . . . .

Circuit fittings of all kinds . . . .

All other electrical machinery, apparatus and supplies .

All other products, including amount received for custom work and repairing . .

4,631

123,985

—71.7

$153,433

$1,706,959

—56.5

7,635

$146,717

$2,081,545

$935,874

122.4

$17,350,385

$15,714,809

10.4

74,434,059

11,738,619

534. 1

$11,886,354

$6,241,133

90.5

14,092,055

55,038,378

—74.4

$1,397,572

$6,157,066

—77.3

$2,363, 730

$2,715,991

—13.0

$1,702,729

$600,619

183.5

$5,512,609

$4,521,729

21.9

$3,383,955

$2,200,668

53.8

$2,248,375

$1,957,432

14.9

$201,956

$197,669

2.2

$1,253,954

$1,126,658

11.0

$672,575

$448,262

50.0

$119,890

$184,843

—35.1

$22,815,640

$14,259,357

60.0

$3,916,869

$1,799,834

62,258

$510,509

$10,137,534

80.6

$10,701,764

•

$374,851

$1,002,722

3,693

2,252

64.0

$448,203

$369,915

21.2

$4,060,888

$3,751,908

8.2

$4,034,436

$1,954,112

106.5

$352,617

$671,413

$919,533

155.7

$1,327,183

$1,466,620

$951,074

54.2

$216,603

$83,505

159.4

$8,786,506

$7,800,010

12.6

$1,585,500

$1,639,202

—3.3

$1,073,060

$546,970

96.2

$6,127,946

$5,613,838

9.2

900

/A

$3,720,914

| (4 *)

$2,653,098

$1,107,858

139.5

$22,260,847

$6,092,343

265.4

$6,393,551

$5,377,843

18.9

263 , 806

$235,567

12 0

$410,774

$352,513

16 5

$69,505,573

$51,624,737

34.6

$4,874,709

$5,098,264

—4.4

$1,188,773

$940,171

26.4

$1,757,430

$1,001,719

75.4

$2,067,683

$1 ,080,287

91.4

$27,276,294

$18,995,176

43.6

$23,623,244

$17,765,645

33.0

•

1 Includes for 1914, number and output of 91 establishments engaged primarily in other lines of industry, but which manufactured electrical machinery, apparatus and supplies valued at $24,261,961; and for 190,9, number and output of 142 similar establishments which made electrical machinery, apparatus and supplies to the value of $18,728,916.

2 A minus sign (—) denotes decrease.

3 Rheostats and resistances only.

4 Figures not available.

B Includes a considerable number of starting motors for gasoline automobiles, not separately reported as such.

6 Not including fixtures made by establishments engaged primarily in the manufacture of gas, and electric fixtures^

7 Including insulated wire made in wire-drawing mills.

Electric Light and Power Statistics.— It

is unfortunate that the authoritative statistics as to the four great

groups of electrical public utilities which manufacture ((service® as com¬ piled by the government — telegraphy, tele¬ phony, electric light and power* and electric street railways — do not come down to a later period than 1912. Their figures under an act of Congress are taken by the United States Bureau of the Census every five years, the last being compiled in 1912 and the next not being due until 1917, and not becoming available be¬ fore the end of 1918 at the earliest. The data for 1912 are therefore presented herewith sub¬ ject to the expansion up to date under the average rates of increases that are apparently revealed.

6,000,000 customers in 1916. At least 10,000,000 devices for consuming current, outside of power and light purposes, were then in circuit — flat¬ irons, vacuum cleaners, coffee percolators, grills, toasters, etc. — but electrical refrigeration except in bulk and especially in the production of (

COMMERCIAL AND MUNICIPAL CENTRAL ELECTRIC STATIONS: 1912, 1907 and 1902

1912

1907

1902

Per cent of

increase :

1902-1912

Number of stations 1 .

5,221

4,714

3,620

44 2

Commercial .

3,659

3,462

2,805

30. 4

Municipal .

1,562

1,252

815

91.7

Total income 2 .

$302,115,599

$175,642,338

$85,700,605

252.5

Light, heat and power, including free service .

$286,980,858

$169,614,691

$84,186,605

240.9

All other sources .

$15,134,741

$6,027,647

$1,514,000

899.7

Total expenses, including salaries and wages 3 .

$234,419,478

$134,196,911

$68,081,375

244.3

Total number of persons employed .

79,335

47,632

30,326

161.6

Total horse power .

Steam engines and steam turbines 4 —

7,528,648

4,098,188

1,845,048

308.0

Number .

7,844

8,054

6,295

24.6

Horse power .

Water wheels —

4,946,532

2,693,273

1,394,395

254. 7

Number .

2.933

2,481

1,390

111.0

Horse power .

Gas and oil engines —

2,471,081

1,349,087

438,472

463.6

Number .

1,116

463

165

576.4

Horse power .

111,035

55,828

12,181

811.5

Kilowatt capacity of dvnamos .

5,134,689

2,709,225

1,212,235

323 . 6

Output of stations, kilowatt hours .

Estimated number of lamps wired for service:

11,532,963,006

5,862,276,737

2,507,051,115

360.0

Arc .

505,395

5 562 , 795

385,698

31.0

Incandescent and other varieties .

Stationary motors served:

76,507,142

6 41 , 876 , 332

18,194,044

320.5

Number .

435,473

167,184

101,064

330.9

Horse power capacity .

4,130,619

1,649,026

438,005

843.1

1 The term “station” as here used may represent a single electric station or a number of stations operated under the same ownership.

2 Exclusive of $36,500,030 in 1912, $20,093,302 in 1907 and $7,703,574 in 1902, reported by street and electric railway companies as income from sale of electric current for light or power or from sale of current to other public service corpora¬ tions.

3 In addition to salaries and wages, includes the cost of supplies and materials used for ordinary repairs and replace¬ ment, advertising, fuel, mechanical power, electrical energy purchased, taxes, and all other expenses incident to operation and maintenance, and for 1912 charges for depreciation and charges for sinking fund.

4 Includes auxiliary engines.

5 Includes, for purposes of comparison, 7,082 arc and 267,997 incandescent lamps reported by the electric companies to light their own properties. Lamps used for such service were included in the total number reported in 1912.

Various items in connection with the central station electric light and power industry may here be noted. Statistics as to its income are regularly compiled by the Electrical World on a basis in excess of 60 per cent of the totals re¬ ported from month to month; and these show for 1916 an income of not less than $425,000,000 from electric; service. If the return from other service such as sale of electrical supplies, steam heating, refrigeration and return on investments be considered, the total 1915-16 income of the industry cannot possibly be put lower than $450,000,000, and it is probably far in excess of that. The number of electric meters on all central station consumption circuits in 1912 was 3,617,189, coinciding very closely with the number of customers, and it is estimated on this basis and others that there were not less than

though in projection and searchlight use it has made such strides that an arc search light operating in New York has made its beam visible in Philadelphia, 90 miles away. There is also a large use of arc lights in theatrical and motion picture work. Owing to the ad¬ vancing perfection of the incandescent lamp through the stages of carbon, metallized car¬ bon, tantalum and tungsten filaments, the num¬ ber of spherical candle power hours delivered for one cent has risen from 13.9 in 1885 to 71 in 1916, an increase of nearly 500 per cent in about 30 years, during which time the price of the lamp and the price of electrical energy have both decreased enormously. The rate here given is figured on operation at 1,000 hours of energy at 10 cents per kilowatt hour for current.

Among the chief advances of the period in

electrical development outside of railway work have been those in electro-chemical and electro¬ metallurgical development, both stimulated un¬ doubtedly by the great war and both dependent upon the supply of cheap current. Thus one plant building in 1916 in California was to use 2,500 horse power of electrical energy generated by a hydro-electric company, with an output of 5,000 tons of caustic soda and 10,000 tons of ˆbleach.® The electrolytic production of hydro¬ gen and oxygen has increased enormously, so that over 300,000,000 cubic feet of hydrogen per year are thus manufactured in the United States. It is interesting to note, however, that while the electrical fixation of atmospheric nitrogen has increased enormously abroad, representing about 300,000 tons at the beginning of 1916, or a gain of over 200 per cent in three years, requiring 1,000,000 horse power, little corresponding activity has been shown in the United States up to this time of writing; al¬ though several processes of proved value are of American origin. On the contrary, the develop¬ ment of the electric steel furnace has been re¬ markable. Electrical castings command a pre¬ mium where unusual durability and resistance to stress are needed. On 1 Jan. 1916, about 73 electric steel furnaces were in operation in the United States with an output of about 100,000 tons per year, but a terrific jump was made during 1916, so that the number of American furnaces was at least doubled, while their out¬ put has been estimated at 1,000,000 tons by a conservative authority. Probably the United States has now more electric furnaces than any other country.

The business of the central station has a constantly growing diversity factor. The revenue of one leading system in 1916 was derived as follows: Commercial lighting, 37 per cent ; power for industrial and general pur¬ poses, 22 per cent; residence lighting, 18 per cent ; power for electric railway use 23 per

cent. The item of residence lighting reveals one of the large opportunities before the cen¬ tral station, and includes an endless variety of apparatus and appliances, ranging from the curling iron to the electric range for cooking. In other cities than the one quoted the propor¬ tion of commercial and domestic service would average higher, although taking the country as a whole perhaps only one house or family in every five has electric service. However, very few new houses, even in remote rural districtsˆ are built now without electrical wiring.

Electric Railway Statistics. — Herewith are given the latest available official statistics for the electric street railways of the United States, in this case, as in those of electric lighting, being the . Census Office figures for 1912, the next compilation not being made by the gov¬ ernment until 1917 and not available before 1918-19. The present figures serve, however, as a safe basis from which to estimate the advance in the succeeding five years in almost every respect at an average rate of increase not in excess of 8 per cent. It is a well-known fact that, as to surface traffic, street railways have been subjected to a serious competition from the automobile <(jitney,):) but this element of loss has been largely reduced ; while on the other hand it has stimulated the street railways to develop many types of new and better service, adding to the return on the investment and to the satis¬ faction of the public. While the surface trac¬ tion lines — trolley or slot-conduit — have been working out their own salvation through this strenuous period, elevated, subway and steam railroad electrification have undergone a mar¬ velous expansion as indicated by other statis¬ tics. The gross income of operating street railways — virtually all electric- — is given for 1912 as $520,000,000. The income of all electric service, urban, interurban and main line, is esti¬ mated for 1917 at not less than $800,000,000.

UNITED STATES ELECTRIC RAILWAY STATISTICS.

1912

1907

1902

PER CENT OF INCREASE1

1902-1912

1907-1912

1902-1907

Number of companies .

1,260

1,236

987

27.7

1.9

25.2

Operating .

975

945

817

19.3

3.2

15.7

Lessor .

285

291

170

67.6

—2.1

71.2

Miles of line .

30,437.86

25,547.19

16,645.34

82.9

19. 1

53 5

Miles of single track2 .

41,064.82

34,381.51

22,572.52

81.9

19.4

52.3

Rolling stock:

Cars, number .

94,016

83,641

66,784

40.8

12.4

25.2

Passenger .

76,162

70,016

60 , 290

26.3

8.8

16. 1

All other .

Electric locomotives .

17,854

277

13,625

117

6,494

3

174.9

31.0

109.8

Persons employed by operating com¬ panies:

Number .

282,461

3 221,429

3 140,769

100 7

27.6

57.3

Salaries and wages .

Salaried employees —

$200,890,939

$150,991,099

$88,210,165

127.7

33.0

71.2

Number .

23,271

11,700

7,128

226.5

98.9

64. 1

Salaries .

$26,128,786

$12,909,466

$7,439,716

251.2

102.4

73.5

Wage earners —

Average number .

- 259,190

209,729

133,641

93.9

23.6

56.9

Wages .

$174,762,153

$138,081,633

$80,770,449

116.4

26.6

71.0

Power:

Horse power, total .

3,665,051

2,519,823

1,359,285

169.6

45.4

85.4

Steam (including turbines) and gas engines —

Number .

2,312

3,409

2,652

—12.8

—32.2

28.5

Horse power .

3,193,744

2,427,862

1,310,132

143.8

31.5

85.3

Water wheels —

Number .

383

228

159

140.9

68.0

43.4

Horse power .

471.307

91,961

49,153

858.9

412.5

87.1

Kilowatt capacity of dynamos .

2 , 508 , 066

1,723,416

898,362

179.2

45 . 5

91.8

Output of stations, kilowatt hours. . Current purchased, kilowatt hours. .

6,052,699,008

2,967,318,781

4,759,130,100

(5)

2,261,484,397

(5)

167 6

27. 2

110.4

ELECTRICAL MANUFACTURING INDUSTRY

157

UNITED STATES ELECTRIC RAILWAY STATISTICS — Concluded

•

1912

1907

1902

PER CENT OF INCREASE1 2 3 4 *

1902-1912

1907-1912

1902-1907

Traffic:

Passengers carried .

12,135,341,716

9,533,080,766

5,836,615,296

107.9

27.3

63.3

Revenue .

9,545,554,667

7,441,114,508

4,774,211,904

99.9

28.3

55.9

Transfer .

2,423,918,024

1,995,658,101

1,062,403,392

128.2

21.5

87.8

Free .

165,869,025

96 308 157

(5)

7? 2

Revenue car mileage .

1 ,921 ,620ˆ074

1,617,731,300

1 , 144,430,466

67.9

18.8

41 . 4

Passenger .

1,885,870,157

1,583,831 , 199

1 , 120, 101 ,944

68.4

19. 1

41 4

Express, mail and freight .

35,749,917

33,900,101

24,328,522

46.9

5.5

39 3

Revenue car hours 6 .

190,478,140

151 ,338,944

65,869 342

Passenger .

187,590,223

148,678,052

65 403 287

Express, mail and freight .

2,887,917

2, 660ˆ892

[$ i

466ˆ055

Average number of revenue pas-

sengers —

Per mile of track operated 7 . . .

232,556

216,522

212,217

9.6

7.4

2.0

Per revenue passenger car mile .

5.06

4. 70

4.26

Per revenue passenger car hour.

48.38

43 . 06

33.28

Condensed income accounts:

Operating companies —

Gross income 8 .

$585,930,517

$429,744,254

$250,504,627

133.9

36.3

71.6

Operating revenues .

567,511,704

418,187,858

247,553,999

129.2

35.7

68.9

Transportation rev-

enues .

520,184,773

390,276,347

235,997,005

120.4

33.3

65.4

Non -transport a t i o n

revenues .

47,326,931

27 911 511

11 556 994

309 5

fiO A

141 S

Income from other sources.

18,418,813

11,556,396

2,950,628

524. 2

59.4

291.7

Operating expenses .

332,896,356

251,309,252

142,312,597

133.9

32.5

76.6

Net earnings (operating rev-

enues less operating ex-

penses) .

234,615,348

166,878,606

105,241,402

122.9

40.6

58.6

Gross income, less operating

expenses .

253,034,161

178,435,002

108,192,030

133.9

41.8

64.9

Deductions from income .

191,123,408

138,094,716

77,595,053

146.3

38.4

78.0

Taxes .

35,027,965

19,755,602

13,078,899

167.8

77.3

51.0

Interest on funded and

floating debt and mort-

gages .

98,025,338

63,740,744

38,085,911

157.4

53.8

67.4

Rent of leased lines and

terminals .

44 784 521

48 022 596

25 518 225

75.5

_ A 7

88.2

Miscellaneous .

13,285,584

6,575,774

912,018

Net income .

61,910,753

40,340,286

30,596,977

102.3

53.5

31 8

Dividends .

51,650,117

26,454,732

15,882,110

225.2

95.2

66.6

Surplus .

10,260,636

13,885,554

14 714 867

— 30 3

- — 26 1

S 6

Lessor companies —

Gross income 9 .

35,605,367

47,913,249

26,138,899

36.2

—25.7

83.3

Rentals from operating

companies ....

35 144 521

47 500 953

26 116 884

34 6

— 26 0

81.9

Miscellaneous income ....

460ˆ846

412,316

22,015

11.8

Deductions from income . . .

16,090,372

19,465,984

8 770 7QJ.

83.3

1 7 ˆ

121.7

Interest on funded and

other debt ....

15 234 132

18 030 5^2

8 376 559

81 9

— 1 5 5

115 2

Miscellaneous deductions .

856 [240

1,435,462

402 , 735

112.6

—40.4

256.4

Net income .

19 514 995

28 447 265

17 359 605

17 4

— 31 4

63 9

Dividends .

19,342,101

28,030.542

17,157,061

li! 7

—31.0

63.4

Surplus .

172,894

416,723

202,544

— 14 6

— 58 5

105.7

Capitalization:

Total .

4,708,568,141

3,774,772,096

2,308,282,099

104.0

24. 7

63.5

Ooerating companies .

3,956,718,023

2,811,876,374

1,775,468,781

122.9

40. 7

58.4

Lessor companies .

751 850 118

962 895 722

532 813 318

41 1

— 21 9

80 7

Capital stock .

2,384,344,513

2,097,708,856

1,315,572,960

81.2

13.7

59.5

Operating comoanies .

1,957,300,149

1,543,269,002

982,969,070

99. 1

26.8

57.0

Lessor companies .

427,044,364

554,439,854

332,603,890

28. 4

—23.0

66. 7

Funded debt .

2,324,223,628

1,677,063,240

992,709,139

134. 1

38.6

68.9

Operating companies .

1,999,417,874

1,268,607,372

792,499,711

152.3

57.6

60. 1

Lessor companies .

324,805,754

408,455,868

200,209,428

62.2

—20.5

104.0

1 A minus sign (—) denotes decrease.

2 Includes track lying outside the United States, namely — 1912, 31.91 miles; 1907, 27.52 miles; and 1902, 4.20 miles. Exclusive of track not operated.

3 For 939 companies in 1907 and for 797 companies in 1902.

4 Number employed 16 Sept. 1912.

6 Figures not available.

6 Represents 899 companies in 1912, 734 companies in 1907 and 390 companies in 1902.

7 Exclusive of companies doing freight traffic only and in 1902 of four companies not reporting revenue passengers.

8 Exclusive of six companies in 1907 and of 18 companies in 1902, which failed to furnish this information.

9 Exclusive of 12 companies in 1902, which failed to furnish this information.

Telephony and Telegraphy. — The general statistics of the telegraph and telephone indus¬ tries of the country are shown both comprehen¬ sively and comparatively in the following table. These two branches of the great modern art of the communication of intelligence are separate and distinct, yet are very closely interwoven in their physical relationships ; and at various times and in various ways have been largely con¬ ducted financially as one business. The economic

reasons for such a combination are not far to seek and are recognized in the existence in most countries of a united telegraph and telephone governmental administration ; whereas in the United States such a policy, under the pre¬ vailing private ownership, has been declared illegal. American telephone and telegraph sys¬ tems as to apparatus used and results obtained are in general infinitely superior to anything prevailing elsewhere. A point to be noted in

the accompanying table is the relatively dis¬ proportionate magnitude of the younger art, telephony, in all respects, particularly invest¬ ment and earnings.

depots, being placed at 30,000. The annual re¬ port of the Western Union Telegraph Company for 1917 is a sufficient indication of revived prosperity now and in recent years. The report

TELEPHONE AND TELEGRAPH SYSTEMS — COMPARATIVE SUMMARY: 1912, 1907 AND 1902.

Census

Total

Telephones 1

Telegraphs 2 3

PER Cl TO’

Tele¬

phones

ENT OF

rAL

Tele¬

graphs

Number of systems and lines .

1912

32,261

32,233

28

99.9

0. 1

1907

22,998

22,971

27

99.9

0. 1

1902

9,161

9,136

25

99.7

0.3

Miles of single wire .

1912

22,062,522

20,248,326

*1, 814, 196

91.8

8.2

1907

14,577,325

12,999,364

1,577,961

89.2

10.8

1902

6,218,801

4,900,451

1,318,350

78.8

21.2

Ocean eahle nautical miles .

1912

67,676

67,676

100.0

1907

46,301

46,301

100.0

1902

(4)

0)

Employees and salaries and wages:

Average number .

1912

6 220, 656

183,361

37,295

83.1

16.9

1907

172,203

144, 169

28,034

83.7

16.3

1902

106,379

78,752

27,627

74.0

26.0

Salaries and wages .

1912

$121,005,555

$96,040,451

$24,964,994

79.4

20.6

1907

$86,087,376

$68,279,127

$17,808,249

79.3

20. 7

1902

$51,295,294

$36,255,621

$15,039,673

70. 7

29.3

Capital stock and bonds outstanding .

1912

$1,213,798,950

$991,294,115

$222,504,835

81.7

18.3

1907

$1,134,909,579

$814,616,004

$220,293,575

79.3

29.7

1902

$510,977,583

$348,031,058

$162,946,525

68. 1

31.9

Income .

1912

$319,844,077

$255,081,234

$64,762,843

79.8

20.2

1907

$236,045,615

$184,461,747

$51,583,868

78.2

21.8

1902

$127,755,574

$86,825,536

$40,930,038

68.0

32.0

Expenses .

1912

$262,133,861

$203,754,909

$58,378,952

77.7

22.3

1907

$182,681,918

$140,802,305

$41,879,613

77.1

22.9

1902

$96,112,805

$65,164,771

$30,948,034

67.8

32.2

1 Includes farmer or rural lines, and in 1907 and 1912 systems reporting annual incomes of less than $5,000; therefore, except for number of systems or lines and miles of wire, figures do not agree with those shown in other tables.

2 Does not include wireless telegraph systems.

3 Exclusive of 314,329 miles of wire owned and operated by railway companies.

4 Not reported.

6 Number employed 16 Sept. 1912.

The extent to which the condition of the times affect electrical utilities is strikingly shown in the fact that while for the period of eight months in 1917 the American (Bell) Tele¬ phone and Telegraph Company's earnings rose from $171,608,490 to not less than $194,337,712, the operating net income was but $47,439,392 as compared with $47,586,666. The whole gain of nearly $23,000,000 was thus negatived with $150,000 more thrown in; but the gain was there all the same, and in due time the larger interest charges due to rapid increases of capital will work out to advantage. On the basis of total operating revenues of the Bell system of $270,000,000 the year 1917 will show at 10 per cent increase an amount well in excess of $290,000,000. For telephony as a whole, includ¬ ing the independent systems, a total of, say, $425,000,000 might be set down. The physical statistics of the Bell telephone system and its growth are strikingly shown in the accompany¬ ing table.

Telegraphy. — As an industry the telegraph showed a remarkable recovery following the outbreak of the European War, and at the end of 1917 there were no fewer than 60,000 tele¬ graph operators engaged at telegraph centres, local offices, brokers' offices, etc., the number of distinctively telegraph offices, including railroad

showed that the company in 1917 experienced the most prosperous year in its history. The earnings available for common dividends were equal to $12.79 per share as against $12.42 in the previous year. This amount was earned on almost $100,000,000 stock. During 1917 the company paid 6ˆ4 per cent dividends, compared with Sy2 per cent in 1916. The statement for 1917, with comparison, follows :

Earned

Gross income Surplus income on stock

1917 . $78,400,000 $12,766,000 $12.79

1916 . 63,621,000 12,395,000 12.42

1915 . 51,171,000 10,167,000 10 19

1914 . 46,264,000 5,371,000 5.38

1913 . 45,783,000 3,234,000 3.24

1912 . 41,661,000 4,003,000 4.01

1911 . 35,478,000 5,371,000 5.38

1910 . 32,754,000 5,587,000 5.60

These significant figures are matched by those with regard to wireless telegraphy. Thus, gross earnings of the Marconi Wireless Tele¬ graph of America have nearly doubled during the period of the war, while expenses, including taxes, were less during 1917 than in 1914. The company's net income for 1917 was $609,430, and undivided profits and reserves on 31 Dec. 1917 amounted to $2,150,000. The capital stock is

$10,000,000.

Electrical Export Trade.— The effect of

the European War has been felt generally in the export of American manufactures, but in this respect electrical goods have been a con¬ spicuous item. The foreign demand for Ameri¬ can electrical apparatus and supplies, even under the severe limitations imposed by lack of ships and many closed markets, has carried the strictly electrical exports from $19,771,757 in the year ending 30 June 1915 to no less an amount than $52,158,773 in the corresponding period 1916-17. The chief gains were in insulated wires and cables from $1,911,850 to $7,191,684; electrical

in use in modern power stations on land, con¬ nected to two independent induction motors mounted on each of the four propeller shafts. It is quite probable that details as to any part of this tremendous innovation in naval equip¬ ment should not be expected until the war is over. Many advantages for this method of propulsion are claimed by the designers and disputed by critics. Three battleships requiring 33,000 horse power each, of the same type, have also been provided for in naval plans ; and one of these, the superdreadnought California , cor-

Total miles of pole lines .

Miles of underground conduit (length of single duct)

Miles of underground wire .

Miles of submarine wire .

Miles of aerial wire .

Total miles of wire .

Comprising toll wire .

Comprising exchange wire .

Total .

December

31, 1910

282,877

30,165

5,992, 303 24,636 5,625,273

11,642,212

1,963,994

9,678,218

11,642,212

December

31, 1915

December

31, 1916

330,602

337,289

44,510

47,120

10,536,837

36,314

7,932,394

11,468,525 41 ,172 8,340,618

18,505,545

19,850,315

2,453,483 I

16,052,062

18,505,545

2,682,910

17,167,405

19,850,315

Increase

6,687

2,610

931,688

4,858

408,224

1,344,770

229,427

1,115,343

1,344,770

Miles of phantom circuit .

Total exchange circuits .

Number of central offices . .

Number of bell stations (owned)* .

Number of bell connected stations .

Total stations . .

Number of employees .

Number of connecting companies, lines and systems

Exchange connections daily .

Toll connections daily .

115,506

2,082,960

4,933

3,933,056

1,949,663

5,882,719

120,311

17,845

21,681,471

602,539

196,841

3,174,271

5,300

5.968.110

3. 183. 111

9,151,221

156,294

28,306

25,183,799

819,030

221,994

3,459,069

5,397

6,545,490

3,301,702

9,847,192

179,032

30,358

28,530,073

889,860

25,153

284,798

97

577,380

118,591

695,971

22,738

2,052

3,346,274

70,830

- Includes private line stations.

\

batteries from $967,146 to $3,286,674; electric motors from $2,818,743 to $5,895,696; trans¬ formers from $624,483 to $1,265,459; telegraph instruments from $76,271 to $539,389; incan¬ descent lamps from $575,072 to $2,301,407 ; electric meters from $2,818,743 to $5,895,696.

Electrical Ships.— A decided novelty in the field of electrical manufacture is the equipment of electrically propelled ships. The world is familiar with the use of launches driven by storage batteries and with submarine boats in which the same motive power is employed ; but in the modern electrical ship propulsion is secured by means of electrical energy fed from steam turbine generators to electric motors mounted on the propeller shafts. The success of this method in the United States collier Jupiter would seem to be very emphatically evidenced in the provision in the Navy Bill of 1916 for four great battleships or cruisers each requiring 180,000 horse power delivered to four screw shafts turning at full speed at about 250 revo¬ lutions per minute, which yield a rate of travel through the water of 35 knots per hour. Each of the ships is to have installed four high sneed turbine-driven generating units, similar to those

responding to the present direct steam-driven Arizona, is under construction. No other nation has yet ventured on such an experiment.

Thomas C. Martin,

Secretary National Electric Light Association.

ELECTRICAL MEASURING INSTRU¬ MENTS. The four fundamental electrical quantities which are being constantly measured in electric circuits are ohms, amperes, volts and watts. Another quantity of much commercial importance is watt hours.

The usual method of measuring ohms, that is, the electrical resistance of a circuit, is to use a Wheatstone Bridge, which is described elsewhere. The electrical resistance of a cir¬ cuit may also be measured by what is called Mall of potential method,® which consists in sending a measured current through the cir¬ cuit and measuring the difference of potential between the terminals of the circuit, as illus¬ trated in Fig. 1. When the current is measured in amperes and the difference of potential is measured in volts, the resistance is obtained by taking the ratio of the volts to the amperes. The

instruments used in this measurement are

ammeters and voltmeters, which are described below.

In measuring amperes, advantage may be taken of any one of three different physical effects of the electric current: (1) The elec-

Fig. 1. — Arrangement for measuring resistance by “ fall of potential.”

tro-chemical effect, (2) the magnetic effect, and (3) the heating effect. Instruments which are used for measuring currents by taking advan¬ tage of the first of these phenomena are called voltameters. When an electric current is passed through a dilute solution of sulphuric acid and water, the water is electrolyzed and the com¬ ponent gases, oxygen and hydrogen, are given off respectively at the two metallic terminals by means of which the current enters and leaves the water. These two terminals may be placed in the two limbs of a vertical U tube, such as the arrangement illustrated in Fig. 2, where A and B are the two ends of the U tube and EE are the two metallic electrodes.’ The arrow shows the direction of the flow of the electric current from the battery. A riser C is provided to maintain the supply of acidulated water as the gases collect in the upper limbs of the tube.

Fig. 2. — Water Voltameter.

A water voltameter such as is here illustrated has not been found convenient or satisfactory for measuring currents, and voltameters in which the electrolytes are the solutions of salts of metals are preferred for actual measurements. Copper plates in a solution of copper sulphate

may be used or silver terminals in a solution of nitrate of silver. Voltameters are not now used in practice, as they are not sufficiently convenient for general use; but the silver volta¬ meter at one time proved to be so satisfactory for use as a standard that the International unit of current (the ampere) is defined as the current which flowing for one second through a suitable voltameter will deposit .001118 grams of silver on the cathode.

Most of our common instruments for meas¬ uring currents depend upon the magnetic effect of the current for their indications, and each is really a modified galvanometer provided with a pointer to indicate

the deflections of the needle or movable coil. Such instruments ar¬ ranged for convenient, everyday measurements of electric currents are generally called am¬ peremeters or ammeters, and they are made in numerous forms, some of them intended to be mounted upon switchboards in dynamo rooms, and others made up in more or less portable form so that they may be carried around to be used at any convenient place. The switchboard instruments — namely, those in¬ tended to be mounted on switchboards — are used in large numbers in electric lighting plants or works, where they may be seen mounted upon marble or slate boards along with switches for controlling the current. They are there used to show the dynamo attendants how much cur¬ rent is being generated by the plant at any moment and what proportion is furnished by each dynamo.

Portable forms of these instruments are ordinarily used in laboratories for experimental work.

According to the mechanical details entering into their construction electromagnetic ammeters may be roughly divided into three classes: (1) Those having soft iron parts which are moved by the magnetic attraction set up by the current in the coils of the instrument; (2) those having permanently magnetized parts which are acted upon by the magnetic force set up by a current in the coils of the instrument, either the coil or the magnet moving under the influence of the magnetic force; (3) those having no iron in their construction, but having two coils, one of which is moved by the magnetic force ex¬ erted between them when a current flows in both.

The moving parts of these instruments are usually mounted on pivots which are carefully finished to reduce the friction to a small value, and the instruments may be considered equiva¬ lent to galvanometers arranged with the moving parts mounted on pivots, instead of being mounted upon a delicate suspension, and each provided with a pointer arranged to play over a scale graduated to read in amperes.

If the magnetic force caused by the current in the coils of an ammeter had nothing except the friction to overcome, every current capable of moving the pointer would pull it entirely across the scale. As the instrument should be constructed so that the range of movement of the pointer is proportional to the current in the windings, a proper force must be arranged to hold the pointer back, and thiˆrnay be done by properly counter-weighting theˆarts or using a suitable spring to oppose the magnetic force set up by the current.

Instruments of the first class may be cheaply

constructed, and formerly were commonly made by dynamo builders for use in electric light plants, but it is difficult to make them extremely accurate because the coercive force of the iron prevents it from responding equally to equal magnetic changes. For this reason instruments of the first class cannot, as a rule, be used w here great accuracy is essential, but only where an accuracy within from 2 per cent to 5 per cent is sufficient. For measurements that re¬ quire greater accuracy, instruments belonging to the second or third class are usually used, and these can be made so that their readings do not vary more than one-half of 1 per cent from true values when the instruments are used with proper care.

The best form of such instruments consists of a modified D'Arsonval galvanometer with a movable coil mounted upon pivots and ar¬ ranged with a pointer to play over a scale, which was first successfully produced by Dr. Ed¬ ward Weston. The Weston ammeters and volta-

Fig. 3. — Plan of the Weston Amperemeter.

meters made of this construction may be prop¬ erly said to have revolutionized the everyday measurements of amperes and volts.

Fig. 3 shows a plan of a Weston ammeter for measuring direct currents. A A represent the binding posts of the ammeter through which the current may be led to and from the instru¬ ment. W W are wires within the instrument, and E consists of a series of conducting shunts between the conductors W W. The movable coil C is connected by the wires w w with the binding posts, and through this movable coil there flows a fixed proportion of the current, which bears a ratio to the total current depend¬ ing upon the electrical resistance of the shunt E and of the movable coil. The movable coil is mounted on pivots wdthin the magnetic field of the permanent magnet M, and any motion which is caused by the magnetic effect of a current flowing through the coil is opposed by the spiral spring D. The spring and the pole pieces of the magnet M are carefully designed so that the movement of the coil shall be directly pro¬ portional to the current flowing through the coil, and the deflection is indicated on the scale S by the pointer B that is attached to the coil.

Fig. 4 shows a sectional end view of the working parts of one of these instruments. A stationary soft iron cylinder is mounted within the

movable coil C for the purpose of produc¬ ing radical direction and uniform density of the magnetic flux in the space between it and vol. to — 11

the pole pieces of the magnet, within which space the conductors of the movable coil move.

Weston or similar instruments are used a great deal where accurate portable current meas¬ uring instruments are required, and instruments

Fig. 4. — Sectional end-view of mechanism of Weston Di¬ rect Current Amperemeters and Voltameters,

following this type are now manufactured in large numbers in this and foreign countries.

Magnetic instruments belonging to the third class are frequently called electrodynamometers because their indications are caused by the magnetic effect of the current in the fixed coils acting on the current in the movable coils.

Fig. 5 shows an early form of electrody¬ namometer which is arranged for use as an am¬ peremeter. This is often called the Siemens Electrodynamometer. The coil marked F is fastened to the frame of the instrument, and the coil marked M, which stands at right angles to the first, is suspended by a heavy silk fibre or a wire so that it is free to rotate. The ends of the conductor composing the movable coil dip into little cups C C containing mercury, and these are connected with a circuit arranged so that a current can enter and leave the mov¬ able coil. The spring G is attached at one end of the movable coil, and at the other end it

Fig. 5. — Siemens Electrodynamometer.

is connected to a thumbscrew T called a torsion head, by means of which this spring may be twisted. When a current flows in the coils, the magnetic force tends to turn the movable coil so as to place it parallel with the fixed coil.

This force is balanced by twisting the spring by means of the thumbscrew. The amount of twist is shown by the pointer B, and it is

pro¬ portional to the force exerted by the coils on each other, which in turn is proportional to the square of the current flowing in the circuit. The pointer S indicates when the movable coil is at its zero position.

Fig. 6. — Kelvin Balance.

Very accurate and permanent standard in¬ struments have been designed for measuring currents by this direct magnetic action, but they have not been made sufficiently portable to bring them into much use. The most important of these are the current balances of Lord Kel¬ vin, one of which is illustrated in Fig. 6. The fixed and movable coils in these Kelvin balances are parallel to each other and horizontal. The force with which the coils tend to move with respect to each other when a current flows in them is directly balanced and weighed by means of a slider moving on a scale beam. In order to avoid any disturbing effect from the earth's magnetism, coils are placed at both ends of the balance arm.

Instruments utilizing the heating effect of the current are usually called <

Fig. 7. — Simple Illustrative Model of Hot-wire Amperemeter.

end is wrapped around and fastened to a small wheel of metal. This wheel is supported on steel pivots, one of which is connected to another binding post. The wire is kept under a constant strain by means of a spring which is fastened to the periphery of the wheel. When the wire is heated and thereby lengthened, the wheel is turned by the contraction of the spring l

and a pointer which moves over a graduated scale indicates the amount of expansion of the wire. When the wire cools again and con¬ tracts, the wheel is pulled back into its old position by the shortening of the wire.

A refined instrument of this type suitable for reasonably accurate measurements, is illus¬ trated in Fig. 8. The extension of the measur¬ ing wire A B is indicated by a pointer moved by mechanism attached to the pulley D. The case protects the wire from air currents and the use of two stretched wires, A B and B C, through only one of which the current to be measured flows, neutralizes the effect of the general tem¬ perature of the surrounding air.

Instruments of this type are particularly useful in measuring the high frequency cur¬ rents of radio telegraphy.

Instruments for measuring electrical pres¬ sures, in volts, may be made of the same forms as the ammeters utilizing the magnetic effects and the heating effects of electric currents. Such instruments are ordinarily called volt¬ meters and when they are constructed to utilize the aforenamed effects of the electric current they are really ammeters wound with coils of

T

high resistance so that very little current will be wasted in the process of making the meas¬ urements of the voltage. Such an instrument really measures the very small current that is caused to flow through the resistance of its winding by the voltage to be measured. The resistance of the instrument is of constant value and the voltage is therefore directly propor¬ tional to the flow of current through the in¬ strument. It is consequently possible to grad¬ uate the scale so that the position of the pointer indicates volts.

In most ammeters and voltmeters the scales are so divided and marked that the divisions read directly in amperes and volts. These in¬ struments are generally called ˆdirect reading* instruments.

Currents which rapidly alternate in direc¬ tion cannot be measured by magnetic instru¬ ments like the Weston instruments having per¬ manent magnets; but they can be measured by instruments having soft iron parts which are moved by the magnetic attraction set up by the current in the coils of the instrument, or by

instruments of the electrodynamometer class or by hot wire instruments. In the first class of instruments, the soft iron core is always at¬ tracted by the coil in which current flows, with¬ out regard to the direction of the current and the attraction in an electrodynamometer is also independent of the direction of the current be¬ cause the current reverses at the same time in both coils. Any iron cores which are used in

Fig. 9. — Thomson Alternating Current Amperemeter or

Voltmeter, in which magnetic effect of coil acts on bit

of soft iron.

instruments designed to measure these alter¬ nating currents must be built up from thin strips or fine iron wires so that induced eddy currents shall not be set up in them by the reversals of the magnetism. The working parts of an instrument which operates by the attrac¬ tion of the coil D upon a thin iron strip C, are illustrated in Fig. 9, the exterior of the case having been removed so that the working parts shall be exposed.

The heating effect of currents is also inde¬ pendent of the direction of the current flow, so that hot wire instruments may be used for measuring alternating currents and voltages.

When very large currents are to be meas¬ ured, it is often inconvenient and expensive to build an ammeter with conductors large enough to carry the entire current. In these instances an ammeter of small capacity may be shunted by a German silver wire or rod and the shunted instrument may then be calibrated and used to measure the large current. This arrange¬ ment has become quite universal in the large electric light works where very great currents are to be measured and it is not uncommon in ordinary portable instruments. Indeed, nearly all Weston self-contained ammeters, such as illustrated in Fig. 3, consist of a milli-ammeter arranged with a proper shunt E inside the case.

An entirely distinct method of measuring voltage is by means of electrometers, and when these are converted into portable form for everyday use they are called electrostatic volt¬ meters. They are particularly useful for meas- suring alternating voltages.

The electric power which is used in any part of a continuous current circuit may be determined by measuring by means of an am¬ meter the current flowing through the circuit and measuring by means of a voltmeter the voltage at the terminals of the circuit. In a direct current circuit the product of the num¬ ber of amperes by the number of volts gives the power in watts. This product called the

volt-amperes, however, differs from the watts in an alternating current circuit when the power factor is less than unity and a summation of instantaneous values of the product must be secured. Instruments are made which in them¬ selves perform this double measurement and multiplication so that their indications are directly proportional to power and these in¬ struments are called wattmeters. The simplest form is an electrodynamometer in which one coil is wound with many turns of fine wire exactly as though it were to be used as a volt¬ meter coiNand the other coil is wound with a few turns of coarse wire as

though it were to be used in an ammeter.

The action of such a wattmeter is best ex¬ plained by an illustration. Suppose it is de¬ sired to measure the power used by an electric motor — the fine wire coil of the wattmeter is connected across the terminals of the motor and the coarse wire coil of the wattmeter is connected in series with the motor. The magnetic effect of the fine wire coil is then proportional to the voltage at the motor ter¬ minals and the magnetic effect of the coarse wire coil is proportional to the current flowing through the motor. The force exerted at any instant, to move the movable coil, is propor¬ tional to the product at that instant of the two magnetic effects and the pointer moves over the scale so as to indicate the average force, thereby indicating the watts which are trans¬ mitted through the circuit.

The connection of a wattmeter in a circuit is diagrammatically illustrated in Fig. 10, where W is the wattmeter, V V' are the terminals of the fine wire coil and C C' are the terminals of the coarse wire coil. This figure is intended to show a dynamo furnishing current to a set of incandescent lamps L L L L L, and the watt¬ meter is introduced in circuit for the purpose of measuring the power delivered to the lamps.

The number of alterations made in each second by the alternating currents that are ordinarily used in practice is so great that the movable coil of an electrodynamometer acts exactly as though it were pulled around by a continuous force proportional to the average of the variable force which results from the magnetic action of the alternating current. This is true whether the instrument is arranged to be used as an alternating-current ammeter, in which instance the two coils are placed in series with each other and both are of low resistance ; or the instrument is arranged to be used as a voltmeter, in which instance the two

Fig. 10. — Illustration of the manner in which the coils of a Wattmeter are connected with the main circuit.

coils are connected in series with each other but both are of relatively high resistance and their resistance is re-enforced by that of a supplementary non-inductive coil of high re¬ sistance; or the instrument is arranged for use as a wattmeter, in which instance one of the coils is of low resistance and is a current coil to be connected in series with the main circuit, while the other coil is a fine wire coil of high

resistance re-enforced by a supplementary non- inductive resistance coil and is a voltage coil to be connected across the terminals of the circuit.

The wattmeter already described is called an indicating wattmeter, but it is often desirable to make a registry of the integrated consump¬ tion of energy by a customer during a given period, such as a month, and such an instrument is illustrated in Fig. 11, which is called the Thomson watthour meter. This is built like a little electric motor without any iron in its work¬ ing parts. It is arranged with its revolving part or armature A to be connected to the circuit like the fine wire coils of a wattmeter and its field magnetizing windings W W to be connected in circuit like the coarse wire coils of a watt¬ meter. The magnetic pull which tends at each instant to make the armature rotate is propor¬ tional to the product of the two magnetizing effects, so that the rotative effect, or torque, is proportional to the watts in the circuit. If the speed of such an armature is made propor¬ tional to the magnetic pull, it is easily seen that every revolution of the armature means a cer¬ tain number of watts used for a fixed length of time. Such instruments usually have at-

ft

Fig. 11. — Thomson Integrating Wattmeter.

When the power in alternating current cir¬ cuits is to be measured, it is necessary to make the self-induction of the fine wire coil of such a wattmeter practically negligible in compari¬ son with the resistance of the coil, to prevent the readings of the instrument being affected

Fig. 12.

by the frequency of the alterations of the cur¬ rent. This is brought about by introducing a coil of high resistance and of practically no self-induction in series with the fine wire mov¬ ing coil of the instrument.

Another form, called an <(induction watt- hour meter® is usually used for recording the watthours in alternating current circuits. This instrument in its simplest form illustrated in Fig. 12, consists of coarse wire coils F F and a fine wire coil C connected to the circuit as in a wattmeter. The iron core of the fine wire coils is adjusted so that the magnetic flux lags in phase, 90 degrees behind the phase of the voltage, thus producing a magnetic field out of phase with the

magnetic field produced by the coarse wire coil. These two magnetic fields

tached to the spindle of the armature a set of dials D like those of a gas meter, which record the revolutions and are so marked that the consumption of electric energy may be re¬ corded in what are known as ((watt hours.® A more convenient unit for commercial instru¬ ments is the kilowatt hour, each kilowatt hour being 1,000 watt hours, and the dials of such instruments usually read in kilowatt hours.

If no external retarding force were applied to the armature of such an instrument, it would tend to run at an excessive speed for any current flowing through the apparatus and to make the instrument give an accurate record of power, a retarding force which is propor¬ tional to the speed of the armature must be applied to the spindle. This is admirably ar¬ ranged by placing at the bottom of the spindle S a flat disk of aluminum C, on either side of which are placed the poles of permanent mag¬ nets M. The rotation of the disc between the magnet poles generates electric currents in it which are attracted by the magnets and retard the motion of the disc.

act on an aluminum disc armature D and cause it to rotate like the armature of an induction motor. Permanent magnets are associated with the disc so as to cause the retardation of the rotation as in the Thomson watthour meter.

Sometimes a continuous record of amperes, volts or watts is desired and in that case the

pointer of an indicating instrument is tipped with a pen which plays over a moving dial or strip of paper, thus leaving a record of changes in the circuit. Instruments thus equipped are called curve-drawing instruments. Fig. 13 shows part of a record taken from a curve drawing wattmeter.

Various other instruments are used in elec¬ tric circuits, such as those indicating the power factor of alternating current circuits, called power factor meters; those indicating the fre¬ quency of alternating currents, called fre¬ quency meters; and those indicating the phase and frequency relations between the currents in two alternating

current circuits, called phase meters or < synchroscopes. Descriptions of all such special instruments may be found in standard works on electrical engineering.

Bibliography. — For further information in regard to electrical measuring instruments con¬ sult Jackson, D. C. and J. P., (Elementary Book on Electricity and Magnetism) ; Laws, Elec¬ trical Measurements-* ; Swenson and Franken- held, (The Testing of Electro-magnetic Ma¬ chinery and Other Apparatus } ; Gerhardi, Electricity Meters: Their Construction and Management^ and other treatises.

Dugald C. Jackson,

Professor of Electrical Engineering, Massa¬ chusetts Institute of Technology.

ELECTRICAL RESISTANCE. See

Resistance, Electrical.

ELECTRICAL TERMS. The develop¬ ment of electrical industries and applications during the last 20 years has been so rapid and considerable as to constitute one of the salient characteristics of this era. Prior to that time a knowledge of electrical phenomena, terms and phrases was limited to a few philosophic¬ ally minded persons. During that time, how¬ ever, this knowledge has not only spread to a large professional and artisan class enlisting to-day more than a million persons in the United States alone ; but has also extended in a considerable measure to the public at large. We can hardly read through the news of a day in the columns of a newspaper without encounter¬ ing electro-technical words or phrases. The telegraph delivers its messages at every door. The telephone whispers into thousands of house¬ holds in every large city. The electric light shares with the primeval flame the brightening of the evening fireside. These things speak in a language of their own and force their own terms upon our speech. The following is a list of about 100 of the electrical terms in very general use :

Air-Blast Transformer. — A transformer which is cooled when operating, by a blast of air delivered through its framework.

Alternating Current. — A current which periodically alternates, or reverses in direction. — A to-and-fro electric current; in contradistinction to a direct current. See Electric Alternating Current Machinery.

Ammeter. — An abbreviation of ampere-meter. An in¬ strument which measures in amperes the electric current flowing through it.

Ampere, International. — A unit of electric flow or current, theoretically derived, by electromagnetic principles, from the centimeter-gramme-second system of units. _ Practi¬ cally defined as the current which will deposit 1.118 milligrammes of silver per second in a standard type of electrodepositing bath.

Anode. — The electrode from which a current enters an electrolyte or conductor. A positive electrode.

Arc Lamp. — An electric lamp consisting essentially of a column of intensely heated vapor maintained between two closely opposed, or slightly separated, conducting

pencils which are usually of carbon. Much used for the illumination of streets, factories, and grounds. See Electric Lighting.

Armature. — In an electromagnet, the movable element of iron or steel -which is attracted to, or released from, the poles. In a dynamo, the element which is connected writh the line, and which is subject to rapid cyclical changes in magnetic flux during operation.

Asynchronous Motor. — An alternating-current motor in which the rotation is not synchronous with the rotating element of the generator supplying the driving current. See Electric Alternating Current Machinery.

Branch-Fusf. — A fuse inserted in a branch wire or circuit.

Brushes of a Dynamo-Electric Machine. — The con¬ ductors which convey current from one element to another, when there is relative motion between them. Usually, stationary conductors resting upon a rotating commutator and carrying current either to or from the same. See Generators.

Bus-Bars. — An abbreviation of “Omnibus-bars.” The main conductors in a central station, to which generators, or feed-wires may be connected.

Canopy.-— In electric wiring of building, a metallic plate or disc attached to a wall or ceiling at an outlet to conceal the hole made where the wires protrude.

Cathode. — The electrode by which a current leaves an electrolyte or

conductor. A negative electrode.

Ceiling-Rosette. — An insulating block fastened to a ceiling, in which electric supply wires terminate, and from which a pendant flexible cord, or other pair of con¬ ductors, descend to a lamp or fixture. Usually circular in form and fairly ornate in appearance.

Circuit-Breaker, Electric. — (1) A device for opening and restoring a circuit, either by hand at will or auto¬ matically, in the case of an overload. (2) A switch that automatically opens at overload, usually by electromag¬ netic mechanism.

Coherer. — In radio telegraphy, a receiving device con¬ sisting of an imperfect contact, the resistance of which is broken down on the passage of an electric wave, thereby enabling an electromagnetic mechanism to respond.

Commutator. — A device for commuting or changing the direction or path of a current. In a dynamo, the element which enables the alternating currents generated within the armature to be delivered as a unidirectional current to the external circuit.

Compound Motor or Generator. — A motor or generator having both a shunt winding and a series winding on its field magnets.

Continuous Current. — A current uniform both in strength and in direction. A steady direct current.

Controller. — A device for controlling an electric machine or circuit. A controlling switch.

Converter or Rotary Converter. — A machine which operates by means of a rotating commutator to convert alternating currents into direct currents for distribution.

Current, Electric.— A flow or passage of electricity along an electric circuit, usually measured in amperes.

Cut-Out, Electric. — (1) A device for automatically interrupting an electric circuit in which an excessive current flows, by the melting of a fuse-wire or strip carrying the current and heated thereby. (2) A device for supporting or holding an electric fuse.

Dieletric.— An insulating material capable of being sub¬ jected to electric stress.

Direct Current. — A current which, however greatly it may vary in strength, always flows in one and the same direction. A undirection al current. See Electric Direct Current.

Duplex Telegraphy.— The method of sending messages in both directions simultaneously over one and the same telegraph wire. See Telegraphy.

Efficiency of a Dynamo, Machine, Apparatus or Translating Device. — The ratio of the power given out of the power taken in, usually measured in per cent. The ratio of output to input. A measure of the effective¬ ness of transformation or utilization of power by a device. Example, a motor which delivered 9 horse power, mechanically, while receiving 10 horse power, electrically, would have an efficiency of 90 per cent.

Electrode. — The conducting terminal by which electricity finds either ingress to, or egress from, an electrolyte, a conducting mass or a dielectric. Commonly, a metal plate immersed in an electrolytic solution.

Electrolysis. — The chemical change accompanying the flow of electricity through electrolytes, to which class nearly all conducting liquids belong. See Electrolysis.

Electromagnet. — A magnet excited by an electric current and whose magnetism mainly disappears on the cessation of the exciting current.

Electromotive Force (abbreviated E.M.F.). — The force in an electric circuit which produces therein, or tends to produce, an electric discharge or current. Electric pressure. Voltage. Usually measured in volts.

Enclosed Arc Lamp. — An arc lamp enclosed almost air¬ tight within a narrow glass globe, from which the oxygen in the contained air soon becomes consumed during operation, thus leaving the carbons burning in inert gas

and greatly prolonging the duration of their serviceable life.

Feeder. — In an electric distributing system, a supply con¬ ductor carrying current from a power-house to main conductors, and not

itself connected to motors, lamps or translating devices.

Fixture, Electric-light. — Originally, an electric lamp¬ holder fixed to a wall or ceiling. Now, any electric lamp¬ holder whether fixed or semi-portable.

Frequency of an Alternating Current. — The number of complete cycles, or to-and-fro motions, effected by the current in one second of time.

Galvanometer. — An instrument for measuring the strength of an electric current. Usually a sensitive instrument which measures the strength of a very feeble current, as distinguished from an ammeter.

Galvanoscope. — • An instrument for detecting the passage of an electric current.

Generator, Electric. — A machine which is capable of generating an electric current. Usually a dynamo-electric generator or dynamo.

Ground. — (1) The earth, considered as an electric con¬ ductor. (2) A return circuit provided through the ground. (3) A fault or leak of electricity to the earth through a defect in the insulation of a conductor. See Electric Condenser.

High-Potential System. — In electric distribution, a system of conductors, generators and translating devices in which the pressure or voltages is relatively high. Specifically, an electric distributing system, which, accord¬ ing to fire insurance rules, has within it a pressure of over 550 volts and less than 3,500 volts.

Incandescent Lamp. — An electric lamp consisting es¬ sentially of a glowing filamentary conductor* maintained at an incandescent temperature by a traversing electric current.

Induction Motor. — An asynchronous alternating-current motor in whicn the currents flowing in the winding of the secondary member are induced electromagnetically by the currents flowing in the primary member. See Electric Alternating Current Machinery; Electric Motors; Generators.

Insulation, Electric. — The property of nonconduction. Particularly the property possessed by a conductor when it is kept out of contact with, or out of likelihood of dis¬ charge to, the ground or neighboring conductors.

Interior Conduit. — A tube or raceway placed in the interior walls, floors or ceilings of a building, to guide, hold and protect the wires or conductors supplying the building.

Joule, International. — A unit of work theoretically derived from the centimeter-gramme-second system of units and equal to 10,000,000 ergs. Approximately equal to 0.74 foot-pound.

Kilowatt Hour. — A unit of work generally used in the

, sale of electric energy. One thousand watt hours, 3,600,000 joules; approximately 2,700,000 foot-pounds or 1,200 long-foot- tons, or 1.34 horse-power hours. The work done by one ampere under a pressure of 1,000 volts in one hour.

Lightning Arrester. — A device connected to an electric circuit or system for the purpose of protecting the system from damage by atmospheric electricity. Commonly a device connected to an aerial line either on a pole or near the point of entrance to a station, and offering a separate conducting path to ground along which lightning dis¬ charges may be deflected. See Generators; Lightning Arrester.

Load. — The output of, or demand upon a machine, usually measured either in terms of current delivered or of power delivered. A load may be light, heavy, normal, full, half, excessive, etc., according to the output of the machine at the time considered.

Low Potential System. — In electric distribution, a system of conductors, generators and translating devices in which the pressure or voltage is relatively low. Specifically, an electric distributing system, which, according to fire insurance rules, has within it a pressure less than 550 volts and more than 10 volts.

Magnectic Field. — Any region in space permeated by magnetism. A magnetized space. Commonly a mag¬ netized air-space.

Magnetic Flux. — The magnetism or magnetic influence which permeates a magnetic field. This influence possesses at any point both intensity and direction. By reference to these properties, the magnetic lines of influence may be conceived of as stream lines or lines of magnetic flow or flux, and may be expressed in terms of a unit named the Maxwell.

Mains. — In an electric distributing system, the street- supply conductors, to which the house-service wires are connected. The main conductors intended for connecting to lamps, motors or devices at any

point along their route. In house-wiring, the principal supply wires, as distinguished from submains, taps or branches.

Megohm. — A million ohms; derived from “ Ohm ” and the prefix “ mega ” signifying by convention one million, and literally, in ancient or modern Greek, “ great.”

Microphone. — An apparatus capable of having its re sistance affected by very feeble sounds and, therefore, of enabling such sounds to be heard with the aid of a telephone in the circuit. In telephony, the carbon trans¬ mitter connected with the diaphragm against which the speaker’s voice is directed.

Morse Code. — The code of dots and dashes forming the alphabet of the Morse system. See Telegraphy.

Morse System of Telegraphy. — The system of telegraphy originally devised by Samuel Morse, in which an electro¬ magnet placed in the telegraph line circuit responds to impulses of the sender’s key, and actuates an armature in such a manner as to give either audible or legible signals to the receiving operator. See Telegraphy.

Motor, Electric. — A machine for transforming electric power into utilizable mechanical power. Motors almost invariably operate on electromagnetic principles. See Electric Alternating Current Machinery; Electric Motor; Generators.

Motor-Starter. — An automatically operating device for starting a motor from rest with a proper rate of acceleration by the simple act of closing a switch.

Multipolar Dynamo. — A dynamo having more than one pair of magnetic poles in its field frame.

Ohm, International. — A unit of electric resistance, theo¬ retically derived, by electromagnetic principles, from the centimeter-gramme-second system of units. Practically defined as the resistance offered by a uniform column of pure mercury 106.3 centimeters long and weighing 14.4521 grammes, at the temperature of melting ice.

Oil-Cooled Transformer. — A transformer which is cooled, when operating, by a flow of oil through its frame¬ work.

Oscillating Current. — An alternating current or dis¬ charge, gradually or rapidly decreasing to zero intensity.

Overload. — An excessive load or duty imposed upon a machine or device. An abnormal or an extra load.

Phase. — The fractional development of an alternating electric wave with reference to a cylic condition such as the zero point in the positive direction. Usually measured in degrees of 360 to the complete cycle.

Polyphase System. — An alternating-current distributing system employing a plurality of alternating currents definitely differing in phase. See Electric Alter¬ nating Current Machinery.

Power-Factor. — The ratio of the active power, in watts, absorbed by a circuit or conductor carrying an alternating current, to the apparent power consumed, in volt amperes.

Primary Voltaic Cell. — A voltaic cell which derives its energy from its chemical constituents and which consumes or converts those constituents irreversibly during action; as distinguished from a secondary cell which, after dis¬ charging, may be recharged by the action of an electrical charging current.

Quadruplex Telegraphy. — The method of sending four messages simultaneously over one and the same telegraph wire, two in one direction and two in the opposite direction. See Telegraphy.

Rail-Bonds. — The conducting straps or bridges applied between contiguous ends of rails in an electric railway in order to improve their electric conducting power.

Relay. — An apparatus, usually electromagnetic, which controls and operates a local circuit by opening or closing the same. In telegraphy, a sensitive electromagnet inserted in the telegraph line which, by the movement of its armature, operates a sounder, or other translating device, in a local circuit, with a vigor that the line current could • not directly exert. See Generators; Telegraphy.

Resistance, Electric.— The property of conducting substances by virtue of which they obstruct or oppose the passage of an electric current. Usually measured in ohms. The opposite or inverse of conductance.

Rheostat. — An adjustable electric resistance.

Rotor. — The rotating element of a machine as distinguished from the stationary element.

Series Motor or Generator. — A motor or generator whose field-magnet winding is connected in series with, or in succession to, its armature. See Generator.

Series-Parallel Controller. — A device on the platform of an electric street car, operated by a handle, through the aid of which the motorman can with his left hand connect the motors under the car either in series or in parallel, so as to vary the speed of the car.

Shade. — In electric incandescent lighting, the ornamental bell or cover, usually of glass, secured over a lamp in order to scatter or reflect the light and produce either a better distribution of light or a more pleasing effect upon the eye of the observer.

Shunt. — An electrical by-pass. A conductor which is applied to the terminals of an apparatus or branch in order to divert a part of the current from that branch.

Shunt Motor or Generator. — A motor or generator whose field-magnet winding is connected in shunt to, or in parallel with, its armature. See Generator.

Short-Circuit. — A cross between active electric conductors whereby an excessively strong current is produced. Usually a metallic bridging between two or more supply

wires, whereby a violent overload of current results, capable, in extreme cases, of producing violent arcing, burning, or disruptive local effects.

Singlephase System. — An alternating-current distributing system employing a single alternating current supplied by the generator, as distinguished from a polyphase system.

Socket of Incandescent Lamp. — The holder into which an incandescent lamp screws or attaches and which con¬ tains the ends of electric supply wires, for supplying current to the lamp.

Stator. — The stationary element of a machine, as dis¬ tinguished from the rotating element.

Storage Battery. — A grouping of secondary or storage cells. See

Electric Storage Battery.

Storage Cell. — A voltaic cell which receives its elec¬ trochemical energy from the electrolytic action of a charging current. A voltaic cell which is alternately charged and discharged.

Sub-Station. — In an electrical distributing system, a local or auxiliary power-house for facilitating the operation or control of the system. A station which is subsidiary to a principal station or power-house.

Switch, Electric. — Any device for opening, closing or modifying an electric circuit. Usually a hand-operated device for opening and closing a circuit.

Switchboard. — An assemblage of switches, controlling or indicating devices mounted upon a frame for the purpose of convenient control or inspection of an electric path, circuit or system of circuits. Originally, a board with switches mounted on it; now typically, a metal frame holding vertical slabs of slate or marble, with switches, controlling handles, and indicating or recording instruments mounted thereon, in an electric central station or dis¬ tributing centre. In telephony, a frame holding the switches and other devices by which connections are made between subscribers.

Synchronous Motor. — An alternating-current motor in which the rotation occurs in synchronism with the rotating element of the generator supplying the driving current. See Electric Alternating Current Machinery.

Third Rail. — In an electric railway system, a supply conductor running parallel to the track and consisting of a steel rail electrically continuous and supported on insulators, for carrying current to the car-motors. See Third-Rail System.

Three-Phase System. — An alternating-current system employing three alternating currents, of equal strength, differing in phase by 120°, or one-third of a cycle.

Three-Wire System. — In electric distribution, the system which provides three main conductors, the middle one of which is neutral, or midway in potential between the other two.

Torque. — The twisting effort, rotating effort or mechanical couple exerted by a motor at a shaft. Often measured in pounds' weight at one foot radius.

Transformer. — A device for changing the pressure or current of electric energy supply. Usually, a stationary electromagnetic device consisting of a laminated iron core and two insulated windings, a primary and a secondary. The device transfers electric power of alternating currents from the primary to the secondary circuit, and changes the voltage in the ratio of the number of turns in the two windings.

Transformer, Step-Down. — A transformer which locally lowers the electric pressure; i.e., which has a lesser number of turns in the secondary than in the primary winding and thereby produces a lower voltage in the secondary circuit than in the primary.

Transformer, Step-Up. — A transformer which locally raises the electric pressure; i.e., which has a greater number of turns in the secondary than in the primary winding and thereby produces a higher voltage in the secondary circuit than in the primary.

Translating Device. — Any device actuated electrically which receives electrical energy and translates it into energy of some other type, such as mechanical energy.

Trolley-Wheel. — The metallic wheel which is carried at the upper end of a street-car trolley pole, and which is pressed upward against the trolley wire, in order to maintain running contact therewith.

Turbo-Alternator. — A machine consisting of an alter¬ nating-current generator mounted upon the shaft of a steam turbine.

Two-Phase System. — An alternating-current system em¬ ploying two alternating currents, of equal strength, differing in phase by a quarter cycle, or such that one current has maximum strength when the other is passing through zero.

Two- Wire System. — In electric distribution, the system which provides two main conductors, between which lamps, motors or translating devices are connected in parallel.

Vapor-Lamp. — An electric lamp consisting of a glass tube or chamber usually containing mercury and mercury vapor, exhausted of air, and kept illumined by the passage through the vapor of an electric current admitted by electrodes sealed into the walls.

Volt, International. — A unit of electric pressure or current-driving electric force, theoretically derived, by electromagnetic principles, from the centimeter-gramme- second system of units. Practically, the

international volt is a certain fraction of the electromotive force of a standard type of voltaic cell at a standard temperature. Voltmeter. — An electrical measuring instrument for de¬ termining the value of the electromotive force connected to its terminals. A voltage measurer.

Watt. — A unit of power, activity, or rate of working, equal to l-746th of a horse power, or to 44.4 foot-pounds per minute. The power expended by a current of one ampere under a pressure of one volt. The power expended by an E.M.F. of one volt through a resistance of one ohm. The power expended by one ampere through a resistance of one ohm. Theoretically derived from the centimeter- gramme-second electromagnetic system of units.

Watt Hour. — A unit of work, much used in electrical measurements, equal to the work done in one hour at an activity of one watt; approximately 2,700 foot-pounds; exactly 3,600 joules. The work done by one ampere under one volt pressure, in an hour.

Wattmeter. — An instrument connected to an electric circuit and measuring the power delivered to the circuit in watts.

Wheatstone Bridge. — An instrument devised by Sir Charles Wheatstone for measuring electric resistance, by effecting a balance between the resistance to be measured and an adjustable known resistance. The balance employs a bridge or bridging conductor, usually containing a galvanoscope.

W ireless Telegraphy. — Generally, any method of signaling which does not employ wires. Specifically, the method of signaling which employs invisible electromagnetic waves radiated from a sending station and detected at the receiving station. See Telegraphy, Wireless.

For definitions of mechanical terms see the articles in this encyclopedia on Mechanical Terms; Boiler Shop Terms; Foundry and Forge Shop Terms; Engine; Engineering and Structural Terms; Tools; Valve and Valve Terms; Workshop Terms; and Locomotive, Principal Parts of.

A. E. Kennelly,

Professor of Electrical Engineering , Howard University.

ELECTRICAL UNITS. Two systems of electrical units are in use by electricians, known respectively as the Practical system and the C. G. S. (centimeter-gramme second) system. The former is used in electrical engineering, the latter in the notation of electrical science.

The Practical system is sometimes called the Q. E. S. (quadrant-eleventh-second) system. It is based on the earth quadrant, or 109 cen¬ timeters as the unit of length ; 1011 gramme as the unit of mass ; and the second as the unit of time. The foundational mechanical units from which the Practical system of electrical units is developed are the dyne and the erg. The dyne is a unit of force, assumed to be that force which gives a weight of one gramme a velocity of one centimeter per second during that second. The erg is a unit of work, being the energy exercised when a weight of one gramme is moved a distance of one centimeter with the force of one dyne.

Arranged alphabetically, the principal units of the Practical system with their definitions and their ratios to the units of the same class in the C. G. S. system are as follows :

Ampere (the unit of current) — the rate, or volume-per-second, of current . flowing through a conductor in which the resistance is one ohm, when the pressure is one volt. It is one-tenth of the C. G. S. unit of current, designated as lO1 — that is, 10 to the • — 1 power.

Coulomb (the unit of quantity) — the quantity of electricity passing through a con¬ ductor in one second when the rate is one ampere. This unit is not often employed.

Quantity is generally designated in ampere hours, an ampere hour being 3,600 coulombs. The coulomb is 10-1 C. G. S. units of quantity.

Farad (the unit of capacity) — ‘the capacity of a condenser which would require a charge of one coulomb to establish a difference of potential amounting to one volt between the two conductors forming the condenser. The farad being expressed by figures inconveniently large, the micro-farad, the one-millionth part of a farad, is commonly used. A farad is equal to 10-9 C. G. S. units of capacity.

Henry (the unit of inductance) — the in¬ ductance produced in a circuit when the cur¬ rent is changing at the rate of one ampere per second and is producing in the circuit a dif¬ ference of pressure amounting to one volt. A henry is equal to 109 C. G. S. units of inductance.

Joule (the unit of work) — the work done by one ampere of current flowing for one second through a conductor which has a re¬ sistance

of one ohm. The joule is seldom em¬ ployed, the watt hour being the more common unit, equivalent to 3,600 joules. (See Watt). The joule is equal to 107 C. G. S. units of work — that is, 107 ergs.

Ohm (the unit of resistance) — the resist¬ ance of a column of mercury weighing 14.4521 grammes, of such constant cross-section as to be 106.3 centimeters in length. In designating very high resistances the unit used is the <(megohm,® equivalent to 1,000,000 ohms. The ohm is 109 C. G. S. units or resistance.

Volt (the unit of pressure) — the electro¬ motive force (E. M. F.) required to force a steady current of one ampere against a re¬ sistance of one ohm. The volt is equal to 108 C. G. S. units of pressure.

Watt (the unit of power) — a current of one ampere flowing under a pressure of one volt — equivalent to one joule per second. The usual commercial unit is the kilowatt, or 1,000 watts. The commercial consumption of electric current is commonly designated as kilowatt hours. The physical unit of power called one horse, power is equivalent to 746 watts. The watt is equal to 107 C. G. S. units of power — that is, 107 ergs-per-second.

ELECTRICITY is a form of energy (q.v.), like mechanical energy or energy of motion, heat, radiant energy (as light), chemical energy, etc. Electric energy is the form of energy most recently introduced into everyday life and is, therefore, not yet quite familiar, so that we still ask, <(What is electricity ?® while ages ago man¬ kind ceased to ask, <(What is gravity?® or <(What is light?® although the manifestations of electric energy are no more wonderful and in-explainable than those of gravity. That is, the cause why a stone, falls to the ground and water flows down hill is just as mysterious as the manifestations of electricity. In nature electric energy manifests itself during atmospheric dis¬ turbances as lightning (q.v.), but the energy of lightning is too erratic for use. For the pro¬ duction of electric energy on a larger scale re¬ course must be had to the stores of energy afforded by nature. In large amounts energy is found in nature, first, as mechanical energy in the waterfalls and to a lesser extent the wind, and second, as chemical energy in coal, wood, oil, natural gas, etc.

Generation. — In the transformation o,f the

mechanical energy of waterfalls into electric energy, the water power is first converted into rotary motion by the turbine or water-wheel, the latter then converted into electric energy by the electric generator or dynamo. Chemical en¬ ergy can be converted directly into electric

energy only to a limited extent, as chemical energy of metals. This is done in the electric battery. (See Electric Battery). But due to the high cost of the chemical energy of metals, the production of electric energy by means of the battery is commercially feasible only where small quantities are required and the cost of the energy therefore secondary to the convenience of generation, as for signaling purposes, bells, annunciators, etc. The chemical energy of coal and other combustibles cannot be directly con¬ verted into electric energy, but is converted into heat energy by combustion, the heat •energy transferred from the gases of combustion to the water in the steam boiler, converted into me¬ chanical energy in the steam engine or steam turbine and the mechanical converted into elec¬ tric energy in the electric generator. In the gas engine the heat energy of combustion is directly converted into mechanical energy. In any transformation of energy from one form to another a certain loss occurs by conversion into heat. This loss is moderate in the transforma¬ tion of water power into mechanical energy, very small in the transformation of mechanical into electric energy, but enormous in the trans¬ formation of heat into any other form of energy. Our modern theories consider all forms of energy as different modes of motion; of the masses in mechanical energy, or of the molecules and atoms of matter or of the elec¬ trons with electric, chemical, etc., energy. Heat is the simplest form of energy, irregular motion of the molecules or motion without definite speed and direction. It is, therefore, intelligible that in any conversion of energy, that is, of a regular motion into another regular motion, some of the energy is lost by losing its regu¬ larity of motion, that is, converted into heat, the more the greater the difference between the two. forms of motion, and that when convert¬ ing irregular into regular motion, that is, heat into other forms of energy, this loss is specially great. The cost of electric power derived from water power does not differ much from that derived from coal by the steam engine, the cost of coal in the latter case offsetting the interest on the greater investment required in developing the water power and transmitting the electric power to the place of consumption. Hence where coal is . cheap the steam power may be more economical, and where water power is found which can cheaply be developed, or where coal is expensive, water power is more economical.

Use.— Electric energy is hardly ever used as such, but only after transformation into other forms of energy, mainlv mechanical energy, heat, chemical energy and light. Since electric en¬ ergy is generated, from other forms of energy, it follows that it is used essentially as an inter¬ mediary form of energy. For this it is better suited than any other, form of energy, due to the high efficiency and simplicity of

generation and reconversion and especially the almost unlim¬ ited flexibility which permits transmission over long distance, distribution with the simplest means and unlimited subdivision and ease of control.

Mechanical Power. — The electric motor is a secondary and not a primary source of power, that is, it does not convert the stores of energy found in nature into mechanical energy as the steam engine, but mechanical power has to be exerted somewhere to produce the electric power which is reconverted into mechanical power in the electric motor. The advantage of the electric motor is that the mechanical power can be utilized at a distance from the source of power; the factories and mills may be located far distant from the water power and the railroad train or street car receive the power from the distant station. The power generated at one place can be distributed efficiently to a large number of places, or all motors of the city may receive their power from one central generating station. Instead of an extended and inefficient system of belting, individual motors may drive the machines of the factory or mill. All the cars or trains of a railway system may receive their power from one generating system, perhaps a water-power as Niagara. The elec¬ tric motor is under more perfect control than almost any other motor, and when not used consumes no power and requires no special care in starting and operation. Mechanical power in small quantities can be produced almost as ef¬ ficiently as in large units and a great subdivision of power becomes thereby feasible. In the field of mechanical power generated by electricity also belong telegraphy and telephony, or the transmission of signals and speech over long distances.

Light.— For lighting, electric energy usually is first converted into heat and the light given by the incandescence of very refractory solid substances, carbon or tungsten (wolfram), the tungsten wire or carbon filament of the in¬ candescent lamp, or the glowing tip or crater of the arc lamp carbons. (See Electric Light¬ ing). Here again, especially with incandescent lamps, the main advantage lies in the absolute steadiness, control and flexibility of the light, the simplicity of turning it on or off, and its relatively high efficiency, which gives a light with less heat than the gas flame or kerosene lamp. While due to the use of heat as inter¬ mediary form of energy only a very few per cent of the electric energy are converted into light, most being dissipated as heat,

with the gas or kerosene flame the percentage of energy con¬ verted into light is still much less. Recently considerable work is being done and with great promise of converting electric energy more directly into light by electro-luminescence in luminous arcs, which promise an efficiency of light production very much greater than the incandescent or carbon arc lamp, and there is a possibility of still very much higher efficien¬ cies of light production by electro fluorescence.

Heat. — The conversion of electric energy into heat means a degradation of energy from regular to irregular motion and in the heat production by electric energy only a very few per cent of the heat energy expended under the boilers of the steam engine driving the electric generator is recovered, so that electric heating is usually more expensive than direct generation of heat by combustion and therefore commercially practicable only :

1. For the production of temperatures be¬ yond those which can be reached bv combus¬ tion. At very high temperatures chemical affin¬

ity and therefore combustion ceases and tem¬ peratures beyond this cannot be reached by combustion but are reached by conversion of electric energy into heat in the electric fur¬ nace. By this means chemical compounds have been produced for industrial purposes which were either entirely unknown or mere curiosi¬ ties before, as the carbides, calcium carbide, car¬ borundum, silicon metal, etc.

2. Electric energy is used for heating where the temperature has to be perfectly controlled.

3. For intermittent use, such as flat-irons, etc., where heat production by combustion is in¬ efficient.

4. Due to its convenience and cleanliness for domestic uses to a limited extent, electric heating and cooking are coming into use.

Chemical Energy. — Electric energy is con¬ verted into chemical energy either directly in the electrolytic cell or indirectly with heat as in¬ termediary in the electric furnace as discussed above. Electrolysis (q.v.), that is, the chemical action of electric energy, is used exclusively for the production of aluminum, magnesium, cal¬ cium, etc., metal, is used for copper refining, production of sodium, chlorates, soda and bleaching powder, and many other compounds.

Storage. — Electric energy cannot be stored as such conveniently, but the ease and efficiency of conversion of electric energy into the chem¬ ical energy of metals and metallic oxides, and inversely, permits the

storage of electric energy as chemical energy in the storage battery. (See Electric Storage Battery). Charging the storage battery means converting in it electric energy into chemical energy, discharging, the reconversion of the chemical energy into electric energy.

Forms of Electric Energy. — Electric energy is used as direct current, as alternating current and as high frequency current. In the direct current circuit, the electric current con¬ tinuously flows in the same direction, and the electric pressure or voltage therefore also is constantly in the same direction. Direct current is required for electrolytic work, therefore also for the charging of storage batteries. It is generally preferred for electric railroading, and often for electric lighting, especially where the demand is very concentrated, as in the centres of large cities. All electric batteries give di¬ rect current. Electric generators or motors may be built for direct current as well as for alter¬ nating current. In the alternating current cir¬ cuit, the electric current and thus the electric pressure reverses periodically, usually 120 or 50 times per second, and the number of double reversals or cycles per second is called the fre¬ quency of the alternating current. Sixty and 25 cycles per second are the standard frequencies. Usually several alternating currents are used in the same system, which reverse successively, and the system then is called a three-phase system, if three, a quarter-phase system, if two successively reversing currents are employed. If only one current is used, the system is called single-phase. Alternating currents have the ad¬ vantage that they can be raised in voltage bv stationary apparatus, so-called transformers for transmission to a distance, and lowered in voltage for use. They are therefore more flex¬ ible in application, and for this reason all large electric generating systems now produce alter¬ nating currents, and where direct current is re-

quired, it is produced from the alternating cur¬ rent supply by rotary transforming devices, so-called “converters,® or stationary devices, so-called “rectifiers.®

High frequency currents are alternating cur¬ rents reversing very rapidly, often a hundred thousand or million times per second. Often they are not constant in value, but die out and then start over again, so-called “oscillating cur¬ rents.® They are mainly used for wireless teleg¬ raphy and telephony.

Measurements. — Since all forms of energy are convertible into each other they can be measured by the same measure. Heat being the simplest form of energy, the measure of heat has been the usual measure of energy. It is the calorie, or the amount of heat required to raise one litre of water from 0° to 1°C, or the British Thermal Unit (B.T.U.), that is, the amount of heat required to raise one pound of water by 1° F. However, due to the far greater convenience and exactness of electrical measurements, the electrical unit of energy, the joule or watt second (one watt equals one volt times one ampere) is rapidly replacing the thermal unit or calorie, even in chemistry. Generally, the kilo-joule, or thousand joules, is used. Other forms of energy usually have some measure, convertible into calories or into joules. So, mechanical energy is measured in foot-pounds, or kilogram-metres, and the flow of mechanical energy, or mechanical power, in foot-pounds per second or horse power, 1 (horse power = 550 foot-pounds per second, = 76 kilogram-metres per second = .178 calorie seconds. The value of electric energy or elec¬ tric power is measured either in the mechanical measure, horse power, or electric measure, watts, 746 watts = 1 horse power. Usually the kilo¬ watt or 1,000 watts =1.34 horse power, is used. 1 kilowatt = .238 calorie second. 1 kilowatt second=l kilojoule (KJ). Most forms of energy are resolved into the product of two components ; a quantity and a pressure compo¬ nent, as the power of a waterfall is the product of the quantity of water flowing and its head or fall. So electric power is resolved into a auantity component called “current® and meas¬ ured in amperes, and a pressure component called “electromotive force® or “potential difference® or “voltage,® and measured in volts, and the electric power then is a product of volts and amperes, 1 watt = 1 volt X 1 ampere and one joule = 1 watt X 1 second is the electric energy. Just as a small quantity of water under a high head may give the same power as a large quan¬ tity under low head, so a small current at high voltage may represent the same electric power as a large current under low voltage. The smaller the quantity and the higher the voltage the less the loss in transmitting the power. Therefore, for long distance transmissions high voltages are used, the higher the greater the dis¬ tance, while relatively low voltages are employed for general use, due to the difficulty and danger of handling high voltages. The instrument measuring electric power is called the wattmeter, that measuring electric current or flow of quan¬ tity is the ammeter, that measuring electric pressure or voltage is the voltmeter.

Conductors and Insulators. — Some sub¬ stances, as metals, carbon, salt solutions, etc., are conductors of electricity, others as air, glass, rubber, paper, oils, etc., are insulators. There

is, however, no perfect conductor nor perfect insulator, but even the best conductors, silver, copper, aluminum, offer still some resistance to the flow of electric power and thereby cause a loss of energy which is proportional to the square of the current flowing and appears as heat in the conductor. For transmission of electric power conductors are therefore used to direct the flow of power, copper or aluminum, surrounded by insulators, as rubber, paper. It is not sufficient, however, merely to surround the conductor by insulating material, but the insulating material must have sufficient thick¬ ness to withstand the electric pressure or volt¬ age, otherwise it is disrupted, that is, the electric power penetrates it as spark discharge. The ability to withstand electric pressures is called the dielectric or disruptive strength and is of foremost importance in insulating electric cir¬ cuits of high voltage. Very good insulators are not necessarily of very high dielectric strength, for instance air, which is perhaps the best insulator, has rather low disruptive strength, that is, is easily penetrated by an elec¬ tric spark, while mica and rubber, although not as good insulators as air, have very much greater dielectric strength.

Physiological Effects. — Electric energy is perceived by the senses either indirectly by transformation into other forms of energy, as light and sound in the spark discharge or light¬ ning, or directly if the electric current passes through the body. A large current of very short duration, or electric discharge, causes a shock which when very powerful, as in light¬ ning, may be fatal. A current flowing continu¬ ously through the body causes a specific sensa¬ tion which with increasing voltage and therefore increasing current becomes unbearable, the muscles contract and become uncontrollable, so that in case of accidental contact with electric circuits the victim is unable to let go, and ulti¬ mately at high voltages death may result. With alternating currents, the specific sensation de¬ creases with increasing frequency, so that at very high frequencies even large currents are little felt — though not without danger. (See Electricity, Cause of Death by). The amount of current flowing through the body depends upon the electric pressure or voltage and the resistance of the body. This resistance is mainly the skin or surface resistance, therefore depends upon the nature of the contact between body and electric circuit. When loosely touched with dry hands a 100-volt circuit may hardly give any sensation, while grasped with wet hands a 50-volt circuit may be unbearable. Only at very high voltages the nature of the contact becomes of less importance and the electric cur¬ rent penetrates as arc. Electric pressures below 500 to 600 volts are considered as still safe, since only in cases of exceptionally good

contact with such voltages serious results may occur. Much higher voltages are usually fatal, but instances are on record of contact with 10,000 to 20,000 volts without fatal results, in cases where the duration of the contact has been very brief.

The causes of death by electricity are :

1. The direct effect of large power exerted upon the body, causing destruction by heat, etc., as in electrocution where several horse power are used.

2. Mechanical destruction of vital organs by very heavy discharges, as lightning.

3. Paralysis of the nervous system, stop¬ page of the heart and respiratory organs. In these cases resuscitation by artificial respira¬ tion, etc., when immediately resorted to, is very promising, especially if only respiration has stopped, but the heart is still beating.

Therapeutically electricity is used as stimu¬ lant by its action on the nervous system and for carrying substances through the skin into the body electro-chemically. It is very useful in the hands of expert physicians but like any powerful agent, in the hands of a layman, is harmful and dangerous. The electric healing devices advertised broadcast, as electric belts, etc., are mere swindles and without any value. See Electrotherapeutics.

Prospect. — Only the very beginning has been made in the use of electricity as secondary form of power for transmitting energy from it $ natural source, waterfall or coal mine, to the place of consumption, factory, city, railway. Here very great strides are still to be looked forward to, resulting in a much more efficient use of the stores of energy afforded by nature. The essential characteristic of modern civiliza¬ tion is the independence of man of his immedi¬ ate surroundings, in the necessities of civilized life. These necessities are materials and energy. The transportation, distribution and supply of materials has been organized in the last century in the system of railway, steamship and other transportation agencies, and the generation, transmission, distribution and supply of energy is now being organized by electric power, in the system or network of transmission and dis¬ tribution lines, which increasingly spread over the country and interconnect the electric power generating stations —

steam and hydraulic — with the places of energy demand. Only elec¬ tricity can fulfil this requirement of energy supply of our civilization, due to the high effi¬ ciency and economy of electric transmission, the practically unlimited possibility of subdivision in distribution, and the efficiency and simplicity of conversion of electric energy into anv other form of energy, from the small lamp of a few watts power consumption, to the huge motor of many thousand horse power. In the pro¬ duction of light from electric energy at present the efficiency is low, due to the use of heat as intermediary form of energy. A direct con¬ version of electric energy into light giving an efficiency of 50 per cent or more would make electric lighting many times cheaper than any other form of illumination and so displace all other illuminants. In this direction fair promise of a gradual advance exists. The direct con¬ version of the stored energy of coal into electric energy and thereby the elimination of the enor¬ mous loss of energy between the chemical energy of the coal and the electric energy is still en¬ tirely hopeless and no clue to its solution visible. In electro-chemistry (q.v.), that is, the transfor¬ mation of electric into chemical energy, lies an enormous field which has already produced powerful industries, as the aluminum and car¬ bide production, and therefore holds out the hope of most wonderful advances in the future. See Electrochemical Industries Metal¬ lurgy ; and various other articles in this volume on electrical subjects.

Charles P. Steinmetz, General Electric Company, Schenectady, N. Y.

ELECTRICITY, Its History and Prog¬ ress. There is perhaps no better illustration of the slow growth of man's knowledge concern¬ ing physical things than the fact that the identity of lightning and electricity in some of its other modes of manifestation should have escaped detection for so many centuries of the world's history.

Lightning, of course, and certain other manifestations of electricity, were known to the philosophers of ancient times, but to them no thought was more remote than that these mani¬ festations had a common origin. Pliny (61- 115 a.d.) in his books writes: ((The ancient Tus¬ cans by their learning hold that there are nine gods that send forth lightning and those of eleven sorts.® This was in general the early pagan idea of lightning. The property of amber when rubbed of attracting light bodies, such as particles of feathers, a property now known to be electrical in its nature, must have been familiar to philosophers many hundred years before the Christian era, although Thales of Miletus (640-548 b.c.), one of the seven sages of Greece, is mentioned as having been the first to observe this phenomenon. Pliny has several references to this peculiar property of amber. Pliny's

(Natural History,* (trans. Philemon Holland, London 1634, pp. 606, 608, 609).

The peculiarity of the torpedo in defending itself by means of a property, now also known to be electrical, which it possesses whereby it can stun an enemy, was also known to Pliny and other early writers. Consult Cavallo's Philosophy,* p. 536 (Philadelphia 1829).

The property of the magnet or loadstone in attracting iron was likewise known to the en¬ lightened men of that early period, but neither in the case of electricity nor of magnetism had these philosophers any conception of the real nature of the phenomena involved, attributing the peculiar properties of the substances named to some occult vitality possessed by them.

It is not, however, much to be wondered at that .the philosophers of long past ages should have failed to observe any relationship be¬ tween the electricity of lightning, amber and the torpedo, when as we shall see, many who may be termed modern philosophers — those of the 17th and 18th centuries — failed for years to discover this identity, even when in posses¬ sion of electric machines capable of producing in miniature many of the effects of lightning, and for long after the knowledge of the elec¬ trical properties of amber had been extended to wax, glass and other substances. Even the corelationship of electricity and magnetism es¬ caped particular notice for some years after the affinity of these phenomena had been demonstrated. Possibly the earliest and near¬ est approach to the discovery of the identity of lightning, and electricity from any other source, is to be attributed to the Arabs, who before the 15th century had applied the Arabic word for lightning (raad) to the torpedo. The Greek word for amber, however, is elektron, and it is due to the fact that this substance was the first known to possess the property mentioned that the word electricity is derived.

Centuries passed after the discovery of fric¬ tional and animal electricity before any advance appears to have been made in the production of electricity artificially or before any important developments of value were made in the art.

Toward the latter part of the 16th century a physician of Queen Elizabeth's time, Dr. William Gilbert (1540-1603), undertook a

number of careful electrical experiments, in the course of which he discovered that many substances other than amber, such as sulphur, wax, glass, etc. (consult Priestley's (History of Electricity, > London 1757), were capable of manifesting electrical properties. Gilbert also discovered that a heated body lost its electricity and that moisture prevented the electrification of all bodies, due to the now well-known fact that moisture impaired the insulation of such bodies. He also noticed that electrified sub¬ stances attracted all other substances indis¬ criminately, whereas a magnet only attracted iron. The many discoveries of this nature earned for Gilbert the title of founder of the electrical science. Since Gilbert's time scarcely a year has passed in which some new discovery relating to the science and art of electricity and magnetism has not been made. This is es¬ pecially true during the years since 1872.

Amongst the experimenters immediately following Gilbert one of the most notable was Dr. Wall of England (1650). During one of his experiments on approaching his fingers to an electrified rod, Dr. Wall saw a spark, ac¬ companied by a noise which he likened to lightning and thunder. Wall's contemporaries and some comparatively recent writers have thought that this was the first time an artificially produced electric spark had been observed. This, however, is doubtless an erroneous view. Archbishop Eustathias, of Thessalonica, Greek scholar and writer of the 12th century, for in¬ stance records that Woliver, king of the Goths, was able to draw sparks from his body. The same writer states that a certain philosopher was able while dressing to draw sparks from his clothes, a result seemingly akin to that ob¬ tained by Symmer in his silk stocking experi¬ ments, a careful account of which may be found in the Philosophical Transactions,*

1759.

It would indeed have been surprising if the electric spark had not been observed prior to Dr. Wall's time (although its origin may not have been recognized) when it is considered that any one shuffling across a carpet in dry, crisp weather, or if whipped with a piece of fur while his body is insulated, will accumulate a charge of electricity upon his person that will discharge with a spark into any other person or piece of metal that he may touch. The present writer has even noticed electric sparks passing from his knuckles to the metal fixings of a hand bag that he was carrying while walk¬ ing on a stone pavement in cold, dry weather.

Robert Boyle was another of the experi¬ menters in electricity of this

period (1650). One of his important discoveries was that elec¬ trified bodies in a vacuum would attract light substances, this indicating that the electrical effect did not depend upon the air as a medium. He also added resin to the then known list of electrics. (Consult Boyle's Experiments on the Origin of Electricity,* and Priestley's (History of Electricity*). Up to about the year 1682 the only known way in which electricity could be developed was virtually that known to the an¬ cients, namely, by rubbing rods of amber, glass, wax, resin or similar substances. The amount pf electricity producible in this way was very

small. At this time Otto von Guericke of Magdeburg (also the inventor of the air-pump) invented an electric machine consisting of a sulphur globe or ball, suitably mounted on a shaft and rotated by a handle. Using his hand as a ˆrubber® (see Electric Machine), von Guericke obtained electricity in fairly large quantities, the production of which was accom¬ panied by light and sound.

The electric machine was subsequently im¬ proved by Hawkesbee or Haukesbee, Litzendorf, and by Prof. George Mathias Boze, about 1750. Litzendorf substituted a glass ball for the sul¬ phur ball of Guericke. Boze was the first to employ the ((prime conductor® in such machines, this consisting of an iron rod held in the hand of a person whose body was insulated by stand¬ ing on a cake of resin. Dr. Ingenhousz, in 1746, invented electric machines made of plate glass. Consult Dr. Carpue's (Introduction to Electricity and Galvanism, * London 1803.

Experiments with the electric machine were largely aided by the discovery of the property of a glass plate, when coated on both sides with tinfoil, of accumulating a charge of electricity when connected with a source of electromotive force. This property, now and for many years availed of in the electric condenser, was, accord¬ ing to Priestley ((History of Electricity,* 3d ed., Vol. I, p. 102), first observed by Von Kleist of Leyden in 1754. Von Kleist happened to hold, near his electric machine, a small bottle, in the neck of which there was an iron nail. Touching the iron nail accidentally with his other hand he received a severe electric shock. In much the same way Prof. Pieter van Mus- schenbroeck assisted by Cunaens received a more severe shock from a somewhat similar glass bottle. Sir William Watson of England greatly improved this device, by covering the bottle, or jar, outside and in with tinfoil. This piece of electrical apparatus will be easily recognized as the well-known Leyden jar, so called by the Abbot Nollet of Paris, after the place of its discovery. The electric machine was soon further improved by Prof. Andrew Gordon, a Scotchman, of Erfurt, who substi¬ tuted a glass cylinder in place of a glass globe ;

and by Giessing of Leipzig who added a ((rub- ber** consisting of a cushion of woolen material. The <(colleetor,** consisting of a series of metal points, was added to the machine by Benjamin Wilson about 1746, and Mr. John Canton of England (also the originator of the first pith ball electrometer) in 1762 made a notable im¬ provement in the efficiency of electric machines l}y sprinkling an amalgam of tin over the sur¬ face of the rubber.

In the second quarter of the 18th century (1729) Stephen Gray in a series of interesting experiments for the first time demonstrated the difference between conductors and non-con¬ ductors (insulators), showing amongst other things that a metal wire and even pack thread conducted electricity, whereas silk did not. In one of his experiments he sent an electric cur¬ rent through 700 feet of hempen thread which was suspended at intervals by loops of silk thread; probably explainable on supposition that the hemp is more absorbent of moisture than silk. Subsequently Du Fay transmitted a current through a wet hempen string to a distance of 1,256 feet, the string being insulated by means of glass. In 1741 Mr. Ellicott <(pro-

posed to measure the strength of electrification by its power to raise a weight in one scale of a balance while the other was held over the elec¬ trified body and pulled to it by its attractive power® (Carpue).

The Sir William Watson already mentioned conducted numerous experiments, about 1749, to ascertain the velocity of electricity in a wire, which experiments, although perhaps not so in¬ tended, also demonstrated the possibility of transmitting signals to a distance by electricity. In these experiments an insulated wire 12,276 feet in length was employed and the transmis¬ sion of a signal from one end of the wire to the other appeared to the observers to be instanta¬ neous. Monnier in France had previously made somewhat similar experiments, sending shocks through an iron wire 1,319 feet long.

About 1737 Hawkesbee and Du Fay inde¬ pendently discovered that there were apparently two kinds of frictional electricity namely, that which is developed by rubbing glass and resin, respectively. The former electricity Du Fay termed <(vitreous,® the latter ftresinous® elec¬ tricity. Later, these electricities were termed ((positive® and ((negative® electricity, respec¬ tively, by Franklin, Dr. Watson, Lichtenberg and others.

Theories regarding the nature of electricity were quite vague at this period, and those prev¬ alent were more or less conflicting. Franklin considered that electricity was an imponderable fluid pervading everything, and which, in its normal condition, was uniformly distributed in all substances. He assumed that the electrical manifestations obtained by rubbing glass were due to the production of an excess of the elec¬ tric fluid in that substance and that the mani¬ festations produced by rubbing wax were due to a deficit of the fluid. This theory was op¬ posed by the <(two-fluid® theory due to Robert Symmer, 1759. By Symmer's theory the vit¬ reous and resinous electricities were regarded as imponderable fluids, each fluid being com¬ posed of mutually repellent particles while the particles of the opposite electricities are mutu¬ ally attractive. When the two fluids unite by reason of their attraction for one another, their effect upon external objects is neutralized. The act of rubbing a body decomposes the fluids one of which remains in excess on the body and manifests itself as vitreous or resinous electricity.

About 1750 various tests were made by dif¬ ferent experimenters to ascertain the physio¬ logical and therapeutical effects of electricity. Mainbray (or Mowbray) in Edinburgh exam¬ ined the effects of electricity upon plants and concluded that the growth of two myrtle trees was quickened by electrification. These myr¬ tles were electrified ((during the whole month of October, 1746, and they put forth branches and blossoms sooner than other shrubs of the same kind not electrified.® (Priestley's his¬ tory of Electricity, * p. 138). The Abbe Menon tried the effects of a continued application of electricity upon men and birds and found that the subjects experimented on lost weight, thus apparently showing that electricity quickened the excretions. The efficacy of electric shocks in cases of paralysis was tested in the county hospital at Shrewsbury, England, with rather poor success. (Philosophical Transactions, > p. 786, 1754). In one case reported a palsied

arm was somewhat improved, but the dread of the shocks became so great that the patient preferred to forego a possible cure rather than undergo further treatment. In another case of partial paralysis the electric treatment was fol¬ lowed by temporary total paralysis. A second application of this treatment was again fol¬ lowed by total paralysis, whereupon the fur¬ ther use of electricity in this case was stopped. For further accounts of the early use of elec¬ tricity as a remedial agent the reader may con¬ sult De la Rive's (Electricity. > See also article Electrotherapeutics.

Up to the time of Franklin's historic kite ex¬ periment (see Electricity,

Atmospheric) the identity of the electricity developed by rubbing and by electric machines (frictional electricity), with lightning had not been generally estab¬ lished. Dr. Wall, 1807, Abbot Nollet, Hawkes¬ bee, Gray and Winckler had indeed suggested the resemblance between the phenomena of ((electricity® and ˆlightning,® Gray having inti¬ mated that they only differed in degree. It was doubtless Franklin, however, who first proposed tests to determine the sameness of the phenom¬ ena. In a letter to Peter Comlinson, London, 19 Oct. 1752. Franklin, referring to his kite experiment, wrote, <(At this key the phial (Ley¬ den jar) may be charged; and from the elec¬ tric fire thus obtained spirits may be kindled, and all the other electric experiments be formed which are usually done by the help of a rubbed glass globe or tube, and thereby the sameness of the electric matter with that of lightning be completely demonstrated.® (Franklin, Experi¬ ments and Observations on Electricity >). Dali- bard, at Marley, near Paris, on 10 May 1742, by means of a vertical iron rod 40 feet long, obtained results corresponding to those recorded by Franklin and somewhat prior to the date of Franklin's experiment.

Franklin's important demonstration of the sameness of frictional electricity and lightning doubtless added zest to the efforts of the many experimenters in this field in the last half of the 18th century, to advance the progress of the science. Amongst those workers may be men¬ tioned Watson, Boze, Smeaton, Le Monnier, De Romas, Jallabert, Beccaria, Cavallo, John Can¬ ton, Robert Symmer, Nollet, Winckler, Rich- man, Dr. Wilson, Kinnersley, Priestley, Aepinus, Delaval, Cavendish, Coulomb, Volta and Galvani. A description of many of the experiments and discoveries of these early workers in the fields of electrical science and art will be found in the scientific publications of the time; notably the Philosophical Trans¬ actions, } Philosophical Magazine , Cambridge Mathematical Journal, Young's (Natural Phi¬ losophy,) Priestley's (History of Electricity,* Franklin's Experiments and Observations on Electricity,* Cavalli's (Treatise on Electricity,* De la Rive's (Treatise on Electricity.* Among the more important of the electrical experi¬ ments and researches at this period were those of Francis Aepinus, a noted German scholar (1724-1802) and Henry Cavendish of London, England. To Aepinus is accorded the credit of having been the first to conceive the view of the reciprocal relationship of electricity and magnetism. In his work (Tentamen Theorise Electricitatis et Magnetismi,* published in Saint Petersburg, 1759, he gives the following ampli¬ fication of Franklin's theory, which in some of

its features is measurably in accord with pres¬ ent day views: CiThe particles of the electric fluid repel each other and attract and are at¬ tracted by the particles of all bodies with a force that decreases in proportion as the dis¬ tance increases ; the electric fluid exists in the pores of bodies; it moves unobstructedly through non-electric (conductors), but moves with difficulty in insulators ; the manifestations of electricity are due to the unequal distribution of the fluid in a body, or to the approach of bodies unequally charged with the ‘ fluid ,® Aepinus formulated a corresponding theory of magnetism excepting that in the case of magnetic phenomena the fluids only acted on the parti¬ cles of iron. He also made numerous electrical experiments, amongst others those apparently showing that in order to manifest electrical ef¬ fects tourmalin requires to be heated to a tem¬ perature between 37.5° C and 100° C. In fact, tourmalin remains unelectrified when its tem¬ perature is uniform, but manifests electrical properties when its temperature is rising or falling. Crystals which manifest electrical properties in this way are termed pyro-electrics, amongst which, besides tourmalin, are sulphate of quinine and quartz.

Cavendish independently conceived a theory of electricity nearly akin to that of Aepinus (Philosophical Transactions, } 1771). He also (1784) was perhaps the first to utilize the elec¬ tric spark to produce the explosion of hydrogen and oxygen in the proper proportions to pro¬ duce pure water. The same philosopher also discovered the inductive capacity of dielectrics (insulators) and as early as 1775 measured the specific inductive capacity for beeswax and other substances by comparison with an air condenser.

About 1784 C. A. Coulomb, after whom is named the electrical unit of quantity, devised the torsion balance, by means of which he dis¬ covered what is known as Coulomb’s law; — The force exerted between two small electrified bodies varies inversely as the square of the distance; not as Aepinus in his theory of elec¬ tricity had assumed, merely inversely as the distance. According to the theory advanced by Cavendish <(the particles attract and are at¬ tracted inversely as some less power of the distance than the cube.®

With the discovery, by the experiments of Watson and others, that electricity could be transmitted to a distance, the idea of making practical use of this phenomenon began, about 1753, to engross the minds of ˆinquisitive® per¬ sons, and to this end suggestions looking to the employment of electricity in the transmission of intelligence

were made. The first of the meth¬ ods devised for this purpose was probably that due to Lesage (1774). This method consisted in the employment of 24 wires, insulated from one another and each of which had a pith ball connected to its distant end. Each wire repre¬ sented a letter of the alphabet. To send a mes¬ sage, a desired wire was charged momentarily with electricity from an electric machine, whereupon the pith ball connected to that wire would fly out; and in this way messages were transmitted. Other methods of telegraphing in which frictional electricity was employed were also tried, some of which are described in the article on the telegraph (q.v.).

Hitherto the only electricity known was that developed by friction or rubbing, which was therefore termed frictional electricity. We now come to the era of galvanic or voltaic electricity. The first mention of voltaic electricity, although not recognized as such at the time, was prob¬ ably made by Sulzer in 1767, who on placing a small disc of zinc under his tongue and a small disc of copper over it, observed a pecul¬ iar taste when the respective metals touched at their edges. Sulzer assumed that when the metals came together they were set into vibra¬ tion, this acting upon the nerves of the tongue, producing the effects noticed.

In 1790 Prof. Luigi Alvisio Galvani of Bologna on one occasion, while conducting ex¬ periments on <(animal electricity,® as he termed it, to which his attention had been turned by the twitching of a frog's legs in the presence of an electric machine, observed that the muscles of a frog which was suspended on an iron balus¬ trade by a copper hook that passed through its dorsal column underwent lively convulsions without any extraneous cause ; the electric ma¬ chine being at this time absent. To account for this phenomenon Galvani assumed that elec¬ tricity of opposite kinds existed in the nerves and muscles of the frog; the muscles and nerves constituting the charged coatings of a Leyden jar.

Galvani published the results of his discov¬ eries, together with his hypothesis, which at once engrossed the attention of the physicists of that time ; the most prominent of whom, Alexander Volta, professor of physics at Pavia, contended that the results observed by Galvani were due to the two metals, copper and iron, acting as ((electromotors,® and that the muscles of the frog played the part of a conductor, completing the circuit.

This precipitated a long discussion between the adherents of the conflicting views ; one set of adherents holding with Volta that the elec¬ tric current was the result of an electromotive force of contact at

the two metals; the other set adopting a modification of Galvani's view and asserting that the current was due to a chem¬ ical affinity between the metals and the acids in the pile. Michael Faraday wrote in the preface to his Experimental Researches,* relative to the question whether metallic con¬ tact is or is not productive of a part of the electricity of the voltaic pile: <(I see no rea¬ son as yet to alter the opinion I have given ;

. . . but the point itself is of such great

importance that I intend at the first opportu¬ nity renewing the inquiry, and, if I can, ren¬ dering the proofs either on the one side or the other, undeniable to all.® Even Faraday him¬ self, however, did not settle the controversy, and while the views of the advocates on both sides of the question have undergone modifi¬ cations, as subsequent investigations and dis¬ coveries demanded, up to the present day di¬ versity of opinion on these points continues to crop out.

Volta made numerous experiments in sup¬ port of his theory and ultimately developed the pile or battery (see Voltaic Pile), which was the precursor of all subsequent chemical bat¬ teries, and possessed the distinguishing merit of being the first means by which a prolonged continuous current of electricity was obtainable.

Volta communicated a description of his pile to the Royal Society of London and shortly thereafter Nicholson and Cavendish (1780) produced the decomposition of water by means of the electric current, using Volta's pile as the source of electromotive force. Davy in 1806, employing a voltaic pile of approximately 250 cells, or couples, decomposed potash and soda, show'ing that these substances were respectively the oxides of potassium and sodium, which metals previously had been unknown. These experiments were the beginning of electro¬ chemistry (q.v.), the investigation of which Faraday took up, and concerning which in 1833 he announced his important law of electro¬ chemical equivalents, viz.: i(The same quan¬ tity of electricity — that is, the same electric current — decomposes chemically equivalent quantities of all the bodies which it traverses; hence the weights of elements separated in these electrolytes are to each other as their chemical equivalents .® Employing a battery of 2,000 elements of a voltaic pile Humphrey Davy in 1809 gave the first

public demonstra¬ tion of the electric arc light (q. v.), using for the purpose charcoal enclosed in a vacuum.

Somewhat singular to note, it was not until many years after the discovery of the voltaic pile that the sameness of annual and frictional electricity with voltaic electricity was clearly recognized and demonstrated. Thus as late as January 1833 we find Faraday writing Philo¬ sophical Transactions 1833) in a paper on the electricity of the torpedo. “After an examina¬ tion of the experiments of Walsh, Ingenhousz, Cavendish, Sir H. Davy, and Dr. Davy, no doubt remains on my mind as to the identity of the electricity of the torpedo with common (fric¬ tional) and voltaic electricity; and I presume that so little will remain on the mind of others as to justify my refraining from entering at length into the philosophical proof of that identity. The doubts raised by Sir H. Davy have been removed by his brother, Dr. Davy; the results of the latter being the reverse of those of the former. . . . The general con¬

clusion which must, I think, be drawn from this collection of facts (a table showing the similar¬ ity .of properties of the diversely named elec¬ tricities) is, that electricity, whatever may be its source, is identical in its nature.®

It is proper to state, however, that prior to Faraday’s time the similarity of electricity de¬ rived from different sources was more than suspected. Thus, William Hyde Wollaston, b. 1766; d. 1828 (another noted and careful experi¬ menter in electricity and the discoverer of pal¬ ladium and rhodium), wrote in 1801 (Philo¬ sophical Magazine , Vol. Ill, p. 211): “This similarity in the means by which both electric¬ ity and galvanism (voltaic electricity) appear to be excited in addition to the resemblance that has been traced between their effects shows that they are both essentially the same and confirm an opinion that has already been advanced by others, that all the differences discoverable in the effects of the latter may be owing to its being less intense, but produced in much larger quan¬ tity.® In the same paper Wollaston describes certain experiments in which he uses very fine wire in a solution of sulphate of copper through which he passed electric currents from an elec¬ tric machine. This is interesting in connection with the later day use of almost similarly ar¬

ranged fine wires in electrolytic receivers in wireless, or radio-telegraphy.

In the first half of the 19th century many very important additions

were made to the world's knowledge concerning electricity and magnetism. For example, in 1819 Hans Chris¬ tian Oersted of Copenhagen discovered the de¬ flecting effect of an electric current traversing a wire upon a suspended magnetic needle. This discovery gave a clue to the subsequently proved intimate relationship between electricity and magnetism which was promptly followed up by Ampere who shortly thereafter (1821) an¬ nounced his celebrated theory of electro¬ dynamics, relating to the force that one current exerts upon another, by its electro-magnetic effects, namely: (1) ((Two parallel portions of a circuit attract one another if the currents in them are flowing in the same direction, and re¬ pel one another if the currents flow in the oppo¬ site direction. (2) Two portions of circuits • crossing one another obliquely attract one an¬ other if both the currents flow either towards or from the point of crossing, and repel one an¬ other if one flows to and the other from that point. (3) When an element of a circuit exerts a force on another element of a circuit, that force always tends to urge the latter in a direc¬ tion at right angles to its own direction ,®

Professor Seebeck, of Berlin, in 1821 discov¬ ered that when heat is applied to the junction of two metals that had been soldered together an electric current is set up. This is termed Thermo-Electricity. (See Thermo-Electricity). Seebeck's device consists of a strip of copper bent at each end and soldered to a plate of bis¬ muth. A magnetic needle is placed parallel with the copper strip. When the heat of a lamp is applied to the junction of the copper and bis¬ muth an electric current is set up which deflects the needle.

Peltier in 1834 discovered an effect opposite to the foregoing, namely, that when a current is passed through a couple of dissimilar metals the temperature is lowered or raised at the junction of the metals, depending on the direction of the current. This is termed the Peltier ((effect.® The variations of temperature are found to be proportional to the strength of the current and not to the square of the strength of the current as in the case of heat due to the ordinary re¬ sistance of a conductor. This latter is the C2R law, discovered experimentally in 1841 by the English physicist, Joule. In other words, this important law is that the heat generated in any part of an electric circuit is directly proportional to the product of the resistance of this part of the circuit and to the square of the strength of current flowing in the circuit.

In 1822 Sweigger devised the first galvanom¬ eter (q.v.). This instrument was subsequently much improved by Wilhelm Weber (1833). In 1825 William Sturgeon of Woolwich, Eng¬ land, invented

the horseshoe and straight bar .electromagnet, receiving therefor the silver medal of the Society of Arts ((Trans. Society of Arts,* 1825). In 1837 Gauss and Weber (both noted workers of this period) jointly in¬ vented a reflecting galvanometer for telegraph purposes. This was the forerunner of the Thomson reflecting and other exceedingly sensi¬ tive galvanometers once used in submarine sig¬ naling and still widely employed in electrical measurements. Arago in 1824 made the im-

portant discovery that when a copper disc is rotated in its own plane, and if a magnetic needle be freely suspended on a pivot over the disc, the needle will , rotate with the disc. If on the other hand the needle is fixed it will tend to retard the motion of the disc. This effect was termed Arago's rotations. Futile attempts were made by Babbage, Barlow, Herschel and others to explain this phenomenon. The true explanation was reserved for Faraday, namely, that electric currents are induced in the copper disc by the cutting of the magnetic lines of force of the needle, which currents in turn react on the needle. In 1827 George Simon Ohm (q.v.) announced the now famous law that bears his name, that is :

Electromotive force

Current = – * –

Resistance.

In 1831 began the epoch-making researches of Michael Faraday (q.v.), the famous pupil and successor of Humphrey Davy (q.v.) at the head of the Royal Institution, London, relating to electric and electromagnetic induction.

Faraday's studies and researches extended from 1831 to 1855 and a detailed description of his experiments, deductions and speculations are to be found in his compiled papers, entitled Experimental Researches in Electricity. } Fara¬ day was by profession a chemist. Fie was not in the remotest degree a mathematician in the ordi¬ nary sense- — indeed it is a question if in all his writings there is a single mathematical formula.

The experiment which led Faraday to the discovery of electric induction was made as fol¬ lows : He constructed what is now and

was then termed an induction coil, the primary and secondary wires of which were wound on a wooden bobbin, side by side, and insulated from one another. In the circuit of the primary wire he placed a battery of approximately 100 cells. In the secondary wire he inserted a galvanometer. On making his first test he ob¬ served no results, the galvanometer remaining quiescent, but on increasing the length of the wires he noticed a deflection of the galvanome¬ ter in the secondary wire when the circuit of the primary wire was made and broken. This was the first observed instance of the development of electromotive force by electromagnetic induc¬ tion. He also discovered that induced currents are established in a second closed circuit when the current strength is varied in the first 'wire, and that the direction of the current in the sec¬ ondary circuit is opposite to that in the first circuit. Also that a current is induced in a secondary circuit when another circuit carrying a current is moved to and from the first circuit, and that the approach or withdrawal of a mag¬ net to or from a closed circuit induces mo¬ mentary currents in the latter. In short, within the space of a few months Faraday discovered by experiment virtually all the laws and facts now known concerning electro-magnetic induc¬ tion and magneto-electric induction. Upon these discoveries, with scarcely an exception, depends the operation of the telephone, the dynamo ma¬ chine, and incidental to the dynamo electric machine practically all the gigantic electrical industries of the world, including electric lighting (q.v.), electric traction, the opera¬ tion of electric motors for power purposes,

and electro-plating (q.v.), electrotyping (q.v.;, etc.

In his investigations of the peculiar manner in which iron filings arrange themselves on a cardboard or glass in proximity to the poles of a magnet, Faraday conceived the idea of mag¬ netic Hines of force® extending from pole to pole of the magnet and along which the filings tend to place themselves. On the discovery being made that magnetic effects accompany the passage of an electric current in a wire, it was also assumed that similar magnetic lines of force whirled around the wire. For conven¬ ience and to account for induced electricity it was then assumed that when these lines of force are ((cut® by a wire in passing across them or when the lines of force in rising and falling cut the wire, a current of electricity is devel¬ oped, or to be more exact, an electromotive force is developed in the wire that sets up a current in a closed circuit.

Faraday advanced what has been termed the molecular theory of electricity which as¬ sumes that electricity is the manifestation of a peculiar condition of the molecule of the body rubbed or the ether

surrounding the body. Faraday also, by experiment, discovered para¬ magnetism and diamagnetism, namely, that all solids and liquids are either attracted or re¬ pelled by a magnet. For example, iron, nickel, cobalt, manganese, chromium, etc., are para¬ magnetic (attracted by magnetism), whilst other substances, such as bismuth, phosphorus, anti¬ mony, zinc, etc., are repelled by magnetism or are diamagnetic ((Phil. Trans., } 1845). Brugans of Leyden in 1778 and Le Baillif and Becquerel in 1827 had previously discovered diamagnetism in the case of bismuth and antimony. Faraday also rediscovered specific inductive capacity in 1837, the results of the experiments by Caven¬ dish not having been published at that time. He also predicted {Phil. Mag., March 1854) the retardation of signals on long submarine cables dup to the inductive effect of the insula¬ tion of the cable, in other words, the static capacity of the cable.

The 25 years immediately following Fara¬ day's discoveries of electric induction were fruitful in the promulgation of laws and facts relating to induced currents and to magnetism. In 1834 Lenz and Jacobi independently demon¬ strated the now familiar fact that the currents induced in a coil are proportional to the number of turns in the coil. Lenz also announced at that time the important law that, in all cases of electromagnetic induction the induced currents have such a direction that their reaction tends to stop the motion that produces • them, a law that was perhaps deducible from Faraday's ex¬ planation of Arago's rotations.

In 1845 Joseph Henry, the American physi¬ cist, published an account of his valuable and interesting experiments with induced currents of a high order, showing that currents could be induced from the secondary of an induction coil to the primary of a second coil, thence to its secondary wire, and so on to the primary of a third coil, etc. (Philosophical Magazine, 1849). Abria published the results of some re¬ searches into the laws of these induced currents, but owing to their complexity the investigation was not productive of very notable results. ((Ann. de Chimie III, } i, 385). About 1850

Kirchoff published his laws relating to branched or divided circuits. He also showed mathe¬ matically that according to the then prevailing electrodynamic theory, electricity would be propagated along a perfectly conducting wire with the velocity of light. Helmholtz investi¬ gated mathematically the effects of induction upon the

strength of a current and deduced therefrom equations, which experiment con¬ firmed, showing amongst other important points the retarding effect of self-induction under cer¬ tain conditions of the circuit ((Poggendorf Ann.* 1851). In 1853 Sir William Thomson (later Lord Kelvin) (q.v.) predicted as a re¬ sult of mathematical calculations the oscillatory nature of the electric discharge of a condenser circuit. To Henry, however, belongs the credit of discerning as a result of his experiments in 1842 the oscillatory nature of the Leyden jar discharge. He wrote ((Proc. Am. Phil. Soc.,* Vol. II, pp. 193, 196) : The phenomena require ns to adnpit the existence of a principal dis¬ charge in one direction, and then several reflex actions backward and forward, each more feeble than the preceding, until the equilibrium is ob¬ tained. These oscillations were subsequently observed by Feddersen (1857) who using a rotating concave mirror projected an image of the electric spark upon a sensitive plate, thereby obtaining a photograph of the spark which plainly indicated the alternating nature of the discharge. Sir William Thomson was also the discoverer of the electric convection of heat (the ˆThomson** effect). He designed for elec¬ trical measurements of precision his quadrant and absolute electrometers. The reflecting gal¬ vanometer and siphon recorder, as applied to submarine cable signaling, are also due to him.

About 1876 Prof. H. A. Rowland of Balti¬ more demonstrated the important fact that a static charge carried around produces the same magnetic effects as an electric current. The importance of this discovery consists in that it may afford a plausible theory of magnetism, namely, that magnetism may be the result of directed motion of rows of molecules carrying static charges.

After Faraday's discovery that electric cur¬ rents could be developed in a wire by causing it to cut across the lines of force of a magnet, it was to be expected that attempts would be made to construct machines to avail of this fact in the development of voltaic currents. (See Electric Machinery ; Electric Direct Current ; Gen¬ erators). The first machine of this kind was due to Pixii, 1832. It consisted of two bobbins of iron wire, opposite which the poles of a horse¬ shoe magnet were caused to rotate. As this pro¬ duced in the coils of the wire an alternating current, Pixii arranged a commutating device (commutator) that converted the alternating current of the coils or armature into a direct current in the external circuit. This machine was followed by improved forms of magneto¬ electric machines due to Ritchie, Saxton, Clarke, Stohrer 1843, Nollet 1849, Shepperd 1856, Van Maldern, Siemens, Wilde and others.

A notable advance in the art of dynamo con¬ struction was made by

Mr. S. A. Varley in 1866 (consult his British patent of that year) and by Dr. Charles William Siemens and Mr. Charles Wheatstone (consult (Royal Society Proceed¬ ings,* 1867), who independently discovered that when a coil of wire, or armature, of the dynamo

machine is rotated between the poles (or in the Afield**) of an electromagnet, a weak current is set up in the coil due to residual magnetism in the iron of the electromagnet, and that if the circuit of the armature be connected with the circuit of the electromagnet, the weak current developed in the armature increases the mag¬ netism in the field. This further increases the magnetic lines of force in which the armature rotates, which still further increases the current in the electromagnet, thereby producing a corre¬ sponding increase in the field magnetism, and so on, until the maximum electromotive force which the machine is capable of developing is reached. By means of this principle the dynamo machine develops its own magnetic field, thereby much increasing its efficiency and economical operation. Not by any means, however, was the dynamo electric machine perfected at the time mentioned. In 1860 an important improvement had been made by Dr. Antonio Pacinotti of Pisa who devised the first electric machine with a ring armature. This machine was first used as an electric motor, but afterward as a generator of electricity. The discovery of the principle of the reversibility of the dynamo electric ma¬ chine (variously attributed to Walenn 1860; Pacinotti 1864; Fontaine, Gramme 1873; Deprez 1881, and others) whereby it may be used as an electric motor or as a generator of electricity has been termed one of the greatest discoveries of the 19th century. In 1872 the drum armature was devised by Heffner-Altneck. This machine in a modified form was subsequently known as the Siemens dynamo. These machines were presently followed by the Schuckert, Gulcher, Fein, Brush, Hochhausen, Edison and the dynamo machines of numerous other inventors.

In the early days of dynamo machine con¬ struction the machines were mainly arranged as direct current generators, and perhaps the most important application of such machines at that time was in electro-plating, for which purpose machines of low voltage and large current strength were employed. (See Electric Direct Current). Beginning about 1887 alternating current generators came into extensive oper¬ ation and the commercial development of the transformer, by means of which currents of low voltage and high current strength are transformed to currents of high voltage and low current strength, and vice-versa, in time revolutionized the

transmission of electric power to long distances. Likewise the introduc¬ tion of the rotary converter (in connection with the ((step-down** transformer) which converts alternating currents into direct currents (and vice-versa) has effected large economies in the operation of electric power systems. See Elec¬ tric Alternating Current Machinery.

Before the introduction of dynamo electric machines, voltaic, or primary, batteries were extensively used for electro-plating and in teleg¬ raphy. There are two distinct types of voltaic cells, namely, the ((open** and the “closed,** or ((constant,** type. The open type in brief is that type which operated on closed circuit becomes, after a short time, polarized; that is, gases are liberated in the cell which settle on the negative plate and establish a resistance that reduces the current strength. After a brief interval of open circuit these gases are eliminated or absorbed and the cell is again ready for operation. Closed circuit cells are those in which the gases

in the cells are absorbed as quickly as liberated and hence the output of the cell is practically uniform. The Leclanche and Daniell cells, re¬ spectively, are familiar examples of the “open® and “closed® type of voltaic cell. The “open® cells are used very extensively at present, espe¬ cially in the dry cell form, and in annun¬ ciator and other open circuit signal sys¬ tems. Batteries of the Daniell or “gravity® type were employed almost generally in the United States and Canada as the source of elec¬ tromotive force in telegraphy before the dynamo machine became available, and still are largely used for this service or as “local® cells. Bat¬ teries of the “gravity® and the Edison-Lalande types are still much used in “closed circuit® systems.

The possibility of obtaining the electric cur¬ rent in large quantities, and economically, by means of dynamo electric machines gave im¬ petus to the development of incandescent and arc lighting. Until these machines had attained a commercial basis voltaic batteries were the only available source of current for electric lighting and power. The cost of these bat¬ teries, however, and the difficulties of main¬ taining them in reliable operation were pro¬ hibitory of their use for practical lighting pur¬ poses. The date of the employment of arc and incandescent lamps may be set at about 1877. Even in 1880, however, but little headway had been made toward the general use of these illuminants ; the rapid subsequent growth of this industry is a matter

of general knowledge. (See Electric Lighting). The employment of storage batteries (q.v.), which were originally termed secondary batteries or accumulators, be¬ gan about 1879. Such batteries are now utilized on a large scale as auxiliaries to the dynamo machine in electric power-houses and substa¬ tions, in electric automobiles and in immense numbers in automobile ignition and starting systems, also in fire alarm telegraphy and other signal systems.

In 1871 the electric telegraph had grown to large proportions and was in use in every civ¬ ilized country in the world, its lines forming a network in all directions over the surface of the land. The system most generally in use was the electromagnetic telegraph due to S. F. B. Morse of New York, or modifications of his system. (See Telegraph). Submarine cables (see Cable) connecting the Eastern and West¬ ern hemispheres were also in successful oper¬ ation at that time. When, however, at the present day one views the vast applications of electricity to electric light, electric rail¬ ways, electric power and other purposes (all it may be repeated made possible and practicable by the perfection of the dynamo machine), it is difficult to believe that no longer ago than 1871 the author of a book published in that year, in referring to the state of the art of ap¬ plied electricity at that time, could have truth¬ fully written : “The most important and remarkable of the uses which have been made of electricity consists in its application to tele¬ graph purposes® (Miller’s (Magnetism and Electricity,* p. 460). The statement was, how¬ ever, quite accurate and perhaps the time could have been carried forward to the year 1876 without material modification of the remarks. In that year the telephone (q.v.), due to Alex¬ ander Graham Bell (q.v.), was invented, but

it was not until several years thereafter that its commercial employment began in earnest. Since that time also the sister branches of electricity just mentioned have advanced and are advanc¬ ing with such gigantic strides in every direc¬ tion that it is difficult to place a limit upon their progress. For a more adequate account of the use of electricity in the arts and industries see Electrical Manufacturing Industry.

In 1864 James Clerk Maxwell of Edinburgh announced his electromagnetic theory of light, which was perhaps the greatest single step in the world’s knowledge of electricity. (Consult Maxwell’s (Electricity and Magnetism,* Vol. II, Chap. xx). As already noted herein Fara¬ day, and before him, Ampere and others, had inklings that the luminiferous ether of space was also the medium for electric action. It was known by calculation and experiment that the velocity of

electricity was approximately 186,000 miles per second; that is, equal to the velocity of light, which in itself suggests the idea of a relationship between electricity and “light.® A number of the earlier philosophers or mathematicians, as Maxwell terms them, of the 19th century, held the view that electromag¬ netic phenomena were explainable by action at a distance. Maxwell, following Faraday, con¬ tended that the seat of the phenomena was in the medium. The methods of the mathemati¬ cians in arriving at their results were synthetical while Faraday’s methods were analytical. Fara¬ day in his mind’s eye saw lines of force travers¬ ing all space where the mathematicians saw centres of force attracting at a distance. Fara¬ day sought the seat of the phenomena in real actions going on in the medium ; they were satisfied that they had found it in a power of action at a distance on the electric fluids (Max¬ well’s (Electricity and Magnetism,* preface).

Both of these methods, as Maxwell points out, had succeeded in explaining the propaga¬ tion of light as an electromagnetic phenomenon while at the same time the fundamental concep¬ tions of what the quantities concerned are, radi¬ cally differed. The mathematicians assumed that insulators were barriers to electric cur¬ rents; that, for instance, in a Leyden jar or electric condenser the electricity was accumu¬ lated at one plate and that by some occult ac¬ tion at a distance electricity of an opposite kind was attracted to the other plate. Maxwell, look¬ ing further than Faraday, reasoned that if light is an electromagnetic phenomenon and is trans¬ missible through dielectrics such as glass, the phenomenon must be in the nature of electro¬ magnetic currents in the dielectrics. He there¬ fore contended that in the charging of a con¬ denser, for instance, the action did not stop at the insulator, but that the “displacement® cur¬ rents are set up in the insulating medium, which currents continue until the resisting force of the medium equals that of the charging force. In a closed circuit conductor an electric current is also a displacement of electricity. The con¬ ductor offers a certain resistance, akin to fric¬ tion, to the displacement, and heat is developed in the conductor, proportional as already stated herein to the square of the current, which cur¬ rent flow’s as long as the impelling electric force continues. This resistance may be likened to that met wdth by a ship as in its progress it displaces the water. The resistance of the dielectric is of a different nature and has been

compared to the compression of multitudes of springs, which, under compression, yield with an increasing back pressure, up to a point where the total back pressure equals the initial pres¬ sure. When the initial pressure is withdrawn the energy expended in compressing the “springs® is returned to the circuit, concurrently with the return of the springs to their original condition, this producing a reaction in the op¬ posite direction. Consequently the current due to the displacement of electricity in a con¬ ductor may be continuous, while the displace¬ ment currents in a dielectric are momentary and, in a circuit or medium which contains but little resistance compared with capacity or in¬ ductance reaction, the currents of discharge are of an oscillatory or alternating nature. (See Oscillating Current; Telegraphy, Wire¬ less). Maxwell extended this view of displace¬ ment currents in dielectrics to the -ether of free space. Assuming light to be the manifestation of alterations of electric currents in the ether, and vibrating at the rate of light vibrations, these vibrations by induction set up correspond¬ ing vibrations in adjoining portions of the ether, and in this way the undulations corre¬ sponding to those of light are propagated as an electromagnetic effect in the ether. Maxwell’s electromagnetic theory of light obviously in¬ volved the existence of electric waves in free space, and his followers set themselves the task of experimentally demonstrating the truth of the theory. This honor was reserved for Prof. H. Hertz, who in 1887 in a series of experi¬ ments proved the actual existence of such waves. The discovery of electric waves in space naturally led to the discovery and intro¬ duction in the closing years of the 19th century, of wireless telegraphy (q.v.), various systems of which are now in successful use on ship¬ board, lighthouses and shore and inland stations throughout the world, by means of which in¬ telligence is transmitted across the widest oceans and large parts of continents.

In 1891 notable additions to our knowledge of the phenomena of high frequency and high potential current were contributed by Nikola Tesla (q.v.). (Consult (Proc. Am. Inst. El. Engrs.,* 1901). Amongst the novel experi¬ ments performed by Tesla was to take in his hand a glass tube from which the air had been exhausted, then bringing his body into contact with a wire carrying currents of high potential, the tube was suffused with a pleasing bright glow. Another experiment was to grasp a bulb that was suspended from a single wire attached to a high potential, high frequency current cir¬ cuit, when a platinum button within the bulb was brought to vivid incandescence, the experi¬ menter at this time standing on an insulating platform. The frequency and potential in¬ volved in the experiments made by Tesla at this time were of the order of one or more million cycles and volts. For further

informa¬ tion relative to these experiments , the reader may be referred to Tesla's Experiments with Alternate Currents of High Potential and High Frequency. }

The place of electricity in leading up to the discovery of those beautiful phenomena of the Crookes Tube (due to Sir William Crookes), viz., Cathode rays (consult Eroc. British Associationˆ 1879), and later to the discovery of Roentgen or X-rays (q.v.),

must not be overlooked, since without electric¬ ity as the excitant of the tube the discovery of the rays might have been postponed in¬ definitely.

It has been noted herein that Dr. William Gilbert was termed the founder of electrical science. This must, however, be regarded as a comparative statement. Up to the middle of the 19th century, indeed up to about 1870, elec¬ trical science was, it may be said, a sealed book to the majority of electrical workers. Prior to this time a number of handbooks had been published on electricity and magnetism, notably Aug. de La Rive's exhaustive (Treatise on Electricity,) 1851 and (in the French) 1835; Beer's Einleitung in die Electrostatikp Wiede¬ mann's

The theories regarding electricity are also undergoing change. Indeed it may with truth be said that the trend of all scientific investiga¬ tion now leads to the conclusion that matter in its final analysis is electrical in its nature — in fact is electricity; the theory upon which this view is based being termed the electronic the¬ ory, or the electric theory of matter. See Electron.

This theory (or better, hypothesis) in a word assumes that the atom of matter, so far

from being indivisible, as assumed under the older theories, is made up of smaller bodies termed electrons, that these electrons arc electrical in their nature, and consequently all matter ultimately is electrical, the atoms of the different elements of matter con¬ sisting of a certain number of electrons, thus, 700 in the hydrogen atom and 11,200 in the oxygen atom. This theory of matter though of comparatively recent origin in several of its im¬ portant features is not altogether one of a day, nor is it due to the researches of one man or to the conception of one mind. Thus, as re¬ gards the view that the

atom is not an indi¬ visible particle of matter, but is made up of numerous electrons, many scientists have for years held that all the elements are modifica¬ tions of a single hypothetical substance, protyle, “the undifferentiated material of the universe.® Nor is the theory entirely new in its assump¬ tion that all matter is electrical. Faraday, Weber, Helmholtz, Clifford and others had glimpses of this view ; and the experimental work of Zeeman, Goldstein, Crookes, J. J. Thomson and others had greatly strengthened this view. Over 35 years ago Weber predicted that electrical phenomena were due to the exist¬ ence of electrical atoms, the influence of which on one another depended on their position and relative accelerations and velocities. Helmholtz and others also contended that the existence of electrical atoms followed from Faraday’s laws of electrolysis , and Johnstone Stoney, to whom is due the term “electron,® showed that each chemical ion of the decomposed electrolyte car¬ ries a definite and constant quantity of electric¬ ity, and inasmuch as these charged ions are separated on the electrodes as neutral sub¬ stances there must be an instant, however brief, when the charges must be capable of existing separately as electrical atoms ; while in 1887, Clifford (q.v.) wrote: “There is great reason to believe that every material atom carries upon it a small electric current, if it does not wholly consist of this current.®

Whether the electron theory will survive or will in turn be displaced by some more suitable theory remains for the future to de¬ termine. In the meantime, be that as it may, the practical application of electricity will go on apace. It is an every day saying of laymen that electricity is as yet in its infancy. This re¬ mark causes technical men to smile, for “electricity® is already a most prodigious infant. But in the sense that we may only be on the threshold of the possible utilizations of this most wonderful of nature’s agents, the remark is perhaps true. Predictions that were with diffidence made in the closing decade of last century to the effect that within 100 years of that time people would probably speak to one another without artificial means of com¬ munication ; that wires would be laid along every street and tapped into every house as gas pipes were then, for lighting and power pur¬ poses, have been for a decade facts accom¬ plished. What the next 20 years shall bring forth with regard to the applications of electricity none can tell. Twenty years ago it would have been difficult to find one steam rail¬ road engineer willing to admit that application of electric traction to steam railroads was a possibility. To-day much has been done in this

direction in the improvement of railroad termi¬ nal facilities, and it is now difficult to find one steam railroad engineer who will deny that in

20 years hence all the important steam railroads of America may not be operated electrically. In other directions the progress of events as to the utilization of electric power may be ex¬ pected to be equally rapid. In every part of the world the power of falling water, nature's per¬ petual motion machine, which has been going to waste since the world began, is now being converted into electricity and transmitted by wire hundreds of miles to points where it is usefully and economically employed. (See Electric Transmission of Energy). But the extensive utilization of falling water will not be limited to natural v/ ater falls. In hundreds of places where a fall of 40 to 400 feet extends over 10 to 50 miles, and where in the aggregate hundreds of thousands of horse power, by suit¬ able hydraulic methods, are available, this power will be usefully employed, thereby in large measure conserving the limited quantity of the world's coal. It has for instance been pro¬ posed to dam Niagara River at the foot of the gorge whereby another source of water power equal to that at the present falls would be avail¬ able. The Jehlun River in Kashmir, India, too, has a fall of 2,480 feet in 80 miles with a mini¬ mum flow of 30,000 gallons per second, and a beginning has been made to develop the 1,000- 000 electric horse power here represented, a considerable portion of which it is proposed to utilize in the production of nitrate of lime for fertilizer purposes, by combining by means of powerful, electric currents the limestone that abounds in this region with the nitrogen of the air, a combination which Danish engineers have shown to be commercially possible, and which inexhaustible product may in time be economi¬ cally available to replenish the failing powers of the farm lands of America and other countries. Within 10 or 20 years also that dream of the electrical engineer, the direct production of electricity from coal without the intervention of the steam engine with its wasteful methods, may be realized. Other means, now unknown, of developing electricity may be wrested from nature's storehouse. Indeed in view of the past progress of electricity, and especially in view of its marvelous progress in the last two decades, theoretically and practically, it requires no great exercise of the imagination to conceive that the time, may not be far distant when the universal artificial source of the world's heat, light and power, will be electricity, and that what is. now only surmise as to the sameness of electricity and matter will be demonstrated beyond reasonable doubt. Not only will wire¬ less telegraphy be more perfected than at present, but wireless telephony, and "seeing by electricity® to a distance, may all be practically accomplished. Indeed, it is not even beyond the possibilities that the transference of thought directly from brain to brain with the ether as the medium — the suggestion of which is now regarded as the vagary of a disordered imagina¬ tion — may then also

be realized. In short our successors of 25 or 30 years hence mav wonder at our obtuseness in not perceiving the obvious¬ ness of things which to them may then be self- evident, virtually as we now marvel at the simplicity of our cleverest ancestors in so long

failing to recognize the identity of frictional, animal, and voltaic electricity, or the more sim¬ ple fact that the wind, by them regarded as a phenomenon, is merely air in motion.

William Maver, Jr.,

Author of (American Telegraphy and Encyclo¬ pedia of the Telegraph >; Fellow, American Institute Electrical Engineers.

ELECTRICITY, Atmospheric. Experi¬ ments have shown that there is always free electricity in the atmosphere, which is some¬ times negative and sometimes positive, but most generally positive, and the intensity of this free electricity is greater in the middle of the day than at morning or night and is greater in win¬ ter than in summer. In fine weather the poten¬ tial increases with altitude at the rate, accord¬ ing to some writers, of about 30 volts per foot. To detect the presence of free electricity in the air a pointed metal rod projecting into the air several feet and connected at its lower end to a gold leaf electroscope may be used. When this rod is projected into the air a few feet the leaves diverge. Kites and balloons have also been used to detect and, so to speak, draw down the free electricity of the air. The origin of atmospheric electricity is still unknown. Some physicists have ascribed it to the friction of the air upon the ground, others to the gradual oxidation of plant and animal life, others again to evaporation, to induction from the sun, and to differences of temperature. Most authori¬ ties are agreed, however, that whatever may be the origin of free electricity in the atmos¬ phere the electricity of enormous voltages that disrupts the air and produces the phenomena of lightning (q.v.) is due to the condensation of the watery vapor forming the clouds ; each minute vapor drop as it moves through the air collecting upon its surface a certain amount of free electricity. Then as these drops of vapor coalesce into larger drops with a corresponding decrease in the total surface exposed the elec¬ tric potential rises until it overcomes the resist¬ ing power of the air. This remark will be more clearly understood when it is considered that with a given charge of electricity its potential rises as the electrical capacity of the object holding the charge is decreased, which is the case when the

minute vapor drops coalesce into larger drops. The similarity of lightning^ to the electricity developed by an electrical machine was demonstrated by Franklin in his memorable kite experiments.

Saint Elmo's fire (q.v.) is another phase of atmospheric electricity to.be considered in this connection. It is otherwise known as the fire of Saint Elias, of Saint Clara, of Saint Nicho¬ las and of Helena, as well as composite, com- posant or corposant (that is, corpus sancium) . The phenomenon is observed, usually during a thunder storm, at the tops of trees, spires, etc., or on the heads of animals, as a brush or star of light.

ELECTRICITY, Cause of Death by. As

is well known, one of the most impor¬ tant safeguards of the human body against the passage of electrical currents through it is its high degree of resistance. This degree of resistance, however, is subject to a considerable amount of variation. If the skin is dry the re¬ sistance is from 5 to 20 times as great as when

the skin is wet. From what is known of the amount of electrical current necessary to cause death in man, it is probable that 1,600 volts of electromotive force, of a continuous current, is sufficient to bring about this end, and that an alternating current of half this voltage would probably be fatal. In fact, the general deduction has been drawn from the experiments conducted in electrocution work at the Sing Sing prison, that no human body can withstand an alternating current of 1,500 volts, and 300 has produced death, while for the continuous current it may be necessary that over 3,000 volts may be required to bring about fatal results. Some of the minor injuries due to lightning and electricity are severe burns, paralysis of some of the muscles, deafness, loss of smell and taste, hysterical phenomena, traumatic neuroses. Oc¬ casionally blindness has resulted, also insanities of the maniacal type have been known to occur, following lightning stroke. As to the cause of death by lightning and electricity, modern re¬ search has shown that there are marked changes in the blood vessels of a hsemorrhagic type, and minute alterations in the nerve cells, but these seem to be secondary to the physiological action that the electrical current has upon the fibres of the heart muscle. The electrical shock brings about a condition of delirium or fibril¬ lary contraction of the heart muscle, causing a stoppage of that organ. This theory of the cause of death at present has the largest num¬ ber of adherents.

As to what can be done for the treatment of electrical shocks, medical

science is still somewhat in doubt. For all practical purposes, death, when it takes place, is instantaneous. The evidence derived from non-fatal cases is of great interest. In these, personal experience has shown that a number of individuals who have been rendered unconscious have recognized in the brief moments of consciousness the ex¬ perience of a strange sensation. Recoveries from the shock of electricity or lightning which have been severe enough to bring about uncon¬ sciousness are very common. As to the border lines which separate the recoverable from the fatal cases it seems difficult to determine. Promptness in the treatment is imperative. Ex¬ ternal heat to the body, artificial respiration and cardiac stimulants should be used simulta¬ neously. It is of importance to remember that the body of a patient in contact with live wires must not be touched by the rescuer with naked hands, but should be dragged away by his clothing, or removed from contact with the earth by slipping a board under him, thus to break the connection with the live wires. Live wires may also be raised by a stick and thus take the body out of the circuit. Artificial respiration (q.v.) by the Sylvester method or by means of the Gibbon's pump should be per¬ formed and the body should be surrounded by hot bottles or bricks, and rubbed, and suitable cardiac stimulants should be utilized. Injec¬ tions of large quantities of hot salt solution into the rectum may be of service and occa¬ sionally it may be necessary to infuse normal salt solution directly into the veins. Efforts at artificial respiration should not be discontinued under from three to six hours. Consult Jelliffe, Peterson and Haynes (Textbook of Legal Medicine and Toxicology.)

ELECTRICITY, Contact Theory of, a

theory which assumes that the electromotive force of a voltaic cell, and perhaps the electric¬ ity produced by friction, is due to the difference of potential assumed by two dissimilar sub¬ stances when placed in contact.

ELECTRICITY, Diffusion of. Electricity diffuses itself on the surface of a conductor. This may be proved very easily, by a simple apparatus devised by Faraday. An insulated spherical conductor has two hemispherical cups carefully fitted to it, each attached to an insu¬ lating handle. The conductor and its covering are charged with electricity, the cups are then removed and the conductor is brought near an electroscope. No divergence of the leaves oc¬ curs, indicating

that none of the electricity has passed into the conductor. If the conductor have a spherical shape, the electricity distributes itself equally over the surface; in other words, the density is the same on every part of the surface. We may conceive the electric fluid to surround the conductor as an ocean of uni¬ form depth. If the conductor be a brass disc, the electricity is found in greater quantity at the edges or rim. If it be a brass cylinder with rounded ends, the density is greatest at the ends. If the conductor have the shape of a cone, the density is greatest at the apex, and the sharper the apex the greater the density. Hence the remarkable effect of a pointed body in dissipating an electric charge.

ELECTRICITY, Dissipation of. The

gradual loss of electricity from a charged body surrounded by non-conductors which takes place by means of them is called dissipation of the electric charge. A charged conductor, for instance, supported on a glass pillar, slowly loses its electricity. This is due partly to the creeping of the electricity along the surface of the glass, which, even if it be free from dust and dirt, is seldom absolutely free from an invisible film of moisture ; and partly to the air that sur¬ rounds the insulated conductor, the electrified body charging the particles of air with similar electricity and then repelling them, by which means a gradual loss of charge occurs. Ex¬ periments extending over a period of several years show that this dissipation of electricity does not take place in a vacuum. Coulomb made a careful investigation into the laws of dissipation, by which he was able to allow for it in cases where he could not arrange his ex¬ periments so as to be undisturbed by it. Cou¬ lomb was led by his experiments to abandon the use of glass as a support for his conductors whenever it was possible, employing instead thin stems of shellac, and sometimes suspending small electrified bodies by well-dried silk fibres. He found that the amount of loss in a given time by means of the particles of air diminishes as the charge possessed by the conductor gets weaker and weaker, the losses in successive equal intervals of time being in geometrical progression.

ELECTRICITY, Experimental Researches

in, by Michael Faraday (1839-55). A monu¬ mental work in the literature of science ; not merely recording the results of experiment in what Tyndall called <(a career of discovery un¬ paralleled in the history of pure experimental

ELECTRICITY, FRICTIONAL

science,® but enriching the record with thoughts, and clothing it in many passages in a style worthy of exceptional recognition. In devising and executing experiments for passing beyond the limits of existing knowledge, in a field the most difficult ever attempted by research, Fara¬ day showed a genius and achieved a success, marking him as a thinker not less than an ob¬ server of the first order. In strength and sureness of imagination, penetrating the secrets of force in nature, and putting the finger of exact demonstration upon them, he was a Shakespeare of research, the story of whose work has a permanent interest. He made elec¬ tricity, in one of its manifestations, explain magnetism. He showed to demonstration that chemical action is purely electrical, and that to electricity the atoms of matter owe those prop¬ erties which constitute them elements in nature. In language of lofty prophetic conception he more than suggested that the physical secret of living things, the animal and the plant, is electrical. He particularly dwelt on the amount of electricity forming the charge carried by the oxygen of the air, which is the active agent in combustion and the supporter of life in both animals and plants, and only stopped short of definitely pronouncing vitality electrical. He urged very strongly as a belief, to which no test of experiment could be applied, that gravi¬ tation is by electrical agency, and that in fact the last word of discovery and demonstration in physics will show that electricity is the uni¬ versal agency in nature. And among his far-reaching applications of thought guided by new knowledge was his rejection of the idea of <(action at a distance,® in the manner of ((attrac- tion.® If a body is moved, it is not by a mys¬ terious pull, but by a push. The moving force carries it. These ideas outran the power of science to immediately understand and accept. But Maxwell, Hertz and Helmholtz have led the way after Faraday, to the extent that his electrical explanation of light is now fully ac¬ cepted. Fifteen years after his death, the great¬ est of his successors in physics, Helmholtz of Berlin, said in a Faraday lecture in London, that the later advances in electrical science had more than confirmed Faraday's conclusions, and that English science had made a mistake in not accepting them as its point of departure for new research. See Light.

ELECTRICITY, Frictional. It was an ob¬ servation made by the Greek philosopher Thales, 600 years before the Christian era, that, when amber was rubbed, it acquired the property of attracting light bodies. The cause of this at¬ tractive power was assigned to – a principle to which the name of <(electricity® was given — derived from the Greek word for amber. When a piece of wax is rubbed on the coatsleeve, an attractive power is awakened in it ; it is capable of attracting small pieces of light paper or par¬ ticles of sawdust. Taking

a warm glass tube closed at one end, and rubbing it with silk, the same thing is manifested. It is observed also that after contact with the wax or tube, the light bodies fall away, being seemingly repelled. If a stick of sealing-wax be rubbed with flannel and then balanced on a paper loop suspended by a silk thread and the knuckle be presented to it, the wax will in like manner follow the hand.

We have, therefore, the fact that an electrified hody attracts or is attracted by an unelectrified body. Another experiment of a simple char¬ acter may be mentioned. Take a piece of warm brown paper or sheet of foolscap, place it upon a warm board and rub it well over with a piece of india-rubber, — it clings to the board; or re¬ move it from the board and apply it to the wall of the room, and it adheres to the wall and remains in its position till its electricity is dis¬ sipated. Observation of these phenomena led to the development of the electric machine (q.v.).

. ELECTRICITY FROM HEAT. The de¬ riving of electricity directly from the application of heat is interesting, though it has not proven of commercial value. Two different metals in contact usually show a difference of potential. This difference is most marked in the case of bismuth and antimony. When bars of these metals are soldered together at one end and the opposite ends connected by a copper wire, and a flame is applied to the point of junction a slight electric current is set up, flowing through the closed circuit thus formed. The cooling of the point of junction also sets up a current. An apparatus made on this principle is called a thermo-electric couple, and a series of such couples, arranged to work together, is called a thermopile ; a still larger aggregation of thermo¬ electric couples arranged in rings superimposed has been styled a thermo-electric generator. With any of these contrivances the current ob¬ tained is so minute as to serve no purpose except experiment. The thermopile is valued for experimental purposes because of the great constancy obtainable with a very slight current. Iron is not a good metal to use in a thermopile, because at certain temperatures its potential coincides with nearly all other metals, so that there would be no current when that tempera¬ ture was reached.

Pyroelectricity is not to be confused with thermo-electricity because of the similarity of name. It treats of the phenomena of electric polarity in minerals on being heated or cooled. The quality of pyroelectricity is

best shown in tournaline, a crystal of which on being heated from about 10° to 150° C. displays positive elec¬ trification at one end and negative at the other; but on cooling the polarity is reversed and the positive and negative ends change places. Twin crystals of quartz also show the phenomena and other crystals in a lesser degree.

ELECTRICITY IN MEDICINE. See

ElECTROTH ERA PEUTICS.

ELECTRICITY IN MINING. See

Mines and Mining.

ELECTRICS and NON-ELECTRICS.

The chief work of the earliest experimenters in electricity was to divide bodies into electrics, which they could excite by friction, like amber; and non-electrics, such as the metals, which they could not so excite. These names were given to the two classes by Gilbert of Colchester (1600). But Du Fay (1733-45) showed that electrics are identical with non-conductors, and non-electrics with conductors ; and that the reason why non¬ electrics did not exhibit excitement by friction was that the electricity was conducted away from them as fast as it was produced. The dis¬ tinction was thus broken down.

ELECTRO-BALLISTIC MACHINES.

See Gunnery.

ELECTRO-BIOLOGY, the science which treats of the electric currents developed in living organisms ; also the department of knowledge which treats of the influence or control over the feelings, thoughts and actions of a mesmerized person. Very simple powers of observation show that the motions of a man's body are under the direction of his will. He puts forth his hand because he wills to do so ; he walks through volition, even though his mind be occu¬ pied with other things ; and talks or is silent as his will directs. It follows that there is some method by which the will communicates with the physical mechanism of that wonderful ma¬ chine, the human body. Through anatomy we learn that the muscles do the work, and that the nerves guide the muscles, and that the nerves all proceed from or centre in the brain. Through chiropractic we learn to plot the paths of the nerves through the body, and discover when their office is interfered with. Through phrenology we learn that certain classes of nerves connect with certain portions of the brain, and thus certain brain

areas are identified with certain physical, mental and moral capaci¬ ties.

But the thing we cannot demonstrate — be¬ cause we cannot see it' — is just how the will connects with a portion of the brain and sends out its order, which we know travels through the nerves to the muscles. Therefore we have to theorize as to how this is done, and the best theory appears to be the electric or magnetic theory, that that which Mesmer called (

through which electricity, magnetism, X-rays and similar manifestations are believed to travel. Mesmer considered that the human body was charged with this magnetism much as the earth is charged with electricity, and the theory stands analysis. He called it ((animal magnetism,® which is here used as the most familiar term, though it might better be termed ((physical mag¬ netism.® That animals have it as well as humans is shown by the fact that animals can be hypnotized. Away back in 1646 Father Athanasius Kirchner described his hypnotizing of poultry, and later this became a fashionable pastime in France. In 1872 Czermak repeated his experiments, and also hypnotized birds, rab¬ bits, salamanders and crabs.

Whether this animal magnetism is identical with animal electricity, or whether — as is more probable — it is a separate form of some higher etheric vibration than electricity, is interesting, but not all-important, and appears never to have been demonstrated. The vital fact of interest in electro-biology is that the human organism is virtually a vitalized dynamo, that gathers charge from the air breathed, and which gives off energy through the muscles under the direc¬ tion of the will. Electrical engineers commonly make this comparison, being struck with the similarity of the human organism with the elec¬ tric dynamo. And the fact that the human organism gets its charge of magnetism through the air breathed suggests that human magnetism is either universal in space or at least existent in both the air and water in which men and fishes live.

Another proof of the reality of this thing we call <(animal magnetism® is furnished by spiritualistic or mediumistic phenomena. The <(animal magnetism® is believed to be the cause of the (

The term electro-biology was coined about 1850 to describe the relationship between elec¬ tricity and life. We do not know what electricity is, and we do not know what life is; we have to judge of both by their manifesta¬ tions. We know little of the nature and nothing

of the origin of either, although some scientific men and some theologians are apt to be dog¬ matic in asserting that this or that must be or cannot be possible. But we do know 1 that through some medium the will controls man's sensory organism and physical functions, and we choose to call this thing ((animal magnetism,® as Mesmer called it, and to consider it of the nature of electricity. Reasoning analogously, that as the wireless telegraph conveys a certain vibra¬ tion which may be picked up by an instrument hundreds of miles away through etheric vibra¬ tions, caught by a coherer or detector, so we conclude that the will also originates vibrations, which many call thought-vibrations, and sends them through the etheric magnetism that im¬ bues all men and animals, and perhaps all nature. But ordinarily these vibrations are picked up and responded to only by the organism of the man who sends them out, presumably because his magnetic vibrations harmonize with his physical body. It is also logical to reason that this sort of magnetism exists everywhere, as we suppose electricity pervades the universe, and that the phenomena of telepathy or thought- transference, and mind-reading, are explainable through harmonic vibrations of the ether which this magnetism permeates and pervades. Clair- voyage and clairaudience likely are closely related, so that in solving the problem of physical magnetism probably these will also se solved.

ˆ It is stated in

Charles H. Cochrane.

ELECTRO-BRONZE. See Electroplat¬ ing.

ELECTROCHEMICAL EQUIVA¬ LENTS. The general principles of electro¬ chemistry (q.v.) and especially Faradajˆ's laws (q.v.) have shown us a definite quantitative re¬ lation between the amount of electricity passing in a given electrolysis, and the amount of de¬ composition resulting. According to Faraday's laws, the amount of any given element which will be deposited by a given amount of current is directly proportional to the amount of cur¬ rent passing, and to the chemically equivalent weight of the element in question. Quanti¬ tatively, it requires 96,500 coulombs of electricity (ampere-seconds) to deposit a chemically equiv¬ alent weight of any substance; or, to

put it in a more practical way, it requires 96,500 coulombs to make a unit change of valence of a gram- atom of any substance. From this numerical relation one can then calculate the weight of any element that will be deposited by a unit amount of current in a unit time. This is called the Electrochemical Equivalent of the element. For scientific purposes it is usually stated in grams per coulomb or per ampere-hour; for commercial use larger units are convenient, such as kilograms or pounds per ampere-day, or per 1,000 ampere-hours.

Following is a table of the electrochemical equivalents of the more common elements.

1

2

3

4

5

Atomic

Grams per

Element

Symbol

weight

Valence

ampere-hour

Aluminium. . . .

. . . A1

27.1

3

0.33702

Antimony .

. . . Sb

120.2

3

1 . 4948

5

0.89689

Arsenic .

74.96

3

0.93221

5

0.55932

Barium .

. . . Ba

137.37

2

2.5625

Bismuth .

. . . Bi

208.0

3

2.5867

5

1 . 5520

Bromine .

. . . Br

79.92

1

2.9817

Cadmium .

. . . Cd

112.40

2

2.0976

Calcium .

. . . Ca

40.07

2

0.74747

Chlorine .

. . . Cl

35.46

1

1.3229

Chromium ….

. . . Cr

52.0

2

0.97001

3

0.64667

Cobalt .

. . . Co

58.97

2

1.1000

3

0. 73335

Copper .

63.57

1

2.3717

2

1 . 1858

Fluorine .

. . . F

19.0

1

0.70885

Gold .

. . . Au

197.2

1

7.3572

3

2.4524

Hydrogen .

. . . H

1.008

1

0.0376066

Iodine .

. . . I

126.92

1

4. 7351

Iron .

. . . Fe

5-5 . 84

2

1.0416

3

0.69443

Lead .

. . . Pb

207.20

2

3.8651

4

1.9326

Lithium .

. . . Li

6.94

1

0.25892

Magnesium . . .

. . . Mg

24.32

2

0.45367

Manganese. . . .

. . . Mn

54.93

2

1.0247

Mercury .

• Hg

200.6

2

3.7420

Molybdenum. .

96.0

3

1.1939

Nickel .

. . . Ni

58.68

2

1 . 0946

3

0.72975

Nitrogen .

. . . N

14.01

3

0. 17423

5

0. 10454

Oxygen .

. . . O

16.00

2

0.29847

4

0. 14923

Phosphorus. . .

. . . P

31.04

3

0.38601

5

0.23161

Platinum .

. . . Pt

195.2

4

1.8206

Potassium ….

. . . K

39. 10

1

1 . 4588

Selenium .

. . . Se

79.2

4

0.73870

Silicon .

. . . Si

28.3

4

0.26395

Silver .

. . . Ag

107.88

1

4.02480

Sodium .

. . . Na

23.00

1

0.85809

Strontium .

. . . Sr

87.63

2

1 . 6347

Sulphur .

... S

32.06

4

0.29903

Tellurium .

. . . Te

127.5

2

2.3784

4

1.1892

6

0.79280

Tin .

. . . Sn

118.7

2

2.2142

4

1.1071

Titanium .

. . . Ti

48. 1

4

0.44863

Tungsten .

. . . W

184.0

6

1.1441

Uranium .

. . . u

238.2

6

1.4811

Vanadium ….

. . . V

51.0

5

0.38054

Zinc .

. . . Zn

65.37

2

1.2194

These values are taken from Electrochemi¬ cal Equivalents) by Hering and Getman (New York 1917).

G. A. Roush,

Assistant Secretary, American Electrochemical Society.

ELECTROCHEMICAL INDUSTRIES.

Electrochemistry may be defined as that branch of chemistry relating to the carrying out of chemical reactions by the means of or with the assistance of electricity. The word electro¬ chemical as here used includes the processes of electrometallurgy, the production and treat¬ ment of metals by means of electricity, there being no generic term covering both subjects.

The production or furtherance of chemical action by means of electrical energy may be secured in three ways: (1) By electrolysis — the action of an electric current upon a chemical compound in solution or in a fused condition; (2) by electrothermal action — the production of chemical changes by electrically, generated heat; (3) by the discharge of electricity through gases,

The largest employment of electrolysis is in the production and refinement of metals, par¬ ticularly aluminum and copper; but it is also used extensively in the preparation of a large number of chemical compounds of widely vary¬ ing character.

In most cases a substance obtained by elec¬ trolysis may be prepared also by a strictly chem¬ ical process. The choice of methods then be¬ comes simply one of cost. An example in point is the manufacture of metallic sodium: originally discovered by the electrolysis of caustic soda, it was for many years made com¬ mercially by the reduction of

sodium carbonate with carbon, or of caustic soda by a mixture of iron and carbon ; more recently the electro¬ lytic process has replaced the chemical methods,, because it is cheaper. In other cases certain products of electrochemical action have not yet been made by any other process.

A great saving of heat is found in most electrothermal processes, due to the fact that the electrically generated heat is applied inside the container, where it is effectively employed, no heat being wasted in heating the contents through the walls of the container, as in com¬ bustion processes. But even when produced by the cheapest water power, electric heat costs several times more than heat produced by the combustion of coal, so that where large quan¬ tities of heat are needed at only moderate tem¬ peratures, the combustion processes are usually cheaper.

We shall here consider the chief electro¬ chemical industries that have thus far attained commercial importance.

Copper. — The process of refining copper electrolytically consists in the transfer of cop¬ per from the anode to the cathode,, by the selective action of the electric current, and in leaving the impurities behind dissolved in the electrolyte, or in the form of slime or sedi¬ ment. The material at present subjected to profitable electrolyte refining is crude copper containing from 96 to 98 per cent pure copper* and varying amounts of silver, gold, platinum* palladium, nickel, iron, arsenic, antimony, sul¬ phur, etc. This crude copper is obtained from various copper ores by smelting and is cast in copper molds into anode plates, which are about three feet square and one to two inches thick,, weighing 250 to 500 pounds. The cathode plates are of electrolytically refined copper, practically the same in length and width as the anodes, but only 1/32 to 1/16 inch thick. The electrolyte, or bath, in which the plates are sus¬ pended, is a solution of copper sulphate just short of saturation, with enough sulphuric acid to prevent the separation of hydrated cupric oxide, but not enough to cause hydrogen in¬ stead of copper to be separated at the cathode; the proportions are about 3-4 per cent of copper as sulphate and 10-13 per cent of free sulphuric acid. When silver is present in the anode a little salt or hydrochloric acid is added to the electrolyte. The bath is kept at a temperature of about 40-60° C. (100-140° F.). The contain¬ ing tanks are of wood, usually lined with sheet lead or carefully coated with a pitch compound, and of such dimensions that a distance of from 1.5 to 2 inches exists between the faces of the plates. In some cases the plates are ar¬ ranged in series and in others in parallel or multiple. In the series system the anodes,

\vhich are touch stoaller than in the multiple System, are suspended in the electrolyte from

The series arrangement has the advantage of requiring electrical connections to be made at the first and last plates only, whereas the parallel system requires a connection at every plate; but in the series system the leakage of current due to the short-circuiting action of the sediment and sides of the tank is from 10 to 20 per cent, so that the parallel system is more generally used. The connections between the various plates and the circuit in the parallel systems are made by copper rods, which are run at two different levels along the edges of the tanks, one bar for each set of plates. In some instances these rods are of the inverted V shape, so that the edges will cut through any corrosion which may happen to form at the points of contact. The vats are arranged, with respect to each other, so that each is accessible from all sides and free circulation of the elec¬ trolyte is possible. This circulation is some¬ times obtained by blowing a stream of air through the electrolyte, but more frequently by arranging the vats in steps, and piping so that the electrolyte may pass from the top of one vat to the bottom of the next, by the action of gravity. This maintains a uniform density of electrolyte, which is necessary for the proper formation of the deposit. The electromotive force required is from 0.2 to 0.4 volt per tank, with a current density of 15 to 20 amperes per square foot of cathode plate surface. The individual vats are connected in series so that the total voltage may be approximately the same as that which the generator furnishes, being usually 110 volts. One ampere of current de¬ posits on the cathode only about one ounce of refined copper in 24 hours, and the current density must be kept below 40 amperes per square foot to avoid mushrooming and conse¬ quent short-circuiting. In practice from 400 to 500 ampere-hours are required per pound of copper deposited, the theoretical amount ac¬ cording to Faraday's law being only 386.2 am¬ pere-hours. The loss varies from 4 to 20 per cent according to the system employed.

The main product of refining is commercial cathodes, which are sometimes shipped to con¬ sumers, but more frequently cast into wire-bars, ingots, cakes or slabs of standard dimensions and weight. They usually assay from 99.86 to 99.94 per cent pure copper. The yield in com¬ mercial cathodes is from 97 to 99 per cent of the anodes treated, excluding the anode scrap which varies in weight from 7 to 15 per cent of the original anode in parallel plants, but this scrap is

not a loss as it is collected and recast into anode plates. Besides electrolytic .copper most plants secure gold, silver, platinum

and palladium from the slimes, and sometimes selenium, tellurium and other rarer metals. Nickel salts are usually recovered from the solutions.

There are in the United States 10 electrolytic copper refineries with a total capacity of 2,780,000,000 pounds per year; one refinery in Canada witli a capacity of 14,000,000 pounds per year. The actual production in 1917 was about 2,300,000,000 pounds, representing approxi¬ mately 74 per cent of the entire world's produc¬ tion of copper for the year. Or, deducting from the total production the amount that does not require refining, about 275,000*000 pounds from Michigan, the United States production amounts to over 81 per Cent_pf the total pro¬ duction of refined coppef; The other 19 per cent 11 produced in a number of plants of com¬ paratively small capacity in England, Wales and Continental Europe.

Aluminum. — Practically the whole output of this metal for the entire world is now pro¬ duced electrolytically. The only process used on a large scale is that invented independently in 1886 by Charles M. Hall in the United States and by Paul L. T. Heroult in Ffanei; This process consists in electrolyzing alumina dis¬ solved in a fused bath of cryolite. The alum¬ ina is obtained from the mineral bauxite which occurs abundantly in Arkansas, Georgia, Ala¬ bama and Tennessee. The natural material, being a hydrated alumina containing silica, iron and titanium, must be treated in order to drive off the water and eliminate the impurities, This is accomplished by a chemical process. In practice it requires about two pounds of alum¬ ina for each pound of aluminumˆ produced. The flux or bath in which the alumina is dissolved consists of cryolite, a natural double fluoride of aluminum and sodium (AlF3.6NaF) found in Greenland. This is melted in a large carbon- lined, sheet-iron tank which constitutes the negative electrode, a group of suspended carbon rods forming the positive electrode. A current of several thousand amperes at six to seven volts is used. Only a portion of this voltage is required to decompose the alumina, the bal¬ ance amounting to about four to five volts rep¬ resents the heat required to keep the bath melted. The passage of the current causes the aluminum to deposit on the bottom of the tank as a fused metal, whence it is drawn off period¬ ically. The oxygen set free combines with the carbon of the positive electrodes and passes off as carbonic oxide. The reaction is A1203 + 3C = 2A1 + 3CO. About one pound of carbon is con¬ sumed for one pound of aluminum produced. An excess of alumina is kept floating on the bath so that it is saturated

at all times. Ac¬ cording to Faraday's law the weight of alumi¬ num deposited by 1,000 amperes is 0.743 pound per hour. The actual yield of metal by the Hall process is about 85 per cent of this theo¬ retical amount. The metal when drawn from the tanks is cast into rough ingots which are afterward remelted and converted into com¬ mercial shapes, such as sheets, rods, wires, etc. The United States in 1917 produced about 180,000,000 pounds of aluminum, which was about two-thirds the total production of the world. Before the European War the share of the United States in the tota] production was under 50 per cent,

ELECTRO-CHEMICAL INDUSTRY

1 Electrolytic process of copper-refining, showing tanks filled with a solution of copper sulphate and containing sheets

of copper connected to the terminals of a generator

2 Casting side of a furnace showing copper anodes placed radially on a Clark casting machine

Zinc. — The very high temperature (1300° C. or 2370° F.) necessary to reduce zinc from its common ores, and its generation as a vapor, due to its boiling point being at 930° C. (1700° F.) present difficulties which offer an unusually open field for success to an electrolytic method of reduction. Several processes are in use. They all provide for the preliminary roasting of the ore — which is essentially lead sulphide, zinc sulphide and gangue — at a low red heat, so as to convert the sulphides into oxides and sulphates. The roasted ore is then treated with dilute sulphuric acid, the zinc being dissolved as sulphate, leaving the lead sulphate as an in¬ soluble residue to be smelted by the usual dry methods. Most of the silver present remains with the lead, a small portion passing into solu¬ tion with the zinc. It is in fact the recovered silver that sometimes makes the process profit¬ able. It is necessary to free the zinc solution from iron, copper and other foreign metals — a matter of considerable difficulty. When suf¬ ficiently purified, the zinc sulphate is electro¬ lyzed, the anodes being of lead, and the cathodes thin sheets of zinc. The operation is in reality a reduction of the sulphate, in no sense a refining process. As the reduction proceeds the electrolyte becomes more and more acid, and when hydrogen in quantity is evolved at the cathodes, the

electrolyte is run off, and used again to leach roasted ore.

Lead. — ’The electrolytic refining of lead has never been as widely applied as in the case of copper, due to the fact that the operation is more expensive in comparison with the low price of the metal, and that the ordinary fur¬ nace-refined lead of commerce is 99.98 per cent pure. In some cases, however, the lead carries valuable impurities that are not readily re¬ covered by furnace methods, and the process of electrolytic refining is resorted to. The prin¬ ciples involved are the same as for copper, the impure lead being used as anode in a solution of lead fluosilicate as electrolyte. The cathode is a rolled sheet of pure lead. The electrolyte ordinarily carries 60 to 70 grams of lead per litre, as fluosilicate, and 80 grams of free hydro- fluosilicic acid. Lead normally tends to give a fine crystalline deposit, but by the addition of 0.1 per cent of gelatin to the electrolyte, this is changed to a smooth, coherent deposit. The temperature has no effect on the deposit, but the current used is sufficient to maintain the bath at about 30° C. (86° F.). The current density used is 12-16 amperes per square foot, and the voltage per tank is 0.30-0.38. Tanks are arranged in series with the electrodes in each tank in multiple. The purity of the re¬ fined lead is about 99.995 per cent.

Silver. — The parting of the gold and silver when the silver is in excess, or the refining of auriferous silver, is also carried on by an electrochemical process. In this process the electrodes are arranged horizontally, the anodes above and separated from the cathode by a porous diaphragm. The cathode is a thin sheet of silver formed into an endless belt which travels horizontally below the series of anodes. The upper surface of the belt is smeared with graphite to prevent a close adherence of the crystals of deposited silver. These crystals are brushed off at the end of the tank upon a con¬ veyor-belt and removed at once from the electrolyte. Another modification has a horizon¬

tal graphite plate for cathode, from which the silver crystals are removed by hand with a scraper. The electrolyte carries 1 to 3 per cent of silver, 4 to 6 per cent of copper, and one-tenth of 1 per cent of free nitric acid. A certain amount of the acid is consumed in dis¬ solving the copper present in the silver — about one and one-half pounds to each 1,000 ounces of silver treated.

Gold. — The electrolytic process has been used in the recovery of gold from its solution in potassium cyanide, after cyanide extraction. The cyanide liquor is electrolyzed between iron anodes and sheet lead cathodes, using low cur¬ rent density. Chemical precipitation of the

gold, using zinc or aluminum is usually pre¬ ferred, however. In addition to this recovery process, electrolytic refining is practised to a considerable extent. The crude gold is used as the anode, in a solution of gold chloride with hydrochloric acid as the electrolyte. The cathode is a thin sheet of pure gold. A cur¬ rent density of 90 amperes per square foot at a low voltage (say 1 volt) is employed. The gold is deposited in crystalline form, leaving the impurities in the anode as a sludge, or dissolved in the electrolyte.

Antimony. — Antimony has been produced by an electrochemical process, but never on any extended scale. One process consists in leach¬ ing the sulphide ore with sodium sulphide, and extracting the dissolved antimony from the solu¬ tion by electrolysis, using iron cathodes, from which the deposited metal is broken by ham¬ mering when it reaches a thickness of about one-tenth of an inch. The electrolyzing cell is separated into two compartments by a porous diaphragm, the anode being carbon in a solu¬ tion of sodium chloride. The chlorine from the anode compartment is used in the manufacture of bleaching powder, and the exhausted sodium sulphide from the cathode compartment is used to leach more ore. One method of working up the slimes from the electrolytic lead-refining process gives a sodium sulphide solution carry¬ ing antimony, which is treated in a similar man¬ ner. Attempts have also been made to refine antimony in both sulphide and fluoride solu¬ tions.

Nickel. — While the electrolytic processes have not proved available for the commercial winning of metallic nickel from its ores, its electrolytic refining is successfully accomplished, though the details of the process employed are guarded as a trade secret. As is well known, electroplating with nickel is simple and easy. When, however, a thicker deposition is at¬ tempted, the metal scales off of the cathode in thin flakes which cannot be collected and melted into ingots at a commercial profit. The tend¬ ency of any iron and cobalt present in the crude nickel to be deposited on the cathode along with the nickel is a serious drawback — and incidentally compels attention to the fact that electrolytically deposited metal is not neces¬ sarily pure. It has been proved by experiment that nickel may be thus deposited in thick plates if the operation is conducted with a hot electro¬ lyte — in the neighborhood of 65° C. (150° F.) — and with a comparatively high current den¬ sity. Difficulty is experienced under these con¬ ditions with the evolution of hydrogen from the cathode, causing pitting of its surface. An indirect method of refining nickel by electro-

lysis consists in the deposition of its principal impurity (say copper), the release of other im¬ purities (say silver and platinum) in the anode sludge, leaving the pure nickel in solution in the electrolyte, from which it is then de¬ posited.

Calcium. — The production of metallic cal¬ cium by electrolysis may be accomplished economically by using fused calcium chloride as the electrolyte. The principal process used in this country is that of Seward and von Kugelgen. The cell consists of a circular iron box through the bottom of which projects a conical iron cathode, insulated from the box. The anode is a carbon lining, also insulated from the box. Above the cathode at the level of the bath is a water-cooled collecting ring within which the metal collects, it being lighter than the bath. By the time the collecting ring is full of metal the top layer is solidified, and the solid metal is gradually lifted up through the ring by a hook, the freshly collected metal building on underneath as it solidifies, thus making a stick or rod of metal.

Magnesium. — Being, like aluminum, reduc¬ ible with difficulty by ordinary furnace methods, magnesium is prepared almost solely by electro¬ lysis. The raw material used is ˆcarnallite,® the double chloride of magnesium and potas¬ sium. The operation is carried on in a cylin¬ drical steel box, which is made the cathode by suitable electrical connections. The anode is of carbon, and it is enclosed in a porcelain cylinder open at the bottom and with slotted sides, and having a tube at the top for the escape of the chlorine gas set free at the anode. The charge of carnallite is kept in a fused condition by heat applied externally to the steel box. All oxygen is excluded from the appara¬ tus by the introduction of some other gas (usually nitrogen) into the space above the electrolyte. This is necessary in order to pre¬ vent the oxidizing of the metallic magnesium, which rises and floats on the surface of the electrolyte. A tendency of the globules of magnesium to gather a film of oxide sufficient to prevent coalescence is overcome by the addi¬ tion of fluorspar (calcium fluoride) to the molten mass. While the metal thus obtained is not strictly pure, it Is sufficiently so to be available for all commercial purposes.

Sodium. — Formerly secured by chemical methods at very high temperatures, the world's supply of sodium is now produced wholly by electrolysis. The operation according to the Castner process is conducted in a cylindrical steel crucible so placed in a flue that the body of it can be heated while the inverted neck, through which the cathode enters from below, remains cool. The electrolyte used is

caustic soda. The anode is iron, cylindrical in form, with vertical slits which allow the free flow of the electrolyte : it surrounds the upper end of *the cathode, a cylinder of wire gauze hanging between from the collecting chamber above. As the operation proceeds, molten metallic sodium is released at the cathode and rises to float on the surface of the caustic soda, being guided by the wire gauze, which it cannot pass owing to its high surface tension. In the col¬ lecting chamber the metal is protected by the hydrogen also set free at the cathode, and is drawn off at intervals through a trap.

The Seward and von Kugelgen process uses an electrolyte of fused sodium chloride, the melting point of which has been reduced by the addition of other salts less readily decomposed by the current.

Potassium. — There is little commercial de¬ mand for metallic potassium. Its production, however, is entirely practicable by the Castner process described for sodium, using caustic potash as the electrolyte.

Electroplating and Electrotyping. — Elec¬ troplating is the art of covering a metallic sur¬ face with an adherent, electrodeposited coating of the same or some other metal, the form of the original surface being retained. The metal coating may be added purely for decorative purposes, or because of its superior resistance to wear or corrosion. Electrotyping is the art of reproducing the form of an object by electro¬ deposition of a metal, usually copper, in a cast or molded impression of the original object. For further details of these processes, the reader is referred to the articles under these separate headings.

Caustic Soda. — The production of caustic soda(NaOH) and chlorine (Cl) by the electro¬ lysis of a solution of common salt (NaCl) is readily realized experimentally (NaCl + H20 = NaOH + Cl + H), but its successful accom¬ plishment on a commercial basis is difficult be¬ cause of the secondary reactions which take place, forming a mixed product of caustic, salt, and hypochlorite of soda. These difficulties are avoided by separating the caustic soda that is formed, either by a porous diaphragm, by draw¬ ing it off as soon as formed, or by absorbing the sodium deposited in mercury or melted lead.

The most prominent system for the electro¬ lytic production of caustic soda and chlorine from common salt is the Castner-Kellner proc¬ ess. The Castner process employed in this country at Niagara Falls is as follows: The electrolytic tank consists of a slate box, 4 feet long, 4 feet wide and 6 inches deep, the joints being set in rubber cement. Two slate parti¬ tions reaching within 1/16 inch of the bottom (under

which are grooves) divide the cell into three compartments, each 15 inches by 4 feet, sealed from each other by a layer of mercury covering the bottom of the tank to a consider¬ able depth. The two outside chambers through which the brine is passed are provided with graphite anodes. These compartments are pro¬ vided with gas-tight covers and exhaust pipes of rubber and lead, to lead the chlorine away. The central compartment has an iron cathode, of 20 upright strips, and is filled with pure water above the mercury. Whenever the specific gravity of the water rises to 1.26, from its absorption of caustic soda, it is drawn off and fresh water supplied. The liberated hydro¬ gen is led from this chamber by means of pipes and used as a fuel for the concentration of the caustic. The tank is pivoted at one end on a knife blade and rests at the other on an eccen¬ tric, wrhich raises and lowers that end of the tank about half an inch every minute and causes a circulation of the mercury between the outer and middle compartments. The current passes into the outer chambers, splits up the sodium chloride (common salt, NaCl) into sodium and chlorine (Na and Cl), the latter is liberated at the graphite anodes and passes through the exhaust pipe to the absorption chambers where

it combines with slacked lime to form bleaching powder. The sodium combines with the mer¬ cury forming sodium amalgam, which by the rocking of the tank passes to the center cham¬ ber, where it serves as the anode, and combines with the water to form caustic soda (NaOH) and hydrogen (H), which appears at the iron cathode. Each of these tanks uses 630 amperes at 4.3 volts. The theoretical voltage required is but 2.3, the remainder being utilized in over¬ coming the ohmic resistance of the electrolyte and in keeping it warm. The output of this process per horse power per day is 12 pounds of caustic and 30 pounds of bleaching powder for each cell. The product contains from 97 to 99 per cent caustic, 1 to 2 per cent sodium carbonate, 0.3 to 0.8 per cent of sodium chloride, and traces of sodium sulphate and sodium sili¬ cate. A number of other processes have been de¬ veloped for the electrolysis of salt solutions for the production of alkali and chlorine, all based more or less on the same general principles as those utilized in the Castner process.

The Acker process, which was formerly used at Niagara Falls, but which has been discontin¬ ued, obtained caustic soda and chlorine using molten lead in place of mercury as a cathode, fused salt instead of brine as the electrolyte, and operated at a temperature of 850° C.

(1560° F.). The containing tank was a cast-iron vessel 5 feet long, 2 feet wide and 1 foot deep, the sides above the molten lead being covered with magnesia so that the current must pass from the graphite anodes to the lead which acted as the cathode. At one end of the tank was a small compartment separated from the re¬ mainder of the vessel by a partition dipping into the lead to such a depth that nothing but this fused lead can pass from one compart¬ ment to the other. In the smaller compartment the lead was subjected to a stream of steam, which decomposed the lead-sodium alloy with the formation of NaOH and hydrogen and at the same time kept the alloy in circulation. At intervals the caustic, which was in a fused state, was drawn off and allowed to solidify, thus avoiding the evaporation of water which is necessary in the Castner-Kellner process. The current employed per vessel in the Acker process was 2100 amperes at from 6 to 7 volts, of which energy 54 per cent is used in chemical action, and the remainder in maintain¬ ing the temperature. The output of each was 550 pounds of caustic soda and 450 pounds of chlorine in 24 hours.

Chlorine. — All processes making caustic soda from salt at the same time produce chlorine gas at the anode. In some cases this is absorbed in lime for the manufacture of bleaching powder, and in other cases it is compressed and liquefied. The liquid chlorine is shipped in pressure tanks for chemical purposes and for water purifica¬ tion. One of the most striking uses to which it has been put is as one of the poison gases used at the front in trench warfare. Hundreds of tons of gas have been used in a single attack.

Hypochlorites. — Another electrochemical in¬ dustry that is widely distributed throughout the country is the manufacture of hypochlorite for bleaching purposes. For some time the use of hypochlorite as a bleach was confined to large installations where an enormous quantity of bleaching liquor was demanded every day, e.g., in the manufacture of paper pulp. Now hypo¬

chlorite plants are installed in small units, pro¬ ducing only a few gallons of bleach a day for use in laundries. The types of cell used in hypochlorite manufacture vary widely, but are all alike in that they must have unattackable electrodes of some kind, usually either graphite or platinum. Many of the different types of cells have a number of electrodes in series, acting as bipolar electrodes. The electrolyte used is a 15 to 16 per cent solution of common salt, NaCl. The efficiency of the operation in practice usually amounts to only about 20 to 25 per cent, but the simplicity and ease of working of the process commend it in spite of its low energy efficiency. The minimum requirement is 1.27 kilowatt hours for the production of 1 kilogram of

active chlorine, while actual practice requires 6 to 7 kilowatt hours.

Potassium Chlorate is produced electro- chemically in considerable quantities, both here and abroad. The Gibbs process, used at Niagara Falls, consists in the electrolysis of potassium chloride solution, using a copper or iron cathode and a platinum anode. The current density is high, being 500 amperes per square foot of anode. Each cell uses about four volts, of which 1.4 is required to convert chloride to chlorate, and the remainder produces the heat that maintains the electrolyte at from 50° to 70° C. (125° to 160° F.), which is necessary for the proper reaction. The whole commercial supply is thus produced. Perchlorates are made by elec¬ trolyzing chlorates at low temperatures in the same type of cell.

Hydrogen and Oxygen. — One of the most widely distributed of the electrochemical indus¬ tries, but one that is usually installed in fairly small units, is the electrolysis of water for the production of hydrogen or oxygen, or both. When only one of the gases is required it is often more economical to produce it by some other method, but if both gases are needed, it is better to use an electrochemical method, and often the conditions are such that the single gas can be produced advantageously by the electro¬ chemical method.

Apparatus for the commercial electrolysis of water uses as electrolyte a solution either of sulphuric acid (H2SO4), or one of the alkalies (NaOH or KOH). With the alkalies the cells are usually constructed of iron, and with the acid, they must be lined with lead, whatever the body of the cell may be. With the alkaline solu¬ tions, a concentration of 10 to 25 per cent is used, and with acid, 20 to 30 per cent. The voltage needed to force a current through such a cell is composed of three factors — the voltage of decomposition of the water, the voltage nec¬ essary to overcome the resistance of the cell, and the voltage necessary to overcome the re¬ sistance of the gas layers on the electrodes, sometimes known as ˆovervoltage.® The sul¬ phuric acid solution has a much better con¬ ductivity than the alkaline solutions, but the resistance of the gas films is greater on lead than on iron, so that on the whole, cells using alkaline solutions have a lower working voltage than those using acid. The current efficiency in either case can be made to approach 100 per cent.

The total voltage required for the cells is 2.3 to 3.6 volts. The energy requirement for one cubic meter of mixed gases is 3.7 to 5.9 kilowatt hours, the alkaline cells giving the lower figure,

and the acid cells the higher. In the acid cells, lead anodes are used, which peroxidize, and the presence of Pb02 causes the oxygen to contain some ozone. The chlorides in the alkaline solu¬ tion allow the anodes, usually of iron or nickel, to be slowly attacked, requiring occasional re¬ placement. The purity of the gases is usually 97 to 99 per cent.

Electric Smelting. — One of the earliest commercial processes in electrochemistry was that devised by E. H. and A. H. Cowles in 1884. A mixture of about two parts of alumina, one or two parts of granulated copper and one or two parts of carbon was introduced in a brick¬ work chamber. Bundles of carbon rods inserted at the ends formed the electrodes between which a current of 3,000 amperes at 50 volts was main¬ tained. At a very high temperature the alumina was reduced (A1203 + 3C = 2A1 + 3CO) and the resulting aluminum combined with the cop¬ per to form aluminum bronze. This was the forerunner of the various types of electro¬ thermal operation described in the following paragraphs.

Iron and Steel can be produced by reducing iron ore with carbon in an electric furnace. For example, a mixture of magnetite and carbon can be heated by passing a current through it, as in the Cowles aluminum bronze process, by passing the current through a carbon core in contact with the material as in the carborundum proc¬ ess; or by the action of an arc as in the carbide process. The reaction is simply FesCN + dC5ˆ 3Fe + 4CO. Pure iron, cast iron or steel may be produced, depending upon the proportion of carbon. The chief advantages are the directness of the process and the fact that no impurities (sulphur, silicon, etc.) are introduced in the fuel, besides a considerable saving of fuel over the ordinary steel furnace. On the other hand it is a question of location, whether the electric furnace can compete in economy with the blast furnace, the Bessemer converter, and the open- hearth furnace. Pig iron has been made in the electric furnace in places like California and Norway, where water power is cheap and fuels expensive. The grade of iron thus produced is equal to the best Swedish charcoal iron, and commands a higher price than ordinary pig iron.

The chief utilization of the electric furnace in the iron and steel industry, however, is not in the direct production of pig iron or steel, but in the conversion of low-grade metal from the Bessemer or open-hearth into a high-grade metal, or in the remelting and refining of scrap steel for high-grade castings. Ordinary metal from the Bessemer

converter or the open-hearth furnace can, in the electric steel furnace, be con¬ verted into metal of crucible quality or better, at a lower cost than crucible steel, and in large quantities, up to 25 tons to the charge.

Ferro-alloys. — One of the most important developments in the steel industry in recent years has been the production of the various al¬ loy steels, — steels in which some special prop¬ erty is secured by the addition of some other metal to the simple alloy of iron and carbon. The simplest way to produce these steels is by the addition to ordinary steel of the proper amount of an iron alloy carrying a high per¬ centage of the metal desired. This ferro-alloy is usually, though not always, made electrother- mally by the reduction by carbon in an electric furnace of an oxide of the metal, in contact with

metallic iron to take up the reduced metal. Sometimes a reduction is made of a mixture of iron oxide and the oxide of the metal in question, but this necessitates the supplying of electric energy for the reduction of the iron, as well as of the alloying metal ; and the iron can usually be reduced more cheaply by other methods. Under these conditions the reduction of the oxide is much more readily accom¬ plished than if there were no iron present, since the iron considerably reduces the melting point of the resulting mixture. The type of furnace used varies somewhat with the metal being pro¬ duced, but in general are quite similar to those used for the production of calcium carbide.

The alloys that are made in this way are : ferromanganese, ferrosilicon, ferrochromium, ferronickel, ferrotungsten, ferromolybdenum, ferrovanadium, and ferro-uranium.

Silicon Carbide. — Known under the trade names “carborundum,® “crystolon,® and “exo- Ion® silicon carbide is produced in large quanti¬ ties by the process invented by E. G. Acheson. It is formed by intensely heating in an electric furnace a mixture of 35 per cent of ground coke, 52 per cent of sand, and about 11 per cent of sawdust and 2 per cent of salt, the jdeld being seven or eight tons of crystalline carborundum and a considerable amount of the amorphous material. The furnaces used at Niagara Falls consist of simple brick hearths 28 feet long and 11 feet wide, ˆith brick walls at each end, these being about three feet thick and six or eight feet high. The side walls are built without cement or mortar to allow the escape of gases and because they have to be pulled down at the end of each run to dis¬ charge the furnace. In the middle of each of the end walls there are iron frames holding together a large carbon electrode built up from a number of small electrodes, through which the current is led to a core

about two feet in diameter composed of broken coke and ex¬ tending the entire length of the furnace. This core, is raised to a very high temperature by passing through it an alternating current, using about 1,600 kilowatts. The heat from the core permeates the mass and converts it at a tem¬ perature of about 2,200° C. (4,100°F.) for some distance around the core into silicon car¬ bide. The unchanged material on the outside is worked over in the next charge. The coke of the core is converted into graphite. The shell of carbide is broken up after the furnace has cooled and is used in the manufacture of grinding wheels and other forms of abrasives. It is also used to a limited extent as a refac¬ tory material, since it is stable at high temper¬ atures and is a good conductor of heat.

Siloxicon. — This substance is an oxygen- carbon-silicon compound, intermediate between silica and carborundum. It is formed in the electric furnace by reducing silica with carbon, but not carrying, the reduction so far as with carborundum. Siloxicon is an exceedingly re-factory material, neutral toward both acid and basic slags, and infusible and insoluble in molten metals. It is used as a furnace lining, either made into. bricks or as a protective wash with sodium silicate.

Silicon. — The production of metallic silicon (90 to 95 per cent pure) has been accomplished by the extension of the principles used in the production of silicon carbide and ferro-sihcon.

It is made in an arc furnace consuming 1,200 to 1,500 horse power, having two electrodes dipping down into the charge, consisting of coke and sand. The principal impurities are iron and aluminum, with some carbon.

Titanium Carbide. — This compound can be made by a process exactly as for carborundum, but substituting the mineral rutile (titanium oxide) for the sand of the charge. Made into electrodes for arc lights, titanium carbide gives twice the light given by carbon electrodes.

Calcium Carbide. — The earliest of the large electric furnace industries to be established was the manufacture of calcium carbide. It is made in the electric furnace by the interaction of lime, CaO, and carbon, usually in the form of coke or anthracite coal. Charcoal can be used, and in fact, on account of its purity, is the most desirable of the

three, but is always more ex¬ pensive. The raw materials should be as pure as possible, in order to prevent the collection of impurities in the product. Phosphorus and arsenic are particularly to be avoided as im¬ purities, and sulphur is also undesirable. The lime and fuel, coarsely crushed, are mixed and charged into the furnace, where they are heated to the reaction temperature mainly by the direct action of the arc.

The furnaces for the manufacture of carbide are all of the arc type and only a small portion of the heating is done by resistance. They may turn out the carbide either in solid blocks or as a liquid, to be tapped out as collected. For¬ merly the furnaces were of the block type, but now many are going over to the tapping furnaces.

The earliest form of furnace consisted of an electrode suspended in a car, which served as the other electrode and as a container for the carbide. This form of furnace was small and of low efficiency, 100 to 200 kilowatts at 40 to 70 volts, with a power consumption of 6 to 7 kilowatt hours per kilogram of 85 per cent carbide, an efficiency of only 40 per cent. The losses of raw materials were also high.

The modification of the block furnace for continuous operation, the solidified material being drawn away from underneath the work¬ ing zone of the furnace, made possible a de¬ crease in power consumption to 4.5 kilowatt hours per kilogram of carbide. The size of the furnace was also increased up to 375 kilowatts.

Tapping furnaces are much larger, up to 1,200 to 1,400 kilowatts and have a power con¬ sumption of 4.2 to 4.5 kilowatt hours per kilo¬ gram of carbide. One ton of product requires 900 kilograms of lime and 600 kilograms of anthracite coal.

Three-phase carbide furnaces have been built up to 3,000 kilowatts per phase, or 9,000 kilowatts per furnace. This proved to be the limit in furnace extension for single units, as the handling of larger currents at the electrodes gave excessive heat and volatilized the charge. A unit of double this size was constructed by including two three-phase electrode systems in one furnace jacket. This gives an 18,000 kilo¬ watt furnace with 6 electrodes, each electrode carrying up to 45,000 amperes. A furnace of this size will produce carbide with a power consumption of 4 to 4.2 kilowatt hours per kilogram. Using charcoal as a source of car¬

bon, the power consumption can be cut as low as 3.8 kilowatt hours per kilogram, equivalent to about 69 per cent efficiency, but the extra

cost of the charcoal over that of the coal will probably overbalance the extra saving in power.

Cyanamide. — A large portion of the calcium carbide now made is for use as a raw material for the manufacture of calcium cyanamide. The carbide after being finely ground is heated to temperature of about 1,000° C. (1,830° F.) in a special type of electric furnace, in the pres¬ ence of pure nitrogen. The nitrogen combines with the carbide forming CaCN2. This formula calls for 35 per cent of nitrogen in the product, but since the carbide is never entirely pure and since it is not entirely converted, the resulting product carries about 20 per cent of nitrogen.

The process was orginally developed for the production of a fertilizer material to replace the more expensive sodium nitrate or ammonium sulphate, but processes have since been devel¬ oped for the conversion of the nitrogen of the cyanamide into ammonia and for the oxidation of the ammonia into nitric acid, thus providing a means for the chemical utilization of the nitrogen of the air. This same result has been secured by the direct oxidation processes for atmospheric nitrogen, which will be considered later.

Graphite. — Artificial graphite was first con¬ sidered as a commercial possibility when it was noticed that in the carborundum furnaces masses of graphite frequently resulted from the overheating of the carborundum in the center of the furnace, the carborundum being decom¬ posed and the silicon volatilized, leaving the carbon as graphite. The process was then car¬ ried on with the intentional overheating of the entire charge, with the result that it was con¬ verted into graphite. It was eventually found that all carbides decompose with the formation of graphite and the volatilization of the metal, and that it was not necessary to make up a carborundum charge to secure graphite, but that any carbonaceous material could be graphi- tized that carried a uniform mixture of metal¬ lic oxides, for example, coke or anthracite coal. The next step was the graphitization of molded carbon materials, particularly electrodes, it be¬ ing only necessary to incorporate uniformly throughout the body, while in the process of manufacture, a small percentage of some metal¬ lic oxide, preferably Fe203, this being largely volatilized out in the course of the graphitiza¬ tion. The amount of amorphous graphite pro¬ duced in this way now amounts to about ten million pounds annually, and the electrode material graphitized to at least half that amount.

Alumina. — Electrically fused alumina under the trade-names of

ˆalundum® and ((aloxite® is used mainly for abrasive purposes and to a lesser extent as a refractory material mainly for laboratory apparatus. The process consists in fusing down pure calcined bauxite in an electric furnace. The furnace is of the crucible type with two electrodes dipping into it. When the furnace is filled it is shut down, the sides stripped off and the block of alumina, weighing about five tons, is cooled slowly and then broken to lump form for shipment. The furnace works at 1 10 volts and 2,500 amperes, consuming 275 kilowatts. The energy consumption is about 2.1

kilowatt hours per kilogram of alumina. This is about half the power requirement for car¬ borundum, but the raw material is more ex¬ pensive, so that the product is a trifle more expensive than carborundum.

Fused Quartz. — Fused silica ware is now made by several manufacturers, and almost any shape can be secured that is made in glass, pro¬ viding the size is not too great. The price of the material is still quite high. Pure silica is fused in a small electric furnace and the main difficulty encountered is the heating of the silica to a sufficient temperature for it to flow easily (2,000° C. or 3,600° F.) without excessive volatilization and without the silicon combining with the carbon electrodes to form siloxicon or silicon carbide.

Phosphorus. — The disadvantages of the old chemical methods for the manufacture of phos¬ phorus were considerable, the reduction of phos¬ phoric acid or a phosphate giving a very low yield. The operation is now carried on electro- thermally, reducing a mixture of bone ash, calcined phosphate rock or calcined wavellite (AIPO4) with carbon and sand. The phos¬ phorus distils off and is collected under water, and the calcium or aluminum silicate slag is drawn off intermittently. The yield of phos¬ phorus is 80 to 90 per cent and the furnace requires 11.6 kilowatt hours per kilogram of phosphorus.

Carbon Bisulphide. — The chemical manu¬ facture of this substance was attended with con¬ siderable difficulty, but the electrothermal pro¬ duction works very easily, and one plant sup¬ plies the entire demand of this continent. A current of electricity passing through a granu¬ lar carbon resistor volatilizes sulphur to vapor, which passes up through a column of hot char¬ coal above the resistor, forming CS2, which is drawn off from the top of the furnace and con¬ densed.

The energy consumption is about 1.15 kilowatt hours per kilogram of CS2, an efficiency of about 35 per cent.

Nitrogen Fixation. — The direct oxidation of the nitrogen of the atmosphere for the pro¬ duction of nitric acid and ammonia is a re¬ sult long sought by numerous investigators, but it is only within recent years that it has become a commercial possibility. This has now been accomplished in three types of processes. One of these, the direct combination of nitrogen with hydrogen to form ammonia, is more chem¬ ical than electrothermal, and so does not con¬ cern us here. The second type of process is a more or less indirect conversion of the nitro¬ gen, largely electrothermal in character and is treated in the preceding paragraphs on Cal¬ cium Carbide and Cyanamide. The third type of process is the direct combination of atmospheric nitrogen and oxygen to form nitrous oxide under the influence of a high- tension electric discharge. This process is gen¬ erally known as the arc process, while the pre¬ ceding process is known as the cyanamide process.

The arc process, while a very interesting development from an electrochemical stand¬ point and as the pioneer in the field, cannot cope with the cyanamide process either in cost of operation or in efficiency. One of the simplest forms of apparatus and at the same time one of the most satisfactory is that of

Birkeland and Jiyde. If an arc is struck be¬ tween two high-tension electrodes, it imme¬ diately tends to break down to a low-voltage arc, at a high current, but if the arc is placed between two powerful electromagnets the elec¬ tromagnetic force will bend the arc out from the line of the electrodes, in a semi-circular form. As the arc spreads and becomes longer, the current drops and the voltage at the elec¬ trodes increases and soon reaches a point where a second arc strikes across between the electrodes in the same manner, to be imme¬ diately followed by others until the first arc formed reaches such a length that the voltage is no longer able to sustain it. Since an alter¬ nating current is used, the succeeding arcs form on opposite sides of the electrodes and, with proper regulation, maintain a circular sheet of flame, composed of a series of arcs progress¬ ing outward till they are extinguished either by becoming too long to be maintained by the volt¬ age available or by the reversal of the electro¬ motive force at the end of every half period of the alternating current.

This disc of flame, which is about 1.6 metres in diameter, is enclosed in a furnace and a current of air is forced out radially on each side of the arc. Furnaces are in operation, taking 3,200 to 4,000 kilowatts at

about 5,000 volts, of which 3,300 to 3,900 volts are across the arc, the remainder being the drop in the series inductances. The frequency is 50 cycles, the power factor is 66 to 68 per cent and the current 940 amperes. The gas from the fur¬ naces carries 1 to 1.2 per cent NO, and the yield of HN03 is about 67 grams per kilowatt hour.

The Paulding process is similar in principle to the Birkeland-Eyde, but differs in applica¬ tion. Here the succession of arcs is produced not by magnetic deflection but by blowing the blast of air that is to be treated between the two electrodes, thus accomplishing the same end as the magnet of Birkeland and Eyde, except that the sheet of flame extends on one side of the electrodes only. The gas from the Paulding furnace is somewhat richer than that from the Birkeland-Eyde furnace, but the yields are some¬ what lower. Each furnace contains two 200-kilowatt arcs in series, at 4,000 volts, taking 140 amperes at a power factor of 70 per cent.

In comparison with these processes, the Schonherr process is of interest, this being based on a different principle. Both the Birke¬ land-Eyde and the Paulding processes recognize the difficulty of maintaining a high-tension arc, particularly when subjected to a current of air, and so means are provided for securing a rapid succession of arcs as fast as they are extin¬ guished. As a matter of fact, the arcs tire made to overlap, so several exist in parallel at the same time. Schonherr, however, attacked the problem of maintaining a stable high-ten¬ sion, high-current arc, working on the prin¬ ciple that if the air current were so introduced that it did not deform the arc, the discharge could be maintained in a stable condition. Paulding used the air current, at right angles to the arc, to draw the arc out to a greater length. Schonherr secured the same result without destroying the arc by introducing the air tangentially from all sides simultaneously so that it traveled with a helical motion in the direction of the arc. This neither deformed

the arc nor overcooled it, allowing it to burn quietly. Working on this principle, the com¬ mercial furnaces designed by Hessberger take 700 to 750 kilowatts, 3,500 volts and 290 amperes with a power factor of 66 per cent. The arc carried is from 5 to 7 metres (16 to 22 feet) in length. The gases carry 1.5 to 2 per cent NO and the yield is 68 grams HN03 per kilowatt hour.

Ozone is a polymerized form of oxygen which may be produced by a silent electric dis¬ charge from a static electric machine, induction

coil or very high voltage transformer, through oxygen or air.

It has powerful oxidizing and bactericidal properties and is extensively used in water and air purification.

Other Compounds. — Many other com¬ pounds, too numerous to describe, are made by electrochemical processes of one kind or an¬ other. For details of the principles involved in the operations of such processes, see Electro¬ chemistry, Electrolysis, Electric Furnaces and Metallurgy. For details on individual subjects, see under the name of the substance in question.

Bibliography. — Allmand, A. J., (Applied

Electrochemistry) (London 1912) ; Borchers, W., (Electrometallurgy > (New York 1905) ;

Loeb, W., (Electro-Chemistry of Organic

Compounds) (New York 1907) ; McMillan, W. G., and Cooper, W. R., (Electro-Metallurgy } (London 1910) ; Thompson, M. de K., (Applied Electrochemistry } (New York 1911) ; Watt, A. and Philip, A., (Electric Plating and the Electric Refining of Metals) (London 1910) ; Metallurgical and Chemical Engineering (New York, semi-monthly) ; Transactions of the American Electrochemical Society (South Bethlehem, Pa., semi-annually).

G. A. Roush,

Assistant Secretary American Electrochemical Society.

ELECTROCHEMICAL SERIES, the

arrangement of the chemical elements in the order of their ability to replace one another in a solution.

ELECTROCHEMICAL SOCIETY, American. The American Electrochemical Society was organized 3 April 1902, at Philadelphia, Pa., the objects of the so¬ ciety, as stated in its constitution, being the advancement of the theory and practice of electrochemistry. The charter members of the Society numbered 337, while the member¬ ship at the close of the year 1917 was about 1,600. Since its organization, the Society has held two meetings each year, in the Spring and Autumn, for the presentation and. discussion of papers on electrochemical subjects. These meetings have been distributed as follows New York city, 9; Niagara Falls, 4; Atlantic City, 2; Boston, 2;

Philadelphia, 2; Pittsburgh, 2; Washington, 2; and one each in Albany, N. Y. ; Bethlehem, Pa.; Chicago, Ill.; Detroit, Mich.; Denver, Colo.; Ithaca, N. Y. ; Saint Louis, Mo.; San Francisco Cal.; Toronto, Can. Since the membership of the Society includes practically all of the prominent electrochemists of the United States, as well as many in for¬ eign countries, the Society has naturally played an active part in scientific developments in the years since its organization.

ELECTROCHEMICAL TELEGRAPH,

a telegraph which records signals upon a paper sheet or strip moistened with a chemical solu¬ tion, which is decomposed by the electric cur¬ rent. See Telegraphy — Chemical Automatic Telegraphs.

ELECTROCHEMISTRY. That branch of chemistry which treats of the utilization of elec¬ trical energy to facilitate or carry on a chemical reaction is known as electrochemistry. This end may be accomplished in one of three ways : by electrolysis, by electrothermal action, or by the discharge of electricity through gases. Com versely, electrochemistry also includes those re¬ actions by which electricity is generated by means of chemical action. It was the Italian physicist Alessandro Volta (q.v.), a professor in the University of Pavia, who first discovered that when two metals and a liquid are combined in a circuit an electric current is produced. It was also Volta, who, for the first time, distin¬ guished between the two classes of electrical conductors, recognizing the difference between metallic conductors and electrolytic conductors, which is the foundation of all electrolytic work. Soon after this he established what has been called the contact electromotive series, which is a table of metallic conductors arranged in such order that if any two of them be connected with each other and also with an electrolytic conductor, an electric current will flow through the liquid from the metal higher in the series to the one lower in the series, and the current increases in magnitude the farther apart the two metals are in the series. Following this, it was discovered by Ritter, that the order of the metals in this series was the same as the previ¬ ously known order in which metals replaced each other in solutions of their salts. This dis¬ covery was the first bond of linkage between the newer science of electricity and the older one of chemistry, and marks the birth of our modern electrochemistry. Volta's contact elec¬ tromotive series soon led to the development of the voltaic pile (q.v.), the first device for the generation of electric

current, and one depend¬ ent entirely on electrochemical principles. In his work on the pile, Volta could hardly have failed to notice the formation of gas bubbles on the metals immersed in his solutions, and the fact that he makes no mention of these phenomena indicates that he did not appreciate the significance of the reactions that were tak¬ ing place. It remained for Nicholson and Carlisle in 1800 to record the formation of hydrogen and oxygen on passing the electric current through water. In the study of the various decompositions it was soon noted that there was a formation of alkali at the negative pole in the electrolysis and of acid at the posi¬ tive pole. Following up these observations led to the discovery by Davy in 1807 of the alkali metals, sodium and potassium, which he separated by electrolysis of the fused hydrates, thus laying the foundation for the development 100 years later of the Castner process of manu¬ facture of metallic sodium on a commercial scale. (See Electrochemical Industries). It was Berzelius, the great Swedish' chemist, who devised the first theory for the explanation of the nature of chemical compounds, based upon elec¬ trochemical observations. The Berzelius theory dominated this new science and the parent

science of chemistry as well for many decades, but in turn was supplanted by other theories. During its lifetime, however, it served as the basis for an enormous amount of valuable dis¬ cussion and research. According to the Berze¬ lius theory, chemical atoms behave similarly to a magnet, having a positive and negative pole, but in the case of some elements the positive pole is much the stronger of the two and in others the negative pole is the stronger. Con¬ sequently the atom behaves in accordance with the character of the predominating pole, and the positive or negative character of the pre¬ dominating pole of the atoms, and its relative strength, determine the chemical character of the element. Atoms of an electropositive char¬ acter can then combine with those of electro¬ negative character, in proportions determined by their relative strength, thus neutralizing each other more or less, but not necessarily completely. If complete neutralization does not result from the first combination the result is a compound which is more or less electro¬ positive or electronegative, depending on which charge predominates, and compounds of this kind of opposite polarity can still further com¬ bine for more complete neutralization. Com¬ binations of certain elements thus gave com¬ pounds of an acid character while others gave compounds of a basic character, and these com¬ bine to form salts, which, if not

completely neutralized, can still further combine to form double salts.

After the establishment of the Berzelius theory, no great progress was made along elec¬ trochemical lines until about 1835, when Fara¬ day announced his discovery of what are now known as Faraday's laws, which will be . dis¬ cussed later. Faraday received his taste for scientific work and the training that led up to it while serving as a helper in the laboratory of Sir Humphrey Davy, and Davy is said to have once replied, in answer to a question, that his most important scientific discovery was Michael Faraday. Besides the laws governing the quantitative relations of electrochemical reactions, we also owe to Faraday our system of electrochemical nomenclature. To explain the reactions taking place he assumed the pas¬ sage of the electricity to be associated with the movement in the solution of particles of mat¬ ter which he called ions ; the poles themselves were in general termed electrodes , the positive pole being the anode and the negative pole the cathode; the ions that moved to the positive pole were anions ; and those moving toward the negative pole were cathions; the solution un¬ dergoing decomposition was the electrolyte , that surrounding the anode being the anolyte, and that surrounding the cathode the catholyte ; the process of decomposition was called electro¬ lysis.

When the decomposition of water was first noticed, an explanation was sought for the si¬ multaneous appearance of hydrogen at one elec¬ trode and of oxygen at the other. In 1805 Grotthus proposed a theory to explain the mechanism of the conduction of the electric current through the solution and opened the discussion of a problem for which we still have no entirely satisfactory solution. According to the Grotthus theory, the current charges one electrode positively and the other negatively,

and these charged surfaces in turn act on the molecules of water in such a way that the hy¬ drogen of the water becomes positively charged and the oxygen negatively charged. The at¬ traction of the negative pole for the positively charged hydrogen and of the positive pole for the negatively charged oxygen then causes the molecules to arrange themselves as shown in A of Fig. 1. If the charge on the two electrodes

is then sufficient, the atoms a and a have their charges neutralized at the electrode and become free gas; the atoms h and b' then recombine with c and c and so on throughout the line, forming new molecules of water, as in B, which then, under the continued influence of the cur¬ rent, will reorient themselves as before and the whole process is

repeated. This theory held its own for about 50 years, but as the science developed, imperfections were discovered that made it no longer tenable, and it was eventually replaced by the Clausius theory. Clausius as¬ sumed that the positive and negative portions of the molecule in the electrolyte were not firmly combined with each other, but were in a state of continuous vibration, which if it became vigorous enough would cause the positive part of one molecule to come within the sphere of influence of the negative part of another mole¬ cule, with which it would unite, the negative and positive particles thus left temporarily free in turn soon come within the sphere of other oppositely charged particles with which to unite, so that there would be going on through the solution all the time a continuous interchange between the particles. But when an electric current is sent through the solution, a force is generated in the direction of the flow of the current and the vibration and 'exchange is no longer irregular, and in all directions, but is intensified in the direction of the current flow, thus causing a movement of positive particles toward the negative pole, and vice versa.

The Grotthus idea of fixed ions was thus replaced by the vibrating ions of Clausius, and this in turn, some 30 years later, was replaced by the Arrhenius theory of free ions. This theory has probably given a greater impulse to electrochemical research and has, directly and indirectly, been an aid to more discoveries than any other conception in the field of electro¬ chemistry. The Arrhenius theory, or as it is frequently called, the electrolytic dissociation theory (see Solutions) was based on the as¬ sumption that when an acid, base or salt was dissolved, yielding a solution that was a con¬ ductor of electricity, the molecules of the dis¬ solved substance were by the act of solution de-

composed into part-molecules, or ions. At any finite concentration the solution will still con¬ tain a certain amount of undissociated material, and only at infinite dilution is the substance completely dissociated into ions. These disso¬ ciated ions are positively and negatively charged, and it is the ions that act as carriers of the current, the conductivity of the solution being dependent on the degree of dissociation of the dissolved substance.

The discrepancies that constantly cropped out in the development of the details of the Ar¬ rhenius theory led up to what is known as the Hydrate theory, which assumes that part of the water present in the

solution is combined with the dissolved substance, thus leaving as free solvent only a portion of the total amount pres¬ ent, which from a concentration standpoint would bring about the same results as the as¬ sumption according to the Arrhenius theory of an increase of the ultimate particles in the solu¬ tion by dissociation. Aqd this idea, in turn, becomes the Solvate theory when its principles are extended from aqueous to all solutions, both aqueous and non-aqueous. This Solvate theory, supplementing the Arrhenius theory, extends the latter from its former constricted field of dilute solutions to a theory of solutions in gen¬ eral. There are still, however, many points that need further development, particularly with regard to the exact relation between dissocia¬ tion and solvation.

If the law of conservation of energy holds, there must necessarily be a direct relation between electrical energy and chemi¬ cal energy on the one hand and heat energy on the other. This brings us first to the discussion of Faraday's laws (q.v.), two of the most fundamental statements in natural sci¬ ence. Faraday's first law specifies that the amount of chemical action produced by an elec¬ tric current in a circuit is directly proportional to the quantity of electricity which passes through the circuit. The second law specifies that the quantities of different substances which are produced by the same amount of elec¬ tricity passing are directly proportional to the chemically equivalent weights of the substances concerned. These effects are entirely independ¬ ent of the concentration or temperature of the solution, the size or distance apart of the elec¬ trodes, and all other conditions. These laws hold with great exactness not only for ordinary aqueous solutions, but also for non-aqueous solutions and for fused salts. The quantity of electricity that is necessary to deposit the chemically equivalent weight of any substance is 96,500 coulombs (ampere seconds) and this unit quantity is known as a Faraday, after its discoverer. Another, and possibly better, way of stating this is to say that one Faraday of electricity, 96,500 coulombs-, is required to make a unit change in valence of any element or rad¬ ical. One Faraday then will deposit as metal 56/3 grams of iron from a solution of ferric iron (a change of three valences) or it will reduce 56 grams of iron from ferric to ferrous, a change of one valence. This holds equally well whether it is a decrease of valence accom¬ panying a chemical reduction, or whether it is an increase of valence accompanying an oxida¬ tion. The fact that 96,500 coulombs will de¬ posit one chemical equivalent of an element makes it possible to calculate from this rela¬

tion the amount of any element that would be deposited by any given amount of current. Ac¬ cording to this, one coulomb should deposit

,“7ˆ7“ =0.000010446 grams of hydrogen or

96,500

63 5 7

- — _ ‘ – , =0.0003294 grams of copper. These 2×96,500

values are known as the electrochemical equiv¬ alents (q.v.) and can readily be calculated for any material. The ampere-second values are usually used for scientific work, but for practi¬ cal work in the plant, larger units for the ampere hour or ampere day may be used. Faraday’s laws refer only to quantities of elec¬ tricity involved in bringing about certain changes, but say nothing about the quantities of electrical energy necessary for the change. To arrive at values for the energy involved, we must consider not only the quantity factor of the current used, but also the intensity factor. In other words, Faraday’s laws deal with am¬ pere changes, while the energy involved is con¬ cerned with amperes X volts, or watts.

All chemical reactions can be compared from an energy standpoint on the basis of the thermochemical changes accompanying the re¬ action.

1 calorie=4.186 watt seconds 1 watt second=l coulomb X 1 volt or 1 volt-coulomb=0.2389 calorie.

Then 1 volt-Faraday — 0.2389 X 96,500 = 23,054 calories. Any given reaction involving one Faraday will then require as many volts as the heat balance of the reaction will contain 23,054. For example, the heat of formation of water is 69,000 calories, and to decompose it an equivalent amount of energy must be sup¬ plied. A molecule of water, H20, includes two chemical equivalents, so per chemical equivalent, there must be supplied 34,500 calories. The voltage required for the decomposition will

then be – — 7 =1.495 volts. The decom-

23,054

position of one molecular weight (18 grams) of water then by electrical energy would require 2 x 96,540=193,080 ampere seconds of electricity

at a voltage of 1.49 volts, or

193,080 X 1.49 3600 X 1000 ”

= 0.08 kilowatt hours of electrical energy.

This same principle can be applied to the calculation of the electromotive force of pri¬ mary or secondary batteries (q.v.) when applied to the thermochemical balance of the chemical reaction that takes place in the cell. The chemical reaction in the Daniell cell is

Zn + CuS04 = ZnS04 + Cu.

The heat of formation in dilute solution of CuSCh is 197,500 cal. pnd of ZnS04 is 248,000 cal., leaving an excess of 248,000 — 197,500 = 50,500 cal. for two Faradays, or 25,250 cal. for

23,250

one Faraday. = 1.094 volts supplied by

the cell.

The reaction on charging a lead storage battery is

2 PbS04 + 2H20 = PbCb + Pb + 2 H2SC > 4

215,700 2(69,000) 63,400 2(210,200)

This reaction shows a deficit of 569,400 — 473,- 800 = 95,600 cal. for 1 Pb02 (two Faradays) or

47,800 cal. for one Faraday. It will then re-

quire ˆ = 2.073 volts to charge the cell,

and since the reaction is reversible, when once charged, it will be capable of generating the same voltage.

Of the phenomena accompanying electrol¬ ysis with unattackable electrodes, two of the most interesting are polarization and over-vol¬ tage. With electrolyses that are more or less reversible, it may be noted that after the pas¬ sage of the current has caused some decompo¬ sition, there is a tendency for recombination of the materials present at the electrodes. If the current is stopped, it will be

noted that for a short time there will be generated a small cur¬ rent in the opposite direction from that of the current originally imposed. This is known as the polarisation current and the voltage gener¬ ating it is known as the polarisation voltage. This polarization voltage, being in the reverse direction from the voltage causing the original electrolysis, will reduce the electromotive force on the cell, and the .current passing. In an electrolysis involving the separation of a free gas on an unattacked electrode, it is well known that the voltage required for decomposition is greater than that calculated from the heat of formation. This excess of voltage required over the theoretical is called over-voltage, or more recently, gas voltage. These voltages vary widely for various metals and an explana¬ tion of the differences has long been sought. Recent investigations seem to indicate that the differences are mechanical rather than chem¬ ical. Calorimetric measurements show that the amount of electrical energy disappearing as chemical work is the equivalent of the nor¬ mal decomposition voltage for the reaction tak¬ ing place, and that the over-voltage appears in the solution as heat. This would indicate that the nature of the over-voltage was mechanical, and the probable explanation is that it repre¬ sents the amount of energy necessary to over¬ come the resistance of the film of gas on the electrode. The gas as first formed on the electrode is a thin film over the entire surface, and then as the amount of gas increases sur¬ face tension begins to act to form the film into bubbles of gas which detach themselves from the electrode and escape from the solution. The amount of energy necessary to force the current through this gas film over the surface of the electrode will of course increase with the thickness of the film, and in turn the thick¬ ness of the film will be dependent on the ease with which the gas mechanically separates itself from the surface of the electrode. This will naturally vary with the material of the electrode and with the condition of its surface.

When the products of an electrolysis are stable and can be removed from the cell in the form in which they were deposited, there is no reac¬ tion taking place except the electrolytic decom¬ position itself and this is said to be a primary reaction. In many cases, however, the products of electrolysis undergo further reaction and appear in some other form than that in which they were originally deposited. In this case the reaction is said to be secondary. These sec¬ ondary reactions may be divided into two classes, depending on whether the products of decomposition react on the material of

the electrodes, or whether they react on the electrolyte. If desired, each of these classes can be still further subdivided into two classes, the first as to whether the action is on the cathode or on the anode,

and the second as to whether the action is on the catholyte or anolyte. For example, if a solution of sodium sulphate were electrolyzed the primary reaction would result in the deposition of metallic sodium on the cathode and of the SCh radical on the anode. The sodium would then react with the water in the electrolyte with the for¬ mation of NaOH and hydrogen, while the SO* would react with the water, forming H2SO4 and oxygen. On the other hand, if a solution of NaCl were electrolyzed with a mercury cathode and a silver anode the sodium set free at the cathode would react on it with the formation of an amalgam, and the chlorine set free at the anode would combine with it with the forma¬ tion of AgCl. Since the electrolysis of the water of an aqueous, solution results in the formation of hydrogen at the cathode and of oxygen at the anode, we can have in the solu¬ tion as the result of secondary reaction either a reducing or an oxidizing action by using condi¬ tions which favor the absorption in the solu¬ tion of whichever is desired. A large electrode and a low current density favor the absorption of the gas in the nascent condition as fast as formed, while a small electrode and a high cur¬ rent density tend to cause the throwing off of the gas as free bubbles almost as fast as formed and with only a limited opportunity for absorption. Low current density at the cathode and high at the anode will then give a strong reducing action, while high density at the cathode and low at the anode will give strong oxidizing action. For further discussion of the phenomena accompanying the passage of a cur¬ rent of electricity through a solution, see the article on Electrolysis.

In electrothermal applications it is the heating action of the current that is sought rather than its chemical action at the electrodes during electrolysis. An apparatus for the utilization of the heating action of the cur¬ rent for carrying on a high-temperature re¬ action is known as an electric furnace. In case the combined action of the high tempera¬ ture and the chemical action of the current are both used, the apparatus is called an electro¬ lytic furnace. In the former, as a matter of convenience and economy in handling the cur¬ rent, alternating current is usually used ; in the latter, since electrolysis is sought, direct current is a necessity. See Electric Furnaces and Electrochemical Industries.

Many of our present day commercial opera¬ tions require temperatures higher than are at¬ tainable from the combustion of a fuel, and for operations of this kind electric heating is a necessity. In many other cases it has been found more economical to substitute electric heating for combustion heating. The particu¬ lar economy in electric heating is due to the fact that the heat is generated within the charge being heated and does not have to be forced through the

refractory wall of the container which, on account of its low conductivity, im¬ poses a heavy loss in efficiency. It is also pos¬ sible to secure certain, electrochemical effects by the passage of a high tension electric dis¬ charge through gases. The two chief reactions

of this kind are the conversion of oxygen, 02, into ozone, 03, and the oxidation of atmos¬ pheric nitrogen to nitric acid. (See Electro¬ chemical Industries). Both of these reactions were first noted in the early years of electrical development, the former by Van Marum in 1785, and the latter by Priestly in 1779, but in both cases nothing was done in the way of study or development of the reactions until many years later, mainly within the last 30 years.

Bibliography — Allmand, A. J., (Applied Electrochemistry) (New York 1912); Jones, H. C., ‘Outlines of Physical Chemistry) (New York 1915) and ‘The Theory of Solutions) (New York 1917) ; Le Blanc, M., ‘Textbook of Electrochemistry) (New York 1916) ; Thomp¬ son, M. deK., ‘Applied Electrochemistry) (New York 1914) ; ‘Transactions of the American Electrochemical Society > (Bethlehem, Pa., semi¬ annually).

G. A. Roush,

Assistant Secretary, American Electrochemical

Society.

ELECTROCHRONOGRAPH. See Chro-

NOSCOPE.

ELECTROCIDES, the amber islands of Greek mythology, at the mouth of the river Eridanus. The name was applied also to the islands on the northern coast of Europe.

ELECTROCULTURE OF PLANTS,

the employment of electric light in agri¬ culture and horticulture. It was determined at the Agricultural Experiment Stations of Cornell University and of West Virginia, in experiments made with the arc and the incandescent lights, respectively, that cer¬ tain crops are forwarded by the light. The most remarkable instance is that of

lettuce, which was brought to maturity in from 5 to 10 days earlier than other plants grown in the same house and under otherwise identical con¬ ditions. This discovery has led to the com¬ mercial application of the arc light, if not of the incandescent also, to the forcing of lettuce under glass in several of the larger New Eng¬ land forcing houses, with the result that a gain of about three weeks' time is calculated upon for the season, thus enabling the gardener to devote his benches to one more crop than formerly or to follow his lettuce crops with cucumbers, the favorite successor, much earlier than would otherwise be possible. Several flower crops, such as Easter lilies and sweet- pease, have been experimented upon, with the result that they were forced into bloom several days in advance of others grown without the stimulus. In such cases the plants are always grown without the light until within about a month of maturity, when the light is applied for about half the night. It has been found that unless the light pass through a glass globe or pane there is a noticeable "scorching® of the foliage or flower. It is concluded that this is due to the action of the ultra-violet rays of the spectrum rays, which do not pass through the glass. Consult various bulletins of the Massa¬ chusetts, Cornell University and West Virginia Experiment stations. See Electric Vegetable Gardening.

ELECTROCUTION, capital punishment by the agency of electricity. See Electricity, Cause of Death by.

ELECTRODE (Greek, liodos, "a way®), a term introduced by Faraday to denote the con¬ ductors by which electricity cither enters or leaves an electrolytic bath or solution. He termed the electrode by which the current en¬ ters the bath, the anode (positive terminal), and the electrode by which the current leaves, the cathode, sometimes spelled kathode (negative terminal). The terms anode and cathode have been introduced generally in metallurgical prac¬ tice, and also in connection with Crooke's tubes and X-ray work, and the term electrode has become common in the more extended sense of signifying either of the terminals of an electric source, instrument or electrolytic bath or cell.

ELECTRODEPOSITION. See Electro¬ chemistry ; Electroplating.

ELECTRODYNAMIC INDUCTION.

See Induction.

ELECTRODYNAMICS, that branch of electrical science which treats of the attractions and repulsions exhibited between wires or other

conductors along which currents are passing. If two wires are parallel they will attract each other when currents are passing the same way along them both and will repel each other when the currents are opposite. If the wires are in¬ clined to each other at any angle there is not only an attraction or repulsion but a still more marked tendency to rotation which is not satis¬ fied until the wires have become parallel and the currents flow in the same direction along them both. When there are only two straight wires these forces are feeble and require deli¬ cate apparatus for their exhibition, but by em¬ ploying coils of wire the forces are multiplied and an instrument constructed on this principle called the electrodynamometer has been much employed for the measurement of currents. The basic principles of electrodynamics were dis¬ covered by Ampere in 1821 by many ingenious experiments, the results of which he expounded in a series of statements known to this day as Ampere's Laws.

ELECTRODYNAMOMETER. See. Dynamometers ; Electrical Measuring In¬ struments.

ELECTROKINETICS. See Electric Di¬ rect Current; Electric Alternating Current Machinery ; Electricity.

ELECTROLYSIS. With respect to their ability to conduct electricity, all substances are divided into the two general classes, conductors and non-conductors ; there is, however, no hard and fast boundary line between the two, but a more or less gradual merging from one into the other. The conductors are again divided into two classes, those which conduct the cur¬ rent without any apparent decomposition and those in which the conduction is invariably ac¬ companied by decomposition. In this latter class, the conduction of the current with con¬ comitant decomposition is called electrolysis, and the liquid subjected to decomposition is termed the electrolyte. These are the names originally proposed by Faraday. True electrol¬ ysis is almost entirely confined to liquids. Evi¬ dences of electrolysis have been found, how¬ ever, in a few cases in solids and similar phe¬ nomena have been observed in connection wi th high-tension discharges through gases. A large number of liquids, particularly of organic na-

ture, fall in the class of non-conductors. Water, and a number of other liquids of inor¬ ganic origin are also non-conductors when care¬ fully purified. Liquids that conduct without de¬ composition are limited to

liquid metals. Liquids that conduct with decomposition — that is, electrolytes, may be a pure liquid, a fused salt, or a solution, either aqueous or non-aqueous. In the case of solutions the conductivity is not necessarily dependent on the conductivity of the constituents of the solution, but may be a prop¬ erty of the solution itself. A solution of one non-conductor in another may give a solution of good conductivity.

Also, in the case of a solution, the decom¬ position caused by the electrolysis may affect the solvent or the solute or both, and may vary with the conditions of electrolysis. If the con¬ stituents of the solute are obtained directly at the anode and cathode, the reaction is said to be a primary one; but if for any reason, these constituents react on either the electrodes or the solution, the reaction is said to be secondary. (See Electrochemistry). Primary reactions are dependent only on the amount of current acting, and are not subject to modification by physical conditions (see Faraday's Laws), but secondary reactions may be modified by tem¬ perature, concentration, current density and other physical conditions and in this type of reaction with its various modifications lie many of the possibilities in the field of industrial electrochemistry. (See Electrochemical In¬ dustries). The problem of the mechanism of electrolysis is one that has attracted more at¬ tention than any other in the field of electro¬ chemistry. A brief discussion of the early his¬ tory and the present status of this problem will be found in the article on Electrochemistry. This question is also closely related to, and to a certain extent dependent on, the problem of the nature of solutions, and a further discus¬ sion of the principles involved will be found in the article on Solutions.

G. A. Roush,

Assistant Secretary , American Electrochemical Society.

ELECTROLYSIS OF GAS AND WATER MAINS. In the system of street railway traction in which an overhead trolley wire is employed, with direct current, in which the tracks are utilized as a return circuit for the current to the power-house, it has been found that damage has almost invariably en¬ sued to the gas and water mains adjacent to the tracks, from electrolysis. This is due pri¬ marily to the electric current leaving the tracks and following the gas or water mains for some distance. At the points where the current leaves these pipes to return to the tracks or to the power-house, if the soil is damp and con¬ tains soluble chlorides of magnesium, sodium or . potassium, the current sets free acids or chlorine which attack the iron of the pipes ; the

rapidity and extent of the damage done thereby being dependent upon the strength of the current, the duration of its application and the constituents of the soil. The electrolytic action results in Spitting® the pipes, and burst¬ ing of water pipes and leakage of gas pipes is not uncommon from this cause. (See illustra¬ tion). Experiments have shown that with as low a potential as 0.5 volt and a current of 0.03

ampere, noticeable electrolysis of an iron pipe has occurred in sand moistened with sea water. Pipes on which the difference of potential was found to be about six volts have burst in a few years. To prevent electrolysis due to this cause greater precautions are now taken, and with considerable success, to preserve the continuity

Electrolytically Pitted Water Pipe.

of the rails by bonding, welding them in situ by electricity by providing separate metallic re¬ turn circuits and by connecting the water and gas mains by means of heavy copper wire at places where the current would otherwise re¬ turn to the tracks via the earth.

ELECTROLYTE. Any liquid which con¬ ducts the electric current with concomitant de¬ composition is called an electrolyte. It may be either a pure liquid, a fused salt or a solution, aqueous or non-aqueous. In the case of a so¬ lution, the decomposition may involve the so¬ lute, the solvent, or both. The name is often incorrectly applied to designate a salt which when dissolved in water will form a conducting solution.

ELECTROMAGNETIC INDUCTION.

See Induction.

ELECTROMAGNETISM. The art or

process of magnetizing by means of an electric current, as distinguished from so-called natural magnetism as in the lodestone, or transient magnetism, as established in a wrought-iron bar. A magnet not only attracts steel and iron in a less degree, but cobalt, nickel, manganese, cerium and chromium. Hans Christian Oer¬ sted (q.v.) is credited with being the first to recognize the identity of magnetic and electric phenomena. In 1820 he observed that wires connecting the poles of a, voltaic pile affected the magnetic needle. In 1821 he wrote a long paper on electro-magnetism. Arago, Ampere, Davy and Faraday all studied and contributed to knowledge of the phenomena. In 1825 Wil¬ liam Sturgeon of Woolwich, England, began to experiment. His two first electro-magnets were made in the shape of a horseshoe and a

straight bar. The former was made of .a bent rod of iron one foot in length and half an inch thick, around which a bare copper wire was wound 18 times, the iron having been previously covered with varnish to insulate the wire from the iron. The current was supplied by one large primary cell. This magnet was able to sustain a weight of nine pounds, though weigh¬ ingˆ itself only seven ounces. Subsequently Sturgeon constructed a horseshore electro¬ magnet 18 inches in length, 2ˆ4 inches thick and wound with 980 feet of copper wire one-twelfth of an inch in diameter, which upheld 1,386 pounds. In 1831 Joseph Henry made electromagnets for both Yale and Princeton universities that lifted 3,000 pounds. Large electromagnets are now used in foundries and machine shops of a capacity of 12 or more tons.

The phenomena of electro-magnetism may be briefly described as follows: It is known that

when iron filings are strewn over a cardboard or glass, if a bar or horseshoe magnet be placed under the cardboard the filings will tend to ar¬ range themselves symmetrically when the card¬ board is tapped. This is due to magnetic lines of force which are assumed to flow from the north to the south pole of the magnet, and the iron filings, becoming temporarily magnet¬ ized by these magnetic lines of force, tend to set themselves parallel thereto. Similarly, when an electric current flows in a wire (elec¬ tro) magnetic lines of force surround the wire in circles or hoops which increase in density with the strength of the current. It is known that iron is a much better conductor of mag¬ netic lines of force (or magnetism) than air, in the ratio of 1 to 100 or 150, depending on the quality or ˆpermeability® of the iron. Hence when the wire is made in the form of a coil into which is inserted a soft iron bar, the magnetic lines of force, so to speak, use the iron as a circuit and the latter becomes a mag¬ net having north and south poles. A simple form of electromagnet consists of a U-shaped bar of soft iron, around which a copper wire is coiled in spirals, beginning at one extremity and extending to the other. If the iron core is placed in this position H» and winding be¬ gins at the lower left side, turning the wire around clockwise, the south pole of the mag¬ netic will be at the starting point on the left.

The space between the poles of a magnet or wherever its magnetic lines of force extend, or in the space around a wire conveying a current of electricity, is termed a magnetic Afield.® The substances

through which the lines of force pass, including the iron of the magnet, consti¬ tute the magnetic circuit. The expression num¬ ber of lines of force per square centimeter in. the material, is at present used as a measure of magnetic density. The total number of lines of force in a magnetic circuit is termed the magnetic flux, and is obtained by multiplying the total cross-sectional area of the field in square centimeters by the density of a square centimeters of the circuit. The magneto motive force (that is, the force that, as it were, drives the lines of force through the circuit) is equal to the product of the strength of current in amperes in the coil by the number of convolu¬ tions of the coil. This is also termed the am¬ pere turns. The magnetic flux may be increased by increasing the magneto motive force or by decreasing the resistance (termed the reluc¬ tance) of the magnetic circuit. Hence the re¬ lation of the foregoing terms to one another is analogous to that between electromotive force, resistance and current, in an electrical circuit, and may be expressed by the equation :

Magnetomotive force Magnetic flux- ReIuctance.

It is to be noted, however, that the reluctance of a magnetic circuit containing iron is not a constant, but increases in other words, its per¬ meability to magnetization decreases, after a certain degree of magnetization, which is termed saturation, has been reached.

Electro-magnets are extensively used in electric bells, in telegraph and telephone appa¬ ratus, in dynamo machines, electric motors (q.v), and for many other purposes. See Elec¬ tric Machinery.

ELECTROMETALLURGY. That branch of electrical science that deals with the reduc¬ tion or refining of metals by electrical proc¬ esses, including electrolysis (q.v.) or decompo¬ sition of chemical compounds by electricity ; electro-deposition, or the depositing of metals in solution by an electric current (see Electro¬ chemistry) ; and the fusing of metals in the electric furnace (q.v.). The electric current is capable of performing the entire work of re¬ ducing a metal from its ore, but in practice this is usually too expensive, and it is used only where there is a commercial gain. The first important application of electricity in the separation of a metal was to aluminum, which industry is based wholly on electrical proc¬ esses. (See Aluminum). In copper refining, electricity has become more and more import¬ ant, owing to the purity of the product which is valued commercially. There is increasing use of electrometallurgy in the production of gold, silver, zinc and the ferro-alloys. It may be used also for separating and refining platinum, lead, nickel, tin, bismuth, cadmium, etc., in fact all the metals. A perusal of the article on Electric Furnace will afford the

student a clear idea of the methods of electrometallurgy. Various electrolytic processes are also outlined under Copper; Gold; Zinc, etc. See also Elec¬ trolysis ; Metallurgy.

ELECTROMETER, an instrument for determining difference of electrostatic poten¬ tial (or electric charge) between two charged conductors. The electroscope (q.v.) and Cou¬ lomb's torsion balance are primitive forms. The attracted-disc electrometer was designed by Volta and developed by Snow-Harris. It con¬ sists of a battery or Leyden jar to the wires of which is attached a horizontal disc. A bal¬ ance is placed close by, having on one end of the beam a disc which is positioned a short dis¬ tance above the disc connected with the jar, and on the other end of the beam a pan for containing small weights. In this manner the degree of force that will pull the two discs to¬ gether is weighed in ounces or pounds. To secure a correct result it was found necessary to place a guard ring around the upper disc, and this later form was named the absolute electrometer. Through this mechanism it was demonstrated that the attraction between the discs at different distances varied as the square of the difference of potential. Lord Kelvin constructed an electrometer located in the in¬ terior of a Leyden jar, and employing the tor¬ sion of a wire to measure the difference of po¬ tential. This invention was outclassed later by his quadrant electrometer. This was de¬ signed to measure the electrostatic charge by the attraction of quadrants of metal of known attractive force on a very light aluminum needle. He hung a paddle-shaped aluminum foil needle, enclosed in a box, between the four insulated metal quadrants. Opposite quadrants were con¬ nected by platinum wires. The difference of po¬ tential when connected with one pair of quad¬ rants or the other pair was made use of to de¬ flect the needle, and a mirror and light being provided, the needle threw a spot of light on a scale. It was found necessary to provide the in¬ strument with a wreplenisher® to preserve the charge of the Leyden jar. The quadrant elec¬ trometer was so much more delicate in its meas-

urements that it superseded the cruder instru¬ ments, and being later improved by Dolezalek and others became a standard instrument. See Electric Measuring Instruments.

ELECTROMOTIVE FORCE. Electric pressure or voltage, equivalent to difference of potential; the force that causes electricity to flow along a

conductor : commonly abbreviated E.M.F. The force which gives rise to an elec¬ tric current is called electromotive force and is comparable with the force exerted by water under pressure or <(head,® resulting from water seeking its level. In a somewhat similar way, electricity seeks a balance. When a conductor is earthed, that is connected with the earth, the electric potential becomes the same as the earth's, balance is restored and there is no flow of current and no electrical manifestation, the electromotive force being at zero.

ELECTROMOTOGRAPH, a name given to a peculiar telephone receiver invented by Edison and constructed virtually as follows : A short metal strip, fastened at one end to the centre of a mica diaphragm, rests on a rotating cylinder, the surface of which is composed of moist gypsum impregnated with mercuric ace¬ tate and potash. The strip and cylinder are placed in series in a telephone circuit. When variations in current pass through the gypsum surface it is found that the friction between the strip and the cylinder varies directly with the current. When the current is weak the strip is drawn along in the direction of the cyl¬ inder's rotation against the natural tension of the mica diaphragm. When the current in¬ creases, the strip slips back in response to the pull of the diaphragm and in this way the dia¬ phragm is set into vibrations corresponding to those set up by the telephone transmitter. An explanation of this phenomena is that the cur¬ rent electrolytically sets free a thin layer of gas between the cylinder and strip, reducing the natural friction.

ELECTRON THEORY or CORPUS¬ CULAR THEORY. The physical theory that the atoms of bodies are composite systems, consisting in part (at least) of corpuscles of a still higher order of minuteness. The theory has heretofore concerned itself mainly with the study of one special form of corpuscle, which is exceedingly prominent in sub-atomic phenomena, and which appears to constitute a sort of basic and omnipresent structural element in the architecture of material atoms of all kinds, inasmuch as it has identically the same properties in every respect, whatever the kind of matter from which it is obtained. These funda¬ mental corpuscles usually occur in combination with structural elements of other kinds to form the atoms, but they are also capable of existing in the free state, and they can be isolated by suitable experimental means. Each corpuscle parries a certain definite and constant charge of negative electricity, which is the same for all of them ; and many authorities believe that the corpuscles are, in fact, mere isolated, disem¬ bodied electric charges. Whether this be so or not, experimental evidence indicates that the charge associated with a corpuscle has one definite value, and that it is incapable of varia¬ tion. An atom is supposed to consist of a

cer¬ tain number of these negative corpuscles, asso¬ ciated in some definite way with a positively-

electrified nucleus, — there being, normally, just enough of the negative- corpuscles present to neutralize the effects of the positive electrifica¬ tion of the nucleus. According to this view, bodies acquire positive charges by losing some of their negative corpuscles, and acquire nega¬ tive charges by picking up additional negative corpuscles. If this hypothesis be correct, it is evident that communicating an electric charge to a body is not a continuous process. It is, on the other hand, essentially discontinuous, and consists in adding to the body (or subtracting from it) a number of definite (though exceed¬ ingly small) units of electricity, — being roughly analogous to filling (or emptying) a barrel by means of a bucket, instead of by the use of a hose. Moreover, the belief that the charging process is essentially discontinuous is no longer based upon theory alone, for Millikan has ob¬ tained direct experimental evidence of such discontinuity, in connection with charges com¬ municated to oil drops by friction.

It happens that the investigation of the posi¬ tive nucleus of the atom is more difficult than the investigation of the negative corpuscles that are normally associated with this nucleus, — or perhaps it would be more accurate to say that the experimental methods thus far devised are mainly applicable to the study of the negative corpuscle. Under certain circum¬ stances atoms can lose positive charges as well as losing or gaining negative ones ; but the loss of a positive charge appears to involve a funda¬ mental change of some kind in the nature of the ‘atom. (See Molecular Theory.) That there is probably an exceedingly important dif¬ ference between positive and negative electric¬ ity is plainly indicated by the fact that no posi¬ tive charge has yet been demonstrably observed in connection with a mass smaller than that of the hydrogen atom, while negative charges (as will presently appear) are known to occur in connection with masses far more minute than this.

The definite charge carried by the negative corpuscle appears to be identical in magnitude with the charge carried by the hydrogen ion (or any other monovalent ion), in electrolysis. For this charge Dr. G. Johnstone Stoney, as long ago as 1891, proposed the name ˆelectron® (Lord Kelvin preferred (

The corpuscular theory of matter has been developed in many directions, and its bearing upon the varied phenomena of physics has been extensively investigated by both mathematical and experimental

methods. To indicate all its bearings and relations would require a volume,

and the present article will therefore be de¬ voted to an explanation of the origin of the corpuscular theory, and to an account of the numerical results that have been obtained in studying the mass, charge, speed and size of the negative corpuscle. Further data concern¬ ing the application of the corpuscular theory to specific physical phenomena may be had from the references given below.

The corpuscular theory of matter, in its modern sense, originated in connection with the study of the discharge of electricity through rarefied gases. Previous to the experimental investigation of this subject it was customary to regard positive and negative electricity as being of the same general nature, but differing from each other somewhat as a right-handed helix or spiral differs from a left-handed one, or (more accurately) as a positive number differs from a negative one. The study of vacuum-tube phe¬ nomena indicated, however, that there is a far more profound difference than this between the two kinds of electricity. It was shown by the researches of Pliicker, Hittorf, Crookes and others that when electricity is passed through a tube containing air or any other gas in an ex¬ tremely rarefied condition, the discharge from the negative electrode (or (

The negative discharge that proceeds from the cathode (or negative electrode) at right angles to its surface, in a ((vacuum tube,® is called the ((cathode ray,® and special attention was naturally paid to this ray, in an effort to . discover its nature. The most strikingly obvi¬ ous fact about it is, that it excites a vivid fluor¬ escence in the glass wall of the tube, where it strikes it. Hittorf, in 1869, showed that a solid object, placed in the course of the ray, inter¬ cepts it and casts a shadow, its outline being plainly visible because there is no fluorescence on the part of the tube that is shielded by the obstacle. Crookes, following Hittorf. took up the study of vacuum phenomena in a fascinat¬ ing and masterly way and obtained many re¬ sults that were not only beautiful and striking, but also exceedingly suggestive and stimulating to further inquiry. By placing a very light pad¬ dle-wheel in the tube, so that its paddles were within the cathode stream (or ray) on one side, and out of it on the other side, he obtained mechanical rotatory effects. By giving the negative electrode a concave form, and thereby bringing the cathode ray to a focus at a

point within the tube, he showed that marked heat¬ ing effects could be produced by it. These phe¬ nomena, together with many others that were observed, suggested that the cathode ray con¬ sists of a stream of material particles, nega¬ tively electrified by contact with the cathode and then repelled from the cathode on account of the charge they have acquired. This had in fact been strongly urged by Varley (in 1871), and very likely by others also, as it was a fairly obvious inference, though it was not the only explanation possible, (In Germany the

cathode ray was quite generally believed to be due to some form of wave-like disturbance in the ether, and this view was held by Goldstein, who first introduced, in 1876, the name ((Ka- thodenstrahlen,® or ((cathode rays®). One dif¬ ficulty was, to identify the nature of the charged particles that were thus repelled. There were reasons for believing that they are not ordinary molecules or atoms. It was known, for example, that when an electrically-charged liquid is evaporated, the vapor does not carry away the electrical charge with it, and this ap¬ peared to indicate that the individual atoms or molecules of a gas cannot be separately electri¬ fied. Moreover, if the cathode ray consists merely of electrified molecules, it was hard to understand why the effects that were observed in connection with the cathode were not also manifested in connection with the anode, or positive electrode. Crookes, as a result of his researches, concluded that the projectile the¬ ory (or charged-particle theory) of the cathode ray is correct, but as he fully realized the dif¬ ficulties in the way of that theory, he announced his belief that in vacuum-tube phenomena we are dealing with matter in a previously unknown state, which he called the <(radiant state.® It is fair to say that his views appeared to physicists in general as rather too mystical, though the eminence and ability of their author ensured them a respectful reception.

Following the experiments of Crookes there was a lull in the activity with which the phe¬ nomena of vacuum tubes were studied, but in¬ tense interest in the subject was again aroused by two exceedingly striking discoveries. Len- ard, in 1894, showed that the cathode ray can be made to emerge from the tube and pass into the outside air of the laboratory, if a ((win- dow® of very thin aluminum (instead of glass) is provided at the point at which the cathode ray strikes the tube. Two years later (namely in 1896) Rontgen discovered that a previously unknown form of radiation is emit¬ ted from the point at which the cathode ray strikes against the tube, or against any other solid obstacle. The prospective usefulness of the Rontgen rays (or ((X-rays®) to the surgeon gave them an intense practical interest, in ad¬

dition to the interest that they had for purely physical reasons; and from this time onward the study of the electric discharge was prose¬ cuted with renewed vigor and earnestness, and by a large number of physicists — further stimulation being presently added by the dis¬ covery of radioactivity (1896) and of polonium and radium (1898). Exceedingly prominent among the physicists who took up the study of the cathode discharge at about this time was Sir J. J. Thomson. Beginning his researches by investigating the general phenomena attend¬ ing the passage of electricity through gases, and guided by a wonderful scientific imagina¬ tion, supplemented by a profound knowledge of mathematics and marked experimental skill, he established the soundness of Crookes' views, generalized them amazingly, developed a new <(corpuscular theory® of matter and placed that theory on a firm foundation.

It is not possible, in the present article, to give more than a superficial idea of the way in which the reality and general properties of the negative corpuscle have been established. The strength of the corpuscular theory lies in the

fact that it has been tested from many angles, and that the results obtained by approaching it from the most diverse viewpoints have, in the main, harmonized with one another astonish¬ ingly. Doubts that may be felt with regard to the legitimacy of the assumptions made in any one line of investigation tend to lose their force when confronted by cumulative evidence from widely different sources. It is true that incon¬ sistencies and other difficulties have developed here and there in connection with the corpus¬ cular theory, but that could only be expected, because the entire subject is still new, and progress in the application of the theory has doubtless been retarded and distorted to a con¬ siderable extent by the persistence of certain of our older conceptions and postulates that are no longer defensible, but to which we still cling because we have not yet learned wherein our error lies. In the main, the data that have been obtained are singularly consistent. Moreover, the corpuscular theory has proved to be ex¬ traordinarily rich in its suggestiveness, and has led to many lines of investigation that have been fruitful and productive of good results. This alone would justify us in following it still further, to see where it will ultimately lead.

Prominent among the quantities that we should like to determine in

connection with the negative corpuscles of which we may for the time being assume the cathode ray to consist, are the following: (1) The mass (m) of a corpuscle, (2) the electric charge (e) that it bears, and (3) the speed (u) with which the corpuscle is moving under given conditions. Let us see how these magnitudes were first obtained :

It has long been known, from the general theory of electricity, that a charged particle, when moving in a magnetic field and at right angles to the lines of magnetic force, is de¬ flected so that it tends to describe a circular arc (instead of a straight line), in a plane perpen¬ dicular to the direction of the magnetic lines. It is, in fact, a simple matter to show that when the charged particle is moving freely in space, its charge per unit of mass (denoted in symbols

£

by the ratio —) bears to its velocity the same

ratio that the reciprocal of the radius of the circle in which it moves bears to the intensity of the magnetic field that causes the path to be circular. Now it is easy enough to subject the cathode ray to the action of a magnetic field, and the deflection of the cathode ray thus pro¬ duced is quite marked even when the field is not very strong. The radius of the circular arc that is described by the ray in a field of known strength is also measurable without any special difficulty, and hence we can determine, with a

£

fair degree of precision, the ratio of — to u.

m

This, however, is only one step in the solution of the problem, for we do not yet know either

£

— or u, separately. Some experimenters, m

£

assuming that the ratio — of the charge on

m

the particle to the mass of the particle is the same in the cathode ray

as it is in the case of

the ions that are involved in electrolysis, sub¬ stituted this value and then proceeded to deter¬ mine, by means of the experiment just cited, the value of u, — that is, the speed of the par¬ ticles in the cathode ray. By this means it value of u was obtained that was not greatly different from the speeds ˆappropriate to atom; of matter.® This result was illusory, however,

£

because the fundamental assumption that —

m

is the same in the cathode beam as it is in elec¬ trolysis was wholly gratuitous, and was also, as the event proved, entirely wrong.

Wiechert succeeded in measuring the speed of the cathode-ray particles directly, by means of an exceedingly ingenious apparatus, which, although it is apparently incapable of giving results of any high order of precision, is at least competent to show the order of magni¬ tude of the speed, and hence to check the va¬ lidity of assuming that it is similar to the

£

ordinary molecular speed, or that the ratio —

m

in the cathode-ray particles is the same as it is in the ions that are concerned in electrolysis. His method depends upon the deflection of the cathode ray by a magnetic field, but he used two magnetizing coils, energized by a rapidly alter¬ nating current having a period commensurate with the time required by the cathode-ray par¬ ticles to traverse a considerable length of the tube. The cathode was placed at one end of the tube and at the other end was a fluorescent screen, which, by its luminosity, showed where the ray came in contact with it. Between the cathode and the fluorescent screen two dia¬ phragms were placed, so that the ray was wholly intercepted except for a small part that could pass through a central perforation in each diaphragm. The first magnetizing coil was placed between the cathode and the first dia¬ phragm, and as the alternating magnetic field that it produced varied, the cathode ray vi¬ brated to and fro across the surface of the first diaphragm. The apparatus was so adjusted that the

ray passed through the opening in this diaphragm only when the magnetic field pro¬ duced by the coil was at its maximum in one particular phase — the oscillating beam being then at the extreme end of (say) its upward swing. At this moment the ray would pass through the opening in the first diaphragm, proceed down the tube to the second diaphragm, pass through the central opening in this, and then register itself by producing a round, luminous spot in a fixed position on the fluores¬ cent screen beyond — the alterations in the magnetic field being so rapid that the spot ap¬ peared steady, although the illumination was really intermittent, because the cathode ray, since it could pass the first diaphragm only when at the extreme upward part of its peri¬ odic sway, traveled down the tube in a series of spurts or pulsations. The second magnetiz¬ ing coil was placed at or just beyond the sec¬ ond diaphragm, and in the absence of a certain special adjustment or relation (to which we shall presently refer) the alternating magnetic field produced by this second coil, acting upon the cathode ray as it passed the second dia¬ phragm, would again deflect it, and cause it to impinge upon the fluorescent screen above or

below the spot at which it would strike if the second coil were absent or inactive. It is evi¬ dent, however, that if the magnetic field of the second coil were always in the zero phase when the cathode-ray pulsation reached it, there would be no second deflection produced, and the luminous spot on the screen would occupy the same position that it would have if the sec¬ ond coil were absent. With the apparatus dis¬ posed as described, it was known that the magnetic field of the first coil was at its maxi¬ mum phase when the cathode ray passed through the first diaphragm, and (if the sec¬ ond coil did not displace the luminous spot on the screen) it was also known that the magnetic field of the second coil was at its zero phase when the cathode-ray pulsation reached the second diaphragm. In performing the actual experiment the two magnetizing coils were made identically alike and were placed in the circuit in parallel and with symmetrically- arranged leads, so that the phase of the current at any given instant would be the same in each. The magnetizing current was furnished by a modified Tesla high-frequency coil, provided with a pair of condensers of known capacity; and from the known electrical constants the frequency of the magnetic oscillations in the two fields could be calculated. The experiment then consisted in determining the shortest dis¬ tance by which the two magnetizing coils could be

separated, consistently with the second one having no effect. (We say the (

great as the speed of translation of hydrogen molecules. It should be understood that no great degree of accuracy is claimed for the particular numerical result just quoted, and it should also be understood that the speed of the cathode-ray particles varies considerably with the degree of exhaustion in the tube, and with the intensity of the electric field in the vicinity of the cathode. It is evident, however, (1) that we are here dealing with speeds en¬ tirely transcending anything previously known in connection with the translatorv motion of matter, and (2) that Crookes was in all proba¬ bility right when he expressed the view that cathode-ray phenomena bring us in touch with matter (if indeed these particles are ((matter)) in the ordinary sense) in a very different state from any with which we have had previous experience.

As might be expected, a large number of experimenters turned their attention to the in¬ vestigation of the nature and properties of these cathode-ray particles or negative cor¬ puscles, and many exceedingly difficult, beauti¬ ful and ingenious lines of research were carried out in this direction. One of the most interest¬ ing was Sir J. J. Thompson's determination of the speed of translation of the corpuscles in the cathode ray, by a method wholly different from that of Wiechert. By the aid of a magnet he deflected the cathode stream so that for a definite time it entered an insulated hollow vessel that was connected with an electrometer, which served to measure the aggregate electri¬ cal charge of the entering corpuscles. Inside the vessel the beam, impinged upon a delicate thermoelectric couple of known thermal capac¬ ity, by means of which the total kinetic energy of the torrent of corpuscles could be determined (in the form of heat). The curvature of the beam, outside the closed vessel and under the influence of the magnetic field, was observed at the same time. If N is the number of corpus¬ cles entering the closed vessel in a given time, and c is the negative electrical charge on each one of them, then Ne is the total aggregate charge on all the N corpuscles taken together. This was one of the quantities measured. Let ns represent it by Q and write Q — Nc. Again, if u is the velocity of the particles (as¬ sumed to be the same for all) and m is the mass of any one of them, the kinetic energy of each corpuscle will be 2 mu2, and the total aggre¬ gate kinetic energy of the N corpuscles that entered the enclosure will be -kNmu2. This quantity, which we will denote by W (so that W = zNmu2), was given by the thermoelectric couple. Finally, if H is the intensity of the magnetic field (in electromagnetic units) and r is the radius of curvature of the cathode beam where it traverses this

field, we have, from general electrical principles, the relation mu — Her. We find that it is possible, from these three equations, to eliminate N and to find the

£

values of u and — > respectively. In fact, we

m

2W e 2W

have u — 7777- and — = – rro When the experi- QHr m QH2r 2

ment was performed and the observed values of the measured quantities were substituted on the right-hand side of each equation, the value of the speed, u, proved to be about 10,000 miles

(or 1.6 X 109 centimeters) per second. The

£

value simultaneously found for — (or the elec-

m

trical charge of a corpuscle, per unit of its mass) was about 10T, the mass being supposed to be measured in grammes, and the electric charge expressed in absolute electromagnetic units. According to this result, the charge of the negative corpuscle, per unit of mass, is about the thousandth part of the charge ob¬ served on the hydrogen atom, per unit of mass in ordinary electrolysis.

It was, of course, highly important to con¬ firm these extraordinary results in as many ways as possible. Another method that sug¬ gested itself for determining the speed of cathode-ray corpuscles depends upon the fact that a static electric field tends to deflect a moving electrified particle and cause it to de¬ scribe a curved arc — circular or parabolic, ac¬ cording to the conditions of the experiment. By subjecting the cathode ray, simultaneously, to a static electric field of intensity E and to a magnetic field of intensity H, it is possible, if the directions of the lines of force are properly chosen, and the respective intensities H and E are properly related, to cause the two fields to neutralize each other, so far as the deflection of the cathode ray is concerned. An application of the principles of theoretical electricity shows that if the deflection of the ray is to be zero, the two fields acting on its particles must fulfil the relation

E = Hu,

from which we obtain the very simple result,

E

In other words, if we find, by experiment, a combined magnetic and electrostatic field in which the cathode ray remains sensibly straight, the velocity of the particles of the ray may be found at once by merely dividing the strength of the observed magnetic field by the strength of the observed electric field. The actual ap¬ plication of this method involves special diffi¬ culties, but J. J. Thomson overcame them all, and obtained numerical results indicating that the velocity u lay between 3 X 10® and 2 X 109 centimeters per second ; and this, combined with the result obtained by applying the equation mu — Her, which holds when the magnetic field acts alone (r being then the radius of curvature of the cathode ray), led to the fur-

c

ther conclusion that the value of — lies between

m

0.7 X 107 and 0.9 X 107, if nt is measured in grammes and e in absolute electromagnetic units.

It should not be inferred that all our in¬ formation with regard to the negative corpuscle is obtained from the study of the cathode ray, because this is far from being the case. Ac¬ cording to the views at present held, the nega¬ tive corpuscle plays a leading part in many physical phenomena, and the study of various other departments of physics has led to con¬ firmatory conclusions with regard to the prop¬ erties of these corpuscles. The Zeeman effect, for example, affords a means of determining £

the ratio — > 2nd gives results that are in

harmony with determinations obtained from the cathode ray. The Zeeman effect, in its simplest form, consists in the doubling of the spectral lines of substances, when the radiating source, from which the light giving the spectrum pro¬ ceeds, is subjected to the action of a powerful magnetic field, in which the lines of force are parallel to the direction of radiation. There is much to be done in the way of clearing up our ideas of the mechanism by which radiation is effected (see Radiation and Molecular The¬ ory), but for the moment let us assume that light-waves originate in the disturbances pro¬ duced in the ether by negative corpuscles exe¬ cuting orbital motions within the atoms of the radiating substance. The planes in which the corpuscles perform these orbital motions will, in general, be distributed equally in all possible positions, and the projections of their orbits upon any selected fundamental reference plane will be described, by the corresponding projec¬ tions of the corpuscles themselves, equally in a clockwise and a counter-clockwise direction. Now if the radiating source be subjected to a strong magnetic field, the lines of force of which are parallel to the direction of the ray under consideration, the speed of the respec¬ tive corpuscles will be differently affected, ac¬ cording as their projections are revolving clockwise or counter-clockwise, in their orbits as projected upon a plane perpendicular to the lines of force. Those that are revolving in one direction will be accelerated and those that are revolving in the opposite direction will be retarded, in accordance with known principles in the theory of electricity and magnetism. But a difference in the periods of revolution of the corpuscles will mean a difference in the wave¬ length of the emitted light, and hence if the magnetic field is sufficiently intense, it will cause a visible separation of the spectral lines into doublets. Lorentz, basing his calculation upon considerations

of this kind, has shown that if T is the original period of the undisturbed vibration causing any given spectral line, and t is the difference in period corresponding to the two components into which the line is resolved by means of the magnetic field, we have

t = – HT2 m 4tt

where e, m and H have the same significance as above, and rc = 3.14159. . . . With the exception of e and m, all these quantities are either known or obtainable by direct observa¬ tion ; and hence the equation affords us an inde¬ pendent means of determining the ratio of e to m. Upon performing the experiment Zeeman

£

found values of — ranging from 1.4 X 107 to

m

1.8 X 107, which agrees fairly well with the re¬ sults previously obtained from the study of the cathode ray.

Other methods, based upon the action of ultraviolet light, and upon radioactivity and phenomena of various other kinds, have been used for determining this ratio, and from the general agreement among the results obtained by different methods and different experiment¬ ers it has become evident that although the velocity with which the corpuscles move de¬ pends upon the circumstances under which they

are liberated or set in motion, the electric

charge of a corpuscle per unit of its mass,— *

m

is always the same, no matter what the condi¬ tion of the corpuscle is, or from what source it is obtained. It is evidence of this kind that has led physicists to conclude that the negative corpuscle is a fundamental and omnipresent constituent of matter of every kind. The best

value of — that has been obtained up to the m

present time is certainly Bucherer's. He found

- =1.767 X 107,

m

if m is measured in grammes and e in absolute electromagnetic units. This is believed to be correct to within about one-half of 1 per cent. It applies only to slowly-moving corpuscles, however, because, as we shall presently see, the apparent mass of a corpuscle increases with the speed of the corpuscle, while the charge presumably remains unchanged. (Bucherer's

value of — is 5.299 X 1017, if the electric charge m

is expressed in absolute electrostatic units.)

The fact that the ratio — is nearly 2,000

m

times as great as the charge per unit mass observed in connection with the hydrogen atom in electrolysis shows, most conclusively, that one of two things must be true : Either (1) the charge on the negative corpuscle is far greater than the charge accompanying an ion in electrolysis, or (2) the mass of a nega¬ tive corpuscle is far less than the mass of any ion or atom previously known to us. Of course these may both be true, but certainly one of them is true, and as soon as this fact was recognized, it was also recognized that the discovery of the negative corpuscle was an event of fundamental importance in the history of physics.

In order to find out which alternative must be adopted, J. J. Thomson undertook to de¬ termine the electric charge on a single corpus¬ cle — and hence also the mass of the corpuscle, since the ratio of the two was known. More accurate values of these quantities have since been obtained by other means, but Thomson, it should be remembered, was a pioneer in a new field, and the work that he did in solving his problem has justifiably been called by Sir Oliver Lodge ((one of the. most brilliant things recently done in experimental physics. }) We can only outline his method in a rough way. It depends (1) on the fact, discovered by * Aitken in 1880, that condensation of aqueous vapor in air does not occur, even when the air is supersaturated, unless there are nuclei o.f some sort for the mist-particles to form about; (2) on the fact, demonstrated by Lord Kelvin in 1870, that the surface tension of small droplets of water, suspended in the air, tends to cause evaporation even though the degree of saturation is enough to cause con¬ densation on a water-surface that is flat, or that has a large

radius of curvature; (3) on the fact, announced by J. J. Thomson himself in 1888, that the electrification of such a drop¬

let tends to neutralize the effect of the surface tension, so that condensation can take place on a water droplet, or on any other curved sur¬ face of exceedingly short radius, if this droplet or surface is electrified, even though no such condensation could take place in the absence of the electrification; (4) on the investigation, by Sir George Stokes in 1849, of the limiting speed at which small spherical bodies will fall, by their own weight, through a fluid of known viscosity; and (5) on the method devised by Mr. C. T. R. Wilson, in 1887, for precipitating, by adiabatic expansion, a definitely-known quantity of aqueous vapor in the form of mist, from saturated air.

Thomson's experiment consisted (1) in partially ionizing, in a closed vessel and by means of X-rays or ultra-violet light, air con¬ taining a suitable quantity of water vapor; (2) in causing the deposition of droplets of mist, by Wilson's method of quick adiabatic expansion, about the ions thus set free; (3) in observing the rate at which the mist thus formed subsides — a process which really con¬ sists in the falling of the individual droplets through the air; (4) in calculating, by means of Stokes' formula, the diameter (and subse¬ quently the weight) of the spherical droplets constituting the mist — this being made possible by the fact that he knew the viscosity of the air and had observed the rate of fall of the .droplets; (5) in calculating the total mass (or weight) of water precipitated, in accordance with Wilson's method, from the known degree of expansion of the air; and (6) in dividing the total weight of precipitated water by the weight of a single droplet, and thereby determining the number of droplets. The number of droplets produced being assumed to be the same as the number of available ions about which condensa¬ tion was theoretically possible, the experiment manifestly gave the total number, N, of the ions present in each cubic centimeter of the air, under the conditions prevailing in the ex¬ perimental apparatus. In one experiment N was found to be 30,000.

The total aggregate charge of the ions was determined by means of a pair of parallel metallic plates in the vessel in which the mist was produced — one of them being insulated and connected with an electrometer. If the space between the plates contained positive ions, for example, then by suddenly communicating a strong positive charge to the non-insulated plate these ions could be quickly repelled against the insulated plate, to which they would give up their charges ; and the aggregate charge that they were carrying could then be measured by the electrometer. By means of this princi¬ ple the total

charge on the ions in a cubic centi¬ meter of the air in the mist-chamber was de¬ termined ; and by dividing this total charge by N, the number of ions in a cubic centimeter of the air, the charge on one individual ion became known.

The charge on each ion was assumed to be due to the excess or defect of one electron, and hence the experiment gave an estimate of the charge, e, associated with each corpuscle. The value of e at first obtained by Thom¬ son in this way ranged from 5.5 X 10- 10 to

8.4 X 10—ln electrostatic units, and he adopted

6.5 X 10~10 as the concluded value. In 1903 he

published a later determination of e, obtained by following the same general plan as before but with certain improvements in technique, and gave the value e — 3.4 X 10— 10.

Beautiful and ingenious as this determina¬ tion of the charge on the individual corpuscle was, the method was open to certain criticisms, inasmuch as it involved certain assumptions which had not been shown to be valid, and which, in fact, were only approximately true. They were near enough to the truth for the method to yield a rough estimate of the value of e . but they were too imperfect to provide us with an accurate and dependable determination. It was not known, for example, that Stokes' formula for the rate of fall of spheres in a viscous fluid would apply with sufficient ac¬ curacy in the case of droplets of the exceed¬ ingly small size here under consideration. Nor was it known that every ion actually did sur¬ round itself by a liquid droplet, nor that there were no droplets containing more than one ion. Nor did the method make allowance for the effect of differences in the sizes of the droplets, nor for possible evaporation from their surfaces after they were formed. It is not possible, in the present place, to discuss these various points, but it must suffice to say that they have all received the most careful consideration in later researches, and Prof. R. A. Millikan, of the University of Chi¬ cago, has recently been able to publish a definitive and probably very accurate value of e, obtained by a method which apparently leaves little to be desired on the score of soundness or of experimental excellence. It does not detract in any way from the admira¬ tion that we must feel for Thomson's original work, to say that Millikan's research was still more

ingenious and beautiful. He succeeded in trapping single corpuscles, and in measuring the value of the “electron® directly; and the account of his work that he gives in his book, ‘The Electron, > is extremely fascinating.

Millikan’s fundamental idea was exceedingly simple, but in its practical application it called for an immense amount of ingenuity, experi¬ mental skill and patient labor. A tiny spherical droplet of oil was electrified and caused to take up a position, suspended in the air, between two horizontal metallic plates that could be electrified or grounded, at will. The drop was strongly illuminated from two opposite sides, and was observed by means of a telescope di¬ rected at right angles to the light-rays. It appeared, in the field of the telescope, <(like a bright star against a black background.® The drop was first allowed to fall freely through a known distance (approximately equal to half a centimeter or one-fifth of an inch), the limits of which were marked by a pair of cross-hairs in the telescope. The time of fall through this distance, in one set of experiments, was about 13 seconds. Before the drop reached the lower metallic plate, both plates were elec¬ trified by connecting them to the terminals of a battery having a total electromotive force of from 5,000 to 10,000 volts, the charge of the lower plate having the same sign as the elec¬ trification on the oil drop. When the experi¬ ment was rightly conducted, the drop (already carrying an electric charge) would begin to rise, under the influence of the electric field to

which it was exposed, and the time required for it to make its upward journey from the lower cross-hair of the telescope to the upper one was noted. Before it reached the upper plate the electric field would be destroyed by grounding the metal plates. The drop would then fall again, and the time of its descent from the upper cross-hair to the lower one was once more observed, and so the experiment proceeded — keeping the droplet always in the air, and continually recording the times of its ascent and descent. (A single drop could thus be kept under constant observation for hours.) The size of the drop was determined from the measured time of its fall by means of a modi¬ fied form of Stokes’ formula for the descent of small spheres in viscous media — the original formula having been studied with great care (especially by Dr. H. D. Arnold) with refer¬ ence to its accuracy in connection with droplets of the size used in these experiments. The diameter of the droplet being known, its weight was readily ascertained, because the density of the oil of which it was composed was known. Then from a knowledge of the weight of the drop, and of the time of its downward passage under the influence of gravity and of its upward passage under the influence of the known electric field,

it was easy to cal¬ culate the electric charge on the drop. An ingenious means was provided for chang¬ ing the electrification of the drop at will, and in either direction, by ionizing the air between the plates by means of an X-ray discharge, and then throwing ions against the drop by electric repulsion. The original posi¬ tive electrification of the drop was reduced every time a negative ion was taken in, and increased every time a positive ion was re¬ ceived. After a positive ion had been taken in, the upward journey would be performed more quickly than before, and the inclusion of a negative ion would cause a correspond¬ ing slowing of. the upward motion. It was found to be quite possible to determine, from the circumstances of the motion, the number (as well as the sign) of the ions thus entering the drop ; and by calculating the electric charges for all the different upward journeys that were observed, it became evident that these various charges either showed no change, or differed from one another either by a certain constant quantity, or by a low multiple of that quantity. It was even found that the original charge of the droplet was also an apparently exact multiple of this same quantity. The doctrine that electrification is a discontinuous process, and that it consists in adding to a body (or subtracting from it) a certain number of small-sized yet finite and equal charges, or “electrons,® thereby received an exceedingly striking and definite confirmation ; and the data available made it quite easy to calculate the magnitude of this elementary unit charge. After several years of study and observation, cul¬ minating in two years of work with a special apparatus constructed with exceeding care, the final conclusion was, that the charge on the electron is invariably e — 4.774 X \0~10 abso¬ lute electrostatic units; and Millikan believes (apparently with good grounds) that the un¬ certainty in this result is not greater than the thousandth part of its own magnitude. (The

corresponding value of the charge, in absolute electromagnetic units is £= 1.592 X lO”20).

Millikan obtained his oil drop by perforating the upper of the two metallic plates by means of a minute pinhole, and then sending a fine spray of the oil into the space above the plate, by blowing a puff of air through an atomizer. In the course of time one of the droplets of the spray would fall through the pinhole into the region between the plates, and the experi¬ ment could be started. The friction to which the oil was subjected in the atomizer electrified the droplets of spray

positively, and, as has been stated above, the charge communicated to the droplet in this way was always found to be an exact multiple of the value given above. This fact is highly interesting, because here we have, for the first time, direct evidence that an electric charge communicated to a body by friction consists in an excess or deficit of a definite, finite number of electrons. In one ex¬ periment, for example, the positive charge com¬ municated to the droplet by the initial friction of the atomizer was found to correspond to a loss (or deficiency) of nine negative electrons.

Millikan varied his drop-experiments in many ways, using numerous substances (in¬ cluding mercury) for the drops, and experi¬ menting with drops of widely different sizes, and with various gases between his electrified plates ; and he concludes that <(the apparent value of the electron is not in general a func¬ tion of the gas in which the particle falls, of the materials used, or of the radius of the drop on which it is caught.® In other words, he strikingly confirmed the theory that the negative corpuscle has an actual, physical existence^ apart from the existence of the kinds of matter heretofore contemplated by the chemist.

The determination of the mass m of a free, slowly-moving negative corpuscle is an easy

matter after — and e have been separately m

determined ; for we have the simple relation

e-7-(^) = ra. With Millikan's value of e and

\ m J

c •

Bucherer's value of — (both expressed in

m

terms of absolute electrostatic units) we have m = (4.774 X 10-10) ^ (5.299 X 10«) = 0.901

X 10 — 27 grammes.

(It may be shown, from this, that it would require 1,845 slowly-moving negative corpuscles, to have a combined mass equal to the mass of one hydrogen atom.)

We do not yet know the shape of the negative corpuscle, nor do we positively know that the word “shape® has any definite mean¬ ing when applied to it. Larmor, for purposes of discussion, assumed the corpuscle to be a mathematical point endowed with a finite charge of electricity, which creates a certain type of strain in the surrounding ether; but the pre¬ vailing conception (in which Larmor would doubtless concur) is that the actual, physical corpuscle has some kind of spatial extension, though it may not have definite boundaries. Nicholson, in a paper read before the Physical Society of London in October 1917, suggested that the corpuscle is a region of strain in the ether, the strain being intense in the immediate

vicinity of a certain central point, and diminish¬ ing with extreme rapidity as we pass away from that point. According to this view the corpuscle would have no definite boundaries, and therefore (in a strict sense) no definite shape, though on account of the intense localiza¬ tion of the region in which the strain is really significant, we might treat the corpuscle for most purposes almost as though it were a mathematical point. If we desired to assign a “radius® to such a corpuscle, we should have to define the radius arbitrarily, either as ex¬ tending to a region where the strain is some definite fraction of the maximum central strain, or in some other way.

In the absence of data concerning the shape of the negative corpuscle, it is natural to try, first, the simplest assumption we can make with regard to it and to see how well this fits such facts as we have. The simplest shape, from a mathematical standpoint, is a sphere; and we find that the three best-known theories as to the shape of the negative corpuscle assume it to be spherical, at all events when it is at rest.

(1) Abraham considers the corpuscle to be rigid and spherical at all times, whether it is moving rapidly or at rest.

(2) Lorentz considers it to be spherical when at rest, but assumes that when it moves it be¬ comes transformed into an ellipsoid of revolu¬ tion with its equatorial radius unchanged, but with its polar radius (which is parallel to the

direction of the motion) shortened to r ˆ 1 — x2 where r is the original radius and x is the ratio that the speed of the corpuscle bears to the speed of light.

(3) Bucherer and Langevin also consider the corpuscle to be spherical when at rest and assume that when it is in motion it takes the form of an ellipsoid of revolution with its polar radius shortened and directed

parallel to the motion ; but they assume that the polar radius becomes r(1 — x2) 3 and that the equatorial radii are increased in consequence of the mo¬ tion, so that each becomes equal to r(l — x2) — % where r and x have the same significance as before. (It is to be observed that these rela¬ tions of Bucherer and Langevin leave the vol¬ ume of the corpuscle unchanged, whatever the speed may be).

Each of these conceptions has something in its favor, and each has something against it, but they should all be regarded merely as con¬ venient mathematical fictions for the present — fictions that are worth considering because they may serve to suggest further researches when their consequences are investigated. The ex¬ periments of Kaufmann (to which reference will presently be made) appear to be incompat¬ ible with Lorentz's conception of the corpuscle, while the theory of relativity suggests that those of Abraham and of Bucherer and Lange¬ vin are untenable.

The general theory of electricity, as applied , to static charges moving rapidly through space, brings us face to face with an exceedingly in¬ teresting topic in connection with the negative corpuscle, — namely, that its apparent mass is doubtless in some measure of electrical origin, and that it is quite within the bounds of possi¬ bility that it is wholly electrical. Sir J. J. Thomson pointed out, as long ago as 1881, that a moving body (for example, a sphere) pos-

sesses a somewhat greater apparent inertia, or mass, when it is electrically charged than it does when it is not charged. ((Recent Researches in Electricity and Magnetism, > p. 21.) This is due to the fact that the charged body has Fara¬ day ((tubes of force® radiating from it, and these tubes are supposed to carry a certain amount of ether along with them and to encounter a sort of hydrodynamic resistance from the sur¬ rounding ether. This resistance is not analo¬ gous to friction, however. It does not neces¬ sarily entail any dissipation of energy, but has the general effect (when considered mathemat¬ ically) of increasing the apparent mass of the charged body. Thomson showed, for example, that a sphere having a radius of r centimeters, and bearing an electric charge of e absolute electromagnetic units, has an apparent mass

/ 2 e2\

equal to) grammes, if it is station¬

ary or moving with a speed that is small in comparison with the speed of light ; m being its mass, in grammes, when the electric charge is absent.

When a charged sphere is caused to move with greater and greater speed, the Faraday tubes of force shift their positions in relation to it, and Heaviside showed (in 1889) that as the speed increases, each tube, whatever its original direction, will be displaced more and more toward a plane passing through the cen¬ tre of the sphere perpendicularly to the line of motion. In other words, if we call the diameter that coincides with the direction of motion of the sphere its ((polar axis,® the tubes of force that radiate from the sphere will crowd closer and closer toward the equatorial plane, the faster the sphere moves. Moreover, the shift¬ ing of each tube (according to Heaviside's analysis) will take place in such a way that the original distance of every point in the tube from the equatorial plane will be reduced by

the motion in the proportion of V F2 — ˆ2 to V , where v is the speed of the sphere, and V is the speed of light. (It is to be observed, in particular, that the tubes approach the equa¬ torial plane in the same way, whether they lie in front of it or behind it, as the sphere moves through space).

Now the effect of the ether upon a Faraday tube is very different when the tube is moving endwise than when the tube is moving side- zvise (or perpendicularly to its own length) ; and in consequence of this fact, the part of the apparent mass that is due to the electrification increases when the speed of the sphere becomes great enough for the equatorial crowding of the tubes of force to become significant. It is not possible to deal with this phase of the sub¬ ject more than superficially in the present arti¬ cle, but it should be specially noted that mathe¬ matical analysis has shown (1) that owing to the existence of the Faraday tubes of force that stretch out into the ether from an electrified body, that body, whether its charge be positive or negative and whether it be stationary or in motion, has an apparent mass greater than the mass it has when the charge is absent; (2) that owing to the crowding of the Faraday tubes toward the equatorial region when the speed of the body increases, the apparent mass of the body increases as the speed increases; (3) that at any ordinary speed this increase in apparent

mass is insignificant and does not have to be reckoned with; but (4)

that it becomes sig¬ nificant as soon as the body attains a speed equal to a few tenths of the speed of light, and (5) the apparent mass increases with extreme rapidity as the speed approaches closely to the speed of light, and (6) it would become infinite if that speed were fully attained.

Now until the last few years this rather striking conclusion was of academic interest only and it had no practical bearing because we could not produce any such prodigious speeds, in electrified bodies, as were necessary in order to give rise to any sensible increase in their apparent mass. When, however, it was discovered that the negative corpuscles in high vacuum tubes are moving with speeds compara¬ ble with (though always materially less than) the speed of light, the conclusions summarized above began to have an important practical bearing and physicists asked themselves whether any increase in the apparent mass of these cor¬ puscles could be detected, that could be assigned to the causes indicated — that is, whether any experimental evidence could be adduced, to show that the apparent mass of a swiftly-mov¬ ing electrified particle increases with the speed with which the particle is traveling. The ques¬ tion became far more interesting and import¬ ant when it was shown that the so-called <(beta rays® emitted by radium are identical with the negatively electrified corpuscles observed in vacuum tubes, because the speed of these beta particles has been found to be as high as from 95 to 97 per cent, of that of light in some cases, and hence they should show a marked increase of apparent mass, if the previous theoretical conclusions about the effect of speed upon mass were sound.

Partly with the object of testing this point, and partly with the broader idea of gaining a general insight into the nature of mass and in¬ ertia and into the constitution of the negative corpuscle, W. Kaufmann, of Gottingen, under¬ took to determine the ratio of charge to mass for these rapidly-moving particles, at various speeds. An interesting semi-popular account of his best-known experiments will be found in Sir Oliver Lodge's Electrons. > (For the origi¬ nal papers, see Comptes rendus, 13 Oct. 1902; Physikalische Zeitschrift, 4, 1902-03, p. 55 ; Annalen der Physik, Vol. XIX, 1906). The method employed by Kaufmann was a modifi¬ cation of the one outlined above for determin¬ ing. the speed of cathode-ray corpuscles by subjecting the particles simultaneously to mag¬ netic and electrostatic fields of force, except that Kaufmann made use of a stream cf beta particles, emitted by radium, and arranged his apparatus so that the magnetic field tended to deflect each corpuscle toward (say) the north, while the electric field, instead of being dis¬ posed so as to neutralize this effect, was ar¬ ranged so that it tended to deflect the corpuscle (say) toward

the east. The stream of beta particles impinged against a photographic plate in such a way that a small, round, single spot was registered upon it when neither field was active. When the magnetic field alone was ex¬ cited, the spot would have been merely dis¬ placed toward the north if the beta particles all had the same speed ; but inasmuch as they had a great variety of speeds, it was drawn out into a straight line, extending in a north-and-

south direction. Similarly, the electric field, when acting alone, caused it to be drawn out into a straight line extending in an east-and- west direction. In the actual experiment, with both fields acting at once, the line that was ob¬ served was a curve; and from a study of the shape and position of this curve it was found to be possible to determine, separately, the ve¬ locity, u, of the particles impinging upon any

given part of it, and the ratio — for these

m

same particles. If it is assumed (in accordance with all the other evidence ihat we have) that c remains invariable, the data thus obtained show the relation between the mass, m, of a negative particle and the speed, u, with which the particle is moving.

The relation between speed and mass, as re¬ vealed by these experiments, was very marked. For example, at the highest speed observed (which was about 97 per cent, of that of light) the apparent mass of a corpuscle was found to be about three times as great as the mass of the same corpuscle when at rest.

Kaufmann's experiments provide us with means of testing, to a certain extent, theories of the constitution of the negative corpuscle, inasmuch as for every theory concerning the general nature of the corpuscle there will be a corresponding law of variation of mass with speed. This was recognized immediately, and was, in fact, largely what led to the making of the experiments to which we have just re¬ ferred. A curious fact that has to be reckoned with, in applying tests of this kind to the ob¬ servational data, is, that every negative-corpuscle theory yet proposed indicates that the mass of a body moving at high speed is a vector quantity — that is, that the mass of the body, as meas¬ ured in the direction of the motion (i.e., the so-called longitudinal mass) is different from the mass of the same body as

measured at right angles to the direction of the motion (i.e., dif¬ ferent from the so-called transversal mass). It is the transversal mass, as Abraham pointed out in 1902, with wrhich we have to deal in dis¬ cussing experiments such as Kaufmann's.

If R is the ratio that the speed of a given negative corpuscle bears to the speed of light when the electrical part of the transversal mass of the corpuscle is m, and if mo is the electrical part of the mass of this same corpuscle when it is at rest, then for m r mo we have the fol¬ lowing values for the respective theories of negative-corpuscle structure mentioned above:

3 J_ 4 ' R 2

theory ;

log

1 + R2

2 R

1

(i — R2)1/*

— 1 j- for the Abraham for the Lorentz theory; and

- – - -r for the Bucherer-Langevin theory.

(1 — Rr)1′ 3

When the several hypotheses as to the con¬ stitution of the negative corpuscle are judged by comparing these formulas with Kaufmann's experimental data, it appears (1) that the Lo¬ rentz corpuscle, which is the only one of the three that conforms with the theory of rela¬ tivity, does not fit the data at all well ; and (2) that the experimental evidence agrees quite well with either the Abraham or the Bucherer-Langevin corpuscle.

From experiments of this nature we may

VOL. to — 14

obtain a certain amount of information with regard to the proportion of <(electrical mass® to <(real mass® in a corpuscle ; for the experi¬ mental data reveal the law in accordance with which the total

mass varies with speed, while the theory of the nature and constitution of the corpuscle yields a formula showing merely how the electrical part of the mass varies. If there is a (

Before attempting to estimate the size of a negative corpuscle, it is necessary clearly to understand that we have no way, as yet, to determine the dimensions of corpuscles, if we assume that the mass that they possess is only partially electrical and that the rest of it is mass in the usual or non-electrical sense. If, however, we assume that the mass is wholly of electrical origin, we can easily obtain an esti¬ mate of the size of the corpuscle. The value that we obtain will depend in some measure upon the views that we hold with regard to the shape of the corpuscle; but if, for present pur¬ poses, we consider it to be spherical, the esti¬ mate of size obtained will probably be of the right general order of magnitude, even if the spherical shape ultimately proves to be unten¬ able, so far as concerns the relation of the negative corpuscle to phenomena in general.

To obtain the desired estimate of size (in conformity with the assumptions here outlined) we may make use of the expression given by J. J. Thomson, and already quoted above, for the electrical mass of a slowly-moving electri¬ fied sphere. Thus if in is the mass of the (stationary or slowly-moving) corpuscle in grammes, r its radius in centimeters and e its charge in absolute electromagnetic units, we have

2 e2 2 e2

m= —•— * or r=~- – -

3 n 3 m

Hence, with the values given above for e and m, we have

2 H S92 V 1 0 _ 20')2

'=T I-90. x lo-^ =1875 x 10-'3 centimeters In other words if 10,000,000,000,000 negative

corpuscles were placed in a line and just touch¬ ing one another, they would make a row about an inch and a half long. (An equal number of oranges, each three inches in diameter and placed in a row in like

manner, would reach from the sun to the orbit of Jupiter).. Atoms differ in size, but in a rough and general way it may be said that it would require something like 100,000 negative corpuscles, placed in a straight line and in contact with one another, to reach across the diameter of an atom.

The corpuscular theory has developed mar¬ velously in the last 15 years, and it has been applied, in one form or another, to the explanation of the mechanism of many phe¬ nomena, such as radiation, X-rays, radioactiv¬ ity, and electrical and thermal conduction. It has also been pressed into service to explain chemical affinity and valency and to elucidate the structure of atoms and molecules. It has proved to be a fruitful conception, and some modification of it will no doubt remain with us, as a permanent addition to our physical the¬ ories. It should be recognized, however, that when, in discussing particles so exceedingly small, we apply the general physical and me¬ chanical laws and principles that we have de¬ duced from observation in our grosser world of experience, we are very likely committing a serious error — an error which, though it will no doubt be corrected in the course of time, may be blinding us, meanwhile, to some very large facts. Many of the <(laws® that apply to larger masses of matter are probably statis¬ tical laws, due to the averaging of many mil¬ lions of separate events that do not individu¬ ally follow these laws. That the properties of the negative corpuscle are far different from those that we have heretofore assigned to ˆgross® matter is already sufficiently shown by what we have learned about the mass of such corpuscles. In a general way, however, it may be said that we have made progress enough in the study of the negative corpuscle to have it become a real thing to us — or at least a symbol of a real thing; and J. J. Thomson has well said that although the negative corpuscle is a recent discovery, we already know more about it than we do about the atom. See also Elec¬ tricity; Molecular Theory; Radiation; Ra¬ dioactivity.

Bibliography. — A creditable and interesting popular account of the negative corpuscle and its various relations is given in E. E. Fournier d'Albe's (Electron Theory,* though the numer¬ ical data therein given have now been largely superseded by better values, as indicated in the present article. A more recent and more au¬ thoritative review of the relation of the corpus¬ cular theory to physical phenomena in general is given by J. P. Minton in a series of papers printed in The General Electric Reviezv for 1915 (Vol. XVIII. Consult also Thomson, J. J., (The Corpuscular Theory of Matter,*

Allan D. Risteen, Ph.D.

ELECTROPLATING

ELECTROOPTICS, a branch of elec¬ trical science treating of the relation of elec¬ tricity to light. See Light.

ELECTROPHORUS. See Electric Ma¬ chine.

ELECTROPHOTO MICROGRAPHY,

the art of photographing, by means of the elec¬ tric light, certain objects magnified by the microscope.

ELECTROPHOTOGRAPHY. See Pho¬ tography.

ELECTROPLATING, the art of plating

or covering solid objects with a coating of metal by electro-deposition. This is the most common method of applying silver or gold plate for ornament, or copper or nickel plate, as for rendering an article more durable. Given a solution of the salts of a metal, say, for in¬ stance, sulphate of copper (the constituents of which are sulphuric acid and copper oxide), in which are immersed a copper plate connected with the positive pole of a source of electro¬ motive force and a metal plate connected with the negative pole ; when an electric current is passed through the solution an action takes place which may be described as follows : First, the salt is decomposed into sulphuric acid and oxide of copper. At the same time a portion of the water of the solution is also decomposed, setting free hydrogen and oxygen. The oxygen of the oxide of copper is drawn to the negative pole, where it unites with a portion of the hydrogen just freed, forming water, and the metallic copper thus set free is deposited uni¬ formly on the negative metal plate. Simul¬ taneously with this action sulphuric acid and oxygen arrive at the positive plate, where the oxygen unites with a particle of the copper plate, forming oxide of copper, with which the sulphuric combines, forming sulphate of cop¬ per; which process is continued as long as there is any metal left in the positive plate. For each atom of copper thus dissolved at the posi¬ tive plate another is set free at the negative plate. Actions analogous to these underlie all electroplating and electrotyping operations. If it is desired to deposit nickel, silver, gold or other metal on the object, salts of those metals instead of copper will be used in the solution or bath, as it is termed.

Silver is the easiest metal to use in plating, one ampere of current depositing 4.02 grams of metal per hour; with the same current copper deposits 1.17 and nickel 1.09 grams per hour. If 10 baths are worked in series of eight hours a day, depositing each 10 pounds of

copper, they will require 4,830 amperes of current all the time ; and with copper anodes the pressure will be about 16 volts for the 10 baths.

The art of electroplating is extensively practised. The current for the decomposition of the electrolyte, in solution, is usually sup¬ plied by continuous-current dynamo machines which are specially designed to give large cur¬ rents at low electromotive force, rarely exceed¬ ing three to five volts. Sufficient electromotive force must be provided to decompose the solu¬ tion, but the amount of chemical decomposition depends altogether on, and is proportional to, the rate or amperage of the current. If too high electromotive force is employed the plating is uneven and granular. Storage or primary batteries may also be used for this purpose,

and are so used for planting on a small scale. Much care and special knowledge is required to obtain the best results in electroplating. The process is begun by thoroughly cleaning, as by pickling and scouring the article to be plated to remove all trace of oxide or other impurity from its surface. In the case, for instance, of gold, silver or nickel plating the bath or solu¬ tion employed by some electroplaters consists of 100 parts water, 10 of cyanide of potassium and 1 of the cyanide of gold, silver or nickel, as the case may be. Plates of either of these metals are suspended in the bath as the positive pole, while the article to be plated is suspended in the bath as the negative pole. When the plating has proceeded to the desired depth or thickness the articles are taken out and bur¬ nished. Such parts of the article as it may not be desired to plate are covered with grease, oil or wax. When non-metallic articles are to be plated they are first given a coating of wax, over which is laid a film of powdered plum¬ bago, upon which the plating then takes place.

ELECTROPNEUMATIC BLOCK SYSTEM. See Block Signal System.

ELECTROPOION, a mixture of sulphuric acid, bichromate of potash and water used as the liquid for batteries in which zinc and carbon are the poles. See Electric Battery.

ELECTROPYROMETER. See Pyrom¬ eter.

ELECTROSCOPE, an instrument for de¬ tecting or determining the presence of elec¬ tricity upon a conductor, and showing whether it is

positive or negative. It has many forms, of which the simplest consists of pith balls hanging from silk threads in a dry, closed glass case. On contacting with an electrified body the piths are excited and swing apart. In the gold leaf electrometer there is a wide-mouthed vial stoppered with a cork, through the centre of which a metal rod passes into the middle of the vial. There is a brass knob at the top of this rod and its lower end is bent or hooked to support a narrow strip of gold foil, which is folded in equal lengths over the hook. When a rubbed glass rod is. brought near the brass knob, negative electricity is attracted and posi¬ tive electricity is repelled to the gold leaves, which diverge by reason of the repulsion of the similar electricity on the leaves. To show the kind of electricity with which the leaves are charged, or with which another body may be charged, a finger is placed on the brass knob while yet the glass rod is near it. This allows the positive electricity to escape. When next the finger and then the rod are removed the negative electricity is dispersed, over the gold leaf system and the leaves again diverge. If now, while the leayes are charged with negative electricity, a negatively charged rod be brought near the knob, the leaves tend to diverge still farther. If a positively charged rod is. used the negative electricity in the leaves is at¬ tracted and the leaves tend to collapse.

Electroscopes of this general type are. now utilized, on account of their great susceptibility to the presence of electricity, to detect, and measure the radioactivity of weakly radiating substances like uranium and thorium, advantage being taken of the ionizing properties of such substances by which the particles of gases be¬ come carriers of electric charges proportional

to the radioactivity of the substances. For this purpose the gold leaf system is placed in metallic connection with the upper plate of a small air condenser, on the lower plate of which is spread a layer of the radioactive material. A source of electromotive force is connected with the lower plate and the movement of the gold leaf is noted. As the rate and extent of this movement vary with the radioactivity of the substance, comparisons can be readily made of different substances or with a standard. See Electrostatics ; Electrometer.

ELECTROSMELTING. See Electro¬ chemical Industries.

ELECTROSTATICS, that branch of elec¬ trical science dealing with electricity at rest, or static; opposed to electrodynamics, which deals with electricity as a force, in action. In the period of early research the electrical phe¬ nomena produced by friction came to be called static electricity, and it has been convenient to retain the nomenclature,

although it is recog¬ nized that all divisional names of electricity are arbitrary, for in all of them we deal with the same unknown thing whose phenomena we ob¬ serve largely through its high vibrations. The terms free electricity and atmospheric electricity (q.v.) were formerly much used to describe the electricity which we recognize as resident in the air and clouds above us; but to-day the term static electricity is the one most commonly employed to describe that drawn from the at¬ mosphere on a kite-string; or that which ac¬ cumulates in a pile of printing paper which has been subjected to some frictional contact that causes the sheets to adhere to each other; or to electrification in a driving belt caused by some accidental rubbing in the course of its travel.

The first discoveries regarding electricity were regarding its static qualities. In the handling of amber, which is a fossilized vege¬ table resin, it was found to display peculiar phenomena when rubbed, attracting light par¬ ticles of matter. This phenomena came to be called electric, after Greek elektron, the name for amber. Later glass was found to display similar yet opposite phenomena on being rubbed, and there arose the terms <(vitreous® and <(resin- ous® electricity, for the sort produced by rub¬ bing glass or amber respectively, and which have since been identified as simply positive and negative electricity. It was also learned that there is always a balance maintained be¬ tween positive and negative electricity, and that the development of a given amount of one means an equivalent amount of the other. For a fuller description of the development of knowledge regarding frictional electricity which we now call static electricity, see the article on Electric Machine.

An understanding of induction is essential to an appreciation of static electricity. Static in¬ duction is the production of an electrical charge upon one body by another body that is statically charged. It might be termed electrical influence.

a

If the circle a becomes charged by friction, so that it is positively and electrostatically

charged, as indicated by the sign +, then on being brought near to another body b, the near end of b will become negatively charged, as

indicated by the minus sign — , and the far end positively +. By touching b with the finger the electricity may be drawn off, or “earthed® or “grounded,® passing through the body of the toucher to the earth if he is not insulated. The electrophorus is the simplest device for illustrating this principle and is described under Electric Machine. But it should be under¬ stood that the current producible by a static electric machine does not differ from that of a battery or a dynamo, except that it is naturally and usually much less in quantity, being a primi¬ tive form of apparatus. From these early ex¬ periments it was demonstrated that every body positively charged repelled another body of positive charge ; and any negatively charged body repelled another negatively charged body, while attracting a positively charged body. It was soon apparent, however, that the forces of attraction and repulsion varied greatly when the bodies were exposed in some other medium than the ordinary atmospheric air. The word di¬ electric was coined to express the material medium in which a body statically charged was located, and the term has been extended by common consent to mean any non-conductor, as glass or mica. A static machine was sometimes termed a dielectric machine, and the transmit¬ ting of electric forces by induction instead of conduction was dielectric; while the power of a dielectric to resist stress caused by induction across it, as measured by difference of potential necessary to break through in a violent dis¬ ruptive discharge, was denominated dielectric strength.

Referring again to the positively charged circle a, let it represent a sphere. The electric charges it has been determined by various ex¬ periments are on the outside surface of the sphere and not inside. This is apparent in the case of a cylinder open at the ends through which something may be passed ; and also in the transferring of a charee on a globe by enclosing it with larger hemispheres. If an electroscope be covered by a wire cage and insulated below a charge may be brought near or in actual contact without any disturbance of the sensitive mechanism of the instrument. The surface being the thing affected, it becomes ap¬ parent that if one wishes to increase the capacity of a conductor, as a trolley- wire, the simple way is to increase its surface, as by making it twice as thick. Capacity may also be increased by filling the space through which the lines of force tend to pass with some dielectric other than air, as with petroleum, mica or glass. Large quantities of mica are so used in elec¬ trical machinery.

To measure the force of electricity obtained in primitive electric experiments a delicate in¬ strument was necessary, and Coulomb invented the torsion balance, using a needle suspended at the centre of its gravity by a very fine wire or silk thread, etc. A minute electrical

force of repulsion allowed to operate against one end of the needle so as to twist the thread was therefore measurable as a mechanical force. This principle is used in the torsion electrometer and various other instruments. Experimenting with a torsion balance, Coulomb demonstrated that the transfer of statical electricity by in¬

duction involved an expenditure of force, the force varying inversely as the square of the distance of the centre of the bodies affected. See Electric Machine — Static Electric Induc¬ tion Machine and Electrotherapeutics, where various static machines are described and illustrated.

ELECTROTAXIS. See Electroculture of Plants.

ELECTROTHERAPEUTICS, or the

treatment of disease by electricity, began to be a science with the work of Duchenne of Bou¬ logne. Working chiefly with a faradic current he determined the motor points of the various muscles or the places upon the skin where the application of the current produces contrac¬ tion of the individual muscles. And for a long time the testing and treatment of paralysed muscles was the principal function of the elec¬ trotherapeutist. The burning and sometimes fa¬ tal effect of lightning had always been known and our countryman Benjamin Franklin had charged a Leyden jar with electricity collected from the clouds during a thunder storm. Frank¬ lin, after whom static electricity is denominated Franklinic electricity, was among the first to ex¬ periment with the shocks and muscular contrac¬ tions produced by static electricity.

One of the types of electricity employed in electrotherapeutics and electrodiagnosis is Galvanic or Voltaic electricity or the constant direct current. This is obtained from a voltaic battery or from a storage battery, or from the direct current electric light circuit (suitably controlled) or from the alternating current electric light circuit employed to actuate a motor generator of direct current.

For various purposes the strength of the cur¬ rent may be regulated in the case of a battery by selecting the proper number of cells, and in the case of the other sources of voltaic currents by rheostats or variable resistances placed in the path of the current or by volt controllers. The latter regulate the voltage at the terminals applied to the body by offering the current a side path of variable resistance through which a greater or less part of the current may pass. A milliamperemeter to show the strength of current traversing the

patient is essential. For many purposes the current should have such or such a strength; and for all kinds of electro¬ diagnosis we must be able to determine the strength of current required to produce certain physiological effects. Conducting cords or flexible insulated wires pass from the control table to electrodes in contact with the patient. The simplest example is a flat metal disk cov¬ ered with fabric wet with a dilute solution of bicarbonate of sodium, preferable to salt which discolors the metal, and provided with an in¬ sulated handle. Some other electrodes are a needle in an insulated handle ; a carbon plate covered with a wet pad in a non-conducting tray partly filled with bicarbonate of sodium solution ; a metal plate in an insulated bath¬ tub of water ; a metal sheet thickly covered with damp clay; or a bare metal cylinder which may be grasped in the hand. The galvanic or voltaic current is a bipolar application, passing through the patient's body between two separate electrodes, one the anode from the positive and the other the cathode from the negative pole of the battery or other generator. A switch

is essential for turning the current on or off. A pole changer alters the polarity of the elec¬ trodes by changing the connections at the con¬ trol table by simply turning a switch. A pole detector is a necessary apparatus and a con¬ venient one contains a colorless liquid which changes to red at the negative terminal.

Effects of the Galvanic Current. — One important effect is muscular contraction. This does not occur during the uniform passage of the current, but at the moment of any great variation in the strength of the current, as when a strong current is suddenly turned on or off. If the current were gradually increased from zero to the same maximum, no muscular con¬ traction would result. In electrodiagnosis one electrode is called the indifferent one and is placed at some place remote from the region

N. museulAoutaneousancl M. coraco- brachialis .

N. ulnar M. brachialis anticus

M. flexor carpi ulnaris

M. flexor profundus digitorum (sup¬ plied partly by ulnar and partly by median nerve)

M. flexor carpi radialis

M. palmaris Iongus

M. flexor sublimis digitorum

N. ulnar

• fgrepyr”

M. palmaris brevisjjjgsgi M. abductor minimi digiti M. flexor minimi digiti M. opponens minimi digiti M. third and fourth lumbricales {

M. deltoid

M. biceps

N. median

pronator radii teres

SSS M. supinator Iongus,

M. flexor sublimis digitorum

M. flexor Iongus pollicis

ftfggg N. median

SUSHI M. abductor pollicia M. opponens pollicis Ijjjjl M, flexor brevis pollicis “ M. adductor brevis pollicis

first and second lumbricales

Motor points, palmar surface, of the upper extremity.

Fig. 1.

(From ‘ Medical Electricity,’ courtesy W. B, Saunders & Co.)

under examination. The other, active, electrode is applied to the skin either over the nerve at the place where the nerve is nearest the sur¬ face, or over the muscle at the place where the motor nerve enters the muscle. These two places are called the motor points for the nerve and muscle respectively, because at these the application of electricity is most effective in producing muscular contraction. Figure 1 from a standard text-book is a chart of the motor points in the arm and is

used as a guide in elec¬ trodiagnosis or treatment. The threshold of excitability is the weakest strength of current which when suddenly turned on or off will cause muscular contraction. The reaction of degen¬ eration takes place in many cases of paralysis and indicates a degeneration in the substance

of the motor neuron itself. It occurs in polio¬ myelitis, labioglossopharyngeal paralysis, and paralysis accompanied by lesions of the motor roots or of the motor nerves. In its complete form there is (1) abolition of galvanic and faradic excitability of the nerve; (2) abolition of the faradic excitability of the muscle; (3) hyper or hypoexcitability of the muscle with or without inversion of the normal formula, Ca C C “> C C; (normally cathode closure contracture exceeds the anode, positive, closure contracture) but the muscular contraction is slow instead of the normal sharp jerk. The presence of the reaction of degeneration shows what nerves are affected and to what extent ; and the return to a normal reaction indicates progress toward recovery of voluntary muscu¬ lar power.

The auditory reactions to the appli¬ cation of electricity form a very delicate and important means of the diagnosis of lesions in the labyrinth of the ear. For example, one of the normal re¬ actions is obtained when an electrode is placed in front of the tragus of each ear and a galvanic current is applied. The patient feels dizzy and the outside world seems to be moving toward the cathode and the head is inclined toward the anode. He may see sparks before the eyes and hear a noise in the ears, and if the current is quite strong there is nystagmus or oscillation of the eye¬ balls.

A sensation of taste accompanies any application inside the mouth and often applications to other parts of the face.

The heating effect of electricity is well known but suitable galvanic cur¬ rents are so weak that the sensation of warmth or even the reddening of the skin in contact with the electrode is usually due to electrolysis and not to the frictional resistance to the passage of the current. Very heavy galvanic currents of over 100 milliamperes, ap¬ plied inside the uterus in the Apostoli treatment for fibroid tumors, did pro¬ duce a great deal of heat but treatment by radiotherapy (X-ray and radium) is now more usual.

Galvano-cautery. — Instruments which are connected with both poles of the battery so that no current passes through the patient, are arranged so that a certain part becomes red hot owing to the passage of a heavy current through a thin metal strip in the same way that the

filament in an electric light bulb is heated by the passage of the current. Only the portion which is to be applied to the diseased surface becomes appreciably hot because the conducting wires are larger and capable of transmitting the current with less resistance. Familiar examples of galvano-cauterization are in the treatment of growths in the nose and larynx.

Electrolysis is an effect of the passage of a constant current through an electrolyte such as the human body. A chemical compound such as water is separated into its elements such as hydrogen and oxygen, and in the case of the human body an accumulation of sodium hy¬ drate and a liberation of oxygen take place at

the negative electrode and an accumulation of hydrochloric acid and a liberation of oxygen at the point of contact with the positive elec¬ trode. If the negative electrode is a fine needle thrust into a hair follicle, a current of about four milliamperes causes a liquefaction of the tissues and loosening of the hair, the root of which may be permanently killed. A needle connected with the positive pole of the battery would stick fast and could not be withdrawn until a negative current had been turned on for a short time to loosen it by liquefying the tissue around it. The anodal needle has a coagulating effect. Electrolysis is employed also for the destruction of warts, birth-marks and keloids, in the treatment of strictures of the urethra and oesophagus and such lesions as anthrax.

For most of these cases the indifferent electrode is a sponge electrode held in the patient's hand; but for a more extensive destruction of tissue, needles connected with each pole of the generator are used and the needles are near enough together for all the intervening tissue to be destroyed. Rhy- nophyma, a bulbous swelling of the nose, is re¬ moved in this way.

Iontophoresis, including Cataphoresis and Anaphoresis. — A galvanic current tends to separate the electrode itself or the solution with which it is moistened into ions and to carry these into the tissues, iontophoresis. Metals and alkalis are carried toward the negative electrode or cathode and the introduc¬ tion of these ions by an electric current is called cataphoresis. For example the positive electrode may be moistened with a solution of a cocaine salt and the cocaine will penetrate the tissues ; they leave the anode and pass

toward the cathode but their anesthetic effect is upon the tissues into which they first penetrate.

Some of those who have experimented most with iontophoresis assert that it is a more re¬ liable way of administering many drugs, than giving them either by the stomach or hypo¬ dermically. Two rabbits were experimented upon by Leduc, as in Fig. 2. Rabbit A died with symptoms of strychnine and rabbit B of

cyanide poisoning. Two other rabbits were subjected to the same experiment except that the direction of the current wras reversed so that the strychnine ions did not tend to enter rabbit A, nor the cyanions the rabbit B, and neither was poisoned.

Another example of cataphoresis is electric ionization of the root canals of devitalized teeth. The positive active electrode may be a zinc needle moistened with a solution of a zinc salt. The method is employed to remove in¬ fection from the root canal and the area of the jaw around the apex of the root.

Very extensive destruction of cancerous tissue is accomplished by the introduction of metallic ions from large zinc needles amalga¬

mated with mercury and connected with the positive, pole while the patient lies upon the large indifferent negative electrode.

Anaphoresis or the introduction of acid radicals which the current carries toward the anode, is illustrated by the introduction of salicylic ions from a cathode wet with a solu¬ tion of sodium salicylate, in rheumatism and neuralgia.

The old theory about the use of electricity in paralysis was that the involuntary contrac¬ tions produced by the abrupt makes and breaks of the galvanic current and especially as we shall see later by the faradic current, tended to maintain the nutrition of the paralysed muscles until regeneration of the nerve took place. Certainly the patient and friends could see that something was happening during the application. It is doubtful whether the con¬ tractions accomplish this and in some cases of paralysis it is thought that the contracture or permanent shortening of some muscles, difficult or impossible to overcome by manipulation, may be aggravated by electrical treatment of a nature to produce marked muscular movements. The passage of the galvanic current itself has a tendency to maintain the nutrition of the muscles and to aid in the regeneration of the nerves. And by means of the apparatus in Fig. 3, a galvanic current sufficiently strong

to produce the maximum benefit may be applied without the disadvantage of electrolysis and possible skin irritation at the electrodes and especially without any noticeable muscular con¬ tractions.

This current is a slow sinusoidal current or a rythmically varied galvanic current increasing from zero to a certain maximum, 18 or 20 mil¬ liamperes in one direction; then gradually de¬ creasing to zero ; then changing polarity and gradually increasing to 18 or 20 milliamperes ; then gradually decreasing to zero where the polarity again changes. About 25 such cycles occur each minute under the influence of a variable rheostat and pole changer actuated by an electric motor. This type of current is use¬ ful in paralysis from poliomyelitis and apoplexy and also as a general tonic in many debilitated conditions and also in cases with vertigo from affections of the cerebral or cerebellar circula¬ tion.

Another effect of the galvanic current is to stimulate the secretion of glands. Another is to promote the return of sensation in paralysis of a sensory nerve. By its sclerolvtic effect it aids in the treatment of pleuritic adhesions and of anchylosis or joints stiffened by some previ¬ ous inflammatory condition. Galvanic elec¬ tricity has a sedative or calming effect valuable in many general disorders and this effect is often best produced by hydroelectric baths. Its analgesic effect makes it valuable in the treatment of neuritis and neuralgia.

Faradic electricity is made up of alternating currents induced in a coil with many turns of insulated wire surrounding a coil with few turns of ware through which passes a current rapidly made and broken by a vibrating inter¬ rupter. The faradic current is of very small electrical quantity as measured by its heating effect. A couple of dry cells may supply the current for a portable faradic coil but for an office equipment the electric light circuit suit¬ ably controlled is best because it does not re-

quire renewal and affords also power for the galvanic, galvanofaradic and sinusoidal cur¬ rents. It produces marked muscular contrac¬ tion of a tetanic type continuous during the entire time the current is applied, not merely at the beginning and end as .with a galvanic current.

Two electrodes are necessary for applying the faradic current; one of which may be at an indifferent place. And in contrast with the galvanic current there is usually no difference in the effect of the two electrodes, practically

Fig. 3.

Sinusoidal Apparatus, gradually and rythmically changing the polarity and strength of a galvanic current.

no polarity. Testing the faradic excitability of a muscle or nerve is an important part of electrodiagnosis, but, as explained above, the treatment of paralysis through involuntary muscular movements induced by faradic stimu¬ lation is not always best. Faradic currents from a secondary coil with a comparatively small number of turns and a slowly vibrating interrupter, are more effective in producing muscular contractions, and a great many turns of wire in the coil and very rapid interruptions are best for producing a sedative effect upon neuralgic nerves.

There are several other effects of faradic electricity. As a general stimulant it is used in debility from any cause. As an excito-motor,

the Bergonie method is used for the treatment of obesity by producing marked muscular con¬ tractions without any effort on the part of the patient. Straps or weights prevent excessive movement of the patient's limbs. As a sensory stimulant it is used in sensory paralysis. It stimulates the secretion of glands. It is re¬ vulsive or counterirritant in the later stages of inflammatory processes. Lumbago may be treated by applying faradic electricity with a dry wire brush electrode. It is excito-nutritive and tonic as a hydroelectric bath, in such dis¬ eases as gout, diabetes, obesity, neurasthenia, convalescence from a long illness, and muscular atrophies. And the same baths are useful in combating various toxaemias. It may be used as a sedative.

The same conducting cords and electrodes may transmit to the patient a combination of faradic and galvanic current, in series ; the De VVatteville or galvano- faradic current.

Galvano-faradic or De Watteville currents are applied by connecting a faradic and a gal¬ vanic apparatus in series with a conducting cord leading from one pole of each to the different parts of the patient. One example of its use is in the treatment of spasmodic constipation. Large electrodes are over the abdomen and back ; the faradic coil has many turns and the interruptions are rapid, producing very slight muscular

contractions ; and the galvanic current is quite a strong one, perhaps 30 milliamperes.

Sinusoidal currents are so called because the graphic curve in which forward motion repre¬ sents time and up or down motion represents strength and direction of the current makes a sine wave. In effect it is an alternating current varying gradually as described in one of the paragraphs on galvanic electricity, but these gradual alternations may be of any desired number up to 1,800 per minute. The alternating electric light current is a sinusoidal current of 1,800 cycles per minute and controlled by a suitable rheostat it can be used for treatment. The apparatus previously referred to and shown in Fig. 2 is used for changing the direct to a sinusoidal current of from 12 to 120 alterna¬ tions per minute. It is useful as a local and general tonic application in a wide range of chronic general and local disease characterized by debility, congestion, motor atony and pain. It is applied from the same kind of electrodes as the galvanic current.

Static Electricity. — Lightning is an example of a discharge of static electricity and so is the spark which we produce by shuffling our feet on the woolen carpet as we cross the room in winter and then touch another person or a metallic object. A charge of static electricity upon a hard rubber comb rubbed over our hair or over wool or fur causes the comb to attract small light objects to it. By suitable means any object may be given either a positive or a negative static charge. Similar charges repel each other and unlike charges attract, and if the charged bodies are light and freely move- able, they will come together in the latter case and the two charges be more or less completely neutralized with an accompanying discharge which would be a loud spark between two large metal balls, or a silent and almost invisible brush discharge between two sharp metal points. Static electricity is of small quantity but of

such high voltage that it tends to escape from a charged body ; in fact no body can be charged at all unless it is more or less insulated. Con¬ densers are sheets of metal separated from contact with each other by sheets of glass or some other insulating material. One metal sheet is charged from one pole of a static machine and the other is charged from the other pole. Owing to the great attraction which charges of the two opposite polarities have for each other, when in such close proximity each will receive a much greater charge than it could

contain separately. And if both are discon¬ nected from the source of electricity the two opposite charges are actually self retaining, so that either can be touched by a conductor with¬ out losing its charge ; but if a person touches both of the metal coatings at one time he re¬ ceives a loud spark. Leyden jars with a dozen or more square inches of condensing surface are charged with a very small quantity of high tension electricity from a static machine and their discharge is used in electrotherapy under the name of the static induced current. A single electrode passes to the patient from the outer coating of a Leyden jar whose inner coating is connected with one pole of the static machine. The outer coating of the Leyden jar at the other pole is grounded (has a metallic connec¬ tion with the earth). The patient need not be insulated. The distance between the discharging rods determines the voltage and consequently the degree of effect upon the patient. A wide separation of the discharging rods makes the static induced current suitable only for the ap¬ plication of sparks which are powerfully stimu¬ lant to both striated and smooth muscles and to all other tissues.

Condensers having a great many square inches of condensing surface interleaved like a book may be charged from the two poles of a galvanic battery. They receive a very large charge at a low voltage ; and when they are discharged through the human body they pro¬ duce marked muscular contraction. Since the capacity of the condenser and the voltage to which it is charged can be regulated, these low tension condenser discharges form a very exact means of electrodiagnosis. They may be used for treatment chiefly of paralysis, and for some of the same purposes as the static induced current.

The modern static machine, also called an influence machine, has its initial charge pro¬ duced by friction upon a revolving glass plate. This is communicated to other glass or mica or fibre plates arranged in such a manner that as they revolve the mutual attractions of positive and negative static charges separated by insulat¬ ing disks, result in the accumulation of very strong charges at the two poles of the machine.

Static insulation or the static bath is ap¬ plied by connecting one pole of the machine with an insulated platform upon which the patient is seated. A static breeze is a silent, almost invisible discharge from a metal crown with sharp points connected with one pole of the machine, suspended within 6 or 12 inches of the patient. The effect is increased if at the same time the patient is insulated and receiving a static bath from the other pole of the ma¬ chine. Static sparks are applied by bringing near any part of the patient, either clothed or not,

a metal ball having an insulating handle

and connected by a flexible conductor with one pole of the machine. Here, again, the effect is intensified if the patient is insulated and receiv¬ ing a static bath from the other pole.

The static induced spark is described in another paragraph.

The Morton wave current is a bipolar appli¬ cation from the two poles of the machine by two wet electrodes which make a very perfect contact with the patient to avoid any spark effect. The patient had better be upon an in¬ sulated platform. The discharging rods of the machine are only a fraction of an inch apart. The greater their distance, the more powerful and even intolerable the effect becomes.

Every possible connection with and without Leyden jars has been used in treatment. They all have distinctive names but the arrangements described are the most important.

Effects of Static Electricity. — A single spark produces a muscular contraction and a sensation of local shock which is not very dis¬ agreeable. It is applied by striking at but not touching the patient with the insulated metal ball and quickly withdrawing it; somewhat the motion of cracking a whip. A dozen separate loud sparks applied along the spine are easily received by the most sensitive patient. But it is a very different matter when the ball elec¬ trode is held near the skin and a steady stream of sparks is applied at one place. That is intolerable. Static sparks are used as a general tonic in debilitated states and as a counter- irritant for removing any old inflammatory products. They are not suitable for electro¬ diagnosis or for the treatment of paralysis. The static bath is a general tonic in debilitated states including convalescence from illness or operation and exhaustion from the care and anxiety attendant upon the illness of some dear one. It is excellent in neurasthenia and in insomnia. It is frequently combined with the static head breeze, and, except for insomnia, with the application of sparks along the spine. The static induced current has effects similar to those of the wave current but less useful.

Morton’s wave current produces a succession of muscular contractions which should be slight. It is of value in relieving hyperemia and swelling and pain, and is used in the treatment of a great many chronic conditions in which these are prominent symptoms.

High Frequency Currents.— When a con¬ denser is discharged by

touching its two metal surfaces, the result is not an immediate change to an uncharged condition in each metal sur¬ face. Taking the surface that was positively charged we find that its charge drops not only to zero but to a certain distance on the nega¬ tive side then back to zero and a certain lesser distance in a positive direction and so through thousands of oscillations in a small fraction of a second it comes to rest at zero. The oscilla¬ tions are analogous to the vibrations of a piano wire after being pulled out of a straight line and released. The static induced current is the simplest example of a high frequency current but the discovery of the D'Arsonval current and of the resonator current has lately added a method of wonderful value.

The D'Arsonval current may be obtained from an induction coil, static machine or trans¬ former, capable of producing sparks four to

eight or more inches long. The two poles are connected with the inner coatings of two Ley¬ den jars whose outer coatings are connected with the extremities of a solenoid or cylindrical spiral of perhaps 20 turns of coarse wire about V2 inch apart. Conducting cords lead to the patient from each of the extremities of the solenoid or from any two turns of it. The apparatus but not its connection with the patient is similar to that shown in Fig. 4.

The inner coatings of the two Leyden jars are oppositely charged and are connected with the terminals of a spark gap of adjustable length or preferably, an adjustable number of short spark gaps in series. With each impulse from the induction coil, the Levden jars are charged to such an extent that a discharge of their inner coats occurs through the spark gap. This releases the opposite charges in the outer coatings of the two Leyden jars and their high frequency discharge passes partly through the solenoid and partly through the parallel path formed by the patient's body.

One would suppose that with each dis¬ charge of the Leyden jars the current would almost all pass through the solenoid which is a relatively short length of thin wire whose resistance measured in ohms is trifling com¬ pared with that of the human body. There is however, a counter-electromotive force gene¬ rated in a coil of wire at the making of the current which adds a great inductive resistance to the passage of the current and increases enormously the percentage of the current which will pass through any other path open to it. The current

passing through the patient may be measured by a hot wire milliamperemeter and may be all the way from 50 to 1,000 or more milliamperes. It is also a current of much higher voltage than the galvanic and the fact that it does not cause muscular contraction or a shock of any kind is due to its very rapid oscillations, a million or more per second. The motor nerves respond actively to alterna¬ tions of 20 to 2,000 or 3,000 per second but are inert in the presence of much higher than 5,000 oscillations per second. The oscillatory character of the current prevents the elec¬ trolysis which would render a constant cur¬ rent of 1,000 milliamperes intolerable. One principal effect of the passage oi the D'Ar- sonval current through the tissues is the pro¬ duction of heat in the tissues themselves by ohmic resistance of the same nature as the production of heat by a current passing through a galvano-cautery wire or through the filament of an electric light bulb. Whether all the other effects are due to this generation of heat or whether some are due to direct stimulation of the tissue cells, is uncertain but the effects themselves are of the greatest value in therapeutics. D' Arson val high frequency cur¬ rents of moderate milliampereage may be ap¬ plied by two wet electrodes or by bare metal electrodes ; or by one glass electrode and a glass vacuum bulb or by autocondensation. Diathermy (or less properly called thermopene¬ tration) is simply a D'Arsonval high frequency current of very great milliampereage tending consequently to produce a great deal of heat in the tissues. Two metal electrodes may be ap¬ plied to a piece of raw meat and after the cur¬ rent has passed through for some time, the

meat will be found to be cooked all the way through. The electrodes themselves do not become too warm to be touched by the finger — are not wa,rm at all until contact is made with the meat. This is the underlying principle of the Deforest Cold Cautery which is suited to all the purposes of a hot metal cautery.

Fig. 4. — High frequency Autocondensation.

Diathermy may be applied by two wet elec¬ trodes, for instance at opposite sides of a joint, for producing a local effect. Or it may be used for producing a constitutional effect by means of Autocondensation. One conducting wire passes to a very large metal surface close to the patient's body but separated from i.t by a thick sheet of some complete and impenetrable nonconductor The patient may hold one or .more metal terminals from the other pole of the DˆArsonval apparatus or may be in close proximity to a second insulated surface charged from the other pole. During the application currents of high frequency, medium tension and high milliampereage

(about 1,000) surge through the patient's body. The application produces very little sensation except a slight warmth and no shock or muscular contraction. The metal terminal must, however, be grasped before the current is turned on and not re¬ leased during the flow of the current. Other¬ wise the patient will receive a succession of ex¬ ceedingly hot sparks.

High Frequency Resonator Discharges. —

The Oudin resonator shown in Figure 5 is an apparatus for this purpose. The outer coat of one of the two Leyden jars is connected with the end of a wire spiral and the outer coat of the other with some part of the spiral between its two ends. With each discharge of the Ley¬ den jars, a current passes through the turns of the spiral between the two connections and this induces a current passing toward the free end of the spiral and increasing in voltage until from its terminal a long spark or a violet colored effluve may be drawn ; or a glass vacuum electrode may be used to apply this high tension high frequency current. The ap¬ plication is a unipolar one. When the vacuum electrode is held near the surface of the body a shower of sparks passes to the skin and this may be more or less disagreeable. This spark effect is largely avoided by keeping the electrode in' contact with the surface. But even then tiny sparks may be seen passing from parts of the bulb not in close contact with the skin. These are not disagreeable. A sensation of

warmth is produced and the entire glass vacuum tube becomes heated in proportion to the strength of the high frequency current. The glass stem where the current enters from the insulated handle and the surface in contact with the patient are hotter than other parts of the electrode. The bulb is filled with a violet and ultraviolet light. The latter is invisible but its presence is easily demonstrated by fluoresence induced in Willemite. It doubtless is partly concerned in the effect produced upon the tissues.

High frequency currents have little or no tendency to produce muscular contraction and are not used for electrodiagnosis. The spark effect is useful as a general tonic, to stimulate sensory nerves, to cause constriction of blood vessels locally and vasodilitation generally. Sparks applied from a metal point held close to the surface have a counterirritant or a destructive effect depending upon the strength of

the current and the length of time sparks are applied to one spot without intermission. D'Arsonval currents, locally, raise the tempera¬ ture and increase the circulation, increase the activity of glands and are a sedative. Autocon¬ densation increases the production of heat in the body, increases the urinary solids and acts as a sedative. And especially it reduces the blood pressure when that is unnaturally high. The vacuum electrode actuated bv the Oudin resonator has the effect of heating the tissues and promoting cellular activity of every kind as well as increasing local circulation. It is a counterirritant when the current is strong or is so regulated as to produce considerable spark effect even with the electrode in contact with the surface. In this case its general effect is stimulating; but with the current adjusted to produce very little spark effect and a great deal of warmth from the vacuum electrode in contact with the skin it has a sedative effect, and tends to reduce unnatural high blood pressure.

Some of the conditions treated by high frequency applications are growths varying from warts to skin cancers ; various skin dis¬ eases including acne; high blood pressure and

arteriosclerosis or hardening of the arteries; rheumatism; gout; neuritis and neuralgia; angina pectoris; hemorrhoids.

Bibliography. — Consult Gould and Pyle, ˆCyclopedia of Medicine) (Philadelphia 1912) ; Guilleminot, (Electricity in Medicine* (New York 1906) ; Jones, (Medical Electricity* (6th ed., Philadelphia 1913) ; Martin, Practical Electro-therapeutics* (Saint Louis 1912) ; Neiswanger, (Electro-therapeutical Practice) (18th ed., Chicago 1912) ; Rockwell, (Electricity in Medicine) (New York 1904) ; Tousey, S.,

(Medical Electricity and Roentgen Rays* (Philadelphia 1910, 1915).

Sinclair Tousey, M.D.

New York City.

ELECTRONIC STATE, a term invented by Faraday (q.v.) to designate the total mag¬ netic flux due to a conductor conveying a current, which linked with any secondary cir¬ cuit in the field or even with itself. By careful experiment he proved that electromotive forces set up in conductors by the induction of other currents in the field were caused by the cutting lines of the secondary circuit. See Electricity.

ELECTROTHERMAL PROCESS, the

term applied to electrometallurgic operations in which electricity is

employed solely as a heating agent, to distinguish them from electrolytic processes. In special electrothermal processes, as the manufacture of calcium carbide, the mixture of substances is raised by the electric current to the temperature at which the chemical reaction desired will take place. In other electrothermal processes the heat is applied to produce molecular or physical changes, as in the manufacture of graphite from gas-carbon or coke. The continuous current only can be used in electrolytic work, whereas an alter¬ nating current is also available in electrothermal work. See Electrometallurgy.

ELECTROTROPISM. The sensitiveness of plants to cultivation by electricity. See Electroculture of Plants.

ELECTROTINT, a method of tracing

drawings, etc., for printing, by the action of electricity on a copper plate. The design is drawn in some varnish not affected by acid and placed in an electro-bath, the lines being thus brought out *in relief.

ELECTROTYPE, a metallic copy, made

by electro-deposition, a form of type, a <(cut,** engraving, etc., and manufactured into proper shape for printing. Wax is heated in a kettle, poured out on a molding-case and placed in a press to receive a reverse impression of the form, engraving, etc. The face of the wax mold is covered with plumbago to give it a conducting surface to which the metal will ad¬ here. The negative pole of a battery is attached to the mold and the positive to a piece of copper (or occasionally nickel or iron) and both are placed in a bath of sulphate of copper in solution. The copper is deposited on the face of the mold in a thin film, which increases in thickness as the process continues. The shell having attained the thickness of a stout sheet of paper the mold is removed from the bath, the shell detached and strengthened by a backing of electrotype metal, this being a composition of lead, tin and perhaps a little antimony. The electrotype shell being washed is laid face down

on a metal surface and a sheet of tin foil melted on to the back, after which the backing metal is poured on in a molten condition. After cool¬ ing, the electrotype plate goes to a planer, shaver, trimmer, etc., until reduced to the proper form for printing. Later it is remounted on

a base of wood or metal to bring it to the same height as type, that it may be printed in a form with type; or sometimes the plate is curved in a bending machine for rotary printing. For details of the electric bath employed, see Elec¬ trochemistry. When the copper electrotype is faced with nickel it is sometimes called nickel- type, or if with iron, steeltype. The electrotype plate has almost wholly superseded the stereo¬ type for book and miscellaneous printing, though the stereotype is retained for rotary newspaper printing.

ELECTRUM, a substance mentioned by Greek and Latin writers, with regard to the nature of which there has been much discus¬ sion. The term was used with different mean¬ ings ; it originally meant gold, and was then applied specially to native gold, containing quan¬ tities of silver, copper and other metals. The term employed for this native alloy was trans¬ ferred to the artificial alloy of gold and silver, afterward made, and was also applied to amber on account of its color and inferior lustre. The natural alloy occurring in Placer County, Cal., and Humboldt and Nye counties, Nev., con¬ tains about 40 per cent of silver. It is the prin¬ cipal mineral in the ore at National, Humboldt County, Nev.

ELEGY, properly, a poem of mourning. The Greeks and Romans, however, employed the term to denote a poem written in elegiac verse, whatever its character. This elegiac verse was the distich, consisting of the hexameter alternating with pentameter. Catullus, Proper¬ tius, Tibullus and Ovid were masters of the elegiac style. In modern times the term elegy is usually applied to any serious piece in which a tone of melancholy pervades the sentiments, as in Gray's (Elegy Written in a Country Church¬ yard. J In music, the term is used to denote a sad or suppressed theme. See Poetry ; Lyric Poetry

ELEGY WRITTEN IN A COUNTRY CHURCHYARD, a poem by Thomas Gray, often said to be the most popular piece of verse in the language. It is thought to have been begun at Stoke-Poges in 1742, resumed at Cambridge in 1749 and finished at Stoke in June of the next year. Gray at once sent a copy to his friend Horace Walpole, who showed it about. Early in February 1751 the poet received a letter from the editor of a magazine announcing the intention to print it. Gray thereupon through Walpole arranged for its publication by Dodsley on 16 Feb. 1751. Its success was instantaneous. Eleven editions were published in speedy succession, translations were made into Latin and into numerous modern languages, and parodies and imitations flooded the world. Subsequent reprintings, especially in anthologies, have secured for it an enormous circulation, and, although it has not escaped the disparagement sure to be vented upon what is hackneyed,

it has retained an unparallcd hold upon public affection. It would be a rash critic who should attempt to deny classic rank to Gray and his best-known poem.

Three copies exist in Gray's handwriting, and a study of the readings and the suppressed stanzas, as well as of the poet's borrowings from himself and others, is a valuable exercise for the student of poetic style. Owing to the almost flawless felicity of the diction and to the ad¬ mirable fitness of the pentameter quatrain to the purposes for which it was employed, there are but few of the 32 stanzas that do not yield some memorable phrase or line, many of which have become stock quotations, such as (

As has been intimated, the (Elegy, > through its own popularity due to its own excellence, has contributed to its own decline in favor among those exigent persons who feel that it is an offense against taste to praise what the masses like. A moment's thought, however, should convince even the most fastidious that the masses are right. The (Elegy) is not profound, or subtle, or exceptionally imaginative, or full of ravishing surprises in phrase and cadence. Had it been it would have failed of its purpose to express with consummate dignity and felicity the thoughts and feelings common to humanity in the presence of death and its monuments. The (Elegy* is popular because the honest critic will confess that he could not improve it if he would and because the average reader has never thought it needed improvement. It is about as perfect a poem of pensive melan¬ choly as the world can show, and if all its predecessors and successors in the so-called churchyard poetry were lost and it alone pre¬ served it would suffice to voice practically all the pertinent reflections and emotions connected with ((the great leveller.® Consult editions of Gray's poems by Gosse, Rolfe, Bradshaw, Phelps, etc.

William P. Trent.

ELEMENT, in chemistry, a primary sub¬ stance that cannot be decomposed as may be done with compound substances. The different substances now admitted by chem¬ ists to be elements, together with those which are tentatively assumed to be so, until further evidence is accumulated, number (1918) 82. They are aluminum, antimony, argon, arsenic, barium, beryllium, bismuth, boron, bromine, cadmium, caesium, calcium, car¬ bon, cerium, chlorine, chromium, cobalt, copper, dysprosium, erbium, europium, fluorine, gado¬ linium, gallium, germanium, gold, helium, hol- mium, hydrogen, indium, iodine, iridium, iron, krypton, lanthanum, lead, lithium, lutecium, magnesium, manganese, mercury, molybdenum, neodymium, neon,

nickel, niobium, niton, nitro¬ gen, osmium, oxygen, palladium, phosphorus, platinum, potassium, praseodymium, radium, rhodium, rubidium, ruthenium, samarium, scan¬ dium, selenium, silicon, silver, sodium, stron¬ tium, sulphur, tantalum, tellurim, terbium, thallium, thorium, thulium, tin, titanium, tung¬ sten, uranium, vanadium, xenon, ytterbium, yttrium, zinc and zirconium. Whether any of these apparently elementary substances will be proved to be in reality compounds cannot be definitely foretold. The most that can be said is that up to the present time no force has been brought to bear on them sufficient to disrupt the atomic attraction which holds each in its individual form. Much speculation has been

indulged in concerning the fundamental struc¬ tural differences that subsist between the atoms of the different elements, but no universally acceptable explanation has yet been offered to account for the fact that the thousands of com¬ pounds that have been studied are all composed of so small a number of essentially different constituents. The alchemists believed that every apparent “element* can be modified, or “trans¬ muted,* into every other one, and much labor was expended in the effort to transmute the baser metals into the < or more valu¬ able ones. We now know that the problem of transmutation, if it is capable of solution at all, is at any rate far more serious than it was be¬ lieved to be in the early history of chemistry. But there are numerous indications which sug¬ gest a relationship among the substances that are now accepted as elements, and it may yet prove to be possible to transform lead into gold, or tin into platinum. For some years past Sir William Crookes has been a consist¬ ent advocate of the theory which teaches that all matter is fundamentally the same, and he has shown that some of the “elements*- can be resolved, by fractionation, into substances which exhibit spectra that differ from one another in a marked manner, any two consecutive members of the series showing close similarity in their spectra, while the extreme members of the series are totally dissimilar. (Consult his lecture be¬ fore the Berlin Congress of Applied Chemistry, entitled ‘Modern Views on Matter, 5 in Science for 26 June 1903). The theory of matter which is in favor at the present writing teaches that all atoms are composed of electrons (q.v.), which are all alike, but which are grouped to¬ gether in various ways, and in various numbers, to form the atoms of the elements. If this view stands the test of further research the possi¬ bility of transmuting the elements into one another may not be altogether fanciful. The element

radium (q.v.), which appears to pos¬ sess the singular power of continuously emitting streams of free electrons, occurs in nature in certain varieties of the mineral uraninite. It is notable that the inert gas helium (q.v.) also occurs in this same mineral, though it appears to be present in the free state and never in actual chemical combination. It has been sug¬ gested that we are here face to face with a real case of transmutation of elements, the electrons that are emitted by the radium being slowly built up, within the uraninite, into new systems, which are nothing less than atoms of helium. See Molecular Theory ; Periodic Law ; Radiation ; Radium.

ELEMENTAL SPIRITS, beings who, ac¬ cording to the popular belief of the Middle Ages, presided over the four elements, living in and ruling them. The elemental spirits of fire were called salamanders; those of water, undines; those of the air, sylphs; and those of the earth, gnomes. Paracelsus wrote a treatise upon them, and they play a part in Pope's (The Rape of the Lock.*

ELEMENTS, Conscious. As is the case with any other process of analysis, the analysis of experience must disclose certain component factors from which more complicated experi¬ ences are built, and these are called conscious elements. It is by no means obvious that the psychical fragments which form the elements

in the psychology of the present day are not subject to further fragmentation, nor, for the matter of that, that there are any conscious ele¬ ments whatever insusceptible to further frag¬ mentation. Furthermore, the subdivision of an experience into its elements does not exhaust its analysis any more than the analysis of a mosaic is exhausted by an enumeration of the constituent bits of stone. Just as the arrange¬ ment of the constituent bits of stone is the really vital part of a mosaic, so the arrangement of the constituent bits of experience is the vital part of a mental state. The tentative character of conscious elements and the inadequacy of a psychology which confines itself to cataloguing them are all but entirely overlooked by perhaps the majority of experimental psychologists.

The general consensus of opinion among psychologists is that the structural elements — the items — out of which experience at any one moment is built are sensations and affections (qq.v.), and these alone. In determining what constitutes a single sensation, our knowledge of the physiological processes of the sense-organs often yields us indications which are contra¬ dicted by introspection, as in the case of the sensation of a color, which does not show upon introspection the division into separate light and color processes which is indicated by

its physiology.

There is not so much agreement as to the nature of the simple psychological functions, or temporal sequences of psychological units. Stout assumes that the simple processes are cognition — i.e., sentience, simple apprehension, and be¬ lief and will — i.e., hedonic tone and desire or aversion. Brentano separates ideation or aware¬ ness from belief. Wundt regards all experi¬ ence as a manifestation of the volitional process of impulse, which involves both sensory and affective factors. Consult Brentano, (Psychol¬ ogy (Leipzig 1874) ; Stout, 'Analytic Psychol- ogy> (London 1896) ; Titchener, (An Outline of Psychology* (New York 1907) ; Wundt, 'Grundriss der Psychology (Leipzig 1897) ; id., 'Physiologische Psychology (ib. 1902-03).

ELEMI, as commercially used at the pres¬ ent day, an oleo-resin obtained from the Cana- rium luzonicum of the Philippine Islands, also known as "Manila elemi.* As found in the mar¬ ket it has the appearance of old honey, due to admixture with extraneous material, but when pure it is colorless, and has a pleasing fragrance. It is a mixture of resin with a volatile oil, the resin being compound, part (61 per cent) amor¬ phous and part (25 per cent) crystalline; the latter known by the specific name, arnyrin. The amorphous resin dissolves in cold alcohol ; the crystalline only in hot alcohol. The hard elemi, most abundant in the West Indies, is obtained from species of Bur sera, and is either yellowish or greenish, sometimes opaque and sometimes translucent, has a fatty lustre, is easily pulver¬ ized and very fusible. It is heavier than water, in which it is insoluble, although it is readily dissolved in either turpentine or alcohol. The Oriental elemi of ancient times was the African elemi, an extract of Boszvellia Frereana or San- tiriopis balsamifera. The Mauritius variety is obtained from Canarium paniculatum. A large part of the elemi of commerce is produced from trees of different genera of the same family growing in tropical America. Brazilian elemi,

or mime, is the product of Hymenoea Cour- baril. Mexican elemi, now rarely found in com¬ merce, is the product of Amyris plumieri. It was formerly the base of a highly valued lac¬ quer. Elemi is a regular constituent of spirit varnishes, and the Manila kind is used in plas¬ ters and ointments, and in the preparation of certain high grade printing inks. In Eastern countries it is also used as incense. Its active

principle is a volatile oil obtained by distillation.

ELEPHANT, the largest of living land animals, the two species of which constitute the family ElephanticUe, of the sub-order Proboscidea. The better-known species (Elephas or Evelephas maximus) is native to the jungles of India; while the other species (Elephas or Loxodon africanus) is found in the forests of Africa.

The elephant is a huge, ungainly creature with an enormously heavy body, mounted on four short, columnar legs, the hinder ones bend¬ ing like knees when he lies down, as he doubles them behind, and not under him ; his tail is long and tapered, ending in a bunch of coarse hair; otherwise the wrinkled bluish-gray hide is quite hairless. His head is large, with big pendu¬ lous ears, small eyes, and a nose, prolonged into a proboscis or ˆtrunk,® which reaches to the ground when he stands erect. The average male elephant is 8 or 10 feet high, and weighs five tons or more. There is a pigmy race of the African elephant, however, found in the Kongo, which is not over seven feet in height. The incisors of his upper jaw are pro¬ longed into tusks, which are, however, less useful to him, as weapons, than is his trunk. This organ enables the animal to pick up things from the ground, and to reach fruits or leaves many feet above his head, and it also conveys water to the mouth. Indeed, so great is the tactile sense of this singularly flexible proboscis that it has been likened to a hand. It is also its owner's chief weapon of offense and defense; for with it he can catch and crush a man with ease, or hurl aside the tiger. The nasal bones are rudimentary, to give room for the trunk. The powerful muscles of the trunk demand a large surface for their attach¬ ment, and accordingly the skull is very large, and yet is prevented from being excessively heavy by the presence of large air spaces be¬ tween the inner and outer tables. The end of the trunk forms a prehensile organ with two flaps in the Indian elephant, one in the African. The tusks are not present in all elephants, and vary much in size. They lack all coating of enamel. The digestive system is typical of that of the herbivorous animals in general, except for the long, narrow form of the stomach, and for a peculiar muscle attached to the gullet, which renders regurgitation of water possible. The female has a single pectoral pair of mammae. Gestation lasts two years, and the young are suckled for two years more. The. age which this huge creature attains is proportionate to its size; for captive specimens have been known to live a hundred years, and scientists believe that, in a wild state, it may live many years longer. The Indian elephant (Elephas asiaticus) differs from the African in having smaller ears and a longer head with concave forehead and smaller eyes; in this species, also, the hind feet are often five-hoofed, whereas in the African

they are never more than four-hoofed, though five digits are always present in both limbs. Though the two species present some differences as to dentition, the special peculiarity in the structure of the molars is common to both. These teeth are of great size, and are formed of vertical plates of dental bone, separately covered with enamel, and welded together by a bony “cement, > > so that each tooth looks like a number of teeth, cemented together. In both species, also, there are no canine teeth, and no incisors in the lower jaw; while the incisors of the upper jaw are developed into tusks, often weighing 150 to 200 pounds each. These tusks furnish the ivory (q.v.) which is so much es¬ teemed for ornamental purposes. The Indian elephant for thousands of years has been the servant of man. From the earliest ages he has borne the Oriental warrior into battle, has hauled his stores and ammunition, and has even been taught to wield weapons. In peace he has piled logs and huge blocks of stone as un¬ remittingly as a derrick, and has been the main feature in the processions of the native princes. In these last and always spectacular functions, the elephant’s anklets, saddlecloth and trappings are often encrusted with gold and jewels; and the prince who sits in the canopied howdah on his back is not more gorgeously attired than his elephant. In this connection, also, the al¬ binos of the elephant are prized far more highly than the ordinary sort; in Siam, indeed, the white elephant- is royal and venerated. The catching of these elephants singly, or in herds, is by no means an easy task. In former years they were caught in pitfalls, but this practice has been abandoned, because the creatures were frequently injured. Modern methods are varied. Sometimes male elephants are decoyed by tame females trained for that purpose, until they are in close proximity to the hunters. These en¬ tangle their unconscious victim’s legs in stout ropes, and when, eventually he finds himself trapped, he fights until exhausted. When, how¬ ever, herds are hunted, they are driven by an ever narrowing circle of hunters toward the mouth of a strongly built stockade, or ((keddah.)> When, after many days, surrounded and en¬ closed by their pursuers, they rush into the stockade, the great gate is shut upon them. They are then tamed by a variety of methods, which differ as the stockades do, according to locality. Once caught, the elephant is easily trained, a few months being, usually, sufficient to teach him all he needs to know. Methods of training vary in detail; but, after the first severe lessons, the trainer usually finds gentle¬ ness effective. The driver or mahout sits upon the elephant’s neck and manages him by words and by the use of a small iron-pointed stick. Once tamed, elephants, except in cases where they become “bad,** and have to be shot like mad dogs, often are so gentle that children may be trusted to play with them. Besides the differ¬ ences between the two species, already

noted, the African elephant is not as amenable to domestication and confinement as the Asiatic, and is the chief source of the world's supply of ivory. Indeed, the African elephant generally succumbs to disease and dies in confinement, while the only change noted in the Asiatic under the same circumstances is that the species gen¬ erally does not breed in captivity. The African elephant is peculiar in that the great tusks, twice

as large as those of the Asiatic species, are present in both male and female, while in the Asiatic species they are found only in the male. Because of the demand for these, the African natives have made war upon the female as well as the male, and this leads naturally to a diminution of the species, as the number of tusks shipped has increased rather than de¬ creased each year. The African elephant is now never used as a beast of burden, though in ancient Egypt he may have been so utilized. Elephants generally live in large herds, each herd led, and apparently governed, by a leader, usually the largest of the party. So marked a family resemblance exists between members of the same herd that, in India — where they are classed as ((high caste® and ((London 1873) ; Hornaday, W. T., Two Years in the Jungle) (New York 1885) ; Kipling, J. L., (Beast and Man in India) (London 1891) ; Lydekker, (The Game Animals of Africa) (ib. 1908) ; Neumann, (Elephant Hunting in East Equatorial Africa5 (ib. 1898); Sanderson, (ib. 1893) ; Selous, F. C., (A Hunter's Wanderings in Africa5 (ib. 1890).

ELEPHANT MOUND. See Mound Builders and Mounds.

ELEPHANT, Order of the, an ancient Danish order of chivalry. It is said to have been instituted about the end of the 12th cen¬ tury by Canute VI to perpetuate the memory of a Danish crusader who had killed an elephant in the Holy Land. It was renewed by Christian I in 1462, and placed on its present footing in 1693 by Christian V. It is the highest of the Danish orders. The number of members, not counting those of the royal family, is restricted to 30. Foreign sovereigns are exempted from these restrictions. The fete of the order is held on 1 January, when the knights meet in the chapel of the order in the castle of Fred¬ ericksburg, taking rank by seniority upon seats over which are suspended their arms and de¬ vices. The insignia of the order are an enameled white elephant, with a negro mahout, bearing on a blue housing, bordered with gold and crossed with white,

a sculptured tower. On state occasions the elephant is worn attached to a chain composed of elephants and castles of gold, with a letter D in gold to represent Dania (Denmark). The device of the order is Magni animi pretinm.

ELEPHANT-APPLE, a large and hand¬ some East-Indian tree (Feronia elephantum) . It belongs to the orange family, and produces a large gray-colored fruit with a very hard rind.

ELEPHANT BEETLE, one of the great cetonian beetles of the genus Megasoma of Central and South America; especially M. elephas. It reaches a length of three to four inches, and is black, delicately pitted. A related species (M . thersites) occurs in California.

ELEPHANT BUTTE DAM, the largest

of the government's irrigation projects, located in Sierra County, N. M., in the valley of the Rio Grande, 120 miles above the point where the river strikes the Mexican border. The lake formed by this dam is about 45 miles long and averages 1ˆ4 miles in width, submerging 40,000 acres and storing 2,642,292 acre-feet, or 862,200,000,000 gallons. The water is intended to irrigate 183,000 acres of very fertile land in the States of New Mexico and Texas and 25,000 acres in Mexico. The water stored is sufficient to irrigate all the crops wThich can be grown on this acreage for two years in case there should be no rainfall. The dam is of cyclopean con¬ crete. It was begun in 1910 and completed in May 1916. The crest is 1,310 feet long and is 305 feet above bed-rock at its lowest point, 100 feet below the bed of the river. At its base the dam is 215 feet thick and it tapers to 18 feet at the crest, which carries a permanent roadway. The masonry content of the structure is 608,000 cubic yards, making it the third largest dam in the world (see Dams). In addi¬ tion to the irrigation feature it is estimated that from 25,000 to 30,000 electric horse power can be delivered at El Paso, besides the many smaller powers which will be developed . when the high level canals are in operation.

ELEPHANT FISH (Callorhynchns antarc- ticus), a fish of the sub-class Chimceroidea or Holocephali (q.v.), found in southern seas, where it is the sole representative of its kind. The name alludes to the prominent projecting appendage of the snout. The young remain until an advanced stage of development within the remarkable seaweed-like horny egg-cases. The fish attains a considerable size and is some¬ times eaten in New Zealand.

ELEPHANT RIVER, a river of Cape Colony, running into the Atlantic after a course of 140 miles.

ELEPHANT SEAL, the largest of the

hair seals (Macrorhinus leoninus), usually over 20 feet long, with a circumference of 12 feet around the thickest part of the chest. The female is much smaller than the. male. In color this seaMs grayish; its body is covered with short hair, growing in patches, which gives a spotted look to the animal. The head is pro¬ portionately large, with prominent eyes and thick eyebrows ; the whiskers are long ; and the canine teeth are so large as to form heavy tusks. The nose of the males is prolonged into a proboscis about a foot long, which, seemingly useless, hangs loosely over the face. When this is dilated it gives a new character to the crea¬ ture's voice. This species has been almost ex¬ terminated, owing to the demand for. its oil, though less than a century ago it was plentiful in the southern hemisphere. The skin is not valued for its fur and the flesh is not edible.

ELEPHANT BEETLE

The herds migrate southward in summer and northward in winter to avoid the extremes of temperature. The northern elephant seal M. an-gustirostris, is also nearly extinct, being confined to the island of Guadaloupe, off Lower Califor¬ nia. Consult Moseley, (Notes by a Naturalist on the Challenger } (London 1879) ; Townsend, (The Northern Elephant SeaP (Zoologica , Vol. I, No. 8, New York 1912).

ELEPHANT-SHREW, the typical species Macroscelides, of the family Macroscelididce, belonging to the order of insect-eating mam¬ mals. The body, in general appearance and size, resembles that of the common rat. The popular name alludes to its peculiar, elongated nose, which looks like an elephant's trunk. The hind legs, which are long

and out of all pro¬ portion to the length of the fore legs, fit the animal for jumping, giving it the additional name of jumping-shrew. This insect-eater is confined to Africa. It moves by jumps, lives on the sandy plains, makes burrows in the sand and finds its prey among the grass and bushes.

ELEPHANTA, el-e-fan'ta, or ELE¬ PHANT ISLE, called by the natives Gharipur, a small island in the Bay of Bombay, seven miles northeast of Bombay. It consists of two long hills and an intervening valley. It is cele¬ brated for a cave temple 130 feet long, 123 broad and 18 high, supported by pillars cut out in the rock. Many of these were cut down by the Portuguese. There are 36 columns in six rows and in the centre is a gigantic trimurti or three-formed god — Brahma the creator in the middle, with Vishnu the preserver on one side and Siva the destroyer on the other. There are other pieces of sculpture and also several other rock-caves. The date of these constructions is not known. A large stone elephant, which once stood near the landing place, gave name to the island. Pop. of the island about 500.

ELEPHANTIASIS, properly speaking, a peculiar and rare disease, sporadic or endemic in warm climates, and characterized by a chronic thickening of the skin and the underlying tissues, usually limited to a definite area, and subsequent to an impairment of the lymphatic circulation. The disease is of great antiquity and exhibits a great variety of forms, by reason of which it has received a large number of names, medical as well as popular. The term is now applied by the best dermatologists to one disease, and not to several as heretofore. Elephantiasis ex¬ ists in an endemic form in Africa, India, the Indian Archipelago, the West Indies and South America. The extra-continental possessions of the United States bring this disease in their train. The endemic form of the disease com¬ mences rapidly. There is pain, heat, swelling and temperature. The lymphatics and blood¬ vessels soon become involved and the part affected seems to be attacked by erysipelas. In a few days the acute symptoms may subside. A recurrence of the attack leaves the arm, or leg, or scalp, or face, or genitals somewhat thicker, and repeated attacks may result in enormous deformities of the affected parts. In the most characteristic cases of the tropical countries the disease seems to be due to a blood parasite, the Filaria sanguinis hominis. This worm gets into the blood, at times through the agencies of mosquito bites, and blocks up the lymphatic channels. In other cases the disease is regarded

as a forni of chronic erysipelas. In a few in¬ stances it is congenital. The treatment will depend largely on the type of the disease. Rest in bed, elevation of the limb, quinine for the Filaria and prompt medical

attendance are the essentials. See Filariasis; Parasitism.

ELEPHANTINE, el-e-fan-ti'ne (Arabic, Djeziret-ez-Zaher, <(isle of flowers®), a small island in the Nile, opposite Assouan (Syene), remarkable for its ruins. The island is almost covered with ruins piled up on each other — Egyptian, Roman, Saracen and Arabic. At the beginning of the present century there were the remains of two temples in Elephantine, one a very interesting one built by Amunoph III. They were destroyed in 1822 by the governor of Assouan in order to obtain stone for build¬ ing a palace. The greater part of the Nilometer, mentioned by Strabo, which stood at the upper end of the island, was restored in the 19th cen¬ tury. The quay built of blocks taken mostly from older monuments is from Roman times. Many fragments of pottery with inscriptions in Greek have been found, some of these being receipts for taxes.

ELEPHANTINE PAPYRI. Elephantine is a small island in the Upper Nile and the most southern of the old Egyptian fortresses. In the ruins of a small city which was on the southern end of the island Aramaic papyri in considerable quantities have been found. These reveal the fact that soon after the destruction of Jerusalem by Nebuchadnezzar a colony of the Jews found their way to the southern frontier of Egypt. In them is mentioned the house of Yahu which is probably Jehovah. They cover the period extending from 471 b.c. to 411 b.c. and bring much light to bear on Jewish customs and worship of the times of this important document. One contains a peti¬ tion for the restoration of the house of Yahu which had been destroyed by Egyptian soldiers.

ELEPHANTS, Fossil. The present genus (or genera) of elephant had many now extinct representatives in the Pleistocene. Among these the best known is the hairy mammoth (q.v.) of Siberia and northern North America. The mammoth was smaller than the largest existing elephants, but a similar species, Elephas columbi, ranging over the entire United States, equalled the extant species in size. E. imperator from the Southwest stood even larger, being 13 feet high at the shoulder. Another Pleistocene elephant was Mastodon Americanus. This differed from the true elephants in its lower skull and breast¬ like molar teeth, of which several were in simultaneous use in each side of each jaw. The teeth were covered with enamel, but had no cement on the crowns. Straight traces of tusks remained in the lower jaw of the males. The Pliocene beds contain, besides several species of Mastodon, the genus Stegodon, with the molar teeth intermediate in> character between those of Elephas and of Mastodon. In the Miocene the interesting genus Gomphoterium or Tetra- beladon is found. The skull resembles that of Mastodon, but is much lower and flatter. The

mandibular symphysis is prolonged and bears the well-developed tusks. Upper and lower tusks alike are relatively short and banded with enamel. The molars have four cross-ridges in the later forms, three in the earlier ones. The height at the shoulder is less than six feet.

The body and limbs have their present structure. The next earlier form in the line of ascent was Palceomastodon from the lower Oligocene and upper Eocene of Egypt. The dentition was

i – , cˆr, pˆr, m Both lower and upper tusks

1 v Z O

were very short and banded with enamel. All the grinders were in use together. There was probably a snout more or less like that of a pig instead of a well-developed trunk. The lower jaw was longer than the upper. The occipital bones extended nearly to the top of the parietals. There was a third trochanter on the femur. The size varied between that of a small elephant and that of a tapir. There is a considerable gap between Palceomastodon and any known ancestral form, but it appears that Moeritherium of the middle Eocene of Egypt is not very far removed from its line of descent. Moeritherium has the dental formula

.31 3 3

1 1- co' p ym 3′

Both first and third upper

incisors and the canines are very poorly de¬ veloped; the second upper and lower incisors form short tusks. The molars are quadrituber- cular. The skull is quite unlike that of Palaeo- mastodon and is long and narrow, with enor¬ mous cheek bones. The cranial capacity is relatively large. There appears to have been only a very slight trace of a trunk. The body was essentially like that of the elephants, though less specialized. An aberrant offshoot of the proboscidean stock is characterized by the pos¬ session of tusks in the lower jaw only. This offshoot, containing the genus Dinotherium, is quite like typical elephants in its body and limbs. The tusks point downward and are curved to the rear. The molars resemble those of

the tapirs. The skull is low and flat and probably bore a trunk. (See Mammoth; Mastodon). Consult Andrews, C. W., Catalogue of Ter¬ tiary Vertebrata of the Fayum, Egypt* ; Scott, W. B., (A History of Land Mammals in the Western Hemisphere) (New York 1913).

ELEPHANT'S-EAR, a name frequently given to plants of the genus Begonia (q.v.). It is applied more frequently to a plant bearing the name Caladium esculentum.

ELEPHANT'S-FOOT, or HOTTEN- TOT'S-BREAD (Testudinaria elephantipes) , a plant of the yam family (Dioscorcacece) , of which the rootstock forms a large fleshy mass, curiously truncate, or somewhat resembling an elephant's foot, and covered with a soft, corky, rough and cracked bark, recalling the shell of a tortoise, whence its generic name. From this springs annually a climbing stem, which bears the leaves and flowers, the latter being small and yellow. The starchy rootstock is used as food by the Hottentots. The plant is not in¬ frequent in hothouses. The American plants known as elephant's-foot belong to the genus Elephantopus of the Asteracece. The genus comprises 16 species, natives of tropical or warm regions. Four are found in the United States, mostly to the south of Delaware. The best known is the Carolina elephant's-foot (E . carolinianus) . This is an erect hairy herb, with thin oval leaves and bracted heads of blue or purple flowers in branching corymbs. It grows as far north as southern New Jersey and

west to Kansas, and is abundant in all the region to the south. Another species is known in the Southern States as tobacco-weed and devil's grandmother.

ELEUSINE, el- u-sl'ne, a genus of grasses comprising six species, all natives of the Old World. The genus is represented in America by E. indica, the crab-grass or yard-grass, which is found in waste places all over North America except in the extreme north, natural¬ ized from Asia. In its native places it is an im¬ portant article of commerce. E. corocana, called in the west of India natchnee, nagla, ragie and mand, forms a principal article of diet among the hill people of the western Ghauts in India. It is cultivated also in Japan. E. stricta is also used for food.

ELEUSINIAN MYSTERIES, festivals held annually at Eleusis, a town of Attica, in honor of the goddess Demeter, or Ceres, the patroness of agriculture and procreative power of nature. According to the Homeric hymn to Demeter, the festival was established by the goddess to commemorate the hospitality of King Celeus of Eleusis, who

received her as a wayfarer. The usual opinion is that they were begun by Eumolpus, the first heirophant, 1356 b.c. Great secrecy was observed in the cele¬ bration of the festivals, consisting of the greater and lesser mysteries. The greater mys¬ teries were celebrated toward the end of Sep¬ tember and the first of October, lasting nine days. The lesser mysteries took place at Agrae on the Ilissus during springtime. It was a capital offense to reveal any of the rites. They existed about 18 centuries and ceased during the invasion of Alaric, in 396. Consult Pater, Walter, (Greek Studies; Demeter and Proser¬ pina* ; Cooper, Jacob, (The Eleusinian Mys¬ teries.) See Mysteries.

ELEUSIS, e-lu'sis, a ruined village of At¬ tica, but in ancient times a city of Greece, 12 miles from Athens. It was celebrated as the chief seat of worship of Ceres (Greek Demeter), whose temple here was the largest sacred edifice in Greece. The Greek govern¬ ment began here an elaborate system of excava¬ tions in the year 1882, with the result that many remarkable ruins have been discovered. Even the site of the ancient temples is a matter of debate, so completely have they vanished. There are not wanting, however, ancient remains, which include two propylaea, a sacred well, an ancient council hall and small temples. The great hall of initiation was a modest structure until after the Persian War when it was greatly enlarged, first by cutting into the rock at the back, and later by constructing another hall alongside the first. A great portico was added by Philon in the 4th century b.c., making a common front to both, and during the Roman occupation the interior was made into one great hall 178 feet by 170, with seven rows of columns. A little Albanian village, poor and mean looking, called Leusina, stands on the site of what was once powerful Eleusis. Consult Diehl, Excursions in Greece) ; Philios, Eleusis, ses mysteres, ses mines, et son musee* (Athens 1896) ; Frazer, Eausanias) (2d ed., 1913). For a plan of the excavations, consult Baedeker's (Handbook to Greece> (4th English ed., Leipzig 1909).

ELEUTHERA, e-lu'the-ra, British West Indies, one of the largest of the Bahama Islands, lying east of Nassau, near New Provi¬ dence, the second most populous island of the group. It is, like most of the islands of the group, long and narrow, its length being about 70 miles, area 164 square miles. It exceeds the neighboring isles in fertility, and produces more oranges, onions and pineapples than any. Its chief town is Governor's Harbor with a fort and good harbor. Pop. 6,533.

ELEUTHERIA, el-u-the'ri-a (Gr. D,ev6epiat freedom), among the ancient Greeks a festival commemorative of deliverance from the armies of Xerxes. It was instituted after the battle of Platsea (479 b.c.) and celebrated annually at that place in the month Maimacterion, nearly corresponding to our September. At the dawn of day a procession marched through the town, at the head of which trumpeters blew the sig¬ nal for battle. At midday a chariot was driven toward the altar crowned with myrtle and va¬ rious garlands and leading behind it a black bull. In front of the altar the archon of Plataea immolated the bull to Jupiter and Mer¬ cury, eulogized the heroes who had fallen at Plataea and sprinkled the ground with wine. Every fifth year these solemnities were attended by contests, chaplets being the reward of the victors. See Greek Festivals.

ELEVATED RAILWAYS. See Rail¬ ways, Elevated.

ELEVATION, in the liturgy of the Roman Catholic Church, the act of lifting up by the celebrating priest and presenting to the sight of the faithful the Host and the Chalice imme¬ diately after the consecration; this is the eleva¬ tion by eminence. There is both in the Latin and in the Greek Church liturgies another ele¬ vation shortly before the communion. Prior to the promulgation and condemnation of the teaching of Berengarius in the llth century the elevation after consecration appears to have had no place in the Latin liturgy; but from the beginning of the 12th century, when this cus¬ tom was introduced, it spread rapidly and be¬ came universal and obligatory. . It was the Church's way of confessing her faith in the truth of transubstantiation, attacked by Berengarius. In the Latin Church in the 12th century began and in the next century became universal the custom of ringing a small bell at the moment of the elevation, as is the present usage. But the ringing of the great bells in the church steeples and towers at the elevation which was pretty general in the 13th century is now not common.

ELEVATION, in astronomy and geography, means generally the height above the horizon of an object on the sphere, measured by the arc of a vertical circle through it and the zenith. Thus, the elevation of the equator is the arc of a meridian intercepted between the equator and the horizon of the place. The elevation of the pole is the complement of that of the equator and is always equal to the latitude of the place. The elevation of a star or any other point is similarly its height above the horizon,, and is a maximum when the star is on the meridian. . In architecture the term is applied to a geometrical delineation of the front or any face of a build¬ ing in which all the parts are drawn according to the scale and not shown as they would

appear in perspective. It is one of the three designs necessary in outlining any work of architecture, the other two being the plan and the section.

ELEVATORS. The modern elevator is a direct evolution from the machine which Elisha G. Otis exhibited in 1853 at the World's Fair in the Crystal Palace, New York. Hoists of various kinds had been built before that time, but this was the first . elevator wherein provision was made for stopping the fall of the car in the contingency of the breaking of the hoisting cables. During the next five years a number of machines were built similar to that exhibited, all being driven from line shafting. In 1859 the same inventor introduced an inde¬ pendent reversible steam-engine directly con¬ nected to the hoisting machinery, and from that date the era of the elevator as a separate insti¬ tution of the age began. In 1871 the hydraulic elevator was introduced, soon to attain pre¬ dominance in the elevator art and displacing the steam-engine. The year 1888 witnessed the first application of the electric motor to elevator ma¬ chines, destined in turn to eclipse the hydraulic elevator. The first type of electric elevator ma¬ chine, still in use to-day for low and moderately high buildings, consisted of an electric motor actuating a hoisting drum through the inter¬ mediary of worm gearing. Although this ma¬ chine has been developed to operate satisfactor¬ ily at comparatively high speed, it could not satisfy the requirements imposed on the ele¬ vator art with the advent of the skyscraper. Thus in 1903 a new type of electric elevator machine was developed, known as the 1 :1 gear¬ less traction machine, ' which has since com¬ pletely ousted the hydraulic machine from the field of high-rise, high-speed elevators. Another development in the electric elevator art is the so-called microdrive machine, first introduced in 1915. This machine is capable of accurately and automatically stopping an elevator platform level with the landing under any condition of loading. It is extensively used in all cases where heavy loads have to be wheeled on or off the elevator platform on trucks..

It is quite evident that the high state of de¬ velopment of the electric elevator to-day could not have been accomplished without improve¬ ments in the design of electric motors and con¬ trolling devices. At the time of the introduc¬ tion of the electric elevator in 1888 the design of the direct-current motor was already well advanced, while alternating-current motors were yet in their infancy. In the next decade the energy of designers was mostly bent upon the further development of the application of direct current, resulting in 1897 in

the introduc¬ tion of the direct-current magnet controller. With this invention the direct-current electric elevator at once entered the field of high-speed elevator service and became a dangerous com¬ petitor of the hydraulic elevator.

The electric power systems at that time were mostly direct current, but began gradually to make place for the more economic two- or three- phase alternating-current systems. Along there¬ with polyphase induction motors had been in¬ troduced and began to be applied to elevators. The first attempts were not very promising. It would seem for a time that the polyphase alter¬ nating-current elevator never would be suitable

for high speed, owing to the fact that the motor operated only at a fixed single speed and to the inability to design suitable alternating-current magnets. To-day all of these difficulties have been overcome ; polyphase induction motors are now easily built for two or more speeds as well as alternating-current magnets of sufficient power to operate controller and brake. In fact, the number of alternating-current installations to-day equals the number of direct-current in¬ stallations and is doubtlessly destined to exceed the latter in the near future. Safety appli¬ ances were developed hand in hand with the development of the various types of machines. Grips to arrest and stop a falling cage were first designed to operate upon the breaking of the hoisting rope only. These soon proved to be inadequate, since they remained inactive in runaway accidents from various causes not due to the parting of the ropes. This defect was removed with the introduction of centrifugal governors, which actuate the safety grips when the car speed exceeds a predetermined maxi¬ mum. In 1890 steel began to be used for guide rails, which previously to that date consisted exclusively of wood. This brought about a new type of safeties. Other demands came with the increase in elevator speeds, necessitating the design of safety grips capable of arresting a falling car without shock or injury to the passengers. Other safety appliances gradually developed but which have now become part of the standard equipment are : automatic stop at the terminals of the travel ; slack cable devices to prevent further motion of the machine in case the car is obstructed in its descent; door locks to prevent the starting of the cage as long as the door is open, and to prevent the opening of door unless the car is at rest at the landing.

According to the foregoing there are, there¬ fore, four general classes of elevators — belt, steam, hydraulic and electric.

Belt-driven Elevators. — This class of ele¬ vator, Fig. 1, is usually installed for slow-speed freight service in factories, is reliable and vet low in cost. The speed seldom exceeds 75 feet per minute. The machine is usually bolted to the ceiling of one of the floors. The middle one of the three flat-faced pulleys shown in the illustration is tight on the shaft and is adapted to actuate the hoisting drum through the intermediary of a worm-and-worm gear. The two outer pulleys are loose on the shaft and are belted, one by straight belt and the other by crossed belt to a line shaft pulley. To operate the elevator in the one or other direc¬ tion the straight or crossed belt is shifted onto the tight middle pulley. The machines are pro¬ vided with brake, slack cable device and auto¬ matic stop at terminal landings.

Steam Elevators. — Steam machines for elevator service may be dismissed with the ref¬ erence that they are no longer in use. This has been due to the very large consumption of power with no compensation for the disad¬ vantage in the matter of ease of control.

Hydraulic Elevators. — The hydraulic ele¬ vator installed in large numbers up to about the year 1900 is the so-called vertical hydraulic type (Fig. 2). In this type a cylinder of a diameter of 8 to 24 inches is placed in a vertical position in the elevator shaft or in any other

convenient location. Within this cylinder works a piston. The pull exerted thereon by the water pressure is transmitted through the piston rods to a number of sheaves, which in turn operate on the hoisting ropes. The sheaves introduce a gear ratio varying from 2:1 to 12:1 between the car and piston travel. The ele¬ vator is controlled by a lever placed in the car, which actuates the operating valve. For the ascent, the valve admits water to act on the piston, at the same time discharging the water underneath. The descent of the car occurs by

Fig. 2. — -Standard Hydraulic Elevator Vertical Cylinder Geared Type Lever Control.

reason of its unbalanced weight, the water above the piston being allowed to flow through a circulating pipe to the space underneath. About the year 1900 the plunger type of hy¬ draulic elevator (Fig.. 3), (before that date applied only to low rises) began to be intro¬ duced for high speed passenger service. In this type a cylinder of a length equal to the car travel is set vertically in the ground. In this cylinder works a piston or plunger of the same length, carrying the car on its

top. The weight of car and plunger is partially counter-

ELEVATORS

1 Double Belt Ceiling-type Machine

4 Hydraulic Pilot Valve

5 Automatic Cut-off Valve for limited car travel, at top and bottom of hatchway

6 Direct Current Single Screw Electric Elevator Machine

7 Direct Current 1:1 Gearless Traction Elevator Machine Overhead Type

8 Electric Micro Drive Drum Machine

ELEVATORS

10 Steel Freight Platform with Double Grip Safety

14 Speed Governor

11 Steel-roller Safety Aopliance for Low Car Speed

15 Steel Car Frame Fitted with Wedge Clamp Safety

12 Steel Platform with Roll Safety

ELEVATORS

227

balanced by a weight attached to the car frame. Although this type of elevator had a larger power consumption and was more difficult to control than the vertical geared elevator, it succeeded in driving the latter from the field. This was due to the popular belief in the greater safety of the plunger elevator, since the load to all outward appearance was sup¬ ported on a steel column and not suspended from ropes as in other types. As a matter of fact the plunger consisted of ordinary com¬ mercial tubing, finished to size and screwed together. That columns of this nature and of lengths up to about 300 feet could carry loads without buckling was due to the counterbal¬ ance, which for high rises exceeds the weight of live load and car. In reality therefore part of the plunger was in tension, and the load, in¬ stead of being supported on a steel column, was again suspended from

ropes overhead. As the plunger rose out of the cylinder, its buoyancy decreased.

To compensate, there¬ fore, the weight of the counterweight ropes per foot is made equal to half of the weight of water dis¬ placed by one foot of plunger. In a high rise plunger elevator the masses to be set in motion and stop¬ ped are quite consid¬ erable. For a rise of 200 feet, for example, the plunger may weigh 4,000 pounds, the car 4,000 pounds, the ropes 2,000 pounds, counter¬ weight, 4,000 pounds, live load, 2,500 pounds. For this reason, the control, of the elevator at high speeds became diffi¬ cult, notwithstanding the allowance of a liberal amount of un¬ derbalance and sur¬ plus pressure. The control of the elevator is effected by means of a lever actuating an oper¬ ating valve (Fig. 4), which at the will of the operator permits water to flow into the cylinder for the ascent, or out of the cylinder for the descent. In addition, two automatic top valves (Fig. 5) are furnished, automatically to stop the elevator at the limits of its travel. Another type of hydraulic elevator machines, which may be dismissed with simple reference, is the horizontal hydraulic machine. It consists of a cylinder set horizontally. As in the vertical geared machine, the piston oper¬ ates a number of multiplying sheaves. This type is distinguished as of the pushing or pulling type depending on whether the piston rod is in compression or tension. The desired water pressure is generally obtained by steam or electrically driven pumps. On low pres¬ sure systems of about 150 pounds per square inch, the pumps deliver the water into a pres¬ sure tank, which absorbs the pump pulsations

.

■ ‘ A ,

, ..

r- t ■ * ~ ip?

■ •.

urr? ■

. V”

‘

_ :•

Fig. 3. — Plunger passenger elevator lever control.

and serves as a storage of power. In high pressure systems, generally of about 800 pounds per square inch, the pumps deliver the water into a weighted accumulator. The water dis¬ charged by the machines is collected in a dis¬ charge tank from which again the pumps are supplied.

In addition to the types of hydraulic ele¬ vators mentioned above, there are the so-called aero-hydraulic and hydro-steam elevators. The elevator proper may be of any one of the hydraulic types already described, but they differ in respect to the manner in which the hydraulic pressure is obtained. In the aero- hydraulic machine a tank partly filled with water is connected to a supply of air pressure. The elevator ascends by simultaneously admit¬ ting air into the tank and water into the cylinder. For the descent, the air is dis¬ charged, while the machine returns the water to the tank. In the hydro-steam elevator, steam is employed in place of air. All hy¬ draulic elevators absorb the same amount of power in each cycle of their operation, inde¬ pendently of the live load in the cage. The power consumption for this reason, notwith¬ standing an excellent mechanical efficiency, is quite large. In addition, the speed of the hy¬ draulic elevators varies largely with the load in the car.

Electric Elevators. — These excel the hy¬ draulic elevator by reason of a speed practi¬ cally independent of the load and by a lower power consumption. They may generally be classed as having machines with winding drums or machines with traction sheaves. Further, distinction is made in respect to the type of gearing employed, into worm gear, worm and spur gear, herring-bone gear, gearless or 1:1 and 2:1 gearless machines.

Fig. 6 shows a typical worm gear machine with winding drum. The motor in the illus¬ tration is of the direct current type, but may be alternating of single or polyphase. The brake is placed between motor and gear hous¬ ing and is of the shoe type with springs to hold the shoes in frictional contact with the brake pulley. The brake is released only upon the admittance of current to the brake magnet and is applied immediately upon the interrup¬ tion of the current supply thereto. The hoist¬ ing cables lead from the cage to the face of the drum, where they are solidly anchored. At the opposite side of the drum a counterweight is attached, adapted to counterbalance the cage and live load. Frequently also a second coun¬ terweight is employed, suspended directly from the cage. The weight of the counterweight where one is used, or their aggregate weight where two are used, is made to exceed the weight of the cage by an amount of from 30 to 50 per cent of the maximum load. On ac¬ count of this arrangement a

relatively small motor can be employed since it will be subject only to from 70 to 50 per cent of the maximum load when lifting the same. When lowering the empty cage the load on the motor corre¬ sponds to from 30 to 50 per cent of the maxi¬ mum load. The worm runs partially sub¬ merged in oil (preferably castor oil) and owing to the excellent lubrication the efficiency of worm gearing is higher than usually antici¬ pated. The roping employed in a traction ele¬ vator installation is shown diagrammatically in

Fig. 7 and will also be evident from Fig. 8. The machine is usually and preferably located overhead. The ropes pass from the car to the traction sheave, thence to an idler or second¬ ary sheave and again over the traction sheave to the counterweight. The tension due to the weights of car and counterweight and the approximately two half wraps of contact be¬ tween the ropes -and traction sheave furnish the necessary adhesion to transmit motion from the traction sheave to the elevator without slip. This adhesion is instantly destroyed if either car or counterweight is obstructed in its de¬ scent, in which case motion of the elevator must cease even though the machine keeps on revolving. This property is a most valuable safety feature of the machine with traction sheave. By arranging the car to land on an oil buffer at the lower landing and by simi¬ larly obstructing the further descent of the counterweight when the car is at the upper landing, the car travel is absolutely fixed be¬ tween two limits. Another advantage of the traction machine lies in the fact that the width of the traction sheave is independent of the height of the building. For a given capacity therefore, a standard machine can be provided, irrespective of the elevator travel. In the 1:1 traction machine (Fig. 7) the traction sheave is mounted directly on the motor shaft. As the illustration shows, the construction of the machine is simplicity itself. It consists of an armature with extended shaft, carrying a brake pulley and a traction sheave, all sup¬ ported on two bearings. At full speed the motor runs at about only 60 revolutions per minute. Reductions in speed are obtained by means of field control and by manipulation of resistance in series and parallel with the arma¬ ture. Contrary to popular belief motors for such low speeds can be made with as high efficiency as high speed motors, although, of course, the motor frame assumes considerable dimensions. Owing further to the absence of gears, the 1 :1 traction machine has the highest efficiency of any elevator machine yet designed. Wherever it has replaced existing hydraulic elevators, the saving in power consumption has paid for the

new installation within a few years. The microdrive machine shown in Fig. 8 de¬ rives its name from the fine adjustments in the stopping, which can be made with this machine in a manner not unlike the action of a microm¬ eter.

To obtain accurate stops level with the land¬ ing it is necessary to slow down the cage to an extremely slow speed. In the microdrive ma¬ chine this is obtained by having a main machine (which may be of any desired type) for ordi¬ nary hoisting purposes and an auxiliary ma¬ chine for the stop. The main and auxiliary machines may be coupled together by a mag¬ netically operated clutch carried on an exten¬ sion of the main motor shaft. At the start, the coupling is released leaving the main ma¬ chine free to hoist the load. Shortly before the stop the current supply to the main motor is interrupted while simultaneously the auxili¬ ary motor is started up and the coupling ap¬ plied. The effect of this operation is that the load is now transferred to the auxiliary ma¬ chine, which drives the drum through its own and the main gear reduction. The cage there¬ fore proceeds to the landing at extremely slow

speed controlled by an automatic leveling de¬ vice. The function of this device is not only to stop the cage flush at the landing, but to maintain the alignment between cage and land¬ ing during loading and unloading. If for example a heavy loaded truck is rolled onto the car, the stretch of the hoisting ropes will cause the platform to sink below the landing as soon as the front wheels of the truck rest on the car floor. This will cause the auxiliary motor immediately to restore the alignment be¬ tween car and landing before the rear wheels pass onto the platform. The controlling device most in use with electric elevators consists of a lever in the car operating a number of con¬ tacts. These in turn energize magnets as¬ sembled on a controller panel near the machine. The operator controls only the direction in which the car is to travel, the fast and the slow speed. Operations such as releasing the brake and stepping out the starting resistance occur automatically. In push button controlled ele¬ vators, each landing is provided with a button to call the elevator to that landing. The cage is provided with a series of buttons to dis¬ patch the cage to any desired floor. A passen¬ ger desiring to use the elevator presses the button placed near the elevator shaft, and the car, if not in use, immediately travels to that floor and stops automatically. When the car has come to rest, the door can be opened. The passenger enters, closes the door and presses a button corresponding to the floor to which he wishes to travel and the car at once proceeds thereto. It will be seen that the push button elevator is entirely automatic in its operation, having the advantage of not requiring an at¬ tendant.

Although this type of control was de¬ veloped many years ago, it has in the past found application only to slow speed residence and apartment-house elevators for the lack of a machine capable of making accurate stops level with the landing. With the advent of the microdrive machine, however, this type of control is receiving increased attention and It is safe to predict that it is destined to come into general use.

Safety Appliances.— While the factor of safety in the standard make of elevators is such that accidents rarely occur and practically never where proper attention is paid to the machinery, still all elevators (except plunger elevators) are equipped with safety grips. Of the very large variety of safeties, only those types which have found extensive application will here be described. With wood guides the type of safety generally used consists of an arrangement of planer teeth forced into the guides and pro¬ ducing resistance by planing or grooving the wood as the car descends. Figs. 9 and 10 show one form of this type of safety. With steel guide rails the types in use are the roll, wedge clamp and the flexible guide clamp safeties. The roll safety — shown on Figs. 11 and 12 — emplovsa corrugated steel roller, adapted to be forced into the apex of an angle, formed by the guide rail and the inclined surface of the safety block. The angle usually is small so as to make the roller self-locking. This in turn causes an abrupt stop, so that the safety can be used only for low car speeds. In the wedge clamp safety, the rails are gripped between the

jaws of two clamps. As shown in Fig. 13 the safety is actuated by a drum having a hub pro¬ vided with right and left hand screw threads which engage with two screws. Rotation of the drum in the proper direction moves the screws outwardly, forcing the wedges at the ends of the screws between the rollers of the clamp levers and causing the jaws to grip the rails. The drum is provided with a few wraps of rope, one end of which is fastened to the drum and the other to the governor rope.

Let us now imagine a falling car, equipped with a wedge clamp safety as here described, and analyze what will happen. Let us further assume that the normal speed of the car is 600 feet per minute. The governor (Fig. 14) — so as not to interfere with moderate speed varia¬ tions from natural causes — will be set to trip at 800 feet per minute ; that is to say, as soon as the speed of the car reaches 800 feet

per minute, the governor jaws will grip the gov¬ ernor rope, causing the latter to come to rest quickly. As a consequence, the rope on the safety drum, having one end fastened to the governor rope, will unwind while the car keeps on falling. This will cause the safety drum to rotate, actuating the safety mechanism. Before, however, the jaws grip the rail, all of the clear¬ ances must have been taken up. During this

celeration of the governor rope. It will there¬ fore be seen that there is, at high speed, a considerable increment in the retarding force exerted by the clamps, resulting in undesirably heavy retardations. Another disadvantage is due to the fact that the safety must be made self-locking so that it will not release its grip on the rails, should the governor rope break. If, therefore, during the slide of the jaws on the rails, variations in the thickness of the rails occur, the jaws can yield only by virtue of their elasticity. That this will cause enormous varia¬ tions in the retarding force in the one or the other clamp is plain and it is therefore no surprise that the platform frequently comes to a stop altogether out of level. These dis¬ advantages have led to the development of the flexible guide clamp safety, first introduced in 1916 and now rapidly superseding the type de¬ scribed above. Each of its clamps has two jaws, one solid and the other provided with a wedge having its face slightly inclined toward the guide rail. Both jaws are pivoted and are adapted to compress a spring held between the clamp levers. The spring is normally free from compression. A roller is adapted to be brought in contact with the inclined face of the wedge on one side and the guide rail on the other. The inclination of the former is such that once

Fig. 13. — Wedge damp safety.

time the car falls another 4 or 5 feet, equiva¬ lent to an increase in speed of approximately 1,000 feet per minute. At the time that the application of the safety begins, the car speed therefore has assumed very considerable over¬ speed, amounting in the present example to 1,800 feet per minute. This is decidedly a dis¬ advantage. The jaws now grip the rail and, as a consequence, the rotation of the safety drum stops. The governor rope, previously at rest, is therefore suddenly accelerated to the car speed of 1,800 feet per minute and begins to slip through the governor jaws. The force then exerted on the periphery of the safety drum, which is a direct measure for the retarding force exerted by the clamp, is the sum of fric¬ tion caused by the grip of the governor on the governor rope and of the force necessary to suddenly accelerate the same to car speed. Now it will be clear, that in the present example the safety should be designed to

stop the car at any speed above 800 feet per minute. At a speed of 800 feet per minute, however, the effect of the sudden acceleration of the gov¬ ernor rope is small and most of the work is done by the friction caused by the grip ˆof the governor on the governor rope. If, however, the car actually falls, action of the safety be¬ gins at a speed of 1,800 feet per minute with a very considerable effect of the sudden ac-

ihis contact is established, the roller continues to climb upwards until its motion is arrested. In doing so, it first forces the solid jaw to engage with the rail, after which it will cause the wedge — and therewith the jaw containing the wedge — to recede from the rail. The lat¬ ter jaw thereby swings around its pivot and compresses the spring. The rail, therefore, will be gripped between the solid jaw on one side and the roller on the other side with a force corresponding to the spring compression. Since the travel of the roller is limited, the maximum amount of spring compression is also fixed and, with that, the retarding force which the clamps exercise can be arranged to be just sufficient for a smooth stop from any speed. It will be seen that the operation of the safety begins immediately from the moment that the roller makes contact with the wedge and rail. The time lag between the operation of the actuating mechanism and the gripping of the rails, exist¬ ing with the wedge clamp safety, is here prac¬ tically eliminated ; indeed, the flexible guide clamp safety responds immediately to any de¬ mand for its operation.

Another advantage of this type of safety lies in the fact that it is practically not affected by slight changes in the thickness of the rail. This is, of course,, due to the very flexible arrangement of the jaws. A slight increase in

the thickness of the rail will merely result in a somewhat higher spring compression without, much increase in the retarding force of the clamps. The operation of a safety by means of a speed governor always has the disad¬ vantage that no action occurs, except at a certain overspeed. If, for example, the hoist ropes break while the car is at rest, it is rather contrary to common sense to permit the car to fall and gather speed before the safety is applied. For this reason, the flexible guide clamp safety is arranged to be actuated in three different manners, viz., first, in the ordinary way by means of a speed governor; secondly, immediately upon the breaking of the ropes and thirdly, at the will of the operator.

Air Cushions. — An air cushion is the en¬ closure of the bottom part of the shaft to a height of from one-sixth to one-third of the car travel with just sufficient clearance for the

Fig. 16. — Oil buffer with spring return.

normal operation of the elevator. At high speed, therefore, the action is that of a piston within a cylinder. It is intended as an addi¬ tional safeguard in case all other safety de¬ vices fail. The speed of a falling car within the air cushion is controlled in various manners, all tending to decrease the area through which air is permitted to escape, as the car nears the bottom of the shaft.

One of the advantages claimed for the air cushion is that it has no moving parts, so that no disarrangement can occur to prevent its operation. This claim, however, is not justified since, of course, there must be a number of doors within the air cushion zone for the in¬ gress and egress of passengers. One of these left open or blown open by the air pressure may be sufficient to put the entire air cushion out of commission.

The main defect, however, is that a car at the top of the shaft is permitted to fall free for a distance of from five-sixths to two-thirds

of the height of the shaft before entering the cushion. As a consequence, the speed of the car at the entrance of the cushion is enormous and large retardations — dangerous to life and limb — have to be allowed to bring the car to rest within a comparatively small distance. By actual tests, velocities at the entrance of the air cushion as high as 10,000 feet per minute have been measured. Retardations observed have been as much as 10 times gravity, sub¬ jecting a person standing in the car to 11 times his weight. Air pressures have been measured as high as 16 pounds per square inch from which it will be evident that a heavy construc¬ tion of the cushion and doors is required.

Oil Buffers. — With particular reference to high speed electric elevators, it is highly im¬ probable, but yet conceivable, that all of the switches, which constitute the automatic stop¬ ping device at the terminal landings, fail. Un¬ der such conditions, the car will proceed at normal speed and since — in the absence of overspeed — the safety remains inactive, there is no agent to prevent the cage from striking the limits of its travel. Accidents of this kind are made impossible by the installation of oil buffers. One or more of them are placed in the pit and are struck by the cage as it over¬ runs the bottom landing.

Another buffer is usually attached to the counterweight and comes into operation when the cage overruns the top landing. The construction of an oil buffer is shown in Fig. 16. It consists of an outside casing with a cylinder within and a piston operating in the cylinder. Casing and cylinder are filled with oil. When the car strikes the buffer and the piston descends, oil is forced out of the cylinder through holes, so arranged in number and position that the resist¬ ance offered by the fluid is just sufficient to bring the car to an easy stop within the stroke oi the buffer. The piston is returned to the upper position by a spring. Consult Baxter, ‘ William, (Hydraulic Elevators > ; Hymans, F., (Elevators in the Oliver Building) (in Electric Journal 1911) ; Bethman, H., (Der Aufzugbau* ; Ernst, Adolf, (Die Hebezeuge) ; Lindquist, D., (Modern Electric Elevators and Elevator Prob¬ lems } (in Transactions of the American Society of Mechanical Engineers, Vol. XXXVII) ; id., (The Micro-drive Machine) (1917).

David Lindquist,

Engineering Department, Otis Elevator Com¬ pany.

ELEVENTH CENTURY, The. The 10th century is commonly said to have been an es¬ pecially backward period in human achieve¬ ment, due to the belief then prevalent that the world was coming to an end in the year 1000. This superstition is supposed to have placed an inhibition upon human effort which kept men from serious work. An interesting commentary on this generally*$accepted impression is to be found in the fact that the two men in the world’s most prominent positions of the time, that is as emperor and Pope, who lived over from the 10th to the 11th century, are distin¬ guished in history for their intellectual abilities while their lives are striking examples of the deep mental interests of the time. The Pope was Sylvester II (999-1003) who before he became Pope was known as the famous Ger- bert, the most distinguished scholar of the

period. Gerbert wrote a series of works on philosophical, mathematical and physical sub¬ jects which have been preserved and which serve to illustrate the breadth of intellectual interest of the men of his time. He was no merely academic scholar but a man of very practical ability, for he is said to have intro¬ duced the use of Arabic figures into western Europe and to have invented the pendulum clock.

A great improvement in the organ is also attributed to him and he is said to have notably influenced the development of music. As Pope, he is known for his determined in¬ sistence on the elevation only of men of un¬ blemished character to the episcopal office and his consistent reformation of abuses. He main¬ tained Church discipline firmly, especially in matters of the moral law, even where it con¬ cerned kings and was undoubtedly a man of saintly character. In spite of this, popular legend gradually attributed to him the powers of a magician in league with the devil and after some generations his name became a byword. The incident is illuminating because it demon¬ strates how little the Church was able to pre¬ vent such perversions on the part of the people of the real significance of scientific knowledge and original discovery.

The emperor of the transition to the second millennium was Otto III, an orphan brought up by his grandmother Adelheid, assisted by a civil and ecclesiastical council who assumed the government and made every effort to give the boy, who was destined to be the ruler of the larger part of Europe, a fitting education. Nothing shows so clearly how much they valued education, nor how well founded were the ideas with regard to it at this time, than the details of Otto's training as they have come to us. The council thought first about his body, and his physical training was entrusted to Count Hoiko of Saxony. His mental education was begun under Berwand, late bishop of Hildes-heim, known both as litterateur and artist, and famous for his interest in schools of the arts and crafts. To him the Bernward Cross and other beautiful objects of high artistry are due. Later Otto's education was entrusted to the famous Gerbert, deservedly considered the greatest scholar of the period. Special pro¬ vision was made for the teaching of Greek to the young prince, and John of Calabria, where Greek was still a spoken language, was chosen for this purpose. These measures were so suc¬ cessful that Otto III as a young man received the title of (

Young Otto as he approached the age of 20 had high aspirations and dreams of restoring the ancient glories of Rome so as to make it the capital of his empire and to surround it

with the magnificent circumstance of the Byzantine court. Personally, however, he exhibited a humility in striking contrast to his position as a monarch and his talent as a scholar. He proclaimed himself the (

Unfortunately neither of these men was destined to live long to influence the new millen¬ nium. The young Emperor Otto died 23 Jan. 1002, and Gerbert followed him to the grave on 12 May 1003. (III is in one respect more memor¬ able than any who went before or

came after him. None save he desired to make the seven- hilled city again the seat of dominion, reduc¬ ing Germany and Lombardy and Greece to their rightful place of subject provinces. No one else forgot the present to live in the light of the ancient order; no other soul was so possessed by that fervid mysticism and that rev¬ erence for the glory of the past whereon rested the idea of the mediaeval empire.® (Bryce, (The Holy Roman Empire*)- Thus opened the second millennum.

Otto III was the last of the Ottos, and as he died unmarried three claimants to the throne brought confusion and warfare to the world of the time and opened a century that was to be full of war. Henry II the Saint who succeeded was the last of the Saxon emperors. His reign is a bright spot in the century and after him the crown passed to the Franks in the person of Conrad II who reigned for some 15 years and then was buried in the cathedral of Spires which he had founded. After him came Henry III and then Henry IV who succeeded to the empire at the early age of six years and is known in history for his recurring quarrels with Pope Gregory VII.

It is not surprising to find that a century which opened thus auspiciously for the in¬ tellectual life in its greatest representatives should have witnessed the development of what is practically the first university of modern times, that of Salerno. It was founded around a medical school largely under the influence of the Benedictines whose mother house of Monte Cassino was not far away. The greatest teacher of this century was Constantine Africanus who afterward became a Benedictine, withdrawing to Monte Cassino. According to an old document published by De Renzi in his (Collectio Salernitana) it is definitely recorded that the school was founded by four doctors, a Greek, a Saracen, an Arab and a Jew, each of whom lectured in his native language. This is probably only a tradition invented to account for the wide interest in the school. The Greek influence as is not surprising here in southern Italy, which used to be called Magna Graecia, was the strongest. As has been pointed out by Gurlt in his (History of Surgery, * the writ-

ings of the Salernitan physicians contain Grecisms and not Arabisms. The influence of the Arabs was comparatively slight and was due entirely to the fact that certain of the old Greek authors were available only in Arab translations and this gave Arab physicians a certain

prestige. The medical school at Salerno became so famous that it attracted students and patients from even distant parts of Europe and Duke Guiscard sent his son Bohemund to Salerno for the cure of a wound which had refused to heal under the ordinary surgical treatment of the time. Robert, the son of William the Conqueror of England, is said to have passed some time in Salerno for a similar reason. From very early in its history Salerno not only permitted, but seems to have encouraged, women medical students, and the department of women's diseases was placed entirely in their charge. As a consequence of the high standards maintained in medical edu¬ cation at Salerno the king of Sicily issued rather stringent laws with regard to the regu¬ lation of the practice of medicine ((for the protection of the subjects of our kingdom from the dangers arising from the ignorance of practitioners.® The development of the history of medicine in recent years has shown that the Salernitan School made magnificent achieve¬ ments in surgery and that its favorite remedial measures were fresh air, good food, water in¬ ternally and externally and rest. The (Regi¬ men Sanitatis Salernitanum,* the little book of abstracts from the medical advice of the teachers at Salerno, written originally just before the close of the 11th century, was for centuries the most popular medical book in Europe. It has been printed in more than 300 editions since the invention of printing and has been reprinted in most of the modern languages in our time.

The important political events of the century were due to the continuation of the incursions of the Northmen. King Aethelred II, ((The Unready,® had tried at the end of the 10th century to buy off the Danes from further in¬ vasions of his territory in England, but the 10,- 000 pounds of silver only whetted their appe¬ tite for conquest. A second and third ransom were no more effective, and then an organized massacre of the invaders (1002), in which the Saxons tried to repay all the cruelty of their oppressors, only prompted organized re¬ prisals. Sweyn invaded England time after time, and finally (1013) assumed the title of king of England. Edmund Ironside, son of Aethelred, fought with a heroism that has made his name forever memorable, but in vain. Canute after Edmund's death (1016) estab¬ lished the Danish rule, and as he was the mon¬ arch also of Denmark, Sweden and Norway as well as of most of Scotland, had an imperial domain. He proved an excellent ruler once he had securely established his power, and the familiar incidents related of him, as when he showed his flattering courtiers how little his power really was on the seashore, is typical of the man. He made a visit to Rome, organized the government of his states and well deserves a place among the great rulers of history. His death was the signal for internal

dissensions in his empire and it was not until rebellions had been put down that Hardicanute succeeded him.

The Irish suffered also from the invasions

of the Danes, but the Northmen were definitely defeated by Brian Born at the great battle of Clontarf not far from Dublin, 1014. Brian had secured his place of High King by previous defeats of the Danes and gave the example of military success as a claim for the position of ruler with very unfortunate effects during the next two centuries. Brian himself and his son and grandson were killed at the battle of Clontarf, and after this Ireland was plunged into internal dissensions.

England was destined to have a quarter of a century of peace and goodwill in the reign of Edward the Confessor who on Hardicanute's sudden death in 1042 was called by acclamation to the throne, at the age of about 40. There were no wars except to repel an inroad of the Welsh and to assist Malcom III of Scotland against Macbeth the usurper. Edward de¬ voted himself to the welfare of his people. His royal patrimony sufficed for even his generous donations to the poor and for religion without taxes. ((The good Saint Edward's laws® were often demanded by the English of subsequent generations in times of oppression. In their affection and reverence for him the people came to be touched by his hands in certain ailments and so <(the King's Touch® became a tradition for English royalty.

For the west of Europe the significant event of the century was the Conquest of Eng¬ land by the Normans, 1066. The duchy of Nor¬ mandy, the district at the north of France which had been given over to the sea rovers from the Scandinavian countries in the hope thus to create a barrier against further in¬ vasion, had been growing in power and pros¬ perity for several generations. William the Conqueror became one of the most important sovereigns by his acquisition of England. He led some 60,000 soldiers of fortune on the ex¬ pedition. Emerson in (English Traits) sums it up as <(these founders of the House of Lords were greedy and ferocious dragoons, sons of greedy and ferocious pirates.® The English people had given the crown to Earl Harold, <(the Last of the Barons,® but on the strength of a promise made by King Edward the Con¬ fessor, who was through his mother a kins¬ man of the Duke of Normandy, William claimed the throne. The English King Harold found himself compelled to defend himself against Harold Hardrada, king of the North¬ men, so that he had two enemies to contend with. He defeated Harold of Norway, but was himself defeated and slain in the famous battle of Hastings or Senlac. The English still op¬ posed the Normans after the victory but

Wil¬ liam succeeded in spreading his dominion over the country and the opposition, often fomented for the purpose, only served to give excuses to get the large estates and the highest offices in England into the hands of Normans and those on whom he could depend to support him in his policy. The Norman dynasty and its descend¬ ants have since ruled England. Britain which up to this time had been outside the circle of European affairs was now drawn into Con¬ tinental politics. With a ruler who had do¬ mains on the Continent nothing else could well have happened. Royal claims on various parts of France embroiled England in war for cen¬ turies. Conflicts between sovereigns and various petty rulers continued to be constant

during the century. More and more the nobil¬ ity refused to acknowledge obligations to their feudal lords in the matter of abstaining from war, and private wars of various kinds became almost the rule. As a consequence, the reli¬ gious and intellectual life as well as the com¬ mercial and agricultural life of the people suffered severely. Feudalism at the beginning of the 11th century had broken down as an instrument for maintaining peace. It is inter¬ esting then to see what was accomplished, and how successfully, to put an end to this state of affairs. It is almost the last place at the be¬ ginning of the second millennium of modern history to find a great movement for peace, but here it is.

In order to save bloodshed and protect people generally, the Church succeeded in bring¬ ing about the introduction of the ((The Truce of God.® Councils of the Church early in the 11th century forbade hostilities from Saturday night until Monday morning. This prohibi¬ tion was subsequently extended to other days in the week, and Friday in honor of the Pas¬ sion and Saturday the day of the Resurrection were declared illegal for military or judicial contests. About the middle of the century ecclesiastical regulations made it unlawful to fight during Lent and then during Advent. The Truce was first successfully proclaimed in France and spread to Italy and Germany to the great advantage of the people of the time. The Truce required that people were to be allowed to go quietly to and fro on their busi¬ ness without being disturbed by soldiers on the designated days and special regulations were issued protecting the peasant and his cat¬ tle and his agricultural implements. Before this councils had proclaimed the Peace of God which protected consecrated persons, places and times from warlike invasion. This protec¬ tion was extended to the poor,

pilgrims, Crusaders, and eventually even merchants on a journey. The further development in the Truce of God gave the impetus to peace which was finally taken up by the public authorities, through leagues for the enforcement of peace, and municipal federations until war was re¬ stricted to international conflict.

One of the most noteworthy features of the history of the 11th century is its interest in architecture. This began at the very begin¬ ning. ((About three years after the year 1000,® said Rodulf Glaber, <(the churches were reno¬ vated almost throughout the whole world es¬ pecially in Italy and the Gauls, although the greater part were still in good enough condi¬ tion not to need repairing.® The movement included not only the churches, but also the public buildings of various kinds.

This interest in architecture naturally led to important developments and the creation of that form of architecture called Romanesque, which was to prove only a step but. a very great one toward the magnificent Gothic archi¬ tecture of the later Middle Ages. The supreme examples of Romanesque are the cathedral of Speyer, finished in 1030 as a mausoleum for the so-called Salian emperors ; the cathedral at Treves or Trier, planned and conceived to¬ ward the end of the century; the new cathedral of Mainz, which followed the one erected by Willigis the Regent (who saved the empire from disintegration during the minority of the

Emperor Otto III), but which was unfortu¬ nately burned down on the day of its consecra¬ tion, but was immediately rebuilt and completed by Bardo von Oppertshafen in 1037. This Romanesque cathedral of Saint Martin at Mainz is one of the most interesting monu¬ ments in the history of architecture and has been the fruitful source of ideas for architects in our generation. The limitation of the width of the Gothic nave makes Gothic churches less suitable for preaching to large crowds, and so even Boston and New York chose to have great churches modeled on Romanesque lines.

The 11th century witnessed some precious social development, especially in the establish¬ ment of hospitals, which at that time were not only for the ailing poor, but also for the crippled and needy of many kinds as well as lodging for strangers. Archbishop Lanfranc erected a series of hospitals and <(the good Queen Maud,® the wife of Henry I, who was the daughter of Saint Margaret of Scotland, acquired a special repute in connection with her care for the ailing poor. King Henry, after the death of his son by drowning in the famous incident of ((the White Ship,® caught something of his lady's

spirit, and Matilda, their daughter, followed their example. The lepers particularly were cared for, and the be¬ ginning of the eradication of this disease, said to be as common then as tuberculosis is with us, was made through segregation, the hard¬ ships of which were mitigated to no incon¬ siderable degree by the lively interest of royalty and the nobility in the afflicted and the spirit in which their ailment was taken.

The 11th century saw the beginning of the organization on a broad scale of the Christian nations against Mohammedanism. The first active reaction against them in the countries where they had maintained themselves for some centuries came in Spain where the Moors in possession since early in the 8th century felt themselves at home. Just about the be¬ ginning of the 11th century the three Christian kingdoms — Castile, Aragon and Navarre — began to play a role of importance in the northern part of Spain. Castile led the move¬ ment, and before the end of the century had reconquered Toledo. The rivalry between the Christian countries hampered their progress for a time, but they grew stronger by the in¬ termarriage of their royal, houses and were able to advance their frontiers at the expense of the Moors. Aragon took possession of Barcelona and the valley of the Ebro. Nearly 500 years of struggle remained however before the Moors were finally expelled. The ad¬ vantage to Spanish character of the ceaseless contest was seen in the role played by the Spaniards in the New World after its discovery and the magnificent development of Spanish power at home and abroad which followed the final expulsion of the Moors in 1492.

The great hero of the century was Ruy or Rodrigo Diaz de Bivar, known as The Cid (Arabic, master) or El Campeador (Spanish, the champion or challenger). His life fills the whole of the second half of the century and his exploits animated the Spaniards against the Moors for all the centuries afterward until their complete expulsion. The romantic chron¬ icle of (The Cid> the substance of which was compiled by Alfonso the Learned only half

a century after the hero's death contains much that is literal history, and the obviously legen¬ dary incidents can be rather readily eliminated. Southey's translation made the work familiar in English. The Cid of the romances is another creature entirely, quite as much the nucleus for myths as Charlemagne's Paladins or King Arthur and

the Knights of the Round Table. Undoubtedly Rodrigo's real victories apart from all romance form the core of Span¬ ish history at the time.

The other phase of Christian opposition to Mohammedanism is also the greatest event of the 11th century, the first Crusade. Jerusalem had fallen into the hands of the Arab Moham¬ medans shortly after the death of Mohammed in the 7th century. This Semitic race shared in the Christian reverence for the Holv Places and permitted the Christian pilgrims who came in large numbers during the Middle Ages to pursue their devotions without molestation. In the 11th century, however, the Seljukian Turks, re¬ conquered long before by the caliphs, now in¬ vaded the caliphate as the Germans the Roman Empire, replaced the Arabs as the rulers of Jerusalem and at once initiated a very different policy toward the Christians. Great hardships were inflicted upon the pilgrims, and the stories of the cruel ties imposed aroused the feelings of Europe. The Seljuks, continuing their victo¬ rious career, defeated the Eastern Empire in 1071 and thus became rulers of Asia Minor. They took possession of Nicaea, just across the straits from Constantinople, and Europe itself was menaced. Pope Urban II, whose training as a churchman had come under Pope Gregory VII, after six years of wandering from the time of his election had, in 1094, at last suc¬ ceeded in gaining entrance to Rome and set himself to the task of unifying Christendom. In spite of rather serious breaks with the Em¬ peror Henry and King Philip of France who had repudiated their wives, Urban devoted him¬ self to the great problems of arousing Chris¬ tianity against the Turks.

The first incentive to the Crusades has often been attributed to Peter the Hermit, but it really came from Pope Gregory VII and was popularized by the address of Pope Urban at the Council of Clermont (in Auvergne). After excommunicating Philip of France for adultery in having taken to wife Bertrada, the wife of Fulk of Anjou, the urgent question of the East was taken up. The Council had attracted im¬ mense crowds of all classes, but particularly of the nobility and knights. The Pope's address asking for an army to be sent to redeem the Holy Places aroused great enthusiasm, and all present exclaimed with one voice ((It is the will of God.® The Pope declared that this should be their rallying cry, and all were to wear a cross as a sign of their acceptance of whatever hardships might be involved. It is from this cross that the word crusade is de¬ rived. Each participant was ˆcrossed.® Pope Urban suggested that particularly those who were in the midst of contentions with brethren and relatives might thus find a holy vocation. Most of those who took up the cross did so out of the highest motives of pure devotion. It would be idle to think that in so great a mass of men there should have been no hypo¬ crites, but they

must have been surprisingly few.

In his great-heartedness the Pope proposed that those who had been robbers ana brigands might now become soldiers of Christ with the feeling that here was a chance for the redemption of such men from evil ways, though doubtless also with the conviction that no matter what their motives they could work less harm in the army than at home, and that at any rate all should have their chance in the great cause.

Many privileges were granted to the Cru¬ saders by the Church, and these have sometimes seemed to modern historians violations of jus¬ tice. The payment of debts for instance could be put off, and the Crusaders were even freed from the payment of interest upon their debts and permitted to mortgage their property for the purposes of the Crusade without the con¬ sent of their feudal lords, though this was re¬ quired by the laws of the time. We in our time who have seen another great World War with its moratoria, its prorogation of rents and notes, its shutting up of stock exchanges and its taking over of the resources of coun¬ tries, are not likely to misunderstand similar events of the Crusade. Crusaders' wives and children and property were taken under the direct protection of the Church and those who disturbed them found that they had to do with the ecclesiastical authorities. The youth of all the country gave themselves unstintedly to the cause quite as they have in our time and have always done for idealistic purposes. Within a year after the great wave of enthusiasm which had begun at Clermont had spread through Eu¬ rope there was, according to the Pope himself, some 300,000 soldiers collected under the leader¬ ship of the great nobles of the time. If it is recalled that at this period the European coun¬ tries whose census of population we have, had much less than one-tenth as many inhabitants as in our time, the immensity of the effort thus put forth will be properly appreciated. The important leaders were Godfrey of Bouillon and his brother Baldwin, from Brabant, with Count Raymond of Toulouse who led a great army from Provence. The French troops were not led by Philip, who was in disgrace, but were joined with those of the Normans from south¬ ern Italy under the command of Bohemund, the son of Robert Guiscard, and his cousin Tancred who was the son of Otto the Good and of Emma, the sister of Robert Guiscard. Tancred came to be the rival in the later legends of the Crusades even of Godfrey of Bouillon and to be the centre of romances for centuries in modern European life.

After many hardships the army of the Cru¬ saders succeeded in finding its way to Constan¬ tinople only to discover that the Greeks

ex¬ pected to turn the great Christian expedition into a military campaign for the benefit of the empire. The Crusaders encamped in the sub¬ urbs of the capital not only were not welcomed, but were actually declared enemies because they refused to take the oath of homage to the em¬ peror. Contemporary documents which show the complaints of traitorous cruelty on both sides used to be held up as flagrant testimony to the essential barbarity of the people of the time, but recent experiences have demonstrated that the trait thus disclosed is human and not merely mediaeval. The emperor's daughter Anna, writing a history of the times, has made a

document almost as bitter in denunciation of the Crusaders as any that appeared on either side in our own great war. The Crusaders did not hesitate to call the Greeks traitors, cowards, liars and worse, but above all to deprecate their cruelty toward small parties of Crusaders un¬ able to defend themselves. The Byzantines replied with accusations of attacks upon women and children and thieving depredations of vari¬ ous kinds.

It was not until the spring of 1099 that an army of 20,000 Crusaders under Godfrey of Bouillon reached Jerusalem. The Holy City was stormed and taken 15 July 1099. Elected king of Jerusalem Godfrey refused that title in deference to the higher King whose spirit reigned over the world from there, and chose the simple designation of Protector of the Holy Sepulchre. He completed the conquest of the Holy Land by defeating the sultan of Egypt in the plain of Ascalon, 12 Aug. 1099. Godfrey had been wounded during the siege of Jerusalem and died just a year later, 11 July 1100. He was succeeded by his brother Bald¬ win. Altogether four principalities were cre¬ ated by the Crusaders in Mohammedan terri¬ tories, the capitals of which were Edessa, Anti¬ och, Tripoli and Jerusalem. Baldwin succeeded in taking possession of Acre, Sidon and some other important towns along the coast of Asia Minor. The news of the fall of Jerusalem caused great rejoicing throughout Europe and brought many accessions to the armed forces of the city's ruler. Unfortunately many of these were lost at sea and many were cut off in various ways by the Turks so that the consolidation of the recent conquests became very difficult. Luckily the Mohammedans were engaged in fighting among themselves and could not combine against the Franks as they called the Crusaders generally. Altogether at the end of the 11th century the Crusaders occupied a small strip of land not 50 miles wide and some

500 miles long from which the Turks were for long unable to displace them.

This was the beginning of the great move¬ ment, the Crusades, which was destined to in¬ fluence Europe so deeply for the next two centuries. There was scarcely a generation until the end of the 13th century that did not witness the going out from some part of Europe of large bodies of men who had nobly taken up the task of securing the possession of the Holy Places to the Christians. In the end they failed of that object and the Holy Land fell once more under the domination of the Turks, but in the meantime an immense amount of good was accomplished. The loss of men in battle and by disease so far from draining the human resoufces of the countries rather added to them. Men developed new energies. A great surgeon said during the Great War that for every man killed two men were being made. Something like this happened in the Crusades. They aroused men's energies, brought the East and 'West in contact, broadened men's interests, lessened the power of the nobles, strengthened national feeling and accomplished great good for the race which was manifest in the achieve¬ ments of the 13th century.

The character of the 11th century most dis¬ puted about in history is Pope Gregory VII. whose name Hildebrand has been translated (

complished wonderful work for Christendom and <(a brand of Hell® by those who declared that he was an influence for evil. There is no doubt at all that he exerted a deep influence over his own and succeeding generations. He was a self-made man of lowly birth, one of those who in President Wilson's words make it clear ((why government did not suffer dry rot in the Middle Ages under the aristocratic systems which then prevailed . . . there

was no peasant so humble, that he might not become a priest and no priest so obscure that he might not become Pope of Christendom and every Chancellory in Europe was ruled by those learned, trained and accomplished men.®

As Pope he took up at once the reform of Church matters and the definite regulation of the relations of the Church to the State. By abuse bishops had come to be almost more state officials than Church dignitaries. Gregory labored to have them independent in their ecclesiastical functions except of the head of the Church, but it was difficult to correct long standing abuses. The most serious contest in this matter is between Pope Gregory and the Emperor Henry IV of Germany. Hildebrand dissolved the oath of allegiance of Henry's

subjects and the nobility, glad of the opportunity to put down a tyrant, fell away from him and made Henry realize that unless he regularized his relations with the Church he could not hope to continue as a ruler. After many attempts to avoid the humiliation Henry made the famous journey to Canossa to be reconciled with the Pope, when he was required to do penance so severe that Hildebrand's conduct in this matter has often been censored. But Hildebrand maintained the rights of the Church as he saw them and continued to purify the Church itself of abuses of various kinds and to uphold the moral law as binding upon rulers as well as the people. Reformers are not likely to be popular and Gregory was in constant trouble. His own last words sum up his life better than any others. He had been compelled to leave Rome and was dying in Salerno when he said ((I have loved justice and hated iniquity, there¬ fore I die in exile.®

Hildebrand both before and after his election as Pope did more than anyone else to lay that foundation of the ascendency of the Papacy in Europe which culminated a century later in the pontificate of Pope Innocent III. During the time when popes were looked up to as guardians of the moral conscience of Europe, the best historians admit that there was a mag¬ nificent development of culture in the best sense of that word. Few if any epochs in the whole history of mankind present achievements higher than those of the 12th and 13th cen¬ turies. The loftiest aspirations of mankind were finely fostered. Beautiful architecture, painting that has never lost its interest, mag¬ nificent hospitals and great literature, charming arts and crafts all developed at this time and have come to be the loving study and reverent admiration of our generation. If a career is to be judged by its fruits, Hildebrand's in¬ fluence in making the popes a moral centre as well as ecclesiastical power in Europe must be considered one of the great factors for a great era of human development.

A great scholar of the 11th century whose works are still republished in many languages

and whose influence continues to be felt is Anselm, archbishop of Canterbury. His little book, (Cur Deus Homo,* is still frequently read by those who are deeply interested in the philosophic side of Christianity and his (Mono- logium* and

The rise of the Seljukian Turks gave a period of peace in Persia under

the viziers of Toghrul Beg and his son and grandson, Alp Arslan and Malik Shah, during which a series of contributions of enduring interest to the in¬ tellectual life of humanity were made. At the beginning of the 11th century Abul Kasim Man¬ sur of Tus in Persia (d. 1020), known as Firdusi or Firdausi <(the Paradisiac,® finished the Shahnahmeh, the great Persian epic of about 60,000 distichs, which sings the deeds of Persian heroes and rulers for 500 years. A little later Avicenna, <(the prince of physicians® (d. at Hamaden, Persia, 1037), ((at once the Hippoc¬ rates and the Aristotle of the Arabians® (Whe-well) wrote the books that for five centuries influenced medicine in Asia and Europe more than any others. They are only compilations of Hippocrates and Galen, but when Greek was .no longer known they served as sources of

ancient knowledge for a great many writers. Avicenna's work is typical of much of what the Arabs did. There is little of originality, he was merely a channel for the older medical writers and for Aristotle. The second half of the century A1 Gazali (b. at Tus 1058) was for a time professor of Mohammedan theology in the school at Bagdad. In his earlier years some of his writings were sceptical and these have a special appeal to the moderns, but later he became the greatest of Moham¬ medan apologists and continued to be studied for long afterward. Omar Khayyam, the Persian poet-astronomer, whose (Rubaiyat) at¬ tracted so much attention at the end of the 19th century was the fourth of these Mohamme¬ dan writers destined to an enduring influence. He corrected the calendar successfully and wrote books on algebra and astronomy, but these have had no influence beyond a generation or two in its own time, while his quatrains on life and death and love and God and the prob¬ lems men face forever, struck off at idle mo¬ ments, caught the vein of thought of the dis¬ tant Western peoples eight centuries later. He had been the schoolmate of the vizier of Alp Arslan, and the third of a little trio who at school swore eternal friendship and to share whatever fate might bring them was the notori¬ ous Hasan, ((the Old Man of the Mountains,® from whose name because of his infamous deeds very probably the word <(assassin® in our modern languages is derived. Manifestly Omar's experience of life and its vicissitudes in person and through his friends was ample to enable him, if he had the mind to, to write of humanity's problems with fullness of knowl¬ edge.

There are two great women of the century whose names are still well known and lives of whom have been written in our generation. One of these was Matilda of Canossa, Countess of Tuscany and heiress of the Marquess Boni¬ face of Tuscany. She knew Latin well, was fond of serious books, took a deep interest in the philosophical and religious

discussions so common at the time and came to exert an im¬ mense influence, not only in Italy but through¬ out Europe. She was a great personal friend of Hildebrand before his election to the Papacy as Gregory VII, and constantly supported him in the conflicts which his reforms involved. It was in letters to the Countess and her mother that Pope Gregory discussed the question so dear to his heart of the organization of the Crusade for the winning back of the Holy Land. It was at her castle of Canossa that Pope Gregory received the repentant Emperor Henry. At her death Matilda bequeathed her estate in central Italy to the Church, feeling the necessity of strengthening the Pope's po¬ litical situation and this bequest was confirmed by the Emperor Frederick II.

The other great woman of the century was Margaret of Scotland, whose life runs almost parallel with the second half of it. She was in¬ timately related to many of the well-known characters of the time. She was the grand¬ daughter of Edmund Ironside, and when exiled under Canute spent some years with King (Saint) Stephen of Hungary. She returned to be close to Edward the Confessor for a time, but, with her mother, set out for France

when the Normans won the battle of Hastings. Their ship was driven by storm to Scotland where Malcom III, having defeated Macbeth, was king. Margaret became his wife and did so much to soften the barbarous manners of the Scotch that ever since she has been in bene¬ diction. A favorite occupation was the securing of justice for the poor and a stone is still pointed out near Edinburgh, called Saint Mar¬ garet's stone, on which she sat to hear their causes. Her favorite son David is the Saint David of Scottish history, and the building of great churches and monasteries was initiated by Margaret. She was untiring in zeal for education and for the encouragement of book¬ making and is looked upon by the Scotch as one of the great founders of their civilization.

James J. Walsh,

Author of (The Thirteenth , the Greatest of Centuries?

PRINCIPAL EVENTS OF THE ELEVENTH CENTURY.

1001. The Eastern Empire loses territory to the Bulgarians and is attacked by the Russians.

1002. Emperor Otto III of the Western Empire dies.

1003. Pope Sylvester II previously known as Gerbert, the greatest scholar of the age, dies.

1013. Danes conquer England.

1014. The Irish under Brian Boru defeat the Danes at Clon- tarf.

1017. Canute, king of Scandinavia, becomes king of Eng¬ land.

1042. Edward the Confessor reigns over England.

1060. The Normans invade Sicily.

1066. The Norman Conquest of England. William the Con¬ queror reigns; institutes feudalism; forest laws; the Doomsday Book.

1071. The Turks defeat the Eastern Empire, occupy Asia Minor and threaten Constantinople.

1076. The Turks capture Jerusalem.

1077. Henry IV of Germany does penance at Canossa for disobedience to Pope Gregory VII.

1087. The Moors enter Spain to assist the Arabs and Saracens.

1094. Ruy Diaz de Bivar the Castilian Cid Campeador defeats the Moors and becomes lord of Valencia, Spain.

1094. Urban II after six years of wandering re-enters Rome and actively engages in uniting Christendom.

1095. The European Truce of God proclaimed at the Coun¬ cil of Clermont by Pope Urban II.

1095. Peter the Hermit stirs Europe to save Jerusalem from the Turks. Celibacy enjoined.

1096. The First Crusade.

1099. Christian Crusaders capture Jerusalem.

ELF-ARROWS, ELF-BOLTS, ELF- SHOT, are the names given to implements of stone, especially flint, of various sizes and forms, which are found abundantly in many countries, and are the remains of

arrow-heads, darts and other rude ancient weapons from the Palaeolithic period. They belong to the same class of ancient implements that are generally known as Celts (stone hatchets). . These rude and ancient implements are objects of some extraordinary superstitions. The names given above are, of course, of popular and com¬ paratively modern origin, and imply that those who gave them were completely ignorant of the real origin and use of those weapons. These names are found independently among the peasantry in Scotland, England and Ireland, and the superstitions associated with them are much more widely spread. According to the popular belief the stones are of supernatural origin, and various virtues are attributed to them. They are worn as charms, and used as a protection against lightning; but they are chiefly suspected of mischievous consequences. A cavern has been pointed out where the arch¬ fiend carries on the manufacture with the help of attendant imps, who rough-hew them while

he finishes the work. Similar superstitions pre¬ vail in Italy, Africa and Turkey. Consult Evans, (Ancient Stone Implements of Great Britain.5

ELGAR, Sir Edward William, English composer : b. Broadheath, Worcestershire, 2 June 1857. Among his compositions are (The Black Knight5 (1892) ; (Choral Suite: from the Bavarian Highlands> (1895) ; (Lux Christie produced at the Worcester Festival (1896) ; (Te Deum,5 sung at the Hereford Festival (1897) ; (Caractacus,5 produced at the Leeds Festival (1898) ; (Sea Pictures,5 for the Nor¬ wich Festival (1899); (Dream of Gerontius,5 for the Birmingham Festival (1900), which is considered his masterpiece. It was reproduced at the Niedderrheinische Musik Fest in 1902. Other of his compositions are (Coronation Ode) (1902) ; (The Apostles5 (1903) ; (The King¬ dom5 (1906); (Coronation March) (1911); a masque, (The Crown of India.5 (1912) ; (The Music Makers5 (1912) ; (Falstaff,5 a sym¬ phonic study (1913), and (Carillon5 (1915). Besides these he has written symphonies, sev¬ eral concert overtures and a violin concerto.

ELGIN, James Bruce, 8tii Earl of, and 12th Earl of Kincardine, English statesman : b. London, 20 July 1811; d. Dhurmsala, North India, 20 Nov. 1863. He was educated at Eton and Oxford ; in 1841 entered Parliament as member for Southampton, and in the same year succeeded to the earldom. In 1842 he was ap¬ pointed governor of Jamaica. His rule in Jamaica was so successful that in 1846 he was appointed governor-general of Canada, and there he succeeded by a conciliatory policy in allaying the discontent which had broken out and for some time continued. It was through his efforts that

reciprocity between the United States and Canada in natural products was established (1854-66). In 1849 he was raised to the British peerage as Baron Elgin; was sent in 1857 as special ambassador to China, where in the following year he succeeded in concluding the Treaty of Tientsin. He also concluded a treaty with Japan. When he re¬ turned to England he was given the office of Postmaster-General and elected lord rector of Glasgow University. In 1860, the Chinese emperor having manifested unfriendliness, Lord Elgin was sent to enforce the treaty, which he did by seizing Peking. The treaty which followed was successful in regulating Chinese relations with Europe until 1890. In 1861 he was appointed governor-general of India. He maintained internal peace and ex¬ erted himself unceasingly for the development of the country. His ˆLetters and Journals5 were edited by Walrond (London 1872).

ELGIN, Thomas Bruce. See Elgin Mar¬ bles.

ELGIN, Victor Alexander Bruce, 9th

Earl of, British statesman : b. Montreal, 1849; d. Scotland, January 1918. His grandfather, the 7th earl, best known by his connection with the Elgin Marbles (q.v.), was British Ambassador at Constantinople from 1799 to 1802. Lord Elgin was edu¬ cated at Eton and Oxford and entered Parlia¬ ment as a Liberal under the banner of Glad¬ stone. In 1893 he was appointed viceroy of India, a post which his father had held — and

died in — 30 years before. The five years of Elgin's administration, 1894 to 1899, were marked by numerous and serious problems, financial, economic, plague, famine and war. The difficulties were met by the viceroy and his advisers with courage, resource and success, and much was done to improve public works in gen¬ eral and railroad construction in particular. Lord Elgin was chairman of the royal com¬ mission appointed in 1902 to inquire into the military preparations for, and conduct of, the South African War. In the Campbell-Banner¬ man Cabinet (December 1905) he became Colonial Secretary, in which capacity he was primarily responsible for framing the Constitu¬ tion for the Union of South Africa. He retired in 1908, but his services were employed on im¬ portant government commissions where judg¬ ment and impartiality were needed. As chair¬ man of the Carnegie Trust he took a strong interest in the application of the fund. Lady

Elgin, who died' in 1909, had six sons and five daughters.

ELGIN, Ill., city of Kane County, 36 miles west by north of Chicago, on the Fox River. Two railroads supply adequate shipping facili¬ ties, the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern. It is also the terminus of the Aurora, Elgin and Chicago Railway, which is a third-rail electric line be¬ tween these cities. Two products make Elgin famous — butter and watches. The dairy in¬ terests have probably had more to do with the development of the community than any other factor. Early in its history, The Borden Con¬ densed Milk Company located a large plant here and since that time has established many more in the immediate vicinity. The current quotations of the Elgin Board of Trade fix the market price of high grade butter throughout the entire country. The other industry to which Elgin largely owes its growth and prosperity is the making of fine watch-movements. The watch factory was started in the spring of 1864 and has been a success from the beginning. There are many other industries in Elgin, all of which are prosperous concerns. Two watch- case factories and as many shirt factories dis¬ tribute their products throughout the country. Besides these, there are shoe, pipe-organ, silver- plate, automobile, coffin-fixtures, canning, malted milk, rug factories, foundries, flouring mills, etc. Two large publishing houses are located here and there are several machine shops and foundries. The United States census of manu¬ factures for 1914 showed within the city limits 91 industrial establishments of factory grade, employing 5,974 persons ; 5,529 being wage earners, receiving annually $3,320,000 in wages. The capital invested aggregated $17,371,000 and the year's output was valued at $10,492,000; of this, $6,221,000 was the value added by manu¬ facture. Elgin is sometimes called the <(City of Churches.® Nearly all denominations are represented and the various houses of worship are large and handsome. The city is noted for its public school system, which is highly devel¬ oped and very efficient. The buildings are handsome in architecture and a new high school has been constructed recently. The Elgin Academy of the Northwestern University is a well-known preparatory school for the latter institution, which is located at Evanston, Ill.

Saint Mary's Academy is also well known throughout the State and bears a high repu¬ tation as a place of learning. The Illinois Northern Hospital for the Insane is located in Elgin. The Elgin Woman's Club has built and operates a large hospital, which is famed throughout the country and State for its high standing and great efficiency. Its cost was about $1,000,000. The banks are six in number, four national and two savings. They have a com¬ bined capital of over $650,000 and

are prosper¬ ous and strong financial institutions. Founded in the spring of 1835, Elgin has grown rapidly in size and importance until it now is the most beautiful and the second largest city in Kane County. Elgin was incorporated in 1854 and Dr. Joseph Tefft was chosen the first mayor. The waterworks and sewer system and an elec¬ tric-lighting plant are the property of the mu¬ nicipality. The city has commission form of government. Property is in demand, owing to the number of Chicago people who, on account of good transportation facilities, are seeking more room and pleasanter homes within the confines of the beautiful city on the Fox River. Pop. 27,485.

ELGIN MARBLES, the name given to a peerless collection of antique sculptures brought from Athens to England by Thomas Bruce, 7th Earl of Elgin, in the early part of the 19th century. While Ambassador at Constanti¬ nople (1799-1802) he conceived the plan of securing some portion of the ruins of ancient Athens and to that end secured permission of the Porte to take (

third less than he had expended upon them. They are now to be seen in the British Museum as priceless examples of the highest in Greek art which matured under the genius of Phidias. Many casts have been taken of these unsur¬ passed relics of which the city of New York possesses a set. Consult (Ancient Marbles in the British Museum* (Vols. VI-IX, London

1830-39, 1842).

ELHORST, Hendrik Jan, Dutch biblical scholar: b. Wisch, Guelderland, 1861. He re¬ ceived his education at the University of Am¬ sterdam. He entered the Mennonite ministry and held pastorates successively at Insum, Friesland, Arnhem, The Hague and Haarlem. In 1906 he was appointed to the chair of Hebrew language, antiquities and literature in the University of Amsterdam. He has published critical commentaries on Micah (1891), Amos (1899) and (Israel in Thet lichte der jongste onderzoekingen* (1906).

ELI, e'll, Hebrew judge and high-priest of Israel. After a turbulent rule of 40 years, he died 1116 b. c. Failing to punish the misdoings of his sons, Phineas and Hophni, the downfall of his house followed.

ELI PERKINS. See Landon, Melville de L.

ELIA, e'li-a. S ee Lamb, Charles.

ELIE DE BEAUMONT, a'le de bo-moii, Jean Baptiste Armand Louis Leonce, French geologist: b. Canon, France, 25 Sept. 1798; d., there, 22 Sept. 1874. He was educated in the Polytechnic School ; became professor at the School of Mines (1829); professor of geology in the College of France (1833) ; chief engineer of mines (1833) ; member of the In¬ stitute (1835) and perpetual secretary of the Academy of Sciences (1853). He published (Carte geologique de France* (1843) ; No¬ tices sur les systemes de montagnes) (1852) ; and with Dufrenoy, (Voyage metallurgique en Angleterre) (1827), the record of a scientific journey he had made in England and Scotland in 1823. His principal services to science were in the establishing of the geological survey of France and the stimulating of interest in mountain geology.

ELIGIUS, e-Hj'us, or EL'OI, a-lwa. Saint, bishop of Noyon: b. Cadillac, near Limoges, 588; d. Noyon, 1 Dec. about 660. Having in boyhood shown a decided aptitude for fine art he was placed by his parents under the direction of the master of the mint at Limoges and there acquired skill in the goldsmith's craft. Ap¬ pointed coiner to the Frankish king, Clotaire, and to his son and successor, Dagobert, he exe¬ cuted at their order the bas-reliefs on the tomb of Saint Germanus, bishop of Paris, and other works in the precious metals which were re¬ garded as the masterpieces of decorative art in that time. He was a favorite at court, which he was obliged to frequent because of his con¬ nection with the king; but he took more pleas¬ ure in relieving the needy than in the society of the worldly. He daily fed a large number of poor people, he buried the bodies of male¬ factors, and he ransomed captives, especially the Saxon slaves who were often sold in the markets. Both Clotaire and his son Dagobert bestowed costly presents upon Eligius, but they could not make him rich, he gave so much to

the poor and to the founding of charitable in¬ stitutions. At about the age of 50 he decided to abandon the world entirely and devote him¬ self to the conversion of the pagans. Two years later he was ordained priest and in 546 was made bishop of Noyon. As* bishop he gave special attention to the conversion of the Flemings and Frisians, and the greater part of Flanders was converted through his efforts. Consult Lebeuf, (Histoire du diocese de Paris* ; Fleury, (Vita S. Eligii.*

ELIHU, a friend of the patriarch Job, introduced as speaking after the three intimate friends. His portion in chapters xxxii-xxxvii is supposed by many critics to be a later addi¬ tion to the book. Lightfoot and others con¬ jecture that Elihu was the author of the book of Job.

ELIJAH, whose name (((Jehovah is God®) indicates his mission and his work, was one of the greatest prophets of Israel. His prophetic activity began in the days of Ahab of Israel, and ended in the days of his son, Ahaziah, or, as is on the whole more probable, in the days of his son-in-law, Jehoram of Judah. His first ap¬ pearance is strange; the end of his life on earth still more strange. Throughout his career he comes and goes in an unusual and remarkable way. His special work was to save his nation from falling into heathenism, and thus making impossible the great history which has resulted in the Christian civilization of our own days. Ahab, the king of northern Israel, had married Jezebel, the daughter of Ethbaal, king of Tyre, and formerly a priest of the Tyrian religion. Among the Semitic peoples an alliance of na¬ tions meant a mutual honoring of gods. Thus the marriage of Ahab and Jezebel introduced into the kingdom of Israel the worship of the Tyrian Baal. Gradually, through the deter¬ mined efforts of Jezebel, who was a fanatic for her faith, the worship of Baal displaced that of Jehovah, and seemed likely altogether to de¬ stroy it. Later, by the marriage of Athaliah, the daughter of Ahab and Jezebel, to Jehoram, king of Judah, the same course of things began in the kingdom of Judah (2 Kings viii, 18). To bring back the nation to the worship of Jehovah, and to the recognition of him as God, was the work of Elijah. This work began with the sudden appearance of the prophet to Ahab, to announce to him the coming drought and famine, which the nature god Baal would be powerless to prevent (1 Kings xvii, 1). The life of the prophet up to this time had probably been spent in the lonely and wild region on the eastern side of the Jordan, although it is un¬ certain where his birthplace was. During the three years and more of drought and famine which followed Elijah's first appearance to Ahab, the prophet found a home and the means of life, first by the brook Cherith, and after¬ ward in the home of a widow in Zarephath, a city of Phoenicia. At the end of this time he had his great contest with the prophets of Baal on the Mount Carmel, where, in answer to his prayer, Jehovah revealed himself by fire, and was acknowledged by the people to be God. The same day the falling rain ended the drought and the famine (1 Kings xviii). The triumph of the prophet was followed by a flight to Mount Horeb to escape the wrath of the angered Jezebel. On this mountain he received

from God a revelation in regard to the real part his work had in the history of his nation, and was commanded by God to call Elisha to be his successor in the work for the nation. In obedience to this

command, he went from Horeb to Abel-meholah, the home of Elisha. Having given to Elisha the call to be his successor, he disappeared for a time from the view of men (1 Kings xix). About six years later, the prophet again appeared to Ahab in the vine¬ yard of Naboth, in Jezreel, to denounce him for his wicked disregard of the rights of his brother, made sacred by the law of Jehovah (1 Kings xxi, 17-24). The final work of the prophet on behalf of his people is recorded only in the book of Chronicles (2 Chron. xxi, 12-15). This was the sending of a letter to Jehoram, the king of Judah, to tell him that, because he had endeavored to introduce the Baal worship of the northern kingdom into Judah, and be¬ cause he had cruelly murdered his brothers to make his own throne more secure, Jehovah would send great evils upon his people, his family and himself. How long the prophet lived we do not know (2 Kings li, 1-12). Con¬ sult Milligan, (Eli j ah : His Life and Times) (in (in Hastings' dictionary of the Bible, > 1899).

Sylvester Burnham,

Professor of Old Testament Interpretation, Theological Seminary of Colgate University.

ELIJAH, The, an oratorio by Mendelssohn, first performed at Birmingham, England, 26 Aug. 1846. It is one of his best-known works and is more popular in England and America than any other oratorio, with the exception of Handel's Messiah.5

ELIMINATION. In mathematics we often meet with instances where, given several state¬ ments concerning several distinct quantities, we wish to discover precisely what is affirmed of a smaller group of these quantities. For ex¬ ample, in the solution of simultaneous equa¬ tions, such as

\a\X + biy + ci — 0 } a2x + b2y + c-i — 0,

to obtain the value of x, we must derive from these two equations a single one not involving y. This process is called the elimination of y. In the case of linear simultaneous equations such as the above, the elimination may be performed by multiplying the first equation by b2 and the second by bi and, subtracting or by solving the first equation for y and substituting this value in the second, or by solving both equations for y and equating the values thus obtained. All these methods give the result

OjCi

a2c2 oc — ■

aibi

a2b2

(see Determinants), and throughout all forms of elimination determinants are very convenient.

Elimination between equations not linear is apt to be very complicated and difficult. How¬ ever, in the case of the elimination of a single unknown from two consistent algebraic equa¬

tions, Sylvester's dialytic method forms art easy solution to the problem. This consists in obtaining from two equations in x of the mth and nth degrees, respectively, the n equa¬ tions formed by multiplying the first equation by the powers of x from the 0th to the (n — 1) st and the m equations formed by multiplying the second equation by the powers of x from the 0th to the (w — 1) st, and by eliminating from these the powers of x, considered as independ¬ ent variables. We thus get m + n equations in ra + n — 1 variables, and the condition (see Determinants) that these be consistent is that the determinant of the coefficients should vanish. For example, if our two equations are

j a\x 4 f a3×3 + a2× 2 + aix + a0 = 0

i b2× 2 T bix T bo = 0 ,

we obtain from these the equivalent family of equations

aix* T- a3×3 + a2×2 + aix j a0 — 0 aiX5 + asx 4 + a2×3 + axx 2 + aox =0

b2× 2 + bix | bo = 0 bix3 + bix 2 j bo =0

b2x* + bix3 + box 2 = 0

bix 5 + bix 4 j box3 = 0,

which

give

the relation between the coefficients

0

at

0

0

0

b2

at a3 a2 Ux Oo

a3 a 2 <2i a0 0

0 0 b2 bi bo

0 b2 b\ bo 0

b2 bi bo 0 0

bi. bo 0 0 0

= 0.

In certain cases an analogous method may be applied to systems of three or more equa¬ tions. A method of similar application to that of Sylvester had been discovered previously by Euler. (See Algebra, Elementary; Determi¬ nants). Consult Burnside and Ponton, (Theory of Equations) (Dublin 1901) ; Dickson, intro¬ duction to the Theory of Algebraic Equations > (New York 1903) ; Muir, (Theory of Deter¬ minants } (London 1890) ; Young, (Monographs on Modern Mathematics) (New York 1911).

ELIOT, Charles William, American col¬ lege president and educator: b. Boston, Mass., 20 March 1834. He was graduated from Har¬ vard in 1853, was tutor in mathematics there 1854—58, and assistant professor of mathematics and chemistry in the Lawrence Scientific School, Harvard, 1858-63. After spending two years in Europe studying chemistry and investigating educational methods he was professor of analytical chemistry in the Massachusetts Insti¬ tute of Technology 1865-69. In the last-named year he became president of Harvard University, which position he resigned in 1909. He is one of the foremost writers and speakers of the day upon educational and social problems and has exerted a strong influence upon the trend of American thought. During his incumbency Harvard College introduced what is commonly known as the elective system — a system since adopted by most American colleges, whereby students no longer must pursue a rigidly pre¬ scribed curriculum, but may chose (within

certain groups) any of the subjects taught. Under President Eliot, too, Harvard's college course could be covered in three years instead of four, thus making it possible to complete both the college and a professional course in six, instead of seven, years. Numerous other educational reforms were advocated by Dr.

: — ***.■ . . M!ninisp»

From the etching made by John A. Lowell & Co., Boston,

CHARLES WILLIAM ELIOT

GEORGE ELIOT

From the etching by Rajon

ELIOT

241

Eliot in his long career at Harvard, which have placed him among the greatest American educators and have won great prestige for the university over which he presided. He has published (Manual of Qualitative Chemical Analysis } (with F. H. Storer) ;

ELIOT, George (the pseudonym of Mary Ann or Marian Evans Cross), the most dis¬ tinguished of English women novelists : b. Ar- bury farm, near Nuneaton, Warwickshire, 22 Nov. 1819; d. Chelsea, 22 Dec. 1880. Her father, Robert Evans, who was of Welsh extraction, was agent on the estates of Francis Newdegate; and the future novelist was the second daughter and third child of his second marriage. When Marion was a few months old, the family removed to Griff, a ((cheerful red-brick, ivy- covered house,)) and there the first 21 years of her life were spent amid scenes and among a people that she was destined to im¬ mortalize. Her first school was at Attleborough, and from there she went to a boarding school at Nuneaton, one of the governesses at which, Miss Lewis, became a warm friend, and suc¬ ceeded in awakening religious impressions that were deepened in the years she spent between the ages of 13 and 16, at Miss Franklin's school in Coventry. The death of her mother, to whom she was tenderly devoted, which occurred in 1836, was succeeded soon after by the mar¬ riage of her sister, and the care of her father's home then devolved upon her. The duties of the household were accompanied by lessons in Italian and German, Greek and Latin ; she was already an omnivorous reader and one with a fine power of selection; she was passionately fond of music, and an excellent player on the piano on

which instrument she might have at¬ tained some distinction as an executant but for the ((agonies of shyness® with which she was af¬ flicted. Her father's retirement from active life was followed by her brother's appointment to succeed him, and Marian and her father re¬ moved in 1841 to Toleshill Road, Coventry.

Lip to this time Marian was deeply imbued with evangelical religion, which had been stamped upon a mind of singular receptivity by the example and instruction of her teachers. Then with expanding intellect came vanishing faith. Among the new friends was Charles Bray, whose wife was a sister of Charles Hen- nell, the author of a work entitledˆ An Inquiry Concerning the Origin of Christianity,) pub¬ lished in 1838, and rationalistic in tone. The reading of this and similar works effected a complete revolution in the inner life of Marian Evans ; she abandoned the creed of her girl¬ hood, and determined in the spring of 1842 not to go to church. This was the occasion of a temporary breach with her father, who was a churchman of the old school and little disposed to brook rebellion in his own household. After a short absence from home and through the efforts of friends a reconciliation was effected; Marian returned and resumed her attendance at church, and although she never retraced by a step the course she had taken, her works arc witness to the insight and tenderness, born of

understanding, with which she approached evangelical beliefs.

The years from 1842 to 1849 were devoted to attendance on her father during his recurrent illnesses, and by the translation of Strauss's (Life of Jesus,) a work which entailed two years of exacting labor and was published anonymously in 1846, and for which she received the sum of £20. The completion of this work left her ((Strauss-sick — it makes her ill dis¬ secting the beautiful story of the Crucifixion.® After the death of her father (1849) she went to the Continent and passed about eight months in Geneva. On her return she took up work on the Westminster Review, acting as sub¬ editor, and in 1853 went to reside at the office of the magazine at 142 Strand. In the same year she published a translation of Feuerbach's (Essence of Christianity,) the only work pub¬ lished under her own name, and the leading idea in which is that man has made God in his own image — the spiritualized form of his hopes and desires. At this period she made the ac¬ quaintance of Froude, J. S. Mill, Carlyle, Har¬ riet Martineau, Herbert Spencer and George Henry Lewes (q.v.).

With Lewes, whom she describes as ((a man of heart and conscience,

wearing a mask of flippancy,® she entered into a connection which she regarded as a marriage without the sanc¬ tion of law. He had a wife already, from whom he was separated under circumstances that pre¬ cluded the possibility of divorce. This alliance is regarded by many as the one fatal step in her life, and to it they attribute the somewhat obtrusive self-consciousness that is apparent in some parts of her writings, and note that the novelist's own conduct does not square with her teachings. There is no doubt however that they lived happily together, and that their union exercised a profound mutual influence on their literary life and fortunes. Lewes undertook all business matters for her, acted as critic and mentor; and tactfully shielded her from the perusal of unfavorable or inept reviews. In¬ deed but for the constant encouragement and stimulus given by Lewes, the chances are that Marian Evans would never have discovered herself as a creative artist, for although possess¬ ing singular robustness and health of intellect she was of low physical vitality, subject to acute fits of depression, and only by strong effort was able to undertake creative _ work. Lewes and Marian Evans left England in July 1854 and wintered in Germany. On their re¬ turn she labored at a translation of Spinoza's (Ethics) and wrote reviews for the Leader. An article contributed to the Westminster Review entitled <(Evangelical Teaching: Dr. Cumming,® in which the famous preacher of Crown Court was subjected to a criticism that was at once informed, witty, pointed and scath¬ ing, revealed to Lewes that he had mated with genius, and under his encouragement, (The Sad Fortunes of the Reverend Amos Barton) was begun in September 1856, and appeared in Blackwood's Magazine in January 1857. This was followed by (Mr. Gilfil's Love Story,) and (Janet's Repentance,) the three stories being published in book form in 1858, under the pen name of (George Eliot.) Discerning critics like Thackeray and Dickens recognized that a new force had arisen in England fiction, and the latter divined that the creator was a woman.

It may be questioned if the author ever bettered those faithful sketches of old-fashioned life in the Warwickshire of her girlhood, with their genial and kindly humor, warmth of sympathy, power of desciption and moving but unforced pathos. (Scenes of Clerical Life) could not be called a popular success, but with her next novel (Adam Bede> (1859) written partly in Eng¬ land, partly at Munich and Dresden, the read¬ ing public was taken by storm, and it has re¬ mained the most popular of George Eliot's works. The genesis of the story came to the

author through an aunt, a Methodist preacher, who had occasion to pass a night with a girl condemned for child murder, the aunt and girl respectively becoming the Dinah Morris and Hetty Sorrel of the novel. George Eliot was put to considerable annoyance by the claims made to its authorship, especially by one Lig- gins in her native county, and only the inter¬ vention of Blackwood the publisher set the mat¬ ter at rest. It then became known that Marian Evans, the Westminster reviewer, and George Eliot were identical. The Mill on the Floss) (1860) is to some extent autobiographical, the charming portraits of Maggie and Tom Tulli- ver being drawn from her own and her brother Isaac's childhood. (Silas Marner,5 which many regard as her most perfect story, followed in 1861. In 1860 George Eliot had spent the sum¬ mer in Italy collecting material for her great historical romance, first published serially in Cornhill, for which she received the then unheard-of sum of £7,000, and which ap¬ peared in book form in 1863. In order to write this she went through a course of reading that would have qualified her to write a history. Her husband says that, <(it ploughed into her more than any of her works,® and she herself says she ((began it a young woman, and finished it an old woman.® Although it must be pro¬ nounced a masterpiece, reflecting her powers at their very highest, it cannot be regarded — in spite of the fine character drawing in it, espe¬ cially of Tito Milema and Tessa — as a faith¬ ful and lifelike reproduction of the Florence of the Renaissance. The appearance of (Felix Holt the Radical5 in 1866 seemed to betoken diminishing powers. She then essayed poetry, The Spanish Gypsy) appearing in 1868, and < Agatha 5 in 1869; and these revealed that her art did not lie in that direction. The only poem of hers that is certain to live is the noble piece beginning (0 may I join the choir invisible.5 (Middlemarch5 (1871-72), a novel which may be regarded as inspired by her life at Coventry, as her early works drew their stimulus from childhood and girlhood, is notable for some fine characterizations of middle and upper class life in an English provincial town, and is replete with pregnant thought. (The Legend of Jubal and Other Poems) appeared in 1874. (Daniel

Deronda,5 her last great work, was published in book form, and in the opinion of at least one noted critic is the best of her novels and marks the culminating point in her career. On 28 Nov. 1878, Lewes died. This bereavement was a crushing blow to George Eliot; for weeks she saw no one and wrote no letters ; and she busied herself preparing his unpublished work for the press, and founded a scholarship in his memory for scientific investigation. Theo¬ phrastus Such,5 written sometime earlier, ap¬ peared in 1879. She never really got over the

shock of Lewes's death. In the months of sor¬ row and depression

following on that event she had been lifted somewhat by the fore¬ thoughtfulness and helpful sympathy of J. W. Cross, an American — an old friend of her own and of Lewes — to whom she was married on 6 May 1880. But their married life was cut short, for, after contracting a chill at a concert, she died on 22 December of the same year. The first collected edition of her novels ap¬ peared 1878-80, and a 25-volume edition was issued at Boston in 1908. See Adam Bede; Middlemarch ; Mill on the Floss, The; Romola; Silas Marner.

Bibliography. — Consult her (Life and Let¬ ters, 5 by J. W. Cross (3 vols., London 1885) ; biographies by Blind (London 1883) ; Brown¬ ing, O., (London 1892) ; and Stephen, L. (New York 1902) ; Deakin, (Early Life of George Eliot5 (Manchester 1913) ; Dowden, E., (Studies in Literature) (London 1878) ; Hutton, Mod¬ ern Guides of English Thought5 (London

1887) ; James, 'Partial Portraits5 (1888); Mottram, The True Story of George Eliot in Relation to Adam Bede5 (New York 1905) ; Myers, (Essays Modern5 (1883) ; Parkinson, 'Scenes from the George Eliot Country5 (Leeds

1888) .

ELIOT, Sir John, English orator and statesman : b. Port Eliot, Cornwall, 20 April 1592; d. London, 27 Nov. 1632. He studied at Exeter, but did not take a degree. He then took up law, and traveled in Europe, where he became an intimate friend of George Villiers, later Duke of Buckingham. In 1614 he was sent to the ((Addled® Parliament for Saint Ger¬ mans. In 1618 he was knighted and in the fol¬ lowing year, through the patronage of the Mar¬ quis of Buckingham, was made vice-admiral of Devon. In this capacity he was energetic in suppressing piracy. His arrest of a notorious pirate named Nutt brought him into collision with Nutt's protector, Sir George Calvert, then Secretary of State; and Eliot was imprisoned on trumped-up charges for three months. The return of the Duke of Buckingham accom¬ plished his release. He was returned to Parlia¬ ment in 1624, where his remarkable independ¬ ence and fluent oratory at once brought him into prominence. Lie supported the proposed war with Spain and began his life-long opposi¬ tion to encroachments on the rights of the House of Commons, which he considered the backbone of the national government. He was re-elected in 1625, during which session he opposed the leniency toward Catholicism and became an ardent supporter of constitutional rights. In 1626, the accumulated mismanage¬ ments and instances of the selfish policies of Buckingham completely undermined Eliot's faith in him and an impeachment

followed. This, together with Eliot's opposition of forced loans, led to his imprisonment. At the protest of the Commons he was shortly released and returned to Parliament in 1628. He joined Coke in promoting the Petition of Right which was signed by Charles on 7 June. In 1629, after the murder of Buckingham, Eliot devoted him¬ self to the earnest support of Protestantism. His attempts to resist the king's tonnage and poundage taxes were met by the monarch with contempt and with the adjournment of Parlia¬ ment. When this last measure was to be carried out a second time, Eliot insisted that the

speaker be held in his chair while a speech was read indicating the king's encroachments on constitutional rights. When summoned to trial he declared that he was answerable to Parliament alone for his actions and would not reply to charges brought against him by any other body. He was con¬ fined in the Tower, and finally tried with Holies and Valentine for conspiracy against lawful order. Eliot refused to yield an inch in submission to the king and was fined and im¬ prisoned in 1629, where he sickened and died. During his imprisonment he wrote a work on constitutional monarchy entitled the (Monarchy of Man,> and also an account of the first Parliament of Charles I under the title (Negotium PosteriorunP ; (An Apology for Socrates, } a vindication of his own public con¬ duct, and (De Jure Majestatis,* a treatise on government. Eliot was not republican in his views, but believed rather that the ideal state was a constitutional monarchy in which the powers of the king would be strengthened and inter¬ preted by Parliament. He was distinguished by the enthusiasm rather than the logical depth of his speeches. The king's treatment of Eliot was one of the causes of the unpopularity of that monarch which led to his downfall. Pym did much to systematize the political theories of Eliot. Consult Forster, Wife of Sir John ElioD (London 1871) ; and Gardiner, (History of England* (London 1893-95).

ELIOT, John, American colonial mission¬ ary, ((the Indian Apostle® : b. probably at Wid- ford, Hertfordshire, 1604; d. Roxbury, Mass., 20 May 1690. He was graduated at Cambridge in 1622, and, after taking orders in the Church of England, quitted his native country for con¬ science's sake and landed at Boston, New Eng¬ land, in 1631. In 1646, after two years study of the Indian language, he delivered a long ser¬ mon in the native dialect at Nonantum, and other meetings soon followed. He shortly after began to establish his converts in regular set¬ tlements, his work meeting with approval both in the colony and

at home; in England a cor¬ poration was founded in 1649 ((for the promo¬ tion and propagating the Gospel among the In¬ dians of New England,® which defrayed the expenses of the preachers and the cost of print¬ ing translations. At one time there were over a dozen townships of “praying Indians® within the bounds of Massachusetts, and many more outside these limits, with numbers estimated in 1674 at 3,600; but, although the organization survived until the death of the last native pastor in 1716, the decay of the “praying towns® was rapid after the war with King Philip (1675), in which the converts suffered equal cruelties at the hands of their countrymen and of the English. There are monuments to Eliot’s memory in the Indian burying-ground at South Natick, and at Newton, near the scene of his first Indian sermon. A man of earnest piety and devotion, warm-hearted and of a singularly attractive manner, he has left a memory that is honored among the first in the history of New England. With Thomas Weld and Richard Mather, Eliot prepared an English metrical ver¬ sion of the Psalms, the Way Psalm-book® (Cambridge 1640), as the first book printed in New England. He was also the author, among other works, of (The Christian Commonwealth*

(London 1659), suppressed by the court and now extremely rare; (The Communion of Churches * (1665), the first book privately

printed in America; and of translations into the Indian tongue of Baxter’s Wall* ; Bayly’s (Practice of Piety) (abridged) ; and Shepard’s (Sincere Converts But the great work of his life was the translation of the Bible into the tongue of the Indians of Massachusetts (Algonquin), of which the New Testament ap¬ peared in 1661, and the whole work, with a ver¬ sion of the Psalms in metre and a page of “catechism® in 1663. The longest single word in it is “Wutappesittukqussunnoohwehtunkquoh,® signifying “kneeling down to him,® in Mark i, 40; which illustrates the jest of Cotton Mather, who said he thought the words of the lan¬ guage must have been growing ever since the dispersion at Babel. Only 14 complete copies of the first and second editions are known to be in existence. A scientific study of Eliot’s Indian Bible was made by J. H. Trumbull (q.v.), and his manuscript published 1903 as (Bulletin 25* by the Bureau of American Ethnology, Washington. Its title is the (Natick Dic¬ tionary* and it is divided into two parts, the first giving the Natick words with Eng¬ lish definitions and the second giving the English words with Natick definitions. While it is devoted to the Natick lan¬ guage it is practically a dictionary of all the Algonquin languages of Massachusetts, for the tribes of that part of the country spoke prac¬ tically the same language, though each had its dialectic variations. Eliot’s Hndian Grammar Begun * was printed in 1666; his Hndian

Primer) in 1669. The finest collection of unique and scarce copies of Eliot's works is in the Lenox Library, New York; many of them have been reprinted. The best Wife of Eliot) is that by Francis (Vol. V) ; Sparks' (American Biography* 1st series (1836) ; the earliest that by Cotton Mather (1691). Consult also articles in the (Cyclopaedia of American Biography® (Vol. II, 1887) ; and the (Dictionary of National Biography* (Vol. XVII, 1889).

ELIOT, Sir John, English colonial clergy¬ man : b. 7 Nov. 1685; d. 22 April 1763. He was a grandson of John Eliot, the "Apos¬ tle to the Indians,® and was long a pastor at Killingworth, Conn. He was an able preacher, a botanist and a scientific and prac¬ tical agriculturist; was the first to introduce the white mulberry tree into Connecticut, and dis¬ covered a process of extracting iron from fer¬ ruginous sands. He was also regarded as the first physician of his day in the colony; and such was his success in the treatment of in¬ sanity and chronic complaints, that he was some¬ times sent for to Newport and Boston, and was more extensively consulted than any other phy¬ sician in New England.

ELIOT, Samuel, American educator and historian : b. Boston, Mass., 22 Dec. 1821 ; d. Beverly, Mass., 14 Sept. . 1898. . He filled the chair of history and political science in Trinity College, Hartford, Conn. (1856-64) ; was its president (1860-64) ; and lecturer on history at Harvard (1870-73), and head master of the Girls' High School in Boston (1873-76). Frosr 1876-80 he served as superintendent of tK: Boston public schools. Among his publicationc are (The History of Liberty) (1853) ; (The

Liberty of Rome) (1849) ; (Life and Times of Savonarola5 (1856) ; (Manual of United States History Between the Years 1492 and 1850) (re¬ vised ed., 1873) ; and (Stories from the Ara¬ bian Nights5 (1879); Selections from Ameri¬ can Authors5 (1879).

ELIOT, Samuel Atkins, American Uni¬ tarian minister : b. Cambridge, Mass., 24 Aug. 1862, son of Charles W. Eliot (q.v.). He was graduated at Harvard College 1884; was pastor of Unity Church, Denver, 1889-93, and of the church of the Saviour, Brooklyn, 1893-98. He was secretary of the American Unitarian Asso¬ ciation 1898-1900,

becoming its president at the latter date. He is a member of the United States Board of Indian Commissioners; the president of the trustees of the Hackley School, an editor of the Hibbert Journal ; vice- president of the Massachusetts Federation of Churches, etc. He holds the honorary degree of D.D. from Bowdoin and LL.D. from Western Reserve University.

ELIS, e'lis, (1) a country in the west of Peloponnesus, where Olympia was situated. It was bounded on the east by Arcadia, on the south by Messenia and ran along the coast, watered by the river Alpheus. There were three districts in their country — Colle, or Hollow Elis, Pisatis and Triphylia ; the two latter being subject districts. It was the seat of the greatest national festivals. The Athenians were the first to raid the coast during the Peloponnesian War and frequent conquests followed. After the suppression of the games at Elis by the Em¬ peror Theodosius in 394 a.d., the Eleans lost their prestige entirely. Elis and Archaia now form a nomarchy of Greece with the capital at Pyrgos. (2) Elis, once the capital of Elis, is now called Ivaloskopi. (See Olympia). Consult Curtius, (History of Greece.5

ELISHA, a member of the tribe of Issa- char, a citizen of Abel-meholah, was a dis¬ ciple of Elijah, and his successor in the pro¬ phetic office. His prophetic ministry, which was exercised, as was that of Elijah, in northern Israel, began in the reign of Ahab, and con¬ tinued through the reigns of Jehoram, Jehu, Jehoahaz, and during a part of the reign of Joash, thus covering a period of more than half a century. He was a man of very dif¬ ferent character and mode of life from Elijah, although master and disciple seem to have been most warmly attached to each other. Elijah was a son of the desert; Elisha came from a quiet farm in the Jordan Valley. Elijah lived apart from men; Elisha, for the most part, dwelt in the city, either at Jericho among the sons of the prophets, or in his own home at Dothan or Samaria. Elijah had nothing to do with kings except to rebuke them ; Elisha was their friend and counsellor. Yet it is easy to make too much account of their difference of character and life and to suppose that it affected essentially the prophetic aim and re¬ ligious attitude, so that these were quite differ¬ ent in the case of each prophet. But to claim that the work and spirit of Elisha were in marked contrast to those of Elijah would be to claim too much. The declaration of Jehovah to Elijah on Mount Horeb, <(Him that escapeth from the sword of Jehu, shall Elisha slay55 (1 Kings xix, 17), shows that it was Elijah's work of vengeance and destruction which

Elisha was to continue. It was Elisha, more¬ over, who devised the plan for the destruction of the house of Ahab (2 Kings ix, 1-3). It was

Elisha, also, who reproved King Joash for his lack of zeal for the utter overthrow of Syria (2 Kings xiii, 19). It is to be remembered in this connection that the accounts which we have concerning the career of Elisha, whatever the cause may be, relate rather to his deeds as a man, than to his work as a prophet.

For some six or seven years after his call to the office of prophet by Elijah at Abel-me¬ holah (1 Kings xix, 19-21), he was a helper and disciple of Elijah. But we do not know just where he was in all this time, or the exact nature of his work. At the close of this time, after the ascension of Elijah, he began his own independent work as a prophet (2 Kings ii, 13- 22). The character of the narrative in the Second Book of Kings makes it impossible to arrange the events of his life in chronological order. It is better, therefore, to group them under two headings: (a) his deeds in private life; (b) his deeds in public life.

Under the first class, we may put (1) the healing of the waters of Jericho (2 Kings ii, 19-22) ; (2) the punishment of the lads of Bethel (2 Kings ii, 23-25) ; (3) the saving of a widow's son from slavery (2 Kings iv, 1-7) ; (4) the restoring of the Shunammite's son to life (2 Kings iv, 32-36) ; (5) the rendering of some poisonous pottage harmless (2 Kings iv, 38-41) ; (6) the miraculous feeding of a hun¬ dred men (2 Kings iv, 42—44) ; (7) the healing of Naaman the leper (2 Kings v) ; (8) the causing of the iron head of an axe to swim (2 Kings vi, 1-7).

Under the second class we may put (1) his helpful work in the campaign against Moab (2 Kings iii, 11-24) ; (2) his bringing of the Syrian armv into Samaria, where they were made pris¬ oners (2 Kings vi, 8-23) ; (3) his activity in the siege of Samaria (2 Kings vi, 24, vii, 2) ; (4) his visit to Damascus to announce to Hazael that he shall be king of Syria (2 Kings viii 7-13) ; (5) the sending of a messenger to anoint Jehu to be king of Israel (2 Kings ix, 1-3) ; (6) the assuring of King Joash that Israel should be victorious over Syria (2 Kings xiii, 14-19).

But the power of Elisha for good did not end with his life. Of him alone of all the prophets it is recorded that he wrought a miracle after his death. A dead man who was hastily cast into the sepulchre of the prophet, on touching the prophet's bones, came to life, and stood upon his feet (2 Kings xiii, 20-21). Consult Grove, (Elisha5 (in Smith's dictionary of the Bible,5 1868) ; Strachan, (Elisha 5 (in Hastings' dictionary of the Bible,5 1899) ; Farrar, (Second Book of Kings5 (Chaps, iii— xvii in the (Expositor's Bible,5 1902).

Sylvester Burnham,

Professor of Old Testament Interpretation,

Theological Seminary of Colgate University.

ELIXIRS, in pharmacy, are aromatic, sweetish, spirituous preparations, containing small quantities of active medicinal drugs. They are now mostly used as vehicles for other remedies and have very little potent action save that of the alcohol which they contain. Elixir aromaticum and Elixir glvcyrrhizoe (licorice) are the only two elixirs recognized by the 1917 revision of the United States Pharmacopoea.

ELIZABETH

ELIZABETH, the wife of the priest Zacharias and mother of John the Baptist, and a relative of Mary, the mother of Jesus. An angel foretold to her husband the birth of a son in her old age; and it was also foretold by the angel Gabriel to the Virgin Mary, as an assurance of the birth of the Messiah.

ELIZABETH, queen of England : b. Green¬ wich, 7 Sept. 1533; d. Richmond, Surrey, 24 March 1603. She was the daughter of Henry VIII and of Anne Boleyn. After her mother had been beheaded (1536) both she and her sis¬ ter Mary were declared bastards, but finally she was placed after Prince Edward and the Lady Mary in the order of succession. Thus, while the first two marriages of King Henry were both still held to be illegal, the children of both wrere legitimized. Elizabeth received a classical education, as was customary wdth women of rank in her time, and under her tutor, Roger Ascham, is said to have attained very consider¬ able proficiency in Latin and Greek. During her father's life, as wTell as in the reign of her brother, various negotiations were entered into for her marriage. The duke of Angouleme and Philip of Spain, who afterward married her sister, were among the matches proposed for' her; but the only affair of this kind in which she may be supposed to have been personally inter¬ ested was the suit of Lord Seymour of Dudley, the Protector Somerset's brother. It is certain that even during the life of Catharine Parr, the widow of Henry VIII, whom he married, his attentions to the Lady Elizabeth were only too well encouraged. Both before this marriage and after the death of his wife he wras a suitor for the hand of the princess ; but his ambitious designs in this and other matters were not coun¬ tenanced b}7 the council, and ultimately cost him his life.

On the death of King Edward, Elizabeth vigorously supported the title of Queen Mary against the pretensions of Lady Jane Grey, by which her own title as well as her sister's were barred. She rode to meet her sister, accom¬ panied by 1,000 horse, and this bold proceeding was of no small service in confirming the doubt¬ ful in their allegiance; but Elizabeth gained lit¬ tle for herself by a policy in which it was well understood she had her own interest in view. After Wyatt's conspiracy her life was in great danger, and was probably saved only by the in¬ tercession of Philip. She was committed to the Tower, from whence she was removed to Wood- stock, where she was confined with great strict¬ ness. She afterward, through Philip's interces¬ sion, obtained greater liberty; but throughout the whole reign continued an object of suspicion and surveillance. The danger she now incurred developed traits in her character which ever after continued conspicuous, her prudent self- control and power of dissimulation. She made every

demonstration not only of conformity, but of zealous adherence to the established re¬ ligion. Her conduct in this must not be judged from the point of view of rigid Protestantism, which Elizabeth never professed; but there were some at least among the Roman Catholic ceremonies and customs to which she could not be supposed to give a sincere adherence. Never¬ theless, her simulated zeal must have been well . and ably sustained, for her conduct was not left to the report of friends, but carefully

watched by spies and informers. Philip was most anxious to have her married out of the kingdom ; and if the Duke of Savoy, whom he proposed, was unacceptable from his Roman Catholicism, there was Eric, son of the king of Sweden, who long after continued to press his suit; but Elizabeth refused both. She felt in herself a capacity for rule, and her sister's ill health opened up for her an early prospect of the throne, which she was unwilling to peril. Mary's reign was not without advantage to Elizabeth. It tried her councillors as well as herself, and gave her the opportunity of select¬ ing them to advantage. Her adviser throughout the whole of it was William Cecil, afterward Lord Burleigh, who had already been a minister under Edward VI, and continued for the rest of his life to be one of the chief councillors and ablest ministers of Elizabeth, to whom he was in many respects a congenial spirit.

Gn 17 Nov. 1558 Mary's disastrous reign came to a close, and Elizabeth was immediately recognized queen by Parliament. On entering London she was met by the bishops, whom she permitted to kiss her hand, with the exception of Bonner, <(whom she omitted for sundry severities in the time of his authority.® It was now that the caution and secrecy characteristic equally of Elizabeth and Cecil, and which en¬ abled them to do such great things, appeared in spontaneous exercise. The Roman Catholic re¬ ligion was still predominant in the House of Lords, and any attempt to overthrow it suddenly might have been attended with the greatest danger. Elizabeth made no immediate change in her habits. For a full month the ceremonies of the Roman Catholic Church were retained in all their state. A solemn funeral service was held for Queen Mary in Westminster Abbey, at her interment on 13 December. The Queen even intimated her accession to the Pope. She re¬ tained the greater part of her sister's council, choosing only seven new councillors, who were Protestants, it is true, but not then known as such. Like Cecil and herself, they had all con¬ formed, and possessed the necessary qualifica¬ tion for Elizabethan councillors of accomplished dissimulation. Such were her difficulties, not¬ withstanding her great prudence, that at her coronation only one of all the bishops, Ogle¬

thorpe of Carlisle, could be found to set the crown on her head. The obstacle lay in the terms of the oath of allegiance, which affirmed that the sovereign was the supreme head of the Church, and to which no loyal Catholic could subscribe. She had also before this authorized the reading of the liturgy in English. The first great object of her reign was the settlement of religion. A Parliament was immediately called, to which this work was assigned. It met on 25 January, and was dissolved 8 May, but its object was already accomplished. The nation was pre¬ pared for a return to the reformed faith or rather to the via media which is embodied in the Anglican Church — and Parliament was at the bidding of the court. The reformation of re¬ ligion in England was the work of Cranmer, and had already been accomplished in the reign of Edward VI ; the re-establishment of the ecclesi¬ astical system of the national Church on the basis on which it has remained to the present day was the work of Cecil and Elizabeth, and it was nearly completed in this Parliament. Eliza¬ beth had less extreme opinions than many sup-

porters of the new faith. She was tolerant, for instance, in regard to images and was fond of ceremonial and is said to have entertained scruples as to the extent of the royal supremacy in spiritual matters ; but if she did, they must have been purely speculative. They certainly vanished on the first taste of power.

If the formal establishment of the reformed religion was easily completed, the security and defense of the settlement was the main object of the policy and the chief source of all the struggles and contentions of her reign. What made the position so difficult was the intolerance by which at this period and for long after all religious sects were characterized. No sooner were the Puritans freed from the restrictive measures of Mary's reign than they began to claim predominance for their own dogmas. But it was far from the intention of the Queen and the supporters of the Established Church, not¬ withstanding the common persecutions they had endured, to grant them even liberty of worship. Elizabeth's own determination, as expressed by herself, was that none should be allowed to turn aside either to the right hand or the left from the drawn line of prescribed duty, and in insist¬ ing upon uniformity of worship she was not singular, but was acting in the spirit of her age. This principle was not less firmly held in her reign than in her sister's ; and Roman Catholics on the one hand, and Puritans on the other, re¬ strained only by their

dread and hatred of each other, were made the irreconcilable enemies of the existing order. Moreover, from the neces¬ sities of the struggle the severities of Elizabeth's reign went on increasing as time advanced. At first no one suffered death for his opinions; but eventually many were executed for this cause. The struggle against Roman Catholics was the most severe, chiefly because they were supported by foreign powers ; so that while their religion was wholly prohibited, even exile was forbidden them in order to prevent their intrigues abroad. Simple non-conformity, from whatever cause, was pursued with the severest penalties. The fine imposed for non-attendance at church was £20 per month, while so straight were the lines of conformity drawn, that many more clergy¬ men were driven out of the Church by differ¬ ences about the position of altars, the wearing of caps and such like matters, than were forced to resign by the change from Rome to Reforma¬ tion. These stringent measures were, however, the rigid consequences of the false position assumed.

Elizabeth's first Parliament approached her on a subject which, next to religion, was the chief trouble of her reign, the succession to the crown ; they requested her to marry. She replied in a long speech, declaring her intention to live and die a virgin. It is certain, from her conduct both before and after, that this decla¬ ration was only a convenient affectation of prud¬ ery, which at once served to flatter her vanity and to veil her real indecision. She saw too clearly for her own interest the restraints to which each particular marriage might subject her and therefore she shunned them all, thus leaving open the question of the succession.

On Elizabeth's accession the country was at war with France. Peace was easily concluded 1559; but the assumption by Francis and Mary of the royal arms and titles of England led to an immediate interference on the part of Eliza¬

beth in the affairs of Scotland. She entered into a league with the Lords of the Congregation, or leaders of the Reformed party; and throughout her reign this party became distinctively an Eng¬ lish one, and was frequently serviceable in fur¬ thering her policy. She also gave early but half¬ hearted and dubious support to the Huguenot party in France, and to the Protestants in the Netherlands. Though she disliked war as an occasion of expense and had no toleration for any kind of nonconformity, throughout Europe she was looked on as the head of the Protestant party. She roused the implacable resentment of Philip, who strove in turn to excite the Roman Catholics against her, both in her own dominions and in Scotland. After the detention of Mary queen of Scots in England, he fomented the various rebellions in

her favor, formed in Eng¬ land and Ireland and at her death declared him¬ self her avenger. Mary, as is well known, was imprisoned 19 years in England, whither she fled to the protection of Elizabeth. Her im¬ prisonment was followed by a series of con¬ spiracies, beginning with that under the earls of Northumberland and Westmoreland and ending with the plot' of Babington, which finally deter¬ mined Elizabeth to proceed to extremities with her captive. The execution of Queen Mary was, nevertheless, the chief political blunder of Eliza¬ beth's reign. If the death of Mary did not raise up new enemies to Elizabeth on the Continent it at least gave a just cause of offense to those she already had. Elizabeth had for some time been engaged in a negotiation for marriage with the Duke of Alengon (afterward of Anjou) ; and in 1580 the Duke arrived in London to pur¬ sue his suit, which had lasted nearly 12 years, in person. He was well received, but still the Queen hesitated. She was now 47. The follow¬ ing winter the Duke paid another visit and the marriage was all but concluded, but she finally informed him she could never marry.

The state of France, as indicated by the change of government consequent on the acces¬ sion of Henry IV, who was assisted by Eliza¬ beth, obviated any danger that might have arisen from the indignation which the execu¬ tion of Queen Mary had caused in that coun¬ try. Nowhere, however, was that event more meekly borne than by King James. The Scot¬ tish Solomon had thought his mother's danger a favorable opportunity for sententious obser¬ vations about the strangeness of her case, and now his philosophy was nonplussed. His awe of Elizabeth and his dread of interfering with his own right of succession to England made him powerless, and he accepted an addition to his pension in full of his grievances. Philip was not to be so appeased. . He had other grievances, to which the execution of Mary lent edge. The fleets of Elizabeth had gallecl him in the West Indies, her arms and subsidies had helped to deprive him of the Netherlands; the Armada was already in preparation. There¬ fore he called the Queen of England a mur¬ deress, and refused to be satisfied even with the sacrifice she seemed prepared to make of her Dutch allies. The Armada sailed on 2 May 1588. Its fate is too well known to need reca¬ pitulation. The war with Spain dragged on till the close of Elizabeth's reign.

During her long rule Elizabeth showed her judgment in nothing so much as in the coun¬ cillors she trusted. But while the splendor of

her government at home and abroad was sus¬ tained by such men as Burleigh, Bacon, Wals- ingham, Throgmorton and Davison, who served her with a zeal which did not always spare even their own reputations, she had personal favorites of less merit who were often more brilliantly rewarded. It is sufficient to name Dudley, whom she created Earl of Leicester; and Essex, who was still more a personal favo¬ rite, though much less a courtier. The latter had some merit as a soldier; but his violen; tem¬ per, ill-suited to the Queen's haughty disposition, brought about his ruin. He was beheaded in 1601 and Elizabeth never forgave herself his death. Her own health soon after gave way, and she died, naming James of Scotland as her successor.

Besides its political glories, won in despite of the Queen's somewhat insular and narrow outlook, the reign of Elizabeth was the golden age of English literature. If all else could be forgotten, it would be remembered as the age of Spenser and of Shakespeare, not to mention a host of minor names. The naval achieve¬ ments of Drake and the discoveries of Raleigh concurred to do it honor. Thus everything conspired to throw a halo round the name of Elizabeth, when regarded as a sovereign, and seen as she would be in her own day, especially by foreign beholders, through the drapery of state. If a minute criticism has exposed some of the weaknesses of the individual woman who bore this burden, it must be remembered that the process is only half fair. As a sover¬ eign she is entitled to her surroundings, and as an absolute ruler, as to a great extent she undoubtedly was, she must have her share of praise for the good that was done in her name. It is no small merit to select good councillors and to adhere to them. Elizabeth knew how to do both ; and yet she was no puppet in the hands of her advisers. Though haughty and imperious to the Commons, she knew both when and how to yield. She studied with rare sagacity the temper of the people; and high as were her notions of prerogative, she may fairly be considered the first constitutional monarch of England.

Bibliography. — Cambden, (History of Queen Elizabeth * (1622) ; D'Ewes, journals

of all the Parliaments of the Reign of Queen Elizabeth (1682) ; Bruce (ed.), 'Letters of Elizabeth and James VP (1849) ; Wright, (Queen Elizabeth and Her Times* (1838); Strickland, ' Lives of the Queens of England* ; Wiesener, 'La jeunesse d'Elisabeth d'Angle- terre> (1878) ; Froude, 'History of England* (Vols. VII-XII, 1870) ; Hume, Martin. 'Calen¬ dar of Spanish State Papers: Elizabeth*; id., 'Courtships of Queen Elizabeth* (1896) ; id., 'The Year After the Armada* (1896) ; id., 'The Great Lord Burghley* (1898) ; Creighton, 'Queen Elizabeth*

(1899); Beezley, ‘Queen Elizabeth* (1902) ; Jessopp, ‘Queen Elizabeth,* in ‘Dictionary of National Biography.*

ELIZABETH, empress of Austria : b. Possenhofen, Bavaria, 24 Dec. 1837 ; d. Geneva, 10 Sept. 1898. She was the daughter of Duke Maximilian Josef of Bavaria, and married her cousin, the Emperor Franz Josef, on 24 April 1854. Together they were crowned with the insignia of Saint Stephen when the inaugura¬ tion of the dual system was solemnized. She

was greatly admired by Austrians and Hun¬ garians alike. While visiting Geneva, Switzer¬ land, she was assassinated by an Italian anar¬ chist. Consult Friedmann, ‘Kaiserin Eliza¬ beth* (Berlin 1898).

ELIZABETH, Madame (Elisabeth Philippine Marie Helene), French princess: b. Versailles, 3 May 1764; d. Paris, 10 May 1794. She was a sister of Louis XVI. She was the faithful friend and companion of the royal family in their flight to Varennes, and during their imprisonment was executed, on the pre¬ tense of corresponding with her other brothers, afterward Louis XVIII and Charles X.

ELIZABETH, Pauline Ottilie Luise,

dowager queen of Rumania (pseudonym “Car¬ men Sylva**) : b. Neuwied, 29 Dec. 1843; d. Bucharest, 2 March 1916. Her father was Prince Hermann of Wied and her mother, Princess Marie of Nassau. She married Charles of Rumania, 15 Nov. 1869. She was the patroness of arts and letters in Rumania, did much to promote native artistic industries and founded several charitable institutions. She is well known as a writer over the signa¬ ture “Carmen Sylva,** her works including ‘Sappho* (1880) ; ‘Hammerstein* (1880) ; ‘Stiirme* (1881) ; ‘Leidens Erdengang* (‘Sorrow on Earth*) (1882); ‘Les pensees d’une reine* (1882) ; ‘Pelesch Marchen* (1883) ; ‘Le pic aux regrets* (1884) ; ‘Es klopft* (1887). She was very much interested in collections of Rumanian legend and folk¬ lore. In English she wrote ‘Pilgrim Sorrow,* ‘A Real Queen’s Fairy Tales* and ‘From Memory’s Shrine.* In 1882 she became a mem¬ ber of the Academy of Science at Bucharest, and in 1914 an honorary Fellow of the Royal Society of Literature of the United Kingdom.

ELIZABETH, Saint, of Hungary, daughter of Andrew II, king of Hungary, and Gertrude, daughter of the Duke of Carinthia : b. Presburg 1207; d. Marburg, 19 Nov. 1231. Early in life she displayed a dislike for things worldly, as the pomp with which she was surrounded, am¬ bition, avarice and vain pleasures, and began to

cultivate humility, piety and great charity. According to the custom of the times, when she was only four years old she was betrothed by her parents to Louis, the son of the Landgrave of Thuringia, who was about her own age. When Elizabeth was 14 years old they were married. Her husband admired his wife's piety and approved her great charity, especially during the famine in Germany in 1225, al¬ though members of his own family severely censured her. She founded hospitals in Mar¬ burg and other places within her husband's dominion. (Louis' father died the year after the betrothal, and he was the landgrave when he married Elizabeth). In 1227 Louis left home with Frederick Barbarossa to engage in the war for Palestine; but before reaching the Holy Land Louis died from fever. Great mis¬ fortunes soon befell Elizabeth. She was de¬ prived of her regency by the brother of her deceased husband and driven out of her do¬ minion on the plea that she wasted the treasures of the state by her charities. The inhabitants of Marburg, whose miseries she had frequently relieved, refused her any asylum, for fear of the new regent. At last she found refuge in the monastery of Kitzingen, where her aunt

was abbess, and later with her uncle, bishop of Bamberg, and when the warriors who had at¬ tended her husband in the Crusade returned from the East with his body, she gathered them around her, and recounted her sufferings and the wrongs done to her three children. Steps were taken to restore to her her sovereign rights. She declined the regency, however, and would accept only the revenues which accrued to her as landgravine. The remainder of her days were devoted to almsgiving, mortifications and prayer. She became a member of the Third Order of Saint Francis, and in pictures she is often represented clothed in the Francis¬ can habit. She was canonized by Gregory IX four years after her death. Consult Montalem- bert, (Life of Saint Elizabeth of Hungary5 (trans. into English by F. D. Hoyt 1904) ; Starr, (Patron Saints 5 ; Butler, (Lives of Saints5 ; Bonaventure, (Sermon on Saint Eliz¬ abeth. 5 There are extant manuscripts on her life, by contemporaries, Conrad of Marburg, Siegfried of Mentz, Theodoric and Montague of Spire, and others.

ELIZABETH Farnese, far-na'ze, queen of Spain: b. 25 Oct. 1692; d. 1766. She was a daughter of Edward II, Prince of Parma. On becoming the second wife of Philip V she sur¬ prised those who had counseled the marriage by assuming the practical headship of the king¬ dom ; her ambition to place her sons Carlos and Philip in power over

principalities in Italy and the aggressive policies of her Minister, Alberoni, disturbed the whole of Europe.

ELIZABETH PETROWNA, empress of Russia: b. 29 Dec. 1709; d. 5 Jan. 1762. She was the daughter of Peter the Great and Cath¬ arine, and ascended the throne on 7 Dec. 1741, as the result of a conspiracy, in which Ivan VI, a minor, who had reigned only one year, was deposed. Elizabeth is said to have rivaled her mother in beauty and to have surpassed her in her love of pleasure. Her reign was stained both by her unbridled licentiousness and the tyranny of her government, which was con¬ ducted by favorites. Banishment to the mines of Siberia and imprisonment in dungeons were awarded for the slightest political offenses. She was a patron of literature and corresponded with Voltaire, to whom she supplied materials for his (Life of Peter the Great. > She also founded the University of Moscow and the Academy of Fine Arts of Saint Petersburg. Elizabeth sent an army, in 1748, to assist Maria Theresa in the war of the Succession, which contributed to bring about the Peace of Aix-la- Chapelle; and she joined in the Seven Years' War against Prussia. Consult Bain, (The Daughter of Peter the Great) (London 1899).

ELIZABETH STUART, queen of Bo¬ hemia : b. Falkland Palace, Fifeshire, 16 Aug. 1596; d. London, 13 Feb. 1662. She was a daughter of James I of England and was mar¬ ried to the Palatine Frederick at Whitehall, 14 Feb. 1613. Her husband was then at the head of the Protestant interest in Germany, and in 1619 he accepted the crown of Bohemia offered to him by the revolted Protestants of that country. This he was only able to retain for a very short period ; and after his defeat by the Imperialists at the battle of Prague in 1620, he and his wife were obliged to flee, first to Bres¬

lau and Berlin, and then to The Hague. Eliza¬ beth had 13 children, several of whom died early. Charles Louis, the eldest surviving, was reinstated in the palatine by the Treaty of Westphalia in 1648. His daughter, Eliza¬ beth Charlotte, was the second wife of Philip, Duke of Orleans, brother of Louis X,IV. Her descendants were excluded by their Catholicism from the crown of England, but one of them was regent of France during the minority of Louis XV ; and another, Louis Philippe, ascended the throne after the revolution of 1830. Her sons, Princes Rupert and Maurice, distinguished themselves in the civil war in England. Her daughter, Sophia, married into the house of Brunswick, became electress of Hanover and mother of George I. Elizabeth Stuart's cause was extremely popular with the English nation and after her husband was de¬ prived of the crown of Bohemia she still re¬ tained among them the endearing epithet of <(Queen of

Hearts.® She returned to England at the Restoration with her nephew, Charles II. Consult Green, Mrs. E., (Lives of the Prin¬ cesses of England5 (London 1854).

ELIZABETH OF VALOIS, val-wa', or ISABELLA, Queen of Spain : b. Fontainebleau, France, 22 Nov. 1545; d. Madrid, 3 Oct. 1568. She was a daughter of Henry II, of France, and Catherine de Medici. She was destined to be the wife of the infante, Don Carlos, but his father, Philip II, being left a widower, became fascinated and married her himself. The story of a romantic relationship between Elizabeth and Don Carlos has furnished tragic subjects to Otway, Campistron, Chenier, Schiller and Alfieri.

ELIZABETH, N. J., city, county-seat of Union County, on Newark Bay and the Arthur Kill, and on the Pennsylvania, Lehigh Valley, Baltimore and Ohio, Philadelphia and Reading and New Jersey Central railroads, 14 miles southwest of New York. Elizabeth has a good harbor admitting vessels of 25 feet draught. Coal and iron reach tidewater here from the Pennsylvania fields and are transshipped here. The city has steamer communication with New' York and is the residence of many who com¬ mute daily to the latter city. It has many fine homes and wide streets, well paved. The chief articles manufactured are sewing-machines (one of the shops of the Singer Manufacturing Company, employing about 10,000 people, being located here), oilcloth, hats, saws, mill-ma¬ chinery, stoves, hardware, edge-tools, harness, cordage, combs, leather and rubber works, oil refineries, foundries, chemical works, ship build¬ ing plants, wire and cable, tools, electromotors, castings and bronze powder. The United States Census of Manufactures for 1914 showed within the city limits 184 industrial establish¬ ments of factory grade, employing 14,297 per¬ sons, 12,871 being wage earners, receiving $8,198,000 annually in wages. The capital in¬ vested aggregated $31,037,000 and the year's output was valued at $31,228,000: of this, $14,- 921,000 was the value added by manufacture. The shops of the Central Railroad, employing about 1,000 hands, and the Crescent Steel Works and shipyard are located here. There are three banks, one savings bank and a trust company with a combined capitalization of $700,000 and deposits of $7,154,000, and building and loan

associations. Among public institutions are the Alexian Brothers' Hospital, General Hospital, Saint Elizabeth Hospital, Orphan Asylum,

Old Ladies Home and Public Library. The educa¬ tional institutions include the Battin and Pingry high schools, the Vail-Deane School, a business college and 11 public schools. The city has electric lights and street railways, many hand¬ some churches and contains an old tavern where Washington stopped on his way to New York for his inauguration. Gen. Winfield Scott's home the Boudinot House and the old Living¬ ston Mansion are located here. It was settled in 1664 as Elizabethtown and four years later the first General Assembly of New Jersey met here. For two years after 1755 it was the capital of the Colony of New Jersey. During the Revolution it suffered from its position be¬ tween the contending forces. In 1789 it was chartered as a borough, as a town in 1796, and as a city in 1855. Its revenue averages about $2,250,000. In 1746 the college of New Jersey (now Princeton) was established here. Among its early citizens were the great rivals Alex¬ ander Hamilton and Aaron Burr. There are many fine types of architecture of the Revolu¬ tionary period still standing. Pop. 95,682. Consult Hetfield, (History of Elizabeth) (New York 1868).

ELIZABETH, Cape. See Cape Eliza¬ beth.

ELIZABETH CITY, N. C., town, county- seat of Pasquotank County, on the Pasquotank River and the Norfolk and Southern and the Virginia and Carolina Coast railroads, about 145 miles northeast of Raleigh. A State normal school and United States custom-house are lo¬ cated here. The town has a good trade in the produce of the neighboring truck farms, also in cotton, fish and oysters. The region about is adapted for agriculture, lumbering and cotton raising. The manufactures of the town are varied, including cotton, saw- and planing-mills, shipbuilding, brick yard's, carriage and wagon factories, shingle factories, hosiery mills, flour and grist-mills, ironworks, machine-shops, bar¬ rels and baskets, boxes, etc. The town was founded in 1793 and now has a government consisting of a mayor, elected every two years, a board of aldermen and a board of control. A naval victory was gained here by the Federals, 10 Feb. 1862. Pop. (1920) 8,925.

.ELIZABETH ISLANDS, Mass., group of 16 in number, forming the town of Gosnold, in Dukes County. They are situated between Vineyard Sound and Buzzards Bay; area, 14 square miles. In 1602 the first New England settlement was made on one of these islands, Buttyhunk, by Bartholomew Gosnold; but after a residence of a few weeks it was abandoned and Gosnold returned to England (see Gosnold, Bartholomew). The climate is healthful and the islands are popular with anglers and as a vacation resort. Naushon and

Nashawena are the largest of the group, which in 1864 were incorporated as the town of Gosnold. Pop.

164.

ELIZABETHAN ARCHITECTURE, a

style of architecture, which began to prevail in England during the reigns of Elizabeth and James I. It was a mixture of inferior Gothic with debased Italian, often very picturesque,

but without purity and unity of design. It was characterized by deeply embayed windows, gal¬ leries of great length, very tall and elaborate chimneys, strap work in the parapets and win¬ dow-heads, and many dormented details of surface-carving characteristic of the bizarre in¬ fluence of the combined Renaissance forms from Germany and Holland. The names of Holbein and John of Padua are associated with this style of architecture in which they had hoped to revive classic models. The mansions erected for the nobility during the reigns of Elizabeth and James I are examples of this style of architecture, particularly the palace erected in the mixed style for Protector Somer¬ set by John of Padua and the mansion of Long- leat for his secretary, Sir John Thynne. Others which may still be seen near London and which represent the architecture of the 17th century are : Knowle, belonging to the Duke of Dor¬ set, the Marquis of Salisbury's at Hatfield, Hol¬ land House, Campden House in Surrey, Brams- hill in Kent, Sir T. Willow's at Charlton, Bur¬ ton Agnes, Blickling, Montacute, Audley End, Mogus Park, Aston, etc. This style was suc¬ ceeded by the Jacobean in which Gothic details disappeared. The greatest architects of the Elizabethan period were Gerard Chrismas, John Thorpe, Thomas Holt and Rodolph Sy- monds. Consult Gotch and Brown, Archi¬ tecture of the Renaissance in England) (Lon¬ don 1894) ; Richardson, Architectural Remains of the Reigns of Elizabeth and James P (ib. 1840) ; Blomfield, (History of Renaissance Architecture in England) (ib. 1897).

ELIZABETHTOWN, Ky., city, county- seat of Hardin County, on the Louisville and Nashville and the Illinois Central railroads, about 40 miles south of Louisville. The city is the centre of the trade in asphalt for which the county is noted. It has flouring mills, stave and overall factories, and dairying interests, and carries on a considerable trade in live stock, grain, flour, fruit, brick and tobacco. It has municipal waterworks. Pop. (1920) 2,530.

ELIZAVETPOL, e-le-za-vet-pol, or YELIZAVETPOL, Russia, (1)

government of Transcaucasia, Asiatic Russia; area 16,991 square miles; pop. 1,098,000, of whom about 60 per cent are Azerbaijan Tartars, 30 per cent Armenians and the balance Kurds, Russians, etc. It is bounded on the north by Tiflis, Daghestan and Zakataly, east by Baku, south by Persia and west by Erivan. It be¬ longs partly to the region of the Little Caucasus and is partly covered with steppes, in the west consisting of high mountains whereas the east is more level. The Kur River and several smaller streams are the chief waterways. Agri¬ culture is the principal industry, the valleys being fertile and well cultivated. Wine is pro¬ duced in considerable quantities; also cotton, the acreage in 1914-15 being 142,570 producing 23,652,500 pounds. The rearing of live stock is largely carried on in the steppes. The moun¬ tain slopes are well wooded and there are rich deposits of minerals, especially of copper, cobalt and iron ore which are found and mined in large quantities. The Transcaucasian Railway crosses the government, which is divided into eight districts, Elizavetpol, Zanglzur, Aresh, Jebrail, Javanshir, Shuslra, Kazakh and Nukha.

(2) A city of the same name is the capital of the government, located on an affluent of the Kur River about 120 miles by rail southeast of Tiflis. It is situated in a rich agricultural region and besides trading in the agricultural products and fruit, the inhabitants are exten¬ sively engaged in the silk-worm industry. The city consists of two sections, the old and the new; the former is poorly built with crooked streets and low-roofed houses and is occupied chiefly by Mohammedans ; the latter is well built and contains several handsome buildings, churches, mosques, etc., and a bazaar. Ancient remains are found in the vicinity of the city and the old Turkish fortifications may still be seen. The city changed hands between Per¬ sians, Arabs and Khozars as early as the 7th century, later came into the possession of the Mongols, Georgians, Persians and Turks, was taken by the Russians in 1796 and finally an¬ nexed to Russia in 1813, receiving its name in honor of Elizabeth, daughter of Alexander I. In 1826 the Persians were defeated here. Pop.

60,500.

ELK, the name of various deer, but origi¬ nally and properly belonging to the great, fiat¬ horned deer of northern Europe (Alces mach- lis), of which the American moose is substan¬ tially the counterpart, although regarded by naturalists as a distinct species. The

European elk is now restricted to northern Russia, north¬ ern Scandinavia and the wilder forests of east¬ ern Prussia; but in Pleistocene times it had a far more southerly range, together with other species now extinct. The great-antlered (

The American deer called elk, by the igno¬ rance or carelessness of early colonists, is the large, round-horned stag, related not to the true elk but to the red deer of Europe, and the white-tailed and other deer of this country, and would better be called, as commonly nowadays by its Indian name Wapiti. See Wapiti ; Deer.

ELKESAITES. See Elcesaites.

ELKHART, Ind., city in Elkhart County, at the confluence of the Saint Joseph and Elk¬ hart Rivers, and on the Cleveland, Cincinnati, Chicago and Saint Louis, the Lake Shore and Michigan Southern and other railroads, 101 miles east of Chicago. It is a railroad centre and shipping point for a large agricul¬ tural region. The rivers afford excellent water power. A large dam and power-house, erected in 1913 at a cost of $750,000, furnishes abun¬ dant power for its industries, which include rail¬ road shops, musical instrument factories, auto¬ mobile works, bridge and iron works, and es¬ tablishments for the manufacture of carriages, invalid tables, machinery, gocarts, corsets, tele¬ phone supplies, furniture, brass sundries, gas generators, paper boxes, rubber and paper. The United States census of manufactures for 1914 showed within the city limits 105 in¬ dustrial establishments of factory grade, em¬ ploying 3,815 persons; 2,993 being wage earners, receiving annually $4,382,000 in wages. The capital invested aggregated $9,511,000, and the

year's output was valued at $8,649,000 : of this, $4,267,000 was the value added by manufacture. The city has a Carnegie library and a fine high school building. Elkhart is the seat of Elkhart Institute and has public schools, business col¬ leges, daily and weekly newspapers, gas and electric lights, electric railways, waterworks and two national banks. The control of the govern¬ ment is vested almost entirely in the mayor and there is a city council. Pop. (1920) 24,277.

ELKHORN, a river in Nebraska formed by the junction, in Madison County, of the North Fork, which has its rise in Brown County, and the South Fork, which rises in Knox County. The general course is south¬ east, 260 miles, when it flows into the Platte River. Logan Creek is the largest tributary.

ELKIN, William Lewis, Ameri :an astron¬ omer: b. New Orleans, 29

April 1855. He was educated at the Royal Polytechnic School in Stuttgart, Germany, and was graduated in 1880 at the University of Strassburg. He then went to the Cape of Good Hope on the invitation of Sir David Gill, English astronomer there, and took part with him in observations with the heliometer for the determination of stellar parallax, these determinations being the most accurate of the kind ever made up to that time. He became astronomer in 1884 and director in 1896 of the Yale College observatory. His work there was mainly in the lines of determi¬ nations of stellar parallax, the solar parallax from asteroids and the photography of meteor trails.

ELKINS, Stephen Benton, American pol¬ itician : b. Perry County, Ohio, 26 Sept. 1841 ; d. 4 Jan. 1911. He removed to Missouri when a child; was graduated at the University of Missouri in 1860; and admitted to the bar in 1864. During the latter year he went to New Mexico, where he was a member of the Terri¬ torial legislature in 1864-65 ; and the Territorial delegate in Congress in 1873-77. Subsequently he removed to West Virginia where he ac¬ quired large business interests. He married the daughter of Henry Gassawav Davis. He secured control of great coal fields in West Virginia and also became a large stockholder in several railroads, serving also as vice-presi¬ dent of the West Virginia Central and Pitts¬ burgh Railroad. In 1891-93 he was Secretary of War and in 1894, 1900 and 1907 was elected to the United States Senate. The Elkins Rail¬ road Law of 1903 bore his name. See Elkins Act.

ELKINS, W. Va., city and county-seat of Randolph County, on both sides of the Tygarts Valley River and on the West Virginia Cin¬ cinnati and Pennsylvania (Wabash) and its branches, the Coal and Iron and the Coal and Coke railways, 60 miles south of Graf¬ ton and 130 miles northwest of Charles¬ ton. Elkins is in the centre of vast timber areas, and nearby are large deposits of coal, glass, sand, limestone, potter's clay, fire clay and shale suitable for the manufacture of pressed brick and tiling. The industries include railroad car and machine shops, brick works, ice plant, foundries and machine shops, tannery, boiler works, pail factory, several planing mill's, etc. The principal streets are paved with brick or macadamized limestone, and walks are laid with brick. The city owns the waterworks,

which pump the water from the Tygarts Valley River. The streets are lighted by electricity and natural gas is furnished for domestic and

manufacturing purposes. There are a national bank and a trust company in the city, with com¬ bined capital of $300,000 and deposits of about $1,200,000. The city contains seven churches, representing the leading denominations. There are a graded public school and a high school. Elkins is also the seat of Davis and Elkins Col¬ lege and has an Odd Fellows home, two hospi¬ tals and an orphans' home. Under a charter of 1905 it is governed by a mayor, chosen annu¬ ally, and a unicameral council. Pop. 6,788.

ELKINS. ACT, a law enacted 19 Feb. 1903, to prevent secret railroad rebates and discrimi¬ nations. The acceptance as well as the offer of a rebate or unlawful discrimination was a violation of the law ; the published rate was de¬ clared to be the only lawful charge, and the United States Circuit Courts were authorized to enjoin carriers to charge only the published rates. The penalty was not less than $1,000 nor more than $20,000 for each offense, the corpo¬ ration as well as the officer giving the rebate receiving the penalty. The law was most effective and with slight changes was incorpo¬ rated in the Hepburn Act (1906) and the Mann-Elkins Act (1910). See Differentials in Railroad Traffic; Sherman Anti-Trust Act.

ELKS, Benevolent and Protective Order

of, a fraternal association, founded in 1868 in New York from an older social and benevolent society, the Jolly Corks. The grand lodge was incorporated 10 March 1871, and was composed of past members of New York Lodge No. 1, the premier regular association. In the same year it was empowered to form branch lodges. Lodges were formed in Philadelphia, San Fran¬ cisco, Chicago, Cincinnati, Sacramento, Balti¬ more, Louisville, Saint Louis, Boston, Pitts¬ burgh, Indianapolis, Providence, Washington and Denver and in every other city of any size throughout the country. The order has been noted for the prompt assistance given its members and also its ready response to calls for aid from the outside. In all great calami¬ ties of recent years it gave liberally of its funds to aid the needy. Its membership is close to 500,000, and its annual disbursements are about $600,000. There are 1,392 lodges, and sub¬ ordinate lodges in Alaska and the island pos¬ sessions of the United States. White male citizens of 21 years or over and of good char¬ acter are eligible for membership. In any city there may be but one lodge, and the population of such citv must be at least 5,000. On the first Sunday of December is held a memorial service for the deceased members of the order. Prop¬ erty and cash to the extent of over $11,000,000 are owned by the order. Its official organ is the Elks Antler , a monthly published in New York. Consult Ellis, C. E., (Authentic History of the Benevolent and Protective Order of Elks)

(Chicago 1910).

ELKTON, Md., town and county-seat of Cecil County, 50 miles northeast of Baltimore, on the Philadelphia, Baltimore and Washing¬ ton Railroad and on the Elk River. It contains a hosiery mill, fertilizer works, boat yards, tex¬ tile mills and pulp mills. First settled in 1681. Elkton was incorporated in 1787. It has

adopted the commission form of government. Pop. (1920) 2,660.

ELKUS, Abram Isaac, American lawyer and diplomat: b. New York, 6 Aug. 1867. He was educated at the College of the City of New York and at Columbia. He has been promi¬ nent at the New York bar since 1888 and was considered by President Wilson for a place on the Federal court in New York. He is one of the leaders of the American Jewry and has frequently appeared for Jewish immigrants who have faced detention at Ellis Island and deportation because they had less than $25 in cash when they reached this country.

In 1896 he became a member of the law firm of James, Schell and Elkus. On the deaths of his partners he became senior member in the firm now known as Elkus, Gleason & Pros- kaner. He has appeared in all branches of his profession. He was elected by the United States judges as a special United States attor¬ ney to prosecute fraudulent bankruptcy cases and met with great success in that work.

He acted as counsel for the Merchants' Association and president of the Hebrew- Technical School and as trustee of the Baron de Hirsch Fund. In July 1916 he was nomi¬ nated by President Wilson as Ambassador to Turkey to succeed Henry Morgenthau. He re¬ mained at this post until July 1917. In Novem¬ ber 1919 he was appointed judge of the Court of Appeals of New York. He wrote < Secret Liens and Reputed Ownership.)

ELL, an old linear measure, originally de¬ noting the length of the forearm and later de¬ noting different lengths. The English ell equalled one and one-quarter yards (45 inches).

ELLAGIC ACID or BEZOARIC ACID,

ChH608, is separated from Oriental bezoar stones (concretions found in the stomachs of goats and other animals which have fed upon plants containing ellagitannin) by dissolving them in cold strong potash, away from the air, passing a current of carbolic acid, collecting the ellagate of potassium, washing and recrystalliz¬ ing it, and then liberating the ellagic acid by hydrochloric acid. When

crystallized from pyridine it forms prismatic needles. After washing these with alcohol ellagic acid becomes pale yellow, tasteless, crystalline powder, insolu¬ ble in water, decomposing at 680°, at which temperature it has still refused to melt. With the bases it forms salts, which are not very well known ; they are crystalline and insoluble or sparingly soluble in water. The lead and barium compounds are yellow. This acid can be prepared synthetically by oxidizing gallic acid with arsenic acid. Though not in itself a. tanning agent it is considered of great value in the tanning industry.

ELLE ET LUI () is a novel by George Sand which excited a good deal of comment and enjoyed a kind of celeb¬ rity because it was accepted as her version of her unfortunate love affair with Alfred de Musset. After the rupture which brought to a pitiful end their Venetian adventure (1834), many bitter accusations were brought against each by the friends and partisans of the other, and neither hesitated to exploit the experience for literary purposes. George Sand's (Lettres

d'un voyageur,* written immediately afterward, already drew largely upon it and echoes of it are frequent in the subsequent poetry of Mus¬ set (Nuit de mai, Souvenir) and in his Con¬ fession d'un enfant du siecleP The appearance of (Elle et Lui) (1859) shortly after the poet's death (1857) revived the bitter memories and recriminations of the affair. It was evidently substantially the story of their relations, under the transparent disguise of a novel, though George Sand's intention, as she tells us else¬ where, was not to tell their story, but to ((pre- sent, under the veil of fiction, a certain situ¬ ation in which others than they may have found themselves.® It provoked from Paul de Musset, Alfred's brother, the answering volume, (Lui et ElleP in the poet's defense. The fttruc story® of (Elle et LuP has been told by Spoel- berch de Louvenjoul ((La veritable histoire de Elle et Lui, Notes et documents, > 1897). The original correspondence of George Sand and Alfred de Musset has been published by Felix Decori (1904).

Arthur G. Canfield.

ELLENBOROUGH, el'len-bur-6, Edward Law, Lord, English lawyer: b. Great Salkeld, Cumberland, 16 Nov. 1750; d. London, 13 Dec. 1818. He was educated at Cambridge, became the pupil of the celebrated special pleader, George Wood, in 1771, and was called to the bar in 1780. In 1787 he was made a king's counsel. On the trial of Warren

Hastings in 1788, Erskine having refused to undertake the defense, Law served as leading counsel. It required no little courage to encounter such opponents as Burke, Fox, Sheridan and other eminent men of the time, who conducted the impeachment. Law, as is well known, obtained the victory. In 1801 he was made Attorney- General and in 1802 became Lord Chief Jus¬ tice of the king's bench and was created baron. In Parliament he opposed the emancipation of the Catholics. Believing that the criminal laws were not severe enough he succeeded in estab¬ lishing 10 new capital felonies by the passage of the so-called Ellenborough Act, afterward repealed in toto. He held the office of chief justice for 15 years.

ELLENBOROUGH, Edward Law, 1st

Earl of, English statesman: b. 8 Sept. 1790; d. near Cheltenham, 22 Dec. 1871. He was educated at Eton and Cambridge; entered Par¬ liament as representative of Saint Michael's in 1814, and in 1818 succeeded his father as 2d baron and entered the House of Lords. He was Lord Privy Seal in 1828, and in 1841 accepted the governor-generalship of India. He arrived in Calcutta in time to take control of the Afghan war, which was brought to a suc¬ cessful issue. Scinde was conquered by Sir Charles Napier and annexed in 1843. This was followed by the conquest of Gwalior. The conduct of the governor-general, however, gave great dissatisfaction at home. He was conse¬ quently recalled by the East India Company early in 1844. Under Lord Derby's govern¬ ment in 1858 he held the office of President of the Board of Control from February to June, during which he wrote a dispatch censuring the policy of Lord Canning as governor-gen¬ eral of India, which caused much discussion and led him to resign his office.

ELLENVILLE, N. Y„ village of Ulster County, at the foot of Shawagunk Mountain, on the main line and on the Ellenville and Kingston division of the New York, Ontario and Western Railroad, 18 miles north of Mid¬ dletown. The first house was built in 1805, a post office established in 1823 and the village incorporated in 1856. It has several denomi¬ national churches, a high school and other edu¬ cational establishments, two national and one savings banks, and its industries include zinc mining, manufactures of cutlery, paints, hand¬ kerchiefs and shirt waists, overalls, artificial stone, and wooden wares, employing about 300 operatives. Ellenville is a popular summer re¬ sort. It has finely shaded streets and is near several places of interest, including Mount Meenahga, the Ice Caves, Sun Ray Spring and many beautiful waterfalls. The village owns its waterworks. Pop. 3,114.

ELLER, Johann Theodor, German chem¬ ist : b. Plotzkau, in Anhalt-Bernburg, 29 Nov. 1689; d. Berlin, 13 Sept. 1760. In 1721 he was appointed Anhalt-Bernburg physician; in 1724, professor of anatomy in Berlin; in 1735, physi¬ cian to Frederick the Great; in 1755, privy councillor and director of the physical class of the Academy of Sciences. His papers were published in the (Memoirs of the Berlin Acad¬ emy,) and among them is a long and interesting review of the opinions held respecting the ele¬ ments from the earliest times down to his own day. He also published a series of curious microscopic observations upon the change of blood corpuscles by the addition of different salts, tinctures of plants and other solutions. Eller was undoubtedly a man of great learning and abilities, but his writings do not indicate a high degree of originality.

ELLERIANS, a sect of fanatics which arose in 1726, and had for its founder Elias Eller, a ribbon-weaver, who was born in 1690 at Ronsdorf in Berg. He was influenced in his religious beliefs by reading the works of Jacob Bohme, and other mystical writings. The sect committed great excesses, and became very numerous. See Bohme, Jacob.

ELLERY, William, American patriot : b. Newport, R. I., 22 Dec. 1727; d. there, 15 Feb. 1820. He sat in the Congress of 1776, and was one of the signers of the Declaration of Inde¬ pendence. He became Chief Justice of Rhode Island in 1785 and in the following year com¬ missioner of the Continental Loan Office for Rhode Island. From 1790 till his death, he re¬ tained the office of collector in his native place.

ELLESMERE LAND, the most northern region of the continent of North America, dis¬ covered by Baffin in 1616. The western part of this region was explored and mapped by Otto Sverdrup (q.v.) in 1899. Ellesmere Land is a high plateau, without human inhabitants; a few reindeer, musk-oxen and wolves find suste¬ nance there. It is separated from Greenland by Smith Sound. Consult Sverdrup's account of his discoveries: (Four Years in the Arctic Region) (2 vols., New York 1904).

ELLET, Charles, American engineer: b. Penn's Manor, Bucks County, Pa., 1 Jan. 1810; d. Cairo, Ill., 21 June 1862.' He was educated at the Polytechnic School in Paris, and on his return to America held various responsible en-

gineering posts. He built at Fairmount, Phila¬ delphia, the first wire suspension bridge in the United States, and in 1845 built at Niagara below the Falls a suspension bridge adapted for railway purposes. He constructed also the railway suspension bridge at Wheeling, W. Va., which is owned by the Baltimore and Ohio Railroad. In the Civil War he became colonel in the engineering corps and equipped nine Mississippi River steamboats as rams, and with them defeated a fleet of Confederate rams, but died of wounds on that occasion.

ELLET, Elizabeth Fries Lummis, Ameri¬ can prose writer: b. Sodus Point, N. Y., Octo¬ ber 1818; d. New York, 3 June 1877. She was popular in her day, and among her books are a translation of Silvio Pellico's 'Euphemia of Messina) (1834) ; 'Poems, Original and Se- lected) (1835) ; Characters of Schiller) (1842) ; 'Pioneer Women of the West) (1852) ; 'Novelettes of the Musicians1* (1852) ; 'Queens of American Society* (1867) ; Court Circles of the Republic,* with Mrs. R. E. Mack (1869) ; 'The Practical Housekeeper* ; 'Evenings at Woodlawn* ; 'Women Artists in All Ages.*

ELLICE, el'is, or LAGOON ISLANDS,

a group of coral islands, situated north of the Fiji and northwest of the Samoan group be¬ tween lat. 5° and 11° S. and long. 176° and 180° E. They extend for 360 miles in the direction northwest to southeast, and form nine groups, the largest islands being Sophia or Rocky Island, Nukulailai or Mitchell, Ellice, Nukufe- tau, Vaitupu, Netherland and Lynx. The in¬ habitants almost all speak a Samoan dialect, and have traditions of a migration from the Samoan Islands. They have long been Chris¬ tianized, and reading and writing are general. The islands are of coral formation. Guano, yams, fruit, coconuts and copra are the chief products. They were discovered in 1781 by Maurelle, and were annexed by Great Britain in 1892. Area, 15′ square miles. Pop. 3,084.

ELLICHPUR, el-ich-poor', India, town in Amraoti district, Berar, on the Bichan, 32 miles northwest of Amraoti and was once large and prosperous. It contains manufactories of cot¬ tons and carpets, and is an important trading centre in lumber. Imperial troops have a regu¬ lar station here. The town contains many interesting ruins, including a palace and several fine tombs. Pop. 13,909.

ELLICOTT, Andrew, American astrono¬ mer and civil engineer: b. Bucks County, Pa., 24 Jan. 1754; d. West Point, N. Y., 28 Aug. 1820. His father founded the town of Ellicott's Mills, Md., where the younger days of his son Andrew were devoted to the study of the sciences and practical mechanics. The latter's scientific attainments early attracted

public at¬ tention, and from the Revolution to the day of his death he was employed in the fulfilment of trusts conferred by the general or State gov¬ ernments. About 1785 he removed to Balti¬ more, and represented the city in the State legislature. In 1789 he was appointed by Presi¬ dent Washington to survey the land lying be¬ tween Pennsylvania and Lake Erie, and during that year made the first accurate measurement of the Niagara River from lake to lake, with the height of the falls and the fall of the rapids. In 1790 he was employed by the government to

survey and lay out the Federal metropolis. In 1792 he was made Surveyor-General of the United States, and in 1795 superintended the construction of Fort Erie at Presque Isle (now Erie, Pa.), and was employed in laying out the towns of Erie, Warren and Franklin. In 1796 he was appointed by President Washington commissioner on behalf of the United States under the Treaty of San Lorenzo el Real, to de¬ termine the southern boundary separating the United States territory from the Spanish pos¬ sessions. The results of this service, embracing a period of nearly five years, appear in his (Journal* (published 1803). Upon the comple¬ tion of this service he was appointed by Gov¬ ernor McKean of Pennsylvania secretary of the State land office, the duties of which he performed to the year 1808, and in 1812 became professor of mathematics at West Point. In 1817, by order of the government, he proceeded to Montreal to make astronomical observations for carrying into effect some of the articles of the Treaty of Ghent.

ELLICOTT, Charles John, Anglican prel¬ ate : b. Whitwell, Stamford, England, 25 April 1819; d. 15 Oct. 1905. He was educated at Saint John's College, Cambridge, and after be¬ ing professor of divinity in King's College, Lon¬ don, Hulsean lecturer and professor of divin¬ ity at Cambridge, and dean of Exeter, was ap¬ pointed bishop of Gloucester and Bristol in 1863. In 1897 the diocese of Bristol was separated from that of Gloucester, Bishop Elli- cott remaining at the head of the latter diocese. He was for 11 years chairman of the scholars engaged on the revision of the New Testa¬ ment translation, and published commentaries on the Old and New Testament, as well as 'Historical Lectures on the Life of Christ* (1860); 'Modern Unbelief* (1877) ; 'Some Present Dangers of the Church of England* (1878); 'The Revised Version of Holy Scrip¬ ture* (1901), which is the best popular account of the work of the revisers, etc.

ELLICOTT CITY, Md., city and county- seat of Howard County, on the Patapsco River, nine miles west of Baltimore, and on the Balti¬ more and Ohio Railroad. Saint Charles College (R. C.) in charge of secular

clergy, and Rock Hill College, in charge of Brothers of the Christian Schools, are located here. It has manufactures of flour, cotton, silk and woolen goods. Founded in 1772, Ellicott City was in¬ corporated in 1867. Pop. (1920) 1,246.

ELLIOT, Arthur Ralph Douglas, English lawyer: b. 17 Dec. 1846. He is second son of the 3d Earl of Minto, was educated at Edin¬ burgh University and at Trinity College, Cam¬ bridge. From 1880 to 1892 and from 1898 to 1906 he was a member of Parliament. In 1903 he was Financial Secretary to the Treasury and from 1895-1912 was editor of the Edinburgh Review. He has published 'Criminal Pro¬ cedure in England and Scotland* (1878) ; 'The State and the Church* (1881; 2d ed., 1889); 'Life of the First Viscount Goschen* (1911).

ELLIOT, Benjamin, American jurist: b. Charleston, S. C., 1786; d. 1836. He was

graduated at Princeton in 1806, studied law, was admitted to the bar in 1810 and entered on his practice in his native State of South Caro¬ lina. He was the author of numerous literary,

historical and political productions. Among his works is a Refutation of the Calumnies circulated against the Southern and Western States respecting the Institution and Existence of Slavery' (1822). He also prepared and published (The Militia System of South Caro¬ linaˆ which was adopted as the military code for the State.

ELLIOT, Daniel Giraud, American zoolo¬ gist: b. New York, 7 March 1835; d. 22 Dec. 1915. He made zoology a special study from his youth; traveled in Europe, Africa and parts of Asia in 1856-78; subsequently in Canada, Alaska, South America and the greater part of the United States. He afterward became curator of zoology in the: Field Columbian Museum. He has published (The Pheasants' (1871-72) ; 'Birds of North America) (1897) ; (The Grouse1* (1865); 'Birds of Paradise) ; III, 1913). He has been decorated 10 times by various European governments for his researches in natural science.

ELLIOT, Sir Gilbert, Scottish philoso¬ pher and poet: b. Teviotdale, September 1 722; d. Marseilles, 11 Jan. 1777. His song of 'Amynta' beginning "My sheep I neglected, I broke my sheep hook,® is famous ;

he also wrote occasional philosophical papers.

ELLIOTT, Charles, American Methodist clergyman : b. Glenconway, County Donegal, Ireland, 16 May 1792; d. Mount Pleasant, Iowa, 3 Jan. 1869. He came to the United States in 1814 and became prominent in the Methodist denomination. He was a professor of languages at Madison College, Uniontown, Pa., 1827-31, and president of Iowa Wesleyan University 1856-60 and 1864-67. He was editor of The Western Christian Advocate, Cincinnati 1836- 48, The Central Christian Advocate, Saint Louis 1852-56. He published treatise on Baptism' (1834) ; 'Delineation of Roman Cathol¬ icism' (2 vols., 1841) ; Rife of Robert R. Roberts) (1844) ; 'Sinfulness of American Slavery' (1851) ; The Bible and Slavery,1* etc. His most important book was (The History of the Great Secession from the Methodist Episcopal Church in the year 1845.) Southwest¬ ern Methodism1* was edited by L. M. Vernon

(1868).

ELLIOTT, Charlotte, English hymn- writer: b. 17 March 1789; d. Brighton, 22 Sept. 1871. She wrote a number of religious poems, which were published under the titles (Hymns for a Week1* ; 'Hours of Sorrow) ; 'Invalids' Hymn Book.1* The last collection included 'Just as I Am,* a hymn which is widely used, and has been translated in <(almost every living language.®

ELLIOTT, Edward Charles, American educator: b. Chicago, Ill., 21 Dec. 1874. He was graduated at the University of Nebraska in 1895, studied also at Jena and at Columbia Uni¬ versity. In 1898-1903 he was superintendent of schools at Leadville, Colo., in 1905-07 associate professor, and after 1907 professor of education at the University of Wisconsin, where after 1909 he also served as director of the pedagogi¬

cal seminar. In 1906-10 he conducted special investigations for the United States Bureau of Education, in 1911-12 for the New York Board of Education and in 1913 for the State of Ver¬ mont. He has published 'Some Fiscal Aspects of Public Education in American Cities1* (1905) ; 'State School Systems> (3d ed., 1910) ; 'Legis¬ lation upon Industrial Education in the United States1* (1910) ; 'City School Supervision'

(1914).

ELLIOTT, Jesse Duncan, American naval officer: b. Maryland 1782; d.

1845. He entered the United States navy as a midshipman 1804, and in October of 1812 won the first American naval success on the lakes, capturing two Brit¬ ish brigs, the Detroit and the Caledonia , near Fort Erie. He commanded the Niagara, in the battle of Lake Erie, September 1813, being sec¬ ond in command to Perry, whom he succeeded in October of the same year as commander of the Lake Erie fleet. In 1815, during the war against Algiers, he was in command of the sloop of war Ontario, under Decatur, being ap¬ pointed captain in 1818. He was court- martialed and suspended for four years, after his service in the Mediterranean squadron. He resumed his duties in 1843 and was given charge of the Philadelphia navy yard.

ELLIOTT, Maud Howe, American novel¬ ist: b. Boston, Mass., 9 Nov. 1854. She is a daughter of Julia Ward Howe (q.v.), and was married to John Elliott, an artist, in 1887. Her writings include 'A Newport Aquarelle' (1883) ; 'The San Rosario Ranch' (1884) ; 'Atlanta in the South' (1886) ; 'Mammon* (1888); 'Honor'; and 'Phyllida' (1903); 'Roma Beata' (1904) ; 'Two in Italy' (1905) ; 'Sun and Shadow in Spain' (1908) ; 'Sicily in Shadow and in Sun' (1910) ; 'The Eleventh Hour in the Life of Julia Ward Howe' (1911) ; 'Life and Letters of Julia Ward Howe,' with Laura E. Richards (1915).

ELLIOTT, Maxine, American actress : b. Rockland, Me., 5 Feb. 1873, daughter of Thomas and Adelaide Dermot. Making her debut with E. S. Willard, she played Felicia Umfraville in 'The Middleman' (1890), and later in 'The Professor's Love Story.' She was with Rose Coghlan, and in 1895 went to London with Augustin Daly's company. A member of N. C. Goodwin's company 1896, she played in Clyde Fitch's 'Nathan Hale' (1898) ; was married to Mr. Goodwin that year, ap¬ peared with him in 'When We Were Twenty- One,' and played Portia in the 'Merchant of Venice' (1901). She starred in Fitch's 'Her Own Way' in 1903 and thereafter appeared in several light comedies. She is owner and manager of the Maxine Elliott Theatre, New Yotk, since 1908. She appeared there in 'The Chaperon' and 'Deborah of Tods,' etc. She has since appeared in the film drama and with the greatest success.

ELLIOTT, Sarah Barnwell, American novelist. She is a granddaughter of Stephen Elliott. Her best-known works are 'The Fel- meres' (1879); 'Jerry'; 'John Paget'; 'The Durket Sperret' (1898); 'An Incident and Other Happenings' (1899) ; 'Sam Houston' (1900) ; 'The Making* of Jane' (1901); and a play 'His Majesty's Servant.' She is a mem¬ ber of the Society of Colonial Dames and the United Daughters of the Confederacv.

ELLIPSE (Lat. ellipsis, from Gr. elleipsis, omission), a plane curve of such a form that, if from any point in it two straight lines be drawn to two given fixed points, the sum of these straight lines will always be the same. The ellipse is a species of conic section (q.v.), and is obtained by a plane which cuts all the ele¬ ments of one nappe of a right circular cone. Protectively considered, an ellipse is a conic which cuts the line of infinity in two distinct imaginary points. If these are the two circular points, the ellipse becomes a circle. These two fixed points are called the foci. In the ellipse A B C D E and F are the foci. If a straight line (E Q F) be drawn joining the foci, and be

D

then bisected, the point of bisection is called the centre. The distance from the centre to either focus (E Q or Q F) is called the linear eccentricity. The straight line (G Q H), drawn through the centre and terminated both ways by the curve, is called the diameter. Its vertices are G and H. The diameter A C, which passes through the foci, is called the major axis; the points in which it meets the curve (A and C), the principal vertices. The diameter (B D), at right angles to the major axis, is called the minor axis. Practically, a tolerably accurate ellipse may be drawn on paper by sticking two pins in it to represent the foci, putting over these a bit of thread knotted together at the ends, inserting a pencil in the loop, and pulling the string tight as the figure is described. The importance of the ellipse arises from the fact that the planets move in elliptical orbits, the sun being in one of the foci — a fact which Kepler was the first to discover.

The equation to an ellipse, referred to its centre as origin, and to its major and minor axes as rectangular axes, is

— (- — = 1, where a and a are the semi-major a2 b2

and semi-minor axes respectively.. From this equation it may be shown, by the integral cal¬ culus, that the area of an ellipse is equal to 7r ab; or is got by multiplying the product of the semi-major and semi-minor axes by 3.1416. It may also be shown that the length of the cir¬ cumference of an ellipse is got by multiplying the major axis by the quantity

lb2

The eccentricity e, is \ 1 – and the

a 2

ellipticity is the ratio a — b to a. See Geom¬ etry and Conic Sections.

ELLIPSIS, in grammar, the omission of one or more words, which may be easily sup¬

plied by the connection. It is common, espe¬ cially in colloquial language, for the sake of brevity, and frequently adds to the strength and perspicuity of the sentence ; hence a more extended use of the ellipsis in rhetoric and poetry. In the hands of a genuine poet or ora¬ tor the ellipsis has a very telling value. In nat¬ ural language, from the brevity it affords, the ellipsis becomes in all its phases the language of passion, and especially of sudden and intense emotion ; and the imitation of its natural use in this way is to the poet the most powerful in¬ strument for painting passion to the life. The works of all the greater poets, and especially the Hebrew poetry of the Old Testament, abounds with familiar instances of this use of the ellipsis.

ELLIPSOID, in geometry, a real quadric surface with no real points at infinity. Its equation may be reduced by a transformation

ofi z?

of axes to — ˆ T -ra T — = 1 , a, b and c

a2 b 1 c-

being real. Every real plane section of an ellipsoid is an ellipse. If a, b and c are not all distinct, the ellipsoid is a figure of revolution, and is known as a spheroid. An oblate spheroid is one where the axis of revolution is less than the chords of the spheroid bisect¬ ing it perpendicularly; a prolate spheroid is one where the chords are less.

ELLIPSOIDAL STRUCTURE IN IG¬ NEOUS ROCKS. Certain extrusive igneous rocks when viewed at a distance seem to be made up of aggregates of bowlders varying from a few inches to several feet in diameter. If these masses are studied more closely, how¬ ever, they are seen not to be bowlders at all, but merely ellipsoidal shaped masses of the rock that have a slightly different texture and color from the remaining mass. This difference is believed to be the result of certain differences set up during the cooling and solidification of the molten rock. The cause is obscure but there is some reason to believe that it is due to the lava being poured out into a body of water, as in a

lake or the ocean.

ELLIS, Alexander John (originally Sharpe), English scientist and philosopher: b. Hoxton, 4 June 1814; d. London, 28 Oct. 1890. He was educated at Shrewsbury, Eton and Trinity, Cambridge, and devoted himself to mathematics, the scientific side of music, and more especially to philology and phonetics. His translation of Professor Helmholtz's Sen¬ sations of Tone) (1875) has taken a place as a standard work on scientific music. In 1848 he published two small works : (The Essentials of Phonetics> ; and (A Plea for Phonetic Spell¬ ing, } and collaborated with Sir Isaac Pitman (q.v.) in framing a phonetic system. His magnum opus on (Early English Pronun¬ ciation,) with special reference to Chaucer and Shakespeare, appeared between 1869 and 1889. His other works include (Horse Taming' (1842) ; Phonetics' (1844) ; (On Glosik, a Neu Sistem ov Inglish Speling' (1870) ; (Eng¬ lish Dyonisian and Hellenic Pronunciations of Greek' (1876); (Logic for Children' (1882), which consists of two addresses; 'Original Nursery Rhymes for Boys and Girls' (1848) ; (Algebra Identified with Geometry' (1874) ; Practical Hints on the Quantitative Pronuncia-

tion of Latin) (1874) ; Pronunciation for Singers) (1877).

ELLIS, Alston, American educator : b. Kenton County, Ky., 26 Jan. 1847 ; d. Athens, Ohio, 14 Nov. 1920. Graduated at Miami Uni¬ versity 1865, in 1867-92 he was principal of schools at Covington and Newport, Ky., and superintendent of schools at Hamilton and San¬ dusky, Ohio. From 1892 to 1900 he was presi¬ dent of the State Agricultural College of Colo¬ rado and for the greater part of that time served also as director of the Colorado Experi¬ ment Station. In 1901 he was chosen president of Ohio University. He was president of the Ohio Superintendents' Association in 1875, of the Ohio Teachers' Association in 1888, of the Ohio College Association in 1892-93, and of the Ohio Association of President and Deans in 1910-11. He published a (History of the Un¬ graded Schools of Ohio,* and many educational reports.

ELLIS, Edward Sylvester, American writer of school textbooks : b. Geneva, Ohio, 11 April 1840; d. 20 June 1916. For some years he was superintendent of public schools at Trenton, N. J. He published more than 100 juveniles, most of which have been reissued in London and

are sold in every part of the world. He is joint author of (The World's Great Events, > and of a school history of New Jer¬ sey. His (History of the United States > (8 vols., Cincinnati 1887) has sold to the extent of 114,000 sets or 912,000 separate volumes. A number of his historical productions have ap¬ peared in the moving pictures. His latest liter¬ ary work was the editing of some 60 transla¬ tions, devoted to a full history of all the na¬ tions engaged in the great European War.

ELLIS, George, English author : b. Lon¬ don, England, 1753; d. 10 April 1815. He was educated at Westminster School and Trinity College, Cambridge, and was one of the junta of wits concerned in the well-known political satire, (The Rolliad.* He published speci¬ mens of the Early English Poets, with an His¬ torical Sketch* (1790); Specimens of Early English Metrical Romances) (1805) ; and was an intimate friend of Sir Walter Scott.

ELLIS, George Edward, American Unita¬ rian clergyman and historical writer : b. Bos¬ ton, Mass., 8 Aug. 1814; d. there, 20 Dec. 1894. He was pastor of the Harvard (Unitarian) Church, Charlestown, Mass. (1840-69) ; and held the professorship of systematic theology in the Cambridge Divinity School (1857-63). He was also a lecturer of Lowell Institute in 1864, 1871 and 1879, and was editor of the Christian Register and Christian Examiner. As president of the Massachusetts Historical Society he made valuable contributions to an early colonial history. He published (A Half- Century of the Unitarian Controversy* (1857) ; (History of the Battle of Bunker's HilP (1875) ; (The Red Man and the White Man* (1882) ; (The Puritan Age and Rule in the Colony of Massachusetts Bay, 1629-85) ; vari¬ ous memoirs, and several biographies in Sparks' (American Biography. *

ELLIS, Henry Havelock, English scientist and literary scholar : b. Croydon, Surrey, 2 Feb. 1859. He taught school in New South Wales 1875-79, and on his return to England practised

medicine for a short time and then devoted him¬ self to literary and scientific work. He was editor of the Contemporary Science Series* (1889) ; and of the (Mermaid Series of Old Dramatists* (1887-89); and is the author of (The New Spirit* (1890); (The Criminal* (1890) ; (Man and Woman: a Study of Human Secondary Sexual Characters * (1894) ; (Sex¬ ual Inversion) (1897); (Affirmations * (1897) ; (1905) ; (Erotic Symbolism* (1906) ; (Sex in Relation to Society) (1910) ; (The World of Dreams) (1911) ; Hmpressions and Comments) (1914).

ELLIS, John, English naturalist : b. Ire¬ land about 1710; d. 1776. He

was the first who suggested the idea that the South Sea islands were constructed and raised from the bottom of the ocean by means of zoophytes or the polypi inhabiting different species of coral ((Essay towards the Natural History of Cor- allines) 1755). 'He was for some time agent for the colony of West Florida and the island of Dominica. Among his works is a posthu¬ mous one entitled (The Natural History of Many Uncommon Zoophytes) (1786).

ELLIS, John Valentine, Canadian states¬ man: b. Halifax, Nova Scotia, 1835. He was educated in the public schools of his native city; worked several years in a printer's office and in 1857 removed to Saint John, New Brunswick, where he became a reporter. He bought the Globe of that city in 1862 and thereafter was its editor and publisher. In 1882 he entered the political arena, served in the New Brunswick legislature as Liberal for Saint John from 1882-87. In the latter year he went to the House of Commons as member for Saint John. In connection with his election court proceed¬ ings were instituted which involved Ellis in contempt of court and he was imprisoned and fined. His popularity was greatly increased by these proceedings and the fine was made up by public subscription. He sat in the Commons until 1891, was again elected in 1896 and in 1910 became a member of the Senate. In 1911 he was chairman of the Senate Committee on De¬ bates and in the same year was also president of the Natural History Society of New Brunswick.

ELLIS, John Willis, American statesman : b. Rowan County, N. C., 25 Nov. 1820; d. Raleigh, N. C., 1861. He was graduated at the University of North Carolina in 1841, was ad¬ mitted to the bar in 1842 and soon acquired a large practice. He was a member of the State House of Commons from 1844 to 1848, when he was elected a judge of the Superior Court of North Carolina. This office, in which he suc¬ ceeded his former preceptor, R. M. Pearson, who was elevated to the Supreme bench, he held until 1858, when he was elected governor of North Carolina. He was re-elected in 1860 and died in office. On 2 Jan. 1861, Governor Ellis took possession of Fort Macon at Beaufort, the works at Wilmington and the Federal arsenal at Fayetteville, professedly on behalf of the State. On 20 April he ordered the seiz¬ ure of the United States mint at Charlotte. He was active in promoting the passage of the secession ordinance in North Carolina.

ELLIS, Mina A., Canadian explorer: b. Bewdley, Ontario, about 1875.

She was gradu¬ ated at the Brooklyn (N. Y.) Training School for Nurses; later became assistant superin¬ tendent of the S. R. Smith Infirmary (now the Staten Island Hospital) and superintendent of the Virginia Hospital, Richmond, Va. She mar¬ ried Leonidas Hubbard, journalist and explorer, in 1901 ; he perished two years later in Labra¬ dor. She organized an expedition and in 1905 succeeded in completing the exploration work undertaken by her husband by crossing the northeastern part of Labrador, now known as the District of Ungava, Province of Quebec. She wras the first white person to cross the ridge dividing the Naskaupi and George water¬ sheds. An account of the expedition, which resulted in some important discoveries, is given in her (A Woman's Way through Unknown Labrador* (1908) and in (The Bulletin of the American Geographical Society.*

ELLIS, Powhatan, American jurist and politician: b. Virginia, about 1794; d. Richmond, Va., about 1844. In 1813 he was graduated at William and Mary College, settled in Missis¬ sippi while it was a Territory, gained a high reputation as a lawyer and in 1818 was raised to the supreme bench of the State, being one of the first judges of that court. He remained in office until 1825, when he was appointed by the governor to serve out the unexpired term of David Holmes in the United States Senate. He failed of election by the legislature, but at the next election he was chosen senator for a full term, but served only from 3 Dec. 1827 to 1832, when he resigned to take his seat on the bench as United States judge for the dis¬ trict of Mississippi. While in the Senate he joined Thomas H. Benton and William Smith in opposing the ratification of the treaty of 1828 with Mexico, which established a bound¬ ary-line intersecting the Red and Arkansas rivers, thus leaving only Florida and Arkansas for the expansion of slavery. While on the bench he delivered more opinions than any con¬ temporary judge. On 5 Jan. 1836 he was ap¬ pointed by President Jackson charge d'affaires in Mexico, and on 28 December he closed the American legation. President Van Buren ap¬ pointed him minister to Mexico on 15 Feb. 1839, in which post he was succeeded by Waddy Thompson in 1842. After his return he resided in Virginia.

ELLIS, Robinson, English classical scholar: b. Barming, Kent, 5 Sept. 1834; d. 9 Oct. 1913. He was educated at Rugby and Balliol College, Oxford, and in 1870 became professor of Latin in University College, London. From 1883 till 1893 he was university reader in Latin liter¬ ature at Oxford, and in the latter year he was elected to the corpus professorship of Latin. His name is chiefly associated with the elucida¬ tion of the poems of the Roman poet Catullus. In 1867 he published a critical edition of Catullus ((Catulli Veronensis LiberO and

in 1871 (The Poems and Fragments of Catullus) in the metres of the original, these works being followed by a Commentary on Catullus) (1876). Other publications of his include Ovid's

Fables of Phsedrus* (1894), and a new recen¬ sion of (Velleius Paterculus, * with commen¬ tary (1898) ; (Aetna* (1900) ; (Appendix Ver- giliana) (1907) ; (Licinianus* (1908). Consult American Journal of Philology (Vol. XXXIV, pp. 494-496; 1913).

ELLIS, William Hodgson, Canadian chem¬ ist : b. Bakewell, Derbyshire, England, 1845. He came to Canada in early youth and was graduated at the University of Toronto in 1867, afterward studying medicine there and in Great Britain. On his return he became pro¬ fessor of chemistry in Trinity Medical School and lecturer on chemistry at Trinity University. Afterward he became instructor in chemistry in the Provincial College of Technology, and in 1900 was appointed to the chair of toxicology in the University of Toronto. He also served as official analyst of the Inland Revenue office at Toronto. He is widely known as an expert chemist.

ELLIS, William Thomas, American jour¬ nalist : b. Allegheny, Pa., 25 Oct. 1873. He was educated in the public schools and until 1894 was on the staff of Philadelphia newspapers, when he became editor of the International Christian Endeavor organ. In 1897 he became editor of Forward and in 1903-08 was editorial writer for the Philadelphia Press. He investi¬ gated social conditions in foreign countries in 1906-07 and in 1910-11 in the interest of a news syndicate. He wrote Sunday-school les¬ sons and also contributed to religious peri¬ odicals. He has lectured frequently before re¬ ligious bodies and has published (Men and Missions) (1909) and (Foreign Missions through a Journalist's Eyes.*

ELLIS ISLAND, small island situated in New York Bay, one mile southwest of the Bat¬ tery, where the old immigrant station, Castle Garden, was located. The United States immi¬ grant commissioner has his offices on this island. Immigrants detained for investigation as to compliance with the United States immigra¬ tion laws are kept on this island until allowed to land or are deported. It was sold by New York State to the United States in 1808, and for many years was used as a powder maga¬ zine. In 1891 it was made an immigrant sta¬ tion. The present buildings were erected in 1897, when the original structures were burned.

ELLORA, e-16'ra, ELORA, or ELURU,

e-loo'ra, India, village in the province of Aurungabad Hyderabad State ; situated in 20° 21′ N., and 75° 10′ E., about 15 miles north¬ west of Aurungabad city. Near by is the red stone temple of Ahalya Bai, the Rane of Indore (1767-95), a good example of modern Hindu architecture. Ellora is celebrated for some re¬ markable cave temples, excavated in the solid rock, which in magnitude and perfection sur¬ pass all other constructions of the kind in India. The temples are divided into three series, Buddhist, Brahmanical and Jain and are ar¬ ranged chronologically. There are 12 Buddhist caves at the north end, 5 Jain caves at the oppo¬ site end, with 17 Brahmanical caves between. Important inscriptions have been found on them, dating from the 5th to the 9th cen¬ turies. The Kailas temple at Ellora is a re¬ markable specimen of Indian architecture. Its court is about 154 feet wide by 276 feet long,

entirely cut out of the solid rock, backed by a scarp 107 feet high. A curtain of stone has been left at the front on which forms of Siva, Vishna and the other gods are carved. Rooms inside face an entrance passage at the end of which are a colossal Lakshmi and her attendant elephant and lotuses. An inscription dates from the 8th century. A bridge leads to the tem¬ ple proper, guarded by posts. The temple was built by Krishna I, the Rashtrakuta King of Malked (760-83). Consult Fergusson and Burgess, (The Cave Temples of India* (Lon¬ don 1880).

ELLORE, e-lor', India, town, in the God¬ avari district of the Madras presidency, on the river Jammaler, once the capital of the North¬ ern Circars. It has magisterial and judicial establishments, police station, post office, etc., a number of Christian missions and a garrison. There are some manufactures of carpets and saltpetre. Pop. 33,500.

ELLSWORTH, Ephraim Elmer, Ameri¬ can soldier: b. Mechanicsville, N. Y., 23 April 1837; d. Alexandria, Va., 24 May 1861. He organized about 1859 a zouave corps which became noted for the excellence of its dis¬ cipline. In March 1861 he accompanied Presi¬ dent Lincoln to Washington, and in April he went to New York, where he organized a zouave regiment of firemen, of which he be¬ came colonel. Ordered to Alexandria, he lowered a Confederate flag floating over a hotel, for which act the hotelkeeper shot him dead.

ELLSWORTH, Oliver, American jurist: b. Windsor, Conn., 29 April 1745 ; d. there, 26 Nov. 1807. He was graduated at the College of New Jersey in 1766, and soon after com¬ menced the practice of law. In 1777 he was chosen a delegate to the Continental Congress, and in 1780 was elected a member of the coun¬ cil of Connecticut, in which body he continued till 1784, when he was appointed a judge of the Superior Court. In 1787 he was elected to the convention which framed the Federal Constitution, and was afterward a member of the State convention, where he earnestly advo¬ cated the ratification of that important instru¬ ment, which his exertions had essentially aided in producing. In 1789 he was chosen a Senator of the United States, which station he filled till 1796, when he was nominated by Washing¬ ton Chief Justice of the Supreme Court of the United States. In 1799 he was appointed envoy extraordinary to Paris, and with his associates successfully negotiated a treaty with the French. He resigned his office of chief justice in 1800. In 1803 he was made a member of the governor's council of Connecticut, and in 1807, chief justice of that State. His biography was written by W. G. Brown (New York

1905).

ELLSWORTH, Maine, city, port of entry and county-seat of Hancock County, on both sides of the Union River, and on the Maine Central Railroad ; 30 miles southeast of Bangor. It is the trade centre of the county and has extensive timber, ship-building and fishing in¬ terests, exporting over 50,000,000 feet of lumber annually. It has shoe, woolen, leather, car¬ riage, sails, gasoline engines and other manu¬ facturing industries. The city contains a court¬

house, custom-house, public library and a city hall. The Union River is crossed by several bridges and furnishes good water power for manufacturing purposes. A fish hatchery is maintained here by the Federal government. The city was settled in 1763, was incorporated as a town in 1800 and as a city in 1869. A mayor and a board of aldermen administer the affairs of the municipality which controls the water-supply system and the electric plant. Pop. 3,549.

ELLWOOD, Charles Abram, American sociologist: b. near Ogdensburg, N. Y., 20 Jan. 1873. He was graduated at Cornell University in 1896 and studied also at the Universities of Chicago and Berlin. For one year he was lec¬ turer and instructor at the University of Nebraska and in 1900 became professor of so¬ ciology at the University of Missouri. He became also advisory editor of the American Journal of Sociology and associate editor of the Journal of Criminal Law and Criminology. In 1904 he served as president of the Missouri

Confederated Charities. He has published Sociology and Modern Social Problems) (1910); Sociology in its Psychological As- pects) (1912; French trans., 1914); also mono¬ graphs and special articles on social psychology.

ELLWOOD, Thomas, English Quaker: b. Crowell, near Thame, Oxfordshire, 1639; d. Amersham, 1 March 1714. About 1660 he was induced to join the Society of Friends, and sub¬ sequently became reader to Milton, with whom he improved himself in the learned languages, but was soon obliged to quit London on account of his health. In the year 1665 he procured a lodging for Milton at Chalfont, Bucks, and was the occasion of his writing (Paradise Regained* by the following observation made on rereading the (Paradise Lost) which the poet had lent him to read in manuscript : <(Thou hast said much of paradise lost, but what hast thou to say of paradise found?® In 1705 he pub¬ lished the first part of (Sacred History, or the Historical Parts of the Old Testament* ; and in 1709 (Sacred History, etc., of the New Testa¬ ment.) His other works are numerous; among them (Davideis, the Life of David, King of Israel, 5 a poem, which is more distinguished for piety than poetry. His life, written by him¬ self, and published the year after his death, affords many interesting particulars of the history of his sect.

ELM, Ulmuti, a genus of trees and a few shrubs of the family Ulmacece. The species, of which about 20 are known, are natives of the North Temperate zone and the southern portions of the Arctic zone. Their southern limits seem to be the Himalayas in Asia and the mountains of southern Mexico. None are natives of the Pacific slope of North America. They are characterized by short-petioled, alter¬ nate, rough, usually deciduous leaves with ser¬ rate edges ; axillary racemes of perfect, apetalous flowers which appear in early spring before or with the leaves ; and compressed, winged, dry fruits. Many of the species are of wide economic importance. Their hard, heavy, tough, pliable wood is largely used in the manu¬ facture of barrels, agricultural implements, boats, wagon wheels, buildings, etc., and for fuel. The inner bark of some species furnishes an article of food, and that of others a tough

ELM TREES

Famous New England Elms

bast fibre used for cordage and cloth making. The outer bark of some is used in dyeing and sugar refining. Various parts of several species were formerly popular remedies employed in medicine, but except in domestic and local prac¬ tice are rarely prescribed. Most of the species are highly valued as ornamental trees in street and park planting, those specially popular being the straight-trunked, tall-growing, vase-formed species, which quickly over-arch the streets and cast an abundant shade. Many cultivated varie¬ ties of fantastic form, color of foliage, or habit of growth are also planted as curiosities.

The best-known American species is the white, water, or American elm (JJ . americand), which grows in rich moist woods, especially on the shores of streams, from Newfoundland to Florida and westward to the eastern side of the Rocky Mountains. It is a tall tree, often at¬ taining a height of 120 feet when growing in the forest, and with a wide-spreading, less lofty top when growing in the open, where it may be seen in several different forms, popularly known as vase, plume, oak-tree, etc., according to the arrangement of the branches. Some specimens of each one develop numerous twiggy growths upon the trunk and main branches, which are thus rendered very attractive because of their feathery appearance. The most common form is the vase, in which the main branches develop at about 20 feet or more, and at their bases gradually, and toward their extremities widely diverge. This is probably the most popular street form in America. Another well-known American species is the slippery or red elm (U . fulva), which attains a height of 70 feet in rich soils and is found from Quebec to Florida and westward to Texas and the Da¬ kotas. It is called red because the bud scales are reddish and conspicuous when unfoldh-g in spring; and it is called slippery because of its mucilaginous inner bark. Its wood is less val¬ ued than that of the English elm, but more than that of the white elm. The cork or rock elm (U . racemosa) , which grows on river banks from New England to Nebraska and as far south as Kentucky and Tennessee, attains a height of 100 feet and is noted for the corky developments resembling wings on the smaller branches. Its wood is specially valued for its great durability, strength, pliability and tough¬ ness. Another species with corky, winged branches is the wahoo or winged elm (U. alata), which ranges from Virginia to Florida and westward to Texas and Illinois. It rarely exceeds 70 feet in height, is very attractive in habit, and is planted for ornament in the South, but not in the North, as it is not sufficiently hardy for the rigors of winter.

The most noted European species is the English elm (U . campestris) , which ranges through middle and southern Europe, northern Africa, and eastward to Japan. It reaches 100 feet in height and has a rather

round-topped or open head, on account of its spreading branches. It is frequently planted for ornament at home and abroad, and in America is valued because its foliage continues green for several weeks after that of the white elm. It has sev¬ eral distinct varieties, which are sometimes considered as distinct species, and of which there are a large number of horticultural varieties. The next most important European species is probably the Scotch or wych elm (U . scabra),

which has much the same range as the preced¬ ing species, like which it attains a height of about 100 feet. It is a variable species with many cultivated varieties, one of the best- known of which is the Camperdown elm, which has long, pendulous branches, on account of which the tree is frequently planted as a curiosity in parks and gardens. The Chinese elm (U . parvifolia) is a semi-evergreen shrub or small tree, a native of eastern Asia, which has proved hardy in America as far north as Massachusetts.

Elms, are readily propagated from seed which ripens in late spring or early summer and should be sown at once. The seedlings are easily managed, both as to cultivation, trans¬ planting and pruning. The trees do best in rich soil, especially if moist. The choice varieties are generally grafted. The trees, especially of the American or white elm, are specially liable to the attacks of certain insects and diseases, which often defoliate them. The latter may be kept in check by the timely and proper applica¬ tion of a standard fungicide (q.v.).

The name elm is also given to various un¬ related trees, the best-known of which are probably the following: Water elm {Planer a aquatica) ; Spanish elm or Bois-de-Chypre (Cordia gerascanthus) . Several Australian trees are also known as elms, especially Duboisia my op oroides and Aphanantlie philip- pinensis, each of which is valued for its timber.

ELM, Slippery, in medicine, the bark of Ulmus fulva, is widely used as a demulcent. It is probable that the ancient Indian inhab¬ itants of the country introduced it into medi¬ cine. Slippery elm bark is noted for the large amount of mucilage which it contains, thus rendering it a pleasing demulcent for sore throat, diarrhoea, dysentery, and inflammation of the intestinal tract in general.

ELM-INSECTS. Few ornamental trees are more subject to the attacks of insects than are the elms, and especially the American elm. The European species are, however, attractive to the European insects, of which many have been brought over unintentionally, and have spread remarkably because of the absence of their enemies. One of the most

notable is the plant-louse known as Colopha ulmicola, which produces the cockscomb galls upon the foliage. It is rarely very troublesome, and has usually done its damage before it can be attacked. Kerosene emulsion, if applied in time, will prove effective. (See Insecticide). A borer (Sap – erda tridentata) is sometimes troublesome, but there seems to be no satisfactory way to control it, though it has been suggested that the trunk should be washed with lime or soft soap during June and July. Most of the other insects that attack the elms are beetles, their larvae, or the caterpillars of various moths. These all bite their food, and hence may be attacked with arsenites or other stomach poisons sprayed upon the foliage. Among these insects are the four-horned sphinx-moth (Ceratomia amyntor or quadric or nis) , a green caterpillar with four little horns near the head and the long anal horn characteristic of the sphinx-moth. The bag-worm (Thyridopteryx ephemerceformis) , the gypsy-moth (Ocneria dispar), the tussock- moth (Notolophus or Orgyria leucostigma) ,

and several other general feeders are frequently troublesome. But the most important leaf-eat¬ ing enemy of the elm is the elm-leaf beetle (Galeruca xanthomelcena) , a reddish-yellow, two-striped European insect which appears and eats the leaves in spring. The bottle-shaped yellow eggs are laid in rows on the under sides of the leaves, and the hairy, black-spotted, yel¬ low larvae eat circular holes between the leaf- veins. Spraying with arsenites is effective, but where more than one brood is produced the sprayings must be repeated frequently through¬ out the summer. Consult Marlatt, (Elm Leaf Beetle, } Circular 8, Division of Entomology, United States Department of Agriculture (Washington 1895).

ELMAN, Mischa, Jewish violinist: b. Talnoje, Russia, 1892. He showed such re¬ markable talent that at the age of six he was taken by his father to Odessa and there studied under competent masters for four years. He met Leopold Auer in 1902 and so impressed the latter that he secured the permission of the Tsar for Elman's admission to the Imperial Conservatory at Saint Petersburg, hitherto closed to members of the Jewish race. Elman spent two years there under Auer and at his debut in 1904 he was at once acclaimed as an artist of first rank. He toured Germany and everywhere scored a triumphant success. He visited the United States in 1908 and again in 1911, 1912, 1913 and 1914, being eminently suc¬ cessful on every occasion. On the violin he is now recognized as a veritable genius.

ELMENDORF, Theresa Hubbell West,

American librarian : b. Pardeeville, Wis., 1855. She was graduated at Miss Wheelock's Semi¬ nary, Milwaukee, in 1874 and from 1880 to 1896 was deputy librarian and librarian of the Mil¬ waukee Public Library. In 1896 she married Henry Livingston Elmendorf (d. 1906), and in 1906 was appointed vice-librarian of the Buffalo Public Library. In 1903-04 she was president of the New York Library Association and in 1911 became president of the American Library Association — the first woman to fill that office. She was also coeditor of the (American Library Association Catalogue) and has published many articles in library periodicals on professional topics.

ELMINA, el-me'na, or SAINT GEORGE DEL MINA, West Africa, town belonging to Great Britain, formerly the capital of the Dutch settlements on the Gold Coast, five or six miles west of Cape Coast Castle. The Castle of Saint George del Mina was the first European estab¬ lishment on the coast of Guinea, having been erected by the Portuguese in 1481. The castle is the residence of the government officials of the district. It is the chief outlet for the trade of Ashanti. It came under English control in 1872, when it was claimed by the. King of Ashanti the result being the Ashanti wars of 1873-74. Pop. about 4,000.

ELMIRA, N. Y., city, county-seat of Che¬ mung County, on both sides of the Chemung River, and on the Delaware and Lackawanna, the Lehigh Valley, the Northern Central and the Erie railways ; 100 miles southeast of Roch¬ ester, 149 miles east-southeast of Buffalo, and 46 miles south-southwest of Ithaca. Among the more important establishments are railroad-

car shops, iron and steel bridge works, steel- plate works, valve and radiator works, manu¬ factories of boots and shoes, automobile parts, tables, bicycles, glass, fire engines, tobacco and cigars, boilers and engines, doors, sashes and blinds, hard-wood finishing works, silk and knitting mills, tobacco warehouses, dyeworks, breweries and aluminum works. The district is fertile, and there are also stone-quarters in the vicinity. Here are located Elmira College (q.v.), a State armory, the State reformatory (see Elmira Reformatory), the Arnot-Ogden Memorial Hospital, the Steele Memorial Free Library, a Federal government building housing the Federal courts, the post office, etc., and various charitable institutions. The park sys¬ tem includes Wisner, Riverside, Eldridge and Hoffman parks. Elmira is finely laid out, and has an excellent water supply, and gas and electric lighting. Elmira was permanently set¬ tled in 1788, was incorporated as the

village of Newtown in 1815, and in 1828 was reincor¬ porated as the village of Elmira. In 1836 it be¬ came the county-seat of Chemung County, and in 1864 obtained its city charter. During the Civil War it was the State recruiting and mili¬ tary rendezvous, and in 1864—65 one of the Federal prisons for Confederate prisoners of war was here situated. Near the present site of Elmira the battle of Newtown was fought, 29 Aug. 1779. General Sullivan, with an Ameri¬ can force numbering 5,000, defeating a com¬ bined band of Tories and Indians commanded respectively by Sir John Johnson and Joseph Brant (Thayendanegea) and numbering ap¬ proximately 1,500. The battle-ground is now marked by a memorial to Sullivan. Elmira is governed, under a charter of 1906, by a mayor, who is biennially elected, and a common coun¬ cil, which is unicameral. In addition to the aldermen who are chosen by wards for terms of two years,, the recorder, municipal judge and 12 supervisors, to act as a county board, are also chosen by popular vote. Pop. 45,305.

ELMIRA, Battle of, 29 Aug. 1779, in the Revolution. See Chemung, Battle of.

ELMIRA COLLEGE, at Elmira, N. Y. The first college founded exclusively for women in the United States (1855). Under the aus¬ pices of the Presbyterian Church, its course of study from the first demanded as high a grade of work as is usual in first-class colleges. The degrees conferred are bachelor of arts, bachelor of science, bachelor of music and master of arts. The college maintains a graduate department and also a summer ses¬ sion. The average enrolment is about 260, with 20 members in the faculty. There are 11,000 volumes in the library. The annual in¬ come is about $90,000, and the productive funds amount to $140,000.

ELMIRA HEIGHTS, N. Y., village in

Chemung County, adjoining Elmira, on the Delaware, Lackawanna and Western, the Erie and the Lehigh Valley railroads. Bridgeworks, machine shops, knitting mills and pump fac¬ tories give employment to a very great number. Pop. 2,732.

ELMIRA REFORMATORY, State insti¬ tution, located in Elmira, N. Y. It is a re¬ formatory to which may be sent only males be¬ tween the ages of 16 and 30 who have not served a period in a State prison. The court

of the State of New York, in sentencing a prisoner to this institution, has no authority to limit the time ; that is determined by the man¬ agers of the institution, and is almost wholly dependent upon the conduct of the prisoner. However, the term of imprisonment shall not, according to the law of the State, “exceed the maximum term provided by law for the crime for which the prisoner was convicted and sen¬ tenced.® This reformatory, which takes the place of a State prison for male offenders who have not become hardened in crime, has effected a radical change in methods of dealing with the class of law-breakers intended to benefit. Al¬ though the law authorizing the institution was passed in 1866 it was not until 1876 that the in¬ stitution was opened. The plan has been a splendid success and has had many imitators. About 22,000 prisoners have passed through its regimen. About 1,300 is the average detained there. Consult Winter, ‘The Elmira Reforma- tory) ; New York State Laws of 1877, sec. 2, ch. 173. Wines, (Punishment and Reformation* (1895); and the Yearbooks of the Reformatory.

ELMO, ERMO, or ERASMUS, Saint, a

martyr who suffered death at Formiae, a town of ancient Italy, during the persecution under Diocletion, in 303. He is considered the patron saint of sailors, and is usually invoked by Italian sailors during a storm. His feast is kept on June 3.

ELMO’S FIRE, Saint, is the popular name of an electric appearance, especially in southern climates during thunderstorms, of a brush or star of light at the tops of masts, spires, or other objects. Greek superstition embodied this phenomenon in the story of Castor and Pollux.

ELMORE, Alfred, Irish artist: b. Clona- kilty, Ireland, 18 June 1815; d. London, 24 Jan. 1881. He studied at Royal Academy, London, traveled through Europe to Rome, where he lived two years, returning to England in 1844, becoming an associate of the Royal Academy, 1845, and Royal Academician, 1856. Among his works are (Martyrdom of Thomas a Becket* (1840), Saint Andrew’s Church, Dub¬ lin; (The Novice) (1843); (Rienzi) (1844); ‘Death of Robert, King of Naples* (1848) ; ‘Griselda* (1850) ; Charles. V at Yuste* (1856) ; ‘Marie Antoinette in the Temple) (1861); Louis XIII and Louis XIV* (1870); ‘Ophelia* (1875) ; ‘Mary Queen of Scots and Darnley* (1877) ; ‘Pompeii,* ‘John Alden and Priscilla* (1878) ; ‘After the Ruin,* and ‘Lenore.*

ELMWOOD PLACE, Ohio, village of Hamilton County, adjoining Cincinnati, to which it has repeatedly refused to be annexed, and on the Cincinnati, Chicago and Saint Louis and the Dayton and Cleveland railroads, the Miami River and the Erie Canal. It contains large steel manufacturing plants and extensive railroad freight yards. Pop. (1920) 3,991.

ELOBEY ISLANDS, a-lo-ba'e. The name of two small islands off the coast of Guinea, in Africa, belonging to Spain. Elobey Chico is the smaller and Elobey Grande the larger. Pop. 350.

ELOCUTION (Latin elocutio, e, out, loqui, to speak), the science and art of expression by voice and action. Though expression is depend¬

ent upon the thought or emotion to be given, elocution applies only to the manner of delivery. In a larger sense it relates to all forms of ex¬ pressive art, such as music, painting or sculp¬ ture ; but the treatment here is confined to its uses in human action and speech. As a science it discovers and sets forth the elements or principles of expression ; as an art it embodies these elements in the portrayal of our physical, mental and emotive moods.

The principles of elocution are as old as the human race and are exemplified in nature whenever the vibration of vocal cords produce sound or muscular activities reveal a psychic state. They are heard and seen in animate nature, and their proper use constitutes that naturalness so desirable in public speech. The laws governing the use of these elements are as fixed and definite as those of other well-es¬ tablished sciences, and a violation of these laws results in unnatural, ineffective expression. The relation between psychic conditions and the elements and laws through which im¬ pressions are received and expressed presents a useful and consistent philosophy by which all students of the art of expression in any of its forms may be guided.

Man is endowed with a vital, a mental and an emotive nature. Through these three natures he receives all impressions, and through the elements of elocution corresponding to these triune natures he must communicate all expression.

PART I. — ELEMENTS OF VOCAL EXPRESSION.

There are four generic vocal elements of elocution, namely. Quality , Force, Time and Pitch, all of which are embodied in every utterance, while, in turn, every shade of human expression may be traced in its various sub¬ divisions and combinations. A tabular view of the vocal

elements is given on p. 262.

I. Quality. — Quality is the tone-color or kind of voice, the purity or impurity of the tone, and is dependent upon the size, shape and physical condition of the vocal organs and cav¬ ities. Broadly speaking it is an emotive ele¬ ment which subdivides into eight varieties, each having a definite correspondence to man's triune nature. Each quality is determined by its resonance, which Helmholtz defines as "the strengthening or reinforcing of sound** in the cavities of the head, throat and chest. By changing these resonances at will the speaker can employ the qualities to express his various moods and emotions.

(1) Normal. — The normal is the ordinary, predominant, characteristic quality of voice peculiar to each individual. Its resonance is in the upper and back part of the mouth, and the tone should be pure. By this quality we recognize the voices of different persons. It belongs to the mental division and is the natural expression of our ordinary thoughts, such as solemnity, tranquillity, mild pathos, conversa¬ tion, didactic thought, gladness, and joy.

(2) Orotund. — The orotund is a strong, clear, deep, voluminous quality, the resonance of which is in the upper part of the thoracic cavity. It represents about equally the mental and vital natures and is used to express thoughts and emotions of a lofty nature, such as reverence, sublimity, grandeur, courage, patriotism and oratorical intensity.

(3) Oral. — The oral is a thin, feeble, shal¬ low quality with the resonance in the forward part of the mouth. It is the physical result of a low state of inherent or exerted vitality and logically belongs to the vital division. It is generally used by a speaker in a personative sense to express sickness, feebleness, idiocy, timidity and fatigue.

(4) Nasal. — The nasal is an impure twang¬ ing, head-tone with the resonance in the front nasal cavities. It represents a vital condition and belongs to that division. As an habitual

•-H

in

in

W

Pi

ft

w

u

o

>

u.

o

w

w

w

J

w

y

2

w

z

w

o

w

X

H

‘quality^

(Emotive) ‘

FORCE

(Vital)

TIME

(Vital)

(‘Normal…. .. . ,

Orotund, -^ental\ Oral. _ \

N asal. . . .’.’.-^Vital _

Falsetto-‘/’

Guttural’/ /’

Pectoral – – -/Emotive ‘*

/

Aspirate-‘

(Effusive –

‘ Form . -< Expulsive – – –

[Explosive-—

(Energetic. Moderate—; Subdued

—h > MAN as a psychic bein

-Emotive. -Mental \

Stress – <

;> Vital –

, “A.

“;Aman

- -

..“Mental-’”

Emotive ‘*

Radical –

Compound —

Median – -

Final – / /’

Thorough——/ Vital .Intermittent’

fLong..,

‘Q uantity – – < M edium – Emotive ...

[.Short

Pause – Rhetorical – Mental – MAN

{Rapid…

Moderate —};iWital Slow.—”

’ Degree —

PITCH

.(Mental)

High—... Middle — Low—”*

Tnflection-

:/_ = s»Emotive •

Change…/ Waves

(Rising –

\ Falling—”

‘Single –

Double Continued •

Equal –

Unequal”’

Direct . .

.Inverted-”

rˆ-Mental

Wit at

Emotive.’.

V-Mental

Intervals ■

’ Semitones- Seconds — ”

Thirds –

Filths –

.Octaves-—-

MAN

A

/of

> Emotive ‘//,»

‘ ‘ ‘!

\ / / 1* Mental—’ » ;!

>Vital ~j :!

.Melody- —<

Current-

Cadence-

Monotone. ; !

Ditones—. \ ! ,*

Tritones – — Vital — ‘ !

.Polytones-‘ ;

•

Monad\

Duad---/’-.

A Triad . —}vVftal— — •

Tetrad-‘/’

[Pentad-‘^

quality it is a grave defect in a speaker. Under control of the will it may be used in an imper¬ sonate way to express laziness, mockery, burlesque or drollery; and in more serious thought, it is often employed to give pungency to irony, insinuation or contempt.

(5) Falsetto. — The falsetto is a pure, shrill, penetrating quality ranging above the ordinary pitch. Its resonance is in the upper part of the pharynx and it belongs to the vital division. Its use shows a lack of

physical poise and ex¬ presses great excitement, fright, yelling, scream¬ ing, calling, etc.

(6) Guttural. — The guttural is a harsh, grating, impure quality the resonance of which is in the upper part of the throat. It repre¬ sents a vital condition under a strong emotion and belongs about equally to the vital and emo¬ tive natures. It is used to express the malig¬ nant passions such as malice, scorn, anger, revenge, violent hate and rage.

(7) Pectoral. — The pectoral is a hollow, hoarse, sepulchral quality with the resonance in the lower part of the chest. It is emotive in nature and is never used except under the influence of the deepest emotions such as ven¬ eration, dread, amazement or horror.

(8) Aspirate. — The aspirate is a hissing, breathy, whispered quality in which intensity of emotion forces out more breath than can be vocalized. It belongs to the emotive divi¬ sion. The resonance varies according to the position of the organs and resonant cavities ; and its use ranges from the gentlest whisper of secrecy or caution to the intense, half-whispered emotions of fear, terror or consternation.

II. Force. — Force is the power or energy with which sound waves are sent forth from the vocal organs. Figuratively speaking, it is the exploding powder back of the projectile and clearly represents the vital nature in speech. It has three divisions.

(1) Form. — Form is the manner of exert¬ ing force, the smoothness or abruptness with which a sound or word is begun and ended. It reveals the sentiment or emotion implied and belongs to the emotive division. It has three divisions which also correspond to the triune nature of man.

a. Effusive. — The effusive is that form of voice in which the sound flows forth smoothly and evenly without abruptness of force either in the beginning or the ending of the tone. It represents the emotive nature and is used to express such gentle and solemn emotions as pathos, tranquillity, reverence, awe or sup¬ pressed fear.

b. Expulsive. — The expulsive is that form in which the force is applied abruptly causing the sound to rush forth from the vocal organs. It is the ordinary form and represents the mental nature in the expression of narration, didactic thought, gladness, patriotism, etc.

c. Explosive. — The explosive is that form in which the force is exerted very abruptly, causing the sound to burst forth from the vocal organs. It belongs to the vital nature and is used to express those

emotions in which great physical vitality is aroused such as in the excitment of ecstatic joy, great earnestness, de¬ fiance, alarm, anger, etc.

(2) Degree. — Degree of force is the meas¬ ure or power with which sounds are uttered. Its subdivisions are subdued, moderate and energetic, all of which correspond to the vital nature and mark the degree of energy used. This scale of degrees is relative and dependent upon individuality and the acoustic properties of the auditory which, in turn, depend upon the size and shape of the room and whether or not it is filled with an audience.

(3) Stress. — Stress is the application of force to the different parts of a sound or syllable. Any change of the location of the strongest impulse of force from one part of a word to another invariably changes the mean¬ ing of the utterance ; hence stress responds to

the mental division of man's triune nature. There are six varieties of stress.

a. Radical. — In the radical stress the force is applied strongest in the first part of the sound. It is the ordinary stress representing the mental nature and is expressive of didactic thought, narration, gaiety, patriotism, courage, etc.

b. Compound. — In the compound stress the main force is put upon the first and the last parts of the sound. It represents the mental and emotive natures and expresses any irony of purpose or insinuation of statement such as mockery, satire, sarcasm, taunt, derision, etc.

c. Median. — Median stress represents the placing of the force chiefly upon the middle part of the sound. It belongs to the emotive division and is used to express pathos, sorrow, wailing, reverence, awe, etc.

d. Final. — In the final stress the force is placed mainly upon the last part of the sound. It represents the emotive and vital natures and expresses self-assertion, determination, stub- borness, courage, amazement, hate or revenge.

e. Thorough. — The force continues in about the same intensity throughout the sound in the thorough stress which represents the vital nature and is appropriate in the expression of calling, command,

triumph, shouting, apostro¬ phe, lofty appeal, etc.

f. Intermittent. — In the intermittent stress the force is placed upon periodic parts of the sound which represents a physical unsteadiness or trembling of the body; hence it belongs to the vital division. It is used to express laugh¬ ter, crying, ecstatic joy, deep sorrow, tender¬ ness, sympathy, extreme fright and defiant courage.

III. Time. — Time is the duration of utter¬ ance and relates to the length of vocal sounds, syllables and words, the rests which occur between them and the rate of speed with which they are given. It is one of the vital generic elements with three specific divisions which represent the three psychic natures.

(1) Pause. — Pause is the time spent be¬ tween the impulses of the voice in the utterance of sounds and syllables or between words or groups of words in speech. By correct pausing words are grouped into their ideas, hence this element belongs to the mental division of the triune nature. Rhetorical pauses should be used (a) Before relative pronouns always and conjunctive words, prepositional phrases and infinitive phrases generally; (b) between words of a series, words marking an ellipsis and clauses; (c) after nominative phrases, words or phrases used independently and words of strong emphasis or emotion; (d) before and after words or phrases transposed or used in apposition, direct quotations and parenthetical expressions.

(2) Quantity. — Quantity is the length of time given to the utterance of sounds, words and syllables. It is especially adapted to the vocal utterance of the different shades of feel¬ ing or emotion and belongs to the emotive division. It naturally divides into (a) long quantity which expresses sorrow, pathos, rev¬ erence, sublimity, apostrophe, command, calling, etc. ; (b) medium quantity which is ordinarily used to express narrative, descriptive and di¬ dactic thought and all unemphatic words of unemotive language; and (c) short quantity

which is the shortest prolongation of sound consistent with the requirements of articulation and is expressive of joy, laughter, impatience, contempt, fright, excited anticipation, etc.

The. use of the various lengths of quantity depends upon the length of the inherent pho¬ netic sounds composing the words. Long quan¬ tity, especially, should never be placed on a short sound.

(3) Movement. — This is the rate or degree of rapidity with which a series of sounds or words or a sentence is given. Since the vari¬ ous

degrees of movement are but an expres¬ sion of the physical activities of speech this element belongs to the vital division of man's triune nature. Its degrees are slow, moderate and rapid, and are dependent upon the indi¬ viduality of the speaker and the acoustic con¬ ditions. Very naturally the inner or reflective life requires a slow utterance, while the im¬ pulsive, lively, joyous moods find their expres¬ sion in rapid movement, and the ordinary states of mind require the moderate degrees.

IV. Pitch. — Pitch is the range or compass of voice and relates to the location, variation and succession of notes upon the scale of de¬ grees. It has three specific divisions which may be subdivided to suit greater varieties of shad¬ ing in expression. Broadly speaking, it is men¬ tal in significance and belongs to that triune division.

(1) Degree. — The degree of pitch is the range of voice from the lowest to the highest tone, and the position in that range given to a particular note or word. Its subdivisions are high, middle and low, which may be further subdivided; and like all other scales of degrees in elocution depends upon individuality and acoustic conditions. The degrees of pitch mark plainly the speaker's emotive state, and the scale ranges from the deeply serious of rever¬ ential emotions of low pitch, through the ordi¬ nary thought of middle to the cry of excite¬ ment, joy, alarm or defiance of high pitch.

(2) Change. — Change is the transition from one degree of pitch to another and is accom¬ plished by a concrete glide or a discrete step. By changes of pitch we convey the various shading of meaning in expression and thus represent the mental nature. There are three varieties of change or transition which corre¬ spond to the triune classification.

a. Inflection. — Which corresponds to the mental nature is a simple concrete change of pitch of which there are two varieties, rising, expressing anticipation or questioning, and fall¬ ing, which denotes decision and conclusion.

b. Waves. — Waves are emotive and consist of two or more inflections united in a con¬ tinuous concrete movement. They may be single, composed of two inflections ; double, composed of three ; or continued, made up of four or more inflections, all of which are used to extend the vocal quantity without overstep¬ ping the interval of pitch that the sentiment requires ; and they represent the vital nature. Waves are also equal, expressing pleasantry; or unequal, implying irony; both of which repre¬ sent the emotive ; and direct, expressing

asser¬ tion, and inverted, indicating anticipation, both of which are representative of the mental nature.

c. Intervals. — An interval is the distance between two points on the scale and marks the

length of the vocal slide or step taken. As a measure of the physical act of vocalization it belongs to the vital division. The five relative intervals of pitch are: Semitones, expressing plaintiveness or sorrow ; seconds, reverence and sublimity; thirds, ordinary conversation and oratorical thought; fifths, animated conversa¬ tion and triumph; and octaves representing extreme surprise, horror or impassioned exclamation.

(3) Melody. — Melody is the succession of speech-notes in utterance and represents the vital nature in the vocal placing of all degrees and changes of pitch upon the scale. There are two divisions.

a. Current melody relates to the body of the sentence and is made up of monotones, ditones, tritones and polytones, all of which show the vital notation of intervals and notes and record the vocal trend in speech or song.

JBrain

.•Cerebrum— . -Mental.

in-C;; – Cerebellum . . Emotive’..

II. HEAD*. (Mental) ‘

.Vital”

/Upper – - – Mental-.,

ni/TORSo(—Middle . . . Emotive –

(Emotive) “Lower – Vital •”

Mental.

””-Medulla Oblongata — -Vital… ˆ

.-Forehead – . , .‘4.,,.,

/ „ Mental – /MAN

\ x > -‘Eyes

Face -»*C – - Nose and Cheek Emotive/’

‘••.^••‘Mouth –

”Chin and Jaw.. –

> MAN

,Index –

•

/‘Supine— – /”..-Prone —

Hands ˆ – Reflex – Emotive — ~y MAN

‘-o.’/ -Clasped ,/

\ “Ave«se = ;.I _

‘-Clenched –

-Vital’

.Wrist –

-Mental –

/.Forearm—ˆ —

•MAN

‘.Upper Arm .

‘Shoulder-

..’.-.Vital

I. ; LIMBS.’ (Vital) ‘

\

\

“Leg’

;2d Att. R. and L., For’d-.^

(»(3d Pos. and 3d Att. – -/Vital – i

. . y’ lst Att. Right and LeftC 1

r* CCt t %% •

V- 1st Pos. Right and Left ---/Mental-/,

‘ \2d Pos. Right and LeftC’. \

‘3d Alt.. R. & L. Back’d-‘“t-m0t‘Ve-:i

)JVIAN

Ankle – Mental’’/’.

”-Lower Leg – , //

W’% ,, . .’.‘V.---‘ — Emotive.

\ \ -Knee – ;

‘/‘Upper Leg . vital ”^

. . “

b. The cadence, which is that part of melody which gives repose at the close of a sentence when the thought is complete. Its technical varieties are (a) the monad, in which the lowering of pitch occurs on one syllable; (b) the first and second daads, on two syllables ; (c) the rising and falling triads, on three syl¬ lables; (d) the tetrad, on four; and (e) the pentad, on five syllables.

The distance over which the line of repose is reached is dependent upon the range of the current melody.

PART II. — THE PRINCIPLES OF ACTION.

Action in elocution is that part of delivery which addresses itself to the eye. The main principles of gesture and position, the common property of students of expression since the days of the ancient

Greeks, were set forth in the ˆChironomia,5 a voluminous work of a century ago, by Dr. Gilbert Austin, of London ; but the eminent French psychologist, Francois Delsarte, was the first to show the relation of

the whole physical activities to man's triune nature and present anything like a philosophy of actional expression. More recent writers have presented the subject in textual form and made it practical for the student. Combining the exprcssional use of the hands and feet, as explained in the (Chironomia,5 with the zonal correspondencies of Delsarte, we dismiss the subject by referring to the diagram.

For the history of elocution and its relation to the material used in speaking, see Oratory.

Bibliography. — Bartlet, B. R., (The Prac¬ tical Reader } (New York 1822) ; Bassett, (A Handbook of Oral Reading) (Boston 1917) ; Belle, A. M., (Essays and Postscripts on Elocu¬ tion (New York 1886) ; Brewer, J. M., (Oral English (Boston 1916) ; Burgh, J., (The Art of Speaking) (New York 1785) ; Fulton, R. I.,

(Practical Elements of Elocution (Boston 1883) ; Jennings, H., (Voice and its Natural Development (New York 1911) ; Kliser, G., (How to Develop Power and Personality5 (New York 1909) ; Tow to Read and Declaim) (New York 1911) ; Tow to Speak in Public) (New York 1906) ; Knowles, A., (Oral English5 (Bos¬ ton 1916) ; Pertwee, E., (The Art of Effective Public Speaking5 (New York 1911) ; Porter, E., (Rhetorical Reader5 (New York 1835); Rush, J., (The Philosophy of the Human Voice5 (Philadelphia 1885) ; Sheridan, T., (A Course of Lectures on Elocution5 (Troy 1803) ; Staley, D. M., Psychology of the Spoken Word5 (Boston 1914) ; Winans, J. A., Public Speaking5 (New York 1916). Among the organs devoted to elocution is The Quarterly Journal of Public Speaking (official organ of Society of Teachers of Elocution, published at Menasha, Wis.).

ELOHIM, el'-o-him or e-lo'him (plural of Eloah), one of the Hebrew names for God, of frequent occurrence in the Bible, especially in those parts of the Pentateuch attributed to the earliest writers in the northern domain of the Semitic race. Elohim is used in speaking both of the true God and of false gods, while Jehovah is confined to the true God. The plural form of Elohim (literally signifying ((the great Eloah55 or God) has caused a good deal of controversy among critics. By some it has been considered as containing an allusion to the doctrine of the Trinity, others regard it as the plural of excellence, while others hold it as establishing the fact of a primitive polythe¬ ism. This word, together with "Jehovah,55 has played a great part in

modern criticism. Critics have professed to find in the comparative fre¬ quency of the two terms an evidence of the date of the manuscripts in which they occur; but on this controversy we cannot enter. See Elohist.

ELOHIST, el'o-hist, also called Yahwist, both used in contradistinction to Jehovist (q.v.), one of the biblical writers, hypothetically as¬ sumed to have written part of the Pentateuch, who habitually, if not exclusively, used the He¬ brew name Elohim for God. The Elohistic passages in the Old Testament, as determined upon by biblical scholars, are simple, straight¬ forward, and bear no signs of rhetoric or poetic effort, therein contrasting with the Jehovistic paragraphs. Gen. i, 27 is Elohistic; Gen. ii, 21-4 is Jehovistic.

ELOISE, el' o-ez, Mich., a hospital settle¬ ment in Wayne County, on the Michigan Cen¬ tral Railroad, 15 miles from Detroit. Here are situated a large hospital, an infirmary and a sanitarium. These are controlled by the Wayne County Superintendent of the Poor, a board established in 1832. Pop. 1,750.

ELON COLLEGE, a coeducational insti¬ tution, situated at Elon College, 64 miles north of Raleigh, N. C. It was founded under the auspices of the Christian Church, in 1889, suc¬ ceeding the Graham Normal College, founded in 1865. Courses are given leading to the de¬ grees of bachelor of arts, music, philosophy and literature ; and master of arts. The ad¬ vanced degrees of doctors of literature, divinity and laws are also awarded. Certifi¬ cates are given in music, art, expression and domestic science. The instructors number 27, the students 400. The library contains 10,000 volumes.

ELONGATION, in astronomy, the angle that measures the apparent distance of two stars as seen from the earth. The term is, however, by usage confined exclusively to the distance of a planet from the sun, and of a satellite from its primary. The greatest elon¬ gation of Mercury amounts to about 28 degrees 30 minutes; that of Venus to about 47 de¬ grees 48 minutes, and that of the superior plan¬ ets may have any value up to 180 degrees. When two fixed stars or planets are spoken of the word ˆdistance® is employed.

ELOPEMENT, in law, an act of unlicensed departure, especially when a wife forsakes her husband and flees with a paramour, or when a

daughter or ward accepting the protection of a lover leaves her natural or legal guardians. In almost every one of the States, the male prin¬ cipal in an elopement is held guilty of an abduc¬ tion provided his associate in the act is under age. Marriage, however, checks all consequent criminal proceedings unless the female alleges coercion. All persons guilty of aiding or abet¬ ting an elopement of a male with a female are deemed in law accessories, and liable to legal proceedings. Elopers themselves are not safe from arrest, their act coming within the pur¬ view of the criminal statutes.

ELOTHERIUM, an extinct suilline animal of the Lower Miocene Epoch, remotely related to the hippopotami and pigs. The skull sug¬ gests that of the hippopotamus, but it has a narrow elongated muzzle; and the front teeth resemble those of the carnivora rather than the shearing tusks of the hippopotami and pigs. The limbs and feet are tall and stilted, the lat¬ eral toes reduced to small rudiments, . as in ruminants. Different species ranged in size from that of a sheep to that of a rhinoceros.

ELPHINSTONE, Mountstuart, East In¬ dian administrator: b. Scotland, 6 Oct. 1779; d. Limpsfield, Surrey, 20 Nov. 1859. He joined the Bengal civil service in 1795; was Ambassa¬ dor to the Afghan court in 1808; resident at the court of Poonah from 1810 to 1817 ; and British commissioner to that province from 1817 to 1819, when he became lieutenant-governor of Bombay. During a government of seven years he established a code of laws, lightened taxes and paid great attention to schools and public institutions. He resigned in 1827. A college

established by the natives was called after him Elphinstone College. He twice declined the governor-generalship of India and devoted the remainder of his life to literary pursuits. He was the author of an (Account of the Kingdom of Cabul and Its Dependencies) (1815) ; and a (History of India* (1841).

ELPHINSTONE, William, Scottish prel¬ ate: b. Glasgow 1431; d. 25 Oct. 1514. Hav¬ ing gone to France he studied law for three years, and was appointed professor of law, first at Paris and subsequently at Orleans. He was later made general of the diocese of Glas¬ gow (1471) ; rector of that university (1474) ; archdeacon of Lismore (1478), and commis¬ sary of the Lothians, and in 1479 became arch¬ deacon of Argyle, and Privy Councillor. Soon after he was made bishop of Ross; and in 1483 was transferred to the see of Aberdeen. In 1488 he was appointed Lord High Chancellor of the kingdom. In October of that year he as¬ sisted in the coronation of James IV. He was afterward sent on a mission to Germany, and on his return was

installed in the office of Keeper of the Privy Seal, which he held till his death. In 1494 he obtained a papal bull for the erection of a university at Aberdeen, and King's College and University soon came into existence. He was the author of (Breviarium Aberdonense> (1509-10, reprinted London

1850).

ELSBERG, elz'berg, Louis, American phy¬ sician : b. Gerlohn, Prussia, 1836; d. in the United States in 1885. His family settled in the United States in 1849 at Philadelphia. He introduced the art of laryngoscopy in the United States, wrote many papers on the throat and its diseases, notably, (The Throat and the Production of the Voice) ; was the first to illus¬ trate the character of undertones and divisions of sound in articulation, and invented many in¬ struments which are used in surgical treatment of the throat and ear.

ELSHEIMER, elz'hlm-er, Adam, German painter: b. Frankfort-on-the-Main 1578; d. probably at Rome 1620, called the ((Roman Painter of Germany.® He studied in Rome and settled there while still very young. He painted many biblical and mythological scenes and was a master of landscape, being the chief German artist of the end of the 16th century to acclima¬ tize Roman art in Germany. Among his prin¬ cipal works are (Jupiter and Mercury with Philemon and Baucis) ; (Joseph in the Pit) ; and

ELSIE VENNER, the first novel of Oliver Wendell Holmes, was originally published as

— ideas which he had advanced in the (Auto¬ crat and the (Professor at the Breakfast Tabled and which had been vigorously chal¬ lenged by orthodox New Englanders. His moralizing is not, however, obtrusive, and his strange heroine is fascinating and not in the least repulsive. As in all Dr. Holmes' novels, the plot is of the old-fashioned, obvious sort, and some of the incidents are almost melodra¬ matic. The humorous and realistic picture of New England village life, and of a young ladies' boarding school are delightful, and some of the more serious scenes are portrayed with force. The work has the limitations that might be ex¬ pected from an author who began to write fiction at the age of 50, and who was by nature an essayist and a social philosopher rather than a novelist ; but the conception is striking, and

the execution not unworthy. The story has a strange power of impressing itself on the reader and is usually remembered longer than many novels of far greater technical merit.

William B. Cairns.

ELSINORE, el-si-nor', or ELSINEUR

(Danish, Helsingor), Denmark, seaport, on the island of Zealand, 24 miles northeast of Copen¬ hagen. The town has a charming site, with several interesting buildings, notably the town hall and the hospital. Its inhabitants are en¬ gaged chiefly in commerce and seafaring. The castle of Kronborg, built about 1580, is the chief defense of the town. It is a Gothic-Byzantine edifice, built by Frederick II in the boldest style, and is said to be one of the finest struc¬ tures of its kind in Europe. Until 1857 tolls were exacted of all ships navigating the strait. Scenes in Shakespeare's (Hamlet) are laid here. It is now chiefly used as a prison, and was the place of confinement of the unfortunate Matilda, sister of George III of England. The manufactures are chiefly fishing-nets and a coarse cloth, iron founding, shipbuilding, marine engines and net weaving. It has a good harbor, with excellent dry-docking facilities for repairing vessels. Coal is imported in great quantities. To the northwest lies the bathing place of Marienlyst, once a royal sum¬ mer residence. Pop. 13,783.

ELSON, Arthur, American musical critic: b. Boston, 18 Nov. 1873. Son of Louis C. Elson (q.v.). He studied music with his father and with Prof. J. K. Paine, at Harvard. He has degrees from Harvard and the Massachusetts Institute of Technology, and has been promi¬ nent as a teacher. His chief works are (A Critical History of Opera) (1901) ; Orches¬ tral Instruments and their Use) (1902); (Woman's Work in Music) (1903) ; (Modern Composers of Europe1* (1904) ; (Musical Club Programmes from all Nations) (1907) ; (The Book of Musical Knowledge) (1915) ; and (The_ Pioneer School Music Course) (1916). He is editor-in-chief of the (Musician's Guide) (10 vols., 1913) and author of many musical essays. He contributes occasional con¬ cert reviews to Boston Advertiser and many articles to magazines.

ELSON, Henry William, American author : b. Muskingum County, Ohio, 29 March 1857 ; spent early life on farm; took classical college course at Thiel College, Greenville, Pa., after which he spent three years in the Lutheran Theological Seminary at Philadelphia and later

two years in the University of Pennsylvania. After six years in Lutheran pastorates, at Kit¬ tanning and Philadelphia, Pa., he left the

active ministry and took up the work of writer on historical subjects and lecturer in the Univer¬ sity Extension Society of Philadelphia. In 1912 Dr. Elson was elected a member of the Constitutional Convention of Ohio in which he took a very active part in the debates and pro¬ ceedings, especially as champion of the short ballot and as one of the leaders in bringing about a reform in the judicial system of the State. He introduced and piloted through the proposal to enable three-fourths of a jury to render a verdict in civil cases. This was made a part of the constitution of the State. In 1905-16 Dr. Elson was the head of the history department in Ohio University. Since 1916 he is president of Thiel College, He was presi¬ dent of the Ohio Valley Historical Associa¬ tion in 1915-16.

He published (Side Lights on American History1* (2 vols., 1898-99) ; (History of the United States) (1 vol., 1904) ; (History of the United States 5 (5 vols., 1906) ; (Guide to American History5 ; (Guide to English His¬

tory) (1906-ˆ)7) ; wrote most of the first four volumes of the 10-volume set of the Photo¬ graphic History of the Civil War > (1911).

ELSON, Louis Charles, American writer on music: b. Boston, Mass., 17 April 1848; d. Boston, 14 Feb. 1920. After studying music at Leipzig he returned to Boston and taught and lectured on music there from 1880. He was musical editor of the Boston Advertiser since 1888. He published (Curiosities of Music) (1883); (German Songs and Song Writers5 (1886) ; (Our National Music and Its Sources1* (1896) ; (Theory of Music) (1890) ; < Realm of Music5 (1892) ; (European Reminiscences5

(1893) ; (Great Composers) (1897) ; (Shakes¬ peare in Music > (1900) ; (Famous Composers and Their. Works,5 new series (1901). His later activities were wide-spread. He was twice a Lowell Institute lecturer, giving one course of eight and one of 10 lectures before that institution. He was city lecturer of Boston, giving about 250 lectures on music to the gen¬ eral public of that city, assisted by an orchestra, and he traveled over the United States and Canada with musical lectures. His (Shakes- peare in Music,5 and (Great Composers5 have been reprinted in London. He wrote a (History of American Music5 (1905) and a revised edi¬ tion of the same (1915) ; (Mistakes and Dis¬ puted Points of Music5 (1912) ; and he was editor-in-chief of (The University Musical Encyclopedia5 (10 vols.). He wrote two musical dictionaries, numerous magazine articles, and was teacher of the advanced courses in theory of music at the New England Con¬ servatory of Music, Boston.

ELSSLER, elz'ler, Fanny, Austrian dancer: b. Vienna, 23 June 1810; d. there, 27 Nov. 1884. She was the daughter of Johann Elssler, Haydn's factotum, and was educated at Naples for the ballet, with her elder sister Theresa (b. 1808; d. 1878), who in 1851 became the mor¬ ganatic wife of Prince Adalbert of Prussia and was ennobled. Fanny Elssler during her visit to the United States gave an entertainment in order to raise money for the Bunker Hill Monu¬ ment. She retired in 1851.

ELSTER, el'ster, two German rivers. (1) The White, or Great Elster, rising in the west of Bohemia, flows north into Saxony, receives the Pleisse and Parde at Leipzig, and joins the Saale between Halle and Merseburg, after a course of about 115 miles. It is navigable for small vessels as far as Leipzig. (2) The Black Elster, rising in Saxony, flows north into Prussia, then northwest, receives the Pulsnitz and Roder, and joins the Elbe between Witten¬ berg and Torgau, after a course of about 130 miles. It is navigable for 40 miles.

ELSTRACKE, Reginald or Ronald, Eng¬ lish engraver : b. probably in London and lived there early in the 1 7th century. His plates were made with the graver solely, their chief value being historical. He executed portraits of Mary Queen of Scots, Darnley and Queen Elizabeth. Among his works was a volume of 32 plates called (Basiliologia : a Book of Kings, being the true and lively effigies of all our English Kings from the Conquest until this present)

(1618).

ELSWICK, elz'wik, England, suburb of Newcastle, containing the great ordnance works of Sir William Armstrong, Mitchell and Com¬ pany. These works are probably the largest of their kind in Europe, employing in normal times about 14,000 persons. Pop. 58,352.

ELTON, Charles Isaac, English jurist and archaeologist : b. Somerset 1839 ; d. Chard, Som¬ erset, 23 April 1900. He was educated at Ox¬ ford and was called to the bar in 1865. He represented West Somerset in Parliament as a Conservative 1884-85 and 1886-92. On legal subjects he published (Tenures of Kent) (1867) ; (Commons and Waste Lands) (1868) ; (Copyholds and Customary Tenures > (1874-93); Hmprovement of Commons BilP (1876) ; ˆCus¬ tom and

Tenant-Right* (1882) ; and (Robinson on Gavelkind) (1897). Other works of his are (Norway, The Road and FelP (1864) ; (The Career of Columbus) (1892) ; (The Great Book- Collectors) (1893); and (Shelley's Visits to France) (1894). His greatest work, however, is his (1882). It is chiefly characterized by its thorough investi¬ gation of the evidence furnished by Greek and Roman writers regarding the condition and cir¬ cumstances of early Britain, by its discussion of the ethnology and prehistoric archaeology of the country, and by the importance assigned to the Celtic and even pre-Celtic element in forming the English nation.

ELTON, James Frederick, English ex¬ plorer: b. 3 Aug. 1840; d. 13 Dec. 1877. He entered the Indian army in 1857. In 1871 he found himself in the Transvaal and Natal; in 1873 he was vice-consul at Zanzibar, two years afterward as consul in Mozambique he explored the coast of East Africa for the sake of repress¬ ing the slave trade. With Cotterill he reached Lake Nyassa in 1877 and scaled the Konde range of mountains at the north end of the lake, to the height of 10,000 feet. After his death Cotterill published his journal under the title

(1879).

ELTON, Oliver, English literary historian: b. 1861. He was educated at Marlborough School and at Corpus Christi College, Oxford. From 1890 to 1900 he was lecturer on English

literature at Owens College, Manchester, and in the latter year became professor of English literature at the University of Liverpool. He published an edition of Milton's (Comus and other Poems) ; (The Mythical Books of Saxo Grammaticus,* (Historia Danica,* translated for the Folklore Society; (The Augustan Ages) (in (Periods of European Literature,* 1899) ;

(Michael Drayton> (1906) ; (Life, Letters and Writings of Frederick York PowelP (1906) ;

(Modern Studies* (1907) ; (Survey of English Literature from 1780 to 1830) (1912) ; contribu¬ tions and reviews in the Manchester Guardian, the Quarterly Review, etc.

ELTON, a shallow lake in the government of Astrakhan, in Russia ; area, 60 square miles. Eight salt-water streams flow into this lake, and it has no visible outlet ; thus a large salt de¬ posit rests on the bed of the lake. From about the middle of the 17th century for 100 years, the

salt from this lake was in demand; but since the opening of the salt fields in the southern part of Russia (1860) the Elton salt has not been on the market.

ELTZBACHER, elts'baH-er, Paul, German jurist: b. 1868. He was educated at the uni¬ versities of Heidelberg, Leipzig, Strassburg and Gottingen. He was appointed a judge; in 1900 privatdozent at Halle, and in 1906 professor of law at the Berlin Handelshochschule. He has published (Ueber Rechtsbegriffe) (1900) ; (Die Handlungsfahigkeit* (1903) ; (Die Unterlas- sungsklage) (1906) ; (Gross-berliner Mietsver- trage) (1913). His best-known work is (Anarchismus) (1900; Eng. trans. by Byington, 1908), the most complete and unbiased treat¬ ment of the subject; it has appeared in most modern languages. The article in (Handbuch der Politik) on anarchism was written by Eltzbacher in 1910.

ELVAS, al'vas (Rom., Alpesa; Moorish, Balesh), Portugal, the strongest fortified city of the republic, in the province of Alemtejo, near the Spanish frontier, 10 miles west of Badajoz. Standing on a hill, it is defended by seven large bastions and two isolated forts. The city contains a 15th century cathedral, in which are housed some fine paintings ; a theatre, hospital and an ancient aqueduct of remarkable construction. It was completed in 1622. Fire arms and jewelry are the only articles manu¬ factured. The Moors fortified the place and the city suffered from the wars between the Moors, Portuguese and Spaniards. It fell to Portugal in 1226, was taken by the French in 1808, but was ceded to Portugal after the Convention of Cintra. Pop. 14,018.

ELVES (O. Eng., oelf; Germ. Alp; phan¬ tom, spirit), imaginary creatures of the north¬ ern mythology, forming, according to some classifications, with the undines, salamanders and gnomes, groups of elementary sprites identified respectively with the water, fire, earth and air. The elves are of the air, and have been more widely received in the faith and poetry of Eu¬ rope under this name than under that of sylphs, invented by Paracelsus. They are capricious spirits, of diminutive size but preternatural power. Their stature is less than the size of a young girl's thumb, yet their limbs are most delicately formed, and when they will they can hurl granite blocks, bind the strongest man or shake a house. They are divided in the sagas

into good and bad, or light and dark elves, the former having eyes like the stars, countenances brighter than the sun, and golden yellow hair, the latter being blacker than pitch, and fearfully dangerous. The elves ordinarily wear glass shoes, and a cap with a little bell hanging from it. Whoever finds one of these slippers or bells may obtain from the elf who has lost it any thing which he asks for. In the winter they retire to the depths of mountains, where they live in much the same way as men, and in the first days of spring issue from their grottoes, run along the sides of hills, and swing upon the branches of the trees. In the morningˆ they sleep in blossoms or watch the people who pass by, but at the evening twilight they meet to¬ gether in the fields, join hands and sing and dance by the light of the moon. They are gen¬ erally invisible, but children born on Sunday can see them, and the elves may extend the privilege to whomsoever they please. In Eng¬ land and Scotland they became fairies in the former, and brownies in the latter country, and were subject to a king and queen. The islands of Stern and Rugen, in the Baltic, are especially subject to the king of the elves, who rides in a chariot drawn by four black horses, and whose passage from island to island is recognized by the neighing of the steeds, the blackness of the water, and the bustle of the great aerial com¬ pany who follow in his train. The elves some¬ times become domestic servants, and would be valuable as such if they were less easily offended and less dangerous after taking offense. As long as their caprices are gratified, their food and drink regularly left at an appointed place, and no attempt made to interfere with their freedom, the furniture is sure to be dusted, the floor to be swept and every chamber to be perfectly in order. But the brothers Grimm, in their (Deutsche SagenP have chronicled the misfortunes of many a young girl, who, having called an elf to her aid, repented too late of having offended it.

ELVIRA COUNCIL OR SYNOD. This council was held at Illiberis or Elvira in Gran¬ ada, Spain, at the beginning of the 4th cen¬ tury. Three dates are assigned, May 15, 303, 305, 309. Felix, bishop of Accis, presided. The town is no longer in existence. The council was attended by 19 bishops and 26 priests. Hosius of Cordova, adviser of the Emperor Constantine, was the most important person¬ age present. Eighty-one canons were adopted, which reveal the fact that the Spanish Church was largely influenced at the time by Noratian and Montanist teaching. The regulations are many of them very stringent and are largely negative in character. They deal with idolatry, marriage, unchastity, penance and the prohibi¬ tion of communion to specified classes.

EL WELL, Frank Edwin, American sculp¬ tor: b. Concord, Mass., 15

June 1858. His early instruction in art was from May Alcott and Daniel C. French. He studied subsequently at the School of Fine Arts, Paris, the Ghent Academy, and with Falguiere of Paris. He settled in New York soon after his return home in 1885. His principal works are 'Death and Strength > at Edam, Holland; 'Diana and the Lion,* now in the Chicago Art Institute; statue of General Hancock at Gettysburg bat¬ tlefield; 'New LifeP in the cemetery of Lowell,

Mass. ; monument to Edwin Booth, Cambridge, Mass.; (Charles Dickens and Little Nell,* at Philadelphia; statues of Greece and Rome on the New Customs House, New York; busts in the Senate, Washington, D. C. ; (Water Boy of PompeyP in the New York Metropolitan Museum. From 1902 to 1905 he was curator of a department at the Metropolitan Museum and in 1910 was chosen director of the School of Applied Design for Women, New York.

ELWOOD, Ind., city in Madison County, on the Pittsburgh, Cincinnati, Chicago and Saint Louis and the Lake Erie and Western railroads, about 50 miles northeast of Indian¬ apolis. It is surrounded by an agricultural re¬ gion and is in a natural-gas belt. Its industries are chiefly lumber, flour, tin-plate mills, window, iron works, saw and planing mills, brickyards, canneries, plate glass and lamp chimney and other factories. The United States census of manufactures for 1914 showed within the city limits 40 industrial establishments of factory grade, employing 2,216 persons, 1,969 being wage earners, receiving annually $1,484,000 in wages. The capital invested aggregated $4,624,000, and the year's output was valued at $8,199,000: of this, $2,507,000 was the value added by manufacture. Its shipping trade con¬ sists in the agricultural products of the sur¬ rounding country and the articles manufactured in the city. The city maintains a public library. Pop. 12,000.

ELY, Richard Theodore, American politi¬ cal economist: b. Ripley, N. Y., 13 April 1854. He was educated at Columbia College (A.B. 1876, A.M. 1879, Fellow in Letters, 1876-79), and studied at the universities of Halle, Heidelberg (Ph.D. 1879) and Geneva; Royal Statistical Bureau, Berlin, 1879-80; LL.D. Hobart Col¬ lege, 1892. He was head of the department of political economy at Johns Hopkins, 1881-92, when he became professor of political economy in the University of Wisconsin. He was mem¬ ber of the Baltimore Tax Commission, 1885-86; of the Maryland Tax Commission, 1886-88, and founded the American Bureau of Industrial Research in 1904 and has since been one of its directors. He was one of the founders of the American Economic Association, 1885 ; its secretary, 1885-92; its twice elected president, 1899-1901, and was first president of the Ameri¬ can

Association for Labor Legislation, 1907-08. In 1913 he was appointed lecturer at the Lon¬ don University; has traveled in Great Britain and Ireland and Germany investigating land problems; was invited in 1914 by the New Zealand government to visit New Zealand; member of the International Statistical Insti¬ tute. He published 'French and German Social¬ ism in Modern Times) (1883) ; (Taxation in American States and Cities) (1888) ; (Outlines of Economics > (1893); Monopolies and

Trusts) (1893) ; 'Socialism and Social Reform* (1894) ; (Studies in the Evolution of Industrial Society* (1903); 'Property and Contract in their Relation to the Distribution of Wealth* (1914) ; editor of 'Macmillan's Citizen's Library of Economics, Politics and Sociology, * also 'Macmillan's Social Science Text-books.*

ELY, Theodore Newel, American civil engineer: b. Watertown, N. Y., 23 June 1846; d. 28 Oct. 1916. Graduated at the Rensselaer Polytechnic Institute in 1866, from 1868 to 1910

ELY

he was a member of the engineering department of the Pennsylvania Railroad. He also held directorships in the Pennsylvania Steel Com¬ pany and the Cambria Steel Company; was trustee of the Drexel Institute and director of the Philadelphia Academy of Fine Arts. He was honorary member of the American Institute of Architects and vice-president of the Ameri¬ can Academy in Rome. In 1904 he was presi¬ dent of the Eastern Railroad Association.

ELY, England, an episcopal city in the county of Cambridge, about 15 miles northeast of Cambridge, on the Ouse. The place is noted for its cathedral, one of the most remarkable edifices of the kind in England. It was founded in 1083 and displays in itself all the styles of architecture from early Norman to late Perpendicular. It is a cruciform building, 537 feet long and 190 feet across the transepts. The nave is 208 feet long and the tower 215 feet high. It occupies the site of a monastery founded about the year 673 by Saint Etheldreda (or Audry), daughter of Anna, king of East Anglia. Its ancient history is most interesting. In 1071, Hereward, the noted English outlaw, defended Ely against the Normans. (See Hereward). Market gardening and fruit pre¬ serving are among the important industries. Pop. 7,917. Consult Van Rensselaer, (English Cathedrals y ; Bond, F., (English Cathedrals* ; Stewart, Architectural History of Ely Cathedral. >

ELY, Minn., city and summer resort in Saint Louis County, 115 miles northeast of Duluth, on the Duluth and Iron Range Rail¬ road. It is in

the centre of the Vermilion Iron Range, and nearby are several lakes and water¬ falls. There is a large trade in fish, furs, lum¬ ber and iron. The government is vested in a mayor, elected annually, and a board of aider- men. The city has a fine high-school building and city hall, and owns the waterworks and electric-lighting plants. Pop. (1920) 4,902.

ELY, Isle of, a district in England, in the county of Cambridge, separated on the south by the Ouse from the remaining portion of the county and forming in itself an administrative county; area, 283,073 acres. It rests about 100 feet above the general level of the fen country, and was formerly surrounded by marshes, which at times became sheets of water. The whole has by drainage been converted into fertile fields and is a most productive fruit¬ growing district. Pop. 69,752.

ELYMAS. See Bar-Jesus.

ELYOT, eli'-ot, Sir Thomas, English author: b. Wiltshire not later than 1490; d. Carlton, Cambridgeshire, 20 March 1546. In 1511 he became clerk of assize, in 1523 clerk of the king's council. In 1531-32, as Ambassador to Charles V, he visited the Low Countries and Germany, having orders to procure, if pos¬ sible, the arrest of Tyndale. (The Boke named the Gouernour, deuised by Sir Thomas Elyot, Knight, > was published in 1531. It may be described as the earliest treatise on moral phi¬ losophy in the English language, the author's principal object being <(to instruct men in such vertues as shall be expedient for them which shall have authoritie in a weale publike.® An elaborate 10th edition appeared in 1880, with life notes and glossary by H. H. S. Croft.

Elyot's 12 other works include (Of the Knowl¬ edge which maketh a Wise Man> (1533) ; (Pas- quil the Playne) (1533) ; Isocrates', (Doctrinal of Princes) (1534) ; Picus de Mirandola's (Rules of a Christian Lyfe> (1534) ; (The Castel of Helth) (1534) ; (The Bankette of Sapience) (1534) ; (Bibliotheca) (1538), the first Latin- English dictionary; (The Image of Governance) (1540) ; defence of Good Wo¬ men* (1545) ; and Preservative against Deth) (1545). _ These books went through edition after edition in their author's lifetime, and have now become among the rarest treasures of book collectors.

ELYRIA, Ohio, city and county-seat of Lorain County, on the Black River and on the Baltimore and Ohio and Lake Shore and Michigan Southern railroads, 25 miles south¬ west of Cleveland. It has a public

library, a hospital and a fine natural park. Agriculture is the chief industry of the surrounding country; the sandstone quarries furnish employment to a number of people. The chief manufactures in the city are supplies for automobiles and bicycles, saddles, telephones, home-lighting plants, flour, feed, canned goods, concrete blocks, moldings, paints, metal polish, switch¬ boards, screws, machine parts, iron pipe, angle iron, strip steel, etc. The United States census of manufactures for 1914 showed within the city limits 63 industrial establishments of fac¬ tory grade, employing 3,236 persons ; 2,735 being wage earners, receiving $1,759,000 annually in wages. The capital invested aggregated $9,485,- 000, and the year's output was valued at $8,792,000 : of this, $3,776,000 was the value added by manufacture. The waterworks are owned by the city. Pop. (1920) 20,474.

ELYSˆE, Palais de T, pa-la de la-le-za, the official residence of the President of France, in Paris, on the Rue du Fauburg Saint Honore, with its garden extending to the Champs Elysees. It was built in 1718 for the Count d'Evreux ; in the reign of Louis XV it became state property and was the residence of Madame de Pompadour. It was also used as a residence by Napoleon I and by Louis Na¬ poleon, and became the presidential residence in 1871.

ELYSIAN FIELDS, or ELYSIUM, in

classical mythology, the residence of the blessed after death. Elysium was supposed by Homer to have been at the western end of the earth; other poets placed it in the Fortunate Isles ; later it was supposed to be in the under world. It was represented as a region of perfect hap¬ piness, where the sky was always cloudless and a celestial light shed a magic brilliancy over every object; where each one was free to fol¬ low his favorite pursuit, and cares and infirm¬ ities were unknown.

ELZE, el'tse, Karl, German historian of literature: b. Dessau, 22 May 1821; d. Halle, 22 Jan. 1889. His specialty was English literature, and he was professor of English philology in the University of Halle 1875-89. One of his first works was a compilation entitled a treas¬ ury of English Song.* He produced critical editions of Shakespeare and other English dramatists, and wrote biographies of Byron and other English authors. Specially noteworthy is his (Grundniss der englischen Philologie)

(1877). (Westward) (1860) contains transla¬ tions of English and American poems.

ELZEVIR, el'ze vir, name of a notable family of printers descended from Ludovic Elsevier or Elzevier, Latinized Elzeverius, a native of Louvain: b. 1540; d. 1617. Having learned the bookbinders' trade, he practised it for some years in his native town, but in 1580 he removed to Leyden in* the United Provinces and there set up a printing press. His five sons, Matthew, Ludovic, Egidy, Joost and Bona- ventura, were also printers and booksellers ; but it was the youngest of the five, Bonaventura, born 1583 at Leyden, that gave the name Elzevir its great celebrity. The first work pub¬ lished by the house of Elzevir appeared in 1583, the (Ebraicse Quaestiones et Responsiones) of Drusius, not the whole three books, but only the second and third. In 1608, nine years before his father's death, Bonaventura Elzevir founded a separate printing and publishing establishment in the same city and then commenced the issue of works in Greek, Latin and other languages which have ever since been regarded as models of correct and elegant typography. He . con¬ ducted the business of his house more than 42 years, till his death in 1652, having had as part¬ ner from 1626 Abraham Elzevir, his nephew, whom he survived one month. He was suc¬ ceeded by his son Daniel and Abraham's son John; this partnership was soon dissolved, John carrying on the business in Leyden, Daniel migrating to Amsterdam in 1655 and entering into partnership there with another of his cous¬ ins ; both of these were dead 1680. The last of the Elzevirs to figure in the history of typog¬ raphy was Abraham, son of Abraham, one of the five sons of Ludovicus; from 1681 to 1712 he was printer to the University of Leyden. The Elzevir editions of the ancient classics, especially Latin, while admirable in point of typography, are mostly reproductions of the texts adopted by previous printers and hence are inferior from the critical point of view. The number of works published by the different Elzevir houses nears the 2,000 mark.

EMANCIPATION, the act by which free¬ dom of various kinds is granted to individuals, races or nations. In Roman law the dissolu¬ tion of paternal authority (patria potestas) in the lifetime of the father. It took place in the form of a sale by the father of the son to a third party, who manumitted him. The Twelve Tables, the foundation of Roman law, required that this ceremony should be gone through three times. In general, the son was at last resold to the father, who manumitted him, and thus acquired the rights of a patron which would otherwise have belonged to the alien purchaser who finally manumitted him. In the case of daughters and grandchildren one sale was sufficient. This form of emancipation con¬ tinued in the Empire

until the time of Justinian, who substituted a declaration by the father before a proper tribunal. This emperor also changed the succession law, by making kinship by blood decisive. According to Teutonic law the marriage of a daughter freed her from parental control and a son became free upon setting up a home of his own. In modern states liberty from parental authority comes on attaining full age. If a person receives his freedom before attaining full age he is said

to be “emancipated.® For full information on this question it is necessary to consult the vari¬ ous codes. The Catholic Emancipation Act was the act signed 13 April 1829, which removed the most galling of the Roman Catholic disabilities in England. See Emanci¬ pation, Catholic; Emancipation Proclama¬ tion; Slavery.

EMANCIPATION, Catholic, the custom¬ ary designation of a measure of relief from penalties and civil disabilities granted to pro¬ fessors of the Catholic religion in England and Ireland by acts of the British Parliament 1829: the act did not extend to Scotland. The neces¬ sity of granting relief to the Catholics of Ireland became apparent soon after the out¬ break of the war against the American colonies, and the first relaxation of the penal laws against the professors of the Catholic religion was made in 1780. At that time it was high treason for a priest, native of the kingdom, to perform any of the duties of his office. Catholics could not own land in fee. Roman Catholics whose titles to land antedated the penal laws were ousted if the legal heir professed Protestantism. A Catholic could not practise law, nor conduct a school. In 1780 a bill for removal of some of the disabilities was passed for England and Ireland. When the act of union of the king¬ dom of Ireland with that of Great Britain was passed in the Irish Parliament 1800, solemn pledges were given by the British Cabinet that the disqualifying statutes should be repealed ; but after the union the promise was ignored. In 1824 in Ireland was formed the Catholic Association to agitate for civil rights, such as the right to vote for members of the Parlia¬ ment, to be elected members of the same and to occupy various offices in the government, na¬ tional and local. In 1829 it was seen by English statesmen that to withhold these rights and franchises any longer would provoke a rebel¬ lion in Ireland; and a bill of relief was intro¬ duced in the Parliament 5 March, and passed in both houses and approved by King George IV 13 April, permitting Catholics to elect and be elected to the Parliament, and to hold offices under the Crown ; but they remained still ex¬ pressly excluded from certain high offices — that of lieutenant-governor of Ireland, that of regent of the universal kingdom, or lord chan¬ cellor of the United Kingdom, or of Ireland, etc. In 1867 the last named disability was re¬ moved, as was, many years after, the disability of a Catholic to be lord

chancellor of the United Kingdom. But the Act of Grace of 1829 con¬ tained a clause forbidding Catholic ecclesiastics, monks, friars and nuns from wearing the at¬ tire or habit of their respective station or order in public under a penalty of $250 for each of¬ fense. This proviso was ostentatiously violated in Ireland, and with impunity, for, like the $500 forfeiture for violation of the Ecclesiastical Titles Acts fq.v.), no penalty was ever exacted. Another clause of the Catholic Emancipation Act, which was also ignored and condemned, required that Jesuits and members of religious orders of the Roman Catholic Church living within the kingdom should register in the office of the clerk of the peace of the county under a penalty of $250. (See O'Connell, Daniel). Consult Butler, (Historical Memoirs-* ; Milner, Supplementary Memoirs* ; Lingard, (History

of the Church in England*; Green, 'History of England.*

EMANCIPATION IN LATIN-AMER¬ ICA, the Manumission of Slaves in Relation to the several Declarations of Independence. In Haiti, where African slavery was first intro¬ duced into America, the negroes received as a gift (

Slaves introduced in any way what¬ ever into the country shall become free by virtue of the fact that they have trodden the soil of the republic.** In Colombia (New Granada) the number of negroes was never very great ; it was estimated at 80,000 in the middle of the 19th century. The struggle for independence, beginning 20 July 1810, or as a vigorous insurrection in 1811, was continued after the union with Venezuela (December 1819), and the republic of New Granada was formed in 1831. In 1821 a law was passed by the republic of Colombia for the gradual manu¬ mission of slaves, and all born after that date were declared free at the age of 18, — that

gradual process applying, of course, to all the territory of the Greater Colombia at the time of the law's enactment. (See Colombia, His¬ tory). A law of 1851 abolished slavery entirely in New Granada, by giving liberty to all who remained slaves on 1 Jan. 1852, provision being made for the payment of indemnity to. the

owners. The beginning of the war for inde¬ pendence in Mexico dates from 16 Sept. 1810 (see Dolores, el Grito de) ; on 6 Nov. 1813 the first

Mexican Congress, installed in the town of Chilpancingo, issued the declaration of inde¬ pendence and decreed the emancipation of

slaves. This, therefore, was the starting point of emancipation on the mainland of America. Venezuela's declaration of independence (5

July 1811) was followed after 10 years by the

law for the gradual manumission of slaves which we have mentioned above, that is, the law of the Greater Colombia of 1821. Para¬ guayan independence should be dated from 11 June 1811, when an assembly of deputies began its sessions; for the resolution passed by this assembly, renouncing allegiance to Spain, was ratified as a declaration of independence by the Paraguayan Congress of 1 Oct. 1813. The ques¬ tion of African slavery was comparatively unimportant in Paraguay. "In 1865 there were negroes and mulattoes at Emboscada, Tabapy, and Aregui ; but the negroes have now almost completely disappeared** ('Handbook of Para¬ guay,* September 1902, issued by International Bureau of the American Republics). Chile entered upon a contest with Spain on 18 Sept. 1810, and the independence of the country was proclaimed 12 Feb. 1818. The negro problem did not weigh upon that country, the popula¬ tion being recruited from Europe quite largely. The independence of Peru was declared at Lima 28 July 1821; that of the Dominican republic 1 Dec. 1821 ; that of Brazil 7 Sept. 1822; and Bolivia became an independent republic 6 Aug. 1825. In Brazil the conservative states¬ man, Silva Paranhos, obtained from the Parlia¬ ment the passage of a bill (28 Sept. 1871) for the gradual extinction of slavery, which pro¬ vided that thereafter every child born of a slave mother should be free, and created a special fund for emancipation by redemption. Private philanthropy, largely directed by the Masonic lodges, effected more than the fund created for this purpose; and the number of slaves began to decrease. A bill for the immediate and un¬ conditional abolition of slavery in Brazil was signed by Princess Regent Isabel 13 May 1888; the monarchy was overthrown 15 Nov. 1889; the new constitution approved 24 Feb. 1891. In Cuba the slaves were emancipated on the conclusion of the Ten Years' War, that is, in 1878, and Cuba became a republic 20 May 1902. The experiences of the French, Danish and British possessions may be referred to briefly in conclusion. Napoleon restored slavery in French Guiana, Martinique and Guadeloupe, although his efforts to accomplish the same re¬ sult in Haiti were, as mentioned above, frus¬ trated by the resistance of the blacks them¬ selves. The freedom of all who were held in bondage throughout the French dominions was declared in 1848. Slavery in the Danish West Indies (Saint Thomas, etc.) was abolished also in 1848. The act to

abolish slavery throughout the British colonies, providing £20,000,000 for compensation of the owners, was dated 28 Aug. 1833, and its effect was to free 770,280 slaves on 1 Aug. 1834, the number thus emanci¬ pated in Jamaica being 309,000.

Marrion Wilcox.

EMANCIPATION PROCLAMATION,

the announcement issued by Abraham Lincoln 1 Jan. 1863 abolishing slavery in all military sections of the South except those territories occupied by Union arms. The Republican ad¬ ministration at the outbreak of the Civil War was awkwardly placed for dealing with slavery. To assail it in its own territory was not only to belie the past professions of the party, but to alienate so much Northern support as to assure failure ; nor indeed had the great bulk of the party any thought beyond fettering the slave

power for future aggression. On the other hand, to leave slavery untouched was not only to chill the energies of the most reliable up¬ holders of the War, but to give foreign coun¬ tries a pretext for asserting that the North was fighting merely for dominion, and that the Southern cause was that of liberty and morally entitled to help. The former horn of the di¬ lemma was much the sharpest; and the govern¬ ment moved very cautiously, restraining its subordinates like Fremont (30 Aug. 1861) and Hunter (9 May 1862) from forcing its hand by emancipation orders. On 9 Aug. 1861 an act had declared masters employing slaves against the government barred from further claim to them ; but that was a mere warning and rule of court. The first embarrassing problem was how to deal with slaves in conquered districts, or who had come within its lines : was the gov¬ ernment to act as slaveholders' trustee and re¬ turn them to servitude? The growing resent¬ ment against slavery as a convertible term for the rebellion, and disgust at being slave-catchers to the behoof of their enemies, supplied the answer, and on 13 March 1862 all army officers were forbidden to return fugitive slaves ; their surrender from any quarter was made harder (though the Fugitive-Slave Law was not form¬ ally abolished till 28 June 1864) ; on 17 June 1862 all captured, deserted or fugitive slaves of owners in rebellion were freed. As to the main body who plainly could not be left in un¬ changed status as the core of a fresh abscess, Lincoln's wish was for compensated emancipa¬ tion ; he sent a special message to Congress 6 March, and that body passed a joint resolution 10 April, declaring that

the United States ought to co-operate with any State which would adopt gradual abolition, by paying for the slaves, and on 16 April those in the District of Columbia were thus emancipated ; but despite his repeated urgencies, the border States would take no measures of the kind. On 19 June the slaves in the Territories were freed.

The final blow came, as John Quincy Adams 20 years before had forecast that it would, by using the President's war power to suppress in¬ surrection. As the second year of the conflict wore on, the majority demanded the crippling of its enemy by the most efficient means, and very many believed that a threat of general emancipation would bring about a general sur¬ render. Lincoln wished for a great victory first, that it might not appear the selfish re¬ source of an overmatched power; but the dis¬ couraging Peninsular campaign obliged him to satisfy his supporters by holding this bludgeon over the enemy. On £2 Sept. 1862 he issued a proclamation announcing that 100 days after, on 1 'Jan. 1863, the Executive would issue an¬ other proclamation designating the States or parts of States then deemed in rebellion, evi¬ dence to the contrary being the presence of bona-fide representatives in Congress, that all slaves in the designated sections should be per¬ manently free, and that the civil and military authorities of the United States would main¬ tain their freedom, and would not repress any effort of theirs to make it good. The only re¬ sult was a retaliatory proclamation by Jeffer¬ son Davis 23 December, ordering that captured negro Federal soldiers and their officers should be turned over to the States, and that Gen.

B. F. Butler should be hanged if captured. On the 1st of January the threatened proclamation was issued, as <(by virtue of the power in me vested as commander-in-chief of the army and navy of the United States, and as a fit and nec¬ essary war measure for repressing said rebel¬ lion.® It designated Arkansas, Texas, Louisi¬ ana except 13 parishes® or counties, Missis¬ sippi, Alabama, Florida, Georgia, South Caro¬ lina, North Carolina and Virginia except West Virginia and seven other counties, as in rebel¬ lion, emancipated all the slaves in them ; en¬ joined these freedmen to abstain from all vio¬ lence except in self-defense, and to wbrk faith¬ fully for reasonable wages ; announced that suitable members of them would be received into United States military and naval service, and for this act invoked ((the considerate judg¬ ment of mankind and the gracious favor of Almighty God.®

The curious feature of this proclamation is that it abolished slavery only in the sections not under the military power of the United States, and left it untouched in those which were, namely, the ones specially

excepted by it, <(which are, for the present, left precisely as if this proclamation were not issued.® . Hence it was argued by the Democrats that it had no legal force whatever, and emancipated no one ; a question the Supreme Court never passed on. It was always accepted by the majority party, however, as a continuing act, applying as fast as any of that territory fell into the Union power, and not necessary to repeat. Politically, the results were enormous. Recognition of the Confederacy thenceforward meaning a flat maintenance of slavery instead of freedom, the entire anti-slavery sentiment of France and Great Britain was thrown against those countries' interference, which at once became unthinkable. It drove away many lukewarm Northern Republicans, and brought many local and State defeats to the administration; but it took the party <(off the fence® and made it a coherent organization with one firm, open prin¬ ciple, for many years unassailable. In the South, as defeat meant emancipation by their enemies and it would be no worse if done by themselves, some of the leaders (as Lee) seriously thought of offering freedom to slaves to fight in their armies in the latter part of the war, hoping to save independence and the con¬ trol of their own destinies at least.

EMANTS, em [ants, Marcellus, Dutch poet and descriptive writer: b. Voorburg, near The Hague, 12 Aug. 1848. His volumes of travels display his keen observation and his poetical imagination. Among his best are

(Along the Nile) (1884) ; (From Spain) (1886). He holds a permanent place in the literature of the Low Countries through his charming narrative poems, (1879); (The Shimmer of the Gods) (1883).

EMANUEL THE GREAT, king of Por¬ tugal : b. 31 May .1469; d. Lisbon. 13 Dec. 1521. He ascended the throne in 1495. During his reign were performed the voyages of dis¬ covery of Vasco da Gama, of Cabral, of Americus Vespucius and the heroic exploits of Albuquerque, by whose exertions a passage was found to the East Indies (for which the way was prepared by the discovery of the Cape of

Good Hope in 1486 by Bartolomeo Dias), the Portuguese dominion in Goa was established, the Brazils, the Moluccas, etc., were discovered. The commerce of Portugal under Emanuel was more prosperous than at any former period. The treasures of America flowed into Lisbon and

the reign of Emanuel was justly called (

EMBA, em'ba, a river in the district of Orenburg, Asiatic Russia ; the Russians call it Jemba, the Kirghiz, Dchem. It rises at three sources in the western slope of the Mugodchar foothills, flows sluggishly through an area of steppes, is about 200 feet wide and 500 miles long, and forms a delta at its embouchure in the Caspian. It is not navigable, but abounds in fish. The fortress Embinsk is built on its upper waters.

EMBALMING, the art of preserving the body after death. It was probably invented by the Egyptians, whose bodies thus prepared for preservation are known as mummies, but it also prevailed among the Assyrians, Scythians and Persians. It is at least as old as 4000 b.c. The Egyptian mummies were placed in costly coffins ready for sepulture; but were frequently kept some time before being buried — often at home — and even produced at entertainments, to re¬ call to the guests the transient lot of humanity. The usual method of embalming among the ancients was as follows : The intestines and brains were taken out, and the cavities filled up with a mixture of balsamic herbs, myrrh, cassia, etc.; the arteries and other vessels were injected with balsams. The ancient Egyptians filled the cavities of the trunk with aromatic, saline and bituminous stuff. The cloths in which the mummies were swathed were saturated with similar substances. So effectual were some of the processes that after 2,000 or 3,000 years, the soles of the feet are still elastic and soft to the touch. By 700 a.d., when embalming prac¬ tically ceased in Egypt probably 730,000,000 bodies had been thus treated ; many millions of them are still concealed. In 1881 upward of 30 mummies of potentates, including that of Rameses II, were discovered together at Deir- el-Bahari. (See Mummy). The Persians em¬ ployed wax for embalming; the Assyrians, honey; the Jews aloes and spices. Alexander the Great was preserved in wax and honey. Desiccated bodies, preserved by atmospheric or other influence for centuries, have been found in France,- Sicily, England and America, espe¬ cially in Central America and Peru. The art of embalming was probably never wholly lost in Europe. The body of Edward I, buried in Westminster Abbey in 1307, was found entire in 1770. The body of Canute, who died in 1036, was found very fresh in Winchester Cathedral in 1776. The bodies of William the Conqueror and of Matilda, his wife, were found entire at Caen in the 16th century.

Chaussier's discovery, in 1800, of the preserv¬ ative power of corrosive sublimate, by which animal matter becomes rigid, hard and grayish, introduced new means of embalming; but, ow-

ing to the desiccation, the features do not re¬ tain their shape. The discovery of the preserv¬ ative power of a mixture of equal parts of ace¬ tate and chloride of alumina, or of sulphate of alumina, by Gannal, in 1834, and of arsenic by Tranchini, pyroxilic spirits by Babington and Rees in 1839, and of the antiseptic nature of chloride of zinc, have led to the application of these salts to the embalming of bodies required to be preserved for a limited time. The latest method common in the United States is an in¬ jection of a fluid into the femoral artery and the cavity of the abdomen. The most efficient agents are mercuric chloride, arsenic and zinc chloride. Embalming has taken the place of ice in preserving the dead until funeral services are ended. The reasons for this are its preser¬ vation of the body for transportation and leisurely disposal and its absolute prevention of communication of infection, either before the body is buried or after it has crumbled and mingled with earth in a cemetery. Consult Budge, (The Mummy) (2d ed., London 1894) ; Dhonan and Nunnamaker, (Hygiene and Sani¬ tary Science) (Cincinnati 1913) ; Eckles, Practical Embalmer) (Philadelphia 1904) ; Gannal, (Traite d'embaumemenD (Paris 1838; trans. by Harlan, Philadelphia 1840) ; Myers, (Champion Textbook of Embalming) (5th ed., Springfield, Ohio, 1908) ; Pettigrew, (History of Egyptian Mummies* (London 1834) ; Smith, G. E., (A Contribution to the Study of Mummifi¬ cation in Egypt* (Cairo 1906) ; Sucquet, (Em- baumement* (Paris 1872). See Dead, Disposal of the; Mummy.

EMBANKMENT. See Levee; Missis¬

sippi Levee System.

EMBARGO IN THE UNITED STATES.

Prohibition of foreign commerce, to distress foreign countries and obtain the revocation of hostile measures; (

till the victory of Old Ironsides (see Consti¬ tution, The) that American ships could fight English on equal terms, and it was the general conviction that in case of war our entire fleet would at once be (

EMBASSY (ambassy , from O. Fr. ant – bassee, from low Lat. ambachus, a servant, vas¬ sal) in its strict sense, signifies a mission pre¬ sided over by an ambassador, that is, a diplo¬ matic agent of the

first rank, as distinguished from a legation or mission entrusted to an en¬ voy or agent. The difference between the pow¬ ers and privileges of an ambassador and an en¬ voy is, that the former, as the representative of the person of his sovereign, can demand a private audience of the sovereign to whom he is accredited, while the latter must communicate with the Minister for Foreign Affairs.

EMBER-DAYS, called in the Roman Mis¬ sal and Breviary Quattuor Temper a (the four seasons) and in the Anglican (Book of Com¬ mon Prayer) <(Ember-days at the four seasons,® are in the Roman and in the Anglican calendar the Wednesdays, Fridays and Saturdays which come next after 13 December, the first Sunday of Lent, the Feast of Pentecost (Whitsunday), and 14 September, respectively. In both the Latin Church and the Anglican these days are days of fasting. The Quattuor Tempora were observed at Rome in the time of Saint Augus¬ tine (the bishop of Hippo, early in the 5th cen¬ tury) and doubtless the observance was already of ancient date. The custom was brought into Britain by that other Saint Augustine who was the herald of the gospel to the Anglo-Saxons. It was anciently the custom for bishops to hold ordinations only on the Saturdays of the Quat¬ tuor Tempora. The origin of the phrase Ember- days cannot be definitely ascertained ; but it is probably a corruption of Quattuor Tempora, as in German Die Quatember signifies the Ember- weeks.

EMBEZZLEMENT (O. Fr. besiler, to rifle, lay waste) is the fraudulent appropriation, as by a clerk, public officer, agent or other per¬ son of property entrusted to him. It must not be confounded with larceny, which is the wrongful taking and carrying away of the per¬ sonal property of another, with the felonious intent of converting such property to one's own use without the consent of the owner. This "taking® implies a trespass, which does not ex¬ ist in embezzlement. By common law, embez¬ zlement was not a crime, but it has been uni¬ versally made so by statute both in the United States and Great Britain. The earliest statute recognizing the offense was that of Henry VIII, c. 7 (1529). This act was passed with the ob¬ ject of remedying an admitted defect in the existent criminal law, by which persons who had fraudulently appropriated goods or money, coming into their possession legally, escaped all punishment, although their moral guilt was great. Obviously they could not be convicted of larceny, as their offense lacked some of the essential elements of that crime. The above- named statute, however, restricted the offense to servants and in 1799 another statute was passed extending it to include clerks. This act, not proving completely satisfactory, the Lar¬ ceny Act, passed in England in 1901, which amended sections 75 and 76 of the Larceny Act of 1861, further extended the offense to include trustees, directors

of companies and others. This act makes the offense a misdemeanor and provides that the punishment therefor shall be penal servitude for a term not exceeding seven years, or imprisonment, with or without hard

labor, for a term not exceeding two years. In Scotland certain designated courts have inher¬ ent jurisdiction to punish all offenses, even when not declared to be crimes by statute,, with the result that no legislation on the subject has been found necessary in that country.

Most of the statutes in the United States are based on the English act of 1799, but are much broader in their scope. In this country em¬ bezzlement is a misdemeanor or a felony, de¬ pending usually on the value of the property appropriated, although in some States embez¬ zlement by an officer of a corporation or embez¬ zlement of certain animals is a felony irrespec¬ tive of the value of the property converted. Statutes often define embezzlement and men¬ tion is frequently found therein of the persons who may be guilty of the crime, as adminis¬ trators, guardians, trustees, public officers, servants, agents and others who occupy fidu¬ ciary relations. It is essential to constitute the crime that the person charged therewith should have come into possession of the property by virtue of his employment and that he intention¬ ally violated some confidence. There must also be a criminal intent to appropriate the property of another. Thus one holding property which is legally in his possession in the honest though mistaken belief that he owns it cannot be con¬ victed of the crime. In some States, as Massa¬ chusetts and New York, embezzlement is in¬ cluded in the offense of larceny. The punish¬ ment differs in the various States, usually being imprisonment for a term varying from 2 to 10 years.

EMBLEMENTS (O. Fr. emblacment, from emblaer, to sow with grain), a term ap¬ plied to the growing crops of land when the lease of a tenant for life has expired by the death of the tenant, or when an estate at will has been determined by the lessor. In either case the emblements belong to the tenant or his executors. But when the tenant puts an end to his occupation by his own voluntary act, he will not be entitled to the crops.

EMBOLISM, em’bd’lizm (Gr. efifiofaofiog intercalation, rv in, and (Sal’kdv to cast). In the calendar, an intercalation of a day, as in the

second month of our year in leap-year, or of a lunar month, 28 days, in the Greek calen¬ dar. In medicine, the blocking up of a blood¬ vessel by a clot of blood that comes from some distance till it reaches a vessel too small to permit its onward progress. The immediate cause or clot is called thrombus and the dis¬ ease is known as thrombosis. See Pathology ; Thrombus; Thrombosis.

EMBOSSING (Fr. bosse, a protuberance), the art of producing raised figures upon plane surfaces, such as leather, paper, cardboard, metal, textiles, etc., by means of powerful presses furnished with dies of the desired pat¬ tern. Color embossing is done by two proc¬ esses: (1) By applying the color to the raised part of the design, in which case the color is spread on the die with a brush and the whole surface cleaned, leaving the ink in the depressed parts of the engraving only; (2) by leaving the design uncolored and applying the color with a printing-roller to the flat portions of the die. For large designs, engraved plates or electro¬ types are used with a counterpart of mill board faced with gutta-percha. Book-binding makes

extensive use of the art of embossing. Em¬ bossed wall-paper designs are effected by means of copper cylinders on which the design has been engraved, with counter parts of rollers of a softer surface. These are mounted on cal¬ endar frames. A common type of embossing machine has been adapted from the fabric printing cylinder machine, by engraving the cylinders in a suitable fashion. For some pur¬ poses the cylinders must be heated and kept at a high temperature while being used. Metal ornaments are likewise often made by an em¬ bossing process and finished and polished later. See Chasing; Repousse.

EMBRACERY (O. Fr. embraser, to set on fire), an attempt to corrupt or influence a jury by money, promises, letters, threats or persuasions. This offense in the United States is punished by fine and imprisonment.

EMBRASURE, em-bra'zur, in fortification, an opening made in the breastwork or parapet of a battery or fortress, to admit of a gun being fired through it.

EMBRO, a corrupted form of the name Edinburgh.

EMBROIDERY, the art of working 'on an already existent material a decoration with needle and thread. Form and shading are ex¬ pressed by means of stitches; and it is essential in embroidery that the stitches must be frankly visible. Stitches are never concealed, nor dis¬ guised.

Technique. — A stitch is the thread left on the surface of the cloth after each ply of the needle. A piece of embroidery may be worked in one kind of stitch only, or a number of dif¬ ferent stitches may occur in the one article. Embroidery stitches are ancient and have spe¬ cial names: Canvas (including cross, tent [petit-point] and cushion), crewel (also out¬ line and stem), chain (simple, twisted, cable, zigzag and checquered), button-hole, feather, rope, fern, herring-bone, back, satin, basket, brick, braid, interlocking, overcast, plait, rococo, running, split-stroke, tambour, coral, darning, insertion, snail-trail, leviathan, ladder (Creton), two-sided Italian, trellis, old English knot, German knot, French knot, Rumanian, Hol¬ bein and many others.

Couching is the word used to define the method by which one thread is sewn down by another thread upon the material. Cord and braid, or a bundle of tiny threads, may also be (

Laid-work is an elaborate kind of couching. The stitches are laid down loosely on the sur¬ face of the material and then sewn down by cross lines of stitching. The Japanese use laid- work more extensively than any other nation. The Chinese, on the other hand, prefer to sew through the material, and, as a rule, their deco¬ ration is as beautifully embroidered on the wrong side of the material as on the right side.

(

iheir skill in placing the stitches. Constantly changing the direction of the stitches, they work for a pleasant play of light and shade acquired by the placing of the silk. They shade with the intention of showing where one shade ends and another begins. They are also fond of voiding, i.e., leaving the ground to show be¬ tween the petals of flowers, similar to the use of (ties) in stencilling.®

Raised-work is formed by a layer of padding placed on the material and worked over with threads. It was popular in the 14th century and was carried to excess in the 18th century (par¬ ticularly in England), when stump-work, in which figures were stuffed like dolls, was de¬ veloped. Turkey-work, in imitation of Oriental rugs and carpets, appeared in the 16th century. It was worked in worsted and was used for table-covers, cushions and chair-seats. Eastern patterns were superseded by floral ones char¬ acteristic of the Renaissance ; and

these, in turn, by 18th century designs. Turkey-work chair-seats were plentiful in American homes in the 17th and 18th centuries. Petit-point or tent- stitch, is often used generically to describe the needlework that most nearly imitates tapestry. It enjoyed favor in the 16th, 17th and 18th centuries. Bargello, or Florentine, work is pro¬ duced by the cushion-stitch on a canvas foun¬ dation, a blunt needle being used. Sometimes the satin-stitch is employed in combination with the cushion ; the one 'for the pattern and the other for the background. Zigzag patterns are characteristic. Bargello was much used in the 17th century. It has lately been revived and is now very fashionable. Delicate line-work and color in mass are sought for by the expert and artistic embroiderer, who also takes delight in producing effects in shading and a beautiful finish by a perfect control of the stitches. Occasionally the worker uses a frame on which the material to be embroidered is stretched. The tambour-frame, shaped like a sieve, or drumhead, said to have originated in China, gave its name to the tambour-stitch. Chinese embroidery, exquisite in design and work¬ manship, has been unchanged for centuries. The devices and motives resemble those on porcelain vases and cloisonnee enamels. Noth¬ ing more beautiful than the embroidery on the robes of mandarins and noble ladies has ever been produced. Sometimes to the dragons, phcenix, flowers, butterflies, pagodas, clouds and temples the embroiderer adds something from his own fantastic imagination. The treatment of flowers in Chinese embroidery, in color, form and technique, is alone worthy of special study. The most beautiful Japanese work is on cere¬ monial robes on sashes for women and on the squares, called fuknsa, used for covering fine presents. The best Japanese embroiderers live in Kioto. In the Mikado's collection at Nara there are specimens of Indian embroideries worked 1,200 years ago. India is said to have had some influence upon Japanese embroidery, though the chief source of inspiration was China.

Indian embroidery is done on silk, velvet, cotton, wool and leather. Most famous of all is the embroidery on wool, both loom-wrought and by the needle, of Cashmere, as shown in the Cashmere shawl. Muslin is embroidered at Dacca, Patna and Delhi. Rich embroidery in colored silk and gold and silver is made in Hy¬

derabad and other places in Sindh. The em¬ broidery of Nauanager and Gondal in Kathiwar (of which Cutch gets the credit) resembles that of Resht on the Caspian. Gold is also used in Cutch for embroideries in the Persian style of Isphahana and Delhi. The gorgeous gold-em¬ broidered velvets of Lucknow, Gulbargah, Au-rungabad and Hyderabad in the Deccan, used for canopies of state, umbrellas of dignity, elephants' cloths and state-housings, have re¬

mained unchanged from the earliest periods of Indian history; but their sumptuous gold-scroll ornamentation resembles Italian design of the 16th century. The Portuguese used to send satin to India to be embroidered in European designs and Oriental workmanship. Of such exquisite material were made many of the beau¬ tiful coats and waistcoats worn in the European courts in the 17th and 18th centuries. The em¬ broidered native apparel of Cashmere, Amritsar, Lahore, Delhi, Lucknow, Murshedabad, Bombay and Vizagapatam are highly prized.

History. — Whether embroidery originated in China or India is a disputed point. The Chinese claim to have practised it 3,000 years b.c. India also boasts similar antiquity in this beautiful art. All ancient nations carried em¬ broidery to perfection; for the art of the needle was developed before that of the brush. Thousands of years before the Bayeux Tapestry (q.v.) was worked with the needle to chronicle the Norman Conquest (1066 a.d.), if Homer may be believed, ((Helen embroidered in her palace a large cloth, white as alabaster, with the story of the conflicts in which Trojans and Greeks contended for love of her.® Embroidery was, therefore, not only an artistic enrichment of material, but it was used for centuries as a means of record and commemoration. Sacer¬ dotal vestments, draperies and curtains for temples, robes of ceremony, clothes for ordinary use and household articles were embroidered with appropriate symbols and designs in col¬ ored wools, silks and threads of gold in every country of civilization. The Egyptians excelled in embroidery, rivaling the gorgeous work of the magnificent Babylonians. The Jews learned the art from Egypt, as is proved by the veil that Moses had made for the Holy of Holies <(of fine linen embroidered with cherubim of blue and purple and scarlet.®

The Greeks attributed the invention of em¬ broidery to Athene ; and a magnificently em¬ broidered peplos hung behind her statue by Phidias in the Parthenon, and was renewed every five years. Persia was also famous for this art. Strabo speaks of the impression made upon the Greeks by the aerial and delicately embroidered fabrics, as well as the heavy and magnificent ones. Phrygia was so celebrated that all splendid embroideries were known in Rome as <(Phrygian.® Roman emperors were not behind others in patronizing the art. Even more sumptuous were the Byzantine emperors, whose robes were stiff with gold and of enormous weight with woven stitches. The favorite scheme of Byzantine embroidery con¬ sisted of pairs of birds or animals (often en¬ closed in circles), separated by the sacred tree of Persia, a kind of palm — the <(tree of life.® This Byzantine style dominated ecclesiastical embroidery throughout Europe during the

Middle Ages when monasteries and convents had special rooms for male and female em-

EMBROIDERY

Japanese. Hoyei Period, 1704-1711. Costume for Uo Dance 2 Chinese. Silk, crimson and gold. (In Metropolitan Museum, New York)

EMBROIDERY

1 French. Louis XV

2 English-Period, Charles I. A fine example of “ stamp-work ” (see article) characteristic design: figures, castle, animals, flowers and birds. (In Metropolitan Museum, New York;

EMBROIDERY

IMIS

UM

..wffc

_/#j

m

■fiv *4

|>-J|

i

■ ;■ . fc

mmif

Ecclesiastical English Embroidery of the 15th Century ‘opus anglicum), representing orphreys (name given to this golden embroidery). The background is completely overworked and hidden by the needlework in gold, silver and silks of various colors in the style of the illuminated manuscripts of the period. (In Metropolitan Museum, New York)

1 Italian, 16th-17th Century

2 Valence; linen background with brightly colored crewels, or worsteds, design showing Indian influence. English, 17th Century. (In Metropolitan Museum, New York)

broiderers. Embroidery was also one of the most important subjects of instruction, ranking in dignity with painting and sculpture. Superb articles were worked on linen grounds with worsteds, silk and gold threads. Sometimes the entire material was covered with em¬ broidery in the style of the miniature paintings in the illuminated manuscripts of the time ; and it is noticeable that the great period of church embroidery, from the 12th to the 14th century, is also the great period of the illuminated manuscripts. In these ((paintings with the needle,® as contemporary writers call them, the English were the most celebrated. Their special work was known as Opus anglicum. It became so famous that great lords had to have speci¬ mens in their collections and many churches throughout Europe received gifts of this artistic production. The Syon Cope, now in the South Kensington Museum, is the most celebrated specimen in existence.

Embroidery was lavished not only on copes, chasubles, dalmatics, mitres, gloves and shoes for church ceremonials in the Middle Ages, but was also used to decorate the costumes of men and women and for draperies and house¬ hold decoration. Beds were magnificent with embroidered draperies and counterpanes. Nor was it sufficient to embroider one set of bed and window hangings, but several sumptuous ((sets of hangings® were produced to suit the changing seasons and various occasions. Hang¬ ings for tents were also marvelously em¬ broidered and so were the armorial bearings of the knight on his surcoat and on his ban¬ ners. Much of this work was done in the con¬ vents and monasteries and by the groups of embroiderers supported in wealthy homes and much of it was done by the accomplished and noble ladies. We know this from allusions in contemporary literature and in the detailed and descriptive entries in inventories and wills.

In the 16th century embroidery was no less used. It submitted, however, to Renaissance influence. Superb work was produced in Spain, Italy, France and England. Beautiful specimens exist in private

and public collec¬ tions and in the treasuries of cathedral and abbey churches ; and, moreover, we have the paintings of the old Italian, Flemish and Spanish masters to show what gorgeous embroideries people wore. Household articles received much work from the embroiderer and also such small articles as purses, bags, handker¬ chiefs, gloves and covers for books. Sets of hangings – for windows and beds were em¬ broidered and ((Turkey work® and petit-point chair-seats and cushions were made. Queen Mary and Queen Anne, like Queen Elizabeth and their Stuart ancestor, Mary Queen of Scots, were expert embroiderers. They fol¬ lowed in their designs the general taste of the day led by the artists of Louis X,IV and in¬ spired by the growing Eastern influence. Still employed to adorn costume, the art of em¬ broidery grew ever more and more delicate; and in the days of Louis XV, when there was a rage for Chinese decoration, the handsome coats of courtiers and men of fashion were often sent to China to be embroidered accord¬ ing to order with European patterns. Floss and spun silks were now made up into various new threads, such as the fluffy velvet chenille, or caterpillar cord. Delicate gold and silver

threads were also produced; and with these pretty materials beads and spangles were often mingled to make the fantastic and graceful designs even lovelier by their added brightness and sparkle.

Embroidery was still exquisite in the days of Louis XVI and in the time of Napoleon. Josephine favored delicately embroidered and filmy muslins, which shared their vogue with Cashmere shawls. French, English and Ameri¬ can fingers were soon able to produce lovely flowered and figured muslins and to decorate tulles and nets with (

Within the last 30 or 40 years there has been a revival of artistic needlework — a move¬ ment in which Walter Crane and William Morris took the lead. Many art schools have been formed in the United States similar to that of the South Kensington Museum in Lon¬ don in which the stitches and styles of ancient and decorative embroidery are taught.

Bibliography. — Christie, Mrs. Archibald H.,

Esther Singleton.

EMBRUM, on-brun (ancient Eburodunum Caturigum), France, town in the department of Hautes-Alpes, on a rocky eminence in the centre of a large plain watered by the Durance, 20 miles east from Gap. It is an ancient place, surrounded by walls and ditches, and of very

picturesque appearance. The principal buildings are a cathedral and the archiepiscopal palace. It was pillaged successively by Vandals, Huns and Saxons, and its inhabitants almost ex¬ terminated by the Moors in 966. It is still a bishop's, and was once an archbishop's see. The manufactures consist of broadcloth, hats, yarns and farm tools. Pop. 3,812.

EMBRYO. See E MBRYOLOGY.

EMBRYOLOGY, that branch of biological science which is concerned with the develop¬ ment of the organism from the egg. The term is applied to the development of plants as well as animal organisms, but in the present article only the latter will be considered. Though every species of metazoan or multicellular animal produces eggs, not every individual arises directly from the egg. Indeed, in some groups asexual reproduction is commoner than sexual. It may occur by fission, or division of the organism into two or several individuals, as in certain flat-worms and annelids, or by gemmation, where new individuals bud or sprout out from the older ones, and either separate completely, or remain attached, form¬ ing colonies as in hvdroids and bryozoans. However, strictly speaking, embryology applies only to the development of the organism from the zygote or fertilized egg-cell, or in some cases from eggs which develop by partheno-

genesis, i.e., without fertilization by a male gamete.

Historical. — Before the invention of the miscroscope observations on development were of the most superficial sort and the genesis of the organism from the egg was chiefly a prob¬ lem for the philosopher. The relation of the embryo to the two parents was not in any sense comprehended and as late as the middle of the 1 7th century spontaneous generation was be¬ lieved to occur in some animals, even by so great a physiologist as William Harvey. Dur¬ ing the 17th and 18th centuries the theory of ˆevolution,® later known as preformation, of which Bonnet, Leibnitz and Haller were among the greatest exponents, was the dominant view. Evolution in this sense denotes mere unfolding, like the flower from the bud, and has no rela¬ tion to evolution in the sense of a theory of descent with modification. In brief, preforma¬ tion is the doctrine that all the structures of the adult body are present in miniature in the germ and that development consists merely in their unfolding and growth.

According to this theory nothing arises anew ; as a corollary, known as the (

An important advance was made in 1759 by C. F. Wolff, who demonstrated, from observations on the developing hen's egg, that bodily parts are not performed but actually arise anew in an orderly sequence, a theory which had been advocated though not proved by Harvey a century earlier and even vaguely stated by Aristotle. This conception, which is termed epigenesis, shortly supplanted the purely speculative preformation theory, but what regu¬ lated this epigenetic differentiation remained a problem and still remains the great problem of embryology, notwithstanding a vast amount of observation and experimental research. During the 19th century great progress was made in morphological or descriptive embryology and if space permitted many important discoveries might be enumerated. The greatest of the early investigators in this field is generally ad¬ mitted to be Karl Ernst von Baer (1792-1876), sometimes called <(the father of embryology,® who, working mainly on the chick, was the first to give an orderly account of the chief phe¬ nomena of development, including cleavage of the egg, formation of germ-layers and the differentiation of organs. Von Baer also laid the foundations of comparative embryology.

The cell theory, formulated by Schleiden and Schwann in 1838, which has so completely revolutionized biological thought, led only gradually to the recognition of the unicellular character of the gametes, egg and sperma¬ tozoon, and despite the much earlier germ

theory of the spermists it was not until nearly the middle of the 19th century that the sperma¬ tozoa were generally recognized as the agents of fertilization; indeed by many naturalists they were regarded as parasitic micro-organ¬ isms, accidentally present in the fertilizing fluid. In 1843 Martin Barry witnessed the penetration of the rabbit's egg by the spermatozoon, but strange to say the unicellular character of the two gametes, a fact of fundamental importance, was not clearly demonstrated until after 1860. As a consequence of the rapid development of comparative embryology during the middle and latter part of the 19th century, together with the newly awakened interest in organic evolu¬ tion, came the recognition of embryology as one of the greatest sources of evidence of phylogenetic relationship, and it is not surpris¬ ing that a generalization known as the ((re- capitulation theory,® namely, that the individual in its development repeats in brief its racial history, should have been developed. Though this theory has frequently been forced farther than the facts warrant, it is unquestionably true that embryology has yielded highly important

data as to the relationships of classes and smaller groups within the same phylum, thus confirming in many instances evolutionary evi¬ dence from comparative anatomy and palaeon¬ tology. The latter part of the 19th century and the earlier years of the 20th witnessed the de¬ velopment of a school of experimental am- ■ — bryology, concerned with the physiology and the philosophy of development, with the old problem of what makes the egg develop and what factors regulate the progressive differentia¬ tion of the embryo. In this field of morpho¬ genesis some of the leaders have been Roux, Herbst and Driesch in Europe, and Loeb, Mor¬ gan and Lillie in America. Experimental studies have shown that while organs are not preformed in the egg, still in many cases the egg substance is differentiated into formative zones at, or even before, fertilization, that it exhibits in greater or less degree (

EMBRYOLOGY

MALE

FEMALE

HD) Spermatogonia Oogoma

V (// wlIll dmlnid nur1 – 1 1

witK diploid, number of chromosomes X (X = 4- in this diagram)

SYNAPSIS

union of xbroTno&omes in pairs forming *- (haploid. number) of bivalents

bivalents longitudinally split FIRST MATURATION DIVISION

dr split cKromosomes \ SECOND MATURATION DIVISION

Female pi-on. ucleus

-§• single

chromosomes

Spermatids

become

Spermatozoa

Head

Middle-piece Ta.ll

\ 1st pola_v

body

&) &}

\ _ V..ˆ

2.nd polaLr 1st polar body body divides (in

Mature Ovum some cases)

Malt pvonucleu,s

FERTILIZATION

Form aii ore of cleavage rxu.de us

FIRST CLEAVAGE OF ZYGOTE

Fig. 1 Diagram of maturation of male and female germ cells, fertilization and the first cleavage of the zygote. (The

paternal chromosomes are here differentiated by stippling)

CPPL.Y CLEAVBCE STAGES

Fig. 3 Diagram illustrating relations of extra- embryonic membranes in chick embryo at ninth day of incubation

Fig. 2 Holoblastic cleavage, and formation of blastula and gastrula in Amphioxus, a low vertebrate. (The first five stages figured are surface views, the last six are represented as cut in the median plane.) From Calkins' Biology

EMBRYOLOGY

279

in man and other species. These are always of the same sex. Ordinary or dissimilar twins, of course, arise from different ova and may or may not be of the same sex, as is the case in ordinary litters of young in mammals. In the nine-branded armadillo a litter contains four young,

all of the same sex, and these have been conclusively shown to come from a single egg, and in a related species the polyembryonic litter contains eight or nine. In certain hymenopterous insects (chalcids) a single ovum produces a great number, in some cases hun¬ dreds of individuals. It follows from the method by which sex is determined at fertiliza¬ tion that all embryos thus arising from a single zygote must be of the same sex.

The Germ Cells. — The great generalization on which modern embryology is based is the cell concept as applied to the gametes. This is the fact that the ovum and spermatozoon are single cells of the parent organisms, and cor¬ related with this the relatively new knowledge of the physical basis of heredity as located in the chromosomes. It is essential to realize not only that the gametes are true cells, but that they are exactly equivalent as regards their chromatin content and consequently their heredity-carrying capacity (with the exception of the sex-chromosomes, for which see the articles Cell and Heredity), and that their great diversity in size and form represents only a physiological differentiation by which the spermatozoon, minute and capable of locomotion is enabled to reach the egg, which as it is sup¬ plied with foodstuff for the future embryo is much larger and non-motile. It is scarcely pos¬ sible to conceive of two types of cells more widely different in form and appearance, yet both are the descendants of similar primordial germ cells, and their differences, except for the sex-chromosomes above mentioned, are entirely in the extranuclear structures. The sperma¬ tozoa are proliferated in the testis in enormous numbers. In their commonest form, often de¬ scribed as tadpole-shaped, there is a head com¬ posed of condensed nuclear chromatin, a middle piece containing a centrosome, and a vibratile flagellum or tail by means of which the spermatozoon is actively propelled and enabled to reach the egg. Frequently also a pointed body, the acrosome, is present at the anterior end and facilitates penetration into the ovum. There is no relation between size of sperma¬ tozoon and size of organism. In man the entire length is 52-62 thousandths of a millimeter. In many minute invertebrates it is very much greater. In a few animals, the spermatozoa are non-motile and not of the usual flagellated form. The ovum, or egg, is always much larger than the spermatozoon, non-motile and usually of spherical form. During the elaboration of the egg in the ovary granules of inert food-yolk or deutoplasm are stored up in its extranuclear protoplasm. This food-yolk is rich in protein, fats, lecithin, etc., and serves during develop¬ ment as food for the embryo. The difference in size of eggs of different species is largely a difference in the amount of yolk and accord¬ ing to distribution of

this substance eggs are described as (a) alecithal or homolecithal, hav¬ ing very little yolk evenly distributed as in the minute ova of mammals; (b) telolecithal, with the yolk massed toward one pole of the egg, the condition in most vertebrate eggs ; and

(c) centrolecithal, in which central mass of yolk is surrounded by a superficial layer of protoplasm, a type occurring in some arthro¬ pods. The amount of yolk affects the develop¬ ment of the egg profoundly. The largest eggs are those of sharks, reptiles and birds, which are of extreme telolecithal type and comprise the largest cells known. Those of placental mammals are very minute, that of man only 17 hundredths of a millimeter in diameter. In oviparous animals the eggs are usually en- . closed in protecting envelopes of which some are formed in the ovary and others secreted by the lining of the oviduct. In the hen's egg, to cite a familiar example, the delicate mem¬ brane surrounding the yolk is of ovarian origin, while the albumen, shell membrane and shell are oviducal secretions. Frequently, as in in¬ sects and bony fishes, the egg membrane is pierced by one or more minute pores, micro- pyles, which permit ingress of the spermatozoon at fertilization.

Maturation. — A phenomenon long known to be of almost universal occurrence in the his¬ tory of the egg is the successive extrusion from it coincident with or shortly preceding fertiliza¬ tion, of two minute globules known as ((polar bodies.® The significance of these bodies long remained a problem, the solution of which dur¬ ing the later years of the 19th century consti¬ tuted one of the most brilliant discoveries of cellular biology. It invested chromatin with a new importance, rendered possible a new un¬ derstanding of germ-cells and fertilization and opened a new avenue for the investigation of the mechanism of heredity. It is a well-estab¬ lished fact that the cells composing the body (somatic cells) of every animal contain a defi¬ nite number of rods of chromatin called chrom¬ osomes, this number characteristic of the par¬ ticular species ; also that these chromosomes are in even number and composed of two equiv¬ alent groups derived respectively from the two parents (an exception to this occurs in the case of the sex chromosomes. See articles on Cell and Heredity). By a series of researches beginning in 1883, in connection with which the names of E. Van Beneden, Theodor Boveri and Oscar Hertwig are especially identified, it was demonstrated that the ripe germ-cells of both sexes have only one-half the somatic number of chromosomes, though in the earlier primor¬ dial germ-cells the full somatic number occurs. This reduction is accomplished through a phe¬ nomenon known as "synapsis® or union in pairs of the chromosomes of paternal and maternal origin. Thus the somatic "diploid® number of singles

chromosomes becomes reduced in germ- cells to the “haploid® number • of bivalent or double chromosomes, this reduction occurring in the spermatocyte or oocyte cell generation prior to the last two cell divisions known as maturation divisions, by which the definitive gametic cells are formed. During the matura¬ tion divisions the bivalent chromosomes are twice divided and the resultant univalent chromosomes distributed, still in haploid num¬ ber, to each of the four resulting cells. In the male these four cells all develop into func¬ tional spermatozoa, but in the female the di- visions are so unequal as to consist merely in the successive extrusion from the egg of two abortive eggs or polar bodies. In some cases the first of these bodies again divides so that

the end result is one functional egg and three polar bodies, which differ from the egg only in the smaller amount of cytoplasm and yolk, their chromatin content being exactly equiva¬ lent. The racial significance of the reduction of the number of chromosomes to one-half in both gametes will be obvious in connection with the union of these cells in fertilization. Fig. 1.

Fertilization. — “Fertilization® as applied to the union of gametic cells is a somewhat in¬ adequate term, a relic of earlier days when it was supposed that the male semen merely acti¬ vated the germ contained in the egg. While it is quite true that the spermatozoon does initiate development of the egg and thus “fertilizes® it in the same sense in which artificial treat¬ ment with chemicals may fertilize many kinds of eggs, another essential fact of the conjuga¬ tion of the two gametes, is the combination in the new zygote of two equivalent groups of chromosomes from the two parents. In many invertebrates and some aquatic vertebrates eggs and sperm are shed in the water, where conjugation occurs, but in many other animals the spermatozoa are transferred to the genital ducts of the female and fertilization is internal. Only one spermatozoon is normally concerned in the fertilization of an egg, though poly¬ spermy, or the penetration of several into the egg-cytoplasm, frequently occurs, especially in forms having large eggs, but such supernumer¬ ary sperms always degenerate eventually and take no part in the formation of the embryo. When a spermatozoon comes in contact with the ovum it penetrates the cytoplasm and in many cases a delicate membrane, the fertiliza¬ tion membrane, is instantly secreted from the surface of the egg, thus preventing the entrance of any more sperms. At the same

time other marked evidences of disturbance of the physico¬ chemical equilibrium occur, often with violent streaming and new arrangement of formative zones in the protoplasm, and in some eggs the promorphology is rapidly established at this time. The tail, which is of no further use after the sperm has reached the egg, is frequently left outside. The head upon entrance speedily enlarges and assumes a vesicular appearance, becoming the male pronucleus. The egg nu¬ cleus after the last maturation division is called the female pronucleus. Each of these pronu¬ clei, as a result of previous reduction, has the haploid or halved number of chromosomes and by the union of pronuclei to form the zygote nucleus the normal diploid number characteris¬ tic of the species is restored. Thus reduction maintains the specific number of chromosomes from generation to generation. A centrosome, the function of which is to initiate the process of cell-division, is also introduced by the sper¬ matozoon, usually in the middle piece, replacing the egg centrosome which disintegrates after the last maturation division. The zygote, as the fertilized ovum is called, is now a complete cell, really a new individual in the stage of a unicellular embryo, with its chromatin, the ve¬ hicle of heredity, derived equally from the two parents.

Cleavage. — Development of the zygote may be defined briefly as a progressive differentia¬ tion accompanied by cell-division and sooner or later by growth, but it must not be assumed that differentiation is determined by the cell division, for experimental embryology indicates

rather that the converse is the case. The term cleavage or segmentation is applied to the mi¬ totic divisions by which the zygote is divided into numerous cells or blastomeres. When this process involves the entire zygote, it is described as total or holoblastic. In some cases the cells may for some time be equal in size, but where there is a unipolar aggregation of yoke, cleav¬ age is mechanically retarded at the vegetal pole, the result being unequal cleavage, well shown in the egg of the frog, while if the yolk be very abundant cleavage may be parfal or meroblastic, limited to a small disc of yolk-free protoplasm at the so-called animal pole, as in the hen's egg. In such cases this small disc, the blastodisc or blastoderm, gives rise to the entire embryo which gradually encloses, digests and absorbs the inert mass of yolk. In cen- trolecithal eggs of arthropods the cleavage is superficial over the entire egg. As a result of cleavage the egg in most cases soon attains the form known as the blastula, which in its most typical condition is a hollow sphere of cells containing a central segmentation cavity or blastocoel. Where yolk is very abundant the blastula is greatly altered and in some forms there is no true

segmentation cavity and strictly speaking no blastula. See Fig. 2.

Gastrula and Primary Germ Layers. — The single-layered blastula becomes transformed into a gastrula , a two-layered sac-like stage, in which there is an outer cell-layer called ecto¬ derm (or ectoblast) and an inner layer, the endoderm (or endoblast) . This two layered stage is variously formed; in some cases, as in certain ccelenterates, cells wander inward from one pole of the blastula forming a solid inner mass which later becomes hollowed out, but a far commoner method of gastrulation is that known as the embolic type, in which a part of the gastrula wall, generally the part richest in yolk, becomes turned in or invaginated as a result of unequal growth to form a cup-like endoderm. The new cavity thus formed in the endoderm is the archenteron or primitive gut cavity; the mouth of the sac is the blastopore, which in various animals may form the mouth or the anus or neither. This simple sac-like gastrula is found only in eggs which have very little yolk, thus among vertebrates it is met with in typical form only in amphioxus, though readily recognizable in lamprey, amphibian and some other forms, while in most vertebrates the abundant yolk masks the sac-like character of this stage. Frequently in eggs with abundant yolk invagination of endoderm is mechanically impossible and in such cases gastrulation may be effected by an overgrowth of the ectodermal layer which surrounds the large yolk-filled por¬ tion of the egg. Such overgrowth is termed epiboly in contradistinction to emboly, or in¬ turning of endoderm. However formed, the gastrula has considerable differentiation and foreshadows the orientation of the future body and some of the great organ systems. . Its ec¬ toderm is the source of the epidermis and the nervous system. The endoderm forms the lin¬ ing of the gut and later gives rise to out¬ growths which become the chief digestive glands. These two layers are called the pri¬ mary germ layers and are of well-nigh universal occurrence. In those vertebrates which have very abundant yolk and consequent partial cleavage, as well as in mammals which seem to

retain the developmental mode of forms with large eggs, the two-layered stage is so modi¬ fied as to be scarcely recognizable as a gastrula and in such cases the blastopore becomes compressed and drawn out into a longitudinal primitive streak which is almost the earliest evidence of the body axis.

Mesoderm. — In all animals above the ccelenterates a third germ layer called the mesoderm (or mesoblast) develops between the two primary layers and gives rise to the connective tissue, muscles, blood system and gonads. This layer arises in very diverse ways. In many worms it is segregated very early in cleavage as special mesoblast cells. Usually it appears much later as a differentiation from the endoderm or in rare cases even from the ecto¬ derm. In its origin from the endoderm it either delaminates as a sheet of cells from the outer surface of that layer, or arises as a series of hollow, sac-like outgrowths from the endo¬ derm called enteroccels or gut-pouches. When formed by the latter method the mesoderm from the beginning contains cavities which were originally parts of the primitive gut cavity. In cases where it splits off as solid masses similar cavities appear within it later. Such cavities in the mesoderm become the coelome or true body cavity. In animals in which the body is seg¬ mented or metameric, such as the annelid worms, arthropods and vertebrates, the first evidence of segmentation appears in the meso¬ blast. In certain embryos a rather ill-defined tissue appears composed of loose cells and called mesenchyme. It may be produced very early, before the true mesoderm, or it may be prolif¬ erated from that layer. In general it gives rise to connective tissues.

Germ-Layer Theory. — All metazoa, except¬ ing sponges and ccelenterates, exhibit three germ layers, a fact to which great significance has been attached by many embryologists. The sponges are so aberrant in their development that it is impossible definitely to identify their two layers with ectoderm and endoderm ; while the ccelenterates, as suggested by Haeckel, may be regarded as a primitive group which has not progressed morphologically beyond the gas- trula stage of complexity. The question of the homology of the three germ layers in the other phyla is one which has evoked much discussion and has led to considerable difference of opin¬ ion. As comparative embryology became known, the well-nigh universal occurrence of three layers and the general similarity of their respective derivatives naturally led to the as¬ sumption of their homology, a generalization known as the <(germ-layer theory,® though, as stated above, the middle layer differs greatly in its mode of origin in different groups. In nearly all cases, however, the ectoderm gives rise to the epidermis, the lining of the mouth and anal region, the nervous system, and in some invertebrates, to the kidneys. The endo¬ derm, with which from the beginning the nutri¬ tive yolk is especially identified, becomes the lining epithelium of most of the alimentary canal and the chief digestive glands and in vertebrates gives rise to the germ cells which later wander into the mesoderm. The meso¬ derm, the latest layer to

appear, is the source of the connective tissues, including the internal supporting hard parts when such are present, the blood and blood vessels, the piusqular sys¬

tem, the gonads with the germ cells in most cases, and usually the kidney system. The methods by which germ layers become differ¬ entiated into their derivative tissues and organs are so varied that limitation of space precludes their present discussion, but it may be stated that common accompaniments of histogenesis are thickening, folding and delamination (splitting) of layers and also localized prolif¬ eration of free cells. The assumption of homol¬ ogy of the germ layers in different groups was quite natural, but of late years evidence has accumulated which indicates that many of the developmental resemblances of different phyla are to be interpreted rather as similar but quite independent reactions to like environmental fac¬ tors ; or in a word, as homoplastic rather than truly homologous.

Nutrition of Embryo. — Throughout the entire course of development the mechanical effect of food-yolk is very marked, not only in its retardation or prevention of cleavage in cer¬ tain parts of the egg but in its mechanical ef¬ fect on the formation of the germ layers and its physiological relation to development of the nutritive system. In general, though there are many exceptions, large eggs rich in 3ˆolk de¬ velop slowly and the resulting embryos hatch in an advanced state, often with essentially the adult form, while small eggs poor in yolk must early develop some means of securing food and usually in such cases the embryonic period is very brief, the embryo hatching in the form of a larva, often totally different from the adult. Such larvae are especially common among ma¬ rine invertebrates, in which usually they have the form of minute free-swimming organisms, often with no resemblance to the adult either in form or habit. Examples are the trocho- phores of annelids and molluscs, the nauplius of the crustacean, bipinnaria of the starfish, etc. In some cases the larva represents only a small portion of the future adult animal, occa¬ sionally only a portion of the head precociously equipped with an alimentary system and means of locomotion. These larvae feed on various micro-organisms and eventually become made over into the adult form by a more or less com¬ plete metamorphosis.

Extra-embryonic Membranes. — In some animals extra-embryonic membranes are pro¬ duced which subserve a temporary function in the protection or nutrition of the embryo and which are lost at hatching or at birth. In the higher vertebrates such structures include the chorion, a membrane > forming the outer wall of the entire

embryonic vesicle ; the amnion, a closed water-sac lined with ectoderm and com¬ pletely enclosing the embryo, and the allantois, an extension outside the body of the urinary bladder which in reptiles and birds and also in the primitive egg-laying mammals known as monotremes spreads its vascular wall inside the chorion close to the porous egg shell and serves physiologically as an embryonic respiratory organ. In the marsupial mammals, such as the kangaroo and opossum, the young are nourished during the very brief period of gestation by ((uterine milk,® a secretion of uterine glands which the embryo absorbs by means of its vas¬ cular membranes, chiefly the yolk sac. Uterine milk is also an important source of nutriment to the embryo even in some placental mammals, where it contains leucocytes and the detritus of

disintegrated cells of various sorts in addition to glandular secretion. The placental mammals are so called because an organ named the placenta is developed, which is essentially com¬ posed of villi or vascular tufts developed on the surface of the chorion and supplied with blood vessels by the allantois. These chorionic villi come into intimate contact with the mucous membrane lining the uterus, which becomes profoundly modified during pregnancy, and through their rich vascular supply the blood of the embryo is brought into close osmotic rela¬ tion with that of the mother, thus permitting the diffusion into the embryonic circulation of soluble foods and oxygen from the maternal blood and at the same time removing carbon dioxide, so that the placenta serves the func¬ tions of embryonic nutrition and respiration. It is important to note that there is no admix¬ ture of maternal and embryonic blood, the two in all cases being separated by an osmotic mem¬ brane. In some mammals the placental villi are minute and scattered over almost the entire chorion, forming what is known as a diffuse placenta , as in the horse and pig. In others they are aggregated into a number of brush¬ like tufts, the cotyledonary type, found in most of the ruminants, as the deer, ox, etc. In other cases the villi are limited to a broad girdle forming a zonary placenta, as in most carniv¬ ora and in the elephant. In insectivores, rodents and most of the primates, including man, a discoidal type of placenta is found in which the villi are limited to a single cake¬ like mass. In many cases, especially the diffuse and cotyledonary types, the villi fit into cor¬ responding crypts of the uterine mucous mem¬ brane from which they are drawn at birth without injury. In other cases, the so-called deciduate placentae, the

uterine lining becomes greatly altered and its union with the villi be¬ comes so firm that at birth portions of the maternal tissue are torn away with the em¬ bryonic placenta. Recent investigation, how¬ ever, favors the view that even in deciduate types the maternal portion is largely absorbed before full term, so that the placenta at birth is almost wholly of foetal origin. Though the eggs of mammals are very minute and undergo complete cleavage, their development is re¬ markably like that of the large eggs of reptiles and birds in the mode of germ-layer formation, organogeny and relations of extra-embryonic membranes, and strongly indicates the descent of mammalia from ancestors whose eggs had abundant yolk and underwent partial cleavage. This, indeed, is often cited as one of the classsic examples of the persistence of ancestral devel¬ opmental habit. In this particular case the evi¬ dence is confirmed by the occurrence of ovip¬ arous habit, large eggs and reptile-like mode of development in the primitive monotreme mammals.

Bibliography. — Among numerous works on embryology the following may be mentioned as of especial value: Balfour, F. M., (A Treatise on Comparative Embryology) (Vols. I and II, London 1885) ; Ziegler, H. E., (Lehbruch der vergleichenden Entwickelungsgeschichte der niederen Wirbelthiere5 (Jena 1902) ; Lillie. F. R., development of the Chick) (New York 1908) ; Kellicott, W. E., (General Embrvology) (New York 1913) ; Jenkinson, J. W., Verte¬

brate Embryology) (Oxford 1913) ; MacBride, E. W., (Textbook of Embryology) (Vol. I, Invertebrates, London 1914) ; Hertwig, O., (Elemente der Entwickelungsgeschichte: Ver- tebrates) (5th ed., Jena 1915) ; Marshall, F. H. A., (The Physiology of Reproduction > (London

1910).

J. H. McGregor,

Professor of Zoology, Columbia University.

EMBRYOLOGY, Human. In the human female, at birth, the ovaries contain several thousand ova. These remain quiescent during the years of childhood, but beginning at pu¬ berty and continuing until the climacteric or menopause, ovulation or the dehiscence of ripe ova occurs, usually a single egg escaping from one of the two ovaries at intervals of four weeks. There is without doubt a correlation between the phenomena of ovulation and men¬ struation, though difference of opinion exists regarding their exact time-relation. During the

reproductive life, some 30 years or more, ap¬ proximately 400 ova may be thrown off, but pregnancy and lactation temporarily suspend ovulation and menstruation. After the climac¬ teric the ovaries, which still contain vast num¬ bers of ova, undergo very gradual degeneration. Maturation, fertilization and cleavage have not been studied in the human egg, but on the basis of studies of the early stages of many other mammals, especially mouse, cat, bat and rabbit, the corresponding conditions in man can be in¬ ferred with great probability. Early embryos of monkeys and apes, which in their later stages, where direct comparison is possible, show prac¬ tical identity with human development, have also supplied important evidence. The human ovum at maturity is spherical, about .17 milli¬ meter in diameter, and is surrounded by a transparent zona pellucida, and a mass of follicle cells, the corona radiata, and the whole enclosed in a vesicle, the Graafian follicle. Ovulation is accomplished by the rupture of the follicle, and the egg thus escaping from the ovary passes into the funnel-like end of the oviduct or Fal¬ lopian tube, being carried along by the cilia which line this structure. In most mammals thus far studied the egg undergoes the first matur¬ ation division, producing one polar body while still in the ovary and before rupture of the fol¬ licle. Fertilization occurs in the upper portion of the oviduct in case spermatozoa are present, and shortly after penetration of the egg by a spermatozoon the second polar body is ex¬ truded. Fertilization in mammals is frequently termed ˆconception.® Judging from conditions in other mammals, including monkeys, the zygote undergoes cleavage in the oviduct while it is being slowly swept along by cilia and reaches the uterus or womb in the stage of the early blastocyst , a minute hollow sphere or vesicle of cells with an inner mass of cells ad¬ herent at one side. This inner mass is the em¬ bryonic mass and from it come all the cells which form the embryo, while the wall of the vesicle, the trophoblast, has only protective and nutritive functions, becoming later the outer layer of the chorion. At the time when the vesicle reaches the uterus the mucous mem¬ brane lining that organ is soft, thick and con¬ gested. During pregnancy this membrane be¬ comes profoundly modified and is called the decidua. Apparently in consequence of some

i

o

g

m

o

z

4) *0 W

■S S’”

VJ. U -*-»

O

,

G j3.2

q,

**‘N /i)

s °.g

dT3 H > G O CD

4) «’

in 13 G

•*-* 4-» 7C 4) 3 £

ft 0-2

X! G<

*S * «

1 O Jh

o

s

•

r

chemical interaction the embryonic vesicle undergoes ˆimplantation,® sinking into the superficial layer of the decidua, which grows over and encloses it, thus separating it from the uterine cavity. Implantation is usually on the posterior wall of the uterus, though it may occur elsewhere, and in abnormal conditions the embryo may become attached in the oviduct, causing a tubal (extrauterine) pregnancy.

The earliest human embryos studied had al¬ ready become implanted. In one of these (Peters' ovum) the entire blastocyst was about one millimeter in diameter, the embryo one- fifth millimeter, or about one one hundred and twenty-fifth of an inch in length. The age was estimated by Peters at three or four days, but it is now believed to be several days older. The three germ layers are distinguishable and the amnion and yolk-sac are already formed. The chorion is covered with villi which have in¬ vaded the capillaries of the uterine mucosa, thus bringing the embryo even at this early stage into nutritive relation with the maternal blood by osmosis. (Fig. 4).

In a slightly older embryo (Graf Spee's embryo) measuring 1.54 millimeters in length, the neural plate or rudiment of the spinal cord and brain is formed. Blood-channels representing some of the chief veins and arteries are dis¬ tinguishable, and also the two heart rudiments, not yet united in the median line. The chori¬ onic villi already contain blood vessels. The yolk-sac, though quite empty of yolk, is of considerable size, and the allantois has ap¬ peared. Several embryos of the third week have been described. At this age the spinal cord and brain form a closed canal, the heart is a twisted tube, and from comparison with other mammals there can be no doubt that the heart¬ beat is already established. By the 21st day the embryo is four or five millimeters in length, and head, tail, gill-clefts and rudiments of eyes and inner ears are clearly distinguishable. By the end of the first month the arms and legs appear as lateral buds and the rudiments of the face are formed. There is a well-marked tail, and head and tail are so flexed as nearly to meet. Measured from neck to rump the embryo is about one centimeter in length. The yolk-sac has not kept pace with the body and is a small pedunculate vesicle. Practically all the great organs are indicated by the beginning of the fifth week. For example, from the alimentary canal the rudiments of thyroid, thymus, lungs, liver and pancreas have budded out. In general structural plan the embryo up to this stage is rather more like a fish than like the adult human. This is especially true of the blood- vascular and urinary

systems.

During the second month growth is rapid, and by the end of this period the embryo is about 30 millimeters in length. Even the layman could now identify it not merely as a mammal but as human, or at least as a primate. The face is now fairly well formed, even to mouth and nostrils, and the external ear is taking shape. The tail diminishes after the sixth week and has almost disappeared by the eighth. Elbow and knee flexures are well marked and hand and foot exhibit digits. The third month wit¬ nesses an increasing humanness in the appear¬ ance of the embryo — or ((foetus,)) as it is com¬ monly called after the establishment of its ex¬

ternal form. About the 11th or 12th week it becomes possible to distinguish the sex from the external genitalia. Before this time these organs were present but different in develop¬ ment, though sex is actually determined at fer¬ tilization and can be distinguished about the end of the first month by microscopic examination of the genital ridges, the structures which later give rise to ovary or testis. About the middle of pregnancy, toward the fifth month, muscu¬ lar movements of the foetus become strong enough to be felt by the mother, a fact which has given rise to a vulgar belief that life begins at this period of ((quicken- ing® as it is called. About this time the face and most parts of the body become cov¬ ered by a dense growth of fine hair, the <(lanugo.® This foetal hair increases for a month or two, but is shed to a great extent before birth. With the growth of the foetus great changes have taken place in the embryonic membranes, the later conditions of which and their relations to the decidua or uterine mucous membrane are illustrated in the diagram (Fig. 5). It may be stated in brief that the amnion enlarges greatly, becoming adherent to the chorion. The yolk-sac and allantois vir¬ tually disappear. The chorionic villi disappear except on the portion of the surface directed toward the original site of attachment, where they persist, forming the chorion jrondosum, which comes into close relation with the cor¬ responding part of the decidua, and with it forms the placenta, the vascular organ by which the foetus, physiologically a parasite, derives its nourishment and its oxygen from the maternal blood.

Birth occurs approximately 280 days after fertilization, though a foetus born as early as the seventh month may survive. The average weight at birth is near seven pounds. The foetus is expelled by involuntary contraction of the uterus, aided by contraction of the ab¬ dominal muscles. Rupture of the amnion by muscular pressure precedes birth, and shortly after the child is born the placenta, torn loose by further uterine contraction, is expelled, to¬ gether with the

amnio-chorion. The entire mass is called the (

Bibliography. — Many excellent works on human embryology have been published. Among the best textbooks are McMurrich, J. P., (The Development of the Human Body5 (Philadel¬ phia 1907) ; Bryce, T. H., Embryology5 (Vol. I of Quain's Elements of Anatomy,5 London and New York 1908); Keibel and Mall, (Manual of Human Embryology5 (Vols.

I and II, Philadelphia and London 1912), a very exhaustive work ; Bailey and Miller, (Textbook of Embryology) (3d ed., New York

1916).

J. H. McGregor,

Professor of Zoology, Columbia University.

EMBRYOLOGY OF PLANTS. That

phase in the life history designated as the em¬ bryology begins within the fertilized egg, but its end is not marked by any such definite feature. In general, the embryo represents the early stages in the development of an individual from the egg. In the ferns and their allies, some¬ what later stages, in which one or more leaves are visible to the naked eye, are called spore- lings. There is no definite feature to mark a line between the sporeling and the adult plant. In the seed plants, the series is embryo, seed¬ ling, adult, with no features to mark the tran¬ sitions. The difficulty is the same as that in de¬ fining baby, boy and man. The early stages in the development of the embryo are fairly well known in all groups from the liverworts to the

highest flowering plants. In the liverworts and mosses, the development of the embryo from the fertilized egg up to the adult stage, and even to the death of the individual, is rather short. The embryo, and even the adult, are small, are parasitic upon the egg-bearing plant (gametophyte), and do not produce any leaves. In the lowest liverworts the egg divides into halves, then into quarters and continues divid¬ ing until a spherical mass becomes differentiated into an outer protective layer enclosing a large number of spores. In the higher liverworts and in the mosses, the embryo starts in the same

way, but later becomes differentiated into three regions called the foot, stalk and capsule, the latter producing the spores. In the lower liver¬ worts, the adult is a small spherical body not more than one-sixteenth of an inch in diameter; in the higher liverworts and in the mosses the diameter is not much greater, but there is con¬ siderable elongation. A couple of inches is rather long; but a few liverworts reach a length of five or six inches and one of the higher mosses is said to reach a length of 10 or 12

inches. (Figures of some of these features may be found under Sporophyte, Evolution of). In the ferns and their allies, the embryo begins to develop in the same way, forming a spherical mass of cells, but definite growing re¬ gions soon appear, marking the root, stem, leaf and foot. The embryo is parasitic upon the gametophyte until the root becomes developed and begins to get nutrition from the soil and the leaf begins to secure materials from the air. When this stage has been reached, we no longer call the young plant an embryo, but a sporeling. In the seed plants, which include the Gymnosperms and Angiosperms, the develop¬ ment of the embryo presents great variation and complexity. In the cycads (q.v.) which rep¬ resent the lower living Gymnosperms, the fer¬ tilized egg does not immediately give rise to a mass of cells, but nuclear divisions, without any separating walls, take place, until there may be as many as 1,000 nuclei lying free in the cyto¬ plasm of the egg (Fig. 1, A). Cell walls then appear at the lower part of the egg (Fig. 1, B). The cells, thus formed, become differentiated into three regions, (1) a group of cells remain¬ ing within the limits of the egg, (2) a region of rapidly elongating cells called the suspensor and (3) at the tip of the suspensor some small cells with dense protoplasmic contents (Fig. 1, C). The root, stem, cotyledons and leaves of the embryo come from these small cells, the other two regions being temporary structures which function only during the early develop¬ ment. After the embryo breaks out from the seed and becomes independent, it is usually called a seedling. The eggs of the cycads are very large, reaching one-eighth of an inch or even one-fourth of an inch in length. In the higher Gymnosperms, the eggs are much smaller, in most Pines not more than one-one- hundredth of an inch in length. In these higher forms there is a constant tendency to reduce not only the size of the egg, but also the num¬ ber of free nuclei. There are still the three re¬ gions mentioned above, but each consists of only a few cells. In a few Gymnosperms, the free nuclear period is entirely eliminated, a cell wall following the first division of the egg nu¬ cleus. In the Angiosperms rhe eggs are still smaller, all being microscopic in size, and in all the cases the first division of the nucleus of the fertilized

egg is followed by the formation of a cell wall so that there is no free nuclear stage. Even under the microscope, the eggs of this group look so exactly alike that it hardly seems possible for one to develop into an herb, another into a shrub and another into a tree. We say the course of development is determined by heredity, and those who are satisfied with the mere naming of a phenomenon may be satis¬ fied with this explanation. Although the eggs and embryos are very small, modern technic is so efficient that the embryology is well known from the willows and crowfoots to the sun¬ flowers and orchids. A simple and fairly typi¬ cal type of embryology is illustrated by the Shepherd's Purse (Capsella), a familiar and widely-distributed weed (Fig. 2). The first di¬ vision of the fertilized egg is transverse (A). Divisions then take place so that a filament con¬ sisting of a single row of cells is produced (B) ; the terminal cell of the row then divides vertically and from the two resulting cells the stem, cotyledons, leaves and nearly all the root

are produced (C). The cell in which the verti¬ cal division has appeared is generally called the embryo cell, and the rows of cells below it, the suspensor. A second vertical wall at right an¬ gles to the first one gives rise to four cells, each of which immediately divides transversely, so that eight cells, apparently just alike, are produced (D). Each of the eight cells now divides, forming a wall parallel to its outer sur¬ face (E). These outer cells (dotted in the il¬ lustration) continue to divide, but all walls are perpendicular to the surface, so that the result is an extensive layer of cells only one cell in thickness. Since this layer, at maturity, is the epidermis, it is called the dermatogen, which means the epidermis producer. In the lower half of the more or less spherical embryo, the four central cells, inside the dermatogen, divide longitudinally (F). The four inner cells re¬ sulting from this division (dotted in the illus¬ tration) constitute the plerome and give rise to

Fig. 2.

the vascular system of the root; the outer four give rise to the periblem which gives rise to the cortex of the root. In the upper half of the embryo, which is to form the stem and leaves, the differentiation into cortex and vascular re¬ gion takes places much later, after a large number of cells has been produced. Thus there are three embryonic regions, one producing epidermis, another producing the vascular

sys¬ tem and the third producing cortex. These three regions, established in the early develop¬ ment of the embryo, are also found in the adult plant.

There are other types of embryology in the flowering plants. Many have no filamentous stage ; some have a single, very large suspensor cell, while some have a massive suspensor. In many the differentiation into the three embry¬ onic regions takes place much later ; some do not differentiate at all until the seed germinates ; while in others, like the bean, the embryo, while still in the seed, has not only cotyledons but well-developed leaves. Some special features of embryology will be found under Plants, Re¬ capitulation in, and Sporophyte, Evolution

of. Consult (Morphology of Gymnosperms,* by John M. Coulter and Charles J. Chamber- lain; (Morphology of AngiospermsP by the same authors; (College Botany, > by G. F. At¬ kinson; (Mosses and Ferns,) by D. H. Camp¬ bell. Charles J. Chamberlain,

Professor of Cytology and Morphology, Uni¬ versity of Chicago.

EMBURY, Philip, Methodist clergyman : b. Ballygaran, Ireland, 21 Sept. 1729; d. Cam¬ den, N. Y., August 1775. He joined John Wes¬ ley's society and became a local preacher at Court-Mattress in 1758. Emigrating to New York in 1760, he began to preach in his own house in 1766 and two years later erected a chapel on the site of the present ((01d John Street Church.® Being a carpenter by trade, he worked on the building with his own hands and completed the pulpit, in which he preached the sermon of dedication 30 Oct. 1768. This was the first Methodist chapel of the New World and he has been called ((the founder of American Methodism.® It was, however, at Camden, Washington County, N. Y., that he did his greatest work, forming there a congre¬ gation which grew into the flourishing and in¬ fluential Troy Conference. Consult Buckley, 'History of Methodism* (Vol. I, New York

1898).

EMDEN, Germany, town, in the province of Hanover, on the Ems, near where it dis¬ charges itself into the Dollart estuary. Emden has an excellent roadstead and its harbor is connected with this by a canal admitting large vessels. The Dortmund-Ems and other canals connect it with the interior. The town has a Dutch appearance due to its quaint architecture and the dykes which protect it from inundation. The town hall, dating from the 16th century, has a remarkable collection of ancient armor and is one of the finest public buildings in Germany.

The town contains also a 12th cen¬ tury church, a museum, art gallery, barracks, a public library, trade and industrial schools, and a deaf and dumb institute. Emden has cable communication with Great Britain, America, and other countries. Its export trade in¬ cludes grain, dairy produce, cattle, tallow, wool, hides, etc. ; and it imports coal, timber, wine and colonial produce. A considerable number of vessels are built here annually; and the man¬ ufactures include leather, paper, dairying instru¬ ments, basketware, cement, wire ropes, bricks, soap and tobacco. There are also oil-mills, breweries and distilleries. Emden was founded in the 10th century or earlier and in 1433 was added to Hamburg. It became a free city in 1595, and a free port in 1751. In 1806 it was taken by Holland, but nine years later was added to Hanover, which in 1866 was itself made part of Prussia. Pop. 24,038.

EMELE, a-ma-la, Wilhelm, German painter: b. Buchen, Odenwald, 1830; d. 1905. He first adopted a military career but studied art with Dietz at Munich and later at Antwerp and Paris. His canvases are noted for exact knowledge of military detail and are spirited in conception, his subjects being military. He lived in Vienna after 1861 where he attained great popularity as a painter of equestrian por¬ traits and hunting scenes. Among his works are (Battle of Stockach* ; ‘Capture of Heidel¬ berg Bridge in 1 799} (1857), purchased by the

Austrian emperor; (The Fight Near Alden- hoveiC (1859) ; (The Square of the Battle of Aspern) (1860); (Capture of Camp Near Far- mars) ; (Attack on the English by French Cui¬ rassiers at Waterloo* ; (Battle of Wurzburg) (1867), his best work; (The Archduke Charles at Battle of Neerwinden* (1872) ; (Attack of the Bournernain Division Near Elsasshausen* ; (Battle of Dijon) ; (Meeting of Patrols of Sev¬ enth and Fourteenth Corps, Prussian Army, Near VesouP ; headquarters of 14th Army Corps in Battle of Belfast* ; (Episode of Battle of Worth) ; (Victory of George II over the French at Dettingen) (1879). His (Cavalry Encounter . near Langenbriick) gained first medal at the Vienna Exposition in 1873.

„ EMERALD (O. Fr. emeraude, Gr. cfiapa- y4oc), a gem of pure green color, often very rich and beautiful. It is a variety of the min¬ eral beryl and is, therefore, a silicate of alumi¬ num and glucinum (q.v.),

its green color being due to the presence of a little chromium. It is usually found in nodules or in distinct six- sided prisms of the hexagonal system. It is a little harder than quartz and has a specific grav¬ ity of about 2.69. It is not acted on by acids. Many of the most intensely colored and valu¬ able emeralds that we are acquainted with were brought from Peru, the largest from Takowaja, in the Urals, a specimen of which is seen in the 624-pound stone at Saint Petersburg. Most modern emeralds come from the republic of Colombia, which quite supplies the current mar¬ ket. In the United States emerald crystals up to nine inches in length and of rich color have been found in Alexander County, N. C., while extensive mining in Mitchell County, N. C., has yielded beautiful gems and much so-called (

EMERALD GREEN, known also as SCHWEINFURTH or PARIS GREEN, and

by a great number of other names, is one of the most beautiful green pigments. It appears to contain copper, arsenic and acetic acid and is usually regarded as an aceto-arsenite of copper. It is a crystalline powder, which becomes paler by grinding, is not affected by light and air and is insoluble in water, but is de¬ composed by alkalis. It is employed as a water and as an oil color and is used for tinting wall-papers, though with much less frequency since the danger of that practice has been discovered.

EMERALD ISLE, an epithet applied to Ireland, from the freshness and bright color of the verdure, produced by the abundant heat and moisture continually reaching it from the At¬ lantic. This epithet was first used by Dr. W. Drennan (1754-1820), in his poem entitled

EMERSON, Edward Waldo, American physician, writer and lecturer: b. Concord, Mass., 10 July 1844; son of Ralph Waldo Em¬ erson (q.v.). He was educated at Harvard, where he was graduated in 1866 and from the

medical school in 1874. After retiring from practice he was instructor in art anatomy at the School of the Museum of Fine Arts 1885— 1906. He published (Emerson in Concord) (1888); he edited (Correspondence of John Sterling and Ralph Waldo Emerson* (1897); (Centenary Edition of Ralph Waldo Emerson,* annotated (1903) ; (Life and Letters of General Charles Russell Lowell) (1907) ; (Emerson's

Journals,* with W. E. Forbes (1909) ; joint author with M. Storey of (The Life of E. R. Hoar> (1911) and many contributions to maga¬

zines.

EMERSON, George Barrell, American educator: b. Kennebunk, York County, Me., 12 Sept. 1797 ; d. Newton, Mass., 14 March 1881. He was graduated at Harvard College (1817), and was the tutor in mathematics and natural philosophy there (1819-21). In 1823 he opened a private school for girls in Boston, which he conducted until 1855, when he retired from professional life. He wrote the second part of the (School and Schoolmaster, * of which the first part was written by Bishop Potter of Pennsylvania. He was appointed chairman of the commissioners for the zoologi¬ cal and botanical survey of Massachusetts, in which capacity he published a (Report of the Trees and Shrubs Growing Naturally in the Forests of Massachusetts) (1846) ; and was also the author of (A Manual of Agriculture * (with C. Flint, 1861) and Reminiscences* (1878).

EMERSON, Luther Orlando, American

composer: b. Parsonsfield, Me., 3 Aug. 1820; d. Hyde Park, Mass., 29 Sept. 1915. He studied music and later taught for eight years in Salem, Mass. He then served as organist and musical director in various churches in Massachusetts, and was the director of about 300 musical fes¬ tivals and conventions. He published (The Rom¬ berg Collection) (1853) ; (1866), etc.

EMERSON, Oliver Farrar, American edu¬ cator: b. Traer, Iowa, 24 May 1860. He studied at Iowa College, taking a post-graduate course at Cornell University, where he received the degree of D.Ph. in 1891. . After serving as superintendent of schools in Grinnell and Mus¬ catine, Iowa, he was principal of the Academy of Iowa College (1885 —88) ; instructor in Eng¬ lish (1889-91) Cornell University, and assistant professor of rhetoric and English philology in the same institution (1892-96), when he took the same chair in Western Reserve University. He is member of the Modern Language Association, American Dialect Society, Simplified Spelling Board, and is a regular contributor to philologi¬ cal papers. He has published ‘History of the English Language) (1894) ; (1905); (Poems of Chaucer) (1911); ‘Outline History of the English Language) (1906) ; and contributions to various philological journals and magazines.

EMERSON, Ralph Waldo, American poet and philosopher: b. Boston, 25 May 1803; d.

Concord, Mass., 27 April 1882. The celebration in 1903 of the 100th birthday of Ralph Waldo Emerson served as a meter to mark how wide and deep was the influence which a single origi¬ nal thinker gifted with literary expression can exert at the end of his first century; for there was public recognition of his ethical and poetic genius in every quarter of the globe. Along with this appreciation went also the perception that a distinct Emersonian school of thought had arisen, modified in some degree by the circle of striking writers and talkers — men and women of thought, fancy, imagination and elo¬ quence — who gathered around Emerson early or late in his career and now constitute the group known as the (

had no inclination, and did not stand high in general scholarship at his graduation in 1821. He read widely, however, and the discipline of teaching in his elder brother William's school for young ladies at his mother's house in Frank¬ lin street, Boston, gave him exactness in Latin, French and Greek. He presently (1823) took up the study of divinity with Dr. Channing and Prof. Andrews Norton, and began to preach sermons in 1827. He spent much time in youth at his grandmother's, who owned the Old Manse in Concord, and there he preached for some months in 1828, during the absence of her second husband, Rev. Dr. Ripley. His own grandfather, Rev. William Emerson of Concord, who built the Old Manse, died as a chaplain in the Revolutionary army in 1776.

The clerical life of Emerson was a distinct era, marked by originality and independence in the young divine. His first and only settle¬ ment was at the Second Church of Boston, which had been Cotton Mather's, and was Henry Ware's when Emerson was ordained as a colleague in 1829. He became sole pastor in 1830, and in the meantime had married a deli¬ cate young Bostonian, Ellen Louisa Tucker, who died in 1832. In 1833, upon a point of doctrine concerning the rite of the Lord's Supper, in which he found himself at variance with his deacons, he preached a sermon gently setting forth his scruples and resigned his place, much against the wish of his people. But he had been ill and despondent since the death of his wife and the illness of his brother Edward ; and a foreign tour was prescribed for him, which broke the continuity of his preaching, although he continued to officiate in pulpits here and there for some six years after his first visit to Europe. Miss Elizabeth Peabody, who had often heard Emerson preach, said at the Con¬ cord School of Philosophy in 1883 :

From 1834 I never omitted an opportunity of hearing Emerson preach.

I sought and obtained leave to read the sermons he had in manuscript. They were all as truly “ transcendental ” as any of his later writings in prose or verse. If a volume of them could be printed to-day in their own form it would interpret his later revelations, of which they are but a varied expression. From first to last he never shut in his vision of the living God to the limitations of his own or any other individual conception. I once repeated to him the reply of an unconsciously wise and pious woman of the Lexington congregation, when asked why they did not settle an eminent preacher (Dr. Hedge). “ Oh, we are a very simple people in East Lexington; we can hardly understand anybody but Mr. Emerson.” He did not laugh; on the contrary, with an accent almost pathetic, he replied, “If I had not been cut off untimely in the pulpit, perhaps I might have made something of the weekly sermon.”

No doubt he would have made much of it. But what he did was better; he turned the lecture desk into a pulpit, and for more than 30 years preached righteousness there. From 1835, the date of his second marriage, to Miss Lidian Jackson of Plymouth, lecturing was his chief occupation during half the year. His es¬ says were first lectures and were generally given to many audiences before he thought them good enough to print.

His first book, (Nature,) published in a small edition in 1835, was not a course of lec¬ tures, but rather genuine essays, thought out for years, and mostly written out in their final form at the Old Manse, or finished in his own study at the home he made for himself in 1835 at the east end of Concord village, and where he died, 27 April 1882. The book attracted little notice in America or England at first,

and* a second edition was not issued until 1849, a dozen years having been required to sell 500 copies. But Carlyle, whom he had visited at Craigenputtock in 1833, and with whom he formed then a strict friendship and corresponded until Carlyle’s death, saw its value, and so did Alcott, Hawthorne, Parker, Thoreau and a circle of high-minded women, who became his constant hearers. It now takes rank as the nearest approach to a system of philosophy which he put forth in successive chapters dur¬ ing his whole active life. He planned another and more elaborate work, which he called (The Natural History of Intellect, > and of which he wrote several chapters, intended to set forth the function and operation of the qualities of the human mind —

memory, imagination, reason, volition, etc. — but he never brought it to such completion that it could be published as a whole, either by himself or his successive editors, Mr. Cabot, Dr. Emerson, etc. When invited to lecture on philosophy at Harvard, as he was in 1870, he threw these chapters and copious notes and readings into 18 lectures, two in a week, but the effort was too great for him at his age and in his failing strength, and he could never afterward bring the papers into form for printing. Several of the chap¬ ters appear separately; and perhaps some future scholar may combine them with

Emerson was actually introduced to noisy public notice by two of his early addresses, which are now printed in the same volume with

Meanwhile Emerson was drawing about him in Concord and Boston, in Plymouth, Salem and other New England towns a circle of friends and a school of thought. The num¬ ber of these persons was small at first, but their enthusiasm was fervent, and their in¬ tellectual and social force was considerable. Prominent among them was Margaret Fuller,- a woman of genius who drew other women by her

talent and her sympathies, and who had formed a circle of her own in Cambridge and Boston. Among men, the most, prominent for a time was Bronson Alcott, an educational reformer, who had shown insight and eloquence in dealing with the young, but whose talent for conversa¬ tion was not accompanied by any corresponding gift of expressing himself in writing. Others of the circle were F. H. Hedge, an accom¬ plished student of German literature, afterward distinguished in theology; Dr. Convers Francis, a learned pastor and professor at Cambridge; Theodore Parker, equally learned and more radical in opinion ; with younger man like Wil¬ liam Henry Channing, James Freeman Clarke, Henry Thoreau, Wentworth Higginson, Ellery Channing, S. G. Ward, Marston Watson of Plymouth, J. Elliot Cabot ; and in his own im¬ mediate acquaintance, Mrs. Sarah Ripley, the most learned woman of New England, who had married Emerson's uncle, Rev. Samuel Rip¬ ley; her brother, George Bradford; Miss Eliza¬ beth Hoar, an accomplished woman, betrothed to Emerson's brother Charles (who had died in 1836), and Emerson's own aunt, Mary Emer¬ son, who at times favored and at times opposed the movement in which her nephew was en¬ gaged. This movement presently was called, rather than called itself, ˆTranscendental® — the term borrowed from the phraseology of Ger¬ man philosophy, but hardly corresponding in New England to the meaning it had in Ger¬ many, and indeed used loosely in America with no fixed meaning. Its followers were in fact idealists of various shades and divisions of thought and speculative philosophy, whose or¬ gan, the quarterly

review called The Dial, ex¬ isting four years (1840-44), became the recep¬ tacle of much youthful literature and many earnest essays toward the reformation of society in education, morals and politics. Its first editors were Margaret Fuller and Rev. George Ripley, the founder of the famous community at Brook Farm; but from the first Emerson had great influence in its councils, and ultimately became its proprietor and editor, associating Thoreau with himself in editing it. Hence much of the earlier writing of Thoreau first came out in The Dial, as did that of Emerson and Margaret Fuller and Theodore Parker. For this review Emerson wrote the introductory essay, as he did in December 1847 for a kindred venture, the Massachusetts Quarterly Review, in which Parker and Elliot Cabot were frequeni writers. In these two brief essays must we still look for a characterization of the so-called transcendental movement, so unimportant in its first appearance, yet so momentous afterward in determining some of the chief results of the Civil War of 1861-65. In The Dial Emerson spoke of it as ((the progress of a revolution,® and such it proved indeed to be. He added:

Those who share in it have no external organization, no badge, no creed, no name. They do not vote or print, or even meet together. They do not know each other's faces or names. They are united only in a common love of truth and love of its work. . . . Without concert or proc¬

lamation of any kind, they have silently given in their several adhesion to a new hope; and in all companies do signify a greater trust in the nature and resources of man than the laws or the popular opinions will well allow.

Seven years later, aproaching the same topic from another point of view, and with more experience of his countrymen, Emerson said in

the first number of the Massachusetts Quar¬ terly :

The aspect this country presents is a certain maniacal activity, an immense apparatus of cunning machinery, which turns out at last some Nuremberg toys. Has it gen¬ erated, as great interests do, any

intellectual power? One would say there is nothing colossal in the country but its geography and its material activities; that the moral and the intellectual effects are not on the same scale with the trade and production. . . . It is a poor consideration

that the country wit is precocious, and, as we say, practical; that political interests on so broad a scale as ours are administered by little men with some saucy village talent; by deft partisans, good cipherers, strict economists, quite empty of any superstition. . . . The state, like the

individual, should rest on an ideal basis. As soon as men have tasted the enjoyments of learning, friendship, and virtue — for which the state exists — the prizes of office appear polluted, and their followers outcasts.

The profound discontent so manifested, yet lightened by an ideal hope of better things, was working in the mass of the Northern people, as well as in this small nucleus of Platonists and agitators of New England, New York and Ohio. While The Dial had to perish for want of subscribers, the Tribune of New York rose up to more than fill its place; and Margaret Fuller, Thoreau, George Ripley and George William Curtis found Greeley ready to give them a hearing in his daily and weekly newspaper, which had readers everywhere. It reported Emerson's lectures, the sermons of Parker and printed the higher criticism of Rip¬ ley, Dana and Margaret Fuller. Political parties began to be formed on ideal issues and courageous minorities began to grow into tri¬ umphant majorities here and there.

In this escape out of the ideal into the prac¬ tical Emerson rather unwillingly found himself involved. He began to be popular, and his books, which up to 1850 had scarcely paid for the cost of publishing them, became a source of moderate income. He had followed up the publication of essays in The Dial by the issue in 1841 of a volume selected from his earlier lectures and essays, a second series in 1843, a collection of his orations annexed to a reprint of Mature' in 1849, and in 1850 his most effective book for European recognition of his high quality, the Representative MenP All these books had been lectures mainly, though much changed in publication, as may be seen by reading the omitted passages cited in the (Notes > to Dr. Emerson's (Centenary Edition' of his father's books, issued in 1904. And by 1850 Emerson had become a widely-sought lec¬ turer and went as far west as Galena and Saint Louis, though practically shut out of the slave¬ holding States by his pronounced anti-slavery opinions which began to bernade public by him in 1844. This wider hearing as lecturer was

needful to him now pecuniarily, for his small fortune which had made him independent since 1832 had become involved in railroad specula¬ tions by the ambition of a classmate at college and yielded him little revenue for years. The way had been prepared for his extended reputa¬ tion in England and on the continent by his visit there in 1847ˆ48, when he lectured exten¬ sively in England and Scotland under arrange¬ ments made for him by Alexander Ireland of the Manchester Guardian and by his friend Carlyle and others in London. He had even aroused the envy of Mrs. Carlyle by his wel¬ come in England among the aristocratic circle to which he had access through his friends voi.. 10- 19

George Bancroft and Charles Sumner, as well as by the simple dignity of his own manners, which admitted him everywhere in the exclusive society of great cities. On this visit he saw something of the French Revolution of 1848, and made acquaintance in England with Arthur Hugh Clough, Matthew Arnold, Froude and others of the rising young men in literature, as well as the older men of letters whom he met at the breakfasts of Rogers and in the circle to which Carlyle, long resident at Chelsea, be¬ longed.

Emerson had ever been more forward to publish his friends' books than to hasten to the press with his own. The first edition of (Sartor Resartus) in America was introduced by him in a preface, and he took charge later of American editions of the (French Revolution-' and the earlier essays of Carlyle, by all which the author received from sales in America before 1842 about $1,000, which he assured Emerson was more than he had then got from his books (not his review articles) in Great Britain. Emer¬ son also edited the first edition of Jones Very in 1839, and promoted the earlier volumes of Ellery Channing and Thoreau from 1840 to 1854, when Thoreau issued the second of the only two volumes published in his lifetime. Altogether, for Carlyle, Margaret Fuller and his other friends, he had caused to be printed three times as many volumes as appeared of his own writing during the 20 years after his second marriage in 1835. In 1852, while in the midst of his lecturing popularity, he paused at Buffalo, N. Y., from one of his extended tours to urge on his friends at Plymouth to gratify the ambition of Ellery Channing, who would figure as a lecturer as well as a poet. Emerson wrote then to Marston Watson, the <(Plymouth Evelyn,® as Alcott styled him, thus (4 Jan.

1852) :

Mr. Scherb is a very proper person to take a part in your series of Sunday lectures, and will gladly do so. One other person I should like

well to have engaged, my friend Ellery Channing. But I dare not quite say he has any lecture for your purpose, until I hear his lecture on the ‘ Future.’ Both the others of his three I have heard; and though they are full of wit and criticism or sarcasm all round the compass, he needs practice and pruning. I am sorry on his very account to leave home just now; for I wish more that he should lecture than that I should.

As a poet Emerson had been slightly known to his youthful associates in college and else¬ where, and in 1834 he had been invited to write the customary poem for the Phi Betta Kappa anniversary at Harvard and did so. But he was dissatisfied with it and for some years after did not publish verses. In 1837 he sent to his friend J. F. Clarke at Louisville, Ky., for printing in the Western Messenger of Louis¬ ville and Cincinnati three poems of his earlier composition, and he continued to print others in The Dial. In 1846 he collected these and others in a small volume, printed in Boston and London in 1847, and he issued another volume, largely made up from contributions to the Atlantic Monthly, in 1867. His son has added many poems and fragments in the final edition, so that it is now possible to judge of Emerson as poet by a perusal of all that he wrote in metre. At first his verse attracted little atten¬ tion, except by parodists, who viewed it as something comical and to be satirized; this he had expected, for it had happened with his

prose also. But even those who admired and quoted his poetical prose were rebuffed by his irregular and difficult verse, and only some 20 years after the volume of 1847 did it begin to be recognized that here was a philosopher put¬ ting his thought into oracular verse, some of which was becoming proverbial, as oracles are wont to be. Since 1884, when at the summer session of the Concord School of Philosophy this feature of his poetry was set forth, it has become a fashion to interpret it in readings ; and the essence of his deeper philosophy is best given in his verse ; a key to the whole Emer¬ sonian theory of the universe being found in the oracular

Had it been predicted in 1847, when Harvard professors were scoffing at Emerson’s verse and declaring his philosophy unintelligible, that 60 years later Harvard would be teaching philoso¬ phy in a spacious hall named for Emerson and built in part by the contributions of his followers and friends, the prophecy would have been classed with

almanac presages of the weather. Yet that very thing has happened and happened partly in consequence of the 10 years' continu¬ ance, from 1879 to 1888, of the summer school of philosophy and literature just mentioned. This school carried out an early dream of Emerson and Alcott, who both took part in it till Emerson's death in April 1882 and Alcott's stroke of paralysis in the following October. It brought together speculative men of different schools, all in their wav idealists, and it raised into prominence Emerson's share in quickening and deepening philosophic ideas in America.

Emerson had published his (English Traits, } a masterly summary of English history and character, in 1856; in 1857 he became a leading writer for the new Atlantic ; in 1860 published the (Conduct of Life) ; in 1864, (Society and Solitude) ; in 1874 a selection of poems (omit¬ ting his own) called (Parnassus) ; and in 1876 (Letters and Social Aims,* edited by his subse¬ quent biographer, Elliot Cabot. During the Civil War he was a frequent orator for the Union and emancipation, and his political speeches have been posthumously collected in a volume of Miscellanies,* published in 1883 and enlarged in the Centenary edition. A volume of (Lectures and Biographical Sketches) (1883 and 1904) gives his posthumous lectures and per¬ sonal tributes, and a final volume (1893 and 1904), (Natural History of Intellect, > gives others, and a general index, long needed.

The classification of topics in these later books does not well agree with the titles, and there are still other volumes promised from Emerson's journals and letters, although these have been much drawn upon in notes to the 12 volumes already issued. It remains for some future editor to arrange the writings with a better regard to their chronological sequence, since the estimate of Emerson as a writer de¬ pends somewhat on the observed growth and decline of his powers as in the analogous cases of Plato and Goethe.

It is in the class with these two world- renowned authors that Emerson will stand

hereafter. Less copious and less imaginative than either Plato or Goethe, he is not less original than they, and his expression of pro¬ found thought and ethical truth was guided by a taste often better than theirs. Much man¬ nerism and many repetitions are found in his books as in theirs ; many apparent inconsisten¬ cies also, as with them. But these last grew out of the development of his thought and his in¬ creasing perception of the complexity of the two worlds, Nature and Man. Of his many biogra¬ phers and critics few have fully comprehended him — they furnish material for final judgment rather

than a statement to satisfy future readers. The best, in this view, are Elliot Cabot and Dr. Emerson, to whom the world is indebted for much material drawn from the manuscripts and not found in type elsewhere.

Emerson's health and vigor failed after the partial burning of his house in 1872, and his last tour abroad, in 1872-73, did not restore him. He continued active for years, though with¬ drawing more and more from publicity by reason of his failing memory. His virtuous and serene nature remained unshaken by these accidents of mortality, and his final illness, though pathetic from his anxiety to avoid bur¬ dening others, was short and hardly afflictive. His wife and three of his four children survived him — Mrs, Emerson, the mother of all, dying in 1892 at the age of 90. His descendants are numerous, by various names; his friends are numberless, for he never had a personal enemy and he inspired affection almost as much as admiration. See Emerson's Essays; Tran¬ scendental Philosophy.

Bibliography. — Memoirs of Emerson in various forms began to appear even before his death in 1882, the first good one being by G. W. Cooke (Boston 1881), (Ralph Waldo Emerson, His Life, Writings and Philosophy * ; followed in 1882 by Alcott's last book, (An Estimate of Emerson's Character and Genius in Prose and Verse.* In 1883, supplemented in 1885, appeared (ib., 1908) ; Howells, biterary Friends and Acquaintance) (New York 1900) ; Eliot, (Emerson as a Seer* (Boston 1904) ; Morley, John, (Critical Miscel¬ lanies 5 (Vol. I, London 1893) ; Cary, (Emer¬ son, Poet and Thinker) (New York 1904) ;

Sanborn, F. B., Personality of Emerson1* (ib. 1904); Dugard, M., 'Ralph Waldo Emerson; sa vie el son oeuvre5 (Paris 1907) ; Harrison, I. S., (Teachers of Emerson5 (New York 1910) ; Maeterlinck, Maurice, (Emerson and other Essays5 (English trans., ib. 1912). An extensive literature concerning Emerson exists in French, German and Italian, and he is studied to some extent in Scandinavia, Russia, Greece, Persia and India. The autobiographies of M. D. Conway and A. D. White (1904-05) contain something on these points.

F. B. Sanborn, Author of (Life of Emerson .5

EMERSON'S ESSAYS. In 1841 Emerson published a volume which he

called simply ‘Essays.5 When he published another volume of the same kind he called it (Essays: Second Series.5 So these two books — the First and Second Series — may properly be called (Em¬ erson’s Essays.5 The name, however, may also be taken to cover all of Emerson’s work, for although his later volumes, which were gener¬ ally collections, often had lectures as well as essays, there was no very striking difference between the two forms. Emerson usually wrote as if he were speaking to some one, so that his essays always have the spoken tone ; and in the actual lectures which he really de¬ livered, he gave his thoughts much the same turn as if he were writing a book. The (Es¬ says : First Series5 are, however, both in thought and expression the most characteristic thing Emerson ever did. In the matter of style (Emerson’s Essays5 are like Bacon’s (q.v.) in one way; they are series of reflections and meditations rather than finished treatises. If Emerson writes on history or on art, we are not to expect a systematic account of the sub¬ ject, complete within the range allowed by its length ; we have something very different. While the course of thought is not rambling or disconnected, yet the essay makes its im¬ pression chiefly by the sense and meaning of each idea as we come to it, by the illustrations or the figures ; by the interest of each element, in short, rather than by the round of completed thought which it presents. This kind of ex¬ pression has one great advantage at least, for it gives us Emerson’s thought with the utmost sincerity and genuineness and permits him to say exactly what he wants to say and exactly as he wants to say it. His method of writing aided in this effort; he used to write down his thoughts day by day in a journal,5 and when he wrote an essay on any subject he would gather up whatever he had said on the matter at any other time and use it. His (Journals5 have relatively little as to his goings and com¬ ings about Concord or about the house, but they are very full of what he was thinking about. And his thoughts were very likely to be not about everyday things, but about larger questions and the philosophies of life. One finds in the (Essays, 5 then, the real essence of Emerson’s thought — sincere, original, inde¬ pendent, undistorted, unadorned, unmingled. Here we have, not merely what he might think on sitting down to write, but the sum and sub¬ stance of his thinking on the matter, as it had for years simmered and distilled in his mind till it left the pure and concentrated essence. Thus his writing has a very personal quality,

although there is none of the gossipy char¬ acter which we often think of as belonging to the personality of the essayist. It is Emerson himself, so intent on his thought that we for¬ get that it is Emerson. As to what the thought is, that will be better found in the article on

Emerson. It may be said here, however, that Emerson was interested in philosophy in its broad sense, namely as the knowledge of him¬ self and the universe that enables a man to get the best out of life. Two comments may be quoted: one by Lowell from (My Study Win¬ dows5 who said of Emerson's later lectures that even if the meaning were not always clear, one always felt that something beautiful had passed that way; and the other by Matthew Arnold in discourses in America,5 that what¬ ever Emerson might be as poet and philosopher, he was pre-eminently the guide and companion of those who wish to live by the spirit. The (Essays 5 and (Journals 5 may be compared in the recent authorized editions edited by Edward Waldo Emerson and Waldo Emerson Forbes.

Edward E. Hale.

EMERTON, Ephraim, American histo¬ rian: b. Salem, Mass., 18 Feb. 1851. He was graduated at Harvard 1871 and studied in Leip¬ zig, becoming instructor in Harvard 1876, and professor of ecclesiastical history there 1882. His works include : (Synopsis of History of Con¬ tinental Europe5 ; 'The Study of Church His¬ tory5 ; (The Practical Method in Higher His¬ torical Education5 (1885) ; (An Introduction to the Study of the Middle Ages5 (1888) ; (Me¬ diaeval Europe5 (1894); (Desiderius Erasmus5; (Heroes of the Reformation5 ; (Sir William Temple und die Tripleallianz vom Jahre, 16685 ; 'Unitarian Thought5 (1911).

EMERTON, James H., American natural¬ ist and illustrator : b. Salem, Mass., 1847. Lie is the illustrator of Packard's (Guide to the Study of Insects5 ; Scudder's 'Butterflies of North America5 ; Verrill's papers in (Reports of the United States Fish Commission5 (1884) ; and Minot's 'Embryology.5 He is the author of seven papers on ((New England Spiders55 in the transactions5 of the Connecticut Acad¬ emy; the Structure and Habits of Spiders5 (1878) and 'Common Spiders of the United States5 (1902). Emerton constructed anatomi¬ cal and zoological models for museums at Cambridge, New Haven, New York and Wash¬ ington.

EMERY, Henry Crosby, American econo¬ mist : b. Ellsworth, Me., 21 Dec. 1872. In 1892 he was graduated at Bowdoin and later studied at Harvard, Columbia and Berlin. From 1894 to 1900 he was instructor and professor of political economy at Bowdoin and from 1901 to 1909 was professor of political economy at Yale. In 1909 he was made chairman of the United States Tariff- Board, but returned to his chair at Yale in 1913. He has written Specu¬ lation on the Stock and Produce Exchanges of the United States5 (in ' Columbia Univer¬ sity

Studies5 (1896) ; (The Tariff Board and Its Work5 (1910) ; ‘The Work of the Tariff Board in Connection with the Cotton Industry5 (1911); ‘Politician, Party and People5 (1913); ‘Some Economic Aspects of War5 (1914).

EMERY, John Runkle, American jurist: b. Flemington, N. J., 6 July 1842; d. Morris¬ town, N. J., 30 Jan. 1916. He was graduated

at Princeton in 1861 and at the Harvard Law School 1864. He was admitted to the New Jersey bar in 1865. He was vice-chancellor of New Jersey from 1895 to 1 Jan. 1916, when he retired under the veteran retirement act.

EMERY, Stephen Albert, American mu¬ sician: b. Paris, 1841; d. 1891. He studied at Leipzig where among his masters were such lights as Hauptmann, Plaidy and Richter. He removed later to Dresden and continued his studies under Spindler. – Shortly after his re¬ turn to America he became instructor at the New England Conservatory in Boston. He was three years in this position when he be¬ came professor of harmony and counterpoint at the newly founded College of Music of Bos¬ ton University. He wrote pianoforte pieces, songs, string quartets and textbooks on piano¬ forte playing and the elements of harmony.

EMERY, an impure variety of the mineral corundum (q.v.), reddish brown, black, blue black or gray in color and next to the diamond the hardest mineral known but is not crystal¬ lized. It consists of nearly pure alumina (65 to 75 per cent) and oxide of iron and a small amount of silica and water. Emery occurs in large boulder-like masses, closely resembles a fine-grained magnetite ore in texture and is often mistaken for it. In its native form its value as an abrasive has been known from the earliest times and many references are made to it in books by Greek authors. Then as now it was used in cutting and polishing jewels and intaglii in the sculpture of statuary from the harder rocks and in polishing marble. It was undoubtedly used by the Egyptians and there are many evidences of the use of it or as hard a substance in the manufacture of prehistoric stone implements.

As now used, in its pulverized form, it is one of the most useful substances known to the arts. The rock is broken in powerful crushers

and stamping-mills and separated into powders of varying degrees of fineness by screens or by elutriation. These powders, varying from par¬ ticles one-tenth of an inch in diameter to the finest flour, are sprinkled with water or oil upon the lead wheel of the lapidary, or spread upon wood, paper or cloth to which a thin layer of glue has been previously applied; or as has been found to be its most effective application, mixed with various adhesive substances and molded into solid wheels. Emery-stones of various shapes and sizes are also made in the same manner.

Emery-wheels are now made up to 36 inches in diameter and from four to six inches in thick¬ ness and in every variety of coarseness from rough shapers to fine polishers for brass and steel. The cementing material is usually a secret with the manufacturer and upon this and upon the quality of emery used depends the cost and the subsequent life and usefulness of the wheel. Properly mounted and turned at a proper speed it is our most effective cutting tool, tearing its way rapidly into chilled castings that the best file will not cut, or taking the teeth instantly off the hardest file. Special points to be observed are uniformity of texture, that the wheel may wear away evenly under use ; care¬ fully fitted bearines, that there may be no vibra¬ tion under the high speed at which it is run ;

the wheel must not be fitted closely to either mandrel or flanges, lest expansion by heat burst the wheel; and the cementing material of the wheel must be able to resist the tendencies to centrifugal disruption and to melting under the heat generated by its friction with the object being cut. Its effective speed must have been determined and tested and the degree of pres¬ sure with which the work is to be applied must likewise be ascertained. Emery wheels that have become misshapen through use are turned true by various special contrivances, all of which must have a cutting edge of rough diamond. Wheels are often shaped for special work in the same manner.

The present supply of emery is chiefly from the island of Naxos and from near Smyrna,, Turkey. A small amount is mined near Chester, Mass., and Peekskill, N. Y., and it is found in insignificant quantities elsewhere in the United States. Corundum and precious sapphire have been found in Georgia and North Carolina. Consult Merrill, (Non-Metallic Minerals) (New York 1910) and Pratt, (North Carolina Geolog¬ ical Survey) (1905).

EMERYVILLE, Cal., city in Alameda County, on San Francisco Bay, near Oakland, on the Atchison, Topeka and Santa Fe Rail¬ road. It has large stockyards, packing-houses, iron foundries, paint and rubber

works, cracker factories and fertilizer plants. Shell Mound Park, so named from an Indian mound, is the most noteworthy feature. Pop. 2,613.

EMESA, an ancient town, now called Hems. See Hems.

EMETIC, any agent used to induce vomit¬ ing. In medicine the emetics that are used are now few in number. The main object to be at¬ tained by their use is to empty the stomach of irritating or poisonous contents. As most emetics act strongly on the sympathetic nervous system, they also cause muscular relaxation, di¬ lated arteries and a sense of weakness, amount¬ ing at times to collapse. Emetics are usually classified as local or as systemic — those act¬ ing directly on the stomach walls, such as luke¬ warm water, mustard, alum and the more vio¬ lent corrosive metallic salts, or those, as copper sulphate, whose influence is exerted on the cen¬ tral nervous system, after first being absorbed into the blood. Of these tartar emetic, ipecac¬ uanha and apomorphine are examples. Emetics should be given with caution. In children par¬ ticularly the stronger emetics often cause great prostration and if a child be suffering from a disease that causes heart weakness, such as diphtheria, emetics are not advisable. In cases of poisoning emetics should be promptly given, but washing out the stomach by means of a flexible rubber tube is preferable. It is some¬ times justifiable to give emetics when there seems to be danger of asphyxiation from re¬ tained mucus in the bronchial tubes. The relax¬ ation following emesis is sometimes remarkable. See Toxicology.

EMETINE, an alkaloid occurring in ipe¬ cacuanha and constituting its chief active prin¬ ciple. It can be extracted from ipecacuanha by moistening the finely powdered root with ammonia and extracting with alcohol. From the total alkaloids so isolated, emetine is sepa¬ rated by extraction with ether in the presence

of alkali. Its chemical formula has not been es¬ tablished with certainty, but is considered to be $C_{30}H_{44}O_4N_2$. Emetine is sparingly soluble in water and in ether, though it dissolves readily in alcohol, chloroform, carbon disulphide and various essential oils. It is colorless, but is turned to a yellow by the action of sunlight. When taken internally in considerable doses it acts as a powerful emetic, to which circum¬ stance it owes its name.

EMEU. See Emu.

EMIGRATION, the removal of the popula¬ tion of a country or region for the purpose of settling elsewhere. Within the United States the movement of population from the Eastern States to the Western, or from the Northern to the Southern is properly termed emigration, but no statistics are kept as to such movements. The removals from the United States to for¬ eign countries, however, are recorded by the Commissioner General of Immigration and embodied in his annual report to the Secretary of Labor.

In the United States two classes of emigra¬ tion are recognized: first, the flow of aliens who came into the country as immigrants back to their native lands ; second, the emigration of United States citizens to other countries.

For the fiscal year ended 30 June 1917 the departing emigrants included in the first class numbered 66,277 — a figure which must be compared with those of previous years to gain a fair estimate of emigration under normal conditions. In 1915-16 the number was 129,765; in 1914-15, 204,074; in 1913-14, 303,338; in 1912-13, 308,190; in 1911-12, 333,262 — the larg¬ est record for any one year. The influence of the war is readily noticeable. Of the total alien emigration for the year 1916-17, 15,924 were women and children. The chief occupations of the 38,649 men who emigrated were as follows : laborers, 24,801 ; mechanics, 5,700 ; servants, 4,005; professional men, 1,930; miners, 1,049. The destinations of the larger groups of these departing aliens were: British North America, 18,994; Italy, 12,542; Russia, 5,947; West Indies, 5,891; England, 2,798; Spain, 2,491 ; France, 2,064 ; Greece, 2,034 ; China, 1,871; Norway, 1,633; Portugal, 1,353; Ireland, 1,027; South America, 993; Sweden, 969; Mexico, 812.

The number comprised in the second class cannot be determined from the United States records, but as the only considerable emigra¬ tion of United States citizens is into Canada, the figures must be obtained from the records of the Canadian Immigration Office. From these it appears that 61,389 former residents of the United States entered Canada as immigrants in the fiscal year ended 30 June 1917. It is a significant fact noted by Canadian officials that this immigration from the United States con¬ stituted 81 per cent of the total immigration for that year. In addition to this large num¬ ber admitted, 17,988 residents of the United States who attempted to enter Canada in that year as immigrants were rejected as undesir¬ ables. It is of interest to note in passing that the Canadian reports show that since emigra¬

tion from the United States into Canada be¬ gan in 1898 and 1899, the number of such immi¬ grants totals 1,178,764 persons — out of a grand total of immigration of about 3,250,000 from

all countries ; and about 225,000 other residents of the United States have been refused admis¬ sion in the same period because of their un¬ desirable character or destitute circumstances. The earlier emigrants were chiefly former Canadians who had settled in the United States, but returned to take advantage of improved conditions. Later there were added to this group numbers of European immigrants who did not become naturalized in the United States. The larger part of the more recent emigration from the United States into Canada has been of American-born citizens who have been at¬ tracted by the inducements of the Canadian Provincial land offices and by the great mining opportunities in Western Canada, made avail¬ able by the completion of the Canadian trans¬ continental railroads. See United States — Immigration to.

EMIGRES, a-me-gra', a French term for those who have been compelled to leave their country on account of religious persecutions, as did the Huguenot, for instance, in the 17th cen¬ tury, or for some other causes. The term, however, is now most commonly applied to those Frenchmen, many of them of noble family, who left France at the commencement of the first French Revolution. Princes, nobles and prelates crossed the frontier into Switzerland, Germany and Holland, and even penetrated as far as Italy. Their conduct made the position of Louis as a constitutional monarch untenable, for they were constantly plotting with the enemies of France. Proscription followed: be¬ tween October 1792 and the dissolution of the convention more than 300 laws were passed against the emigres and their relatives. The relatives who remained behind were formed into an ostracised class, deprived of civil rights and obliged to live under police supervision, and exposed to all manner of special fines and exactions. In 1796 relatives were on the list of proscribed. Vast interests depended on the maintenance of the laws against them : their property formed part of the security on which the assignats had been issued, and the granting of an amnesty and reclamation would have made the assignats so much waste paper and brought the social fabric to ruin. At the head of the emigrants stood the royal princes of Conde, Provence, and Artois, the first of whom collected a part of the fugitives to co-operate with the allied armies in Germany for the restoration of the monarchy. At Coblentz a particular court of justice was established to settle causes relating to the French emigres. But the invasion of the Netherlands by Dumouriez drove them from these provinces in mid-winter in a deplorable condition, while their number was daily increased by the

system of violence and terror carried on in France. The corps of Conde was finally taken into the Russian service, and was disbanded in the Russo-Austrian campaign in 1799. When Napoleon became emperor it was one of his first acts of grace to grant permission to all but a few of the emigres to return to their country, but by the terms of the charter of 1814 they were precluded from regaining either their status or their ancient privileges. During the Restoration period they persistently petitioned Louis XVIII and subsequently Charles X for reinstatement and indemnification, but though

a government grant was made for their com¬ pensation, the measure was rendered abortive by the July revolution. One of the largest set¬ tlements comprising several thousand acres near Towanda, Pa., was made at the place now called Rummersfield on the Lehigh Valley Railroad in Bradford (and formerly in Luzerne) County. Here, from 1793 to 1800, was a centre of French refinement, to which luxury-loving parties from the coast cities came for the purchase of articles from Paris and students for the language. The place was called Azilum, Asylum or Frenchtown. Consult Murray, JThe Story of Some French Refugees and their AsilunP (1903).

EMILE. After all deductions have been made Rousseau's (Emile) or

Rousseau's artistic instinct led him to cast his work in' the form of a romance, as is indicated by the title

Underlying his treatise we find everywhere the two cardinal Rousseauistic assumptions which are the heart of his doctrine — man is by nature good, society and civilization corrupt his native goodness. For this reason a large part of the work of Emile's tutor is negative, consisting in preventing misleading contacts, and the remainder lies in guiding and directing natural desires and tendencies rather than in inculcating aims, aspirations, or what is generally termed culture. His object is not to teach any traditional body of knowledge, but is entirely utilitarian, directed toward develop¬ ing a healthy, vigorous, right-minded citizen. He insists everywhere on the natural, the normal and the favor which these words have since enjoyed in connection with education is sufficient testimony to his influence. As any just criticism of Rousseau's philosophy involves a criticism of his doctrine of education, we refer to the article on Rousseau where his theories are considered more at length.

Christian Gauss.

EMILIA, a-mel'e-a, division of Central Italy, comprising the provinces of Bologna, Ferrara, Forli, • Modena, Parma, Piacenza, Ravenna and Reggio neU'Emilia. The name is derived from the ancient Via iEmilia and was

built by the censor 2Emilius Lepidus in b.c. 186. It is a continuation of the Via Flaminia, which passed through these territories. Area 7,993 square miles; pop. 2,740,316. Prior to its inclusion in the kingdom of Italy, in 1860, it consisted of the former duchies of Parma and Modena and the papal Romagna.

EMIN PASHA, a'men pash-a, or pash'a

(Eduard Schnitzer), African army surgeon, governor and explorer: b. of Jewish parents at Oppeln, Prussia, 28 March 1840; d. October 1892. He was educated at Breslau, Berlin and Konigsberg, going to Turkey in 1864 and being appointed surgeon in the Turkish army 1865. In 1875 he went to Egypt, becoming surgeon- general of the Egyptian army under General Gordon, who made him governor of the equa¬ torial provinces in Sudan. He made several exploring expeditions, his route surveys extend¬ ing to over 4,000 miles, and gave to the world much information in reference to the fauna and flora of that region, together with much geographical knowledge. He also showed him¬ self an enlightened ruler, and was strongly op¬ posed to the slave trade. He was cut off from relations with the rest of the world by the insur¬ rection of the dervishes under the Mahdi in 1883, although maintaining his position. The Egyptian government made him a pasha 1887. Rescued by Stanley in 1888 he entered the service of the German East Africa Company in 1890. He went with Dr. Stuhlman to East Africa upon an exploring expedition and was assassinated at the instigation of Arab slave raiders. Consult Schweitzer, G., (Emin Pasha> (2 vols., London 1898).

EMINENCE, as a designation of cardinal- itial dignity, is of comparatively recent introduc¬ tion ; it dates from the 17th century. Down to that time the cardinals were addressed by the titles Most Illustrious (Illustrissimus) , and Most Illustrious Lordship (Illustrissima Domi- natio) ; but in 1630 Pope Urban VIII pro¬ mulgated a decree, drawn up in accordance with a report of the Congregation of Rites, substituting for the previous formulas Most Eminent (Eminent issimus) , and Eminence (Eminentia), respectively. No dignitary but a cardinal (or by exception the Grand Master of the Knights Hospitallers of the Order of Saint John of

Jerusalem) was to be addressed in this form. Further, a cardinal was to ignore any communication addressed to him in any other form ; and any prelate who assumed the title Eminence, or Most Eminent, was made liable to penalties. The title was also applied in the Roman Empire in its later days to the emperors and the highest officials.

EMINENT DOMAIN, the power of the State to appropriate private property for pub¬ lic use on payment of just compensation to the owner. A superior right of property subsists in a sovereignty, by which private property may, in certain cases, be taken, or its use controlled for the public benefit, without regard to the wishes of the owner. The highest and most exact right of property is immanent in the government, or in the aggregate body of the people in their sovereign capacity, giving the power to resume the possession of the property, in the manner pointed out by the constitution and the laws of the various States, when the

public good requires it. There seems to be no objection to considering this right, theoretically at least, as so much of the original proprietor¬ ship retained by the sovereign power in grant¬ ing lands or franchises to individuals or corpora¬ tions, wherever the common-lav/ theory of original proprietorship prevails. Extraordinary and unforeseen occasions arise in cases of ex¬ treme necessity in time of war, or of immediate and impending danger, in which private prop¬ erty may be impressed into the public service, or may be seized and appropriated to the public use, or may even be destroyed, without the consent of the owner. The power exists only in cases where public exigency demands its exercise. It makes no difference whether cor¬ poreal property, as land, or incorporeal, as a franchise, is to be affected by the exercise of the right. It is part of the constitutional law of the United States that no person can be de¬ prived of his property by eminent domain ex¬ cept it be taken for public use, by due process of law, and for just compensation. The first condition has been held by the courts to in¬ clude not only public improvements carried on directly by the State, as the construction of docks, fortifications, etc., but also private or semi-public undertakings, as railroad bridges, etc. There exists some difference of opinion as to what constitutes <(due process of law.® The usual method is by condemnation proceed¬ ings, determined by general law. These are instituted before a court of competent jurisdic¬ tion, or a referee appointed for the purpose, just as any equity suit. The final step is an or¬ der of condemnation and

award. The legisla¬ ture may, however, substitute any other process, provided the owner is given notice of the pro¬ ceedings contemplated. Just compensation means payment of the full value of the property taken or of any interest therein, whether vested or contingent, present or future. (See Sover¬ eignty; Taxation). Consult Cooley, (Treatise on the Constitutional Limitations which Rest upon the Legislative Power of the State) (7th ed., Boston 1903) ; Kent, Commentaries on American Law> ; Lewis, (Eminent Domain) (2d ed., Chicago 1900) ; Mills, (Eminent Domain) (2d ed., Saint Louis 1888) ; Randolph, (Eminent Domain* (Boston 1894).

EMINESCU, a-men-es'koo, Michael, Ruma¬ nian lyric poet: b. Botuschani 1849; d. Bu¬ charest, 27 June 1889. After receiving his edu¬ cation at Vienna and Berlin, he returned to Rumania and was appointed librarian at the University of Jassy. He was for a time editor of Timpul, a strong Conservative journal, and the fierceness of political strife would seem to have spoilt his fine poetical genius.. He died in a madhouse. His fame rests on his first vol¬ ume of (1st ed., 1884) ; they are mostly elegiosatiric, and touch questions politi¬ cal, social, religious and moral ; all of his thought being pervaded by the philosophic pes¬ simism of Schopenhauer, who influenced him profoundly.

EMIR, e'mer, or AMEER, e-mer' (that is, noble, princely), a title of honor given in the East and in North Africa to those who claim descent from Mohammed and his daughter Fa¬ tima. These emirs are found in Arabia, where they are the chieftains of the Bedouins. Their origin, however, is doubtful. In Turkey they

form a kind of hereditary nobility, and wear as a badge a green turban, as Mohammed is said to have done. They have certain privileges, but otherwise no higher claims to civil offices than other Mussulmans. The word emir is also ap¬ plied to certain offices and employments, for example, emir hadji, conductor of the pilgrims to Mecca; emir-aklior, commander of the Turk¬ ish horse; emir-bazar, overseer of the markets; emir-alem, the Turkish standard-bearer ; emir- al Umara, prince of princes. The title emir-al- mumenin, commander of the faithful, was borne by the caliphs. In earlier times the title emir was much more generally assumed by nobles and princes of high rank. It was borne, for instance, by the Thaherids and Samanids in Persia, by the Tulunids in Egypt and by the first seven Ommiads of Cordova, Spain. There were also Christian emirs in the Lebanon region of Pales¬ tine, who represented Mohammedan clans con¬ verted to Christianity.

EMMA, Adelheid Wilhelmine Therese,

queen dowager of Holland: b. Arolsen, Ger¬ many, 2 Aug. 1858. She was the second daugh¬ ter of Prince George Victor of Waldeck and Pyrmont, and was married 7 Jan. 1879 to King William III of Holland. She is the mother of Queen Wilhelmina of Holland, and was queen regent of the Netherlands after the death of William III 23 Nov. 1890 until 6 Sept. 1898, when her daughter ascended the throne. She took an active interest in charities, especially hospitals for consumptives.

EMMA. From the time of its publication i'n 1816, this has been one of the most highly re¬ garded of the novels that Jane Austen wrote. It is the fruit of matured artistry, meditated observation and ripened judgment. The plot involves rather more strands than is customary in her work, but the main line of action is simple. Emma Woodhouse, the youthful hero¬ ine, is much given to matchmaking. Having married off her governess before the opening of the story, she sets herself to bring about other marriages among her friends and ac¬ quaintances. But the men and women around her are not mere pawns ; they act in unantici¬ pated ways ; unsuspected factors alter situa¬ tions; and in the resulting comedy of errors Emma eventually awakens to the fact that she herself has fallen in love. Difficulties and mis¬ understandings are smoothed away and she is happily married. The easy, natural develop¬ ment of the action, by means of incidents and conversations so normal in aspect as to con¬ ceal the artistry of their conception, is espe¬ cially noteworthy. Plot, however, is subsidiary to characterization. The book abounds in living personalities: the aggressive, vulgar Mrs. El¬ ton ; the valetudinarian father of Emma, with his taste for thin gruel ; the immortally loqua¬ cious, tender-hearted Miss Bates ; the admi¬ rable, thoroughly sensible Knightley ; and Emma herself. It is one of the triumphs of Miss Austen's art that, despite the writer's fears — – (

acters, the author has presented us with an account of English village life remarkable for vitality, wholesomeness and unassuming in¬ sight, related with amused tolerance and unob¬ trusive irony, in a style easy, limpid and abso¬ lutely adequate. The novel is not a complete picture of life. The awe and mystery of the world, the stormy passions of men, have no place here. But what is done is done su¬ premely well. The ordinary occurrences of ordinary lives are transmuted into the pure gold of literature. Consult Howells, W. D., (Heroines of Fiction) ; Cornish, Francis Ware, (Life of

Jane Austen) ; Smith, Goldwin, (Life of Jane Austen) ; Scott, Sir Walter, (Review of Emma (Quarterly Review, Vol. XIV, 188).*

George B. Dutton.

EMMANUEL COLLEGE, founded in connection with Cambridge University in 1584, by Sir Walter Mildmay as a Puritan institu¬ tion. The chapel was designed by Wren. John Harvard, who gave so liberally to education in America, was from this college. It consists of a master, 16 fellows and 36 scholars. In 1913-14 there were 74 undergraduates.

EMMANUEL MOVEMENT, The, so

named after the Emmanuel Church, Back Bay, Boston, Mass. The movement was started by the rector of the church, Rev. Elwood Wor¬ cester, D.D., and his associate, Rev. Samuel McComb, D.D. Dr. Worcester had been re¬ siding in Philadelphia, where he enjoyed the friendship of Dr. S. Weir Mitchell, one of the great nerve specialists of the country. Neither of the leaders of the movement had studied medicine, but Dr. Worcester had not only studied psychology under Wundt at Leipzig but for several years had taught the subject at Lehigh University. Dr. McComb had studied the subject at Oxford University. In 1905 work was begun with a tuberculosis class and in 1906 a similar work was begun ((among the nervously and morally diseased." From the first, the movement had the co-operation of several lead¬ ing physicians. Dr. Cabot of Boston, Dr. Barker of Johns Hopkins University, Dr. Put¬ nam and others discussed before the class such subjects as worry, anger, habit, suggestion, in¬ somnia, nervousness, what the will can do, what prayer can do and similar topics. Patients were given mental treatment along with the reading of Scripture and prayer. For some time the movement attracted considerable at¬ tention and the Emmanuel Church had many imitators in nearly all denominations. At the present time it seems to have nearly passed away. Consult (Religion and Medicine — The Moral Control of Nervous Disorders, by El¬ wood Worcester, Samuel McComb and Isador H. Coriah, M.D. (1908) ; (Faith and Health,* by Charles Reynolds Brown (1910).*

EMMAUS, e-ma'us or em'ma-us, Palestine, (1) A village, about eight miles from Jeru¬ salem, the place mentioned in Luke xxiv, 13. The exact location of this village is not known; the modern El Kubebe, 60 furlongs northwest of Jerusalem, on the road to Lydda, has in its favor as the location of Emmaus its distance from Jerusalem and the fact that in 1099 a.d. the Crusaders found the name Castellum Emmaus given to the place. Recently the mod¬ ern Koloniyeh has been favored by expert

opinion as the site of Emmaus. In its favor is cited the evidence of its name to the coloniz¬ ing of the place and the statement by Josephus that Titus planted a colony of 800 veterans at a village called Emmaus, 30 stadia from Jeru¬ salem. (2) Modern Amwas, the place men¬ tioned in Macc. iii, iv and ix. In ancient times and down to the conquest of the Moham¬ medans, this Emmaus was a place of import¬ ance. Its position, about 18 miles northwest of Jerusalem and near the Roman road from Jerusalem to Jaffa, on the seacoast, made it prominent. It was the capital of one of the 10 toparchies into which Judaea was for a time divided. It was known as Nicopolis after the 3d century. Consult Sanday, (Sacred Sites of the Gospels) (Oxford 1903), and Schurer, (History of the Jewish People) (Eng. trans., 5 vols., New York 1896).

EMMENAGOGUES, e-men'a-gogz, are agents that stimulate the pelvic organs and are used to bring about a restoration or regulation of the menstrual function if it should be absent or abnormal. Occasionally absence of men¬ struation is due to anaemia or lack of iron in the blood, in which case taking iron internally, by overcoming the anaemia, restores menstru¬ ation and may be thus termed an emmenagogue. More properly speaking, however, the term is applied to such drugs as ergot, quinine and hydrastis. These bring about direct stimulation of the unstriped muscles of the body and hence act most forcibly on the uterus, it being the largest mass of unstriped muscular tissue in the body. Aloes, myrrh and the active cathar¬ tics act as emmenagogues by increasing the amount of blood in the large intestine and other pelvic organs, thereby increasing the nutrition of the uterus. Occasionally massage and elec¬ trical applications are used to bring about the restoration of the menstrual flow and hence may be included in thG group.

EMMERAN, or EMMERAM, Saint, mar¬ tyr, bishop of Poitiers : b. the last of the 6th century; d. 653. His feast is kept on 22 Sep¬ tember, but the exact date and place of his death is not known. In his own day he was re¬ nowned for his piety and learning. His biogra¬ pher says of him ((For his great learning and sanctity he was chosen bishop of Poitiers in the 7th century; he preached the pure maxims of the gospel with indefatigable zeal, without respect of persons." After a time his zeal led him to ask permission to go to Bavaria to preach to the <(infidels and idolators." After three years' work in Bavaria he began a journey to Rome. On the way he was assassinated by men who believed false accusations which a wicked woman had made. He is the patron saint of Ratisbon, where he was buried.

EMMERICH, em'mer-iH, Germany, town in Rhenish Prussia, on the Rhine, five miles northeast of Cleves. It is enclosed by walls and ditches, contains several ancient and modern churches, a gymnasium, ecclesiastical seminary and orphanage, and has manufactures of woolen and linen cloth, hosiery,

leather, ma¬ chinery, oil, soap, cigars, tobacco, etc. ; some shipping and a free port, at which an active trade is carried on, chiefly with Holland. Its history dates from the 7th century. In 1233 it came under the dominion of the counts of

Geldcrn, by whom it was raised to the rank of a city, but in 1402 it passed to Cleves. In 1407 it belonged to the Hanseatic League and is believed to have contained then a population of 40,000. It subsequently shared the fortunes of the duchy of Cleves. Pop. 13,418.

EMMERSON, Henry Robert, Canadian lawyer and politician: b. Maugerville, N. B., 25 Sept. 1853. He entered the New Brunswick legislature in 1888 and was Premier of the province, 1896 to 1900, when he was elected to the Dominion House of Commons and was Minister of Railways and Canals in the Laurier administration, 1900-07.

EMMET, Robert, Irish patriot: b. Dublin 1778; d. 20 Sept. 1803. He intended to practise law and with that view studied at Trinity Col¬ lege, Dublin, from which, however, in 1798 he was expelled on the ground of exciting re¬ bellion. Subsequently he became an object of suspicion to the government and accordingly quitted Ireland and traveled on the Continent. He interviewed Napoleon and Talleyrand, the former of whom promised aid to the Irish revo¬ lutionary movement. He returned to Ireland on the repeal of the suspension of the Habeas Corpus Act. He now became a member of the Society of United Irishmen, whose object was the establishing the independence of Ireland. In July 1803 he was the ringleader in the badly planned rising which had for its object the seizing of Dublin Castle, and in which Lord Kilwarden and several other persons were killed, but which was almost immediately sup¬ pressed. Emmet was arrested a few days after¬ ward, tried and executed by the sentence of a special court. His fate excited considerable in¬ terest from the circumstance of his attachment to Sarah Curran, daughter of the celebrated barrister. Moore has immortalized his memory in (0 breathe not his name,5 and that of Miss Curran in the poem beginning ((She is far from the land where her young hero sleeps.® Con¬ sult Madden, (Life and Times of Robert Emmet5 (Glasgow 1902) ; O'Donoghue,

EMMET, Rosina. See Sherwood, Rosina.

EMMET, Thomas Addis, American law¬ yer: b. Cork, Ireland, 24 April 1764; d. New York, 14 Nov. 1827. He was a brother of Robert Emmet

(q.v.), and being tried for the crime of treason was sentenced to exile. He came to the United States and became a noted lawyer in New York. In 1812 he was elected attorney-general of the State.

EMMET, Thomas Addis, American gyne¬ cologist: b. Charlottesville, Va., 29 May 1828; d. New York, 1 March 1919. He was of a dis¬ tinguished Irish family. His father was pro¬ fessor at the University of Virginia and his grandfather was a prominent leader of the Irish movement for independence in 1798 and after coming to America served as attorney-general of New York. He was a brother of Robert Emmet (q.v.). He was graduated at Jefferson Medical College 1850. He served as physician at the Ward's Island Hospital for Immigrants and established his practice in New York in 1852. He was successively assistant surgeon, after 1862, chief surgeon after 1872, and visit¬ ing surgeon after 1900 at the Women's Hos¬

pital. He was also consultant of Roosevelt Hospital. He published Principles and Prac¬ tice of Gynecology5 and Ureland under Eng¬ lish Rule5 (2 vols., New York 1903). He was inventor of several special surgical instruments and operations.

EMMETSBURG, Iowa, city, county-seat of Palo Alto County, on the Des Moines River, the Burlington and M., the Chicago, Milwaukee and Saint Paul and the Cedar Rapids and other railroads, about 123 miles northeast of Sioux City. It is in an agricultural section of the State and it has several grain elevators. Some of the industries are the manufacturing of butter, cheese, flour, brick, cement and tile works. It contains a fine lake and a Carnegie library and owns its waterworks. Pop. (1920) 2,762.

EMMETT, Daniel Decatur, American song writer and negro minstrel: b. Mount Vernon, Ohio, 1815 : d. 1904. He served in the army, joined a circus company 1835 and formed the first negro minstrel company 1842 with Frank Brown, William Whitlock and Richard Pelham, appearing at the old Chatham Theatre, New York, and later in Boston and in England, where Emmett remained till 1844. He was with Dan Bryant 1854-65, writing the famous song (Dixie5 in 1859. He became a manager 1865, returning to his native town 1878. He was a most prolific song writer and among his pro¬ ductions were (01d Dan Tucker5 ; (The Road to Richmond5 and (The Boatman's Dance.5

EMMITSBURG, Md., town in Frederick County, on a branch of the Western Maryland Railroad, about 45 miles northwest of Balti¬ more. The town is known chiefly for its two large educational institutions, Mount Saint Mary's Theological Seminary (q.v.), just out¬ side the town's limits, and Saint Joseph's Acad¬ emy, within the town. It contains also the

mother-house and seminary of the Sisters of Charity of Saint Vincent de Paul, from Paris. Emmitsburg was the scene of the labors of Mother Eliza Seton (q.v.) when establishing the Sisters of Charity in the United States. There are about 1,800 sisters working in differ¬ ent parts of the country who belong to this mother-house. The city contains a public library and a museum. Its industries include cattle raising and the manufacture of furniture, brooms and hosiery. Settled about 1757, Em¬ mitsburg received its present name in 1785, was incorporated in 1824, and under a charter of 1911 is governed by a burgess and three commissioners. Pop. 1,054.

EMMONS, Ebenezer, American geologist: b. Middlefield, Mass., 1799; d. 1863. He was educated and afterward taught at Williams College, later becoming geologist-in-chief, sec¬ ond district, New York State Geological Sur¬ vey. He introduced the new Taconic strati¬ graphic system, not now in vogue. He was made professor of chemistry in the medical college at Albany 1838, and had charge of the geological survey of North Carolina 1858. His works include (Manual of Mineralogy and Geology5 (1826) ; and (American Geology5 (1856), and the monographs published in the reports of the geological surveys of New York and North Carolina.

EMMONS, George Foster, American naval officer: b. Clarendon, Vt., 23 Aug. 1811; d. Princeton, N. J., 2 July 1884. He entered the

navy as midshipman in 1828; was promoted lieutenant in 1841 ; rear-admiral 1872 ; and was retired the next year. He was a member of the South Sea exploring expedition under Captain Wilkes in 1838-42; took part in the Mexican War; and during the Civil War captured Cedar Keys, Fla., and Pass Christian, Miss., with 20 prizes, in 1862. He served as captain of the fleet under Dahlgren, off Charleston, 1863 ; and raised the American flag over Alaska in 1868. He published (The Navy of the United States,

1775-18535 (1853).

EMMONS, Samuel Franklin, American geologist : b. Boston, Mass., 29 March 1841 ; d. 1911. He was graduated at Harvard, taking post¬ graduate courses at the Ecole Imperiale des Mines, Paris, and Freiberg, Saxony, Mining School, and was a member of several scientific societies, including the National Academy of Sciences and the Geological Society of Amer¬ ica, of which he was president in 1896 and 1903. Hi was in the employ of the government almost uninterruptedly after 1867 and geologist

upon the United States Geological Survey, Colorado division, after 1879. He made a survey in 1870 of Mount Rainier, the loftiest point in the State of Washington. Among his writings are (Descriptive Geology of the Fortieth Parallel Region5 (1877) ; Statistics and Technology of the Precious Metals5 (1885) ; Geology and Mining Industry of Leadville, Colorado5 (1886) ; Geology of Lower California5 (1890) ; Geological Distribution of the Useful Metals in the United States5 (1893) ; Progress of the Precious Metal Industry of the United States5 (1893); Geology of the Denver Basin in Colorado5 (1896) ; (Ten-mile District, Colo¬ rado5 (1898) ; (The Downtown District of Lead¬ ville, Colorado5 (1907); Gre-Deposits5 (1913).

EMODIN, one of the active constituents in Cascara sagrada and in other species of the genus Rhamnus. Emodin acts as a cathartic.

EMORY UNIVERSITY, an educational institution in Oxford, Ga., founded in 1836 under the auspices of the Methodist Episcopal Church. There are in attendance an average of students, 1,200; volumes in the library, about

40,000.

EMOTION, a complex mental state inti¬ mately associated with our actions and with extensive and often sudden physiological changes. Among the more familiar emotions are fear, anger, hate, joy, love, pity, pride, shame, grief, awe, contempt and surprise. They almost invariably seem to involve all the fol¬ lowing factors: (1) an experiencing subject;

(2) an object toward which they are directed;

(3) a set of coexisting actions and physiological changes on the part of the experiencing sub¬ ject; (4) the mental representation of a future course of action, together with the intention to pursue or to avoid it; (5) a general pleasant¬ ness or unpleasantness. The best-known theory of the emotions is that due to William James and C. Lange. These authorities regard an emotional state as entirely constituted by fac¬ tor (3), the set of coexistent actions and more especially of physiological changes on the part of the experiencing subject. In their opinion, fear consists in a feeling <(. . . of quickened heart-beats, ... of shallow breathing ... of trembling lips, ... of weakened limbs, . . . of

gooseflesh . . . [and] of visceral stirrings.55 Rage is constituted by <(. . . ebullition in the chest, . . . flushing of the face, . . . dilatation of the nostrils, . . . clenching of the teeth, . . . [and an] impulse to vigorous action.55 Each of our emotions is subject to a similar analysis and nothing is found beyond our awareness of an active response to some excitant

object.

The consciousness of our own reactions is indeed a factor of the utmost importance in the generation of an emotional state. Whether it is the sole factor is a disputable point. Cer¬ tain recent experiments as to the nature of the vascular and organic changes characteristic of emotional states appear to tell very strongly against the James-Lange theory. As Prof. W. B. Cannon writes in his (Bodily Changes in Pain, Hunger, Fear and Rage,5 <(In terror and rage and intense elation, for example, the responses in the viscera seem too uniform to offer a sat¬ isfactory means of distinguishing states which, in man at 'least, are very different in sub¬ jective quality. For this reason I am inclined to urge that the visceral changes merely con¬ tribute to an emotional complex more or less indefinite, but still pertinent, feelings of dis¬ turbance in organs of which we are not usually conscious.55 The peculiar marks which separate emotion from emotion cannot always reside in the grosser concomitant actions, for these are by no means invariably present, while on the basis of what Professor Cannon has shown, the visceral aspect of the immediate emotional act is too generalized to serve as a principle of individuation. The main differentiae of the emotions are to be found in the courses of pur¬ posive conduct intended by the subject and the shadings of pleasantness or unpleasantness with which the emotional states are tinged. It is not the involuntary organic preparation for flight which makes fear distinct from rage, but the conscious intent to flee ; while no state of excitement can be called elation unless it is distinctly and intensely a state of pleasure.

The intimate association between emotion and hedonic tinge demands a more thorough analysis, for it is closely connected with one of the most interesting features of an emotion — its directedness. Both pleasure and the most complex emotion may have an object. To be pleased or angry or afraid is usually to be pleased or angry at something, or in fear of something. The relation between the emotion and its object is not one of the simple coexist¬ ence of an awareness of the object and the emotion ; it is possible, for example, to be conscious of many things and to be annoyed at but one of them. The object need not be the efficient cause of the emotional state — one's annoyance may be caused by indigestion, but directed toward those whom one chances to meet. Furthermore, the object of an emotion does not gain its rank as object by virtue of a place in the focus of attention. One may be annoyed at the btzzing of a mosquito of which he is but dimly aware, while his main atten¬ tion is directed toward a book which he is reading. It is by no such extraneous means as these that the reference of mental states can be explained. The reference of one ex¬ perience to another is due to the fact that the unity of the content of the mind is the unity of a system and not the unity of a mere fortuitous aggregate. The definite directions of

pleasure or emotion can only be explained on the basis of the existence at each stage of psychological analysis of some unanalyzed state with a definite reference. However, pleasure and emotion are not themselves simple un- analyzable directed states. From what had al¬ ready been shown of emotion, it is clear that it involves many undirected experiences of the nature of organic and kinsesthetic sensations or images. Pleasure likewise appears to have the dual aspect of a mass of organic experiences, going to make up what may be called a sense of well-being and of an attribute of other mental states. Now, if we strip all sense of well¬ being from our pleasure, say, at a dinner, all that remains is an act of bare approval. This approval does not appear to be qualitatively dis¬ tinct from that involved in an aesthetic judg¬ ment, an ethical judgment or a normative judg¬ ment of any kind. (See Norm). Similarly, active displeasure is apparently composed of a sense of ill-being, accompanied by, and possibly forming a portion of the object of, an act of disapproval. The hedonic tone of an emotional experience thus generally seems to involve : (a) a diffuse organic experience of well-being or ill-being; and (b) an act of approval or dis¬ approval directed toward some definite object. It is almost, if not quite, impossible to think of a case where an emotion involves an act of approval or disapproval of this sort, but where the

objects of the emotion and those of the act are distinct. There seems to be no valid objection to identifying the objective reference of the emotion with the objective reference of the act. On the basis of this and of what has been said previously concerning the emotions, it is easy to account for the coexistence of different emotions in the same individual : the physiological excitement characteristic of all emotion is present ; but it is accompanied by a background of organic sensations conforming in its entirety neither to that of well-being nor to those of definite ill-being though sensations of both sorts are present; by the approval of certain objects and the disapproval of others; or by the intention of pursuing different courses of conduct with regard to the different emo¬ tional objects.

The emotions are clearly indispensable for the propagation of the species, the nurture of young-, the protection of the individual in times of danger, and for many other essential needs of the race. They have undergone a strict process of natural selection. Among the emo¬ tions showing the deepest and most recent effects of this natural selection are those that form the basis of the moral conduct. In many ways our emotions and their modes of expres¬ sion show traces of the needs of a more primitive existence — thus a sneer is a rudi¬ mentary unfleshing of the teeth for combat. (See Esthetics; Feeling). Consult Cannon, W. B., (Bodily Changes in Pain, Hunger, Fear and Rage) (New York 1915) ; Darwin, C., Ex¬ pression of the Emotions) (London 1873) ; James, W., Principles of Psychology) (New York 1890) ; Mantegazza, Physiognomy and Expression (tr. London 1904) ; Ribot, Psy¬ chologic des sentiments) (Paris 1896) ; Stout, (Manual of Psychology) (London 1899).*

Norbert Wiener, Editorial Staff of The Americana.

EMPALEMENT, a mode of executing criminals, mentioned by Juvenal, often inflicted in Rome, and still used in Turkey and Arabia. In England the dead bodies of murderers were sometimes staked in this manner, previous to being buried; but the custom was abolished in

1823.

EMPANEL, or IMPANEL, the placing of the names of jurors on a list, often called a panel from the former custom of using a pane, slate or panel for this purpose. Abroad the term empanel is more generally applied to the act of the sheriff, upon whom devolves the duty of making up the list of jurors who are to be summoned for a specified court term. In America the term is also used in this sense but is also employed to the selection of a jury to try a particular case.

In the popular sense, therefore, a jury is said to be empanelled when its

members have been selected after an examination by opposing coun¬ sel as to their qualifications, impartiality, etc., and are sworn to try the case.

EMPARAN, Diego de, de-a'gd da em- pa'ran, Mexican writer: b. Puebla, 5 April 1718; d. Ravenna, Italy, about 1807. His books, (The Jesuits and the Pope) (1746), published soon after entering the priesthood, gained him five years' imprisonment. The year after his re¬ lease he issued a bitter criticism of Church dignitaries, for which he was deposed from the priesthood and imprisoned in the Castle of Sant' Angelo, but released later. His work was burned by the executioner. His other works include (The Tombs of Mohammed and Christ ; (Voltaire and His SchooP ; (Science and Superstition 5 ; and (Religion and Hygiene.)*

EMPECINADO, El. See Diaz, Don Juan Martin.

EMPEDOCLES, Greek philosopher: b. Agrigentum, Sicily, about 460 b.c. His fellow- citizens esteemed him so highly that they wished to make him king; but being an enemy to all political forms which elevate a few above their fellows, he refused their offer, and prevailed on them to abolish aristocracy and introduce a democratical form of govern¬ ment. Aristotle states that he died in ob¬ scurity at the age of 60 years, in the Pelopon¬ nesus, but there are various legends respect¬ ing the manner and place of his death. Empedocles presented his philosophy in a poet¬ ical form. His general point of view is deter¬ mined by the influence of the Eleatic school upon the physical theories of the Ionic philos¬ ophers. He assumed four primitive independent substances — air, water, fire and earth, which he designates often by the mythical names Zeus, Hera, etc. These four elements, as they were called, kept their place till modern chemistry dis¬ lodged them. Along with material elements he affirmed the existence of two moving and oper¬ ating powers, love and hate, or affinity and an¬ tipathy, the first as the uniting principle, the second as the separating. The contrast between matter and power, or force, is thus brought out more strongly by Empedocles than by previous philosophers. His theory of the universe seems to assume a gradual development of the perfect out of the imperfect and a periodical return of things to the elemental state, in order to be again separated and a new world of phenomena

formed. Of his opinions on special phenomena may be mentioned his doctrine of emanations, by which, in connection with the maxim that like is known only by like, he thought to ex¬ plain the nature of perception by the senses. He attempted to give a moral application to the old doctrine of the

transmigration of souls, his views of which resembled those of Pythagoras. The fragments of Empedocles have been edited by Sturz (1805) ; Karsten (1838) ; and Stein (1852). Consult monographs by Lommatsch (1830) ; Raynaud (1848) ; and Gladisch (1858) ; also Windelband, (Geschichte der griechischen Philosophy (3d ed., Munich 1912).

EMPEDOCLES ON ETNA is a dramatic poem by Matthew Arnold, based on legendary accounts of a Greek philosopher who lived in Agrigentum, Sicily, in the 5th century before Christ. The«interest of the drama centres in the philosophical despair of Empedocles and his suicide, which he accomplishes by leaping into the crater of the volcano. Before his death he discourses at length on the consolations of philosophy for the benefit of his friend, the physician Pausanias, who accompanies him part way to the summit. Dramatic relief and con¬ trast are provided by Callicles, a young harp- player, who on the lower slopes of the mountain sings with unshaken faith in the traditional divinities and the eternal freshness and delight¬ fulness of nature.

Arnold first published this drama in 1852, but the volume in which it was contained was withdrawn from circulation before 50 copies were sold. He reprinted fragments of it in 1853, '54, '55, '57, and in 1867 revived it in its entirety at the instigation of Robert Browning. In an interesting preface to a volume of verse pub¬ lished in 1853 he explains both why he wrote the poem and why he withdrew it. He had been attracted to the theme because Empedocles, like Arnold himself, was a troubled spirit wander¬ ing between two worlds, one dead, the other powerless to be born — ((the calm, the cheerful¬ ness, the disinterested objectivity have disap¬ peared; the dialogue of the mind with itself has commenced ; modern problems have presented themselves ; we hear already the doubts, we wit¬ ness the discouragement, of Hamlet and of Faust.® He had seized upon this parallelism between his position in the 19th century and that of the Greek philosopher in the 5th cen¬ tury b.c. to express with penetrating power the profound melancholy of religious disillusion which sorely afflicted his early manhood. As a critic, however, he felt bound to condemn as morbid, monotonous and painful the representa¬ tion of a situation (

Stuart P. Sherman.

EMPEROR, the title of the highest rank of sovereigns. The word imperator, from im- perare, to command, had very different meanings among the Romans at different periods. It sig¬ nified one who exercised imperium authority, whether in a civil or military capacity. In the time of the republic consuls were called imper- atores before they entered on their office. The soldiers afterward conferred the title on their general, after a victory, by hailing him imper¬ ator; the Senate also called a victorious general

imperator until he had celebrated his triumph. After the overthrow of the republic imperator became the title of the rulers or emperors who assumed to themselves personally every depart¬ ment and privilege of civil and military impe¬ rium. Victorious generals were still, however, sometimes saluted with the title imperator, in its original sense. With the fall of Rome the title was lost in the West, but was kept up in the Eastern or Byzantine empire for nearly 10 cen¬ turies. In 800 it was renewed in the West when Charlemagne was crowned, by Leo III, as "Car¬ olus Augustus, the God-sent and pious emperor of Rome,® which title was borne by his succes¬ sors until the dissolution of the Holy Roman Empire in 1806.

The Eastern Empire having been finally overthrown by the conquest of Constantinople in 1453, the imperial dignity in the East became extinct. The sultans, who succeeded the emper¬ ors, have never received, in official language, the title of emperor. This title was adopted in Russia by Peter I in 1721, but the right of the Russian sovereign to its possession was not acknowledged by the German Empire until 1747, by France in 1745, and by Spain 1759. Napoleon adopted the old idea of an empire, as a general union of states under the protection, or at least political preponderance, of one powerful state. Napoleon crowned himself as emperor in 1804; the title fell into disuse at his deposition in 1815, but was revived by his nephew in 1852, with whom it again ended on 5 Sept. 1870. In 1806 the first German Empire, 1,000 years old, became extinct and the German emperor, Francis II, adopted the title of Francis I, Emperor of Austria. In December 1870 the second German Empire was formed, King William of Prussia having ac¬ cepted the imperial office and title offered him at Versailles while engaged in the siege of Paris. This empire fell in 1918.

Great Britain is considered as an empire, the crown as imperial and the Parliament is styled the Imperial Parliament of Great Britain and Ireland; but the sovereign has not the imperial title in reference to the home dominions, though the king bears the title of emperor of India. The sovereigns of Japan and Morocco are often, though with little propriety, called emperors.

EMPEROR, or PURPLE EMPEROR,

name of a butterfly of the genus Apatura. The antennae are rather long, the ground color of the wings is rusty black, decorated in the male with a purple lustre wanting in the female; seven white, spots in the male ; as many faint yellow ones in the female; on the four wings above a transverse white band; an ocellated spot and a darker marginal bar on the hinder ones.

EMPHYSEMA, em-fi-se'ma, a disease of the lungs, in which there is a

dilatation of the air vesicles with lack of elastic recoil. It is most frequently the result of persistent high intra-alveolar tension, acting upon weak lung

tissue. The most important symptoms are bronchitis, loss of breath with harsh and wheezy respirations, and a certain amount of cyanosis or blueness of the face, due to insufficient oxida¬ tion in the lungs.

EMPHYTEUSIS, em-fi-tu'sis (Gr. im¬ planting®), in Roman law, a perpetual right in a piece of land, for which a yearly sum was paid to the proprietor. It was secured by contract on condition of improvement, as well as pay¬ ment of rent, and much resembled a feudal holding in the features of perpetuity, etc. See Feudal System.

EMPIRE STATE, a name given to New York State because of its predominant wealth and commerce. The expression "Empire,® prob¬ ably rendered more vivid by Berkeley's proph¬ ecy made at Newport, R. I., a generation previous. <(Westward the course of empire takes it way® was quite common after the Revolutionary War. It was not necessarily of political significance, as relating to a form of government, but referred rather to the course of progress in civilization; or, as we say, Ex¬ pansion.® As such, it was applied especially to New York. When the Free Quakers of Phila¬ delphia, led by Colonel Eyre, built their first temple, at Fifth and Arch streets, in Phila¬ delphia, they dedicated it, as the stone inscribed and set in the facade declared, "Erected in the year of our Lord, 1783, of the Empire.®

EMPIRICAL SCHOOL. See Empiricism.

EMPIRICISM (Greek, empeiria, trial, ex¬ perience, from the adjective empeiros, which means expert, or experienced in). The philo¬ sophical view that experience is the source and ' the criterion of all knowledge ; the theory that all knowledge is derived from material or data existing in the form of particular states of con¬ sciousness. As sense, outer and inner, is com¬ monly regarded as the source of this material, empiricism, as a theory of the origin of knowl¬ edge, is nearly synonymous with Sensationalism (q.v.). Moreover, since historically it has been customary for representatives of empiricism to explain the connections and relations of ideas by means of the principle of association, the theory is closely connected with Associationism. Empiricism, however, is not alone in its appeal to experience ; all modern systems profess to draw their conclusions

from this source. But as a philosophical theory, it is distinguished by the particular way in which it envisages the mind and its content. For it, the mind is either merely the place or support of ideas (as for Locke), or .(with later writers) simply a general name that is given to the stream of conscious processes ; 'it is not itself a contributing factor in experience, and has no power to supply ideas or principles which are not already furnished to it by the original data. At birth the mind is like a blank sheet of paper : it contains no innate ideas, and has no original capacity. In this respect empiricism is opposed to Nativism (q.v.), Transcendentalism (q.v.), and all theo¬ ries which find in experience some expression of the nature of reason or intelligence.

As a theory of the origin of knowledge, em¬ piricism has the task of explaining how the more complex and general aspects of knowledge and of concrete experience have been derived from the simple psychological elements which it as¬ sumes as its data. As these elements are par¬

ticular and isolated states of consciousness, the most difficult problem for empiricism has been to explain the connectedness of experience, and more especially the nature and validity of general propositions. How can experience, which is by hypothesis originally constituted of particular states, guarantee the truth of universal state¬ ments, such for example as are arrived at by science? Since for • this theory the mind possesses no general principles in the form of innate truths from which it might deduce con¬ clusions, it is evident that empiricism will em¬ phasize induction as its method of reasoning and seek to explain universal propositions as derived in this way from particular experiences.

In regard to the validity of knowledge, em¬ piricism holds that only those ideas are valid that have their source in and can be traced back to some original data which can be exhibited in the form of actual impressions or contents of consciousness. In Hume's statement, all ideas are derived from some original impression. If then it is impossible in any case to point to the impression from which our supposed idea is de¬ rived, we have to conclude that the idea is no proper idea at all, but only a ((fiction® of the imagination. It is by means of this principle that Hume and the empiricists who have con¬ sistently followed his lead discredit the idea of the self, and all universal principles and catego¬ ries which cannot be traced back to some par¬ ticular experience or group of experiences.

Empirical views regarding the origin and criterion of knowledge were maintained by the Greek Sophists, and more systematically by both Stoic and Epicurean schools. In the Middle Ages, the doctrine was maintained in the formula, <(Nihil est in intellectu quod non priusquam fuerat in sensu.® But it has been in the modern period that empiricism has been

systematically developed and applied as a philo¬ sophical doctrine. The name is especially con¬ nected with the English school that begins with John Locke and includes as its chief representa¬ tives, George Berkeley, David Hume, David Hartley, Joseph Priestley, James Mill, J. S. Mill and A. Bain. The views of H. Spencer also are very largely determined by the influence of this school, though his application of the doctrine of evolution leads him to some new conclusions. It should be recognized, however, that the influence of empiricism has not been confined to any single group of thinkers, but that it has in a sense formed a general platform for the sciences of mind and society. By pro¬ viding a set of conceptions through which the inner life can be readily ordered and made com¬ prehensible, empiricism came to be accepted as a matter of course by writers on psychology, ethics, sociology and education, oftentimes with¬ out even being aware that their procedure had committed them to any philosophical position. During the past generation the empirical view of mind and experience has furnished the frame¬ work which has largely determined the course of investigations in these fields, even when, as in the case of Spencer, they have been accom¬ panied by professions of allegiance to the prin¬ ciple of development. The truth is that the empirical way of representing experience, as constituted out of atomic ((states® or Elements® which unite in accordance with certain prin¬ ciples to form Eomplexes,® is so convincing to "common sense® and at the same time to sue-

cessful in rendering the mind picturable and describable in terms of science, that it appears to be both natural and indispensable. It has accordingly happened that the demonstrations of the shortcomings of empiricism as a philo¬ sophical doctrine which have been furnished, notably from the point of view of Kant and the idealistic school (cf. T. H. Green, introduction to Hume)), have failed to overthrow the influ¬ ence and standing of this doctrine in popular favor. The rival view of experience put for¬ ward by Kant and his followers, being more difficult to understand and to envisage, did not so readily form the basis for investigation and discussion in this field, and so the dominance of empiricism remained almost unshaken. In recent years, however, there are signs that in¬ vestigations into psychological and social phe¬ nomena are becoming more fully penetrated with historical and developmental conceptions, and are being carried beyond the atomic and mechanical logic of the older empiricism. This movement beyond empiricism is illustrated by the importance attached to studies of behavior and function at the present time, and especially by the tendency shown to interpret mind and its various types of experience in the

light of the categories of historical development.

Radical Empiricism. — With the movements described in the last sentences there may be connected the position outlined by William James, to which he gave the name of "radical empiricism.® James distinguishes his own em¬ piricism from that of Hume and the English school by insisting that in addition to the sub¬ stantive states of consciousness to which the latter had called attention, there are also cer¬ tain "conjunctive relations® given directly through experience, and so to be accepted as equally real in a true empirical theory. Radical empiricism thus professes to give a more accu¬ rate description of experience than that of the earlier school ; it recognizes the fact that experi¬ ence presents itself as whole and continuous, and not as a series of discrete substantive states or atoms. James' object is to maintain the wholeness and continuity of experience, and at the same time to avoid any appeal to rational elements which cannot be themselves experi¬ enced as facts. "Radical empiricism,® just by being thoroughgoing in its empiricism, believes itself able to describe the thing just as it is experienced, without imposing upon it any con¬ ceptual form through logical interpretation.

Empiricism in Medicine. — The Empiric school of medicine arose in Alexandria in the 3d century b.c., in opposition to Dogmatism. The latter supported itself by appeal to the theories of Plato and earlier philosophers, while the empirics took Aristotle as their leader. They avoided the one-sided theorizing tenden¬ cies of the dogmatists regarding the ultimate causes of disease, and emphasized the practical ends of medicine as an art of therapeutics. Though the influence of this school was in many respects beneficial in leading to the study of cases, and to careful methods of observation, it tended in the end to resolve itself into char¬ latanism, and to occupy itself exclusively with a search for specifics. At the present day what is meant by empiricism is the following of ac¬ cumulated experience independent of rational explanation. A physician uses a drug empiri¬ cally because he, or others, believe it to be of service, although no reason can be given by

him, nor by others, why it should be of service. Little by little, the real causes of the action of drugs that physicians have used from time im¬ memorial has been revealed by students of medicine and the reproach that medicine is merely an empirical science, and in the sense above defined, has little weight at the present time. Consult Locke, J., (An Essay Concern¬ ing Human Understanding) (1690) ; Mill, J., (An Analysis of the Phenomena of the Human Mind) (1829) ; Hodgson, S. H., (Metaphysics of Experience) (1898) ; Green, T. H., intro¬ duction to Hume) (1874) ; James, W., (Essays in Radical Empiricism) (1912) ; Moon, R. O., (The Relation of Medicine to Philosophy>

(1909).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell

University.

EMPIS, an'pe', Adolphe Dominique Flor- ent Joseph Simonis, French dramatist and litterateur: b. Paris, 1795; d. 1868. After re¬ ceiving a liberal education in his native city, he successively tried the fields of journalism and the drama. Of the two the latter proved the more successful. In 1856 Empis became ad¬ ministrator of the Theatre Frangais, which po¬ sition he retained until 1859. Empis published several plays which have more than a passing fame because of their ease and naturalness, their graceful style, their heightened dramatic situations and their excellent character delinea¬ tion. Among the best known are (La Mere et la fille> (1820); (1824); VHP (2 vols., 1854).

EMPLOYERS' ASSOCIATIONS, com¬ binations of business establishments for the pur¬ pose of dealing with or fighting labor organiza¬ tions. They are a special form of capitalistic organization, exclusive of those general com¬ binations (see Combination, Industral) which have been formed to advance the political, commercial or legal interests of employers. Their history follows the history of trade unions — they have been weak or strong ac¬ cording to the strength of the unions. Two distinct types of employers' associations prevail (1) bargaining associations; (2) hostile asso¬ ciations. The former recognize the unions while the latter are opposed to every form of collective bargaining.

The bargaining associations aim to check the abuses and excesses of organized labor by en¬ deavoring through deliberation and discussion to work out some system of agreement with their employees. The employment of labor is treated as a simple business proposition. The first employers' association of national im¬ portance of this type was the United States Potters' Association formed in 1875. The Stove Founders' Association formed in 1886 stimulated similar organizations in all branches of that industry. By 1905 national employers' associations representing the stove and furnace making, metal foundry work, lake transporta tion, machine construction, publishing and print¬ ing, marble cutting and ready-made clothing industries were successful in making working agreements with employees. Employers' asso¬ ciations have been steadily on the increase. Their organization is essentially similar to that of the unions. They have local bodies with*

national federations, and nearly all maintain employment agencies, secret service depart¬ ments (analogous to the walking delegate sys¬ tem) ; control the members who are forced to agree to measures adopted by the central or¬ ganization ; issue publications ; and have a de¬ fense fund.

The class of hostile employers' associations is a comparatively recent development and represents the counteraction of the forces of ag¬ gressive industrial unionism. In many cases the associations we*e first formed for the pur¬ pose of negotiating joint agreements with the unions, but after the failure of negotiations or the breakdown of an agreement, they assumed their present form. In some cases associations which have been hostile have resumed rela¬ tions with unions.

But there is a strong tendency for an or¬ ganization of this type to develop exclusive principles and policies which make an agree¬ ment with the unions impossible. Their plat¬ form shows absolute disagreement with unionist principles. They insist that the conditions of employment shall be determined by the indi¬ vidual workman and the individual employer. This generally means that employers, either as an association, or, in many cases, as individuals, have the right to dictate the terms of employ¬ ment and of discharge. Discrimination is made either against all union workers, or else their number is so limited as to prove in¬ effective in agitation. Any indication of spread of unionist principles i* watched for and in¬ stantly suppressed. They deny the privileges of boycott, strike, etc., but do not hesitate to seek redress in event of such crises by em¬ ploying strike breakers and spies. This extreme form of hostility takes on a highly anti-social aspect. But the more enlightened employers of the hostile associations have begun to realize the vast psychological problems underlying un¬ rest and opposition of laborers; and they at¬ tempt to change conditions where there is evi¬ dence of dissatisfaction. They also endeavor to ameliorate affairs by profit-sharing and wel¬ fare systems, safety devices and offering op¬ portunities for advancement. This minimizes the advantages of unionism and secures satis¬ factory results. A striking example of this type of reform was evinced by the voluntary introduction of the eight-hour law into the Western Union Telegraph Company^ in 1917. Among noteworthy hostile employers' associa¬ tions may be mentioned the National Associa¬ tion of Manufacturers (q.v.) and the Citizens' Industrial Association of America.

The weakness of the first type of employers' association lies in the fact that a considerable number of employers, though accepting results of collective

bargaining, do not belong to the associations and thus lessen the force of bar¬ gaining power. The United States government through its Board of Mediation and Concilia¬ tion recognizes the fact that agreements made between employers' associations and trade unions form a basis for settling trade problems which is equitable, elastic and intrinsically democratic. Consult Hollander and Barnett, (Studies in American Trade Unionism > (Chap. 12, 1912) ; Mitchell,; Organized Labor) (Chap. 22, Philadelphia 1903) ; Gilman, N. P., (Methods of Industrial Peace) (Chap. 3, 1904). The Re¬ ports of the United States Industrial Commis¬

sion > contain valuable studies in mediation and conciliation which are pertinent to the workings of these associations. Consult especially (Senate Documents) (Vol. XIX, Washington

1916).

EMPLOYERS' LIABILITY, a term gen¬ erally used to denote the liability of employers for injuries inflicted upon workmen in their em¬ ploy. In many States workmen injured in the course of their employment can recover damages from their employers only if the employers be proved guilty of negligence and if such negli¬ gence resulted in the injury. Employers are not liable for injuries resulting from the obvious occupational risks or for accidents that are in¬ evitable or for which blame cannot be fixed. Since an employer is responsible for injuries due to his own negligence or that of his serv¬ ants, an employee thus injured supposedly would be entitled to recover damages from the em¬ ployer. But under the common-law relation of master and servant, as interpreted in foreign countries until recently, and now discarded in nearly all civilized countries save the United States, an employee, on entering service, agrees to run all the ordinary risks of the service, in¬ cluding injuries that might befall him through negligence on the part of fellow-employees. The so-called absolute duties of the employer are to furnish a reasonably safe and proper place in which employees may engage in their work, suitable appliances, reasonably competent em¬ ployees, such as superintendents, foremen and other servants, and rules and instructions when they are reasonably necessary. The employer is liable for gross negligence, for risks of an ex¬ traordinary nature involved in the service, and for all acts of negligence, whether committed by himself or by employees, occurring outside the regular service. Modern industrial condi¬ tions necessitated a modification of these com¬ mon-law rules, especially in England, where the liabilities of employers has been greatly extended by such acts as the Employers' Lia¬ bility Act of 1880 (43 and 44 Viet. c. 42) and the Workmen's Compensation Acts of 1897, 1900 and 1906 (60 and 61 Viet. c. 37 ; 63 and 64 Viet. c. 22; and 6 Edw. VII c. 58). Under this legislation employees are virtually insured by the employer against injury while in his employ, the employer being compelled to pay a

limited sum to the injured or to the families of employees killed by such accidents, whether or not due to the negligence of the employer or to that of fellow-employees.

In the United States the employee must prove that in a given instance the master has failed to fulfil one of the above-mentioned absolute duties. In contesting such an action the employer, in general, may rely on three de¬ fenses : (1) that the injury sustained by the employee was among the ordinary occupational risks which he assumed when entering the em¬ ploy of the master, or was caused by a danger of which the employee either was or should have been cognizant, but in spite of which he continued to work; (2) that the injury inflicted upon the employee was not due to negligence on the employer's part but on the part of a fellow-servant of the plaintiff, wherefore the employer is not liable since the employee as¬ sumed this risk, too; (3) that the injured em¬ ployee failed to use reasonable precautions

against accident and that this contributory neg¬ ligence had resulted in his injury. During the past few years several of the United States have enacted laws of a very diverse character which differ widely from the general principles of the American system as above set forth and considerably extend the liability of em¬ ployers. Attempts have been made to offset the liability laws by compelling employees to sign contracts waiving the benefits of such legislation, but subsequent enactments have overcome this evasion of the law by forbidding such contracts or rendering them null and void. The liability laws should be studied in connec¬ tion with the new compensation laws which have been enacted to replace the former in order to provide a system of definite compen¬ sation for accident without litigation. Some of these laws have been attacked as unconstitu¬ tional on the ground that the forcible grant of compensation to an employee injured through no fault of the employer was confiscation of property for no public purpose and without due process of law. Where the courts have sus¬ tained such contentions the tendency has been to amend the constitutions so as to permit such legislation, and acts passed under such amend¬ ments have been upheld in the court of last resort. The rapid advancement of the move¬ ment to compel compensation to injured work¬ men led to the extension of the field of insurance, some companies now issuing employ¬ ers' liability policies, under which, for a stipulated premium, the employer is insured against loss resulting from accidents to em¬ ployees, any damages for which the employer may be legally liable being paid by the insur¬ ance company. The most recent laws make such insurance compulsory, while State insur¬ ance funds, placed on a sound actuarial

basis, have been created in some States, since, as the New Jersey commission on employers' liability reported in 1915, previous laws have not ensured the payment of compensation in case the em¬ ployer should become insolvent. Most of the States have compensation laws which apply to public as well as to private employees, while the Canal Zone order and the Federal statute apply to public employees and to persons en¬ gaged in interstate commerce. In general either compensation or insurance is provided and either type of law may be elective or compul¬ sory. Alaska, Colorado, Connecticut, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Mich¬ igan, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Vermont and Wisconsin provide elective compensation; while in Arizona, California, Canal Zone, Hawaii, Maryland, New York and Oklahoma the compensation is compulsory as it is under the Federal statute. Massachusetts, Nevada, Oregon, Texas and West Virginia have elective insurance laws, while Ohio, Washington and Wyoming have compulsory insurance laws. See Accidents; Workmen's Compensation; Labor; Family Law; Factories and Factory Inspection; Diseases, Occupational.

Bibliography. — Consult the files of the American Labor Legislation Review; Barnett, H. N., Accidental Injuries to Workmen5 (Lon¬ don 1909) ; Beyer, D. S., (Industrial Accident Prevention5 (Boston 1916) ; Boyd, J. H., (Workmen's Compensation and Industrial In¬ surance5 (Indianapolis 1913) ; Cowee, G. A.,

Practical Safety Methods and Devices5 (New York 1916) ; Connor, J. F., Employers' Lia¬ bility, Workmen's Compensation and Liability Insurance5 (New York 1916) ; Clark, L. D., (Law of the Employment of Labor5 (New York 1911) ; Dawson, M. M., Constitutionality of Workmen's Compensation and Compulsory In¬ surance Laws5 (in Case and Comment, Vol. XXII, pp. 275-280, New York 1915) ; Doherty, P. J., liability of Railroads to Interstate Em¬ ployees5 (Boston 1911) ; Eastman, C., (Work-Accidents and the Law5 (New York 1910) ; Forsyth, C. H., (Workmen's Compensation in the United States5 (in American Underwriter, Vol. XLV, pp. 89-99, 136-145, 239-250, New York 1916) ; Glass, W. M., (The Law of Work¬ men's Compensation5 (Rochester, N. Y., 1916) ; Henderson, C. R., industrial Insurance in the United States5 (Chicago 1911), and (Working- men's Insurance5 (Philadelphia 1912) ; Hotch¬ kiss, W. H., (The Case against State Insurance5 (New York 1913) ; {Legal Liability of Employ¬ ers for Injuries to their Employees in the United States5 (U. S. Labor Bureau (Bulletin5 No. 74, Washington 1908) ; Otis, S. L., (Manual of Compensation and Liability Insurance5 (New York 1914) ; Paterson, J. V., (Workmen's Com¬ pulsory Compensation System5 (Seattle 1912) ; (Risks in Industry5 (in Annals of the Ameri¬ can Academy of Political and Social Science,5 Vol. XXXVIII, Philadelphia 1911) ;

Sherman, P. T., (The Consequence of Accidents under Workmen's Compensation Laws5 (in University of Pennsylvania Law Review, Vol. LX IV, pp. 417-448, Philadelphia 1916) ; Seager, H. R., So¬ cial Insurance5 (New York 1910) ; Thornton, W. W., (Treatise on the Federal Employers' Liability and Safety Appliance Acts5 (Cincin¬ nati 1916) ; 'Workmen's Compensation Laws of the United States and Foreign Countries5 (U. S. Labor Statistics Bureau 'Bulletin5 No. 126, Washington 1914) ; Walgren, J. A., 'Federal Employers' Liability Act5 (Chicago

1916).

EMPLOYMENT BUREAUS, establish¬ ments, whether private or public, at which those seeking employment are put into communication with those who are offering it. Private em¬ ployment bureaus are found in every large city, but they are often conducted without judgment, sometimes have been accused of dishonesty, in many cases are mercenary, and their usefulness is at least problematical. In order to correct the evils arising from the practice of these bureaus, much remedial legislation has been passed. No agency is now allowed to charge a fee before informing an applicant of a situa¬ tion that is actually open to him, and should such position, through no fault of the applicant, be found not open to him as understood when the fee was paid, such fee is required to be returned promptly. All employment bureaus are under the supervision of some State bureau, while some cities impose license fees and bonds of varying amounts and limit the amounts of the fees to be charged for registration, also requiring the return of fees should applicants fail to secure positions within a prescribed time, Public bureaus, opened by the national or city, government, are non-mercenary and the motive that has prompted their establishment is a sound humanitarian and political motive. Such bureaus have two practical objects. They are a means of communication between employer

and employee — labor exchanges, as they are called in France. In the second place they do something toward settling the wage question, by giving quotations of the amount offered and asked. Ohio was the pioneer in the movement for free public employment offices in the United States, instituting hers in 1890, and the move¬ ment has spread so that 19 States now have more or less effective systems of public employ¬ ment offices in about 60 different cities, the offices usually being under the supervision of a superintendent of free employment offices, or some other State official,

such as the commis¬ sioner of labor or the chief of the bureau of statistics. These offices find employment annually for about 300,000 wage-earners at exceedingly low cost, ranging from four cents for unskilled workers in Seattle to $2 or more in some small offices. With two exceptions the various laws stipulate that there shall be no charge to employer or employee for the service rendered. Municipal bureaus are operated in¬ dependently in seven States. In 1914 the United States Department of Labor, through a bureau called the Federal Employment Bureau, began the establishment of 38 branch offices in various parts of the country and subsequently broad¬ ened the scope of the work so as to include a woman's division. The country is divided into 18 zones of distribution, each with head¬ quarters in a large city; besides the station headquarters there are 80 sub-branches.

The public governmental employment bureau originated in France. In 1848 one such bureau was established in each of the mairies of Paris. The institution languished and in 1851 a meas¬ ure submitted to the legislative assembly for the establishment of a comprehensive system of employment bureaus throughout the country failed to be adopted and nothing of importance was accomplished until 1888 when the Bourse de Travail was opened at Paris, which institu¬ tion received a subsidy of 150,000 francs from the government. In 1892 a large building was erected and became the headquarters of labor syndicates, but a year later this was closed because of a dispute between the government and the labor syndicates. In 1896 it was re¬ opened under the management of a commission appointed jointly by the government and the labor syndicates. There are also numerous bu¬ reaus in France operated and managed by unions of labor syndicates whose chief endeavor is to place members of syndicates but who may aid other workmen in the hope that they will join the syndicate. In order to equalize the supply of labor in the various sections of the country, a national bureau was established, but though this received government aid in 1900, such aid has since been withdrawn because the bureau endeavored to restrain workers from entering districts wherein strikes were in prog¬ ress. About 50 cities have labor bureaus of some sort. Belgium established such a system in 1870; Switzerland followed suit with a labor bureau at Bern in 1888 and with another at Basel in 1889; and since that time Italy has developed a system, the most important ex¬ change being at Milan.

The first employment bureau in England was opened at Egham, near London, in 1885, but when the Local Government Act of 1894 went into effect this was discontinued. From 1885 to 1906 a voluntary bureau was in operation at vol. 10 — 20

Ipswich but in the latter year the Distress Com¬ mittee took over its work

and within a short time numerous municipal and private bureaus were taken over by the Distress Committees under the local governments. In 1909 an act became law making the establishment of em¬ ployment bureaus or labor exchanges compul¬ sory throughout the United Kingdom, and there are now more than 425 such exchanges with about 1,100 local agencies, all under the control of a central office at London and eight divisional offices in various cities. This federated system of labor exchanges is chiefly for unskilled labor but it works in conjunction with the trade union bureaus for skilled labor and has been very successful.

Germany's first municipal bureau grew out of a private bureau established at Freiburg in 1892, and the movement has been taken up enthusiastically by almost every city of im¬ portance. Ordinary commercial bureaus in Germany concern themselves chiefly with se¬ curing positions for domestic servants. The trade unions have their own bureaus. The Berlin public employment bureau is under the charge of various united societies but it is granted a subsidy by the city government and is also strictly supervised. A nominal fee is charged to workmen who register but it is free to all employees. The management is equally divided between employers and employees and prominent citizens are in charge of the im¬ portant committees. The best system is that of Munich. The Bavarian communes are held legally responsible for the conduct of the em¬ ployment bureaus; the separate municipal bu¬ reaus are federated into a complete system with central bureaus in the largest Bavarian cities. No charge is made for services, the municipality defraying the entire cost with the aid of appro¬ priations by the Bavarian government. In almost every German city of 50,000 or more inhabitants a municipal bureau will be found, and such bureaus are particularly successful in southern Germany, but in the northern part of the country the work of the municipal bureau is performed, to a great extent, by voluntary associations, aided by the municipalities. See Labor Legislation in the United States.

Bibliography. — Barnes, C. B., (Public Bu¬ reaus of Employment (in (Annals of the American Academy of Political and Social Sci¬ ence, > Vol. LIX, pp. 185-193, Philadelphia 1915) ; Beveridge, W. H., Unemployment (London 1912) ; Devine, E. T., (Reports on the Desirability of an Employment Bureau in the City of New York) (New York 1909) ; Green¬ wood, Arthur, (Juvenile Labour Exchanges> (London 1911) ; Hodges, H. G., Statutory Provisions for the Achievements of Public Em¬ ployment Bureaus) (in f Annals of the American Academy of Political and Social Science, Vol. LIX, pp. 165-184, Philadelphia 1915) ; Kellor, F. A., (Out of Work) (New York 1904) ; Leiserson, W. M., (The Movement for Public Labor Exchanges* (in Journal of Political Economy, Vol. XXIII, pp. 707-716, Chicago 1915) ; Nash, M., (Municipal Employment Bu¬ reaus in the United States) (in National Municipal Review , Vol. IV, pp. 429-436,*

Con¬ cord, N. H., 1915) ; Persons, Parsons, Moses, et al., (Labor Laws and Their Enforcement (New York 1911); Willoughby, W. F., Employment Bureaus in the United States > (Boston 1900).

EMPLOYMENT MANAGER. The new

profession of employment manager has within the past few years come to be recognized as one of the most vital factors in industry. Ten years ago, workmen were hired by foremen or clerks simply because they happened to apply for jobs that were vacant but without regard for any particular fitness for the work to be performed. Naturally, there was general dis¬ satisfaction, both on the part of employer and employee, and as this greatly increased the labor cost and tended to reduce production, a closer study of the question of the human ele¬ ment in the industrial organization was made, with the result that many manufacturing con¬ cerns have placed their employment work in the hands of a trained executive, with the power to hire, place and handle the working force with a view to more efficient labor management.

The employment manager occupies the posi¬ tion of the representative of his company in the labor market. He must be familiar with all sources of labor supply and be capable of selecting the men and women needed for the different positions in his plant in accordance with their fitness for the jobs, for the duties of the employment manager are not only to keep the machines running but to see that they are operated by workers who are able to maintain a high standard of efficiency in the quality and quantity of the goods produced.

As the connecting link between the manage¬ ment and the worker, the employment manager is entrusted with all matters of personnel con¬ nected with the company. The hiring of the help, their assignment to tasks that they are fitted to perform, their change of jobs or trans¬ fer from one department to another, and, when necessary, their discharge, are matters that rest in his hands. He is the <(friend at court® to whom all requests for assistance are made and it is he who must sit as a judge upon all grievances that are brought to his attention, separating the imaginary from the real.

The employment manager must not only en¬ force the policies of his company and see that all rules for the management of the help are understood and obeyed, but he must also see that there is effective co-

operation between his office and the heads of other departments, for his duties require that he keep as fully in accord with the various foremen as with the workers. The successful maintenance of these varied relations requires both intelligence and executive ability of a high type.

This plan of delegating all personnel prob¬ lems to a skilled employment manager has proved so successful, both in improving pro¬ duction and in promoting an esprit de corps, that it has been adopted in nearly all important industrial concerns and in many financial and mercantile establishments.

Employment Managers' Associations. — The development of the profession of employ¬ ment manager has resulted in the organization of associations, or clubs, where the employ¬ ment managers could meet to discuss the prob¬ lems arising in their work, exchange experiences and otherwise fit themselves to handle more efficiently the human element so vital to the success of an industrial enterprise. The first emnloyment management society was organized in Boston, about five years ago, and soon proved so helpful to its members that similar employ¬

ment executives' organizations have since been formed in nearly all of the industrial centres of the country. Three conventions have been held, Minneapolis, Minn., 1916; Philadelphia, Pa., in 1917, and Rochester, N. Y., in 1918. At the latter, on 11 May 1918, the several organizations formed a permanent association to be known as the National Association of Employment Managers.

Employment Manager's Course. — The suc¬ cess of the employment manager in promoting production and stabilizing industrial employ¬ ment came to be so generally recognized that, in 1918, as one of its war measures, the United States government established an intensive course in employment management, under the direction of the employment management divi¬ sion of the War Industries Board. The first course was inaugurated at the University of Rochester, where the first class graduated on 9 May 1918, and courses have since been estab¬ lished at Harvard, in connection with the Massa¬ chusetts Institute of Technology; Boston Univer¬ sity, Boston; Columbia University, New York; Carnegie Institute of Technology and the Uni¬ versity of Pittsburgh, Pittsburgh ; the Case School, Cleveland ; the University of Washing¬ ton, Seattle, and the University of California, at Berkeley. The courses of instruction occupy from six weeks to two months, and the classes, which are conducted by the foremost employ¬ ment executives and industrial authorities in the country, devote themselves to such subjects of study as the following:

Functions and organization of an employ¬ ment department ; labor

turnover, its causes and how to reduce it ; character analysis ; science of hiring; transfer and promotion; discharge; fol¬ lowing employees' progress in the plant ; educa¬ tional work for employees ; recreational work for employees; safety and sanitary engineering; method of wage payment ; .bonuses and profit sharing; hours of labor and fatigue; industrial organization; sources of labor supply; public employment offices and methods of co-operating with them; labor statistics; causes of labor un¬ rest; employers' liability and compensation; history of the labor movement, etc.

In outlining this course of study, the War Industries Board stated that the introduction of the employment manager into industry and the standardization of the services of an employ¬ ment department is one of the greatest move¬ ments taking place in the manufacturing indus¬ try in this country, and employers of labor, particularly those having war contracts, were urged to suggest men or women from their organizations as candidates for the government courses.

John R. Meader.

EMPLOYMENT MANAGEMENT. Em¬ ployment management embraces the work of re¬ cruiting, placing, retaining and discharging the working force. This modern method of handling personnel problems was inaugurated by one or two employers of labor a compara¬ tively few years ago, but the plan quickly dem¬ onstrated its value so clearly that it has now come to be quite generally adopted, not only in important industrial plants but by many large mercantile establishments and financial institu¬ tions as well.

The development of the present system of employment management began when large em-

ployers commenced to realize the fact that the greatest labor problem confronting industry was that of the proper handling of the working organization. The studies of the efficiency engineer proved conclusively that a plant, to operate effectively, must have something more than the number of hands required to run the machinery. If the highest possibilities of pro¬ duction were to be reached it was necessary to obtain and retain the goodwill and active co¬ operation of the operatives.

This was a problem that had steadily been assuming more serious proportions for many years. In the old days of industry, when master and

man worked side by side at the bench the spirit of co-ordination in the average shop was similar to that in the family, but with the growth of industry came the development of the impersonal corporation and the loss of the human touch that had been so largely the source of the loyalty and friendship existing between the <(boss® and the worker. The great industries, therefore, found themselves face to face with the necessity of finding a substi¬ tute for the human relations which they had sacrificed and employment management, under a trained director of personnel, is their solution of this problem.

The primary purpose of employment man¬ agement is to stabilize the working organization by reducing the number of men employed to maintain the necessary average working force, or, in other words, by reducing the ((labor turn¬ over.® To accomplish this end, employment management includes many and varied func¬ tions, ranging from the preliminary work of securing the help to the larger social problems involved in guiding and protecting them.

The functions of the department devoted to employment management begin with the selec¬ tion of the right type of person for the ftjobs® to be performed and this naturally includes an analysis and classification of the various tasks, as it is necessary that all prospective employees shall conform as closely as possible to the specifications of the <(job-analysis.® Once em¬ ployed, the new operative, if he is a ((learner,® must be placed under competent instruction, preferably in a segregated school under a spe¬ cially trained teacher. Close watch must be kept upon his progress, not only during this period of instruction, but during the length of his stay with the concern, in order that he may find no occasion for discontent or discourage¬ ment in the fact that he does not profit in pro¬ portion to the degree of efficiency which he attains. The performance of these functions, as well as those of a so-called <(welfare® char¬ acter (which are almost as closely allied to the work of employment management), require close personal contact with the workers, the ability to inspire confidence in the genuineness of the firm's intentions to deal justly with its individual employees and the careful mainte¬ nance of a system of records through which thorough supervision may be kept over the development of the plant personnel.

Broadly stated, these are the functions of an employment department. Described in de¬ tail, the scope of employment management em¬ braces :

1. Maintaining a Constant Survey of the Labor Market and a List of Available Ap¬ plicants for Positions. — Both are necessary

if the organization is to be maintained at its normal standard. It is assumed

that an em¬ ployment department will receive advance notice from foremen of places to be filled and the men to take these (

2. Hiring the Right Type of Employees. —

To meet this demand, the employment depart¬ ment must not only be familiar with the char¬ acter of every operation to be performed but must employ new operatives in conformity with technically correct ((job specifications® for all classes of help required. To assure the best results in hiring, all applicants should be care¬ fully interviewed as to domestic relations and individual responsibilities as well as to records of previous employment. While employment managers differ in their opinions regarding the value of references, the data supplied by a statement of previous employment usually af¬ fords an illuminative record of the man's ac¬ complishments and most authorities are agreed that knowledge regarding an applicant's per¬ sonal responsibilities is important in preventing the possible hiring of men for ((jobs® paying a smaller wage than that on which they are accustomed to live, as men employed at less than they have previously earned are likely to regard the place as a make-shift rather than a permanent position. The opinions of employ¬ ment men also differ regarding the value of character analysis based upon personal appear¬ ance or psychological tests, although there is a general agreement that tests are advantageous in the case of operatives who are to perform tasks requiring certain well-established quali¬ fications.

3. Examination of Applicants. — Many im¬ portant concerns now require a physical exami¬ nation of applicants before actual employment, not only as a safeguard against conditions for which the firm might be held responsible under the compensation laws (such as hernia, etc.), but also as a protection for other employees against possible infection.

4. Introduction of New Employees. — The introduction of the newly employed worker also devolves upon the employment department. If the employee is a ((learner,® he is introduced both to the instructor and to other members of the <(school® ; if a skilled, or semi-skilled, operative, to the foreman and the operatives working near him. An ˆintroduction® must also include an explanation of the policies and regulations of the concern, a description of its welfare activities and full information regard¬ ing the location of such important points as the emergency hospital, lunchroom, lockers,. wash¬ rooms and toilets, stockroom, etc. Lasting im¬ pressions of a plant are frequently gained dur¬ ing the first days of employment and an intro¬ duction which shows a personal interest in the welfare of a new employee is of incalculable value.

5. Following up Employees' Performances.

— The work of following up the performances of new employees is one of the most import¬ ant functions of employment management. In the schools, it assumes the responsibility of determining when the "learner® has attained a sufficient degree of efficiency to graduate as a skilled operative ; with all operatives, the "follow-up® covers such tangible evidences of efficiency as: (a) General conduct; (b) Earn¬ ing capacity from week to week; (c) Absences and tardiness; (d) General health and acci¬ dents; (e) Regular ratings as to efficiency in:

(1) Workmanship, covering both quantity and quality of product as well as record of waste;

(2) Reliability and industry; (3) Attitude to¬ ward work.

A record of this character is of great value to the employment director in many ways. It enables him to see that "learners® are trans¬ ferred to regular "jobs® as soon as they are capable of assuming greater responsibilities ; it supplies the information from which a careful study of the average earnings of the employees can be made, both as a check upon possible decreases in productive ability of the individual worker and as an indication of rate-changes, transfers or promotions that may have become desirable. From this record may be secured the facts regarding tendencies toward absences and tardiness that require further investigation.

6. Investigations. — Much of the success in employment management depends upon the thoroughness of the department's investigations. All instances of chronic tardiness should be investigated and, if possible, a means should be found to remedy this defect. Absences must also be investigated and in each case a record should be made of the causes. In cases where the absence is due to illness, injury or personal troubles, advice can often be given and material , assistance afforded, and where the failure to report is the effect of a misunderstanding that has inspired the desire to "quit,® a personal in¬ terview at this early stage in the withdrawal is frequently the means of adjusting the differ¬ ences and saving a valuable employee.

7. Arrangement of Transfers. — Transfers in an industrial plant usually are made for one of two reasons: (1) Because an operative has been found capable of assuming greater re¬ sponsibilities, and (2) because an operative has failed to "make good® in one "job® but is to be given a chance to perform a different task for which he seems to be better fitted.

The practice of filling the higher positions by pro¬ motion has proved so valuable in developing an espirit de corps that this rule should never be violated except in cases where there is no mate¬ rial available within the plant, while the plan of transferring the more inefficient operatives instead of discharging them has been proved to be a valuable change in practice by many important concerns. It is one of the vital func¬ tions of employment management to see that promotions are given to those deserving them and that the "misfit,® who may be nothing worse than a round peg in a square hole, is put where he may perform effective service.

8. Power of Discharge. — In plants where the hiring and placing of workers is delegated to an employment department, the final dis¬ charge of an operative becomes one of the func¬ tions of employment management. In concerns

where this rule is in force the authority to dis¬ charge unconditionally does not rest with the foreman. A foreman usually is given the privi¬ lege of saying when a man shall not continue to work in his department but the authority to decide that an operative shall not be permitted to work in any other part of the plant is dele¬ gated to the employment manager, subject, of course, to the approval of the plant manager.

To perform these duties successfully and without weakening departmental discipline re¬ quires that all cases shall be handled diplo¬ matically and each case upon its own merits. In fact, where these methods are pursued, the employment manager becomes a man who sits in judgment upon all questions of differences between the employees and their superiors, who is entrusted with the important duty of seeing that the foreman is protected in the exercise of all just methods of directing his help and that every employee is assured a square deal.

9. Maintaining the Reputation of the Firm. — If a desirable class of employees is to be obtained and retained it is necessary that the concern should have a "good name® among the workers. While the wages paid, the hours of labor and other conditions that depend upon the policy of the management, have a great deal to do with the development of the reputa¬ tion of the firm, fully as much depends upon the character of the employment management, as it is essential that both applicants for "jobs® and those actually working in the plant shall be pleasantly impressed by the treatment they receive at the hands of the employment depart¬ ment. This means (1) All applicants must be handled promptly and treated courteously, ap¬ plications being taken and filed for future ref¬ erence where there are no positions to be filled ; (2) Employees shall invariably be treated cour¬ teously and justly and shall be advised and assisted in every way practicable; (3) Even those who are discharged, or who are leaving the

concern because of dissatisfaction, shall be treated so fairly and courteously that they will go away with as agreeable an impression of the firm as possible.

10. Management of Welfare Activities. —

The various welfare activities of the firm, in¬ cluding those of a social and educational char¬ acter, also come under the direction of the em¬ ployment department. See Industrial Welfare.

11. Keeping Labor Records. — In order that these various functions may be performed effectively, it is necessary that a system of de¬ partment records shall be adopted and care¬ fully kept. These include records of (1) Ap¬ plications for employment and data regarding condition of labor-market. (2) Employment cards, containing such information as: Name and address, date of application, place and date of birth, date of arrival of foreign-born immi¬ grant, degree of education, language spoken, domestic condition and record of previous em¬ ployment. (3) Physical examination. (4) Daily report of those tardy and absent, with causes. (5) Industrial progress of the indi¬ vidual worker, with special attention to progress of "learners.® (6) Labor turnover sheet, de¬ tailing the number "quitting® or discharged both by departments and "jobs,® with such facts as (a) reasons for withdrawal, (b) length of serv¬ ice, etc. See Labor Turnover.

In plants where these methods have been

adopted there has been a marked improvement in the personnel, a reduction of the labor turn¬ over and general stabilizing effects that have been clearly reflected both in the quality and the quantity of product.

John R. Meader.

EMPORIA, Kan., city and county-seat of Lyon County; on the Neosho River near its junction with the Cottonwood, in the central part of the State, and on the Missouri, Kansas and Texas, and a division point of the Atchi¬ son, Topeka and Santa Fe and other railroads; 60 miles southwest of Topeka. It is the com¬ mercial centre for a large section of country devoted to farming and dairying and to the fat¬ tening of western range cattle for the eastern market. Emporia has a thriving jobbing and export trade and some manufactures, including marble and iron works, carriage and canning factories, woolen mills, corrugated metal works, and flour and grist mills. It has three banks, with a combined capital of over $250,000

and doing a large annual business and daily and weekly newspapers. Gas is served by a private company, and the waterworks and electric¬ lighting plant are owned and operated by the city. Emporia is the seat of the State Normal School (2,000 students), and of the College of Emporia (Presbyterian), and the Western Con¬ servatory of Music, and has a business college, railroad and public libraries, nine school build¬ ings, 11 churches, and many handsome busi¬ ness buildings and private residences. It is the largest town in Kansas that never has permitted a saloon to open within its limits since the pas¬ sage of the prohibitory law iri 1880. The city adopted the commission form of government in 1910. Emporia was founded in 1856 by P. B. Plumb, afterward United States Senator, and a group of pioneers from the Middle States; it was incorporated in 1870. Pop. (1920) 11,273.

EMPYEMA, em-pi-ema, a collection of pus consequent on pleurisy. True empyema is pus secreted from the pleura; the false, when an abscess of the lung bursts into the cavity of the chest. When the quantity of fluid is so large as to cause great dyspnoea and endanger life, it must be let out by tapping the chest.

EMPYREAN, a word used by the ancient Greek philosophers to designate the highest region of the heavens, where the purest and most rarefied elements of fire and light exist; and by mediaeval poets to indicate the ninth heaven, the home of the blessed. In modern poetry the empyrean is merely the over-arching dome of the heavens.

EMPYREUMA, em-pi-roo'ma (Gr. «a live coal preserved in ashes®), the smell acquired by organic matter when subjected to the action of fire, but not enough to carbonize it entirely. The products of imperfect combustion, as from wood heated in heaps or distilled in close ves¬ sels, are frequently distinguished as empyreu- matic.

EMS, emz, Germany, a celebrated water¬ ing place in the Prussian province of Hesse- Nassau; on the river Lahn. The environs are beautiful. As early as 1583 it was a town of resort as a watering-place. The mineral waters at Ems are warm — from 70° to 133° F. ; they are of the saline class, containing large quanti¬ ties of carbonic acid gas, and are used with

much effect in chronic catarrhs, pulmonary complaints and some other diseases. The his¬ tory of the town dates back to the 9th century, and the lead and silver mines have been worked a number of years. Since 1865 the fame of the springs has overshadowed its industrial and trade advantages. It was here that the memor¬ able interview between the king of Prussia and the French ambassador, Benedetti, took place which formed the prologue to the Franco-Prus- sian war of 1870-71. Pop. 6,519.

EMS, river of Germany, which rises at the southeast extremity of the Teutoburger-Wald, in Lippe-Detmold, flows northwest through Rhenish-Prussia and Hanover, and into the Dollart, near Emden ; length about 210 miles. It drains an1 area of about 4,600 Square miles. Its chief affluents are the Aa, the Haase, the Hessel, and the Leda, all from the east. It is navigable as far as Papenburg for light ves¬ sels, but it supplies water to numerous canals, which are used for both irrigation and naviga¬ tion. In 1818 it was connected by a canal with the Lippe, and thus with the Rhine and its im¬ portance has been greatly increased \>y the open¬ ing of the Dortmund-Ems and othˆr canals.

EMS DISPATCH. The historical designa¬ tion of the communication which precipitated the Franco-German War of 1870-71. The his¬ tory of the famous Ems telegram, with the texts of the original dispatch, is as follows :

Isabella, Queen of Spain, deposed in 1868, formally abdicated 25 June 1870, and the Span¬ ish throne was thus left vacant. On 5 July the foreign governments were notified, and the fact was generally made known that Prince Leopold of Hohenzollern, evidently with the approval of the King of Prussia, had consented to be¬ come a candidate for the vacant throne. The announcement created intense excitement in France. Seven days later the withdrawal of Prince Leopold's candidacy was made public.

The next day, 13 July, the French ambassa¬ dor, Count Benedetti, forced himself upon the presence of the King of Prussia at Ems and insisted that the king make a formal and spe¬ cific declaration that no Hohenzollern Prince would be permitted to accept the throne of Spain. The king declined to listen to such de¬ mands and broke off the interview. When the account of what happened was sent to Bis¬ marck, it was with permission to ((use® it. Bis¬ marck used it by giving to the press abridged features of the French demand, with the result that the Germans were inflamed against France, France declared the nation insulted, and war was declared. The details are shown in the texts, which follow :

This is Abeken's telegram of 13 July 1870 to Bismarck :

((His Majesty the King writes to me: (Count Benedetti caught me on the Promenade and importunately requested me to authorize him to send a telegram at once saying I bound myself not to consent to the Hohenzollern can¬ didature should they recur to it at any future time; this I declined, and rather sternly at last. One cannot enter a tout jamais into such an en¬ gagement. I, of course, told him that I had no news, but as he got his from Paris and Madrid sooner than I did, he must understand that my government was taking no part in the matter.5

<(Since then his Majesty has received a letter from Prince Karl Anton. His Majesty had in¬ formed Count Benedetti that he was expecting news from the Prince, but, having regard to the above reasonable demand, his Majesty resolved, on the advice of Count Eulenburg and myself, not to receive Count Benedetti again, but merely to send him a message by an adjutant to the effect that his Majesty had now received from the Prince the confirmation of the news which Benedetti had already received from Paris, and that his Majesty had nothing further to say to the ambassador. His Majesty leaves it to the decision of your excellency whether this new demand of Benedetti and our refusal to comply therewith should not be forthwith com¬ municated to our ambassadors and to the press.55

As issued by Bismarck, the telegram read as follows :

<(After the news of the renunciation of the Prince of Hohenzollern had been officially com¬ municated by the Spanish government to the French government, the French ambassador in Ems nevertheless demanded that his Majesty should authorize him to telegraph to Paris that his Majesty pledged himself for all future time never again to give his consent to the Hohen-zollerns resuming their candidature. His Majesty has thereupon declined to receive the ambassador again and has informed him through the adjutant that he has nothing further to communicate to the ambassador.®

Consult Barrett-Lennard (Mrs.) and Hoper (M. M.), Bismarck's Pen: (The Life of Hein¬ rich Abeken) (London 1911).

EMSER, em'zer, Hieronymus, German Roman Catholic theologian : b. Ulm, 26 March 1472; d. Dresden, 8 Nov. 1527. In 1502 he be¬ came professor at the University of Erfurt, where Luther is said by him to have been among his pupils. In 1504 he established him¬ self at Leipzig, where he also lectured at the university. He served as secretary to Duke George of Saxony, who sent him on a mission to Rome, in order to obtain the canonization of Bishop Benno of Meissen. With Luther and the theologians of Wittenberg generally he was on good terms until the disputation of Leipzig in 1519, from which time he made, in union with Dr. Eck, incessant endeavors to oppose the increasing influence of Luther and the progress of Protestantism. The German translation of the Bible by Luther was attacked by him as errone¬ ous, whereupon it was forbidden in Saxony by Duke George. Emser then himself published a translation of the New Testament into German, made from the Vulgate (1527). He also wrote (Vita S. Bennonis,5 as he ascribed to Saint Benno his recovery from

a severe sickness.

EMU, the only representative of the fam¬ ily DromaiidcB, and with the cassowaries the Australian representatives of the order Struth- iones. In size the emu ranks between the African ostrich and the rhea of South America, the African bird being seven feet in height and the emu five. In general appearance and form it is more bird-like than either of the others. Like the cassowary of northern Australia, its head and neck are feathered, and the back is gracefully arched. Its body is covered with a rich brownish plumage. With the rhea and cas¬ sowary, it has three toes on the foot,' while the African ostrich has but two. The emu is a-bird

of the plains, where it feeds upon fruits, herbs, and roots. The nest is scooped in the sand, and the number of eggs is six or seven, of an attractive green, each measuring five inches in length. The feathers have no ornamental value, and the flesh is eaten only by the natives. Coursing the emu has been carried to such an extent that the birds of New Holland, once spread throughout the whole continent, are now in many parts exterminated. It is valued by the natives chiefly for the fat beneath the skin which contains great quantities of oil. The emu utters a faint booming noise and sometimes a shrill piping note. In confinement it is found to be tractable, and is readily tamed.

EMUCKFAW AND ENOTACHOPCO, Battles of, in the War of 1812. After the battle of Talladega (q.v.), the volunteers mutinied and on 10 Dec. 1813 demanded their discharge, but on 14 Jan. 1814 Jackson was re¬ inforced by 900 sixty-day militia and therefore decided to co-operate with Gen. John Floyd (who had recently won the battle of Autessee, aiming at Emuckfaw, a town 40 miles north of Tuckaubatchee (q.v.). On 20 January with 930 militia and about 200 Creeks and Cherokees, he camped on Enotachopco Creek, 12 miles from Emuckfaw, where on the morn¬ ing of the 22d he was attacked by the Indians but repulsed them with great slaughter and drove them nearly two miles from the field. On the 23d Jackson began the return journey to Fort Strother but the next day, while crossing Enotachopco Creek, the Indians attacked and threw his force into disorder, many of the troops fleeing. But Colonel Carroll with 25 men maintained their ground and, rallying the fugitives, Jackson soon turned defeat into vic¬ tory.ˆ His loss in the two fights was 24 killed and 71 wounded, and that of the Indians 200 dead and many wounded. On 27 January he returned to Fort Strother where he remained until the battle of Horseshoe Bend (q.v.), Floyd in the meanwhile having fought the bat¬ tle of Tuckaubatchee (q.v.). Consult Adams, Henry, VII, pp. 247- 249) ; Fay, H. A., (Official Accounts5 (pp. HO¬ DS) ; Lossing, (War of 18125 (pp. 773-777) ; Wiley and Rines, (The United States5 (Vol. V, pp. 452-453) ; biographies of Jackson by Parton (Vol. I, pp. 487-494), Buell (Vol. I, pp.

318- 321), Frost (pp. 205-223).

EMULSIN (/3 — glucase), a mixture of closely related enzymes which hydrolyze the Q- glucosides. It contains a /J-glucase proper, a cyanase, an amygdalase and a lactase. It is found in many seeds and especially in the bitter almond, but also in the sweet almond and the kernel of the cherry pit. The addition of a small amount of water to this seed develops the characteristic reaction and the formation of the oil of bitter almonds, containing the deadly poison prussic acid in solution. Emulsin is ex¬ ceptionally wide in its action, owing probably to its compound nature. But it is commonly con¬ sidered as a unit, and a specific enzyme for ($- alkyl glucosides ; and all glucosides which are hydrolyzed by it are regarded as derivatives of /J-glucose. Some of its properties are erratic : it hydrolyzes isomaltose, but synthesizes glucose to maltose. Emulsin hydrolyzes the natural glucosides : aesculin amygdalin, androsin, arbu- tin, aucubin, bankankosin, calmatambin, coni-

EMU (Hippalectryo Uniappendiculatus)

t

♦

— »

‘

ferin, daphnin, dhurrin, gentiopicrin, helicin, in- carnatrin, indican, mandelonitrile glucoside, meliatin, oleuropein, picein, prulaurasin, salicin, sambunigrin, syringin, taxicatin and verbenalin, and the synthetic #- glucosides.

Emulsin is prepared by digesting the oil-free pulp of ground sweet almonds with a little tolu¬ ene or chloroform for several hours, generally overnight. The whole is then put into a cloth bag and the liquid pressed out. This is treated with acetic acid, drop by drop, until the protein has been all precipitated. The clear liquid is treated with alcohol in repeated small quanti¬ ties until no more precipitate falls. Pouring off the liquid the precipitate is hurriedly washed with absolute alcohol and ether to remove all moisture. It is then thoroughly dried in a vacuum to a soft white powder. Consult Arm¬ strong, E. F., (Lactase, Maltase and Emulsin) (London 1912).

EMULSION, the term applied to those preparations in pharmacy in which oily sub¬ stances are suspended in water by means of gum, sugar, carrageen, etc., called emulsifiers. In general it will be found that the bulk of the . emulsifier must first be taken, while the oil should only be added little by little, rubbing together in a mortar, and taking care that it is completely absorbed or emulsified before further additions. Should too much be added, the effect is to throw out most of what has already been incorporated; it is then practically impossible to remedy the error. The emulsion of cod-liver oil is familiarly known. Milk and the yolk of eggs are natural emulsions. The name is also given to suspensions in water of certain in¬ soluble substances, such as resins. These be¬ ing reduced to impalpable form are mixed with a syrup of gum or sugar, or other viscid fluid thick enough to prevent their settling. A familiar instance of this form of emulsion is common coal tar, which appears black because of the particles of free carbon suspended in the colorless pitch.

. ENAMBUC, a-non-buk, or ESNAMBUC, Pierre, French navigator: b. Dieppe about 1570; d. Saint Christopher, W. I., December 1636. Being of an adventurous spirit, he sailed from Dieppe in 1625 in a brigantine of eight guns, for the Antilles. He landed in the island of Saint Christopher on the same day with a party of English colonists, with whom he divided the island, and, until his death, held the French half of the colony with extraordinary tenacity. In 1635 he took possession of Martinique, in the name of the king of France, and founded the town of Saint Pierre (q.v.).

ENAMELS AND ENAMELING. The

term enamel is used for certain siliceous com¬ pounds employed for coating metals. They are, in every sense of the word, glass, either trans¬ parent, opaque, white or colored. The art is a very ancient one, some claiming it originated with the Scythians, who are said to have in¬ troduced it into China during the reign of a certain Emperor Tha'iwonti, but India was ac¬ quainted with the art before China. Extant evidence exists that the ancient Egyptians, Phoenicians and Assyrians used enamel coating in the decoration of jewelry, and of the clay beads and scarabs of the Nile-dwellers in our museums many are covered with colored glass. The subject of enamel work on the precious

metals is discussed in another article (see Art Enamels), so we will confine this article to the technical side of enamel production and the industrial utilization of enamel.

Raw Materials. — The ingredients used in the production of the different kinds of enamels are felspar, quartz, fluorspar, borax, boric acid, soda, potash, saltpetre, cryolite, clays, ammo¬ nium carbonate, stannic oxide

and water. The coloring agents used are cobalt oxide, limonite, iron oxides, chromic oxide, cupric oxide, etc. The felspar composition most desirable con¬ sists of siliceous earth 65 per cent, alumina 18 per cent, alkalis 16 per cent. For the creation of white enamels it is essential that the felspar shall be as free from iron oxide especially, as possible. Quartz must be pure but it is fre¬ quently replaced beneficially with a 'fine white river sand, which is pure quartz. Fluorspar or calcium fluoride of the purest quality only can be used, for white enamels especially. The borax needed for enamels is of the monoclinic system of crystallization (containing 10 mole¬ cules water of crystallization) not the octahe¬ dral crystals regular system, which contain only five molecules water. It is used as a flux or accelerator of fusion. Boric acid functions the same as borax but the former is more fre¬ quently used than the latter. Soda and potash have identical action in enamels and their pres¬ ence heightens the lustre if it is not used too freely. The soda of commerce, being cheaper, is mostly employed ; it is first calcined to obtain its anhydrous condition, then finely powdered. Saltpetre (nitre) used is the sodium variety, be¬ ing cheaper than the potassium salt. It is used chiefly to decolorize ; little or none at all is needed in the blue enamels. Cryolite used in the pnamel industry may be either the natural or the artificial. This sodium-aluminum-fluoride is utilized for its double reaction of acting as flux and creating opalescence. Ammonium car¬ bonate is supposed by some to be a valuable in¬ gredient to inhibit cracking or crazing of the enamel in firing on account of its making the substance more uniform. Some authorities, however, declare its use a waste of money and useless. Stannic oxide is expensive, with the present prices of tin but its use continues as a necessity after many attempts with substitutes. Care must be taken in maintaining the purity of the metal while in the oxidizing process or small black spots will appear in the baked enamel from impurities or may occur from particles of metal not having become oxidized. This chemical produces perfect opacity, . which antimony substitutes do not, unless sufficient be used to cause 'other defects. The poisonous character of antimony has also caused its use to be forbidden in many countries. Lead oxide lends a wonderful brilliance to enamels; it acts also as a flux of great power. The lead oxides were formerly used considerably on earthen¬ ware utensils to assist the glaze, but long since they have been eliminated by law on account of their poisonous nature, their solubility render¬ ing ihem extremely injurious when used on vessels for cooking, or even containing, food¬ stuffs. The use of the lead oxides is, there¬ fore, restricted to the glazes of ornaments and art work.

Coloring Matters. — Cobalt oxide affords an intense blue color when used in strength and can be reduced in tone in lesser proportions.

Aside from its use in pigment cobalt oxide has the physical value of adhesiveness to sheet iron through its coefficient of expansion being the same as sheet iron. It, therefore, forms an ideal ingredient for the enamels used in cooking utensils. Perhaps it is here necessary to the uninitiated to state that one of the first require¬ ments in an efficient enamel body is that it shall adhere to the metal under the stress of changes of temperature. On account of the high cost of cobalt nickel oxide is much used, through its considerably lower price. Limonite is a per¬ oxide of manganese (called also pyrolusite) and is used in enamels to bleach out any impurity of tone in the white enamels. Additional propor¬ tions will produce dark violet (the noted manganese violet of the ceramist) and mix¬ ing a proportion of iron oxide with the limonite gives beautiful brown to black effects. Limo¬ nite in small proportions is sometimes blended with the more costly cobalt, producing a red¬ dish blue of much brilliancy. Ferric oxide may be prepared to produce either a bright red or a reddish violet pigment according to the amount of heat applied in its manufacture. Chromic oxide produces a green enamel and cupric oxide gives a dark-green and a bluish-green ; again a bluish-green can be obtained by a combination of copper and cobalt salts or chromium and copper salts, varying from bluish-green to greenish-blue according to their equivalents in the mixture. The salts of chromium, cadmium, uranium and titanium can each be used in ob¬ taining yellow enamels. Ferrous chromate produces a lovely brown ; it is called Brongniart's brown, after the great French ceramic chemist. Nickel is used in obtaining a gray enamel. The salts of gold produce a beautiful rose enamel as well as the loveliest pink. But a far less expensive pink is produced by chalk, quartz, stannic oxide, borax and bichromate of potash mixed and heated to a frit, the pigment being dissolved in water to separate it from the solids. Antimony produces several yellows in¬ cluding the noted Naples yellow (lead anti- monate) of the art porcelains ; they are, how¬ ever, poisonous and forbidden in food utensils.

Enamel Manufacture. — In the mixing oper¬ ations only absolutely trustworthy operators are employed. The working formulae are kept strictly secret from all but the highest officials. From this point our description will be devoted to practices applied in the sheet iron and steel enamel industry. Every ingredient has to be dry and the degree of pulverization cannot be too fine to obtain a homogeneous enamel. The same care and time has to be given to the process of mixing the different ingredients. The French machine (melangeur) does very effective work. The various chemicals are kept in separate bins, and, in order to maintain secrecy, each ingredient is known only under a letter or number. Taking the raw material from the bins it is loaded into small cars termed ˆdollies,® which are loaded to a height approximating the quantity, then run on to a scale and weighed and

the excess shoveled back or fresh added. The precaution is taken to have the scale beam and its graduation marks invisible to all but the person presiding over the work. With the completion of loading all the dif¬ ferent materials in correct proportions in their individual Mollies® the material is mixed on a hard maple floor of the machine. First comes

*the coarser material at bottom, the finest on top. The mixture made, it is hoisted by an electric elevator and run to its bin and the process is renewed in preparing the next kind of enamel, again to be stowed in its special bin. By means of a traveling bucket holding the cor¬ rect amount for a melt the mixed raw material (about 1,200 pounds) is carried to the blast furnace (rarely a crucible furnace). The kind of furnace common in American use is the same that is used in the manufacture of glass and is heated with natural gas or crude oil as the most economical fuel, though coal is used in the older factories. The furnace temperature has to be very carefully regulated as insufficient heat produces a slow melt liable to create a de¬ composition, whereas too high a degree may create combustion or some chemical reaction injurious to the outcome. Some authorities place 1,000° C. for a glaze heat and about 1,300° C. for a ground coat. Control over the heat is permitted by the installation of pyrome¬ ters. A furnace can afford from seven to eight melts in 24 hours. As the ingredients fuse separately according to their different melting points great care has to be taken that the mixed mass be kept stirred lest they separate. The length of time needed for the smelt differs ac¬ cording to the enamels, a white fusing well at two hours while ground enamels and blues take from two-and-a-half to three hours, and so forth. The enamel is now a liquid glass, in which state it is drawn off by releasing a fire¬ clay plug located in the front of the furnace. The molten body flows into a tank of cold water and, with noisy reaction, the vitreous liquid is torn into shreds and small pieces with explosive violence, leaving minute fissures throughout the substance. Besides toughening the enamel body this so-called ˆquenching® as¬ sists in easing the next process, which is grind¬ ing. This grinding cannot be too fine, in fact the finer the resulting impalpable powder the brighter the resulting lustre of the enamel. The suddenly quenched glassy mass is known as a *f rit.® During the grinding other materials are added, such as stannic acid for creating an opaque white, or pigments for the different colors. About 30 hours is required for grind¬ ing in the large ball mills. The latter are cylindrical, about five feet in length and have a diameter of about six feet, and are lined with porcelain bricks. To the frit, which should re¬ tain about 50 per cent of water, is added a small percentage of white ball-clay. About 2 per cent zinc oxide improves a white. The clay addition is made to help hold the other ingredi¬ ents in suspension, hindering them from sub¬ siding according to their specific gravities; it also creates opacity, increasing at the same time, the needed quality of elasticity of the enamel. Other*

additions are added in proportions in ac¬ cord with the secret formulae, such as sal-am¬ moniac, ammonium-carbonate, magnesium- chloride, burnt magnesia, chloride of sodium (table salt), borax, soda, etc. The ground mass should reach the consistency of a rich cream, when it is poured into tanks and left to mature for a week or more.

Formulae.— A German formula for a white enamel is (in kilogram equivalents) borax, 132; quartz, 152; felspar, 130; soda, 26; salt¬ petre, 6; cryolite, 78; fluorspar, 3 ; magnesia, 6. An aeid-resisting enamel white is borax, 74;

felspar, 100; quartz, 115; cryolite, 47; stannic oxide, 40; fluorspar, 6; soda. 20; saltpetre, 10; magnesium carbonate, 1 ; pure powdered glass-meal, 53; clay, 12; calcspar, 6. A blue enamel formula is borax, 60.0; alumina, 3,6; felspar, 101.0; soda, 6.2 ‘ natural cryolite, 24.0; salt¬ petre, 3.0; fused enamel fragmentary, 40.0; cobalt oxide, 3.0; limonite, 0.3; ferric oxide, 0.1. A black fused enamel formula is borax, 62; felspar, 120; soda, 14; ferric oxide, 8; cobalt oxide, 2; smalt, 16; limonite, 16.

The Metal and Treatment. — In the pro¬ duction of steel enameled kitchen utensils the metal should be as free as possible from sul¬ phur, carbon, silicon or phosphorus and with a general manganese content of about 0.2 per cent. The sheets (oblong or square) run from 27 to 20 gauge. Applying as little heat as pos¬ sible, they are circled, stamped and spun, using a lubricant that is eas-ily eliminated. A pick¬ ling process must, of course, cleanse the metal from impurities before the shaping is done. The additional trimmings (ears, handles, etc.) should be welded on because the enameling of riveted parts is a difficult process.

The Enameling Process. — The operation as carried on in American factories is clearly described by R. D. Landrum, an expert. This work starts in the ((dipping room,® where the liquid enamel is placed in tanks of dish-pan form sunk into tables. The operator, called a <(slusher,® dips the stamped steel vessel (which has been previously cleansed of all grease and impurities) into the enamel. Coming out of the immersion the vessel is covered with a film of the w-et enamel, any drip or excess is elimi¬ nated by the slusher gently swinging the object, when it is placed, bottom down, on three metal points that project from a board. After several vessels are placed on the board it is set in a rack, and, when dry and the rack full, they are conveyed to the furnace room, where a bank of muffle ovens receives them. The temperature (about 1,000° C.) here fuses the minute

powdered particles of enamel together into a glass coating covering the entire vessel, a proc¬ ess requiring but three to five minutes. Other coats are added, as needed, over this ground coat. In a three-coat piece we wish, perhaps, three coats of white on the inside and turquoise- blue outside. The ground coat enamel having dried and been passed through the oven comes out almost black, from the cobalt and nickel oxides, and the piece is left to cool. The slush¬ ing room operator now gives the vessel an im¬ mersion in white enamel and adds a black <(bead® or edge on the rim. This second coat still shows up grayish as the first coat penetrates through after firing, so it is subjected to another dip at the hands of the slusher in the white enamel. A spray of blue-green enamel is applied to the outside, before drying, with the aid of a wire brush, or the more up-to-date machine which acts as an atomizer. The vessel is next dried and fired again in the oven, leaving turquoise blue spots outside on the white background. The next process is the assorting of the finished wares into ˆfirsts,® ˆseconds® and ˆthirds® or job lots, according to their perfection or de¬ fects. Imperfection in the cleaning of the original vessel may have caused minute spots to appear on the surface, due to rust or dirt. This defect can sometimes be remedied by filing the spots off, or subjecting them to a sand-blast.

and giving the vessel another coat of enamel. The discovery, or invention, of applying enamel coatings to metal ware such as kitchen utensils, bathtubs, etc., in the same manner as the bath tiles and earthen utensils which had been used by our fathers was indeed opportune, for the rising price of the metal had made the process of tinning so exorbitant that the industry was in real distress, with the certain prospect of the price of tin advancing to much higher pro¬ portions. The iron-enamel industry has ex¬ tended its lines into sanitary ware, hygienic im¬ plements, chemical apparatus and numerous other branches. The growth of the industry, starting principally in France and Germany on a large scale, has extended to the United States, all in the course of about 25 years. The Ger¬ man output, by 1909 already, was 90,000,000 kilos, employing a capital of near $15,000,000. In 1914 the industry in Germany and Austria-Hungary employed in the neighborhood of 60,- 000 wage earners. In the United States the (Census of Manufactures) (1914), gives us the following interesting statistics of the sheet iron and steel enamel industry. There were 270 factories, employing 28,731 operators. They produced goods valued at $68,979,005, and had a payroll of $15,242,586. Consult Gruenwald, J., (The Theory and Practice of Enameling on Iron and SteeP (translation by H. H. Hodgson, London 1909) ; id., (The Raw Materials for the Enamel Industry and their Chemical Technol- ogy) (London 1914) ; Landrum, R. D.,

Clement W. Coumbe.

ENARA, a-na'ra, or ENARE, a-na'ra, a lake in Finland; area, about 145 square miles. The outlet is Patsjoki River, which flows into the Arctic Ocean. A town of the same name, at the southwest extremity, is inhabited chiefly by fishermen.

ENAREA, e-na're-a, a country of the Gallas, south from Abyssinia, between lat. 7° and 8° N., and long. 35° and 37° E. In the valley of the Gibbi, immediately beyond Sakha, the chief town of the country, are extensive plantations of coffee, which, along with ivory, is largely exported. The inhabitants are the most civil ized of the Gallas, and show much skill in manufactures. Pop. about 40,000.*

ENARGITE, en-ar'jlt, a native sulphars- enate of copper, of which it contains 48.3 per cent. It constitutes an important ore of copper and is found in cleavable-granular masses, also in orthorhombic crystals. It has eminent pris¬ matic cleavage, a brilliant metallic lustre, and grayish-black color and streak. Its hardness is 3 and specific gravity 4.44. It is common in Chile, Peru, Mexico, South Carolina, Colorado, Utah, California and Montana.

*ENAULT, a'nd, Louis, French novelist: b. Isigny, Calvados, 1824; d. Paris 1900. He used the pen-name <(Louis Vermond.® He wrote many novels and books of travel, includ¬ ing among them, (1854) ; Constantinople et la Turquie> (1855) ; (Voyage en Paponie et en Norvege5 (1857) ; (La Mediterranee, ses iles et ses bords5 (1862) ; C'Amerique centrale et meridionale5 (1866) ; *Paris brule par la Commune5 (1871) ;*

(Valneige> (1887) ; (Le Chateau Jes anges) (1891) ; (Tragiques amours) (1891) ; (Jours d'epreuve) (1894) ; (La tresse bleue) (1896) ;

ENCiENIA, en-se'ni-a, or ENCENIA, a name given to the feast in commemoration of the dedication or consecration of Christian churches. In early times it was applied to the feast in honor of the founding of a city as well as in honor of the founding, or taking pos¬ session by dedication or consecration, of churches. The custom of observing the anni¬ versary of the consecration of a church or cathedral dates from the time of Constantine, when Christians were permitted more freedom of worship in the Roman territory; but the Jews before the coming of Christ solemnly ded¬ icated their tabernacles ; and in a certain sense, consecrated their houses of worship. The Christian ceremonies became very elaborate on these occasions and were disapproved and finally modified. The name is applied

also to commemorating festivals in honor of the founders and benefactors of Oxford and Cambridge universities. At Oxford University ˆCommemoration,® or ((Encaenia,® usually takes place the third Wednesday after Trinity Sun¬ day. The oration in honor of the founders and benefactors is given in Latin.

ENCALADA, an-sa-la'da, Manuel Blanco,

Chilean soldier and statesman : b. Buenos Aires, Argentina, 1790; d. Santiago, Chile, 5 Sept. 1876. He studied at Madrid, and in the Naval Academy at Leon, and after deserting from the Spanish ranks joined the Chilean rev¬ olutionary party, and served with distinction both in the artillery and in the navy. He be¬ came rear-admiral in 1819, and major-general of infantry in 1820; and in 1825 was appointed head of the army of Chile. He was for two months President of the republic in 1826, gov¬ ernor of Valparaiso 1847-52, and Minister to France 1853-58.

ENCAMPMENT, the military camp in its more comprehensive sense, including the occu¬ pants of the camp proper, as well as the phys¬ ical equipment collected and arranged to shel¬ ter and provide for them. In military parlance the shorter term <(camp® is used to embrace the whole significance of the term encampment — which therefore has lapsed to a greater or less degree into disuse, except among the romantic writers. See Camp.

ENCAUSTIC. See Mural Painting.

ENCAUSTIC PAINTING. See Paint¬ ing, Technique of.

ENCAUSTIC TILES, a species of orna¬ mental tiles made of a finer kind of clay than the ordinary tiles, but not so fine as porcelain. These are of two sorts : plain and figured. The plain tiles are sometimes square, but more fre¬ quently triangular and of different colors ; the latter shape renders possible a greater number of designs when the tiles are employed in a sort of mosaic work for the paving of churches, halls, etc. They are made by putting the col¬ ored clay into strong steel molds and subjecting it to a pressure of several hundred tons, by means of a plunger fitting accurately into the mold. The under surface of the tile is usually ribbed in order to afford a better hold for

mortar. The clay for figured tiles is pressed into an iron mold, the bottom of which is formed of a plaster of Paris pattern, bearing the desired design. The pattern being removed, the depressions on the surface of the tile are filled with colored clays, and the surface is then shaved to remove all superfluities and rugged¬ ness, leaving the pattern intact. The tile is then

dried for two or three weeks and finally fired by being exposed to an intense heat for 60 hours.

ENCEINTE, on-saiit, in military engineer¬ ing and in fortification, the continuous line of works which forms the main enclosure of a town or fortress. The term is also applied to the area within this line.

ENCELADUS, son of Tartarus and Gaea in Greek mythology; one of the hundred¬ handed Titans who made war against the gods. Jupiter slew him with a thunderbolt and burned him under Mount 2Etna. The name Enceladus was given to the second satellite of Saturn, discovered by Herschel 28 Aug. 1789.

ENCEPHALITIS, an inflammation of the brain proper which may be localized or dif¬ fused, and results from coexistent intoxications, or following any acute affection such as ulcer¬ ative endocarditis, rheumatism, mumps, etc. It is quite probable that many cases of acute encephalitis occur in children, resulting in the well-known picture of infantile hemiplegia. The symptoms are very indefinite. There is headache, vomiting, somnolence. There may be coma or delirium, the symptoms all pointing to acute inflammation of the brain. Acute enceph¬ alitis is usually fatal. In many of the insani¬ ties, as acute mania, delirium, dementia para¬ lytica, there is a form of encephalitis usually present. Localized encephalitis usually results in abscess. See Brain, Diseases of the.

ENCEPHALOCELE, en-sef'a-lo-sel, a hernia or a protrusion of a portion of the con¬ tents of the cavity of the brain through an opening in the skull beneath the skin. At least three different forms are described: Menin¬ gocele, when the dura mater alone protrudes from the cavity, forced out by the pressure of the cerebrospinal fluid ; hydrocephalocele, in which the tumor consists of an internal hydro¬ cephalus ; and encephalocele, which is made up of true brain-tissue with more or less fluid sur¬ rounding it. Most of these tumors are of con¬ genital origin, due to insufficient union of the bones of the skull ; a few are acquired later in life. Surgical procedure is the only efficient mode of treatment.

ENCEPHALON, the contents of the skull. See Brain.

ENCHANTER'S NIGHTSHADE, a

name common to plants of the genus Circcca, belonging to the family Onagracecc , of which there are three American species, C. lutetiana, C. Pacifica and C. alpina. The first is about a foot and a half high, and has delicate ovate leaves, small white flowers tinged with pink, and small roundish seed-vessels covered with hooked bristles. It abounds in woods

from Nova Scotia to western Ontario, south to Geor¬ gia and west to Nebraska. It is also called the bindweed nightshade. C. alpina, which is simi¬ lar but smaller and more delicate, is found in cold, moist shady woojg throughout the north-

ern hemisphere. Both plants are common in Europe and Asia. Neither has any affinity with the true nightshades.

ENCHASING, or CHASING, the art of

enriching, beautifying and finishing ornamental designs in raised work upon metal surfaces, especially gold and silver. When these designs have received their general form by casting or hammering they are ready for the skilled hand of the artisan and his chasing tools. These are of a great variety of shapes and sizes, fitted to correspond with the minute details of the most complex work. Some are grooved or checkered at the ends, and some of the gravers and burins are curved and blunt, while others taper to a needlepoint. The worker possesses a set of hammers, big and little, graded in size to suit any kind of tool. To offset his alternating task of punching and carving he employs sand bags upon which to rest his work. In order that the form of hollow articles may not suffer in¬ jury during the operations they are filled with a composition of melted pitch and brick dust or rosin. Articles in copper and brass are sometimes filled with lead to give them firm support within. Fine steel blocks are often used to the same end. Excellent specimens of chased work are seen in pieces of ancient armor, and in vases and other ornaments in gold and silver- plate. Among the most beautiful are those exe¬ cuted by Benvenuto Cellini (q.v.) in the 16th century. Bronze, richly wrought, has taken its place beside gold and silver work.

ENCINA, en-the'na, Juan del, Spanish dramatist : b. La Encina, Spain, 1469 ; d. there 1534. Little is known of his life; the probable facts are that he was educated at Salamanca, and in 1492 became a member of the household of the Duke of Alba, under whose patronage he began to write his plays. He was appointed maestro di cappella to Leo X at Rome, took or¬ ders and was ordained prior at Leon. His first volume of poems, (The Song-Book, > contained also a dissertation on (The Art of Castillian Poesy. > His lyrics are full of charm and lively wit. He wrote 14 dramas, eight of which are shepherd-plays or eclogues ; the rest are pieces for church holy seasons. It is to the former that he owes his position in Spanish literature, for these homely scenes were the first secular plays in Spain. He

made the Jerusalem pilgrimage, and described it in the poem (Tribagia; or, the Sacred Way of Jerusalem) (1521). He has been styled ((The father of the Spanish drama.® His dramatic works were edited by Asenjo Barbieri, in (Teatro Completo) (Ma¬ drid 1893) ; his lyrics by Francisco Asenjo Bar¬ bieri in (Cancionero musical de los siglos XV y XVP (Madrid 1894). Consult Diaz Jimenez y Molleda (Juan del Encina en Leon) (Madrid

1909).

ENCISO, en-the'so1, Martin Fernandez

de, Spanish geographer: b. Seville, about 1470; d. after 1528. He came to America in 1500; practised law in Santo Domingo and supplied funds to Alonso de Ojeda for the colonization of Tierra Firme, the region about the Isthmus 1509. Encisco followed in 1510 and founded the city Santa Maria la Antiqua del Darien. His soldiers revolting, he was arrested by Vasco Nunez de Balboa, and went to Spain, returning to Darien 1514 as alcalde, and opposing Balboa

till the latter's unjust execution by Pedrarias Davila at Darien 1517. He was the author of (Suma de Geographia, que trata de todas las partidas del mundo, > the first Spanish descrip¬ tion of America which touched upon the dif¬ ference in level of the two oceans.

ENCKE, eng'ke, Erdmann, German sculp¬ tor: b. Berlin, 20 Jan. 1843; d. 1896. He was a pupil of the Berlin Academy and of Albert Wolff, his first piece being a group entitled (A German Struggling With Two Gauls. He took a prize for the statue of Jahn in 1872, and was made professor at the Berlin Academy in 1883. His art was related to the school of Rauch, his temperament being at the same time realistic and poetical. Among his prominent works are a statue of the Great Elector, Fred¬ erick I of Brandenburg (Town Hall, Berlin) ; a colossal statue of Queen Louise of Prussia (Thiergarten, Berlin) ; and the sarcophagi of Emperor William I and Empress Augusta in the mausoleum at Charlottenburg.*

ENCKE, Johann Franz, German astrono¬ mer: b. Hamburg 23 Sept. 1791; d. Spandau, 26 Aug. 1865. He studied under the astrono¬ mer Gauss, at Gottingen ; during the war of liberation (1813-15) served as artillerist in the German army, and on the conclusion of peace was appointed assistant in the observatory of Seeberg, near Gotha. Here he calculated the orbit of the comet observed by Mechain, in 1786, by Miss Herschel in 1795, and by Pons in 1805-18. He predicted its return in 1822- 25-28, and with each reappearance more data were afforded for computing its exact orbit, which, it was calculated, required three and a quarter years to complete. By comparison of the times of its earlier and later appearances, Encke was

subsequently led to detect a gradual acceleration of its movement, amounting to about two and a half hours on each revolution. This acceleration he ascribed to a resisting me¬ dium, which sensibly affects the body of the extreme rarity of this comet, which is trans¬ parent to its centre. The fame of his two pub¬ lications (Die Entfernung der Sonne> (1822), and (Der Venusdurchgang von 1769) (1824), led to his appointment as director of the observa¬ tory of Berlin (1825), a position which he held till his death. Many of his works are contained in the (Astronomische Jahrbiicher) (1830-66), a publication during these years issued under his direction. His various scientific publica¬ tions were collected and published as (Gesam- melte mathematische und astronomische Ab- handlungen (3 vols., Berlin 1889) ; and (As- tronomische Abhandlungen* (3 vols., Berlin*

1868).

ENCLOSURE, or conventual seclusion of nuns who have taken solemn lifetime vows, is guarded very strictly by the laws of the Roman Catholic Church. The conventional seclusion of monks is less strict, the prohibition of con¬ verse with the outer world being in their case limited to the exclusion of women from the interior of the monasteries and rigid rules on the observance of silence. The Council of Trent forbids nuns to leave their convents, even for a short time, on any account whatever save for a legitimate cause — a cause specified in the law — with the approval of the local bishop. And no person from outside, male or female,

young or old, high or low, lay or clerical, is to be admitted within the clausura of a nunnery unless with leave in writing from the bishop or superior. By violation of this rule excommuni¬ cation is incurred ipso-facto. These rules, however, apply to regularly cloistered nuns, who take solemn life-vows of detachment from the world : they do not apply to the houses or con¬ vents of religious women whose work brings them in contact with the outside world, such as Sisters of Charity, o-f Mercy, Little Sisters of the Poor and the like. In such religious insti¬ tutes the spirit of the Tridentine law governs, not the letter.

ENCRATITES, en-kra'ti-tes (continentes , abstainers), a Gnostic sect of the 2d century, disciples of Tatianus, who was himself a dis¬ ciple of Justin Martyr, and, like him, author of an Apologia on behalf of Christian believers. Tatianus held that the material world is essen¬ tially evil, proceeding from the evil principle. For him marriage was sinful and animal

food an abomination ; he employed water instead of wine in the eucharistic rite.

ENCRINITES, en-kn-ni'tez, a division of fossil crinoids or so-called ˆstone-lilies8 distin¬ guished from the more common forms with angular stems (pentacrinites) by having stems whose cross section was circular or oval. The Derbyshire ((birdseye8 marble is noted for the vast numbers of encrinital remains it contains, the silicon skeletons appearing in the polished stone as if in relief. See Crinoid.

ENCYCLICAL (literce encyclicce) , a cir¬ cular letter. The word used in an ecclesiastical sense means a letter addressed by the Pope to all the bishops in the world who are in com¬ munion with him, in which he condemns errors prevalent in the world, or explains the line of conduct which Christians ought to take in ref¬ erence to practical questions pertaining to faith and morals. Pius IX was the author of a re¬ nowned encyclical which noted 80 prime errors in current thought. Leo XIII issued a large number of encyclicals on such questions as, rights of labor, education, marriage, Bible study, etc., and Pius X in 1907 condemned certain trends of modern thought and actions. An encyclical differs from a bull or brief, in that the encyclical is to the bishops of the whole world, treats of matter of universal interest and is of concern to the entire Church. A bull or brief is determined by circumstances, is of a special nature and may be of particular value only to some locality. There is a difference in the form of an encyclical from that of a bull or brief, — that is, in the seals used, the signatures and the introductory words;

ENCYCLOPAEDIA, CYCLOPAEDIA, or CYCLOPEDIA. This word, formed from the Greek en, in, kuklos, a circle, and paideia, instruction, but not a native Greek compound, originally denoted the whole circle of the vari¬ ous branches of knowledge which were compre¬ hended by the ancients in a liberal education (the artes liberales of the Romans). The dis¬ tinction between the words encyclopaedia and cyclopaedia is almost too trifling to be compre¬ hended. At a later period the word was ap¬ plied to every systematic view, either of the whole extent of human knowledge or of par¬ ticular depaitments of it. The want of such

general surveys was early felt ; and as knowl¬ edge increased they became still more desirable, partly for the purpose of having a systematic arrangement of the sciences in their mutual re¬ lations, partly for the readier finding of particu¬ lar subjects; and, for these two reasons, such works were sometimes philosophically, some¬ times alphabetically, arranged. The spirit of compiling, which prevailed in the Alexandrian School, soon led to attempts remotely allied to this, and Varro and Pliny the Elder, among the Romans, composed works of a similar kind.

The honor of undertaking encyclopaedias on a regular plan belongs to the Middle Ages, which produced not only a large number of cyclopaedias of particular sciences, called Swn- mce or Specula (for example, the 'Summa The- ologiae) of Thomas Aquinas), but also a Uni¬ versal Encyclopaedia, such as had never been seen before. The indefatigable Dominican, Vincent of Beauvais, about the middle of the 13th century, exhibited the whole sum of the knowledge of the Middle Ages in a work — or rather three works — of considerable size — a real treasure to the inquirer into the literary history of the Middle Ages. An exceedingly popular work was the (De Proprietatibus Rerum) of Bartholomeus de Glanvilla, an Eng¬ lish Franciscan friar, which maintained its repu¬ tation from the year 1360 to the middle of the 16th century. In the 17th century various en¬ cyclopaedic works were compiled, such as the Latin one of John Henry Alsted, Encyclopaedia vii Tomis distincta) (Herborn 1620), a work in which the subjects are divided into 7 classes, and treated in 35 books. In 1674 appeared the first edition of Moreri's (Le Grand Dictionnaire HistoriqueP In 1677 John Jacob Hoffman pub¬ lished at Basel his (Lexicon Universale, the first work of the kind in which a summary of art and science was presented in dictionary form. In 1697 appeared Bayle's famous (Dic- tionnaire Historique et Critique* (Rotterdam, 4 vols.), a work which is still of great value. Among the greatest works of earlier date would have been reckoned the Eiblioteca Universal of Coronelli, had it been completed according to the original plan. It was to have appeared in 45 folio volumes, of which only seven were published (Venice 1701-06). More successful, especially in being brought to a completion, was the (Grosses vollstandiges Universallexicon aller Wissenschaften und Kiinste) (Grand Universal Lexicon of all the Arts and Sciences), com¬ monly called Zedler's, from the person, a book¬ seller, who conducted it (Halle and Leipzig 1732—50, 64 vols.; Supplement 1751—54, 4 vols. folio). It has, on the whole, much merit. Lives of living men were included after volume XVIII.*

The transition from the ancient type to the modern occurred about the middle of the 17th century and originated in the desire to make books of this kind more easy of consultation. This changed the arrangement of the material by classified subjects to its alphabetical arrange¬ ment by key words, names or special topics. The encyclopaedia thus approached and was as¬ similated to the dictionary. The change was not confined to the form, for the alphabetical ar¬ rangement inevitably led to a change in the purpose and character of encyclopaedic compila¬ tion, viz., that from the exposition of the system

of human knowledge to the mechanical arrange¬ ment of its contents. In this line of its develop¬ ment the encyclopaedia became a work of reference in the strict sense of that word — a work for occasional use, in which any particular topic or item of information desired can be found under the proper word in an alphabetical vocabulary. This practical aim and this method have, however, been adopted by modern encyclo¬ paedists in varying degrees. On the one hand, there has been a tendency to approach more and more closely to the dictionary type by in¬ creasing the number and variety of the vocabu¬ lary words, and correspondingly subdividing the material contained in the book ; and, on the other, a tendency (traceable to the ancient sys¬ tematic type) to restrict the vocabulary and combine the material as much as possible under comprehensive titles. In its extreme form the former tendency has given rise to the modern <(encyclopaedic dictionary, w and the latter to en¬ cyclopaedias which are little or nothing but aggregations of monographs.

In practice, however, encyclopaedia makers incline more and more toward the adoption of the dictionary type, as better suited to the prac¬ tical needs of scientific and literary workers and as, in fact, essential to the adequate presen¬ tation of the vast accumulations of modern science, history and biography. An important characteristic of modern methods is the em¬ ployment of a large corps of specialists, both as compilers and as editors. In general it may be said that no good general encyclopaedia is now possible which does not include in its editorial staff a small army of men of science, historians, theologians, lawyers, and so on. The aim is to collect at first hand the special knowledge of the time and to present it in a manner that is acceptable to specialists. Lastly, the use of pic¬ torial illustrations — plates and diagrams and pictures in the text, which found a place in encyclopaedias at an early date — has been ex¬ tended and their quality improved.

The first encyclopaedia written in English and with the articles alphabetically arranged was the (Lexicon Technicum,) or a 'Universal English Dictionary of Arts and Sciences) (Lon¬ don 1704, 1 vol. folio), by John Harris, a Lon¬ don clergyman. This was a useful and popular work, though it omitted from its scope theology, biography, antiquity and poetry. It was re¬ printed in 1708 and a second volume was added in 1710. Among other important encyclopaedic works in English the following may be men¬ tioned: Ephraim Chamber's 'Cyclopaedia'; or a 'Universal Dictionary of Arts and Sciences > — a work published in 1728, in two volumes folio. A second and improved edition came out in 1738. Latterly it was revised and en¬ larged by Abraham Rees, in which form it was several times reprinted, being finally known as 'Rees' Cyclopaedia,' and published in a number of volumes. Then was published the 'Encyclo¬ paedia Britannica.' Of this there have been 11 editions. The first edition was

completed in 1771, in three volumes and the 11th edition was completed in 1910-11 in 29 volumes and an index volume. The (Edinburgh Encyclopaedia > (1810— 30, 18 vols.) was devoted particularly to the sciences and technology and was conducted by Sir David Brewster. The Encyclopaedia Met- ropolitana) (London, begun 1815, completed 1845, in 25 vols., was published in four divi¬

sions, according to a plan devised by the poet Coleridge). The (London Encyclopaedia,' by Thomas Curtis (22 vols.) and the (Penny Cy- clopaedia) (29 vols.), appeared in 1833-46. Chambers' 'Encyclopaedia' (in 10 vols.) was published in 1860 and a new edition appeared in 1902.

During the 19th century, the various branches of science and technology, history, biography, theology, commerce, politics, law, the fine arts, etc., are all admirably represented in special works ; the growth of the special encyclopaedia having kept pace with the advance of knowl¬ edge and of industry. Among the most import¬ ant are the encyclopaedias of biography. Some excellent examples of the special encyclopaedia date from the 17th and 18th centuries; but those produced in the 19th century are much more numerous and, in several cases, far more com¬ prehensive. The most notable of these later biographical works are the (Biographie uni- verselle ancienne et moderne) (85 vols., 1811-62, including supplement; 2d ed., 45 vols., 1842-65) of Joseph and Louis Gabriel Michaud; and the dictionary of National Biography' (66 vols., 1st supplement, 3 vols., 1885-1901 ; 2d supple¬ ment, 3 vols., 1901-11; republished in 22 vols.,

1913).

In the United States an early work in the general field was the Encyclopaedia Ameri¬ canaˆ edited by Francis Lieber and published 1st ed., 13 vols., 1829. (The American Cyclo¬ paediaˆ edited by George Ripley and Charles A. Dana, appeared in 1858-76 in 16. volumes. The publishers of this work from 1861 to 1905 pub¬ lished the (American Annual Cyclopaedia,' de¬ signed to record the progress of science and the arts, and the world's history from year to year, and to serve as supplements to the 'American Cyclopaedia. ' It is in the same form as that work, octavo, and comprises about 800 pages per volume. Johnson's New Universal Cyclo¬ paedia' first appeared in 1874-77, in four im¬ perial octavo volumes. It was especially strong in the departments of natural science — phys¬ ics, chemistry, mechanics, etc. — and American gazetteer matter. In its later form. 'John¬ son's Universal Cyclopaedia' (1893-95, 8 vols.), with a change of publishers, the work was thor¬ oughly revised, by a corps of 36 editors, under the direction of Charles Kendall Adams. Then followed (The International Cyclopaedia' (New York 1884), which was succeeded by (The New International Encyclopedia' in 20 volumes (1902; 2d ed., 24

vols., 1914), and later by the Encyclopedia Americana) (1st ed., 16 vols., 1903; 2d ed., 20 vols., 1906; 3d ed., 22 vols., 1910; new and enlarged edition, 30 vols., 1918; revised throughout, 30 vols., 1921).

Of the French cyclopaedias the most famous is the great Encyclopedic, ou Dictionnaire Rai- sonne des Sciences, des Arts, et des Metiers,' by Diderot and D'Alembert. This was pub¬ lished in 35 volumes 1751-80. Not only infor¬ mation was given in these volumes, but opin¬ ions of the most radical character, hostile to the Church, subversive of religion, intensely antagonistic toward everything in the old order of things. The clergy and the court had fought the work, had even broken into it with altera¬ tions secretly made at the printers', and left no stone unturned to prevent its circulation. Yet Europe was filled with it and shaken with the effects of it. It was an immense burst of every-

thing which journalism to-day means; a fierce prophecy of changes which are still pending; a wild proclamation of the problems of human aspiration and desire. Not only were the sciences pushed to the utmost by Diderot, but he made industry, labor, human toil in the shop, an interest unceasingly cherished. It was an explosion heralding the Revolution a quarter of a century later. Still more comprehensive is the (Encyclopedic Methodique, ou par Ordre des Matieres> (Paris 1781-1832, in 166ˆ4 vols.), an aggregate of dictionaries rather than a sin¬ gle work. The French have also the Encyclo¬ pedic ModerneP begun in 1824, finished in 1832, 26 volumes, and subsequently republished; the Encyclopedic des Gens du Monde) (1835-44), 22 volumes; Larousse's more recent and valu¬ able (Grand Dictiojinaire Universel du XIX SiecleP 16 volumes folio (with two supple¬ mentary volumes) ; Ea Grande Encyclopedic, > an extensive and excellent work which was completed in 1903, and (Dictionnaire encyclo- pedique universel, illustre de 20,000 figures, J edited by E. Flammarion and begun in 1895. Of works published in Germany the most fa¬ mous is Erockhaus' Conversations-LexikonP now in its 14th edition. It is equaled, if not surpassed, by the similar work of Meyer. The huge (Allgemeine Encyklopadie der Wissen- schaften und KiinsteP originally edited by Profs. J. S. Ersch and J. G. Gruber, begun 1818, is not yet completed. To 1916 168 volumes have been issued. Three sections of the alpha¬ bet are carried on simultaneously. Other Ger¬ man encyclopaedias deserving mention are those of Pierer and Spamer.

In Italian, the (Nuova Enciclopedia popo- lare) (14 vols., Turin, 1841-51) ; the (Diziona- rio universale di scienze, lettere ed artP (Milan 1874), by

Lessona and Valle; the En¬ ciclopedia popolare italiana) (ib. 1872), ed¬ ited by Giovanni Berri, and (Nuova enciclope¬ dia italiana> (25 vols., Turin 1875-88), are the principal. In Spanish Mellando published the Enciclopedia moderna) (34 vols., with an atlas) at Madrid in 1 848—5 1 . Another Spanish work of note is Montaner y Simon, (Diccion- ario enciclopedico Hispano-Americano de lit- eratura, ciencias, y artes) (25 vols., Barcelona 1887-99) ; the greatest of all such works in Spanish is the. new Enciclopedia Segui,) begun at Barcelona in 1907 and of which the vol¬ umes are still appearing. The Eiccionario popular historico, geographico, mytholog- ico, etc. > (16 vols., Lisbon 1876-90), by Chaga ; (Diccionario universal portuguez illustradoP by Zeforina, are the standard works in Portu¬ guese. Other works deserving of notice are Salmonsen's (Store illustrerede Konversations- leksikon) (19 vols., Copenhagen 1891-1911) in Danish; the (Geillustreerde encyclopedic: woordenboek for wetenschap en kunst> (2d ed., 16 vols., Rotterdam 1884-88) ; (Nordisk Fam- ilyebok) (Stockholm 1904-, 15 vols. to 1911) ; Entsiklopeditchesky Slovar) (41 vols., Petro- grad 1890-1904) and Encyclopedya Pows- zechna, etc. (16 vols., Warsaw 1898-1904).*

The rapid advancement of the sciences and arts and the proportionately rapid communica¬ tion between all civilized nations, have made a general acquaintance with many different branches of knowledge more necessary than ever before. This is one of the chief causes which have produced in our time so many en¬

cyclopaedias of various kinds, some very learned and others more adapted for the gen¬ eral reader; some embracing all the sciences and arts, others only single branches.

END-BRAIN, a name given to the front part of the brain, which corresponds to the fore-brain or telencephalon. See Brain.

END-ORGANS, important nerve-struc¬ tures specially designed for particular purposes. Thus the taste-buds in the mouth and tongue, the touch-bulbs in the fingers and the muscle- plates in the muscles are special forms of nerv¬ ous end-organs. There is a vast variety of nervous end-organs found in the special glands, such as the secretory glands of the skin, of the mucous membranes, in the liver, the spleen, the kidneys, etc.

ENDE, en'de, Hermann, German architect : b. Landsberg 1830 ; d. 1907. He studied at the Academy of Architecture at Berlin ; made a tour of Europe, during which he studied all the great models. At Berlin, with Bockmann, he erected the Red Palace, Royal York Lodge, the Bank of Commerce, the Ethnological Museum and the buildings of the Zoological Gardens. In 1866 he designed several public buildings for the city of Tokio,

Japan, at the behest of the Japanese government. From 1885 to 1901 he was chief professor in the High School for Technical Arts at Berlin. He was a member of the Berlin Academy of Arts and honorary member of those of Vienna and Saint Peters¬ burg.

ENDEMAN, en'de man, Wilhelm, German jurist : b. Marburg, 24 April 1825 ; d. 1899. He studied at Heidelberg and was professor of law at Jena 1862-66 and at Bonn in 1867. He was a member of the Reichstag 1871-73. His writings on German commercial law are highly esteemed. Among his works are (Die Beweis- lehre des Civilprozesses) (1860) ; (Der deutsche Civilprozess) (1878-79) ; (Die Entwicklung des Beweisverfahrens im deutschen Civilprozess)

(1895).

ENDEMIC (Gr. (

tries particularly, are peculiarly subject to in¬ flammatory disorders. In countries and districts very much exposed to currents of wind, espe¬ cially in mountainous places, we find at all seasons of the year rheumatism, catarrhs and the whole train of complaints which have their origin in a sudden stoppage of the functions of the skin. In large and populous towns we meet with the most numerous instances of pulmonary consumption. In cold and damp countries like England, Sweden and Holland the most frequent cases of croup occur.

Diseases which are endemic in one country may also appear in others and become epidemic if the weather and other physical influences re¬ semble those which are the causes of the en¬ demic in the former place ; the climate being for a time transferred, as it were, from one to the other. Endemic disorders in some circumstances become contagious, and thereby spread to other persons, and may be transplanted to other places, the situation and circumstances of which predispose them to receive these disorders. This is known by the migrations of diseases, the spreading of leprosy from Oriental countries to Europe, and the like.

It is favorable to the cure of obstinate dis¬ orders for the invalid to remove to a climate where his particular complaint is rare. Thus it is customary for people attacked with pulmonary complaints to remove to localities where the air is pure and dry and sunshine abundant. So it is of advantage to the consumptive to ex¬ change unwholesome city air for pure air in the country. Modern sanitation is learning to deal with conditions which, alike

in populous and sparsely peopled places, have hitherto bred dis¬ eases; so that immunity from fatal disorders may be said to show the good results of sanitary science, as do also the improved statistics of longevity.

ENDER, Eduard, Austrian painter: b. Vienna 1824. He is the son of Johann Ender (q.v.) and is noted alike for his historical and genre works, among which are (Francis I in the Studio of Cellini) ; (Shakespeare Reading <(Mac- beth55 before the Court of Elizabeth ; (La Cor- beille de Mariage) ; and (A Game of Chess. >

ENDER, Johann, Austrian artist: b. Vi¬ enna, 4 Nov. 1793; d. 16 March 1854. As a portrait painter he was successful at an early age. In 1818-19 he made a tour of Italy, Turkey and Greece, remaining in Rome 1820-26. Upon his return to Venice he devoted his attention to miniature and historical paintings, being pro¬ fessor at the Academy from 1829 to 1850. Among his works are (Madonna with Slumber¬ ing Christ-Child) (Vienna Museum) ; (Marcus Aurelius on His Death Bed5 (1814, Esterhazy Gallery) ; his masterpiece, (The Crucifixion (a fresco in the Vienna Cathedral) ; (Orestes Pur¬ sued by the Furies) (1815) ; (Minerva Showing Ithaca to Ulysses) (1816); Assumption; (Sleeping at Christ's Sepulchre) (1817); ■Ju¬ dith) ; (Bacchus Finding Ariadne5; and many portraits.

ENDER, Thomas, Austrian artist: b. Vi¬ enna, 4 Nov. 1793; d. there, 28 Sept. 1875. He was twin brother of Johann Ender (q.v.). He also studied at the Vienna Academy, becoming a noted landscape painter. He won the grand prize at the Vienna Academy 1816. Going to Brazil in 1817, he brought back nearly a thou¬

sand drawings and water colors. He visited Italy, Palestine, Greece and Paris. In 1836 he became corrector and later professor at the Vienna Academy, filling that chair until 1849. Among his works are (View of GrossglockneD ; Castle TyroP ; (Coast of Sorento> ; (View of Rio de Janeiro) (Vienna Academy) ; Chapel in the Woods5 (National Gallery, Berlin).

ENDERBY LAND, a region in lat. 65° 5 7 S., long. 47° 20′ E., named by John Briscoe in 1831, when on a whaling voyage, in honor of his employer, Samuel Enderby. Briscoe could not approach within 20 or 30 miles, and was unable to say whether it was an island or a strip of continental coast. It was first discovered by Dirk Gherritoz, in 1599, and named for him.

ENDERMIC, a term designating a form of medication once much in vogue, but now al¬ most abandoned, consisting in raising a blister upon the affected part and applying to the raw surface the remedy to be absorbed. It

has been superseded by the hypodermic method. See Hypodermic Injection.

ENDICOTT, Charles Moses (((Junius Americano's^), American historical writer: b. Danvers, Mass., 1793; d. Northampton, Mass., 1863. He contributed to the (New England Historical and Genealogical Register5 and to the Boston Gazette. He wrote a (Life of John Endicott5 ; (The Persian Poet, a Tragedy5 ; (Essays on the Rights and Duties of Nations5 ; and (Three Orations.5

ENDICOTT, John, American colonial gov¬ ernor: b. Dorchester, England, 1589; d. Boston, Mass., 15 March 1665. He was sent out to this country by the ^Massachusetts Company55 to carry on the plantation at Naumkeag, or Salem, where he arrived 6 Sept. 1628. In April 1629 he was chosen governor of ((London's plantation55 ; but in August it was determined to transfer the charter of the colony to New England, and Winthrop was appointed governor. Endicott was deputy-governor of the Massachusetts colony 1641—44, in 1650 and 1654; and was gov¬ ernor in 1644 and 1649, 1651-54 and 1655-65. He was bold and energetic, a sincere and zeal¬ ous Puritan, rigid in his principles and severe in the execution of the laws against those who differed from the religion of the colony. So averse was he to everything like popery that he cut out the cross from the military standard. He was opposed to long hair, insisted that the women should wear veils in public assemblies and did all in his power to establish what he deemed a pure Church. In 1659, during his ad¬ ministration, four Quakers were put to death in Boston. Consult Endicott, C. M., (Memoir of John Endicott5 (Salem 1847).

ENDICOTT, Mordecai Thomas, Ameri¬ can naval officer : b. May's Landing, N. J., 22 Nov. 1844 He was graduated at the Rensselaer Polytechnic Institute in 1868 ; practised as civil engineer from 1868 until appointed civil engineer in the United States navy in 1874. He served as consulting engineer at various navy yards and in the Navy Department at Washington. In 1895 he was appointed member of the Nicaragua Canal Commission, of the United States naval armor factory board in 1897 and in 1898 became chief of the Bureau of Yards and Docks with rank of commodore. Later he was advanced to the rank of rear-admiral, and reappointed in

1902 and 1906. In 1905 he became a member of the Isthmian Canal Commission, retired in 1906, but continued upon active duties until 30 June 1909. He is a member of the American Society of Civil Engineers and

was its president in

1911.

ENDICOTT, William Crowninshield,

American lawyer: b. Salem, Mass., 19 Nov. 1826; d. Boston, 6 May 1900; was a descendant of John Endicott (q.v.), the Puritan governor of Massachusetts. He was graduated at Har¬ vard College in 1847; served as justice of the State Supreme Court (1873-82) ; was an un¬ successful candidate for governor of Massachu¬ setts, on the Democratic ticket, in 1884; and was appointed Secretary of War in President Cleveland's Cabinet in 1885.

ENDIVE, en'div (Cichorium endivia), an annual or biennial herb of the natural order Composite e. It is an East-Indian annual or bi¬ ennial, with a rosette of smooth radical leaves, more or less lobed or cut, blue axillary sessile flowers and grayish angular seeds. It has long been cultivated as a salad, for which use it probably ranks in Europe next to lettuce, but not quite so high in America. It is as easily cultivated as lettuce, but must be blanched, either by loosely tying the outer leaves up over the inner ones or by covering the plants with large drain-tiles or similar tubes. Of the nu¬ merous varieties, those that naturally are most curly-leaved, and that ordinarily develop a white centre without blanching, are the most esteemed. The leaves are also used as a pot-herb and as an ingredient in soups, stews, etc.

ENDLESS or PERPETUAL SCREW, a

mechanical contrivance consisting of a screw the thread of which gears into a toothed wheel at an oblique angle corresponding to the pitch of the screw. It derives its name from the endless recurring effect its thread produces when in motion. It is in general use as a means of producing slow motion in the adjustment of machines rather than as a transmitter of great power.

ENDLICH, Gustav Adolf, American ju¬ rist: b. Alsace Township, Berks, County, Pa., 29 Jan. 1856. He was educated in Germany and at Princeton ; studying law and being admitted to the bar in 1877. He was elected judge of the 23d judicial district, Pennsylvania, 1879, and re¬ elected 1899. He was member of the United States Assay Commission in 1897, and from 1906 to 1910 was president of the board of trus¬ tees of Muhlenberg College. He edited the Criminal Law Magazine and Reporter 1890-94. He has published (The Law of Building Asso- ciations) _ (1882) ; (The Law of Affidavits of Defense in Pennsylvania) (1884) ; Woodward's Decisions J (1885) ; Commentaries on the In¬ terpretation of Statutes) (1888) ; (

Rights and Liabilities of Married Women in Pennsylvania) (1889) ; and numerous articles on legal sub¬ jects for periodicals.

ENDLICHER, end'lm-er, Stephen Ladis- las, Hungarian botanist: b. Hungary, 24 June 1804; d. Vienna, 28 March 1849. He was des¬ tined for the priesthood, but in 1827 began botanical and linguistic studies. He became curator of the manuscript department of the Imperial Library at Vienna in 1828; and in 1836 of the botanical department of the Royal

Natural History Museum there, and in 1840 bej came professor of botany in Vienna and di¬ rector of the Botanical Garden. Much dis¬ turbed by the events of 1848, he fell into melan¬ choly, and in 1849 put an end to his own life. His (Genera PlantarunP (1836-40) has had great influence on succeeding botanists. His studies in Oriental philology are also important. Among them may be mentioned (Anfangsgriinde der chinesischen Grammatik) (1845) ; and with Eichenfeld, (Analecta Grammatica) (1837).

ENDOCARDITIS, inflammation of the endocardium or serous membrane lining the valves and internal surface of the heart.

ENDOCERAS, en-dos'e ras, genus of fos¬ sil cephalopods, found in the Ordovician rocks of the United States, Russia and Scandinavia. Many species have been uncovered ; the conch is long, slender and either annulated or smooth. Specimens have been found in the Trenton rocks of New York, having a length of over 10 feet. See Cephalopoda.

ENDOCHROME, the characteristic pig¬ ment mixture of diatoms. It is apparently a mixture of a green constituent and a golden- brown constituent (diatomin). See Diatoma- ceous Earth.

ENDOCRINOPATHIES. Diseases or disorders of growth or adjustment due to dis¬ turbances of the endocrinous glands, or glands of internal secretion. The early mechanistic conceptions concerning the push that lies be¬ hind the metabolism of the human body have slowly and gradually undergone modification until the importance of a number of overlooked structures has forced itself, almost with a whirl, upon the medical horizon. These structures are the endocrinous glands. The study of their anatomy and functional import¬ ance now constitutes an enormous specialty.

As early as 1828 Parry called attention to the relationship between enlarged thyroid and increased frequency of the heart beat (tachy¬ cardia), since which time the works of Jo¬ hannes Muller, Addison, Gull, Brown-Sequard, Marie and many others have served as start¬ ing points for the building up of a rich struc¬ ture which is amply recorded in a score

of monographs. The chief of these are Biedl, (Internal Secretions } (bibliography of 4,000 titles, 1913) ; Falta, (Ductless Glands) (1915) ; Parhon et Golstein, (Les Secretions Internes > (1909) ; Levy and Rothschild, (Endocrinology (1913) ; Gley, (Les Secretions Internes) (1914) ; Sajous, Unternal Secretions) ; special articles in Lewandowsky's (Handbuch der Neurology (1913), and Jelliffe and White, (Diseases of the Nervous System (2d ed., 1917).*

Out of this prodigious development to be found in the works just cited and in current medical literature, much of which is evanescent and hastily constructed, a large amount of solid substance remains and a number of permanent acquisitions have been made. The net result has been to show much more essentially than ever before the fundamental physicochemical foundations of biological metabolic processes as they are utilized in the upkeep of the animal machine. The viewpoint has been attained that a marked degree of chemical interrelationship takes place between the different organs of the body. That this is automatically regulated

Trough the vegetative nervous system (the old sympathetic) chiefly, apparently in some cases, though this is by no means clear, solely through chemical regulation. The disorders of this ad¬ justment now constitute a special department of vegetative neurology, and are most conveniently grouped under the terms endocrinology, or the endocrinopathies.

In the earlier period of the study of these endocrinopathies individual disease groups, uni- glandular syndromes, were isolated. Among the most accentuated of these were Addison's dis¬ ease, diabetes mellitus, myxedema, cretinism and acromegaly; but of recent years it has been increasingly emphasized that whereas a certain group of symptoms, which may be linked to plus or minus activities of one or another gland may be most prominent, nevertheless other glandular modifications are bound up in them and are not to be neglected. Hence has arisen the viewpoint that most of. the endocrin¬ opathies are, strictly speaking, poly- or pluri¬ glandular syndromes, that is, that disease or maladjustment in one gland usually induces compensatory changes in other glands.

For many years, even back to thie earliest days of primitive animistic magic, it has been held that every living tissue yields a chemical product which will act upon other tissues. The early alchemistic studies, those of Paracelsus, to the later work of Hahnemann, and the iso¬ therapists, are all attempts to co-ordinate a host of empirically observed facts. They are

all worth rereading if the reader will put himself in sympathy with them through a comprehen¬ sion of the now strange symbols then used.

Endocrinous glands for the present purposes are those structures which yield products termed hormones and chalones having some definite or specific action related to, yet different from, enzyme activities. These structures are developed from different embryological forma¬ tions. The hypophysis (posterior lobe) and chromaffin tissues (suprarenal chiefly) are nervous; the thyroid and pituitary (anterior lobe) come from the buccal cavity; the pan¬ creas and mucosa of the small intestine from the intestine, the parathyroids and thymus from the branchial arches (old gill slits of fishes), the gonads (testes and ovary) and the inter- renal bodies from the genital ridges. Some of these, in humans, merge into one structure, as thyroid and parathyroid, as chromaffin and m- terrenal cells in the suprarenals, as hypophysis (posterior lobe) and pituitary (anterior lobe).

The present resume, largely following the author's summary in Stedman's Reference Handbook of the Medical Sciences, \ will attempt to sketch only the general . outlines of the various uniglandular and pluriglandular disease pictures. The more radical French < school is followed, but at the same time attention should be called to the fact that the French school presentations contain gross fallacies, and should be read curn grano salis. Still the ˆ clinical sug- gestions of these writers are so rich it is felt to be a better course to call the attention .of the intelligent lavman to possible relationships rather than to take the more conservative atti¬ tude of directing attention only to that which can indubitably be proved. This whole sub¬ ject is still so largely empirical that the prin¬ ciple of putting the hypotheses to a test will be found to be more advantageous than that of

recording only the obvious. The former atti¬ tude may result in gaining useful therapeutic truths, the latter becomes monotonous and fre¬ quently encourages stupidity.

The more recent suggestive and extreme summaries of Biedl, Falta, Laignel-Lavastine, Levi and Rothschild are therefore here sum¬ marized.

Uniglandular Syndromes. Thyroid. — Myx¬ edema. — The chief symptoms are arrest of development, dwarfism, infantilism, infiltration of skin and mucous membranes, mental torpor, slow ideation, defective memory, apathy, lazi¬ ness, slowness, sleepiness, taciturn, awkward¬ ness. The pulse is usually small, rapid and irregular, at times increased tension. There are constipation, diminished urination, hypo¬ thermia and chilliness of the skin. Reflexes diminished. The voice is frequently nasal, slow, monotonous and raucous. Headache is frequent and at times epileptic

attacks occur. These are all symptoms of diminished secre¬ tion.

Exophthalmic Goiter. —A more or less com¬ plete catalogue of findings for a lot of cases will include tachycardia, arrhythmia, anxiety, pulsations in the neck, exophthalmos, epiphora, v. Graef's, Stellwag's, Mobius' symptoms, facial paresis, cramps, tremors, neuralgias, chiefly frontal and ocular, colic, hot flashes, profuse sweats, thermophobia, engorgement of the skin, dermographism, transitory edemas, pigmenta¬ tion, urticaria, alopecia, diminution of electrical resistance, albuminuria, polyuria or glycosuria, anorexia, bulimia, vomiting, ntyalism, hyper- chlorhydria, diarrhoea, dyspnoea, amenorrhoea, atrophy of mammae, loss of flesh, agitation, emotional instability, volubility, insomnia, anxiety, excessive anger or reverse, maniacal excitement, marked depression, cyclothymic variations, confusion, epileptic attacks. Ep- pinger and Hess have endeavored to separate a vagotonic and sympathicotonic type.

In the vagotonic type the more prominent signs are decreased lacrvmation, less exophthal¬ mos, with enlargement of the palpebral fissures, v. Graef's sign, abundant sweating, diarrhoea, mild tachycardia, no alimentary glycosuria, pilocarpine and oculocardiac reflexes positive. In the sympathicotonic types there are exoph¬ thalmos, dryness of eyes, violent tachycardia, glycosuria, oculocardiac reflex reversed or ab¬ sent, increased reaction to adrenalin. Most cases are mixed in type. In all save infectious forms psychical influences are striking and psychotherapy is extremely valuable in the early stages, less so in chronic cases. Money worries are of great importance in the caus¬ ation of the psychogenic cases.

Thyroid insufficiencies, other than those of myxedema, are infantilism, obesity, Dercum's syndromes, pseudolipomata, alopecia, precocious loss of hair, scleroderma, urticaria,' pruritus, recurring herpes, transitory edemas, migraine, asthma, constipation, mucous enterocolitis, acrocyanosis, Raynaud's syndrome, localized erythemas, rhinorrhcea, glucose tolerance, geni¬ tal instability, chilliness, mammary hypertrophy.

Thyroid Instability (Levi and Rothschild). — From dyshypothyroidism : chilliness, bald¬ ness, headaches, depression, crying, giddiness, passing edemas, neuralgic pains, suffocations, shivering hot flushes, at menstrual period. With predominant dyshyperthyroidism : thinness, in-

crease of' eyebrow development, hot flashes, palpitation, intestinal spasms, irritability, emotionalism, phobias, inquietudes, migraine, asthma,

hyperidrosis, dvsidrosis, tremors. Mixed cases : chilliness, shivering, migraine, frequent urination, neuralgic pains, distractable reddening of eyebrows, catamenia ; neuralgias, anxiety, dilatation of palpebral fissures, swell¬ ing of feet, variations in volume of the feet, tremors, nervous crises, hysterical attacks.

Parathyroids. — Tetany. — This syndrome is unquestionably related to parathyroid loss or deficient Parkinson's syndrome (?). The viewT- point of Lundborg and of Gauthier is that this syndrome belongs here, and is a hyperfunction disorder but it rests on very unstable founda¬ tions.

Thymus. — Vagotonic Symptoms of Base¬ dow Syndrome (?): Profuse sweating, palpita¬ tion, lymphocytosis, eosinophilia, sensation of weakness.

Myasthenia of Erb-Goldflam(?) : Head¬ ache, ptosis, external ophthalmoplegia, fixed or transitory palsies principally of the face, the neck, myasthenic electrical reaction.

Thymus Loss: Idiocy of Klose and Vogt.

Tetany (?): Basch.

Suprarenals.— Addison's Syndrome and Suprarenal Insufficiency: Asthenia, arterial hypotension, morning nausea and vomiting, lumbar pains, melanoderma, white lines on the skin, amyotrophy, aboulia, depression. At times myoclonus, epileptic attacks, tetany, periodic palsies, delirium, mental confusion, sudden death.

Suprarenal-genital Syndrome : External feminine pseudo-hermaphroditism with virile secondary sexual characters ; suprarenal viril¬ ism ; amenorrhcea, gynecomasty, adiposis with easy bruising, all sigps of feminine maturity; hypertrophy of the clitoris, hypertrichosis of masculine type, masculine voice, muscular and nervous hyperasthenia, active and violent sex¬ ual inversion ; arterial hypertension, arterio¬ sclerosis ; glycosuria.

Sympathetic Paraganalia. — Chromaffine cells of the solar plexus, aortic paraganglion of Zuckerkandl, cardiac paraganglion of Wiesel and Weisner, Luschka's carotid and coccygeal glands, tympanic paraganglia. The syndromy of the affections of these glands is entirely ob¬ scure.

Pancreas. — Diabetes Mellitus : Glycosuria, polyuria, polyphagia, polydipsia ; neuralgias, pruritus, impotency, constipation, dry mouth, dry skin, diminished perspiration, atrophy of the testicles, abolition of the tendon reflexes, arterial hypertension, asthenia, headache, sus¬ ceptibility to cold, perforating ulcer of the foot, syncopies, comatose or apoplectiform at¬ tacks, paralyses, vertigos, asthmatic dyspnoeas, pseudoangina, narcolepsy, depression, apathy, hypochondria and coma.

Hypophysis. — Froehlich's Genital Adiposity Syndrome: Adiposity, arrest of development or regression of the genital glands of the genital organs and the corresponding secondary sexual characters ; somnolence.

ˆ Syndrome of Hypophyseal Insufficiency of Renon and Delille : Tachycardia, instability of the pulse, arterial hypotension, insomnia, anorexia, distressing sensation of heat, exag¬ geration of sweat secretion.

Acromegaly: ((A simple hypertrophy, not

congenital, of the upper and lower extremities and also cephalic,® headache, amenorrhoea, ten¬ don reflexes increased, arrhythymia, syncope, perspiration, polyuria, glycosuria, sensitive¬ ness to cold, neuralgias, acroparesthesia, cramps, lancinating pains, lassitude, irritability, depression.

Gigantism : ((Acromegaly of the subjects in the epiphyseal cartilages which have not yet ossified,® impotency, amenorrhcea, indolence, infantilism, aboulia, asthenia, glycosuria, polyuria.

Pineal. — Genital Macrosomia : Abnormal increase in height, premature genital and sexual development with secondary sexual characters, hypertrichosis, exaggerated mental precocity.

Pineal Adiposity : Diffuse obesity.

Choroid Plexus. — Hydrocephalus : Hyper¬ tension of the cerebrospinal fluid, rapid de¬ velopment, nervous and mental syndrome of ventricular hypertension, obnubilation, idiocy.

Ovaries. — Infantilism : Amenorrhoea, ab¬ sence of secondary feminine characters, obesity, deficiency of hair, childishness.

Acquired ovarian insufficiency, (a) Periph¬ eral vasodilatation, subjective crises of heat, sweating, continuous or paroxysmal tachy¬ cardia, palpitations, arterial hypertension, in¬ somnia, severe headache, facial neuralgia, lum¬ bago, neuromuscular asthenia, memory instabil¬ ity, irritability, enervation, hysterical crises ; exaggeration of the sexual instinct (?), more often absent or inverted ; obesity, restlessness, anxiety, phobias, impulsions, gastrospasm, con¬ stipation, vomiting, vertigo, syncope.

(b) <(Vagotonic crises® before the menses and at the beginning of pregnancy, pallor, tendency to syncope, nausea, vomiting, consti¬ pation, diminished arterial tension, pulse rather slow, oculocardiac reflex positive, Samogyus's sign, psychic depression particularly connected with the development of the corpus luteum. These crises occurring before menstruation or at the beginning of pregnancy must not be confused with the reactionary dyshyperthyroid- ism of the menopause marked by flashes of heat, sweating, hypertension, paroxysmal tachycardia, palpitations, anxiety.

<(Hyperovaria® (Dalche) : Precocious

puberty, copious menstruation, pain before and during the first days of the period, inter- menstrual leucorrhcea, developed sexual in¬ stinct, well-marked eyebrows, thinness, pallor, small breasts, large pelvis, rounded

lower limbs contrasted in size with the upper ones, arterial hypotension, craving for movement and action, enervation, tendency to loquacity, erotic crises.

Testicles. — Infantilism: Defective develop¬ ment of the male genital organs, absence of secondary sexual characters, obesity, deficiency of hair length of the lower limbs, small cra¬ nium, childishness.

Acquired Testicular Insufficiency: Increase in height, diminution of the pilous system, glabrous state of the body, tendency to obesity, gynecomasty, frigidity, impotency, senility, arterial hypertension (?), asthenia.

1 he types of testicular insufficiency accord¬ ing to Rebattus and Gravier are: (a) The sterile. (b) Eunuchoid gigantism, because the internal secretion of the testicle is established late. In this case there is a prolonged infantil¬ ism. (r) Eunuchism by castration character-

ized by gigantism and infantile appearance. The secondary sexual characters do not appear.

(d) The reversive infantilism of Gandy, where simply a sort of a sexual condition is noticed, with attenuation of secondary sexual characters and a certain degree of obesity, with late testicular difficulty in the adult.

Dyshyperdiastematia : Lower limbs short and cranium very large, pilous system well de¬ veloped, especially the mustache, thinness, per¬ sistence of youth, a degree of arterial hyperten¬ sion, virile character, activity, moral and physi¬ cal energy.

Prostate. — Prostatic Insufficiency: Asthenia, diminution of potency, neurasthenia, at times suicide.

Hypertrophy of Prostate: Arterial hyper¬ tension, retardation of the heart, cerebral hemorrhages, genital excitation.

Pluriglandular Syndromes. — Basedow's dis¬ ease with thymic hypertrophy and vagotonic symptoms ; scleroderma, and letany, amen¬ orrhea, Addison's syndrome ; acromegaly, etc.

Myxedematous with Thymic Hypertrophy : Tetany, acromegaly, Addison's synch ome, amenorrhcea, infantilism, mammary hyper¬ trophy, etc.

Acromegalic or ovarian insufficiencies with various disturbances, psychic, nervous, vaso¬ motor, trophic, etc., connected at one time with the myxedematous, at another with the basedowian series.

Ovarian Predominance. — Thyroid Reaction to Ovarian Insufficiency: Tachycardia, palpita¬ tions, perspiration, nervous irritability, vertigo, scanty urination, trembling, anxiety, etc.

The differences between these nervous manifestations and the picture of the attenuated forms of exophthalmic goitre are very slight says Laignel-Lavastine. This pathogenic con¬ ception permits of important therapeutic re¬ sults; one may ask, for example, whether the anti-basedowian therapy with hematothyroidin would not be of advantage in the nervous and psychic disturbances of the normal menopause which repeat one feature after another of the basedowian series.

Dyshyperovaria of the Hypothyroid: Antici¬ pation, prolongation and copiousness of the menses, menorrhagia, metrorrhagia.

Thyro-ovarian Disturbances of the Same Significance. — Either ovarian insufficiency in the myxedematous series, or the dyshypero- varian in the basedowian series; in either case the nervous disturbances of the dysthyroid are modified by all factors of the ovarian rhythm, whatever they may be.

Hypophyseal Predominance. — Infantile giants, with their clinical varieties : feminism, eunuchism cryptorchidism, feminine pseudo¬ hermaphroditism, mental infantilism.

Acromegalics with deficiency syndromes, myxedema, infantilism, amenorrhoea, obesity, asthenia.

Acromegalics with syndromes of hyperactiv¬ ity, more or less vicious, synergetic or substitu¬ tive : simple or exophthalmic goitre, arterial hypertension and atheroma, lacteal secretion.

Suprarenal Predominance. — Addisonian with amenorrhoea. impotence, chilliness, tetany or, on the other hand, exophthalmic goitre.

Very often basedowians, acromegalics, giants, with spontaneous glycosuria, alimentary or merely adrenal, the latter making it possible in

certain cases to suppose a certain degree of suprarenal hyperactivity.

Without Marked Predominance. — The case of Claude and Gougerot is an example : Loss of sexual characters, countenance old-looking, skin thickened, wrinkled, pigmented ; chilliness, ab¬ sence of perspiration,

asthenia, arterial hypo¬ tension, tetany; testicular, prostatic, suprarenal, thyroidal and perhaps parathvroidal atrophy. Consult Jelliffe and White, (Diseases of the Nervous System> (Chap. Ill, ((The Endocrino- pathies”) ; Eppinger and Hess, (Vagotonia, Nervous and Mental Disease > (Monograph Series, No. 20, New York).

Smith Ely Jelliffe.

ENDODERM, or ENODERM (also called entoblast or hypoblast), the innermost layer of cells in the developing embryo. In man it subsequently develops into the epithelium that lines the digestive canal and its appendages, the pancreas, liver, lungs, etc. See Embry¬ ology.

ENDODERMIS, in plants, the layer of cortical cells which surrounds the vascular region and generally called the bundle sheath. In many cases there is but a single sheath sur¬ rounding a single vascular region; in others there are several vascular regions each pro¬ tected by its own sheath or endodermis. See Morphology.

ENDOGAMY, a custom among some sav¬ age peoples of marrying only within their own tribe. Opposed to exogamy.

ENDOGENS, en'do-jenz, a name tor mon- ocotyledonous plants, referring to the mode of growth of the stem. See Botany ; Mono¬ cotyledons.

ENDOR, en'der, a village of Palestine, four miles south of Tabor, now a poor mud hamlet. It was the place which Saul visited (1 Sam. xxviii, 7) to consult the ((woman with a familiar spirit.” The word is in common use in the writ¬ ings of the Philistines.

ENDORSE, in heraldry, a subordinary equivalent to one-eighth or one-fourth of a pale.

ENDOSCOPE, in surgery, a general term for an instrument for the examination of in¬ ternal parts. It consists of a tube and an appa¬ ratus for lighting. The most serviceable is that devised by Nitze and Leiter.

ENDOSMOSIS. See Osmosis.

ENDOTHELIOMA, en-dd-the-li-6'ma. See Tumor.

ENDOTHELIUM, a modified form of the cells lining certain internal organs. Such are the internal lining membranes of ’ the heart and blood vessels, the joints and other closed cavi¬ ties. Endothelium is a modification of epithe¬ lium (q.v.).

ENDOTHYRA, genus of fossil. Forami- riifera, the shells of one species of which (E . haileyi) form a large part of the oolitic lime¬ stone of the Lower Carboniferous and known as Bedford limestone. See Foraminifera.

ENDOWED SCHOOL ACTS. Acts of the British Parliament made to prevent misap¬ plication of the foundations for the support of secondary education in England. See Great Britain — Education , arid consult Balfour, A.

J., 'The Educational Systems of Great Britain and Ireland) (Oxford 1912).

ENDROMIS (1) a kind of boot which was first generally worn by Cretan huntsmen and then by athletes in general. It was close-fitting, reached above the ankle, with the top turned down. (2) a woolen rug or covering worn by Roman athletes, gladiators, etc., after violent exercise. They were made in Spain or in Tyre.

*ENDYMION, in classical mythology, ac¬ cording to some a huntsman ; according to others a shepherd ; and according to a third account a king of Elis. One tradition is that he asked of Zeus eternal youth and eternal sleep, and that Selene (the moon) saw him sleeping and became enamored of him. Others relate that Selene herself, charmed by his beauty, con¬ veyed him to Mount Letmus in Caria and threw him into a perpetual sleep in order that she might kiss him whenever she pleased. The legend is the subject of Keats' 'Endymion.**

ENDYMION. Keats was 23 when, in April 1818, he published his first long poem, 'Endymion. The young poet, in love no less with the beauty of his native England than with "the beautiful mythology of Greece,® incarnated in the poem his own passionate seeking for the soul of beauty in the world. We may trace this theme through the "uncertain path® of a story which is almost lost in the luxuriant tan¬ gles and by-paths of incident and description. Endymion, smitten with strange trance at the feast of Pan, confesses to his sister the vision of an immortal loved one that has turned waking life to despair. Led on to "woe-worn wanderings® by a mysterious command, he descends "into the silent nˆsteries of earth.® He is succored bv Diana, urged on by Venus, who foretells his happiness, and is moved to pity by the vain loves of Alpheus and Arethusa. And when at length his "fated way® leads him through the sea-depths to the rescue of spell¬ bound Glaucus, Endymion's awakened sym¬ pathy with suffering gives him power not only to restore "all lovers tempest-tost® to eternal love and youth, but to win Cynthia and im¬ mortal bliss. So at last his mortal love,*

the Indian damsel, reveals herself as the goddess; and through earthly loveliness he attains im¬ mortal beauty. And so this story of Endymion's love for the moon-goddess is the symbol not only of Keats' intense susceptibility to the loveliness of moonlight but of his life-long passion for "the principle of beauty in all things.®

The form of the poem is, like its spirit, wavering, but shot .through with imaginative glory. Structure is lacking — the poet does not master his story, but is swept on by it, like Endymion on his celestial steed. Metre and diction are treated with a freedom not only Elizabethan but revolutionary. And in such lyric ecstasies as the "Hymn to Pan® and "O Sorrow,® in such perfect images as "the danc¬ ing poppies,® "tip-toe Night,® "panting light,® '"rain-scented eglantine,® there speaks Keats, the magician of English poetry. Consult article "Keats,® 'Cambridge History of English Literature) (Vol. XII) ; and Colvin, Sidney, (John Keats) (New York 1917).

Frances W. Cutler.

ENEMATA, fluid substances passea into the rectum and large intestines for cleansing, for medication or for nutrient purposes. For the treatment of chronic constipation, enemata of cold or hot water, water and soapsuds, water and glycerine, are found to be of great service. Almost any remedial substance capable of solu¬ tion and absorption may be placed in the rectum or large intestine to affect the parts locally or to exert a general action on the body. Almost all remedies that are taken into the stomach may be taken by means of enemata. The dose has to be somewhat larger in most instances. For the treatment of pinworms, diarrhoea and dysentery enemata are invaluable. In medicine the lower bowel may be used much oftener than it is. In acute colicky pains from "wind® in the bowels there is nothing better, as a rule, than a hot enema of at least two quarts, at a temperature of from 116° to 118° F. As the lower bowel is not provided with digestive juices, when nutrient enemata are to be given the insoluble food-substances should be so con¬ verted as to render them capable of absorption — hence all gruels, eggs, milk, etc., to be used should first be predigested by peptic or pan¬ creatic ferments. A special form of enema, consisting of hot (116° to 118° F.) salt solu¬ tion (1 teaspoonful of salt to 1 pint of water), allowed to pass in and out of the bowel slowly and made to ascend some distance, is of im¬ mense service in cases of surgical shock, in profuse bleeding, and in cases in which the kidneys refuse to secrete urine. This is termed enteroclysis (q.v.). Enemas for cleansing the bowel should be copious ; those for nutrient purposes should be small — not over half an ounce.

ENEMY, in international law, a nation at war with another. The term

includes the nation as a whole, and also individuals belong¬ ing to the latter. A state of war must exist before States assume toward each other the position of enemies. By international law the status of an enemy is regulated according as it is a combatant or non-combatant. If a com¬ batant the opposing nation may employ its whole force toward its destruction. Non- combatants, however, in as much as they have no connection with the war but continue their ordinary avocation, are exempt from attack according to the usage of modern civilized peoples. A state of war precludes commercial relations between the non-combatants of states at war, contracts are not upheld, and the courts are closed to enemy aliens. Ordinarily non- combatants are not liable to injury in person or property arising from military operations, but it frequently happens that they suffer prop¬ erty losses through bombardments, etc. If at¬ tacked or robbed by troops of the enemy with¬ out authorization and contrary to international law those troops are liable to punishment by their own military superiors for violation of the rules of war. The modern tendency of civilized peoples is to limit all acts of hostility to the actual combatants in the theatre of war.

It has frequently happened, however, that modern nations while engaged in hostilities with savage peoples have been unable to observe all the rules of international law, and especially the distinction between combatants and non-com¬ batants. See Alien; Belligerent; Interna-

TiONAL Law; War, Rules of, and consult the authorities referred to under these articles.

ENEMY ALIEN PROBLEMS. In early times it was the practice of belligerent govern¬ ments upon the outbreak of war to arrest the citizens or subjects of the enemy power resid¬ ing within their jurisdiction, to confiscate their property and sometimes to expel them sum¬ marily from the country. In the course of time, however, relaxations from this harsh practice began to be made and many treaties were concluded providing that such persons should either be allowed to remain in the coun¬ try, or in case they were required to leave, they should be allowed a specified period within which to dispose of their property and wind up their business affairs. The policy of confiscat¬ ing their property also ceased and wholesale expulsions became rare. During most of the wars of the 19th century the treatment accorded to enemy aliens was uniformly liberal and humane. During the Spanish-American War of 1898, for example, neither belligerent mo¬ lested the citizens or subjects of the other, so long as they demeaned themselves

peaceably and their property was not interfered with in the slightest degree. When the great Euro¬ pean War broke out the rights of enemy aliens had not been regulated by any of the great international conventions ; the treatment to which they were entitled, therefore, depended upon the customary law of nations and upon particular treaty stipulations between the op¬ posing belligerents.

The enemy alien problem of the late war was somewhat different from that of any preceding war, partly because of the unprece¬ dented number of enemy aliens which were found in most of the belligerent states at the outbreak of the conflict, and partly because of the enormous amount of property held by such persons in the countries where they resided. In England, for example, there were more than 50,000 German subjects; in France the num¬ ber was still larger ; and in the United States the number of such persons probably exceeded a million. In consequence of the German policy of universal compulsory military service large numbers of them were reservists who if they had been allowed to depart would have returned to Germany and joined the army. Many of them were of course spies, for the German his¬ torian Treitschke tells us that (

The treatment which was accorded to every alien by the various belligerent governments may be discussed under three heads: (1) policy in respect to their personal freedom; (2) measures in respect to their property and busi¬ ness undertakings; and (3) their right of ac¬ cess to the courts. At the outset Great Britain accorded to German subjects a period of seven days during which they might leave, but it does not appear that any considerable number suc¬

ceeded in getting away. France allowed them to leave before the end of the first day of mobilization, but few were able to return to their home countries. Germany and the United States did not allow any days of grace for this purpose and Germany even went to the length of arresting all Japanese subjects found in the country at the outbreak of the war between that country and Japan. British and French nation¬ als were summarily expelled from any German towns and cities and without being allowed to take their effects with them. On the day of the outbreak of war between France and Ger¬ many the French government as a military pre¬ caution required all enemy subjects to evacuate the region of the northwest, and also the cities of Paris and Lyons and to retire to other regions in the west. They were not, however, expelled. Portugal appears to have been the only belligerent country which went to the length of expelling all enemy persons between certain ages. In every belligerent country measures were early taken to restrict the liberty of movement of enemy aliens. In Eng¬ land they were required to reside in certain "approved® places ; they were forbidden to re¬ side in certain designated regions or to change their places of

residence or travel more than five miles without a permit; they were for¬ bidden to have within their possession any firearms and various other articles such as sig¬ naling apparatus, military maps, motor cars, etc.; they were forbidden to frequent clubs; to see any but English newspapers, etc. In every belligerent country they were required to regis¬ ter and were placed under strict surveillance by the authorities. In the United States they were forbidden to reside within a certain distance of any fort, arsenal, armory or similar place; they were excluded from residing near to or from approaching water fronts or wharves, and they were prohibited from remaining or residing within the District of Columbia. All enemy aliens including women were required to register, and in general they were subjected to other restrictions similar to those adopted by the British government. On account of the close geographical proximity of France to Ger¬ many, the French government at the outset ordered a general internment of the enemy population. They were therefore removed to concentration camps located in various parts of France, mainly in the west, behind a line ex¬ tending roughly from Dunkirk to Nice. For some eight months after the outbreak of the war the British government did not go to such lengths, although considerable numbers of sus¬ picious and dangerous characters were interned as a precautionary measure. In consequence, however, of various acts of the Germans, such as the bombardment of undefended coast towns, Zeppelin raids upon England, the use of as¬ phyxiating gases as a means of combat, the ill- treatment of English prisoners, and the like, public opinion in England came to demand that the whole enemy population of England should be interned, and the sinking of the Lusitania in May 1915 greatly intensified the popular de¬ mand. This last act led to serious mob out¬ breaks against the Germans in England and the dominions, during the course of which many German houses and shops were wrecked and a considerable number of lives were lost. Partly,

therefore, in the interest of the national de¬ fense and partly in the interest of the Germans themselves, whom it was difficult for the pub¬ lic authorities to protect so long as they were scattered throughout the United Kingdom, the British government in May 1915 ordered the internment in concentration camps of practi¬ cally all enemy persons then left in England, although exemptions were granted in particular cases where internment would have worked a serious hardship without subserving any pur¬ pose of national defense. The order for in¬ ternment, it may be added, applied not only to enemy subjects but also to British subjects (of which there were some 8,000), of enemy origin. So far as possible work was provided in the camps for such persons ; classes for instruction were

organized, libraries were established, and instructors in the handicrafts were furnished. Long before the British policy of internment had been decided upon, the German govern¬ ment, in consequence of reports that large num¬ bers of Germans were being arbitrarily ar¬ rested and imprisoned in England, had issued an order (6 Nov. 1914) for the general intern¬ ment of all British males between the ages of 17 and 55. Most of them were interned in the buildings of a race course at Ruheleben near Berlin. The United States was almost the only great power which did not resort to the policy of general internment, for there the presence of enemy aliens at large did not, by reason of the remoteness of the country from Germany, constitute the same danger as it did in England and France. Large numbers of individual Ger¬ mans whose disloyalty was clearly established, others who were regarded as suspects or danger¬ ous persons, and still others charged with espion¬ age and other crimes were, however, arrested and confined in internment camps in various parts of the country. The members of the crews of German merchant vessels in American ports as well as the crews of German warships which took refuge in American ports were likewise interned. Other enemy persons who conformed to the regulations in regard to residence, move¬ ment and registration and who demeaned them¬ selves peaceably were left at large, although they were subjected to close surveillance and were frequently warned against the conse¬ quences of misbehavior and disloyalty.

Subsequent to the inauguration of the policy of wholesale internment, special conventions were concluded between a number of the belligerent governments providing for the re¬ ciprocal exchange and release of women and males except those of military age. Thus in January 1917 an arrangement was concluded between the British and German governments under which all males over 45 years of age and under 17 held in either country as interned prisoners were released and allowed to return to their own countries. In pursuance of this arrangement some 7,000 Germans in England and some 600 or 700 British subjects in Ger¬ many were repatriated. Somewhat similar ar¬ rangements were concluded between the German and French governments and between the Ger¬ man and Austro-Hungarian governments.

The presence in many of the belligerent countries of enormous property holdings and business houses owned wholly or in part by, or under the control of, enemy persons raised

a difficult problem for belligerent govern¬ ments. Obviously considerations affecting the national defense made it necessary to de¬ prive the enemy of the use and control of such property or business ; otherwise his power would have been employed to increase its own strength and resources. Steps were therefore taken in every belligerent country for placing enemy-owned

property and enemy business un¬ dertakings under the control or supervision of the public authorities. In England and the United States all such property was placed in the hands of a public custodian who was em¬ powered to hold and administer it and in gen¬ eral to exercise over it all the powers of a common-law trustee throughout the period of the war. At first the American custodian was given only a limited right to dispose of such property by sale, as for example, when it was necessary to prevent waste or protect the rights of the United States therein, but later he was given a general power of sale and enormous German holdings aggregating many millions of dollars worth of property were sold. The pro¬ ceeds were turned into the treasury of the United States with the understanding that the eventual disposition of it be determined by the treaty of peace at the close of the war. The proceeds in some cases were used to pur¬ chase war bonds. It should be remarked, how¬ ever, that this somewhat rigorous policy was not enforced against the property owned by enemy persons residing or domiciled in the United States, but only against property of those living in the enemy country and who were presumably engaged in making war upon the United States. The property holdings of the former, except those interned, were not mo¬ lested. The property of American citizens residing in Germany, however, was treated as enemy property on the theory that the test of enemy character is domicile rather than nation¬ ality.

In France enemy property wras put under the control of sequestrators appointed by the courts and their power over such property was substantially the same as that of the English and American custodians, except that they were never given a general power of sale. Again and again it was emphasized in France that sequestrators were mainly conservators with no general power to dispose of the property placed in their custody. They were authorized to sell enemy property only when it was perishable or when it was necessary to protect it from waste or loss. Germany began by placing enemy property under supervision, but later on adopted the policy of other countries and put it in the hands of administrators who had the power to manage it and in some cases to dispose of it by sale. There was widespread complaint in France of the conduct of the German govern¬ ment in respect to its treatment of French property, especially in Alsace-Lorraine where large quantities were held and the proceeds of which in some cases were employed for the purchase of war bonds. As regards enemy business enterprises and undertakings, all belligerents adopted a somewhat similar policy. In England an official known as the controller was appointed to manage and carry on any enemy business undertakings the continuance of which was demanded by

the public interest. Other businesses were prohibited or wound up and liquidated by the Board of Trade. In the United States this power wras exercised by the alien enemy cus¬ todian. Certain enemy businesses such as in¬ surance were prohibited; in the case of other businesses under the ownership or control of enemy persons residing in Gerrqany the boards of directors were reorganized by the appoint¬ ment of new directors by the custodian, and the business was continued by the reorganized di¬ rectorate. In Germany all enemy business en¬ terprises were put under a regime of com¬ pulsory administration and management through government appointed agents. Some of them were continued; many were wound up and liquidated. Likewise, in France administrators were appointed by the courts to operate and manage any enemy enterprise, the carrying on of which was required by the public interest ; others were wound up by a liquidator, likewise appointed by the courts. In the case of that particular species of property in the form of patents, trademarks, copyrights, etc., the 'policy of all belligerent governments was more liberal than it was in respect to other property. In general, the policy of all of them was to sus¬ pend such rights but without confiscating them. Citizens who held patents in enemy countries were allowed to transmit money thereto in or¬ der to pay the necessary fees for the renewal of their patents or copyrights. In most of the belligerent countries enemy patents for the manufacture and sale of articles which the pub¬ lic interest required to be manufactured were assigned to local firms or persons, the licensees in such cases being required to pay the fees and royalties due the enemy patentee into the pub¬ lic treasury the same to be held for the benefit of the enemy patentee until the end of the war or to be otherwise disposed of as might then be determined, presumably by the treaty of peace.

As to the right of enemy subjects to enforce their rights by suits in the courts or to appear in court and defend actions brought against them the policy of most of the belligerent gov¬ ernments was fairly liberal. Under the English common law no enemy alien was allowed such a right unless he remained in England by permis¬ sion of the Crown and was under the special pro¬ tection of the king. During the late war, how¬ ever, the Englisn courts have not only held that an enemy alien residing in England may defend an action brought against him in the courts but that an enemy subject who was interned might bring an action as a plaintiff. Since practically the entire enemy population was interned the effect of the decision was to open the courts generally to all enemy aliens in the country. This privilege, however, did not extend to persons residing or domiciled in enemy terri¬ tory. Germany allowed enemy aliens domiciled in the empire the right of access to German courts but denied it to those residing or domi¬ ciled outside the empire. In France some of the lower courts

admitted enemy aliens to bring actions but others less liberal refused it. This discrimination resulted in great confusion. The Court of Appeals of Paris in April 1916, how¬ ever, rendered a notable decision upholding this right. In the United States the policy of the courts was somewhat divided but in general

enemy aliens residing here were allowed access to the courts on a footing of equality with citizens. Those residing in enemy country, however, were not allowed the privilege.

Bibliography. — Hall, Unternational Law1 (Pt. Ill, ch. 1) ; Lawrence, Principles of In¬ ternational Law,5 (Pt. Ill, ch. 3) ; Oppenheim, Unternational Law5 (Vol. II, Pt. II, ch. 2) ; Phillipson, Unternational Law and the Great War) (Ch. 5) ; Baty and Morgan, (War, Its Conduct and Legal Results5 (Pt. I, chs. 1-3) ; Garner (in American Journal of International Law, Jan. and July 1918).*

James W. Garner,

Professor of Political Science, University of Illinois.

ENERGETICS. In physics, mechanics and chemistry, Energetics is the science that treats of energy and its transformations — "energy55 being defined as that attribute of a body, or of a material system, by virtue of which the body or system can do mechanical work; and "work55 being simultaneously defined as the overcoming of resistance through distance. Any such body or system, that can do mechan¬ ical work by changing its shape, position or configuration, or its physical or chemical state, is said to possess "energy55 — that is, power to do work.

The mechanical work is often performed directly and immediately by the body possess¬ ing the energy, without the intervention of any other agency. This is by no means essential, however, because the conception of energy has been extended so as to include all systems and processes, however complicated or indirect the development of the work may be. Thus a hot body is said to possess energy, because its heat can be used to actuate a heat engine; and a galvanic battery is similarly said to possess en¬ ergy, because it can generate electricity and thereby operate an electric motor. We even speak of food as possessing energy, because when eaten, digested, assimilated and oxidized in the muscles it enables human beings or ani¬ mals to perform mechanical work.

In view of the varied kinds of bodies and systems that exist, and the varied ways in which they may perform work, we speak of "heat energy,55 "electrical energy,55 "chemical en¬ ergy55 and energy of other types ; but

in using such expressions we merely indicate, in a rough way, the kind of source that we are deal¬ ing with and the general nature of the proc¬ esses to which we may have to resort, if we attempt to utilize the energy. The energy is the same thing in every case — namely, it is the capacity of the body or system under con¬ sideration to do mechanical work. In many cases, in fact, it is hard to say in what condi¬ tion the energy exists in a body. For example, a mass of hot, compressed gas certainly pos¬ sesses energy, but in view of the fact that we can obtain work from it either by direct adia¬ batic expansion, or by keeping the volume con¬ stant and using the heat (for example) to op¬ erate a thermoelectric battery and a motor, it is scarcely logical to say that the energy of the original mass existed either in the form of heat or in the form of mechanical compres¬ sion. If we try to solve this difficulty by re¬ plying that it existed in both forms, we are quickly made aware of the superficial nature

of the answer, if we attempt to determine how much is present as heat, and how much is pres¬ ent as mechanical compression. When we in¬ crease the energy of a body or system, we say that we <(add energy® to it ; and when we de¬ crease its energy, we say that we ˆsubtract energy® from it. We can always tell what form the energy has that we add or subtract, but it is often impossible to tell what form it has, while it actually resides within the body or system with which it is associated.

For purposes of measurement and compu¬ tation it is necessary to have a satisfactory unit, in terms of which we can make definite quantitative statements with regard to energy; and in view of the definition of energy, it is evident that this unit must necessarily be either the same as the one that is used for measuring work or else a mere multiple or submultiple of it. The unit that is adopted in the measure¬ ment of work depends upon the nature of the problem that is under consideration. In mod¬ ern scientific investigations the unit of work is commonly the erg, which is defined as the work done in overcoming a resistance of one dyne, through a distance of one centimeter. In engineering operations, the unit of work com¬ monly employed (at least in the United States and in England) is the foot-pound, which is de¬ fined as the amount of work done in overcom¬ ing, through a distance of one foot, a resist¬ ance equal to the weight of one pound of mat¬ ter. (In countries using the metric system, the unit of work in engineering operations is the kilogram-meter). The foot-pound is not as precise and definite a unit as the erg, because the attraction that the earth exerts upon a pound of matter varies with the latitude and with the elevation above the sea and hence the foot-pound varies in the same

manner. The variation is not great enough, however, to de¬ stroy the usefulness of the foot-pound as a unit of work or energy for engineering pur¬ poses, and hence this familiar unit is not likely to be superseded, for ordinary, rough purposes. To avoid the indefiniteness of the foot-pound, we might adopt the far more scientific (but exceedingly uncommon) unit known as the <(foot-poundal,® which is defined as the quan¬ tity of work that must be done in order to overcome a resistance of one (

A moving body possesses energy in virtue of its motion and work must be done by it before it will stop. Thus a railroad train, mov¬ ing at high speed, cannot be brought to rest at once, because the energy of motion that it pos¬ sesses must first be expended in overcoming the resistance of the brakes, or the natural fric¬ tional resistance of its axles in their journals and its wheels upon the tracks. The mechan¬ ical energy that a body possesses in virtue of its motion of translation or rotation is called <(kinetic energy® ; and that which it possesses in virtue of its position or its state of elastic strain is called <(potential energy.®

The kinetic energy of a body having a given mass and a given speed of translation, is (by definition) the amount of mechanical work that

the body must do, in order to come to rest. If the mass of the body is M and the velocity is V, it can easily be shown, from the principles of theoretical mechanics, that the work thus performed is J/i MV2. This is therefore the numerical expression for the kinetic energy of the body. If V is given in feet per second and M is given in pounds, this formula gives the kinetic energy in foot-poundals ; and hence if it is desired to state the result in foot¬ pounds, it is necessary to divide by the accelera¬ tion of gravity, as expressed in the same fun¬ damental units — namely, by 32.2, in a locality in which the speed of a body falling freely in a vacuum increases, each second, by 32.2 feet per second.

It is not only impossible, in many cases, to state what form the energy has, within a given body or system, but it is also usually (and per¬ haps universally) impossible to say how much energy the body or system contains in the ag¬ gregate. In other words, there is usually no absolute and natural zero from which the en¬ ergy can be reckoned ; and hence we have to assume an arbitrary zero point, or else confine our attention to the quantities of energy added to the body or system (or subtracted from it), without making any attempt to estimate the total amount present. In the case of ordinary kinetic energy, there is apparently a natural zero, corresponding to absolute rest; but it will be evident that this zero is only conventional, inasmuch as <(rest® is a relative term and a body that is seemingly quite devoid of motion is nevertheless rushing through space, with the earth, at a considerable speed. The case is even plainer in

connection with the potential energy of a raised body. The body can do work by falling, but it evidently can do an indefinite amount of work by falling through an indefi¬ nite distance. In applying the principles of en¬ ergetics to falling weights it is therefore con¬ ventional to assume some arbitrary level (at least as low as the lowest point to which the weight can go) as the level of zero potential energy. In the case of a pendulum, for exam¬ ple, we say that the bob has no potential en¬ ergy when it is at the lowest point of its swing, for the simple reason that it cannot do more work by descending further, because it is al¬ ready at the lowest point to which the con¬ struction and mounting of the pendulum will allow it to go ; yet we know very well that it could do more work if the supports were re¬ moved and the pendulum as a whole were al¬ lowed to fall still further.

Transformation of Energy. — It often hap¬ pens that energy of some one given and distinct¬ ly recognizable type may be transformed into en¬ ergy of some other easily recognizable and def¬ inite type. The simplest example of a trans¬ formation of this kind is afforded by the case of a freely-falling body. The potential energy that the body possesses in virtue of its elevated position grows less as the body descends, and the kinetic energy that it possesses increases at the same time ; and it is a simple matter to show, by the aid of elementary mechanical principles, that the gain in kinetic energy is precisely equal to the loss in potential energy. In the same way, an electric current flowing through a wire causes the wire to become heated and it has been proved that the heat-energy thus produced is precisely equivalent to the electrical energy

that disappears and which is not otherwise ac¬ counted for.

When energy is thus converted, it is found that there is always an exact relation between the quantity of energy of one type that dis¬ appears and the quantity of energy of the other type that appears. In fact, these two quantities are precisely equal, if they are both expressed in work-units — that is, in ergs or foot-poundals. As a matter of practical con¬ venience, however, energy of a given special type is often measured in some special unit that lends itself, more readily than the erg or foot-poundal, to the particular measurements and approximate calculations that are associ¬ ated with this species of energy. Heat is a fa¬ miliar case in point, as it is commonly meas¬ ured in terms of either the (

Owing to the fact that energy of one type may be transformed into energy of another type, it becomes exceedingly important to know the numerical

relation between the <(nat- ural® units in which different forms of energy are measured; for until we possess this knowl¬ edge we cannot compare quantities of energy of different types — because we cannot express these quantities in terms of the erg, or foot- poundal, or any other common or fundamental unit. We should, in fact, be in the same position as a man who had measured one liquid with a gallon measure and another one with a pint mug, but who had no idea of the relation of the pint to the gallon.

It is especially important to be able to com¬ pare the (

Efficiency of Conversion. — It is not always possible to convert a given quantity of energy of one type wholly into energy of some other given type, or wholly into mechanical work. Heat, for example, cannot be wholly converted into me¬ chanical energy — though the reverse process, of converting mechanical energy wholly into heat, is easily performed. This fact has led to the use of the expression ˆavailable energy,® to signify that part of the total energy of a body or system, which can be converted into mechanical energy. The distinction between available and unavail¬ able energy is arbitrary, however, because the

fraction of the total energy that is available de¬ pends upon the completeness of our control over the conditions under which the transformation is attempted. Heat energy, for example, could be wholly converted into mechanical energy (so far as any theoretical limitation is concerned), if we could effect the transformation by means of a heat-engine having a condenser at the absolute zero of temperature, and in that case all the heat-energy would be ((available.® Similar limi¬ tations and conditions apply to energy of other types. The fact that heat-energy is not fully convertible into mechanical energy under con¬ ditions that we can realize, or which exist in nature, while the reverse transformation takes place quite readily and completely, leads to the recognition of the fact that in the processes of nature there must be, on the whole, a tendency toward the ˆdegradation of energy,® in the sense that there is a continuous diminution, in the uni¬ verse, of the store of available energy. The supply of available energy, in other words, is tending continually to become dissipated, in the form of diffused, low-temperature heat.

*For purposes of mathematical analysis, it is * convenient to designate the condition of a body or system by representing, by means of algebraic symbols, its configuration, size, temperature, electric potential, and any other measurable at¬ tributes that it may have — the particular at¬ tributes or features that are selected being to a considerable extent arbitrary, though to serve the purpose of defining the condition of the body or system at every moment, they must be numer¬ ous enough, and must be selected in such a way, so that no change, essential to the problem under*

consideration, can take place in the body without at least one of these symbols (or defining vari¬ ables) changing its value. It may be that some of the selected variables will be functionally de¬ pendent upon the others ; but there will always be a certain number (small in the cases usually considered) that will be independent, so that any one of them can vary without any of the others necessarily undergoing a simultaneous variation. Then if E represents the aggregate energy (in¬ cluding all types) possessed by the body at a given moment, and if the body then undergoes an infinitesimal change of condition so that E increased by the theory of energetics teaches that a relation of the following form exists:

$AE = X\text{-}Ax + Y\text{-}Ay + Z\text{-}Az + \ldots$

where X, F, Z, x, y, z, . . . are functions of

the independent defining variables — some of them being perhaps identical with certain of those variables. The symbols on the right-hand side may be so selected that each of the several expressions that are added together will repre¬ sent the total quantity of energy of some one type that the body must take in, in order to un¬ dergo the physical change corresponding to an increase of x , y, z, . . . by the respective

amounts Ax Ay, Az, . . . The variables, more¬

over, may be so chosen that X, F, Z, will be analogous to intensities, in the sense that they do not depend in any way upon the mass or volume of the body, but only upon its physical state ; and for this reason they are called the <(intensity-factors.® At the same time the in¬ finitesimals Ax, Ay,Az, . . . (since the dimen¬

sions of every one of the added terms must be the same as the dimensions of energy) will be proportional to the volume of the body, or to

its mass, or to some other quality or attribute that would necessarily vary if the size of the body should vary, without any change in X, Y, Z, . . The terms Ax, Ay, A z, are there¬

fore called the ˆcapacity factors® of the terms on the right of the equation. Furthermore, the intensity-factor X will be of such a nature that its value within the body, as compared with its value in the environment immediately external to the body, determines whether the energy rep¬ resented by X -Ax will enter the body or leave it.

By way of elucidation, let us consider the case of a <(perfect gas,® subject to variations such that any two of the three variables pres¬ sure, temperature and volume, will suffice to define its condition at any given moment ; and let us assume that the only forms of energy to be considered are heat-energy and the energy of elastic compression. Then the fore¬ going equation takes the form

AE= T * A 0 — p' Av,

where T is the absolute temperature, 0 is the entropy, v is the volume of the gas, and p is the pressure to which it is subject, per unit of its bounding surface. (See Thermody¬ namics). The first term on the right is then the quantity of heat-energy absorbed, and the second is the quantity of compression-energy absorbed. (The negative sign is affixed to the last term because we are considering the energy added to the system, and the internal energy due to compression increases when v decreases) .

If the body or system undergoes any kind of a cyclic change, such that its final state is in all respects identical with its initial state, then the algebraic sum of all the changes of E (the internal or intrinsic energy), summed up for the entire cycle, will be zero; for if this were not the case, then by causing the body to pass around the cycle repeatedly, in one certain di¬ rection, we could obtain an indefinite supply of energy from it; and this would violate the principle of the conservation of energ)^. (See below). Suppose, now, that in the special case we are considering, the body undergoes the following cycle: (1) With its temperature constantly equal to 7\ it passes from the state in which 0=0i to the state in which 0=0 2; (2) with 0 constantly equal to 02 it passes from the state in which T—Ti to the state in which T=r2; (3) with T constantly equal to Tz it passes from the state in which 0=02 to the state in which 0=0q and (4) with 0 constantly equal to 0i 1 it returns to its initial state, so that T changes from T2 to Ti. In each stage the heat absorbed will be ob¬ tained by integrating along the path that is followed. Thus in the first stage T\ (02 — 0i) units of heat will be absorbed. In the second stage there will be no heat absorbed, because 0 does not change. In the third stage Ti (0i — 02) units of heat will be absorbed; and in the final stage no heat will be absorbed. But as T, the absolute temperature, is essen¬ tially positive, it follows that Tz{

i) = (7\ — Ti) {

the conservation of energy, this must have been converted into some other form of energy. But it is not represented by any increase in the internal energy of the body, because a com¬ plete cycle has been described, and the body has returned to its original state. Hence it has been transformed into mechanical energy. The only heat that has entered the body (in the positive

direction) is the quantity taken in during the first stage of the cycle. Hence the efficiency of the conversion of heat-energy

into mechanical-energy is

(Tx-Tz) (02— 0i) _ Ti—T,

Tl(02 – 0l) Tl

The cycle we have here considered is known as the Carnot cycle, being named for the dis¬ tinguished French founder of the mechanical

theory of heat, who first employed it. An analogous cycle can easity be applied to any other type of energy.

In the foregoing discussion we have as¬ sumed that the processes considered are rever¬ sible, and that any change can take place in either the positive or negative direction. The

theory of irreversible changes is too involved to be considered in the present article — and in fact it has not yet been completely worked out.

Conservation of Energy. — The physical law that is known by this name asserts that the total amount of energy in any isolated system is absolutely invariable in amount. En¬ ergy may be added from without, or abstracted in a similar manner ; but so long as no external influences are permitted to interfere, the total quantity of energy within the system is in¬ capable of either increase or diminution. In a simple case like that of the pendulum this is easily admitted ; but other systems are easily imagined, in which the truth of the law is by no means obvious. For example, a tightly- wound watch-spring possesses potential energy, in virtue of which it may be caused to drive a train of wheels and to do work. But suppose the coiled watch-spring is dissolved in an acid and meanwhile secured in some manner so that it cannot unwind. What becomes of the energy- in the spring? This question would be best answered by experiment ; but in the absence of experimental data the conjecture may be reason¬ ably made that the two sides of the spring, being in different states of strain, act like plates of different metals when immersed in the acid and give rise to electric currents through the liquid, whose combined chemical and thermal effects correspond precisely to the potential energy that was stored in the spring by winding. The simpler case of a body falling freely in a vacuum is also somewhat confusing at first thought, because although it may be ad¬ mitted that the potential energy- is used up by accelerating the body while it is falling, it is by no means evident that the accumulated ki¬ netic energy is not annihilated as soon as the body strikes the ground. But the energy of the falling body is converted into heat when the visible motion is suddenly

arrested, and the body and the ground immediately around it are warmed by an amount that corresponds pre¬ cisely to the kinetic energy that the body had immediately before the arrest. This explana¬ tion is not merely speculative, for it rests upon sound experimental evidence. The arrest of a

cannon-ball is accompanied by the generation of enormous quantities of heat, and the wood¬ work on battleships is often set afire in con¬ sequence of the mere impact of projectiles. The water at the bottom of a waterfall is measur¬ ably warmer than that at the top ; and the rise in temperature that is observed when a falling mass of lead is suddenly arrested was used by Hirn with remarkable success for the deter¬ mination of the mechanical equivalent of heat.

The idea that energy cannot be created ap¬ pears to have been familiar to Galileo, who inferred the fact from a careful study of the simple machines that were in use in his day. There appeared to be many cases in which energy is destroyed, however, and the indica¬ tions were, in fact, that all mechanical energy is gradually wasted away by frictional losses and by others of like nature. In cases in which these losses do not exist, or are neg¬ ligible, the idea of the conservation of the energies of a system, and of the perpetual trans¬ formations of kinetic energy into potential energy and the reverse, proved to be of the greatest service in simplifying the theoretical discussion of many problems in mechanics, even before the modern theory of heat was formulated. The motions of the celestial bodies, for example, are much more easily discussed by the aid of the principle of conservation of energy than they could be without it. The extension of that principle so as to cover all the cases in which it had previously appeared to be violated could not be made until the fact was recognized that heat is not a substance ; for, obviously, it was impossible that a substance could be converted into mechanical energy. In the first years of the 19th century Rumford made experiments tending to prove that heat is not a substance, and he appears to have been convinced, in his own mind, of the correctness of his novel views. A quarter of a century later Carnot probably reached the same con¬ clusion, if we may judge from the note-book that he left among his papers. It was not until about 1840, however, that the great steps were taken that led to the establishment of our pres¬ ent views. Several eminent names are con¬ nected with these beginnings of the modern theory of heat and it is difficult to apportion the credit among them justly. Prominent among these names are those of Seguin, Mayer, Col ding and Joule; but it is undoubtedly to Mayer and Joule that we are chiefly indebted for the new ideas, and the controversies that were rife at one time

concerning the credit that should be given to different investigators for their work along this line were mainly confined to a discussion of the priority and the relative importance of the contributions of these two men.

Dr. Julius Robert Mayer, an obscure physi¬ cian of Heilbronn, Germany, who had had some professional experience in the island of Java, had observed that the venous blood of the Javanese often exhibits the brilliant red color that is commonly observed only in the highly oxygenated blood of the arterial circulation; and after much reflection he came to the con¬ clusion that this is because a lesser amount of oxidation suffices to maintain the temperature of the body in a hot climate than would be required in a cooler one. These observations were made in the summer of 1840. In May

1842 he published, in Liebig's Annalen, a paper entitled (Remarks on the Forces of In¬ organic Nature, in which he gave a preliminary account of his discovery. Here he presents the general outline of the new theory very clearly, and the grasp of the subject that he displays at this early date is truly wonderful. The locomo¬ tive itself was then a great novelty, but he uses it to illustrate the transformation of heat into mechanical energy and back again in the fol¬ lowing sentence, which would be a credit to the most advanced physicist of to-day : <(Our locomotives may be compared to distilling ap¬ paratus ; the heat beneath the boiler passes into the motion of the train, and is again deposited as heat in the axles and wheels.** In 1845 he published a second and much more remarkable paper entitled (Organic Motion in its Connec¬ tion with Nutrition,* in which he gives a de¬ tailed calculation of the mechanical equivalent of heat, from the known specific heats of air.*

The contributions of James Prescott Joule, of Manchester, England, to the mechanical theory of heat and the conservation of energy were the natural outcome of investigations that he had been making upon the heating effects of electric currents. His first paper that distinctly enunciated the new conception of heat as a form of energy was read at Cork, in 1843, before the British Association, and was entitled (On the Calorific Effects of Magneto-Electricity, and on the Mechanical Value of Heat. As first written it was very involved, and Faraday, who appears to have failed to grasp its exceed¬ ing importance, advised Joule not to submit it. He did submit it, however, and in it he gave a number of estimates of the mechanical equiva¬ lent of heat. The paper apparently did not greatly impress either the British Association or the outside world; for when Joule brought the subject up again before the same association in 1847 he had an experience that is best de¬ scribed in his own words : ((The chairman suggested that, as the business of the section pressed, I should not read my paper, but con¬ fine myself to a short verbal description of my*

*experiments. This I endeavored to do, and discussion not being invited, the communication would have passed without comment if a young man had not risen in the section, and by his intelligent observations created a lively interest in the new theory.** The young man was Lord Kelvin, then simply William Thomson, two years out of college. In later years Joule ob¬ tained far better values for the mechanical equivalent of heat, and spent much of his time devising and executing new methods for its determination.*

*In England and the United States Joule is commonly credited with the discovery of the true nature of heat ; but in Europe the honor is frequently given to Mayer. Tyndall compares the two very fairly. <(Withdrawn from mechan¬ ical appliances,** he says, (*

follow the theory into its most abstruse and impressive applications. With their places re¬ versed, however, Joule might have become Mayer, and Mayer might have become Joule.® In 1847 Helmholtz published his remarkable paper entitled (On the Conservation of Energy, } in which the subject was presented with great generality and clearness, and which had a pro¬ found influence in spreading the new doctrine which taught that no energy is ever created or annihilated, but that we have to do merely with endless transformations of it from one form into another. Attempts have been made to deduce the principle of the conservation of energy from the general laws of mechanics, and in many special cases these attempts have been successful, though they cannot be in al! cases, because systems are easily imagined in which the law is not fulfilled. The point is, however, that these imaginary, non-conservative systems apparently do not exist in nature. In allusion to the twofold nature of the subject fthat is, the mathematical and physical aspects), it has been humorously said that everybody believes firmly in the conservation of energy, because the mathematicians believe it to be a fact of observation, while the physicists believe it to be a theorem in mathematics. It is now gen¬ erally admitted, however, to be a fact of ob¬ servation,. the truth or falsity of which is to be established by experiment. Helmholtz proved that in any system composed of particles moving about in paths or orbits, and subject only to <(central forces® (that is, to forces that act always toward fixed centres or foci, or which act, between every pair of particles, along the line adjoining their centres), the energy must be conserved, if the ordinary laws of theoretical mechanics hold true for the motions of the particles of which the system consists. Hence, if it be admitted that all matter consists of atoms that act upon one another only by forces that are central, a long step has been taken toward proving the law for all material systems. Unfortunately,

however, we are not sure that central forces are the only ones that act upon the atom. It is an interesting fact that it was the study of the processes of organic nature that gave Mayer his first inspiration concerning the true nature of heat, and yet it is precisely here that the only doubt as to the entire gener¬ ality of the law of conservation now exists. The most general test that can be applied to a system to enable us to judge from theoretical considerations whether it is conservative or not is this : Let the system be protected from ex¬ ternal influences, and then, at a given instant, conceive the motion of every one of its particles to be precisely reversed in direction, without being modified in any other way. If, when left to itself, the system would then retrace its pre¬ vious history so that the events of that history would recur in reverse order, the conservation of energy is rigorously fulfilled in it. If, on the other hand, the system would not so retrace its history, we cannot affirm that it is conservative, but must test the point by a direct appeal to experiment. Now, although this crucial con¬ dition is frequently fulfilled in inorganic nature, we certainly cannot assert it to be true in con¬ nection with living matter, even with respect to the meanest fungus. Hence we cannot, from reasoning based on the inorganic world alone, draw any sound conclusion whatever about the

conservation of energy in the organic changes that occur in living tissues. To reach such con¬ clusions for the living animal, we must weigh and analyze the food administered and the excreta given off; we must determine the oxygen absorbed and the carbon dioxide and other products exhaled; and we must measure the heat given out and the external work per¬ formed. When these things have been weighed, measured and analyzed for a sufficient period and with the necessary precision, then, and then only, shall we be competent to affirm or deny the truth of the conservation of energy in the animal machine. Such data are difficult to obtain, but much has been done in this direc¬ tion, and while we are not yet prepared to establish it as a fact, beyond controversy, that energy is conserved in the animal body, all the data that we have point to this conclusion and it is now commonly admitted to be true.

The fact that energy (like matter) cannot be either created or destroyed has led physicists to speak of it as though it were a real thing, having an objective existence. It is useful to think of it in this way, and convenient to speak of ((converting® energy from one form into another. In reality, however, it is no more a real thing than is momentum, or "action® (which figures prominently in modern theoretical me¬ chanics). In pure mathematics the theory of transformations makes us familiar with the idea of ((invariant® functions and configurations, which retain their forms or values when sub¬ jected to the given transformations. It is more logical to think of energy as being a similar invariant under the physical transformations that the existing universe and its contents can undergo. If

this be admitted, then the discus¬ sions that are now often encountered, in which the possibility of energy having a molecular structure is considered, must be taken in a figurative sense only. It is quite possible that it is given out discontinuously in connection with radiation phenomena, just as the water handled by a ((bucket brigade,® at a fire, is de¬ livered discontinuously; but the question as to whether or not energy has a molecular struc¬ ture, or a structure of any other kind, appears to have no physical meaning, when interpreted in any strict sense. (For the "quantum hypothe¬ sis® of Planck, see Radiation). For an interest¬ ing expression of Planck's . own view on the molecular-structure conception, after he had given it mature thought, consult his (LeQons de thermodynamiqueP Chevassus' translation, 1913, page 307.

The first systematic paper on the general theory of energetics (as distinguished from writings on the conservation of energy and on the mechanical theory of heat) was Rankine's (Outlines of the Science of Energetics, read before the Philosophical Society of Glasgow on 2 May 1855, although Rankine. two years before that time, had read, before the same society, a somewhat analogous paper containing the germs of the later one, and entitled (On the General Law of the Transformation of. Energy. * The phrase "potential energy® occurs in the earlier of these papers, for the first time.*

Bibliography.— Carnot, Reflections on the Motive Power of Heat (Thurston's transla¬ tion) ; Clausius, (Mechanical Theory of Heat) (Browne's translation) ; Duhem, (Traite ele- mentaire de mecanique chimique,* and (Le*

potentiel thermodynamique) ; Gibbs, (0n the Equilibrium of Heterogeneous Substances) ; Helm, (Die Energetik) ; Helmholtz, (Ueber die Erhaltung der Kraft> ; joule, (Scientific Papers) ; Nernst, (Theoretical Chemistry, } and (Thermodynamics and Chemistry > ; Stewart, (The Conservation of Energy > ; van't Hoff, (Lois de l'equilibre chimiqueP See also Mechanics ; Perpetual Motion ; Radiation ; Radioactivity; Thermodynamics.

Allan D. Risteen,

Director Technical Research, The Travelers Insurance Company.

ENERGISM, the name given by many phil¬ osophical writers to the neo-Aristotelian view concerning the chief ultimate goal of human life. It is summed up in the dictum, (

ENERGUMEN, en-er-gu'men, a person controlled or <(worked up® (hep-yob/ievoe) by evil spirits. The word is in common use in the writings of the Greek and Latin fathers; it is equivalent to the (daipovCo/uevo <;) (possessed by a devil) of the New Testament. In the 3d cen¬ tury the churches kept registers of their ener- gumens and dealt with them much as though they were lepers; they were supported by the alms of the faithful and lodged in dwellings near the churches. The treatment of ener- gumens and their relationship to the Church was discussed at and regulated by a number of synods, especially by that held at Orange in 441 and usually known as Concilium Arausi- cana, See Exorcism. Consult Hefele K. J., (A History of the Councils of the Church (translated by W. R. Clark and others, Vol. Ill, Edinburgh 1883).*

ENERGY, Conservation of. See Ener¬ getics.

ENEURESIS, a symptom of many diseases of the bladder resulting in incontinence or in¬ voluntary passing of urine. It is a prevalent malady of childhood and only becomes of im¬ portance after the period of infancy, when the child should have learned to control the bladder. The control of the bladder is in part a matter of conscious effort, and has its representation in the higher brain-centres. Bladder-control is also exercised by that portion of the sympa¬ thetic nervous system found in the solar and sacral plexuses, and likewise in a number of cells in the spinal cord situated in the lumbar region. Interference with the action of any or all of these centres may result in eneuresis. Disease of the spinal cord may cause excessive irritation of the sympathetic nervous system and may result in nocturnal eneuresis, and the cutting off of the cerebral control may also bring about this condition. During deep sleep the cerebral control is usually cut off, account¬ ing thus for the prevalence of eneuresis in deep sleep in children. Very frequently the imme¬ diate cause of eneuresis is some form of local irritation. This is particularly prevalent in young girls, and should always be removed, if possible, in the treatment. Drug medication is

extremely unsatisfactory for this condition. The most efficient measures consist in building up the general nervous system of the patient by tonics, cold baths and exercise in the open air.

ENFANTIN, on-fon-tan, Barthelemy Prosper, French socialist of the Saint-Simon school: b. Paris, 8 Feb. 1796; d. there, 31 May 1864. He was the son of a Paris banker, and after studying for some years at the Ecole Polytechnique went into business. After trav¬ eling extensively for a number of years he set¬ tled in Paris in 1823. In 1825 he first met Saint-Simon (q.v.) and became strongly inter¬ ested in his political and economic theories. After the July revolution of 1830 Enfantin associated himself with Bazard for the active propagation of Saint-Simonism. They

became the supreme heads of the sect. Bazard ex¬ pounded it in its relations to philosophy and politics; Enfantin mainly in its relations to the social state. They established a paper, called Globe, in which they propagated their views. Soon, however, a schism broke out between the two on the question of marriage and the relation of the sexes, for his views on which Enfantin was, in 1832, sentenced to one year's imprisonment and to pay a fine of 100 francs. This broke up a model community, which, together with 40 of his disciples, he had founded at Menilmontant after the break with Bazard and where he was known as <(Le pere.® Being released from prison at the expiration of a few months he went to Egypt. He was sub¬ sequently appointed a member of the scientific commission for Algiers, and on his return from Africa published (Colonization of Algeria> (Paris 1843). At this time he became again actively interested in business and in 1845 was made director of the Paris-Lyon Railway. After the revolution of 1848 he founded and edited the journal Le Credit, which stopped publication in 1850. He was then made admin¬ istrator of the Lyon Railway, in which position he was quite successful and which he occupied until his death. His library of 1,018 volumes and 63 manuscripts he left to the Library of the Arsenal at Paris. His various writings, all on economic and political subjects, have been published together with those of Saint-Simon as (Oeuvres de Saint-Simon et d'Enfantin) (47 vols., Paris 1865-78). Consult Howse, E. S., (Enfantin and Saint-Simon) (in Theological Review, Vol. IX, p. 50, London 1872).

ENFANTS DE DIEU, on-fan-de-dye, a name of the French Camisards (q.v.).

ENFANTS PERDUS, per-du («lost chil¬ dren®), in military parlance the men appointed to perform some exceedingly hazardous duty from which their chances of returning safely are practically nil. Our English equivalent phrase is <(a forlorn hope.®

ENFEOFFMENT, en-fef'ment, (1) the act of bestowing or investing with a freehold estate ; (2) the instrument or deed by which such estate is conveyed ; (3) the estate so conveyed. See Fee-simple.

ENFIELD, Conn., town in Hartford County, on the Connecticut River and the New York, New Haven and Hartford Railroad, 15 miles north of Hartford. Its chief manu¬ factures are carnets shoddy, powder, filter

presses, supplies for undertakers and bicycles, and it has large brick works.

A large amount of the now celebrated Connecticut tobacco is here prepared for use and shipped to different parts of the world. Shaker Station is a part of the town (see Shakers). It contains a Carnegie library. The government is adminis¬ tered by town meetings. Pop. 11,708.

ENFIELD, England, a market town in the county of Middlesex on New River, nine miles northeast of London. Enfield is the seat of the well-known government manufactory of rifles and small-arms, and the standard rifle used in the British army is made here. At Cuffley, three miles north of Enfield, the first Zeppelin to be brought down on English soil was shot down on 3 Sept. 1916 by Flight-Lieutenant Robinson, who was awarded the Victoria Cross for the daring deed. The airship fell headlong, sinking to the ground in flames, and the mem¬ bers of the crew burned to death. Some noted people have lived in Enfield. See Beaconsfield ; Lamb; Keats. Pop. 56,388.

ENFIELD RIFLE, a muzzle-loading rifle used in the British army prior to the introduc¬ tion of the breech-loading system. It was also used in the United States during the Civil War by the Northern army, when Springfields could not be obtained, and by the Confederate army. In England large numbers of these rifles were converted into breech-loaders on the Snider principle and were known as the Snider-Enfield or simply Snider. The Enfield rifle must not be confused with the recent British Lee-Enfield, which is a modified Mauser.

ENFILADE, en-fi-lad' (from the Fr. en- file?'), in the military art, is to rake by fire the enemy's trenches or positions along the whole length. In conducting the approaches at a siege care must be taken that the trenches be not en¬ filaded from any part of the place besieged. To avoid this they are generally cut in a zigzag. The same principle holds true of trench war¬ fare, where the boyaux or communicating trenches are zigzagged and the firing trenches are interrupted by traverses.

ENFLEURAGE, on-fle-razh, in perfume¬ making, the method of extracting by contact and absorption the scents of flowers used for perfumery. For this purpose wooden frames containing glass smeared with pure grease are filled with flowers, which are allowed to remain from one to six days. The grease gradually absorbs the scent, the flowers being renewed from time to time. The scent is afterward separated from the grease by soaking the latter in strong spirits of wine. Sometimes wire frames covered with cotton cloths, saturated with fine olive-oil, are used instead of glass. In this manner the most delicate odors are extracted from flowers which would be lost in the process of distillation. This process is em¬ ployed especially in the south of France. It is rather complicated, and has the disadvantage of permitting the flowers to come into direct touch with the grease and imparting to it possi¬

bly some impurities. In modern perfume fac¬ tories the process of enfleurage, therefore, is frequently accomplished by placing flowers and grease in separate containers. A current of air is created by means of an exhaust fan in such a manner that it passes first over the flowers

and later over the grease, which latter rapidly absorbs the odors originated by the flowers. Another method consists of passing a current of carbonic acid gas through a tin box con¬ taining fresh flowers and then into a glass jar of strong alcohol cooled by water. The car¬ bonic acid absorbs the odors of the flowers, which, in turn, is absorbed by the alcohol. Con¬ sult Askinson, G. W., (Perfumes and Cos¬ metics, their Preparation and Manufacture) (translated from the German by W. L. Dudley and others, New York 1915) ; Rolet, A. V., (Les Essences et les Parfums) (Paris 1907) ; Piesse, G. W. S., (Chimie des Parfums et Fabrication des Essences) (Paris 1917).

ENG AND CHANG. See Siamese Twins.

ENGADINE, en-ga-den', a beautiful valley in Switzerland, in the Grisons, on the banks of the Inn, bordering on the Tyrol. The extent of the valley is 60 miles and it has an area of 653 square miles. The language generally spoken is the Ladin, a branch of the Romanic tongue. Several towns and villages are situated in the valley, which is visited by numbers of strangers on account of its picturesque beauty and its mineral springs as well as its invigorating climate. Pop. 12,193.

ENGAGEMENT. See Betrothment.

ENGAGEMENT, Military, a minor battle or encounter in which all the parts or divisions of the contending armies do not have a part. Engagements or skirmishes usually occur when major forces are being manoeuvred for position to secure the advantage in a pitched battle. See Military Science; Tactics, Military.

ENGANO, en-ga'no, an island of the Malay Archipelago, 60 miles south of Sumatra. It is covered with forests and surrounded by coral reefs; area, including several small adjacent islands, 300 square miles. The natives are Malays.

ENGEDI, en-ge'di or en'ge-di (Heb. ((Fountain of the Goat®), on the .western shore of the Dead Sea, about 30 miles southeast of Jerusalem. The modern Arabic name is Ain- Jidy. The ancient name was applied also to the eastern part of the wilderness of Judah. The city in the time of Abraham was called Hazazon-tamar (Gen. xiv, 7), the tamar mean¬ ing palm tree. In 1 Samuel xxiv mention is made of David fleeing into the

wilderness of Engedi to escape from Saul. There are nu¬ merous other references to the place in the Old Testament. In modern times nothing remains except the. never-changing effectiveness of the scenery arising from the combination of steep cliffs, the Dead Sea, strange vegetables, balmy air and almost excessive quietness. Consult Robinson, E., (Biblical Researches in Palestine, etc.5 (yol. II, Boston 1841) ; Wilson, Sir C. W., ˆPicturesque Palestine5 (Vol. I, London

1884).

ENGEL, Ernst, German statistician : b. Dresden, 1821 ; d. Berlin, 1896. After a pre¬ liminary education he took up the study of mining engineering at Freiberg and Paris. For a time he was a member of the commission investigating industrial and labor conditions in Saxony, and in 1850 was appointed chief of the Royal Bureau of Statistics at Dresden. He re¬ signed in 1858 and was made chief of the Saxon

Mortgage Insurance Company, but two years later became director of the Prussian Bureau of Statistics, from which he retired in 1882. He was one of the most efficient of modern statis¬ ticians and his investigations into the social condition of the working classes have proved invaluable. He wrote (Die Methoden der Volkszahlung1 (1861) ; (Land und Leute des Preussischen Staates> (1863) ; *Das Zeitalter des Dampfes) (1881).*

ENGEL, Franz, German explorer: b. Robel, Mecklenburg-Schwerin, 1834. He trav¬ eled extensively in South America in the years 1857-63 and published the results of his ex¬ plorations in several valuable volumes, including (Studien unter den Tropen Amerikas) (2d ed., 1879) ; (Aus dem Pflanzerstaate Zulia) (1881). From 1872 to 1896 he published the Landwirth- schaftliche Jahrbiicher.

ENGEL, Johann Christian von, Hun¬ garian historian: b. Teutschau, Hungary, 1770; d. 1814. He received his education at the University of Gottingen, where Heyne and Schlozer were among his teachers. He wrote several historical works which in their day were treasure-houses of knowledge and scholar¬ ship. He was the first to put the history of Hungary on a sound scholarly basis. In 1812 he was ennobled. His greatest works are (Geschichte des ungarischen Reiches und seine Nebenlander> (5 vols., 1797-1804) ; and (Geschichte des Konigreichs UnganP (5 vols.,

1814).

ENGEL, Johann Jakob, German prose writer: b. Parchim, 11 Sept. 1741; d. there, 28 June 1802. On the accession of King Fred¬ erick William III of Prussia, whose tutor he had been, he was invited by his former pupil to Berlin, where he made himself exceedingly useful in the Academy of Sciences by his writ¬ ings. Among his philosophical works may be mentioned his (Der Philosoph fur die Welt, y distinguished for acute observations on men and manners, enlivened by elegant illustrations. Of a similar character is his (Mirror for Princes (Fiirstenspiegel). His (Ideen zu einer Mimik,* full of taste, acuteness and knowledge of human nature, may be regarded as a kind of manual for actors. Anxious to make the German theatre the mirror of the national life, he wrote several plays, but they were of little merit — (Der dankbare Sohn) ; (EdeJ- knaben,* etc. His a novel, is a masterly picture of life and manners. A complete edition of his works appeared at Berlin (1801-06).*

ENGEL, Joseph, Austrian anatomist: b. Vienna. 1816; d. 1899. He was appointed pro¬ fessor of anatomy at Zurich in 1844 and later the chair of physiology fell to him also. Five years afterward he was appointed to the chair of pathological anatomy at the University of Prague. In 1854 he became professor of an¬ atomy at the Josephakademie, Vienna, in which position he remained until 1874. He made many important contributions to the system¬ atization of anatomical science and its study. His principal works are (Lehrbuch der pathol- ogischen Anatomie, and (Kompendium der topographischen Anatomie) (1859).*

ENGEL, Karl Dietrich Leonhard, German musician and writer : b. grand duchy of

Oldenburg, 21 Feb. 1824. He went to Russia as a violin virtuoso at the age of 18, becoming a member of the Imperial Orchestra at Saint Petersburg at 22, and later its concert-master. He went to Dresden in 1869 and took up his residence there. Among his works are (Deutsche Puppen Komodien (1874-93) ; (Das Volksschauspiel Doktor Johann Faust> (2d ed., 1882) ; (Zusammenstellung der Faust- schriften vom 16 Jahrhundert bis Mitte 1884) (2d ed., 1884) ; (Die Don Juan Sage auf der Biihne* (1887). His musical compositions in¬ clude a concerto in B minor and the humorous fantasy entitled (Jiidischer Carneval.*

ENGELBERG, Switzerland, a noted health resort, situated in Unterwalden Canton, in the Engelberg Valley, about 3,500 feet above sea- level, and 15 miles south of Lucerne. It is the seat of a Benedictine monastery, dating from the 12th century, with a library of 20,000 volumes, including incunabula and manuscripts of great value. Connected with the monastery is a gymnasium which was founded in the 11th century. Cheese-making is the main industry. Pop. 2,500.

ENGELBERT, Bohemian monastic author: b. Volkersdorf, Styria, about 1250; d. 1331. He received his education at Prague and Pad¬ ua, entered the order of the Benedictines and in 1297-1327 was abbot of Admont, Styria. He is best known to scholars through his Roman history; entitled (De Ortu, Progressu et Fine Imperii Romani,) which has gone through numerous editions. For other works of this author consult (Thesaurus Anecdoto- rum Novissimus) (1721) and (Bibliotheca Ascetica Antiquo-nova) (1723-25).

ENGELBERT, Saint, archbishop of Co¬ logne: b. Berg, 1185; d. 1225. In 1206 he was excommunicated, but was restored to friendly relations with the Church and reinstated two years later. In 1216 he was appointed arch¬ bishop of Cologne. He was one of the most progressive men of his age ; he greatly im¬ proved the administration and governmental methods of his see ; patronized agriculture, the industries and art, and opposed the repressive and cruel methods of the feudal barons. He reformed the electorate and after 1220 was ad¬ ministrator of the empire. In 1222 he crowned Henry VII. He was assassinated by hirelings of his nephew whom he had accused of mal¬ administration. He is commemorated as a martyr on 7 November, although he has never been formally canonized. Consult Stoffel, (Engelbert aer Reichsverweser (Elberfeld*

1893).

ENGELBRECHT, Theodor Heinrich,

German geographer : b. Obendeich, Schleswig- Holstein, 1853. He acquired his education at the universities of Leipzig and Strassburg, and in 1911 received the honorary degree of doctor from the University of Breslau. In 1895 he became a member of the Free Conservative party in the House of Deputies. His works in¬ clude (Die Landbauzonen der aussertropischen Lander (3 vols., 1899), a valuable work on the study of agriculture in Europe; (Die geo- graphische Verteilung der Getreidepreise* (2 vols., 1908), the first volume dealing with the United States, the second with India; (Boden-*

i

bau unci Viehstand in Schleswig-Holstein

(1905).

ENGELBRECHTZEN, eng'el-breHt-zen, Cornelis, Dutch painter : b. Leyden, 1468 ; d. there, 1533. He was the son of the wood- engraver Engelbert, and the teacher of Lucas, being the earliest known painter in Leyden and the first of his nation to use oil colors. Many of his works were destroyed during the Refor¬ mation, and the only two properly authenti¬ cated pictures of large size are altarpiece with Moritz Chapel, Nuremberg; ˆfa- donna and Child, 5 National Gallery, London; (Crucifixion, 5 Venice Academy. The Van Ley¬ dens were his pupils.

ENGELHARD, Friedrich Wilhelm, fred'- riH vil'helm eng'el-hart, German sculptor and painter: b. Griinhagen, Prussia, 19 Sept. 1813; d. 22 Jan. 1902. He studied at Hanoverˆ at Co¬ penhagen with Thorwaldsen and at Munich with Schwanthaler. He executed many groups, single figures and genre pieces. Among his creations are Cove on a Swan5 ; dancing Springtime5; dinger with Dog1 ; dacchus Conquering a Panther5 ; Cupid and Psyche5 ; the frieze of the (Edda,5 his chief work; (A Child Fishing5 ; (A Child Threading a Needle5 ; statue of (St. Michael5 ; portrait medallion of Bismarck for the monument of Canossa, near Harzberg; Christ Blessing Little Children5; and the legendary characters of Germany, Cdin,5 (Thor5 and the Valkyries.*

ENGELHARDT, Georg von, Russian statesman: b. Riga, 1775; d. 1862. He went to Saint Petersburg in 1790 and six years later secured a post in the Department of Foreign Affairs. He became Undersecretary of State in 1801 under Alexander I. Pie was made di¬ rector of the Pedagogical Institute in 1811 and of the Lyceum at Tsarkoe-Selo in 1816. His liberalism, however, led to his removal in 1823. From 1838 to 1852 he edited the Russische Landwirtschaftliche Zeitung. He published (Russische Miscellan zur Kenntnis Russlands und seiner Bewohner5 (4 vols., 1828-32) and edited the manuscript journals of the explorer, Wrangel, which he issued in (Reise langs der Nordkiiste von Sibirien und auf dem Eismeer5

(1839).

ENGELHARDT, Johann Georg Veit,

German theologian: b. Neustadt-an-der-Aisch, Bavaria, 1791 ; d. Erlangen, 13 Sept. 1855. In 1822 he became professor of theology at Erlan¬ gen; during the years 1845, 1847 and 1848 was the representative of his university in the diet at Munich. His most celebrated works are a translation of the writings ascribed to Diony¬ sius the Areopagite; (Handbuch der Kirchen- geschichte5 (1834) ; (Richard von St. Victor und Johannes Ruysbroek5 (1838) ; (Dogmen- geschichte5 (1839).

ENGELHARDT, Moritz von, Russian naturalist: b. Esthonia, 1779; d.

1842. He re¬ ceived his education at Leipzig and Gottingen and the Freiberg mining school. He made a tour of Europe with Karl von Raumer and in 1811 visited the Crimea and Caucasus with von Parrot, and seven years later he traveled

through Finland. He taught mineralogy at Dorpat in 1820-30, and thereafter traveled and explored Russia, discovering vast deposits of gold, platinum, etc., detailed in his reports, which were issued at Riga in 1830. His prin¬ cipal works are (Geognosticher Umriss von Fin¬ land5 (1821); and, with von Raumer, (Geog- nostische Versuche5 (1816) and (Geognostische Umrisse5 (1817).

ENGELHARDT, Vassili Pavlovich,

Baron, Russian astronomer: b. Kustovitchi, Grodno, 1828. He received his education in Saint Petersburg, entered the government em¬ ploy in 1847 and remained in its service for six years. He built an astronomical observatory in Dresden in 1872. He also gave valuable as¬ tronomical instruments to the University of Kazan and erected buildings there to house them. His published works include Observa¬ tions astronomiques faites a Dresde5 (3 vols.,

1886, 1890, 1895).

ENGELHARDT, Zephyrin (Charles Anthony), American writer and missionary: b. Bilshausen, Hanover, Germany, 13 Nov. 1851. He came to the United States in 1852, was edu¬ cated in the parish schools and Saint Francis Seraph College, Cincinnati, Ohio. In 1872 he entered the Franciscan order, was ordained to the priesthood in 1878 and in 1878-80 was teacher at Saint Joseph's College, Cleveland, Ohio. From 1880 to 1885 he was missionary to the Menominee Indians in Wisconsin and from 1885 to 1887 was stationed at Superior City, Wis. He was vice-commissary for the Holy Land and editor of the Weekly Pilgrim of Palestine at New York in 1887-88 and for the ensuing two years was missionary in Men¬ docino County, Cal. From 1890 to 1894 he was stationed at Saint Joseph's Monastery, Cleveland, and from 1894 to 1900 was superior of the missions of his order in northern Michi¬ gan and of the Indian Boarding School, Har¬ bor Springs, Mich. In 1901 he was stationed in California. In 1895 he founded and for five years edited the Anishinabe Enamiad, a period¬ ical in the Ottawa-Chippewa language. He is a member of the Texas Historical Association and of the National Geographical Society and has published (Kachkenohamatwon Kesekoch5 (1882) ; (Kateshim5 (1883) ; (The Franciscans in California5 (1897) ; (Missions and Mission¬ aries of California5 (5 vols., 1908-16) ; (The Holy Man of Santa Clara, or Life of Father Magin Catala5 (1909). He is a

contributor to Katholische Missionen, California Volksfrennd, Sankt Josephsblatt. He writes in German un¬ der the nom-de-plume of (

ENGELMANN, George, American bot¬ anist: b. Frankfort-on-the-Main, 2 Feb. 1809; d. Saint Louis, Mo., 4 Feb. 1884. He studied medicine at the universities of Heidelberg, Ber¬ lin and Wiirzburg, receiving the degree of M.D. from the last-named institution in 1831. The first half of 1832 he spent in study at Paris where he met Braun and Agassiz. In Septem¬ ber 1832 he sailed for the United States where relatives of his had bought some land in the Mississippi Valley. In 1835 he began the prac¬ tice of medicine at Saint Louis, Mo. Although he was highly successful in the practice of his profession, he had, even during his student days, become deeply interested in botany. This in-

terest grew gradually until almost all his leisure hours were occupied with scientific investiga¬ tions, chiefly in relation to botany, although some of them were devoted to meteorology. As his success in his profession increased he found it possible at times to take protracted vacations, some of which he spent abroad and all of which he devoted to botanical investigations. The re¬ sults of these were some 100 papers published at various times in different scientific journals, especially in the transactions of the Saint Louis Academy of Science which were examples of the most painstaking and thoroughgoing scholar¬ ship. He soon was recognized as an authority on the botany of the North American continent. The most important of his papers were on Cus- cutinae, Cacteae, Coniferae, American oaks and grape vines.. They together with all his other writings, hardly less important, have been col¬ lected and published, illustrated by many plates, as (The Botanical Works of the Late George Engelmann) (ed. by W. Trelease and Asa Gray, Cambridge, Mass., 1887). This publication also contains an exhaustive biographical sketch. He was the first president of the Saint Louis Academy of Science and an active or corre¬ sponding member of many learned societies. His extensive botanical collection is in the Shaw Botanical Garden, Saint Louis, Mo.

ENGELMANN, Johannes, Russian jurist : b. Mitau, Courland, 7 July 1832. Educated at the University of Saint Petersburg he became professor of Russian law at Dorpat 1860, re¬ taining the chair for 39 years, and delivering his lectures in Russian instead of German after 1887. These lectures covered a wide field and contributed greatly to the advancement of the science of jurisprudence in Russia. Among his works are (Die Verjahrung nach russischem PrivatrechD (1867; in Russian, 1868); (Die

Zwangsvollstreckung auswartiger richterlicher Urteile in Russland) (1884) ; and (Das Staats- recht Russlands) (1888).

ENGELS, Friedrich, German Socialist: b. Barmen, Prussia, 28 Nov. 1820; d. London, 5 Aug. 1895. The son of a German manufac¬ turer he spent two years in Manchester, Eng¬ land, 1842-44, and took part in the revolution¬ ary movement in Baden in 1848. He returned to Manchester in 1850, and was partner in a manufacturing business from 1860-69, after which he lived mainly in London. He was an intimate friend of Karl Marx (q.v.), and his most efficient helper in the work of organizing the International Socialist movement. In 1870 Engels was corresponding secretary of the In¬ ternational Workingmen's Society for Belgium, Italy and Spain. With Marx he wrote the Communist Manifesto) (1847); he also wrote

(1899).

ENGERTH, eng'ert, Eduard von, Aus¬ trian painter: b. Pless, Silesia, 13 May 1818; d. 1897. He was a pupil of the Vienna Academy, taking- the gold medal there in 1845. He be-

came director of the Prague Academy 1854 and in 1855 professor at the Vienna Academy. He was appointed director of the Belvedere Gallery 1871 and director of the Academy 1874. He was made commander of the order of Francis Joseph 1867. Among his works are (Haman and Esther; (Ladislaus and Akus) (1844);*

(Coronation of Rudolph P ; (Joseph Explaining the Dream (1845) ; (Seizure of King Man¬ fred's Family* (1853), a masterpiece in the Vienna Museum; (Victory of Prince Eugene at Zenta* (1865) ; 'Marriage of Figaro* ; 'Fable of Orpheus* (1868); (Coronation of Francis Joseph as King of Hungary* (1870) ; 'Death of Eurydice) (1877). Engerth frescoed the church at Alt Lerchenfeld after the car¬ toons of Fiihrich, painted numerous portraits and decorated the new Vienna Opera House.*

ENGERTH, Wilhelm, Baron, Austrian en¬ gineer: b. Pless, Prussian Silesia, 1814; d. 1884. He received his education in architecture at the Polytechnic Institute and the Academy of Arts, Vienna. He became professor of mechanical engineering at Gratz in 1844. He is known in¬ ternationally as the inventor of the ((Engerth system® for freight locomotives, which was gen¬ erally adopted throughout Europe. He also designed and constructed a river gate near Nussdorf to prevent ice from entering the Danube Canal, which previously was the cause of annual inundations. In 1873 he was

super¬ vising architect of the Vienna Exposition build¬ ings and had complete charge of the engineering department at the exposition.

ENGHIEN, an-gan, Louis Antoine Henri de Bourbon, Duke of, French prince: b. Chan¬ tilly, 2 Aug. 1772; d. Vincennes, France, 21 March 1804. He was the only son of Louis Henri Joseph Conde, Duke of Bourbon. From 1796 to 1799 he commanded with distinguished merit the vanguard of Conde's army, which was disbanded at the Peace of Luneville (1801). He then married and took up his residence at Etten- heim, in Baden. He was generaly looked upon as the leader of the emigres, and was suspected by the Bonapartists of being privy to the attempt of Cadoudal to assassinate the First Consul in 1804. The spies of Napoleon reported that Enghien was often absent for 10 or 12 days together from Ettenheim, and it was believed that on some of these occasions he had secretly visited Paris. Napoleon therefore invaded the neutral duchy of Baden and the Duke of Enghien was seized 15 March 1804, conducted to Strassburg, and thence to the fortress of Vincennes, where he arrived on the evening of the 20th. That same night a court-martial was assembled; his innocence being established, the ground of accusation was changed into that of compassing a new coalition against France, of which he was adjudged guilty. He requested an interview with Bonaparte, which was refused, and he was immediately led out to execution. He was shot between four and five o'clock in the morning in the ditch outside the walls, and his body was thrown, dressed as it was, into a grave dug, it is said, the day before. His execu¬ tion was followed by an indignant protest and the rupture of diplomatic relations with Russia ; but of the deed Napoleon never repented. He was the last representative of the house of Conde. Consult Dupin, 'Pieces judiciaires) (Paris 1823), and 'Memoires historiques sur 1?,

catastrophe du Due d'Enghien) (Paris 1834) ; Fay, {The Execution of the Due D'Enghien) (in the American Historical Review, New York 1899) ; Welschinger, (Le Due d'Enghien) (Paris 1888).

ENGINE. A motor or prime mover which is capable of utilizing natural forces, such as the pressure of steam or the expansion of a gas, and converting those forces into mechan¬ ical energy in the form of motion, which may be employed for doing mechanical work, thus distinguishing it from a ((machine,)) which can receive motion only from a motor or engine external to itself.

The term engine was originally used in the sense of a machine, a usage

which survives in rose-engine and cotton-gin (gin being simply a short form for engine). The first textile ma¬ chines were called engines, and we still speak of engines of war. But when steam engine be¬ came familiarly shortened to engine, the term was confusing, and gradually machine was sub¬ stituted for the word engine in nearly all uses except for generation of power.

All heat engines act through the medium of a working substance which absorbs heat, con¬ verts a portion of that heat into mechanical energy, which is represented by the work per¬ formed by the engine, and rejects the remaining portion of the heat, still in the form of heat. The working substance may be a gas, a liquid or a solid. The various successful forms of heat engines may be conveniently grouped into three general classes — steam en¬ gines, gas and oil engines, turbines and rotary engines.

Steam Engines. — In ordinary forms of steam engines the working substance is sat¬ urated steam, a fluid consisting of a mixture of water and steam in varying proportions, the expansive energv of which is utilized to drive or impart motion to a piston working within a cylinder.

Miscellaneous Engines. — Many engines are named from some distinctive feature of their mechanism or a peculiarity of construction. Hence there is the automatic engine, one that is self-regulating, requiring little attention. In a stationary engine this would mean one that regulated its own speed or point of cut-off; in an automobile engine it would mean one, that would run without attention, as long as the gasoline feed, carburetor, spark-plug, etc., were in order. A cut-off engine is one in which the steam or motive fluid is cut off before the end of the stroke. A quadrant engine is one having a piston that moves in a quadrangular chamber. A reciprocating engine is the most ordinary type, in which the piston moves back and forth. A direct-connected engine is one that has the crank-shaft extended to form the main shaft of a dynamo. A multi-cylinder en¬ gine is one having several cylinders operating on the same shaft, as a 6- or 8-cylinder auto¬ mobile engine. A self-contained engine is one in which the engine and boiler are both housed in one framework. A screw or propeller en¬ gine is a marine engine for driving a screw- propeller. A series-expansion engine is one having several cylinders in which the steam or motive fluid is successively expanded. A twin cylinder engine is one having two cylinders formed in one casting or aen bloc .})

High-Speed Engine. — One in which the pistpn speed is rapid, according to some authori¬ ties exceeding 900 feet per minute. It pos¬ sesses the advantages of small dimensions and small weight for a given power, and on account of the frequency of its strokes is capable of meeting variations in load more quickly than a low-speed engine. Its disadvantages consist in the

greater waste of steam, the greater wear, increased danger of heating and higher cost of construction and operation.

Low-Speed Engine. — « One in which the piston speed is slow, according to some authori¬ ties, less than 600 feet per minute.

Single-Acting Engine. — One in which the pressure of the steam is exerted only on one side of the piston, which is forced back again by the pressure of the atmosphere on the other side against the vacuum produced by the con¬ densation of the spent steam. They were for¬ merly used chiefly for pumping purposes, and in connection with steam hammers, but are now practically out of date.

Double-Acting Engine. — One in which the steam in the cylinder is exhausted into the piston, either against the pressure of the air, or against the vacuum of the condenser. Origi¬ nally, all engines were made single-acting, but nearly all modern steam engines are double¬ acting.

Direct-Acting Engine. — One in which the

action of the piston is transmitted directly to the crank-shaft. Nearly all engines are of this type.

Indirect-Acting Engine. — One in which the

motion of the piston is communicated to the crank-shaft by means of intermediate levers. In the beam-engine, the connection between the piston and the connecting rods consists of a beam, the oscillating point of which is placed midway between the two rods. They are chiefly employed for pumping purposes and for driving paddle-wheel steamers. Other than in this lim¬ ited field, they are becoming obsolete.

Expansive Working Engine. — An engine is worked expansively when the steam, instead of being admitted at full pressure into the cylinder until the termination of the stroke, is cut off at some fractional part of the stroke and thus caused to do work simply by its own expansion. The steam may be expanded in one or more cylinders. The amount of steam consumed is low as compared to the amount of work done. It is universally used where circumstances will permit, on account of its greater economy as compared with the engines of the non-expansive working type.

Non-expansive Working Engine. — An en¬ gine in which the steam is allowed to enter the cylinder at boiler pressure and is maintained at that pressure behind the piston during the whole of the stroke. The amount of steam consumed is disproportionately high as com¬ pared to the work done.

Condensing Engine (called also low-pres¬ sure or vacuum engine). — One in which the spent steam in the cylinder is exhausted into a vacuum and condensed into water, thus oblit¬ erating the back pressure of the atmosphere and consequently effecting a gain of pressure equivalent to 14.7 pounds per square inch in the effective working pressure of the steam.

Non-condensing Engine (called also high-

pressure engine). — One in which the spent steam in the cylinder is exhausted into the air at atmospheric pressure, thus entailing the work of forcing the piston against a back pressure of 14.7 pounds per square inch, at the expense of the effective working pressure of the steam. This disadvantage is offset by using steam at higher pressures.

Simple Engine.— One in which the steam after having forced the piston through its stroke is exhausted into the air or into a vacuum or condenser.

Compound Engine. — An engine with two or more cylinders in which the steam after having expanded and performed its work in one cylin¬ der passes into the next cylinder, of larger size, and continues to expand and perform work. The different types of compound engines are distinguished as ˆseries-expansion® engines or by the number of cylinders employed for the expansive working of the steam, and are desig¬ nated as the two-cylinder compound engine, the three-cylinder or triple-expansion engine and the four-cylinder or quadruple-expansion engine. The cylinders are usually arranged side by side or parallel with each other. Some¬ times, as in the case of the ˆtandem-compound,® they are placed in line one behind the other, and also vertically one above the other as in the case of the (

Air (or Hot Air) Engine. — An engine in which the working fluid is air expanded by heat. It is only of experimental interest.

Horizontal Engine. — One in which the axis of the cylinder and piston rod is horizontal.

Vertical Engine. — 'One in which the axis of the cylinder and piston rod is vertical. Vertical engines are made in a great variety of forms and are usually arranged with the cylinders uppermost. Very few of them are constructed with the cylinders lowermost and those are only of the smallest sizes. The principal ad¬ vantages of the vertical engine consist in the small space required for their foundations and the uniformity of wear on the cylinders, pistons and rods. The type includes many forms of steam

hammers, launch engines, screw engines and inverted cylinder engines.

Inverted Cylinder Engine. — A vertical en¬ gine, in which the cylinder is inverted or placed above the piston rod, connecting rod and crank¬ shaft. It is typical of the marine engines em¬ ployed to drive screw propellers.

Inclined Engine or Inclined Cylinder En¬ gine. — A form of marine engine in which the cylinders are inclined toward each other at an angle of about 120 degrees and make a triangle with the base. They are connected by cranks to a common crank-shaft.

Beam Engine. — An indirect-acting engine in which the piston rod is connected to the con¬ necting rods by means of a lever in the form of a beam. It is more fully described under the term Indirect-Acting Engine.

Oscillating Engine. — A marine engine of the direct-acting type, in which the cylinders are suspended upon hollow trunnions and oscil¬ late thereon, thus allowing the motion of the piston rods to accommodate itself to that of the crank at all parts of the revolution. It occu¬ pies but little space and is peculiarly adapted for paddle-wheel steamers. It survives mainly in toy engines because of its simple con¬ struction.

Trunk Engine. — An engine having a large hollow piston open at one end and ' called a trunk. The connecting rod goes right into the open end of this trunk-piston and is attached directly to the piston-head, so that there is no piston rod. It is used in some forms of gas engines and toy engines.

Corliss Engine. — A very economical type of engine, in which the valves are controlled auto¬ matically from the governor and the steam sup¬ ply proportioned to the requirements of the engine at each moment during its working stroke. The valve forms a segment of a circle and turns through an arc of a circle and alter¬ nately covers and uncovers the steam port. It is operated by a rod from a wrist plate, but is disconnected at every stroke of the engine and the supply valve closed instantaneously by means of a dash-pot.

Cornish Engine.— A standard type of pump¬ ing engine, originally of the single-acting type. At the present time it appears in two forms — • the beam engine and the direct-acting engine. The valves of a Cornish engine are operated by a special device called a cataract, consisting of a weighted piston which works in a cylinder provided with a large inlet valve and a small discharge valve. The working stroke of the pump lifts the weighted piston and draws the water into the cylinder through the former, and the return stroke discharges it through the latter and at the same time actuates the valves of the steam cylinder of the pump so as to cause another working

stroke.

Marine Engine. — Any form of engine used for propelling a vessel. They are usually of the compound or multiple-expansion type.

Stationary Engine. — An engine on fixed foundations, as distinguished from the locomo¬ tive, portable and marine engines.

. Locomotive Engine. — A high pressure steam engine and multitubular boiler complete, mounted on a carriage and provided with suitable wheels to enable it to draw loaded cars upon a permanent way or railway track. See Locomotive.

Portable Engine. — A small engine of the locomotive type, mounted on a carriage which permits of its being moved from place to place for use in connection with work of a temporary character. Portable engines are extensively used for agricultural purposes and for general traction purposes on ordinary highways.

Gas and Oil Engines. — These classes of heat engines are commonly designated as in¬ ternal-combustion engines. See Internal Com¬ bustion Engine and Diesel Engine.

The Slide-Valve. — 'The introduction of the slide-valve for operating the ports of a steam engine marked a distinct advance in economy, because it can be made at exactly the right time and also because it admits the hot steam to the cylinder through a port which has just been

cooled by the exhaust. As ordinarily con¬ structed the slide-valve is a sliding D-shaped piece in the steam-chest, moving back and forth over the three ports — the two end-ports of the cylinder and the exhaust port in the centre — and permitting the steam to pass alternately to either end of the cylinder to push the piston and opening the exhaust for the release of the used steam. There are (

Superheating. — Originally, saturated steam was the only sort employed in steam engines, but as multiple-expansion developed and higher pressures were carried in boilers the use of superheated or dry steam at as high as 500° C. was tried, and it was demonstrated that the hotter the steam was the more it expanded and the greater the power to be got out of it. Superheating began experimentally about 1895 and was operated in connection with an econo¬ mizer. This is a mechanism for utilizing the

waste heat and turning it into the feed-water, so that hot water, close to the boiling point, can be supplied to the boiler. Engines using super¬ heated steam have been operated with as little as 1.3 pounds of coal per indicated horse power. See Locomotive.

*Steam Turbines comprise a class of heat engines *in which the kinetic energy of expand¬ ing steam is utilized to drive a wheel and thus convert the natural heat energy of steam di¬ rectly into mechanical energy in the form of rotary motion. The principal forms are the Parsons, De Laval, Seger and Curtis turbines, and their first field of application and develop¬ ment was in the marine service. Noteworthy examples of their application are the Lusitania and Mauretania ocean steamships and many of the modern <(dreadnaught® type of battle¬ ships. They are now coming into use in large lighting stations and mammoth manufacturing plants. See Turbine.*

Hydraulic Engines. — • Mechanical power is obtained from flowing water by its weight, pressure or impact, utilized in various forms of water wheels, turbines, hydraulic rams and water-pressure engines. In the water-pressure engine the pressure of the water only is util¬ ized to drive a piston in a cylinder. In some forms the action of the piston is reciprocating and in others rotary. In all of them the actual amount of pressure expended is only that which is needed to impart motion to the fluid to fol¬ low the piston and escape from the cylinder, and, therefore, the greatest efficiency is obtained by making the piston as small as practicable and using a large pressure. The majority of them are of the reciprocating, low-speed type, and are particularly useful as secondary motors for operating the opening machinery of various forms of swing, draw and lifting or rolling bridges, and in connection with cranes and va¬ rious forms of hydraulic lifts.

For futher detailed information relative to the construction, operation and application of the various forms of engines, consult the arti¬ cles under the titles Automobile; Aeroplane; Internal Combustion Engine ; Locomotives ; Motor; Pumps and Pumping Machinery; Ro¬

tary Steam Engine; Traction Engines; Tur¬ bine; Water Motor; Water Wheel.

Charles H. Cochrane, Author of (Modern Industrial Progress P

ENGINE, Testing of. Engines are tested in order to determine the economy with which they produce a given amount of power. The economy of steam engines, as usually deter¬ mined, relates to the weight of steam con¬ sumed, or to the quantity of coal used in mak¬ ing the steam, or to the number of heat units supplied; while in the case of an internal com¬

bustion engine, it relates to the amount of gas, gasoline, oil, alcohol or other fuel burned. Also, if the latter operate on producer gas, the determination of economy involves the amount of coal burned in the gas producer.

Factory tests are generally limited to the performance of individual engines, to determine the set of the governor relative to the proper speed and to ascertain if the valves are set and operate properly. In the case of gas engines, the factory test is extended to cover the cor¬ rect timing of the igniter and to determine the correct compression.

In its broadest sense, however, testing is a form of scientific investigation conducted for the purpose of securing practical results which are very important not only to the manufacturer, but also to the owner of the engine who has to pay the expense of its operation and to those who require information showing the capabili¬ ties of the machines for the purpose of advertis¬ ing and trade.

As an engine test involves the determination of two elementary quantities-— (1) the amount of fuel consumed, and (2) the amount of power developed — it is necessary that these two factors should be represented by units of measurement which are susceptible of universal application.

Standard Unit of Fuel. — The most satisfac¬ tory unit for expressions of economy based on the amount of fuel consumed is the British Thermal Unit (B.T.U.), which is the quantity of heat required to raise one pound of water 1° F. at or about 39.1° F. According to Joule, it is equivalent to 778 foot-pounds of mechanical energy.

A convenient and useful subsidiary standard is that based on a "standard coal® unit, the term "standard coal® defining a coal which im¬ parts to steam 10,000 B.T.U.'s for each pound of dry coal consumed. It is a coal which has a calorific value of 12,500 B.T.U.'s, equivalent to an efficiency of 80 per cent when used in a "standard boiler.®

Standard Unit of Power. — The unit of mechanical power which most satisfactorily ex¬ presses the power developed by an engine is the "horse power,® which represents an energy of 33,000 foot-pounds per minute, equivalent to 2,545 B.T.U.'s per hour.

Standard of Engine Economy. — Employ¬ ing the given standard units of fuel and power, the expressions of engine economy which are best adapted to meet all conditions of service and for all classes of heat engine are those rep.- resented by the "indicated® horse power based on the number of B.T.U.'s consumed per hour.

Such an expression is commonly called a horse power hour and represents a heat energy of 1,980,000 foot-pounds converted into me¬ chanical power or work by the consumption of 2,545 B.T.U.'s per hour.

Rules for Conducting a Test. — All tests should be conducted systematically under a set of standard rules, clearly defining the character of the data to be obtained and the methods which should be employed for their determina¬ tion. A set of such rules may be briefly defined as follows :

1. Object of the test. — At the beginning, the specific object of the test should be ascer¬ tained. It may relate to the determination of highest economy obtainable ; the economy under ordinary working conditions and the existing defects ; the performance under special condi¬ tions ; the effect of changes in existing con¬ ditions ; or the fulfilment of a contract guar¬ antee ; and the preparations for the test should be made accordingly. These preparations will necessarily depend largely upon the good sense, judgment and ingenuity of the engineer making the test.

2. Condition of the Engine. — The engine should be carefully examined and its general condition noted, especially any points of design, construction or operation which bear upon the object of the test. Special examination should be made of all valves, by inspecting their seats and bearing surfaces and great care taken to ascertain, in the case of a gas engine, that the piston rings work freely in their grooves and are perfectly gas-tight.

3. Dimensions. — The cylinder dimensions should be taken whether they are already known or not, the measurements being made when they are hot and in working order. When practica¬ ble, the clearance volume or compression space of the cylinder should be measured by filling it with water previously measured, the proper correction being made for temperature.

4. Fuel. — When the test involves the com¬ plete plant — in the case of a steam engine in¬ cluding the boilers, and in the case of a gas en¬ gine including the gas producer plant — the class, name of coal mine, size, moisture, should be stated in the report — and the quality of the coal used should be of some recognized standard. This is desirable for purposes of comparison. In the case of an internal combustion engine, if the test is made to determine the maximum efficiency, the gas, oil, or other fuel used,

should be the best obtainable, or one that possesses the highest calorific value.

5. Measurement of Fuel. — The methods of determining the amount of fuel consumed de¬ pend upon the character of the fuel used. If it be coal furnished to the furnace of a boiler, or to a gas producer, the amount consumed during a period not less than 24 hours should be care¬ fully measured by weight. If it be oil, gasoline, distillate, alcohol, etc., it can be drawn from a tank, which can be refilled to the original level at the end of the test, and the amount required for this purpose weighed; or in the case of a small engine, it can be drawn from a properly calibrated vertical pipe. When gas is used, it should be measured by a suitable gas metre and gas bags should be placed between the metre and the engine to keep the pressure as constant as possible. The pressure and temperature of the gas and the barometric pressure and tempera¬ ture of the air should be measured and in determining the quantity of the gas supplied, as given by the reading of the metre, the tempera¬ ture and pressure of the gas should be taken into account.

6. Measurement of Heat Units Consumed. — The number of heat units consumed by the engine can be found by multiplying the number of pounds of coal or oil, or the cubic feet of gas supplied, by the total heat of combustion of the fuel as determined by a calorimeter, or from the results of a chemical.analysis. In determin¬ ing the total heat of combustion, usually no deduction is made for the latent heat of the vapor of water in the products of combustion, therefore, for purposes of comparison, care should be taken to state whether the higher or the lower value has been used in the deter¬ mination.

The Mahler calorimeter is a type much used for determining the heat of combustion of solid fuels and oils and the Junker calorimeter for gases.

7. Instruments and Their Calibration. — All instruments and apparatus used in the tests should be calibrated and their accuracy veri¬ fied by comparison with recognized standards. All such as are liable to undergo changes, or become broken during the progress of a test, especially gauges, indicator springs and ther¬ mometers, should be calibrated both before and after the test.

Gauges. — For measuring pressures above that of the atmosphere, the most convenient and reliable standard is the dead-weight testing ap¬ paratus, consisting of a cylinder having a close- fitting vertical piston working in oil or glycer¬ ine, by the medium of which the pressure is transmitted to the gauge. The piston is sur¬ mounted by a circular stand on which weights may be placed so as to secure any desired pres¬ sure. The total weight, in

pounds, on the piston, divided by the area of the piston, in square inches, gives the pressure in pounds per square inch.

The mercury columri is another reliable standard of comparison for pressures, but when it is used care should be taken to see that it is properly graduated with reference to the ever varying zero point; that the mercury is pure and that the proper correction is made for any difference of temperature that may exist at the time of using and the temperature at which the instrument was graduated.

For pressures below that of the atmosphere, the use of an air pump or some other means of producing a vacuum is required. The apparatus must be referred to a mercury gauge, which may consist of a U-shaped tube about 30 inches in length, with both arms properly filled with mercury.

Thermometers. — Standard _ thermometers are those which read 212° F. in steam escap¬ ing from boiling water at the normal barometric pressure of the atmosphere (29.92 inches) when the whole stem up to the 212° point is sur¬ rounded by the steam ; and which read 32° F. in melting ice, when the stem is com¬ pletely immersed to the 32° point; and which are calibrated for points between and beyond these two points of reference.

For temperatures between 212° and 400° F., the thermometers should be compared with the temperatures given in Regnault's Steam Tables, by placing it in a mercury well sur¬ rounded by saturated steam under sufficient pressure to give the desired temperature.

For higher temperatures, such as those oc¬ curring in gas-engine practice, which often

exceed 2,000° F., some form of pyrometer or calorimeter should be used. That of Le Chatelier, which makes use of the thermo¬ couple,,!^ been successfully used for accurately measuring temperatures over 2,500° F.

Indicator Springs. — For gas-engine indicat¬ ing, the indicator springs used should be much stiffer and stronger than those used for steam- engine work, so as to enable them to withstand the higher and more suddenly developed pres¬ sure. When indicator springs are calibrated, the temperature of the indicator should be as nearly as possible the same as that which exists during the test. An indicator may be conven¬ iently heated by subjecting it to steam pressure immediately before calibration and the actual work of calibration then performed by the use of compressed air or compressed carbonic acid gas. The calibration may be made under a con¬ stant pressure, or more satisfactorily by cover¬ ing the

whole range of pressures through which the indicator acts, by gradually increasing the pressure from the lowest to the highest point, and then by gradually reducing it from the highest to the lowest point, and a mean of the results taken for at least five points — two for the pressures corresponding to the maximum and minimum pressures and three for equally distant intermediate points. These values should be compared with a dead-weight testing apparatus, a mercury column, or a steam gauge, compared with either of the two first-named standards, and the correct scale of the spring used for calculating the mean effective pressure from the indicator diagrams taken during the test, should be the average based on this calibration.

Gas Meters. — A meter used for measuring the gas supplied to a gas engine should be calibrated by comparing its readings with the displacement of a gasometer of known volume; with a standard gas meter of known error; or by passing air through the meter from a tank containing air under pressure. In the latter case, the pressure and temperature of the air in the tank, both at the tank and the meter, should be observed at uniform intervals of time dur¬ ing the work of calibration ; and the amount of air passing through the meter calculated from the volume of the tank and the observed tem¬ peratures and pressures.

The volume of the gas thus ascertained should be reduced to the equivalent volume at a given temperature and atmospheric pressure, corrected for the effect of moisture in the gas, which is usually at or near the point of satura¬ tion. For gas-engine work, a convenient stand¬ ard is the equivalent volume of the gas when saturated with moisture at normal atmospheric pressure at a temperature of 60° F. A vol¬ ume of moist gas at any other temperature may be reduced to this standard by being multi¬ plied by the factor

*459*4 + 60 b— (29.92— s)*

459-4 + t X 29-4 '

in which b represents the reading of the barome¬ ter in inches at 32° F. ; t, the temperature of the gas at the meter in degrees F. ; and s, the vacuum in inches of mercury corresponding to the temperature of t given in the sfeam tables.

8. Duration of a Test. — The length of time devoted to a test will depend largely upon its

character and the purpose for which it is made. For determining the working economy, the time allowed should be equal to the number of hours

per day during which the engine is really oper¬ ated. In the case of a gas engine using pro¬ ducer gas, the time should be sufficient- to deter¬ mine the amount of coal used in the gas pro¬ ducer. It should never be less than 24 hours, and usually it should extend over several days.

9. Commencement of a Test. — If the test is to determine the performance of an engine under working conditions, it should begin at the time the engine is started, and the observations continued until it shuts down for the day. If the test is for determining the maximum economy of the engine, at first it should be run a sufficient length of time to make all condi¬ tions normal and constant, then the observa¬ tions may be commenced and continued for the allotted time.

10. Measurement of Water. — In the case of a steam engine this relates to the feed water or steam consumption. The usual method is to measure all the feed water supplied to the boil¬ ers, and deduct therefrom all the water dis¬ charged by separators and drips, and the water and steam lost by leakage from the boiler and its main and branch pipe connections with the engine. Where the engine exhausts into a sur¬ face condenser, the steam consumption can be measured by measuring the quantity of water discharged by the air pump and adding thereto the steam used by jackets, reheaters and auxil¬ iaries as determined independently. In measur¬ ing the water, it should be carried through a tank resting on the platform of a suitably arranged weighing scales, and the water subse¬ quently emptied into a reservoir beneath, from which the pump is supplied.

For measuring small quantities of water, about 6,000 pounds per hour, the most conven¬ ient apparatus consists of a small hogshead connected to the suction pipe of the pump or injector and an ordinary oil barrel placed on a platform scale. The barrel is filled by means of a cold-water pipe leading from the source of supply. For pressure not less than 25 pounds per square inch, this pipe should have an inter¬ nal diameter of one and one-half inches. The outlet valve of the barrel is attached to the side near the bottom and should be at least two and one-half inches in diameter, so as to permit of quick emptying.

Where larger quantities of water have to be measured, the barrel can be replaced by a hogs¬ head and two hogsheads can be joined together for the lower reservoir. With this arrangement, when the weighing hogshead is supplied through a two and one-half inch valve under 25 pounds of pressure and emptied through a five-inch valve, the capacity attained is 15,000 pounds of water per hour.

For the measurement of very large quanti¬ ties, or in some cases, very small quantities, the orifice method gives the most satisfactory re¬ sults,

and when applied, the average head of water on the orifice must be ascertained and the discharge of the orifice should be calibrated under the conditions of use.

In the case of an internal combustion engine, the measurements of water relate to that sup¬ plied to the water-jacket provided for cooling the temperature of the cylinder. The measure-

merits may be made by the methods already described, but care should be taken, in cases where the temperature exceeds 212° F., first to cool the water by discharging it into a tank of cold water previously weighed, or by passing it through a coil of pipe immersed in running cold water, so as to prevent the loss of evaporation which takes place when hot water is discharged into the open air.

11. Determination of Speed. — The speed of the engine, or the number of revolutions of the crank shaft per minute, can be determined by counting the number of revolutions in one minute with the eye fixed on the second hand of a timepiece, or by the use of some form of mechanical counter such as a tachometer, or continuous recording engine register. The use of such instruments is imperative when the speed exceeds 250 revolutions per minute.

In the case of internal combustion engines governed by the hit-or-miss method, the number of explosions per minute should be ascertained, when the engine is running under nearly maxi¬ mum load, by counting the number of times the action of the governor causes a miss in the explosions.

The determination of variation of speed dur¬ ing a single revolution on the effect of fluctua¬ tions due to sudden changes of load should be made especially in the case of engines employed to drive electric generators used for lighting purposes.

12. Indicator Diagrams. — From the indi¬ cator diagrams taken during the test for the computation of the mean effective pressure, etc., sample diagrams nearest to the mean should be appended to the report.

The mean effective pressure (M.E.P.) is obtained as follows : Measure the diagram with a planimeter and divide the area, in square inches, thus obtained by the length of the dia¬ gram in inches to obtain the mean height or mean ordinate of the diagram. Multiply the mean ordinate by the scale of the indicator spring and the product will be the mean effective pressure

desired. In the absence of a planime¬ ter, the diagram can be divided by 10 ordinates and their mean length taken for that of the mean ordinate. If the indicator is specially designed for indicating internal combustion engines, the mean ordinate should be multiplied by twice the scale of the spring, unless the scale has been expressly marked for the reduced piston.

In the case of internal combustion engines, when indicator diagrams are not obtainable and the compression pressure is known, the mean effective pressure may be determined approxi¬ mately as follows : For example, in gas engines the compression pressure ranges from 70 to 90 pounds per square inch, and the maximum pressure developed by the explosions is about 3.5 times the compression pressure. Therefore, if p represents the compression pressure, then for compressions of 100 pounds per square inch or less, M.E.P. = 2p — – 0.01 p2 ; thus, if P' 70 pounds per square inch, M.E.P. = 140 — 49 = 91 pounds per square inch.

In the case of a steam engine, the steam accounted for by the indicator diagram may be calculated by means of the formula -j 13750

M = M.E.P. ((C + E) X Wc-(H-t-E) X Wh), which will give the weight in pounds per indi¬

cated horse power per hour. M.E.P. represents the mean effective pressure, which in the case of a multiple-expansion engine is the combined mean effective pressure referred to the cylinder in question. For example : In the case of a com¬ pound engine, the combined mean effective pressure for the high pressure cylinder consists of two items: (1) the mean effective pressure of the high pressure cylinder, and (2) the mean effective pressure of the low pressure cylinder multiplied by the ratio of the piston displace¬ ment of the low pressure cylinder to that of the high pressure cylinder. The sum of these two items is the combined mean effective pressure for the high pressure cylinder.

Similarly the combined mean effective pres¬ sure for the low pressure cylinder consists of (1) the mean effective pressure of the low pressure cylinder, and (2) the mean effective pressure of the high pressure cylinder divided by the ratio already stated. The sum of the two items is the combined mean effective pres¬ sure of the low pressure cylinder.

In the given formula, C represents the pro¬ portion of the piston stroke completed at points on the expansion line of the diagram near the actual cut-off or release; H the proportion of compression ; and E the proportion of clearance ; all of which are determinable from the indicator diagram. Wc represents the weight of one cubic foot of steam at the cut-off or release pressure ; and Wh the weight of one cubic foot of steam at the compression

pressure.

13. Standards of Economy and Efficiency. — The standard expression for engine economy, as already stated, is the hourly consumption of heat units divided by the indicated horse power or the brake horse power. The standard ex¬ pression for efficiency is the thermal efficiency ratio, or the proportion which the heat equiva¬ lent of the power developed bears to the total amount of heat actually consumed, as deter¬ mined by test. One horse-power-hour represents the consumption of 2,545 B.T.U.'s per hour, therefore,

_ 2,545 _

B.T.U.'s per horse power per hour

expresses the thermal efficiency ratio.

In comparing the standard for internal com¬ bustion engines with that for steam engines, it must be noted that the former usually covers the losses due to combustion, but the latter does not, and therefore, in order to make a direct comparison between the two classes of engines as complete horse-power plants, the losses in generating the 'working agent must be consid¬ ered in both cases not only on the basis of the fuel used, but on the basis of equivalent fuel used in each case. In comparing a gas engine plant using producer gas, with a steam plant, the producer should be included in the former, and then the fuel consumption, represented by the weight of coal in both cases, may be directly compared.

14. Heat Analysis. — For scientific purposes, a heat analysis of the indicator diagram, in the case of a steam engine, and a heat balance in the case of an internal combustion engine, should be made, showing the manner in which the total heat of combustion is expended in working the engine.

In the case of a steam engine, the analysis shows the interchange of heat from steam to

cylinder walls, etc. For example: the amount of heat supplied to the engine in a given time is represented by the number of pounds of steam supplied multiplied by the total heat of one pound of steam. A portion of this heat is used in the jacket, if one be employed, and the remainder passes through the cylinder. The heat entering the jacket is lost partly by radia¬ tion from

the outside surface, and the remainder enters the walls of the cylinder and is absorbed by the steam wdthin it. The cycle of operations within the cylinder consists of the following phases: (1) A portion of the entering heat is transferred into a small portion of the thick¬ ness of the cylinder walls, and heats them to the temperature of the entering steam. This trans¬ ference of heat is more active during the period of admission and up to the point of cut-off than during any other part of the cycle. (2) Beyond the point of cut-off, the transference of heat continues until the lower pressure due to ex¬ pansion causes the temperature of the steam to fall below that of the interior surfaces of the cylinder last uncovered. At this point the inter¬ change of heat is reversed, the metal giving up heat to the steam, and causing the re-evapora¬ tion of the particles of water condensed on the surface of the cylinder walls and piston. The radiation of heat from the small thicknesses of the interior walls, which were heated during admission to the temperature of the entering steam, commences after cut-off or after the pressure begins to lower by expansion, and con¬ tinues to the end of the stroke.

A portion of the heat is also expended in the performance of work, and a loss of heat is sustained by radiation from those portions of the cylinder not protected by the jacket. The amount of heat remaining after the steam has passed through these operations is that which is rejected by it through the exhaust valve to the atmosphere or to the condenser.

In the case of an internal combustion engine, the total heat of combustion expended in the working of the engine may be divided into three parts: (1) Heat converted into work and represented by indicated or brake horse power. (2) Heat carried away by the cooling water circulated through the water jacket. (3) The heat lost in the exhaust gases, and through incomplete combustion and radiation.

15. Heat Converted into Indicated or Brake Horse Power. — The number of foot¬ pounds of work done by one pound or one cubic foot of fuel divided by 778, the mechanical equivalent of one British Thermal Unit, will give the number of heat units desired.

16. Heat Carried Away by the Jacket Water. — This is determined by measuring the quantity of cooling water passed through the water jacket equivalent to one pound or one cubic foot of fuel consumed, and calculating the amount of heat rejected by multiplying that quantity by the difference of the tempera¬ ture of the water entering and leaving the jacket.

17. Heat Rejected in the Exhaust Gases, or Total' Heat Unused. — The sum of the heat converted into brake horse power and the heat carried

away by the jacket water, subtracted from the total heat supplied, will give the total heat rejected or unused.

In order to determine the cost of each horse¬

power hour in thermal units, the gas consumed and the air supplied should be reduced to the conditions of temperature and pressure corre¬ sponding to some adopted standard. This may be done as stated under gas meters in rule 7, or more conveniently by the formula

t v v'pi

v=5 x ir •

in which v^ volume of gas reduced to standard; t=461° + 60° = 52U F., absolute

standard temperature; p = 29.92 inches of mer¬ cury; v* = volume of gas registered by meter; p1 = pressure of gas at meter measured by manometer in inches of water; t1 = = absolute temperature of gas.

Since t and p are constants

v'p1

v = 18.00

t*

and as p1 and t1 are practically constant dur¬ ing a given test, v = Ev1, in which

E=

pi

= 18.00 g,

and p1 = height of barometer f (0.073 X read¬ ing of manometer); and t1 = ' temperature of gas at meter + 461.

For example : Assume the heights of the barometer as 29.40 inches ; the reading of the manometer as 6 inches ; the temperature of the gas 80° F. ; and the volume of the gas regis¬ tered by the meter 350 cubic feet ; then for determining (v) the equivalent volume of gas for standard conditions :

p» = 29.40 + (0.073X 6) = 29.84 t* = 80 + 46 1 = 541;

then v — 0.976 X 350 = 341.6 cubic feet.

The air supplied should be entered and re¬ duced to standard conditions in the same manner.

If the rate method is employed to ascertain the amount of gas consumed, the number of cubic feet for a ten-minute interval may be found by dividing the number of cubic feet registered by one revolution of the small dial by the time in seconds elapsed at the completion of that revolution and multiplying the result by

6,000.

18. Indicated Horse Power (I.H.P.). — This factor is expressed by the formula —

PXLXAXN

I.H.P.-

33,000

in which P is the mean effective pressure in pounds per square inch; L the length of the piston stroke in feet; A the area of the piston in square inches; and N the number of revolu¬ tions of the engine crank shaft per minute.

AXL

33,000 *

is constant for a given engine, and in the case of an internal combustion engine, N is the number of explosions per minute.

19. Brake Horse Power (B.H.P.). — When this factor is determined by the use of some form of dynamometer, such as the Prony brake, it may be readily computed from the formula —

WXNXLXC

B.H.P. = –

33,000

in which W is the net weight in pounds on the scales ; N the number of revolutions per minute ; L the length of the lever arm from the centre of the braked wheel to the knife-edge of the

brake, or the radius of the braked wheel if a rope brake is used; and C the circumference of the braked wheel.

CXL t 33,000 ’

is constant for a given Prony brake, therefore, if L be made five and one-quarter feet, this constant becomes 0.001, and gives the simple and very convenient expression —

20. Total B.T.U.’s Per Hour. — The total amount of gas consumed, in cubic feet, multi¬ plied by its calorific value.

B.T.U.’s Per Brake Horse Power Hour. — The total B.T.U.’s per hour dvided by the brake horse power.

B.T.U.’s Per Indicated Horse-power Hour. – — The total B.T.U.’s per hour divided by the indicated horse power.

Friction Horse Power. — The difference be¬ tween the indicated horse power and the brake horse power.

Thermal Efficiency. — The ratio of 2,545 B.T.U.’s to the B.T.U.’s per horse-power hour.

Mechanical Efficiency. — The ratio of the brake horse power to the indicated horse power.

William Morey, Jr., C.E., Consulting Civil and Mechanical Engineer, New York.

ENGINE INDUSTRY. Notwithstanding the wonderfully rapid development of water power and of the internal combustion engine, the steam engine holds its own in the industries of the world. The total steam engine horse power used in manufacturing in the United States, which was 8,139,574 in 1900, rose to 14,199,339 in the 1910 census. Seven great industries utilize 56 per cent of the horse power employed in manufacturing in this coun¬ try, and 76 per cent of the power they use is based on the steam engine. The industries meant are lumber, steel works and rolling mills, paper and

pulp mills, cotton factories, blast furnaces, foundries and machine shops and grist mills. In only one of the seven — the paper and pulp industry, which requires large quantities of water for dissolving pulp — is steam power less used than water power. The fourteen million horse power quoted does not by any means represent the total employment of steam engine power in the country, but only such as the census gathers as reported by manu¬ facturers. It does not cover steam engine power used on vessels, nor used in mines and quarries, nor its vast employment in the locomotives that do most of the haulage on the railways, nor a number of minor uses. These are reported in other ways, or escape enumeration. . The best way of measuring the steam engine industry is to note that 450,000.000 long tons of coal are used in the United States every year, and it is estimated that at least 350,000,000 tons of this is consumed under boilers to make steam. Evi¬ dently while the coal holds out the steam engine is going to continue the favorite power-producer, because it can be located anywhere and its cost is moderate. Even the electric railway lines around New York city and the electric light and power companies there, base their power en- tirelv on the steam engine.

There are no complete figures of the engine industry because it is so completely interwoven

with other activities that it cannot be separated. Thousands of machinery manufacturers build steam engines, which are part of this or that special industry, often being for their own use. The internal combustion engines alone are mixed up with 20 different industries from automobiles to blast furnaces and a vast num¬ ber of engines are built direct-connected to dynamos and credited to the electrical indus¬ tries. See Internal Combustion Engine; Gas Engine; Steam and Steam Engines; Locomotive; Locomotive Industry; Automo¬ bile Engine; Aeroplane.

ENGINE STARTERS, or «self-starters,» auxiliary devices for the purpose of starting gasoline automobiles (or other) engines with¬ out laborious method of turning the hand crank commonly provided. Self-starters operate upon either of two principles : the crank shaft is rotated by external mechanism, causing the pistons to charge the cylinders with gas to be exploded when the spark is turned on ; or the injection of gas into one or more cylinders with¬ out rotation of the crank and the production of a spark in all the cylinders simultaneously so that the charged cylinder will come into action. Mechanical starters are operated by a heavy spring, by compressed air, or by electric¬ ity. They require a considerable addition to the machinery of the car as well as to its weight, especially in the case of the electric starter and add many sources of possible trouble in an already complicated machine.

The gas injector system adds simply a small hand pump at the driver's seat or on the dash¬ board, two strokes of which effects the charg¬ ing of the cylinders ; and the throwing of a switch fires the charge. In automobiles which employ acetylene gas for lighting, an attach¬ ment is furnished by which this gas may be used in priming the cylinders for starting. The acetylene mixture is claimed to be more certain of explosion than an uncompressed charge of gasoline vapor and air. Consult Cross, H. H. U., (Electric Lighting and Starting) (London 1915) ; Duryea, C. E. and Homans, J. E., (The Automobile Book) (New York 1916) ; Page, V. W., (The Modern Gasoline Automobile) (New York 1912).

ENGINEER CORPS, a branch of the service of the United States Navy; and of those of other countries. The first step toward the organization of an engineer corps in the United States Navy was taken on 2 July 1836, when C. H. Haswell (q.v.) was appointed chief engineer of the Fulton; it was not, however, until 31 Aug. 1842 that Congress passed an act providing for a regular corps, under which act chief engineers were ˆcommissioned® and assist¬ ants ˆwarranted.® On 3 March 1845 Congress passed an act whereby tne power of appointing engineer officers was transferred from the Sec¬ retary of the Navy to the President ((by and with the advice and consent of the Senate.® With the growth of the Navy the corps gradu¬ ally increased till at the time of the Civil War there were 474 regulars and 1,803 volunteers.

A course of instruction for cadet engineers was established at the Naval Academy by act of Congress 4 July 1864. The original two-year course was changed to four years in 1874 and continued in vogue till 1882, when on 5 August Congress amalgamated the cadet engineers and

midshipmen and they are now known as naval cadets. The cadets then took the usual six years' course at the Academy and upon com¬ pletion of the third year of the course were divided into an Engineer Division and a Line Division in proportion to the vacancies that have occurred in the several corps during the preceding year. At the end of the six years' course appointments to fill vacancies in the Line and in the Marine Corps were made from the Line Division, and to fill vacancies in the Engineer Corps from the Engineer Division. If, after making assignments as above, there should still be vacancies in one branch and sur¬ plus graduates in the other, the vacancies in the former were filled by assignment to it of sur¬ plus graduates from the latter. This arrange¬ ment was in vogue until the Line and Engineer Corps were amalgamated under the act of 3 March

1899, at which time the Engineer Corps ceased to be a separate organization, the older officers now being required to perform engineer¬ ing duties only, whereas the younger officers must pass examinations in navigation, gunnery, seamanship, etc. A grade of warrant machinists to perform watch duties was also established be¬ cause of the lack of commissioned officers for this work. See Naval Academy, United States; United States Navy.

ENGINEERING is, in its strict sense, the art of designing, constructing, or using engines, but the word is now applied in a more extended sense, not only to that art, but to that of execut¬ ing such works as are the objects of civil and military architecture, in which engines or other mechanical appliances are extensively employed. Engineering is divided into many branches, the more important being civil, mechanical, electri¬ cal, mining, military, marine and sanitary engi¬ neering.

Among the most notable of the engineering works belonging to very remote antiquity are the pyramids of Egypt. The rude stone monuments of the north, as at Stonehenge and Carnac, also testify to some engineering skill. The harbors and temples of ancient Greece are very memo¬ rable. The buildings of ancient Rome — its theatres, temples, baths and aqueducts, its roads, bridges and drainage-works — vie in ex¬ tent and magnificence with the most celebrated works of modern times. From that period down to the commencement of the 18th century the most extensive works executed were the canals, embankments and other hydraulic con¬ struction used by the Dutch for the purposes of inland navigation and to protect their low lands from the sea; the canals of North Italy; and the cathedrals and fortifications of mediaeval Europe.

If the question were asked as to the char¬ acteristic feature of the modern applied science of engineering, the reply would undoubtedly be : ((The wholesale manner in which work is carried on.® It is not so very long ago that everything except the smallest articles and those required in great quantity were made singly, or at least in small lots ; and even when standardizing and in¬ terchangeability were introduced these methods were by no means used in a way which showed a realization of their possibilities. The present tendency, on the contrary, is toward the elimina¬ tion altogether of things which cannot be made wholesale ; and methods which formerly applied

to firearms, sewing-machines, typewriters and the like are now in general use in the manu¬ facture of steam engines, machine tools, elec¬ trical machinery and nearly all mechanical products.

This has been brought about by a combina¬ tion of two processes: (1) the

standardization of methods of manufacture; and (2) the dis¬ couragement of the demand for special articles. Formerly the customer told the manufacturer what was wanted and the latter hastened to pro¬ duce it. Or the plans and specifications for a certain structure were prepared by a consulting engineer and all bidders were required to con¬ form to these documents in the minutest details; no two such specifications being alike. At the present time the customer, knowing what he wishes to accomplish, seeks to do. so as best he may by means of the standard articles in the market ; or if it be a great engineering struc¬ ture, the engineer specifies only the general re¬ quirements to be met, leaving each manufac¬ turer to meet these with his own standardized product. The influence of these modifications in engineering practice extends to the manu¬ facture and supply of materials.

The result of this concentration and stand¬ ardization has been to reduce costs very mate¬ rially and render possible undertakings which would otherwise be prohibitory in price. While to a certain extent it has obliterated individuality in design, it has also removed much useless repetition and has prevented needless expense in the production of rival machines, differing but slightly in design, yet requiring duplications of drawings, patterns and tools. There is little doubt that it is to this wholesale development of various departments of engineering work that the rapid extension of the share of the United States in the work of the world is largely due. See Civil Engineering; Electrical Engineer¬ ing; Hydraulic Engineering; Mechanical Engineering; Engineering, Marine; Fortifi¬ cations; Mining Engineering; Naval Con¬ struction; Sanitary Engineering. Also En¬ gineering Terms; Engineering Instruments; Education, Engineering ; Mechanics.

ENGINEERING, Electrical. See Electri¬ cal Engineering.

ENGINEERING, Hydraulic. See Hy¬

draulic Engineering.

ENGINEERING, Marine, is partly mili¬ tary and partly civil, embracing naval architec¬ ture, building and operating of ships and naval accessories. In the military sense, it comprises the construction of war vessels and the con¬ struction and placing of torpedoes, submarine mines, etc. See Navy; Naval Construction; Submarine Mines, etc.

ENGINEERING, Mechanical. See Me¬

chanical Engineering.

ENGINEERING, Mining. See Mining

Engineering.

ENGINEERING, Sanitary. See Sanitary

Engineering.

ENGINEERING EDUCATION. See

Education, Engineering.

ENGINEERING INSTRUMENTS. To

attempt a definition of an engineering instru¬ ment is hardly practicable, as the wide range of departments into which the profession is now

divided demands so many special appliances for their requirements that no one description is possible and an extended catalogue is inad¬ missible within the limits of this article. The earliest known engineering instrument was the Diopter of Hero of Alexandria, 130 b.c., al¬ though rude appliances must have been used long before that time by the ancient engineers in the construction of the public works of Chaldaea and Egypt, the ruins of which even now awaken our admiration and wonder. It was not, however, until the beginning of the 19th century that the great impulse to the con¬ struction and use of engineers' instruments was

and lightness of construction combined with great strength and an adaptability of parts for the special service required. It is not the purpose of this article to attempt a description of the various instru¬ ments used by engineers — this may be found in the article Surveying — but to give the reader a general idea of their construction.

The metals used in the construction of engi¬ neers' instruments are principally the alloys of copper and tin with small quantities of silver, aluminum and German silver. Great care must be constantly exercised that these substances be free from iron or other materials which would

Engineer's Transit.

given by the advance of civilization and com¬ merce incident to the application of steam as a motive power on sea and land. Since that time great advances have been made not only in the design and accuracy of engineering in¬ struments but also in the invention of new in¬ struments

for the many purposes required by engineers in the construction of railroads, canals, bridges, harbors, etc.

The characteristics of engineers' instruments differ in the various nations as the requirements of engineering practice and thus American en¬ gineers' instruments possess a distinct char¬ acter of their own as compared with other nations, having as a rule few parts

affect the magnetic needle. In the construction of an instrument such a distribution of the metals is aimed at that the greatest strength consistent with light weight may be obtained and that the metals coming into contact at the bearing surface may be of such varying compo¬ sition as to cause the least friction.

Take, for the purpose of better illustration, an American transit, illustrated herewith, as typical, as far as the construction is concerned, of nearly all engineering instruments. The plate of the instrument on which the magnetic needle is mounted, or as it is termed, the compass circle, is turned with great care so that the surface may be absolutely true and is gradu-

ated usually into 720 spaces, each representing one-half of a degree.

Compass circles are usually figured in quad¬ rants of a circle, that is, from 0 at the point marked ((N)} or ˆNorth® to 90 and back again, while the figuring of the limb varies with the custom of the maker or the requirements of the engineer.

In engineers' instruments, however, the angu¬ lar measurements are made usually without the use of the needle, by a telescope so mounted as to revolve in a vertical or a horizontal plane. The angular measurement of its movement is indicated on circles divided into fractional spaces of a degree and read for convenience to finer spaces by one or more verniers. Accuracy of graduation of the compass circle, and especially of the limb, is essential to the perfection of the instrument, and great pains are taken by manufacturers in perfecting and improving engines for graduating. The best machines are automatic in action and the spaces are so accurately laid off that there is no appreciable error in the finished work. The instrument rests on the socket or bearing surface to which the compass plate and limb are

rays of light entering the object glass may be properly refracted and concentrated at a point called the focus.

The making of the lenses is an operation requiring much skill in manufacture, as upon the accurate grinding of the curved surfaces depends the quality of the telescope.

At the focus of the object glass are placed the cross-wires, which are filaments of spider web or very fine platinum. In conjunction with these are often used two more wires commonly called stadia wires, so placed that they intercept on a rod a space proportional to its distance from the instrument, thus furnishing an effi¬ cient method of ascertaining distances di¬ rectly by the observer. The metal parts of the instrument, having been prepared, are polished with some suitable material, a prep¬ aration of rouge being generally used for fin¬ ishing the surface of the screws, and the larger surfaces being finished with fine emery paper. The larger parts are usually colored dark to avoid reflection of the sun, while the smaller ones, such as screws, etc., are left bright in order that there may be a pleasing contrast be¬ tween the different parts of the instrument. The

Engineer's Wye Level

attached; the surfaces of the socket must be so accurately fitted together as to produce no error when the parts are moved on each other. The socket is mounted on a leveling head, which is actuated by three, or in the usual American practice, by four leveling screws, as shown, by means of which the instrument can be accurately leveled. Upon the compass plate are placed the standards which support the telescope, the prep¬ aration of the optical parts of which is next in importance to the fitting of the socket and the graduation.

The telescope consists of an eye piece and object glass mounted in a tube. The eye piece is simply a magnifier of the image produced at the focus of the object glass. Two kinds of eye pieces are used, one showing the image erect, and the other showing the image inverted. The object glass is composed of two plates of optical glass of such specific gravity and re¬ fractive index that it will magnify the image clearly without prismatic colors. To secure achromatism the two parts of the object lens are made the one of crown and the other of flint glass, the crown being a light glass of soda and silica and the flint being a heavier glass containing potash and lead. The surfaces of each are curved to such a degree that the

parts, prepared as above, are covered with a thin coat of lacquer, a preparation of shellac and alcohol, applied after heating. All the parts are assembled and fitted together, and the in¬ strument is then ready for the final complete ad¬ justment. This consists in fitting the sockets so that they will move freely on each other, placing the compass plate and limb in position on the sockets, making the limb truly concen¬ tric with the socket

and placing the verniers in position. The telescope must be so adjusted that its parts may work freely, and having been supplied with optical parts, etc., it is then fitted to the standards or supports previously placed in position on the compass circle. The whole instrument is then tested for accuracy and if found correct is packed in its case and is ready for use.

The above description is only intended to give a general idea of the construction of a typical instrument, but the same methods will practically apply in the construction of all engi¬ neering instruments, such as levels, plane-tables, alidades, and the various kinds of compasses, etc.

ENGINEERING SCHOOL. See Educa¬ tion, Technical.

ENGINEERING TERMS

349

ENGINEERING TERMS. Engineering has spread into so many branches that it is difficult to differentiate between them and much more difficult to separate the technical verbiage of the several divisions of the profession. The more common technical terms have therefore been gathered together here for the benefit of the lay reader.

Abutment. — A side support or buttressing structure to resist lateral pressure, as the abutment of a bridge-pier; anything that abuts or stands out as a support or brace.

Action. — The active moving parts of a machine, as a piano- action (the keys, levers and connections for sounding the strings). Also a single complete movement or stroke: used mostly in the phrases single-action and double-ac¬ tion, the latter being an action performed on both strokes of a reciprocating part.

Annealing. — The process of heating and slowly cooling, as for reducing the brittleness and increasing the toughness of glass or steel. Also fixing an enamel or color on earthen¬ ware or china by heating and cooling. The annealing- arch of the glassmaker is called a leer.

Annular . — Ring-shaped .

Apex. — The top of a cone, pyramid, truss, outcropping of ore, etc.; the vertex of an angle, either plane or solid.

Aqueduct. — A water conduit. See Aqueducts.

Armor. — A thing constructed for protection or defense, es¬ pecially the

steel plates of a war- vessel; any protecting device, as steel wire wound around a submarine cable, a diver's suit, etc.

Axis. — The theoretical line around which a thing turns; one of the principal lines drawn through the centre of a geometrical figure, especially the longest and shortest of such lines; in early use, an axle.

Axle.— The central fixed part on which a wheel turns, especially a rod or bar on a vehicle having a spindle on each end for a wheel. Compare, 'Shaft' in this list.

Balance. — The condition when opposed forces exactly counteract each other; equality of forces; equilibrium; also any device or mechanism that secures equilibrium, as a pair of scales; any weighing mechanism whose es¬ sential part is a scale-beam. Any one of similar instru¬ ments, as a torsion-balance, electric balance (Wheat¬ stone's bridge), the balance-wheel of a watch, etc.

Batii. — A tank or a solution in a tank, as for electroplating; also the molten mass in a reverberatory furnace.

Bearer. — A supporting part, that receives weight or strain.

Bearing. — The box or journal (or simply a hole) in which a moving or rotating part rests, holding it in position. See Bearings.

Belt. — A continuous band or strap, as of leather, for trans¬ mitting power, as from one pulley to another, or for con¬ veying. (See Conveyer). They are sometimes made of rubber, cotton or steel. Cotton is adopted as a cheap substitute for leather; steel has to be made very thin, and if bent around small pulleys is liable to fracture. The leather belt, having moderate elasticity, is generally preferred, as it adheres to pulleys by friction, and slips in case of accidental stoppage.

Belting. — A system of belts, also belts collectively.

Bending Moment. — The sum of the external forces which act upon each side of a given section of a beam bending under a load. It is equal to the " moment of resistance " of that section, or the sum of the internal forces or stresses set up therein by the bending action.

Blocking or Blocking-Up. — The elevating and support¬ ing of large pieces of machinery, or entire structures, by means of cranes, jacks, and blocking or short lengths of timber and planks, during erecting and constructing op¬ erations. Also the elevation given to the outer rail of the curve of a railway track, for the purpose of counter¬ acting the effect of the centrifugal force

developed by a rapidly moving train.

*Boiler. — The steel tank or container in which water *is boiled to make steam. (See Boiler). Also a hot-water cooking or scalding device.*

*Bolt. — A rod of metal for tightly securing together the parts of a structure, having usually an enlarged end called a head, and at the other end a threaded portion for holding a nut; when threaded at both ends called double-ended; when made with a ring or eye at one end called eye-bolt. (Compare * Rivet ' in this list). Also the bar or main sliding piece of a door-lock; also a block of wood suitable for cut¬ ting into shingles, staves, etc. In flour milling, a rotating sifting cylinder.*

Boring. — An operation not to be confused with drilling. See Boring.

Brake. — A mechanism for restraining or retarding some motion or action. It may be a simple shoe of metal or wood, with a lever for pressing it against a wheel; or an encircling band of metal on a drum, as on an automobile; or a complex system of mechanism, as an air-brake (q.v.) Brake horse power is the amount of power delivered by an engine or motor at the driving pulley or pulley shaft, and actually available for doing work.

Bridge. — (See Bridges). Also one of various cross-pieces or minor mechanisms likened to a river-bridge, as a low dividing wall in a boiler; a horizontal scaffold; an electric balance used in measuring electric resistance — a Wheatstone's bridge.

Bridging. — Short wooden braces or struts placed between joists to secure them in position.

British Thermal Unit. — (Abbreviated B. T. U.) — The amount of heat required to raise the temperature of water one degree Fahrenheit, at or about 39.1°F. To convert values of energy expressed in foot-pounds to their equiv¬ alents in British Thermal Units, divide the values by 778.

By-Pass. — A pipe arranged to pass by or around a valve and permit a fluid to take another route.

Caisson. — A large water-tight box or casing, usually with an open bottom and shafts through the top, for carrying on working operations under water. Air-locks are placed in the shafts and the men work under air pressure. It is much used in laying foundations for piers and docks.

Calender. — A pair of rolls, or more usually a machine in¬ cluding several pairs of contacting iron cylinders, used in surfacing paper, cloth, etc.

Camber. — The upward curvature given to an arched bar or structure in order to compensate for the downward curvature resulting from the application of the load. In machinery, it is specifically applied to the arching of springs like those of locomotives. In structural work, it is applied to the arching of bridge trusses like the stiffening trusses of suspension bridges.

Canal. — An artificial waterway, as for transportation of barges or for drainage. (See Canal). Also a channel, groove or duct.

Cantilever. — A large counterbalanced truss-section of a bridge, that may be built out over the water, and sus¬ tained by the balancing weight of an opposite part project¬ ing from the other side of the pier; a balanced truss. Also a bridge having such trusses. (See Bridges). In archi¬ tecture, a bracket for a cornice, etc.

Casting. — See Foundry Practice.

Cement. — See Portland Cement.

Centre. — The middle of a thing: in various special uses. In machine designing, that one of two points in a crank motion which marks the end of a piston-stroke — a dead centre; in lathe- work, one of the conical points supporting the work, the one at the driving end being termed the live centre. In geometry, the fixed point about which the radius of a circle or a circular arc moves; the central point of a closed curve. In architecture, the centring support of an arch or dome. The " centre of buoyancy " of a vessel is the central point of compression of the forces that buoy her up. It must be above the centre of gravity or the vessel will capsize. The " centre of compression " is the line in which the resultant of the compressive forces in the lower part of a beam is located. The " centre fo gravity " is the point in a body about which the body will remain balanced when placed in any position. The " centre of gyration " is the point in which the momentum of a revolving body is concentrated. The " centre of moments " is the point about which the forces applied to a rigid body act. The " centre of oscillation " is the point in the axis of a vibrating body, such as a pendulum, in which if all the matter of the body were concentrated, the body would vibrate in the same time. The " centre of tension " is the line where the resultant of the tensile forces in the upper part of a beam is located.

Circular Inch. — The area of a circle one inch in diameter, as distinguished from a square inch. The number of cir¬ cular inches in a given diameter is obtained by squaring the diameter.

Coefficients. — Numerical values deduced from data ob¬ tained by experiments and used as constant multipliers in engineering calculations. They have been determined for friction, elasticity, tension, rupture, resistance, the flow of water, etc. For example — the amount of force or weight that will elongate an elastic bar of any material and of uniform section to twice its original length is desig¬ nated as the " coefficient of elasticity " of that material. Also termed " modulus " as the " modulus of elasticity," the " modulus of resistance," etc.'

*Cohesion. — The condition of things that stick or cleave together; the union of particles, especially small particles, or the force that brings them together. Solids have great cohesion or tensile strength; liquids have little and gases none. See * Tension ' in this list.*

Column. — An upright beam, shaft or truss, as for support¬ ing a structure. The classical column is cylindrical and tapered, with a slight bulge at the centre of height. The concrete structural column may be square or rectangular. The steel column is frequently formed of several beams riveted or laced together.

Columniation. — The arrangement of columns in a build¬ ing or portico.

Combustion. — Burning; the continuous combination of a substance with oxygen (or chlorine, etc.) with flame and generation of heat. The best economic combustion of coal has been the subject of exhaustive experiment. The gases of combustion are the vaporous portions of smoke.

Compression. — The act or process of concentrating or con¬ densing by pressure; the forcing of something into reduced space. Air is compressed by a machine built like a steam- pump, the piston packing and condensing the air in the cylinder at each stroke. Air so compressed is used for producing power, and for supplying workers in caissons, tunnels, mines, etc. In a gas-engine the mixture or ex¬ plosive charge is subjected to pressure to heat it and in¬ crease its explosive properties. The members of a truss that are strained by longitudinal pressure are called compression members. See ' Truss ' in this list.

Concentrator. — A machine used in ore-concentration to bring together the richer portions of mineral content; a jigger or vanner.

Condenser. — Any one of various devices for condensing:

(1) a contrivance for suddenly cooling and thus condens¬ ing exhaust steam. (See Steam and Steam-Engine).

(2) A mutual induction apparatus. (See Condenser).

(3) A lens or combination of lenses in a microscope or other optical instrument, for concentrating light rays.

(4) In cotton-ginning a device for compacting lint, etc.

(5) A mechanism for separating impurities by conden¬ sation from illuminating or fuel gas.

Constant. — A number deduced from data obtained by ac¬ tual tests made upon the strength of a particular material, and used in calculations relative to the strength of struc¬ tures built of that material. For example — having ascer¬ tained by actual experiment the weight required to rupture a steel bar measuring $3 \times 2 \times 1$ inches, that weight can be used to estimate the stresses in structures made of the same material but differing in length, breadth, and depth.

Conveyor. — See Conveyer.

Couple. — In physics, two equal and opposite forces acting upon a body, which is therefore in a state of equilibrium. Also any two similar things joined together so as to be a pair, as two different metals joined in a thermopile.

Creeping. — Slow movement caused by conditions not easily foreseen, as the creeping of a railway track due to unusual heat and expansion of the rails. If a belt tends to work slowly out of position, or a machine through vibration gradually shifts its place on a floor or founda¬ tion, it is said to creep.

Crusher. — See Crushing and Grinding Machinery.

Cycle. — In mechanics, a series of motions that repeat.

Cylinder. — A solid bearing two flat surfaces or ends, con¬ nected by one continuous round surface; when relatively short called a drum; when relatively long a round rod, column, etc. Familiar examples of the cylinder are found in the steam-engine and the printing press.

Datum or Datum Line. — Any base line from which meas¬ urements are made, or dimensions taken, either in actual work, or in graphical calculations.

Deals. — Sawn timber which usually measures not less than 3 × 9 inches, and not more than 3 x 12 inches in cross section.

Differential. — A mechanical motion, in which the opera¬ tion of some part is determined by the difference between the action of two other parts. For instance, if one part is making lOR.P.M.and another 40 R.P.M., the differential governed by them will make 25 R.P.M.: called also Differ¬ ential Motion. The most common illustration is the differ¬ ential on the rear axle of an automobile. The term dif¬ ferential is also used to describe a double screw, having two sets of threads of different pitch, or some other mech¬ anism embodying different double action.

Digester. — A chemical apparatus for digesting or partially dissolving something by heat and moisture.

Dock. — A wharf or pier, as on the margin of a body of water, to which vessels may tie up and load or discharge cargo. The term dock is more commonly used in England than America to describe the enclosed basin where vessels locate in a harbor. In the United States the term pier is more common, representing one of a row of long wharves with slips between which the vessels lie. In America the word dock is used mainly for the dry dock, being a basin in which a vessel can be docked, and the water pumped out, so that repairs can be made to the hull. A floating dock is an enormous structure, into which a vessel can be floated, and then. by closing the gates of the dock and pumping out the water, the vessel is left dry resting on the floor of the floating structure.

Drill. — See Drills and Drilling.

Driving. — The act or process of moving or directing the motion of some other thing, especially that part of a machine that imparts power or momentum to other parts, as a driving-pulley or driving-axle. A driving gear is the combination of parts in the gear or mechanism that drives a machine; a driving-shaft is a power-shaft, usually having fixed pulleys for driving belts, or gears or clutches for communicating the power to the thing driven. When two wheels are geared together the one that is nearest the source of power and that imparts motion to the other is called the driver, while the wheel that receives motion is a driven wheel. To calculate the mechanical efficiency of a train of gearing, multiply the radii of all the drivers together, and likewise the radii of all the driven, and divide the latter by the former.

Duty. — The efficiency or useful work accomplished by an

engine or motor; also the amount of such work, usually stated in

footpounds. The duty of a steam engine is the number of pounds raised to the height of one foot by the burning of a bushel of coal. In the case of pumping engines, the duty was formerly expressed in millions of pounds of water lifted to the height of one foot by the burning of 100 pounds of coal; but, as the quality of coal varies greatly, the basis now employed is the work done by 1,000 pounds of dry steam, or by 1,000,000 British Thermal Units.

Dynamics. — See Dynamics; Electric Machine, etc.

Eccentric. — A wheel, gear, etc., mounted out of centre, so that its periphery has an irregular or eccentric motion, which may be used in a manner very similar to cam-mo¬ tion. See Mechanical Movements.

Efficiency.— The efficiency of a machine or of a structure, or any portion thereof, is the ratio of its strength, power, or capacity, to that of some predetermined, understood, or fixed standard of reference. For example — the effi¬ ciency of a riveted joint in plate work is its percentage strength calculated relatively to that of the solid plate. The efficiency of a machine is the ratio of its actual value to its theoretical value, or the difference between the amount of work expended on the machine and the amount given out by it or obtained from it. See Efficiency Engineering.

Encastre. — The immovable fixing of the ends of a canti¬ lever, or the ends of other forms of beams or girders in a wall or support. Beams are much stronger when en¬ castre than when simply supported.

Energy. — Inherent capacity for doing work, as distin¬ guished from force, which is energy in action in a definite direction, and power, which is the quantitative idea of force, without reference to direction. (See ‘ Force,’

‘ Horse Power ’ and ‘ Power ’ in this list). We speak of kinetic energy, meaning energy in motion, that is active and exhibiting motion, and which is theoretically equal to the product of half the mass into the square of the velocity. Potential energy is applied to stored energy, as in a pound of coal, which when consumed and used to make steam appears as kinetic energy. A storage battery when charged has potential energy, though it may lie idle. Electric energy is defined as molecular kinetic energy. (See Electron). Radiant energy is light, radiant heat, X rays or any form of energy transmitted through the hypothetical ether.

Ether. — A theoretical medium supposed to fill all space and pervade all substances, being that in which electricity, light, radiant heat, cathode rays and similar phenomena are promulgated. According to this theory electric phe¬ nomena are strains and pulsations in the ether. See Ether.

Expansion. — Increase of volume, especially of steam, gas or other motive fluid. Also the point in a piston-stroke at which such expansion becomes available and the period during which expansion takes place in an engine cylinder. When compound cylinders are employed it is termed double expansion, and if there are three or four steam- cylinders used in series it is termed triple, quadruple or series expansion. See Steam; Steam-Engine.

Factor of Safety. — When calculating the ultimate strength of a structure it is necessary to provide for contingencies arising from a lack of uniform quality in materials, in¬ feriority of materials, wear and tear of parts, the unex¬ pected application of loads, etc. This provision is made by the use of multipliers such as 4, 6, 8, and in some cases 10, which are applied to certain dimensions. For ex¬ ample — the application of a factor of safety of four will give a structure having four times the strength necessary to carry the load it will be ordinarily required to sustain.

Feeding. — The supplying of material to a machine or the like, as feeding of coal by a mechanical stoker, feeding of sheets of paper to a printing press, feeding logs to a sawing machine, or cotton to a breaker.

Flue. — A channel or passageway for smoke, waste gases, etc., as a subsidiary tube or smoke-duct in a chimney, or a tube carrying gases of combustion in a boiler, or a hot¬ air passage in a wall. It is distinguished from pipe and tube.

Fly-Wheel. — A relatively heavy wheel added to a machine for the purpose of maintaining uniform speed: called fly¬ wheel because it simply rotates or flies around. It resists sudden acceleration of speed by its inertia, and is useful in machines that do their work in a small fraction of a cycle, to prevent slowing up or racing.

*Force. — Energy in action with reference to its direction; mechanical power as apparent in pushing, pulling, rotat¬ ing, attracting and repelling; exertion that can be meas¬ ured in pounds or units. Force always has direction, while energy has not, being rather the static idea. A storage battery may possess great energy, and yet exhibit noforcefor lack of aconductor. Compare * Energy/ "Power and ‘ Horse Power,’ in this list.*

Gas. — Matter in the aeriform state, usually invisible and apparent to the senses only by its odor or motion. Coal gas, water gas, petroleum vapor and various other gases, when mixed with atmospheric air in a proportion of about 1 to 10, readily explode when in contact with a flame.

and this principle is used in the internal combustion engine. See Internal Combustion Engine.

Gear. — See Gearing and Mechanical Movements.

Governor. — A device for speed-regulation, as of an engine or motor, the most common type being the ball-governor used on steam-engines to prevent racing.

Graphic Statics.— The graphical methods employed for ascertaining the strains on structures, velocity ratios, etc., by means of lines drawn to a uniform scale and represent¬ ing the direction and intensity of active forces.

Horse Power. — A theoretical unit of work, assumed to be the equivalent of what a horse can do; it equals 33,000 pounds lifted one foot in one minute. The power of engines and motors is frequently expressed m horse power units. A.H.P. is actual horse power; B.H.P. is brake horse power; I.H.P. is indicated horse power; and F.H.P. is friction horse power. Horse power is also the name of a form of tread-mill in which the traction power of horses is utilized in place of an engine or motor.

Inertia. — Resistance to change of motion due to mass or weight; persistence in a given motion or state of rest.

Ingot. — A mass of cast metal from a mold. The more val¬ uable metals when not shaped as bars or rods are usually cast in ingots; iron is cast in pigs.

Interchangeable System. — That system of manufactur¬ ing machinery by which each part or piece is so exactly formed or machined that it may be replaced by any sim¬ ilar part. It originated in America and has become general. See Interchangeable Parts.

LAr. — A part that extends beyond the body of a thing over some other part, specifically, in steam-engineering, the extension on a slide-valve that determines the instant of opening or closing a steam-port. Also a piece of soft wood, metal, leather, etc., for polishing.

Load. — The weight or pressure a structure carries or sus¬ tains, distinguished as live load when moving, as of wagons on a bridge, and dead load when stationary. Live load is liable to create twice the stress of dead load, and must be provided for in the strength of the structure.

Machine Tool. — A machine for cutting, planing, drilling, turning, milling, etc., with cutters or small tools; formerly called engine-tool.

Motor. — A machine for transmitting power, as of water under head, or by electricity, as distinguished from an engine where the power is assumed to originate in the machine. See Electric Motor.

Mine. — An excavation in the ground for the purpose of obtaining some metal or mineral. Also a buried or sub¬ merged explosive.

Modulus. — A number or coefficient for the measure of a force or function. See ‘ Coefficients ’ in this list.

Molding. — See Foundry Practice.

Oscillation. — A swinging from side to side, or short regular reversal of rotation; also vibration, as of electric waves. Compare ‘ Reciprocation ’ in this list.

Pattern. — A model or original form of a piece designed to be cast, as for forming in iron. See Foundry Practice.

Pile. — A large heavy timber, pointed and driven small-end- first into the ground, as a support for a superstructure; commonly used in muddy places or on the edge of a body of water for securing a foundation: formerly railed a spile. Now made also of concrete, or steel and concrete. Some¬ times metal planks are used for the same purpose, or to .form a breakwater or stout wall, and are termed sheet piles.

Pipe. — A long hollow tube, either one piece or a series of connected pieces. The distinction between pipe and tube is usually arbitrary, but when the article is made of soft, yielding material, as rubber, the correct term is tube.

Power. — Mechanical energy as viewed from the stand¬ point of capacity; the measurable amount of active en¬ ergy; capability of performing a given amount of work Compare ‘ Energy,’ ‘ Force ’ and ‘ Horse Power ’ in this

list. .

Pressure. — Stress such as would tend to move a body in contact; the impelling force of a load. It is usually esti¬ mated by units of weight. See ‘ Load ’ and ‘ Stress ’ in this list.

Prime Mover. — An engine or the like from which a power originates. The electric dynamo depends upon the steam- engine or water-wheel as its prime mover.

Racing. — Running at an excessive speed, as an engine sud¬ denly

released of its load. It is liable to burst a fly-wheel if not checked.

Reaming. — The enlarging of a hole by inserting and turning a tool termed a reamer; done to taper a hole or remove edges weakened by punching.

Reciprocation. — ■ The act of moving back and forth sys¬ tematically, as a piston. Compare ‘ Oscillation ’ in this list.

Reducing. — Drawing to a smaller scale; also _ tapering in diameter; also the smelting or reduction of ore in a furnace; also the act of withdrawing fluid under pressure, as by a reducing-valve.

Revolving. — Turning around in an orbit, after the manner of a planet, or a ball in a ball-bearing. Such a ball rotates on its own centre, but revolves around the center of the bearing. See ‘ Rotation ’ in this list.

Resistance. — That which opposes a force or movement. An electric resistance is a poor conductor, as an iron wire, placed in a circuit to impede the current.

Reverberatory. — Reflecting, or operating by reflection, as a puddling furnace, where the flame and heat are reflected from the vaulted roof to the top of the material to be fused.

Rivet. — A short metal connection for holding metal plates together, resembling a bolt, but instead of having a thread¬ ed end and nut, the tail end is designed to be upset, that is battered and spread, to keep it tight in its hole.

Rolling. — Passing between heavy iron rolls to reduce and shape, as steel rails and beams. Also calendering.

Rotation. — The act of turning around its own centre. Compare ‘ Revolving ’ in this list.

Shaper. — A machine tool for cutting or machining small metal parts, the work being stationary, and the cutting tool mounted to reciprocate.

Spindle. — A slender rod or pm, usually for some rotary purpose, as the central rod of a bobbin.

Spinning. — In metal working, the operation of drawing out and expanding into a cup or cone form, by pressure and rotation. In textile manufacture, the drawing out and twflsting of sliver to form thread.

Stamping. — The operation of forming light metal articles in the cold by a

sudden blow of a die. Also the crushing of ore in a stamp-mill.

Static. — At rest or in equilibrium. See Electricity.

Stoking. — The supplying of a furnace with fuel. Mechan¬ ical stokers are common for supplying coal under sta¬ tionary boilers, but are not adapted to marine use.

Strength of Materials. — The engineer is continually confronted with this problem, and elaborate tests are now undertaken to secure uniform and knov/n strength in structural materials. The force that resists being pulled apart is termed tensile strength; that resisting crushing is termed strength of compression. There is also torsional and bending strength.

Stress. — Any force or power that tends to deform, bend or fracture a thing; especially, such a force considered with its reaction or opposing force.

Stuffing. — In steam engineering, a packing of spiral steel rings for making a fluid-tight joint for a moving part, as a piston-rod.

Switch. — A mechanism for side-tracking a thing. An elec¬ tric switch is usually a jointed piece of copper with in¬ sulated handle, by which conductors can be connected or disconnected. A railway switch is a pair of jointed and pointed rails for guiding car-wheels to an adjacent track. A weaver's switch is a reversing motion for a shuttle.

Tempering. — The process of bringing steel, etc., to a cer¬ tain degree of hardness by heating and sudden cooling in water or oil. Also the process of bringing clay to proper working condition by moistening and kneading.

Template. — A flat pattern, usually of metal, serving as a guide in various cutting, drilling and shaping operations. Also spelled templet.

Tension. — The force or system of forces tending to draw a body apart or lengthen it; pulling stress as opposed to compression. A tension member of a truss is a rod that is subjected to a pulling strain.

*Testing. — The operation of testing materials. See * Strength of Materials ' in this list. A testing machine pulls apart pieces of metal and measures the elongation and strain of rupture, and also determines crushing or compression strains.*

Thread. — A spiral projection on a screw for enabling it to grip a softer substance, as wood, or to fit into a reverse thread in a nut.

Train. — A series of parts acting together, as a train of gears.

Transmission. — ■ The passage of something over or through some other thing, as heat through the air, or electricity through a copper or aluminum wire. Also the sending mechanism of a telephone. Also a mechanism that trans¬ mits power in a given way, as the transmission of an automobile.

Truss. — A braced framework, calculated to resist strains in all directions, as used in bridges, roofs, etc.

Tube. — See Pipe.

Turbine. — A flanged wheel or circular structure, calculated to receive the impact of rapidly moving water, steam, etc., and deliver a large part of it as power on a shaft. See Hydro-Electric Development.

(Jnit.— -A given minor quantity represented by 1, for cal¬ culating the quantities of things. The fundamental units are the metre and foot for length, pound and kilogram for weight, second for time. See Metric System; also Elec¬ trical Units.

Work. — The accomplishment of machinery or mechanical motion by the expenditure of energy. The work done by lifting 10 pounds 10 feet is 100 foot-pounds.

Working. — Adapted to work; accurate in operation, as a working model.

Charles H. Cochrane, Author of ‘ Modern Industrial Progress .’

ENGINEERS, Corps of, a branch of the United States army which takes charge of the construction and repair of fortifications, both temporary and permanent, military reconnoiter- ing and surveying, the selection and planning of camp sites, the construction and maintenance of roads, railroads, bridges, storehouses, etc., and divers other technical services which are not under the supervision of special branches of the army. It also superintends river and harbor improvements, the collection and preser¬ vation of documents relating to the Washington aqueduct and public buildings in the District of Columbia and the construction of bridges and roads in the Crater Lake and Yellowstone National Parks. The Panama Canal was built under engineer officers.

Engineer officers were authorized by Con¬ gress on 16 June 1775 and in

the same year Col. R. Gridley became chief engineer. Many French engineers served with the United States army during the Revolution. A corps of artillerists and engineers was established by the act of 9 May 1784. In 1802 the artillery and engineers were separated and the Corps of En¬ gineers was established. This was gradually increased in size until the present establishment is 505 officers, one band, seven regiments and two mounted battalions. In 1813 appointments were first made to the rank of topographical engineer. After various vicissitudes, the topo¬ graphical service of the army was organized as the Corps of Topographical Engineers in 1838. In 1863 this corps was merged in the Corps of Engineers.

Engineer officers are appointed, in general, from West Point, although competitive exami¬ nations are held which are open to civilian engineers. Commissions in the engineers are generally given to those West Point cadets with the highest academic standing. Officers in the Corps of Engineers are considered as in the line when they are on service with engineer troops. Otherwise they are staff officers.

During the Great War the uses of engineer troops and the organizations which they form have undergone great diversification. Whereas the engineer troops of the United States army were formerly grouped into pioneer regiments, mounted pioneer battalions and pontoon bat¬ talions, there are now also labor regiments, railroad regiments, lumbering regiments and so on indefinitely, made up from men in the Na¬ tional Army or National Guard and under engineer officers. The technical training of officers of the Corps of Engineers is divided be¬ tween the United States Engineer School at Washington and the Army Field Engineer School at Fort Leavenworth. The Royal Engi¬ neers of the British Army, the <(technische Truppen® of Germany and the Engineer Corps of the French Army correspond very closely to the United States Corps of Engineers, but per¬ form work which belongs to the American Sig¬ nal Corps as well. The foreign corps also differ from the American in that they draw in general from technically trained men, whereas in times of peace American engineers receive the greater part of their training after enlistment. See Army Organization ; United States, Army of.

ENGIS, on-zhe, Belgium, on the Meuse, southwest of Liege, in the neighborhood of which there are many caves. In these, in 1832,

there were discovered by Dr. P. C. Schmerling a human skull and parts of a man's skeleton together with bones of the rhinoceros, mam¬ moth, cave-bear and hyena imbedded in de¬ posits belonging to the Quaternary period. This discovery gave cause for much discussion among anthropologists. The skull, usually known as ((7th ed., London 1913) ; Doudon, E., (Nouvelles explorations dans les cavernes d'EngihouP (in Soc. d'Anthrop. de Paris,

Bull, et Mem., Ser. V, Vol. IV, p. 177, Paris 1903) ; Dupont, E. F., (Les Temps Prehis- toriques en Belgique (Brussels 1873) ; Hux¬ ley, T. H., (Man's Place in Nature1* (New York 1899) ; Schmerling, P. C., (Recherches sur les ossements fossiles decouverts dans les cavernes de la province de Liege* (Liege 1833) ; Spring, (Les Hommes d'Engis et de Chauvaux) (in Bulletins de L' Academie Roy ale de Belgique , Ser. II, Vol. XVIII, pt. 2, No. 12, Bruxelles 1864).*

ENGLAND, John, American Catholic prel¬ ate : b. Cork, Ireland, 23 Sept. 1786; d. Charles¬ ton, S. C., 11 April 1842. He was educated in the schools of Cork and studied law for two years, but in 1803 entered the theological col¬ lege of Carlow. Here his progress in his studies was so brilliant that after his second year he was selected to deliver public lectures on re¬ ligious subjects. He also devoted much of the time given him for recreation to the instruction of the militia stationed in the town. He also founded an asylum for unprotected females which afterward suggested the plan of the Presentation convent and established free schools for the education of poor boys. In 1808 he was recalled by his bishop and appointed president of the theological seminary at Cork. He took a leading part in the agitation for Catholic emancipation .and, with the view of helping the cause of religious liberty, founded the Chronicle, which he continued to edit until his departure from Ireland. When the see of Charleston, embracing the States of North Car¬ olina, South Carolina and Georgia, was founded Dr. England was nominated its first bishop. As he had determined to become an American citizen he refused to take the oath of allegiance exacted from Irish bishops on their consecra¬ tion. After some difficulty he was consecrated in Cork in 1820 and arrived in Charleston the same year. He had many obstacles to contend with. There were only two priests and two churches in the three States under his jurisdic¬ tion and his flock was made up chiefly of poor Irish emigrants and refugees from Santo Do¬ mingo. In order to provide priests for his diocese he opened a classical school in Charles¬ ton, and the success that attended his efforts in this respect enabled him to support several of his ecclesiastical students. Not only did he succeed in training a body of educated mission¬ aries for his church, but contributed largely to the revival of classical learning in South Caro¬ lina. Several schools were reopened and the College of Charleston, which had suspended for some time, resumed its studies. He infused new life into the Philosophical Literary Asso¬ ciation of Charleston as soon as he became a

member and did much to suppress dueling, not by intemperate

denunciations but by forming the most influential gentlemen of the State into an anti-dueling association. He was invited by Congress to preach in the Hall of Repre¬ sentatives at Washington and was the first Catholic clergyman on whom this honor was conferred. To explain and defend the doctrines of his church he established the United States Catholic Miscellany at Charleston. It was through the columns of this periodical that most of his writings found their way to the public. His influence was felt in every part of the Cath¬ olic church in the United States and his influ¬ ence at Rome was decisive in affairs connected with the church in America. His courses of lectures, which he delivered in all the great cities of the Union, were attended by citizens of every creed. Nothing, however, endeared him to the people of Charleston so much as his heroism during the frequent visitations of the yellow fever, when he continued at his post night and day. In 1834 he visited Ireland and obtained the services of three nuns of the Ursuline Order, by whose aid he established the Ursuline schools of Charleston. He also founded orphan asylums, boarding-schools and free schools, which he placed in charge of the Sisters of Our Lady of Mercy. He conceived the plan of assembling the prelates in council for mutual aid, and has been styled ((the author of our provincial councils.® He visited Europe four times in the interests of his diocese, was sent twice as Apostolic Delegate to Haiti and was offered an Irish See, which he declined. On his return from Europe in 1841 malignant dysentery broke out among the steerage pas¬ sengers, and Dr. England's attendance on them was incessant until he was attacked by the dis¬ ease himself. He finally died from its effects, which were heightened by overwork. His principal works are (Discourse before the Hibernian Society of Savannah) (1824); Explanation of the Construction, Furniture and Ornaments of a Church) ; (Letters on Slavery) ; and ((Works,® edited by Bishop Reynolds (5 vols., Baltimore 1849).

ENGLAND, including WALES, the south¬ ern and larger portion of the island of Great Britain, is situated between lat. 50° and 55° 46′ N. and long. 1° 46′ E. and 5° 42′ W. Eng¬ land covers 42 per cent, and Wales 6 per cent, together 48 per cent of the whole area of the British Isles. For geographical, administrative and statistical purposes Wales is usually in¬ cluded with England, of which it forms a west¬ ern peninsula, similar to the counties of Devon and Cornwall. Bounded on the East by the North Sea or German Ocean, which separates the territory from Germany, Holland, Denmark and Belgium; on the south by the 'English Channel, dividing it from France, and on the west by the Saint George's Channel and the Irish Sea, its only land frontier is that irreg¬ ular line of 110 miles facing Scotland on the North. As the crow flies, that border line is barely 70 miles; forming a rough triangle, the eastern side measures 350 miles in a straight line ; the western 425, and the southern 325 miles — a total of

1,170 miles. But the shores within this triangle are so deeply indented by bays and estuaries that the actual, coast line is more than twice that distance, estimated at not less than 2,765 miles. The length of the coun-

try, measured on a meridian from Berwick nearly to Saint Alban's Head, is 365 miles. Its breadth, calculated on a parallel of latitude, at¬ tains its maximum between Saint David's Head, in South Wales, and the Naze, in Essex, where it amounts to 280 miles. The area of England without Wales is 50,873 square miles; that of Wales, 7,366; together, 58,239 square miles. The seas surrounding the British Isles are shal¬ low. If the waters were to subside to the ex¬ tent of 300 feet, the whole of the British Islands, including Ireland, would once more be united to Continental Europe.

Geographical History. — This great island possession of Rome had been virtually aban¬ doned by the Romans (a.d. 410) before the Teutonic settlements in it began. The invaders had therefore to struggle rather with native Britons than with Romans. Moreover they were invaders who came by sea, and from lands where little or nothing was known of the Roman law or religion. They met with a de¬ gree of strictly national resistance such as no other Teutonic conquerors encountered, and therefore, in the end, they swept away all tracets of the earlier state of things in a radical way which took place nowhere else. As far as such a process is possible, they slew or drove out the older inhabitants ; they kept their heathen religion and Teutonic language, and were thus able to grow up as a new Teutonic nation in their new home without any impor¬ tant intermixture with the earlier inhabitants, Roman or British. The conquerors who wrought this change were the forefathers of the present day English, — the low Dutch in¬ habitants of the borderlands of Germany and Denmark. Among them three tribes, the An¬ gles, the Saxons and the Jutes, had the chief share in the conquest of Britain. The Saxons had already attempted a settlement here in the 4th century and were consequently the tribe first known to the Roman and Celtic inhabit¬ ants of the island. Hence it came that the Celts of Britain and Ireland have called all the Teutonic settlers Saxons to this day. But, as the Angles, or English, occupied in the end by far the greater part of the land, it was they who, when the Teutonic tribes in Britain began to form one nation, gave their name to that nation and its land. That nation was the English and their land was England. While Britain thus remains the proper geographical name of the whole island, England is the political name of that part of Britain which was step by step conquered by the English. Before the end of the 5th century several Teutonic kingdoms had been founded in Britain. The Jutes began the conquest by their settlement in Kent, and pres¬ ently the Saxons began to settle on the south coast and on a small part of the east coast, in Sussex,

Wessex and Essex. Along a consid¬ erable portion of the eastern coast various Anglian settlements were also made, which gradually grew into the kingdoms of East Anglia, Deira and Bernicia. By their ultimate union the last two formed the great kingdom of Northumberland. At the close of the 6th century, however, the English had not got very far from the southern and eastern coasts. The Britons, whom the English called Welsh, or strangers, held out in the west, and the Piets and Scots in the north. The Scots were prop¬ erly the people of Ireland; but a colony of them

had settled on the western coast of northern Britain — distant at one part only 13 miles from Ireland — and in the end gave the name of Scotland to the whole northern part of the island.

The changes of boundary between England and Wales began with the great Welsh cam¬ paign of Harold in 1063. All the border shires, Cheshire, Shropshire, Herefordshire and Glou¬ cestershire seem to' have been enlarged at this period. The English border stretched to the Conwy in the north and to the Usk in the south. But part of this territory appears to have been recovered by the Welsh princes, while part passed into the great march district of England and Wales, under the rule of the Lords Marchers. The gradual conquest of South Wales began under the Conqueror and was continued by his sons ; but it was more the work of private adventurers than of the kings themselves. The lands of Morganwg, Bre- heiniog, Dyfed and Ceredigion, answering nearly to the modern South Wales, were grad¬ ually subdued. In some districts, especially in the southern part of the present Pembroke¬ shire, the Britons were actually driven out, and the land was settled by Flemish colonists; the latest of the Teutonic settlements in Britain. Elsewhere Norman lords, with Norman, Eng¬ lish and Flemish followers, held the towns and the more level country, while the Welsh kept up a semi-independence in the western moun¬ tains. In North Wales, meanwhile, native princes still ruled as vassals of the English king till the war of Edward I. In 1277 the vassal prince was compelled to relinquish again the territory east of the Conwy to his overlord. The final conquest followed in 1282, but com¬ plete incorporation with England did not take place until the reign of Henry VIII, 253 years later. During this long interim North and South Wales remained a separate dominion, giving the princely title to the eldest son of the English king, a dynastic custom that still exists to-day. Some shires were formed or remod¬ eled, new towns founded, and the border dis¬ tricts maintained under the anomalous juris¬ diction of the Marchers till the ultimate ab¬ sorption in 1535. Thirteen new counties were then formed and some districts added or re¬ stored to the border

shires of England. One of the new counties, Monmouthshire, was added to an English circuit under Charles II, and has since been considered an English county. Curiously enough, it frequently appears in¬ cluded with Wales even in official publications at the present time.

With the exception of these new creations, all the existing shires of England were in being at the time of the Norman Conquest, save those of Lancaster, Cumberland, Westmoreland and Rutland. The boundaries were not always ex¬ actly the same as at present, but the differences are commonly slight and of mere local interest. As they stood at the Conquest the shires were of two classes : some were old kingdoms or principalities which still kept their names and boundaries as shires, while others seem to have been mapped out afresh when the land was re¬ covered from the Danes. All the shires on the Welsh border stretched further west in (Domes- day> than they do now. On the Scottish border Westmoreland and Cumberland were formed

out of 'the Cumbrian conquest of William II and enlarged by territory which appears in VIII. In central England the only change was the formation of the smallest shire — Rutland — out of the Domesday district of Rutland, an appendage to Nottinghamshire, en¬ larged by a small part of what was then Northamptonshire.

If one were to trace these changes over a series of ancient and modern maps, they would reveal but very little alteration of boundaries in the island since the 11th century. The land, as a whole has not been mapped out afresh since the 10th century. While a map of France or Germany in the 11th century, or even in the 18th, would be useless for immediate practical purposes, a map of England in the days of Domesday (1085-86) hardly differs from the map of England as we know it to-day. The only changes of any import — and they are neither many nor great — are the shires on the Welsh and Scottish borders. William the Conqueror put the finishing stroke to the work of Egbert and made England forever one. By uniting that country under the same ruler as Normandy (namely, himself), he led her into the general current of continental affairs, and gave her a European position such as she had never held under her native kings.

Although there have been but slight changes in the boundaries of England itself within a thousand years, the extra-territorial expansion of that country beyond the seas constitutes the most remarkable phenomenon in the world's history.. England alone is about the size of Rumania, less than a fourth of France or of Germany, and but little larger than the State of New York. England and Wales together are not equal in area to the State of Georgia, nor a quarter the size of Texas. There are 29 States or Territories in the Union each larger than England, and several much larger than the whole United Kingdom put together. Whilst the area of the British

Isles is less than one- fiour hundredth part of the land surface of the globe, the colonies and dependencies which Eng¬ land has acquired within about 300 years cover something like one-fifth of the earth, or 11,- 351,046 square miles, with a population esti¬ mated at over 400,000,000.

Topography. — The chief indentations are: On the east,, the Humber, the Wash and the Thames estuary ; on the west, the Solway Firth, Morecambe Bay, Cardigan Bay. and the Bristol Channel ; those on the south are less prominent, though including some useful harbors. The greater part of the coast consists of cliffs, in some places clayey, in others rocky and some¬ times jutting out into bold, lofty and precipi¬ tous headlands, as at Whitby and Flamborough Head on the east, Beachy Head, the Isle of Portland, the Lizard and Land's End on the south and southwest, Saint David's Head and Saint Bees Head on the west. The most ex¬ tensive stretches, of flat coast are on the east, in the county of Lincoln, and from the south part

D

E

H

-V -p '

Mjiufoa

CampbeJ tovvjk

ˆ0 Dumbarton ˆQoatbridgt

Hamiltonˆ

*Airdrie M«EiOINBURGHL*M"?RMU", > – -St“*

, C)xpLASGOW -■ /ˆ'HiLLa

, l»l»leyo'!_ SFjg&i V)*

\ f ˆbMURAK l'

UTTuV f '

IUMDRaK uU

V Ardrossan ick

>3 \ Kilmarnock

ih 5^ 1 ti – –

^ Ayr/.^-'

V Cumnock

vS ' "

--*~ – ^LU

Motherweir^^'

° Wishaw *' . T .

moorfoot h(lls„ \ 0Laudor

Lanark^A Peebles® fjtyred '^V ■£,,

.Mull of^Kintyro A\

% *

May bole N f1 Girvan

Abb's Head

Berwick-upon-Tweed

, /|S A^aWhlte coombv

y^'wlck ^ f:^°HYa\A[W

,r A' V) — { W UPvETTRICK PEN < r— V,#- V aT

HtAupp'LAc»3p4-^V0

mouth

Budle Bay 'Farne Is-.

54°

K..m wc,

\ – ^ j\Newry '

DumlalkV

Corsew all Pt^(

I. Maoer Stran Port Patrick?

Port Logarf

iDonaghadeo ards Mull of Galloway

'Aid on liam

Stan more p

p Ep]>ing

^Waltham/Abbey

Kelvodon Hal

N

UNDERLAND Seaham Harbout

Burrow

Head

*'Downpatrick/**

rtaferry

• Bay

*Point of Ayr**

*Aedyefr^,rld**

KirkmlchaelZy ; yMaughold PuoIj^ '•' •. .^Laxey __ — wRjMAN Foidalc MW J^UoMgUl**

Port Pri-Y -/g^]sJ!i|lt

*o<^^*

El t ham o Grnyjofd

OUUBIU/A " P ” V

1 >p<>n o>>ordeu svx/ J# [V*

V'Silrllll.in CROYDON' ^ ;W«.t Wirkh.o, \ »s, -V

k'H'«k) BeTidMigJ \ /) ' X Crockenlull/ Mary Cray

^xctu*/

Walton / Statute Miles, 12 =1 Inch,

i the BM / »

IRISH

Dublin.

/*j – Kingstown.

V# '

VV icklow

Arklow"

| (f Wexford .

c?

The Skerbies Carmel Head if

[Amlwch^ i Holyhead Bay\ LUnercifymedd HolyheadrVkxrp. * Jf —

Hour HE AD ^ ,

PurtDliiijrwi V' Carnarvon s

Glass Point Braich-y.Pwll Bardsey I

Houghton carborou iFiley

inhjlg^atf;/ Bay

'sifclo!ereBHd,h< *^5^Flamt>orough Head Bridlington

Environs of LONDON.

>

V At.

A-

i – - ?He5ˆrtfc Eˆn SI/

.$ St. Davids Head

ra Xo®1,

Ramsey I.QˆrHvˆtocb * v St Br

'. (Sol*"4 ˆ A > 1

St

c-v'

o'''

Lvndy Islam]

/ 'Oa. «5.

,9 K > '

\9- | ««,

iljjMr. Maky > aN' rfˆ.o' >

t'.t*rs'- as“«» j % < * -?-0

ˆESTBRV RolKR n '

d- "'«* \

rSSJfSVZ

BRISTOL

Jr"\

; /J A \r •. , W eaton super Mar £/VˆZ Mreaa Dowu*

ihwold 'pun wick

; Quj

ietfoi

MUdenhˆl

‘b&m.

SMI F V <) VL IS/), Leinton

ˆ.— ■ – • 4 .ˆbrford Ness

VQifovd Havon_

iH- Midguard Point 'The Naze P Walton on the

ss- nft\

Hartland Ft.-, °y

Moorwinstowˆit Torringtonfo Soˆb Mattcn

/b “ilkhampton , | Tlvertonj

IgBton /

, -J/ˆˆfoineaj lymouth

’otheoombe , , ,

ˆ ˆ / Dartmouth

RinnbjUga/ˆarf Bay ˆ VˆSttlcombeiˆl Start Point

Eddy stoke Riclcbam

L. B.

uyt> , .

pNew Romney V;

S%dd A

s Dungeaew Vj

Boulog sur.Mi r

j%2 %,X

H

C H A N n E

ENGLAND AND WALES

SCALES

Statute Miles, 41 = 1 Inch..

*I**

t

M

A

*C»v**

N C H E)

deˆ&

Ha6ue

Kilometres, 05 = 1 Inch.

0_ 25 SO 75 100

Rand .McNally St, Co.'e New 11 x 14 Map of England and WaTeii,
Copyright, by Rand V»»Na11j 4 Co. _

\ Alderney I.4ˆ

GUERNSE Y'I. rˆ8i- Sampson's n q .°hebm i. StPeteˆ .. ˆfSi,Kl

CHANNEL ISLANDS

.Jersey l.C — -dit – Martins

Corbiere W%J °»"J

Lie Mcnquiers — f£pg-i/3

ˆ Point® de Barfleur

?®St. Lo

Longitude West/from Greenwich.

50

I Longitude East from Greenwich.

B

C

D

E

G

H

334

ENGLAND

355

of Suffolk to F e South Foreland in Kent, and in Sussex and Ha..ts on the south coast. The chief islands are Holy Island, the Fame Is¬ lands, Sheppy and Thanet on the east coast; the Isle of Wight on the south; the Scilly Isles at the southwestern extremity; and Lundy Island, Anglesey, Holyhead and Walney on the west.

The loftiest heights of England and Wales are situated at no great distance from its west shores and consist of a succession of mountains and hills, stretching, with some interruptions, from north to south, and throwing out numer¬ ous branches on both sides, but particularly to the west, where all the culminating summits are found. The northern portion of this range has received the name of the Pennine Chain and is commonly designated (

A large part of the surface of England con¬ sists of wide valleys and plains. Beginning in the north, the first valleys on the east side are those of the Coquet, Tyne and Tees; on the west the beautiful valley of the Eden, which, at first hemmed in between the Cumbrian range and Pennine Chain, gradually widens out into a plain of about 470 square miles, with the town of Carlisle in its centre. The most im¬ portant of the northern plains is the Vale of York, which has an area of nearly 1,000 square miles. On the west side of the island, in south Lancashire and Cheshire, is the fertile Cheshire plain. In Wales there are no extensive plains,

the valleys generally having a narrow, rugged form favorable to romantic beauty, but not compatible with great fertility. Wales, how¬ ever, by giving

rise to the Severn, can justly claim part in the vale, or series of almost un¬ rivaled vales, along which it pursues its roman¬ tic course through the counties of Montgomery, Salop, Worcester and Gloucester. Southeast of the Cotswold Hills is Salisbury plain, a large elevated plateau, of an oval shape, with a thin, chalky soil only suitable for pasture. In the southwest the only vales deserving of notice are those of Taunton in Somerset and Exeter in Devon. A large portion of the southeast may be regarded as a continuous plain, con¬ sisting of the Wealds of Sussex, Surrey and Kent, between the North and South Downs, and containing an area of about 1,000 square miles. The southeast angle of this district is occupied by the Romney marsh, an extensive level tract composed for the most part of a rich marine deposit. Extensive tracts o'f a similar nature are situated on the eastern coast in Yorkshire and Lincoln, where they are washed by the Humber; and in the counties which either border the Wash, or, like Northampton, Bedford, Huntingdon and Cambridge, send their drainage into it by the Nen and the Ouse.

For the climate of England see Great Brit¬ ain — Geographical Environment.

Rivers. — England is well supplied with riv¬ ers, many of them of great importance to in¬ dustry and commerce. Most of them carry their waters to the North Sea. If we consider the drainage as a whole, four principal river basins may be distinguished, those of the Thames, Wash and Humber belonging to the North Sea; and the Severn, belonging to the Atlantic. The basin of the Thames has its greatest length from east to west, 130 miles, and its average breadth about 50 miles, area, in¬ cluding the Medway, 6,100 square miles. The river itself, which is the chief of English rivers, has a length of 210 miles. The basin of the Wash consists of the subordinate basins of the Great Ouse, Nen, Welland and Witham, which all empty themselves into that estuary, and has an area computed at 5,850 square miles. The basin of the Severn consists of two distinct portions, that on the right bank, of an irregularly oval shape, and having for its principal tribu¬ taries the Teme and the Wye; and that on the left, of which the Upper Avon is the principal tributary stream. The area of the whole basin is 8,580 square miles. The next basin, that of the Humber, the largest of all, consists of the three basins of the Humber proper, the Ouse and the Trent, and its area is 9,293 square miles, being about one-sixth of the whole area of England and Wales. Other rivers unconnected with these systems are the Tyne, Wear and Tees, in the northeast ; the Eden, Ribble, Mersey and Dee, in the northwest. The southern coast streams are very unimportant except for their estuaries. See Thames.

Areas and Population. — The total area of England and Wales amounts to 58,340 square miles, and the population (1911 census) aggre¬ gated —

England, 34,045,290; Wales, 2,025,202, making a total of 36,070,492. A later official estimate, made in 1914, placed the total at 36,960,684; while the National Register, taken in August, 1915, placed the civilian population

at 35,360,000. In 1901 England and Wales con¬ tained 78 per cent of the population of the United Kingdom; in 1911 it rose to 79.8 per cent, or four-fifths of the whole British Isles. The density of the population in England is greater than in any other European country (disregarding Monaco) except the Free State of Saxony (829 per square mile). In 1911 it was for England alone 670 per square mile; for England and Wales, 618. In Scotland it was only 154, and Ireland 137 per square mile.

The first uniform census of the United Kingdom was taken in 1801. The growth of population in England and Wales during 264 years is shown by the following available statistics :

In 1650 (estimated) . 5 , 450 . 000

1750 (probably) . 6,400.000

1801 (census) . 8 , 892 , 536

1841 (England) . 15,002,443

1851 (together) . 16,921,888

1861 " . 18,954,444

1871 " 21,495,331

1881 " 24,613,926

1891 " 29,002,525

1901 " 32,526,075

1911 " 36,070,492

1914 (estimated) . 36,960,684

During the 100 years (1801-1901) the popu¬ lation of the United Kingdom rose from 16,- 000,000 to 41,000,000. The 1911 census revealed 17,445,608 males and 18,624,884 females, an ex¬ cess of

1,179,276 females. Men serving in the army, navy and merchant service abroad are not included in this calculation. The number of separate families in 1911 was 8,005,290, as compared with 7,036,868 in 1901. In 1914 there were 879,096 births, 37,329 illegitimate births, 294,401 marriages and 516,742 deaths. The pro¬ portion of male to female births for that year was 1,036 male to 1,000 female, while of the total estimated population 17,877,052 were males and 19,083,632 females. The following table shows the areas and population of the 40 Eng¬ lish and 12 Welsh counties (1911) :

Counties

(Administrative)

Area in

square Population miles

Bedfordshire .

Berkshire .

Buckinghamshire .

Cambridgeshire .

Cheshire .

Cornwall .

Cumberland .

Derbyshire .

Devonshire .

Dorsetshire .

Durham .

Essex .

. 466.4

. 721.9

. 743.2

. 492.5

. 1,027.8

. 1,356.6

. 1,520.4

. 1,029.5

. 2,604.9

. 987 9

. 1,014.6

. 1,523.2

194,588

195,811

219.551

128,322

676,275

328,098

265,746

560,013

457,331

223,266

929,214

1,061,851

329,014

Gloucestershire .

. 1,243.3

Hampshire .

. 1,623.5

433,566

Herefordshire .

. 839.6

114,269

Hertfordshire .

. 634.6

311,284

Huntingdonshire .

. 366.0

55,577

Isle of Ely .

. 371.9

69,752

Kent .

. 1,554.7

1,020,965

Lancashire .

. 1,880.2

1,739,320

Leicestershire .

I Lincolnshire :

. 823.6

249,331

Holland .

. 410.6

82 , 849

Kesteven .

_ _ 727.9

111,324

Lindsey .

. 1,501.7

237,843

London .

. 117.0

4,521,685

Middlesex .

. 283.3

1,126,465

Monmouthshire .

. 534.0

312,028

Norfolk .

. 2,044.4

321,733

Northamptonshire .

Stoke of Peterboro' .

. 1,003.1

213,733

. 83.5

44,718

Northumberland .

. 2,018.0

371,474

Nottinghamshire .

. 843.4

344,194

Counties

(Administrative)

Area in

square Population miles

Oxfordshire .

. 755.7

146,221

Rutlandshire .

. 152.0

20,346

Shropshire .

. 1,343.0

246,307

Somersetshire .

. 1,630.3

407 , 304

Staffordshire .

. 1,171.2

738,990

Suffolk .

. 1,488.6

320,128

Surrey .

. 758.0

676,027

Sussex .

. 1,459.2

418,454

Warwickshire .

. 902.3

408,227

Westmoreland .

. 786.2

63,575

Wight, Isle of .

. 146.9

88,186

Wiltshire .

. 1,374.9

286,822

Worcestershire .

Yorkshire:

. 751.0

427,026

East Riding .

. 859.0

154,768

North Riding .

. 2,124.5

314,779

West Riding .

. 2,264.2

1,584,880

Following are the 72 county boroughs, their areas and populations :

Area

County Boroughs

(square Population

(England)

miles)

Barrow-in-Furness .

Bath, City of .

Birkenhead .

Birmingham, City of .

Blackburn .

Blackpool . .

Bolton .

Bootle . . .

Bournemouth .

Bradford, City of .

Brighton .

Bristol, City of .

Burnley . . .

Burton-on- Trent .

Bury . . .

Canterbury, City of .

Chester, City of .

Coventry, City of .

Croydon .

Derby .

Devonport .

Dudley .

Eastbourne .

Exeter, City of .

Gateshead .

Gloucester, City of .

Great Yarmouth .

Grimsby .

Halifax .

Hastings . .

Huddersfield .

Ipswich .

Kingston-upon-Hull, City of. .

Leeds, City of . .

Leicester .

Lincoln, City of . .

Liverpool, City of .

Manchester, City of .

Middlesbrough .

Newcastle-upon-Tyne, City of

Newport (Monmouth) .

Northampton .

Norwich, City of .

Nottingham, City of .

Oldham .

Oxford, City of .

Plymouth .

Portsmouth .

Preston . ; .

Reading .

Rochdale .

Rotherham .

St. Helens .

Salford .

Sheffield, City of .

Smethwick .

Southampton .

Southport .

South Shields .

Stockport . .

Stoke-on-Trent .

Sunderland .

Tynemouth .

Walsall .

Warrington .

17.2

63.770

5.3

50,721

6.0

130,794

21.0

525,833

12.2

133,052

5.6

58,371

23.8

180,851

3.0

69,876

9.0

78,674

35.8

288,458

3.9

131,237

27.3

357,048

6.2

106,322

6.5

48,266

9.2

58,648

6.2

24,626

4.5

39,028

6.5

106,349

14.0

169,551

8.2

123,410

4.9

81,678

5.5

51,079

10.1

52,542

4.9

48 , 664

4.9

116,917

3.6

50,035

5.6

55,905

4.5

74,659

21.8

101 ,553

7.0

61,145

18.5

107,821

12.7

73,932

14.3

277,991

33.7

445,550

13.4

227,222

5.8

57,285

26.0

746,421

33.8

714,333

4.2

104,767

13.2

266,603

7.0

83,691

5.4

90,064

12.3

121,478

17.1

259,904

7.4

147,483

7.3

53,048

3.5

112,030

9.5

231,141

6.2

117,088

9.2

75,198

10. 1

91,428

9.3

62,483

11.4

96.551

8.1

231,357

37.9

454 , 632

3.0

70,694

7.2

119,012

8.0

51,643

3.7

108,647

8.5

108,682

17.4

234,534

5.2

151,159

6.8

58,816

11.7

92,115

4.7

72.166

ENGLAND

357

County Boroughs (England)

Area

(square Population miles)

West Bromwich . .

West Ham .

West Hartlepool. .

Wigan .

Wolverhampton . . Worcester, City of York, City of .

9. 1

68 , 330

7.3

289,033

4.2

63,922

7.6

89,152

5.5

95,328

4.9

47,982

5.8

82,282

Welsh Counties (12)

Anglesey .

Brecknockshire .

Cardiganshire .

Carmarthenshire .

Carnarvonshire .

Denbigshire .

Flintshire .

Glamorganshire .

Merionethshire .

Montgomeryshire .

Pembrokeshire .

Radnorshire .

276

0

50,928

733.

2

59,287

692.

5

59,879

919.

5

160,405

571.

8

125,043

665.

7

144,783

254.

7

92 , 705

764.

8

742,998

659.

9

45 , 565

797.

0

53,146

614.

0

89,960

470.

5

22,590

Welsh Boroughs (3)

Cardiff, City of . 9.8 182,259

Merthyr Tydfil . 27.7 80,990

Swansea . 8.1 114,663

The political divisions are — England, 40 counties in 231 divisions returning 231 members to Parliament; 134 cities, boroughs, etc., in 204 divisions returning 225 members ; and three universities, 5 members. Total, England, 461 members. Wales, 13 counties in 22 divisions — 22 members; 10 cities, boroughs, etc., in 11 divisions — 12 members. Total, Wales, 34. Total parliamentary representatives, England and Wales, 495 (Scotland, 72; Ireland, 103).

Historical Summary. — The leading events in English history (which are treated more fully elsewhere), may be briefly summarized here for ready reference :

B. C. 55 — First Roman invasion under Julius' Caesar, led to Roman conquest and civilization A. D. 410 — Roman evacuation; left Britain and her earliest civilization a prey to the barbarians.

449 — "English land in Britain; birth of feudalism and local government.

597 — Landing of Augustine; conversion of English to Christianity;

beginning of papal domination.

787 — Beginning of Danish invasions; inaugurated a period of anarchy and warfare, arresting progress and preparing England for conquest by the Normans.

825 — Ellandune and supremacy of Wessex; union of English kingdoms under Egbert.

878 — Ethandune and Treaty of Wedmore; England saved from anarchy and devastation; inauguration of King Alfred's reforms.

1066 — Battle of Hastings; Normans conquered Saxons; introduction of Norman civilization; beginning of Eng¬ land's greatness.

1086 — Domesday book and Salisbury Oath; established feudal system, and the power of the Crown; reformed central government.

1095 — Crusades began; undermined feudalism; aided the rise of the middle classes; introduced Eastern civilization. 1100 — Charter of Liberties; basis of English liberty and of Magna Carta.

1106 — Tenchebrai; conquest of Normandy; beginning of colonial empire and of English power in France.

1170 — Invasion of Ireland; inaugurated incessant misrule and anarchy in a part of the British Empire; opened a problem not yet solved in the 20th century.

1215 — Magna Carta; first written law and first real guar¬ antee of the liberty of the subject; basis of all subsequent legislation.

1265 — De Montfort's Parliament; first representative par¬ liament; beginning of popular representation.

1295 — Model Parliament of Edward I; first free parliament;

all classes completely represented.

1314 — Battle of Bannockburn; established Scotland's in¬ dependence.

1322 — Commons gain a share in legislation; the middle classes begin winning their way into first place in the government.

1346 — Battle of Crecy; definitely plunged England into a century's struggle with France; established the supremacy of yeomen and mercenaries over feudal knights and feudal levies.

1349 — The "Black Death;" — depopulated Europe; pro¬ voked a life and death struggle between capital and labor, culminating in the Peasants' Revolt.

1381 — Peasants' Revolt; revolution in the manorial system; emancipation of serfs; new era in the history of labor.

1399 — Deposition of Richard II and accession of Henry IV; overthrow of royal despotism; establishment of con¬ stitutional monarchy; its failure marked a century and a half of great misery.

1429 — Siege of Orleans; turning point in the Hundred Years' War; death-blow to English Continental Empire; caused the War of the Roses.

1430 — Disfranchising Act; lower middle classes deprived of their vote; no representative parliament for exactly four centuries.

1461 — Battle of Towton and of Mortimer's Cross; over¬ throw of Lancastrian rule and of the constitutional experi¬ ment; inauguration of the New Monarchy (the " benev¬ olent despotism " of the Crown).

1473 — Caxton introduced printing; inaugurated the " New Learning " and the education of the masses.

1497 — Cabot's discovery of the American mainland; inau¬ gurated trade with America; forerunner of British- American empire.

1529 — Divorce of Catherine of Arragon; Reformation set in motion.

1534 — Act of Supremacy; separation from Rome; King supreme head of English Church; establishment of Anglican Church.

1558 — Accession of Elizabeth; final victory of Protestantism; beginning of brilliant Elizabethan era and of England's supremacy in Europe.

1588 — Defeat of the Spanish Armada; Protestantism saved; England mistress of the seas; inaugurated great struggle between Crown and Parliament.

1604 — The name " Great Britain " given to England, Scotland and Wales.

1607 — Colonization of Virginia; began rivalry of English and French in America.

1628 — Petition of Right; first great victory of Parliament over Stuart despotism ; ranks with Magna Carta as a bulwark of English liberties.

1640 — Meeting of the Long Parliament; overthrew Stuart despotism.

1641 — Root and Branch Bill and Grand Remonstrance; plunged England into the great Civil War; victory of Puritanism over Episcopacy.

1645 — Battle of Naseby; victory of Puritan army over Royalists; led to execution of Charles I.

1649 – — Execution of Charles I.; overthrow of the Consti¬ tution, Monarchy, Church and Parliament; establishment of republic.

1660 — Restoration; overthrow of Puritanism; restoration of Monarchy, Church and Parliament; renewal of Stuart despotism.

1679 — Habeas Corpus Act; prevented arbitrary imprison¬ ment; guaranteed to the accused a fair trial.

1688 — The " Glorious Revolution;" final overthrow of royal despotism; establishment of constitutional govern¬ ment; Bill of Rights — the third great guarantee of English liberty.

1693 — National Debt began; revolution in British finance; Bank1- of England founded (1694); security of j invest¬ ment.

1704 — Battle of Blenheim; saved England and Europe from French domination.

1707 — Union with Scotland; completed the union of Great Britain; new era in Scottish development.

1721 — Walpole Prime Minister; cabinet system; party government; inaugurated a peace policy which formed the foundation of England's future supremacy.

1757 — Battle of Plassey; conquest of India; saved England's Empire in the East.

1759 — "Annus Mirabilis " — the most wonderful year in England's history; gave her Canada; overthrew French supremacy; led to Treaty of Paris, and establishment of her great Colonial Empire.

1783 — Treaty of Versailles; Pitt Prime Minister; independ¬ ence of New England colonies; overthrow of George Ill's absolutism.

1788 — Settlement in New South Wales; colonization of Australia, and establishment of Australasian Empire.

1789 Outbreak of French Revolution; overthrow of Conti¬ nental feudalism; inaugurated revolt of the oppressed; plunged Europe into great wars; produced Napoleon; arrested reform in England for 40 years.

1801 — Union with Ireland; Pitt's failure to solve the Irish question.

1805 — Trafalgar; finally established Britain's naval suprem¬ acy, and saved her from Napoleon's domination,

1815 — Waterloo,

1829 — Catholic Emancipation Act; triumph of religious toleration in England; put an end to religious hatred and persecution.

1832 — First Great Reform Bill; new phase in parliamentary reform; gave the franchise to the upper middle classes; added half a million voters.

1846 — Repeal of the Corn Laws; triumph of free trade; cheap food for the masses.

1854-55 — Crimean War.

1868 — Second Great Reform Bill; gave the franchise to the lower middle classes; added over a million voters.

1869 — Disestablishment of the Irish Church; gave to Ireland the religious liberty enjoyed by Great Britain; marked a new phase in the Irish question — that of reform and attempted conciliation.

1879 — Zulu War.

1882 — British supremacy in Egypt established at Tel-el- Kebir; end of the Anglo-French condominium; beginning of British conquest in North Africa.

1885 — Third Great Reform Bill; gave the franchise to the laboring classes; completed popular representation; added over two million voters.

1899 — South African War.

1901 — Death of Queen Victoria.

1910 — Death of King Edward VII.

1914 — Great Britain declared war on Germany.

Redistribution Recommendations for Eng¬ land and Wales. — On 4 Oct. 1917 the report of the boundary commission was published as a blue book in three volumes. The commis¬ sioners recommended the extinction of 27 Eng¬ lish boroughs and merging them in county con¬ stituencies in order to remove the (

GENEALOGICAL TABLE OF ENGLISH SOVEREIGNS, 975 —

England Eadgar, 975

Normandy Richard I, 996

Aethelred II, 1016 = Emma.

E AD WARD THE CONFESSOR, 1066

Richard II, 1026

i

Robert, 1035

*William the Conqueror, 1081 = Matilda _ ^ **

William II, 11C0. Henry I, 1135. Adela Geoffrey, Count of Anjou (Plantagenet) = Matilda

Henry II, 1189

Richard I, 1199. John, 1216. Godfrey, 1186. Matilda

Henry III, 1272 Edward I, 1307

Edward II, 1327

!

Edward III, 1377

Richard of Cornwallis, 1272

Black Prince, 1376. Clarence, 1368. York, 1402. Lancaster, 1400

Richard II, 1400 Phillippa

Roger Mortimer, 1399

Henry IV, 1413. Charles VI of France. Beaufort, 1410. Card. Beaufort

i '

Henry V, 1422 = Catharine = O. Tudor. John, 1444

Edmund, 1424. Anne = Cambridge, 1415. York, 1415. Henry VI, 1471. Edmund = Margaret

Edward IV, 1483. Richard III, 1485. Clarence, 1478

Edward' V, 1483.

York, 1483.

Elizabeth — Henry VII, 1509

James IV of Scotland, 1513 = Margaret = Douglass, 1557. Henry VIII, 1547.

Mary

James V, 1542 Margaret Mary, 1558. Elizabeth, 1603. Edward VI, 1557

*| . – * – -*

Mary Stuart — Darnley, 1567. Charles, 1576

*I * .. .• I*

James I, 1625

Charles I, 1649

Elizabeth = Frederick V

I

Charles II, 1685. James II, 1701. Mary = William of Orange Sophia = Duke of Brunswick

*• – * – - I*

Anne, 1714. The Pretender, 1766. Mary, 1694 — William III, 1702 George I, 1727

" George II, 1760

Frederick, Prince of Wales, 1751 I vc

George III, 1820

George IV, 1830. William IV, 1837. Edward, Duke of Kent, 1820 = Victoria 1861

j •

i . ..

'3

Victoria, 1901 = Albert, 1861

I

Edward VII, 1910 = Alexandra, — George V, – = Victoria Mary —

Edward

Albert

Mary

Henry

George John, d, 1920,

Welsh constituencies from 34 to 35; total in¬ crease for England and Wales, 25 members.

Some of the changes under the redistribution scheme are given below. Birmingham is allotted 12 members instead of 7 ; Bradford, 4 instead of 3; Bristol, 5 instead of 4; Kingston-upon- Hull, 4 members instead of 3; Leeds, 6, formerly 5; Leicester, 3 members, formerly 2; Liverpool, 11, formerly 9; Manchester, 10 mem¬ bers, formerly 6; Portsmouth, 3, formerly 2; Sheffield, 7 members, formerly 5. New bor¬ oughs created are Accrington, Barnsley, Black¬ pool, Bootle, Bromley, Kent, Ealing, East Ham, Eccles, Edmonton, Hornsey, Ilford, Kingston- upon-Thames, Leigh, Leyton, Morley, Nelson,. Richmond, Surrey, Rossendale, Rotherham, Smethwick, Southend-on-Sea, Southport, Tot¬ tenham, Wallasey, Wallsend, Walthamstow, Willesden, Wimbledon.

ENGLAND'S HELICON, an anthology of 150 poems by popular writers of the period, edited by John Bodenham in 1600. It was re¬ published in 1812.

ENGLEHEART, George, English minia¬ ture painter: b. Kew, 1752; d. 1829. He was a pupil of George Barret and Sir Joshua Rey¬ nolds. In 1773 he first exhibited at the Academy. He retired in 1813. He is reputed to have painted in all about 4,850 miniatures, mostly on ivory, but also on enamel. He was a good draughtsman and a skilful colorist. He was appointed miniature painter to George III in 1790, whom he painted 25 times. He was the most important rival of Richard Cosway for court honors. Consult Williamson and Engle- heart, (George Engleheart) (London 1902).

ENGLER, Edmund Arthur, American edu¬ cator: b. Saint Louis, Mo., 23 Dec. 1856. He was graduated at Washington University in 1876, where he taught mathematics from 1881 to 1901. In 1901-11 he was president of the Worcester Polytechnic Institute and in 1911 returned to Washington University as secre¬ tary and treasurer. He was a member of the Washington University eclipse party to Nor¬ man, Cal., in 1889, served r as chairman of the jury of the department of manufactures at the Buffalo Exposition of 1901, and chairman of the international jury on instruments of precision at the Saint Louis Exposition of 1904. He is Fellow of the American Association for the Advancement of Science and member of many other scientific societies, . serving as presi¬ dent in 1898-1901 and again in 1912-15 of the Saint Louis Academy of Science. He is a frequent contributor to magazines on scientific subjects.

ENGLER, Heinrich. Gustav Adolf, German botanist : b. Sagan 1844. He received his edu¬ cation at Breslau, held the chair of botany at Kiel in 1878-84, and at Breslau in 1884-89.. In the latter year he was appointed to the chair of botany at Berlin, becoming also director of the Botanical Gardens. His work has been more or less exclusively devoted to classification and plant geography. After 1881 he edited the leading journal in this field, the Botanisclie J ahrbiicher. His most remarkable publication is (Syllabus der Pflanzenfamilien, > the classifi¬ cation of which has been almost universally adopted. With Prantl he issued a systematized presentation of the plant genera of the world,

entitled (Die naturlichen Pflanzenfamilien, > and of the species, (Das PflanzenreiclU With Drude he prepared a detailed plant geography of the different regions under the title, (Die Vegetation der ErdeP

ENGLEWOOD, Colo., city of Arapahoe County, five miles south of Denver. It is the seat of the National Swedish Sanitarium and the Molkeray

Sanitarium. The surrounding region is engaged in agriculture, dairying and stock-raising, which represent the city's prin¬ cipal interests. The city contains many beautiful homes, and is a favorite residential suburb of Denver, with which it is connected by trolley. Pop. (1920) 4,356.

ENGLEWOOD, N. J., city, in Bergen County, near the Hudson River, on a branch of the Erie Railway, about 13 miles north of Jersey City. It lies on the long slope toward the west from the crest of the Palisades of the Hudson. It is a beautiful residential city, con¬ tains two summer homes for working girls, a hospital and a library with over 10,000 volumes. The township of Englewood was set off from the old township of Hackensack in 1871. It was incorporated as a city in 1895, but because of error under the constitution of the State it was . reincorporated in 1899. While not im¬ portant in manufactures the United States census for 1914 showed within the city limits 19 establishments of factory grade, employing 135 persons ; 91 being wage- earners receiving annually a total of $51,000 in wages. The capi¬ tal invested aggregated $257,000, and the year's output was valued at $321,000: of this, $210,000 was the value added by manufacture. Pop.

11,617.

ENGLIS, John, American shipbuilder : b. Brooklyn, 25 Nov. 1808: d. Brooklyn, 25 Oct. 1888. He was educated in the public schools of New York and learned the shipbuilding trade there. In 1837 he went to Lake Erie where he built his first steamships. A few years later he returned to New York, opened a shipyard of his own on the East River and devoted himself to the building of steamships, a science then still in its infancy and facing many difficult problems. To the solution of these he brought a keen scientific mind and a great capacity for hard work, which soon put him into the forerank of American shipbuilders. During his long busi¬ ness career he built a total of 89 boats, mostly side-wheelers. Amongst them were many of the most famous boats of this period, such as the steamboats – Saint John, Dean Richmond, Daniel Drezv, Grand Republic and especially the Long Island Sound liner Newport. The last- named boat was 340 feet long and made the trip from' New York to Newport in eight hours, a record which stood for many years. In 1861 he built the Unadilla, the first gunboat built, for the United States government. Many im¬ provements in shipbuilding were due to him. After his retirement his son and grandsons continued his shipyard.

ENGLISCH, Joseph, Austrian surgeon : b. Freudenthal, Austrian Silesia, 1835. He re¬ ceived his education at the University of Vienna and in 1871 was appointed one. of the chief phy¬ sicians at the Rudolfstiftung. In 1892 he was appointed to the chair of surgery at the Univer¬ sity of Vienna. He

was widely recognized as

an authority on genito-urinary diseases. His published works include (Ueber Ovarial- hernien5 (1871); (Zur Ridikalbehandlung der Eingeweidebriiche) (1878) ; (Ueber abnorme Lagerung des Hodens ausserhalb der Bauch- hohle5 (1885) ; (Ueber angeborene Penisfisteln)

(1892).

ENGLISH, Thomas Dunn, American au¬ thor: b. Philadelphia, Pa., 29 June 1819; d. Newark, N. J., 1 April 1902. He was gradu¬ ated in medicine at the University of Pennsyl¬ vania in 1839. In 1842 he was admitted to the bar. From 1844-52 and 1857-59 he engaged in journalism in New York and Washington. From 1852-57 he practised medicine in what is now West Virginia. During the years 1859-79 he divided his time between New York city and Fort Lee, N. J. In the latter year he removed to Newark, N. J., where he resumed the prac¬ tice of medicine. He was a member of the New Jersey State assembly in 1863-64, and of Congress in 1891-95. During all these years he was also very active in literary work. He was the author of (Ben Bolt,5 an exceedingly popu¬ lar ballad (1843), which after having long fal¬ len into obscurity was revived by its employ¬ ment in Du Maurier's novel (ˆTrilby,5 but which owed its popularity more to its sentimentality and its musical setting than to any inherent poetical merit. His published writings are (Zephaniah Doolittle: a Poem. From the Manuscripts of Montmorency Sneerlip Snags, Esq.5 (Philadelphia 1838) ; (Walter Woolfe5 1842); (1844; or, the Power of the <(S.F.55 A Tale- ; developing the Secfet Action of Parties During the Presidential Campaign of 18445 (New York 1847) ; together with C. G. Foster, (The French Revolution of 1848, etc.5 (Phila¬ delphia 1848) ; (Ambrose Fecit, or, the Peer and the Printer) (New York 1867) ; (American Ballads) (New York 1880) ; (The Boy's Book of Battle-Lyrics 5 (New York 1885) ; (Jac°b Schuyler's Millions5 (New York 1886) ; (The Rules of * Order Governing Public Meetings, etc.5 (under the pseud. F. M. Payne, New York 1887); (01d Glory: A Song5 (1895); dairy Stories and Wonder Tales5 (New York 1897) ; (The Little Giant, the Big Dwarf and Two Other Wonder Tales, etc.5 (Chicago 1904). During the period of his New York residence he also wrote about '20 plays for Palmo's Opera House, later Burton's Theatre, on Chambers street, New York, of which only one, (The Mormons; or, Life at Salt Lake City, A Drama in Three Acts,5 has been published (New York 1858). Consult Noll, A. H., (Thomas Dunn English5 (in Midland Monthly, Vol. VII, p. 3, Des Moines 1897).*

ENGLISH, William Hayden, American capitalist: b. Lexington, Ind., 27 Aug. 1822; d. Indianapolis, Ind., 7 Feb. 1896. He was edu¬ cated at Hanover College, Indiana, and ad¬ mitted to the bar in 1840. However, he soon became interested in politics, gave up the prac¬ tice of law, and successively held various local, State and Federal positions. In 1851 he was elected to the Indiana State legislature where he served as speaker. He was elected to Con¬ gress in 1852 and served there through four consecutive terms. As a member of the Com¬ mittee on Territories, in opposition to his own party, he worked against the admission of Kan¬ sas to the Union. He reported from the Com¬

mittee of Conference what was known as the <(English bill,55 in which it was urged that the question of admission be referred back to the people of Kansas according to the provision of the Lecompton constitution. This was adopted and the people voted against admission. He strongly opposed secession, and warned South¬ ern Congressmen that the North would never countenance such a policy. He also served as regent of the Smithsonian Institution for eight years. He finally refused the offer for a re¬ nomination for a fifth term in Congress and in 1863 removed to Indianapolis where he founded the First National Bank and soon made a repu¬ tation for himself as a banker. Though not taking an active part in the Civil War, he was an ardent supporter of the Union. He continued his interest in politics, and, in 1880, was unani¬ mously nominated by the Democratic party for the office of Vice-President on the unsuccessful ticket with General Hancock against Garfield and Arthur. He was president of the Indiana Historical Society, a number of whose publica¬ tions were financed by him. He also published (Conquest of the Country Northwest of the River Ohio, 1778-83, and Life of General G. R. Clark5 (2 vols., Indianapolis 1896). Consult Forney, J. W., (Life and Military Career of W. S. Hancock, etc.5 (Philadelphia 1880) ; Keyser, C. S., (The Life of W. H. English5 (Philadelphia 1880).

ENGLISH ARCHITECTURE. The ear¬ liest architecture of England (not including the megalithic remains at Stonehenge, Avebury, etc., whose date and history are still in con¬ troversy and which can hardly be classed as architecture) dates from the Roman occupation, which has left many remains of walls, villas and baths (Bath, Silchester, etc.), but hardly more than the foundations of these. Indeed, there is but little left of any architecture pre¬ vious to the Norman Conquest (1066 a.d.), for the. active building of churches and monasteries which followed involved the demolition of most of the earlier Christian or ((Saxon55 edifices. A few walls, crypts and fragments show that they were without exception rudely built, with little of architectural elegance in design or decora¬ tion. The tower of Earl's Barton is the most noted of these remains.

Following the Conquest, there began under the Norman kings a remarkable activity in building, especially of abbeys and castles. The imported Norman style, itself a provincial phase of the French Romanesque, was modified in English hands, developed into the Anglo- Norman, and applied in the building of great monastic churches, many of which surpassed in size those of France or Italy. This style was marked by its great massiveness ; the use of the round arch of stepped section ; huge piers sometimes round, sometimes clustered ; square lantern-towers at the crossing of nave and transept; timber ceilings in preference to vaulting for the high central aisle; and re¬ stricted but bold decoration in which the zig¬ zag is the most frequent motive. Interlaced arches frequently appear as a wall decoration. The original abbey-cathedral of Canterbury, St. Alban's abbey, Romsey abbey, Ely and Peter- boro' cathedrals, Winchester, Southwell, Dur¬ ham, Norwich, Gloucester and Hereford cathe¬ drals, the church of Christchurch, Saint Bar-

tholomew's at London, the Tower of London with its Saint John's chapel, and many feudal castles belong to this style, which lasted from 1070 to 1200. Most of the above churches were in part, Canterbury almost wholly, rebuilt in the following centuries.

The Anglo-Norman style passed away with the introduction from France of the Gothic style (see Gothic Architecture) in the re¬ building of the choir of Canterbury Cathedral destroyed by fire in 1174. The pointed arch had been used occasionally before this date in England, but from about 1190 its use became the general rule, and with it the English adopted the ribbed vault and traceried window and less universally the flying arch and buttress. The new style they developed on independent lines, retaining more of the early massiveness than did the French, with less display of the structural framework in stone. The English cathedrals of 1190 to 1350 are longer, lower and narrower than the French, less ornate externally, more ornate internally, having often two transepts, square east ends in place of apses and apsidal chapels, and with west fronts often forming a screen of picturesque design instead of a logical expression of the form of that end of the church. As there were many cathedrals which were abbey-churches as well, the practice became general of grouping with them cloisters, chapter-houses, libraries and residences for the clergy. Nearly all the cathe¬ drals have great square towers at the crossing, forming internal lanterns ; at Ely this takes the form of a superb octagon as wide as the three aisles together. But one cathedral was built continuously in one style from end to end, — Salisbury (1220-58) ; Lichfield Cathedral and Westminster Abbey present

internally a fairly uniform style, although their building covered in both cases a long period; most of the cathe¬ drals were so often rebuilt in one or another part at different periods that they exhibit clearly the changes of style from one century to another. It is customary to distinguish these different phases and periods by names derived from the window designs, e.g., the Lancet (or Early English), 1174-1250; the Decorated (subdivided into "geometric" and "Curvilinear"), 1250-1375; and the Perpendicu¬ lar, 1375-1500 or 1520. During these 346 years the vaulting was developed by the multiplying of the main and subordinate ribs into the ex¬ tremely ornate form seen in Henry VII's Chapel at Westminster and other late works, and known as fan-vaulting. The English were consummate workers in wood, and many of the larger parish and collegiate churches and secu¬ lar halls have timber ceilings with "hammer- beam" trusses of extraordinary beauty, instead of stone vaults. Many of the larger parish churches are unequaled elsewhere except by the foreign cathedrals. Among the most im¬ portant of the predominantly Gothic cathe¬ drals are Canterbury, Lincoln, Salisbury, Ely, York. Winchester; of the second rank, Wells, Lichfield, Exeter and Gloucester may be named; among the parish churches Boston, Saint Michael's (Coventry), Saint Mary-Red- cliffe at Bristol, and Patrington ; and among abbey-churches Westminster, Sherborne and Beverley.

During the 14th and 15th centuries secular architecture was developed in new lines in the

great universities and schools, and in vast manorial residences and palaces ; to this phase the name of Tudor architecture is often given. Under Henry VIII (1507 — 47) artists from Italy, Germany, Holland and Flanders were im¬ ported, by whose works the decorative details of Renaissance art were made known to the English; but the Renaissance taste made slow progress in architecture, even in the manor houses of the wealthy, which continued to dis¬ play the square mullioned windows, battle- mented parapets and irregular plans of the Tudor Gothic period. Under Elizabeth (1558— 1603) and James I (1603-25) the use of Renaissance forms steadily increased — round arches, the classic "orders," openwork balus¬ trades and a peculiar fashion of flat relief- ornament, called "strapwork" and derived from Germany, became more and more frequent ("Elizabethan" and "Jacobean" styles). This prepared the way for the introduction of a more purely Italian or classic style by Inigo Jones under James I and Charles I, and for its culmination in Saint Paul's Cathedral (q.v.) by the great Sir Christopher Wren (q.v.), whose 53 churches built after the Great Fire of 1666, and his works at Hampton Court, Greenwich, Oxford and Cambridge firmly established the style. It continued to be used throughout the 18th century and was the parent style of our own "Colonial® or Georgian style (see Archi¬ tecture — United States). The

19th century was marked by attempts, partially successful, to revive the Greek and Gothic styles in modern work; but, except in church architecture, the tendency of English design has since 1880 been toward Renaissance forms very freely adopted. The most notable example of the Gothic Re¬ vival is the Houses of Parliament by Barry (1835-50). The best work of the present-day architects of England is in domestic archi¬ tecture, in which, on the whole, they are un¬ equaled or at least unsurpassed. In the design of rural buildings, of small cottages, of garden suburbs and of country churches they especially excel.

Bibliography. — The literature of English architecture is enormous in volume. Only a few leading works can be mentioned. On me- diceval architecture the works of Sir T. G. Jackson, E. S. Prior and F. Bond, and the earlier works, now somewhat out of date, of Rickman, Pugin, Britton, Parker, etc. ; also Moore, C., (Mediaeval Church Architecture of England. On the Renaissance developments: Blomfield, R., (A Short History of Renaissance Architecture in England) ; Gotch and Brown, Architecture of the Renaissance in England) ; Richardson, C. J., (Monuments of Classic Ar¬ chitecture in Great Britain. > For the more re¬ cent developments one must consult the archi¬ tectural periodicals. There is no single work devoted to the work of the last 50 years.*

A. D. F. Hamlin,

Professor of Architecture, Columbia Uni¬ versity.

ENGLISH CHANNEL, or THE CHAN¬ NEL (Rom. Mare Britannicum, French La Manche), an arm of the Atlantic Ocean ex¬ tending into the west coast of Europe to the Strait of Dover, by which it is connected with the North Sea. The land bodies separated by this channel are England and France. Its

length from the Strait of Dover to the Atlantic Ocean is about 350 miles ; it's greatest breadth, from Saint Malo, in France, to Sidmouth, in England, is 140 miles ; its narrowest width, called the Strait of Dover, is about 20 miles. At its juncture with the Atlantic Ocean it is about 100 miles wide. Its total area is about 30,000 square miles. The average depth of the western half is about 300 feet, the maxi¬ mum about 500. In the eastern half the aver¬ age is only 200, and in the Strait of Dover the depth varies from 6 to 120 feet. The length of the north coastal line, from Land's End to Dover, is 390 miles ; and of the south coastal line from Calais to Ushant is 570

miles. Some of the largest indentations on the coast of Eng¬ land are the bays of Falmouth, Plymouth, Lyme, Weymouth, Spithead and The Solent. On the coast of France are Baie de la Seine, Baie de Saint Brieuc and Baie de Mont Saint Michel. The principal islands in the Channel are: Isle of Wight, Channel Islands and sev¬ eral other islands near the coast of France; Scilly Isles and Ushant at the entrance. The most important ports are : on the English coast, Falmouth, Plymouth, Southampton, Ports¬ mouth, Brighton, Folkestone, Andover; on the French coast, Cherbourg, Le Havre, Dieppe, Boulogne and Calais. Many of these and many other towns and villages on both coasts have become famous as watering places and seaside resorts. The tides, coming both from the Atlantic Ocean and from the North Sea, possess man}" peculiarities and make navigation difficult at times. There are many lighthouses and light ships, the most famous of which, per¬ haps, is the Eddystone Light off Plymouth. The prevalent winds are most westerly. Gales are frequent, especially between October and January. Fog and thick weather are also fre¬ quent occurrences throughout the entire year. The water, most of the time, is rough and makes travel in the Channel as1 a rule a most unpleasant experience. This has been a chief factor in bringing forth many plans for a direct non-water connection between England and France, either by means of a bridge or a tun¬ nel. Of the former the most important has been a project put forward by the famous French engineering firm, Schneider & Co., Le Creusot, in conjunction with English and French engineers, which provided for a bridge 24 miles long with 120 piers and permitting the passage of ships beneath it. The tunnel project was found feasible from an engineering point of view, and preliminary shafts and headways were started on both coasts. On the English side the shaft at Shakespeare's Cliff, Dover, is 164 feet deep, and a driftway, 7 feet in di¬ ameter at an inclination of 1 in 72, extends eastward under the Channel for 2,300 yardsl During the borings valuable coal beds were dis¬ covered. So far, however, neither the bridge nor the tunnel projects have been able to get the final approval of either the English or the French government. Many historic naval engagements have been fought in the Channel. Consult Channel Bridge and Railway Co., (Pont sur la Manche' (Paris 1890) ; Great Britain, Admi¬ ralty, Hydrographic Department, 'The Channel Pilot) (2 parts. Lbndon) ; Hawkshaw,' T. C., 'The English Channel Tunnel and Its Early History) (in Scientific American Supplement ,*

Vol. LXXVIII, pp. 18 and 34, New York 1914) ; Hersent, H., and Sir John Fowler, and Benj. Baker, 'Pont sur la Manche, Avant-Projets de MM. Schneider et Cie., etc.; (Paris 1889) ; Jukes-Brown, A. J., 'Geographical Evolution of the English Channel (in Contemporary Review, Vol. LXI, p. 855, London 1892) ; Mackinder, H. J., 'Britain and the British Seas) (New York 1902) ; McMullen, R. T., 'Down Channel* (London 1893) ; Perkins,*

W. T., ed., 'Channel Tunnel: Reports by British and French Engineers) (London 1907) ; Spethmann, H., 'Der Kana.1 mit seinen Kusten und Flotlen- stiitzpunkten) (in Kreigsgeographische Zeit- bilder, Part 3, Leipzig 1915).

ENGLISH CHRONICLES. The writing of English chronicles begins with the 'Anglo- Saxon Chronicle, the earliest English history written in the English language, and the ear¬ liest vernacular fbcord of national events in modern Europe. The 'Chronicle) opens with the Christian era, combining in its earlier parts records of Roman, Christian and British events. It rapidly becomes strictly national, carrying the record of English history forward to a consid¬ erable period after the Norman Conquest. It treats in general of the affairs of all the Eng¬ lish-speaking peoples in Great Britain, and as one of the first attempts at an expression of coherent national life and as a trustworthy source of information Concerning the language, history and social manners and customs of the Anglo-Saxon period, the importance of the 'Chronicle> can hardly be overestimated. Al¬ though the work itself does not mention the name of its author, there is strong evidence to show that in its original form it was under¬ taken at the suggestion of King Alfred and was in part actually written by him. From this original form, now no longer extant, copies were made and carried to different sections of England, where they served as foundations of what, from that time, became separate and in¬ dependent chronicles. Seven of these local chronicles, with a fragment of an eighth, have come down to us. The date at which the orig¬ inal parent version was made was about 892, and the place was probably Winchester, the cap¬ ital of the West-Saxon kingdom. The form in which the 'Chronicle) is written is that of a book of annals, the entry for each year contain¬ ing usually the record of but a single occur¬ rence. For the. early years the records, derived chiefly from literary sources, are brief and colorless, but in the later parts, particularly in the accounts of the Danish wars, when the nar¬ rative becomes more nearly contemporary with the time of the compilation of the work, they become more detailed and vigorous. At no time, however, is there an attempt to write a philosophic history, to point out the causes or the trend of events. This is in accord with the main purpose of chronicle writing, which is merely to keep the events of history in their right chronological perspective, the details cen¬ tering about these events being largely entrusted to oral tradition. This annalistic purpose of the 'Chronicle* determined also its mechanical form. The scribe's method y/as to rule off a number of pages as though preparing a journal in which the entries were to be made by years instead of days. Egch year was thus given a blank space opposite its number sufficient usu-*

ally for only a few lines. The scribe then in¬ serted whatever annals he had been able to col¬ lect, leaving the spaces for which he had no materials to be filled in later when new mate¬ rial should become available. This method of chronicle writing remained long in use in Eng¬ land, being followed by Capgrave as late as the 15th century.

Although no single model or source for the (Chronicle) is known, there were in existence in Alfred's time a number of Latin works which were of help in its first compilation. Of these the most important were Bede's (Historia Ecclesiastica Gentis Anglorum,5 finished in 731 ; Bede's (De temporum rationed a chronological essay containing a short epitome of the history of the world from Adam to 729 a.d. ; Orosius' (Universal History5 ((Pauli Orosii Historiarum Adversum Paganos Libri VIP) ; and doubtless many records of national events preserved in local monastic libraries. But the Chronicle5 was an original work in that it strove to record the life of a nation. Just as the codes of laws systematized the customs and rules of living of the people, so the (Chronicle5 fixed for them the ever-receding events of their history.

From the period of its original composition to the middle of the 11th century, the (Anglo- Saxon Chronicle5 established the form for all historical writing in England. Although we now know only seven, with the fragmentary eighth, versions of the (Chronicle, 5 the number in the Anglo-Saxon period must have been much greater, copies being probably kept at every important monastery and town. Toward the end of the Anglo-Saxon period, however, the ˆChronicle5 tends to become less and less national and more and more ecclesiastical in its character. In harmony with this change the language of chronicle writing changed also to Latin. The use of Anglo-Saxon as late as 1154, the date of the latest entry in that tongue, appears only in one version, and is plainly due to reasons of respect for the traditional lan¬ guage of the (Chronicle. 5 To take the place of the English annals of the 'Chronicle,5 new histories began to be written in Latin. The earliest of these was that of Ethelwerd; others from the beginning of the 12th to the 14th century were the histories of Symeon of Dur¬ ham, Florence of Worcester, William of Malmesbury, Henry of Huntingdon, Roger of Hoveden, Matthew of Paris, Matthew of West¬ minster, Roger of Wendover, and Ralph Higden, whose (Polychronicon5 was the "standard work of general history in the 14th and 15th cen¬ turies55 (Babington, ed. of (Higden5 in the Rolls Series, p. xliii). All of these Latin histories derived much of their material either directly or indirectly from the (Anglo-Saxon Chronicle.5 In the Middle English period several metrical histories were written in English, the (Brut5 of Layamon, the chronicles of Robert of Gloucester and of Robert Manning of Brunne; but these are better characterized as historical romances than as attempts at veracious history. The writing of prose histories in English begins again with Trevisa's

translation of Higden's 'Polychronicon,5 made in 1387, and with John Capgrave's original chronicle, written about the middle of the following century. The tone of Capgrave's work, as compared with the (Anglo Saxon Chronicle,5 is extremely naive. The

writers of the (Chronicle5 had a most rigid sense of historical fact, but the work of Capgrave and his contemporaries is marked by an altogether uncritical and credulous mingling of legend and history. As a result, however, of this infusion of the romantic spirit into historical writing, the older annalistic method gave way to one in which greater attention was paid to a consecu¬ tive narrative interest, after the manner of modern historical writing. The national, awakening accompanying the reigns of Henry VIII and Elizabeth resulted in a renewed in¬ terest in the writing of these history-chronicles. In 1516 appeared Fabyan's (New Chronicles of England and France5 ; in 1562 Grafton's Abridgment of the Chronicles of England5 ; in 1565 Stowe's 'Summarie of Englyshe Chroni¬ cles5 ; and in 1578, the most important of the Elizabethan chronicles because of the use made of it by Shakespeare, 'The Chronicles of England, Scotland and Ireland,5 written by Holinshed with the assistance of several others. The term chronicle continued to be used in the titles of historical works to the end of the 17th century, as in Sir Roger de Coverley's favorite book, Baker's (Chronicle of the Kings of Eng¬ land,5 1643; by this time, however, the naive annalistic chronicle had largely given way to the more philosophical treatment of events which is designated by the name of history.

Bibliography. — For general bibliography, consult Gross, (Sources and Literature of Eng¬ lish History from the Earliest Times to about 1485 5 (1900). Editions of most of the chroni¬ cles will be found in the Rolls Series; the best edition of the Anglo-Saxon Chronicle5 is that of Earle and Plummer (Oxford 1892-99). The literary significance of the chronicles is dis¬ cussed by Schofield, (English Literature from the Norman Conquest to Chaucer5 (pp. 29-46) ; and by Schelling, 'English Chronicle Plays5 (New York 1902). Consult also Cambridge History of English Literature5 (Vol. I, chap. 7,

1907).

George P. Krapp,

Professor of English, Columbia University.

ENGLISH COLLEGE AT ROME, an

ancient institute in the papal city, erroneously supposed to have been

founded, according to statements of mediaeval chroniclers, about 816. In reality it dates from the middle of the 14th century, when the Hospice of Saint Thomas of Canterbury, — which owed its estab¬ lishment to the jubilees — was founded and liberally endowed for the entertainment of Eng¬ lishmen visiting the Holy See. In the time of Henry VIII refugees from England were har¬ bored in the hostel. In the reign of Elizabeth the institution was transformed into a seminary for the education of aspirants to the priesthood who proposed to serve in the English mission, which they entered with pretty fair assurance of the martyr's crown. This seminary was placed under Jesuit control, the date of ap¬ pointment of the first rector — the real birth¬ day of the college — being 23 April 1579. Between 1578 and 1647, 40 of the alumni of the institution, serving as missionary priests in Eng¬ land, were executed for the high treason of exercising the Catholic ministry contrary to the laws of the realm; and when Saint Philip Neri, founder of the Congregation of the Oratorians, met any of the young English ecclesiastics in

the streets of Rome, his invariable salutation was Avete flores martyrum — (

ENGLISH CONSTITUTION. See

Great Britain — History; Parliament.

ENGLISH COURTS. See Court.

ENGLISH FURNITURE. See Furni¬ ture, Medieval.

ENGLISH HARBOR, a harbor on the southern coast of Antigua (q.v.), one of the Leeward Islands. It is the site of a British naval station, which from its location is one of the important British possessions in the West Indies. Consult Oliver, V. L., (The History of the Island of Antigua) (3 vols., London

1894-99).

ENGLISH LACQUERWORK. See Lac¬ quers AND LACQUERWORK.

ENGLISH LAND. See Pale, The.

ENGLISH LANGUAGE. The English language is a direct development of the Anglo- Saxon, a circumstance which makes it question¬ able whether the

latter speech ought to be dis¬ tinguished by a separate name. But although a direct development of the Anglo-Saxon, it is not a development which has been allowed to take place regularly and gradually, as the result merely of internal causes. One important ex¬ ternal influence was brought to bear on the orig¬ inal form of our language, which had the double effect, first, of producing a much more sudden and complete modification of the grammatical structure than could have taken place if the language had grown up independently of for¬ eign influences ; and secondly, of giving a composite character to the vocabulary of the language by the introduction of a large number of foreign words. This external influence was the Norman Conquest, in consequence of which a new language, the Norman-French, came to be spoken in England by those who had made themselves the masters of the country, and who formed, therefore, almost the only class that had leisure and opportunity for literary pursuits. The immediate result of the Norman Conquest (1066) was thus that the language of the Nor¬ mans came to be the chief literary language of England (except where Latin was used), and that the Anglo-Saxon was reduced to a very subordinate place. When the latter language again comes into notice as a written language a great change is seen to have been wrought in it. Before the Conquest it was a very highly inflected, or what is called a synthetic language, that is, one in which the substantives, adjectives, verbs and articles are subject to numerous modifications, each of which expresses a modi¬ fication of the root-meaning of the word, or shows the relation of the word to the other words in the sentence. During the period when Anglo-Saxon ceased to a great extent to be a written language these inflections dropped off ; and when it re-emerges as a written language about the end of the 12th century it is no longer synthetic, but analytic, that is, prepositions and auxiliaries are now used instead of inflectional prefixes and terminations to express the various

modifications of the idea contained in any word, and the relations of the words in a sentence to one another. At this period, however, the lan¬ guage still continued to be essentially homoge¬ neous in respect of its vocabulary: the Norman words that occur are so rare that they need not be taken into account. And it was natural that it should be so, for the Saxon language was still confined to the Saxon inhabitants of the country; and those who wrote in it addressed themselves only to that portion of the commu¬ nity, and accordingly had no occasion to use any word of Norman origin. This state of matters lasted till about the middle of the 13th century, which is the period at which English proper is usually regarded as having begun to be spoken and written. By this time the Normans began to experience the inconvenience of not being acquainted with the language of the people among whom they dwelt, and in learning to speak and write it they very naturally used a large number of Norman words, and these words were

adopted by all such writers belong¬ ing to the subject race as wished to make them¬ selves understood by Norman as well as by Saxon readers. A very rapid mixing of the two languages thus took place, and a second im¬ portant change was wrought in the English lan¬ guage. It is no longer homogeneous in its vocabulary, but contains a large admixture of foreign words.

The whole of what precedes may be shortly summarized thus: From 450 to 1066 the lan¬ guage spoken in England was the so-called Anglo-Saxon, a dialect of Low German, very highly inflected. From 1066 to 1250 two lan¬ guages were spoken in England, Anglo-Saxon and Norman-French, by two different sections of the population occupying different political positions. During this period the grammatical structure of the former language began to be broken up, chiefly owing to its being disused for literary purposes; and toward the end of the period we find a few works written in a language resembling the English of our day in grammar, but differing from it by the homo¬ geneousness of its vocabulary. Finally, about 1250 the two languages begin to mingle and form one intelligible to the whole population, Normans as well as Saxons. This is what is usually called English proper. English is thus seen to be a composite language, deriving part of its stock of words from a German source, and part from a Latin source, Norman-French being in the main merely a modified form of Latin.

The changes that have taken place in the English language subsequently to 1250 are by no means as striking as those which took place in the transitional period between 1066 and 1250. Some few inflections which the English of the 13th and 14th centuries still retained have now been dropped, but the chief change which the language has experienced consists in its gradual growth and expansion in obedience to the re¬ quirements of advancing science, more compli¬ cated social relations, and increased subtlety of thought. This growth has been going on at all times, but there are some periods which may be pointed out as more remarkable than others for the rapidity with which it proceeded. Such a period was the end of the 16th and the begin¬ ning of the 17th century, the period of the Reformation and following the revival of learn-

ing, when numerous words of Latin origin were introduced by scholars directly from that lan¬ guage, instead of through the French, the chan¬ nel through which most of the Latin words previously found in the language had come. Another such period is the present, when the rapid growth of the sciences already existing, and the creation of new sciences, have caused

whole groups of words to be introduced, chiefly from the Greek.

It would scarcely be in place here to discuss the various excellencies and defects of the Eng¬ lish as compared with other languages, but we may mention the following as among the quali¬ ties which the English language is generally allowed to possess. 1. Strength and expressive¬ ness, adapting it admirably for poetical com- posit on. 2. Copiousness, enhanced as shown under assimilation, by the extraordinary recep¬ tivity of the language, that is, its capacity for adopting new words from all sources, and of naturalizing them at once, so that they may be treated without any appearance of strangeness entirely as native English words. 3.. Simplicity in form and construction. 4. Great flexibility, or adaptability to all kinds of composition, the grave and gay, the impassioned and calm, forci¬ ble and tender, sublime and ludicrous. 5. Power of assimilation, words being readily adapted from other languages, Italy, France, Spain, Hol¬ land and distinctive terms originating in the American continent, all contributing to its rich and full expressiveness. The influence of Eng¬ lish colonizing is seen in words borrowed from India, South Africa and other colonies.

In connection with the subject of the English language, we may here further observe, that England and the United States offer the first instance in history of two great, independent and active nations having a common language, but situated at a great distance from each other, and daily developing new and characteristic features. These relations must, sooner or later, exert a powerful influence upon the common language, for no language is so stable as not to undergo continual changes, if spoken by a peo¬ ple in the full vigor of social and political life. This state of things has already produced some effect on the English language. The most ma¬ terial difference, probably, has been in the pro¬ nunciation of the language, which, however mportant in our daily conversation, is of sec¬ ondary importance in relation to the literature and written language of the two countries. It has often been observed by English travelers and others that the pronunciation of the United States is far more uniform than that of Eng¬ land; and so nearly alike everywhere, that the people of any one town or district are perfectly understood in every other part of the country, which is not true of the lower ranks of Eng¬ land. When considered more minutely, how¬ ever, there has for a long time existed a marked distinction between the pronunciation of the New England and Southern States. Only in New England States is there what may be termed a distinctive dialect. It is noted by visitors to the United States, especially to New England, that many words and turns of expres¬ sions, familiar to the England of Shakespeare, and which in their country of origin have either become obsolete or degraded into provincialisms, are living a full and vigorous life on this side of the Atlantic. The orthography of the Eng¬

lish language has undergone no material change in America, it being the general inclination to follow that of the best English writers of the age. Under the inspiration of the Simplified Spelling Board, President Roosevelt in August 1906 authorized the adoption by the public printer of about 300 amended spellings ; but so great was the storm of criticism that the order was withdrawn except in so far as related to the correspondence of the White House.

The English language may be divided into five periods :

1. First Period 450-1100 a.d.

2. Second Period 1100-1250 a.d.

3. Third Period 1250-1350 a.d.

4. Fourth Period 1350-1460 a.d.

5. Fifth Period 1460 a.d. — the present day.

In the first period (called also Anglo-Saxon or Old English), the language was inflectional; in the second it began to show a tendency to become analytic, the tendency increasing till in the fourth period inflections had virtually disap¬ peared. Before the Norman Conquest there were two dialects in English, a southern and a northern, the former of which was the literary language. After the Conquest dialects became much more marked, so that we can distinguish three great varieties, the northern, the midland, and the southern, distinguished from each other by various grammatical differences. The mid¬ land dialect — or rather the subdivision known as the east midland — was that most widely spread, and it ultimately became the standard language, a result principally due to the influence of Chau¬ cer, and in a less degree of Wyclif, Gower and others. See Dialect ; Language, Science of.

ENGLISH LITERATURE. The Norman Conquest made a great change in the develop¬ ment of an English literature, as in all other forms of English life. Conditions were at first most unfavorable : the English language might be used by any who pleased, but the clergy naturally used Latin, and people of any position French, or Anglo-Norman, as it is commonly called. For three centuries, there¬ fore, we do not find in English any striking original work, anything to compare in interest with the Skaldic poetry and the Sagas in Ice¬ land, with the French romances and fabliaux, with the German epic and courtly poetry. Dur¬ ing these centuries, however, we do find in Eng¬ land what is in its way most interesting, namely, a singularly rich representation of the different phases of mediaeval thought. We may con¬ veniently begin with the work connected with the older order of

things. The (Anglo-Saxon Chronicle > was still kept up at Worcester and at Peterborough. Of these the former is preserved only as far as 1079; the latter is a much later work; in 1121 the whole chronicle was rewritten and then carried on to 1154, being something more than a mere set of annals, with a distinct character of its own. After this, beginning in¬ deed before, comes a stately series of Latin chronicles, though in English we find only chronicles in verse. Layamon's

Brunne (1330). Layamon is hardly as much history as romance. Of this latter almost everything is from French, Scandinavian or Celtic sources : there is little native English either in form or substance. (King Horn (c. 1250) and 'Havelock the Dane) (c. 1275) prob¬ ably go back to Scandinavian originals, though they are still regarded by some as English legend material : more purely national are the stories of (Bevis of Hampton) (c. 1275) and of (Guy of VVarwick) (c. 1300), though the ver¬ sions preserved are probably from Anglo-Nor¬ man originals. Renderings of Continental ro¬ mances are numberless, beginning about 1250 with the Alexander story and going on with the tale of Troy and stories of King Arthur, the Round Table and the Holy Grail, where the material is partly Celtic, giving even some of the legends of Charlemagne, and many minor stories, as (Floris and Blancheflor,5 (Amis and Amilon,5 'Sir Tristram. 5 Somewhat later (1300), and less fully, come versions of the fabliaux, (Dame Siriz,5 'Reynard the Fox,5 the (Land of Cokavne,5 the (Lay of the Ash.5 About this time appear the great mediaeval col¬ lections of stories, the 'Seven Sages 5 and the 'Gesta Romanorum,5 which latter, though in Latin, was collected in England. Beside all this epic and narrative material there is a smaller lyric element ; oftenest anonymous, like 'Sumer is ycumen in5 (c. 1250), 'Winter*

wakeneth all my care,5 and other love songs, as well as many political songs, among which are the patriotic poems of Lawrence Minot (c. 1325). But generally where it is not narrative, the Middle English poetry is didactic : the so- called Proverbs of Alfred, dating from the 12th century and preserved in several versions, may have old material and certainly keep some¬ thing of the old alliterative form, though there is also the Norman element of verse. And as the Anglo-Saxon priestly writers used allitera¬ tion in their didactic prose, so now much of the religious literature is put into rhyme, a fashion of the Norman. The 'Poerna Morale5 (1200) is a sermon in verse, though now and then with a personal element and there are many other shorter homilies. A common form is the dia¬ logue; the (Debate of the Body and the Soul5 is known in various forms (1200 and

after), the dialogue between (Mary and the Cross,5 and others including, in lighter mood from a French source, the (Owl and the Nightingale5 (1220), a poem full of popular wisdom in which the gay and the gloomy views of life are cham¬ pioned respectively by the two birds who refer the dispute to Master Nicholas of Guilford, gen¬ erally taken as the author. Less original in substance are the versions of Scripture of which the 'Ormulum,5 a metrical paraphrase of the Gospels by Orm of Lincolnshire (1220) is most important for linguistic reasons, preserved in an autograph copy (probably) with an indi¬ vidual system of phonetic spelling. Versions of Genesis and Exodus (c. 1225) are also to be mentioned, while much later in the north (1320) 'Cursor Mundi5 reviews the whole extent of history from the creation to the day of judg¬ ment. Lives of the saints there were also, especially of Saints Katherine, Margaret and Juliana, and much devotional poetry, some lyric, like the

religious treatises: the 'Ancren Riwle5 (1225), a prose work of considerable merit, giving the conditions of convent rule, and in the early part of the 14th century, three books on holy living, the 'Prick of Conscience,5 by Richard Rolle of Hampole; the (Ayenbite of Inwit,5 by Dan Michael of Northgate and 'Handlyng Synne,5 by Robert of Brunne, the two latter from the French. Also to be noted is the very character¬ istic 'Bestiary5 (1225), a compilation of the mediaeval speculation on natural history. Such are the main elements of Middle English litera¬ ture before 1350, although the number of partic¬ ular works is far greater. As is common in mediaeval literature the language is dialectic : no one dialect gains entire primacy till much later, although by this time the East Midland has be¬ come the most important. The second half of the 14th century was a period of great literary activity. England had been long separate from Normandy, and the English language, like the English people, had digested its different ele¬ ments into an organic combination. Literature now becomes more literary. The old forms were now only to some degree preserved: Tre- visa translated the (Polychronicon5 of Higden (c. 1387) ; Barbour in the north wrote a rhymed chronicle of Bruce (c. 1375). There are num¬ bers of romances from the French. But didac¬ tic or allegoric poetry appears in forms which though not new have yet a certain original character. There are two great poets : one of name unknown, the author of the 'Pearl,5 (Gawain and the Green Knight,5 'Cleanness,5 and 'Patience,5 the other William Langland (as is most commonly thought), the author of the 'Vision Concerning Piers the Ploughman.5 Fine as is their work, it is outshone by the genius of Chaucer, who gathered up and sum¬ marized the spirit of the century and whose in¬ fluence was carried through the century fol¬ lowing by companions or followers of whom the most noteworthy were Gower, Hoccleve and Lydgate. The epoch was also illuminated by Wiclif's great translation of the Bible (c. 1382). Two more popular forms of

literature must be mentioned, as beginning lines of literary de¬ velopment still important. The ballads of Robin Hood probably go back to this period, while many of the Scotch ballads are older. The four cycles of mystery plays, those of Coventry, Chester, Wakefield (Towneley plays) and York, belong to the earlier part of the century. One remarkable book comes in no category, the 'Voiage and Travaile of Sir John Mandeville,5 widely spread in England, and, though a trans¬ lation, a monument of noteworthy prose. The 15th century was a period of bloody civil strife, and in literature a period of great dearth. Lit¬ tle can be mentioned in a summary. Sir Thomas Malory closed the period of the romances of chivalry by the 'Morte d'Arthur5 (c. 1475), a collection to which he gave organic form and unity. The book was first printed (1585) at the press of Caxton, himself a writer and compiler. Some prose treatises are noteworthy, in reli¬ gion Pecock's 'Repressor of Over-much Blam¬ ing of the Clergy5 (c. 1450) ; in politics, Fortescue's 'Monarchy5 (c. 1425), while of lighter interest is the treatise on 'Hawking5 by Dame Juliana Berners (c. 1425), and the every¬ day 'Paston Letters5 which belong to literature because they are so interesting.

With the 16th century new influences become

powerful. The revival of classic learning stim¬ ulated English scholars under the leadership of Grocyn, Linacre, Colet, Cheke. The ideas of the Reformation stirred up. clouds of contro¬ versy in which appear the great figures of Tyn- dale, Latimer, Coverdale. The ˆ.spirit of fierce and gloomy satire which infected the whole world is seen in Skelton and Barclay, the former in a number of pieces, the latter in a translation of Brant's (Ship of Fools) (1508). The spirit of nationality was aroused and More an anthology which gathered up the verse of preceding years, while some years afterward came another, the (Paradise of Dainty Delights. > Later collec¬ tions are the (Bower of Delights) (1591); (The Phoenix' Nest> (1593); (1600). Another characteristic production was the sonnet-sequence, of which Sidney's (Astrophel and Stella) (1591, but written before), is one of

the best and earliest examples. Here belong the famous sonnets of Shakespeare, as well as Daniel's (1593), Spenser's (1580-90) of Sidney, the (Ecclesiastical Polity) (1592-97) of Hooker, the

political or religious controversy many who might otherwise have found

expression in liter¬ ature. Even Milton for a dozen years wrote chiefly prose. We cannot, therefore, look for a varied and definite literary development. The great work of the century was in prose and the greatest and most influential single monu¬ ment was the King James version of the Bible (1611). The spirit of the Bible is everywhere to be felt in the great prose of the time, trans¬ muted into varying substance in the eloquence of Jeremy Taylor ((Holy Living, } 1650), the quaint richness of Fuller ((The Holy Stated 1642), the stately roll of Sir Thomas Browne ((Religio Medici, > 1643), the powerful vigor of Milton's prose — written during the Civil War, to answer in his own way the call of the country — and the intimate simplicity of Bun- yan. A few other writers have little tincture of the struggle of the time, Overbury's (Char¬ acter (1614), Burton's (Anatomy of Melan- choly5 (1621), Cowley's

With the restoration of Charles II began a new period of literature, often called the classic, most immediately noticeable in the drama. The influence of France in the direction of strictness of classic art and looseness of moral life was strong : added to it was a change in stage condi¬ tions, which allowed the development of scenic effect. A realistic, if not spectacular, char¬ acter, was given to the theatre and the Eliza¬ bethan plays, with all their poetry, fell out of fashion, save in versions of the day. A new set of dramatists sprang up to fulfil the conditions. Dryden was a leader, equally strong in tragedy and comedy and what he called the heroic drama, after French models. Otway had the greatest tragic genius ((Venice Preserved, > 1682), but could not so well adapt himself to the taste of the age. Congreve, Wycherley, Far- quhar and many others wrote comedies depic¬ ting a brilliant social world, but of such gross immorality that Jeremy Collier launched an at¬ tack on the whole theatre (1698). His words had some effect and the drama became more decent, but as it really seems to have been quite representative of the life of the time (not arti¬

ficial as Charles Lamb loved to think of it), the succeeding drama lacked vitality, and for a hun¬ dred years hardly a play was written which is now remembered. Addison's (Cato> (1713), Rowe's (Jane Shore) (1714), Gay's (Beggar's Opera> (1728), Johnson's < Journals, } ˆewsP By the end of the century the newspaper was a common form. In 1709 Richard Steele published a small paper every other day which he called the Tatler. This was not precisely a newspaper, but con¬ sisted of a series of essays on all sorts of sub¬ jects, sometimes by Steele, sometimes by Addi¬ son, Swift, or a number of others, who lent occasional help to the enterprise. The Tatler was very popular, and was brought to a close only to be continued in the Spectator, in which Addison took the chief part. He took up the idea of Steele and found in it a form of expression exactly suited to his especial powers. His essays were popular in the best sense ; they were read with delight by all sorts of people, but they dealt with subjects of intelligent

inter¬ est. Addison was a student of human nature, an observer of life and character, a genial philospher, and all these elements of his nature were exhibited in the little essays which he wrote for the Spectator. The success called forth followers. Addison and Steele followed their joint productions with separate publica¬ tions, which were sometimes political as well as literary. Among the many 18th century periodicals should be mentioned1 the World (1752), by Lord Chesterfield and others; the Rambler (1750) and the Idler (1758), by Samuel Johnson; the Bee (1758), by Gold¬ smith. The influence of this sort of literature abroad was also very great; it continued even to the beginning of the 19th century, when a number of clever young men of New York, Washington Irving among them, joined in the production of Salmagundi (1807). One dis¬ tinguishing element in these periodical essays was that of personal character. Some imaginary person was the means by which they were put before the public. The Tatler was edited by Isaac Bickerstaff, the Spectator by a club of the Spectator and others, including the famous Sir Roger de Coverley. This personal element was characteristic of the century, which was extremely sociable and very much interested in human nature. This interest in character for itself is paralleled by an interest in life in ac¬ tion observable in the stories of Defoe. Defoe

was a man who lived by his pen (one of the first who had not been connected with the theatre or the court), whose great gift, so far as literature was concerned, was his power of representing life. His famous (Robinson Cru- soe) (1719) attained inordinate popularity, not only for its adventurous incident, but for its power of realistic story-telling. A little more and these books would have been novels. Addison's (Sir Roger de Coverley) papers are sketches of life and character without a story. (Robinson Crusoe and the many other stories of Defoe have too much action, without atten¬ tion to life and character, in spite of their real¬ ism. These elements were combined by Rich¬ ardson and Fielding: Pamela* (1741), Clar¬ issa Harlowe) (1748), (Sir Charles Grandison) (1753), by the former, were extensively read and influenced all Europe; (Joseph Andrews* (1742), (Tom Jones> (1749),*

Hume ((History of England, 1754-61) and Gibbon ((Decline and Fall of the Roman Empire,) 1776-88), gave example of the com¬ bination of scholarly research and literary skill. Oratory also flourished in the exciting Parlia¬ mentary struggles which now took the place of court faction. Chatham, Burke, Fox, and many others created a standard and form of elo¬ quence, which yet serves as a model for many speakers and a*

foundation for more. A special form of oratory becomes important in litera¬ ture ; sermons were widely read. Barrow, South, Stillingfleet, Tillotson, published their dis¬ courses in the last half of the 17th century and had many successors in the first half of the 18th. The interest in religion was a part of the gen¬ eral intellectual curiosity of the century ; philos¬ ophy also became a part of literature. Locke's (Essay on the Human Understanding) (1690) was more widely read than any other book of such a kind. Philosophy was discussed by Christian as well as by free-thinkers. Berkeley was the former: his Principles of Human Knowledge) (1710) has been of importance in the development of metaphysical ideas. Hume was the latter, so much of a skeptic that his (Essays) (1746) incited Kant, in Germany, to that profound examination of the human reason that has been the founda¬ tion of modern philosophy. The 18th century vol 10 — 24

was a century of reason and of prose. Prose was first simple, either graceful as in Addi¬ son, nervous in Defoe or everything in turn in the wonderful prose of Dean Swift, an unapproached master of satire as particularly in (Gulliver's Travels) (1726). As the century continued, style became more elaborate, of great dignity and stateliness at its highest points (Gibbon and Burke) and even for ordinary purposes admirably effective as in the best of Johnson. The time wa$ intellectual and loved the things of the intellect; hence its poetry was not such as to satisfy the more emotional periods that came after. It was too obviously didactic or satiric, for one thing. Dryden was the first great master in these directions with the (Hind and the Panther) (1687), and the (Religio Laid (1682). In Pope the classic poetry (as it is called) came to perfection; the (Essay on Criticism* (1711), and the (Essay on Man* (1732), the (Dunciad) (1728) and the Pape of the Lock) (1712), have never been equaled in English for their telling brilliancy. The fol¬ lowers of Pope caught something of his manner, but produced nothing great, save Goldsmith, who infused a charm into this as into every other kind of literature. Dr. Johnson wrote two strong poems, but his chief power lay else¬ where. The minor exemplars of the character¬ istic 18th century poetry are of far less value. Addison as a poet, Garth, Prior in (Solomon * (1718), Young, the author of (Night Thoughts) (1742), Blair in (1743) , even Akenside, the author of Pleasures of the Imag¬ ination * (1744), did riot all write the character¬ istic couplet, but they are all of the classic school and all wrote that intellectual poetry that now seems so strangely unpoetic. In lighter forms of verse there were more successful prac¬ titioners, Prior and Gay and Swift, but in di¬ dactic and satiric poetry, save in the work of the greatest, the 18th century produced nothing permanent. But during the whole classic century there had existed, in its time had been growing, a feeling for other things than those which the reason could put into brilliant and elegant*

*form. It found expression in various ways, chiefly in love for the medieval past, before the classic conventions had been, and in a feeling for the present wherever those conventions did not ex¬ ist, namely, in nature and in the heart of man. The first feeling came to expression in various ways, often imperfect, as when Thomas Whar¬ ton wrote Punic Odes) (1748), when Gray wrote poems inspired by the Norse, (The Fatal Sisters, * (The Descent of Odin) (1761), when Sir Horace Walpole imitated Gothic architecture in his house at Strawberry Hill. In 1760 Macpherson published what purported to be translations of Ossian, also (FingaP (1762) ;*

they became an immense influence. In the other direction, love of nature and human sym¬ pathy existed. Thomson's (Seasons) (1726-30) shows his fresh and charming view of nature, though his use of blank verse and the Spenser¬ ian stanza was more in keeping with earlier times. Gray produced very little poetry, but his best, the famous (1798), and Scott's (Lay of the Last Minstrel5 (1805, preceded by (Minstrelsy of the Scottish Border5 1802) stand for the de¬ light in ballads and mediaevalism. With these fine poems and others only less fine, it is plain that a new form of art had appeared quite dif¬ ferent from the classic conventions of the 18th century. The first great excitement of romance was for strange adventure and the glowing life of the Middle Ages. Wordsworth was for the time unread, while the poetry of Scott delighted all. Scott, however, was eclipsed in the popu¬ lar mind by Byron, who really was personally the very thing that Scott and the public ad¬ mired. They longed to hear of men of lofty spirit and recklessness and devotion. Byron was such a man; in (Childe Harold5 (1812) he took England out of itself. In the (Giaour,5 (Bride of Abvdos,5 (Corsair,5 (Lara,5 (Para- sina5 (1813-15), he presented figures full of the romantic spirit. As the century continued, how¬ ever, that spirit expressed itself in all sorts of different ways. Wordsworth presents the com¬ mon delight in nature ; Shelley, noble ideas for the regeneration of mankind ; Keats, the power of beauty. Succeeding poets go in much the same directions. Tennyson is the most rep¬ resentative poet of the century in presenting to us in forms of great poetic beauty all the phases of the thought of the time, religious, scientific, patriotic, literary. Browning gives us a vigorous optimistic conception of life and work, presented in a wonderful series of dra¬ matic figures. Morris, Rossetti, Swinburne (sometimes called Pre-Raphaelites) may be said to follow Keats in their love of beauty, which they seek not only in mediaevalism, but through¬ out all history sacred and profane. Matthew Arnold's poetry has classic qualities of style and great elegiac charm of thought, but he rightly saw that his true field lay elsewhere. By the last decade of the 19th century,

however, the great poets of the Victorian age were dead or silent and it had for some time been felt that they had left no successors. At about this time there was a strong feeling for realism in poetry

as in other forms of literature, and by choice of realistic themes and his realistic manner W. H. Henley became noteworthy. Very different was W. B. Yeats who expressed the craving for some world quite different from current realism. Expressing both of these common feelings the poetry of Kipling ((Ballads 5 and (Barrack-room Ballads5) met with immediate welcome. It was evidently realistic, but it was also clearly romantic. These two lines of poetic interest and feeling may be seen respectively in John Davidson and Stephen Phillips, and are represented at the beginning of the 20th century by John Masefield and Alfred Noyes. The end of the 19th century had many minor poets, but Francis Thompson by virtue of (The Hound of Heaven, 5 will probably have a higher posi¬ tion in the mind of posterity. He had much of the 17th century in his makeup and much of the intense imagination that is generally felt to be the most poetical possession of the poet. In the earlier years of the 20th century there was a great increase of poetic feeling which gradually took more or less definite form in the works of many writers, so that by the 2d decade of the century the ((new poetry55 was a common phrase. Besides Masefield and Noyes (who was hardly in sympathy with the rest) the chief names that have come to general knowledge are those of Rupert Brooke (d. 1915) ; James Elroy Flecker (d. 1915) ; James Walter Delamare, William Davies, Lascelles Abercrombie, James Stephens and D. H. Law¬ rence. The drama has been weak for the whole century, although all the greater poets essayed the form. Only Browning and Tennyson had even temporary success on the stage, while the works of the professional play-writers have without exception failed of a place in literature. By 1890 a new spirit became active. The comedies of Oscar Wilde made a great im¬ pression on the popular mind, by their brilliant dialogue, but the work of Arthur Pinero and Henry Arthur Jones was more representative of the moment in that their effort was usually to deal with the idea of modern social life. The leading spirit in the movement, however, was George Bernard Shaw, who though he began to write plays before 1890 and had some successes as early as 1895, did not seriously impress people till the beginning of the 20th century. When, however, he did begin to gain considera¬ tion he attracted public attention by his plays which always presented not merely interesting or amusing dramatic situations, but some dis¬ cussion of general social ideas. Other dram¬ atists of importance have beeen James M. Barrie and Grenville Barker, as well as the novelists Bennett and Galsworthy. By 1800 the novel had become a definite form of literature. In the early years of the century Miss Austen, Miss Edgeworth, Miss Ferrier produced pic¬ tures of life in England, Ireland, and Scotland, respectively, the first of

surpassing excellence! A grvat change was effected by Scott in the Waverley novels (1814-31). It has been pointed out that the lasting power of these novels de¬ pends on their full and vital knowledge of Scottish life and character. Scott, at the be¬ ginning, had some idea of doing for Scottish life what Miss Austen had done for English. But the real immediate effect of the Waverley novels was to give an enormous impulse to the romance of adventure and scenery and cos-

tume, a romance which found its best ex¬ pression in the historical novel. The Waverley novels are great historical novels, though, of course, some have little history in them, and they gave a conception and an inspiration which was not wasted. In 1825 appeared the first works of importance of G. P. R. James and of Harrison Ainsworth, who for a quarter of a century achieved a very considerable popularity though they added but little to the possibilities of historical fiction. More powerful than either was Bulwer, whose first work appeared in 1827, and who for 40 years produced not only his¬ torical novels, but novels of every kind, works of great talent, though the judgment of time refuses them genius. At much the same time two other writers somewhat extended the field cf the novel : Marryat, by sea-stories, which remind one of Smollett; Charles Lever, by stories of the army as well as of Irish life. Brilliant historical novels have appeared through the century: Thackeray's (Henry Esmond1 (1852), and (1869), Shorthouse's (John Inglesant1 (1880), Pater's (Marius the Epicurean) (1885), Maurice Hewlett's ˆRichard Yea and Nay1 (1900), con¬ stitute a series of remarkable value But the great' successes of fiction in the middle of the century were made in the long-familiar forms. Charles Dickens had many minor character¬ istics, and so had Thackeray, but their novels, as well as those of George Eliot, are novels of every-day life. In the main these three are realists, striving chiefly to depict the life that they knew and saw about them. So chiefly were those who came after them. The Brontes, George Meredith, Charles Reade, Anthony Trollope, William Black, Thomas Hardy, George Gissing, these are realists also, though in only the last two cases of the consistent type developed by their contemporaries in France. Some of them sought in every-day surround¬ ings the romance of character, like the Brontes; some could perceive the rich spirit of comedy, like Meredith. But none felt the need more than once or twice of straying from the familiar life of England. Toward the end of the cen¬ tury the craving for romance began again : it had never been entirely quieted, but it did not come to full expression till Stevenson and Kipling. Both sought the romance of life and character- and of the soul, but both were masters also of adventure and incident and striking cir¬ cumstance and interesting

background. Anthony Hope, Stanley Weyman, Conan Doyle, Maurice Hewlett, have in general followed, and in some cases surpassed them. In the last decade of the century appeared several novelists who have since come to be the leading figures of current fiction. Arnold Bennett and H. G. Wells both began with work of an imaginative and even fantastic character, but in different ways turned to something more realistic. Arnold Bennett's cThe Old Wives' Tale) anjd the books conceived and linked as a series, 'Clay- hanger,1 'Hilda Lessways) and 'These Twain,1 are careful and thorough presentations of char¬ acter and manners, differing chiefly from the older conceptions of the novel in their recogni¬ tion of the ideas dominating modern life.

Wells about 1906 began a series of studies of life of which (The New Machiavelli1 and (Mr. Britling Sees it Through1 have been the most widely read, in which the ideas of the present are embodied in the career of the individual. Besides these are Joseph Conrad, who gives a strong realistic turn to his stories of the sea and of exotic romance, and John Galsworthy, whose chief novels are ironic presentations of the conservative character of life in England. There are also many others who follow not dis¬ similar courses, of whom the best known are Hugh Walpole, Compton Mackenzie, Ethel Sidgwick, J. D. Beresford, Gilbert Cannan, May Sinclair and Oliver Onions. A third de¬ velopment of the century has been in the path of criticism, which at first found expression chiefly in the periodical. The magazine has been one of the most characteristic elements of 19th century literature. There were magazines in the 18th century — the Monthly Review, the Critical Review, the Gentleman's Magazine — but the chief periodical was the Addisonian es¬ say. The Edinburgh Review (1802) and the Quarterly Review (1809) were the beginning of a new movement. Blackwood's Magazine (1817), the London Magazine (1820) and Fraser's Magazine (1830), together with many weeklies and dailies, were the beginning of a flood of literature that is now the form most familiar to us. The influence was at first chiefly critical. Jeffrey, the first editor of the Edin¬ burgh, with Gifford of the Quarterly, set the style of a criticism, which though often unfairly slashing and ridiculously high and mighty in tone, had merit often in expressing sincere and definite opinions in literature and politics. A sort of gaiety and even charm was given by Wilson, who wrote under the name of Chris¬ topher North, by Sidney Smith and Lockhart. But the most important development came in the field of the personal essay. The 'Essays of Elia1 (1820) by Charles Lamb, go beyond the Addisonian essay in their unfettered expres¬ sion of a charming personality. (The English Opium Eater1 (1821), of Thomas De Quincey, is still farther away from the 18th century in form and spirit, and so is the (Table Talk1 (1824) of Hazlitt. All these are sincere per¬ sonal utterance, and in their sincerity and per¬ sonality lies their strength. In the main we

may call the work of these men critical, for they were all absorbed in letters, and their view of life was essentially a criticism of literature. Something more in the way of established form were the famous Assays1 (beginning 1825) of Macaulay, the most remarkable works of their time in the power of focusing wide read¬ ing and immense knowledge into forms of ex¬ treme brilliancy. A striking contrast is offered by Carlyle, who began by essays of the accus¬ tomed character, though not ordinary in style, but after some years produced (Sartor Resartus1 (1833), expressive of his own vigorous person¬ ality and thinking, more extraordinary in form than any of his later work, but not more original or powerful. Carlyle had by no means the im¬ mediate fame of Macaulay, but his influence on the thought of his time has been vastly greater. Both were historians as well as critics, and by their interest in life and sympathy with man they brought in a new and fascinatingly inter¬ esting kind of historical writing, which the later influence of Darwinism and of science in gen-

eral, has done much to deaden. Hallam before them should also be mentioned and Green after them. John Ruskin began his career as critic with what seemed the impossible task of de¬ throning false masters of painting, and estab¬ lishing an ethical foundation for art. About 1850, having succeeded in his earlier task, he be¬ gan a struggle against a much wider range of evil, which was not so fortunate. Matthew Arnold also understood the range of the critic as extending beyond the field of art : his views on politics and religion were an influence in the history of thought, but naturally will not last as long as his conceptions on literature. Walter Pater took even a wider view of art, being at home with painting, architecture, sculpture, as well as with literature. He represents the so-called ˆaesthetic® position which developed from Preraphaelitism. The most noteworthy essayist of the opening century is Gilbert K. Chesterton, whose ready paradoxes cover much sound thought. In philosophy and science the century has been pre-eminent, and many great books have been produced. The last field hardly belongs to literature, although Darwin, Huxley and Tyndall were masters of style and could make the results of scientific work absorbingly interesting. More might be said of philosophy and theology, though here little has been pro¬ duced that will last as literature, except per¬ haps John Stuart Mill's

There are many histories of English litera¬ ture. The most elaborate and authoritative is the (Cambridge History of English Literature,) the work of a great number of representative students. That of Garnett and Gosse is an interesting general account, richly illustrated by extracts and reproductions

of manuscripts and prints. The three volumes on different periods by Saintsbury and Gosse cover the last four centuries in a convenient form. The work of Taine (translated by Van Laun) expresses his views of the development of literature from national life. That of Ten Brink (translated by Kenedav) is unfinished, but covers the ground where German scholarship is strongest, namely, Anglo-Saxon and Middle English. Brandi in Paul's (Grundriss der germ. Philologie, gives a very full and convenient summary. Morley's (English Writers' is a very full account in 10 volumes, but has not got beyond Shakespeare. The (English Men of Letters) series provides lives of the greatest authors. Ward's (English Poets, > and Craik's (English Prosed are valu¬ able, giving a summary of facts, a criticism by a writer of note, and a number of extracts in case of all distinguished poets and prose writers.*

Edward E. Hale,

Professor of English, Union College, Schenec¬ tady, N. Y.

ENGLISH LITERATURE, Middle Period. The term Middle English may con¬ veniently be taken to include the period 1 100— 1500. For more than a century after the Con¬ quest, however, the majority of works produced and read in England were written either in French or Latin. Literature in the vernacular, which had sunk to a low level by the beginning of the 11th century, did not revive materially

until the reign of John. The (Anglo-Saxon Chronicle) continued to the year 1154, and a few religious works, chiefly of linguistic interest, almost exhaust production in English during this era of transition. During the 13th century English began to compete with the other tongues for supremacy, and by the time of Chaucer its victory was assured, although French and Latin continued to be widely used. At first, the progress of the vernacular was greatly hindered by dialectical differences in various parts of the country. The West-Saxon and Kentish, the Mercian, and the North¬ umbrian of the earlier period had developed re¬ spectively into the Southern, Midland and North¬ ern, with some changes of boundary. Of these, East Midland was most important, as the dialect of London and Chaucer, and the parent of Modern English. The language as a whole shows very marked differences from Anglo- Saxon, not only in the addition of many foreign words, chiefly French and Scandinavian, but in changes in the vowels and diphthongs, in the disappearance of inflectional endings, and in a freer use of particles and connectives. The dialectical peculiarities gradually became less marked, until at the end of the period there was practically only one literary dialect, with the ex¬ ception of Scottish.

The influence of Anglo-French and Anglo- Latin upon Middle English was

*exceedingly im¬ portant. The Normans took great intefest in historical writing after their settlement in Eng¬ land, as the Latin chronicles of such men as Ordericus Vitalis, Henry of Huntingdon and William of Newburgh attest. About 1136 Geoffrey of Monmouth produced his fictitious (Historia Regum BritanniaeP a book condemned by serious historians, but of great significance for mediaeval romance. It was later reworked in French rhymed versions by Gaimar and Wace. The Normans were fond of romantic stories, and even retold in their own tongue the deeds of various native English heroes. More serious historical work was done in French verse by such men as Gamier de Pont Saint Maxence or Jordan Fantosme. Churchmen like Lanfranc and John of Salisbury wrote on theological matters, and there was early much activity in the new English universities. Latin writing of a lighter sort is represented by the (De Nugis Curialium) of Walter Map, or the (Speculum Stultorum) of Nigellus Wireker. The Normans were a people of practical mind, and most of their literature consisted of utili¬ tarian or devotional prose. Scientific facts, or supposed facts, interested them greatly. They * were clever tellers of tales, both of the fabliau type and those pointing a moral. Especially noteworthy is the work (c. 1175-85) of the poetess Marie de France, who wrote a charming collection of*

Earlier Middle English literature is better studied by types than by authors. Originality, as a general thing, counted for little in mediaeval days, and works in the vernacular during the 13th century were based almost without excep¬ tion upon French and Latin models. The nar¬ rative literature is of far greater interest than the religious and didactic writing. The French metrical romances, artistic poems dealing with love and war, and chiefly intended for the higher classes, were made accessible to the

English after the middle of the 13th century. The cycle of King Arthur and his knights was the most important and popular. A smaller and less favored division dealt with (

The devotional and didactic literature is somewhat difficult to classify, since the various types were not always clearly differentiated, and borrowed much from secular writing. A favor¬ ite form of conveying wisdom was the proverb poetry. An early collection of this sort was attributed to King Alfred, and another was put into the mouth of a personage called <(Hending.® A similar purpose was served by the ˆdebates,® the most noteworthy of which is the (Debate of the Body and SouP (12th century), in which each speaker accuses the other of being respon¬ sible for the death of the dead man. The (Owl and Nightingale) (c. 1220) is the most im¬ portant secular debate in English. There was much work on scientific subjects, and this was often made to point a moral, as in the bestiary' of the early 13th century, which appends a

ˆsignification to each description. A vast num¬ ber of homilies and devotional treatises were written. The (Poema Morale, J (

The most important figure in Middle Eng¬ lish literature is Geoffrey Chaucer (1340-1400). A Londoner by birth, he was brought up in the atmosphere of the court, took part in the French wars, was often employed upon diplomatic mis¬ sions, and held various public offices. His work may be somewhat arbitrarily divided as follows : The first period, to about 1372-73, when he first visited Italy, reflects the influence of French poetry. Besides a number of shorter lyrical pieces, most of which are not extant, the period includes a translation of a part of the (Romance of the RoseP and (The Book of the Duchess, > a lament for the death of the wife of his patron John of Gaunt. The second period, which closes about 1385, reveals him imitating Italian models, particularly the work of Boccaccio. Here be¬ long (Troilus and CressidaP (Anelida and ArciteP (The House of FameP (The Parliament of Birds) and some stories later utilized in the Canterbury Tales.) This period shows a great advance in versatility and poetic power. The so-called English period, in which he attained the summit of his powers, has been held to in¬ clude the (Legend of Good WomenP but recent research puts much of it earlier and makes plain the strong influence of French. The chief work of this period, and his masterpiece, is the Can¬ terbury TalesP The stories were borrowed from various sources ; the plan of the whole resembles that of the (Decameron, but there is no evidence that Chaucer was acquainted with it. Besides two prose Tales, Chaucer trans¬ lated Boethius and wrote a treatise on the astrolabe. The chronology of his writings has not yet been determined with complete accuracy.*

Four important alliterative poems of the latter half of the 14th century, written in the West Midland dialect, may be referred to one author, whose name has not been preserved : (Sir Gawain and the Green KnightP (Thc Pearip (Purity) and (PatienceP The first of these is generally considered the

finest of the metrical romances, because of its elevation of tone, descriptive power and narrative skill. It is written in a highly artificial style of verse. (The Pearl describes the appearance of a beau-*

tiful maiden in Heaven, seen in a dream. It is probably to be interpreted allegorically, although the poem has often been held to reflect the grief of a real bereavement. The other two poems, which are of minor value, exalt the virtues indicated in their titles. Alliterative verse, with¬ out end-rhyme, was employed by William Lang- land, whose bitter satire contrasts with the genial irony of Chaucer. 'The Vision of Piers the Plowman) attacks the evils of the day by means of various allegorical figures seen in dreams. A continuation of the same material appears in the pieces called 'Do Welp 'Do Bet) and 'Do Best. The allegory is sometimes realistic and sometimes mystic. The (Vision) appeared in three different versions in the lat¬ ter part of the 14th century. It has been doubted that this is all the work of one man and too much weight has been attached to supposed autobiographical evidence in it. (Richard the Redeless) is generally assigned to Langland.*

The fame of John Gower (d. 1408) rests, apart from a series of French ballades, and minor pieces, upon three works, the 'Speculum Meditantis, a moral allegory in French verse, the (Vox Clamantis* in Latin, dealing with the social unrest of his day, and the 'Confessio Amantis) in English, his best-known poem. The are tedious versifying; his minor poems and 'Fables* show him at his best. As a disciple of Chaucer he stands with Thomas Occleve or Hoccleve, a more interesting person¬ ality, but less productive and accomplished than Lydgate. Occleve's chief work is 'The Gouver- nail of Princes.)*

*The prose work of John Wiclif was pri¬ marily utilitarian. He was greater as a per¬ sonality than as a writer, but his translation of the Bible (c. 1380) did much to fix the form of the language, *and his simple and direct ser¬ mons appealed strongly to the lower classes. He was assisted in translating the Old Testa¬ ment by Nicholas of Hereford, and the whole was later revised by John Purvey. An undue importance has sometimes been attached to the fictitious*

The 15th century was a singularly barren era. England was almost devoid of poetry of distinction ; the example of Chaucer inspired little in the south, and the Wars of the Roses had a most unfavorable effect upon literary pro¬ duction in general. Some advance was made in prose writing, however, through the interest taken in historical, legal, controversial and

re¬ ligious subjects.' Reginald Pecock, the great'

opponent of the doctrines which had been advocated by Wiclif, is remembered for his 'Repressor of Over-much Blaming of the Clergy. Sir John Fortescue, the author of 'The Gouvernance of England, * and the chroni¬ clers Capgrave and Fabyan also deserve men¬ tion. Perhaps the most distinguished work of the century was Sir Thomas Malory's 'Morte d'Arthur.* This collection of romantic tales dealing with King Arthur and his knights, told in melodious prose with great skill and charm, was finished about 1470, and printed 15 years later by Caxton. Malory drew most from French romances. Although he invented little, he was no mere compiler, but a great literary artist. The introduction of printing and the publications of Caxton mark a new era in Eng¬ lish letters. Much of the material which Caxton printed he translated from other languages him¬ self. His activity exerted a strong influence in the development of English prose.*

A compensation for the dearth in English proper in the 15th century appears in the emerg¬ ence of Scottish literature. The first note¬ worthy work in this dialect, with the exception of certain legends and romances, is the (Bruce) of John Barbour, whose life falls within almost the same dates as that of Chaucer. The poem partakes of the nature both of a rhymed chroni¬ cle and a romance, and though lacking in finish, is full of vigor and animated by patriotic spirit. It celebrates the deeds of Robert Bruce, with occasional lapses from historical accuracy. An¬ drew of Wyntoun's 'Original Chronicle — so called because he began from the very begin¬ ning — is an exceedingly monotonous piece of versifying. The exploits of William Wallace were celebrated by Henry the Minstrel, or Blind Harry, as he is often called, in a poem which takes great liberties with history. Of Blind Harry little is known. A pronounced imitator of Chaucer, and not an unworthy one, was King James I of Scotland, who celebrated his love for Lady Jane Beaufort in 'The King's Quair) (1423). In structure, language and general lit¬ erary treatment it is highly artificial, but full of grace and poetic feeling. It derives addi¬ tional interest from the romantic career and early death of its author. In variety and excel¬ lence of work, Robert Henryson, who flourished in the latter part of the 1 5th century, holds an important place. He wrote the earliest extant English pastoral, 'Robene and Makyne,* and a notable collection of 'Fables.* The influence of Chaucer is seen in 'The Testament of Cres- sida,* which describes Cressida's unhappy death with great dramatic power. In minor poems he was often felicitous. An elaborate though tedious and awkward bird-fable is the 'Howlat> or 'Owlet> of Holland. The greatest poet of the period was William Dunbar (1460 ?— 1 520 ?) , who led a wandering life in his youth, was later attached to the court of James IV of Scotland, and entered holy orders. Most of his poems are short and a. large number of them are satirical.*

More ambitious are 'The Thistle and the Rose, which commemorates the marriage of the king, and 'The Golden Target an elaborate allegory. 'The Dance of the Seven Deadly Sins,* 'The Flyting with Kennedy,* a brother-poet, 'The Two Married Women and the Widow,) and 'Tidings from the Session > are all representa¬ tive pieces. 'The Two Friars of Berwick,* a piece of vigorous Chaucerian narrative, is as*

cribed to him.

In English literature proper a similar dis¬ tinction is to be made. Alexander Barclay's translation of the (Narrenschiff) of Sebastian Brandt, which he called (The Ship of Foules, and (The Pastime of Pleasure* of Stephen Hawes, a (*

The miracle plays flourished in England from the early part of this period until the end of the 16th century. The morality play, a less important genre, arose in the second quarter of the 1 5th century, and, with the interlude, for a time rivaled the popularity of the miracles. For a discussion of the rise of the drama in the Middle English Period, see Miracle Plays.

Bibliography. — There is a comprehensive and detailed discussion of the earlier Middle English period by Schofield, W. H., (English Literature from the Norman Conquest to Chaucer,) which contains bibliography and chronological tables; for individual authors consult the dictionary of National Biography ; for bibliography and brief discussions, Wells, J. E., (Manual of the Writings in Middle Eng¬ lish ; for literary history in general, the dam- bridge History of English Literature) (Vols. I and II, Cambridge 1913), (Grundriss der germ. Philologie) ; Jusserand, (Literary His¬ tory of the English People* (2 vols.) ; Morley, H., (English Writers) (Vol. Ill — VII) ; Saints- bury, (A Short History of English Literature) ; Chambers, E. K., (The Mediaeval Stage.* For the French literature of the period, cf. Paris, G., (La litt. frang. au moyen age,***— (Mediaeval French Literature,*** *in Temple Primer Series. For the Scottish poets, Henderson, T. F., Scot¬ tish Vernacular Literature, A History) ; and chapters by Gregory Smith in the (Cambridge History of English Literature) (Vol. II, Cam¬ bridge 1913).*

William Witherle Lawrence, Professor of English y Columbia University.

ENGLISH LITERATURE, Elizabethan Period.

THE DRAMA.

At the beginning of the reign of Elizabeth the conflict between mediaevalism and humanism was rife in the drama as in other forms of literature. For the preceding half cen¬ tury there had been a confusion of types ; miracle, morality, interlude, and farce existing side by side and exhibiting various differentia¬ tions and there had been a confusion of theatri¬ cal conditions, play-acting still remaining largely in amateur hands. Neo-latin imitations of the classics were being succeeded by academic at¬ tempts in the vernacular. (Ralph Roister Doister, written by Nicholas Udall for the school performance, had already in 1552 marked the appearance of comedy as a distinct form after the Plautian model, and (Gorboduc,) by Sackville and Norton, performed in 1562 before the Queen, was the first vernacular tragedy. Two other extant plays written within the next few years and performed by amateurs, (Jocasta) and ˆTancred and Gismunda,* were, like (Gor- boducP attempts by Englishmen of culture to imitate the tragedies of Seneca in accord with the practice of Italian humanists. Meantime (Apius and Virginia) and (Damon and PithiasP mixtures of tragedy and comedy, exhibited the persistence 6f popular methods combined with classical borrowings, while were formless chronicles of atroci¬ ties without any perceptible classical decorum. The building of the first London theatre in 1576 was the sign of a speedy triumph of the profes¬ sional companies as the chief purveyors of the drama. A dozen years later the advent of a group of gifted poets prepared the way for Shakespeare by determining the course of a popular drama that was to be literary though disregardful of classical restrictions.*

Comedy, where the departure from mediaeval forms required by the humanists was far less than in tragedy, was the first to attract literary talent to the public stage. The plays of Wilson revealed a satirical comedy of manners emerg¬ ing from the morality, and the entertainments devised by Lyly for the children companies, combined lyrical and spectacular attractions with a refined wit and a certain graceful court¬ liness. Later Green introduced sentimental com¬ edy with its averted tragedy and its idealization of women. Such hasty summarizing, however, does scant justice to the variety and ingenuity of the experiments that preceded Shakespeare, drawing their material from every field from classical myth to native folk lore, and essaying and amalgamating every department of comedy from the Plautian to the pastoral. Most char¬ acteristic, perhaps, of all was romantic comedy, usually based on Italian novelle and offering a medley of fun, sentiment and adventure.

In tragedy Kyd adapted Seneca to the condi¬ tions of the popular theatres, discarding most ot his structural scheme but retaining the story of revenge, the accompanying ghost, the horrors and the moralizing; and thus in the (Spanish Tragedy) (c:r. 1587). creating a special type des¬ tined to a vigorous existence. Marlowe (1564- 93) turned his back on Senecan

methods and brought to the rambling and discordant struc¬ ture of the current popular history plays his splendid blank verse and his soaring imagina¬ tion. (Tamburlaine,'

o i j

Malta,) and 'Edward II, > the chief plays of his half dozen years of dramatic activity, delighted the vulgar by their violence and spectacle, and at the same time made the public stage the abode of noble poetry and genuine passion. His genius, though never fully developed, remade tragedy and history, giving to the chronicle structure the unity of a protagonist, possessed by extraordinary ambition and engaged in tragic conflict with overpowering opposition.

In Marlowe, as in the other early Elizabeth¬ ans, there is much that is fantastic, crude and absurd. The primary aim of each dramatist was to present a story so as to delight a motley audience; hence the tendency was naturally toward stories of sensational crimes for tragedy and of romantic adventures for comedy, without much care for the isolation of either species. Like Marlowe, however, the other dramatists were poets as well as playwrights, stimulated by that imaginative idealism so nobly character¬ istic of the national temper in the years of Elizabeth's greatness, and in their exuberant and somewhat over-fantastic verse reflecting the audacity, adventurousness, emotional ex¬ travagance and undaunted aspiration of the

age.

*Shakespeare's apprenticeship was served in this period, and his early plays naturally follow the forms then current and exhibit the qualities most prominent in other dramatists. The (Comedy of Errors) is an adaptation of Plau¬ tus; (Love's Labour's Lost) follows Lyly; the 'Two Gentlemen of Verona * recalls the senti¬ mental comedy of Greene; 'Titus Andronicus) is a melodrama of atrocities after the fashion of Kyd; 'Henry VP is dominated by Marlowe, and 'Richard III,> following the Marlowean formula, surpasses the master in the vigorous delineation of the villain protagonist and in the stage effectiveness of his part. But Shake¬ speare soon left his fellows far behind. The 'Midsummer Night's Dream * and the 'Mer¬ chant of Venice * transcended the romantic comedies that had made them possible on the London stage, and 'Romeo and Juliet * as com¬ pletely surpassed the prevailing tragedy of blood. By 1600 Shakespeare had*

created his great series of comedies and in the Falstaff plays had wrought a union of comedy and his¬ tory such as the early chronicle plays had only dimly foreshadowed.

By 1600 new forces were manifest in the drama. A young poet, Marston, was following his successful satires by a series of plays, in part tragedies of blood on the Kydian model, and in part satirical tragi-comedies, which aimed to be searching studies of evil. In 1599 Ben Jonson's 'Every Man in His Humour, acted by Shakespeare's company, was prefaced with a declaration of war on the absurdities of chroni¬ cle history and romantic plays, and with the promise of the creation of a comedy dealing with contemporary manners. Jonson, indeed, continued a powerful force in the drama for the next 25 years. His preaching was all directed toward the establishment of a more conscious and painstaking art, and its regularization by classical examples, while his practice resulted in a noteworthy series of satirical comedies, presenting with powerful humor and realism the follies and vices of th,e day. Chapman and Middleton were also writing comedies of do¬ mestic manners, and the whole trend of the*

*drama from 1600 to 1608 was away from ro¬ mance and sentiment, resulting in a satirical and realistic treatment in comedy and a more search¬ ing analysis of evil in tragedy. Under these circumstances Shakespeare's great series of tragedies was produced. This is not the place to speak of their lasting significance, but merely to note that his genius, now in the full maturity of its powers, was still engaged in transforming the prevailing types of drama. Narratives from chronicle and novella, so often the sources of formlessness of structure, resulted in the splen¬ did dramatic concentration of ' Macbeth * and 'Othello* ; the absurd tragedy of blood, popular again through the efforts of Marston and others, became ' Hamlet * with its infinite sug¬ gestiveness of human tragedy; the grotesque¬ ness characteristic of mediaeval as well as Elizabethan drama had its final justification in 'Lear.*

By 1607-08 the success of the heroic plays of Beaumont and Fletcher had brought the roman¬ tic and idyllic again into favor and perhaps given the suggestion for Shakespeare's return to romantic tragi-comedy in 'Cymbeline, a 'Win¬ ter's Tale,* and the 'Tempest.* Heroic ro¬ mances, such as 'Philaster* and the 'Maid's Tragedy* succeeded not only because of their poetry and their sensational contrast of senti¬ mental love and sensual passion, but even more because of the telling theatrical effectiveness of their situations and the clever alternations of suspense and surprise with which their in¬ genious plots were complicated. The comedy of Beaumont and Fletcher, especially in its later development by Fletcher, like their heroic plays, had a long continued influence on the drama. Possessing ready wit, great poetic facility and an abundant invention, but without*

moral taste or any serious criticism of life, Fletcher marks a stage in the drama that may fairly be called decadent when we recall the sound moral sense and the artistic aspiration of the early plays. Yet the last decade of Shakespeare's life was the time of Jonson's greatest comedies, of the masterpieces of Beaumont and Fletcher, and of some of the best work of Chapman, Tour¬ neur, Webster and Middleton.

The very existence of these masterpieces was of itself a factor in the drama's decline. Web¬ ster, writing in 1612, made the first avowal of obligations to his great contemporaries ; and henceforth the increasing recognition of the greatness of the immediate past seemed to stifle rather than to inspire innovation and experi¬ ment. Webster himself, borrowing freely from others, carried the tragedy of blood to its final development in the powerful and gloomy 'White Devil and 'Duchess of Malfi.* Middleton in collaboration with Rowley created scenes of powerful tragic interest in 'A Fair QuarreP and the 'Changeling.* Massinger, collaborating often with Fletcher and to a considerable ex¬ tent borrowing Fletcher's methods, produced a body of tragedy and tragi-comedy, morally di¬ dactic, and rhetorically excellent, but in char¬ acterization and poetry somewhat deficient. These are only a few of the writers of tragedy during the reign of James I ; in the development of comedy, where less poetical excellence is de¬ manded, the number of important contributors was much larger. Middleton's most character¬ istic work was a group of lively comedies that exposed contemporary manners with the frank-*

est realism. Massinger, though on the whole deficient in humor, produced in (A New Way to Pay Old Debts) the noteworthy character of Sir Giles Overreach that has attracted many great actors, including Kean. Dekker and Hey- wood, writers without great literary pretensions, wrote a large number of successful plays. Dek¬ ker ranged from the romantic idealism of <01d bortunatus) and the sentiment and merriment of the (Shoemaker's Holidav) to the painful realism of the (Honest Whore. > Heywood, al¬ ways a skilful and inventive playwright, like¬ wise wrote plays of every kind, achieving a real masterpiece in his (A Woman Killed with Kind¬ ness. This play may be classed as a sentimental tragic-comedy or as a domestic tragedy, a class which includes a number of plays depicting cur¬ rent crimes and goes back at least as far as (Arden of Feversham* in Marlowe's day. One other dramatic form, extremely popular in the court of James I, must be mentioned, the court mask. For these scenic and musical entertain¬ ments many dramatists, and notably Jonson, wrote libretti ; and the spectacles and dances in turn had an important influence on the*

popular theatres. The dramatic product of the reign of James I (1603-25) was indeed fully as large as that of the reign of Elizabeth, and, including as it did the last nine years of Shakespeare's career, vastly greater in value. But the enthusi¬ asm and earnestness of the days of the Armada were succeeded by a time of immorality, cor¬ ruption, and national weakness.. The people were turning more and more to Puritanism, but the drama, following the court, grew less serious, more licentious and gradually forgetful of its high calling.

During the reign of Charles I the drama offered little that remains notable, outside of the continued work of the older writers and the plays of Ford and Shirley. Ford, a poet of original and lofty genius, ranks with the great dramatists in the intensity of his tragic crises, but he sought themes and motives, abnormal and decadent. The great dramatists of the preceding generation stimulated Shirley, who was their last worthy follower and who often recalls but never quite equals their best work. Of comic dramatists Brome, of (

Within a few years Chapman, Dekker and Jonson, the last surviving dramatists of Eliza¬ beth's time, had died. Their lives had spanned the entire course of the drama's development, its rapid rise and its splendid culmination as well as its decline. The 30 years from Mar¬ lowe's first play to the death of Shakespeare include, in fact, all that is great in this amaz¬ ingly rapid development. Incomparable as this period is because it contains the career of Shakespeare, it is hardly less astonishing be¬ cause of the variety and range of the work of his fellows. Lacking, as even Shakespeare's plays lack, in the symmetry and unity of the Athenian drama; faulty, as his plays are often faulty, in the over-exuberance of language and

the violence and extravagance of scenes; suf¬ fering, as his genius suffered, from the crudity of a bare stage and an immature dramaturgy; these Elizabethan plays, taken as a whole, reveal in however inferior measure, his great excel¬ lences, the untrammeled play of wit, sentiment, fun and fancy; a splendid energy of diction and of dramatic treatment ; a searching revela¬ tion of human character, and an abounding grace and power of poetic expression. See Drama; English Literature; English Lit¬ erature — Middle Period; Great Britain — Trend of Thought and Literature in the 19th Century, and consult works there re¬ ferred to. A. H. Thorndike,

Professor of English, Columbia University.

non-dramatic poetry.

Elizabethan poetry is the product of the Renaissance, — the flowering of

the English stock under the fertilizing power of European thought. English literature at all points — in Alfred's time, in Eliza¬ beth's, in the 18th and 19th centimes, — has owed its great moments to foreign inspiration, but this is true of no age so conspicuously as of the Elizabethan. The period is short, if it be measured strictly by Elizabeth's reign, 1558- 1603; and even if the limits be broadened to include Wyatt and Surrey at the beginning and all of Shakespeare's work at the end, it is still but narrow room for the development of the crude religious play into the drama of Shakespeare and Jonson, — of the clumsy son¬ nets of Wyatt into the great sequences of Sidney, Spenser and Shakespeare, — of the stiff Tudor music into the noble harmonies of the madrigals and the sweet melodies of the airs.

Perhaps because of this swiftness of devel¬ opment, the age illustrates with unusual clear¬ ness the transference of life to books. The rush of genius draws into its vortex most of the experience about it; Spenser's friends enter the (Faerie Queene) unchanged, and in spite of the allegory, undisguised ; Sidney's passion takes over the incidents of his wooing with an immediateness that the occasional bookishness of his inspiration cannot smother; history, scarce made, is subject for a play; the gossip of a shipwreck becomes the

In this swift drawing-in of Continental Ren¬ aissance thought with English history and char¬ acter, the age is set off by three great names — Spenser, Shakespeare and Milton — for though Milton stands well outside the Elizabethan period, he is the last term in its development. The apparent remoteness of Spenser, his un- English quality, is due probably to the fact that he is nearest to the great wave ; he takes over a larger quantity of unnaturalized material ; he represents the early school of wholesale colo¬ nizers of Italian thought on English soil. Yet he takes over into his writings quite as much

of English life, even of English incident, and quite as much of English character, as Shakes¬ peare. The great dramatist, at first glance so natural, so near to his race, so untouched by the tyranny of books, is indeed all these things, yet his imagination starts always in some for¬ eign suggestion. Aside from the different scale of genius, he is as English as Spenser — no more so ; but he represents a more complete blend of the foreign themes with the native mind. So Milton also, heir to the assimilated learning of the Renaissance — to humanism, yet draws on the most English sources of life — English experience, English character, English landscape. These three poets illustrate the Elizabethan age in that they are typically

in¬ dividual, typically English, and typically chil¬ dren of the Renaissance mind.

It is usual to take as the beginning of Eliz¬ abethan poetry the book in which the Eliza¬ bethans themselves saw the herald of their day — prophesied at long range the love of English country life that was to find noble expression in Marvell and Walton.

The fame of Tottel's book made the miscel¬ lany a fashionable vehicle of publication throughout the Elizabethan age, though the growing habit of general publishing tended to diminish its importance. (The Paradise of Dainty Devices) (1576), is interesting for the work it preserves of Richard Edwards (1523?- 66), of Edward de Vere, Earl of Oxford (1550-1604), and of Sidney's friend, Sir Edward

Dyer (– P-1607), whose fine ((My mind to

me a kingdom is,® appears in this anthology. (A Gorgeous Gallery of Gallant Inventions) (1578), illustrates the fashion of translation, and bears witness, in the names of tunes for the poems, to the growing invasion of poetry by music. (A Handful of Pleasant Delights) (1584), is a weaker anthology, of practically no merit, but (The Phoenix Nest> (1593), is note¬ worthy for the elegies on Sidney — one by Sir Walter Raleigh (1552 P-1618), and for other poems by Raleigh and Thomas Lodge (1558?- 1625). (England's Helicon > (1600) includes

selections from Sidney, Spenser, Breton, Lodge, Peele and Barnfield the great writers of the first Elizabethan period, strongly marked by the pastoral vein ; the book would be notable for one poem alone, Marlowe's <(Come live

with me and be my love.® (England's Parnas- sus) and (Belvidere, or the Garden of the Muses) (1600), are mere collections of quota¬ tions; (Davison's Poetical Rhapsody (1602), is of little more importance, though its selections reflect the sonnet vogue. An earlier and more important book, (The Passionate Pilgrim, by William Shakespeare) (1599) is clearly a mis¬ cellany, as only part of its contents, some songs from (Love's Labour's Lost) and some sonnets, are by Shakespeare.*

*In subject matter the earlier part of the Elizabethan age was pastoral, following the tone set by Sidney's (Arcadia * (1590). This Eliz¬ abethan pastoral, literary and artificial as in Sanazzarro and other Italian models, left its im¬ press on the incidental songs in the prose ro¬ mances. Sidney himself was the most zealous experimenter in classical metres, in the general attempt that Gabriel Harvey fostered, to bring English verse under*

the laws of Latin prosody. Green and Lodge, the great writers of prose romance after Sidney, were less pedantic in their lyrics, yet their songs have the idyllic method of the pastoral, the method of painting.

The best representative of this pastoral period is Edmund Spenser (q.v.). His first book, (The Shepherd's Calendar (1579), was an imitation of the Virginian eclogue, with the same bookish flavor — here increased by Edward Kirke's commentary — and with the same alle¬ gorical treatment of contemporaries and events under the pastoral mask ; but with an English setting and with English ideals that stamp the book as native. In (Th Faerie Queene) (1590- 96) and the (Amoretti) (1595), Spenser speaks also through the pastoral convention — that subduing of all things to loveliness, which is the mark of the world of the Sicilian Muses. The (Faerie Queene> especially, as might be ex¬ pected from its ancestry in the Italian romantic epics, has the irresponsibility of pastoral ro¬ mance — the arbitrary management of the facts of life as if those facts themselves were a flex¬ ible language. The paradox of the Renaissance, of Elizabethan literature, is illustrated here on the largest scale, in the gorgeous, archaic lan¬ guage, the unreal, un-English world of the story on the one hand, and on the other the stern English fibre of the ground theme: This same blending of Italian imagery and expression with English spirituality is seen in the (Epithala- mion) (1595) and in the*

The pastoral convention, molded by Spen¬ ser, remained popular, though less characteris¬ tic, in the succeeding decades. Michael Dray¬ ton (1563-1631), remembered now for his splen¬ did (Battle of Agincourt (1605), and for his great sonnet, (Since there's no help* (1619), wrote much in the Spenserian pastoral, as did William Browne (1591-1643). In another way also the pastoral habit of beauty was trans¬ ferred to poems not strictly pastoral, such as Shakespeare's Venus and Adonis* (1593), (Lucrece) (1594), and Marlowe's (Hero and Leander) (before 1593), where the convention of old-world beauty blends with the Elizabethan zest for a story, evidenced more popularly in the broadside ballads. The tradition of narra¬ tive poetry was strong throughout the Tudor period, from the < Mirror for Magistrates> (1559) to Drayton's (Barons' Wars* (1603).*

As the first period of Elizabethan poetry is

pastoral, so the second period, roughly from 1590 to 1600, is marked by the sonnet fashion. The Italian sonnet had been introduced in de¬ tached

imitations and translations by Wyatt and Surrey but the fashion of sonnet sequences was set by Sir Philip Sidney's (1554-86) (Astro- phel and Stella, published in 1591, but known much earlier. Sidney here followed Petrarch, after the example of the innumerable French sonneteers. His sonnets, however, derive vital and individual interest from the circumstances of his own love for Penelope Devereux, a pas¬ sion as famed among his contemporaries as Pe¬ trarch's love for Laura. His poems have had the not unprecedented fate of being called merely literary in their inspiration, and it can¬ not be denied that his borrowings were prob¬ ably many; yet in the mediaeval way he con¬ sidered himself sincerely original, and much in his work supports the claim. The amount of actual incident that he tqkes over from his own life is large, especially in the noble sonnets that deal with horsemanship and knightly exercise, and his story in one point was radically differ¬ ent from Petrarch's or Dante's. His love was known and returned ; the bar between Penelope and himself was one of honor, since she was married to another; this lofty sense of this kind of honor was Sidney's characteristically English contribution to the world-theme of love.*

In most cases the Hove passionings® of Sid¬ ney's imitators wrere of the head rather than of the heart. This undeniable note of artifice has led to serious doubts as to the sincerity of the greater sequences — Sidney's, Spenser's and Shakespeare's. With due allowance for the un¬ doubted imitations in all three poets, it remains true that their sonnets, as distinguished from others, have the very tone of sincerity. It would be an interesting question, though hard to an¬ swer, whether through the impress of similar ideals of love and courtly behavior, the poets in England and their fellows in France had not acquired for the moment the same channels of thought — whether the similarities in their work are not frequently coincidences rather than bor¬ rowings.

Sidney's (Astrophel and Stella> had been preceded by Thomas Watson's

Spenser's 'Amoretti (1595) record his own love story, and should be read with his beau¬ tiful wedding song, the 'Epithalamion.* The sonnets exhibit almost in excess his sweetness of language and his idyllic, picture method; there is an all but fatal smoothness of sur¬ face that makes the thought elusive. But the noble tone, the Platonic emphasis on beauty of*

soul, indicates the true Spenser, and the son¬ nets rank third among Elizabethan series.

*Shakespeare's (Sonnets, * printed in 1609 but written much earlier, mark the supreme reach of this kind of writing. Some of the attention they have received comes from the poet's greater fame as a dramatist; some of it*

comes from the mystery that still on many sides en¬ velopes the sonnets; but the story itself, the con¬ flict of the two angels of friendship and of dark love, is the most striking of the sonnet themes, and the powerful directness with which the sub¬ ject for the most part is treated places the series above anything else of its kind in English. Natural as the sonnets seem, however, and spontaneous as the themes appear, yet compari¬ son with other sequences shows that Shakespeare assimilated much of his predecessors; how much of his own life is in the story remains the puzzle of his biographers.

In the years immediately following the son¬ net-writing, the characteristic vehicle of Eliza¬ bethan non-dramatic poetry was the song-book. The manuscript miscellanies of Henry VIII's time had contained the notes as well as the words of songs, and the Elizabethan period was rich in musicians as well as poets. In 1588 Nicholas Younge published his (Musica Trans- alpina, a collection of Italian madrigals with English words. The madigral was a strict musical form, a contrapuntal part song, built up on many repetitions of a musical theme, and so needing few words — only a short poem, or part of a longer one. With the development of the lute and the growing popularity of lute music, came the song built on a melody, with harmon¬ ized accompaniment — what the Elizabethans called an Air. John Dowland, the greatest of the lutanists, introduced this new kind of song in 1597, in his (First Book of Songs or Airs,* and the form was perfected, in both words and*

music, by Thomas Campion (– ?— 1619) in

several books of Airs. As the Air was but a short melody, repeated without change, it needed for words a short lyric of several stanzas. This need encouraged the composition of short, finely wrought songs, frequently in the lighter vein, such as Campion himself wrote, and such as became a model for Herrick (q.v.).

Beginning with Wyatt, there had been a vein of satire in Elizabethan poetry. Gascoigne (1525-77) in his (Steel Glass) (1576), Lodge in his 'Fig for Momus) (1595), Joseph Hall in his (Virgidemiarum (1597), and Marston in his 'Satires* (1598),. and many lesser writers, kept the tradition alive. One other minor strain, which was destined to flower later into larger expression, was religious verse — often crude and moralizing, as in the miscellanies, often fantastic, as foreshadowing Donne (q.v.), but often devout. In Robert Southwell (1561- 95), this writing becomes passionate and of the first quality. His (Saint Peter's Complaint * (1595) contains that one poem, ((The Burning Babe,® that Ben Jonson preferred to all his own work.*

These are the main forms of Elizabethan non-dramatic poetry. If we except the 'Faerie Queene, the genius of the age is perhaps best seen in the drama. But in these other forms the Elizabethan mind preserved for us a broad and varied record of its amazing power to ab¬ sorb the literary past, and to feel deeply its own experience. See English Literature; English*

Literature — Middle Period, and consult works there referred to.

John Erskine,

Adjunct Professor of English, Columbia Uni¬ versity.

prose.

Elizabethan prose has neither the sig¬ nificance nor the splendor of Elizabethan poetry. The greatest masters, Sidney, Lyly, Hooker, have no supreme interest of matter or style ; and Bacon belongs in spirit to another age with other ideals and another ethos. But the shaping of English speech as an instrument for the science and thought of the 17th century was the result of the efforts of Elizabethan prosemen. Before the period itself commences, the work of More, Elyot and Latimer, of Coverdale, Tyn- dale and the editors of the English Prayerbook, had already brought a simple and vigorous vernacular into being; but the ancestorˆ of Augustan prose were the group of Cambridge scholars, Cheke, Wilson and Ascham, whose writings, with the exception of the (Schole- master,5 antedate the accession of Elizabeth. This group devoted considerable attention to the study of English rhetoric ; they aimed at plainness and purity of speech and the forma¬ tion of a literary vernacular in emulation of the classics; they objected to archaisms and affectations of all sorts, and Wilson's condemna¬ tion of ((ink-horn terms® is one of the signifi¬ cant loci of English criticism. The introduc¬ tion of classical studies as a result of the revival of learning had necessitated a complete revision of the mediaeval curriculum, and Ascham's (Scholemaster,5 published posthumously in 1570, follows the fashion set by the humanists of Italy, France and Germany, in a very large number of pedagogical treatises. Like these humanists, it was his purpose to indicate the education necessary to a cultivated gentleman. His own prose style is simple and direct, bor¬ rowing the more inconspicuous excellences of Latin prose. But his mood is in some respects that of the Puritan; and in his suspicion of romance and of the growing Italian influence, he is at odds with the whole spirit of Eliza¬ bethan life and letters. Prose and poetry alike were to be saturated with the

Italianate spirit which he contemns.

Ascham is in some measure the father of that whole school of Elizabethan stylists, whose model was ˆeloquence® in the classical and humanistic sense, and who disregarded the ornate and <(aureate® tendencies of Continental prose. The full and rich notes of Hooker are the final culmination of this manner. The first four books of the Ecclesiastical Polity) were published in 1594: several schools of Novella Elocutio had intervened -since the composition of the (Scholemaster,5 but they have not affected the purity and directness, the calm and judicious argumentation of Hooker's style and manner. In this great book, moderation and passion temper each other after the fashion of the best Latin prose ; and Hooker realizes the ambitions of the earlier English humanists who had made this their ultimate goal. Other models and other ambitions could alone make it pos¬ sible to arrive at a higher standard than that which Hooker achieves at his best. Much of the book is unreadable to-day, like the technical arguments of the Attic orators; but its soaring

passages, like theirs, are monuments of the race and religion whose ardor and conviction they express.

Directness and vigor were also put to far different uses both in seculqr and in religious polemics. Of the latter, the Martin Marprel- ate Controversy relating to the problem of church discipline, which raged between 1587 and 1590, gave opportunities which secular pamphleteers only too soon made use of. The significance of (Hay any work for Cooper?5 and (Pap with a Hatchet5 has been greatly over¬ rated ; in them the instrument which the Cam¬ bridge group had prepared for use was blunted and used as a cudgel. Nor can much more be said of the controversial writing of Nash, Greene and Harvey, in which is illustrated the nearest Elizabethan approximation to modern journalism, but with manners and morals untempered by a wholesome or cultivated pub¬ lic opinion. Other miscellaneous writings of these men, and of Dekker, Breton and others, are concerned with every variety of subject, and their models include Aretino, Rabelais, Dede¬ kind, as well as other Continental writers of a wholly different type.

Literary criticism began in this period and employed for the most part the prose style whose tradition goes back to Ascham. In con¬ tent and structure its models were Italian, either directly or through the French ; and its significance consists in the fact that it was the means of introducing literary ideals which had been current in Italy for nearly a century. The group of the Areopagus, which parallels the Pleiade of France in a few more or less important respects, found its highest critical expression in the (Defence of Poesy5 of Sir Philip Sidney, written about 1580, and pub¬ lished posthumously in 1595. Sidney's ideals of prose style are not those of

Ascham, but his practice here is without those excesses and affectations which in the (Arcadia5 furnish the model for a whole school of imitators. His book is an impassioned apology for the poetic art against the onslaught of the Puritans ; but the objections which it refutes are universal, and its answers to these questions have in themselves, too, the temper of universality. There are parallels for all its ideas in the al¬ most contemporary works of Frenchmen and Italians. They, too, from the dawn of the Re¬ naissance, as in Boccaccio's (Genealogy of the Gods,5 which Sidney doubtless knew, had writ¬ ten defenses of poetry ; but Sidney's is an Eng¬ lish book, and in its passion, unity and general spirit seems the native product of Elizabethan genius. Puttenham's

original idea in regard to the art of literature ; but the luminous utterances of the later Latin rhetoricians, and the rational classicism of the Dutch critics, are alike embedded in his robust prose, and become an influence on English crit¬ icism even after the Restoration.

The formal treatise or preface was the vehi¬ cle of criticism in the Elizabethan Age ; the chief vehicle which it was to use in future was introduced into England by Bacon at the very end of the 16th century. Montaigne is the father of the modern essay; and to him Bacon owed the name and a number of definite ideas. But in everything else no two works could differ more than theirs. The air of loquacity, the personal anecdote, the amused curiosity, the vivid imagery of Montaigne are not to be sought for in the essays of Bacon. The states¬ man utters his brooding thought in curt and dipt sentences ; Seneca and Pliny here speak English ; and the sententious manner enters our speech, destined to saturate prose and verse, and resulting after many changes in the pointed couplets of Pope. Each sentence is its own world and has its own message. Bacon, even in his scientific work, has been called a mere phrase maker by a modern scientist whose dis¬ tinction in this respect is not unlike his own; in the essays this power is unrestrained by the need of argument and experiment. Emerson is the great American example of this dogmatic use of the disjointed sentence, and like Bacon he, too, has fed deeply on the thought of Mon¬ taigne.

A wholly different ideal of prose style, dis¬ daining directness and simplicity, was current throughout the Elizabethan Age, and found its most natural expression in the novel. Fenton's version of Bandello, adapted through the French, and the varied collection of Painter's (Palace of Pleasure, introduced the Italian novella into England. Their interest is alpiost wholly in the story, and Herodotus and Boc¬ caccio are made to*

speak the same language of fiction. In Pettie's (Petite Pallace of Pettie his Pleasure, which is modeled on the work of Painter, a new element intrudes itself, and the style which culminates in Lyly may be said to have been inaugurated. The sources of Euphuism have been sought in individual works of Continental literature, notably in those of Guevara; but modern scholarship finds in it simply one manifestation of a disease which was rife throughout Europe at this period, as a result of the disintegration of Humanism. The excesses of the Ciceronians find a parallel in the antithetical balance of Lyle's sentences ; and the absurd imagery was a natural result of a literature which had exhausted its content and sought for originality in affectation of man¬ ner. This explains the kindred writings on the Continent; and although English prose was young, it could not fail to be affected by these influences. The well-known marks of euphu¬ ism, the so-called <(parisonic antithesis,** the ((unnatural natural history,** and the like, may all be explained on these grounds. (Euphues) itself is in some senses a novel of psychology and character rather than of incident ; but its chief purpose is the fashioning of a perfect gentleman after the manner of Castiglione's (Courtier.) Here Lyly's purpose meets Spen¬ ser's ; and (Euphues* may be considered as the connecting link between the purely pedagogical*

treatise like the (Scholemaster and the final poetic idealisation of Renaissance education in the (Faerie Queene.* The vogue of Euphuism is indicated by the number of its imitators ; but it is unnecessary to consider the forms which Euphuistic romance assumed at the hands of Lodge, Greene and others.*

Sidney is credited by his contemporaries, notably Drayton, with having put an end to this fashion; but if the

With the accession of James I Jacobean erudition and science superseded the creative impulse of the Elizabethans. Bacon and Jon- son represent the new sententious manner at its best ; other writers lose themselves in a sea of detail ; still others add a hectic fervor to thought or feeling. But these things do not properly belong to the Elizabethan spirit. The opposition of the vernacular and ornate styles ; the inauguration of formal criticism and prose fiction; the passion for controversy; these are the main impulses of Elizabethan prose.

Bibliography. — Jusserand, (Histoire lit- teraire du Peuple Anglais (Vol. II) ; Saints- bury, (Elizabethan Literature) (London 1887) ; Smith, G. Gregory. (Elizabethan Critical Es- says> (Oxford 1904) ; Child, C. G., (J °hn Lyly and Euphuism* (Erlangen. 1894) ; Jusserand, (The English Novel in the Time of Shakespeare* (London 1890) ; (The Cambridge History of English Literature) (Cambridge 1913) ; Raleigh, fThe English Novel to*

Waverley) (New York 1894) ; Landmann, Shakespeare and Euphuism > (New Shakespeare Society Publications, 1880- 85, Ser. I, No. 9) ; Spingarn, (Critical Essays of the 1 7th Century (Oxford 1908-09), and (Literary Criticism in the Renaissance* (New York 1899) ; Einstein, ˆItalian Renaissance in England* (New York 1902) ; The studies of*

John Lyly by R. Warwick Bond, Feuillerat and Croll ; Lee, (French Renaissance in England (New York 1910). See English Litera¬ ture; English Literature — Middle Period; Literature, and consult works referred to under those headings.*

J. E. Spingarn,

Major, Infantry, U. S. A., formerly Professor of Comparative Literature, Columbia Uni¬ versity.

ENGLISH LITERATURE, Victorian Period. The name "Victorian® is popularly given in honor of the late Queen Victoria (1819-1901), and the literature designated by that adjective is roughly coincident with her reign (1837-1901), and is limited to England. The death of Scott (1832) is commonly taken as the most con¬ venient date for fixing the term to the brilliant literary movement of the last years of the 18th century and the early decades of the 19th : and, from this point of view, Victorian literature stands for the new literary impulses that suc¬ ceeded the decline of the great work of Burns, Cowper, Wordsworth, Coleridge, Byron, Shel¬ ley, Keats, Scott and their contemporaries. The literary movement of the Victorian period may best be defined by the main tendencies in poetry, prose and the drama.

POETRY AND PROSE.

Poetry. — The first, the most popular, and the most prolific poets of the period were Alfred Tennyson and Robert Browning. Three main interests may be observed in their work and that of their contemporaries and successors. The ideal interest in humanity, best represented in the preceding epoch by Shelley, found its most vivid expression in Browning, whose work, at first written under the spell of the great lyric poet, early took on those traits of vigorous interest in the experiences of man¬ kind which are the source of its originality and popularity. Browning's poems are distinguished for their pervasive feeling for the moods and the experiences of many people of all ages and for the dramatic vigor of their expression. In these respects he represents a verv important movement of the century, and many

of the same characteristics inform the poetry of his wife, Elizabeth Barrett Browning.

In the second place, the serious moral poetry of Wordsworth, the poetry "of man, of nature and of human life,® justly celebrated as one of the chief glories of English literature, had a legitimate successor in the grave, reflective poetry of Matthew Arnold and Arthur Hugh Clough. They began writing a few years later than Tennyson and Browning. Like many of their contemporaries, of whom they are the best mouthpieces, they were oppressed by the melancholy of life, and, to a greater degree than their literary prototype, they deal with morals, with duty, with the vanity of human effort and with "the eternal note of sadness.® Their poetry, particularly that of Arnold, is brilliant in style and finely finished, and a high place is accorded to them as exponents of the graver and more solemn side of the poetry of the cen¬ tury. Their temper is expressed in a more sentimental strain in such poets as Arthur O'Shaughnessy.

Contemporaneous with the decline of this impulse, which spent itself in the endeavor to

express some solution of the enigma of exist¬ ence, there arose the third school of poets, who, foregoing this quest, gave themselves up to the search for beauty of form and sentiment, who busied themselves with the retelling of old tales, who were concerned with romance, and who strove, for the most part, to recreate a picturesque and ideal world. Three names stand out conspicuously; the painter-poet, Dante Gabriel Rossetti ; William Morris, poet, story-teller, socialist and manufacturer; and Algernon Charles Swinburne. With them is to be named Christina Rossetti, sister of D. G. Rossetti.

In some respects, Tennyson more than any other poet of the century is representative of these three groups. Beginning, in his first volume (1827), under the spell of Keats, he had within a decade . produced much original work and by 1860 established his reputation as the best-beloved poet in England. In much of his earlier work, he treated subjects from human life not unlike those of Browning, though with more calm and repression and less lively vigor. The ethical ideas of his time found, as in Arnold and Clough, a current and lasting expression in many of his shorter lyrics, such as (The Two Voices) and fLocksley Hall, as well as in the longer (In Memoriam) (1850) and as (Idylls of the King) (1858—) . Through¬ out his poetical career, Tennyson was a most distinguished and careful workman, and in this respect he is akin to the poets who were spoken of in the third group, as, like them, he is, in some respects, a reteller of tales. Unlike them, however, an ethical and not chiefly an aesthetic motive is dominant in him.*

*Besides these chief poets, there should be mentioned William Barnes, the painter of the homely life of Dorsetshire; two distinguished writers of vers de societe, Frederick Locker- Lamson and Charles Stuart Calverly; Tenny¬ son's own less celebrated brothers, Frederick Tennyson and Charles Tennyson Turner, Cov¬ entry Patmore and many other poets who have written in a touching way of simple things ; and above all, Edward Fitzgerald, whose trans¬ lation of the (Rubaiyat * of Omar Khayyam is not only classical in its finish but also not un¬ representative of much of the melancholy of the poetry of the century. Of contemporary English poets, the greatest amount of popular fame has fallen to Mr. Rudyard Kipling.*

Prose. — Important as is the poetry of the era, it is many ways surpassed by the amount and richness of the prose. During the period the great popular form of imaginative litera¬ ture was the novel. Sir Walter Scott, in the preceding part of the century, did more than any one else in the history of English literature to establish the widespread vogue of fiction, and in the field of historical romance he re¬ mains an object of the detracting envy and real despair of his successors. The main develop¬ ment of the novel in the Victorian period was, however, along a different line from that es¬ tablished by Scott, whose more immediate suc¬ cessor, Edward Bulwer-Lytton, a prolific writer, marked a decadence of the romance from the standard of the great master. Rather the novel developed according to the principles laid down and exemplified by the great writers of the 18th century, Richardson, Fielding and Smollett, and brilliantly carried on in the early 19th century

by Maria Edgeworth and Jane Austen. Ac¬ cordingly the great fiction of . the Victorian period is largely realistic in tendency. The most brilliant and most popular, as well as the earliest of the men of the period, was Charles Dickens, who, in the type of story and the method of narrative, followed the school of LeSage and Smollett, but added to the English novel, considered as a whole, a new kind of buoyant humor and a warm and polemic hatred of wrongdoing and oppression. Almost con¬ temporary, though flowering later and declining earlier, was William Makepeace Thackeray, • often spoken of as the chief of English novel¬ ists. Like that of Dickens, his material was largely drawn from contemporary life, but he wrote of higher social strata, and viewed his world more as a panorama, calmlv and with less personal intensity and less polemic sense. Almost contemporary with the finest work of these masters, was represented a very different and highly original impulse in Charlotte Bronte, whose (Jane

Eyre (1847) is the prototype of the intense personal novel from time to time in vogue.*

Of the types of material furnished by these novelists, that represented by the humanistic novels of Dickens was the most conspicuous in the group of slightly less great novelists of this early Victorian period. The purposeful spirit found a very interesting expression in the religio-historical, and modern ethical, novels of Charles Kingsley, the gist of whose teach¬ ing is that no earthly happiness exists, save in the surrender of self to the faith of Christianity (understood in an Anglican sense) ; in Eliza¬ beth Gaskell, whose classic and charming 'Cran¬ ford (1865) is less representative of her in¬ terest in social questions than such earlier novels as (Mary Barton* (1848) ; and in the vigorous and voluminous Charles Reade, who, besides being a writer of historical fiction, was also a vehement champion of the oppressed and a challenger of injustice. These writers were, in many respects, akin to Dickens. The most distinguished representative of the more realis¬ tic school, in many respects a follower of Thackeray, was Anthony Trollope, a writer of pleasant stories of English life, and one of the most consistent of the realists.*

*Charlotte Bronte and her sisters may be called specialists in representing emotional in¬ tensity. The term "specialist** may also be applied to several writers of the early Victorian period. Frederick Marryat was a specialist in the writing of sea-stories, and some of his nautical creations are famous. Charles Lever dealt chiefly with the military hero. An inter¬ esting picture of the out-of-the-way life of peasants and gypsies is to be had in the works of George Borrow. A popular writer on school and college life was Thomas Hughes. There may be named also Benjamin Disraeli, G. P. R. James, Samuel Lover, and of a somewhat later period, contemporary with George Eliot, Rich¬ ard Doddridge Blackmore and Margaret Oli- phant.*

Since the time of the great panoramic novel¬ ists of the early Victorian period, the novel has tended to specialization, such as has been described, though of a larger kind. Among writers belonging to the so-called later Victorian period, stands out the name of the great special¬ ist in states of the human mind, in questions of

*duty, in ethics, "George Eliot** (Marian Evans Cross). Though in one or two novels, as*

Quite as important and striking as either the poetrv or the fiction of the Victorian period is the large body of humanistic, critical and scientific prose that is regarded by Victorian writers as among the chief glories of English literature. During the period, the essay form, owing largely to the growing prevalence of magazines and reviews, was, and still is, in vogue,

but it was used more and more widely for other than strictly literary purposes. There have been practically no important successors of such essayists as Lamb, Hazlitt and DeQuincey (who, like Landor, falls also within the early Victorian period). The ancestry of the litera¬ ture of 1830-1900 is rather to be traced back, in humanism, to Burke and the French Revolu¬ tion, with some diffusion and dispersion; in criticism, to Coleridge ; in history, to Gibbon ; in economics, to Adam Smith and Bentham ; in science and philosophy, to Hume and Ben¬ tham ; with the infusion, from time to time, of ideas from Germany.

This last was the initial source of inspira¬ tion of one of the greatest humanists of the century, Thomas Carlvle. Beginning with translations of German writers and essays and excursions into German ideas, Carlvle, not far from the opening of the reign of Victoria, be¬ came at once the prophet and the scourge of his countrymen. Moved by the same spectacle that had stirred Dickens and Kingsley, he pro¬ ceeded somewhat illogically but very eloquently to demonstrate the futility of contemporary institutions, to decry the impotence of the democracy, and to point out the one way of salvation, the dominance of the "hero® whom he illustrated in several important works, as 'Heroes and Hero-Worship) (1841); 'Crom- welP (1845) ; and (The History of Friedrich P (1858-65). It would be wrong to say that the mantle of Eli i ah fell upon the Elisha of John Ruskin, for the careers of the two overlap

by many years. But Ruskin continued vehe¬ mently the task of upbraiding his countrymen for their failure to observe what was of good report. Starting his career as a critic of art, and trying to reform the taste and the aesthetic manners of the time and to lead his readers back to a true idea of the beautiful and the good, he, by the middle of his career, (Unto This Last) (1860), broadened the scope of his interests so that they included economic and social, as well as literary and artistic, questions. His influence has been very widely diffused, like that of Carlyle, and their contemporary human¬ ist, Emerson. A third great chastiser of the evil which men do and think was Matthew Arnold, already mentioned as a poet. From about 1870 to 1880, his literary energies, origi¬ nally devoted to poetry and next to literary criticism, were directed toward trying to make his stubborn island countrymen think rightly on political, literary and religious matters in ac¬ cord with that formula which he continually characterized as ˆculture.®

With these spiritual guides is to be named the great humanist, the friend

and contemporary of Carlyle, John Stuart Mill, who, besides being an admirable technical student and expounder of logic and political economy, attempted to disseminate the principles of moderation, of justice, of right reason, and in all his works, as in his famous essays (On Liberty y (1859) and (The Subjection of Women) (1869), sowed the seed of righteousness. For a discussion of Mill's work as an economist and a philosopher, the general articles and the special article on Mill should be consulted, since it is out of the province of the present article to touch on scientific studies of the century except in so far as they relate to literature.

The humanistic movement in its earlier phases is often regarded as an aspect of what is called, for the purposes of classification, the romantic movement, the impulse, that is, which expressed the desire for individual expansion rather than the submission to the limits im¬ posed by authority, and which implied the manumission of the human spirit and intellect from current and traditional bonds. In the religious field, the so-called Oxford Movement of 1833-41 is sometimes called romantic in that it was the work of a few young men who revolted at the religious custom of the time and endeavored to re-establish an earlier, and as they conceived it, a purer form of belief and worship. The Oxford Movement received at once its best exposition and severest criticism in the controversial autobiography of the originator of the movement, (The Apologia Pro Vita Sua) of John Henry Newman, written in defense of his conversion to Catholicism. Newman stands in English literature as one of the great masters of finished prose of a formal but winning cast and as a specialist in some¬ what technical religious controversy. The orthodox Anglican feeling of the time is best represented in the sermons and .writings of Frederick Denison Maurice, Frederick Wil¬ liam Robertson and Charles Kingsley, the novelist.

The more strictly critical movement, as re¬ lated to literature, goes back to Coleridge and Germany. The dogmatic manner and air of finality which distinguished the pronouncements of the Edinburgh and Quarterly reviewers,

found its descendant chiefly in the common- sense criticism of Macaulay. Most of the critics of the early decades of the century, Lamb, Hazlitt, De Quincey and others, were, in one way or another, frankly personal or de¬ liberative rather than ex cathedra in their atti¬ tude, and in Coleridge criticism tended to the ascertaining and expounding of principles rather than the assertion of dogmas. The early work of Carlyle, the next important critic after the group just named, was largely critical, and it busied itself with the exposition and in¬ terpretation of Schiller, Goethe, Richter and other contemporary German writers, for the benefit of his countrymen. Carlyle, however, was too busy exploiting the doctrine of the Rero® and sounding the sins of his fellow men to become a literary critic

of lasting influence. The main stream of critical tendency, up to the time of the modern scientific and philological schools, had sprung from the stimulating power of the German-derived Coleridgeianism. The chief tenets of that influence were the casting aside of authority in favor of appreciation : any work of art contained in itself the reason why it was good: and consequently an author's pur¬ pose, his range, his total production and his vogue were things to be taken into considera¬ tion. This principle passed naturally in the later Victorian period to the criticism of types, wherein criticism tended to become character¬ ization rather than censure or commendation. Two great critics are illustrative of the tendency: Walter Bagehot (1826-88), unex¬ celled for the vigor and brilliancy of his char¬ acterizations of types of mind and art, and Walter Pater (1839-94), the polished ex¬ pounder of artistic personality. The same tendencies, with different material and different emphasis, are to be observed in the work of such distinguished modern critics as Leslie Stephen, John Addington Symonds, Viscount Morley (1838—) , and others. Matthew Arnold, poet and humanist, second to none in import¬ ance as a critic, represents a reaction in favor of a more abstract and ideal standard. His¬ torically important as having done much to en¬ large the confines of English criticism and to rid it of insularity, he, nevertheless, was at variance with his contemporaries (as in matters of religion and politics) in asking for more authority and standardization of judgment, which standard is largely a matter of his own predilection.

Much of the critical study of literature during the period was dominated by the histori¬ cal and the scientific method. That aspect of criticism, except in such invaluable work as Stephen's dictionary of National Biography } and other excellent biographical works, is, how¬ ever, less important in the field of literature proper than that of history and science. Though these subjects do not properly enter into the present article, they are so important that men¬ tion of them cannot be wholly ignored. In history, besides such men as Carlyle, who wrote histones, and Symonds, the historian of the Renaissance, there were, in the Victorian period, since the time of Hallam, such dis¬ tinguished names as Milman, Grote, Macaulay, Harriet Martineau, Kinglake, Froude, Buckle, Freeman, Gardiner, J. R. Green, Lecky and Viscount Bryce. In philosophy and science the names of Lyell and Spencer are eminent,*

;ind the theory of natural selection as presented by Darwin and expounded by Huxley has pro¬ foundly influenced the whole train of 19th cen¬ tury thought since the publication of (The Origin of Species1 (1859).

Bibliography. — References are so numerous that it is impossible for the preceding and the following section to make more than a general reference to the lists contained under the arti¬ cles on the writers specifically named, though such books as Saintsbury's 'History of Nine¬ teenth Century Literature1 ; Stedman's Victo¬ rian Poets1 ; Stopford Brooke's 'English Liter¬ ature1 ; Palgrave's 'Golden Treasury1 (second series), and G. K. Chesterton's Victorian Lit¬ erature1 may be cited.

William T. Brewster, Professor of English, Columbia University.

DRAMA.

At the beginning of the Victorian period, the English stage was still contentedly support¬ ing the traditions of two preceding centuries. The objects and methods of both actors and plays were practically the same as they had been at the Restoration. In both, the rhetorical style prevailed. The two Patent theatres created by Charles II still had the sole privilege of play¬ ing the legitimate drama, and Macready was striving to perpetuate the histrionic tradition which went back through Edmund Kean and John Kemble, to Garrick and to Betterton. The plays themselves still kept, with slight modifi¬ cations, notably in the direction of morality, to the Restoration models, of comedy which de¬ rived from Moliere with a slight infusion of Jonson; and of tragedy which was either Elizabethan simple or Elizabethan Restora- tionized. Since Goldsmith and Sheridan, lit¬ erature had showed a widening separation from the stage which almost to their time had been its chief mouthpiece. This had been mainly brought about by the great ex¬ tension of journalism and, later, by the signal success of the novel in the hands of Scott. These two forms of literary endeavor were offering larger and securer returns than play¬ making, and thus naturally drew away from the theatre men of mark and left only the adapters and the hacks. Such was the position at the outset of Victoria's reign. Dramatic history during her reign is, until the very latter end of it, one rather of movements than of men. The changes which were to take place during her occupation were brought about by social, eco¬ nomic and physical, as well as literary forces ; for more than any other artistic activity, the stage is responsive to the conditions under which it exists. These changes embraced the decay of the old traditions, the even wider sepa¬ ration of the stage from literature, the birth of a new drama followed by a partial return of literature to the stage, and finally the growth of a serious conception of the drama as a criticism of life, a conception already achieved by other European nations.

London, during the first 40 years of the cen¬ tury, had more than doubled its population, and, as a result, the Patent theatres were on all sides encroached upon by minor theatres which, in spite of their legal disabilities,

proved for¬ midable rivals. When the Act of 1843 abolished the privilege of the Patent theatres, an era of

more active competition began. This compe¬ tition naturally relied upon display as its best means of advertisement; and the invention of gas and lime-light about the same period — in¬ ventions of great significance to the stage — con¬ firmed the universal tendency toward the spectacular treatment of plays. Inevitably there set in the decline of the rhetorical drama, the appeal of which, on a poorly-lighted stage, was primarily to the ear and not to the eye. Meanwhile another cause was contributing not only to destroy the rhetorical tradition but to widen the gap between literary men and the theatre. What small demand there was for original work would doubtless have in time recalled writers from the novel and the news¬ paper, but unfortunately the demand, just be¬ ginning to be felt in the early Victorian period, was checkmated by an outside influence. The Romantic revival in France had suddenly broken away from the frigid classicism, so unattractive to English audiences, and Hugo had ushered in a kind of play which the English found more to their taste. These new plays proved easily imitable and adaptable in London, but the habit of importation did not become whole¬ sale until the advent of Scribe. Scribe perfected the mechanics of story-telling in dramatic form, and in so doing largely deleted everything else from a play — witty dialogue, atmosphere, local¬ ity, and characterization. Thus his plays, being simply stories, could be given anywhere with equal effect, and as London managers could get them for nothing, his output and that of his school became an inexhaustible storehouse for adaptation.

The result upon the home product was two¬ fold. It reduced to a minimum the meagre band of English writers, and those that remained no longer even attempted to represent English life and thought. Instead, they provided for the public an impossible melange of French ideas and emotions served up in British dishes. In the second place, the adaptation and imitation of Scribe's methods proved the finishing blow to the moribund rhetorical conception of comedy by bringing in a French realism of mounting and stage-setting. When a stage room had three sides, a ceiling and real doors, many conventions of action and dialogue, unnoticed when an interior consisted only of wings and a back-drop with painted chairs, became ridicu¬ lous and unendurable. Thus gradually a new ideal was developed, by which the play was forced to move a little nearer to the life now in a material way presented with considerable reality. Internally, however, the plays remained as artificial as they had been before, their char¬ acters puppets impelled by theatrical and ab¬ surd sentiments and exhibiting the crudest of psychologies. The main dramatists of the per¬ iod which this development

closes were Bulwer, Tom Taylor and Charles Reade, and Dion Bou- cicault. Bulwer, under the influence of the Romantic revival in France, produced 'The Lady of Lyons1 and Richelieu,1 and his com¬ edy 'Money1 shared the distinction of being the last representation of rhetorical comedy with Boucicault's 'London Assurance1 and 'Old Heads and Young Hearts,1 with Taylor and Reade's 'Masks and Faces,1 and with Taylor's 'Still Waters Run Deep.1 Boucicault, the arch¬ adapter and plagiarist of the period, had the

good fortune to hit upon a type of his own in his series of very successful Irish plays, but they are no nearer real studies of life than the others of the period. The predominance of Scribe and his school had paralyzed native authorship.

Into this lifeless world came T. W. Robert¬ son — a dramatist whose pleasant work has no great intrinsic value, although he possessed a strain of original genius — to create a new form of drama. It ignored not only the old rhetor¬ ical tradition but the new French-English mon¬ grel species. It was merely the comedy of manners, clothed in natural speech and realistic setting, but it seemed absolutely original and spontaneous. It viewed the commonplace so¬ cial relations from the outside, with a naivete and humor which disguised to an unsophisti¬ cated public the insipidity of its characters and the shallowness of their sentiments. Though he brought new life to the drama, fortunately his school, represented by H. J. Byron and Al- bery, did not long survive him, else the stage would have found itself in almost as lifeless a way as when he rescued it and with an artifi¬ ciality different from, yet as great as, that against which he effectively protested.

Though W. S. Gilbert could not be called a follower of Robertson, he made the same pro¬ test against the fustian of the stage, and car¬ ried on the verbal flippancy which had vied with sentimentality in the latter's plays. So thoroughly original was he that only the ad¬ jective Gilbertian can cover the precise blend of wit, delicate fancy, satire and extravaganza, which achieved some brilliant successes on the legitimate stage and which finally secured the aid of musical accompaniment in a long series of comic operas that stand, like their author, in a class apart.

In spite of Robertson and Gilbert, however, the theatre lapsed again into a period of adapta¬ tion from France. But there, meanwhile, had sprung up a larger type of social drama than that of Scribe, — a type of which (Diplomacy) is an illustration, — and imitation of this wider species was

less deadening than the former had been. When, however, international copy¬ right was at last secured and French works could no longer be adapted for nothing, the effect of fair play for the English dramatist was seen almost immediately. A group of young writers arose who, beginning as imitators, were soon applying French methods to original and native purposes. Of this group, Mr. A. W. Pinero and Mr. H. A. Jones were pre-eminent. They sought their material at home and, ob¬ serving carefully, reproduced sincerely. An¬ other decade had to pass in experiment before these men really undertook a drama which evinced anything like a serious psychology and a vital relationship with life. Not until 1890 did they dispense with elementary love-idylls and the kind of story which had been up to that time inevitable to every play, or set out defi¬ nitely for a more thoughtful and virile drama covering the field of social intercourse. Fol¬ lowing their lead, Oscar Wilde and Mr. Ber¬ nard Shaw developed the social comedy into a more serious content. Wilde's pyrotechnic brilliance of dialogue and inverted epigram concealed at first his genuine dramatic quality and adroit constructiveness as a playwright.

Mr. Shaw took up the stage as a lively form of presenting himself and his social propaganda, but, though his brilliant plays hardly succeed as drama, there can be no question of their success with the public and as literature. These men with Mr. Pinero and Mr. Jones have once more elevated the English drama not only to the level of Continental drama but of the literature of their own land.

The poetic drama during the reign is repre¬ sented by Westland Marston, Talfourd, Brown¬ ing and Tennyson. The formal dramas of the first two are long forgotten. Masterly as are some of Browning's plays, they seem remote from the purpose of the stage, and when some of them got there it was discovered that they could be only recited, not acted : at any rate, they can be successful, if at all, only in the manner of the rhetorical tradition for which they were conceived. Tennyson's plays, al¬ though loosely constructed in the loosest of Elizabethan formulas, — the chronicle history, — have been acted with considerable success. This was due, no doubt, to the circumstances of their production, for his fine verse lacks vigor and he has not seized upon the essential mo¬ ments of his stories, the crucial parts of most of his dramas taking place behind the scenes. In (Queen Mary) and ˆHarold, however, he presented genuine dramatic material. If the taste for the poetic play can be revived in the future, it must be as drama first and poetry afterward, and drama conceived in a modern rather than Shakespearian type.*

Algernon Tassin,

Lecturer in English, Columbia University.

De Quincey's consists of three sections, the first of which appeared in Blackwood's Edinburgh Maga¬ zine in October 1849, with the added title, (On the Glory of Motion,* and with no intima¬ tion that more was to follow. In December appeared what the author subsequently, in the collective edition of his writings, called (Section

II, The Vision of Sudden Death, * and (Section

III, Dream-Fugue, Founded on the Preceding Theme of Sudden Death.) It would seem that the (Dream-Fugue* was composed in 1844 (when De Quincey had virtually conquered the opium habit), and the two introductory sections five years later; these are, then, subordinate to the. 'Dream-Fugue,* which is a specimen of De Quincey's rhythmical, "impassioned® prose — the medium which, for his special purpose, he preferred to metre. 'The English Mail Coach* being a kind of sequel to 'The Confessions of an English Opium-Eater,* the ' Dream Fugue,* as the author would have us believe, constitutes one of the poetical dreams, full of beauty and terror, which arose from his indulgence in opium, though based upon actual occurrences in his life. Accordingly, in Section I, his experi¬ ences while a' student at Oxford, traveling to and fro by coach during the time of the Napo¬ leonic war, are related, with much circumstance and digression, in a less impassioned style; in Section II is recounted an accident on the high road, in which a young man and girl in a frail carriage narrowly escape destruction from the flying mail coach ; and in Section III sugges¬ tions from these themes are elaborated in a highly ornate style, the "music® of which is in-

deed beautiful, though the value of the content is slight. The allusions to Waterloo, and to the way the news of the battle spread through England, give the document an interest for the historian. Consult Hart's edition of (The Eng¬ lish Mail Coach* (New York 1893) ; and Cooper, (The Prose Poetry of Thomas De Quincey) (Leipzig 1902).

Lane Cooper.

ENGLISPI MERCURY. See Cheno-

PODIUM.

ENGLISH PALE, the name formerly ap¬ plied to extraterritorial districts in

Ireland. Scotland and France, staked off by pales or poles from the surrounding country, marking definite boundaries, these districts being gov¬ erned by special laws. The pale in Ireland was established in the reign of Henry II ; its ex¬ tent varied under different kings ; from the time of Henry VIII until the subjugation by Cromwell, it comprised most of the modern counties of Dublin, Louth, Meath, and Kil¬ dare. In 1558 the "English' or (*

ENGLISH POETRY, Spasmodic School

of, an epithet first applied to Byronic verse by Carlyle, and subsequently by Professor Wil¬ liam Edmonstoune Aytoun to a group of minor poets of the middle 19th century. The school was said to include Philip James Bailey, Syd¬ ney Thompson Dobell, Alexander Smith, George Gilfilian, John Stanyan Bigg, and ac¬ cording to some critics, Gerald Massey and even Swinburne. The Byronic "weltschmerz,® world- pain or cosmic agony, spasmodic strivings after unattainable ideals, discontent with life and its mysteries, sceptical disquietude, vain effort and resentment against unrewarded labors, charac¬ terized their writings, which, however, were frequently marked by passages of considerable merit, and were a faithful reflection of a strug¬ gling phase of contemporary thought. In (Fir- milian: A Spasmodic Tragedy, Professor Ay¬ toun in 1854 attacked and parodied the writ¬ ings of the school with considerable success, ridiculing their subjects and imitating their ponderous style, especially the works of Bailey, Dobell and Alexander Smith. See biographical articles of the writers mentioned and consult Martin, (Sir) T., (Memoir of W. E. Aytoun* (London 1867).*

ENGLISH SNIPE, a name frequently used for the common American snipe or Wil¬ son's Snipe (Gallinago Delicata). There is, however, an English snipe proper (Gallinago Gallinago) , which is almost indistinguishable from the former and has its habitat in the north of Europe. See Snipe.

ENGLISH SPARROW. See House Sparrow.

ENGLISH TAPESTRIES. See Tapes¬ tries.

ENGLISH VERSIONS. See Bible.

ENGLISHRY, or ENGLESCHERIE, an

old Norman law term, which originated after the invasion of England by William the Con¬ queror to designate the identity of a person found slain, as a native. If the body was un¬ identified, the law presumed that the person

was a Norman, vindictively slain, and where found, the community of 100 was fined. If the Englishry of the victim was established, the fine was remitted.

ENGRAFTING. See Graftage.

ENGRAILED, a heraldic term used to designate a line made up of concave semi-cir¬ cles. See Heraldry.

ENGRAVINGS. For humanity's great indebtedness to the art of pictorial reproduc¬ tion it would be difficult to claim too much. Next in importance to the art of printing, as an aid in the history of the advance of civilization, certainly comes that of illustrating. The growth in the art of the manifold reproduction of pictures is one of great interest, as well as importance, and many books have been dedi¬ cated to an exposition of our best engravers and their productions, known to the connois¬ seur as sprints.® And among connoisseurs of art their collections of prints hold a very favor¬ able position.

Etching. — This process is carried out on a copper plate having its upper surface highly polished. This plate is heated- and then coated with an acid-resisting substance, usually a mix¬ ture of burgundy-pitch, asphaltum and beeswax. Cold applications of certain pastes composed of materials dissolved in oil of lavender or chlo¬ roform are sometimes used. The plate next receives a coating of lamp-black. This prepared plate has the drawing scratched through the sur¬ face coating by means of etching-needles. All work is drawn in reverse (negative) of the actual desired impression. The back of the plate is next coated with varnish (the process is termed ((stopping-out®). Now the plate is immersed in an acid for the process of "biting in.® Those lines which are to remain the finest are stopped out by varnish early, then the plate is returned to the acid bath to attain 'the deep black lines. When the process has been car¬ ried on till the artist is satisfied with the condi¬ tion, the varnish and wax are cleaned off and the plate is ready for the press. Next the entire upper surface of the plate is coated with ink, the channels made by the acid being also filled; then the ink on the upper surface is cleaned and a copper-plate press takes an im¬ pression (called a "print®) on damp paper. Dry-point Etching is done by engraving the design directly into the metal with a needle (using no acid). This scratching of a furrow leaves a "burr® (or raised ridge of the erased metal) on either side of the channel; the effect of this burr on the impression is characteristic of a dry-point print. Etching, unlike engraving with a "burin® (graver) is done as rapidly as the genius of the operator permits, and there¬ fore is a process frequently used by painters. Among the early painter-etchers were Albert Diirer, Lucas van Leyden, Vandyck, Rem¬ brandt,, Agostino, etc. Rembrandt was the first exponent of the art

of etching (17th cen¬ tury) besides producing the grandest work known. Among other well-known early etchers were Van Vliet, Ostade, Paul Potter, etc. In England were Barlow, Gaywood, Hollar, Place; and in France, Callot, Bosse, etc. In the 18th century were Hogarth, Claude Gelee, Guido Reni, Canaletto, etc. In the 19th cen¬ tury were such masters as Ingres, Corot, Meryon, Jacquemart, Seymour Haden, McNeil

Whistler, Joseph Pennell. Most noted of etch¬ ings are, probably, those from the drawings of Claude, reproduced by Richard Earlom in the great (Liber Veritatis) (1740-1822).

Wood Engraving. — Here the technique is just the reverse of etching, inasmuch as the parts to appear in black or color are left the height of the surface, while the background (white) is cut away. Our earliest woodcuts are German (middle 15th century) and the practice grew up with the sister art of printing. Albrecht Diirer and Hans Holbein greatly aided the advancement. To the early school of wood engravers belong such names as Lucas Cranach, the Behams, Lucas van Leyden, Altdorfer, Burgkmair, Baldung, Ammon, etc. The 17th century witnessed the decadence of wood engraving, but in the 18th century it was revived. The early workers had engraved on the plank or with the grain ; in the re¬ vival a modern method of engraving across the grain on boxwood blocks was used. The <(white line® now appears, produced by means of making cuts into the wood surface. Thomas Bewick (1758-1828) was one of its earliest ex¬ ponents. The prints of this period show clearly the merits of the changed system, allow¬ ing such delicate treatment. Among its expo¬ nents are Whymper, Baxter, Thompson, Lin¬ ton, Harvey, etc., in England; Vogel, Ungel- mann, Kretchner, Pfnorr, Weber, etc., in Ger¬ many; the Pannemakers, You, Pisan, Colin, Valloton, etc., in France; Veldheer, Nieuen- kampf, etc., in Holland. But another process of wood engraving was brought about by the fact that wash drawings on the block permitted light and shade effect to be engraved through the painting. This soon put the original work in the hands of draughtsmen to be engraved by what soon became an artisan engraver class. Decadence set in and the first half of the 19th century found its art work done in the metal (steel). Periodicals (started by the Illustrated London News, in 1842) brought back work again to the engravers as wood engravers, be¬ cause they could put wooden engravings on the press with the type, whereas the metal plate engraving had to be printed from separately. The Victorian School of wood engravers arose from illustrated volumes on India paper for which such artists as Rossetti, Millais, Hughes, etc., did drawings on the block and <(facsimile® work

was done by such geniuses of interpreta¬ tion as the Dalziel brothers and Swain. Birket Foster did fine drawings as did also North, Lawless, Small, Boyd, Houghton, Sandys ; even Burne-Jones and Whistler did a few. Noted 19th century wood engravers were Roberts, Thomas, Babbage, Comfort, Cooper, etc. Fur¬ nishing drawings from artists quickly led to photographing the picture on the block and reproducing directly (in positive). But wood was not adapted to stand the heavy wear in producing prints on a large, popular scale, hence metal casts were invented to 'preserve the original (cliches they were termed). In Amer¬ ica, Harper's Magazine and, later, the Century helped the cause of the wood engraver and they did better justice to the artists' originals, bring¬ ing out the tones displayed in chalk or wash drawing.

Line Engraving. — • Here the engraving is done by a graver (burin) of prism form which scoops out a strip of the metal nearly free from

<(burr,® and easily scraped. After cutting out all the lines that go to make up the picture, ink is applied, filling up the lines. Then the sur¬ face is cleaned and an impression (called a print) is taken on damp paper on the press. Line engraving is a 15th century invention of the Italian goldsmiths, who themselves were artists, and did fine line engravings. In Flor¬ ence were Botticelli, Baldini, Fra Lippi, Ro- betta. Andrea Mantegna worked in Padua ; Marc Antoni in Bologna; Francesco Francia in Venice; Raimondi in Rome, etc. Clever line engravers in Germany were Albrecht Diirer, the van Mechens, Schongauer, Aide- grave, Altdorfer, the Behams, Pencz, etc. ; and in Holland Rubens and Vandyck, with their pupils. In England were Holl, Pelaram, Payne, Cecil, the Audrans, Nanteuil, Roullet, etc. Also numerous 18th and 19th century engravers did fine work all over Europe.

Stipple Engraving. — This process consists of producing a series of dots so related to one another as to size and distance that the com' bination produces the desired picture. The usual method is to produce the marks by etch¬ ing, to be further manipulated with a specially prepared graver. While a pure stipple engrav¬ ing consists of dots solely, the line engraver frequently used the stippling method to obtain softness in flesh shading. Crayon drawings were in vogue late in the 18th century so that stipple engraving (best suited) was quite com¬ mon then in reproducing the crayon cartoons of Fragonard, Watteau, etc. The greatest ex¬ ponents of this style were Francisco Bartolozzi (1725-1815) and his school. Stippling never found much favor on the Continent. Wynne specialized largely on Angelica, Kaufmann on drawings and portraits ; other noted names are Bond, Bromley, Cheesman, Blake, Picart, Stod- dart, the Holls, Heath, etc.

Steel Engraving. — The introduction of soft steel (1822) by Thomas

Lupton for engraving mezzotints brought with it two changes. Com¬ mercially the plate was more profitable, pro¬ ducing about three times as many impressions as the copper ; and the harder metal permitted much more minute and delicate work to be done. To the untrained eye the difference in ordinary line work is very slight. The incision of the tool is less deep in the harder metal for¬ bidding the bold gradations of line that copper permits. In etching the ink does not produce from steel as artistic an impression as from cop¬ per and is easily recognizable. In mezzotints the steel medium produces a ˆthinness® not seen in copper work. Most steel engravings are done by etching and later improved by the graver. The stages ("trial states®) through which a steel engraving progresses to a finish are so widely apart that the work was fre¬ quently divided among several engravers, each having his special part. This commercialization soon brought decadence, the work becoming me¬ chanical. Work of good merit was done by the following, among others, engravers : Fittler, Heath, Smith, Bromley, Danforth, Doo, Good- all, Raimbach, Holl, Le Keux, Finden, Great- bach, etc. The later invention of giving a steel coating to a finished copper plate engraving made the old medium as commercially produc¬ tive as the steel, and soon ended the career of the latter.

Turner Prints. — The great engravings <(after Turner" are generally treated to a spe¬ cial classification. The great painter Joseph Mallord William Turner (1775-1851) did en¬ tirely finished engravings himself but in most cases confined himself to outlines of the repro¬ ductions of his own drawings, and left the con¬ tinuation (always under his close supervision, however) to other engravers. <(Turner prints" range from 1794 to 1856 (five years after his death. Ihe most noted collection is a series of 71, engraved for his great (Liber Studiorum. Assisting him were such engravers as Basire, Pye, Dunkarton, Clint, Lupton, etc. Turner's medium was mezzotint. Another noted series is his (Southern Coasts Whitaker's History of Richmondshire,* etc.*

Mezzotints. — In this process the plate is given an immeasurable number of small ((burrs" or sharp projections. This work is termed "grounding" and is done with a "cradle" or "rocker," an instrument consisting of a curved blade similar to a cheese cutter. This is rocked from one side of the plate to the other and its teeth create a jagged line (termed "way"). Starting at the top the <(ways" are made in parallel till the last one reaches the bottom of the plate. Next these rough lines are made from top to bottom, at right angles to the last ones, then others are done diagonally at every possible angle gradation. The picture is produced on this roughened surface by

tooling away the burrs for the lights with a <(scraper" ; the high lights being next brought out by pol¬ ishing parts with a "burnisher." The method allows great delicacy in Hones" closely similar to those of a painting. The process was in¬ vented by Ludwig von Siegen (1640). Noted mezzotint engravers were Sherwin, Place, Blooteling, Vandervaart, Beckett, Faithorne, Lutterel, Simon, Pelham, Beard, McArdell, Houston, Miller, Spooner, Purcell, Frye, Green, Earlom, etc.

Aquatints. — In this process the surface of the plate is prepared with a ((ground" of resin of finely granulated consistence. The drawing is done with the penetration of the etching needle exposing the plate to the acid. The beauty of the aquatint depends upon the various depths to which the acid bites into the metal. Certain parts are ((stopped out" with the resist¬ ing substance (where only shallow lines are desired) early in the bath, the plate being again immersed for deeper lines, then other lines "stopped out," and the plate returned to the acid. This process is continued for perhaps a dozen bitings, each application creating another tone. When finished the work resembles an Indian ink drawing. Noted workers in this method were Le Prince, Malton, Stadler, Lewis, Sutherland, Turner (C.), Metz, Havell, Prout, F. Goya, Delacroix, etc.

Bibliography.— Hayden, A., (Chats on Old Prints) (New York 1906) ; Hind, A. M., (A Short History of Engraving and Etching (Boston 1908) ; Maberly, J., (The Print Col¬ lector (New York 1880) ; Richter, E. H., (Prints) (Boston 1914) ; Wedmore, F., (Fine Prints* (New York 1897) ; Weitenkampf, F., ˆPrints and Their Production: a List of Works In the New York Library) (New York 1916).*

Clement W. Coumbe, Technical Art Expert,.

ENGROSSING, in law, an act which, on statute books, when the natural laws of trade were little understood, and political economy not even guessed at, was set down as a crime. It consisted in something similar to what now¬ adays is known as ((cornering the market" by buying up the crops or the herds wholesale (Fr. en gros) before they were fit for use, in order to retail them at a great profit when they ma¬ tured and were available for consumption. The offense was not only a statutory offense in Eng¬ land, but a crime in common law, and from the time of Edward VI to that of Queen Anne laws were repeatedly passed for its repression. Even in the last century a prosecution for en¬ grossing was witnessed in an English law court. In 1844 all English, Irish and Scottish statutes, in respect to the offenses known as forestalling, engrossing and regrating, or retailing at a profit, were repealed. In more recent times there has been a good deal of litigation in the United States, and much discussion all over the civilized world with regard to the legality of corporations formed for the express

purpose of monopolizing the trade in certain necessities or luxuries of life. (See Combination; Monop¬ oly; Restraint of Trade; Trusts). Consult Cunningham, W., (The Growth of English In¬ dustry and Commerce) (3 vols., Cambridge 1903-12) ; Girdler, J. S., Observations on the Pernicious Consequences of Forestalling, Re¬ grating and Ingrossing, etc. (London 1800) ; Illingworth, W., (An Inquiry into the Laws, Ancient and Modern, Respecting Forestalling, Regrating and Ingrossing, etc.1* (London 1800) ; Marwick, Sir J. D., (On Forestalling, Regrat¬ ing and Engrossing, etc.* (in Society of Anti¬ quaries of Scotland, Proceedings, Session 1902- 03, Vol. XXXVII, pp. 145-159, Edinburgh 1903).*

The term is also used to denote the careful transcription of a deed, statute, or other legal document in large hand; and is often applied, in the United States, to the final and certified copy of a statute, which is ready to be signed by the President, or the governor of a State.

ENHARMONIC (from Gr. evapfioviKoc in accord). In modern music a general term to denote a difference in degree but not in pitch, though specifically there is a slight variation of pitch, which the same note takes according to its adjustment to a fundamental tonic. Thus C % and D J? are practically the same note on keyed instruments, yet strictly speaking, the former should be produced by 1 5—16 of the whole string sounded, the latter by 9-10. An enharmonic change of key, that is shifting from one scale to another, as in transposing C $ to D \>, often enables a composer to write more easily by avoiding recurrent accidentals. In ancient Greek the enharmonic mode was dis¬ tinguished by the use of small intervals or quarter tones, such as the tetrachord of which the first two steps were quarter steps and the third a major third. See Mode.

ENHUBER, enhoo'ber, Karl von, German painter: b. Hof, Bavaria, 16 Dec. 1811; d. Munich, 6 July 1867. He studied at Munich, at first being known as an animal painter and later applying himself to romantic and humor¬ ous themes, being especially felicitous in depict¬ ing the peasantry of Upper Bavaria. Among his works are (The Dying Gunner ; ˆPoachers* ; (Smoking Boy) ; < Interrupted Game of Cards) ;*

(Munich Burgher Guardsman' ; (Grandfather's Delight' ; (Wood Carver in His Shop' ; and (Stage Coach at the Tavern.'

ENID, the wife of Geraint in Tennyson's (Idylls of the King' (q.v.). She is upheld as a model of conjugal fidelity.

ENID, Okla., city and county-seat of Gar¬ field County, 36J/2 miles north by east of King¬ fisher and 88 miles by rail west by north of Okla¬ homa City, on the Chicago, Rock Island and Pacific, the Atchison, Topeka and Santa Fe, and the Saint Louis and San Francisco rail¬ roads. It is a banking city ; owns its water¬ works, and adopted in 1909 the commission form of government. It contains a College of Fine Arts, Saint Francis Institute, Phillips Uni¬ versity, a business college, a State institution for the insane, an excellent high school, a Carnegie library, courthouse, two hospitals, Federal buildings, opera house, etc. Among the industrial establishments are tile and iron works, sash and door factory, electric supplies, nursery, marble works, washing machine factory, metal silo factory, planing and flour mills, bottling works, manufactories of binders, candy, bricks, corn-seeders, steel posts, boilers and rugs. The United States census of manufactures for 1914 showed within the city limits 45 industrial es¬ tablishments of factory grade, employing 383 persons ; 276 being wage-earners receiving an¬ nually a total of $175,000 in wages. The capi¬ tal invested aggregated $1,667,000 and the year's output was valued at $2,611,000: of this, $563,000 was the value added by manufacture. There are two parks. Enid is situated in a rich agricultural section and is one of the largest poultry centres west of the Mississippi, shipping in 1913 more than $3,000,000 worth of poultry and eggs. Underneath the city from 35 to 45 feet flows a subterranean river, with an inex¬ haustible supply of pure soft water, which is pumped to the reservoirs at a cost of less than six cents per 1,000 gallons. Pop. (1920) 16,576.

enimAgan, a linguistic stock of Indians in South America, inhabiting the northern half of the Gran Chaco. It includes the Angaite, Enima, Guana, Sanapana, Sapuki, Sujen, Toosle and other lesser tribes. Consult the works of Boggiani, Hawtrey, Kersten, Schuller and other anthropologists who have written on these tribes.

ENKHUIZEN enk'hoi-zen (Lat, Encliusa), Holland, town on a projection in the Zuyder Zee, 29 miles northeast of Amsterdam. Its most important public building is an elegant town house with a lofty tower, and mural decorations by Johan van Neck. In the 1 7th century it had a population of upward of 40,000 and sent a fleet of 400 vessels to the herring fisheries, but the herring trade has died away. Its chief industries now are ropemaking and shipbuilding. The town is the birthplace of the painter Paul Totter. Pop. 7,748.

ENLIGHTENMENT, Philosophy of, the

name popularly given to much of the philosophi¬ cal thought of the 18th century, which cut loose from superstition and attempted to establish reason as the foundation of all belief and of all rules of conduct. It

included the empiricism and deism of the English school, the sensualism of the French as well as the ultra-nationalism of Germany. Individualism was a strong figure

in its teachings. Locke, Bayle and Leibnitz, Hume, Voltaire, Lessing, Tom Paine and Benjamin Franklin were the most representative of the school, if school it may be called. Con¬ sult Hibben, J. G., (Philosophy of the Enlight¬ enment' (New York 1910) and any standard work on the history of philosophy.

ENLISTMENT, a contract between a gov¬ ernment and an individual, in accordance with which the latter voluntarily assumes the duties of a soldier in return for which the government assures him a soldier's rights, pay and allow¬ ances. It differs from ordinary contracts for services in that it involves a change of status, so that the contract cannot be broken with im¬ punity at the will of the enlisted man. Enlist¬ ment is the method of obtaining soldiers to which those nations resort that do not favor conscription. Accordingly before the European War, it was best exemplified by the armies and navies of the English-speaking peoples. In the United States army, recruits to be enlisted must be of good moral character, i.e., must never have been convicted of a felony nor imprisoned — and must be able-bodied, and between the ages of 18 and 35, if it is their first enlistment. They must be citizens or have taken out their first papers, and must be able to speak, read and write the English language. The physical, standards vary somewhat with the different branches of the army and the need for men, but in time of peace are very stringent. The enlistment of recruits is part of the duty of the adjutant-general's department. The period of enlistment is seven years, of which the first three or four, as the case may be, are spent with the colors, and the remainder with the Army Reserve, which is only on duty in time of war. Extra pay is allowed for re-enlistments within three months.

In the navy, candidates for enlistment must be of sound physique, not subject to fits, and able to read or write ; or otherwise of satis¬ factory general intelligence. In general, only citizens of the United States and its possessions are accepted. They must be of good character and must not have been convicted of a crime. Enlistments in the grade of apprentice seamen are made among those between the ages of 17 and 25. The term of enlistment for those under 18 is until they become of age; for those over 18, four years. For those under 18, the con¬ sent of the parent or guardian is necessary. All those enlisted after they are of age serve for four years, but the term may be extended for from one to four years by the voluntary agreement of the enlisted man, if he is not undesirable. The upper limit of age for enlist¬ ment is 35, but not all ratings have the same limit. Enlistments are made at naval rendez¬ vous, on board receiving ships, on

board cruis¬ ing ships which are short of their complement at a port where there is no rendezvous or re¬ ceiving ship, on board vessels of the Bureau of Fisheries and at naval stations to fill up the complement of their yard craft. Finger-prints are taken at each enlistment. As in the army, extra pay is given to those who re-enlist, but the period within which this re-enlistment may take place is four months.

In the British army, since the law of 1907, the army consists of the regulars and the ter¬ ritorials. The regular army comprises the per¬ manent army, the army reserve and the special

reserve. The period of enlistment is 12 years, of which three, five or nine years may be spent in the reserve. The maximum service permit¬ ted to good service men is 21 years, after which they are pensioned. On the average those men who serve in the colonies or in India serve from 12 to 16 years. Enlistment in the special re¬ serve is for six years, in the territorial army for four.

In the active force of the British navy, the majority of the enlistments are made between the ages of 15 and 16j4. After two years of preparation, the term of service with the fleet is 12 years. Re-enlistment for 10 years is per¬ mitted. See Army Organization.

ENNA, August, Danish composer: b. Nak- skov, Laaland, 1860. He was entirely self- taught. In 1880 he became violinist of a trav¬ eling troupe and in 1881 settled at Copenhagen, where he eked out a living as a violinist and produced the operetta, (A Village Taled Later he was made conductor of a provincial com¬ pany. During this time he produced several compositions which brought him to the notice of Gade. Through the latter's instrumentality Enna was enabled to spend one year in study (1888) in Germany. He produced (The Witch) in 1892, an opera which at once brought him success and fame. Other works since then have been received more or less favorably but none has equaled his premier. These works include (1904) ; (Gloria Arsena (1913) ; (A Mother's Love,* a legend for chorus and orchestra.*

ENNA, or HENNA, Sicily, the ancient name of the town now known as Castrogio- vanni. It is situated at about the centre of the island, was renowned in antiquity as one of the principal seats of the worship of Demeter. See Castrogiovanni.

ENNEACRUNOS (Gr. ((nine springs"), a famous fountain at Athens

(q.v.).

ENNEKING, John Joseph, American painter : b. Minster, Ohio, 4 Oct. 1841 ; d. 17 Nov. 1916. He studied at Munich and Paris under Bonnat and of Daubigny. He painted chiefly landscapes and figure paintings. He received honorable mention at the Paris Exposition of 1900 and among his works are (Moonlight on the Giudecca, Venice) (1876); (Freshly Picked) ; (Drove of Cattle on a November

Day) (1878); (The Obersee) ; (Farmyard Scene in France ; 'November Twilight* (1881) ; (Summer Twilight* (1883) ; 'Indian Summed (1885); (The Coming Storm) ; 'Springtime* ; and (Autumn in New England) (Worcester Museum).*

ENNEMOSER, en'e-mo-zer, Joseph, Aus¬ trian medico-philosophic writer: b. Raben- stein, Tyrol, 15 Nov. 1787; d. Egern, Bavaria, 19 Sept. 1854. He fought in the rising of the Tyrolese against the French in 1809, acting as secretary to its famous leader, Andreas Hofer. Previous to this he had begun the study of medicine at the University of Innsbruck and at the universities of Erlangen and Vienna. During 1813-14 he fought against Napoleon as an officer in the famous Luetzow Corps. After the Peace of Paris he went to Berlin, where he

finished his studies and in 1816 took his de¬ gree in medicine. In 1819 he became professor of medicine at the new University of Bonn. From 1837-41 he practised medicine in Inns¬ bruck. In 1841 he went to Munich, where he obtained great reputation by the application of magnetism as a curative power. He had be¬ come interested in this subject while studying at Berlin and published a number of works re¬ lating to it. The most important of these is 'Geschichte des Thierischen Magnetismus) (Leipzig 1844), which has been translated by W. Howitt as 'The History of Magic> (2 vols., London 1854). Others of his writings are 'Historisch-Psychologische Untersuchungen fiber den Ursprung und das Wesen der meri- schlichen Seele) (Bonn 1824) ; 'Anthropolo- gische Ansichten, oder Beitrage zur Besseren Kenntnis des Menschen) (Bonn 1828) ; (Der Magnetismus im Verhaltniss zur Natur und Religion > (Stuttgart 1842) ; (Der Geist des Menschen in der Natur) (Stuttgart 1849) ; (Anleitung zur Mesmerischen Praxis) (Stutt¬ gart 1852) ; (Das Horoskop in der Weltge- schichte) (Munich 1860).

ENNERY, en-ne-re, Adolphe Philippe D.,

frequently called Dennery, French dram¬ atist: b. Paris, 17 June 1811; d. there, 25 Jan. 1899. He began life as a clerk, but later turned to the drama ; he studied scenic effects, the quick change from the tragic to comic, and

the contrast between the serious and ludicrous characters. He subsequently became the master of modern melodrama, producing alone and in collaboration some 200 plays. Dur¬ ing the 50 years of his active life he accumu¬ lated a large fortune. In 1896 he was made a Commander of the Legion of Honor. His most successful plays include (The Grace of God) (1841) ; 'Mary Jane) (1845) ; (If I Were King) (1852); (The Taking of Peking) (1861); Two Orphans (1875); 'Martyrdom* (1887). He also wrote, in collaboration with others, the librettos for Gounod's*

ENNES, en'nas, Antonio, Portuguese dram¬ atist : b. Lisbon 1848; d. 1901. He was for some years prominent in journalism, and in 1886 was appointed • chief librarian of the National Library and in 1890 Minister for Marine and the Colonies. His first play, 'The Lazarists, had extraordinary success in Por¬ tugal and Brazil and long held the stage. It was followed by the comedy 'Eugenia Milton) (1874) and the dramas 'The Troubadours) ;*

ENNIS, Ireland, town in county Clare, on the Fergus, 25 miles northwest of Limerick by rail. It contains a Roman Catholic college and Ennis College, founded by Erasmus Smith. The ruins of a 13th century Franciscan abbey is one of its attractions and a notable monument has been raised to Daniel O'Connell. A consider¬ able trade in grain, flour and agricultural prod¬ uce is carried on and large fairs and markets are held. Pop. 5,472.

ENNIS, Tex., city of Ellis County, 35 miles south of Dallas, on the Houston and Texas Central and the Texas Midland railroads. It has extensive agricultural and stock-raising in¬ terests and contains cotton compresses, gins, railroad repair shops, cottonseed-oil mill and a flour mill, etc. Since 1914 it has been under the commission form of government. The waterworks are municipal property. Pop. 7,224.

ENNISCORTHY, Ireland, town, in the county of Wexford, situated on the river Slaney, 77 miles south of Dublin. There is an old castle erected by one of the early Norman conquerors, and in the neighborhood is Vinegar Hill, the scene of a skirmish in 1798, when the town was stormed by the rebels. The river Slaney is navigable and there is a considerable trade in provisions. Pop. 5,495.

ENNISKILLEN, Ireland, a borough and market town of county Fermanagh, 37 miles northeast of Sligo, on an island in the narrow¬ est part of Lough Erne. Suburbs are on the adjoining mainland. In its town hall are kept the flags of the battle of the Boyne. The bat¬ tle of 1689 between the forces of

James II and William III, in which William's forces were victorious, took place here. The noted regi¬ ment called Enniskillen Dragoons was first formed from the defenders of the town at this battle. The manufacture of cutlery, straw hats, shirts and collars and the tanning of leather are carried on here, and there are several steam sawmills. Pop. 4,847.

ENNIUS, Quintus, Latin poet: b. Rudiae, near Brundusium, 239 b.c. ; d. 169 b.c. When he was 38 Cato the Censor brought him to Rome, where he soon gained the friendship of the most distinguished men and instructed the young men of rank in Greek. With an extensive knowledge of the Greek language and literature he united a thorough acquaintance with the Oscan and Latin tongues and exerted great in¬ fluence on the last. He wrote an epic poem in hexameters, ˆnnales,. describing the history of Rome from the arrival of ˆEneas in Italy to the poet's own times; tragedies and comedies, satires, epigrams, precepts, etc., but nothing now remains except fragments given as quota¬ tions in other ancient authors, many of them mere citations by grammarians and other insig¬ nificant extracts. A few larger fragments have been preserved, which give a favorable im¬ pression of his genius.. His success in his own day was great. His poems were for a long period read aloud to admiring multitudes, and they were often quoted and referred to by the great writers of antiquity. Fragments of his works have been edited by Muller, L. (Saint Petersburg 1885) ;' Ribbeck, O., in (Scaeniae Romanorum Poesis Fragmenta) (Leipzig 1897); and Vahlen, J., (Leipzig 1854 and 1903). Con¬ sult Duckett, E. S., (Studies in Ennius) (in Bryn Mawr College Monographs, Monograph Series, Vol. XVIII, Bryn Mawr 1915) ; Knapp, C., (Vahlen's Ennius> (in American Journal of Philology, Vol. XXXII, p. 1, Baltimore 1911) ; Muller, L., (Der Dichter Ennius) (in Samm- lungen IVissentschaftlicher Vortraege, edited by R. Virchow, N. F. Ser. VIII, Heft 185, Ham¬ burg 1893) ; (Die Entstehung der Romischen Kunstdichtung) (ib. N. F. Ser. IV, Heft 92, Hamburg 1889) ; Postgate, J. P., (Corpus*

Poetarum Latinorum) (Vol. VI, London 1894) ;

Ribbeck, O., (Geschichte der Romischen Dich- tung) (2 vols., Stuttgart 1887-89) ; Vahlen, J., (Bemerkungen zum Ennius) (in Konigl. Preuss. Akad. der Wiss., Sitzungsberichte 1899, p. 266, Berlin 1899) ; (l)ber Ennius und Lucretius) (ib. 1896, Part I, p. 717, Berlin 1896) ; (t)ber die Annalen des Ennius (in Konigl. Preuss. Akad. der Wiss. Philos. Hist. Klasse, Abhand lungen 1886, Part I, Berlin 1886).*

ENNODIUS, Magnus Felix, a Latin Church father: b. at either Arles or Milan about 473; d. Pavia, 17 July 521. He early became an orphan. When the Visigoths invaded Italy he was sent to an aunt in Milan who educated him. After her death he married a wealthy woman and lived in

lavish fashion. A severe illness made such a deep impression upon him that he entered the priesthood and his wife became a nun. In 496 he went to Rome and soon became a noted man. He was the first to give the Bishop of Rome the name of Pope. In 511 he succeeded Maximus as Bishop of Pavia. Twice he was sent as a messenger to the Emperor Anastasius with the plan of reuniting the East¬ ern and Western Churches. His writings in¬ clude a (Life of Epiphanius) and several theo¬ logical treatises. He is said to have written in favor of the freedom of the will. His writings have been published in Basel 1569, Tournay 1610, Paris 1611, and also in Migne, (Patrol-ogia Latina) (Vol. LXIII).

ENNS, ens, river in Austria, has its rise in the Alps of Salzburg, flows east-northeast and then takes a northwesterly course, discharging into the Danube near Mauthausen. Length about 160 miles. Through part of its course it forms the boundary line between Upper and Lower Austria.

ENOCH, Hebrew patriarch. He became the father of Methuselah at the age of 65 years ; and we are told that he (

ENOCH, Books of. According to Gen. v. 21-23, Enoch lived 365 years, and he walked with God and disappeared, for God took him. He is supposed to be identical, with the seventh of the 10 antediluvian kings in Berosus (Eue-dorachus), the Enmeduranki of K 2486, 4364, the seventh king in the Sumerian list discovered by Pcebel (Babylonian Publications of the Uni¬ versity of Pennsylvania, VI, Philadelphia 1913). Enmeduranki, like Enoch, was called into com¬ munion with the gods and initiated into the mysteries of heaven and earth. If the number 365 indicates the original solar character of Enoch, the story is likely to have been derived from a Babylonian or Amorite version in which the regnal years had not been brought into the chronological system found in Berosus. The opportunities of this world-wanderer for ob¬ serving celestial phenomena, reading the heav¬ enly tablets and foreseeing the future naturally invited speculation. He became the inventor

of writing, mathematics and astronomy, and the forerunner of Dante as an explorer of heaven and hell. Alexander Polyhistor in the time of Sulla found him referred to by a writer as hav¬ ing learned astronomy from the angels (Euse¬ bius, (Praeparatio evangelica> ix, 17, 8). With the growth of angelology the interest cen¬ tred on the fate of the ((sons of God" who had married the ˆdaughters of men" (Gen. vi, Iff.), while the concern about the future of sinners and saints on earth and in the other world- de¬

manded authoritative revelations. None was better fitted to impart information on these things than the translated patriarch.

The writings ascribed to Enoch do not seem to have been generally accepted as canonical at any time, either by Jews or Christians. In some circles, however, they have been regarded as authentic and cherished as sacred books. From references in the book of Jubilees and the earlier stratum of the Testaments of the Twelve Patriarchs it may perhaps be inferred that some of them belonged to the 70 hagiographa, men¬ tioned in 4 Ezra xiv, 46, which were not in¬ cluded in the finally adopted Palestinian canon. There is one direct quotation in the New Testa¬ ment: The epistle of Jude (vs. 14) cites a pas¬ sage from one of the books of Enoch in such a manner as to show that it was considered a genuine utterance of the patriarch and an in¬ spired prophecy. In the epistle of Barnabas an¬ other passage is quoted as ˆScripture," Tertul- lian defended the authenticity and sacred char¬ acter of the book known to him and maintained that the Jews rejected it because it referred prophetically to the Lord, having probably in mind the passage cited by Jude. Clement of Alexandria also quotes the book with confi¬ dence. Origen charges Celsus with not having read the book of Enoch whence his statement concerning the angels was taken, and not being aware that the books ascribed to Enoch were not universally accepted as divine in the churches. Anatolius of Laodicea quoted a pas¬ sage simply to show the character of the Jewish calendar, but Zosimus of Panopolis refers to the books as <(ancient and divine scriptures." Jerome rejected the book of Enoch as apocry¬ phal ; Augustine took the same position ; and it is counted among the Apocrypha by the Apos¬ tolic Constitutions (5th century), Pseudo Athanasius, Nicephorus' ˆtichometria' (1500 or 4800 stichi), and the Undex LX librorumP The parts copied by George Syncellus (c. 790) may have been drawn from Pandorus of Alex¬ andria; but the manuscript found at Panopolis seems to have been written later than the 8th century. Many writers, from 4 Ezra and 2 Peter to George Cedrenus in the 11th century, who do not mention the name of Enoch, show an acquaintance either with the book itself or with its characteristic ideas, notably that of the fall and punishment of the angels.

In Abyssinia the book of Enoch has main¬ tained its position in the canon before the book of Job to the present time, not only among the Christians, but also, according to the testimony of Bruce, among the Jews whose Ethiopic text, however, has not yet been examined. To what extent another book ascribed to Enoch, pre¬ served in the Slavonic Church, was regarded as canonical cannot be determined. The He¬ brew Enoch, though quoted by many mediaeval Jewish writers, does not seem to have been con¬

sidered by them as a part of the canon. Ven¬ erable Bede (died 735) thought that the book of Enoch merited to be counted among the sacred

scriptures because of its authority, age and use, but especially because of the testimony of Jude. William Whiston defended the canon- icity of the book known to him through Syn¬ cellus, and William Murray regarded the nu¬ cleus of the Ethiopic Enoch as genuine and in¬ spired. The Roman Catholic Church reckons the books ascribed to Enoch among the Apoc¬ rypha of the Old Testament, while manv Prot¬ estant scholars, who give this name to the deu- tero-canonical books of the Old Testament, des¬ ignate them as Pseudepigrapha, a term first used by Jerome in regard to the Wisdom of Solomon and the Epistle of Jeremiah. Un¬ identified quotations indicate that all the Enoch literature has not yet been discovered. The three extant works are generally called the Ethiopic, Slavonic and Hebrew Enoch, because of the languages in which they first became known, in their full extent, to modern scholars.

Ethiopic Enoch. — Whether Pico della Mi- randola possessed a manuscript of this book is still uncertain. According to Fabricius, it was stated by many, on the testimony of Reuchlin, that he had purchased a copy of it for a large sum of money. In Reuchlin's treatise, (De arte cabalistica) (1517), Simon does not question the possible survival of some such books as that of Enoch, but declares that he cannot af¬ ford, like Mirandola, to buy at great expense the 70 books of Ezra. Mirandola himself speaks of his purchase and indefatigable study of these books, both in his (Apologia, > written in 1489, p. 178, and in (De hominis dignitateP p. 330. A description of his cabalistic codices was given by Gaffarel in 1651 (reprinted in Wolf, (Bibliotheca hebraicaP I, 1 71 5) ; in the first manuscript, ascribed to Recanati (13th century), there are some extracts from the He¬ brew Enoch. This may have given rise to the rumor. But Reuchlin refers directly to the book of Enoch in (De verbo mirificoP written in 1494 (Lyon 1552, pp. 92f). Here Sidonius lashes the gallows-birds who place splendid titles in front of the volumes they offer, falsely declaring that one is the book of Enoch, an¬ other the book of Solomon. It would seem, therefore, that Reuchlin had heard of a sepa¬ rate book of Enoch being offered for sale. Since Ethiopic texts were published as ((Chal- dsean" by Potken already in 1513 and Reuchlin knew in 1515 that Benignus had studied the ((Chaldic" letters used by Prester John, it is not altogether improbable that the book to which he referred 20 years earlier was the Ethiopic Enoch and that such a work may have drifted into Mirandola's library; but it may have been a Hebrew Enoch. There can be no question that Guillaume Postel before 1553 was shown a copy of the Ethiopic Enoch at Rome by an Abys¬ sinian priest and had its contents explained to him, as he refers to the Noachic interpolations. Gilles de Loches, a Capuchin missionary, who spent seven years in Egypt, reported to Peiresc that he had seen (c. 1630) this book in Ethiopic script and language, and gave the title correctly. Gassendi relates that Peiresc purchased an¬ other manuscript.

This was afterward found by Ludolf not to be the book of Enoch and it has not been published yet, though it contains the story of Enoch's birth. James Bruce se-

cured a copy of Ethiopic Enoch in Abyssinia in 1769 and brought to Europe three manu¬ scripts. A brief account appeared in Michaelis (Orientalische und Exegetische Bibliothek) (1774) ; a fuller account was given by Bruce himself in 1790. The text has been edited by Laurence (1838) on the basis of one manu¬ script; by Dillmann (1851) who had five manu¬ scripts; by Flemming (1902) who used 15; and by Charles (1906) who had at his disposal 23. Charles consulted 29 in his translation of 1912. None of these is earlier than the 16th century; even the oldest of them inspire no very great confidence, and all have manifestly suffered much in transmission. Of the Greek text the fragments preserved in Syncellus, viz., vi-x, 14; xv, 8-xvi, 1, and viii, 4-ix, 4 in duplicate, were first published by Scaliger (1609), then by Goar in the editio princeps of the Chrono- graphia (1652), by Fabricius (1713), Dindorf (1829) and recent editors of Enoch. A frag¬ ment, containing lxxxix, 42-49, was published by Mai (1844) and Gildemeister (1855). A larger part, including i-xxxii, 6 and xix, 3-xxi, 9 in duplicate, was discovered at Panopolis (mod¬ ern Akhmim) in 1886-87 and published by Bou- riant (1892-93), Lods (1892) with a French translation, Dillmann (1892), Charles (1893) and Radermacher (1901). A fragment of a Latin translation, cvi, 1-18, was published by Charles (1893) and James (1893).

Already Grotius, familiar only with the Syncellus fragments, expressed the opinion that the book of Enoch originally was small, but grew gradually by expansion. Laurence (1821) pointed out some of the more obvious Noachic sections, and de Sacy (1822) suspected Chris¬ tian interpolations. Murray (1836), who con¬ tended for a genuine nucleus, recognized among the extensive later additions several dis¬ tinct books and assigned a separate authorship to lxxii-lxxxii. Bruno Bauer (1841) main¬ tained that there were several authors and es- \ pecially that xxxvii-lxxi formed a book inserted 1 in the larger volume. Dillmann (1853) as¬ sumed a different authorship for cvi-cvii and cviii and a number of interpolations. Sieffert (1867) argued a distinct origin for lxxxiii-xc. Through the studies of Krieger (1845), Ewald (1854) and Hilgenfeld (1857) the marked dif¬ ference between xxxvii-lxxi and the rest of the work became generally recognized ; and through the analytic work of O. Holtzmann (1888) and Charles (1893) wide currency was given to the view that the volume is made up of five distinct books by different authors, viz.,

1, i-xxxvi ; 2, xxxvii-lxxi; 3, lxxii-lxxxii; 4, lxxxiii-xc; 5, xci-cv, and two shorter ap¬ pendices, cvi-cvii and cviii. This division is indeed largely suggested by sub-headings in the text itself. But within each of these books a lack of unity has also been felt by critics and it has been explained either by accretion or by compilation. It is thought that an original work has been expanded in the course of trans¬ mission, or a compiler is supposed to have pieced it together from various sources. The earlier and more widely accepted theory is that of accretion, but in recent years several schol¬ ars have favored a documentary theory similar to that now in vogue in Pentateuchal criticism. It is therefore proper to consider the composi¬ tion as well as the date and original language of each book separately.

Book I unquestionably contains some dis¬ parate elements. It is likely to have begun originally in vi, 1, since i-v seems to be a gen¬ eral introduction to a larger volume which, however, did not as yet include xxxvii-lxxi. While xvii-xix and some other passages appear to be interpolations, the attempt to explain the seemingly identical roles of Semyaza and Aza- zel by the compilation of two documents is less convincing. The idea of a Greek original has no- defender to-day in the case of this or any other part of Ethiopic Enoch. Those who have made a special study of the subject are sub¬ stantially agreed that Book I was written in Aramaic from which it was translated into Greek. As the descriptions of the fall of the angels, Enoch's mediation and his celestial journey give no clear , indications of date; the relation to Book IV, which evidently is some¬ what younger, must decide. Some scholars have thought of the period preceding the Maccabean uprising, the majority, on what would seem more adequate grounds, of the reign of John Hyrcanus (135-104 b.c.).

In Book II the outlines of a ground-plan are clearly discernible; inserted excerpts from a book of Noah are equally unmistakable in liv, 7-lv, 2 ; 1 ; and lxv-lxix, 25. That the re¬ mainder is not a Joseph's coat without seams, as it was once called, is now universally ad¬ mitted. But while some recent critics, like Ap¬ pel and Gry, assume a compilation of different documents, one designating the celestial guide as ((the angel who went with me,® another as <(the angel of peace,® and a third being particu¬ larly interested in wisdom, most scholars have resorted to the theory of more or less exten¬ sive interpolations. Some have been satisfied with indicating as such xli, 3-8 ; xliii ; xliv ; lix ; lx; lxx $ lxxi. Others, like Bruno Bauer, Bottcher, Drummond, Pfleiderer, De Faye and Bousset, have looked upon all the passages re¬ ferring to the Messiah as Christian interpola¬ tions. In the case of these Schmidt thinks of successive expansions, first by Jewish, and then by Christian hands. The idea of a Christian origin of the Parables, held by Hilgenfeld, Vernes, Kuenen, Tideman, Stanton, Konig and Cornill, is no longer advocated. As to the original language there is still a decided differ¬ ence of opinion between the two scholars who have published the

results of special investiga¬ tion upon this point ; Charles thinks that it was Hebrew, Schmidt that it was Aramaic. The former assumes that the Ethiopic was made from a Greek version, in which the New Testa¬ ment term for the <(Son of Man® was uni¬ formly used, by an Aramaic-speaking Jew who rendered it in three different ways, correspond¬ ing to three Aramaic expressions. The latter thinks that the absence of even the slightest sign of acquaintance with this particular book in patristic literature throws doubt upon the existence of a Greek version, and in any case deems it probable that the translation was made by an Aramaic-speaking Jewish Christian who used two other terms besides the one uniformly employed in the New Testament, because he found three expressions for (

supposed to be Alexander Jannaeus and the Sadducees. It is difficult, however, to see how they could be charged with putting their ((faith in the gods they have made with their own hands" (xlvi, 7) ; and many scholars have con¬ sidered it more natural to understand the phrase as referring to pagan rulers. If Roman emperors and governors are meant, the time of Gaius Caligula (37-41 a.d.) is more likely than that of Herod the Great. A Jewish expansion in the time of Domitian is not improbable; and it is significant that those ideas and expressions which have their closest counterparts in the Gospels and present the Messiah in a more transcendent character than is found anywhere in Jewish literature, fit very loosely in the con¬ text and are connected with a title which even in the Gospels appears to be a translation, not of a Greek, but of a Christian Aramaic original.

Book III, dealing with astronomy, has no doubt a few interpolations. The endeavor to prove that it is a compilation of four documents dovetailed into one another does not seem to be called for by the facts. If Jubilees was written in Hebrew, as is probable, this book may have been written in the same language. Like Jubi¬ lees and Slavonic Enoch, it advocates a solar year of 364 days ; it is quoted in the former work (iv, 17, 21) and may be dated c. 110 b.c. The author makes the longest day of the year 16 hours, which led Laurence and Murray to infer that his home was near the Caspian or the Black Sea ; and Martin thinks that it may in¬ dicate the use of a , document written in the latitude of Constantinople. It is possible that the writer reflected upon the length of the day in the region where he supposed the antedilu¬ vians to have lived. In Book IV there are some obvious additions. The original language is supposed to be Aramaic. In the historic vision the 70 shepherds are no longer conceived of as either native or foreign rulers, but as angels; yet it is admitted that the four periods of

their domination represent the Chaldaean, Persian, Ptolemaic and Seleucid kingdoms, and the great horn in xc, 9, is assumed to refer either to Judas Maccabaeus or John Hyrcanus. The lat¬ ter is more probable, and the date is likely to be c. 108 b.c. Dislocations and interpolations are also found in Book V. It may have been writ¬ ten in Hebrew in the 1st century b.c. Not much later the two appendices seem to have been penned in the same language. The first of them has been assigned by some scholars to the Noachic stratum ; others have surmised for it an independent Essene origin. Recent critics have been inclined to ascribe to the 2d century b.c. the book of Noah, from which excerpts have been copied in the book of Enoch ; this is doubtful, and some of the appropriated pas¬ sages may have been interpolations in the Noah apocalypse.

The influence of Babylonian, Persian and Greek speculation, mythical and scientific,. upon this literature is unmistakable, though it has occasionally been exaggerated. It reveals the growing conceptions of angels and demons, heaven and hell, the Messiah and his kingdom, the last judgment and the resurrection, in the generations immediately preceding the appear¬ ance of Jesus. If the original of the Parables could be found, or the later accretions removed with a high degree of certainty, the actual ap¬ proach to the Christology of the New Testa¬

ment might be determined with greater assur¬ ance than now is possible. The eschatological notions seem to have been in a fluctuating state. There is nowhere a clear allusion to a resurrec¬ tion of the body; immediately after death spirits pass to their destiny of joy or suffering and appear to be clothed with a spiritual body ; yet a final judgment is emphasized, and at least in Book I a return to terrestrial life seems to be contemplated. The work as a whole pre¬ sents numerous problems that cannot be solved until the Semitic original is recovered.

Slavonic Enoch. — This book was first pub¬ lished by A. Popov in 1880 from a manuscript written in 1679 in a South Russian dialect under the title (The Book of the Secrets of Enochs In 1886 Sokolov found at Belgrade a Bulgarian manuscript of the 16th century representing the same recension. Novakovic published in 1884 a Serbian manuscript of the 16th century, found at Belgrade, representing a different recension. Of the same type are a manuscript in Vienna of the 16th century, one of the 17th owned by Barsov in Moscow, and a number of frag¬ ments, some as old as the 14th century, pub¬ lished by Tichonravov, Pypin, and Popov. It has become customary to designate the former recension, which is longer, as A, the latter as B. Of A an English translation was made by Morfill (1896) ; Bonwetsch gave a German ver¬ sion of both A and B (1896) ; excerpts of A were rendered into Latin by Szekely (1913) ; and both A and B were translated into Eng¬ lish by Forbes (1913). Charles, Bonwetsch, Harnack,

Schtirer and Szekely have looked upon A as a faithful translation of the Greek text and B as an abbreviated copy of the Sla¬ vonic translation, and have therefore concluded that the author was an Alexandrian Jew writ¬ ing his work in Greek. Charles indeed main¬ tains that some parts may originally have been written in Hebrew, since he thinks they are quoted in the Testaments of the Twelve Patri¬ archs, but deems it impossible to separate them from their context. Unfortunately, none of the nine passages in that work in which Enoch is quoted can be regarded as having come from this book, as Schiirer has shown. But Schmidt has pointed out that practically every passage cited to prove either familiarity with the Greek version of the Bible or acquaintance with Hel¬ lenistic thought is absent in B. He does not consider it possible that a Christian Slav, living in the 10th or 11th century, could have pos¬ sessed such a marvelous knowledge of the ten¬ dencies of thought among the Alexandrian Jews, or could have had any motive for exer¬ cising his skill in the removal of every touch of Greek influence.. But if A represents an Alexandrian expansion . of a Greek text still free from the peculiarities indicating a local origin, the latter may well be a translation of a Hebrew or Aramaic book written in Palestine at some time between 50 b.c. and 70 a.d. Other books of Palestinian origin are equally .silent, concerning the Messiah and a physical resur¬ rection. The interest in a solar year of 364 days (xvi, 5 B) may point to a period not very long after Eth. Enoch lxxii-lxxxii and Ju¬ bilees ; the later Greek recension A has a year of 365T/4 days (xiv, 1; xvi, 5). A few Chris¬ tian interpolations have been suggested, espe¬ cially by Schiirer and Szekely. Those worthy of consideration, such as the statement concern-

ing the pre-eminence of the eighth, i.e., the first day (xxxiii, 1, 2), the prohibition of oaths in very nearly the words of Jesus (xlix, 1, 2) and the condemnation of sacrifices (xlv, 3), are found in the longer recension. The counsel not to requite evil (1, 4) need not be Christian. But in the ethics of the original work there is an unmistakable approach to the teachings of Jesus. Origen knew this work as a part of his Greek hook of Enoch, and refers to the descriptions in xxiv, 2, and xlvii, 3. It reveals no acquaint¬ ance with Eth. Enoch xxxvii-lxxi.

Hebrew Enoch. — During the Middle Ages a book of Enoch written in Hebrew was quoted by many Jewish writers. It may have been of this work that Pico della Mirandola and Reuchlin had a vague knowledge through ex¬ cerpts or some longer manuscript. Drusius called attention to two quotations in the book of Zo'har (13th century). A list of quotations in Menahem Recanati, Hekaloth, Maase Bereshith, Pirke de Rabbi Eliezer,

and Rasiel has been given by Jellinek. This scholar pub¬ lished in 1873 from a Munich codex the (Sefer Hekaloth or Book of Enoch. > It was an in¬ complete edition, but could be supplemented by the (Sefer Hekaloth of R. IshmaeV pub¬ lished at Lemberg, in 1864. An unedited manuscript is in the Bodleian Library at Ox¬ ford. A critical edition and a translation are needed. Brief descriptions have been given by Buttenwieser and Charles. The book tells of the ascent of Rabbi Ishmael to heaven where he receives a series of revelations from the angel Metatron (Lat. metator — guide), with whom Enoch has been identified. Various parts of Ethiopic and Slavonic Enoch are used by the author, though there is no trace of the characteristic ideas of the Parables. An apoca¬ lyptic fragment, preserved in the

Bibliography. — I. Translations, with com¬ mentary, in Latin, by Silvestre de Sacy, in Magasin encyclopedique (Paris 1800, Chaps, i- xvi, xxii, xxxi) ; Gfrorer, A. F., in (Prophetse Veteres PseudepigraphP (Stuttgart 1840) ; and Stephan Szekely, in (Bibliotheca Apocrypha } (Freiburg 1913, extensive excerpts) ; in English, by Richard Laurence (Oxford 1821; later edi¬ tions 1833, 1838, 1883) ; Schodde, G. H. (An¬ dover 1882); Charles, R. H. (Oxford 1893; 2d ed., 1912) ; in German, by Hoffmann, A. G. (Jena 1833-38) ; Clemens, Richard (Stuttgart 1850) ; Dillmann, A. (Leipzig 1853) ; Beer, G. (Tfityngen 1900) ; Flemming, J., and Rader-macher, L. (Leipzig 1901) ; in French, by Bru¬ net, G., in Migne dictionnaire des Apocryphes) (Paris 1856) ; Lods, A., of the Greek text (ib. 1892) ; and Martin, Francois (ib. 1906) ; in Russian, by Smirnov, A. (Kasan 1888) ; and in Hebrew, by Goldschmidt, L. (Berlin 1892). Introductions by Zockler (1891) ; Konig (1893) ; Comely (1894) ; Cornill (1896) ; Strack (l898) ; Bertholet (1906); Steuernagel (1912); Sellin

(1914) ; Mirandola, Pico della, dpera Omnia (Basel 1572) ; Reuchlin, J., de arte cabalistica) (Hagenau 1517; appended to Galatin, de arcanis catholicae veritatis,* Ortona 1518, and to Mirandola, op. cit.) ; Postel, G., de originibus) (Basel 1553) ; Scaliger, (Thesaurus temporunP (Geneva 1609) ; Drusius, J., de patriarcha Henoch* (Frankfort 1615) ; Gassendi, P., de vita Peirescii* (Paris 1641); Ludolf, J., (His- toria sethiopica* (Frankfort 1681) ; Fabricius, J. A., dodex pseudepigraphus Veteris Testa-mentP (Hamburg 1713) ; Calmet, A., dis¬ sertation sur le livre d'FIenoch* (Paris 1720) ; Whiston, W., (A Collection of Authentick Records) (London 1727) ; Bruce, J., travels to Discover the Source of the Nile* (London 1790) ; Sacy, S. de, in Journal des Savans (Paris 1822) ; Murray, E., (Enoch Restitutus) (London 1836) ; Bauer, Bruno, (Kritik der evangelischen Geschichte* (Leipzig 1841) ; Krieger, E., deitrage zur I^ritik* (Nfirnberg 1845) ; Lficke, F., dinleitung in die Offenbarung Johannes) (2d ed., Bonn 1852) ; Ewald, H., (Abhandlung fiber des athiopischen Buches Henokh Entstehung) (Gottingen 1855) ; Hilgen- feld, A., die jfidische Apokalyptik) (Jena 1857) ; Siefifert, F., de apocryphi libri Henochi origine*

et argumento> (Konigsberg 1867) ; Philippi, F., das Buch Henoch (Stuttgart 1868) ; Halevy, J., in Journal Asiatique (Paris 1867) ; Vernes, M., distoire des idees mes- sianiques) (Paris 1874) ; Tideman, A., in Theologisch Tijdschrift (Leiden 1875) ; Drummond, J., (The Jewish Messiah* (London 1877) ; Deane, W. J., (The Pseu*depigrapha) (London 1891) ; Bousset, W., die Religion des Juden- tums) (Berlin 1903) ; Appel, H., die Kom- position des athiopischen Henochbuches> (Gfitersloh 1906) ; Burkitt, J. C., in Journal for Theological Studies (Cambridge 1907) ; Schmidt, N., (The Original Language of the Parables of Enoch) (Chicago 1908) ; Gry, L., in Le Muse on (Louvain 1908—10) ; Lagrange, T., (Le messianisme* (Paris 1909) ; Schfirer, E., deschichte des jfidischen Volkes) (4th ed., Leipzig 1909) ; Charles, R. H., in did Testa¬ ment Apocrypha and Pseudepigrapha) (Oxford 1913). II. Morfill, W. R., and Charles, R. H., (The Book of the Secrets of Enoch) (Oxford 1896) ; Bonwetsch, N., das slavische Henoch- buch) (Berlin 1896) ; Schfirer, deschichte des jfidischen Volkes* (Leipzig 1909) ; Forbes, N., and Charles, R. H., in did Testament Apocry¬ pha and Pseudepigrapha* (Oxford 1913) ; Szekely, S., in (Bibliotheca Apocrypha) (Frei¬ burg 1913) ; Schmidt, N., (The Two Recensions of Slavonic Enoch* (in Journal of American Oriental Society, New Haven 1918). III. Jel¬ linek, A., (Beth ha Midrasch* (Vienna 1853-78) ; Buttenwieser, M., (Apocalyptic Literature) (in (Jewish Encyclopedia,) New York 1901) ; Charles, R. H., ˆhe Book of Enoch * (Oxford*

1912).

Nathaniel Schmidt,

Professor of Semitic Languages and Literature , Cornell Un ive rsi ty .

*ENOCH ARDEN. Tennyson's (Enoch Arden, * a narrative in 911 lines of blank verse, is one of the most popular poems of modern times. Sixty thousand copies of it were sold soon after its publication in 1864 and translations appeared in seven foreign lan¬ guages. The story itself was $uch as to make*

a wide appeal, blit the poet enhanced its power. He describes the life and scenery of an English fishing village and a sailor s exile on a tropic island with elaborate, vivid detail and genuine feeling. He shows also the strength and purity in humble English folk, as he imagines them ; of certain simple, universal, if restricted, ideals of family life as seen in his hero's aspirations

for his children and in his self-sacrifice when, returning from long absence to find that he has been thought lost at sea and his wife happily remarried, he refrains from disclosing himself. The story, as distinct from the setting, is pre¬ sented with studied, almost prim, simplicity, but with narrative effectiveness, to be seen, for in¬ stance, in Enoch's silent, self-effacement after beholding Annie at the hearth with Philip and her children. False sentiment appears, perhaps, in Enoch's making sure that his wife shall know of his return after his death and in the author's emphasis upon the costliness of his hero's funeral. There is weight too in Bagehot's criticism that the poem is an example of ornate rather than pure art, concealing lack of truth to facts under beautiful but irrelevant details. Nevertheless, (Enoch Arden1 holds its place as one of the loveliest descriptive and idyllic poems in English.

William Haller.

ENOCK, C. Reginald, English mining ex¬ pert and author: b. 23 Nov. 1868. He has spent many years in various countries in professional work and in the investigation of natural re¬ sources, especially in North and South America, and of the British empire. He has carried out scientific work for the governments of Peru and Mexico ; has given papers and lectures be¬ fore the Royal Geographical Society, the Royal Society of Arts, etc. He has taken an active interest in the work of economic reform. His publications include (The Andes and the Ama¬ zon1 (4th ed., 1910) ;

ENOMOTO, Buio, boo'd, Japanese states¬ man: b. Tokio 1839; d. 1909. He was educated in Europe, and returning to Japan in 1867 be¬ came the first president of a republic which he established in the island of Yego, but was ousted by the Japanese army in 1869. After imprisonment for two years he was appointed vice-admiral in the Japanese navy 1874. He served as Minister Plenipotentiary to Russia and became a member of the Council of State and Minister of Education 1888, Minister of Foreign Affairs 1891 and Minister of Agricul¬ ture and Commerce 1892, which office he held for four years.

ENOS, a'nos, Greece, town on the north coast of the 2Egean, 70 miles south by west of Adrianople. Its harbor is commodious, but much neglected and too shallow for deep-sea vessels. The trade, formerly of importance, has greatly decreased, Enos having been super¬ seded as an export centre by the adjacent sea¬ port of Dedeagatch. The town is the see of a Greek archbishop. Homer attests its antiquity

by alluding to it the Uliad1 (IV, 519). Pop. 7,000, principally Greeks.

ENRIQUEZ GOMEZ, en-re'keth go'meth, Antonio (properly Enriquez de

Paz), Spanish poet; son of a converted baptized Portuguese Jew: b. Segovia early in the 1 7th century. He entered the army in his 20th year and rose to the rank of captain ; but in 1636 fled to Amsterdam, and, having there professed the Jewish faith, was in 1660 burned in effigy at a Seville auto-da-fe. The date of his death is not known. Besides 22 comedies, some of which passed as Calderon's (q.v.), he wrote a number of other works, both in prose and verse: (La Vida de Don Gregorio Guadana1 (1644) ; (La Culpa de Primer Peregrino1 (Rouen 1644) ; (E1 Siglo Pitagorico1 (Rouen 1647) ; (E1 Samson Nazareno1 (Rouen 1647) ; (Las Academias Morales de las Musas1 (Mad¬ rid 1660). The first of these, his lyric poems, and two of his dramas have been republished in (Biblioteca de Autores Espanoles1 (Vols. XXXIII, XLII, XLVII, Madrid 1846-80). Consult Fitzmaurice-Kelly, J., (A History of Spanish Literature1 (London 1898) ; Ticknor, G., (History of Spanish Literature1 (3 vols., Boston 1872).

ENROLMENT, an entry on a public register. In England this term denotes the registration of recognizances, deeds of sale, etc., on the rolls of chancery or of the ordinary courts, or by a clerk of the peace on the records of a court of Quarter Sessions. The term in this sense dates from the enactment in 1536 of the Statute of Enrolments, designed to prevent the practice of secret conveyances and requir¬ ing as a condition of their validity that they be enrolled or recorded, within six months of their date, in the manner prescribed by the act. See Conveyance; Registration of Property Titles.

ENS. See Enns.

ENSCHEDE, en-ska-da', Johannes, Dutch printer: b. Haarlem 1708; d. 1780. He re¬ ceived his education at Leyden and in due time became head of the printing firm which his father had established. He introduced the type known as Holland Gothic and did much to fur¬ ther the art of printing. In 1768 his firm issued the (Proef van Lettern,1 specimens of printing types. His firm is still in business in Haarlem.

ENSCHEDE, Holland, town in the prov¬ ince of Overyssel, 30 miles east-northeast of Zutphen. Rebuilt since its destruction by fire in 1862, it has large yarn- and cotton-mills, iron products, print goods and electrical machinery. Pop. 35,448.

ENSEMBLE, all the parts of a thing taken as a whole, or the general effect produced by them. Thus the word is used to designate the general effect of a drama, opera or picture.

ENSENADA, en-sa-na'da (Spanish, a creek, cove or bay). (1) Seaport of Argentina, in the • province of Buenos Aires It is the port of La Plata and is

about 40 miles southeast of Buenos Aires. (2) Seaport of Mexico, in the northern part of Lower California, on the Pa¬ cific coast, at the head of the Bay of Todos los Santos, about 50 miles south of the border and 70 miles southeast of San Diego, Cal. It has some few local manufactories and is the seat of a United States Consul. Pop. 2,170.

ENSIGN, Orville Hiram, American elec¬ trical and mechanical engineer: b. Ithaca, N. Y., 8 July 1863. He was educated at Cornell University. From 1882 to 1890 he served as machinist at Ithaca, Schenectady and New York, after which he was engaged as consulting engi¬ neer to several public service companies in Los Angeles and vicinity. In 1897 he became super¬ intendent and chief engineer of the Southern California Power Company, and in this capacity planned and constructed the first successful 30,000-volt long-distance transmission in the world, and when this company was merged with the Edison Electric Company he became super¬ intendent and chief electrical and mechanical engineer until 1904, when he was appointed chief electrical and mechanical engineer of the United States Reclamation Service and of the Los Angeles Aqueduct.

ENSIGN, the flag or colors of a regiment, in England, consisting of a field of white, blue or red, with the union in the upper corner, near the staff. Of naval ensigns the white flag is confined to the royal navy, the red to the merchant service, the blue to the naval reserves. In the American navy the ensign is the national flag, and it is also flown by the merchant serv¬ ice. In England, up to 1871, the lowest grade1 of commissioned officers in a regiment of in¬ fantry, by the senior of whom the regimental ensigns or colors were carried. The corre¬ sponding rank in a cavalry regiment was cornet. The name is now abolished, the title of 2d lieutenant being substituted for it. Also the title of the lowest grade of commissioned offi¬ cers in the United States navy, which they receive on graduation from the Naval College. In the 16th century ensign was corrupted into ancient and is so used in Shakespeare, and was at that time applied in the two senses of a flag and the bearer of a flag. See Flag.

ENSIGN STAL'S TALES (Fanrik Stals Sagner). The best known work of Johan Ludvig Runeberg, the greatest Swedish poet of Finland ; appeared in two parts, the first in 1848 and the second in 1860. Most of the poems are narratives and relate incidents from the war of 1808-09, when the Finns tried in vain to stem the Russian invasion. The poems cele¬ brate the heroes of this struggle and present scenes of great dramatic power. The first poem, entitled (Vart land (Our Country), is highly lyrical and has become the national hymn of Finland. The tales form a connected whole, even if the person of the ensign often steps behind the scenes. Although arranged*

rather loosely and without strict chronology they all refer to the war, and they all have the same general theme. This theme is love of country. Runeberg was inspired with a profound love for his native land and for its history, and was charmed by its natural beauty. In his poems he lauds the patriotism, the self-sacrifice and devotion of the men and women who suffered and died for Finland. (Ensign Stabs Tales) are imbued with sound humor. While the background throughout is the deeply tragic struggle in a hopeless cause, humorous touches, artistically interwoven, relieve the strain. Con¬ sult Estlanderg, C. G., (Runeberg's Skaldskap1 ; Wrangel, Ewert, (Om Fanrik Stabs sagner* ; Lagus, Ernst, (Forklaringar till Fanrik Stabs sagner. > J. Alexis.*

ENTAIL

ENSILAGE, en'si-laj. See Silage.

*,ENSTATITE, Mg Si 03, a silicate, chiefly of magnesium, but also containing more or less iron and aluminum. The mineral commonly oc¬ curs in massive or fibrous forms, but distinct crystals, prismatic in habit and belonging to the orthorhombic system, are also occasionally found. Its color varies; it may be white, green¬ ish or brown. Its hardness is 5.5, and its spe¬ cific gravity about 3.2. Enstatite is a common constituent of peridotites, crystalline schists and meteorites, and is also associated with certain serpentines. It belongs in the pyroxene group, is insoluble in hydrochloric acid and before the blow-pipe it fuses only along its thin edges. The name (Greek, ˆadversary**) refers to these refractory qualities. It is found in Putnam County, N. Y., Bavaria, the Harz Mountains, Moravia and Tyrol.*

*ENTABLATURE, in architecture, the hori¬ zontal, continuous work which rests upon a row of columns and belongs especially to classical architecture. It consists of three principal di¬ visions, the epistyle or architrave immediately above the abacus of the column, next the frieze, and then the cornice. In large buildings pro¬ jections similar to and known also as entabla¬ tures are often carried round the whole edifice or along one front of it. Consult Boetticher, K. G. W., (Die Tektonik der Hellenen) (Berlin 1874) ; Flirt, A. L., (Die Baukunst nach den Grundsatzen derAlten) (Berlin 1809) ; Kohte, J., (Die Baukunst des Klassischen Altertums, etc. * (Braunschweig 1915) ; Marquand, A., (Greek Architecture* (New York 1909) ; Uhde, C., (The Architectural Forms of the Classic Ages, etc.* (edited by R. P. Spiers, Berlin 1909).*

ENTADA, a genus of leguminous plants containing about a dozen species of climbing tropical shrubs, remarkable for the great size of their pods. E. scandens has pods which meas¬ ure from six to eight feet in length. The

seeds have a hard, woody and beautifully polished shell, and are often made into snuff-boxes, scent-bottles, etc.

ENTAIL, the settlement of an estate so that it shall pass according to a certain rule of descent. In England after the Norman Con¬ quest estates were frequently granted to a man and the heirs of his body, but in time the law courts interpreted such grants as conferring a fee-simple conditional, so that when the condi¬ tion, namely, the begetting of an heir, was ful¬ filled, the estate became a fee-simple absolute and could be alienated by the grantee. The statute (

to dispose of, for an estate in fee-simple abso¬ lute, or for any less estate, the lands entailed ; but a tenant-in-tail in remainder, expectant on an estate of freehold, cannot bar the entail, though he may bar his own issue, without the consent of the ((protector of the settlement,® who is usually the tenant for life.

ENTASIS, en'ta-sis, in architecture, the delicate outward curve of a column, found in perfection in the Doric column, by which an arc is described whose highest point is about mid¬ way between capital and base. This swelling of the column is intended to counteract the optical error by which a rigidly straight perpendicular line has a tendency to appear concave. The entasis is also calculated to suggest life and mo¬ tion in the column under the superimposed weight of the entablature. Consult Goodyear, W. H., (Greek Refinements > (New Haven

1912) ; Penrose, F. C., (An Investigation of the Principles of Athenian Architecture > (London

1851).

ENTELECHY, en-tel'e-ki, a Greek word meaning ((the bringing to completion,® in the peripatetic philosophy of Aristotle is the transi¬ tion or connecting action between what he calls 6vva[ug} potentially and epyovt actuality; that which, among the schoolmen, is conceived as intervening between the posse and the esse, for example, between the infinite possibilities of omnipotence in the Supreme Being and their manifestation in creation and active providence.

ENTELLUS MONKEY, a book-name for the langur (Semnopithecus entellus), the sacred monkey of Hindustan, representative of the god Hanaman. See Langur.

ENTELODONTS, a group of split-hoofed, swine-like animals of early Tertiary time, the giant pigs, represented in both the Old and New Worlds. In North America their fossil remains are found in rocks from Eocene to Lower Mio¬ cene age from New Jersey to the Rocky Moun¬ tains. The head was very long, the neck short, the body compact, the long spines of the dorsal vertebrae forming a decided hump on the shoul¬ ders, and in some the legs were very long and slender, giving a stilted appearance to the ani¬ mal. The teeth were large and strong, espe¬ cially the incisors and premolars (sharp cutting- teeth) and the canines were large but not de¬ veloped in formidable exterior tusks as in mod¬ ern wild boars. The brain-case was ((absurdly small,® says Scott; and ˆevidently these great pigs were profoundly stupid.® Beneath each eye was a long, descending, bony, process, and the lower jaw had in its under side two pairs of bony protuberances, which Osborn believes were for the attachments of the great, muscles needed in tearing up roots, which there is reason to believe formed their principal food (Brack¬ ett). The genus Dinohyus, of the Upper Oligo-cene of Nebraska, contained species six feet or more in height, and others were scarcely less. Consult Scott, {Land Mammals in the Western Hemisphere) (New York 1913).

ENTENTE CORDIALE (Fr., cordial understanding), a term commonly applied to the reconciliation, in 1904, between France and Great Britain after many years of enmity. In diplomatic language the phrase signifies a close friendship between two or more nations, though without any formal alliance existing between

them. See Alliances; Triple Alliance; Triple Entente.

ENTERALGIA, en-te-ral'ji-a. See Enter¬ itis.

ENTERIC FEVER. See Typhoid Fever.

ENTERITIS, an inflammation of the small intestine, the most important symptom of which is diarrhoea. Different varieties of enteritis are described as catarrhal enteritis, the acute entero¬ colitis of children, or cholera infantum, croup¬ ous enteritis, and enteritis due to tuberculosis, carcinoma, and other malignant diseases. In primary enteritis the symptoms may be acute or chronic, the most important single symptom being diarrhoea. The stools are thin and watery, and particles of undigested food may be found in them. There is usually colicky pain with gas, and occasional vomiting. Loss of appetite, thirst and dry tongue are usually present, but fever is not common. The general causes of catarrhal enteritis are improper food, particu¬ larly in children, unripe fruit, toxic substances, changes in the weather, and nervous influences bringing about changes in the character of the secretions and in the muscular activities of the walls of

the intestines. Infectious diseases may also be the cause of acute enteritis. Rest in bed, following a mild laxative such as calomel or castor oil, together with milk diet, will usually be sufficient treatment for the simple cases.

Acute enteritis of infants, known as cholera infantum (q.v.), is a much more serious disease. This is a form of dysentery, in which not only the small intentine but the large intestine also is involved, and the most active cause of this dis¬ ease is a specific micro-organism called the bacil¬ lus of Shiga. Treatment of acute enteritis of infants requires trained medical advice. The most important feature, however, in infants is to cut down the feeding, giving practically nothing but water for at least 24 to 36 hours. Horses, cattle and sheep, too, are subject to enteritis, and, unless properly and promptly treated, are apt to succumb to it. See Cholera Infantum; Colitis; Dysentery; Intestines — Diseases of.

ENTEROCLYSIS, a form of intestinal hydrotherapy of much importance. It consists in lavage of the intestines. The ordinary hot- water enema is the simplest form of enterocly- sis, but true enteroclysis consists in continuous irrigation with large quantities of solution, either with a single or a double tube. The effect of the introduction of large amounts of hot salt solution (a dram of common table-salt to a pint of water at a temperature of from 110° to 118° F.) is very marked. There is much increase in the tension of the pulse, and pro¬ nounced stimulation of the heart-action, both of prime importance in the treatment of hemor¬ rhage, shock, asphyxiation from drowning or from coal-gas poisoning, and of many forms of drug and industrial poisoning. Enteroclysis has also a marked effect in augmenting the se¬ cretion of the kidney, and proves of immense importance in the treatment of chronic uraemic poisoning, such as is seen in Bright's disease, and also in the treatment of diabetic coma. It is likewise of importance in bladder troubles, in colitis, in peritonitis, septic endocarditis, and in ulcerative conditions of the large intestine, such as are found in dysentery and in cholera.

Enteroclysis is also an excellent mode of treat¬ ing collapse in chronic alcoholism.

ENTERPRISE, The, the name of a number of American and English boats, the most famous of which was an American 12-gun schooner with such a brilliant career that she became known as the <(Lucky Little Enterprise.® Built 1799 to deal with the French privateers in the West Indies, she had an extraordinary cruise in 1800 under the command of Lieut. John Shaw: in a six months' run she took eight privateers, some of them much heavier than herself, and aggregating 47 guns, and also recaptured four American merchantmen. In

1801 she was sent under Lieut. Andrew Sterett with Captain Dale's squadron to the Mediter¬ ranean against the Barbary pirates, captured a 14-gun Tripolitan after a fierce engagement, and later was at the bombardment of Tripoli. In December 1801 she returned to the United States, but went back to the Mediterranean in

1802 under Lieut. Isaac Hull. In 1803 she was under the command of Lieut. Stephen Decatur (q.v.), who in December of that year captured with her the Tripolitan Mastico which later be¬ came famous in connection with Decatur's re¬ capture of the Philadelphia. Between 1805 and 1809 the

*Enterprise was in home waters. From 1809-11 she was once more in the Mediter¬ ranean, this time under Lieutenant Trippe. Her most memorable battle was during the War of 1812 and was fought with the English brig Boxer, Captain Blythe, on 5 Sept. 1813, off the Maine coast, toward Monhegan Island. By that time she had been converted into a brig, carried 16 guns and was under Lieut. William Burrows ; the Boxer had 14 guns. The crews were about 100 each. The fight began at 3 :20 p.m., and was ended at 4 by the surrender of the Boxer, literally cut to pieces in hull, masts, rigging and spars, several of her guns dis¬ mounted, boats and quarters shattered ; the Enterprise was almost uninjured, with but one shot in the hull and one in the main-mast. Both commanders were killed and were later buried side by side at Charleston. Burrows who had received his mortal wound during the progress of the fight was succeeded by Lieuten¬ ant McCall. After this heroic battle the Enter¬ prise, together with some other boats, cruised for some time in southern waters under Lieut- James Renshaw and there, even though she had lost much of her former speed by the structural changes made upon her, escaped at a number of occasions from English boats which were attempting to capture her. She then served until the end of the war as harbor guard at Charleston. From 1816-19 she was again attached to the Mediterranean squadron, this time under Lieut. Laurence Kearney. In 1821 she cruised in the West Indies and suc¬ cessfully broke up the pirates then swarming in those waters. In 1823 she was wrecked on Curagoa, but all hands were saved. A famous English boat bearing the name Enterprise was one of three masts which, under the command of Capt., later Adm., Richard Collinson, made, from 1850-55, one of the many unsuccess¬ ful searches for Sir John Franklin's ships in the Arctic. Consult Collinson, Sir R., (Journal of H. M. S. Enterprise > (London 1889) ; Hill, F. S., (Twenty-Six Historic Ships) (New York 1903) ; (The Romance of the American Navy**

(New York 1910) ; (The <(Lucky Little Enter¬ prise®; etc.) (Boston 1900); Maclay, E. S., (A History of American Privateers) (New York 1899) ; (A History of the United States Navy> (3 vols., New York 1902) ; Morris, C., (Heroes of the Navy in America) (Philadelphia 1907) ; Speers, J. R., (The History of Our Navy) (4 vols., New York 1897) ; (A Charmed American Warship) (in Harper's Magazine, Vol. CIV, pp. 927-936, New York 1902).

ENTFUHRUNG AUS DEM SERAIL,

ent-fiir'oong ous dam sa-ril', Die (II Seraglio). An opera by Mozart, which was produced for the first time at Vienna on 13 July 1782 and at New York in October 1862.

ENTHYMEME, in logic, the technical name for a syllogism of which either

one prem¬ ise or the conclusion is not expressed. For example, <(The Lusitania must have been steam¬ ing under 20 knots for it was torpedoed® — the unexpressed premise being <(A steamship steaming over 20 knots cannot be torpedoed.® See Logic.

ENTOMBMENT, The, a favorite subject of the painters of all the centuries has been this representation of the placing of Christ's body in the sepulchre. Of all perhaps the most famed is that by Raphael (1507), now in the Palazzo Borghese, Rome. The finest is that in the Louvre by Titian (1523). The Madrid Gallery has another Titian but it is inferior in concep¬ tion to that of the Louvre. Other representa¬ tions of this subject are those by Caravaggio, Tintoretto, Ferrari (Turin), Carracci (Louvre), Donatello (a sculpture group in the South Kens¬ ington Museum, London), and Van Dyck (in Antwerp).

ENTOMIS, a genus of fossil ostracods, having a vertical furrow along their shell valves. It is found in the Ordovician and Car¬ boniferous and all intermediate strata, espe¬ cially the Devonian. See Ostracoda.

ENTOMOLOGICAL SOCIETIES. Half

a century ago a single entomological society was all that had been organized in the United States, but at present there are probably up¬ ward of a score of organizations devoted to this science. The first entomological society of which we have record was formed in 1842. This was The Entomological Society of Penn¬ sylvania, which has long been out of existence. The American Entomological Society of Phila¬ delphia, founded in 1859 under the name of The Entomological Society of Philadelphia, and incorporated in 1862, published (Proceed¬ ings } until 1868, when the society name was changed and the publications became known as 'Transactions.* This, as well as some of the other societies that will be mentioned, is sup¬ ported by a permanent endowment fund, owns very extensive and valuable collections and a library, which are deposited with the Academy of Natural Sciences of Philadelphia, of which insti¬ tution its members are associate members of the entomological section. Under the combined aus¬ pices of these organizations there is now pub¬ lished Entomological News. The Entomologi¬ cal Society of Ontario publishes the Canadian Entomologist which began publication in 1868, though the society had a previous existence under the name of The Entomological Society of Canada. It is supported by an annual

ENTOMOLOGY

4m

government grant and the sale of its pub¬ lications. The Brooklyn Entomological Soci¬ ety was organized in 1872 and in 1888, while retaining a corporate existence, became merged in the Brooklyn Institute, forming the depart¬ ment of entomology of that institution. It pub¬ lished seven volumes of a (Bulletin) and six volumes of (Entornologica Americana. The Cambridge Entomological Club, founded at Cambridge, Mass., in 1874, publishes Psyche, a quarterly originally devoted largely to biblio¬ graphical and biological entomology. The same year The Entomological Club of the American Association for the Advancement of Science was formed. In 1884 The Entomological Soci¬ ety of Washington was organized, publishing Proceedings.* The Association of Economic Entomologists, as has previously been men¬ tioned, was established in 1889. Its (Proceed- ings) are published in the general series of bulletins of the Division of Entomology of the United States Department of Agriculture. In 1881 The New York Entomological Club began the publication of Papilio,* but at the end of its 4th volume its members joined the Brook¬ lyn Entomological Society. In 1892, however, another society was organized in New York as The New York Entomological Society. It was incorporated in 1899.*

In addition to these principal publishing en¬ tomological associations there are several other entomological sections of larger scientific soci¬ eties in Canada and in the United States. There are also local clubs or societies in various sec¬ tions, for example, in Newark, N. J. ; at Wil¬ liamsburg, N. Y. ; at Chicago, Pittsburgh and in San Francisco, the home of the California En¬ tomological Society.

There are many foreign societies, nearly all of the largest cities of Europe supporting one or more, usually holding titles significant of an entire nation, for example, there are entomo¬ logical societies of Belgium, France, Switzer¬ land, Russia, Italy and Germany, and others representing the cities of London, Berlin, Vi¬ enna and Stockholm. See also American En¬ tomological Society and consult Skinner, H. (ed.), Entomologists' Directory, containing the names, addresses, special departments of study, etc., of those interested in the study of insect life in the United States and Canada) (Phila¬ delphia 1904).

ENTOMOLOGY, the science which deals with insects. See Insects.

ENTOMOLOGY, Economic. Attacks by insects upon useful plants doubtless began with the first cultivation of plants; but it was not until the end of the 18th century that any means for mitigating their ravages were em¬ ployed beyond hand methods and other purely mechanical measures. A few crude efforts were made among the ancient farmers and fruit-raisers on the shores of the Mediterranean toward the suppression of insect pests and

Pliny even advised the use of white hellebore, one of the modern insecticides ; but it was at about the middle of the 19th century that insecticides (q.v.) or insect poisons began to be generally adopted, and the migration of the Colorado po¬ tato beetle from its native home in the Rocky Mountain region to the potato fields of the East was the indirect means of the employment of arsenical preparations as a means of destroy-

ing insects ; so that this insect, while an appar¬ ent curse, has proved, indirectly, of the great¬ est value to the agricultural community at large. Prior to the use of Paris green, which appears to have first been applied to this potato pest in Michigan in 1867, knocking the beetles from the infested plants into a pan of water was the only method of treatment and was used for many other insects as well. The discovery of the value of this poison as a remedy for the codling moth was made in 1878, by Prof. A. J. Cook, who used Paris green as a remedy for canker-worms and found that the trees treated with it were free from codling moth. To Pro¬ fessor Cook also is probably due the first use of kerosene mixed with soap, although the kerosene emulsion, which is now a standard remedy for all sucking insects, was the joint product of Messrs. Barnard, Hubbard and Riley, and first used in 1877. White arsenic was employed as an insecticide as early as 1871 and London purple was put to practical use in the destruction of the cotton worm in 1878. London purple has since been displaced by va¬ rious other insecticides, as it has proved in¬ ferior to Paris green, which, in turn, has been replaced by arsenate of lead, because the latter, while poisoning the insects, does not scald or otherwise injure the plants. In the same man¬ ner the discovery of Paris green as a remedy for the Colorado potato beetle was made through the migrations of this insect, the rav¬ ages of the 'cotton cushion scale {I eery a pur- chasi) of the orange orchards of California led to experiments conducted by Mr. D. W. Co- quillett, of the United States Department of Agriculture, in 1886, to the finding of hydrocy¬ anic-acid gas as the best medium for extirpation of scale insects (q.v.), and to its general use in fumigation for all insects which can be treated with it. In 1895 Messrs. A. F. Woods and P. H. Dorsett, also of the Department of Agri¬ culture, began experiments which led to the adoption of a perfected system of fumigation with the same gas of plants grown under glass and injured by scale and other insects.

Our best remedies for insects, then, arseni¬ cal mixtures and kerosene emulsion and other preparations, and hydrocyanic-acid gas, are the product of American research. The bisulphide of carbon as an insecticide, however, though the discovery of a foreigner, has doubtless received greater attention in our country than else¬ where. It was first employed by M. Doyere, as early as 1856, as a remedy for weevils in stored grain, which is still its principal use ; but its cost when first employed was so exces¬ sive as

*to preclude its general employment on a large scale. Subsequently a high grade of this chemical, known as ˆfuma-bisulphide,** was made for sale at 10 cents a pound. It supplements the use of hydrocyanic-acid gas in that the former is used for the fumigation of plants above ground, while the latter destroys insects affecting the root-system. Both gases are used for the treatment of indoor insects in granaries and mills and in dwellings and warehouses. Although these are the main insecticides, there are others, nearly all of which owe their dis¬ covery and perfection to economic workers in America. They include pyrethrum, better known as Buhach, Persian and Dalmatian in¬ sect powders, the extensive use of which has resulted in the establishment of a considerable*

industry in the growing of the principal plants which produce these powders (Pyrethrum cine- rarice folium and Pyrethrum roseum) ; and whale-oil and fish-oil soaps, originally used against the hop aphis in 1886, and later against scales.

In more recent years lime-sulphur combina¬ tions have been used as washes and sprays against scales and other sucking insects with good results. Still more recently nicotine sul¬ phate standardized at 40 per cent purity has come into general use as a contact insecticide for the same class of insects, and is now a standard remedy in combination with soap for the control of aphides or plant-lice, the onion and pear thrips and related species, leafhoppers, plant-bugs and many others. Prior to this time tobacco preparations were used but with in¬ different success except on a restricted number of insect pests.

Quassiin is the subject of investigation as a contact insecticide. Of arsenical poisons arse- nite of zinc and arsenate of calcium are effec¬ tive but not superior to arsenate of lead. Ad¬ hesives, such as whale-oil (fish-oil) and other soaps, are also in general use under the name of Stickers.® Repellents, to prevent such in¬ sects as the parent flies of root-maggots from depositing their eggs, are being successfully em¬ ployed and in some cases odorous substances are being used to attract insects from their nat¬ ural foods where they can be destroyed.

As fumigants, hydrocyanic-acid gas gener¬ ated from sodium cyanid is in general use for the destruction of mill and granary insects, greenhouse and household pests. Carbon te¬ trachloride and para-dichlorobenzene are excel¬ lent fumigants, but too costly for general use. Insects affecting stored products and pests in households may also be controlled by heat — an old

remedy which is now employed in many mills and warehouses where steam-heating plants are installed.

During the early years of work in spraying for various insects the principal dependence was placed in American insecticide machinery, but after the invention of different forms of nozzles by M. Vermorel, of France, various other noz¬ zles, pumps and other machinery were invented in America and have gone into general use.

An almost incredible number of spraying machines and appliances are being manufactured and constant improvements are being made adapted to special purposes.

Prevention of Insect Injuries by Farming Methods. — It would be difficult to detail step by step the wonderful progress that has been made in means of subduing insects by simple farming methods which, as a rule, neces¬ sitate little or no extra labor or monetary out¬ lay. Some of our principal pests, with which we cannot cope successfully by means of in¬ secticides or by mechanical methods, may be controlled by the judicious use of ordinary methods of tillage. The seed, nursery or other stock for planting should be selected with a special view to securing immunity from attack by the insect most feared or most prevalent in the region where the crop is to be planted. By planting different immune varieties of wheat the ravages of the Hessian fly are reduced to a minimum. Certain forms of trees may be selected for planting for shade in some regions without danger of injury, because the insects

which elsewhere do greatest damage to them arc not present. The selection of a suitable location on the farm for a crop should be made with the same end in view. Where injury is feared by an insect which does not travel freely, immunity can be secured by planting in that part of the farm where the insect is known not to exist. The prompt destruction of crop rem¬ nants and the pulling up and burning over of weeds and other rubbish is a preventive ap¬ plicable to all crops. Another measure is the use of <(trap crops.® Thus part of an old crop may be left to attract insects which usually remain in the field after the crop is made; similar or more attractive plants may be grown for the protection of the main crop; or of early varieties of the same plants, as lures for the insects until the main crop can obtain a good start. On the lure plants the congregated insects must be destroyed by poisons or by fire. Trap crops are of considerable value in the treatment of several of the worst enemies of cucumbers, melons, squashes and similar vines. The stimulation of a plant by means of fertili¬ zers and the maintenance of healthy, vigorous growth by cultivation, the suppression of dis¬ eases and the prevention of injury by insect pests other than those which it is specially designed to circumvent,

are helpful aids. Crop rotation or the planting of alternate crops which are not injured by those insects which ravage the staples assists in the warfare; as also do fall and spring plowing, which, in proper combination, result in the destruction of nearly all forms of the many insects which pass one or more stages in the earth in hibernation. The use of water by irrigation or submersion, if practised at the right time, will result in the temporary extirpation of nearly all insects in the fields thus treated, particularly in cranberry bogs. The reclamation by drainage of land subject to more or less complete submersion, such as swampy tracts, river bottoms and the like, and the destruction of the weeds and other plants and the insect life which remain by burning over, are of great value in suppressing many pests. If, to the methods above out¬ lined, we add the strict observance of timely harvesting of crops with a view to the preven¬ tion of further attack and the destruction of insects which might reproduce the following year; the. utilization of natural enemies, such as parasitic and predaceous insects, poultry and live stock, to destroy the insects in the field after the crop is off; the systematic inspection of the farm for the first appearance of insect attack, and, finally, the co-operation of neigh¬ boring farmers having a community of inter¬ ests in growing the same crops, there is com¬ paratively little use for insecticides save in the case of insects such as grasshoppers and the caterpillars of moths and butterflies, which are strong fliers and cannot be successfully con¬ trolled by mechanical methods.

Economic Entomologists. — Dr. T. W. Har¬ ris is credited with having been the first eco¬ nomic entomologist of America, but in reality the honor is due to W. D. Peck, who began writing on injurious insects late in the 18th century (1795-1819). His writings, however, are few, in comparison to those of Harris, whose labors began in 1831 and whose greatest work appeared in 1841, his classic treatise on Hnsects Injurious to Vegetation. > In the year

ENTOMOLOGY

6 Lagria

7 Scarlet-beetle

8 Melandry

9 Mordella Fasciata

10 Meloe (Oil-beetle)

11 Cantharis (Spanish Fly)

Fig. 1 Boring-beetle (Plilinus) 2, 3 Boring-beetle (P'imuj and Larva) Plum-

*tree Beetle 19 “ilpine “Goat-beetle” * 26“lTna Popul’i ” 21 Fungus-beetle 22 Lady-bird 23 Head ol Bee 24 Hindleg*

12 Oedemera 13 Pea-beetle 14 Corn-weevil 15_ Vine-weevil 16 Clover-weevil 17 Bostrychus viaticus _ . . .

asp -. an waˆsp Plum-tree S r w-ft y and Larva 41, 42 Turnip Saw-fly and Larva 43, 44 Pear-tree JFly and Larva 45 Corn Saw-fly

of Worker 25, 26, 27 Queen, Drone and Worker

31 European Mutilla 32 a Female Worker ; b Male of Yellow Ant

33, 34 Female and Worker or Brown Ant

35 Microgaster

36 Teleas

37 Brilliant Ichneumor 38 Rhodites Rosae

55 Willow-moth

56 Bee-moth

.

1853 the New York State legislature appropri¬ ated $1,000 for the study of economic entomol¬ ogy and Dr. Asa Fitch was appointed to per¬ form the work specified. Fitch’s work con¬ tinued until 1871 or 1872, when his 14th and last report was published. Afterward different States, Illinois in 1866-67, and Missouri about a year later, appointed State entomologists, the latter State obtaining the services of Dr. C. V. Riley, who wrote a series of nine reports which, for originality, scientific accuracy and practical value, have received recognition the world over.

When Dr. Riley assumed the duties of ento¬ mologist of the United States Department of Agriculture, economic entomology received a new impetus, his work and that of his assist¬ ants marking a new era in practical entomologi¬ cal work. Upon his death in 1894, he was succeeded by Dr. L. O. Howard, under whose direction the Bureau of Entomology continues to issue reports, bulletins and circulars of the highest practical and scientific value. See Agriculture, Department of.

Prior to 1888 Massachusetts, New York, Illi¬ nois and Missouri were the only States which maintained officially appointed economic ento¬ mologist. During that year the State agri¬ cultural experiment stations (q.v.) were or¬ ganized under the Hatch Act and several official entomologists were appointed in connec¬ tion with them. In 1889 was formed an As¬ sociation of Economic Entomologists which held annual meetings in various cities subse¬ quently and had in 1916 a total membership of about 470.

Bibliography. — Harris, Unsects Injurious to Vegetation) (Flint ed., 1852) ; Treat, Unju- rious Insects of the Farm and Garden) (1882) ; Saunders, Unsects Injurious to Fruits) (1883) ; Cooke, Unjurious Insects of the Orchard, Vine¬ yard, etcP (Sacramento 1883) ; Smith, Eco¬ nomic Entomology) (1896) ; Weed, Unsects and Insecticides) (Hanover, N. H., 1891) ; Sander¬ son, Unsects Injurious to Staple Crops (1902) ; Chittenden, Unsects Injurious to Vegetables) (New York and London 1907) ; Sanderson, Unsect Pests of Farm, Garden and Orchard> (New York and London 1912) ; Slingerland & Crosby, (Manual of Fruit Insects* (New York 1914) ; Essig, Unjurious and Beneficial Insects of California* (2d ed., Sacramento 1915). Also the serial publications of the United States Department of Agriculture and of the entomologists of the State agricultural experiment stations and of State entomologists, including Fitch, Riley, Forbes, Lintner, Felt, J. B. Smith, Webster and others.*

F. H. Chittenden,

Entomologist, in Bureau of Entomology, United States Department of Agriculture, Washing¬ ton, D. C.

ENTOMOPHTHORALES, en-to-mof"- tho-ra'jes, group of parasitic fungi, which is highly destructive of insects. In germination the spore emits a tube which penetrates the in¬ sect's body, which is thereupon filled with the mycelium of the fungus.

ENTOMOSTRACA, one of the two great sub-classes of Crustacea (the other is Malacos- traca), including minute forms; the ˆwater- fleas, having a horny shell of many pieces, a well-developed cephalo-thorax, mandible and three pairs of maxillae, five pairs of thoracic

feet but no abdominal feet and no gills, breath¬ ing instead by specialized organs. They have a great variety of shapes and of means of locomotion. The young is a nauplius and de¬ veloped by numerous molts. The group in¬ cludes many thousands of species, divided into four orders, — Phyllopoda, Ostracoda, Copepoda and Cirripedia (barnacles). They abound in stagnant fresh waters and also in the sea, and furnish an immense quantity of subsistence for fishes that are used for human food.

They exist and increase in innumerable millions. The descendants of a single cyclops may in one year number over 4,000,000,000. At one time they render the surface of the sea-water phosphor¬ escent by their vast luminous congregations. At another time the Atlantic Ocean is colored red over a space of hundreds of square miles by the assembly of these minute creatures, attract¬ ing multitudes of fishes, even of whales, which feed upon them. On the other hand, some forms are equally injurious as parasites. Those belong chiefly to the copepod group — siphon- ostomata, having mouths fitted for suction. Some are commensal, entering the gill-sac or digestive cavity and feeding upon the food, not upon the tissue, of the host. Some attach themselves long enough to suck the blood of their victim and then pass on, while others enter the body as permanent residents and embed themselves in the tissue. Thus they are the pests of starfish, jellyfish, worms, ascidians, fishes and whales. See Barnacle; Copepoda; Crus¬ tacea; Fish-Lice; Ostracoda; Phyllopoda.

ENTOZOA, formerly employed as the name of a subdivision of radiate animals, has passed out of use as a term of systematic classi¬ fication, because it fails to indicate or signify any ideas of structure and only hints at the habitat and occupation of great numbers of liv¬ ing creatures. Following the strict meaning of the word entozoa, denoting ((animals within® (i.e., internal parasites) other animals, not only brings together many genera that belong with the different subdivisions of the same general division, but also imports those which are in¬ cluded under classes morphologically distinct. Even this use of the word is obsolescent. See Bot Fly; Distoma; Elephantiasis; Filari- asis ; Guinea-Worm ; Hook-Worm ; Oxbot ; Parasitism ; Pi.atyhelminthes ; Round- Worms; Tapeworms; Trematoda.

ENTRE-DOURO-e-MINHO (i.e., be¬ tween the Douro and Minho), en'tre do'roo e men'yoo, a province of Portugal, more gen¬ erally known by the shorter appellation of Minho. The surface is broken and partially occupied by high mountains, but the soil in the valleys is well cultivated and the province the most densely populated in the country. Area 2,808 square miles. Pop. 1,289,066.

ENTRE MINHO e DOURO, name fre¬ quently employed by the Portuguese for the province Entre Douro e Minho or Minho (qq.v.).

ENTRE RIOS, en'tra re'os, Argentine Re¬ public, a province bounded on the north by Corrientes, on the east by the republic of Uru¬ guay, on the south and west by the provinces of Buenos Aires and Santa Fe. As its name indicates its territory lies ((between the rivers® — Rio Parana and Rio Uruguay. Area 29,241

square miles. Agriculture and immigration were encouraged by the provincial government, which sold land to settlers in portions of 82ˆ2 acres, to be paid for in three years, at prices ranging from $600 to $2,000, according to loca¬ tion. A considerable amount of land has been taken up by the Jewish Colonization Association. Until the building of the Entre Rios Railway this province was the ((poor sister® of the republic; but since then it has made very rapid strides. It is second in the production of oats and grows large quantities of wheat of excellent quality, other products being maize, lucerne, barley, flax, grapes, tobacco, fruit and (on a very large scale) cattle, sheep and horses. Its capital, the city of Parana (pop. 65,000), was the capital of the republic from 1852 to 1861 ; it has a national college, a normal school and several elementary schools, a charming park, tramway service, and is an important port for the traffic on the Parana River. Pop. of the province estimated 423,100.

ENTRECASTEAUX, dontr-kas-to, Joseph Antoine Bruni d\ French navigator: b. Aix 1739; d. at sea, near the island of Java, 20 July 1793. He entered the French naval serv¬ ice in 1754, gradually rose to the position of commandant of the French fleet in the East Indies (1786), and in 1787 became governor of Mauritius and the Isle of Bourbon. In the same year he made a voyage to China. In 1791 he was sent by the French government in search of La Perouse (q.v.), who had not been heard from since February 1788. For this pur¬ pose he was given the command of two ships, the Recherche and L'Esperance. He failed in detecting any trace of the lost navigator, but ascertained with great exactness the outlines of New Caledonia, the west and southwest coast of New Holland, Tasmania and various other coasts. The D'Entrecasteaux Archipelago was named in his honor. Other reminders of his visit to Tasmania are D'Entrecasteaux Channel, Bruni Island, Recherche Bay, Port Esperance, all names given by him to these various localities and still in use to-day. The journal of this voyage has been edited by de Rossel, (Voyage de Dentrecasteaux) (2 vols., Paris 1808). His maps and other topographical drawings have been published as (Atlas du Voyage de Bruny- Dentrecasteaux) (Paris 1807). Consult Cor- dier, H., (La Mission de M. le Chevalier d'Entrecasteaux a Canton en 1787> (Paris 1911) ; Goepp, E., and Cordier, E. L., (Les Grands Hommes de la France: Navigateurs) (Paris 1873) ; Labillardiere, J. J. H. de, /Rela¬ tion du Voyage a la Recherche de la Perouse) (2 vols., Paris 1800), and its translation into English, (Voyage in Search of la Perouse) (2 vols., London 1800) ; Marriott, I. L., Commo¬ dore Sir John Hayes, His Voyage and Life) (London 1912).

ENTREMONT, don-tr-mon', Comte d

See L'Hopital.

ENTRENCHED MEANDERS. See

Meanders.

ENTRESOL, on tr-sol or en'ter-sol (Fr. (

ENTROPION, or ENTROPIUM, inver¬ sion or turning in of the edge of the eyelids, in consequence of which the lashes rub on the eye¬ ball, causing annoyance and pain.

ENTRY, Right of, in the common law, the right of taking pQSsession of lands or property by entering or setting foot on the same. This may be done either by the claimant personally, or through his agent or attorney.

ENTRY, Writ of, a formal declaration made by one exercising the right of entry in recovering property of which he has been dis¬ seized that he claims full possession of the said property. The common-law action of Writ of Entry has for some time been obsolete in Great Britain, but is still in use in a modified statutory form and generally for special purposes in a few jurisdictions in the United States.

ENTWISTLE, James, American naval officer: b. Paterson, N. J., 1837 ; d. 23 March 1910. He entered the engineering service, United States navy 1861, became commander in 1888, and in 1899 was made captain and rear- admiral and placed upon the retired list. He first served on the Aroostook under Farragut in the Western Gulf squadron, and on 21 other vessels ; was inspector of machinery at the Bath (Me.) Iron Works 1890-95 while the ram Katahdin and the gun-boats Machias and Castine were in process of construction, and assistant to the general inspector at Mare Island Navy Yard in 1895. He joined the Asiatic squadron at Yokohama during that year, being appointed fleet engineer 1897 and assigned to the Olympia. He took part in the battle of Manila Bay, 1 May 1898, being advanced in numbers for meritorious services upon that occasion.

ENTWISTLE, Joseph, English clergyman: b. Manchester, England, 15 April 1767; d. Tad- caster, 6 Nov. 1841. In 1787 he was called into the Wesleyan ministry by John Wesley and spent 54 years of his life in preaching the Gos¬ pel. He was twice president of the British Conference and was connected with the Theo¬ logical Institution at Hoxton 1833-38. His last years were spent at Tadcaster. Consult (Memoir of Rev. Joseph Entwistle) by his son (1st ed, 1845, 5th ed. 1861).

ENURESIS. See Urine, Incontinence of.

ENVELOPE, a paper case, sealable by means of an adhesive flap or other means, and used for enclosing letters or other matter. It has not been established definitely by whom and where envelopes were invented, but they seem to have been used first in France, possibly as early as the middle of the 17th century, though in very limited quantities. They were not in general use in any country prior to 1839-40, when, after the passage of the penny postage bill, they became common in England. Until about 1845 nearly all letters in this coun¬ try were folded so that an unwritten portion came on the outside, and the address was placed there, though even then there was a certain de¬ mand for envelopes, all of which, however, were made entirely by hand. Gradually the use of envelopes spread and by 1850 practically all letters were enclosed in them. The first maker of envelopes in New York is believed to have been a Mr. Pierson who, as early as 1843, made envelopes by hand in his store on

Fulton street. In 1846 he sold his business to an Englishman named Dangerfield who was soon succeeded, first by Jacob Berlin, and then by W. G. West. At that time only 2,000 or 3,000 could be made in a day, as machinery was not yet used. The blanks were cut out by means of a sheet of metal, placed on top of a pile of paper, around the edges of which a sharp knife was run. They were then folded and pasted by hand. Machines were invented in England, probably as early as 1840, though they were not patented until 1849, by Warren de la Rue and Edwin Hill, the latter a brother of Sir Rowland Hill (q.v.), the father of the penny post. These machines were one of the chief attractions of the Hyde Park Exposition, held in London in 1851. The first machine used in this country was a French model. It had been purchased in 1847 for $600 by H. C. Ber¬ lin, son of Jacob Berlin, who had gone into the envelope business with his father's suc¬ cessor, W. G. West. This machine, however, was not very successful. The first patent for an envelope-folding machine was issued in the United States 23 Jan. 1849 to J. K. Park and C. S. Watson of New York, the second on 26 April 1853 to E. Coleman, Philadelphia. Neither of these was accompanied by commercial suc¬ cess. The third patent was issued to Dr. Russel L. Hawes, a physician of Worcester, Mass., in 1853. This machine was quite successful, but was used exclusively by the concern founded by its inventor, which, after many changes in ownership, is still in existence as the W. H. Hill Envelope Company, Division of the United States Envelope Company. Not until just be¬ fore the outbreak of the Civil War was a ma¬ chine patented and placed on the open market. The

inventor was George H. Reay, and his machine was for many years one of the most successful. It gave a tremendous impetus to the envelope industry. At this period many others invented envelope machines or attach¬ ments to them none of which, however, could be purchased in the open market. From then on the development of envelope machinery made rapid strides. Improvements gradually pro¬ vided for self-feeding, gumming, automatic counting, etc. The men chiefly responsible for these improvements were J. M. D. Keating, T. V. Waymouth, H. D. and D. W. Swift, J. G. Arnold, D. Whitcomb, and others. Many of these early inventors went into business for themselves and quite a number of these com¬ paratively old concerns were included in the consolidation of the 10 leading envelope com¬ panies accomplished in August 1898, and there¬ after known as the United States Envelope Company, Inc. Modern machines have been improved to a point where it is possible for one machine to turn out as many as 55,000 en¬ velopes a day. The variety of envelopes, too, has rapidly increased. They are used now not only to enclose letters, but a great deal of printed matter and for many other purposes. Recent innovations are especially the so-called window-envelope, with a transparent front through which the address at the head of a letter can be read, saving thereby the separate addressing of the envelope; envelopes with special sealing devices, such as metal hooks and eyes, threads, etc. ; and the envelope with a wire or thread attached to its inner edge,

facilitating its opening. Since 1853 the govern¬ ment supplies stamped envelopes, which are purchased in ever increasing quantities, the total issue to postmasters in 1916 amounting to 1,853,- 791,461 of a gross selling value of $36,875,445. About two-thirds of these are issued with printed return cards in the upper left hand corner. Practically every government, having a postal service, issues stamped envelopes. The remarkable growth of the envelope industry can be seen from the following figures, based on (The United States Census of Manufactures of 1914) (Washington 1917) : In 1849, the first year for which figures are available, the total value of products in the envelope industry was $45,000. In 1914 there were 90 establishments with 6,970 operatives, capitalized at $15,830,000 and producing goods valued at $18,481,000. These figures indicate increases during the 10-year period, 1904-14, of 25 per cent, 62 per cent, 110 per cent and 77 per cent, respectively. Envelope factories were located in 1914 in 15 States of the Union, especially in Massachusetts, Illinois, Ohio, New York, Connecticut, Pennsylvania, Missouri. Consult Logan, J., (The Story of the Envelope) (in The Red Envelope , Hartford 1915-17) ; House of Representatives, Committee on United States Post Office and Post Roads, (Stamped Envelopes) (Hearings during April 1910, Washington 1910).

ENVER PASHA, Turkish soldier and war minister: b. Constantinople about 1880. Of aristocratic descent, he was educated for the army and saw his

first active service in Mace¬ donia against the Serb and Bulgar komitadjis. He was one of the prime movers in the Young Turk revolution of 1908. Stationed at the time in Salonica, his activities were known at Con¬ stantinople. In a friendly letter he was invited to return to the capital and promised promo¬ tion. But Enver Bey — as he then was — knew better than to accept the invitation. He dis¬ guised himself as a peasant and fled to the mountains, traveling rapidly from place to place, spreading the doctrine of revolt and put¬ ting the final touches to the preparations. The speedy success of the revolution, the revival of the dormant constitution of 1876, and the subsequent fall of Abdul Hamid, raised Enver to the height of a popular national hero. He was ˆlionized® in Paris and London ; at the latter place he was introduced to both houses of Parliament. Under the new regime he was sent as military attache to Berlin, where he learnt German, studied the Prussian military organization, and became a close friend of the Kaiser. According to competent observers, the mighty emperor and the humble attache had much in common, especially dreams of bound¬ less ambition. Fired with admiration for all things German, Enver returned to Constanti¬ nople an ardent apostle of Teutonism and heartily threw himself into the work of assist¬ ing the German Generals von der Goltz and Liman von Sanders to build up the Turkish army. That army, however, failed of its pur¬ pose in the Tripolitan and Balkan wars, in both of which Enver played a prominent part. Of youthful, almost boyish, appearance, poetical imagination and undoubted courage, though en¬ tirely unscrupulous, he became the most pic¬ turesque figure in Turkish politics. Those who stood in his way he simply shot down. In Jan-

uary 1913 he shot the Commander-in-Chief, Hussein Nazim Pasha and two aides-de-camp who attempted to stop him from entering the council chamber. (Prince Yussuf-ed-din, the heir to the throne, was murdered in February 1916 by order of Enver Pasha). In January 1914 Enver was appointed Minister for War and created a pasha. At the beginning of the European War six months later, Turkey de¬ clared her neutrality. Although, apparently, most of the ministers opposed entering the War, they were overborne by Enver Pasha, who not only had the whole Turkish army at his back, but had also adopted the German view that Turkey's salvation was bound up with the suc¬ cess of German arms. Consult Buxton, C. R., (Turkey in Revolution (London 1909) ; (Enver Pasha's Reign of Terror at Constantinople) (Current Opinion, September 1915) ; (Enver Pasha (Current Opinion, April 1916) ; Free¬ man, L. R., (Enver Pasha: Turkish Patriot* (Harper's Weekly August 1915) ; (The Calvary of a Nation,* (Atlantic Monthly, November 1916) ; (Why Turkey Went In) (Harper's*

Weekly, 10 April 1915) ; (The Turkish Atroci¬ ties in Armenia (Outlook, 29 Sept. 1915). See Turkey; War, European: Turkish Campaign.*

ENVIRONMENT, a modern scientific term applied to the modifying influences of an organ¬ ism or surroundings. Neither plant nor ani¬ mal can be understood as a rounded-off unity; the whole life or function is made up of action and reaction between the organism and its en¬ vironment. Streams of matter and energy from without preserve the relative constancy of the organism, as of a special wave-crest in the sea; while changes in the streams have their corre¬ sponding changes within the organism. The plant or animal has obviously a strong unity of its own, but even that is in part due to an¬ cestral welding under the hammers of the en¬ vironment. It may seem, too, to vary of itself like a fountain in the air, but throughout all its rises and falls there blows the wind of the environment.

The influence of outside conditions has been recognized by most naturalists from the time of Hippocrates, and is taken for granted in our everyday speech and action. There is consid¬ erable difference of opinion, however, as to the importance and degree of this influence. Thus Buff on, Treviranus and Geoff roy Saint Hilaire regarded the surroundings as directly hammer¬ ing changes on the organism ; while to Erasmus Darwin and Lamarck internal changes arose as indirect functional results of new environment. Charles Darwin allowed a measure of truth in both these positions, but emphasized the inde¬ pendent action of the organism itself in the direction of natural selection. These three posi¬ tions are still held, some emphasizing one, others another, the majority combining the three. See Darwinian Theory; Evolution; Heredity.

ENVOI, oii-vwa', the last stanza of a ballad (q.v.).

ENVOY, originally envoye, the French translation of the Latin word “ablegatus,® a person deputed by a sovereign or government to negotiate a treaty, or transact other business of a diplomatic nature with a foreign ruler or government. In its general use we usually apply the word to a public minister sent on a special occasion or for one particular purpose; hence

an envoy is distinguished from an ambassador. Envoy extraordinary and minister plenipoten¬ tiary is a permanent resident abroad, usually in one of the less important countries officially representing his government, but of inferior rank to an ambassador. His ranking, next to ambassadors, dates back to the beginning of the 18th century, though the term was in use as early as the 1 7th century at which time envoys belonged to the second class of diplo¬ matic agents together with agents, residents and ablegati.

Consult Foster, J. W., (The Practice of Diplomacy as Illustrated in the Foreign Re¬ lations of the United States) (Boston 1906) ; Garcia de la Vega, D., (Guide Pratique des Agents Politiques, etc. (Bruxelles 1873) ; Krauske, O., (Entwickelung der Standigen Diplomatic, etc.* (Leipzig 1885) ; Satow, Sir E., (A Guide to Diplomatic Practice* (2 vols., Lon¬ don 1917).*

ENZINA, Juan de la. See Encina, Juan Del.

ENZINAS, en-the'na, Francisco de (also known as Dryander), Spanish translator of the New Testament: b. Burgos 1520; d. 1553. He was educated at Louvain and at Wittenberg. During his stay in the latter place he resided at the house of Melanchthon. He translated the New Testament from the Greek in 1543 and presented a copy to Charles V. His heretical views caused his imprisonment at Brussels; he escaped after a year's confinement and made his way to Wittenberg. Cramner made Enzinas professor of Greek at Cambridge in 1548. Thereafter his life is obscure and according to some accounts he died at Strassburg in 1553 of the pestilence, according to others he was last heard of at Geneva in 1570. He wrote (History of the State of the Netherlands and of the Religion of Spain) (1558, republished as (Me- moires de Francisco de Enzinas) (3 vols., Brus¬ sels 1863). Consult Menendez y Pelayo, (His- toria de los Heterodoxos espanolesP

ENZIO, king of Sardinia: b. about 1220: d. 14 March 1272. He was a natural son of Frederick II, the German Emperor, with whom he fought at Cortenuova against the Lombards in 1237. In 1238 he married Adelasia, and was made King of Torres and Gallura and later King of Sardinia. In 1241 while in command of the fleet Enzio inflicted a great defeat on the Genoese. In the years following he added renown to his name by his exploits in Lombardy. He laid siege to Parma in 1248 but was com¬ pelled to withdraw ; he next besieged Colonna, took the castle of Arola in 1248, but on 26 May of that year he was made prisoner at Fossalta by troops of Bologna and sentenced to life imprisonment. Consult Blasius, (Konig Enzio) (Breslau 1884) and Jordan, Wes origines de la domination angevine en Italic1 (Paris 1909).*

ENZOOTIC, en-zo-ot'ik, a disease which appears to have secured a permanent lodgement in the animals of a region. It is used of ani¬ mals as the term endemic is used of diseases which affect man in certain localities.

ENZYME (Gr. "leavened®), any of the unorganized ferments, such as diastase, cytase, trypsin, etc., which induce fermentive changes in organic substances. It was formerly thought that these "unorganized® ferments might be essentially different in their action from the so-

called “organized® ferments, such as the yeasts, molds and bacteria; but it is now known that the fermentive action of the “organized® class is due chiefly, and perhaps wholly, to the enzymes that they secrete. The chemistry of the enzymes is very imperfectly understood. According to some authorities they act merely by catalysis, being capable of effecting the fer¬ mentive change of indefinite quantities of the substances upon which they act, without being themselves used up, nor exhausted in any way. According to other authorities, they are gradu¬ ally destroyed by their own activity, so that a definite mass of any given enzyme can produce only a definite (though surprisingly large) amount of fermentive transformation. See Fermentation.

Chemical ferments, elaborated in the cells of plants and animals and capable of bring¬ ing about a peculiar series of biochemical reactions, which are produced without the inter¬ vention of physical factors or mineral sub¬ stances. Under some conditions they have the properties of facilitating chemical interchanges between certain bodies without entering into the composition of the different products that result. These enzymes, or ferments, zymases, or dias¬ tases, as they are frequently called, play an im¬ portant role in the digestive processes, as well as being of vital importance in the general life- history of nearly all plants. A knowledge of enzymes dates back to very remote periods. In the beginning of the 16th century observations on the phenomena of digestion called attention to this class of bodies; but it remained for Du- brunfaut and Pasteur to place the science of fermentation on a stable basis. Enzymes are for the most part soluble in water, being thrown out of solution by a large number of chemical sub¬ stances, such as alcohol, tannic acid, etc. They usually lose their activity at a temperature above 100° F. Most of them decompose hydrogen peroxide and they act largely in proportion to their quantity. With reference to their chemical composition, it would appear that they belong to the proteid class. There is usually a large proportion of inorganic salts, particularly cal¬ cium phosphate, in their composition. A few, however, do not contain nitrogen. Although closely related to proteids, they do not give pro¬ teid color-reactions. As to their formation, it is considered by some that they are oxidation products of albuminoid substances, or zymogens. The transition of the zymogen into the ferment is termed zymogenesis. Destruction of enzymes is termed zymolysis. As to the manner of action of this interesting class of bodies, a vast variety of phenomena may be observed. They may bring about molecular changes either by hydra¬ tion or by oxidation. They appear to occupy the position of intermediaries, as it were. Many theories are put forward in attempting to

ex¬ plain the action of enzymes; but as they pre¬ sent many analogies to living protoplasm, explanation of the phenomena of their activities is almost as difficult as to explain the phenomena of life. Attempts have been made to classify the various enzymes, but any classification must be of a transitory character, since knowledge concerning this group of bodies is increasing daily. The classification of the soluble ferments suggested by Effront is shown below.

Those enzymes secreted by plants and ani¬ mals in the course of their digestive processes,

such as invertin, which breaks up cane-sugar into a mixture of glucose and fructose, diastase, which has an analogous action on starch, ptyalin, found in the saliva, which also acts on starch, pepsin and trypsin, which decompose proteids in the acid medium of the stomach and the alkaline medium of the intestines, respectively, are not difficult of isolation, while almost none of the intracellular enzymes, which perform a far more important function in the life of the animal or plant, have yet been isolated.

The enzymes have many applications in the arts. Consult Effront, (Enzymes and Their Applications > (New York 1902) ; Greene, Sol¬ uble Ferments. J

EOBANUS, Helius or Hessus (Eoban Koch), German philosopher: b. probably at Halgehausen 1488; d. 1540. He wandered about to different places in which he taught and lec¬ tured like so many teachers of the period. He espoused the Reformation, participated in the (Epistolse Obscurorum Virorum,) and trans¬ lated Ecclesiastes and the Psalms. Consult the life by Krause (Gotha 1879).

EOBASILEUS, the latest-known species of the Uintathere (q.v.) fossil in the Bridger Stage of the Middle Eocene in the western United States. It was an immense, rhinoceros-like animal with a remarkably long and narrow head, with very large, shovel-shaped nasal pro¬ tuberances from the skull and long, backward- curved tusks in the male.

EOCENE, e'o -sen, a subdivision of geo¬ logical time. Lyell in 1833 first used the term Eocene (dawn of the recent) for the earliest of his three subdivisions of the Tertiary. The term found favor quickly since early Tertiary life differed greatly from late Cretaceous. To¬ ward the close of Cretaceous time, the sea re¬ ceded from a large part of North America and by the end of Eocene time the continent had nearly its present form. The climate continued warm, Greenland and Alaska being temperate. Of Cretaceous animals the reptiles suffered most, the ichthyosaurs, dinosaurs and plesio¬ saurs passing away as well as many peculiar mollusks. Eocene

fishes were mostly of mod¬ ern character (teleosts), birds were more numerous and highly developed than in the Cretaceous Age ; while mammals developed wonderfully. True carnivorous mammals ap¬ peared, as also the ancestors of the horse, rhinoceros, tapir, pig and the ruminants, be¬ sides bats, primitive camels and monkeys. A study of organic types indicates that Asia, North America and Europe were connected in Eocene time ; and, by the Antarctic continent, South America and Australia ; while South America was separated from North Arfierica, and Africa and southern Asia from Europe and northern Asia.

The Eocene rocks of the Altantic border are nearly all loose sands and clays of ma¬ rine origin and contain in New Jersey beds of greensand once of some economic importance as a source of phosphate of lime for agricultural use. The rocks of the Gulf border were partly laid down in fresh or brackish water and partly in salt water. They comprise shales, sandstones and limestones. In Florida are valuable de¬ posits of phosphate rock, and in Texas are ex¬ tensive beds of lignite, of workable size, but poor quality. The interior province formations,

mostly clays and sands, were laid down as alluvial fans and cones (q.v.), in brackish or fresh water lakes which stretched, though not contemporaneously, from Mexico to Alaska. The largest of these lakes covered eastern Utah and western Colorado, and must have been 450 miles long and 250 miles wide. In Utah are lignite deposits of some importance. In the Pacific border province the Lower Eocene stages are wanting and the epoch is represented by a single series, the Tejon shales and sand¬ stones, partly marine and partly terrestrial, with workable deposits of lignite in California and Oregon. See Cenozoic Era ; Geology ; Tertiary System.

EOHIPPUS, the earliest known progenitor of the horses, found fossil in the Lower Eocene (Uinta) formations of the West, four-toed and about the size of a house-cat. See Horse.

EOLIAN DEPOSITS, accumulations of wind-blown material. In some regions, par¬ ticularly in deserts, such deposits may be of considerable importance. Most conspicuous are sand dunes, which occupy large areas in many parts of the world. Sand dunes sometimes be¬ come buried and consolidated to form sand¬ stones, often strongly cross-bedded. Loess, fine wind-blown dust, accumulates to great thickness in some regions. Important deposits are known along the Mississippi and Missouri rivers in the United States, but the most ex¬ tensive loess beds known are in China. Buried

loess deposits would ultimately form shales. Eolian limestones are rare, but are known in Bermuda, where great dunes have accumulated, composed of the ground-up fragments of shells from the beaches. These dunes are consolidated in places to form limestones. See Dune; Loess ; Rocks.

EOLITH, one of the rudely chipped pebbles, regarded as a relic of the earliest dawn of human industry. The adjective ®Eolithic® is sometimes used to designate the period of human history preceding the paleolithic stage of culture. See Stone Age.

EOLITHIC. See Paleolithic Period.

EON, a'on', or EUDO DE STELLA, also EON DE L'ETOILE, a religious fanatic of the 12th century, born in Brittany. He claimed to be the final judge of mankind and derives his name from the pronoun eum, in the for¬ mula <(per eum qui venturus est judicare vivos et mortuos.® He was opposed to the hierarchy and sent forth his followers to plunder ecclesi¬ astical property. He showed the inconsistency of his opposition to a hierarchy by putting him¬ self at the head of a church and ordaining bishops and priests. The Legate Alberic and Hugh, archbishop of Rouen, were his prin¬ cipal opponents. He was captured in 1148, was tried at Rheims and, being considered insane, escaped execution. However, he was kept in prison for the remainder of his life; numbers of his followers perished at the stake and his sect soon disappeared. Consult Dollinger,

EON DE BEAUMONT, a-on de bo-mon, Charles Genevieve Louis Auguste Andre Timothee d' (called till 1777, Chevalier d'Eon),

French writer, military officer, diplomatist and publicist: b. Tonnerre, 5 Oct. 1728; d. London, 21 May 1810. His brilliant qualities enabled him to act a conspicuous part in the world, but he gained a greater notoriety by the mystery long kept up in regard to his sex. In 1755, by some other accounts in 1757, he was sent as envoy on a difficult mission, to the Russian court. Here he gained the favor of the Empress Elizabeth, and for about five years was the medium of a secret correspondence between her and the King of France. In 1762 he went to London as sec¬ retary of a special legation, under the Duke de Nivernais, sent there for the purpose of arrang¬ ing peace between France and England. In April 1763 he was made French Resident Minister and chargee d'affaires. From then on, though soon officially superseded in his diplo¬ matic office, he lived for years in London as a kind of informal representative of his sovereign. In 1777 he returned to France, but Louis XVI, for what reason has never been satisfactorily explained, imposed on him the obligation of assuming female attire and he now styled him¬ self La Chevaliere d'Eon. Even before this, however, doubts and discussions as to his real sex had arisen. He returned

to England in 1785. After the French Revolution broke out, he styled himself Citoyenne Genevieve Deon. He now attempted to support himself by giving lessons in fencing (still dressed as a woman), but was not very successful and depended for subsistence mainly on his friends. He was a voluminous writer and his works appeared in 1775 under the title (Loisirs du Chevalier D'Eon) (13 vols., London). He also wrote the memoirs of his life, covering especially the years of his residence in England, 1762-77. They have never been published ; the manu¬ script is in the archives of the French Ministry of Foreign Affairs in Versailles. Consult, Broglie, J. V. A. de, (Le Secret du Roi) (2 vols., Paris 1878; translated into English as (The King's Secret London 1879) ; Christie, R. C., (Selected Essays and Papers) (London 1902) ; Gaillardet, F., (Memoires sur la Chevaliere d'Eon) (Paris 1866) ; Ross, O. C. D., (The Chevalier d'Eon and Peter the Great's WilP (in Gentleman s Magazine , n. s., Vol. XVIII, p. 159, London 1877) ; Telfer, J. B., XVI et Elizabeth de Russie* (Paris 1882) ; Vizetelly, E. A., (The True Story of the Chevalier D'Eon, etc.* (London 1895),*

EOS, e'os. See Aurora.

EOSCORPIUS, a fossil scorpion, known by its slender form, hand and pincers. It in¬ cluded about four separate species and abounded in the Carboniferous period. Many fine specimens have been uncovered at Mazon Creek, Ill. See Scorpion.

EOSIN. See Coal-Tar Products.

*EOSINOPHILES, e-6-sm'o-fils, one of the types of leucocytes or white blood-cells found in the circulating blood and character¬ ized by its specific reactions to acid stains, such as eosine, whence its name — <(a lover of eocine.** Eosinophiles are present in the proportion of one-half to 2 per cent of the white blood- cells. Their increase above 2 per cent is termed eosinophilia, and it has an important relationship to some forms of parasitism.*

EOSINOPHILIA, a condition in which there is an excess of eosinophile white blood- cells in the circulating blood. #The exact causes of eosinophilia are not thoroughly understood. But is seems to be an almost constant accom¬ paniment of certain diseases, notably of infec- , tion by intestinal parasites. So it is in trichini- asis, in anchylostomiasis and in infection by the ordinary tapeworm. Consult Ewing, Pa¬ thology of Blood (1902).*

EOSTRA, the Teutonic goddess of spring. The festival in her honor is believed to have given its name to our Easter.

EOTHEN. Alexander William Kinglake, later known as the historian of the Crimean War, made about 1835, three years after his graduation from Cambridge, a tour through Turkey, Egypt and the Holy Land. In 1844 after he had twice rewritten his manuscript he published a narrative of his Eastern experi¬ ence under the title (Eothen, a Greek word signifying <(from the early dawn® or ((from the East.® In an interesting preface he explains that he has deliberately avoided the virtues of the ordinary book of travel. What he has sought to impart is not statistical and geo¬ graphical information but the tang and color and thrill of his own personal impressions amid those alien scenes and peoples which he dis¬ covered when he slipped out at the back door of Europe. As Kinglake's impressions were extraordinarily fresh, vivid and intense, and as his style corresponded to his impressions, he added to the golden treasury of travel liter¬ ature an enchanting little volume which takes its place with (Child Harold's Pilgrimage,* (The Bible in Spaing and (Travels with a Donkey.* In reading books of this sort one's interest passes back and forth between the traveler and the lands through which he travels. Kinglake as he presents himself is the typical, self-contained, independent, resolute young English gentleman, concealing his occasional moments of poetical rapture beneath an im¬ perturbable exterior and smiling inwardly to perceive how his mere presence and bearing extort from Turk and Bedouin the deference due to a natural lord of creation — a modest incarnation, in short, of that spirit which has made it impossible for the sun to set on British soil. The most amusing illustration of this English spirit is to be found in the 29th chap¬ ter, in which Kinglake relates how he and a Russian officer forced a landing at Satalieh in defiance of the quarantine officers, marched through the streets to the residence of the Pasha, entered his audience chamber, seated themselves on the divan at his side and bullied him through an interpreter into open-armed hospitality. Another wonderful chapter, <(Cairo and the Plague,® depends partly for its effect upon the stunning contrast between the wailing pestilence-stricken city and the non¬ chalant Englishman going about his business and his pleasure undeterred by the universal terror of contagion. Superb, too, as a repre¬ sentation of the traditional English reserve, is his account of his meeting in the desert with another solitary Englishman traveling west¬ ward from India, whom he would have passed with a silent nod but for the friendly interposi¬ tion of their respective camels. The passages in (Eothen,* however, which are unforgettable*

and which raise the terse, brilliant, narrative almost to the level of poetry, are those com¬ memorating the not infrequent occasions when the magic of the East broke through the trav¬ eler's guard and laid its spell upon him in

some , lonely bivouac by the Dead Sea, or in the Sanctuary of Nazareth, or on a dromedary's back in some sun-smitten wilderness of sand, or in a curious throng of dark-eyed Jewish girls, or when the sharp vision of an abandoned English garden flashed into memory and ming¬ led with the splash of fountains and the fra¬ grance of Eastern roses in some old garden of Damascus. Consult Tuckwell, (A. W. King- lake> (1902).

Stuart P. Sherman.

EOTVOS, et'vesh, Joseph, Baron von,, Hungarian statesman and author : b. Ofen, 13 Sept. 1813; d. Pesth, 3 Feb. 1871. He was edu¬ cated by private tutors, especially the well- known Hungarian patriot and liberal Pruzsinskv,, who gained a powerful mental influence over him and was primarily responsible for the lib¬ eral ideas and ideals which Eotvos displayed later in life. He completed his studies in phi¬ losophy and law at the Univesity of Pesth in 1831. Even before leaving the university he produced three plays — (Kritikusok, (Haza- sulok) and (Boszu) — 'the last a tragedy, all of which were well received. From 1832-37 he traveled extensively in Europe and occupied a number of minor governmental offices. After 1838 he devoted himself exclusively to literature and politics, joining the Young-Hungarian Re¬ form party. In the same year he published an important work on the reform of prisons (Pesth 1838) ; he became a friend of Kossuth and dis¬ tinguished himself as a journalist and as a speaker in the Diet. A collection of his early political writings was published in Leipzig in 1846. His literary work of this period resulted in a succession of novels giving vivid pictures of Hungarian life during his own times and in more remote epochs: (The Carthusian) (Pesth 1838-41) ; (A Falu Jegyzoje* (Pesth 1844-46; translated into English as (The Village Notary> by O. Wenckstern, New York 1850) ; (Hungary in 1514> (3 vols., Pesth 1847-48). After the March revolution of 1848 he became Minister of Public Instruction under Batthany, but the September revolution of the same year made j him lose hope in the cause of liberalism in his country and he retired to Munich, remaining in voluntary exile for three years. During this period he published several works, among which was (The Influence of the Ruling Ideas of the 19th Century on the State* (2 vols., Pesth 1851— 54), which is considered his most important work. About the middle of 1851 he again re¬ turned to Hungary and was made vice-president of the Hungarian Academy in 1856 and presi¬ dent in 1866. After his return he was a staunch supporter of Deak (q.v.) and of his efforts to arrange the famous Austro-Hungarian Compo¬ sition (Ausgleich) of 1867. In that year he again became Minister of Public Instruction in the Andrassy cabinet. From then on until his death all his energies were devoted with con¬ siderable success to the improvement and lib¬ eralization of the Hungarian school system. In 1879 a bronze statue by Huszar was erected in his memory at Pesth. A collection of his writings*

was published in Pesth in 14 volumes

(1870), and still another in 17 volumes (1891). His political speeches were collected in two volumes in 1875 and 1886. Consult Berzeviczy, A. v., (Baron Josef Eotvos als Kulturpolitiker) (in Ungarische Rundschau, Vol. Ill, p. 78, Munich 1914) ; Ferenczi, Z., (Baron Josef,

Eotvos } (Budapest 1903) ; Ringwald, W., (Beitrage zu einer Kritischen Wiirdigung der Staatslehre des Barons Josef von Eotvos > (Zurich 1908).

E6TVOS, Roland, Hungarian scientist and Statesman: b. Budapest, 27 July 1848. He is a son of Joseph Eotvos (q.v.). He studied at Konigsberg and Heidelberg, receiving an ap¬ pointment as lecturer at Budapest 1871 and as professor of experimental physics there 1875, being made a member of the Hungarian Acad¬ emy of Sciences 1873, and becoming its presi¬ dent in 1893. Much of his attention has been given to the problems of gravitation and capil¬ lary attraction. He was made a life member of the Hungarian House of Magnates and was Minster of Public Worship and Education*

1894-95.

EOZOIC (e-o-zoGk) ERA (dawn of life), one of the early names applied to the Geologic Pre-Cambrian or Algonkian period, during which life first appeared on the earth. The eozoic rocks, though often showing traces of organic origin, have in general been greatly metamorphosed and contain few, if any, fossils. Stratigraphically they are separated from the Archaean (or Azoic) rocks below and the Cam¬ brian (or earliest Palaeozoic) rocks above by unconformities. See Algonkian System ; Ge¬ ology ; Huronian Series ; Keweenawan Series.

EOZOON, e-o-zo'on. Sir J. W. Dawson (q.v.) in 1864 described certain curious aggre¬ gates of calcite and serpentine in the Lauren- tian limestone of the lower Saint Lawrence Valley as the remains of a foraminiferan which he called Eozoon Canadense. The so-called fossil was thought to represent the earliest known form of life on the globe. The evi¬ dence of organic origin is, however, not con¬ clusive. Similar forms have been found in Bavaria. Moebius, who investigated Eozoon thoroughly, concluded that the serpentine in the calcite had infiltrated along a very regular system of fine fissure and most geologists now believe that Eozoon is of inorganic origin. An extensive literature has sprung up as a result of this discussion. A list of most of the im¬ portant papers, almost all published in scienti¬ fic

journals of Europe and this country may be found in the bibliography of Sir J. W. Dawson, attached to a memoir of his life by F. D. Adams and published in the Bulletin of the Geological Society of America (Vol. II, New York 1899). Consult Dawson, Sir J. W., (The Dawn of Life} (London 1875) ; (Review of the Evidence for the Animal Nature of Eozoon Canadense) (in McGill University Paper, De¬ partment of Geology, Nos. 1-2, Montreal 1896) ; Hauer, M., (Das Eozoon Canadense) (2 vols., Leipzig 1885).

EPAORIDACEZE, ep-a-kn-da'se-e, a small order of heath-like shrubs or small trees, usu¬ ally reckoned as the Australian sub-order of Ericacea , from which they are chiefly distin¬ guished by the epipetalous stamens destitute of the peculiar specializations of anther dehiscence or appendages. The flowers are red, white or

purple, generally in leafy spikes. Many species are cultivated in greenhouses along with the heaths proper. ˆArnong the most attractive of these is E. grandifiora, which has blossoms nearly an inch in length, of a brilliant reddish purple at the base and pure white at the apex. A few species produce edible berries resembling the American huckleberry, and which are known as Australian cranberries.

EPACTS (Gr. additions®), in ecclesiastical chronology, a set of 19 numbers used for fixing the date of Easter and other Church festivals, by indicating the age of the moon at the be¬ ginning of each civil year in the lunar cycle At the reformation of the calendar in 1582 it was found that the Golden Numbers could no longer by themselves serve the purpose of adjusting the double reckoning by lunations and by the tropical or true year; and thus, instead of adopting the more rational com¬ putation, the Roman Church devised the arti¬ ficial and involved method of epacts. The main point to determine is the age of the moon (in entire days) at the beginning of each civil year, or the number of days between the end of the ecclesiastical year in December and the first January succeeding. Thus, subtracting 354 days '(12 lunations) from 365, we should have 11 days for the first annual epact, then 22 for the year following, then 3, 14, 25, 6, 17, 28, 9, 20, 1, 12, 23, 4, 15, 26, 7, 18 and 29; the series of 19 numbers being obtained in succession by add¬ ing 11, and when the sum exceeds 30, subtract¬ ing that number. This illustration, however, is simpler than any actual case, by reason of the leap-years, which require 12 to be added for the following epact, and of the fact that no lunation is exactly 30 days long. When the lunar cycle of 19 years is completed, the epacts recur again in the same order. In the Anglican reckoning, as distinguished from the Roman, it is note¬ worthy that the Gregorian epact for any year is the same as the Julian epact for the year preceding, owing to the coincidence that 11, the number of days lost on the Julian account before the English Parliament adopted the re¬ formed calendar (q.v.), is also the number of days between the lunar and the solar years. The epact determines by subtraction the date of the first new moon in January; then by adding 29 and 30 alternately the successive new moons throughout the year are assigned to their re¬ spective dates. Consult Clavius, C., (Romani Calendarii a Gregorio XIII P. M. Restituti Ex¬ plicate etc (Rome 1603) ; Butcher, J. G., and Butcher, S. H., editors, (The Ecclesiastical Calendar: Its Theory and Construction (Dub¬ lin 1877) ; De Morgan, A., (London 1871) ; Seabury, S.,

EPAMINONDAS, e-pam"In-on'das, The¬ ban general and statesman : b. about 418 B.e, ; d. Mantineia, Arcadia, Greece, 362 b.c He was distinguished for the friendship existing between him and Pelopidas, whose

life he had saved in 385 at Mantineia. He was sent to Sparta 371 b.c. to represent Thebes in negotiat¬ ing a peace with the Athenian envoys. As the Spartans refused to recognize Thebes as the

representative of Bceotia, the Thebans were ex¬ cluded from the peace. Cleombrotus was sent by the Spartans to invade Bceotia, but was de¬ feated at Leuctra (371 b.c.), chiefly through the tactics of Epaminondas. Two years after Epaminondas and Pelopidas were made Boeotarchs. They detached several nations from the alliance of Lacedaemon, and delivered the Messenians, whose capital they rebuilt. Epaminondas then marched with his army to Sparta ; but this city was so bravely and skil¬ fully defended by Agesilaus that the Theban hero retreated. An accusation was brought against him on his arrival in Thebes, because he and Pelopidas had kept the Boeotarchate be¬ yond the legal time; the accusation was literally true, but the infringement of the law was justi¬ fied by his services, and after having pleaded his own cause, he was acquitted. In 368 he com¬ pelled Sicyon and Pellene to relinquish the Lacedaemonian alliance, and in the same year served in a Theban army sent into Thessaly to rescue Pelopidas, who was kept a prisoner at Pherae. In the following year he commanded an expedition with the same object which was successful. In 362 he was compelled to make head against a formidable coalition of states, in¬ cluding Athens and Sparta. His tactics were never more brilliant and successful than in this campaign, but in the battle of Mantineia he was killed at the moment of victory. Consult Col- croft, J. W., (Epaminondas of Thebes) (in Dublin University Magazine, Vol. XL, p. 34, Dublin 1852) ; Cornelius Nepos, (Vita Epami- nondae) ; Pomtow, L., (Das Leben des Epami- nondas) (Berlin 1870) ; North, Sir T., ed. and trans., (The Lives of Epaminondas, Philip of Macedonia, etc.5 (in (Plutarch's Lives of the Noble Grecians and Romans, 5 London 1656) ; Yonge, C. M., (A Book of Worthies) (New York 1882).

EPAPHOS, the son of Zeus and Io, who, according to Ovid, caused Phaeton's destruction by denying his divine descent. Epaphos, ac¬ cording to Greek mythology, became the ances¬ tor of the Egyptian race and the first lord of their country whither his mother had fled be¬ fore the jealous wrath of Hera and where he had been born. There are comparatively few references to him in the Greek writers; only Pindar, /Eschylus, Euripides, . Herodotus,. Ovid and a few less important writers of later date mention him. Herodotus claims that his name was the Greek equivalent to the Egyptian deity Apis. Consult Berens, E. M., (A Handbook of Mythology5 (New York, n. d.) ; Gruppe, O., VII, Munich 1897-1903) ; Linforth, I. M.,

ˆEpaphos and the Egyptian Apis5 (in University of California Publications in Classical Philology, Vol. II, No. 5, Berkeley 1910).

EPARCHY (krrapxia), originally the name of one of the divisions of the Roman Empire, being a subdivision of a diocese. Both of these terms were adopted by the Church. Ecclesiastical eparchies were under a metropolitan to whom the first Council of Nicsea (325) 'gave the power to appoint the other bishops in his eparchy. Later this term was applied to mean the diocese of any bishop. It is now in common use only in the Russian

Church, where it still applies to all subdivisions of the Church corresponding to the western dio¬ cese. There were, before the Russian Revo¬ lution of 1917, 86 eparchies of which three were administered by metropolitans (Kiev, Moscow and Petrograd), 14 by archbishops and the rest by bishops.

EPAULEMENT, e-pal'ment, in fortifica¬ tion, a term originally employed to denote a mound of earth, raised to protect a body of troops at the extremity of their line; or a screen or rampart erected, as a sort of shoulder, to defend the flank of a battery from enfilading fire, which would dismount its guns. In mod¬ ern artillery, the word is applied to the whole mass of earth, stone or fascines raised to pro¬ tect a battery both in front and at the flanks. It is also used of the breastwork set up to shel¬ ter reserve artillery. See Fortifications.

EPAULET, ep a -let, an ornamental badge consisting of a fringe hanging over the shoul¬ der, worn in the English army up to 1855, and still worn in the English navy by all ranks above lieutenant. Epaulets were not partially discarded by the United States army until 1872, when none but general officers continued to wear them. In the United States navy the epaulet is worn by all officers above the rank of ensign. The French private soldiers wear epau¬ lets of worsted.

EPEE, a-pa', Charles Michel, Abbe de 1\

French instructor of the deaf and dumb: b. Ver¬ sailles, France, 25 Nov. 1712; d. Paris, 23 Dec. 1789. Taking orders, he became a preacher and canon at Troyes, but later lived in retirement in Paris. In 1765 he first began to occupy him¬ self with the education of two deaf and dumb sisters ; and, as he asserted, without any previ¬ ous knowledge of Pereira's efforts in the cause, invented a language of signs, by which persons thus afflicted might be enabled to hold inter¬ course with their fellow-creatures. He deter¬ mined to devote his life to the subject. At his own expense he founded an institution for the deaf and dumb, which was first publicly ex¬ amined in 1771, and from 1778 received an an¬ nual subsidy. It was not,

however, converted into a public institution till two years after his death. He published Unstitution des Sourds et Muets, etc.5 (Paris 1774) ; Unstruction des Sourds et Muets par la Voie des Signes Meth- odiques5 (Paris 1776) ; (La Veritable Maniere d'instruire les Sourds et Muets5 (Paris 1784). Consult Arnold, Thomas, (Aures Surdls. The Education of the Deaf and Dumb5 (London 1872) ; Arrowsmith, J. P., (The Art of In¬ structing the Infant Deaf and Dumb, etc.5 (London 1819) ; Berthier, F., (L'Abbe de l'Epee, sa Vie, etc.5 (Paris 1852) ; Bouilly, J. N., (The Deaf and Dumb ; or, the Abbe de l'Epee. An Historical Play in Five Acts5 (Paris 1800; London 1801).

EPEIRA, e-pl'ra, a genus of spiders, typical of the family of Epeiridce, comprising some of the largest and best-known spiders, those build¬ ing orb-webs. They occur in all parts of the world, and are usually handsomely marked. See Orb-weaver; Spider.

EPEIROGENIC MOVEMENTS. These are such geological movements as have to do with the uplift and depression of continents and oceanic basins, as distinguished from oro-

genic movements, which form mountain ranges. Their causes are only imperfectly understood. Among the factors which are thought to have played a part in inducing them are the expan¬ sion of strata in which the escape of heat has been blanketed by superincumbent deposits, the weight of these superincumbent deposits, the wrinkling of the earth's crust due to cooling and the tidal effect of the moon on the earth's lithosphere. Epeirogenic movements are usu¬ ally measured from sea-level, but it is highly probable that they are all in the strictest sense movements of depression, as there is strong evi¬ dence that the radius of the earth's crust is steadily diminishing. See Earth ; Geology.

EPENCEPHALON, a term used to desig¬ nate that part of the embrionic brain from which the cerebellum and pons Varolii are formed. In the fully developed brain the term is used for that part containing the cerebellum, pons Varolii and the medulla oblongata. See Brain.

EPERIES, a-par'yes (Slovak Pressova) , Czechoslovakia, an old town on the Tarcza, 190 miles northeast of Budapest by rail. The city was destroyed by fire in 1887. It is the seat of a Greek Catholic bishop, and has a Lutheran col¬ lege. It manufactures earthen-ware, linens and woolens, and has some trade in corn and Tokay w ne; in the vicinity are the Sovar

saltworks. The Reformed Church made great headway here and the city played a considerable part in the religious wars of the 16th and 1 7th century. It is celebrated as the scene of the (

EPERNAY, a-per-na, France, in the depart¬ ment of Marne, in the midst of a rich vine¬ growing district, 19 miles northwest of Chalons, The earthen-ware called terre de Champagne is made in Epernay. It is an entrepot for Cham¬ pagne wines, which are kept in vaults in the chalk rock on which the town is built. There are large railway workshops. Pop. 21,811.

EPERNON, da-par-noii', Jean Louis de Nogaret, Due d', French courtier: b. 1554; d. 1642. About 1573 he became a partisan of Henry III, whose fortunes he followed and whose chief favorite he became. In return the king enriched him, made him Duke of Epernon in 1581, and admiral of France. He was ap¬ pointed governor of Normandy in 1587, but through the influence of the Catholic League he was exiled to Loches in 1588. Henry IV made him governor of Limousin in 1596 and he was transferred to Guienne in 1622. In the early period of his ascendancy Epernon was a defender of absolute monarchy, but later he urged the independence of the nobility. His opposition to the policies of Cardinal Richelieu caused the latter to banish him to Loches in 1641. Consult the life by Montbrison (Paris*

1874).

EPERVIER, The. See Peacock and

Epervier, Battle of.

EPHAH, e'fa, a dry measure of capacity among the ancient Hebrews, corresponding with the liquid measure bath. The ephah contained about 37 litres, equal to about 10 gallons of the United States or 8 gallons British. There were, however, two measures called ephah, of

which the above estimate applies to the smaller, and this contained about one-tenth less than the other. The ephah had 18 cabs or 72 logs. Con¬ sult Nicholson, E., (Men and Measures) (Lon¬ don 1912).

EPHARMONY. See Ecology.

EPHEDRA, ef'e-dra, a genus of shrubs used for decorative purposes in landscape gar¬ dening. In general appearance they resemble the horsetails. The flowers are small and incon¬ spicuous. The species occur in all parts of the world, but are not hardy and need protection from frosts. They flourish best in dry or rocky soils and are easily propagated. Their fruit is said to be mucilaginous, eatable, sub-acid and slightly pungent. The branches and

flowers of the Asiatic species were formerly sold as styptics.

EPHEMERA, e-fem'e-ra, the typical genus of the insect family Ephemeridce (q.v.).

EPHEMERIDiE, ef-e-mer'i-de, a family of neuropterous insects characterized by the slenderness of their bodies ; the delicacy of their wings, which are erect and unequal, the anterior being much the larger; the rudimentary condi¬ tion of the mouth, and the termination of the 10-jointed abdomen in 3-jointed filiform ap¬ pendages. The adult May-flies, or day-flies, as they are called, emerge from the chrysalis on the banks of the running streams in which the eggs are hatched, and, appearing usually toward sunset, when they throng about street-lamps, lighthouses (where sometimes they obscure the light) and the screens of lighted windows, are no less remarkable for their great activity than for their enormous numbers, and the brief period of their existence. The eggs, which are shed in a mass, drop into the water. The larvae have elongated depressed bodies ; setose antennae, and long caudal filaments ; and lamellar or tufted gills, symmetrically disposed on either side of the abdomen. They remain in the water for a year or two before undergoing further change, lying beneath stones, and leading a pre¬ daceous life, for which their strong jaws fit them. The rudiments of wings mark the com¬ mencement of the nymph stage, at the close of which they crawl out of the water and cast the nymph integument. Their sexual immaturity prior -to the second molt has led to their being named, at this stage, subimagos or pseudimagos. The larvae, which are very similar throughout the family, are largely used as bait. There are many species in various parts of the world, divided into various genera. Ephemera and Ccenis have three caudal filaments ; Paling enia and Cloe only two, but the larvae have three. The posterior wings are absent in Cloe and Ccenis. Consult books mentioned under Insects.

EPHEMERIS, an astronomical almanac. The plural Ephemerides is applied to tables showing the places where the planets and heav¬ enly bodies are found at noon of every day. It is from these tables that eclipses, conjunctions, etc., of the planets are determined. An espe¬ cially exhaustive and very carefully compiled bibliography, covering some 280 columns, is to be found under the heading (Ephemerides) in the (Catalogue of Printed Books, published by the British Museum (London 1887, 1902, etc.). Consult Newcomb, S., Sidelights on Astronomy* (New York 1906). See Almanac,*

EPHESIACA

EPHESIANS

EPHESIACA, or EPHESIAN TALES,

a romance in Greek from the pen of Xenophon of Ephesus. It is occupied with the loves of Abrocomas and Anthia, and is the primary source of the story of Romeo and Juliet.

EPHESIANS, Epistle to the. Addressed to <(the saints that are at [Ephesus]® by Paul the Apostle when a Roman prisoner (i, 1 ; iii, 1; iv, 1; vi, 20), linked in time and place of composition with "Colossians® and "Philemon® by the mention of the same bearers, Tychicus "of Asia® (Acts xx, 4; Eph. vi, 20; Col. iv, 7) and Onesimus of Colossae (Col. iv, 9; Philem. v, 12) and the same five persons sending salu¬ tations (Col. iv, 10-14; Philem. 23-24). As the words ((at Ephesus® are wanting in our oldest MSS. (Sinaiticus and Vaticanus), a fact known to Origen (a.d. 186-254), Basil of Caesarea (329- 379), and probably to Marcion (150?) who named the epistle assent to another city of Asia, Laodicea, the original may have borne the ad¬ dress : ((to the saints that are in Asia® (1 Cor. xvi, 19; Acts xix, 10), like (

Origin and Content. — Answering to their simultaneous origin, the phenomenal paral¬ lelism between Colossians and Ephesians in thought and diction presents a psychological and literary problem of exceptional interest, as no fewer than 78 of the 155 verses of the latter epistle contain phraseology which occurs in the former. The prevailing penchant of the 19th century for literary dissection, however, has failed to produce, even with the critical acumen of a Holtzmann, anything better than a com¬ plicated and preposterously artificial theory of secondary imitation and compilation. Here is no patched garment, but a seamless robe. In its profundity, sublimity, spiritual and ethical intuition and in structural symmetry, Cole¬ ridge's eulogium is well-nigh justified: (

spective. Calm meditation upon the cosmic im¬ plications of the Gospel message, unvexed by controversial stress, leaves its impress upon the vocabulary and style of one who could speak of having been <(caught up into Paradise® (2 Cor. xii, 4). Thus in i, 3— iii, 21 the greater elabora¬ tion of the conventional epistolary divisions of Address, Thanksgiving and Prayer, fore¬ shadowed in passages like Rom. i, 1-15, flowers forth in full luxuriance, and in like manner the effort (manifest in Col. ii, 8-23) to gain greater fulness of expression by means of lengthy sentences built up of many subordinate clauses, and the employment of an ampler vo¬ cabulary, has freer scope. The resulting super¬ ficial aspect of aimless discursiveness is ap¬ parent rather than real ; for faith and love, the dominant elements of all of Paul's Christo- logical teaching, form the obvious warp and woof

throughout.

Theme. — The subject of the epistle is : The Reincarnation of the Cosmic Christ in his Church through faith (chs. i-iii) and through love (chs. iv-vi). Following the characteristic opening salutation of ((grace® and (

Bibliography. — Discussions of the prob¬ lems of authorship, vocabulary, style and re-

lation to Colossians may be found in New Tes¬ tament Introductions: T. Zahn (Eng. trans. 1909); J. Moffatt (1901); B. Weiss (1897); H. J. Holtzmann (1892) ; A. Juelicher (1904) ; A. S. Peake (1910) ; F. J. A. Hort (1895) and detailed exegesis in the commentaries of C. J. Ellicott (4th ed., 1868) ; H. A. W. Meyer (Eng. trans., 1880) ; J. A. Robinson (1904) ; H. von Soden (Handcommentar, 2d ed., 1893) ; E. Haupt (8th ed., 1902).

Marcus D. Buell,

Professor of New Testament Greek and Exe¬ gesis, Boston University School of Theology.

EPHESUS, ef'e-sus, Asia Minor, a Greek city of Lydia; one of the 12 Ionian cities; near the mouth of the river Caystrus, now called Kutshuk Mendre. Ephesus is now represented by the village of Avasoluk, about 36 miles from Smyrna, on the railroad to Aidin. After be¬ longing to the Ionians, it fell successively under the dominion of the Lydian and Persian kings. Its importance as a commercial city dates chiefly from the time of Alexander the Great, and it was the starting point of one of the great trade routes into Asia Minor. The apostle Paul lived for two years at Ephesus and established a Christian Church there, to which he addressed one of his epistles. Timothy succeeded Saint Paul, and Saint John is said to have had charge of the Church after Timothy, and to have died at Ephesus. Its bishop was the first of the seven to whom the Apocalypse was addressed. It was long famous for its temple of Artemis (Diana), called Artemision, reckoned one of the seven wonders of the world. The temple was of the Ionic order, and was adorned with many pillars, each 60 feet high, and with numer¬ ous statues and paintings by the most celebrated Grecian masters. It had been destroyed seven or eight times before Pliny wrote, particularly by the notorious Herostratus, 356 b.c. The tem¬ ple, however, was rebuilt by the Ephesians with more magnificence than ever, whose women contributed their trinkets to the general fund raised for this purpose. There were also

many other temples here, a theatre, a stadium or race¬ course, gymnasia, odeum, etc. The site of the temple had become lost when it was discovered by Mr. Wood in 1867-69. In his excavations he found that the building measured about 343 feet by 164, and stood on a raised platform measuring 418 feet by 239. Important excava¬ tions have since been carried out here by the Austrian Archaeological Institute and the theatre, important buildings connected with the gymnasium, and a splendid semicircular marble portico round the east side of the harbor have thus been disclosed. In the double church of Saint Mary the Virgin the Council of Ephesus was held in 431. The Great Mosque or Church of Saint John, the cave of the Seven Sleepers, and other interesting objects are to be seen here. Consult Wood, (Discoveries in Ancient Ephesus) (1877).

EPHESUS, Council of, the third general council of the Roman Catholic Church, held at Ephesus in June 431, principally to oppose the heresy of Nestorius, patriarch of Constantinople. It was convoked by the Emperor Theodosius II at the instance of Pope Celestine I and many Catholic bishops. Cyril, bishop of Alexandria, presided on behalf of Pope Celestine I. The number of bishops in the Council was about 200.

Nestorius, adopting the teaching of Theodorus of Mopsuetia, denied the Church's doctrine of the incarnation, and held that instead of the Word being made man, he (the Word) simply had his special abode in the man Jesus Christ; and that hence Mary the Virgin was not Oeordˆo God-bearing, mother of God, but only XPICJT0T &- wf, mother of the Christ. The Council de¬ clared that Mary is 0ˆot6koc} Deipara, and that Jesus Christ is God and man. (See Communi- catio) . Nestorius was deposed and excom¬ municated. It was not, however, until some years afterward that his supporters acquiesced in this finding. Nestorius himself was ordered by the emperor to retire to his monastery near Antioch. Another Council was held at Ephesus — the (XIV, New York 1900) ; Perry, S. G. F., ed., (The Second Synod of Ephesus, etc. (Dartford 1881) ; Rivington, L., (The Council of Ephesus and Anglican Writers) (in Dublin Review, Vols. CX-CXI, London 1892) ; (Papal Supremacy at the Council of Ephesus) (Ibid., Vol. CXVI, London 1895).*

EPHIALTES. (1) The Malian who con¬ ducted the Persians over a mountain path and enabled them to surprise Leonidas and his Spartans at Thermopylae with a rear attack. (2)' The son of Poseidon and Iphimedia.

EPHOD, commonly believed to have been a species of vestment woven of gold, blue, pur¬ ple, scarlet, and fine twined linen, worn by the Jewish high-priest. According to Exodus xxviii, 6 ff. and xxxix, 2 ff. it consisted of two main pieces, one covering the back, the other the breast and upper part of the body, fastened together on the shoulders, by shoulder straps. On

each shoulder was an onyx stone set in gold, on which were engraved the names of six tribes according to their order. A girdle or band, of one piece with the ephod, fastened it to the body. Just above the girdle, in the mid¬ dle of the ephod, and joined to it by little gold chains, rested the square breastplate or pouch with the LIrim and Thummim. The ephod was originally intended to be worn by the high- priest exclusively, but a similar vestment made of linen was worn in later times by priests of

»

lower rank. In more recent times considerable discussion has been carried on in regard to the true nature and appearance of the ephod. Some investigators claim that it was a shrine, some that it was just a pouch somewhat on the order of a loin cloth, and still others that it was an instrument of divination. However, inasmuch as all the evidence on which these investigations are based is more or less circumstantial and indefinite the question is still unanswered and is likely to remain so. Consult Elhorst, H. J., (Das Ephod) (in Zeitschrift fiir die alt-testa¬ ment liche W'issenschaft , Vol. XXX, p. 259, Giessen 1910) ; Foote, T. C., (The Ephod (in Journal of Biblical Literature, Vol. XXI, p. 1, Boston 1902) ; Macklenburg, A., (liber den Ephod in Israel* (in Zeitschrift fur Wissent-schaftliche Theologie, Vol. XLIX, n. F. Vol. XIV, p. 433, Leipzig 1906).*

EPHORS, ef'ors, or EPHOROI, magis¬ trates common to many ancient Greek com¬ munities. The most celebrated were the Ephoroi of Sparta. The origin of the office is uncertain and it is very doubtful that they were instituted by Lycurgus. They were five in num¬ ber, and in historical times were elected by the people annually, their authority being designed as a counterpoise to that of the king and coun¬ cil. They superintended the morals and domes¬ tic economy of the community; scrutinized the conduct of all officials, and even summoned the kings before their tribunal. The judicial au¬ thority and executive power eventually fell almost entirely into their hands ; they became autocratic, opposed the extension of popular privileges, and arousing the antagonism of the kings and people, were suppressed by Cleomenes III, the latter murdering the Ephors 225 b.c. After his fall in 221 b.c. the office was revived, but never regained its influence. There is a very extensive literature on the subject, almost entirely in German. Besides articles in the vari¬ ous (Histories of Greece) (q.v.), there is a very exhaustive, but rather technical article by Szanto in Pauly-Wissowa (Real-Encyklopadie der Klassischen Alertumswissenschaft) (Vol. V, Stuttgart 1907). Consult Dum, G., (Die Entstehung und Entwickelung

des Spartan- ischen Ephorats) (Innsbruck 1878) ; Kuchtner, K., (Berlin 1894).

EPHORUS, Greek historian, flourishing in the 4th century b.c., from about 400 to 330 B.c. ; was born at Cyme, in Aeblis, Asia Minor. Little is known concerning his life, but it is related that he studied under Isocrates and that the latter, after training him in rhetoric, persuaded him to abandon oratory for history, and that it was upon his suggestion that he prepared his universal history. This work laropiai, in 30 volumes, was the first history ever written in Greece and was remarkable for its wealth of material and also for the fact that each book, containing a compact portion of the history with an introduction, was complete in itself. The history deals with the Greeks (outside of the mythical age) from the return of the Hera- cleidae to the siege of Perinthus (340 b.c.), cov¬ ering a period of over 700 years. His style of

*writing was loose and feeble, well meriting the alleged remark of Isocrates, that he needed the spur, as Theopompus the bit. The history was used and praised, however, by Polybius, Dio¬ dorus and Strabo. The main portions of the manuscripts have perished, only a few frag¬ ments remaining, which were published in (Fragmenta Historicorum Graecorum * (C.*

Muller, ed., Vol. I, p. 234-277, Vol. IV, p. 641, Paris 1841). An older collection, (Ephori Cumaei Fragmenta, (Karlsruhe 1815) was edited by M. Marx. Consult Bury, J. B., (The Ancient Greek Historians) (New York 1909) ; Schwartz, E., (Ephorus) (in Pauly-Wissowa ˆeal Encyklopadie der Klassischen Altertums- wissenschaft,* Vol. VI, p. 1, Stuttgart 1907) ; id., (Die Zeit des Ephoros) (in Hermes, Vol. XLIV, p. 481, Berlin 1909).*

EPHRAEM SYRUS, e'fra-em si'rus, SAINT EPHREM, or EPHRAM (the Syrian), Syrian theologian: b. Nisibis, Mesopo¬ tamia, about 306; d. Edessa, Mesopotamia, 373. He lived in Nisibis till 363 and played an im¬ portant part in defending his native city against the various sieges to which the Persians sub¬ mitted it. When the Emperor Jovian gave up the town to the Persians in 363, he, together with its other Christian inhabitants, left. He finally settled in Edessa where he continued to reside till he died, except for intervals which he spent in prayer and meditation in the desert and except for a journey to Egypt and a visit to Saint Basil, Archbishop of Caesarea in Cap¬ padocia. He held humble rank in the hierarchy, that of deacon, but as a preacher attained high celebrity. He refused to be ordained a priest because he thought himself unworthy. His writings were very numerous, and many are ex¬ tant. He used a poetic form in his homilies and harangues; and Saint Jerome tells us that his homilies (translated into Greek, for he wrote in Syriac) were wont to be read in many of the churches of Greece immediately after the Scripture lesson. He

was a valiant defender of Catholic orthodoxy against the heretics of his time — Bardesanes, the Gnostic, the Arians, and the Sabellians, the Manichaeans and the Nova- tians. Some of his lyrics are remarkable for their simplicity and genuine poetic spirit. Even his homilies are of a poetic cast and form. His works have been collected and translated into Latin, Greek, German and English. There are also Armenian, Arabic, Coptic and Ethiopic versions of the original Syriac. The most im¬ portant translations and collections, many of which are preceded by accounts of his life, are: (Omnia Opera S. Ephnemi Syri) (G. Vossius, ed., 3 vols., Rome 1589-98) ; (Greek Text of 156 Writings of Saint Ephrem (E. Thwaits, ed. Oxford 1709) ; (S. P. M. Ephraem Syri Opera Omnia Qua? Extan Greece, Syriace, et Latine) (J. S. Assemanus and S. E. Assemanus, ed., 6 vols., Rome 1732-46) ; (Ausgewahlte Schriften des Heiligen Kirchenvaters Ephram* (F. Zin- gerle, ed., 6 vols., Innsbruck 1831-46) ; (Saint Ephrem's Commentaries on the Epistles of Saint PauP (Latin text, Aucher, ed., 4 vols., Venice 1836) ; (Select Works of Saint Ephrem the Syrian) (J. B. Morris, transl., Oxford 1847) ; (Repentance of Nineveh) (H. Burgess, transl., London 1853) : (Select Metrical Hymns and Homilies, etc.,* (H. Burgess, transl., Lon¬ don 1853) ; (S. Ephnemi Syri, Rabulae Epis-*

copi Edesseni, Bataei, Aliorumque Opera Se- lecta) (Syriac text, J. J. Overbeek, ed., Oxford, 1865) ; (S. Ephraemi Syri Carmina Nisibena, etcP (Syriac and Latin texts, G. Bickell, ed., Leipzig 1866) ; (Commentaries on the Concord¬ ance of the Gospels } (Latin text, Moesinger, ed., Venice 1878) ; (S. Ephraem Syri Hymni et Sermones) (Syriac and Latin texts, T. J. Lamy, ed., Malines 1882) ; (S. Ephraem Syri Com- mentarii in Epistolas D. Pauli, etc. ' (Venice 1893) ; < Fragments of the Commentary of

Ephrem Syrus Upon the Diatessaron> (J. R. Harris, ed., London 1895) ; (Selections Trans¬ lated into English from the Hymns and Homi¬ lies of Ephraim the Syrian J (J. Gwynn, ed. and transl., in (A Select Library of Nicene and Post-Nicene Fathers, 2d ser., Vol. XIII, pt. 2, p. 112, New York 1898). Consult Alsleben, (Das Leben des H. Ephrem* (Berlin 1853) ; Ferry, S., (Saint Ephrem, Poete* (Paris 1877) ; Lamy, T. J., (Saint Ephrem Syrus* (in Dublin Review, 3d ser., Vol. XIV, p. 20, London 1885).*

EPHRAIM, e'fra-im, according to Gen. xli, 50-52, the younger son of Joseph and of Asenath and the founder of one of the 12 tribes of Israel. The tribe occupied one of the finest and most fruitful territories of Palestine; in the very centre of the land, and included the most of what was afterward called Samaria. Its approximate boundaries were : on the east

the river Jordan, on the west the Mediterranean Sea and the tribe of Dan, on the south the tribe of Benjamin, and on the north that of Manas- seh. The Ephraimites, when they left Egypt, are said to have numbered 40,500, and, being numerous and influential, often appear as the representatives of the 10 tribes, both in histor¬ ical and prophetical passages of the scriptures. For a long time the ark and the tabernacle were situated at Shiloh in the heart of Ephraim. The tribe was the most warlike of all the Israelites

attested by their protests against Gideon (Judges viii, 1) and against Jephthah (Judges Xli, 1-7) because they did not ask their aid in war. Joshua, who conquered the Holy Land, and Samuel, the prophet, were members of the tribe. Upon the death of Saul, the Ephraimites, in conjunction with all the other tribes except Judah, took part in the revolt of Saul's son Eshbaal (Ishbosheth), and recognized him as legitimate king in opposition to David (2 Sam. ii, 8-9), but upon his murder, submitted to the hegemony of Judah under David. Later, about 975 b.c., after the death of Solomon, the tribe revolted under Jeroboam against Rehoboam, the son of Solomon (1 Kings xii, 1-20), and with all the tribes except Judah, Simeon, part of Benjamin, and the Levites, merged into the northern kingdom of which they constituted the most important part. There are, of course, nu¬ merous references to Ephraim in many parts of the Old Testament. A list of these may be found in the article by H. W. Hogg in Vol. II of Encyclopedia Biblica (London 1901). Con¬ sult also English Commentaries on Bible, Old Testament, Exodus.

EPHRAIM, town of Palestine, mentioned in John xi, 54, as a place where Jesus took temporary refuge. A town of this name is mentioned twice in the Old Testament and by Josephus, and is probably the same place. Nothing is known of its history. Modern at¬ tempts to identify it with Et-Taiyibeh, four

*miles northeast of Beitin, the ancient Bethel, do not rest on any secure foundation beyond the fact that it best corresponds to the New Tes¬ tament description as <(near the wilderness.**

EPHRAIM CODEX. See Bible.

EPHRATA, Pa., township and borough in Lancaster County; on the Philadelphia and Reading Railroad, about 50 miles northwest of Philadelphia. It is an agricultural and mining region with forests nearby. It is a health re¬ sort and has manufactories of cigars, silk, underwear and hosiery. The borough owns its waterworks and electric-light plant. Ephrata was founded by Johann Conrad Beissel (q.v.) and his followers in 1735. The community es¬ tablished by Beissel was called ((1872) ; Kuhns, Ger¬

man and Swiss Settlements of Colonial Pennsyl- vania) ; Sachse, (The German Sectarians of Pennsylvania) (2 vols., 1900).

EPHYDRA, a genus of flies, of the Ephy- dridae, the eggs and larvae of which were con¬ sidered a dainty by the aborigines of America. See Fly.

EPIBLAST, one of the layers in the de¬ veloping embryo from which the structures making up the skin and its appendages are de¬ veloped; also called ectoderm. See Em¬ bryology.

EPIC. See Narrative Poetry.

EPICARDIUM. See Heart.

EPICHARMUS, Greek philosopher and comic poet : b. Cos, about 540 b.c. ; d. 450 b.c. He lived at Syracuse, and there wrote his cele¬ brated comedies, now lost. Their number is reckoned at 52, and the titles of 35 of them have been preserved. Very little is known def¬ initely about his life. But it is said that, be¬ fore commencing his career as a comic poet, which apparently he did somewhat late in life, he lived at Megara, engaged in the study of philosophy, both physical and metaphysical. The

fragments of his writings which are preserved abound with philosophical maxims, and with speculative discourses. His genius was highly esteemed among the ancients by such judges as Plato and Cicero. The Sicilian comedy of Epi- charmus, prior to the Attic, grew out of the mimes, which were peculiar to this island, mak¬ ing a sort of popular poetry. He arranged the separate unconnected scenes; exhibited in the mimes, into continued plots, as in tragedy. His comedies were long regarded as models in this species of composition, and were as much dis¬ tinguished by their knowledge of human nature as by their wit and lively dialogue. The Sicil¬ ian comedy, in opposition to the Attic-Ionic, is also designated as the Doric comedy and is written without chorus. As their subject mat¬ ter Epicharmus chose mythological incidents which he travestied or characters from every¬ day life. He wrote in trochaic and anapaestic tetrameter. The best and most recent collec¬ tion of his fragments is contained in (Poetarum Graecorum Fragmenta) (G. Kaibel, ed., Vol. VI, Berlin 1899). Consult Koerte, A., (Die Griechische Komodie) (Leipzig 1914).

EPICCENE, or THE SILENT WOMAN,

a comedy by Ben Jonson, produced in 1609. An old man, named Morose,

disliking noise marries Epicoene because of her good reputation as a good listener and also with the aim of disin¬ heriting a nephew. Immediately after marriage Epicoene displays an exceedingly shrewish dis¬ position. Morose, in order to be rid of her, secures the services of his nephew by gifts and promises of reward. The nephew then discloses Epicoene as a boy in disguise, who had been in¬ duced to play this trick upon Morose.

EPICONTINENTAL SEAS, those shal¬ low seas which cover the continental shelf (q.v.) and which from time to time have cov¬ ered most parts of this and other continents in the geologic past. The term is in contrast to the deep seas which have been more persistent in their history.

EPICTETUS, Stoic philosopher: b. Hiera- polis, Phrygia, about 60 a.d. He lived at Rome, where he was the slave of Epaphroditus, a brutal freedman of Nero, whose abuse and mal¬ treatment he bore with fortitude. He was later manumitted. Epictetus himself did not leave any written account of his doctrines, which appear to have been of the most elevated kind. In his discourses he aimed to impress his hearers with the love of practical goodness. The foun¬ dation of philosophy he held to be the percep¬ tion of one's own weakness and inability to do what is needful. His doctrines approach more nearly to Christianity than those of any of the earlier Stoics, and although there is no trace in what is recorded of them of his having been directly acquainted with Christianity, it is at least probable that the ideas diffused by Chris¬ tian teachers may have indirectly influenced them. The excellence of his system was uni¬ versally acknowledged. Banished from Rome by Domitian who hated him on account of his principles, Epictetus settled in Epirus, and al¬ though he possessed the favor of Hadrian, there is no evidence that he returned to Rome. His pupil Arrian, the historian of Alexander the Great, collected his maxims with affectionate care, in the work entitled (Enchiridion) (handbook) and in eight books of (Commen- vol. to — 27*

tariesP four of which are lost. These reveal the simple and noble earnestness of the philos¬ opher's character, as well as that real heart¬ felt love of good and hatred of evil which is often assumed to be an exclusively Christian feeling. (See Discourses). Consult the com¬ plete edition of his works by Schenkl (Leipzig 1898), and the translation by Carter (London 1758), Higginson (2 vols., Boston 1890) and Long (London 1897). Consult also Arnold, 'Roman Stoicism) (Cambridge 1911) ; Melcher, (De Sermone Epictetes) (Halle 1906) ; Ritter and Preller, (Historia Philosophise Graecse) (9th ed., Gotha 1913).

EPICUREANISM. Epicureanism as a philosophical doctrine has its rise in the teach¬ ings of its founder Epicurus, who was borne in Samos in the year 342 or 341 b.c. He was the son of Neocles and Chserestrata. His

*father's name being the same as that of the great states¬ man Themistocles, suggested to * the poet Menander a verse in which he contrasts the son of Neocles, who freed his country from slaver}", with him who freed it from foolishness. In his early life, Epicurus taught in several schools in Asia Minor and in the year 306 came to Athens, where he founded a school of his own. By the subtle charm of his personality he at¬ tracted to himself a group of admiring friends and followers who were not only devoted to the teacher but were also fired with enthusiastic zeal for his teaching. They were his com¬ panions and friends rather than his pupils. Their meeting place was the famous garden of the master which has become so closely asso¬ ciated with the very name of the school. After the death of Epicurus in 270 his followers car¬ ried on his work and maintained the teachings and traditions of their leader with unabated earnestness and loyalty. Among the successors of Epicurus, the most conspicuous perhaps are Hermarchus, Dionysius, Apollodorus, Zeno and Phaedrus. But no one of his followers achieved marked distinction until we come to the time of T. Lucretius Carus, the interpreter and chief apostle of Epicureanism. Though a Roman, he had caught that Greek spirit which had been so brilliantly illustrated in the garden of Athens.*

Epicureanism as a distinct school flourished with varying fortunes until a period as late as the 4th century a.d. With the decay and dis¬ appearance of the school, its influences how¬ ever did not cease, but lived on, and will live ; for Epicureanism represents an attitude of mind which will ever appeal most strongly to certain natures, and in a way to all natures. It is not in a strict sense of the phrase, a system of philosophy. It is rather a theory of life. It is essentially practical in its purposes, methods and results. So far, however, as Epicureanism- may be called a system of philosophy, it falls into three parts — a system of canonics, of nature and of morality. By canonics is meant a system which exhibits certain canons or tests of truth. With Epicurus the supreme test of truth was to be found in the sensations. It is the same thought as that which is contained in the old adage — seeing is believing. He held that only the actual facts of a sensory experience can furnish a scientific basis upon which to con¬ struct a body of knowledge. The notions are to be regarded merely as generalized sensations, and all opinions are inferences which at the

last analysis must rest upon simple sensations. The sensation as such, therefore, is the court of last appeal. Concerning his philosophy of nature, Epicurus taught that there were only natural causes. Any belief in supernaturalism he regarded as a superstition which only a weak intellect

could possibly entertain. As regards the constitution of matter, he followed Democ¬ ritus in the essential features of his atomic theory of the universe. He did not follow, however, with complete rigor the logic of his materialistic conceptions, for he allowed that there must be a distinction between the irra¬ tional, or more sensory part of the soul on the one hand, and on the other, the rational part which he regarded as the superior and con¬ trolling power of man's nature. Moreover, while denying the existence of the gods, as gods of providence sustaining the forces of nature, and ruling the destinies of man, he nevertheless believed in their existence as beings apart and wholly separate from mundane affairs. From the standpoint of his ethical system, the gods were of very necessity beings supremely happy, and such they could not be, were they supposed to be in any way cognizant of the darker side of nature and the manifold ills of human life. Ac¬ cording to Epicurus the great end to be attained through the study of nature was to disabuse the mind of any lurking superstition concerning the possibility of the supernatural.

It is, however, the ethical system of Epicurus which is the heart of his teaching, and it is this system that the term Epicureanism usually suggests to one's mind. With Epicurus man's chief end is the attainment of pleasure, — not in the sense, however, that life is a heedless pur¬ suit of pleasure here, there and everywhere. The end is pleasure, not pleasures. The supreme pleasure, the constant source of all other pleas¬ ures, is the tranquil and happy mind. In plac¬ ing the true source of pleasure within, Epicurus here differs from the earlier Cyrenaic who re¬ garded man's happiness as consisting in the full round of delights, the sum total of all his actual enjoyments. Epicurus taught that mere bodily pleasures were not an end in themselves, but only as they minister to peace of mind. Vio¬ lent excesses disturb, extreme asceticism tor¬ ments the inner spirit of man. Therefore be not too indulgent, nor too rigorous with self. Study to attain the maximum of enjoyment with the minimum of distress. Let a wise prudence transmute both the good and the evil of life into a tranquillity of soul. In this conception of conduct, virtue is never an end in itself. It is always a means to an end. The end is happiness and so far as a life of virtue contributes to well-being, so far only is it to be commended.

We find in Epicureanism and in Stoicism alike, the common endeavor to free man from the dominion of circumstance, and to establish an inner world of mind wholly independent of the outer world of chance events, of untoward influences, of hostile forces and fleeting delights. The Stoic, however, urged the repression of all desire ; the Epicurean, on the other hand, urged its wise regulation. As Epicurus himself puts it, <(It is not an unbroken succession of drinking feasts and of revelry, not the pleasures of sexual love, nor the enjoyment of the fish and other delicacies of a splendid table, which pro¬ duce a pleasant life, it is sober reasoning,

searching out the reasons for every choice and avoidance, and banishing those beliefs through which greatest tumults take possession of the soul. Of all this, the beginning and the great¬ est good is prudence. Wherefore prudence is a more precious thing even than philosophy : from it grow all the other virtues, — for, it teaches that we cannot lead a lift of pleasure which is not also a life of prudence, honor and justice, nor lead a life of prudence, honor and justice which is not also a life of pleasure. For the virtues have grown into one with a pleasant life, and a pleasant life is inseparable from them.® In dealing with the fear of death Epicurus proved that the dissolution of the body involves that of the soul, and therefore death is nothing to us, because when we are, death is not; and when death is, we are not.

Bibliography. — Asener, (Epicurea) (Leip¬ zig 1887) ; Cassel, (Epikur der Philosoph) (Berlin 1892) ; Geodeckemeyer, (Epicurus' Verhaltnis zu Demokrit in der Naturphilosophie (Strassburg 1897) ; Gizycki, (Ueber das Leben und die Moralphilosophie des Epicurus) (Halle 1879) ; Gomperz, (Herculanische Studien* (Leipzig 1866) ; Guyan, (La Morale d'Epicure* (3d ed., Paris 1886) ; Joyau, (Epicure) (ib. 1910) ; Kreibig, (Epicurus y (Vienna 1886) ; Lange, (History of Materialism J (Boston 1886) ; Pater, W., (Marius the Epicurean) (latest ed., 2 vols., New York 1913) ; Santayana, (Three Philosophical Poets) (Cambridge, Mass., 1910) ; Taylor, (Epicurus > (London 1911) ; Trezza, (Epicuro e l'Epicureismo) (Florence 1877) ; Wallace, (Epicureanism } (London 1880) ; Wat¬ son, (Hedonistic Theories) (Glasgow 1895).*

John Grier Hibben, President of Princeton University.

EPICURUS, ep-i-ku'rus, Greek philoso¬ pher : b. Samos 341 b.c. ; d. Athens 270 b.c. He went to Athens 323 b.c., where he is said to have enjoyed the instructions of Xenocrates, then at the head of the Academy, but this he himself does not admit. Epicurus generally denied his obligations to other philosophers. Although some parts of his system are evidently borrowed from his predecessors, he claimed to be self- instructed, and treated his teachers with hos¬ tility and contempt. His stay at Athens, how¬ ever, was brief ; and on leaving it he went to Colophon, where; his father was engaged in teaching, and began himself to give lessons in grammar. It was here, according to some ac¬ counts, that his attention was first turned to philosophy. He himself says he began his philo¬ sophical studies at the age of 14, but they may have subsequently taken a more distinct devel¬ opment. The inability of the grammarians to explain a passage about Chaos and the acci¬ dental possession of a copy of the works of Democritus are variously assigned as the cause of this new or more decided direction of his mind. From Colophon he went to Mytilene and Lampsacus, where he engaged in teaching phi¬ losophy. He returned to

Athens in 306 and pur¬ chased a garden in a favorable situation, where he established a philosophical school. Here he spent the remainder of his life except for short visits to Asia Minor. His mode of life appears to have been simple and temperate. He abstained, as a principle, from politics, and took no part in public affairs. During the latter part of his life he _was afflicted with severe physical suffer¬ ing which was borne with heroic courage.

Epicurus was a very voluminous writer. He wrote some 300 separate treatises. His works, however, are represented as full of repetitions and quotations. In ancient times his philosophy appears to have been more popular in Greece than in Rome, although his disciples were numerous in both. This is easily comprehended, as it was in fact a system engendered by the de¬ cline of public virtue in Greece, while the sever¬ est stoical philosophy was better adapted to the still active public spirit of Rome. Little is left of his numerous writings. Some fragments of a (Treatise on Nature, > which is known to have consisted of 37 parts, were found at Hercula¬ neum and published by J. C. Orellius (Leipzig 1818). All other fragments have been pub¬ lished by H. Usener in his (Epicurea) (Leipzig 1887). The chief account of his philosophy is contained in the great poem of Lucretius, (De Rerum Natural one of the masterpieces of Roman literature. A good edition of the latter is that by W. A. Merrill (New York 1907). There is also a translation by H. A. J. Munro (London 1908). Consult (Epicurus and His Sayings > (in Quarterly Review, Vol. CLXXXV, p. 68, London 1897) ; (Epicurus and Lucretius (in Westminster Review, n. s. Vol. LXI, p. 299, London 1882) ; Du Rondel, J., (La Vie d'Epicure) (La Haye 1686) ; Gassend, P., (De Vita et Moribus Epicuri* (1647); Girard, J., (Etudes sur la Poesie Grecque,* etc. (Paris 1884) ; Gomperz, T., (Greek Thinkers* (4 vols, London 1901-12) ; Guyau, M., (La Morale d'Epicure) (Paris 1881) ; Hicks, R. D., (Stoic and Epicurean * (New York 1910) ; Kreibig, J., (Epikur* (Leipzig 1886) ; Reale Accademia Ercolanese di Archeologia, (Herculanensium Voluminum Quae Supersunt* (11 vols., Naples 1793-1857) ; Taylor, A. E., Epicurus* (New York 1911); Wallace, W., (Epicureanism) (London 1880).*

EPICYCLE, in ancient astronomy, a small circle supposed to move round the circumfer¬ ence of a larger, a hypothetical mode of repre¬ senting the apparent motion of the planets, which were supposed to have such a motion round the circumference of a large circle, called the deferent, having the earth in its centre. See Astronomy.

EPICYCLOID, in geometry, is a curve generated by a point in one circle,

which rolls on the convexity of the circumference of an¬ other circle. If the rolling circle is inside the fixed circle the curve generated is a hypocycloid. The common cycloid is generated by a point in a circle that rolls along a right line. The latter has sometimes been assimilated with the former by considering the right line as the circumfer¬ ence of a circle whose diameter is infinite. The invention of epicycloids is ascribed to Roemer, the Danish astronomer. See Geometry.

EPI CYCLOIDAL WHEEL, a wheel or ring fixed to a framework, toothed on its inner side and having in gear with it another toothed wheel of half the diameter of the first, fitted so as to revolve about the centre of the latter. As the inner wheel revolves a point on its periphery will oscillate in a straight line. It is used for converting circular into alternate mo¬ tion, or alternate into circular.

EPIDAMNUS. See Durazzo.

*EPIDAURUS, ep I da'rus, one of the most important towns and commercial seaports of ancient Greece, situated in Argolis, on the east coast of the Peloponnesus, particularly cele¬ brated for its magnificent temple of TEsculapius, which stood on an eminence eight miles west of the town. An inscription over the entrance declared it to be open only to pure souls. Crowds of invalids resorted to the place in hopes of obtaining a cure from the beneficent divinity, in whose honor festivals were cele¬ brated yearly. It received its name from Epi- daurus, a son of Argus and Evadne. Excava¬ tions made by the Greek Archaeological Society have brought to light parts of Tholos ; a tem¬ ple, probably that of Aesculapius, 81 feet long by 43 feet wide; the theatre, which is the most perfect example of Greek theatre in existence; stadia, baths, gymnasia and hospital. Epidaurus is now called Pidavro, or Edidairo, and is the place where in 1821 the first Greek Congress assembled.' The modern town contains about 100 inhabitants. Consult Caton, (Epidaurus * (1900) ; Diehl, Excursions in Greece* (1893) ; Delfrasse and Lichat, (Epidaure) (1895) ; Gardner, (New Chapter in Greek History >*

(1892).

EPIDEMIC. See Epidemiology.

EPIDEMIC CEREBROSPINAL MEN¬ INGITIS. See Meningitis.

EPIDEMIOLOGY, the study of epidemics or the science that treats of those diseases that are known to attack a number of persons at the same time or in close succession. The es¬ sential feature is that epidemic diseases belong to a group of infective or microparasitic mala¬ dies which have the

common property of spreading from time to time in a community. It is well known that many diseases of an epidemic character have their favorite haunts. In such places they are always present and there they are said to be endemic. It is only when they appear in large numbers of people in their fa¬ vorite habitats that they assume epidemic pro¬ portions. Thus there is little distinction between the two classes of disease, since the same dis¬ ease may be at one time both endemic and epi¬ demic. When an epidemic disease, for instance, influenza, spreads the entire world over, the word pandemic is applied. The essential feature in an epidemic disease is that it must have a definite contagium. The contagia may be either of bacterial or protozoan character. Thus cholera, dysentery, the plague are caused, as is known, by bacteria which, being carried in the ordinary paths of commerce, or by bodies of a moving population, are spread about the world. Occasionally epidemic disease is due to an ani¬ mal parasite. This is presumed to be the case in yellow fever, and is known to be true of malaria. In malaria, as is now positively demon¬ strated, the agent that is all-important in the spreading of the disease is one genus of mos¬ quito, Anopheles. The parasite lives normally in the human body and is conveyed by means of the blood into the mosquito, where it under¬ goes a special cycle of development, until it is inoculated into another human being, who de¬ velops the disease.

The importation of epidemic and parasitic disease from Africa and Asia is now urged as a reason for extreme precaution in the contact of whites with alien races. The importation of

such diseases from Africa is now considered to have contributed materially to the downfall of the Roman Empire. The negroes, according to recent investigation, are responsible for the introduction into the Southern States of ma¬ larial fever, which they brought in their blood from Africa, and to which, themselves immune, the whites fell victims. Similarly the American negroes, according to a discovery made by Dr. Stiles in 1902, carry in their intestines the virus of hookworm with relatively slight discomfort; but not so the white population ; and to this cause is set down the physical inefficiency and mental inertia which afflict so many of the Southern whites. Cholera, bubonic plague, typhus and smallpox have all had their origin in Asia.

Further, it may be said that the essential features for the development of epidemic con¬ ditions are (1) A virus; (2) a susceptible popu¬ lation; (3) free intercommunication between the sick and the susceptible. In the group

in which the animal parasites belong there must be (1) A virus; (2) a breeding-place outside of man; (3) a means of transport from place to place, either naturally or artificially; (4) a vehicle for the diffusion of the disease, such as the mosquito, for instance, or a contaminated water-supply, or a person suffering from the disease who travels from place to place and (5) a susceptible population. It is well known that variation in the susceptibility of populations is a very important element in the consideration of epidemics. Thus measles, whooping-cough, diphtheria and similar affections ravaged Ha¬ waiian (formerly Sandwich) Islands with a fierceness and mortality unknown to modern times. Seasonal movements, sectional fluctua¬ tions, time fluctuations and oscillations are in¬ teresting features in the study of epidemics. By some writers the word epidemic is very loosely used to indicate certain waves of mental excita¬ tion which have caused and still cause mental storms throughout the community, as the danc¬ ing mania and similar occurrences. These can¬ not be spoken of as epidemics in the true sense unless one wishes to use the broad term of <(emotional contagion.® Some of the most inter¬ esting epidemics of modern years have been the influenza epidemic of 1890, which»traveled round the world in from three to four years, and the plague epidemic that was raging from 1895 to 1902, slowly traveling over the habitable globe. There have been no severe extensive epidemics in the United States, save the epidemic of in¬ fluenza, for a great many years, and in civilized countries at the present time the chances for the spreading of more severe epidemics are greatly lessened by the application of the laws of modern hygiene as well as by procedures arising from the newly acquired knowledge concerning immunity. The time does not seem far distant when immunity from many forms of infectious disease may be conferred by proper serum therapy. Consult Creighton, (The History of Epidemics in Great Britain from 664 a.d. to the Extinction of the Plague) (2 vols., Cambridge 1891-94) ; Hecker, (Epidemics of the Middle Ages) (trans. by Babington, 2 vols., London 1835) ; Hirsch, (The Geographical Distribution of Disease) (1893) ; Weichselbaum, (Epi- demiologie) (1900) ; and (Epidemiology > (in Encyclopaedia MedicaC 1900).

EPIDENDRUM, a large genus of tropical American orchids, most of the species of which are epiphytic, growing on trees. There are up¬ ward of 500 species in South America alone. The stems develop pseudo-bulbs, the leaves are strap-shaped and leathery and the flowers are single or in spikes, panicles or racemes. The flowers of some species are very handsome and a large number of the species are in cultivation. Two of the finest cultivated species are the Mex¬ ican plants E. nemorale and E. vitellinum, the former with rose-colored and the latter with orange-colored flowers. The plants are much used in hybridization, as they are hardy and rigorous, and are valuable for crossing with the less hardy species of other genera, the result

being in many cases long-stemmed flowers of fine appearance.

EPIDERMIS, the outer layer of the skin.

See Skin.

EPIDIDYMIS, an organ lying beside the testicle and transmitting the semen to the vas deferens. See Testicle.

EPIDIDYMITIS, inflammation of the epididymis, resulting in pain, redness, heat and swelling of the testicle, with general constitu¬ tional malaise. Treatment consists in rest in bed and soothing applications.

EPIDOTE, a common mineral, usually yel¬ lowish-green in color, and crystallizing in pris¬ matic forms belonging to the monoclinic sys¬ tem. It is a silicate of calcium, iron and alumi¬ num, with the general formula HCa2(Al, Fe)aSis O13, the ratio of the aluminum to the iron vary¬ ing, in different specimens, from 6:1 to 3:2. Its hardness is from 6 to 7 and its specific gravity is about 3.4. Epidote occurs throughout the world. Fine crystals 'are found in France, the Tyrol, Haddam, Conn., Calumet, Colo., and Alaska. The epidote group contains, in ad¬ dition to epidote proper, the minerals piedmon- tite and allanite, which resemble it in general nature but contain manganese and cerium re¬ spectively; and also the calcium epidote, zoisite, which crystallizes in the orthorhombic system. EPIGiEA, ep-i-je'a. See Arbutus, Trailing.

EPIGASTRIUM, the upper fore part of the abdomen, reaching from the pit of the stom¬ ach to an imaginary line above the umbilicus (navel) supposed to be drawn from the one extremity of the last false rib, on one side, to the corresponding point on the other.

EPIGENE, a term applied to those geo¬ logical agents of change which affect chiefly the superficial portions of the earth's crust, as the atmosphere, water, plants and animals.

EPIGENESIS, ep-i-jen'e-sis, in biology, the development of the animal from the simple protoplasm of the egg. This term therefore expresses the theory and process of embryology as now understood, and is opposed to the pre¬ vailing theory, previous to the researches of Harvey, and especially of Wolff and Von Baer, which was then known as the emboitment the¬ ory, an account of which is given under Pre¬ formation. See also Embryology.

In physiology the supposed production in organized beings of or additional formations by means of new vital influences, as opposed to the idea that new parts are simply the result of de¬ velopments or changes in pre-existing struc¬ tures.

EPIGENETIC. See Syngenetic.

EPIGLOTTIS, the cartilage at the root of the tongue forming a valve which partly closes the aperture of the larynx (q.v.) during the process of swallowing. When respiration takes place the epiglottis is vertical but falls back and covers the larynx on the approach of food. Any portion of food, however minute, entering the sensitive larynx, causes distress and is auto¬ matically ejected by a spasm of coughing.

EPIGONI, a name given in Greek legend to the sons of the seven Greek chiefs who con¬ ducted the expedition against Thebes in the war between Eteocles and Polynices. The name literally means descendants, successors or heirs, and the second expedition in command of the sons to avenge the first disastrous defeat was thus called the c(war of the epigoni.® The name is also applied to students who attempt to develop the ideas of the great masters of a pre¬ vious period.

EPIGRAM. The Greek noun from which the word epigram comes was originally used to denote a prose inscription on a temple, tomb, statue, votive-offering to a god or the like. Conciseness and brevity were, therefore, essen¬ tial qualities. To give pleasure to the ear and help the memory, the Greeks next chose some poetic form for them, preferably the elegiac distich. Their use for practical purposes even¬ tually suggested their composition as a form of literature, with subject matter sometimes wholly imaginary. These poems now often embraced several distichs, and appeared in other metres, but continued to be ordinarily of a simple, ex¬ pository or descriptive nature. In the Alexan¬ drine period, however, when poets affected al¬ most exclusively short but highly elaborate poems, epigram lost much in simplicity while at¬ taining its highest popularity among the Greeks. Its composition had become the pastime, and even the serious ambition, of authors .of first rank, and its recitation and improvisation one of the favorite entertainments at symposia and other social gatherings. Collections of epi- graphical epigrams were made. Meleager of Gadara followed these early in the 1st century b.c. with his (

ralize this species of poetry at once. At first they modeled after the Greeks, and we have a few specimens of the erotic epigram as the Alex¬ andrines wrote it. By Cicero's time most of the literary men of importance were writing epigram, and its value as a political weapon was fully appreciated. Catullus is, however, the only writer from whom we have any consider¬ able collection. Although we find in him lyric qualities as fine as in the

poems of the Anthol¬ ogy, it is still clear that the national aptitude for satire has already turned epigram strongly in that direction. It is the Latin satiric epi¬ gram and not the more lyrical Greek that be¬ comes the model for modern writers. In the Augustan Age, Domitius Marsus and Pedo Albinovanus were, according to Martial, the great¬ est epigrammatists, but we have not enough of their work to judge it. Martial himself brought this branch of poetry to its acme. None of the eminent poets who followed in his steps, Petronius, Apuleius, Ausonius and Claudian, have equalled him in epigram. In the 6th cen¬ tury Luxorius maintains the tradition, but at a low level. About this time the Salmasian col¬ lection was made which forms the nucleus of the modern compilations which we call the Latin Anthology. In the time of Charlemagne epigram enjoyed a veritable renaissance, taking the inscriptional form to describe the material glories of Christianity as well as to sing the praises of the dignitaries of the Church. Then the humanists, to whom Latin was almost a second mother tongue, revived this form once more. But the Latin scholars who have written epigrams are too numerous to name here. One, John Owen of Oxford, should not perhaps be passed by, since he devoted himself wholly to this field and with marked success. In English literature the composition of epigram has long been out of fashion, but for centuries it was popular with literary men. Notable achieve¬ ments in this line are to be found in the works of Herrick, Johnson, Dryden, Swift, Prior, Addison, Jonson, Goldsmith, Congreve, Hood, Hook, Byron and Burns. Pope's poems might be reckoned a conglomeration of epigrams. Some of the best in our language are by Lan- dor, who cutting loose from the Latin type, at times becomes a Greek in spirit. Epigram has enjoyed wide favor in other modern tongues. In Italy, it long played an important part in politics, as both the Pasquino and Marforio in Rome would testify, could they speak, but it has gradually given way to the madrigal and sonnet. In France from the time of Clement Marot, who introduced it from the Latin, the satiric sort has enjoyed a wonderful popularity. Boileau, J. B. Rousseau, Piron, Lebrun and Chenier have shown its possibilities in many lines. The poetic Priamel of the 14th century may be said to begin epigrammatic literature in Germany, where indeed it has always inclined more to the moral and didactic than in the Latin countries. Among her more eminent epi¬ grammatists are Opitz, Friedrich von Logau who is the best of all, Wernicke Kastner, Klopstock, Lessing, Herder, Schiller and Goethe, who brought out their

and not the contents must determine whether a poem is an epigram or not. Lessing has shown much acumen in tracing the essential ele¬ ments of the

epigram in its modern conception to the primitive type, the inscription. Just as a monument arouses in a spectator a curiosity about the author and purpose of its construc¬ tion, which the inscription then satisfies, so the first part of a literary epigram, whether dealing with some material object, or not, is intended to excite an interest which the close of the poem must duly satisfy. The suspense may be increased by making the prefatory portion of some length. The more remotely separated and apparently contradictory the ideas that are brought together, and the briefer and more un¬ expected the commentary or explanation at the end, the more successful we deem the poem. This point or conclusion becomes in the satiric epi¬ gram a sting. Hence the frequent comparison of an epigram to a bee or wasp. While the above applies to most epigrams as written to¬ day, no definition is quite satisfactory with ref¬ erence to much that the ancients included under the term. Consult Adam, (Book of Epigrams ' (London 1890) ; Booth, (Epigrams Ancient and Modern' (2d ed., ib. 1865) ; Dodd, ˆEpigram¬ matists of Mediaeval and Modern Times' (2d ed., ib. 1875) ; Watson, (Epigrams of Art, Life, and Nature' (Liverpool 1884).

Walton Brooks McDaniel, Assistant Professor of Classical Philology , Uni¬ versity of Pennsylvania.

EPIGYNY, ep-ij'i-ni, in flowers, the con¬ dition arising when the petals, stamens and sepals appear as coming from the top of the ovary, the latter showing just below the flower. See Flower.

EPIHIPPUS, a diminutive horse of the Upper Eocene of Wyoming, in which only the last two premolars had taken on the molar pat¬ tern. See Horse.

EPILEPSY. Epilepsy is no longer used as a definite disease name but rather as a sym¬ bolic term under which are grouped a great variety of conditions presenting a general re¬ semblance. These are sudden and relatively transient attacks accompanied usually by dis¬ turbances of consciousness called variously ((faints," <(absences," ((blanks" and amnesias and convulsive seizures which involve the voluntary and involuntary muscular apparatus.

The historic name epilepsy, the ((falling sick¬ ness," points to the most evident symptom, the falling due to this loss of muscular control. The strictly etymological origin of the word, literally from the Greek word ((to seize upon," also denotes the antiquity of the recognition of this form of disturbance and the ancient ani¬ mistic character of the hypotheses which sought to explain it, and which has long clung about its mysterious and often violent manifestations. It was recognized in its pure tvpe by the most ancient observers. Hippocrates described it, and evidences are found in the

earliest Indian writings of Charaka that the disease was then known.

The most modern belief concerning it is undergoing a process of modification. There is a tendency to speak of ((the epilepsies" rather than to consider a disease entity, which fails to

cover the wide range of conditions of which the attacks are but the outward manifestation. The dynamic concept which is making its way into medicine draws attention to the attack as the result of a faulty distribution of energy which may be brought about in various ways and from a variety of far-reaching causes in the constitution and experience of the individual.

The dynamic, energetic concept of the nervous and psychic functioning establishes a working basis by dividing nervous activity into three levels of operation which have been pro¬ gressively developed according to functional biological needs. Thus the nervous apparatus of man presents the capability of reaction to environment on the physicochemical or purely vegetative level, the sensori-motor and the level which must express itself symbolically as in all the higher psychic forms of reaction. Any one of these levels offers itself as an outlet for the epileptic discharge. The unity of the nervous organism permits the view of it as a mass of interrelated reflexes redistributing the energy bound up with the individual in order to effect his adaptations and his reactions toward his environment, which may thus take place at any one of the three levels. The epileptic in¬ efficiency to so distribute the energy as to bring about a series of harmoniously adjusted ac¬ tivities may in turn emphasize itself in any one of these spheres of discharge.

This accounts for the wide range of mani¬ festations in attacks of the equally extensive underlying conditions. The attacks comprise psychic forms, the so-called functional neuroses and psychoneuroses, the more pronounced psychoses, also toxemic states, many organic brain diseases and the grosser defects of de¬ velopment, even idiocy. The toxic states may be transitory with removable cause or may be due to defective metabolic functioning which cannot be remedied or to other obscure factors working at the physicochemical level. None of these causes in themselves can any longer be regarded as sufficient explanation of the epileptic form of reaction. The more funda¬ mental conception of a faulty energy distri¬ bution indicates a blocking or closing of many paths of outlet either structurally or by psychic inhibition and so accumulation of the discharge within relatively narrow confines. This view¬ point applies thus equally well to the psychic manifestations, the physiological and localized attacks (Jacksonian types) of the physicochem¬ ical (tetany).

More accurate and pathological and clinical knowledge tends to separate

off from the great epileptic group certain varieties of conditions which can be more definitely identified with other disease groups. There remains, however, for general consideration the still broad and ill-defined ((genuine or classical epilepsy" in which the typical reactions are evident for de¬ scription. The classical major epileptic attack (grand mal) is sudden in onset though pre¬ ceded often by a warning aura. This may be sensory, motor or purely psychic. At the sud¬ den onset of the attack the patient falls and immediately develops a tonic spasm with un¬ consciousness. The direction of the patient's fall depends upon the muscles first involved, but in a few moments all the voluntary muscles are affected. Cyanosis results from convulsion of

the respiratory muscles and biting of the tongue from that of the jaw muscles. As the tonic convulsion is succeeded in a few moments by clonic spasms frothy, bloody saliva issues from the mouth and the cyanosis gradually disappears through the return of respiration. Urine is often passed during the attack and less frequently feces. The gradual subsidence of the clonic spasms is followed by a short period of automatic activity after which the patient re¬ turns gradually to full consciousness or sinks at once into a deep sleep from which he awakens with lameness and weakness in the muscles which are affected, and perhaps with headache.

The minor attacks (petit mal) exhibit an endless procession of variations. The disturb¬ ance of consciousness is shorter in duration and less profound and the convulsive phenomena are so mild that they may even escape observation. Occasionally there is a slight convulsion, an involuntary contraction and extension of some of the muscles without loss of consciousness, and the patient resumes his regular course of work or play. In cases of a slight loss of con¬ sciousness the patient may suddenly stop in the midst of play or work or conversation, a shade passes over his face and in a moment he is himself again. Sometimes there is a momen¬ tary confusion, faltering or fumbling about the clothing in a dazed fashion, which quickly passes over and leaves the patient occupied as if nothing had happened. Occasionally he feels sleepy, lies down for a second and then gets up perfectly well. These attacks may also be preceded by an aura.

Psychic disturbances many and varied may precede or follow the attack or may even re¬ place it. In many subjects there is a marked disturbance sometimes for several days pre¬ ceding the convulsion, which serves as a warning to those associated with the patient. The mani¬ festations may be increased irritability, com¬ plaining, depression or dullness and nerhaps

also disturbances of the sensory functions, hypochondriacal complaints and hallucinations, all of which conditions are significantly re¬ lieved by the convulsion. A condition of active excitement may, however, occur just after the attack, sometimes before, which may reach an actual frenzy, epileptic furor. In this state the patient is liable to any act of violence but fortunately the attack is usually brief and moreover the patient's efforts are diffuse and lack coherence.*

The so-called epileptic equivalent is an at¬ tack in which the convulsion is replaced by a purely mental disturbance. The form of at¬ tack is frequently that of the epileptic, autom¬ atism or epileptic dream state. Almost any act may be committed in these conditions with absolutely no recollection on the part of the patient when he comes to himself. The recog¬ nition of this condition is of great importance from a medicolegal standpoint for crimes are sometimes committed and these, if crimes of violence, are often marked by their ferocity and fury. Moreover, the seizure associated with these acts may have been so slight as not to have been noticed. Usually, however, the acts are rather simple and the attacks of short duration. There are also transitory conditions of depression, excitement, confusion, delirium and stupor and peculiarly characteristic one of

ecstasy with hallucinations, particularly of a religious character. There are also transitory states of ill-humor which may be psychical equivalents. These are frequently associated with drinking.

The etiology as well as the prognosis of epilepsy are so involved in the broader con¬ cept which avoids the limitation of definitions and unsubstantial formulations that these are best considered also from the energic stand¬ point. The genuine epileptic usually comes from a badly tainted ancestral stock, manifesting per¬ haps not epilepsy in the ancestors or collaterals but evidences of ill-defined nervous disorders. There is evidently a defect of the germ plasm and hence epilepsy and feeble-mindedness are often found associated. This accords with what has been said about the inadequate dis¬ tribution of energy discharge. There is actual developmental failure to lay down paths for the higher avenues of discharge and constitutional inadequacy to adapt to the demands of en¬ vironment. The epileptic type of character is apt to be morose, irritable, suspicious and hypochondrical with resultant unreliability and shallow aggressive religiosity. He is marked by an extreme egocentricity and hypersensitive¬ ness. This, it has been well said, < (is not to be taken in any narrow or moralistic sense, but is to be considered ... in a broad biologic view, a personality-defect which makes its pos¬ sessor incapable of social adaptation in its best setting and which, if it remain uncorrected, renders the individual entirely inadequate to make a normal adult life. The seizure phenom¬ enon is essential epilepsy . . . constitutes a

reaction away from the difficulties in a loss of consciousness.ˆ

All the patient's interests centre about the ego. His interests are variable but shallow and easily fall away as they fail to contribute to his egotism or as they present some difficulty which calls for a greater effort without a suf¬ ficient egotistic premium. There is always a tendency to turn conversation or any external stimulus to the ego centre. In this as in all his reactions the epileptic manifests the infantile character to a marked degree. His sexuality like his religiosity is of a superficial, infantile, expansive type. The impulses are prominent and easily roused but undeveloped and tending to seek outlet in a number of ways which be¬ long to the infantile polymorphus components of sexuality not yet converged into the adult sexual aim (Freud).

The epileptic state leads in a certain pro¬ portion of cases, if it has begun in early life, to conditions of feeble-mindedness, imbecility and idiocy or it has originally been associated with these conditions. 'It produces in many cases a very profound general mental deteriora¬ tion. The progress toward this condition as well as the ultimate clinical picture present an accentuated manifestation of the heightened infantile and egocentric character of the epileptic character and reaction. It is asso¬ ciated in a close inter-relation with the super¬ ficiality and ready loss of interest. As has been said : (

gressive loss of interest associated with a fail¬ ure of mentation in respect to normal stimuli in which interest is lost. Both loss of interest and intellectual decay proceed from the barely perceptible early stages to total loss of speech

and other acquired functions, when a condi¬ tion is reached equivalent to the lowest grade of idiocy or the helplessness of a suckling in¬ fant.® The dementia does not manifest itself in a withdrawal into an hallucinatory world or in the further symbolic activities of other types of dementia. It consists rather in this gradual withdrawal from all contact with environment until a stage of complete infantilism is reached when the individual is merely a biological ego¬ centric entity in the state of supreme infantile dependence and security which characterize the earliest post-embryonic, almost the fetal period. This is also the psychic goal attained tem¬ porarily by the attacks which produce pro¬ found unconsciousness. Such a conception of the meaning of the tendency and ultimate end of the psychic reaction has been made possible through the psychoanalytic understanding of controlling impulses belonging to the uncon¬ scious and determining such reactions. The ap¬ plication of psychoanalytic knowledge and methods to individual cases has led to and con¬ firmed these conclusions and throws a light upon the obscure problems of epilepsy which have so far baffled the neuropathologist and the psychiatrist of older schools. This psycho¬ logical approach to the problem does not ex¬ clude further research along anatomical and pathological lines. On the contrary it awaits accurate and conclusive knowledge which can only come through such exact research and which must form the physiological basis for complete psychological understanding and en¬ large the possibility of prophylactic and thera¬ peutic control.

Meanwhile a psychic therapy is proving its efficacy in a more rational understanding of the epileptic constitution and its inadequacy before the demands of life. This brings an explana¬ tion of its yielding at points of particular diffi¬ culty and utilizing the characteristic modes of energy discharge. It thus affords a prophylactic basis for education and early training to coun¬ teract the essential egocentricity and super¬ ficiality of interest and in further treatment, whether able to effect a cure or merely to al¬ leviate existing conditions and retard or pre¬ vent the ultimate dementia, it stimulates to a sympathetic and watchful interest in the patient

in order to meet him at the points of least resistance and rearouse a flagging interest and utilize his very tendencies for counteracting his self-centring. The epileptic colony pro¬ vides the ideal environment for this course of treatment. The patients are there under the con¬ stant supervision of the trained psychotherapist who has this necessary understanding. The variety of occupations provided furnish means for the essential chahge of interest and the patients are not subjected to a competition which they are constitutionally unable to with¬ stand.

The question of the use of drugs is an im¬ portant one because of a widespread belief in their efficacy. Bromide is the only one, how¬ ever, which deserves consideration, being in fact the basis of most of the other remedies offered for this condition. The larger concep¬ tion of the clinical picture which recognizes the convulsion as not the disease, nor even the cause nor the first expression of it, but only one form of its outward manifestation, an outlet for the accumulated and unutilizable energy, seriously

questions the rationality of bromide medication. Experience seems to show that the convulsion is only postponed, that sooner or later the energy discharge will take place and the drug may indeed in the end produce a summation of at¬ tacks which will lead up to that final stage of which the epileptic stands in danger, the condi¬ tion known as status epilepticus, a terminal stage which consists of repeated and continued convulsive attacks associated with high fever and usually ending in death. It cannot be denied that the bromides have a function in regulating the convulsions when such a danger is imminent but they must be employed with the utmost caution and consideration on the part of the physician. The general observance of hygienic measures is of course of great im¬ portance. An outdoor life with a mild, health¬ ful occupation, plain, digestible food, the absence of tobacco, alcohol and other stimulants, a free intestinal canal and surroundings in consonance with the mental capacity of the patient are very desirable features. Treatment during a con¬ vulsion is merely protection to prevent injury to the patient. Beyond these measures, how¬ ever, lies the more comprehensive understand¬ ing of the constitutional burden of the epileptic and the very practical aid which this must bring to him in directing and adapting his capacity to the demands of his environ¬ ment. Consult Jelliffe and White, (Diseases of the Nervous System) (2d ed., 1917).

Smith Ely Jelliffe.

EPILEPTIC CHILDREN. See Chil¬ dren, Defective.

EPILEPTIC COLONIES. The treatment and care of epileptics in special

institutions may be said to be one of the developments of applied philanthropy of distinctly recent origin. By the founding of epileptic colonies is meant the setting apart of distinct tracts of ground for buildings and for the exclusive care and training of epileptics. The position of the epileptic in society is altogether anomalous. As Letchworth well says : <(As a child he is an ob¬ ject of solicitude to his parents and guardians.

*. The streets to him are full of dangers, and if sent to school he is apt to have seizures on the way or in the class-room. His attacks shock his classmates and create confusion. He can¬ not attend church or public entertainments, nor participate in social gatherings with those of his own age and station. In consequence of his infirmity the epileptic grows up in idleness and ignorance, bereft of companionship outside of the family, and friendless. He silently broods over his isolated and helpless condition.® The recognition of these truths has caused philan¬ thropists to found such colonies. In continental countries more has been done for epileptics than elsewhere, but in the last 20 years the movement for taking care *of this unfortunate class of society has grown to large proportions and, as expressed by Peterson in his presidential ad¬ dress to the National Association for the Treat¬ ment and Care of Epileptics 1902, <(there is hardly a community in the civilized world that is not now thoroughly aroused to the necessity for the treatment of this class of defectives.®*

This awakening took place about 1887, and has continued to the present time. The first distinct attempt to provide for epileptics was inaugurated by a Lutheran pastor, Friedrich von

Bodelschwingh, who founded at Bielefeld, in Westphalia, Germany, the Bethel Colony, which, from small beginnings, has grown up to a vil¬ lage inhabited solely by epileptics. Here every¬ thing has been provided to meet their special needs, to make up for their deprivations in the outside world. They are supplied with schools to improve their minds, industrial teachers to make them more or less self-supporting, and physicians to study and treat their cases. Out¬ door occupations are provided, special diet is ar¬ ranged for, recreations, amusements, religious instruction, in fact all of the devices that go to make up a home, have been provided under this man's guidance, so that at least nearly 4,000 people, not less than half of whom are epileptics, are being taken care of in Bethel.

The success of the Bielefeld Colony prompted movements elsewhere. Other colonies were founded in Germany and other European coun¬ tries. Ohio

established the first institution for epileptics in the United States, although this was built on the hospital rather than the colony plan. New York has Craig Colony at Sonyea, one of the most elaborate and beautiful institu¬ tions of this class, closely modeled on the Biele¬ feld plan, and accommodating a population of nearly 2,000. Massachusetts has a colony at Palmer ; Pennsylvania a colony farm at Oak- burn; and there is a New Jersey State village for epileptics at Skillman. A colony for epi¬ leptics was established in 1902 at Abilene, Tex., and there are similar establishments in Connec¬ ticut, Indiana, Illinois, Kansas, North Carolina, Missouri, Minnesota and California. In Eng¬ land the first colony founded was at Chalfont in 1893 and another at Warford in 1900. There is also a colony, the Waghull Home, near Liv¬ erpool ; another at Godaiming; a large colony at Chelford, and finally a fifth institution was completed 1903-04 for the city of London, not far from Croydon. Other colonies have been founded in Brazil, Belgium, Switzerland, Sweden, Russia, Italy, Turkey, India, Japan and Australia.

The Craig Colony, of Sonyea, N._ Y., being one of the most modern and ideal, is selected as a type of this institution. Consult Letch- worth. (Care and Treatment of Epileptics)

(1900).

EPILEPTIC CONSTITUTION. The

epileptic constitution, or makeup, has long been recognized as the mental stigma of essen¬ tial epilepsy itself. Only recently have studies disclosed that the main tenets of such a char¬ acter are present years before the nervous disorder of epilepsy, as such, is shown in fits. Indeed, most frequently defects of personality may be detected in earliest child¬ hood. The chief instinctive defects are ego- centricity, supersensitiveness and emotional poverty/ The potential epileptic is intensively self-centred and fails to project his life inter¬ ests into his environment in a normal and healthful manner. Partly because of this< char¬ acter-fault, and still more because of his innate inheritance, he is or soon becomes unduly sen¬ sitized to all forms of stress and annoying de¬ mands. He either extraverts his supersensitive¬ ness by exhibitions of rage and tantrums of a type more severe than those occasionally seen in passionate children, or he introverts this feeling and represses his environmental con¬

flicts, causing him to develop a very unstable, irritable and sullen emotional life, which paves the way for larger and more difficult adapta¬ tions which he cannot meet ; outspoken fits may then occur. By possessing an egocentric and supersensitive makeup, the potential epileptic fails to make the degree of environmental con¬ tact which would lead him into a broad

and rich experience with life, hence sooner or later he fails to acquire a well-rounded emotional de¬ velopment. This deficit may or may not limit the individual's purely intellectual equipment in later life. Previously endowed with the in¬ stinctive defects noted, the demands of adoles¬ cence and adult life increase the difficulties of such individuals until they reach the breaking point in a fit or seizure. Hand in hand with the handicap of defective endowment occurs a disintegration of habits and character, known as deterioration, which often precedes actual epileptic seizures for a considerable time. This accounts for the fact that an essential epileptic from the very nature of his makeup is usually doomed to mental failure in its broadest sense if proper measures to check or controvert his innate faults are not taken at the earliest possi¬ ble moment. Any effective plan of treatment must essentially take strict and early account of the makeup of epileptics before all else.

L. Pierce Clark, M.D.

EPILEPTIC PSYCHOSIS. In the older descriptive neurological concepts, this indicated a mental complex accompanying epilepsy. It was characterized by a certain degree of men¬ tal deterioration, as shown in the impairment of intellect and memory, by impulsiveness, men¬ tal irritability, loss of moral sense and partial or complete loss of productiveness. It is also accompanied by periodic disturbances, transitory attacks of anger, dream-states or automatic phenomena. Many patents with epileptic at¬ tacks do not develop such severe psychoses as to require certification and sequestration, but the mental deterioration may appear at almost any period following the onset of the epilepsy. In many chronic epileptic states there is pronounced weakness, mentally, morally and emotionally. One's sense of one's surroundings is usually preserved, and consciousness may be clear save during the dream-states or automatic periods. Comprehension is usually not markedly im¬ paired, but the field of attention is diminished and easily diverted. Hallucinations are infre¬ quent, illusions are common during an attack or following a grand mal seizure, and delusions are transitory, being found usually only in the dream-states. Morbid and sudden impulses are quite frequent, sometimes approaching distinct nerve-storms, during which suicidal and homi¬ cidal attacks may occur. The conduct other¬ wise is usually orderly, and the ordinary rules of propriety are observed. There is greatly diminished capacity for work in practically all epileptics. The subject of a severe epileptic psychosis is one deserving wide recognition as there are unquestionably a number of phenom¬ ena termed ˆpsychical® epilepsy that need recog¬ nition by specialists. In some of these attacks the patients are confused. They move in a mechanical or automatic manner. They wan¬ der aimlessly about, recognizing no one, al¬ though sometimes answering incoherently when addressed. Occasionally they exhibit symptoms

of excitement, at other times depression, and not infrequently they may set fire to their beds or furniture, commit theft, assaults, homicides, expose their persons and otherwise conduct themselves in an irrelevant and insane manner. Treatment is extremely difficult in advanced stages. While younger psychoanalysis and careful endocrinopathic study offer the best chances for modifying the conditions which tend to bring about the epileptic deterioration. The patient should be kept in a sanatorium or asylum. See Epilepsy.

EPILOBIUM, ep-i-lo'be-um, the willow- herbs, a genus of herbaceous plants belonging to the evening primrose family (Onagraceoe) . The species are herbs or under-shrubs with pink or purple, rarely yellow, flowers, single in the axils of the leaves, or having terminal leafy spikes. The seeds are tipped with a pencil of silky hairs, and are contained in a long four- celled capsule. There are about 65 species scat¬ tered over the Arctic and temperate regions of the world, 40 of them being found in the western and northwestern portions of North America. E. hirsutum, or codlins-and-creams, a great hairy willow-herb, is a common and conspicuous plant of waste places in New England and northern New York. Its flowers are pink and rather large, and the whole plant is very downy. Some species are cultivated in America, but these plants are more common in English cot¬ tage gardens than in America.

EPILOGUE (from the Greek epi, upon, and logos, word, speech), the closing address to the audience at the end of a play. The epi¬ logue is the opposite of the prologue, or open¬ ing address. Many of Shakespeare's plays have an epilogue as well as prologue, in which the poet sometimes craves the indulgence of the spectators for the faults of his piece and the performance, and sometimes intimates in what light his work is to be considered. The epi¬ logue is sometimes a necessary appendage, to tell us something of a composition, which can¬ not be gathered from the composition itself. In rhetoric an epilogue, when fully developed, repeats the principal points already presented in the composition, and offers an appeal to the feelings of the reader or the audience.

EPIMENIDES, ep-i-men'idez, Cretan phi¬ losopher and poet : b. Crete, in the 7th century b.c. By some he is reckoned among the seven wise men, instead of Periander. When the Athenians were visited with war and pestilence, and the oracle declared that they had drawn on themselves the divine anger by the profana¬ tion of the temple, in which the followers of Cylon had been put to death, and must ex¬ piate their offense, they sent

for Epimenides, who was renowned for his wisdom and piety, from Crete, to purify the temple. On his de¬ parture he refused to accept any presents, and only asked the friendship of the Athenians on behalf of Cnossus, his home. There is a legend of his having, when a boy, slept in a cavern for 57 years. On awakening, he found, to his as¬ tonishment, everything changed in his native town. This story is the ground-work of Goethe's poem, the (Waking of Epimenides, > for the anniversary of the battle of Leipzig. Ac¬ cording to some accounts he is said to have lived for upward of 150, according to others for nearly 300, years. He is supposed to be the

prophet quoted by Saint Paul in Titus i, 12 as saying <(The Cretans are always liars, evil beasts, slow bellies.®

EPIMETHEUS, ep-i-me'thus, in Greek mythology, a son of Iapetus and Clymene and the brother of Prometheus. Against the latter's advice he married Pandora, who opened the box in which the foresight of Prometheus had hid all the ills by which mortals were liable to be afflicted. All kinds of diseases and torments issued out of the box and hope alone remained behind. According to other accounts it was Epimetheus himself who opened the box. (See Pandora). It is to be remarked that, in the Greek tradition, curiosity and disobedience are made the origin of evil, as in the Mosaic account of the fall.

EPINAL, a-pe-nal', France, town, capital of the department of the Vosges, in a narrow valley on the Moselle 1,070 feet above sea-level, 190 miles (264 by rail) east-southeast of Paris. It has a communal college, a public library of 30,000 volumes, a museum of antiquities and hospital and is surmounted by the ruins of an old castle. The manufactures consist of arti¬ cles in iron and brass, leather, embroidery print and cotton goods, hats, paper and pottery; freestone and marble are quarried in the vicinity. The town was founded in the 10th century. With Belfort, Dijon and Bescangon it forms one of the line of forts along the Moselle. Pop. of commune, 30,042.

EPINAL GLOSSARY, a glossary of Old Saxon and Anglo-Saxon, said to date from the 7th century and preserved at Epinal, France. Consult the facsimile published by Sweet (London 1883).

EPINASTY, in botany, the rapid growth of a dorsiventral organ on its upper side, which causes it to bend downward to the earth. See Growth.

EPINAY, a-pe-na', Madame de la Live d'

(Louise Florence Petronille Tardieu d'Es- clavelles), French writer: b. Valenciennes 11 'March 1726: d. Paris, 17 April 1783. She was the

*daughter of M. Tardieu Desclavelles, an officer of high rank, governor of Valen¬ ciennes and married her cousin d'Epinay. But his extravagance soon compelled her to separate from him. During the earlier part of her life she formed an acquaintance with Rousseau, who, quick and susceptible in all his feelings, devoted himself to the fascinating and accom¬ plished woman with an ardor, the depth and strength of which he describes himself in his * Confessions.) She was not insensible to the homage of her "bear,® as she used to call him, on account of his eccentricities, and did all that was in her power to place him in a situation corresponding to his wishes. She gave him a cottage (the Hermitage, since so famous) in her park of Chevrette, in the vale of Mont¬ morency. Here the author of the (Nouvelle Heloise) passed many days, rendered happy by his romantic attachment to Madame d'Epinay; until he became jealous of Baron Grimm, whom he had himself introduced to her; and in con¬ sequence of this feeling, which he took no pains to conceal, a coolness and finally an aversion took place between him and the lady, which is but too plainly expressed in his (Confessions. } A defense of the later conduct of Madame d'Epinay toward Rousseau may be found in*

Grimm's Correspondence, where an account is also given of some works written by her, of which the most celebrated is (Les Conversations d'Emilie.* In this the authoress, in a rather cold but neat style, sets forth the principles of moral instruction for children, with equal elegance and depth of thought. It obtained, in 1783, the prize offered by Monthion (the chan¬ cellor to the Count d'Artois) for useful works of this kind, in preference to the (Adele et Theodore-* of Madame de Genlis. She also wrote (Lettres a mon fils,* and (Mes moments heureux.* An abridgment of her memoirs and correspondence, showing her relations with Duclos, Rousseau, Grimm, Holbach, Lambert, etc., appeared in 1818. They give a true picture of the refined but corrupt manners which pre¬ vailed among the higher classes in France dur¬ ing the government of Louis XV.*

Bibliography. — Beaune, H., (Scenes de la vie privee au XVIII e Siecle (1903) ; Cam- pardon, E., (Les Prodigalites d' un fermier general * (1882) ; Fallue, L., (La Marquise*

d'Epinay et ses relations dans la vallee de Montmorency avec la societe philosophique) (1766); Galiani, L'abbe, Correspondance (1881) ; Musset-Pathay, (Anecdotes inediles pour faire suite aux memoires de Mde. d'Epinaj^ (1818) ; Perey, L., and Maugras, G., (La Jeunesse de Madame d'Epinay > (1883) ; Rousseau, J. J.,*

ennemis) (1865).

EPIORNIS, or AIPYORNIS, an extinct ratite bird of Madagascar (JEpyornis maxi- mus), interesting not only for iself, but because its remains appear to have formed the basis for the Arabic tale of the gigantic roc. It was much like an ostrich in size and structure, except for the massiveness of its limbs and the extraordinary size of its eggs. These have been found in considerable numbers in muck-swamps, or sometimes floating in the river-mouths, often in perfect condition, and are the largest and strongest eggs known, measuring about 13 inches by 9 y2. These dimensions are twice those of an ostrich's egg, and an egg of the epiornis would hold the contents of six ostrich eggs, yet the epiornis was little if any larger. First made known to science about 1850, so many remains have since been found that about 12 species have been indicated, and a second genus (Muller ornis), which has been joined with 7Epy ornis into the family A Epyornithidce . Tradition and the evidences of some bones in¬ dicate that these birds were exterminated since human occupation of Madagascar began. See Moa.

EPIPHANIUS, ep-i-fa'ni-us, Saint, Greek father of the Church: b. of Jewish parents near Eleutheropolis, Palestine, about 315; d. at sea near Cyprus 403. In his youth he went to Egypt where at first he came under the in¬ fluence of teachers of Gnosticism; but after¬ ward he embraced monasticism, and returning to his own country there beca.me head of a community of monks. In Palestine he made the acquaintance of the two western churchmen, Jerome and his associate, Rufinus; the. friend¬ ship of the three men was cordial and intimate till Rufinus' defense of the teachings of Origen

angered Epiphanius, whose special mission seemed to be to obliterate every line written by Origen. He was made bishop of Constantia (the older name Salamis), in Cyprus 367, and held that see till his death. On one occasion, 394, he visited Jerusalem to denounce Origen- ism. He must have been more than 80 years old, perhaps near 90, when he went to Constanti¬ nople to charge the patriarch of that see, Saint John Chrysostom, with the sin of favoring the Origenists, but a few words from Chrysostom opened his eyes. His numerous writings are now of little account, his theological polemics being distinguished by fervor rather than by penetration.

EPIPHANY, e-pif'-a nT, (Latin epiphania, appearance or evidence), festival of the Cath¬ olic, Anglican and Eastern churches held on 6 January to commemorate the manifestations of Jesus Christ as son of God; (1) to the Wise men of the East (Magi) at Bethlehem; (2) at his baptism by John in the Jordan, when the voice from heaven proclaimed, <(Thou art my beloved son in whom I am well pleased® ; (3) at the marriage feast at Cana in Galilee, where Jesus wrought his first miracle. The observance of

this festival can be traced to an earlier pe¬ riod in the Eastern Church than in the Western. In the Greek Church it was observed as early as the 2d century, but the event commemorated by the Greeks was not the visit of the MagL-to Nazareth but the manifestation of Jesus at the Jordan as the Messiah. Not till the 4th cen¬ tury does the Epiphany appear to have been ob¬ served in the Latin Church. In the Greek and Oriental churches it is customary to administer baptism on the eve of this festival, with un¬ wonted solemnity. This is said to be because of the relation of the festival to the baptism of Jesus by Saint John. In those churches, too, the Epiphany (Epiphaneia, Theophaneia) was the festival commemorative of the birth of Jesus; for it was believed that the baptism in the Jordan took place precisely on the 30th anniversary of the birth. A popular name for this festival in English is (

Christianized Indians and mestizos of Latin America. This dramatic representation gen¬ erally presented the oblation of the wise men, and fitted it in so that it appeared to form a natural part of the mass. In the traditions of the church the wise men were venerated as the <(Three Holy Kings® after which the festival was itself frequently called, being variously designated as festum trium regum, festum magorum, festum stellae. It has long been the custom in the College of the Propaganda at Rome for young men belonging to various foreign nations to represent, by speeches in their native languages, the appearance of Jesus the Christ unto all nations.

There was a tendency in the early days of the Epiphany to connect it with the heathen spring festival, and more especially with the sacrifices and offerings made to the gods oˆ the running waters, in the rivers, the streams and the clouds. Some Christian communities even followed this old pagan custom and blessed the water, the rivers and lakes. This same pagan custom is noticeable in the attempts of certain sections of the Christian Church to make of the Epiphany a special day of baptism, or as it was called dies luminum. The Franks, who before their conversion to Christianity, had held special spring ceremonies in honor of the gods of growth and fertility, seem to have been strong supporters of the custom of Epiphany Baptisms. This custom probably corresponded to a spring purification ceremony (by water) common among the Franks and Germanic races in general. The custom of making Epiphany a day of baptism was also strongly clung to in the African Christian Church. The consecrating of the water sur¬ vived the baptismal and other semi-papan rites in the Greek Church and is still observed in Russia. The Church connected this baptismal custom with that of the baptism of Christ by John;

but it seems not to have become cus¬ tomary until the spread of Christianity into the Frankish and Sclave countries where the sacrifices and other ceremonies connected with the deities of growth and fertility were also offered to the gods of water. In explaining this cusious blending of pagan religious cere¬ monies and celebrations with Christian tradi¬ tionary history, Christian writers have asserted that the first baptism of Christ was, in a sense, his real birth, since it was his first manifesta¬ tion to man. So it was common, in early Chris¬ tian centuries, to include the ceremony of the commemoration of the birth of Christ in that of Epiphany; and it was only considerably later that the Christian celebration came into vogue. Thus the ancient pagan celebration of the ((ap- pearance of the new birth of spring,® the purification by water and the celebrations in honor of the occasion, split into separate parts, became two of the greatest festivals in the Christian Church, and have continued to main¬ tain their position as such to the present day.

It is probable that the custom of presents from the wise men to the infant Jesus arose out of the practice of presenting offerings to the gods of nature and growth at the spring festi¬ val, and also of a similar custom in vogue among the Roman people who made presents to one another on this occasion. The fact that Epiphany is one of the oldest ceremonies in the Christian Church, having already been

established by the time of Clement of Alexan¬ dria, who lived in the latter half of the 2d and the early part of the 3d centuries, would seem to indicate that it was the survival of earlier customs and ceremonies ; since, even at this early date, there was some considerable speculation as to its origin. See Magi.

Bibliography. — Bingham, R., (Antiquities J (London 1834) ; Blumenbach, H., (Antiquitates EpephamorunP (Leipzig 1773) ; Chambers, (London 1864) ; Herzog, (Real- Encyklopadie) ; Jacoby, A., (Bericht ueber die Taufe Jesus (Strassburg 1902) ; Kellner, K. A. H., (Heortologie) (Freiburg 1906) ; Nazianz, G., (Leipzig 1841).*

John Hubert Cornyn, Editorial Staff of The Americana.

EPIPHYLLUM, ep-i-fil'um, a genus of plants of the natural order Cactacece. The few species seem to be confined to Brazil, where they are epiphytic upon trees. They have flat-jointed stems with blunt ends, from which the new branches and flowers are produced. These are borne in great abundance, on which account, and because of their brilliant red tints, this group of cacti is exceptionally popular in greenhouses, being probably the most useful of all cacti. They are easily propagated by means of cuttings or by grafting, particularly upon erect-growing species of other genera, and

are generally used as hanging-basket plants, for which purpose their drooping habit specially recommends them. They need a porous, poor, fibrous soil and little water. The species most widely grown are E. truncation, the crab or Christmas cactus, with numerous horticultural hybrids between it and related species, and C. Gcertneri, the Easter cactus.

EPIPHYSIS. See Bone.

EPIPHYTE, ep'i-fit, or AIR-PLANT, a

plant attached to a tree or other support, or¬ ganic or inorganic, living or dead, but from which it obtains no nutriment. The term air- plant has been popularly applied because these plants are typically neither parasitic, saprophytic nor terrestrial, but depend upon the dust which lodges around them and upon the water of dew and rain. Strictly speaking, they are not air- plants, because this term implies no other source of life than air. Besides the typical epiphytes, which have representatives in many plant fami¬ lies, particularly the tropical orchids, bromelias and ferns, there are many forms which are only partially epiphytic. In structure many of them exhibit adaptations for checking transpiration and for securing even minute quantities of water from the air or from objects to which they are attached. (See Pitcher-plants). Others (cer¬ tain orchids) have storage organs which are usually specialized stems. Some have roots which serve only to anchor the plants to their support. In these, which are the most typical, the absorption of food takes place in the leaves and other green parts. Others are only epiphytic at first, since they later develop true roots which obtain food from the soil. The home of the largest number of epiphytes is in the moist re¬ gion covered by tropical forests, the trees of which are often so covered with these plants that their branches are wholly concealed by a very miscellaneous growth, In the temperate

and colder climates the epiphytal forms are con¬ fined almost wholly to lower orders of plant life such as liverworts, mosses, algae and lichens. These are also represented in the tropics, some of them even becoming attached to leaves of higher plants. Many of the flowering epiphytes are cultivated in greenhouses for ornament. Among the favorites are various species of Nepenthes (q.v.), orchids and bromelias. One of the best-known American species, common in the southern United States, is the so-called Florida or Spanish moss (Tillandsia usneoides) of the natural order Bromeliacece.

EPIRUS, e-pi'rus (meaning the mainland in Greek), an ancient part of northern Greece which stretched from the Ionian Sea to the Ambracian Gulf and was bounded by Illyria, Macedonia and Thessaly. Epirus is very moun¬ tainous, especially so in the east, and this fact undoubtedly helped to shape the character of the inhabitants, who were of a bold and hardy nature and great lovers of their country, which was divided into numerous independent tribes, the principal of which were the Chaones, Mo- lossi and Thesproti. The Greeks began early to settle along the coast of Epirus, and later, at some interior points. This led the way to Greek domination of the country at a later date. The chiefs of the Molossians, the most powerful of the tribes of Epirus, who claimed to be the direct descendants of Pyrrhus, the son of Achil¬ les, whom legend credited with settling the country after the fall of Troy, and who con¬ sequently prided themselves on a long line of princely ancestors, jealously maintained their ascendency and gradually increased their power over the whole country. Arymbas I of this line, who was educated in Athens, introduced Greek culture among his people during the second quarter of the 5th century b.c. ; Arym¬ bas, a century and a half later, followed in the footsteps of his famous ancestor and namesake, and sedulously encouraged art and literature. One of his nieces, educated carefully by him and married to Philip II of Macedonia, was the mother of Alexander the Great. A period of wars followed the death of Arymbas II, in¬ terrupted from time to time. Pyrrhus, who succeeded to the throne in 295 b.c., carried the war to the Romans in Sicily and Italy for six years, and brought the name of Epirus promi¬ nently to the attention of the Greek and Roman world. Finally Epirus became a sort of republic governed by a magistrate elected annually by the vote of the assembled people. The country unwisely sided with Perseus in his war against the Romans (168 B.C.). The latter exacted a terrible retribution, making slaves of 150,000 inhabitants of Epirus after having destroyed 70 towns and villages; and 22-years later the whole country became a political part of Macedonia under the title of Epirus Vetus. On the fall of Constantinople (1204) it was seized by Michel Angelus Comnenus. Later, after passing through several hands, it became the property of the Turks (1430) ; and it later formed part of the Turkish Vilayet of Janina. Greece obtained the part east of the river Arta in 1881.

At the close of the Balkan War (1912-13) Greece added a new province to her territory on her northwest, and to this she gave the name of Epirus. This province is bordered on the north by Albania, on the east by the provinces

of Macedonia and Thessaly, and on the south and west by the Gulf of Arta and the Ionian Sea. The population of this newly-acquired territory is between 600,000 and 700,000 and its capital is janina, a city of 25,000. It is largely an agricultural country and among its chief products are wheat

and other grains, olives, fruits, vegetables and tobacco.

Bibliography. — Bowen, (Mount Athos, Thessaly and Epirus) (London 1852) ; Dumont,

(Souvenirs de l'Adriatique et de l'Lpire5 (in Revue des deux Mondes, Paris 1872) ; Hob- house, (A Journey through Albania, etc.5 (Lon¬ don 1813) ; Karapanos, (Dodone et ses Ruines) (Paris 1878) ; Leake, (Travels in Northern Greece5 (London 1835) ; Merleker, (Darstellung des Landes und der Bewohner von Epeiros) (Konigsberg 1841) ; Skene, (Remarkable Lo¬ calities on the Coast of Epirus) (in Journal Royal Geographical Society 1848) ; Stuart,

(Physical Geography and Natural Resources of Epirus> (1869) ; Von Hahn, (Albanesische Studien) (fena 1854) ; Wolfe, Observations on the Gulf of Arta5 (in Journal Royal Geographi¬ cal Society 1834) ; Zompolides, (Das Land und die Bewohner von Epirus5 (Berlin 1880).

EPISCOPACY, that form of Church gov¬ ernment in which one order of the clergy is superior to another; as bishops to priests and deacons. Much discussion has taken place on the subject of episcopacy. Nothing conclusive can be gathered concerning it in the New Testa¬ ment ; but there can be no doubt that it existed universally in the Church from the earliest his¬ toric ages down to the time of the Reformation, and it is inferred, as no change can be shown to have taken place, that the same constitution existed from the time of the apostles. Presby¬ terians and others argue, on the other hand, that, as there is nothing definite concerning it in Scripture, Christians are left a discretionary power of modeling the government of their Church in such a manner as may seem to them most meet ; and that every Christian society has a right to make laws for itself, provided these laws are consistent with charity and peace and with the fundamental doctrines and principles of Christianity. The power vested in the bishops or higher clergy differs very much among the different episcopal bodies. The Roman Catholic and the Greek Churches, as also the Church of England and sections of the Methodist Church, are episcopalian. See Bishop ; Great Britain — The Church of England; Greek Church; Methodist Episcopal Church ; Catholic Church. Roman.

EPISCOPAL CHURCH. See Great Britain — The Church of England; Metho¬ dist Episcopal Church ; Protestant Episcopal Church ; Reformed Episcopal Church.

EPISCOPAL CHURCH, Reformed. See

Reformed Episcopal Church.

EPISCOPAL RING, The. See Costume, Ecclesiastical.

EPISCOPAL THEOLOGICAL SCHOOL, an institution situated at Cambridge, Mass. It was established in 1867 by Benjamin Tyler Reed, as a college for candidates studying for the ministry for the Episcopal Church. Students holding bachelors' degrees may obtain the degree of B.D., but those not holding such a degree receive only certificates. The principal

buildings include the chapel, the deanery, the library and Reed, Burnham, Lawrence and Winthrop halls. The students number about 60. The school is affiliated with Harvard University.

EPISCOPIUS (a translation of Bisschop, his Dutch name), Simon, Dutch theologian: b. Amsterdam, 1 Jan. 1583; d. there, 4 April 1643. The religious movement known as Arminianism was fostered by him, and he was its leader after the death of Arminius (q.v.). He was edu¬ cated at Leyden, where in 1606 he received his degree of M.A. In 1610 he was ordained pastor at the village of Bleyswyck near Rotterdam. In 1611 the States-General, with the intention of putting an end to the agitations created by the controversies between the Gomarists or Calvin- istic party and the Arminians or Remonstrants, ordered a conference to be held in their presence at The Hague between six ministers of each party. Episcopius was one of the six charged with the advocacy of Arminianism, and highly distinguished himself by good temper, ability and learning. In 1612 the curators of the Uni¬ versity of Leyden appointed him professor of theology in place of Gomar, who had gone to Seeland. This enraged the leaders of the ortho¬ dox party, who accused Episcopius of Socinian- ism and of having entered into an alliance with the Roman Catholics for the destruction of Protestantism. By this the fanaticism of the populace was roused; he was insulted and abused in the street, and on one occasion nar¬ rowly escaped being stoned to death. The house of his brother in Amsterdam was sacked, under the pretext that it was a rendezvous of the Remonstrants. In 1618 occurred the famous Synod of Dort. Episcopius was present, with several other Arminians. The Calvinists, who were in an overwhelming majority, would not allow him to speak; they told him that the synod was met not to discuss, but to judge; and all the proceedings exhibited much bigotry and tyranny. Expelled from the Church and ban¬ ished from the country, Episcopius betook him¬ self first to Antwerp, afterward to Rouen and Paris, but 1626 returned to Rotterdam, where the odium theologicum against his party had become less virulent. Here he married in 1630, and four years later was made primarius pro¬ fessor of

divinity in the newly established col¬ lege of the Remonstrants. Episcopius held enlightened principles in regard to religious toleration. Not placing a high value on merely doctrinal views, but trusting rather to the efficacy of the Christian spirit to elevate and purify the character, and seeing, moreover, the presence of this spirit in men holding the most conflicting opinions (when not inflamed with controversial hates), he was desirous of a broader and more catholic bond of unity among Christians than the opinionative creeds of his day permitted. He wrote Unstitutes of Theol¬ ogy } ; (Apology 5 ; Confession.5 (See Gom- arus; Arminius). Consult Calder, (Memoirs of Simon Episcopius5 (London 1838).

EPISODE (Lat. episodium, from the Gr. etzelg66lov , epeisodion, something adventitious), a separate incident, story or action introduced into the general narrative, to give variety or digression, but so arranged as to appear a part of the whole. This term is employed by Aris¬ totle in two significations. Sometimes it denotes those parts of a play which are between the

choruses, and sometimes an incidental narra¬ tive, or digression in a poem, which the poet has connected with the main plot, but which is not essential to it. In modern times it has been used in the latter sense only. With the best poets the episode is not an unnecessary append¬ age, serving merely to swell the size of the work, but is closely connected with the subject, points out important consequences or develops hidden causes. Of this kind is the narrative of the destruction of Troy, in Virgil's 2Eneid. This was the cause of the hero's leaving his country ; but the poet does not commence with it because he wishes to bring the plot into a narrower space. He therefore inserts it in the course of the story, but so skilfully that we ex¬ pect it in this very place; and it not only serves as a key to what has gone before, but prepares us for what is to come, namely, the passion of Dido. In this way the episode becomes an essential part of the whole, as it must neces¬ sarily be, if it is of any importance to preserve the unity of the poem. So with the tale in Wieland's (Oberon5 ; it appears incidental, but explains to us the reason of Oberon's singular interest in the fate of Huon. In epic, poetry there is much more room for the episode than in dramatic, where the poem is confined to a present action. An excellent instance of the skilful use of the episode in the modern novel is given in Manzoni's (I promessi sposi,5 in the tale of the (Nun of Monza.5 The term episode has also been transferred to painting, especially historic painting, in a sense analogous to that which it has in poetry. The term episode is also employed in music to designate an inter¬ mediate section of a composition. The term is also applied to a digressive section, especially in contrapuntal work, like a fugue.

EPISTATES, in ancient Greece, the name generally applied to an officer in charge of certain functions and specifically to the presiding officers of the

Ekklesia and the Boule or Senate.

EPISTAXIS. See Nosebleed.

EPISTEMOLOGY (knowledge

or science, and Myog theory or discourse), or theory of knowledge, is an account of the nature of knowledge, treating of its origin and laws of development, its validity and relation to human experience as a whole. In¬ vestigations of this character fall within the field of general philosophy and have usually been included under the heading of meta¬ physics. The word (

doubtedly be granted that for an ultimate ontology, or final view of the world, it is necessary to go beyond the merely cognitional aspect of experience and include in our syn¬ thesis judgments based on other orders of value than the merely logical. But it is at once obvious that we cannot take one signifi¬ cant step in investigating the nature of reality without some criterion of knowledge, i.e., some theory of the conditions under which reality is known, and of what constitutes truth. It is perhaps not so evident that the nature of knowledge cannot be made the sub¬ ject of inquiry without any reference to meta¬ physical theory. Indeed, it is not uncommon to speak of epistemology, as Locke does, as ((a preliminary clearing of the ground® which is to be completed before any more ultimate metaphysical inquiries are to be undertaken, — if, indeed, these are to be undertaken at all. But this way of conceiving the matter is quite misleading. The figures which compare the knowing faculty to an instrument whose nature must first be understood, are here quite inap¬ plicable. For knowledge has no existence by itself, or apart from and external to its objects. What we want, as Hegel has observed, ((is to combine in our process of inquiry the action of the forms of thought with a criticism of them. The forms of thought must be studied in their essential nature and complete develop¬ ment; they are at once the object of research and the action of that object. Hence they ex¬ amine themselves ; in their own action they must determine their limits and point out their defects.® In other words, knowledge is never a mere series of ideas or mental representa¬ tions that can be investigated apart from its relation to objects. In so far as it is knowledge it refers to and implies reality. To investigate its nature, then, is at the same time to test its conclusions regarding the nature of the ob¬ jects with which it deals. But even if one re¬ fuses to take this standpoint, one must still admit the close connection of- epistemology and

metaphysics. For all theories of the nature of knowledge are based implicitly or explicitly on certain metaphysical assumptions regarding both the mind which knows and its relation to the objects known. Epistemology, then, cannot take one step without involving the ontological problems which some of its repre¬ sentatives seek to avoid.

It is likewise impossible to distinguish sharply the discussion of epistemological prob¬ lems from logic. If a division can be made at the present time it is only in degree of ulti¬ mateness. It is possible, though perhaps not advisable, to limit the term ((logic® to the somewhat narrow and abstract treatment which takes as its object the discovery of cer¬ tain correct forms of thinking, or certain rules which are of practical value in testing argu¬ ments. When, however, logic breaks away from this narrow program, as has been done by the more important recent writers, and carries on its inquiries in a philosophical spirit, it becomes identical with epistemology. Epistemology, logic, and metaphysics may thus be said to denote certain main points of view, differing somewhat in the treatment of various writers in emphasis and inclusiveness, rather than three independent and isolated sciences.

Psychology, as a natural science, however,

occupies a different field, and has quite a dif¬ ferent problem from epistemology. It is true that attempts have frequently been made to explain knowledge by beginning with cogni¬ tive mental states viewed as psychological proc¬ esses. But the characteristics of the mental states and functions with which psychology deals have no immediate bearing on the prob¬ lem of knowledge. For psychology is con¬ cerned only with the mode in which ideas exist; it investigates their quality, duration, intensity, etc., as well as their various modes of com¬ bination, viewing them as particular forms of psychical reality. Epistemology, on the other hand, is interested not in the existential aspect of ideas, but in their significance, in the uni¬ versal and objective validity of experience as a body of truth. It thus seeks to bring to light the forms and functions of intelligence, noting the conditions and presuppositions under which it works, and the laws by which knowledge develops from its simpler and more fragmentary stages to the more complicate and cohorent structure of science. It is a philosophy of experience rather than a descrip¬ tion of individual states of consciousness.

Reflection on the nature of knowledge does not arise until a somewhat late stage in the development of the thought of the individual and the race. Thought first announces its conclusions confidently and fearlessly. It is not until this naive confidence fails and scep¬ ticism arises that it is forced to reflect upon the nature of knowledge and its grounds of certainty. This is illustrated in the history both of ancient and of modern philosophy. The

early Greek philosophers, as Hegel re¬ marked, thought away fearlessly regarding the nature of reality. It was the collapse of those early systems and the scepticism of the Sophists (q.v.) which forced Socrates to take up the epistemological problem. In the same way the Stoic and Epicurean discussions re¬ garding the canon of truth arose in response to the more outspoken and thorough-going scepticism of later times. In modern times the epistemological interest did not come into the foreground until Locke's (Essays Locke's account of the origin of this work brings out very clearly the way in which problems of this character naturally arise: (

Kant's (Kritik of Pure Reason) was the work which placed epistemology in the fore¬ ground of continental philosophy. In the Pref¬ ace to that work, he showed that the motives that led to his undertaking were very similar

to those which influenced Locke. The scep¬ ticism of his time, he says, ((is clearly the result, not of the carelessness, but of the ma¬ tured judgment of an age, which will no longer rest satisfied with the mere appear¬ ance of knowledge. It is, at the same time, a powerful appeal to reason to undertake :anew the most difficult of its duties, namely, :self-knowledge, and to institute a court of ap¬ peal which should protect the just rights of reason, but dismiss all groundless claims, and should do this not by means of irresponsible decrees, but according to the eternal and un¬ alterable laws of reason.® Kant has a poor opinion of Locke's account of knowledge, and characterizes it as (

In the Pre-Kantian philosophy Rationalism (q.v.) and Empiricism (q.v.) were the main types of epistemological theory. The basis of the former was laid by Descartes (q.v.), who sought to universalize the method of mathe¬ matics, and by this means to secure the cer¬ tainty of absolute demonstration in all fields. As mathematics start from axioms and prin¬ ciples which are intuitively certain, and pro¬ ceeds by means of reasoning to deduce all its other propositions from these as necessary consequences, so all science must derive its conclusions from fundamental and indemon¬ strable principles. These principles exist in the mind as a priori truths, and are universal and necessary in character. All science is thus built up by reasoning from general prin¬ ciples. Sense-perception and observation of particular facts were neglected, since.it was held to be impossible to arrive in this way at the universal and necessary form of truth which science demands. It is evident that this theory of knowledge could more readily be applied to the general features of reality than to a determination of its particular details. As in the hands of Wolff (q.v.) and other continental

rationalists it was occupied mainly in furnishing formal proofs of the existence of God, the nature of the soul, and the external features of the physical universe. Empiricism (q.v.), on the other hand, emphasizes sense-perception as the basis of all knowledge. Ex¬ perience is described as a series of particular sensations and ideas in consciousness which are given to the mind from some external source. The mind itself is regarded as merely receptive, without any store of innate ideas, or of organizing principles. It was not strange, then, that in the hands of a genius like David Hume (q.v.), who carried this point of view to its logical outcome, empiricism 'should issue in scepticism. For if experience is nothing but a series of conscious states, each of which is ((loose and separate® from all the others, it is impossible to know anything except these particular states in their isola¬

tion; impossible, therefore, to reach any uni¬ versal propositions such as science demands. Again, if knowledge is limited to states of consciousness, it follows at once that there can be nothing known either of the nature of objects or of the subject or soul.

Kant (q.v.) did much to overcome the one- • sidedness of these theories, and to give a more adequate account of the nature of knowledge. For, while he insists that knowledge must begin with experience, he points out that ex¬ perience itself is a compound, implying both a given sense material and forms and prin¬ ciples of organization on the part of the mind. By his doctrine that ˆthoughts without per¬ ceptions are empty, while perceptions without thoughts are blind,® he passed beyond the one¬ sided views of both Rationalism and Empiri¬ cism. By his transcendental method of inquiry he seeks to show what are the fundamental forms and categories which the mind employs in building up a coherent and universally valid system of experience. But, in spite of the great reform which he effected, he did not wholly succeed in reaching an organic view of experience. This was partly the result of pre¬ supposition which he inherited from the past, and partly due to his own tendency to make hard and fast divisions and distinctions. There always remained for him an unresolved dualism within experience between the datum of sense and the forms of thought. Again, thought, as he conceives it, does not pass beyond subjec¬ tivity and include in itself the nature of its object, but is occupied with bringing order and unity into sensations and mental repre¬ sentations. Although these states of con¬ sciousness, when thus acted upon by thought become objective in the sense that they are parts of a universal and necessary system, nevertheless they are still only (

Modern epistemological investigation may be described as seeking to exhibit the organic unity of experience. To reach this result, new theories regarding the nature of the mind and its relation to objects are necessary. In the first

place, the conception of the mind as made up of a number of distinct faculties must give place to the idea of the mind as a unitary sys¬ tem of functions which mutually co-operate and determine each other in the progressive development of experience. Secondly, the mind can no longer be regarded as a system of merely subjective functions related only in an external and accidental way to the real world of objects. The course of philosophical dis¬ cussion has rendered it evident that if we begin bv defining experience in terms of mental proc¬ esses there is no way of deriving from these the world of objects. If our epistemological theory is to be adequate to experience as we know it, objectivity must be included within it. Thought, that is, is real only as a relation*

to objects; by itself, and apart from the world of real objects, it has no reality. It is only by thus recognizing from the beginning the essen¬ tial relation of subject and object that it is possible to exhibit the real organic unity of experience as a system of knowledge. It was Kant's successors in Germany, and pre¬ eminently Hegel (q.v.), who first developed this organic view of experience. But partly on account of the form in which these systems were expressed, and partly as a result of the decline of philosophical interest, their most valuable and characteristic ideas failed for a long time to be appreciated. The credit of freeing these fruitful ideas from the somewhat obscure and uninviting form in which they were presented in the German systems of a century ago, belongs in the main to the English neo-Hegelians and their co-laborers in Amer¬ ica, among the latter of whom a place of honor must be given to Dr. William T. Harris, the late United States Commissioner of Education. The fundamental doctrine of these writers is that what is real is rational, i.e., knowable in terms of reason, and therefore that all forms of cognitive experience can be exhibited as organically interconnected as a system of ra¬ tional ideas or meanings. Conscious experi¬ ence is from the first regarded, not as a series of psychological states, but as taking the form of a judging activity whose function is to in¬ terpret and reveal the nature of the objective world. Moreover, knowledge proceeds in its development through differentiation and inte¬ gration in accordance with the fundamental laws of logical evolution. Its later and more highly developed forms are then to be under¬ stood as the differentiation and systematization of its more elementary forms and functions. The final truth regarding the nature of the real world must accordingly correspond with the ideal of completely developed and per¬ fectly rationalized experience. As representa¬ tives of this general type of objective Idealism we may mention the late T. H. Green, Edward Caird, the late D. G. Ritchie, A. S. Pringle- Pattison, B. Bosanquet, W. T.

Harris, John Watson and Josiah Royce.

There are, however, prominent philosophical writers of the present day who employ to some extent Hegelian methods and principles in dealing with experience, but who yet main¬ tain that the account of knowledge in terms of reason requires to be modified and supple¬ mented in various ways. Two main points of view may be here mentioned, which have much in common, and which are both often empha¬ sized by the same writers. On the one hand, it is claimed that logical thinking operates with universal concepts, . and can therefore never do justice to the individual aspects of real objects. Thought, in other words, is con¬ cerned only with universal relations, and is unable to apprehend the uniqueness and par¬ ticularity of real existence; it gives us only descriptions of things in general terms, and has to receive as a datum from another form of knowing the particular facts which form its subject-matter. This latter aspect of real¬ ity, it is maintained, can be apprehended only in some form of immediate experience. In fact, it is often maintained that logical ex¬ perience must both start from and pass into direct intuition or feeling. In its beginning,

logical thinking presupposes the awareness of objects in sense-perception ; for it is claimed it is only in this way that thought comes into contact with individual things and gets a foot¬ hold in reality. Again, since the total system of things must exist in individual form, the final synthesis of knowledge must transcend logical relations and be realized, if it can be attained at all, in immediate intuition — a mode of cognition that may perhaps be described as analogous to aesthetic contemplation. Although the neo-Hegelian writers have not been back¬ ward in meeting these arguments, and have successfully shown the difficulties involved in their opponents' antithesis of universal and in¬ dividual, of thought and immediate knowing, yet the discussion cannot be regarded as closed at the present time.

In a similar spirit the function of will and purpose as a fundamental element in experi¬ ence is at present emphasized in many quarters. The intellectual or rationalistic account of cognitive experience is maintained to be in¬ adequate, since it abstracts from the volitional element which alone gives to knowledge its function and significance. Concrete experience is the process of living, and living consists in the realization of purposes. So much may,

I think, be granted : experience is essentially a teleological process and must be interpreted in terms of purpose. But purposes are only defined and realized through thought. Prag¬ matism (q.v.) (as the popular theory ol the present day is called) goes further, and inter¬ prets knowledge solely in its

relation to action. Knowledge is the instrument which the will employs to discover the means whereby prac¬ tical purposes may be realized. It is thus never an end in itself, nor does its function consist in revealing the nature of a reality beyond experience. The function of thought is to effect the practical control of experience, and the only realities which it can define are terms within experience itself. Its problems are set by the particular situations and con¬ crete demands which the developing process of experience presents. There is no intelli¬ gible problem regarding the nature of reality in general, or reality that does not exist as a particular functional element in concrete ex¬ perience. Against this position various ob¬ jections have been urged by many writers; the chief of which are (1) that it does not reach a real organic unity of experience; (2) that it overlooks the fact that knowledge is an end in itself; (3) that it is subjective, and fails to recognize the objective and rational ends without which no real experience can exist.

At the present time perhaps the most im¬ portant function of Epistemology consists in a criticism and evaluation of the fundamental conceptions and principles which underlie the procedure of the special sciences. These sciences set out from certain definite assump¬ tions regarding the nature of the phenomena which they investigate, and with certain de¬ mands which their method of investigation has to fulfill. It is the function of Epistemology to make explicit the nature of these initial assumptions, and to show that the accounts given by these sciences are essentially deter¬ mined by the character of these assumptions. Instead of assuming that the results of the

special sciences are to be accepted at their face value as direct statements about the nature of reality, both philosophical epistemol- ogists and workers in these sciences who have reflected on the problems of method (as e.g., E. Mach and Karl Pearson) now agree that the view of the world given by natural science — 'and especially the mechanical theory — is itself a logical construction, based on certain assumptions which are necessary to carry out the purpose of the scientific co-ordination and explanation of facts. This construction must not be read apart from the purpose for which it was designed. Indeed, the prevailing tend¬ ency is to emphasize the merely methodologi¬ cal character of scientific results to such an extent as to make them appear almost arbi¬ trary and devoid of any ontological signifi¬ cance. This is undoubtedly an extreme posi¬ tion. It must, of course, be admitted that the results of the special sciences are largely hypothetical and possess only relative truth. But they are never mere logical constructions in the sense that they are entirely divorced from reality. The

ultimate purpose of science, as of all thinking, is to exhibit the structure of the real world, and the assumptions and hypotheses of the special sciences derive their significance and justification solely from their employment as means for the accomplish¬ ment of that end. In its task of criticizing the assumptions of the special sciences, then Epistemology cannot escape the consideration of metaphysical problems regarding the nature of the external world and its relation to the human mind.

Bibliography. — The bibliography of this subject is coextensive with that of general philosophy. A few works may be mentioned which deal with the more recent development of the subject: Albee, (The Significance of Methodological Principles) (in Philosophical Review, Vol. XV, 1906) ; Bergson, Henri, (Creative Evolution> (Eng. trans., New York 1911) ; Creighton, James E., (Methodology and Truth> (in Philosophical Review, Vol. X, 1901) ; Dewey, (Studies in Logical Theory) (Chicago 1902) ; id., (The Influence of Darwin on Philosophy) (New York 1910) ; James,

James E. Creighton,

Professor of Logic and, Metaphysics, Cornell University.

EPISTLE TO ARBUTHNOT. Pope's Ppistle to Arbuthnot) (1734-35), known also as (The Prologue to the Satires,) is quite the best thing of its kind in English. Characteristic of the writer in its invective, its brilliant wit, its epigrams and apothegms, and its incisive and compressed style, it is far more than any other of his satires a key to the character of the man

himself. Indeed, it presents an entire auto¬ biography in little more than 400 lines. It is Pope's apologia, in which he disproves the state¬ ment that he was of lowly birth, tells how and when he entered upon his profession as poet, relates his persecution by literary pretenders and bores ; dwells especially upon the slanderous attacks by his enemies; and draws portraits of his enemies and his friends. The whole is a melange of personal confession and of satire to which unity is given only by the personality of the poet and by his interest in himself. So highly autobiographical and allusive is the (Epistle) that a commentator is needed to point out its full significance. Quite apart from any autobiographic element, however, it is intrin¬ sically great among its kind, and even to the reader who knows little of Pope's character and disregards the contemporary allusions, is still immensely entertaining. As Sir Leslie Stephen has remarked, Pope is at his best when he expresses personal antipathies and attachments, when he is autobiographic, and when he points his morality by personal and concrete instances. He was a curious mixture of honesty and hypoc¬ risy, though often honestly self-deceived, and certain passages of the fpistle5 must (

Dr. Johnson traces the idea of the (Epistle) to Boileau's address beyond reach of rivalry in this kind of writing® (Elwin and Courthope). For a full discussion of the date of composition, consult Pope's (Works,) (Vol. Ill (Poetry), ed. Elwin and Courthope, 1881) . Sir Leslie Stephen in his life of Pope in the (English Men of Letters> series makes interesting comments on the satires.

Marion Tucker.

EPISTLE TO AUGUSTUS. Pope's

(Epistle to Augustus) (1737) is a literary satire in imitation of the epistle which Horace ad¬ dressed to the Emperor Augustus (Book II,

Ep. I). In his choice of topics and their order Pope follows his original rather closely, except of course that he substitutes English literature for Latin, London for Rome, and George II for Augustus. There is also a change of tone, in that Horae's eulogy of Augustus becomes bit¬ terly ironical when applied to George II. Pope discusses the relative merits of ancient and mod¬ ern English writers, the theatre, the London judgment of poets and poetry, the progress of poetic art and the poet's power to confer dis¬ tinction upon his patrons. In effect, the whole is a satire upon George II, upon unworthy writers, and upon poor literary taste. Here and there occur passages full of sound sense and excellent literary criticism, expressed with Pope's characteristic terseness and point (for example, lines 213-20, on Dryden and Addison). The most celebrated passage in the (Epistle) is perhaps the one on the progress of English poetic art (11. 267-81), which states that

" Dryden taught to join The varying verse, the full-resounding line,

The long, majestic march, and energy divine."

Though less frequently quoted than some others of Pope's poems, the contains lines which have passed into the common use, such as <(The last and greatest art — the art to blot.®

Marion Tucker.

EPISTLE SIDE OF THE ALTAR, the

right side of the altar, looking toward it, so named because the epistle of

the day is read at that side. It is secondary to the gospel or left side, and on fete days is occupied by the lesser ecclesiastical dignitaries.

EPISTLES, Spurious. See Apocrypha. EPISTLES OF HORACE. See Horace.

EPISTOL.® OBSCURORUM VIRO- RUM, e-pis'td-le ob-sku-ro'rum vi-ro'rum (Lat. (

EPISTOLER, or EPISTLER, the clergy¬ man in the English Church who assists the celebrant in administering Holy Communion, and who reads the epistle. The office corresponds to that of subdeacon in the Catholic Church.

EPISTUL2E EX PONTO, four books of letters, written by Ovid during his exile. They are made up for the most part of appeals to

his friends at Rome for intercession with the emperor. They are in elegiac metre.

EPISTYLIUM, or EPISTYLE, a beam of stone or wood, used to span the space between columns or pillars. It is synonymous with the term architrave.

EPITAPH (Gr. kniratyLoq, epitaphios, funeral, from ri, epi, upon, and ratpog, taphos, tomb), an inscription upon a tomb. The earliest known are those upon Egyptian sarcophagi. Epitaphs are common among many people, and arose, in all probability, out of the desire to commemorate the dead. They were in use among both the Greeks and Romans. Many of the later Greek epitaphs were of considerable length, while those of the Romans commonly recorded only brief particulars regarding the deceased. The tombs of the Romans were placed near the highways, and their epitaphs generally commenced with Sta viator! (Stop, traveler!). On Christian tombstones epitaphs frequently express the pious hopes of survivors in reference to the doctrines of the Christian faith. In the catacombs of Rome, which were made a place of refuge by the persecuted Chris¬ tians under the pagan emperors, are many re¬ markable epitaphs of this description. Among memorable epitaphs, one of the happiest, is that of Sir Christopher Wren, in Saint Pauls, Lon¬ don, of which he was the architect:

Si monumentum quarts circumspice

“If you seek for his monument, look about you.”

The following is the epitaph of a Roman matron :

Domum servavit,

Lanam fecit.

“ She kept the house and span the wool.”

Sta, viator: heroetn calcas, —

“ Traveler, pause: thou treadest upon a hero,”

has been ascribed both to Montecuculi and to Gen. Merci.

Sufficit huic tumulus, cui non sufecerat orbis, —

“ This tomb suffices for him for whom the world did

not suffice,”

was the epitaph of Alexander the Great.

Count Tessin, a governor under Gustavus III of Sweden, ordered the words

Tandem felix,

“ Happy at last ”

to be inscribed on his tomb. The following is Sir Isaac Newton’s epitaph:

Isaacum Newton,

Quem immorlalem

Testantur Tempus, Natura, Ccelum,

Mortalem hoc M armor,

Fatetur.

“ This marble acknowledges Isaac Newton mortal, to whose immortality time, nature, and heaven bear witness.”

Saint Anne’s Church, at Cracow, has the fol¬ lowing suggestive epitaph, dedicated by Count Sierakowski to Copernicus :

Sta, sol, ne moveare.

“ Stand, O sun! move not.”

Many so-called epitaphs are merely epigrams, never intended for serious use as monumental inscriptions. Among such may be cited that of Piron, on

Marshal de Belle-Isle, who was buried next to Turenne:

Ci-git le glorieux a c6t£ de la gloire,

“ Here beside glory lies the vainglorious.”

Bibliography. — Andrews, (Curious Epi-

taphs) (London 1883) ; Armstrong, (Autobi-

ographic Elements in Latin Inscriptions) (New York 1910) ; Blommaert, etc., inscriptions funeraires et monumentales de la prov. de Flandre Orient > (Ghent 1857-60) ; Brown, J., (Paris 1885) ; Robinson, (Epitaphs from Cemeteries) (1859) ; Thompson, (Taedium vitae in Roman Sepulchral Inscriptions) (Saint Louis 1911) ; Tolman, (A Study of the Sepul¬ chral Inscriptions in Biicheler’s Carmina Epi- graphica Latina) (Chicago 1910) ; Weever, (Ancient Funeral Monuments) (1631) ; Words¬ worth, (Essay on Epitaphs.)

EPITHALAMIUM, ep"i-tha-la mi-um

(Lat. epithalamion, from the Gr. kiudaˆdiuoˆ t epitlialamios, nuptial, from eni, epi, upon, and eala/iog, thalamos, a chamber), a nuptial song, a poem in honor of a newly married couple or one of the pair. Among the Greeks and Ro¬ mans it was sung by young men and maids at the door of the bridal chamber of a newly-mar¬ ried couple. It consisted of praises of the bride¬ groom and bride, with wishes for their happi¬ ness. Examples may be seen in Theocritus’ epithalamium of Helen, and the three epithala- mia of Catullus, in which the Greek form is much modified. Some Roman epithalamia were collected by Wernsdorf in Vol. IV of his

EPITHELIOMA, a species of cancer in which the disease attacks the surfaces covered with epithelium or epidermis. See Cancer.

EPITHELIUM, ep-i-the'li-um, one of the simplest forms of tissue derived chiefly but not alone from the outer embryonic layers and characterized by its non-vascularity. It con¬ sists of flattened or columnar cells united into continuous membranes by an intercellular ce¬ ment substance. Epithelium serves for the most part to protect exposed surfaces of the body, and performs the functions of absorp¬ tion, secretion and excretion. The epithelial tissues are developed from all three layers of the developing embryo. They themselves secrete their own cement substance. This takes on

the form of thin plates between the cells, gluing them together. Occasionally the epithelial cells develop short lateral projections (prickles), forming with similar structures of neighboring cells intercellular bridges, between which are intercellular spaces filled with lymph for the nourishment of the cells. Inasmuch as practically all epithelial cells have one ex¬ posed surface and one surface lying in contact with tissues underneath, the upper and lower surfaces show certain variations of structure.

Occasionally the free surface develops fine hairs or cilia. These are found in various localities. The outer surface of the cell, be¬ ing exposed, develops more truly animal func¬ tions, the inner more vegetative. Blood ves¬ sels and lymph vessels do not penetrate, as a rule, into epithelial tissues, but they are richly supplied with nerve-end organs.

According to their shape and relation, the epithelial cells are divided into these varieties: (1) Simple epithelial cells, with or without cilia, comprising (a) squamous epithelium; (b) cubical epithelium; (c) columnar epithelium; (d) pseudostratified columnar epithelium. (2) Stratified epithelium, comprising (a) stratified columnar epithelium, with superficial flattened cells without cilia; (b) transitional epithelium; (c) stratified columnar epithelium. (3) Glan¬ dular epithelium. (4) Neuro-epithelium.

1. Simple Epithelium. — This is that type in which the cells lie in a single continuous layer. This form is found lining almost the entire alimentary tract, the smaller air-passages, the majority of the gland-ducts, the ovarian ducts, the uterus, the central canal, the spinal cord and the ventricles of the brain. In (a) simple squamous epithelium the cells are flattened, forming a mosaic with the nuclei lying in the middle of the cell. It is found in the alveoli of the lungs. In (b) simple cubical epithelium the appearance is that of short polygonal prisms. It occurs in the smaller bronchioles of the lung, in certain portions of the urinifer- ous tubules, the liver, pancreas, salivary and mucous glands. In (c) simple columnar epi¬ thelium the cells are pyramidal or prismatic. This type is found in the intestinal tract from the cardiac end of the stomach to the anus, and in certain portions of the kidney. Ciliated columnar is found in the ovarian duct and uterus, in the central canal of the spinal cord and in some of the smaller bronchi, (d).

2. Stratified Epithelium. — When the cells of simple epithelium increase to such an extent that layer upon layer is developed, the epithe¬ lium no longer remains simple, but becomes stratified. The lower layers are richly sup¬ plied with blood vessels, and multiply very rapidly, pushing out the upper layers that are constantly dying and being cast off. The various forms, are: (a) Stratified columnar epithelium, with superficial flattened cells, forming the outer covering of the body, the epidermis and its continuations inside of the body, as, for instance, the walls of the oesopha¬

gus, the epithelium of the conjunctiva, the ex¬ ternal auditory canal, the sheath of the hair- follicles, the walls of the rectum, the anus and the vagina. The deeper cells are usually cu¬ bic-cylindrical, and are followed, as a rule, by one or more layers of slightly flattened cells, until finally the outmost layers become very much flattened and horny, or they may be developed into distinct horn-like substances such as that found in the nails. (b) Transi¬ tional epithelium, a type of stratified epithe¬ lium found m the kidney, uterus, urethra and bladder. It is somewhat similar to the stratified columnar epithelium, but does not show the characteristic deep papilla? in the basal mem¬ brane, so. characteristic of the former. (c) Stratified columnar epithelium, consisting of a superficial layer of columnar cells and deeper

layers of irregular, triangular, cubical or spindle-shaped cells. This type is found in the larger duct-glands, in the mucous mem¬ brane of the nose, portions of the male urethra and in parts of the larynx. Many of this type of cells have cilia, particularly those found in the back of the nose, larynx, respiratory tract, larger bronchi, Eustachian tube, epididymis and portions of the vas deferens.

3. Glandular Epithelium. — This is a type of epithelium occasionally found scattered among other epithelial cells, and which shows the char¬ acteristic of gland-structures. See Glands.

4. Neuro-epithelium. — Neuro-epithelial cells are highly specialized cells in which special nerve-end organs are to be found. In one sense nearly all epithelium is neuro-epithelium since many nervous receptors are located in flat, stratified epithelium and also both receptors and effectors are found in the epithelium of mucous membranes. Consult Bailey, histol¬ ogyˆ

EPITHEM, in botany, a gland which ex¬ cretes water, or, the internal tissue of a hyda- thode (q.v.).

EPITOME, e-pTt'6-me, a summary or ab¬ stract of any book or writing; a compendium containing the substance or principal matters of a book. Such digests or abstracts were common in the Middle Ages and have not been un¬ common even in modern times, for instance, the abridgment of the French encyclopaedia La- rousse.

EPIZOA, in a general sense, external parasites, as contrasted with Entozoa, or in¬ ternal parasites. These are not exact terms in scientific classification. Among them are the fleas, lice, ticks, itch-mites and similar minute

ˆvermin® infesting man or beast.

In a more restricted sense the term is ap¬ plied to the degraded, distorted copepod crus¬ taceans parasitic upon the skin, gills and other parts of marine animals, especially fishes. See Fish-lice.

EPOCH, or ERA (Gr. hnoxfj, epoche, epoch, pause). In history, a fixed point of time, commonly selected on account of some remark¬ able event by which it has been distinguished, and which is made the beginning or determining point of a particular year from which all other years, whether preceding or ensuing, are com¬ puted. Some writers distinguish between the terms epoch and era. According to. them, both mark important events, but an era is an epoch which is chronologically dated from; an epoch is not marked in this way. The birth of Christ was thus both an epoch and an era from this point of view.

The more important historical epochs are here enumerated. For further details on the mode of reckoning see Calendar.

The Creation. — The biblical record of the creation has formed the foundation of numer¬ ous chronologies. Of course the authorities (Jewish and Christian) on these various modes of reckoning do not agree as. to the time signi¬ fied by the common authority for the event dated from. The more important of these epochs, of which there are about 140 different varieties, are (1) The epoch adopted by Bossuet, Ussher and other Catholic and Protestant divines, which places the creation in

4004 b.c. (2) The Era of Constantinople (adopted by Russia), 5508 b.c. The civil year begins 1 September, the ecclesiastical year about the end of March. (3) The Era of Antioch, used till 284 a.d., placed the creation 5502 b.c. It was merged in the following year in (4) The Era of Alexandria, which made the creation 5492 b.c. This is also the Abyssinian Era. (5) Jewish Era. The common, era of the Jews places the creation in 3760 b.c. Their year is lunar-solar, that is, lunar with intercalary months, forming a cycle of 19 years, of which 12 have 12 months and seven 13 months. The year thus varies from 353 to 385 days. The civil year begins with the new moon following the autumn equinox. The eras dating from the creation are distinguished by the initials A. M. Const., Abyss., etc., are sometimes added to dis¬ tinguish the particular epochs.

Julian Period. — This begins 4713 b.c. It is an arbitrary epoch, fixed for the purpose of computing all dates forward, as in the case of the creation epochs.

The Olympiads. — The Greeks computed their time by periods of four

years, called Olympiads. Their year was lunar, with inter¬ calary months. The first Olympiad, being the year in which Coroebus was victor in the Olym¬ pic games, was in the year 776 b.c. The period of the commencement of the year, which was variable, was about July. The contraction used for the Olympic epoch is Olymph.

The Roman Era (Ab Urbe Condita).ˆ The Romans dated from the supposed era of the foundation of their city, 21 April, in the third year of the sixth Olympiad, or 753 b.c. (accord¬ ing to some authorities 752 b.c.). This epoch is designated by the initials A. U. C. The Roman mode of computation was the foundation of our modern chronology.

Era of the Seleucides. — Begins 1 Oct. 312 b.c., the epoch when Seleucus I (Nicator) took possession of Babylon. The year consisted of 365 days, with a leap year every fourth year. This era is used in the book of Maccabees.

Spanish Era. — This dates from 1 Jan. 38 b.c. The months and days were the same as those of the Julian calendar. It was disused in Aragon in 1350; in Valencia, 1358; in Castile, 1383; in Portugal, about 1415.

Christian Era. — Our mode of computing from supposed data of the birth of Christ was first introduced in the 6th century, and had not been generally adopted until the year 1000. Since the first year of the 1st century was 1 a.d., the last year of the same century was 100 a.d. Similarly the year 1900 a.d. was the last year of the 19th century. The same holds good in reckoning backward. For particulars of the mode of reckoning the years of the Christian era and the changes which it has undergone, see Calendar.

Armenian Era. — This began 7 July 552, and was superseded by the Julian era about 1330. The year consisted of only 365 days.

Mohammedan Era, or Hegira — This be¬ gins on 16 July 622. The conversion of the Mohammedan into Christian chronology causes more difficulty and confusion than arises with any of the other modes of reckoning. The Mo¬ hammedan year is purely lunar. It consists of 12 months, and each month commences with the appearance of the new moon. Hence their

years have no correspondence with the recur¬ rence of the seasons, and to know the period when a Mohammedan year begins it must be reckoned from the beginning of the era. In chronology, history, etc., they use months

of 29 and 30 days alternately, making the year consist of 354 days. Eleven times in 30 years one day is added to the last month, making 355 days in the year. The mean length of the year is thus 354 11/30 days, of the month 29 191/360, differ¬ ing from the true lunation by little more than three seconds, or less than a day in 2,260 years. As 33 Mohammedan years amount to only six days (including intercalary days and leap years) more than 32 of our years, by deducting one year from each 33 Mohammedan years, and add¬ ing 621ˆ years, the year of the Christian era will approximately be found. The Hegira is distin¬ guished by the initials A. H.

Persian Era. — The era of Yezdegird III began 16 July 632. The year consisted of 365 days. It was reformed in 1075 by the addition of a day whenever it was necessary to make the commencement of the year occur on the day of the sun's passing the same degree of the ecliptic. The months have each 30 days, with five or six days intercalated. This era is still used by the Parsees in India.

Indian Chronology. — The best-known eras computed by solar time are the Kaliyuga, which dates from 3,101 years before Christ and the Salivahana from 77 a.d. Both are computed astronomically, losing one day in 60 years by our computation. The era of Vikramaditya, beginning 57 years b.c., is computed by lunar months, with intercalations made according to astronomical observation, and bringing the year up to 365 or 366 days. The Bengali year was formerly identified with the Hegira, but is now reckoned by solar computation.

Chinese Chronology. — The Chinese, like all the nations of northeast Asia, reckon their time by cycles of 60 years. Instead of numbering them as we do, they give a different name to every year in the cycle. The Chinese months are lunar, of 29 and 30 days each. Their years have ordinarily 12 months, but a 13th is added whenever there are two new moons while the sun is in one of the zodiac. This will occur seven times in 19 years. The boasted knowledge of the Chinese in astronomy has not been suffi¬ cient to enable them to compute their time cor¬ rectly. The first cycle, according to Roman Catholic missionaries, began February 2397 b.c. To find out the Chinese time multiply the elapsed cycle by 60 and add the odd years ; then if the time be before Christ subtract the sum from 2,398; but if after Christ, subtract 2,397 from it; the remainder will be the year re¬ quired.

Primitive American Chronology. — The na¬ tives of America, previous to its discovery by Europeans, particularly the Peruvians and Mexicans, appear to have had a considerable acquaintance with astronomy and to have reck¬ oned their time with great care. The Mexican year consisted of 365 days, composed of 18 months of 20 days and five added days. At the

end of a cycle of 52 years 12 and 13 days were added alternately, making the mean year very near the truth.

In geology, according to United States Geo¬ logical Survey usage, a subdivision of a period of geologic time, the period in turn being a

subdivision of an era, the largest time unit in use. The rocks laid down during an epoch are usually known as a series, this term being used as a subdivision of a system, the latter being the rocks laid down during a period. The Cambrian (q.v.) period is usually divided into three epochs, Georgian, Acadian and Saratogan, and the Cambrian system into three corresponding series of rocks known by the same names. Other periods are also divided into epochs. The Eocene, Oligocene, Miocene and Pliocene are sometimes given the rank of periods, but are now generally considered to be epochs of the Tertiary period. While periods are divisions the nomenclature of which is fairly well standard¬ ized the world over, epochs are not so constant, and go by various names in various lands. See Cambrian; Ordovician; Eocene, etc.

In astronomy, epoch is the longitude which a planet has at any given moment of time.. To predict this for any future period the longitude at a certain instant in the past must be known; that instant is termed the epoch of the planet.

EPODE (Lat. epodus, Gr. epodus, an after song or epode). In Greek choral poetry the term is used of an ode succeeding a strophe and antistrophe, or a series of strophes and anti¬ strophes. The name was also given by gram¬ marians to any poem the material unit of which is a distich consisting of a long, followed by a short verse. In this sense it was especially used by the iambic trimeter followed by the iambic dimeter, as in Epodes 1-10 of Horace. In music the term epode is used to signify a bur¬ den or refrain.

EPOMEO, a-po'ma-o, a volcano, on the island of Ischia, Italy, 15 miles south by west of Naples. It has an elevation of 2,588 feet and commands a fine panoramic view of the coast with the famous bay of Naples. Terrific erup¬ tions have marked its history; one in 474 b.c. caused most of the inhabitants to flee from the island. In 1302 occurred the last great up¬ heaval. The mountain is sometimes known as Mount San Nicola, from the San Nicola Her¬ mitage near the summit. The mount is men¬ tioned in Virgil's (/Eneid/ IX, '716.

EPONA, the goddess of stables, asses, mules and horses. She was at first exclusively wor¬ shipped in Gaul but the cult spread to Rome in the 1st century of our era. Inscriptions to her have been uncovered in France, Germany, the Dobrudja and Italy. Consult Wissowa, Re¬ ligion und Kultus

der Romer) (2d ed., Munich

1912).

EPONYM, epo-nlm, a mythical personage created to account for the name of a tribe or peo¬ ple; thus Tros is the eponymous hero of Troy; Italus was assumed as ancestor of the Italians; Romulus of the Romans. It is also more generally used in the sense of names of people, places and periods, derived from those of per¬ sons. Thus Bolivia is derived from Bolivar. Hearn, in his (Aryan Household,* declares that <(wherever there was a clan there was an eponym or founder, whether real or legendary, of that clan." By extension the term is also applied to the name of something, as a part or organ of the body derived from a person, as the fissure of Sylvius.

EPONYMOUS, an adjective of Greek ori¬ gin and meaning usually the giving of a name to

some person or thing. In ancient Greece it was especially applied to the ephor, from whom the year was named. Tribes and cities usually traced their origin to some eponymous ancestor, generally a national hero. Thus Tros is the eponymous hero of Troy, Italus of the Italians, etc.

EPOREDIA. See Ivrea.

EPOS. See Narrative Poetry.

EPPES, John Wayles, American states¬ man: b. Virginia 1773 ; d. near Richmond, Va., 20 Sept. 1823. He received an academic educa¬ tion, and after studying law was admitted to the bar and began practice in Richmond. In 1803 he was elected as a Democrat to the House of Representatives at Washington, and with successive re-elections served continuously from 17 Oct. 1803 to 3 March 1811. Later he was elected to the 13th Congress and served from 24 May 1813 to 3 March 1815. He was chosen United States Senator in 1817, but re¬ signed the office two years afterward on ac¬ count of failing health and retired to his es¬ tates in Chesterfield County. He married Maria, the daughter of Thomas Jefferson, who died at Monticello in April 1804.

EPPING, England, market town, in Essex, 17 miles from London and in the midst of the forest to which it gives name. This ancient royal forest, once a part of Waltham forest, and all much larger than at present, has an area of 6,000 acres and presents some fine wood¬ land scenery. It was secured to

the nation by legislative enactment and was opened by Queen Victoria in 1882 as a public recreation ground. The town consists of a single broad street on a ridge of hills. Pop. 4,253.

EPPING FOREST. See Epping.

EPSOM, England, market town in the county of Surrey, 14 miles southwest of the heart of London. Epsom was formerly cele¬ brated for a mineral spring, from the water of which the well-known Epsom salts were manu¬ factured. A number of the sons of medical men are educated at the Royal Medical Col¬ lege, and adjoining the school is a home for aged physicians or their widows. The prin¬ cipal attraction Epsom can now boast of is the grand race-meeting held on the Downs, which is attended by hundreds of thousands of per¬ sons. The races begin on Tuesday and continue to the end of the week preceding Whitsuntide; the Derby stakes are run for on Wednesday, which is the principal day, and the Oaks on Friday. There is also racing on two days earlier in the season ; the town being otherwise characterized as ((a dull little place for 50 weeks in the year.® Epsom gives name to one of the parliamentary divisions of the county. Pop. 19,156.

EPSOM SALT, a hydrous sulphate of mag¬ nesium, having the formula MgSCh + 7H20. It occurs abundantly in nature and takes its name from its occurrence, in dissolved form, in a mineral spring at Epsom, England. It may be prepared also from dolomite, by decomposing the mineral by the addition of sulphuric acid. Epsom salt, proper, is known to the mineralo¬ gist as epsomite, and more popularly as hair- salt, from the delicate fibrous efflorescent de¬ posits in which it often occurs on the walls of mines, quarries and caves. Epsomite crystal¬

lizes in the orthorhombic system, and large quantities of it are found in the limestone caves of Kentucky, Tennessee and Indiana, mingled with earthy matter. In the Mammoth Cave it occurs in loose masses suggestive of snowballs, adhering to the roof and walls. An allied min¬ eral known as kieserite, which has the composi¬ tion MgS04 + H20, and occurs abundantly at Stassfurt, is largely used as a source of epsom salt. Magnesium sulphate is used as a fertilizer, as a raw material for the manufacture of the sulphates of sodium and potassium and in siz¬ ing and dyeing cotton goods. The epsom salt is also extensively used as a purgative, in medi¬ cine.

EPSOMITE, natural magnesium sulphate of the same composition as Epsom salt (MgS04 + 7H20) . It has a bitter saline taste and is found in fibrous crusts in white botry- oidal lumps.

EPSTEIN, Jacob, English sculptor: b. New York, 1880. He is of Polish-Prussian descent, made his studies under Rodin at Paris and set¬ tled in London. He was commissioned to exe¬ cute 18 figures to decorate the new building of the British Medical Association in 1907-08. The work when finished was attacked by newspapers and various religious bodies, but was defended by the Times , Herbert Gladstone, Sir Martin Conway and others. Epstein was also com¬ missioned to execute the tomb of Oscar Wilde in Pere Lachaise Cemetery, Paris, which he completed in 1909. He also decorated Church Square, facing the government buildings, Pretoria, Transvaal. His art is intensely real¬ istic and is a protest against the conventional imitation of the Greek.

EPULIS. See Mouth.

EPWORTH LEAGUE, a society of young people of the Methodist Episcopal Church ; formed 15 May 1889 in Cleveland, Ohio, by the union of five societies affiliated with the Meth¬ odist Church. It adopted as its motto : (

about 30,000 chapters and over 2,000,000 mem¬ bers. Its official organ is the Epworth Herald,. published in Chicago, which has a circulation of over 100,000. Consult Bacon and Northrop, (Young People's Societies) (New York 1900) (The Methodist Year Book) ; Brummett, (Ep¬ worth League Methods V (New York 1906).

EQUAL RIGHTS PARTY, in 1835. See

Locofocos.

EQUAL RIGHTS PARTY, in 1884. Belva Lockwood nominated herself for the presidency,, on a platform of Woman Suffrage; and gave her voters this title.

EQUALITY BEFORE THE LAW, a

fundamental of civil liberty, in which the equal¬ ity of all men to receive the protection afforded by law is assumed. The guaranty of liberty and equal privilege to all freemen was embodied in Magna Charta (q.v.) in 1215, and in the Decla¬ ration of Independence the equality of all men with unalienable rights was emphasized. The equal protection of the laws excludes any dis¬ tinction between individuals, invidious dis¬ crimination, and class legislation not founded on legal or reasonable distinctive grounds. See Due Process of Law; Common Law.

EQUATION, a term based on the idea of equality, in general use throughout the various branches of calculus. (1) In mathematics it is the statement in algebraic expressions of the identity of two or other mathematical expres¬ sions. The assertion of equality is made by writing the sign = (read < (is equal to® or ˆequals®) between the expressions. Thus: Sx + 7 = 32, and ax2 + bx + c — 0, are equa¬ tions, each of which indicates the equality of the quantity written on the left of the sign (=) to that written on the right of the sign. Usu¬ ally the object of writing down an algebraic equation is to express in symbols known rela¬ tions between given and unknown quantities, so that by algebraic processes the latter may be determined in terms of the former. Such equa¬ tions are designated conditional, while equa¬ tions which are true for all values of the vari¬ ables they involve or which involve no variables, are called identities. (See Algebra, Defini¬ tions and Fundamental Concepts). (2) In astronomy, is the correction by addition to or subtraction from the mean motion of any heavenly body, in order to determine its true place at any given time. The angular motion of a planet around the sun will not be uniform if its orbit is not circular, regardless of any per¬ turbations. Furthermore, the mutual attraction among the planets renders each one capable of producing a perturbation in the orbits of all the others. An equation is required for every such perturbation before it is possible to calcu¬ late accurately the course of the planet. Thus

we have the equation of the centre, a quantity to be added to or subtracted from the anomaly, in order to determine the true position of a heavenly body. For instance, let the curve e c f represent the earth's orbit (which is an

ellipse), e f the line of the aspides, and a the position of the sun. When the earth is in any position as c, the line a c drawn from the sun to the planet is the radius vector, then will the angle c a f be the anomaly, or the angular distance from the perihelion. Were the earth's angular motion uniform the increase or de¬ crease of this angle would be equal in equal times, and the mean anomaly would be the true anomaly; but the earth's motion is retarded as it advances from f to c, is slowest at e, and is accelerated from that point, the aphelion, through the other half of its orbit till it arrives at f, the perihelion. The quantity to be added to the mean angular motion, during one por¬ tion of the orbit, or subtracted from it in the other, in order to find that true anomaly, is called the equation of the centre. (3) In chemistry, is a collection of symbols to denote that two or more definite bodies — simple or compound — have been brought within the sphere of chemical action, that a reaction has taken place, and that new bodies are produced. It is called an equation because the total weight of the substances concerned remains the same. Equations may also involve the energy con¬ sumed or given off in a reaction. See Chem¬ istry.

EQUATION, Personal, an important cor¬ rection that must be considered in connection with refined measurements in astronomy and physics, and which originates in the fact that no two observers agree precisely as to the in¬ stant at which a phenomenon occurs, nor as to the setting of a micrometer-wire so as to bisect a division mark on a scale. Differences of this sort are exceedingly irregular among inexperi¬ enced observers, but among the more experi¬ enced ones the regularity, while not absolute, is strongly marked. In some kinds of work the personal equation of the observer can be eliminated by the method in which the observa¬ tions are made. Thus in the determination of differences of longitude by telegraphic meth¬ ods, it is usual to eliminate the effect of per¬ sonal error from the final result by having the observers change places when the work is half done ; so that if the difference of longitude as determined by the first half of the work was too large, that determined during the second half will be too small by an equal amount, and the effect of personal equation will disappear from the final mean. In other cases it is im¬ possible to eliminate the effects of personal error in any such way, and in these cases the attempt is often made to determine the magni¬ tude of the personal equation, and apply the proper correction to the results as directly ob¬ served. Thus Otto Struve, in connection with his measurements on double stars, had artificial double stars constructed, upon which he made regular observations for the purpose of study¬ ing his personal equation in such work, and he applied to his results for the genuine stars, a scries of corrections deduced in this way. When the thing to be measured is an interval of some kind, the personal equation can usually be neglected, provided the same observer makes all the measures. For example, in determining the length of a bar, the reading of the mi¬ crometers will be in error (so far as the per¬ sonal equation is concerned) bv the same amount at both ends of the bar, and hence the

difference of these readings; or, in other words, the observed length of the bar will be independ¬ ent of the observer's personal equation.

EQUATIONS, Differential. 1. Introduc¬ tion. — The invention of the calculus, made necessary by the demands of natural science, was followed immediately by the most brilliant applications. The names of Newton, Leibnitz, Euler, Lagrange and Laplace are attached to the principal discoveries of this period, whose importance from a scientific and philosophical point of view can hardly be overestimated. A simple example will suffice to explain the ruling idea of this epoch. From the observ¬ ations of Tycho Brahe, Kepler had obtained the laws of planetary motion still

known by his name. Newton had shown that Kepler's laws were but a consequence of the laws of universal gravitation, which assumes that every particle in the universe acts upon every other according to a definite law. The effect of Newton's law upon a system of moving bodies can be formulated in mathematical symbols without any difficulty. This forrpulation gives rise to a system of equations involving the co¬ ordinates of the moving bodies and their accelerations, i.e., the second derivatives of these co-ordinates with respect to the time. The problem of expressing the co-ordinates as functions of the time, i.e., the problem of integrating this system of differential equations, was solved by Newton for the case of two mutually attracting bodies, and its solution is given precisely by Kepler's laws. Newton him¬ self and his successors, especially Laplace and Lagrange, studied the further consequences of the law of gravitation as applied to the solar system. The accord between the theory and ob¬ servation became closer and closer, so that it was reasonable to suppose that the true law of nature had been found. Gradually other branches of physical science were treated in a similar way. In all cases, the fundamental laws being assumed, the mathematical formula¬ tion of the problems led to the question of integrating differential equations. It should be noted that, although in some cases this method of arriving at the formulation of the physical problems has now been abandoned, differential equations are now, more than ever, used as the expressions for the fundamental phenom¬ ena in physical science. For the applications of mathematics there is no field so important as the theory of differential equations. That the whole world is a mathematical problem was the point of view gained by Laplace, an insight gained in a different way also by Leib¬ nitz and Spinoza. But the mathematician is more specific; we learn from him that this world-problem belongs to the domain of the theory of differential equations. Even if the details of the picture have changed, the formu¬ lation of this general idea is one of the posi¬ tive achievements of the philosophical thought of the 18th century.

Ordinary Differential Equations; Elemen¬ tary Theory. — Let y be determined as a function of x by means of an equation,

(1)

which involves an arbitrary constant a. If x and y be interpreted as the co-ordinates of a point in the plane, equation (1) represents a family of curves, pne curve for each value of a,

By differentiation we find, from (1),

(2)

dj > 60 dy dx dy dx

Between these two equations a may be elimi¬ nated; the result will be an equation of the form

(3)

f(x'

free from a. Equation (3) is a differential equation. Since it does not contain the con¬ stant a it gives the expression of a property which is common to all of the curves of the family (1). The main object of the theory of differential equations is to invert the proc¬ ess which we have just carried out, i.e., the equation (3) being given, the equation (1) involving an arbitrary constant, from which (3) may be derived by differentiation, is to be found. This process is known as the integra¬ tion of the differential equation.

In general let there be given an equation of the form

dy d2y dny

f(x, y,

dx ' dx 2 '

dxn

0,

between x f the function y of x and its deriva¬ tives up to the nth order; it is called an ordi¬ nary differential equation of the nth order. The adjective ordinary implies that y is considered as a function of only one independent variable x . Under certain restrictions as to the continuity of the function / (a question to which we shall recur later), it may be shown that there exists a function y of x and of n arbitrary constants which satisfies the differential equation ; it is known as the general integral of the differential equation; the determination of this function is the object of the theory of differential equations. The equation is then said to have been inte¬ grated.

The simplest case of such a differential equa¬ tion presented itself in the problem of finding the area included between a curve y—f(x)t the jr-axis, and two ordinates erected for x = a and x — x. The differential equation satisfied by the area z considered as function of ˆ is

dz

dx

=/(*).

and the area itself becomes

■*/:*

f{x)dx.

This simple case served as a model for the earlier investigators in this field. Confining ourselves for the moment to equations of the first order, it may be possible to reduce such an equation to the form dx dy R{x) S(y)

where R(x) is a function of x, and S(y) a function of y alone. The variables are then said to be separated, and we may write

dx

C d x 4- C dy _

J Wx) +j R(y) ~ c'

where c is an arbitrary constant. Owing to the fact, which has just been mentioned, that the problem of areas is solved by the com¬

putation of an integral of the form^ f(x)dx,

such an integration is known as a quadrature. If the variables can be separated, the differ¬ ential equation may, therefore, be integrated by quadratures.

The earlier analysts believed that any differ¬ ential equation could be integrated by the elementary functions then in use, and by quad¬ ratures. This we now know not to be the case, just as we know, since the days of Abel, that all algebraic equations cannot be solved by the mere extraction of roots. (See Algebra; Theory of Equations; Galois' Theory). Moreover, even if the reduction to quadratures can be effected, such a reduction is, properly speaking, the beginning and not the end of the investigation. For it does not suffice to give a formal indication of the relation between x and v ; this relation must be thoroughly under¬ stood in its essential properties before the in¬ tegration can be said to have been accomplished. Nevertheless the consideration of the simpler cases, in which integration by

means of elemen¬ tary functions or by quadratures is possible, constitutes a first important chapter of the theory of differential equations. We may char¬ acterize this chapter as the elementary theory of differential equations.

Elementary Theory of Differential Equa¬ tions. — We have already referred to the case in which the variables are separated. In many cases a simple transformation will accomplish the separation. Consider, for example, the equation

(♦) $dl + py = 0'$

where P is a function of x only. We may write

whence

ˆ $+ Pdx = 0,$

y

/

$\log y + | Pdx = \log e,$

or

(5)

— f Pdx, y—ce J

This example will be useful in enabling us to treat, at once, a more general equation ; we shall do so, moreover, by making use of a method frequently employed, and especially important in the applications to theoretical astronomy, the method of variation of constants. We consider the equation

(« $fx + Py = Q$-

where P and Q are functions of x only. This equation is the most general linear differential equation of the first order, a linear equation being one which contains y and its derivatives in no higher than the first power. Equation (6) differs from (4) only in having Q in the right member in place of zero. The expres¬ sion (5) will certainly not satisfy (6) since it satisfies (4). Clearly, however, it must be possible to satisfy (6) by an expression of the form analogous to (5), viz.,

— (Pdx y — ue J ,

where u is a properly chosen function of x instead of being a constant. Moreover, as we shall see, we can actually determine the func¬ tion u by quadratures. In fact, we find from (7)

which gives, on substitution into (6) du _ (Pdx

rx^Qe >

so that we shall have

(8)

— CPdx y = e '

C +

fQJPd%

as the general integral of (6). This formula was found by Jacob Bernoulli, who also showed that the equation

dv — m T 1

(9) X+Py^Qy

could be reduced to (6) by putting u = ym. The homogeneous equations of the form

(10)

dx

where

y to x, may be solved by quadratures. In fact, if we put y=vx, the equation becomes

dx _

x ' v-

dv

whence

(ID

■(v)

= 0,

log X -f

r dv

J v —

Euler's method of the integrating factor is sometimes useful. It rests upon the following considerations. Let 0 (x, y)— const, be the equation of any integral curve of the equation

(12) P{x, y)dx -\-Q(x, y)dy=0.

We shall have, by differentiation from

50 j , ˆ a n -dx + -dy = 0,

an equation which must have the same signifi¬ cance as (12). We must, therefore, have

(13) gP× y) = ~~ * gQ(x,y)=ˆ,

if g is a properly chosen function of x and y. If g is known, the determination of 0 by quad¬ ratures can be immediately accomplished on account of the two equations (13). For this reason g is called an integrating factor. Equa¬ tions (13) show that g must satisfy the partial differential equation

dy dx

In general, the determination of an integrating factor is just as difficult as the integration of the equation. But Euler succeeded in finding a number of equations with known integrating factors. Herein lies the value of the method.

By means of these various methods there was obtained in the course of time a consider¬ able number of equations which could be inte¬ grated by quadratures. Lie showed that this rather scrappy theory could be understood as the consequence of a single principle. This we shall now proceed to explain, making use of geometric images for the sake of clearness as well as brevity.

The equations

***i* = *0*(, y), yi=ˆ(x, y),**

are said to constitute a transformation of the point (x , y) into the point (xh yx) if they can be solved for X\ and ylf

EQUATIONS, DIFFERENTIAL

443

These equations may contain a certain num¬ ber of arbitrary constants ah . . . ar\ they are then said to constitute an r-parametcr family of transformations. Let us consider the simplest case of a one-parameter family which we may write

05) Xi =

If the parameter a has a definite value, this transformation converts every point (x , y) into a definite other point (xu yi). Let us transform this new point (xif Vi) by equations of the same form, but with a different parameter b, into a third point (x2, y2), so that we shall have

(16) x2=(xi, yx\ b), y2=-tp(xi, yi; b).

In general, if we eliminate xi, yi between (15) and (16) we shall find x2 and y2 as functions of x, y, a and b. It may happen that these func¬ tions assume the form

(17) X2=

where c is a function of a and b, and where the functions and ip are the same as in (15) and (16). If this is the case, the transformations (15) are said to form a one-parameter group. The one-parameter family of transformations (15) then has the property that the transforma¬ tion, obtained by combining any two of its transformations, is itself a member of the family. It is for this reason that the family is then called a group. (See Groups, Theory of). It is obvious how this definition may be ex¬ tended to cover r-parameter groups.

The one-parameter group (15) will contain, in general, the identical transformation; i.e., for a certain value a0 of a (15) will reduce to xi=x, yi= =y. If now we denote by ˆt an infini¬ tesimal, and put in (15) a=a« -\-cdt, we shall find a transformation which transforms (x, y) into a point (xi, yi) such that the differences Xi — x=dx and yi — y—

A one-parameter group always has an in¬ variant: i.e., there exists a function ft(x, y) such that, for all transformations (15) of the group. ft

(jci, yi) =ft (x, y) . Such a function is said to admit the one-parameter group of trans¬ formations. It admits, in particular, the in¬ finitesimal transformation of the group. Simi¬ larly, a differential equation may admit one or more infinitesimal transformations. Lie has shown that in the cases in which the variables may be separated, i;e., in which integration by quadratures is possible, it is possible to write down infinitesimal transformations which leave the equations invariant. He has developed a general theory showing what advantage is gained for the integration of a differential equa¬ tion by the knowledge that it admits one or more infinitesimal transformations. Let us re¬ mark, explicitly, that this theory is not con¬ fined to equations of the first order nor even to ordinary differential equations.

Before passing to the consideration of the ele¬

mentary theory of equations of higher order, we proceed to explain the important notion of sin¬ gular solution. Geometrically, an equation of

dy

the first order = 30 determines the tan¬

gent of an integral curve at every point of the plane. If we start from any point P, the tan¬ gent of the integral curve passing through that point is completely determined. We follow the direction thus indicated for an infinitesimal dis¬ tance to the point (x + &x, y+dy). At this point the tangent is again given by the differen¬ tial equation, etc. We obtain in this way, syn¬ thetically, the family of integral curves, say F(x, y, c) ~0. Any one of these curves is obtained by giving a definite value to the con¬ stant of integration c. The envelope of this system of curves, however, will also be a solu¬ tion of the differential equation. For it will also be a curve whose tangent satisfies the re¬ quirements of the equation. But, in general, the envelope will not be itself a member of the family of curves, i.e., it will not be possible to find its equation by giving a special value to c. The envelope is then said to give a singular solution of the equation. If it exists, it may be found without any integration, that is to say, without a knowledge of the general integral of the differential equation.

The most important case of a differential equation of a higher order, which may be treated by elementary methods, is that of the linear homogeneous differential equation of the nth order with constant coefficients. A linear homo¬ geneous differential equation of the nth order has the form

(18)

d.ny

dxn

+ Pi

dn ly dxn~l

+ . . . + pny — 0.

If yi, y2, . . . , yn are particular solutions of the equation, y = Ciyi + c2y2 + . . . -fi cnyn, where c i, . . . cn are constants, is also a solution. More¬ over, if yi, . . . yn are linearly independent, i.e., if they satisfy no relation of the form 7iyi + > VV2 + . . . -fynyn = 0, where yu . . . yn are constants, the above expression for y is the general solution, yi, . . . yn are then said to constitute a fundamental system of solutions. In the case that pi, . . . pn are constants a fundamental system may be easily obtained. In fact we find that y = ePx is a solution of (18) if p is a root of the equation

pn (pipn 1 . . . j pn — i P T pn — 0.

Moreover, if Pi, ... Pn are the roots, supposed distinct, of this equation, eP'x' eP **♦ ■ • • ePnX actually form a fundamental system. If A roots, say p\, p2, . . . P9i, coincide, the A identical func¬ tions ePix, . . . eP)f are replaced by & °lZ, xePlX, x2eP'x, . . . xl~'eP'x.

Total Differential Equations. — In the case of an equation between two variables which we have considered so far, one important distinc¬ tion, which we shall now have to make, has not been necessary. If P(x, y) dx + Q (x,y)dy = *0 is such an equation, it is always possible to find a single function $(x, y) such that (x, y) = const, shall represent the general integral. Either the expression Pdx + Qdy is the complete dif-

d

ferential of (x, y) so that P = — and Q = —' or else upon multiplication with Euler's in-

tegrating factor g(Pdx + Qdy) becomes such a complete differential. This is not the case when there are more than two variables. Consider such an equation in three variables,

(19) Pdx + Qdy + Rdz = 0,

where P, Q, R are functions of x, y, and z. For the sake of symmetry

assume that x, y, z are regarded as functions of a fourth variable t. The problem before us is to find all sets of functions x, y, z of t which will satisfy (19). It may happen that the left member of (19) becomes a complete differential upon multiplica¬ tion with a function poi x, y, z, so that

"p=i' "C=!> /*=

d(t>

dz

The elimination of p from these three equations shows that this can be the case only if P, Q, R satisfy the so-called integrability condition :

Moreover it may be shown that if P, Q, R satisfy this condition, there exists a function §{x,y,z) and an integrating factor p(x, y, z) such that

p(Pdx + Qdy + Rdz) — d,

so that integration of (19) will give the result {x, y, z) — const. But if (20) is not satisfied, no integration of (19) in this sense is possible. The reason for this distinction as well as the discussion of the non-integrable case will be clearly understood if we make use of a geo¬ metric interpretation. Let x, y, z be Cartesian co-ordinates of a point in space. If x, y, z are known as functions of t, there will be determined a certain space-curve. It is* our problem to de¬ termine such space-curves

x = f(0, y = g(t), z — h(t) as satisfy (19). Through every point (xo, yo, zo') of space there may be drawn an infinity of such curves. The tangents of all of these curves which pass through the point (xo, yo, Zo) form a plane pencil with (xo, yo, Zo) as vertex and the plane

P(xo, yo, zo) (x — .vo) + Q(xo, yo, zo) (y — yo)

+ R (xo, yo, zo) (z — Zo) = 0

as plane. Thus there is for every point P a plane p containing P, to which all of the in¬ tegral curves of (19) which pass through P must be tangent. We may now imagine an integral curve of (19) constructed as follows: Start from a given point P and construct the corresponding plane p. We go from P to a point Q infinitesimally close to P but otherwise arbi¬ trarily situated in the plane p. At Q we con¬ struct the plane q corresponding to it, and in this plane we pick out a point R infinitesimally close to Q. Proceeding in this way we grad¬ ually build up an integral curve. It may happen that all of the integral curves of (19) which pass through the point

P are situated upon a certain surface S. If this is the case for all points P, the integrability condition is satisfied; there exists a single infinity of sur¬ faces (x, y, z) = c, such that an arbitrary curve upon each of these surfaces satisfies the differential equation. In general, however, such a family of surfaces does not exist. We may then integrate (19) as follows: Take an arbi¬ trary surface (p(x, y, z) =^=0. Let P be any point

upon it. Let p be the plane of the pencil of direc¬ tions which the differential equation assigns to P, and let p ' be the plane tangent to the surface (x,y,z) = 0 at P. The intersection t of p and p' will be at the same time tangent to an in¬ tegral curve of (19) and tangent to the surface =0. From P we go along t to a point Q in¬ finitesimally close to P and there repeat this process. We may build up in this way all of the integral curves of (19) which are situated upon an arbitrary surface. Upon every arbi¬ trary surface there will be a single infinity of such curves. Analytically this process may be carried out as follows: From ip = 0 we find

*Wdx+31dy + *tdz== o.*

dx dy dz

From this equation and ip = 0, dz and z may be expressed in terms of x, y, dx and y. Substitu¬ tion of these values into (19) gives rise to an equation of the form

Mix, y)dx~\-N (x, y)dy=0,

which may be integrated, in the form

Similar considerations are necessary in the general case of n variables. The first consider¬ able contribution to this theory is due to Pfaff. For this reason such an equation is known as a Pfaffian equation, and the problem of its inte¬ gration as Pfaff's problem. The problem leads to a system of no more than n integral equa¬ tions when the number of variables is 2n or 2 n — 1. If the equations are of higher than the first degree in the differentials, Lie speaks of them as Monge equations. Many problems of differential geometry, especially in relation to the theory of complexes, are connected with Pfaffian and Monge equations.

Partial Differential Equations. — Frequently functions of several variables are defined by relations between those functions and their partial derivatives. Such equations are called partial differential equations. For the sake of simplicity we will confine ourselves to the case of a single unknown function, and for the most part to the case of two independent variables. As in the case of ordinarv differential equations, it will be instructive to see

first how such equa¬ tions may arise as the result of elimination of arbitrary elements from equations which do not involve the derivatives. Let z be given as a function of x, y and of the two arbitrary con¬ stants a, b by the equation

f{x, y, z; a, b) = 0.

dz , dz

(21)

Let p, q represent ˆ and Then differentiation will give

(22)

dy

respectively,

% P + dl

dz v ˆ dx

°- II2 + | = 0-

Between the three equations (21) and (22) a and b may be eliminated. Let

(23) F(p, q; x, y, z) = 0.

be the result of this elimination. It is the partial differential equation which corresponds to (21) ; (21) is called the complete integral of

(23).

But a and b in (21) may be functions of x, y and still the result of the elimination may

be the same equation (23). In fact we find from (21), assuming that a and b are functions of x and y.

dlo

dz ˆ 0# da dx db dx ’

dla + y.4-dld±x. ˆ =

dz ˆ dy da dy' db dy ’

which equations will reduce to (22), and there¬ fore give rise to the same equation (23), if

0f0a , d/06 d_lda dfdb_

da dx db dx ’ da dy db dy

Let the determinant of these equations be de¬ noted by J, so that

da db da db

dx dy dy dx ’

then we may write, in place of (24), the equiva¬ lent equations

(24a)

ˆ=0

If A ± 0, we must therefore have

?l=o 9/

da ’ db

0.

From these equations a and b may be obtained as functions of x and y; if these values are substituted in (21), a function z of x and y is obtained, independent of any arbitrary con¬ stants, but still a solution of the partial differ¬ ential equation (23). This solution is called a singular integral of (23). It may or may not be a special case of the complete integral.

Equations (24a) are also satisfied if yd = 0, i.e., if

(25) b =

where (a) denotes an arbitrary function of a,

If we multiply the left members of (24) by dx and dy respectively, and add, we find

a-f da+ft>db-

whence, since db = (P' (a) da,

(26)

0,

i + f '< >-«

If we eliminate a and b from the equations (21), (25) and (26), we find s as a function of x and y, the expression of which depends upon the arbitrary function . Moreover this func¬ tion z will again be a solution of (23). It is known as the general integral and involves an arbitrary function. It may be shown that every integral of such a partial differential equation belongs to one of these three classes.

Geometrical interpretation will again render the matter perfectly clear. Let x, y, z be co¬ ordinates of a point in space; (21) will repre¬ sent a two-parameter family of surfaces, or, as we may say, a family of °o2 surfaces. The equation of the plane tangent to one of these surfaces at a point (x, y, z) will be

Z — z = p(Z — x) + q(v — y).

For a fixed value of x, y, z, (23) gives therefore an infinity of planes through that point (en¬ veloping a cone) ; any integral surface of (21), which passes through that point must have one of these planes as its tangent plane. In other words, the differential equation deter¬ mines a certain cone corresponding to every point of space, and with this point as vertex;

an integral surface must be tangent at each of its points to the corresponding cone. Now let a complete solution of the equation be given, so that we know a family of oo2 surfaces each of which fulfils the requirements of the problem. If we put b =

Since the surface represented by the general integral is the envelope of a single infinity of surfaces represented by the complete integral, each of these latter surfaces will touch the former along a certain curve ; such a curve is known as a characteristic. If the partial differ¬

ential equation is not linear in and 9?

dx dy ’

there are oo3 characteristics. A linear equation has only oo2 characteristics. The integral sur¬ faces may be looked upon as generated

by characteristics, and the usual method of inte¬ grating the partial differential equation con¬ sists in setting up a system of ordinary differen¬ tial equations which determines the character¬ istics.

The points of view in the higher theory. —

In speaking of ordinary differential equations, we have already mentioned the fact that the point of view of the elementary theory is inade¬ quate even in those cases in which the reduction to quadratures is possible. Given for example, the equation

— k2y2) ,

V(T

- y2) (1 — k2y2) '

The reduction of the equation to this form is a mere formal process which, in itself, teaches us nothing. We shall have to ask ourselves the following questions : to what extent does a given differential equation define a function y of x? what are the characteristic properties of this function? what analytical processes in¬ volving known functions, infinite series, prod¬ ucts, etc., will serve for the computation of the values of the function for all of the values of its argument? In the case of the above differ¬ ential equations these questions have been com¬ pletely answered by the creation of the theory of elliptic functions by Abel and Jacobi. In gen¬ eral it is to be expected that every differential equation defines a transcendental function ; it is the theory of these transcendentals which constitutes properly the most important por¬ tion of the theory of differential equations.

In order fully to understand the properties of functions it has been found necessary to look upon the variable as being capable of assuming not only all real but also all complex values. In the hands of Cauchy, Riemann, Weierstrass there has grown up in this way the theory of functions of a complex variable (q.v.). This theory serves as a base for our further discus¬ sions. We shall, however, confine ourselves to a few of the simplest cases, merely indicating the general point of view.

Let

£ = /(.*

be the given differential equation : Let fix, y) be analytic in the vicinity of (jr0, y0) i.e., let it be possible to develop fix, y) into a series proceeding according to positive integral powers of x — x0 and y — y0. Then, as was first proved by Cauchy, there exists a function y of x which may be developed according to positive integral powers of x — . x0, which reduces to y — y o for x — xo, and which satisfies the differential equa¬ tion. This theorem, which may be easily gen¬ eralized to apply to equations of higher order, or to systems of equations of the first order, is generally known as the fundamental theorem of the theory of differential equations. It proves the existence of analytic functions which are uniquely defined as solutions of analytic differential equations and which satisfy the sub¬ sidiary condition of reducing to given values for a given value of the argument. The theorem may be proved by the method of dominating functions. This consists in finding a series which formally satisfies the differential equation and reduces to y0 for x — Xo ; its convergence is then demonstrated by comparing it term for term with a corresponding series, which is formed in the same way from another differential equa¬ tion, and which is known to be convergent. The exact circle of convergence cannot, however, be generally stated. A great many papers have been written on questions which easily suggest themselves in connection with this theorem. If the function fix, y) is not developable in the given form ; if, for example, its development contains negative or fractional exponents, how far are its solutions determined and what is the form of their developments? Besides the ana¬ lytic solutions whose existence Cauchy has demonstrated, are there other non-analytic solutions? The first investigations of these questions are due to Briot and Boquet. They have since been completed by a great many authors.

Cauchy's existence theorem can be made more precise in the case of linear differential equations. Let

(27)

dny dn ly

dx71 ^ 1 dxn~l

T pny = 0

be a homogeneous, linear differential equation of the nth order. In the vicinity of x~Xo let the coefficients pk be expressible as power-series, proceeding according to positive integral powers of x — xo, and convergent for all values of x for which \x — Xo

The proof of this theorem, due to Fuchs, is also based on the method of

dominating func¬ tions. The important point is the fact that the true radius of convergence of the series is determined by inspection from the differential equation itself. The existence of a fundamental system of solutions expressible by power-series follows at once.

Let yi, . . . yn be the members of such a funda¬ mental system. Let ai, . . . am be the singular points (poles) of the coefficients pi, . . . pm which we shall assume to be rational functions of x. Let yi, . . . yn be continued analytically along a path passing, in the positive direction, around one of these singular points a, and let yh . . . yn be the new branches of the functions yi, . . . yn which are thus defined by power-series in the vicinity of x=Xo after this process. We must have

(28) y/c=a/ayi+a/c2y2+ . . . +fljfcnyra, (*=!, 2 ,...»), where ak are constants, since yi . . . yn must constitute again a system of solutions (more¬ over a fundamental system). A new funda¬ mental system may be chosen in the following manner. Put

z — ciyi 4- Ciy-i (... } cnyn, where Ct, . . . Cn are constant coefficients. After the continuation around a, z will be changed into

Z=Ci(flnyi — ... — flmyn) -f* . . .

~b Cniamyi T . . . ~\~annyn)m

This will be equal to uz, where w is a constant, if

Ci (flu — w) -p C2fl2i T" . . . -f-Cnfl»i=Ot

Cla12 T" Czia22 – w) — j— ... + Cnfl7l2=0,

(29)

Ciflm -\~C2,nm \ . . . \ Cniann — w)=0.

whence

(30) F(u) =

flu — a2i, . . . flm flj2, fl22 — c), . ‘ . ani

am, am< . . . ann — o)

If is a root of (30) and the ratios of ci, . . . cn are determined from (29) after o has been put equal to wlf we shall therefore find a solution Z\ of (27) which changes into OiZi when the variable x describes a closed path around the singular point considered. If the equation F(io) = o has n

distinct roots, we shall find n such solutions, and we may write

(31) zi — c > izi, (i = l, 2, ... n)

in place of (28). Moreover, these n solutions Z\, . . . Zn will constitute a fundamental system. We shall not attempt to discuss the case of co¬ incident roots of the equation (30), which is known as the fundamental or characteristic equation.

Now the function

ix — a)ri—eri log (x—a)

1

2 xi

log 6 H

has precisely the same property. Therefore the

quotient , – is a function uniform in the

(x — a)ri

vicinity of x — a, and therefore expressible by a so-called Laurent series proceeding according to positive and negative but integral powers of x — a. Let i(x) be such series; then we have (32) zi~ix—a)rmix), (i = l, 2, , ... n).

The Laurent series will be convergent for all points, excepting a itself, of the circle which has a as center and which reaches up to the nearest singular point of the differential equation. The main questions to solve are: 1st. Determine the exponents ry, 2d. Find the coefficients of the Laurent series {. These questions are capable of a direct and general solution in the special case in which the Laurent series contains only a finite number of terms involving negative

powers of x — a. In that case the differential equation (27) may be written in the form.

(33)

d?ly , Pi(x) dn—ly P2(X) dn~ 1 dxn x—a dxn i + (x—apdxn—2 + * '

*

+

Pn(x)

y— o.

(x — a)n

where Ph P2, . . . Pn are expressible as power- series proceeding according to positive , integral powers of x — a. The exponents n are then the roots of the determinating fundamental equation of the «th degree

(34) r(r— 1) . . . (r — n + 1) + Pi(a)r(r — 1) . . .

(r — n + 2) -f • • • + Pn(a) = 0.

After n has been obtained from this equation, the method of indeterminate coefficients enables one to find the coefficients of the power-series. In the case of equal roots some of the solutions may contain such terms as log (x — a), {log (x — a) { 2, etc.; the general discussion of the various cases which may arise is rather com¬ plicated.

The case in which the equation may be written in the form (33) is usually described as that in which the solutions are regular about x = a. If they are regular in the vicinity of each singular point, including x—w, the equa¬ tion is said to be of the Fuchsian type, and may be written as follows:

(35) y(n) +

Gg — l . .. . Gitu—i)

y(n — 1) j

1p2

y(n — 2) 4″

Gn (P — 1) ipm

y = o.

where y y", etc., denote the derivatives of y of

the first, second order, etc., where

(35a) ip = (x — ai)(x — a-i) . . . (x — am),

ai, . .. am and °o being the singular points, and

where G ˆ denotes a polynominal in x of degree

no higher than A. The most important special case of such an equation is that of the hyper¬ geometric series, the so-called Gauss equation, which is of the second order and has three singular points, 0, 1 and Historically, the

theory of the Gauss equation, as treated by Riemann, was the origin of the general theory of linear differential equations. A large num¬ ber of the most important conceptions of the theory of functions are closely connected with this equation. The question of finding the cases in which the general solution is algebraic led Schwarz, Fuchs and Klein to the remark¬ able algebraic functions which are connected with the five regular solids. This equation also leads to the general theory of automorphic functions, of which the elliptic functions are a special case.

If, in the vicinity of a singular point, the solutions are regular, they may be developed in the manner indicated. The problem of finding the developments of the solution in the vicinity of a point where they are not regular is far more difficult and still awaits a satisfactory general solution. A solution, not regular at x = a, may have the special form.

eQ(x — a)Pi'(x),

where p is a constant, where ip(x) is an ordinary power-series in x — a, and where

so

a i , a 2 ,

(x— a)s + (x— a)s— 1 ' ' ' ‘ x—a

that it differs from a regular integral only

by the presence of the factor eˆ. Such an in¬ tegral, if it exists, is called a normal integral. There may also be integrals of a similar form in which, however, be — a) t/ˆappears in place of x — a, where k is a positive integer. They are called subnormal. The conditions for the exist¬ ence of normal and subnormal integrals have been investigated, but none of these investiga¬ tions is as yet in a final form. Considerable progress in the theory of non-regular integrals has been made in recent years by Birkhoff.

It is possible however to change the method of attack. The general theory shows that, in the vicinity of the singular point

x — a , a solution exists of the form (x — a)P(x), where (x). In the regular case, when

The theory of linear differential equations has served as a basis for practically all that is known about non-linear equations. There are two fundamental properties of the linear equa¬ tions which render them peculiarly accessible. In the first place it is known, a priori, how the arbitrary constants enter into the expression of its general integral ; in the second place the singular points of its solutions are fixed, i.e. independent of the constants of integration. Other classes of differential equations may be defined which have one or both of these proper¬ ties. The first-mentioned point of view leads to the differential equations with fundamental solutions. These may be defined in various ways and have been investigated by Guldberg, Vessiot, Lie and Wilczynski. The idea of in¬ vestigating the differential equations with fixed branch-points is due to Fuchs. For equations of the first order he succeeded in formulating the conditions in a very simple theorem. Poin¬ care then showed that all such equations can be transformed into a Ricati equation, i.e., an equation of the form

(36) ˆ =a<, + ary 4-a

where a«, ai, a2 are functions of x, or else are integrable by quadratures or algebraic functions. Differential equations of the first order with fixed branch-points do not, therefore, as was at first expected, lead to new transcendental func¬ tions. For, the Riccati equation may, by the

transformation y= – be converted into a

a£z dx

linear differential equation of the second order. It may be noted, incidentally, that this remark enables us to prove, in a simple manner, the theorem that the anharmonic ratio of any four

solutions of a Riccati equation is constant. This is important in geometric applications.

The most important recent investigations in the theory of differential

equations, from the standpoint of the theory of functions of a com¬ plex variable, are due to Painleve. A brief ac¬ count of some of them will indicate their funda¬ mental nature. Let

(37) fx = f(x'y)

be an algebraic differential equation of the first order. The general integral will be a function of x and u, u being the constant of integration. We may, instead, consider u as a function of x and y defined by the partial differential equation

(3S) ˆ | + g/(. y) = o.*

The general integral of (37) is said to be reducible if other equations, algebraic in x, y, u,

*3% 3u 3P*n*

— > etc., may be adjoined to (38) com¬ patible with it without being deducible there¬ from. All of the equations of the first order which have been studied are reducible in this sense; for instance, the Riccati equation, the linear equation, etc. In the case of a linear

Q2U

equation the condition = 0 may be thus ad¬ joined; if the equation admits an algebraic integrating factor 7, we may adjoin the condi¬

tion — = 7; etc. This definition of reducibility

may be extended to equations, or systems of equations, of any order.

Applied to equations of the first order, the following theorem results. If an equation of the first order is reducible, only four cases are possible: 1st, the equation is algebraically integrable ; 2d, it has an algebraic integrating factor; 3d, the logarithm of the integrating factor has algebraic first derivatives ; 4th, a first integral is given by a system of differential equations whose general solution is of the form

CLU\~\- b , , , , . . .

u ™ —~r—j(a, b, c, d being arbitrary constants,) cui j a

and which may be reduced to a Riccati equa¬ tion.

Irreducible equations of the first order lead to known results, if we confine ourselves to the case that y shall be a uniform function of x. This is not the

case, however, for equations of higher order. Among the equations of the second order, the simplest case is that of the equation

*(39) y" — 6y2 + . **

Its general integral is a uniform function of x, which may be represented as a quotient of two integral transcendental functions in the

form y — ~ ' jwhere u is an integral trans-

ax'4

cendental function which satisfies the equation (40) | (z")2 + 2(z')3-f xzr — z = 0,

where z = — > and which may, therefore, be

represented by an ordinary power-series con¬ vergent for all values of x.

Although great progress has been made in

this direction and although greater progress Is to be expected as the efforts of mathematicians are being gradually rewarded, the results are meager from the point of view of. the mathe¬ matical physicist, who would like to refer to the mathematician the questions connected with the integration of a differential equation which may have appeared in some of his investiga¬ tions. For very rarely will it happen that such an equation belongs to one of the classes with which the mathematician is prepared to deal. It remains necessary to study such equations directly by methods of successive approximation especially adapted to them, usually upon the assumption that all of the variables that enter be confined to real values. The restriction to real variables in such cases, the systematic and rigorous application of the method of successive approximations, has been productive of many valuable results in recent years, especially in the hands of Picard and Hilbert. The theory of partial differential equations, primarily, has made rapid progress through their efforts and many mathematicians are following their ex¬ ample. It may, however, be predicted that, even in the theory of partial differential equations, the restriction to real variables will gradually pass away. For in the case of analytic func¬ tions, and these after all are the most import¬ ant, the characteristic properties are veiled by such a restriction. But a necessary prerequisite for a theory of partial differential equations with complex variables is the theory of func¬ tions of several complex arguments ; this theory, however, is still in its infancy.

Bibliography. — A. R. Forsyth, (A Treatise on Differential Equations5 (3d ed., London 1903). This contains an account of the more elementary parts

of the theory. A. R. Forsyth, (Theory of Differential Equations5 (6 vols ; Cambridge 1890). In this work the main stress is laid upon the functiontheoretic point of view. S. Lie, (Vorlesungen fiber Dif- ferentialgleichungen mit bekannten infinitesi- malen Transformationen,5 bearbeitet und he- rausgegeben von G., Scheffers (Leipzig 1891). E. Picard, (Traite d'analyse5 (Vols. 2 and 3; Paris 1893-95). Important principally for the modern theory of partial differential equations. P. Painleve, (Lecons sur la theorie analytique des equations differentielles, professees a Stock¬ holm,5 Sept., Oct., Nov., 1895. Lithographed at Paris, 1897, an account of the most advanced points of view. L. Schlesinger, (Handbuch der Theorie der linearen Differentialgleichungen5 (Leipzig 1895-98). For further bibliographical indications and for a brief account of the whole subject from the point of view of the expert mathematician, see the various articles on dif¬ ferential equations in (Encyclopadie der mathe- matischen Wissenschaften mit Einschluss ihrer Anwepdungen,5 which is now being published in Leipzig. A French edition, much more ex¬ tensive than the German edition, of this monu¬ mental work is also being published.

Ernest J. Wilczynski,

Professor of Mathematics, University of Chi¬ cago.

EQUATIONS, Galois' Theory of. — In the

16th century the Italian mathematicians suc¬ ceeded in solving the cubic and biquadratic equations. Their brilliant achievements must have made it seem probable that the solution

of the equations of fifth and higher degrees would soon be found. Such, however, was not to be the case. For two centuries the first mathematicians of the day essayed in vain to solve the quintic. Tschirnhausen, Euler, Van¬ dermonde, Malfatti and Lagrange embodied their researches in valuable memoirs, but at the close of the 18th century the solution of the equation of the fifth degree seems farther away than ever.

In their apparent defeat, however, lay the germs of ultimate victory. As a result of all these investigations it became manifest that the solution of algebraic equations and certain groups of substitutions of their roots were inti¬ mately related. In the case of the general equations of degrees three and four this rela¬ tion was very clear indeed; it was less clear in regard to the general equation of degree n, and still more hazy in regard to the special equa¬ tions which had been considered up to that time. It was

reserved to Evareste Galois to put these loose ends together and to develop a theory of the solution of algebraic equations at once simple and far-reaching. Indeed, the ideas of Galois are not only fundamental in most algebraic investigations, but they have also been extended by Lie and others with great effect to the theory of differential equations. But even here they do not stop. It is in Galois' theory that the notion of a group first came promi¬ nently before the mathematical public ; a notion which to-day pervades a good part of the whole domain of mathematics.

Galois died at the age of 22 (1832). Twice he presented memoirs to the Paris Acad¬ emy, containing an account of his theory. The first was lost, the second was returned to its youthful author by Poisson as unintelligible. Galois' theory was first made public to the mathematical world in 1846 when Liouville published this latter memoir without comments. In 1858 Betti published an exposition of Galois' theory with complete proofs and some valuable extensions.

Lagrange in his great memoir of 1770-71 developed what he styled a calcul des combina¬ tions and which is in fact the origin of Galois' Theory of Equations. This new calcul was further developed in a number of papers by Ruffini, beginning 1799, who tried to demonstrate the impossibility of the algebraic solution of the general equation of degrees greater than four by this means; by Gauss (1801) and Lagrange (1808) in the solution of the equations on which the roots of unity depend; and finally by Abel, who, besides being the first to rigorously demon¬ strate the insolvability of the quintic by radi¬ cals (1826), discovered a new class of algebraic solvable equations which occur in the division of the elliptic functions (1829).

BASAL NOTIONS.

*Domain of Rationality. — One of the most fundamental notions in Galois' theory is that of a domain of rationality which was first clearly formulated by Abel. When an equation f(x) = a0xn 4- aixn — *+ . . . — ix + an = 0 (1)*

offers itself for solution, its coefficients are sup¬ posed known. It often happens that other quantities are known, or are assumed as known. Suppose 7, w are such quantics, finite in

number. The totality of rational functions of VOL. 10— 29

these letters with rational numbers as coefficients constitutes a domain of rationality which we denote by,

R&, /“>••• w)-

Thus any element of this domain may be ob¬ tained by a finite number of additions, sub¬ tractions, multiplications and divisions per¬ formed on the letters A, fit . , . w. The domain of rationality which we lay at the base of a given algebraic investigation is to some degree a matter of choice. In any case, however, the coefficients of the equations we start with should lie in it.

Every domain must contain the domain R(1), called the absolute domain, and which is simply the totality of rational numbers. For ' the domain R(h, . . . w) must contain the ele¬ ment 7,/7, = i. It is often desirable to add cer¬ tain elements 7, C, ... to a domain R(A, forming the new domain R'ty, p, ... y, C, . . .) The elements y , C, . . . are said to be adjoined to R.

Rational Functions in R. — In elementary algebra and in the function theory a rational function of x, y, z, ... is an expression of the form

A xmlym2zm3

+

+

(2)

Bxnlynizn .*

where the exponents m, n are non-negative integers and the coefficients are merely inde¬ pendent of the variables x, y, z, . . . In Galois' theory the term rational function is a much narrower one. In fact the term rational has no meaning unless in connection with a specific domain of rationality. Thus the expression (2) is a rational function of x, y, . . . in Galois' theory with respect to the domain R, when and only when the coefficients A, B, . . . lie in R. Thus such a function as (2) may be rational with respect to one domain and not with respect to another. For example

x + V — 3y.

is a rational function of x, y with respect to the

2rri

domain R {p), P= e 3 ; but it is not rational with respect to R(1) or R (V — 5). When the

denominator in (2) reduces to a constant, it becomes a rational integral function.

An equation as (1) is rational with respect to R when its coefficients do, ai, . . . an lie in R.

deducibility and Irreducibility is another basal notion of Galois' theory. The rational integral function of x, y, z . . . ,

Fix, y, z, ...) = 4xwlyTO2zwl3… +... fLˆyV3… , (3)

with respect to the domain R is reducible in R when it is the product of two or more rational integral functions of x, y . . . with coefficients in R, viz., F = G-HI... In this case we say F is divisible by G, //,... , which are factors or divisors of F in the domain R. If the ex¬ pression (3) cannot be split up into two such factors, it is irreducible with respect to R. An equation as (1) is reducible or irreducible in R according as its left side is reducible or irre¬ ducible in R.

An equation as (1) may be irreducible in one domain and reducible in another. Thus x2 + x + 1 = 0

is irreducible in R(1), but is reducible in R (V — 3). In fact,

X2 + X + i = (x— p) (x— p2), P = e3

If si, ... tin are the roots of (1), it is obviously reducible in R (G, . . . £n). In fact its left side splits up into rational lineal factors,

f(x) = ao(x — G) . . . (re — in).

A theorem of utmost importance in Galois' theory is the following:

Let f(x) = Q, g(x) = 0 be rational equations for the domain R, and let f(x) — 0 be irredu¬ cible in R. If g(x) — 0 admits a root of f(x)— 0, it admits all the roots of f(x) = 0, and g(x) is divisible by f(x).

Equality. — As a third pillar on which Galois' theory rests is the distinction between formal and numerical equality, as we may designate it for lack of better terms. It is only by such a distinction that Galois was able to extend Lagrange's methods so as to apply to any type of algebraic equation. As long as we are deal¬ ing with constants, equality and inequality are of course the same as in arithmetic — they are numerical. What do we mean, however, by the equation

q, • • •)—ifiP, q, . • .),

equation

where Vi, Va represent now all the variable elements in , ty, among which will be p, q, , while Ci, ca, . . . represent constants. By an equation of the above type we mean : that for each and every set of numerical values vi, Va,

. . . can take on consistent with their definition, the resulting numerical value of

.

When no two of the quantities , i>, X, . . . are equal we shall call them distinct or unequal.

THE GALOISIAN RESOLVENT AND GROUP.

Construction of nl-valued Functions; In¬ determinants. — Let

f(x) = aoxn + aixn—l-\- . . . -\-an — 0 (1)

be an equation whose solution is to be effected. The first thing to do is to choose a domain of rationality R. As already remarked, the nature of R depends partly upon (1) and partly upon our own pleasure. In any case it must contain the coefficients.

Without loss of generality we may suppose its roots unequal. For by means of the greatest common divisor of f(x) and f (x) we may ob¬ tain by rational operations an equation whose roots are the distinct roots of (1).

Let us now adjoin n new variables u i, . . . un to R, forming a domain R', and introduce the rational function

Vi~UiXi~\- U2X2 + . . . + UnXn. (4)

If we permute the Xi, x2, . . . xn in all pos¬ sible ways, or, as we say, apply the n ! substitu¬ tion

Xi X2 . . . Xn\

•, • • %ln)

of the symmetric group, we get the n ! functions Vi, V2, . . . Vn\. (5)

With these we form the equation F(t; Ui, . . . un) = (t— Vi) (t- Vs) ... (/- Vn 0 = 0, (6) whose coefficients lie in R' In the discrimi¬ nant of (6), D(ui,...un), we may give to ui, ... Un values, a,, . . . nn , in R, integral values,

even, if we choose, in an infinity of ways so that D zt 0. In that case the qualities (5) are dis¬ tinct and the roots of (6) thus unequal. The function (4) has thus n ! values under the sym¬ metric group. A special case of this function (4) was used by Lagrange; in its general form it was first employed by Abel. Its fundamental importance in the solution of algebraic equa¬ tions was first brought out by Galois. For this reason the function V in (4) is called the Galoisian resolvent function. Besides the func¬ tion (4) there are obviously an infinity of other n 1-valued functions. The function (4) is em¬ ployed on account of its simplicity.

On replacing the u's by thea's these variables disappear. Their introduction was to show the existence of n !valued rational functions of the roots Xi, . . . xn. Such auxiliary variables which we introduce into our reasoning, and which at any moment can be made to disappear by giving them appropriate special values, are called in determinates. In a primitive way they are used by all mathematicians. Kronecker has shown that they are an implement of immense power in algebraic investigations. Since in the end we can always replace the indeterminates by values lying in our domain, we shall suppose that our domain contains in advance as many of these auxiliary variables as we care to use.

Galoisian Resolvent and Group. — In gen¬ eral the equation (6) is reducible in R, so that

E(t) = Go (t , Ui, . . . U/n) Gi (/, U\, . . . Un) . . .

Let us take now any one of these irreducible factors, say that one which admits Vi as root, to form the equation

Go (/, Mi, . . . un) — 0. (7)

This is called the Galoisian Resolvent of (1) for the domain R. Let its degree in t be m.

Galois showed now that the solutions of (1) and (7) are equivalent problems. In fact every rational function of the roots of (1), and in particular the roots themselves and hence also the roots Va, Va, . . . Vm of (7), are ra¬ tional functions of V i. We have therefore for any rational function of the A"'s

0(xi, . . . Xn) = = Ti o t T \V \ ) r 2 FA f . . . -f – rm. — 1 Vim — 1.

The advance that is made by considering the equation (7) instead of the original equation (1) lies in the fact that the roots of (7) are rational in any one of them. Let the roots of (7) be

*V 1, V 2, . . . V TO**

These are obtained from the expression (4) by effecting certain substitutions,

Siz= = 1, ^2, . . . Sm, (G)

on the roots Xi, . . . xn. These m substitutions G enjoy now three remarkable properties:

1° Every rational function (x i , . . . xn) of the roots of (1) which remains unaltered by G lies in R, or, as we say, is rationally known.

2° If the rational function of the roots (xi, . . . xn) is rationally known, it remains un¬ altered for the substitutions G.

3° The substitutions G form a group, and there is no other group of substitutions having the properties 1°, 2°.

This group is called the Galoisian group of the equation (1) for the domain R. For the definition of the various terms concerning groups see Groups, Theory of. The index of a sub-group F of a group G with respect to G is the ratio between the number of terms in H

and the number of terms in G. We say for the domain R, because by changing R the irre¬ ducible factors of (6) will in general change, and therefore the substitutions G will in gen¬ eral change. The importance of the Galoisian group, or, as we shall say more shortly, the Group, of an equation f(x) =0 lies in the fact that an investigation of its structure reveals many of the most important properties of the algebraic irrationalities defined by this equation. In particular it affords a rational and uniform scheme for effecting the solution of any alge¬ braic equation. Before entering on this topic let us consider

SOME PROPERTIES OF THE GALOISIAN GROUP G.

Since the grout) G of an equation

CLoXn T diXn — 1 } . . . -\-dn = 0 (1)

is unique for a given domain of rationality R, it follows: 1° that the group is independent of the particular n!-valued function we take; 2° that we get the same group whichever of the irreducible factors Go(t), Gi(t), ... of (6) we may choose; and 3° that these functions Go, Gi, . . . are all of the same degree.

4°. In any rational equation

0(xi, . . . Xn) = ˆ(x i, . . . Xn)

between the roots of (1) the substitutions of G may be applied, and the result is a true equation.

This is not true for all substitutions. For example, let

f(x) = x — 1 = 0, whose roots are*

2 'Xjm

Xm = e 3 . m — 0, 1, 2.

Take as domain R(l), and as rational rela¬ tion

X \X 2 = = = 1 .

On applying the substitution

(WA = (0 , 2)

\XiX2Xo/

this relation becomes,

X0X2 = 1,

which is false.

Group Belonging to a Rational Function of the Roots and Rational Functions Belong¬ ing to a Group. — Let

0(Xi, . . . Xn)

be a rational function of the roots of (1). Since the group G of (1) contains the identical sub- titution, (p remains unaltered by at least one substitution of G and may remain unaltered by others. These substitutions form a subgroup of G called the group belonging to f On the other hand, let H be a subgroup of G. Any rational function 0(xi, . ■ ■ xn) which remains unaltered by the substitutions of H but is changed by all other substitutions of G is said.to belong to H. It is important to note that while the substitutions of the Galoisian group which leave a rational function 0(x i, . . • xn) unaltered form a group, this property does not hold for substitutions which lie outside G. For example, the substitutions of the symmetric group S» which leave

2 rrim

do not form a group. This is due to the fact that the group of the equation x6 — 1 —0,

the domain being R(1), is not A6 but a smaller group.

If 0(xi, . . . xn), ˆ(x i, . . . xn) belong to the same subgroup H of the Galoisian group, each can be expressed rationally in terms of the other.

RATIONAL RESOLVENTS.

Let 0(xi, . . . xn) be a rational function of the roots of

aoxn-\-aixn — x+ . . . +On=0, (1)

whose group for the domain R is G. Let 0 belong to a subgroup H of G of index r. Then on applying the substitutions of G to 0 it will take on r distinct values,

0, 0i, . . . 0i — i, (8)

which are called conjugate functions. They are in fact roots of an irreducible equation

ˆ(y) = (y 0) {y — 00 . . . (y— 0r— 0, (9)

whose coefficients lie in R. It is thus a rational equation. Suppose one of its roots, say 0, can be found. If we adjoin it to R, forming a domain R', the group of (1) is no longer G, but H.

Suppose not only

The group of the resolvent equation (9) is of importance sometimes. In the functions (8) considered as functions of the „r's, let us effect the substitutions of the group G. This gives rise to a substitution group t in the 0's, and this group is the group of the resolvent equa¬ tion (9), the domain of rationality being that of G, viz., R. The groups G and f are what is called meroedrically isomorphic. To the identical substitution of T corresponds the group I above ihentioned, viz., the subgroup of G, which leaves all the roots (8) unaltered. To any subgroup A of f will correspond a subgroup Gi of G, and conversely. In particular if JTi is an invariant subgroup, G i is also invariant.

GALOIS' SOLUTION OF AN EQUATION.

Let G be the group of the equation

aoXn + a\xn — x + . . an— 0 (1)

for the domain R. Let Hi be a subgroup of G of index n. Let 0i(xi, . . .xn)

be any one of the infinity of rational functions belonging to Hi. Then 0i is root of a rational resolvent of degree n. On solving $i=0 and adjoining one or more of its roots to form a new domain Rt, the group of (1) is now a sub¬ group of Gi of G. Let Hi be a subgroup of Gi of index r2, to which belongs the rational func¬ tion 02(x i, . . . xn). This is the root of a re-

solvent $2(y) =0 of degree r2. On solving $2=0 and adjoining one or more of its roots to form a new domain R2, the group of (1) is now a subgroup Gi of Gi. As the order of the groups G, Giy Gz, decreases, we must eventually arrive at the identical group when the roots of (1) are rationally known. Since the group G usually admits quite a variety of subgroups, and since the functions belonging to a given sub¬ group are infinite in number, Galois' theory shows that the number of ways for solving a given equation is endless. At the same time it clearly shows that the number of distinct ways is usually quite limited, depending on the sub¬ groups of G.

Among the solutions of the equation (1) which Galois' theory offers, one class is par¬ ticularly interesting, depending on a

Series of Composition. — This is defined as follows : Let Gi be an invariant subgroup of G, such that G contains no invariant subgroup containing Gi. It is then a maximum invariant subgroup of G. If G has no maximum in¬ variant subgroup besides the identical group, it is simple. The series of groups

G, Gi Gi, . . . Gˆ—\, (10)

such that each is a maximum invariant sub¬ group of the preceding group, is called a series of composition of G. If the index of Cm under Gm — i is rm, the numbers n, r2, . . . rx are called the factors of composition. It may be possible to decompose a group G into a series of com¬ position in more than one way. Thus the cyclic group C«,

where s=

1, 5, s2, s\ s\ J6,

XiXiXtXiXiXaX _ , J 2 3 4

XiXiXiXsXeXiJ ' '

5, 6) ad¬

mits the series

Ce, A, 1

and

Co, B, 1,

where

A =]l, 52, s4} ,

The factors of composition of the first series are 2, 3, while those of the second series are 3, 2. They are thus the same aside from their order. A theorem of Jordan states that how¬ ever a group he decomposed in a series of com¬ position, the factors of composition are the same aside from their order.

What makes the solution of an equation by means of a series of composition so remarkable is the fact that the resolvents $i = 0, $2 = 0, . . . , $A = 0 corresponding to the subgroups G\, Gi . . . G\— i of (10) have groups A, A2, . . . Al for their respective domains which are simple. Their orders are the factors of composition. Moreover, any root of one of these equations is a rational function of any root of that equa¬ tion. Thus on adjoining one of its roots the same effect is produced as adjoining all. Finally, the resolvent equations $ = 0 are the simplest possible.

Cyclic Equation of Prime Degree. — When the group G of an equation F (x) = 0 is a cyclic group of prime order p its solution is readily effected, as Abel showed. Let the roots of F= 0 be xo, xi,...Xp~i, and let 7 = (0, 1, . . . p — 1). Then

G = 1 1, y, y2, . . . yp-1 { .

For the case in hand we may suppose the

pth roots of unity p, p2, ... lie in the origi nal domain of rationality. Consider the rational functions

hhz = = xo-{- p^Xi f . . . pkiP r)xp — 1| h= 1, 2 ,...p 1. On applying y they go over into p~ hQ. Hence

j)

0a = ©a are unaltered by y and hence by G.

They are therefore rationally known. On ex¬ tracting a />th root we get

x*+PhXi+ . . . -\-ph(P~1)xp— 1=

This system of p — 1 equations together with

Xo f #i . . . j Xp — l = \/ ©o

gives

1 v , p

Xs — — z p—hs

P h= 0

©A, s — 0, 1, . . . p — 1.

The />th roots which enter here must be deter¬ mined uniquely in terms of one of them, say

P^je^ The others are rational in this one, for

(Xo + PhXi+ . . .+ p(P~ l)hXp i)

(0Co-\- PXi T . . . ~FpP — *Xp — \)P ^ = A h

remains unchanged for y and hence for G. Hence these Ah are rationally known. We have now

Xt=ye,lp~h' (Ve,)'/U-

This result gives the theorem : Cyclic equations Of prime degrees can he solved algebraically , i.e., by the extraction of roots from known quanti¬ ties.

Algebraic Solution of an Equation. — Let the equation

aoxn-\-aixn 1-f- . . . T an — 0 (1)

have a group G for a certain domain R, whose factors of composition

r i, r2, . . .

are all primes. Then (1) can be solved alge¬ braically. For the corresponding chain of re¬ solvents

$1=0, $2=0, . . .

have groups of prime orders rt, r2, . . . ; they are therefore cyclic equations, whose solution has just been effected. Since, as will be set forth later at more length, it is never necessary to employ other than rational resolvents, the above results leads to Galois' Criterion for the Solution of an Equation by Radicals. In order that (1) admit an algebraic solution it is neces¬ sary and sufficient that the factors of composi¬ tion of its Galoisian group consist of primes only.

Application to the Solution of the Biquadra¬ tic

x 4 + OiX3 -f a2×2 + azx + 04 = 0. (11)

For simplicity let us suppose its coefficients are independent variables. Let the original domain of rationality R embrace besides the coefficients a cube root of unity p. Then the group of (11) is the symmetric group S. As subgroups of Si we note the alternate group A4, which con¬ sists of all the substitutions of S4 which can be obtained by an even number of exchanges of the roots of our equation, the axial group = \ 1» (12) (34), (13) (24), (14) (23) }, and the semi-axial group G2 = j 1, (12) (34)}. The*

groiips S4, A4, Gi, G2, 1 form a series of compo¬ sition whose factors are obviously

2, 3, 2, 2.

As they are primes, the equation (11) admits an algebraic solution. To solve (11) let us proceed with Starkweather as follows : To form our first resolvent, let us use the subgroup A4, and take as function belonging to this group

(x2 — x3)(x2~xi)(x3 — x4) (12)

The corresponding resolvent is

- *= 2—A = 0, (13)*

where A is the discriminant of (11).

On adjoining

A subgroup of A4 is G4 A rational function, belonging to this is

i> =XiX2 -f XiX4.

This gives the resolvent

y = — a2i/»2 ((ajaj — 4 a4) ip

\ ai(ai2 — 4^2) f a32 | = 0. (14)

The solution of this cubic, which is a cyclic equation, gives ip as a known explicit function of quantities in FU. On adjoining ip we get the

domain Ri(R, \/A,ip), for which the group of (11) is G4. The next subgroup we take is G2 to which belongs

X=Xi -f x2 — (x3 + x4) .

This gives the resolvent

X = x2— (4V» + «i2— 40a) = 0.

The extraction of a square root gives xt whose^ adjunction produces the domain Rt

(R,\/A , V\ X), for which the corresponding group of (11) is G2. The last group we take is the identical group, to which belongs xx. The cor¬ responding resolvent is

x3 £(< *»— X)x (l> + xaii) = °-

The solution of this quadratic gives Xi. Its

adjunction gives the domain RfR,\/ A, ip, x, x 1) for which the group consists only of the iden¬ tical substitution. Hence all the other roots of (11), viz., x2, x&, x4, must lie in R4. This is indeed so, for

#2 = #i — 2 “t* hx-

To get Xi, x 4, we note that if V, V' " denote the two other roots of (14),

a

I , _ _ (V>— VO (V>— V>")

Here the numerator is the square root of the discriminant of (14), which, as is well known, is the same as the discriminant A of (11). The

d *

denominator is obviously ˆ .

Thus

a =

— X2) (x» — X),*

a quantity lying in R4.

*Moreover, xi, x2 being already found, xi — Xi—fi and xi 4- X2 —7 are known; also xi + x2 +xz + *4= y + x3 -f x< = — 01 is known. This last with ft{xi — Xt)=a gives *3 and*

Lagrange's Solution instead of employing a series of composition uses the following sub¬

groups, A4, O, G2, 1, where

0=11, (1324), (13) (24), (1423), (12), (34),

(12) (34), (14) (23) }.

As rational function belonging to A4 La¬ grange uses the function (12), which gives rise to the resolvent (13). As rational function belonging to 0, Lagrange takes

0= } Xi + X2 — (jCs + Xt) j 2, whose conjugate values are

*0i=] Xi-j-ˆ3 — (aci+aci) } 2 02= 1 xi + *4 — (#3 + *2) [2.*

The corresponding resolvent is 6=0— (3ai2 — 8a2)02 + (3ad — 1604202 + 16202*

+ 16010, — 6404)0 — (013 — 40102 + 8 a3)2= 0. For the subgroup G2 he takes

*V— Xi + Xi — (*2 Xi) ,*

which gives the resolvent

H—rf- — 0i = O.

For the identical group 1, Lagrange uses

*U — Xi+Xi — (jC3 + *4),*

which gives the resolvent

n—o 2 — 0 = 0.

For the domain R'(R, Vi, 0, 0i, 02, V, <•>), the group of the biquadratic is (1), and its roots therefore lie in R' . In fact we have

Xi + x2 — Xi — Xi = V0,

Xl T *3 – Xi – #4= V 01,

X\ -f Xi – X3 – *2= V02,

Xi X 2 Xi -f – Xi= — 01.

From which we get

Xa=\(— 01 + V 0+ V 01+ V0j)» J=l, 2^ 3, 4. _ Here we choose at will the signs of V0, V0i. The sign of V 0* is then determined, for

V0 V 0i V 02=40102 — 0i3 — 803.

Abelian Equations. — Let G be the group of an equation f(x) =0 for a certain domain. If the substitutions of G are commutative, that is, isiSK=sKSi for any two substitutions slt s k of

G, the equation / = 0 is called Abelian in honor of Abel, who first studied them. We may show at once that every subgroup of G is invariant and that its factors of composition are all primes. Hence all Abelian equations can be solved algebraically. The most important equa¬ tions of this type are the equations of degree < p(n) on which the nth roots of unity depend. Here 0(n), called the totient of n, is

- (1_ f)-

where P, q, ... are the different prime factors of n. The domain of rationality is R(1).

Equation of Degree > 4. — The group of the equation (1) when no restrictions are placed on the coefficients, i.e., when they are inde¬ pendent variables, and when the domain of rationality contains not only the coefficients but any constants, is the symmetric group. When n — 2, 3, 4, its factors of composition are primes. Not so when nf> 4. In this case its only in¬ variant subgroup besides the identical group is the alternate group whose order is in !. Thus the factors of composition are 2, in!. The latter is not a prime. We have thus Abel's Theorem: Equations of degree "> 4, whose group is the symmetric group, cannot be solved

algebraically ; i.e., their roots cannot be found by extracting roots from known quantities.

We have just observed that when the coeffi¬ cients of an equation of degree > 4 are inde¬ pendent variables, it cannot be solved algebraic¬ ally. From that we cannot, however, deny that every equation of degree 4 with constant co¬ efficients may admit an algebraic solution. This important question was finally settled by Hil¬ bert, who showed that there are an infinity of equations of any degree with rational integral coefficients whose group in R(1) is the sym¬ metric group.

IRRATIONAL RESOLVENTS.

Up to the present we have considered the effect on the Galoisian Group of an equation, of adjoining roots of rational resolvents to the cur¬ rent domain of rationality. In many investiga¬ tions it is important to consider the adjunction of roots of equations which may not be rational functions of the roots of the given equation. Equations whose roots are not rational functions of the roots of the given equation are called irrational resolvents when used in the solution of the given equation. A theorem which lies at the foundation of this subject is due to Kronecker. Let f(x) — 0, g(y) = 0 be two ra¬ tional irreducible equations for the domain R of degrees m, n respectively. If on adjoining a root Xi, of f = 0, g(y) becomes reducible, the adjunc¬ tion of a root yi of g — 0, will make f(x) re¬ ducible. If

m _ n

a /3′

As an important corollary of Kronecker's theorem we have: Let the adjunction of yi reduce the group G of f(x) =0 to an invariant subgroup of index i. Then n is a multiple of i and hence never less than i. When n=i (and this is always the case if n is a prime) g(y) = 0 is a rational resolvent.

Another theorem of great importance in this connection is due to Jordan. If the adjunction of all the roots of g(y) —0 reduces G to a sub¬ group Gi of index i, the adjunction of all the roots of f(x) reduces the group H of g(y) to a subgroup Hi of index k. The two groups Gi, Hi are invariant and i — k. Finally, when H is simple g(y) = 0 is a rational resolvent.

Application to Some Celebrated Problems. — The Delian Problem or duplication of the cube requires the solution of

x3 — 2 = 0

by rule and compass. The construction of the regular polygons by rule and compass is an¬ other famous problem of antiquity. Its solu¬ tion depends upon the irreducible equation of degree

Another famous question is the Casus Irre-

ducibilis of cubic equations. The theory of irrational resolvents enables us to prove readily the following general theorem: An irreducible equation of degree n whose roots are all real can never be solved by real radicals alone if n contains other factors than two.

That the casus irreducibilis is indeed such follows as corollary of this theorem.

Holder's Theorem. — One of the most im¬ portant and fundamental contributions to Ga¬ lois' theory in recent years is a theorem of Holder. Speaking roughly, it asserts that how¬ ever the solution of a given equation f(x) — 0 be conducted, sometime in the course of the solution certain simple equations whose groups are uniquely determined and known in advance must be employed. When the group of f(x) = 0 is simple (in which case we say f(x) is simple) it can be solved by no other simple equation g(y) — 0 essentially different from / = 0. The solution of any given equation therefore depends upon a chain of simple equa¬ tions. But of all simple equations belonging to a given group certain ones will enjoy peculiar properties which will recommend their selection as normal equations. The reduction of the given equation to these normal equations is a problem by itself.

THE SOLUTION OF THE QUINTIC.

We have seen that the equation of fifth de¬ gree <2 = 0 whose group is the symmetric group cannot be solved by means of radicals, i.e., by resolvents of the type x ™ — a — 0. On adjoin¬ ing (Xi — X3) (Xi — Xs) (Xi — Xt) (Xi — Xb) (x i Xz)

(Xi — Xi) (Xi — Xs) (xB — .r4) (x3 — Xs) (xi — Xs) the square root of its discriminant 4, the group of Q~ 0 reduces to the alternate group As of 60 substitutions. But As is simple. Thus Q— 0

is a simple equation for the domain R(V A). Other algebraic equations having this group arise in the theory of linear differential equa¬ tions, and also in the theory of elliptic func¬ tions. In fact the hypergeometric function

E(«, p, y, x) = \

a'ct f 1 ’P‘P T 1 l-2-yy + 1

Xi~\~ . . .

is a solution of a very simple differential equa¬ tion of the second order (7 = 0. For variable a, 3, y, it represents a new transcendent ; but for certain values of these parameters it re¬ duces to the elementary functions ; e.g., it may become algebraic. . In seeking for these latter cases Schwarz was led to introduce a new vari¬ able s, the quotient of two fundamental inte¬ grals of (7 = 0. This variable for certain values of a , Pt y satisfies the equation

J(s) = \728xf(s) + H3(s) = 0,

where

/(j) = j(j1* + 11/ — 1),

H(s) = s20— 288.r15 + 494/0 + 288s5 + 1.

The equation 7 = 0 stands in so intimate relation with the icosahedron that it is called the icosa- hedral equation. Indeed if we project stereo- graphically the icosahedron, on the j-plane, the centre being at the origin, the 12 vertices and the middle points of the 20 faces will be pre¬ cisely the roots of f and H respectively.

From this it is easy to conclude that the group of 7 = 0 is formed of the 60 rotations which leave the icosahedron unchanged. Klein has shown that the icosahedral equation whose

roots are very simple known functions of F(a, ft, y, x can be put in connection with 0 = 0. The equation / = 0 may thus be considered as a normal resolvent of the quintic.

A normal resolvent which springs from the elliptic functions is the following: In trigo¬ nometry one of the problems is to express sin x . .

— in terms of sin x, n a prime number. This

ft

may be done algebraically, as is readily shown. In the elliptic functions the same problem arises. Here the algebraic relation between

P (ˆn , °>i, and p (u, is of degree «* — 1.

The solution of this equation depends upon an equation of degree w+1 called an equation of transformation. For n= 5 such an equation is

J*/+ 10Jy3— 12(72y+5=0, (15)

whose group is the above At and whose roots are

and

/ .) 48r<*>i 4ˆ2 + 96rwA

\ P – 5 – > “I –)

r=0, 1, 2, 3, 4.

Here A is the discriminant g2 * — 27 g a*. How equations of this type could be set in relation with the quintic was first shown by Hermite in 1858. The equation (15) was used by Kie- pert. It forms a very convenient normal re¬ solvent of the quintic.

Having found in the elliptic functions con¬ venient normal resolvents for this quintic, we might hope to employ the equations of transfor¬ mation of higher orders to solve the general equations of higher degrees. The considera¬ tion of their groups, however, shows very easily that this is not possible. To find suitable equations we must pass from the elliptic to the hyperelliptic functions. By their aid the gen¬ eral equation of every degree can be solved.

Bibliography. — Bolza, O., (Theory of Sub¬ stitution Groups and its Application to Algebra) (American Journal Math. V. 13) ; Cajori, F., (Theory of Equations) (New York 1904) ; Hil¬ bert, article in Crelle’s Journal (V. cx) ; Hol¬ der, article in Mathematische Annalen (V. xxxiv) ; Jordan (ibid., V. I, 1869) (Traite des substitutions) (1870); Netto,

1898-99).

James Pierpont,

Professor of Mathematics, Yale University.

EQUATIONS, General Theory of. The

theory of equations finds its origin in efforts to solve the equations which arise in the appli¬ cations of algebra to problems in pure geometry or in applied mathematics. In the exposition of this theory a rational integral algebraic func¬ tion of x arises which may be defined as follows :

*f(x)ˆaoXn + aix**— 1 f a2xn-i 4- . . . + an—ix + an.*

It is assumed here that the exponent n is a posi¬ tive integer and that the coefficients a0, (h, a7, an are algebraic numbers independent

of x. If this polvnomial, is put equal to zero,

we have an equation of the nth degree. Any value of the variable x which makes the value of the polynomial zero is said to (

+ 2 = 0.

Fundamental Theorems about Roots. —

That at least one root of the equation f(x) = 0 always exists is a fundamental theorem which it is somewhat difficult to establish rigor¬ ously. The proofs usually given in elementary texts lack rigor. Among the most satisfactory demonstrations are the four given by C. F. Gauss and the one based on the theory of func¬ tions, given by A. L. Cauchy. Granted that every equation of the nth degree has at least one root, it is easy to show that it has n roots and no more. An equation of the second degree (a ((quadratic equation®) has two roots, one of the third degree (a ((cubic equation®) has three roots, one of the fourth degree (a (

There are important relations existing be¬ tween the roots and the coefficients of an equa¬ tion. From the equalities

(x — n) (x — r2) =x1 — (n + r2)x + rir»=0;

(x — ri)(x — r2) (x — r,)=x3) — (n + r i + r3)x2

+ (nr2 + r3r3-\-r7r3)x — fWa=0;

(x — r3) (x — rj). . . (x — rn) = xn

— (ri + u + . . . + rn)xn -1

+ (rirj+rir»+ . . . +rn-irn)xn -2

— ... + (— \)nrir2 . . . r» = 0.

we see that in the equation fix) ==0, when 09=1, the coefficient a3 of

the second term is equal to minus the sum of the roots ; the co¬ efficient a2 of the third term is equal to the sum of the products of the roots, taken two by two ; the coefficient a3 of the fourth term is equal to minus the sum of the products of the roots, taken three by three ; and so on, until finally we arrive at the last coefficient, an, which is equal to (— 1 + times the product of all the roots. The coefficients of the equation are said to be symmetric functions of the roots, that is, func¬ tions in which any two roots may be inter¬ changed without altering the value of the func¬ tion. As an illustration take 2.r3 + 4×2 + 6jr — 5 = 0. To make ao—l, divide through by 2. Then the sum of the three roots is — 2, the sum of their products, taken two by two, is 3, the product of all three roots is-f.

The roots of an equation may be complex

(i.e., imaginary) quantities. (See Algebra). Thus the equation x2 + x + 1 = 0 has the two

complex roots §'(— 1 -\-i\f3) and £(— 1 — iV 3),

where — 1. If the coefficients of the equa¬ tion f(x) =0 are all real, then it can be shown that, if complex roots occur at all, they occur in conjugate pairs; that is, if a + ib is a root, then a — ib is likewise a root. From this it follows at once that no cubic or other equation of odd degree and with real coefficients can have all its roots complex. Considerable infor¬ mation on the character of the roots can usually be secured from ((Descartes' Rule of Signs,® which may be stated as follows : An equation with real coefficients has as many positive roots as it has variations in sign , or fewer by an even number. A variation is said to exist whenever two successive terms have opposite signs. Thus

there are two variations in + – +. The

theorem may be proved from the consideration that every time that a new positive root is in¬ troduced into an equation, by multiplying fix) by (x — r), the number of variations is in¬ creased by an odd number. Applying Descartes' Theorem to the equation x 6 — x5 + x4 ~h2×2 — 5 = 0, observe that the sequence of signs is + — + + — . There are three variations ; hence, the equation has either three positive roots or one. To apply the theorem to negative roots, we first transform the given equation into a new one whose roots are the same as those of the given equation, excepting in sign. This can be done by writing — x in place of x. The above sextic then becomes xa + x6 + x4 + 2×2 — 5 =0. This transformed

equation has one variation; hence, by Descartes' Rule (q.v.), it has one positive root, and the given equation has one negative root. As the total number of roots is six and the number of real roots is four or two, it follows that either two or four of the roots are complex. By the same reason¬ ing we can show that x5 — 1 = 0 has one posi¬ tive and four complex roots and that x4 + x 2 + 1 = 0 has all its roots complex. In some cases, as in x4 + xz — x2 + 5 = 0, Descartes' Rule gives but little information.

Strenuous efforts have been put forth by mathematicians to discover theorems by which the exact number of real and of complex roots of equations with real coefficients can always be determined. The most noted result of these efforts is the theorem of J. C. F. Sturm, dis¬ covered in 1829. Sturm's theorem tells the number of complex roots, and the number of real roots within a given interval, with unfailing certainty; but it labors under the disadvantage of being laborious in its application. Hence it is commonly used only when the simpler methods fail to give the wanted information. We state the theorem for the special case when f(x) = 0 has no equal roots. Let f (.r) be the first derived function of fix). (See Calculus). Then proceed with the process of finding, by division, the highest common factor of fix) and f{x), with this modification, that the sign of each remainder be changed before it is used as a divisor. Continue the process until a re¬ mainder is reached which does not contain x, and change the sign of that also. The functions fix), f(x), together with the several remain¬ ders with their signs changed, viz., fix), fix),

. . ., / ix), are called ((Sturm's functions.®

Sturm's theorem is as follows: If fix)- = 0 has no equal roots, let any two real quantities a and b be substituted for x in Sturm's func¬ tions, then the difference between the number of variations of sign in the series when a is substituted for x and the number when b is substituted for x expresses the number of real roots of fix) = 0 between a and b. To make this clearer, take fix) = x 3 — x2 — 10.r + 1, then fix)— 3. x2 — 2x — 10, fix)— 62x fix) = 38,313. For the indicated values of x the signs of the Sturmian functions are as follows :

X

CO

fix)

fix)

fix)

fix)

+

4

+

+

+

+

3

—

+

+

+

1

,

■

+

+

0

+

—

+

+

— *2*

+

+

—

+

— 3

—

+

—

+

- OO

—

+

—

+

Since x = co gives no variations and x = — °° gives three variations, there are three real roots between °° and — 00 . Hence there are no complex roots. The real roots lie between 3 and 4, 0 and 1, — 2 and — 3.

Transformations of Equations. — The study of the properties of an equation is frequently facilitated by the transformation of the given equation into a new one whose roots (coeffi¬ cients) bear a given relation to the roots (co¬ efficients) of the original equation. Thus, in applying Descartes' Rule to negative roots we transformed the equation into another whose roots were numerically the same, but differed in sign. If the roots of the new equation are to be m times those of the one given, we place y = mx and substitute y/m for x. For instance, if the roots of the transformed equation are to be 10 times those in

y3

x3—x2—2x + 5 = 0, we get

100

2y

+ 5=0,

or y3 — 10y2 — 200y+5000=0. The result is ob¬ tained more easily by the rule : Multiply the second term by m, the third by m2, and so on. If the roots of the new equation are to be the reciprocals of the roots of the old we write

x = —. A more important transformation is the

one of diminishing the roots by a given number h. We have here y=x — h. Substituting y+h for x in a0xn + aix«-2 a2xw-2 . . . 4-an=0, we obtain

a0(y+/i)n+fli(y+/Or?-1

+02 (y h) »-2 . . . +a,r=0. Expanding the binomials and collecting like terms, we obtain, let us suppose,

A0yn +/+y«-1+242y*-2+ . . . +An =0. Writing x — h for y we get
+ o (x — h) n + A i (x — h) n-1

+ . . . + +n-i(x — h) +An=0, which differs from the original equation merely in form. This new form suggests an easy way for carrying out the actual computation. Dividing the left member by x—h, the re¬ mainder obtained, is seen to.be An, the abso¬ lute term. Dividing the quotient thus obtained

by x — h, the remainder is An-i. By repeating this process the remaining coefficients of the required equation are secured. The process, called <(synthetic division,® is very convenient in this transformation. Suppose we desire to transform ,r'4+8ˆ3 — x+6=0 into another in which the second term is wanting. The sum of the roots is — 8 hence, to cause x 3 to disappear, we must increase each root by 2 (i.e., dimin¬ ish by ■ — 2). Dividing successively by .r+2 we obtain the coefficients —40. 63. —24. 0. 1. and the required equation is x6 — 24.r2+63.r — 40=0.

The transformations thus far considered are all special cases of the so-called homographic or projective transformation in which y =

ax \~b ji

ˆ > a, b, c, a being constants. Thus, if

ar = d = 1 and c = 0, we have the preceding trans¬ formation. The homographic transformation is of interest in geometry, in the study of homo¬ graphic ranges of points. The most general rational algebraic transformation of the roots of an equation /(.r): = 0 of the wth degree can always be reduced to an integral transformation of a degree not higher than the (n — 1) th, and can, therefore, be represented by the relation

y = dL + dix + diX2 + . . . + dnxn- i.

This last is known as the <(Tschirnhausen trans¬ formation, w by which Tschirnhausen in 1683 hoped to be able to reduce the general equation of the nth degree to the binomial form xn — a = 0, which is always solvable. But this transformation to the binomial form can be effected only for general equations that are lower than the fifth degree.

Solution of Equations. — This subject re¬ solves itself into two quite distinct parts: (1) The solution of numerical equations (i.e., equations whose coefficients are given numbers) by some method of approximation to the exact value of the roots; (2) the solution of equa¬ tions, whose coefficients are either given num¬ bers or letters, by operations which will give the accurate values of the roots, expressed in terms of the coefficients, — such expressions to involve no other processes than addition, sub¬ traction, multiplication, division and the ex¬ traction of roots. The former is called a solu¬ tion by approximation, the second is called the algebraic solution of equations. In the former each root may be found separately, in the lat¬ ter a general expression is obtained which rep¬ resents all of the roots indifferently. The for¬ mer is of importance to the practical computor, the latter is of special interest to the pure mathematician. The solution by approximation can be effected for equations of any degree ; the algebraic solution is impossible for general equations of the fifth or of higher degrees. See Equations, Galois' Theory of.

Algebraic Solution of Equations. — The algebraic solution of the quadratic equation ax3 + bx-\-c = 0 is well known. (See Algebra). The algebraic solution of the cubic, due to Scipio Ferro and Tartaglia, and first published by H. Cardan in 1545, is known as <(Cardan's solution.® To effect it, first transform the gen¬ eral cubic equation so that the second term shall be wanting. This done, we have x3 + ax + b = 0. Putting x = y-\-z we obtain

y8-f*3y/(y4"£ r) + s8 + a (y + 2) + 6 = 0,

or y8-f-28_h (3y£-fa) (y + 2) + 6 = 0.

We may subject y and z to any second condi¬ tion which is not

inconsistent with x—y+z. It will be convenient to assume 3y£+a=0. Then y3Jrz3-\~b— 0, or, substituting for z its

d 3

value — a/3y, we obtain y6T by=— and*

■ =_y_6=_i + ?I.

Since x=y rhz, we have

b lb2 a 1

4 + 27 '

Since y3 and z3 have each three cube roots, it might seem as if y-\~z or x had altogether nine values. As the cubic has only three roots, this cannot be. Of the nine values, six are ex¬ cluded by the relation Zyz+a— 0, which y and z must satisfy. Eliminating z between x=y~hz

and 3yz-ha=0, we get x=y — •

a

3y

where y has

the three values obtained from the expression for y3 given above. This last expression for x does not involve the difficulties of the first ex¬ pression. If the numerical values of the coef¬ ficients a and b are given, the numerical values of the roots may be obtained by substituting the values of a and b in the above expression for x. In any case, this mode of computing x is more laborious than Horner's method of approximation (explained below), but when all three roots of the cubic are real and dis¬ tinct, an unexpected difficulty is encountered.

In this case ˆ j ˆ represents a negative num¬ ber. As the square root of a negative number is a complex (imaginary) number, we are re¬ quired to find the cube root of a complex num¬ ber. But there exists no convenient arithmet¬ ical process for doing this. Nor is there any way of avoiding the complex radicals and of expressing the values of the real roots by real radicals. This is the famous ˆirreducible case® in the solution of the cubic. Its interest is purely theoretical. The practical computor experiences no difficulty, for he can always fin-d the values of x by the methods of approxima¬ tion.

Since Cardan's time a great many different algebraic solutions of the cubic and also of the quartic have been given. They are brought together for convenient reference in L. Mat- thiessen's (Grundziige der Antiken und Modernen Algebra, > Leipzig 1878. We proceed to give Euler's algebraic solution of the general quartic. By transforming it, bring it to the form x*-\-ax3Jrbx-\-c=0. Assume the general

expression for a root to be x=\/ tt + V^+V^. Squaring,

Jt2 — • u – — v — w= 2\/ 2

Squaring again and simplifying,

x 4 — 2 x2{uJrvJrid) — 8x V u \/vV w

+ (m+Z'+w)3 — 4(W7/+WW+Z'W)= = =0. Equating coefficients of this and the given quartic we have

a — — 2(u-\~v+w), b — — 8 V«Vt'Vw-

c— (u-hvArw)3 — 4 (uv~huw-\~vw) .

But — (w+i/- hw), (uw\ruw-\-vw) , — uvw the coefficients of a cubic whose roots are u w. This cubic, called ((Euler's cubic,® is

f+jf +

are , v.

Solving it, we have the values of u, v and w, and, therefore, the values of x. Of the eight apparent values of x, four are excluded by the

relation b= — 8 \^u\ZvVw. To solve the quartic by the present method we must, therefore, first solve ((Euler's cubic,® called the resolvent. When this resolvent has a rational root, then its other two roots can be expressed in terms of square roots and the quartic can be solved algebraically without the extraction of cube roots. All methods of solving algebraically the general quartic depend upon the solution of some resolvent cubic.

Binomial equations of the form oC1 — 1=0, or more generally, of the form xt1- — a=0, are known as cyclotomic equations, and can always be solved algebraically. They possess also many interesting properties. We shall give a trigonometric solution and mention a few of these properties.

*Let xn=a=r[cos (2&tt + 6) + * sin (2&7r -| -0)], where a may be a complex quantity, where k may be any integer, and where r and 0 are known from the value of a. (See Trigonometry). By De Moivre's heorem we obtain*

x =

n

Vr

2 kx -\-Q . . 2 kn \ 6

cos – + t sm

n

n

By assigning to k any n consecutive integral values we obtain n distinct values for x and no more than n, since the n values recur in periods. These values are the roots required.

Among the properties of xn — 1=0 are the following: It has no multiple roots; if r is a root, then any positive integral power of r is a root ; if m and n are relatively prime, then xm — 1=0 and xn ■ — 1=0 have no roots in common, except 1 ; if h is the highest common factor of m and n, then the roots of xh ■ — 1=0 are common to xm — 1=0 and xn — 1=0; if r is a complex root of x — 1=0, n being a prime number, then 1 , r, r2, . . . , r'v—1 are the roots; the roots of xm- — 1=0 and xn ■ — 1=0 satisfy the equation xmn — 1=0; xn ■ — 1=0 has always primitive roots, i.e., roots which are not also roots of unity of a lower degree than n. For the proofs consult Burnside and Panton, (Theory of Equations, } Vol. I. The theory of roots of unity is closely allied with the problem of inscribing regular polygons in a circle, or the theory of the ((division of the circle.® Consult P. Bachmann, Leipzig 1872.

Solution by Approximation. — Of the vari¬ ous methods which have been given for the solution of numerical equations, the most satis¬ factory, all things, considered, is the one known as <(Horner's method.® It is commonly used for finding incommensurable roots (i.e., such as in¬ volve an interminable decimal which is not a repeating decimal), but it may be used also for finding commensurable roots (i.e., such as are in¬ tegers or rational fractions). It is desirable here to begin with the theorem that a rational frac¬ tion cannot be a root of an equation of the nth degree with integral coefficients, the coefficient of xn being unity. To prove this, let, if

possible,

h _

be a root of f(x) — 0, where h and k are in¬

tegers and —r a fraction reduced to its lowest

K

terms, and where Oo = l. Substitute for x ,

then multiply both members of the equation by

. hn

kn — if and we obtain, after transposing, — =

— adm — 1 — affin — 2 k — . . . — ankn — l. This

equation is impossible, since a fraction in its

h

lowest terms cannot equal an integer. Hence

cannot be a root. This being the case, it fol¬ lows that all commensurable roots are exact divisors of an, for an is numerically the product of all the roots. We know that if (fx) is di¬ visible by x — r, without a remainder, r is a root. Hence we are enabled to find all com¬ mensurable roots of numerical equations of the type now under consideration by testing in suc¬ cession each factor of an • For instance, in the equation x3 + 8.r2 + 13.r + 2 = 0 the factors of an are ± 1 and ±2. Taking the factor — 2, we find that f(x) is exactly divisible by x + 2. The test for each of the three other factors yields a remainder. Hence — 2 is the only com¬ mensurable root.

Before we can apply Horner's method we must know the first significant figure of the root to be found. In other words, we must <(locate® the root. This can always be done by Sturm's theorem, but usually the following theorem is more convenient. If two real num¬ bers a and b, when substituted for x in f(x), give to f(x) contrary signs, an odd number of roots of the equation f(x)— 0 lies between a and b. Thus, to locate the roots of x 3 — 3×2 — 46.V — 71 = 0, substitute for x , in succession, the values — 6, — 5, — 4, — 3, — 2,

— 1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. It is found that /(— 5) and /(— 4), /

(— 2) and /(— 1), /(8) and /(9) are pairs of values of f(x) having opposite signs. As there are three roots in all, we conclude that there is just one root between each of the pairs of values — 5 and

— 4, — 2 and — 1, 8 and 9. To reduce the number of trials in more difficult examples, there are theorems on the upper and lower limits of roots which may be applied.

Horner's method consists of successive transformations of an equation. Each transfor¬ mation diminishes the root by a certain amount. If the required root is 1.955, then the root is diminished successively by 1, .9, .05, .005. Syn¬ thetic division is employed. Suppose we desire to find, to three decimals, the root between — 1 and — 2 in the above example. It is convenient first to transform the equation so that the root becomes positive. We get x3 + 3×2 — 46„r + 71 = 0. The first significant figure in the root is 1. To diminish the roots by 1 we perform by synthetic division the following operation :

1 + 3 — 46 + 71 | 1

1 + 4 — 42

4— 42 + 29

1 + 5

5— 37 Jl

~6

The transformed equation, whose root under

consideration now lies between 0 and 1, is x3 + 6.r2 — 37.r + 29 = 0. This root being less than unity, x2 and x3 are less than x. Neglect¬ ing x3 and 6.r2, we obtain an approximate value for x from — 37. r + 29 = 0, viz., x = .7. As in the process of ordinary long division or in the extraction of roots, so here the digit ob¬ tained by the first approximate division may be too large or too small and may need correction. An error of this sort will reveal itself later in the attempt to find the third digit of the root. Such correction is needed here. Actually x — .9. Diminish the roots of the last trans¬ formed cubic by .9, then find the third digit by the process just indicated for finding the sec¬ ond digit, then diminish the roots again, and

so on. The entire operation is as follows :

1 + 3 — 46

1 4

4

1

— 42

5

5

— 37

1

0.21

6

— 30.79

.9

7.02

6.9

— 23.77

.9

.4375

7.8

— 23.3325

.9

.4433

+ 71 | 1.955

— 42

+ 29

— 27.711

+ 1.289

— 1.166625

+ .122375

8.7

.05

8.75

.05

8.80

8.05

8.85

22.8925

The broken lines indicate the conclusion of the successive transformations. For advanced reading on the solution of numerical equations consult McClintock, E., in Am. Jour, of Maths.,) Vol. XVII, pp. 89—110 ; Carvallo, M. E., (Resolution numerique complete d. Equations algebriques ou transcendantes) (Paris 1896) ; A. Xavier, Approximations numeriques' (Paris 1909).

Multiple Roots. — Suppose that in f(x) = 0 there are m multiple roots ; that is, m roots are equal to each other. Then f(x)—(x — r)OT (a')» and the first derivative is f(x)—(x — r)mf (x) + m(x — r)m — 1(P(x). The fact that f{x) and f (x) have the factor (x — r)m—1 in common suggests the following rule for the discovery of multiple roots : Find the highest common factor of f(x) and f(x). If that factor is (x — r)st then r occurs as a root j + 1 times. If the highest common factor is (x — r)s(x — n)fi then r occurs as a root s + 1 times and n occurs t + 1 times. If f{x) = 8 + — 20.r2 + 6x + 9, then f (x) = 2Ax 2 — 40.r + 6. and the H.C.F. is 2x — 3. Hence { is a double root.

Elimination. — Take the equations,

f(x)—x2 + bxx + b2 — 0, F (x)=x2 + axx + a2 — 0,

and let n and r2 be the roots of the second equation. The necessary and sufficient con¬ ditions that the+wo equations shall have a root in common is that f(r i) or f(r2) shall vanish;

that is, that the product /(n)-/(r2) shall be zero. Multiply together

f{rx)=r2 + ain + a2, f(r2)EEr22 + chr2 + a2,

we get

r2r2 +ox (rxr22 + rcr2) + a2(r i2 + r22)

+ acr \Y 2 — f- axa2(ri + r2) + a2 .

Expressing the symmetric functions of rx and r2 in terms of the coefficients of the second of the given equations, we get r2r2=b2,

rxr2 + r2r2~ — bib2, ri+ri—bi — 2 b2, rxr2=b2, r i+r2= — bu Substituting these values, we have b2 — axbib2 + a2b2 — 2 afb2 + a2b2 — axa2bi + a2.

This expression, involving the coefficients of the two given equations, is called the eliminant or resultant. Its vanishing is the condition that these equations have a root in common. More generally, if from n equations with n — 1 varia¬ bles we eliminate the variables and obtain an equation R — 0, involving only the coefficients, the expression R is called the eliminant or re¬ sultant of the given equations.

In the above example the elimination was performed with the aid of symmetric functions. Of other methods of elimination the best known are those of Euler, Bezout and Sylvester. We outline the last, known as Sylvester's Dialytic Method. To eliminate x between

f(x) :==z a oXn + aixn~ *• + . . . +flfx= 0,

F(x) = bx™ + bix™—1 + . . . + bn — 0,

multiply the first successively by x°, x1, x2, . . x™— l, and the second successively by x°, x1, x2, . . . , xn~l, and we obtain m + n equations. The highest power of x is m + n — 1. If f(x) = 0 and F (x) =0 have a common root, it will satisfy all the m + n equations. If the differ¬ ent powers of x, viz., x, x2, , x^+ ^-fibe taken

as m + n — 1 unknown quantities, satisfying m + n linear equations, a relation will exist be¬ tween the coefficients. This condition of con¬

sistency is the vanishing of the resultant. This resultant Sylvester expressed neatly in the form of a determinant. See Determinants.

Discriminants. — It has been shown that a multiple root of f(x)—0 is also a root of /'(. r)=0. But the condition that these two equations have a common root is expressed by the vanishing of the resultant.

The resultant of f(x) =0 and f (x) =0 is called the discriminant of f(x) —0. It may be otherwise defined as the simplest function of the coefficients, or of the roots, whose vanishing signifies that the equation has equal roots.

To the references already given we add the following: (Encyklopadie der mathematischen Wissenschaften^ Band I; Cajofi, Florian, (In- troduction to the Modern Theory of Equations J (New York 1904) ; Netto, E., (Vorlesungen fiber Algebra) (Leipzig, Vol. I, 1896, Vol. II, 1900) ; Serret, J. A., (Cours d'Algebre Supe- rieure) (Paris, 2 vols.) ; Todhunter, (Theory of Equations } (London 1880) ; Weber, H., (Lehr- buch der Algebra J (Braunschweig, Vol. I, 1898, Vol. II, 1896) ; (Encyklopiidie der elem. Algebra und Analysis' (Leipzig 1903).

Florian Cajori,

Professor of History of Mathematics, Univer¬ sity of California.

EQUATIONS, Integral. See Integral Equations.

EQUATOR, an imaginary great circle of the celestial vault or on the surface of the earth. As used in astronomy the term signifies a great circle of the celestial vault at right angles to its axis, and dividing it into a northern and a southern hemisphere. It is constituted by the plane of the earth's equator, produced in every direction till it reaches the imaginary celestial sphere. The sun is twice a year in the celestial equator — namely, at the equinoxes, whence the equator is also known as the equinoctial line, or simply the equinoctial (see Equinox). The point in the equator which touches the meridian is raised above the true horizon by an arc which is the complement of the latitude. The sun and planets all have equators. They rotate around their several axes and the plane at right angles in each case is the equator of the heavenly body. In geography, the equator is a great cir¬ cle on the surface of the earth equidistant from its poles, and dividing it into two hemispheres. Its latitude is zero; it is therefore marked on maps as 0. Other parallels of latitude are counted from it, augmenting in their

numerical designation as their distance from it north or south increases, the poles being 90 degrees. The plane of the terrestrial equator is a plane perpen¬ dicular to the earth's axis and passing through its centre. The magnetic equator is a somewhat irregular line, nearly but not quite a great circle of the earth, in which there is no dip of the mag¬ netic needle. It is hence called also the aclinic line. It is not far from the geographical equa¬ tor, but its situation slowly alters year by year, there being a slow oscillation of the magnetic poles, while the geographical equator and poles are almost fixed.

EQUATORIAL (<(of the equator®), a geo¬ graphical and astronomical term. In astron¬ omy it is usually applied to a telescope so mounted that the right ascension and decli¬ nation of the point in the heavens at which it is directed can be read off from two scales. Clockwork is sometimes attached to the instru¬ ment to give the motion in right ascension, and thereby keep the object constantly in the field of the instrument. See Astronomy ; Tele¬ scope.

EQUATORIAL COUDˆ ("Elbow Equa¬ torial®), a form of equatorial telescope invented by Loewy, of the Paris Observatory. The ob¬ server can remain stationarv in a comfortable position, with a desk table built around the eye¬ piece end, and can have all this part enclosed from the cold, and warmed if desired, at the same time commanding the whole heavens without rising from his chair. See Astron¬ omy; Telescope.

EQUATORIAL CURRENT. See Ocean

Currents.

EQUERRY, ek'we ri, an official of the royal household of Great Britain in the department of the master of the horse. There are the crown equerry, equerries in ordinary and extra equerries, 7 of the former and 15 of the latter, all army or navy officers, one or more of whom is attached to the suite of each member of the royal family.

EQUESTRIAN ORDER, or EQUITES,

the order of knights in ancient Rome (Latin ordo equester). The equites or knights orig¬ inally formed the cavalry of the army. They

are said by Livy to have been instituted by Romulus, who selected 300 of them from the three principal tribes, naming them (

Bibliography. — Bouche-Leclercq, A., Man¬ uel des antiquites romaines) ; Bury, J. B., (The Student's Roman Empire' (1893); Cagnat, R.,

(Equites ' (in (Dictionnaire des Antiquites } by Daremberg and Saglis) ; Friedlander, A. H., (SittengeschicKte Roms' (1901) ; Greenidge, A. J. H., (History of Rome' (1904) ; Herzog, E. (Geschichte und System der Romischen Staats- verfassung' (Leipzig 1891) ; Madvig, J. N., die Verfassung des romischen Staates) ; Mommsen, T., (in Smith's dictionary of Roman Antiquities' (3d ed. 1891).

EQUIDiE, ek'wi-de, the horse family, the most highly specialized of the perissodactyl un¬ gulates, characterized by the fact that only one toe (the third) in each foot is now functional, traces (((the splint bones®) remaining of the two other toes (the second and fourth) in the <(splint bones® hidden beneath the flesh on each side of the shank of the foot. (For the rela¬ tionships of this family to the titanotheres, tapirs and rhinoceroses, see Ungulata; and for the evolution of the characteristic foot-structure see Horse, Evolution of). The fam¬ ily contains but a single extant genus (Equus), structural distinctions not being of sufficient importance to separate generically the modern horses from several extinct species, or from the asses or zebras, or these from each other. Apart from the dependence upon a single toe, the family is characterized by the facts that the orbit is completely surrounded by bone; the in-

cisor teeth are chisel-shaped; the canines or <(tushes)) are rudimentary (when present), and the premolars (except the first or ((wolf tooth®) resemble the hypselodont molars. Externally the members of this family are robust, with comparatively slender limbs, the feet "booted® in a single horny hoof, encasing the terminal phalanx; the body thickly clothed with short close hair, which, however, becomes longer, and in some species profuse, forming a mane, on the nape and tail. The colors are apt to be dis¬ posed in dark stripes on a yellow or brownish ground, most strikingly in the zebras, but trace¬ able in most others. There are never any horns, and speed is depended on to escape from ene¬ mies which cannot be beaten off by kicking with the hind feet, while struggles between rival males for the leadership of the bands of mares are carried on mainly by biting and striking with the fore feet. The fore-limbs, or both pairs, have a callous pad upon the inside, "which,® says Beddard, <(is possibly to be looked upon as an aborted gland, probably originally of use as secreting some odorous substance calculated to enable strayed members of the herd to regain their companions.® The whole structure of the equidce has been developed in adaptation to a life upon open dry plains, where ability to travel with rapidity and to live upon grass and herbage has been perfected to a high degree. The stomach has no such complicated arrangement for the

assimilation of this com¬ paratively innutritious diet as has been acquired by the ruminants (q.v.). The alimentary canal is of great length (about eight times the length of the body) : and the stomach, simple in form, is divided into a cardiac and a pyloric part, sharply distinguished by the dense epithelial lining of the former. The caecum is twice as large as the stomach and there is no gall-blad¬ der. The teats are two in number and situated in the groin. One or two foals are produced at a birth after a gestation of about 11 months. All the species are gregarious and polygamous and like most such animals are readily tamable, though the zebra has proved somewhat intracta¬ ble and useless to mankind.

The family in the course of its history has occupied all the larger land-areas of the globe except Australia; but although its ancestors abounded in both Americas in the past, and modern horses run wild have multiplied and flourished exceedingly upon their grassy plains, no living species is native to the New World. In the Old World the horse, or horses and sev¬ eral of the asses were Asiatic and European ; a second species of ass and the various zebras were wholly African. See Ass; Horse; Quag- ga; Zebra.

EQUILIBRIUM, a state of balance as to the forces acting upon any body. The condi¬ tion is generally considered in respect to the action of gravity, and especially as to the centre of gravity of the body under observation. In accordance with that law of physics that the centre of gravity tends always to occupy, the lowest possible position — that is, the position in which it is nearest to the centre of the earth — equilibrium . appears in three forms: (.1) stable equilibrium, when the centre of gravity is below the point of support; (2) unstable equilibrium, when the centre of gravity is above the point of support; (3) neutral equilibrium,

when the centre of gravity and the point of support coincide. An illustration may be found in a wheel supported free of the ground on its axle. If the wheel is of uniform build in all of its parts it will be in neutral equilibrium, re¬ maining at rest in any position to which it may be revolved on the axle. If, however, a weight be attached to the rim of the wheel at its low¬ est point, when the wheel is moved so as to raise the weight ever so little the wheel will swing back until the weight is again at the low¬ est point, in which position it is in stable equilibrium. If the wheel is then revolved so that the weight is directly above the axle, and carefully balanced in that position, the wheel will be in unstable equilibrium, for when dis¬ turbed it will immediately revolve so as to bring the weight to the lowest point again, and come to rest in stable equilibrium. See Applied Me¬ chanics ; Mechanics.

In physiology, the ability to maintain the body by proper muscular force under nervous control, so that it can perform co-ordinated movements or

resist the force of gravity. By equilibrium is here meant the control of the body in the upright position, apart from the localized processes of co-ordination. Loss of equilibrium shows itself particularly in walk¬ ing and running. Here the centre of gravity of the body is constantly changing and the ability of the individual to hold himself erect depends upon a number of features. The eye, the tactile sense of the feet, the joint-senses, the muscular sense that weighs the various muscular move¬ ments and the higher cerebral centres are all involved, and loss of equilibrium or inco-ordina¬ tion may result from disease or injury to any of these functions. Loss of eyesight does not necessarily involve any loss of equilibrium, but loss of tactile sense of the feet, such as is seen in locomotor ataxia or in people who have had their feet frozen, almost invariably produces a loss of equilibrium. In the same disease (loco¬ motor ataxia) and in forms of neuritis the loss of muscular sense and joint-sense produces similar phenomena. For the higher cerebral centres of control there is good reason to believe that the semi-circular canals in the in¬ ternal ear constitute a special sense-organ for the determination of the direction of the move¬ ments of the head which are so essential in the preservation of general equilibrium. Diseases of the semi-circular canals are frequently ac¬ companied with dizziness and vertigo. It has been suggested that the sacculus and utriculus of the internal ear act to maintain equilibrium while at rest. It also seems probable that cer¬ tain areas in the cerebellum are closely associated with the equilibrium. See Cerebellum ; Inco¬ ordination ; Locomotor Ataxia.

EQUILIBRIUM, Chemical. In mechanics a system is said to be in equilibrium when the forces that act upon it are precisely balanced, so that their resultant is everywhere zero. A system or mass is similarly said to be in chemi¬ cal equilibrium when its state is such that there is no tendency toward a sensible chemical change in any of its parts. As set forth by Berthollet, chemical equilibrium is not a condi¬ tion of rest, but one in which the velocity of reaction in one direction is equal to the velocity in the opposite direction. The absence of chemi¬ cal action may be absolute, or merely apparent.

In other words, there may be no chemical changes going on at all, or there may be op¬ posite changes going on simultaneously in such a way that no resultant modification can be ob¬ served in any part of the system, however small the part selected for observation may be. In the latter case the existence of the simultaneous and opposite reactions can only be indirectly inferred from a study of the system when it is not in equilibrium.

According to the theory of chemical affinity that was held before the importance of mass- action was understood, two substances either would combine or would not, according as their ˆaffinities® were more or less completely satis¬ fied in the combined state, or in the uncombined state. That this view is entirely inadequate to explain the facts of chemistry is made evident by the following simple example : When steam is passed over red-hot iron filings it is decom¬ posed into oxygen and hydrogen, the iron ab¬ sorbing the oxygen with the formation of oxide of iron, while the hydrogen escapes in the free state; but if hydrogen is passed over red-hot oxide of iron the oxide is reduced to the metal¬ lic state, its oxygen combining with the hydro¬ gen to produce steam, which passes on in the hydrogen current. This apparent contradiction may be best explained by assuming that when a mixture of steam and hydrogen is in contact with a red-hot mixture of iron oxide and me¬ tallic iron, both of the foregoing reactions take place simultaneously. If the metallic iron and the steam are present in excessive amounts, the resultant action will be, on the whole, the oxida¬ tion of the iron and the decomposition of the steam ; while if the iron oxide and the hydrogen are present in excess, the resultant action will be the reduction of the oxide to the metallic state and the simultaneous formation of steam. It is therefore apparent that in some reactions, at any rate, the relative masses in which the various constituents are present must be con¬ sidered with much care before any prediction of the chemical deportment of the mixture can be made. Attention was first directed to this fact by Claude Louis Berthollet ((Essai de statique chimique 1803). In the example cited above, if the iron, iron oxide, hydrogen and steam were left in contact in a closed vessel, a state of apparent equilibrium would be finally at¬ tained in which the formation and decomposi¬ tion of the steam would occur with equal rapidity, so that no visible change would take place thereafter. When this state of <(chemical equilibrium® is attained the abstraction of hy¬ drogen or of iron oxide, or the addition of steam or of metallic iron, will destroy the equilibrium, and more iron will be oxidized, until a new state of equilibrium is established. Similarly, the abstraction of steam or of me¬ tallic iron or the addition of hydrogen or of iron oxide when the system is in equilibrium will be followed by the reduction of a portion of the iron oxide and the establishment of a new state of equilibrium. According to Ber¬ thollet, all reactions are fundamentally of this kind. When sodium chloride is added to a solu¬ tion of silver nitrate we know that the silver is all thrown down in the form of an insoluble chloride. In this case, Berthollet would con¬ sider that the sodium chloride, sodium nitrate, silver chloride and silver nitrate tend toward a state of chemical equilibrium ; but that since the*

silver chloride is continually removed from the solution by reason of its insolubility, it is im¬ possible for the state of equilibrium ever to be

attained, just as it would be impossible for such a state to be attained in our previous illustra¬ tion, if one of the constituents (say the iron oxide) were removed, or rendered inactive in any way, as fast as it were formed.

The ideas of Berthollet have been found to be sound in their essentials, and they have served as the foundation for the modern theory of chemical action, though their full develop¬ ment cannot be explained without the use of the differential calculus. The basis of the theory of mass-action, so far as solutions are concerned at all events, appears to be substantially as fol¬ lows : Two substances in solution cannot com¬ bine with each other, except when a molecule, or ion (see Solutions) of the one, in its wan¬ dering through the solution, chances to encoun¬ ter a molecule or ion of the other. Now while we do not know the actual number of encoun¬ ters that take place in a given time between molecules of different kinds, we do know that in a homeogeneous solution the chance that any one given molecule of the first kind will encoun¬ ter some molecule of the second kind within (say) the next second, is strictly proportional to the number of molecules of the second kind that are present in the solution ; and conversely, the chance that any given molecule of the second kind will encounter some molecule of the first kind within the next second is strictly propor¬ tional to the number of molecules of the first kind that are present. Since the number of molecules of each kind that are present in an actual solution is practically infinite, this amounts to saying that the actual number of encounters between molecules of different kinds, in one second, is proportional to the product of the number of molecules of the first and second kinds that are present. As an illus¬ tration of the usefulness of this principle, we may consider the equilibrium of a mixture of acetic acid and ethyl alcohol. Some of the acid combines with some of the alcohol to form water and ethyl-acetic ester (see Esters), but the reaction is never complete, since a state of equilibrium is attained after a time, in which the inverse combination takes place just as fast as the direct one. The molecular weight of acetic acid (CHaCOO.H) is 60, that of ethyl alcohol (CzELOH) is 46, that of ethyl-acetic ester or ethyl acetate (CHsCOO.CaHs) is 88, and that of water (H20) is 18. A mass of any substance which contains as many grams as there are units in the molecular weight of the substance is known as a <(gram-molecule® of the substance. This name is rather unhappily chosen, but the idea itself is a useful one, and is commonly employed in modern writings upon theoretical chemistry. Let us suppose that one gram-molecule of acetic acid (60 grams) is originally mixed with M gram-molecules of ethyl alcohol (46M grams), and with N gram- molecules (18M grams) of water, and let us inquire what the composition of the mixture will be when the state of final chemical equi¬ librium has been attained. The advantage of taking the gram-molecule as a unit of mass is, that when this unit is used the number of grams . of acetic acid, alcohol

and water that are originally present will be proportional to 1. M and N, and we may speak of M and N and

write them in our equations precisely as though they were really the number of actual molecules present. "1 he acetic acid and alcohol act upon each other as indicated by the equation

CH3COO.H + C2H5OH = ch3coo.c2h5 + h2o.

Now let us assume that when the state of equi¬ librium has been attained, X gram-molecules of the alcohol have been decomposed. This implies that X gram-molecules of the acetic acid have also been decomposed, and that X gram-mole¬ cules, each of water and of ethyl acetate have been formed. The total numbers of gram-mole¬ cules of the various substances that are present when the final state of equilibrium is attained are therefore as follows: Acetic acid, 1 — X; alcohol, M — X; water, X; ethyl acetate, N + X. The number of molecular collisions per second, in which a molecule of acetic acid encounters a molecule of alcohol, is therefore (in the final state) proportional to (1 — X) (M— X) ; and since the chemical action is itself proportional to the number of such collisions, we may assume that the number of gram-molecules of ethyl acetate formed per second, in the state of equilibrium, is A(1 — X) (M — X), where A is a constant whose value we do not know. The same line of reasoning shows that the number of gram-molecules of ethyl acetate that are lost from the solution in the same time, through combining with water to reproduce acetic acid and alcohol, is B(N + X)X, where B is another constant, whose value is also unknown. Since the existence of equilibrium requires that the quantity of ethyl acetate present shall be con¬ stant, we have A (1 — X) (M — X) = B(N + X)X. Now it is known by experiment that when the original mixture is free from water, and con¬ tains chemically equivalent amounts of acetic acid and alcohol, so that M = 1 and N— O, the state of final equilibrium is attained when X—%. If these values of M and X are sub¬ stituted in the foregoing equation, we find that A and B are connected by the necessary relation A = 4B. If we replace A by 4B and then divide through by B, the foregoing equation reduces to 4 (1— X) (M — X) = (N + X)X, or 3X2— (4 + 4M + N) X + 4M = 0, a quadratic equation from which the value of X (that is, the number of gram-molecules of acetic acid decomposed) may be inferred, in the final state of equilibrium, for any desired initial mixture of acetic acid, alco¬ hol and water. This example has been given at some length, both because it illustrates clearly the principles of chemical equilibrium and the law of mass-action, and because reactions of this very kind, in which

esters are formed by the direct action of an acid upon an alcohol, have a special historic interest, since their study has contributed in no small measure toward placing the modern theory of chemical equi¬ librium upon a firm foundation.

When it is desired to determine the state of a chemical system after the lapse of a definite interval from an initial instant for which its state is given, we must form a differential equation in which the condition is expressed that the chemical change, per unit of time, is proportional (as above) to the product of the number of gram-molecules of the reacting sub¬ stances that are present at the instant consid¬ ered; and having formed this equation and inte¬ grated it, we obtain an expression in which the composition of the system is expressed as a

function of the time. When several substances that may react upon one another are present, the differential equation is more complicated in form, as might be expected; but for details of this sort reference must be made to works on theoretical chemistry. When the system con¬ tains several acids and one or more bases, the distribution of the bases among the various acids may be investigated in accordance with similar principles, and by comparing the nu¬ merical results that are thus obtained with the facts of observation, estimates of the true rela¬ tive ˆaffinities® of the acids may be had.

When, as is often the case, the course of a reaction depends upon the temperature, the principles of mass-action apply as before, but regard must also be had for the laws of ther¬ modynamics (q.v.), which usually impose cer¬ tain limitations upon the equations. The full theory of chemical changes in which thermody¬ namical considerations play an important part was given by J. Willard Gibbs, in a paper of great power and originality, entitled (On the Equilibrium of Heterogeneous Substances,1 pub¬ lished in the transactions of the Connecticut Academy of Arts and Sciences1* for 1875. Gibbs' basic phase law, or (*

n different bodies (chemical substances, either simple or compound) can form n + 2 phases, and these can co-exist at one single point only ; that is, at a definite temperature and pressure.

The great importance of a full understand¬ ing of the laws of chemical equilibrium rests in the fact that by far the larger part of all chemi¬ cal processes, both in nature and in the indus¬ trial arts, result not in complete reactions, but in a condition of chemical equilibrium, with meas¬ urable quantities present of every possible compound.

Bibliography. —Arrhenius, S. C., (Theories of Chemistry) (London 1907) ;

Bigelow, S. L., (Theoretical and Physical Chemistry1* (New York 1912) ; Comey, A. M., dictionary of Chemical Solubilities> (London 1896) ; Findlay, A., (The Phase Rule) (London 1911) ; Hoff, J. H. van't, (Lectures on Theoretical and Physical Chemistry) (London 1899) ; Nernst, W., (Theoretical Chemistry* (London 1895).

EQUIMULTIPLE. See Multiple Series.

EQUINE ANTELOPE. See Blaubok.

EQUINOCTIAL, in astronomy, synony¬ mous with equator. When the sun is on the equator there is equal length of day and night over all the earth : hence the name equinoctial. See Equator; Equinox.

EQUINOCTIAL GALE, a gale popularly supposed to occur at the time of the spring or autumn equinox. See Equinox.

EQUINOCTIAL POINTS are the two

points wherein the equator and ecliptic intersect each other; the one, being the first point of Aries, is called the vernal point; and the other, in the first point of Libra, the autumnal point. See Ecliptic ; Equinox ; Equinoxes, Preces¬ sion of THE.

EQUINOX, in astronomy, is that time of the year when the day and night are equal : the length of the day is then 12 hours ; the

sun is ascending six hours, and descending the same time. This is the case twice a year, in spring and in autumn, when the sun is on the equator. When the sun is in this situation the horizon of every place is divided into two equal parts by the circle bounding light and darkness, generally. The vernal equinox is on 21 March, and marks the beginning of spring; the autumnal is generally on 23 September, which is considered the commencement of au¬ tumn; at all other times the length of the day and of the night are unequal, and their differ¬ ence is the greater the more we approach either pole, and in the same latitude it is everywhere the same. On the equator this inequality en¬ tirely vanishes ; there, during the day, which is equal to the night, the sun always ascends six hours and descends six hours. In the opposite hemisphere of our earth the inequality of the days increases in proportion to the latitude : the days increase there while they diminish with us, and vice versa. The points where the ecliptic intersects the equator are called equi¬ noctial points. The vernal equinoctial point was

formerly at the entrance of the constella¬ tion of Aries; hence the next 30 degrees of the ecliptic, reckoned eastward, have been called Aries ; but this point long ago deserted the constellation of Aries, and now stands in Pisces; for it is found by observation that the equinoctial points, and all the other points of the ecliptic, are continually moving backward or westward ; which retrograde motion of the equinoctial points is what is called the precession of the equinoxes. This retrograde motion is quite analogous to the revolution of a gyroscope weighted at one end and balanced in the middle. It is due to the gravitational pull exerted by the sun and moon on the equa¬ torial protuberances of the earth, which is a spheroid, not a sphere. It appears from the result of calculations that the path of the poles of the equator is nearly a circle, the poles of which coincide with those of the ecliptic, and that the pole will move along that circle so slowly as to accomplish the whole revolution in about 25,800 years. The diameter of this circle is equal to twice the inclination of the ecliptic to the equator, or about 47°. Now, as the ecliptic is a fixed circle in the heavens, but the equator, which must be equidistant from the poles, moves with the poles, therefore the equator must be constantly changing its inter¬ section with the ecliptic. And from the .best observations it appears that the equator cuts the ecliptic every year 50.25″ more to the west¬ ward than it did the year before ; hence the sun's arrival at the equinoctial point precedes its arrival at the same fixed point of the heavens every year by 20 minutes 23 seconds of time, or by an arc of 50.25". Thus, by little and little, these equinoctial points will cut the ecliptic more and more to the westward, till, after 25,800 years, they return to the same point. The pre¬ cession of the equinoxes is not absolutely uni¬ form, for the forces inducing the precession de¬ pend on the position of the sun and moon with reference to the earth. Thus at the vernal and autumnal equinoxes the sun is in the plane of the equator, and can cause no precession. Another important factor in causing the pre¬ cession to vary is the fact that the plane of the moon's orbit is somewhat inclined to the eclip¬ tic. Besides causing the component of the

moon's attraction in the plane of the ecliptic to vary, this inclination introduces a component perpendicular thereto. This is an important factor in causing the path of the pole of the equator to be a wavy curve rather than a pre¬ cise circle. This wavy motion is known as nutation. See Day; Ecliptic; Equator; Gyroscope.

EQUINOXES, Precession of the, the

motion of the equinoxes along the ecliptic due to the change in the direction of the earth's axis of rotation, caused by the attraction of the moon and sun on the protuberant equatorial ring of the earth. See Equinox.

EQUISETUM. See Equisetales under Ferns and Fern Allies.

EQUITES, ek'wi-tez. See Equestrian Order.

EQUITY. The name equity was given to that supplemental law which was formerly administered exclusively in the Chancery Courts of England, and which was designed to work out substantial justice in cases where that could not be obtained normally in the common law courts. The common law became very strict and narrow at a very early period, and if a suitor could not bring his case in such a form as to fall within one of the recognized writs, he was without a remedy. For example, the common law courts had no provision for the preventing of wrongs, however imminent they might be. Here the Chancery Court could step in, and by injunction against the person threatening a wrong, cover this con¬ tingency. A body of law subsidiary to the common law therefore arose, whose administra¬ tion was in the hands of the Chancellor (q.v.). Hence arose the curiosity presented for an extended period in English legal history, in which a suitor's chances of success depended largely upon the particular court in which he brought his action. The existence of this body of law led ultimately to scandals and vexatious delays ; the rules of equity varied at different periods, depending a good deal upon the per¬ sonal idiosyncrasies of the Lord Chancellor for the time being, and justifying Selden's sneer, that <(they should make the standard for equity the Chancellor's foot.® Between the 17th century and the beginning of the 19th cen¬ tury, however, equity became almost as fixed as the common law, but the systems were always kept distinct until the passing of the Judicature Acts of 1873 and 1875, under which they were consolidated. Since 1875 law and equity have been administered equally to all the divisions of the High Court of Justice, and if there is any conflict between the rules of law and equity, those of equity are to prevail.

After the Revolution, the States of the American Union continued the English system ; but while some of them have kept strictly to that system and have distinct courts of law and of equity, other States have law and equity administered by the same judges and courts, at one time sitting as courts of law and at another time as courts of equity.

Some^ of the rules and maxims of equity are : <(Equity considers that as done which ought to be done.® ((Equity acts in personam .» (

the law will prevail.® ((Nd right without a remedy.® ((When a court of

equity has once acquired jurisdiction of a cause it will continue to act until the matter is finally disposed of.®

Equity is divided into three great classes or divisions: Equitable titles, equitable rights

and equitable remedies. Equitable titles are those which are recognized only by a court of equity, as where, when a person gave a value for a chose in action which was assigned to him, the assignment was not recognized at law, as it would violate the rules against champerty and maintenance, but equity allows the assignee to bring suit in the name of the assignor. Equitable rights arise where a guardian enters into a transaction with his former ward a very short time after the ward has obtained his majority. If within a reasonable time the ward returns what he received from the guardian the guardian will, in equity, be compelled to return the property to the ward. Equitable remedies arise in those cases in which the law recognizes a right but cannot enforce it, as where a contract is made for the sale of a piece of property, if the seller refuses to con¬ vey, the purchaser's remedy at law is for damages for breach of the contract; but in equity the court will decree specific perform¬ ance. Generally this applies only to real estate, because if it is personal property, after the damages are recovered other personal property of the same kind can be purchased; but if the personal property is of such nature that it cannot be duplicated, such as a painting by a particular artist, equity will affirm relief in the way of specific performance.

Suits in equity are commenced by a bill or petition. The bill may be amended, or, if the proceeding have gone too far for that, a sup¬ plemental bill may be filed. The defense is by demurrer, plea or answer. The judgment of the court is called a decree, and the relief granted is such as to affect all the parties, and is adapted to the facts and circumstances of that particular case. The general rules of evi¬ dence are the same as in a proceeding at law, but the answer to the bill, if made under oath, is evidence for the defendant in so far as it is responsive to the bill.

Consult Kerly, D. M., (Historical Sketch of the Equity Jurisdiction of the Court of Chancery) (London 1890) ; Pomeroy, J. N., (Equity Jurisprudence as Administered in the United States) (3d ed. San Francisco 1905) ; Spence, G., (Equity Jurisdiction of the Courts of Chancery } (2 vols. London 1846-49).

EQUITY, Courts of. See Court.

EQUITY OF REDEMPTION. The right, enforceable in equity, of a mortgagor to re¬ deem the mortgaged property, even after for¬ feiture, by

paying the debt with interest and costs. This right is barred only by strict foreclosure proceedings or by one of the vari¬ ous statutory procedures provided for the pur¬ pose, or by the mortgagee taking possession of the property after forfeiture and holding it for the period required by the statute of limita¬ tions. The term is also applied to the. interest or estate remaining in the mortgagor in prop¬ erty he has mortgaged. See Chancery ; Equity; Forfeiture; Mortgage; Redemption.

EQUIVALENT, having equal value, power, area or volume. In chemistry, (1) vol. 10 — 30

atomic weight. (2) The equivalent of a base is the number of grams of it which will neu¬ tralize one gram-molecule of a monobasic acid. The equivalent of an acid is the number of grams of it which will neutralize one gram- molecule of caustic potash or soda. See Chemistry.

EQUULEUS, e-kwoo'le-us, in astronomy ((

ERA, the largest unit of geologic time. According to United States Geological Survey usage, all geologic time is divided into the fol¬ lowing eras, beginning with the oldest: Pro¬ terozoic, Palaeozoic, Mesozoic, and Cenozoic. By some authorities one and sometimes two other eras are recognized. The earlier part of the Proterozoic is split off under the name Archeozoic or Azoic, and to its latter divisions is given the name Proterozoic or Eozoic. The latter part of the Cenozoic is also sometimes split off to form the Psychozoic. But these names are not generally recognized, and the official classification is into the four eras first given. These divisions are in part based on palaeontologic evidence, that is on changes in fossil form, and in part on structural con¬ siderations. With few exceptions there is unconformity (q.v.) between the Proterozoic and the Palaeozoic. The close of the Palaeozoic is marked by the folding of the Appalachian Mountains and the close of the Mesozoic by the Rocky Mountain uplift. See Chronology;

‘ Epoch ; Proterozoic ; Palaeozoic, etc.

ERA OF GOOD FEELING, 1817-24. In American political history, Monroe’s two ad¬ ministrations, up to the canvass for his suc¬ cessor. There were practically no issues, and but one party. The issue on which the Fed¬ eralist party was founded had long since been appropriated by the Democrats, and it had foolishly taken theirs in exchange. The em¬ bargo and the war had created a sectional issue ; but peace ended that and left no pretext for division. The Hartford Convention (q.v.) had killed the old leaders politically; the new ones had joined the Democrats, because the embargo and the war had driven New England capital from commerce into

manufactures, and it wished to demand tariff favors from the administration. But it was a decade before the tariff and internal improvements, the next divi¬ sion lines, assumed theoretic consistency. Monroe issued an inaugural in 1817 especially to placate the Federalist; and followed it by a tour through New England where he was received with immense ovations from both parties. He was unanimously re-elected in 1820, save for the whim of one elector. The personal factions which contested the field in 1824, the coalition (q.v.) which decided the result, and the Jacksonians' fury over it, ef¬ fectually ended the good feeling.

ERAGROSTIS, a large genus of the grasses, belonging to the festucece. There are over 100 species of the Eragrostis, of which there are in America about 30, either native

or naturalized. The species are from a few inches to several feet in height, and are found in nearly all parts of the United States. None are of commercial importance, and such as are used for hay are accidental growths among cultivated grasses. The strong scented Era- grostis (£. major), is an ill-smelling grass, but tall, erect and rather handsome, owing to the shape and size of its leaves. It is found in almost every part of the United States and On¬ tario, naturalized from Europe.

ERAN, Eranian. See Iran, Iranian.

ERARD, a-rar, Sebastien, French musical instrument maker: b. Strassburg 5 April 1752; d. Passy, near Paris, 5 Aug. 1831. He went to Paris at 18, and with his brother, Jean Bap¬ tiste, produced pianofortes so superior to any previously made in France that his fame quickly spread, and orders flowed in upon him from all quarters. During the Revolution he went to England and established a manufactory in Lon¬ don, and when peace was restored his life was passed between that city and Paris. His im¬ provements upon the harp, more especially that of the double movement, the principle of which he afterwards communicated to the piano, en¬ titled him to high merit as an inventor.

ERAS, a'ras, Wolfgang, German econo¬ mist : b. Schonfeld, 1843 ; d. 1892. He received his education at the universities of Leipzig, Jena and Berlin. In 1866-70 he served as secre¬ tary to the Rhenish-Westphalian Industrial As¬ sociation and from 1871 to 1886 was recorder of the Chamber of Commerce at Breslau. After 1886 he was secretary of records of the Silesian Textile Manufacturers' Association. He pub¬ lished (Der

WahrungsstreiD (1883) ; (Einrich- tungen f fir die Binnenschiffahrt an deutschen und hollandischen Handelsplatzen) (1885) ; (Unser Handel mit den BalkanlandenP (1891). He edited the Jahrbuch fiir V olkswirtschaft in

1868-69.

ERASISTRATUS, er-a-sis'tra-tus, Greek physician. He lived in the 3d century before the Christian era, was the court physician to Seleucus Nicator, king of Syria, and rendered himself famous by the sagacity with which he discovered the malady of Antiochus, the king's son. He subsequently went to Alexandria, where he devoted himself to the study of anat¬ omy. He was the first who systematically dis¬ sected the human body, and his description of the brain and nerves is much more exact than any given by his predecessors. He classified the nerves into nerves of sensation and of locomotion, and it is said had almost stumbled upon the discovery of the circulation of the blood, for he explained that the veins and the arteries had their origin in the motion of the heart. He was remarkably adverse to blood¬ letting and the giving of purgatives, relying chiefly upon diet and regimen, bathing, exercise, friction and the most simple articles of the vegetable kingdom, for the restoration and preservation of health. His professional fol¬ lowers, a body of physicians of note, were known as Erasistrateans. He wrote several works on anatomy, practical medicine and pharmacy, of which only the titles remain, to¬ gether with a great number of short fragments preserved by Galen and other ancient medical writers. Consult Fuchs, (De Erasistrato Capila

Selectaˆ (in (Hermes, > Vol. XXIX, Berlin 1894) ; Hieronymus, (Erasistrati et Erastitrat- eorum HistoruP (Jena 1790) ; Susemihl, (Ge- schichte der griechischen Litteratur-* (Vol. I, Leipzig 1892).

ERASMUS, e-raz'mus, Saint, Syrian bishop and martyr. He is said to have been put to death under Diocletian by disemboweling, and his martyrdom is frequently represented in art. As he was counted as one of the 14 Succorers of the Distressed, so was his aid especially in¬ voked in affections of the stomach. The re¬ maining 13 Succorers are Saints Acasius, Blasius, Christopher, Cyriacus, Dionysius the Areopagite, Egidius, Eustathius, George the Martyr, Pantaleon, Vitus, Barbara, Catharine and Margaret. June 2 is the saint's day of Erasmus. On the capture of Formiae (the reputed scene of the martyrdom of Erasmus in the 3d century), by the Saracens in 842, the body of the saint, or what was popularly be¬ lieved to be his, was removed to Cajeta.

ERASMUS, Desiderius, Dutch scholar : b. Rotterdam, probably 28 Oct. 1467 ; d. Basel, Switzerland, 12 July 1536. He was the illegiti¬ mate son of one Gerhard of Gouda. The name by which he is known is merely the

Latin and Greek rendering of Gerhard, Desiderius, the Latin, and Erasmus, or, more correctly, Eras- mius, the Greek equivalent. He was a singing- boy in the cathedral of Utrecht till his ninth year, then entered the school at Deventer, where he displayed such brilliant powers that it was predicted that he would be the most learned man of his time. At the age of 17 he assumed the monastic habit near Gouda, but the bishop of Cambrai delivered him from this constraint by taking him as a Latin secretary. In 1492 he was ordained, and went to Paris to perfect himself in theology and polite literature, and there became the instructor of several rich Englishmen, from one of whom — Lord Mont- joy — he received a pension for life. He ac¬ companied them to England in 1497, where he was graciously received by the king. He re¬ turned soon after to Paris, and then traveled into Italy to increase his stock of knowledge. He now asked a dispensation from the vows of his order, which the Pope granted him. He visited Venice, Padua and Rome; taught at Louvain 1502-04; but brilliant as were the offers here made him, he preferred the in¬ vitation of his friends in England. When he visited the lord-chancellor, Sir Thomas More (1506), without making himself known to him, the chancellor was so delighted with his con¬ versation that he exclaimed, ((You are either Erasmus or the devil.® He made his third visit to England in 1509. He was offered a benefice, but was unwilling to fetter himself by an office of this kind. He was for a short time pro¬ fessor of divinity and Greek at Oxford. He afterward traveled through Germany and the Netherlands, and went to Basel, where he had his works printed by Froben and acted as gen¬ eral adviser of Froben's presses, which he raised to be the most important in Europe.

To profound and extensive learning Erasmus joined a refined taste and a delicate wit. Naturally fond of tranquillity and independence, he preferred the pleasure of literary ease and retirement to the pomp of high life. All through life he suffered from a bad stomach;

he could not eat nor bear the smell of fish; as he humorously put it> "his heart was Catho¬ lic, but his stomach was Lutheran.® For a man of a detached and inquiring mind like his, partisanship was impossible; but he wished to see the power of the clergy broken as the main obstacle to the spread of liberal ideas. But he recoiled from the fanaticism which accompa¬ nied the Reformation, and had no sympathy with the evangelicism to which it gave birth. Indeed theological disputation had no attrac¬ tions for him, although it has been said of him that he laid the egg which Luther hatched. Luther spoke for the low-born ; Erasmus for the

more cultured class. He implies that the revelation of religion has added nothing to life that makes it worth living. The incisive way in which he handled the religious abuses of his time prepared men's minds for Luther's work, and he was also free and outspoken in his criticism of the treatment meted out by kings to their subjects. The great service he rendered was in fighting the battle of sound learning and plain common sense against ob¬ scurantism, and in emphasizing the sover¬ eign place of reason as the ultimate guide in all questions, religious and political not ex¬ cepted. Besides his editions of various classics, the first edition of the Greek Testament from MSS. (with Latin translation), and his other philological and theological writings, may be only mentioned his well-known book in praise of folly, (Encomium Moriae, and his (Collo- quies) (1519). His letters are very valuable in reference to the history of that period. (See Colloquies of Erasmus ; Praise of Folly, The). Consult (Lives) by Knight (1726) ; Jortin (1748) ; Burigny (1752) ; Durand de Laur (1874); Feugere (1874); Drummond (1873) ; Froude (1894).*

ERASMUS MONTANUS, comedy in five acts by Holberg; translated by O. J. Campbell and F. Schenck. It was written before 1723 but not produced till 1747. It did not at once score such a success as many of his other comedies. Now, however, it is considered not only to be an excellent picture of the times, but it has its value for all times as showing the contrast in life between appearance and reality and also the demand, strong then as now, that the individual seek the truth for its own sake.

Erasmus, the son of a well-to-do peasant, has studied at the university and now is on a visit to his parents in the village, called (The Hill.® As he has tasted of the tree of knowl¬ edge, he wants to show off his great learning, claiming to be able to "prove® in a logical way any assertion, however foolish, he makes. His arrogant ways and hair-splitting methods arouse the antagonism of all. Through the "Lieutenant,® who is Holberg's mouthpiece in the comedy, Erasmus is properly punished, and he is finally compelled to renounce the only true assertion he has made, viz., that the earth is round.

In the leading character, Erasmus Montanus, with his insufferable intellectual conceit, ac¬ quired at the university, Holberg attacks the methods and aims of this seat of learning, ridicules the academic pedantry, the formalism of logic and the Latin disputations as prac¬ tised at the time. Holberg knew that among

the peasants, ignorant though they were and often so sadly neglected, there was a good deal of common sense. In Jacob, Erasmus' brother, Holberg has presented, in a most humorous manner, the contrast to the vain and empty "learning® of the hero. In Peter the deacon, Jesper the bailiff, Jeronimus whose con¬ servatism shrinks in terror from anything that is new, Holberg

shows his mastery in drawing character, and in the scenes in which they figure, the author's humor is at its best. Many sayings in this comedy are common property in the current speech of the Scandinavian countries even to-day. Consult Campbell, (The Comedies of Holberg.)

Gisle Bothne.

ERASTIANS, in England, a name applied to a party that arose in the 17th century, deny¬ ing the right of autonomy to the church — a right neither maintained nor denied by Erastus (q.v.). The Erastian controversy broke out at the time of the Westminster Assembly. The leading Erastians in that assembly were Light- foot and Coleman, who were supported by Selden, Saint John and Whitelocke, three noted lawyers, in the House of Commons. The Eras¬ tians in England would subordinate the govern¬ ment of the Church to the authority of the State, both as regards doctrine and discipline. Since the time of the Reformation the con¬ troversy has been confined chiefly to the Church in Scotland where the term Erastinian has been applied to those denying the power of the Church to nullify the operation of lay patronage. Consult Cunningham, (Historical Theology) (Vol. II, Edinburgh 1862) ; Henson, (English Religion in the Seventeenth Century (London 1903).*

*ERASTUS, Thomas (a Latin translation of his name Liebler or Lieber), German theolo¬ gian and physician : b. Auggen, near Miihlheim, 1524; d. Basel, Switzerland, 1583. He studied theology at Basel (where he Grecized his name), and philosophy and medicine at Bologna and Padua. After nine years in Italy, he was appointed physician to the counts of Henneberg. In 1558 he received an invitation to go to the court of the Elector Palatine, and accepted it. There he became first physician and Privy Councilor and professor of medicine at Heidel¬ berg. He removed from Heidelberg to fill the chair of medicine at Basel in 1580. Shortly before his death he had been appointed profes¬ sor of ethics. Erastus was a skilful physician and a man of upright character, an equally vigorous writer against "the new medicine of Philip Paracelsus® (1572) holding that the only true road to knowledge is to be found in ex¬ perimental investigation, and not in astrology, magic and other obsolete practices. In theology he was a follower of Zwingli, and his fame now rests on his strenuous opposition to Calvinist discipline and Presbyterian order. In 1564 he maintained the Zwinglian doctrine of the Lord's Supper at the conference of Maulbronn, and it was in defense of it that he wrote Worn Verstand der Wort Christi "Das ist Mein Leib® * (1565). Erastus was excommunicated on a false suspicion of heresy, founded on a correspondence with Unitarians of Transyl¬ vania, but was restored in 1575. His chief work is a treatise on excommunication entitled (Ex- plicatio gravissitnae quaestionis utrum Excom-*

municatio mandato nitatur divino, an excogitata sit ab hominibus. This was answered by Beza in his (De vera Excommunicatione et Christi- ano Presbyterio* (1590). Erastus maintained that no member of the church should be ex¬ cluded from her communion as a punishment for sin. Punishment is ((the special duty and office® of the civil magistrate. Consult Bon¬ nard, (Thomas Eraste et la discipline ecclesi- astique) (1894) ; Lee, (The Theses of Erastus Touching Excommunication > (Edinburgh 1844). See Erastians.*

ERATO, er'a-to (Gr. erao, I love), one of the nine Muses, whose name signifies loving, or lovely. She presides over lyric and especially amatory poetry, the songs of lovers, and touches, as Ovid, in his (Art of Love, informs us, the hearts of the coldest maidens by her tender lays. She is represented as crowned with roses and myrtle, in the act of playing, the plectrum in her right hand and the lyre in her left.*

In zoology erato is a genus of cowries be¬ longing to the family of cypraeidae. (See Muses.) Erato is also the name of one of the planetoids.

ERATOSTHENES, er-a-tos'the-nez, Greek astronomer, geographer and philosopher: b. Cyrene, Africa, 276 b.c. ; d. about 196 b.c. He studied in his native town and Alexandria and then went to Athens. He became librarian at Alexandria, and improved the science of mathe¬ matical geography, which he reduced to sys¬ tem ; but he gained his greatest renown by his investigations of the size of the earth, his esti¬ mate of the circumference of which was sur¬ prisingly near the truth. He wrote also on chronology, grammar, philosophy, literature, history and the drama, and was considered no mean poet. He rendered much service to as¬ tronomy and first observed the obliquity of the ecliptic. He is said to have starved himself to death after becoming blind. The extant frag¬ ments of his writings were collected by Bern- hardy in his

His commentary on (Timaeus) (of Plato) seems to have been highly valued in his day, and his philosophical dialogues became, as they were intended, popular. His (On the Old Comedy, which treated of the foremost comic poets in 12 or more books, was looked upon as a really great work. In it he dealt with the works of the poets and the general life and management of the theatre. He may be said to have been the father of exact chronology since he endeavored to ascertain the dates of the principal events in history, politics and lit¬ erature from the fall of Troy to his own day. In his (Katasterismoi* he deals, in an interest¬ ing manner, with the relation*

existing between the popular Greek mythology and the constella¬ tions. In his Geography, issued in three books, he made the first known attempt to treat the subject scientifically, historically and ex¬ perimentally. He wrote two books on mathe¬ matics, which have not survived him, and he worked out' a (*

Bibliography. — Berger, (Die geographischen Fragmente des Eratosthenis) (Leipzig 1870) ; Bernhardy, (Berlin 1822) ;

Christ-Schmidt, (Geschichte der griechischen Litteratur) (Munich 1911) ; Hillier, (Eratosthe- nis Carminum Reliquae (Leipzig 1872) ; Maass, (Eratosthenica) (Berlin 1883) ; Olivieri, ˆseudo-Eratosthenis Catasterismi* (in Mytho- graphi Graeci* III, Leipzig 1897) ; Robert, (Eratosthenis Casasterismorum Reliquiae (Ber¬ lin 1878) ; Schaubach, (Katasterismoi* (1795) ; Seidel, Geographical Fragments of Eratos- thenes) (1799); Stiehle, (Zu den Fragmenten des Eratosthenes> (in Philologus, supplement¬ ary, Vol. 2, Gottingen 1863) ; Susemihl, Ges- chichte der griechischen Litteratur an der Alexandrinerzeit* (Leipzig 1892).*

ERAUZO, a-row'tho, Catalina de, Spanish- Amerlcan heroine : b. San Sebastian, Viscaya, 10 Feb. 1585; d. Cuitaxtla, near Orizaba, Mexico, 1650. The daughter of a good family of Biscay, she was placed at an early age in a Dominican convent of her native city with a view to entering on a religious state. Soon she attracted attention by her originality of character and her passionate love of liberty. In consequence of a dispute with one of her superiors, Catalina, on 18 May 1607, being then a novice, she scaled the walls and escaped to the woods, where, subsisting on herbs and roots, she remained three days and in that time trans¬ formed her garb into that of a man. Pro¬ ceeding to Vittoria she found employment as an amanuensis. Thereafter she wandered over a great part of Spain, being employed many times in divers occupations usually reserved to the male sex. After some years she embarked on a Spanish vessel bound for America as a mem¬ ber of the crew. On arrival in the New World she deserted and secured employment with a rich merchant, who later made her administrator of his affairs. After many adventures in which she managed successfully to conceal her sex she enlisted as a soldier and won distinction fight¬ ing against the natives, winning the grade of ensign. Her disposition led her into many scrapes, principally duels, in which she was not always victorious. More than once she slew her opponents in duels and in quarrels and twice she was reprieved after sentence of death had been imposed on her. Being gravely wounded in a quarrel at Cuzco, Catalina believed herself to be dying and longed to reveal her sex. She revealed the secret to the priest who visited her. She afterward met Bishop Augustin de Carvajal to whom she related the story of her life, telling him she was willing to submit to examination by a committee of matrons, adding that she still preserved

her purity. It was proved by the matrons that she had spoken the truth. Catalina lived in a convent in 1620-22, then traveled to New Granada, and sailed for Spain, arriving in Cadiz, 1 Nov. 1624. Her fame had preceded her and she was enthusi¬ astically received. In Madrid she was received by Philip IV, who granted her a life pension of 800 crowns. She journeyed to Rome, where she narrated her eventful history to Pope Urban VIII, who gave her permission to dress in male attire for the rest of her life. Returning to Spain she resided in Seville until 1630, when she set out for Mexico, where she served in the army for some years and afterward with a string of pack-mules began trade between Mexico City and Vera Cruz. She was buried at Orizaba. In 1653 the history of her life, written

by herself, was published in Mexico. This autobiography under the editorship of Joaquin Maria Ferrer was issued at Paris in 1829 under the title (Historia de la Monja Alferez, etc., escrita por ella misma con notas y piezas justi- ficativasP

ERB, Wilhelm Heinrich, German neuro¬ pathologist: b. Winnweiler, Bavaria, 1840. He received his education at the universities of Heidelberg, Erlangen and Munich. From 1880 to 1883 he was professor of special pathology and therapy at Leipzig, thereafter removing in the same capacity to the University of Heidel¬ berg, where he was appointed clinical director. He has made extended investigations on electro¬ therapy and neuropathology. His published works include (Handbuch der Krankheiten der peripheren cerebro-spinalen Nerven) (2d ed., 1876) ; (Handbuch der Krankheiten des Riicken- marks und des verlangerten Marks (2d ed., 1878) ; (Handbuch der Elektrotherapie) (Eng¬ lish trans. by Putzel, 1883) ; (Ueber die neuere Entwicklung der Nervenpathologie* (1880); dystrophia Muscularis Progressiva) (1891) ; (Gesammelte Abhandlungen> (1910).*

ERBEN, Hency, American naval officer : b. New York, September 1832; d. 1909. He was graduated at the United States Naval Academy in 1854, became commander in 1868, rear- admiral in 1894, and was retired in the latter year. During the Civil War he served with Admiral Farragut in the Gulf of Mexico and on the Mississippi River with Admiral Dupont, etc. In 1866-69 he was on duty in South America; later, in command of the Tuscarora, he made deep-sea soundings in the Pacific ; afterward commanded the Pensacola in a trip round the world, and in 1891-92 was command¬ ant of the New York Navy Yard and of the European squadron in 1893-94. He voluntarily returned to service in the Spanish-American War.

ERBEN, Karl Jaromir, Czech poet: b. Miletin 1811; d. 1870. He received his educa¬ tion at the University of Prague, was a leading figure in the Czech troubles of 1848 and two years later was appointed secretary of the Museum at Prague and archivist of the town in 1851. In 1855 he published the important his¬ torical work (Regesta Diplomatica nec non Epistolaria Bohemiae et MoravijeP His fame spread through his volume of ballads, (KyticeP and his collections of folksongs and popular melodies. In 1863-65 his 100 Slavic folk tales earned him a reputation similar to that of the Grimm Brothers. He also edited the vernacular works of John Huss. Consult Novak, (Cechische Litteratur der Gegenwart (Leipzig*

1907).

ERBIUM, a rare metallic element, occurring in the form of a tantalate or

silicate in the minerals gadolinite, fergusonite and euxenite, and as a phosphate in the mineral xenotime. It has the chemical symbol Er, or E, and an atomic weight of about 167.7. The oxide of erbium, Er203, has a pale rose color, is infusible, and when strongly heated glows with a bril¬ liant green light. It is not affected by water, but dissolves slowly in hot acids with the for¬ mation of the corresponding erbium salts. Most of the salts are rose-colored and the haloid compounds are also deliquescent. The name

erbium is derived from Ytterby, Sweden, where the mineral gadolinite is found. The recog¬ nition of erbium as a new element is attributed to Mosander (1843), but the metal itself has not yet been isolated.

ERBT, Wilhelm, German biblical scholar: b. Berlin 1876. He was educated at Halle, Greifswald, Leipzig and Wittenberg. He has held several pastorates and taught in various seminaries. His works on Hebrew religion and history has brought him an international repu¬ tation. They include (Die Purimsage in der BibeP (1900) ; Jeremia und seine Zeit (1902) ; (Sicherstellung des Monotheismus) (1903); 'Israel und Juda> (1903); 'Die Ur- geschichte der BibeP (1904) ; 'Die Hebraer* (1906); (1907); 'Hand- buch zum Alten Testament* (1909) ; 'Kirchen- geschichte) (5th ed., 1913) ; (Das Marcusevan- geliunP (1911) ; 'Von Jerusalem nach Rom> (1912) ; Geschichte der Religion in der Alten Welt> (1913).*

ERCILDOUNE, Thomas of. See Rhymer, Thomas.

ERCILLA Y ZUNIGA, ar-thel'yae thoo- nye'ga, Alonzo de, Spanish soldier and epic poet: b. Madrid, 7 Aug. 1533; d. there. 29 Nov. 1594. He was of noble family and was a close friend of the prince who afterward became Philip XI of Spain. His father died when the boy was less than a year old, and his mother, who had charge of the family es¬ tates and who was related to the royal families of several of the European countries, made visits to Germany, Austria, Hungary and other European courts, taking Alonzo with her. She also succeeded in getting him appointed page at the court of Spain. Before he had reached man's estate he had seen much of the court and was one of the most traveled persons in Spain. At the age of 22 Ercilla sailed for South America on the Spanish squadron sent out at the king's command. In 1557 he ac¬ companied the new governor of Chile, Garcia Hurtado e Mendoza, from Panama to Lima. An insurrection breaking out among the Arau- canian Indians of Chile, Ercilla joined an expe¬ dition sent against them. The difficulties the Spaniards had to encounter, the heroic resist¬ ance of the natives, and the multitude of gallant deeds by which the war was signalized, inspired the young and brave Ercilla with the idea of making it the subject of an epic poem, to which he gave the name 'La AraucanaP While on this campaign Ercilla and

a fellow officer, Pineda, were arrested by the commanding officer and condemned to death. They spent the night in the death chapel ; and in the morning their sentence was commuted to imprisonment while the expedition lasted and final banishment from the country. Ercilla recovered his liberty after a short time and frequently distinguished him¬ self for bravery in the remaining part of the campaign. Returning to Spain in 1562, during a two years' journey, he visited Germany for the third time, Hungary, France and Austria. He was knighted and made Duke of Lernia on his return to Spain. In 1575 he went to Italy and was received by the Pope. Later he again visited Germany, became a friend of the Em¬ peror Maximilian and attended his coronation as King of Bavaria. Later he was sent on diplo¬ matic missions by the King of Spain. He seems

to have lost many of his friends and much of his property in his old age. He returned to Spain after having finished the first part of his epic. In 1570 he had married Maria Bazan at Madrid, whose charms and virtues are cele¬ brated by him in various passages of his poem. In 1569 the first 15 cantos of his poem appeared; in 1578 a second part, and in 1590 a third part were added, making in all 37 cantos. The (Arau- cana is an historical epic in the octave measure in which the author confines himself, with the exception of some episodes and a few fictions, to the exact historical course of events. Hence the poem often assumes almost the character of a chronicle. In addition to its poetic merits, which are not few, (La Araucana) is very valu¬ able for the information it gives of the condi¬ tions in the Spanish colonies of America. Ercilla is impartial even to his Indian enemies whom he admires. His literary work is good and his descriptions of times, manners and personages are vivid and bear the stamp of truth. His battle pictures are especially vivid. Consult Barros Arana, (Historia General de Chili } . (Santiago 1884). Lope de Vega has taken from the epic of Ercilla the materials for his piece (Araucana Conquered. J The best editions are those published at Madrid in 1776 and 1876 and 1828. It has been translated into Italian, and twice into French. See Araucana, La; Arau-*

CANIANS.

ERCKMANN-CHATRIAN, erk'man-sha- tre-an', the combined surnames of two French¬ men, natives of Alsace, who collaborated in writing romances. Emile Erckmann : b. Phals- bourg, 20 May 1822 ; d. Luneville, 14 March 1899. Having completed his studies in the com¬ munal college of his native town, he went to Paris in 1842 to study law. Returning to Phals- bourg in

1847 because of a serious illness, he began to turn his attention to romance writing during his convalescence. It was about this time (1848) that he met his collaborateur, Louis Gratien Charles Alexandre Chatrian, b. Soldatenthal, 18 Dec. 1826; d. Rainey, 3 Sept. 1890. Chatrian was a member of an old family of glass-work owners, and it was intended that he should follow the same craft. Instead of doing so, however, he left his native village and became a teacher in Phalsbourg, where he made the acquaintance of Erckmann. For sev¬ eral years the stories produced by this copart¬ nership were published in obscure newspapers, both in Strassburg and Paris, but about 1860 their graphic romances of Alsace in the time of Napoleon I gained a rapid popularity. Their stories, though not possessing any particularly high literary value, were distinguished especially for their sincerity, their striking descriptions and their clever characterizations. Their pub¬ lished works include (1866);

(1869); (Histoire du Plebiscite (1872) ; (Les Deux Freres* (1873) ; (Une Campagne en Kaby- lie) (1874); (Le Brigadier Frederic* (1874); (Hugues le Loup* (1876) ; (Maitre Gaspard Fix) (1876) ; (Souvenirs d'un Ancien Chef de Chantier* (1876); (Contes Vosgiens) (1877); (Le Grand-Pere Lebigre) (1880) ; (Quelques Mots sur L'Esprit Humain> (1880) ; (Les Vieux de la Vieille* (1881); (Le Banni* (1882). Some of these have been collected into groups, in accordance with their contents: (Romans Nationaux) (1867) ; (Contes et Romans Popu- laires) (1867); (Contes et Romans Alsaciens) (1876). They also dramatised successfully some of their novels: (L'Ami Fritz) (1867); (Le Juif Polonais) (1869, known in its English adap¬ tation by L. Lewis as (The Bells* and pro¬ duced with considerable success by Sir Henry Irving) ; (Madame Therese* (1882) ; (Les Deux Freres* (1884, known in its dramatised form as (Les Rantzau*). English translations are avail¬ able of practically all these publications. There are also German translations of many of them and of some of these a collection was made (12 vols., Stuttgart 1882). After Chatrian's death Erckmann wrote a few books alone, none of which, however, achieved much success. In regard to their methods of collaboration it be¬ came known that when the two friends met they elaborated the scheme of a work; then Erck¬ mann wrote it. Chatrian corrected it, and some¬ times put it in the fire. Sometimes Erckmann would even be required by his friend to write his story over three times. Chatrian also acted as business manager, made all contracts and collected all royalties. Shortly before his death a break occurred between the two old friends which led to a law suit, but was finally com¬ promised. (See L'Ami Fritz). Consult Acker, P., (Erckmann-Chatrian) (in La Revue de Paris, Vol. XIX, No. 6, p. 347, Paris 1912) ; Anon., (Erckmann-Chatrian* (in The Bookman, Vol. XL, p. 494, New York 1915) ; Claretie, J., (Erck- mann-Chatrian) (in (Celebrites Contemporaines,* Paris 1883) ; Hinzelin, E., (La*

Verite sur Erck¬ mann -Chatrian (in La Revue , Ser. VI, Vol. LXXXIX, p. 310, Paris 1911); Velde, M. S. van de, (French Fiction of To-day) (2 vols., London 1891).*

ERDˆLYI, er'dal-ye, Janos, Hungarian poet: b. Kapos 1814; d. 1868. In 1848 he be¬ came director of the national theatre at Pest and in the following year was appointed to the chair of philosophy at Sarospatak. He published a collection of popular songs of Hungary to¬ gether with the principal legends entitled (Nepdalok es mondak (3 vols., 1848). In 1851 he published a collection of Hungarian proverbs. His smaller works have been issued in Ger¬ man under the titles (Bahnen und Palmed (1886) and*

ERDMAN ACT. See Arbitration, In¬ dustrial.

ERDMANN, David, German theologian: b. Giistebiese, Brandenburg, 1821 ; d. 1905. He received his education at the University of Ber¬ lin and in 1850 was appointed assistant preacher at the cathedral there. Six years later he was appointed to the chair of theology at Konigsberg. In 1864 he was made superintendent-general of Silesia, and 25 years later he became superior consistorial counselor. In 1900 he retired. His published works include (Lieben und Leiden

der ersten Christen5 (1854) ; (Die Reformation und ihre Martyrer in Italien) (1855) ; (Luther und die Hohenzollern) (2d ed., 1884) ; and a commentary on (Samuel 5 in Lange, (Bibelwerk> (1873). Consult Eberlein, (Aus einem reichen Leben : Blatter der Erinnerung an David Erd-mann) (Berlin 1907).

ERDMANN, Johann Eduard, German phi¬ losopher: b. Wolmar, in Livonia, 13 June 1805; d. Halle, 12 June 1892. He studied theology at the universities of Dorpat and Berlin, com¬ ing there under the influence of Hegel (q.v.). In 1829 he became a clergyman in his native town. In 1832 be returned to Berlin, became a member of the philosophic faculty of the uni¬ versity in 1832, and in 1836 professor extraordi¬ nary of philosophy at the University of Halle, being appointed ordinary professor in 1839. He was one of its best-known and most successful teachers and lecturers. His numerous philosophi¬ cal writings, characterized for the most part by their Hegelian tendencies, were widely read, chiefly because he was brilliantly successful in some of them in his attempt to combine a strictly scientific attitude toward his subject with easy style and clear presentation. His

writings include (Versuch einer Wissenschaft- lichen Darstellung der Geschichte der Neueren Philosophy (3 vols., Leipzig 1834-51) ; (Vorle- sungen fiber Glauben und Wissen, etc.5 (Berlin 1837) ; (Leib und Seele5 (Halle 1837) ; (Natur und Schopfung5 (Leipzig 1840) ; (Grundriss der Psychology (Leipzig 1840) ; (Grundriss der Logik und Metaphysik5 (Halle 1841) ; (Ver- mischte Aufsatze5 (Halle 1846) ; (Philoso- phische Vorlesungen fiber den Staat5 (Halle 1851) ; (Psychologische Briefe) (Leipzig 1851) ; (Vorlesungen fiber Akademisches Leben und Studium5 (Leipzig 1858) ; (Grundriss der Ge¬ schichte der Philosophy (2 vols., Berlin 1865- 67). The last has been translated as (A History of Philosophy5 (W. S. Hough, ed., 3 vols., Lon¬ don 1890). There is also a translation of an¬ other one of his works by B. C. Burt,

ERDMANN, Otto Linne, German chemist: b. Dresden, 11 April 1804; d. Leipzig, 9 Oct. 1869. He studied at the universities of Dresden and Leipzig, first medicine and then chemistry, and was graduated from the latter institution in 1824. In 1825 he began the teaching of chemistry at his alma mater, a profession to which he devoted his entire life and in which he was highly successful, being one of the most brilliant lecturers of his day. In 1827 he be¬ came an extraordinary professor and in 1830 was given the chair of technical chemistry which he occupied until his death. He also acted as rector of the university at various times, notably so in 1848-49 when he managed by his great tact to steer the university un¬ harmed through the troublous times of the German revolution. With the exception of a few years devoted to travel he spent practi¬ cally his entire life in Leipzig, taking a deep

interest in art and its public affairs. As early as 1835 he was elected a director of the Leip- zig-Dresden Railway, the first important Ger¬ man railway, for the development of which he did much and in whose affairs he was actively interested throughout his life. His chief claim to fame, however, rests on his chemical re¬ searches which embraced a wide range of sub¬ jects. He examined minutely the technology of nickel, and described some of its compounds ; analyzed a number of minerals and slags, and experimented on several other points of inor¬ ganic chemistry. In inorganic chemistry his chief research is upon indigo, in the course of which he discovered isatin. His work in this direction formed the principal foundation of most of the wonderful later discoveries in con¬ nection with indigo. The most important work in which he engaged was the exact determina¬ tion of atomic weights. In company with Marchand (q.v.) he made determinations of oxygen, carbon, hydrogen, sulphur, calcium, copper, mercury and some others, and his num¬ bers have been fully confirmed by subsequent experimenters. In 1828 he founded and from then on conducted the Journal fiir Technische und Okonomische Chemie, of which 18 volumes were published. In 1833 its title was changed to Journal

für Praktische Chemie. After his death it was continued by others and is still one of the most important scientific pub¬ lications of its kind; the name Erdmann con¬ tinues to be used in connection with the pub¬ lication to this day. He also published in 1828 (Lehrbuch der Chemie5 which has since then gone through a number of editions. Of his (Grundriss der Allgemeinen Waarenkunde, etc.,5 the 15th revised edition was edited by E. Remenovsky (Leipzig 1915). Of note is also (Uber das Studium der Chemie) (Leipzig 1861). Consult Berichte der Deutschen Chem- ischen Gesellschaft (Vol. Ill, p. 374, Berlin 1870) ; Journal of the Chemical Society of Lon¬ don (Vol. XXIII, p. 306, London 1870).

EREBUS, in Greek mythology, the son of Chaos and Darkness. He married his sister, Night, and was the father of the Light and Day. The Moirae, or Fates, by some are called his daughters. He was transformed into a river, and plunged into Tartarus, because he aided the Titans. From him the name Erebus was given to the infernal regions, particularly that part of it designated as the abode of virtuous shades, whence they pass over immediately to the Elysian fields. Consult Hesiod, (Theogony) (Schoemann ed., Berlin 1868).

EREBUS, Mount, an active volcano on the east coast of South Victoria Land, in lat. 78° 10′ S., rising over 13,000 feet above the sea. It was discovered in 1841 by Ross, who named it after one of his vessels. His progress further south was barred by a wall of ice. In more recent times its vicinity has served as winter quarters to the Antarctic expeditions of Capt. R. F. Scott (1901-04) and of Sir E. H. Shackle- ton (1907-09) and as a result it has become one of the best-known and most thoroughly investigated regions of the Antarctic. During Shackleton's expedition an ascent was made in March 1908. Consult Scott, R. F., (The Voyage of the Discovery5 (2 vols. London 1905) ; Shackleton, E. H., (The Heart of the Ant¬ arctic5 (2 vols. London 1909) ; Zimmermann,

M., (La Terre Antarctique de Victoriaˆ (in Annales de Geographic, Vol. XVIII, No. 98, p 97, Paris 1909).

EREC AND ENID, a metrical romance dealing with the adventures and love of one of the knights of King Arthur. The author is Chrestien de Troyes.

ERECH, e'rek, an ancient city of Baby¬ lonia, on the site of the modern Warka. It was of great extent and of high commercial importance in the Parthian period. Recent ex¬ cavations have brought much to light

regarding its shrines and ruling dynasties. It appears to have been the seat of at least two principal dynasties. Marduk is said to have been its founder according to Assyrian and Babylonian records where the city is often mentioned. Documents dating from the period 721-710 b.c. have recently been discovered. The city con¬ tained a famous temple of Nana. (See Babylonia). Consult Loftus, (Travels and Researches in Chaldea and Susiana, with an Account of the Excavations at Warka5 (Lon¬ don 1857), and Meyer, E., (Geschichte des Altertums) (3d ed., Berlin 1913).

ERECHTHEUM, e-rek-the'um, the temple of Erechtheus (q.v.) on the north side of the Acropolis (q.v.) at Athens. It was built in honor of Athena, Poseidon and Zeus. The name of Erechtheus is associated, as a local hero or demigod, with that of Athena. In this temple was preserved the oldest existing statue of Athena, which was supposed to have fallen from heaven and the sacred olive-tree created by Athena as a gift to the city, of which she is worshipped at Athena Polias, the protector of the town and state. The building is one of the finest remaining examples of Greek archi¬ tecture, having been rebuilt after the Pelopon¬ nesian War in pure Ionic style after the original building had been destroyed. Its ground plan is unusual, resulting from the union under one roof of three separate chapels, or halls of wor¬ ship. The porch of the caryatides is one of its distinguishing features. In this porch the place of columns is taken by colossal figures of women whose heads support the capitals on which the entablature rests. The Erechtheum was described in considerable detail by Pausanias. It is one of the best preserved build¬ ings on the Acropolis, in spite of the hard usage to which it was put by the Turks and other invaders. In comparatively recent times it has been restored to some extent, not entirely with pleasing results. Consult Carroll, M., ed., (The Attica of Pausanias) (New York 1907) ; Fer- gusson, J., (The Erechtheum5 (in Transactions of the Royal Institute of British Architects, London 1875-76) ; Fowler, H. N., (The Erechtheion at Athens 5 (in Papers, Archce- ological Institute of America, American School of Classical Studies at Athens, Vol. I, 1882-83, p. 213, Boston 1885) ; Frazer, J. G., trans., (Pausanias's Description of Greece5 (6 vols., London 1898) ; Frickenhaus, A., and Washburn, O. M., (The Building Inscriptions of the Erechtheum5 (in American Journal of Archceology, Ser. II, Vol. X, p. 1, Norwood 1906) ; Gale, E., (The Erechtheum5 (in Archi¬ tectural Record, Vol. XII, p. 498, New York 1902) ; Gardner, E. A., (Ancient Athens5 (New York 1907) ; Inwood, H. W., (The Erechtheion at Athens5 (London 1827) ; Kolbe, W., (Die

Bauurkunde des Erechtheion vom Jahre 4085 (in Kaiserlich-Deutschcs Archceologisches Insti- tut, Mittheilungen, Athenische Abtheilung, Vol. XXVI, p. 223, Athens 1901) ; Leopold, J., XII, p. 1, London 1891) ; Stevens, G. P., (The Restoration of the Erechtheum5 (in Putnam's Monthly,

Vol. I, p. 66, New York 1906) ; Stuart, J., and Revett, N., (The Antiquities of Athens5 (London 1837) ; Thiersch, F., (Uber das Erechtheum, etc.5 (in Koniglich-Bayerische Akademie der IVissen- schaften, Abhandlungen, Philosophisch-Phi- lologische Klasse, Vols. V-VI, Munich 1849-52) ; Weller, C. H., (Athens and its Monuments5 (New York 1913).

ERECHTHEUS, e-rek'thus, or ERICH- THONIUS, Attic hero or demigod, worshipped in the earliest period of Athenian history. He was brought up by Athena, who placed him while yet a babe in a chest, which was en¬ trusted to Agraulo., Pandrosos and Herse, the daughters of Cecrops, with the strict charge that it was not to be opened. Unable to restrain their curiosity, they opened the chest and discovering a child entwined with serpents, were punished with frenzy and threw them¬ selves down the most precipitous part of the Acropolis. Afterward Erechtheus was the chief means of establishing the worship of Athena in Attica, where he instituted the Panathenaea in her honor. He was a god of agriculture and had a joint temple with Athena on the Acropolis. His connection with the serpent is probably that common to the culture gods. Consult Farnell, (Cults of the Greek States5 (Oxford 1896) ; Frazer, (Pausanias5 (London 1913). See Erechtheum.

EREGLI, a-ra'gle, Turkey (the ancient Heracleia Pontica), a seaport town of the Kastamuni vilayet, 125 miles east of Constan¬ tinople, on the Black Sea. Coal is mined in the neighborhood and shipped at this point, about 750,000 tons being the annual output. The harbor is known as Zoungundalk. Pre¬ vious to the war of 1914 French capitalists held a controlling interest in the coal mines of the district. Pop. 6,500.

EREMACAUSIS, er'e-ma-ka'sis, slow com¬ bustion (from Greek erema, gently, and kausis, burning), a term employed by Liebig to denote the gradual combination of the constituents of a combustible substance with the oxygen of the air.

EREMIT VON GAUTING, a're-met fon gow'ting. See Hallberg-Broich, Theodor M. H.

EREMITA, Johannes. See Cassianus.

EREMITES (er'e-mits) OF SAINT FRANCIS, and EREMITES OF SAINT JEROME, two religious orders of the Roman Catholic Church. The order of the Eremites of Saint Francis de Paula was founded by Francis, a native of Paula, in Calabria, 1436, and had there its first house. It received the approval of the Holy See 1474; it is properly styled Order of Minim Hermits of Saint Francis de Paula (Ordo Minimorum Eremitarum Sancti Francisci de Paula). Their founder chose the name

"Minims" (minimi, least, smallest to keep the brethren ever in mind of the Christian humility to which they were vowed. The order of Eremites of Saint Jerome, styled also Hierony- mites, con isted originally of hermits, but they adopted the cenobite rule of Saint Austin with the approval of Gregory XI, 1373. This order was confined to the Spanish Peninsula.

ERETRIA, Greece, an ancient Ionic trading and colonizing town on the southwest coast of Euboea, which was destroyed by the Persians in 490 b.c., and rebuilt by the Athenians. The recent excavations and . explorations made by the American School at Athens (1890-95) and the Greek Archaeological Society have resulted in finding the theatre and old temple and many other buildings, together with remains of pre- Persian times. Eretria was the home of the Menedeum philosophy. Consult any good his¬ tory of ancient Greece; (Papers of the American School at Athens. }

ERFURT, er'foort, Germany, (1) town in the Prussian province of Saxony, formerly the capital of Thuringia, and a fortress till 1873, situated on the river Gera, about 13 miles west of Weimar. (In the 1 5th and 16th cen¬ turies Erfurt was a flourishing commerical and manufacturing place, but its university made it one of the most famous of German cities. The university, established in 1378, was suppressed in 1816. Its trade and manufactures have rapidly increased in recent times along with its population. The most characteristic industry is that of flower-growing, plants and seed being exported in enormous quantities to almost all parts of the world. The most important edifice is the cathedral. The large bell called Maria gloriosa, made of the finest bell-metal and weighing 275 hundredweight, hangs in one of the towers. The cell in which Luther lived while an Augustinian monk, from 1505 to 1512, containing his Bible, portrait, etc., was in the Martinsstift or orphan-house into which the old Augustinian convent had been converted, but was destroyed by fire, along with the relics of Luther, in 1872. According to tradition Erfurt was founded as early as the 6th century, by a certain Erpes. It was not a free Imperial city, but always maintained a sort of independence. Saint Boniface established here an episcopal see. In 1483 it concluded a treaty with Saxony, by which it agreed to pay an annual sum for pro¬ tection. In the 17th century the Elector of Mainz obtained possession of it. The Congress of Erfurt (September-October 1808) was at¬ tended by Napoleon, Alexander of Russia, and many German sovereigns. In 1813 the town was taken by the Prussians, after a severe bom¬ bardment. In 1814 it was granted to Prussia by the Congress of Vienna. Pop. 111,463. (2) The government of Erfurt of

which it is the capital has an area of 1,364 square miles. Pop.

530,775.

ERG (Gr. "work"), in physics, the unit of work in t e centimeter-gram-second system. It is the work done in overcoming a force of one dyne, through a distance of one centimeter. See Units of Measurement.

ERGASTERIA. See Laurion.

ERGOGRAPH, The, a machine for testing a child's capacity for study and which shows the degree of fatigue that is experienced by pupils.

Its operation is based on the fac. that the fatigue of a set of muscles, if accurately meas¬ ured, will show the extent of the general weariness. The physical deterioration of many school children has been a source of anxiety to both physicians and instructors; if by means of this instrument the exact power of endurance of each pupil can be demonstrated, the course of study can be so arranged as to suit different temperaments and so lessen the mental strain. Also a machine for registering the exact effort made in any feat of strength, testing the com¬ parative and relative strength of various sets of muscles.

ERGOT, er'got, according to the United States Pharmacopoeia, "is the sclerotium of the fungus Claviceps purpurea replacing the seed of the rye." Thus the Pharmacopoeia calls for a certain definite kind of ergot for medicinal use ; but there are a number of allied species of para¬ sitic fungi that infest not only the rye, but a number of other grasses ; other species of the same genus (Claviceps) , and other genera. Both the botanical and physiological relation¬ ships of these forms are close. The ordinary ergot of commerce consists of purplish grain¬ like masses, one-half to three-quarters of an inch long and one-eighth to one-quarter of an inch wide, and somewhat resembling large grains of rye. Microscopically the ergot is made up of the closely matted mycelium of the fungus, which has entirely replaced the cells of the seed.

The fungus is propagated by means of mi¬ nute spores. These are blown about by the wind, or carried about by insects and lodge upon rye or other grasses. They there ger¬ minate and form a more or less viscid yellowish mass filled with spores of another type, the conidia. These in turn may be carried by in¬ sects to other grasses. As the fungus grows and, little by little, replaces the tissue in the grain, there results a brownish to blackish mass which in different species assumes differ¬ ent shapes. These are collected with the differ¬ ent grasses and may be the cause of various types of poisoning in cattle. The fungus grow¬ ing on rye constitutes the ergot of

commerce, which has been used in medicine for many years. The principal sources of ergot at the present time are Spain and Russia.

Chemically considered, ergot is an extremely complex body and it cannot be said that even at the present time a full knowledge of its com¬ position has been gained. It contains large quantities of an inert fixed oil, a resin and one or two active principles which, from the earliest chemical investigation to the present, have been called by no less than 50 or 60 differ¬ ent names, among these being ergotine, ecboline, ergotin, cornutine, sphacelic acid, ergotic acid, etc. The unsatisfactory condition of organic drug analysis accounts for these varying re¬ sults and confusions. The investigations of Kobert (1890) and his students are the first of real merit, and Kobert isolated a body cor¬ nutine to which he ascribed the chief activity of ergot. More recently, however, Jacobi, a student of Schmiedeberg, has isolated two bodies, sphacelotoxin and chrystoxin which are, he claims, the active principles.

Taken internally, ergot has the singular power of stimulating an involuntary muscle,

causing it to contract. In this manner it pro¬ duces a number of reactions on those organs which are rich in this type of muscular fibre. Acting on the heart and blood vessels, it con¬ tracts the cardiac muscle and the arterial walls, causing. an increase in the force of the heart's contraction and a marked rise in the blood- pressure. It also stimulates the unstriped mus¬ cular tissue of the stomach and intestines, oc¬ casionally causing purging with violent peristal¬ sis. The organ in the body containing the greatest amount of unstriped muscular tissue is the uterus and naturally the action of ergot would be most forcibly manifested in this organ. It here causes contractions, the uterus becoming hard and pale and forces the blood out of the uterine blood vessels. During pregnancy the action is much more pronounced, since the uterus is so much more dilated. Ergot has many applications in medicine, but its chief uses are to control blood-pressure and to treat uterine disorders. Ergot is usually given as a fluid extract of ergotin, prepared in several ways, as wine of ergot, etc.

ERGOTISM. In the article on ergot it has been shown that there are a great many closely related parasitic fungi, growing on different varieties of grasses. A number of these in¬ fected grasses belonging to the ergot family produce, when eaten by cattle, forms of acute and chronic poisoning. These are character¬ ized by changes, particularly in the blood ves¬ sels, causing

swellings below the knees or ankles, with gangrene of the skin and at times symp¬ toms of paralysis of the extremities. In years in which unusual humid conditions have per¬ mitted the wide and abundant growth of these parasitic fungi, large areas of pasture land have become infected, resulting in widespread poison¬ ing of cattle, almost resembling epidemics.

In Europe, where the eating of rye bread is much more common than in this country, par¬ ticularly in Russia and Italy, cases of chronic poisoning by ergot occur in man from eating the bread made from infected grain. The chief symptoms here are those referable to changes in the blood vessels of different parts of the body, with secondary consequences. Thus, in some, there is a loss of touch-sensation in the hands and feet, a condition which may go on to the formation of ulcers and gangrene. This is the result of the cutting off of the blood sup¬ ply to the periphery of the body by the con¬ tracting influence of the poison on the walls of the blood vessels. In some cases disease of the spinal cord results. This is thought to be due to the artificially induced anaemia with secondary degenerations in the columns of the cord. This disease, called pellagra, closely resembles a toxic neuritis or locomotor ataxia. Treatment con¬ sists usually in a change of food, local anti¬ septics, tannin used internally to neutralize the alkaloids of the ergot and castor oil. Hot water is often applied locally to dilate the blood vessels and chloral hydrate has been found serviceable when taken internally. See Ergot; Pellagra.

ERIC, e'rik or a'rik, the name of several Danish and Swedish kings. Eric VII, king of Denmark: b. 1382; d. Riigenwald 1459; the son of Duke Wratislaw of Pomerania, he was selected as her successor by Queen Margaret of Denmark, and in 1412 mounted the throne of

Denmark, Norway and Sweden, united by the Treaty of Calmar. Cruel and cowardly in char¬ acter, he lost Sweden in 1437 through a revolt of the peasants of Dalecarlia, and in 1439 was deposed also in Denmark. Eric VIII, "The Saint, w became king of Sweden in 1155, did much to extend Christianity in his dominions and to improve the laws, and fell in battle with the Danes in 1160. Eric XIV, the last of the name who reigned in Sweden, succeeded in 1560 to the throne of his father, the great Gustavus Vasa, and at once began to exhibit the folly that disgraced his reign. He married a Swedish peasant girl, who acquired an influence over him which was ascribed by the superstitious to witchcraft; she alone was able to control him in the violent paraxysms of blind fury to which he was subject. His capricious cruelties and the disastrous wars that followed on his follies at length alienated his subjects, who threw off their allegiance in 1568 and elected his brother John to the throne. In 1577 he ended his mis¬ erable life half voluntarily by a cup of poison. He had a genuine love of letters, and solaced his captivity with music and the composition of psalms. His

story has been worked into dra¬ matic form by Swedish poets ; in German by Kruse in his tragedy,

ERIC THE RED, the colonizer of Green¬ land: b. Norway about 950. After committing homicide he fled to Iceland and in 984, again seeking asylum as a murderer, he reached Green¬ land (which from the 11th century belonged to Norway). Here he built a chief town, called Gardar, which he settled with Norwegians. His son, Leif Ericson (q.v.), introduced Christianity, but after flourishing for about four centuries the colony was wiped out, probably by some such plague as black death, although recent authori¬ ties attribute its disappearance to famine. Con¬ sult Nansen's, (In Northern Mists: Arctic Ex¬ plorers in Early Times> (New York 1911).

ERICACE.ZE, er-i-ka'se-e, the heaths, a family of dicotyledonous, sympetalous shrubs or under-shrubs with small leaves, evergreen in some of the genera, rigid whorled or opposite and without stipules. The flowers are arranged in various styles of inflorescence, and are gen¬ erally very beautiful, the heath probably ex¬ celling all other families in the universal beauty of its blossoms. Different writers number the genera from 40 to 70, and the species from 1,000 to upward of 1,300. They are of very wide dis¬ tribution. In North American flora, at least 20 genera are represented, among them such plants as the azaleas, rhododendrons, kalmias, trailing •arbutus and the heaths, and they are specially abundant in western Europe. They love the temperate and cold countries, and wherever they are found in the tropics they are generally confined to the mountainous, upland regions where the climate resembles that of the temper¬ ate zones.

ERICHSEN, Sir John Eric, English sur¬ geon: b. Copenhagen, Denmark, 19 July 1818; d. Folkestone, England, 23 Sept. 1896. He be¬ came a member of the Royal College of Sur¬ geons in 1839 and in 1850 professor of surgery at University College. In 1866 he succeeded Quain as professor of clinical surgery in the same college, a post which he held till his retire¬ ment in 1875. He was appointed president of University College in 1 887, and held that post

till his death ; in 1880 was president of the Royal College of Surgeons, and was created a baronet in 1895. His most important work was his (Science and Art of Surgery > (1853), a stand¬ ard publication which has gone through many editions, and has been translated into several languages and

a pirated copy of which was pre¬ sented to every medical officer in the Federal army during the American Civil War. He also published a volume on (Concussion of the Spine > (1875).

ERICHT, er'iHt, Loch, a lake in the Gram¬ pian Mountains, in Scotland, on the boundary between the counties of Perth and Inverness; it is 60 miles northwest of Perth. It is 14ˆ4 miles long, from one-quarter to one and one-eighth miles wide, with a maximum depth of 512 feet, and 1,153 feet above sea-level (the loftiest of large size in Great Britain). It has two outlets, one flows into Loch Lydoch and one into Loch Rannoch. A cave at the south end near the mouth of the Alder, afforded re¬ fuge to Prince Charlie after the battle of Culloden.

ERICHTHONIUS, in Greek mythology, the son of Dardanus and Batea, and grandson of Zeus. He obtained the kingdom of Troy by the death of his brother Ilus without children. He married Astyoche, the daughter of Simos, by whom (or according to some by Callirrhoe, the daughter of Scamander) he became the father of Tros. The myth or tradition of Erich thonius is sometimes blent or confused with that of Erectheus.

ERICSON, Leif, Ilf er'ik-son, Icelandic dis¬ coverer. According to Sagas he was the son of Eric the Red (q.v.) and at the beginning of the 11th century discovered a transatlantic coun¬ try, which he called Vinland, from the vines which abounded there. Here an Icelandic set¬ tlement was established, but whether the coast was Labrador, Newfoundland or some region farther south has not been decided. A much idealized statue of Leif Ericson adorns Com¬ monwealth Avenue, Boston, the work of Miss Anne Whitney, the sculptor. Consult (The Eng¬ lish Rediscovery and Colonization of America) (London 1891).

ERICSSON, John, American engineer and inventor: b. Wermland, Sweden, 31 July 1803; d. New York, 8 March 1889. He entered the Swedish army in 1820, but resigned in 1826 and soon became known as an inventor. In 1828 he made the first application to navigation of the principle of condensing steam and returning the water to the boiler; later he brought out a self-acting gunlock by means of which naval cannon could be automatically discharged at any elevation without regard to the rolling of the ship. In 1833 he designed a caloric engine ; and in 1836 invented the screw propellor. He was unable to prove the priority of this in¬ vention, however, and received but one-fifth of the $100,000 which the British Admiralty paid for it. In 1839 he supplied engines and screw to the first steam vessel that crossed the Atlantic. The British Admiralty did not be¬ come interested in his inventions, and he came to the United States in 1839 and two years later built the screw-propelling warship Prince¬ ton for the government, the first ship to have her engines and boilers below waterline.

This was the pioneer of modern naval construction.

and the foundation of the steam marine of the world. The achievement, however, which made him most famous in the United States was the construction in 1861 of the ironclad Monitor, which was built under a patent granted by the United States government to Theodore Ruggles Timby (q.v.), the inventor of the revolving tur¬ ret, etc; it was launched 100 days after its keel was laid, and arrived in Hampton Roads just in time to defeat, on 9 March 1862, the Confed¬ erate ironclad Merrimac, which had destroyed several wooden warships. A fleet of monitors was soon built and did important service during the remainder of the war. In his later life Ericsson became interested in tor¬ pedoes and in the development of an engine to be worked by solar heat. His remains were taken to Sweden on the cruiser Baltimore , and interred with imposing ceremonies. The centen¬ ary of his birth, 31 July 1903, was observed in New York by the unveiling of a bronze statue of the inventor in Battery Park and in Worces¬ ter, Mass. A magnificent memorial was erected also by his countrymen in Stockholm. Con¬ sult his

ERICSSON, Nils, Swedish engineer : b. Stockholm, 31 Jan. 1802; d. there, 8 Sept. 1870. He was a brother of John Ericsson (q.v.). He received the appointment as colonel of the Naval Engineering Corps 1850, becoming director of government railroad construction 1858. Among his engineering achievements were the construc¬ tion of the Stockholm docks, the canal between Lake Saima and the Gulf of Finland and the Trollhattan Canal sluices.

ERIDANUS, e-rid'a-nus, a river famous in mythology, mentioned in the return of the Argo¬ nauts. It is located in northern Europe and by some said to mean the Rhone, by others the Rhine, but generally thought to refer to the Po, in Italy. When Phaethon was struck by the thunderbolts of Zeus he fell into this river — and his three sisters, the Heliades, lamented him until they were changed into poplars. They did not cease to weep for him even in this con¬ dition; and their tears falling into the water of the river became transparent amber. The ancient southern constellation of the ((River,® situated south of Taurus, was also called (

ERIE (Ind., wild cat), an American Indian tribe which formerly held the east and southeast shores of the lake known by their name, and now included in the States of New York, Penn¬ sylvania and Ohio. They were of Iroquoian stock, but in 1656 were yearly annihilated by their fierce kinsmen. The survivors were there¬ after incorporated with the Senecas.

ERIE, Kan., city, county-seat of Neosho County, 120 miles east by south of Wichita, on the Atchison, Topeka and Santa Fe and the Missouri, Kansas

and Texas railroads. It is surrounded by a good farming country; and con¬ tains a large oil refinery, an ice factory, a min¬ eral-water plant, flour-mills, grain elevators and lumber yards. There are oil and natural gas fields nearby. The water works and electric- light plant are owned by the city. Pop. 1,300.

ERIE, Pa., city, port of entry, county-seat of Erie County, on Lake Erie, and on the Lake Shore, the Pennsylvania, the Erie and several other railroads 85 miles southwest of

Buffalo, 100 miles northeast of Cleveland. Erie is on a bluff having a good view of the lake, is laid out with broad streets at right angles with one another, and has several large and attractive parks. It is lighted with electricity, and has a bountiful supply of water from the lake. The peculiarly advantageous location of Erie has given it high rank as a shipping and manufac¬ turing point. It has the largest land-locked harbor on Lake Erie. The harbor has been greatly improved, and is now five miles long by one mile wide, depth 9 to 25 feet. Presque Isle, lying directly in front of the city, furnishes ample protection ; three lighthouses stand at the entrance to the harbor, and substantial wharves, where merchandise is transferred directly from vessels to cars,, extend along the entire front. The principal industries are manufactures of iron, steam engines, machinery, car-wheels, car- work and stoves ; flour and grist mill products, brick, leather, organ, pump, furniture and vari¬ ous kinds of woodwork factories, petroleum re¬ fineries, breweries and malthouses. All told, there are 464 manufacturing plants, representing in the aggregate over $40,000,000 capital, employ¬ ing over 16,000 people who receive upwards of $6,500,000 annually in wages, and producing an annual output valued at $30,000,000; the value added by manufacture being about $13,000,000. The leading articles of shipment are lumber, bituminous and semi-bituminous coal, iron ore, petroleum and manufacturing products and these are conveyed by railroads, steamboats and sailing vessels that ply regularly between Erie and other ports on the Great Lakes. Over 1,400 vessels enter and clear annually. Erie ships more than 1,500,000 tons of coal and receives over 1,000,000 tons of ore every year. Among the notable buildings are the city hall, union depot, government building (including post- office, custom-house and other departments), State Soldiers' and Sailors' Home on Garrison Hill, Hamot Hospital, Saint Vincent Hospital, Protestant Home for the Friendless, United States Marine Hospital and Academy High School. Near the city is a memorial in the form of a blockhouse, erected by the State, in honor of Anthony Wayne. The city is

said to ship more freshwater fish than any other port in the world, and to be the leading city in the United States in the output of engines and boilers, has excellent public and private schools, a public library, daily and weekly newspapers, three national and several savings banks. Six banking institutions have a total capital and surplus of $3,700,000 and deposits aggregating over $16,400,000. Erie occupies the site of the old French fort, Presque Isle, built in 1749; was laid out as a town in 1795; had a portion incor¬ porated as a borough in 1805; and the whole was given a city charter in 1851. It was the headquarters of Commodore Perry in the War of 1812 ; the fleet with which he defeated the British in the battle of Put-in-Bay (10 Sept. 1813) was built and equipped here. Natural gas was discovered in 1889. Pop. (1910) 66,525;

(1920) 93,972.

ERIE, Fort. See Fort Erie.

ERIE, Lake, the most southern of the Great Lakes of North America; situated between lat. 41° 30′ and 42° 52′ N., and long. 78° 53′ and 83° 25′ W. It lies between lakes Huron and Ontario and is bordered on the north by Can¬

ada, on the east and south by New York, Penn¬ sylvania and Ohio, on the west by Ohio and Michigan. Its greatest extent is northeast and southwest; it is about 245 miles long, 50 miles wide (from 28 to 58) and has an area of about 9,600 square miles ; is 573 feet above sea-level, 8 feet below Lake Huron; has a maximum of 210 feet and an average depth of 100 feet. It receives, through the strait, Detroit River, the waters from all the other Great Lakes except Ontario; and the chief streams exclusive of the waters from the Great Lakes which flow into it are the Grand from the north, the Maumee from the west, Sandusky, Huron and Cuyahoga from the south. Its outlet is Niagara River, which flows into Lake Ontario at an elevation 326 feet lower than that of Lake Erie. Some of the indentations are the bays of Sandusky and Maumee, on the south coast, and Long Point Bay on the north. In the west¬ ern part is a group of islands, some of which are Point Pelee, Kelly's, North, Middle and South Bass. Lake Erie is the shallowest of all the Great Lakes and dangers to navigation are increased by the heavy ground-swell. The de¬ struction of lakes is largely due to filling from deposits brought by inlets or tributaries ; every particle of sediment brought into a lake tends toward its destruction. Another danger is in changes in outlets. Where the Niagara River emerges from Lake Erie there has been but little change for centuries. It flows through a plain, and the channel is to-day apparently what it was hundreds of years ago ; but <(Niagara is wearing back its falls toward Lake Erie ; and in given time, as a result of this work, it will so lower the outlet as to completely drain

Lake Erie.® The importance of Lake Erie for commercial purpose has been greatly enhanced by its canal connections which are important links in the waterway from East to West. The Welland Canal around Niagara Falls removes obstacles to direct navigation from the Atlantic; the Barge Canal connects the lake by a short route with the Hudson River ; canals crossing Ohio connect the lake with the Ohio River. There are many excellent harbors, not all of them in use by the large steamship lines. Some of the principal ports are Buffalo, Erie, Cleve¬ land, Sandusky and Toledo. At Put-in-Bay near Sandusky on 10 Sept. 1813 took place the Battle of Lake Erie (q.v.). The Americans were successful and the result was most im¬ portant to the United States; it had much to do with the regaining of the territory of Michi¬ gan, which at the time was in possession of the British. Consult Russell, (Lakes of North America ; Smithsonian Annual Report, Modification of Great Lakes by Earth Move¬ ment* (1898). See Great Lakes.*

ERIE, Lake, Battle of, 10 Sept. 1813: a naval battle which annihilated the British fleet on that lake and gave the Americans their northwest at the Treaty of Ghent. In 1813 it had become evident that the reconquest of the northwest from the British, who had captured Detroit and were building a fleet at Malden, nearby, to control the lake, depended on wrest¬ ing the control from them; and Oliver Hazard Perry spent from 27 March till September build¬ ing a rival fleet at Presque Isle, now Erie, Pa. It had nine vessels : the Lawrence , flagship, 20 guns ; the Niagara, Capt. J. D. Elliott, 20 guns ;

the Caledonia, three-gun brig; five two-gun schooners and a one-gun sloop ; in all 54 guns with 714 pounds metal at a broadside. The British had six vessels averaging much heavier, with 63 guns averaging much lighter — about 430 pounds to a broadside; but most of them were far longer range than the American, whose policy therefore was close action. The crews were about equal, some 500 each. The British commandant was Capt. Robert H. Bar¬ clay, a veteran of Nelson's; two of the cap¬ tains were veterans also. The fleets engaged off the islands north of Sandusky Bay, near noon of 10 September. Perry in the Lawrence, with two gunboats, came to close quarters shortly after, and if the whole fleet had followed, the British would soon have been overwhelmed; but for some reason (hotly disputed and a sore point for many years) the other vessels kept off and played away at long range, while for two hours the British vessels concentrated their fire on the Lawrence. Such carnage was scarcely ever known on the ocean ; of 103 officers and men, but 20 were unhurt ; the

vessel was literally shot to pieces, and the very wounded were killed on the surgeon's board by the crashing balls. Seeing that no more could be done with it, Perry turned over the command to a lieu¬ tenant, 'transferred himself in a small boat to the Niagara, now tardily drawn nearer, brought that and the rest into close action, and in 15 minutes (about 3 p.m.) forced the entire British fleet to surrender. The latter was in a dreadful condition, too; the English had fought with heroism and skill, but a third of its force was disabled or dead. The losses were : Americans, 27 killed and 96 wounded ; British, 41 killed and 94 wounded. The battle raised Perry to the summit of naval fame, justly, for no victory was ever more due to the genius and energy of one man, and few naval battles have had such momentous results. The remains of the slain officers were buried at Put-in-Bay Island in 1858. Maclay's < History of the Navy> (Vol. II, 1894) ; Spears' (History of Our Navy (1899) ; Roosevelt's (History of the Naval War of 1812) (1882); Adams, Henry, (History of the United States) (Vol. VII, 1891).*

ERIE CANAL. See Canals.

ERIE RAILROAD. Chartered 24 April 1832, by the New York State legislature to construct a railroad from Lake Erie to the Hudson River, the New York and Lake Erie Railway Company was organized with a capital of $3,000,000, the credit of the State being ex¬ tended to a like amount. The charter provided that the road should make no connection with any railroad in New Jersey or Pennsylvania without special legislative consent and also pro¬ vided that it should run through the southern tier counties of New York. This plan was in accordance with the idea advanced by W. C. Redfield in 1830 when he proposed a railroad from the Atlantic to the Mississippi River. His plan was that it should be a great national road to follow the so-called f(Appian Way® advocated by Generals Clinton and Sullivan in 1780 to further the development of what then consti¬ tuted the United States.

In 1841, the railroad was opened from Pier- mont, at the extreme southern point . of New York State on the Hudson River, inland to Goshen. Orange County, a distance of 46 miles.

Opposed as it was by the canal counties and their representatives in both the State and na¬ tional legislatures, the Erie had to fight for its existence from its birth through a series of legislative obstructions and financial manipula¬ tions that developed even in its early days. Be¬ fore its completion to Dunkirk, which was the objective point on Lake Erie, and as a conse¬ quence of these obstacles to progress, the road had to be placed in the hands of a receiver. In 1845, the State released its claim for the money advanced for construction and through the ener¬ getic efforts of the Erie's

friends, it was finally opened by President Fillmore, Daniel Webster, his Secretary of State, and other government and State officials, from Piermont to Dunkirk, on 22 April 1851, a distance of 463 miles. From Piermont, passengers were conveyed to New York by steamer. This operated so much to the disadvantage of the road that its charter was amended in 1852 permitting it to pass through New Jersey to its present termi¬ nal in Jersey City, and Piermont was abandoned as a terminal in May 1861. Previous to that abandonment, the road was again — in 1859 — in the hands of a receiver and was sold to the Erie Railway Company in 1861. This new com¬ pany also bought the Buffalo and New York City Railroad and so secured independent en¬ trance into Buffalo, which was made its prin¬ cipal lake terminal in place of Dunkirk. It has so remained up to this time. %

In accordance with English ideas, the road was built with a six-foot gauge, a mistake in construction that for years acted as a deterrent to its successful operation, owing to the fact that contents of cars had to be transferred at connecting points. Another mistake of its early managers was a refusal of the Erie to ac¬ cept entrance into New York city over the New York and Harlem lines, then being constructed and which later passed to the control of the New York Central. But this management did see the value of the coal traffic and in 1861 it entered the anthracite coal fields of Pennsyl¬ vania and later through its Bradford branch reached the bituminous fields. But in the mean¬ time, it had become a financial foot-ball in Wall street, partly through a desire to combine with the Atlantic and Great Western, then building, through Ohio, for the purpose of making a route to Saint Louis on the Mississippi River. A connection to the Ohio River at Cincinnati was ultimately effected through a combination with the Atlantic and Great Western and an operating connection with the C., H. and D. completed 33 years after the first work on the Erie was begun. h

In 1867, Jay Gould and Col. James Fisk came into possession of the Erie and from 1868 to 1872 a fight ensued between Gould, Vander¬ bilt, Fisk, James McHenry and Daniel Drew for the possession of the property, resulting in its spectacular wreckage after one of the bit¬ terest and most vindictive railway wars in his¬ tory. The contest for the possession of the property and the financial manipulations in¬ dulged in enriched all who were interested ex¬ cepting the actual owners of the road and these it impoverished as it did the road itself. At the conclusion of this historic fight, Hugh J. Jewett came in as president in 1874 and a year later was made receiver, the property having been pur¬ chased by the security holders to prevent its

complete wreckage. It was reorganized in 1878 as the New York, Lake Erie and Western. It then owned 525 miles of road and leased 400 more. The road was converted into a standard gauge road at a cost of $25,000,000 and was double tracked from Jersey City to Buffalo.

Attempts to enter Chicago, first over what is now known as the <(Pandhandle Route,® and later over the Pittsburgh, Fort Wayne and Chi¬ cago were successfully blocked by rivals and it was not until 1883 that it secured an entrance into the western metropolis over the Chicago and Atlantic Railway. Under succeeding man¬ agements, the road, in spite of the enormous financial obligations which hampered it, was operated as a paying and successful property until the panic of 1883-84. The obligations ac¬ cruing because of its purchase of the Chicago and Atlantic and Pennsylvania coal properties led the road to still further embarrassment and finally to another receivership in 1893. Two years later, the company was reorganized as the Erie Railroad Company and assumed possession of the property on 1 Dec. 1895, which it has since operated.

The Erie Railroad is to-day a great modern highway, its main line extending from Jersey City, N. J., to Chicago, Ill., a distance of 999 miles. Within the last few years this main line has been double-tracked and it is now known as a ((low-grade line,® for example, between Jersey City and _ Salamanca, N. Y., a distance of 414 miles, the ruling grade has been brought down from 0.65 to 0.2 per cent. The present ruling grade is said to be lower than that of any other railroad running from Pittsburgh, Buffalo or the Ohio State line to New York city. Between Marion, Ohio, and Hammond, Ind., the ruling grade of the Chicago and Erie has been re¬ duced from 0.55 per cent west bound and 0.5 east bound to 0.2 per cent in each direction.

The following is the official statement of gross operating revenues and operating expenses and taxes for five recent years — operating revenues 1911, $56,649,908; 1912, $56,492,369;

1913, $62,647,359; 1914, $60,983,574; 1915, $66,-

436,719 ; the operating expenses for the same period were 1911, $40,245,301; 1912, $42,508,253;

1913, $46,146,760; 1914, $48,224,007; 1915, $45,- 670,748.

A pioneer as a trunk line, it was also the first railroad to adopt what are now universal methods — among these the running of trains by telegraph, the use of a printed time table, the running of Sunday trains, emigrant

trains, and special service for suburban passengers, the use of parlor cars, the establishment of dining rooms along the line, the establishment of spe¬ cial milk trains, the running of a newspaper special train (this being done in 1842). It was also the first road to run an excursion train of the modern type with a brass band and a re¬ duced round trip fare, the first road to use a bell cord to signal from the conductor to the engineer, the first to build up local industries by furnishing to manufacturing companies the use of switching and terminal tracks, a custom now so universal, and in more modern days, the first road to adopt all-steel baggage, express and postal cars, and is the only railroad in the world operating a triplex or "centipede® locomotive.

ERIGENA, e-rij'e-na, Johannes. See

Scotus, Johannes Erigena.

ERIGERON, a genus of plants of the fam¬ ily Composite u, having a strong odor. Terpene is the name of the oil distilled from E. canadensis, a widely diffused species, and used as an irritant and stimulant in medicine.

ERIN, an old name for Ireland. It is now used only in poetry.

ERINITE, a basic copper arsenate having the formula CusCOHLAszOs occurring as a dark green crystalline coating of fibrous structure in Cornwall, England, and the Tintic district, Utah. The name is also applied to an aluminum silicate from the Giant's Causeway, Ireland.

ERINNA, Greek poetess : b. Rhodes or Teos, about 600 b.c. ; d. at age of 19. Accord¬ ing to some she was a Lesbian and the intimate friend of Sappho. Others aver that she was born at Teos, Rhodes or Telos, and that she lived in the age of Demosthenes ; while others again assert that there were two poetesses of the same name. She left behind her a few poems which were thought equal to those of Homer in point of merit. The chief of them was a work of about 300 lines, called

ERINYES, e-rin'i-ez, The Furies (q.v.).

ERIOCAULON, er-i-o-ka'lon, the typical genus of the pipewort family (Eriocaulonacece) . See Pipewort.

ERIODENDRON, a genus of tropical trees of the natural order Malvaceae. There are about a dozen species, which are characterized by digitate leaves, medium to large, white or reddish, solitary or clustered flowers, and thick, woody seed-capsules containing a cotton-like fibre which suggested the name silk cotton-tree. Some of the species exceed 100 feet in height, and furnish wood used in making boats. The seeds of several species are

used for food to some extent. But the principal economic value for which these trees are noted is in the fibre which surrounds the seeds. This is too short to be successfully woven like cotton, but is highly valued in upholstery for stuffing cushions, lounges, etc., for making floss and, it is said, as a substitute for animal hair in making felt for hats. The chief source of supply is Java. It is known in various countries as kapok, rimi, bentang, etc. Various South American species o f Bombax, a related genus, also furnish a similar fibre. Like many other species of the natural order Malvaceae , the species of these two genera also furnish a valuable bast fibre which is used for rope and cordage-making. One species, E. occidental, is grown in Califor¬ nia to a small extent as an ornamental tree un¬ der the name Ceiba occidentalis.

ERI'OMETER, an optical instrument for measuring the diameters of minute particles and fibres from the size of the colored rings pro¬ duced by the diffraction of the light in which the objects are viewed.

ERIOPHORUM. See Cotton Grass.

ERIPHYLE, in the Greek mythology, the daughter of Talaus, and wife of Ampharaus, whom she betrayed for a necklace presented to her by Polynices. The necklace was made bv Hephaestus (Vulcan), and had the power of rendering whoever wore it unlucky.

ERIS, e'ris or er'is, in Greek mythology the goddess of discord, daughter of Night, and sister of Nemesis, and the Parcae or Fates. Not being invited to the marriage of Peleus, she re¬ venged herself by means of the apple of discord. See Paris.

ERITH, England, town in Kent, on the Thames, about 14 miles east of London, con¬ tains the Maxim-Nordenfeldt gun-factory, engi¬ neering works and other manufactories. Sev¬ eral yacht clubs have their headquarters here. Pop. 27,750.

ERITREA, a-re-tra'a, or ERYTH'RTEA (from Greek erythros, red, referring to the Red Sea), the official name of an Italian colo¬ nial possession stretching along the African shore of the Red Sea. from Cape Kasar in lat. 18° 2′ N. to the sultanate of Raheita on

Bab-el-Mandeb in lat. 12° 30′ N. The

coast-line is between 500 and 600 miles in length, and the area of the

colony is about 94,- 800 square miles. The chief town is Massowah. Population of the colony is about 400,000, the majority of whom are Arabs.

ERIVAN, er-i-van', Armenia, (1) a forti¬ fied city, capital of the district of the same name in Transcaucasia, on the Sanga River at an elevation of 3,000 feet, 33 miles northeast from Mount Ararat. The manufactures consist of cottons, earthenware and leather ; and the situation of the town, on the caravan route be¬ tween Russia and Persia, gives it a considerable transit trade. Pop. 32,505. (2) The govern¬

ment of Erivan has an area of 10,745 square miles, and a diversified population totaling (1912) 971,290, of which Armenians and Tartars are the chief components, but including also Kurds, Greeks, Russians and Jews.

ERJISH DAGH, er'jish' dag (the ancient Argseus), an extinct volcano in the vilayet of Angora, Asia Minor. It has an elevation of 13,000 feet. The last eruption occurred in the 4th century of the Christian era.

ERK, Ludwig Christian, German musician : b. Wetzlar 1807 d. 1883. He studied at Offen¬ bach under A. Andre, became conductor in the Domkirche at Berlin, founded the Erk Manner- gesangverein in 1843 and nine years later the Erk Gesangverein. He was eminently success¬ ful as a conductor and trained many fine sing¬ ers. His library including many unpublished manuscripts after his death was acquired by the Konigliche Hochschule fur Musik, Berlin. His published songbooks include (Singvoge- lein) (1896) ;

ERLACH, an ancient family of Bern, Switzerland, several of whose members earned distinction in various fields. The first was Walter von Erlach, who lived in the 12th cen¬ tury and took his name from Erlach, a village near the lake of Brienz. Rudolf von Erlach (d. 1360) fought at Laupen. There is an equestrian statue to his memory in Bern. John Ludwig (b. 1595; d. 1650) commanded on the Reformers' side in the Thirty Years' War. Later he entered the French service and be¬ came a marshal of France.

ERLANGEN, Bavaria, town on the Regnitz, 12 miles north of Nuremberg. As old as the

10th century, it owes its prosperity to the set¬ tlement here of French Huguenots after the revocation of the Edict of Nantes (1685) and to its university. The chief manufactures are arti¬ cles made from wood, ivory and horn, electric instruments and some cotton goods. It has large breweries. Pop. 24,874.

ERLANGEN, University of, a Lutheran institution founded in 1742 in Baireuth, but the following year moved to Erlangen (q.v.). In 1769 Alexander, the then Margrave of Baireuth, gave valuable assistance to the university and the name was changed to its present legal title, <(Friedrich-Alexander University.® Owing to the changes of government of the country the growth of the institution was retarded until 1880. Since that time new buildings have been added, and the institution has increased in at¬ tendance and influence. In 1913 the number of students enrolled was about 1,350. Its library contains about 260,000 volumes, some 300,000 pamphlets and a considerable number of manuscripts.

ERLANGER, Camille, French composer: b. Paris 1863. At the age of 17 he entered the Paris Conservatoire and studied piano there under Mathias, and composition under Bazille and Delibes. His cantata (Velleda) secured him the Roman prize in 1888. A dramatic legend,

(Saint Julien l'Hospitalier,* was very successful in 1894. Erlanger's first opera (Kermavia) ap¬ peared in 1897 and scored a great success. It was surpassed three years later by (Le juif polonaisP Others from his hand are (Le fils de l'etoile) (1904) ;

ERLANGER, Joseph, American physiol¬ ogist: b. San Francisco, Cal., 5 Jan. 1874. He was graduated at the University of California in 1895 and from Johns Hopkins as M.D in 1899. Later he was house officer at the Johns Hopkins Hospital and from 1900 to 1906 was successively fellow in pathology, assistant, in¬ structor, associate and associate professor of physiology at Johns Hopkins. In 1906-10 he held the chair of physiology at the University of Wisconsin and since the latter year has held a similar chair at Washington University.

ERLAU, er'low, or EGER, a'ger, Hungary, town, capital of the county Heves, on the Eger, 75 miles east-northeast of Budapest. The man¬ ufactures consist chiefly of woolen and linen cloth, hats, combs, leather, shoes and harness. The finest red wines of Hungary are made from grapes grown in the neighborhood. There are two thermal springs, one on each side of the river. Erlau was in possession of the Turks from 1596 to 1687. Pop. 28.052.

ERLKING (Ger. Erlkonig), a mythical personage first introduced into German poetry, through Herder's translation of a Danish bal¬ lad, (The Erlking's Daughter,* and made famil¬ iar to all readers by Goethe's ballad, (Der Erl¬ konig, } or translations of it. This goblin is represented as exercising a malignant and fatal influence upon men, and especially children, by alluring promises or visions which lead to their destruction. The word is of Danish origin (Ellerkonge , or Elverkonge, king of the

elves).

ERLON, Jean Baptiste Drouet, Comte de.

See Drouet.

ERMAN, (Johann Peter) Adolf, German Egyptologist : b. Berlin, 31 Oct. 1854. He re¬ ceived his education at the universities of Leip¬ zig and Berlin. In 1883 he was made associate professor of Egyptology at the last named in¬ stitution, where his father and grandfather had both held the chair of physics. Two years later he was appointed director of the Egyptian de¬ partment of the Berlin Royal Museum. In 1892 he became full professor of Egyptology. His work on Egyptian grammar has been of inestimable value to students and he may be said to be the first to put this branch on a really scientific basis. His published works in¬ clude (Die Pluralbildung des Aegyptischen> (1878) ; (Neuagyptische Grammatik® (1880) ; (Die Sprache des Papyrus Westcar) (1889) ; (Die Marchen des Papyrus Westcar) (1890) ; (Altagyptische Grammatik) (1894; Eng. trans. by Breasted, London 1894) ; (Gesprach eines Lebensmiiden mit seiner Seele) (1896) ; (Die Flexion des Agyptischen Verbums> (1900) ; (Zauberspruche fiir Mutter und Kind) (1901) ; (Aegyptische Religion } (1909) ; (Aegyptische Grammatik) (1911) ; (Aegypten und Aegyp- tisches Leben im Altertum> (1885; Eng. trans., (Life in Ancient EgypD 1896), the best work on the subject.

ERMINE, any weasel (q.v.) which turns white in winter, as is the habit of all those liv¬ ing in snowy regions ; or has its pelt made up as a fur. The animal's coat becomes completely yellowishi white, except the tip of the tail, which remains black. When this fur is made up into tippets, coat trimmings or garments, the black tails are attached as ornaments in rows, which gives the regularly spotted effect characteristic of ermine furs, and imitated in heraldry, under the terms <(ermine® and <(erminois,® expressive of furs as a bearing. In mediaeval times the use of this kind of fur was restricted to roy¬ alty, and later it became a part of the insignia of judges in high courts, perhaps as a symbol of the majesty of the law; whence the expres¬ sion (

ERMINE MOTH, any of several white moths marked with black spots as in ermine furs. The name is given in America to various bombycids, but was originally applied to a Eu¬ ropean zygsenid (Ypomoneuta pellida).

ERMINE, or ERMYNE, STREET, one

of the four great roads constructed in England by the Romans. It led from Bishopsgate, London, by way of Durolipons (Godmanches- ter), Lindum (Lincoln), Danim (Doncaster) to Eboracum (York), whence it continued north¬ ward past Hadrian's wall into Scotland. At Lincoln it formed a junction with the Foss Way, leading to Bath and Exeter. The Vicinal Way, a branch from London, led through Essex, Suffolk and Norfolk to Venta Icenorum (Caistor near Norwich) and connected with the main road at Durolipons by a branch from Camulo-dunum (Colchester).

ERMINIE, a comic opera in two acts by Edward Jakobowski, first produced at the Comedy Theatre, London, 9 Nov. 1885, and in New York at the Casino 10 March 1886. Based upon the well-known melodrama (Robert Ma- caireP the plot is lightened by the substitution of the vagabonds Ravennes and Cadeaux for the two murderers of the original play. Er- minie was one of the most conspicuous suc¬ cesses in the realm of light opera and to Amer¬ ican audiences it is associated with the names of Francis Wilson and Pauline Hall, who took part in the first New York production. The music is light and graceful, if not strikingly original. The principal numbers are Erminie's song ((Ah, when love is young,® «Dull is the life of the soldier in peace,® the fetching lullaby, <(Dear mother in dreams I see her,® the whist¬ ling chorus, (

Lewis M. Isaacs.

ERMLAND, or ERMELAND, a diocese of East Prussia, situated in the District of Konigs- berg. It was erected as a see in 1230 under the Teutonic Knights and within 50 years became practically independent of the metropolitan of Riga. This independence was acknowledged when in 1742 the pallium was conferred on its prelate by Benedict XIV. Many of the earlier bishops were also temporal sovereigns of this district and as such after 1354 were acknowl¬ edged princes of the Empire. In 1466 they came under the king of Poland and with diffi¬ culty prevented the Polish sovereigns from in¬ vading their right of free election. Pope Pius II as Aeneas Sylvius Piccolomini was once bishop of Ermland. At the period of the Ref¬ ormation the diocese was ruled by Stanislaus Hosias, who held his subjects in their allegiance to the older faith. In 1772, on the partition of Poland Ermland passed to Prussia. It is still a bishop's see, with the cathedral at Braunsberg. Consult Hipler, (Analecta Warmiensia (Braunsberg 1872) and Zeitschrift fiir Ge- schichte und Alterthumskunde Ermlands) (ib., 1858 et seq.).

ERN, or ERNE, earn, a name in poetic rather than common or scientific use for any of the sea-eagles; specifically the European white-tailed eagle of which the American bald- eagle (Haliactus leucocephalus) is a near rel¬ ative. It is the original English name for the eagle, the modern term coming

from the French. See Eagle.

ERNANI, an opera in four acts by Giuseppe Verdi (libretto by F. M. Piave, founded on Victor Hugo's drama), first produced at Venice, 9 March 1844. Its success was immediate and prolonged and was probably contributed to not a little by the interference of the police, who objected in particular to the conspiracy scene in the third act. The chorus «Si ridesti il Leon di Castiglia,® which ends this scene, aroused the Venetians to such a pitch of political enthu¬ siasm that at one time the theatre was closed. The. opera abounds in strenuous, hot-blooded music that found its way easily into the hearts of Verdi's countrymen. But its popularity was not confined to Italy. With Verdi be¬ came an important European figure. When the opera reached Paris, Victor Hugo objected so

strenuously to the utilization of his drama as an operatic libretto that the book was altered, the characters changed to Italians and the new title of (I1 Proscritto) given to it. Verdi traveled a long distance in his artistic growth and

Lewis M. Isaacs.

ERNE, the name of a lake and a river of Ireland. The river Erne takes its rise in Lough Gowna, flows north into Lough Oughter, thence through Upper Lough Erne to the Lower Lough Erne, from which it flows into Donegal Bay. The river has a total length of about 60 miles and is navigable for light-draught vessels for about two-thirds of that distance. Lough Erne, including Upper and Lower, has a length of about 40 miles and has a width varying from 4 to 12 miles. Many islets dot its surface which is 150 feet above sea-level. The lake is the paradise of the angler; salmon, trout, bream, perch, pike, abounding in its waters. The lake possesses remarkable scenic beauty and the archaeological remains on some of the islets and on its shores form an added attrac¬ tion to the tourist. Consult Devenish, (Lough Erne: Its Histories, Antiquities and Traditions) (Dublin 1897).

ERNEST MALTRAVERS, a novel by Bul- wer-Lytton, published 1837. Its sequel is entitled (Alice, or The Mysteries) (1838). In the pref¬ ace to the first-named novel, the author states that he is indebted for the leading idea of the work — that of a moral education or apprentice¬ ship — to Goethe's (Wilhelm MeisterP The apprenticeship of Ernest Maltravers is, how¬ ever, less to art than to life. (Ernest Maltra- vers) is written in the

Byronic strain, and is a fair example of the English romantic and senti¬ mental novel of the thirties-

ERNESTI, er-nes'te, Johann August, Ger¬ man scholar: b. Tennstadt, Thuringia, 4 Aug. 1707 ; d. Leipzig, 11 Sept. 1781. He studied at Wittenberg and Leipzig, and, devoting himself to classical studies, became rector of the Thomas School at Leipzig in 1734, a post which he held till 1759. He became professor of the¬ ology in the University in 1759. He prepared editions of Homer, Callimachus, Polybius, Suetonius and Tacitus, and of Xenophon's (Memorabilia) and Aristophanes' (Clouds,) and an excellent edition of Cicero (3d ed. 1776-77), to which he added a valuable (Key to Cicero, > often re-edited. Regarded as the first Latinist of his age, he gave a great impetus to classical and biblical study and was the founder of a true exegesis of Scripture by the laws of gram¬ mar and history, independent of dogmatic pre¬ possessions. His (Latin Speeches } gained him the name of the "German Cicero.®

ERNST, arnst, I (surnamed "The Pious®), Duke of Saxe-Gotha and Altenburg, and founder of the house of Gotha : b. Castle of Altenburg, 24 Dec. 1601 ; d. 1675. He was the son of John, Duke of YVeimar, and brother of the famous Bernard of Saxe-Weimar. He fought with distinction as colonel of horse under Gustavus Adolphus, at the battles of Nuremberg, Lutzen and Nordlingen during the Vul lo — 31

Thirty Years' War, and was one of the sig¬ natories to the Peace of Prague in 1635. He afterward became famous for the wisdom and frugality of his administration, for the reforms that he instituted and for the progress his prin¬ cipality made during his reign. He was the founder of the Gotha line which became ex¬ tinct by the death of Frederick IV in 1825. His son Bernard founded the house of Meinin- gen; Ernst that of Hildburghausen, and Johan Ernst that of Saalfeld. Consult Beck's (Ernst der Fromme) (1865).

ERNST II, Duke of Saxe-Gotha and Alten¬ burg: b. 1745; d. 1804. On succeeding his father in the dukedom he set about to reform the government and ameliorate the condition of his people. He refused to allow his army to send levies to join the forces of his near rela¬ tive George III in fighting against the American colonies, although large sums were offered as an inducement. He was a patron of science ; insti¬ tuted for the first time a measurement of an arc of the meridian in Germany and established an observatory near Gotha. He wrote on astronomy, and among his works are (Astro- nomische Tafeln) (1799). A biography by Beck was published at Gotha in 1854.

ERNST II, Augustus Charles John Leo¬ pold Alexander Edward, Duke of

Saxe-Co- burg-Gotha : b. Coburg, 1818; d. 1893. He was brother of Prince Albert, consort of Queen Victoria of England, and seems to have re¬ sembled him in tastes and character. He was instrumental in winning the battle of Eckern- forde in the war against Denmark in 1849, fought on the side of Prussia in the Austro- Prussian and Franco-Prussian wars. Alone among the German princes he was liberal and worked for the reform of the constitution as well as for the unification of Germany. His liberalism caused his little duchy to become an asylum for political refugees from the other states. He was succeeded by his nephew, Alfred, duke of Edinburgh. He wrote some successful operas.

ERNST, August, King of Hanover and Duke of Cumberland: b. Kew, 5 June 1771 ; d. 18 Nov. 1851. He was the fifth son of George III of England. He lost an eye at Tournai in 1794, held a command in the campaign in Han¬ over in 1813-14 and was present at the battle of Leipzig. He took up his abode at Berlin but returned to England while the discussions on Catholic emancipation were going on, and en¬ deavored by every means in his power to pre¬ vent the passing of that measure. He as a reactionary also opposed the Reform Bill of 1832. On the accession of Queen Victoria in 1837 he ascended the throne of Hanover, in consequence of the succession to the sover¬ eignty of that country being limited to male heirs. After 150 years of absentee rulers, Han¬ over again had a resident sovereign. His arbi¬ trary and tyrannical disposition, which had hitherto shown itself in opposing every step in the way of political reform and progress, was now manifested by his abrogating the consti¬ tution which had been granted in 1833. In 1848, however, he was compelled to accede to popular demands and accord the nation a more liberal form of government. He was succeeded by his son, George V, the last of the Hanover¬ ian kings. The unpopularity of the Duke of

Cumberland in Britain was extreme and the contingency of his succeeding to the throne was regarded as one of the greatest misfor¬ tunes that could befall the nation. Thus was the Duke's ambition, balked by the marriage of Queen Victoria, against which he loudly pro¬ tested, and refused to attend the ceremony. Consult Wilkinson, (Reminiscences of King Ernst of Hanover > (1880).

ERNST, Harold Clarence, American bac¬ teriologist: b. Cincinnati, Ohio, 31 July 1856. He was graduated at Harvard University in 1876 and at its medical school in 1880, and be¬ came professor of bacteriology there. From 1898 to 1908 he served as president of the Bos¬ ton Society of Medical Sciences, and in 1909 was president of the American Bacteriologists' and Pathologists' Association. He was editor of the Journal

of Medical Research after 1896, and contributes to scientific, medical .and other periodicals. His published works include (In- fectiousness of Milk) (1896) ; Hnfection and Immunity y (1898) ; (Prophylactic Hygiene} ; (Animal Experimentation (1902) ; (Modern

Theories of Bacterial Immunity) (1902).

ERNST, Oswald Herbert, American military officer : b. rtear Cincinnati, Ohio, 27 June 1842. He was graduated at the United States Military Academy and was commissioned a brigadier-general of volunteers 1898. He was engineer in charge of western river improve¬ ments in 1878-86; had charge of harbor im¬ provements in Texas in 1886-89; and while on the latter service began the great work which resulted in the deepening of the channel at the entrance of Galveston harbor from 12 to 35 feet. In 1893-98 he was superintendent of the United States Military Academy. In the war with Spain he went with General Miles to Porto Rico in July 1898, and on 9 August led the troops in the action at Coamo. He was a mem¬ ber of the Isthmian Canal Commission 1899- 1901, which selected the Panama route, and of the Commission of 1905-06 which determined the type of canal should be with locks. He was president of the Mississippi River Commis¬ sion 1903-06 and chairman of the American section of the International Waterways Com¬ mission 1905-15. He has been a director of the Panama Railroad since 1905. He retired from the army 27 June 1906. He has published (Manual of Practical Military Engineering> (1873) and a (Report > (1-904) on the tunnels under the Chicago River.

ERNST LUDWIG, Grand Duke of Hesse : b. Darmstadt, 25 Nov. 1868. He succeeded to the throne in 1892. In 1896 he was made lieu¬ tenant-general. In 1894 he married Princess Victoria Melita of Saxe-Coburg-Gotha. He divorced her in 1901 and in 1905 he married Princess Eleonore of Solms-Hohensohms-Lich. In 1909 the Duke's play

ERNULF, er'nulf, or ARNULF, English prelate: b. France, 1040; d. 15 March 1124. He was appointed prior of Canterbury by Anselm and was subsequently abbot of Peterborough (1107) and bishop of Rochester (1114). He was equally remarkable for skill in canon law and personal saintliness, and compiled a great collection of documents about his own Church,

■ *EROS*

laws, papal degrees, etc. He is alluded to in Sterne's (Tristram Shandy. >

EROICA SYMPHONY, The, a famous symphony by Beethoven, first given at Vienna in 1805, under the title of < Bonaparte. > It was afterward

renamed Sinfonia eroica. – See Bee¬ thoven.

EROS, the Greek god of love, from which the Romans derive their Cupid (cupido, de¬ sire). In this sense Eros is a fiction of later- day poets. Hesiod is the first to mention Eros, whom he asserts to be the fairest of the gods who rules over the minds and the councils of gods and men. It was he who brought order and harmony out of chaos. In this cosmogonic sense he is used by many of the early writers. In Orphic poetry and in Plato he is conceived of as the oldest and most powerful of all the gods. In some instances he is described as the son of Kronos and Ge, and in others he is of independent origin. The Eros of the later poets, which is familiar to us, is conceived as a son of Aphrodite (Venus) and Hermes; or of Venus and Zeus; or of Zephyrus and Iris; or of Aphrodite and Ares (Mars). He is de¬ picted as a wanton mischievous boy, no longer the god of harmony, but of sensual love. He is represented with wings, bows and arrows, etc. See Cupid.

A creature called Anteros was generally connected with Eros, first as opposed to Eros and fighting against him, and later as the aveng¬ ing Eros who punished those who did not re¬ turn the love of others.

Among the places distinguished for the wor¬ ship of Eros, Thespise in Boeotia stands fore¬ most, where his worship was very ancient. Here a festival was celebrated in honor of the god. At Sparta, Samos, Parion and at Athens, where he had an altar at the entrance of the Academy, the god was also worshipped. At Mezora he stood with Himeros and Pothos in the temple of Aphrodite. His statue was rep¬ resented at first by a crude stone, which de¬ veloped into the perfect beauty of the boy-figure by Praxiteles, now in the Capitoline Museum, and undoubtedly the source of all the later rep¬ resentation of Eros as a chubby boy. Among the things sacred to Eros and accompanying him are the rose, wild beasts, the hare, the cock and the ram. See Psyche.

EROS, in astronomy, one of the minor planets, discovered photographically by Witt in 1898, at the Urania Observatory, Berlin. The orbits of most of the other known asteroids lie wholly beyond that of Mars; but Eros ap¬ proaches much nearer to the sun, and at times it may be within 13,500,000 miles of the earth. It is this fact which gives the planetoid its great astronomical interest. The relative dimen¬ sions of the solar system are known with high precision, and if any dimension can be accu¬ rately measured in miles, all the other dimen¬ sions become known at once, in terms of the same unit. It is apparently possible to determine the parallax of Eros (and hence its distance from the earth in miles) with relatively high precision and a correspondingly accurate deter¬ mination of the absolute dimensions of the solar system in general will result. As Eros ap¬ proaches

the earth more closely than any other heavenly body except the moon, its parallax is relatively large; and the fact that its diameter

does not exceed 20 miles, so that it appears in the telescope as a mere point of light without a sensible disk, indicates that extremely precise micrometric measures of its position on the heavens may be had. Astronomers are keenly alive to the possibilities offered by this seem¬ ingly insignificant little planet, and at everv favorable opposition Eros will be studied with exceeding care.

The planet itself is known to be a little world, nearly round, which revolves about the sun in a period of 643 days. A very remark¬ able fact about it is that it is found to vary periodically in brightness ; when brightest it is more than three times as bright as when faint¬ est, the period of a complete variation being somewhat more than five hours. It was sug¬ gested that the apparently single planet is, in fact, two planets, so close together that they ap¬ pear to us as one, the time of their revolution about their common centre of gravity being twice the period of the apparent variation in brightness. More careful photometric study, however, renders it certain that the planet is single, having one side much brighter than the other, and that its variation in brightness is due to its axial rotation.

An asteroid very similar to Eros was dis¬ covered 'by Wolf on 4 Feb. 1918, and although the orbit of this new body is far larger than that of Eros, the eccentricity is so great (0.553), that when nearest to the earth it is but little more than 17 millions of miles from us. Thus this asteroid and Eros come nearer to us than any other planets of the solar system. It hap¬ pens that the time of nearest approach for both of these bodies is toward the beginning of the year 1931. It is probable that from observa¬ tions made at this time the distance of the sun will be ascertained with an accuracy far trans¬ cending that available at present.

EROSION, or DENUDATION, the proc¬ ess of slow removal in air or water of the products of rock decay whereby the surface features of the earth are obliterated. It in¬ cludes the destructive work of winds, of streams, of glaciers and of the ocean. Its various aspects may be considered under two heads: (1) subaerial; (2) marine.

1. Under subaerial erosion comes the action of air and water on all land surfaces above sea-level, first in making rock material fine, weathering, and second, in its removal, trans¬ portation. Chemical processes, due to

moisture and C02 in the air, break up the rock-minerals. Changes of temperature crack off flakes from rock-ledges and reduce them to smaller flakes. Water, freezing in cracks, forces apart large blocks of rock. In a climate with dry seasons the dust may be swept away by the winds (de¬ flation), leaving the larger pebbles. Stony des¬ erts have thus been formed in Arizona and other parts of the world. The dust-charged winds can carve and wear down rock surfaces. Instances are common in the arid regions of the West and in the desert of Sahara. Glaciers scour out their valleys powerfully and carry away much material.

The erosive action of water begins with the raindrop. If a piece of soft ground with small stones lying about be examined closely after a shower, it will be found that soil has been beaten down and washed away from the areas

not protected by stones. This action sometimes takes place on a larger scale in semi-arid cli¬ mates when rock-decay is slow and curious pillars of earth or soft rock capped by pro¬ tecting boulders are formed. Examples may be found in the Garden of the Gods, Colorado. When the raindrops unite to form tiny rivulets the process of river-erosion has begun. In fact, a patch of soft ground on a hillside during a shower shows many of the phenomena of stream-formation, as likewise does even a dust- covered street. The work of surface water is continuous. Some rock-constituents are dis¬ solved and borne away in solution ; other particles are carried away in suspension and, by abrasion on rocks below, help the stream carve its channel deeper. When the current slackens some of the waste from the higher lands may be deposited, the coarser materials first. Thus mountains are worn down and plains formed. The higher the mountains, the deeper the valleys can be carved; but even the highest mountains are ultimately deeply dissected, and finally worn down so that the current of the river may not be strong enough to transport the detritus. The carving of the Grand Canyon of the Colorado, a stupendous piece of work as it is, is but a be- ning in the complete leveling of the region. A country thus worn down is said to have reached a base-level of erosion, and its nearly level surface forms a peneplain. If such a region be uplifted the streams will start work again vigor¬ ously, and a new cycle of erosion will begin. A region reduced to its base-level, if neither ele¬ vated nor depressed, can remain unchanged through millions of years.

The amount of waste brought down by some rivers is enormous. Thus the Po in flood car¬ ries one part sediment to every 300 parts of water; the Ganges one part sediment to 835 parts of water. These may seem small ratios of sediment, but the total amount of material discharged annually by the Ganges is calculated to be 378,100,000 tons, while the Nile annually brings down 150,000,000 tons. The Mississippi annually brings to the Gulf

of Mexico 406,250,- 000 tons of material in suspension, enough to lower its whole basin one inch in 300 years. It is calculated that the average amount of material removed as sediment annually by streams over the whole land surface is 600 tons per square mile.

2. Marine erosion is continually wearing away the continents. Waves undermine cliffs, grind up sand and boulders, and working with the undertow, drag the materials out and deposit them in the ocean. Some geologists even hold that marine planation is more important than river work in the destruction of continents.

EROSTRATUS, Ephesian incendiary. To perpetuate his name as the destroyer of one of the seven wonders of the world he set fire to the magnificent temple of Artemis (Diana), at Ephesus, on the night Alexander the Great was born (356 b.c.). The indignant Ephesians de¬ creed that whoever pronounced his name would be put to death, a sure means of insuring his fame.

EROTIC (Greek eras, love) POETS, the name applied to certain modern French fiction- ists, and in Greek literature, particularly to a class of romance writers, and to the author of the (Milesian Tales. > These writers belong to

the later periods of Greek literature, and abound in sophistical subtleties and ornaments. The best of them are Achilles, Tatius, Heliodorus, Longus, Xenophon of Ephesus and Chariton. The word erotic is used in two closely related senses, (1) amorous, treating of love or in¬ spired by love; (2) a love poem or composition.

EROTOMANIA, a kind of paranoia in which there is present a morbid ideation toward a real or imaginary object of love. See Paranoia.

ERPENIUS, er-pe'm-us (Latinized from Van Erpe), Thomas, Dutch Orientalist: b. Gorkum, Holland, 11 Sept. 1584; d. Leyden, 13 Nov. 1624. His fame rests principally on his acquaintance with the Oriental languages. To extend his knowledge of them he visited Eng¬ land, France, Italy and Germany, and became acquainted with the most eminent scholars. He learned at the same time the Persian, Turkish and Ethiopian languages. He returned, in 1612, to Leyden, and was appointed professor of Arabic and other Oriental languages. He established a press, at great expense, for the printing of works of Oriental literature. In 1619 a second Hebrew professorship was founded at Leyden, and committed to Erpenius. Soon

after he re¬ ceived the office of Oriental interpreter to the states-general. The most learned Arabs ad¬ mired the elegance with which he expressed himself in their language, so rich in delicate peculiarities. His reputation as a perfect master of the Arabic became universal, and he was re¬ peatedly invited by the king of Spain to explain inscriptions on the Moorish buildings and monu¬ ments. The works of Erpenius (some of which were published after his death), are held in the highest estimation. Besides his (Grammatica ArabicaP his (Grammatica HebraicaP and other grammatical works, his most valuable and cele¬ brated publication is his (Historia Saracenica)

(1625).

ERRANTE, Vincenzo, ven-chend'sd er- ran'te, Italian poet and statesman : b. Palermo, 16 July 1813; d. Rome, 29 April 1891. He was many years an exile for his share in Sicilian politics. His works are two volumes of (Tragedies and Lyrics) (1874) ; the dramas (The Feast of Saint Felix) and (Suleiman the Great) ; the poems (The Ideal and (LibertyP He wrote also a (History of the Osmanli Em¬ pire from Osman to the Peace of Carlowitz**

(1882-83).

ERRANTIA, er-an'shi-a, an order of anne¬ lids of the sub-class Polychaeta, characterized by their not dwelling in fixed tubes, but wandering about freely, seeking animal food. They have a well-developed head, with protrusible pharynx usually armed with chitinous jaws, and efficient locomotory organs. A typical genus is Nereis , with many familiar species.

ERRARD, ar-rar, Charles, French painter and architect: b.. Nantes, 1606; d. Rome, 15 May 1689. He was instructed in painting by his father, Charles Errard, known as the elder, and perfected his knowledge at Rome. On his return to France he gradually rose to eminence in his profession. In 1648 he became one of the 12 founders of the Academy of Painting. He was engaged in the decoration of the Palais Royal, Louvre and other palaces. His chief

claim to notice rests, however, upon his con¬ nection with the foundation of the French academy at Rome, which was projected by him and carried into effect in 1666, with 12 pupils, and of which he was the first director.

ERRATA, e-ra'ta (Latin, the plural form of erratum, an error), the list of errors and cor¬ rections placed at the end or at the beginning of a book. Before the invention of printing, and for a short time after, the errata were cor¬ rected on the page where they occurred, but this was found to be

inconvenient when the art became a little more developed. The first known example occurs in an annotated edition of < Juvenalˆ published at Venice in 1478, which contains a list occupying two pages. (The Vul¬ gate, > published in 1590, at Rome, by Sixtus V, and of which the proofs were revised by that Pope himself, contains, instead of a table of errata, a bull which excommunicated those who would dare to make any alterations in the text. The book, however, was found to contain so many blunders that it was afterward suppressed, and the Papal bull had no other effect than that of amusing the learned and creating a demand for the copies still existing, some of which have been sold for about $200. See Bull; Mistake.

ERRATICS, or ERRATIC BLOCKS, in

geology, boulders or large masses of angular or subangular rock which have been transported to a distance from their original outcrop by the action of ice during the Glacial Period. Thus on the slopes of the Jura Mountains, in France, immense blocks of granite are found which have traveled 60 miles from their original situa¬ tion and in northern United States, boulders are found, the nearest source of which must be over 200 miles distant from the present loca¬ tion. See Geology; Glacier; Glacial Period.

ERRERA, er-ra'ra Alberto, Italian political economist: b. Venice, 21 April 1842. He was educated at Padua and has held the pro¬ fessorship of political economy and statistics in the schools of several Italian cities, including Venice, Milan and Naples, and also at the Uni¬ versity of Naples. Among his works are (Storia e statistica delle industrie Venete) (1870) ; (Storia della economia politica nei secoli XVII, e XVIII negli stati della, republica Veneta) (1877) ;

*ERRETT, Isaac, American clergyman : b. New York, 2 Jan. 1820; d. near Cincinnati, Ohio, 19 Dec. 1888. In 1840 he entered the ministry of the <(Christian Church,® a sect founded by Alexander Campbell, and held pastorates in Pennsylvania, Ohio, Michigan and Chicago, Ill. For a time he assisted Campbell in the editorship of the Millennial Harbinger, in 1866 he established the Christian Standard, and published it until his death. He was presi¬ dent of Alliance College 1868-69; filled many offices in his Church, and wrote (Brief View of Christian Missions> (1857) ; < First Principles, or the Elements of the Gospel * (1867):*

(1875) ; (Letters to a Young Christian1 (1877) : (Evenings with the Bible) (1884-87) ; (Our Position; the Plea Urged by the People Known as Disciples of Christ* (1885). Consult Lamar, * Isaac Errett) (Cincinnati 1894).*

ERRHINES, er'rinz, medicines adminis¬ tered locally to produce sneezing, and so relief from catarrh by a discharge from the nostrils. The term is not generally used at present.

ERROR, (Latin errare, to wander) (1) In astronomy errors or differences in calculations and observations, to correct which recourse is had to a system of reduction known as the method of least squares. To correct errors of instrument measurement is of the greatest im¬ portance in all scientific work, and great care and pains are taken to secure these corrections. (2) Clerical error, a mistake in writing, a slip of the pen. (3) Joiner in error, in law; the taking of issue on the suggestion of error. (4) Writ of error, in law, a process issued by a court of review, to an inferior court, suggesting that error has been committed and requiring the record to be sent up for examination ; now commonly known as an appeal. (5) Court of error, a court exercising appellate jurisdiction by means of writs of error. (6) Assignment of error, in law, specification of the error sug¬ gested or objected to. For ordinary errors, see Bull; Mistake.

ERROR, Personal. See Equation, Per¬ sonal.

•

ERSCH, ersh, Johann Samuel, German bibliographer: b. Grossglogau, 23 June 1766; d. Halle, 16 Jan. 1828. He was principal librarian and professor of geography and statistics at Halle, and is credited with being the founder of modern German bibliography. Among his publications are a (Dictionary of French Writers) ; ‘Manual of German Literature> ; and, in connection with Gruber, the (Universal Enc3'dopaedia of Arts and Sciences* (1818). This latter is a work of great merit.

ERSE, ers, a corruption of the word Irish; a name applied to Irish Gaelic people, and also to the lowlanders of Scotland. See Celtic Languages ; Celtic Literature.

ERSKINE, David Stewart, 1 1th Earl of Buchan, Scottish author and antiquarian : b. 1742; d. 1829. He received his education at the University of Glasgow and in 1780 founded the Society of Scottish Antiquaries. He published ‘An Account of the Life, Writings and Inven¬ tions of Napier of Merchiston* (1787) ; ‘Essays on the Lives of Fletcher of Saltoun and the Poet Thomson) (1792) ; (Anonymous and Fugi¬ tive Essays) (1812).

ERSKINE, Ebenezer, Scottish clergyman and founder of the Secession

*Church in Scot¬ land: b. Dryburgh, Berwickshire, 22 June 1680; d. Stirling, 2 June 1754. He was ordained to the parish of Portmoak, Kinrosshire, in 1703, in which charge he remained 28 years, when he was translated to Stirling (1731). His attitude during the "Marrow** controversy as well as his opposition to the system of patronage in the Church, led to a sentence equal to deposition being passed in 1733, which was recalled in the following year; in 1733 he with a few others made a formal act of secession; in 1737 he was joined by his brother, Ralph (q.v.) ; but it was not till 1740 that he was finally deposed from the ministry and his church dosed, to him. The Secession Church was split in twain in 1747 on the question of subscription to the civic oath then taken by the burgesses of Edinburgh, Glas¬*

gow and Perth, those who maintained its law¬ fulness, led by the Erskines, being called Burghers, and their opponents Anti-Burghers. So keen did feeling rise, that Erskine was for¬ mally deposed from the ministry by the Anti- Burghers. The breach in the ranks of the se- ceders was not healed until 1820. Erskine was the author of several volumes of sermons. His (Life and Diary were published in 1845. Con¬ sult his 'Life* by Ker, J., (1881) ; and Mac- Ewen, (The Erskines * (1900).*

ERSKINE, Henry, Scottish barrister: b. Edinburgh, 1 Nov. 1746; d. Almondell, West Lothian, 8 Oct. 1817. He twice held the office of lord-advocate, was for long the leader of the Scottish bar and had a high reputation as a wit.

ERSKINE, John (of Dun), Scottish re¬ former: b. 1509; d. 1591. He came of a noble family of which several members perished at the battle of Flodden Field. His early educa¬ tion was gained at King's College, Aberdeen. Having accidentally killed a priest his family sent him abroad to complete his education. On his return he introduced the study of Greek into Scotland. That he was one of the earliest supporters of John Knox is gathered from the fact that he was one of the signers of the first covenant of the Scottish reformers. He at¬ tended the marriage of Queen Mary in France as one of the special commissioners appointed for this purpose. Later Erskine assumed the role of mediator between Knox and the Queen. He was one of the compilers of (The Second Book of Discipline) (1578).

ERSKINE, John, of Carnock, afterward of Cardross, Scottish jurist: b. 1695; d. near Dumbarton, 1 March 1768. He was called to the Scotch bar in 1719, was professor of Scots law in the University of Edinburgh, 1737-65, and was author of Principles of the Law of Scot- land) (1754), and the 'Institutes of the Law of Scotland) (1773), both authorities.

ERSKINE, John, Scottish theologian: b. Edinburgh, 2 June 1721; d. there,

*19 Jan. 1803. He was educated at the University of Edin¬ burgh and at 22 received his license to preach. In 1744 he was ordained minister of Kirkin¬ tilloch, where he remained nine years, when he removed to Culross parish in Dunfermline presbytery. Five years later he removed to New Greyfriars, Edinburgh, and in 1767 to Old Greyfriars. He was for many years the leader of the evangelical party. He wrote many ser¬ mons and pamphlets of a theological nature. Consult Wellwood, 'Life of John Erskine> (Edinburgh 1818). **

ERSKINE, John, American educator : b. New York, 5 Oct. 1879. He wTas graduated at Columbia University in 1900, and in 1909 be¬ came associate professor of English there. In 1903-09 he was instructor and associate pro¬ fessor of English at Amherst College. After 1909 he was adjunct professor, and after 1916 professor of English at Columbia. He has published 'Actseon and Other Poems) (1907) ; 'Leading American Novelists) (1910) ; (Writ¬ ten English, writh Helen Erskine (1910, rev. ed., 1913) ; Selections from the Idylls of the King> (1912) ; 'Poems of Wordsworth, Shelley and Keats,* with W. P. Trent (1914).*

He has edited (Contemporary War Poems> (1914) ; (The Moral Obligation to be Intelli¬ gent and Other Essays (1915) ; (Interpreta¬ tions of Literature by Lafcadio Hearn) (1915). He contributed also to magazines and to the Encyclopedia Americana. **

ERSKINE, Ralph, Scottish seceder : b. 15 March 1685; d. Dumfermlin, 6 Nov. 1752. He was a brother of Ebenezer Erskine (q.v.). He was ordained to the collegiate charge of Dunfermline in 1711, and in 1737 joined his brother, who had seceded from the Established Church. His (Gospel Sonnets) and other reli¬ gious works were once very popular.

ERSKINE, Thomas, Baron Erskine, Scottish jurist: b. Edinburgh, 21 Jan. 1750; d. Almondell, West Lothian, 17 Nov. 1823. First in the navy and then in the army, he finally decided on a legal career at the suggestion of Lord Mansfield. He became a noted forensic orator and jurist, attaining early renown as a pleader in support of the accusations of cor¬ ruption made against Lord Sandwich ; later he added to his success by his defense of Stock- dale, Lord George Gordon, Hardy, Thomas Paine, Horne Tooke and others. Some of his greatest successes were obtained in combating the doctrine of constructive treason, by which it was sought to make persons who aimed at effecting a change in the sovereign's constitu¬ tional character and position guilty of the cap¬ ital offense of ˆcompassing the

king's death.® His acceptance of a brief for Tom Paine re¬ sulted in his dismissal from the office of attor¬ ney-general to the Prince of Wales. He was a member of the House of Commons in 1790- 1806, but achieved no success there. He was created Baron Erskine of Restormel, on becom¬ ing lord chancellor in 1806, holding office till the following year.

ERSKINE, Thomas, Scottish theological writer: b. Edinburgh, 1788; d. 1870. He studied law at the University of Edinburgh and practised this profession from 1810 to 1816, when he abandoned it for the literary field. Many of his views in matters of theology were unorthodox, such was especially the case with his theories of the atonement and universal restoration. He propounded his views so skil¬ fully, however, that they impressed a great num¬ ber very favorably. He was expelled from the Kirk in 1831 because of his heterodoxy. His writings include (Remarks on the Internal Evi¬ dence of the Truth of Revealed Religion (10th ed., 1878) ; (The Unconditional Freedom of the GospeP (1828) ; (The Doctrine of Election) (1837; 2d ed., 1878) ; spiritual Order and Other Papers) (1871). Consult his (Letters,* edited by William Hanna (1877).*

ERTEL, ar'tel, Jean Paul, German com¬ poser: b. Posen, 1865. He studied composition under E. Tauwitz and piano under Liszt and Brassin. He is teacher at the Brandenburg Con¬ servatory, Berlin, and musical critic of a Berlin newspaper. He collaborated on various publi¬ cations and edited the Deutsche Musikerzeltung 1897-1905. His compositions include the sym¬ phonies (Harald, (Maria Stuart,**

ERUPTION, a term applied to a local disturbance in the skin characterized by the for¬

mation of redness or scaliness, blistering or pustulation. In one class of affections, known as the eruptive fevers, a characteristic form of skin-eruption is diagnostic. Thus the fine red rash of scarlet fever, the bluish red rash of measles, the irregular rash of chickenpox and the pustulate rash of smallpox are readily recog¬ nized. The popular notion that an eruption is an indication of something evil within the body finding its way out belongs to the mediaeval days of superstition and ignorance, when disease was regarded as an evil spirit to be exorcised, and gave notice of its evacuation by means of an eruption on the skin. At the present time we know that most eruptions are either of purely local occurrence, due to localized irritants, as in the case of pimples, boils, etc., or that they represent a disturbance of the nerve-centres, whose end-filaments are distributed to the epi¬ thelial structures of the body. Thus in measles, not only the skin, but also the mucous mem¬ branes of the respiratory tract are affected, the poison affecting the nerve-structures being evi¬ denced by nerve-irritation at the periphery of the body. The popular idea that it is necessary to bring

an eruption out in acute infectious diseases such as measles and scarlet fever is trustworthy, but an interpretation is frequently given to it that is not sound. The presence of an eruption on the surface of the body in these affections is an indication of the protective ener¬ gies of the human organism in its fight with the infection . and poisoning. The inability of the body to counteract the poison of the disease may prevent the development of the eruption, and thus its bringing out, being the sign of the body's ability successfully to cope with the poison, is the warrant for the popular idea of the efficiency of the eruption. Many drugs locally applied, or taken internally, cause the formation of eruptions. These eruptions may be due to purely nervous influences, or they may be of local origin. Drug-eruptions following the use of the iodides and bromides are of this latter character. As the drug is eliminated through the skin, its passage there causes local irritation and the formation of an eruption. See Dermatitis; Measles; Skin and Skin Dis¬ eases.

ERUPTIVE ROCKS. See Igneous Rocks

ERWIN VON STEINBACH, fon stln'~

*baH, German architect : b. Steinbach, Baden ; d. 17 Jan. 1318. The principal tower of the cathe¬ dral of Strassburg had been completed in the 7th century. It was partly built of wood and was reduced to ruins by lightning and successive fires. The nave, begun in 1015, was only com¬ pleted in 1275. Erwin was then requested to furnish designs for the decoration of the in¬ terior of the church and for the construc¬ tion of two new towers and a fagade upon the site of the ruins of the old tower. The founda¬ tion stone of the new structure was laid 25 May 1277. The architect died when the work was only half finished. It was continued by his son Johannes (d. 18 March 1339), and subse¬ quently continued chiefly after his. designs, still preserved at Strassburg. His daughter Sabina assisted him in the decoration of the interior of the church; and another of his sons, Win¬ ding (d. 1330), was also an architect of some distinction. The remains of this * family of architects are interred within the cathedral.*

ERXLEBEN, arks'la-ben, Johann Chris-

tianˆGerman naturalist: b. Quedlinburg, 1744; d. 1777. He was educated at the University of Gottingen and in 1771 was appointed professor of natural philosophy there. He published

ERYMANTHUS, in ancient geography, a river (now called Douana) and

mountain (now Olonos) of Arcadia, in Greece. The river, ac¬ cording to some the modern Dimitzana, rises on the frontiers of Arcadia and Elis, and flows into the Alpheus. The mountain, situated to the east of the river, formed the western point of the northern barrier of Arcadia, and was covered with forests. It was in this mountain that Hercules chased and killed the famous wild boar.

ERYNGIUM, e-rin'jl-um, a genus of plants of the parsley family (Apiacece) . The generic name from the Greek refers to their thistle-like appearance. There are about 220 species in the genus, of which about 22 are found in America. Rattelesnake-master, or button-snakeroot (£. aquaticum) grows in wet soil and in the pine- barrens, from New Jersey south to Florida and west of Texas, Missouri and Minnesota. Its common names are given to it because of its supposed efficacy as an antidote to the venom of snakes. A number of species are cultivated, both on account of the steel-blue color of the stem and branches, and of the unusual manner of growth. Eryngo (E . maritimum), sea holly, is a native of Europe. It frequents sandy shores, and is distinguished by its rigid, spiny, glaucous, veined leaves and its dense heads of blue flowers. The roots are sometimes candied, and are reputed to be stimulating and restorative. Falstaff speaks of its use as a confection and its aphrodisiac qualities, either real or supposed, are mentioned by dramatists from Jonson to Prior.

ERYON, a fossil crustacean found in the rocks of the Mesozoic period in Europe. Six species have been identified of which E. pro- pinquus is the best known. Consult Crustacea ; Fossils.

ERYOPS, a genus of fossil amphibians of the Pemican rocks of Texas, which is of great interest as the ancestor of the extension order of labyrinth-odonts, according to the latest general opinion. Several species have been de¬ scribed, of which the best known (E . mega- cephalus) was six to eight feet in total length. It was sluggish, a water-and-shore living animal, in form something like a Californian horned toad and crept about on legs so short as hardly to lift its belly off the mud. Its skull was en¬ tirely encased in bone, save small holes for nostrils and eyes, and showed no sutures. The feet were broad and spreading and the tail short and contracted into a terminal pointed coccyx. Its ribs did not encircle the body, and it <(probably swallowed air like a frog.ˆ wThis animal, }) says Osborn, may be regarded as a collateral ancestor of the labyrinthodonts ; it belongs to a type that spread all over Europe and North America, and persisted into the Metopias of the Triassic. Consult Osborn,

ˆOrigin and Evolution of Life) (New York 1917) ; Gadow, (Amphibia and Reptiles (New- York 1901) ; Woodward, (Guide to Fossil Reptiles) (in the British Museum, London*

1905).

ERYSICHTHON, er-i-sik'thon, son of King Triopas, and himself a legendary king of Thessaly. He cut down trees in a sacred grove and he was cursed by Demeter with such unsatisfiable hunger that he devoured his own flesh. He is said to have repeatedly sold his own daughter ; but each time she returned to him. She had received from Poseidon the power of self-transformation.

ERYSIMUM, e-ris'i-mum, a genus of plants of the family Brassicacece, chiefly bien¬ nials, with narrow entire leaves, and yellow, often fragrant, flowers. There are about 85 species, natives of northern, temperate and cold countries. E. cheiranthoides, a native of Europe, with small yellow flowers, is found in waste places, along streams, and in fields from southern New England to Newfoundland, and westward to the Pacific coast.

*ERYSIPELAS, an acute infectious disease of the skin and subcutaneous structures caused by a streptococcus. Whether the Streptococcus erysipelatis of Fehleisen, or the Streptococcus pyogenes is considered the causative factor or not, the fact remains that bacteriologically it is probable that these two forms of bacteria are identical. The reaction of the tissues to the streptococcus and its poisons causes the acute inflammation with redness, puffiness and some¬ times gangrene. This local swelling is attended with fever, headache, general constitutional symptoms, nausea, vomiting, and at times with toxic delirium. Occasionally the streptococcus wanders into the blood-stream, and general septicemia or pyemia results. At other times a streptococcic invasion of the joints produces an acute rheumatism with secondary heart com¬ plications. Erysipelas may affect any part of the body, but is very frequently over the face and head. It is extremely contagious, the organism finding entrance through minute wounds. Patients who have had recent ery¬ sipelas should on no account be allowed to come anywhere near women in childbirth, as puer¬ peral fever may result. The treatment of ery¬ sipelas is by means of tonic — iron and quinine being favorites — nutritious and easily assimilable diet, milk, cod-liver oil and some form of al¬ cohol. In those patients in whom abscess for¬ mation occurs, prompt surgical evacuation is imperative. Local treatment by ichthyol and similar antiseptics is widely employed with some benefit. **

ERYSIPHACEAE. See Mildew. ERYTHEMA. See Dermatitis. ERYTHIA. See Hesperides.

ERYTHRAEAN (er'i-thre'an) SEA, in ancient geography a name given to what is now called the Indian Ocean, but including the Per¬ sian and Arabian gulfs. The name was lat¬ terly restricted to the Arabian Gulf.

ERYTHRIC ACID, a white, crystalline, tasteless and odorless powder, readily soluble in alkalis and alcohol obtained from lichens.

ERYTHRINA. See Coral-tree.

ERYTHRITE, or t(cobalt bloom," a native hydrous cobalt arsenate. It has a beautiful peach-blossom red color, whence its name from the Greek, erythros, red. It occurs in mono¬ clinic crystals, but more commonly in globular or stellate masses or earthy. It occurs at Schneeberg, Saxony ; in Cornwall, England ; in Chile, and in some parts of the United States.

ERYTHRONIUM, a genus of small plants of the lily family, common in damp, shady woods, of which a well-known and widespread species (E. americanum) in the United States, is the <(dog-tooth violet" or ((adder's tongue" — both unfortunate names. It is among the ear¬ liest of spring flowers, appearing as two radical leaves, usually handsomely mottled, between which rises a slender, naked stem (scape) three to four inches high, bearing a single bell-shaped flower of six distinct lanceolate segments, pale yellow, often spotted near the base. About a dozen other species are known in the United States, some bearing several flowers on the scape, and of various tints, as purple, rose-color, or pinkish white.

ERYTHROPLCEUM, e-rlth-ro-ple'um, a genus of tropical trees, of the pea family, con¬ taining five species, found in Africa, Asia and Australia. E. guineense of Africa has a poisonous red juice, which is used by the natives as a test of innocence or guilt, and hence the name ordeal-tree. The natives of Guinea and the Gold Coast employ the same juice to poison the points of their arrows.

ERYTHROSIN. See Coal-Tar Products.

ERYTHROXYLON, a genus of plants of the family Erythroxylacea. The genus con¬ tains about 90 species, composed almost exclu¬ sively of trees and shrubs growing in tropical regions. The flowers are small and lack color ; the fruit is a drupe. The red dyewood of Brazil is E. suberosum, and the oil-wood of Mauritius is E. hypericifolium. The chief member of the genus and family is E. coca. See Coca.

ERYX, e'riks, ancient name of a city and mountain in the west of Sicily, about six miles from Drepanum and two from the seacoast The mountain, now Monte San Giuliano, rises direct from the plain, unconnected with any other range, and hence possesses a much greater altitude in appearance

than in reality, its height being only 2,184 feet. It was anciently believed to be the highest mountain in the island after Etna, and is frequently alluded to by Virgil and other poets. On the summit stood a celebrated temple of Venus, from which the goddess re¬ ceived the epithet of Venus Erycina. All traces of the ancient town of Eryx have now disap¬ peared, and its site is occupied by the modern town of San Giuliano ; but some remains of the temple still exist in part of the substructure of the castle.

ERZBERG, arts-berg, a mountain in Styria, Austria, near the town of Eisenerz. It rises about 5,000 feet above sea-level. It has valu¬ able deposits of iron ore, reaching as high as 40 per cent metal, which is taken out annually to the amount of over 1,000,000 tons. Ara¬ gonite is also found in considerable quantity.

ERZERUM, erz'room, ERZEROUM, or ERZEROOM, Armenia, a large city of, and,

after the annexation of Kars by Russia, the chief place of resistance by Old Turkey to a Russian advance, about 100 miles south¬ west of Trebizond. Its fortifications have been repaired and much improved since 1864. The inhabitants consist of Turks, Armenians and Persians and are very industrious; and, in addi¬ tion to important manufacture, especially in cop¬ per and iron, carry on a very extensive trade. This is greatly favored by the position of the town, standing at the junction of several im¬ portant roads leading from Transcaucasia by way of Trebizond, and communicating with dif¬ ferent parts of Asia Minor, with Persia, Kur¬ distan, Mesopotamia, etc. Erzerum is a place of great antiquity. Anatolius, commander of the Emperor Theodosius II, here built the cit¬ adel of Theodosiopolis, northwest of the open Syro-Armenian trading town of Arsen. On the destruction of this town by the Seljuks, in 1049, the inhabitants removed to Theodosiopo¬ lis, which received from them the name of Arsen-er-Rum, that is, Arsen of the Romans. Hence the modern name Erzerum. In 1241 it fell into the hands of the Mongols, and in 1517 into those of the Turks, notwithstanding whose mismanagement it continued to be the most important commercial emporium of the Arme¬ nian plateau, and had a population of 100,000. In 1829 it was taken by the Russians, but was restored to Turkey by the Peace of Adrianople. Many of the inhabitants, however, quitted the town and settled in the Russian territory. In the winter of 1877 it was besieged by the Rus¬ sians, who reduced the defenders by famine, until in February 1878 it was surrendered, and held by the Russians for several months. It was again, however, restored to the Turks. In the European War Erzerum fell a prize to the armies of the Grand Duke Nicolas, on 16 Feb. 1916, after an assault lasting five days. Turk¬ ish prisoners to the number of 13,000 were taken and 323 pieces of cannon. See War, European.

ERZGEBIRGE, arts'ge-ber-ge (German, Ore Mountains), a range of low mountains about 100 miles long on the boundary between Saxony and Bohemia. It is about 25 miles wide, and has an average elevation of 2,500 feet and a maximum of 4,060 (Mount Keil- berg). On its sides are extensive forests, among which are many summer resorts. Like the Blue Ridge Mountains in the United States and the Highlands of Scotland, they are an ancient range, worn down and again uplifted. As the name implies, the Erzgebirge contain valuable deposits of minerals and form an old mining region. Silver ores were mined there as long ago as 1150 and mines of lead, copper, tin, cobalt, nickel and iron ore have also been sunk there.

ERZINGAN, er'zing-an, Armenia, town and capital of a district in the province of Erzerum, 85 miles south of Erzerum. It is situated in a plain at 3,900 feet above sea-level and is of importance as a garrison town. It has a military hospital, large barracks, government buildings, a mosque, a bazaar, an Armenian normal school, and other Armenian schools. It has manufactures of cotton, canvas, silk, copper and clothing. The government maintains several tanneries in the neighborhood. In 1784 most of the place was destroyed by an earth-

quake. In ancient times it was called Arsinga. Pop. 18,000, about equally divided between Armenian Christians and Mohammedans.

ESARHADDON, king of Assyria and son of Sennacherib. He reigned from 681 to 668 b.c. When his father was slain by his brothers, Esarhaddon proclaimed himself governor of Babylonia and set about avenging his father's death. Within a year he succeeded in having himself acknowledged king of Assyria. He conducted several campaigns against foreign enemies, first against the Chaldaeans, capturing Sidon and razing that city. In 673-670 b.c. he made two campaigns in which he brought Egypt under his yoke. He died while on the way to repress an insurrection in Egypt in 668 b.c. He designated Assurbanipal as king of Assyria. He did much for the rebuilding of Babylon and planned many great building enterprises. His liberality has caused him to be considered one of the most beneficent kings of Assyria.

ESAU, the eldest son of Isaac, and twin brother of Jacob (Gen. xxv, 24-26). His name (which signifies rough, hairy) was due to his singular appearance at birth, being (

Many biblical scholars are inclined to look upon this story of Esau and

Jacob as symbolical of the relationship existing between -the Israelites and the Edomites. The characteristics of the former are well represented by Jacob and those of the latter by Esau. Edom, which was older than Israel, was subjected by David. See Edom.

ESBJERG, es'byerg, Denmark, seaport, 56 miles west of Fredericia, with a large export trade in cattle and dairy products, mostly to England. Its harbor, the only one of importance on the west coast of Jutland, was constructed by the state at great expense in 1868-74; and in 1887 an annual subsidy was. granted by govern¬ ment for steam communication with Great Britain. A submarine cable connects with Calais. Pop. 18,208.

ESCALADE, es-ka-ladd', in war, a furious attack of a wall or a rampart, carried on with

ladders, to pass the ditch or mount the rampart, without proceeding in form, breaking ground, or carrying on regular works to secure the men. See War.

ESCALANTE, as-ka-lan'ta, Juan, Spanish soldier and explorer: d. 1519. He accompanied Cortes to Mexico and by the latter was made high constable of Villa Rica de Vera Cruz. He destroyed, on order of Cortes, the fleet which had brought the Spaniards from Spain and with 150 men, remained on the coast while Cortes marched against Mexico City. When two of his company were assassinated by the Indians Escalante set out with 50 whites and thousands of Indian allies to make reprisals on the hostile tribes. In the ensuing battle his forces were successful but he and seven of his white fol¬ lowers were slain.

ESCALATOR, the name applied to a con¬ tinuous carrier designed for conveying pas¬ sengers from one level to another within a limited time. The various units making up the escalator are so arranged that on the incline they present the familiar zigzag appearance of an ordinary stairway, and may be used as such. The escalator consists of an endless series of steps connected together by a heavy sprocket chain which, at the proper place, engages with the driving sprocket wheel. Each step is es¬ sentially a four-wheel truck, bolted to a shaft, which, in turn, is connected to the links of the driving chain. There are two wheels at each end of the truck traveling on separate tracks, so placed that the steps remain horizontal at all points of the ascent. At the landing, at the top and the bottom of the escalator, the trucks travel in the same plane so that the steps there become a moving platform. Ample opportunity is thus given, even to the infirm, to board the de¬ vice before the ascent begins and at the top to step off again. A traveling hand-rail moving at the same speed as the steps further simplifies its use. Should a person fail for any reason to step off at the upper landing,

a device called a shunt removes him from it. This consists of a box-like affair, triangular in plan, placed about 10 feet from the top of the escalator with the apex pointing against the direction of the mov¬ ing platform. In the lower part, set in a ver¬ tical position, are two belts running backwards from the apex. Anything coming in contact with these belts is gently brushed to one side. Every part of the escalator is made to microm¬ eter measurements of one thousandth of an inch by special machinery designed for the pur¬ pose. As a result of this unusual precision,. the various steps fit together so nicely that a piece of paper cannot be forced between them.
>To secure practically noiseless operation, the wheels on which the trucks move are deadened, raw- hide pinions are used in driving gear, and the tracks are built up of wood and steel. The links of the sprocket chain are made of two 18-inch cast steel shrouds,, with 1 ˆ4-inch steel pins between them at 3 inches between centres. The ends of the links are bushed with phosphor-bronze in which graphite is inlaid, thus providing lubrication of the bearing sur¬ faces, and the heels are similarly provided with a constant lubrication of graphite. The escala¬ tor is driven by an electric motor located within the structure of the upper landing and suitably geared to the large driving sprocket wheel by a

combination of worm and spur gearing. All parts of the running gear are made of crucible cast steel, the axles and link pins being of cold drawn steel. Each casting is subjected to a test of many times the working-strain to come upon it.

While there are no mechanical limitations to the rate of speed with which the escalator may be driven, it has been found that a speed of about 100 feet per minute is satisfactory to the public. At this rate of driving, 4,000 steps per hour arrive at the landing and the maximum capacity of the machine depends upon the width of the steps used. The escalators which have been installed for railroad stations, large depart¬ ment stores and other localities where a large capacity is necessary, have been a little over five feet in width and as each step readily ac¬ commodates three people the maximum capacity of such a construction is 12,000 people per hour. For the smaller department stores and for use in railroad stations where the traffic is not heavy the escalator is made of such width as to ac¬ commodate one person on each step, and the capacity is therefore 4,000 per hour. It should be noted that the escalator is a perfectly re¬ versible machine, operating equally well in either direction. In the "duplex® type, the steps dur¬ ing the descent are again guided into the familiar zigzag position by suitably placed tracks and thus the same machine serves to

carry pas¬ sengers both up and down. In a third modifica¬ tion of the device designed especially for the London underground railroad, where the dif¬ ference between levels is considerable, the steps ascend in one spiral and descend in another spiral below the first.

ESCALOP, or SHELL, an heraldic sym¬ bol used to signify that the bearer has voyaged much on the sea. See Heraldry.

ESCANABA, Mich., city and county-seat of Delta County, on Little Bay de Nouquette, an inlet of Green Bay ; on the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads; 52 miles northeast of Marinette. Owing to its excellent and pic¬ turesque situation, it enjoys considerable repu¬ tation as a summer resort. The harbor has an eight-mile frontage and there is steamboat con¬ nection with several lake ports. Much of the Lake Superior iron ore is shipped from here. It contains eight ore docks, in which are handled over 4,000,000 tons annually, and there is, moreover, a large trade in coal, fish and lum¬ ber. There are manufactories of flooring, furniture and wooden ware, a plant for crush¬ ing iron ore, and large railroad repair shops. The United States census of manufactures for 1914 showed within the city limits 45 indus¬ trial establishments of factory grade, employing 921 persons ; 777 being wage-earners receiving $469,000 annually in wages. The capital in¬ vested aggregated $1,354,000 and the year's out¬ put was valued at $1,507,000: of this, $771,000 was the value added by manufacture. The buildings of note are the public library, hospital, high school, courthouse and city hall.* The city was settled in 1863, and was incorporated in 1883 and received its city charter in the same year. Pop. (1920) 13,103.

ESCANDON, Guillermo de Landa y,

Mexican statesman : b. Mexico City. He was educated in Stonyhurst University, England ; was several years a member of the national Senate,

representing the states of Chihuahua and More¬ los ; from 1900-02 he was mayor of Mexico City and became governor of the Federal District in 1903. Under his administration many very im¬ portant reforms have been introduced and car¬ ried to successful results, among them the re¬ striction or practical discontinuance of gam¬ bling; the improvement of the public carriage service; the enactment of rules restricting the speed of automobiles; the protection of the peon or Indian class ; the improvement of the prisons of the capital city and its suburbs, and also of the public buildings and military bar¬ racks; the bettering of the sanitary condition of the correctional schools, the theatres and other places of amusement, and of the entire city; the adoption of a system of street sweeping and sprinkling; the placing of proper restrictions on the sale of alcoholic beverages, etc.

ESCAPE, the liberation of a person from lawful custody without lawful authority. When accomplished by the prisoner it is known as prison breach, but if accomplished by others and with force, it is known as rescue. Prison breach with force is a felony, but, if without force, merely a misdemeanor. In most modern jurisdictions a prisoner who effects his escape loses all commutation of sentence earned by him in any manner whatsoever. His aids in the escape, or even attempt to escape, are guilty of the same grade of crime as the prisoner and are liable to the same punishment. Officers who voluntarily permit an escape are considered as aids and punished as such. When guilty merely of negligence they are punished for a misdemeanor. See Criminal Law.

ESCAPEMENT, a part of the machinery in a watch or clock. See Clock; Watchmaking.

ESCARP, or SCARP, the slope of a ditch next the parapet. In permanent fortifications the escarp is usually faced with mason work behind which are erected casemates. See For¬ tification.

ESCARPMENT, the abrupt descent, which may or may not be a cliff, from a plateau to lower land. Particularly famous are the Hel- derberg escarpment near Albany, and the Niag¬ ara escarpment, the latter responsible for Niagara Falls. The Allegheny Front is an¬ other well-known escarpment. See Mountains ; Cliff.

ESCARS. See Eskers.

ESCAUT, es-ko, the French name for the river Scheldt.

ESCHALOT. See Shallot.

ESCHAR, es'kar, a portion of dead tissue, also the artificial slough produced by the use of caustics.

ESCHATOLOGY. The teaching in re¬ gard to the last things (Greek ta eschata). It deals with man's condition after death, the destiny of nations, and the end of the world. Speculation concerning the fate of the indi¬ vidual appears to have started in a very early period of man's career. Archaeological remains indicate the presence, of certain customs al¬ ready in the paleolithic age which seem to re¬ veal a nascent conception of survival after death. The disposal of the lifeless body so as to provide it with a shelter, the pictorial repre¬ sentation of men disguised by the heads of animals, and the cremation of the dead scarcely

permit any other interpretation. Sepulture, even in its simplest form, apparently implies the idea of something within man that may be tem¬ porarily absent but still demands a measure of sustenance and protection for the body. Ac¬ cording to primitive notions among peoples sur¬ viving until to-day in stone age conditions, some of those that once lived in a neighborhood and, possessed of extraordinary power, created things may return in the guise of totems for the increase and strengthening of the tribe. The desire to have the double within, whose existence had been suggested bv many an ex¬ perience, united with the element of fire, for whose permanent possession man had so long struggled, is likely to have given rise to the incineration of the body. In the neolithic age specially constructed tombs, offerings of solid food and blood to the dead, and other customs testify to the growing belief in a survival de¬ pendent upon such ministrations. It is prob¬ able that the satisfaction of immediate needs, impulses, and passions precluded, in these re¬ mote ages, any serious concern about the future of the tribe, while the nomadic habits which allowed only a loose attachment to any partic¬ ular place tended to prevent a local catastrophe from conjuring up the thought of an impend¬ ing destruction of the whole world.

In various centres the earlv civilizations de¬ veloped along different lines these ideas con¬ cerning the future. The Egyptians continued through thousands of years the practices of the neolithic age, though with some modifications. Tombs were differently constructed, bodies were embalmed, painted food was substituted for real, the mortuary ritual was enriched, but the underlying conception remained the same. Even when the Osirian theology gave a larger measure of independence to the soul, which had to appear before the judges in the nether world, the connection with the entombed body was never lost in popular thought. In periods of foreign invasion and social disorder the need was felt of some guarantees of a better future. While the Prophecies of an Egyptian Sage in a papyrus of the Middle Kingdom do not con¬ tain any distinctly predictive element, there is at least the suggestion of eschatological thought in the desire for a "shepherd of all the people, who has no evil in his heart.® The freedom of the Nile valley from any devastating natural catastrophes was not conducive to ideas of an approaching end of the world. Our knowledge concerning the zEgean and Hittite civilizations is still too scanty to allow any definite con¬ clusions on these points except such as may be inferred from the archaeological remains. The belief in a survival through protection and care of the body is clearly evidenced by tombs and cultic performances. Whatever ideas the Greeks may have brought with them into their new home, they are likely to have been much influenced at the outset by their predecessors In the Homeric Age it was thought that all souls pass at death to a shadowy and undesir¬ able existence in Hades, unless for special rea¬ sons a hero is translated to dwell with the gods. This subterranean realm may be visited by an Odysseus still in the flesh. Speculation upon successive ages, symbolized by gold, silver, copper and iron appears in Hesiod, together with the suggestion that the process of de¬ generacy will end in destruction of the last

race. As the thought of a moral retribution beyond the grave asserted itself, the Orphic and Eleusinian mysteries offered to the initiated assurance of a blessed life after death and sal¬ vation from future punishments adjusted to the crimes committed. Among the Pytha¬ goreans the idea of transmigration, probably of Eastern origin, was added to the Orphic conceptions. The primitive notion seems to have been that at death the soul is carried hither and thither by the wind until it enters another body. Plato developed this eschatological thought in various directions. He based immortality upon the essential nature of the soul as an eternal "idea® existing before birth and sub¬ sisting after death. YVhile accepting the Orphic scheme of retribution, he emphasized the posi¬ tive value and moral significance of life. He adopted the idea of the annus magnus, the cos¬ mic year, thus anticipating the end of the present world ; and he sought the realization by practical efforts of a society patterned upon the ideal, always

limited, however, by the Greek conception of the city-state. Aristotle's atti¬ tude towards this development was on all points negative or agnostic.

In Babylonia, the Sumerians thought of the dead as going to a land below the earth whence there was no return, though some semi-divine heroes, like Engidu and Enmeduranki, might be spared the common lot and translated to be with the gods, and a Gilgamesh might find his way thither. Their mythical lore and astro¬ nomical observations furnished Akkadians, Amorites, Aramaeans and Chaldaeans with ma¬ terial for later speculation. But even these peoples do not seem to have developed any new type of thought concerning the future of the individual. While the growth of a peculiar astrological system, perhaps already in the Kassite period, may here and there have sug¬ gested the idea of the soul rising to life again, and apparently led to the conception of the great cosmic year, there is as yet no unmis¬ takable evidence either that the inhabitants of Babylonia, Assyria and Mesopotamia before the Persian period became deeply concerned about existence after death, or considered in¬ tensely the future of the nation beyond some immediate emergency, or transferred the myth¬ ical imagery from the beginning to the end of the world. This was subsequently done in Syria. But even there the Hebrew writings reveal for long periods substantially the same ideas. The soul passes at death to a subter¬ ranean Sheol where there is no moral distinc¬ tion. Only exceptionally an Enoch or Elijah may escape the universal fate and be translated. But the ethical fervor and insight of the great prophets, men like Amos and Hosea, Isaiah, Micah and Jeremiah, brought to the fore a con¬ ception of the nation as having a spiritual function, independent of the maintenance of the popular religious cult and the changing fortunes of the state. The extraordinary longevity of the Davidic dynasty tended to raise the expectation of a return of political independence and power under a scion of the old line. In some circles the thought, so touch¬ ingly expressed in the book of Job, that, from a longing for the work of his hands, the Creator might bring man back again from Sheol seems to have been entertained, though the author of that great poem resolutely brushes aside this

((hope of man.8 But the way was prepared for a new growth of eschatology through contact with Persian thought.

The Aryans of the Iranian plateau and India followed primitive tendencies into different di¬ rections. A religious practice of promptly re¬ turning the body to the various elements, rather than of preserving it, in connection with a grow¬ ing demand for future retribution, seems to have led the

former to the view that the body would ultimately be restored by the elements. Al¬ though the duty of exposing the dead and the doctrine of a physical resurrection, so strongly insisted upon in the later Avesta, are not al¬ luded to in the Gathas, and the Achaemenian kings were buried, it is probable that they had long been maintained in certain Mazdayasnian circles, and they appear to have been known to Herodotus in the 5th and Theopompus in the 4th century b.c. That the world will pass through a final ordeal by fire is taught in the Gathas. The later Avesta divides the world- year, not according to the precession of the equinoxes into 25,868 years, but into 12 millen¬ nia, placing the advent of Zarathushtra at the end of the 9th, that of the Saoshyant, or Savior, who will raise the dead, at the end of the 12th. In India, on the other hand, the doctrine of transmigration became strongly en¬ trenched, while a tendency toward pantheism excluded the idea of a creation and precluded the growth of eschatology. There are no last things in a pantheistic philosophy, though the infinite stretches of divine manifestation may be divided into kalpas, yugas, or epochs. The doctrine of metempsychosis renders it possible to introduce in the future life of the individ¬ ual the nicest moral adjustments, implying both rewards and punishments in terms of character, and the possibility of rising and sinking in the scale of being according to present conduct. But this never-ending series of births and deaths may come to be felt as an intolerable evil, and Buddhism offered deliverance from the infinite wheel of existence in Nirvana. It is interesting to observe that the Aryanized people of Northern Europe not only believed in the assembly of all souls, except those trans¬ lated to be with the gods, in Hel's subter¬ ranean realm, but also in punishments for the wicked, a destruction by fire of earth's crust, a new earth people by the descendants of the pure children Lif and Lifthraser, and a new dynasty of gods. The practical character of the Chinese has preserved ancestor worship, with its conservative influence, and given an ethical rather than metaphysical turn to phil¬ osophical thought, discouraging speculation about the future. How similar ideas may grow up, apparently without historical contact, from the natural operation of the human mind, is strikingly shown by the fact that the ancient Peruvians and Aztecs looked, forward to the destruction of the world, analogous to its de¬ struction by various agencies in past epochs, and also, it would seem, to a future restoration of the body.

The blending of Greek thought and Oriental speculation that followed the conquests of Alex¬ ander gave a powerful impulse to eschatology. Plato's idea of immortality, involving pre-ex¬ istence as well as post-existence, and emphasiz¬ ing deliverance from the prison-house of mat¬

ter, spread in the East, while the Persian doc¬ trine of a resurrection found its way to Syria, and in some Hellenistic circles a spiritual res¬ urrection immediately after death was ac¬ cepted as a compromise. The colorless

exist¬ ence in Sheol was reduced to an intermediate state between death and the final assize, while the Orphic pictures of heaven and hell helped to give a distinctive character to man's ultimate fate in the other world. Stoic philosophers set forth a theory of cycles according to which each cosmic year ends with a universal con¬ flagration, leaving only the elements out of which a new world rises to pursue its course in exact repetition of its predecessor. Jewish apocalypses described a succession of world- empires and laid down a definite program of the last things with many features ultimately borrowed from Babylonian mythology. Some¬ times the coming kingdom of heaven was thought of as ruled directly by God; some times a theocratic ruler on earth was expected, either a high-priest (

nianism. A great crisis in the history of na¬ tions naturally produces a certain eschatological mood which leads some minds to seek new in¬ terpretations of old prophecies, and others to make forecasts of the future.

The Jewish and Christian doctrines of a final judgment, a resurrection of the dead, and ever¬ lasting punishments and rewards were adopted by Islam, and the eschatology was enriched, after the prophet's time, by contact with Persian thought. The idea of a reincarnation of some great representative of Allah in the past has exerted a particularly strong influence, and the expectation of some Imam or Mahdi to reveal the truth more fully or to change the condi¬ tions of life on earth has from time to time stirred profoundly the Mohammedan world. In later Judaism the denial by Maimonides of a physical resurrection found support at the time and has led more recently to a wide-spread hope for an immortal life independent of a resuscitation of the body. The disillusionment that has followed every Messianic movement has, no doubt, had something to do with the less prominent place held to-day even among orthodox Jews by speculation as to the advent of the Messiah. Neither conservatives nor liberals wh,o are interested in the establishment of a Jewish state in Palestine seem to contem¬ plate a monarchical constitution ; and the fun¬ damental difference between Jewish cosmo¬ politans and nationalists does not even affect the conviction that Israel has a particular func¬ tion to fulfil in the regeneration of the human race.

Modern thought, freeing itself from the authority of tradition, has earnestly en¬ deavored to test the foundations and appraise the value of the various eschatological con¬ ceptions, and to find out how far, and on what grounds, it is possible to formulate any views concerning the future that shall be in harmony with scientifically ascertainable facts. There is a

disposition to examine objectively and im¬ partially any evidence that is adduced, whether from the correspondence of the phenomena of consciousness to the operations of special parts of the brain or the alleged communications with the dead, the kinship of cerebral functions in man and animal or the intrinsic worth of human self-consciousness, the potentiality in all or the high degree of realization in some. Scientific inquiry, unable to go beyond a non liquet, may not find any ground for vetoing the assumption of an idealistic philosophy that the inmost self in man may be an indispensable unit in a spirit¬ ual universe. But there can be no question that the characteristic modern attitude, affected by science, is one of unwillingness to dogmatize, readiness to hold the judgment in suspense, and disinclination to regard knowledge in this field as essential. That the individual continues to live in the race is capable of demonstration, and to the consciousness of this fact a strong moral appeal is possible. An intelligent patriot¬ ism is to-day obliged to consider the future of the nation in connection with the whole system of sovereign and independent states. The political integration of these states into an all embracing league of nations is felt to be indis¬ pensable to the general security and looked forward to with confidence. Eschatological thought is intensely occupied at present with the changes, political, industrial, economic, social,

and religious, that are likely to follow the world war. It attaches itself again to the destiny of the earth. Barring an accident, which is always within the bounds of possi¬ bility, our planet may be expected to run its course through long ages before it passes away or ceases to be inhabitable. A new glacial period, however, probably lies in a much more immediate future. Living in an interval be¬ tween two such periods particularly favorable to the development of civilization, we are threat¬ ened by the exhaustion of some supplies on which that civilization particularly seems to depend. A careful husbanding of all our natural resources, an equitable distribution to men and nations according to their needs, and a just regard for the necessities of coming generations will be called for. In the efforts to realize the eschatological ideals a moral energy may be released which shall constitute the most precious spiritual harvest of the life of man on earth.

Bibliography. — Dechelette, J., (Manuel d'archeologie prehistorique5 (1908-14) ; De Morgan, J., (Les premieres civilisations> (1909); Osborn, H. F., (Men of the Old Stone Age5 (1916) ; Meyer, Eduard, (Ge- schichte des Altertums) (3d ed., 1913) ; Diete- rich, A., (1902) ; Dob- schiitz, A., (Eschatology of the Gospels5 (1910); MacCulloch, J., (Early Christian Visions of the Other World5 (1912); Schmidt, N., (The Ethics of Dante5 (1910) ; Myers, F. W. H.,

(Human Personality; its Survival of Bodily Death5 (1903); Ward, James, (The Realm of Ends5 (1911) ; Duncan, W. B., 'Immortality and Modern Thought5 (1912) ; Adler, Felix, (An Ethical Philosophy of Life5 (1918).

Nathaniel Schmidt,

Professor of Semitic Languages and Literature , Cornell University.

ESCHEAT, es-chet' (old French eschet, spoil, rent, that which falls to a person), the reversion of property to the sovereign. The law considers that all property must have an owner; so if a person die intestate and without issue, the property, in England, escheats to the king, and in America to the state as sovereign. In some jurisdictions, before the sovereign re¬ ceives title there is a certain kind of proceed¬ ing to determine whether or not there are any heirs, while in other jurisdictions the sovereign gets the title on the death of the owner; but

even in these cases the sovereign's title is de¬ feasible until there are proceedings to determine that the deceased had no heirs. When the sov¬ ereign obtains title by escheat it acquires all the rights and privileges of the last owner, and the statutory requirements must be strictly fol¬ lowed, both as to the disposal of the property and as to the use of the fund derived from the sale, in case a sale is necessary. In the United States the powers and duties of the sovereign in relation to escheated property are controlled by statute in the different States. Formerly an escheat might arise through the failure of heirs or forfeiture for treason. In England the word escheat also signifies the district within which the king or lord is entitled to escheats ; a writ to recover escheats ; the escheated possessions of the state or lord; hence, generally, a return or reversion ; and, more generally, that which falls to a person.

ESCHENBACH, esh'en-baH, ˆ Wolfram von, German mediaeval poet : b. Eschenbach, near Ansbach, Bavaria, about 1165; d. about 1220. He was one of the most prominent min¬ strels at the court of Hermann, Landgraf of Thuringia, where he spent part of his time, the other part being spent in Wildenberg (Wehlen- berg). He was a contemporary of another very famous poet with whom he came into frequent contact at court. This was Walther von der Vogelweide (q.v.). According to his own statement he could neither read nor write but he had a very tenacious memory which enabled him to treasure up all the learning that came his way so that he soon became a marked character and finally was invited to the court and

ulti¬ mately acquired all the education of the layman of his day. His work shows chivalry at its best. His epics rank among the greatest German imaginative works. Besides several love songs he wrote (ParzivaP ; (Wilhelm von Orange, > and (Titurel, or the Guardian of the GraalP See Parsifal.

ESCHENBURG, esh'en-boorg, Johann Joachim, German scholar: b. Hamburg, 1743; d. 1820. He received his education at the uni¬ versities of Leipzig and Gottingen and in 1767 began his lifelong connection with the Colle¬ gium Carolinum in Brunswick, of which he was director after 1814. He published the first complete German translation of Shakespeare, (Shakespeares theatralische Werke} (13 vols., 1782) and many other translations from Eng¬ lish authors. He published also (Handbuch der klassischen LitteratuD (1783) ; (Entwurf einer Theorie und Litteratur der schonen Wissen- schafteiP (1783) ; (Biespielsammlung zur The¬ orie und Litteratur der schonen Wissenschaften) (8 vols., 1788-95) ; (Lehrbuch der Wissen- schaftskunde) (1792) ; (Denkmaler altdeutscher DichtkunsU (1799), and the hymns (Ich will dich noch im Tod erheben, and (Dir trau'ich, Gott, und wanke nichtP*

ESC HENM AYER, esh'en-ml-er, Adam Karl August von, German philosopher : b. Neuenburg, July 1768; d. 1852. He was edu¬ cated at the Caroline Academy, Stuttgart, and the University of Tubingen. He was for many years engaged in the practice of medicine at Sulz and Kirchheim. In 1811 he was ap¬ pointed extraordinary professor of medicine and philosophy at Tubingen and in 1818 became

ordinary professor of practical philosophy. He resigned in 1836, removed to Kirchheim and thereafter devoted himself to philosophical study. He was inclined to a belief in mysti¬ cism as an aid to philosophy and took a deep interest in animal magnetism. In his later years his beliefs degenerated into a lower form of supernaturalism. He wrote (Die Philos¬ ophic in ihrem Ubergange zur Nichtphiloso- phie} (1803) ; (Versuch die scheinbare Magie des thierischen Magnetismus aus physiologischen und physischen Gesetzen zu Erklaren> (1816); (System der Moralphilosophie) (1818): (Psy¬ chologic in drei Theilen, als empirische, reine, angewandte) (2d ed., 1822) ; (Religionsphilos- ophie) (3 vols., 1818-24) ; (Die Hegelsche Reli- gionsphilosophie verglichen mit dem christlichen Princip) (1834) ; (Der Ischariotismus unserer Tage) (1835) ; (Konflikt zwischen Himmel und Holle, an dem Damon eines bessessenen Madchens beobachteD ' (1837) ; (Grundriss der Naturphilosophie> (1832) ; (Grundzfige der christlichen Philosophie) (1840) ; (Betrachtun- gen fiber physischen Weltbau) (1852).

ESCHER, esh'er, Johann Heinrich Alfred,

*Swiss statesman : b. Zfirich 1819 d. there, 6 Dec. 1882. He studied law at Zfirich, Bonn, Paris and Berlin and in 1844 became a member of the Cantonal Council of Zfirich. In the fol¬ lowing year he issued a summons for a general convention to be held at Unterstrass and having in view the expulsion of the Jesuits. As mem¬ ber of the Council of Education to which he was elected in 1846 he did much to place the educational system of the canton of Zfirich on a truly modern basis. In 1847 Escher was made president of the Grand Council and in 1848 was elected to the Federal Diet. In 1849 he became president of the National Council and in 1856-57 and 1861-62 he served as vice- president and was later president of the Con¬ federation for several terms. A bronze statue to his memory was erected by the citizens of Zfirich. Consult Scherr, 'Alfred Escher**

(1883).

ESCHER VON DER LINTH, Arnold,

Swiss geologist: b. Zfirich, 8 June 1807; d. 12 July 1872. He was the son of Hans Conrad Escher (q.v.). He was appointed professor of geology at the Zfirich Polytechnic School in 1856. He made extensive researches which have caused him to be considered one of the foremost of the founders of Swiss geology. In 1852-53, in collaboration with Studer, he pub¬ lished the first detailed geological map of Swit¬ zerland. He wrote (Geologische Bemerkungen uber das nordliche Vorarlberg und einige an-grenzenden Gegenden) (1853).

ESCHER VON DER LINTH, Hans Conrad, Swiss, statesman: b. Zurich, 1767; d. 1823.. He studied at the University of Gottin¬ gen in 1786-88 and from 1798 to 1802 was a member of the Legislative Assembly of Swit¬ zerland and at about the same period was editor of the Schwcizerischer Republikaner. He re¬ tired from politics in 1802. In 1807-22 he .served as president of the board of inspection of the canalization of the upper Limmat, known as the Linth. The improvement reclaimed hun¬ dreds of acres of fertile arable lands. Escher's popularity was at its height and his family re¬ ceived the 'surname of Von der Linth in 1823

ESCHERICH

ESCOBEDO

as a recompense and recognition of his services to the republic. Consult Holtinger, (Life of H. K. Escher von der Linth) (Zurich 1852).

ESCHERICH, esh'er-iH, Karl Leopold,

German entomologist: b. Schwandorf, 1871. He received his education at the universities of Munich, Wurzburg, Leipzig and Heidelberg. Beginning in 1892 he made several tours includ¬ ing Tunis (1892), Asia Minor (1895), Algeria (1898), Abyssinia (1906), Ceylon (1910), and North America (1911). At Strassburg in 1901-06 he served as privatdozent and in the latter year was appointed professor at Tharandt Forestry Academy. He has published (System der Lepismatiden) (1905) ; (Der Ameise) (1906) ; (Ferienreise nach Erythrea) (1908) ; (Die Termiten oder weissen Ameisen> (1909) ; (Termitenleben auf Ceylon) (1910) ; (Die ange- wandte Entomologie in den Vereinigten Staaten) (1913) ; (Die Forstinsekten Mitteleuropas> (Vol. I, 1913).

ESCHRICHT, esh'riHt, Daniel Frederik,

Danish zoologist : b. Copenhagen, 1798 ; d. 1863. He studied medicine in his native city, practised his profession for about three years, after which he studied physiology and comparative anatomy in France and Germany. After 1836 he held a chair at the University of Copenhagen. He published (Haandbog i Physiologie) (1851) and (Folkelige Foredrag) (1859). He left a valu¬ able collection which now rests in the Zoological Museum.

ESCHSCHOLTZ, esh'olts, Johann Fried¬ rich, Russian naturalist : b. Dorpat, government of Riga, 12 Nov. 1793; d. there, 10 May 1831. He studied medicine in his native city, and in 1819 became professor of anatomy and director of the zoological museum of the University of Dorpat. In 1815-18 and 1823-26 he accom¬ panied Otto von Kotzebue in the latter's explor¬ ing tours around the world, collected a large number of natural history specimens and made valuable scientific studies on the lower organ¬ isms of deep-sea life. The results of his studies were published in Kotzebue's account of the ex¬ pedition (1821), and he presented his collections to the University of Dorpat 1826. His cata¬ logue of over 2,000 animals was published in Kotzebue's (Neue Reise um die Welt> (Vol. II, 1830). Adelbert von Chamisso, another member of these expeditions, named a botanical species Eschscholtzia in his honor, and Esch- scholtz Bay, on the Alaskan coast, is also named after him. He published (Ideen zur Aneinan- derreihung der riickgratigen Tiere (1819); 'System der Akalephen) (1829) ; 'Zoologischer Atlas > (5 parts, 1829-33), containing plates and distributions of new species of animals.

ESCHSCHOLTZIA, e-sholt'si-a, or CAL¬ IFORNIA POPPY, a genus of annual and perennial herbs of the natural order Papa- veracece, natives of the Pacific slope of the United States. The species, of which there are about a dozen, are distinguished by much dis¬ sected alternate leaves, yellow or

white, showy flowers (the sepals united to form a deciduous hood), and a long capsular fruit resembling a silique. The best-known species is probably E. calif ornica, a perennial which is widely culti¬ vated as an annual in flower gardens, and is a beautiful orange-colored flower, one of the most showy in the whole floral kingdom. It is gre¬

garious in habit, and in California it covers large areas with an almost unbroken orange- yellow bloom of striking beauty when seen on the gray-green slope of a treeless hillside. It is easily raised, especially if the seed be sown soon after gathering in the fall, and the young plants protected in cold climates.

ESCHWEGE, esh'va-ge, Germany, a town of the Prussian province of Hesse-Nassau, on the Werra, 26 miles east-southeast of Cassel. It is a walled and well-built town, with a castle, dating back to 1386, and long the residence of the landgraves of Hessen-Rotenberg, but now used as a public building. It is an important industrial centre and has manufactures of woolen and linen cloth, several large tanneries, glue-works, oil and other mills, and a trade in meal, fruit, lard, ham and sausages. Pop. about

13,000.

ESCHWEILER, esh'vi-ler, Germany, town in the Prussian Rhine province, nine miles east- northeast of Aix-la-Chapelle, at the confluence of the Inde and Dente. It has manufactures of articles in iron and tin-plate, zinc and copper, machinery, boilers, railway plant, needles, wire, rolling-mills, smelting furnaces, belting and other leather goods, beer and birches. Calamine and lead, as well as productive coal-mines, are worked in the vicinity. Pop. 25,000.

ESCHYNITE. See ˆEschynite.

ESCOBAR Y MENDOZA, Antonio,

an-tone-o es-ko-bar' e men-do'tha, Spanish casu¬ ist: b. Valladolid, 1589; d. 4 July 1669. Enter¬ ing the order of Jesuits in 1604, he became cele¬ brated as a preacher and writer. At his death he left more than 40 volumes in folio, mostly in theology and morality, the principal being the casuistical 'Liber Theologiae Moralis) (1646), which has several times been printed, and (Summula Casuum Moralis) (1626). He seems to have been a man of exemplary moral character, but his writings unfortunately drew to themselves the ridicule of La Fontaine, Moliere, Boileau, Pascal and other witty French writers, who represented him as a person of extreme moral laxity, of which the French word "escobarderie® became a strong and appealing symbol. They represented him as advancing the doctrine that the

moral value of an action is to be found in the intention lying behind it, and that purity of purpose, may justify others con¬ trary to the commonly accepted moral code. His writings were censured by the papal authority.

ESCOBEDO, Mariano, ma-re-a'no es-ko- ba-do, Mexican soldier, popularly known as "orejones,® big lugs, on account of his enor¬ mous ears: b. Dos Arroyos, New Leon, 12 Jan. 1827 ; d. Tacubaya, 22 May 1902. When the war between Mexico and the United States broke out he was a muleteer in charge of a string of pack mules belonging to his father. He converted his muleteers into a band of guer¬ rillas, attacked small detachments of the Ameri¬ can troops wherever he found them and took part in the battles of Palo Alto and Resaca. Juarez commissioned him colonel in 1859. In 1861, upon the establishment of Juarez' govern¬ ment in the City of Mexico, Escobedo was made a brigadier-general and sent in pursuit of the Clerical forces under Marquez and Mejia, but was surprised, taken prisoner after an heroic

defense, sentenced to be shot, but escaped and returned to Juarez. He took a prominent part in the war against the French which followed the intervention of Napoleon III in Mexican affairs. He repulsed them at Puebla, 5 May 1862, took part in the long siege of that place and when it was captured by the French, 17 May 1863, was taken prisoner, but succeeded in escaping. When Maximilian's empire was es¬ tablished, Escobedo took up his headquarters in Texas, secretly purchased arms and ammunition in New Orleans, 1865, organized and equipped a force of Mexican refugees, American negroes and ex-Confederate soldiers, led them into Mexico, captured the Imperial garrison at Mon¬ terey, November 1865, and swept everything be¬ fore him. Juarez appointed him commander-in- chief of the Army of the North; he continued his victorious course until all the chief cities were in the hands of the republicans and finally besieged and defeated the Emperor 1. 1 Queretaro, 15 May 1866. It is said that Maximilian offered bis word of honor to Escobedo, on surrender¬ ing his sword, to leave the country at once if conducted to the nearest port ; but Escobedo refused, probably on orders from Juarez, who ordered a court-martial, and the Emperor was condemned and executed. In 1874 Escobedo quelled an uprising against the government of Juarez, but was unsuccessful in putting down the revolution started by General Porfirio Diaz. He fled to Texas, issued a manifesto against Diaz, of whom he became a close friend and strong supporter later, and, later during his administra¬ tion, president of the supreme military court of justice 1882-83. He also held other import¬ ant offices of trust under Diaz.

ESCOIQUIZ, es'ko-e-keth', Juan, Spanish ecclesiastic and politician: b. Navarre, 1762; d. Ronda, 27 Nov. 1820. He began life as a page at court in the reign of Charles III. He took holy orders and held a prebend at Saragossa. Through Godoy he advanced himself to the position of tutor to Ferdinand, the heir- apparent. His efforts in literature at this time consisted of a translation of Young's (Night Thoughts) (1797) and a worthless epic on the conquest of Mexico (1798). He gained an ascendancy over his pupil, afterward Ferdinand VII, and he led the opposition to Godoy's plans for a French alliance. He was banished from court but maintained correspondence with Fer¬ dinand. In 1807 he was implicated in the con¬ spiracy of the Escorial, was imprisoned but later released with the other conspirators. After 1808 he became the trusted adviser of Fer¬ dinand and prevailed on the latter to meet Napoleon at Bayonne, of which meeting he gives a vivid account in (Idea Sencilla de las razones que motivaron el viage del Rey Fer¬ nando VII a Bayona (1814). When the Spanish royal family was imprisoned by Na¬ poleon, Escoiquiz accompanied Ferdinand. At the Restoration he was minister for a short period, but Ferdinand had tired of him, he soon fell into disgrace, was imprisoned in Murcia, recalled for a time and later exiled to Ronda.*

ESCORIAL, or ESCURIAL, a royal pal¬ ace of Spain,, distant from Madrid about 24 miles . (by rail 32 miles) in a northwesterly direction and situated on the acclivity of the Sierra de Guadarrama, the range of mountains which divide New from Old Castile. The

Escorial combines a monastery, a church and a mausoleum with a royal palace. Everything about the Escorial — situation, plan and pur¬ poses — bears the stamp of the sombre tempera¬ ment and unpractical mind of its originator, Philip II. Not the least remarkable of its peculiarities is its site. Away from cities, amid the seclusion of mountain scenery, it stands at a height of 2,700 feet above the level of the sea. It was built in commemoration of the battle of Saint Quentin, which was fought on Saint Law¬ rence's Day (10 August) 1557 and to whom it is dedicated. The building is a rectangular parallelogram measuring 744 feet in length by 580 in breadth. The interior is divided into 13 courts, the plan supposedly in outline of the gridiron on which Saint Lawrence was broiled, while a projection 460 feet in length contains the chapel and the royal palace. The building, which is in the Greco-Roman style, was be¬ gun in 1563 by Juan Bautista de Toledo, a Toledan architect, and finished in 1584 by his pupil, Juan de Herrera. It is irregular in its proportions and thus loses much of the effect which, from its great magnitude, it ought to have. The innumerable windows (said to be 11,000 in honor of the Cologne virgins) give it the aspect of a large mill or barrack. The doors are also numerous. The material of the build¬ ing is gray granite found in the neighborhood, which preserves its fresh and clean appearance. The church, which

dominates the entire design, fronts on a central court, which was formerly opened only to admit the king on his first visit and a second time to receive his dead body for burial. The characteristic is majestic simplic¬ ity. It is 340 feet long by 234. wide; the cen¬ tral dome, 70 feet in diameter, is 320 feet high externally. Under the high altar is the Pan¬ theon or. burying-place. of the kings of Spain. Its interior is lined with dark marble beauti¬ fully veined. One of the most interesting parts of the building is the cell of Philip II, from which the king in his last illness was enabled to witness the celebration of mass. The mon- asterial part of the building contains a valuable library, especially rich in Greek and Arabic manuscripts, and there was formerly a superb collection of pictures scattered through various parts of the building. During the French occu¬ pation the books, 30,000 in number, were re¬ moved to Madrid, but were sent back by Ferdi¬ nand minus 10,000 volumes. The Escorial was partly burned in 1671, when many MSS. were destroyed. It was pillaged by the French in 1808 (when the books were removed) and in 1813. It was restored by Ferdinand VII, but the monks, with their revenues which supported it, have long since disappeared, and the building, which from its situation requires to be kept in repair at considerable expense, has fallen into some decay, though repairs are executed from time to time. On 2 Oct. 1872 it. was struck by lightning and was in consequence seriously injured by fire. The monastery portion of it is now a seminary in which youths receive a secular education. Consult Calvert, A. F., (New York 1875).

ESCORT (French escorte), a guard, a body of armed men which attends an officer or baggage, provisions or munitions, conveyed by

land from place to place to protect them. This word is sometimes used for naval pro¬ tectors ; but the proper word in this case is convoy. In the United States escorts are of two kinds, funeral escorts and escorts of honor. The troops assigned for escort duty may con¬ sist of infantry, cavalry or artillery or all of them. The army regulations fix the character and size of escorts according to the military prominence or title of the individual. Accord¬ ing to the United States Army Regulations of 1913, the funeral escort of a general of the army or the Secretary of War shall consist of a regiment of infantry, a squadron of cavalry and one battalion of field artillery; that of a lieutenant-general or the assistant Secretary of War, a regiment of infantry, a squadron of cavalry and a battery of field artillery; that of a major-general, a regiment of infantry, two troops of cavalry and a battery of field artil¬ lery; that of a brigadier-general, a regiment of infantry, a troop of cavalry and a platoon of field artillery; that of a

colonel, a regiment; a lieutenant-colonel or major, a battalion or squadron; a captain, one company; a subaltern, a platoon.

ESCOSURA, es-kd-soo'ra, Patricio de la,

Spanish novelist and poet: b. Madrid, 5 Nov. 1807; d. there, 22 Jan. 1878. After various po¬ litical and military ups and downs and being twice exiled, in 1855 he was sent as a special envoy to the Portuguese court, became Under¬ secretary of State, Minister of the Interior and afterward Ambassador to Germany, 1872. He wrote the historical novels (The Count de Candespina) (1832) ; (Neither King nor Pawn5 (1835) ; and (The Patriarch of the Valley5 ; the epics (The Bust in Black Cloak5 and (Her- nan Cortes at Cholula5 ; several dramas, the most successful of which was

ESCROW, in law, a written document sealed and delivered to the keeping of a third party to be held by him pending the fulfilment of certain conditions. Such an instrument is not a perfect deed and usually does not take effect until delivered by the custodian. Excep¬ tions to the general rule are made when justice requires, or when the rights of outside parties are in need of protection. See Deed; Delivery.

ESCUAGE, es'ku-aj. See Scutage.

ESCUERZO, a Spanish term for toad, specifically applied in the valley of La Plata to a large local toad-like frog (Ceratophrys or- nata) noted for its varied colors, laid on like those of a Persian carpet. This patchwork thor¬ oughly conceals the toads as they lie half-buried in the ground. <(If there is not enough green vegetation,55 says Gadow, <(they throw, with their feet, little lumps of earth upon their backs, the skin of which becomes at the same time more wrinkled and assumes duller tones. There the creature lies, perfectly concealed, betrayed only by the metallic, glittering eyes, waiting for some unfortunate creature to pass into the trap represented by the enormous mouth, which opens and shuts with lightning rapidity and an audible snap.5) These frogs are of the Cystig- nathine group (see Frog) and closely allied to

the monstrous <(horned toads55 of Brazil. They live chiefly on frogs and are sometimes can¬ nibals.

ESCUINTLA, es-ken'tla, Guatemala, one of the southern departments of that republic ; chief products, sugar cane, cacao and coffee. Its chief town, also called Escuintla, situated at an altitude of 1,269 feet above the level of the sea, on the line of the Central Railroad 30 miles southwest of Guatemala, has good hotels and apartment houses, and, owing to its baths, is a favorite winter resort. Pop. of Escuintla city

18,000.

ESCULAPIANS, a Catholic order, founded at Rome in 1614 and devoted to the education of poor and neglected children. At present it numbers about 2,000 members and has charge of 150 schools. See Orders, Religious.

ESCULENT SWALLOW. See Salan-

GANE.

ESCULIN, ESCULINE. See .Esculin.

ESCURIAL. See Escorial.

ESCUTCHEON, es-kuch'on, in heraldry, is derived from the Old French es cuss on, French ecusson, and that from the Latin scu¬ tum, a shield. It signifies the shield whereon coats of arms are represented. See Heraldry.

ESDRAELON, es-dra-e'lon or es-dra-e-lon (Merdj-Ibn-Amer), the famous and beautiful plain in Palestine, situated between the moun¬ tains forming the western watershed of the Jordan and the Mediterranean Sea. In the Old Testament it is called Jezreel, valley of Megiddo, the Great Plain; in the New Testament, Arma¬ geddon. It is triangular in form, 36 miles in length, with an average width of 15 miles. On its boundary are : on the northeast Mount Tabor, the southeast Mount Gilboa, and on the southwest Mount Carmel. The principal streams are Nahr-el-Djalood, which flows into the Jordan, and the Kishon (Nahr-el-Moukataa) which flows into the Bay of Acre just north of Mount Carmel. Other streams traverse the plain, but are chiefly branches of the two

streams mentioned. The soil is fertile and when cultivated with care yields good crops. When Esdraelon was traversed by caravans

crossing Palestine from the rich countries east and west, grains, vegetables and fruits were raised in abundance. Agriculture is again re¬ ceiving attention. Some of the noted places on this plain are Djeneen (probably the old town of Engannin), at the entrance to the plain and 984 feet above the sea. Tradition says this is where the 10 lepers were cured (Luke xvii) ; Zerlin, known by the residents as Zeraeen,

called by the Crusaders Petit-Guerin, is now a

large village. Near it is the fountain, Ain- Maeeteh, supposed to be where Saul camped when at war with the Philistines (1 Sam. xxxi). Ain-Djalood, said to be the place where Gideon selected the 300 men who fought and

defeated the Midianites (Judges vii). On the south side of the Kishon are the villages of Afooleh, El- Fooleh and Zerin. Afooleh is the old town of Aphec, one of the places where the Assyrians and Egyptians met in battle. At El-Fooleh was once a fortress built by the Templars, but de¬ stroyed by Saladin in 1187. Here in 1799 a bat¬ tle between French troops under Napoleon, 4,000 in number, and the Mohammedans, 35,000

in number, left the French the victory. Ruins of the fort exist. For the ancient his¬ tory of Esdraelon consult the Old Testament; many of the important places mentioned in the New Testament are in a good state of preser¬ vation. Nazareth, Nain and all the surrounding section west of Mount Tabor are usually in¬ cluded in the plain, and must be so considered if Mount Tabor is accepted as on the northeast boundary. Consult Costello, (The Gospel Story5 ; Thomas, (Two Years in Palestine- ; Sayce, (Patriarchal Palestine) ; Smith, histor¬ ical Geography of the Holy Land. See Armageddon.*

ESDRAS, Books of, two apocryphal books, which, in the Vulgate and other editions, are incorporated with the canonical books of Scrip¬ ture. In the Vulgate the canonical books of Ezra and Nehemiah are called the first and sec¬ ond, and the apocryphal books the third and fourth books of Esdras. The Geneva Bible (1560) first adopted the present nomenclature, calling the two apocryphal books first and sec¬ ond Esdras. The subject of the first book of Esdras is the same as that of Ezra and Nehe¬ miah, and in general it appears to be copied from the canonical Scriptures. The second book of Esdras is supposed to have been either of much later date, or to have been interpolated by Christian writers. This book takes its name from the supposed writer, a priest and doctor of the law, called Ezra by the Hebrews.

ESERINE, or PHYSOSTIGMIN, a drug obtained from Calabar-bean, the active principle of this plant, used as a remedy in cases of tetanus (lockjaw). A solution of eserine dropped into the eye causes contraction of the pupil, and hence its use in some eye ailments, as, for instance, glaucoma.

ESHER, Reginald Baliol Brett, 2d Vis¬ count, English writer: b. London, 30 June 1852. He was educated at Eton and Cambridge, and was private secretary to the Marquis of Hart- ington 1878-85. He was member of Parliament for Falmouth 1880-85 ; from 1895 to 1902 was secretary to H. M. Office of Works; and was chairman of the Territorial Forces

Association, county of London, 1909-13. He succeeded his father as viscount in 1899. He has written footprints of Statesmen5 (1892) ; (The Cor¬ respondence of Queen Victoria5 (1907) ; (To- day and To-morrow5 (1910) ; (The Girlhood of Queen Victoria5 (1912) ; influence of King Edward: Essays5 (1914).

ESHER, William Baliol Brett, 1st Vis¬ count, English jurist: b. Chelsea, 13 Aug. 1817; d. London, 24 May 1899. He received his education at Westminster and at Caius College, Cambridge, and was called to the bar in 1840. He entered Parliament in 1866 as a Conservative and two years later was made solicitor-general and within a few months was appointed justice of the Court of Common Pleas. He was made lord justice in 1876 and in 1883 succeeded Jessel as master of the rolls. In 1885 he entered the House of Lords as Baron Esher. In 1897 he retired from the bench and a viscounty was bestowed on him. Several of his decisions were severely criticized and while an able lawyer he was on the whole reactionary and his judgments belong to an earlier and more conservative age.

ESHER, England, village in Surrey, 15 miles southwest of London. Claremont Park, where the Princess Charlotte resided and died, and the ruins of Esher Palace, built in the 15th century, are in the neighborhood. Pop. of parish

2,609.

ESK (Celtic for water), the name of two small rivers in England, one in Cumberland and one in Yorkshire ; and of several in Scotland, the chief being the Esk in Dumfriesshire; the North Esk and South Esk in Forfarshire; and the North Esk and South Esk in Edinburgh¬ shire.

ESKER, a narrow winding ridge of strati¬ fied glacio-fluvial sand and gravel, frequently extending across the country for miles with little regard for hills and valleys. Eskers are believed to have been formed by deposition from subglacial streams in tunnels under the ice. They are also known as osars or sometimes as Serpentine kames.

ESKI-SAGRA, es'ki-sa'gra, or EZKI ZAGHRA, Bulgaria, a town in eastern Rumelia, on the south slope of the Balkans, about 100 miles northwest of Adrianople. It is near the chief passes of the Balkan Mountains, and its advantageous location is favorable to its trade. The mineral springs and extensive rose gardens nearby are sources of wealth for the town. Some of the manufactures are carpets, coarse linen, leather and rose oil. It was one of the South Balkan strongholds of the Turks which repelled the Russians in 1877. Pop. 22,003.

ESKI-SHEHR, es'ki-shehr' (ancient Dory- lmm), Turkey, town 90 miles southeast of the sea of Marmora. It has warm mineral springs, and manufactures of meerschaum pipes from the deposits of meerschaum in the neighborhood. The surrounding region is noted for the quantity and quality of the meerschaum deposit. About two-thirds of the people are Moham¬ medans and the remainder are Christians. Pop. 20,000.

ESKI-ZAGRA. See Stara-Zagora.

ESKILSTUNA, esk'il -stoo-na, Sweden, city 57 miles west of Stockholm, on the river of Eskilstuna, connecting Lake Maelar with Lake Hjelmar. It has daily communication with Stockholm, both by steamer and rail. On an island in the river is a large gun factory, and its manufactures of iron and steel products are so great that it is called the ((Sheffield of Sweden.55 The place takes its name from Saint Eskill, an English missionary of the 11th century, who, it is said, suffered martyrdom here. Pop. 28,485.

ESKIMO DOG, sledge dog, the draught animal of the Arctic regions. It is a wolfish- looking dog, largely or sometimes wholly de¬ rived from the wolf, tinged with yellow or with a grayish color, having an outer coat of long hair, and an undercoat of soft wool. Its short pricked ears and bushy tail add to its wolf¬ like appearance. Its cry is not a bark, but a long melancholy wail. This dog is trained to hunt the polar bear and to drag the Eskimo's burdens over the rough ice, when harnessed in trams to sledges, and is highly prized in the frozen North.

ESKIMO, ESKIMOS (Abnaki, Eskiman- tsic: Oiibwav. Askkimey, eaters of raw flesh), or ESQUIMAUX, es'ki-mo, the name of the

inhabitants of the northern coast of the Ameri¬ can continent down to lat. 60° N. on the west, and 55° on the east, and of the Arctic islands, Greenland, and about 400 miles of the nearest Asiatic coast. They prefer the vicinity of the seashore, from which they rarely withdraw more than from 20 to 80 miles. Their number scarcely amounts to 40,000. Nevertheless they are scattered as the sole native occupants of regions stretching 3,200 miles in a straight line east and west, to travel between the ex¬ treme points of which would necessitate a journey of no less than 5,000 miles. This dis¬ tance, taken in connection with their homo¬ geneous nature and manners, makes their small bands the most thinly scattered people of the globe. Their extraordinary persistency in main¬ taining their language and habits must be due to the difficulties they have

had to face in procur¬ ing subsistence. They call themselves Innuit Yuit, You-Kouk (the people).

Race. — They used to be classed among na¬ tions of the Mongolian stock; but now they are considered as akin to the American Indians. Their height is from five feet two inches to five feet six inches. They appear comparatively taller sitting^ than standing. Their hands and feet are small, their faces oval, but rather broad in the lower part; their 'skin is only slightly brown ; they have coarse black hair and very little beard. The skull is high.

Habits. — The Eskimos get their subsistence mostly from hunting by sea, using for this pur¬ pose skin boats where the sea is open, and dog sledges on the ice. From the skin, blubber, and flesh of the seal and the cetaceous animals, they procure clothes, fuel, light and food. Their most interesting as well as important invention for hunting is the well-known small skin boat for one man, called the kayak. It is formed of a framework covered with skin, and, together with his waterproof jacket, it completely pro¬ tects the man against the waves, so that he is able to rise unhurt by means of his paddle, even should he capsize. In winter the Eskimos are stationary. But, during the summer, when sufficient open water is found, they roam about in their large skin boats. Their winter dwell¬ ings vary with regard to the materials of which they are built, as well as in their form. In the farthest west they are constructed mostly of planks, covered only with a layer of turf or sod; in Greenland the walls consist of stones and' sod; in the central regions the houses are formed merely out of snow. In Alaska the interior is a square room, surrounded by the sleeping places, with the entrance on one side, while a hearth with wood as fuel occupies the middle of the floor. The number of inhabitants at an Eskimo station or village is generally under 40, but in rare cases more than 200 are found. A funnel-shaped, half-underground passage forms the entrance of the narrow dwellings.

Dress.— The dress of the Eskimos is al¬ most the same for the women as for the men, consisting of trousers or breeches and a tunic or coat fitting close to the body, and covering also the head by a prolongation that forms the hood. For women with children to carry, this hood is widened so as to make it an excellent cradle, the amaut. Tattooing has been general among all the tribes. The ordinary materials

of which clothes are made are the skins of seals, land animals and birds.

Language. — The language is characterized by the power of expressing in one word a whole sentence in which are embodied a number of ideas which in other languages require separate words. The Greenland dictionary contains 1,370 radicals and about 200 affixes. A radical may be made the

foundation of thousands of deriva¬ tives, and a word can be composed which ex¬ presses with perfect distinctness what in our civilized languages might require 20 words. In Greenland and Labrador the missionaries have adopted the Roman letters for reducing the native language to writing. The printed Green¬ land literature, including what has been pub¬ lished by the Moravian Brethren, amounts, with pamphlets and the like, to what might make 70 to 80 ordinary volumes.

Sociology. — It is doubtful whether an organization like that of the Indian ˆfamilies® has been discovered among the Eskimos. But a division into tribes, each with their separate territories, actually exists. The tribe again is divided into groups constituting the inhabitants of the different wintering places: Finally, in the same station, the inhabitants of the same house are closely united with regard to common housekeeping.

Religion. — The inhabitants of Danish West Greenland, numbering about 10,000, the greater part of the Labradorians, and the southern Alaskan Eskimos are christianized. As for the rest, the religion of the Eskimos is what is generally designated as Shamanism.

The Eskimos are believed by some to have come from the interior of America, and, follow¬ ing the river courses, to have arrived at the Arctic sea, where they have developed their abilities as an Arctic coast people. The Eskimos may be divided into the following groups: (1) The Western Eskimos, inhabiting the Alaska territory and the Asiatic side of Bering Strait; (2) the Mackenzie Eskimos, or Tchiglits, from Barter Island to Cape Bathurst; (3) the in¬ habitants of the central regions, including the Arctic Archipelago; (4) the Labradorians; (5) the Greenlanders; a side branch inhabiting the Aleutian Islands, speak a dialect considerably different from that of the rest of the Eskimo people.

The Christianized natives still preserve their ancient folklore. It represents at the same time their original poetry, religious ideas and his¬ tory, praising the deeds of their great men in braving the dangers to which their race has been continually subjected. The (Tales and Tradit'ons of the Eskimo) (1875) comprises a collection of 150 tales founded on versions sup¬ plied by about 50 narrators from different parts of Greenland, and a few from Labrador. A valuable collection has since been acquired from East Greenland, some tales from Baffin Land, and a number of the simplest fragments of the same from Bering Strait. See Alaska; Polar Research; Ethnology; Greenland; Labra¬ dor.

Bibliography. — Boas, (The Central Eskimo (Bureau of Ethnology 6th Annual Report) ; McLean, (Notes on the Hudson Bay Territory5 (1846) ; Hall,*

raphy of the Eskimo Language) (1888) ; Peary, (My Arctic JournaP (1893) ; Nansen, (Eskimo Life5 (1894) ; Thalbitzer, (A Phonetical Study of the Eskimo Language5 (Copenhagen 1914) ; Stefansson, (My Life with the Eskimo5 (Lon¬ don 1913) ; Morillot, (Mythologie et Legendes des Esquimaux de Greenland5 (Actes de la Societe Philologique, 1874) ; Richardson, (Polar Regions5 (1861).

ESLA, a river in Spain, which rises in the Cantabrian Mountains and flows south for 150 miles through Leon and Zamora and empties into the Duero, 20 miles below Ciudad Zamora.

ESLAVA, Miguel Hilarion, Spanish com¬ poser : b. Burlada, 1807 ; d. 1878. He was ap¬ pointed maestro in Ossuna cathedral at the age of 21. Later he became a priest and in 1832 removed to Seville. Queen Isabella appointed him court maestro at Madrid in 1844. He pro¬ duced the operas (E1 solitario5 (1841); (Las treguas de Tolemaida5 (1842) ; (Pietro el cru- dele5 (1843) ; the collections (Museo organico espanol5 ; (Lira sacro-hispana5 (1869); also 150 masses, psalms, etc.

ESLAVA, Sebastian de, Spanish soldier: b. Navarre, 1714; d. Madrid, 1789. He was one of the first graduates of the Real Academia Militar of Barcelona. He won distinction in the campaigns undertaken by Philip V, was made lieutenant-general in 1738 and two years later viceroy of New Granada, the present re¬ public of Colombia, South America. He strengthened the fort at Cartagena and de¬ fended it successfully against the English under Sir Edward Vernon in 1741. He returned to Spain in 1748, was advanced to the grade of captain-general and in 1750 made governor of Andalusia. Four years later he was made War Minister and retired from public life on the accession of Charles III.

ESMANN, es'man, Gustav Frederik, Dan¬ ish dramatist: b. Copenhagen, 17 Aug. 1860; d. 1904. After a short period of legal study, he abandoned law for literature and his first work was a volume containing two short stories, (Gammel Gjaeld5 (1885). Thereafter he de¬ voted himself mainly to dramatic composition and a notable series of plays, which have been acted with great success throughout the Scandi¬ navian countries, have come from his pen. They are : (I Stiftelsen5 (1886); (Enkemaend5 ; (For Bryllupet5 ; (I Provinsen5 (1890);

ESMARCH, Johannes Friedrich August,

yo-han'nes fred'riH ow'goost es'marH, German military surgeon : b.

Tonning, Schleswig-Hol¬ stein, 9 Jan. 1823; d. 23 Feb. 1908. He received his medical and surgical education in the uni¬ versities of Kiel and Gottingen, and in 1860 was appointed director of the Kiel Hospital. In 1870 he was a member of the hospital commis¬ sion of the Prussian army, physician-gen¬ eral and consulting surgeon of the army and introduced a system of bloodless operations and originated noteworthy improvements in ambulances and barrack hospitals. In the au¬ tumn of 1888 he made a trip to the United States. He was an authority on gunshot wounds. Among his published works are (Ueber Resektionen nach Schusswunden5

(1851); (Beitrage zur praktischen Chirurgie5 (1853-60); (Ueber chronische Gelenkentziin- dungen5 (1867) ; (Ueber den Kampf der Hu- manitat gegen die Schrecken des Kreges5 (1869) ; (Der erste Verband auf dem Schlachtfelde5 (1899, 3d ed.) ; (Verbandplatz und Feldlazarett5 (1871) ; Ueber kiinstliche Blutteere bei Operationen5 (1873); (Hand- buch der kriegchirurgischen Technik5 (1877) ; (Die erste Hilfe bei plotzlichen Ungliicks- fallen5 (1901).

ESMENARD, Joseph Alphonse, French

editor and poet : b. Pelissane, Bouches du Rhone, 1769; d. 1811. He came to Paris about 1797 and became coeditor of La Quotidienne and in the following year of Le Mercure de France. He was secretary to Villaret-Joyeuse, governor of Martinique under the Consulate, and in 1804 was consul in the island of Saint Thomas. In 1805 he published (La navigation,5 a poem inspired by his early travels in America. In 1810 he was elected to the Academy. Soon afterward a caustic article on Russia in Le Journal de l' Empire so annoyed Napoleon that he banished Esmenard from France.

ESMERALDAN, a linguistic stock of aborigines of South America, who formerly dwelt along the Esmeraldas River in northern Ecuador. Consult Rivet (in L'Annee linguis- tique, 1908-10) and Seler, Feschichte Abh. zur amerikanischen Sprach-und Altertums- kunde5 (Vol. I, pp. 49-64, Berlin 1902).

ESMOND, Henry V., (real name, Jack), English actor and dramatic author: b. Hamp¬ ton Court, 1869. He was educated by private tutors, went on the stage in 1885 but after 10 years abandoned it for the dramatic field. He produced (Rest5 ; (Bogev5 and (The Divided Way5; (One Summer's Day5 (1897); Frier¬ son's Way5 (1899) ; (The YVilderness5 (1901) ; (When We were Twenty-one5 (1901) ; (The Sentimentalist5; (My Lady Virtue5 (1902);

(Billy's Little Love Affair5 (1903);

ESNAMBUC, Pierre Belain d', French

navigator: b. Allonville, 1585; d. 1636. While commanding a vessel in the. Caribbean he seized the island of Saint Christopher and so established his title as founder of the French settlements in that region. He suggested a plan for dividing the island between France and England which was approved. He brought about 500 immigrants there in 1626 and in the re¬ maining years of his life founded colonies on Martinique and other islands of the Antillean group. He was the founder of the town and fort of Saint Pierre, which was annihilated by a volcanic eruption on 8 May 1902.

ESNEH, es'ne, or ESNE, a town in upper Egypt, about 30 miles above Thebes on the left bank of the Nile. It is a seat of manufactures, produces blue cotton cloth and pottery and is a depot of caravans from Abyssinia 'and Sen- naar. The town was anciently called Latopolis ; and was the centre of worship of the fish latus| a species of carp. Among the ruins of this once populous city is the temple, whose portico is in good preservation, having 24 beautiful col¬ umns and a zodiac on the ceiling. Coptic re¬ mains are in the neighborhood. The Christians

here suffered severely in the persecution under Diocletian (a.d. 303).

ESOCID2E, e-sos'i-de. See Luciid^. ESOP. See jEsop.

ESOPUS FORMATION. See Cauda- Galli Grit.

ESOPUS WAR, a long-continued and desultory conflict between the Dutch and the Indians at a place in Ulster County, N. Y., known to the Indians as Esopus, but now called Kingston. This series of skirmishes be¬ gan in 1658, when the Dutch fired upon some Indian farm hands, who were drunk and riot¬ ous. Esopus, which the Dutch called Wiltwyck, was at last destroyed by the aborigines, who carried off 40 women and children and killed 21 men. Governor Stuyvesant sent out a strong force to punish the Indians, and in May 1664 a treaty of friendship was ratified.

ESOTERIC, es-6-ter'ik (Gr. ecroTepuidc dinner®), a term used in opposition to exoteric. In reference to the teaching of Pythagoras, Aristotle, and other ancient philosophers, it re¬ fers to those doctrines which they expounded to their select disciples, in contradistinction to those which 'they published to all the world (exoteric). The distinction does not necessarily imply that the esoteric doctrines were kept se¬ cret as a mystery, but only that they were of a higher and more difficult order. (See Aristo¬ tle;

Pythagoras). Consult Christ-Schmid, (Gesdhichte der Grieschischen Litteratur) (Mu¬ nich 1908).

ESPALIER, es-pal'yer, in gardening, a sort of trellis-work on which the branches of fruit-trees or bushes are extended horizon¬ tally, with the object of securing for the plant a freer circulation of air as well as a full ex¬ posure to the sun. Trees thus trained are not subjected to such marked nor so rapid varia¬ tions of temperature as wall-trees. The term is most commonly used in France, where it is applied to a row of trees planted along a wall. See Trellis.

ESPARSETTE. See Sainfoin.

ESPARTERO, Baldomero, bal'do-ma'ro

es-par-ta'ro, Duke of Vitoria, Spanish states¬ man: b. Granatula, 27 Feb. 1792; d. Logrono, 9 Jan. 1879. The son of a wheelwright, he was educated for the priesthood, but joined the army as a volunteer in 1808 and continued with it fighting against Napoleon until 1814. Shortly afterward he went to South America where he served in the army of Spain against the revolting colonists. He returned in 1824 and took a leading part in the conflict with the Carlists and was one of the most prominent men in Spain during several decades of the 19th century. He was lieutenant-general and com¬ mander-in-chief on two separate occasions. In this capacity he twice held Madrid against the Carlists (in 1836 and 1837) ; and by the Agree¬ ment of Vergara (1839) entered into with Maroto, he forced Don Carlos to withdraw from Spain. In reward for these services to the Crown he was granted the titles of Duke of Vitoria, Duke of Morelia and grandee of Spain. In 1841, on the resignation of the re¬ gency by the Queen Mother, Maria Christina, he became regent. Two years later he was forced into exile, which he spent in England.

He returned to Spain in 1848 and became again head of the government in 1854-56. In 1868 his name was put forward in the Cortes as a candidate for the throne, but the proposal was unsuccessful and the closing years of his life were spent in retirement.

ESPARTO (Gr. on aproq; Lat. spartum), a grass, the Stipa tenacissima , growing in Spain and Africa, known to the ancients and applied by them to the manufacture of cordage, matting, etc., and still more extensively used at the present day. Numerous species of Stipa are found in North America, chiefly in the western part. Esparto grows in tufts and bunches, like rushes, to a height of from two to four feet, and has a long flat blade, which becomes cylin¬ drical when the ripened plant begins to dry. It is pulled up by the roots, dried in the sun and packed in bundles for exportation.

Besides the various uses already indicated, esparto has for some time been applied to the manufacture of paper. Formerly the supply of esparto was almost wholly obtained from Spain, but a closely allied fibre called alfa (Stipa arenaria) is now obtained in still larger quantity from Algeria, while a third fibre, dis (Festuca pa- tula), is imported for the same purpose from Tripoli and Tunis. See Feather Bunch-grass; Fibre.

ESPATOLINO. See Sab or Espatolino.

ESPERANTO LANGUAGE. "Esper¬ anto,® successor to "Volapuk® in the effort to establish an international language, has made considerable progress. The latest reports show that a substantial and lasting interest in this linguistic enterprise now exists. In 1887 Dr. Zamenhof, a Russian physician, issued his first pamphlet concerning a suggested new interna¬ tional language, to be called "Esperanto.® Only small progress was made during the first 10 years of the movement. The idea first took root in the originator's native country. Rus¬ sian educators and other men of culture looked upon the innovation with favor. After the lapse of a decade, a start was made to intro¬ duce the Zamenhof idea among the Norwe¬ gians and Swedes. They, too, showed a friendly attitude. Then France manifested great interest, and almost immediately became prominent as a stronghold of Esperantism. From France the movement extended to Ger¬ many, thence to Austria, Switzerland, Italy and England. In the latter country 30 societies of Esperantists were organized within a year of the system's introduction. During the past years, active missionary work has been under¬ taken in the United States looking toward the promulgation of the Zamenhof plan for use in commercial, educational and other fields. There is little doubt as to the success of the outcome, indorsed as it is by some of the greatest philol¬ ogists in Germany, Austria, England, France, Russia and the United States. Advocates of an international language have in the past in¬ cluded numerous philosophers and scientists, in¬ cluding Roger Bacon, Descartes, Pascal, Leib¬ nitz, Locke, Condillac, Voltaire, Diderot, and, more recently, Tolstoi, who unqualifiedly sup¬ ported the Esperanto piovement and learned its grammar rules in an hour. Only of late years have the linguistic theories of these fa¬ mous thinkers been molded into anything like practical shape.

Occasions Calling for the Use of an Inter¬ national Language. — One of the principal reasons for renewal of interest in the direction of one universal language is the necessity for producing a vehicle of common expression among delegates representing various countries at congresses

and on similar occasions. It has been found difficult for individuals, acting for their respective nations, to keep in touch with the proceedings from day to day. The ex¬ tended use of Esperanto and the widespread appreciation manifested in its development indi¬ cates that the method of Dr. Zamenhof offers a feasible solution of what has, hitherto, been an unsolved problem. In addition to the advan¬ tages of having a common language for cos¬ mopolitan assemblages, the transaction of voluminous mercantile affairs between nations and merchants of various nations, requires some such system to facilitate the making of purchases and adjustment of mercantile accounts. For educational purposes, as in other ways, the availability of a means whereby educators can compare systems and processes without en¬ countering the difficulties connected with proper and complete translation is very evident.

Present Uses of the Esperanto Language. — From a recently published review it is learned that among the books in the Esperanto language, are translations from every known national tongue in common use, and many orig¬ inal novels. The number of periodicals, includ¬ ing national propaganda journals, scientific and official organs of various international socie¬ ties, such as the Good Templars, the Free Masons, the Roman Catholics, Peace Associa¬ tions, etc., printed in the international language, before the outbreak of the European War ex¬ ceeded 200. Since August 1914 many of the magazines in the smaller countries — notably, Belgium, Poland, Bulgaria, Roumania, etc. — have been forced temporarily to suspend pub¬ lication, although the official organs are still ap¬ pearing regularly in England, France, Russia, Germany, Holland, Norway, Sweden, Italy, Spain, United States and several of the South American countries. On the continent of Eu¬ rope and in the United States representative daily and weekly newspapers regularly publish articles in Esperanto, many courses of study have been furnished by the press and editorial endorsements are most frequent. Esperantist clubs and societies are operating in practically all of the European cities and have large mem¬ bership. Among the most important are those of Paris, with 3,000 members, Marseilles, Lyons, Bordeaux, Havre, Lille, London, Moscow, Ber¬ lin and Dresden. The Esperanto Association of North America reports affiliated clubs in nearly all of the large cities and in many of the smaller ones in both the United States and Canada.

Several French, English and American pub¬ lishers have undertaken in an extensive way to publish Esperanto works, conditional on the possession of exclusive rights, while the various national Esperanto publishing houses turn out many books annually. A library of over 5,000 volumes— constantly increasing — including text¬ books, translated and original works, is now found listed in the ˆEsperanto catalogues. Quite a number of large commercial concerns are using the system for cable and telegraphic

purposes. Courses of study in Esperanto form an attractive feature in commercial schools,

clubs and public institutions, some of which make a special feature of teaching the blind to read by the new system. Several of the stand¬ ard typewriters are equipped with Esperanto keyboards, and in that connection many stenog¬ raphers are learning the use of the language for shorthand purposes.

In the colleges and schools, Esperanto is commanding considerable attention. One of the Esperantist triumphs was the delivery of an address in the Esperanto language by Mr. Moch, the famous peace advocate, at the International Peace Congress, Lucerne. At the Boulogne Universal Esperanto Congress, 1,200 delegates from 22 countries spoke the Esperanto lan¬ guage freely and understood each other thor¬ oughly. A complete test was made by means of speeches, discussions, concerts, dramatic performances and religious services. During that congress the work of Dr. Zamenhof was officially noticed by the French government. The Minister of Public Instruction extended thanks in behalf of the president of the repub¬ lic and of the people of France. In the course of the proceedings a reception was tendered to the creator of Esperanto at the Hotel de Ville, Paris. If further proof were needed that the Esperanto language is a practical spoken tongue — 11 universal congresses have been sched¬ uled — two having taken place in the United States. The largest on record was arranged for Paris, in August 1914, at which over 5,000 delegates representing every nation on the globe had already enrolled. A large majority, including a number from the United States, had arrived in Paris for the Congress week, when the declaration of war was made known — 11. universal congresses have been sched meeting of one of the largest and most unique international gatherings ever known. The 11th Universal Congress was held in San Francisco, August 1915, in conjunction with the Eighth Na¬ tional Convention of the Esperanto Association of North America. The value and use of Es¬ peranto in the war have been attested in many ways. Striking instances of the use of the in¬ ternational tongue between Austrian prisoners and their Russian captors ; between Russian captives of the Austrians and Germans, etc., have been made known. Esperantists have sent several fully equipped Red Cross Esperanto ambulances into the field with personnel. Es¬ peranto is being taught in the prison and intern¬ ment camps, so that there may be a common language. There is an Esperanto repatria¬ tion bureau maintained in Geneva, Switzerland, through which disrupted families are brought together, correspondence forwarded, and much other good of like nature accomplished. State¬ ments relating to justification for the war were issued in Esperanto by governments, no¬ tably the French and German — the latter also issuing official war bulletins in Esperanto for international distribution. Keys, weighing but five grams,

though containing the elements of the language and vocabulary of more than 2,000 words, are published in practically all languages, for international conversational and correspond¬ ence purposes. A similar series of Esperanto Red Cross booklets is published, and much other work is being accomplished along these lines. In short, Esperanto is proving its great value for its intended purposes and it is the best pass¬ port in warring countries that one may possess.

Method of the Esperanto Language. — In

the general plan of Dr. Zamenhof the aim is to omit all accidental words in the language of each nation, retaining only such words as are common to all nations. Sounds peculiar to any one language are eliminated. The English th and w, appearing in English words, but not in those of the French or German languages, are, therefore, according to the rule of the origina¬ tor of Esperanto, dropped. The French u, the German u and the French nasals not used in English are left out, also the Spanish n and j, and the German th. The pursuance of this plan removes all difficulties as to pronuncia¬ tion. Phonetic spelling is the Esperanto rule, a certain letter having the same sound always. Mute and double letters are cut out. The letter x becomes ks, ph becomes f, cli becomes k for the guttural sound, and c — c remaining for the ordinary sound in words like cigar. The g is used for the guttural (gril, garb), and g is used for the sibilant ag which is equal to age. New signs introduced are c and g. But these are for sounds already recognized. A third sign takes the place of a double letter, viz., s for sh (sip equals ship and si equals she). Further details regarding the vocabulary, prefixes and suffixes — in fact, the whole gram¬ mar — have been issued in separate form and can be readily obtained by students. It will suffice to say here that the Esperanto vocabu¬ lary is much smaller than that of any other lan¬ guage, containing only about 3,000 root words, exclusive of scientific and technical words, as compared with 32,000 in the French language, a considerably larger number in the German lan¬ guage, and over 100,000 in English. The sim¬ plicity of the Esperanto grammar, comprising 16 fundamental rules, with no exceptions, is quite remarkable. The majority of those who undertake the study of Esperanto, diligently, with the proper textbooks or instruction, master it in a short time. See Universal Language; Science of Language.

ESPERSON, Pietro, Italian jurist: b. Sassari, Sardinia, 1833. He was educated at the university of his native place and in 1860-65 was instructor in law there. • In 1865 he be¬ came professor of international

law at Pavia. He published 'Rapporti giuridici tra i belli- geranti e i neutralP (1865) ; 'La questione Anglo-Americano del <(Alabama,® discussa secondo i principii del diritto internazionale> (1869) ; (Giurisdizione internazionale maritima) (1877); (L'Angleterre et les capitulations dans l'ile de Chypre au point de vue du droit inter¬ national } (1879) ; (Le legge sulla naturalizza- zione in Italia (1886); 'De' dritti di autore sulle opera dell' ingegno ne' rapporti interna- zionalP (1899).*

ESPINAL, Colombia, town in the depart¬ ment of Tolima, about 70 miles south of the capital, Bogota. It has industries of tobacco and pottery. Pop. about 8,000.

ESPINAS, Alfred Victor, al-fra vek-tor a-spe-na, French sociologist : b. Saint Florentin, Yonn-e, France, 23 May 1844. After teaching philosophy in the lycees of Bastia, Chaumont, Havre and Dijon, he became successively pro¬ fessor of philosophy in the universities of Douai. Lille and Bordeaux and in the latter was dean of the faculty of letters 1887-90. Since 1894 he has been professor of the history of

social economy on the Chambrun foundation, in the faculty of letters of the University of Paris. Besides contributing largely to the Revue Philosophique , he has translated (with Ribot) Herbert Spencer's (Psychology) (1874), and written (Des societes animales) (1877-78) ; 'La philosophic experimentale ' en Italie ˆ (1880) ; 'Histoire des doctrines economiques) (1893) ; (Les origines de la technology (1897) ; 'La philosophic sociale du XVIIIe siecle et la revolution (1898).*

ESPINASSE. See L'Espinasse.

ESPINASSE, Esprit Charles Marie,

French soldier: b. Castelnaudary 1815; d. Magenta 1859. He invaded the National As¬ sembly at night and seized the quaestors which enabled Louis Napoleon to effect his coup d'etat of 2 Dec. 1851. For this service he was made general and aide-de-camp to the emperor. He fought in the Crimean War, was Minister of the Interior in February-June 1858, and in this office presented to the chamber the ((Law of Public Safety®. Later he was appointed sena¬ tor. He was killed at the battle of Magenta.

ESPINEL, Vicente Martinez, Spanish novelist and poet: b. Ronda, December 1551; d. 1624. He studied at Salamanca, was ex¬ pelled from the university there in 1572, served in the army in Flanders and about 1584 re¬ turned to Spain. In 1587 he took holy orders, in 1591 was appointed chaplain at Ronda. He lost this charge through absenting himself with¬ out permission, but his musical ability secured for him the position of

choirmaster at Plasen- cia. In 1591 appeared his 'Diversas Rimas, which showed considerable ability. He revived the metre known as decimas — a stanza of 10 octosyllabic lines — and since popularly known as espinelas. He is said to have added a fifth string to the guitar, but this is disputed, al¬ though the evidence against it is far from conclusive. Espinel is best remembered, how¬ ever, for his picaresque novel, (Relaciones de la vida del Escudero Marcos de Obregon* (1618). This work is an autobiography with considerable embellishment. From it, all to the contrary notwithstanding, Le Sage borrowed about one- fifth of his ' Gil Bias.* Many poems of Espinel have remained unpublished owing to their licen¬ tious character. Consult Perez de Guzman's edition of 'Marcos de Obregon* (Barcelona 1881) ; Claretie, Leo, 'Le sage romancier* (Paris 1890).*

ESPINOSA, Aurelio Macedonio, Ameri¬ can educator: b. Carnero, Colo., 12 Sept. 1880. He was educated in the public schools at Veteran and Del Norte, Colo., at the University of Colorado and the University of Chicago. In 1901-02 he was assistant in Romance languages at the University of Colorado, and from 1902 to 1910 was professor of Spanish and French at the University of New Mexico. In 1910 he was appointed associate professor of Spanish at Leland Stanford University. He was founder and special collaborator of the Societe Inter¬ nationale de Dialectologie Romaine and is honorary member of the Chile Folklore Society. He is the author of 'Metipsimus in Spanish and French) (1911); 'La cosecha humana) (Span¬ ish trans. of Jordan's 'Human Harvest,' 1912) ; 'El Imperio Invisible) (Spanish trans. of Jordan's 'Unseen Empire) 1915). He

edited Echegaray's (E1 gran galeoto) (1903); and El Poder de la impotencia) (1906) ; Ayalas' (Consuelo) (1911) ; Sierra's (Teatro de Ensueno) (1917); and (Cancion de Cuna) (1918); Benavente's El principe que todo lo aprendio en los libros) (1918) ; with C. G. Allen, Ele¬ mentary Spanish Grammar> (10 eds., 1915-17) ; Elementary Spanish Reader) (1916); Ad¬ vanced Spanish Composition and Conversation > (1917) ; Radin's Eolklore de Oaxaca) (1916). He is a frequent contributor to the Revue His- panique, Journal of American Folklore , Re¬ vista Ilustrada, Revista Positiva, the Monitor, etc.

ESPIONAGE ACT OF 1917. When the United States entered the European War in 1917 it immediately became apparent that ex¬ traordinary legislation was needed to keep in check treasonous action by certain citizens, but more especially by sympathizers with the enemy, resident in

the country. To this end the Espionage Act was passed, 15 June 1917. The first provision was that whoever was in any way instrumental in the gathering of informa¬ tion, pictures, sketches, etc., on government property with the intent of using them in a way detrimental to the interests of the United States was liable to a fine of $10,000 and to imprison¬ ment for two years. This was, of course, designed to check enemy aliens who had access to navy yards, wireless stations or places where construction work was going on. The trans¬ mission of such information to a foreign coun¬ try, or its representative, in time of war, was made punishable by death, or 30 years' impris¬ onment, and this applied to any sort of informa¬ tion that might be useful to an enemy. The cir¬ culation of false reports for the purpose of causing insubordination, disloyalty, mutiny, etc., including obstruction of enlistment, was made punishable by not over $10,000 fine and 20 years' imprisonment. Conspiracy with a view to doing any of these things carried the same punishment to all conspirators, whether or not the things were accomplished. The harboring or conceal¬ ing of any one guilty of such treasonable of¬ fense involved a possible fine of $10,000 and two years' imprisonment.

The Espionage Act also gave power to the President, in case of emergency, to regulate the anchorage and movements of vessels in United States waters, and provided not over $10,000 fine and two years' imprisonment for any one failing to comply with or interfering with the carrying out of such regulations. A similar provision was made with reference to the har¬ boring of enemies on vessels in United States waters. The injury of vessels engaged in for¬ eign commerce, as by setting fire to them or placing bombs, carried a fine not exceeding $10,- 000 and 20 years' imprisonment. Any other form of violent obstruction of exportation called for not over $10,000 fine and 10 years' imprison¬ ment.

For the enforcement of neutrality the Espionage Act carried a long list of prohibi¬ tions. On reasonable cause any vessel might be detained in port, to prevent the unlawful ship¬ ment of supplies or dispatches. The sending out of armed vessels without permission was strictly, prohibited. Very careful regulations were made to prevent any sending of goods where they might be transshipped to an enemy,

and statements had to be filed with the col¬ lector of customs to aid in carrying out such orders. The taking of a vessel out of port in violation of the rules laid down involved a fine of not over $10,000, plus five years' imprison¬ ment, and forfeiture of the vessel and goods. Any interned alien escaping or attempting to escape was liable to $1,000 fine and a year in prison. Being engaged in any unauthorized or filibustering military expedition carried a possi¬ ble fine of $3,000 and three years in prison. The President was authorized to use the army or navy as necessary to

carry out any of the pro¬ visions specified.

The seizure of arms and other articles in¬ tended for export was provided for, and the same forfeited to the United States, and the method of trying such a case before a compe¬ tent court was set forth. The President was also given power, during the war, to declare certain exports unlawful, such as in his discre¬ tion might be harmful to the United States, and the penalty was placed at not over $10,000 fine and two years in jail. Directors and officials of transportation companies were made personally liable. The disturbance of foreign relations was provided against by making criminal any harmful statements to or about foreign officials, under certain conditions, or the impersonation of a foreign official, or the acting as an agent of a foreign government except as a regularly appointed consul or attache, was punishable. Conspiracy in this country to destroy property in a foreign country was cov¬ ered under this clause, and carried not over five years' imprisonment and $5,000 fine. All abuses of the passport privilege were severely dealt with. The counterfeiting of the government seal, or mutilation or alteration of any docu¬ ment bearing such seal, involved a possible $5,000 fine and 10 years' imprisonment.

The act included a very long section as to the issuing of search warrants. This per¬ mitted judges of District Courts as well as of State and Territorial courts to issue search warrants for either property or papers em¬ bezzled contrary to a law of the United States. Probable cause had to be shown, supported by affidavits, 'the rights of citizens being carefully protected, but when the warrant was issued and in the hands of the proper officer he had the right to break and enter as might be necessary to carry out the search. Such officer had to give a receipt and inventory of the property so taken, under oath, and a copy must be placed with the person from whom the property or papers were taken. Restoration of the property in case of error was provided for. Obstruction of such search warrant officers in their duty involved a fine of not over $1,000 and a year's imprison¬ ment.

The use of the mails was prohibited for any papers, etc., in violations of the provisions of the Espionage Act, but only a search warrant authorized the opening of a sealed letter ad¬ dressed to another. All treasonable matter was declared non-mailable, and the mailing or at¬ tempting to mail such carried a possible fine of $5,000 and five years' imprisonment.

The Espionage Act was framed so as to in¬ clude not only the United States proper but all its territories, as the Philippine Islands and the Canal Zone, and all its waters, continental or

insular. The act is a document of over 10,000 words, under 13 titles, and was modeled more or less on the experiences of Great Britain in dealing with the same sort of difficulties during the earlier years of the war. It proved quite effective in checking the evils at which it was aimed, and after the first year of the war there was very little enemy activity in the United States and all surreptitious treason was effec¬ tively stamped out except, of course, that which occurred sporadically and not as the result of organized bands of conspirators.

ESPINOSA, Gaspar de, Spanish soldier: b. Medina del Campo, about 1484; d. 1537. He studied law and entered into practice in Spain. In 1514 he came to America with Pedrarias Davila and was made chief justice at Darien. He presided over the tribunal which condemned Balboa to death, but only passed sentence on the latter at the express command of Davila. He resigned his judicial office and led several expe¬ ditions against the aborigines, whom he treated most inhumanely. He founded Panama in 1518, returned to Spain a few years afterward and was sent out soon again as a Crown officer in Santo Domingo. He backed Pizarro in his second expedition against Peru and accom¬ panied him to the latter country, where he died at Cuzco.

ESPIRITO-SANTO, es-pe're too-san'to, Brazil, a state bounded on the north by the state of Bahia, on the east by the Atlantic Ocean, on the south and wTest by the states of Rio de Janeiro and Minas Geraes. Area 17,312 square miles. The coast lands are swampy, but in the interior mountains rise to a height of 7,000 feet; the highest of these, Mestre Alvares, is one of the most conspicuous landmarks on the Brazilian coast. The temperature, which is tropical, is moderated by the state’s proximity to the sea. The state has immense forests, and is noted for the valuable woods found in them and the rare drugs which are distilled. The Doce River flows through some of the richest of the hinter¬ lands, but is navigable only for very small craft. Sao Matheus, in the northern part of the state, is surrounded by coffee and mandioca planta¬ tions, the products of which are shipped from this port, officially known as Conceiqao de Barra. A number of small ports intervene be¬ tween the Doce River and the spacious bay of Espirito-Santo, which has given its name to the state. Coffee, the chief agricultural product, is largely exported. Other exports are sugar, tapioca, cotton, cocoa, hides and skins, and woods. There are valuable marble deposits, which are not mined. A railway is being built to connect Ouro Preto, on the upper waters of the Doce, with the coast. Cotton goods are manufactured in the town of Pessanha. The population of the state, which was 135,997 in 1890, increased to 430,000 in 1913, this growth being due to European immigration. A few years ago the city of Victoria (pop. 15,000) had

almost no maritime trade, as its port was too shallow to admit large vessels. Recently improvements have been made in the harbor, which now accommodates transatlantic steam¬ ers, and both trade and immigrants have sought it. It was first visited by the Portuguese in 1535. Colonies of Germans, Poles, Swedes, Tyrolese, Portuguese and Italians are estab¬ lished near Anchieta, Alfredo Chaves, Ita-

pemirim and Cachoeiro — chiefly in the south¬ ern part of the state. Some of these colonies are under government protection, receiving an¬ nual subsidies of seed and cattle ; but the ma¬ jority of the colonists already own lands which they work without government aid. Education, though well subsidized by the government, is, so far as the native population is concerned, in a very backward condition. The state returns four representatives to the Chamber of Deputies.

ESPLANADE, es-pla-nad', in fortification, the wide open space left between a citadel and the nearest house of the city, to prevent an enemy from being able to assail it under cover of these houses. The term is also frequently applied to a kind of terrace, especially along the seaside, for public walks or drives and also to a wide city street.

ESPOUSAL (SPONSALIA), or BE¬ TROTHAL, according to Church law con¬ sists of a deliberate mutual promise of mar¬ riage, expressed by outward signs, between two persons, both of whom may lawfully and validly enter into such an engagement. When such promise is made and accepted on both sides, neither party can lawfully withdraw from it without the other's consent or unless something occurs or some circumstance comes to light which, had it been known in time, would have hindered the engagement. Formerly such en¬ gagements used to be made with some solemnity coram ecclesia or at least in presence of wit¬ nesses ; now they are usually made without cere¬ mony or publicity. See Marriage. Consult Mielziner,

ESPRIT DES LOIS. See Spirit of the Laws.

ESPRITS FORTS (bold spirits), the name of the French school of writers better known as freethinkers, which included D'Alembert, Diderot, Helvetius and Voltaire. This school aimed not to establish general toleration for all forms of speculation, but sought to improve their own views of religion and philosophy. They recognized pure reason as the only de¬ pendable guide ; their motto might have been ((L'esprit prime tout® (Intellect is supreme). They had a wide influence on their time, and their doctrines have borne fruit ever since, the quality varying greatly among the different races and peoples. Their extreme radicalism may be said to have paved the way to socialism ; while their less radical principles have helped

build the democracies of our day.

ESPRONCEDA, Jose de, Spanish poet: b. AlmendraJeio, (Badajoz) 1810: d. Madrid, 23 May 1842. His father was a colonel of cavalry, and the boy was born in the army for his mother insisted on following her husband dur¬ ing his campaigns. At the close of the war young Espronceda was put into school in Mad¬ rid; and there he soon distinguished himself by his precocity, his love of poetry, his enthusiasm and his good literary taste. At the age of 14 he was already known as a poet of great promise. He was filled with democratic and revolutionary ideas ; and he was arrested for his boldly advocated ideas in his 1 5th year, and confined in a convent in Guadalajara, where his parents were then living. There he began the composition of his celebrated poem (E1

PelayoP On his liberation from prison he went to Madrid; but feeling that his every movement was watched by agents of the government, he went to Gibraltar, and from there to Lisbon, London and Paris. Later he fought in the revolutionary ranks in Paris (1830). He then joined an expedition sent to help Poland. After long wandering and exile from home, often with the most limited means of subsistence, he finally took advantage of the act of amnesty of 1833 and returned to Spain. There he might have lived in peace and followed his. poetical inclinations, but his revolutionary bent kept him in constant trouble. Through family influence he obtained a commission in the Queen's Guards (1833); but he was soon dismissed from the army and again forced into exile, on account of his interference in politics. The following year he was permitted to return to Madrid, where he again plunged into militant politics, and into the insurrectionary movements of 1835-36. From this on he became the most ardent of the Spanish advocates of republican¬ ism ; and in 1840 his was the most listened to voice in revolutionary Spain. In December 1841 he was sent as secretary of legation to The Hague by the Republicans who had secured possession of the government, a position he retained a very short time because of his elec¬ tion as deputy for Almeria. Already ill from his residence in the damp and cold climate of Holland, he hastened back to Madrid only to die of a severe inflammation of the throat.*

Espronceda is the greatest of the passionate, patriotic poets of Spain. With him patriotism was a passion and hatred of autocracy an ob¬ session which mastered him. There is no more passionate and compelling voice in all Spanish literature than his. He runs all the gamut of feeling; love of the most passionate kind; the fiercest hatred of oppression and injustice; the

deepest patriotism, expressed in the most com¬ pelling words ; the wildest visionary delight in socialism ; the passion of great aspirations and pure and noble purpose; and the depths of despair of atheism and of vanished hopes and disappointed aspirations. On account of his vivacity, his burning imagery, his wonderful power of word painting, his simple direct meth¬ ods in literature and his ever youthful mind, Espronceda has been called in Spain "the poet of youth and of democracy.® No other writer in Spanish literature or Spanish life had, at his age, at his death (32), such a hold over his followers and admirers as Jose Espronceda. His companion and fellow poet, Enrique Gil, who paid his last poetic tribute to him at the graveside, broke down and sobbed like a child ; and many an eye was wet among the mourners for the bright particular light of democracy that had just been extinguished in Spain. No definitive edition of Espronceda's works has been published for the reason that his efforts were spread over such a wide field of endeavor, and his writings appeared in newspapers, jour¬ nals, reviews and pamphlets. Yet numerous editions of the best known of his literary pro¬ ductions have been issued in Spain and in several foreign countries. In these editions the follow¬ ing works appear:

manca the drama*

Olano (1834); many short poems of a social, political, reflective or amatory nature; (E1 Diablo Mundo (1841) ; and many of the best lyrics in the Spanish language. His literary work has the form of Hugo and the spirit of Byron with an originality that is Espronceda's alone. The first edition of his collected writ¬ ings appeared in Paris in 1840, the second in Madrid in 1846; and the Hartzenbusch edition, with a biography by Ferrer del Rio, in Paris two years later. A more complete edition than any of these was published by Espronceda's only daughter, Blanche Espronceda de Escosura in 1874. A fairly complete edition of his poetical works also appeared in Barcelona in 1883. See El Estudiante de Salamanca.*

ESPY, James Pollard, American meteor¬ ologist, the founder of modern meteorology: b. Washington County, Pa., 9 May 1785 ; d. Cin¬ cinnati, 24 Jan. 1860. He was graduated at Transylvania University 1808. The name "storm-king® was given to him for his originat¬ ing a theory of storms which involved him in much controversy. He studied law at Xenia, Ohio, and was principal of the academy at Cumberland, Md., for five years (1812-17). From there he went to the Franklin Institute, Philadelphia, as professor of classical languages (1817-53). In 1836 he won the Magellanic prize for an essay on the theory of storms; and four years later he visited England and France where he explained at length his storm theories before the chief scientific societies of both countries. On his return home he was ap¬ pointed by the United States Congress meteor¬ ologist to the War Department, and later to the Navy Department also. His (Philosophy of

Storms) which was published in 1841 gained him a great reputation in his special field. His meteorological doctrine on the point of how atmospheric disturbances commence was ap¬ proved by the French Academy, but his views as to the mechanics of storm are contrary to received fact, and have been exploded. His principal contribution to practical meteorology was his institution of a system of telegraphic weather bulletins, 'which should converge at the capital and give daily intelligence of the weather in different widely separated points, and it may be justly claimed that he thus laid the founda¬ tion of all sound theory on the subject of weather prediction. Consult Monthly Weather Review (Vol. XXXV, Washington 1907) ; and Appleton's Popular Science Monthly (April

1889).

ESQUILACHE, Don Francisco de Borja y Aragon, Principe de (Francisco de Borja y Acevedo), Spanish poet: b. Madrid, about 1581; d. there 1658. From 1614 to 1621 he was viceroy of Peru, after which he returned to Spain and lived at the court of Madrid. He wrote (La pasion de Nuestro Sehor, a sacred poem (1638) ; (Napoles recuperada,* celebrating the conquest of Naples (1651) ; a translation of Thomas a Kempis (1661), and many poems. Selections of his works are included in (Biblio- teca de Autores Espanoles.**

ESQUILINE HILL (mons Esquilinus), the highest of the seven hills of Rome. It is between the Viminal and the Caelian hills, is 246 feet in height and under Augustus was laid out in pleasure gardens, known as the Gardens

of Maecenas. Soon after it was the fashionable residential section of the city. Virgil, Horace, Maecenas and Propertius are the most celebrated of its residents at this period. The baths of Titus and Nero's golden palace were on the Esquilinus and many of the ruins have been uncovered only to be at once destroyed in the course of erecting new buildings. In the mod¬ ern city the Esquiline is a new modern portion with fine streets and buildings. Consult Plat- ner, (The Topography and Monuments of An¬ cient Rome) (2d ed., New York 1911).

ESQUIMALT, es-kwi'malt, Canada, naval base in British Columbia, on the southeast coast of Vancouver Island, and on the Strait of San Juan .de Fuca and the Esquimalt and Nanaimo Railway, four miles from Victoria. The harbor is extensive and capa¬ ble of receiving vessels of the greatest size, and was the British navy station for this part of the Pacific coast. It

has a navy yard, and a large dry dock built in 1888. The de¬ fenses were greatly strengthened by the British government, and a British garrison was sta¬ tioned here until in 1905, on the Canadian gov¬ ernment undertaking to look to the defenses of Canada, it was withdrawn. The drydock was transferred to the Canadian government in

1910.

ESQUIMAUX. See Eskimo.

ESQUIRE, escuyer, old French; escudero, Spanish ; a shield-bearer or armor-bearer, an attendant on a knight ; hence, in modern times a title of dignity next in degree below a knight. In Great Britain this title is given properly to the younger sons of noblemen, to officers of the king's courts, and of the household, to counsellors at law, justices of the peace while in commission, sheriffs, gentlemen who have held commissions in the army and navy, and in fact to anyone save tradesmen, mechanics and peasants. It is usually given to all professional and literary men, both there and in the United States. In heraldry the helmet of an esquire is represented sideways with the visor closed. The title, however, no longer exists as a creation of letters patent.

ESQUIROL, Jean Etienne Dominique,

zhon a-te-en do-me-nek es-ke-rol, French physi¬ cian : b. Toulouse, 4 Jan. 1772; d. 12 Dec. 1840. His life was chiefly given to improving the methods of treating the insane, and he contrib¬ uted greatly toward the abolition of the barba¬ rous methods so long in vogue. In 1799 he founded a model asylum at Paris ; visited all the asylums in France 1808; was appointed physician to the Saltpetriere 1811 ; and in 1826 became head of the private asylum at Charen- ton, which he had largely planned. In 1817 his public revelations of the abuses current in French asylums led the government to appoint an investigating commission. His studies in¬ cluded the architecture and construction of asylums, and the best of the earlier 19th cen¬ tury buildings for the insane in France, such as those at Rouen, Nantes and Montpelier, were built in accordance with his plans and instructions. He wrote (Des Illusions chez les Alienes) (1832; English trans. 1833) ; (Des maladies mentales) (1838) ; and articles in the

ESQUIROS, Henri Francois Alphonse,

on-re fran-swa al-fons es-ke-rds, French poet and miscellaneous writer : b. Paris, 23 May 1812; d. Versailles, 12 May 1876. His first work, a volume of poetry, (Les Hirondelles, appeared in 1834. This was followed by numer¬ ous romances, and a socialistic commentary on the life of Christ,*

(L’£vangile du peuple) (1840), for which he was prosecuted and im¬ prisoned, and (Charlotte Corday) (1840). He then published (Les chants d’un prisonnier) (1841), poems written in prison; (Les vierges folles) (1842) ; (Les vierges sages (1842) ; (L'h:stoire des Montagnards) (1847). Having to leave France in 1851, he resided for years in England, and wrote a series of essays for the (Revue des Deux Mondesy on English life and character, which were translated under the title of (The English at HomeJ and were very popular. He also wrote a similar work on the Dutch. Other works of his are (Le droit an travail* (1849) ; (La vie future au point de vue socialiste) (1857) ; (Histoire des martyrs de la liberte* (1851) ; (La Morale Universelle) (1859) ; (Religious Life in England) (1867, published in English) ; (Les paysans) (1877) ; (Le chateau enchante* (1877), a novel.*

ESQUIVEL, Juan de, hoo-an' da es-ke-vel, Spanish soldier: b. 1470; d. 1519. He was the companion of Ovando when the latter went to Hispaniola to succeed Bobadilla as governor. Ovando sent him as leader of an armed expe¬ dition against the uprising of the native chief, Cotabanama, in Higuey province in 1504. In 1509, at the instance of Diego Columbus, he conquered the island of Jamaica and settled it as a Spanish possession. The colony flourished under his administration, and he founded there the city of Sevilla Nueva.

*ESS, Johann Heinrich von, yd-han hln'nH fan es (better known by his Benedictine name ˆLeander**) , German theologian: b. Warburg, 15 Feb. 1772; d. Affolderbach in the Odenwald, 13 Oct. 1847. He entered the Benedictine abbey of Marienmiinster as a novice 1790; was pastor at Schwalenberg 1799-1812; and professor of theology at the seminary in Marburg 1812-22. In 1807, with his cousin Karl, he published a German translation of the New Testament, the circulation of which was forbidden by the Pope. The following year he published a defense of his views as to Bible reading by the people, a new edition of which was issued in 1816 entitled (Gedanken fiber Bibel und Bibellehre.* After 1822 he gave his whole time to circulating his Bible versions among the people, to spreading his doctrines and to the composition of a Ger¬ man version of the entire Scriptures, which he finished in 1840. Others of his publications are (Was War die Bibel den Ersten Christen?* (1816) ; (Die Bibel Nicht ein Buch f fir Priester* (1818) ; an edition of the Vulgate (Tfibingen 1822-24); of the Septuagint (1824; new ed. 1887) and of the Greek New Testament*

(1827).

ESSAAD EFFENDI, Mohammed, Turk¬ ish historian: b. Constantinople, 1790; d. 1848. He was appointed historiographer of the empire, editor of the official state journal, and for some time served also as Ambassador to

Persia. Caussin de Perceval published some of his work under the title, (Precis historique de

la destruction du corps des Janissaires) (Paris

1833).

ESSAD, Pasha, Albanian soldier and adven¬ turer : b. about 1865. The descendant of a powerful and wealthy family — the Topdani — who maintain to this day a sort of feudal authority and splendor, Essad began his varied career in the Turkish army. His elder brother, Ghani, became a secret instrument of Abdul Hamid II for the noiseless removal of ob¬ noxious personages. A relative of one of his victims murdered Ghani, and was in turn shot down by Essad on Galata bridge in broad day¬ light. Combining the profession of a bandit chief with that of a soldier, Essad Pasha had at all times a host of Albanian clansmen at his command. He espoused the cause of the Young Turks in 1908 and, after the revival of the constitution, was sent to Constantinople as a deputy from Durazzo, the Albanian capital. It was Essad Pasha who announced to the sultan that the committee had decided to depose him. On the outbreak of the Balkan Wars (q.v.) he was appointed commander-in-chief to defend Albania with some 18,000 troops. With the garrison of Janina he defended that place for three months when he surrendered to the Greeks with 30,000 men on 6 March 1913; six weeks later he surrendered Scutari to the Montengrins. It appears that Essad Pasha cherished ambitions to create Albania an inde¬ pendent state with himself as ruler, and there were strong grounds to believe that the two capitulations — of Janina and Scutari — were the price he paid for eventual recognition, in addi¬ tion to which he received a handsome fee from Russia. The selection by the powers of Prince William of Wied to be king of Albania nullified the hopes of Essad Pasha, who now became Minister of War under the new regime. Before long, however, he was fomenting an insurrec¬ tion and was deported. The king of Albania had soon to flee from the country himself, and Essad Pasha, under Italian protection, returned to Durazzo in October 1914 in the role of dicta¬ tor. He was elected president of the Albanian provisional government. He dismissed the Austrian Minister — whose government had sup¬ ported the claims of Ismail Kemal Bey for the kingship — and strengthened the remnants of the Serbian army with his own forces against the Austrians and Bulgarians. In 1916 it was reported that Essad Pasha had fled to Italy.

ESSAY. The term essay is used in various loosely defined ways, but usually describes a brief prose composition of an expository character. Originally and properly, the word implies a tentative and suggestive, as distin¬ guished from a formal and complete, discus¬ sion; and this use is applicable to the "familiar® essay, the most purely literary of all the types. Dr. Samuel Johnson, from the same standpoint, defined the essay as "a loose sally of the mind, an irregular, indigested piece.® On the other hand, the term is equally applicable, in modern use, to formal expository compositions, and has even been extended to cover treatises of an extensive character, as Locke's (Essay Con¬ cerning Human Understanding) (1690). In the 18th century it was also extended to composi¬ tions in verse, notably Pope's (Essay on Man 1734. Essays are sometimes classified, for con¬*

venience, as (1) gnomic or aphoristic, (2) per¬ sonal or familiar, and (3) critical or didactic. The first type, which may be regarded as the original or primitive, represents the making of an essay by the process of bringing together gnomic sayings or aphorisms having to do with the same subject, — a process well exemplified by certain portions of the biblical book of Proverbs. Thus, while the greater part of that book is made up of brief separate proverbs or epigrams, these are developed into what may well be called essays in such passages as the account of Wisdom (chap. 1, verses 20-33) or of the Virtuous Woman (chap. 31, 10-31). The second type represents the treatment of a particular subject from a distinctively in¬ dividual standpoint, and at times reaches a point of development closely analogous to the personal lyric in poetry. The third type rep¬ resents a more utilitarian purpose, and has been most fruitfully developed in the pursuit of literary criticism. But the several types are not infrequently blended, and others might well enough be added if the classification were made complete.

In ancient classical literature the essay was not a recognized literary form ; its functions may be said to have been accomplished largely by the epistle and the dialogue. Thus Bacon said that "Seneca's epistles to Lucilius, if one mark them well, are but essays® ; and one might say that certain of Plato's Dialogues mark the highest reach of the method of the essay in any language. To a later philosopher, Theophrastus, were attributed the "Ethical Characters,® descriptive of various character types, which we shall see gave rise in modern times to a kind of essay form. The closest approach in antiquity, however, to what we now call the essay is to be found in the late Greek period, when the biographer and philos¬ opher Plutarch (1st century a.d.) wrote a num¬ ber of compositions, traditionally called Opera Moralia (Moral Works), on such subjects as "The Right Way of Listening,® "How a Flat¬ terer may be Distinguished from a Friend,® "On Chance,® "On Superstition,® and "On Exile.® Analogous to these

writings, in Latin literature, are the partly philosophic, partly personal (Tusculan Disputations of Cicero, the epistles and other moral disquisi¬ tions of Seneca, and — closest to the essay in their informal discursiveness — the Medita¬ tions* of the Emperor Marcus Aurelius. Some influence on later types of essay literature may also be traced to the miscellanies — anecdotal and otherwise — of Valerius Maximus and Aulus Gellius ; the work of the former is called (Books of Memorable Deeds and Utterances,* that of the latter (Attic Nights. *

In the mediaeval period the essay cannot be recognized as a separate type ; some approxima¬ tion to it may be noted in the successors of the miscellanies just mentioned, and in various collections of wise sayings (“sententiae® or sen¬ tences). In particular, writers in the service of the Church made a practice of bringing to¬ gether incidents and utterances illustrative of particular virtues, vices and spiritual truths, which, though they were more likely to de¬ velop into homily or sermon than into essay, sometimes furnished method or materials for later essayists. In France the form called Moral Lesson (legon morale) has been thought

to form a link between these mediaeval writings and the essays of Montaigne.

The modern conception of the essay as a distinct literary form, and the use of the word <(essay® to describe it, have their origin with definiteness in the work of Montaigne, who in 1580 published a volume of essais at Bordeaux; a second edition, with important additions, fol¬ lowed in 1588. A considerable portion of these essays of Montaigne is in the classical and mediaeval tradition, — discourse on moral themes, illustrated with anecdotes and aphorisms col¬ lected from a wide range of reading. But from this type of essay Montaigne developed the more personal type, discoursing on whatever subject came to hand from the standpoint of his individual experience and mood; so that he could say in his address ((to the reader® : I have no respect or consideration at all either to thy service or to my glory. . . . Myself am

the groundwork of my book. It is then no reason thou shouldest employ thy time about so frivolous and vain a subject.® To this sort of mood, and the essays that represent it, the whole later development of the <(familiar® essay is universally traced.

Montaigne’s essays were translated and widely read in England, and the

new form became more important across the Channel than in its native land. In 1597 Francis Bacon borrowed the name Essay for a little collection which bore the subtitle (Religious Meditations, — only 10 in all; in the edition of 1612 the number was increased to 38, in that of 1625 to 58. This collection also became popular, and has remained a classic ; but Bacon held rather to the older tradition of the aphoristic essay than to the newer type of Montaigne. In his later writings he gives more unity, and some¬ times more personality, to the form, yet never to the point of becoming (*

Sir William Cornwallis, a contemporary of Bacon's, followed his work with a succession of essays on moral themes (1600, 1610, etc.). The chief successors of Bacon and Cornwallis, in the 17th century, were Felltham (who called his essays Resolves, about 1620), Cowley (who included 11 essays in his collected works of 1668), and Sir William Temple ((Miscellanea, 1680, etc.). In the Restoration period Dryden may be said to have originated the modern critical essay, in the various prefaces on literary subjects which he was fond of prefixing to his writings. He also revived the dialogue form for the same purpose, in his (Essay of Dra¬ matic Poesy > (1667). Near the close of the century Defoe began to develop the essay form for the discussion of social, political and edu¬ cational questions, notably in the (Essay on Projects1* (1697). One may also note two other literary types which, going back to much earlier periods, were highly valued in the 17th century and contributed to the art of the essay. The first of these is the "character,® originated, as has been mentioned, by the Greek, Theophrastus, whose quasi-essays were now revived and imi¬ tated in both England and France — notably by Joseph Hall ((Characters of Vices and Virtues, > 1608), John Earle ((Microcosmog- raphie, or a Piece of the World Discovered in Essays' and Characters, > 1628), and Jean La Bruvere ((Les caracteres, ou les moeurs de ce siecle,* 1688). The second type is the epistle, also, as we have seen, of long-standing*

importance, and newly cultivated in the Re¬ naissance and the succeeding age; notable ex¬ amples of the development of this form in the direction of the literary essay are the Spanish letters of Guevara (d. 1545), which were translated into English more than once, and came to be called the (

The early 18th century sawr a highly im¬ portant development of the essay in connection with the growth of periodical literature. The beginnings of this movement may be observed in the work of Defoe and even earlier, but its first conspicuous representatives were Steele and Addison, in the several periodicals which they issued singly or jointly; indeed one might say that the new periodical essay was born in Steele's Tatler, which began to appear in 1709. Addison presently became Steele's coadjutor, and in the

Spectator, begun March 1711, his influence was paramount. The type of essay developed in these periodicals was of fairly fixed length, suited to reading at the breakfast table, and combined in an important way the qualities of the familiar and didactic essay: that is, its purpose was the serious and profit¬ able discussion of social, ethical and literary topics, but the point of view was distinctly personal, being represented as that of a saga¬ cious but whimsical character, named (

IV or Id, an amusing method of commenting on contemporary life from the assumed stand¬ point of a foreigner, which had been availed of by earlier critics, notably Montesquieu in the Lettres Persanes (1721).

The development of the essay in the early 19th century was again due largely to the evolu¬ tion of periodical types, and in English litera¬ ture one distinguishes clearly two of these types, the magazine and the critical review, which gave new opportunity for the familiar and the critical essay respectively. Most im¬ portant of the former were Blackwood's and the London Magazine, founded in 1817 and 1820; of Blackwood's John Wilson (((Chris- topher North55) soon became the leading essay¬ ist, while the London Magazine had the dis¬ tinction of printing some of the most brilliant work of Lamb, DeQuincey and Hazlitt. The brothers John and Leigh Hunt were also con¬ cerned in the publication of a number of periodicals, some (like the Examiner) being of a newspaper type, but offering space for literary essays, others (like the Indicator) con¬ tinuing the Spectator tradition. For all these Leigh Hunt was a leading writer, — with the possible exception of John Wilson, the most prolific of the 19th century essayists. The Elia essays of Charles Lamb, which appeared in the London Magazine 1820-25, are by universal con¬ sent the finest examples of the familiar type produced since Montaigne's ; some of Hazlitt's, however (to be found in his collections called The Round Table, 1817, and Table Talk, 1822), are not far beneath them, and of substantial literary criticism (as in the papers called Characters of Shakespeare's Plays, 1817) Haz¬ litt gives us far more than Lamb. Of the second newly developed type of periodical, the critical, the leading representatives are the Edinburgh Review and the Quarterly Review, founded in 1802 and 1809 respectively; these gave rise to a new form of literary essay, called a <(review,55 which normally took its origin in an account of some recent publica¬ tions, but became an independent discussion of the subject suggested by the work in hand. The typical examples of this form are to be found in the essays of Francis Jeffrey, long editor of the Edinburgh, and John Gibson Lockhart, long editor of the Quarterly ; but their work, important as it seemed, has

proved insignificant in comparison with that of Thomas Babington Macaulay, who began his career as reviewer in the Edinburgh with his famous article on Milton, 1825, and remains the most brilliant and prolific of English critical essayists.

We cannot here follow the course of the essay throughout the 19th century. In general, England has continued to produce the most distinguished work in the familiar type; its best representative in recent times was Robert Louis Stevenson (‘Familiar Studies,5 1882, and ‘Memories and Portraits, > 1887). English

writers have also done fine work in the critical essay, notably Matthew Arnold ((Essays in Criticism,5 1865, 1888) and Leslie Stephen ((Hours in a Library, > 1874-79) ; but here the palm must be yielded to the French, who have used the essay most characteristically for this purpose, notably Sainte-Beuve ((Causeries du Lundi,5 1851-72), Brunetiere (‘Questions de Critique, 1889), and Anatole France (‘La Vie

Litteraire,5 1907). American literature in¬ cludes, for the early period, one notable rep¬ resentative of the Addison tradition, Wash¬ ington Irving ((Sketch Bookp 1820). By far the most distinguished American essayist is Emerson, who revived to some extent the method of the aphoristic essay, emphasizing the single utterance rather more than the whole composition ((EssaysP 1841-44). In the criti¬ cal type the work of James Russell Lowell re¬ mains unexcelled (Among my BooksP 1870- 76). Other noteworthy American essayists of the 19th century are E. P. Whipple, Edgar A. Poe, Donald G. Mitchell (“Ik Marvel”), Thomas Wentworth Higginson, George Wil¬ liam Curtis and Charles Dudley Warner. In the (Autocrat of the Breakfast Table) (1858), Oliver Wendell Holmes made wise and witty use of the method of the familiar essay, though in an expanded and discursive form which belongs to no definite type.

Bibliography.— The best account of the familiar essay is to be found in the introduc¬ tion to Bryan and Crane’s collection called (The English Familiar Essay5 (Boston 1916). For the English essay as a whole, consult Walker’s (The English Essay and Essayists5 (London 1915) ; MacDonald, W. L., begin¬ nings of the English Essay5 (University of Toronto Studies) ; Wylie, Laura T., ‘The Eng¬ lish Essay5 (in Social Studies in English Liter¬ ature,5 Boston 1916). For the reviews and the critical essay, consult the introductions to Gates’s Selections from the Essays of Jeffrey5 (Boston 1894), and Haney’s (Early Reviews of English Poets5 (Philadelphia 1904); also Saintsbury’s (History of Criticism5 (Edin¬ burgh 1904). For the character-writers, con¬ sult Morley’s Character Writings of the 17th Century5 (London 1891) ; for the letter- writers, Hansche’s (English Familiar Letter- writers and their Contribution to the English Essay5

(Dissertation of the University of Pennsylvania, 1902). For the Spectator and its influence, consult Beljame's 'Le public et les hommes de lettres en Angleterre au 18e siecle5 (Paris 1881). There is a convenient collection of essays by British writers in the Everyman's Library series, and a similar col¬ lection of American essays has been edited by Brander Matthews (Oxford Press 1914).

Raymond M. Alden,

Professor of English, Leland Stanford Junior

University.

ESSAY ON CRITICISM, An, a didactic poem in heroic couplets by Alexander Pope (q.v.) in which he explains and propounds the canons of verse structure, poetic taste and criticism. The poem, Pope's first really origi¬ nal work, was written either in 1707 or 1709, more likely in the - latter year. It was first published anonymously on 15 May 1711 and sold so well that another impression was made the same year. The second edition, published in 1713, gave as the name of the author ((Mr. Pope.55 Since then it has been included in practically every edition of Pope's works. The most exhaustively critical and most carefully annotated edition is that edited by J. W. Croker, W. Elwin and W. J. Courthope (Lon¬ don 1871-89) where it will be found in the second volume. It has been translated into Latin, French, German, Italian, Spanish,

Portuguese, Hungarian, Polish and Russian. Opinions concerning the merits of the poem are divided. In its own days it was praised very highly by such astute critics as Addison and Dr. Johnson. Of the next generation of critics, Hazlitt continues to sing its praises, but DeQuincey criticizes it harshly.

The fact remains, however, that, though metrically by far the least polished of Pope's poems, it was a remarkable performance for a youth of 21, both in regard to its poetical value and in respect to its contents. Its imagery, though very uneven, at points reaches heights which were never surpassed by the author and many of its striking passages have become familiar quotations. It is one of Pope's longer works, consisting of 744 verses, divided into three parts. With it began the long series of literary quarrels in which Pope was involved throughout his entire career as a result of his biting satire. In the (Essay on Criticism } he attacked particularly vigorously and outspoken¬ ly a critic and playwright of that day, J. Dennis (q.v.) who replied in a pamphlet, called Reflections upon a late Rhapsodic,

called "An Essay upon Criticism" in which he in turn criticized very sharply and in places with considerable justice Pope's work. Consult Graner, K., ((Die Ubersetzungen, von Pope's Es¬ say on Criticism,® etc. (Aschaffenburg 1910). See Pope, Alexander.

B. H. Goldsmith.

ESSAY ON THE HUMAN UNDER¬ STANDING, An. John Locke's (Essay on the Human Understanding) is the classic of Eng¬ lish common sense empiricism. Subsequent philosophy and psychology and English thought in general are weighted with its terminology and opinions.

Locke's purpose, so he tells us, was ((to in¬ quire into the origin, certainty and extent of human knowledge, together with the grounds and degrees of belief, opinion and assent.® He would determine the powers of the understand¬ ing by an ˆhistorical® method, that is, by trac¬ ing the growth of knowledge in the individual. As a result of his analysis Locke decided that mind is conversant only with < (ideas® and their relations, which ideas it acquired through sen¬ sation and through reflection on its own oper¬ ations. These ideas. < (whatever is the object of the mind when a man thinks,® are the copies of things — the effects produced in us by ob¬ jects. He never questioned their representa¬ tive character so far as the primary qualities, such as extension, motion, etc., are concerned and considered them sufficient evidence of an external world.

Knowledge is the perception of the agree¬ ment or disagreement of ideas and arises in three degrees: intuitive, by which we perceive immediately the relation between two ideas; demonstrative, i.e., a chain of intuitions ; sensi¬ tive, which gives us knowledge of particular things. The limitation thus imposed leaves out¬ side the realm of knowledge most of the mat¬ ters with which the mind is generally occupied in the conduct of life. These must be deter¬ mined by probable ((judgment.®

Locke was very uncritical and avoided the logical extremes to which his argument is ob¬ viously subject and which are to be found in the idealism of Berkeley and the sensationalism

of Condillac. His doctrine of representative ideas as the ultimate data of knowledge clearly expresses an epistemological position which may be regarded as the fundamental principle or fundamental fallacy of subsequent philosophy, according to one's metaphysical preferences.

The (Essay > has probably run to more edi¬ tions than any other modern philosopical classic and almost every subsequent philosopher has taken it at one time or another as a topic. Leib¬ nitz's (Nouveaux Essais sur

l'entendement hu- main) (1761) is a running commentary on Locke. The best critical edition is that by Prof. C. Fraser (1894).

Walter B. Veazie.

ESSAY ON MAN, The, one of the later works (1733-34) of Alexander Pope, shares with the (Essay on Criticism, > the Rape of the Lock, > the Runciadp the (Epistle to Dr. Ar- buthnoD and a few other poems the position of foremost place among his original works. It is a didactic poem of some 600 heroic coup¬ lets grouped into four epistles and dedicated to Lord Bolingbroke, with whose brilliant but somewhat trivial philosophy it is in substantial agreement. There is probably a fixed order in the universe and definite gradations among all living things, including man, but it is pre¬ sumption in man tp attempt to define himself and to determine his place in the universe ; he can only humbly submit to the decrees of Providence. The proper study, therefore, of mankind is man, in whom the outstanding characteristic is a mixture of two principles, self-love and reason, which are expressed in \arying combinations of virtue and vice, which by giving men different characters, serve the ends of Providence. Reason and self-love oper¬ ate in the formation of Society, and its insti¬ tutions are according to the divine purpose. This universal aim is human happiness which, though obscured by false notions of the means of attaining it, consists in the acquisition of virtue. This is the general law, which it is folly to think will be altered to suit man's de¬ sires for prosperity, honors and the many ob¬ jects of ambition of men. The philosophy is not particularly moving or consistent, and the poem is to-day best remembered for the large number of familiar quotations that it has con¬ tributed to the common stock — ((Whatever is, is right,® ˆPleased with a rattle, tickled with a straw,® <(Order is heaven's first law,® (VII of Les¬ lie Stephen's Rope in the English Men of Letters. William T. Brewster.*

ESSAYS OF BACON. Bacon's < Essays > were practically the first things in English liter¬ ature to be called by the name <(Essay.® That word, in the 16th century, generally car¬ ried the idea of attempt or trial and it was in some such sense that Bacon used it. In the 10 essays first published he gave, not finished treatments but rather tentative reflections. He himself calls them

M2

developed into several forms in the 17th century, but in the earlier essays there was something of the experimental, incomplete char¬ acter which we

do not generally have in mind when we think of the essay at present. The subject matter of Bacon's have been <(the most current® of his works because (

Edward E. Hale.

ESSAYS FROM THE EASY CHAIR.

In 1854 George William Curtis began to write familiar and personal essays in a department of Harper's Magazine called (

able incidents and interpretations of American life for nearly half a century.

Curtis has many of the characteristics of the men who from Montaigne to Stevenson have made of the personal type of essay one of the permanent and most delightful forms of litera¬ ture. The light touch, personal likes and dis¬ likes, character sketches, delicate humor and pathos, suggestive bits of wisdom, are all found in his essays. He suffers most by contrast with Lamb in his lack of felicitous literary allusion and in his failure to secure the more perma¬ nent effects of rhetoric, in the better sense of that word. He is perhaps more like Addison, or Goldsmith, or Irving, though less final in his power of expression than any of them.

A typical volume of these essays gives some idea of the range of his topics. He has reminis¬ cences of Edward Everett, Emerson, Dickens, Thoreau, Wendell Phillips, Jenny Lind, Thackeray and Browning, each of whom is recalled in some typical lecture or conversation or dinner. The theatre figures in an account of Jefferson as Rip Van Winkle and in reminis¬ cences of Fanny Kemble and John Gilbert. That he was fond of music is suggested in ((The Opera in 1864,® <(Thalberg and Other Pianists® and <(Cecilia Playing.® Typical sketches of social life and of various aspects of New York are to be found in ((Shops and Shopping,® <(Mrs. Grundy and the Cosmopoli¬ tan,® <(Easter Bonnets® and <(The Town.®

At the time Curtis was writing such essays for Harper's Magazine he was writing edi¬ torials for Harper's Weekly and delivering ad¬ dresses throughout the country of an entirely different character. It is surprising that the man who was a leader in the movement for civil service reform, who helped to inaugurate the independent movement in American politics, and who at an earlier date took a prominent part in the organization of the Republican party, should have been able to detach himself from the stream of affairs as he did in his charming essays. In this respect, as in many others, he was like his friend James Russell Lowell, who wrote to him words that best give an interpretation of his personality :

“ Had letters kept you, every wreath were yours;

Had the world tempted, all its chariest doors

Had swung on flattered hinges to admit

Such high bred manners, such good natured wit.”

Edwin Morris.

ESSAYS OF ELIA. Charles Lamb’s Essays, the most famous and delightful of his works, were written in the spare hours of his busy life, and were originally published chiefly as contributions to the London Magazine from 1820 to 1833. The first collected volume, (The Essays of Elia, appeared in 1823; the second,*

(Last Essays of Elia, 10 years later. The signature Elia, which Lamb adopted from the name of a former clerk in the South Sea House where he had been employed, served as a thin disguise, under the cover of which the author revealed in an intimate way his own experiences and thoughts, distorting the actual facts of his life only so much as was necessary to preserve a semblance of anonymity.*

. The substance of many of the essays consists in reminiscences of Lamb’s early years, toward which he looked back with a tender and ro¬ mantic yearning. He describes, for example, in

the essay entitled ((Christ’s Hospital Five-and- Thirty Years Ago,® his schoolboy life and his first association with Samuel Taylor Coleridge ;

in ((Blakesmoor in H – shire,® a visit with his

sister, Bridget Elia (Mary Lamb), to an old mansion in the country in his childhood ; in ((My First Play,® his earliest sensations in the theatre; in <(01d Benchers of the Inner Tem¬ ple,® the curious personalities of the antique lawyers with whom he had become acquainted in his boyhood home in London. In these essays and others which refer to the circum¬ stances of his own life. Lamb admits us freely to the inner circle of his thought. He frankly confesses his weaknesses and his prejudices. He pictures in <(The Superannuated Man® his sensations on finding himself at last free from the business routine of a lifetime ; he even writes the <(Confessions of a Drunkard,® speak¬ ing seriously and truthfully of his

own experi¬ ence. Finally, in that most beautiful of all the essays, <(Dream Children,® he indulges in a vision, regretful but not unmanly, of what might have been had the circumstances of his sad life been different. In all this Lamb is lovable and charming. If a tender melancholy pervades some of the essays, others, like the famous <(Dissertation on Roast Pig,® are full of hilarious fun. In the majority of his sketches humor and pathos go hand in hand. The senti¬ ment is relieved by brilliant flashes of wit which make Lamb rank as one of the chief of English humorists; the laughter is tempered by kindly sympathy.

Lamb's romantic love of bygone things is apparent everywhere in the essays. He com¬ plains of <(the decay of beggars in the me¬ tropolis,® writes C(the praise of chimney¬ sweepers,® describing with delightful humor the annual dinner given in their honor by his friend Jem White. He confesses to an almost femi¬ nine delight in old china, prefers the sun-dial to the clock and the old type of schoolmaster to the new. In human personality Lamb is most interested in out-of the-way characters, with some peculiar humor or bias, <(odd fishes,® like the old-fashioned clerks of the South Sea House or the immortal, whist-playing Sarah Battle. A number of the essays deal with literary matters, particularly with the drama, in which he was much interested, and with those older authors like Sir Thomas Browne, toward whom he was drawn by his antiquarian instinct and by his liking for the unusual and piquant in literature as in life. As a critic Lamb is appreciative and informal, relishing his favorite authors rather than judging them. He is the best and most enthusiastic of all book-lovers.

Whatever his subject Lamb casts upon it the magic of a style rich in personality, pictur¬ esque, brilliantly witty and singularly respon¬ sive to the author's mood. Quaint turns of phrase and antiquated words, borrowed from the older writers of whom Lamb was fond, give a touch of oddity to his language which suits his highly individual type of humor.

The (Essays of Elia) are the most attractive example in our literature of the personal or informal essay, compounded of wit and senti¬ ment, observation and reflection, familiar in tone, whimsical and unexpected in idea, but richly human and often touching by way of intimation and suggestion on the deepest truths.

Consult (The Works of Charles and Mary Lamb (ed. E. V. Lucas, 1903-05) ; (The Essays of Elia) (In (Everyman's Library*), and (The World's Classics* (Oxford) ; essays on Lamb in Walter Pater's (Appreciations } ; A. Birrell's (Obiter Dicta) (2d series) ; G. E. Woodberry's (Makers of Literature, * and C. T. Winchester's (A Group of English Essayists.* For biblio¬ graphy, consult Cambridge History of English Literature) (Vol. XII).*

James H. Hanford.

ESSAYS AND REVIEWS, a work issued in 1860 by seven members of the Church of England, six of whom were laymen. It was severely criticized by the clerical body and in 1864 was condemned by convocation. Two of the seven contributors were sentenced to suspension of one year by the ecclesiastical courts, but the Privy Council reversed this sentence.

ESSEG. See Eszeg.

ESSEN, Hans Henrik, Count, Swedish statesman : b. Kaias, West Gotland 1755 ; d. 1824. He received his education at the Uni¬ versity of Upsala and entered the army in the service of Gustavus III. In 1795 he was made governor of Stockholm and five years later governor-general of Swedish-Pomerania and Riigen. In 1807 he defended Stralsund against the French and two years later was made a count and a councillor of state. Charles XIII made him Ambassador to France in 1910 and he was successful in having Napoleon restore Pomerania to Sweden. In 1811 he was made field marshal, campaigned in 1813 against Nor¬ way, of which he was governor in 1814-16. In 1817 he was transferred and made governor- general of Skane Consult the life by Wiesel- gren (Malmo 1855).

ESSEN, Germany, town of Rhenish Prus¬ sia, 18 miles northeast of Diisseldorf. It has recently greatly increased in population and man¬ ufactories. The cathedral, founded in the 10th century, is one of the oldest in Germany. It is celebrated for the steel and iron works of the Krupps (q.v.) the most extensive in Europe, employing 70,000 workmen in their various un¬ dertakings. This great establishment was started in 1811, with only two workmen. The rifled steel cannon made here were supplied to most of the armies of the world. In the suburbs are the <(colonies® — cottages, churches, schools, stores, libraries, places of amusement, homes for superannuated and disabled workmen, etc., established by the Krupps for their workmen who, however, on pain of dismissal, are for¬ bidden to become associated with any socialist or trade union organization. During the Euro¬ pean War, Essen was frequently attacked and bombed by allied air squadrons. (See War, European). The town was founded in the 9th century, when the Benedictine abbey was estab¬ lished here, and for some time it was under the control of the Abbess of Essen. In the 10th century the Abbess Hagona gave the town mu¬ nicipal privileges. In 1803 it was incorporated into Prussia. The town of Ruttenscheid was annexed to Essen in 1905 and the commune of Huttrop in 1908. Pop. 295,000.

ESSENCE, in metaphysics, originally the same as substance. Later, substance came to be used for the undetermined substratum of a

thing, essence for the qualities expressed in the definition of a thing; or, as Locke put it, Essence may be taken for the being of any¬ thing, whereby it is what it is.® (Essay Con¬ cerning Human Understanding,* Book III, Chapter III, Section 15). It is now used in a wider sense, to designate the intrinsic nature of a thing. In chemistry, and in popular par¬ lance, essences are solutions of the essential oils in alcohol, and may be prepared by adding rectified spirit to the odoriferous parts of plants, or to the essential oils, and distilling; or simply by adding the essential oil to the rectified spirit, and agitating till a uniform mixture is obtained. The term has, however, received a wider sig¬ nificance, and is applied to any liquid possess¬ ing the properties of the substance of which it professes to be the essence. Thus essences of coffee and beef contain in a concentrated form the virtues of coffee and beef, and in some circumstances may be substituted for them.

ESSENCE DE PETIT GRAIN (essence of small grain), a perfume produced by the distillation of small oranges while in an un¬ ripe state. The oranges for this purpose are taken when about the size of a cherry.

ESSENES, es-senz', a sect or society of Hyper-Pharisaic Jews, in existence 150 years b.c., and which existed till the 2d century, the remnant then returning to Pharisaic or orthodox Judaism or entering the Christian communion. They are not mentioned in the Bible or rabbin¬ ical literature. Josephus the historian (1st cen¬ tury) describes their manner of life in some detail; Philo Judaeus has a notice of it, so too has Pliny in his (Historia Naturalist Josephus was in his youth a probationer of the society, but lived among them only a short time and was unacquainted with the details of their sys¬ tem, which were strictly withheld from novices; but his narrative has the marks of authenticity. In essentials Josephus and Philo are in accord, and with them agrees Pliny in the one peculiar¬ ity of this society which he notices — their celibate life. The Essenes were stern ascetics and in that respect were the prototype of the Christian Solitaries, who in the 3d and 4th centuries peopled the Nubian deserts; withal, they were both in name and in deed Friends — for such was one of the appellations of the brethren. Among themselves they had all things in common, like the first Christians, and they were open-handed and hospitable to strangers. They are supposed never to have numbered more than 4,000 souls. There were groups of Essenes in all the towns of Judea, but their institute had opportunity for full de¬ velopment only in their communal settlements on the western shore of the Dead Sea, where they devoted themselves to their peculiar reli¬ gious observances and to

agriculture and a few simple handicrafts. Their food was of the simplest, taken at the common board, their only drink, water; their attire was of the plainest white linen material. None possessed more than one tunic or more than one pair of shoes. They rose at daybreak for prayer ; after prayer and a hymn they went about their customary occupations. (Here we are reminded of what Pliny wrote to Hadrian concerning usages of the Christians in Bithynia : ((They met on a stated day before daybreak and chanted a hymn

to Christ as God.®) At the 5th hour (11 a.m.) they again assembled in one place and bathed their faces in cold water, after which they put on pure white garments and repaired to the common simple meal, which was preceded by a blessing, a prayer and a hymn; and after the repast there was again prayer and a hymn. Then the brethren put off the ceremonial garb of white linen, put on their workday attire, and went back to their employments. No women were admitted to the order; like some of the modern Shakers they adopted young boys and brought them up in their own simple way of living; on attaining maturity they might, if wdlling, be admitted to membership after a term of probation ; or they were free to return to the world. But they also received accessions of life-weary grown people. ((Thus,® says Pliny, ((here is a people that never dies out (ceterna cst) yet in which there are no births : so fruitful for them is others' (disgust of life J ®

(Tam fecunda illis aliorurn vita pcenitentia est). They were opposed to trading as leading to covetousness, and to the making weapons of offense, and rejected animal sacrifices. Like the Society of Friends they forbade oaths; and they held that a man whose word needed to be confirmed by oath was not to be believed at all. Nevertheless the postulant for admission into the society was required to take <(terrible oaths® that he would pay worship to God, be just to men, injure none, hate the unjust, be faithful and true to all, especially rulers, for none bears rule save by God's will. Pliny writes of a similar oath taken by the Christians.

There were four degrees of membership re¬ sembling in some respects the castes of the Hin¬ dus. If a person in a higher degree so much as touched one of a lower grade, he was thereby defiled and was bound to make himself clean in cold water. Their severely abstemious life, their contempt for riches and honors, their deep conviction of the immense superiority of their religion gave them all the heroic courage in face of persecution and torture which distinguished the Christians in the ages of martyrdom. So scrupulous were they in avoiding everything like idolatry, that some of them would never enter any city because of the images erected at the gates ; nor would they touch a coin that bore the likeness of any ruler.

Bibliography. — Pliny, (Historia Naturalis ; the writings of Josephus and Philo Judaeus; also Philosophiimena, or Refutation of all Heresies, * written in Greek 230 A.n., author un¬ known; Lightfoot, (Colossians and Philemon) (3d ed., London 1879) ; Fairweather, (The Background of the Gospels1* (New York 1908) ; Pfleiderer, Erimitive Christianity) (Eng. trans., New York 1912) ; and Hastings, Encyclopedia of Religion and Ethics. *

ESSENTIAL OILS are those volatile aromatic constituents of certain flowers, fruits, seeds, etc., which contain their specific odors and flavors — that is, the properties which de¬ light the senses of smell and taste. The obj •-•”t aimed at in the manufacture of these essence is that they may be transferred to cthe1 comp¬ ilations, through which the pleasure they afford may be enjoyed to a far greater extent. The delicacy of the methods to be employed may be better appreciated when it is remembered that these oils are products of the living plants,*

and that immediately upon harvesting the plant the essences begin to deteriorate, the loss vary¬ ing with the period which elapses between the time when the life of the plant is halted and the time when the essential oil is finally secured in a permanent form. Another point to be care¬ fully attended to is that each essence is at its best at a certain time in the growth of the plant, and that it must be taken at that time — neither immature nor past maturity. Other conditions are liable to affect the product injuriously, and heat is one of these. The delicate essence of the strawberry is quickly dissipated if the sun beats down hot upon it, and many other essen¬ tial oils are as sensitive to heat. And this peculiarity of course prevents the use of the chief refining process of the chemist, that of distillation, for these particular oils. An ex¬ ample of this condition is presented in winning the oil of lemon from the peel. Any attempt to obtain this oil by heat results in a product of low quality. The fine flavor has to be gained by cold pressing of the raspings of the surface. The banana, peach and pineapple are in the same class with the strawberry and the lemon in this respect. This difficulty is overcome in large measure by dissolving out the essential oils with alcohol, and distilling the alcoholic solution under vacuum — which so reduces the degree of heat needed that the delicate flavors are preserved. Another condition likely to in¬ jure these sensitive substances is undue exposure of the plants or fruits to the air after harvest¬ ing. Some oils quickly become rancid, and in the case of others fermentation of the source of the oil completely destroys it. The class of flavors and odors which are injured by fermen¬ tation is practically the same as that which is supersensitive to heat. In the case of some other essences, as of the apple and cherry, fer¬ mentation of the fruit serves to accentuate its particular flavor.

Volatile oils consist of two component groups, the taste-carriers and the terpenes. In addition to these there may be varying proportions of waxy and resinous matters. The aim of the manufacturing processes is to eliminate all but the taste-carriers' constituents, for it is solely upon these that its market value depends.

The methods employed in making essential oils are (1) expression; (2) distillation; (3) extraction. The first makes use of simple press¬ ure ; the second uses distillation with water or steam, and subsequent rectification to remove the water; the third is carried on by dissolving out the desired oil with a solvent, such as al¬ cohol, chloroform, benzol, etc., these solvents being afterward distilled off at a low tempera¬ ture under vacuum. The

terpenes are removed from some kinds of oil by the vacuum process, being the first to pass over on the rise in tem¬ perature. The sesquiterpenes follow. At a slightly higher degree the true flavor carrying oil comes over. When it is necessary to raise the temperature again, the fractions which then distil over are gathered separately, as not of the highest quality. Another method of remov¬ ing the terpenes used with a class of oils which cannot be worked by the first process, is by alcoholic distillation. In this process one part of the oil to be treated is mixed with five parts of 43 per cent alcohol. Upon heating this mix¬ ture vapors containing about 80 per cent alcohol and 20 per cent water, together with the vapors

of the oil, pass over into a receiver where they are condensed. The terpenes separate as they are insoluble in alcohol of that strength. The essential oils remain in solution with the alcohol. The process is continued until the collecting terpenes cease to increase in quantity. The oil thus purified is dried by agitation with anhy¬ drous sodium sulphate, and placed in lightproof and airproof bottles. From these essential oils are made the so-called ˆessences," tinctures, flavoring extracts, syrups for soda water, per¬ fumes, cordials, liqueurs, etc. Many of the es¬ sential oils are used as medicine, or in medicinal preparations, ointments and liniments.

The United States Census of Manufactures for 1914 reported 105 establishments engaged in the manufacture of essential oils, employing 435 persons, of whom 249 were wage-earners receiving annually $133,272 in wages. The capi¬ tal invested totaled $1,616,682, and the year's output was valued at $2,313,606; of this, $748,- 771 was the value added by manufacture. Two other establishments reported making essential oils as a subsidiary product, but the value of their production is not given. See Oil.

ESSENTUKI, or ESSENTUKSKAYA,

Russia, a health resort in the territory of Terek, northern Caucasus, 10 miles north of Pyatigorsk. It is 2,000 feet above sea-level and is widely known for its cold alkaline springs. Pop. 8,000.

ESSEQUIBO, es-se-ke'bd, the largest river of British Guiana, draining about one-half of the area of the colony. It rises in the northern slope of the Akarai Mountains, which marks the watershed between it and the Amazon, takes an irregular northerly course, and flows into the Atlantic west of Georgetown by an estuary 20 miles in width. Its whole length is about 600 miles. It is navigable for some distance from the ocean. The district or division of Esse- quibo, which is in the basin of the Essequibo River, is well cultivated and extremely fertile, producing coffee, cotton, cocoa and sugar. Its principle tributaries are the Mazaruni, Cuyuni, Potaro, Siparuni and Rupun. A portion of the basin of this river was included in the disputed

territory claimed by the Venezuelan and the British governments in 1896. The claims were settled by an arbitration of treaty 2 Feb. 1897, and the award made 3 Oct. 1899. Pop. 36,000.

ESSEX, Arthur Capel, 1st (Capel) Earl of, English statesman: b. January 1632; d. 13 July 1683. At the Restoration he was created Viscount Malden and Earl of Essex. He be¬ came troublesome to Charles II and to be rid of him the latter sent him as Ambassador to Denmark. His conduct in Denmark restored him to favor and in 1672 he was made privy councillor and lord-lieutenant of Ireland. His subsequent administration lasted five years and was most successful and honest. He kept a just balance between the Catholics, Presbyterians and the members of the Church of England. His opposition to corruption in the administra¬ tion made him many enemies, who through in¬ trigue brought about his recall. He joined the so-called Country Party under Lord Halifax and again became noted for his opposition to the Crown. With Shaftesbury he supported the Exclusion Bill, designed to keep James from the throne. In 1683 he was arrested and placed in the Tower. His spirits appear to have been

cast down and about a month after his arrest he was found with his throat cut. Consult dictionary of National Biography) and (Essex Papers) (Camden Society 1890).

ESSEX, Robert Devereux, 2d Earl of, English courtier: b. Netherwood, Herefordshire 19 Nov. 1566; d. London, 25 Feb. 1601. He was educated at Trinity College, Cambridge, and ap¬ peared at Court in 1577. He greatly distin¬ guished himself at the siege of Ziitphen in 1786. On Leicester's death 1588, he became the chief favorite of Elizabeth. In 1590 he married the widow of Sir Philip Sidney, and in 1591 was sent to support Henry IV against Spain, but the expedition effected nothing of importance. About this time Essex was on terms of close friendship with Francis Bacon, who assisted him greatly by advice on political and other matters. In 1596 he commanded an expedition to Spain, and greatly distinguished himself at the capture of Cadiz. In 1597, after an unsuc¬ cessful expedition to the Azores, he, with How¬ ard and Raleigh, made extensive captures of Spanish ships. He became earl marshal and chancellor of the University of Cambridge. Next year he quarreled with the queen, who struck him on the ear and bade him <(go and be hanged.® After some months a reconcilia¬ tion took place, and he was appointed lord-lieu¬ tenant of Ireland (1599), then in a state of re¬ bellion. He returned to England in September, having

been entirely unsuccessful in his govern¬ ment and made a humiliating truce with the rebels; was made a prisoner in his own house, and was shortly afterward (June 1600) tried by special court. The charges against him were that he had exceeded his instructions in the Irish campaign, and had deserted his post with¬ out leave ; and he was deprived of all his offices, and sentenced to imprisonment, but not long afterward was set at liberty. He now conceived a deep resentment against the queen's councillors particularly Cecil and Raleigh, who, he imagined, had biased her against him. Being summoned before the council, he assembled his friends in his house, and proceeding to the city, endeavored to enlist the citizens to enforce dismissal of the queen's ministers. After a skirmish with a party of soldiers he returned to his house, but after a short defense was compelled to sur¬ render, and sent to the Tower. He was tried for treason on 19 February and executed on 26 Feb. 1601. Consult Croxall, (Memoirs of the Unhappy Favorite) (1729); Spedding,

ESSEX, Robert Devereux, 3d Earl of, English soldier: b. 1591 ; d. 14 Sept. 1646. When 11 years old he was restored by James I to the rank and titles held by his father, the 2d earl. He served in the army of the elector palatine in Holland 1620-23, was vice-admiral of an un¬ successful naval expedition against Cadiz in 1625, and lieutenant-general of an army sent by King Charles against the Scotch Covenanters in 1639. He, however, was opposed to the arbitrary measures of the king, refused payment of the forced loan in 1626, supported the Petition of Right, and in spite of attempts to detach him, favored the execution of Strafford. Espousing the cause of the Parliament against the king, he was appointed to the command of the parlia¬ mentary army at the beginning of the civil war, was victorious over Charles at Edgehill

in 1642, captured Reading in 1643, and relieved Gloucester, but his invasion of Cornwall in the following year was a failure ; the greater part of his army surrendered at Lostwithiel, and he was obliged to escape by sea. He dissented from Cromwell's measures against the Scots as likely to stir up ill will between the two nations, and resigned in anticipation of the Self-Denying Ordinance in 1645.

ESSEX, Thomas Cromwell, Earl of. See

Cromwell, Thomas.

ESSEX, Walter Devereux, 1st (Devereux) Earl of, English soldier : b. 1541; d. 1576. He served as high marshal under Warwick and Clinton in 1569 and rendered valiant service in putting down the rebellion in the north. In

1572 he was created Earl of Essex as a reward for his zeal in the queen's

service. In 1573 he offered to subdue and colonize a portion of the province of Ulster. His offer was accepted with some modifications and he set out in July

1573 with a force of about 1,200 men. Storms delayed the expedition and sickness, death and desertions cut the force to about 200 men. Meanwhile Essex was in difficulty with the lord deputy, Fitzwilliam, his operations consisted of raids and brutal assaults on the O'Neills. By treachery he captured Sir Brian MacPhelim, leader of the O'Neills, slaughtered his attend¬ ants, and executed him, his wife and brother at Dublin. He next prepared to attack the Irish chief, Tirlogh Luineach, defeated him and mas¬ sacred several hundreds of the followers of Sorley Boy McDonnell, mostly women and children whom he found hiding on Rathlin Island. In 1575 he was recalled, retired from public life, but returned to Ireland the year following as earl marshal. He died in Dublin soon after his arrival.

ESSEX, Canada, a town in the province of Ontario, on the Michigan Central Railroad, 15 miles southeast of Windsor. Electric tramways connect it with Leamington, Kingsville and Windsor. It contains flour and planing mills, brick and tile yards and a large canning estab¬ lishment. Natural gas is plentiful in the district. Pop. 1,353.

ESSEX, Conn., a town in Middlesex County, on the New York, New Haven and Hartford Railroad, and on the Connecticut River, 30 miles southeast of Hartford. It contains a large piano factory, a tool factory and a public library. Pop. 2,745.

ESSEX, England, a maritime county, on the southeastern coast; area, 1,530 square miles, of which 80 per cent is under cultivation. In the northwest wheat and barley are the prin¬ cipal crops; fringing the coast were formerly swamps, now turned with excellent grazing land; there are no great manufactures, but the fisheries arc important. The Stour, Colne, Blackwater, Lea and Thames are the principal rivers. The chief towns are Chelmsford, the county town, Colchester, Maldon and Harwich. Essex is one of the six ((Home Counties,® and took its name from the East Saxons, whose monarchs reigned over it from a.d. 617 to 823, when the kingdom was absorbed by the West Saxons. It was recognized as Danish terri¬ tory by Alfred the Great at the Peace of Wed- more in 879, but was reconquered by his son, Edmund the Elder. In 1045 it was a part of the earldom of Harold, but passed into the

hands of the Norman conquerors. The county was rich in monastic foundations, of which few traces remain; and has some noteworthy ancient churches and other ecclesiastical antiq¬ uities. The county for parliamentary purposes is divided into eight divisions, each returning one member. Pop. 1,350,881.

ESSEX, Vt., town in Chittenden County, on the Central Vermont Railroad, 10 miles north¬ east of Burlington. It is the seat of the Essex Classical Institute. Agriculture and dairying are the only industries. Pop. 2,714.

ESSEX AND ALERT, Naval Action Be¬ tween the, in the War of 1812. On 3 July 1812 the American frigate Essex, rated as a 32 but carrying 44 guns, under Capt. David Porter (q.v.) and with David G. Farragut (q.v.) as a midshipman, left New York and after capturing a brig containing 197 soldiers on 10 July, came up with (30 August) and was chased by the British sloop of war Alert (rated at 16 guns, but carrying 2 long 12's and 18 short 32's), under Capt. Thomas L. P. Langharne. Deceived as to the nature of the Essex, the Alert closed up and opened fire, whereupon the Essex nearly sank her with a broadside and after five minutes of fighting compelled her to strike her colors. The Alert was then converted into a cartel and Porter's prisoners were sent in her on parole to Saint John's, Newfoundland. After taking a few more prizes and being chased by two British ships, Porter returned to port 7 September. Consult Cooper, J. F., (Naval History (Vol. II, pp. 52-55) ; Farragut, Loyall, (Life of Farragut* (pp. 15—17) ; James, William, (Naval Actions) (pp. 5-6) ; Maclay, E. S., (History of the Navy* (Vol. I, pp. 326-31) ; Roosevelt,*

(Naval War of 1812 (pp. 52-82) ; Spears, John R., (Life of Farragut* (pp. 47-51), and (History of Our Navy* (pp. 33-50).*

ESSEX HOG. See Hogs.

ESSEX JUNCTION, Vt., village in Chit¬ tenden County, seven miles east of Burlington, on the Central Vermont Railroad. It contains Fort Ethan Allen and a national army post. It has also grain and lumber mills, brickyards, a corn-canning factory and a butter factory. Its agricultural interests are extensive. The village owns its water plant. Pop. (1920) 1,410.

ESSEX JUNTO, a name applied about 1778 by John Hancock to the group of Mas¬ sachusetts political leaders resident in or con¬ nected with Essex County, Mass. — the north¬ eastern county, from just north of Boston to the New Hampshire boundary. Its coast was a line of commercial and fishing towns and its interests therefore overwhelmingly in favor of a strong national government to protect them from foreign countries and their sister states. This made its leaders, whose great ability gave them powerful

influence, the vanguard of the ultra Federalists and adherents of Hamilton, whom they followed in his split with John Adams. The latter revived the old nickname, charged them with being a ˆBritish faction" and forcing on a war with France and for years after his retirement assailed them in the press. When the embargo (q.v.) and the latei war solidified all New England Federalism in a common self-defense, all the opposition and the suspected treason were attributed by out¬

siders to the Essex Junto. Its chief members were George Cabot, Timothy Pickering, Theoph- ilus Parsons (State chief justice), the Lowell family, Stephen Higginson and Benjamin Good- hue. The (

ESSEX, PHCEBE AND CHERUB, Battle of the, in the War of 1812. On 28 Oct. 1812, the Essex, under Capt. David Porter (q.v.), passed the Delaware Capes and ran south to meet the Constitution, but failing in this contin¬ ued her voyage and on 12 December, a little south of the equator, captured the British frigate Norton, which was dispatched to the nearest American port but which on the way was recap¬ tured by the Belvidere. Porter then sailed around Cape Horn, arrived at Valparaiso, Chile, 14 March 1813, supplied his ship and in the next few months cleared the seas of British whalers and warships, one of which he turned into a 20-gun ship and renamed the Essex Junior. After numerous adventures the two ships put in at Valparaiso, where on 8 Feb. 1814, they were found and blockaded by the British frigates Phoebe (13 long 18's, 1 long 12, 1 long 9, 7 short 32's and 1 short 18), Capt. James Hillyar, and Cherub (2 long 9's, 2 short 18's and 9 short 32's). The Essex was armed with 17 short 32's and 6 long 12's so that while she could overpower the Phoebe at short range, the latter's long range 18 pounders would en¬ able her completely to destroy the Essex from a position beyond reach of the latter's guns. For a month Porter lay practically idle, but, on learning of the approach of several other ships, had decided to run the blockade when on 28 March 1814, the Essex parted her port cable ; he thereupon attempted to escape but a mishap compelled him to return. As he was anchored in a small bay a short distance from shore, Porter supposed the British would respect the neutrality of the port and had begun to make repairs when the Phoebe and Cherub bore down on him and a few minutes before 4 o'clock opened fire. As the Phoebe was on her stern and the Cherub off her starboard bow, the Essex could not reply effectively with her broadside, but Porter ran two long 12's out of the stern ports and at 4.30 compelled the Phoebe to haul off' to repair damages. Since Porter's long guns could not be brought to bear and his carronades could not reach them, the British ships then proceeded leisurely to pound the Essex to pieces, the Phoebe anchoring and firing her broadsides of long 18's into the quarter of the Essex while the Cherub kept under way and threw solid shot from her bow guns. Porter then attempted to run his ves¬ sel ashore but was prevented by a shift of the wind ; accordingly he let an anchor go,

brought the head of his vessel around and gave the Phoebe a broadside that crippled her and caused her to drift away with the tide. Unfortunately at this moment the hawser of the Essex parted and, a helpless wreck, she aimlessly floated toward her antagonist ; twice she took fire, part of her powder exploded, she had been hulled

at almost every shot, and at 6.10 her colors were hauled down, though the British did not cease firing until 6.20. The Essex lost 58 killed and 66 wounded and 28 drowned or missing out of her crew of 255, while the British loss was only five killed and 10 wounded. The Essex Junior was converted into a cartel and Porter and the survivors were sent to New York, arriving in July 1814. Consult Adams, (United States> (Vol. VIII, pp. 174-181); Barnes, James, (Naval Actions of the War of 1812) (pp. 171-87) ; Cooper, J. F., (Naval History) (Vol. II, pp. 76- 97) ; James, William, (Naval Actions) (pp. 78- 82) ; Macla}ˆ, E. S., 'History of the Navy1 (Vol. I, pp. 543-75) ; Mahan, A. T., 'War of 18121 (Vol. II, pp. 244-52) ; Porter, 'Journal of a Cruise made to the Pacific Ocean by Capt. David Porter in the United States Frigate Essex1 (2 vols., 1815) ; Porter, David D.,

ESSEX SKULL. See Man, Prehistoric

Types of.

ESSIPOFF, Annette, Russian pianist; b. Saint Petersburg 1851. She studied under Leschetitzky, of whom she was the most bril¬ liant pupil. In 1874 she began her career in Saint Petersburg, made successful tours in Europe, and in 1876 visited- the United States, where she also achieved a large measure of success. She married Leschetitzky in 1880, but the pair soon separated and were divorced. She taught piano at the Saint Petersburg Con¬ servatory from 1893 to 1908.

ESSLINGEN, or ESSLING, Austria, a village about six miles east of Vienna, famous as the scene of a battle between the French and Austrians on 21-22 May 1809. It is some¬ times known as the battle of Aspern.

ESSLINGEN, es'ling-en, Germany, town in Wiirtemberg, on the Neckar, seven miles east- southeast of Stuttgart. It was founded in the 8th century and was long a fortified, Imperial free town. There are three noteworthy churches of the 12th, 13th and 15th centuries respectively. Originally Esslingen belonged to the duchy of Swabia and the Swabian League of Swabian cities and governments was formed here in 1488. There are great;

railway work¬ shops, manufactories of machinery, cutlery, cot¬ ton, dye-works, paper and beer. Pop. 32,364.

ESSON, William, British mathematician; b, 1838. He received his education at the Inver¬ ness Royal Academy and at Oxford. In 1860- 97 he was Fellow of Merton College and also of New College. In 1894-97 he served as deputy Savilian professor and after the latter year was full professor at Oxford. He was elected member of the Royal Society, in whose trans¬ actions1 appeared his 'Laws of Connection be¬ tween the Conditions of Chemical Change and its Amounts1 (1864, 1866, 1895) and Varia¬ tions with Temperature of Rate of Chemical Change1 (1912).

ESSONITE, or HESSONITE, a variety of garnet (q.v.), also often called Cinnamon- stone (q.v.).

ESSONNES, es'son, France, town in the department of Seine-et-Oise, 20 miles southeast of Paris. Its industries comprise iron foun¬ dries, linen and paper manufactories and ma¬ chinery. Pop. (commune) 9,348.

*ESTABLISHMENTS, Ecclesiastical, re¬ ligious bodies having prescribed relations to the state in return for which they enjoy various privileges and are obligated to certain duties. The origin of the custom harks back to the period when the religious belief of a nation was unanimous and there existed much less of a mixture of faiths such as we witness to-day among practically all modern nations. In Eng¬ land, the*connection between Church and State grew up prior to any formal legislation on the subject, and at the Reformation, as in other countries which then changed their spiritual affiliation, passed to the new denominations. In Ireland the Protestant Church, though in a minority, enjoyed all the privileges of an es¬ tablished church until 1870. The usual con¬ nection between an established religion and the state is seen in the appointment of higher church officials by the secular power, by tax¬ ation for the support of the clergy, by regula¬ tion of religious property, by the maintenance of ecclesiastical courts in which the canon law is enforced, and by the founding of a system of education under the general supervision of the clergy. England, Greece, Sweden, Norway, Prussia and other German states, and until 1917 Russia, have established churches. In cer¬ tain republics of Latin America the Catholic Chuch enjoys special privileges, but the nearest approach to an established church in America is to be found in the Province of Quebec. For the particular relations existing between the church and these states see articles on the various countries.*

ESTAING, es-tan, Jean Baptiste Charles Hector, Comte d', Marquis of Saillans, French army and navy officer; b. Auvergne, 1729; d. Paris, 28 April 1794. He entered the French army as colonel of infantry ; was

promoted to brigadier-general in 1757, and in, 1777 became vice-admiral in the French navy. In 1778, in accordance with the treaty between France and the United States, France fitted out a fleet of 12 ships of the line and four frigates to aid the latter in the struggle against Great Britain and Estaing was placed in command. He sailed 13 April, reached Delaware Bay in July, and pro¬ ceeded to New York. He captured some prizes off the coast of New Jersey, agreed to assist in a land and sea attack on Newport to expel the British from Rhode Island; reached the har¬ bor late in July; and hearing of the approach of a fleet, put to sea to meet it. He was over¬ taken by a severe storm, which caused him to put into Boston for repairs and the pro¬ jected attack failed. Subsequently he captured Saint Vincent and Grenada, West Indies, and in 1779 co-operated with General Lincoln in an in¬ effectual attempt to capture Savannah, Ga. He returned to France in 1780. He commanded the allied fleets of France and Spain in 1783; was chosen admiral of the navy in 1792. He was in favor of the French Revolution, and was one of the Assembly of Notables. In 1789 he was commander of the National Guard, and three years later admiral by the selection of the Legislative Assembly. Two years later, prob-

ably because he had tried to save the life of Marie Antoinette, despite his eminent military and naval services to France he was con¬ demned as a royalist and guillotined. Estaing had ambition to shine as a literary man and he wrote poetry, a drama and a work on the Colonies.

ESTAMPES, or ETAMPES, Anne de Pisseleu, Duchesse d', French adventuress, mistress of Francis I: b. 1508; d. 1585. She was maid of honor to Louise of Savoy, the mother of Francis, who fell under her charms in 1526 soon after his return from Spain. At the age of 28 she was married formally to Jean de Brosse and received the title of Duchesse d'Estampes. She wielded a powerful influence over Francis, but there soon arose a rival in the person of Diane de Poitiers, the mistress of the Dauphin. Political parties gathered about these two courtesans but the accession of Henry in 1547 totally eclipsed the Duchesse d'Estampes who retired to her estates. She embraced Protestantism and was a staunch supporter of the Huguenot cause. Consult Paris, Paulin, (Etudes sur Francois Ier) (Paris 1885).

ESTANCIA, es-tanthe-a, Philippines, a pueblo of the province of Iloilo, situated on the eastern coast of the island of Panay, 66 miles north of the town of Iloilo. The main por¬ tion of Estancia is one mile inland, connected by a good road with the coast and anchorage ground. Pop. 12,700.

ESTATE, a term sometimes used to indicate property generally, whether personal or real. Sometimes it includes land alone. It signifies in law the interest which a person may have in property. It denotes the time during which ownership may exist, as for a year, for life or forever. At common law estates in land are di¬ vided, as regards the quantity of interest, into two kinds, (1) freehold estates, and (2) estates less than freehold. A freehold is an estate which may last for life or longer. An estate which is circumscribed within a certain number of years, or one in which the possessor has no fixed right of enjoyment, is less than freehold, and although in fact it may last longer than the life of its first possessor, still the law regards it as a lower estate than a freehold; it is per¬ sonal property in the eye of the law, and does not descend to heirs, although it may pass to executors or administrators.

Freehold estates are divided into estates of inheritance, which pass to heirs, and estates not of inheritance; the former are again divided into estates in fee simple and estates in fee tail. An estate in fee simple is the estate which a man has where lands are given to him and his heirs absolutely without any end or limit put to his estate, and it is the most extensive and the highest interest a man can have in land. If not aliened or devised, it passes to heirs generally. On the other hand, a fee tail is an estate which is limited to certain particular heirs or to a certain class of heirs, to the exclusion of the others; as to the heirs of one's body, which excludes collateral heirs, or to the heirs male of one's body, which excludes females.

In the United States fee tails have had only a limited existence, and are now in general abolished. They were changed into estates in fee simple in New York as early as 1782. Free¬ holds not of inheritance are for life onlv, either

for the life of the tenant or of some other per¬ son or persons ; when the estate is called an estate pour autre vie. Life estates are created by operation of law, or by the act of the parties. An example of an estate created by act of the parties is where A conveys land to B for the term of his natural life, or where A conveys land to B without mentioning the duration of the term. Here under the common law B would take only a life estate; but by statute in many of the States — among them New York — a grant or devise of real estate possesses all of the interest of the grantor or testator, unless the intent to pass a less estate or interest appears by express terms or by necessary implication.

Dower and curtesy are estates created by operation of law. An estate by the curtesy is that estate to which a husband is entitled upon the death of his wife in the lands or tenements of which she was seized in possession in fee simple or fee tail, during their coverture, provided they have had lawful

issue born alive, and possibly capable of inheriting her estate. An estate in dower is an estate which a widow has for her life in some portion of the lands of which her husband was seized at any time during cover¬ ture, and which her issue might have inherited if she had any, and which is to take effect in possession from the death of her husband.

Estates less than freehold are divided into estates for years, at will and by sufferance. An estate for years is an interest in lands by virtue of a contract for the possession of them for a definite and limited period of time. Such estates are ordinarily called terms. The length of time for which the estate is to endure is of no im¬ portance in ascertaining its character, unless otherwise declared'by statute. An estate at will is where one man lets land to another to hold at his will, as well as that of the lessee. An estate of this kind is terminated by either party on notice. Out of estates at will a class of estates has grown up called estates from year to year, which can be terminated only by six months' notice, expiring at the end of the year. An important element in creating this estate is the payment of rent. An estate at sufferance is the interest of a tenant who has come rightfully into possession of lands by permission of the owner, and continues to occupy the same after the period for which he is entitled to hold by such permission. This estate is not of frequent occurrence, but is recognized as so far an estate that the landlord must enter before he can bring ejectment against the tenant. If the tenant has personally left the house, the landlord may break in the doors, and the modern rules seems to be that the landlord may use force to regain pos¬ session, subject only to indictment if any injury is committed against the public peace.

Estates may depend upon condition; that is, their existence may depend on the happening or not happening of some event whereby the estate may be created, enlarged or defeated. A term for years, a freehold or a fee may thus be upon condition. The condition must either be precedent, that is, must happen before the estate can vest or be enlarged;- or must be subsequent, when it will defeat an estate already vested.

Estates may also be divided into estates which are legal and those which are equitable. Estates are termed equitable when the formal ownership is in one person, while the beneficial ownership is in another. In another form of expression it

may be said that a trust is created. The na¬ ture of the estate is not affected by this distinc¬ tion. For example, a trust estate may be an estate

for life or a fee, and in the latter case is transmissible to heirs as though it were a legal estate.

Estates are divided into estates in possession and estates in expectancy, in regard to the time of enjoyment. An estate in possession is one in which there is a present right of enjoyment. Estates in expectancy are those which give either a vested or contingent right of future enjoyment. Estates are also divided, in regard to the number of owners, into estates in sever¬ alty, in joint tenancy, in common and in co¬ parcenary. An estate in severalty is one which has only a single owner. An estate in joint tenancy is an estate owned jointly by two or more persons, whose title is created by the same instrument. The right of survivorship is the distinguishing characteristic. When a tenant dies his interest is extinguished, and the estate goes to the survivors. Where an estate is con¬ veyed to two or more persons, at common law, without indicating how it is to be held, it is construed to be in joint tenancy. In most of the United States, however, this rule has been changed by statute, and persons to whom an estate is conveyed or given take as tenants in common, unless they hold as trustees. An estate in common is an estate held in joint possession by two or more owners at the same time by several and distinct titles. An estate in copar¬ cenary is an estate which several persons hold as one heir, whether male or female. This estate has the three unities of time, title and possession. The interests, however, of the co¬ parceners may be unequal. In the United States this estate is essentially extinguished, and heirs take as tenants in common.

ESTATE DUTIES. See Death Duties.

ESTE, es-ta, the name of an illustrious and ancient Italian family. Albert Azzo II is con¬ sidered the founder of the greatness of his house. He inherited or acquired Este, Rovigo, Montagnana, Casal Maggiore and other places in Italy; and was made governor of Milan by Henry III in 1045. One of his sons became Duke of Bavaria in 1071, by the title of Welf I. He was the ancestor of the German branch of the house of Este, the dukes of Brunswick and Hanover from whom the royal house of Great Britain, also called Este-Guelphs, trace their descent. Albert Azzo died 1097, having pre¬ viously resigned his Italian possessions to his son Fulk, and retired to Burgundy. Fulk I was attacked by his brother Welf, who com¬ pelled him to become tributary to him to the extent of a third of his revenues. He was suc¬ ceeded (1137) by his son Obizzo I, who joined the Lombard league against Frederick Barbarossa in 1167. He d. 1193, and was succeeded by his son, who in the annals of the family is called Azzo V. Either he or Oberto acquired by mar¬ riage Ferrara, with its dependencies in Romagna, and with a feud which became hereditary with the house of Torello, for a member of which house the bride, violently carried away by the Estes, was intended. The house of Este thus became vassals of the Church as well as of

the Empire. He was succeeded by Azzo VI (d. 1212). He was constantly.engaged in war with the To- relli, by whom he was thrice driven from

*Ferrara. Aldobrandino, his son, died young, and was succeeded by his brother Azzo VII, a minor, in 1215. He was engaged in protracted wars with the Ghibelline party. Honorius VII invested him with the marquisate of Ancona. He d. 1264, and was succeeded by his grandson, Obizzo II, who was chosen lord of Modena and Reggio. We may pass over his successors to Niccolo III, who succeeded in 1393 at the age of nine. During his reign, and those of some of his predecessors, the house of Este became patrons of literature. Niccolo died at Milan 26 Dec. 1441. Lionel, his son (1441-50), re¬ ceives a high character from Muratori for jus¬ tice and piety, and for his patronage of letters. He mediated a peace in 1450 between the Vene¬ tians and Alfonso, king of Sicily, and died in November of the same year. He was succeeded by his brother, Borso (d. 20 Aug. 1471), who received new accessions of dignity from the emperor, and was created Duke of Ferrara by Pope Paul II. His reign was peaceable and prosperous. Ercole I, his brother (d. 25 Jan. 1505), succeeded, to the prejudice of his son Niccolo. His usurpation caused a war, which was unsuccessful in deposing him. He had Milan and Florence for allies, the Pope and Venice for adversaries. After the conclusion of peace in 1484 he maintained neutrality in his estates for the remainder of his reign, while the rest of Italy was convulsed with wars*and revolutions. He had for his minister Boiardo, the famous author of the 'Orlando Innamorato) ; and Ariosto, born near the commencement of his reign, grew up under his patronage. Al¬ fonso I, his son, d. 31 Oct. 1534. His reig;n was a contrast to the peaceable one of his father. In 1509 he joined the League of Cam- brai, and commanded the Papal army as gon¬ falonier. While conducting the operations of the allies elsewhere, his estates were ravaged by the mercenary troops of Venice, whose atroc¬ ities are described in the 36th canto of the 'Orlando FuriosoP AJfonso continued in the French alliance after the Pope had joined the Venetians. He assisted in the battle of Ravenna, and took prisoner Fabrizio Colonna, the general of the Pope. After the French had been driven from Italy he endeavored to make peace with the Pope; but Julius continued implacable. Leo X restored him to his possessions, with the ex¬ ception of Modena and Reggio, but afterward excommunicated him. He joined in the wars between Francis I and Charles V on the side of the French king, but was afterward recon¬ ciled with the emperor, who confirmed him in his possessions, against Pope Clement VII (1530). He married as his second wife the famous Lucrezia Borgia (q.v.). His brother, the Cardinal Ippolilo, was the patron of Ariosto. Alfonso was succeeded by his son, Ercole II who died 3 Oct. 1559. He married Renee of France (daughter of Louis XII) in 1528. She favored the Reformation, and made the court of Ferrara the*

resort of the few advocates of that cause in Italy. Calvin visited it in 1535. Ercole at first adhered to the imperial party but in 1556 joined the league of Paul IV and Henry II of France against Spain, and was made general of the allied forces; but did not push the war with vigor, and made peace with Spain in 1558. Leonora, his daughter by Renee, was the object of the unfortunate attachment of Tasso. He was succeeded by his son, Alfonso

II, the patron and persecutor of Tasso, who died 27 Oct. 1597. He was succeeded by his cousin Cesare (d. 11 Dec. 1628), whom by his testament he had made his heir ; but this dis¬ position was annulled by the Pope, Clement VIII, who excommunicated Cesare and de¬ prived him of Ferrara, with the dependencies of the Church. Cesare was obliged to content him¬ self with Modena and Reggio, which depended on the empire. From this period the political importance of the house of Este greatly dimin¬ ishes. Alfonso IV, who lived in the latter half of the 17th century, was distinguished for his pat¬ ronage of the fine arts. His daughter, Mary of Modena, was married to James II of England. Rinaldo (1655-1737) by his marriage with the daughter of the Duke of Brunswick-Luneburg, reunited the German and Italian branches of the house. By the death of his grandson in 1803 the male line became extinct. His only daughter was married to the Archduke Ferdinand of Austria, third son of Francis I, who founded the Austrian branch of the family which existed until 1875. The last sovereign of the house was Francesco V, who succeeded in 1846. In 1859, ihe dynasty was deposed by the National Assembly, the duchy was annexed to Sardinia by the Treaty of Zurich, 10 Nov. 1859, and has consequently been incorporated with the kingdom of Italy. Consult Browning, (Guelfs and Ghibellines) (1893) ; Gardner, Prin¬ ces and Poets of Ferrara* (1904) ; Noyes, (The Story of Ferrara) (1904) ; Sismondi, (Italian Republics) (Eng. trans., 1832) ; Symonds, (The Renaissance in Italy* (1875-76).*

ESTE, Italy, town in the province of Padua, 17 miles southwest of Padua; the an¬ cient Adeste. Its chief industries centre in pot¬ tery, cordage and ironware products. The lean¬ ing tower, or campanile, is an interesting feature of the town, as is the battlemented mediaeval for¬ tress, known as the Rocca. Here once ruled the Este family, one of the most ancient and illus¬ trious families of Italy. In the 11th century the house of Este became connected by marriage with the German Welfs, or Guelphs, and founded the German branch of the house of Este, the dukes of Brunswick and Hanover. The reigning house in Great Britain descends from this family. The sovereigns of Ferrara and Modena were also of this family, several of

them being famous as patrons of letters. The lives of Boiardo, the author of (Orlando Innamorato,* Ariosto and Tasso were closely connected with members of this house. The last male representative of the Estes died in 1798. His daughter married a son of the Emperor Francis I of Austria, who founded the Austrian branch of the house of Este, of which the male line became extinct in 1875, his title then passing to the Archduke Francis Ferdinand, heir to the Austrian throne. Pop.

11,700.

ESTEBANEZ, Calderon, Don Serafin,

Spanish author, best known as <(E1 Solitario** : b. Malaga, 27 Sept. 1799; d. Madrid, 5 Feb. 1867. He studied for the legal profession at the University of Granada, was called to the bar and settled for some time in Madrid. In 1822 he was appointed professor of poetry and rhetoric at the University of Granada, and in 1831 under his pseudonym of <(E1 Solitario** he published a volume of verses. He wrote several

articles on Andalusian customs ’for Cartas Espanoles, and in 1834 became auditor-general of the Legitimatist army of the north. Two years later he was made mayor (Jef e-politico) of Logrono, but before entering on his new duties an accident obliged him to retire to Madrid where he §et about collecting manu¬ scripts of the national literature of Spain. In 1838 he was made jefe-politico of Seville and thereafter served several terms as deputy. In 1856 he was elected to the Council of State. In 1847 appeared his greatest original work, (Escenas andaluzas,* inimitable as records of a life most of which has now gone. His manu¬ script collections are now the property of the Spanish government. Consult Canovas del Cas¬ tillo, (E1 solitario y su tiempo) (2 vols., Madrid 1883).

ESTELLA, Spain, town in the province of Navarre, 20 miles southwest of Pamplona. It is a well-built city with fine streets and many interesting churches, some of which are many centuries old. Its trade and manufactures are also considerable and it is a place of military importance. The town was taken by the Car- lists in 1835, and in 1839 was executed here the Carlist leader, Maroto, with five other generals of that party. Again in the seventies it was the scene of spirited conflicts and the stronghold of Don Carlos. When the latter lost the town in 1876 his cause suffered a complete collapse. Pop. 5,638.

ESTEPA, Spain, town in the province of Seville, 60 miles east of the city of that name, and situated in a hilly region. It contains a famous old Moorish castle and has fine broad streets. Agriculture and stockraising are its principal interests but it has also manufactures of oil soap. Jasper quarries

in the neighbor¬ hood give employment to a large number of persons. Estepa is the ancient Astapa, which came into prominence during the Second Punic War for the heroic resistance of its citizens who chose to die by fire rather than surrender to the Roman besiegers. Later it was a flourishing Roman colony. Ferdinand III took it from the Moors in 1240. Pop. 8,234.

ESTEPONA, Spain, seaport in the province of Malaga, on the Mediterranean coast, 25 miles northeast of Gibraltar. It is situated in a fertile region which produces fruits, grain, vegetables and wine. Its coast trade is ham¬ pered by the lack of adequate harbor facilities but its fishing interests are considerable and it has distilleries, leather-curing establishments, rope and cork works and brick and tile yards. Pop. 9,613.

ESTERHAZY. See Eszterhazy.

ESTERIFICATION. See Esters.

ESTERS (an arbitrary modification of ether). Compound ethers, or ethereal salts, are compounds in which one or more alcohol or basic radicals are united to one or more acid radicals. They are analogous to the salts of the metals. Thus CHaCOO.H is acetic acid and if the typical hydrogen of this acid is replaced by the monad radical ethyl, the resulting compound, CH3COO.C2H5, is known as ethylacetic ester. Chemically, this sub¬ stance is analogous to potassium acetate, CHsCOO.K, obtained by replacing the hydrogen of the acetic acid by potassium. The word

ester was originally applied by Gmelin to compounds of the alcoholic radicals with oxy¬ genated acids; but it has now been extended so as to include all the salts of the alcoholic radi¬ cals. Ethyl bromide, C2Hs.Br, for example, is now included among the esters. Some of the esters are prepared by the direct action of the acid upon the alcohol. In other cases a mix¬ ture of the acid and the alcohol is distilled with the addition of sulphuric acid, zinc, chloride or other dehydrating agent. The esters may also be prepared by treating the iodide of the alcohol radical with the silver salt of the acid, the iodine and silver combining to form iodide of silver, while the liberated alcoholic and acid radicals combine to produce the desired ester. The esters of the organic acids occur in fruits and flowers and are also prepared artificially for flavoring purposes and for improving the bouquet of wines. The fats and oils which contain glycerine in combination with oleic, margaric and other acids may be regarded as esters, since glycerine is a

triatomic alcohol. Much attention has been paid to the esters in connection with theoretical chemistry, since they are well adapted for the study of the laws of mass-action. See Equilibrium, Chemical; Ether.

ESTES, Dana, American publisher : b. Gorham, Me., 1840 ; d. 1909. He received his education in the public schools, for many years was engaged in mercantile affairs and served in the Union army in the Civil War. He became a member of the publishing firm of Degen, Estes and Company, and afterward that of Lee and Shepard. In 1872 he became a partner in the firm of Estes and Lauriat, which in 1898 be¬ came known as Dana Estes and Company. He was also a traveler of note, being the first American to explore the region of the Nile as far as Uganda and the Kongo. He also helped organize the International Copyright Associa¬ tion, of which he became the first secretary. He wrote (Chimes for Childhood) (1868); (Spectrum Analysis Examined5 (1872) ; and was the editor of (Half-Hour Recreations in Popular Science5 (2d ed., 1879).

ESTEVAN, Canada, town in Assiniboia District, on the Canadian Pacific Railway and on the Souris River, 145 miles southeast of Moosejaw. Flour mills, lumber and brick yards, grain elevators are its principal industries. It has also a government coal-testing plant and there is a large trade in coal and brick. The electric-light plant is the property of the town. Pop. 4,000.

ESTHER, or HADASSAH (Heb. myrtle; Babylonian, Ishtar), the name of a Jewish maiden, chosen by Xerxes to be his queen. She was one of the heroines of Hebrew history and maintained the rights of her nation at the court of the king of Persia. Esther gave her name to the (Book of Esther,5 one of the books of the Bible. According to the account given in the latter, Esther belonged to the tribe of Benjamin. Much controversy has been expended over the character of Esther whom the more radical Biblical critics have been inclined to look upon as a purely mythical personage evolved from the Jewish knowledge of the Babylonian goddess, Ishtar, a name which, in later Babylonian, be¬ comes Estra. The Jewish account of the life of Esther states that she was the daughter of

Abihail who died while she was quite young, leaving her to the care of her cousin Mordecai in Susa, then the capital of Persia. When she had grown to be a young woman, Xerxes (Ahasuerus) divorced his queen, Vashti, and made Esther queen in her place. But according to Herodotus Xerxes had only one queen, Amestris, whose character and history in no manner resemble those of Esther. Moreover, it has been pointed out by critics that the Persian sovereigns were bound by a certain court etiquette, and by Persian custom, to select their legal wives from the Persian royal family or from the daughters of foreign royal families in order to maintain the purity of the blood of the Persian sovereign. This was looked upon as of great

importance in an age when the royal family was believed to be the direct blood descendants of the gods. Vashti is said to have been divorced because she re¬ fused to unveil herself publicly at a banquet. It has been suggested that there is some con¬ nection between this statement and the fact that Ishtar (Estra) was called the naked god¬ dess, and was looked upon as the great mother deity and the (

Notwithstanding this attitude of modern critics, the Jews never had any doubt as to the truth of the Biblical account of the life and doings of Esther, who is credited with deliver¬ ing the Jewish people from the exactions and cruelty of Xerxes' vizier and effecting the final overthrow of the latter. This belief is as strong to-day as in the past, and the deliver¬ ance effected by Esther is still celebrated in the Feast of Purim. Consult the Biblical (Book of Esther5; Isthar; Purim; and Es¬ ther, Book of.

Bibliography. — Cheyne, founders of Old Testament Criticism5 (London 1893) ; Debaeza, (Historia Esther5; de Lagarde, (Purim5 (Gottingen 1887) ; Gunkel, (Schopfung und Chaos5 (Gottingen 1895) ; Hughes, (Esther and her People5 (London 1846) ; Jampel,

ESTHER, Indian chieftainess. See Mon¬ tour.

ESTHER. (1) Drama on the life of Esther, the personage of the Old Testament, written by Racine at the instance of Madame de Main- tenon. The pupils of Saint-Cyr performed the drama before King Louis XIV in 1689. (2)

An oratorio by Handel based on the drama of Racine, first performed in 1720. The words were by Humphreys.

ESTHER, Apocryphal Books of. See

Apocrypha.

ESTHER, Book of. The book of Esther was written for the primary purpose of giving an account of the supposed circumstances of

ESTHERIA

the origin of the feast of Purim. This was put in the reign of the Persian king Ahasuerus, is certainly to be identified with Xerxes, who reigned from 487 to 466 b.c.

The first question is concerning the historical character of the book. The author had a gen¬ eral acquaintance with Persian customs, and some of the statements made are confirmed from other sources. But some of the

details of the book are certainly inaccurate, and many others probably so. Xerxes' queen from the seventh to the twelfth year of his reign was not Esther, as represented in the book, but Amestris, a Persian; no captive of Nebuchadrezzar's was chief minister of Xerxes ; and the chronology is incorrect. The book, therefore, is not ac¬ curate history; it is probable that there is no historical element in the book. This appears especially from a consideration of the feast of Purim. This is stated in ix, 26, see iii, 7, to have been derived from the presumably Persian word Pur, meaning lot. No such Persian word is known. The feast of Purim is first men¬ tioned, under the name of the day of Mordecai, in 2 Maccabees xv, 36, 2 Maccabees being writ¬ ten in the 1st century b.c. This makes it un¬ likely that the feast was established as early as the time of Xerxes, and hence makes im¬ probable any historical basis for the book. The book, therefore, is of the nature of a romance, giving a current story concerning the origin of the feast.

The actual origin of the feast would seem, therefore, to have been unknown to the writer and his time. This gives a presumption that it was of foreign origin. The indications are that the origin was in Babylonia. The name Mordecai is quite evidently a form of Marduk, the name of the head of the Babylonian pantheon, and Esther is Ishtar, the principal Babylonian goddess. Haman, further, is Hum- man or Humban, the chief Elamite god, and Vashti is probably to be identified with Mashti, a vaguely known Elamite deity. Originally, therefore, the story seems to have been a myth, giving an account of a conflict between the principal deities of Babylonia and Elam. It is not possible, however, to find any probable iden¬ tification of the feast of Purim with any known Babylonian feast. The Babylonian account of the feast has here been put into a Jewish form. It is, of course, quite possible that the mythical nature of the story had been obscured before it reached the writer.

The indications point to a late writing of the book. The author was living in the time of the observance of the feast of Purim, which was probably late, as has been indicated. The omis¬ sion of Esther and Mordecai from the long list of Hebrew worthies in Eccl. xliv-xlix, written about 180 b.c., strongly suggests that the book had not then been written. It has been sug¬ gested that the attitude of hostility to the Gentiles which appears in the book might be due to the experiences of persecution by Antio- chus Epiphanes. But the absence of any specific references to the Maccabean period makes it probable that the date was before 168 b.c. The language of the book is late, although there are no words which are certainly to be identi¬ fied as Greek. The author speaks of the. reign of Xerxes in a way which indicates that it was long past. It is probable that the book was written after 180 b.c. and before 168.

The absence of the name of God from the book has been the occasion of much perplexity. The explanation has been suggested that it was due to the fact that the book was designed to be read at the celebration of the feast of Purim, this being a festival of such mirth, due prin¬ cipally to drinking, that there would be danger of the profanation of the name of God if it occurred in the reading. The principal reli¬ gious teaching of the book is that of the provi¬ dence of God over his people, which is con¬ ceived, however, in a spirit of national bigotry. The interest of the writer is not primarily religious but national.

The moral tone of the book is not high. No character portrayed in the book is an admirable one. Esther and Mordecai have the desire for revenge, as well as other qualities rather ignoble than exalted. The book in its general spirit is below the level of most of the Old Testament.

Bibliography. — Adeney, W. F., (Ezra, Nehemiah and Esther) (Expositor's Bible), New York 1893) ; Davies, T. W., Ezra, Nehemiah and Esther 5 ((Century Bible, 5 Edin¬ burgh no date) ; Paton, L. B., (The Book of Esther) (international Critical Commentary, 5 New York 1908) ; Streane, A. W., Esther5 ((Cambridge Bible,5 Cambridge 1907).

George R. Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

ESTHERIA, bivalve crustacean of the order of Brachiopods, found as a fossil in fresh water deposits dating from the Devonian to the Pleistocene periods. There are about 24 living *species and about the same number of fossil species. In the former the shell is from one-eighth to one inch in length and is rounded and flat with beaks near the hinge. The sur¬ face is marked with folds .and ridges which serve to- distinguish it from the small pelecypods. Consult Jones, (A Monograph of the Fossil Estheriae5 (in (Monographs of the Palaeonto¬ logical Society,5 London 1862).

ESTHERVILLE, Iowa, city and county- seat of Emmet County, 140 miles northwest of Des Moines, on the Des Moines River, and on the Minneapolis and Saint Louis and the Chi¬ cago, Rock Island and Pacific railroads. It has extensive agricultural and stock raising in¬ terests and contains flour mills, grain elevators, railroad repair shops, machine shops, tub fac¬ tories and cement works. It has also a Carnegie library and a fine school building and owns the waterworks and electric-lighting plants. Pop.

(1920) 4,699.

ESTHONIA, es-tho'm-a, a maritime re¬ public, bordering on the Gulf of Finland and the Baltic. On the east is the Russian gov¬ ernment of Petrograd ; on the south Lake Peipus and the republic of Latvia. Most of the territory included in Esthonia is low and swampy or cut up by streams and lakes ; and cold, raw winters and hot summers are the rule. Live stock raising and agriculture are the chief occupations of the inhabitants, who are industrious, enterprising and given to the use of modern methods of farming and stock rais¬ ing. Among the growing industries of Es¬ thonia are machinery, iron and steel, liquors and cotton. Considerable trade is also carried oti with neighboring countries and with the

interior of Russia. It includes several islands, of which the most important are Dagoe and Oesel ; area, about 23,160 square miles. The peasantry are almost all of Finnish origin and speak a Finnish dialect. In the 10th and 12th centuries it belonged to Denmark ; it was after¬ ward annexed by Sweden and in 1710 was seized by Russia. On 24 Feb. 1918 it became an in¬ dependent republic. The chief seaport, Reval, which is connected by rail with Petrograd, has extensive shipping. (See Reval). Pop. 1,750,- 000. Consult Vincent, (Norsk, Lapp, and Finn. >

ESTHS. See Esthonia.

ESTIENNE, a-te-en, or ETIENNE (Lat. Stephanus), Henri, on-re, French painter and scholar: b. Paris, 1528; d. Lyons, March 1598. He was a son of Robert Estienne (q.v.) and continued his work. Besides compiling the noted (Thesaurus linguae Grsecae) (1572), he wrote (Apologie pour Herodote) (1566) ; (Traite de la conformite du Francais evec le Grec, etc.*

ESTIENNE, or ETIENNE (Lat. Stepha¬ nus), Robert, ro-bar, French printer and scholar: b. Paris, 1503; d. Geneva, 7 Sept. 1559. In 1526 he established a printing house in Paris and in 1539 was appointed royal printer to Francis I. He removed to Geneva about 1552. He published many editions of the Greek and Latin classics and compiled numerous other works. His son Henri took up his father's work on the death of the latter and was also a writer of note. He died in Lyons in 1598.

ESTIVATION, the dormancy or ((summer- sleep,® induced in some of the lower plants and animals by heat and drought, and the means by which in summer they resist these unfavorable conditions, as they do others in winter by hiber¬ nation. The two states are comparable, though induced by opposite conditions. In summer the principal danger to which such

organisms are exposed is the deprivation of water. Some of the lowest are able to endure this to an extreme degree. Certain bacteria and other low plants and various animalcules will survive prolonged baking and may blow about in the dust of dried-up ponds for a long period, ready to revive when dampened. Among land-snails estivation is a common phenomenon, the snails protecting themselves from excessive loss of moisture, not only by burrowing into the ground, but by throwing one or several epiphragms of hard¬ ened, sometimes chalky, mucus across the aper¬ ture of the shell, thus shutting themselves into an air-tight case, where they remain inactive until better conditions arrive. In a similar man¬ ner certain fishes and amphibians bury them¬ selves in the muddy bottom of ponds or river- pools evaporated by drought, where they preserve sufficient dampness about them to keep alive. Turtles, on the other hand, are often compelled to leave their pools in the tropics, because the water becomes so hot and full of fermentation and seek cool spots under rocks, and the like, where they sleep torpidly until autumn. Even a few mammals of extremely hot regions, such as the deserts of Australia, go into a summer-sleep during the height of the hot season, substantially as their congeners hibernate in the midwinter of northern climates. See Hibernation.

ESTLANDER, Carl Gustav, Finnish author: b. 1834; d. 1910. In 1868 he was ap¬ pointed professor of aesthetics in the University of Helsingfors and in 1876 founded the the Finland Review of which he became the editor. His many works were of great importance to the artistic literature of his country; they in¬ clude (The History of the Plastic Arts from the Middle of the Eighteenth Century to our own Time) (1867) ; (The Development Past and Future of the Art and Industry of Finland (1871) ; (Richard Coeur de Lion in History and Poetry> (1858) ; (The Robin Hood Ballads* (1889); and researches into the Tristan ro¬ mance, published in French (1866).*

*ESTOC, a small dagger, known in the 16th century as a ˆtuckle** and usually worn at the girdle.*

ESTOILE, or STAR a bearing in heraldry, differing from the mullet in that it has six wavy rays instead of the five plain waves of the latter. See Heraldry.*

ESTON, England, town in the North Riding of Yorkshire, four miles east of Middlebor- ough. It has large manufactories of steel rails. Pop. 12,026.

ESTOPPEL, the preclusion of a person from asserting a fact by previous conduct, in¬ consistent therewith, on his own part or the part of those under whom he claims, or by an ad¬ judication upon his rights which he cannot be allowed to call in question; a preclusion, in law, which prevents

a man from alleging or denying a fact, in consequence of his own previous act, allegation or denial of a contrary tenor ; a plea which neither admits nor denies the facts alleged by the plaintiff, but denies his right to allege them. According to Blackstone, it is a special plea in bar, which happens where a man has done some act or executed some deed which precludes him from averring anything to the contrary. Where a fact has been asserted or admitted for the purpose of influencing the con¬ duct or deriving a benefit from another, so that it cannot be denied without a breach of good faith, the law enforces the rule of good morals as a rule of policy and precludes the party from repudiating his representations or denying his admissions. (Rawle, Cor. 407.)

This doctrine of law gives rise to a kind of pleading that is neither by way of traverse nor of confession and avoidance; that is, a pleading which, waiving any question of fact, relies merely upon the estoppel, and, after stating the previous act, allegation or denial of the oppo¬ site party, prays judgment if he shall be re¬ ceived or admitted to aver contrary to what he before said or did. This pleading is called a pleading by way of estoppel. Until a recent period questions regarding estoppel arose almost entirely in relation to transfers of real estate and the rules in regard to one kind of estoppel were quite fully elaborated. The principle is now applied to all cases where one by words or conduct wilfully causes another to believe in the existence of a certain state of things, and induces him to act on that belief or to change his own previous situation.

Estoppels operate not only on present in¬ terests, but on rights subsequently acquired. They operate, however, only between parties and privies and the party who pleads the es¬ toppel must be one who was adversely affected

by the act which constitutes the estoppel. An estoppel may be by record, and by record in this connection is meant the record of a tribunal of a judicial character. An admission made in a pleading in a judicial proceeding cannot be contradicted by the person making it. So, ordi¬ narily, the judgment of a court of competent jurisdiction cannot be impeached. If it deter¬ mines the status of a person or thing, it is binding on all persons, whether rendered by a domestic or a foreign court. Judgments of this character are judgments in rem. If the judg¬ ment is in personam , it is conclusive if rendered by a domestic tribunal, and is conclusive in some instances if rendered by a foreign tribunal. Legislature records also import absolute verity. (Bigelow on Estop. 33.)

An estoppel by deed is such as arises from the provisions of a deed. It is a general rule that a party to a deed is estopped to deny any¬ thing stated therein which has operated upon the other party, as the inducement to accept and act under such deed, including a deed made with covenant of warranty, which estops even as to a subsequently acquired title. The deed must be good and valid in its form and execution to create an estoppel, and must convey no title upon which the warranty can operate in case of a covenant.

Estoppels must be reciprocal. An estoppel in pais, or equitable estoppel, occurs when a party to an action has by his act or declaration induced the other party to do some act or acts which otherwise would not have been done, or to omit to do some act or acts which he would have done, and by means of which he has been injured. The principle underlying such estop¬ pels is, that it would be a fraud in a party to assert what his previous conduct and admission have denied, when, on the faith of that denial, others have changed their situation. There must, however, as a rule, be some intended de¬ ception in the conduct or declarations of the party to be estopped, or such gross negligence on his part as to amount to constructive fraud, by which another has been misled to his injury.

ESTOTILAND, a mythical land, placed by the old geographers where are now portions of Newfoundland, Labrador, and that part of British America bordering on Hudson Bay. It was said to have been discovered by two Fries¬ land fishermen driven out of their course by a storm, two centuries before the time of Colum¬ bus. In 1497 the Cabots set sail from England for Estotiland, but discovered instead New¬ foundland.

ESTOURNELLES DE CONSTANT, Paul Henri Benjamin, Baron d', French author: b. La Fleche, Sarthe, 1852. He was educated at the Louis-le-Grand Lyceum, Paris, and at the School of Oriental Languages, joined the diplomatic service, in which he served as secretary to the commission for the boundaries of Montenegro, afterward becom¬ ing charge-d'affaires in that country. He served also at The Hague and in Tunis and London. In 1895-1904 he was deputy from Sarthe and in the latter year was elected sen¬ ator. He become conspicuous for his advocacy of international peace, was elected member to The Hague conferences and of the international court. His efforts to bring about a better feel¬ ing between France and Germany were untir¬

ing and in 1909 he was awarded the Nobel prize f9r peace. He has published frequently in re¬ views in England, France and America, has written on modern Greece and made transla¬ tions from the modern Greek tongue, published reports of The Hague conferences and prepared papers for the Parliamentary Union, etc. Other works are (Lcs congregations

religeuses chez les Arabes) (1887) ; (La politique frangaise en Tunisie (1891) ; and (Les Etats-Unis d'Amerique) (1913), an account of his impres¬ sions during his visits to America in 1902, 1907, 1911 and 1912.*

ESTOVERS, in law, (1) wood which a ten¬ ant may legally use, as for repairs or firewood. It is a principle of both English and American law. It includes to-day. in the absence of ex¬ press covenants to the contrary, any wood which a tenant for life, for years, from year to year, or at will may use from the estate to repair the house, fences, implements, etc., thereon, in addi¬ tion to that which he uses for fuel. (2) For¬ merly, alimony allowed a divorced wife ; also, a widow's allowance.

ESTRADA, Spain, town in the province of Pontevedra, 15 miles southeast of Santiago de Compostela, eon the Ulla. It has extensive agricultural and stock raising interests and con¬ tains lumber yards and manufactories of linens and woolens. Mineral springs are in the neigh¬ borhood. Pop. (commune) 27,898.

ESTRADA CABRERA, Manuel, Guate¬ malan statesman : b. Quezaltenango, 1857. At first he devoted himself to the study of law and philosophy and practised his profession. He was appointed district judge and finally at¬ tained the supreme bench. About 1885 he be¬ gan to take an active interest in politics and was elected to the National Assembly; he was appointed Secretary of State in 1892 and six years later, on the assassination of President Barrios, became acting President. Within a few months he was elected to a full presidential term and secured re-election for a second term in 1905. His administration was very progres¬ sive ; he did much to place the finances on a sound basis, promoted agricultural and indus¬ trial enterprises, aided education and promoted in general the well-being of his country. Sev¬ eral attempts were made on his life by the bitter enemies he had made. For the third time he was elected to the presidential chair in 1911.

ESTRADES, Godefroi, Comte d', French

soldier : b. Agen, 1607 ; d. 1686. He served as a page at the court of Louis XIII and in 1646 was sent to Holland on a special mission. He was commissioned a colonel of infantry and in 1647 was made field marshal. He was sent as Ambassador Extraordinary to England in 1661 to negotiate the cession of Dunkirk to France; he also served as ambassador to Holland and distinguished himself at Wesel and Liege. In 1678 he represented France at the Peace of Nymwegen. His (Lettres, Memoires et nego-tiations> (9 vols., Paris 1758, and a tenth vol¬ ume, London 1763) were published after death. Consult Lauzun, Philippe, (Le Mareschal d'Estrades) (Agen 1896).

ESTRAY, in law, any animal not ferae naturce and the subject of property which is found at large without ostensible owner in any place other than the land of the owner. If

found on private land such animal in most ju¬ risdictions may be impounded at the cost of the owner. In England an estray becomes subject to the lord of the manor who acquires a right therein which becomes absolute in case the ani¬ mal is not reclaimed by the owner after due proclamation by the lord of the manor. In some States the finder of an estray may after due advertisement sell same at public or private sale and the purchaser will acquire a good title therein. The proceeds of the sale after the finder's expenses have been deducted are as a general rule paid into the town treasury. Con¬ sult Burn, (Justice of the Peace and Parish Officer) (30th ed., London 1869).

ESTREAT, in law, a copy or extract of an original record, particularly of fines : common in the phrase estreat of a recognisance , or the removing of such recognizance from among the other court records and sending it to the ex¬ chequer to be enforced. In England, if a recognizance is forfeited by violation of a con¬ dition, it is estrated, whereupon the parties be¬ come indebted to the Crown to the amount named in the recognizance.

ESTREES, Gabrielle d\ French court favorite and mistress of Henry IV : b. about 1573; d. 1599. She was the daughter of the Marquis Antoine d'Estrees, Governor of L'Isle de France. In 1590 she met Henry IV at her father's castle and he fell a slave to her charms. Her father, having learned of the king's infat¬ uation and fearing a scandal, forced Gabrielle into a marriage with M. d'Amerval de Lian- court but the king annulled the marriage and called her to court. Henry made her Mar¬ chioness de Monceaux and Duchess of Beau¬ fort. She had several children by Henry and was the recipient of the greatest favors at his hand. To make her queen he even had in mind to divorce Margaret of Valois and was only hindered from so doing by the sudden death of Gabrielle. Consult Desclozeaux, (Gabrielle d'Estrees> (Paris 1889).

ESTRELLA DE SEVILLA, a comedy of Lope de Vega, which by many critics is con¬ sidered his best work.

ESTREMADURA, esh-tra-ma-doo'ra, Por¬ tugal, maritime province divided by the Tagus into two nearly equal parts, of which the north is the more mountainous. Wines and olives are the principal products. The chief city is

Lis¬ bon. Area, 6,876 square miles. Pop. 1,438,726.

ESTREMADURA, a-stra-ma-doo'ra, a di¬ vision of southwestern Spain, consisting of two provinces, Badajoz and Caceres. The northern part has large forests, and in the central and southern parts are some good agricultural lands. Deposits of coal, copper and silver are found in the mountains ; but the mines are not well developed. Area, 16,162 square miles. Pop.

990,990.

ESTREMOZ, Portugal, town in Alemtejo province, 30 miles northeast of Avora. It is 1,500 feet above sea-level and contains the ruins of two ancient forts. The porous clay of the district is much used in the manufacture of the earthenware which has made Estremoz famous throughout the peninsula. Wool is exported in large quantities from here and marble of varied color is quarried nearby. Pop. 7,857.

ESTREPEMENT, the waste of lands com¬ mitted by a tenant, in which sense the word has been supplanted by the term ˆwaste.® It survives, however, as the name of an ancient writ of common law to restrain the commission of waste. In most modern jurisdictions the writ has become obsolete through the development of the functions of the courts of equity, but it still exists in Pennsylvania, where there are no courts of equity, as a remedy for the prevention of waste.

ESTRUP, Jacob Bronnum, Danish states¬ man : b. Soro, 1825 ; d. 1913. He was elected to the Landsthing in 1864 and in due time became leader of the Agrarians, and also was active in the preparation of the new constitution of 1866. He served as Minister of the Interior in 1865-69 and did much to improve the railway service of the country. He was chosen presi¬ dent of the council in 1875 and at the same time accepted the portfolio of Minister of Finance. After 1877 he acted very arbitrarily in issuing provisional acts and for several years, from 1885 to 1894, financed the government through provisional budgets. All this involved him in difficulties with the Folkething and his resig¬ nation in 1894 may be said to mark the passing of power from the upper house to the lower. He soon lost his influence and his opposition to the sale of the Danish West Indies in 1902 and later to electoral and tax reforms were little heeded.

ESTSANATLEHI, the ever-self-renewing goddess of the Navajos, wife of the sun and mother of the two war gods. See Namouna.*

ESTUARINE DEPOSITS, sediments laid down in estuaries along a coast. They are frequently formed on great mud flats or tidal flats that are above

the ocean water part of the time and part of the time submerged. As a result they often partake both of the nature of marine sediments (q.v.) and of terrestrial sediments (q.v.).

ESTUARY. Where a shore-line is sinking or has been recently depressed, the rivers, un¬ less large and heavily charged with sediments, have their valleys drained by the encroaching sea, forming roughly funnel-shaped bays. Such bays are called estuaries and are common along the sinking Atlantic Coast of North America. Illustrations are seen in Passamaquoddy and Narragansett bays, the mouth of the Hudson River, Delaware and Chesapeake bays. Owing to their shape, estuaries frequently have strong tidal currents, due to the height of the tides, and the rising tide rushes in as waves, the most remarkable examples of such surf-like tidal waves, or bores, being found in the Bay of Fundy. The rivers entering estuaries drop much of their fine sediment there because of the checking of their currents and the precipitating effect of salt water. The strong tidal currents sweep away and rearrange these sediments. Hence conditions on the bottoms of estuaries are often unfavorable for the growth of organ¬ isms, and the estuary deposits of past ages are seldom rich in fossils, but may contain remains of land organisms brought down by the old river; and the tidal mud-flats have preserved the prints of raindrops, the traces of worms and the tracks of birds and reptiles. See Rivers.

ESZEK, es'sek, or E&SEG, Jugoslavia, an important city in Croatia and Slavonia, capital of the county of Virovitica, on the Drave, about 63 miles west-northwest of Peter- wardein. It consists of the town proper, par¬ tially fortified, and three suburbs, and is the seat of an appeal court for three centuries. Its public buildings of note are the Capuchin and Franciscan monasteries, the town hall, county court building, and commandant's residence, a gymnasium, and training school for teachers. It has manufactures of flour, silk goods, leather, glass, etc. There is a considerable trade in grain and meat and other products of the dis¬ trict. The four annual fairs, chiefly for corn, cattle and hides, are important. As a Roman colony, founded by the Emperor Adrian, under the name of Mursia, it became the capital of Lower Pannonia, and in 335 was made a bishop's see by Constantine. In 1848 the Hungarians under Batthyanyi, held out for some time in this city before submitting to the Austrians. Pop. 31,388, mostly Germans.

ESZTERGOM, Hungary, royal free town and capital of the county of Esztergom, 25 miles northwest of Budapest, on the Danube. AgrL culture is

the principal industry of the inhabit¬ ants and there is a large trade in wine. It has manufactures of brick and ironware and hot medicinal springs have made it a health resort. The town is the seat of the Prince Primate of Hungary; its handsome cathedral has a dome like Saint Peter's, Rome, and is an imposing structure in the Italian Renaissance style. Another noteworthy church is Saint Anne's and the primate's palaces, the ecclesiastical seminary, the museum, gymnasium and town hall are well deserving of notice. In the cathedral is a library of 113,000 volumes and many manu¬ scripts, some of which are invaluable. The town is one of the oldest in Hungary ; here was borne Saint Stephen, the first king of Hungary, who established a bishop's see here soon after his conversion in the year 1000. It was long of importance as a commercial centre, but its destruction by the Tatars in 1241 caused its decline and it never regained its former splendor. From 1543 to 1683 it was in pos¬ session of the Turks. Pop. 17,881.*

ESZTERHAZY, as-tar-a-ze, or es'ter-ha-zi, Marie Charles Ferdinand Walsin, forger: b. Austria, 16 Dec. 1847. He served in a regiment of Papal Zouaves during the latter part of the French Empire; was prompted commander, a rank equivalent to major in other armies, in 1892. In the early part of 1897 he was retired from the army. He became notorious through his connection with the trial of Capt. .Alfred Dreyfus (q.v.), whom he accused as being the writer of the famous "bordereau," alleged to have been sent to certain German military officers revealing French military secrets. In December 1894 Dreyfus was tried by court-martial and convicted as the author of the document, and on 5 Jan. 1895 was publicly degraded and a little later sent as a prisoner to Devil's Island. In 1896 Colonel Picquart, the bead of the intel¬ ligence bureau of the war office, made certain discoveries which pointed to Maior Eszterhazy as the author of the "bordereau." These dis- led to further investigation and Drey¬ fus was t':° orison and given a

new trial in 1899, but was again convicted, al¬ though much of the evidence gathered pointed to Eszterhazy as the forger of Dreyfus's hand¬ writing and as the real traitor. So strong did this opinion become that Eszterhazy was com¬ pelled to leave France.

ESZTERHAZY VON GALANTHA, es'ter-ha-zi fon ga-lan'ta, a family of Hunga¬ rian magnates, afterward princes of the Ger¬ man Empire, whose authentic genealogy goes back to the first half of the 13th century. It traces its origin to Salamon von .Estoras, whose two sons, Peter and Illyes, founded re¬ spectively the families of Zerhazy and Illyes- hazy about 1240. The latter branch became extinct in the male line with the death of Count Stephen Illyeshazy in 1838. Peter's de¬ scendants took from their domain the name of Zerhazy, till Francis Zerhazy (b. 1563; d. 1595), vice-

regent of the county of Pressburg and the first of the family to take a definite place in history, changed his name to Eszter¬ hazy in 1584, on the occasion of his being named Lord (Freiherr) of Galantha, an estate acquired by the family in 1421.

Francis left three sons, of whom Daniel (d. 1654), founded the house of Czesznek; Paul (d. 1641), founded the Altsohl branch, and Miklos, who founded the Farchtenstein branch, which occupies a prominent place in the history of Hungary.

Miklos (b. 8 April 1582; d. 1645), was in early life a Protestant but subsequently went over to the Catholic party. He was made count of Beregh by Matthias II and in 1625 was made Palatine of Hungary. He was a staunch sup¬ porter of the Habsburg dynasty as a means of banishing the Turks from Hungary.

His third son, Paul (b. 1635; d. 1713), a general and literary savant, founded the princely- branch of the family. He fought against the Turks, and in 1683 took part in the liberation of Vienna from the Turkish yoke. He wrote several religious works. His grandson, Nicholas Joseph (b. 1714; d. 1790), was a great patron of the arts and music, founder of the school in which Haydn and Pleyel, among others, were formed, and a brilliant soldier. Joseph II con¬ ferred the princely title on all his descendants, male and female. His grandson, Prince Nicho¬ las Eszterhazy (b. 1765; d. 1833) was distin¬ guished as a field marshal, but left the army to enter on a diplomatic career and was employed by his sovereign as extraordinary ambassador on several occasions. He gathered a priceless collection of paintings and engravings and erected several palaces. He refused the over¬ tures of Napoleon for the crown of Hungary, maintaining the traditional loyalty of his family to the Habsburgs. His son, Prince Paul .An¬ tony (b. 1786; d. 1866), was a distinguished and able diplomatist, serving his sovereign suc¬ cessively at Dresden, Rome and London. In 1848 he was Minister of Foreign Affairs.

ETA, or AETA. See Negritos.

ETAMPES (ancient Stamps),. France, a town in the department of the Seine-et-Oise, at the confluence of the Etampes and Juine, 32 miles southwest of Paris. It has four Gothic churches, one of them a remarkable structure of the 13th century; tanneries and bleacheries, and a considerable trade in corn, flour and prepared wool and garden produce. Pop. 9,454.

ETANG, a- tan, a French geographical term applied to the remarkable salt lagoons and marshes on the south and west coasts of France. The stagnant seawater is generally utilized, as in Brittany and in the department of Bouches- de-Rhone, for the manufacture of salt. The principal lagoons of this character in France are the Etangs de Berre, de Sigean, de la Palme, and de Leucate on the south, and de Heurtin, de Cazan and de Parentes on the west coast.

ETAWAH, e ta'wa, India, town in the northwest provinces, 70 miles southeast of Agra, capital of the district of Etawah, situated on the left bank of the Jumna River. It was once the residence of many of the Mogul grandees, and it is now an important trade centre. Pop.

45,350.

ETCHEMIN. See Malecite.

ETCHING: ITS TECHNIQUE AND GREAT MASTERS. An etching is the proof or picture an artist obtains by printing from a prepared plate of copper or zinc on which the lines and forms of a subject had been scratched by him and then bitten-in by the action of an acid. It is evident that to produce satisfactory work, the etcher must be a good draughtsman, must have an active imagination, and a keen knowledge of the technique of etching and print¬ ing. He must, moreover, be acquainted with the works of the masters of the art. In this article, therefore, the various processes used in producing an etching will first be described, and then the works of the master-etchers will be reviewed.

I. Technique of Etching.

Materials Employed in Etching. — The

following articles which can be procured at any artists' supplies store are now generally used in the practice of the art:

Copper plates

Etching needles

Burnisher

Scraper

Dabber

Roller

Hand-vise

Porcelain trays

Acid hydrometer

Plate-warmer

Etching-ground Stopping-out varnish Nitric acid Turpentine Wax tapers Charcoal Crocus powder Tracing paper Emery paper Whitening

The Processes of Etching. — The several steps taken in the production of an etching em¬ brace : grounding and smoking the plate ; mark¬ ing the outline ; biting-in by means of an acid ; and printing.

Method of Grounding and Smoking the Plate. — After thoroughly cleaning the plate — first with turpentine and a soft clean rag, and then with a little whitening — a handvise is firmly screwed on to the middle of one of its long edges. To prevent the jaws of the vise from scratching the surface of the plate, a piece of thin cardboard is inserted between them and the plate.

The plate is then uniformly heated through¬ out over the flame of a small gas jet or spirit- lamp and is covered with what is known as etching-ground — a gummy preparation in the form of a ball, wrapped in a piece of silk, and composed of mastic gum 30 parts ; white wax 30 parts; and asphaltum 15 parts.

As it is desirable that the ground be spread over the plate in an even and thin film, it is dabbed all over with the dabber. This tool con¬

sists of a circular pad of horse-hair with card¬

board backing, enveloped in two wrappers, an inner one of cotton-wool, and an outer one of silk fabric, the latter stretched tight, gathered and tied in the back to form a handle.

The next step is to smoke the ground. The plate is again evenly heated and then held over a flame of three or four wax. tapers twisted together. Care must be taken to have only the tip of the flame touch the ground, while the plate is kept constantly in motion, until the whole ground is blackened. The etcher must also see to it that the flame is not playing too long on the same spot of the ground or it will be burnt. When an area of the ground, no matter how small, does get scorched, the whole ground becomes useless. After the process of smoking is completed, the back of the plate is covered

with some stopping-out varnish, to pro¬ tect it against the action of the acid during the subsequent process of etching. When the plate has been prepared in the manner described, it is ready to receive the outline.

Method of Marking the Outline on the Ground. — A careful drawing of the subject, the size of the plate, is first made on ordinary paper, from which a tracing is made on tracing .paper. After rubbing some lead on the back of this tracing, it is fastened, face upward, to the smoked ground of the plate ; and with a hard pencil the outline is gone over, pressing lightly. Upon removing the paper from the plate, the lines will be found transferred to its surface. On this pencil impression as a guide, the etcher next freely redraws the subject with an etching needle, putting into it all the art at his command as regards beauty of line, form and composition generally.

The needles used to etch with are generally made for the purpose, and may be held in a handle specially contrived. A needle with a fine oval-shaped point is used for putting in the delicate lines, such as are required in the treat¬ ment of skies or distances ; and one with a blunt point for the deeper lines. Th£ point is used with sufficient pressure to remove the ground, expose and faintly scratch the bare copper along its track. This faint outline, made by the needle, is then bitten-in to the required depth by immersing the plate in a porcelain tray con¬ taining an acid solution, called a mordant.

The Mordants Used in Etching. — The two mordants now generally used are the nitric and the hydrochloric acid baths. The nitric mor¬ dant is composed of nitric acid equally diluted with water. The hydrochloric bath, known as the Dutch mordant, is composed of chlorate of potash, 2 parts ; hydrochloric acid, 10 parts ; and pure water, 88 parts. The nitric mordant is more liable to vary in its action than the hydro¬ chloric; but it has the great advantage of being decidedly more rapid, thus affording the artist the opportunity of watching the process of bit¬ ing and checking it when necessary. For this reason, it is preferred by many . etchers.

The action of either mordant may be re¬ tarded or accelerated by the varying conditions of the weather; it is advisable, therefore, to keep it at a uniform temperature (about 60° Fahren¬ heit) throughout the biting. This is best regu¬ lated by performing the etching on a plate- warmer — an iron box with gas-jets beneath.

Method of Biting-in the Sketch. — There are two methods now used in etching the plate. One way is by the process of stopping-out. The

1 La Vieille aux Loques (Whistler) 2 A Group of Beggars (Rembrandt)

•

plate is immersed in the acid bath for about five minutes, if in the nitric mordant and three times as long in the hydrochloric. This will suffice for the lightest tints to be bitten-in. After withdrawing the plate from the bath, it is washed, and dried between blotters, and the light lines are painted over with stopping-out varnish — a combination of resin dissolved in turpentine to which a little lamp-black had been added.

When dry, the plate is returned to the bath and kept there for about 10 minutes. As after the first biting, the plate is again taken out, washed, dried and the next deeper tones stopped-out. The process is repeated four or five times until the darkest tints have been pro¬ duced. About 30 minutes in the nitric mordant is sufficient to bite-in the deepest lines.

A more satisfactory way of etching the plate consists in taking several different proofs dur¬ ing the process of biting. This method is as follows : The etcher makes his drawing on the grounded plate with the needle, putting in only the lines representing the middle and dark tones, and leaving the light lines for subsequent treat¬ ment. The plate is immersed in the mordant for about 15 minutes — just long enough to bite- in the middle tint. After removing the ground with turpentine and thoroughly cleaning it, a proof is taken and the parts intended to be darker are rebitten in the same lines. This of course necessitates the regrounding of the plate without filling up the lines already bitten-in. To accomplish this, a very thin film of ground' is spread upon another heated plate, and the roller, thinly charged with it, is lightly passed over the etched plate, also warmed for the pur¬ pose. When the plate has been rebitten, another proof is taken, and if the middle tint then proves to be satisfactory, successive bitings are made, and proofs taken to obtain the dark tones. The middle and dark tones settled, the etcher next completely covers the plate with transparent etching-ground or stopping-out varnish so as to fill up the lines and protect the spaces between them, and draws in the delicate lines intended to represent the pale tints. These are bitten-in and the final proofs taken.

Correcting Processes. — Light lines that have been over-bitten may be reduced by rubbing with a piece of charcoal moistened with olive oil. Deep erasures are made with the scraper — a kind of a knife, triangular in

section, and coming to a point. The polished surface in an erased area is regained by the use of the bur¬ nisher — a polished tool, made of steel and tapering to a point. The burnisher is also used to slightly reduce an over-bitten passage by rubbing it on the plate, pressing, thereby, the copper more together into the lines.

Auxiliary Processes. — Etched plates are frequently finished and enriched with what are known as dry-point and soft ground etching. Dry-point is the name given to a form of en¬ graving in which the lines are cut directly into the dry plate by means of the needle, and with¬ out the use of a mordant. It is remarkable for yielding rich and velvetv proofs, which is due to the burr or rough edge of the copper, pro- produced by the point as it cuts the plate. Dry- point is employed to deepen foreground tones, and with the burr removed by means of the scraper) it is also useful for putting in the delicate markings in a composition. Prints are VOL. 10 — 34

often made of plates produced entirely by dry- point. In soft ground etching, the' plate is covered with etching-ground mixed with tal¬ low, to prevent it from hardening, and a piece of slightly rough paper is laid over it on which the artist makes his drawing with a lead pencil. When the paper is removed it brings off with it etching-ground, exposing the copper in such a manner that when bitten-in and printed, the plate will yield a proof having much of the quality of a pencil drawing.

Method of Printing. — The apparatus and articles necessary for printing include :

A printing press Printer's canvas

A plate-warmer Soft old muslin

Printing ink Whitening

A printer's dabber Paper

A palette knife Printer's blankets

Proofs are made from the etched plate in the following manner: After thoroughly clean¬ ing it, first with turpentine and then with a little olive oil, the printer, by means of the dabber, covers the whole plate with thick oily ink, usually of a brownish tint, taking care to fill up the lines. With coarse canvas he then wipes out the superfluous ink from the surface. In that portion of the sketch where a sombre and mysterious effect is desired, he allows a thin film of the ink to remain on the surface of the plate ; in another part which should be light, sharp and vivid, he wipes the surface of the plate dry and clean until it shines. In an area where the lines should be

soft and velvety, he draws the ink out of the lines and over their edges by means of a piece of soft old muslin. When the plate has been inked and wiped it is laid face upwards on the platform of the press upon which had been first spread several print¬ ing blankets of soft woolen cloth. A dampened piece of Japan paper or vellum is then laid over the plate and covered with more blankets. The press is slowly set in motion, and the plate, cov¬ ered by the paper and blankets, passes under the heavy revolving roller. The pressure causes the inked lines and tones in the plate to be transferred to the paper.

II. The Great Masters of Etching.

Of all the graphic and plastic arts, the art of etching has always had a profound fascina¬ tion for the true artist, painter or sculptor. When weary of the more exacting arts of paint¬ ing or sculpture, he frequently finds diversion in the joys of handling the copper plate and etch¬ ing needle. Since the early part of the 16th century when etching was originated, it has steadily risen into high artistic favor, so that now some of the very greatest, names in the art history of England, France, Germany, Hol¬ land, Spain and the United States appear in the list of those who have enriched the world with improvisations in this medium.

Etching in England. — England has pro¬ duced many great painter-etchers. The most significant are Turner, Haden and Brangwyn. In the etchings of J. M. W. Turner (1 775— 1851) which were published in his (Liber Studiorum, he makes the same appeal to the imagination as in his famous paintings, by cast¬ ing an indefinable glamor over the bits of nature he interpreted. Technically, he was remark¬ able for having the power of selecting the main lines of a subject which he rendered boldly, depending upon mezzotinting for the delicate*

tones. Sir Francis Seymour Haden (1818— 1913), who was a London physician profes¬ sionally, practised the art of etching merely as a pastime. Nevertheless, he ranks as one of the greatest of modern landscape etchers. He was very skilful in depicting the poetry of still waters, the movement of clouds, and the beauty of trees, silhouetted against the sky. On purely technical grounds he is incomparable, having in¬ vented several processes which he employed in the production of his works. His masterpieces for which he was knighted by his sovereign are (The Agamemnon,5 (Whistler's House) and (Harlech. 5 Frank Brangwyn, although still a young man, has already won for himself first rank among the British

contemporary painters and etchers. His prints of Italian, French and English subjects are famous for vigor of handling, rich blacks, and clever adjustment of tones.

Etching in France. — France has given the world a legion of etchers, including Claude Lor- rain, Delacroix, Daubigny, Jacque, Millet, Jacquemart, Meryon and Legros. But all of these have attained greater fame in painting, with the exception of Meryon and Legros, who rank very high as etchers pure and simple. Charles Meryon (1821-68) etched for the most part the quaint old buildings and streets of Old Paris, depicting them with such depth of poetic feeling that they give one the same over¬ whelming sensation that he experiences in list-

Le Petit Pont (Meryon)

ening to Beethoven's (Heroic Symphony5 or in viewing Michael Angelo's (Day.5 His etchings are indeed the sublime expression of a great and inspired soul. And yet. this rare genius was so little appreciated during his lifetime that his finest proofs sold for only 30 cents each. He took this public indifference much to heart, and

one day, in a moment of despair, he destroyed some of his most magnificent plates. Finally, through adverse fortune, he became mentally unbalanced and died in an insane asylum. And now that the master is at rest, some of his proofs sell for thousands of dollars each. Alphonse Legros (1837) has produced etchings

Portrait of Dalou (Legros)

which are austere and gloomy in sentiment and simple in execution. His portrait of the sculp¬ tor Dalou and ((The Death of the Vagabond55 are considered his best prints.

Diirer and Etching in Germany.— The great pictorial genius of Germany is Albrecht Diirer (1471-1528) who excelled in painting, engraving and etching. He was among the first to practise the art of etching in which, as in the other arts, he shows himself a man of in¬ tense seriousness, of powerful but somewhat morbid imagination, and of a philosophical turn of mind. His best work in this medium is 'Saint Jerome,5 etched in 1512 and now in the British Museum.

Etching in Holland.— The painters of Hol¬ land who also practiced the art of etching are Ostade, Paul Potter, Ruysdsel, Everdingen and Rembrandt Van Ryn (1606-69), the greatest painter and etcher who has ever lived. It is common knowledge that he was a great painter, but many are the critics who are of the opinion that he is even greater as an etcher. This « Wizard

of the North,55 as Rembrandt has been called, was a robust and versatile genius, hav¬ ing such keen powers of observation and great technical skill, that with a few lines he could depict the life history of a human being or the spirit of a landscape. The subjects of his etch-

ings range from the humble and lowly to the majestic and sublime; from (A Group of Beg¬ gars } to (Christ Healing the SickJ ; but in all we feel the same master hand and mind.

Etching in Spain. — The one artist in the history of Spanish art who has especially dis¬ tinguished himself as an etcher is Francisco de Goya (1746-1828). He was a man of great physical energy and courage, and an open revo¬ lutionary in religion and politics ; but possessed of a morbid imagination. All these personal characteristics found expression in his etchings which he produced in several series. The most noted are (The Caprices) (80 plates), which have an important philosophical bearing; and 'Disasters of War> (80 plates), with which he tried to make men disgusted with war.

Etching in the United States. — The art of etching in the United States was first practised by William Dunlap about 1830. Since then very many painter-etchers have appeared, including Peter Moran, Farrer, Falconer, Gi'fford, Smilie, Parish, Church, Bacher, Whistler and Pennell. Of these, Whistler and Pennell have won inter¬ national fame. James A. McNeill Whistler (1834-1903) as an etcher is ranked with Rem¬ brandt and Meryon. His subjects include figure compositions, Holland, Venetian and Paris street scenes and London wharves, which he etched with consummate skill and refinement. Of his street scenes, his most famous are (A Street at Savern) and (The Unsafe Tenement. His (La Vieille aux Loques) is considered his best figure print. Joseph Pennell (1860 —) has etched a series of plates of Spanish, Italian, London, Philadelphia and New York subjects, which are remarkable for spontaneity and spir¬ ited execution. His proofs of the New York 'sky-scrapers* are particularly famous. See Engraving.*

A. G. Schulman,

Department of Art, College City of Neiv York.

ETCHMIADSIN, a celebrated Armenian monastery in the Transcaucasian province of Erivan, 10 miles west of Erivan. It consists of three groups of buildings, surrounded by a high brick wall and from a distance has the

appearance of a fortress. It contains a the¬ ological seminary, a library, with Armenian manuscripts, and several churches, of which the Shoghakath is said to have been founded by Saint Gregory. It has a Byzantine cupola and its walls are decorated in Persian style. The monastery is the seat of the Armenian primate and after the Russian occupation also of the Armenian Holy Synod. The monastery was founded in the 6th century and was ceded to Russia after the Russo-Persian War of 1827.

*ETEOCLES, e-teo-klez, and POLY- NICES, pol-i-ni'sez, two heroes of ancient Greek legend, sons of CEdipus, king of Thebes. After their father's banishment from Thebes, Eteocles usurped the throne to the exclusion of his brother, whom he drove from Thebes, an act which led to what was known as <(The Ex¬ pedition of the Seven Against Thebes,** Poly- nices being one of the seven leaders. Polynices went to the court of Adrastus, king of Argos. There he married the daughter of the latter and induced his father-in-law to help him against Thebes. The two brothers fell by each other's hand. The interment of Polynices was forbidden under penalty of death, but Antigone*

(q.v.), his sister, braved the doom decreed. Racine has dramatized this story with some poetical variations in his 'Freres Ennemis, but the story was famous long before he took it up, having already played a part in Greek epic sec¬ ond only to that of the Siege of Troy. Rschy- lus used it in his (The Seven Against Thebes,* and Euripides in his*

*ETERNAL CITY, The, Rome, the capital of Italy. Legend states that it was raised by or under the immediate supervision of the immortal gods. The term is frequently to be met in classic literature. (Ave, Roma Immor- talis) is the title of a historical work on the Italian capital, by Francis Marion Crawford. 'The Eternal City) is the title of a novel by Hall Caine, published in 1901, the scene of which is laid in Rome. It was dramatized and produced simultaneously in England and in the United States in 1902. (See Rome). Consult Moore, F. G., (Urbs Rterna and Urbs Sacra**

(Transactions of the American Philosophical Association, Vol. 25, 1894).

ETERNITY, Cape, headland on the left bank of the Saguenay River, Canada, about 40 miles up the river. It has an elevation of about 1,800 feet and is a prominent feature of the landscape.

ETESIAN WINDS, winds blowing at stated times of the year; applied especially to north and northeast winds which prevail at certain seasons in the Mediterranean regions. They are due to the heat of the African Sahara, which causes a huge displacement of air due to superheating. This is

supplied by the cooler air from Southern Europe.

*ETEX, Antoine, an-twan a'teks, French sculptor, painter, architect, engraver and writer : b. Paris, 20 March 1808; d. Chaville, 16 July 1888. He studied under Ingres, Dupaty, Pradier and Duban. He took the second grand prize of Rome (1829) with his ‘ Dying Hyacinthe) ; and became a member of the Legion of Honor (1841). Among his other works in sculpture are ‘Cain and His Cursed Race) (1833) ; Re¬ sistance of France to Coalition of 1814, 5 and (Peace, * for the Arc de l’Etoile; group, (City of Paris Imploring God for Victims of Chol¬ era* ; ‘Charlemagne* ; equestrian statue of Char¬ les I. Among his paintings are Romeo and Juliet* ; (Faust and Marguerite) ; (Allegorical Glory of the United States,* for City Hall, New York (1853). Among his literary works are Rotes on Paul Delaroche) (1857) ; (Study of Life and Works of Ary Schaeffer* (1859) ;*

(Textbook for the Polytechnical Association, for Students and Workmen) (1861).

ETHANE, C2H6, a gaseous hydrocarbon be¬ longing to the paraffin series and constituting its second member (the first being methane, or marsh-gas). It occurs in the gases that are given off by crude petroleum, and it may be prepared by heating methyl iodide with metallic zinc in closed tubes at 300° F. ; the iodide of methyl that is required being obtained by acting upon methyl alcohol (see Alcohol) with iodine, in the presence of phosphorus. Ethane is also liberated at the anode, together with carbon dioxide in the electrolysis of a concen-

trated solution of sodium acetate. It is a color¬ less gas, which burns with a pale flame and combines with water, under pressure, to form a crystalline hydrate. Chlorine combines with ethane rapidly, in diffuse daylight, with the formation of ethyl chlorid, C2H6C1 ; but if excess of chlorine is present, higher substitution products are also formed, terminating with hexachlorethane, C2C16. Ethane is also known as ((ethyl hydride

ETHE, (Karl) Hermann, German Oriental scholar : b. Stralsund 1844. He received his education at the universities of Greifswald and Leipzig. In 1867 he was appointed privatdozent in Arabic, Persian and Turkish in Munich. Five years later he visited Oxford for the purpose of cataloguing the Oriental manu¬ scripts in the Bodleian Library there, the first volume of his catalogue making its appearance in 1889. He was made professor of

German and Oriental languages at University College, Aberystwyth, Wales, in 1875. His varied labors include a catalogue of the Persian docu¬ ments in the India office library, a critical text of (Yusuf and Zalikha) (1908) ; (Grundriss der ivanischen Philologies and articles on pro¬ fessional topics in the Athenceum, etc.

ETHELBALD, or 2ETHELBALD, king of Mercia : b. date unknown ; d. 757. He was the son of Alweo and succeeded to the throne after the death of Ceolred in 516. Within 15 years he succeeded in making subject to him all the princes and peoples of the southern and central parts of England as far as the Humber. In 740 he invaded Northumbria and two years later led a successful campaign against the Welsh. In 752 he was vanquished at Burford by Cuthred, king of the West Saxons. It is supposed that Ethelbald was murdered by his guards. Consult Green, (Conquest of England (New York 1884).*

ETHELBALD, king of Wessex: d. 860. He was a son of Ethelwulf, king of the Anglo- Saxons ; was present with his father at the victory over the Danes at Ockley in 851, and obtained the throne of Wessex in 856. While Ethelwulf was making a journey to Rome, Ethelbald formed the project of seizing the throne. A civil war was prevented only by the moderation of Ethelwulf, who resigned to his son the dominion of Wessex and confirmed that portion of the kingdom to him in his will. The reign of Ethelbald was peaceful, but he excited general disapprobation by marrying, contrary to the canonical law, his stepmother, Judith.

ETHELBERT, king of Kent: b. about 552; d. 616. He married Bertha, the daughter of Charibert, king of the Franks, and a Christian princess, who, stipulating for free exercise of her religion, brought over with her a Frankish bishop. Her conduct was so exemplary as to prepossess the king and his court in favor of the Christian religion. In consequence, Pope Gregory the Great sent a mission of 40 monks, headed by Augustine, to preach the gospel to the Saxons (597). They were well received and numbers were converted; and the king him¬ self at length submitted to be baptized. Civi¬ lization and knowledge followed Christianity, and Ethelbert, about 600, enacted a body of laws, which was the first written code promul¬

gated by the northern conquerors. At the time of the landing of Augustine he had acquired a supremacy over all the English south of the Humber. Ethelbert founded the see of Roch¬ ester in 604 and built the first cathedral, and afterward that of London, and built the church of Saint Paul. He was succeeded by his son, Eadbald.

ETHELBERT, king of Kent and Wessex: d. 866. He was the third son of

Ethelwulf and succeeded to the government of Kent about 855, and in 860, on the death of his brother, Ethelbald, became king of Wessex. His reign was much disturbed by the inroads of the Danes and Gaulish pirates, whom he repulsed with vigor, but without permanent success as, when¬ ever they were driven from one part of the country, they ravaged another.

ETHELFLEDA, or AETHELFLA' ED,

eldest daughter of Alfred the Great, king of England, and often referred to as the Lady of the Mercians. She was born about 870; d. Tamworth, 12 June 918. In 886 she was mar¬ ried to Aethelred, Earl of Mercia, and with him she held Mercia when her brother Edward ascended the throne. They fortified Chester in 907 and with the Danes held off the Norwegians when the latter besieged Chester in 909. Later, with the Scots (Irish) and Welsh, she formed an alliance to resist the barbarians from the north. Her husband died about 911 and Ethel- fleda lost Middlesex and Oxfordshire to her brother but managed to hold the rest of her territory. In 916 she led an expedition against the Welsh, took Derby in 917 from the Danes and Leicester and York in 918. She was buried in Saint Peter's, Gloucester. Having wielded almost royal authority the title of queen is frequently %Jven her by the chroniclers. Con¬ sult (Saxon Chronicle ; fragments of Irish Annals, * edited by D. O'Conor.*

ETHELRED I, king of England: d. 871. He was the fourth son of Ethelwulf and suc¬ ceeded, his brother, Ethelbert, in 866. Assisted by his brother, Alfred the Great (by whom he was succeeded), Ethelred drove the Danes from the centre of Mercia, where they had pene¬ trated, but the Mercians refusing to act with him, he was obliged to trust to the West Sax¬ ons alone, his hereditary subjects. Notwith¬ standing various successes, especially a great victory at Ashdown, the menace of the invaders continually increased.

ETHELRED II, king of England: b. 968; d. London, 23 April 1016. He succeeded his brother, Edward the Martyr, in 978, and, for want of sound judgment and sagacity, was sur- named the "Unready® (without rede or coun¬ sel). About 981 the Danes, who had for some time ceased their inroads, renewed them with great fury. In his reign began the practice of buying them off with ever-increasing presents of money. After repeated payments of tribute (see Danegeld) he effected, in 1002, a general massacre of the Danes in England. Such revenge only rendered his enemies more violent ; and in 1003 Sweyn and his Danes carried fire and sword through the country. They were again bribed to depart ; but, upon a new in¬ vasion, Sweyn obliged the nobles to swear allegiance to him as king of England; while Ethelred, in 1013, fled to Normandy with his

family. On the death of Sweyn, in 1013, he was invited by the national council to resume the government. Ethelred, in 1002, married, as his second wife, Emma, sister of the Norman Duke Richard II, by whom he was father of Edward the Confessor. His reign is described by Freeman as the worst and most shameful in English annals.

ETHELREDA, Saint, East Anglian prin¬ cess: b. Exiling, Suffolk; d. Ely, 23 June 679. Although twice married she never lived in wed¬ lock with either of her husbands but kept her monastic vow. She finally became abbess of Ely, and the county fair held in the Isle of Ely on her day, after her canonization as Saint Ethelreda or Audrey, gave rise to the expres¬ sion "tawdry, » as indicating something cheap and fine, such as would be offered for sale in a village booth.

ETHELWULF, king of England: d. 858. He succeded his father, Egbert, in 839, and soon after his accession associated his son Athelstan with him, giving him the sovereignty over Essex, Kent and Sussex. In 851 the Danes poured into the country in such numbers that they threatened to subdue it; and though op¬ posed with great vigor by Athelstan, they fixed their winter quarters in England, and next year burned Canterbury and London. After inflict¬ ing a great defeat on the Danes at Ockley, he went on a pilgrimage to Rome, and on his re¬ turn found his son Ethelbald in revolt against him. In order to avoid a civil war, he gave up the western division of the kingdom to his son, retaining Kent for himself. The youngest of his children was Alfred the Great.

ETHENDUN, Battle of, the victory which Alfred the Great gained over the Danes (878), and which led to the treaty with Guthrum, the Danish king of East England. The locality where the battle was fought is supposed to be at Edington, in Wiltshire.

ETHER, ETHYL ETHER, DIETHYL ETHER, or SULPHURIC ETHER. When the term ether is used without qualifica¬ tion, diethyl ether (C2H5GC), is universally understood to be meant, just as ethyl alcohol is understood, when alcohol is mentioned without qualification. Ether is prepared by distilling a mixture of five parts of 90 per cent alcohol and nine parts of concentrated sulphuric acid, at a temperature of 285° F., alcohol being fed continuously into the retort during the operation. The distillate is treated with lime to remove traces of sulphuric acid, and dried with calcium chloride, and is then redistilled. The substance so obtained is a mobile, colorless, inflammable liquid of agree¬ able odor, with a specific gravity of

about 0.72 at ordinary temperatures. It volatilizes rapidly with the production of great cold. Its vapor mixed with air is highly explosive. It will not mix with water to any great extent, but will mix readily with many organic fluids, and also with liquid carbon dioxide. It dissolves bromine and iodine, sulphur and phosphorus sparingly, guncotton, rubber, most of the resins and fats, and many of the alkaloids. It boils at 95° F., under a pressure of one atmosphere, and at 200° F. below zero it freezes into a crystalline solid, which melts again at about 180° F. below zero. A hydrate of ether is ob¬

tained by evaporating aqueous ether on blot¬ ting paper. It becomes solid at 26° F.

The inhalation of the vapor of ether pro¬ duces insensibility and it is used for this pur¬ pose in surgical operations. Ether is also used anaesthetically in the form of a spray produc¬ ing an intense cold with inhibition of pain locally. See Ethers.

ETHER, The, or COSMICAL ETHER,

in physics and astronomy, postulated material substance, which is assumed to fill all space, and to penetrate freely among the ultimate particles of which all matter is composed. It is not in any way related to the substance known as "ether" to the chemist, and the identity in name is unfortunate. The physicist has the ad¬ vantage of priority, however, and cannot be ex¬ pected to change the name because the chemist subsequently appropriated it for something else. Although it has not been possible to determine the properties of the ether of physics, the ad¬ mission of its existence seemed a necessity of scientific reasoning. For we know that light is some kind of a periodic disturbance, and we know that it travels through interstellar space with a definite, finite speed. It appears absurd to suppose that a motion of any kind could take place in a void, in which there was nothing to be moved ; and hence, as has been said, it appears to be a logical necessity to assume the existence of some kind of a luminiferous (light-bearing) ether throughout space. As soon as we begin to inquire closely into its nature, however, we encounter difficulties that have proved insuper¬ able. Obviously our conclusions in this respect depended to a large extent upon a study of the phenomena of light and, later, of electricity, and of the kind of motion that would be com¬ petent to produce those phenomena. Naturally the assumption was first made that the ether, when submitted to stress, conforms to the same laws of elasticity that hold true in ordinary mat¬ ter. (See Elasticity). In that case the full mathematical theory of the motion of the ether would involve no less than 21 numerical coeffi¬ cients, if the ether were anisotropic. And it is as reasonable to believe that, whatever its nature may be, it is the same in all its parts, and that its properties,

whatever they may be, are the same in all directions. If these two facts are admitted — that is, if the ether be ad¬ mitted to be isotropic — then the number of con¬ stants involved in the theory reduces to two. These, as is explained in the article Elasticity, are (1) the modulus of compressibility, and (2) the modulus of rigidity. If the ether were analogous to a liquid or a gas, its modulus of rigidity would be zero. It is found, however, that the equations of motion that are obtained by making the modulus of rigidity zero are not at all competent to explain the acual phenom¬ ena of light ; for in this case the ether-waves would be merely waves of alternate compres¬ sion and rarefaction, like those of sound in the air, and there could be no such phenomenon as polarization. It must therefore be admitted that the modulus of rigidity of the ether has a defi¬ nite, finite value, if the ether itself is to be re¬ garded as analogous to other kinds of matter, so far as its general mechanical deportment is concerned. If it be also admitted that the modulus of compressibility of the ether has a definite, finite value, the conclusion is reached

that the ether can transmit two essentially dif¬ ferent kinds of waves, one of which involves distortions of its parts, while the other involves changes in its density. Of these the first would admit of polarization, while the second would not. Moreover, the two kinds of waves would have, in general, different velocities of propa¬ gation; and the fact that all ether-disturbances appear to be propagated at the same speed indi¬ cates that only one kind exists, and that we must therefore make one of the three following assumptions with regard to the compressibility of the ether: (1) The modulus of compressibil¬ ity of the ether is infinite; or (2) it is zero; or (3) the circumstances under which the atoms (or their component electrons) impress their motions upon the ether are such that the modu¬ lus of compressibility is not involved in any way. The first of these alternatives implies that the ether is absolutely incompressible, and this is the one that has been most favorably re¬ garded by physicists in general. The second implies that the ether yields indefinitely, even to the smallest compressive forces, so that it is essentially unstable. This view has been de¬ veloped in recent years by Lord Kelvin, but it is hard to regard it as more than a mathematical possibility. The mind cannot be brought to ad¬ mit that it corresponds to the actual state of affairs in space. The third of the suggested alternatives must also be regarded as improb¬ able, although, for lack of exact knowledge, we can hardly pronounce it impossible. On the whole, therefore, it is plain that if the elastic behavior of the ether is analogous to that of ordinary bodies, we have to admit (tenta¬ tively, at least) that so far as elastic properties are concerned, the ether resembles an

absolutely incompressible solid.

According to the elastic-solid theory of the ether, light consists of a periodic or wave-like disturbance in a jelly-like medium, the waves traveling in straight lines with a uniform veloc¬ ity of about 186,000 miles per second, and the di¬ rection of oscillation of the ether being at right angles to the direction in which the wave pro¬ gresses, just as the direction of oscillation of the various points of a rope along which a wave is passing is at right angles to the rope. This view of the case accords very well with most of the observed phenomena, but there are some that do not appear to be reconcilable with it. We assume that the ether penetrates all bodies, and fills up the spaces between their molecules (or electrons) ; and as the phenomena of re¬ fraction show that the velocity of light is less in a transparent solid (say in glass) than it is in a vacuum, it follows that the ether in the glass has either a greater density or a less rigidity than it has in free space. Either of these suppositions will fit this simple case equally well ; but there are other phenomena that will not be satisfied so easily, and it has been found to be impossible to make any single set of consistent assumptions which shall recon¬ cile the "elastic-solid® theory of the ether with all the known facts. For example, when we come to investigate certain problems in partial reflection from transparent media, and others relating to diffraction from small particles, we are obliged to conclude that it is the density of the ether that varies, the rigidity remaining practically constant. On the other hand, the phenomena of double refraction require us to

admit that the rigidity of the ether in a doubly refracting body is different in different direc¬ tions ; and hence we conclude that the rigidity of the ether is modified by the presence of mole¬ cules of matter — a conclusion at variance with that previously reached by considering the phenomena of diffraction and partial reflec¬ tion. Other difficulties have been encountered in the application of the elastic-solid theory of the ether to the phenomena of light, and al¬ though reference to it is common, because it is definite enough to present a clear image to the mind, and so is helpful in many ways, the gen¬ eral opinion among physicists of the present day is that it is no longer tenable as an accurate description of the real properties of the ether. It has been abandoned in favor of the "electro¬ magnetic® theory of Maxwell, and in abandon¬ ing it we also abandon his method of estimating the density and rigidity of the ether.

Faraday was convinced, many years ago, that there is some mechanism by which magnetic and electric forces are enabled to make themselves felt through a space apparently vacuous. "Such an action,® he said, "may be a function of the ether; for it is not unlikely that, if there be an ether, it should have other uses than simply the conveyance of radiation.® Maxwell, after read¬ ing Faraday's writings, became so impressed by the

ideas which they advanced that he applied his own ingenious and powerful mind to the problems whose solution Faraday had dimly glimpsed, and succeeded in completely revolu¬ tionizing our ideas with regard to light and the ether. His now famous "electro-magnetic the¬ ory® is given in his masterly but exceedingly difficult (Treatise on Electricity and Magnetism > and a popularized account of it may be found in Oliver JLLodge's (Modern Views of Electricity. He agrees with previous writers that light is some sort of a periodic disturbance in some sort of an ether, and that the displacements that occur are indeed perpendicular to the direction in which the light-wave travels ; but he teaches us that these displacements are not analogous to those that are produced in an elastic solid when that solid is deformed. He considers that they are of an electrical nature, and that we must learn about them not by observing the behavior of elastic bodies under stress, but by observing the phenomena exhibited by electrified bodies. Maxwell has given us the fundamental equa¬ tions that must be satisfied when an electrical disturbance is propagated through the ether, and by means of these equations the entire theory of light can be constructed on the new basis. The theory thus constructed agrees well with the facts of observation, and it is free from the objections that beset the old elastic-solid theory. Moreover, it successfully with¬ stood the searching experimental tests devised and executed by Hertz and his followers, whose labors have shown us that electrical radiations are propagated with the same speed as light, and that they can be reflected, refracted, dif¬ fracted, polarized, and made to interfere; so that we are now quite ready to admit that light consists in a rapid succession of such radia¬ tions. It is not at all essential to Maxwell's theory that we should know precisely what an "electrical displacement® really is, and hence it does not teach us so much about the nature of the ether as we might desire. It does teach that the elastic-solid analogy is probably not*

correct, and it strongly suggests that the ether is incompressible, and that there is some kind of an ethereal rotation going on in a magnetic field; but it has not yet been made to furnish a means of estimating the density of the ether, nor of obtaining any of its other constants.

We do not even certainly know whether the ether is continuous, or whether it is molecular in structure. Some writers find it difficult to think of a displacement of any kind, in a space that is entirely filled with matter, especially if the matter is incompressible. Others hold that this objection is without weight.

Faraday's idea that magnetic and electric induction are propagated by the same medium as light proved to be exceedingly fruitful, and it is by no means unlikely that the ether pos¬ sesses still other functions, which will throw further light upon its nature, when they are understood. The various kinds of radiations that have been discovered in recent years (<(cathode rays,® ((Becquerel rays,® ((X-rays,® and the like) were at first believed by many au¬ thorities to consist in ethereal motions different from those constituting light, and it was even thought that some of them might correspond to the waves of ethereal compression that had been so earnestly sought. Some of these radia¬ tions, however, are now believed to be nothing but ordinary light of exceedingly short wave¬ length, and others are believed, at least tenta¬ tively, to consist in the actual emission of storms of corpuscles, or ((electrons,® from the bodies from which they proceed. (See Electron; Radium; Radiation). Gravitative action has also been attributed to ether stresses, and it is not impossible that this is its real nature. No mechanical explanation of gravitation, as an ether-phenomenon, has yet been offered, how¬ ever, to which serious objections cannot be urged. In Maxwell's theory of gravitation it is assumed that bodies produce a stress in the ether about them, of such a nature that there is a pressure along the lines of gravitative force, combined with an equal tension in all directions at right angles to those lines. "Such a state of stress,® says Maxwell, (

directions. # . ...

One of the most obvious difficulties in the way of the ether-theory is that the planets, and even the atoms, move through space as though it were absolutely empty. According to modern ideas however, the atom may be only an aggre¬ gate of smaller "electrons,® each of which may ˆj-anspire to be nothing but a state of stiaiu in the ether; and if this proves to be the case, we are certainly not in position, at present to say that the ether would oppose in the slightest de¬ gree the transmission of such a state of stiain through its own substance. The difficulty with the theory of aberration is more formidable. If a shower of rain is falling vertically, the drops will appear to an observer to descend vci tically so long as he remains stationary It he moves forward, however, the drops will strike*

him in the face and will therefore appear, to him, to come from some point slightly in ad¬ vance of the zenith, rather than from the zenith itself. A similar phenomenon is observed in connection with light and is known as aberra¬ tion. Every star is seen in its true position when the earth is moving directly toward it ; but three months later, when the earth is mov¬ ing at right angles to this direction, the observ¬ er's telescope will have to be inclined slightly toward the direction in which the earth is mov¬ ing, in order that the light from the star may come down through the instrument

centrally. The maximum displacement that a star can have, from this cause, is known by observation to be about 20.47 seconds of arc on the heavens. If the ether were motionless, the analogy with the raindrops would be perfect, and the "coTh- stant of aberration,® whose value has just been given, could be calculated from the known ve¬ locity of light, and the known velocity of the earth's orbital motion. It is found, however, that the theory of aberration is exceedingly complicated when the possibility of currents in the ether is admitted, and hence physicists have been much concerned to know whether or not the earth drags the adjacent ether along with it, in its motion around the sun. As long ago as 1859 Fizeau showed, by a justly celebrated ex¬ periment, that the ether is apparently dragged along by a current of water flowing through a tube ; and Michelson and Morley have since shown, by an even more ingenious experiment, that there is evidence that the ether in the immediate vicinity of the earth participates in the earth's motion to such an extent that any difference that may exist does not amount to the twentieth part of the whole motion. Lodge, on the other hand, found no evidence of any <(ether drag® in the space between two rapidly whirled steel plates that were separated by an interval of one inch. (Consult Preston, (Theory of Light)• The whole subject of the ((drag® of the ether is still unsettled ; but the observed value of the constant oL aberration appears to require that the ether is not disturbed by the motion of the earth through it.*

As indicative of confused condition of thought in regard to the ether, even among the most illustrious scientific minds, the following quotations are appended. Sir William Thomp¬ son (Lord Kelvin) says: (

machine, all the phenomena in which the ether appears to play a part.® J. Clerk Maxwell offers the hypothesis that the constitution of ether is made up of elastic centres or vortices in close proximity, but goes on to say, <(No the¬ ory of the constitution of the ether has yet been invented which will account for such a system of molecular vortices being maintained for an indefinite time.®

It has more recently been postulated of the ether (Erwin 1916), that it is structureless, in¬ compressible, motionless, but capable of taking on motion, non-elastic, and capable of indefinite subdivision, and that the subdivided parts can be moved over each other without friction. On the other hand such eminent physicists as Ein¬ stein, Ritz and Poincare deny the necessity for any such suppositional substance as the ether. It is a fact that scientific inquiry is attacking this and similar problems along quite a

differ¬ ent line, upon the hypothesis that matter has no existence otherwise than as a mode of mo¬ tion

Consult Erwin, M., 'The Universe and the Atom) (New York 1916) ; Larmor, J., (ˆEther and Matter (Cambridge, Mass. 1900) ; Pres¬ ton, S. J., (Physics of the Ether) (London*

1875).

Richard Ferris.

ETHEREAL SALTS. See Esters.

ETHEREGE, Sir George, English dram¬ atist : b. Oxfordshire, about 1635 : d. Paris, probably late in 1691. He is said to have spent some time at Cambridge, but this is probably not the case, since we have it on high authority (Dennis) that he was unacquainted with either Latin or Greek. He traveled much abroad and spent some time in Paris, where it is probable that he saw the performance of the early come¬ dies of Moliere. Returning to England he

studied law for some time. After 1660 he wrote 'The Comical Revenge, or Love in a Tub, which was produced in 1664 at the*

*Duke's theatre. It was very successful and brought the author the patronage of the court. In 1668 he produced 'She Would if She Could, * a rather frivolous and immoral work, but which attained a great success. For many years*

*Etherege neglected literature but returned in 1676 with 'The Man of Mode, or Sir Fopling Flutter, * a splendid comedy of intrigue. It*

added to the author's fame and fortune, but his dissolute mode of life soon dissipated the latter. He was knighted about 1680 and soon afterward married a rich widow. Charles II sent him on a mission to The Hague and in 1685 he was Minister at Regensburg. He remained there for three and one-half years, but never liked Germany. Consult the edition of his works by Verity (1888) and Gosse, Seven¬ teenth Century Studies) (London 1895) ; 'Cam¬ bridge Historv of English Literature) (ib.

1907-13).

ETHERIDGE, Emerson, American states¬ man : b. Carrituck County, N. C., 28 Sept. 1819 ;

d. – . When 13 years of age he removed to

Tennessee, received a public school education, studied law and was admitted ,to the bar in 1840. He was a member of the legislature in 1845-47, and a candidate for speaker, and was then sent to Congress as a Whig and re-elected by the "American® party, serving from 1853 to 1857. He was defeated for the next Congress

but was re-elected in 1858 and served again in 1859-61, in which session he was chairman of the Committee on Indian Affairs. He was then elected clerk of the House of Representa¬ tives and served from 4 July 1861 to 8 Dec. 1863. On his return to Tennessee he devoted himself to the practice of his profession and the study of philosophy. He served in the Tennes¬ see

Senate in 1869-70 and was twice nominated for the governorship of his State, being de¬ feated once and declining the second nomination. He was the last Whig that served in Congress. He published 'Speeches in Congress) (Wash¬ ington 1857).

ETHERIDGE, John Wesley, English non¬ conformist clergyman: b. near Newport, Isle of Wight, 24 Feb. 1804; d. Camborne, 24 May 1866. He was educated by his father and later ac¬ quired a thorough knowledge of Hebrew, Greek, Latin. Syriac, German and French. In 1826 he attempted to enter the ministry and after a period of probation was received in full con¬ nection at the conference of 1831. Thereafter he spent two years at Brighton, when he re¬ moved to Cornwall. In 1838 his health began to fail and he was pensioned and went to live at Caen and Paris. His health improving, he accepted the pastorship of a Methodist church at Boulogne in 1842. Four years later he re¬ turned to his native land and was successively on the circuits of Islington, Bristol, Leeds, Pen¬ zance, Penryn, Truro and Saint Austell in Corn¬ wall. Heidelberg conferred on him the degree of Ph.D. He published 'The Apostolic Minis¬ try and the Question of Its Restoration Consid- ered) (1836) ; 'Misericordia, or Cont2mplations of the Mercy of God (1842) ; 'Horae Aramai- cae) (1843) ; 'The Syrian Churches : Their Early History, Liturgies and Literature) (1846); 'The Apostolical Acts and Epistles from the Peschitto, or Ancient Syriac, to which are Added the Remaining Epistles and Book of Revelation from a later Syriac Text* (1849) ; 'The Targums of Onkelos and Jonathan ben Uzziel on the Pentateuch, with the Fragments of the Jerusalem Targum* (2 vols., 1863); 'Life of Rev. Adam Clarke* (1858). Consult memoir by T. Smith (London 1871).*

ETHERIDGE, Robert, English geologist : b. Ross. Hereford. 3 Dec. 1819; d. Chelsea. London, 18 Dec. 1903. He engaged in mercan¬ tile pursuits and devoted his spare time to nat¬ ural history study. He became curator of the museum attached to the Bristol. Philosophical Institution, was made assistant paleontologist in 1857 and paleontologist six years later of the Geological Survey. In 1881 he was transferred to the geological department of the British Mu¬ seum, where he was assistant curator for 10 years. He published 'Catalogue of Fossils in the Museum of Practical Geology, > in collabo¬ ration with Huxley (1865) ; 'Fossils of the British Islands, Stratigraphically and Zoologi¬ cally Arranged) (Vol. I, 1888).

ETHERS, in chemistry, those compounds which may be regarded as derived from water by the replacement of each of the hydrogen atoms by a basic or alcoholic radical The ether is "simple® if the basic radicals that are so substituted are alike, and it is "mixed® if they are unlike. The formation of a simple ether may be conveniently illustrated by the case of common, or "diethyl® ether, (C2H5)20

This may be prepared in various ways, but the sulphuric-acid method will serve best to illus¬ trate the nature of the compound. When alcohol, GHs.OH, is heated to 285° F. with sulphuric acid, H2S04, one of the hydrogen atoms of the acid, is replaced by the alcohol radical ethyl C2HB, according to the equation GH,OH+ H2S04 = (GH#)HS044- HsO, the compound (GHB)HS04 being known as hydro- genethyl-sulphate, or <(sulphovinic acid.® When the hydrogen-ethyl-sulphate comes in contact with another molecule of the alcohol, it under¬ goes a second transformation, by which another ethyl radical is taken up, and a molecule of sul¬ phuric acid again set free, as indicated by the equation (GH.)HS04 + GH..OH = (GHB)80 4~ H2S04. It will be seen that although a mole¬ cule of sulphuric acid is used up in the first part of the process, it is regenerated in the second part, so that on the whole there has been no change in the quantity of acid present. The water produced in the first stage, and the ether, (C2H5)20, produced in the second stage, pass off in the state of vapor, and the apparatus is ready for the admission of a new supply of alcohol. The process by which an ether is formed, as here illustrated, is called etherifica¬ tion ; and the etherification is said to be ((con- tinuous® if it can go on, as in this case, by merely passing a stream of the alcohol into one end of the apparatus, and withdrawing the vapor of ether and water at the other end Methyl ether, for example, can be formed by the action of sulphuric acid upon methyl alcohol in a manner precisely analogous to that explained , above. The equations in this case are CH3.OH + H2S04= HaO + (CH») HS04; (CH3)HS04 + CH«OH = H2S04 +(CH,)20; where CHs.OH is methyl alcohol, (CH3)20 is methyl ether, and (CH8)HS04 is hydrogen- methyl-sulphate.

As an illustration of a mixed ether, the case of methyl-ethyl ether may be cited. If ethyl alcohol be heated with iodine in the presence of phosphorus, a substance known as ethyl iodine is formed. Thus : 5C2HB.OH 4* 51 4* P — 5C2H5.I + H3P04 + H20. On the right of this equa¬ tion, HaP04, is phosphoric acid, and C2HB.I is ethyl iodide, which is a liquid boiling at 152° F., readily separable from the phosphoric acid by distillation. Now if ethyl iodide be mixed with potassium ethylate (obtained by dissolving metallic potassium in absolute ethyl alcohol), the following reaction occurs, and ethyl ether is formed: GHs.I 4* C2H5.OK= =KI 4-(GH5)20. But if the ethyl iodide is mixed with potassium methylate, CH3.OK, which is obtained by dissolv¬ ing metallic potassium in absolute methyl alco¬ hol, then the ether that is formed contains the radical methyl, CHs, and also the radical ethyl C2Hs, and hence is a mixed ether;

GHb.I 4- CH3.OK = KI 4- GHb.O.CHs. The mixed ether, GHs.O.CHs, is known as methyl-ethyl ether. The reactions that have here been given at

some length are typical of similar ones that hold true very generally of the alco¬ hols and ethers. In all the more familiar cases the iodide of a given alcohol radical can be prepared by treating the corresponding alcohol with iodine and phosphorus; and a potassium <(alcoholate® can be formed by dissolving metal¬ lic potassium in the corresponding (anhydrous) alcohol. Then if we wish to prepare a proposed

mixed ether, we have only to treat the iodide of one of its radicals with the potassium compound of the other one, as indicated above. The com¬ moner ethers, both simple and mixed, strongly resemble one another in their general properties. Thus they will not mix with water, nor combine with ammonia nor other alkalies, nor with me¬ tallic sodium, nor with dilute acids. The resem¬ blance is also close in other respects. For ((compound ethers® see Esters.

ETHICAL DETERMINISM. See Deter¬ minism.

ETHICAL MOVEMENT AND ETH¬ ICAL SOCIETIES IN AMERICA AND ABROAD. The first Ethical Society was established and the Ethical Movement inaugu¬ rated in 1876 in New York by Felix Adler, then a lecturer at Cornell University. In re¬ sponse to a call, several hundred persons met in May at Standard Hall and at the conclusion of Professor Adler's address, outlining the purpose and spirit of the proposed organization, the Society for Ethical Culture of New York was constituted. In this address he appealed to his auditors to unfurl a new flag of peace and con¬ ciliation over the bloody battlegrounds where religions had fought in the past ; he laid stress upon the urgent need of a higher and sterner morality to cope with the moral perils of the hour, especially noting the growing laxity that accompanied the decline of discredited forms of religious belief ; and he placed peculiar emphasis upon the duty of caring for the moral education of the young. The society thus initiated grew rapidly, and soon gave practical effect to his program. Within a few years it had established a free kindergarten for the children of the poor, the first of its kind in New York; and this de¬ veloped into a workingman's school, based upon the Froebelian pedagogy, which was the first school to introduce manual training and system¬ atic ethical instruction into the curriculum. It also inaugurated a system of trained nurses for the poor, which has since become an adjunct of dispensary out-door relief in the city. Nor were the larger social and political applications of morality to contemporary life neglected : its leader devoting special attention in his platform utterances to the labor problem and specific social reforms, as being at bottom great moral issues. His vigorous exposure of the evils of the tenement houses bore fruit in the creation of the Tenement House Commission of 1884, of which he was appointed a member. He also was among the first advocates of small parks in the congested districts, of public

playgrounds and public baths; and, above all, of greater jus¬ tice and humanity in the relations between labor and capital, employer and employed. The Labor party here found a new type of advocate; and reformers and politicians a platform from which the issues of the hour were brought to the touchstone of ethical first- principles.

Meanwhile, the society filled more and more the place of a church in the lives of its hitherto unchurched members. It did not neglect the problems of the personal life, but aimed to illuminate and inspire its members in their dealings with the problems of the home and the vocation, family relations, marriage, the

training of the young, etc. Its position as a distinctive religious organization became better understood and its religious appeal more for¬ cibly felt, while its practical educational and philanthropic activities continued to multiply. Its schools, testifying to its conviction that moral improvement must begin with the care and education of the young, expanded until kindergarten normal and high school depart¬ ments were added. These expansions necessi¬ tated greatly enlarged quarters ; the society therefore erected at Central Park West and 63d Street a thoroughly modernized school build¬ ing, next to which an appropriately dignified meeting place and society-house were later on added. This thoroughly equipped schoolhouse has enabled the society to fulfil its cherished aim of having a model and experimental school, standing for the highest ideals of non-sectarian education and the most efficient pedagogical method of realizing them. Many significant developments have taken place including unique Arts High School. What distinguishes these from many other similar schools is their demo¬ cratic organization and spirit; like the public schools, they educate children both of the well-to-do and of the poor, a generous pro¬ portion of free pupils being admitted under a system of free scholarships endowed by the society.

To give further effect to its conception of a religious society as a body of workers, bent upon learning by doing and promoting piety by service, the society opens to its members many other fields of education and philanthropic activity. Here the women of the society take a prominent part. Most of the philanthropies are affiliated under a general representative body, known as the Women's Conference. Fortunate in drawing an unusual number of young men to its ranks, the society has a strong Young Men's Union which contributes largely to the support of two neighborhood houses : the Hudson Guild on the West Side, of which Dr.

John Lovejoy Elliott, one of Professor Adler's associate lecturers, is the head worker; and the Down-Town Ethical Society, on the lower East Side. The Union also owns and supports a summer home on its farm of 70 acres at Moun- tainville, N. Y., where a farm school is held, and a summer holiday is given to groups of the boys and girls who belong to the Neighborhood clubs. The larger policies and relations of all the working bodies of the society are considered and shaped by a Council of Fifty, composed of representatives from all of them. One other event in the history of the society that calls for mention is the recent appointment of Professor Adler to the newly created chair of political and social ethics at Columbia University. As the chair was endowed with a view to Professor Adler's tenure of it at the instigation of. some members of the well-known Committee of Fif¬ teen appointed by the chamber of commerce to deal with the social evil in New York, of which committee Professor Adler was an active mem¬ ber, this appointment is a remarkable public tribute to the large public place which the

founder of the ethical movement has won for himself and for it.

Early in the history of the society,

a number of young men, including William

M. Salter and Walter L. Sheldon, were at¬

tracted to it, and, after a period of apprentice¬ ship in New York, went forth to found societies in Chicago, Philadelphia and Saint Louis, and across the seas to London. To these have been added organizations in Brooklyn, Newark, the Bronx and Wilmington, Del., the heads and lecturers of these being in New York, Dr. Felix Adler, Dr. John Lovejoy Elliott, Dr. David Saulle Muzzey and Mr. Alfred Martin; in Philadelphia, Mr. E. Burns Weston; in Saint Louis, Mr. Percival Chubb; in Chicago, Mr. Horace J. Bridges; in Brook¬ lyn, Dr. Henry Neumann; in Newark Mr. George E. O'Dell. These American societies, while loosely federated in a union, maintain an individuality of their own, and have developed different forms of activity according to local needs and circumstances. Local settlement work was done in Saint Louis as early as 1889, when <(Wage Earners' Self Culture Clubs® were established in four sections of the city. They all hold Sunday exercises, which consist for the most part of music, readings and an ad¬ dress. All admit to membership on a simple declaration of devotion to the ethical ends. All attach great importance to the moral and reli¬ gious education of the young, and maintain well-organized Sunday schools and associations and clubs of young men and young women devoted to the same end and to various kinds of practical work. From the pub¬ lishing and literary headquarters of the Ethi¬ cal

Union in New York is issued monthly, The Standard, the organ of the movement. Among the literary products of the American societies are Professor Adler's (The Religion of Duty, (Moral Instruction of Children) and (Life and Destiny, } etc. Mr. Salter's (Ethical Religion* ; Mr. Sheldon's (An Ethical Move¬ ment ; (An Ethical Sunday School*; (01d Testament Bible Stories as a Basis for Ethical Instruction of the Young,) etc., several volumes by Mr. Martin and others.*

That the movement initiated in America ex¬ pressed no merely local phase of religious de¬ velopment is evident by its still more rapid spread in Europe. American influences led to the establishment in 1886 of the London Ethical Society with which Professors Muirhead, Bosanquet, Bonar and others, upon whom the ethical influence of Thomas Hill Green of Oxford had been profound, were identified; and under its auspices lectures were given at Toynbee Hall and elsewhere by many men at the universities and in public life who felt the importance of the new ethical propaganda, such as Seeley, Caird, Leslie Stephen, etc. About the same time Dr. Stanton Coit went over from New York to assume (vice Mr. Moncure D. Conway) the leadership of the congregation at South Place Chapel, then renamed the South Place Ethical Society, which, after a brief pastorate, he resigned to push the ethical cause in other ways.

Under his leadership ethical societies multi¬ plied rapidly in London and in the provinces. A union of ethical societies (14 or more), and a moral instruction league (to introduce systematic non-theological, moral instruction into all schools), since become a separate or¬ ganization, were established. There has also been a considerable output of literature. Special mention should be made of the valu-

able series of books of ethical instruction by Mr. F. J. Gould.

The new movement was finding, meanwhile, favorable soil on the Continent. A centre of activity was established at Berlin, where Pro¬ fessor Gizycki, Prof. William Foerster, and others identified themselves with the cause. Other societies were in time established in Germany, and in Austria at Vienna, in Italy at Venice and Rome, in Switzerland and Zurich and Lausanne ; and in France through the Union pour L'Action Morale (1891) which found spokesmen in M. Emil Desjardins (notably in his stirring brochure (Le Devoir Present), and in other well-known writers. In Germany the movement languished until only a small group in Berlin under the courageous leadership of Professor Foerster became the only*

noteworthy survivor.

The early activity of these European centres led to the establishment of an international or¬ ganization with a central station at Zurich where in September 1896 an International Con¬ gress was held which issued a representative manifesto. It is largely colored by a continental sense of the urgency of applying ethical prin¬ ciples in the domain of social and political affairs. It announced its sympathy with the efforts of the populace to obtain a more human existence ; but recognized as an evil hardly less serious than the material need of the poor, the moral need which exists among the wealthy, whose integrity is often deeply imperiled by the discords in which the defects of the present industrial system involve them. It demanded that the social conflict should be carried on within the lines prescribed by morality, in the interest of society as a whole, and with a view to the final establishment of social peace. It declared for universal peace, and against mili¬ tarism and the national egotism and jealously which precipitate war. Finally, it urged upon all ethical societies not simply to concern them¬ selves with these practical issues, but to devote their utmost energy to the building up of a new ideal of life in harmony with the demands of modern enlightenment. This first international manifesto is still significant because it expresses the almost universal interest of ethicists in the social question, and their desire to bring theories, policies and measures of reform to the test of ethical principle; it expresses also their interest in promoting peace and an educa¬ tion animated and unified by an ethical pur¬ pose. It does not, however, lay the stress which would to-day be laid upon the relation of the movement to modern liberalism, its frank acceptance of the spirit and results of modern science, and its repudiation of the supernatural, miraculous and priestly elements in religion; nor does it voice the deeper religious serious¬ ness and spirituality of the movement. By some of the leaders this latter is very strongly emphasized ; and some of the ethical societies are primarily churches for inspiration and guidance in the difficult effort to lead the good life. What effect the Great War will have on the international movement it is impossible to predict. So far it has crippled or handicapped the smaller societies. In England there has been a brave struggle to maintain them. Per¬ haps after the war their great opportunity will

come. In America they continue to move for¬ ward.

While the inception of the ethical movement was due to the insight and prevision of Felix Adler, and its first powerful impact due to his attractive eloquence and personal power, its slow but steady growth is evidence that it met a deep and widespread need. It was fitly born on American soil ; for a new ethical religion .and ethical church for America had been defi¬ nitely prophesied and sketched by Emerson in his latter essays on (Worship) and

(The Sov¬ ereignty of Ethics.) He had said: ((The prog¬ ress of religion is steadily to its identity with morals. ... It accuses us that pure ethics is not now formulated and concreted into a cultus, a fraternity with assemblings and holy days, with song and book, with brick and stone. . . . America shall introduce a pure religion. . . . There will be a new church founded on moral science ; at first cold and naked, a babe in a manger again, the algebra and mathematics of ethical law, the church of men to come, without shawms, or psaltery, or sackbut; but it will have heaven and earth for its beams and rafters, science for symbol and illustration ; it will fast enough gather beauty, music, picture, poetry.® The development of ad¬ vanced Unitarianism through Channing and Parker had been in this direction. It had two practical outcomes — the Free Religious Asso¬ ciation, which still holds annual sessions ; and the Ethical Movement. As distinguished from the Free Religious Association, which ex¬ pressed vaguely the libertarian tendencies of Emerson's thought, the Ethical Move¬ ment gave effect to the positive and con¬ structive tendency which found clear utterance in his prophecy. Although this positive spirit was present in the religious society conducted in New York by Octavius B. Frothingham — who was wont to say, after he had retired and it had disbanded, that its legiti¬ mate successor was the Society for Ethical Culture — it was not until Felix Adler brought to the new movement at once an ethical out¬ look and philosophy learned chiefly in the school of Kant, an impassioned Hebraic sense of religion as righteousness of life, and a prac¬ tical sense of the urgency and ethical import of the great impending moral issues in the social, industrial and political world, that con¬ ditions existed for the full birth of the new ethical religion.

The most distinctive feature of this new phase of religious development was that it did not propose to add to the religions of the past, in the way in which these had multiplied, namely, on the basis of differences of specula¬ tive belief. Instead, it announced the basic im¬ portance and the priority of the ethical factor in -religion. It approached religion, not from the credal, but from the practical moral stand¬ point ; and it saw, in a common affirmation of this priority and supremacy of virtue and the good life, a ground of union for people of vary¬ ing philosophical convictions, or none. Following Emerson, it asserted that character and conduct condition creed and thought ; and that it is only by sowing a worthy character that men can reap a vital and meaningful creed. It contended that no certain and lasting basis of union can be found in anything so variable and personal

as one's philosophical view of the world ; and that no one should pledge his

intellectual future by subscribing to-day to a creed which to¬ morrow he may outgrow. What a man thinks is the result of what he is — the outcome, there¬ fore, of his action, his experience, his effort and his love, far more than it is the outcome of his deliberate thought and accumulated knowl¬ edge. This position differed from that of the Comtian Positivists because theirs assumed a final, definite, and in some respects, very nega¬ tive philosophy. The new movement allowed for the greatest individual differences in men's philosophical interpretation of life, save in the one tenet that all must acknowledge the sacred obligation imposed by man's moral nature to live the good life and to follow without swerv¬ ing the dictates of duty according to the best light that is in each.

On the basis of this moral earnestness and this attitude of moral resolve men may safely and hopefully work backward into a philosophy and forward into a faith. Their philosophy and their theory of moral sanction may be what it will, theistic or pantheistic, materialistic or ideal¬ istic; it may or may not issue in a faith in immortality, conditional or absolute. This is a personal concern, and the statements on such matters frequently made by the leaders of ethical societies who differ much in their philosophies, are merely expressions of personal conviction, and not made as in any way com¬ mitting the societies. This is to make a clear distinction between the private and the public factors of religious belief ; and to find as the only possible basis for religious union, for those who would jealously guard their intel¬ lectual integrity, a moral aim by which any man should be ashamed not to be bound.

The ethical movement has been criticized as lacking in imaginative color and appeal, and therefore unlikely to spread among the masses of the people. Perhaps Emerson was right in emphasizing the austerities of the new religion in its early protestant phases. But at heart it is genial and passionately human. It has noth¬ ing sensationally novel to offer; it does not compete with picturesque claimants like Theos¬ ophy, Christian Science, Vedantism, etc., and it may be a fact that ((plain goodness,® <(mere morality,® <(the beauty of holiness,® will not yet draw many with their old-new evangel. And yet one finds among its adherents nothing less than a new type of the religious tertiperament, voicing a new imaginative sense of the hidden mysteries and wonders of the moral personality, the new unrevealed heights and depths of the moral life, the unrealized joyousness of devo¬ tion to duty and to service.

Percival Chubb,

Leader of the Ethical Society of Saint Louis.

ETHICS (from Gr. vdindˆ having to do with conduct, from vQotc ,

character, lengthened form of £0o

nomics; but it is marked off from such sciences in that it considers the common subject matter of human conduct from the standpoint of right¬ ness and wrongness. Such terms as good and evil, the dutiful or obligatory, might be used in the definition as substitutes for the terms <(right® and ((wrong,® but good and evil are somewhat too wide in scope, including, for instance, eco¬ nomic utilities, commodities and satisfactions; while duty is somewhat too narrow an idea, emphasizing the notion of control at the ex¬ pense of the idea of the good and desirable. ftRight® and ((wrong® designate exactly those phases of good and evil to which the idea of the obligatory is also applicable. The terms moral philosophy, moral science, and morals have also been used to designate the same sub¬ ject of inquiry.

In its historical development, ethics has been regarded as a branch of philosophy, as a science, and as an art — often as a composite of two or all of these in varying proportions. As a branch of philosophy, it is the business of ethics to investigate the nature and reality of certain conceptions in connection with fundamental theories of the universe. It is the theory of reality in its moral aspect. The term good is taken to denote or describe a property of ulti¬ mate and absolute being. As such, it is usually co-ordinated with two other fundamental prop¬ erties of reality, the true and the beautiful; and the three philosophic disciplines are defined as ethics, logic and aesthetics. Even when so much emphasis is not thrown upon the place of the good in the general scheme of the universe, ethics may still be regarded as a branch of philosophy, because concerned with the ideal, with what ought to be, or with what is abso¬ lutely desirable, as distinct from the actual, the existent, the phenomenal. From this point of view, ethics is regarded as normative in char¬ acter, that is, concerned with establishing and justifying certain ultimate norms, standards and rules of action.

In contrast with such functions, ethics as a science is concerned with collecting, describ¬ ing, explaining and classifying the facts of experience in which judgments of right and wrong are actually embodied or to which they apply. It is subdivided into social, or socio¬ logical, ethics, and individual, or psychological, ethics, (a) The former deals with the habits, practices, ideas, beliefs, expectations, institu¬ tions, etc., actually found in history or in con¬ temporary life, in different races, peoples, grades of culture, etc., which are outgrowths of judgments of the moral worth of actions or which operate as causes in developing such judgments. Up to the present, social ethics has been developed mainly in connection, (1) with discussion of the evolution of morality, either by itself or in connection with institutions of law and judicial procedure, or of religious cult and rite; or (2) with problems of contemporary social life, particularly with questions

of philan¬ thropy, penology, legislation, regarding divorce, the family and industrial reform — such as child-labor, etc. In both aspects it is closely connected with the science of sociology. It is sometimes called inductive, or in its second as¬ pect, applied ethics. (b) Psychological ethics is concerned with tracing in the individual the origin and growth of the moral consciousness,

that is, of judgments of right and wrong, feel¬ ings of obligation, emotions of remorse, shame, of desire for approbation; of the various habits of action which are in accord with the judg¬ ment of right, or the virtues; with the possi¬ bility and nature, from the standpoint of the psychical structure of the individual, of free, or voluntary, action. It gathers and organizes psychological data bearing upon the nature of intention and motive ; desire, effort and choice ; judgments of approbation and disapprobation; emotions of sympathy, pity in relation to the impulse of self-preservation and the formation and reformation of habit in its effect upon character, etc. In other words, it treats be¬ havior as an expression of certain psychical elements and groupings, or associations : psy¬ chological analysis.*

Ethics as an art is concerned with discover¬ ing and formulating rules of acting in accord¬ ance with which men may attain their end. These rules may be considered as of the nature either of injunctions or commands, which pre¬ scribe as well as instruct ; or as technical formulae which indicate to the individual the best way of proceeding toward a desired result, thus not different in kind from rules of paint¬ ing, or of carpentry. Which view is taken depends usually upon the kind of philosophy with which ethics as an art is associated. Ethics as an art may also be an outgrowth of either a general philosophy of conduct, or of a scien¬ tific analysis of it. Thus, from the philosophic point of view, a recent writer, Sorley, in the Dictionary of Philosophy and Psychology (Vol. I, p. 346, 1902), says of ethics: <(It has to do not merely with actual conduct, but with right or good conduct, and accordingly with an ideal from which rules may be laid down for actual conduct.® It is clear that the philosophical establishment of the ideal is considered to terminate in rules for its attainment. On the other hand, Jeremy Bentham in his Principles of Legislation (1789), having before insisted that ethics is a science whose truths are to be discovered ((only by investigations as severe as mathematical ones, and beyond all comparison more intricate and extensive,® goes on to define ethics <(as the art of directing men's actions to the production of the greatest possible quantity of happiness,® and says*

it is the business of private ethics C(to instruct each individual in what manner to govern his own conduct in the details of life.® Thus as an art ethics may be grounded upon either a philosophy or a science.

As may readily be inferred from the above account, some of the most serious problems of ethics at present are concerned with defining and delimiting its own scope, basis and aims. From a purely abstract point of view, all three conceptions can exist harmoniously side by side. It is possible theoretically to regard certain topics as assigned to ethics as a branch of philosophy, others to its scientific phase, and others to the practical, or to ethics as an art. But no consensus as to these various possible assignments exists. Usually those who insist that ethics is a branch of philosophy deny that it can be anything else; they deny that any descriptive and explanatory account of actual, as distinct from ideal, conduct, deserves the i.ame of ethics. What we have above treated as belonging to the science of ethics is by them

treated as really a matter of history, sociology and psychology, not of ethics proper at all. Thus Green, Prolegomena to Ethics (1883), begins by attempting to prove that a natural science of ethics is inherently impossible, be¬ cause moral conduct by its nature implies an ideal that transcends actual conduct which alone can be made a matter of observation and experiment, and sets up an obligation which in its absoluteness transcends all the sanctions of experience. On the other hand, those who have occupied themselves with the scientific analysis of moral behavior and character, have usually denied the legitimacy of the philosophic aspect. Thus Bentham expressly regards all philosophi¬ cal inquiries as doomed to result in sterility, in mere dogmatic personal assertions, or, as he calls them, C(ipse dixit s? A more recent writer, Leslie Stephen, (Science of Ethics* (1882), without absolutely denying the possibility in the remote future of a metaphysics of conduct, says that the metaphysical view is entirely ir¬ relevant to a scientific treatment. Along with this uncertainty as to the defining aim and characteristic methods of ethics, are naturally found a large number of subordinate and secondary controversies and divisions of opinion.*

As a matter of fact, however, in every his¬ torical period there have been found in ethical theories some connection with general philo¬ sophic thought, and with the data of behavior exhibited in experience (or the scientific aspect) and with the further direction and conduct of life — the practical aspect. Historically, ethics has passed through three epochs: (1) the Graeco-Roman ; (2) the Patristic-Mediaeval ; (3) the Early Modern; terminating with say the French Revolution, and may now be re¬ garded as having entered upon a fourth stage. In each period, a certain practical interest is uppermost in social life and this interest serves to concentrate

and direct attention toward certain relevant theoretic problems. An ade¬ quate account of ethical thought accordingly is possible only in connection with the larger civilization and culture of which it is a part. Brief characterizations of the main problem of each epoch in its wider social tendencies will serve, however, to point out (a) the philosophic, (b) the scientific, (c) the practical centre of ethics in each period.

The Grseco-Roman period was characterized by the disintegration of local custom, tradition and institution, civil and religious, coincident with the spread of cosmopolitan learning and the formation of an inclusive political organization taking effect in both legislation and administra¬ tion — Greek culture and the Roman empire. With the disintegration of the habits and modes of life which had previously defined the sphere of legitimate individual satisfaction, and which supplied the sanctions of the moral life, there was necessarily coincident an inquiry which attempted to establish through reflection ade¬ quate substitutes for the waning institutional modes of control. One of the results of modern historical science is the proof of the extent and stringency of the force of custom in early life. It is custom which defines the morally right and obligatory, and it is custom which enforces its own demands. In it are bound together morals, law and religion, and all are bound into the very life of the people, emotional and intellectual,

as well as practical. Where custom rules, moral theory is unnecessary and indeed impossible. In the 6th and 5th centuries before Christ, this regime of custom was irretrievably shaken in the Greek world, and with a twofold result upon morals. Many thought that all sanctions for morality had disappeared, or at least lost validity, and that pure individualism in thought and conduct — tempered at best only by some judicious regard to consequences- — was the proper outcome. Others, prevented by what they regarded as the low moral standards of customary morality from coming to its defense, were also shocked by the demoralization attend¬ ant upon ethical individualism, and set to work to discover a universal and unassailable basis for a higher type of ideal morality. In this conflict, ethical theory was born.

The Graeco-Roman Period (6th century b.c. to 5th century a.d.) — The controversy origi¬ nated in a discussion as to whether morality ex¬ ists by convention by arbitrary enact¬

ment (dicet), or in reality, that is (in the ter¬ minology of the time), (vcret) or in the nature of things. Some of the Sophists taught that morality

was a creature of the efforts of the rulers of a community, being a device on their part to keep others in subjection for the better indulgence of their own desires — much as many of the ˆfree-thinkers® of the 18th century (in many respects the modern con¬ geners of the Sophists) taught that religion was an invention of state-craft and priest-craft. Others taught that it was a product of social agreement or institution. Some of the nobler Sophists (like Protagoras, see the Platonic dialogue of the same name) interpreted this as praise of the state of civilization and culture as against the raw, crude state of nature, while others taught that it was merely a conventional means to personal satisfaction, and hence had no binding force when short-cuts to happiness were available. In the meantime the actual moral discipline of the Greek city-state was much relaxed, partly because of the intermi¬ nable dissensions of party strife, and partly be¬ cause the religious beliefs which were the foun¬ dation of civic life were fast becoming incredi¬ ble. Socrates (about 470 B.C.399 b.c.) was ap¬ parently the first to undertake a positive and constructive analysis of moral ideas. He made the following contributions: (1) All things have to be considered with reference to their end, which indeed constitutes their real "nature® ; the end of each thing is its good. Man must therefore have his own end, or good ; this is real and inherent, not conventional nor the product of law. (2) To know is to grasp the essential, real being of a thing — its "nature,® or end ; "know thyself® is the essence of morality; it means that man must base his activity upon comprehension of the true end of his own being. All evil is really involuntary, based on ignorance or misconception of man's true good. To be ignorant of the good is the one disgrace. If a man does not know it- — and Socrates professed that he did not — he can at least devote himself seriously to inquiring, to the effort to learn. If not wise (a sophist) he can at least be a lover of wisdom (a philoso¬ pher). And until he attains knowledge, the in¬ dividual will be loyal to the responsibilities of his own civic life.

'The two conceptions of the good as some¬

how the fulfilment of man's true nature or reality, and as attainable only under conditions of rational insight are the bases of all later Greek thought. Opinions differed to what man's end is, and as to the character of true knowl¬ edge of it. The extreme division was between the Cynic school, the forerunner of the Stoics, founded by Antisthenes (about 444 B.C.-369 b.c.) , and the Cyrenaic (the precursor of Epi¬ cureanism, founded by Aristippus (about 435 b.c-360 b.c.). The former taught that virtue, manifested in temperance or self-control, is the one and only good, pleasure as an end being evil, and that it is known by pure reason. The latter taught that pleasure, known only in feel¬ ing (the sensation of a gentle and continuous change) is the good. The wise man of Socrates is he who knows this moderate and enduring pleasure and is not captured by sudden and

vio¬ lent passion. Both schools take a somewhat antagonistic attitude toward the state ; the Cynic emphasizing the superiority of the sage to gov¬ ernment and authority, well illustrated in the anecdotes of Diogenes and Alexander the Great ; the Cyrenaic holding that the pleasures of friendship and social companionship of the congenial are superior to those of partici¬ pation in public life. These schools thus set two of the fundamental problems of subsequent ethical theory, namely, the nature of the good, and the nature of knowledge of it ; and supplied the framework of later schools of thought. Those who hold that pleasure is the good are termed Hedonists (Gr. ydovrj, pleasure) ; those who held to its residence in the virtuous will Perfectionists, or (with certain qualifications added) Rigorists. Those who hold that it is known through reason are Intuitionalists, the other school, Sensationalists or Empiricists.

Plato (q.v.) (about 427 b.c-347 b.c.) at¬ tempted a synthesis of the conceptions of the two schools just referred to, with a constructive program of social, political and educational reform, and with a reinterpretation of earlier philosophic theories of the universe and of knowledge. His most characteristic doctrines are (1) the generalization of the Socratic con¬ ception of the good as constituting the true essence or nature of man. Under the influence of philosophic concepts derived from a variety of sources, Plato conceived man as essentially a microcosm ; as the universe in miniature. He is composed of a certain arrangement of the elements of reality itself ; hence he can be truly known only as the real nature of the universal reality which constitutes him is known ; his good is ultimately one with the final cause or good of the universe. Thus Plato goes even farther than Socrates in asserting that morality is by nature — it is by the nature not only of man but of absolute reality itself, which is thus given an ethical or spiritual interpretation. Thus he grounded ethics on general philosophic concep¬ tions and has been the model for all since who have distinctly conceived ethics to be a branch of philosophy. Moreover, since he regards the ultimate good of the universe as one with God and as the animating purpose in the creation of physical nature, he brings ethics into connection with religion, and with man's relations to the world about him. (2) Plato regarded the state in its true or ideal form as the best embodiment or expression of the essential nature of indi¬ vidual man ; as indeed more truly man than any

one individual. In its true organization, it reflects or images the constitution of the ultimate good. Thus Plato brings ethics back into con¬ nection with politics as the theory of ideal social organization. Practically, he delineates

this state in outline (especially in his Republic, and, with greater attention to feasible detail in his Laws), and proposes in view of this ideal a specific reform of the existing order, instead of disregard of it as with Cynic and Cyrenaic. (3) He sets forth a scheme of the good as realizable in human nature, which endeavors to combine the one-sided extremes of mere pleas¬ ure and mere virtue. Pie conceives the good to be the fulfilment of all capacities, facul¬ ties or functions of human nature, the fulfil¬ ment of each power being accompanied with its own appropriate pleasure, and all being ordered and bound together in a harmonious whole by a law of measure or proportion which assigns to each its proper place ; at the head, the pleas¬ ure of pure knowledge ; at the bottom, the appetites ; between, the pleasures of the nobler senses (sight and hearing), and of the higher impulses — ambition, honor, etc. The right func¬ tioning of each is virtue ; its product is pleasure. The system of pleasures according to virtue is the good. Moreover, he specifies four cardinal virtues which result — wisdom, the knowledge of the good or organized whole; justice, the law of proportion or measure; courage, the asser¬ tion of the higher tendencies against the pleas¬ ures and pains arising from the contemplation or imagination of the lower; temperance, the law of subordination in accordance with which each lower function is restrained from usurping the place of the higher. Plato's system of ethics remains the standard of ethical theories of the ˆself-realization® type.

Aristotle (q.v.) (384 B.C.-322 b.c.) gave the philosophic consideration of Plato a more scientific and empirical turn — a contrast, how¬ ever, which is often exaggerated. He protested against the identification by Plato of human end or good with that of the universe, and conse¬ quently attached less importance to knowledge in the form of philosophic insight, and more to practical insight or wisdom. But, in the main assuming the Platonic basis, he carried into detail the analysis of human faculties or func¬ tions involved in conduct, giving a careful analysis of desire, pleasure and pain, of the various modes of knowledge, of voluntary action and making a remarkable analysis of the various forms of virtue and vice actually cur¬ rent. In a word he emphasized in detail psycho¬ logical and social aspects, merely sketched by Plato. On the social side, it had become obvious that the comprehensive scheme of reform enter¬ tained by Plato was impossible ; and here, also Aristotle is free to undertake a more empirical description and analysis of various forms of government and organization in their moral bases and bearings. When in the 12th and 13th centuries a.d. the works of Aristotle were again made known to the European world, first through translations from the Arabic and then from the Greek, Aristotle's ethics became em¬ bodied in the official philosophy of the Roman Catholic Church, especially in the writings of Saint Thomas Aquinas (1225—74) , and found literary expression in the Divine Comedy of Dante. His ethical

writings have more pro¬ foundly affected common speech and thought

than those of any other writer, and to a large extent have become a part of the moral com¬ mon-sense of civilized humanity.

The details of later ethical philosophy in Greece and Rome form an interesting part of the history of ethics, but, with one exception, supply no new idea of sufficient importance to need mention here. The exception is the Stoic conception of virtue as ((living in accordance with nature,® and the conception of the (

Patristic Mediaeval Period (5th to 1 5th cen¬ turies a.d.) — The second period of ethical his¬ tory is characterized by the subordination of ethics, as a branch of philosophy, to theology. The distinctive features contributed in this period to subsequent ethics are the emphasis laid upon ideas of law, authority, obligation or duty, and merit or demerit, namely, the good as religious salvation involving a knowledge and love of God as supreme perfection, possible only in the next world; and evil as sin, guilt also needing supernatural expiation. Because of the emphasis upon law and authority, moral ideas are largely assimilated to forensic and ju¬ ridical conceptions. Most significant, however, for ethical theory is the transfer of theoretical interest from the conception of the good, the central idea of ancient ethics, to that of obliga¬ tion. Not the natural end of man, but the duty of absolute submission of will to transcendent moral authority was the keynote. And even when ethics was freed from subservience to theology, it still remained easier for the modern mind to conceive of morality in terms of the nature and authority of duty than as the process of realizing the good. On the more concrete, empirical side, the great contribution of me¬ diaeval theory was in depicting the moral drama, the struggle of good and evil,, as it goes on in the individual soul. The fact that this was fraught with significance for an endless future life made it a subject of anxious and minute attention; and here, too, even when the moral region was later marked off more or less definitely from the religious, modern thought owes its consciousness of the subtle perplexities, temptations and shades of moral effort and issue to mediaeval rather than to ancient ethics.

Early Modern Period (The Reformation to the French Revolution). — The complexity and variety of moral theory and inquiry since the 15th century, as well as its relative nearness, make it difficult to secure the perspective neces¬ sary to its proper characterization. It is all

more or less connected, however, with the strug¬ gle toward greater individual freedom, and with the problem of maintaining a stable associated and institutional life, on the basis of recog¬ nition of individuality — the democratic move¬ ment. In its earliest period, modern ethics was largely characterized by reaction against scho¬ lasticism ; it was an effort to secure a basis for ethics free from subordination to theology and to mediaeval philosophy, and the schoolmen's versions of Aristotle. Moreover so much of energy was expended in the practical effort to get freedom of thought, of political action, of religious creed, of commercial life, that moral theory turned largely upon detailed questions arising out of the practical struggle. This ac¬ counts to a considerable extent for the scat¬ tered, fragmentary condition of modern ethics as compared with the systematic character of either Greek or mediaeval thought. Moreover, the very gaining of intellectual freedom of in¬ quiry opened up countless fields of interest. Ethical problems sprang into existence at every turn ; every new movement in industry, in poli¬ tics, national and international, and in art, brought with it a new ethical problem. Social life was itself undergoing such rapid change and in such tentative, uncertain ways, that each of these problems had to be attacked independ¬ ently. The result is a critical controversial and individualistic, rather than a constructive and systematized ethics — with the advantage, how¬ ever, of remarkable richness in detail.

Continental ethics followed the prevailing philosophic method of rationalism ; the attempt to build up a theory of conduct, individual and social, on the basis of pure reason, independent of revelation of ecclesiastic authority, or positive institutions. While the method was a priori in name, as matter of fact it drew largely upon the inheritance of generalized Roman law, at¬ tempting to harmonize and purify it in accord¬ ance with ideals of unity and comprehensiveness which were supposed to represent the demands of reason. Grotius (1583-1645) was the founder of this movement, and, in his De Jure Belli et Pads, used the idea of law which is founded upon man's rational nature, which in turn is inherently social, to place international relations of comity, commerce and war upon a more hu¬ mane and enlightened basis. His German suc¬ cessors, Puffendorf (1632-94), Leibnitz (1646- 1716), Thomasius (1655-1728), Wolff (1679- 1754), carried on with greater critical acumen and more adequate philosophic instruments, the same work, and finally developed a complete system of rights and duties (called Naturrecht after Jus Naturale) applicable to all spheres of private, domestic, civil, political and interna¬ tional life — a code of morals, positive in effect, but supposed all to be drawn deductively from rational first principles. Upon the whole, the influence of German ethical rationalism was conservative; the result in fundamentals was the justification of the existing social order, purged of

inconsistencies and reformed of abuses in detail. French rationalism took a different turn. It attempted a synthesis of the more basal notions of the newly arisen physical science with psychological ideas borrowed from Locke and his English successors. It was rationalistic not so much in attempting to deduce an ethical system from the conceptions of reason, as in subjecting the existing order of belief and insti¬

tutions to unsparing criticism as anti-scientific. In its extreme forms it seemed to demand an abrogation of existing institutions, the erection of the same tabula rasa in social matters, that Descartes had postulated in intellectual, and a creation de novo, by sheer voluntary action, of a new social order, aiming at universal happi¬ ness. Reason gives an ideal of society in which all men shall be free and equal, and in which economic want and misery shall be abolished, and a widely diffused intelligence and wealth shall be instituted. Pessimistic to the extreme as regards the existing order, it was equally optimistic as to the possibilities of social or¬ ganization, culminating in the conception of the infinitely progressive perfectibility of human nature; thus Helvetius, 1715-71 (De l'esprit, 1758; De l'Homme published 1773); Diderot (1713-84); Condillac (1715-80); D'Holbach (1723-89), especially (Systeme Social > (1773) ; Condorcet (1743-94). While German ethics had emphasized the conception of natural law which is social in nature, French thought culminated in a deification of natural rights which are individual in their import and loca¬ tion. Certain characteristic features of not only the French Revolution but of the thought of American publicists in the latter half of the 18th century are directly traceable to this influence.

English ethical theory received its impetus from Hobbes (1588-1679). He begins with an analysis of the make-up of the individual, and resolves the latter into a bundle of egotistic im¬ pulses, all aiming at unrestricted satisfaction. He denies the existence of any inherent social tendency, or of anything ˆrational® in the in¬ dividual save as deliberation may be involved in the individual's efforts after satisfaction. The social counterpart of this unlimited individualism is chaos, anarchy, conflict — the war of all against all. Hence the individual's quest for happiness is self-contradictory. It is possible of fruition only within the state of absolute power which prescribes to each individual the proper sphere of the exercise of his powers. The state is thus the author and sanction of all moral distinctions and obligations. The au¬ thority of this state with respect to individuals is absolute ; since the source of moral law, it cannot be subject to anything beyond itself. There are thus three strains in Hobbes' teaching. The psychological, which teaches pure egotism and hedonism ; the ethical, which makes the state the source of moral values and relations ; the political, which makes its authority un¬ limited. Each strain evoked profound and in¬ stant reaction. John Locke (1632-1704) taught that the

individual has a natural right to a life of personal security, possession of property and social activity, subject only to limits of the similar rights of others, and that the state comes into existence to protect and secure these rights by settling cases of dispute or aggression, and hence is null and void when it goes beyond this province and encroaches upon individual rights. A succession of writers, notablv Staftes- bury (1671-1713) ; Hutcheson (1694-1747) ; But¬ ler (1692-1752)); Adam Smith (1723-90), un¬ dertook a re-analysis of human nature, and endeavored to justify the presence of disin¬ terested benevolent impulses, of tendencies to regard the welfare of others. Cudworth (1617— 88) ; More (1614-87) ; Cumberland (1632-

1718); Clarke (1675-1729); Price (1723-91) took up the question of the origin of moral dis¬ tinctions, and tried to show that they were based not in the state but in immutable laws of reason, or upon a science as abstract and certain as mathematics ; or else were made known in ini¬ tiation, etc. But during these inquiries, new problems came to light, and led to a rearrange¬ ment of forces. These problems were (1) the relation of happiness — the expression of the self-seeking tendencies of man — to virtue, the expression of his benevolent tendencies ; (2) the nature of the test or standard of right and wrong; (3) the nature of moral knowledge. The first problem led in Butler to the attempt to introduce ˆconscience® as a third and bal¬ ancing authoritative factor in human nature ; and in Smith and Hume (1711-76) to a peculiarly rich and significant theory of sym¬ pathy as a central principle through which dis¬ tinctively moral sentiments are generated and whose exercise is intimately bound up with individual happiness. The second and third problems taken together lead to the conflict of utilitarianism and intuitionalism, the former holding that conduciveness to the maximum of possible happiness is the standard of right, the basis of obligation, and the source of all moral rules ; this conduciveness to be determined by actual experience ; the latter holding that there are moral values, which are inherently and absolutely such, without reference to conse¬ quences. Each school has a theological and a non-theological variety. Among theological utilitarians are prominent: Gay (1686-1761), and Paley (1743-1805) ; among the non-theological Jeremy Bentham (1748-1842) outranks all the others. Without adding much that is funda¬ mentally new to the theoretical analysis, he makes an analysis of happiness in connection with a discussion of the various impulses (or motived as he termed them) of human nature the basis of a thorough-going scheme of judi¬ cial and penal reform. Through him utili¬ tarianism became the most potent instrument of the first half of the 19th century of

social reform; conduciveness to general and equally distributed happiness being the test by which all customs, traditions and institutions were tried — and by which most of them in their ex¬ istent forms were condemned.

Recent Modern. (From the French Revolu¬ tion.) — The last 20 years of the 18th century signalize a turning point in the history of thought. Bentham's and Kant's chief works are dated in this period. The French Revolution, carrying into effect the naturalistic rationalism and its optimistic faith in the possibilities of the individual, compelled a reconsideration of the intellectual premises from which it set forth. The problem of 19th century ethics was to get back from the individual to the social whole which includes him and within which he func¬ tions; but to do this in a way which should take due account of the deepened significance given to individual initiative and freedom — without, that is, a return to pure institutional¬ ism, or to arbitrary external authority. The following schools or main tendencies are easily distinguishable :

(a) English Liberalism. — In Bentham, utili¬ tarianism, as we have seen, became a program of social reform. The attempt to stretch an in¬ dividualistic hedonism which taught that the vol. 10 — 35

end of desire is always the agent's own pleasure into a theory which taught that the individual should always judge his motives and acts from the standpoint of their bearing upon the happi¬ ness of all beings, brought out all the weaknesses of the theory. James Mill (q.v.) (1773-1836) strove valiantly to overcome these weaknesses by a systematic use of the principle of associa¬ tion, in virtue of which individual states be¬ come indissolubly connected, through punish¬ ment or commerce, with the welfare of others

— the theory of <(enlightened selfishness,® for which Hartley (1705-57) had previously pro¬ vided the psychological machinery. His son, John Stuart Mill (1806-73) while extending the same idea, introduced into utilitarianism two innovations, which were seized upon by his intuitional opponents as virtual abandonments of the entire hedonistic position. These were that quality of pleasure is more important than quantity and that the individual is naturally social and so instinctively judges his own wel¬ fare from the standpoint of society, instead of vice versa. J. S. Mill also severely criticised the other utilitarians for their neglect of the ideal elements in education, and for neglect of the culture element in historical development. With¬ out abandoning the individualistic basis he was much influenced by schools (b) and (c) below. From (b) came the influence of Coleridge (1772-1834) ; Maurice (1805-72), and Sterling (1806-43). Bain (1818-1903) belongs to the same empirical and utilitarian school. Sidgwick (1838-1900) in his (Methods of Ethics at¬ tempted a fusion of the utilitarian standard with an intuitional basis and method.*

(b) German rationalism culminated in Kant (1724-1804), who reduced the function of moral reason in man- to a single principle ; the consciousness of the moral law as the sole and sufficing principle of action. Since the claims of this principle are opposed by those of self-love

— the desire for personal happiness — the pres¬ ence of moral reason in us takes the form of a ((categorical imperative,® or the demand that duty alone, without any influence from inclina¬ tion, desire or affection, be the motive of con¬ duct. Upon the consciousness of duty are built the ideas of freedom, God and immortality — that is, by moral action is opened to us a sphere of reasonable faith in transcendental realities which are shut to scientific and philosophic cognition. Kant brought rationalism to a turn much as Bentham had affected empiricism. Sub¬ sequent German thought attempted to overcome the formalism of Kant's bare reason, making it¬ self known only in a consciousness of obligation. Hegel (1770-1831) attempted a synthesis of the Kantian idealism with the ideas of Schiller, of Spinoza (especially through the medium of Goethe), and of the rising historical school founded by Savigny. He endeavored to show that the social order is itself an objective em¬ bodiment of will and reason, and that the regions of civil law, of family life, social and commercial intercourse and above all the state, constitute an ethical world (as real as the physi¬ cal) from which the individual must take his cue. He anticipated in many particulars from the standpoint of a different method and termin¬ ology, doctrines of recent anthropology and social psychology. German moral influence has been felt in English thought chiefly through Coleridge, Carlyle (who was mainly affected by

Kant's successor, Fichte, 1762-1814), and more recently, T. H. Green (1836-82). The New England Transcendentalists were also affected by this school of thought, Ralph Waldo Emer¬ son (q.v.) (1803-82) giving a highly original version of it, blending it with factors of his own personality and with ideas drawn from Puritan¬ ism.

(c) In France, the reaction from the indi¬ vidualism of the Revolution was most marked. At the head of the reaction stands Comte (1798-1857), who attempted to build up a theory of ethics upon an organized social basis, similar in many respects to that of Hegel, but relying upon a systematization of sciences rather than upon philosophy, for method, his system ac¬ cordingly being termed positivism. Comte sought to show how such an ethical-social science could replace metaphysics and theol¬ ogy, the latter in the form of a religion of humanity. He influenced G. H. Lewes

and the latter's wife, George Eliot, and also John Stuart Mill.

(d) In the latter half of the 19th century the theory of evolution has been dominant in ethical as well as in other forms of philosophic and scientific thought. Herbert Spencer's appli¬ cation is the best known to English readers. It is, however, generally recognized that his funda¬ mental ethical conceptions were worked out before he became an evolutionist, and that the attachments between his ethics and the theory of evolution are of a somewhat external character. Indeed, it is now clear that the further develop¬ ment of the science of ethics waits upon the more thorough clearing up of the evolutionary ideas themselves, and upon more complete appli¬ cation to biology, psychology and sociology (in¬ cluding anthropology and certain phases of the history of man) in order to supply the auxiliary sciences necessary for ethical science. Through the conception of evolution it is probable that ethics, will #be emancipated from the survival of the idea that it is an art whose business is to lay down. rules. The practical aspect of the theory of ethics will necessarily remain (since it is theory of practice or conduct), but it will take the form of providing methods for analyzing and resolving concrete individual and social situations, rather than of furnishing injunctions and precepts. The coincidence of the evolution¬ ary tendency with the growth of democracy will relieve ethics in its philosophic aspects from its dependence upon fixed values, ideals, stand¬ ards and laws, and constitute ethics more and more a working method for the self-regulation of the individual and of society.

Every period of ethical theory has been associated, as we have seen, with some corre¬ sponding epoch of human development, having its own characteristic problem. Upon the whole, however, ethics has not as yet adequately outgrown the conditions of its origin, and, the supposed necessity they imposed of finding something as fixed and unchanging as custom. Consequently, philosophic inquiry has been de¬ voted to finding the good, the law of duty etc. ; that is, something unchanging, all inclusive. Even the empirical school, in its emphasis upon pleasure, has tried to find something free from conditions of development, something fixed in the sense of being.everywhere and at all times the same single unchanging standard and end. Even Spencer distinguishes present ethical codes

as merely relative, and anticipates a period in which evolution will reach its goal — a period in which an unchanging set of rules shall be uniformly binding. But as ethical writers be¬ come more habituated to evolutionary ideas, they will cease setting up ideals of a Utopian millennium, with only one end and law; and will devote themselves to studying the condi¬ tions and effects of the changing situations in which men actually live.

Consult the works of the authors already men¬ tioned and also Clifford,

W. K., (The Scientific Basis of Morals5 (New York 1884) ; Croce, B., 'Philosophy of the Practical5 (London 1913) ; Dewey and Tufts, (Ethics) (New York 1908) ; Mackenzie, J. S., (Manual of Ethics5 (New York 1901); Mezes, S. E., (Ethics) (London 1901) ; Palmer, G. H., (The Field of Ethics5 (Boston 1901) ; Paulsen, F., (System of Ethics5 (New York 1899) ; Royce, J., (Philosophy of Loyalty5 (New York 1908) ; Sorly, R., (Recent Tendencies in Ethics5 (Edinburgh 1904) ; Stephen, Sir Leslie, 'The Science of Ethics5 (2d ed., New York 1907) ; Thilly, Frank, Untroduction to the Study of Ethics5 (New York 1900) ; Wundt, W. M., (Ethics5 (London

1897-1901).

John Dewey,

Professor of Philosophy, Columbia University.

ETHIOPIA (Gr. aidio, to burn, and o-ip, countenance), the biblical Cush, in ancient geography, the name originally given by the Greeks to the southern parts of the known world. It is divided in the poems of Homer into eastern and western Ethiopia, and this dis¬ tinction is repeated by Herodotus, and by the later Greek and Roman geographers. Homer gives the southern limit of Ethiopia as the northern boundary of the Southern Sea. Some ancient writers give the boundaries of the three Ethiopian kingdoms, Meroe, Aksum and Napata. Eastern Ethiopia appears to have in¬ cluded southern India, whose inhabitants were called Ethiopians from their color. There were also other Asiatic Ethiopians, an equestrian race, of a darker color than their neighbors, who wore crests made of the hides and manes of horses, and are supposed to have been a Mon¬ golian tribe which had wandered into the steppes of Koordistan. The name Ethiopia was more usually and definitely applied to the coun¬ try south of Libya and Egypt, between the Red Sea on the east and the desert of Sahara on the west, and embracing the modern regions of Nubia, Sennaar, Kordofan and Abyssinia. In a still narrower sense, the designation was restricted to the province or kingdom of Meroe, which was also called the civilized Ethiopia. African Ethiopia, which is called in the Bible the land of Cush, embraced, according to Pliny, 45 distinct kingdoms ; yet as neither the Greeks nor Romans ever penetrated beyond Napata, in lat. 19° N., we are indebted for most ac¬ counts of it to Greek imagination. Meroe, be¬ tween the Nile and the Astaboras, formed the most . powerful kingdom, and had a theocratic constitution. The other principal divisions were the Blemmyes, whose aspect was hideous ; the Troglodyte, who lived in caverns; the Macrobii, or long-lived men ; the Ichthyophagi, or fish eaters ; and the Creophagi, Chelonophagi, Elephantophagi, Struthophagi, and Ophiophagi, respectively the eaters of flesh, tortoises, ele-

•phants, ostriches and serpents. Fable placed also in this region the race of pygmies. Some parts of Ethiopia were named from their pro¬ ductions ; as the land of cinnamon, and of myrrh, and the Jews and Phoenicians went thither to obtain aromatics and ivory. The Ethiopian kings seem to have been chosen from among the priests, and the order of succession gave the crown to the nephew of the king, the son of his sister; and in default of an heir, an election was made. The people practised circumcision, and embalmed their dead in a manner similar to that of the Egyptians. They were of an intrepid, impetuous and violent character, and yet are represented as loving and practising justice. Homer makes Jupiter visit them, and sit at their feasts. There were many Ethiopian queens named Candace, one of whom became subject to the Emperor Augus¬ tus. Under the Romans the population of Ethiopia became almost wholly Arabian, and so continued after the introduction of Chris¬ tianity in the 4th century. When the followers of Mohammed overran the entire region some centuries later, the Arabic element gained com¬ plete predominance in it. During the Middle Ages the Christians and clergy of Abyssinia were designated as the Ethiopian Church. See Meroe.

Language and Literature. — Of the differ¬ ent dialects spoken in modern Abyssinia, the Amharic and the Tigre are the most remark¬ able. The former of these shows little affinity with the ancient language of the country, the Geez, or the Ethiopic properly so called, which since the beginning of the 14th century, when a dynastic change made the Amharic the lan¬ guage of the court, has ceased to be the ver¬ nacular, and is used only by people of educa¬ tion and learning, in religious and civil docu¬ ments. This ancient language, which has ite name from the inhabitants calling it lesana geez, that is, language of science, as it is also called language of books, is of Semitic origin, resem¬ bling in roots, structure and grammatical forms, the ancient South Arabian dialect of the Himyarites, which since Mohammed has disappeared from the peninsula. This favors the hypothesis of some historians, who suppose the Ethiopians to have been a colony from Arabia. The alphabet also of the Geez greatly resembles that of the Himyarites, as found in their remaining inscriptions. It consists of 26 consonants and 7 vowels, which are small marks inseparably connected with the former, thus forming a peculiar syllabic mode of writ¬ ing, analogous to the Devanagari and some other Indian alphabets. Few of these letters show a resemblance to the Phoenician alphabet, while 24 of them may be traced in the Arabic. There are no diacritical marks; the single words are separated by two dots ; the accent is difficult; the mode of writing is from left to right, the reverse having been the practice be¬ fore

the introduction of Christianity into Abys¬ sinia. In roots, and forms of expression and construction, the Geez is poorer than the Arabic. According to Gesenius, one-third of all the roots can be traced distinctly in the Arabic, and many other words may be pre¬ sumed to be of the same origin, while the roots of others can be found in the Hebrew, Syriac, or Chaldaic, some being native African,, a few of Greek, scarcely any of Coptic derivation.

The Geez has 10 conjugations, 8 of which answer to those of the Arabic, the 5th and the 6th being peculiar. A double infinitive is used substantively, this mood having both an absolute and constructive form. There is no participle. The dual is unknown both in verbs and nouns ; the difference of masculine and feminine is observed throughout in the second and third persons. The relation of the genitive is ex¬ pressed by an inflection, causing some changes in the terminations, or through the relative pronoun ; the dative by prepositions ; the com¬ parative and superlative degrees by particles.

I he plural is formed by affixed syllables, an in masculine, at in feminine nouns, on the prin¬ ciple common to the Hebrew, Arabic and Aramaic, or by changes in the radical letters, after the manner of the so-called broken plural in Arabic. In the formation of nouns the Geez most resembles the Hebrew, but it has superfluous final vowels, modified in certain cases, in which it is analogous to the Arabic in its nunnation. Besides a few fragments in inscriptions, there are no remnants of the ancient Ethiopian literature of a period preced¬ ing the introduction of Christianity under Con¬ stantine the Great, but of works composed since that time about 200 are known to European scholars. The Old Testament, translated from the Septuagint by unknown Christian writers in the 4th century, is extant in manuscripts in Europe, but only a part of it has been printed. The Psalms were published in Ethiopic and Latin by Ludolf (Frankfort 1701), and in Ethiopic alone (London 1815). The version of the New Testament appeared at Rome in 1548, and in the London polyglot Bible. Of versions of apocryphal books, in which the Ethiopic is particularly rich, several have been published, as the (Book of Enoch, } translated by Richard Laurence into English (2d edition, London 1833), and by Hoffmann into German (Jena 1838), in Vatis, translated by Laurence into Latin, and published in both languages (Oxford 1819). Geez in 1840 (London), and Ascensio Isaice. The (Didascalia, or Apostolical Constitution of the Abyssinian Church,) was published in Ethiopic and English by Platt (London 1834). The Synaxar contains lives of saints, martyrologies and the hymns of the Ethiopian Church, in rude rhythmical form, every three or five lines often ending in the same consonant, which forms a kind of rhyme. The profane literature of the Ethiopian lan¬ guage is comparatively poor, consisting chiefly of chronicles, which appear to be of consider¬ able interest, but have not yet been generally accessible. Of these the most remarkable are

the (Keber za NagesteP containing the tradi¬ tional and legendary history of the once mighty kingdom of Aksum, a copy- of which was brought to Europe by Bruce, and a translation of it appended to his travels; and the (Tarek Nagushtip or chronicle of kings. In Europe the Ethiopian language was almost unknown until the time of Job Ludolf, who, being assisted by an excellent native scholar, Abbas Gregorius, made himself master of it, and published an admirable dictionary and grammar (2d im¬ proved and enlarged edition, Frankfort 1702). Manuscripts written in the Ethiopian language are in possession of Abyssinian monks and in libraries in Europe. Their knowledge of music may be inferred from their musical notation

which has been published. After a long inter¬ val the interest in this language and literature has been revived by the works of Platt, Lau¬ rence, Gesenius, Hupfeld, Hoffmann, Rodiger, Ewald and others, as well as by the contribu¬ tions of Isenberg, Blumberg, and D'Abbadie.

Bibliography. — Breasted, (History of Egypt > (New York 1909) ; Budge, (The Egyptian Sudan > (London 1907) ; D'Almeida, (Historia de Ethiopia alta} (Coimbra 1660) ; Bosset, (Ltudes sur l'histoire d'Ethiope) (in Journal Asiatique, Paris 1881) ; Bent, (Sacred City of the Ethiopians (London 1893) ; Bruce, (Travels in Abyssinia) (Edinburgh 1773) ; Hoskins, (Travels in Ethiopia * (London 1835) ; Dillmann, (Grammatik der Athiopischen Sprache) (Leipzig 1859; 2d ed. by Bezold, 1899) ; Prsetorius, (Die amharische Sprache) (1871) ; id. (Grammatik der tigrina Sprache) (1871) ; Schrieber, (Manuel de la langue tigra'P (Vienna 1887) ; Goldschmidt, biblio¬ theca ZEthiopica* (Leipzig 1892) ; Fumagalli, bibliografia Etiopica) (Milano 1893) ; Litt- mann, (Die deutsche Aksum-Expedition) (Berlin 1913) ; Beccari (Documenti inediti per la storia d'Etiopia) (Rome 1903).*

ETHIOPIAN CHURCH. See Abyssinian

Church.

ETHIOPIAN PEPPER. See Guinea Pepper.

ETHIOPIAN REGION. See Zoogeog¬ raphy.

ETHIOPIANISM, a movement among the native races of South Africa, having for object negro domination in Africa, thus contem¬ plating the ousting of the whites. It has in the past masqueraded as a sort of religious teaching and took its start in the early 90's of the last century when two

black ministers receded from the Wesleyan Church and founded the Church of Ethiopia for blacks ex¬ clusively. One of these ministers, Dwane, cam® to America and had his church recog¬ nized by the African Methodist Episcopal Church. Later he sought a union with the Anglican Church at Cape Town and was par¬ tially successful through the temporizing and weak-kneed policy of the Anglican archbishop. Various troubles, religious and political, have been traced to the movement; of the latter we may cite the Herero uprising of 1904, and the Zulu insurrection two years later. Little has been heard of the movement within the last decade.

ETHIOPIC. See Ethiopia, Language and Literature ; Ethiopic Writing.

ETHIOPIC WRITING. See Ethiopia.

ETHIOPS MINERAL, a name formerly given by chemists to the black sulphide of mercury, prepared by rubbing mercury and sul¬ phur together, either hot or cold. TEthiops martis, or ethiops of iron, was the black oxide got by exposing iron-filings and water to the air. Vegetable ethiops is the plant bladder- wrack, heated until it becomes black, a remedy for scrofula.

ETHMOID BONE, The (so called from

ethmos , <(a sieve®), is one of the eight bones which collectively form the cranial box. It is of a somewhat cubical form, and enters into the formation of the cranium, the orbits, and

the nasal fossae. Its upper surface is perforated by a number of small openings (whence its name). See Nose.

ETHNIC PSYCHOLOGY. See Psy¬ chology, Ethnic.

ETHNOGRAPHY, a branch of ethnology, the vast science which treats of mankind as a whole, their origin and their development in language, art, religion and political ideas, from barbarism into civilization. The German scientists class ethnology as a science standing midway between natural history and philosophy. As natural history, in the ordinary sense of the term, is a classification and description of the lower animals, ethnology may fairly be con¬ sidered as a classification of the various fami¬ lies of the human race, based on the observa¬ tion of their physical characters, and geo¬ graphical distribution. From the earliest rec¬ ords and monuments of mankind we find traces of various types of humanity. The statues and paintings of ancient Egypt rep¬ resent several racial types including the negro, the Berber and the Asiatic. In the first book of Moses, mankind are divided according to their descent from one of the three sons of Noah, Shem's progeny occupying Western Asia, while to the posterity of Ham and Japhet •fell North Africa and southern Europe, re¬ spectively.

Some recognition of the superficial physical differences observable in variously dis¬ tributed races may also be found in Greek and Roman writers. In the Middle Ages little prog¬ ress was made in ethnography. The discovery of America, with its revelation of new human types, seems to have given the first genuine stimulus to this study, and the word ethnog¬ raphy was first used in a book published at Nuremberg in 1791, and entitled

*(Systema Naturae, * Linnaeus classes mankind (Homo sapiens) together with the apes under the order of Primates, and divided them into four groups, as American, European, Asiatic and African. Buffon in his*

The modern science of ethnography dates from the year 1829 when Milne-Edwards wrote to Thierry, with the result that the Societe Ethnologique was founded. The founding of an ethnographic museum was suggested by Jomard in 1843, and built some years later in Paris. Since that time the study has been thoroughly systematized all over the world. While of all ethnographical classifications the most obvious is the enumeration of the white yellow, red and black-skinned races, as together making up mankind, this is clearly insufficient,

as it would be likely to confound widely differ¬ ent types. Many attempts at a more scientific classification have been made. Oscar Pechsel recognized seven races of men: (1) the Aus¬ tralian ; (2) the Papuan, including the Melane¬ sian, the Negrito, etc.; (3) the Mongolian, in¬ cluding the Polynesian, the Malay, the Eskimo, and the American Indian ; (4) the Dravidian (southern India and Ceylon) ; (5) the Hotten¬ tot and Bushman; (6) the negro; (7) the Mediterranean races, or Caucasian, which in¬ clude the Hamitic, Semitic, and Indo-European.

It will be seen that these divisions are based upon other considerations than those of physi¬ cal character, for it is merely because of their geographical proximity that the Hamitic, which includes the inhabitants of North Africa, can be placed in one category with the Caucasian. Among the most recent systems of ethnographi¬ cal classification is that of Haeckel who has divided the human family into races in ac¬ cordance with the variations of a single physi¬ cal character, that namely of the hair. Accord¬ ing to his authority there are two main species and four sub-species of hair found among man¬ kind, who may be broadly separated into the woolly-haired (Ulotriches), and the straight¬ haired (Lissotriches) . The woolly-haired con¬ sist (1) of the crested-haired (Lophocomi) subdivision, represented by

the Hottentot, and the Papuan; and (2) of the fleecy-haired (Eriocomi) which includes the negro and the Kaffir. The straight-haired are subdivided into the streaming-haired, and the curly-haired. To the former belong the Australian, the Arctic dwellers, the American Indian, Malay, and Mon¬ golian ; to the latter the Dravidian, the Medi¬ terranean races and the Nubian. See Eth¬ nology and consult works subjoined thereto.

ETHNOLOGY, that branch of the science of anthropology which treats of the races of mankind and seeks to explain their origin and development.

Anthropology is the science which treats of man in relation to himself, to other men and to all nature. It is subdivided into several branches, each of which treats of some special phase of man's natural history. There is a difference in the meaning given by students to the names employed to designate the divisions of the study of man. Ethnology, ethnography, and anthropology have been to some extent in¬ terchangeable terms. Each of these branches of knowledge has a special meaning given it in different countries. However, there is becoming a more general acceptance of a definite meaning for these topics. The comprehensive term anthropology is recognized in its general sense to include all others (Keane, Tylor, Mason). The meaning herein given to Ethnology is widely recognized (Keene, Brinton). The use of the term anthropology, to designate societies for the study of man and for sections in na¬ tional scientific bodies on both sides of the Atlantic, indicates a general tendency to accept the proper meaning of the word.

Ethnology differs from ethnography, which deals chiefly with the collection of facts regard¬ ing the families, tribes and races of mankind, in seeking to explain the significance of the information obtained. Ethnography (from edvoc a people, ypa

e0wc, a people, 7oyoc a discourse), attempts to interpret the facts gathered, to explain the causes for the conditions and the relationships of different peoples. Ethnography and ethnol¬ ogy occupy a relation to each other somewhat akin to that of geography and geology. One deals chiefly with existing facts, the other at¬ tempts to interpret the history which brought them forth.

Broca says ethnography studies peoples, ethnology races. The following seems a con¬ venient scheme for grouping the branches of anthropology. Substantially it is as follows: Archaeology, Biology, Psychology, Ethnology, Ethnography, Philology, Technology, Sociology and Religion (Mason).

The unity of the race is now generally ac¬ cepted. From the researches of the physiologist, the anatomist, the philologist and the psycholo¬ gist we

obtain the same testimony as to the specific unity of our race. The place of origin or centre of dispersal is not fixed. From the studies of eminent specialists, it would seem that the land about the shores of the Medi¬ terranean, or the region farther eastward toward India, may claim to be the home of primitive man. About the Mediterranean they settled down like frogs about a pond (Plato).

Classification. — For classification, mankind is divided into groups. On account of their distribution, these are sometimes named for geographical divisions. They are also distin¬ guished as families, clans, tribes, nations, peo¬ ples and races. In the naming of the latter, family relationships form a prominent factor. It is with both of these lines of classification and the distribution of those discussed under them that ethnology has to do. In these efforts at classification, different schemes have been tried. It is generally accepted that there are two groups of elements of characterization, which are sometimes called criteria. These are physical elements and psychical elements.

The principal physical elements are the bones, the shape of the skull, the facial angle, the color of the skin, color, shape and texture of the hair. Of these, color, probably because the most conspicuous feature, was the first to be considered and formed the basis of all the early classifications. The craniological school founded by the elder Retzius (1796-1860), made the shape of the head the basis of classification, and introduced exact methods into this branch of the subject. This was based on the relative length and breadth of the skull, and accordingly mankind was divided into long-skulled and short, broad-skulled races. Later developments in craniology introduced a third class, repre¬ senting a mean between the other two. Crani¬ ology alone cannot be depended upon to supply sufficient or trustworthy materials for the proper classification of mankind. Nevertheless it has thrown much light upon the subject. Of late years the color, shape and texture of the hair have steadily risen in the estimation of natur¬ alists as a racial test. The hair is now re¬ garded as the most constant of all the physical features and has been made the foundation of their groupings by some of the most emi¬ nent anthropologists.

The other physical ethnical elements are of little value separately, but are often useful aids in combination with others. Such are stature ; the shape, color and position of the eye ; the

size and form of the brain ; the shape of the nose and mouth ; the

superciliary and zygomatic arches, and all such other elements as collec¬ tively constitute the broad, flat features of the lower, the oval and regular faces of the higher races.

The psychical elements are less conspicuous, and have but recently been taken into account in classification. It has been said that (

(1) Preservative instinct, food, clothing, shelter; (2) Perpetuating instinct; (3) Lan¬ guage; (4) Religion; (5) Government (6) The Arts.

Food, clothing and shelter are the impera¬ tive needs of the human species at all ages and under all conditions. Among the prominent topics considered under the sexual impulse are the position of woman, the marriage relation and the line of descent. Language is the chief of the psychical elements. Some perhaps, with Horatio Hale, would make it the sole test of race. The power of religion, both as a con¬ structive and dispersive force, is the repeated testimony of history. The organization and administration of government, whether in its

primitive form or in the more enlightened stage, is of deepest interest. The arts of life find their origin in the rude homes of early man, and have steadily been influential in all human progress. For these have lives been lost, tribes been destroyed, nations been formed, battles been won. They have been the motive power in every effort, the impulse behind every forward movement of mankind from the earli¬ est days to now.

Race Classification. There have been so many changes in this world of ours and so many mixtures of ancestral strains that it is impossible to determine certainly to which race certain peoples belong. After successive efforts by able students to classify mankind upon this or that character or group of characters, the tendency now seems to be to return to the earlier classification. To recur to the three greater subdivisions — white, black and yellow; or, Caucasian, Negro, Mongolian.

With all the data gathered and the characters used in succeeding classifications, the original color plan in a general way is as good as we know. Popularly, too, this seems to have struck the fancy. Without thought we speak of a person as white, black or red, as he is a Cau¬ casian, Negro or an American Indian.

Dali divides man into three groups : white, black and yellow. Flower and Lydekker also

GENERAL ETHNOGRAPHIC SCHEME.

Race

Traits

Branches

Stocks

Groups or Peoples

1. Hamitic

1. Libyan

2. Egyptian

I

3. East African

South

Color white

Mediterranean

1. Arabian

2. Semitic

2. Abyssinian

European

Hair wavy

3. Chaldaean

II

1 . Euskaric

Euskarian

Nose narrow

North

2. Aryac

Indo-Germanic or Celtindic

Mediterranean

peoples

3. Caucasic

Peoples of the Caucasus

I

1. Central African

Dwarfs of the Congo

Negrillo

2. South African

Bushmen, Hottentots

Color black or dark

1. Nilotic

Nubian

African or

II

2. Sudanese

Negro

Hair frizzly

Negro

3. Senegambian

4. Guinean

Nose broad

III

Negroid

1. Bantu

Kaffirs and Congo Tribes

1 . Chinese

Chinese

I

2. Tibetan

Natives of Tibet

Color yellow or olive

Sinitic

3. Indo-Chinese

Burmese, Siamese

1. Tungusic

Manchus, Tungus

Asiatic or

2. Mongolic

Mongols, Kalmucks

Mongolian

Hair straight

II

3. Tartaric

Turks, Cossacks

Sibiric

4. Finnic

Finns, Magyars

Nose medium

5. Arctic

Chukchis, Ainos

6. Japanic

Japanese, Koreans

1. Arctic

Eskimos

Color coppery

I

2. Atlantic

Tinneh, Algonkins, Iroquois

Northern

3. Pacific

Chinooks, Kolosh, etc.

American

Hair straight or

wavy

II

1. Mexican

Nahuas, Tarascos

Central

2. Isthmian

Mayas, Chapinecs

Nose medium

III

1. Atlantic

Caribs, Arawaks, Tupis

Southern

2. Pacific

Chibehas, Quichuas

1. Negrito

Mincopies, Aetas

Color dark

I

2. Papuan

New Guineans

Hair wavy or frizzly

Negritic

3. Melanesian

Feejeeans, etc.

Oceanic

II

1. Malayan

Malays, Tagalas

Malayic

2. Polynesian

Pacific Islanders

Nose medium or

III

1. Australian

Australians

narrow

Australic

2. Dravidian

Dravidas, Mundas

RACES OF MANKIND

» B « 5 «3 . £ . S4J ˆ

GO

. ’

l

!

ETHNOLOGY

551

assign all representatives of mankind to three primary divisions. The status of the American aborigines is left unsettled. Keane gives to these a place among the races, making four. Linnaeus in his day adopted four primary divi¬ sions. He, however, recognized man as a dis¬ tinct genus, homo, having four species : Homo- sp cethiopicus, Homo sp mongolicus, Homo sp americanus, Homo sp caucasicus. Gerland divides mankind into six races, separating the Dra- vidians from the other groups. To-day man is considered a single species, having several varieties or races. Blumenbach gives five groups, classified according to the color of the skin. Professor Huxley also designated five groups along somewhat similar lines. Morton used the skull as a basis of classification ; Haeckel and Broca the hair; and Hale lan¬ guage.

To one who carefully goes over the different schemes of classifying man, it is apparent that none is wholly satisfactory. Each in some direc¬ tion

overlaps some other. It is by taking all these race criteria so far as they are of value that the most reliable conclusions may be drawn as to the proper classification of mankind. No one set of standards will properly answer. That classification will be most satisfactory which obtains the most help from all the elements. All that we can aim to do is to group under some general and loose fitting subdivisions those members of the species which display the great¬ est number of similarities. (Brinton). Perhaps it will be as satisfactory to follow the plan of Linnaeus and classify the races of men ac¬ cording to geographical areas. Under such a plan we speak of the European race, which in ancient times was confined to Europe and ad¬ jacent parts of Asia and Africa; the African race, whose natural home is Africa; the Asiatic race, which is chiefly confined to Asia ; the American race, composed of those occupying the western continent before its occupation by Europeans ; and, the Oceanic or Australian race, comprising the tribes of Polynesia, Australia and the many groups of islands sometimes in¬ cluded in Oceanica. We can use Blumenbach's scheme of dividing them according to the color of the skin. Under it, they are grouped as follows :

1, Caucasian, or white; 2, Ethiopian, or black ; 3, Mongolian, or yellow ; 4, American, or red ; 5, Malay, or brown. Dr. D. G. Brinton enumerated five races of mankind. Their chief characteristics may be summed up substantially as follows: 1. The European Race — Traits

— Color white, hair wavy, nose narrow, jaws straight, skull variable, languages inflectional, religions ideal. II. The African, or Negro Race

— Traits — Color black, hair woolly, nose flat, jaws protruding, skull, long, language, agglu¬ tinative, religions material. III. The Asiatic, or Mongolian Race — Traits — Color yellowish or brownish, hair straight, nose flat or medium, jaws straight, skull broad and high, languages isolating or agglutinative, religions material. IV. The American Race — Traits — Color cop¬ pery, hair straight, nose narrow, jaws straight, skull variable, language incorporating, religions ideal. V. The Oceanic Race — Traits — Color dark, hair lank or wavy, languages agglutina-

tivc. . , ,

Classified in this manner, the human species

presents the subdivision shown in the preceding "scheme.®

The European Race — Of the South Medi¬ terranean branch of the European race there are given two divisions, the Hamitic and the Semitic. The former is divided into three groups, the Libyan, Egyptian and East African. The Libyan group extends over Northern Africa from the Atlantic

Ocean to the Nile. Some of these tribes are very dark and have been termed "Black Caucasians.® Neverthless, ex¬ cept for color, they are fine representatives of the white race. The Egyptian group is repre¬ sented by the ancient Egyptians and their de¬ scendants, the modern Fellah of the Nile valley and the Copts. These two groups of this branch of the European race have been potent factors in the. world's history. The development of the earliest seats of culture, the organization of government, and the establishment of high de¬ grees of civilization have been the work of their representatives. On the contrary the East African group is represented by a number of tribes who are chiefly nomadic and occupy the territory south of the Egyptian group and ex¬ tending from the Nile to the Indian Ocean. They include the Gallis, Somalis and Agaas.

The Semitic stocks are made up of three groups — the Arabian, Abyssinian and Chal- daean. The most prominent of the first group are the Arabians ; the existing tribes best known are the Ishmaelites and Bedouin. They have occupied at different times parts of the Arabian peninsula and now practically cover it all.

The Abyssinian group is supposed to have originated in the region last mentioned and to have been dispersed over Abyssinia and ad¬ jacent parts of Africa. They have become mixed with adjoining tribes and a corrupt form of Christianity exists among them. The Abys- sinians, Tigre and Amhara are prominent na¬ tions. The former is best known.

The third group of Semitic peoples has been called the Chaldsean. This includes the Syrians, Israelites, Samaritans, Babylonians and Jews. They also originated in Arabia and spread out into other lands. The Jew has become world¬ wide in his dispersal. From these peoples great nations were developed and from them two great religious leaders, Jesus Christ and Mo¬ hammed, have sprung.

The North Mediterranean branch is divided into three divisions. They are the Euskaric, Aryac and Caucasic stocks. The only surviving remnant of the Euskaric stock is the Basques of Spain. That they formerly were more widely distributed is generally believed. Their rela¬ tionship with other peoples is not satisfactorily determined. The most extended and most im¬ portant of these race stocks is the Aryac. The origin of the Aryans has been a fruitful theme of discussion in recent years. While there is still a difference of opinion on this subject, the majority of writers have accepted the theory of their European origin. The Aryac or Indo- Germanic stock is divided by Brinton into eight groups : Celtic, Italic, Illyric, Hellenic, Lettic, Teutonic, Slavonic and Indo-Iranic groups.

The Lettic or Lithuanian peoples, while comparatively inconspicuous, are in. some re¬ spects the most interesting of their fellows. They are thought by some students to be the remnant of the original stock and that which

most resembles it. They are located along the Baltic Sea in Prussia and Russia.

The Indo-Iranic group is of special interest because it has the farthest eastern range and for the reason that it is nearest the region which those who believe in the Asiatic origin of the race think was its primitive home. The term Iranic is derived from the plateau of Iran, which has been thought by some to be the area of dispersal of the race. The group divides into two divisions, the Iranic, whose old representatives were the Bactrians and Persians. To-day it includes the modern Persians, the Parsees, generally known as fire-worshippers, and the tribes of Beluchistan, Afghanistan and neighboring regions. The Indie branch com¬ prises the peoples occupying

India. The most prominent of these are the Hindus, Rajpoots and Djats. The typical Brahmins probably are the best representatives of the stock.

The Teutonic group includes the Germans, English, Norwegians, Swedes and Danes, and their ancestors, the Goths, Vandals, Angles, Saxons, Norsemen. These independent, aggres¬ sive, progressive races have been conspicuous in the history of the past and the activities of the present. They have spread throughout the world as missionaries of business, education or religion. They are the forces which operate in all progressive government, and are destined to sway the world.

East of these is the Slavonic group. It is represented to-d'ay by the Russians, Poles, Czechs, Bulgarians, and other tribes of the Danube region. Of their ancestors known in history are the Scythians and Massagetae. The Slavonic tribes to the east, in one direction, came in contact with the Indo-Iranians and, in another, with some of the branches of the Mon¬ golians. Within comparatively recent times some of them have made remarkable progress in civilization.

The Hellenic group comprised the ancient Greeks and their relatives. They occupied at an early date the peninsulas of Asia Minor, Greece, the southern part of Italy and con¬ tiguous territory. The progress of Greek cul¬ ture is familiar. Greek language, literature and art form the basis of education everywhere. Their dominion was one of the world's greatest confederacies. Overthrown by the Romans and subsequently by the Mohammedans, they were for generations hidden from the view of the progressive world. Tfie Illyric stock is situated near the Greeks in Turkey. It is represented by the Albanians. The Italic stock covered most of the Italian Peninsula. The Umbrians, Etruscans, Oscans and Latins were the princi¬ pal older representatives. They developed the Roman Empire, and in the organization and con¬ duct of government and the framing of laws they achieved a front place in the history of the world.

The Celtic group, originally spread over western Europe, has largely disappeared. Cer¬ tain parts of the British Isles and the north of France contain the surviving members. These are the Irish, Welsh, Scotch, Manx and the people of Brittany.

The Caucasic stock is represented by four groups: Lesghic, Circassic, Kistic and Georgic. They occupy the Caucasus Mountain region.

The African or Negro Race. — The African race. occupies Africa south of the Sahara Desert

and of the Nile Valley. It is classified in three groups: the Negrillos, Negroes

and Negroids. Under Negrillos (little Negroes) are grouped the Akkas and other pygmies of the interior re¬ gion and the small-sized Bushmen and Hotten¬ tots farther south. The characters of some of these tribes are faithfully preserved in figures upon the Egyptian monuments. The most striking of these physical features is the peculiar growth and development about the pelvic region. The clicks of the Hottentot and Bush¬ man languages find no counterpart in any other tongue. The Negroes are confined chiefly to western and central Africa, ranging east into Nubia. They comprise four subdivisions: the Nilotic, Sudanese, Senegambian and Guinean. The first is confined to the upper Nile Valley. The Sudanese group is represented by tribes in Sudan and westward. The western coast south of the Senegal River is the territory of the Senegambians. Farther south toward the Niger River are the tribes of the Guinea group. This region was the chief source of the slave trade. The descendants of the Guinea negroes found throughout the United States are living witnesses of the slavery which existed there but a generation ago.

The Negroids approach the Negroes, but are in some ways quite different from them. Their color is brown rather than black; their hair is ˆkinky® but not woolly; the nose is straight and not short and flat. They are of two groups — the Nubian and Bantu. The former are found in Nubia and the upper Nile Valley. The latter occupies practically all of southern Africa ex¬ cept the region of the Hottentots and Bushmen. Among the better known tribes are the Kaffirs, Bechuanas and Zulus. The African race occu¬ pies a low stage in culture. It has developed in the restricted area south of the Sahara basin. Probably it reached its typical development in the Niger Valley.

The Asiatic or Mongolian Race. — The

Asian, or Mongolian race, is made up of two divisions — the Sinitic and Sibiric. The Sinitic branch includes the Chinese, Tibetans and the inhabitants of Anam, Siam, Burma and Cochin China. The Chinese have occupied their terri¬ tory from quite early times. They have devel¬ oped a peculiar civilization and in some par¬ ticulars reached quite a high stage of culture. While there is Considerable difference of opinion whether the arts of ancient China de¬ veloped there or were acquired from the Aryans to the westward, it seems probable that in a great measure at least they were indigenous.

The Sibiric branch of this race is largely located north of the mountains of central Asia, ranging with the Arctic Circle from the Pacific to the Atlantic Ocean. The six groups are the Tungusic, reaching from northern China toward the Arctic Ocean and to Kamchatka. The Mongolic occupying the vast highlands west of Manchuria, Genghis-lvhan and later Tamerlane

established two of the wide extended Mongol empires. The Tartaric, another highland group, has spread from Turkestan in several direc¬ tions. The Turk is the most conspicuous rep¬ resentative, though much mixed with other races. The Finnic is a group of Mongols oc¬ cupying northern Europe. It is represented ihere by the Finns and Lapps, and farther south by the Magyars. From there it extends east

to the Volga River. The rude tribes fringing the Arctic Ocean in eastern Siberia and reach¬ ing to the Pacific are grouped under the name Arctic. The Chukchis and Kamchatkans are of their number. The Japanese and Koreans constitute the Japanese group. The Japanese are the most progressive and advanced of the Asiatic race.

The Oceanic Race. — The Oceanic race may be divided into three stocks — Negritic, Malayic and Australic. It occupies Australia, the islands of the South Pacific and Indian oceans and the adjacent shores of Asia. In their migrations, whether along the shores or over the seas, they have so intermingled that their relationships are puzzling. The Negritic stock is represented by the Negritos, including such small peoples as the Mincopies of the Andaman Islands, the Papuans of New Guinea and other islands, and the Melanesians. The Malayic stock is the most conspicuous and ener¬ getic of the ocean peoples. Its representatives are found extending almost two-thirds around the world, reaching from Easter Island to Madagascar. The most typical Malays are found in Malacca, Sumatra and Java, while others less marked extend from the Celebes to the Philippines. The Malays farther to the eastward are often called Polynesians. From their traditions it has been possible to obtain a fairly good idea of their successive migra¬ tions and of the comparative time of the settle¬ ment of the different island groups. They ex¬ tend from New Guinea to New Zealand, Easter and the Sandwich Islands. The Austrafic stock includes the different tribes of Australia, the extinct Tasmanians, and, according to some authorities, the primitive peoples of the penin¬ sula of Hindustan. The Australians are very low in culture, nomadic, lacking government and wear little or no clothing. <(The life of these savages proves to be of undeveloped type, alike in arts and institutions, so much so, that the distinction of being the lowest of normal tribes may be claimed for them.® — (E. B. Tylor).

The American Race. — The American race includes those peoples occupying the western continent at the time of its discovery by white men. For the purpose of study they may be divided into seven groups: Arctic, North At¬ lantic, North Pacific, Mexican, Inter-Isthmian, South Atlantic,

South Pacific.

The Arctic groups include the Eskimo and Aleutian peoples. They occupy the shores of the oceans in Arctic America and extend from Labrador to Greenland. In the North Atlantic group are some Indians of wide range. The Athabascans extend from the valleys of the Yukon and lower Mackenzie to Arizona; while farther to the southward, reaching into Mexico, the warlike Apaches are of this group. The Algonkins ranged from Newfoundland to the Rocky Mountains and from the Churchill River Valley and Hudson Bay southward throughout the Ohio and Mississippi valleys to the Ten¬ nessee River. These included most of the Indians encountered by the early settlers. Their names are more or less familiar to us from history. The intelligent Iroquois, the formi¬ dable Dakotas (Sioux), the southern Indians, some of whom built mounds within historic times, and the tribes of the interior plains also

belong to this division. The North Pacific group includes a number of tribes west of the Rocky Mountains, many of which are small and represent distinct linguistic stocks. Several of these tribes have the head artificially deformed. These include the Flatheads and Nez Perces (Pierced Noses). The Cliff-dwellers and Pueblo tribes of the arid regions of the south¬ western United States are placed here. The Mexican group is notable because of the state of civilization attained by the Aztecs, its best- known tribe. The organization developed, gov¬ ernment established, education acquired, build¬ ings constructed and arts pursued were un¬ equaled by any tribe of the American race. The Mayas were the most important tribe of the Inter-Isthmian group. They were builders of note, elaborate decorators of stone and mural artists. The South Atlantic group occupied the Atlantic coast of South America. They were chiefly wandering tribes without settled habita¬ tions. The Quichuas of .Peru are the best- known tribe of the South Pacific group. They attained higher civilization than any other South American tribe. They developed agri¬ culture, domesticated animals, constructed large buildings of stone, were expert workers in metals and devised a method of record keeping by means of strings and knots called quippus. See Anthropology; Ethnology; Man, Chris¬ tian Anthropology; Man, Prehistoric Races of; Embryology, Human.

Bibliography. — Boas, F.,

(Anthropology 5 ; id., (Primitive Culture5 (2 vols., New York 1891).

Amos W. Butler,

Zoologist and Anthropologist , Indianapolis.

ETHNOLOGY, Bureau of American. See

Smithsonian Institution.

ETHOLOGY. See Bionomics.

ETHYL, the organic radical C2H5, which occurs in many carbon compounds, but which is not known to exist in the free state. Its most important compounds are ethyl hydrate, or ethyl alcohol (see Alcohol) and ethyl oxide, popularly known as ether (q.v.) ; but the iodide, C2H5I, which is formed by acting upon ethyl alcohol with iodine in the presence of phos¬ phorus, is also of much importance in synthetic chemistry.

ETHYL NITRATE. See Nitrous Ether.

ETHYLAMINE, an amine (q.v.) in which one or more of the hydrogen atoms of ammonia, NH3, is replaced by the radical ethyl, C.H.-. Three compounds of this sort are possible, and all have been actually prepared. When, only one of the hydrogen atoms of the ammonia has been replaced, the resulting compound, NH2. C2H5, is known as mono-ethylamine, or ethyl monamine; and it is this substance which is understood when the word ethylamine is used

without qualification. NH(C2H5)2 is known as diethylamine, and N. (C2Hs)3 is called trieth- ylamine. All three are formed when absolute alcohol is heated with zinc chloride, in closed tubes, to 500° F. ; and they may then be sep¬ arated by the crystallization of their picrates. Ethylamine (that is, the mono-amine) may also be prepared by boiling cyanic ether with an aqueous solution of caustic potash, absorbing the liberated gas by passing it through hydro¬ chloric acid, and finally drying the ethylamine hydrochloride that is so formed, and distilling it with quicklime. All three of the ethylamines are alkaline, all smell strongly of ammonia and all combine with acids to form salts. The mono¬ amine is a colorless, caustic, inflammable liquid, burning with a yellow flame, having a specific gravity of 0.70, boiling at 68° F., and not solid¬ ifying at 220° below zero, F. Diethylamine (which may be prepared by heating the mono¬ amine with ethyl bromide is also volatile, color¬ less and inflammable, with a specific gravity of 0.72, and boils at 133° F., under ordinary atmos¬ pheric pressure. Triethylamine is an oily liquid, alkaline, and similar to the other two in general character. It has a specific gravity of 0.73, boils at 194° F., and its critical temper¬ ature (according to Pawlewski) is 513° F. (See Critical Point). Triethylamine is but slightly soluble in water; diethylamine*

dissolves in water freely; mono-ethylamine mixes with water with a considerable rise in temperature, and the probable formation of a hydrate, though it is entirely expelled again, upon boiling.

ETHYLENE, a gaseous hydrocarbon hav¬ ing the formula C2H4, and constituting the first member of the olefine series. It is formed in the dry distillation of numerous organic bodies, and constitutes 4 to 5 per cent of ordinary coal gas. It is most conveniently prepared for labor¬ atory purposes by mixing 1 part of alcohol with 4 parts of sulphuric acid, adding enough sand to form a paste, and heating the mass over a flame. The sand takes no part in the chemis¬ try of the process, but merely serves to regu¬ late the action. The sulphuric acid, owing to its affinity for water, removes the elements of water from the alcohol, and thereby liberates the ethylene, C2H5.0H = H20 + C2H4. Ethylene is a colorless gas, which burns with a bright flame, a five-foot burner, using the pure gas, yielding a light of 68 candle-power. It may be condensed to a transparent liquid which boils, under ordinary atmospheric pressure, at 153° F. below zero, and freezes at 272° F. be¬ low zero. Ethylene is an unsaturated compound, and combines directly with hydrogen when mixed with that gas and led over platinum black; the product of the combination being ethane, C2H0. Mixed with three times its own volume of oxygen, and fired by a spark, ethylene explodes with great violence. When it is mixed with chlorine in the dark, combination takes place according to the formula C2H4 + 2C1 = C2 H4CI2, the new substance being' an oily fluid, known as ethylene dichloride, or (

ETHYLENE DICHLORIDE. See Dutch Liquid.

ETIENNE, Charles Guillaume, sharl ge yom a-te-en, French dramatist: b. Chamouilly, 6 Jan. 1778; d. Paris, 13 March 1845. Under the First Empire he was censor, editor-in-chief of the Journal of the Empire, and a member of the Academy. He took part in Napoleon's campaigns in Italy, Germany, Poland and Austria. At the Restoration he was expelled from the Academy, and thereafter as editor of the Constitutional was a power on the side of the opposition. His comedies give proof of brilliant fancy, elegant style, and great constructive skill; (The Two Sons-in-Law) is the best comedy of the Imperial Era, and not unworthy of Moliere. He composed many farces, vaudevilles, operettas and spectacular pieces, which had unbounded success ; and his operas,

ETIENNE DU MONT, a-te-en du mori (Fr. ((Saint Stephen of the Mount®), a fine church of mediaeval Paris. It was founded in 1220; its completion and restoration were begun in 1517, and the building reached its present perfection in 1626. The shrine of Saint Gene¬ vieve, heroine and patron saint of Paris is its principal point of antiquarian interest, but it

is also the burial-place of Pascal and Racine.

ETIOLATION, e't!-o-la'shon, the altera¬ tion in the color and the structure of plants due to the absence of light during growth. The most noticeable changes are paleness and elongation of the stems. The elongation is due to the ex¬ tension of the cells, and the paleness to the non-development, arrested development or de¬ struction of the chlorophyll or green coloring matter of the plant. Other phenomena are im¬ perfect development of leaves, altered method of branching and various modifications of tissues, especially in the imperfect development of the cell walls, which do not attain normal thickness. Agriculturally, etiolation is either a fault to be shunned or a useful process. In the first case it is often responsible for the (*

ETIOLIN, in botany, a name given by the older authors to the carotin of etiolated plant structures. See Carotin.

ETIQUETTE, Madame, the nickname of the Duchesse de Noailles, mistress of cere¬ monies at the French court in the time of Marie Antoinette, because of her rigid adherence to the formalities or prescriptions for the various ceremonies at court.

ETIQUETTE, et'i ket, a collective term for the established ceremonies and usages of society. Among courts the Byzantine and Spanish courts, and the French court under Louis XIV and Louis XV, were noted for the strictness of their etiquette. Social etiquette consists in so many minute observances that a tolerable familiarity with it can be acquired only by a considerable intercourse with polite society. Quickness of sympathy and a certain fineness of observation are more needed for proficiency in this sphere than mere power of intellect. The term is derived from the French word etiquette, originally a slip of paper affixed to a packet to indicate its contents. This term has come to mean the various decorums to be observed in the ordinary intercourse of life, and especially the comportment on state oc¬ casions perhaps from the custom formerly of distributing tickets or slips of paper to each person containing the rules to be observed by him or her at the ceremony. The word is also used by the members of certain professions to designate the rules to be observed by the mem¬ bers, e.g., ((legal etiquette,® etc. In the latter sense, however, it has been supplanted by the word (

ETIVE, et'iv, Loch, an inlet from the Firth of Lome, in north of Argyllshire, west coast of Scotland. The river Awe, the outlet of Loch Awe, and the

river Etive flow into it. At Connel Ferry, about three miles from the sea, it is barely 200 yards wide, and is crossed by a ridge of sunken rocks. The depth here at low water is six feet; the inflowing tide, which rises 14 feet, rushes with tremendous force through the narrow channel, breaking into raging foam which may sometimes be heard miles away. Dunstaffnage, a 13th century castle, once a royal fortress, is near its mouth.

ETLAR, Carit, pseudonym of Karl Bros- boll, Danish realistic novelist: b. Fridericia, 7 April 1816; d. 1900. His first story was (The Smuggler's Son) (1839) ; of his later writings, the historical tale of (The Queen's Captain of the Guard) and the realistic story (The People in Need) (1878) are the most popular; his verse also has merit. An edition of his collected works was published in 1859-68, with an addi¬ tional collection in 1873-79 ; a new addition ap¬ peared in 1888.

ETNA, or .7ETNA, a volcano in the eastern part of the province of Catania, on the island of Sicily, and the largest active volcano in Europe and the highest mountain in Italy. Directly north is the valley of Alcantara, on the west and south, the valley of Simeto, and on the east, the Ionian Sea. From the waters

on the east, which are in depth from 5,000 to

6,000 feet, Etna rises cone-like to a height of about 10,875 feet; but on the south and west it seems formed of superimposed mountains, the terminal being surrounded by a number of cones, all of volcanic origin, about nine of which are of considerable size. The circumference

at the base is about 90 miles. Around the

mountain and at the lower slope are a number of villages, cultivated fields, groves of olive-, orange-, fig- and date-trees ; and a little higher up is a belt of forest with oak, birch, beech and coniferae. Above 7,000 feet vegetation is scanty, the cone is almost bare ; rocky preci¬ pices, lava beds, masses of ashes and scoriae are

visible at its summit except where covered by snow. A deep depression, Val de Bove, on the eastern side, was once the principal crater ; and frequently lava has issued out of the sides of the mountain, thus forming small cones and craters, about 200 of which are now distinctly marked. The summit is usually altered with every eruption. From the summit may be seen the whole of the island of Sicily, the Lipari Islands, Malta and Calabria.

The eruptions of Etna have been numerous and many of them destructive ; more than 80 have been recorded, 11 of which occurred be¬ fore the Christian Era. That of 1169 a.d. over¬ whelmed Catania and buried

15,000 persons in the ruins. In 1669 the lava spread over the country for 40 days, and 10,000 persons are estimated to have perished. In 1693 there was an earthquake during the eruption, when over 60,000 lives were lost. One eruption was in 1755, the year of the Lisbon earthquake. Among more recent eruptions are those of 1852, 1865, 1874, 1879, 1886, 1892, 1909 and 1911. An erup¬ tion is ordinarily preceded by premonitory symptoms of longer or shorter duration. In Greek mythology there are found frequent allusions to Etna, especially in the legends of Enceladus and Hiphaestus. Consult Dana, Characteristics of Volcanoes) ; Kneeland, (Vol¬ canoesˆ

ETNA, Pa., borough in Allegheny County, on the Allegheny River, the Baltimore and Ohio and a branch of the Pennsylvania railroads. It is really a suburb of Pittsburgh, with only the Allegheny River between. The chief in¬ dustries are in connection with the iron and steel products for which this part of the State is famous. It has rolling mills, furnaces, steel mills, galvanized-pipe works and other manu¬ factures. The waterworks and electric-light plant are owned by the borough. Pop. 6,341.

ETON, England, village and parish, in the county of Buckingham, on the Thames, 21 miles west-southwest of London. It consists principally of one narrow street which has of late years been much improved. An iron bridge across the Thames connects Eton with Windsor, from which it is separated only by the river. Eton derives its celebrity from its college. Pop. 3,192.

ETON COLLEGE, the most famous of English public schools, was founded by Henry VI in 1440, under the name of (

side, called oppidans, who board and lodge in the houses of the masters is about 1,000. The course of instruction is mainly classical, but modern languages, mathematics and the natural sciences are given now a due share of attention. The college roll includes the most famous names in more recent English history in nearly every department of service, and especially among statesmen and administrators. Consult Cust, (Eton College) ; Lyte, (History of Eton Col¬ lege > (1440-1898).

ETOROFU, a'to-ro-foo, or ITURUP, e-too-roop', (1) an island; (2) a strait; in the most northerly part of Japan. The island be¬ longs to the Kurile group. Area, 1,500 square miles.

ETOSA LAKE. See Kunene.

ETOURDI, L', a comedy of Moliere, which was first produced at Lyons in

the year 1653. See Moliere.

ETOWAH MOUND. See Mound Build¬ ers and Mounds.

ETRETAT, France, a fashionable summer resort on the English Channel, 17 miles east of Havre, in the department of Seine-In- ferieure. It contains a casino, bathhouses, a fine strand and many summer residences. It is famed for its gatherings of litterateurs and artists. Pop. (commune) 1,973.

ETRURIA, e-troo'ri-a (Greek Tyrrhenia) , the name anciently given to that part of Italy which corresponded with the greater part of modern Tuscany and part of Umbria, and was bounded by the Mediterranean, the Apennines, the river Magra and the Tiber. The name Tus- cia, for the country, came into use in late times, while Tusci, as well as Etrusci, was used by the Romans as the appellation of the people from an early period. The oldest inhabitants of the country belonged, according to the accounts of the ancients, to the Umbrian stock and were dispossessed by the Tyrrhenians or Tyrsenians, a people who came by sea and who were gen¬ erally believed to be Lydians. These again were in early times subjected by another race who called themselves Rasena and who finally became incorporated with the Tyrrhenians proper, the whole nation then being called Tus¬ cans or Etruscans. These Rasena, by ancient writers usually confounded with the Tyrrhe¬ nians, entered Italy at a very early period from the north and gradually took possession of the whole country from the Alps, Ticino and lower Adige on the south.

To what race the Etruscans belonged is un¬ known and our ignorance is equally great with regard to their language, remains of which still exist in numerous inscriptions mostly on tombs. It appears to have been quite distinct from the languages of the rest of Italy, but attempts to connect it with the Greek, Celtic, Germanic or Semitic languages have had little or no success. The characters used are essentially the ancient Greek and were either introduced from Magna Graecia or possibly from Corinth. Etruria was very early a confederation under the rulers of the 12 principal cities, each of which formed a republic by itself. The chiefs of these republics were styled lucumones, who were also the priests and generals and held their meetings in the temple of Voltumna, where they deliberated to¬ gether on the general affairs of the country. In

all the cities there appears to have been an aristocracy, toward which the mass of the com¬ mon people stood in the relation of clients, though there would no doubt be a body of en¬ tirely free men resembling the plebeians at Rome. The religion of the Etruscans offers a subject of great difficulty, but it is at least cer¬ tain that it had many points in common with the religious systems of the Sabines and Latins, while in some respects it shows

evidences of an Eastern origin. Among the deities may be men¬ tioned Tina or Tinia, corresponding to the Latin Jupiter; Cupra, corresponding to Juno; Menerfa (Minerva) ; Sethlans (Vulcan) ; Turms (Mercury) ; and Aplu or Apulu (Apollo).

What may be called the Etruscan Era com¬ menced about 1044 b.c. They became the domi¬ nant race in northern and central Italy and Rome itself fell under their rule and was ruled by Etruscan kings. In the maritime wars they were in alliance with Carthage against Greece. The zenith of their power was in the 6th cen¬ tury b.c., when with the Greeks and the Phoeni¬ cians they shared the maritime supremacy of the Mediterranean. Their naval power was shattered in 474 b.c. by Hiero I of Syracuse and after this their decline was rapid. The Gauls swarmed over the Alps in 396 b.c. ; in 351 the southern Etruscans made submission to the Romans; and the process of conquest was com¬ pleted by the subjugation of the northern Etruscans in 282 b.c. After this they became merged in their conquerors, on whom they ex¬ ercised a considerable influence in religious, social and political life.

The chief occupations of the Etruscans were agriculture and commerce, both maritime and overland. Grain, wine, timber, cattle and wool seem to have been the principal articles of trade. The staple food of the common people was pulse, but the upper classes were notorious for extravagance in their diet as well as in dress and in furniture. Their knowledge of the arts and sciences is said to have been derived mainly from Greece and in a less degree from Egypt. The iron mines and copper mines in the interior of Etruria were worked at a very remote pe¬ riod and the metallurgical skill shown by the Etruscans was obviously connected with their proficiency in the art of working in bronze, silver, gold, etc. Of Etruscan architecture our knowledge is limited; but their cities were laid out on a quadrangular plan and strongly forti¬ fied. The so-called Tuscan order seems to be little else than a modification of the Doric. Of their temples there exist no traces; the theatres have been more fortunate, that at Fiesole show¬ ing how much in this form of construction they owed to the Greeks. The sepulchres, which were always subterranean, but frequently having superstructures of an architectural character surmounting them, present many varieties of construction.

For articles in terra-cotta the Etruscans were especially celebrated. These were not restricted to small objects, but embraced statues and figures of large size, with which the exteriors and interiors of their temples were adorned Closely related to this branch of art was the Etruscan pottery, in the manufacture of which they excelled ; but the only extant productions of this class that can be said to be genuine are

the red ware of Arretium and the black ware of Clusium ornamented with figures in relief, many of them of a grotesque and strongly-marked Oriental character. On the other hand, numbers of the painted vases popularly known as Etrus¬ can vases are undoubtedly productions of Greek workmen, the subjects, the style and the inscrip¬ tions being all Greek. The skill of the Etrus¬ cans in works of bronze is attested by many ancient writers, and also by numerous extant specimens. The style of art characteristic of these works is stiff and archaic, having some resemblance to the early Greek, though some of the existing specimens exhibit more freedom of design and great beauty of execution. The bronze candelabra, of which many examples have been preserved, were eagerly sought after both in Greece and Rome. Another branch of art which seems to have been peculiar to this people was that of the engraved bronze mirrors, a considerable number of which has been dis¬ covered, some quite recently. These mirrors were polished on one side, and have on the other an engraved design, taken in most cases from Greek legend or mythology. Consult Dennis, (The Cities and Cemeteries of Etruria) (1892) ; Seymour, (Up Hill and Down Dale in Ancient Etruria) (1910).

ETRURIA, Kingdom of, the name given to the province of Tuscany, in Italy, when, in 1801, Napoleon formed of it a kingdom, and made Florence the capital. In 1808 he incor¬ porated it with the French Empire, and in 1809 his sister, Elise Bacciocchi, was made Grand Duchess of Tuscany.* When Napoleon became an exile in 1814, Tuscany reverted to Austria, and Frederick III became king.

ETRUSCAN. See Etruria.

ETRUSCAN VASES, a class of beautiful ancient painted vases made in Etruria, but not strictly speaking a product of Etruscan art, since they were really the productions of a ripe age of Greek art, the workmanship, subjects, style and inscriptions being all Greek. They are elegant in form and enriched with bands of beautiful foliage and other ornaments, figures and similar subjects of a highly artistic character. One class has black figures and ornaments on a red ground — the natural color of the clay; another has the figures left of the natural color and the ground painted black. The former class belong to a date about 600 b.c., the latter date about a century later, and extend over a period of about 350 years, when the manufacture seems to have ceased. The subjects represented on these

vases fre¬ quently relate to heroic personages of the Greek mythology, but many scenes of an ordinary and even of a , domestic character are depicted. The figures are usually in profile.

ETSCH. See Adige.

ETTINGHAUSEN, Konstantin, Baron von, Austrian geologist and botanist : b. \ ienna, 1826; d. 1897. He was educated in his native city and became professor of botany and of medical natural history at the Joseph Academy in 1854. He removed to Gratz in 1871 and seven years later was engaged by the British Museum to arrange the collection of fossil plants there. His works include ˆhysiotypia Plantarum AustriacarurrP (2 vols., 1o56-75) ; < Physiographis der Medizinalptanzen) (1862) ,

lBeitrage zur Erforschung der Phylogenie der PflanzenarteiP (7 vols., 1877-80).

ETTLINGEN, et'ling-en, Germany, town in the Free State of Baden, on the Alb, five miles south of Karlsruhe. It is an ancient place, containing some Roman remains ; is en¬ tered by three gates, and has an old castle with gardens, town-house, hospital, normal and other schools, manufactures of machinery, linen and cotton goods, starch, leather and paper. Near the town the Archduke Charles of Austria here suffered defeat at the hands of Moreau, 9 and 10 July 1796. Pop. 9,407.

ETTMULLER, Ernst Moritz Ludwig,

lood'vig et'miil-ler, German philologist and historian : b. Gersdorf, Saxony, 5 Oct. 1802 ; d. Zurich, 15 April 1877. He was graduated at Leipzig; lectured at Jena on the German poets of the Middle Ages ; in 1833 went to the Gymnasium at Zurich and in 1863 he be¬ came professor of German literature in the University of Zurich. He made extensive re¬ searches in German mediaeval literature and was author of (German Dynasty Founders) (1844) ; and other epic poems, besides the (Anglo-Saxon Lexicon) (1852). He also translated (Beowulf) into German.

ETTOR, Joseph J., American industrial agitator : b. 1886. He came into prominence during the labor troubles at Paterson, N. J., Brooklyn, N. Y., and elsewhere, but attained his greatest attention in conducting the textile workers during the strike at Lawrence, Mass., in 1912. For his methods in this affair he was sentenced to nine months' imprisonment, having been held responsible for the death of a woman shot in a riot there on 29 Jan. 1912. After his release he was again prominent in the waiters' strike in New York in 1913 and the barbers' strike in the same city in 1914. He is promi¬ nently identified with the Industrial Workers of the World, of the

executive council of which, he became a member.

ETTRICK, et'rik, a district of Scotland, in Selkirk, through which the Ettrick water runs. It is now a sheep pasture, denuded of wood, but in ancient times it formed part of Ettrick Forest, which included the whole country as well as parts of Peebles and Edinburgshire. The ((Ettrick Shepherd,® James Hogg, was a native of this district. Consult Craig-Brown,

(History of Selkirkshire) (Edinburgh 1886).

ETTRICK SHEPHERD, The. See Hogg, James.

ET TU BRUTE («and thou also, Brutus®), the words supposed to have been uttered by Julius Caesar at the moment he was stabbed by Brutus. There is, however, no ancient author¬ ity for attributing this utterance to Caesar, and it is probable that the popular impression is due to the use of these words by Shakespeare in his play, (Julius Caesar. Other dramatists of the same period also used the phrase.*

ETTWEIN, et'vln, John, American Mora¬ vian bishop: b. Trendenstadt, Wiirtemberg, 29 June 1721; d. Bethlehem, Pa., 2 Jan. 1802. He came to America in 1754 and for nearly 50 years worked among the Moravians as evangel¬ ist, pastor and bishop. He traveled thousands of miles, oftentimes on foot,, preaching in 11 of the 13 colonies and in what is now the State of

Ohio, ((in cities, in villages, in homesteads, from pulpits, in the open air, in courthouses and barns to many and very different classes of men,® as he himself wrote. Among the Indians, too, he worked with great success. In 1776-77 he rendered noble services to the sick and wounded of the American army in the general hospital at Bethlehem, Pa. Elected bishop in 1784, he presided over his Church for nearly 17 years, displaying the soundest judgment in matters of polity and a fine personal heroism in critical circumstances. In 1787 he founded the Society for Propagating the Gospel Among the Heathen, which still exists, richly endowed, and is the bulwark of the extensive Moravian mission work. He became proficient in the language of the Delaware Indians, prepared a dictionary and phrasebook of it, and in 1788 compiled an account of the language with a vocabulary, which has since been published by the Pennsylvania Historical Society. Old age compelled his retirement from active service in

1801.

ETTY, William, English painter: b. York, 10 March 1787; d. there, 13 Nov. 1849. He worked long without much recognition, but at length in 1820 won public notice by his (Coral Finders.5 In 1828 he was elected an academi¬ cian. Among his works, which were greatly admired, are a series of three pictures (1827- 31) illustrating the (Deliverance of Bethulia by Judith) ; (Benaiah one of David's Mighty Men5 ; (Women Interceding for the Van¬ quished. } All these are very large pictures, and are now in the National Gallery of Scotland. Others of note are (The Judgment of Paris) ; (The Rape of Proserpine) ; (Youth at the Prow and Pleasure at the Helm.5 In coloring and the representation of the nude he dis¬ played high ability.

ETUDE, at first a term to designate a musical composition written for the purpose of developing some particular point, as arpeggio, etc., has come to mean a study for a concert performance with many technical difficulties. Some of the latter by famous masters are of special beauty and elegance, of which we may mention here the famed etudes of Chopin, Liszt and Schumann, which rank among the finest compositions for the piano. For the vio¬ lin the compositions of Fiorillo, Kreutzer and Paganini are justly famous.

ETYMOLOGICUM GUDIANUM. See

Etymologicum Magnum.

ETYMOLOGICUM MAGNUM (Gr. «the great etymological glossary, or dictionary55), the sole lexicon of size surviving from the Byzan¬ tine age of Greek learning. It is evidently a compilation from other works of the same class, and bears no author's name. The book may be attributed to the 10th century. It consists of a number of quotations from the works of ancient grammarians, arranged alphabetically. It may have received its name from its first critical editor, Sylburg, or from its printer, Cal- liergus. The book is of high philological value, although many of the derivations of words con¬ tained in it are fanciful and utterly unscientific. Consult Cohn, (Griechische Lexicography (in (Griechische Grammatick> of Burgmann-Thumb, Munich 1913) ; Gaisford, (Etymologi¬ cum Magnum5 (Oxford 1848) ; Reitzenstein,

(Geschichte der griechischen Etymologika5 (Leipzig 1897) ; Sturz, (Etymologicum Gudia- num5 (Leipzig 1816-20).

ETYMOLOGY, that branch of philol¬ ogy which deals with the investigation of the origin or derivation and of the original sig¬ nification of words. It forms a subsidiary part of the science of comparative philology, and, though it has occupied the attention of the learned and the curious in every age, it is only within the 19th century that its study has been pursued

on really scientific principles. Igno¬ rance, or what is still more dangerous, half¬ knowledge, has often suggested false etymol¬ ogies and many more have sprung from that excess of confident and self-sufficient ingenuity which will not take plain words like beej-eater and welsli-rabbit for what they are. Folk- etymology, properly so called, has played an important role in the development of languages. The words that the people have known from infancy are for them things, but it is quite different from the new terms they meet. These arrest their curiosity, and, as they believe that every word has its signification, they seek for this, guided by resemblances of sound with words already known, and consequently reach conclusions often hopelessly distorted by false analogies. We see the same illogical process in the Old Testament interpretation of personal names, applied conveniently after the fact; in the Homeric explanation of the names of gods and men ; in the quaint etymologies so common in the mediaeval writers and in such moderns asˆThomas Fuller; in the vagaries of Celtic topographers ; and even in the pages of some modern dictionaries it is possible to find such a statement as that the English word news is derived from a certain conjunction of the points of the compass, north, east, west and south. These whimsical etymologies were laughed at by Dean Swift, whose ostler = ocit- stealer, was a stroke of genius, but have not yet disappeared; and, indeed, the modern ideas of method in etymology are hardly at all beyond the point attained by the grammarians of Alex¬ andria and by Varro among the Romans. It was the birth of philology and the study of the languages of the East that made a scientific etymology possible. It no longer sought the relation of the words of a single language ex¬ clusively within itself, but extended its view to the whole group of cognate tongues, or, wider still, to a whole family and became a new science under the name of Comparative Gram¬ mar. Grimm's Law was the first finger-post that pointed out the path ; among his greatest successors are Curtius and Fick. The Teutonic revival in England in the 19th century com¬ menced the history of English upon an historical method, from which has grown a really scientific English etymology, as seen in the dictionaries of Professor Skeat and- Dr. Murray. No more useful chart of warning could be given than the former's canons for etymology: ((Before at¬ tempting an etymology, ascertain the earliest form and use of the word and observe chro- nology. If the word be of native origin, we should next trace its history in cognate lan¬ guages. If the word be borrowed, we must observe geography and the history of events, remembering that borrowings are due to actual contact.® See Curtius, (Grundzuge der Griech-

ischcn Etymologie (1879) ; Fick,*

ETZEL. See Attila.

EU, e (Lat. Anga), France, town in the department of Seine-Inferieure, two miles above the mouth of the Bresle, 17 miles northeast of Dieppe. It was in the castle belonging to this place that William the Conqueror married Maud of Flanders. The town was burned to the ground in 1475, by order of Louis XI, to pre¬ vent it from falling into the hands of the Eng¬ lish. It has several small manufacturing estab¬ lishments. Pop. of commune 5,651.

EUA , a-oo'a, or EOA, a small island belong¬ ing to the Friendly Islands, owned by Great Britain. It is about 10p2 miles long by three wide. The climate of all the islands of the Tonga group, to which the Friendly Islands belong, is but slightly higher than that of the Samoan Islands, just north. Pop. about 400.

EUANTHIUS, Roman grammarian: d. Constantinople, 358 a.d. He wrote a commen¬ tary on Terence which was extensively used by Donatus in his own commentary of that author. His treatise (De Fabula was also incorporated by Donatus. Consult Wessner, (2Eli Donati . . . Commentum Terenti* (Vol. I, Leipzig 1902).*

EUBCEA, u-be'a, formerly called Negro- pont, a Greek island, the second largest island of the ZEgean Sea. It is 90 miles long, 30 in greatest breadth, reduced at one point to four miles. It is separated from the mainland of Greece by the narrow channels of Egripo and Talanta, and is connected with the Boeotian shore by a bridge. There are several mountain peaks, one over 7,000 feet. The island is well wooded and remarkably fertile. Wine is a staple product and cotton, wool, pitch and tur¬ pentine are exported. The chief towns are Chalcis and Karysto. The island was anciently divided among seven independent cities, the most important of which were Chalcis and Eretria. Successively held by the Athenians, the Persians, the Romans and the Venetians, it was taken by the Turks in 1470, and in 1830 was delivered from their control. With some small islands it forms a modern nomarchy, with a population of 116,903.

EUBULIDES (u-bu'lidez) OF MILE¬ TUS, Greek philosopher: the best known of the disciples of Euclid of Megara, flourished about the middle of the 4th century b.c. His life was a struggle against Aristotle, in which by a captious logic he sought to prevail against good sense. A partisan of the Megaric principle, that there is nothing real but what is always one, simple and identical, he immediately found an adversary in the- founder of the great contemporary school which made experience the condition of science. He attacked the peripatetic doctrine, like Zeno of Elea, by striving to show that there is none of our experimental notions which does not give place to insolvable difficulties. He wrote a num¬ ber of comedies and a work on

Diogenes the Cynic. See Mf.garian School of Philosophy.

EUBULIUS. See Cyrillus and Metho¬ dius.

EUBULUS, u-bu'lus, Greek comic writer: 11. at Athens about 375 b.c. His subjects were chiefly mythological and many of his plays con¬ tained parodies of the tragic poets, especially Euripides. He is credited with having written over 100 plays, of which only some fragments and 50 titles have survived. Consult Koch, (Comicorum Atticorum Fragmenta (Leipzig 1884) ; Meinke, (Fragmenta Comicorum Grae¬ corum* (Berlin 1839-57).*

EUCAINE. See Cocaine.

EUCALYPTOCRINUS, a genus of fossil Crinoidea found in the Silurian beds of the Niagara group in America and in England and Scotland. Its special peculiarity is that its 20 arms rest in vertical compartments divided by 10 partitions attached to the tegmen and sup¬ ported by the interbrachials.

EUCALYPTUS, u-ka-hp'tus, a genus of trees and a few shrubs of the family Myrtacece. The species, of which there are about 300, are characterized by simple symmetrical leaves, whose edges usually turn toward the sun ; gen¬ erally white, bell-shaped flowers, sometimes solitary, but commonly in terminal or axillary umbels near the ends of the twigs ; calyx-lobes joined to form a lid, which falls off when the flower opens (from this feature the genus is named); numerous stamens; and many-seeded, angular fruit-capsules. With the exception of about half a dozen species which are natives of the East Indies and the Malay Peninsula, the members of the genus are indigenous to Australasia, where they are among the most common forest trees. The various species are highly valued for planting in parks and along avenues; for the gum-resin which oozes from their trunks ; for the volatile oil contained in their leaves; for the tannin obtained from their bark; and for the fibre of their inner bark. They have been widely distributed by man in warm climates, particularly in the British pos¬ sessions. Above all they are valued for their timber, which is extensively used for wharf, ship, bridge and house building, telegraph poles, railroad ties, implements, furniture, etc. To obtain it the trees are frequently ring-barked about the beginning of the warm season so as to exhaust the sap as much as possible. After standing until the end of the dry season they are felled. Some of the species are among the largest living trees of the world. Specimens exceeding 450 feet in height and with a girth of 50 feet are occasionally reported.

Few species are hardy, but many are culti¬ vated for ornament where they can be given shelter from cold winds, or where, like other tender

ornamental plants, they can be removed to a house during the winter. In California a majority of the species thrive in the open air and are valued for their striking habits of growth, their foliage, etc. They are readily propagated from seeds sown in light, sandy soil. The seedlings should be transplanted when about four inches tall and again at rather frequent intervals, to ensure the formation of fibrous roots near the surface, thus to secure them a good start when transplanted to final quarters. Transplanting should always be done in cool, moist, cloudy weather. When once established they demand no further attention than ordinary pruning and training.

Among the best-known species are the fol-

lowing: Eucalyptus globulus, the blue-gum,

which often exceeds 300 feet in height, has bluish or grayish smooth bark, except at the base. It is noted for its rapid growth, the un¬ pleasantly flavored nectar of its blossoms, which is very attractive to bees, and its ability to withstand long periods of drought. It is the most frequently planted species in California, where it is also becoming naturalized by means of its seeds. It is also planted to some extent in Florida and other Gulf States, and is said to survive a temperature as low as 20° F. It is one of the most valuable of timber trees and is one of the chief sources of oil of eucalyptus. A somewhat hardier species (E . viminalis) , popu¬ larly known as manna gum, attains about the same size, but has either dark-colored persistent bark or light-colored deciduous bark. In Cali¬ fornia, where it also is spreading like the former, it has withstood lower temperatures and made phenomenal growths, in some instances exceeding 70 feet in height and 3 feet in girth in 12 years. It is valuable for its nectar, of which bees are very fond, but its timber is less valuable than that of the preceding species, be¬ ing less strong. It is frequently used for fenc¬ ing, shingles and other purposes where strain is not expected. Perhaps the most valued is E. marginata , the jarrah tree or wood, which often attains heights exceeding 70 feet without the development of any limbs, and at that height often has a girth of 15 feet. It is not hardy. Its wood is especially valued for wharf and ship building, since it is not attacked by the teredo or shipworm. It is also highly esteemed for underground work, such as ties and telegraph poles, and, being easily worked and polished, is popular for house finishing and furniture. The largest species is probably E.

amygdalina, the peppermint-tree, which is also noted for its abundant yield of oil. Its timber is not strong, but is largely used for staves, shingles, build¬ ing, etc. E. robusta, the swamp-mahogany gum, is perhaps the species most frequently planted in swampy places. Its timber is re- mˆ-kably durable and is used, like that of E. marginata, but is somewhat less esteemed. It is one of the finest of avenue trees, and one of the best for bees because of its abundant nectar and profuse bloom.

In medicine, oil of eucalyptus is used for its antiseptic .and stimulating properties. It is very widely used in affections of the nose, mouth and bronchi, and in diseases of the bladder and urethra. It makes a very agreeable and efficient drug to add to antiseptic mouth-washes and is useful internally as an intestinal anti-fermenta¬ tive. Trees of eucalyptus have been planted, especially in low marshy places, with a belief in their beneficial effects against malaria. It is frequently asserted that they have a direct action on malaria. By the aid they furnish in converting marshes into dry land they also help to prevent the development of mosquitoes, some forms of which are known to be the chief agents in the spread of malarial disease. (See Malaria; Volatile Oils). Consult Bailey, Cyclopedia of American Horticulture) (1914) ; Mueller, ; Bentham, (Flora Australiansˆ (Vol. Ill) ; Pepper, (Eucalyptus in Algeria and Tunisia, from an Hygienic and Climatological Point of View) (Proceedings of the American Philosophical Society, Vol.

XXXV, pp. 39-56) ; Cooper, (Forest Culture and Eucalyptus Trees, }

EUCHARIS, u'ka-rTs, (I) a genus of plants of the natural order Arnaryllidacecc , the species which, mostly natives of Colombia, are perennial herbs with perennial bulb-like rootstocks, broadly ovate leaves and very showy white flowers in umbels upon long, strong scapes. They are very popular hot-house plants because of their beauty and the prolificacy of their long- lasting flowers. They are easily grown in course fibrous soil which will permit of abundant watering without danger of stagna¬ tion. Partial shade and rather high tempera¬ ture are also needed. The best-known species is probably E. grandiflora, which is popularly known as star-of-Bethlehem and Amazon lily. The flowers of this species are borne upon a scape often exceeding 18 inches in height and bearing two to four star-like and very fragrant flowers, often four inches in diameter. (2) a genus of mollusks ; also known as Glaucus ; (3) the typical genus of Chaleidians, sub¬ family Eucharinse.

EUCHARIST, u'ka-nst, in the Roman Catholic Church, the sacrament of the body and blood of Jesus Christ, and also the Christian covenant sacrifice. Regarding the Eucharist as a sacrament, the Roman Catholic Church teaches that it is the true body and blood of Jesus Christ under the

(

And that attitude of the apostles is the attitude of the Roman Catholic Church. Those words of her Founder and the many other an¬ nouncements he made touching this sacramental mystery, the Roman Catholic Church from apostolic times has received in their plain literal interpretation — the interpretation put upon

EUCALYPTUS

Forest Cover for Parks, Los Angeles, California

Avenue Shade Trees, near Santa Monica, California

EUCHLORINE – EUCHRE

561

them by all who heard them, Jews, disciples, apostles, and by Jesus Christ himself: the Ro¬ man Catholic Church teaches that in the Eu¬ charist is contained ((truly, really and sub¬ stantially® the body and blood of Jesus Christ, together with his soul and divinity. Here nothing is added to, nothing taken away from, the words of Christ, and nothing explained away in those <(words of eternal life.® And when in the 11th century the Church's reading of those words as denoting a ((true, real and sub¬ stantial® change of the bread and wine into Christ's body and blood was challenged by Berengarius, who, more (

But the Eucharist is not only a sacrament : it is also the perpetual New Covenant sacrifice, believed to have been foretold by the prophet Malachi, as rendered in the Vulgate, which differs slightly from the authorized Anglican version: ((From the rising of the sun even to the going down thereof, my name is great among the Gentiles, and in every place there is sacrifice, and there is offered to my name a clean oblation® (Mai. i, 10-11). And the Ro¬ man Catholic Church teaches concerning the Eucharistic sacrifice or the Mass that ((it is one and the same sacrifice with that of the cross: the victim is one and the same, Jesus Christ, who offered himself, once only, a bloody sacrifice on the altar of the cross. The bloody and unbloody victim is still one and the same, and the offering upon the cross is daily renewed in the Eucharistic sacrifice, in obedience to the command of our Lord, (Do this in remembrance of Me.) ® — Catech. Cone. Trid., cap. de Eucha- ristiee Sacr.

Bibliography. — Adamson, R. M., (Christian Doctrine of the Lord's Supper) (New York 1905) ; Armstrong. (Sacraments of the New Testament (ib. 1880) ; Bridgett, T. E., (His- tory of the Holy Eucharist in England)

(new ed., London 1908) ; Bright, W., (Aspects of Primitive Church Life) (ib. 1898) ; Dalgairns, J. D., (The Holy Communion: Its History, Philosophy and Practice) (3d. ed., Dublin 1868) ; Denzinger, Heinrich, (Enchiridion Symbolorum et DefinitionunP (Wurzburg 1854) ; Dimock, N., (On Eucharistic Worship in the English Church) (London 1911); Franzelin, (Die Eu- charistia) (Rome 1868); Gardner, P., (Origin of the Lord's Supper) (London 1893) ; Gore, Charles, dissertations) (ib. 1895) ; id.,. (The Body of Christ: An Inquiry into the Institution and Doctrine of Holy Communion) (New York 1901); Groton, W. M., 'Christian Eucharist and the Pagan Cults) (ib. 1914); Harrison, J., (Answer to Dr. Pusey's Challenge Respecting the Doctrine of the Real Presence) (2 vols., ib. 1871); Jacob, G. A., 'The Lord's Supper His¬ torically Considered) (Oxford 1884) ; Jeaffre- vol. 10 — 36

son, H. H., 'The Holy Eucharist) (London 1887) ; Keating, J. F., (The Agape and the Eucharist in the Early Church) (ib. 1901) ; Kidd, B. J., 'The Later Mediaeval Doctrine of the Eucharistic Sacrifice) (ib. 1898) ; McGif- fert, A. C. , (History of Christianity in the Apostolic Age) (New York 1897) ; Macnaught, J., (Coena Domine : An Essay on the Lord's Supper) (London 1878) ; Meyrick, Frederick, (The Doctrine of the Church of England in Holy Communion) (New York 1908) ; Morti¬ mer, A. G., (Catholic Faith and Practice) (Philadelphia 1898) ; Moule, H. C. G., (The Supper of the Lord) (London 1899) ; Perowne, J. J. S., doctrine of the Lord's Supper) (ib. 1887) ; Pusey, E. B., (The Real Presence of the Body and Blood of Our Lord in the Holy Eucharist) (Oxford 1857) ; Sanday, William, different Conception of Priesthood and Sac¬ rifices) (New York 1900) ; Stanley, A. P., (Christian Institutions) (London 1871) ; Stone, D., distory of the Doctrine of the Holy Eu¬ charist) (2 vols., New York 1901) ; Strong, T. B., (The Doctrine of the Real Presence) (ib. 1899) ; Thalhofer, V., das Opfer des alten und neuen Bundes) (Regensburg 1870) ; Weizsacker, C., (The Apostlic Age) (2 vols., London 1895) ; Wilberforce, R. I., doctrine of the Holy Eucharist) (ib. 1853) ; Cardinal Wise¬ man, dectures on the Real Presence) (Dublin

1852).

EUCHLORINE, a name given by Sir Humphry Davy (q.v.) to the yellow gas ob¬ tained by acting ifpon potassium chlorate with hydrochloric acid. Davy believed it to be a new oxide of chlorine; but it is now known to be a mixture of chlorine and chlorine peroxide, C102. It has powerful bleaching and disinfect¬ ing properties, but it is frightfully explosive, and should never be prepared nor handled save by an expert chemist, provided with proper safeguards, and with a full previous knowledge of its properties.

EUCHOLOGION, ii-ko-lo'ji-on, the litur¬ gical and ritual book of the Greek

Church, cor¬ responding to the Missal, which is the Pontifi¬ cal and Ritual of the Latin Church. The Uniate Greek Church, or Church of the Greek Rite in communion with the See of Rome, has a separate Euchologion. The Euchologion con¬ tains the liturgies, the order of daily services with prayers and litanies, and finally a collection of sacraments and sacramentals, with various rules, canons and blessings. The first printed edition was published in 1526 at Venice and since then the successive official Greek editions have been printed there. There are, however, other editions published both in Athens and Constantinople. There is also an abstract, called (Small Euchologion.) There is no Eng¬ lish translation, but M. Rajewsky has trans¬ lated it into German under the title (Eucholo¬ gion der Orthodox-Katholischen Kirche, etc.) (Vienna 1861-62).

EUCHRE, u'ker, a game of cards, regard¬ ing the origin of which nothing definite is known. For a long time it was the most gener¬ ally played parlor game after whist in the United States. The pack of cards consists of 32, but sometimes only 24 are used, being an ordinary (

the most interesting party being four, two play¬ ing on each side as partners. When choice of partners and first dealer has been decided five cards are dealt, usually two at once, then three, or the contrary. Having dealt five cards to' each player, the dealer turns up the next card for trumps, leaving it, face upward, on top of the balance of the pack. The cards rank in value as follows : The best euchre card is the knave of trumps ; the second best is the knave of the suit of the same color as the trump. The former card is called the <(right bower,® the latter the Heft bower.® After the right and left bowers the cards rank as at whist, the knaves of the color not turned as trumps fall¬ ing into their regular place as at whist. The object of the game is to take tricks. The score is five points, unless otherwise agreed. In two- handed euchre the following rules apply : The non-dealer may <(pass,® or (

1904) ; id., (Foster's Complete Hoyle, etc. (New York 1914) ; Jessel, F., (A Bibliography of Works in English on Playing Cards and Gaming) (London 1905) ; Seaver, C. M., (The Standard Guide to Progressive Euchre) (Bos¬ ton 1885).*

EUCKEN, Rudolf Christoph, German philosopher: b. Aurich, East Frisia, 5 Jan. 1846. His father died while he was a

child, but he enjoyed the loving care of his mother, a woman of marked

intelligence and warm sympathies. His early education was received in his native town and he came under the influence of the theologian and philosopher, William Reuter, who was one of his teachers. It is generally believed that Reuter stimulated his interest in religion. He studied at Gottin¬ gen where he entered the philosophical classes of Hermann Lotze. It was characteristic of the man that, while he admired Lotze's acute¬ ness, he was not attracted by it. Thus early his anti-intellectualism displayed itself. Eucken took his doctor's degree at Gottingen, not in philosophy, but in classical philology and ancient history. After his graduation, he spent five years as a gymnasium teacher. In 1871 he was called to the University of Basel, and in 1874 he received a call to succeed Kuno Fischer as professor of philosophy at Jena. Here he set¬ tled permanently, refusing invitations to other places. During the quiet years passed as a teacher at Jena, he worked out his own phi¬ losophy of history and life. In 1908 he received the Nobel prize for literature. His interna¬ tional fame dates from this period. In 1911 he visited England and received a cordial re¬ ception, and the next year he came to the United States to deliver a course of lectures at Harvard.

Eucken's early philosophical work was along historical lines. In fact, his first publications deal with Aristotle. Gradually, his thinking be¬ came more original and constructive and moved in the direction of a philosophy of religion. His philosophy can' best be described technically as a spiritual activism founded on a NeoKantian theory of knowledge. He makes constant use of history to show the growth of life-systems which soar beyond anything for which the phy¬ sical world can account. This inner spiritual life of man is real and tremendously significant. While it is conditioned by physical processes, it is not reducible to them. Spiritual values are achievements which must be actively appropri¬ ated by those who come after. Mere accept¬ ance is not enough. We have already referred to his anti-intellectualism. This does not con¬ sist of a distrust of reason but of a feeling that concepts are not sufficient. There must be ex¬ periencing as well as knowing. Philosophy must aim at a profound penetration of life in the light of eternal values.

There can be no doubt that Eucken has struck an important note. His attack upon mere traditionalism, for instance, is valuable. So is his stress upon personal idealism. But the technical thinker is likely to criticize his neglect of theory of knowledge and his disre¬ gard of the mind-body problem. These lacunae need filling in, as even his most ardent disciples admit. Yet, when all is said, Eucken must be accorded a high place among modern thinkers. He has helped to free religion from its mytho¬ logical setting and to bring into relief its ethical content. He has been a very prolific writer. The following are his chief works:

der grossen Denker) (1890; English title (The Problem of Human Lif e)) ; (Der Kampf urn einen geistigen Lebensinhalt5 (1896);

Roy Wood Sellars,

Professor of Philosophy, University of Michi¬ gan.

EUCLASE, u'klas, a very rare gem mineral, a basic silicate of beryllium and aluminum, HBe A1 SiOs. It occurs in Brazil, Siberia, and Austria, in brilliant, transparent, colorless to pale-green or blue crystals of monoclinic forms, with perfect cleavage and has a hardness of 7.5. Its specific gravity is 3.1. There is a fairly extensive, scientific literature, a bibliography of which as well as all available scientific details regarding Euclase may be found in Dana, E. S., ed., Che System of mineralogy of James D. Dana5 (6th ed., New York 1914).

EUCLID OF ALEXANDRIA, Greek mathematician : fl. about 300 b.c., taught

geometry at Alexandria in the reign of Ptolemy I (323-285 b.c.) , and extended the boundaries of mathematical science. The severity and ac¬ curacy of his method have never been surpassed. There is very little known regarding his life, Proclus (412-485 a.d.) forming the chief source for our information. His chief work, Tagrolxeia, is known as (Elements5 and has formed for many generations the principal introduction to the study of geometry. It consists of 13 books, though some editions contain two additional books, which, however, are almost without doubt not the work of Euclid. There also have been preserved six other works: (Data,5 (Intro¬ duction to Harmony,5 (Section of the Scale,5 (Phsenomena, 5 (Optics 5 and Catoptrics.5 Con¬ cerning some of these, however, it is doubtful whether Euclid was the author or not. Even more doubtful is the authorship of some frag¬ ments sometimes ascribed to him. From quo¬ tations, etc., it has been well established that he wrote four other works of which, however, nothing is in existence now: three books on (Porism,5 two books on (Curves,5 four books on (Conic Sections5 and one book on fallacies.5 The (Elements 5 have come to us indirectly through the Arabs who made a number of trans¬ lations of which, however, only one, made in the 13th century, has been printed (Rome 1594). It is claimed that the first retranslation into Greek from Arabic was made by Adelard of Bath in the 12th century. On this there was based the first printed Greek edition edited with comments by Campanils of Novara (Venice 1482), which, however, is

not very reliable. The first translation into Latin, made by B. Zam-

berti, was published in Venice (1505). The first reliable Greek text was printed in Basel

(1533) and edited by S. Grynaeus. Other

editions were brought out by D. Gregory (Greek and Latin, Oxford 1703) ; F. Peyrard (3 vols., Paris 1814-18) ; E. F. August (two parts, Berlin 1826-29) ; T. L. Heath (3 vols., Cambridge 1908). His complete works have been edited by M. Curtze (Leipzig 1899) and by J. L. Heiberg and H. Menge (Leipzig 1883— 96). There have also been many translations into almost all the modern languages. The

first English translation was made by H. Bil¬

lingsley (London 1570) ; the first French by D. Henrion (Paris 1615) ; the first German by J. Scheybl (Augsburg 1555). There are also a large number of commentaries, almost every new editor for many years feeling it his duty to attempt a new and original, and, therefore, in many cases useless commentary. Consult Anon., (The Elements of Euclid5 (in Dublin Review, Vol. XI, p. 330, London 1841) ; Dodg- son, C. L., (Euclid and His Modern Rivals5 (London 1879) ; Heiberg, J. L., (Litteratur- geschichtliche Studien fiber Euklid5 (Leipzig 1882) ; Hultsch, F., (Eukleides5 (in Pauly-Wissowa, (Real-Encyclopadie der classischen Altertumswissenschaft,5 Vol. VI, Stuttgart 1907) ; Riccardi, P., (Saggio di una Biblio- grafia Euclidea5 (four parts, Bologna 1887-90) ; Smith, T., (Euclid: His Life and System5 (New York 1902).

EUCLID OF MEGARA, Greek philos¬ opher, the founder of the Megaric school of philosophy : b. about 450 b.c. ; d. about 380 b.c. He was a pupil of Socrates, after whose death, 399 b.c., he retired to Megara (most probably his native city) and set up a school of philoso¬ phy, in which he blended the doctrines of the Eleatic school with those of his master. He adopted the Eleatic notion of one universal unchangeable existence, and upon this he en¬ grafted the ethical views of Socrates. From its subtlety and disputativeness, the school of Euclid was sometimes called the Dialectic or Eristic. He wrote six dialogues of which only one small fragment has been saved.

EUDZEMONISM, the doctrine that happi¬ ness (Gr. eudaimonia) is the chief good. Hap¬ piness, according to Aristotle, is the activity of soul in accordance with virtue, virtue being the mean between excess and defect as deter¬ mined by reason. As pleasure and life are in¬ separably joined together, the one is therefore essential to the other, and the former is a

necessary part of all human activity. See Ethics; Energism.

EUDEMUS OF RHODES, Greek philos¬ opher and the disciple of Aristotle. He wrote many works, most of which were in defense of the philosophy of his master; of these the most celebrated is the (Eudemian Ethics,5 published as a part of the writings of Aristotle. He wrote also a history of mathematics and astronomy, now lost, but of which a com¬ mentary remains to us in a work on Euclid by Proclus and in the works of other writers we have fragments. All these fragments were pub¬ lished by Mullach in (Fragmenta Philoso- phorum Graecorum5 (Vol. Ill, 1881). Consult Gow, History of Greek Mathematics5 (Cam¬ bridge 1884).

EUDES. See Odo.

EUDES, Duke of Aquitania : d. 735 a.d. He ruled that portion of France from the Loire to the Pyrenees and in 721 inflicted a serious defeat on the Arabs, who had besieged Tou¬ louse. Ten years later Charles Martel began his incursions into Aquitania and the Arabs took advantage of this state of affairs to again invade France; Eudes joined forces with Charles to repel the invader and the allied armies won the battle of Tours in 732. Con¬ sult Vic and Vaissette, (Histoire generale de Languedoc) (16 vols., Toulouse 1872-1904).

EUDES, Jean, the venerable French clergy¬ man and founder of the Catholic congregation known from his name as the Eudists : b. Ri, 14 Nov. 1601 ; d. Caen, 19 Aug. 1680. He was educated at the Jesuit College of Caen and in 1623 entered the Congregation of the Oratory at Paris and rose to be superior of the Oratory at Caen in 1639. In 1643 he founded the Con¬ gregation of the Mission Priests of Jesus and Mary for the training of priests in missionary work. This society came to be known by the name of their founder, took no vows, were under the jurisdiction of the ordinary, and were at liberty to leave the congregation at any time they pleased. They received papal approval in 1674 and were regarded with jealousy by the Oratorians, especially after the latter became affected with Jansenism ' which the Eudists reprobated. The congregation spread rapidly throughout France but suffered in the debacle of the Revolution. In 1826 it was reorganized and has since spread to Canada. Eudes also founded a society for the rescue of fallen women which still exists. Pope Leo XIII be¬ stowed on Eudes in 1903 the title of (

EUDIALYTE, u-di'a-lit, rhombohedral red mineral of vitreous lustre,

translucent or nearly so ; its hardness, 5.5 ; specific gravity, 2.90 to 3.01. It consists principally of silicates of iron, zirconia and lime. There are two varieties, eudialyte proper, of which the double refrac¬ tion is positive, and eucolite, in which it is nega¬ tive. It is found in North Greenland, Norway and Arkansas.

EUDIOMETER, an instrument employed in the analysis of gaseous mixtures. It was originally designed for ascertaining the quantity of oxygen contained in any given bulk of elastic fluid. The first instrument of this kind was con¬ structed by Joseph Priestley. In one form of eudiometer two platinum wires are inserted near the top of a graduated glass tube open at the bottom. An electric spark is introduced by these wires. The process involves the explosion and combustion of one of the constituents to be determined. The operation may be conducted in a trough of mercury or over water. See Gasometric Analysis.

EUDISTS, u'dists, a congregation or so¬ ciety of secular priests founded in the 17th cen¬ tury by a priest named Eudes for the purpose of conducting ecclesiastical seminaries and giving ˆmissions® in parish churches, for the revival of religious zeal and the conversion of sinners. The members of the society take no religious vows, but they live in common and are volun¬

tarily subject to the orders of their superior. They do not wear any habit to distinguish them from the rest of the secular clergy. Their first house was established at Caen in Normandy 1643; the membership at that time consisted of Eudes and eight other priests. In his time Eudes conducted 110 missions in various places in the kingdom. The institute never spread to other countries. Eight or more Eudists were among the priests who were butchered in the wholesale slaughter of priests, monks and bishops at the Carmes, Paris, Sep¬ tember 1792. The society was broken up during the French Revolution, many of the members seeking refuge in England. In 1826 the apos- tolate was revived and resumed with ardor and great success.

EUDO DE STELLA. See Eon.

EUDOCIA, u-do'shi-a, Roman empress: b. Athens, about 393; d. Jerusalem, about 460. She was a daughter of Leontius the philosophical sophist. After the death of her father, who left nearly all his property to his two sons, she went to Constantinople for the purpose of com¬ plaining of this injustice to the emperor, Theo¬ dosius II. There she embraced the Christian religion, was baptized as Eudocia and became empress 421 a.d., through the efforts of Pul- cheria, sister of Theodosius (421). Pulcheria in reality ruled the royal household and Eudocia appears to have bowed to her will in everything. Finally, however, they quarreled over religious matters and

Pulcheria was banished from court; but she succeeded in again securing her influence there and Eudocia was afterward divorced or retired from Constantinople and spent the remainder of her life in Jerusalem, engaged in acts of devotion. She is said to have written some Greek poems and also a life of Christ. Consult Diehl, (Figures byzantines) (Paris 1906) ; Gregorovius,

EUDOXIA, u-dok'si-a, Byzantine empress: wife of Arcadius, emperor of the West: d. 409. She was the daughter of Banto a Frankish general of Theodosius. Eutropius the eunuch, intriguing against Rufinus, chief minister of Arcadius, induced the emperor to take her to wife, instead of marrying the daughter of Rufinus, as the latter had designed. Eutropius soon after this union caused Rufinus to be put to death and succeeded him. Eudoxia, if we may believe John Chrysostom, was an infamous creature, although at one time winning his ad¬ miration and profuse acknowledgments by an open profession of religious earnestness. She was a woman of strong passions and resolute will, and when Eutropius insulted her by saying that as he had raised her so he could debase her, she appealed to the weak Arcadius who at once degraded. Eutropius from, all his honors and ordered his statue in the market place of Constantinople to be destroyed. Chrysostom so vehemently inveighed against the court life of Eudoxia that she caused him to be banished in

403, but popular clamor, added to the panic caused by an earthquake, induced her to recall him. But her enmity caused his second exile in

404. She survived this persecuted prelate only two years, and if she were too impatient under the almost Aristophanic invective of a bishop

who was more a monk than a courtier, she was probably sincere in her anxiety to rescue the feeble Arcadius from the dominion of a min¬ ister like Eutropius, and the best act she ever did in her life was to bring this monster of profligacy and corruption to the end of his career.

EUDOXIA, Roman empress, who wras the daughter of Theodosius II : b. Constantinople, 422; d. about 463. She was married to her cousin Valentinian III, emperor of the West, after whose death, by the hands of emissaries of the senator Maximus, she was constrained to espouse the latter. Maximus subsequently had the folly to reveal to her the part which he had taken in the murder of Valentinian, and when the time for vengeance seemed to her to have come she invited to Italy Genseric, king of

the Vandals, at whose approach Maximus was mur¬ dered. Genseric delivered Rome to pillage and bore away with him to Africa Eudoxia and her two daughters.

EUDOXIA FEODOROVNA, tsarina of Russia: b. 1669; d. 1731. At 19 she became the wife of Peter the Great, but her adherence to the Conservative party caused her husband to look on her with little favor and in 1698 for refusing to consent to a divorce she was im¬ prisoned in a convent at Susdal. In 1718 she was brought to Moscow for trial on a charge of adultery and forced to confess her guilt. Thereafter she was confined in the monastery of Staraya Lodoga, but on the accession of her grandson, Peter II, in 1728, she was set at liberty and returned to Moscow, where she died.

EUDOXIANS, u'dok'si-anz, followers of Eudoxius, who from 356 a.d. was bishop of Antioch, in Syria, and from 360 to his death in 370 bishop and patriarch of Constantinople. He was successively an Arian, a Semi-Arian and an Aetian. Respecting the Trinity, he believed the will of the Son to be differently affected from that of the Father.

EUDOXUS (u-dok'sus) OF CNIDOS,

Greek astronomer, lived about 370 b.c., was the scholar and friend of Plato. All his works are lost, but the poem of Aratus on astronomy makes us acquainted with the extent of his astronomical knowledge. Eudoxus seems to have been the first to introduce an astronomical globe into Greece and this may account for the great reputation which he acquired and long continued to enjoy. He is said to have discov¬ ered that the solar year is six hours longer than 365 days and to have invented a sun dial. He was considerable of a philosopher too, in his day; and he held that the summum bonum of all things is pleasure, which is the aim of every¬ one. Consult Letronne, (Sive les ecrets et les travaux d'Eudoxe de Cnide) (1841).

EUFAULA, u-fa'la, Ala., city in Barbour County, on the Chattahoochee River, and on the Central of Georgia Railroad; 80 miles south¬ east of Montgomery. It is at the head of steamboat navigation on the river; is the trade centre of a large manufacturing and agricul¬ tural district, and carries on an extensive cotton-shipping trade, exporting over 30,000 bales annually. It has manufactures of cotton- goods, cottonseed oil, buggies and fertilizers. It has gas and electric lights, waterworks plant erected by the city in 1897 at a cost of $60,000,

public parks, Union Female College, public high school and three national banks. Pop. 4,939.

EUGANEAN (u-ga'ne-an) HILLS, a range of well-wooded hills, lying

southwest of Padua, in northern Italy, between the river Bacchig- lione, the canals of Battaglia and Este and the river Bisatto, deriving their name from an ancient Italian people called Euganei. They owe their origin to eruptions of trachyte dur¬ ing the Jurassic Period. The highest point, Monte Venda, reaches about 1,980 feet. On their slopes stand several villas with interesting histories, among them Petrarch's house at Arqua in which the Italian poet died in 1374. His tomb is on the market square of Este at the southern end of the Hills and near this town is the villa, I Cappuccini, lent by Byron to Shelley, who there finished the first part of (Prometheus Unbound and also wrote (Lines Written Among the Euganean Hills 5 (1818). There are also a number of monasteries dating back to the early Middle Ages, some of them in ruins. Valuable building stone, quarries and mineral springs abound. Consult Reyer, E., (Die Euganeen. Bau und Geschichte eines Vulkans) (Vienna 1877) ; Symonds, J. A.,*

(Among the Euganean Hills (in Fortnightly Review, Vol. LIV, p. 107, London 1890).*

EUGANEI. See Euganean Hills.

EUGEN, Frederich Karl, Duke of Wurt- temberg, Russian general : b. Oels, Germany, 1788; d. 1857. His aunt was the wife of Tsar Paul of Russia and while still in his early years he was made major-general. In 1806-07 he took part in the military operations in Prussia and in 1810 in Turkey. He won distinction at Boro¬ dino, Krasnoi, Lutxen, Kulm, Leipzig and other battles, commanded the Seventh Russian Army Corps in the war with Turkey in 1828 and re¬ tired from the service after the peace of Adrian- ople. He now gave his attention to study and composed an opera (Die Geisterbraut, produced at Breslau in 1830. His works include (Erin- nerungen aus dem Feldzuge des Jahres 1812 in Russland) (1846) and*

EUGEN ONIEGIN, an opera in three .acts by Peter Uich Tschaikowsky (libretto adapted from Poushkin), first performance by the students of the Conservatory at Moscow in March, 1879. The reception was cool, but grad¬ ually the work crept into popular favor. In spite of the strong dramatic character of Tschaikowsky's music, he never developed any marked talent for the theatre and from the dramatic standpoint (Eugen Oniegin shows many weaknesses. Beside the works of the younger Russian school of which Monssorgsky is the leader, it seems to lack the virility that has come to be associated with modern Russian music. The influence of sunny Italy is felt rather than that of the Northern steppes. But the music breathes the composer's joy in cre¬ ation and is pervaded by a romantic melancholy and elegiac sentiment that makes its emotional appeal very strong. The letter scene is the most popular bit in the opera. Rosa New- march, who has made a special study of Rus¬ sian opera, likens (Eugen*

Oniegin to <(the embodiment of some captivating, wayward, fe¬ male spirit, which subjugates all emotional natures, against their reason, if not against their will,® Lewis M. Isaacs.*

EUGENE

EUGfeNE, e-zhan, Prince (Fran£Ois Eu¬ gene de Savoie-Carignan), Austrian general: b. Paris, 18 Oct. 1663; d. Vienna, 21 April 1736. Among all the generals and statesmen of Austria, none has rendered more numerous and important services than Eugene. He was great alike in the field and the cabinet. He petitioned Louis XIV for a company of dragoons, but was refused on account of the opposition of Louvois, Minister of War, who hated the family of Eugene. Indignant at this repulse and at the banishment of his mother, a niece of Car¬ dinal Mazarin, Eugene, in 1683, entered the Austrian service. The distinction he earned at the siege of Vienna in 1683, at that of Belgrade in 1688, at that of Mayence in 1689 and else¬ where, procured for him rapid promotion. War having broken out between France and Austria, he prevailed upon the Duke of Savoy to enter into an alliance with the emperor, and in 1690 received the command of the imperial forces sent to Piedmont to act in conjunction with the troops of the Duke of Savoy. He defeated the Turks at the battle of Zenta (11 Sept. 1697) and obtained on that occasion the applause of Europe. The loss of the Turks at Zenta obliged them to accede to the Peace of Carlowitz, 1699, which was the first symptom of their decline. On the outbreak of the War of the Spanish Succession he was given the command in Italy and defeated the French on several occasions, but inadequate forces led to his defeat at Luzzara, 15 Aug. 1702. In 1703 he received the command of the army in Germany, and his efficient co-operation with Marlborough frus¬ trated the plans of France and her allies. In the battle of Hochstadt (Blenheim), 13 Aug. 1704, the two heroes gained a decisive victory over the French and Bavarian army, com¬ manded by the Prince of Bavaria and Marshal Tallard, the latter of whom was made pris¬ oner. In 1705 Eugene returned to Italy, where he hastened to the relief of Turin, stormed the French lines, forced them to raise the siege and in one month drove them out of Italy. In 1707 he entered France and laid siege to Toulon; but the immense superiority of the enemy obliged him to retire into Italy. During the following years he fought on the Rhine, took Lille and, in conjunction with Marlborough, defeated the French at Oudenarde (1708) and Malplaquet (1709). After the recall of Marl¬ borough and the defection of England and Hol¬ land from the alliance against France, his farther progress was in a great measure checked. The Peace of Rastadt, the consequence of the Treaty of Utrecht, was concluded between Eugene and Villars in 1714. In the war with Turkey, in 1716, Eugene defeated two

superior armies at Peterwardein and Temesvar, and, in 1717, took Belgrade, after having gained a decisive victory over a third army that came to its relief. The Treaty of Passarovitz (concluded in 1718) was the result of this success. His fame is still celebrated in popular song, ((Prinz Eugen der edle Ritter.® He was also distinguished as a discriminating patron of art and literature. Consult Malleson, (Prince Eugene of Savoy

(1888).

EUGENE, u-jen', Ore., city and county-seat of Lane County; on the Willamette River, the Southern Pacific, Oregon Electric and other railroads; 123 miles south of Portland and 50

miles from the Pacific Ocean. The University of Oregon was established here in 1876 and now has about 1,000 students. The city is also the seat of the Eugene Bible University and con¬ tains a Carnegie library. It is the commercial centre of a fertile agricultural region. Lumber¬ ing and gold and silver mining are carried on in the vicinity. The manufactures are chiefly flour, lumber, brick, tiling, fruit drying and packing, a flax factory and some articles for home consumption. The Lffiited States census of manufactures for 1914 showed within the city limits 37 industrial establishments of factory grade, employing 322 persons ; 238 being wage-earners receiving annually a total of $167,000 in wages. The capital invested aggregated $651,000, and the year's output- was valued at $810,000 : of this, $403,000 was the value added by manu¬ facture. The city was settled in 1854, and was incorporated in 1864. The government is ad¬ ministered by a mayor, chosen for two years, and a city council. The waterworks and elec¬ tric-light plant are the property of the city. Pop. 12,000.

*EUGENE ARAM, a novel by Edward * Bulwer-Lytton (q.v.) written in 1831 and pub¬ lished in 3 vols., 1832. It was founded on the career of an English scholar, Eugene Aram : b. 1704; executed for the murder of one Clark in 1759. The character of the murderer and the circumstances of his life made the case one of the most interesting, from a psychological point of view, in the criminal annals of England Aram was a scholar of unusual ability, who, selftaught, had acquired a considerable knowl¬ edge of languages, and was even credited with certain original discoveries in the domain of philology. Of a mild and refined disposition, his act of murder seemed a complete contradic¬ tion of all his habits and ideals of life.*

Eugene Aram is an unusually successful study in fiction of a complex psychological case. At the time of its publication, it caused a great stir in England, many attacks being made upon it on the ground of its false morality. To the present generation its romance is of more inter ¬ est*

perhaps than its psychology. Some years after the novel was first published, the author changed his opinion concerning the guilt of Aram and as a result also changed the story beginning with the edition of 1851. The Eng¬ lish poet, Thomas Hood, wrote a poem on the same theme entitled (The Dream of Eugene AranP (London 1831). It has also been dramatized, first by Bulwer-Lytton, who, how¬ ever, never finished the play but published it in its unfinished form in The New Monthly Maga¬ zine and Literary Journal (Vol. XXXVIII, p. 401, London 1833), and later attached it to the novel itself. Other dramatic versions were pub¬ lished by Moncrieff, W. T., < Eugene Aram, or Saint Robert's Cave> (in (French's Acting Edition of Plays, > Vol. CIII, London and New York, n. d.) ; Williams, E. W. H., (Eugene Aram. A Play in Five Acts) (New Orleans 1874), and Wills, W. G., (Eugene AranV which was produced in 1873 by Henry Irving. For the history and life of Eugene Aram consult Scatcherd, N., (Memoirs of Eugene Aram (London 1838).*

EUGfcNE DE BEAUHARNATS, e-zhan de bo-ar-na. See Beauharnais, Eugene de.

EUGENI ONYEGIN. Pushkin's poem (Eugeni Onyegin> is the prototype of the Rus¬ sian novels dealing with unsuccessful heroes. Here the hero Onyegin represents a member of cultured society in the 20's who took Childe Harold for their example. Indeed, the first canto arose directly under the influence of Byron's (Don Juan) and (Childe Harold, but in the further development Pushkin described, not an individual blase, but a class type of helpless, frivolous upper society, and, to a certain ex¬ tent, gave his poem the nature of a social satire, as which it was recognized by contemporary critics. But, although Pushkin' in the begin¬ ning of his poem pursued Onyegin with banter and irony, he looked more objectivelv at the hero as he proceeded, and even 'pitied him, when his relation to Lenski and Tatyana became tragic. Onyegin began by joining in his friends' orgies, but soon commenced to pine, and at last tried to busy himself with affairs. He wanted to act as a benefactor to his peasants, but was not understood by them. After killing Lenski in a duel, he started on a journey, but even his wandering could not cure his blase spirit. He insulted simple-minded, faithful Tatyana with his cold counsels, and fell in love with her only when he found her married to another man.*

The enormous popularity of this poem is evidenced by the fact that up to 1885 it was re¬ printed in whole or in part 27 times, while for the same period there are recorded 55 critical essays dealing with the subject and 33

trans¬ lations. English translations are by D. Minaieff, (Saint Petersburg 1868) ; by Mrs. J. Buchan Telfer (nee Mouravieff, London 1880) ; by Spalding (London 1881). It was dramatized in 1846, and in this form was kept in the repertoire until 1852. It gained its greatest popularity through Chaykovski's opera, written in 1872.

Leo Wiener.

EUGENICS (from Greek evyevfc well¬ born). According to Francis Galton, the great English scientist who, in 1883, first used the term ((eugenics,® this branch of learning ((is the science which deals with all influences that im¬ prove the inborn qualities of a race.® Within the scope of such influences Galton included all forces that tend to produce an increase in the number of such individuals as possess desirable hereditary qualities and a decrease in the num¬ ber of those whose transmissible traits are un¬ desirable. As applied to the human race Galton admitted that differences of opinion exist as to what hereditary traits are desirable and what are not. A warrior may approve pugnacity, a statesman, tolerance. An hereditary trait ex¬ pressing itself in one of these qualities might easily prove unfavorable for the development of the other. Who, then, is to decide what qualities are really favorable? Galton met this difficulty by pointing out the fact that few per¬ sons would fail to consider desirable such fundamental qualities as health, energy and ability. In a lecture before the Sociological Society of London in 1904 he reviewed some of the results that in his opinion would follow if the British nation through the practice of eugenics were to raise its average quality to that of its better half. (

ically more provident than now. Its dem¬ agogues who (Played to the gallery would play to a more sensible gallery than at present. We should be better fitted to fulfil our vast imperial opportunities. Lastly men of an order of abil¬ ity which is now very rare would become more frequent because the level out of which they rose would itself have risen.® It is evident, from the foregoing, that knowledge of the laws of heredity is requisite if eugenics is to be sci¬ entific in fact as well as in aim. Such knowl¬ edge must necessarily include ability to tell not only what traits are transmissible by physiolog¬ ical processes but also the extent to which they are heritable. If these laws be given as known factors, the eugenist then becomes interested in discussing how they may be utilized. He wishes to know who are the bearers of the de¬ sirable hereditary traits and how they may be led to contribute a relatively large proportion of offspring to the succeeding generation. Like¬ wise he wishes to know who arc the bearers of undesirable hereditary traits and how their contributions may be minimized. Still further, having ascertained these facts he wishes by propagandist methods to spread abroad what¬ ever knowledge exists within the field and by practical measures to better the breed of man.*

The idea that, like the animals, the breed of man may be improved by a conscious selective process is by no means modern. It appears even in early Chinese literature. Plato's sug¬ gestions on this subject in the

caused by the attraction of the best stock to cities and a failure to reproduce therein. The subject matter of de Candolle's work was closely related to that of Gabon's. The conclu¬ sions reached in the former's book, however, did not fully support Gabon's belief that spe¬ cialized ability is hereditary. Gabon imme¬ diately replied to it in an effective manner and shortly after brought out his classic (English Men of Science: their Nature and Nurtured In this he set forth additional carefully com¬ piled data indicating the supremacy of nature over nurture. Shortly after these hopeful be¬ ginnings popular interest in the field now known as eugenics waned in England and for more than two decades little attention was paid to the scientific side of the subject. It is true that during this period Gabon produced two important works (Inquiries into Human Fac¬ ulty and its Development and (Natural Inher¬ itance,) the first in 1883 and the second in 1889, but they aroused comparatively little general notice. Even Gabon himself <(laid the subject wholly to one side for many years."

In America, however, various contributions to the problem of race betterment appeared from time, to time. Among these Mr. Robert L. Dugdale's (The Jukes) (1877) was easily the most important. This was a thoroughly scien¬ tific and intensive study of a degenerate family. In it the characteristics of over 500 descend¬ ants of the head of the family were carefully recorded and a number of important (or otherwise to warn the reader that the conclu¬ sion is tentative. Far from believing that heredity is fatal, Mr. Dugdale was profoundly convinced that (environment } can be relied upon to modify and ultimately to eradicate even such deep-rooted and wide-spreading growths of vice and crime as the

ited number of specialists. Popular interest in the specific eugenic problem of social improve¬ ment through better breeding was waning to some extent in America just as it was in England.

The beginning of the 20th century, however, witnessed a very marked reawakening. By that time Darwin's doctrine of selection had thor¬ oughly established itself and the public was ac¬ customed to think of biological laws as some¬ thing more than mere hypotheses. By that time, also, the Italian school of criminologists including Lombroso, Garofalo and Ferri had aroused lively discussion of the question as to how far there was a true

*hereditary criminal type. In England much alarm had been oc¬ casioned by the military reverses in South Africa. Moreover at about the same period Charles Booth's thorough investigations had been revealing the wide extent of poverty and degradation in London. The discussion of Max Nordau's (Degeneration (1893) which had aroused widespread fears of progressive deterioration had not yet wholly died away and Benjamin Kidd's (Social Evolution * (1894)*

which had emphasized the relation of religion and biology to social progress was still the subject of lively comment in pulpit and press. In view of this situation it is not strange that Karl Pearson, the foremost eugenist of Eng¬ land, after Galton, created almost a sensation when in November 1900 he delivered his now famous Newcastle lecture on (National Life from the Standpoint of Science. In this lecture he reviewed what he regarded as sources of weakness in the British population and em¬ phasized the necessity of being ever ready to meet the competition of other peoples. ((If the nation," he said, <(is to maintain its position in this struggle it must be fully provided with trained brains in every department of national activity. . . . Are we certain we have a reserve of brain-power ready to be trained? We have to remember that man is subject to the universal law of inheritance and that a dearth of capacity may arise if we recruit our society from the inferior and not the better stock." Again he exclaimed, <(Our legislators get wonderfully excited over laws relating to horses and cattle ; they devote money and time to breeding pur¬ poses and realize the strength of the law of inheritance when they endow national studs and give prizes to encourage the maintenance of good stock or when again they work for the establishment of selected herds. But which of them has considered domestic legislation from the national history standpoint? What states¬ man has remembered that in the character of the national fertility of to-day is written the strength or weakness of the nation to-morrow?" Primarily through the efforts of Professor Pearson, this lecture was followed a little later by the founding of the journal known as Biometrika. This journal became the particular organ of those eugenists who attacked the problem from the mathematical and statistical point of view. The impetus given to the move¬ ment by the various investigations published in this journal, however, was greatly strengthened by developments following another striking event — also purely scientific in its nature — which had occurred unexpectedly in 1900. This was the rediscovery by several independent workers of the so-called Mendelian laws of*

heredity. These laws had been announced by Gregor Mendel as early as 1868 but had received practically no attention. After their redis¬ covery, however, biologists all over the world began systematic experiments to ascertain the extent to which the so-called 'daws® applied. Hitherto such Haws® of heredity as had been formulated always expressed a relationship be¬ tween the average amount of a given trait in an entire group of ancestors and the average amount of the same trait in the entire group of their descendants. For example, the Galtonian Haw of ancestral heredity® was, that two parents contribute together, on the average, one- half of the total heritage of the offspring; the four grandparents, one-quarter; the eight great grandparents, one-eighth. This, even if true, tells nothing about the probability of a given individual inheriting any given characteristic from any particular ancestor. The Mendelian laws, however, formulated relationships between specific traits of a single pair of ancestors and the corresponding traits in their descendants. For example, it happens that eye color in man appear to (

The importance for eugenics of the dis¬ covery of the Mendelian laws and of the farther investigation of the extent of their validity is evident. In the case of feeble-mindedness alone, the facts stated above, taken together with other known relationships of similar definiteness, con¬ stitute ample justification for active efforts to prevent propagation by the feeble-minded. This is not the place to present extended discussion of the technical phases of the biological side of the eugenic problem. Attention may properly be directed, however, to some of the hopes and anticipations, cherished by contemporary eugen- ists, that will indicate the possibilities of im¬ provement if, in fact, the biological basis of the claims becomes fully established. Dr. Charles Davenport, director of the department of ex¬ perimental evolution of the Carnegie Institution at Cold Spring Harbor, Long Island, is, at the present time, one of the most enthusiastic be¬ lievers in what the future holds in store for eugenics. In describing the plans for the work of the committee on eugenics of the American Breeders' Association he outlined a number of interesting plans for future advance, Accord¬

ing to Dr. Davenport one sub-committee of that organization is charged with the study of the feeble-minded. ((This committee,® he says, (

The phases of eugenics emphasized by Pro¬ fessor Davenport in the foregoing account are chiefly negative. They have to do with efforts to eliminate the unfit. Positive eugenics deals with a wholly different field, namely, the effort to increase the productivity of the best stocks. There is no doubt whatever that the birth rate among the more highly educated classes through¬ out the civilized world tends to be much lower than that of the more ignorant classes. It is true that a corresponding state of affairs exists in the matter of death rates. In spite of this, however, the actual

effective contribution of the better educated to the next generation is at a much lower rate than that of the ignorant.

Not only is it true that college graduates as a group are scarcely reproducing themselves but the same is true of the foremost men of science. The completed family of the contemporary scientific man in the United States and Canada according to a very careful investigation by Professor Cattell is about two; the surviving family about one and eight-tenths. Twenty-two per cent of the families are childless ; only one family in 75 is larger than six. As a rule the native-born inhabitants of Massachusetts rank fairly high as regards education. During the 25 years from 1887 to 1911 the deaths among this class exceeded births in families where the parents were native born by 269,918. The eugenic importance of these declines in birth rates among educated persons depends entirely upon the question whether, as a matter of fact, the better educated are, on the average, pos¬ sessed of better hereditary charactistics than other classes. Biologically considered the train¬ ing that a man receives cannot be held to in¬ crease in any way the probability of his having children of higher talent than if he had not had any training whatsoever. It may well be, however, that, on the average, those who pos¬ sess better hereditary traits have succeeded in obtaining a good education more frequently than have persons less well endowed by nature. On the other hand it may well be that, on the average, educated and successful persons have merely been more fortunate than others. The question as to whether or not success is an evidence of hereditary superiority has been long debated but is yet far from solution. Gal- ton believed that if the eminent men of any period had been changelings when babies a very fair proportion of those who survived and re¬ tained their health up to 50 years of age would, notwithstanding their altered circumstances, have equally risen to eminence. If a man is gifted with vast intellectual ability, eagerness to work and power of working, Galton could not com¬ prehend how such a man could be repressed. If this belief proves to correspond with fact, it is easy to see that the more successful mem¬ bers of society, including the better educated, must be the carriers of hereditary traits higher than the average. A low birth rate in such classes would be correspondingly serious from the eugenic point of view. It is, however, very doubtful if the argument can legitimately be pushed as far as Galton carried it. Prof. Lester F. Ward was never weary of contending that natural ability is distributed fairly evenly throughout the various classes in society. Naturally he did not contend that all individuals are equally endowed at birth — such a conten¬ tion would have been absurd. He did hold, however, that in all probability the percentage of

individuals highly endowed by nature with desirable hereditary qualities in all nations and in all social classes does not materially differ. If the question here presented could be scien¬ tifically solved it would carry with it the solu¬ tion of the vexed question as to whether some races are by nature superior to others. Galton was consistent in holding that the ancient Greeks were much more highly endowed with desirable hereditary qualities than are modern Europeans, and that the African negro of to-day ranks about as far below the present European as the ancient Greeks ranked above. The anthropol¬

ogist Boas on the other hand agrees with the ˆegalitarian® view held by Ward.

Because of the differences of opinion held concerning many of the biological questions in¬ volved it is evident that no careful thinker is likely to give unqualified approval to the more extreme practical measures advocated by rad¬ ical eugenists. It is probably in part at least for this reason that advocates of the ((steriliza- tion of the unfit® have not as yet succeeded very fully in having their ideas carried over into leg¬ islation. It is true that 12 commonwealths of the United States have enacted sterilization laws, but only two appear to have attempted any enforcement and only a few operations have actually been performed. On the other hand the increasing adoption of the idea that custodial care is necessary for the feeble¬ minded reflects the increasing willingness of public authorities to carry out measures advo¬ cated by those more moderate eugenists who base their practical plans upon established bio¬ logical facts.

Possibly the most hopeful fact in the field 'of eugenics at the present time is the growing interest in the subject itself and the increasing number of trained investigators who are at work upon the various phases of the problems which lie within the field. One has only to glance over the reviews of books and articles on eu¬ genic topics commented on or listed in the Eugenics Review to be convinced of the tre¬ mendous popular literature that is accumulat¬ ing. On the other hand one needs but to scan a few of the numerous strictly scientific jour¬ nals in the field of biology to realize what a vast amount of accurate research is going on within the general field of heredity. To be convinced that much valuable work in the specialized in¬ vestigation of strictly eugenic problems is being done one need but turn to publications embody¬ ing from time to time the results reached at the biometric and eugenic laboratories in England and, in America, the bulletin of the Eugenics Record Office. The work of this American of¬ fice according to its own prospectus is: (1) To serve eugenical interests in the capacity of re¬ pository and clearing house. (2) To build up an analytical index of the traits of American families. (3) To train field workers to gathei data of eugenical import. (4) To maintain a

field force actually engaged in gathering such data. (5) To co-operate with other institutions and with persons concerned with eugenical study. (6) To investigate the manner of in¬ heritance of specific human traits. (7) To ad¬ vise concerning the eugenical fitness of pro¬ posed marriages. (8) To publish results of researches. To such persons as will undertake to fill them out it furnishes free in duplicate (one copy to be retained by the applicant) the following blank schedules: (1) Record of Family Traits; (2) Index to Germ-plasm — a Parallel Family Record of Prospective Marriage Mates; (3) Musical Talent; (4) Mathematical Talent; (5) Tuberculosis; (6) Special Trait Chart; (7) Hare-lip and Cleft-palate.

The foregoing is sufficient evidence that the modern eugenic movement is very much alive. To what extent it will suffer from the present war is difficult to predict. Undoubtedly it will lose the services of many brilliant minds that, had peace continued, would have made notable contributions to the subject. It will thus, with

Courtesy of the Booklovers Magazine

From the painting by Winterhalter

EUGENIE

all the other sciences, feel the Misgenic effect of war. On the other hand the various psycho¬ logical investigations now being attempted on a very large scale with army men as subjects may throw such light on various phases of the eugenic problem that the science will advance even more rapidly than it has in the past. Fur¬ thermore the war may itself produce such po¬ tent demonstrations of various contentions now merely debated that the net result for the sci¬ ence, if not for the race, will be advantageous. Consult Biology; Heredity; Mental Tests; Sterilization.*

Bibliography.— Galton, Francis, (Hereditary Genius } (London 1869) ; id., (Natural Inher¬ itance^ (New York 1889) ; id., (English Men of Science: Their Nature and Nurture) (New York 1895) ; id., Unquiries into Human Fac¬ ulty and Its Development > (New York 1883) ; Pearson, Karl, (National Life From the Stand¬ point of Science) (London 1901) ; Conklin, E. G., (Heredity and Environment in the Devel¬ opment of Men (Princeton 1916) ; Davenport, C. B., (Heredity in Relation to Eugenics) (New York 1911) ; Dugdale, R. L., (The Jukes) (4th ed., New York 1910) ; Goddard, H. H., (Feeblemindedness) (New York 1914) ; id., (The Kallikak Family) (New York 1912) ; Castle, Wm. E. ; Coulter, J. M. ;*

Davenport, C. B. ; East, E. M. ; Tower, W. L., (Heredity and Eugenics > (Chicago 1912) ; Doncaster, L., (Heredity in the Light of Recent Research (Cambridge, England 1911) ; Guyer, M. F., (Being Well Born) (Indianapolis 1916) ; Ten¬ ney, A. A., (Social Democracy and Population } (in Columbia University Studies in History, Economics and Public Law, Vol. XXVI, No. 4, New York 1907) ; Kellicott, W. E., (The Social Direction of Human Evolution) (New York 1911) ; (Eugenics Laboratory Memoirs) (Lon¬ don 1901-) ; (Record Office Memoirs) (Cold*

Spring Harbor, N. Y., 1912-).

Journals: Biometrikia (London 1902-); The Eugenics Review (published by Eugenics Education Society, London 1909-) ; Archiy

für Rassen ■ — und Gesellschafts Biologie (Berlin 1904-) ; The Journal of Heredity (Washington, D. C., 1910).

Alvan A. Tenney,

Assistant Professor of Sociology, Columbia University.

EUGENIE, e-zha-ne (Eugenie Marie de Montijo), ex-empress of the French: b. Gra¬ nada, Spain, 5 May 1826; d. Madrid, Spain, 12 July 1920. Her father, the Count de Montijo, was of a noble Spanish family; her mother was of Scotch extraction, maiden name Kirk¬ patrick. On 29 Jan. 1853 she became the wife of Napoleon III and empress of the French. On 16 March 1856, a son was born of the mar¬ riage. When the war broke out with Germany she was appointed regent (27 July 1870) dur¬ ing the absence of the emperor, but on 4 Sep¬ tember the revolution forced her to flee from France. She went to England, where she was joined by the prince imperial and afterward by the emperor. Camden House, Chiselhurst, be¬ came the residence of the imperial exiles. On 9 Jan. 1873, the emperor died, and six years later the prince imperial was slain while with the English army in the Zulu war. In 1881 the empress transferred her residence to Farnbor-

ough in Hampshire. She published (Some Recollections from My Life) (1885).

EUGENIE GRANDET, e-zha-ne gron-da. In the scenes of the (Comedie Humaine) that present aspects of provincial life the first place by universal assent belongs to (Eugenie Gran- deC (1833). Its heroine is Balzac's finest female character, radiant in the generosity of her love; its story is probably the most terrible study of the corroding influence of avarice in any literature. Its astonishing power of grad¬ ually developing description, exhibited in the account of Old Grandet's house, its strong¬ room, store-

closet, stairway, gives a presiding personality to inanimate objects in which each detail marks the inevitable next step in the inexorable progress of the miser's vice to monomania. Grandet's assumed stammering hesitancy in bargaining infects the reader with the same impatience that it was designed to produce in his victims in negotiation. (

The story in brief outline is this: Felix Grandet, a cooper of Saumur, has amassed wealth from trade, land speculation and usury, but with such shrewd concealment that his wife and his daughter Eugenie think him as straitened as he is penurious. Partial con¬ fidents of his business intrigue for the hand of the unsuspecting heiress, but are made the dupes and tools of Felix to swell his own fortune. Charles Grandet, a Parisian cousin, son of a bankrupt suicide, wins Eugenie's sym¬ pathy and a love of which he proves unworthy. Felix contrives to save his brother's name to his own hidden profit. Eugenie remains faith¬ ful to the memory of Charles, who prospers in India, while Felix, with unrelaxing vigilance, is ever seizing and devising new ways to add to his hoard. Eugenie had given Charles her little store of gold coins on his departure. Her father sees opportunity to increase it by ex¬ change. His discovery of the gift leads to a terrible scene, accentuating the miser's mania. He confines Eugenie and ignores her; avoids his wife, who falls ill. Should she die he would have to render an account of her es¬ tate to his daughter. It becomes policy to keep the ailing wife alive and to cajole Eugenie to a renunciation of the accounting. The mother dies, but Eugenie's renunciation even of the in¬ heritance from her is attained with a truly dia¬ bolical ingenuity by playing on the poor girl's emotions. Five years later Felix dies, clutch¬ ing at the gold on a crucifix. His last words to his daughter, in the very gasp of death : (

suitors, a lawyer, who, thinking to secure her fortune, arranged that each should be the other's heir but was himself first to die.

No novel of Balzac's is better constructed, none has more scenes and descriptions that cling to memory. Grandet's business transactions are told with the keenest psychological insight. The leading characters are among the master¬ pieces of all fiction; the minor personages, es¬ pecially the maid-servant, Nanon, are clearly defined. There are many scenes of great power ; that of the miser's death is incompara¬ ble. Consult translation by Marriage, E., in. (Everyman's library.)

Benjamin W. Wells, Author of (Modern French Literature?

EUGENIUS, u-ja 'm-us, the name of four popes. The first, Saint Eugenius, was elected 654; d. 657. Eugenius II occupied the Roman See from 824 to 827. His election was contested by a powerful faction in the city who favored Cincinnus (Zinzinnus) ; and Lothaire, son of Louis le Debonnaire, who shared the empire with his father, came to Rome to quell the dis¬ turbance. On this occasion the people and clergy of Rome took the oath of fidelity to the two emperors and promised that thereafter when¬ ever a new pope succeeded he should, before his consecration, take oath in presence of the people and the emperor's representative to honor the emperor as the protector of the Church. The Pope was the first to take this oath ; its terms were complied with at the two papal elections next following, for example, of Valentius who filled the see three months and of Gregory IV. Eugenius III : b. Pisa ; d. Tivoli, 7 June 1153. He was a Cistercian abbot and a close friend of Saint Bernard of Clair- vaux and was elected 1145. Before his conse¬ cration the populace of Rome, led by Arnold of Brescia, effected a revolution and over¬ turned the papal government ; during a reign of a little more than eight years Eugenius was most of the time in exile, living at Viterbo, Siena and other places in Italy and in France. Eugenius IV : b. Venice 1383; d. Rome, 23 Feb. 1447. He was a Celestine monk, cardinal and bishop of Siena when he was elected successor to Martin V 1431. On 23 July 1431 was opened the Council of Basel, convoked by his predeces¬ sor; but not one bishop was present for the opening, only theologians, abbots and canons. On 12 November the Pope ordered the council to be dissolved and convoked another council to be held in 1433 at Bologjia ; but the fathers of the council of Basel continued to hold their ses¬ sions ; throughout his reign the Pope was in conflict with the council. From first to last the council sought primarily and almost exclusively to curb the authority of the Roman See, and in consequence there passed between Rome and Basel a succession of bulls ordering the disso¬ lution of the council, annulling its acts, anathe¬ matizing its members; and from the other side decrees of the council declaring that general assembly of the Church to be superior in au¬ thority to the Pope, and finally a decree pro¬ claiming Eugenius deposed and setting up as Pope, Amedeo, Duke of Savoy, who assumed the st}de Felix V. This was the act of the council in its 35th session held 8 July 1439. At the same date there was assembled at Florence, at the call of Eugenius, a council attended by

160 Latin and some 20 Greek bishops, with the Emperor John Palaeologus ; at this council a reconciliation was effected between the Eastern and Western churches ; but it stood only till its terms and conditions became known in the East, when it was repudiated by the Greek Church. The cause of the rival Pope Felix was at this time fatally weakened by the withdrawal by the emperor Sigismund of his support and by his declaring for Eugenius.

EUGIPPIUS, or EUGYPPIUS, an Ital¬ ian monk of the 5th century, born at

Carthage. He studied at Rome and later became the pupil of Saint Severin at Fariana and was afterward abbot of Lucullanum, near Naples. In 511 he wrote (Vita Sancti Severinip but his most im¬ portant contribution to ecclesiastical history is a collection of excerpts from the works of Saint Augustine, (Thesaurus AugustianeusP Consult (Corpus Scriptorum Ecclesiasticorum LatinorunP (Vol. IX, Vienna 1885-86).

EUGNATHUS, ug-na'thus, a fossil fish, a precursor of the mudfish, found in the Liassic rocks of England and also in Bavaria. It pos¬ sessed an elongated body with ganoid scales, supported internally by vertical ribs, some of which were joined to each other. It had dorsal, pelvic, pectoral, anal and tail fins.

EUGUBINE (u'gu-bm) TABLES, the

name given to seven bronze tables found in 1444 at the town of Gubbio, the ancient Iguvium or Eugubium, now in the Italian province of Perugia, bearing inscriptions in a language de¬ cided to be that of the ancient Umbrians. They were purchased by the town and are kept in its town hall. These tables are the most important monument of the language in which they are written. Four are inscribed in Um¬ brian characters, two in Latin and the remain¬ ing one partly in Umbrian and partly in Latin. The contents of the tables refer to the ritual customs of the ancient Iguvinians. Photo¬ graphic reproductions of the inscriptions, with French translations, are given in Breal, M. J. A., (Les Tables Eugubines) (Paris 1875-78). An edition of the Umbrian text with interlinear Latin translation was published by F. W. New¬ man, (The Text of the Iguvine Inscriptions) (London 1864). Consult Aufrecht, S. T., and Kirchhoff, J. W. H., (Die Umbrischen Sprach- denkmaler, etcP (2 vols., Berlin 1849-51) ; Biicheler, F.,

EUGUVIUM. See Gubbio.

EUHEMERISM, u-he'me rizm, or EUE-

MERISM. See Mythology.

EUKAIRITE, u-ka'rit, a rare mineral of a shining lead-gray color and granular struc¬ ture, consisting chiefly of selenium, copper and silver CiuSe.AgoSe. Its name is derived from the Greek word meaning opportune, and was given to it by Berzelius because found soon

after the discovery of selenium. It occurs in Smaland, Sweden, and in Chile

and the Argen¬ tine Republic. Its hardness is 2.5 and its specific gravity 7.5. Consult Dana, E. S., ed. (The System of Mineralogy of James D. Dana) (6th ed., New York 1914).

EULACHON, u'la-kon, or CANDLE-

FISH. See Candle-fish.

EULALIA, u-la'li-a, Spanish virgin martyr : b. Merida, Estremadura; d. 12 Feb. 303 a.d. There is some doubt whether there was only one or more martyrs of this name. At any rate there are two distinct festivals celebrated in Spain, one at Barcelona on 12 February and one at Merida, 10 December. The legends, hymns and acts about these two saints are very similar in many points. Concerning Saint Eulalia of Merida it is reported that when she was only 12 years old, the great persecution of Diocletian was set on foot, whereupon the young girl left her maternal home and, in the presence of the Roman judge, cast down the idols he had set up. She was martyred by tor¬ ture. Aurelius Rudentius has written (about 406) a hymn about the martyrdom of Saint Eulalia of Merida, of which there are a num¬ ber of translations. Her relics are at Oviedo, whereas those of Saint Eulalia of Barcelona are preserved in the Barcelona Cathedral. The latter saint is the patron saint of Barcelona and of sailors. The oldest French poem in exist¬ ence is also devoted to the description of the life and martyrdom of a virgin Saint Eulalia ; but it is a mooted question whether it refers to one of the two Spanish saints or to still another. This manuscript is to be found in the library at Valenciennes. Consult Anon., (Annals of Virgin Saints) (London 1846) ; Baring-Gould, S., (The Lives of the Saints1 (Vols II and XV, Edinburgh 1872) ; Moretus, H., (Les Saintes Eulalies> (in Revue des Questions Historiquesd Vol. LXXXIX, p. 85, Paris 1911) ; Ruinart, T., (Acta Primorum Martyrum, etcP (Amsterdam 1713) ; Suchier, H., (t)ber Inhalt und Quelle des altesten Franzdsischen Gedichtes) (in Zeitschrift filr Romanische Philologie, Vol. X, p. 24, Halle*

1891).

EULALIA, a popular name for certain species of tall perennial ornamental grasses of the genus Miscanthus (family Poacece). They are natives of eastern and southern Asia. The best-known species is probably M. sinensis, which has developed several well-marked horti¬ cultural varieties characterized by green, mottled or striped foliage and large terminal fan-like panicles of flowers, which, after shedding their deciduous parts, are still attractive because of their persistent silky hairs, which give the pani¬ cle a delicate, fluffy appearance for which they are valued as house decorations and for ever¬ lasting bouquets. Because of their beauty, their perfect hardiness and the ease with which they can be propagated by

means of seeds or division of the roots, these plants are universal favorites, especially for bedding purposes.

EULALIUS, an antipope, elected in oppo¬ sition to Boniface I in 418. His election is the first instance of the interference of the tem¬ poral authorities in a papal election. Eulalius was unable to maintain his authority against

Boniface and was forced to leave Rome. Soon afterward he resigned his pretensions and submitted.

EULENBERG, oi'len-berk, Hermann, German physican : b. Muhlheim-on-the-Rhine, 1814 ; d. 1902. He was educated at the universities of Bonn and Berlin. From 1860 to 1870 he was government medical counsellor at Cologne and in the latter year was named counsellor to the Ministry of Education, in which relation he remained until 1887. In Coblenz he founded the Korrespondenzblatt der deutschen Gesellschaft fur Psychiatric und gerichtliche Medizin and from 1870 to 1890 was editor of Vierteljahrs- scliaft fiir gerichtliche Medizin und off entliches Samtatszvesen. He published (Das Medizin- alwesen in Preussen> (1874); Handbuch der Gewerbehygiene> (1876); (Handbuch des of- fentlichen Gesundheitswesens) (1882) ; (Schul- gesundheitslehreC with Bach (2d ed., 1896).

EULENBERG, Philip, Prince: b. Konigs- berg, Prussia, 1847. He took part in the wars waged by his country against Austria and France and later studied law at the universities of Leipzig and Strassburg. From 1888 to 1890 he was Ambassador at Oldenburg, latter at Stutt¬ gart and Munich, and from 1894 to 1902 he served as Prussian Ambassador at Vienna. Ill health compelled (his retirement and in 1900 he was raised in rank, being made Fiirst in that year and having Hertefeld added to his title. He was also made hereditary member of the house of peers. Maximilian Harden attacked him bitterly in the Zukunft in 1907 and Eulen- berg's reputation suffered greatly in conse¬ quence and his influence was diminished. He wrote (Rosenlieder) (1886; many later edi¬ tions) ; (Skaldengesange) (1892) ; ˆichtungen (1892) ; (Erich und Erika und andere Erza- lungen fiir Kinder) (1893) ; (Abenderzalungen, Marchen und Traume* (1894).*

EULENBURG, oi'len-boorg, Albert, Ger¬ man physician : b. Berlin, 1840. He received his education at Bonn and Berlin, was made as¬ sistant at the University Hospital, Greifswald in 1863 and there published (Die hypoderma- tische Injection der Arzneimittel,1 for which he was awarded a prize by the Hufeland Society, Berlin. He was named professor of thera¬ peutics and director of the Pharmacological Institute at Greifswald in 1874, removed to Berlin in 1882 and began his researches in neuropathology, in which he was soon recog¬ nized as the leading*

authority. His published volumes include (Sexuale Neuropathie) (1895) ; (Lehrbuch der Nervenkrankheiten) (2d ed., 1878). He edited the (Real-Encyklopadie der gesamten Heilkunde1 after 1893, and with Schwabe the Deutsche medizinische W o chai¬ se hrift.*

EULENBURG, Botho, Count, German statesman: b. 31 July 1831 ; d. 1912. In 1867 he was elected to the North German Reichstag as a Conservative ; became Minister of the Interior in 1878 and as such formulated the famous So¬ cialist law of October 1878. Differences with Bismarck led to his resignation of this office 1881. In 1892 he succeeded Count Caprivi as president of the Prussian ministry, but owing to controversies between Eulenburg and Caprivi over the bill for an amendment to the criminal

code, the emperor dismissed them both in Octo¬ ber 1894. In 1899 Eulenburg took his seat in the Herrenhaus, or Prussian House of Lords.

EULENSPIEGEL, oi'len-spe-gel, a typical character associated in Germany with all sorts of frolics and fooling. The type originated in Till or Tyll Eulenspiegel, a German clown who lived probably in the first half of the 14th cen¬ tury, and became celebrated for the wild pranks and escapades that he practised in all parts of Germany, and in some of the neighboring coun¬ tries. According to popular account he was born at the village of Kneitlingen, near Bruns¬ wick, and died at Molln, near Lübeck about 1350 where his tombstone with the design of an owl and a mirror on it may still be seen. The tricks and frolics currently attributed to Eulen¬ spiegel first appear in a Low Saxon account written in 1483 ; the earliest edition, in High German, was published at Strassburg in 1515, a reprint of which was published in Halle (1885). A poetic treatment of the same theme was pub¬ lished by Johann Fischart (q.v.) as XVIII, pt. 2, Stuttgart 1892). The same collection published a reprint of the prose version in Vol. XXV. The work became very popular, and was translated into nearly every European language. In English it first appeared as a miracle-play, with the title (A Merry Feast of a Man that was called Howleglas) (Eulenspiegel meaning literally (XXVII, Berlin 1903).

EULER, oi-ler, Leonard, Swiss mathe¬ matician : b. Basel, 4 or 5 April 1707 ; d. Saint Petersburg, 7 Sept. 1783. He was educated by his father, a minister and mathematician, and then studied at the University of Basel under the famous mathematician, Jacob Bernoulli, where he received the degree of Master in 1723. In his 19th year he gained the acccssit of the

prize offered by the Paris Academy of Sciences for the best treatise on the masting of vessels. He went to Russia in 1727 to become a member of the faculty of the newly founded Academy of Sciences of Saint Petersburg and, in 1733, became its professor of mathematics, where he labored with astonishing industry. He com¬ posed more than half of the treatises in this branch of science contained in the 46 quarto volumes published by the Saint Petersburg Academy 1727-83; and at his death left about 200 unpublished dissertations, subsequently

printed by the society. In 1741 he accepted' an invitation from Frederick the Great to become professor of mathematics in the Berlin Acad¬ emy, but in 1766 returned to Saint Petersburg. Soon after his arrival he was attacked by a very serious illness from which he finally re¬ covered, but only after he had lost his eye¬ sight. This, however, did not prevent him from continuing his work, employing a secretary and overcoming the difficulties in connection with his elaborate computations chiefly by means of his remarkable memory. He finally submitted to an operation which, at first, was successful ; but in some way he suffered a relapse and lost his newly recovered sight again. He first gave the example of those long processes in which the conditions of the problem are first ex¬ pressed by algebraic symbols, and then pure calculation resolves all the difficulties. He ap¬ plied the analytic method to mechanics, and enlarged the boundaries of this science. He greatly improved the integral and differential calculus, of which he afterward published a complete course, which surpassed everything then extant on this subject. An extensive optical treatise, (Sur la Perfection des Verres object, des Lunettes,5 in the Memoires de Ber¬ lin (1747), was the result of his inquiries into the means of improving spectacles. The share which he contributed by this work toward the discovery of achromatic telescopes is sufficient to distinguish his name in this department also. He also employed himself in metaphysical and philosophical speculations. He attempted to prove the immateriality of the soul, and to de¬ fend revelation against freethinkers. In his well-known (Lettres a une Princesse d'Alle- magne, sur Divers Sujets de Physique et de Philosophic5 (3 vols., Saint Petersburg 1768- 72), he attacks the Leibnitzian system of mon¬ ads and pre-established harmony. Among his numerous writings may be mentioned here his (Theoria Motuum Planetarum et Cometarum5 (Berlin 1744) ; Untroductio in Analysin Infini-torum5 (2 vols., Lausanne 1748), which has always been regarded as his greatest produc¬ tion ; Unstitutiones Calculi Differentialis5 (Saint Petersburg 1755); Unstitutiones Calculi Integralis5 (3 vols., Saint Petersburg 1768-70) ; (Introduction to Algebra5 (Saint Petersburg 1770) ; his (Dioptrica5 (3 vols., Saint Peters¬ burg 1767-71) ; (Opuscula Analytica5 (2 vols., Saint Petersburg 1783-85). His industry was as remarkable as his genius. During his life of 76 years, of which about 60

were devoted to scientific studies, he published a total of 32 separately printed books written in Latin, Ger¬ man and French, and many running to more than one volume; 331 treatises in the publica¬ tions of the Saint Petersburg Academy, all in Latin ; 14 treatises for the Royal Academy at Paris, in French; 128 treatises for the Royal Academy at Berlin, all in French; and 196 mis¬ cellaneous treatises in Latin. For a detailed bibliography of his works consult Hagen, J. G., (Index Operum Leonardi Euleri5 (Berlin 1896). For his life, etc., consult Fuss, N., (Eloge de M. Leon. Euler5 (Saint Petersburg 1783, Basel 1786) ; Hoppe, E., (Die Philosophic L. Eulers5 (Gotha 1904) ; Schulz-Euler, S., (Leonard

Euler5 (Frankfurt a. M. 1907) ; Rudio, F., (Die Baseler Mathematiker D. Bernoulli und L. Euler5 (Basel 1884); id.,

1884).

EUMauS.a character in Homer's (Odys- sey, Book XV, who recognizes Odysseus on the latter s return from his long absence and who materially assisted the latter in getting rid of Penelope's suitors. He was a swineherd bv occupation.

EUMENES, u'me-nez, Macedonian officer of Alexander the Great: b. Cardia, Thracian Chersonesus, 360; d. 316 b.c. He began his career as secretary to Philip, and after the lat¬ ter's death occupied a similar post under Alex¬ ander, who also placed him in command of the cavalry. After the death of Alexander he was made governor of Cappadocia, Paphlagonia, and the coast along the Euxine as far as Trapezus. In 321 he, with Perdiccas, defeated Antipater, Craterus and Neoptolemus, but in 320 he was himself routed by Antigonus, and forced to re¬ treat to Nora. Here he held out for over a year until his soldiers at last betrayed him into the hands of Antigonus, who had him executed in 316 b.c. Consult the lives by Nepos and Plutarch, also Vezin, (Eumenes von Kardia : ein Beitrag, zur Geschichte der DiadochenzeiC (Munster 1907).

EUMENES II, king of Pergamum: d. 159 b.c. He was a son of Attalus I and suc¬ ceeded to the throne in 197 b.c. He wras a faithful ally of Rome, and for his services against Antiochus was given the provinces of Lydia, Mysia and Phrygia. He was also an able civil administrator and under him the kingdom was great and powerful, also rich and prosperous, and having Rome for an ally it was practically invincible in the East. Eumenes did much as a patron of art and science. He founded a magnificent library

*which in its day had no rival other than that of Alexandria^*

EUMENIDES, u-men'i-dez. See Furies.

EUMENIUS, Roman educator: b. Augusto- dunum (Autun), in Gallia Lugdunensis, 260; d. 311 A.n. He became secretary to Constan- tius Chlorus, whom he accompanied on his campaigns. Constantius commissioned him to restore the famous schools of Augustodunum in 296. We have an address, (Pro Restauran- dis Scholis,5 made there by him in 297. For other addresses attributed to Eumenius consult Baehrens, (Panygerici LatinP (Leipzig 1874) and Teuffel, (Geschichte der romischen Littera- tur> (Vol. Ill, 6th ed., ib. 1913).

EUMOLPIDiE. See Eumolpus.

EUMOLPUS, a mythical personage of an¬ cient times, celebrated as a poet, warrior, hiero¬ phant and legislator, according to the common tradition a Thracian, the son of Poseidon and Chione, the daughter of Boreas. He is said to have been driven from Thrace, but to have afterward returned. The accounts of his sub¬ sequent career vary. According to one tradi¬ tion he was the founder of the Eleusinian mys¬ teries (q.v.), in which he was instructed by Demeter. The sacerdotal family of the Eumol- pides at Athens claimed to be descended from this Eumolpus.

EUMYCETES, u'ml-se'tez, the name used to distinguish Ascomycetes and Basidiomycetes from the Phycomycetes. See Fungi.

EUNAPIUS, Greek philosopher of the 4th century a.b. He was a native of Sardis and throughout his life bitterly opposed Chris¬

tianity. In 366 he set up a Neoplatonist school at Sardis. He wrrote (Lives of the Philoso¬ phers and the Sophists.) This work was edi¬ ted by Boissonade (Paris 1849). He also wrote a history of his own time of which only frag¬ ments have come down to us. These are to be found in A! idler, (Fragmenta Historicorum Graecorum > (5 vols., Paris 1841-73).

EUNICE, a Jewess of Lystra, mentioned in Acts xvi, 1; 2 Tim. i, 5; iii, 15. See Tim¬ othy.

EUNOMIANS, the extreme faction of the Arian sect in the 4th century, so called from the name of their leader, Eunomius (q.v.). They asserted , the doctrine that Jesus Christ the son of God is of different nature (or sub¬ stance) from the Father av6fno r Kara ovoiav icai Kara Travra-. unlike in substance and everything) : thus his doctrine was that of Unitarianism. The doctrine of the Roman Catholic Church, de¬ clared in the Council of Nicsea, was that of dfioovaioe consubstantiality ; that of the Semi- Arians was that the Son is of like or similar substance, dfioiovato r and hence they are called homceusians, while the orthodox took the name of homousians (both words usually written homoiousians, homoousians) . To give solemn expression to their distinctive tenet the Euno- mians changed the baptismal formula, (

EUNOMIUS, Arian bishop: b. Dacora, Cappadocia ; d. there about 395. In the contro¬ versy which gave rise to Arianism, Eunomius was an ardent disciple of Arius. So extreme were his views that he and his followers were looked upon as members of a party within the Arian ranks and were called Eunomians (q.v.). He was made bishop of Cyzicus in 360, but was deposed the following year as a resuit of his extreme views. He lived the life of an exile after this, but finally returned to his birthplace. He wrote a number of works, three of which are still in existence: (ApologeticusP de¬ fence of the Defence) and (Confession of Faith. > The first of these is in (Patres GraecP (J. P. Migne, ed., Vol. XXX, Paris 1857-66) and has been translated into English by Whis- ton, W., (The Apologetick of Eunomius (in Primitive Christianity Revived, * Vol. I, Lon¬ don 1711). The fragments of the second have been collected by Rettberg, C. H. G., (Marcel- liana) (pp. 124-147, Gottingen 1794). Consult Klose, (Geschichte und Lehre des Eunomius) (Kiel 1833).*

EUNUCH, u'nuk, a castrated male, gener¬ ally used to take charge of the harem. Eunuch¬ ism is of prehistoric origin and prevailed among all Eastern nations and peoples and amongst those of the West which had been sub¬ ject to Eastern influences. History refutes the general idea that eunuchs are deficient in cour¬ age and intelligence. In Persia, India, China, and during the later days of the Roman Em¬ pire, they frequently

occupied, with great suc¬ cess, important military and civil positions. In modern times eunuchism is practiced exten¬ sively only in Moslem countries and even there it is gradually losing ground. Of secondary importance has been its practice for religious

reasons, an exaggerated development of asceti¬ cism. In the Christian Church it was, perhaps, most prevalent in the 3d century, though never officially countenanced.

EUNUCHUS, u-nuk'us, a comedy of Ter¬ ence and one of the best of his works, written in 161 b.c. Modern imitators are Sedley in

EUOMPHALUS, a fossil gastropod, hav¬ ing a spiral shell and found in Silurian and Triassic rocks, but most numerous in the Car¬ boniferous Age.

EUORNITHES, u-or'm-thez, a grand divi¬ sion of birds, which, according to some authors, includes all living birds except the ostriches and their allies and the penguins ; and according to others includes all birds, modern and extinct, except Archaeopteryx. In this sense it is equivalent to the preferable term Neornithes (q.v.).

EUPALINUS OF MEGARA, Greek architect, who constructed the great aqueduct for Polycrates on the island of Samos. Con¬ sult Smith, dictionary of Greek and Roman Antiquities, > sub verbo, "Emissarium® (3d ed., London 1890).

EUPATARIA, or EUPATORIA, Russia, seaport, in the government of Taurida, on the Black Sea, 38 miles northwest of Simferopol. Having long been possessed by the Tartars of the Crimea (who gave it the name of Kosloff or Kesloff), it is more Asiatic than European in its aspect. The salt lake of Sake is a bathing resort. Formerly in possession of the Turks it was annexed by Russia in 1783. It was here that the allied forces landed at the commence¬ ment of the Crimean War (14-18 Sept. 1854). It was unsuccessfully attacked by the Russians 17 Feb. 1855. Pop. 30,432.

EUPATORIUM, a genus of composite plants including many (about 600) species, espe¬ cially characteristic of America, where several are well known. Among the most prominent are boneset or thcroughwort (E . perfoliatum) , a native of low grounds, distinguished by the fact that its opposite leaves are joined around the stem; and the Joe-Pye-weed, or gravel- root (E. purputeum) , whose purplish rosy flowers become conspicuous in late summer in wet meadows, borne on stems often 12 feet

high. The hemp-agrimony is a well-known British medicinal herb. The flower-heads in this genus are in corymbs, all the florets tubu¬ lar. Several of these plants have enjoyed from time immemorial a reputation in folk-medi¬ cine as remedies for the breaking up of fevers. Popular tradition has it that eupatorium is good for broken bones, the common name boneset preserving this notion. It has no such action. By reason of a certain amount of volatile and fixed oil which eupatorium contains it makes a fair diaphoretic mixture, and in the form of <(boneset tea® it is of service in causing profuse sweating, This may be of service in the treat¬ ment of congestions in different parts of the body. See Diaphoretics.

EUPATRIDES (Gr. nmaTpidcu, eupatridai, well-born), the aristocracy, or land-owning class of ancient Athens, distinguished from the geomiroi, or peasants, and the demiourgoi, or artisans.

EUPEN, oi'pen (Fr. Neaux), Germany, town in Rhenish Prussia, on the Wenze, near the frontiers of Holland, 10 miles south-south¬ west of Aix-la-Chapelle. Its manufactures are numerous and varied. Eupen owes its manu¬ facturing prosperity to the French refugees, who settled here while the town formed part of the duchy of Limburg, under Austrian rule. After the Peace of Luneville, when this duchy was ceded to France, Eupen belonged to the department of Ourthe until the Peace of Paris in 1814, when this town, with other portions of Limburg, was ceded to Prussia. Pop. 14,000.

EUPHEMISM, a figure of speech by which one avoids the use of words directly expressing anything improper, disagreeable or painful by the employment of phrases that suggest in a more delicate manner or under a more cheer¬ ful aspect the idea to be conveyed. Thus the Greeks, in speaking of the Erinyes or Furies, came to call them the Eumenides, or well-dis¬ posed, gracious goddesses, and sometimes sem- nai theai, ((the august goddesses.® Nearly all languages have some euphemism for death, or to express the fact that one has died, as when we speak of the ˆdeparted.® In the Bible we have the phrases <(he was gathered to his fathers,® "he has fallen asleep,® etc. ; the Romans, with the same intention, said <(he has lived® (vixit) ; the Germans say (

EUPHORBIACE.SE, u-for-bi-a se-e (the Spurge family), a family of plants, consisting of more than 4,000 species of herbs, shrubs and trees arranged in about 220 genera, some of which are well known for their ornamental and economic uses. They are, with few exceptions, natives of warm climates, especially of tropical America, and nearly every species has an acrid juice, usually poisonous, but sometimes made bland when heated. Among the members of the family are many species of commercial im¬ portance. Thus the juice of some species and the roots of others are used in

medicine, for in plants of this kind are found croton oil, castor oil, etc. A few of the Euphorbiaceae yield fra¬ grant balsamic products ; a few, although their juice is poisonous, yield a wholesome starch in considerable abundance (see Manioc) ; a few are cultivated and used as pot-herbs, particu¬ larly species of Plukenetia in the East Indies; a few yield wholesome and agreeable sub-acid fruits, as Ciccn disticha and C. raccmosa in the East Indies; the seeds of some are edible, as those of the candle-nut (q.v.), etc.; the oil of the seeds is also in some cases used for food, like other bland oils, but more frequently for burning, as castor oil, candle-nut oil, the oil of Aleurites cor data in Japan and Mauritius, and the solid oil of Sapinm sebiferum, which is used in China for making candles, and in medicinal preparations as a substitute for lard. From He – vea is derived the highest grade of rubber pro¬ duced in South America. Others yield dye¬ stuffs. The timber of some of the Euphorbia¬ ceae is valuable — for example, African teak. Of the numerous genera, many are represented in the American flora, the most important being Croton Ricinus (castor-oil plants), and Euphor¬ bia or spurge proper. This genus numbers about

700 species, most abundant in the warm parts of the north temperate zone, more than 125 of them being found in America. They are all known as ˆspurge,' and some are poisonous. Some one species is found in almost every part of America, those not native having es¬ caped from cultivation. Some of the species are imposing ornamental plants and are much used in landscape gardening and in green¬ houses, usually for their curious forms of growth, rather than for their beauty.*

Plants of this family, although of widely differing forms of growth and foliage, are char¬ acterized by unisexual, monoecious or dioecious flowers, often brilliantly colored and often in¬ conspicuous, in the latter case sometimes sub¬ tended by brilliantly colored bracts ; the usually three-lobed fruits split elastically when ripe and throw the seeds to greater or less distances.

EUPHORBIUM. See Gums.

EUPHORBUS, in Greek mythology, one of the bravest of the Trojan heroes, the son of Panthoiis. He was slain by Menelaus in the Trojan War.

EUPHORION, Greek grammarian and poet: b. Chalcis, Euboea, 276; d. about 200 b.c. He was educated at Athens and in 220 was ap¬ pointed

librarian to Antiochus the Great. He maintained secret amours with Nicia, wife of Alexander of Euboea, reference to which fre¬ quently appears in the (Greek Anthology. > He produced several works on history and gram¬ mar in prose, and in verse several elegies, epics and epigrams. Fragments of his works appear in Koch, (Fragmenta Comicorum GraecorunP (Leipzig 1880), and Meinke, (De Euphorionis Chalcidensis Vita et Scriptis) (Berlin 1823). Consult Christ-Schmid, (Geschichte der griech- ischen Litteratur) (Munich 1911) and Ber¬ liner Klassikertexte (Vol. I, 1907).

EUPHRANOR, Greek sculptor and painter of the 4th century b.c. He lived at Corinth. His most famous statues were an Apollo, a Paris, a Leto, with Apollo and Artemis in her arms. His most celebrated painting was that representing 12 gods in the Stoa Basileios, at Athens. Consult Gardner, E. A., (A Handbook of Greek Sculpture) (London 1911).

EUPHRASIA, a genus of plants of the figwort family (Scrophulariacece) . It com¬ prises about 110 species, natives of temperate and cold regions of both hemispheres, several of them occurring in North America. They are annual or perennial low-branched herbs, with small, blue, yellow or white flowers, generally known by the name eyebright. The principal American species are E. artica, glandular eye- bright and E. am eric ana, hairy eyebright, the most widely distributed. The common Eng¬ lish eyebright, E. officinalis, is not known in America. This is a very pretty little plant, the flowers white streaked with purple, and a yel¬ low spot on the lip. It grows so abundantly in some places, as to give the ground an appear¬ ance of being covered with snow, during the time of its flowering, from May to September. The whole plant is slightly aromatic. It has been used with success in catarrhal inflamma¬ tions of the eye, in cough, hoarseness, earache or headache which follow after catarrhs. vol. to — 37

EUPHRATES, u-fra'tez, a celebrated river in the Arabic Peninsula, having its sources in cen¬ tral Armenia, at no great distance from the shores of the Euxine, and its mouth in the Per¬ sian Gulf ; length, including windings, 1,716 miles. It is formed by the junction of two large streams, called the Kara-Su and the Mourad- Chai. These two head streams unite near Kaban Maden, about lat. 38° 58′ N. ; long. 38° 30′ E. ; from which point the river holds in the main a southeasterly course, until it falls into the Persian Gulf. At Korna, about 100 miles from its mouth, it is joined by the Tigris, and the united streams take the name of the Shatt-el-Arab. In point of current the Eu¬ phrates is for the most part a sluggish stream, except in the height of the flooded season. The Shatt-el-Arab has a depth of from three to five fathoms and presents banks covered with vil¬ lages and cultivation. The most important town on the Shatt-el-Arab is Bassora or Basra. The melting of the snow in the mountains along the upper part of the river's course

causes the Euphrates to rise. This takes place about the beginning of March and it increases gradually up to the end of May. The river continues high for 30 or 40 days; but after¬ ward there is a daily decrease. From the mid¬ dle of September to the middle of October the river is at the lowest. The Euphrates is navi¬ gable for a long distance from the sea, but there are numerous rapids. Steamers navigate the Shatt-el-Arab. Between the Euphrates and the Tigris lies the celebrated region Mesopotamia.

EUPHROSYNE, u-fros'Fne (Lat., from Gr. E vpooivT} the personification of joy, from evpovt euphron, joyous), in Greek mythology, one of the three Graces (q.v.).

EUPHTHALMINE, uf'thal'mm, an arti¬ ficial alkaloid the hydrochlorate of which is used in solution in place of atropine and homa- tropine to dilate the pupil of the eye for ex¬ amination with the ophthalmoscope. The great advantage it possesses is that the effect passes off within five hours and there is no danger of causing glaucoma, whereas atropine causes dilation for from 24 to 40 hours and homatro- pine for several days.

*EUPHUES (u'fu-ez), OR THE ANAT¬ OMY OF WIT, and EUPHUES AND HIS ENGLAND, a book and its sequel, by John Lyly, published respectively in 1578 and 1580, when the author was a young courtier. They constitute the first and second part of a work which can only loosely be called fiction in the modern sense. Perhaps the word ˆromance® best expresses its nature. For 50 years the work was fashionable in the polite circles of England; and the word ˆeuphuism** survives in the language to designate the stilted, far-fetched, ornate style of writing introduced and made popular by Lyly. Although Lyly's style had in it too much of the affected to give it long life, he undoubtedly did something toward making the 16th century speech refined, musical and choice. It is this rather than any attraction of story that makes the (Euphues) interesting to the modern student of literature. See Euphuism.*

EUPHUISM, u-fu'izm, an affected style of speech which distinguished the conversation and

writings of many of the wits of the court of Queen Elizabeth. The name and the style were derived from (Euphues, or the Anatomy of Wit) (1579), and the (Euphues and His Eng¬ land) (about 1581), of John Lyly. It is prob¬ able that Lyly got his idea of these books from Ascham who, in his < Schoolmaster, > published a short time before, had said that Euphues is

((he that is apt by goodness of wit, and appliable by readiness of will to learning having all other qualities of the mind and parts of the body that must another day serve learning.® At any rate Lyly adopted the word ((Euphues® as the title of his hero, whom he developed in the sense in which Ascham used the Greek word <(a man well endowed by nature.® Lyly deliberately, in his writing, appealed to the audience of ladies throughout Britain for whom it was made light, pleasant and couched in high sounding English, which his followers soon styled <(the new Eng¬ lish.® For over half a century re¬ mained one of the most popular of books and its author was held to be one of the im¬ mortals. Among his most noted ardent admir¬ ers was Queen Elizabeth herself. These books which became the model of the wits and the gallants of the time, and an acquaintance with which was regarded as a test of courtly breed¬ ing, were characterized by smoothness and ver¬ bal elegance, but chiefly by fantastic similes and illustrations. Sir Walter Scott draws the por¬ trait of a euphuist in the character of Sir Pier- cie Shafton, in

EUPHYLLOPODA. See Branchiopoda.

EUPION, u'pi-on, or EUPIONE, Reich-

enbach's name for a fragrant colorless liquid produced in the destructive distillation of various animal and vegetable substances. It is highly volatile and inflammable ; it is insoluble in water, but mixes with oils, and acts as a solvent for fats and resins. It is not readily acted on by ordinary chemical reagents.

EUPOLEMUS, Jewish historian, who lived in the 1st or 2d century b.c. He wrote a work with the title, Concerning the Kings of Judaea, fragments of which have come to us through Clement Alexandrinus and Eusebius, Eupole- mus claimed that Moses was the inventor of the alphabet and that from him it passed to the Phoenicians and Greeks. For the fragments consult Kuhlmey, (Eupolemi Fragmenta> (Ber¬ lin 1840) and Muller,*

EUPOLIS, Greek poet: b. about 446; d. 411 b.c. In 429 appeared his first play, written when he was about 17. Suidas relates that he wrote altogether 17 pieces and was awarded 10 prizes. Early in his literary career he was on intimate terms with Aristophanes, with whom he collaborated. Later they became enemies and Eupolis was accused of plagiarism. Frag¬ ments of his works are found in Meineke, (Fragmenta Comicorum Graecorum (Vols. I and II, Berlin 1839-57) and Koch,*

sult Christ-Schmid, Ceschichte der griechischen Litteratur) (6th ed., Munich 1911).

EURAQUILO, u-rak'wi-lo, the name given by the sailors to the east-northeast wind which wrecked the ship on which Saint Paul was traveling to Rome (Acts xxvii, 13, 14). The Authorized Version adopted the incorrect Euroclydon from a faulty manuscript, probably.

EURASIANS. See Anglo-Indians.

EURE, er, France, a department in the northwest forming part of Normandy; area, 2,331 square miles. The chief river which flows through it is the Seine, of which the Eure and the Rille are the most important tributaries. Wheat is the principal crop, and the mining and manufacturing industries are extensive. Capital, Evreux. Pop. 323,651.

EURE, a river of France, which has given its name to two departments — that of the Eure, and that of the Eure-et-Loir. The river rises in the department of the Orne, and flows into the Seine, near Pont-de-l'Arche, after a course of 124 miles, being navigable for about half the distance.

EURE-ET-LOIR, er-a-lwar, France, a de¬ partment in the northwest, forming part of the old provinces of Orleannais and Normandy; area, 2,293 square miles. The department is essentially agricultural, and has few manufac¬ tures. The capital is Chartres. Pop. 272,255.

EUREKA, u-re'ka, a Greek word meaning <(I have found it® ; used as an expression of triumph at a discovery. See Archimedes.

EUREKA, Cal., city, county-seat of Hum¬ boldt County, on Humboldt Bay, the Eel River and the Northwestern Pacific Railroad, 225 miles northwest of San Francisco. It has a fine har¬ bor, which has been improved by the United States government on the jetty plan. The city is situated in the famous redwood region, and has large lumber interests. Sequoia Park, a tract of 40 acres of redwood forest, is near the city. The noteworthy features are the Carnegie library, Federal building, county jail, hospital, city hall and courthouse. An extensive trade is carried on in redwood lumber, shingles, but¬ ter, fish, apples and wool, the exports in 1912 amounting to $10,960,000. There are shingle mills, tobacco factories, bottling works, sash and door factories, marble and granite works, a tan¬ nery, iron foundry, woolen mill, etc. The United States census of manufactures for 1914 showed within the city limits 57 industrial establish¬ ments employing 928 persons; 799 being wage earners receiving annually a total of $605,000 in wages. The capital invested aggregated $2,976,000, and the year's output was valued at $2,480,000; of this, $1,263,000 was the value added by manufacture. The government, under a. charter of 1895, is vested in a mayor, elected biennially, and a municipal council. First settled in 1850, Eureka became the county seat

and was incorporated in 1856. The city has gas and electric lights, high schools, daily and weekly newspapers, and five banks. Pop. 13,768.

EUREKA, Ill., city and county-seat of Woodford County, on the Atchison, Topeka and Santa Fe and the Toledo, Peoria and Western railroads, 20 miles east of Peoria. Eureka College, under the auspices of the

Christian Church, was established in 1855. The city is a trade centre for the surrounding agri¬ cultural community. Eureka was incorporated as a town in 1856. The waterworks are owned by the municipality. Pop. 1,559.

EUREKA, Kan., city, county-seat of Green- wood County, on Fall River, and on the Atchison, Topeka and Santa Fe and the Mis¬ souri Pacific railroads, about 58 miles north¬ east of Wichita. It is the seat of the Southern Kansas Academy, under the auspices of the Congregational Church. There is a Carnegie library. The city is. a trade centre for the surrounding rich agricultural region. Eureka has adopted the commission form of govern¬ ment and owns its waterworks. Pop. 2,333.

EUREKA, Nev., town, county-seat of Eureka County, on the Southern Pacific Rail¬ road. It was once a productive mining camp, producing great quantities of lead, gold and silver; and many other valuable minerals. The town has numerous and important smelting and refining works. Because of severe fires, de¬ stroying a large portion of the place, the popula¬ tion decreased from 5,000 in 1880 to 708 in

1920.

EUREKA, Utah, city of Juab County, 90 miles southwest of Salt Lake City, on the San Pedro, Los Angeles and Salt Lake, and the Rio Grande Western railroads. It has copper smelting works and quartz mills and a Carnegie library. Copper and silver are mined in the neighborhood. Pop. 3,608.

EUREKA COLLEGE, coeducational in¬ stitution in Eureka, Ill. ; founded in 1855 under the auspices of the Christian Church. The annual reports show an average of : Professors and instructors, 26; students, 275; and volumes in the library, 12,000.

EUREKA SPRINGS, Ark., city and county- seat of Carroll County, on the Jefferson High¬ way and the Missouri and North Arkansas Railroad, 175 miles northwest of Little Rock. It is a noted health and pleasure resort to which 30,000 visitors come annually. The shipping of water from the

springs is the principal industry. It has two banks with combined resources of $550,000, taxable property valued at $1,875,000, public and high schools and is the seat of the Crescent Cottage for Women. The chief pub¬ lic buildings are the city hall, United States post office and the county courthouse. It has also several large hotels catering to tourists. The receipts of the city amount to about $18,000 annually. The commission form of gov¬ ernment is in operation. Pop. 2,429.

EURIC, a king of the Visigoths (q.v.).

EURINGER, oi'ring-er, Sebastian, German Semitic scholar: b. Augsburg, 1865. He was educated at Munich, Heidelberg, Freiburg, Strassburg, Tubingen and at the Ecole Biblique Pratique at Jerusalem. He entered the min¬ istry in 1887 and preached for two years, after which he toured Egypt and Palestine. From 1894 to 1900 he held a pastorate near Augsburg and in the latter year was appointed professor in the Dillingen Lyceum. He has published

sinieren) (1900) ; (Die Chronologie der bibli- schen Urgeschichte> (1909); (1912); (Ein un- kanonischer Text in der armenischen BibeP

(1913).

EURIPIDES, son of Mnesarchus, a retail dealer of the Attic village, Phlya: b. 480 b.c. on the island of S&lamis, and, according to tradition, on the day of the famous battle ; d. 406. His mother's name was Clito, which indi¬ cates aristocratic lineage. Under the influence of his father Euripides first paid attention to athletics, then to painting, and finally to philos¬ ophy. He learned much from Protagoras, from Prodicus and from Anaxagoras, with whom he holds that nothing which exists per¬ ishes. The poet entered upon his real career at 25. His first success was limited, but he became more and more the favorite of the people. The popularity of his plays at the close of his life and throughout late antiquity was extraordinary. Later comedy was based on his methods. The Romans had a strong predilection for him. In modern times the admiration for Euripides was unbounded until Schlegel set up a standard against him. But Schlegel is unfair: a poet must be measured by his aims. Nevertheless, the poet's works failed at first to win the approval of the Athenians. He was unsuccessful until he was 38, and he won only five first prizes in his whole life. He was also personally unpopular, for he was essentially a pessimist. He felt that the evil in life was not counterpoised by good. He loved retirement and sequestration from open haunts and popularity; preferred the contemplative life of the student to the active life of the statesman. He even acquired the reputation of being a morose cynic, vicious in his private life despite his austere exterior. His gloomy visage, rendered doubly so by un¬ happy

domestic relations, was not attractive to the Athenians, who detested an unsociable dis¬ position. So he lived the life of a recluse, on his estate at Salamis, rapt in secret studies. His library was dukedom enough for him. Late in his life he repaired to the court of Archelaus, king of Macedonia. Here he died in 406. The Macedonians built him a magnifi¬ cent tomb at Pella. The Athenians erected for him a cenotaph in Athens.

Euripides is the most rhetorical of the three tragic poets, because he is most affected by the spirit of the new school. He is the representa¬ tive of the new Athens, of the new ideas which were crowding out the simpler beliefs of the .TEschylean and Sophoclean school. Eurip¬ ides is nearer ourselves. He marks the transition to the modern world. The antique standard cannot be applied to him. With Alfred de Musset he might have said: ((je ne puis m' enfuir hors de rhumanite.® His heart is full of compassion for the poor. None is too lowly for his Alcestis to address, as she bids farewell to the household. Euripides was the first dramatic poet to hold aloof from the world. But the motive was not pure indiffer¬ ence : he spoke to a larger audience. No tragedian treated a greater number of patriotic themes; but he had no affection for the demagogue. The pomp and glory of war had no fascination for him. The suffering of all humanity appeals to his generous heart. In

the cosmopolitanism of Socrates, traces of which we find in Euripides, he anticipates Goethe. A poetic associate of the sophists, he was naturally not orthodox. He did not act¬ ually deny the existence of the gods — that were dangerous in Athens and in the theatre impossible. Euripides simply puts the question to his audience and so troubles their souls. He shrinks from discussing no question of heaven or earth. Toward the close of his life he is supposed to have drawn nearer to the religion of his fathers, but the only monument of this change is that remarkable play, the ˆacchaeR No chronological develop¬ ment in his religious views can be shown. He was a skeptic and a seeker after truth, but not a creative philosopher. No other poet gives us a better conception of what the truth-seek¬ ing Athenian knew and read.

Much has been written about the poet's hatred of women. But we have only to read the ˆlcestis,5 or

The plays of Euripides are not so subtle in structure as those of Sophocles. He cared more for striking situations than for articulated plots, more for thrilling scenes than for unity and symmetry of the whole. But he made a

special study of the recognition as leading to the denouement. Another innovation of Eu¬ ripides was the introduction of the prologue. In the very beginning he gives the entire set¬ ting of the piece, relates all the circumstances. This mechanical opening has been criticized as flat and jejune. But he worked on a different plan from Sophocles. Like Lessing, he be¬ lieved that the audience should know more than the characters themselves. He disdained to excite vulgar curiosity. So he conceived the prologue as an integral part of the play. Moreover, he leaves the most important part untold ; the audience does not know at the outset how the poet proposes to treat the myth; hence the pleasure of surprise is not entirely lacking. The audience enjoys also the sudden revelations to the individual char¬ acters. Furthermore, the Greeks cared more for the quiet contemplation of situations than we do. Nevertheless, this practice of beginning the play with a prologue became a mannerism and was justly ridiculed by Aristophanes. Eu¬ ripides' plays have also a mechanical ending — when the conflict seems insoluble, the dens ex machina interfers expressly to solve diffi¬ culties, to cut the cords atwain that seem too intrinse to loose. This is not high antique art ; but the flaw-hunters unduly emphasize

the defect. Many of the plays also break in two in the middle. This is, indeed, a fault. Nevertheless, the scenes are interesting, some¬ times stirring. Often the thoughts expressed are not adapted to the speaker; and the choral odes frequently seem irrelevant. The poet's monodies constitute an undue proportion of the lyrical element.

We have 80 titles of plays, but very few fixed dates. There are 19 extant dramas — 18 tragedies and one satyr drama ˆCyclops). The (Rhesus, } regularly printed in the editions of the Euripidean corpus, is certainly not by Eu¬ ripides. The earliest extant play is the (Alcestis) (438) ; the most famous is the (Medea) (431) ; but probably the two greatest tragedies are the (Hippolytus) (428) and the (407). One of the most interesting is the (Iphigenia in Tauris* (414) and the most charming the (Ion) (about 416). The other plays with approximate dates are Hphigenia in Aulis) (407), (Orestes) (408),*

Joseph E. Harry,

*Author of iThe Greek Tragic Poets .**

EURIPUS, u-rl'pus, in ancient geography, the strait between the island of Euboea and the mainland, Boeotia in Greece. At Chalcis, the width at the narrowest part was 120 feet. The term Euripus is also sometimes applied to the southeast part of the Euboean Channel.

EUROCLYDON, u-rok'li-don, a tempestu¬ ous wind that frequently blows in the Levant, and which was the occasion of the disastrous shipwreck of the vessel in which Saint Paul sailed, as narrated in Acts xxvii, 14-44. In the form in which the word is found in the re¬ vised version it must be taken as made up of the two Greek words, euros, the east or rather southeast wind, and klydon, a wave. But the word used for it in the' Vulgate is Euro-aquilo, a Latin compound signifying a northeast wind; and some of the best MSS. have the reading Eurakylon instead of Euroclydon, which is ac¬ cepted by some scholars as the preferable read¬ ing. Whatever may have been the true form of the word, it was applied to a northeast or north-northeast, and not an east or southeast wind, as the course taken by the vessel referred to indicates. Exactly such a wind is described by sailors of the present day as prevalent at certain seasons (especially in early spring) in the Mediterranean. The name by which the wind is now known is Gregalia.

EUROPA, u-ro'pa, in Greek mythology, the daughter of Agenor or of Phoenix, king of the Phoenicians, and a sister of Cadmus. The fable relates that she was abducted by Jupiter, who assumed the form of a bull, and swam with his prize to the island of Crete. Here Europa bore to him Minos, Sarpedon and Rhadamanthlus. Zehus made her miraculous presents, Talos (a bronze man), a dog that always kept track of his prey and a spear that never missed its mark. By his order also she became the wife of Asterius, king of Crete. As Hellotia, Europa was worshipped in Crete in the capacity of the goddess of fertility. She

EXPLANATORY KEY

22.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

21. Western Thrace, to be decided by Allied and Associated Powers.

Roumania will probably cede Dobrudja' t Bulgaria.

23. Eastern Thrace to be decided by Allied and Associated Powers.

and

H

Schleswig plebiscite.

Heligoland, to be dismantled Moresnet, ceded to Belgium.

Eupen) , . . , , , T . Associated Powers.

Malmedy J 1 o be deeded by I-eague of Nations 24. Finland, republic; recognized by Allied j Saar Basin, under French control. _ Associated Powers.

Alsace-Lorraine, ceded to France.

Loebschiltz, ceded to Czecho-Slovakia.

Upper Silesia plebiscite.

Area ceded to Poland.

Danzig, a free city.

East Prussia, plebiscite. ^ _ _ t _

Memel, to be decided by Allied and Associated ;°0r,g,a. I proclaimed April' 22,1 91 g' IWk 31. Azerbaijan

20°

K

M

N

40°

O

Longitude Last from Greenwich

Esthonia, republic; recognized by Great Britain. 20. Latvia (declared themselves independent re-

27. Lithuania) publics in 1918.

28. Ukrainia, republic; recognized by Allied and Asso¬

ciated Powers.

29. Daghestan i

an r1 V. Caucasian States, independence

30. Georgia . proclaimed April 22. 1918.

20.

Powers Area ceded to Italy.

Ivlagenfurt, plebiscite.

Area disputed by the Serb-Croat-Slovene State and Italy.

Transylvania, claimed by Roumania.

Bukowina, claimed by Roumania.

Galicia, to be divided between Poland and Ukrainia.

The frontier with Serbia to be modified.

32. Armenia, (part of) independence proclaimed August, 1918.

OLD BOUNDARIES, 1914

NEW BOUNDARIES SHOWN IN TINT^/^fk'S

*I-oroTE *c£ "*

*I Islands-^*

|v«t» i.

Broru

t*u*o'.'4 ^ Slcnsclc^V '^

_ J Strom

9 °

.r*'**) Umea

SHe/>x

G,Xv

7*r, ‘ "i? ^

«Qt,

"“AAO

***'**«,%

Sotit-rhaninq

c'«> < -""“AW... G

' F £%a,',n \ Alans

H, Tori- _ '5->-,GcfkVv| .

uSesiitl(iAr ^7 N 1 A 'T***^

w«^E-r

SKA°1' ‘

, 0°' j, y-

u

. T / 7» 0"k° /STOCKHOLM C* a

y yf 1 ^ Dnjgtf Pc25 1

*£flWr,,*h« b0E5^'H^-

1 e.^r.1. .^onkonin/* V A

^ 7*

■^oo

1 * / e£i J I * D • L*I«V. 's > C l'b^M

t > ° iJI V L 1

J/LZ 8

T , < •

n.ertA»W» ^JCtirTstfanslad \

r-. _ – C^V pri»?0* Chnn,

?Sl^Geor9eSl.ln H, ~

-SB?

. S ,V.O ‘tv*1 – \ LAp

r – m

, jg?ssiir#,tar“'

■ STOCKHOCM. jP^g.^

\\» VAO'

1 V – (*• 0,f s

3 U A Bilwjj ,U < 1 c-rw > vh0"^-^v

oi^sirfjr *

[K^no

(^V’iDtavrvgr^j. J A ^ ’

,ni.

0\ilna A BonsoM

Itcttin

X«»» Slonim „c iyelostolt

. ^f] CctP'*

VU,.l,sV _ , J »C

X > w'ensk 6

Mos" > '^nSBoiWho"0\

A

iB«VtulS!? ^ ■siutA-K stS > > dtt"

- ^Bo«*ovA

wi r

s > .

iS

A^-'bn

Htircvi, C

%V. -t / L

SS.“"~ alajA rT v

^ - - - - " ^

wm. * – « — > T^atendll

Vicsto DURAZ/OO Marietta ^ ^abaiitfX_

JJari ^

j„ ^Veria°,

T. O V > Vtl,ctl Cattara^l

' ^

v •••■'-on*

JV/uca'V

;.W^:

O/ • V °?r,eD® **'!/' • "7-

"'X'-c Pu5«b

Salerno^filMT* VjE^UViuS llirSintO'

n'1— 1 *0^fa

ofrUoVA ■ '

B\cV4

BV

feJjl'U" 1

. " r V “ xtGE.^U

SEA c.oj ^ ^0\\

'0«.J \l

I

Gj* Spar[ivco,0 vi { ju Catantiro

% > W««ov

'ran

i(JugiQ

jTu

unis' T

unis

£

„ oNjyp^,

CoKr“'fa Rizxuto r/.

"i\ % v“k" A .J SEA> t

Malta I.{B«.jV ' "**/

Vcd'o v s > —

Milos Og.ytons

E

G

H

K

- » v – - ■» V (

5

6

EUROPE

SCALES

*Statute Jlilcs, *s!SG = 1 Inch.*

*y 100 ZOO_ 300 *0 <*

kitoiurtm, 4 GO = 1 lurli.

0 50 100 700 390 400 soo 600 TOO

Baud MoNullj & Co.' 11 x 14 Map of > '*w Europe Copyright bj Rand Me. S ally it Co.*

»

N

U

3270

.

.

. /

>

.

'

.

■

.

.

'

-

seems to have been originally a moon deity and a patroness of hunting.

EUROPA, Rape of. See Titian; Vero¬ nese, Paul.

EUROPE, the smallest of the great conti¬ nents but the most important, distinguished above the others by the character of its popula¬ tion, the superior cultivation of the soil, and the flourishing condition of arts, sciences, industry and commerce.

Topography. — Europe forms a huge penin¬ sula projecting from Asia, and is bounded on the north by the Arctic Ocean on the west by the Atlantic Ocean; on the south by the Med¬ iterranean, the Black Sea and the Caucasus Range ; on the east by the Caspian Sea, the Ural River and the Ural Mountains. The most northerly point on the mainland is Cape Nord¬ kyn, in Lapland, in lat. 71° 6′ N. ; the most southerly points are Punta da Tarifa, lat. 36° N., and the Strait of Gibraltar, and Cape Matapan, lat. 36° 17', which terminates Greece. The most westerly point is Cape Roca in Portugal, in long. 9° 28′ W., while Ekaterinburg is in long. 60° 36′ E. From Cape Matapan to North Cape is a direct distance of 2,400 miles, from Cape Saint Vincent to Ekaterinburg, northeast by east, 3,400 miles ; area of the continent, about 3,800,000 square miles. Great Britain and Ireland, Ice¬ land, Nova Zembla, Corsica, Sardonia, Sicily, Malta, Crete, the Ionian and the Balearic Islands are the chief islands of Europe. The shores are very much indented, giving Europe an immense length of coast line (estimated at nearly 50,000 miles). The chief seas or arms of the sea are

the White Sea on the north ; the North Sea, or the German Ocean, on the west, from which branches off the great gulf or in¬ land sea known as the Baltic ; the English Chan¬ nel, between England and France; the Mediter¬ ranean, communicating with the Atlantic by the Strait of Gibraltar (at one point only 19 miles wide) ; the Adriatic and the .Egean seas, branching off from the Mediterranean, and the Black Sea, connected with the Egean Sea through the Hellespont, Sea of Marmora and Bosporus.

The mountains form several distinct groups or systems of very different geological dates, the loftiest mountain masses being in the south central region. The Scandinavian mountains in the northwest, to which the great northern peninsula owes its form, extend above 900 miles from the Polar Sea to the southern point of Norway. The highest summits are about 8,000 feet. The Alps, the highest mountains in Eu¬ rope (unless Mount Elbruz in the Caucasus is claimed as European), extend from the Medi¬ terranean first in a northerly and then in an easterly direction, and attain their greatest ele¬ vation in Mont Blanc (15,781 feet), Monte Rosa and other summits. Branching off from the Alps, though not geologically connected with them, are the Apennines, which run south¬ east, through Italy, constituting the central ridge of the peninsula. The highest summit is Monte Corno (9,541 feet). Mount Vesuvius, the cele¬ brated volcano in the south of the peninsula, is quite distinct from the Apennines. By south¬ eastern extensions the Alps are connected with the Balkan and the Despoto-Dagh of the south¬ eastern peninsula of Europe. Among the moun¬

tains of southwestern Europe are several mas¬ sive chains, the loftiest summits being in the Pyrenees, and in the Sierra Nevada in the south of the Iberian Peninsula. The highest point in the former, La Maladetta or Mont Maudit, has an elevation of 11,165 feet; Mulahaven, in the latter, is 11,703 feet, and capped by per¬ petual snow. West and northwest of the Alps are the Cevennes, Jura and Vosges; north and northeast, the Harz, the Thiiringerwald Moun¬ tains the Fichtelgebirge, the Erzgebirge and Bohmerwaldgebirge. Farther to the east the Carpathian chain encloses the great plain of Hungary, attaining an elevation of 8,000 or 8,500 feet. The Ural Mountains between Eu¬ rope and Asia reach the height of 5,540 feet. Besides Vesuvius two other volcanoes are Etna in Sicily, and Hecla in Iceland. . A great part of northern and eastern Europe is level. The ((great plain>:> of North Europe occupies part of France, western and northern Belgium, Hol¬ land the northern provinces of Germany, and the greater part of Russia. A large portion of this plain, extending through Holland and North Germany, is a low sandy level not in¬ frequently protected from inroads of the sea only by means of strong dykes. The other great plains of Europe are the plain of Lom¬ bardy (the most fertile district in Europe) and the plain of Hungary. Part of southern and southeastern Russia consists of steppes.

Rivers and Lakes. — The main European watershed runs in a winding direction from southwest to northeast, at its northeastern ex¬ tremity being of very slight elevation. From the Alps descend some of the largest of the European rivers, the Rhine, the Rhone and the Po, while the Danube, a still greater stream, rises in the Black Forest north of the Alps. The Volga, which enters the Caspian Sea, an inland sheet without outlet, is the longest of European rivers, having a direct length of nearly 1,700 miles, including windings of 2,400 miles. Into the Mediterranean flow the Ebro, the Rhone and the Po ; into the Black Sea, the Danube, Dnieper Dniester and Don (through the Sea of Azov) ; into the Atlantic, the Guadil- quivir, the Guadiana, the Tagus and Loire; into the English Channel, the Seine ; into the North Sea, the Rhine, Elbe; into the Baltic, the Oder, the Vistula and the Duna ; into the Arctic Ocean, the Dwina. The lakes of Europe may be divided into two groups, the southern and the northern. The former run along both sides of the Alps, and among them, on the north side, are the lakes of Geneva, Neuchatel, Thun, Lucerne, Zurich and Constance; on the south side, Lago Maggiore, and the lakes of Como, Lugano, Iseo and Garda. The northern lakes extend across Sweden from west to east, and on the east side of the Baltic a number of lakes, stretching in the same direction across Finland on the borders of Russia, mark the continuation of the line of depression. It is in Russia that the largest European lakes are found — Lakes Ladoga and Onega.

Geology. — The geological features of Europe are exceedingly varied. The older formations prevail in the northern part as compared with the southern half and the middle region. North of the latitude of Edhu burgh and Moscow there is very little of the surface of more recent origin than the strata

of the upper Jura belonging to the Mesozoic Period, and there are vast tracts occupied either by eruptive rocks or one or other of the older sedimentary formations. Denmark and the por¬ tions of Germany adjoining belong to the Creta¬ ceous Period, as does also a large part of Russia between the Volga and the basin of the Dnieper. Middle and eastern Germany with Poland and the valley of the Dnieper present on the sur¬ face Eocene formations of the Tertiary Period. The remainder of Europe is remarkable for the great diversity of its superficial structure, rocks and deposits belonging to all periods being found within it, and having for the most part no great superficial extent. Europe possesses abundant stores of those minerals which are of most importance to man, such as coal and iron, Great Britain being particularly favored in this respect. Coal and iron

are also obtained in France, Belgium and Germany. Gold is found to an unimportant extent, and silver is widely spread in small quantities. The richest silver ores are in Norway, Spain, the Erzgebirge and the Harz Mountains. Spain is also rich in quicksilver. Copper ores are abundant in the Ural Mountains, Thuringia, Cornwall and Spain. Tin ores are found in Cornwall, the Erzge¬ birge and Brittany.

Climate. — Several circumstances concur to give Europe a climate peculiarly genial, such as its position almost wholly within the temperate zone, and the great extent of its maritime boundaries. Much benefit is also derived from the fact that its shores are exposed to the warm marine currents and warm winds from the southwest, which prevent the formation of ice on most of its northern shores. The eastern portion has a less favorable climate than the western. The extremes of temperature are greater, the summer being hotter and the winter colder, while the lines of equal mean temper¬ ature decline south as we go east. The same advantages of mild and genial temperature which western has over eastern Europe, the continent collectively has over the rest of the Old World. The diminution of mean temper¬ ature, as well as the intensity of the opposite seasons, increases as we go east. Peking, in lat. 40° N., has as severe a winter as Petrograd in lat. 60°.

Botany. — With respect to the vegetable kingdom Europe may be divided into four zones. The first, or most northern, is that of fir and birch. The birch reaches almost to North Cape; the fir ceases a degree farther south. The culti¬ vation of grain extends farther north than might be supposed. Barley ripens even under the 70th parallel of north latitude ; wheat ceases at 64° in Norway to lat. 62° in Sweden. Within this zone the southern limit of which ex¬ tends from lat. 64° in Norway to lat. 62° Russia, agriculture has little importance, its inhabitants being chiefly occupied with the tare of reindeer or cattle, and in fishing. The next zone, which may be called that of the oak and beech, and cereal produce, extends from the limit above mentioned ' to the 48th parallel. The Alps, though beyond the limit, by reason of their ele¬ vation belong to this zone, in the moister parts of which cattle husbandry has been brought to perfection. Next we find the zone of the chest¬ nut and vine, occupying the space between the 48th parallel and the mountain chains of south¬

ern Europe. Here the oak still flourishes, but the pine species become rarer. Rye, which char¬ acterizes the preceding zone on the continent, gives way to wheat, and in the southern portion of it to maize also. The fourth zone, compre¬ hending the southern peninsula, is that of the olive and evergreen woods. The orange, lemon and olive flourish in the southern portion of it, and rice is cultivated in a few spots in Italy and Spain.

Zoology. — As regards animals the reindeer and polar bears are peculiar to the north. In the forests of Poland and Lithuania the urus, a species of wild ox, is still occasionally met with. Bears and wolves still inhabit the forests and mountains; but, in general, cultivation and population have expelled wild animals. The do¬ mesticated animals are nearly the same through¬ out. The ass and mule lose their size and beauty north of the Pyrenees and Alps. The Mediter¬ ranean Sea has many species of fish, but no great fishery; the northern seas, on the other hand, are annually filled with countless shoals of a few species, chiefly the herring, mackerel, cod and salmon.

Inhabitants. — Europe is occupied by several different peoples or races, in many parts now greatly intermingled. The Celts once possessed the west of Europe from the Alps to the British Islands. But the Celtic nationalities were broken by the wave of Roman conquest, and the succeeding invasions of the Germanic tribes completed their political ruin. At the present day the Celtic language is spoken only in the Scotch highlands (Gaelic), in some parts of Ireland (Irish), in Wales (Cymric) and in Brittany (Armorican). Next to the Celtic comes the Teutonic race, comprehending the Germanic and Scandinavian branches. The former includes the Germans, the Dutch and the English. The Scandinavians are divided into Danes, Swedes and Norwegians. To the east, in general, of the Teutonic race, though sometimes mixed with it, come the Slavonians, that is, the Russians, the Poles, the Czechs or Bohemians, the Serbians, Croatians, etc. In the south and southeast of Europe are the Greek and Latin peoples, the latter comprising the Ital¬ ians, French, Spanish and Portuguese. All these peoples are regarded as belonging to the Indo-European or Aryan stock. To the Mon¬ golian stock belong the Turks, Finns, Lapps and Magyars or Hungarians, all immigrants into Europe in comparatively recent times. The Basques at the western extremity of the Pyre¬ nees are a people whose affinities have not yet been determined. The total population of Europe is about 425,000,000; nine-tenths speak the languages of the Indo-European family, the Teutonic group numbering about 108,000,000, the Slavonic and Latin over 95,000,000 each. The prevailing religion is the Christian, em¬ bracing the Roman Catholic Church, the various Protestant bodies and the Greek Church. A part of the inhabitants profess the Jewish, a part the Mohammedan religion.

Political Divisions. — The states of Europe, with their respective areas and populations, are as shown below.

Area and Population. — The following table shows the countries with their government, area and population according to {The Statesman's Year Book :*

I — ^

S LAPLAND

*h£**ihg*

ƒ OTTO (VS

BUVMRi

*J * WOOD >*

*Ch\ **

'I tr T'»8en

STJ«MA v

VaiJa'

BiU?

*=-~^ris*N*

WORSES

VVWERT

SHttP

< tester

t$l J • ' E N N A

^ /ifSTR^K,

Cantabj

§Tl

'«« (FRU *tr.,

iw s/t , Bif

6500 A

Uba»t°V

*. s i

BUK&RE

yBJJLGARI

iSOF > A3^LKAN U

^TjPl^lippojP1^

Trebia,

yoreha

Ji.

(Commercial) Scale

t *4W A

Falerm^ i

Statute Miles to one inch H0OLE.

Principal Products . . . –

Navigable Portions of Rivers Most important "Rail ■•. > !»■ —

Most important Stc. mslxip Lines-

LY'.no

Malta c

(B‘u) 'Jdoo ft

Longitude West from Greenwich 0° Longitude East fi

Copyright by Rand McNally Sr Company

Plnsk

Marshes

bohemia

[UNC ARIA'!

si«»S£\ > CriMEAWˆ B LA CK

£lbrUZ

mount.

*ˆiijnhru > *p*

CANTAB,

v-ˆ— TTyr-

Balkan

BALKAN MTS.' 1

; N INS U LA

*fy SIERRA ˆiuOSEa**

kttVesuviuslyi C

(Physical)

Scale

SIERRA NEVr0i(

4~o Statute Miles to one inch Explanation

Pelopon n nt > us

'Sicily

C.ypRJ£

Malta

6500 to 13000 ft.

Dmffitude Wist from Greenwich 0* Longitude EaeVfrom Greenwich ID'

Copyright by Rand McNally &* Company

'

J

■

s

J ,

v-

.1

• ;

i ;

:

■' –

.

• –

A

\

'

1 1

■

.

. ....

Countries

Albania .

Andorra .

Austria .

Belgium .

Bulgaria .

Czechoslovakia .

Danzig .

Denmark .

Esthonia .

Finland .

France .

Germany .

Great Britain and Ireland

Greece . . .

Hungary .

Iceland .

Italy . .

Jugoslavia .

Latvia .

Liechtenstein .

Lithuania .

Luxemburg .

Monaco .

Netherlands .

Norway .

Poland .

Portugal .

Rumania .

Russia (European) .

San Marino .

Spain .

Sweden .

Switzerland .

Turkey (European) .

Ukraine .

Government

Area in square miles

Population

Principality .

10,500

800,000

Republic .

175

5,231

Republic .

39,012

(1910) 7,529,935

Kingdom .

11,373

(1917) 7,642,054

Kingdom .

47,750

(1917) 5,517,700

Republic .

56,316

(1910) 13,914,336

Free city .

579

(1919) 200,000

Kingdom .

15,582

(1916) 2,940,979

Republic .

23,160

1,750, 000

Republic .

125,689

(1918 3,329,146

Republic .

212.659

6191 1J 41,475.523

Republic .

183,331

(1919) 60,900,197

Kingdom .

121,391

(1911) 45,370,530

Kingdom .

41,933

5,250,000

Republic .

54,090

9,171,000

Kingdom .

39 , 709

(1910) 85,183

Kingdom .

110,632

(1915) 36,120,118

Kingdom .

101,254

16,361,459

Republic .

24,440

(1914) 2,500,000

Principality .

65

10,716

Republic .

36,532

(1914) 4,651,000

Grand Duchy .

999

(1910) 263,824

Principality .

8

(1913) 22,956

Kingdom .

12,582

(1918) 6,778,699

Kingdom .

125,001

(1918) 2,632,010

Republic .

141,854

30,072,181

Republic .

35,490

(1911) 5,957,985

Kingdom .

122,282

(1912) 17,393,149

Republic .

1,867,737

(1915) 131,700,800

Republic .

38

(1919) 11,944

Kingdom .

194,783

(1918) 20,719,598

Kingdom .

173,035

(1918) 5,813,850

Republic .

15,976

(1916) 3,937,000

Empire .

2,000

1,250,000

Republic .

498,100

46 , 000 , 000

Bibliography. — Adams, (European History } (1899) ; Allison, (History of Europe) (1853) ; Bryce, (The Holy Roman Empire; (1877) ; Duruy (General History } (1898) ; Dyer, his¬ tory of Modern Europe) (1901) ; Fyffe, his¬ tory of Modern Europe) (1890) ; Freeman, historical Geography of Europe) (1881) ; Gibbon, (Decline and Fall of the Roman Em¬ pire (ed. 1902).

EUROPEAN CITIES, Government of.

See Cities, European, Government of.

EUROPEAN FURNITURE. See Furni¬ ture, Medieval.

EUROPEAN HISTORY. See also His¬ tory, Ancient; History, Mediaeval; History, Modern. See also the articles on the Centuries — First Century; Second Century, etc., and the history of the various nations under their own titles.

EUROPEAN WAR. See War, European,

EUROPHEN, a yellow powder containing 27.6 per cent of iodine. Heat and moisture ap¬ plied set the iodine free. Europhen is easily soluble in alcohol, ether or chloroform, but is insoluble in water. In action it is similar to iodoform, to which it is often preferred be¬ cause of its pleasant odor.

EUROPIUM, a chemical element iound in small quantities in monazite sand. Its symbol is Eu ; atomic weight, 152; it is known in the metallic state.

EUROTAS, u-rd'tas, or IRI, a river of southern Greece (Peloponnesus), at one time called the Iris and Niris in the upper and the Basilipotamo (King's River) in the lower part of its course. It flows in a southerly direction through the valley between the ranges of Taygetu and Parnon, and enters the Gulf of*

Kolokytha. Amyclae and Sparta were on the Eurotas.

EUROTIA, a genus of the goosefoot family (Chenopoliacecu) , which comprises 'two or three species, one of which, E. lanata, is found in western

North America, and is gener¬ ally known as white sage. It is a many-branched shrub, from one to three feet high, the flowers densely covered with long silky hairs. It is also called winter fat, being used by cattle as a winter forage.

EUROTIUM, u-ro'shi-um, the common mold which appears on bread, preserves, etc., and often called herbarium mold. Aspergillus is the generic name now in most general use.

EURUS, the southeast wind, also in Greek mythology, the son of Astrseus and Eos. See Greek Mythology.

EURYALE, u-ri'a-le, a genus of the water lily family (Nympluzacece) . It has but one species, Euryale ferox, a native of China and southeastern Asia. The plant is covered with spines ; the flowers are small, red or purplish, and the leaves very large, sometimes four feet in diameter. The seeds are rich in starch, and in the native countries of the plant are an article of commerce, being roasted and eaten or used in soups. The root is also eaten. The plant is hardy and will grow out of doors in America and reproduce itself as far north as Baltimore.

EURYBIADES, u'n-bl'a-dez, admiral of the Spartan fleet and commander of the united Greek fleets against the Persians in 480 b.c. With Themistocles he shares the glory of the battle of Salamis.

EURYCLEA, the nurse of Odysseus, who recognized the latter on his return by a scar disclosed while washing his feet and reported the matter to Penelope.

EURYDICE, u-rid'i-se, in Greek mythol¬ ogy, the wife of Orpheus, who died by the bite of a serpent. Her husband, inconsolable for her loss, descended to the lower world, and, by the charms of his lyre, moved the infernal deities to grant him permission to bring her back. This they granted, on condition that he would not look back upon her till he had reached the upper world. Forgetting his promise, he looked and lost her forever. This story has often formed a subject for poets — as for Virgil in the Georgies (book iv), and for Pope in his (Ode on St. Cecilia's Day.' One of the first modern operas was the (Eurydice) (Euridice) of Coccini and Peri. It was first produced at Florence in 1600. The name Eurydice was borne by certain Macedonian princesses.

EURYLOCHUS. See Circe.

EURYMACHUS, the son of Polybus and a suitor of Penelope. With the other suitors he was killed by Odysseus.

EURYMEDON, Athenian general. He was commander of a fleet at Corcyra in 428 b.c., and three years later, with Sophocles, son of Sostratides, led an expedition against Sicily. On arrival there they made peace with Hermocra- tes, which the Athenians suspected to have been brought about by bribery. Eurymedon was heavily fined, but in 414 was sent to reinforce the Athenians at Syracuse and lost his life before reaching Sicily.

EURYMONE, u-rim'6-ne, an infernal deity, who gnawed the dead to the bones and was always grinding her teeth. Also a daughter of Apollo.

EURYNOME, u-rin'o-me, in Greek my¬ thology, the daughter of Oceanus and mother of the Graces and of Zeus, and the wife of the Titan Ophion, the ruler of Olympus. In her temple at Phigolia she was represented as half woman and half fish.

EURYPTERUS, u-rip'te-rus, a remarkable fossil arthropod related to the horseshoe crab (Limulns) , many genera and species of which occur in Palaeozoic rocks of western Europe and eastern North America. They include the largest anthropods known, and form the family Eurypteridce and order Enrypterida of the sub¬ class Merostomata (q.v.). They resembled the modern horseshoe crabs in structure, but had elongated, often scorpion-like bodies, terminat¬ ing in a hinged, spike-like or flattened tail or telson. The most remarkable feature, however, is the great size they attained, some exceeding six feet long, so that they were well named by-Haeckel Gigantostraca. The surface was formed by a thin chitinous epidermal skeleton, ornamented by fine scale-like markings, and bearing upon the head-shield two large lateral faceted eyes and a pair of median ocelli. Be¬ neath the cephalo-thorax are six pairs of legs, the foremost preoral, the basal joints of which serve as jaws. The last pair is greatly enlarged, somewhat flattened and terminated by an oval plate, which suggests that these limbs served as paddles in swimming, but they may have been otherwise useful. In Pterygotns and some allied genera the preoral limbs are modified into more or less antennae-like organs terminating in toothed pincers (chelae), no doubt for seizing prey, etc. The ventral segments are 13, of which the first two bear the genital organs, and

the remainder leaf-like structures regarded as respiratory and equivalent to the ((bookgills" of Limulus. These extraordinary crustaceans are found associated with graptolites, cephalopods and trilobites in the Ordovician ; with marine Crustacea in the Silurian ; with oceanic fishes in the Devonian, and with land and fresh-water plants and animals in the coal measures. Their structure shows that they must have been marine and good swimmers

; but toward the end of their race they became gradually adapted to brackish and even fresh water. The latest review of the group is in Eastman's American edition of Zittell's (Text-book of Palaeon¬ tology } (1900).

EURYSTHENES (u-ris'the-nez) AND PROCLES, pro'clez, the twin sons of Aristo- demus, and the progenitors of the two royal lines of Sparta, which consisted of 31 sovereigns.

EURYSTHEUS, u-ns'thus, the son of Sthenelus, and king of Mycenae, who, at Juno's instigation, ordered Hercules to perform ((the twelve labors.® Hyllus, the son of Hercules, afterward killed him.

EURYTHMICS. See Dalcroze, Emile Jacques.

EUSDEN, us'den, Laurence, English poet: b. Spofforth, Yorkshire, 6 Sept. 1688; d. Coningsby, Lincolnshire, 27 Sept. 1730. He at¬ tracted much attention by his (Original Poems' (1714); (Ode for the New Year' (1720), and other poems. His appointment as poet laureate in 1718 was due to a fulsome poem on the marriage of the Duke of Newcastle, in whose gift the office lay, and was the occasion of much ridicule.

EUSEBIUS (u-se'bi-us) OF CJE- SAREA, surnamed Pamphili, Church historian: b. probably Caesarea, Palestine, 264 a.d. ; d. there, about 349. He is known as Eusebius Caesariensis and Eusebius Pamphili, that is, Pamphilus's Eusebius — a style assumed after the martyrdom of his instructor, Saint Pam- philus. He was chosen bishop of Caesarea 314. He took a prominent part in the Council of Nicaea (325), and was present at the Synods of Antioch (330) and Tyre (335). With the ex¬ ception of Origen and Jerome he was the most learned of the fathers, and is regarded as the father of ecclesiastical history. His moderation procured him the favor of Constantine, who de¬ clared him fitted to be the bishop of the whole world. Though he never subscribed to the views held by Arius and the Arians regarding the Godhead of Christ, he being averse to dis¬ cussing the nature of the Trinity, was always friendly toward them and thus incurred censure as being at best a semi-Arian. Before the rise of Arianism he wrote a spirited defense of the Christian faith in refutation of a book by one Hierocles, who contended that the noted impostor, Apollonius of Tyana, was superior to Jesus Christ in sanctity and in miraculous powers. Eusebius wrote two treatises which have come down to our time: (1) the Prepara¬ tion,' and (2) the demonstration of the Gos¬ pel,' usually designated by their Latin titles, Pneparatio Evangelica,' Pemonstratio Evan- gelica.' The argument of the former is the groundlessness of idolatry, the impostures of the oracles, the monstrous impieties of the

heathen mythology and theology ; and the author shows that the doctrine of the unity of the Godhead and the truth of his revealed religion is as ancient as the world. In the demon¬ strate the argument is that the law and the prophecies of the Jewish scriptures clearly foreshow Jesus Christ and the Gospel. Of his other works extant the chief is his (History of the Church from the Time of Its Founder to the year 323. > It has the defect that in it no mention is made of the wickedness or dis¬ sensions of Christians as not being edifying to the faithful. See Schone, die Weltchronik des Eusebius in ihrer Bearbeitung durch Hierony¬ mus) (1900).

EUSEBIUS OF EMESA, Greek ecclesi¬ astic: b. Edessa; d. Antioch about 360. He studied under Eusebius of Gesarea, and at Alexandria and Antioch. Averse to all theo¬ logical controversies he declined the bishopric of Alexandria vacant by the deposition of Athanasius. He was afterward, however, ap¬ pointed bishop of Emesa, in Syria, but was twice driven away by his flock, who accused him of sorcery on account of his astronomical studies. The homilies extant under his name are probably spurious.

EUSEBIUS EMMERAN. See Daumer, Georg Friedrich.

EUSEBIUS OF NICOMEDIA, Arian bishop : d. Constantinople 342. He was ap¬ pointed bishop of Beryta (Beirut) in Syria and afterward of Nicomedia. He appeared as the defender of Arius at the Council of Nice and afterward placed himself at the head of the Arian party. He baptized the Emperor Con¬ stantine in 337, and became patriarch of Con¬ stantinople in 339.

EUSKALDUN, u'skal-don. See Basques.

EUSKIRCHEN, ois'kir-ken, Prussia, town and capital of a circle in the Rhine province, 15 miles west of Bonn. It has manufactories of cloth, furniture, leather, machinery, flour, meal, pottery, malt and beer. Pop. 12,413.

EUSPORANGIATES, u'spo-ran'ji-a'tez, plants in which the sporangia occur beneath the body surface and not on the surface. The class includes all the seed plants and most of the Pteridophytes.

EUSTACHIAN (u-sta'kian) TUBE, in anatomy, a canal leading from the pharynx to the tympanum of the ear; named for the Italian anatomist, Eustachio. See Ear.

EUSTACHIO, a-oos-ta'ke-o, Bartolom¬ meo, Italian anatomist : b. San Severino, c. 1500; d. Fossombrone, August 1574. He studied at Rome and became professor of medi¬ cine at the Studeo della sapienza there and was also pensioned physician. He later be¬ came physician to Cardinal Peretti, who there¬ after became Pope Sixtus V. Although Eus¬ tachio at first took the part of Galen against Vesalius, he advanced the science of anatomy very considerably and thoroughly understood the importance of comparative and pathological anatomy. He later came to appreciate the work of Vesalius. The eustachian tube to the middle ear and the eustachian valve of the foetal heart perpetuate his name. He investigated the structure of the kidneys, the teeth, the os¬ sicles of the ear, the azygous vein, the ductus

thoracicus, the valve of the vena cava inferior, the oranial nerves, the muscles of the head and neck and the valves of the coronary veins. He published (De Renibus Liber) (Venice 1563) ; (De Dentibus Liber> (Venice 1563) ; (Opus- cula Anatomica) (Venice 1564) ; (Tabulae An- atomicae) (Rouen 1714).

EUSTACHIUS, u-sta'ki-us, or EUSTA¬ THIUS, Roman martyr of the 2d century. At first named Placidus, after his conversion to Christianity he took the name of Eustachius. It is told that while hunting he beheld Christ between the antlers of a deer. He is regarded as the patron of hunters and suffered martyr¬ dom under the Emperor Hadrian. In the Roman Catholic Church he is commemorated on 20 September.

EUSTATHIUS, semi-Arian bishop of Se- baste : b. about 300; d. 380. He introduced monasticism in Armenia and the celibate Eustathian order named from him were con¬ demned at the Gangra Synod in 340. At Se- baste he founded a hospital for the poor. His doctrinal views brought him into continual con¬ flict with his more orthodox contemporaries, but his intimacy with Constantine enabled him to retain his see. In 358 he was deposed by the Synod of Melitene. Consult Loofs, Eu¬ stathius von Sebaste) (Halle 1898).

EUSTATHIUS, Byzantine commentator: b. probably at Constantinople, early in the 12th century; d. 1194. He became a member of a monastic order, was made deacon of Holy Wis¬ dom (Hagia Sophia) and in 1175 was made archbishop of Thessalonica. His principal work is the commentary on the c Iliad J and EdysseyP still a valuable source of informa¬ tion on ancient learning. In 1542 the commen¬ tary was first published in Rome ; the latest edition is that of Stallbaum (7 vols., Leipzig 1825-30). He also wrote a commentary on Dionysius the Periegete, valuable for the frag¬ ments of Stephanus of Byzantium and Arri- anus, which it has preserved to us. Consult the edition of Dionysius by Bernhardy

(Leipzig 1828). He also wrote a commentary on Pindar of which the introduction only survives. He also left a great number of historical pam¬ phlets, tracts and speeches ; these are nearly all found in Migne, (Patrologia Graeca) (Vols. CXXXV, CXXXVI). Consult Krumbacher, (Byzantinische Litteraturgeschichte) (Munich 1897) and Pauly-Wissowa, (Real-Encyclo- padie der classischen AltertumswissenschafD (Vol. VI, Stuttgart 1909).

EUSTATIUS, Saint, one of the Leeward

Islands. See Saint Eustatius.

EUSTIS, James Biddle, American diploma¬ tist : b. New Orleans, La., 27 Aug. 1834; d. Newport, R. I., 9 Sept. 1899. He was admitted to the bar in 1856 and practised in New Orleans till the Civil War broke out. He then entered the Confederate army and served as judge-ad¬ vocate on the staffs of Gens. Magruder and J. E. Johnston till the close of the war. He was elected United States senator in 1876, but not given his seat till late in 1877 ; and was professor of civil law in the University of Louisiana in 1879-84, when he again served as senator, 1885-91. In March 1893 he was ap¬ pointed United States Minister to France, and on the expiration of his term, in 1897, resumed

practice in New York. He translated into Eng¬ lish the (Institutes of Justinian, and Guizot's (History of Civilization.**

EUSTIS, William, American physician and politician: b. Cambridge, Mass., 10 June 1753; d. Boston, 6 Feb. 1825. He served as a sur¬ geon in the American army during the Revolu¬ tion, and subsequently practised medicine in Boston. He was a member of Congress 1801-05 and 1819-23; was Secretary of War 1809-13; and governor of Massachusetts in 1823-25.

EUTAW, u'ta, Ala., town, county-seat of Greene County; on the Alabama Great South¬ ern Railroad, about 95 miles southwest of Bir¬ mingham. It was settled in 1838, named in honor of the battle of Eutaw Springs, S. C. (1781), where the American forces commanded by General Greene gained a victory. It is in a rich agricultural region. It has an oil mill, gin¬ neries, a lumber mill and a cotton compress. Pop. (1920) 1,359.

EUTAW SPRINGS, a small tributary of the Santee River in Charleston County, S. C. It is noted for the battle fought on its banks in 1781. See

EUTAW SPRINGS, Battle of, 8 Sept. 1781, in the Revolution. Tactically a drawn battle, in results it was an important American victory, winning the object of Greene's cam¬ paign, as the British shortly abandoned inte¬ rior South Carolina, retiring to Charleston. Greene, having captured 96 men, stole on the British, some 2,500, under General Stuart, at Eutaw, 50 miles northwest of Charleston, and attacked suddenly at 4 a.m. He had about 2,000 men, part militia, but with Marion and Pickens for commanders; while the regulars were the famous Marylanders under Howard and Hardman, Virginians under Campbell, North Carolinians under Sumner, and the rem¬ nant of the brave Delaware men; with William Washington, R. H. Lee and Pleasant Hender¬ son for cavalry leaders. The British had one line; the right on Eutaw Creek, the left in the air. The Americans had two, besides the re¬ serves; the militia in front, who fought des¬ perately and fired in some cases 17 rounds be¬ fore giving way. Then the regulars rushed forward and swept the British line off the field; but gaining their camp, stopped to plunder it, and though rallied, could not drive the British from the strong positions they had taken. In assailing a brick house, Greene's guns were cap¬ tured and he lost many of his best men ; and a charge of Colonel Washington's was repulsed and himself taken prisoner. Greene was obliged to retreat ; but Stuart decamped in the night. The American loss was 408 regulars killed and wounded, militia probably at least 150; British, 453 killed and wounded, 257 miss¬ ing.

EUTERPE, u-ter'pe (((the well-pleasing"), one of the Muses, considered as presiding over lyric poetry. The invention of the flute is ascribed to her. She is usually represented as a virgin crowned with flowers, having a flute in her hand, or with various instruments about her. As her name denotes, she is the inspirer of pleasure. (See Muses). In botany, Euterpe is a genus of palms found in South America and the West Indies, and embracing seven or eight species. Some specimens attain a height

of nearly 100 feet. The wood of E. oleracea is used for flooring. Its fruit, as also that of E. eduUs , is edible; and the latter species fur¬ nishes assai (q.v.). Euterpe in astronomy is an asteroid (No. 27), discovered by Hind in

1853.

EUTHANASIA, u-tha -na'sT-a, means, in Greek, being happy or opportune in the time of one's death. The correlative adjective is ap¬ plied in Greek literature to a man who died for his country, and it has been translated by the Latin historian <(felix opportunitate mortis." The term euthanasia has recently been employed by some scientific men in advocating the reason¬ ableness of relieving the sufferings of those afflicted with incurable diseases

by administer¬ ing to them anaesthetics or narcotics in suffi¬ cient doses to prove fatal. But religion, law and medical ethics alike condemn all forms of self-destruction.

*EU*THERIA, subclass of Mammalia, com¬ prising all mammals except the monotremes. Consult Cambridge Natural History) (Vol. X, London 1902) and Gregory, (The Orders of Mammals* (in Bulletin of the American Mu¬ seum of Natural History, Vol. XXVII, New York 1910).*

EUTHYMIUS, Bulgarian prelate and author of the late 14th century. He was a pupil of the patriarch, Theodosius, lived for a time as a monk at Mount Athos, but afterward with¬ drew to Tirnovo, the seat of the Bulgarian patriarch. He here directed a large monastic establishment and revised the Slavic liturgical books. In 1375 he was chosen patriarch. He preached against the Bogomiles and other heret¬ ical bodies. He wrote much on the lives of the saints, prominent churchmen and various pastoral epistles. His style was clearly Byzan¬ tine, as was his thought, syntax, etc. His school of religious literature for a long time held sway in Bulgaria, Russia, Rumania and Serbia.

EUTING, oi'tmg, Julius, German Oriental

scholar : b. Stuttgart, 1839 ; d. 1912. He was educated at Tubingen, Paris, London and Ox¬ ford. He was made librarian-in-chief at the Imperial University and Government Library at Strassburg, of which institution he became director in 1900. In 1909 he retired. He traveled extensively in the Orient and collected a great number of Semitic inscriptions, which he bequeathed to the University of Strassburg. He published (Sechs Phonikische Inschriften aus Idalion) (1875) ; ˆeschreibung der Stadt Strassburg und des Miinsters> (1881; 15th ed., 1909) ; (Nabataische Inschriften aus Arabien) (1885); (Sinaitische Inschriften> (1891); (Tage-buch einer Reise in Inner- Arabien (1896) ; ˆandaischer Diwan) (1904).*

EUTROPIUS, Roman historian. He was secretary to Constantine at Constantinople and in 363 fought against the Persians. Little else is known of him beyond the fact that he was still living in 378 a.d. He wrote (Breviarium ab Urbe Condita, a compendium of Roman history down to the time of Valens. An en¬ larged edition was later issued by Paulus Dia-conus, and at the time of the Renaissance the work was in three distinct forms — the two named above and a third interpolated copy. The editio princeps (Rome 1471) was printed*

from the text of Paulus. Good modern edi¬ tions are those of Droysen (Berlin 1879), of Ruehl (Leipzig 1887) and one with English notes by Hazzard (New York 1898). Consult Teuffel, (Geschichte der romanischen Littera- tur> (Vol. Ill, 6th ed., Leipzig 1913).

EUTYCHES, u'ti-kez, heresiarch of the Eastern Church, who flourished in the 5th century. He was a priest and archimandrite or prior of a monastery in Constantinople ; was the founder of the religious sect called after him Eutychians, but also Monophysites, as believing that in Jesus Christ was but one nature, and that the divine nature. The Council of Ephe¬ sus (431) having declared that in Jesus Christ were united the divine and human natures. Eutyches was condemned as a heretic by a synod of bishops held in Constantinople 448, but the next year the ((Robber Synod® of Ephe¬ sus, controlled by Dioscorus, patriarch of Alex¬ andria, reversed that judgment. In 451 the General Council of Chalcedon annulled the decrees of the Robber Synod, excommunicated Eutyches and formulated the Catholic doctrine regarding the hipostatic union of the divine and human natures in Christ. Eutyches died in exile. His doctrine took fast root in Syria, Armenia, Mesopotamia, Egypt and Ethiopia, and in those countries the Monophysite (now known as Jacobite) churches are strong to this day. See Monophysites.

EUTYCHIANISM, u-tik'i-an-iz'm, in Christology, the monophysitism peculiar to Eutyches, an archimandrite, or abbot of a mon¬ astery, who lived near Constantinople during the 5th century a.d. Monophysitism designates the creed of those who in opposition to the Creed of Chalcedon maintain the single-nature in Christ, or that the human and the divine in Jesus Christ constitutes but one composite na¬ ture. In Eutychianism it is held that the divine and human person in Christ is so blended as to constitute one nature. Eutyches was seduced by the vehemence of his opposition to Nestorian- ism into an unorthodox view of the nature of Jesus Christ. Prior to his time the Nicene Fathers had pronounced on the relation of the Father to the Divine Logos but left within the limits of orthodoxy room for a difference as to the relation of the Logos to the human Christ. The Antiochene school dreaded lest the idea of humanity should be entirely merged in that of the Logos. Others, leaning toward the teachings of Alexandria, sought to avoid any contaminations of the Logos by the associations of humanity. These positions on dogma be¬ came intermingled with questions of ecclesias¬ tical authority, the conflict of national ideals and the lower strife of personal rivalry.

It is usually alleged that Eutyches was the victim of his own zeal in opposition to Nesto- rius. Nestorius, a harsh, unpleasant man, in¬ tolerant of doctrinal eccentricities, other than his own, made it his peculiar mission to prevent mankind from assigning human attributes to God, and boldly

took the consequences of his position.

Now in time Nestorius came into collision with Cyril, a member of the Alexandrian school. To Cyril, it seemed that the doctrine of the Incarnation of the Logos is impugned by any hesitation to assign the attributes of hu¬ manity to the divine Christ. And it was this

theological principle which was the cause, or at least the pretext, of Cyril's first attack on Nes¬ torius. On the other side, the Antiochene school, well represented in Theodore of Mops- vestia, a learned man and a great commenta¬ tor, and the teacher whether directly or indi¬ rectly of Nestorius, — held to the christology of Theodore. In it the union of the divine and human in the person of Jesus was moral rather than physical or dynamical, and Theodore care¬ fully avoided the deduction that the relation of divine and human was similar in kind, though different in degree, in Christ and in his follow¬ ers. And the actions of Christ and his quali¬ ties as man and particularly his birth, suffer¬ ings and death, were not, in the christology of the Antiochene school, to be attributed to God without a qualifying phrase. This was the doc¬ trine which Nestorius carried to its logical and practical conclusion ; a position which is sum¬ marized in his saying : ((I cannot speak of God as being two or three months old !® And yet this is the view which the Alexandrians, with Cyril at their head, and Eutyches among its fol¬ lowing, considered as virtually implving two Christs, one divine and the other human.

In the Monophysite controversy Eutyches is the main figure. He had opposed Nestorius; now he was himself accused of disseminating errors of an opposite kind from those of his opponent. His accuser, Euselius of Dorylaeum, induced Flavian, the patriarch of Constantino¬ ple, to call Eutyches to account. The accusa¬ tions made, the aged Eutyches was with diffi¬ culty brought from the seclusion of his monas¬ tery. He was no theologian ; and wished to fall back on the decisions of Nicaea and of Ephesus. But the accusers pressed him, and the old man replied that he confessed Christ as being of two natures before the union in the Incarnation, of one nature afterward, being God Incarnate ! On this point he would not recant : it was his peculiar monophysitism. How he appealed to the emperor, to Pope Leo and to the monks of Constantinople ; how the decision of the Patriarch Flavian to excommunicate Eutyches was controverted by the Council of Ephesus in 449; and how in Chalcedon, two years later, Eutychianism was condemned a second time, and the received doctrine came into existence ; all this is without the limits of this article. In place of the Monophysite doctrine of the one nature, it was established at Chalcedon that Christ was perfect God and perfect man, con- substantial with the Father as to his divinity, and with man as to his humanity, the two na¬ tures being united with him, without conversion, without confusion

and without division. But if the Council of Chalcedon had succeeded in pronouncing Eutyches a heretic, it did not stamp out the influence of his doctrine. The sect of the Eutychians continued quietly to grow for a century after his death in the churches of Armenia, Ethiopia and of the Copts. And soon after his condemnation, 10 different sects could be counted who shared his teachings among themselves. Thus it came about that his heresy got for itself the name ˆten-horned.®

Monophysites still exist in Egypt and the East, under the title of Jacobites, a name de¬ rived from Jacob Barodaeus. From them the orthodox are distinguished, by the name of Melchites, or Royalists, which title they have

owing to their adherence to the edicts of the Emperor Marcian, in favor of the Council of Chalcedon, and their adoption of the doctrine it laid down. (See Monophysites). Consult Harnack, (History of Dogma > ; and Ottley, R. L., (The Doctrine of the Incarnationˆ

EUTYCHIANUS, u-tik'i-a'nus, Saint, the 27th Pope and bishop of Rome. He reigned from 275 to 283. He is commemorated on 8 December.

EUTYCHIDES, Greek sculptor of the 4th century b.c. He was a native of Megara and a pupil of Lysippus. For the city of An¬ tioch he executed a statue of Fortune, which made him famous. Many copies of it were made throughout the Orient and a small copy now rests in the Vatican Museum. Some authorities hold that the (Victory of Samo- thrace} is his work, but of this there is no con¬ clusive proof.

EUXANTHIC (uk-san'thik) ACID (Ci»- HieOio), called also PURREIC ACID, an acid obtained from purree, or Indian yellow. With the alkalis and earths, it forms soluble yellow compounds.

EUXENITE, uk'se-nit, a rare Norwegian mineral, essentially a niobate and titanate of yttrium, erbium, cerium and auranium. It sometimes contains iron calcium and germa¬ nium, while water is always present. It occurs in orthorhombic crystals, but usually it is mas¬ sive. It has a hardness of 6.5, a specific gravity of 4.7 to 5.0, a brilliant metallic-vitreous lustre, and a brownish-black color, showing a reddish- brown translucence in thin slivers.

EUXINE, ulc'sln, the ancient name for the Black Sea.

EVA, Little, a beautiful child, who becomes the friend and consoler of

Uncle Tom in Harriet Beecher Stowe's novel (Uncle Tom's Cabin. } Her early death forms one of the climaxes of that affecting story.

EVACUATION HOSPITALS. See Hos¬

pitals, Military.

EVADNE, e-vad'ne, in Greek fable, the daughter of Iphis of Argos, who threw herself into the funeral pile of her husband, Cateneus.

EVAGORAS, e-vag'6-ras, king of Salamis in Cyprus, flourished about the beginning of the 4th century b.c. His family had been ex¬ pelled by a Phoenician exile. Evagoras re¬ covered the kingdom in 410 b.c., and endeavored to restore in it the Hellenic customs and civil¬ ization. He was friendly with the Athenians, and in return for his services a statue was erected to him at Athens. His increasing power attracted the jealousy of the Persian king, Artaxerxes II, who declared war against him and besieged Evagoras in his capital. He was saved only by the dissensions of his enemies, and was able to conclude in 387 a peace by which the sovereignty of Salamis was nominally at least secured to him. He was assassinated 374 b.c.

EVAGRIUS (e-vag'ri-us) SCHOLAS'- TICUS, Syrian Church historian: b. Epi- phonia, about 536; d. after 594. He wrote the history of the Church in continuation of the ecclesiastical histories of Eusebius, Socrates, Theodoret and Sozomen from 431, the date of

the Council of Ephesus, to 594. His surname, Scholasticus, indicates that he was by profession (probably at Antioch) an advocate, for such at that time was a usual meaning of the word : he was legal adviser to Gregory, patriarch of Antioch, who commended him for his fidelity and learning to the emperor, Tiberius Absi- marus, and obtained his promotion to a judicial office. In recognition of his eminent integrity as an official of the empire his second marriage was made the occasion of a public festival; which, however, had a disastrous ending, for it was interrupted by a violent earthquake, which caused the loss of thousands of lives.

EVALD, a'valt. See Ewald, G. H. A.

EVALD, a'vald, Herman Frederik, Danish novelist : b. 1821 ; d. 1908. His works deal mostly with history and are of considerable merit. They include (Valdemar Krone's Youth) (1860); (The Nordby- Family> (1862); ˆJohannes Falk) (1865) ; (Charles Lyng) (1882) ; (The Swedes at Kronborg) (1867); (Anna Hardenberg (1880) ; (Clara Bille) (1892); (Leonore Kristine) (1895); (Klein Kirsten) (1901) ; (Bondebruden) (1904).*

EVALD, Johannes, Danish lyrical poet: b. Copenhagen, 1743; d. 1781. In 1764 appeared his (Temple of Fortune, } followed two years later by (Elegies) on the death of Frederick V. These works brought him fame, which was further established by the biblical drama, (Adam and Eve,> in 1769. His (Rolf Krake, which appeared in 1770, was the first original tragedy in the Danish language. From 1770 to 1780 he wrote tragedies, comedies and farces, including (The Fishers, > his greatest work, in which appeared the present Danish national anthem. Evald's health had been seriously im¬ paired through overwork and the strain inci¬ dent to the production of (The Fishers* has¬ tened the end. His works were edited by Liebenberg (8 vols., Copenhagen 1855). Con¬ sult his (Life and Opinions * (Copenhagen 1792) ; and the lives by Hammerich (ib. 1882) and Jorgensen (ib. 1888).*

EVANDER, in classical legend, the civilizer of Latium, the son, according to one account, of Hermes and an Arcadian nymph. About 60 years before the Trojan War he established himself in Latium and built, at the foot of the Palatine Hill on the banks of the Tiber, a town, to which he gave the name of Pallantium. The Roman legends represent him as teaching the Latins the use of the alphabet and the arts of agriculture and music, softening their fierce manners by the introduction of more humane laws, and introducing among them the worship of the Lycaean Pan, Heracles, Demeter, etc. In the 2Eneid Virgil brings his hero 2Eneas into connection with Evander, who gave him a favorable reception, and becomes his ally against the Latins. Divine honors were paid to Evander by the inhabitants of Pallantium in Arcadia.

EVANGELICAL, a word literally signify¬ ing "pertaining to the gospel® and used in dif¬ ferent senses. In one of its senses it is a term used to qualify certain doctrinal opinions, stress being laid on the total depravity of human nature, need of conversion, justification by faith, free offer of the gospel, the plenarv in¬ spiration and exclusive authority of the Bible.

In this sense the word, when applied to a whole church, is in Scotland almost synonymous with orthodox; and in the United States it has much the same significance, in contrast to the words <(liberal® and ˆrationalistic.® In England the Evangelical or Low Church party is looked upon as extreme in its views, and is distin¬ guished from the orthodox party, which holds the doctrines above specified in a more modern form. When used in a less general sense some¬ thing more is implied in the word. It indicates peculiar attachment to sound doctrine and pecu¬ liar fervency

in advocating it. In another sense the term is applied in Germany to Protestants as distinguished from Roman Catholics, inas¬ much as the former recognize no standard of faith except the writings of the evangelists and the other books of the Bible, and more espe¬ cially to the national Protestant Church, formed in Prussia in 1817, by a union of the Lutheran and Calvinistic churches.

EVANGELICAL ALLIANCE, a voluntary association of members of the different sections of the Christian Church, organized in London 19-23 Aug. 1846. At this meeting was adopted a doctrinal basis, which is, in effect, the recogni¬ tion by the members of the divine inspiration, authority and sufficiency of the Holy Scriptures ; the right of private judgment in their interpre¬ tation ; the unity of the Godhead and the Trinity of persons therein; the doctrine of human depravity in consequence of the fall ; the incarnation, atonement, intercession and media¬ torial reign of the Son of God; justification by faith alone ; the work of the Holy Spirit in con¬ version and santification ; the immortality of the soul, the resurrection of the body and the final judgment of the world, resulting in the eternal blessedness of – the righteous and the eternal punishment of the wicked; the divine institution of the Christian ministry; and the obligation and perpetuation of the ordinances of baptism and the Lord's Supper. The organization thus commenced has since been extended throughout Protestant Christendom. Branch alliances have been formed in Great Britain, Germany, France, Switzerland, Sweden, the United States, Australia, and among missionaries in Turkey, India, Brazil and Japan. These national branches are related to each other as members of a confederation having equal rights. The whole alliance appears in active operation only when it meets in general conferences having the character of Protestant ecumenical councils, but claiming only moral and spiritual power. The American branch of the alliance was or¬ ganized in 1867. Conferences of the entire alliance have been held in 1851, 1855, 1857, 1861, 1867, 1873, 1879, 1885, 1891, 1896, 1907, that of 1873 having met in New York. The American branch held a conference at Chicago in October 1893. The alliance has aided largely in the promotion of religious liberty in Europe and the East. Consult < Reports 5 of the conferences ; and Arnold, (History of the Evangelical Alli¬ ance) (London 1897).

EVANGELICAL ASSOCIATION, a re¬ ligious denomination founded in Pennsylvania about the beginning of the 19th century by Jacob Albright, a member of the Methodist Episcopal Church, who was born in Pennsyl¬ vania 1759, and from about 1790 traveled among the German population as an evangelist. Al¬

bright founded a society of converts in 1800, which so increased in numbers that it was finally organized in 1807 as the Evangelical

Association of North America, with Albright as bishop. The theology of the association as de¬ fined in its 21 articles closely resembles that of the Methodist Episcopal Church, from which, also, it differs little in government and form of worship. The Church was divided in 1891, when a minority, numbering 40,000, organized the United Evangelical Church. In 1916 the association had 27 annual conferences, including one in Japan, one in Switzerland, and two in Germany; 1,663 preachers, 115,243 communi¬ cants, and property valued at about $11,000,000. Besides its German elements it has a relatively large English-speaking membership and pub¬ lishes English periodicals and English books. It has four bishops, a well-equipped publishing house at Cleveland and another at Stuttgart, Wiirtemberg; a biblical institute and North¬ western College at Naperville, Ill.; two semi¬ naries ; an orphan home at Flat Rock, Ohio ; a charitable society; a missionary society, sus¬ taining domestic and foreign missions in Japan and China and assisting the European churches ; ,a Woman's Missionary Society; a Church Extension Society. Hospitals are maintained in various cities in Germany, and in Chicago and in Bismarck, N. Dak. Its periodicals are The Evangelical Messenger (weekly) ; The Mis¬ sionary Messenger (monthly) ; Der Christliche Botschafler (weekly). Consult Plitt,

EVANGELICAL CHURCH, The United.

See United Evangelical Church, The.

EVANGELICAL CHURCH CONFER¬ ENCE, the name of the general meetings of representatives of the Protestant bodies of Ger¬ many and Austria. The first general confer¬ ence met at Berlin in 1846 and was followed by the Eisenach Conference of 1852. Since 1854 these conferences have been held every two years at Eisenach. The object is the promotion of unity among the several evangelical bodies which send representatives to the conference. The official organ, Allgemeines Kirchenblatt filr das evangelische Deutschland, is issued regu¬ larly at Stuttgart. Consult Braun, (Zur Frage der engern Vereinigung der Deutschen evan- gelischen Landeskirchen5 (Berlin 1902).

EVANGELICAL COUNSELS, in Catho¬ lic theology, are distinguished from divine com¬ mandments in this, that the commandments are of universal obligation for whoever would be saved, while the Evangelical Counsels point to the readiest and surest means of attaining that end. When a certain ruler put to Jesus Christ the question <(What good thing shall I do that I may inherit life?® and received the answer (

giving him one of the Evangelical Counsels, the counsel of voluntary poverty. The celibate life is commended by Saint Paul as more favor¬ able to entire devotion to the service of God than the state of marriage; that Evangelical Counsel is the principal topic of the epistle of 1 Corinthians. Finally, entire obedience is the third of those counsels — renunciation of self- will, cheerful submission to the rule of supe¬ riors. Members of the religious orders of the Catholic Church bind themselves by solemn vows to practise the three Evangelical Coun¬ sels : poverty, chastit}ˆ and obedience.

EVANGELICAL UNION, the name of a religious body, also familiarly known as the Morisonians, from the Rev. James Morison, of Kilmarnock, by whom, with three other clergy¬ men, it was founded in Scotland in 1843. The founders were soon joined by a number of ministers and churches of the Congregational Union of Scotland, and extended themselves considerably in Scotland and the north of Eng¬ land. The Morisonians maintain the univer¬ sality of the atonement, combining with this the doctrine of eternal personal and uncondi¬ tional election. In point of church government the members of the Evangelical Union are independent, but many congregations have rul¬ ing elders. In 1896 nearly all the churches were absorbed by the Congregational Union. The body had in 1899 between 90 and 100 congrega¬ tions, chiefly in Scotland, and 712 ministers. Consult Ferguson, (History of the Evangelical Union) (1876) ; and Adamson, (Life of Dr. James Morison) (London 1898).

EVANGELINE. (Evangeline: a Tale of Acadie) is based upon a true story which traveled from Canada to New England by word of mouth, reached Hawthorne, who did not care to use it for a romance, and was by him turned over to Longfellow, who published his poem in 1847. It instantly won the widest public, and has ever since remained among the most popular narrative poems in the English language. Hawthorne's disinclination to use the incident was probably due to the fact that he did not find it deeply tragic : the fate of the innocent lovers who are separated by a purely external force but who remain faithful till death is hardly more than pathetic. The tenderness, however, with which Longfellow handled the pathos of the theme quite con¬ ceivably appealed to a larger variety of read¬ ers than a stern tragic handling, such as Haw¬ thorne's might have been. In form the poem follows the example set by J. H. Voss's (Luise) (1795) and the greater (Hermann und Doro- thea) (1798) of Goethe, both of which had attempted to treat modern sentiments and man¬ ners with Homeric simplicity. But (Evange- line> owes nothing essential to its predecessors. The hexameters in which the story is told, while not so close to classical hexameters as those of A. H. Clough's (Bothie of Tober-na-Vuolich) (1848) or Kingsley's

the general world of romance. Still, in spite of its lack of raciness and actuality, the poem founded a national legend which has kept alive the memory of an episode that would otherwise have been forgotten ; and by something uni¬ versal in its gracious manner has increased modern literature with a story everywhere read and remembered.

Carl Van Doren.

EVANGELIST (a bringer of good tid¬ ings), in the New Testament, a preacher of the gospel, distinguished (Eph. iv, 11) from the apostles, prophets, pastors and teachers. The term came ultimately to refer to only the authors of the four Gospels, but in modern times has been extended to indicate also an unattached preacher whose specific work is the arousing of personal interest in matters of religion.

EVANGELISTARION, a book of selec¬ tions from the Gospels, used as a service book in the Greek Church. It contains the Gospel lessons for each day in the year. The book which contained the lessons from the Acts and Epistles was called the Praxapostolos. If both were included in a single work, the latter was termed a Euxologia. There are hundreds of manuscripts of these service books in existence, dating, from the 6th century onward. Con¬ sult Gregory, C. R.,

1894).

EVANGELISTS, Symbols of the Four.

These symbols take their origin from Irenaeus, who identified the four living creatures before the throne of God (Rev. iv, 64) with the four Evangelists. For a long time there was little agreement as to the order in which the creatures were assigned to each Evangelist. Later in the Western Church the following order became general : the man represents Saint Matthew ; the lion, Saint Mark; the calf, Saint Luke; and the eagle, Saint John. Consult Goldsmith, E. E., (Sacred Symbols in Art (New York 1911) and Jenner, Mrs. Henry, (Christian Sym- bolism) (Chicago 1910).*

EVANS, Alexander William, American botanist: b. Buffalo, N. Y., 17 May 1868. He was graduated at Yale in 1890 and in 1894-95 studied at Munich and Berlin. In 1895 he began his connection with the botanical department of Yale, becoming professor of botany there in 1906. He is an ex-president of the Botanical Society of America. He has made extensive investigations of the bryophtyes of Connecticut and the hepaticae of Alaska. He is a Fellow of the American Association for the Advancement of Science.

EVANS, Sir Arthur (John), English archaeologist: b. Nash Mills,

Hertfordshire, 1851. He is a son of Sir John Evans (q.v.). He was educated at Harrow, Oxford, and Gottingen, and was keeper of the Ashmolean Museum, Oxford, from 1884 to 1908. Since 1893 he has superintended archaeological re¬ searches in Crete, excavating in 1900-08 the pre¬ historic palace of Knossos. He has published 'Through Bosnia) (1895); Ullyrian Letters; < Antiquarian Researches in Ulyricum* (1883-*

*85) ; (Cretan Pictographs and Prae-Phcenician Script*ˆ (1896) ; ˆFurther Discoveries of Cretan and iEgean Script* (1896); (The Mycenaean Tree and Pillar Cult* (1901), etc. He was knighted in 1911.*

EVANS, Augusta Jane. See Wilson, Au¬ gusta Jane Evans.

EVANS, Christmas, Welsh Baptist divine: b. Isgaerwen, Cardiganshire, 25 Dec. 1766; d. Swansea, 19 July 1838. He was at first a Presbyterian but joined the Baptists in 1788, and in the following year was ordained a mis¬ sionary among the Baptists of Carnavonshire. After three or four years there he removed to Anglesey where he lived until 1826. In Anglesey he practically exercised episcopal functions and his removal to Glamorganshire in 1826 was occasioned by his arbitrary conduct. He re¬ moved to Cardiff in 1828 and four years later to Carnarvon. He was an able and eloquent preacher and was well known throughout Wales where he did much in behalf of church build¬ ing. Consult the biography by Hood (London

1881).

EVANS, Edward Payson, American author: b. Remsen, N. Y., 8 Dec. 1831. He graduated at the University of Michigan in 1854, where, after several years of teaching in Mississippi and Wisconsin, he was professor of modern languages and literatures in 1862-67. He has made a special study of Oriental lan¬ guages ; in 1884 became connected with the

EVANS, Edward Radcliffe Garth Russell,

English explorer and naval officer: b. 1881. He was educated at Merchant Taylors' School and entered the navy in 1897, becoming sub¬ lieutenant in 1900. He served on the Morning, the relief ship to the Discovery expedition in 1902-04. In 1907 he was awarded the Shadwell Testimonial Prize by the Lords Commissioners of the Admiralty. In October 1909 he joined the British Antarctic Expedition as second in command, and was made commander in 1912. He returned in command of the expedition after the

death of Captain Scott. He lectured on the Scott expedition in the United States in 1914, commanded the Mohawk in the bombard¬ ment of the right wing of the German army on the Belgian coast in 1914. In this year he received the cross of the Legion of Honor, was made C.B. in 1913 and received the D.S.O. in

1917.

EVANS, Elizabeth Edson Gibson, Ameri¬ can prose writer: b. Newport, N. H., 8 March 1832; d. 10 Sept. 1911. She was married to Edward Payson Evans (q.v.) 1868. She has published (The Abuse of Maternity (1875);*

Hauser (1892) ; (The Story of Louis XVII of France* (1893) ; transplanted Manners* (1895) ; (Confession* (1895) ; (Ferdinand La-salle and Helen von Donninger* (1897) ; (The Christ Myth* (1901).*

EVANS, Evan Heber, Welsh Congrega¬ tional clergyman: b. near Newcastle, Cardigan¬ shire, 1836; d. Bangor, 1896. He received his education at Swansea Normal College and Bre¬ con Memorial College. In 1862-65 he was pastor of Lebanus Church, Morriston, and from 1865 to 1894 of Salem Church, Carnarvon. In 1886 he served as clergyman of the Welsh Con¬ gregational Union and in 1892 of the Congre¬ gational Union of England and Wales. In 1894 he was appointed head of the Bangor Con¬ gregational College. He edited the Welsh Con¬ gregational magazine, Y Dysgedydd. Consult the biography by H. Elvet Lewis.

EVANS, Frederick William, American writer: b. Bromyard or Leominster, England, 9 June 1808; d. Mount Lebanon, N. Y., 6 March 1893. He removed to the United States in 1820; joined the United Society of Believers (Shakers) at Mount Lebanon, N. Y., in 1830, and became a recognized leader in that society. The best known of his works are Compen¬ dium of the Origin, History, and Doctrines of the Shakers (1859) ; (Autobiography of a*

Shaker (1869) ; (Shaker Communism* (1871) ; (The Second Appearing of Christ* (1873).*

EVANS, Sir George de Lacy, British general : b. Moig, Ireland, 1787 ; d. London, 9 Jan. 1870. He entered the army in 1806, took part in the later stages of the Peninsular War and in the beginning of 1814 wa-s sent to America, and at the battle of Bladensburg (24 Aug. 1814) had two horses shot under him. At the head of 200 men he forced the capitol at Washington. He was present at the attack on Baltimore, and was twice wounded before New Orleans in December 1814, and was on that account sent home to England, where he re¬ covered just in time to be able to join

Welling¬ ton at Quatre-Bras and Waterloo. He served with distinction on the side of the queen regent in the Carlist War of 1835-37. In 1846 he was raised to the rank of major-general. At the outbreak of the Crimean War he was appointed to the command of the second division of the British army, and distinguished himself at the battle of the Alma, the siege of Sebastopol and the battle of Inkerman. He was made a gen¬ eral in 1861. He served as a Liberal member in the House of Commons between 1831-65, but not continuously.

EVANS, George Essex, Australian poet : b. London, 18 June 1863. He went to Australia in 1881 where he eventually became district registrar at Toowoonby, Queensland. He has written extensively for the Australian press. He was editor of the Antipodean (1893—97) ; and he won the 50 guinea prize offered by the gov¬ ernment of New South Wales for the best ode on the inauguration of the Commonwealth in 1901. He was founder of the Astral Associa¬ tion for the Advancement of Music, Art, Liter¬ ature and Science (1901). Among his pub¬ lished works are (Madelene Despar and Other Poems* (London 1891) ; (Loraine and Other Verses* (Melbourne 1898) ; (The Garden of Queensland* (1898) ; (The Secret Key apd*

Other Verses) (Sidney 1906). The greater part of his work, most of which has been contributed to magazines and newspapers, has not been pub¬ lished in book form.

EVANS, Henry Clay, American politician: b. Juniata County, Pa., 18 June 1843. He served in the 51st Wisconsin Infantry, enlisting 1864, and subsequently settled in Chattanooga, Tenn., as an iron and railway-car manufacturer, and was mayor of Chattanooga for two terms. He sat in Congress in 1889-91, and was assistant Postmaster-General 1889-93. His election as governor of Tennessee 1894 was disputed and the opposing Democratic candidate was seated. He stood second in the vote for Vice-President at the National Republican Convention 1896, was appointed United States Commissioner of Pen¬ sions in 1897, and was consul-general in London from 1902 to 1905. He was subsequently com¬ missioner of education and health of the city of Chattanooga.

EVANS, Hugh Davy, American author: b. Baltimore, Md., 26 April 1792 ; d. there, 16 July 1868. He studied law, began practice in Baltimore in 1815 and became eminent as a jurist. He was editor of The True Catholic 1843-56, and was connected with various other papers. He was a

prominent member of the Maryland Colonization Society, and prepared a code of laws for the Maryland colony in Liberia ; and in 1862-64 lectured on civil and ecclesiastical law. Among his writings are (Essays on Pleading) (1827) ; (Maryland Com¬ mon-Law Practice) (1837) ; (Theophilus Angli- canus) (1851) ; (Essays on the Episcopate of the Protestant Episcopal Church in the United States) (1855) ; (Treatise on the Christian Doctrine of Marriage) (1870). Consult memoir by Harrison (1870).

EVANS, John, American geologist : b. Portsmouth, N. H., 14 Feb. 1812; d. Washing¬ ton, D. C, 13 April 1861. He served on several State and Territorial geological surveys, and discovered remarkable fossil deposits in the Bad Lands of Nebraska. He was afterward commissioned by the United States government to carry on the geological surveys of Washing¬ ton and Oregon.

EVANS, John, American philanthropist : b. Waynesville, Ohio, 9 March 1814; d. Denver, Colo., 3 July 1897. He was graduated at the med¬ ical department of Cincinnati College in 1838; in 1848 became a professor in the Rush Medical College of Chicago, in which city he accumulated a large fortune by investments in real estate. Much of this he gave to philanthropic objects. He established the Northwestern University, and endowed two chairs in it with $50,000 each. In 1862-65 he was governor of the Colorado Territory. Later he established the University of Denver, to the construction of which he gave $200,000 and a large endowment. He gave largely for the erection of the Grace Methodist Episcopal Church in Denver, and aided almost every educational institution and Methodist Episcopal Church in the State.

EVANS, Sir John, English archaeologist : b. Britwell Court, Buckinghamshire, 17 Nov. 1823 ; d. 31 May 1908. His publications include (The Coins of Ancient Britons) ; (The Ancient Stone Implements, Weapons and Ornaments of Great Britain and Ireland) (1872) ; (Ancient Bronze Implements, Weapons and Ornaments

of Great Britain and Ireland) (1881). From 1878 till 1896 Sir John was treasurer of the Royal Society, and he presided over the Toronto meeting of the British Association in 1897. He was president of the Geological Society (1874- 76), of the Numismatic Society (1874-1908), and of the Society of Antiquaries (1885-92). His great work on stone implements received a prize from the French Academy, and both it and his other work on bronze implements were translated and published in Paris shortly after they appeared in England.

EVANS, John Gwenogvryn, Welsh scholar: b. Ffynon Velved, Carmarthenshire, 1852. He was educated at Pontshan Grammar School,

the Presbyterian College, Carmarthen, and Owens College, Oxford. He was editor of the (Series of Old Welsh Texts,) was inspector of documents in the Welsh language for the Historical Manuscripts Commission from 1894 to 1906. He was nominated gover¬ nor and member of the council of the Univer¬ sity College of Wales, and governor and mem¬ ber of the council of the National Library of Wales by the lord president of the Privy Coun¬ cil. His publications include (Homeward Bound> (1882) ; (Red Book Mabinogion> (1887) ; facsimile of the Black Book of Car¬ marthen) (1888); (The Bruts) (1890); MSS.) (1907) ; facsimile and Text of the Book of Aneirin) (1908) ; (Facsimile of the Chirk Codex of the Welsh Laws} (1909) ; facsimile and Text of the Book of Taliessen, with a revised text and translation into English) (1914).

EVANS, Margaret J. See Huntington,

Margaret Evans.

EVANS, Mary Ann, or Marian. See

Eliot, George.

EVANS, Oliver, American inventor : b. Newport, Del., 1755; d. New York, 25 April 1819. In 1877 Evans invented a machine for making card-teeth. Two years later he entered into business with his brothers, who were millers, and in a short time invented the elevator, the conveyor, the drill, the hopper- boy, and the descender, the application of which two mills worked by water-power effected a revolution in the manufacture of flour. For some years after these improvements were per¬ fected, the inventor found much difficulty in bringing them into use, although in his own mill the economy of time and labor which they effected was very manifest. About 1799 or 1800 he set about the construction of a steam- carriage ; but finding that his steam engine dif¬ fered in form as well as in principle from those in use, it occurred to him that it could be patented and applied to mills more profitably than to carriages ; and in this he was completely successful. This was the first steam engine con¬ structed on the high-pressure principle; and to Evans, who had conceived the idea of it in early life, and in 1787 and again in 1794-95 had sent to England drawings and specifications, the merit of the invention belongs, although it has been common to assign it to Vivian and Treve- thick, who had had access to Evans' plans. In 1803-04, by order of the board of health of

Philadelphia, he constructed the first steam dredging machine used in

America, consisting of a flat scow with a small engine to work the machinery for raising the mud. Evans also invented the ((Cornish boiler.®

EVANS, Robley Dunglison, American naval officer: b. Floyd Court House, Va., 18 Aug. 1846; d. Washington, 3 Jan. 1912. He was appointed to the United States Naval Academy from Utah in 1860, promoted ensign in 1863, and in 1864-65 was on board the Powhatan of the North Atlantic blockading squadron. He participated in both attacks on Fort Fisher; in 1868 was commissioned lieutenant-commander, in 1870-71 was on duty at the navy yard, Wash¬ ington, in 1871-72 at the Naval Academy. Hav¬ ing served in 1873-76 successively on the Shen¬ andoah and the Congress, of the European station, he was made commander in 1878; in 1891-92 was in command of the Yorktown at Valparaiso, Chile, where American sailors were killed by a mob, and in 1893 became captain. He policed the Bering Sea sealing grounds. During the Spanish-American War he was in command of the Iowa, and at the naval battle of Santiago he took an important part in the destruction of Cervera's fleet. In 1901 he was commissioned rear-admiral ; in 1902 was made commander of the Asiatic fleet with the flag¬ ship Kentucky ; was escort to Prince Henry of Prussia, during the latter's visit to the United States; commanded the Atlantic fleet, 1905-07, taking it in 1907, as commander-in-chief, on tour of the world. After rounding Cape Horn, and on reaching San Francisco, ill health forced him to give up the command. He was retired 18 Aug. 1908. He published (A Sailor's Log) (1901); and (An Admiral's Log) (1910).

EVANS, Thomas Williams, American den¬ tist : b. Philadelphia, 23 Dec. 1823 ; d. Paris, 14 Nov. 1896. He studied dentistry and practised in Maryland and later in Lancaster, Pa., and made a specialty of saving teeth by filling. In seeking a substitute for gold foil he mixed rub¬ ber and sulphur, which made a black substance instead of a white one. Because of the un¬ favorable color he laid the substance aside and gave it no more thought till his mixture was used by others for producing commercial gutta¬ percha, which he declared he had discovered. In 1848 he went by invitation to Paris, as the most skilful American dentist, to attend to the teeth of President Louis Napoleon. During his career in Paris he accumulated a very large fortune. He also won an international repu¬ tation as an expert in military sanitation, and was one of the founders of the Red Cross Society. His home was the refuge of the Empress Eugenie from the mob on the night of 4 Sept. 1870. Dressed in his wife's clothes, she was taken by him to the Normandy coast, where he secured her escape to England. He bequeathed all of his fortune, estimated at from $8,000,000 to $12,000,000, excepting $250,- 000, to establish a museum and institute in Philadelphia.

EVANSTON, Ill., city in Cook County, on the Chicago and Northwestern

Railway, 12 miles north of Chicago on Lake Michigan. It has electric surface and elevated railroads to Chi¬ cago; Holly system of waterworks, with com¬ plete filtration plant, daily newspapers and three banks, deposits over $6,000,000. It is the seat vo^. to — 38

of Northwestern University (M.E.) founded in 1854, largely endowed and of high repute, with a library of 25,000 volumes and a museum. It is the seat also of the Garrett Biblical Insti¬ tute. The Dearborn Observatory was trans¬ ferred here from Chicago in 1888. Evanston was the home of Frances Willard (q.v.). It is really a residential suburb of Chicago, and called (

EVANSTON, Wyo., city and county-seat of Uinta County, 76 miles east of Ogden, on the Bear River and the Union Pacific Railway. There are valuable coal mines in the vicinity, and the surrounding region is also largely de¬ voted to stock-farming and agriculture. Oil has been discovered in the neighborhood. Among the local industries are a large flouring-mill, ice plant and railway repair shops. The State Asylum for the Insane is situated here. The city contains a public library and owns the waterworks. Pop. (1920) 3,479.

EVANSVILLE, Ind., a city and port of entry of Vanderburg County, of which it is the county-seat, about 185 miles west of Louisville, 192 miles northeast of Cairo, and 180 miles southwest of Indianapolis, on the Ohio River, and the Louisville, E. & St. L., the Louisville & N., the Evansville & T. H. and other rail¬ ways. It is pleasantly located on a high bank of the river. Evansville is the chief shipping point for southwestern Indiana, and ranks highly among the commercial centres of the State. The neighboring region abounds in coal and the local coal trade is a large one. There is also an important trade in flour, pork, to¬ bacco, grain and timber. There are machine- shops and foundries, plow-works, furniture factories, flouring-mills, and manufactures of cottons and woolens, brick and tile, pottery, terra-cotta and fire-clay products, malt liquors, and saddlery and harness. The United States census of manufactures for 1914 showed with¬ in the city limits 297 industrial establishments of factory grade, employing 11,698 persons; 10,333 being wage earners, receiving a total of $5,168,000 annually in wages. The capital in¬ vested aggregated $24,666,000, and the year's output was valued at $31,427,000: of this, $13,- 427,000 was the value added by manufacture.

The prominent buildings include the United States custom-house, the courthouse, the city hall, the Willard Library, the State Hospital for the Insane, Evans Temperance Hall, Citi¬ zen's National Bank Building and the United States Marine Hospital. There are also 10 parks. Daily and weekly newspapers are pub¬ lished. Evansville was founded by Gen. R. M.

Evans in 1817, became the county-seat of Van¬ derburg County in 1819, and was incorporated in 1847. The government is administered by a charter of 3 March 1893, with amendments of 11 March 1895. This instrument provides for a mayor, elected for four years, and a com¬ mon council, one member from each ward for one year and four councilmen at large for two years. The annual expenditure of the munici¬ pality is about $700,000, the annual income about $940,000. The municipality owns the water¬ works, which are operated at a yearly expense of about $30,000. Pop. (1920) 85,264.

EVANSVILLE, Wis., a village of Rock County, 17 miles northwest of Janesville and 22 miles south by east of Madison, on ihe Chicago and Northwestern Railway. Among its indus¬ tries are an extensive wind-mill factory, an iron- foundry and two large tobacco warehouses. Pop. 2,209.

EVAPORATION (Lat. evaporatio, from evaporare, to emit vapor), the formation of vapor at the free surface of a liquid. In evapo¬ ration a portion of the liquid escapes in the gaseous form from the general mass, and, rising into the space, spreads through it according to the laws of diffusion of gases. Supposing the temperature of the space above the liquid to be uniform, the evaporation proceeds (provided there is a sufficient quantity of liquid) until the space is uniformly filled with vapor. A space thus filled with the maximum quantity of vapor corresponding to the temperature of it is said to be saturated. If the dimensions of the space be diminished, a portion of the vapor is forced to condense ; if the temperature of the space falls, a portion of the vapor condenses also ; while if the temperature of the space is in¬ creased, the dimensions remaining unchanged, the space ceases to be saturated, because the quantity of the vapor that corresponds to saturation is greater the higher the temperature. When there is not a sufficient quantity of liquid present to saturate the space completely, the whole of the liquid evaporates and the vapor diffuses uniformly through the space. The space is then said to be non-saturated. Consult the United States Monthly Weather Review for March 1914. See Boiling Point; Vapor.

EVARTS, Jeremiah, American editor and missionary secretary: b. Sunderland, Vt., 3 Feb. 1781 ; d. Charleston, S. C., 10 May 1831. He was graduated at Yale 1802, and settled in New Haven as a lawyer. His life was largely devoted to the interests of missions, he being editor of the Missionary Herald for a long term and corresponding secretary of the American Board of Commissions for Foreign Missions 1821-31.

EVARTS, William Maxwell, American lawyer and statesman : b. Boston, Mass., 6 Feb. 1818; d. New York, 28 Feb. 1901. He was grad¬ uated from Yale in 1837, studied law in the Harvard Law School and the office of Daniel Lord of New York, in 1841 was admitted to the bar, and in 1849-53 was assistant district attor¬ ney in New York. In 1851 he was successful in the conduct of the prosecution of the Cuban filibusters of the Cleopatra expedition. He was retained in 1857 and 1860 to argue the Lemmon slave case on behalf of the State of New York against Charles O'Conor, counsel for Virginia. An active and prominent Republican, he made the speech nominating Seward for the Presi¬ dency at the Republican National Convention in Chicago in 1860, though subsequently moving to make the nomination of Lincoln unanimous. In 1861 he and Horace Greeley (q.v.) were rival candidates before the State legislature for appointment to the senatorship vacated by Sew¬ ard, newly made Secretary of State. As a com¬ promise, Ira Harris was finally appointed. Evarts' legal knowledge was frequently em¬ ployed in the service of the administration. On behalf of the government he conducted numer¬ ous important cases. Among such were that be¬ fore the Supreme Court to establish the right

of the United States during the Civil War to deal with the captured ships as maritime prizes (1862), and that maintaining the unconstitu¬ tional character of the State laws taxing United States bonds or stock of the national banks without authorization of Congress (1865-66). He was principal counsel for Andrew Johnson (q.v.) in the President's trial for impeachment, and by his lofty judicial argument contributed much to a result which has since been regarded as most fortunate. He then went into John¬ son's Cabinet as Attorney-General for the re¬ maining year of the term. In 1872 he was chief counsel for the United States before the Geneva tribunal for settlement of the Alabama claims. As chief counsel for the Republican party before the electoral commission (q.v.) that settled the Hayes-Tilden Presidential dispute, Evarts based his argument on the constitutional idea that sovereign States must conduct their elections and govern themselves without Federal interference, pointing out that the electoral re¬ turns from Louisiana revealed the choice of Hayes electors. During Hayes' administration he was Secretary of State. He made, in 1880, a report upon the matter of American control of a trans-isthmian canal, whether at Nicaragua or Panama. His administration of the office was marked by skill in diplomatic questions, the im¬ provement of the consular service and the pub¬ lication of consular reports on the economic and commercial status of foreign lands. In 1881 he was a delegate to the international monetary conference at Paris, and in 1885 entered the United States Senate, his term expiring 3 March 1891. He was the senior partner in the law firm of Evarts, Choate and Beaman, and was frequently

retained in important corpora¬ tion cases. While in the Senate he made several noteworthy speeches and he also pronounced many distinguished occasional addresses, includ¬ ing the Centennial oration at Philadelphia in

1876.

EVE. See Adam.

*EVE, Paul Fitzsimmons, American phy¬ sician: b. near Augusta, Ga., 1806; d. 1877. He was graduated at Franklin College in 1826 and at the medical college of the University of Pennsylvania in 1828. He then studied for two years in Europe, and in 1831 was sur¬ geon during the Polish Revolution. In 1832-49 he was professor of surgery in Georgia Medi¬ cal College, and in Louisville 1849, the Univer¬ sity of Nashville 1850-68, and the University of Missouri in 1868-77. He was elected president of the American Medical Association in 1857. He published over 600 articles on medical sub¬ jects, including (Remarkable Cases in Surgery**

(1857).

EVECTION (Lat. evectio, (

EVELETH, evY-leth, Minn., city of Saint Louis County, 70 miles northwest of Duluth, on the Duluth and Iron Range, and the Duluth, Missabe and Northern railroads. It has ex¬ tensive dairying, lumber and iron-mining in¬ terests, a public library, etc. The commission

EVELINA

EVENING

595

form of government was adopted in 1913. The waterworks are the property of the munici¬ pality. Pop. 7,205.

EVELINA. When (Evelina } appeared, in 1778, its originality created a literary sensation. That Fanny Burney, a young woman of 25, in a period of mediocre and frequently indecorous imitations, should have produced a novel keen in observations, seemly in humor and spirited in execution, won admiration everywhere. To-day some of the newness has worn off and the artistry has been partially eclipsed by the genius of later writers. But (Evelina } will always possess distinction as an early example of the novel of domestic manners as seen through clear and subtle feminine eyes ; time cannot rob it of its intrinsic freshness, and, indeed, en¬ riches it with a certain charming quaintness. The. story is told in the form of letters, con¬

tinuing in this respect the tradition of (Pamela. } But most of the Richardsonian analytical psy¬ chology is omitted and the incidents are not as exceptional as those that were necessary to regale an earlier generation. With these modi¬ fications, the stress is laid upon the presenta¬ tion of contemporary English life as it would impress an Evelina. The result is a degree of immaturity and externality as compared with the penetration of Jane Austen; however, the surface of society as it is reflected in the mind of the youthful letter-writer, is portrayed with undeniable vivacity and comic power. The comedy arises chiefly from the juxtaposition of contrasting ridiculous characters. They are simplified and exaggerated almost to the point of caricature, but they possess truth enough to make them human ; and the comedy to which they give rise, though verging upon farce, is always amusing and wholesome. Among the varied types moves Evelina, finally successful in winning the recognition of her deceived father and the love of her noble admirer. She is in essence Miss Burney herself ; and to the spontaneity and vividness of her reactions to the life about her the novel in the last analysis owes its vitality and charm. Consult Dobson, Austin (Life of Fanny Burney) ; Macaulay, Lord, (Essays on Madame D'ArblayP passim;

George B. Dutton.

EVELYN, ev'e-lm, John, English writer: b. Wotton, Surrey, 31 Oct. 1620; d. there, 27 Feb. 1706. After completing his course at Oxford he began to study law at the Middle Temple. He made some efforts in favor of the royal cause in 1659, on which account he was much favored by Charles II after his restora¬ tion. In 1662 he published (Sculptura, or the History and Art of Chalcography or Engraving on Copper.) On the foundation of the Royal Society he was nominated one of the first Fel¬ lows and at its meetings he read a discourse on forest-trees, which formed the basis of his most celebrated publication, (Sylva, or a Dis¬ course of Forest-trees> (1664). He continued in favor at court after the Revolution of 1688 and was made treasurer of Greenwich Hospital. He lived for many years at Sayes Court, Dept¬ ford, and subsequently succeeded to his brother's estate of Wotton, his life being that of a loyal, worthy, public-spirited country gentleman. Evelyn left a most interesting diary, picturing his life from 1641 to 1706, first published with

his correspondence in 1818. A new edition of the (Diary was issued in 1827; another, with life, by Wheatley, in 1879; and one by Austin Dobson in 1906.*

EVENING GROSBEAK, a large finch (Hesperiphona vespertina) or western North America. It is olivaceous, with the crown, wings, tail and feet black; forehead and rump yellow ; bill yellowish and a white patch on

the wing. It inhabits the forests of northwestern Canada and the Rocky Mountain region, occa¬ sionally coming south into the upper Mississippi Valley in winter. This was the limit a few years ago, but since about 1905 the bird has extended its winter migration to eastern Canada, New England and New York, where it annually appears in increasing numbers and is reported to have bred in a few instances. Its nest is a rather rude structure placed in a tree ; eggs, greenish, blotted with pale brown. This grosbeak feeds by preference on berries, espe¬ cially those of the mountain ash, bittersweet and the like; also on buds, seeds, 'frozen apples, etc. It goes about in small flocks, uttering a variety of calls, and in spring sings in a loud, odd way, more striking than beautiful. Full accounts of the extraordinary winter-spread eastward of this interesting bird may be found in recent files of the ornithological magazines.

EVENING PRIMROSE, the common name of American plants belonging to the vari¬ ous genera of the family Onagracec e, or evening primrose family. They are annual or biennial herbs, the yellow flowers opening either during the night or at evening. There are upwards of 40 species to which the name is applied, nearly all natives of North America, but some of them naturalized in Europe, particularly in England. Evening primroses, especially Oenothera biennis and related species, have attracted much interest because of experiments in plant breeding con¬ ducted with them.

EVENING or NIGHT SCHOOLS,

schools in which instruction is given to pupils debarred, generally by reason of being wage- earners, from the advantages of the day schools. Evening schools arose at a time when compul¬ sory education was not as widespread as at present and when more children were conse¬ quently growing up without instruction. Be¬ ginning with the idea of imparting the more rudimentary branches, such schools have ex¬ tended their scope until in some cases they form departments of institutions devoted to the study of art, science or technology. In some of its wider aspects their work has become allied to the university extension movement.

Central Europe. — The evening schools in central Europe are largely the outgrowth of Sunday-schools which shortly after the middle of the 18th century began to add elementary secular instruction to religious teaching. The school age limit being less than at present, a review or continuation of school studies seemed of great importance. In Germany, beginning with lessons in arithmetic and the mother tongue, the range of instruction gradually widened. Some states made attendance obliga¬ tory at such Sunday-schools in certain cases. At present the term F ortbildungsschulen (liter¬ ally <(further developing schools®) is applied in Germany and Switzerland to schools intended for pupils who have passed the elementary

school age and yet study the elementary branches. These F ortbildungsschulen are open only in winter and rarely require more than six hours of attendance in the week. Their object is to give boys a practical turn of mind by instruction fitted to bear upon their future callings. They do not furnish instruction in foreign or dead languages or the higher mathe¬ matics. In Switzerland, all the 25 cantons have systems of F ortbildungsschulen held on Sun¬ days, holidays and in the evening. The evening schools of France, now numbering many thou¬ sands, appear not to date back farther than 1820. The tendency is toward technical train¬ ing rather than liberal studies, but there are also evening classes or lectures open to those who desire a broader culture.

Great Britain. — In 1806 a benevolent asso¬ ciation founded an evening school in Bristol, England, for young persons who were working for a living. In 1811 a school for adults was started in Bala, Wales, and others shortly fol¬ lowed in London and other towns. Such schools were originally supported by private benevolence or local funds, but the government, after a .time, saw the wisdom of aiding them by grants. Since 1861 this aid has been greatly increased, but is not intended to supersede local effort. Accord¬ ing to regulations issued by the Board of Educa¬ tion of Great Britain for the school year ending 31 July 1903, local funds were expected to meet 25 per cent of expenditure for the evening schools and such expenditure to be approved by the board. The schools must not be con¬ ducted for private profit. They are under super¬ vision and examination by the board, are subject to its examinations and must report to it. Schools charging no fees are not generally rec¬ ognized. Instruction must begin after 4 p. m. or on Saturday after 1 p. m. Students under 12 are not admitted nor those who attend day schools under government inspection (art students being excepted). The courses are as follows: (1) Literary and commercial; (2) art; (3) manual instruction; (4) mathematics and science; (5) home occupations and industries. The last course is largely for girls and includes <(home nursing.® The boys may take a course in am¬ bulance training, in gardening, etc. Through¬ out London the evening schools give instruc¬ tion in gymnastics and swimming and life-sav¬ ing methods have been taught to some of the pupils. Evening classes have been held in Lon¬ don, at various institutions such as University College, King's College, South Kensington Mu¬ seum, etc. In the so-called provincial colleges evening classes constitute an important part of the work. Special schools give instruction in commercial branches, courses for women, art, technology and advanced science. The Edu¬ cation Department of Great Britain reported 1911-12 for the evening schools of England and Wales

7,749 schools inspected and 222,776 pupils enrolled.

In Scotland the Parliamentary grants for evening schools are administered by the Scotch Education Department, and are used as in Eng¬ land to supplement locally raised funds. The courses of study cover about the same ground. Gaelic is found on the curriculum, and agricul¬ ture, horticulture, navigation, military drill and swimming may all be learned.

Evening schools also exist in most of the countries of Europe and republics of Latin

America ; and in Canada they are specially flourishing.

United States. — The first successful evening schools of the United States began near the middle of the 19th century, although an attempt without permanent results was made in New York in 1834. Boston and other large cities soon followed and evening schools gradually be¬ came a recognized part of the common school system. The aims of the pupils in the evening schools being generally very practical and their minds more mature, the methods and subjects of instruction are varied from those of the day schools. Branches relating to commercial and industrial occupations are naturally preferred. Free evening schools for instruction in drawing exist in some cities and drawing is included in the curriculum of some of the regular schools. Evening high schools have become common and in addition to these extensions of the public school system, various important institutions, such as Cooper Union, New York; the Mary¬ land Institute, Baltimore, and the Drexel Insti¬ tute, Philadelphia, offer evening courses of a highly varied and very valuable character, and of a range resembling that of the day classes. Free lectures also connect such schools with university extension methods.

The evening schools of the Young Men's Christian Association in the United States, in 1914, had 83,771 students, while the Young Women's Christian Association had 65,129. In the business and commercial schools reporting to the United States Bureau of Education in 1912, there were 134,818 students in evening classes. The evening schools connected with the city school system of the United States reported, in 1912, for cities over 10,000 inhabit¬ ants, a total of 204 cities, 9,476 teachers. Forty- one of these schools were in Massachusetts and the remainder were scattered over the other States. In 1911 Massachusetts added greatly to the efficiency of the State vocational educa¬ tion by extending its help in a very liberal and broad manner to the night schools. The great¬ est number of night schools are still to be found in the North Atlantic States and the smallest number in the South Central States and Territories.

EVENING STAR (also called HES¬ PERUS and VESPER), the name given to any one of the planets seen above the horizon before midnight ; especially applied to the planet Venus on account of its brightness. Mars, Jupiter and Saturn are the other chief evening stars.

EVERDINGEN, ev'er-ding-en, Aldart or Allart van, Dutch landscape painter: b. Alkmaar, 1621 ; d. Amsterdam, November 1675. His sea pieces, in which he represents the dis¬ turbed elements with great truth to nature, are particularly celebrated. In forest scenes, too, he was a master. He is known also as an able engraver by his plates to < Reynard the Fox. >

EVEREST, Sir George, English military engineer: b. in Wales, 1790; d. 1866. He was educated at the Royal Military Academy at Woolwich, was commissioned second lieutenant in the Bengal artillery, and took part in a sur¬ vey of Java and in engineering work on the Ganges. Later he was engaged on a survey of India and in 1830 was appointed surveyor- general of India, from which post he retired

in 1843. He was knighted in 1861 and was elected vice-president of the Royal Geographical Society in 1862. Mount Everest was named in his honor. He published (An Account of the Measurement of Two Sections of the Meridional Arc of India5 (1847).

EVEREST, Mount, the highest known ' mountain in the world, is a peak of the Him- alays, in Nepal near the Tibet frontier. It is 29,002 feet high, or about five and one-half miles. It was named in honor of Sir George Everest, an Englishman who for a time was surveyor-general of India. This mountain has been confused with Gaurisankar, whose twin peaks lie 36 miles west of Everest.

EVERETT, Alexander Hill, American diplomatist: b. Boston, Mass., 19 March 1792; d. Canton, China, 29 May 1847. He was gradu¬ ated from Harvard in 1806, was admitted to the bar, and, after serving as charge-d'affaires at The Hague, was Minister to Spain in 1825-29. He then became editor of the North American Review , and was elected to the State legisla¬ ture of Massachusetts. In 1840 he was ap¬ pointed special agent to Cuba, and from 1845 until his death he was a commissioner to China. To the North American Review he contributed a large number of essays. While resident in Cuba he was appointed to the presidency of Jefferson

College, but ill health compelled his return north. He was at first a member of the National Republican or Whig party, but later supported Jackson. His work on (Europe, or a General Survey of the Political Situation of the Principal Powers, with Conjectures on their Future Prospects5 (1822) was highly esteemed in its time, and was published in French, Spanish and German. In 1827 appeared his somewhat similar book on (America. 5 Among his other volumes are (Critical and Mis¬ cellaneous Essays) (1st series, 1845; 2d series, 1847) and

EVERETT, Charles Carroll, American Unitarian clergyman : b. Brunswick, Me., 19 June 1829; d. Cambridge, Mass., 17 Oct. 1900. He was graduated at Bowdoin College, and afterward studied at the University of Berlin. He returned to Bowdoin College, where he was tutor for two years, librarian for five and pro¬ fessor of modern languages 1855-57. He was ordained pastor of the Independent Unitarian Congregational Church in Bangor, Me., 1859, but resigned in 1869 to become professor of theology in Harvard Divinity School, and was dean of the school from 1879 till his death. Among his published works are (The Science of Thought5 (1869); (Religions Before

Christianity) (1883) ; (Fichte's Science of Knowledge) (1884); (The Gospel of Paul5 (1893) ; (Psychological Elements of Religious Faith5 (1902) ; < Immortality and Other Essays > (1902) ; (Theism and Christian Faith) (1909).

EVERETT, David, American writer: b. Princeton, Mass., 29 March 1770; d. Marietta, Ohio, 21 Dec. 1813. He studied law in Boston, and while there wrote for Russell's Gazette

and a literary paper called the Nightingale. He edited the Boston Patriot (1809), and the Pilot (1812). His works include (The Rights and Duties of Nations,5 an essay;

You'd scarce expect one of my age

To speak in public on the stage.

EVERETT, Edward, American statesman and orator, brother of A. H. Everett (q.v.) : b. Dorchester, Mass., 11 April 1794; d. Boston, 15 Jan. 1865. He was graduated from Harvard in 1811, pursued studies in divinity, became in 1813 pastor of the Unitarian Church, Brattle street, Boston, and in 1814 published his (Defence of Christianity) in reply to the (Grounds of Christianity Examined5 of George G. English. In 1814 he was also chosen to occupy the newly established chair of Greek literature. To qualify himself for the post he went to Europe in 1815 for a course of

travel and study. He was for two years at the Uni¬ versity of Gottingen, and later sojourned in France, England, Italy and Greece. In 1819 he returned to enter on the duties of his professor¬ ship. He became also in 1820 the editor of the North American Review, and in 1820-24 con¬ tributed to it about 50 papers. He was elected to Congress in 1824, and by successive re- elections held his seat until 1834. Throughout this period he was a member of the Committee on Foreign Relations and in the 20th Congress its chairman. He drew either the majority or the minority report of many select committees, In politics he was a National Republican (Whig). He declined a renomination to Con¬ gress in 1834. In 1835 he was elected governor of Massachusetts, subsequently was three times re-elected, holding the office for four years, and in 1839 was defeated by a majority of one vote. While in Europe in 1840 he was appointed Minister Plenipotentiary to England. At a time when there were many points of controversy be¬ tween England and the United Stales he was successful in the adjustment of numerous im¬ portant questions. He declined in 1843 an ap¬ pointment as commissioner to China, and in 1845 was recalled. In 1846-49 he was president of Harvard, and in 1852 he be¬ came Secretary of State in Fillmore's Cabinet for the last four months of the latter's administration. During this brief term of office he settled several difficult matters. In a diplomatic note he declined the joint proposition of Great Britain and France that the United States should enter a tripartite conven¬ tion which should guarantee to Spain exclusive possession of Cuba in perpetuity. Before he left the Department of State he was elected to the Senate. There he vigorously opposed the Kansas-Nebraska bill for the repeal of the Missouri Compromise. He resigned his seat in May 1854. From 1856 to 1859 he pronounced his well-known lecture on Washington in all on 122 occasions, realizing thereby nearly $60,000, which he turned into the treasury of the Mount Vernon Association for the pur¬ chase of Mount Vernon by private subscrip¬ tion. He prepared a collective edition of the orations and speeches of Daniel Webster, with an introductory biographical notice ; wrote a life of General Stark for Sparks' (American Biography5 ; and prepared for the Encyclopaedia

Britannica,5 at the instance of Macaulay, a life of Washington, afterwards separately published (1860). In 1860 he reluctantly became a candidate for the Vice-Presidency on the Con¬ stitutional-Union, or, as it was sometimes known, the Bell-Everett ticket — John Bell (q.v.) being the Presidential candidate. The ticket received 39 electoral votes, — those of Kentucky, Tennessee and Virginia. During the Civil War he was a staunch Unionist, but dis¬ posed also toward a policy of reconciliation. He

delivered the address at the dedication of the national cemetery at Gettysburg, Pa., 19 Nov. 1863, and in the Presidential election of 1864 as an elector-at-large he cast his ballot for Lincoln and Johnson. His last public appear¬ ance was at Faneuil Hall, 9 Jan. 1865, where he spoke on behalf of the sufferers at Savannah.

Everett was noteworthy in his versatility, — a preacher and theologian, a Greek scholar, an editor and author, orator, diplomat and states¬ man. He attracted much attention by his pul¬ pit eloquence. As a Grecian he was thoroughly equipped and gave in his time a considerable stimulus in America to the study of Greek let¬ ters, antiquities and history. His literary pro¬ ductions were carefully wrought and marked by his scholarship; but, through interruptions by other activities, they were limited, so far as pub¬ lished, chiefly to his North American articles and the above-mentioned (Defence of Christian¬ ityˆ He did not complete a treatise on public law — a subject he was eminently fitted to ex¬ pound, — on which he was for some time at work. His utterances in Congress showed him rather the orator than the debater, and while a member of the lower house he stood apart from much of party contention as it there ap¬ peared. He took, however, a prominent part in discussion, and, as indicated above, was a most valuable committee member. While he was a foreign minister the general negotiations re¬ garding the northeastern boundary and Oregon difficulties were transferred from him through the appointment by Great Britain of Ashburton as special ambassador, yet many of the points in dispute were left to Everett's skilful adjust¬ ment. As representative, secretary and senator he held to the possibility of saving the Union by compromise on the slavery question, but, the war once begun, he was among the ablest sup¬ porters and advisers of the Federal government. It is as an orator that Everett is best known. His addresses were generally written with elaborate care, and were of the Ciceronian type in the knowledge and culture displayed as well as in their finished rhetoric. More fully than any other American orator he combined the re¬ sources of learning with the arts of the speaker. He lacked Webster's fire and Phillips' magic, but his manner was always impressive and well- poised. Even in his own time, however, his oratory did not escape criticism for .lack of directness and artificiality, and this charge has frequently been made against it. He may be called the pioneer in the American Lyceum,® which long had such a reputation. His Ora¬ tions and Speeches on Various Occasions5 were collected in four volumes in 1853-68. Consult also Dana, (An Address upon the Life and Services of Edward Everett5 (Cambridge 1865) ; (A Memoir of Edward Everett5 (Bos¬ ton 1865) ; and Whipple's remarks in (Char¬

acter and Characteristic Men,5 pp. 243-252

(1866).

EVERETT, James, English clergyman: b. Alnwick, Northumberland, 16 May 1784; d. Cumberland, 10 May 1872. In 1807 he began to preach as a Wesleyan Methodist minister. In 1821 he retired until 1834 and was in the book business at Sheffield, later at Manchester. In 1842 his health compelled a second retire¬ ment. From 1846 to 1848 he published the notorious (Fly Sheets5 intended to expose the inefficiency in the affairs of the Wesleyan Methodist Connection. This led to his expul¬ sion from the Wesleyan ministry along with his friends William Griffith and S. Dunn. They formed the Wesleyan Reform Union which later united with other liberal Methodists and formed the United Methodist Free Churches. He was president of the Conference of this body. He was a voluminous author and a poet of no mean ability. His most noted book was (The Vil¬ lage Blacksmith5 (1831), which passed through many editions. He was also the biographer of his friend Adam Clark, the great commen¬ tator. He assisted John Holland in the prep¬ aration of the life of the poet James Mont¬ gomery (7 vols., 1854).

*EVERETT, Joseph David, English phys¬ icist: b. Rushmore, near Ipswich, 11 Sept. 1831; d. 9 Aug. 1904. He was educated at Glasgow University; was professor of mathematics, King's College, Nova Scotia, 1859-64; assistant in mathematics, Glasgow University, 1864-67 ; and professor of natural philosophy in Queen's College, Belfast, 1867-97. He took a leading part in the selection and naming of dynamical and electrical units, and drafted a report (1873), the adoption of which originated the C.G.S. system now generally employed. His (Universal Proportion Table,5 was the first ap¬ plication of the parallel column arrangement for obtaining a slide-rule with very open scale. His English version of M. Privat-Deschanel's (Physics 5 (1870) was so largely rewritten as to be almost an original work. Other of his publications are (Centimetre-Gramme-Second System of Units5 (1875) ; (Elementary Text- Book of Physics5 (1877) ; (Shorthand for Gen¬ eral Use5 (1877); * Vibratory Motion and*

Sound5 (1882) ; (Batteries of Natural Phi¬ losophy5 (1887), etc.

EVERETT, William, American educator, youngest son of Edward Everett (q.v.) : b. Watertown, Mass., 10 Oct. 1839 ; d. Quincy, Mass., 15 Feb. 1910. From 1870 to 1877 he was assistant professor of Latin at Harvard. He was master of Adams Academy at Quincy, Mass., 1877-93 andˆ in 1897, and was member of Congress 1893-95. He was the author of (On the Cam5 (1865) ; ˆChanging Base5 (1868), (Double Play5 (1870), two books for boys; a poem, (Hesione, or Europe Unchained5 (1869) ;

EVERETT, Mass., city in Middlesex County, three miles north of Boston,

on the Boston and Maine Railway and with connection by electric surface lines with Lynn, Salem, Chelsea, Boston and adjacent towns. Accord¬ ing to the report of the 13th United States census there were in Everett 62 establishments, with a capital of $22,905,000, employing 2,680

wage-earners at wages amounting to $1,979,000 and having a product valued at $8,747,000. The most important manufactories are a chemical plant, structural iron foundries, steel works and gas and coke works, radiators, shoes, coal-tar products, leather, beds, concrete blocks, tools, wagons, boxes, trunks, etc. The United States census of manufactures for 1914 showed within the city limits 85 industrial establishments of factory grade, employing 3,788 persons ; 3,226 being wage-earners receiving annually a total of $2,047,000 in wages. The capital invested aggregated $26,409,000 and the year's output was valued at $13,219,000; of this, $6,708,000′ was the value added by manufacture. There are two public libraries, the Shute Memorial and the Parlin Memorial, and the Whidden Memorial Hospital is also located here. Everett was settled in 1643 and until 1870 it was a part of Malden. It received its city charter in 1892. Its chief development was in the decade 1890-1900. The government is administered by a mayor, chosen annually, and a municipal council in which members of the lower chamber are elected by wards for one year, those of the upper chamber at large for two years. The more important of the subordinate officials are nominated by the mayor and confirmed by the council ; the others are chosen by the council. Pop. (1920) 40,120.

EVERETT, Wash., city, county-seat of Snohomish County, on Puget Sound, on the Northern Pacific, the Great Northern, the Chicago, Milwaukee and Saint Paul railroads, about 55 miles east by north of Tacoma and 30 miles north of Seattle. It has an excellent harbor with water communication with the Pacific and agricultural lands, forests and val¬ uable mines nearby. Such a combination of natural resources is not common. Everett is the entrepot of the towns and camps in a rich mining belt. Within a district 36 miles long and 20 miles wide, the Monte Cristo, Great Lake, Silver Creek, Troublesome, Sultan, Stilla- guamish and North Fork district send ores to the great smelter in Everett and in various ways contribute naturally to the substantial growth of the city. The city trades extensively in lumber, having some of the largest plants in the Northwest. Red-cedar shingles are the most important products. The smelter and refinery plant obtains mineral from all over the Northwest. The city contains railroad shops, flour- and lumber-mills, large shipyards, sash and door factories, saw and shingle mills and one of the two plants in the United States for saving arsenic from smelter

fumes. There are several well-built brick buildings, churches, a theatre, graded streets, electric light and motor power, sewers, school houses, newspapers, a Carnegie library, two hospitals and the United States customs and assayer's offices, etc. Its school system is excellent. Everett was settled in 1891, incorporated in 1893. Its growth has been rapid because of its favorable situation as a commercial port, its transportation facilities and its nearness to extensive forests. It has adopted the commission form of government. Pop. (1920) 27,644.

EVERETT-GREEN, Evelyn, English writer: b. London, 17 Nov. 1856. She is the daughter of Mary Wood Everett-Green (q.v.); She was educated at Bedford College, London,

studied music at the London Academy; and for two years was a nurse in a London hospital. Since 1883 she has devoted herself entirely to writing; Among her many published works the best known are (The Last of the Dacres) (1886); (St. Wynfriths) (1893); (Dare Lori- mer's Heritage (1892) ; (Dominique's Venge¬ ance * ; (Shut In* (1894) ; (Over the Sea WalP (1894) ; (Arnold Inglehurst the Preacher*

(1895); (Squib: His Friends (1896); (French and English* (1898); (Odeyne's Marriage* (1899); (The Heir of Haskett HalP (1899);*

(Monica (1900) ; (After Worcester > (1901) ; (For the FaitlP (1901) ; (01ivia's Experiment (1901); (1905); (The Magic Island* (1906); (Married in Haste* (1907) ; (The House of Silence> (1910); (The Evolution of Sara* (1911);*

EVERETT-GREEN, Mary Anne (Wood), English author: b. Sheffield, 1818; d. London, 1 Nov. 1895. She moved to London in 1841 and for nearly 40 years was employed in the record office as one of the editors of the (Rolls Series of State Paper Calendars. The works edited by her include (Letters of Royal and Illus¬ trious Ladies of Great Britain* (1846) ; (Diary of John Rous) (1856); (Letters of Henrietta Maria* (1857) ; (Life of William Whitingham* (1870). Her only original work was the (Lives of the Princesses of England from the Norman Conquest, (1850-55).*

EVERGLADES. The name given to a vast tract of land and water in the southernmost part of Florida, a region, though under the very eyes of the early pioneers and bordered by our own advanced lines of commerce and travel, remained practically undiscovered until the first decade of the 20th century. It is not a marsh, a swamp nor a stagnant pool ; neither land nor water. No white man had penetrated it for any great distance, either bv boat or on foot, owing to the variance in the depths of the water and the dense tangle of saw-grass, scrub- willow and custard-apple which abounded

there. The State of Florida is one immense mountain top of limestone formation, covered with a net¬ work of pot-holes, varying in size from a few feet to thousands of acres ; it has countless lakes of fresh water, fed by springs and sub¬ terranean streams, and among these is Lake Okeechobee, named by the Indians Lake May- aimi; at the southern end of the lake began the district known as the Everglades. This vast marsh lay in Dade, Lee, Monroe and Palm Beach counties, extending southward from the lake about 110 miles and having a breadth of about 45 miles. Over the rocky bottom of this region lay a layer of muck, formed of alluvial deposit and decayed vegetation, varying in thickness from a few inches to several feet, and in this muck the saw-grass found its origin, took root and sometimes grows to a height of 10 feet. This saw-grass is one of the most peculiar and interesting features of the Ever¬ glades. Shooting up rapidly, pale green in color, as it goes through the water, fading in the sunlight to a dull golden tint, its blades are tough as bamboo, its edges sharp and jagged as a saw. Toward the western end of the lake it

is interwoven with wild myrtle and formed an almost impassable barrier, running through the entire length of the lake, although there are some passages through it, known familiarly to the Seminole, but which are almost impossible to locate by the explorer.

Scattered along the eastern and western edges of the marsh are numerous islands, some very small, others hundreds of acres in extent, covered with luxuriant growths of live oaks and bays, interspersed with wild cucumber, lemon and orange trees. The papaya, the cus¬ tard-apple and prickly-ash are of frequent oc¬ currence, and here and there may be seen the cabbage palmetto, the pine and the rubber-tree.

The first white man to enter this mysterious, silent country was a Spaniard, one Escalente de Fontenada, who, after being shipwrecked in the Strait of Florida, was made captive and slave by the great cacique, Calos, but he has left us only a few meagre details of his experi¬ ences during his 17 years of captivity. Fre¬ quent expeditions of exploration were sent out by the United States government from 1847 to 1900 to penetrate this wilderness if possible, but all failed, each bringing the explorers, after days of hardships and privations, to the con¬ clusion that the Everglades, though fascinating in its wildness, was a region to be avoided ; a forest of trees, rank undergrowth and saw- grass, impenetrable and practically valueless ; and the lake a mixture of currents which seemed to begin without reason, led nowhere in particular and generally ended in a compara¬ tively still pool,

with a labyrinth of passages from which there seemed no direct egress.

Animal life in the Everglades is fairly abun¬ dant, deer being found on both eastern and western shores, otter are plentiful, alligators and crocodile quite numerous, while the snake is there in large numbers. The Glades were once the breeding place for the egret, the ibis and the heron, and, while many of them are yet to be found, the plume hunter has made such inroads that all are nearly extinct. Small flies and gnats are found where the foliage is thick, as in all regions.

Probably the most interesting of the deni¬ zens of the Everglades are the Seminole In¬ dians, divided into two clans or families, the Muskokis and the Mikasukes, who for hundreds of years have inhabited this section of Florida, defying all attempts to dispossess them, and in 1835, during the Seminole War, killing a large number of troops, under Major Dade, sent against them. The shores of the streams by which the Glades are entered are covered with the cocoa-plum tree, which also grows about the edge of the Glades, producing a blue fruit on the eastern and a white fruit on the western edge. Wherever the land is sufficiently dry, the coontie-plant, really the Florida arrow-root, grows, and from these the Indian gets his sus¬ tenance, extracting flour and starch from the roots.

The physical features of the Everglades are beyond description, beauty and charm blending in a strange, sweet sense of mystery. In dry weather, when the water is low, it is possible to drive into the Glades, but the most beautiful and ideal approach is by water, all the rivers of the Glades finding their way to the sea, some by the rocky channels worn by their own age-long floods, and some through miles of wandering

curves, their shores lined with forests of man¬ grove trees.

Looking into these forests, only the dark waters are to be seen. Ascending, the fresh water of the Glades overcomes the brackish tidal water, and the cocoa-plum takes the place of the mangrove. Still farther up the river, the cocoa-plum gives way to the cypress, and pond lilies abound, the whole panorama of shift¬ ing green, — the lemon-like foliage of the cocoa- plum, the dark olive of the mangrove, and the lighter green of the cypress, enlivened by the sunlight, — making a scene of unique beauty.

In the perspective, when the water is low, the Glades, with its numerous islands and with the tall golden grass, gleaming in the sun¬ shine, waving over a field of silver, ending with a sky-line of blue, has a charm for the eye, unequaled, perhaps, by any other spot in the world, and gives to the sightseer or explorer that subtle impulse and uncontrollable desire to adventure into this never-ending plain of grass and water, never reaching

the goal but always seeking for something that lies just be¬ yond the horizon.

The climate of the Everglades is faultless, showing no extremes of heat or cold, nor is it subject to sudden change. There are two sea¬ sons in the year, the rainy and dry, the latter including June and September, although light showers may be expected at any season, and in the autumn the humidity is very high. Malaria is seldom heard of, the pure air giving the best assurance of health, and it is small wonder that the ancient explorers spent years here try¬ ing to find the <(Fountain of Youth.®

The title to the Everglades is vested in the trustees of the Internal Improvement Fund of Florida, under patents from the Department of the Interior of the United States, by virtue of an act of Congress of 1850, and they promoted efforts to drain the Glades and open it to actual settlers, the cost of reclamation being small compared to the great agricultural value.

A private company set about building a drainage canal from Lake Okeechobee to the New River in 1881. but owing to faulty plan¬ ning the project failed. A definite plan was finally outlined by the State in 1906 and work was promptly begun. This plan provided for a series of main canals to be dredged from the coast Jo the lake, with the purpose in view of lowering the level of the lake sufficiently to stop the overflow of its waters into the Everglades, and to lower the water level there by means of these . same canals. At the present time five canals of a total length of over 200 miles and of an average depth of 5 feet with a 60-foot width have been completed and have served to reclaim about 1,000,000 acres, although certain acres have not received sufficient protection against overflow during heavy raining season. The success of this work proved that a great part of the remainder — 2,700,000 acres — could in time be reclaimed by the natural incline of the surface, from the flood source to the rivers entering the sea. A contract was let to a dredging company of Baltimore to excavate nine canals aggregating 425 miles. All of these waterways are now under construction, with widths ranging from 50 to 60 feet for the larger, and an average of 25 feet on three smaller ones. The depth of the main canals ranges from five to seven feet, while some average four feet.

The excavation is accomplished by huge dfedges and ditching machines of the clamshell, dipper and suction types according to the nature of the formation in which they are employed. Float¬ ing dynamite plants are employed for rock ex¬ cavation, and are equipped with steam-driven

shovel buckets for removing the rock blown out from the bottom of the Ctlt, The Work is proceeding at such a pace that soon about one-third of the entire area will be ready for the farmer and the settler. The Everglades where drained* are being Occupied by settlers from all parts of the country Every kind of fruit and vegetable raised in the temperate zone can he cultivated ; at a profit in Florida, Oranges, bananas, pineapples and other varieties may be added to the list. The farms under cul¬ tivation in the reclaimed portion prove the truth of this. The new land is being sold in large tracts by the State authorities to be divided intoˆ truck and other farms, but the possibility of producing sugar is perhaps the most important. The total cost of the reclama¬ tion project under the plan of 1906 has been about $4,500,000 or $1,125 per acre. For acts, reports and official papers relating to the recla¬ mation scheme, and giving much valuable in¬ formation concerning the region, consult (The Everglades, > Senate Document No. 89, 62d Con¬ gress, 1st Session (Washington 1911) ; (Florida Everglades* > Report of the Everglades Engi¬ neering Commission, Senate Document No. 3/9, 63d Congress, 2d Session (ib. 1914) ; Rhodes and Dumont, (Guide to Florida) (New York 1912) also Willey, D. A., ((Draining the Ever¬ glades, ® in Scientific American, Vol. CIV, No. 2 (21 Jan. 1911) ; id., ((Reclaiming the Ever¬ glades,)} in Scientific American , Vol. CXV, No. 12 (16 Sept. 1916) ; and Dimock, "The Passing of a Wilderness® in Scribner's Magazine, Vol. XLI (March 1907). ' ,*

EVERGREEN, Ala., town, county-seat of Conecuh County, on the Louisville and Nash¬ ville Railroad, about 100 miles northeast of Mobile. An agricultural school and experi¬ ment station and the State Baptist Orphan Asylum are located here. Its mineral springs and agreeable climate make it a winter resort. The town is interested chiefly in agriculture, lumbering and market gardening, and contains a veneer mill, box factory and saw mill. The waterworks and electric-light plant are owned by the municipality. Pop. (1920) 2,000.

EVERGREEN ISLE, a poetical name given to Ireland.

EVERGREENS. Those plants which im¬ perceptibly shed their leaves and acquire new foliage, without noticeable change in their aspect, and those which, like certain biennials and alpines, maintain their leaves throughout the winter season so that they may make a quick start in the spring, are called evergreens. In the northern countries cultivated evergreens are roughly divided into two groups popularly called conifers and "broad-leaved® evergreens, the latter including laurels, rhododendrons, hollies, box, etc. The tropical flora is chiefly evergreen, and some trees, like the Magnolia glauca, that shed their foliage in the north, retain it in the south.

This evergreen character, especially where the plants are subjected to extremes of drought and wetness, or of heat and cold, has given

-Evergreenˆ

rise to many devibes for regulating transpirzk tiort or the deleterious effects of too much moisture Such as the rolling of leaves* waxy deposits on the leaves* and various CUrioUS arrangements of pits* hairs and Cells. When¬ ever the foliage pefsistent for seve'fal years* a§ is the case of the holly afid Of many tropE cal trees and epiphytes, it is often thick and leathery, being provided with a thickened 6Utfete, especially where the leaf undergoes drought periodically; Other evergreens like cacti and rock-plants become fleshy or Succulent, when living irl arid conditions, storing Water in their tissues and Sometimes retaining it there with mucilaginous juices and salts. Furthermore! they are apt to assume a more or less cylindrical shape in both leaf and stem, the foliage often being reduced to mete needles and scales* or being absent entirely. This rodlike, nearly leaf¬ less, condition is particularly noticeable in the so-called whip-plants of arid regions* which are reduced to switch branches with scales for leaves, thus greatly reducing the evaporating surface during the heated term. They often! occur on the Mediterranean shores where an¬ other type of device for controlling exhalation is conspicuous ; for there the evergreens are' really gray, like the lavender, hoary with their envelopes of hair, just as some alpine plants* notably the edelweiss, are smothered in felted: hairs. In the shadowless forests of Australia- many trees reduce their evaporating surfaces by presenting only the edges of their leaves to the midday sun.*

Coniferous evergreens furnish some of our most valuable forest products in the way of timber, naval stores and tanning materials, and also various food products as nuts and bark chiefly of value to the aborigine. One or two* as the West Indian yacca and the yew, furnish cabinet woods, but the latter seems to have been used wherever it grows, chiefly for bowsˆ Most of them also are useful for windbreaks* hedges or for ornamental planting, where shelter, concealment or winter-color is desired ; various species being adapted for differing soils and climates. Some of them, as the arbor-vitae and yew, stand shearing well, and can be pruned into sundry geometrical forms ; holly and box share this distinction, and the custom was formerly carried into grotesque excess in topi¬ ary gardening. _ _*

Laurel, rhododendrons and other “broad¬ leaved® evergreens are often valuable in shrub¬ beries not only on account of their winter ver¬ dure but because they also have handsome blossoms or fruit; they moreover afford shelter . for birds.

Their long life and perpetual verdure have caused many of the evergreen

tribe, particularly the fir and mistletoe, to be included among sacred plants ; and they have become adopted as symbols of immortality, of resurrection and of perennial remembrance, at funeral services and in graveyards. Several kinds, as the yew, served as "palms® on Palm Sunday. On the other hand, yews and cypresses, espe¬ cially the latter, serve as emblems of eternal death and are frequently referred to in this connection in classical literature "with every baleful green denoting death.®

Evergreens are favorite plants for decorat¬ ing during the Christmas holidays ; in England

a certain order was observed in their disposal, as we find in Herrick's (Ceremonies for Can¬ dlemas Eve) :

Down with the rosemary and bays,

Down with the mistletoe;

Instead of holly, now upraise,

The greener box, for show.

Then youthful box which now hath grace Your houses to renew,

Grown old, surrender must his place Unto the crisped yew.

Presumably these holiday garlands and decorations of evergreens — rosemary, ivy, laurel, box, holly and mistletoe — were sur¬ vivals, with the Christmas tree, of pagan cere¬ monies and tree-worship, more or less incor¬ porated in the rites of the early Christian churches ; the mistletoe, however, was so inti¬ mately connected with Druidical rites that it was excluded from the Church decorations. There is a large trade in these Christmas greens, both of the foreign and native kinds, the latter including southern smilax, long-eared pine, ground-pine and hemlock.

Helen Ingersoll.

EVERHART, Benjamin Matlack, Ameri¬ can botanist: b. West Chester, Pa., 24 April 1818; d. 22 Sept. 1904. After a successful busi¬ ness career in his native town and Charleston, S. C., he retired in 1867 and devoted himself to botanical study, becoming a recognized author¬ ity on cryptogamic botany. With J. B. Ellis, of New Jersey, he published in 50

parts a notable work entitled (The Century of North American Fungi, } describing 5,000 species, many of which were discovered by Everhart. With W. A. Kellerman, professor of botany in Ohio State University, he founded and edited (The Journal of Mycology, } to which he contributed numerous articles on his specialty. Several new fungi discovered by him have been named after him by his fellow-scientists.

EVERLASTING FLOWERS , a name ap¬ plied to certain plants belonging to the family Asteracece, from the fact that when dried they suffer little change in their appearance. By the French they are called immortelles, and this name has been introduced into our own lan¬ guage as applied to wreaths made of such flow¬ ers to be placed beside recent graves as emblems of immortality. The plants to which this name is most commonly applied belong to the genus Helichrysum, and are natives of southern Africa and Australia; but it is also given in America to members of allied genera, such as Antennaria, Gnaphalium, Anaphalis, etc. The native women of Australia are fond of deco¬ rating their hair with the flowers of Helichry¬ sum elatum and Helichrysum hracteatum. See Amaranthus.

EVERLASTING GOSPEL, The. See

Joachim de Floris.

EVERLASTING MERCY, The.

(the name is suggestive of two biblical char¬ acters and incidents), who at the age of 20 ((was tokened to the devil.® The crisis in his depravity is hastened by the fight with Billy Myers, precipitated by a poaching adventure and succeeded by a drunken debauch at (

A naked madman waving grand A blazing lamp in either hand

He wakens the sleeping town with a furious ringing of the fire bell. When the firemen rush toward him he flees and they, because of his nakedness and his wild yelling,

I'm fire of hell come up this minute To burn this town and all that's in it.

think him an escaped lunatic. Having shaken his pursuers he returns to ((the Lion® and sleeps. On waking a second spell of madness rushes him to the street. On seeing ((old puffing parson,® with exaggerated rudeness he bars his path and pours out a scathing criticism of the established religious and social order, not spar¬ ing even the parson :

O, what are you, and what you preach.

And what you do, and what you teach Is not God's Word, nor honest schism.

But Devil's cant and pauperism.

Masefield is at his best when criticizing the social order, but the sanity of his spirit is well disclosed in the parson's pointed and effect¬ ive reply. Saul Kane drunk and exaggeratedly boastful in his degradation is not bad all through. Before the fight began he looked at

The five and forty human faces Inflamed by drink and going to races,

Faces of men who'd never been Merry or true or live or clean.

It is a man's sympathy rather than a drunkard's that prompts Kane to comfort little Jimmy Jag- gard who has lost his mother in the market place. Jimmy's mother hurries to the scene as soon as she is warned that ((Saul Kane, the drunken braggard,® is talking to her Jimmy, and in her crude, unlettered and forceful way she pictures Kane to himself and to the as¬ sembled crowd with pitiless accuracy, so that he confesses that

This old mother made me see What harm I done by being me.

And

Summat she was, or looked, or said,

Went home and made me hang my head.

I slunk away into the night Knowing deep down that she was right.

Put thus to shame before himself and the peo¬ ple he drowns the mortification he felt in deeper drunkenness which spurs him to a more brazen assertion of depravity as exhibited in the insult offered to Miss Bourne, who regularly visited the saloons ((To bring the drunkards' souls to grace,® an act which shocked even his com¬ panions in drunkenness. This insult recoiled upon him with such force from the clean soul and simple word of Miss Bourne that it caused something to snap inside his brain. The re¬ maining part of the poem describes his wander¬ ing <(out into darkness, out to night,® merging

into the dawn of a new day, the birth of a new self, and the finding of the <(everlasting mercy, Christ. ® The whole poem grips and holds the reader

with the intensity of its realism and speed of action. One forgets that it is verse and feels the touch of flesh and blood.

EVERLASTING PEA, a popular name for plants of the genus Lathyrus, of the pea family. In the United States it is applied to the beach pea (L. maritimns) , because it often blossoms until late in the fall. In Europe the everlasting pea is L. latifolius, a cultivated plant like the sweet pea, sometimes cultivated for ornament in North America.

EVERMANN, Barton Warren, American ichthyologist : b. Monroe County, Iowa, 1853. In 1886 he was graduated at Indiana University, after which he spent 10 years as teacher and superintendent of schools in Indiana and Cali¬ fornia. In 1888 he began his connection with the United States Bureau of Fisheries, was made ichthyologist in 1891 and from 1903 to 1911 was chief of the division of scientific inquiry. Thereafter, until 1914, he had charge of the Alaska Fisheries Service. In 1892 he was also United States fur-seal commissioner and in 1908 was made chairman of the fur-seal board. At various times he lectured at the universities of Cornell, Stanford and Yale. He is the author of several bulletins of the United States Fish Commission and has con¬ tributed to the proceedings of several learned societies.

EVERSLEY, 1st Baron (George John Shaw-Lefevre), English statesman: b. 12 June 1832. He received his education at Eton and at Cambridge University. In 1855 on the com¬ pletion of his studies in law he was called to the bar. He unsuccessfully contested Winches¬ ter at the election of 1859, but was successful in 1863, when he was elected member for Reading, which seat he held until 1885, when he was elected from Bradford. In 1856 he became civil lord of the Admiralty and in 1858 was appointed commissioner to negotiate a conven¬ tion on fisheries with the French government. He carried the vote in the Commons, in 1868 for the arbitration of the claims arising from the Alabama. From 1869 to 1871 he was sec¬ retary of the Board of Trade and in the latter year was made undersecretary at the Home Office. In 1871-74 he was secretary to the Admiralty; in 1881-83 first commissioner of works and in 1883-84 postmaster general. In 1892-93 he was a member of the Gladstone ministry and in 1894-95 was president of the Local Government Board. While in the Commons he sponsored many important legis¬ lative bills, especially dealing with modern social legislation. He was created first baron in 1906. He published (English and Irish Land Questions) ; incidents of Coercion) ; (Peel and O'ConnelP; (Agrarian Tenures; (English Commons and Forests* ; Gladstone and Ire- land) (1912); (The Partitions of Poland)*

(1915).

,EVERY MAN IN HIS HUMOUR, the

first comedy of Ben Jonson, which has come down to us. It was produced at the Globe Theatre in 1598, with Shakespeare in the cast

and was printed in 1601. David Garrick later revised it and achieved a great success in the principal role.

EVERY MAN OUT OF HIS HUMOUR,

a satirical comedy by Ben Jonson, first pro¬ duced in 1599.

EVESHAM, evz'ham or evz'am, England, municipal borough and market town in the county of Worcester, on the Avon, 15 miles southeast of Worcester, beautifully situated in the vale of Evesham. It is an ancient place and was the scene of a battle fought in 1265, which replaced Henry III on the throne. It had a celebrated abbey, of which a fine tower and some other structures still remain. Fruit grow¬ ing and market gardening are the chief indus¬ tries. Pop. 8,340.

EVICTION. See Ejectment and Evic¬ tion.

EVIDENCE. ((The word evidence con¬ sidered in relation to law includes all the legal means which tend to prove or disprove any mat¬ ter of fact the truth of which is submitted to judicial investigation.® (Taylor). Evidence may be either oral or documentary. Oral evi¬ dence is the statements made by witnesses dur¬ ing the trial ; and documentary evidence con¬ sists of the production of papers, on which is writing, marks or characters capable of being read, which are submitted during the course of the trial. Oral evidence must in all cases be direct: if it is of something that was seen, by the person who saw it ; if of something heard, by the person who heard if ; if of an opinion, by the person who holds that opinion ; or if the knowledge was acquired in any other man¬ ner, by the person who perceived it in that manner. The general rule is that hearsay evi¬ dence is not admissible. Documentary evidence may be either primary or secondary. Primary evidence of a document is where the document itself is produced for the inspection of the court. When a document has been executed in counterparts, each counterpart is primary evi¬ dence against the party executing it, and where a document has been made by printing or any other means that will ensure an exact repro¬ duction, each copy is primary evidence of the other copies, but none of them is primary evi¬ dence of the original. Secondary evidence of a document would be counterparts of the docu¬ ment as against the party who did not execute them, copies made from the original and com¬ pared with it, 'office copies, official copies and oral evidence of the contents of a document by a person who has seen the

original. Before secondary evidence will be received the party offering it must show a legal reason why the original is not produced, such as being lost, destroyed, in possession of the adverse party who refuses to produce it after notice to do so, or when it is a public document, or when it is in a country or place from which it is not per¬ mitted to be removed.

Either oral or documentary evidence may be given of any fact in issue or relevant to the issue; and where two facts are so connected, although one fact is and the other fact is not the issue or relevant to the issue, yet evidence of both may be given if that fact will render probable the existence or non-existence of the

other fact which is in issue or relevant to the issue.

Admissions are statements made by a party to any proceeding and in reference to that pro¬ ceeding, and they are admissible against the party making them, but not in his favor. Ad¬ missions may also be made by an agent, but to bind the principal they must be made by the agent in his regular course of business or em¬ ployment. If an admission is made after an agreement has been entered into between the parties not to use it as evidence, it is not ad¬ missible, nor is it admissible in evidence made under duress. A confession is a statement made by a person charged with a crime stating or suggesting that he committed that crime. If made voluntarily it is admissible as evidence against him, but if made while the perspn is under any threat or promise which has" been given by a person in authority, it is not admis¬ sible. Confessions may be made during the course of the trial, but if the question which produced the confession is an improper one, and after the witness had refused to answer it he had been compelled to do so, it is not a volun¬ tary confession and therefore inadmissible. But if he made no objection to answering the ques¬ tion, it is admissible as a voluntary confession. A witness's opinion is received in evidence when it falls under the head of expert testimony; as, when the question is of some science or art, the opinions of persons specially skilled in that art or science are relevant. Any subject on which special study or experience is necessary to the formation of a correct opinion is a science or art. The most frequent illustrations are medical and handwriting experts. Before the testimony of a person called as an expert is received, he must satisfy the court as to his ability to form a correct opinion on the partic¬ ular subject on which he is to testify. The gen¬ eral rule is that evidence as to a person's char¬ acter is not admissible unless it is the fact in issue, except in criminal cases, but if a person introduce evidence to show good character, the other side may

produce witnesses to show the contrary. All facts should be proved by the best or highest evidence. If a fact can be proved by a written instrument, the writing should be produced and the party alleging a fact must prove it.

In the United States the rules of evidence are laid down by State enactments which apply in State courts in civil cases, and in Federal courts also, in the absence of Federal enact¬ ments. There is no bar to the giving of testi¬ mony, either of color or nationality. In crim¬ inal trials evidence follows common-law rules, as interpreted by the Federal courts, modified by Federal enactments. Consult Chamberlayne, (Treatise on Evidence) (4 vols., Albany 1911) ; Greenleaf, (Treatise on the Law of Evidence) (16th ed., Boston 1899) ; Stephen, J. F., di¬ gest of the Law of Evidence5 (7th ed., London 1907) ; Thayer, Preliminary Treatise on Evi¬ dence at Common Law) (Boston 1898) ; Wig- more, (System of Evidence in Trials at Com¬ mon Law5 (Boston 1904) ; Mills, (Theory and Practice of the Law of Evidence) (London

1907).

EVIDENCES OF CHRISTIANITY, in

favor of its divine origin, may be divided

broadly into two great classes, namely, external evidences, or the body of historical testimonies to the Christian revelation ; and internal evi¬ dences, or arguments drawn from the nature of Christianity itself as exhibited in its teach¬ ings and effects.

Among the earlier Christian apologists were Justin Martyr, Minucius Felix, Tertullian, Ori- gen, Arnobius and Augustine. Their work was continued by the schoolmen during the Middle Ages. In the 16th and 17th centuries the influ¬ ences of the Renaissance and the Reformation gave rise to a spirit of inquiry and criticism which developed English deism as ' represented by Herbert and Hobbes in the 1 7th century, and Collins and Bolingbroke in the 18th. The gen¬ eral position of English deism was the accept¬ ance of the belief in the existence of God, and the profession of natural religion along with opposition to the mysteries and special claims of Christianity. It was in confutation of this posi¬ tion that the great English works on the evi¬ dences of Christianity of Butler, Berkeley and Cudworth were written. In France the new spirit of inquiry was represented by Diderot, D'Holbach, and the encyclopaedists, who assailed Christianity mainly on the ground that it was founded on imposture and superstition, and maintained by sacerdotal trickery and hypocrisy. No reply of any great value was produced in the French Church, though in the previous age Pascal in his (Thoughts 5 had brought together some of the profoundest considerations

yet offered in favor of revealed religion. The 19th century was distinguished by the strongly rationalistic spirit of its criticism. The works of such writers as Strauss, Bauer and Feuer¬ bach, attempting to eliminate the supernatural and the mysterious in the origin of Christianity, were answered by the works of Neander, Ebrard and Ullmann on the other side. The historical method of investigation, represented alike by the Hegelian school and the Positivists in philosophy, and by the Evolutionists in science, is the basis of the chief attacks of the present time against the supernatural character of Christianity, the tendency of all being to hold that, while Christianity is the highest and most perfect development to which the religious spirit has yet attained, it differs simply in de¬ gree of development from any other religion. Notable among later apologists of Christianity have been Paley ((Natural Theology5), Chal¬ mers (‘Natural Theology5), Mansel, Liddon and others, lecturers of the Bampton Founda¬ tion; in Germany, Luthardt, Ewald, Baumstark and others. The evidence of the miraculous is not so much insisted on as it was; life and con¬ duct and the fruits of Christian grace make a stronger appeal to the age. Consult Bruce, apologetics5 (London 1902) ; Burton, (Our Intellectual Attitude in an Age of Criticism5 (Boston 1913) ; Fisher, ‘Grounds of Theistic and Christian Belief5 (1883, rev. ed., 1902) ; and ‘Manual of Christian Evidences5 (New York 1888) ; Foster, (The Finality of the Christian Religion5 (Chicago 1906); Garvie, ‘Handbook of Christian Apologetics5 (New York 1913) ; Robbins, (A Christian Apologetic5 (London 1902) ; Rowland, ‘The Right to Be¬ lieve5 < (Boston 1909) ; Stearns, ‘Evidence of Christian Experience5 (New York 1891). See Apologetics ; Christianity ; Higher Criticism.

EVIL, King's. See Scrofula.

EVIL, Origin of, the subject of extensive J-? °iglca philosophical speculation. The difficulty of the question lies mainly in the fact that the existence of evil in the world seems in¬ consistent with the view that it was created and is maintained by an omnipotent and beneficent creator The various theories on the subject have all sought to elude this difficulty either by the supposition of some principle of evil equally eternal with that of good, or by regarding evil as having only a relative existence, being a kind of good in an imperfect and immature stage. But the problem remains inscrutable and in¬ soluble.

Perhaps the oldest theory on this subject is that of Parseeism, or the religion of Zoroaster, according to which there were two original an¬ tagonistic

principles, one good (Ormazd) and the other evil (Ahriman). This is the doctrine that is now very often spoken of as Manichae- lsm. In contradistinction to this dualistic theory with reference to the origin of evil stand the Monistic theories of Brahmanism and Plato¬ nism. According to the Brahmanic doctrine of the emanation of all things from one original being (Brahma), this original being was re¬ garded as the sole true existence, and the phe¬ nomenal world, with all the evils appearing in it, was held to be mere illusion. Similarly Plato held that the good was the essence of all things, and that the evil and imperfect contained in them had no real existence. The theory enun¬ ciated by Leibnitz in his Vindica¬ tion of God resembles that of Plato. In that work he assigns to the evil existing in the world created by God, which he holds to be the best of all possible worlds, a merely relative existence ; all that we call evil is, he holds, only evil to us because we do not see it in relation to the rest of the universe, for in relation to the universe it is not evil but good, and accordingly cannot be evil in its own nature. The tradi¬ tional Christian account of the origin of evil is that given in Genesis. In the theology based thereon, Satan, the personal principle of evil, differs from the Zoroastrian Ahriman only in not being co-ordinate with the personal prin¬ ciple of good. Consult Orchard, (Modern Theories of Sin) (1911) ; Rashdall, ,(Theories of Good and EviP (1907) ; Royce, (Studies of Good and EviP (1898).

EVIL EYE. See Superstition.

EVIL-MERODACH, e'vil-me-ro-'dak, king of Babylonia and son of Nebuchadnezzar II. He reigned for less than a year in 561-560 b.c., and was put to death by his brother Neriglissar. His name has been found on some contract tablets. According to 2 Kings xxv, 27 he • liberated Jefioiachin, king of Judah.

E VOLUTE. The evolute of a curve is the locus of its centres of curvature. The tangents to the evolute will be normals to the curve, if it lies in a plane, and principal nor¬ mals, if it lies in a three-dimensional space, so that the curve may be traced by the unwinding of a cord stretched along its evolute. A curve is said to be the involute of its evolute. In general, every curve has an infinitude of in¬ volutes. Different involutes of the same curve are said to be parallel. The equation of the evolute of the plane curve y — fcx is obtained

by eliminating x and the curve and xi = x- 1 + (y D 2

y between the _ri P + (y1)2]

equation of

$y^* = y +$

Circle, BBB, as Evolute and its Spiral Involute, MNRSA.

In the geometry of surfaces, the so-called surface of centres corresponds to the evolute. This consists of two sheets, corresponding respectively to the centres of maximum and minimum curvature of the various points of the surface with reference to which it is described. See Curves; Surfaces, Theory of.

EVOLUTION. See Man, Christian An¬ thropology.

EVOLUTION, History of. In travers¬ ing the history of natural science as in travers¬ ing the history of any phase of human thought and activity, we seek constantly for new things, for the precise time of the discovery of the new fact, the announcement of the new idea, the formulation of the new understanding or philosophy. But nothing comes wholly new into the world; the world and its content are all the result of development and growth. So correspondingly very little comes wholly new into history; and the history of evolution is no exception to the rule. The history of evolution clearly reveals that the evolution idea is the result of a long evolution itself ; it is impossible to say just when the idea came first into its more primitive form of being, or just when its principal modifications or accretions occurred, or when its present form was finally determined. In tracing the history of the unfolding of the evolution idea we shall find that the conspicuous achievements in connection with it have not been the discovery of absolute newness, but the recognition and determination and general establishment or the important ideas and con¬ ception germs among the host offered.

An eminent American naturalist has defined three stages in connection with the discovery of the laws of science: First, a stage of dim suggestion and pure speculation with little ref¬ erence to facts; second, a stage of the statement of a working hypothesis to explain certain facts; and, third, the proof or demonstration of the law by facts. These stages can be recog¬ nized in the history of evolution. The first corresponds with the period of the Greek phi¬ losophers ; the second with the post-Greek, pre- Darwinian period, and the third with the Darwinian and post-Darwinian period.

The evolution theory was largely anticipated, at least by suggestion, by the Greeks. They

have left writings that can easily be interpreted as more or less clearly

outlining the essential conception of organic evolution. Empedocles (493-435 b.c.), for example, who has been called <(the father of the evolution idea,® be¬ lieved in spontaneous generation as the explana¬ tion of the origin of life, and he believed that different forms of life were not produced simultaneously. Plant life came first and animal life only after a long series of trials, but the origin of the organisms was a very gradual process. (

Aristotle (384-322 b.c.), the greatest of the Greek natural philosophers, believed in a com¬ plete gradation in nature, a progressive de¬ velopment corresponding with the progressive life of the soul. Nature, he says, proceeds con¬ stantly by the aid of gradual transitions from the most imperfect to the most perfect, while the numerous analogies which we find in various parts of the animal scale show that ail is gov¬ erned by the same laws ; in qther words, nature is a unit as to its causatiop/ Man is the highest point of one long and continuous ascent. Aris¬ totle perceived a marvelous adaptation in the arrangement of the world, and felt compelled to assume intelligent design as the primary cause of things. Nothing, he held, which occurs regularly can be the result of accident. Aris¬ totle rejected the crude conception of Empe¬ docles of the survival of adapted, and the ex¬ tinction of unadapted, beings. <(It is impossible that these adapted parts should arise in this manner [of Empedocles] ; for these parts and everything which is produced in nature are either always, or for the most part, adaptively produced; and this is not the case with any¬ thing which is produced by fortune or chance even as it does not appear to be fortune or chance that it frequently rains in winter . . . As these things appear to be either by chance or to be for some purpose, and we have shown that they cannot be by chance, then it follows that they must be for some purpose. There is, therefore, a purpose in things which are pro¬ duced by and exist from nature.®

The Greeks, taken altogether, suggested more or less crudely the idea of the gradual development of organisms, the idea of the elimination of mistakes in production, and therefore the idea of the survival of the fittest, the idea of the adaptation of parts or the fit¬ ness of certain structures to certain ends, the idea of intelligent design constantly operating in nature, as also the idea of nature being con¬ trolled by the operation of natural causes due

in the beginning to the laws of chance. After all, however, in how far are we justified in reading into a happy suggestive phrase or sentence of any Greek speculative thinker a real conception of that idea of the origin and de¬ velopment of organic nature that we hold to-day under the name of Evolution?

Following the Greeks the evolution idea was left in the hands of the

theologians, natural philosophers and naturalists of the long period from Augustine (1st century a.d.) to the end of the 17th century, a period chiefly ruled by the Mosaic interpretation of the origin of organic life and its variety. Augustine, him¬ self, large-minded man that he was, gave a liberal and naturalistic interpretation of the Mosaic record, favoring potential rather than special creation and teaching that in nature we should not look for miracles, but laws. But opposed to him were almost all the other churchmen, and their rigid adherence to the Mosaic interpretation controlled almost all thinking about life for many centuries. The great Evolution idea lay practically dead from the time of its foreshadowings by the Greeks until the time of the speculative natural philoso¬ phers of the 16th and 17th centuries.

Bacon (1561-1626) pointed out the evidence for variation in animals and the bearing of this upon the production of new species and upon the gradations of life forms. Descartes (1 596— 1650) advocated a strong mechanistic concep¬ tion of the physical universe and all life within it. Leibnitz (1646-1716) advocated a doctrine of continuity of life forms, and said that the different classes of animals are so connected by gradatory forms that it was practically impos¬ sible either by observation or imagination to determine where any one begins or ends. These ideas of continuity in nature were also reiterated and strengthened by Spinoza, Pascal and New¬ ton. It is interesting to note that all these con¬ tributions to the establishment of the evolution idea came from the speculative natural philoso¬ phers rather than from the naturalists.

Chief among all the natural philosophers who have attempted to express the early idea of evolution was Kant (1724-1804), but he was staggered by the thought that any human in¬ vestigation could ever reach an understanding of the laws which have governed the derivation of all organic beings from the lowest up to man. <(It is quite certain,® he wrote, ((that we cannot become sufficiently acquainted with organized creatures and their hidden potentialities by the aid of purely mechanical natural principles, much less can we explain them; and this is so certain, that we may boldly assert that it is absurd for man even to conceive such an idea, or to hope that a Newton may one day arise ' even to make the production of . a blade of grass comprehensible, according to natural laws ordained by no intention. Such an insight we must absolutely deny to man.®

However, certain naturalists of the 17th and 18th centuries did make their contribu¬ tions of fact, or alleged fact, to the evolu¬ tion idea. For example Bonnet (1720-93), who is reputed to be the author of the term ˆEvolution® in connection with the de¬ velopment of life, is famous for his extraor¬ dinary ((encasement theory® of embryology, ac¬ cording to which all the future progeny and successive after-generations derived from

female animal existed in miniature in the eggs in her body, with lesser eggs within the minia¬ ture young, containing the next generation, and so on ad infinitum.

But it is with the great French naturalist Button (1707-88) that the real contribution of naturalists to and participation in the develop¬ ment of the evolution idea importantly begins. He has, indeed, been catled by Osborn the naturalist founder of the modern applied form of the evolution theory. But with other his¬ torians of evolution, he has no such standing. Radi, for example, says that <(the best thing about Buffon is his style.® However it may truthfully be said of him that he was the first great naturalist to point out on a broad scale the mutability of species in relation to changes of environment. Very early in his studies of comparative anatomy he found difficulty in the special creation theory. ((The pig does not ap¬ pear to have been formed upon an original special and perfect plan since it is a compound of other animals. It has evidently useless parts, or rather parts of which it cannot make any use, toes, the bones of which are perfectly formed and which nevertheless are of no service to it. Nature is far from subjecting herself to final causes in the formation of her cieatures.® Buffon believed in the direct modi¬ fying influence of environment. ((How many species, being perfected or degenerated by the great changes in land and sea, by the favors or disfavors of nature, by food, by the pro¬ longed influence of climate, are no longer what they formerly were? He also fairly clearly expressed the conception of a struggle for ex- * istence, an elimination of the least-perfected species and a contest between the fecundity of certain species and their constant destruction. This is anticipating more or less definitely the prodigality of production ideas of Malthus, and the natural selection doctrine of Darwin. But he was not of the stuff of which martyrs are made. When the authorities of the Church called for an explanation of his views he said: <(I declare that I have had no intention of denying the Holy Writ; I declare that I firmly believe all that is written there concerning crea¬ tion, as well concerning the time as the pro¬ cedure; and I willingly retract whatever is in my book that in any way is contradictory of the Mosaic relation, as I hold my hypothesis concerning the formation of the earth and other planets as a purely philosophical conception.®

It is interesting to note the fact that another great naturalist, Linnaeus, exactly contempo¬ raneous with Buffon, a botanist, and the first great

systematist or classifier of organisms, was an absolute believer in the fixity of species. Species were, in his mind, the units of direct creation ; each species bore the impression of the thought of the Creator in all its structure and functions. Later in his life Linnaeus did give up, in some little measure, this idea of the special Divine creation and absolute fixity of species. <(A11 the species of one genus,® he wrote before his death, ˆconstituted at first a single species, but this subsequently became multiplied by hybrid generations, that is, by in¬ tercrossing with other original species.®

Following Buffon, the next two most im¬ portant names to be mentioned in connection with the history of evolution are those of Erasmus Darwin (1731-1802), and Lamarck

(1744-1829). Erasmus Darwin was a poet and naturalist, and the grandfather of Charles Dar¬ win. He was, in his late years at least, a firm evolutionist, with conceptions concerning the factors or causes of evolution strangely like those afterward proclaimed by Lamarck, ' and quite opposed to those chiefly insisted on by Charles Darwin. After stating his Relief that all organisms have been produced by ((one and the same kind of living filament,® and setting out strong arguments for the mutability of species, he says : (

Lamarck may fairly be called the first to set out in detail a full and logical theory of descent with explanations of the causes of this descent. With full justice he is referred to as the most prominent figure in the history of evolution be¬ tween the Greeks and Charles Darwin. But no one has been more misunderstood nor judged with more partiality by over or under praise. He had as contemporaneous antagonist the great anatomist Cuvier (1769-1832) who gave all the heavy weight of his name and position to the attack on the Lamarckian doctrines in particular and evolution in general. Indeed, Cuvier, though he added enormously to our knowledge of comparative anatomy, almost as enormously hindered the progress and post¬ poned the accentance of the evolution theory, which actually finds a large part of its proof in the facts of comparative anatomy.

Lamarck's exposition of the evolution theory and particularly of its causes, with the great stress laid upon the principle of the inheritance of acquired characters, and hence the all-import¬ ant influence and effect of varying environment in the modification of species, has come to be known in evolution literature as <(Lamarckism® in contrast with ˆDarwinism,® or Charles Dar¬ win's contribution with its special emphasis on natural selection as the explanation of the ˆorigin of species.® ((Darwinism® is too often popularly used synonomously with evolution, but it should not be so used. (

Contemporary with Lamarck were Goethe (1749-1832) who contributed somewhat to the evolution theory by his studies and generaliza¬ tions on the metamorphosis of plants and the vertebrate theory of the skull, and Saint Hilaire (1772-1844) who maintained insistently the truth of the evolution theory, then being ob¬ scured by the antagonism of Cuvier, but who denied the inherited influences of habit, holding that the direct modifying action of environment on organisms was the sole cause of species¬ forming.

But it was Charles Darwin (1809-82) who

was first able to restore and extend enor¬ mously the prestige of the evolution conception. This was due first to his tremendous marshal¬ ing of facts to support it, and, second, to his contribution of a new, or practically new, causo-mechanical explanation of species change, or, as usually expressed, (

Part of the general acceptance of Darwin's ideas was due to the polemic ability of various immediate friends and champions of Darwinism among contemporary naturalists. Intimately associated 'with Darwin and his presentation of the natural selection theory were such men as Huxley, Lyell, Asa Gray, Agassiz and others. Huxley, Lyell and Asa Gray were adherents and defenders of Darwinism, while Agassiz was among the more conspicuous of the antagonists. The actual weight of personal debate and po¬ lemic struggle on behalf of Darwin fell largely on Huxley. It could have rested in no bettgr hands. Despite the fact that the time was ripe for Darwin, and despite his extraordinary mass¬ ing of facts, and his marvelous anticipations and refutations of criticisms, the swift winning of the acceptance of Darwinism was largely due to the championship of Huxley. Haeckel, the great zoologist and bold speculative monist phi¬ losopher of Jena, was the principal continental contemporary champion of Darwinism.

A curious incident in the history of the Dar¬ winian evolution exposition and explanation is that of the extraordinary coincidence of the formulation of the natural selection theory by Alfred Russel Wallace at the very same time of its utterance by Darwin. As a matter of fact both men published papers formulating this theory in 1858 in a single number of the Jour¬ nal of the Linnaean Society The name of Wells (1813), Matthews (1831) and Nandin (1852), are often mentioned as those of men who anticipated in some measure, at the various dates indicated, Darwin's utterance of the

selec¬ tion theory, by more or less clear statements of its essence, but none of them carried conviction to the world.

The post-Darwinian history of evolution has chiefly to do with the further development of the Darwinian theories, together with the rise of the so-called ((mutations theory® of species origin, associated with the name of De Vries, as an addition to Lamarck's and Darwin's ex¬ planations, and the stressing of the significance of the new knowledge of heredity, beginning with the discovery by present-day biologists of the experimental work and conclusions of Men¬ del, achieved some 30 years prior to their com¬ ing to be generally known. But as these later developments are treated in some detail, to¬ gether with Lamarck's and Darwin's own the¬ ories, in an article elsewhere in this work (see Evolution. Theories of), this sketch of the history of evolution may suitably close with the period of Charles Darwin. The pres¬ ent status of the evolution conception is still that so solidly established by Darwin and his

contemporaries. As to the explanatmns, or factors, of evolution, also, Darwin's still hold chief place, especially in the minds of the mass of the generally educated people. Among biol¬ ogists, however, there is a growing tendency to see in the Darwinian selection theories many difficulties formerly unperceived, and to cast about for other aiding or even possibly replac¬ ing theories.

Bibliography. — Clodd, Edward, (Pioneers of Evolution, from Thales to Huxley > (New York 1897) ; Locy, W. A., (Biology and Its Makers) (New York 1908) : Osborn, H. F., (From the Greeks to Darwin (New York*

1895).

Vernon Kellogg,

Professor of Entomology, Leland Stanford

Junior University, California.

EVOLUTION, Theories of. In any con¬ sideration of the theories of evolution® there must be kept clearly in mind the distinction be¬ tween conceptions or theories of the origin or transformation of species and of plant and ani¬ mal descent generally, and theories offering ex¬ planations of the causes and controls of this species, origin and descent. The first is the evolution conception proper, and should be what is primarily meant when the term evolu¬ tion is used alone. We could still believe in evolution, and recognize it as a great scientific fact, even if we had no wholly clear or gener¬ ally accepted understanding of the causes that bring it about and

the influences that control it. In fact, that is not far from being the actual situation to-day.

But in common usage, and in many books, the fact, or theory, of evolution, and the facts and theories of the causes of evolution are not differentiated. In the minds of naturalists, however, the distinction is usually maintained, and it would be of great advantage if it were more widely and popularly made. For the evo¬ lution conception itself is no longer a debated question, whereas the particular methods and, above all, the so-called factors, or initiating and guiding causes of evolution, are still open to debate, and, indeed, are continuously and vigor¬ ously debated. When one reads of disagree¬ ments among biologists concerning the merits of ˆDarwinism,® it is not a disagreement con¬ cerning the fact of evolution, for which the term ((Darwinism® is too often synonymously used in popular writing and speaking, but it is a disagreement concerning the value of Charles Darwin's explanation of the causes of evolution, Tiamely, his theories of natural and sexual selec¬ tion.

However it is hardly possible to consider the general theory of evolution apart from theories of its cause and control, and the subject of this article, which for the sake of brevity, is written simply as <(theories of evolution,® is really meant to cover a discussion of theories which explain evolution; how it comes to be, what its methods are, and what are its causal factors.

In earlier days, the days of the Greeks and the later churchmen and natural philosophers of the middle centuries, there were various dif¬ ferent theories of evolution, if the incomplete and often fantastic speculations of these times can be called theories. Some of these are out¬ lined in the article Evolution, History of. But the real struggle from the beginning of serious thinking about the multitude and variety of

plant and animal forms up to the time of the publication of Darwin's 'Origin of Species) (1859) and the few years thereafter, when its heretical doctrine was getting firmly established among scientific and educated men the world over, was between the believers in special creation of all these forms and believers in their origin by evolution.

To-day there is not a biologist of standing who does not accept the theory, or better, fact, of evolution. And the great majority of all people who think about the matter at all also accept this once ultra-heretical and scoffed-at doctrine.

The explanatory theories of evolution are numerous ; some of them are not readily dis¬ tinguishable from one another; they overlap more or less ; but a number of fairly well-con¬ trasted different theories can be made out when careful analysis is made of the whole group. Each of these is distinguished by the emphasis which it gives to some one factor and the sub¬ ordination or even total rejection of other fac¬ tors particularly stressed in other theories.

These various distinguishable theories can be grouped into several categories, such as those which are essentially vitalistic as compared with those essentially mechanistic in their explana¬ tion ; or those which envisage species-forming as proceeding by little leaps as contrasted with those which assume perfect gradation and conti¬ nuity in species. Some of the theories are based on the assumption of individual change in response to the environment and personal habit, and the inheritance of these "acquired charac¬ ters. Others reject this possibility in toto, or partially, and stress the effect of a selection among strictly g'erminal inheritable variations based on a rigorous struggle for existence which extinguishes the possessors of disadvan¬ tageous variations and preserves the lucky pos¬ sessors of advantageous ones, thus leaving only these latter to leave progeny, which will natu¬ rally inherit the fortunate characteristics of the parents. Some see the germinal variations, which in all modern theories are the basic ele¬ ments of evolution, produced purely by chance, while others see them as the determined re¬ sults of the influence of an inner directing force, or of the outer environment.

Only the more important and more strongly contrasted of these theories need be described. For most are but changes rung on a few prin¬ cipal themes. Lamarckism and Neo-Lamarck¬ ism as contrasted with Darwinism and Neo- Darwinism; Vitalism as contrasted with the Mechanicalism ; and Chance as contrasted with Determinism ; these are the chief points that need to be taken into account in differentiating the various explanations of the phenomena of organic evolution.

Despite the suggestiveness of the many Evo¬ lution and Evolution-explaining speculations made by various natural philosophers and nat¬ uralists before the beginning of the 19th cen¬ tury, it was not until Lamarck, in the very first years of said century, began to express his view of evolution and its causes, that a full and logi¬ cally constructed evolution theory may be said to have been formulated. The nearest approach to such an earlier formulation was that made in the late years of the 18th century by Erasmus Darwin, grandfather of Charles Darwin. "A rapid run through the later writings of Dr. Dar- VOL io — 39

609

win,® says Clodd, "shows that there is scarcely a side of the great theory of evolution which has escaped his notice or suggestive comment.® While Grant Allen notes that the theory of nat¬ ural selection, which was Charles Darwin's great contribution to the evolution conception, was the only cardinal one in the evolutionary system on which Erasmus Darwin did not actu¬ ally forestall his more famous and greater grandson.

Lamarck and the Lamarckian Theories. —

Jean-Baptiste-Pierre- Antoine de Monet, Cheva¬ lier de Lamarck, born in 1744 in the village of Bazentin in Picardy (northeast France), was in 1800 professor of invertebrate zooloev in the Museum of Natural History in Paris. He had previously been for many years keeper of the herbarium in the Museum. He was, therefore, well grounded in the facts of both botany and zoology, and he had a philosophical mind, which, in the face of the facts of science learned by him, compelled him to turn from the orthodox view of creation by special de¬ sign and act to the heretical one of evolution. In the opening lecture of his professional course in the year 1800 he outlined his views and his theory of the method and cause of evolution. Later he exposed his theory at length and in full detail in his famous 'Philo¬ sophic Zoologique) (1809).

The essential feature in the explanation of descent conceived and uttered by Lamarck is the inheritance of acquired variations. Lamarck was convinced, first, of the certainty that species vary under changed external influences, second, that there is a fundamental unity in the animal kingdom, and, third, that there is a progressive development. The main influences that tend to change species come under the law of use and disuse, for he believed that nature does not effect her changes directly (Buffon's belief) but through the reaction of animals to their environment. Lamarck denied, absolutely, the existence of any perfecting tendency in nature, and regarded evolution as the final necessary effect of surrounding conditions on life.

Thus, instead of suggesting that animals had been created for a certain mode of life, he supposed that their mode of life had itself created them. "In considering the natural order of animals, the very positive gradation which exists in their structure, organization, and in the number as well as the perfection of their faculties, is very far removed from being a new truth, because the Greeks themselves fully perceived it ; but they were unable to expose the processes and proofs of this evolution because they lacked the knowledge necessary to establish it. In consideration of this gradation of life, there are only two conclusions which face us as to origin: The conclusion adopted up to to-day: Nature (or its Author) in creating animals has foreseen all possible sorts of circumstances in which they would be destined to live, and has given to each species a constant organization, as well as the form, determined and invariable in its parts, which forces each species to live in the places and climates where it is found, and there preserve the habits which we know belong to it. My personal conclusion : Nature, in producing successfully all the species of animals, and commencing by the most imperfect or the most simple to conclude its labor in the most

perfect, has gradually completed our organiza¬ tion ; and of these animals, while spreading generally in all the habitable regions of the globe, each species has received, under the in¬ fluence of the environment which it has en¬ countered, the habits which we recognize and the modifications in its parts which observation reveals in it.®

The following is Lamarck's statement or explanation of the causes of this descent : <(First Law : Life by its internal forces tends continually to increase the volume of every body that possesses it, as well as to increase the size of all the parts of the body up to a limit which it brings about. Second Law : The production of a new organ or part results from a new need or want, which continues to be felt, and from the new movement which this need initiates and causes to continue. Third Law : The de¬ velopment of organs and their force /or power of action are always in direct relation to the employment of these organs. In every animal which has not passed the term of its develop¬ ment the more frequent and sustained employ¬ ment of each organ strengthens little by little this organ, develops it, increases it in size, and gives it a power proportioned to the length of its employment ; whereas the constant lack of use of the same organ insensibly weakens it, deteriorates it, progressively diminishes its powers and ends by causing it to disappear. Fourth Law : All that has been acquired or altered in the organization of individuals dur¬ ing their life is

preserved by generation (hered¬ ity), and transmitted to individuals which proceed from those which have undergone these changes.®

Neo-Lamarckian Theories. — Lamarck's theory was a simple and well-constructed one, and one which, if based on established fact, would furnish the most satisfying explanation of evolution yet offered. But its great fault is that the basic assumption in the theory is not an established fact; indeed, it seems to be just opposed to the facts. Despite a few plausible cases, about which a great storm of argument has raged — for example, the famous contro¬ versy in 1893 and 1894, in the Contemporary Re¬ view, between Herbert Spencer, champion of Lamarckism, and August Weismann, its most destructive antagonist — most naturalists agree that the known facts of inheritance not only do not support but strongly deny the La¬ marckian assumption of the heritability of char¬ acters acquired by an individual in its lifetime by reaction to environment, use or disuse of parts, and personal habit.

And yet there have always been, and are to¬ day, biologists of the very first class who be¬ lieve in most of the essentials of the La¬ marckian explanation of evolution as opposed to the Darwinian. Their principal reasons for this belief are : First, the radical assumptions as to almost limitless time, rigor of the struggle for existence and actual validity of the minute, fortuitous, germinal variations as determining elements in this struggle, and the necessary ex¬ treme variety of these variations, that have to be made in connection with Darwin's selection explanation in order to get such results out of chance as are revealed in the extraordinarily fine and perfect adaptations of plants and animals to their environment.

Second, it has been shown by the experi¬

ments of Klebs, Tower and others, that the environment can sometimes affect the germ- cells, and that when it does it can actually pro¬ duce changes in the next generation that are inheritable, although it must be said that these changes are not necessarily adaptive.

Third, it is a fact of familiar observation that the adaptations of species are often almost exactly of the same character as the changes that are produced in individuals by their im¬ mediate reaction to environment conditions, and on this the assumption is made that despite our lack of any knowledge of how this individual change is impressed on the germ-cells, and even in face of our greatly advanced understanding of the mechanism of inheritance, almost all of which goes to indicate the independence of the germ-cells from external influences affecting the body-cells, this parallelism must in some way be the result of an inheritance of acquired characters.

For these reasons and others, therefore, there is a school of biologists, who may be called Neo-Lamarckians, which is busy formu¬ lating modifications of the old Lamarckian theory to make it fit our more recent knowledge of facts.

Charles Darwin and the Darwinian Theo¬ ries. — In a paper presented to the Linnaean Society of London in 1858, and far more fully and elaborately in the (Origin of Species > pub¬ lished in 1859, Charles Darwin, born in 1809, in Shrewsbury, England, and bearing, without any question, the most distinguished name in all the long roll of names associated with the evolution conception, presented an explanatory theory of species-forming and descent which is best known as the Selection Theory.

This Darwinian explanation rests on certain observed facts and certain inductions from these facts. The observed facts are: (1) the increase by multiplication in geometrical ratio of the individuals in every species, whatever the kind of reproduction which may be peculiar to each species; (2) the always apparent slight (to greater) variation in form and function ex¬ isting among all individuals even though of the same generation or brood; and (3) the transmission, with these inevitable slight varia¬ tions, by the parent to its offspring of a form and physiology essentially like the parental. The inferred (also partly observed) facts are: (1) a lack of food and room for all these new individuals produced by geometrical multiplica¬ tion, and consequently a competition (active or passive) among those individuals having any cecologic relations to one another, as, for example, among those occupying the same local¬ ity, or needing the same food; (2) the probable success in this competition of those individuals whose slight differences (variations) are of such a nature as to give them an advantage over their confreres, which results in saving their lives, at least until they have produced offspring; and (3) the fact that these <(saved® individuals will, by virtue of the already re¬ ferred to action of heredity, hand down to the offspring their advantageous condition, of structure and physiology.

The competition among individuals and kinds (species) of organisms may fairly be called a struggle. This is obvious when it 'is active, as in actual personal battling for a piece of food or in attempts to capture prey or to escape

capture, and less obvious when it is passive, as in the endurance of stress of

weather, hun¬ ger, thirst and untoward conditions of any kind. The struggle is, or may be, for each individual threefold in nature: (1) an active struggle or competition with other individuals of its own kind, for space in the habitat, suf¬ ficient share of the food, and opportunity to produce offspring in the way peculiar and com¬ mon to its species; (2) an active or passive struggle or competition with the individuals of other species which may need the same space and food as itself, or may need it or its eggs or young for food, and (3) an active (or more usually passive) struggle with the physico¬ chemical external conditions of the world it lives in, as varying temperature and humidity, storms and floods and natural catastrophes of all sorts.

The resultant of these existing conditions is, according to Darwin and his followers, an in¬ evitable natural selection of individuals and of species. Thousands must die where a few may live to maturity (i.e., to the time of producing young). Which 10, say, of the thousand shall live depends on the slight but sufficient advantage possessed by 10 individuals in the complex struggle for existence due to the fortuitous possession of fortunate congenital differences (variations). The 990 with unfor¬ tunate congenital variations are extinguished in the struggle and with them the opportunity for the perpetuation (by transmission to offspring) of their particular variations. The offspring of the 10, of course, will vary in their turn, but will vary around the new and already proved advantageous parental condition : among the thousand, say, offspring of the original saved 10 the same limitations of space and food will again work to the killing off before maturity of 990, leaving the- 10 best equipped to reproduce. This repeated and intensive selection leads to a slow but steady and certain modification, through the successive generations, of the form and functions of the species; a modification always toward adaptation, toward fitness, to¬ ward a moulding of the body and its behavior to safe conformity with external conditions. The exquisite adaptation of the parts and func¬ tions of the animal and plant as we see it every day to our infinite admiration and wonder has all come to exist through the purely mechanical, inevitable weeding out and selecting by nature (by the environmental determining of what may and wrhat may not live) through uncounted generations of unreckonable time.

Associated with this theory of natural selection Darwin also advanced a theory to ac¬ count for the often marked differences between the sexes of a species, involving the possession by one sex, usually the male, of special out¬ growths of the body, bright and heavy plum¬ age, or conspicuous colors and pattern, etc., most of which would seem to be elements of disadvantage rather than advantage in the struggle for life. Darwin's explanation of this, called the theory of sexual selection, was that these characters are of advantage in the rivalry of mating, many of them being

apparently of a kind to attract and excite individuals of the opposite sex. Hence they might help their possessors win in the struggle to find mates and consequently to leave progeny. It is a sort of particular and limited kind of natural

selection, not involving a determination between life and death, but one between going child¬ less and leaving posterity — which is, after all, the essential determination in natural selection. But the assumed fact of choice in this theory of sexual selection involves various unproved and hardly probable assumptions regarding the esthetic development of birds, butterflies, spiders, etc., and has been strongly attacked both on the basis of actual opposing observation and experiment as well as on the basis of general improbability. On the whole, Darwin's theory of sexual selection has been largely discredited, although it must be said that no very satisfac¬ tory substitute explanation has been offered for it. But this discrediting of sexual selec¬ tion throws a heavier strain on the theory of natural selection, for it was to relieve the lat¬ ter theory of the difficulty of facing these ap¬ parently existing disadvantageous characters of the males of many species of birds and insects that the sexual selection theory was devised.

Nevertheless it is true that Darwin's natural selection explanation of evolution has been, ever since its announcement, more widely and au¬ thoritatively accepted as the needed revelation of the causes and methods of species-forming and adaptation than any other explaining theory yet offered.

Neo-Darwinian Theories. — Darwin never claimed for natural selection that it was the only influence capable of modifying species and explaining descent. But some of his followers have practically made that claim. Most notable among these Neo-Darwinians was August Weis- mann, professor of zoology at Freiburg in Baden, whose strenuous attacks on the con¬ ception of the inheritance of acquired char¬ acters did so much to discredit the Lamarckian explanation of evolution. Weismann's theories of heredity led him to a belief in the almost ab¬ solute isolation in the body, and hence inde¬ pendence from influences affecting it, of the germ-cells, and the consequent belief that the only variations that could be possibly inherited were the minute germinal ones that served Darwin as the basis for the working of natural selection. From this to a belief in the All-Maclit of natural selection in determining species- change and descent generally was but the natural step.

Alfred Russell Wallace and some other prominent English naturalists ranged them¬ selves with Weismann as Neo-Darwinians. Most American naturalists, however, held aloof from this extremist attitude, while the

Germans were divided. In the later years of his life, Weismann withdrew from his original most advanced position, and was inclined to admit the inadequacy of natural selection as an all- sufficient explanation of descent.

Isolation Theories. — One of the most valid criticisms of the natural selection theory has been that it makes it necessary to ascribe a life- and-death determining value to the small germi¬ nal variations which are the basis of the selec¬ tive working of the struggle for existence, and it has always seemed hard in the face of the very trivial character of many of these little differences to admit this value for them. But there is one way in which it seems that these little differences might be heaped up and de¬ veloped into larger ones in the course of suc¬ cessive generations, and that is by the isolation

from the main body of the species of a group of individuals more or less similar in germinal characters. This isolation could be effected by a migration and later geographic segregation of a group. The result would be an enforced in- breeding and an elimination of the swamping effects of unrestricted wider crossing. The re¬ sult would be a cumulation of the characteristics represented in the group by originally minute germinal variations.

Beginning with Moritz Wagner (1868), energetically supported by Romanes (1897), and now most conspicuously urged by David Starr Jordan, this ˆisolation theory® has been much in favor with some biologists, especially those who pay especial attention to the relation of geographic distribution of plants and animals to evolution.

Theories of Orthogenesis. — As the char¬ acter of the original small germinal variations necessarily first determines the possible lines along which species change and descent pro¬ ceed; and as it is evident from careful study of the actual lines of descent exhibited both by the many living groups of animals and plants and also the many extinct ones (made visible to us by their fossils) that descent has actually proceeded along certain distinct lines and has not been scattered miscellaneously and futilely in all directions, it is plain that the discovery of any cause or form of control which would direct variation in certain more or less definite directions would help very much in solving the great problem of the cause and control of evolu¬ tion.

From the beginning, therefore, the existence of such means, and its

character, have been sought for. Many biologists have believed that the phenomenon of evolution can only be explained by the assumption of such a means. Cope, an American paleontologist — and it may be noted that paleontologists, from their studies of the long succession of life through many millions of years seem especially inclined to this belief — about 1870, attributed to the simplest life-stuff a sort of primitive conscious¬ ness which gives it a capacity for adaptation and modification that results in definite ortho- genetic evolutionary advance. Naegeli, a great German botanist and natural philosopher, pro¬ posed in 1884 a theory of orthogenesis (evolu¬ tion in fixed lines) by assuming the existence of an inner perfecting principle, inherent in all organisms, which determine the general lines of variation and makes steadily toward evolution¬ ary progress.

Both these theories are essentially vitalistic in character in that they assume an inner mystic something associated with life and char¬ acteristic of it that can direct its evolution, which makes it unnecessary and futile to try to find a more mechanical or physico-chemical explanation of this capacity of living matter. More modern exponents of this vitalistic be¬ lief are such men as Driesch and Bergson, who may be called Neo-Vitalists.

Eimer, a German zoologist, in 1888 denied the vitalistic, automatic inner perfecting prin¬ ciple of Naegeli, but upheld the assumption of orthogenetic evolution, attributing its cause to the direct influence of extrinsic and environ¬ mental conditions. A number of English bi¬ ologists, as Henslow and Lloyd Morgan, have ranged themselves in the ranks of the believers

in orthogenesis, but they have not cared to admit the existence of any peculiar vitalistic factor as its explanation. The present dean of American paleontologists and evolutionists, H. F. Osborn, is also, on the basis of his extensive studies of evolutionary progress among extinct animals, especially the mammals, a believer in orthogenesis, but he is content to attribute its cause to some as yet (

Theories of Heterogenesis and Mutations.

— All of the theories of the causes of evolution so far referred to agree in assuming a progress mostly by small, continuous change, so that spe¬ cies form series of perfect gradations. But there have always been naturalists to deny this as¬ sumption and to claim that change comes often by definite leaps, so that even the original differences may be fairly large and fixed from the beginning. Such naturalists have formu¬ lated a number of theories of heterogenesis or mutancy. Von Koelliker, a 'German zoologist, proposed, in 1864, such a theory, but only in most general terms. The American naturalist, Dali, in 1877, expressed his conviction that sudden

changes of species-forming character sometimes occur in animals, and Francis Galton, the great English anthropologist and cousin of Charles Darwin, and in most of his beliefs a thorough Darwinian, nevertheless denied that the original germinal variations must necessarily be small, referring to the many known cases of <(sports® among animals and plants as ex¬ amples of original differences appearing as leaps.

In 1899, Korschinsky, a Russian botanist, advocated an explanation of species-forming by heterogenesis as one to be preferred to Dar¬ win's selection theory, which he strongly op¬ posed. However he presented few new facts bearing on the subject and made no particular impression on biologists. In 1901, however, the Amsterdam botanist, Hugo de Vries, published the first volume of a large work called (The Mutations Theory, > in which he described his observations and experiments, extending over many years, on certain plant species, especially the evening primrose, Oenothera lamarckiana, and definitely proposed a theory of the origin of species by mutations, or sudden new fixed changes, the new forms thus formed having no special relation, as regards their origin, to adaptation or the struggle for existence. He backed up his theory with a description of many such new ((elementary species® which had arisen suddenly under his eyes from the evening primrose.

De Vriess' theory has had a large attention and a considerable acceptance from naturalists, especially with those already dissatisfied with the Darwinian explanation. However, despite much observation and experimentation by other men, few other ((mutations® besides those de¬ scribed by De Vries have been recorded, while as a general explaining theory of evolution the mutations theory leaves much to be desired.

It is especially helpless in the face of the necessity of explaining adaptation, and adap¬ tation is as characteristic of evolution as is species-change.

Influence of the Modern Knowledge of Heredity on Theories of Evolution. — In 1900 three European botanists working independ¬ ently at problems of inheritance in plants dis¬ covered that certain similar work done a third of a century before in the gardens of an Augus- tinian cloister in Brunn (Austria) by a monk named Gregor Mendel, had been quite over¬ looked by naturalists and yet was of the utmost importance. This discovery of Mendel's work by the botanists De Vries, Correns and Tschermak, and their independent discoveries, at the same time, of facts confirming Mendel's earlier results, marks the beginning of the modern study of heredity whose

positive re¬ sults already amount to more than had been learned in all time before.

A general summation of these results and consideration of their bearing on the validity of the various theories for the explanation of evolution, lend much weight to the type of theory that assumes the original variations to be the result of influences working from within rather than without. The modern knowledge of heredity also is strongly opposed to any assumption of the inheritance of acquired characters and emphasizes the strictly germinal character of all variations that really count in species-making. As has recently been said by Davenport, a leading American exponent o.f Mendelism, <(a theory of Evolution that assumes internal changes chiefly independent of ex¬ ternal conditions, i.e., spontaneously arising . . . seems best to meet the present state of our knowledge® [of heredity]. And he admits that the thorough-going accepters of Mendel¬ ism and the new heredity generally are driven to a position as regards the causes and fundamental control of evolution which is essentially like Naegeli's vitalistic theory of evolution from within by virtue of a per¬ fecting or progressive tendency; which is an idea that goes back to Aristotle and includes Huxley and Bergson in its roll of adherents. In other words the most modern theory in explanation of evolution is essentially both anti- Lamarckian and anti-Darwinian, and allies itself with that type of explanation which may be called orthogenetic and vitalistic.

Bibliography. — Kellogg, V. L., (Darwinism Today' (New York 1907) ; Morgan, T. H., (Evolution and Adaptation ' (New York 1903) ; Morgan, T. H., (A Critique of Evolution) (New York 1917) ; Osborn, H. F., (The Origin and Evolution of Life) (New York 1917) ; Packard, A. S., (Lamarck, His Life and His Work' (New York 1901); de Vries, H„ (Species and Varieties' (New York 1905) ; Weismann, August,

Vernon Kellogg,

Professor of Entomology, Leland Stanford

Junior University, California.

EVOLUTION IN MATHEMATICS. See

Involution and Evolution.

EVOLUTIONS, Military, the movements by which troops change formation, position or order. See Tactics, Military.

EVONYMUS, ev-on'i-mus, a genus of the staff-tree family (Celastracece) , comprising about 120 species of shrubs, natives of the north temperate

zone. Three species are found in America. The best known are the strawberry bush (E . americanus), the burning-bush or wahoo (E. atropurpureus) , and the spindle- tree (E . europcens) . (See Spindle-tree). From the bark of the wahoo or burning-bush an ex¬ tract known in medicine as euonymin is ob¬ tained. It is used as a cholagogue, tonic and diuretic, and for its stimulant action on the liver.

EVORA, a' voo-ra (ancient Ebora), city, Portugal, capital of the province of Alemtejo, 75 miles east by south of Lisbon. It is a very ancient city ; Quintus Sertorius took it in 80 b.c., and it was also conquered by the Moors in 715, but recovered from them in 1139. Among the famous Roman antiquities of Evora are the temple of Diana, with fine Corinthian columns ; an aqueduct erected by Quintus Sertorius and restored in the 16th century, which still supplies the city with water; and the beautiful tower, surrounded by Ionic columns, at the extremity of the aqueduct, and which, although it has ex¬ isted since 70 b.c., is in almost perfect preser¬ vation. It has an archiepiscopal library, con¬ taining, besides some 25,000 volumes, several pictures of great merit. There are iron fur¬ naces and some manufactures of cotton cloth and hats, and a considerable trade in wine. Pop. 17,901.

EVREMOND, avr-mon. See Saint Evre- mond.

EVREUX, a-vre (ancient Civitas Eburovi- cum), France, the capital of the department of Eure, on the Iton, 57 miles west by north¬ west of Paris. It is one of the oldest towns of France and its ruins and existing ancient Nor¬ man buildings show its antiquity. The most noted of the buildings are the church of Saint Taurin; the bishop's palace, dating back to 1484; the Tour de l'Horloge, built in the same century. The history of the town has been of the same tumultuous order as that of many other towns in that section of France, having been taken from the Romans by Clovis; the Normans under Rollo pillaged the town in 892; Henry I of England captured it in 1119, laying it in waste by fire; Philip Augustus of France took it in 1194 and in 1199; and during the wars of the 1 5th century between the French and English it was the scene of many bloody con¬ flicts, being passed from the control of one to the other many times. The principal manu¬ factures are machinery, linen, hosiery, leather, tiles and bricks. Pop. (of the commune) 18,957.

EWALD, a'val, Carl, Danish novelist: b. Schleswig 1856; d. 1908. He was educated at the University of Copenhagen, to which city his family had removed after his native province had fallen to the Germans in 1864. After spend¬ ing some years as a forester, he turned to literature in 1887, at first issuing school texts and translations. His principal original works are Singleton's Udenlandsrejse' (1894) (Glaede over Danmark' (1898);

(Sulasmiths Have' (1898) ; (Der Kinderkruezzug' (1896) ; (Mein Kleiner Junge' (1899); (Crumlin' (1900). Several of his works have been translated into English.

EWALD, Georg Heinrich August,

ga-org hin'riH ow'goost a'valt, German Orien¬ talist and biblical critic: b. Gottingen, 16 Nov. 1803 ; d. there, 4 May 1875. As a student he published his first critical work, (Die Kompo- sition der Genesis. He became professor of theology at Gottingen in 1831, and in 1835 professor of Oriental languages. As one of the seven professors of Gottingen who signed the protest against the abrogation by King Ernest Augustus of the Hanoverian constitution, he was deposed from his chair and accepted, in 1838, a call to Tubingen as professor of phi¬ losophy. In 1841 he was ennobled by the king of Wiirtemberg and returned in 1848 to Gottin¬ gen, and resumed his old position. When Hanover was annexed by Prussia in 1866 he became a zealous defender of the rights of the ex-king and this led to his removal from his university chair, though his salary was con¬ tinued. He was elected severaLtimes a member of the Diet, where he spoke strongly in favor of the restoration of the Hanoverian monarchy. His Hˆritische Grammatik der hebraischen Sprache) (Critical Grammar of the Hebrew Language) (1827), afterward merged in his (Ausfiihrliches Lehrbuch der hebraischen Sprache,* and continually enlarged (8th ed., 1870), formed an epoch in the study of Hebrew and placed Ewald in the first rank among scholars. (Das Hohe Lied Salomos> (The Song of Solomon) ; (Die poetischen Bucher des Alten Bundes) (The Poetical Books of the Old Testament) ; (Die Propheten des Alten Bundes,* containing a translation and interpretation of all the prophets in chronological order ; together with his (Geschichte des Volkes IsraeP (His¬ tory of the People of Israel) ; and (Die Alter- thiimer des Volkes IsraeP (The Antiquities of the People of Israel), are his principal works on the Old Testament.*

The (History of IsraeP is considered his greatest work, entailed a labor of 30 years and is a work of rare genius stamped with the impress of its author's individuality. Like others of his more important writings, it has been trans¬ lated into English. On the New Testament he wrote, among other works, (Uebersetzung und Erklarung aller Bucher des Neuen Testaments) (Translation and Explanation of all the Books of the New Testament). Another important work is (Die Lehre der Bibel von Gott, oder Theologie des Alten und Neuen Bundes) (the Doctrine of the Bible regarding God, or Theol¬ ogy of the Old and New Testaments). He also

wrote philological treatises on various Eastern languages and on subjects connected with them, among which may be mentioned works on the book of Enoch, on Phoenician inscriptions, on Phoenician views regarding the creation of the world, on Arabic Grammar, and linguistic Studies. From 1849-65 he issued a serial almost entirely written by himself called (Die Tahrbiicher der biblischen Wissenschaft* (Year Books of Biblical Science). Ewald has been called the ((second founder of the science of the Hebrew language® Consult Cheyne, founders of Old Testament Criticism) (London 1893).*

EWALD, or EVALD, Johannes, yfr-han'-

nes, Danish poet: b. Copenhagen, 18 Nov. 1743; d. there, 17 March 1781. At 15 he ran away and enlisted in the Prussian service. Being com¬ pelled to join a regiment of artillery at Magde¬ burg, instead of being attached to the hussars

as he had been promised, he deserted the Prus¬ sian standard in the Seven Years' War, and entered the Austrian service. After a few months he again deserted, returned home and began to apply himself seriously to theology. On the death of Frederick V of Denmark he was requested to compose an elegy (1766) ; and the general admiration with which it was received roused his ambition and he soon be¬ came one of the most eminent lyric and tragic poets of his nation. His opera the (Death of Balder) (1774), the subject of which is taken from the northern mythology and his (Rolf Krage) (1770), a tragedy taken from the ancient history of Denmark, are works which, not¬ withstanding many defects, bear the impress of true genius ; but by some his lyrical drama (The Fishers) (1779), in which is included the Danish national hymn, is ranked as the finest of all his works. As a lyric poet he is most popular at the present day, and several of his odes and elegies are among the best that modern times have produced. Consult Jorgensen, Jo¬ hannes Ewald (1888).*

EWART, u'art, David, Canadian architect : b. Scotland, 1843. He received his education at the Edinburgh School of Arts, removed to Canada in 1871 and became assistant engineer and architect in the Department of Public Works, at Ottawa, rising to the post of chief architect in 1897. He completed the central tower of the Parliament buildings at Ottawa and erected the Canadian buildings at the Chicago World's Fair in 1893 and at the Paris Exposition of 1900. He is a member of the board of assessors of the departmental buildings at Ottawa since 1906 and since 1909 is councillor of the Royal Architectural Institute of Canada.

EWART, James Cossar, British zoologist : b. Penicuik, near Edinburgh, 26 Nov. 1851. He was educated at Edinburgh University, where he graduated

M.D., and was appointed demon¬ strator of anatomy 1874. In 1 875 he became conservator of the museum, University College, London ; in 1878 professor of natural history, Aberdeen University; and in 1882 professor of the same, Edinburgh University, when he was also appointed member of the Scottish Fishery Board. In London he made researches into the bacillus of splenic fever, etc., and at Aberdeen- founded the first marine laboratory in Britain, where, with the late Dr. Romanes, he made researches into the locomotor system of the echinoderms, which was the subject of the Croonian lecture of the Royal Society 1881. He conducts the fishery investigations into the fer¬ tilization and life history of the herring, white-bait and other food-fishes and directs a large corps of assistants in the work at various sta¬ tions. He established lectureships in his uni¬ versity in embryology and the philosophy of natural history and organized, for the students, a union. At Penicuik he has conducted the costly experiments, with which his name is widely known, into the development of the horse, and hybridizing of equine species, in¬ cluding the quagga, zebra and island pony, in different ways ; and disproved the hoary theory as to the influence of previous impregnation (telegony). Among his publications are (The Electric Organs of Skate) (1888-89) ;(The Cranial Nerves and Lateral Sense Organs of Elasmobranchs (1889);*

the H°rse> (1894); (Telegony and Reversion) (1887) ; (A Critical Period in the Development the Horse' (1889); (Guide to Hybrids' (1900) ; 'The Multiple Origin of Horses and Pomes) (1904); (Horse Skulls from the Ro¬ man Fort, near Melrose) (1906) ; (On a Prej- valsky Hybrid' (1907).

EWART, John Skirving, Canadian law¬ yer: b. Toronto, 1849. He received his educa¬ tion at Upper Canada College and was admitted to practice in 1871. He practised in Toronto until 1882, when he removed to Winnipeg. He came to Ottawa in 1904 and was now recog¬ nized as a leader in his profession. During the contest for separate schools in Manitoba he represented the Catholic side. He became in¬ terested in political questions after 1900 and opposed the aims of the imperialists. At The Hague court in 1910 he was chief counsel for Canada. He published reports of cases in the courts of Manitoba from 1883 to 1890 and also (The Kingdom of Canada and Other Essays) (1908) ; (Sir John Macdonald and the Canadian Flag' (1908); (Canadian Independence) (1911); (The Kingdom Papers' (1912).

EWART, William, English physician: b. London, 1848. He received his education at the University of Cambridge and also at Paris and Berlin. He

became consulting physician to many hospitals and examiner and lecturer to the Royal College of Physicians. He was assistant physician to the Brompton Hospital for Consumption. He became a recognized au¬ thority on the diseases of the heart and lungs. His works include (Pulmonary Cavities) (1882); (Cardiac Outlines' (1892); (Heart Studies, Chiefly ClinicaP (1894); ˆBronchitis,® and ˆBronchiectasis® (in Allbutt and Rolleston's (System of Medicine,' London 1909), and a portion of (Report on Climates and Baths of Great Britain' (issued by the Royal Medical and Chirurgical Society, Vol. II, 1902).

EWBANK, u'bank, Thomas, American sci¬ entist : b. England, 11 March 1792; d. New York, 16 Sept. 1870. He came to America about 1819 and engaged in manufacturing metallic tubing (1820-36). He was United States commis¬ sioner of patents 1849-52. His publications in¬ clude (The World a Workshop' (1855) ; (Life in Brazil,' with an appendix on a collection of American antiquities (1857) ; (Reminiscences in the Patent Office' (1859); (Thoughts on Mat¬ ter and Force' (1858) ; and Unorganic Forces Ordained to Supersede Human Slavery,' an essay.

*EWE, a linguistic negro stock, inhabiting the coasts of Dahomey and Togoland. It is probable that they came from Borgu or Gurma only a few centuries back. They are agricul¬ turists and possess *a highly developed juridical system. They comprise the Awuna, Ataklu, Agbosimi, Aflao, Geng, Togo, Krikor, Ewemi, Fra, Dahoman, Mahi, Aja, Affakpami and others. Consult Ellis, (The Ewe-Speaking Peo¬ ples of the Slave Coast of West Africa' (Lon¬ don 1890) ; Stanford (Africa' (ib. 1895).*

EWELL, u'el, Arthur Woolsey, American physicist : b. Bradford, Mass., 1873. He was educated at Yale where he was graduated in 1897, and also studied at the universities of Tohns Hopkins and Berlin. From 1897 to 1910 he was instructor in physics and assistant pro¬

fessor at the Worcester Polytechnic Institute, becoming professor in 1910. He is a Fellow of the American Academy of Arts and Sciences and has published (A Textbook of Physical Chemistry' (1909) ; (Physical Measurements' (1910; 2d ed., 1913) ; Artificial Rotatory Po¬ larization' (1911).

EWELL, Benjamin Stoddert, American educator: b. Washington, D. C., 10 June 1810; d. James City, Va., 19 June 1894. He was grad¬ uated at West Point 1832, taught mathematics there until 1836, and later served as assistant engineer of the Baltimore and Susquehanna Railroad, becoming professor of mathematics at Hampden-Sidney College 1839, where he re¬ mained till 1846. He filled a similar chair at Washington University, Lexington, Va., 1846- 48, when he went in the same capacity to Wil¬ liam

and Mary College, becoming its president 1854, and president emeritus 1888. He was in command of the 32d Regiment, Virginia Volun¬ teers, from 1861-62 and adjutant-general of the Confederate army on the staff of Gen. Joseph E. Johnston, when he was commander of the departments of Tennessee and Mississippi 1862-

64.

EWELL, Marshall Davis, American law¬ yer : b. Oxford, Mich., 18 Aug. 1844. He was graduated at the University of Michigan Law School (1868), and was professor of common law in the Union College of Law, Chicago, from 1877 until the founding of the Kent Col¬ lege of Law, in which he became professor of common law, dean and president. Fie is well known as a microscopist and handwriting ex¬ pert, and was elected a F"ellow of the Royal Microscopical Society of London (1886), and president of the American Microscopical Soci¬ ety (1893). He has edited (Blackwell on Tax Titles' (1875) ; Ullinois Reports' (Vols. XXXII-XXXVI, inclusive, 1877) ; Wash¬ burn's Manual of Criminal Law' (1878) ; (Evans on Agency' (1879) ; (Lindley on Part¬ nership' (1881) ; and written (Leading Cases in Disabilities' (1876) ; (Treatise on the Law of Fixtures' (1877) ; (Student's Manual of Medical Jurisprudence' (1887; 2d ed., 1909); (Essentials of Law' (1882 ; 2d ed., 1915).

EWELL, Richard Stoddert, American sol¬ dier : b. Georgetown, D. C., 8 Feb. 1817; d. Springfield, Tenn., 25 Jan. 1872. He was grad¬ uated at the United States Military Academy in 1840, and served during the Mexican War with t Scott from Vera Cruz to the City of Mexico. At the outbreak of the Civil War he resigned his commission in the National army; joined the Confederates; was actively engaged throughout the war and attained the rank of lieutenant-general. He was at the battles of the first and second Manassas, where he lost a leg, Front Royal, Cross Keys, Port Repub¬ lic and Cedar Mountain ; and was later placed in command of the Second Corps of General Lee's army, upon the death of ((Stonewall" Jackson. In this capacity he was in personal command and led the charges of the corps at the capture of Winchester, at Gettysburg, the Wilderness, and Spottsylvania Court House, but was transferred to the Department of Rich¬ mond after these engagements, owing to his ina¬ bility, on account of his wounds, to withstand the hardships of another campaign. He was later captured by Sheridan at Sailor's Creek

with his forces (6 April 1865). After the war he retired to private life.

EWER, u'er, Ferdinand Cartwright,

American Episcopal clergyman: b. Nantucket, Mass., 22 May 1826; d. Montreal, Canada, 10 Oct. 1883. He was graduated at Harvard 1848. After several years devoted to journalism he entered the Episcopal ministry and became rec¬ tor of Grace Church, San Francisco, 1858. In 1862 he was chosen rector of Christ Church, New York, but his belief in the doctrine of the Real Presence and his introduction of ceremo¬ nies and practices not usual in Episcopal churches caused him to be charged with Roman¬ ism and he resigned. The majority of his communicants followed him to the parish of Saint Ignatius, New York, which was organized for him, and of which he continued rector till his death. He was an able controversialist, and wrote Two Eventful Nights, or the Fallacies of Spiritualism Exposed) (1856) ; (Sermons on the Failure of Protestantism 5 (1869) ; Cath¬ olicity in its Relations to Protestantism and Romanism5 (1878) ; (The Operation of the Holy Spirit) (1880) ; (Grammar of Theology)

(1880).

EWING, u'ing, Finis, American clergyman: b. Bedford County, Va., 1773; d. 1841. He re¬ ceived his license to preach in the Cumberland presbytery in 1802 and for many years was a successful revivalist. In 1810, with two others, he formed the presbytery which later became the Cumberland Presbyterian Church. In 1820- 36 he held a pastorate at New Lebanon, Mo., and after 1836 at Lexington, Mo. He published (Lectures on Important Subjects in Divinity) (1824). Consult Cossit, (Life and Times of Finis Ewing) (Nashville 1853).

EWING, Hugh Boyle, American soldier : b. Lancaster, Ohio, 31 Oct. 1826; d. there, 30 June 1905. He was educated at the United States Military Academy; in 1849 went to Cali¬ fornia in charge of an expedition sent out by his father, then Secretary of the Interior, to rescue emigrants from the snow-bound Sierras, whence he returned in 1852 ; practised law in Saint Louis 1854-56 and in Leavenworth, Kan., 1856-58. He served through the Civil War, becoming a brevet major-general; was United States Minister to The Hague 1866-70, and wrote (A Castle in the Air5 (1887) ; (The Black List) (1893), etc.

EWING, James, American pathologist : b. Pittsburgh, Pa., 1866. In 1888 he was grad¬ uated at Amherst College and three years later at the College of Physicians and Surgeons of Columbia University. He also studied at Vienna and after his return was successively tutor, Fellow and instructor at Columbia from 1893 to 1899. In the latter year he was ap- nointed professor of pathology at Cornell. He is an ex-president of the Association

for Cancer Research and of the Harvey Society. His pub¬ lications include (Clinical Pathology of Blood5 (2d ed., 1903) ; and articles in (Textbook of Legal Medicine and Toxicology5 (1903).

EWING, Sir (James) Alfred, Scottish physicist and engineer: b. Dundee, 27 March 1855. He was educated at the Dundee high school and the University of Edinburgh. For several years he was engaged in engineering work and was assistant to Lord Kelvin and

Prof. Fleeming Jenkin. He was professor of mechanical engineering at the Imperial Uni¬ versity of Tokio 1878-83. While in Japan he devoted himself assiduously to the study of earthquakes, devising seismographs to record the earth's vibrations during such disturbances. In 1883 he became professor of engineering at University College, Dundee, and from 1890 to 1903 he was professor of mechanism and ap¬ plied mechanics in the University of Cambridge. From 1903 to 1906 he was a member of the Explosives Commission and a member of the Ordnance Research Board 1906-08. In 1907 he was made C.B., and K.C.B. in 1911. In 1916 he became principal of the University of Edin¬ burgh. He was awarded the royal medal for researches in magnetism in 1895. He has pub¬ lished many papers on scientific subjects, espe¬ cially on magnetism and the physics of metals, in transactions of the Royal Society5 and elsewhere; also treatise on Earthquake Meas¬ urement5 (1883) ; (Magnetic Induction in Iron and Other Metals5 (1891) ; the Steam Engine and Other Heat Engines5 (1894) ; the Strength of Materials5 (1899); the Mechan¬ ical Production of Cold5 (1908).

EWING, John, American Presbyterian minister and mathematician: b. Nottingham, Md., 22 June 1732; d. Philadelphia, Pa., 8 Sept. 1802. As a youth he exhibited marked ability in mathematics and later took a course of study in Princeton College. Upon graduating in 1755 he was appointed instructor in the college. He then became interested in theology and after finishing his course in divinity was licensed to preach by the presbytery of Newcastle, Del. In 1758 he received his appointment as instructor of the philosophical department in the College of Philadelphia and in 1759 became pastor of the First Presbyterian Church in that city, re¬ maining such until 1773 when he was sent to England to solicit pecuniary aid in the estab¬ lishment of an academy. In 1775 he returned to his native land, and in 1779, when the Col¬ lege of Philadelphia was changed to the Uni¬ versity of Pennsylvania, he was placed in the station of provost, and officiated in that capacity until his death. He was also selected to serve on more than one boundary commission. His

EWING, Juliana Horatia Gatty, English writer for young people: b. Ecclesfield, York¬ shire, 3 Aug. 1841 ; d. Bath, Somerset, 13 May- 1885.

She contributed largely to a magazine started by her mother (Mrs. Gatty). On her mother's death the magazine was edited by her and her sister conjointly, and many of her best stories first appeared in it. Of her delightful tales of child-life we may mention (Mrs. Over- the-Way's Remembrances5 (1869);.(The Land of Lost Toys5 (1869) ;

*1885 under the title (Juliana Horatia Ewing and Her Books.**

EWING, Thomas, American statesman : b. near West Liberty, Va., 28 Dec. 1789; d. Lan¬ caster, Ohio, 26 Oct. 1871. He was graduated at the Ohio University in Athens in 1815; ad¬ mitted to the bar in 1816; and practised law for 15 years. He was a United States senator from Ohio 1831— 37 and 1850-51 ; Secretary of the Treasury under President Harrison in 1841 ; and Secretary of the Interior under President Taylor in 1849-50. In the United States Su¬ preme Court he ranked among the foremost lawyers of the nation. During the Civil War his judgment in matters of state was frequently sought by President Lincoln. When the cap¬ ture of Mason and Slidell brought England arid the United States to the very point of hostili¬ ties, Ewing sent the famous telegram that was really decisive of the whole trouble : "There can be no contraband of war between neutral ports® — and it was his advice that finally prevailed over Everett's opinion, and the envoys were set free.

EX CATHEDRA (Lat. "from out the chair®) : a phrase originally applied to deci¬ sions given by the Pope in the discharge of his spiritual office as pastor and bishop of all Christians. Hence it is applied to every deci¬ sion pronounced by any one in the exercise of his proper authority, as a bishop in the spiritual sphere, a judge on the bench, etc.

EX PARTE, eks par'te (Lat. "from a part®), a law Latin term used in reference to an action taken by either party to a suit or other legal proceeding, or on behalf of such party, without notice to the other. Ex parte evidence or hearings are frequently made use of without being regarded as an infringement of the rights of the opponent. In a derived sense the term indicates a lack of accuracy or impartiality in a statement.

EX POST FACTO (eks p6st fak to) LAW (Lat. ((from what is done afterward"), one made after an offense and taking effect retroactively. The provision in the Constitu¬ tion of the United States, Art. I, sec. 9, clause 3, that ((no ... ex post facto law shall be passed,® has been interpreted to refer only to crimes, and in that sense the words are com¬ monly used. The

following have been decided to come within the scope of the phrase: Every law that makes an action done before its pas¬ sage, and innocent when done, criminal, and punishes such action ; every law that aggravates a crime, or makes it greater than when com¬ mitted; every law that changes the nature of the punishment, or makes it greater than at the time the act was committed; every law that alters the rules of evidence so as to make it easier to convict the offenders; every law that, while not avowedly relating to crimes, in effect imposes a penalty or the deprivation of a right ; every law that deprives persons accused of crime of some lawful protection to which they have become entitled, as a former acquittal Such laws are therefore contrary to the Consti¬ tution. Consult Cooley, (General Principles of Constitutional Law in the United States) (3d ed,, 1900).

EXACTIONS (from Lat. cxactio. act of driving out, forcing out, a forced contribution),

a legal term of ecclesiastical jurisprudence, used in the Middle Ages to denote such duties or contributions, demanded by the clergy of their parishioners, as were extraordinary, either because they were new and against custom or because their amount was unduly increased. They were illicit, and it was found necessary repeatedly to denounce their unlawfulness. The power of the clergy over their parishioners or of the bishops over the subordinate clergy was so great that it was easy for them to make the most outrageous exactions. They were de¬ nounced at the third Council of Toledo (589).

EXAMINERS, Medical, in some S tates, as Massachusetts and New York, county officials whose duties are practically those formerly dis¬ charged by coroners, whom they have super¬ seded. See Coroner.

EXANTHEMATA, ek-san-the'ma-ta, a name formerly widely employed to designate the acute infectious diseases that were character¬ ized by an eruption — the eruptive fevers. The most important of these are measles, scarlet fever, chickenpox, smallpox, typhoid fever, and typhus fever (qq.v.). The term is also used in botany for blotches and eruptive excrescences on the surface of leaves.

EXARCH, eks'ark (Gr. exarchos,

leader), a title equivalent to governor (Lat. rector), in the terminology of civil government after the seat of empire was transferred to Con¬ stantinople. But already in the 4th century it acquired the signification of archbishop, metro¬ politan or patriarch. In the acts of the first Council of Constantinople (381) the bishops of Alexandria, Antioch and Constantinople are styled exarchs; and the field of jurisdiction of an

exarchos is exarchia. In the same period exarchos, exarchia were in use as designations of civil magistrates and their jurisdictions, the terms diocese (AioIkpcoc, dxoecesis) was also used. In ecclesiastical usage exarch came in time to be a title of honor apart from jurisdic¬ tion ; thus, by the Council of Chalcedon (451) the bishops of Ephesus, Heraclea and Cappado¬ cian Caesarea, though deprived of their juris¬ diction over the metropolitans previously suf¬ fragan to them, were permitted to be called by the title exarch.

EXAUVILLIEZ, Philippe Irenee Boistel

d/ fe-lep e-re-na bwas-tel deks-oˆve-e-a, French author: b. Amiens, 6 Dec. 1786; d. Paris, 30 March 1862. His essay, (The Saint Gervais Library (1831), gave the first impulse to the establishment of small libraries all over France. He translated Walter Scott's novels, from which, he eliminated every passage which could be in¬ terpreted as telling against the Roman Catholic religion, and also all love passages as far as possible.*

*EXCALIBUR, the famous mystic sword of King Arthur (q.v.) which, in accordance with the promise of Merlin, was given him by the Lady of the Lake. At Arthur's death it was hurled by Sir Bedivere into the lake, where it was seized and conveyed from sight by a mys¬ terious hand. Consult Tennyson, Udylls of the King.**

EXCAVATION, the removal of material in engineering operations in order to make space for some structural work. There is a wide variety of such work and the special proc-

esses are described under Canals, Dams, Foun¬ dation, Tunnels, etc.

EXCAVATOR, a machine for digging, moving and transporting gravel, soil, etc. Ex¬ cavators are made of two kinds, each adapted for different kinds of work. In making a long cutting, the first to come into operation is operated on rails, and employs a large ˆscoop® or bucket, with a lever heavy enough to counter¬ balance the bucket when filled with clay. The scoop is lowered and driven into the bank until full. It is then raised by the suspension chain, and dumped by the chain on the lever. The second class of excavator is employed to make the cutting wider. Its sides are made sloping to an angle of 45 degrees, and on the top of the bank a temporary line of rails is laid a few feet from the edge. The machine is placed on the rails at the end of the cutting; the jib is lowered until the row of buckets it carries can cut into the clay; these scrape up the bank, reaching the top of

it full of soil ; they next pass over the machine, and are emptied into the wagons beyond it. Excavators were ex¬ tensively employed in the digging of trenches and construction of breastworks on the Western front during the Great War. Consult McDaniel, (Excavating Machinery) (New York 1913).

EXCELL, Edwin Othello, American song writer: b. Uniontown, Stark County, Ohio, 13 Dec. 1851. He received his education in the pub¬ lic schools of the states of Ohio and Pennsyl¬ vania, and gave special attention to the study of music. For over 20 years he was associated with the celebrated Georgia evangelist, the Rev. Sam P. Tones, as gospel singer. After 1881 he engaged in the publication of church and Sun¬ day school music books. He is the composer of many gospel songs which have attained wide popularity. He also took a prominent part in the Prohibition movement.

EXCELLENCY (from Lat. excellentia, superiority), a title of honor given to ambas¬ sadors, ministers plenipotentiary, governors of British colonies and their wives and the gov¬ ernor of Massachusetts. The President of the United States and the governors of many of the States have the same title by courtesy. For¬ merly it was limited to soverign princes.

EXCELSIOR (Lat. "higher®) (1) the motto of New York State. (2) A well-known poem by H. W. Longfellow, published in 1841, of which the opening words are : "The shades of night were falling fast.® The poem in its musical setting became in America a favorite • academic song.

EXCELSIOR, the trade name of a ma¬ terial invented in America and widely used for packing and as stuffing in mattresses and up¬ holstery. It is made from logs of wood which have first been divided into 18 inch blocks. The fibres are separated from the blocks with great rapidity by knife-points, and packed in bales of 250 pounds weight. Not far from 140,000 tons are annually manufactured in the United States, and of this output large quantities are exported.

EXCELSIOR SPRINGS, Mo., city of Clay County, 25 miles northeast of Kansas City, on the Chicago, Milwaukee and Saint Paul, the Wabash and other railroads. Because of its mineral springs it is widely known as a summer

resort; it has fine hotels, a Carnegie library, an auditorium, a government building and several pavilions. Its industrial establishments are limited to bottling works and an ice factory. Pop. (1920) 4,165.

EXCEPTION, an objection taken to testi¬ mony or any relevant matter in a

legal proceed¬ ing, also to an adverse ruling of the court upon a point of law. In general, it must be taken within a prescribed period and must be entered on the record. The term is also given to the exclusion of some part of an instrument, or statement. It may mean also the part so ex¬ cluded. See Plea and Pleading.

EXCESS. In spherical and Riemannian non-Euclidean geometry, the excess of a tri¬ angle is the amount by which the sum of its angles exceeds 180°. Thus the spherical excess of a spherical triangle with angles of 70°, 60° and 65° is 15°. Similarly, the excess of a poly¬ gon is the amount by which the sum of its angles exceeds the sum of the angles of a plane Euclidean polygon with the same number of sides. The spherical excess of a triangle or polygon, if measured in radian, is equal to the area of the figure divided by the square of the radius of the sphere. In Lobachevskian geometry the defect, or the amount by which the sum of the angles of a polygon falls short of that of a plane Euclidean polygon with the same number of sides, plays a part quite anal¬ ogous to that of spherical excess. The term ex¬ cess is also used to indicate the remainder when one number is divided by another. See Trigonometry.

. EXCHANGE, the act of exchanging or giving one thing for another. The term also signifies that which is so given. In commerce it is applied to a place where merchants, brokers, etc., meet to transact business ; it is generally contracted into 'Change. The institution of the modern exchange dates from the 16th century. Those institutions originated in the important trading cities of Italy, Germany and the Nether¬ lands, from which last-named country they were introduced into England. The most celebrated are the Royal Exchange of London, the Bourses of Paris and Amsterdam, the Borse of Ham¬ burg and the New York Stock Exchange in Wall street. In some exchanges only a special class of business is transacted. Thus there are stock exchanges, corn exchanges, coal ex¬ changes, cotton exchanges, etc. For Bill of Ex¬ change, see Bill.

Course of exchange is the current price of a bill of exchange at any one place as compared with what it is at another. If for $500 at one place exactly $500 at the other must be paid, then the course of exchange between the two places is at par; if more must be paid at the second place, then it is above par at the other; if less, it is below it. Arbitration of exchange signifies the operation of converting the cur¬ rency of any country into that of a second one by means of other currencies intervening be¬ tween the two. Consult Goschen's standard work, (The Theory of Foreign Exchange ; and Withers, (Money Changing) (1913).*

In arithmetic exchange is a rule for ascer¬ taining how much of the money of one country is equivalent in value to a given amount of that of another.

In law, a mutual grant of equal interests, in consideration the one for the other,

is termed exchange. In physics the theory of exchange is a hypothesis with regard to radi¬ ant heat, devised by Prevost of Geneva, and since generally accepted. All bodies radiate heat. If two of different temperatures be placed near each other, each will radiate heat to the other, but the one higher in temperature will receive less than it emits. Finally, both will be of the same temperature, each receiving from the other precisely as much heat as it sends it in return. This scale is called the mobile equi¬ librium of temperature.

EXCHANGES, Government Regulation

of. This regulation in no way differs from that controlling other associations, corporations or banking institutions, exchanges having no dif¬ ferent or special relations with governments. They may be held liable for restraint of trade if they fix prices ; their transactions may be subject to special taxes, or they may be con¬ sidered as gambling under some circumstances. See Stocks and Stock Exchange.

EXCHEQUER, eks-chek'er, in Great Britain, the department which deals with the moneys received and paid on behalf of the pub¬ lic services of the country. The public revenues are paid into the Bank of England, or the Bank of Ireland, to account of the Exchequer, and these receipts as well as the necessary payments for the public service are under the supervision of an important official called the controller and auditor-general. The public accounts are also audited in his department.

EXCHEQUER, Chancellor of the. See

Chancellor.

EXCHEQUER, Court of. See Court.

EXCHEQUER BILLS, bills of credit issued by authority of the British Parliament as a means of raising money for temporary pur¬ poses. They are of various sums and bear daily interest. Generally paid off, or renewed annually they were much in demand and usually quoted at a premium, and were receivable in payment of taxes. These bills pass from hand to hand as money, and form a principal part of the public unfunded debt of Great Britain. Exchequer bonds, which have generally super¬ seded them in

recent years, are similar, but they run for a definite number of years at a fixed rate of interest. Exchequer bills some¬ what resemble the treasury notes which were adopted as a financial expedient in the United States before the Civil War.

EXCHEQUER TALLIES, seasoned wands of ash, hazel or willow, formerly used for checking accounts in the English Exchequer. Notches cut on the tally indicated by their form the class to which the account belonged.

EXCIPIENT (from Lat. exipere, take up, undertake), in pharmacy, an inert or slightly active substance used to give form and con¬ sistence to solid preparations, such as pills, or to give palatability and the necessary qualities for administration to any medicine. The various conserves, also honey, treacle, simple syrups, glycerin, white of egg and mucilage of acacia are among the most useful excipients.

EXCISE, an inland duty or impost laid on commodities produced and consumed in the country. The word seems to be derived from a Dutch term of similar meaning, which in turn may be of same origin as assize, its present

form being influenced by a supposed derivation from Latin excisus. It must be differentiated from customs duty, imposed on goods en¬ tering a country. In England excise duties were established in 1643. On one article, spirits, the duty was at first only a few pence per proof gallon; in 1915 it was 14s. 9d. In the United States the internal revenue duties are analogous to the British excise. For a more detailed ex¬ planation of excise, see Customs; Internal Revenue.

EXCISE LAWS IN THE UNITED STATES. The struggle of the English people against excise was not -due to any intrinsic ini¬ quity in the tax, but partly to popular dislike of all direct taxes (see Customs; Tariff) ; partly to the inquisitorial methods involved, partlv to their use as a means of strengthening the royal power against popular control. At any rate, the colonists inherited this unreasoned dislike, even under totally different conditions ; though Con¬ necticut had laid an excise on spirits and all use of foreign articles, and Massachusetts and Pennsylvania on spirits, before the Revolution. But all shrank from giving the national govern¬ ment such power, and several States proposed amendments to the Constitution forbidding the United States ever to lay excises. Hamilton, however, recommended to Congress in 1790 an excise on spirits, upon the most advanced mod¬ ern grounds — that it would not only produce a revenue without burdening any worthy indus¬ try or person, but would check the consumption, to the great advantage of the community. With great opposition the law was passed, imposing a duty of 9 to 25 cents a gallon

(according to strength) on all native spirits, and a higher one on imported. In 1792 the tax was lowered some¬ what. Later, under Hamilton's advisement, the scope was extended to other articles of luxury, auction sales, stamp duties on instruments of exchange, etc. But it was nullified in some sections by passive resistance; at last in 1794 a furious open defiance began in Pennsylvania (see Whisky Insurrection), which had to be quelled by the regular army. There was no further resistance, but no cessation of the dis¬ like, which was naturally a Democratic tenet, from the power it gave the general govern¬ ment; and when Jefferson became President, on his recommendation Congress abolished the en¬ tire system, which was possible from the large increase in customs receipts. The War of 1812, however, necessitated a fresh resort to it; and duties were laid on spirits (license tax), and the same articles Hamilton had chosen — sugar, carriages, auctions and exchanges — with salt added. They were repealed in December 1817, and no further excises were levied till the sys¬ tem of internal revenue taxes (q.v.) was adopted in 1862.

EXCITANT. See Stimulant.

EXCITO-MOTOR ACTION, the action of nerves distributed to muscular organs the stimulation of which leads to movement. Thus, irritation of a nerve supplying a muscle will lead to contraction of the muscle by excito-motor action, and irritation of certain nerves distributed to blood vessels will lead to con¬ traction of the vessel by acting on its muscular coat. See Nervous System.

EXCLUSION, Bill of, a bill introduced into the British Parliament (1679) during the

reign of Charles II for the purpose of exclud¬ ing the Duke of York, he being a Roman Catholic, from the throne. See Charles II; James II.

EXCOMMUNICATION, an act of eccle¬ siastical jurisdiction whereby a Christian is separated from the communion of the Church. It is not, however, peculiar to biblical religion, a discipline somewhat analogous being exercised by the ancient Romans. The clearest analogy to the Christian discipline is that furnished by the rabbinical code, whereby offenders were ex¬ cluded from civil and religious fellowship. Under the Christian dispensation this power was exercised by the Apostle Paul when in his first letter to the Corinthians, ch. v, he writes concerning a man guilty of incest that he <(delivers such a one to Satan.® Authority for

excommunication is found in the words of Christ reported in Matt, xviii. ((If he will not hear the church let him be to thee as the gentile and the publican.® In the Roman Catholic Church there are two degrees of excommunica¬ tion — major and minor. By the minor an offender is deprived of the use of the sacra¬ ments; by the major one he is deprived of all manner of communion or communication with the faithful. In the times when the laws of the Church were enforced in their primitive rigor the excommunicated were denied communication with the faithful not only in sacred things but in the common life; and if a monarch, his subjects were absolved from all allegiance. This is greatly modified now, and persons who have incurred the uttermost ecclesiastical censures suffer only the spiritual penalties attached to their offenses. But though the Church's ex-communication has in the present time lost all its civil effects, a brief notice of these effects is necessary for an appreciation of the condition of an excommunicatus vitandus, that is, of a person under the major excommunication, who must be avoided by the faithful, under penalty of themselves incurring the minor excommuni¬ cation.

A person who is under the major excom¬ munication is disqualified for acting as judge or juror, notary, witness in courts of law, advo¬ cate, attorney; but he is competent to plead his own cause and to sue others on his own behalf. He cannot be a guardian of a minor, nor curator, nor executor of a last will, nor can he make contracts. He cannot act as a legis¬ lator. After death his body is deprived of Christian burial : and if it does get burial in consecrated ground in whatever way, it is to be dug up and cast out. The excommunicate under major excommunication must be shunned by all the faithful : they must not, under pain of excommunication (minor), communicate with him either by word of mouth or by writ¬ ing; must not greet him, nor have exchange of

gifts with him. If an excommunicatus vitandus appens to enter a church while the Mass is proceeding, he must forthwith be put out ; if that cannot be, then the service must be suspended. Such is the letter of the laws ; but long before these stern prescriptions went into desuetude there were notable assuagements of their rigor through the interpretations of moralists. To illustrate this by one example only: The serfs and servants and the children, grandchildren and other relatives (even by affinity only) were

permitted to continue their relations of obedi¬ ence and respect to their head even after he was excommunicated. See Bell, Book and Candle.

The Reformers claimed and exercised the same rights in regard to excommunication as did the Roman Church. In England the ex¬ communicated person was subjected to various disabilities; he could not hold a benefice, or practise as a barrister or attorney in the courts ; and

could not be admitted as a witness. These were removed by Act of Parliament in England in 1813, and in Ireland in the following year. In the Presbyterian churches of Scotland the lesser excommunication involved deprivation of ((sealing ordinances® ; the greater excommunica¬ tion is now unheard of, and since the Revolu¬ tion of 1688 has carried no civil consequences with it.

EXCRETION. See Faeces ; Sweat ; Urine.

EXCRETORY SYSTEM, Comparative

Anatomy of the. See Anatomy.

EXCURSION, The. (1814), Wordsworth's longest poem, was orig- inally designed as the second part of a still vaster work, (The Recluseˆ in which the poet intended to embody in monumental fashion his ripest reflections on man and nature. Of this enterprise (The Prelude, which was to have constituted an introduction, (The Excursion,* in nine books, and one other fragment were completed. Less interesting, on the whole, than (The Prelude-* and the best of the shorter poems, (The Excursion* is yet a rich and noble work of genius, not to be neglected by those who would master Wordsworth's philosophy or appreciate the full compass of his powers. The poem consists of a series of dialogues, of which the protagonist is The Wanderer, a venerable friend of the poet's, who from long and loving contact with nature and a deeply sympathetic knowledge of human life, has reached the heights of optimism and philosophic calm. Meeting the poet at a ruined hut on a common he tells in the first book the pathetic story of Margaret, its last inhabitant. They then pass to the secluded abode of The Solitary, a per¬ son in whom Wordsworth has embodied the disillusionment and despondency characteristic of the age, a reflection of what Wordsworth himself might have become after the French Revolution had not the malady been checked by a timely return to the tranquillizing influences of his early years. (See Prelude, The). The conversation of The Wanderer and the sub¬ sequent discourses of a good Pastor, visited by the party in his parish, are directed toward a correction of The Solitary's despondency. Standing amid the graves of a country church¬ yard, The Pastor tells the simple but affecting stories of the lives of those who lie buried there. In Books VIII and IX The Wanderer dis¬ courses of society and government, deploring the industrial exploitation of the poor, advocat¬ ing a system of universal education and ex¬ alting morality as the true basis of national greatness and the highest fruit of freedom. Despite some tediousness inseparable from the didactic character of the theme, the poem is a moving record of a mature and sobered ideal¬ ism, firmly held in the face of all the influences which work against it — an impressive memorial*

of the strength and comfort which Wordsworth found

In the primal sympathy Which having been must ever be;

In the soothing thoughts which spring Out of human suffering;

In the faith that looks through death,

In years that bring the philosophic mind.

For reference, see article on (The Prelude. >

James H. Hanford.

EXE, a river of England, rising in Somer¬ setshire and flowing southeast to the Devon¬ shire border, thence south through Devon and debouching into the Channel at Exmouth. Its length is about 54 miles. Tiverton and Exeter are situated on the banks of the Exe.

EXECUTION, in law, the carrying into effect of the final judgment, decree or order of the court. Execution is effected by a writ or order directed to the proper officer and com¬ manding him to do a certain thing. In civil law it is the means of obtaining that which the court ordered to be done by one of the parties. Execution may be had for either plaintiff or defendant. When taken out by the plaintiff it depends on the cause of action as to what is to be recovered under the writ ; generally it is for the debt and costs or for the goods, dam¬ ages and costs. When taken out by the defend¬ ant it may be for goods, damages and costs, and in some cases it may be only for costs.

As soon as final judgment has been entered, the party entitled to it may take out his writ of execution, and he is entitled to this writ until the other party has taken some step which is a supersedeas , such as an appeal or writ of error. The writ issues from the court which last passed on the judgment on which the writ of execution is taken out. Execution may be against personal property, taking and selling it, or it may be against real estate, either holding jt until the judgment is paid or selling it, or in some cases by the seizure of the person of the defendant and holding him until the judgment is satisfied or until he is declared insolvent. If the property is sold the fund derived from the sale is applied to paying the judgment and costs, and the surplus, if any, is returned to the former owner of the goods. At common law, however, real property was not subject to ex¬ ecution

except for a debt due the State or the king. By statute of 5 George II, c. 5, real estate in the colonies became subject to sale under execution the same as personal property. A writ of execution, although issued at the instance of the party in whose favor the judg¬ ment is, must be directed to the sheriff, who must carry out the direction of the writ. If he fails to do so he must answer in damages to the injured party.

Originally, at common law, when the execu¬ tion was against personal property, such as goods and chattels, the writ of fieri facias was used, but to-day this writ may be used against land also. When the personal property consisted of choses in action it was reached by a writ of attachment. If the execution was against real estate a writ of scire facias was used (now usually elegit or fieri facias), and it was sold under a writ of venditioni exponas. In some cases, when the judgment was confined to a particular piece of real estate, the writ of levari facias was issued first and it was sold under a writ of venditioni exponas. In modern

usage, if the execution is against the person of the defendant a writ of capias ad satisfaci¬ endum may be issued in some jurisdictions, under which the defendant is arrested and his person held until the judgment is satisfied or until the defendant is declared insolvent. Sometimes the defendant is released if security is given that the defendant will abide by the order of the court. Nearly all these writs and other old forms are obsolete or modified in use except fieri facias and, to a less extent, elegit and capias ad satisfaciendum. See At¬ tachment; Fieri Facias; Scire Facias.

A general judgment binds all property owned by the person against whom the judgment is recovered at the time the judgment is entered, and it also attaches to all property he acquires up to the time the judgment is satisfied, and if the debtor sells any real estate before the judg¬ ment is satisfied, the property is not released from the lien of the judgment. When property is sold under an execution the purchaser buys only the title of the debtor, and all equities under which he held it still attach to the property. i

In criminal law execution is the carrying into effect of the judgment of the court in rela¬ tion to the person convicted. It consists in putting the convict to death according to his sentence. See Capital Punishment.

EXECUTION, Military, in drill regula¬ tions, the command following the preparatory command and causing the execution of the lat¬ ter. Legally, a military execution is the putting in effect the sentence of a military court. See Military Law.

EXECUTIONER, the official who carries into effect a sentence of death or inflicts capital punishment in pursuance of a legal warrant. In England it is

the province of the sheriff to execute the extreme sentence of the law, but in practice the disagreeable duty is performed in his presence by an officer retained for this purpose. In Scotland the duty devolves upon the civic magistracy, but the strict letter of the law is avoided as in England by the attend¬ ance of a magistrate to witness the proceedings. Several executioners have become famous from their names being dragged into literature ; such as Richard Brandon, the supposed headsman of Charles I; Jack Ketch, commemorated by Dryden (Epilogue to the Duke of Guise), whose name was long vulgarly given to all who succeeded him (in London) in this odious office. In America, the title and duties of the public executioner differ in the various States. In some States the sheriff of the county becomes the executioner, but in New York State the warden of the penitentiary is technically the executioner. The duties are usually performed by one of his subordinates. In the army the provost-marshal is the military executioner. See Capital Punishment; Electrocution; Guillotine; Hanging.

EXECUTIVE, in the United States, prop¬ erly, though in the narrow and restricted sense, the entire official body charged with the ex¬ ecution of the laws, but popularly the chief officer, as President (of the United States), governor (of a State), mayor (of a city), etc.

Executive Power. — The executive functions in the modern state are much more diversified and important than the usual definition of the

word "executive® would indicate, since, besides enforcing the laws enacted by the legislative department of government, the executive, in the larger sense, must formulate and carry out constructive policies, direct the public life of the state, act as its representative in its rela¬ tions with foreign states, render many highly- important decisions and exercise wide discretion and judgment. Hence the executive power covers a range of official activities wider and more significant than the mere fulfilment of the commands of the legislature. The organiza¬ tion of the legislative and executive branches of government necessarily must differ because the former is the body which deliberates upon the needs of the state and enacts the legisla¬ tion required to meet such demands, while the latter's primary, though not its sole, function is to execute with the utmost promptness, energy and efficiency the will of the state as formulated by the legislative body. To attain such results a single executive is most desir¬ able, since the division of executive power between several co-equal authorities would create confusion in times of stress, would en¬ able the responsibility for

action easily to be shifted from one shoulder to another, and would result in a lack of Unity and efficiency in government so essential to its success. In ancient Athens executive power was divided between generals and archons ; in Rome be¬ tween two consuls, and in Sparta for many years between two kings, while in France be¬ tween 1795 and 1800 a directory (q.v.) of five persons was in office and later three consuls held the executive power. The general execu¬ tive of the American colonies was the king; their individual executives, the governors, ap¬ pointed by the Crown or (in Rhode Island and Connecticut, and for a few years in Massa¬ chusetts) chosen by the people. These were succeeded de facto by the committees or coun¬ cils of safety; then by officials usually called governor, sometimes president, and sometimes not by single persons, but by executive coun¬ cils, as in Switzerland. (See also Colonial Governments, Proprietary). The general gov¬ ernment had no executive till the adoption of the Constitution (q.v.). The Continental Con¬ gress (q.v.) had only such functions as the State legislatures allowed it, which were to debate and ask for supplies and make recom¬ mendations ; and the Articles of Confederation provided for no executive. (See United States — The Articles of Confederation). At the present time executive power is organized on the single person plan in all countries save Switzerland which has an executive council of seven members.

In general executive power may be said to include the execution of the laws and treaties ; the conduct of foreign relations either with or without the aid or consent of the legislature or one of its branches ; the command and dis¬ position of the military and naval forces ; the power to approve or disapprove acts of the legislature, to recommend subjects and meas¬ ures for its consideration, and in some coun¬ tries to summon, open and prorogue its ses¬ sions ; the power of appointing and dismissing the more important administrative officials ; and the right to pardon those who have of¬ fended against the laws, save in impeachment cases. The executive branch of the government

in nearly all states, in a greater or lesser de¬ gree, is empowered to issue ordinances, regula¬ tions or decrees establishing rules for the con¬ duct of governmental officials and affairs, to interpret statutes for the guidance of officials and to supplement laws respecting numerous matters that have been left to the discretion of the executive. In England such executive legislation is accomplished by the "statutory rules and orders® issued by the departments of state, especially the home office and the local government board. In France the legislature enacts laws on broad, general principles and allows the executive to insert the details by means of ordinances. The undefined and now greatly restricted "royal prerogative® of the executive in monarchical states has no statutory authority and may be considered the remnant of the king's common-law powers. See the

articles or paragraphs on "Government® under the titles of the various nations.

RELATIONS OF THE NATIONAL EXECUTIVE AND

CONGRESS.

Separation of Powers. — When the Con¬ stitution was framed the belief prevailed that the executive, legislative and executive depart¬ ments of government should be separate and in¬ dependent, but nevertheless this separation was subject to some modifications in the Constitu¬ tion as adopted and has been considerably changed by the practices which have developed since. The Senate was allowed to wield a cer¬ tain amount of executive power in that it was entrusted with the confirming of appointments ; Congress was given a considerable degree of control over the administration through its right to establish, regulate and maintain the various departments ; and the President could participate in legislation through his right to address or send messages to Congress and through his power of veto. In recent years the contest for domination between the executive and legislative branches has resulted in a strug¬ gle in which each has endeavored to strengthen its own position at the other's expense.

*Patronage. — Under Article II, § II, ˆ 2 of the Constitution the President has power, "by and with the advice and consent of the Senate, * to make treaties, provided two-thirds of the Senators present concur; and he shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, other pub¬ lic ministers and consuls, judges of the Su¬ preme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for and which shall be established by law; but the Congress may by law vest the appointment of such inferior offi¬ cers, as they think proper, in the President alone, in the courts of law, or in the heads of departments.® Though the fathers of the Con¬ stitution probably intended that the Senate should refuse to confirm Presidential nomina¬ tions because of unfitness only, the Senate has not hesitated to use its power in this respect for partisan purposes, chiefly to coerce the President. Under this senatorial power has arisen the practice known as "Senatorial courtesy® (q.v.), the extent and importance to which this practice may attain depending largely on the President's character and force¬ fulness. The Constitution makes no provision respecting removals from office, but in 1867, at*

the time of the dispute between President Johnson and Secretary Stanton, Congress passed the Tenure-of-Office Act (q.v.), provid¬ ing that persons appointed with the consent of the Senate should hold office until their suc¬ cessors were appointed in like manner; in other words, the incumbent could be removed only with the consent of the Senate. The doubtful legality of the act caused material alterations in 1869 and its final repeal in 1887. (See also De Facto Government). Impeachments are rarely used, though all branches of the government have had occasion to employ this cumbersome procedure (President Johnson, Judges Pickering, Chase, Humphreys, Peck, Swayne and Archi¬ bald; Senator Blount; Secretary Belknap) and in the nine cases only three convictions have resulted (Pickering, Humphreys and Archi¬ bald), while Blount and Belknap were out of office when their cases came up for considera¬ tion. Save by the method of impeachment Congress cannot remove objectionable officials, though it may investigate and discredit them and thus compel their resignation or dismissal. See Appointments ; United States — The New Democracy and the Spoils System ; United States — Impeachments.

Treaty-Making. — The legislature is seldom allowed to participate in the negotiations of treaties, but to exclude errors and to prevent the possibility of abuse by an unwise, ambitious or unscrupulous executive, the legislature, or one branch thereof, usually possesses power of ratification before treaties negotiated by the executive may become the law of the land; hence the treaty-making power is neither purely executive nor legislative in character. The Sen¬ ate practically controls the power of making treaties through the constitutional provision, as previously stated, that two-thirds of the Sena¬ tors must approve the treaty; as a result of the encroachment of the legislature on the executive the Senate now to a certain degree participates in the negotiations through its committee on foreign relations. The House has often en¬ deavored to exert some influence over the course of negotiations but the President is not obliged to heed the advice of the House, its concurrence being necessary only when legisla¬ tion is required to render treaties effective. Sometimes, to circumvent the certain defeat of a treaty in the Senate, the President has entered into an (

Departmental Affairs. — The President's power and influence over the executive depart¬ ments vary and in many respects are subject to Congressional limitation. He is the head of the National administration, is obliged to en¬ force the faithful execution of all laws, and under Article II, § II, ft 1 of the Constitution <(may require the opinion, in writing, of the principal officer in each of the executive depart¬ ments, upon any subject relating to the duties of their respective offices® ; yet the departments, being organized by Congress, are subject to the will of Congress under statutory regulation, which situation somewhat curbs Presidential power over departmental heads and their sub¬ ordinates. From a strictly legal

standpoint, the President does not possess full authority in re¬ spect to the control and direction of adminis¬

trative affairs but he can establish himself as the chief executive and administrative officer of the government and can make his will ef¬ fective by removing an officer who refuses to comply with his wishes and appoint one who will do so — as was the case when President Jackson compelled the removal of government funds from the United States Bank. However potent this power may be, it could not be said to constitute the President's chief means of control over administrative affairs since his authority has been strengthened constantly by an ever-broadening construction of the consti¬ tutional provisions requiring him to execute the laws. His power to issue and enforce executive orders pertaining to administrative affairs has been sustained by numerous opinions and the courts seldom interfere to upset firmly estab¬ lished precedents. When clothing the Presi¬ dent with executive power the framers of the Constitution primarily intended that, besides en¬ forcing the laws, he should perform acts of a political nature, such as conducting foreign af¬ fairs, which are not subject to judicial review. Hence Congress seldom hampers the President in his conduct of foreign affairs through the State Department, and the extent of his per¬ sonal supervision of such affairs depends largely upon the personality (and of course the capabilities) of the Secretary of State. But in respect to vesting authority for the administra¬ tion of affairs (other than political), the intent of the framers was not clearly indicated in the Constitution, since one or more of the secreta¬ ries is required to report annually direct to Con¬ gress instead of to the President; furthermore, when it deems necessary or wise, Congress may provide for the management of certain services by joint committees of the two Houses, and may authorize subordinate officials to perform certain acts without the consent, approval or intervention of their superiors or the President. (Among the administrative services outside the jurisdiction of the executive departments are the Interstate Commerce Commission, the Civil Service Commission, the Government Printing Office, the Commission of Fine Arts, the Smith¬ sonian Institution, etc.). Congress maintains a close control and regulation over the Treasury Department and the administration of the finan¬ cial needs of all departments. Although each secretary annually submits an estimate of his department's needs, Congress not only disre¬ gards the secretary's recommendations but, if in the mood, appropriates vast sums which are not only not requested, but which are deemed by the secretaries and the President to be un¬ necessary and wasteful. Such oftentimes are appropriations for rivers and harbors and pub¬ lic buildings, popularly known as the (

The executive endeavors to cultivate har¬ monious relations with Congress by complying with requests for opinions and advice, informa¬ tion,

documents, etc., partly because the success of the administration's legislative program de¬ pends upon such harmony and partly because Congress controls the purse of the nation. This has resulted in bringing the executive and legislature together by devious and extra-legal methods, but in one instance an opposite devel¬ opment has occurred. In our early history Cabinet members sometimes appeared in per¬ son before Congress to give information or to

outline and advocate or oppose policies and this was not unconstitutional. Department heads cannot be members of either House though they are not excluded from the sessions, but the early practice was discontinued and seems un¬ likely to be revived, though this course was ad¬ vocated by a Senate committee in 1881 and by President Taft in a message 19 Dec. 1912. See United States — The President's Office; United States — The Cabinet of the; United States — Beginnings of Executive Depart¬ ments of the; Cabinet and Cabinet Gov¬ ernment; Congress; Federal Government; Constitutional Government; and the various departments by name.

Presidential Influence over Legislation. —

Under Article I, § VII, If 2 of the Constitution the President may veto an act of Congress and such act cannot become law unless repassed by a two-thirds vote of both Houses. (See Veto; Acts of Congress; Bills, Course of). This fact is important not because of the fre¬ quency of Presidential vetoes, but because it enables the President to dominate Congress in a large measure ; by a threat to wield this weapon he may prevent the passage of bad laws and compel the elimination of objectionable features from otherwise good ones. Article II, § III provides that the President ((shall from time to time give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient.® No method of communicating with Congress is suggested or prescribed and both the written message and the speech in person have been employed. Con¬ gress is not compelled to act upon the Presi¬ dent's recommendations and seldom does com¬ plete the' suggested legislative program, but as the legislation advocated by the President pre¬ sumably coincides with the policy of the party by which he has been elected, as the majority of the members of Congress usually have the same political affiliations, and as the outcome of future elections is much influenced by the char¬ acter of the legislation and the manner of its execution, the President's recommendations rarely are refused serious consideration and generally are enacted into law. Moreover Con¬ gress can

ill afford to ignore public opinion and if the President be a capable party leader and can arouse public interest sufficiently to consti¬ tute a public demand he is quite sure to obtain the desired results. In recent years the Presi¬ dent's influence has depended largely upon his ability to control his party whether through force or persuasion.

relatiqns of the national executive and the

JUDICIARY.

Conflicts often arise in the relations of the executive and judiciary, due chiefly to the adop¬ tion of the doctrine of separation of powers and the fact that unconstitutional actions and laws are referred to the courts for determina¬ tion. This conflict of relations is most noted as regards the State executives and the Fed¬ eral courts. Amendment XI of the Constitu¬ tion provides that ((the judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by citizens of another State, or by citizens or sub¬ jects of any foreign State.® Nevertheless the

courts have decided that this amendment does not apply to an injunction or mandamus suit brought against a State officer under a Federal statute or constitutional 'provision (Ex parte Young, 209 U. S. 123). On the other hand suits against Federal officers in the State courts have been rare and never successful (see, for instance, Ableman vs. Booth, 21 Howard 506; Tarble's Case, 13 Wallace 397). Conversely, in 1793 Congress passed an act prohibiting Federal courts to issue writs of injunction in order to stay proceedings in State courts, save in matters of bankruptcy ((Rev. StatP 720). Broadly speaking, the executive is not subject to judicial control in cases of discretion nor in any political matter, save that any executive order which is unconstitutional is null and void, even though it be issued by the President him¬ self ; and any officer or other person executing such unconstitutional order is liable in dam¬ ages (Little vs. Barreme, 2 Cranch 170). In the case of Marbury vs. Madison (consult also Cranch 137) Chief Justice Marshall enunciated the doctrine that although the court could not interfere with the prerogatives of the execu¬ tive it could and would command a head of a department to perform a duty not dependent on executive discretion ; but the question of such executive coercion has not been extended to the President. Furthermore, so far as the President and Secretary of War are concerned, the court has decided that purely political ac¬ tions by an executive are not subject to judicial review or injunction (4 Wall. 475; 6 Wall. 50). But while unauthorized and unconstitutional executive orders are null and void and private parties have the right to sue for damages those executing such orders, the mere allegation of unconstitutionality is not sufficient ground for the courts to enjoin the

enforcement of a stat¬ ute by the executive. In Wilson vs. Shaw (204 U. S. 24) Justice Brewer expressed the opinion, since Congress had ratified the executive action, that the courts <(have no supervising control over the political branch of the government in its action within the limits of the Constitution.® Indirectly through the appointing power the ex¬ ecutive has considerable influence over the judi¬ ciary. See United States — Judiciary of the; Supreme Court; Court.

!

POWERS AND INFLUENCES OF THE STATE EXECUTIVE.

Organization of the State Executive. —

Unlike the National Government, where the chief responsibility is concentrated in the hands of a single individual, the executive power and responsibility in the States are divided between the chief executive and a number of other State officers, virtually his colleagues, over whom he has little or no control, and who, save in rare instances, are elected by the people, to whom alone they are responsible. Sometimes the chief executive may belong to one political party and his subordinates or part of them to another, which renders difficult any co¬ operation among departments or between de¬ partments and the chief executive. Under early State constitutional provisions these State officers were either appointed by the governor or chosen by the legislature and thus the governor had a certain measure of control over the conduct of State business ; but in late years these officers have been elected by

the people, as a result of which the governor no longer can be compared with the President as the head of the administration which has been placed in power, having no general au¬ thority to direct, remove or discipline such elective officers; his only power of supervision is the right to examine the administration of the respective offices and in some cases to re¬ move the incumbents if found guilty of mal¬ feasance, corruption or gross negligence. In a few States (New York for instance) the treas¬ urer, if found to have violated his duty, may be suspended from office but not removed by the governor. As a rule the governor may remove his own appointees for good cause, but the per¬ son removed must be informed of the reasons and be afforded ample opportunity to refute the charges. In Massachusetts and a few other States the governor at first appointed all judges, sheriffs, court clerks, registers of probate and the attorney-general,

but in most States all these officials (and in Massachusetts all save the judges) are elected by the people. In Maine a few of the department heads are appointed by the legislature, and in New Hampshire a few are elected on joint ballot of the general court. In Delaware and Texas the secretary of state is appointed by the governor, while in Maryland the secretary of state, state librarian and com¬ mission of law office, in New Jersey the secre¬ tary of state and the attorney-general, and in Pennsylvania the secretary of state, the attor¬ ney-general and the superintendent of public instruction are appointed by the respective governors with the advice and consent of the senate. In New Jersey the treasurer and in Tennessee the secretary of state are appointed by the general assemblies, but in the latter State the attorney-general is appointed by the judges. Governors still possess the pardoning power (in most States without restriction), but in a few New England States the pardon is incomplete without the concurrence of the executive coun¬ cil. The governor is commander-in-chief of the State military forces and may appoint his military staff, but as a rule the other militia offi¬ cers are elected by the votes of the military organizations.

Relation to Legislation. — Like the Presi¬ dent, the governor is authorized to convene the legislature in other than its regular sessions, and again like the President he presents for the consideration of that body his views respecting matters of public policy and importance and his recommendations of legislation to be enacted for the good of the State. As is the case with Congress the legislature is not obliged to heed his advice and often does not, but in many cases governors have made direct and effective ap¬ peals to the people to arouse public sentiment in favor of their plans. All the States save North Carolina empower their governors to veto legislative enactments with the excep¬ tion of constitutional amendments, but when returning such rejected measures they must state their reasons for objection. Unless over¬ ruled by a two-thirds vote of both branches of the legislature the veto is absolute, but if re¬ passed by the necessary vote the enactment becomes law without the governor's signature; all other acts approved by him bear his signature.*

Administrative Powers. — From the fore¬ going the governor's powers may be surmised as vol. 10 — 40

lying not so much in his constitutional rights or privileges as in the moral atmosphere and prestige of his office, since he represents the highest dignity of the State. On all public oc¬ casions he is the first citizen of the State, the representative of its political, civil and military authority. As the official head of the State he sends and receives communications in its name ; issues proclamations to its people ; and owing to a variety of powers, including the bestowal of considerable patronage, his prominence in the public eye and his relation to the legislature, he has an influence in shaping legislation

far ex¬ ceeding a strict interpretation of his constitu¬ tional prerogatives. He is the official and nat¬ ural exponent of the State in National affairs and in its relations to the Federal Government, for which reason he issues writs for the holding of elections to fill vacancies in Congress and even under Amendment XVII to the National Constitution may make temporary appointments of senators in case of vacancies until the peo¬ ple fill such vacancies by elections ; he trans¬ mits ratifications of constitutional amendments and other acts of the State legislature which relate to National matters.

Tendencies and Proposed Reforms. — The evils of the subdivision of executive power have not only been recognized but in many States the tendency is to remedy such defects by strength¬ ening the governor's control over the adminis¬ tration through a wider appointing power; by reducing the number of co-ordinate elective officials ; by relieving him of the confirmation of his appointment, by the State senate ; by recog¬ nizing his unrestricted removal power; by au¬ thorizing him to make special inquiries into the several executive departments and during the legislative recess to suspend officers who have violated the law; by empowering him to require from department heads written statements per¬ taining to anything connected with their re¬ spective duties ; in some cases by allowing him, at stated intervals, to examine the accounts of officials such as the treasurer and auditor ; and in some States by requiring the principal State officers to render to the governor periodic re¬ ports covering the activities of their depart¬ ments, although such reports, even if convincing as to the official's incompetency, neglect of duty or violation of the law, in no way augment the governor's power of supervision over the ad¬ ministration because of his greatly restricted power of removal. Although responsible for the faithful execution of the laws, the governor is often powerless, without the co-operation of the department heads, to carry out the constitu¬ tional injunction owing to the manner in which the executive power is divided ; as an example, he cannot compel the attorney-general unwill¬ ingly to start a suit against an individual or a corporation chiefly because he has neither the power of direction or removal, and this same weakness characterizes his relations with other State officers. The enforcement of responsi¬ bility is impossible owing to the multiplication of departments exercising administrative powers, and this is particularly noticeable in States which have boards and commissions the members of which are often elected by the people, though even if they are appointed by the governor he has little power of control or supervision over the administration of affairs entrusted to them. New York, Pennsylvania

and Massachusetts each have nearly 100 such boards and commissions, but a movement is going forward to consolidate most of these boards into one board of control or board of affairs. The creation of the office of ((state business manager,® to organize and manage State business affairs under the governor's di¬ rection, has also been proposed. One governor has even recommended a system of State rule by commission, similar to the commission sys¬ tem of city government (q.v.). Another pro¬ posal is to authorize the governor to appoint the principal State officers, who, collectively, shall constitute a cabinet or council, and to give the governor a large power of initiating legisla¬ tion. In this way the State executive would resemble the President and his Cabinet; thus the power and responsibility would be central¬ ized, and unity, co-ordination and efficiency could be introduced into the administration of State affairs.

POWERS AND INFLUENCE OF THE MUNICIPAL EXECUTIVE.

Growth of the Mayor's Powers. — In the

government of the borough during colonial times the executive and legislative functions were not separate. The council was the sole governing body and the presiding officer was called mayor. He was merely a member of the council, possessed no powers other than those of a presiding officer, could not veto en¬ actments of the council and could make no ap¬ pointments to office, though in a few boroughs lie did have some minor responsibilities, such as regulating taverns, supervising markets, holding coroners' inquests and hearing petty contesta¬ tions at law. After the Revolution and with the advent of the Federal Government, the mayor's powers were increased gradually but materially, owing to the influence of the separa¬ tion of powers which was put in vogue in the National and State governments. For the first time in the history of American cities, Balti¬ more in 1796 empowered the mayor to veto resolutions of the city council, though vetoed measures might be repassed by a three-fourths vote; the mayor's powers of appointment to city offices were also much enlarged. In 1822 Boston authorized the mayor to appoint whom he chose, subject to aldermanic approbation. But not until the middle of the 19th century did the municipal executive make much headway. The government of cities by council had de¬ veloped inefficiency, waste, extravagance and considerable corruption, whereupon the State governments intervened, transferring various functions from the councils to State-appointed and controlled boards, as, for example, in 1860 the Baltimore police department was placed under the control of a State board; in 1866 the Chicago police suffered the same interven¬ tion ; and in 1865 the New York legislature assumed control of police, fire protection, pub¬ lic health and licensing in New York city. Subsequently the legislatures restored a large measure of local control, but instead of rein¬ stating the city council in power, they

placed control in separate executive boards, the mem¬ bers of which were appointed by the mayor or elected by the people. Hence the power of appointment substantially increased the powers of the mayor's office and in time even the con¬ firmation of the mayor's appointees by the al¬

dermen was eliminated from city charters, as was the case in Brooklyn in 1882. Many other cities followed Brooklyn's lead and though a large number still retain the practice, it is gradually being abandoned. It should be re¬ membered, however, that in no two cities of the United States are the mayor's powers alike, and in describing the position and powers of the American mayor even the most important statements must be made with large reserva¬ tions; in New York and Boston the authority of the municipal councils is insignificant when compared with the powers of the mayors, whereas in Philadelphia and Chicago the reverse is true, the councils still maintaining a strong grip on local governmental affiairs.

The Mayor's Influence upon Legislation. — Theoretically the mayor's office is adminis¬ trative and has no legislative power but often the mayor exerts a strong influence upon local legislation. In some cities, like Chicago, he presides over the sessions of the city council but in most cities he not only is deprived of this privilege but may communicate with that body only through a written message. Like the President and the State governor, the mayor may and often does suggest new legislation for the consideration of the council and to a cer¬ tain degree the deference shown to his sugges¬ tions depends upon his personal character and political influence. Like the President, how¬ ever, the mayor has an effective weapon in the veto power (but not the privilege of the <(pock- et veto®), since under most city charters he must pass upon every ordinance or resolution of the council, and in many cases mayors have used this privilege without scruple to enforce aldermanic submission. A prescribed majority must be obtained to override the mayor's veto whether the council consists of one or of two chambers, but though the usual practice is a two-thirds vote, the requirement is more rigid in some cities, being three-fifths in Philadelphia, three-fourths in Baltimore and seven-ninths in San Francisco.

The Mayor's Appointing Power. — In most cities the people elect a few heads of the city departments; in other cities some officers are appointed by the council ; and in isolated cases important city officials may be appointed by the State executive or by the higher State courts. But in the majority of cities the mayor appoints the departmental heads, subject to the approval of the council or board of aldermen; sometimes, as in New York city, Denver and San Fran¬ cisco, these appointments need not be confirmed by any municipal or State authority, but in a few cases, as in Boston, such appointments, to be effective, must be approved by a State civil service commission. Recently the system of council confirmation has been viewed

with dis¬ favor and the latest city charters omit the con¬ firmation feature. See Appointments, Federal, State and Local.

Miscellaneous Functions.— As regards mu¬ nicipal finance, the mayor's powers have been largely increased; the preparation of the city budget, which formerly was under the super¬ vision of the council, has been transferred to the city executive owing, in a large measure, to the inordinate amount of logrolling in which the councilmen indulge. In some cities, like New York, the preparation of the budget and the determining of the tax rate are supervised

by the board of estimate and apportionment and in other cities, like Boston, the mayor has direct charge of the work, but in all cases the city executive is deprived of the power of making appropriations, this being vested in the council, which, under certain restrictions, may also in¬ crease or reduce the various items. (See Bud¬ get System, American). Some charters em¬ power the mayor to obtain reports from city officials at stated intervals, to inspect accounts and to conduct investigations ; and some re¬ quire the mayor's approval to validate contracts. In a few cities, when necessary, the militia may be called out by the mayor and in some cities persons convicted and fined in municipal courts may be pardoned by the mayor and he may also remit their fines. See Cities, American, Gov¬ ernment of; Municipal Government; Cabi¬ net and Cabinet Government; Commission Form of Government; City Manager Plan of Government.

Bibliography. — Beard, C. A., (American

Government and Politics) (rev. ed., New York 1914), and (Readings in American Govern¬ ment and Politics) (New York 1909) ; Bayles, G. J., 'The Office of Mayor in the United States5 (New York 1895) ; Bondy, W., (The Separation of Governmental Powers) (in Co¬ lumbia University Studies, 5 Vol. V, No. 2, New York 1896) ; Blue, L. A., cRelation of the Gov¬ ernor to the Organization of Executive Power in the United States) (Philadelphia 1902) ; Bryce, James, (American Commonwealth) (rev. ed., New York 1914) ; Belmont, Perry, Cabinet Officers in Congress5 (in North Amer¬ ican Review, Vol. CXCVII, pp. 22-30, January 1913) ; Bradford, G., 'The Lesson of Popular Government5 (New York 1899) ; Croly, H., (Promise of American Life5 (New York 1912) ; Durand, E. D., Council vs. Mayor5 (in Political Science Quarterly, Vol. XV, pp. 426-51, 675- 709, 1900) ; Eaton, D. B., (The Government of Municipalities5 (New York 1899) ; Fish, C. R., 'The Civil Service and the Patronage5 (New York

1905) ; Finley, J. H., and Sanderson, J. F.,

1910) , and Covernment in the United States, National, State and Local5 (New York 1914) ; Grant, A. H., 'The Office of Mayor5 (in The American City, Vol. IV, pp. 25-26, New York

1911) ; Gettell, R. G., 'Readings in Political Science5 (Boston 1911) ; Goodnow, F. J., 'Mu¬ nicipal Government5 (New York 1910), City Government5 (New York 1904), and 'Prin¬ ciples of American Administrative Law5 (New York 1905) ; Hatton, A. R., 'Digest of City Charters5 (Chicago, 1906) ; Hart, A. B., 'Actual Government5 (rev. ed., New York 1909) ; Mc¬ Laughlin and Hart (eds.), 'Cyclopaedia of American Government5 (New York 1914) ; Mason, E. C., 'The Veto Power5 (Boston 1890) ;' Munro, W. B., 'Government of Amer¬

ican Cities5 (New York 1913), and 'Bibliog¬ raphy of Municipal Government5 (Cambridge, Mass. 1915) ; Powell, T. R., 'Separation of Powers; Administrative Exercise of Legislative and Judicial Power5 (in Political Science Quar¬ terly, Vol. XXVII, pp. 215-238, June 1912, and Vol. XXVIII, pp. 34-48, March 1913) ; Reinsch, P. S., 'Readings in American State Govern¬ ment5 (Boston 1911) ; Salmon, L. M., 'History of the Appointing Power of the President5 (New York 1886) ; Story, J., Commentaries on the Constitution5 (5th ed., Boston 1890) ; Taft, W. H., 'Four Aspects of Civic Duties5 (new ed., New York 1906) ; White, F. H., 'Growth and Future of State Boards and Commissions5 (in Political Science Quarterly, Vol. XVIII, pp. 631-656, 1903) ; Woolsey, T. D., 'Political Science5 (2d ed., New York 1893) ; Wilson, Woodrow, Congressional Government5 (15th ed., Boston 1900), and Constitutional Government5 (New York 1908) ; Willoughby, W. W., Constitutional Law of the United States5 (New York 1910).

Irving E. Rines.

EXECUTIVE AND JUDICIARY, those branches of government which, respectively, are entrusted with the execution of the laws, and that judge or determine the application of the laws to particular cases, their constitutionality, etc. See Court; Executive; State.

EXECUTIVE OFFICER, in the navy of the United States the officer of the line next in rank to the captain. His appointment is usually direct from the Navy Department, but in some cases a senior officer is detailed as executive officer by the captain. On the larger vessels this officer is generally of the rank of commander, but in the smaller vessels is of lower rank. He is the aide and executive of the captain in all matters and is responsible for all drills and routine work. He has charge of the enlisted force and keeps their

records. In battle the executive officer has general su¬ pervision of the battery and of everything in regard to the safety of the ship except naviga¬ tion. While on board he has general supervision of the organization, discipline, exercise, etc., of the crew.

EXECUTIVE POWER, narrowly defined, is that power which enforces law. In its larger aspect it involves the exercise of wide dis¬ cretion and judgment, the rendering of import¬ ant decisions, and the formulation and carrying out of constructive policies. The executive directs the public life of the state, and in all relations with foreign states is its representative. The principal function of the executive is to administer and enforce the will of the state as formulated by the legislature. The execu¬ tive should be characterized by prompt de¬ cision, singleness of purpose and energetic action, objects which are only obtained by vesting the executive power in the hands of a single person. See Executive; Government; Governor; State; President.

EXECUTIVE REFORM. See Execu¬ tive; State.

EXECUTOR (Lat. "performer55). An executor is one to whom another man commits his last will and testament for execution of that last will and testament (2 Black. Comm. 503). A person to whom a testator by his will1 commits the execution or putting in force of

that instrument and its codicils. The following is a brief summary of an executor's duties :

(1) He must bury the deceased in a man¬ ner suitable to the estate left behind. But no unreasonable expenses will be allowed, nor any unnecessary expenses if there is risk of the estate's proving insolvent. (2) Within a convenient time after the testator's death, he should collect the goods of the deceased, if he can do so peaceably; if resisted he must apply to the courts for relief. (3) He must prove the will, and take out administration papers. (4) Ordinarily, he must make an in¬ ventory of personal property, and in some States of real estate also. (5) He must next collect the goods and chattels, and have the claims in¬ ventoried, with reasonable diligence. And he is liable for a loss by the insolvency of a debtor, if it results from Jhis gross delay. (6) He must give notice of his appointment in the statutory form and should advertise for debts and credits. (7) The personal effects he must deal with as the will directs, and the surplus must be turned into money and divided as if there was no will. An administrator must at once

collect, appraise and sell the whole. The safest method of sale is a public auction. (8) He must keep the money of- the estate safely, but not mixed with his own, or he may be charged interest on it. (9) He must be at all times ready to actually file an account within the year generally prescribed by statute. (10) He must pay the debts and legacies in the order required by law. Funeral expenses are preferred debts. See Estate.

EXECUTORY DEVISE, a bequest by testament of a future interest of real or per¬ sonal property, which is such that it may not be described as a residuary estate. It must take effect within a life or lives in being and 21 years after. See Devise; Future Estate.

EXEDRA, a seat built out from a portico in Greek and Roman buildings. Such seats were usually simi-circular in form and some¬ times were provided with a roof. Famous ex¬ amples of exedras built out of doors were those in the Street of Tombs, Pompeii. The Sieges- Allee, Berlin, contains modern examples of this kind.

EXEGESIS, Biblical. The word <(exege- sis® is from the Greek Hrjyr]ai

sets its complete import before the mind's eye. The task of Biblical exegesis, therefore, is to clear up all difficulties and to make plain the meaning of the Bible text. It might seem a comparatively easy thing to do this ; but cen¬ turies of endeavor have shown that while all the essentials of the revelation in the Bible are reasonably clear there are problems con¬ nected with all of the Bible books which tax the utmost powers of the greatest minds to master them. Then at least four temptations beset the interpreters of Bible truth. One of these is apparent in those exegetes who

" Each dark passage shun And hold their farthing candle to the sun."

What is clear in itself needs no further ex¬ planation. The office of the exegete becomes a necessity only when the meaning seems ob¬ scure. Another danger in exegesis is that of bringing a meaning to the text instead of draw¬ ing the meaning from it. The text is forced into agreement with previous prejudice or opin¬ ion. This is nearly always fatal to the truth. As an old monk said, <(Whosoever seeketh an interpretation in this book shall get an answer from God; whosoever bringeth an interpreta¬ tion to this book shall get an answer from the devil.® Jerome put the same truth more mildly when he said, (

The first important school of exegesis was founded at Alexandria, and it flourished from 150 to 400 a.d. Its most distinguished repre¬ sentatives were Clement, Origen, Athanasius, Basil and the two Gregories. Of these the peerless prince was Origen, the greatest scholar and saint the Christian

Church has produced since apostolic times. A great injustice has been done both him and the Alexandrian school

by associating their names almost exclusively with thy allegorical interpretation of the Scrip¬ tures, in which they sometimes indulged, as though this method were their only method or were peculiar to them alone. Neither of these things were true. The allegorical interpretation was much older than the Alexandrian school and has persisted in dragging out its pernicious existence to this day. It was prevalent and predominant in the Rabbinical schools of exe¬ gesis before the Christian era began. The Tal¬ mudists finally found a watch-word for their mystical exegesis in Pardes, or Paradise. The four letters of this word in the Hebrew, P R D S, were made to indicate the four words, Peshat or explanation, Remes or hint, Danish or homily, and Sod or mystery; and these in turn represented the fourfold interpretation of which every passage in Scripture was capable. Rabbi Ishmael declared that by means of these any Scripture could be expounded in 49 ways and the expositor could break every text into fragments even as a rock is broken by a hammer (Sanhedrin, 34). The apostle Paul carried at least one example of allegorical treat¬ ment into our New Testament, probably sug¬ gested by his Jewish training in the school of Gamaliel, Gal. iv, 22-31. This method was introduced into Alexandria by Aristobulus and pseudo-Aristeas, and it became authoritative as a method of exegesis under Philo, the fore¬ most writer among the Alexandrian Jews con¬ temporary wuth the Christ. Philo found the method ready made to his hand, not only by the Jewish rabbis, but also by the Greek philoso¬ phers who had allegorized Homer and Hesiod and the ancient Greek nˆths into conformity with their more advanced ethics and faith. The Alexandrian Church fathers thus found the al¬ legorical interpretation in vogue among their heathen and Jewish neighbors and forbears. They believed it had a Scriptural sanction. They accepted it without question. Their genius and wide influence gave it a standing in the Chris¬ tian Church for centuries ; but the Alexandrian school never had a monopoly of its use. It is unfair, therefore, to hold them responsible, either for the origination or for the promulga¬ tion of this method of Scriptural interpretation. Origen did teach that there was a threefold sense in Scripture, corresponding to the body, soul and spirit in man — a literal and a moral and a mystical sense. But Jerome also made it a rule that the Scripture should be interpreted in three ways, historically, tropologically and spiritually; and he related this threefold divi¬ sion to the doctrine of the Trinity. And Au¬ gustine formulated one principle of his exegesis in these words, <(Whatever there is in the word of God that cannot, when taken literally, be referred either

to purity of life or soundness of doctrine, you may set down as figurative® (

Littera gesta docet, quid credas Allegoria,

Moralis quid agas, quo tendas Anagogia

A good example of this fourfold sense was the Scriptural use of the word, Jerusalem. Lit¬ erally it was a city; allegorically, the church; morally, the individual believer; anagogically, the heavenly state.

This much may be said for the Alexandrian school in connection with the allegorical inter¬ pretation of the Scripture. (1) It did not originate this method. (2) It never exercised any monopoly in its use. (3) It found what seemed to be a sufficient sanction in the typology and allegory of the Apocalypse, the Pauline epistles, and the epistle to the Hebrews. (4) No other method of interpretation would have availed them, in their stage of Biblical knowl¬ edge and in their environment, for the defense of many portions of the Old Testament. Their adequate apology for yielding to the fourth temptation mentioned above is to be found in the necessities of their case. (5) Their use of this method grew out of their very piety and spirituality. These simply joined forces with their poetical imagination and philosophical in¬ sight in the endeavor to save the Scripture from contemporary disrepute. (6) They never used the allegorical method dogmatically and they avoided most of the excesses of the later day. ((They are always intelligent and reasonable. They evaporated the letter ; they did not stereo¬ type the spirit® (Bigg, (Christian Platonists of Alexandria,) pp. 149-150). Making all allow¬ ance for fault at this point, the fact remains that ((Origen was the greatest Biblical critic and exegete of the ancient church® (Terry, (Biblical Hermeneutics, p. 639). His one object was to find and set forth the edifying truth in the Scripture. He said, ((The passages that are true in their historical meaning are much more numerous than those which are interspersed with a purely spiritual signification.® Having adduced many passages in which a literal mean¬ ing seems impossible, he concludes, ((Therefore the exact reader must, in obedience to the Savior's injunction to search the Scriptures, carefully ascertain in how far the literal mean¬ ing is true, and in how far impossible; and so far as he can, trace out, by means of similar statements, the meaning everywhere scattered through Scripture of that which cannot be un¬ derstood in a literal signification® ((De Prin- cipiis,* IV, 1; 19). This is seen at once to be, as Davidson said, "not so absurd or injurious as many represent® ((Sacred Hermeneutics,* p. 68). Bishop Lightifoot is fully justified in say¬ ing of Origen, "A very considerable part of what is valuable in subsequent commentaries, whether ancient or modern, is due to him. A deep thinker, an accurate grammarian, a most laborious worker,*

and a most earnest Christian, he not only laid the foundation, but to a very great extent built up the fabric of Biblical inter¬ pretation® ((Commentary on Galatians, p. 227). Farrar declares, "His knowledge of the Bible and his contributions to its interpretation were absolutely unrivaled® ((History of Inter¬ pretation, > p. 188). Fairweather adds, "Properly speaking, Origen was the first exegete. Every¬ thing done in this direction previously had been merely preparatory to a scientific interpretation of Scripture. . . . One of the great merits*

of Origen is that he never shirks a difficulty. . . . Nothing could exceed his passion for

verbal and grammatical accuracy, or his linguis¬ tic and critical insight, while his knowledge of

630

EXEGESIS

the ancient theology is unique® (c Origenˆ p. 120). Harnack calls Origen (

dark and enigmatical, . . . and set it in the

light, as being himself a skilled and most dis¬ cerning hearer of God. . . . He alone of

all men with whom I have myself been ac¬ quainted, or of whom I have heard by the re¬ port of others, has so deeply studied the oracles of God, as to be able at once to receive their meaning into his own mind, and to convey it to others. For that leader of all men, who in¬ spires God's dear prophets, and suggests all their prophecies and their mystic and heavenly words, has honored this man as He would a friend, and has constituted him an expositor of these same oracles ; the things of which He only gave a hint by others He made matters of full instruction by this man's instrumentality; and in things which He, who is worthy of all trust, either enjoined in regal fashion, or simply enunciated, He imparted to this man the gift of investigating and unfolding and explaining them ; so that, if there chanced to be anyone of obtuse and incredulous mind, or one again thirsting for instruction, he might learn from this man, and in some manner be constrained to understand® (Argument, XV). It is the pic¬ ture of the perfect pattern of the union of scien¬ tific investigation and spiritual insight which makes the model exegete. The transcendent genius of Origen lifted him above his age at many points, and the 20th century is be¬ ginning to see that his conception of revealed truth is far superior to that of most of his suc¬ cessors in the history of the Church.

It has been customary to denounce Origen and the Alexandrian school for their indul¬ gence in allegory and to contrast with them most favorably the next great school of exe- getes at Antioch. The most distinguished names here were those of Lucian, Diodorus, Theo¬ dore, Theodoret, and Chrysostom. We are told that these men were literalists rather than alle- gorists. They held rigidly to the historical and grammatical sense and it is but natural that the historical and grammatical critics of the 19th century should applaud their opposition to the allegorical flights of the Alexandrians. However, it is well for us to remember that this school has its dangers and faults as well as the Alexandrian. Its literalism resulted in a rationalism which was like a dry rot in the Church. Historically, it led directly to Arianism,

which threatened to cut the tap-root of the Christian faith; and against this the orthodox exegesis of Athanasius the Alexandrian, proved to be the only safeguard of the Church at the last. Its tendency was to narrowness, rather than to richness. What it gained in straitness, it lost in breadth. However, among all the Greek fathers, Chrysostom will rank next to Origen in uniting the best characteristics of both schools. "Through a rich inward ex¬ perience he lived into an understanding of the Holy Scriptures ; and a prudent method of interpretation, on logical and grammatical prin¬ ciples, kept him in the right track in deriving the spirit from the letter of the sacred volume® (Neander, (History of the Christian Religion and Church, > II, p. 693). Origen and Chrys¬ ostom had no worthy successors in the next millennium of church history. Jerome has been called the Origen of the Western Church but he was too hasty in composition, too much in¬ fluenced by his personal prejudice, and too vacillating and uncertain in his own opinions to deserve this name as an exegete. His serv¬ ices in other directions were invaluable. He was the greatest scholar in the West as Origen had been the greatest scholar in the East ; but he lacked the depth of character, the consistency of principle, and the consequent spiritual intui¬ tion of that greatest master in the early Church.

Augustine has exerted a wider influence upon the Christian Church than any other of the church fathers. He was the chief authority through the whole of the mediaeval age. Mar¬ tin Luther was an Augustinian monk at the time of his conversion ; and he and Melanchthon and Calvin and Bucer all built upon the foun¬ dations which Augustine had laid down. The works of the great Latin father have been read and reverenced by Protestant and Roman Catho¬ lic alike, and it is only in our day that serious question has arisen as to his right to continued supremacy. In the present reaction from the theology of the Latin fathers to the older and purer theology of the Greek fathers, it is in the field of scholarly exegesis that the inferior¬ ity of Augustine becomes most apparent. He was not even equal to Jerome in scholarship. He knew no Hebrew. He was very deficient

in his knowledge of the Greek. He preferred a translation to the original text. He was con¬ tinually making mistakes as to the meaning of words. .He had all the defects of his predeces¬ sors, without their excuse for them. The Alexandrians had been driven into the use of allegory to harmonize, the Gospel teaching with the truth of Greek philosophy and to command the hearing and respect of their Jewish con¬ temporaries. But Augustine was an allegorist of the allegorists when no necessity was laid upon him and when allegory had degenerated into mere imaginative ingenuities. Augustine had genius and a genuine Christian experience and consequently flashes of illuminative inter¬ pretation are found in his books, but these can¬ not compensate for the lack of the critical faculty and a sound basis of linguistic scholar¬ ship in exegesis. <(Spiritual insight though a far diviner, gift than the critical faculty, will not supply its place. In this faculty Augustine was wanting, and owing to this defect, as a con¬ tinuous expositor he is disappointing® (Light- foot, < Commentary on Galatians, > p. 233). His total influence has been an immeasurable bane

to Christendom. He was chiefly responsible for subordinating exegesis to ecclesiastical authority. He said, (III, ch. 10, sect. 15), and he bent his exegesis to make good that declaration. He fastened upon the Christian Church the dogmas which have been the chief hindrances to its progress for 1,400 years; ((the exaggerated doc¬ trine of total human depravity,® the guilt of innocent infancy, arbitrary election involving a practical denial of the freedom of the human will, atonement by quantitative equivalence in suffering, the subtle systematization of divine counsels and schemes, the imperious necessity of sacerdotalism and sacramentarianism, intoler¬ ance of opinion contrary to churchly authority, even when based upon an earnest and intelli¬ gent study of the revealed Word. Following his lead the Church has floundered for centuries through sloughs of despond and has almost for¬ gotten the broader horizon and the fresher air of the high table-lands of the earlier theology. Among the Greek fathers no one of these ques¬ tions which have afflicted our Latinized Chris¬ tianity found an atmosphere congenial enough in which to thrive. We owe much to Augus¬ tine but it is hard for us to believe that his good influence can begin to equal his evil influ¬ ence upon the Christian Church. His is the last great name among the church fathers. For a thousand years little or no progress was made in the interpretation of the Scriptures.

The Schoolmen contented themselves for the most part with copying and compiling the work of their predecessors in this field. It became a proverb among them, Si Augustinus adest suf- ficit ipse tibe. One of them stated

plainly that no interpretation of Scripture must be accepted which ran counter to the authority of the Church, ((however much such a sense may be in conformity with the literal meaning. Indeed that ought not to be called the literal sense which is repugnant to ecclesiastical authority® (Paulus of Burgos, (Prol. in Additiones)) . Even Gerson declares, <(The literal sense must be judged according as the Church has deter¬ mined® (Propp. de sens., lit. 3). With no inde¬ pendence of thought and with no fresh scholar¬ ship the schoolmen added no new principle of exegesis in a thousand years of commentary writing. They were expending their energies upon subtle and futile speculations. They com¬ posed great folios which aimed at nothing orig¬ inal and arrived nowhere in particular. They labored hard in a treadmill. They were weakest in exegesis. Only two or three of them knew any Hebrew, and most of them knew very little if any Greek. They were unoriginal, un- courageous, uncertain, uninformed. They had a wrong notion of the Church and a wrong conception of inspiration, and it naturally fol¬ lowed that they had a wrong method of exe¬ gesis. They had their merits too, but not as exegetes.

With the Protestant Reformation we come to a new era in Scriptural exegesis. Coleridge said of the Reformers, (III, p. 276). Calvin sweepingly asserts,

((Modestv will not allow me to speak of our¬ selves as fact would justify; and yet I will most truly declare that we have thrown more light upon the Scriptures than all the doctors who have appeared under the Papacy since its commencement. This praise even they them¬ selves dare not deny us® ((Antid. in Cone. Trid.P Sess. IV). The Bible seemed like a fresh discovery to the Church of that day. For the first time it became the property of the common people ; and the printing press made it possible for it to become a common pos¬ session. It had been locked up in the Latin tongue and was supposed to be the peculiar property of the priests. Translations now made it accessible to all and the Protestant preachers constantly appealed to its authority in their opposition to the usurpations and the abuses of the hierarchy. That necessitated a renewed study of the sacred text on both sides. It soon became impossible for a man to be a doctor of divinity for eight years, as Carolstadt con¬ fessed that he had been, before he had read his New Testament. The Protestants delighted to circulate such stories as that of Sixtus of Amana concerning Albert, archbishop of May- ence, who read a few pages in the New Testa¬ ment and then put it down, saying, <(I know not what book this is, I only see that all things contained in it are hostile to us® ((Antibarb. BibP II, 7). The churchmen and schoolmen had always based their doctrinal systems upon the Bible, but the stereotyped interpretation of the Scriptures had come to claim the authority of the Scriptures themselves. John Nathin said to Martin Luther in the convent at Erfurt, (

man, but only the truth which is so perfectly certain that nobody can deny it® (Dods, (The Bible, Its Origin and Nature, * pp. 38-40). Cal¬ vin said, (

be a true religion on earth, it must be of the most serene and unmistakable authority® (cf. Lindsay op. cit., p. 457). That authority is not,

according to Lacordaire, found in private judg¬ ment but in the infallible decree of Pope or Councils. Such was the issue drawn by the Reformation, both parties claiming the authority of the Scriptures, the one as interpreted by the Church for all, and the other as interpreted by the Spirit to each man. It was equally in¬ cumbent upon all concerned to show that their interpretation was a true one. This battle over the Book led to such searching of the Scriptures as had not been seen in the Church in any period of its history.

The way was opened for an intelligent dis¬ cussion of the Scripture text largely by the labors of Erasmus of Rotterdam. His edition of the Greek Testament became the standard text among the reformers. His translations, annotations and paraphrases entitle him to high rank as an exegete. He was independent in judgment, characterized by good sense, and a philologist without a peer. His aim was to make the meaning of the Word perfectly clear to all. He said, <(I do not see why the unlearned are to be kept away, especially from the evan¬ gelical writings, which were proclaimed alike to learned and unlearned, equally to Greeks and Scythians, as much for slaves as for the free, at the same time to men and to women, not less to peasants than to kings® ((Praef. in Paraph, in Matt.5). Erasmus still clung to the mystical or allegorical interpretation of certain Scrip¬ tures and thought that the Holy Spirit had in¬ tended that some words should carry multiple meanings. It was Martin Luther who broke finally and conclusively with this ancient error. He deserves highest honor as an exegete as well as a reformer by the enunciation of this principle, ((Each passage has one clear, definite and true sense of its own. All others are but doubtful and uncertain opinions.® He added, aThe literal sense of Scripture alone is the whole essence of faith and of Christian the¬ ology. . . . Allegories are empty specula¬ tions. . . . An interpreter must as much as

possible avoid allegory that he may not wander into idle dreams. ... To allegorize is to juggle with Scripture. ... If we wish to handle Scripture aright, our one effort will be to attain unum, simplicem, germanum, et

certum sensum literalem ® (Commentary on Genesis5). Unlike Jerome and so many others who had recognized these truths before him, he is true to these principles in his own exegesis. He published (Notes 5 on many portions of the Scripture, -and a complete Commentary on Gala¬ tians.5 His exegetical works were published in a score or more volumes in both Latin and .German,, and were of paramount influence in introducing better methods of exegesis in the Reformed Churches. Melanchthon, Bucer. Zwingli, Beza and many others did notable work in exegeses in the Reformation period; but their books are for the most part unread to-dav. The greatest exegete among the re¬ formers was John Calvin. He wrote complete commentaries on nearly the whole of the Bible. The single exception in the New Testament was the book of the Apocalypse; and Judges, Ruth, Kings, Esther, Ezra, Nehemiah, Proverbs, Ecclesiastes, and Song of Solomon were the only books left untouched in the Old Testa¬ ment. His commentary on the Psalms was justly celebrated for its religious insight; and in the Pauline epistles and the book of Acts he is

at his best in the New Testament. He wrote to his friend Grynseus in 1539, <(We were both of this mind, that the principal point of an in¬ terpreter did consist in a plain briefness. . . . We wished that there might be some

one who gave his diligence not to trouble those who are desirous of learning with long com¬ mentaries® ((Praef. in Rom.5). This suggests one chief excellence of Calvin's exegetical work. It is clear and concise and not loaded down with references to a host of other authorities. Cal¬ vin has the learning necessary for his task, but he makes no needless display of it. He uses it simply to present plainly the meaning of the text. He was honest and independent in his comment, intelligent in his method and com¬ paratively free from the worst faults of all his predecessors in this line. He never agreed with Luther as to the adequacy of the private judg¬ ment; and yet he was a persecutor of those who did not agree with his own, views. The prejudices of his peculiar theology appear throughout his commentaries, and the repudia¬ tion of his conception of the decree as the central idea of Christianity has gone far to detract from his use and usefulness in the America of the 20th century. However he is still worth consulting for his good sense in most things and his good style in all.

It seemed a necessity of the age that all Christians should be dogmatists, and Protestant dogmatism soon became as deadly an influence in the field of exegesis as Roman Catholic tra¬ dition had ever been. The successors of the great Reformers were like the schoolmen who succeeded the great Fathers of the earlv Church. They were subservient to authority and fettered by dogma; and in the 17th and 18th centuries very few exegetes appeared whose works are read to-day. The scholarship of the elder Light-foot is valued. The practical comments of Rob¬ ert Leighton on First Peter

are still enjoyed. John Owen's Exercitations on the Epistle to the Hebrews is a monument of erudition and pious reflection; but, like Caryl on Job, it is too voluminous to hold attention in this modern age. Robert Hall said of Owen, <(He always takes for granted what he ought to prove, while he is always proving what he ought to take for granted; and after a long digression, he con¬ cludes very properly with, This is not our con¬ cernment ; and returns to enter upon something still farther from the point.® Adam Clarke added, ((To me he is one of the most unsatis¬ factory of writers. His sense and meaning he drowns in a world of words. He cannot con¬ dense his meaning, and never comes to the point, but by the most intolerable circumlocu¬ tion® (Etheridge,

and Adam Clarke wrote devotional commen¬ taries which are still in use. Ernesti has been regarded as the founder of a new exegetical school, attempting to hold the via media be¬ tween the allegorists and the dogmatists. His exegesis was predominantly grammatical. Sem- ler, pietist and rationalist, introduced the his¬ toric method of exegesis, and prepared the way for the unparalleled exegetical activity of the 19th century. The most dominant influence in the 19th century in the whole field of theol¬ ogy was that of Schleiermacher. He was the founder of what has been called the psycho¬ logical school of exegesis. He was both ration¬ alistic and supernaturalistic in his interpretation of the Scriptures. He appealed to opposing classes and did much to bring all Germany back to a central emphasis upon the person and teach¬ ing and influence of Christ. In Germany and, through Coleridge and Maurice, in England and America his spirit and methods have been fruit¬ ful of much good in Biblical study. (p. 244). He was the ((Plato and Origen of Germany in the 19th Century® (Philip Schaff). He based his religion upon faith and feeling, and he made the Christian conscious¬ ness and personal experience the guiding lights of his Scriptural interpretation. He claimed a Divine compulsion in his teaching and spoke and wrote with prophetic fervor and authority. He said, (

or accident. Rather. . . . it is a divine call®

((Reden fiber die Religion, > I). His personal magnetism and pronounced genius, his eloquence and earnestness, the genuineness of his Christian experience, the remarkable breadth of his vision and thought, and the intensity of his spiritual zeal gave him a most extraordinary influence upon his own and succeeding generations. He vindicated the right of Christian experience to an equal hearing with the results of any purely scientific

research. His spirit pervades the Christian world to-day and will maintain its permanent place in Christian thought. De Wette was the greatest exegete among the dis¬ ciples of Schleiermacher. His work represents prodigious learning and ((perfect loyalty in the search for truth® (Godet). He expresses him¬ self clearly, but does not always come to a de¬ sirably definite conclusion. Credner occupied practically the same standpoint.

The year 1835 marked a new era in all scientific Bible study (Pfleiderer, development of Theology, > p. 209). In that year Strauss published his (Life of Jesus,) Baur, his work on the (Pastoral Epistles, > and Vatke, his (History of the Religion of the Old Testament. > Each of these books may be regarded as epoch- making.

Eichhorn has reduced the rationalistic treat¬ ment of the Scriptures to a scientific system. Strauss was the first to put this rationalism into concrete and popular form. Baur was the founder of the Tfibingen or Tendency school, which probably represented in Germany the greatest theological movement of the century. Baur endeavored to bring all his exegesis to the bar of historical investigation. He examined all traditional exegesis critically and subjected the Newr Testament books to a more thorough¬

going analysis than they had ever known. He emphasized the theological standpoint of each writer, and he thought he detected an irrecon¬ cilable antagonism between the Pauline and the Petrine wings of the Christian Church. He stimulated Bible study to an astonishing degree. His personal power was manifest in the re¬ markable group of disciples he gathered about him. Among these we may mention Zeller, Schwegler, Hilgenfeld, Holsten, Pfleiderer and Volkmar. The entire movement inaugurated by Baur has been characterized by comprehensive and accurate scholarship, the value of which has been somewhat impaired by the critical presup¬ positions upon which it was based. Strauss came over into this school in the second edi¬ tion of his (Life of Jesus.) Ritschl began his career in it, but later swung clear of it and became the founder of a distinct school of thought, to which Harnack, Jfilicher, Kaftan, Hermann and Von Soden adhere.

Ritschl claimed to repudiate all metaphysical presuppositions and to found his system on the religious consciousness alone. He believed that the primitive faith sprang from the person and word of Jesus, with no philosophical alloy in the beginning. He held that experience limits the domain of knowledge. The Scriptures are sufficient in themselves to reveal the spiritual and moral worth of the kingdom of God, whose end is realized in love. Dogmatics and ethics unite in the higher synthesis of the revelation of the New Testament. Frank was the most determined opponent of Ritschlianism in Germany. He pointed out the lack of a true and deep

conception of sin in this system of thought, and its consequently inadequate notion of atonement and conversion; and he claimed that, instead of rejecting metaphysics, the whole system was based on a highly developed but false and contradictory metaphysics of its own.

Vatke in 1835 outlined the revolution which has since taken place in the conception of Old Testament history. His book, however, was overloaded with philosophical terminology and met with no general appreciation and soon seemed to be forgotten. Reuss lectured along the same lines at Strassburg, and two of his pupils, Graf and Wellhausen, published the new hypothesis of the development of Old Testa¬ ment ritual and literature. It was Vatke's theory brought to life again, and it has exer¬ cised increasing influence upon the exegesis of all the Old Testament books for the last half century. The prophets have come into new prominence as a result of this study. They are recognized as the founders of the Hebrew religion. The Law in its present form was of later growth in the Jewish Church. The Penta¬ teuch has been resolved into a number of docu¬ ments. Deuteronomy is believed to belong to the times of Josiah. Isaiah and other prophetic books are shown to be of multiple authorship. The Psalms come last in the Hebrew sacred literature. Stade, Budde, Smend, Schultz and others have represented this school of thought.

Germany has been the great battle-ground of the Higher Criticism through the last cen¬ tury; and the exegetes have enrolled themselves among the critical and the traditional, the more radical and the more conservative camps. Ne- ander the champion of spirituality, Hengsten- berg the bulwark of orthodoxy, Delitzsch the;

pre-eminent scholar, did valiant service for what they deemed the traditional truth. Just before his death Delitzsch seemed disposed to go over into the critical ranks. Dillmann and Gunkel have adopted the newer views. The indispen¬ sable commentary in the New Testament field has been that of H. A. W. Meyer. Characterized by grammatical rigor and literary freedom, and brought up to date by frequent revisions, it has maintained itself as a standard authority for two generations. The principal contributor to the later editions has been Bernard Weiss, the present prince of all laborers in the exegetical field. Having completed more than 50 years of University service he stands to-day without a peer in his record of worthy achievement as a textual critic and commentator. He is incom¬ parable for minute and searching investigation, exactness and solidity of scholarship. His as¬ sociates in the Meyer Commentary series have been Wendt, Heinrici, Sieffert, Schmidt, Diister- dieck and Beyschlag. 'Lipsius, Weizsacker, Schmiedel and Holtzmann have represented the more advanced school of commentators. Bleek did most admirable work in the earlier part of the century and Luthardt and Hofmann have been conservative leaders in -the latter days.

Among the Dutch theologians the dominant tendency in the last century has been toward extreme radicalism. Scholten and Kuenen have represented advance thought in the Old Testa¬ ment field, while Loman, Pierson, Naber, Volter and Van Manen have been generally considered hypercritical in the discussion of New Testa¬ ment questions. Steck has represented the latter school in Switzerland; while Godet has nobly upheld the traditions of orthodoxy in this land. Godet combines a French felicity of style with a German thoroughness of scholarship and adds to these a genuine spiritual fervor which makes his commentaries on Luke, John and Romans veritable masterpieces of exegesis. It may well be doubted if the century has produced more luminous and interesting contributions to this field.

France has furnished the brilliant and ver¬ satile and radical Renan, and the more profound and philosophical De Pressense; and it is mak¬ ing its influence felt to-day through the writ¬ ings of the new Symbolo-Fideistic

school, Stap- fer, Sabatier and Menegoz being the chief theological representatives. This school em¬ phatically repudiates the infallibility of Pope or Church and just as emphatically renounces the infallibility of Scripture or the Christ recorded in Scripture. It believes that philosophy can never deduce any religious truth from its prem¬ ises, and so repudiates rationalism as a founda¬ tion for faith. It believes in a Divine revelation through the immanent Spirit of God. It identi¬ fies prayer and religion. All expression of re¬ ligious impression must be through images or symbols. (

In Great Britain the century has furnished

some masterly exegetical work. Cambridge University has easily taken the honors in this field. Dean Alford in his Commentary on the Greek Testament introduced the best results of German exegesis to English readers. Bishop Ellicott gave splendid examples of painstaking investigation of the Scriptural text. The great trio of later Cambridge scholars, Lightfoot, Westcott and Hort, have reached the high- water mark of English scholarship in their field. Bishop Lightfoot's commentaries upon the Pauline Epistles have been standard au¬ thorities ever since their publication. Westcott did equally fine work upon the writings of John and the Epistle to the Hebrews. Hort was gen¬ erally reputed to be the greatest scholar of the three, but his extreme modesty and his realiz¬ ing sense of the yet unattained perfection pos¬ sible in his work kept him from the publica¬ tion of any but fragmentary treatises. His in¬ fluence lives among his students and associates. Mayor on James and Second Peter and Jude, and Swete on Mark and the Apocalypse are worthy companions of the other Cambridge University commentaries. Professor Davidson of Edin¬ burgh was the leading Hebrew scholar of Great Britain in the century, and his pupils, W. Rob¬ ertson Smith and George Adam Smith and others, have done yeoman service in revolution¬ izing and revitalizing the exegesis of the Old Testament. Sanday, Driver, Plummer, Beet, Findlay, Bruce and Dods have done excellent interpretative work. The (International Critical Commentary * and the Expositor's Greek Tes¬ tament, J bid fair to continue the best traditions in English exegesis.*

America has had a share in the exegetical labor of the century. Moses Stuart, J. A. Alex¬ ander, Hackett, Hodge, Shedd, Harper, Mitch¬ ell, Moore, Toy, Vincent and others have pro¬ duced exegetical studies of acknowledged merit. Albert Barnes, Henry Cowles, J. A. Broadus and D. D. Whedon have published series of helpful and devotional commentaries. Ezra Abbott, Edward Robinson, McGiffert, Mathews, Burton, Briggs, Bacon, Gilbert, Stevens, Allen and Smyth have done first-class service in special fields.

The Roman Catholic Church began the cen¬ tury with two most worthy

representatives of Biblical learning. Hug ably combated the rationalistic tendencies of his day and defended the traditional views of the origin of the New Testament writings. Herbst performed the same service for the Old Testament. During the greater part of the century, however, free in¬ quiry has been more or less stifled by the au¬ thority of <(the usual exegesis of Scripture.® Scientific research has been systematically dis¬ couraged and any tendency toward a new or modified interpretation of the Scriptural text and any originality of conclusions, .such as may not be guaranteed by the authority of the Fathers and the Councils of the Church, have been frowned upon by those in the places of power. A better condition of affairs seems to be on the point of realization now. A growing body of students within the pale of the Church have felt the influence of the great onward movements in the Protestant world and are beginning to demand the privilege of free in¬ quiry and the use of modern methods in exegesis. They point to the critical work in

the writings of Origen and Jerome and Euse¬ bius and other Christian scholars and saints as proof that scientific research is no novelty in the Catholic Church, and they claim the right to follow in the footsteps of these illustrious critics of antiquity. A measure of freedom would seem to be already granted them since Pope Pius X wrote to Bishop Le Camus, ftWe should not approve the attitude of those who in no way dare to depart from the usual exegesis of Scripture, even when, faith not being at stake, the real advancement of learn¬ ing requires such departure. You follow a wise middle course, and by your example show that there is nothing to be feared for the sacred books from the true progress of the art of criticism, nay that a beneficial light may be derived from it, provided its use be coupled with a wise and prudent discernment® (Dated 11 Jan. 1906). What this <(wise and prudent discernment® may be is probably best illustrated in the decisions of the Biblical Commission ap¬ pointed by Leo XIII, in its report upon the Pentateuch, published in the Revue Biblique and dated 27 June 1906. The report is presented in the form of questions and answers in cate¬ chism style. They may be summarized as fol¬ lows : May one assert that Moses was not the author of the Pentateuch, but that it was made up largely of later elements? No. Must Moses then have written the whole of the Pentateuch with his own hand, or dictated it to secretaries? No. May Moses have committed the editing of it in whole or in part to secretaries and have permitted the publication of it under his name? Yes. May he have used sources, documents or oral traditions, borrowing sometimes the words, sometimes the sense? Yes. May the Pentateuch have undergone modifications, Additions made after Moses' death by an inspired author,

glosses and parenthetical explanations, ancient words and phrases turned into more modern language, false readings to be attributed to errors of copyists, which criticism may examine and weigh according to its principles? Yes, the Church reserving judgment.® The rights of the newer criticism to a hearing and standing in the Church are clearly allowed in this report, while the Church reserves the right to judge to what extent the findings of the critics may be compatible with its authority and peace.

Historical criticism has now come to the fore. The allegorical interpretation is discred¬ ited, it is to be hoped, finally and permanently. A vaster knowledge is at the service of the exegete than has been possible in any preceding age. The battles of the giants would seem to have ended for the time at least, and much of the smoke of conflict has cleared away. What ought the 20th century exegesis to be? It ought to be capable of the production of both popular and critical work. It ought to meet the demand for edification on the part of the most humble and unlearned; and at the same time it ought to be proficient in the most exhaustive scholarship. It has at its disposal the accumulated wealth of material collected in the preceding centuries; and it may profit by the defects as well as the excellences of the masters who have gone before. Biblical knowl¬ edge was never more profound or more preva¬ lent than now. The original text has been determined within approximate accuracy. The

Bible has been freed from multiplied errors of manuscript transcription and restored to some¬ thing like its original form and revelation. The original languages are better understood. The study of ancient inscriptions and frag¬ ments of newly discovered papyri have thrown a flood of light upon many new points. Modern travel and exploration and excavation in the Orient have taught us many things concerning the manners and customs of the ancient times. The marvelous advance made in the last cen¬ tury along the lines of scientific investigation and metaphysical research and literary criticism has had its beneficial influence upon the inter¬ pretation of the Bible. The exegete of to-day has an unprecedented equipment, and his task is comparatively clear. To-day, <(the great body of evangelical expositors are united on the fundamental principles of interpretation. They agree that a proper commentary on the Bible or on any part of it should clearly set forth the true meaning of the words and the train of thought intended by the sacred writer; and it should point out the grammatico-historical sense of every passage, giving careful atten¬ tion to the context, scope, and plan® (Terry,

(Biblical Hermeneutics, p. 738). The great exegetical works of the present are character¬ ized by directness, accuracy, learning, independ¬ ence of research, a careful consideration of the context and all the light that historical and lit¬ eracy criticism can throw upon the theme. There is a*

better conception of the nature of inspiration and more freedom in the exercise of the critical faculties of the commentator. Rationalism has come to its rights, together with a recognition of the due restraint laid upon the student of a divine revelation. Having escaped from the tradition of an absolutely inerrant text and a form of revelation infalli¬ bly fixed for all time, the exegete of to-day is freer to turn from the letter that killeth to the spirit that maketh alive. The tendency of the times seems to be away from the dominance of the Latin and the Reformation theology to thue purer exegesis of the primitive faith. With the broader spirit of the Greek fathers and the better critical apparatus of the present day the promise of work in this field was never brighter than now.

Bibliography. — Rosenmuller, (Historia in- terpretationis librorum sacrorum in ecclesia Christiana) (5 vols., 1795-1814) ; Meyer, G. W., (Geschichte der Schrifterklarung (5 vols.; 1802-08) ; Ernesti, Hnstitutio Interpretis Novi Testamentˆ (5th ed., 1809) ; Marsh, (Lectures on the Criticism and Interpretation of the Bible) (1842) ; Liicke, (Grundriss der neutesta- mentlichen Hermeneutic (1817) ; Schleier- macher, (Hermeneutik und Kritik* (1838) ; Klausen, (Hermeneutik. German translation from Danish) (1841) ; Immer, (Hermeneutik des neuen Testaments) (1873) ; English trans¬ lation (3d ed., 1890) ; Doedes, (Manual of Her- meneutics) (translated from the Dutch, 1867) ; Davidson, Samuel, (Sacred Hermeneutics* (1843) ; Fairbairn, hermeneutical Manual* (1858); Cellerier, (Manuel D' Hermeneutique Biblique } (1852) ; Elliott and Harsha, (Biblical Hermeneutics) (chiefly a translation of the foregoing, 1881) ; Lange, (Grundriss der Bib- lischen Hermeneutik* (1878); Hofmann, (Bib- lischen Hermeneutik* (1880) ; Farrar, history*

of Interpretation (1886) ; Terry, (Biblical Hermeneutics) (3d ed., 1890), probably the best book on the subject in English.

D. A. Hayes,

Professor of New Testament Exegesis, Garrett Biblical Institute, Evanston, III.

EXELMANS, eks-el-mong, Remy Joseph Isidore, Comte, French soldier, Marshal of France: b. Bar-le-duc, 13 Nov. 1775 ; d. 22 July 1852. He entered the army in 1791, when only 16 years of age, and by 1799 had reached the rank of captain. He subsequently served with great distinction under Macdonald and Cham- pionnet in the campaign of Naples, and in

1801 was appointed to the staff of Murat as aide-de- camp. He was arrested in 1808 while serving with Murat in Spain, and sent to England, but after three years of confinement there effected his escape and in 1812 joined Napoleon in his Russian campaign. For brilliant conduct dur¬ ing this campaign he was appointed general of division by Napoleon but upon the emperor's fall was banished from France owing to his Napoleonic inclinations. He was, however, permitted to return in 1819 and seems to have been highly esteemed under every successive government. He was restored to the Chamber of Peers in 1831 by Louis Philippe and Louis Napoleon appointed him grand chancellor of the Legion of Honor, and on 11 March 1851 created him Marechal de France. He was sub¬ sequently thrown from his horse which resulted in his death.

EXEMPLARY NOVELS. Second only in importance to (Don Quixote5 among the fictions of Cervantes are his tales, published in 1613 as (Novelas Exemplares,5 or (Exemplary Novels.5 Although the preface spoke of 13 stories, but 12 were first included, the 13th having evidently been withdrawn at the last moment. This was not printed until 1814, when Agustin Garcia Arrieta found it in manu¬ script among other matters of entertainment prepared from 1606 to 1610 for the delectation of an archbishop of Seville. Published at first in expurgated form, (La Tia fingida,5 or (The Pretended Aunt,5 it was soon presented in full, and now forms part of all modern editions of the (Novelas Exemplares.5

The 13 stories were written at various times, one as early as 1605, since it is referred to in the first part of (Don Quixote.5 Cervantes, who had spent six years in Italy, sought to com¬ pete with Boccaccio in tale-telling, although ex¬ pressly distinguishing his productions from the novelle of the (Decameron5 as being moral and instructive. Unlike his contemporaries, Cer¬ vantes drew less upon Italian sources than upon his own invention. He endeavored to reflect life as he had seen it and to avoid the sensa¬ tionalism of Bandello and Cinthio. Such sen¬ sationalism appears only in (La Fuerza de la sangre,5 where, however, he carefully reconciles the ravished heroine to her lover. The exotic adventures so common in early fiction are re¬ duced in this collection. Although an unreal London is shown in (La Espanola Inglesa,5 the heroine js a Spanish girl carried off by the English in their sack of Cadiz; and, although the island of Cyprus is the scene in (E1 Amante liberal, > the story contains recollections of Cer¬ vantes' own experience among the Moham¬ medans of Algiers. If the setting of (La

Senora Cornelia5 is Italian, that of most of the tales is native, and in the best it is strongly localized. This is the case, above all, with (Rinconete y Cortadillo,5 a humorous pictuie of roguery among the professional thieves of Seville, organized in a band astutely governed. Inn life is smartly shown

in (La ilustre Fregona,5 and life among the gullible students of Salamanca in (La Tia fingida.5 Humor and satire unite in (E1 Casamiento enganoso,5 with its account of the marriage of two knaves, each thinking to deceive the other, and, more ad¬ mirably still, in (E1 Coloquio de los perros,5 with its dialogue between two dogs of Valla¬ dolid, one of them a canine Sancho Panza, who describes to the other his griefs in the service of various masters. Cervantes' imagination finds freest play in (E1 Licenciado Vidriera,5 whose hero suffers from the delusion that he is made of glass, and in (La Gitanilla,5 with its gypsy heroine who proves to be well born, after a noble youth for love of her has turned Bo¬ hemian. This story in particular has exerted wide influence, Preciosa's adventures being copied by Hugo in France and Longfellow in America, and dramatized by Montalvan and Antonio de Solis in Spain, by Moeller and Wolff in Germany, and by Middleton and Row- ley in England. Middleton, also, drew upon (La Fuerza de la sangre,5 as did Florian in his (Leocadie,5 and Fletcher in four plays borrowed from four tales of Cervantes — in (Love's Pil¬ grimage5 from Was dos doncellas5 (used also by Rotrou), in (The Fair Maid of the Inn5 from (La ilustre Fregona,5 in (The Chances5 from cLa Senora Cornelia,5 and in (Rule a Wife and Have a Wife5 from (E1 Casamiento enganoso.5 The last-named tale was drama¬ tized, also, in England by Tobin; in Germany by Schroder; and in Denmark by Holberg. The ˆNovelas Exemplares5 were early translated into French, Italian, English and German. They are most fully discussed in the Spanish volume of Luis Orellana y Rincon, entitled (Ensayo Critico sobre las Novelas Exemplares5 (1890).

Frank W. Chandler.

EXEMPTION, the right to be excused from rendering certain services, or retain prop¬ erty free from claims or taxation. Exemptions are established by positive law. For example,, the laws designating certain classes of persons not liable to military service nor to jury duty. Such also are the laws exempting church and school properties from taxation. Exemption from debt claims is also granted in many cases; in distress for rent cases, the necessary house¬ hold furniture, the tools of a workman, do¬ mestic animals and a limited supply of food are exempted from seizure under execution. For the various State exemptions it is necessary to con¬ sult the codes of the State in question. Con¬ sult Hubbell, (Legal Directory for Lawyers and Business Men5 (New York, annually).

EXEQUATUR, the document issued by the executive department of a government re¬ garding the consul of another state after it has been formally notified of his appointment by the latter. The effect of the exequatur is to grant all the privileges, immunities and ad¬ vantages to a consular officer in the country to which he has been appointed, with

authority to discharge all the functions of his office and to constitute him the legitimate representative of

EXERCISE

EXETER

637

his state in the locality mentioned in the docu¬ ment. The following is the form of exequatur issued to principal consular olhcers of foreign countries by the government of the United States :

President of the United States of America To all whom it may concern:

Satisfactory evidence having been exhibited to me that

• . . has been appointed .

°f ……. . .at . . . I do hereby recognize him

as such, and declare him free to exercise and enjoy such

functions, powers, and privileges as are allowed to .

by the Law of Nations (or " the . of the most favored

Nations in the United States ”).

In testimony whereof, I have caused these letters to be made Patent, and the Seal of the United States to be here¬ unto affixed.

Given under my hand, at the City of Washington, the . day of . , a.d. 19…., and of the inde¬ pendence of the United States of America the .

„ President’s signature.

Seal

By the President

Secretary of State.

To subordinate consular officers an almost identical form is issued by the Secretary of State. When a state of war supervenes or even when diplomatic relations are broken between two states it is usual to cancel all exequaturs of consular officers of the country with which war has been

declared or diplomatic relations broken. Consult Moore, John Basset, (Digest of International Law) (1906); Stowell, E. C.,

(Consular Cases and Opinions) (1909).

EXERCISE, Physical. The upbuilding of the muscular system of the body is of prime importance in preserving the health or the curing of disease, and whether by passive mo¬ tion or volitional activity is now recognized as necessary to keep the various functions of the body in normal condition. Artificially devised methods have been brought into use, but regular daily out-of-doors exercise is preferable. In¬ struction in gymnastics is now given in many educational institutions and public schools, well- appointed gymnasiums being maintained for that purpose. In these gymnasiums outdoor sports are often practised, but the. chief courses of exercise consist of a systematic use of dumb-bells, wands, Indian clubs, horizontal and parallel bars, chest-weights, swinging rings and other specialties. In many gymnasiums there are running tracks, baseball cages, swimming tanks, bowling alleys, etc. The chief outside sports are tennis, golfing, bicycling, baseball, football, rowing, walking, running, skating, swimming and the various forms of track ath¬ letics. See Gymnasium; Hygiene; Physical Training; Educational Athletics, etc.

EXERCISES, Spiritual. See Spiritual Exercises.

EXETER, or Exon, Domesday. See

Doomsday Book.

EXETER, England, city,, seaport and county, parliamentary and municipal borough, in the county of Devon on the left bank of the Exe, 10 miles northwest from its outlet in the English Channel, on the Great Western and London and Southwestern railways and 171 miles by rail southwest of London. Though still presenting many indications of antiquity, the city can now boast of as handsome squares, terraces, streets and houses, all of modern erec¬ tion, as any other in the kingdom. The princi¬ pal object of interest is the cathedral, a noble

edifice founded in 1112. It is cruciform, 408 feet in length, and consists of a nave, with two side aisles, two short transepts formed out of two heavy Norman towers, each 130 feet in height; a choir of the same width as the nave and 128 feet in length ; 10 chapels or oratories and a chapter-house. The west front, erected in the 14th century, is richly decorated, presenting one of the most picturesque fagades of any building in Europe. The interior, restored by Sir Gilbert Scott in 1877, is magnificent. Its perfect symmetry and the grand unbroken line of vaulting are remarkable features. The epis¬

copal throne dates from 1320. The Great Peter Bell weighs 12,500 pounds. The chapter-house contains a valuable library of manuscripts and early books. Other architectural antiquities are the remains of the castle of Rougemont, por¬ tions of the ancient city walls of Athelstan, Norman work in some of the churches and the noble guild-hall, tastefully restored. Among several fine modern churches Saint Michael's may be mentioned. Among the numerous edu¬ cational establishments is the Exeter School, founded by the citizens in the time of Charles I, to which there are a number of free scholar¬ ships. It has 16 exhibitions to either of the universities of Oxford or Cambridge. The Exeter Diocesan Training College is also situ¬ ated in the city. The charitable institutions of various kinds are numerous. The principal scientific and literary institutions are the Devon and Exeter Institution for the Promotion of Science, Literature and Arts, established in 1817, and possessing a valuable library; the Exeter Literary Society, established in 1835 ; and the Royal Albert Memorial College, Mu¬ seum and Free Library. The college has over 1,000 students. Exeter is not an industrial town, its woolen manufacture, once one of the largest in England, being extinct; but it has iron foundries, manufactories of agricultural implements, paper mills, corn mills, tanneries, etc. Glove-making and lace-making are also carried on. By means of a canal, 5 miles in length and 15 feet in depth, vessels of 400 tons can reach the city, and there is a large floating basin. The Exe itself is not navigable to the city. Exeter is a place of remote antiquity, having been a British settlement long prior to the invasion of the Romans, by whom it was called Isca Damnoniorum. The city returns one member to Parliament. Pop. 48,664.

EXETER, N. H., town, one of the county- seats of Rockingham County, on the Squam- scott River, the Boston and Maine Railroad, 26 miles east of Manchester and about 13 miles southwest of Portsmouth. Exeter was founded in 1638 by John Wheelwright, a CongregationaJ- ist clergyman, who was banished from Massa¬ chusetts. Massachusetts claimed control over the place until 1680. It was the capital of New Hampshire and the centre of military move¬ ments of the colony during the Revolution. The town is well known as the seat of the Phillips Exeter Academy (q.v.), established in 1781. The Robinson Female Academy is located in Exeter. The town contains a large public li¬ brary and a number of manufacturing establish¬ ments, cotton mills, iron, brass and machinery factories; also manufactories of boxes, um¬ brellas, automobile tubes, asbestos and rubber novelties, casings and shoes. Pop. 4,897.

Consult Fassett, (Colonial Life in New Hamp- shire) ; Bell, (History of the

Town of Exeter) (Exeter 1888).

EXETER, Pa., borough of Luzerne County, 10 miles west of Scranton, on the Lehigh Valley Railroad. It has extensive agricultural, coal and lumber interests. Fort Wintermooth nearby is the principal object of interest. Pop.

3,537.

EXETER BOOK, or CODEX EXONI- ENSIS, a manuscript anthology of Anglo-Saxon poetry in the library of Exeter Cathedral. It was presented to the chapter by Leofric, first bishop of Exeter (1050-72), contains 246 pages of vellum, and is the extant original copy of some valuable remains of Anglo-Saxon litera¬ ture. The text with a translation is to be found in Gollancz, (The Exeter Book5 (1895). Con¬ sult Tupper (ed.), (Riddles of the Exeter Book5 (1910).

EXETER COLLEGE, Oxford. This col¬ lege, originally called Stapledon Hall, was founded in 1314 by Walter de Stapledon, bishop of Exeter, sometime Lord High Treasurer of England, who removed to this place his scholars from Hart Hall and made a foundation for a rector and 12 fellows. In 1404 Edmund Staf¬ ford, bishop of Exeter, added two fellowships and obtained leave to give the college its pres¬ ent name. In 1565 Sir William Petre, Secretary of State, added eight ; in 1636 Charles I annexed one for the Channel Islands, and, lastly, Mrs. Shiers left certain rents in 1770, out of which two fellowships were founded. Under the au¬ thority of 17 and 18 Viet., cap. lxxxi, the fel¬ lowships (a number of which were appropriated to various archdeaconries or counties) were reduced from 25 to 15, and were thrown open; they are now 12 in number, three of them in suspense. From the revenues of suppressed fel¬ lowships over 20 scholarships were founded, eight of which (called Stapledon scholarships) are limited to persons born or educated in the diocese of Exeter, and one or more to persons born in any of the Channel Islands, or educated at Victoria College, Jersey, or Elizabeth Col¬ lege, Guernsey. In 1915-16 there were 32 scholarships and 181 undergraduates.

EXETER HALL, a large building for¬ merly on the north side of the Strand, London, opened in 1831. It was capable of containing over 5,000 persons. In it the (

EXFOLIATION, a process of concentric or spheroidal weathering, whereby the rock tends to scale off in thin and often curved plates. It is usually explained as follows : Rock is a poor conductor of heat. During the day a boulder or ledge becomes heated for a few inches from the surface, while the interior remains unaffected. The consequent expansion causes the surface to spall. At night the sur¬ face cools quickly over an interior that

may still be warm and the shrinkage again tends to make the surface scale off. In rocks made up of several minerals, like a granite, this process

is intensified by the fact that each different mineral has a different rate of expansion and hence tends to tear away from its neighboring minerals. The process is particularly character¬ istic of deserts, where there are great ex¬ tremes of temperature.

EXHAUSTIONS, Method of. The

ancient geometricians employed the method of exhaustion for determining the areas of curves and for the solution of similar problems. The method consists in comparing the magnitude to be determined with rectilinear magnitudes ; thus, the area of a curve with an area of a polygon constructed so as to be comparable with the curve in question. The use of the method is exemplified in the second proposition of (Euclid's Twelfth Book. 5 The method was ap¬ plied with all the rigorous logical exactness for which the Greek geometricians are so famous. See Geometry ; Mathematics.

EXHIBITION, Industrial. See Exposi¬ tion, Industrial.

EXILARCH. The title of an officer in Jewish communities in Persia. In 624 the Jews rendered the Mohammedans considerable as¬ sistance in their campaign and in consequence the exilarch was recognized as the chief of the Jews. His functions were civil and judicial. Later the gaon of Sora and the head of the College of Pumbedetha shared his authority, the gaon being of equal rank, and when the office of exilarch was vacant performed the duties of the office. The exilarch assumed all the pomp of a prince. His induction into of¬ fice was attended with pomp and ceremony. The office was in existence for seven centuries and ceased with the death of Saadiah who was as¬ sassinated in 942. It was revived again for a few years about the middle of the 12th century.

EXILE, voluntary or involuntary pro¬ longed absence from one's country; also, a per¬ son long absent from his country. Involuntary exile or expulsion for crime, particularly for murder and other serious offenses, can be traced back to a very ancient period. It was known among the early Greeks and was the penalty not only for murder but for offenses affecting the general interests, chiefly the for¬ mer. Exile often took the form of expulsion, with death or some other penalty as the alter¬ native, or of simple transportation, as to a for¬ eign land. Sometimes confiscation of prop¬ erty was an added penalty.. In Rome under the empire, exile or expulsion was known in two forms : deportatio and relegatio. The first was often punishment for political crimi¬ nals, but later its use was extended. It

in¬ volved banishment, generally to an island, with forfeiture of civic rights and usually of prop¬ erty. Relegatio . was a much less severe form of punishment, involving no loss of civic rights by the offender.

The rights of aliens who are voluntary ex¬ iles in the country to which they flee after com¬ mitting political or other crimes is usually fixed by treaty. Generally those guilty of political crimes only are not subject to extradition. They are,, however, subject to the laws of the coun¬ try in which they reside. See Aliens ; Citizen¬ ship.

Transportation for crime was abolished in England in 1857, but it still survives among some nations, as Russia, this country maintain-

ing penal settlements in Siberia. The tendency to-day, in keeping with advancing civilization, is toward its utter abolition.

EXMOOR, a wild and hilly district in the extreme southwest of Somersetshire, extending also into Devonshire, England. It was formerly a forest, but, with exception of a considerable portion lately cultivated, it is now mostly heath and marsh. It embraces ranges of hills of con¬ siderable elevation (the loftiest being Dunkerry Beacon, 1,707 feet), and in the time of the Druids was a favorite spot for the celebration of their religious rites. Red deer still exist here in a wild state. Good descriptions of Ex¬ moor may be found in Blackmore's

EXMOUTH, eks'muth, Edward Pellew,

Viscount, English naval officer: b. Dover, Eng¬ land, 19 April 1757 ; d. 23 Jan. 1833. He served as midshipman in the Blonde frigate during the American Revolution, and greatly distin¬ guished himself at Lake Champlain. In 1808 he had attained the rank of vice-admiral, and in 1814 he was made Baron Exmouth. In 1816 he proceeded to Algiers in command of a com¬ bined fleet of English and Dutch ships to en¬ force the terms of a treaty which the dey had violated. He bombarded the city for seven hours and inflicted such immense damage that the dey consented to every demand. Twelve hundred Christian slaves were by this exploit restored to liberty. Lord Exmouth was raised to the dignity of a viscount for this service. He was commander-in-chief at Plymouth

1817-21.

EXMOUTH, England, seaport, market town in the county of Devon, on the English Channel at the entrance to the estuary of the Exe. It is one of the favorite resorts on the coast of Devon, for sea-bathing and, owing to its sheltered situation and salubrious climate, has risen into favor as a winter resort. The chief industry is fishing, and the shipping trade is considerable ; the new docks are commodious. Exmouth was one of the principal ports of the country in the reign of Edward III ; but sub¬ sequently it became a mere fishing hamlet. Late years it has increased steadily in population and trade. Pop. 11,962.

EXNER, Karl, Austrian physicist: b. Prague, 1842. He received his education at Vienna and Zurich and in 1885 was chosen president of the Chemico-Physical Society of Vienna and seven years later became lecturer at the Universitv of Innsbruck and from 1894 to 1904 held the chair of mathematical physics there. He retired in 1904. He has written 'Ueber die Frauenhoferschen Ringe) (1877) ; (Ueber das Funkeln der Sterne) (1881); (Ueber Beugungserscheinungen) (1885) ; (Ue- ber die polarisierende Wirkung der Lichtbeu- gung) (1892); < Genesis der Erklarung des

Scintillation (1901).

EXNER, Siegmund, Austrian physiologist : b. Vienna, 1846. He was educated at the uni¬ versities of Vienna and Heidelberg and in 1875 was named to the chair of physiology at the former institution. In 1891 he became a di¬ rector of the Physiological Institute. For orig¬ inal researches on the physiology of the nerv¬ ous system he was twice awarded a prize by the Vienna Academy of Sciences. He has

written (Leitfaden bei der mikroskopischen Untersuchung tierischer Gewebe) (2d ed., 1878) ; (Untersuchungen iiber die Lokalisation der Funktionen in der Grosshirnrinde des Men- schen) (1881) ; (Die Innervation des Kehl- kopfes) (1884); (Die Physiologie der facet- tierten Augen von Krebsen und Insekten (1891); (Entwurf zu einer physiologischen Erklarung der physichen Erscheinungen) (1894). With Gad he was joint editor of the Centralblatt fur Physiologie after 1887.*

EXNER, Wilhelm Franz, Austrian tech¬ nical expert: b. Ganserndorf, 1840. He re¬ ceived his education at the Vienna Polytechnic Institute and in 1874 became industrial-school inspector in the Ministry of Commerce. He was one of the founders of the Vienna Industrial Museum in 1879 and became its first director. In 1882, 1885 and in 1891 he was elected to the Chamber of Deputies. He has published (Das moderne Transport wesen im Dienste der Land — und ForstwirtschafD (2d ed., 1880); (Werkzeuge und Maschinen zur Holzbearbei- tung) (1878-83) ; (Die Hausindustrie Oester- reichs) (1890) ; (Das K. K. Technologische Gewerbe-Museum in Wien im

ersten viertel- jahrhundert seines Beistandes) (1904).

EXODUS, Book of. The book of Exodus is the second book in the Old Testament; and, of course, occupies the same position in the collection known as the ((Five Books of Moses® or the "Pentateuch,® which constitutes the first division of the Hebrew Bible. Its Hebrew name is Weelleh shemoth, "And these are the names,® or, in abbreviated form, shemoth, "Names® after the opening words of the book. The designation Exodus, which means, Coming out, that is, from Egypt, originated with the early Greek translation known as the Septuagint, and is meant to be descriptive of the contents of the book..

Contents. — The book falls naturally into four divisions of unequal length: (1) Oppres¬ sion of Israel in Egypt (i, 1-ii, 22) ; (2) Prepa¬ rations for the departure (ii, 23-xii, 29) ; (3) Exodus and march to Mount Sinai (xii, 30-xix, 2) ; (4) Giving of the Law and building of the tabernacle (xix, 3ˆx1, 38). The closing chap¬ ters of the book of Genesis record how the Hebrew nomads, after living in Canaan for several generations, were driven by famine to Egypt, where they were assigned to a district in the eastern portion of the Delta. There they remained for many generations (i, 7). In the course of time a new dynasty ascended the throne of Egypt, under which a period of op¬ pression set in, from which the Hebrews were delivered under the leadership of Moses. After some wanderings in the desert, the fugitives encamped at the foot of Mount Sinai, where a covenant was established between the local God Yahweh and Israel, a law was given for the purpose of regulating the life of the cove¬ nant people in harmony with the will of their God ; and a tabernacle, in which the people or their representatives might meet with their God, was built.

Composition. — In its present form the book is a compilation of material taken from three originally separate sources, commonly desig¬ nated by the letters J, E and P. (For proofs of this assertion and for the significance of the symbols see article Pentateuch). The P sec-

tions can easily be separated from the rest; to distinguish E from j is more difficult, espe¬ cially after chapter iii. The J and E narratives were written first, and the combination of the two was made long before P was written. The two earlier documents contained a full account of all the important events connected with Israel's stay in Egypt and with the exodus, also at

least a brief record of the journey from the Red Sea to Mount Sinai. There followed an account of the giving of the law, the rebellion of the people, Yahweh's anger, Moses' inter¬ cession and the divine response. The P ac¬ count was written by one who shared the com¬ mon postexilic conception that the age of Moses was the period during which Yahweh was nearer to Israel than at any subsequent time ; consequently he introduced more of the mirac¬ ulous in his history, and attempted to trace the beginning of the religious practices and institutions of his day to that unique period in Israel's history. The latter tendency mani¬ fests itself especially in the priestly sections xxv, 1-xxxi, 18 and chapters xxxv-xl. For an analy¬ sis of the book of Exodus according to the sources used in its compilation consult any modern Commentary on Exodus, or any Old Testament Introduction. The contents of each source are printed consecutively in Kent, C. F., (The Student's Old Testament ; Carpenter and Battersby, (The Hextateuch) ; Brightman, E. S., (The Sources of the HexateuchP

Legal Sections. — In addition to the his¬ torical material derived from the three sources indicated, Exodus contains three groups of laws, which at first existed independently but later were embodied in E or the combined JE. (1) The Ten Words, commonly called the Decalogue, xx, 1-17; found, with few varia¬ tions, also in Deuteronomy v. In both cases some of the commandments are expanded by certain hortatory additions, but- the original form can easily be restored. (2) A second Decalogue, xxxiv, 10-28 ; which bears a more primitive aspect than the other and lacks the ethical emphasis. Most scholars hold that the decalogue in xxxiv is earlier than that in xx; the latter is considered by many a compendium of the teaching of the 8th century prophets, while the other is generally assigned to the period of the Judges or of the early monarchy. (For a fuller dis¬ cussion of the two decalogues and of their relation to each other consult Eiselen, F. C., (The Books of the Pentateuch,) chap. xvii). (3) The Book of the Covenant, xx, 22-xxiii, 19. The laws in this code deal with a great variety of subjects, and it requires considerable adjust¬ ment to make any systematic arrangement pos¬ sible. Originally the arrangement may have been on the principle of the decalogue, in the sense that it contained 10 separate decalogues, each containing two groups of five laws. Corre¬ sponding to the two divisions of the decalogue the Book of the Covenant may be divided into two groups of laws, each consisting of five decalogues. (1) Judgments, dealing with civil and criminal cases; (2) Religious and humane laws. The five decalogues of the first group are not difficult to reconstruct; of the second group only four exist, though traces of the fifth appear. The Judgments deal with the following subjects: (1) The rights of slaves, xxi, 2 —11; (2) Assaults, xxi, 12-27; (3) Domes¬

tic animals, xxi, 28-36; xxii, 1, 4; (4) Responsi¬ bility for property, xxii, 5 —15 ; (5) Social

purity, xxii, 16-20 plus Deut. xxii, 13-27. The religious and humane laws deal with: (1) Kind¬ ness, xxii, 2, 3, 6, 7, 21-27 ; xxiii, 4, 5 ; (2) Justice, xxiii, 1-3, 6-8; (3) Duties to God, xx, 23-26; xxii, 28-31; (4) Sacred seasons, xxiii,

10-19.

Many of the laws in the Book of the Cove¬ nant are strikingly similar to Babylonian laws, chiefly those found in the law code of Ham- murapi (q.v.), king of Babylon about 2100 b.c. (Consult Johns, C. H. W., (The Relation be¬ tween the Laws of Babylonia and the Laws of the Hebrew People)). This similarity has an important bearing on the question of the date and origin of the Hebrew code. One widely accepted view is that the Book of the Covenant is essentially a collection of Mosaic decisions, expanded and modified to meet the needs of the Hebrews in Canaan during the period of the Judges or of the early monarchy. However, there is much to be said in favor of the view that it is a Canaanite production, based on the Babylonian legal system, and that it came to the Israelites from the Canaanites (Luckenbill, D. D., (Israel's Origins) in Ameri¬ can Journal of Theology, XXII, p. 44).

The Song of Moses. — This poem, in chap¬ ter xv, was originally independent of its present context. From verse 17 it is clear that the poem in its present form cannot be earlier than the reign of David or even that of Solomon (compare also verses 13 and 15). It is not improbable, however, that it is the expansion of a shorter poem composed at the time the events commemorated took place (compare verse 21).

Bibliography. — In addition to the discus¬ sions already mentioned the following works in English may be named: Bacon, B. W., Edinburgh no date) ; Cornill, C. H.,

(Introduction) (London 1907) ; Driver, S. R., (Exodus) ((Cambridge Bible,) Cambridge 1911); and 'Introduction) (1891); new ed., (1910) ; Gray, G. B., introduction) (New York 1903) ; McFadyen, J. E., introduction) (New York 1905) ; McNeile, A. H.., (Exodus) ('West¬ minster Commentaries,) London 1908). Also articles on (

Frederick Carl Eiselen, Professor of Old Testament Interpretation, Garrett Biblical Institute.

EXOGAMY, the usage by which in many primitive races a man is forbidden to marry a woman of his own stock or tribe. See Mar¬ riage; Tribe.

EXOGENOUS (eks-oj'e-nus), PLANTS, an old and now disused name for dicotyledons. Monocotyledons were similarly known as en¬ dogenous

plants, or endogens. See Botany.

EXONERATION, in a general sense, the discharging from some liability or obligation. In a limited sense it is now applied mostly to the right of a surety to call upon the principal debtor to pay the guaranteed debt and relieve the surety from his liability. Consult De Col- yar, 'Treatise on the Law of Guarantees and of Principal and Surety) (London 1900) ; Red- field, 'Law and Practice of Surrogate's Courts)

(7th ed., New York 1910) ; Williams, Prin¬ ciples of the Law of Real Property0 (22d ed., Toronto 1914).

EXOPHTHALMIC GOITRE, enlarge¬ ment with turgescence of the thyroid gland, accompanied by protrusion of the eyeballs, breathlessness, palpitation and anaemia. Also called Basedow's (q.v.) or Graves' disease.

. EXORCISM, the act of expelling evil spirits by adjuration. The word is of Greek origin, exorkismos, from the verb exorkizo, which in classic Greek means to put one on oath, but in the New Testament to drive out by adjuration. Demonic possession was a no¬ tion generally entertained by the Jews in the time of Christ ; and that it was entertained by Jesus Christ and his apostles is as certain as any fact recorded in the Scripture. (Matt, xii, 27; Acts xix, 13). Hence, till modern times it was believed by all Christians, though now it is repudiated expressly or tacitly, or is . explained in a naturalistic sense, or at least ignored by very many who profess belief in the gospels as a divine revelation and the very word of God. The Catholic Church, while it does not stand committed to the popular beliefs of the faithful upon this matter, nor to the views even of her most eminent doctors, except so far as she may have formally adopted them in her authoritative symbols, claims to possess and to exercise in these days no less than in apostolic times the power to expel evil spirits from the obsessed or possessed, and exorcism is formally pronounced prior to the administration of baptism and the blessings of chrism (or holy oil) and of holy water. One of the minor orders of clergy in the Catholic Church is that of the ˆexorcist,® and the ritual of the Church to this day has an official formula of prayers and adjuration for driving out demons. Pope Innocent I (d. 417) forbade exorcists to exercise their ministry save with the express permission of the bishop, and that rule is still in force.

EXORCIST, the name of one of the minor orders of the clergy in the Roman Catholic Church. See Holy Orders; Exorcism.

EXOSMOSIS. See Osmosis.

EXOSTEMMA, a genus of American shrubs and trees of the natural order Rubiacece, several species of which yield barks sometimes used in medicine. Though closely related to the genus Cinchona (q.v.) which yields quinine, the species of this genus are lacking in similar alkaloids. Saint Lucia bark and Caribbee bark, obtained from West Indian species, are prob¬ ably the best known.

EXOSTOSIS, a bony excrescence from the osseous structure. See Tumor.

EXOTERIC. See Esoteric.

EXOTIC, an appellation applied to a for¬ eign plant not acclimated or naturalized. It is implied that the exotic is more or less of a rare or tropical character and can be preserved only in greenhouses.

EXPANSION. See American Expan¬ sion Policy; Territorial Expansion of the United States.

EXPANSION, in physics, is the increase in the bulk of bodies, in consequence of a rise in their temperature. This is one of the vol. 10 — 41

most general effects of heat, being com¬ mon to all forms of matter, whether solid, liquid or gaseous. Expansion of three kinds is recognized: (1) linear (2) super- ficial ; and (3) cubical. The last only is applicable to liquids and gases, as they have no definite form. Most solids and liquids ex¬ pand uniformly as their temperature increases, each substance having its own peculiar rate of expansion. This statement is true, however, only for usual temperatures. It has been found that as temperatures are increased beyond nor¬ mal limits the rate of expansion also increases. The ratio of increase in bulk for each degree- rise in temperature as referred to the original volume at a temperature of zero is called the coefficient of expansion. Solids expand equally in all directions, so that the coefficient of cubical expansion for solids is three times the linear co¬ efficient. Liquids expand much more for the same rise in temperature than do solids, and gases still more proportionally. With gases, moreover, the bulk depends very largely upon the pressure acting upon it, gases being readily compressible. _ However, gases do not differ ma¬ terially in their coefficients of expansion. It is found that under a constant pressure the co- efficient of cubical expansion for all gases is about 1/490. The expansion of liquids varies considerably, but, in general, the denser the fluid the less the expan¬ sion; thus water expands more than mer¬ cury, and alcohol more than water; and, com¬ monly, the greater the heat the greater the ex¬ pansion ; but this is not universal, for there are cases in which

expansion is produced, not by an increase, but by a diminution of temperature. Water furnishes us with the most remarkable instance of this kind. Its maximum of density corresponds with 39.2° F. This fact is of the utmost importance in the economy of nature. When the surface of rivers and lakes is cooled the upper or surface layer of water sinks and warmer water from below takes its place till the whole mass is cooled to 40°. After this the circulation ceases ; the colder layer being less dense remains at the top until it freezes. The maximum density point of sea water is consider¬ ably lower than that of fresh water, and varies with the quantities of the salt contained in it. The expansion of water is about the same for any number of degrees above or below the max¬ imum density point. Thus, if we heat water 5° above 39.2° it occupies the same bulk as it does when cooled down to 5° below 39.2°. The force with which water ex¬ pands in the act of freezing is shown when glass bottles are filled with water and sealed; the glass is broken in pieces when the water freezes. A brass globe, whose cavity is an inch in diameter, may be burst by filling it with water and freezing it; and the force necessary for this effect is 27,720 pounds. The expansive force of freezing water is due to the tendency which water in solidifying is observed to have to arrange its particles so as to form prismatic crystals, crossing each other at angles of 60 degrees and 120 degrees. Various methods have been tried to ascertain the specific gravity of ice at 32° ; that which succeeded best was to dilute alcohol with water till a mass of solid ice put into it remained in any part of the liquid with¬ out either sinking or rising. The specific gravity of such a liquid is 0.92, which, of course, is the

specific gravity of ice, supposing the specific gravity of water at 60° to be 1. This is an expansion much greater than water experiences even when heated to 212°, its boiling-point. We see from this that water at the instant of solidification rceives a sudden and considerable augmentation of bulk. See Heat.

The coefficients of expansion of some of the commoner solids and liquids on the Fahrenheit scale are approximately as follows :

Glass, 1/75,000; iron, 1/50,000; gold, 1/40,000; copper, 1/36,000; silver and brass, 1/33,000; tin, 1/31,000; lead and zinc, 1/23,000; mercury, 1/1 1,700 ; water, 1/3,870; ether, 1/2,570; chlo¬ roform, 1/1,150.

Economically the importance of expansion is very large, particularly in the

temperate zone. Here the variation of natural temperatures be¬ tween winter and summer is about 80°. In all buildings, bridges, concrete constructions, etc., expansion joints are inserted to take up the variation due to the changes in temperature. In instruments of precision this variation be¬ comes of the utmost importance, requiring deli¬ cate adjustments, as in the compensating pen¬ dulum. See Pendulum.

EXPATRIATION, the voluntary renunci¬ ation of the rights and liabilities of citizenship in one country, in order to become the citizen or subject of another. The right of a citizen of one country to renounce his allegiance in order to adopt another country as his own has and is still much disputed. It seems most reasonable that the mother country and not the individual should decide the question. In the early part of the 19th century the United States was almost the only nation that claimed for individ¬ uals the right of expatriation without the con¬ sent of the government of which they were citi¬ zens or subjects. The European nations, as a rule, maintained that the permission of the sovereign was necessary; and the enforcement by England of the claim was one of the causes of the War of 1812. The right of voluntary re¬ nunciation of allegiance to the United States by one of our citizens was unsettled, so far as legislation was concerned, till the Act of Con¬ gress of 27 July 1868 asserted that expatriation (

The right of the individual to expatriate him¬ self has always been a cardinal doctrine with

American statesmen. The whole subject of ex¬ patriation is regulated by the law of 2 March 1907. Under this statute an American citizen is assumed to have changed his citizenship when he becomes naturalized in any foreign state. When an individual who has been naturalized in the United States has resided for a period of two years in the foreign state from whence he came, or five years in any foreign state, he is presumed to have divested himself of his American citizenship. An American woman who marries a foreigner assumes the nationality of her husband. If a resident of the United States on the termination of the matrimonial bond, she may reassume her citizenship, or if in a foreign state, by registration within a twelve- month with the American consul. A foreign woman who acquires through marriage with an American citizenship in the United States re¬ tains her status if she continues to reside in the country. The problem of assimilation has in the United States assumed an aspect of extreme gravity since the outbreak of the Great Euro¬ pean War. On questions growing out of the war there has been maintained a persistent agitation by the representatives of foreign gov¬ ernments, with the object of influencing Ameri¬ can citizens of their respective races and through them stimulating loyalty to these for¬ eign governments so as to influence American opinion on their behalf, to the grave endanger- ment of American neutrality.

Pressure has been brought to bear on legislators and through them on the national administration. Unwar¬ rantable interference with the internal concerns of the United States led to the dismissal of Dr. Dumba (q.v.), the Austrian Ambassador. See Citizenship in the United States; Aliens; Naturalization.

EXPECTATION. See Psychology.

EXPECTATION SUNDAY, the Sunday before Whitsunday. Acts i, 4, Christ com¬ manded the disciples <(that they should not depart from Jerusalem, but wait for the promise of the Father/ They waited till the day of Pentecost and the promise was fulfilled.

EXPECTATION WEEK, the week, or rather the nine days, which elapsed between the ascension of Jesus and the Pentecostal effusion of the Spirit, because during that interval the apostles and early Church waited in expectation that the promised Comforter would come.

EXPECTORANT, a remedy used to in¬ crease the amount of secretion of the lower respiratory tract — the trachea and bronchi. Such remedies act: (1) Through nervous influ¬ ences, like those of ipecac, antimony, senega ; or (2) they increase the amount of blood flowing around the bronchi; or else (3) they stimulate the mucous membranes of the bronchi as they are excreted. To this latter class potassium iodide, chloride of ammonium, the aromatic balsams and squills belong. They are useful in chronic stages of catarrhal bronchitis. See Bronchitis.

EXPECTORATION, technically termed sputum, is a physiological secretion, but when there is an excess of secretion of mucus in the bronchi and trachea, which is expelled by hawk¬ ing or coughing, it becomes a diseased condition. Its examination and determination are essen¬ tials in the diagnosis of chest ailments. Ex-

cessive expectoration is found in bronchitis, in pneumonia, in tuberculosis, in gangrene of the lung and in influenza. In all of these condi¬ tions the sputum carries the germ of the disease and should be disinfected. Miscellaneous ex¬ pectoration in the street and public places should be prohibited by law. To properly disin¬ fect the sputum it should be received in a paper spit-cup or appropriate pocket-flask, and later destroyed. A mixture of carbolic acid, 1 to 25 of water, or of chlorinated lime, a teaspoonful to a pint of water, should be used in spittoons if these are essential. In cases of tuberculosis and influenza particularly, great care

should be taken of the sputum and of all handkerchiefs, towels, napkins and other linen that come in contact with the patient. See Disinfection ; Influenza; Tuberculosis.

EX PEDE HERCULEM, ([know] Her¬ cules from his foot), a proverb meaning that from a part we may be enabled to test the whole structure of a thing. The proverb is founded on the story that Pythagoras deter¬ mined the stature of Hercules on the basis that the Olympic stadium measured exactly 600 times the length of Hercules' foot. In pro¬ portion as this stadium exceeded others which were 600 times the length of a normal foot, so much larger was Hercules than the normal man. Kindred are the expressions, (II, 65-66), and ((Ex ungue leonem,® (((know) the lion from his claw.®

EXPEDITIONS TO LATIN AMER¬ ICA. See Discovery of America.

EXPERIENCE MEETING, a religious gathering whereat some of those present recount their spiritual experiences. Such meetings are common in the Methodist denomination and other sects hold such meetings at stated inter¬ vals.

EXPERIMENT, an operation designed to discover some truth, principle or effect, or to establish or illustrate it when discovered. It differs from observation in the fact that the phenomena observed are, to a greater or less extent, controlled by human agency. Experi¬ ment distinguishes the modern method of in¬ vestigating nature and we owe to it the rapid strides made in chemistry, physics and other sciences.

EXPERIMENT STATIONS. See Agri¬ cultural Experiment Stations.

EXPERIMENTAL PSYCHOLOGY.

See Psychological Apparatus.

EXPERT. One having special knowledge or skill in a particular subject; a specialist; specifically, in law, one qualified to give expert testimony in a judicial proceeding. See Evi¬ dence.

EXPERT TESTIMONY. A branch of the law of legal evidence which may be defined as testimony in the form of an opinion, based upon facts proved in an action by other wit¬ nesses, or upon facts assumed to have been proved, concerning matters involving scientific or technical knowledge.

The value of expert testimony was recog¬ nized in the Roman law and was incorporated in that system of jurisprudence. In the law of some continental countries the system has al¬

ways been firmly established. Indeed, in those countries, all forms of opinion evidence was and still is freely accepted: the courts giving it such weight as it seems entitled.

In the very earliest period of the English law, however, expert testimony was unknown. At that time a jury was selected from among persons already possessing knowledge of the facts of the case to be tried. In other words, during the early development of English law, the witnesses composed the jury and their ver¬ dict was based upon the facts within their own knowledge, and no effort was made to assist them. Gradually, however, the practice of taking testimony in open court came into vogue, and it was later seen, in order that an impartial verdict might be rendered, that the jury should be composed of unbiased persons, whose minds were not hampered by conclusions theretofore formed.

As a general rule in the English common law, which is, with slight modifications, the law of the United States, testimony of opinions has never been admitted as evidence. Our courts require and allow testimony as to facts only, and consider it the province of the court and jury to draw conclusions and form opinions from the facts proved. An exception to this rule is found in expert testimony. Since a jury represents only the average intelligence of the community, cases were early encountered where it was difficult or impossible for the jury to reach a reasonable conclusion from the facts proved before them, and to obviate the defect in the trial system, the courts gradually brought to its assistance expert witnesses, to aid in cor¬ rectly determining questions presented. At that stage expert testimony was confined almost en¬ tirely to that of physicians. Causes of death or effects of physical injuries were then and still are the most common questions with which juries must deal, and the determination of such issues is dependent largely upon the opinions of skilled physicians, familiar with the conditions, testifying as experts. In later years in England and in the United States, expert testimony has been availed of to assist juries in various other classes of cases. The theory of the courts in allowing such testimony is, that the jury, or where the action is tried without a jury, the trial judge, is not competent to draw its own conclusion from the facts proved, without the aid of such testimony. In that event witnesses possessing technical or peculiar knowledge upon the subject are allowed to give their opinions as evidence for the enlightenment of judge or jury. .

Within the last few years, the practice of em¬ ploying expert testimony has grown rapidly and has resulted in the creation of a class of wit¬ nesses who might be termed professional ex¬ perts, and who command large fees for their services. This has conduced to a result which has brought about much criticism, adverse to the system, based largely upon the fact that the testimony of expert witnesses involving lengthy technical discussions is one

if not the principal cause of the unreasonable length of modern trials ; upon the further fact that the testimony of the modern expert, with its tech¬ nicalities and extreme length, tends rather to obscure than to enlighten the minds of a jury; but principally upon the fact that such testimony has proved in a great many cases to be so par-

tisan as to be wholly unreliable. This criticism is not unmerited.

The creation of the class of so-called pro¬ fessional experts whose services demand large compensation has resulted in a condition where opposite opinions may be obtained in any num¬ ber. Some of the recent prominent murder trials have hence afforded an interesting spec¬ tacle of arrays of experts with conflicting opin¬ ions retained by the respective parties, at great expense, whose examination and cross-examina¬ tion has consumed days and even weeks, ex¬ hausting the patience of the judge, consuming the time of the courts, perplexing instead of clearing the issues, and weakening the confi¬ dence of the public in its system of justice.

Before the testimony of an expert witness is admitted, he must be qualified as an expert; in other Words it must be shown by his own testi¬ mony that he has a knowledge derived from experience or study not possessed by the or¬ dinary persons in regard to the particular sub¬ ject to which he intends to testify. Whether or not the witness has proved himself an expert is determined by the trial judge in his discretion.

The method usually adopted to get the tes¬ timony of an expert witness before the jury, after his qualification, is through the form of a hypothetical question. A question is put to the witness by the counsel of the party calling him, the question containing in detail the facts which the counsel believes have been proved and the witness is asked his opinion upon the assump¬ tion that the facts assumed are true. Such hypothetical question is often of great length, containing, as it does, a statement of facts that may have required days to prove. After the question is answered by the expert, he is usually subjected to a long cross-examination by the opposing counsel to test his skill and knowledge and the correctness of his conclusion. That the ordinary jury places little weight upon the con¬ clusions of an expert based upon the facts con¬ tained in a hypothetical question may be in¬ ferred from the fact that the counsel putting the question may assume facts which have not been proved to the satisfaction of the jury. Again the question is often so long and involved that its meaning is soon lost.

In other cases, however, where the witness has knowledge of the facts, the hypothetical question is not necessary. For instance, the opinion of an expert in handwriting may be given after his comparison of the disputed writ¬ ing with an admitted sample of handwriting used as a standard of comparison ; and the physician who has examined a physical injury, or the alienist who has examined a person claimed to be insane, may testify as to his opin¬ ion based upon the knowledge acquired by him through such examination without the medium of a hypothetical question.

The courts do not consider expert testimony of great importance, or in any case binding on the jury. It is allowed solely for the purpose of assisting the jury and the courts take oc¬ casion to instruct a jury to attach such weight to expert testimony as in their minds it seems entitled or to disregard it altogether if they deem fit so to do. Such an instruction will be upheld even if there is no conflict in the expert testimony introduced.

In spite of the just criticism to which the modern development of expert testimony has

been subjected, the doctrine has its uses and is necessary to our system of jurisprudence.

Thus, such testimony is absolutely indispen¬ sable to prove the custom in a trade ; to prove the tensile strength of materials; the probable cost of buildings or works; the chemical com¬ position of materials; the presence of disease and the cause and effects of disease or physical injury and the cause of death; the seaworthiness of vessels and other nautical matters ; and to assist the jury in various other matters not within the knowledge of the average judge or juryman.

Various remedies through legislation have been suggested to remedy the abuses to which expert testimony has been subjected, such as limiting the number of such witnesses to be called upon a trial ; limiting the length of the testimony, forbidding an expert witness receiv¬ ing any compensation beyond the ordinary fees of witnesses and even to the extent of forbid¬ ding expert testimony in some classes of cases, the most recent suggestion in connection with criminal cases being the creation of a board of experts retained and compensated solely by the State whose services may be invoked by either the people or the accused.

It may be suggested that the evil will, in time, work its own remedy through the agency of the courts without the aid of legislation. The judge presiding at the trial of an action has a wide discretion in allowing or disallowing the testimony of experts, and it may be said that a too liberal policy of allowing expert tes¬ timony without limit is largely the cause of the abuse.

Henry M. Earle, Attorney, New York City.

EXPIATION, Day of. See Atonement.

EXPLANATION. An event is explained when it is exhibited as an instance of a law, or true universal proposition. For example, the fall of a raindrop is partly explained if it is regarded as an example of the tendency of water to fall to the earth, and it is still further explained if it is regarded as an example of the gravitational attraction which each body has for every other. The explanation becomes even more satisfactory if the velocity and course of the raindrop are found to conform to the mathematical formulae concerning gravitational motion in a retarding medium. In other words, the function of physical explanation is to re¬ duce the world of physics from an incoherent mass of particular, disconnected facts, to the far more manageable domain of a few reason¬ able simple laws, even though these laws go beyond the particular facts which form their basis. The ideals of explanation are the same everywhere, though but seldom can the per¬ fection of physical explanation be attained. Even teleological explanation, or explanation, not by the causes of natural science, but by purposes, attempts to reduce what it re¬ gards as the complex of deeds of some agent to the performances of some more or less stable character — that is, of some character which acts in a more or less uniform manner.

The criteria of a good explanation are largely dependent on the particular field within which the explanation is made. There are certain general methods of explanation which

have been found especially adapted to the facts of physics, others with a peculiarly psychologi¬ cal field of usefulness, others again which serve best in the discussion of moral conduct. The good new explanation, though like every innova¬ tion, it must in some way conflict with estab¬ lished traditions, will almost invariably follow in a general way the explanatory traditions of its appropriate field. There is one kind of ex¬ planation, however, which is almost never of service. This is the explanation that goes back to some more or less occult force, principle or faculty. See Induction.

EXPLOITS RIVER, a river of New¬ foundland, rising in the southwest part of the island and flowing in a northeastern direction through Red Indian Lake and emptying into the Bay of Exploits after a course of 160 miles. Large steamers ascend it for about 11 miles and light draught vessels for over 100 miles. It almost divides the island into two equal parts.

EXPLORATION IN AMERICA. As

the routes followed by explorers of North America were determined by its physical con¬ tour, a brief geographical survey is necessary to understand the progress of its exploration. Thus considered, the continent divides itself into four geographic provinces : the Atlantic coast region, the eastern mountains, the central region and the western mountains. The first embraces the coastal plain and Piedmont pla¬ teau lying east of the Appalachians ; . the second the Appalachian Mountains and their northern extension to the Gulf of Saint Lawrence; the third the whole Mississippi Basin, the Great Lake region and the Hudson Bay drainage. The last province is the great cordillera of western North America, which lies west of the Mis¬ sissippi Basin and includes the R.ocky Moun¬ tain system, Pacific Mountain system and the Great Basin region lying in between.

The Atlantic seaboard, which was the scene of the earliest exploration and settlement, is separated from the central region by the Appa¬ lachian barrier. Hence the Saint Lawrence, lying beyond the northern terminus of this bar¬ rier, is the only easterly flowing river which drains any part of the central province; and' as in an unexplored wilderness watercourses nat¬ urally offer the easiest routes of travel, it was by its valley that explorers first penetrated the continent. A way through the barrier was found by following the Hudson and its westerly tributary, the Mohawk, which is connected with Lake Ontario by a lowland area.

The central province is covered by a network of waterways extending nearly two-thirds .of the distance across the continent, from the in¬ land margin of the Appalachians on the east to the front of the Rocky Mountains on the west. It is separated by low divides into three distinct drainage systems : the rivers emptying into the Gulf of Mexico through the Missis¬ sippi ; the waters which feed the Saint Law¬ rence ; and the rivers tributary to Hudson Bay.

The western mountain belt stretches north¬ ward from Mexico through the United States and Canada to the Arctic Ocean. Its southern section is interlaced by a series of rivers tribu¬ tary in part to the Rio Grande, flowing into the Gulf of Mexico; and part to the Colorado River, flowing into the Gulf of California.

The easiest route across the continent lay

near the present northern boundary of the United States, where the head waters of the Missouri reach far into the western mountains, only 500 miles from the Pacific, and separated by but one divide from the Columbia River Basin, which leads directly to the Pacific. Geographically, then, the

explorations of our country fall into four groups: (1) those along the Atlantic seaboard, made by colonists of various nationalities; (2) those along the Mis¬ sissippi, made by the Spaniards from the south, the French from the north and pioneers break¬ ing through the passes of the Appalachians from the the Atlantic seaboard; (3) those made by the Spaniards northward from the Mexican border; and (4) those of the western mountains, made by Americans and of comparatively recent date.

Though the Cabots discovered North America in 1497 and claimed it for England, it was Spain who first attempted its exploration. Ponce de Leon, who had sailed with Columbus on his second voyage and subsequently become governor of Porto Rico, set out in 1513 in search of the ((Fountain of Youth.® Sighting an unknown coast at lat. 30° 8', he named the land ˆFlorida,® and turn¬ ing south explored both sides of the peninsula. When he attempted nine years later to plant a colony on these shores, he was driven off by Indians.

But Spanish interest was aroused. In 1519 Cortes achieved his infamous conquest of Mex¬ ico, and the fame of its wealth inspired others to seek the New World. Panfilo de Narvaez ob¬ tained a grant to conquer and govern Florida, by which was meant all the rest of the con¬ tinent, stretching indefinitely northward from the Gulf of Mexico. With 300 men he landed at Tampa Bay in 1528 and marched northward, suffering terrible hardships. Disappointed at not finding the gold they sought, they returned to the coast near Appalachee Bay and set out for Mexico in improvised boats, but were wrecked by the wray. Of the whole party, Cabeza de Vaca and three others were the only survivors. For six years they wandered : up through Mis¬ sissippi, across the Mississippi River near Mem¬ phis, along the Arkansas and Red rivers to New Mexico and Chihuahua; at last reaching Sinaloa on the Gulf of California, where they were found by Spaniards and taken to Mexico

(1536).

Cabeza's written account of their experi¬ ences, published after his return to Spain, falsely attributed great wealth to Florida. So when Hernando de Soto, fresh from the con¬ quests in South America, which had given him riches and fame, obtained permission to con¬ quer Florida, many flocked to join him. He sailed in nine ships with 620 men, maintaining great display. Landing at Tampa Bay in 1539, the procession wandered westward, ill-treating the natives, for three years in pursuit of gold through the wilderness of the present. Georgia, Alabama, Tennessee and Mississippi to the banks of the Mississippi River. They crossed above the Arkansas, penetrated westward until frightened back by the roving prairie tribes, and returned to the Mississippi, where De Soto died and was buried in its waters

at the mouth of the Red River (1542). His followers under Moscoso built seven brigantines, descended to the Gulf and reached the Spanish settlement on

the river Panuco, 311 survivors all told. Thus it was De Soto who first attracted attention to the Mississippi. Alonso de Pineda had dis¬ covered its mouth in 1519, and named it (

The fate of this expedition discouraged coastal explorations for a time. But the Span¬ iards in Mexico were already pushing their way up into the heart of the continent. In 1539 Marcos de Niza, a priest, penetrated New Mex¬ ico and came back with reports of the wealth of Cibola, a name which he applied to seven cities somewhere to the north. These were long supposed to be mythical, but have since been identified as the seven Zuni villages in New Mexico.

The tale led Vasquez de Coronado to set out in 1540. Part of his expedition he sent by water up the Gulf of California under Her¬ nando d'Alarqon, who discovered the Colorado River and ascended it for 85 leagues. The other part he led overland in the direction of Cibola, which he found and conquered (about lat. 35°) ; and then on into Kansas to about lat. 40°.

The belt of country bounding Mexico on the north received the name (

The colonizer of New Mexico was Juan de Onate. He entered the country in 1597 with 130 families and founded the first capital, San Gabriel (second oldest town in the United States), near Santa Fe. In succeeding years he carried his explorations westward through Ari¬ zona, in 1604 following the Gila River to the Gulf of California. The following year he founded Santa Fe.

While this was going on in the interior, other nations were interested in the coast. It must be remembered that Columbus was in search of a western passage to Asia when he came upon America. But the idea did not die. A similar quest brought the Cabots to the shores of North America; and later, as the vast extent of the new country began to be realized, one explorer after another searched the coast for a water route by which to pierce the continent. When at last the waters of the Saint Lawrence were found to lead no farther than the Great Lakes, explorers still pushed west¬ ward along the tributaries of the Mississippi or attempted to round the continent on the north through the ice-blocked seas.

In 1524 Giovanni da Verrazzano, sent by Francis I of France, examined the shores from South Carolina to Newfoundland, and wrote to the king the first known description of them. He brought back a theory of an inland sea approaching the Atlantic coast about the mid¬ dle of the continent; and it was to find this ((Sea of Verrazzano,® as a possible route to Asia, that the king sent Jacques Cartier in 1534 to the Gulf of Saint Lawrence (previously dis¬ covered by Jean Denys of Honfleur). In the course of three voyages he explored the Saint

Lawrence as far as Montreal, believing that he had found the western passage.

Cartier attempted to plant a colony near the site of Quebec; but for many years France's efforts in that line were doomed to failure. Equally unsuccessful were Jean Ribaut, who in 1562 brought over a band of Huguenot colonists to the site of Beaufort, S. C. ; and Rene de Lau- donniere, who founded Fort Caroline two years later at the mouth of the Saint John's River, Florida. In 1565 Pedro Menendez de Aviles came to colonize Florida for Spain, and mas¬ sacred the inhabitants of Fort Caroline. Lau- donniere escaped to France, but Ribaut (who had just arrived from his second voyage with reinforcements for the colony) was killed while attempting to escape along the coast.

Menendez was the first to establish Spanish rule firmly in Florida. He founded Saint Augustine (oldest town in the United States) in 1565, sent a mission to the Rappahannock in 1570, and explored Chesapeake Bay and the Potomac.

England sent out her first colonists to James¬ town, Va., in 1607. Among the number was Capt. John Smith, an indefatigable explorer of the neighboring rivers and Chesapeake Bay.

Another Englishman, Henry Hudson, sent out in 1609 by the Dutch East India Company, explored the coast from Nova Scotia to Chesa¬ peake Bay, and then ascended the Hudson River to Albany. It was during the following year that, in the search for a northwest passage, he discovered the strait and bay that bear his name.

France first gained a foothold in North America through the efforts of Samuel de Champlain. The years 1603-07 he spent in ex¬ ploring the Saint Lawrence and the shores of New England, making the first accurate map of that coast. After he founded Quebec in 1608, he became interested in inland exploration, which twice led him into the United States. In 1609 he set out with 11 men to aid the Hurons against the Iroquois, descended the Richelieu in canoes, portaging part of the way, and pushed on through

Lake Champlain to about Crown Point ; and again in 1615 he accompanied a great war party of Indians by way of the New York lakes into the heart of the Iroquois coun¬ try, south of Lake Oneida.

From this time fur-traders and missionaries spread over the country bordering the Saint Lawrence and its tributaries, gradually approach¬ ing the Mississippi. The Spaniards had not fol¬ lowed up their discovery, failing to understand its importance. Nearly a century after De Soto's journey the French at the north began to have an interest in the Indian traditions re¬ garding the ((Great River.® About 1635 a trader, Jean Nicollet, was sent to a tribe near the head of Green Bay, Wisconsin. From there he went with Indian guides up the Fox River, portaged to the Wisconsin and descended that until he came (

When these rumors of a great river to the west reached Frontenac, the governor of Canada, he sent Louis Joliet to explore it in company with Jacques Marquette, a Tesuit. Meeting at Saint Ignace, they set out with five

men and two canoes, skirted the north shore of Lake Michigan and Green Bay, and ascending the Fox River, were guided by Indians across the portage to the Wisconsin, down which they passed, reaching the Mississippi 17 June. For one month they floated down the great stream, noting the mouths of its tributaries as they passed, until they came to an Indian village opposite the mouth of the Arkansas. By this time they knew that the river emptied into the Gulf of Mexico, and supposing themselves nearer the mouth than they actually were, they turned back through fear of Spaniards, return¬ ing by way of the Illinois and the western shore of Lake Michigan, which they reached by portage. Two years later Marquette met his death while attempting to establish a mission on the Illinois. His work among the Indians was taken up by Father Claude Allouez, also a Jesuit, who established several missions and traversed much of the country around lakes Superior and Michigan between 1665 and 1680.

Already another explorer was searching for the Mississippi. Robert Cavalier de La Salle was one of those who had come to Canada in pursuit of the passage to China, and guessed that it lay by wav of the Mississippi, which he supposed emptied into the Gulf of California. In 1669 he crossed from Lake Ontario to a branch of the Ohio, and followed that river as far as Louisville. The next year he reached the Illinois from the end of Lake Michigan and explored it for some distance. For years he went back and forth through the region and established trade with the western Indians. In

1680 he sent Louis Hennepin, another Jesuit, with two men down the Illinois to ascend the Mississippi. On the way they were taken prison¬ ers by the Sioux and carried up the great river to the Falls of Saint Anthony, which Hennepin named. There they were joined by the famous trader Daniel Greysolon Du Lhut, who for two years had fearlessly explored the region around the end of Lake Superior and the head of the Mississippi. He had just come by way of the Saint Croix River from his fort on the site of Duluth and now joined Hennepin on his return journey by the Wisconsin.

At last, in 1682, La Salle attained his goal. With Henri de Tonty and a large party he reached the Mississippi from the foot of Lake Michigan by way of the Chicago and the Illi¬ nois, and descended to its mouth. On 9 April La Salle took possession in the name of King Louis of France and gave the name Louisiana to all territory drained by the Mississippi. After his return he sailed for France and obtained permission to transport colonists to the new province. He reached the Gulf of Mexico, but was unable to find the mouth of the river, and put in at Matagorda Bay. There he built Fort Saint Louis, and then started overland to find the Mississippi and reach Canada to obtain supplies for the colonists, but was murdered by one of his men near a fork of Trinity River,

T 0XclS

Where La Salle had failed, Pierre Le Moyne d'Iberville was to succeed. In 1699 he entered the Gulf of Mexico and explored the region around the mouth of the Mississippi, leaving a colony at Biloxi, which was afterward trans¬ ferred to Mobile. With him was one already known as an explorer of the northern region Pierre Le Sueur. He in 1695 had discovered

and named the Saint Peter (the Minnesota) River and observed a quantity of green earth near it; and now, in the belief that it was cop¬ per, he led a party of men up the river to work it and establish a fort on the Blue Earth (Green) River.

Just at this time (1703) Baron La Hontan, a man who participated in many explorations in the north of the Valley, published an account of his wanderings which contains some valuable information with much that is false. He claimed to have discovered a river (La Riviere Longue) entering the Mississippi from the west near Lake Pepin and to have followed it to its source in a large lake at the foot of mountains, on the other side of which was another river which emptied into the Pacific. This figured on maps for years before it was found to be fictitious.

The right to ((farm out® this great country of Louisiana was granted to Antoine Crozat in 1714 and agents were immediately dispatched to explore

the tributaries of the Mississippi. Before the year was out St. Denis followed the Red River and crossed to the Rio Grande, where he came upon a Spanish mission and was im¬ prisoned, sent to Mexico and ordered to return. La Harpe in 1719 pushed up the Red River and across to the Arkansas, reaching lat. 37° 21'. He established a post among the Indians, claimed all this country for France and defied the Spaniards in a letter to the Spanish gov¬ ernor. The exploration of the Missouri was attempted in 1719 by Du Tisne and followed up to six leagues above Grand River, at the peril of his life among hostile Indians, who attempted in vain to bar his passage.

In this southwestern section of the Valley French intrusion was resented by the Spaniards. Their claim to Texas rested on the exploration of its rivers by Francisco de Urdinola in 1575, and an expedition led across its borders by Hernando del Bisque in 1675. Farther west their control was assured by the work of mis¬ sionaries. Father Kino, a Jesuit, had entered Arizona as early as 1658 and by 1679 had es¬ tablished five missions and become well ac¬ quainted with the country. On one of his expe¬ ditions he reached the mouth of the Colorado and discovered that Lower California was a peninsula, not an island, as was supposed.

With the expulsion of the Jesuits in 1767 the missions passed into the hands of the Fran¬ ciscans, who inaugurated the era of Spanish exploration and settlement in California by a colony at San Diego in 1769. Years before pioneers from the East broke through the moun— tains and seized upon the country, these mission¬ aries had permeated it and stamped their in¬ fluence upon it.

Meanwhile the French at the north were every year sending traders and explorers into the interior. For some time they continued to use the routes followed by Marquette through Green Bay and by La Salle up the Chicago, but in 1716 they opened a new one by way of the Wabash and another in 1720 by way of the Miami. A dispute over boundaries arose be¬ tween the English and the French. Governor Spotswood of Virginia urged upon the English the necessity of colonizing the Ohio Valley and in 1716 made his fantastic ride with the <(Knights of the Golden Horseshoe® to see if a way through the mountains could be found He crossed the Blue Ridge and the Shenandoah

Valley, but it was not until 1732 that the first settler, Joist Hite, entered the region.

Other efforts were being made to cross the mountains. When it was learned that the French were winning the allegiance of the Cherokees from the English, Sir Alexander Cuming, a Scotchman, set out in 1730 with a party from Charleston and made a circuit of 500 miles across the mountains, bringing back several Indians in token of renewed faith. In 1736 Col. William Mayo and a party of sur¬ veyors followed the Potomac to its springs and discovered a portage to waters flowing into the Monongahela. Another route was opened to the Kanawha, an affluent of the Ohio, in 1744 by Col. James Wood, a well-known frontiersman and explorer. Dr. Thomas Walker in 1748 led an expedition across the Virginia mountains, named Cumberland Gap and River and made a circuit through West Virginia.

As the country became better known public interest awakened and in 1748 a number of Virginians formed themselves into the ((Ohio Company® for the purpose of colonizing the Ohio Valley. To anticipate them, the governor of Montreal dispatched Bienville de Celeron down the Ohio to bury at the mouths of its tributaries plates inscribed with the declaration that all territory drained by those waters be¬ longed to France. In spite of this, the Ohio Company sent out Walker in 1750 to survey lands for settlement. He explored Kentucky and built the first house in the region now com¬ prised in that State. Christopher Gist was also sent to explore routes to the north, select lands for settlement and investigate the Indian tribes. He made a circuit of 1,200 miles north to the Scioto and Miami and then south of the Ohio, visiting all the Ohio tribes and returning by way of the Licking, Kentucky and Roanoke rivers. On a second mission in 1751, he discov¬ ered a new gap from the Potomac to the Monongahela and explored the Kanawha.

The next year Gist acted as guide to George Washington when he went as emissary from the governor of Virginia to the French fort at the head of the Ohio to protest against the French occupation of the valley. His mission was fruit¬ less, but he brought back a map of his route : up the Potomac, across the divide and along the Monongahela and Allegeny to the French fort near Lake Erie.

A most prominent figure in English explora¬ tion was George Croghan. Sent out by Penn¬ sylvania in 1750 with the half-breed Montour to win over the Indians through the Ohio Valley to the English, he went far and wide, from tribe to tribe, attaining an influence over the Indians which was of invaluable service to the English during the French and Indian War. When peace was declared he was delegated to prepare the Indians for English occupation. Starting from Pittsburgh, he followed the Ohio, Wabash and Maumee to Detroit and reported that the way was open ; whereupon the English troops, under Capt. Thomas Stirling, advanced to Fort Chartres

and took possession of the country east of the Mississippi.

And now, with English control assured, set¬ tlement spread rapidly beyond the Appalachians. Much of the preliminary exploration was made by hunters, trappers and traders too numerous to mention, were they known. North of the Ohio the country was first settled by Moravian

missionaries. Among the southern pioneers, James Smith followed the Kentucky and Ten¬ nessee rivers in 1766 and John Finlay explored northern Kentucky in 1767 ; but most prominent was Daniel Boone. His first venture was made in 1769, when he crossed the Cumberland Gap with James Robertson and spent two years ex¬ ploring eastern Kentucky and Tennessee. Sub¬ sequently these two men took a prominent part in the settlement of this region.

With the advent of the American Revolution exploration received a check ; but the expeditions of troops led by George Rodgers Clark into the Ohio Basin 1778-79 and by Gen. John Sullivan into western New York were not without geo¬ graphical value. And in the Indian wars which followed (1790-94) the American expeditions under Harinar, Clark, St. Clair and Wayne added to knowledge of the Ohio Valle}ˆ.

During the 17th and 18th centuries, while ex¬ ploration and settlement had been pushed west¬ ward from the Atlantic seaboard over halfway across the continent, the Pacific coast was al¬ most unknown. Balboa had discovered the Pacific at the Isthmus of Panama in 1513 and Cortes had sent several expeditions to the west coast of Mexico (1522-24). The first white man to reach the coast of California was the Spaniard Juan Cabrillo, who in 1542 traced it north as far as Monterey; and after his death the following year his pilot continued to Cape Mendocino. In 1576 the English seaman Drake reached lat. 43° in his coastal exploration. To the north the coast was unknown until Vitus Bering (1741), commanding a Russian expedi¬ tion, visited it in lat. 60°. His voyage was followed by a swarm of Russian fur-traders, who, following the chain of Aleutian Islands during the latter part of the 18th century, grad¬ ually worked their way eastward and event¬ ually reached the mainland of what is now Alaska.

In 1778 came Capt. James Cook, the famous English navigator, surveying the coast from Vancouver Island to the Arctic Ocean in his search for a northeast passage. When the pub¬ lished account of this voyage called attention to the rich fur-trade in the northwest, Americans were among the first to take advantage of it. In 1789 Capt. Robert Gray, of Boston, in the ship Columbia, cruised around the Horn and visited the northwest coast, carried a cargo of furs to China and returned to Boston by way of the Cape of Good Hope. Thus was the American flag first carried around the world.

On a second voyage in 1792 he discovered and explored the lower reaches of the Columbia River. This all-important achievement, besides disclosing an easy route from the western mountains to the sea — thus paving the way for transcontinental exploration — formed the chief basis of our territorial claim to Oregon. When George Vancouver, who was exploring the west coast with two British vessels (1792), learned of the Columbia River through Gray, he sent a boat expedition to investigate it. Afterward he continued northward to extend Cook's ex¬ plorations on the coast of Alaska and British Columbia.

As yet none had succeeded in finding an overland route to the Pacific north of Mexico, Cabeza de Vaca, in his transcontinental wander¬ ings, had turned to the south when he reached the mountains. A Canadian, Varennes de la

Verendrye, spent many years (1731-49) in the search for a route ; at his own expense, for his government refused to back him. With his sons he made extensive explorations west of Hudson Bay, in the course of which he dis¬ covered (1731) the Red River and Lake Win- mpeg, and his son Pierre penetrated to the forks of the Saskatchewan River (1739). In 1742 the two sons made a perilous journey to the southwest, across the Missouri and on to the Black Hills in western South Dakota.

In the struggle for the Ohio Valley the west¬ ern route was forgotten for a time. But when that contest was settled the quest was renewed by Jonathan Carver of Connecticut. In 1766 he made his way westward by canoe through the Great Lakes and by Marquette's route to the Mississippi, which he ascended to the Falls of Saint Anthony. He explored the Minnesota River, spent a winter among the Sioux and in 1767 returned by ascending the Chippewa River and reaching Lake Superior waters by portage. While his journey added little to geographical knowledge, yet it served to awaken interest and led Richard Whitworth to join Carver in plan¬ ning a transcontinental expedition, which was unfortunately prevented by the outbreak of the Revolution.

Meanwhile the English fur-trading compa¬ nies, through the journeys of their agents, had contributed much to geographical knowledge, not only of Canada but of the United States. The Hudson Bay Company, since it obtained its charter in 1670 and established its first post (Fort Rupert) on the great bay from which it took its name, had, in spite of French interfer¬ ence, extended along the shores of the bay and its tributaries. After the

English conquest of Canada in 1763 it had a clear field until the ap¬ pearance in 1783 of a rival <(North western Company, » made up of Canadian merchants, which operated by the direct route from Mon treal to the Great Lakes and rapidly pushed its control throughout the north and west. Its influence was extended to the west coast by Alexander Mackenzie in a journey (1792-93) from Lake Athabasca up the Peace River and across the Rocky Mountains, the head waters of the Fraser River and the Coast Range to the coast of British Columbia in the latitude of Queen Charlotte Sound. This was the first time the continent was crossed north of Mexico.

Thomas Jefferson in 1803 induced Congress to make an appropriation for the expenses of a transcontinental exploring expedition, a project that he had entertained for some 20 years. Nominally, Capt. Meriwether Lewis was leader of the party, with Lieut, (generally known as Capt.) William Clark second in command; but in point of fact all action was taken jointly and the expedition is always known as that of Lewis and Clark. While preparations were under way the purchase of the territory of Louisiana from France gave additional importance to the enter¬ prise. Lewis and Clark, with 43 men, left Saint Louis, then a frontier trading-post, in three large boats, pushed their way up the Missouri and built a fort at the Mandan Village, about 50 miles above the present town of Bismarck, N. D. From this point some of the party were sent back and in the spring of 1805 the rest con¬ tinued their voyage up the Missouri with 32 men. At the falls the heavy boats were left and canoes were constructed to continue the ascent of the*

river. Near the head of what they named the Jefferson (the western fork of the Missouri) they cached their canoes and with horses secured from the Indians crossed the Rocky Mountains to the Columbia, which they descended to the mouth, reaching the Pacific in November 1805. After wintering here the party retraced their steps to the east side of the Rocky Mountains and there separated ; Lewis following the Mis¬ souri while Clark traced the course of the Yel¬ lowstone. At the junction the reunited forces continued their rapid down-stream journey, reaching Saint Lewis in September 1806. This was not only the most notable exploration ever undertaken by the United States government, but its complete success led to the many others which have followed up to the present day.

The head waters of the Mississippi were ex¬ plored by Lieut. Zebulon Montgomery Pike, who ascended the river with a party of 20 soldiers in 1805. He reached Leach Lake drain¬ age system and found the region already occu¬ pied by the agents of the Northwestern Com¬ pany. Upon his return in 1806 Pike set out again with 23 men, with the idea of winning the allegiance of the Indians from the Span¬ iards and establishing an

American claim to the region which had long been in dispute between the French and Spaniards. He ascended the Osage River in boats and crossed overland with horses to the Pawnee villages, where he took up the trail of the Spaniard Malgares, who in the previous year had made an excursion into this region from' Mexico at the head of several hundred troops. At the Arkansas Pike detailed Lieut. James Wilkinson to explore that stream to the Mississippi and continued west with the larger section of the party, arriving in Novem¬ ber at that high peak of the Rockies which now bears his name. During the winter, after ter¬ rible suffering from cold and hunger, he reached the Rio Grande. The Spanish authorities sent out a large force to capture the little band of explorers and they were conducted back through what is now known as Texas.

The roving fur-traders were quick to pene¬ trate the regions pioneered by Lewis and Clark and Pike. During the years 1806-09 they ex¬ tended their excursions well into . the Rocky Mountains from the east. In Canada the North¬ western Company, ever active, pushed its out¬ posts westward; and in 1808 one of its agents, Simon Fraser, reached the Pacific at the mouth of the Fraser River.

In 1810 John Jacob Astor, a New York fur- trader, organized a company for the purpose of exploiting the trade on the Pacific slope. A vessel was dispatched to the mouth of the Columbia River to establish a post and an ex¬ pedition sent overland to follow the Lewis and Clark route. This was the second party to cross the United States to the Pacific. Numbering three boats and 60 men under the leadership of one of the partners, Wilson Price Hunt, it left Saint Louis in the late summer of 1810 and pushed its way up the Missouri about 450 miles. Here the party wintered and in the spring continued by boat to the big bend of the Missouri; then with horses purchased from the Sioux proceeded overland in a southwesterly direction, crossed the Rockies near the head oi the Big Horn River and followed the Snake River Valley to the Columbia. With only a fraction of his large party and after the most

terrible suffering, Hunt reached the mouth of the Columbia in February 1812, and found As¬ toria, the post established by the party sent by sea. The American company was only just in time; the previous year David Thompson of the Northwestern Company had portaged across the Rockies from the Saskatchewan to the head waters of the Columbia and followed it to the Pacific, where, much to his disgust, he found the Americans already in possession.

In 1812 David Stuart, with a small parly, started eastward from Astoria to make the diffi¬ cult and hazardous journey to Saint Louis. He chose a route to the head waters of the Snake, across the divide to the Green River, a tributary of the Colorado, and across a second divide to the Platte, which he followed to its junctiob with the Missouri and continued down stream to Saint Louis, arriving in April 1813, after a journey full of peril and hardship.

In 1814 Astoria passed into the hands of the Northwestern Company, which extended its trade over the entire Columbia River basin and established posts at various points. The eastern slope of the Rockies was occupied by American traders, with headquarters at Saint Louis and posts on the upper Missouri in. the Green River Valley.

The government began to realize the im¬ portance of exploration. In the hope of discov¬ ering the sources of the Red River, a large ex¬ pedition under Maj. Stephen H. Long left Pitts¬ burgh on a small steamer in April 1819, wintered on the lower Missouri and during the following year made explorations and surveys in the country now included in Arkansas and Mis¬ souri. Long was sent again in 1828 to explore the head waters of the Mississippi, which he approached through the wilderness from the Miami River to Lake Michigan, thence to the junction of the Wisconsin and Mississippi and on to the Minnesota ; a difficult route, but lying in a region which had been explored by French pioneers more than a century before.

Still the source of the Mississippi had not been discovered. The head water region, pre¬ viously visited by Pike and long the stamping- ground of the fur-trader, had been again ex¬ plored in 1820 by Gen. Lewis Cass, governor of Michigan, in company with Henry R. School¬ craft. It was not until 1832 that the source was finally discovered in Lake Itasca by Schoolcraft and Lieut. J. Allen.

Capt. B. L. E. Bonneville, an officer of the United States army, in 1832 organized a party of trappers and hunters for the ostensible purpose of taking part in the fur-trade, but more to gratify his own ambition to explore the Far West. He left Fort Osage on the Missouri with 110 men, transporting his supplies by means of wagons, instead of using pack-animals, as all previous parties had done. Following Stuart's route of 20 years before along the valley of the Platte River, he crossed the mountains with his wagon- train and established a post at the head of the Green River. From this point as rendezvous his party scattered out in various directions, he himself exploring the Big Horn and Wind River mountains and extending one journey to the English trading-post on the Columbia. A party sent out by him visited Salt Lake and con¬ tinued through to the Spanish settlement of Monterey on the Pacific,

During the years 1833-35 the Rev. Samuel Parker, a zealous missionary, made several haz¬ ardous journeys from the Mississippi waters to those of the. Columbia. At this time the Hud¬ son Bay Company, which had absorbed its rival, the Northwestern Company, controlled the en¬ tire Columbia River basin and claimed it for England, in spite of the protest of the few American settlers. In 1842 it came to the knowledge of the Americans that the English were making preparations to colonize the region and it was necessary that the authorities at Washington should be informed at once. For this purpose Dr. Marcus Whitman and A. L. Lovejoy set out in the dead of winter on a journey of 4,000 miles across the continent. They took a southerly route through New Mexico to the Arkansas, and Whitman reached Washing¬ ton.

In 1841 Lieut. R. E. Johnson of the United States Exploring Expedition, commanded by Charles Wilkes, U. S. N., crossed the Cascade Mountains near Mount Rainier and, after mak¬ ing an extended journey in the Columbia River Valley, recrossed the Cascades to the coast. A detachment ascended the Willamette and crossed to the Sacramento Valley, which they followed to San Francisco.

With the exception of the Lewis and Clark expedition, the most important exploration of the century was done by Lieut. John C. Fremont, who had gained his first experience while assist¬ ing J. N. Nicollet, a French geodesist, employed by the United States government 1836-40, for making surveys in the upper Mississippi Basin. In 1842 Fremont, with 25 men, among whom was the famous scout, Kit Carson, made sur¬ veys of a region lying between the Missouri River and the Rocky Mountains, along the valleys of the Kansas and Great Platte rivers. In 1843 he was instructed to carry his surveys to the Pacific Coast. With a party of 40 men he made his way westward from the junction of the Kansas and Missouri rivers to the head waters of the North Platte, crossed to Green River, and traversing a region long known through the explorations of Bonneville and others, crossed another divide and descended Bear River to Salt Lake, which he explored. From there he went westward to the Snake River, and on to the mouth of the Columbia. After renewing the supply of provisions, Fremont retraced his steps to the Dalles of the Columbia, then turned southward to Klamath Lake, and made a hazardous journey through the Sierras which brought him into California along the valley of the American River, an eastern branch of the Sacramento. Traveling southward, he once more crossed the Sierras in lat. 35°, and returned to Saint Louis across the Great Basin region and the Rockies. On his third journey Fremont crossed the Rockies from the head of the Arkansas to the Green River Valley, then continued westward around the southern end of Salt Lake across the Sierras, near where he previously traversed them, and then turned northward along the Sacramento Valley and across the mountains to

Klamath Lake. Here he was impelled to turn back by the news of the uprising in California, and converted his exploring party into a military expedition.

• The southwest became better known through military operations during the Mexican War,

and after its close many expeditions were sent out by the government, under both military and civilian leadership, most of them, however, in regions already explored.

Public interest in the construction of a trans¬ continental railway led to five extensive expedi¬ tions during the years 1852-57 : the first explor¬ ing along the 32d parallel ; the second near the 35th ; the third near the 38th and 39th ; the fourth near the 41st and 42d ; and the fifth near the 47th and 49th. Various military explora¬ tions and surveys were carried on west of the Mississippi up to the outbreak of the Civil War.

In 1869 Maj. J. W. Powell made a daring exploration of the Grand Canon of the Colo¬ rado. With only a few men, in small boats, he followed the Green and Colorado rivers from Green River Station to the mouth of the Virgin River. In the next two years he extended this exploration in the Colorado basin under gov¬ ernment auspices.

The Pacific Railroad surveys practically com¬ pleted the purely exploratory work of the United States ; subsequent investigation was directed to minor details. During the years 1867-79 this work was carried on by various organizations which were created for both geographic and geologic research. Four of them were of special note : (

EXPLOSION, a sudden bursting, generally due to the rapid production of gaseous matter from solids or liquids. Thus the explosion of gunpowder is due to the sudden formation and expansion of gases into which the powder is converted by chemical agency. Explosions are often caused by the elastic force of steam con¬ fined in boilers, and by spontaneous combustion. See Explosives.

EXPLOSION CRATERS. Although many of the great craters on volcanic peaks are due to explosion, the name is applied to holes not connected with lava outflows. Most of these holes are in plains and they are rimmed by a ridge of fragmental materials evidently blown out of the hole by an explosion. Craters of this class are the ((maars® of the Rhine Valley, the

craters of Eiffel, Auverne, Montec- chio, Albani, Nemi, Astromi and Faifa in south¬ ern Europe, of Nassibe in Madagascar and Lonar, India. The latter, as described by Dr. Blandford, is a hole about a mile in diameter, 300 to 400 feet deep, in a great plain of old lava, similar to the rocks on the sides of the hole. The latter are bent up slightly. There are several notable explosion craters in Mexico, on the plateau near Orizaba Peak in Puebla and in Valle Santiago at Xico, Tacambaro, and on the northern part of Sonora. The Afton craters

in New Mexico, 31 miles northwest of El Paso, the crater of Zuni Salt Lake, New Mexico, and the wonderful Crater Mound in east-central Arizona are also believed by some geologists to have been caused by the explosion of vol¬ canic steam. As to the competency of this agent to cause a crater there are some notable illustrations in historic time, notably the great Bandai Sai eruption in Japan in 1888 which made a vast crater on a mountain where there had been no volcanic activity for many cen¬ turies. It was not attended by lava flow. The eruption of Krakatoa in 1883 is another im¬ pressive instance. Consult Darton, N. H.,

(Explosion Craters) (Science Monthly, Novem¬ ber 1916).

N. H. Darton.

EXPLOSION ENGINE. See Internal Combustion Engine.

EXPLOSIVE GELATINE, blasting gela¬ tine or gum dynamite, an explosive material resembling wine jelly in appearance. It was invented by Nobel in 1878, and consists of soluble cellulose nitrate dissolved in nitrogly¬ cerin. Originally, the solution was effected by warming the nitroglycerin and adding the per¬ fectly dry soluble cellulose nitrate, called nitro- cotton, little by little, with stirring, whereby the nitroglycerin was made to dissolve from 4 to 10 per cent of the nitro-cotton : Then the solution was effected by the aid of a solvent like acetone, which was afterward evaporated off. All of these processes of manufacture were dangerous. In 1889, Lundholm and Sayer dis¬ covered that if the nitroglycerin and nitro-cot¬ ton are mixed with warm water and stirred up by compressed air, gelatinization sets in, and may be completed by pressing out the water and working the mass in malaxating machines. Explosive gelatine is a gelatinous mass, looking something like new honey in color, and vary¬ ing in consistency from a tough leather-like material to a soft jelly, in accordance with a variety of circumstances, such as the quantity and chemical composition of the nitro-cotton used, and the methods of manufacture. In general, the thinner the gelatine, the more sen¬ sitive it is to detonation ; but, on the other hand, a thin gelatine is subject to liquefaction and possibly also to exudation, which would make it dangerous in storage, transportation and

use. Specially strong detonators are re¬ quired to explode blasting gelatine ; or ordinary detonators may be used with primers of dyna¬ mite or gunpowder : In order that detonation should be transmitted through a mass of ex¬ plosive gelatine it must be confined ; for, un¬ like dynamite, a train of it cannot be exploded in the open, except by means of an extremely powerful initial detonation. The sensitiveness of the material is still further diminished by the solution in it of camphor, or other sub¬ stances rich in carbon and hydrogen, like ben¬ zine or nitro-benzine. While dynamite and nitroglycerin are much less liable to be ex¬ ploded by a blow when frozen, the reverse is true of frozen explosive gelatine. Though while in the unfrozen condition explosive gela¬ tine is less sensitive to shock or blows than either nitroglycerin or nitrocellulose, it is, when exploded, a more powerful explosive than either of them. This is due to the fact that when nitroglycerin is detonated, there are unused oxi-

dizing materials in the gaseous products; and when cellulose nitrate is detonated, there are unused combustible materials in the products. When, therefore, these bodies are mixed in the right proportions, the products will be those of complete combustion. Explosive gelatine has the advantage over dynamite in that it is prac¬ tically unaffected by water and therefore can be stored in water. It is, on the whole, less liable to freeze than dynamite. It possesses an advantage over guncotton in being plastic and can, therefore, better adapt itself to the irregu¬ larities of the bore-holes in loading. The spe¬ cific gravity of explosive gelatine is from 1.5 to 1.6. If heated slowly, beginning at 60° C., it will explode at 204° C. (399.2° F.). On rapid heating it explodes at 240° C. (464° F.). If ignited when frozen even small quantities may explode. Pure explosive gelatine is used for blasting in unusually tough rock or for blasting under water, or for military purposes. It is put up in cylindrical ˆsticks® in paper wrappers like dynamite. For general use in blasting it is too violent, and therefore ((gelatine dynamites® are made by mixing this costly and powerful material with diluents. A great many different dopes are used, but a good example of a gela¬ tine . dynamite is <(gelignite,® which is made by mixing 65 per cent of explosive gelatine with 35 per cent of an explosive wood-pulp dope, giving a substance consisting of nitroglycerin 62.5 per cent, nitro-cotton 2.5 per cent, sodium nitrate 26.25 per cent, wood pulp 8.4 per cent, and sodium carbonate 0.35 per cent. <(Forcite® is a similar modification of explosive gelatine containing 50 per cent of wood pulp.

EXPLOSIVES (from Lat. explosus, p.p. of explodere, to drive out, to drive out a player with clapping, to explode; from cx, out + plaudere, plodere,

to clap, strike, applaud), are substances which easily react at comparatively low temperatures with the formation of a con¬ siderable volume of highly expanded gas, the evolution of heat and light and the production of sound. At ordinary temperatures they may be solid bodies like gunpowder or liquid like nitroglycerin or gaseous like fire damp mix¬ tures. They may consist wholly of a single chemical compound like mercuric fulminate, or of mixtures of combustible substances with sup¬ porters of combustion or oxidizing agents like blasting powder, which is a mixture of char¬ coal, sulphur and sodium nitrate. Though the temperature is different for each explosive they can all be caused to explode if heated to the explosion temperature, which under given cir¬ cumstances are for nitrogen chloride, 93° C. ; mercuric fulminate, 152° C. ; emmensite, 165° C. ; nitrostarch, 175° C. ; dynamite and gun¬ cotton, each 180° C. ; and blasting gelatine, 204° C. ; nitroglycerin, 218° C. ; blasting powder, 27 0° C. ; picric powder, 273° C. ; rifle powder, 27 5° C. ; best sporting powder, 315° C.

History. — The inventor of gunpowder, the oldest of explosives, and the place where it originated, are not known. The invention has been ascribed by different authors to Marcus Graecus, Albertus Magnus, Roger Bacon and Berthold Schwarz; to the Arabians, whose works were largely used by Marcus Graecus in his writings; to the Hindus, because of cer¬ tain passages occurring in the code of Gentoo laws prepared by Indian savants by order of

Warren Hastings in the 18th century ; and to the Chinese because of certain statements made by Marco Polo. There seems to be little doubt that this confusion exists (1) because modern meanings have been given to words and phrases used in the old manuscripts; (2) because of the intentionally confusing methods employed by the writers of the Middle Ages; and (3) be¬ cause gunpowder for use in guns was not the invention of any one person, but was really the result of a progressive development.

It is recorded that what moderns call ((Greek fire,® and the ancients called <(naphtha,® was employed in the defense of Constantinople in the 7th century and that these fiery composi¬ tions were propelled against the enemy by means of arrows from bows, or in hollow vessels of stone or iron thrown by war engines. Though consisting at first of pitch, rosin, sulphur and similar easily inflammable and highly combusti¬ ble substances, it is easy to imagine that in the tentative development of these materials of war nitre was added to the combustible substances and that there was thus produced a deflagrating composition for use as bursting charges in bombs and grenades and for the manufacture of devices analogous to modern firecrackers and rockets with which to frighten and confuse their foes.

The supposition that gunpowder was known before it was applied for use in guns is sup¬ ported by the older historians. All the com¬ ponents and mixtures for Greek fire similar to gunpowder were already known in the time of Hassan-al-Rammah (1290). From an exhaustive search of the literature Guttmann arrives at the conclusion ((that gunpowder was gradually de¬ veloped from Greek fire, and that it was known for years before cannons and guns were thought of. The use of purer materials in making it developed its propulsive power, and led to the subsequent invention of cannons and guns. The Arabians were the first to make gunpowder-like mixtures, probably about 1280 a.d., while the idea of utilizing their propulsive force, that is the invention of guns and cannons, belongs to the monk, Berthold Schwarz, of Freiburg, Sax¬ ony; the date of the latter invention being prob¬ ably 1313 a.d.® It is accepted as indisputable that gunpowder mills existed at Augsburg, Ger¬ many, 1340, and at Spandau, Germany, 1344, and that the English used gunpowder in guns at the battle of Crecy, 1346.

Though many improvements were made in the manufacture of gunpowder, such as in the preparation and purification of the raw materials from which it was produced; the methods of in¬ corporation ; and its granulation to adapt it to special uses, this substance remained unrivaled until the end of the 18th century, when the French chemist Berthollet proposed the substi¬ tution of potassium chlorate for the potassium nitrate and produced by this means a much stronger and quicker powder, but one which was also, much more dangerous than gunpowder. Beginning with the discovery of mercuric ful¬ minate by Howard, an English chemist, 1800, there was added to the achievements of the 19th century the discovery of nitrogen chloride by the French chemist Dulong, 1812; nitrostarch by Braconnot, 1832 ; guncotton by Schoenbein of Basel, Switzerland, 1845; nitroglycerin by Sobrero at Turin, Italy, 1846; the invention of blasting powder by L. DuPont of Wilmington,

Del., 1856; the discovery of diazo compounds by the German chemist, Griess, 1860; the in¬ vention of dynamite by A. Nobel of Sweden, 1866 ; smokeless sporting powder by Schultze of Potsdam, Germany, 1867; blasting gelatine by Nobel, 1878; military smokeless powder by Vieille of France, 1886; hard-grained smokeless sporting powder by Richard von Freeden of Walsrode, Germany, 1889; homogeneous smoke¬ less powder composed of a single chemical sub¬ stance in a state of chemical purity by Charles E. Munroe of Newport, R. I., 1890; and the discovery of triazoic acid by Curtins of Kiel, Germany, 1890, while in the meantime picric acid,

which was discovered by Woulfe 1771, was shown to possess explosive properties and adapted for use in shell, it having been pointed out by Sprengel, 1873, that it contains a suffi¬ cient amount of available oxygen to render it, without the help of foreign oxidizers, a power¬ ful explosive when fired with a detonator.

This growth has been coincident with the development of the chemical and physical sci¬ ences and has been the more rapid, the more completely experimental methods of research have been perfected and applied. In addition to those enumerated above this advance in the sci¬ ence and art of explosives has been chiefly due to the labors and intelligence of Hess, Latter, Trauzl and von Lenk in Austria; Abel, Cundill, Debus, Dewar, Dixon, Dupre, Majendie and Noble in England; Berthelot, Chalon, Daniel, Desortiaux, Gay-Lussac, Lavoisier, Le Chatelier, Mallard, Maurouard, Roux, Sarrau, Turpin and Violette in France; Bunsen, Dittmar, Gutt- mann, Liebig, Meyer, Schischkoff, Upmann, Will, von Forster and von Romocki in Ger¬ many; Abbot, Barnard, Craig, Emmens, Judson, Hill, Maxim, Mixter, Mowbray, Quinan, Rodman, Count Rumford and Woodbridge in the United States; Mendeleeff in Russia; Cron- quist in Sweden and Hebler and Lunge in Switzerland. See the biographical sketches of Abel and Berthelot who were especially prom¬ inent in this science.

Theory of Explosives. — When wood or other combustible substances containing hydro¬ gen and carbon are ignited in contact with air they burn, giving forth heat and light and are converted into water and carbon dioxide, which pass off as invisible and highly expanded gases. As the wood is subdivided so as to expose a continually increased surface to the air the rapidity of the combustion is increased until, when the wood is reduced to dust like saw¬ dust and suspended in the air so as to be inti¬ mately mixed with it, the velocity of the com¬ bustion is so great and the evolution of the gases so rapid that the reaction becomes an explosive one and such a mixture of sawdust and air is an explosive. All inexplosive com¬ bustible substances can, when finely divided and intimately mixed with air, form explosives and volatile liquids and gases are especially likely to do so. Many accidents have arisen from the ignition of mixtures of air with the dust of char¬ coal, coal, flour, malt, soap, starch, sugar, zinc, wood and other solids ; with the vapors of alco¬ hol, ether, gasoline and other naphthas, spirits of turpentine and other liquids, or gases like ethy¬ lene, coal gas, hydrogen and marsh gas since each of these substances, though in themselves non-explosive, form explosive mixtures with air if they be mixed with it in the right pro¬

portions. The best proportions are those in which the volume of oxygen in the air present is just sufficient to convert all of the hydrogen in the combustible into water and all of the carbon into carbon dioxide, or, in

other words, to produce complete combustion. Less violent explosions may occur when the proportion of air is greater or less than the (

If pure oxygen in the proper proportions be substituted for air in the above mixture the velocity of the reactions will be still greater, and the energy set free in unit of time and con- sequentlv the violence of the explosion will be greatly increased. Besides the proportions that determine the limits between explosion and combustion will be extended. Such mixtures if confined and out of contact with the air will still take fire and explode. Oxygen may be supplied either in the free state or in solid bodies which contain it and which give it up when heated to comparatively low temperatures. Among such solids are the nitrates of metallic radicles, like ammonium nitrate, potassium nitrate (India saltpetre), and sodium nitrate (Chile saltpetre) ; chlorates such as potassium chlorate ; peroxides like sodium peroxide, and many others. If these solids be dried, finely divided, and inti¬ mately mixed with a combustible, in the right proportions, a solid explosive is produced. Often, as in the case of mixtures of charcoal and saltpetre the temperature to which they must be heated in order that combustion shall begin, called the point of ignition, is so high that they are difficult to ignite and in such cases a small portion of a substance like sulphur, which has a low point of ignition, is incor¬ porated in the mixture.

Another method by which oxygen may be brought into intimate contact with combustible bodies so as to form an explosive is through the action of nitric acid upon them by which nitrogen and oxygen combined as N02 is intro¬ duced into the molecule. Three cases present themselves. First, when the combustible body is a simple or mixed primary alcohol and the nitric acid reacts with the acidic hydrogen. Second, when the combustible substance is a hydrocarbon or its derivative and the nitric acid reacts with the hydrogen of the hydrocar¬ bon or the hydrocarbon nucleus. Third, when the reaction leads to the union in the hydro¬ carbon of N02 through the intervention of a nitrogen atom. The products of the first case are organic nitrates called also nitric esters. The products of the second case arc nitro- substitution compounds. Those of the third are called nitroamines. Examples of the first case are ethyl nitrate from ethyl or grain alcohol, glycol nitrate from ethylene glycol, glyceryl nitrate (nitroglycerin) from glycerol (glycerin), mannitol nitrate from mannitol (mannite), starch nitrate (nitrostarch) from starch, and cellulose nitrates (guncotton and pyroxylin) from cotton. Examples of the sec¬ ond case are mono and di nitro benzene from benzene, tri nitro phenol (picric acid) from

carbolic acid (phenol), nitrotoluenes from toluene, and nitro-naphthalenes from naphtha¬ lene. An example of the third is ethyl. These explosives differ markedly from mixtures like gunpowder, for, whereas in the mixtures the combustible substance and the oxidizing agents are in different masses, in the

explosive compounds like nitroglycerin, they are both in the same molecule. Therefore in the latter the contact is more intimate and the reaction takes place with greater velocity.

In addition to the explosives of the char¬ acters described above is another class of

chemical compounds, of which mercuric fulmi¬ nate, silver amine (fulminating silver), acety¬ lene, the azides and diazo benzene nitrate are notable examples, whose explosive properties are due to a phenomenon (namely, a molecular disruption), which is quite unlike that of com¬ bustion ascribed to those of the previous

classes. This case of disruption arises from the fact that these substances are endo- thermous compounds, or in other words, that they absorb heat during their formation and are therefore reservoirs of energy.

Classification of Explosives. — Following the foregoing theories of their constitution and behavior, explosives may be classed as

(1) Nitrate mixtures. — Amide powder (charcoal, potassium nitrate, and ammonium nitrate) ; amidogene (bran or starch, charcoal, magnesium sulphate, potassium nitrate and sul¬ phur) ; ammonal (metallic aluminum and am¬ monium nitrate) ; azotine (petroleum, charcoal, sodium nitrate and sulphur) ; blasting powder (charcoal, sodium nitrate and sulphur) ; car- bazotine (bark or wood pulp, lampblack, fer¬ rous sulphate, potassium nitrate and sulphur) ; Courteille's triumph safety powder (charcoal, peat, coal, oleaginous matters [animal or vege¬ table], metallic sulphates, sodium nitrate and sulphur) ; diorrexine (sawdust, sodium nitrate, potassium nitrate and sulphur) ; fractorite (rosin, dextrine, potassium dichromate, am¬ monium nitrate) ; gunpowder (charcoal, potas¬ sium nitrate and sulphur) ; haloxyline (char¬ coal, sawdust, potassium ferrocyanide and potassium nitrate) ; Himly's powder (hydro¬ carbons and potassium nitrate) ; Nordenfeldt and Meurling's powder (hydrocellulose, potas¬ sium nitrate and sulphur) ; pyrolithe (charcoal, sawdust, sodium carbonate or sulphate, potas¬ sium nitrate, sodium nitrate and sulphur) ; saxi- fragine (charcoal, barium nitrate and sulphur) ; schneiderite (mononitronaphthalene and am¬ monium nitrate).

(2) Chlorate mixtures. — Asphaline (hydro¬ carbons, potassium sulphate, potassium nitrate, potassium chlorate) : Berthollet's powder (char¬ coal, potassium chlorate and sulphur) ; bri- tainite (naphthalene, potassium nitrate, am¬ monium nitrate, potassium chlorate) ; Callow's powder (orpiment, potassium ferrocyanide and potassium chlorate) ; carlsonites (naphthalene, or dinitrobenzene and other combustible sub¬ stances with ammonium perchlorate) ; cheddite, (nitro body, oil and potassium chlorate) ; comet powder (rosin and potassium chlorate) ; cycene (cane sugar, paraffin oil or coal dust, potassium nitrate and potassium chlorate) ; Ehrhardt's powder (tannic acid, charcoal, rosin, potassium nitrate and potassium chlorate) ; Hahn's pow¬ der (charcoal, spermaceti, antimony sulphide and potassium chlorate) ; Himly and von

Trutschler-Falkenstein's powder (coal tar, po¬ tassium nitrate and potassium chlorate) ; Hors¬ ley's powder (nutgalls and potassium chlorate) ; Kellow and Short's safety powder (tanbark or sawdust, potassium nitrate, sodium nitrate, potassium chlorate and sulphur) ; Knaffi's pow¬ der (ammonium ulmate, potassium nitrate, potassium chlorate and sulphur) ; Melland's paper powder (porous paper which has been soaked in a paste composed of starch, char¬ coal, potassium ferrocyanide, potassium chro¬ mate, potassium nitrate, potassium chlorate and water and dried) ; Oriental powder (gum gambier and potassium chlorate) ; Parone's ex¬ plosive (carbon disulphide and potassium chlorate) ; Pertuiset's powder (sulphur and potassium chlorate) ; pyrodialites (mixtures of coal tar with chlorates or perchlorates and with or without nitrates, nitrosubstitution com¬ pounds, charcoal and oxidizing salts) ; pyronome (rye flour, charcoal, metallic antimony, sul¬ phur potassium chromate and potassium chlo¬ rate) ; rossellite (asphalt oil and potassium chlorate) ; Siemen's powder (a solid hydro¬ carbon, potassium nitrate and potassium chlorate) ; thorite (cane sugar and potassium chlorate) ; tutonite (metallic sulphides, sulphur and potassium chlorate) ; and white powders of Augendre and Pohl (cane sugar, potassium ferrocyanide and potassium chlorate).

(3) Oxidizing mixtures. — These are mix¬ tures of combustible substances with oxidizers other than the nitrates, chlorates or per¬ chlorates. Among such bodies may be named sodium peroxide, potassium permanganate, po¬ tassium dichromate, liquid air and liquid nitro¬ gen tetroxide. As examples we have mixtures of sodium thiosulphate with sodium peroxide ; metallic aluminum with sodium peroxide; cot¬ ton wool with liquid air, and panclastite, which is a mixture of carbon disulphide with liquid nitrogen tetroxide.

(4) Organic nitrates or nitric esters and mixtures containing them. — Esters : Guncotton, which is a cellulose nitrate of high nitration and practically insoluble in a mixture of ether and alcohol at ordinary

temperatures ; nitro¬ cellulose, a term applied to all cellulose nitrates; nitroelectrite (isomannitol nitrate) ; nitro- erythrite (erythrol nitrate) ; nitroethyl (ethyl nitrate) ; nitroglucose, a nitrate produced from grape sugar; nitroglycerin, pyroglycerin or glonoin oil (glyceryl trinitrate) ; nitrolactose (nitrated sugar of milk) ; nitrolignin (nitrated wood) ; nitromannite (mannitol nitrate) ; nitro- methyl (methyl nitrate) ; nitrostarch or xyloi- dine (starch nitrate) ; nitrosugar or nitrosac- charose, a nitrate produced from cane sugar; pyroxylin, collodion cotton, nitrocotton or pyrocellulose, are cellulose nitrates of medium nitration and practically completely soluble in a mixture of ether and alcohol at ordinary temperatures. In this class is also to be in¬ cluded the explosive mixtures into which these esters enter as essential components and of which the dynamites are conspicuous examples. These are classified, according to the nature of the dope or absorbent, into

A. Dynamites with an inert base. — Nobel's dynamite No. 1, giant powder No. 1; dynamite blanche de Paulilles; dynamite de Vonges; E. C. dynamite; S. 1, dynamite; Rutenberg's ex¬ plosive; dynamite rouge, all consist of nitro¬ glycerin with kieselguhr ; Hill's powder (nitro-

glycerin with precipitated silica) ; Mowbray's mica powder (nitroglycerin with asbestos) ; Hercules powder (Extra No. 1) ; (magnesia powder, nitro-magnite ; dynamagnite; fulgur¬ ite; nitroglycerin with magnesia alba); dyna¬ mite de boghead (nitroglycerin with ashes from Boghead coal) ; selenitic powder (nitro¬ glycerin with plaster of Pans) ; Horsley's powder No. 1 (nitroglycerin, alum and mag¬ nesium sulphate) ; metalline nitroleum (nitro¬ glycerin, red lead and plaster of Paris) ; renish dynamite (nitroglycerin, kieselguhr and naph¬ thalene) ; dynamite noire (nitroglycerin, sand and coke); mataziette (nitroglycerin, sand, ochre, charcoal and resinous matter) ; pori- fera nitroleum (nitroglycerin, sponge or vegetable fibre and plaster of Paris) ; Bursten- bender's explosive (nitroglycerin, spongy vegetable substances with glycocoll or chon- drin) ; Morse's explosive (nitroglycerin with rosin) ; Borland's carbo-dynamite (nitro¬ glycerin with charcoal from cork) ; white dyna¬ mite (nitroglycerin with lime-guhr) ; boritine (nitroglycerin, kieselguhr and boric acid) ; fluorine (nitroglycerin, kieselguhr and calcium fluoride).

B. Dynamites with an active base. — a. Con¬ sisting of nitroglycerin absorbed by a gun¬ powder like dope — Ammonia dynamite ; am¬ monia krut; ammonia powder; Coad's ex¬ plosive; Champion's powder; colonia powder; Dittmar's powder; dynamite No. 2; dynamite au charbon ;

dynamite d'ammoniaque ; dynamite grieses de Paulilles; extra powder; Fowler's explosive; giant powder No. 2; Gotham's powder; Hercules powder ; Horsley's powder No. 2; Judson's powder; Jupiter powder; lithofracteur ; Monakay's explosive; miner's powder Co. dynamite; Neptune powder; potentia; petrolithe; sebastine; thunder¬ bolt powder; Titan powder; virite powder; Vulcan powder.

b. Consisting of nitroglycerin absorbed by or gelatinized with a cellulose or ligno-cellulose nitrate — Blasting gelatine; cellulose dynamite; Clark's explosive; Dean's explosive; Dittmar's explosive ; extra dynamite ; explosive gelatine ; glyoxyline ; grisoutine ; gum dynamite ; nitro- gelatine; paleine; Punshon's . explosive; Schultze's dynamite; straw dynamite; Trauzl's dynamite.

c. Consisting of nitroglycerin or an explosive gelatine incorporated with wood pulp or saw¬ dust and a nitrate, principally sodium nitrate. Such dynamites are styled lignin-dynamites ■ — JEtnz powder; amidogene; Atlas powder; Brain's powder; carbonite; diaspon; dualin; dynamite de Krummel; dynamite de Lanky; forcite; gelatine dynamite; gelignite; giant powder; Hecla powder; meganite; miner's friend powder; grisoutite; kadmite; petralithe; rendrock; rhexite; safety nitropowder; Schultze dynamite; stonite ; stowite; vigorite.

d. Other dynamites. — Americanite (nitroi glycerin and methyl alcohol) ; Castellano's pow¬ der (nitroglycerin, fibrous material, earth and nitrobenzine) ; cerberite (nitroglycerin, wood oil, nitrobenzine, wood pulp and sodium nitrate) ; Engle's powder (nitroglycerin, am- moniacal salts, saltpetre, pyroxyline, mtro- starch, nitromannite, nitrobenzine, and water glass) ; glukodine (nitroglycerin and nitro- saccharose) ; perunite or terrorite (nitrogly¬ cerin, nitromethyl, nitroethyl and pyroxylin) ;

thunder powder (nitroglycerin and nitroglu- cose).

e. Low freezing dynamites. — Ordinary dy¬ namites freeze at temperatures prevailing in the northern and middle Atlantic states from October to May. When frozen they are diffi¬ cult to detonate and are therefore not only inefficient but dangerous and particularly when being thawed. To overcome this defect nitro- substitution compounds such as some of the nitrotoluenes and, more recently, esters such as nitrated di- and polyglycerins are introduced as components of dynamite. These are styled L. F. dynamites and put upon the market with a designating term of this kind.

C. Organic nitrate mixtures other than dynamites. — Casteau's explosive (nitrodextrine and _ ammonium nitrate) ; Cooppal's powders (resinous bodies, barium nitrate, and nitrocellu¬ lose) ; diflamyr (metallic nitrates and nitro¬ cellulose) ; flamminore (collodion cotton, am¬ monium sulphate and ammonium nitrate) ; grenee powder (paraffin; agar-agar, nitorcellu- lose, potassium nitrate, and barium nitrate) ; explosive P, (nitrocellulose and ammonium nitrate) ; potenite and tonite (guncotton and barium nitrate).

(5.) Nitro substitution compounds and mix¬ tures containing them. — Compounds: Nitro- benzenes ; nitrocresols ; nitrocumenes ; nitro- naphthalenes ; nitronaphthols ; nitrophenols ; nitroresorcinols ; nitrotoluenes ; picric acid or caroazotic acid (trinitrophenol) ; picramic acid; styphnic acid or oxypicric acid (nitroresor- cinol) ; trinitrotoluene (T. N. T.) ; trotyl; tetra- nitraniline; tetranitronuthyl-aniline (tetryl, tetralite).

A. Mixtures containing nitro substitution compounds— Abel's powder ; ammonite : amvis ; bellite ; boritine; Borlinetto's powder; Boyd's powder; bronolithe; Brugere's powder; ex¬ plosive A ; explosive C ; explosive N ; cre- monites ; Du Bois-Raymond's powders ; du- plexite ; ecrasite ; emmensite ; Faversham pow¬ ders ; Favier explosives ; ferrif ractor ; Fontaine's powder; Gathhurst powder; gelbite; Geserick's powder; Girard's powder; hellhoffite ; Hill's powder; Jo'hnite; joveite; kinetite; lyddite; macarite; melinite; oxonite; plastrotyl ; rack- arock; roburite; romite ; securite; streetites ; triplastite ; Volney powders.

(6) Fulminates. — Compounds : Copper and silver, acetylides; diazonbenzine nitrate; fulmi¬ nating gold (auramine) ; fulminating silver (argentamine) ; mercuric fulminate; mercuric triazotate; lead and nitrogen chloride (chlora- mide) ; nitrogen iodide (iodamide) ; silver ful¬ minate ; and triazoic acid, also called hydrazoic acid and azoimide.

In addition to these classes there are seven groups of explosives which have received such widespread notice as to merit -especial mention here, though the members of each may all be and many of them are included in the classes given above. These groups are Sprengel ex¬ plosives, safety or flameless explosives, per¬ mitted explosives, and smokeless powders, shell explosives and grenade and bomb explosives.

Sprengel Explosives. — These explosives were invented by Dr. Hermann Sprengel, 1873, and he advocated their use because of their safety, as they are non-explosive during manu¬ facture, storage and transportation, but are very powerful explosives when prepared and de-

tonated. His plan was to employ mixtures of combustible and oxidizing substances, which should be kept separate until needed for use, the bodies to be employed in the compounding of the explosives being either all liquid or part liquid and part solid, for by taking advantage of the liquid state speedy and intimate mixing could be realized and the explosives could be compounded on the spot and at the time they were wanted for use. Among the oxidizing agents proposed were the nitrates and chlorates, which are solids, and nitric acid and nitrogen tetroxide, which are liquids. Among the com¬ bustible substances were the nitrosubstitution bodies, carbon disulphite and petroleum. A conspicuous example of a Sprengel explosive is rackarock, which was used in blowing up Flood Rock in Hell Gate, N. Y., and which may be made by pouring mononitrobenzine upon pot¬ assium chlorate crystals. Other examples are some forms of emmensite; explosive A; hell- hoffite ; oxonite ; panclasite ; and Parone's ex¬ plosive.

Safety or Flameless Explosives — These explosives are for use in fiery mines, particularly coal mines, where there is a chance of an acci¬ dent arising through the ignition of the fire damp from the flame or incandescent particles given off by the explosive as the blast is fired. Among the earlier devices employed to pre¬ vent this was the mixing in the dope of the dynamite or with the powder of a quantity of washing soda, alum, Epsom salts or other salt containing a large amount of water of crystalli¬ zation that would be set free when the mix¬ ture was fired. In 1883 Mallard and

Le Chatelier discovered that when explosives were detonated unconfined in air containing 10 per cent of methane (marsh-gas), the fire damp could not be ignited if the temperature of de¬ tonation was below 2200° C., owing to the cool¬ ing of the gases due to their rapid expansion and to the retardation of the inflammation of the fire-damp. An investigation by the French Fire Damp Commission showed that, among others, certain salts of ammonia and especially ammonium nitrate, were capable of reducing the temperature of the gases produced by deto¬ nation very materially, the temperature of the gases from explosive gelatine being reduced from 3090° C., when detonated alone, to 1493° C., if detonated when mixed with 88 per cent of ammonium nitrate. In August 1890 the French government prohibited the use of black powder in fiery or dusty mines and permitted the use in them of explosives whose gases are not combustible and the detonation tempera¬ ture of which does not exceed 1900° C., where blasting is to be done in the rock, nor 1500° C., where the work is to be done in the coal seam. Among the explosives designed to meet such conditions and styled abroad safety or flameless explosives are : Ammonite ; amvis, aphosite ; bellite ; benedite ; britainite ; cambrite ; car- bonite; Casteau's explosives; dahmenite; Fa- vier's explosive; fractorite; Geserick's powder; grisoutine; grisoutite; nitroferrite ; progressite; roburite ; securite ; westphalite ; wetterdyna- mite.

Permissible Explosives are those which have passed the tests by the United States Bureau of Mines and which have been placed by it on the Permissible List of Explosives for Use in Coal Mines, established in 1908. There were

137 explosives on the permissible list 15 April 1916 classified as ˆammonium nitrate,® ((hy- drated,® ((organic nitrate® and ˆnitroglycerin® explosives. Rules for testing and regulations for use of these explosives are supplied in free publications of this Bureau. By the use of these explosives safety in mining coal is in¬ creased.

Smokeless Powders are high powered propellents used as substitutes for gunpowder in firearms and cannon. They are formed of the highest grade of cellulose nitrate only, like indurite, or of the medium grade only, like pyrocellulose powder, or they may be mixtures of different grades together with metallic nitrates like the B. N. powders. Another class are mixtures of cellulose nitrates with nitro¬ glycerin and a restrainer, like vaseline; ballis- tite, cordite and filite being examples of this kind. In robin-hood, gold dust, and gelbite, we have examples of such powders made from nitrosubstitution compounds and oxidizing agents. Other smokeless powders are amberite ; Erackett's powder; cannonite; Curtis and Andre's powder; Du Pont powder; E. C. pow¬ der; fulgor; granulite; hornite; J. B. powder; kolfite ; poudre J ; poudre S ; pyrocollodion ; rifleite; Schultze powder and Walsrode powder.

** Shell Explosives. — For charging armor piercing and other high explosives shell very stable, insensitive, detonating explosives are required. Nitroglycerin, dynamite, guncotton and explosive gelatin were tried but found too dangerous. Picric acid was known to be powerful and, when condensed by fusion, so insensitive that it could be safely fired from modern guns, but it was found difficult to de¬ tonate it when it was compressed in the shell. Turpin in France in 1886 solved the problem by causing a mercury fulminate detonator to act on pulverulent picric acid contained in a cavity in the compressed picric acid. For attack on warships shells are required that will pass through the armor and explode when on the inside. According to Marshall nitroaromatic explosives, such as picric acid, generally deto¬ nate on the face of the armor. This is accom¬ plished by ammonium nitrate explosives. The first complete demonstration was made at the United States Naval Proving Ground, Indian Head, Md., in 1897 under Capt. W. T. Sampson, U. S. N., when a shell containing 8.25 pounds of Joveite (moronitronaphthalene, picric acid and ammonium nitrate) penetrated a sheet of the harveyized armor of the United States Steamship Kentucky 14.5 inches in thickness and burst on the other side of the plate. Com¬ pressed picric acid is known in France as melinite; in England as lyddite; Germany, granatf ullung 88; Italy, pertite; Japan, shimo- site; Sweden, coronite; Spain, picrinite; and Austria, ecrasite. In many instances other sub¬ stances are mixed with the picric acid. Thus in France to reduce the melting point and avoid the formation of cavities from crystallization or <(piping® trinitrocresol is mixed with the pic¬ ric acid. A mixture of 60 per cent trinitrocre¬ sol and 40 per cent picric acid is known as cresylite 60/40. It melts at 85° C., but at 65° is sufficiently plastic to permit of its being com¬ pressed into charges which, on cooling, are com¬ pact, amorphous and very homogeneous. In Austria ammonium cresylate is mixed with the picric acid. Since picric acid is corrosive, and*

may, by action on the metal of its containers, produce dangerously sensitive compounds, and also because the supply of it is limited, trinitro¬ toluene has come to be largely used as the bursting charge for detonating shells. Schnei- derite (mononitronaphthalene 10 per cent and ammonium nitrate 90 per cent) is used at Creu- sot for this purpose also. Macarite (T. N. T. and lead nitrate) is also used.

Grenade and Bomb Explosives. Ammonal, cheddite, compressed gun cotton, picric acid, smokeless powder, T. N. T., and tonite are used for charging hand grenades and bombs.

Methods of Firing Explosives. — Explo¬ sives may be made to explode by heating them to their explosion temperatures. This may be accomplished by a flame, a spark, an incandes¬ cent body, friction, percussion, concussion, pres¬ sure or chemical action, provided the resulting temperature is sufficiently high. Gunpowder was originally ignited in muskets, guns and boreholes by the application of a torch, a glow¬ ing tinder or a heated iron rod. Later mus¬ kets were fired by the sparks from a flint strik¬ ing steel. Joseph Egg, an English gunmaker, 1815, invented percussion caps and to-day all fixed ammunition is fired by percussion primers, while the charges in very large guns are fired by friction primers or by electric primers. In firing blasts a train of powder was laid from the mine to a safe distance by which to convey the inflammation. Later quills, straws or paper or wooden tubes were used to hold the train and permit of the charge being tamped so as to secure the advantage which comes from con¬ fining an explosive. Bickford of Tuckingwall, England, 1831, invented the ˆrunning® or ˆtape® or ˆsafety® fuse, in which a core of gunpowder is enclosed in a tube of jute yarn impregnated with a waterproof composition, and this is to-day largely used in firing blasts. Dr. Watson of England, 1745, succeeded in igniting gunpowder by means of electric sparks, and in 1749 a bat¬ tery of 11 guns was fired by means of a fric¬ tional electric machine at Annapolis, Maryland. Dr. Robert Hare of Philadelphia, 1832, invented the method of firing gunpowder charges by means of the electric current, using low tension fuses, and he had for some time prior to this employed the voltaic battery, in eudiometrical experiments, for igniting explosive mixtures of gases. Sir Charles Wheatstone, 1856, intro¬ duced the magneto-exploder in blasting, and Moses G. Farmer of Newport, R. I., 1871, in¬ vented the dynamo-electric machine with which to generate the current and applied it to firing electric ignitors or detonators, and to-day great guns, military and naval mines, and torpedoes and 'many blasts, especially those in which sev¬ eral charges are to be fired simultaneously or where the blast is under water, are fired by this means.

It has long been known that when a notable quantity of a mixture of two volumes of hydro¬ gen with one volume of oxygen is ignited at any point, the inflammation extends almost instan¬ taneously throughout the mass and a most vio¬ lent explosion ensues. This phenomenon is called detonation, and this mixture has long been known under the name of detonating gas. Certain chemical compounds such as nitrogen chloride, nitrogen iodide and mercuric fulminate undergo an almost instantaneous decomposition,

giving rise to violent explosive effects, if heated, struck or rubbed, and they are known as de¬ tonating explosives. At first guncotton, nitro¬ glycerin and dynamite were fired by ignition, as gunpowder had been, but Nobel, 1866, discov¬ ered that if a quantity of mercuric fulminate was detonated

in contact with nitroglycerin or dynamite they then underwent a detonating explosion also. E. O. Brown of the chemical department at Woolwich, England, 1868, discov¬ ered that not only could dry compressed mili¬ tary guncotton be detonated in this way, but that if the dry charge, called a primer, was in contact with wet guncotton, the latter was de¬ tonated also, even though it was saturated with or submerged under and in contact with water. There are then two kinds of explosion, namely, explosion by simple combustion and explosion by detonation. Explosives of the gunpowder class undergo only the first kind of explosion. Explosives of the nitric ester or nitrosubstitu- tion classes undergo both kinds of explosions. Explosives of the fulminate class practically undergo only the second kind of explosion. A marked difference between the two kinds of ex¬ plosion is found in the velocity with which the explosive reaction is propagated within the mass of the explosive. Thus in detonating gas, which can undergo both kinds of explosion, Bunsen found, when using very narrow tubes where only combustion could take place, that the velocity of the reaction was 34 metres per sec¬ ond, while Berthelot, using long and wide tubes in which detonation could take place, found that the velocity of the reaction was 2,810 metres per second. Experiments made by lay¬ ing trains of the materials and firing them showed that while the velocity of combustion of gunpowder in the open air is but from 1.5 to 3.4 metres per second, the velocity of detonation of dynamite and of guncotton is about 6,000 metres per second. Provided each explosive gave the same volume of gases, having the same temperature and that the conditions were in all other respects alike, it is evident that the explosion in which the reaction velocity was the greater would be the more violent one. But they are not alike, since guncotton, nitroglycerin and mercuric fulminate, besides being endo-thermos compounds, are completely resolved into gases, while gunpowder, besides being a mixture, yields but about 44 per cent of gaseous products. The pressure developed by gunpow¬ der when fired in a space completely filled by it is, from Noble and Abel's experiments, 6,150 atmospheres. The theoretical pressure de¬ veloped by guncotton, notroglycerin and mer¬ curic fulminate when detonated in contact with bodies, are respectively 24,000 atmospheres, 25,000 atmospheres and 28,000 atmospheres. In¬ vestigation has shown that no other explosive known will give in contact an instantaneous pressure at all comparable with that of mer¬ curic fulminate.

Owing to these differences in behavior ex¬ plosives have been distinguished as high ex¬ plosives and low explosives. Gunpowder and explosives of the nitrate class, together with smokeless powder are low explosives. They act with comparative slowness and are used where it is desired to lift or push a load without cracking it or in propelling projectiles. Nitro¬ glycerin and explosives of the class of nitric

esters or nitrosubstitution bodies are high ex¬ plosives. They are shattering and crushing in .their effect. Detonators containing mercuric fulminate are used to fire high explosives, the detonators being themselves fired by means of a Bickford fuse or by an electric current. The high explosives are usually put up for use in paper cylinders, and, when loaded for shipment, these are called cartridges or <

Direction in Which Explosives Explode. — There is a very common but erroneous belief that gunpowder explodes upward and that high explosives explode downward. It arises from the fact that if a quantity of dynamite be laid unconfined upon the surface of the rock on de¬ tonating it the rock will often be fractured, whereas if gunpowder is thus placed and fired, it produces no effect whatever upon the rock. The facts are that each explosive tends to act in all directions about the centre of explosion. As exposed in air they are subjected to the weight of the air above them and are to that extent under confinement. When the high ex¬ plosive is detonated the gases are set free so fast that the air acts as a tamping agent ; when the gunpowder explodes the gases are generated so slowly that they have time to move the air. Besides the ((pressure in contact® exerted by the high explosives is enormously greater than that of the low explosives. That high ex¬ plosives exert pressure in all directions was demonstrated by Munroe by fastening blocks of guncotton of equal size and weight on opposite sides of a plate of iron, but at some distance apart, by means of light cords or wires, sus¬ pending the plate in any position and detonat¬ ing both charges simultaneously when holes were blown through the plate away from each of the charges. Although high explosives usu¬ ally produce a shattering effect when fired un¬ confined upon a body the effect is markedly increased by increasing the confinement. Thus in the method of breaking boulders and large masses of stone called ˆplastering,® after the charge is laid upon the stone and fused, one or two shovelfuls of earth are placed over it be¬ fore firing. In (

Explosions by Influence. — In detonating explosive substances it has been found that the influence of the detonation is exerted to a dis¬ tance all about the mass depending on the kind and the amount of the explosive used and its environment and that a second charge of ex¬ plosive within the sphere of influence may be detonated by the detonation of the first charge without being in contact with it. Thus in acci¬ dental explosions in explosive works the initial explosion occurring in one building may de¬ tonate the explosives in other buildings unless care is taken in the construction of the works to separate the buildings by a safe distance from one another. Care, too, must be taken in forming fixed ammunition that the primers are not heavily charged with fulminate, and that the cartridge's

are so packed that the accidental

explosion of one cannot explode the others by influence. Application of this principle is made in military engineering in the operation of countermining, the enemy's submarine mines be¬ ing blown up by firing a heavy torpedo charged with guncotton in the vicinity of them. To-day large quantities of explosives are frequently used in big blasts. According to Eissler, it is an almost daily occurrence in California for 20,000, 30,000 and even 50,000 pounds of explosives to be used in a single charge. The system of large blasts has even become common in hard rock excavations, such as quarries and railroad cut¬ tings, and in these large blasts it is common practice to dispose the larger part of the mass of explosive so that it may be exploded by influ¬ ence and not by contact or by propagation of flame or fire.

The largest single blast ever fired was that used in the blowing up of Flood Rock at Hell Gate in the East River, N. Y., 10 Oct. 1885. There was used in the blast 240,399 pounds of rackarock and 42,331 pounds of dynamite, or 283,000 pounds of explosive. There were 13,000 separate charges of rackarock embedded in drill holes with a dynamite cartridge on top of each, and there were 591 primary charges of dynamite placed on timbers 25 feet apart within the mine. When all the charges had been placed in the excavation and the primary charges connected with the firing batteries, the mine was filled with water, the primary charges were exploded by the electric current and these exploded the 13,000 other charges by influence through the intervening water. Munroe founded on this principle a method of testing the relative sen¬ sitiveness of explosive substances.

Uses of Explosives. — The uses of explo¬ sives as propellents in war and in the chase; as rupturing agents in mining, quarrying and engi¬ neering operations, and as an essential compo¬ nent of fireworks is well known. It is not so generally known that they are employed for sav¬ ing life and property in signal lights, rockets and guns; in projecting lines from the shore to stranded ships, and, in case of fire, to the upper stories of high buildings; in casting oil upon the water to quell a raging sea; and in railroad torpedoes to prevent collisions. Gunpowder guns are also used in bridge building to project a line across a chasm which is to be bridged, and they are used in the whale fishery to project the harpoons, while the latter may carry an ex¬ plosive charge with which to stun or destroy the whale. Detonating explosives have been im¬ properly used in taking fish; in burglarious operations against safes and vaults and in anarchistic outrages.. Dynamite has been used to knock the blocking from the ways when launching ships. Fired on an iron plate placed on the top of a pile and covered with a tamping of earth or clay, it has successfully replaced the pile driver. It has been found efficient in ex¬ cavating holes in which to plant telegraph and telephone poles and fence posts ; in driving water out

of quicksands in which foundations are to be laid or shafts to be driven; in slaugh¬ tering cattle ; in breaking down ice dams to pre¬ vent inundations; in blowing up buildings to prevent the spread of conflagrations; in razing unsafe walls of burned buildings; in destroy¬ ing wrecks which endanger navigation, and in freeing vessels which are hard aground on shoals. The farmer uses them in breaking

boulders, grubbing stumps and felling trees; in shaking the soil to fit it for deep-soil culti¬ vation, and, in wine growing districts, to free the soils from the phylloxera: while their aid has been sought in breaking droughts and diverting hailstorms from their courses. The iron founder uses them in breaking large cast¬ ings. The iron smelter employs them to clear out obstructions in blast furnaces while the lat¬ ter are still in operation. Munroe proposed using detonating explosives as a means of test¬ ing the integrity of large masses of metal and their resistance to shock.

Transportation of Explosives.— It is well known that the transportation of explosives is a necessary menace. Munroe pointed out that in 1904 there was not less than 600 cars of ex¬ plosives on the railroads of the United States each day. In 1905 the matter of regulating the transportation of these and other dangerous substances was taken up by the American Rail¬ way Association and a bureau of supervision was created. Later the matter was taken up by the United States Congress and by its acts of 4 March 1909 and 18 June 1910, this super¬ vision and regulation was entrusted to the In¬ terstate Commerce Commission which, on 2 July 1914, issued a pamphlet of 196 pages con¬ taining its regulations for the safe transporta¬ tion of explosives, inflammables and other dangerous substances, and these now control.

Explosives Industry in the United States. — -The reports of the United States census for 1900, 1905 and 1909 contain much descriptive and historical besides statistical matter regard¬ ing this industry. From the reports of the census for 1914 it appears that in that year there was produced 7,685,036 pounds of gun¬ powder; 208,316,125 pounds of blasting powder; 3,560,581 pounds of nitroglycerin ; 223,000,073 pounds of dynamite and 18,113,601 pounds of permissible explosives. The comparative condi¬ tion of the industry from 1840 to 1914 is shown in the following table :

TOTAL PRODUCTION AND VALUE OF EXPLOSIVES IN

THE UNITED STATES BY DECADES, 1840-1914.

t/1

c

0)

o E

U-t

O

dg

Products

. rC

0.2 23

Capital

2 So

a

4->

> fc

Pounds

Value

1840. . .

137

$875,875

496

8,977,348

$1,590,332

1850. . .

54

1,179,223

579

1860…

58

2,305,700

747

3,223,090

1870. . .

36

4,099,900

973

4,237,539

1880. . .

54

6,585,185

1,340

5,802,029

1890. . .

69

13,539,478

2,353

98,645,912

10,993,131

1900. . .

97

19,465,846

4,502

215,590,719

**16,950,976*

1905. ..

124

42,307, 163

5,800

29,602,884

1910. . .

86

50, 167,976

6,274

487.481.252

40,139,661

1915. ..

111

71,351,414

6,306

486,824.427

41,432,970

**This value is for the explosive substances only. When materials of all kinds produced in these establishments are included, the value is $17,125,418.*

The establishments reported for 1914 were most numerous in the sections where mining or engineering operations were carried on most extensively. Pennsylvania had 33 factories, Ohio 11, Illinois 9, New Jersey 8, West Virginia 7, Oklahoma 6 and California 5. The produc¬

tion is largest in the East. See Dynamite; Fire-damp; Guncotton; Gunpowder; Nitro¬ glycerin; Maximite; Picric Acid; Stabilite; Trinitrotoluene, ((T. N. T.®

Bibliography. — Abbot, H. L., < Report Upon Experiments and Investigations to Develop a System of Submarine Mines (Washington 1881) ; Berthelot, M., Ees feu gregois et les origines de la poudre a canon * (Paris 1891) ; Brunswig, H., Explosives' trans. from German by Munroe and Kibler (New York 1912) ; Chalon, P. F., Ees explosifs modernes) (Paris 1886) ; Cundill, J. P., and Thomson, J. H., (A Dictionary of Explosives* (London 1895) ; Daniel, E., Eictionnaire des matieres explosives) (Paris 1902) ; DeKalb, C, (Manual of Explosives) (Toronto 1900) ; De- sortiaux, E., Eictionnaire des explosifs) (Paris 1892) ; Drinker, H. S., (Tunneling, Ex¬ plosive Compounds and Rock Drills } (New York 1882) ; Eissler, M., (A Handbook on Modern Explosives* (London 1890) ; (The Modern High Explosives) (New York 1893) ; Gody, L., (Traite matieres explosives* (Namur 1896) ; Guttmann, O., (The Manufacture of Ex- plosives) (London 1895) ; Hill, W. N., (Notes on Certain Explosive Agents) (Boston 1875) ; Macquet, A., Explosifs de surete* (Paris 1893) ; Marshall, A., Explosives, Their Manufacture, Properties, Tests and History * (Philadelphia 1915) ; Mowbray, G. M., (Tri-nitro-glycerin as Applied in the Hoosac TunneP (New York 1874) ; Munroe, Charles E., Eectures on Chemistry and Explosives) (Newport 1888) ; (Index to the Literature of Explosives) (Balti¬ more 1893) ; (Chemicals and Allied Products, Bulletin 92 of the United States Census of 1905 J (Washington 1908) and (Chemicals and Allied Products, Vol. X, pp. 527-624, Report of 13th United States Census) (Washington 1911) ; Munroe, C. E., and Chatard, T. M., (Chemicals and Allied Products, Bulletin 210 of 12th United States Census) (Washington 1902) ; Munroe and Hall, (A Primer on Explosives for Coal Miners, Bulletin 17, United States Bureau of Mines) (Washington 1911) ; (A Primer on Explosives for Metal Miners and Quarrymen, Bulletin 80, United States Bureau of Mines> (Washington 1915) ; Nobel, A., Ees Explosifs modernes) (Paris 1876) ; Walke, W., Eectures on Explosives) (New York 1897) ; Wisser, J.*

P., ‘Compressed Gun Cotton for Military Use) (New York 1886).

Charles E. Munroe,

The George Washington University, Washing¬ ton, D. C.

EXPONENTS AND EXPONENTIALS.

The symbol xn is used in elementary algebra to denote the result of multiplying x by x, the re¬ sult by x, and so on, till n- 1 multiplications have been made. It is read, i(x to the «th power,® or simply ((x to the wth.** n is said to be the exponent of x. Clearly this manner of defining exponents only applies to real integers. While the generalization of the notion of exponents has proceeded step by step, it is perhaps best to give directly the widest extension of the notion that is possible in ordinary complex algebra. ex, the so-called exponential function, is defined

v2 v3 vTl

as 1 + x + + , . + . . . + — : 4- . . . , which

z ! i ! n !

always converges when x is finite, be it real

660

EXPOSITION

or complex. Log x is defined as a value of y for which e — yx is then defined as ey log x. It will in general be many valued. By the selec¬ tion of certain values of xy as the so-called principal value, the following laws may be established.

xm. xr* = xm + n (xm)n = xmn xm. ym = (x y).m

It will be found that when m is an integer, m will have its conventional meaning, and that

x— will stand for n V x where n\x is a num-

n

ber which, when raised to the nth power, will yield x.

While ex is the exponential function, func¬ tions the argument of which appears in an exponent are often known collectively as ex¬ ponential

functions.

EXPOSITION, Industrial. The promo¬ tion of trade and manufactures by means of collections of works of industry and art has no claim to the merit of novelty. In modern times, however, the idea has been more systematically carried out, and was probably suggested by the good effects produced by two institutions of a like nature — the galleries of rare productions of art or nature collected by the wealthy and educated, and the exposure for sale of orna¬ mental and useful articles in the stores of individuals, and more particularly on a large scale at the great fairs which in former times were more important features of commercial enterprise than they now are. The beneficial effect thus derived from the exhibition and com¬ parison of the manufactured products of dif¬ ferent localities could not long escape notice. In England this knowledge was brought to practical purposes in the 18th century, when the Society of Arts in 1756-57 not only offered prizes for specimens of manufactures, but ex¬ hibited the works of the competitors. In France an exhibition embracing all kinds of manufac¬ tures was held in the year 1798, and another under the consulate of Bonaparte in 1802, and the gratifying results attained led to the idea of holding them every three years, which was carried out as far as the political troubles of the country would allow. Many exhibitions were subsequently held at different cities on the continent of Europe, and in the British Islands exhibitions of a more or less local nature were held in Dublin, Manchester, Liver¬ pool and Birmingham, as well as in London in the premises of the Society of Arts. All these had been generally successful, but the necessity of having an exhibition on an international scale had become with some a fixed idea. This was first brought fairly before the British public in 1848 by Prince Albert, then president of the Society of Arts. In 1849 the project for an exhibition in which all nations might join began to take a tangible shape; and it was at last determined by government to issue a royal commission to deal with the matter, which was gazetted 3 Jan. 1850. The better to enable the commissioners to enter into contracts and otherwise incur obligations, subscriptions were procured to a guarantee fund, the queen lead¬ ing the list with $5,000. A vast structure of iron and glass, generally designated the Crystal Palace, built from the design of Joseph Paxton,

was erected in an incredibly short space of time in Hyde Park, London, and was opened by Her Majesty on 1 May 1851. The extreme length of the. building was 1,851 feet, the width 408 and the height about 64 feet. The entire area was about 19 acres. In the ground floor and galleries there were about eight miles of tables set apart for the exhibitors. The articles sent for exhibition were divided into four great sec¬ tions : Raw materials, machinery, manufactures and fine arts. The number of exhibitors was about 15,000. The exhibition remained open until 11 October, and the

number of visitors dur¬ ing the 144 days amounted to about 6,170,000. After all expenses were defrayed there was a balance of $700,000 left. The immense success of the undertaking encouraged the local and national exhibitions of Dublin and New York in 1853 and of Munich in 1854; and the French nation in 1855 opened its first Exposition Uni- verselle. The main building was an imposing structure of white stone and of classic architec¬ ture. The buildings were erected in the Champs Elysees, and covered about 24 acres. There were in all about 24,000 exhibitors, and the contents were pronounced greatly in advance of those exhibited in London in 1851. It was said that continental manufacturers had taken lessons from the British exhibition which the British had failed in fully profiting by, and so exhibited a vast improvement in works in which the latter considered themselves unrivaled. This was fol¬ lowed by the national exhibitions of the Dutch at Haarlem and the Belgians at Brussels, both in 1861, and the following year by the second great international exhibition held in London. It oc¬ cupied a vast brick building, lighted by a roof and two immense cupolas of glass, and erected in the garden of the Horticultural Society at South Kensington. The space covered was about 17 acres. There were 26,348 exhibitors in the industrial division, of whom 8,487 were Brit¬ ish, and in the fine art division 2,305, of whom 990 were British. The aggregate number of visitors from 1 May to 31 October was 6,211,103, giving an average of 36,328 per day. The pro¬ ductions, which came from almost all parts of the globe, were divided into 40 classes, and in¬ cluded manufactures of all kinds — machinery, chemical products, railway plant and ordinary vehicles, animal and vegetable products used in food or manufacture, architecture, painting, sculpture, engraving, etc. This exhibition was also eminently successful and enabled the public to judge of the progress or shortcomings of British home manufactures and art as com¬ pared with others. In 1865 a rather important exhibition was held in Dublin which was a pecuniary failure. The second French Interna¬ tional Exhibition was opened on 1 April 1867, and closed on 3 November. On 1 May 1871 the first of the British annual international exhibi¬ tions of fine arts and industry was opened by the Prince of Wales. On 1 May 1873 the first Austrian international exhibition was opened by the Emperor Franz Josef with great pomp and ceremony. The building was situated in the Prater, or, as it may be called, the park of Vienna and was 2,940 feet in length, with an average breadth of 570 feet. A great exhibition was opened by President Grant at Fairmount Park, Philadelphia, upon the occasion of the centennial festival of the American Declaration of Independence. It occupied 60 acres and had

nearly 10,000,000 visitors. A third French In¬ ternational Exhibition was held at Paris in 1878; area occupied 140 acres; visitors 17,000,- 000. A

fourth French International Exhibition was opened by President Carnot in 1889 to commemorate the centenary of the Revolution, the visitors to which numbered over 25,000,000. One of its chief features was the Eiffel tower, of iron, 984 feet high. The series of exhibi¬ tions which were held at South Kensington, London, included The Fisheries (1883), The Health (1884), The Inventions (1885) and the Exhibition of Colonial and Indian products (1886); the latter of which was visited by 5,550,749 visitors. Besides these, exhibitions have been held in Edinburgh (1886), at which there were 2,7 69,632 visitors; Manchester (1887) at which there were 4,765,000 visitors; and Glasgow (1888), with 5,748,379 visitors. In 1899-1900 a huge International Exhibition was held at Paris, but, though visited by about 47,000,000 persons, was not a financial success. It occupied the Champ de Mars and extensive areas on both sides of the Seine.

In 1893 the fourth centenary of the discovery of America by Columbus was celebrated by the World's Columbian Exposition, at Chicago. It excelled all predecessors in conception, scope and grandeur. Every nationality contributed to the exhibits and many countries possessed their own buildings. The <(White City,® as it was called, was opened by President Cleveland 1 May and closed 30 October. It occupied about 600 acres, at Jackson Park, on the shore of Lake Michigan, including the (

The Brussels Exposition in Belgium, 23 April to 14 Nov. 1910, drew 13,000,000 people;

the Turin Exposition, 30 April to 31 Oct. 1911, celebrated the 50th anniversary of Italy as a kingdom. See Fairs and Shows.

EXPOSITION OF ORACLES OF THE LORD by Papias of Hierapolis, an important Greek work in five books to which the date 145-60 is assigned. It is described by Lightfoot as (

EXPOSITION OF THE SACRAMENT,

in the Roman Catholic ritual, the public showing of the Blessed Sacrament, accompanied with certain ceremonies, for the veneration of the faithful. Until the 16th century the practice was not general, taking place only on the feast of Corpus Christi, but within the last 300 years the practice has become general. Formerly permission of the bishop was required for an exposition. The 40-hour adoration is now a common practice in the larger Catholic centres even in the United States. The ceremony is begun and ended with a mass. Consult Maier, (Die liturgische Behandlung des Allerheiligsten ausser dem Opfer der heiligen Messe (Ratis- bon 1860) and Raible, (Der Tabernakel einst und jetzt) (Freiburg 1908).*

EXPRESS SERVICE. A transportation system for parcels which require a safer and quicker delivery than can be had through the common freight service.

The creation and development of express service in the United States and the extension of the American express system, under Ameri¬ can control, throughout the length and breadth of the civilized world and beyond, affords con¬ vincing proof of unique constructive and ad¬ ministrative genius along the lines of greatest utility to mankind.

One of the most prominent, successful and progressive express companies, now operat¬ ing on every continent, began some 70 years ago with a simple service for delivery of pack¬ ages between a few Eastern and Western points. To-day, the same organization has, in addition to traffic in the United States, British North America and the Latin-American republics, at least a dozen agencies with commodious quarters on leading thoroughfares in principal European cities, each fully equipped with men, wagons and horses for the most rapid and effective express service.

As part of its routine business, the company is in touch with 30 of the world's largest banking institutions and has shipping and bank¬ ing correspondents at all large cities and ports in both hemispheres. As a means of comparsion with express conditions of half a century ago, when the system was merely an adjunct to the railroads, a brief outline of the work now being carried on in progressive express com¬ panies will be of interest. Since the express plan first began, in 1838, the relations of the railroads toward the express companies have, by mutual consent and to meet ever-

growing demands, been reversed. The rail¬ roads, in their own interests, so far as carriage of express freight is concerned, are now ad¬ juncts of the express companies.

The most modern American express serv¬ ice, when conducted on a large scale, is con¬ ducted under five divisions: (1) The transporta¬ tion of merchandise; (2) transfer of money, precious stones and other valuables, securities, etc.; (3) purchasing and selling merchandise; (4) forwarding of imports and exports; (5) issuance of money orders, letters of credit, travelers' checks and the transmission of money by telegraph.

The <(check® system has been so perfected that travelers in foreign countries save time and avoid delay by their use, as they are promptly recognized and cheerfully cashed or accepted by the principal hotels,

steamship and sleeping- car companies, by many railroad companies and by merchants, shopkeepers and others, in settle¬ ment of accounts. They are issued in the denominations $10, $20, $50, $100 and $200.

For those traveling in the United States, Canada, Mexico, Central and South America, these checks afford the advantages of a secure and convenient means of carrying funds imme¬ diately available, combined with the avoidance of the risk of loss of money by fire or destruc¬ tion and of annoyance of negotiating personal checks in places where such may be unaccept¬ able. Being cashed by agents of the companies and by banks in all the principal cities and pleasure resorts of the United States, the Canadas, Mexico, Cuba, Central and South America, accepted in payment of fares by the principal steamship companies and many railroad companies throughout the United States and received as cash by agents and con¬ ductors of the Pullman Palace Car Company and by many hotels in settlement of account, travelers' checks are found to be a most satis¬ factory form of credit for use during a tour.

<(Letters of Credit® now form a usual ex¬ press office specialty. These documents are drawn in sterling and are available in all parts of the world. Through the Letters of Credit system, checks may be obtained from ex¬ press agencies at all important points. Every foreign express correspondent has a cable address, also every express agency.

The <(C. O. D.® system and bank of ac¬ count collection are among the useful develop¬ ments of express service. <(C. O. D.® shipments are subject to collection of bill or invoice for the goods, with prompt return of proceeds made at a small charge for such service. C. O. D. shipments to foreign countries are usuallv made under the same system as applies to domestic points.

Several of the big express companies at¬ tend to the collection of accounts, bills, notes, drafts, etc., in any part of the commercial world. Collections in United States and Canada are effected with unusual promptness and at less risk and cost to payee than by other meth¬ ods. Collections in foreign countries of drafts or deposits, or by powers of attorney, are undertaken by express companies through their own organizations in Europe or through bank¬ ing correspondents. The proceeds of C. O. D.'s or collections are transferred by cable when patrons desire, with a charge for collecting, plus only the cost of cablegrams.

The transfer of money is another useful and much appreciated feature of express serv¬ ice. Purchases are made and commissions executed for patrons, in the quickest possible time, at places in United States, Canada and Europe, by a special department. Besides attending to orders for the

purchase or sale of goods and property, including household supplies, this department pays tax bills, re¬ deems articles pawned, collects baggage at railroad stations, secures seats at theatres, berths on sleeping cars, staterooms on steam¬ boats, baggage and staterooms on European steamers. Rare goods or books or articles requiring exact matching, or the maker or seller of which is unknown, are obtained without annoyance or loss of time to patrons.

Imports and exports of every class and size are handled by express companies as a part of their regular business. Bills of lading, bills of exchange and all other documents of that character are prepared and attended to from first to last.

Money orders and drafts are issued by sev¬ eral express companies for any amount, at the posted rate of exchange, in sterling, francs, lire, lei, marks, kroner, rubles, kronen, gulden, fin- marks, Turkish pounds, Mexican dollars, local dollars, pesos, rupees, yen and United States dollars on all parts of the commercial world.

The regular transportation service of ex¬ press companies includes merchandise, par¬ cels, produce, money, bonds, valuables and baggage. The routes extend over 250,000 miles of railroads in the United States alone. Shipments are frequently made in through express cars with burglar and fire-proof safes for valuables and iron express trunks for par¬ cels, all in charge of special armed messengers. The swiftest trains are almost invariably used for express service. The aim of the com¬ panies is to cover the ground in the least time at the lowest rates. They accept entire respon¬ sibility for loss or damage. Some express com¬ panies run special express trains to facilitate business during very busy seasons. Other com¬ panies have this feature as a permanent arrange¬ ment.

Novel and highly useful features of the most modern express service are the securing of ocean passages, European railroad tickets and passports for patrons at a nominal charge. It is only necessary for those who desire to utilize express companies in this way to state their wishes ■ — the companies do the rest rapidly, per¬ fectly and inexpensively.

So much for the work-scope of express com¬ panies to-day as compared with that of earlier periods. Before reviewing briefly the evolu¬ tionary processes connected with express serv¬ ice developments it may be well to mention what has been brought about through the use of express enterprise and by such methods as are peculiar to the service.

1. The creation of wagon service, and, in connection with this, special cars and trains for transportation of express matter at high speed.

2. The creation of transportation business for carriage to and from all advantageous pro¬ ducing points of. game, poultry, fish, oysters and fruit to localities where these commodities are not easily obtainable.

3. The creation of a novel method of selling goods for merchants by collecting on delivery

the amount of invoice and returning cash to the shipper.

4. The creation of a method of collecting the proceeds of negotiable paper and assuming, for the time being, responsibility of endorsers.

5. The creation of an efficient means of safe transportation of moneys and valuables shipped by individual citizens and by firms, banks, rail¬ roads and the government. As much as $4,000,- 000,000 have been shipped in the United States through the express companies in a single year in this manner.

6. The creation of a vast and perfect net¬ work of money-order agencies. The present number of these agencies is estimated at 40,000.

7. The creation of improved facilities for immediate transportation of foreign goods from ports of entry to destination. Heavy bonds are demanded by the government and given for proper execution of this service.

Commonly, the express company owns its terminal facilities, and rents from the railroads the cars on which its traffic is carried. These cars are usually attached to the regular passen¬ ger trains, and the employees of the express company accompany the shipments, and attend to the delivery to local agents along the route. The contract with the railroad company secures to the express company exclusive rights to oper¬ ate over that line. For the privileges conveyed the railroad company receives from 45 to 55 per cent of the gross collections on the mer¬ chandise traffic. In some instances, however, the share of the railroad reaches 60 per cent, and even 70 per cent, and in a few exceptional cases all of the express earnings in excess of the actual expenses are paid to the railroad.

Under the law the express company is a common carrier, and its rates are under the supervision and control of the Interstate Com¬ merce Commission — as well as under the ju¬ risdiction of State Railway Commissions in most of the States. For the purpose of fixing rates the Interstate Commerce Commission has divided the area of the United States

into five great zones: (1) The country lying east of the Mississippi River and north of the Ohio River: in this zone the minimum rate per 100 pounds has been fixed at 60 cents. (2) The country lying south of the Ohio River and east of the Mississippi, together with a small section west of this river: in this zone the minimum rate per 100 pounds is 65 cents. (3) The trans-Mississippi country extending to the intermoun¬ tain section : in this zone the minimum rate per 100 pounds is 70 cents. (4) The intermountain country: in this zone the minimum rate per 100 pounds is $1.05. (5) The Pacific Coast

States, in which the minimum rate per 100 pounds is 70 cents. The whole territory is divided into 950 "blocks® having a uniform length of 69 miles, and widths which vary from 45 miles along the northern border to 62 miles along the southern border; in about 100 of these blocks there are no express offices. The blocks are subdivided into "squares® or sub-blocks. The blocks are designated by numbers running in series from right to left across the map, the northernmost row beginning with 101, the next row toward the south beginning with 201, the next southerly row beginning with 301, and so on. Transportation is then designated as from 403F (Portland, Oregon) to 952A (New York,

N. Y.).

Express charges are based on a classification into three divisions: (1) ordinary merchandise; (2) specials; and (3) what is commonly called "Section D® — newspapers, books, printed mat¬ ter, seeds and scions, etc. Bulky and fragile merchandise is charged multiples of the first- class rates; as, for example, carriages at six times first-class, and racing shells or airships at eight times the first-class rates. As is the case with freight traffic on railroads there has been established by the express companies a schedule of ((commodity rates® which allows the trans¬ portation of merchandise of relatively low value at a reduction from the regular rates (which would be prohibitive) — a lower class rate on carload lots, or a first-class rate on goods which would regularly take several times that rate. On the regular tariff the limit of liability on the part of the express, company is $50 on a ship¬ ment not exceeding 100 pounds in weight. If the property shipped is valued at more than this figure the rate is higher, and the higher rate must be paid to secure the full value of the package in case of loss or damage. The express company is liable only to the extent of the valuation declared by the shipper, and when the full charges have been paid or charged on that valuation.

Origin and Evolution of the Express Idea.

— The "Express® idea sprang from the system of sending parcels in care of

coach-drivers, by stage-coach, and from the shipping of such par¬ cels in care of captains, by coasting vessels.

When the railroads took the place, gradually, of the coaches, much parcel traffic was per¬ formed by means of the steam cars. Then the conductors of these cars had to assume respon¬ sibility for safe-keeping. Eventually, this transfer overcrowded them with work. A divi¬ sion of duties naturally followed. Finally, the railroads insisted that their employees should choose between railroad and the supplemental delivery traffic.

The principal events following this decision were :

1838-39. The starting of an express com¬ pany to operate in New England. Alvin Adams, who later began business for himself in New York, was with this company.

1839. "Harnden's Express® started between New York and Boston.

1840. ((Adams' Express® began operations between the same points.

1840-45. Other expresses opened up busi¬ ness, extending service to Philadelphia, Balti¬ more, Washington, Buffalo, Pittsburgh, Detroit, Chicago, Cincinnati, Louisville, Saint Louis and New Orleans.

The men most active in the new field at this time were William F. Harnden, William B. Dunsmore, Henry Wells, Edward P. Sanford, Samuel M. Shoemaker, Johnston Livingston, and William G. Fargo.

Almost all of the western transportation was carried on over the Ohio, Mississippi and Mis¬ souri rivers, with their tributaries, which in¬ cluded canals then recently completed in several of the States to connect those rivers with the lakes.

From 1840 the construction of railroads con¬ tinued uninterruptedly, express business ex¬ panding in proportion. Then came the inaugu¬ ration of express "continuous lines," enabling

goods to be carried quickly between many points without transfers.

At this period people sent their letters by express as being safer than the government's mail service. In course of time the authorities at Washington protested, and finally prohibited by law the private conveyance, without

United States contract, of private letters.

1848. The stampede of gold-seekers, 1848- 49, to California, brought out a great extension of the express system. Money and gold-dust were transmitted direct from the coast to east¬ ern points through the express companies, many new agencies being established for the purpose.

1854. In this year a consolidation of express interests took place. <(Adams & Co.® bought up Hamden's business and worked several minor Eastern routes and secured the right to much Southern traffic.

During the same year the "American Ex¬ press Co.® first established in 1841 was formally organized, to operate from the East to the Far West.

The "United States® express also came into existence in 1854 to operate along the New York and Erie Railroad and the route running westward.

1854—55. About this time "Wells, Fargo & Co.® were organized. They started the famous "Pony Express® and several stage lines Other firms competed in these special forms of rapid transportation.

1855. The <(National® Express Company be¬ gan operations in this year, with routes between New York, Albany, Troy, Saratoga, Whitehall, Rutland and Montreal.

1858. Wells, Fargo and Company and the Pony Express lines organized the <(Overland Mail Co.,® which, until the completion of the Union Pacific Railroad, carried the whole of the United States mails between the Missouri River and the Pacific Coast. By this time the express had become a recognized necessity in the commercial and individual transactions of the country. Its lines had amplified in every direction. It had attracted to itself sufficient capital to place it on a firm financial basis. Obligations to ensure the safe and speedy transmission of merchandise, valuables and money were readily assumed. When loss or damage occurred, due reparation was promptly made. Thieves were and are, to-day, followed up by them until caught and punished.

1861. Henry S. Plant and associates organ¬ ized the (

1861-65. Upon the breaking cut of hostilities, the express was the only means of communica¬ tion between soldiers in the field and their friends at home. Government securities, being purchased largely by the people, were sent by government through the express, it being offi¬ cially recognized that, during that critical period, the express was much safer than the official mail service.

After the war a contract was made by the United States government with the Adams Ex¬ press Company, acting for itself and other companies, to transmit all securities and moneys of the government by express.

1865-1918. This period represents a phe¬ nomenal growth of the express movement. The present organization of the great companies, each with experience of oyer half a century to

guide it, is practically perfect in its workings, and labors continuously at high tension to keep even pace with calls which increase day by day.

The establishment of the parcel post in 1913 and its subsequent extension to larger packages had marked effect on the business of the ex¬ press companies. A scaling down of rates by the Interstate Commerce Commission in 1914 seemed likely to affect the financial condition of the companies. The United States Express Company retired from business on 30 June 1914. But the later years have witnessed but little diminution of the bulk of the traffic and the profits. For valuable packages and for promptness in transmission and delivery the express company is an unequalled public utility.

The first statistics of the express business were gathered in 1890. In that year 18 com¬ panies were operating over routes which aggre¬ gated 174,060 miles. At the close of the fiscal year which ended 30 June 1916, the general business was in the hands of eight companies operating over a total of 297,139 miles: of this, 253,750 miles were on steam railroads, and 43,389 miles on other routes — electric railways, steamboats and stage routes. The mileage served was divided among the companies as follows: Wells, Fargo and Company. 107,529 miles; American, 74,280 miles; Adams, 45,153 miles ; Southern, 34,765 miles ; Canadian, 12,050 miles; Great Northern, 9,838 miles; Northern, 6,275 miles ; and Western, 5,249 miles. The combined revenues of all the companies for the fiscal year were $173,709,411, of which sum $172,655,204 was from the ordinary domestic express transportation business. Out of these revenues the express companies paid for ex¬ clusive privileges and transportation of merchandise to the carrying companies, $87,- 971,137, leaving their net revenues at $85,971,- 136. To this was added an income of $5,497,238 from the money-order and similar non-trans¬ portation business. Out of the net revenues, $68,020,529 was paid out in expenses, and $4,- 527,474 for maintenance. Taxes amounted to $1,548,761, and the total net profit on the year's business was $10,560,650.

The largest carrying business was done by the American Express Company, amounting to $57,039,124; Wells, Fargo and Company were second, with $45,366,216; and Adams Express Company third, with $42,018,735. The

largest net profit was made by the Southern Express Company, 9.5 per cent on the year's business ; as compared with 6.3 per cent by Wells, Fargo and Company; 5.8 per cent by the American Express Company; and 5 per cent by Adams Express Company.

The latest available official statistics as to the capital, property and equipment of express companies in the United States are those for the fiscal year ended 30 June 1914. In that year the combined working capital of all the large companies amounted to $186,815,717, of which sum $75,760,300 was stock. The real es¬ tate owned was valued at $16,446,269, and the equipment at $17,547,845: the latter sum in¬ cluded 155 railroad cars valued at $603,787. The number of money orders, travelers' checks, letters of credit, telegraphic transfers of money, etc., was 24,209,695, representing the aggregate sum of $537,099,796.

Consult Chandler, W. C.,

Commerce Commission, Document 4198, Ex¬ press Rates, Practices, Accounts and Revenues) (Washington 1913) ; and the annual reports of that commission.

EXPRESSED OILS, in chemistry, oils obtainable from bodies by pressing, to distin¬ guish them from mineral and essential oils, which last are obtained by distillation.

EXPRESSION. Our mental states, and particularly our emotions, are closely linked with certain muscular and physiological asso¬ ciates, which are exhibited in perhaps the great¬ est detail and variety by the muscles and blood vessels of the face. These associates are de¬ nominated expressions ; they include not only the visible muscular and vascular phenomena which have already been indicated, but also a vast number of more or less obscure respiratory, circulatory and secretory changes. These changes and movements are at times striking in their apparent inutility, so that much labor has been spent in the effort to elucidate their reason for being. The first explanation of the expressions which possess much interest at the present day is that of Darwin. In accordance with his evolutionism, he regards many emo¬ tional expressions as rudiments of actions which have been useful to the animal either in its individual history or in the history of the race. An acquired example of this sort is the point¬ ing of the pointer dog. Other expressions are held to be the result of tendencies opposing those which would be called into play by the opposing emotion. A

dog approaching its master playfully will evince in its relaxed muscles, in its bent back, in its flexed limbs, in its wagging tail and ears laid back, actions exactly the opposite of the tense sinews, the straight back and forward pointed head, the rigid extended limbs, the uplifted tail and ears which betoken its desire to attack another dog and serve to frighten its antagonist or to facili¬ tate its attack. The third factor in the produc¬ tion of emotional expression, according to Darwin, is the direct overflow of the excited nervous system into motor channels, as in the case of trembling from fear.

Wundt retains Darwin's third principle of expression, but replaces the other two by the principle of association, which causes an ex¬ perience to assume the physical correlates of related experience, and the principle of the connection of movement with sense-ideas, which includes all cases of movements which indicate or symbolise the object of the emotion or its desired result. The facial expression of dis¬ like is an example of the former of these prin¬ ciples ; it represents an attempt to eliminate a bitter-tasting substance from those parts of the mouth where it will be tasted most. Exemples of the second principle are the stare of surprise or the clenching of the fist in anger.

James retains Darwin's first principle that many expressions are rudimentary purposeful actions, and Darwin's third principle of nervous overflow. He adds to these what is equivalent to Wundt's principle of the association of analogous sensations, and two new explana¬ tions of expression. The first of these is that not only are formerly useful emotional expressions retained as rudiments, but that their physiological consequences and concomitants undergo a like atrophy and schematisation. B?'

sides all these, there is a class of reactions sus¬ ceptible to no very simple explanation. These have been perpetuated in a more or less mechanical manner, independently of their mode of origin. Perhaps the greater number of facial expressions belong to this class.

In accordance with the James-Lange theory of the emotions, which holds that they are con¬ stituted by their expressions, James maintains that there are distinct and different expressions of every emotion. This has been denied by Cannon, who has made perhaps the most thorough physiological investigation into the actual nature of emotional expression. He finds that all intense emotions are characterized by the increased secretion of adrenalin and the liberation of the carbohydrates stored in the liver. These reactions are directly serviceable to the individual in whom they happen (1) be¬ cause they cause the blood to be driven from the abdominal viscera to the muscles, heart, brain and lungs, where it is more needed in any sudden action ; (2) because they release an im¬ mediately available store

of energy; (3) because they cause the heart to act more vigorously and more rapidly; (4) because they increase the clotting power of the blood and decrease haemorrhage in case of injury. The milder emotions, on the other hand, are characterized by a directly antithetical physiological process, in which the normal action of the digestive system and other abdominal vicera is helped rather than hindered. The milder emotions are associated with a preponderant activity of the cerebro-spinal nervous system, while the violent ones belong rather to the sympathetic system. See Emotion.

Bibliography. — Cannon, W. B., (Bodily

Change in Pain, Hunger, Fear and Rage} (New York 1915) ; Darwin, (The Expression of the Emotions in Man and Animals) (London 1873) ; James, W., Principles of Psychology) (New York 1890) ; Mantegazza, P., Physiognomy and Expression (3d ed., London 1904) ; Warner, F., Physical Expression (New York 1886) ; Wundt, (Grundziige der Physiologischen Psy¬ chology (Leipzig 1911) ; (Leipzig 1900).*

EXPULSION. Usually this word is used to describe the act of depriving one or more members of a political or corporate organiza¬ tion, or of a society, of their right of member¬ ship. The act is frequently brought about by a vote of the organization or society after the submission of a committee report, for some violation of duty or some other offense render¬ ing such member or members, in the opinion of their associates, unfit or unworthy.

It is provided in the Constitution of the United States that the members of the Senate or House of Representatives may expel mem¬ bers of their respective bodies, by a two-thirds vote, for disorderly conduct.

Corporations have the right of expulsion in cases where good order and proper control make the exercise of such power essential as, for example, (1) when the offense is not within corporate duties, but nevertheless disgraceful or infamous, or (2) when the offense is against his duty as a corporation member or officer or director, or (3) when the offense is of such a character as to infringe corporation rules and the statutes at the same time.

Before a person can be expelled from a cor¬ poration or society for disgraceful conduct out¬ side of the jurisdiction of such organizations, a previous conviction by jury is necessary. If the offense is against or in violation of cor¬ poration or society rules or duties, a trial and conviction may be had before the authorities of the organization.

The word ˆexpulsion55 is also used to de¬ scribe the ejection of people from meetings when they create a disturbance or otherwise make their presence obnoxious. Those who convene meetings have, under the law, the right to expel objectionable persons, providing they use only as much force as is necessary for the purpose.

Club members are liable to expulsion under the rules of the club to which they belong. They have an appeal to the courts for reinstate¬ ment on the ground that membership in a club is a form of property.

Non-members of any organization, if present at any meeting of such organizations, are liable to expulsion.

The Constitution of the United States pro¬ vides that Federal judges cannot be expelled from their posts during good behavior. See Disfranchisement.

EXPUNGING RESOLUTION. See

Censure, Congressional.

EXTENDED ORDER. See Infantry; Tactics, Military.

EXTENSION, in physics and metaphysics, that property of a body by which it occupies a portion of space. Extension is an essential as well as a general property of matter, for it is impossible to form a conception of matter, however minute may be the particle, without connecting with it the idea of its having a cer¬ tain bulk and occupying a certain quantity of space. Every body, however small, must have length, breadth and thickness ; that is, it must possess the property of extension. Figure or form is the result of extension, for we. can¬ not conceive that a body has length, breadth and thickness without its having some kind of figure, however irregular. In logic, extension is the extent of the application of a general term, that is, the objects collectively which are included under it ; thus European is more ex¬ tensive than French, Frenchman, German, etc. Matter and mind are the most extensive terms of which any definite conception can be formed. Extension is contrasted with comprehension or intension. See Physics.

EXTENSION. While our spatial experi¬ ences undoubtedly contain many elements which are noted for a peculiarly spatial nature, the predominance of psychological opinion is that certain experiences possess the unanalyzable primitive attribute of extension. Though the existence of this attribute is denied by Wundt and is attributed to all sensations by James, it is generally held that it exists and is confined to cutaneous, visual and possibly to kinsesthetic sensations. The Wastness55 which James mentions as pertaining to such experiences as those of hearing is in all probability a complex of various degrees of intensity, clearness and other sensory

attributes.

While sight and touch are endowed with the attribute of extension, this extension is pnly two-dimensional. Everything which we

see is stretched out over the surface of rhe ret¬ ina, and everywhere we feel is stretched out over the surface of the skin. The transition from two to three dimensions involves an ap¬ peal to experiences which are neither visual nor cutaneous, and which, in a large measure, are not specifically spatial. In the case of vision these are (1) The difference between the images on the two retinae. (2) The experience of strain in the muscles which make the two lines of vision converge. (3) The e-xperience of strain in the muscles of accommodation. (4) The experience of clearness of vision when the eye is focused on an object, and of blurred¬ ness when it is not. (5) Geometrical perspec¬ tive. (6) Atmospheric perspective. (7) The partial obliteration of more remote objects by nearer ones. (8) The parallax of the various objects of vision, consequent upon motion of the head or of the entire body. (9) The visual angle subtended by known objects. (10) The effect of light and shade.

In the case of touch, the muscle and joint sensations indicating the position of the various parts of the body are of the utmost importance in giving knowledge of the third dimension.

The various tactile and kinsesthetic limina of extension are discussed under Locality (q.v.). At the fovea of the eye, the lower limen of visibility, or <(minimum visibile,55 is probably the angle subtending a single cone or from half to a whole minute of arc. Ob¬ jects subtending smaller angles can be per¬ ceived, and even compared in size, but it ap¬ pears that this is due to the differences in the intensity of the stimulus exert and the sensation they cause, quite apart from the extensity of the latter, and that the real area stimulated is at least an entire cone. The least distance at which two objects can be distinguished is about a minute of arc at the fovea, but near the periphery of the retina it is as great as two degrees or thereabouts. The sensation experi¬ enced when a small point of light is seen often lacks all colors. It takes a larger area of stimulus to evoke color, and often a still larger area to evoke the color which we should nor¬ mally associate with the source of light.*

Extension obeys Weber's law (q.v.). The least noticeable increment of a linear visual ob¬ ject is about one-fiftieth the length of the latter, if movement of the eye is allowed. It is con¬ siderably larger when the eye is kept at rest ; but as is obvious, measurements with the eye at rest are by no means easy. The field of vision is rather irregular in outline. It extends (from a line connecting the centre of the pupil to the macula lutea) about

80 degrees outward, 65 degrees inward and 65 degrees downward. Of this, about two-thirds can be seen by both eyes. (See Space). Consult James W., Prin¬ ciples of Psychology5 (New York 1890) ; Kiilpe, Outlines of Psychology0 (London 1909) ; Titchener, E. B., (Text-Bookof Psychol¬ ogy5 (New York 1910) ; Wundt, W., ((Jrund- ziige der physiologischen Psychology (Leip¬ zig 1908-11) ; introduction to Psychology5 (London 1912).

EXTENSION, University. See Educa¬ tion; University Extension.

EXTENSION TEACHING. See Home

Economics; University Extension.

EXTENUATING CIRCUMSTANCES,

in legal practice, those circumstances, in connec- tion either with the position of the prisoner or with the act alone, which are taken into con¬ sideration by the court in mitigation of the pumshment. The previous good character of the person convicted may always be proved as a circumstance giving him some claim to leniency of punishment. Besides character, there a.re °ther circumstances, the presence of which in a case sometimes serves to mitigate the sentence, sometimes to take the act done out of the category of crime altogether. One is youth. Thus, no act done by any person under seven years of age is a crime. Defective mental power in the person convicted will always be considered in determining the sever¬ ity of his sentence. Such disease of mind as prevents a man from knowing that the act he does is wrong will excuse him from the consequences of an act otherwise criminal. Drunkenness, when voluntary, is not held an extenuating circumstance, but if a man is made drunk by the fraudulent administration of drugs, and while under their influence kills another, not knowing what he does, the act is not a crime. It is a good excuse for persons charged with crime that they have been com¬ pelled by others by threats of death or great violence to do the criminal act ; and the acts of a married woman in presence of her husband are presumed to be done under his coercion, and so, unless the presumption is rebutted, will be excused. Ignorance of the law is no excuse for an offense. Nor, in general, will ignorance of facts be a good excuse, though in particular circumstances it might form a valid defense. Sir James Fitzjames Stephen states, in lan¬ guage purposely vague, to represent the vague¬ ness of the law, a principle under which the stress of necessity is held to excuse acts other¬ wise

criminal : wAn act which would other¬ wise be a crime may in some cases be excused if the person accused can show that it was done only in order to avoid consequences which could not otherwise be avoided, and which, if they had been followed, would have inflicted on him or on others whom he was bound to protect inevitable and irreparable evil, that no more was done than was reasonably necessary for that purpose, and that the evil inflicted by it was not disproportionate to the evil avoided.®

EXTERIOR BALLISTICS. See Gun¬ nery.

EXTERIOR BOUNDARIES. See

Boundaries of the United States.

EXTERIOR MURAL PAINTING. See

Mural Painting.

EXTINCT ANIMALS. Many animals which inhabited the earth in bygone periods have entirely disappeared, leaving not even a modern representative of their race. Others, no doubt, were known to prehistoric peoples, con¬ cerning which no record has come down to us. But within the period of recorded observations, many animals have lived and died out ; various causes contributing to their extermination, not least among these being the presence of man¬ kind. Man reconstructs the face of the earth to suit his needs : he cuts down forests, plows or burns over prairie lands, changes the course

of rivers, drains the swamps and thus destroys the natural environment of many of nature's wild children. Then, too, he destroys crea¬ tures directly; he kills them for food, for clothing or for other utilitarian purposes; he hunts them because he fears them, as dangerous foes to himself or to his agricultural pursuits; he destroys them for his sport; and, finally, he draws them from feral conditions by domestica¬ tion. Not only thus does man directly injure the wild creatures, but his coming, accompanied by exterminating influences, kills out certain other creatures. These, when man has destroyed their natural prey, practically die of starvation before they can adapt themselves to changed conditions. Then the domestic dogs, cats, etc., help on the work of slaughter in certain ways, by preying upon wild life.

That prehistoric man was partially respon¬ sible for the extinction of certain animals, scientists are agreed; but they are also assured that except in the cases of the horse, the camel, and perhaps the domestic dog, the extinction was due more to their inability to adapt them¬ selves readily to the changes of climate of that remote time than to human agency. The wild

progenitors of the horse and camel have not been known in historic times. That aboriginal man in Europe aided the elemental forces in their work of destruction, by hunting to death the mastodon and the great cave-hunting lions, bears and hyenas, and other huge creatures of his time, is most probable; but in America this is not at all likely to have been the case.

Since the earliest records were made, how¬ ever, various species have been eliminated from the European fauna; many from that of the other continents as well. In the days when the Romans fought, the Dacians, various members of the cat family were common along the Rhine- Danube frontier, among them, lions, tigers, leopards and wild-cats. They found also the great herds of wild cattle, which have entirely vanished. The ibex, too, is gone, and, but for the protective legislation, the chamois and the deer would have been exterminated as well. The bear, the beaver, the wolf and the wild boar have all gone within the last 10 centuries, from Britain, the wild-boar, which was hunted by royal cavalcades, disappearing at the close of the 17th century.

Records concerning Asiatic animals show few cases of extinction except those of a few cases of a species of sea-cow native to the Commander Islands, off the Kamchatkan coast. This animal, the rhytina, was pursued for its flesh, chiefly, and, so far as is known, the last survivor was killed in 1768. Among the same islands lived the now extinct Pallas's cormorant, a great bird also exterminated because of its edible quality.

Animals which are • restricted in habitat to small islands seem liable to suffer from the in¬ roads of man, more surely and swiftly, because they have no adequate means of escape, many such examples being furnished of birds whose power of flight is limited. Such species, espe¬ cially in the Australasian and South Sea islands, have been in almost all cases destroyed; not¬ ably several representatives of the moa tribe in New Zealand, the dodo, the solitaire and certain parrots, rails and fowls. The disappearance of the gigantic edible tortoises from the islands

of the Indian Ocean and from the Galapagos presents another striking instance of the ex¬ termination of animals owing to man's dep¬ redations.

Both Africa and America have presented fields for indiscriminate slaughter. In the former continent, where once there roamed great herds of antelope, countless buffaloes and elephants the slaughter has been so great since the middle of the 19th century as to leave many of these denizens of plain and

forest extremely rare if not altogether extinct. The search for hides was perhaps the strongest destructive force ; but the European hunters for <(big game® and their followers have done much in the same direction. The mountain zebra, the quagga and various species of antelope are examples oi this; while the giraffe to escape entire extinction has retired to almost inaccessible regions in the Kalahari Desert and northward.

As for America, with her long list of lost species, most people are more or less acquainted with the efforts that have been made (and sometimes with signal success), within the past few years, to save, by protective legislation, such of her native birds as are still found, and to prevent the wholesale slaughter of her wild denizens of field and forest. The best- known example of extinction is furnished by the bison (q.v.), which roamed in vast herds over the grass lands, until it was destroyed by hide-gatherers ; so that now there are no wild bison except one small herd, carefully protected by law, dwelling beyond the North Saskat¬ chewan River. In 1903 it was estimated that only 34 wild bison were left in the United States, and about 600 in Canada; and even these remnants had more or less degen¬ erated from the superb original type of the plains. Such large animal species liv¬ ing under strenuous conditions and necessarily breeding slowly, urgently require protection at this time. The unremitting warfare against all the animal kind that began with the de¬ struction of the great land turtles and moas in prehistoric times, now extends to the remot¬ est places of the earth. With the arming of every savage tribe, and with shooting expedi¬ tions often organized on a large scale and even carried out under the guise of scientific explo¬ ration, all large animal types are to-day threat¬ ened with a speedy extinction. A typical case of natural restriction accelerated by man is that of the muskox (q.v.). Circumarctic in the Pleistocene this curious animal, yielding in quantity a strong underwool with a texture as fine as silk, is now confined solely to the tree¬ less arctic wastes of North America and the islands to the north. Cut off by the white hunter everywhere to the south, the Eskimo rabbit-catchers of the far north, always hard on the muskox, are now killing with modern rifles the northern remnants of the original herd. The American sea-elephant and the monk-seal are also practically gone. The long lists of birds, from the great auk and the "passenger-pigeon® to the California condor, give evidence how much this continent has been depleted as to its wild life. Many fishes, too, have decreased or wholly disap¬ peared ; and there is no doubt that, but for timely protection, many species, now small, would soon follow these vanished representa¬

tives of the earlier fauna and swell the already lamentably long list of extinct animals.

On the high seas the reckless killing of larger animals goes on as relentlessly

as on land. The great Cetaceans were abundant down both coasts when America was discov¬ ered. Since then the Biscayan whale, Balaena glacialis, the Greenland whale, Balaen-a mysti- cetus, and the much wilder Balaenoptera phys- alis have in turn been brought to the verge of extinction. No less the widely distributed ((cachalot,® Physeter macrocephalus ; while a lengthening list of lesser marine forms is being rapidly hunted out. The greatest destruction has taken place since the invention of the "shot harpoon® by Sven Foyn (at first a sealer), about 1870. By that time owing to wildness and scarcity the older methods of whale cap¬ ture were no longer capable of returning a profit. With the introduction of power launches few forms can now escape. The monetary loss resulting from this indiscriminate slaughter has been enormous. From 1835 to the wane of the fisheries about 1872, in 19,943 American voyages some 300,000 whales were captured, yielding oil and bone worth $272,-000,000. At the meeting of the American Asso¬ ciation for the Advancement of Science in Chi¬ cago, 1907, a resolution was passed to aid "in any way practicable those measures legislative, international and local which will prevent the now imminent extermination of the great marine vertebrates, especially the cetaceans and manatees, seals, green and other turtles on the coasts of the United States, or on the high seas.® (See Extinction of Species). Consult Dawkins, Boyd, (Cave Hunting5 (London 1874) ; Bryden, (Nature and Sport in South Africa5 (ib. 1897) ; Dixon, (Lost and Vanish¬ ing Birds5 (ib. 1898) ; Buffer, (Birds of New Zealand5 (2d ed., ib. 1888) ; Grieve, (The Great Auk5 (ib. 1885) ; Finn, Wild Animals of Yesterday and To-day5 (ib. 1913) ; Harting, (British Animals Extinct within Historic Times5 (ib. 1880) ; Hutchinson, (Extinct Monsters and Creatures of Other Days5 (New York 1911) ; Lankester, (Extinct Animals5, (ib. 1905) ; Loomis, (Hunting Extinct Animals in the Patagonian Pampas5 (ib. 1913) ; Nathorst, (Hafva djuren rattighet att lefva5 (Stockholm 1907); Newton, (Dictionary of Birds5 (ib. 1896) ; Rothschild, (Extinct Birds5 (London 1907) ; Wieland, "Conservation of the Great Marine Vertebrates®. (Pop. Sci. Monthly, 1908) ; Wallace, (Island Life5 (London and New York 1880) ; (Annual Report of the Smithsonian Institution for 18885 (Washing¬ ton 1889).

Revised hy G. R. Wieland.

EXTINCT RACES. See Man, Prehis¬ toric Races of.

EXTINCTION, Tribal. Certain broader inferences as to the nature of arrested evolution and extinction of races or types, rather than the species, can be drawn only from a systematic examination of the geologic-paleontologic rec¬ ord. It is now clearly recognized that periodic emergence and subsidence of the continents has been going on as far back as the fossil records extend, with resultant biologic dias- trophisni. It is also recognized

that the initial expansion or climacteric of groups mainly occurs soon after their first appearance,

As a consequence the inadaptive and unfit species are crowded out, not alone by those nearly of their own kind, but by the successful iorms of other groups. Earth, sea, and air, as suggested, must tend to hold to some numeri¬ cal mean of population. But the higher a group in the scale of organization, the more delicate is the adjustment to environment. Rapid adaptive change, like over-specialization, much increases liability to extinction by cataclysm. The relatively successful forms are swept away by renewed environmental disturbance if too rapid to neutralize by a further course of direct evolution, or by catagenetic change. For this reason alone the relative tenure of races as such is longest in the lower forms. The higher groups such as Limulids may show a remarkable persistence, or, like the Testudinata, a relatively long life ; but ((immortal types® are mainly in¬ conspicuous like the Foraminifers. That such so often occupy abysmal oceanic or other zones least subject to change, sets a further visible boundary to the course of extinction. Still another is set by the fact that higher types also tend to persist in the zones and regions of least change — "asylums.®

The inherent organic quality which as fixedly as gravity sets and holds evolution in its course was aptly termed by Cope ((bathmism.® This is the force that evolves, and also kills; but the bathmic causes of extinction are even harder to scan than are direct bathmic factors. Re¬ duced to its simplest elements, life must be regarded as a property of matter, and plasm certainly exhibits in closed environments a high degree of stability. It may also exhibit char¬ acters little removed from those of strictly in¬ organic substances (Chunder-Bose) ; although wholly senescent or absolutely unchanging types are not theoretically indicated — that is, taking the entire duration of the rock succession as a time unit. However, when the common fac¬ tors of change, bathmism (or ontogeny), en¬ vironment, heredity and selection, are inactive, the organism shows little progression; and this indicates climatic change, taken in its very broadest sense, as the chief evolutionary stimu¬ lus. There is a further inference of primary value gained from the study of devolution or catagenesis as opposed to anagenesis. No races are exempt from the totality of climatic factors. The precision of the phenomena of plant suc¬ cession would alone warrant this statement. It follows that while surprising modifications may take place when races decline, there is, dur¬ ing the anagenetic movement, a melior mean of form toward which all types strive — each according to its

capacity, and in delicate adjust¬ ment to environment. Consequently the idea that lines of descent take the form of the "paleontologic tree,® and lead back continually to main primitive stems, must as a rule express too much. A far simpler course of parallel development and parallel decline is indicated. As to when, in the course of this universal parallelism, direct evolution or ascendancy reached its high noon would at present be only a subject of speculation. But from a physical point of view there must be such a point of time, probably denoted by the appearance of persistent bipolar ice caps. Morphologically the appearance of the oak in the lowermost Cre¬

taceous may denote the evolutionary crest. Be¬ yond are palms and grasses.

Bibliography. — Patten, 'Evolution of Ver¬ tebrates and their Kin) (1912) ; Scott, W. B., 'History of Land Mammals on the Western Hemisphere) (1913) ; Wieland, (American Fos¬ sil Cycads) (Vol. II, 1916) ; Clements, (Plant Succession, an Analysis of the Development of Vegetation (1916) ; Lull, (Organic Evolution* (T917) ; Osborn, 'Origin and Evolution of Life) (1918) ; Ruedemann, 'The Paleontology of Arrested Evolution* (1918).*

G. R. Wieland, Yale University.

EXTINCTION OF SPECIES. The an¬ tithesis of evolution is extinction. Direct evo¬ lution leads by insensible degrees to replace¬ ment by changed descendants or to actual de¬ cadence and disappearance of types. Study of the phenomena of elimination sheds much light on the nature of life and the general evolution¬ ary course. Also, the fossil record peculiarly lends itself to such a study, being so largely a record of extinctions.

The particular reasons for the extinction of animals and plants are not always obvious and may be very difficult of interpretation. Barring some factors to be mentioned later, the same variations of environment and most of the forces of selection considered as necessary to the production of new species are also powerful agents in the extermination of established forms. The history of many species may be compared to that of an individual. It has its birth, its growth, its decline, its death. Also, the laws of evolution show that many other species undergo modifications or changes which ultimately transgress or supplant the original assemblage of specific characters, so that a new species results by a process of mutation. Fur¬ thermore, many other species, while retaining their strictly specific characters, may be trans¬ lated into different genera through modifica¬ tions of their generic characters.

The continuance of a species depends upon its harmony with its environment. A perfectly stable and continuous environment is obviously a

natural impossibility. The physical conditions of any region of the earth are in a state of con¬ stant change, sometimes very gradual and ex¬ tending over long periods of time, sometimes sufficiently rapid to be measured by ordinary standards. The organic agencies surrounding any species are also not permanent ; migrations are continually going on ; the areas occupied by various organisms are being extended or re¬ duced; periods of excessive or repressed fecun¬ dity often occur ; there are times of abundance and scarcity of food, increase and diminution in the number of enemies, and so on. Any ma¬ terial change in the physical or organic environ¬ ment must produce a readjustment among the individuals composing a species ; their number may be lessened or increased, or they may be forced into conditions of life which produce changes in habits, place or abode, food, func¬ tion, structure or organs.

The study of a geographic life-province shows that the organisms inhabiting it are in the state of a moving equilibrium. Minor changes in the physical conditions, as slight differences in temperature, moisture, elevations, etc., may be compensated for by a readjustment

among the organisms themselves. In some cases this readjustment may be favorable to many of the species, while in others it may initiate changes which ultimately result in ex¬ tinction. More profound changes in the physical environment necessarily produce a greater effect upon the animals and plants, and may result in the extermination of many and the considerable modification of others, so that a distinctly transmuted fauna and flora would occupy the region.

The forces already mentioned, though opera¬ tive to a greater or less degree, are not believed to affect so immediately the equilibrium of a species or the general equilibrium of a biotic province as the invasion of new species, either by extension, migration or evolution. The struggle for existence amid gradually changing physical conditions alone is not so aggressive as the invasion of a new assemblage of plants and animals ; for in the former the struggle is the normal result of the physical and organic forces of an environment in which the adjust¬ ments have been made and an equilibrium reached; in the other there is the direct addi¬ tion of a new set of opposing forces, requiring the immediate readjustment of both invading and invaded organisms.

A census of the animals and plants of any region will show a great variation in the num¬ ber of individuals representing the various spe¬ cies.

Some are abundant, some common, while others are rare. Now, since the normal im¬ pulse of the individuals of each species is to increase inordinately, the fact that some are of rare occurrence shows that forces are at work tending to check their multiplication, and the relative rarity of a species, as compared with others of the same genus, is taken as an indica¬ tion of approaching extinction.

The development of spines, thorns, prickles or horns on animals and plants has been shown by the writer to represent an advanced stage of evolution within the type, as well as the degree of differentiation of the organism, the ratio of its adaptability to the environment and the measure of its vital power. The study of the life histories of spinose forms shows that they are simple and inornate during their young stages, and their phylogeny shows that they were all derived from non-spinous ancestors. It is further believed that spines represent an extreme of superficial differentiation which may become fixed in ontogeny, and also that spinosity repre¬ sents a limit to morphological and physiological variation. Therefore, after attaining the limit of spine differentiation, spinose organisms leave no descendants, and out of spinose types no new types are developed.

The factors as above partly noted affecting the continuance or life of a species may be di¬ vided into two classes: (1) those residing within the individuals of a species itself (intrin¬ sic), and (2) those extraneous to the species (extrinsic). The action of either the intrinsic or extrinsic factors tends to result either in ex¬ tinction or in the mutation of a species into an¬ other form. In both cases a specific type dis¬ appears or is eliminated, although only in the first instance is the species exterminated in the sense that it has left no descendants. Within the limits of this article but little more than a descriptive statement of these principal factors can be attempted. It should also be borne in

mind that there is an overlapping and interde¬ pendency among the factors, causing them to react upon each other. Thus, an unfavorable environment due to change of climate may affect the food (extrinsic), which in turn may affect the vitality of the species, possibly re¬ sulting in degeneracy (intrinsic). Likewise, parasitism and disturbances in symbiotic rela¬ tionships produce far-reaching, complex effects.

Intrinsic Factors of Extinction. — Under this head may be considered such factors as (1) lack of power of adaptation; (2) lack of vitality; (3) overspecialization; (4) old age (gerontic stage of evolution) ; (5) pathologic condition; (6) degeneracy; (7) inbreeding; (8) mutation. When a species cannot accom¬ modate itself to changes of climate, food, etc., or in any way becomes fixed, it must perish un¬ less it can find a suitable and constant environ¬ ment — a physical impossibility. The waning vitality so

plainly expressed by many species must be considered as evidence of approaching extinction. Such species usually occupy re¬ stricted geographic provinces, they are generally not numerically abundant, and their powers of reproduction are more or less retarded or re¬ pressed. An animal or plant which becomes so specialized that it can live only under certain peculiar conditions stands a chance of extermi¬ nation whenever the harmony of these condi¬ tions is disturbed. Thus a plant which depends upon a certain species of insect for its fertiliza¬ tion will succumb if the insect seek's other food or is itself extirpated from any cause. Also, an animal depending solely upon a species of plant for food, or requiring a certain elevation or range of temperature for its continuance, will be exterminated when these are disturbed, unless it can adapt itself to the change. Spe¬ cialization in general is manifested by the de¬ parture of organs or sets of organs from what is normal to the class. It results in the extreme differentiation of previous structures, or in their suppression, generally due to disuse or re¬ straint, and also in a perversion of their orig¬ inal function. It has been shown by the study of many instances of extinct species preserved in the rocks of past geological periods, that each species has its period of birth, youth, maturity and old age, which often may be recognized by distinctive individual or numerical characters ; so that whenever a species can be shown to possess what are known as gerontic or old-age characters it can be safely predicated that its extinction is near at hand. Pathologic char¬ acters in a species, indicate the same conditions as disease in an individual, and point clearly toward extermination. Adverse conditions may affect the entire fauna and flora of a region, producing dwarfed, depauperate and pathologic species. Their history is usually very brief and their places are taken by organisms in accord with the environment. Retrogressive evolution indicates that the race has not only ceased to advance, but is declining. The history of any genetic line of species shows that whenever retrogressive characters appear and constitute dominant features the rapid decline and ex¬ tinction of forms possessing them is imminent. The reduction of species numerically, and its restriction within narrow geographic limits, lead to inbreeding and the consequent impair¬ ment of virility. The small herds of European bison preserved by the Russian government in

the forests of Lithuania and the Caucasus are rapidly declining, both numerically and in vital¬ ity, due almost wholly, according to recent re¬ ports, to inbreeding. Each species now exist¬ ent must have had an ancestor from which it has been derived through one or more of the many processes of evolution. Some of these ancestral types may be still living,

while others are extinct. Going back to past geologic times (for example, to the Carboniferous) each spe¬ cies was derived by evolution from ancestral species. Both the ancestors and all the species once living in the Carboniferous are now ex¬ tinct. Life, however, was continued on into the next age through modified descendants of a percentage of true Carboniferous species. The rest were exterminated and left no descendants. In the first instance it is extinction by mutation and in the second extinction by extermination. It seems probable that ever since the earth has been fully tenanted with a varied life there has been a fairly constant ratio at all times between the number of species just exterminated, the number of primary species originating by the mutation of ancestral forms, the number of species arising by the special differentiation of the primary species, and the number of species adapting themselves to the changes which are dominant during the succeeding geologic period.

Extrinsic Factors. — Agencies outside of the organism itself which in their operation may cause extermination of species may be grouped under the following heads: (1) Unfavorable physical environment; (2) changes affecting the food-supply; (3) preponderance of enemies; (4) the agency of man; (5) cataclysms. A physical environment which can properly be considered unfavorable must act on the individ¬ uals of a species in an adverse manner, and necessarily the result is deleterious to its con¬ tinuance. The unfavorable characters of the environment may be various, as too high or too low temperatures, excessive moisture or dry¬ ness, unsuitable altitude, storms, winds, pol¬ luted and sediment-laden waters, etc., any of which if not normal to the requirements of the organisms will have a repressive effect on their growth and multiplication. The persistence of these inhibitory conditions will generally cause the speedy extinction of the species. The life of any organism is so dependent upon the sta¬ bility of the food-supply that any change which seriously affects the kind and amount of food reacts immediately upon the species which rely upon it for sustenance. The extinction of a species from any cause involves either the ex¬ tinction of the organisms dependent wholly upon it, or their adaptation to new conditions. Such of these as have lost their plasticity, either from high specialization or gerontic develop¬ ment, will perish. The invasion of any prov¬ ince by a new fauna or by a new flora or by both combined will initiate a struggle f or su¬ premacy of occupation which will drive out some species, exterminate others and modify still others. In these changes the food is an important element in determining the success or failure of a species to maintain itself. On the other hand, abundance of food leads to sluggish habits and tends to produce increase in size. In this way may be explained the preva¬ lence of many large contemporaneous species of reptiles in the Mesozoic, and of large mam¬

mals at different epochs in the Tertiary. This increase in size exposed them

to increasing danger from starvation, from changes in cli¬ mate and from competition with smaller active and more numerous animals. It is difficult to estimate how far in some cases the extinction of a species may have been due to the invasion of noxious bacteria or other parasitic organ¬ isms. It can only be predicated that their rav¬ ages are sometimes of such a nature that the ranks of a species are thinned out to the verge of extinction, and it is quite possible that ac¬ tual extermination occasionally has occurred through this cause. Dr. Falconer believed that insect enemies have prevented the increase and extension of the elephant in India, and Darwin likewise stated that the increase of large quad¬ rupeds in some parts of South America was prevented by insects and blood-sucking bats. It is doubtful, however, whether these agents were ever the primary and sole causes of the extinction of any large animal. The most vul¬ nerable point of attack in the extermination of large animals is their young or their eggs. Ani¬ mals of large size usually lay few eggs or bring forth very few young, and usually at infrequent intervals. The eggs or the young are easily destroyed by small creatures that would be powerless before the full-grown animals. The downfall of the great reptiles at the end of the Mesozoic has been explained by Morris as due (1) to the lack of care reptiles in general take of their eggs or young; (2) to the smaller num¬ ber of eggs laid by the large species as com¬ pared with the smaller, whose continued exist¬ ence in some measure is owing to their fecun¬ dity; and (3) to the progressive development of the mammals into egg-eating and predaceous placental forms of higher intelligence, at the close of the Mesozoic.

Agency of Man. — Man, being the dominant organism of the existing fauna and flora, has since his establishment had an increasing effect in the restriction and extension of contempo¬ rary plants and animals. As compared with the ordinary forces of nature, which in general work in an almost imperceptible manner when measured by human standards, man's influence has been incisive, profound and very rapid. He has been the only animal that has attempted to conquer nature in an intelligent manner for his own ends. Noxious animals and plants have been persistently attacked until many of them through reduction in numbers or by extinction have ceased to be a menace to his well-being. His inordinate greed has also led him to ex¬ terminate harmless useful animals by wholesale slaughter, chiefly because they offered little or no resistance, and also from a false notion that nature's resources are inexhaustible. (See Extinct Animals). Along with man's con¬ scious destruction of life, he has indirectly and without purpose accomplished the extermina¬ tion of species to which he was wholly indiffer¬ ent. This fact necessitates the division of this topic into two parts: (1) organisms directly exterminated by man, and (2) organisms in¬ directly exterminated by man. It is well known that the remains of early prehistoric man are found associated with the bones of

extinct ani¬ mals. Among these may be mentioned the mam¬ moth, mastodon, cave-bear, cave-hyena, sabre- toothed tiger, Irish elk, woolly rhinoceros, the giant birds of Madagascar and New Zealand,

and many others. While it is impossible to as¬ sert positively that their extermination was due wholly to man, yet undoubtedly man was one of the most powerful agents. Otherwise it is difficult to account for the disappearance of an animal from a continent that in some parts, at least, would furnish the proper climate and food for its continuous existence, from the time of primitive man down to the historic period. Even with the crudest of weapons, man with his superior cunning and intellect could successfully wage a war of extermination on such animals as the mammoth and mastodon by a method already mentioned; namely, that of killing the young.

Coming now to within the historical period, there are quite a number of well-authenticated cases of the extermination of species that can be traced directly to man as either the principal or sole agent. A few instances will be men¬ tioned in this connection, and the list could be easily extended. Probably the best-known example of an animal exterminated by man is the dodo (q.v.), a large flightless bird related to the dove, formerly living on the island of Mauritius. Its clumsy helpless condition made it an easy prey, and the introduction of cats, dogs and pigs into the island hastened its extermination. On the islands of Rodriguez and Bourbon of the same group were found the solitaire (q.v.) and at least two other species of birds related to the dodo. They also soon disappeared after man's occupation of the is¬ lands. The great auk (q.v.) formerly ranged from the northeastern coast of the United States northward to the Arctic regions, and thence along the shores of northern Eu¬ rope. It was at one time extremely abundant, but the last two individuals seen were taken near Iceland in 1844. The great northern sea- cow (q.v.) and Pallas cormorant, natives of the Commander Islands, became extinct near the close of the 18th century. The disappear¬ ance of the ure-ox from Europe is also well knowm. When the Bermudas were first settled in 1612, a food-bird known as the cahow bred in almost incredible numbers on several of the smaller islands. By 1616 it was almost exter¬ minated, and a reference to the bird in 1629 states that it no longer existed. Singularly enough no remains of this bird were discov¬ ered until about 1913 when several cahow skeletons were found in the Bermudas by the naturalist, A. E. Verrill. The sickle-bill, a bird formerly used for making the royal robes in the Sandwich Islands, is now no longer liv¬ ing, having been hunted to extinction.

The introduction by man of various species of plants and animals into a region where they formerly did not exist has in some cases pro¬ foundly changed the native fauna and flora. A single well-authenticated illustration will suffice, though many more could be adduced. The is¬ land of Saint Helena was discovered about the year 1506, and at that time was densely cov¬ ered with forests. In a little more than 300 years, fully five-sixths of the island had become entirely barren, and, as reported by Dr. Hooker, most of the existing vegetation was not indige¬ nous but consisted of plants introduced from Europe, Africa, America and Australia. These exotic species, together with the goats, were carried to the island through the agency of man.

The goats destroyed the forests by eating the young plants, and the native vegetation could not compete in the struggle with the introduced species. It is estimated that 100 peculiar and indigenous species were extirpated in this man¬ ner, and all record of them is lost except a few species preserved in the Kew herbarium.

Besides the species already exterminated by man, it should be noted that many others were once abundant and widespread that are now re¬ duced in numbers and restricted in range. Their final extinction seems to be a matter of a few years only. Among these may be mentioned the American buffalo, the fur-seal, the beaver, the elephant and the big-tree of California.

The violent catastrophes of nature seldom affect more than a very limited area of the globe, and species that are cosmopolitan or of wide geographic distribution would not be in danger of extermination. When, however, it is realized that some species are so restricted in their province as to occupy a single valley or a small island, then it is easy to believe that at rare intervals some great and sudden up¬ heaval, subsidence, hurricane or volcanic out¬ break may have destroyed all the individuals of certain localized species, if any such were within the area of disturbance. A West Indian hurri¬ cane in 1898 is believed to have totally destroyed a species of humming-bird peculiar to the is¬ land of Saint Vincent, though it is doubtful whether the great eruption of Krakatoa in 1883 and of Mont Pelee in 1902 exterminated a single species of animal or plant.

A review of the various causes of extermina¬ tion shows that on account of their diversity and often extremely slow action it is difficult in any particular case to explain the total disap¬ pearance of a species unless a detailed knowl¬ edge can be obtained of the principal agencies affecting in any way the harmony of its sur¬ roundings or its ability to maintain its numbers in its natural province.

Bibliography. — Bailey, (The Survival of the Unlike5 (1896) ; Beecher, (The Origin and Significance of Spines) (in the American Jour¬ nal of Science, 1898) ; Cope, (The Primary Factors of Organic Evolution 5 (1896) ; Cramp- ton, (A Suggestion on Extinction (in Proceed¬ ings of the Royal Physiological Society, Edin¬ burgh, 1901) ; Darwin, (Origin of Species 5 (1866) and

(Anthropology5 (1878) ; Verrill, (The Ber¬ muda Islands5 (Transactions of the Connecticut Academy of Arts and Sciences, 1901-02) ; Wal¬ lace, (The Geographical Distribution of Ani¬ mals5 (1876).

Charles Emerson Beecher (1856-1904).

Revised by G. R. Wieland.

EXTORTION, in general, the taking from another of something through illegal compul¬ sion. It has been defined as a technical term of the common law to be (

common law, the offense is a misdemeanor pun¬ ishable by fine and imprisonment, and subject¬ ing the guilty person to removal from office. In the New York Penal Code extortion is de¬ fined as ((the obtaining of property from an¬ other, with his consent, induced by a wrongful use of force or fear, or under cover of official right.® Consult Encyclopaedia of Pleading and Practice) (Vol. VIII, 23 vols., Northport, N. Y.,

1894-1909).

EXTRA-UTERINE GESTATION. See

Pregnancy.

EXTRACT, a term to denote all that can be dissolved out of a substance by a specified menstruum, such as water, alcohol, ether, etc. In modern pharmacy the term is applied to two kinds of preparation from vegetables. One is obtained by digesting the plant in water or other solvent, and evaporating or distilling away the excess of solvent till the extracted matter is sufficiently inspissated. The other is obtained by bruising the plant in a mortar, separating the juice, warming it till the green coloring matter separates, and filtering it off. The juice is next heated till the albumen coagu¬ lates, and again filtered. The juice is now evap¬ orated to a syrup, the green coloring matter added and well mixed, and the evaporation is thereafter continued till the required concentra¬ tion is attained. Extracts must be capable of being redissolved, so as to form a solution like that from which they were derived. Extracts are used in cookery, medicine and the manu¬ facture of perfumery.

EXTRACT OF MEAT is a soft, yellow¬ ish-brown, solid or very thick syrup, which is employed as a portable soup. It is now manu¬ factured on the large scale by processes pro¬ posed by Liebig. Finely chopped flesh is ex¬ hausted with water, the extract is heated, when, at 133° F., albumen coagulates; afterward the blood coloring matter also separates, and when these are removed and the clear liquid is evap¬ orated at a low temperature, the extract is ready. This substance has a characteristic odor of roast meat, has a strong taste, dissolves in water, and forms a not unpalatable soup, with¬ out, however, nutritive value. It contains no fibrin, gelatine, albumen or fat, but creatine, inosic acid and other organic bodies are present, and it is especially rich in potassic salts and in phosphoric acid. It has the invaluable property of not spoiling by keeping; and has been exten¬ sively used by travelers, explorers and by ex¬ peditionary forces. Consult (Meat Extracts and Similar Preparations* in Bulletin 114, Bu¬ reau of Chemistry, United States Department of Agriculture.

EXTRADITION is the surrender of a criminal who has escaped from a territory un¬ der one government and taken refuge in a terri¬ tory under another government. Extradition has two specific meanings in the United States. In the first place it refers to the surrender by one State government of a criminal who seeks asylum from another State of the Union in which he is held to be guilty of a heinous crime. (See Extradition, Interstate). In the second place, it refers to the surrender of a criminal by one nation to another. The demand for ex¬ tradition made by one nation of another is a matter of international law, and implies merely

the control to be exercised by one nation over the right of affording asylum claimed by an¬ other. The Jay Treaty of 19 Nov. 1794 with Great Britain specified for powers of extradition during a period of 12 years. After its expira¬ tion in 1807 no provisions for international ex¬ tradition were renewed until 1842 when the Ashburton treaty of 9 August of that year with Great Britain was concluded, in which extradi¬ table offenses were enumerated. France on 9 November was the next country to enter into a treaty of extradition with the United States, since when treaties have been arranged with some 24 foreign governments providing for the mutual extradition of criminals, fugitives from justice, charged with heinous crimes, among which are enumerated robbery, burglary, arson, rape, embezzlement and the making and cir¬ culation of counterfeit money. In order to justify a claim for extradition, it is necessary to establish that the supreme political authority in the country where the crime has been com¬ mitted has made a demand for the criminal's surrender; that an inquiry has been made into the facts of the case by a judge or United States commissioner, under direction of the President, in cases where the demand comes to the United States government from abroad; that a complaint be made on oath before the judge or commissioner; that a warrant be issued by the judge or commissioner for the apprehension of the party charged ; that the charge be sup¬ ported by suitable evidence ; that a certificate be sent to the President of the United States signed by the commissioner, and stating that the charges are sufficiently well grounded to warrant a surrender; that such certificate so satisfy the President that he grant the writ of surrender.

The British extradition act of 1870 makes special provision that no criminal shall be sur¬ rendered for a political offense, and that the criminal shall not be tried for any but the crime of which he was demanded. In 1890 an ex¬ tradition treaty was ratified between Great Bri¬ tain and the United States extending somewhat the list of extraditable offenses in the direction of the commercial crimes of fraud and em¬ bezzlement. Consult Moore's (Treatise on Ex¬ tradition and Interstate

Rendition (1891) ; Clark, E., (1884).

EXTRADITION, Interstate. The New

England Confederation of 1643 provided for mutual extradition of criminals between the different provinces; the Articles of Confedera¬ tion did likewise ; and the Constitution pro¬ vides for it between the States, which, are independent countries in all save the functions they have resigned to the general government. But the wording of the provision, though as definite as it can safely be made, leaves room for the widest difference in construction, and the evasion of the mandate in a large share of the cases that arise. It is : <(A person charged in any State with treason, felony, or other crime , who shall flee from justice and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having

jurisdiction of the crime.® But must the offense be a crime by the law of the State requisitioned as well as of the State demanding? The ju¬ dicial decisions say decidedly no — that <(the obligation to surrender the fugitive ... is the same as if the alleged act was a crime by the laws of both.® On the other hand, the State executives, for obvious reasons, have stubbornly refused to tie their hands from exer¬ cising discretion, and have again and again acted on the theory that the offense must be a crime by the law of their own State. Thus, in the Dorr Rebellion (q.v.), Governor Cleveland of Connecticut refused to extradite Dorr — though Dorr was actually using Connecticut soil to organize an attack on Rhode Island — on the ground that the latter's treason laws were not valid outside itself; and Governor Seward of New York refused to surrender persons charged with stealing slaves (though his predecessors had done so), on the ground that it was not a crime by New York law, by common law or the common consent of civilized nations. Even the principles of decision are not agreed upon. In some States the courts hold that the courts of the State making the demand are entitled to decide as to the sufficiency of the cause ; in others their own courts make their own law without regard to that of the other States. Still another question is, whether the governor has any discretion in the matter, supposing his State law to demand extradition. The answer is somewhat startling; it is, that the governor legally has no discretion, that he is imperatively bound to issue the warrant, but if he does re¬ fuse, there is no power to compel him and no punishment for the refusal. The Constitution, in other words, has issued an imperative man¬ date with no provision for its enforcement. In¬ deed, it is difficult to see how there could

be any; the only remedy being a State impeach¬ ment of its executive for malfeasance, which is out of the question in such cases. The forms of interstate extradition are provided in the act of 1793. The accused must be indicted in the State where the offense is committed; if the magistrate before whom the charge is brought is satisfied of its truth, he issues a warrant for the arrest of the criminal, and a copy is forwarded to the executive of the State, who makes requisition for the fugitive's surrender on the executive of the State to which he has fled. If the latter is satisfied of the legality of the process and the sufficiency of the evidence of guilt, he is to issue a war¬ rant for surrender; but habeas corpus proceed¬ ings may always be interposed. The expense of the proceedings and transportation is borne by the State making the demand.

EXTRAORDINARY RAY. See Light.

EXTRATERRITORIALITY, in interna¬ tional law, the privilege granted to citizens of foreign powers of being exempt from the laws of the land of their abode and, in general, of enjoying the rights and privileges of their country of origin. In general, the right to ex¬ ercise state authority and state law is limited to the territory of the state in question and a strict limitation of this view would place all persons within a state under the laws of that state, to the exclusion of all other laws. In the common intercourse between nations and peoples there have grown up certain well-rec¬

ognized and clearly-defined exceptions to the exclusive exercise of state authority. These exceptions are in favor of sovereigns or heads of foreign states, their official representatives, officials performing certain duties by authority of a foreign state and with the consent of the state in which they operate, public vessels and their crews, citizens of Europe or America in certain Oriental countries, and public armed forces passing through a foreign territory. Ex¬ traterritoriality is the ordinary term used to designate the immunity from local jurisdiction enjoyed by these classes, such immunity vary¬ ing according to the official character, or ac¬ cording to the state. Immunities are custom¬ ary when granted to certain official person¬ ages in any foreign state and conventional in the case of other persons, whose treatment is regulated by agreement.

The head of a foreign state is accorded complete exemption from local jurisdiction. His person is inviolable, nor is he liable to any laws. His suite are accorded equal privileges. Should he or members of his suite abuse these privileges the remedy is to request him or them to leave the country, or to expel them in ex¬ treme cases.

Official representatives of a foreign state, such as ambassadors, are granted immunities similar to those accorded the head of their state, are inviolable,

exempt from civil and criminal jurisdiction, enjoy freedom of wor¬ ship, right of asylum and jurisdiction over their official personnel.

Consuls are usually granted such immunity as enables them to perform their functions, in¬ cluding limited exemption from taxation, ex¬ emption from military service and jury duty, inviolability of office and archives. ,

Public vessels, when in the territorial waters of another state, are subject only to the neces¬ sary harbor regulations for safety, anchorage, etc. The personnel are exempt from local juris¬ diction while in the performance of their duties.

Citizens of European and American states have been granted special exemptions in cer¬ tain Asiatic countries. Turkey after 1535 granted almost total exemption from local juris¬ diction to citizens of France and other Euro¬ pean powers. (See Capitulations, Turkish). In other states of non-European civilization, such as China, Persia, Siam, Morocco and Japan, the same principles were applied as to Turkey. In 1899 Japan became a member in full of the family of nations when extraterri¬ torial rights other than those of officials were abolished. In non-European countries several of the European states have developed elabo¬ rate judicial systems with jurisdiction over the persons and places exempt from local jurisdic¬ tion. (See International Law; Nationality; Sovereignty). Consult Moore, J. B., (Digest of International Law (1906) ; McLaughlin and Hart, (Cyclopedia of American Govern¬ ment (New York 1914).*

EXTRAVAGANTES, two collections of decretals and constitutions of popes which were made up subsequent to 1317. Before .the Ex- travagantes the Canon Law comprised the Decretum of Gratian (about 1150), the Liber Sextus (1298), the Clementince (1317) and sev¬ eral other official collections of papal decretals. No further collections were made by papal com-

mand, nor were any further collections officially promulgated ; nevertheless, two collections were made by jurists, the Extravagantes of John XXII and the Extravagantes Communes; and these, though lacking official promulgation, came in time to be recognized as part of the Canon Law. The Extravagantes of John XXII consist of constitutions of that Pope only; the E. Communes comprise decretals of several popes between 1281 and 1484. The Extrava¬ gantes are so called because they wander out beyond (extravagantur) the limits of previous collections. Consult Bickell,

J. W., < fiber die Entstehung und den Heutigen Gebrauch der Beiden. Extravagantensammlungen des Cor¬ pus Juris CanonicP (Marburg 1825).

EXTRAVAGANZA, eks-trav-a-gan'za, in music and the drama, a species of composition designed to produce effect by its wild irregular¬ ity and incoherence; differing from a burlesque in being an original composition and not a mere travesty. See Drama; Stage.

EXTRAVASATION, in contusions and other accidents, occurs when blood vessels are ruptured by the injury and the blood finds its way into the neighboring tissues. A good illus¬ tration may be found in an ordinary bruise, when the part becomes blue in consequence of the vessels having been ruptured and blood hav¬ ing escaped into the tissues. Extravasation in the cranium is a most serious accident, as the pressure on the brain which is the result often produces death very rapidly. The term is, how¬ ever, applied to the escape of any fluid into the tissues from the vessels or cavity containing it.

EXTREME UNCTION, a sacrament of the Roman Catholic Church for the bodily and spiritual comfort of the sick whose death is deemed to be imminent. The words of the apostle Saint James in his epistle, ch. v, 14, 15, «Is any among you sick,® etc., are interpreted as relating to this sacrament. The unction therefore is administered to the sick and to those only who are in danger of death from sickness or from injury or accident; hence, it is not administered to persons under sentence of death, nor to those about to undergo a dan¬ gerous surgical operation, or the like ; nor to persons bereft of their reason; neither is it administered to children who have not reached the age of reason; for the principal end of this sacrament is, not restoration of bodily health, but forgiveness of sins. <(If he has committed sins they shall be forgiven him,® In the pas¬ sage from Saint James are found all the essen¬ tial conditions of a sacrament, namely, the ((outward sign,® to wit : the anointing and the prayer of faith ; and the ftinward grace,® typi¬ fied by the outward sign, namely, forgiveness of sins. The divine institution of this sacra¬ ment is implied in the words of the epistle of Saint James where it recommends its use and declares its efficacy for the remission of sins. Nevertheless extreme unction is not adminis¬ tered save after the person has made confession of his sins and received absolution in the sacra¬ ment of penance. In administering extreme unction the priest performing the ceremony must use olive oil that has been consecrated by the bishop; he dips the thumb of his right hand into it and, by marking them with the sign of the cross, anoints the organs of the five senses, pronouncing at each anointing the

words, (

EXTRUSION. See Volcanism ; and sec¬ tion on Volcanism in article on Geology.

EXUMA, eks-oo'ma, Great and Little,

two of the Bahama Islands. The Great Exuma is 30 miles long and 3 miles wide and has a good harbor. Little Exuma has also a good harbor. The two islands together with Exuma 'Keys have an area of about 150 square miles. Pop. 3,465.

EYAS, i'as, in falconry (q.v.), a hawk reared from the nest.

EYB, ib, Albrecht von, German author: b. Franconia 1420;, d. 1475. He was educated at Pavia and was made archdeacon of Wurz¬ burg at the age of 29. He afterward was in the service of Pius II. In 1472 appeared his ˆhestandsbuch, a work on marriage, of which there have been frequent reprints. A re¬ cent edition is that of Hermann (Berlin 1890). Consult Hermann, (Albrecht von Eyb und die Friihzeit des deutschen Humanismus* (1893).*

EYCK, Ik, Hubert van, Flemish painter: b. Maaseyck near Liege, Belgium, 1365 ; d. Ghent, 18 Sept. 1426. It has been claimed that he and his brother Jan were the inventors of oil paint¬ ing. For transparent and brilliant coloring and minute finish their works have never been sur¬ passed. Their masterpieces are for the most part in Ghent, Bruges, Antwerp, Berlin, Munich and Paris. The only painting that can now certainly be assigned to Hubert is the altar- piece with folding doors, (The Adoration of the Lamb, begun by him and finished by Jan, and afterward presented to the cathedral of Saint Bavon, Ghent, where only the two central di¬ visions now remain, the wings being in the gal¬ lery at Berlin, with the exception of those representing Adam and Eve, which are in the Brussels Museum. The number of authentic works painted by the brothers is 24, but the number of attributions at auctions between 1662 and 1912 is over 400. Consult Weale, (John and Hubert Van Eyck* (1908 and 1912).*

EYCK, Jan van (also called Jan van Brugge, or John of Bruges), Flemish painter;

b. Maaseyck about 1381 ; d. Bruges, 9 July 1441. Hubert (q.v.) gave him his first instruction in the principles of the art, and his talents were so

rapidly and vigorously developed that he soon surpassed his brother. The two resided at Bruges, then much frequented by the noble and the wealthy on account of its flourishing com¬ merce. About 1420, or soon after, they went to Ghent for a considerable time, to execute to¬ gether a work which Jodocus Vydt, a Flemish noble, had engaged them to do. This is the celebrated (Adoration of the Lamb) for the cathedral of Ghent; a painting which contains above 300 figures, and is a masterpiece. It is painted on wood, with side panels which con¬ tain the portraits of the two artists and also of their sister Margaret, who it is now believed never had a corporeal existence.

The reputation of this celebrated painter be¬ came very notable, even during his lifetime, by his great share in the introduction of oil paint¬ ing; the original invention of which has been incorrectly ascribed to him by many. It was a general custom, before his time, to have for the background of the picture a flat gold ground, from which the figure stood out with¬ out perspective, as may still be seen in number¬ less works of earlier date. Van Eyck followed this practice in his earlier efforts, but, as he made further advances in his art, conceived the idea toward which there had been hitherto only some distant advances of giving a more natural grouping and perspective to his figures by a natural background. In this he succeeded so eminently, as many of his still remaining works prove, that he may be called in this respect the father of modern painting, since he gave the art a new turn and impulse, and laid the foundation of that high degree of improvement which it afterward attained in the brightest era of the great masters who succeeded him in the Nether¬ lands and in Italy. In the art of painting on glass he is considered as the author of the mode of painting with colors delicately blended and yet so firmly fixed that obliteration was impos¬ sible — an object before attained only by joining together (in mosaic) several small panes of dif¬ ferent colors. The school of which he was, in some measure, the founder, does not yield in celebrity to the best contemporary or succeeding artists, although it must be allowed to be often defective in the representation of the ex¬ tremities of the human body — a fault oc¬ casioned by that excessive delicacy which pre¬ vented the study of naked forms, and of anatomy in general. On the other hand, the face, dresses, grouping, distribution of light and shade are always superior, and the color brilliant and splendid, in the works of the painter and most of his scholars. Many of his paintings are still preserved, either in churches and museums, or in private collections.

EYDE, Samuel, Norwegian chemist and inventor : b. Arendal 1866. He was educated in his native country and also in Berlin. He was a practising engineer in Norway, Sweden and Germany. With Dr. Christian Birkeland of Christiana, he set about producing fertilizers from the air (nitrogen) and limestone by elec¬ tricity. After a long experimental stage the idea was

reduced to practice in 1903, when they began to manufacture the fertilizer with three men and a small motor. Within the following 10 years Eyde had plants aggregating 200,000

horse power, employed 400 chemists, engineers, etc., and about 14,000 other employees. The output of his works reached 2,000 barrels of Norway saltpetre per day. In 1914 he acquired another plant with 200,000 horse power. Notod- den, Saaheim and Eydehavn are now towns supported entirely by these new industries. The war of 1914 hindered development along the lines mapped out by Eyde but gave a great impetus to the manufacture of explosives to which much of the capacity of the plants was diverted as early as May 1915.

EYE, the peripheral organ of vision. It re¬ ceives light-energy, transforming it into nerve stimulus, which latter is transferred to the brain by means of nerve fibres.

Anatomy and Physiology. — The human eye has in general a spherical form, with a segment of a smaller sphere superadded ante¬ riorly. The average antero posterior diameter is 24.26 mm. ; transverse diameter 23.7 mm. The eyeball of a man is slightly larger than that of a woman. The middle point of the cornea is called the anterior pole, diametrically opposite to which on the sclera is the posterior pole. The line of union between the two poles is the geometric axis. The equator of the eye is a circle equidistant from the poles. (Fig. 1).

Fig. 1. — Horizontal section of the eyeball.

A shallow, circular furrow (sulcus sclerae externus), filled out with conjunctiva, separates the transparent cornea from the opaque sclera. The cornea is elliptical in shape, the horizontal diameter of 12 mm. being slightly greater than the vertical diameter. Between the margin of the cornea and the equator are the insertion lines of the recti muscles. (Fig. 2).

*Posteriorly the optic nerve, with its sheaths, forms a cord, 5 mm. in diameter. Around the nerve some 20 arteries (short posterior ciliary arteries) enter the sclera to supply the chorioid. (Fig. 6). On either side of the nerve, in the horizontal meridan, the long posterior ciliary artery with its nerve pierces the sclera and enters the perichorioidal space. The posterior part of the globe has been called the arterial half, because here nearly all the nutrient blood enters the eyek»n TK**

blood leaves by way of the venae vorticosae — two superior and two inferior, just behind the equator. (Fig. 3).

The eye is composed of a variety of tissues, and is divided into three main zones according to its development. The posterior zone, the largest, extends from the entrance of the optic nerve to the insertion lines of the recti muscles. Here begins the middle zone, the anterior limits of which are marked by the sulcus sclerae ex- ternus. The narrow anterior zone embraces cornea and iris. The cornea and sclera make up the firm, fibrous capsule of the eye, lending form and shape and protecting the delicate inner layers from injury.

There are four principal coats to the eye¬ ball, i.e., (1) sclera and cornea (fibrous

capsule) ; (2) chorioid (vascular layer) ; (3) pigment epithelium; (4) retina. (Fig. 7). In the posterior zone all four coats are easily separated from one another. In the middle zone the sclera undergoes no change, but the other three coats are transformed into one organ, the ciliary body. In the anterior zone the sclera becomes differentiated into the cornea; while elements from the chorioid, pig¬ ment epithelium and retina form the iris.

The contents of the eyeball are the vitreous, the lens and the aqueous. In that part of the eye occupied by the aqueous the iris is sus¬ pended, dividing it into an anterior and a poste¬ rior chamber. (Fig. 1).

On its inner surface the sclera is separated from the chorioid and ciliary body by the perichorioidal space. All the blood vessels and nerves supplying the nvea (that is chorioid, ciliary body and iris) pass through the sclera in canals — emissaria. The sclera is divided into three layers — episclera, containing blood vessels of its own and having more loosely arranged bundles ; sclera proper, with its dense texture and the absence of vessels, and the lamina fusca, characterized by the appearance of chromatophores — branched connective tissue cells, containing pigment granules. (Fig. 7). In general, the scleral tissue is that of a tendon. In the sclera the bundles run in every direction, while in a tendon the bundles are parallel with one another. The fixed cells lie between the bundles. Posteriorly the sclera is continuous with the sheath of the optic nerve; anteriorly it goes over into the cornea. (Fig. 1). The narrow zone of transition between the cornea and sclera is spoken of as the limbus.

The cornea occupies about one-sixth of the circumference of the eyeball, (Fig. 1). It contains no blood vessels, but is nourished by lymph from loops of blood vessels adjoining it. The cornea is strongly curved, and has a weak refractive power because it is thinner in the centre than at the periphery. It

has five layers (from without inward) — (1) Epithelium ; (2) Bowman's Membrane; (3) Stroma; (4) Desce- met's Membrane; (5) Endothelium.

The epithelium of the cornea is a stratified pavement epithelium of some five or six layers. The basal cells lying on Bowman's membrane are tall cylindrical cells. In the second layer the cells become rather cuboid in shape. From the third layer on they grow flatter, until those of the surface layer are exceedingly flat. The superficial flat cells present a perfectly smooth and even surface, giving the cornea its bril¬ liancy and lustre. Between the epithalial cells

are minute nerve endings, endowing the cornea with exquisite sensibility. Bowman's membrane contains no nuclei. It has a smooth anterior surface, while posteriorly it merges with the stroma, of which it is considered a modified part.

The Stroma — substantia propria — com¬ prises about 90 per cent of the cornea. It is made up of connective tissue lamellae, running

Fig. 2.

in all directions. Between the lamellae are the fixed corneal cells. Leucocytes wander into the cornea, and into the epithelial layers, and are called wandering cells, in contradistinction to the fixed cells. The stroma is covered on its posterior surface by the homogeneous, elastic membrane of Descemet. This is a true mem¬ brane having two sharply defined contours. It is of cuticular formation, being the product of the

underlying endothelium. It increases in thick¬ ness with age. A single layer of endothelial cells lines not only Descemet's membrane but extends over the trabeculae at the angle of the anterior chamber onto the anterior surface of the iris.

Opposite the external scleral furrow, on the internal surface of the fibrous coat of the eye, is another circular depression — sulcus sclerai

interim's. This is partly filled by a loose mesh- work, triangular in shape, going over from the cornea to the iris. To the scleral side of the meshwork one finds an irregular lumen — the canal of Schlemm. (Fig. 1). This lies pro¬ tected in the sclera on all sides, except its inner wall which comes in contact with the aqueous. The aqueous finds its way into the canal by a process of filtration. On the scleral side of Schlemm's canal tiny vessels go

off, conveying the aqueous directly into the neighboring veins.

The perichorioidal space is but a narrow cleft, traversed by delicate lamellae extending from the chorioid and cilliary body .to the sclera. The chorioidea — vascular layer of the eye — is a thin brownish membrane, divided into three layers, (1) vessel layer, (2) capillary layer (choriocapillaris) and (3) lamina vitrea. (£%. 7). The vessel layer comprises the

greater part of the chorioid. In the connective tissue supporting the vessels are numerous chromatophores, giving the chorioid the tessel¬ lated appearance seen with the ophthalmo¬ scope. Most characteristic of the chorioid is the capillary layer, forming a stratum of ca¬ pillaries for the nourishment of the pigment epithelium and much of the retina. The thin, transparent lamina vitrea, like Descemet's mem¬ brane, is of cuticular formation — the product of the overlying pigment epithelium. The pig¬ ment epithelium is an expanse of one single layer of hexagonal cells, present everywhere from the optic nerve to the pupillary margin. Each hexagonal cell gives off a number of proc¬ esses which project inward among the rods and cones.

The retina (Fig. 7), fourth of the principal layers of the eyeball, is a soft transparent mem¬ brane, extending from the optic nerve to its jagged anterior margins — the ora serratea — opposite the insertion of the recti muscles. At the anterior and posterior margins the union between the retina and adjoining structures is firm, but elsewhere the retina is held to the pig¬ ment epithelium only by the above mentioned processes. Therefore, the retina is very prone to detachment. Some 3.5 mm. to the temporal side of the optic nerve and slightly below the horizontal meridan is the fovea centralis. Anatomically this is a flattened funnel-like depression, caused by the absence of nearly all elements of the retina except the cones. (Fig. 1). The term macula lutea (yellow spot) refers to the orange color seen in anatomic study of this part of the retina.

The following layers compose the retina (Fig. 7), named from without inward; (1) layer of rods and cones; (2) membrana limi- tans externa; (3) outer nuclear layer; (4) outer plexiform layer; (5) inner nuclear layer; (6) inner plexiform layer; (7) ganglion cell layer; (8) nerve fibre layer; (9) membrana limitans interna. . The layers are connected partly by extensions from the individual ele¬ ments and partly by a supporting framework — the fibres of Mueller.

The rods are cylindrical structures ; the cones flask-shape. Both possess a thinner outer half and a thicker inner part. The rods con¬ tain the visual purple, which bleaches out readily in the cadaver but regenerates in the

dark when the relationship to the pigment epithelium is undisturbed. The cones are found in all parts of the retina ; in the fovea

there are no rods. The membrana limitans externa is a very delicate sieve-like membrane, having a perforation through which each rod and cone sends a prolongation to its own nucleus in the outer nuclear layer. The outer plexiform layer is essentially a supporting layer, composed of proximal portions of rods and cones on the one side and of fine extensions from the inner nuclear layer of the other side. The inner nuclear layer contains the nuclei of Mueller's fibres and nerve cells. There are also larger cells in this layer provided with Nissl's granules. The sixth layer, inner plexiform layer, resembles the outer plexiform layer and belongs to the supporting tissue. The ganglion cells of the next layer are multipolar and send off numerous dendritic processes into the under¬ lying inner plexiform layer. The nerve-fibre layer, with its neuroglia cells, is composed of afferent and efferent fibres passing to and from the optic nerve. In this layer the larger vessels of the retina are lodged. Finally, the very thin glass membrane — membrana limitans interna — separates the nerve-fibre layer from the vitreous.

The retina is composed of three neurons, or nervous units, named as follows in the sense of their conduction. The rods and cones, with the outer nuclei, belong to the first neuron. This unit serves for the reception of the indi¬ vidual light impressions. The nerve cells among the inner nuclei form the second unit. These cells come in contact with elements from the first and third neurons. The latter is repre¬ sented by the ganglion cells, the axis cylinders of which reach through the optic nerve, the chiasm, and optic tract to the brain.

The rods and cones, outer nuclear layer and part of the outer plexiform layer are nourished by the chorio-capillaris. All the other layers have a vessel system of their own in branches of the arteria centralis retinae and veins of the same name. The blood vessels are the only elements in the retina of mesodermic origin; all else is derived from the ectoderm. In the peripheral portions of many eyes one encounters peculiar cavities due to cystoid de¬ generation. These are the spaces of Lessing or Ivanoff's retinal oedema.

The optic nerve (second cranial) unites the retina to the brain. (Fig. 2). That portion of the nerve lying within the wall of the eye is termed bulbar or intraocular. The orbital or retrobulbar portion lies between the eyeball and the canalis opticus. Another division is into a medullated and non-medullated portion. At the lamina cribrosa the medullary sheaths cease ; in consequence the nerve-fibre layer of the retina has no sheaths of Schwann, and is trans¬ parent. The cord is surrounded by three sheaths ; outer, dura

mater ; middle arachnoid ; and inner, pia mater — all continuous with the membranes of the brain. Between the dura and the pia is the intervaginal space. This is divided by the arachnoid into two cavities, an outer, subdural, and an inner, subarachnoid. Both communicate with spaces of the same name in the cranium. The pia mater closely invests the nerve substance sending numerous trabeculae among the nerve-fibres and separat¬ ing them into incomplete bundles. About 20 mm. behind the eyeball the central artery and vein of the retina enter the nerve at right angles and continue in its axis to the retina.

They are surrounded by connective tissue car¬ ried in with them from the pia mater. The nervous element is composed of extremely nu¬ merous fibres estimated at half a million or more, with its own supporting framework the glial cells. The lamina cribrosa is the per¬ forated space in the sclera for the entrance of the nerve fibres.

The circular area in the inner opening of the optic nerve canal, corresponding to the area of the lamina cribrosa, is called the disc or papilla. This space, consisting of conducting fibres only, receives no , impressions, and is known as Mariotte's blind spot. The, cupping or hollow¬ ing of the disc may be physiological, or patho¬ logical as in glaucoma. An arterial ring — Circle of Zinn — surrounds the optic nerve en¬ trance into the sclera.

The ciliary body, with a breadth of 5 or 6 mm., forms a girdle around the eyeball, cor¬ responding to the middle zone. It is divided into a flat, broader posterior part — orbiculus ciliaris — which is succeeded anteriorly by a system of some 70 processes — corona ciliaris. Between the ciliary processes are the ciliary valleys.

In the equatorial region, in the supracho- rioidal lamillae smooth muscle fibres make their appearance, developing anteriorly into the ciliary muscle — or muscle of accommodation. The outer bundles of the muscle run in a meri- dianal direction. This is replaced inwardly by a system of circular bundles — Mueller's muscle. In myopia the meridianal bundles are more developed; in hyperopia the circular bundles.

A layer of blood vessels covers the inner surface of the muscle, being a direct continua¬ tion of the chorioid. Over this vascular layer the lamina vitrea of the chorioid and the pig¬ ment epithelium spread out. The innner sur¬ face of the ciliary body is lined by a single layer of epithelium —

which represents the retina. This ciliary epithelium is everywhere very uneven, due to tiny elevations and depres¬ sions to which it clings — the whole arrange¬ ment forming the reticulum of Heinrich Muel¬ ler. Lastly, the membrana limitans interna comes forward to clothe the ciliary epithelium, just as it clothes the retina posteriorly. The ciliary epithelium secretes the aqueous and has largely to do with the nourishment of the lens and vitreous.

The iris has its insertion on the anterior surface of the ciliary body. (Fig. 1). Severed from connections it has the form of a circular plate — like the diaphragm in optical instru¬ ments. The outer margin is the ciliary border. The circular opening in the middle is the pupil. This latter is located slightly to the nasal side. The anterior surface is divided by a zig-zag line 1.5 mm. from the pupillary margin, into an inner, pupillary zone, and an outer ciliary zone. Trabeculae of connective tissue, containing ves¬ sels traverse the iris, converging toward the centre, like the spokes in a wheel. Depressions between the trabeculae are termed crypts. In the ciliary zone running circularly are the con¬ traction furrows, corresponding to the creases in the palm of the hand. The lesser arterial circle of the iris is situated under the zig-zag line. It is formed by an anastomosis from the radiating vessels which enter the root of the iris. These radiating vessels are derived from the greater arterial circle of the iris, which is

located in the vascular layer of the ciliary body. (Fig. 3). The greater arterial circle is in turn derived from an anastamosis of branches from the two long posterior ciliary arteries. When the stroma is delicate the sphincter muscle may be seen as a whitish band, 1 mm. in width, immediately adjoining the pupillary margin.

The stroma bearing the blood vessels and comprising the bulk of the iris is a continuation of the chorioid, by way of the vascular layer of the ciliary body. The pigment epithelium re¬ mains the same ; while the ciliary epithelium takes on pigment ; so that the structures poste¬ rior to the iris are protected from the light by two strata of highly pigmented cells. The sphincter and the dilitater muscles are of ectodermic origin formed by a differentiation of the pigment epithelium. Other muscles of the body are of mesodermic origin. The posterior surface of the iris has a very delicate system of radiating and circular markings.

The iris varies greatly in individuals. When the stroma is loose and sparse and contains few chromatophores the result is the blue iris, because the black pigment epithelium through the delicate veil anteriorly appears bluish — the blue eye. When the stroma is heavy and the chromatophores numerous we have the brown iris,- here the chromatophores deter¬ mining the color. Aside from the color, there is, therefore, an anatomical difference

— the blue iris being the light thin one; the brown iris the heavy thick one.

Vitreus, corpus vitreum, is a transparent jelly-like substance consisting of an exceedingly delicate meshwork, the interstices of which are filled out by fluid. It has the transparency of water — may be felt in a basin of water but not seen. It contains no blood vessels, no nerves, and depends for its nourishment on adjoining structures, principally the ciliary body. A canal beginning at the front of the papilla extends to the lens — Cloquet's canal. The fibrillae making up the stroma of the vitreus have their origin just anterior to the ora ser- rata, on the orbicularis ciliaris. Diseases of the ciliary body readily affect the vitreus.

The crystalline lens lies in a della — fossa pa- tellaris — on the anterior surface of the vitreus. (Fig. 1). It is a transparent body, having the shape of a biconvex lens. The centre of the anterior surface is designated the anterior pole, a similar point on the posterior surface of the posterior pole. The lens capsule is a typical glass membrane, like that of Descemet or the lamina vitrea of the chorioid. Lining the inner surface of the anterior capsule is a layer of cuboid ' epithelial cells. At the equator of the lens these elongate to form the lens fibres. Those layers of the lens substance next to the capsule comprise the cortex. At the centre is a harder, denser mass, the nucleus. The lens grows larger throughout life tc make room for the ever-increasing number of lens fibres within its body.

Posteriorly the lens is held to the anterior border layer of the vitreus by a firm union in the shape of a ring — Ligamentum hvaloideo capsulare. The zonular fibres are the main sup¬ port of the lens. They are structureless, non- nucleated fibres, clear as glass. They are firmly attached to the ciliary body on the one side and to the anterior and posterior surface

of the lens, near the equator, on the other side. (Fig. 1).

The cornea and lens are the media of the eye principally concerned in the transmission of light to the retina and in the formation of images upon it. The rays of light striking the cornea are refracted to pass through the pupil. The lens now brings them to a focus on the retina, producing an inverted image. The lens by the action of the cilliary body adjusts itself to focusing objects at different distances — accommodation. When the ciliary muscle con-

Fig. 4.

tracts the lens increases its convexity and shortens its focus, as in the act of reading. At about 45 years of age the lens, owing to the sclerosis of its fibres, begins to lose its elasticity. This is the condition of presbyopia — old sight. In myopia the focal image is formed in front of the retina, usually due to too great length of the antero-posterior diam¬ eter of the globe. In hyperopia the eyeball is too short. Astigmatism is the condition in which the rays of light do not converge to a point on the retina. It is ordinarily due to inequality of curvature of the cornea (or lens).

By the field of vision we mean the space in which one can see, while steadily gazing at a point in the direct line of vision. The field does not extend regularly in all directions. It

Fig. 5.

reaches farthest toward the external side, where it extends over 90°. The field for colors grows smaller in the following order: blue, red and green. Defects in the visual field are termed scotomata.

The orbit is the pyramidal cavity in which the globe lies. Its walls are formed by seven bones of the face; namely, frontal, sphenoid, ethmoid, nasal, lacrimal, superior maxillary, and palate bones. These bony walls separate the orbit from the following cavities: the in¬ tracranial, the frontal, the nasal, and the

antrum of Highmore. Diseases of the sinuses frequently involve the orbit. The anterior opening of the orbit is its base. Here the walls become thickened into .a strong bony rim — margin of the orbit — to defend the eyeball against injury. At the upper margin of the orbit is the supra-orbital notch for the passage of artery and nerve of the same name. At the lower margin is another notch for the infra¬ orbital artery and nerve.

The globe is lodged in the orbit in a cushion of fat, and is held in place by connective tissue, the ocular muscles, and the eyelids. The periosteum of the orbit extends over its margin anteriorly to form the fascia tarso-orbitalis. Surrounding the posterior two-thirds of the eyeball, the connective tissue of the orbit be¬ comes condensed into a capsule (Tenon's capsule above mentioned). (Fig. 2).

Posteriorly the orbit has three apertures : (1) optic foramen for the optic nerve and ophthalmic artery; (2) superior orbital fissure, opening into the middle fossa of the skull and transmitting nerves for the ocular muscles and the first branch of the trigeminus; (3) the inferior orbital fissure, connecting the orbit with the temporal fossa and serving for the passage of the second branch of the trigiminal nerve. Near the apex of the orbit is the ciliary

ganglion, for the supply of the ciliary muscle and iris. Abnormal protrusion of the eye is exophthalmus. Absence of the bulb is anoph- thalmus.

The ocular muscles are divided into extrinsic and entrinsic muscles. The latter are the dila¬ tator and the sphincter pupillae. There are six extrinsic muscles, four recti and two obliques. The four recti muscles and the superior obliques have their origin around the margin of the optic foramen (Fig. 5), and diverge as they come forward to form the muscular funnel. The four recti muscles are attached by short tendons, to the sclera, 7 to 9 mm. from the cornea (Fig. 4).

The oblique muscles have a more compli¬ cated course. The superior oblique runs along the upper inner wall of the orbit to send its tendon through the trochlea and thence back¬ ward to its insertion in the upper half of the eyeball behind the equator. The inferior oblique arises near the lower inner margin of the orbit anteriorly and goes backward to its insertion behind the equator about in the horizontal meridian. (Fig. 4).

The muscles are innervated by three nerves. The oculo-motor nerve supplies the internal, superior and inferior recti, and the inferior oblique. Also the levator palpebrae superioris and the two interior muscles of the eye, (sphincter pupillae and ciliary muscle) are innervated by it. The external rectus has the abducens nerve ; the superior oblique the troch¬ lear. The nuclei for these various nerves lie upon the floor of the fourth ventricle.

By the action of the extrinsic muscles we use both eyes synchronously and have binoc¬ ular vision. Disturbance of the muscular bal¬ ance causes diplopia, because images are thrown on non-identical parts of each retina. Ortho¬ phoria is normal balance of the eye muscles. Strabismus, squint, is the condition in which only one eye fixes an object at a time. Par¬ alysis of the ocular muscles is opththalmoplegia.

The eyelids are in origin folds of skin

(Fig. 2), which have pushed their way over the bulb to protect it. The eyebrow, super- cilium, limits the upper lid, while the lower lid passes without any sharp line of demarkation into the cheek. The palpebral fissure separates the two lids. Temporarily the lids join each other at a sharp angle — external canthus. The inner canthus is of horse-shoe shape, embracing a small fleshy growth — the caruncle. The sur¬ face of the lids next to the globe is lined by a mucous membrane — palpebral conjunctiva. When the eyelids are shut the entire conjunc¬ tiva forms a closed sac. Each lid is

supported by a dense connective tissue plate — the tarsus. The upper lid is elevated by the levator palpe- brae superioris, which has its origin at the apex of the orbit, and is inserted into the tarsus. The orbicularis palpebrarum closes the lids. This is a flat, cutaneous muscle surrounding the palpebral fissure in the form of a circle. Drooping of the upper lid is called ptosis.

The lacrimal gland, organ secreting the tears, is situated in a depression in the upper, outer wall of the orbit, near the margin. Smaller accessory glands are located along the inner margin of the upper tarsus. The tears con¬ tain but a small amount of solids, principally sodium chloride (hence salty tears). Psychic weeping occurs only in man. After removal of the gland the eye is kept moist by the secre¬ tion of the conjunctiva. Through the puncta the tears pass into the canaliculi and thence into the lacrimal sac. The latter is contracted below the nasal duct, emptying into the inferior meatus of the nose. Only when the secretion is much increased does any great quantity of tears discharge into the nose. Inflammation of the tear sac is called dacryocystitis. At the free margin of the lids there is a narrow strip — inter-marginal space — where the conjunctiva and the skin merge. The anterior margin is rounded and has swinging from it the cillia. The posterior margin is very sharp. Just in front of it is a row of orifices, mouths of the meibomian glands — sebaceous glands — em¬ bedded in the tarsal plates. They secrete oil to prevent the tears from running onto the cheeks. The modified sweat glands of Moll empty into the follicles of the lashes.

Fig. 6.

Comparative Anatomy. — In man the eve

attains its highest state of development. The farther we descend the scale of animal life the simpler the eye and the more restricted its

functions. In the lower orders there are eyes which distinguish between light and darkness only. In the higher orders, as the vertebrata, the eyes perceive more or less perfect images.

V

Corp vitr

V

Chonoidea

Suprachor.

0

Sclera,

Me mb. limit. 7 eict.

8. Lam. vitr. A- \ CHOP i'Choriocapill-

Fig. 7.

In many unicellular organizations — animals and plants, bacteria and protozoa — sensitiveness to light is a property of the body as a whole. In the more highly organized, multicellular animals certain cells have the function of re¬ sponding to light, all others having lost it. The simplest form of visual organ consists of an epithelial cell connected \vith a nerve fibre. The cell has the power of transforming light into another form of energy that can be con¬ ducted along the nerve fibres to a central nerve organ. The eye of man is essentially reducible to an enormous number of sensory epithelial cells united to form the retina and optic nerve. These latter are the necessary parts of the eye, with the formation of which the development of the eye begins. All other parts of the eye develop later, and are designed for nutrition, protection or optical purposes. Thus the cornea and sclera protect the delicate retina, while the chorioid nourishes it. The cornea and lens refract the light and the iris, by means of its pupil, regulates the amount of light. Man and the higher animals are endowed with two eyes. Most insects and some crustaceans have two complete eyes with a number of single supernumeray ones. Some mollusks have as high as several hundred eyes which lie along their mantle.

Diseases of the Eye. — The morbid changes of the eye and its appendages vary according to the site of the disease. The causes of dis¬ eases are in a general way physical, me¬

chanical, chemical or parasitic. The eye is very tolerant to radiant heat, because the media of the eye, which contain a large amount of

water, absorb the heat rays, and do not per¬

mit them to reach the retina. Injury to man by ultra violet rays in sun light occurs only under very unusual circumstances. Snow blind¬ ness is due to the erythema of the lids caused by the ultra violet rays, with consequent conjunc¬ tivitis and photophobia. Injuries to the eye¬ ball are of two kinds

— the direct and the in¬ direct. In direct injury the damage done de¬ pends upon the nature of the instrument — as when a knife perforates the globe only tissues in contact with the blade are harmed. But when the globe is struck by a baseball or stone, in¬ direct injury, the harm done depends more on the anatomy of the organ. For instance, a se¬ vere blow on the cornea may cause detachment of the retina, rupture of the chorioid, or dis¬ location of the lens. Foreign bodies entering the globe are received with different degrees of tolerance. Thus, organic substances, as cilia or particles of wood may become incapsulated, causing no subsequent trouble. But steel in the interior of the globe becomes oxidized by the fluids and being deposited in the uvea causes siderosis bulbi. Hence the importance of its speedy removal. Copper, of all foreign substances in the globe, is the least tolerated. A small chip is sufficient to produce violent in¬ flammation and loss of the eye. The trau¬ matic uveitis in one eye caused by a per¬ forating wound sometimes produces a similar disease in the uninjured eye — sympathetic in¬ flammation.

The most frequent systemic diseases giving rise to ocular disturbances are syphilis, tubercu¬ losis, rheumatism, nephritis, diabetes, arterio¬ sclerosis, diseases of metabolism and chronic in¬ toxications. Between the ages of 5 and 15, in inherited syphilis, the cornea often becomes the seat of a cellular infiltration with new-formed blood vessels — the salmon patch — interstitial keratitis. Those afflicted with the disease usu¬ ally exhibit a peculiar formation of the face and head. The bridge of the nose is sunken in. The frontal eminences are very prominent. The incisor teeth are abnormally shaped (Hutchin¬ son's teeth). Frequently there is accompanying hardness of hearing. Bad teeth are not infre¬ quently the cause _ of ocular symptoms and disease — as chronic iritis, — which clears up when the mouth receives proper attention. Other foci causing ocular disorders may be located in the tonsils, accessory nasal sinuses and intestinal tract. Acromegaly exhibits many ocular manifestations, as hypertrophy of the margins of the orbit and thickening of the skin of the lids. The accompanying disease of the pituitary body causes characteristic bitemporal hemianopsia. <(Graves Disease® produces exophthalmus, sometimes so great that the lids can no longer cover the eyes. Acquired syphilis is responsible for at least 25 per cent of all cases of iritis. Atrophy of the optic nerve is found above all in tabes. It usually develops in the initial stage of tabes, at a time when the ataxic symptoms are slight or absent. Another

eye symptom which likewise makes its appear¬ ance early in this disease is the Argyll-Robert- son pupil, in which the pupil reacts to accommo¬ dation and convergence, but not to light.

Many cases of impaired vision (ambly¬ opia) and of blindness (amaurosis)

are due to poisons introduced into the system which affect the optic nerve. Chief among these poisons are alcohol and tobacco, alone or combined. Other poisons causing amblyopia are lead, quinine and chloral. Nephritis (Brights Disease) may cause oedema of the lids and albuminuric retinitis. Diabetes produces cata¬ ract and hemorrhages in the retina.

Bibliography. — Fuch's (Text Book of Ophthalmology } (Philadelphia 1917) ; Week's (Diseases of the Eye) ; Salzmann, (Anatomy and Histology of the Human Eye-BalP (Chicago 1912) ; May, (New York 1914).

Bernard Samuels, M.D., New York City.

EYE STRAIN, the result of using the eyes under adverse conditions. It is occasioned frequently by a lack of balance of the ocular muscles, but may be due also to the use of im¬ proper glasses or to the need of glasses. Its effects are serious; it is a great cause of waste of nerve force, causes headache, hysteria, chorea, convulsions, etc. It is remedied by proper glasses or by surgical operation.

EYEBRIGHT, a common name for the plants of the genus Euphrasia (q.v.).

EYEPIECE, the lens or system of lenses in any optical instrument which lies next the eye and enables the image formed at the focus of the instrument to be observed. Its purpose is to form the image of a large field by pencils which, since they must enter the pupil of the eye, are necessarily of small divergence. Eye¬ pieces are usually made of two lenses. The lens nearer the eye is called the eye-lens, the other the field-lens. In the Ramsden eyepiece, eye-lens and field lens are equal and plano¬ convex, and have the convex sides turned toward one another. In the Huygens eyepiece the field-lens has a larger focal length than the eyepiece, and the curved surface of both lenses are turned toward the object. These eyepieces are used both for microscopes and for telescopes and give inverted images. For erect images, as in opera glasses, a convergent eye¬ piece is used, or where a larger field of view is desired the inverting eyepiece of an ordinary telescope/is used to magnify an image which is itself inverted by a convergent system of lenses between the objective and the eyepiece proper, or by a system of two right-angled reflecting prisms, as in the Zeiss binocular.

EYERMAN, John, American geologist : b. Easton, Pa., 15 Jan. 1867. He studied at La¬ fayette College, Harvard and Princeton, and was instructor in blow-piping at Lafayette 1888- 93 and lecturer on determinative mineralogy. He has been an associate editor of the Ameri¬ can Geologist since 1890, and is a member of many English and American scientific societies. He has published (Notes on Geology and Mineralogy) (1889); (

Mineralogy of Pennsyl- vania) (1891) ; (Course in Determinative

Mineralogy > (1892); < Bibliography of North

American Vertebrate Paleontology (1889-93) ;*

EYESIGHT IN THE LOWER ANIMALS

683

cThe Genus Temnoeyon) (1895) ; (1898); (1898) ; (The Old Grave Yards of Northamp¬ ton' (1889-1901) ; (Some Letters and Docu¬ ments' (2 vols., 1900) ; (Genealogical Studies)

(1902).

EYESIGHT IN THE LOWER ANI¬ MALS presents some curious differences from that in man and his nearer allies. The rudimentary eyes of the lower invertebrates can hardly be of more service than to convey an impression of the difference between day and night; many such come out of the ground, or rise to the surface of the sea, at night to sink again into darkness when the sun rises. In echinoderms, the starfishes for example, eyes are found that contain (

thousand facets, often approach close to a per¬ son and hover there, evidently studying the de¬ tails of the moving object (one's self) that has attracted their attention.

Vision among fishes is adapted to the medium in which they live, and varies from total atrophy of the eyes in subterranean waters and sea-abysses to eyes so large as to equal half the head. The relative size and position of the eyes in the head varies with habits in a bewil¬ dering degree, as fishes depend largely on eye¬ sight for finding food and escaping enemies. Those that creep along the bottom, or dwell at intermediate depths, for instance, have the eyes on top of the head, looking upward; but to catalogue these adaptations would require a long essay. In most of the families the eyes are so situated in the side of the head that "the vision is monocular — that is, only one eye can be used at a time for viewing an' object. The species that chase fleeing prey, however, can look forward with both eyes. Such eyes need to change the focus rapidly, and this quick ac¬ commodation to distance is not effected by an alteration of the convexity of the lens, as in birds and mammals, but by a muscular change in its position with regard to the retina. The structure of the fish-eye is substantially the same as that of the human eye, with the important exception that in all deep-sea fishes only the rods (see Eye) exist in the retina, the cones being ab¬ sent; the conclusion is that these fishes do not

*perceive color, which seems to be the special function of the cones. Furthermore, a differ¬ ence in the retina of the deep-sea fishes and other creatures indicates that these animals are ((day blind,)) that is, have eyes adapted to the * gloom in which they constantly live and are blinded by the glare of a strong light. It ap¬ pears, however, that there is no regular de¬ crease in size of the eye, from a small or nor¬ mal form at the surface to the immense and well-developed eye that characterizes many of the fishes dwelling in the oceanic abysses. The pelagic fishes with largest, most efficient eyes, are those living at a depth of from one to 300 fathoms and possessing light-organs, while below that stratum both light-organs and eyes decrease in size until the deep floor of mid¬ ocean is reached, when again big-eyed species occur. The only present explanation of the latter fact is that those abysses are lighted by the glow of innumerable phosphorescent inver¬ tebrates, by whose light the fish seek their food.*

Little need be said of the vision of am¬ phibians and reptiles, which is probably rather dull and restricted. These animals, like many fishes, depend more on the sense of smell than on sight to guide their actions, and have, in addition, good hearing

Vision of Birds. — The power of vision at¬ tains its highest development among birds ; and nowhere but in human faces is the eye so ex¬ pressively beautiful or so exquisitely adapted to its service as an optical instrument. Birds possess the keenest and most farsighted vision, and also extraordinary power of swiftly alter¬ ing the focus of the eye to changing distances, accompanied by astounding acuteness in mental calculation. A swallow or nighthawk sweeping and dodging in the air is catching insects almost invisible to our eyes and excessively agile; a

hawk chasing a swift-winged and quick-turning sparrow or a leaping grasshopper must have eyes that can follow exactly every movement. More wonderful is the work of an eagle or vulture, which while soaring so high in the sky that it appears to us a mere speck sees and de¬ fines an object on the ground that we could hardly notice or recognize at a hundred yards, and darts down upon it with the speed of a bullet. Imagine the farsighted keenness of this act and then the perfection of the apparatus by which the focus of the eye is changed in accord with the speed of the bird's descent, keeping the object always in clear view and stopping at precisely the right instant to escape collision. A hummingbird will dash past one's eyes like a gleam of light and halt at rest on a twig without fail. A woodcock or partridge will rush at high speed through a tangled wood and never touch a

twig. These feats are evi¬ dence of the perfection of birds' eyes, especially in the faculty of accommodation to quickly varying distances.

Eyesight among mammals is relatively less important than among birds, or even to man¬ kind, for their alert hearing and keen sense of smell give them much information. Vision among them varies with their manner of life, and is restricted to their needs in each case. The most farsighted and useful vision, prob¬ ably, is that of the large grazers on the plains — deer, antelopes, giraffes, horses, etc., al¬ though they use but one eye at a time. The beasts of the chase, like owls among birds, have eyes in front, so that they observe with both at once, and of these perhaps the wolves, foxes and wild hunting dogs are best endowed. Here as elsewhere structure of the eye and quality of vision are in adaptation to the habitual needs of each kind of animal, and are always correlated with the power of loco¬ motion.

Ernest Ingersoll.

EYETEETH, CANINE or CUSPIDATE TEETH, two teeth in the upper jaw, the fangs of which project in the direction of the eye. See Teeth.

EYLAU, How, or PRUSSIAN EYLAU,

Germany, town on the Pasmar River and the lake of Arschen, 22 miles south of Konigsberg. It was the scene of a battle, fought 7-8 Feb. 1807, between the French under Napoleon (q.v.) on the one side and the allied Russians and Prussians on the other side. (See Ney). The French force numbered about 70,000, of whom fully 18,000 were killed. The allied forces were about the same in numbers, with a loss of more than 18,000. Pop. about 3,000.

EYLAYET. See Vilayet.

EYMERICUS, Nicolas, Spanish theo¬ logian: b. Gerona, Catalonia, 1320; d. 1399. In 1334 he entered the Order of Preachers, later attaining the rank of Grand Inquititor. He also was appointed chaplain to Pope Greg¬ ory XI and judge of heretics in 1356. He lived many years at Avignon during the reigns of Clement VI and Benedict XIII. He was the author of the severe (Directorium Inquisitorum, which was the standard code of procedure in the Inquisition for nearly one hundred years.*

EYNARD, a'nar, Jean Gabriel, French banker: b. Lyons, 1775; d. 1863. For his partic¬

ipation in the outbreak at Lyons against the Convention, Eynard became persona non grata tc the authorities and sought aslyum in Switz¬ erland and later in Genoa, where he amassed a fortune. In 1810 he removed to

Geneva, and was Ambassador of the Geneva Republic at the Congress of Vienna in 1815. In the follow¬ ing year he helped to organize the administra¬ tion of Tuscany, which he represented at the Congress of Aix-la-Chapclle in 1818. He ad¬ vocated the independence of Greece and for his services to this cause was made a Greek citizen. His personal contribution to the Greek revolu¬ tionaries amounted to Fes. 700,000 ($140,000). His recommendation of Otho of Bavaria for the throne of Greece was adopted. He be¬ queathed his fortune of about $12,000,000 to various charitable enterprises. He wrote (Let- tres et documents officiels relatifs aux divers evenements de Grece) (1831) and (Vie de la baronne Krudener) (1849). Consult Roth- pletz, (Der Genfer Jean Gabriel Eynard als Philhellene) (Zurich 1900).

EYRE, ar, Edward, American financier : b. Dublin, Ireland, 25 March 1851. He was edu¬ cated at the Jesuit school, Belvidere Place, Dr. Quinn's Preparatory School, and at Trinity Col¬ lege. He entered the employ of Grace Brothers and Company, becoming junior partner in 1876 and full partner four years later. He was one of the original founders of Grace House, Chile, in 1882, and became successively manager, vice- president and president of the W. R. Grace Company, New York, in 1903-06. Since 1906 he is a member of the board of managers of the London branch of W. R. Grace Company. Mr. Eyre took prominent part in bringing about a settlement of Peru's foreign debt after the war with Chile, and for some time was mana¬ ger of the railroad systems handed over by Peru to its creditors. In 1892 he negotiated with Chile for the settlement of the claims against her made by the holders of the Peru¬ vian bonds, due to the seizure by Chile of the guano deposits and other properties which formed part of the guarantee of the bonds from Peru. In 1898 Mr. Eyre, on behalf of an American syndicate, obtained from Nicaragua a concession for the construction of an inter- oceanic canal through that country, the project being subsequently held up by the government of the United States; the text of this conces¬ sion was used later by the United States gov¬ ernment in its treaty with Colombia and appears almost verbatim in the treaty actually concluded between the United States and the Republic of Panama. Mr. Eyre was a member of the board of directors of (The Catholic Encyclo¬ paedia^ and the. council of the Westminster Catholic Federation and is an ex-president of the Marquette League. He published a criti¬ cism of Viscount Bryce's (South America: Ob¬ servations and Impressions.

EYRE, Edward John, English explorer and colonial governor : b. Yorkshire, 5 Aug. 1815; d. Tavistock, Devonshire, 30 Nov. 1901. He went to Australia in 1833; in 1839 dis¬ covered Lake Torrens, and in 1840 explored its eastern shores and the adjacent Flinders Range. He then commenced his perilous journey along the shores of the Great Australian Bight, and reached King George's Sound, in western Aus¬ tralia, a distance

of 1,200 miles, accompanied by

a single native boy, having left Adelaide more than a year before. In 1845 he published Ex¬ peditions into Central Australia. > After filling several governorships he was appointed govern¬ or of Jamaica in 1862. In 1865 he was con¬ fronted with a negro rebellion which he crushed with some severity, and was recalled. On his return to England John Stuart Mill and others took measures to have him indicted for murder, but failed. In regard to this question Carlyle was one of his most strenuous defenders.

EYRE, Sir James, English jurist: b. Wells, Somersetshire, 1734; d. 1 July 1799. In 1747 he was appointed scholar of Winchester and two years later became a student of St. John's College, Oxford. In 1753 he went to London, took up the study of law, and in 1755 was called to the bar. He became counsel to the Corpora¬ tion of London and recorder in 1763. In 1772 he was made Baron of the Exchequer and knighted, becoming chief Baron 15 years later. In 1793 he was made chief justice of the Court of Common Pleas. From June 1792 to Jan. 1793 he was chief commissioner of the Great Seal. Consult Foss, (Lives of the Judges of England (1848-64).*

EYRE, Jane. See Jane Eyre.

*EYRE, Jehu, colonel in the Continental army: b. 10 Jan. 1738; d. July 1781. Eyre is the name of a family that for seven centuries has been famous in the English history, the founder having come over the sea with Wil¬ liam the Conqueror. The legendary account states that when, at the battle of Senlac, or Hastings, the Norman leader, early in the con¬ flict, was knocked by a missile off his horse, he lay senseless on the ground, until a soldier stepped forward and loosened his visor, which gave him air. Thereupon William, reviving, asked for his benefactor and knighted him on the spot, giving him the name of ˆeyre** — one of the variants of a word that is older than English spelling. In the feudal division of land, this Norman Baron le Eyr — whose crest was a leg in armor, couped and spurred, he having lost a leg in the battle — was given a fief in Nottingham, the manor house being at Rampton. The family is now extinct in the peerage. The first American ancestor, George Eyre, coming from Worksop, settled at Burlington, N. J., and married in a family of Friends. He had three sons who, in the Revolution, became ˆFree** or ˆHickory**

Quakers and were prom¬ inent in the service of the Continental Con¬ gress. Coming to Philadelphia to learn ship¬ building, two of the sons married sisters, the daughters of their master.

On the fall of Fort du Quesne and its re¬ naming after Pitt, Jehu Eyre traveled with a party of his mechanics to build boats for the transportation of the King's forces down the Ohio. While there, he learned about cannon and artillery, visiting also BraddocCs Field — then piled with the bones of the slain. After the Lexington news, he organized in Philadel¬ phia a military company, which guarded Inde¬ pendence Hall. Besides providing boats for the crossing of the Delaware, he took part in the battle of Trenton and Princeton; in which latter, his younger brother, Colonel Benjamin George, was aide to Washington. In 1777, Jehu was made colonel of an artillery regiment which served at Brandywine, wintered at Valley Forge,

and garrisoned the forts on the Delaware, while Proctor, with his artillery, was away on Sulli¬ van's Expedition (q.v.). He left five children. Consult Keyser, (Pennsylvania Magazine of History and Biography (1879).

William Elliot Griffis.

EYRE, Wilson, American architect : b. Florence, Italy, 30 Oct. 1858. He was educated in Italy until 1869, at Newport, R. I., from 1869 to 1872, at Lenoxville, Canada, from 1872 to 1874, and at the Massachusetts Institute of Technology, where he was graduated in 1876. From 1876 to 1881 he was with James P. Sims and from 1881 to 1912 was in independent practice. In the latter year he became senior partner with John G. Mcllvaine. He has built many buildings in Philadelphia and New York, also several buildings for Newcomb Memorial College, New Orleans, the Detroit Club, Detroit, etc. He is a member of the American Institute of Architects, the National Academy, etc.

EYRE LAKE, a salt lake of South Aus¬ tralia, lying due north of Spencer Gulf, 35 feet below sea-level, in the driest part of the continent, where the rainfall is only five inches per annum. Area 3,706 square miles. During Mesozoic times, a large gulf extended from the Gulf of Carpentaria to Lake Eyre. Its southern arm usually contains salt water; the remainder is a vast salty plain formed from alluvium carried down by the large rivers of Central Australia which now enter it only at flood time.

EYRIA (i'n-a) PENINSULA, on the

south coast of South Australia, triangular in shape, its base being formed by the Gawler Range, while its sides are washed on the south¬ east by Spencer Gulf, and on the southwest by the Great Australian Bight. It is a

rich wheat¬ growing country.

EYTELWEIN, I'tel-vin, Johann Albert,

German engineer: b. Frankfort-on-the-Main, 1764; d. 1848. In 1799 he became director of the Berlin Architectural School ; afterward he was placed in charge of the hydraulic operations for improving the navigation of the Niemen, Oder, Warthe and Weichsel. He also had charge of harbor improvements at Memel, Pil- lau and Swinemiinde. He established a system of weights and measures for the kingdom of Prussia. His works include (Praktische Anwei- sung zur Bauart der Faschinenwerke an Fliis- sen und Stromen) (2d ed., 1818) ; (Verglei- chung in den preussischen Staaten eingefiihrten Masse und Gewichte) (2d ed., 1910) ; (Hand- buch der Statistik fester Korper) (2d ed., 1832) ; (Handbuch der Hydrostatic (1826) ; (Auflosung der hohern numerischen Gleichun- gen) (1837).

EYTH, Eduard, ed'oo-ard It, German poet: b. Heilbronn, Wiirtemberg, 2 July 1809; d. New Ulm, 28 April 1884. He was author of a volume of

EYTH, Max, German agriculturist : b. Kirchheim-unter-Teck 1836; d. 1906. He came to England in 1861, and entered Fowler's agri¬ cultural implement works at Leeds as engineer that same year. In 1863-66 he served in Egypt as chief engineer to Halim Pasha, and intro¬ duced the steam plow into Egypt. He pub¬ lished (Das Agrikulturwesen in 2Egypten)

(1867) ; (Steam Cable Towing 5 (1868) ; (Das Wasser im alten und neuen Hfgypten5 (1891) ; (Wanderbuch eines Ingenieurs: In Brief en 5 (1871—84) ; (Lebendige Krafte5 (1905).

EYTINGE, et'ting, Rose, American actress : b. Philadelphia, 21 Nov. 1838; d. 1911. She made her debut as an amateur in Brooklyn, N. Y., 1852, and the following year played through the West in a stock company. From 1862 to 1869 she played in various theatres in New York and then went abroad with her second husband, George H. Butler, consul- general to Egypt. On her return thence in 1871 she took the role of Cleopatra at the Broadway Theatre, to the Antony of Frederick Warde. Among her parts were Nancy Sykes in (Oliver Twist- ; Gervaise in*

EYUK, a-yook, Asia Minor, a village situ¬ ated about 75 miles southwest of Amasia, and noted for its remarkable groups of ruins. The ruins are the

remains of a colossal palace of the Hittites, whose capital Hatti (modern Boghaz Koi) is only a short distance from Eyuk. Con¬ sult Garstang, (The Land of the Hittites5 (New York 1910) ; Olmstead, C., and Wrench, (Hittite Inscriptions5 (1911); Winckler, (Nach Boghaz Koi5 (1914).

EYZAGUIRRE, a'e-tha-ge'ra, Agustin, Chilean statesman: b. 1766; d. 1837. He be¬ came a prominent figure in 1810 in the move¬ ment for independence and three years later was a member of the first Junta. In October 1814 he was captured by the Spaniards at Ran- cagua and spent the three years following in captivity on the island of Juan Fernandez. In 1823 he was chosen president of the provisional Junta and soon after vice-president of the Re¬ public. In 1826 he became acting President, on the resignation of Freire, but was deposed in January 1827 by malcontents in the army.

EZEKIEL, one of the greater Hebrew prophets. To him is attributed one of the larger prophetic books of the Old Testament, the visions and utterances which it contains beingly expressly attributed, in the work itself, to Ezekiel. He was the son of Buzi, a priest, and was carried captive, in the time of Jehoiachin, 597 b.c., about 11 years before the destruction of Jerusalem under Zedekiah. His prophecies are mostly in chronological order, those excepted which are launched against for¬ eign nations. The central idea in the book is that Jerusalem because of its corruptions is doomed, and that the future of the chosen

people is with the exiles of Babylon. Ezekiel marks the transition from the prophetic to the priestly period. There is no direct quotation from Ezekiel in the New Testament, but there are a few allusions to his utterances, especially in the Book of the Revelation, which, in the concluding portion, distinctly looks back to the temple arrangements prophesied in the last chapter of Ezekiel. The substantial genuineness and authenticity of the prophecies of Ezekiel have not been seriously impugned either in the Jewish or Christian Church, and nearly uni¬ versal suffrage has been given in favor of their canonicity.

EZEKIEL, Book of. The third of the <(major,55 or longer, prophetical books of the Old Testament, derives its title from its author, the priest-prophet who bore the name ((God strengthened.55 The Hebrew form is repre¬ sented more closely in the English of I Chroni¬ cles xxiv, 16 by the name Jehezkel, a priest ascribed to David's time. No one else in the Old Testament bears this name, although the familiar Hezekiah, <(Yah strengtheneth55 or <(hath strengthened55 is of similar import. The author, as one of priestly rank, was among the eight or ten thousand men of standing who with their families were taken to Babylonia in the first exile, 597 b.c. The company of which he was a member formed a

community, presided over by its own elders, on the banks of the river Chebar. American excavations in central Babylonia have identified this with the canal Kabaru, <(the Grand Canal,55 which ran near the ancient, famous seat of Babylonian worship, the city of Nippur. Here Ezekiel lived in his own house, where the elders and people re¬ sorted to him to inquire of Jehovah (viii, 1 ; xiv 1; xx, 1; xxxiii, 30-32). Here, too, in the ninth year of the captivity, his wife died, and he restrained himself from the usual signs of mourning that he might impress upon the peo¬ ple a sense of the stupefying grief that was soon to fall upon them through the destruction of Jerusalem. Ezekiel's familiarity with the worship of the temple leads to the inference that he was already an active priest before the captivity. It was not until the fifth year of the exile (592 b.c.) that he became conscious of his prophetic call through an impressive and repeated vision which assured him that he had the work of a prophet to perform as a spokes¬ man of God (i-iii). For at least 22 years, until 570 b.c. (xxix, 17), Ezekiel continued to in¬ terpret the Divine will and purpose to his fellow exiles, using every ingenious device of symbolic action and figurative speech to arouse their curiosity and interest and make his message penetrate the (

oracles of this second section of the book are dated within the period of one or two years from January 586 to March 585 or 584 b.c., except for a slight addition made by the prophet in the year 570. Chapters 33-48 con¬ tain the direct prophecies of restoration with which Ezekiel sought to encourage and guide his fellow exiles after the destruction of Jeru¬ salem in the summer of 586 b.c. The second division of these prophecies of restoration (40- 48) is, dated as late as 572; this contains Ezekiel's detailed plans for the restored tem¬ ple and worship, and the systematic redistribu¬ tion of Palestine among the 12 tribes, the Prince, the priests and the Levites. Ezekiel's early ministry was contemporary with the later years of Jeremiah. Though the two men were as different as possible in their mode of thought and expression and in some of their conceptions, they were in full agree¬ ment in their central emphasis, at this time, upon the certainty of Jerusalem's destruction and of a restoration after long years. Ezekiel, too, even more clearly than Jeremiah, enunci¬ ated the doctrine of the individual's relation to God, in contrast to the earlier prophetic message of the nation's relationship, and re¬ iterated Jeremiah's teaching of a new spirit within guiding the life in the Divinely ap¬ pointed ways. Ezekiel renews the charges of bribery, greed, oppression of the defenceless, social corruption and blood guiltiness that the 8th century prophets had made against the people ; but he gives equal or greater promi¬ nence to the corrupt worship that had come flooding into Jerusalem under Manasseh

and again under Jehoiakim. His references to economic crimes, which the earlier prophets had painted so vividly, seem rather general and perfunctory, while his pictures of the idolatrous practices in the temple are most con¬ crete and vivid (viii, 5-8). To him it is clear that Jehovah must vindicate upon his people his outraged honor and holiness. As in Deu¬ teronomy, the priestly demand for purity of worship and the prophetic demand for moral character are united ; but in Ezekiel the ritual conception of holiness is much more prominent than the moral. This writer is in fact more fully the heir of priestly ideals and the pre¬ cursor of the age of ritual dominance than the successor of the great ethical and spiritual prophets of the centuries immediately preced¬ ing. In the development of Levitical organi¬ zation Ezekiel's ideals stand between the simpler arrangements of Josiah's time and the completed hierarchy of post-exilic Judaism. His influence upon later generations in further¬ ing the eclipse of the prophetic religion by sacerdotalism was important. Attributable to him is the conception of a sacred nation isolated from all others, which played so large a part in rebuilding and preserving the Jewish com¬ munity after the exile and which led also to the exclusive, ceremonial ideas that culminated in Pharisaic Judaism. This prophet's influence was equally determinative in shaping the Messianic hopes of later centuries. In this stream of influence issuing from his teachings we may distinguish elements which ultimately came to flow in very different channels. On the one hand, he gave the beautiful picture of the good shepherd (34). In this he described

the manner in which the former rulers and strong ones had taken advantage of their posi¬ tion to secure the best water and pasture and wantonly to destroy and foul that which they could not themselves consume. In contrast, he promised the era of justice and safety when God himself would defend the flock and his servant David should feed and shepherd them. Again Ezekiel promised from God a new heart of flesh instead of their old stony heart ; Jehovah's Spirit within them causing them to walk in all his ways (xxxvi, 22-27). On the other hand, he taught that God must re-establish and glorify his people in order to make his own name great among the nations which now despised him as a discredited deity unable to protect his own people from their enemies. He feels the mere restoration of Israel to the land inade¬ quate in itself to vindicate the Divine power, and foresees a time when Israel, gathered out of all lands, shall dwell securely; then hordes from the north shall sweep down over the land, as the Scythians had come a generation .before. Suddenly God will smite down, upon the moun¬ tains of Isarel, this awe-inspiring multitude of King Gog, there to lie as prey of the ravenous birds and beasts. Then Jehovah's holy name will be made known in the midst of Israel and the nations will know that he is the Holy One in Israel (38-39). Here holiness

is evi¬ dently understood in its primary Hebrew con¬ ception of separateness or unapproachableness without the moral connotation that the great prophets had given it. This particular vision of Ezekiel seems to have been the original of that picture of the future which appeared in varied, fantastic forms in the Jewish apoc¬ alyptic writings of the two centuries before Christ and the opening years of the Christian era.

In this book the descriptions of symbolic acts and visions, characteristic of the Hebrew prophets, are carried to an extreme unknown in the earlier documents. Doubtless the elabo¬ rate, composite, human-animal figures conspicu¬ ous in the Babylonian sculptures influenced the form of Ezekiel's visions. The beings seen in the opening vision, each with the face of a man, a lion, an ox and an eagle, each with four wings, with human hands beneath the wings and feet like those of a calf, seem fairly to outdo the fantastic imaginings of the sculptors of Babylonia. An Amos or an Hosea thought in the pictures of the varied hills and skies and mountain torrents of Palestine ; Ezekiel, on the endless plain by the sluggish canal, thought in pictures suggested by the most impressive work of the artists who had decorated the great temples for the ancient worship of this centre of mighty human power. With the audacity of faith belonging to the true interpreters of the unseen God, the exile prophet appropriated the symbols of the conquerors' religion to enforce his own lessons as to the power and purposes of the God of subject Israel. At times, the imagery of the prophet is more simple and becomes effective or even beautiful. An example in point is the picture of the Divine shepherd and the sheep, but generally the figures, even at their best, seem labored. A few poems are introduced here and there among the prose oracles. In the dirge sung over Tyre (xxvii, 3b-9a, 25b-36)

we have one of the most elaborate and appro¬ priate of the many poetic descriptions of the ship of state. In the lament for Egypt (xxxii, 19-32), both the conception and the form of the poem, with its varied haunting, baffling refrain are notable. In general, however, Ezekiel lacks the poetic power and the rhetori¬ cal passion of the greatest of Israel's prophets. The book shows the marks of deliberate literary composition far more even than that of Jere¬ miah, of whose repeated dictation to Baruch of sermons long before delivered, we are told. The books of Hosea and Isaiah suggest in their arrangement scattered memorials gathered by loyal followers. In the case of Ezekiel it seems evident that he committed his own teachings to writing with deliberation and that he finally composed the entire book in essentially its present form. The internal evidence of the book speaks of

unity of plan and purpose and of date of composition. Although the text has suffered more than usual corruption through copyists' errors, the book as a whole is singu¬ larly free from later additions or expansions.

Bibliography. — Bennett, W. H., (The Re¬ ligion of the Post-Exilic Prophets) (Edin¬ burgh 1907) ; Davidson, A. B., (The Book of Ezekiel y (in Cambridge Bible, Cambridge 1892) ; Fowler, H. T., (A History of the Literature of Ancient Israel (New York 1912) ; Kent, C. F., (Sermons, Epistles, and Apocalypses of the Prophets) (New York 1910) ; Redpath, H. A., (The Book of the Prophet Ezekiel* (in (West- minster Commentaries,* London 1907) ; Skin¬ ner, J., (The Book of EzekieP (in Expositor's Bible, * New York 1901) ; Toy, C. H., (The Book of EzekieP (in (Sacred Books of the Old and New Testament,* New York 1899). Con¬ sult also Hastings, Encyclopedia Biblica) and the Old Testament Introductions by Creelman, Cornill, Driver, Gray, McFadyen, Moore.*

Henry Thatcher Fowler, Professor of Biblical Literature and History, Brown University.

EZEKIEL, Moses Jacob, American sculp¬ tor: b. Richmond, Va., 28 Oct. 1844; d. Italy, 1920. Graduated at the Virginia Military Insti¬ tute 1866, he served in the Confederate army during the last year of his course. He studied art in Richmond and Cincinnati 1866-70, and Berlin, Germany, 1870-74, where he was the first foreigner to win the Michael Beer prize (1873). While there he studied under Prof. Albert Wolf, and was admitted to the Berlin Society of Artists on the merits of his colossal bust of Washington, now in Cincinnati. Later he went to Rome, Italy, where he has chiefly resided save for frequent visits to America. He has exhibited in the chief American and European expositions. Large and small, in¬ cluding statues, portrait-busts, ideal groups, and relievos. His works number several hun¬ dred of which the best known are (Cain, or the Offering Rejected, an early ideal bust that showed considerable dramatic talent; (Apollo and Mercury,* Berlin (1870) ; (Religious Liberty. * Fairmount Park, Philadelphia (1874-76) ; bas- relief portraits of Farragut (1872), and Robert E. Lee (1873) ; 12 marble statues of artists for the Corcoran Art Museum. Washington (1880- 82) ; marble busts of Beethoven (1884), Long¬ fellow, and of Cardinal Hohenlohe (1888);*

bronze statue of Columbus in the Columbian Memorial building, Chicago, Ill. ; statue of Mrs. Andrew D. White for Cornell University; bust of Lord Sherbrooke for Westminster Abbey; the fountain of Neptune for the town of Neptune, Italy; Confederate Soldiers' Monu¬ ment in the National Cemetery, Arlington, Va., etc. In June 1903 the sculptor presented a bronze monument, (Virginia Mourning Her Dead, to the Virginia Military Institute.*

EZION-GEBER, e'zi-on ge'ber, a stopping- point of the Israelites on their journev from Egypt (Deut. ii, 8). It is probably indentical with the modern Ain-el-Ghudyan. It is men¬ tioned also as the station of Solomon's fleet (I Kings, ix, 26; II Chron. viii, 17). Accord¬ ing to Josephus it was known as Berenice in his day. Consult Musil, (Arabia Petraea: Edom) (Vienna 1908).

EZRA, the Babylonian Hebrew priest sur- named (

Herford, 'Pharisaism' (New York 1912) ; Tor- rey, (Ezra Studies' (Chicago 1910)..

EZRA, Book of. For the discussion of the original union of Ezra with Nehemiah and Chronicles and for the date of the complete work, see Chronicles.

The book of Ezra covers the history from 53/ b.c. to 458, although some would substitute another date for the latter one. Most of this period is described very briefly, with extended sections of which nothing is said ; it is the narrative of the events of the year 458 that is most extended, chapters vii-x.

Chapters i-vi are claimed to rest upon cer¬ tain official documents which were partly in Hebrew and much more largely in Aramaic. Whether this claim is true is a matter on which there is difference of opinion; it is probable that it is in large measure true, but perhaps not altogether. The remainder of the book, chapters vii-x, is evidently based upon memoirs of Ezra. These memoirs as they now appear are partly in the first person, having been quoted by the writer verbatim or with slight changes, and partly in the third person, hav¬ ing been considerably rewritten. Ezra vii, 27- ix, 15 are of the former kind; Ezra vii, 1-26; 10, of the latter kind.

The question of the historic city of Ezra and Nehemiah is one of much difficulty. The com¬ piler seems to have had access to more ac¬ curate records for this period than for the earlier time covered in the books of Chronicles. Nevertheless, there are many unhistorical de¬ tails in these books, and many that are doubt¬ ful. Ezra iv, 7-24a is out of its chronological order. The question of the proper order is one on which there is much difference of opinion.

The register of returning exiles in Ezra ii is substantially identical with that in Nehemiah vii, 6-73a, where it is put chronologically at a later point. The

connection in Nehemiah is probably more nearly the original one, and the connection in Ezra is unhistorical.

The so-called Septuagint translation of Ezra and Nehemiah, which some have considered to be actually the version of Theodotion, is called 2 Esdras, Esdras being the equivalent of Ezra.

1 Esdras is a so-called apocryphal book, now known only in Greek. It contains the book of Ezra, practically entire, with small portions of

2 Chronicles and of Nehemiah. It is now generally accepted that the book of 1 Esdras is a variant recension of these portions, trans¬ lated from a Hebrew and Aramaic original. There is considerable chronological rearrange¬ ment of the material, and the order of 1 Esdras is now considered to be on the whole superior. 1 Esdras iii, 1-v, 6 is the only portion which has no parallel in these other books.

Bibliography. — Adeney. W. E., Ezra, Nehemiah and Esther' (Expositor's Bible,' New York 1893) ; Batten, L. W., 'The Books of Ezra and Nehemiah' ('International Criti¬ cal Commentary,' New York 1913) ; Davies,

T. W., Ezra Nehemiah, and Esther' ((Century Bible,' Edinburgh no date) ; Ryle, H. E., Ezra and Nehemiah' (Cambridge Bible, Cambridge 1897). See also the list under Chronicles.

George R. Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

EZRA CHURCH (Atlanta), Battle of.

On 20 July 1864 the Confederate army under General Hood was defeated at Peach Tree Creek, and driven into the inner defenses of Atlanta. On the 22d Hood attacked the Army of the Tennessee, and was again defeated, and General Sherman began the investment of Atlanta. He began to force Hood from Atlanta by moving upon his communications leading south from the city. The Army of the Tennessee was transferred from the extreme left of the investing line to the right, near Ezra Church, and Hood took measures to check its further extension and drive it back. On the night of the 27th he marched out of Atlanta with the greater part of his force, and on the 28th Gen. J. C. Brown's division was ordered to attack Logan's corps, then advancing on the right, and drive it back to and beyond Ezra Church. Brown drove in Logan's skirmishers, followed them 500 to 600 yards, and struck Logan's right, carried it at some points, but was quickly repulsed with great slaughter. He made a second attempt with no success

and fell back. He had lost 694 killed and wounded and 113 missing. During Brown's attack four regi¬ ments from Dodge's and Blair's corps extended L.ogan's right, and took part in the action. Clayton's division attacked on Brown's right, but not until after Brown's first repulse, and by a misunderstanding his three brigades made isolated attacks upon Harrow's division, all of which were repulsed with great loss, some of the regiments losing 50 per cent. Walthall had led out his division while Brown and Clayton were engaged, and at 2 p.m., after they had been withdrawn, he was ordered to attack over the ground of Brown's fight. Walthall made several persistent efforts, but failed, although some parts of his force got within 50 yards of Logan's line. After more than an hour's severe fighting, in which he reports the loss of 152 officers and nearly 1,000 men, he fell back. At night Hood withdrew his troops to the works around Atlanta. The Federals in this battle numbered about 13,000 men ; the Confederates about 18,000. The Union loss was 559 killed and wounded, 73 missing. The aggregate Con¬ federate losses were apparently about 2,636 killed and wounded, and 200 missing. The esti¬ mates of Generals Sherman, Howard and Logan that the Confederate loss was from 5,000 to 7,000 are excessive. Consult 'Official Records,' (Vol. XXXVIII) ; Cox, (Atlanta' ; Sherman, Eersonal Memoirs' (Vol. II) ; The Century Company's (Battles of the Civil War,' (Vol. IV).

E. A. Carman

vol. 10 — 44

F

Fthe sixth letter of the English and Latin alphabets and all alphabets derived from the Latin. Its sound, technically called a ˆlabiodental voiceless spirant, }) is produced by bring¬ ing the lower lip into loose contact with the upper teeth, the vocal cords being in¬ active. The character F, though it does not appear in the Greek alphabet of the classic period, had a place in the earlier Greek alpha¬ bet, and is believed to have there represented the sound of v or of w. It is called by Greek grammarians, digamma or double-gamma, being formed of two gammas (g hard, T) written one above the other (F). From the Greek it came into Latin and, finally, was used to ex¬ press the sound which it has for us. That the sound of F in Latin was the same as in Eng¬ lish, we know from what Quintilian says of the mode of uttering it. The Greek letter $ (phi) represented in Latin and English by ph, appears to have been very different in sound from the F of the Latins; and that in the pro¬ nunciation of F Greeks found great difficulty is known on the authority of Cicero; their diffi¬ culty was like that which people of other speech than ours find in pronouncing th in then, this, and in thin, think. A like difficulty in pronun¬ ciation of the F of Latin*

must have presented itself to the inhabitants of the Spanish Penin¬ sula, if not in the time of the Roman domi¬ nation, then after; else the initial F of words from the Latin would not have been so gener¬ ally changed by them into a mere breathing, represented by the letter h. Examples Lat. faba (bean), Span, haba; fabulari (to talk), hablar; facere (to make), hacer. In other languages, whether derived from one another or springing independently from a common original stem, as German, Anglo-Saxon, Greek, Latin, Celtic, etc., we see a different interchange as between F and P ; thus to the English word fish answers the Latin pise (piscis) ; to Eng. fire the Gr. pyr\ to Eng. plow the Ger. pflug. In the local dialect of the English county of Somerset, F usually becomes V : fair becomes vair, friar vrier, five vive. As the Latin alphabet had but one character, V, to represent both the vowel U and the consonant V (or W) the Emperor Claudius ordered that in public inscriptions and state documents this consonant V should be represented by the F inverted, and hence in monuments of that reign we find AMPLIA jIT, TERMINAL IT, OCTAjIA, etc., for Arnplia- vit, Terminavit, Octavia, etc. The letter F in physics is a contraction for Fahrenheit.

F. F. V's (First Families of Virginia), a jocular term applied in the North, before and during the war, to the Southern aristocracy in

general.

FA, fa, the name given by Guido to the fourth note of the natural diatonic scale of C, that is, the subdominant. In the major scale of C this tone is F.

FABELL, Peter, the chief character in (The Merry Devil of Edmonton,) who sold his soul to Satan, and is said to have been derived from a real personage who died and was buried at Edmonton, Middlesex, in the reign of Henry VII (1485-1509).

FABENS, Joseph Warren, American mis¬ cellaneous writer: b. Salem, Mass., 23 July 1821; d. New York, 13 March 1875. Among his works are (The Camel Hunt, > a narrative of personal adventure; (Facts about Santo Domingo ; and (The Last Cigar, * a book of poems.*

FABER, fa'ber, Frederick William, Eng¬ lish theologian and hymn writer : b. Calverley, Yorkshire, 28 June 1814; d. Brompton, London, 26 Sept. 1863. He was a nephew of G. S. Faber (q.v.). He was educated at Balliol College, Oxford, where he came under the influence of John Henry Newman (q.v.), whom in 1845 he followed into the Roman Catholic Church. On becoming a Roman Catholic he founded a small community called Brothers of the Will of God, who three years later joined the oratory of Saint Philip Neri. He afterward established a branch of this oratory at

Brompton, with which he was connected till his death. His prose writings are numerous, but it is by his beautiful hymns that he is best known. Of these (Pil¬ grims of the Night> and (The Land Beyond the Sea) are the most noted. See (Life and Let¬ tersˆ edited by Bowden (1869).

FABER, fa'ber, Frederik, Danish zoologist: b. Odense, Funen, 1795; d. 1828. He was gradu¬ ated in law in 1818, but had also given great attention to zoology and at 20 published (Ind- ledning til Dyrelaeren til Brug ved den Natur- historiske Undervisning. He traveled in Ice¬ land in 1819-21, and published the results of his investigations in ˆeber das Leben der hochnordischen Vogel Islands) (1826), a work still of value; (Prodromus islandischer Orni¬ thology (1822) ; (Naturgeschichte der Fische Islands * (1829), and articles in Isis and in Tids- skrif for Naturvidenskaberne. Several zoo¬ logical species are named from Faber.*

FABER, George Stanley, English theolo¬ gian: b. Calverley, near Bradford, Yorkshire, 25 Oct. 1773; d. near Durham, 27 Jan. 1854. Having been Bampton lecturer in 1801, he shortly after published his lectures under the title of (Horse Mosaicae. From the first he adopted evangelical views, and soon began to aid them by his pen, particularly by (The Doc¬ trine of Regeneration in the Case of Infant*

Baptism. He was vicar successively of Stock- ton-upon-Tees, Redmarshall and Longnewton, holding the last appointment 21 years, when he resigned it to become master of Sherburn Hos¬ pital. His principal writings, in addition to those already mentioned, are 'A Dissertation on the Prophecies,* the most popular of all his works, and the 'Difficulties of Romanism,* of which a third edition appeared in 1853.*

FABER, or FABRI, Jacques Lefevre d'Estaples, French scholar: b. Estaples (Etaples), near Boulogne, about 1450; d. 1536. He was educated at the University of Paris and for a time taught in the College of Cardinal Lemoine. He visited Italy and in 1507 was given a home in the Benedictine Abbey of Saint-Germain-des-Pres by his friend Abbot William Bri<;onnet. Faber remained there for 13 years, becoming in 1520 director of the leper hospital of Meaux. Faber's writings displeased several high church officials but he was safe from persecution through the protection of Francis I. When the latter was taken prisoner in 1525 Faber was formally condemned. On Francis' return he was made royal librarian at Blois and tutor to the king's children. Prin¬ cess Margaret, on becoming Queen of Navarre, took Faber to Nerac, where he spent his last days in peace. His works were numerous

and included a French translation of Saint Paul's Epistles (1512), of the New Testament (1523), of the Pentateuch (1528) and the whole Bible in 1530. Consult the life by De Labatier Plan- tin (Montauban 1870) and that by Prossdij (Leyden 1900).

FABER, Johann Lothar von, German manufacturer: b. Stein, near Nuremberg, 12 June 1817; d. 1896. In 1860 he founded in his native town a manufactory of lead pencils, with only 20 hands employed. He made so many improvements in the manufacture that his factory gradually became the centre of that particular industry, and absorbed the trade of Germany and Austria. Particularly successful and profitable was the making of pencils of different grades, while his business capacity in distributing his goods did much to promote their popularity. He opened branches in the great cities of Europe and the United States. He was ennobled for his services to German industry. He established a plant in New York with a cedar yard and mills at Cedar Keys, Fla. ; and in his factory at Noisy-le-sec, near Paris, over a thousand operatives. were employed.

FABER, Johannes. See Fabri, Johannes.

FABIAN, fa'bi-an, belonging or relating to the famous Roman family, or clan, the Fabian used especially in the military phrase Fabian tactics, to denote tactics the chief point of which is to weary and exhaust the enemy. By such measures Quintus Fabius Maximus, surnamed Cunctatus ("the delayer") greatly harassed Hannibal in the Second Punic War.

FABIAN SOCIETY, an English socialis¬ tic organization, founded in January 1884, hav¬ ing its headquarters in London, and with affil¬ iated branches in most of the principal cities and towns of Great Britain and Ireland. The society includes in its ranks some very promi¬ nent writers on social economy, including George Bernard Shaw and Sidney Webb, and publishes 'Fabian Essays) and 'Fabian Tracts.*

In 1888 they began to hold public meetings. Above 700 lectures have been given in one year by members of the society. The Fabians aim to bring about the Emancipation of land and industrial capital from individual and class ownership and the vesting of them in the com¬ munity for the general benefit" ; (

(1892).

FABII, fa'bi-I, Arch of the, a commemora¬ tive arch in ancient Rome at the entrance of the Sacred Way (Via Sacra) to the Forum Romanum. It was constructed about 120 b.c. by Quintus Fabius Maximus Allobrogicus in cele¬ bration of his victories over the Allobroges and Arverni. Its material

was the calcareous Ital¬ ian rock called travertin, and its design simple. Some few of the travertin blocks were excavated in 1882 not far from the site of the arch. Consult Platner, 'The Topography and Monuments of Ancient Rome' (1911).

FABIUS, fa'bi-us, the name of one of the oldest and most famous families of Rome, every member of which was massacred at Cremera 478 b.c., except Quintus Fabius Vibulanus, who became one of the decemvirate. Among the most noted of the family in later times are: Fabius Ambustus, dictator, 350 b.c. ; Fabius Rullianus, to whose name Maximus was added, twice dictator, conqueror of the Samnites and Etruscans, 323-280 b.c. ; Fabius Gurges, son of the preceding, consul of Rome; Fabius Pictor, the first writer of Roman history, 3d century b.c.; Fabius Maximus Verrucosus, considered the greatest of his family, surnamed "Cunctator," "the Delayer" (see Fabian), from his system of warfare, died 203 b.c. ; Fabius Maximus Quintus, son and next in office to the preceding, afterward consul ; Fabius Maxi¬ mus ˆEmilianus, distinguished in the war of Persia and in Spain, consul 147 b.c. ; Fabius Maximus Servilianus, pro-consul for Spain, censor 126 b.c.; Fabius Maximus Allobrogicus, consul 122 b.c.

FABIUS, The American. Name often given in the last century to George Washington, because of his habit of avoiding pitched battles after the manner of Fabius Cunctator.

FABLE (Lat. fabula, a narrative, especially a fictitious one), in literature, a term applied originally to every imaginative tale, but confined in modern use to short stories, either in prose or verse, which are meant to inculcate a moral lesson in a pleasant garb. Imaginary persons, animals and inanimate objects are introduced as the actors and speakers. The fables consist properly of two parts — the symbolical repre¬ sentation and the application or the instruction intended to be deduced from it, which latter is called the moral of the tale, and is indispen¬ sable to it.

Herder divides fables into (1) Theoretic, intended to form the understanding; thus a phenomenon of nature, as illustrative of the

laws of the universe, is used to exercise the understanding. (2) Moral, which contain rules for the regulation of the will. We do not learn morality from the brutes, but view the great family of nature, and observe that she has connected the happiness of all living creatures with the unchangeable, eternal law of effort, and take example from the observance of this law by

the lower orders of creation. (3) Fables of fate or destiny. It cannot always be made evident how one thing follows as a necessary consequence from another; here then comes in play that connection of events which we call fate, or chance, and which shows that things follow, at least after, if not from one another, by an order from above. Thus the eagle carries with her plunder a coal from the altar, which sets fire to her nest, and thus her unfledged brood becomes the prey of animals which she has already robbed of their young.

The oldest fables are supposed to be the Oriental ; among these the Indian fables of Pilpay or Bidpai, and the fables of the Arabian Lokman, are celebrated. 2Esop is well known among the Greeks, and was imitated by Phaedrus among the Latin writers. Bodmer has pub¬ lished German fables of the time of the Minne¬ singers. The first known German fabulist is Strieker, who belongs to the first half of the 13th century, but the famous mediaeval beast- epic of (Reinecke Fuchs> (see Reynard the Fox) has a much more remote origin. Boner, who lived at the close of the 14th century, shows in his

FABLE OF THE BEES. A satire on the state of English society, first published in 1705 in 200 doggerel couplets, under the title of (The Grumbling Hive or Knaves Turn'd Honest. } It was republished anonymously in 1714 with (Remarks) and an (Enquiry into the Origin of Moral Virtue. > Another edition ap¬ peared in 1723 with the addition of an (Essay on Charity and Charity Schools and (A Search into the Nature of Society.* This edition gave great offense and was indicted as a <(public nuisance® by the grand jury of Mid¬ dlesex, this action by the authorities giving it considerable notoriety. Satirizing the govern¬ ment and attacking the idealism of Shaftesbury, its sarcastic philosophy and pessimistic counsel were not improved by the author's cynical as¬ sertion that he was writing for (*

FABLE FpR CRITICS, A. Lowell's

mirable vehicle for its purpose, present a mix¬ ture of rollicking fun, satire and panegyric. Its title states its purpose. Lowell saw American literary criticism as often unfair and even fool¬ ish and over-dependent on British opinion. His fable presents Apollo, god of poets, delivering Olympian judgment, supposedly unbiased and final, upon American writers ; and this fable is addressed to prejudiced and incompetent crit¬ ics and to the undiscerning public. Perhaps a score of the best-known writers of the day are passed upon, with scarcely a verdict so severe as not to be tempered with commendation, and scarcely any praise that is not edged with a little raillery. Though written early in Low¬ ell's career, the poem shows his characteristic independence in literary judgment, his fearless¬ ness and his

common sense. His estimate of the works of Emerson, Longfellow, Whittier, Holmes, Irving, Cooper and Poe, though antici¬ pating the later and, in some cases, the better work of these writers, is remarkably just and has in the main been ratified by posterity. Many of the terse lines stick in the memory: Emerson ((a Greek head on right Yankee shoul¬ ders® ; Cooper, c(who's written six volumes to show he's as good as a lord® ; Poe,

" With his raven, like Barnaby Rudge,

Three-fifths of him genius, but two-fifths sheer fudge;

Who nas written some things quite the best of their kind, But the heart somehow seems all squeezed out by the mind."

Though Lowell is unfair to Margaret Ful¬ ler and overvalues Maria Child and Sylvester Judd, his perspicacity and fairness are in the main as remarkable as his satire and his fun. The course of the fable is constantly interrupted by digressions ; by a fling at literary bores ; by satire on dependence upon Great Britain; by scathing but humorous denunciation of slavery; and by a noble eulogy of the Bay State.

*In its combination of supernatural machin¬ ery, anapaestic meter and puns, and its use of all these for the purpose of literary satire, (A Fable for Critics * is not original. Its prede¬ cessors run back for hundreds of years ; per¬ haps its immediate ancestor was Leigh Hunt's (Feast of the Poets.* But its mixture of humor, satire and panegyric is as original as delightful. It is far too long; its fun grows wearisome; much of its flavor has of course been lost through time; but its youthful and effervescent hilarity carries it along in spite of its faults. It still lives through a few wise and witty or noble and brilliant passages. Poe reviewed the poem in The Southern Literary Messenger (February 1849). For the text, with explanatory notes, etc., consult Scudder, (Complete Poetical Works) ; id., (Russell Low¬ ell, a Biography) (pp. 238-253).*

Marion Tucker.

FABLES OF iESOP, the collection of old folklore or moralizing animal stories, attributed to the Greek fabulist yEsop (q.v.) who is said to have lived in the 5th and 6th centuries b.c. His reputation is based on these amusingly satirical ((beast stories® with an apposite moral, adapted to contemporary events and incidents, which he narrated at banquets and festival gatherings, for the entertainment of guests and visitors. Artless, simple and transparent in con¬ struction, affecting no graces of style, the story is the main thing, the moral being always subordinate and never permitted to interfere with the principal theme. Insolent sarcasm, how-

ever, introduced into a fable, is said to have been the culminating incident which led to his assassination at Delphi. As oral productions, he did not commit his fables to writing but they were perpetuated by Xenophon, Aristotle, Plutarch, and other Greek writers. Aristo¬ phanes alludes to them a's ((merry tales® and in the (Wasps* represents Philocleon as having learned Aesop's "absurdities® from conversa¬ tions at banquets. Plato in A collection of the (Fables, > probably in prose, in 10 books, is recorded as made by Demetrius of Phalerium 345-283 b.c., for the use of orators; no copy of the collection, however, is known to exist. An edition in elegiac verse is also mentioned by Suidas. The earliest known reliable version of the (Fables) is that of Babrius or Babrias, who, as related by Crusius, was a Roman and tutor to the son of Alexander Severus ; he rendered the fables into Greek choliambic verse in the early part of the 3d century a.d. This version was long known in fragments only, until in 1842 a complete manuscript, now in the British Museum, was discovered by Mr. Minas in a monastery on Mount Athos. Phaedrus, a Thracian freedman, who lived in Rome in the time of Augustus, produced a version of the fables in Latin iambics, making, however, in¬ ferior paraphrases and additions, which for a long time cast doubt on their authenticity, until dispelled by an epigraphical discovery at Apulum in Dacia, and critical re-examination of the manuscript. In the 9th century Ignatius Dia- conus made a version of 53 of the fables in choliambic tetrameters. Stories from Asiatic sources were added, notably from the Buddhist Jataka folklore of India, and (dsop's Fables> as known to-day are derived from the 14th cen¬ tury edition compiled by Maximus Planudes, a monk of Constantinople. Through succeeding centuries, translations were made into almost every known language. Among the curiosities of literature, an early translation from the Babrian edition into Syriac by Syntipas 100 b.c. is mentioned, which Michael Andreopulos rendered back into Greek. One of the latest translations is that of Douglas (1901) into the Celtic Manx dialect. The fables have also been prolific sources of inspiration for artists which may ibe said to have culminated in Tenniel's illustrations with their combination of rare artistic power, humorous observation and knowledge of animal life. (See Fables). . Con¬ sult Jacobs, J., (The Fables of yEsop; i. The history of the yEsopic fable; ii. The Fables of Hˆsop, as first printed by William Caxton, 1484, from his French translation (New York 1896).

FABLES OF PILPAY. See Bidpai.

FABLIAUX, f a-bli-o- (Fr. from the Lat. fabula, a narrative, particularly a fictitious nar¬ rative), in French literature, the short metrical tales of the

Trouveres (q.v.), belonging for the most part in the 12th and 13th centuries. These productions were intended merely for recita¬ tion, not for singing, and reflected the life of the period. They originated with the bourgeoise, made no pretensions to literary merit, embraced all subjects — tales of devotion, sat¬

ires on clerical weaknesses and inconsistencies, conjugal mishaps and love episodes — and were generally conceived in a vein of ironical pleas¬ antry, and in which the wit was coarse if pun¬ gent. From the fabliaux the short story form is derived. Fabliaux in fact were "merry re¬ citals® to excite laughter, in contradistinction to the songs of chivalry, war and love of the period. They were usually based on a comic incident, real or probable, occurring in every¬ day human life. They were marked by con¬ siderable originality and diversity, and would appear to have been largely modelled on the .Esopic fable and its Asiatic parallels. Several of Chaucer's Canterbury Tales) are derived directly from fabliaux ; and so are many of the stories of Boccaccio and of other Italian writers. Fabliaux were the forerunners of the (Hep- tameron, the Cent Nouvelles Nouvelles,* of Rabelais' Cantagruel,** of Prior and Swift's productions, and of Balzac's Cent Contes DrolatiquesP Fabliaux seldom ran to more than 400 lines ; they related an event, the story being the mainspring of the recital, the deduc¬ tions, inferences or lesson, to be drawn being subordinate or left to the imagination. The (Poenitentiale) of Egbert in the 8th century condemned the "fabulas inanes® of the period showing that they were in vogue at that date, but the earliest known is that of (Richeut) which appeared in 1159, a virile picture of the coarse manners and customs of the time. Among the better known writers of fabliaux were Rutebeuf, author of (Le Sacristan,* (Frere Denyse) and (Dit d'Aristote) ; also Henri d'Andeli, and Jean de Conde. While the gen¬ eral run of fabliaux are condemned for vulgar¬ ity, coarseness and obscenity, they afford valuable pictures of contemporary life and de¬ velopment, and are rich in philological material. The usual male scorn of female "fourberies®. or wiles is marked in Chicheface et Bigorne,* (Le Valet aux deux femmes) and (Le Pecheur de Pont-sur-Seine) ; the medical profession is satirized in (Le Vilain Mire) ; the ecclesiastical, in the (Pretre qui dit la Passion,) (Les Perdrix* and the (Pretre aux Mures* ; while marriage is ridiculed in Court Mantel* and (Le Dit de Berenger.* Of pathetic interest is (Housse Partie,* while of idealistic tendency is (Le Chevalier de Barizel.* Consult Montaignon, A., and Raynaud, G., Cecueil general et com- plet des fabliaux des XHIeme et XlVeme siecles* (6 vols., Paris 1872-79) ; Bedier, J., (Les Fabliaux* (Paris 1893) ; Hˆirt, W. M., Che Fabliau and Popular Literature* (Balti¬ more 1908).*

FABRE, Amant Joseph, a-maii zh6-zef fabr, French author: b. Rodez, France, 10 Dec. 1842 (or 1843). A drama, (Joan Gf Arc* (1890), made*

his name most widely known, his other works being largely represented by such books as (A Course in Philosophy) (1870) ; (Washington, the Liberator of America) (1882).

FABRE, Ferdinand, far-de-niin, French novelist: b. Bedarieux, France, 1830; d. Paris, 11 Feb. 1898. He deals almost exclusively with life in the Cevennes, his native district. De¬ signed for the priesthood, for which he found he had no vocation, his gallery of portraits of French priests was the fruit of a large and deep experience, and is the most noteworthy that has ever been drawn. He published (Ivy

Leaves, poems (1853) ; then the novels, (The Courbezons) (1862) ; (J ulien Savignac) (1863) ; (My Uncle Celestin* (1881) ; (King Ramiro * (1884) ; and (Mr. John) (1886). The remark¬ able novel, (Abbe Tigrane) (1873), first won him great distinction; (Lucifer* (1884), por¬ traying the struggle among the clergy between Gallicanism and Ultramontanism, is doubtless his greatest work. Among his shorter stories are (The Abbe Riotelet* (1891); (Norine) (1890) ; (Germany) (1891), etc. (My Voca¬ tion (1889) is a volume of leaves from his student diary. Consult Gosse, 'French Pro¬ files* (1905).*

FABRE, Frangois Xavier Pascal, fran- swa zav-ya pas-cal, French painter: b. Mont¬ pellier, 1 April 1766; d. there, 16 March 1837. He was a pupil of David and produced in 1787 a painting representing the (Execution of the Children of Zedekiah by order of Nebuchad¬ nezzar, J for which he received the great prize of the Academy and was sent as a pensionary to Rome. He was believed to have been se¬ cretly married to the Countess of Albany, widow of the Young Pretender, who on her death in 1824 made him her sole heir and be¬ queathed to him valuable MSS. which had been left to her by Alfieri. Fabre gave them to the city of Florence. He was created a baron in

1830.

FABRE, Hector, Canadian journalist: b. Montreal, 1834; d. 1910. He was educated at L'Assomption, Saint Hyacinthe and the College de Montreal, studied law and in 1856 was ad¬ mitted to practice. He soon abandoned this profession to enter journalism, becoming editor of L'Ordre of Montreal. From 1863 to 1866 he edited Le Canadien of Quebec and founded L'Evencment there in 1869. In 1875 he became a member of the Dominion Senate and seven years later was appointed Paris agent of the Quebec and

Dominion governments. In Paris he founded a French-Canadian journal, Le Paris-Canada. He was Fellow of the Royal Society of Canada and published (Esquisse bi- ographie sur Chevalier de Lorimier) (1856) ; 'Ecrivains Canadiens) (1865) ; Confederation, Independence, Annexation (1871) ; 'Chron- iques (1877).*

FABRE, Jean Henri, French entomologist: b. Saint-Leons, Aveyrori, 21 Dec. 1823 ; d. 1915. In early life he taught school and be¬ came professor of natural philosophy at the College of Ajaccio and later at the Lycee of Avignon. He is corresponding member of the Institut de France and chevalier of the Legion of Honor. Many years ago he retired to Serignan, Vaucluse, and in this retreat pro¬ duced his greatest work. (Souvenirs entomol- ogiques) (10 vols., 1879-1907). Among his other numerous works are (La science elemen- taire) (1862); 'Histoire de la buche (1866); (Les ravageurs) (1870); (Premiers elements de physique* (1875) ; 'La plante* (1875) ; 'Les inventeurs et leurs inventions) (1880) ; 'The Life and Love of the Insect* (1911) ; 'Social Life in the Insect World) (1912); 'The Life of the Fly) (1913) ; 'The Mason-Bees* (1914) ; 'Bumble Bees) (1915).*

FABRE, Marie Joseph Victorin, French

poet: b. Janjac, Ardiche, 1785; d. 1831. At the age of 20 he achieved a brilliant success with (Elogc de Boileau, which was crowned by the*

Academy. His later works, however, did not bear out his early promise and he died in ob¬ scurity. These include 'Discours en vers sur les voyages (1807) ; doge sur Pierre Cor¬ neille* (1808) ; (La mort de Henri IV) (1808) ; 'Opuscules en vers et en prose) (1806) and 'Eloge de La Bruyere* (1810). His collected works were issued by his pupil, T. Sabbatier (Paris 1845).*

FABRE D'EGLANTINE, Philippe Fran¬ cois Nazaire, fe-lep fran-swa na-zar fabr da- glon-ten, French dramatic poet: b. Carcassonne, 28 Dec. 1755; d. Paris, 5 April 1794. Having gained the prize of the Eglantine in the Floreal games at Toulouse, he assumed the name of that flower as a surname. He now wrote sev- • eral theatrical pieces, of which however only two, 'LTntrigue epistolaire and the 'Philinte de Moliere,* were successful. The latter is still considered one of the best character-pieces of the modern French stage. He engaged with ardor in the Revolution, in which he was as¬ sociated with Danton, Lacroix and Camille Des¬ moulins. As deputy from Paris to the National Convention, he at first supported moderate principles, but afterward voted for the death of Louis XVI without appeal, and was chosen a member of the committee of public safety. He afterward became suspected by the Jacobins and being condemned to death was executed along with his colleague Danton (q.v.).*

FABRE D'OLIVET, Antoine, French Pro- vengal writer: b. Ganges (Herault), 8 Dec. 1767; d. Paris, April 1825. He was one of the earliest leaders of the dialect and racial move¬ ment in southern France, and a descendant of Jean Fabre, "l'Honnete Criminel,® the hero of Fenouillot de Falbaire's famous drama of the same title. He was a mystic, a scientist and an erratic student whose literary food was of the most omnivorous nature. The wide range of his studies and sympathies is shown in the following partial list of his works: (Notions sur le sens de Touie en general (1811-19) ; (Les vers dores de Pythagore, expliques pour la premiere fois et traduits en vers eumolpiques frangais). (1813) ; 'La langue hebrai'que* (1816) ; (De l'etat social de l'homme* (1822- 24) ; (Le Quatorze Juillet* (drama 1790) ; (Toulon soumis* (historical opera in vers fibres 1794) ; 'Le Sage de l'Indoustan) (drama 1796) ; 'Lettres a Sophie sur l'histoire) (1801) 'Le Troubadour* (1803); /Cain* (drama 1823). He also published considerable music. His in¬ fluence in the re-establishment of the Langue¬ doc as a literary tongue was due principally to his philological studies in Provengal.*

FABRETTI, fa-bretfie, Ariodante, Italian antiquary: b. Perugia, 1816; d.

1894. In 1860 he 'was appointed to the chair of archaeology at Turin and in 1868 became director of the Mu¬ seum of Antiquities there. He published sev¬ eral works on the antiquities of Perugia and be¬ came senator of the kingdom in 1889. His most important work is 'Corpus Inscriptionum Italicarum Antiquioris 2Evi (1867).*

FABRETTI, Raffaele, Italian antiquarian: b. Urbino, 1619; d. Rome, 7 Jan. 1700. He was made papal treasurer by Alexander VII, and finally superintendent of the archives in the castle of San Angelo, which office he held till his death. Among his writings may be men¬ tioned 'De Aquseductibus veteris Romee ;*

' De Columna TrajanP; and (Inscriptionum Antiquarum Explication in the last of which much light is thrown on the discoveries made by himself in the Catacombs.

FABRI, fa'bre, Felix (German, Schmid), German monk: d. about 1502. He entered the Order of Preachers and became lector in the monastery of the order at Ulm. In 1480 he made a pilgrimage to Jerusalem and three years later went as chaplain with Johann von Wald- burg to the Holy Land, returning via Cairo, Alexandria and Venice. At Ulm after his re¬ turn he penned an account of this journey, which remains one of the most important travel narratives of the late Middle Ages. The Latin version is contained in (Bibliothek des litterar- ischen Vereins) (Stuttgart 1849). A German version appeared in Feyrabend's (Reyssbuch des heiligen Lands) (Frankfort 1584).

FABRI, Friedrich, German theologian: b. Schweinfurt, 1824; d. 1891. He received his education at the universities of Erlangen and Berlin. He held several pastorates, and in 1857 became director of the Missionary Society at Barmen, where he remained until 1884. He then retired to Godesberg-on-the-Rhine and became president of the Evangelical Society for the German Protestants in America. In 1889 he was appointed honorary professor at the University of Bonn. He wrote (Bedarf Deutschland der Kolonien? (3d ed., 1884) ;*

(Brief e gegen den Materia!ismus) (1856); (Die Entstehung des Heidentums und die Auf- gabe der Heidenmission5 (1859); (Die politische Lage und die Zukunft der evangelischen Kirche in Deutschland) (3d ed., 1874) ; (Staat und Kirche) (3d ed., 1872) ; (Fiinf Jahre deutscher Kolonialpolitik) (1889).

FABRI, Jacques L. D'Estaples. See

Faber.

FABRI, Johannes, Roman Catholic prel¬ ate: b. Leutkirch, near Lake Constance, 1478; d. Baden, 21 May 1541. He changed his name of Heigerlin to Fabri or Faber, studied theology and canon law at the universities of Tubingen and Freiburg. He served as a member of the secular clergy for several years and in 1518 became vicar-general of Constance. He was on intimate terms with Erasmus, Melanchthon and Zwinglius and many thought that he agreed with their doctrines, but when the breach came he remained with the ancient Church. In 1522 he published a work against Luther, and there¬ after his opposition to the Reformers was con¬ stant and formidable. His ˆMalleus in Haeres- im LutherananV (1524) earned for him the sobriquet of ((Hammer of Heretics. 5) He was one of the ablest defenders of the old Church at Zurich in 1523, Speiers in 1529, and Augsburg in 1530. In 1531 he was appointed archbishop of Vienna and thereafter his polemical strug¬ gles were with the Moslems. His homiletical works were issued at Cologne (3 vols., 1537- 41) and the polemical in JOppscula Qusedam J. Fabri Viennensis5 at Leipzig (1537). Con¬ sult Horawitz, A., (Johannes Heigerlin genannt Faber, Bischof von Wien, bis zum Regens- burger Convent5 (Vienna 1884) ; and Janssen, (Historv of the German People) (Vol. XIV, English trans., London 1909).

FABRIANO, Gentile da, jen-te'la da fa- bre-a'no, Italian painter: b. Fabriano, about

1370 ; d. Rome, about 1450. His earliest work was perhaps the decoration of a chapel for Pandolfo Malatesta at Brescia. In 1423 he painted one of his best extant pictures, an (Adoration of the Kings,) for the church of the Holy Trinity in Florence. To the same period belongs a Madonna with Saints (now in the Berlin Museum). A picture of the naval en¬ gagement between the fleet of Venice and that of the Emperor Barbarossa, which Fabriano painted for the Venetian Senate, so pleased them that they conferred on him the dignity of a patrician and a pension of a ducat per diem for life. Fabriano next worked at Orvieto, but was called thence by Pope Martin V, who em¬ ployed him in adorning the church of Saint John Lateran with frescoes from the life of John the Baptist. Fabriano's pictures indicate a cheerful and joyous nature. He had a child¬ like love of splendor and rich ornamentation, but his coloring is never extravagant or mere¬ tricious.

FABRIANO, Italy, episcopal city 20 miles northeast of Perugia. It is situated at an eleva¬ tion of 1,066 feet, in the midst of mountain scenery

and in a fruit-growing region. This is the native place of the artist Gentile da Fabri¬ ano (q.v.), a large number of whose paintings are preserved here in churches and in the city hall. Paper, parchment, gunpowder, glue and felt-cloth are the chief manufactures. The paper and parchment factories were established in 1564. Pop. of the commune 23,752.

FABRICE, fa-bres', Georg Friedrich Al¬ fred von, German statesman : b. Quesnoy-sur- Deule, France, 1818; d. 1891. He entered the Saxon army in 1834 and rose to chief of the general staff and major-general in 1865. In the war between Prussia and Austria in 1866 he was chief of staff to Crown Prince Albert, who commanded the Saxon troops on the Austrian side. After the war Fabrice was appointed Saxon Minister of War. In this capacity he reorganized the Saxon army after the Prussian model. He was one of the prominent com¬ manders in the war of 1870-71 with France, conducted the peace preliminaries at Versailles and commanded the German army of occupa¬ tion in France. He again became Minister of War of Saxony in 1871 and Prime Minister in 1876. He was made a baron in 1878 and count in 1884. Consult Dittrich, (General von Fabrice) (Dresden 1884).

FABRICIAN (fa-bnsh'an) BRIDGE,' Rome, a stone bridge joining ˆEisculapiiis Island with the left bank of the Tiber, built in 62 b.c. by Lucius Fabricius. It is the only Roman bridge that has lasted to our day. It is known at present as the Ponte dei Quattro Capi. Con¬ sult Platner, (The Topography and Monuments of Ancient Rome5 (2d ed., New York 1911).

FABRICIUS, fa-brish'us, Gaius Fabricius Luscinus, Roman general and statesman of the 4th and 3d centuries b.c. In 282 b.c. and again in 278 he was consul. In 282 he won a victory over the Lucanians and Bruttians and also led troops against Pyrrhus. He was noted for his incorruptibility. It is said that Pyrrhus once tried to secure favorable peace terms through bribery, but his offer was received by Fabricius with such disdain that Pyrrhus re¬ leased his Roman prisoners. On another occa-

sion an attendant of the king offered to poison his master for a consideration, but Fabricius in¬ formed Pyrrhus of his servant’s treachery and the king again released all Romans held as prisoners by him. Fabricius was censor, to¬ gether with Q. 2Emilius Papus. He was awarded a triumph for his military victories, but at his death his means were so slight that his daughter was given a pension from the pub¬ lic treasury.

FABRICIUS, fa-bre'tse-us, Georg, Ger¬ man scholar: b. Chemnitz, Saxony, 1516; d. 1571. In 1546 he was made rector of Meissen and in 1570 Maximilian II made him poet lau¬ reate. His poetry was written mostly in Latin. In 1560 appeared his (Poematum Sacrorum Libri XV.) Other important works were his (Antiquitatum Libri IP (1549) ; Utinerum Liber Unus' (1551) ; and

FABRICIUS, Hieronymus, hi-er-on'i-mus fa-brish'i-us (Italian Fabrizion, Girolamo), Italian physician: b. Aquapendente, 1537; d. Padua, 21 May 1619. He studied at Padua under the celebrated Fallopius, whom he afterward succeeded in the anatomical chair, and had Harvey, the discoverer of the circulation of blood, for a pupil. Harvey acknowledged that the discovery of the valves in the veins made by his master put him on the way of his discov¬ ery. During the lifetime of Fabricius his merit was fully recognized by the public and the state, an anatomical theatre being built for him at Venice. His works were collected and pub¬ lished by Bohnius (1687).

FABRICIUS, Johann Albrecht, German scholar: b. Leipzig, 11 Nov. 1688; d. Hamburg, 30 April 1736. He was versed in almost every department of human knowledge, particularly in philology and ancient literature, and under¬ stood the art of using these stores of erudition to the greatest advantage. He was professor of rhetoric and moral philosophy in the gymnasium at Hamburg. He published a 'Bibliotheca Grseca' (1705-28); (Bibliotheca Latina' (1697); (Bibliotheca Mediae et Infimae Otaris' (1734) ; 'Bibliotheca Ecclesiastica) ; bibliotheca Anti- quaria) (1713).

FABRICIUS, Johann Christian, Danish entomologist : b. Tundern, in the duchy of Schleswig, 7 Jan. 1745; d. Kiel, 3 March 1808. He pursued his studies at Leyden, Edinburgh and Freiburg in Saxony and under Linnaeus at Upsal. His works upon entomology show the principles, the method and even the forms of ex¬ pression peculiar to Linnaeus applied to the de¬ velopment of a new, happy and fruitful train of ideas. From his intercourse with him he derived his first notions of his system of ar¬ ranging insects according to the organs of the mouth. Fabricius obtained the professorship of natural history in the University of Kiel ; and in 1775 appeared his 'Svstem of Entomology,' which gave to this science an entirely new form. Two years afterward he developed in a second work the characters of the classes and orders, and demonstrated in the prolegomena the advantages of his method. In 1778 he pub¬ lished his 'Philosophia Entomological written upon the plan of the well-known 'Philosophia Botanical

FABRIKOID, a material consisting of a base of cotton cloth, coated with a tough, flexi¬ ble material and embossed by steel plates or rolls to produce the appearance and feeling of any desired natural leather grain. It is made

in various grades, colors, widths and grains for different purposes. It is used for the up¬ holstery of automobiles, carriages, furniture, for bookbinding, suitcases, purses, novelties, and in general for all classes of work where leather may be used, such as wall coverings, trunk linings, etc. Fabrikoid is waterproof, washable and non-absorbent, and has the pleasing appear¬ ance of the best leather. It is manufactured in rolls, averaging 60 yards in length and 36 to 54 inches in width.

FABRIZI, fa-bret'se, Nicola, Italian sol¬ dier: b. Modena, 1804; d. 1885. In 1831 for his part in the Modena insurrection he was impris¬ oned. When released he went to Marseilles and with Mazzini organized the Savoy expedition. He went to Spa-in and took part in the Carlist wars on the Liberal side, and afterward re¬ moved to Malta. In 1848 he fomented a revo¬ lution in conjunction with Crispi and again in 1860. He joined his forces with Garibaldi at Palermo and by the latter was made Minister of War and governor of Messina. Under a United Italy Fabrizi was elected to the Parlia¬ ment of the kingdom.

FABRONI, or FABBRONI, fa-Wne, Giovanni Valentino Mathias, Italian scientist: b. Florence, 13 Feb. 1752; d. Pisa, 17 Dec. 1822. He left behind him a considerable number of valuable memoirs and treatises on matters re¬ lating to chemistry, agriculture, physiology, etc., of which the best known are 'Provvedimenti Annonarj'; his discourses on National Pros-perity) ; on (The Equilibrium of Commerce, and the Establishment of Custom-houses' ; on the (Effects of the Free Traffic in Raw Mate¬ rial' ; on (Rewards for the Encouragement of Trade' ; on the 'Chemical Action of Metals' ; on the 'Value and Reciprocal Proportion of Coins' ; on the 'Scales and Steelyards of the Chinese,' etc.

FABULAS OF TOMAS DE IRIARTE.

In spite of the pronounced fondness of the Spaniards for the moralizing and the aphoristic in both spoken and written expression, the fable as a distinct genre did not come to its own in the Spanish language until the 18th century. In translations of both Oriental and Occidental material and sporadically in this or that literary work, in which it is. used for literary purposes, the apologue material appears now and then from the Old Spanish period down; but as a form displaying any originality of treatment it first becomes important with the composition of the verse fables of Tomas de Iriarte (1750-91) and. of Felix. Maria Samaniego (1745-1801). While Samaniego draws in no slight degree upon the yEsopic stock and does not hesitate to utilize also the Latin Phaedrus,the Frenchman La Fontaine, and the Englishman Gay, Iriarte shows far more independence of conception, and be¬ sides, as the very title of his work, 'Fabulas liter- arias' (1782), suggests he has not Samaniego's purpose of edifying the world at large but

rather the restricted circle of men of letters. Literary criticism is, then, the compelling mo¬ tive of the lessons that he frames and seeks to inculcate. He has the set aim of correcting,

through the ridicule which he directs upon them, the various defects from which Spanish literature is suffering. To do this he has no need of giving free rein to his imagination; on the contrary, he has only to give evidence of a sound literary judgment expressed in an easy and correct style and seasoned with a delicate humor. All these qualities are well exhibited in his fables, which, moreover, present a versi¬ fication of a nature ever varied and ever har¬ monious. Iriarte's abiding fame is associated with the (Fabulas literarias, but it is worthy of record that he was a skilful writer of com¬ edies, in several of which he satirized features of the social life of his time.*

J. D. M. Ford.

FABULOUS ANIMALS. See Fable; Heraldry; Unicorn.

FABVIER, fa 'vya', Charles Nicolas, Baron, French general: b. Pont-a-Mousson, 1782; d. 1855. In 1807 at the order of Bonaparte he went to Constantinople to strengthen that city's fortifications in view of an impending attack by a British fleet. After accomplishing this task he organized batteries of artillery for the defense of Ispahan against the Russians. In 1811 he was with Marmont in Spain and two years later became a member of the general staff with the rank of colonel. After the restoration of the Bourbons his political activ¬ ity soon made a sojourn in England more de¬ sirable than to remain in France, and in 1823 he went to Greece and was made commander- in-chief of infantry. Reverses at Chios and at Athens impaired his position among the Greeks, and he returned to his native land in 1829. He was named Ambassador to Constantinople in 1848. He published (Journal des operations du VI, corps pendant la campagne de 1814 en France > (1819). Consult Debidour, (Le general Fabvier, sa vie et ses ecrits) (Paris 1892) ; id., (Fabvier a l'Acropole) and (Les dernieres annees due General Fabvier (in (Seances et travaux de l'Academie des sciences morales et politiques,* Vols. CLIX, CLXI, Paris 1903,*

1904).

FABYAN, or FABIAN, Robert, English

historian: d. 1513. He was a member of the Drapers' Company and served as an alderman of London. In 1516 was published his (New Chronicles of England and France. He began, with the arrival of Brutus and continued the history down to the battle of Bosworth Field in 1485. The work suffers much from the author's lack of scholarship. Fabyan is, how¬ ever, valuable for his accounts of the London life of his day: Successive chroniclers con¬ tinued the work down to 1558. Consult the edition by Sir Henry Ellis (London 1811).*

FAQADE, fa-sad' (Fr. «the front of a building®), the face or front of any building, particularly its principal face or faces ; gener¬ ally used of a building of magnitude or im¬ portance. A back elevation is termed a rear fagade; a side elevation a lateral fagade. See Architecture.

FACATATIVA, fa'ka-ta'te-va', Colombia, town in the department of Cundinamarca, 20 miles northeast of Bogota. Its site is 8,500 feet above sea-level. Facatativa was an Indian fortress before the advent of the Spaniards. The last chief of the Chibchas, Triquesupa, was

killed here in 1538 by one of Quesada's soldiers. The town has considerable trade with Bogota- Pop. 7,000.

FACCIOLATI, or FACCIOLATO, Ja¬ copo, ya'ko-po fa-cho-la'te or -to, Italian philol¬ ogist : b. Toregia, near Padua, 4 Jan. 1682; d. Padua, 26 Aug. 1769. He devoted the greatest attention to reviving the study of ancient litera¬ ture ; and accordingly undertook a new edition of a dictionary in seven languages, which was called the (Calepin,* from the name of its author, the monk Ambrosius Calepinus. His pupil, Forcellini, assisted him and the work was completed between 1715 and 1719. Fie now, in company with his industrious disciple, con¬ ceived the idea of a Latin lexicon, in which every word, with all its significations, should be contained and illustrated by examples from the classical writers, after the manner of the dictionary of the Cruscan Academy. This im¬ mense undertaking occupied them both for nearly 40 years. Facciolati directed the work, which is generally regarded as having been almost entirely executed bv Forcellini. He left many Latin discourses which are characterized by Ciceronian elegance of style, but differ from .their model by a precise brevity.*

FACE. See Skull.

FACE WHEEL, called also Contrate Wheel and Crown Wheel, a wheel which has cogs projecting from the periphery at right angles to the plane of motion; as, in watches, the wheel situated nearest the crown and driv¬ ing the balance.

FACETIiE, fa-se'shi-e (Lat. ˆwitticisms®), a collection of humorous sayings or tales, witticisms and jests. Among the earliest such is that known as (Asteia, generally attributed to Hierocles. Latin collections were common in the later Middle Ages, the most notable being the (Liber Facetiarum) (1470) of Poggio Brac- ciolini.*

FACHAN, or FATSHAN, China, in the province of Kwang-Tung, on the Tu-Kiang, about 20 miles west by south of Canton. Its iron and steel products have earned for it the name of the ((Birmingham of China® ; it has manu¬ factures also of cloth and silk, bamboo and rattan articles, embroideries and porcelain. Its trade is in manufactured articles and the agri¬ cultural products of the surrounding country. Pop. 450,000.

FACIAL ANGLE, an anatomical term for the angle contained between two imaginary lines, one from the most prominent part of the forehead to the anterior extremity of the alveolar process of the upper jaw, opposite to the incisor teeth; the other from the external auditory foramen to the same point, serving to measure the elevation of the forehead. The angle is of great service in ethnology, but its magnitude is not an infallible criterion of the intellectual capacity of an individual. It is sometimes called Camper's angle, because the celebrated Dutch anatomist Camper was the first to draw attention to the importance of this method of skull measurement.

FACIAL NERVE. The seventh cranial nerve in the cerebro-spinal axis forms the chief motor nerve of the face. It originates in a group of ganglion cells lying in the floor of the fourth ventricle in the medulla. The fibres

pass out through the temporal-bone lying by the side of the auditory nerve in the middle of the ear canal and are finally distributed to the chief muscles of the face. Affections of this nerve cause partial or total loss of power of the muscles of the face. See Facial Paralysis.

FACIAL NERVE PARALYSIS, paraly¬ sis of the motor nerve which controls the muscles of the face. The paralysis may ex¬ tend to one or both cheeks ; but, in most cases, when the cause has been treated recovery follows.

FACIAL NEURALGIA, a painful affec¬ tion involving the chief sensory nerve of the fdCe; the trigeminal or fifth nerve. This neu¬ ralgia may involve any of the branches and, because of their wide distribution over the shoulder, back of the neck, scalp and face may be felt in a number of locations. Very fre¬ quently the pain is in the jaw and is due to dis¬ eased

teeth, toothache being a form of neu¬ ralgia of this nerve.

The pain may radiate from over the orbit, constituting supra-orbital neuralgia, or it may be distributed over the back of the head, con¬ stituting occipital neuralgia. Occasionally neu¬ ralgia of the fifth nerve gives rise to typical attacks of sick-headache. A particular variety which is extremely severe and is supposably due to disease of the sensory ganglia of the fifth nerve is known as tic-douloureux. Characteris¬ tic features of neuralgias of the face are the sudden shooting, darting pains, usually one¬ sided, unaccompanied with other constitutional disturbances. The cause is most frequently ex¬ posure to cold. From riding on the tops of omnibuses, sitting by the open windows of rail¬ road cars, or by any open window with a draft blowing through, persons are very frequently affected. At times ansemia, gout and infection from bad teeth occasion facial neuralgia.

Treatment will depend largely upon the ex¬ citing cause. Heat, gentle massage, simple diet and free movements of the bowels are general measures to be carried out. Occasional surgical intervention is necessary to cure tic-douloureux. The medical treatment of neuralgias of the face is technical and involves the use of remedies that are dangerous in the hands of laymen.

FACIAL PARALYSIS, a partial or total loss of power in the muscles of the face. One side of the face alone is usually affected. Paralysis may result from any disease of or injury to the facial nerve, either inside of the skull proper, or in its external distribution. Paralysis of the face very frequently occurs in apoplexies. Here the disease results from a disturbance of the nerve in its intracranial por¬ tion. It also is occasioned by disease in the middle ear, but is most frequent following ex¬ posure to cold, during which the external branches are involved. This latter form is termed Bell's palsy (q.v.). The symptoms of facial paralysis may vary according to the num¬ ber of branches of the nerve that may be in¬ volved. In a complete case the paralyzed side is flat and expressionless, the mouth is drawn toward the well side, making the well side look as though it were contorted and diseased. The patient is unable to whistle and may not be able to talk very clearly. The tongue may be protruded toward the well side. There may be

inability to close the eyelids. Sensation is not involved. When the patient eats he may not be able to move the torlgue on the paralyzed side of the mouth and he cannot fill out his cheeks on the flat side. The electrical reactions of the muscles at first may not be affected, but later what is known as the reaction of degeneration sets in. Most cases of facial paralysis due to peripheral trouble, as well as Bell's palsy, re¬ cover of themselves; others, due to hemiplegia or to inflammation of the middle ear or to fracture of the skull, recover less frequently.

Treatment is by means of tonics — iron, strychnine, arsenic and electrictiy. In intract¬ able cases surgical anastomosis with other motor nerves may prove of service.

FACIAL SPASM. See Tics.

FACINGS, Military. See Uniforms.

FACSIMILE, fak-sim'i-le, an exact repro¬ duction or likeness, as of handwriting, printed books, manuscripts, etc.

FACTOR (Lat. <(a maker®). (1) An agent or substitute, especially a steward or agent of an estate, appointed by a landowner to manage the estate, collect rents, let lands, etc. ; also an agent employed by merchants to transact business for them in other places, as to buy and sell, to negotiate bills of exchange, etc. He differs from a broker in that he is en¬ trusted with the possession and disposal of the goods, property, etc., and may buy and sell in his own name. (See Agent). (2) In arithmetic any one of the integers the product of which is a given number. A prime factor is a factor which is also a prime number. (3) In algebra, any one of the quantities which, when multi¬ plied, produce a given algebraic expression.

FACTOR ACTS. A term applied to a number of American and English statutes vali¬ dating sales, pledges and other business trans¬ actions of factors with bona-fide purchasers, pledgees, etc. Among the English statutes were those enacted in 1823, 1842, 1877 and 1889. The last-named statute in part extends the former statutes and in part re-enacts them. Many statutes having practically the same effect as those of England have been enacted in the United States. These acts were deemed neces¬ sary to relieve the extreme hardships often resulting from the application of the common-law doctrine that the purchaser buys at his peril, the vendor giving no better title than he has himself. This frequently resulted in the perpetration of numerous frauds by unscrupu¬ lous persons on innocent purchasers, pledgees and the like. By the terms of these acts any agent having possession of goods or the bill of lading, warehouse keeper's certificate, or other document of title, with the consent, actual or apparent, of the real owner, should be deemed to be the owner of the goods for the purpose of validating any lien, pledge or the like, made bona-fide by any person with such agent and for payments and advances made on the secu¬ rity of the goods or evidences of title thereto. It was further provided by some of these acts that such contracts were to be binding upon the real owner of the goods and all persons inter¬ ested therein, even if the purchaser, pledgee or the like was aware of the fact that the per¬ son with whom he dealt was the agent and not the real owner. The tendency of recent legis-

lation, both in England and in many jurisdic¬ tions in the United States, is toward extending the scope of the law in the direction of an entire abrogation of the common-law doctrine on the subject of contracts made with agents or others having possession of personal property or evidences of title thereto with the permis¬ sion, real or apparent, of the owner. The prin¬ cipal by these statutes is compelled to use cau¬ tion in the selection of persons who represent him in business transactions, as ordinarily third persons dealing bona-fide with such represent¬ atives will be protected. In a few States, how¬ ever, persons dealing with agents, knowing them to be such, will not be protected. In a number of States factor acts restrict the doctrine to mercantile transactions and in other States the acts provide that the goods must have been entrusted to the agent for the purpose of sale in order to validate contracts made in relation thereto. See Agent; Caveat Emptor; Factor.

Edward F. Donovan.

FACTOR OF SAFETY. See Strength of Materials.

FACTORIES AND FACTORY IN¬ SPECTION. The American factory in the early days of the Republic was an outgrowth of the English factory. In the 18th century England was the centre of the world's mechan¬ ical progress. She manufactured not only for Great Britain and her colonies, but for a large part of the rest of the civilized portions of the globe. Early emigrants to America were not allowed to bring tools and machines for manu¬ facturing and the laws of the mother country also aimed to hold skilled workmen. The re¬ sult was that the immigrant weaver who sought to follow his trade in the New World when without a loom built one; the printer who wished to issue a newspaper had to build his own press; the tanner had to make his own vats and the currier to fashion his own beam¬ ing knife and table.

Because of these conditions American me¬ chanics had to build largely from the very foundation and thus they became inventors and designers of machinery and introduced many improvements that otherwise might not have seen the light. The textile industries were the first to develop here ; then came the iron mills, the flour and grist mills and the machine shops. At the close of the Civil War in 1865 the United States was a land of small shops, with here and there a factory of modest proportions. The war had given a great stimulus to the machine shops and when it was no longer nec¬ essary to turn out rifles and cannon, the ma¬ chine men turned their

attention to the mechan¬ isms of peace. The reaper, the sewing-machine, the locomotive, the printing-press, the paper- machine, the roller-mill for flour and a thou¬ sand other mechanisms were developed and perfected and the shops grew into factories and gradually all New England, the Middle and later the Western and Southern States built factories of all kinds, thousands of which have grown to enormous proportions. New York City alone has over 10,000 factories and the industrial Directory of New York State) is a book of 787 pages. In 1916 there were 285,- 000 factories in the United States, of which 46,000 were in New York State. The factory has become the backbone of our Western civili¬

zation. Here work is reduced to a scientific system and goods are manufactured at a frac¬ tion of the cost of former times. If the public pays as much for some things, it is because they demand so much better than formerly. The culmination of success in factory production is seen in the automobile. A better automobile is sold to-day for less than $400 than could be bought in 1906 for $1,500.

Factory methods have become so perfected in this country that construction engineers now make a specialty of factory buildings, usually confining themselves to one or more lines of industry and lay out the new buildings from the very foundations according to the most approved practice. Starting with the principle that the cube gives the most working space for the least cost of enclosure, the factory engineers go on to figure what height of story and how many stories are most economical for a given business. They lay out buildings with a view to the handling of a certain class of work to best advantage, that the different departments may move the unfinished work in the least wasteful manner and have the best conditions for good and rapid production. The sanitation and comfort of employees receives marked attention, as the principle is now well established that it pays the factory to keep the good will of its help.

The human element of the factory receives quite as much attention as the mechanical. Efficiency engineers have studied this problem from every angle and all large factories that pretend to scientific management now give close attention to methods of inspiring the workers to get results. Experimental departments are maintained to improve the machinery and proc¬ esses. Elaborate systems of cost-finding and scientific estimating are common. Specialists are found everywhere in all kinds of factories, improving and systematizing, and there appears to be no end of development of these huge working machines, built up of combinations of men and machines all working toward the common end of turning out the largest quan¬ tity of a given product of the best quality in the least time.

English Factory Development. — By the

middle of the 18th century the first English factory, in the present sense of the word, was built by Lombe Brothers. It was a silk-mill and the first in which the motive power was sup¬ plied from the outside and machinery did the work heretofore supplied by human hands. The power used was a water wheel. Ark¬ wright came to the front with his water-frame, so-called, because water was the motive power. There began a rapid development in spinning machines, which were first applied to cotton, and in this industry we have the explanation how the earlier triumphs of the factory system were won. In the beginning of the 19th century, the modern factory system became established and the child-labor question arose. As the mills were first established by the streams, so that wheels might be moved by water power, it often hap¬ pened that labor could not be had in the vicin¬ ity. Application was made to the almshouse for children who were indentured or bound out at a fixed rate and for a certain length of time. Forced to work whether sick or well, often 16 hours a day and given nothing for breakfast but water porridge, these children were visited

*with serious epidemics and the attention of the public was thus aroused. In 1802 the first fac¬ tory act for the ˆPreservation of the health and morals of apprentices in cotton mills** was in¬ troduced by Sir Edward Peel, one of the large manufacturers of that time. All mills employing three or more apprentices, or 20 other persons, were subject to this act. The most important clause was that which fixed 12 hours as a work¬ ing day and prohibited work altogether from 9 p.m. to 6 A.M.*

First United States Cotton Factory. — In

the earlier years of the factory in the United States, each home had its spindles and loom to fill the needs of its own members, the flax and cotton being grown, spun and woven by the in¬ dividual householder, or the slaves on the plantations. England frowned upon all manu¬ factures in her colonies and would allow no machinery or parts of machinery to be brought to them. However it could not fetter the brain, nor forbid the inventive genius ; and Slatter and his associates, who came to America in the latter part of 1700, brought with them the knowledge which in 1803 built in Massachusetts the first American cotton-mill. The first mill to take cotton in its crude state and pass it through the different processes to the woven cloth was erected in Waltham, Mass., in 1813. The first type foundry was built in Philadelphia in 1794. The first glass-house was constructed in Pittsburgh in 1796. Other factories followed in rapid succession between 1796 and 1810.

Inspection Began in England. — The first factory inspection law was adopted in England about the beginning of the 19th century, as a re¬ sult of the agitation caused by epidemics among children and women in factories, but it was not until 1819 that the law was made effective. The abuses became so great that the govern¬ ment was at last compelled to interfere in the interests of humanity. This began by asserting the right of the state to control industrial es¬ tablishments where women and children were employed, but this necessarily involved the freedom of men in making contracts. The law was intended more particularly to meet the evils of the apprentice system, but it did not extend to factories, where children residing in the neighborhood were employed. From time to time this act has been amended and the author¬ ity of government extended, so as to make it generally effective for the protection of all labor. It was thus in England that the value of factory inspection was first determined by experience. Subsequently it was introduced into America. Massachusetts was the first American State to adopt a law of that character.

To-day there are factory laws in the United States based on the Massachusetts laws, for the examination and approval of plans of factories and tenement-houses, also for proper fire-fight¬ ing, means of egress and sanitary provisions; regulating the employment of labor of women and minors in manufacturing, mechanical and mercantile establishments and workshops ; guarding of machinery; the construction of safety appliances of elevators ; ventilation of factories and workshops ; provision of toilet con¬ veniences for the use of each sex employed in factories and workshops and various other sani¬ tary regulations; uniform hours for meals for women and young persons ; communication be¬ tween the engineer's room and each room where

machinery is run by steam; proper safeguards at hatchways, elevator openings and well-holes in public buildings, factories and mercantile estab¬ lishments ; competent watchmen and red lights in hotels; prohibiting during working hours the locking of any inside or outside door of any building where operatives are employed ; weekly payment of wages ; and sundry other matters ; the granting of licenses to make, alter, repair or finish coats, vests, trousers or wearing apparel of any description in a room or apartment in a tenement or dwelling house; the examination of engineers and firemen and the inspection of boilers, granting of licenses and steam power to be used. Women are protected by law from overwork by their employers and children are excluded from factories until of proper age and Massachusetts has been from the first, and con¬ tinues to be, in the advance in factory inspec¬ tion and under this system her industrial estab¬ lishments have become models for all the other States. It is a marked illustration of what such a law accomplishes for a community.

The New York State Department of Labor has a Bureau of Factory Inspection and sends out a large force of inspectors to see that the laws for the protection of employees are en¬ forced.

International Association of Factory In¬ spection. — The International Association of Factory Inspection was organized at Philadel¬ phia in 1886 and includes Canada and the States of Massachusetts, New York, New Jersey, Pennsylvania, Rhode Island, Connecticut, Maine, Michigan, Ohio, Minnesota, Illinois, Wisconsin, Missouri and Indiana. Each of these several States holds an annual convention of its inspectors, who meet to compare notes of their work for the year and as their pro¬ ceedings are made public, each State may know the advancement the other is making in its labor laws.

In 1876 an act was passed in Massachusetts prohibiting the employment of children under 10 years of age. In 1883 the limit was extended by providing that no child under 12 years of age should be employed during the hours in which the public schools were in session. In 1898 the limit was raised to 14 years, pro¬ viding that no child under 14 years of age can be employed at any time in a factory, workshop or mercantile establishment and no child under 16 years of age can be employed in a factory, workshop or mercantile establishment unless the employer procures and keeps on file a cer¬ tificate and posts near the principal entrance a list of all such children employed. States that have adopted the factory inspection system have similar child labor laws, differing as to their age, to the age limit when they can be employed.

The Fifty-Eight-Hour-Law. — In the State of Massachusetts children under 18 years and women cannot be legally employed more than 58 hours in a week in a factory, workshop or mer¬ cantile establishment and every employer must post in a conspicuous place the number of work¬ ing hours each day of the week, the hours al¬ lowed for meals, the hours when starting and stopping work and it becomes a part of the in¬ spector's business to see that this is faithfully complied with. This has been the law of the State since 1894. Other States have enacted similar legislation.

In 1912 the United States Congress estab-

lished a Commission on Industrial Relations to look into conditions in the principal industries of the country and to report upon all the prob¬ lems growing out of the factory system. There is also a United States Bureau of

Labor Sta¬ tistics and, in 1916, 40 of the States maintained labor bureaus, many of which pattern their work after the Massachusetts Board of Labor and Industries. Eight-hour laws now exist in nearly all the States, providing for a limit of eight hours in work for State and in sonu oc¬ cupations, as mining.

Sanitary Provisions in Factories and Workshops. — The laws of most States now provide the most rigid sanitary regulations in the interest of comfort, decency and health. These relate to factories, workshops, mercan¬ tile establishments, offices, schoolhouses and public buildings. It is required that these buildings shall be kept free from all effluvia arising from drains and that they shall have a proper number of water-closets provided for persons of each sex. It is also provided that during working hours these buildings shall be ventilated, that the air may not become inju¬ rious to the health of the persons employed therein. It also provides that all dust from the grinding or polishing of metals be carried away through suction pipes.

The Inspection of Boilers and Engineers' Licenses. — The Massachusetts law which has been copied in many States provides that (

The Sweatshop System. — With the intro¬ duction of the sweating system in the United States came a revolution in the clothing indus¬ try which has left in its wake destruction and poverty ; for prior to the introduction of this system there was not, as a class, a better-paid people than those engaged in the ready-made clothing trade. Looking backward only a few years we have the recollecton of a movement in sympathy with a people who were being driven from Russia and other European countries. The first duty upon arrival was to procure means to provide food and shelter for themselves and families, and, being without funds, the task be¬ came a very complicated one. The inducement to learn a good trade was freely offered them, provided they would work cheap enough to war¬ rant a sufficient return for the knowledge be¬ stowed upon them. The custom in vogue was that the apprentice should give from one to three months at very small pay, giving from 12 to 16 hours as a day's work. The profit to contractors employing this class of help was of course, enormous. The immense amount of available labor, of this class, has been di¬ verted to a new method of employment which is called the task system, and

to which the term "sweating® system was aptly applied. The sweating system, if con¬ ducted in workshops located in buildings de¬ voted exclusively to manufacturing purposes, would never have obtained its present promi¬ nence in the public mind; but the competition between the employers of labor under this sys¬ tem resulted in a complete revision of condi¬ tions ; cheaper shops were secured ; large quan¬ tities of work per day were imposed upon the employed, until finally the tenement of the

con¬ tractor was made to answer the double purpose of home and shop. The crowded condition of these tenements, hardly sufficiently large for the accommodation of the family, was increased by the addition of the help to be employed. All traces of home privacy were obliterated, sani¬ tary conditions became unmentionable, filth and disease abounded and the health of the public became endangered. When these conditions were made plain to the people, fear overcame them and appeals to the State legislature for the prevention of this system of manufacture were made. These appeals led to the enact¬ ment of laws tending to restrict the manufac¬ ture of clothing in tenement-houses. The first law enacted, like most which tend to elevate the conditions of those who are obliged to labor for their living, emanated from the legislature of Massachusetts. This law provided that any house, room or place, used as a dwelling and also used for the purpose of manufacturing, should, within the meaning of the law, be deemed a workshop. The law defines a work¬ shop as meaning any premises, room or place wherein manual labor is exercised by way o£ trade, or for purposes of gain, but the exercise of such labor in a private house by the family, if a majority of the persons therein employed are members of such family, shall not consti¬ tute a workshop. The law also contained a pro¬ vision which was intended to prevent the im¬ portation into the State of garments which had been made under unhealthful conditions and this was enforced until similar laws were en¬ acted in other States, particularly in the State of New York, from which the majority of this class of clothing was produced. The law also provides that any family desiring to do the work of making, repairing or finishing any coats, vests, trousers or wearing apparel of any de¬ scription, in any room or apartment, in any tene¬ ment or dwelling house, shall first procure a license, approved by the chief of the inspection department. Every room or apartment in which any garments are made shall be subject to the inspection and examination of the inspectors, for the purpose of ascertaining whether the rooms or apartments are clean and free from any contagious nature. If the inspector finds evidence of infectious disease present he shall report to the local board of health.

The laws of many States require that no building which is designed to be used above the second story as a factory, or workshop, or mer¬ cantile or other establishment and has accom¬ modations for 10 or more above the second story, and no building more than two stories in height, shall be erected until a copy of the plans thereof has been deposited with the inspectors. Such buildings shall not be erected without suf¬ ficient egress or other means of escape from fire, properly located and constructed. Such inspector may require that proper appliances

shall be provided in the floors, walls and par¬ titions of such buildings to prevent the spread of fire.

FACTORY ACTS. See Child-labor; Labor Legislation.

FACTORY CONSTRUCTION. See

Building Laws.

FACTORY MANAGEMENT. There are twyo accepted uses of the word factory,® the meaning in any given case depending largely on the context, and the term <(Factory manage¬ ment similarly partakes of this usage. As commonly used the term ((factory® is under¬ stood to mean a group of elements made up of land and buildings, capital and credit, equip¬ ment and men, comprising what is known as the modern factory or establishment for the conversion of raw materials into goods for sale. Factory management in this sense is, therefore, the organizing and directing of men and materials for the production of goods through the medium of the factory.

The broader use of the term, however, in¬ cludes any group of non-self-directing em¬ ployees under the control of their employer, and it is so used particularly in reference to the series of problems arising wherever condi¬ tions of grouped labor obtain — in the rail¬ road gang, the army, the construction crew – — conditions reaching their climax in what we are familiar with as the modern factory. We may, therefore, encounter factory conditions and factory problems in fighting forest fires, for instance, though in no sense would a group o„f fire fighters be termed a factory. But it is just this broader use of the term which must not be overlooked, for it implies considera¬ tions of peculiarly far-reaching importance to the factory manager of to-day. For under present day factory conditions we encounter a complexity of relations and problems undreamed of a few years ago, and in order that the aims, and the ends, and the methods of modern in¬ dustrial or factory management may be the more readily appreciated, it is necessary first to consider some of the fundamental problems which must be faced by those engaged in in¬ dustry to-day. The massing of workers, the specialization of processes and the minute sub¬ division of labor, the economic dependence of the employee on the employer, the aggregation of capital and plant, and the keen competition in a world market — all conditions brought on directly by the industrial revolution and its succeeding developments — and finally with the more general dissemination of education among the workers themselves the growing in¬ sistence that labor have an increased participa¬ tion in the operation and fruits of industry — the problems presented through these factors are all

distinctly modern problems requiring distinctly modern methods of attack and solu¬ tion. Some of the broader aspects of each of these factors will be briefly discussed.

The Massing of Workers. — The very act of bringing together a large number of em¬ ployees brings with it entirely new problems. With a group of half a dozen workers we en¬ counter certain problems ; multiply this number by hundreds or even thousands, and our prob¬ lems immeasurably increase not only in degree but also in kind. With any aggregation of persons for any purpose we encounter the psy¬

chology of the crowd — the something within us which arises when we become one of a throng and which may, upon provocation, develop into the spirit of the mob. In the case of industry, however, to these psychological considerations must be added a third: the non-self-directing character of the groups of workers, imposing as this does the oftentimes tremendous burden of the mere physical handling and direction of our force. Taken together, these factors underlie many of the extremely delicate and far-reaching problems of organization and of management which the factory manager of to¬ day must face. What are to be the relations of the group as a whole to each individual, to each superior and to the firm as an individual? What form of organization, how administered, will best serve the true interests of each of these bodies — employer and employed? The simple organization of the small one-man busi¬ ness will no longer suffice. How, in the more complex organization, can there be main¬ tained the desirable personal contact, free¬ dom of action and play of individual initia¬ tive, together with the submission to author¬ ity necessary wherever men are grouped to¬ gether for profitable production? These and scores of similar questions of organization and of management present themselves for solution the moment we bring together large numbers of individuals for any industrial purpose.

The Specialization of Processes.— It is sometimes said that the minute subdivision of labor resulting from advanced specialization of processes is all wrong, and that we should return more nearly to handicraft work. To what extent is this claim well founded, and how, if at all, do the interests of the individual and of society at large and in the long run conflict in any solution which may be evolved? On the one hand, through the expertness which results with specialization of labor, and through the increased use of machinery, goods are more cheaply produced. Sooner or later the .selling price must thereupon be lowered, resulting in turn in an increased demand for the product. This increased de¬ mand must be supplied by additional labor, which reacts beneficially on the worker either through more constant employment at the same wages or through the same amount of employ¬ ment at higher wages. Society at large of course also benefits. On the other

hand, in certain industries and for comparatively short periods of time the individual workers, upon the sudden introduction of labor-saving ma¬ chinery, have suffered through being thrown out of employment and through being unable to secure new work or work to which they could adapt themselves. Here society at large and in the long run benefits at the expense of the individual. It may at least be fairly said that there are elements both of strength and of weakness in the modern factory system of pro¬ duction, and if so, how are we to preserve the strong points and at the same time eliminate the dangers of this method? Is it, or is it not, a fact that there is and of necessity must be monotony in industry? That there is in many cases seems _ indisputable, but how about the necessity of it — are not ways being found, and may there not be other ways found to alleviate and in cases to eliminate monotony, secure the advantages of high specialization of labor, and

at the same time retain free scope for indi¬ viduality and personal initiative? Such meas¬ ures as the interchange of work and workers, the establishment of definite and proper tasks of short duration and the payment of a bonus for accomplishment of each, allowing and ex¬ pecting on the part of each operative a more detailed knowledge of each step in the processes in which he is engaged, the various industrial partnership and profit sharing plans, the sug¬ gestion box and welfare work — such measures and many others may play their part here. These considerations, together with the very recently widespread extension of fatigue studies, form a comparatively open field in the realm of industry.

The Economic Dependence of the Em¬ ployee. — Grave social problems arise through the economic dependence of the employee on his employer. Previous to the industrial revo¬ lution the apprentice or journeyman who had saved up a few dollars or who, in absence of these, had attached to himself a few regular customers, could withdraw from his employer and set up in business for himself. With the introduction of machinery and its accompany¬ ing demands, however, all this was changed; he could then no longer work for himself at his option because he lacked the necessary capital or the knowledge of the proper handling of capital, or the knowledge of all technical processes involved, with which to start his busi¬ ness, and he must perforce join the masses of hired workers dependent on the capitalistic en¬ trepreneur. This change brought with it actual or implied obligations on the part of the em¬ ployer, with corresponding obligations on the part of the employee. Foremost among the former was the social obligation of paying at least a living wage — unfortunately not

always translated into action. Regularity of employ¬ ment was another obligation. Proper working hours comprised an obligation notoriously over¬ looked until recently. The obligation of the worker as well as of the employer in regard to the determination of a proper day's work and a proper day's pay is constantly claiming the attention of the industrial world. Then how far beyond the providing of the bare necessities of life does the employer's duty extend? The attempt to answer this question plunges us at once almost hopelessly into the realms of reasonable costs and justifiable profits, of relative abilities and commensurate re¬ wards, of standards of living and opportunities for advancement. The paying of at least a living wage, however, the maintenance of proper working conditions, accident insurance and the prevention of accidents and the pro¬ vision for open channels for advancement — all these and many other duties which the employee can little effect, devolve as social obli¬ gations upon the management rather than upon the men, due simply to the relative economic positions of the two. It is correspondingly in¬ cumbent upon the employee to give his em¬ ployer honest and whole-hearted co-operation and similarly to refrain from using unjustly to the detriment of the management any power he may possess or obtain through collective action.

The Aggregation of Capital and Plant. —

So much for some of the broader aspects of some modern industrial problems viewed par¬

ticularly from the standpoint of the employee. No less vital questions arise in the case of the employer. The very increase in size of plant and consequently in amount of capital involved, bring forth organization and managerial prob¬ lems and policies only distinctly related to any questions of human relations. The mere act of keeping the wheels in motion smoothly re¬ quires organization and system to a degree un¬ known previous to the development of modern methods of production. Add to this the keen, worldwide competition, involving as this does the necessity of operating at a high efficiency in order to be able to survive in industry at all, and it must necessarily follow that these com¬ plex modern requirements of production must be met by complex modern methods of manage¬ ment. Where shall my plant be erected and how shall it be laid out; what is the minimum amount of equipment and labor necessary ; how shall my business be organized and admin¬ istered ; what system of controlling each of the innumerable plant activities shall I use? Am I producing more cheaply than my competitors but losing money on the whole because my methods of buying or selling are archaic? What means of increasing production or de¬ creasing costs with a given amount of labor and equipment may I take, and what are the interacting effects of these

methods upon the larger questions suggested; how shall I deal with my employees, both individually and collectively, in order to attain the industrial ends of economical production, sale at a profit and growth to the point of diminishing returns with maximum prosperity for employer and employed? From among the scores of dif¬ ferent ways in which each of these problems may be answered, how, for my particular case, am I to know and to utilize the one best way? It is upon this phase of the broader industrial problems — the technique of production and distribution — that a large part of the more recent literature on the so-called (

Democracy in Industry. — And finally, what is to be my attitude, be I manager or workman, in regard to democracy in industry and the distribution of the profits and losses arising through my participation? The maxim of a well-known railway magnate who, several years ago, gave expression to the sentiment (

division of profits, require for their proper solution the best informed and broadest minded men of the age, but most of all they require the close ana active co-operation of both par¬ ties — capital and labor. Such are some of the questions presented to the modern factory man¬ ager. They are all more or less interrelated and no one of them can be properly viewed except in connection with the others. Collectively, all these questions form a background necessary to the adequate solution of any one of them. Each one, furthermore, is a life study and in the present discussion it is manifestly out of the question to attempt to cover the ground in any but a very broad survey. And in what follows in regard to the technique of factory management, a proper perspective must be maintained by keeping constantly in mind the broad social questions which must form the true background for a proper solution of these more tangible factors which arise for consider¬ ation in the every-day work of the executive.

Going back to our original definition we see that factory management as ordinarily consid¬ ered deals, broadly, with land and buildings, capital and credit, equipment and men — that it is the organizing and directing of these elements in an establishment adapted to attain the ends of economical production, sale at a profit, and growth at least to the point where the effect of diminishing returns counterbalances the possible advantages of further expansion. The art of organizing and directing these elements of pro¬ duction, selling and finance, with all that this implies, constitutes the field of modern factory management.

Organization at once becomes the keystone upon which must be reared the whole structure which is to mold, guide and direct the activi¬ ties of the business. Organization as such must be distinguished from the personnel which, at any given time, is entrusted with the task of making effective the policies and principles under which we are to operate. Although per¬ sonality enters into and distinctly affects the minutiae of organization, organization must, to be permanently effective, be independent of the personality of any one man or group of men. The form of organization under which we are to operate must be determined only after a careful analysis of first : the problems which we encounter; second: the conditions under which we must solve these problems ; and to a less ex¬ tent third: the character of the personnel avail¬ able; and as the conditions vary, so must the solution (organization) vary. A study of the evolution of organization not only reveals most interesting ramifications, but also may furnish invaluable instruction to one entrusted with the delicate task of molding the form of organi¬ zation best adapted to any given enterprise The subject may profitably be viewed from two standpoints : organization in war, and organiza¬ tion in industry. If we go back to primitive times we find comparatively small hordes of savages making war upon the neighboring tribes. The conditions under which they operated were simple : small numbers of war¬ riors, individual bodily encounter with primi¬ tive weapons only, a comparatively small terri¬ tory covered on foot or on horse and hence an absence of the problems of engineering and transportation, maintenance largely individual by pillage, little or no division of labor, few ad¬

ministrative or technical details, few problems of correlation, complete mobility. The prob¬ lems were those of secrecy, surprise, control — swift, absolute control in everything. The so¬ lution was correspondingly simple : one-man control by the best, often the physically strong¬ est, warrior. As is true generally in warfare, delay in execution becomes often more fatal than mistakes in details due to unbalanced judg¬ ment. We thus get a pure <(lineM form of or¬ ganization – — orders and directions being passed down directly from the leader to his warriors, each of whom performed all functions pertain¬ ing to the work. Up until the extensive use of gunpowder in warfare the problems and the conditions under which they had to be solved differed comparatively little from those thereto¬ fore encountered. We find the solution to minor changes to consist of minor extensions and developments of the previous form of or¬ ganization — a delegation of supervisory powers to lieutenants immediately over the men, re¬ porting directly to the one superior, who is thus somewhat relieved of the minute details of execution. With the development of modern warfare of course all this was changed. It was then no longer mentally or physically possible for the one strong man to maintain the personal touch and exercise the close

supervision of all details of the operations, although it was still necessary for him to keep final control and au¬ thority absolutely to himself. This in turn made necessary an augmented means of solu¬ tion, and as a result we find the development of the staff — a cardinal principle of military organization to-day. Here we have a group of expert officers under the chief of staff, report¬ ing to the officer in command upon the in¬ numerable specialized and technical questions encountered in modern warfare, the com¬ mander thereafter taking such action upon their recommendations as he sees fit and pass¬ ing his orders down through the now numerous officers of the line until they finally reach the man in the ranks.

In industry on the other hand, previous to the industrial revolution (if we except such works as the building of the pyramids and of the cathedrals and similar construction proj¬ ects) we find no grouped labor. Passing through the successive stages of industrial development as described by Bucher, of housework, wage work, handicraft and commission work, and up until the development of the factory sys¬ tem, we find production carried on entirely by individuals or small groups of home-workers. The problems of control — as expressed in organization — therefore were extremely sim¬ ple and in manv cases non-existent, seldom necessitating more than a one-man organization and perhaps entirely naturally the organization of the army served as the model and was literally copied by those engaged in industry.

With the rise of the factory system of pro¬ duction, however, conditions were revolu¬ tionized. Then arose the intricate questions of human relations and material management out¬ lined in the opening paragraphs. The problems encountered were far different from those of warfare, not the least significant of which was the substitution in industry of duty and the good of the individual, for the idea of force and the good of the state which forms the background of military discipline and control.

It is, however, perhaps not strange that the traditional forms of organization of the army should have still been embodied wholesale in the activities of industry, where they remained firmly entrenched until comparatively recently. It was not until near the last of the past cen¬ tury that these fundamental differences as be¬ tween military and industrial aims and methods became consciously recognized and embodied in the various forms of industrial organization which are offered to-day as more nearly ap¬ plicable to industrial needs. In closing the discussion of

organization, bare mention may be made of these modern tendencies and fur¬ ther details must be sought in the numerous writings on the subject. One of the earlier forms was the committee system. This exists in two forms — the committee with power to enforce its decisions and the committee with advisory duties only. In the latter case the organization retains most of the disadvantages of the staff, with few compensating advantages. Both forms are found to a limited extent in industrv to-day. The departmental and the divisional forms differ somewhat in operation, but are little more than the extension of the principle of division of labor. None of these forms of organization necessarily differs in principle or operation from the regular line form of the military. A fundamental depar¬ ture from the military, however, is found in the modern functional organization devised by Mr. Taylor in connection with the develop¬ ment of scientific management. Here the staff idea is utilized, but with this fundamental dif¬ ference : in the staff the individual expert per¬ forms an advisory function only, while in the Taylor functional these same experts are given administrative authority to embody the results of their knowledge in orders issued direct to men under them as regards their particular sphere of action. Under conditions where this form of organization is necessary and applicable, surprising results are secured.

So much for the various forms of organiza¬ tion from which the factory manager must choose that best adapted to his particular cir¬ cumstances. Of the other broad division of factory management as an art — the directing, the management of personnel and material — little need be said. Sufficient outline of the various factors to be considered has been sug¬ gested to give an insight into the nature of the problems involved. The problems of finance, of division of duties, of delegation of authority and responsibility, of purchasing, of storage of materials, of planning, of shop ad¬ ministration, of cost, of central control of all of these and the innumerable other necessary activities of the modern factory — all such questions arise in never-ending variety in the management of the plant — problems nowise different intrinsically from those of organiza¬ tion previouslv discussed, and problems re¬ quiring for their proper solution the same care¬ ful analysis and the same adherence to fun¬ damental principles of proved soundness and practicability. See Factory System ; Labor Legislation ; Scientific Management.

Henry H. FarQUHar,

Consultant in Industrial Management and In¬ structor in the Harvard Business School.

FACTORY SYSTEM, The. Definition.

— The word factory seems to have been first used in its modern sense about 1792. Previous to this time a factor had been an agent, and all compound derivatives of this word had carried with them the idea of agentship. But with the new system of industry introduced by the Industrial Revolution (q.v.) the term seems to have been used as an abbreviation of manu¬ factory, and in the first factory act in England in 1802 was used interchangeably with mills to designate cotton manufacturing establishments. To-day the term factory covers any establish¬ ment, with its buildings and equipment, used for the manufacture of goods. The legal defini¬ tion varies widely in different States, but is usually based upon the number of workers ; thus an extreme definition of factory is <(any place where two or more persons are engaged in working for hire or reward in any handi¬ craft." As a description this is a poor defini¬ tion, for it leaves out of account the essential characteristics of the system. Better is C. D. Wright's definition, ((a factory is an establish¬ ment where several workmen are collected for the purpose of obtaining greater and cheaper conveniences for labor than they could procure individually at their houses ; for producing re¬ sults by their combined efforts which they could not accomplish separately; and for pre¬ venting the loss occasioned by carrying articles from place to place during the several processes necessary to complete their manufacture."

Not merely has the definition of the term broadened, but the scope of the factory sys¬ tem has widened also. Applied originally only to the textile industry, it has gradually been extended to other branches of manufacturing, until to-day it dominates the manufacture of agricultural implements, automobiles, boots and shoes, carriages and wagons, clothing, fire-arms, metallic goods of all sorts, musical instru¬ ments, rubber goods, slaughtering and meat packing, wooden goods, watches, etc. Most of the people employed in the mechanical indus¬ tries of this country to-day are working under the factory system. Indeed the principles which govern the factory system in the concentration and division of labor, the use of non-human power and of labor-saving machinery, have also been applied to other fields of economic activity such as agriculture, fishing, forestry, mining, transportation, and even personal and profes¬ sional service. There can be no doubt there¬ fore as to the importance of so universal a system.

Domestic System. — We shall perhaps bet¬ ter understand the factory system if we con¬ trast it with the system under which industry was organized, at least in England, just before its introduction. This was the domestic system. According to this manufacturing — which was then truly <(making by hand" (manus-facere) — was carried on by small masters in their own houses, with the help perhaps of a journeyman and an

apprentice or two. Such a master al¬ most always owned the implements or tools of manufacture. In some cases the raw material was the property of a middleman who simply hired the domestic worker to work it up into finished goods, while he distributed the raw material to the homes of the workers and col¬ lected the completed product. The essential

feature of the system, however, to which it owed its name, was the fact that manufac¬ turing was carried on in his own house by the domestic worker, who usually also owned a plot of ground which he cultivated as a by¬ industry.

Factory System. — All this was entirely changed by the introduction of the factory sys¬ tem. The first series of changes that may be noted was the transfer of the industry from the home to the factory, the change in owner¬ ship of the implements of production from the artisan to the capitalist employer, and the change in the power that drove the machines from the muscles of the workers to the force of falling water, and later of expanding steam. A second characteristic of the factory system was the enlargement of the business unit. The textile industry was affected less than mining and the metallurgical industries ; but transporta¬ tion showed the greatest development along these lines. To-day, however, large-scale pro¬ duction is a common characteristic of almost all factory industries. As a result of these changes capital has become increasingly im¬ portant in modern industry until our present system of industrial organization is often called a capitalistic system rather than a factory system.

Evils. — It is obvious that no such far- reaching change in industrial organization could be effected without serious disorganization and readjustment. The transitional period during which the factory system was instituted wit¬ nesses many serious evils, some of which have not yet been altogether eradicated, and which are consequently assumed by some writers to be inherent in the system itself. To a brief consideration of these we may turn. Five criticisms were noted by C. D. Wright in an account of the system given in the Tenth Cen¬ sus, as follows :*

(a) The factory system necessitates the em¬ ployment of women and children to an injurious extent, and consequently its tendency is to de¬ stroy family ties and domestic habits and ulti¬ mately the home.

(b) Factory employments are injurious to health.

(c) The factory system is productive of in¬ temperance, unthrift and

poverty.

(d) It feeds prostitution and swells the criminal lists.

(e) It tends to intellectual degeneracy.

In answer to these criticisms it may be pointed out that the employment of women and especially of children has been regulated and greatly reduced by factory legislation. The employment of married women and of young children is, however, still unhappily too great. On the score of health the best equipped and managed factories undoubtedly compare very favorably with the environment under which work was carried on in the home under the domestic system, but the number of dangerous and injurious trades has multiplied. The result¬ ing evils should, however, be cared for by legislation. The next two counts may be dis¬ missed as untrue ; the factory system as such cannot be held responsible for these evils and in fact works directly against such a vice as

**C. D. Wright, ‘ Report on the Factory System of the United States,' in Tenth Census, Vol. II, p. 552.*

intemperance as inconsistent with efficiency. On the last point so eminent an authority as Prof. Alfred Marshall is of the opinion that the modern factory system makes higher demands upon the intellectual capacity of the workers than any system of industrial organization which has preceded it.

Advantages. — On the other hand certain positive advantages of the factory system of industry may be noted. It makes possible a vastly greater output. That this is not more equitably distributed is indeed a serious prob¬ lem of social justice, but the inequity of our present system of distribution should not be made an indictment against the system of pro¬ duction which gives us more to divide. It has, moreover, greatly lessened the cost of produc¬ tion and hence lowered the price of thousands of articles, which have thus been brought within reach of everyone. One has only to point for illustration to the myriads of articles produced under the factory system which can be found in the 5 and 10 cent stores. And finally wages, both nominal and real, have increased under this system, so that the economic position of the average factory operative is better than that of a similar worker under the domestic system. All in all, in spite of certain dark spots, the factory system may be regarded as a long step forward in the march of industrial progress. See HistOry, Modern.

Bibliography. — Babbage, Charles, (London 1894) ; Cooke-Taylor, R. W., introduction to a History of the Factory Sys¬ tem } (London 1886) ; Cooke-Taylor, R. W., ‘The Modern Factory SystenP (London 1891) ;

Hobson, J. A., (The Evolution of M,odern Capitalism (New York 1894) ; Ure, Andrew, 'The Philosophy of Manufactures* (London 1861) ; Wright, C. D., (Report on the Factory System of the United States) (Tenth Census, Volume Manufactures, Washington 1884).*

Ernest L. Bogart,

Professor of Economics, University of Illinois.

FACULiE, the brighter spots sometimes observed on the sun's disc. Generally they are small at first and gradually assume large proportions. See Sun.

FACULTIES, Court of, an English ecclesi¬ astical court, under the archbishop, which cre¬ ates rights to pews, monuments and particular places and modes of burial, and has also vari¬ ous powers in granting licenses of different descriptions, as a license to marry, a faculty to erect an organ in a parish church or to remove bodies previously buried.

FACULTY, in ecclesiastical law, a privilege or license granted to any person by favor, and not as a right to do any act which by law he may not do. In the Roman Catholic Church, permission granted by an ecclesiastical superior to a duly qualified subject to hear confessions. Such permission only extends to the district over which the superior has jurisdiction. Thus, faculties are granted by bishops to the priests in their dioceses, and by the heads of religious houses to such of their subjects as they judge qualified to hear the confessions of the commu¬ nity. In the. United States, the term faculty in¬ dicates the body of persons who are entrusted with the government and instruction of a uni-

versity or college as a whole, comprising the president, professors and tutors. It is also used for the body of masters and professors of each of the several departments of instruction in a university; as, the law faculty, etc.

FACULTY OF ADVOCATES, an incor¬ porated society of Scottish jurists, with a mem¬ bership of about 400. Practice in the higher courts of the kingdom is confined to members of the Faculty, who for admission are obliged to pass a special examination. Justices are appointed from the membership.

FADEYEV, fa-da'yef, Rostislav Andreie- vitch, Russian military writer: b. 1824; d. Odessa, 12 Jan. 1884. He made more than one campaign in the

Caucasus, achieving a reputa¬ tion as a scientific soldier that commands re¬ spect for his (Sixty Years of War in the Cau¬ casus } (1860) ; (Russian Military Power 5

(1868) ; (My Opinions of the Oriental Problem 5 (1870) ; (Letters on Russia's Present Position) (1881) ; and many similar writings.

FADIENSKOI, or THADDEUS IS¬ LAND, a Russian island of the Arctic Ocean, in the province of Yakutsk. It is 100 miles long by about 40 broad. The climate is very cold the greater part of the year, but the island is inhabited.

F2ECES, the residue of food, combined with the intestinal secretions, as it passes from the body. After chyme has passed into the large intestine it is then termed faeces. During health faeces consist largely of the undigested por¬ tions of the food taken into the body. They contain microscopically many epithelial cells from different parts of the intestinal canal ; shreds of mucus, bits of meat-fibre, the char¬ acter of which depends upon the ingested food, and which can be determined by the microscope ; vegetable detritus consisting largely of paren¬ chymatous and vascular tissues, plant-hairs, etc. ; fat-globules; bacteria of many kinds; bile pig¬ ments ; and other organic residues. As the chemistry of the faeces will vary widely ac¬ cording to the diet, charts of chemical compo¬ sition are worthless. The consistency of the faeces also widely varies. Normally, faeces should be semi-solid ; if too hard, constipation is probable ; if too soft and watery, indigestion may be present, or some degree of colitis (q.v.). Large quantities of mucus indicate a colitis. The color of the faeces is of much importance in determining whether the normal functions of the intestine are being carried on. In health the faeces should vary from a light to an umber brown, white to yellow faeces indicating lack of bile-execretion or loss of fat-digestion. Very black faeces often result from excessive bile- elimination, but such are more likely to be pres¬ ent when the drinking-water contains small amounts of mineral constituents, notably iron. Many drugs modify the color of the faeces. In children, green to greenish stools indicate either the presence of certain pigment-forming bacteria, or they mean that there is excessive fermentation or putrefaction of the intestinal contents, leading to excess of oxidation of the bile-pigments. In either case castor oil is an excellent corrective. Tarry faeces, resembling coffee-grounds in color, usually indicate the presence of blood high up in the intestinal canal. If bleeding occurs in the large intestine or rec¬ tum, red is the prevailing tinge. Small quanti¬

ties of blood color the faeces orange, like pap¬ rika. Cocoa and huckleberries cause a colora¬ tion of the faeces that may be mistaken for blood. Colorless or gray-colored stools usually indicate some form of biliary

obstruction; or, perhaps from fatty indigestion, an excess of fat passed either from lack of bile-emulsion action or from loss of fat-absorption. Children taking cod-liver oil often have light-colored stools. These should be carefully studied to determine if digestion of the oil is taking place. Disturbance of the functions of the pancreas may also cause light-colored or fatty stools. The study of the color of the stools is of im¬ mense practical importance in medicine, and careful observation of this matter by the pa¬ tient may be of immense service to the physi¬ cian. In birds, fishes and reptiles, and in some mammals, urine is mixed with the foeces before they leave the body. See Intestines.

FAED, fad, John, Scottish artist : b. Burley Mill, Kirkcudbrightshire, 1820; d. Gatehouse- of-Fleet, Scotland, 22 Oct. 1902. In 1841 he went to Edinburgh to study, soon won a con¬ siderable reputation as a portrait and subject painter, and was elected a member of the Royal Scottish Academy in 1852. In 1851 he exhibited a work entitled (The Cruel Sisters,5 and this was followed by (The Cotter's Saturday Night5 (1854) ; (The Philosopher5 (1855) ; (The Household Gods in Danger) (1856); (Job and his Friends) (1858) ; and (Boaz and Ruth) (1860). Going to London in 1862, he began to exhibit in the Royal Academy also, some of his pictures shown since that date being Cath¬ erine Seyton) (1864) ; (01d Age5 (1867) ; (John Anderson, my Jo) (1869) ; (After the Victory) (1873) ; (The Morning before Flodden5 (1874) ; (Blenheim5 (1875) ; (In Memoriam5 (1876) ; (The Old Basket-Maker5 (1878) ; and (The Poet's Dream5 (1883). His work invariably displays careful drawing, but his coloring is somewhat hard.

FAED, Thomas, Scottish artist: b. Burley Mill, Kirkcudbrightshire, 8 June 1826; d. Lon¬ don, 17 Aug. 1900. He was a brother of John Faed (q.v.), and at an early age became known as a clever painter of rustic subjects. The sub¬ jects of his brush are for the most part domestic or pathetic, which he depicted with a tender idealism that appealed strongly to the public taste. He was elected a member of the Royal Academy in 1864. Among his principal works are (Sir Walter Scott and his Friends) (1849) ; (The Mitherless Bairn5 (1855) ; (The First Break in the Family5 (1857) ; (His Only Pair5 (1860) ; (From Dawn to Sunset5 (1861) ; (The Last o' the Clan5 (1865) ; (Pot Luck5 (1866) ; (Worn Out5 (1868); (Homeless5 (1869); (The Highland Mother5 (1870) ; (Winter5 (1872) ; (Violets and Primroses5 (1874) ; (She Never Told her Love5 (1876) ; (Maggie and her

Friends5 (1878) ; and (Rest by the Stile5 (in the Metropolitan Museum, New York).

FAENZA, fa -en'za (ancient Faventia), Italy, episcopal city, in the province of Ravenna, on the river Lamone, 19 miles from the city of Ravenna. The

cathedral of San Costanzo, begun in the 14th century, contains the exquisite early Renaissance tomb of Saint Savinus. It is noted for its glazed earthenware, called Faience (q.v.), the manufacture of which was famous from the 15th century and has been recently

revived. Others of its manufactures are majol¬ ica, silk goods and refined sulphur. In the neighborhood are ferruginous and saline springs of considerable repute. Faenza is connected with the Adriatic by the Zanelli Canal, opened in 1782. It claims to be the birthplace of Torri¬ celli. Its history extends into the times before the Christian era, and many changes in govern¬ ment took place before 1509, when it was an¬ nexed by Julius II to the states of the Church. In 1860 it became a part of the kingdom of Italy. Pop. of the commune 40,164.

FAERIE (fa'er-e) QUEENE, The. An

epic poem by Edmund Spenser, published in 1590 (Books I— III) and in 1596 (Books IV- VI) ; a fragment of another book, consisting of two cantos on ˆMutability,® was published in 1609. The poem was planned in 12 books, each book containing 12 cantos ; Spenser com¬ pleted little more than half his design. His purpose, as set forth in his letter to Raleigh, was ((to fiashion a gentleman or noble person in virtuous and gentle discipline,® — thus like Castiglione's (The Courtier) and other influen¬ tial books of the time, the (Faerie Queene) was designed to be a guide to conduct for men who were entering the service of the state. Conforming to current critical doctrine, instruc¬ tion in the cardinal virtues characteristic of the illustrious prince is to be gained best through the study of poetry, not history or moral phi¬ losophy. (Besides the letter to Raleigh, consult also Sidney's (Defense of PoetryQ. Accord¬ ingly, epic poetry was held to be an allegory of the perfect hero : Homer so portrays ((the good governor® in his Agamemnon and <(the virtuous man® in his Ulysses ; Virgil com¬ bines the two in his ZEneas, while Tasso's Rinaldo is the ideal <(private man® and his Godfrey the ideal ruler. Based on this theory, the (Faerie Queene> was to deal with the (ctwelve private moral virtues, as Aristotle hath devised,® in the person of Arthur before he became king; Spenser hints that he may treat Arthur as king in a second epic.

The plan was to be worked out by devoting each book to the exploits of a knight distin¬ guished for a cardinal virtue. Saint George, the Red Cross Knight (Book I), represents Holiness; Guyon (Book II) represents Tem¬ perance in the classical sense of self-restraint ; Britomart (III), a female

knight, stands for Chastity; Cambell and Triamond (IV) for Friendship; Artegal (V) for Justice; and Cali- dore (VI) for Courtesy. Prince Arthur, who stands for Magnificence or Magnanimity, ap¬ pears in several books; first, in his quest for Gloriana, the Faerie Queene, and second, as an assistant to the hero of the book in a crisis. This does not indicate incoherence of design, as some critics maintain, but follows the famil¬ iar construction of the Arthurian romances, where Gawain or Lancelot or Perceval, or who¬ ever happens to be (

Spenser's use of the Arthurian romances is interesting and original. None of the great knights familiar in Malory and elsewhere ap¬ pears ; none of the great stories afterward used by Tennyson finds a place. The Holy Grail, for example, is barely mentioned. Yet

the basis of the plot is familiar to any reader of the metrical romances of France and Eng¬ land. The Faerie Queene holds a feast lasting 12 days, on each of which an (

Spenser uses the technique of romance for a more carefully elaborated moral allegory than had been developed in the mediaeval cycles. Thus, Book I shows how Holiness (Red Cross), accompanied by Truth (Una), slays the dragon of Error. Again the adventures of Guyon (Book II) symbolize the course of temperance through life, avoiding extremes of gloom or of false joy, avoiding wrath and excessive passion, conquering desires for wealth or sensual enjoy¬ ment. The allegory of the poem is complex : there is the type found in mediaeval moral plays, representing the conflict of vices and virtues; there is the mystical interpretation of Christian doctrine; there is also translation of Plato's idealism into allegorical story. To blend with a conception so complex as this the Renaissance ideal of the perfect courtier (Spenser has in mind a man of affairs like Sidney, not a me¬ diaeval ascetic saint) rendered it impossible for the poet to use Malory's version of the Ar¬ thurian legend in any complete or definite way. Yet the chief clue to his method is to be found, not in his moral and religious allegory, which has been too much stressed in Spenser criti¬ cism, but in his purpose to shadow forth his conception of the greatness of Elizabethan England and of its destiny. To bring this out, he represents, in Prince Arthur, the English realm ; Gloriana, the Faerie Queene, is Eliza¬ beth Tudor. Fundamentally the poem means that the return of the old Welsh (Fairy) line, represented in the Tudors, to the government

of England is the source of England's present greatness. He distinguishes

carefully between fairy knights like Guyon and English knights like Saint George (Red Cross). The Queen of the Fairies appears to Prince Arthur in a vision of a type familiar in Celtic folklore, and prom¬ ises in due time to give herself to him; Eng¬ land, personified in Arthur, seeks to realize this vision, made complete when Elizabeth rules. Thus the poem glorifies the ancestry of the reigning house according to the rules of Renaissance epic.

But there is yet more. Artegal, knight of Justice, loves Britomart, the martial spirit of England. Justice united with British might points out a new destiny. Artegal's quest is to free Irena (Ireland) from Grantorto (Philip of Spain). In this book also Prince Arthur rescues Belgae (the Netherlands) from the Spanish monster, and Duessa (Mary of Scot¬ land) is adjudged worthy of death. Thus cer¬ tain crucial events in Elizabeth's reign are set forth : the conflict with Spain necessitated the crushing of the Irish rebellion, fomented by Philip; it necessitated also the aid sent to the Netherlands, crushed by Philip's vast cruelty, and the execution of Mary, the chief means through which Philip plotted the destruction of free England. In a later book, Spenser no doubt would have included the final triumph over the Armada. Furthermore, this exposi¬ tion has a direct bearing on the foreign policy of Elizabeth and is a defense of that school of politics that held it to be England's duty to emerge from isolation, to take part in continen¬ tal politics, to substitute for diplomatic intrigue positive action on behalf of the oppressed in the Low Countries and in France against the sinister shadow of Philip's ambition for world power. The poem is not merely a moral allegory of abstract virtues, not merely a glorification of the Queen, but a positive and almost defiant de¬ fense of a greater nationalism that led eventu¬ ally to the establishment of British sea power and the imperial domain. Raleigh, ((the Shep¬ herd of the Ocean,® is recognized by Spenser as a leader in this progressive movement, as he also recognized Leicester and Essex and op¬ posed the more conservative policy of Lord Burghley.

Besides these allegories of moral and polit¬ ical ideas, which appealed to Elizabethan love of symbolism and shadowed forth the roman¬ tic idealism of the time, are many lovely fea¬ tures that deepen the picture. Such are Cali- dore's wooing of the shepherdess Pastorella, as charming as the pastoral scenes in Shakes¬ peare's (Winter's Tale) ; or the flight of Brito¬ mart with her nurse to Merlin's cave, there to learn of Artegal ; or the stories of Florimel and of Amoret. These stories, and many other strands in the complex web of Spenser's weav¬ ing, are of the very essence of romance — the light that never was on sea or land that Words¬ worth meditated upon, or the faery lands for¬ lorn recalled to momentary life in the poetry of Keats. In this is one secret of Spenser's in¬ fluence upon later English poetry, an influence more pervasive than Chaucer's or Milton s or even Shakespeare's. It is not that he is a mas¬ ter of narrative : one who

desires merely a story had best go elsewhere. It is not that he recreates the world of chivalry as Malory or Chretien had seen it in earlier times. He

draws upon all sources ; ancient and mediaeval, romance and allegory; his learning is enor¬ mous ; one stanza may be compounded of samples from many fields. But it is all fused, through the magic of his imagination, into a new unity that we feel rather than see. His sources are a thousand romances, but he is romance incarnate.

Partly this is due to his wonderful stanza. The foundation of it is not ottava rima , as is often said, but an eight-line stanza adapted by Chaucer from the French and having the same rhymes: ababbcbc. To this Spenser added an alexandrine that repeats the third rhyme. Sin¬ gularly adapted to the genius of one who has been called (

Though Spenser's genius is not primarily dramatic, this element in his work is not want¬ ing. He often refers to the theatres and to acting, and among his lost works we read of nine comedies. The masques of the ((Faerie Queene® — the Temple of Venus, the Masque of Cupid, the Gardens of Adonis, the Seven Deadly Sins, the Masque of the Seasons, and others — form a constant element in his work. The journey of Guyon through the Underworld is both masque and drama, as is also the over¬ throw of the enchanter Busirane by Britomart. In comparison with these, the masques intro¬ duced by Shakespeare into his plays are pale and ineffectual. The tragi-comedy of Malbecco is excellent throughout, and reminds one, in its power of characterization and its edged humor, of Jonson or Massinger. Spenser's characters are not all pale abstractions, creatures of boundless virtue or ugly vice. Britomart has the spirit, the bravery, as well as the beauty of Beatrice, and like Beatrice she is adorably feminine. Una is as lovely and appealing as Hermione; Pastorella is another Perdita. Guyon's career is no succession of tilts with ab¬ stractions; the conflict is as real as in many an Elizabethan tragedy, with victory for his re¬ ward.

But these are mere details, their only serv¬ ice being to recall once more the infinite vari¬ ety of the elements composing the poem. The abiding impression which it leaves upon the mind is that of a succession of marvelous dis¬ solving views, a panorama in which the antique and mediaeval worlds are blended with the epic¬ like life that England then was living. This

life Spenser views through Merlin's magic glass, to wnich time and space

are immaterial, and all human experience is but the semblance of things not seen.

Edwin Greenlaw,

Kenan Professor of English in the University

of North Carolina.

FAEROE ISLANDS. See Faroe Islands.

FAESULiE. See Fiesole, Italy.

FAFNIR, faf'ner, in the mythology of the Nibelungenlied, a son of the magician Hreid- mar. In the form of a dragon he guarded the gold which was paid in atonement for the death of Otr, and was slain by Siegfried.

FAGAN, James Bernard, Irish dramatist: b. 18 May 1873. He was educated at Clongowes Wood College and Trinity College, Oxford. Intended at first for the church, the bar or the Indian Civil Service, he abandoned in turn all three and went on the stage. He was with F. R. Benson for two years, 1895-97, and with Sir Herbert "Beerbohm Tree in 1897-99, retiring in the latter year. He produced (The Rebels) (1899) ; (The Prayer of the Sword) (1904) ; (Hawthorne, U. S. AP (1905) ; (Under which King (1905) ; (A Merry Devil* (1909) ; (The Earth) (1909) ; (False Gods, 5 a translation (1910) ; (The Dressingroom> (1910) ; (Bella Donna, * an adaptation (1911).*

FAGEL, fa'Hel, Frans Nicolaas, Dutch sol¬ dier: b. Nimwegen 1645; d. Sluys 23 Feb. 1718. He was a nephew of Gaspar Fagel (q.v.), en¬ tered the military service in 1672. He distin¬ guished himself in the battle of Fleurus 1690, and the famous defense of Mons, 1691, was di¬ rected by him. He also displayed great military talent at the siege of Namur, at the capture of Bonn and in Portugal 1703, in Flanders 1711 and 1712, at the battles of Ramillies (1706) and Malplaquet (1709).

FAGEL, Hendrik, Baron, Dutch states¬ man: b. 1765; d. 1834. He received his educa¬ tion at the University of Leyden and in 1787 became second secretary to the States-General ; afterward he became secretary. With Van de Spiegel he was commissioned in 1794 to make a treaty of alliance with England and Prussia. When the princes of Orange became exiles Fagel accompanied them. In 1813 he was named Ambassador to England and remained in that post until 1824. With Lord Castlereagh he signed the London Convention, under the terms of which many of her colonies were restored to Holland. In 1829 Fagel was appointed min¬ ister without portfolio.

FAGEL, Kaspar or Gaspar, Dutch states¬ man : b. The Hague 1629 ; d. 1688. He was made pensionary of Haarlem in 1663 and seven years later became secretary to the States- General. He succeeded De Witt as grand pen¬ sionary. He allied himself with William of Orange and took a large part in having the latter declared hereditary stadtholder. To him also is due no small part of the credit for the accession of William to the throne of England after the Revolution of 1688. Fagel's incor¬ ruptibility and patriotism was demonstrated by his refusal of a bribe of 2,000,000 francs from Louis XIV.

FAGERLIN, fa'ger-len, Ferdinand Julius:

b. Stockholm, 5 Feb. 1825. In 1854 he began

his art studies and entered the Academy of Stockholm ; thence he passed to Diisseldorf and finally became a pupil of Couture at Paris. From Diisseldorf he started on a professional journey northward for the purpose of studying sea and coast life in Holland. The pictures he then painted are true to nature, subtle in char¬ acterization and abound in wholesome humor.

*FAGGING, in the schools of intermediate or secondary education in England, a term designating the services which boys of the lower forms are by custom obliged to render to the boys of the upper forms. Usually a lower-form boy is assigned to an upper-form boy, whose ˆfag** he is then said to be. For his master he performs various services, but never menial. Consult Hughes, (Tom Brown's School Days.**

FAGIN, fa'gin, a despicable Jew in Dickens' (Oliver Twist. He is represented as training up children in crime in order to profit by their thievish practices and condemned to be hanged for receiving stolen goods.*

FAGIUS, Paul (German, Biichlein), Ger¬ man reformer and Hebraist : b. Rheinzabern, in the Palatine, 1504; d. Cambridge, England, 1549. He studied at Heidelberg and Strass- burg; at the latter place giving special attention to Hebrew under the direction of Wolfgang Capeto. He was made pastor at Isny in 1537 and here he continued his Hebrew studies under Elias Levita. He set up a printing press from which he issued several Hebrew works. In 1542 he became professor of Hebrew at Strass- burg and later held similar chairs at Constance and Marburg. In 1546 he went to Heidelberg, where he joined the Reform Party. He was deposed in 1549, and in the same year was in¬ vited by Cranmer to England. He died soon after his arrival. Queen Mary in 1557 caused his body to be exhumed and burned. Fagius left several commentaries on books of the Old Testament. His (Hebrew Grammar) (1543) was important in its day.

FAGNANI, fan-ya'ne, Joseph, Italian painter: b. Naples, Italy, 1819; d. 1873. He studied at Vienna and Paris, and came to the United States with Sir Henry Bulwer in 1849; here he painted (The Nine Muses) (portraits of New York women), now in the Metropolitan Museum. He also painted many European celebrities.

FAGNIEZ, fa'nya', Gustave Charles, French historian: b, Paris 1842. He received his education at the Ecole des Chartes and the Ecole des Hautes-Etudes and secured a post in the department of national archives. Subse¬ quently he was member of the commission of diplomatic archives under the direction of the Minister of Foreign Affairs. He was one of the founders of the Historical Society of France and became a member of the editorial staff of the Revue Historique. He has pub¬ lished several works dealing mainly with economic history. These include (Etudes sur l'industrie et la classe industrielle a Paris au Xllle et au XlVe siecle (1877) ;*

de Broglie (1902) ; Corporations et syndicats >*

(1905).

FAGOT, a bundle of sticks or small branches of trees bound together. In times of religious persecution the fagot was a badge worn on the sleeve of the upper garment of such persons as had abjured heresy, being put on after the person had publicly carried a fagot to some appointed place, by way of penance. Among military men in England, fagots were persons hired by officers whose companies were not full, to muster and hide the deficiencies of the company, and thus cheat the government.

FAGOT-VOTE, in Great Britain, was a vote manufactured for party purposes by the transfer to persons not otherwise legally quali¬ fied of sufficient property to qualify them as electors. Estates were divided up into what was called 40-shilling freeholds, to each of which a bogus proprietorship (with a vote) might attach; but under the Franchise Act of 1884 this qualification was abolished and fagot- votes can no longer be manufactured.

FAGOT-WORM, a caterpillar of a moth of the genus Eumeta, which in Ceylon is common on the coffee-trees. It forms a pupa case of silk covered with small sticks, so that it looks like a bundle of fagots ; and local folk-lore explains that these worms are the abode of the souls of persons who in their lifetime were thieves of firewood. These moths are related to the bag-worm moths (q.v.).

FAGOTTO, fa-got'td, a brass wind instru¬ ment, blown with a reed, which can be taken in pieces and carried like a bundle of fagots, hence the name; a bassoon (q.v.).

FAGUET, fa'ga, Emile, French literateur and academician : b. La Roche sur Yon Vendee, 17 Dec. 1847; d. Paris, 7 Tune 1916. He was educated at the Lycee Charlemagne, Paris, and was graduated from l'Ecole Normale in 1867. He taught for some time at La Rochelle and Bordeaux. Later he came to Paris, where he became professor of poetry in the university in 1890, and was elected to the Academy in 1900. His works include (La tragedie au XVIe Siecle (1883);*

FAGUS, the typical genus of the Beech family (Fagacece). The genus has five species, natives of the northern hemisphere, only one of which, the common beech (F. Americana), is native to the United States. All the species are trees with smooth gray bark and serrate leaves, the flowers and leaves appearing to¬ gether. The name is from the Greek, to eat, referring to the edible nuts. See Beech.

FAHAKA, an edible globe-fish (T etraodon fahaka), singular in inhabiting the fresh waters of the Nile.

FA HIEN, fa he-en', Chinese monk and explorer: he was born in Wu-Yang, province of Shan-si, in the 4th century, a.d. In the 15 years from 399 to 414 he traveled in India, Khotan and Tibet in the company of other Chinese pilgrims to the great Buddhist festivals. He penetrated Kashmir, Kabul, Kandahar, the Punjab and central India. In all he spent 10 years in India in quest of information about Buddhism and its founder. He also sought complete texts of the Winaya-pitaka. He went to Ceylon and there copied other sacred texts. From Ceylon he journed to Java, whence he re-entered his native country. His (Fo- kue-kip written after his return, is a full ac¬ count of his wanderings in the Buddhist coun¬ tries. This work appeared in a French trans¬ lation (Paris 1836) and in English by Beal (2d ed., London 1884), Giles (Shanghai 1877), and Legge (Oxford 1886). Consult Beazley, (Dawn of Modern Geography* (3 vols., Ox¬ ford 1904-06) ; Giles, (History of Chinese Literature * (New York 1901).*

FAHLCRANTZ, fal'krants, Christian Erik, Swedish divine and poet: b. Stora Tuna, Falun, 1790; d. 1866. From 1839 to 1852, in conjunc¬ tion with Almquist and Knos he issued the Ecclesiastical Journal. He wrote several polemi¬ cal works and also several long poems. He was appointed bishop of Westeras in 1849. His greatest work is the humorous satire (Noach's Ark (1826). Consult (C. E. Fahlcrantz : Samlade Skrifter* (7 vols., Oerebro 1866).*

FAHLCRANZ, fal'krants, Karl Johann, Swedish landscape-painter: b. Dalecarlia, 29 Nov. 1774; d. Stockholm, 1 Jan. 1861. Study¬ ing nature diligently, he became a self-edu¬ cated artist. He was acquainted only with northern scenery, but has given it with great fidelity and spirit. His principal productions are in the possession of the King of Sweden.

FAHLMANN, fal'man, Friedrich Robert,

Russian philologist: b. Esthonia, 1800; d. 1850. At the University of Dorpat he studied medi¬ cine and philology and in 1842 was appointed lecturer on the Esthonian language at that seat of learning. He collected a vast amount of material which he edited. His biographer, Kreutzwald, published it under the title (Kale- viade) or (Kalevipoeg> (1857-61).

FAHNE, fa'ne, Anton, German historian: b. Munster, 1805; d. 1883. At Bonn and Berlin universities he studied medicine, law and theology. He is remembered for his histories of episcopal sees, cities and noble houses of Westphalia and the Rhine District. They in¬ clude (Forschungen aus dem Gebiet der rheinischen und westfalischen Geschichte) (5 vols., 1864-75); (Denkmale und Ahnentafeln in Rheinland und Westfalen> (6 vols., 1883) ; (Lioland; Ein Beitrag zur Kirchen-und Sitten- geschichte) (1875).

FAHRENHEIT, fa'ren-hit, Gabriel Daniel,

German physicist: b. Dantzic, 14 May 1686; d. Amsterdam, 16 Sept. 1736. He settled in Hol¬ land, where in 1720 he first conceived the idea of using quicksilver instead of alcohol in thermometers — a discovery by which the ac¬ curacy of the instrument was very much im¬ proved. He took, as the limit of the greatest cold, that which he had observed at Dantzic in the winter of 1709. The space between the point to which the quicksilver fell at this tern-

perature, and that to which it rose in boiling water, he divided into 212 parts. About 1724 he discovered the fluctuation of the boiling point of water, which he had made one of the fixed points of his thermometer. Fahrenheit's thermometer owed its beginnings to the inven¬ tion of a thermometer by Newton, described in the Philosophical Transactions) for 1701. Newton's instrument was a tube filled with lin¬ seed oil, and the starting-point of the scale was the temperature of the human body, which Newton called 12. Newton divided the space be¬ tween his datum and the freezing-point of water into 12 equal parts, and stated that the boiling-point of water would be about 30 of these de¬ grees on the scale.

Fahrenheit, when he began to work with Newton's thermometer, did not find the scale minute enough for his purposes. He therefore first doubled the number of de¬ grees, making the scale number 24 instead of 12. Finding he could, by mixing ice and salt, obtain a temperature below freezing, Fahren¬ heit next adopted this for his starting-point and counted 24° up to body heat, making the freez¬ ing-point § and calling boiling water 53. Later on he again divided his degrees into four. It will be seen that if the above figures are multi¬ plied by four, the result is the thermometric scale called after him which is still in use. He was elected to the Royal Society of London in 1724, and contributed five papers on physics to the

FAIDHERBE, Louis Leon Cesar, loo-e la-on sa-zar fa-darb, French general and author: b. Lille, 3 June 1818; d. Paris, 29 Sept. 1889. Entering the army in 1840, he became lieuten¬ ant in 1842. From 1854 till 1861, and again from 1863 till 1865, he was governor of Senegal, in which capacity he considerably extended the French possessions there. After the fall of Napoleon III, he was summoned by the gov¬ ernment of National Defense to France and ap¬ pointed commander of the army of the north, and at Baupaume and Saint Quentin displayed military ability of a high order. In the latter part of his life he went on a mission to Egypt to study the monuments and hieroglyphics. He was called to the Senate in 1879, and was Chancellor of the Legion of Honor. He wrote valuable monographs on Senegal, the Sudan and other parts of Africa, including (L' Avenir du Sahara et du Sudan) (1863) ; Collection complete des inscriptions Numidiques> (1870) ; (Nouvelles inscriptions Numidiques) (1872) ; (1872).

FAIENCE, fa'ans', spelled also formerly fayence and fayance. Originally this term was given to designate the opaque tin-enameled ware made in France which came into being by imitating, first at Nevers (1600), the Italian majolica. (See Majolica). A long mooted point is whether the term is derived from the Italian town Faenza or from Faience, in France. The term was later used to express any tin-enameled ware, such as Delft (see Delft Faience) and those made in imitation elsewhere. It has at last become the term for any art pottery, hence takes in majolica, Persian lustre pieces, Hispano-Moresque, and even the

lightly glazed (

Of 16th century fabriques in France the earliest was Nevers (the Conrades), to be fol¬ lowed by Rouen (see Rouen), Palissy ware; Lyons, Beauvais, Rennes. Outside France, Hirschvogel was working in Nuremberg; Talavera (Spain) and Delft (see Delft Fai¬ ence) were active centres of faience. In the 17th and 18th centuries the following factories (among

others) were added: Paris (Claude Reverend), Saint Cloud (the Chicaneaus), Bordeaux, Clermont-Ferrand, Sceaux-Pen- thievre (Chapelle), Sinceny, Strassburg and Haguenau (the Hannongs), Moustiers (see Moustiers), Marseilles (the Clerissys, Savy, Viry, etc.), Niderviller (Lemire), Luneville (Cyffle), Sarreguimines, Aprey (Ollivier), Lille (Boussemaert), Saint Denis, Apt, La Rochelle, Valenciennes, Bourg-la-Reine, Vara- ges, Rubelles, Orleans, Saint Amand-les-Eaux, Desvres, Aire, Saint Omer, Chantilly, Creil, Saint Paul, etc. French ceramists of note for decorative wares in modern times are Deck, Boulenger, Guidan, Optat Millet, Ulysse de Blois, Parvillee, Haviland, etc.

Faience Fine. — When Astbury or Heath (undecided which), in England, discovered (1720) the use of ground flint (silica) to give a white slip coating to the colored local clays, they were enabled to make a ware similar in appearance to Delft; but the slip did not fuse and a glaze had to be added. The noted "cream-colored® body (see Pottery) soon de¬ veloped and revolutionized pottery making the world over. ((China clay® and "china stone® (felspar clays) added to the flint produced a perfectly white hard body, and the English had the faience fine or faience anglaise that put an end to making coated or enamelled wares. It is the "standard® body used univer¬ sally to this day.

Bibliography. — Azam, Dr., (Les anciennes Faienceries de Bordeaux) (Bordeaux 1880) ; Aussant, M. J., (Fabrique de poteries artis- tiques a Fontenay, pres de Rennes, au XVI et XVII siecles) (Rennes 1900) ; Barber, E. A., (Tln enamelled Pottery, Majolica, Delft and other stanniferous Faience (Philadelphia 1906) ; Barbier, V., (Poterie de la Savoie) (Chambery 1875) ; Burton, W., (A History and Description of the Old French Faience> (New York preface 1903) ; Cavalucci and Mol- ier, E., (Les Della Robbia* (Paris 1884) ; Cohendry, M., (Ceramique Arverne* (Cler¬ mont-Ferrand) ; Dangibeaud, C., (Notices sur les poticrs et les faienciers de la Saintonge> (Saintes 1884) ; Davillier, J. C., (Histoires des Faiences de . . . Marseilles et autres fabriques meridionales* (Paris 1863) ; Despierres, G., (Histoire de la Faience de Saint-Denis-sur- Sarthon) (Alencon 1889) ; du Monceau, Du- hamel, Paris 1773) ; Fieffe, (La Faience patronomique , , . dans la*

FAIENCE

From Strassburg

Old German Jug

From Rouen

Ceramique nivernaise> (Clamecy 1901); Fil- lon, B., ' L'Art de Terre chez les Poitevins) (Niort 1864) ; Foville, J. de, (Les Della Rob- bia^ (Paris 1910) ; Forestie, E., (Les anciennes faienceries de Montauban, Ardus, Negrepelisse, Auvillar, etc. (Montauban 1876) ; Fraisse, du, de Vernines, (Parallele des Oenvrages de Po- terie d'Auvergne, anciens et modernes) (Paris 1874) ; Frantz, H., (French Pottery and Porce¬ lain * (London 1906) ; Gasnault, P., and Gar- nier, E., (French Pottery* (London 1884) ; Gerspach, (Documents sur les anciennes faienceries frangaises* (Paris 1891) ; Grange, G., (Histoire de la manufacture de faience de Clermont-Ferrand) (Clermont-Ferrand 1882) ; Grasset, (Historique de la Faiencerie de La Charite-sur-Loire* (Paris 1876) ; Houdry, J., 'Flistoire de la ceramique lilloise* (Paris 1869) ; Joly, A., (Paul-Louis Cyffle* (Nancy 1864) ; Lambert, G., (Traite pratique de la fabrication des faiences fines) (Paris 1865) ; L'Aulnoit, H. de, (Essai de la Faience de Douai, dites Gres Anglais* (Lille 1882) ; Leader- Scott, (Della Robbia and other Sculptors) (London 1883) ; Lejeal, A., (Recherches his- toriques sur les manufactures de faience et de porcelain de Valenciennes) (Valenciennes 1868) ; Le Men, R. F., (La manufacture de faience de Quimper) (Quimper 1875) ; Loche, Comte de, (Notice sur la fabrique de faience de la Forest* (Chambery 1880) ; Mareschal, A. A., (La faience populaire du XVIII siecle* (Paris 1872) ; Michel, E., (Essai sur l'histoire des faiences de Lyon) (Lyons 1876) ; Musset, G., (Les faiences rochelaises) (La Rochelle 1888) ; Pier, G. C., (Pottery of the Near East) (New York 1909) ; Solon, L. M. E., (A His¬ tory and Description of Old French Faience) (London 1903) ; Tainturier, A., (Recherches sur les anciennes manufactures de porcelain et de faience d' Alsace et de Lorraine> (Strass- burg 1868) ; Thore,*

Clement W. Coumbe.

FAILLON, Michel Etienne, me-shel a-te-en fa-yon, French historical writer: b. Tarascon, France, 1799; d. Paris, 25 Oct. 1870. He was a Sulpician and visited Canada in 1854 to investi¬ gate the houses of that order. He wrote lives of noted French-Canadian religionists such as Mme. d'Youville (1852); and Mile. France (1854); a history of the Church in North America (1853), and a comprehensive history of the French in Canada,

three volumes of which appeared (1865-66) before # his death. His (Life was published at Paris in 1877.*

FAILLY, fa'ye', Pierre Louis Charles de,

French soldier: b. Rozoy-sur-Serre, 1810; d. 1892. He received his military training at Saint-Cyr and after graduation joined the army in Algeria. At the outbreak of the Crimean War he was gazetted brigadier-general. He was a division commander in Italy in 1859 and took part in the battles of Magenta and Sol- ferino. In November 1867 he defeated Gari¬ baldi at Mentana. At the beginning of the war with Prussia in 1870 the emperor appointed him commander of the Fifth Army Corps. At

Beaumont on 30 Aug. 1870 he commanded the right wing of McMahon's army, but was forced to retreat, leaving McMahon's right unpro¬ tected and resulting in his retreat being cut off. The direct result was the capitulation after Sedan, and an immediate consequence to Failly was his removal and Wimpffen's succession to his post. In (Campagne de 1870: Operations et marche du 5eme Corps jusqu'au 31 aout (1871) he defended his conduct of operations.*

FAILSWORTH, England, town in Lan¬ cashire, four miles north by east of Manchester, on the Lancashire and Yorkshire Railway. Cotton manufacturing is the principal industry. The electric-lighting and tramway services are supplied from Manchester. Pop. 15,098.

FAILURE. See Bankrupt.

FAIN, fan', Agathon Jean Frangois,

Baron, French historian: b. Paris 1778; d. 1837. In 1806 he became secretary of the Im¬ perial archives, three years later was created baron and in 1813 became private secretary to Napoleon I. He served the Emperor faithfully until 1815 and drew up the papers of abdica¬ tion. In 1830 Fain was appointed first secre¬ tary of the Cabinet and served three years as deputy from Montargis in 1834-37. He pub¬ lished several memoirs, including (Manuscrit de 1814, contenant l'histoire des six derniers mois ■du regne de Napoleon (1823; 4th ed., 1906); ˆlanuscrit de 1813) (2d ed., 1825) ; (Manuscrit de 1812 J (2 vols., 1827) ; (Manuscrit de l'an IIP (1828). His (Memoires* were published in 1908.*

FAINEANTS, fa-na-an, or DO-NOTH¬ ING KINGS, the name given in French history to some of the Merovingian sovereigns, who were the puppets of the mayors of the palace. The last of these kings was Childeric III.

FAINT (syncope), a peculiar form of sud¬ den loss of consciousness. Impoverishment of the blood, lowered vitality from any cause, an overwrought nervous system and disease of the circulatory system predispose to such at¬ tacks. The immediate cause is an anaemia of the brain. This sudden cerebral anaemia is most frequently due to shocking sights, sickening smells, pains or fears. The attack may be ush¬ ered in by a period of nausea, sighing respira¬ tion, or <(faint feeling.® Immediate lowering of the head below the rest of the body will fre¬ quently ward off further trouble. Most com¬ monly the attack is very sudden, the face be¬ coming absolutely bloodless and having a death¬ like calm ; the pulse is weak or imperceptible, the breathing very shallow. In true syncope spasms are not present, neither is voiding of the urine or feces. Fatal termination is rare, con¬ sciousness ordinarily being restored in a few moments if prompt measures are taken. The patient must be placed in a recumbent position, with the head as low or lower than the rest of the body ; constricting clothing should be loosened ; and water may be slapped on ex¬ posed parts. Smelling-salts held to the nose are of value. Later mild stimulants may be used to restore normal condition ; but resump¬ tion of .vertical position should be postponed as long as practicable.

FAIOUM, or FAYOUM. See Fayum.

FAIR, James Graham, American capitalist: b. near Belfast, Ireland, 3 Dec. 1831; d. San

Francisco, 28 Dec. 1894. He emigrated to America in 1843 and went to California in the famous ’49 year. He amassed great wealth by mining in Nevada, to which he went in 1860. He served from 1881-85 as a Democratic repre¬ sentative from Nevada to the United States Senate.

FAIR GOD, Mexican traditional hero and culture god. See Quetzalcoatl ; Mexican Mythology; Yucatan; Uxmal.

FAIR GOD, The, a romance by Lew Wal¬ lace 1873. It is a story of the conquest of Mexico by the Spaniards, its scene laid upon Aztec soil, in the early part of the 16th cen¬ tury. The title is derived from Quetzalcoatl, ((the fair god,® the Aztec deity of the air.

FAIR HAVEN, Mass., town in Bristol County on Buzzard’s Bay, at the mouth of the Acushnet River and on the New York, New Haven and Hartford Railroad, 60 miles south of Boston and opposite New Bedford, with which it is connected by bridges. Here are the Millicent Public

(Library, the Academy of the Sacred Heart, several banks, churches and other public buildings. It has manufactories of glass, castings, nails, loom cranks, whale boats, oil casks and tacks. Many buildings of architec¬ tural merit, which render Fair Haven one of the most attractive towns of the State, were erected by Henry H. Rogers (q.v.) as memo¬ rials to members of his family. One architec¬ tural group, a fine example of Tudor archi- tecure, consisting of a church and two other buildings, is considered a model of beauty. The town is a summer resort. The government is administered by town meetings. Fair Haven was separated from New Bedford and incor¬ porated as a town in 1812. On 7 Sept. 1778, the militia, commanded by Maj. Israel Fear¬ ing, repulsed a British attack here. Pop. 7,291. Consult Ricketson, (The History of New Bed- ford) (New Bedford 1858).

FAIR HAVEN, Vt., town of Rutland County, 30 miles east of Rutland, on the Dela¬ ware and Hudson Railroad. It has a Carnegie library and extensive slate manufactories. The town owns the waterworks and sewerage sys¬ tem. It received its charter in 1783, at which time it included West Haven. Pop. 3,095.

FAIR HAVENS (Gr. Kalol Atpiveg, Kaloi Limenes), an anchorage on the southern coast of Crete, five miles east of Cape Litino. It is of small size and amply sheltered from western winds. The only mention of it by ancient writers is that by Paul (Acts xxvii, 8), whose well-known shipwreck occurred after departure from Fair Havens for Phenice or Phoenix. It is probable that there was no town at that point, although, as stated in Acts, Lasea was but a short distance away.

FAIR HEAD, or BENMORE, a precipi¬ tous promontory of the north coast of county Antrim, Ireland, opposite Rathlin Isle. It rises 636 feet above the sea and consists of carbon¬ iferous strata, overlaid by greenstone columns, 20 to 30 feet thick and 280 to 320 feet high.

FAIR ISLE, a solitary Shetland island ly¬ ing midway between Shetland and Orkney, and 30 miles southwest of Lerwick. It is three miles long and two miles broad. The men em¬ ploy themselves chiefly in fishing and the women

in knitting the well-known Shetland hosiery. They are said to have acquired this art from the Spanish seamen whose ship, belonging to the Armada, was wrecked here in 1588. Pop.

139.

FAIR MAID. See Scup.

FAIR MAID OF PERTH, The, a novel by Sir Walter Scott, published in 1828. The heroine is Catherine Glover.

FAIR OAKS AND DARBYTOWN ROAD, Engagement at (Second Battle of Fair Oaks). On 27 Oct. 1864, General Grant began a movement on the Petersburg lines to seize the South-side Railroad, and as a sup¬ port to the movement had ordered General Butler to make a demonstration north of James River on Richmond. Parts of three divisions of the Tenth Corps under General Terry, six br'gades of the Eighteenth Corps under General Weitzel and General Kautz's cavalry division, were designated for the movement. Terry was to make a demonstration along the Darbytown Road, under cover of which Weitzel was to push through White Oak Swamp to reach the Williamsburg road and seriously threaten Rich¬ mond. The columns started from camps, near Chaffin's farm, very early on 27 October. Terry reached the Darbytown Road, a part of his command crossed over Jo the Charles City Road and advancing on both roads, a little before 8 a.m. engaged the Confederates in their en¬ trenchments from the New Market Road to the Charles City Road. Weitzel, after a march of 16 miles, crossing both the Darbytown Road and Charles City Road, at 1 p. m. reached the Williamsburg Road at Heintzelman's old works, on the battlefield of 31 May 1862, and pushed at once down the road one and a half miles toward Richmond, and came upon the Confederate works which appeared to be feebly held by a small body of dismounted cavalry and three guns. Weitzel prepared to attack, first sending a brigade of colored troops across the York River Railroad to find and turn the Confederates' left near the New Bridge Road. The defenses north of the James were held by General Longstreet, with the divisions of Gen¬ erals Hoke and Field, some <(local defense® troops under General Ewell, and General Gary's cavalry brigade. These were posted with ref¬ erence to defense along the river roads. As soon as Longstreet detected Weitzel's movement he ordered Field's division to move to the left and it formed on either side of the Williams¬ burg Road. It was 3.30 p.m. when Weitzel, with two brigades and others in support, advanced on either side of the road, over open ground, and was met with an unexpected heavy fire of musketry and artillery. His troops almost reached the works, but were repulsed with a severe loss in killed, wounded and missing. Soon after dark Weitzel withdrew after losing over 1,000 men. While Weitzel was engaged, Terry, at 4 p. m., was ordered to press his demonstration and carry the entrenchments. He made the attempt and was repulsed. On the next day the expedition returned to camp. The Union loss was 905 killed and wounded and 698 missing. The Confederate loss was com¬ paratively small ; Field's division and Gray's brigade reported 64 killed, wounded and miss¬ ing. The entire loss probably did not exceed

FAIR OAKS (SEVEN PINES)

100. Consult Humphrey, (The Virginia Cam¬ paign of 1864-65. >

E. A. Carman.

FAIR OAKS (SEVEN PINES), Battle

of. After the battle of Williamsburg (5 May 1862) the Army of the Potomac, under General McClellan, advanced cautiously up the Penin¬ sula, established a base at White House and 20 May his advance crossed the Chickahominy at Bottom's Bridge, and the entire Fourth Corps under Gen. E. D. Keyes crossed on the 23d, taking position 25 May at Seven Pines, on the main road to Richmond, about five miles distant. The Third Corps, under Gen. S. P. Heintzelman, crossed 25 May. This left on the north bank the Second, Fifth and Sixth Corps, commanded respectively by Gens. E. V. Sum¬ ner, Fitz John Porter and Wm. B. Franklin. McClellan began to rebuild destroyed bridges and to perfect communication between the two wings of his army astride the Chickahominy. The movements of McClellan north of the Chickahominy and information from his cav¬ alry convinced Gen. Joseph E. Johnston, the Confederate commander, that General Mc¬ Dowell with a strong corps was about to join McClellan from Fredericksburg, upon which, 28 May, he ordered up General Huger's divi¬ sion from Petersburg and Drewry's Bluff and suggested to General Lee that every available command should be concentrated at Richmond. On 25 May General Casey's division of the Fourth Corps advanced from Seven Pines to Fair Oaks, about three-fourths of a mile, and threw up works covering the road, and on 30 Mtay two brigades of Kearny's division, Third Corps, were advanced about a fourth of a mile in front of Savage Station to within support¬ ing distance of Casey. General Couch's divi¬ sion, Fourth Corps, was at Seven Pines and General Hooker's division, Third Corps, on the border of White Oak Swamp. Johnston, from his works, three miles in front of Richmond, watched McClellan's cautious advance. A recon- noissance 30 May developed the fact that Keyes had advanced his lines to Fair Oaks; Johnston saw his opportunity and issued orders for an attack next day. The Army of the Potomac, 31 May, had 127,166 officers and men, of whom 98,Q08 were present for duty, and it had 280 guns. Johnston had about 63,000 effectives and was not well supplied with artillery. John¬ ston purposed to throw 23 of his 27 brigades against Keyes and Heintzelman and with four brigades along the line of the river from New Bridge to Meadow Bridge prevent the rest of McClellan's army from crossing the stream. He purposed to move the 23 brigades by the Charles City, Williamsburg and Nine Mile roads, crush Keyes' corps and drive it back in disorder on Heintzelman and capture or des¬ troy those two corps before any assistance could reach them from the north bank of the stream. There

was some misunderstanding of orders on the morning of the 31st and much consequent delay, but at noon Gen. D. H. Hill's division of four brigades deployed in double line on either side of the Williamsburg Road, advanced on Casey's division at Fair Oaks and after a severe fight of two hours drove it back upon Couch's division at Seven Pines. Hill now received a reinforcement of one brigade, and two brigades of Kearny's division came to

the assistance of Couch and Keyes, and the struggle was renewed at Seven Pines, with the result that the entire Union force was driven back to a line of entrenchments about a mile in the rear, which position was held. Three Union divisions had been engaged and suffered severely, and a part of Couch's division had been cut off. Gen. G. W. Smith, with several Confederate brigades, was observing the Chicka¬ hominy, under orders to engage any troop that might cross the stream to assist Keyes and Heintzelman, or, if none came, he was to fall upon the right flanks of the Union lines en¬ gaged. After waiting some time and believing that no Union troops would cross to the south bank of the stream, Smith put some of his troops in motion to make the flank attack, but it miscarried from the timely arrival of Sumner on the south bank of the Chickahominy. Sum¬ ner, who was nearest Keyes and Heintzelman, heard the sound of battle at 1 o'clock and was at once in the saddle and ordered his troops under arms. A little later orders came from McClellan that he should be prepared to march at a moment's notice. Without waiting another moment he marched his two divisions to the Chickahominy and paused upon the two bridges, waiting orders to cross them. At 2.30 p.m. the order came to cross. Richardson could get but one brigade of his division over the lower bridge and was obliged to move up and follow Sedgwick's division over the Grapevine Bridge, which swayed and tossed in the river. But the solid colum of Sedgwick's infantry, loading it with a weight with which even the angry Chickahominy could not trifle, soon pressed and held it down among the stumps of the trees, which in turn prevented its lateral motion. Once across, Sumner pressed forward on the road, deep with mud, toward Fair Oaks, and came up to Couch, who with four regiments and a bat¬ tery had been cut from his division and was » holding ground about a half mile from Fair Oaks, with Smith approaching to make his flank attack. But four of Sumner's regiments had formed on Couch when Smith attacked, two more soon followed, and these six regiments, with Couch's checked all efforts of Smith's four brigades to dislodge them and saved the day at Fair Oaks. Richardson's division came up at nightfall and formed on Sedgwick's left extend¬ ing toward a brigade of Heintzelman's corps, while Hooker coming to the support of the de¬ feated troops on the Williamsburg road filled vacant spaces in the line. There were now three corps across the Chickahominy in continuous order, ready for action when day should

dawn. Near the close of the day General Johnston, the Confederate commander, was severely wounded and relinquished command to Gen. G. W. Smith. On the morning of 1 June, the Union army awaited attack, which was delivered by the Con¬ federates, and on some parts of the line the fighting was severe, but the advantage remained with the Union troops, who regained most of the ground lost the previous day. On 1 June Gen. R. E. Lee was placed in command of the Army of Northern Virginia, but did not take direction of affairs on the field until the fighting was over, and 2 June withdrew to the fortifi¬ cations around Richmond from which Johnston had advanced 31 May. The Union forces en¬ gaged at Fair Oaks numbered about 36,000;

the Confederates about 32,000. The Union loss was 4,384 killed and wounded and 647 missing; the Confederate loss was 5,729 killed and wounded and 405 missing. Consult Alexander, (Military Memoirs of a Confederate) (1907) ; Allan, (The Army of Northern Virginia in 1862) ; (Battles and Leaders of the Civil War5 (Vol. II) ; McClellan, (My Own Story) ; Michie, (Life of General McClellan5 ; (Official Records) (Vol. XI) ; Walker, history of the Second Army Corps) ; Webb, (The Peninsula.5

E. A. Carman.

FAIR ROSAMOND, the common appel¬ lation of the daughter of Lord Clifford, who became mistress of Henry II. A popular legend says she was kept by the king in a bower at Woodstock, which was reached by a labyrinthine passage, known only to the king. The legend adds that in 1173 Queen Eleanor discovered and poisoned the fair Rosamond.

FAIR SIDEA, The, a play of Jakob Ayrer, which by some is considered the source of Shakespeare's (Tempest.5

FAIR TRADE, an expression used in Great Britain by those who, professing to be free traders and objecting to the free trade fiscal policy of that country as a one-sided business, would tax goods imported from any country which refuses to give reciprocal concessions to British exports. Free traders consider this view as protectionist. They hold that if they can import goods cheaper from a protectionist country than elsewhere, they should be free to reap that advantage even if they cannot ex¬ port their own goods to that country free of duty. See Free-trade.

FAIRBAIRN, Andrew Martin, English theologian: b. near Edinburgh, 4 Nov. 1838; d. 9 Feb. 1912. After ministering in charges of the Scottish

Evangelical Union, he was ap¬ pointed in 1877 to the principalship of Airedale Independent College, Bradford; and was the first principal of Mansfield (Congregational) College, Oxford, 1886-1909. His most im¬ portant works are (Studies in the Philosophy of Religion and History> (1876) ; (Studies in the Life of Christ> (1881) : (The City of God) (1882) ; (Religion in History and in Modern Life5 (1884) ; (Christ in the Centuries5 (1892) ; (The Place of Christ in Modern Theology) (1893) ; (The Philosophy of the Christian Religion5 (1902).

FAIRBAIRN, Patrick, Scotch Presbyterian clergyman: b. Hallyburton, Berwickshire, 28 Jan. 1805; d. Glasgow, 6 Aug. 1874. He re¬ ceived his education at the University of Edin¬ burgh. In 1826 he was licensed to preach and served as pastor in the Orkney Islands, Bridgeton in Glasgow and Salton. In 1843 he became minister of the Free Church, remaining in Salton. He was professor of divinity in the Free College of Aberdeen 1853-56, and from 1856 until his death principal of the Free Church College of Glasgow. He was moderator of the General Assembly in 1865 and a member of the Free Church delegation which visited the United States in 1867. He translated several works from the German and edited (The Imperial Bible Dictionary5 (2 vols., 1866). He was the author of several volumes including (The Typology of Scripture5 (1845-47; new ed., New

York 1900) ; (Ezekiel and the Book of His Prophecy5 (1851) ; (Prophecy viewed in its dis¬ tinctive nature, its special functions and its proper interpretation5 (1856) ; (Hermeneutical Manual5 (1858); (Pastoral Theology,5 with a biographical sketch of the author by J. Dodds

(1875).

FAIRBAIRN, Sir William, Scottish engi¬ neer: b. Kelso, Scotland, 19 Feb. 1789; d. 18 Aug. 1874. His father was a farm servant. He entered business in Manchester, England, in 1817. He constructed the first iron ship in Great Britain, for traffic on the Forth and Clyde Canal, and afterward his firm built nearly 1,000 vessels. He was a friend of George Stephen¬ son, made great improvements in cotton mill machinery, was the inventor of a rivetting machine which effected a revolution in the method of manufacturing boilers, and was associated with Robert Stephenson in designing and building the great tubular bridge over Menai Strait. He was created a baronet in 1869. He was the author of (Mills and Millwork5 ; (Iron, Its History and Manufacture5 ; Appli¬ cation of Iron to Building Purposes5 ; (Iron Shipbuilding5 ; (Useful Information for Engi¬ neers5 ; (An Experimental Inquiry into the Strength; Elasticity, Ductility and other Prop¬ erties of Steel,5 etc. Consult his (Life, 5 edited by Pole (London 1877).

FAIRBANK, Calvin, American clergyman : b. Pike, N. Y., 3 Nov. 1816; d. Angelica, N. Y., 12 Oct. 1898. He was an ardent abolitionist, and during 1837-39 aided 23 slaves to escape across the Ohio River. In 1843 he raised $2,275 to secure the liberty of a nearly white slave girl who was to be sold at auction at Lexington, Ky. In 1844 he opened the way for the escape of the Hayden family, for which offense he suffered five years' imprisonment. Later he was again detected in violation of the Fugitive Slave Law, and sentenced to 15 years' imprison¬ ment at Frankfort, where he was cruelly treated, receiving about 35,000 lashes on his naked body. In 1864 he was set at liberty after spending more than 17 years in jail. He pub¬ lished (How the Way Was Prepared5 (in which he told the story of his own life).

FAIRBANKS, Arthur, American teacher and author : b. Hanover, N. H., 1864. He \vas graduated at Dartmouth College in 1886, and received a doctorate from Freiburg, Germany. He has taught at Dartmouth, Yale and Cornell, and from 1900 to 1906 professor of Greek liter¬ ature in the State University of Iowa. In 1907 he was elected director of the Boston Museum of Fine Arts. Among his writings is an (Intro¬ duction to Sociology5 (1901), which has been translated into Japanese; (First Philosophers of Greece5 (1898) ; A Study of the Greek Paean5 (1900) ; (The Mythology of Greece and Rome5 (1907) ; (Handbook of Greek Reli¬ gion5 (1910) ; Athenian White Lekythoi,5 (Vol. I, 1907; Vol. II, 1914).

FAIRBANKS, Charles Warren, Ameri¬ can lawyer and statesman: b. near Unionville Centre, Union County, Ohio, 11 May 1852; d. Indianapolis, Ind., 4 June 1918. His father was a Vermonter and was one of the early pioneers who settled in the West in the middle, 30's and helped to hew out of the wilderness the great Buckeye State. The son's earliest life was

spent in toil on the farm. He attended the pub¬ lic school in the neighborhood until his 15th year, when he entered the senior preparatory department of the Ohio Wesleyan University at Delaware, Ohio, where he was graduated in 1872. After leaving the university he went to Pitts¬ burgh, Pa., as Associated Press agent, mean¬ while studying law. He was later transferred to the Associated Press at Cleveland, Ohio, where he continued his legal studies in the Cleveland Law School, until he was admitted to the Supreme Court of Ohio in 1874, and in the same year removed to Indianapolis, Ind., where he began the practice of his profession. He took an active interest in politics but sought no public office until he was elected to the United States Senate in 1897. He was chairman of the Indiana State conventions in 1892, 1898 and 1914. In 1895 he had the unanimous complimentary vote of his party, which was in the minority, for the United States Senate. He was elected to the United States Senate 30 Jan. 1897, and at the expiration of his term was re-elected, but resigned 4 March 1905 to qualify as Vice-Pres¬ ident of the United States, to which office he was elected on the ticket with Theodore Roose¬ velt in 1904. He was a delegate-at-large to the Republican National Convention at Saint Louis in 1896 and was temporary chairman of the convention ; a delegate-at-large to the Republi¬ can National Convention at Philadelphia in 1900 and was chairman of the Committee on Resolutions ; a delegate-at-large to the Republi¬ can National Convention at Chicago in 1904 and was chairman of the delegation ; a delegate- at-large to the Republican National Convention at Chicago in 1912 and was chairman of the Committee on Resolutions. He was appointed by President McKinley a member of the United States and British Joint High Commission which met in Quebec in 1898 for the adjustment of the Alaskan, the Fur Seal and other ques¬ tions growing out of our relations with Can¬ ada ; he was chairman of the American commis¬ sioners. By appointment of President Roose¬ velt he represented the United States at the Tercentennary Celebration at Quebec in 1908. He was a candidate for the Republican nomi¬ nation for President in 1908. At the close of his term as Vice-President in company with Mrs. Fairbanks he made a tour around the world. At the Republican National Conven¬ tion at Chicago in June 1916 he was nominated for Vice-President of the United States on the ticket with Charles E. Hughes. He received the degree of LL.D. from Baker Univer¬ sity, Ohio State University, Ohio Wesleyan University and Northwestern University. He was a member of the board of trustees of the Ohio Wesleyan, DePauw and

American uni¬ versities and president of the Methodist Hos¬ pital of Indiana and the Indiana Forestry Asso¬ ciation. He was a member of the Board of Regents of the Smithsonian Institution.

FAIRBANKS, Henry, American inventor : b. Saint Johnsbury, Vt., 6 May 1830; d. 7 June 1918; son of Thaddeus Fairbanks (q.v.), he was graduated at Dartmouth College in 1853, and at Andover Theological Seminary in 1857. He was ordained in 1858 ; held pastorates in Burke and Barnet, Vt., and in 1859 was professor of physics, and later of history, at Dartmouth. He became identified with the manufacturing

firm of E. and T. Fairbanks and Co., in 1868; and subsequently gave much of his time to me¬ chanical experiments, and patented a scale for weighing grain and subsequently perfected and patented 34 additional inventions of various kinds. He was president of Saint Johnsbury Academy and was prominent in the work of the Congregational Church in Vermont.

FAIRBANKS, Thaddeus, American in¬ ventor: b. Brimfield, Mass., 17 Jan. 1796; d. Saint Johnsbury, Vt., 12 April 1886. He settled in Saint Johnsbury in 1815, and there worked with his father in a saw and grist mill, and also in the manufacture of carriages. In 1824 he and his brother Erastus began the manufacture of stoves and plows. In June 1831 he patented the platform scales bearing his name. After¬ ward about 50 different improvements were made on these scales, which have been sold in all parts of the world; his last patent being taken out when he was 90 years old. His dona¬ tions to Saint Johnsbury Academy totaled

$200,000.

FAIRBANKS, Alaska, city and capital of the fourth judicial district, on the Tanana River near the head of navigation, 160 miles west of Dawson, and 350 miles by stage north of Valdez. It is the commercial centre of the Fairbanks gold-mining region and is connected with Chena, 45 miles distant by the Tanana Valley Railroad. It is in all respects a modern city, with a centrally located steam-heating plant, schools, churches, electric light and power plants, etc. It is connected with Valdez by a stage route and in summer there is steam¬ boat communication with Dawson to the east and to Saint Michael on the west. In the three years 1906-08, Fairbanks sent out $27,- 000,000 in gold. Lode mining has in recent years displaced the earlier placers. The govern¬ ment of the United States has undertaken the construction of a railroad to Fairbanks at a cost of over $14,000,000. Pop. 3,541.

FAIRBURY, Ill., city of Livingston County, on the Wabash and the Toledo, Peoria and Western railroads, 60 miles east of Peoria. Coal mining and

farming are the leading in¬ dustries. The city has grain elevators, flour mills, cement works and machine shops. It has a public library. Pop. 2,532.

FAIRBURY, Neb., city and county-seat of Jefferson County, on the Little Blue River, the Saint Joseph and other branches of the Chicago, Rock Island and Pacific System, about 60 miles southwest of Lincoln. It is situated in a good agricultural region, and its chief manufactures are flour and dairy products. A large nursery is just outside the city limits. The city contains a Carnegie library and fine post-office building. It owns its waterworks and electric-light plant. Pop. 5,454.

FAIRCHILD, Ashbel Green, American clergyman: b. Hanover, N. J., 1 May 1795; d. Smithfield, Pa., 1864. He wrote many contri¬ butions to the religious press. His most popular work, (The Great Supper, was translated into German and had an immense sale. He also pub¬ lished*

FAIRCHILD, Charles Stebbins, American financier: b. Cazenovia, N. Y., 30 April 1842. He was graduated at Harvard University in

1863 ; admitted to the bar in 1865 ; became deputy attorney-general of New York in 1874 and attorney-general in 1876. After spending some time in Europe he settled in New York city in 1880, where he practised law till 1885. He was assistant Secretary of the Treasury 1885-87, and Secretary 1887-89. He was a member of the monetary commission appointed by the Indianapolis Monetary Conference in 1897. From 1879 to 1905 he was president of the New York Security and Trust Company and later he held high offices in other corpora¬ tions.

FAIRCHILD, David Grandison, Ameri¬ can botanist : b. East Lansing, Mich., 7 April 1869. He was graduated at the Kansas State Agricultural College in 1888 and made post¬ graduate studies in botany at Naples, Italy, in 1893, at the University of Breslau and Berlin in 1894, Munster and Bonn in 1895-96, and at Buitenzorg, Java, in 1896. Since 1889 he has been connected with the United States Depart¬ ment of Agriculture, since 1898 has been agri¬ cultural explorer' and since 1903 has been in charge of foreign explorations. In 1897 he organized the work of seed and plant introduc¬ tion of the Department, now the office of Seed and Plant Introduction, of which he has had charge since 1906. He has made special re¬ searches in botany since 1896 as assistant to Barbour Lathrop on four expeditions in search of economic plants for introduction into the United States. He is a member of the Ameri¬ can Association for the Advancement

of Science and of the International Society of Botanists.

FAIRCHILD, George Thompson, Ameri¬ can educator: b. Brownhelm, Ohio, 6 Oct. 1838; d. 1901. He was graduated from Oberlin Col¬ lege 1862 and from Oberlin Theological School 1865; was professor of English literature, Michigan Agricultural College, 1879-97 ; and was vice-president of Berea College from 1898. He entered the Congregational ministry in 1871 and was the author of 'Rural Wealth and Wel- fare> (1900).

FAIRCHILD, Herman Le Roy, American educator: b. Montrose, Pa., 29 April 1850. He was graduated at Cornell University in 1874; was secretary of the New York Academy of Science in 1885—88 ; president of the Rochester Academy of Science 1889-1902; secretary of the Geological Society of America 1890-1907 and president in 1912. In 1911 he was president of the New York State Commission Government Association. He has been professor of geology at the University of Rochester from 1888, and has published many articles, especially on the glacial geology of New York State.

FAIRCHILD, James Harris, American educator: b. Stockbridge, Mass., 25 Nov. 1817; d. 1902. He was president of Oberlin College from 1866-89 after a service of 26 years as tutor, professor of languages, professor of mathematics and professor of moral philosophy and theology. Besides editing the 'Memoirs of Charles G. Finney5 (1876) and Finney's Sys¬ tematic Theology5 (1878), he was the author of

FAIRCHILD, Lucius, American military officer: b. Kent, Ohio, 27 Dec. 1831 ; d. Madison, Wis., 23 May 1896. At the beginning of the Civil War he enlisted as a private in the Federal army, and in August 1861, was appointed a cap¬ tain in the regular army and major in the volunteer army. He took part in the battles of Bull Run and Antietam, and led the charge up Seminary Hill at Gettysburg, where he lost his left arm. He was promoted brigadier-general in 1863, but resigned to serve as secretary of state of Wisconsin and was governor 1866-72. In 1886-87 he was commander-in-chief of the Grand Army of the Republic.

FAIRCLOUGH, Henry Rushton, Ameri¬ can philologist : b. near Barrie, Ontario, Canada, 15 July 1862. He was graduated at Toronto University in 1883 and in 1896 received the de¬ gree of D.Ph. at Johns Hopkins. From 1893 to 1902 he was associate professor and professor of classical literature at Leland Stanford Uni¬ versity. In the latter year he was made pro¬ fessor of Latin. He also taught. Latin in the summer sessions of the University of Wiscon¬ sin 1906, Columbia 1908, Chicago 1910, Colorado 1913 and in 1910-11 was professor in the Ameri¬ can School of Classical Studies, Rome. He was delegate to the centennial celebration of the

University of Berlin in 1910. He is the author of (The Attitude of the Greek Tragedians To¬ ward Nature5 (1896) ; (The Andria of Terence5 (1901) ; 'The Connection between Music and Poetry in Early Greek Literature5 (1902) ; (The Antigone of Sophocles, translated into English5 (1903) ; 'Virgil's .Triieid,5 with S. L. Brown (1908) ; (The Phormio of Terence,5 with L. J. Richardson (1908) ; (The Trinummus of Plautus5 (1909) ; also ' Monograph on the Text of Terence5 (in Transactions of the American Philological Association, 1900). He was editor- in-chief of the 'Students' Series of Latin Classics5 and edited Virgil in the 'Loeb Classics.5

FAIRFAX, Donald McNeill, American naval officer : b. Virginia, 10 Aug. 1822 ; d. Hagerstown, Md., 10 Jan. 1894. During the Mexican War he participated in the capture of Mazatlan and Lower California. In 1861 he had personal charge of the transfer of Messrs. Mason and Slidell and their secretaries from the Trent, a British mail ship, to the San Jacinto. He later took part in the chief naval operations in Charleston harbor ; was promoted rear-admiral in 1880 and retired in 1881.

FAIRFAX, Edward, English poet : b. Denton, England, about 1580; d. near Otley, England, January 1635. He made a metrical translation 'Godfrey of Boulogne5 (1600), of Tasso's 'Jerusalem Delivered,5 and dedicated it to Queen Elizabeth ; it was highly esteemed by James I, and is still valued; and on this rather than on his own "Eclogues55 the fame of Fair¬ fax as a poet rests. He is also author of a 'Dis¬ course of Witchcraft,5 in which he gives an ac¬ count of the bewitching of his two daughters in 1621.

FAIRFAX, Thomas, Lord, English gen¬ eral : b. Denton, Yorkshire, 17 Jan. 1612; d. Nun Appleton, Yorkshire, 12 Nov. 1671. Fairfax warmly espoused the cause of Parliament, and in April 1642 presented to Charles a petition of the people imploring him to be reconciled to his

subjects. The same year he was appointed gen¬ eral of the horse, and in 1644, together with Essex, Waller and Manchester, he held a chief command in the English army sent to co-operate with the Scots. The credit of the battle of Mar- ston Moor has, by some authorities, been di¬ vided between Leslie and Cromwell, but, accord¬ ing to others, Fairfax is also entitled to share in it. On the Earl of Essex resigning the com¬ mand of the parliamentary army in 1645, Fair¬ fax was made commander-in-chief in his room. He insisted on the command of the horse being given to

Cromwell. When he took Oxford the first thing he did was to set a guard upon the Bodleian Library, an act for which he deserves the gratitude of posterity. He subsequently, in November 1647, was engaged with Cromwell in putting down the levelers in the army, and in the following year captured Colchester, and caused Sir Charles Lucas and Sir George Lisle to be tried by court-martial and shot. He was one of the king's judges in 1649, and endeavored to prevent his execution. Being ordered to march against the Scottish Presbyterians, he positively declined the command and Cromwell was appointed (26 June 1650) to succeed him. He was appointed one of the lay church com¬ missioners in 1654, and was a member of Cromwell's first Parliament. He assisted Monk against General Lambert, and co-operated in the restoration of Charles II, being one of the committee charged to secure his return.

FAIRFAX, Thomas, 6th Baron of Cam¬ eron : b. Yorkshire, 1692; d. Greenway Court, Frederick County, Va., 12 Dec. 1782. He was educated at Oxford and was a contributor to Addison's Spectator. He came to America and settled on a vast landed estate in Virginia, in¬ herited from his mother, a daughter of Lord Cul¬ peper. This property, the <(Northern Neck of Virginia,® embraced the region lying between the Potomac and the Rappahannock and included the Shenandoah Valley (about 6,000,000 acres). William Fairfax, his cousin, acted as his agent, whose daughter Anne became married to Lawrence Washington, the elder brother of George Washington. It was at Greenway Court that Baron Fairfax became acquainted with George Washington, and between them a warm friendship sprang up. Fairfax gave Washington employment on survey work on his domain, and did everything he could to ad¬ vance his interest with the provincial govern¬ ment. During the War of the Revolution, Fair¬ fax, though an ardent loyalist, was permitted to live on his estate in perfect security. The surrender at Yorktown of Cornwallis, and the winning of American independence by the man he had (

The 12th Lord Fairfax and baron of Cam¬ eron, who succeeded in 1900 to the barony, has, like his American predecessors, made no claim to the title.

FAIRFIELD, Sumner Lincoln, American author: b. Warwick, Mass., 25 June 1803 ; d. New Orleans, La., 6 March 1844. He began the publication of the North American Magazine in 1833, and continued to edit and publish it for five years. His published volumes include days of Melpomene> (1824); 'Cities of the Plain

(1828) ; (Poems and Prose Writings) (1840) and (Select Poems) (1860).

FAIRFIELD, Conn., town, port of entry, in Fairfield County, three miles southwest of Bridgeport, on the Long Island Sound, the New York, New

Haven and Hartford Railroad. A popular summer resort, it has a beautiful situa¬ tion and one of the finest beaches on the Sound. The chief manufactures are paper, dog biscuit, aluminum ware, wire goods, ladies' underwear, rubber goods and machinery. It has good public buildings, two libraries and four build¬ ings which date from Revolutionary times. The first settlement was made in 1639 and the town was incorporated the same year. Its town hall, originally built in 1720, contains records dating back to 1648. It was the scene of several In¬ dian and Revolutionary battles, and in 1779 was almost wholly burned by the Hessians and Tories. Pop. 11,475. Consult Child, 'An Old New England Town (New York 1895) ; Os¬ good, (Centennial Commemoration of the Burn¬ ing of Fairfield* (ib. 1879).*

FAIRFIELD, Ill., city, county-seat of Wayne County ; 123 miles southeast of Spring- field, on the Southern and the Baltimore and Ohio Southwestern railroads. The city is the centre of a fruit-growing belt, especially noted for apples, and has a trade in grain, live stock, tobacco, etc. The manufactures are chiefly flour, lumber and dairy products. It is the site of the Hayward Collegiate Institute. The lighting plant is owned by the city. Pop. 2,754.

FAIRFIELD, Iowa, city, county-seat of Jefferson County, 48 miles northwest of Burl¬ ington, on the Chicago, R. I. & P. and the C., B. & Q. railroads. The principal manufactures are brooms, tile, agricultural implements, machin¬ ery, furniture, carriages, flour and dairy prod¬ ucts. The electric-light plant and the water¬ works are owned by the city. The Parsons Col¬ lege, under the auspices of the Presbyterian Church, was founded here in 1875. The first settlement was made in 1839. Pop. (1920) 5,948.

FAIRHOLT, Frederick William, English artists and author: b. London, 1814; d. there, 3 April 1866. He published 'Co-stume in Eng¬ land : a History of Dress to the Close of the 18th Century) (1846); (The Home of Shakes¬ peare Illustrated and Described) (1847) ; Re¬ markable and Scientific Characters) (1849) ; dictionary of Terms in Art) (1854), etc.

FAIRLIE, John Archibald, American econ¬ omist : b. Glasgow, Scotland, 30 Oct. 1872. In 1895 he was graduated at Harvard University and in 1898 received the degree of Ph.D. at Columbia University. He served one year as secretary to the New York State Canal Com¬ mission. In 1900 he became junior professor at the University of Michigan,. and in 1909 be¬ came associate professor, and in 1911 full pro¬ fessor of political science at the University of Illinois. In 1907-08 he. served on the Michigan Constitutional Convention and in 1908-09 was special agent of the United States Bureau of Corporations. He was also associate editor of the National Municipal Review. He has pub¬ lished 'Municipal Administration (1901) ;

Rational Administration of the United States> (1905) ; (Local Government in Counties, Towns and Villages (1906); 'Essays in Municipal Administration (1908); (Taxation and Reve-*

nue System of Illinois } (1910) ; Commission Government in Illinois Cities) (1911) ; (The President's Cabinet (1913) ; (Town and Coun¬ ty Government in Illinois J (1913) ; (Revenue and Financial Administration in Illinois } (1915), and contributions to technical journals on economic, legal and political subjects.

FAIRMONT, Minn., city and county-seat of Martin County, 65 miles southwest of Man¬ kato, on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul rail¬ roads. The city has a Carnegie library, a cigar factory, gas engine works, flouring mills, pack¬ ing-houses, and brick and tile yards. The water and electric-lighting systems are owned and operated by the municipality. Fairmont was first settled in 1855 and is governed by a mayor and council of one chamber. Pop. 4,630.

FAIRMONT, W. Va., county-seat of Mar¬ ion County, at the head waters of Monongahela River navigable to this point; the Baltimore and Ohio Railroad, the Pennsylvania and the New York Central lines enter the city; 78 miles from Wheeling, 125 miles from Pittsburgh, 300 miles from Baltimore; the centre of one of the largest soft coal operations in the world; abundance of natural gas and oil ; commission form of government ; permanently improved roads in all directions from the city; model public school system and a State Normal for training of teachers. The principal manufac¬ tures are glass, of which there are two of the largest plants in the world, mining machinery, cigars, lumber and iron products. Fairmont has the largest trolley system in West Virginia, reaching from Fairmont to Fairview, Manning- ton, Clarksburg, Bridgeport and Weston; a healthy climate; fine water supply; beautiful homes and a splendid public spirit. Pop. 18,000.

FAIRMOUNT, Ind., town in Grant County, 60 miles northeast of Indianapolis, on the Cleveland, Cincinnati, Chicago and Saint Louis, and the Pittsburgh, Cincinnati, Chicago and Saint Louis railroads. Fairmount Academy and the Wesleyan Theological Institute are lo¬ cated here. It has extensive farming interests and has manufactories of catchup, sauce, bot¬ tles and tiles. The waterworks are the property of the municipality. Pop. 2,506.

FAIRM'OUNT COLLEGE, coeducational institution, situated at Wichita, Kan., under the auspices of the Congregational Church. It was established in 1892, with assistance from the Boston Education Society. A collegiate de¬ partment was added in 1895, and in 1896 the name of the institution was changed to Fair- mount College. It offers courses leading to the B.A. and the corresponding M.A. degrees. The abolishment of the preparatory school was be¬ gun in 1912-13, dropping one year at a time. It has a sub-freshman department. In 1916 the college had an attendance of 317. In connec- tion with the college there is a conservatory of music. The library numbers about 32,000 vol¬ umes, besides pamphlets.

FAIRMOUNT PARK. See Philadel¬ phia.

FAIRPORT, N. Y., village of Monroe County, 10 miles east of Rochester, on the New York Central and West Shore railroads. It has extensive farming and fruit-growing inter¬ ests. It has a manufactory of cans. Pop. 4,626.

FAIRS AND SHOWS. A fair is a peri¬ odical meeting of merchants in an open market held at a particular place and generally for the transaction of a particular class of busi¬ ness. The origin of fairs is obviously to be traced to the convenience of bringing together at stated times the buyers and sellers of the stock-produce of a district. Fairs are generally held in or near towns, but from their nature are specially adapted to the convenience of country dealers and their customers. Two curi¬ ous facts are to be noted in the history of fairs. In Europe the numerous festivals of the church afforded the most favorable opportunity for the establishment of these markets. This associa¬ tion is indicated in the German name of a fair, which is identical with that used for the cere¬ mony of the mass. A fair generally brings a concourse of people into the town in which it is held, and gives it something of a holiday appearance. Advantage has frequently been taken of this concourse, either by the persons assembled themselves or by the purveyors of various amusements, to add entertainment to business, and as the business of a particular fair declined it has often, instead of being abandoned, been gradually converted into a periodical opportunity for a saturnalia of amusement. Thus religion, business and diver¬ sion have come to be associated in the idea of a fair.

In the Middle Ages fairs were specially privileged and chartered by princes and magis¬ trates, special temporary tribunals were even es¬ tablished for their use. It was then the custom, which in some places still remains, to make a public proclamation of the commencement and duration of the fair. The goods sold at fairs were then of much greater value, as well as variety, than at present, embracing fabrics of all kinds, as well as jewelry. In some parts of the Continent the practice still prevails of purchas¬ ing clothing at

fairs. Fairs existed in ancient as well as modern times, and are to be found in all parts of the world. In the East they are of great magnitude and importance. At Mecca, during the annual pilgrimages, and at Hardwar in Ajmir, a resort of pilgrims in Hindustan, two of the greatest fairs of the East, we find again the association between commerce and re¬ ligion. According to Prescott fairs were regu¬ larly held in the principal cities of Mexico every fifth day, being the recognized substitute for shops. A fair for the sale of slaves was held at Azcapozales, near the capital. At the prin¬ cipal fair, held at the City of Mexico, the num¬ ber of visitors reached 40,000 to 50,000. Here the same arrangement prevailed as in the Euro¬ pean fairs of the Middle Ages. A court of 12 judges, clothed with absolute authority, main¬ tained perfect order in this great concourse.

The Easter and Michaelmas- fairs at Leipzig, the fairs of Frankfort-on-the-Main, of Lyons in France, and Nijnei-Novgorod in Russia, are among the most important fairs of the present day in Europe. The fairs of Great Britain now mostly consist of the weekly market-days of country towns and certain great agricultural meetings, or trysts, as they are called in Scot¬ land, chiefly for the sale of cattle and horses, such as the Falkirk Tryst. There are also, espe¬ cially in Scotland, a considerable number of the hiring fairs. Among the most celebrated of the

fairs which have been turned into saturnalia are the celebrated Donnybrook fair in the county of Dublin ; Bartholomew and Greenwich fairs, London ; and Glasgow fair.

In America the State and county fairs have developed into periodical expositions of agri¬ culture, horticulture, stock-raising, manufactur¬ ing, domestic science, education, transportation, good roads movement, etc. Most of the States have their State fairs, supported partially by legislative appropriation, and often with per¬ manent buildings. Many county fairs are regu¬ larly incorporated companies, composed of farmers and merchants who make a little money out of them. There is now an American Asso¬ ciation of Fairs and Expositions, comprising in its membership 52 organizations representing State, county and provincial fairs. The secre¬ tary is Charles Downing, of Indianapolis, Ind.

The National Corn Association holds ex¬ positions nearly every year and has members in 35 States. The 1913 exposition was at Co¬ lumbia, S. C., and the 1914 at Dallas, Tex. The slogan of the Association is (

Business Shows. — The fair is a country proposition, adapted to the display of agricul¬ tural products. To supply a similar demand in the cities for the display largely of manufac¬ tures and exploitation of new goods, the busi¬ ness show has developed. It seems to have been a growth from the poultry and horse shows. When the bicycle was in its prime regular bicycle shows were held annually in the large cities of the United States. With the disap¬ pearance of the bicycle show the automobile show developed, and this is perhaps the largest attended show now held annually at Madison Square Garden, New York. Business shows are also held for the display of business office con¬ veniences, typewriters, desks, dictographs and the thousand and one appliances now found in counting-rooms and bookkeeping departments. Printing shows are held for the display of the machinery and products of the graphic arts. Each of the more prominent industries at times has its shows, conducted either by asso¬ ciations or by speculators who sell spaces to houses that desire to exhibit. See Expositions, Industrial.

FAIRVILLE, Canada, village of Saint John County, New Brunswick, on the Canadian Pacific Railway. It has pulp and saw mills, box factories, brickyards, breweries, woodenware works, etc., and a hospital for nervous dis¬ eases. An electric railway connects the village with the city of Saint John. Pop. 3,500.

FAIRWEATHER, Mount, in Alaska, in the Saint Elias range, 35 miles northeast of Cape Fairweather. It is 15,292 feet high and its steep declivities are covered with great glacial sheets.

FAIRY, an imaginary being or spirit of diminutive size, supposed generally to assume a vol. 10 — 46

hitman form, but appearing also in others and represented as both beneficent and malevolent toward mankind. In the latter case diseases of cattle were frequently attributed to their mis¬ chievous operations ; and cattle that died sud¬ denly without any apparent cause were com¬ monly said to be elf-shot. Among the Irish peasantry they are termed ((the good people® by way of placation. In Poole's

Bibliography. — Aarne, (Vergleichende Mar- chenforschungen) (Helsingfors 1908) ; Benz, (Marchen-Dichtung der Romantiker, mit einer Vorgeschichte) (Gotha 1908) ; Chodzko, (Fairy Tales of the Slav Peasants and Herdsmen) (London 1896) ; Delattre, 'English Fairy Po¬ etry (ib. 1912) ; Grimm, 'Deutsche Mythol- ogie) (Berlin 1879-98) ; Friedrichs, (Grundlage, Entstehung und genaue Einzeldeutung der bekantesten germanischen Marchen, Mythen, und Sagen) (Leipzig 1909) ; Hartland, (The Science of Fairy Tales* (London 1891) ; Jacobs, 'English Fairy*

Tales (3d ed., ib. 1910) ; id., 'Celtic Fairy Tales* (New York 1910) ; id., Undian Fairy Tales* (London 1892) ; Keight- ley, 'Fairy Mythology* (ib. 1850) ; Ludwig, 'Sibirische Marchen* (Glogau 1890) ; Mac- Ritchie, (Testimony of Tradition* (London 1891) ; Riklin, (Wunscherfiillung und Symbolik im Marchen* (Vienna 1908) ; Weber, 'Italien- ische Marchen* (1900).*

FAIRY BLUEBIRD, one of the bulbuls (q.v.) of the East Indian family Pycnonotidce and genus Irena, familiar in Indian gardens, and justly admired. The commonest species is brilliant turquoise, with black wings, tail and under parts, and coral-red legs and beak. They make a rather rough little nest in a bush and lay two or three speckled eggs.

FAIRY QUEEN. See Faerie Queene.

FAIRY RING, or CIRCLE, a ring occa¬ sionally observed in pasture, distinguished from surrounding vegetation by being either barer or

more luxuriant and attributed by the peasantry of western Europe to the dancing of the fairies. They are now known to be occasioned by the growth of certain kinds of fungi, which, pro¬ ceeding outward from a centre, render the soil for a time unfitted for the nourishment of grass, but later fertilize it by their decay.

FAIRY SHRIMP, a phyllopodous crus¬ tacean (Chirocephalus diaphanus) , occasionally found in fresh-water ponds in the British Isles. It is about one inch in length and nearly transparent.

FAIRY-TALES, stories in which fairies play a part, or which contain other super¬ natural or magical elements such as mark the folk-tales of (Puss in Boots) ; (Beauty and the Beast1 ; (Hop o' My Thumb1 ; Sleeping Beauty1 ; and others. Actual fairies seldom appear in traditional fairy-tales, so called. Grimm and his successors showed by the study of comparative mythology that these tales are not restricted to Europe alone, but are to be found, in varying forms, among almost all na¬ tions. The survival of popular tales is due to their being unconscious growths, to the strict adherence to form shown by illiterate and sav¬ age people in recitals and to the laws of the permanence of culture. There are several theories in regard to the origin of folk-tales. The oldest is the Oriental theory, which traces all back to a common origin in the Vedas. It is true that the germs of most tales are found in Vedas, but proofs of the Indian origin of the stories are lacking; the discovery of tales in Egypt which were written in the early empire are objections to its acceptance, and the idea of diffusion will not

account for similar tales found in Australia, New Zealand and America. The Aryan theory, supported by Max Muller, Grimm and others, gives as their origin the explanation of natural phenomena. These nature-myths must not be regarded as originally metaphors ; they were primitive man's philos¬ ophy of nature in the days when every object was endowed with a personal life. The tales have enough likeness to show that they come from the same source and enough difference to show they were not copied from each other. Muller says ((Nursery tales are generally the last things to be adopted by one nation from another.® Another theory, supported by Tylor and Lang, traces the origin of folk-lore to a far earlier source than the Aryan — the customs and practices of early man : such as totemism, descent from animals or things, which were at last worshipped; and curious taboos or prohi¬ bitions, which can be explained by similar sav¬ age customs of the present. But late authori¬ ties declare that it is useless to seek any com¬ mon origin of folk-tales ; since the incidents, which are few, and the persons, who are types, are based on ideas that might occur to un¬ civilized races anywhere.

Our popular fairy-tales, or contes, have been, in the main, handed down orally. However, some of their elements or variants at least have come down through ancient Oriental literature. The ˆyntipas,1 a Greek version, belongs to the 11th century. Then followed translations into several European languages. The earliest col¬ lection of European tales was made by Stra- parola, who published at Venice in 1550 his

(Notti Piacevola,1 which was translated into French and was probably the origin of the (Contes des Fees.1 The best early collection is Basile's the ˆentamerone,1 published at Naples in 1637; reprinted at New York 1912. In 1696 there appeared in the Recueil, a magazine published by Moetjens at The Hague, the story (La Belle au Bois Dormant1 (our (Sleeping Beauty1), by Charles Perrault; and in 1697 appeared seven others: (Little Red Riding HoocP ; (Bluebeard) ; (Puss in Boots) ; (The Fairy) ; Cinderella1 ; (Riquet of the Tuft) ; and (Hop o' My Thumb.) These were pub¬ lished in 1697 under the title Contes du Temps Passe Avec des Moralites,1 by P. Darmancour, Perrault's son, for whom he wrote them down from a nurse's stories. Within this century the investigations of Jacob and William Grimm, and their successors in this field, have reduced to written form the tales of nearly all nations. We must include in the comparison of stories the Greek myths ; as the Odyssey is now con¬ ceded to be a mass of popular tales. To these we must add the tales of ancient Egypt ; those narrated by Herodotus and other travelers and historians; the beautiful story of Cupid and Psyche,1 given by Apuleius in his (Metamor- phoses> of the 2d century a.d., which also was taken from a popular myth. See Beauty and the Beast; Bluebeard; Elves; Fairy; Fairy Tales; Folk- lore, etc. Consult bibliography subjoined to article Fairy.

FAIRY TALES OF HANS CHRIS¬ TIAN ANDERSEN. These (Fairy Tales1 have been read by thousands with delight, and have settled down to a place in the world's memory along with the traditional nursery tales of the race. The Ugly Duck¬ ling and The Constant Tin Soldier are re¬ membered in company with Goody Two Shoes or Little Red Riding Hood. The (Fairy Tales1 are among the most original works of the 19th century. Fairy tales are usually stories of legend and tradition ; they grow up in the lives of simple peoples without any one's knowing who originally thought of them or told them. They are told and retold by the old people to the children, and then somebody conies and writes them down as, for instance, Mr. Harris wrote dowm the negro stories of Brer Rabbit and Brer Fox. Of this kind are the famous ˆarchen1 of the Brothers Grimm and the Contes1 of Perrault and many others. These are old stories which have charmed generations put into literary form. Such also are some of the Cventyr1 or Wonder-stories of Andersen. He was born and brought up at Odinse in the island of Funen, a place, which, as he says himself, was in those days a hundred years behind the times. The old women, who made something of a pet of him, used to tell him old stories which re¬ vealed to him <(a world as rich as that of the Thousand and One Nights,® as he said himself afterward, not only in complete stories, but in ways of story-telling. <(In the volume which I first published I had like Musseus but in my own manner related old stories which I had heard as a child. The tone in which they still sounded in my ears seemed a very natural one to me.® But much of his Cales,1 and probably the most characteristic element, is something different ; it is something of his own. Ander-

sen was a man of a peculiarly childlike nature. He was not very fond of children but he was in simplicity, imagination and impulsiveness not unlike them. In all that he wrote he was an idealist, as children are apt to be, without over¬ much concern about the actualities of the real world. So when he told stories to children as he often did he spoke naturally in the lan¬ guage and thought which they recognized as their own. (

Edward Everett Hale.

FAIT ACCOMPLI, fat-ak-kon-ple' (Fr., an accomplished fact), in diplomatic language, de¬ notes an event that has happened and must be accepted or recognized as definite, however disagreeable.

FAITH, the state of mind which treats a certain proposition as true, independently of whether its truth is completely demonstrated. Faith thus

partakes of the nature of will. Its most extreme form is found in the famous passage of Tertullian which ends, ((Buried, He was raised from the dead; this is certain be¬ cause it is impossible.® While . faith, rarely goes to such extremes as this, it is of its very nature that even if its object is proved it totally disregards this proof. .

Faith is not entirely confined to religious matters. It is inherent in the very nature of knowledge. The general form of all descrip¬ tive knowledge is the analysis of a situation. Thus the physicist analyzes his gross physical processes in terms of atoms or electrons, the psychologist reduces everything to atomic men¬ tal states, and so on throughout the sciences. Now, one of the most striking features of analysis is that up to the present, at any rate, it has rarely if ever been exhaustive. In the

first place to record all the significant features of a situation is beyond the powers of the human mind. The total condition of a physical experiment includes every single event in the universe in exactly the unique temporal and spatial relations which it bears toward the ex¬ periment in question. But furthermore, the ultimate terms of analysis are continually re¬ ceding. The physicist of yesterday thought in terms of atoms; the physicist of to-day thinks in terms of electrons ; and what the terms of the physicist of to-morrow will be we cannot imagine. For these reasons an analysis is al¬ most of necessity incomplete. From the stand¬ point of a strict yes or no logic, an incomplete analysis is a false analysis. However, the slightest application of a scientific law demands that we should act as if this analysis, which is probably false, and which at the best is not known to be true, were a demonstrated fact. At the very least, it demands that we should trust in the negligible character of the errors of the law, although nothing but our trust in the continuity of nature guarantees that these are negligible. This trust in the continuity of nature conforms in every respect to the defini¬ tion of faith.

Analysis is not confined to matters of phy¬ sics and the other natural sciences. A moral situation is susceptible to analysis, and indeed demands analysis before a reasonable course of action can ensue. In determining what to do when our motives lead us in opposite di¬ rections, we analyze the many bearings and con¬ sequences of our conduct. This analysis which precedes the appeal to conscience is imperfect for exactly the same reasons as those which render our physical analysis imperfect : the complete bearing and consequences of our deeds are never at our disposal. Again it re¬ quires an act of faith to treat the results of our incomplete analysis as a basis for conduct and to be confident that just those aspects of the deed which we have overlooked do not give it its dominant moral tone.

Faith is thus the necessary concomitant of analysis both in natural science

and in conduct. Analysis makes the scope of faith recede further and further beyond any assignable limit, but the importance of faith remains just what it was in the beginning. To render this faith firm, especially in those matters that con¬ cern the moral conduct, has always been the task of religion. By allegory, by the emotional appeal of rite, mythology and creed, religion furnishes a scaffolding for the faith of those who cannot put an independent trust in the continuity of nature and the moral order itself. Just as Descartes and the Occasionalists founded their physics on the honesty of a God guaranteed by faith as well as by demonstra¬ tion, the exponents of religion have always made some Divine dictum or example their chief moral sanction. Thus Paley based his en¬ tire ethics on a system of divinely established rewards and punishments. It is interesting to note that these religious attempts to mediate between faith and analysis leave the need for faith essentially unchanged, as is shown by the emphasis placed on faith by all religious teachers. What religion accomplishes is the transference of the need for faith to objects more easily grasped than abstractions by those of a mystical trend of mind. There are many

non-mystical natures, however, to which it is more natural and simple to have faith directly in the continuities and laws of nature and morals rather than in those things worshiped by the religious, and in these the most vigorous faith is consistent with the entire absence of anything that can be called a religion.

In theistic religions faith naturally acquires as its principal meaning belief in existence of God and in certain dogmas concerning Him. The Jewish faith was primarily a faith in the moral order as personified in Jehovah. The Christian finds the embodiment of his moral order and accordingly the object of his faith in Christ the Redeemer as well as in the Jew¬ ish God. The Catholic definition of faith has been paraphrased by Cardinal Newman as <(be- lief in certain doctrines because God has re¬ vealed them.® This faith is especially directed toward the Church and toward certain official dicta of the Church. The various Protestant sects differ as to their definition of faith, but all emphasize reliance in God. See Belief. Consult Harnack, (History of Dogma) (Bos¬ ton 1894-99) ; Inge, (Faith and its Psychology 1 (London 1909) ; James, (The Will to Believe) (New York 1911).

Norbert Wiener.

FAITH, Act of. See Auto da Fe.

FAITH, Rule of, in the early Church, the summary of doctrines taught to catechumens, and to which they were required to give their assent before baptism. From the ancient usage, the phrase has been adopted, not very aptly, in modern theology to denote (1) the true source of our knowledge of Christian truth ; and (2) the criterion or standard of Christian doctrine. Protestants find this rule in the Scriptures alone ; the Greek and Roman churches, and some Anglicans, find it not only in Scripture, but also in the Church, as the au¬ thorized interpreter of Scripture, whose inter¬ pretations are embodied in tradition. The Ra¬ tionalists make reason the final arbiter, and the mind of man the measure of truth. See Bible; Creeds; Infallibility.

FAITH HEALER, The. This play in three acts, by William Vaughn Moody, was first produced in New York, at the Savoy Theatre, on 24 Jan. 1910. Henry Miller and Laura Hope Crews were in the cast. It had been previously .presented in Saint Louis, on 15 March 1909. The piece is not as definite in its theme nor as human in its story as (The Great Divided But it was a sincere endeavor on the part of the dramatist to show the struggle that takes place between material and spiritual forces to the weakening of the latter. Moody, being a poet, here tried to write something mystical, and only partly suggested why the Faith Healer, endowed with the power of re¬ viving the sick and raising the dead, suddenly lost that power through a lack of faith in him¬ self. Being a dramatist, he was obliged to justify the human love of the Faith Healer for the heroine, and here he accomplished the one satisfactory stroke in the play — the establish¬ ment of the belief that love does not weaken the exercise of the spirit, but rather enhances it.

As an acting play, (The Faith Healer> is misty, it is unconvincing. This may be due to the fact that it is treated almost realistically,

whereas it is mystic; it takes for granted a theme rarely proven in human experience. The quickening of a paralyzed woman into life, the restoring of a sick baby and then the failure as the Faith Healer's power wanes, are difficult of externalizing. But Moody's art is sincere, and one feels his sincerity above his dramatic effectiveness. As in (The Great Divide) he falls into the obvious, here contrasting the spiritual exaltation of a devout man with the science of a doctor and the conventional tradi¬ tions of a minister.

Montrose J. Moses.

FAITHFUL SHEPHERDESS, The, a

pastoral drama by John Fletcher, published in 1609, and ranking with Tomusˆ which it partly inspired, as one of the finest specimens of this Italian form of poetry extant in English literature.

FAITHFULL, Emily, English philanthro¬ pist: b. Headley, Surrey, 1835; d. 31 May 1895. Out of pure philanthropy, she founded the Victoria Press, 1860, in which women alone were employed as operatives. Queen Victoria encouraged her by appointing her sprinter-in¬ ordinary to the queen.® She started the Vic¬ toria Magazine ' as an advocate of women's right to lucrative employment, and in the United States lectured in 1872-73, and 1882. She was the author of (Change Upon Change,1 a novel (1868) ; (Three Visits to America1

(1884).

FAITHORNE, William, English engraver: b. London, 1616; d. 1691. He received most of his early training from Sir Robert Peake, and taking the side of the Royalists in the civil struggle of 1640 he was banished to France. In that country he studied under Nateuil and after his return to England in 1650 practised as an engraver and also marketed prints. He executed many portraits in crayon after 1680 and engraved several portraits by Lely, Van Dyke and other eminent masters. Consult Fagan, (A Descriptive Catalogue of the Works of William Faithorne1 (London 1888).

FAIZABAD. See Fyzabad.

FAJARDO, fa-har'do, Porto Rico, a sea¬ port on the northeast coast, on the Fajardo River. It has a good harbor and extensive sugar interests. Molasses, sugar and tortoise shell are exported. Pop. 6,086.

FAKHR-AD-DIN AR-RAZI fak'r-ad- den ar-ra'ze, Mohammedan theologian : b. Rai, Tabaristan, 1149; d. 1209. He was educated at Merv and Maragha, where among his masters was the celebrated scholar, A1 Majd al Jili. He wrote a famous commentary on the Koran, the well-known 'Mafatih-al-haib1 and gave much time to all branches of learning. He spent huge sums on experiments in alchemy, then a favorite delusion among the learned. He was also professor at Rai and Ghasni and finally be¬ came president of the University of Herat. His commentary was issued at Cairo in eight volumes in 1890.

FAKIR, fa/ker', or DERVISH, the name

of a class of religious devotees of the Moham¬ medan faith, all leading a life of poverty and generally practising mendicancy. The Arabic word Faqlr signifies ((poor® used in a sense of <(poor® in the sight of God. The Persian word Darwesh is derived from dar, i.e., those who

beg from door to door. The observance of strict forms of fasting and acts of piety give them a character of sanctity among the people. 1 hey live partly in monasteries, partly alone, and from their number the imams are gen¬ erally chosen. Throughout Turkey they are freely received, even at the tables of persons of the highest rank. There are, throughout Asia, multitudes of these devotees, monastic and ascetic, not ony among the Mohammedans, but also among the followers of Brahma. They trace their ultimate origin to Abu or Ali Bekr, and in Egypt all are under the rule of a supposed direct descendant of the latter. There are 32 religious orders now existing in the Turkish Empire, many of which are scarcely known beyond its limits : but others, such as the Nakshbendies and Mevlevies, are common in Persia and India and Morocco. All these com' munities are properly stationary, though some of them send out a portion of their members to collect alms. In fact, all religious faqirs are divided into two great classes, the ha shar (within the law) or those who govern their conduct according to the principles of Islam ; and the be shar (without the law), or those who do not live their lives according to the principles of any religious creed. All these orders, except the Nakshbendies, are considered as living in seclusion from the world; but that order is entirely composed of persons who, without quitting the world, bind themselves to a strict observance of certain forms of devotion, and meet once a week to perform them to¬ gether. Each order has its peculiar statutes, exercises and habits. Since the orders are secret, it is impossible to discover the exact nature of these.

The numerous orders of dervishes are all divided by Europeans into two great classes, the dancing and the howling dervishes. The former are the Mevlevies, and are held in much higher estimation than the other class. They are the wealthiest of all the religious bodies of the Turkish Empire. The dancing of these dervishes is conducted to sounds of music. The movement at first is slow, but as the dervishes become excited it grows in animation, until at last the actors are exhausted, and are obliged to sit down. After a while they rise up again and resume their dancing, which is repeated several times. The whole is concluded by a sermon. The howling dervishes accompany their dancing with loud vociferations of the name of Allah, and violent contortions of the body such as are seen in persons seized with epileptic fits. In former times these dervishes, after working themselves up into a frenzy, used to cut and torture themselves in various ways with apparent delight. The sheiks of all orders have the credit of possessing miraculous powers. The interpretation of dreams, the cure of diseases and the removal of barrenness are the gifts for which the dervishes are most in repute. See Sufism.

None of the fakirs are bound by oath to re¬ main in any particular community. Return to the world is also permitted them, but this privilege is

rarely used. The head of the con¬ vent is called shaikh, and he is appointed by the general of the order. They reside usually in the city which contains the ashes of the founders of their orders, and are subordinate to the Mufti of the capital who has jurisdic¬

tion over them. In Turkey the Shaikhu '1 Islam has the right of removing the generals of the various orders. The Mufti has also the right to confirm the shaikhs who may be nominated by any of the generals of the orders. Consult Lane, (Modern Egyptians5 (3d ed., New York 1908) ; Brown, J. P.,

FAKUMEN, Manchuria, town in the south about 40 miles north of Mukden and about 20 miles west of Tie Pass. On 18 March 1905 Fakumen was occupied by the Japanese.

FALAISE, fa'laz', France, town in the department of Calvados, 20 miles south of Caen, on the Ante. It is located on a cliff and has two fine Gothic churches, a college, public library, a hospital and an ancient castle, in which was born William the Conqueror. It has also manufactories of cotton goods, hosiery, leather, dyes and chimes. Nearby at Guibray since the 1 1th century is held an annual fair in August. Consult Dodd, (Falaise the Town of the Conqueror5 (Boston 1900). Pop. (com¬ mune) 6,900.

FALASHAS, a Hamitic tribe of Abyssinia, supposed to be descended from Jewish immi¬ grants of the time of Solomon. They claim to have come from Jerusalem and to belong to the tribe of Levi. They exhibit many Se¬ mitic traits, although their complexion is a red¬ dish brown like that of the Abyssinians. They practise Israelitic worship although in a some¬ what debased form. Contrary to the method of the Jews of other lands they despise com¬ merce and devote their energies more freely to agriculture and practise minor trades. Their synagogues are always surmounted by a red earthen pot. They have a monastic system and education is in the hands of the monks. Esti¬ mates of the number of these people vary from 100,000 to 250,000. Consult Flad, (The Fal- ashas of Abyssinia5 (London 1869) ; Fait- lovitch, F., (Notes d'un voyage chez les Fal- ashas5 (Paris 1905).

FALB, falp, Rudolf, Austrian meteorolo¬ gist: b. Obdach, Styria, 1838; d. 1903. He was educated at Gratz, where he studied theology and entered the priesthood. He soon afterward was converted to Protestantism and in 1869-72 studied mathematics, physics and astronomy at the universities of Prague and Vienna. In 1877-80 he traveled in North and South Amer¬ ica, after which he settled in Berlin. His theo¬ ries of earthquakes were unacceptable to the scientists of this day and have never been seri¬ ously considered. He founded the astronomical periodical Sirius in 1868. His

published works are Won den Umwalzungen im Weltall5 (3d ed., 1890) ; (Das Wetter und der Mond5 (2d ed., 1892) ; (Kalender der kritischen Tage5

(1892-).

FALCK, falk, Niels Nikolaus, German jurist: b. Emmerlef, Schleswig, 1784; d. 1850. He received his education at the University of Kiel and in 1814 was appointed to the chair of law there. He was chosen president of the Schleswig-Holstein Assembly of the States in 1838, but his policy alienated the Liberal party. He published (Handbuch des schleswig-hol- steinischen Privatsrechts5 (1825-48); (Samm- lungen zur nahern Kunde des Vaterlandes5

(1825) ; Quristische Encyklopadie) (5th ed., 1851). He was editor of the Staatsbiirger- liches Magazin from 1821 to 1831, and contin¬ ued it as the Nenes Staatsburgerliches Maga¬ zin from 1833 to 1841.

FALCKENSTEIN, Eduard Vogel von.

See Vogel von Falckenstein, Eduard.

FALCON, fal-kon, Juan Crisostomo, Ven¬ ezuelan statesman : b. on the Peninsula of Paraguana (now the state of Falcon), 1820; d. Martinique, 1870. He was a brilliant soldier in his youth and in 1858 was made leader of the Federalist revolutionary party. He was elected President of Venezuela in 1863, and in that year entered Caracas. The Constitution of 1864 was sanctioned by him, but on the overthrow of his government in 1867, he retired to Europe. Three years later a counter revolution brought him a call to again lead the nation, but he died

en route at Martinique.

• •

FALCON, Venezuela, a maritime state and the most northern, with an extensive coast line on the Caribbean Sea and the Gulf of Vene¬ zuela. Its adjoining states are Lara to the south and Zulia to the west. It has a much broken surface, with low mountains inland and sandy plains and swamps along the coast. The climate is healthful except in the swampy districts of the coast. The mountain valleys are very fertile, yielding crops of coffee, cacao, cotton, corn, sugar, tobacco and fruits. Stock raising is on the

increase. The state is sparsely settled. Its area is 9,572 square miles, with a population of 139,110. Coro, the capital, is of interest historically and is the chief commercial centre. A railway connects Coro with La Vela de Coro, the state's only seaport, about six miles east of the capital. Coro has a population of 9,452.

FALCON, a term broadly given to any of many birds of the family Falconidce (q.v.), but more narrowly to the species of the typical sub¬ family Falconince, whence are derived most of the hawks used in falconry. The falcons proper, for strength, symmetry and powers of flight, are the most perfectly developed of the feathered race. They are distinguished by hav¬ ing the beak hooked at the point, the upper mandible with a notch or tooth on its cutting edge. The wings are long and powerful, the second feather rather the longest; legs short and strong. The largest falcons are the three great Arctic ones represented by the circum¬ polar jerfalcon (Hierofalco , gyrfalco), and its congeners the Greenland, Iceland and Labrador falcons. (See Jerfalcon). The type of its race, however, is the noble peregrine (Falco pere- grinus), to the female of which the term <(fal- con® was alone given by falconers, and was most highly esteemed for the fierceness, dash and perfection with which she worked. The female is about 17 inches long and 2>l/2 feet in extent of wing; the male is 2 or 3 inches less. The head, neck, a patch under the eye and the whole upper surface are dusky, with gray and brownish shades ; the throat and under parts whitish or cream-colored, with dusky bars and arrowheads ; legs and feet yellow, bill bluish. It chiefly inhabits wild districts, and preys on grouse, ducks, ptarmigans, pigeons, rabbits, sea- fowl, etc., pouncing upon them from above with terrific swiftness and force, and always showing the greatest courage in its encounters

with rivals or in defense of its nest, which is usually placed on a ledge of some lofty cliff. This species is to be found in nearly all quarters of the globe, for the North American duck- hawk (variety anatum) and certain tropical forms are only sub-species.

Other American true falcons are the pigeon-hawk, sparrow-hawk (qq.v.) and some closely allied western and northern forms. Many of the Old World falcons are famous, and are elsewhere individually described, such as the European hobby, kestrel, merlin and lanner; the Asiatic shaheen, saker, luggur, turumti and other species trained by Eastern falconers; the Australasian quail-hawk; and the large African genus Baza, which has the peculiarity of possessing two <(teeth® on the edge of the beak. Another interesting genus is Microhierax, containing the finch-falcons (q.v.). Falcons attain to a great age. One is said to have been found in France, about 1790, with a collar of gold dated 1610, showing it to have belonged to James I of England.

FALCON, a small light cannon in general use in the late Middle Ages. We know from a decree of Henry II of France that it discharged a ball weighing one pound. Some guns of this type are said to have thrown a projectile of six pounds. See Artillery.

FALCONBRIDGE, Sir Glenholme, Ca¬ nadian jurist: b. Drummondville, Ontaria, 12 May 1846. He is a graduate of Toronto Uni¬ versity, and was called to the bar in 1871. He was appointed a senator of Toronto University in 1881; in 1887 became a judge of Queen's Bench of the Supreme Court of Judicature of Ontario; and in 1900 chief justice. He was knighted in 1908.

FALCONE, fal-ko'na, Anielle, Italian painter: b. Naples, 1600; d. there, 1665. He studied under de Ribera and through his numerous battle pieces came to be called ((L'oracolo delle battaglie.® When the Neapoli¬ tans rose against Spain, Falcone organized his pupils into a ((Death Company,® which never gave quarter to a Spaniard. The failure of the insurrection obliged Falcone to retire to Rome. Later he went to France, where he was gra¬ ciously received by Louis XIV. Under the powerful protection of Colbert he was enabled to return to his native city, where he spent his last years. The Louvre has one of his battle pieces, the Naples Museum two and the Prado, Madrid, two.

FALCONER, fa'k'ner, Edmund (((1861) was long very popular. Falconer excelled in his delinea¬ tions of Irish peasant life.

FALCONER, Hugh, Scottish botanist and palaeontologist: b. Forres, Morayshire, 29 Feb. 1808; d. London, 31 Jan. 1865. He was gradu¬ ated in arts at Aberdeen University in 1826, and in medicine at Edinburgh in 1829. He was ap¬ pointed assistant surgeon on the Bengal estab¬ lishment of the East India Company. Arriving

FALCONS

1 Goshawk

2 Marsh Hawk

3 Pigeon Hawk or Merlin

4 Fish Hawk

5 Saker Falcon

in India (1830) he examined and reported on a collection of fossil bones from Ava, and won scientific standing in India. In 1832 he was made superintendent of the botanic garden at Saharanpur. He discovered and was the first to describe the assafoetida plant of commerce; and he discovered the geological character of the Sewalik Hills, aˆnd in order to study their ossiferous deposits he compared them with skeletons of extant species. For these re¬ searches he received the Wollaston medal of the Geological Society of England. He was appointed (1847) superintendent of the botanic garden at Calcutta and professor of botany at the Calcutta Medical College.

FALCONER, Sir Robert Alexander, Ca¬ nadian educator : b. Charlottetown, Prince Ed¬ ward Island, 10 Feb. 1867. He was educated at Queen's Royal College School, Trinidad, and at the universities of Edinburgh, Leipzig, Berlin and Marburg. From 1892 to 1907 he was lec¬ turer and professor of New Testament Greek in Pine Hill College, Halifax, N. S., and also served as principal from 1904 to 1907. In the latter year he was chosen president of Toronto University. He received the degrees of Litt.D and LL.D. from the University of Glas¬ gow, from Princeton, U. S. A., Toronto and other Canadian universities. He is Fellow of the Rt yal Society of Canada and was knighted in 1917. He published (The Truth of the Apostolic GospeP (1904) ; (The German Tragedy and Its Meaning for Canada5 (1915), also articles in professional journals, encyclo¬ paedias and'dictionaries in Britain and America; articles on education and public questions, etc.

FALCONER, William, English poet: b. Edinburgh, 11 Feb. 1732; d. at sea off Mozam¬ bique, 1769. Having early shipped before the mast, he became before 1750 second mate of a ship trading to the Levant. The experience of a shipwreck off Cape Colonna, Greece, furnished material for the poem of (The Shipwreck> (1762), by which he is best known. He was later appointed purser of the frigate Aurora, bound for India. The Aurora touched at the Cape of Good Hope in December 1769 and was shortly after lost with all hands. Falconer s < Poetical Works,5 with a biography by Gilfil- lan, appeared in 1854.

FALCONET, Etienne Maurice, a-te en mo-res fal-co-na, French sculptor: b. Vevay, Switzerland, 1716; d. Paris, 4 Jan. 1791. Catharine II of Russia patronized him, and he was employed by her to execute the colossal statue of Peter the Great, erected at Saint Petersburg.

FALCONETTO, fal'ko-net'to, Giovanni*

Maria, Veronese architect and painter: b. 1458, d. 1534. He received his early instruction from his father, Jacopo Falconetto, an artist of note, and many are of the opinion that he studied also under Melozzo da Forli. Falconetto executed frescoes in the chapel of San Biagio, the church of San Nazaro, the Duomo and the church ot San Pietro, Martire, all in Verona. His Au¬ gustus and the SibyP is in the Veronese Gallery, but is by no means his best work His most noteworthy architectural work is the Palazzo Giustiniani (1524) at Padua. He also designed many of the Padua city gates.

FALCONIDiE, a family of raptorial birds, comprising the sub-families Gypaetiruz (lammer- geiers), Polyborince (carrion-hawks and kites), Accipitrince (hawks), Buteonirue (buzzards), Aquilincs (eagles), and Falconince (falcons). They are all remarkable for strong and sharply hooked bills, with a distinct cere, usually fleshy; and most of them have sharp and power¬ ful talons, designed to seize, kill and tear to pieces the living prey upon which most of them subsist. In the eagles and falcons these char¬ acters are developed in the highest degree. The tarsus is usually more or less feathered, in some cases down to the very toes, which are arranged three in front and one behind and are exceed¬ ingly strong and tenacious. There is a pro¬ jection over the eyebrows except in the ospreys, which gives an appearance to the eyes of being very deeply set in the orbits. These birds range in size from the mighty lammergeier to the falconets, hardly bigger than sparrows. The female is usually decidedly larger than the male and upon her falls the burden of the sup¬ port of the young. The tribe is represented in all climates, even to the remote north, but is most numerous in the tropics, while some species are nearly cosmopolitan. Many migrate, but few show any tendency toward flocking. The color of the plumage frequently differs much in the young from that of the full-grown birds and as their first plumage is retained for some time, this has caused more species to be enumerated than really exist. Plain tints rule, but white and black are often strikingly displayed and a few species present a considerable variety of colors. Their voice is limited as a rule to screaming cries, but a few utter somewhat melodious notes. The nests of all are rude structures, placed in trees, on rock-cliffs, on the ground or in some hole. The eggs are few in number — one to five as a rule — and are laid much earlier in the year than is the case with birds generally; and they and the young are well cared for and ably defended by the par¬ ents. The sport of

falconry (q.v.) took its name from employing certain of these birds in the chase.

FALCONIO, fal-ko-'neo, Diomede, Roman Catholic prelate : b. Pescocostanzo, Italy, 20 Sept. 1842; d. Rome, 8 Feb. 1917. He entered the Franciscan order 2 Sept. 1860, and upon completing his studies came to the United States as a missionary, reaching Allegany, N. Y., December 1865 and being ordained priest by Bishop Timon of Buffalo, 4 Jan. 1866. In 1868 he was named president of the College and Semi¬ nary of Saint Bonaventure, Allegany, N. Y., and on 29 Nov. 1871 was sent by his superiors to Harbor-Grace, Newfoundland, at the request of the bishop of that diocese, who appointed Father Falconio his secretary and chancellor and rector of the cathedral. In 1882 he came back to the United States, where he remained a year. Returning to Italy in 1883, he was elected provincial of the Franciscans in the Abruzzi, and in 1889 he was chosen procurator- general and later visitor-general in various provinces. He was preconized bishop of Lace- donia 11 July 1892, and on the 17th of that month was consecrated at Rome by Cardinal Monaco La Valletta. On 2 Feb. 1893, Monsignor Falconio assumed charge of his diocese. He was elevated to the United Archiepiscopal See

of Accerenza and Matera in Basilicata, 29 Nov. 1895, but was called thence by Leo XIII, 3 Aug. 1899, and appointed first apostolic delegate to Canada, taking possession at Ottawa, 1 Oct. 1899. On 30 Sept. 1902 he was nominated apos¬ tolic delegate to the United States and assumed possession at Washington, D. C., 21 November of the same year. He was elevated to the car- dinalate in 1911. A volume of (Pastoral Let- ters) appeared in French in 1900.

FALCONRY, or HAWKING, the employ¬ ment of falcons in the chase. This sport is of Oriental origin, and has been practised in the East since before the days of any record — in China at least 2,000 years before Christ; and it was probably followed at that date all over Asia and down into the Nile Valley, for falconers with their hawks are depicted in some of the oldest Egyptian mural paintings. The sport spread over Europe with the Roman domina¬ tion, but seems not to have been introduced into England until the 9th century. Many laws and social customs regulated this pursuit in Great Britain and many terms and phrases remain in the language as an inheritance from the art and etiquette of this most elegant form of the chase. Thus the square frame on which hawks were carried to the field was named a “cadge,® and the servant who bore it a “cadger® ; and a “cast®

of hawks meant two taken on a chase together. To ((man a hawk® was to tame it ; and one so thoroughly trained as to be flown with young ones to show them how to work was called a (

The extensive agricultural changes which oc¬ curred in England during the 17th century, causing the enclosure and improvement of waste lands; the growth of towns and industry; the altered temper of the people preceding and dur¬ ing the Protectorate ; and most of all the intro¬ duction of firearms, followed by the sports of shooting and the consequent preserving of game — all tended toward the decline of falconry,

both in England and on the Continent ; and game-keepers and peasants began to shoot as <(vermin® the grand and valuable birds upon which their forefathers had doted. Neverthe¬ less the sport is still followed by fanciers who keep alive its traditions.

The hawks used in falconry are all true falcons, and nearly or quite the whole list have at some time or place been regularly trained, except in the United States, although here the best of material exists, in our duck-hawk (the peregrine), pigeon, and sparrow-hawks, south¬ western prairie-falcon and others. A few clubs here and there have flown their hawks, but the sport shows little sign of becoming general in North America. It is more frequent in Central and South America. In North Africa and the Orient the sport flourishes as much as formerly; and there eagles are often employed and quarry as large as gazelles and bustards is struck down.

Falconers divide their birds into "long¬ winged® or "dark-eyed® hawks, and "short- winged® or <(yellow-eyed® hawks. The first class contains the true falcons, of which the great jerfalcon (q.v) was in old times reserved for royalty, the peregrine for an earl and the others for the nobility; hence these were known as "noble,® while the goshawk, kestrel, etc., on account of the inferiority of their masters as well as of their own powers, were styled "ig¬ noble.®

Hawks are taken for training either as nest¬ lings or when full-grown. They are trained by being hooded, made to wear bands of leather ("jesses®) about the legs, to which are at¬ tached "varvels® (rings, sometimes carrying bells hung by "bewits®), and a swiveled "leash®; and gradually are accustomed, at first in complete darkness, to being fed and handled, and later to feeding in the light and among spectators, and finally to take first live birds thrown toward it and finally wild quarry. During this process young birds are much at liberty and are then said to be "flying at hack.®

The sport was one in which women as well as men of all classes might indulge, going afield on foot and alone, or in mounted cavalcades, and

often during mediaeval times with royal pomp. The hawks, hooded, were carried by servants on frames suspended from their shoulders, but each sportsman was likely to hold a favorite bird upon his gauntleted wrist — in Europe on the left wrist, in the Orient on the right. Dogs, especially small greyhounds and pointers, were likely to accompany the falconer and were put to use in flushing birds, starting hares and the like. When the hunting scene was reached the hawks were prepared for flight, and some were freed to "wait on® until quarry was sighted; but others, trained differently, were kept hooded until the falconer himself started or perceived the game, when they were unhooded and sent after it. The sportsmen then followed, watched the chase and recovered prey and hawk as well as they could. Good falcons show a keen interest and great intelligence in their work.

Many books describe both the sport and the falcons in great detail. One of the best of the early works is (The Booke of Faulconrie or Hawking, > by Turberville (1575). Recent Brit¬ ish authors of repute are Brodrick, Salvin, Freoman (Practical Falconry, 1869), and J. E.*

Harting (< Hints on the Management of Hawks,) 1884). The latest general work is (Coursing and Falconry, > by Cox and Lascelles, in the Badminton Library, 1892. Consult also the ar¬ ticle «An Ancient Sport in the New World," in Outing for March 1914,

FALDSTOOL, or FOLDSTOOL, the

name of various pieces of English church fur¬ niture, the principal being a portable folding seat, also called faldistory, similar to a camp- stool used by a bishop when officiating in other than his own cathedral church; and a small desk at which the litany is read, the name dat¬ ing from a period when folding lecterns were used.

FALEME, fa-la'me, a tributary of the Senegal River, in West Africa. It rises in Futa-Jallon and flows in a northerly direction for a total distance of about 300 miles.

FALERII. See Falisci.

FALERNIAN WINE, one of the favorite wines of the Romans, so called from Falernus Ager (the Falernian Field), the district in which it was grown, in Campania, Italy. It is described by Horace as, in his time, surpass¬ ing all other wines then in repute. In the time of Pliny, however, as he himself informs us, Falernian wine had already, owing to a want of

care in its cultivation, begun to decline in quality. See Wine.

FALERNUS AGER, a district of northern Campania, in ancient Italy, situated north of the river Volturnus. It was famed in classic days for its wine. In modern times the quality of the wine has declined. Consult Nissen, Utalische Landeskunde) (Vol. II, Berlin 1902).

FALGUIˆRE, fa-gyar, Jean Alexandre Joseph, zhon a-lex-zandr zho-zy', French sculp¬ tor and figure painter: b. Toulouse, France, 7 Sept. 1831 ; d. Paris 1900. In sculpture his work is of very notable excellence, and displays originality and vigor and grace. The Luxem¬ bourg Gallery in Paris contains his sculptures : Christian Martyr (1868) ; and (Victor in the Cock Fight* (1870). (Progress Abasing*

Error) is in the Pantheon, (Poet Holding a Lyre) is in the Place de l'Opera, and among other works are statues of Balzac and Lamar¬ tine and one of Lafayette in Washington. His paintings are inferior to his sculptures.

FALIERI, Marino, ma-re'nd1 fa-le-a're, Doge of Venice: b. 1278; d. Venice, 17 April 1355. He commanded the troops of the republic at the siege of Zara in Dalmatia. He there gained a brilliant victory over the King of Hungary, and was afterward Ambassador to Genoa and Rome. He was elected Doge of Venice on 11 Sept. 1354, but in the following year dissatisfaction with the light punishment imposed upon a noble who had insulted Falieri's young wife caused him to conspire with the lower orders to overthrow the republic and make himself sovereign of the state. His plot was discovered on the night before it was to have been consummated, and he was beheaded 17 April 1355. The last scenes of his life are depicted in Byron's trag¬ edy of (Marino Falieri. Plays have been written on the same subject by Casimir Dela- vigne and Swinburne. Consult Brown. Hora- tius, (Studies in Venetian History* (1907).*

FALISCI, fa-lis'i, a people of Etruria, said to have been originally a Macedonian colony. They occupied Falerii, one of the 12 Etruscan cities. When they were besieged by the Roman general Camillus, a schoolmaster offered to betray his pupils into the hands of the enemv, that, by such a possession, he might easily oblige the place to surrender. Camillus heard the proposal with indignation, and ordered the man whipped back to the town by the very pupils whom his perfidy would have betrayed. This instance of magnanimity operated upon the people so powerfully that they surrendered to the Romans.

FALK, falk, Johannes Daniel, German au¬ thor and philanthropist : b. Dantzic, Prussia, 28 Oct. 1768; d. 14 Feb. 1826. His capacity for satire was considerable. Among his works are (A Pocket Book for Friends of Jest

and Satire) (1797) ; (Men and Heroes) (1796), a satire in verse, and (Prometheus (1804), a dramatic poem. He founded at Weimar in 1813 an organization called the <(Society of Friends in Need," and established there an institution for the care of orphan and neglected children, which later was taken over by the state, ana which still bears his name.*

FALK, falk, Max, Hungarian politician: b. Pest, 1828; d. 1908. He received his education at Pest and at the Polytechnic Institute, Vienna. In 1848 he was made a member of the Academic Legion, and became editor of the Wanderer, in which he advocated a restoration of the Hun¬ garian constitution. Soon afterward he was made private lecturer on Hungarian history and literature to the empress. He wielded a powerful influence as editor of the Pester Lloyd, in 1869 became a member of the Hun¬ garian Parliament and allied his fortunes with the party policies of Deak, Eotvos and An- drassy. He published (Graf Stephan Szechenyi und seine Zeit (1868, in German and Hunga¬ rian) ; (Ruckerinnerungen an die Konigin Elisabeth* (1902) ; and, with Brachelli, the 12th edition of Gallettis' (Allgemeine Weltkunde)*

(1860).

FALK, Paul Ludwig Adalbert, powl lood'- vi h a'diil-bert falk, Prussian statesman : b. Metschkau, Silesia, 10 Aug. 1827; d. 7 July 1900. He was appointed Minister of Public Worship and Education in 1872, and in this capacity was mainly instrumental in carrying the so-called May laws (because passed in May 1873-74-75), aimed at the restriction of the Roman Catholic Church in Germany, by limiting the influence of the clergy in the schools, by reorganizing the seminaries for the training of teachers and by defining in a stricter and more comprehensive manner the relations generally of the clergy to the state. (See Kulturkampf). When, how¬ ever, Bismarck came to bid for the support of the clerical party, in order to carry out his later internal policy, Falk was compelled to resign. He was latterly president of the Supreme Court at Hamm. His biography by Fischer was pub¬ lished at Hamm in 1900.

FALKE, falke', Gustav, German poet: b. Ltibeck, 1853. He received his education at the Liibeck Catharineum, engaged in business as a bookseller until 1878, when he began the teach¬ ing of music at Hamburg. In 1903, on his 50th birthday, the Hamburg Senate and Commonalty

bestowed on him an annual grant of 3,000 marks. Falke's works include

the novels (Aus dem Durchschnitt) (1892) ; (Landen und Stranden) (1895) ; and (Der Mann im NebeP (1899) ; and the volumes of verse (Mynheer der Tod) (1892) ; (Fanz und Andacht5 (1893) ; (Neue Fahrt5 (1897) ; (Mit dem Leben5 (1899) ; (Hohe Sommertage) (1902) ; (Der gestiefelte Kater) (1904) ; hrohe Fracht) (1907) ;

FALKENHAYN, falk'en-hin, Erich G. A. S. von, German general: b. 11 Sept. 1861. He passed from the War Academy in 1880, spent three years as military instructor in China and served as major in the German brigade of occupation in eastern Asia. He was on the staff of Count Waldersee during the Boxer Re¬ bellion in 1900. In 1912 he became Prussian Minister of War, in which capacity he sup¬ ported Lieutenant von Forstner of Zabern fame. At the outbreak of the European War General von Moltke was chief of the general staff; he was reported to have fallen ill in October 1914, and Falkenhayn took over his duties. As a matter of fact, von Moltke was superseded on account of disagreement with the Kaiser. He held that the main strat¬ egic object should be to break the Allied line at Verdun, while the Kaiser, unable to reach Paris, desired to strike for the Channel coast and attack England. See War, European.

FALKENSTEIN, falk 'en-stin, Julius Au¬ gust Ferdinand, German explorer: b. Berlin, 1842. At the University of Berlin he studied medicine and geology and in 1873-76 was a member of an exploring expedition to Loango sent out by the African Society of Germany. On this trip Falkenstein made important dis¬ coveries and extensive and valuable collections. He brought home the first gorilla ever taken alive from Africa. About 1881 he founded the German General School Association which later exerted great influence on the educational sys¬ tems of foreign countries. He wrote hie Loango-Kiiste in 72 Original-Photographien) (1876) ; hie Loango Expedition (1879) ; (Af- rikans Westkiiste : Vom Ogowe bis zum Dam- ara Land) (1885) ; (Aerztlicher Reisebegleiter und Hausfreund) (10th ed., 1893).

FALKIRK, fal'kerk, Scotland, a parliamen¬ tary and municipal burgh of Stirlingshire, 10 miles southeast of Stirling and 25 miles from Edinburgh. Its port, Grangemouth, is three miles distant to the northeast and two canals pass close by the town which is a station on the North British railways. Falkirk includes the suburbs of Grahamston, Bainsford, Camelon and Laurieston. Notable features are the burgh buildings, the town hall, a free library, the Camelon fever hospital and the church. In the churchyard lie several persons once promi¬ nent in Scottish history. Falkirk is the princi¬ pal seat of the iron-casting industry of Scot¬ land, being conveniently situated in regard to supplies of coal and iron ore. Other industries are flour-milling, brewing, distilling, tanning, explosives and chemicals. Trysts, or cattle fairs, were long important but have been re¬

placed by local auction sales, held weekly. Falkirk was an important town as early as the 11th century, being then known as Eaglais

breac (((church of speckled stone®), later trans¬ literated as Egglesbreth. Near the town in 1298 was fought an important battle between the forces of Edward I and those of William Wallace, in which the Scots were worsted. In 1746 Prince Charles Edward with Highland forces defeated the English under General Hawley. Pop. 33,574.

FALKIRK, Battle of, (1) a contest in which Edward I of England gained a victory over Wallace, 22 July 1298. The king's army is said to have contained 7,000 to 8,000 mounted men and 80,000 footmen. Wallace's force amounted to about a third of the English army. His infantry was drawn up in circles, the men in the outer ring kneeling and holding their lances obliquely. The archers occupied the cen¬ tre of the circles. The overwhelming superior¬ ity of the enemy's horse, however, decided the battle. Wallace retired with a small body to Stirling, but the bulk of his army was broken up and destroyed. (See Wallace, Sir Wil¬ liam). (2) A battle between the forces of Prince Charles Edward (17 Jan. 1746) and the government troops commanded by General Hawley, whose army was completely routed and compelled to fall back on Edinburgh.

FALKLAND, fak'land, Lucius Cary, Vis¬ count, English statesman and soldier : b. prob¬ ably at Burford, Oxfordshire, 1610; d. New¬ bury, 20 Sept. 1643. He was educated at Trinity College, Dublin, and Saint John's College, Ox¬ ford, and in 1630 succeeded to the estates of his maternal grandfather. In 1633 he suc¬ ceeded his father in the peerage and for some years after chiefly resided at his seat of Bur- ford, near Oxford, where he lived in close in¬ tercourse with scholars from the neighboring universities. Here it was that Chillingworth composed his famous work against (

grosart, were published in London in 1870.

onsult Marriott, (Life and Times of Lucius Cary, Viscount Falkland5 (New York 1907).

FALKLAND, Scotland, a royal burgh in Fifeshire, 21 miles north of Edinburgh. It contains many ancient houses. The principal industries are brewing and linen-weaving. A noteworthy structure is the ancient royal pal¬ ace of the Stuarts, which after centuries of neglect has been restored by the Marquis of Bute since 1888. Pop. 2,356. Consult Wood, historical Description of Falkland5 (Edin¬ burgh 1888).

FALKLAND ISLANDS, two large islands, East Falkland (3,000 square miles) and West Falkland (2,300 square miles), with about 100

*Sonn<ˆS surrc5UI}(ˆng them, having a total area of 1,200 square miles, in the South Atlantic Ocean, about 300 miles east of the Strait of Magellan. The scenery bears a striking resemblance to parts of the Western Highlands of Scotland; the soil is light and but scanty crops are ob¬ tained. The highest elevation is Mount Adam, 2,297 feet in height. The coast is deeply in¬ dented and contains many safe anchorages. There are no roads. Sheep raising is the prin¬ cipal occupation, there being 2,325,000 acres de¬ voted to pasturage. The climate is strictly oceanic, characterized by strong winds, equable temperature and moderate rainfall. The waters round the islands have within re¬ cent years become famous as a whale fish¬ ing ground, the exports of products being valued in 1914 at £1,300,978 (including South Georgia). Dependencies of the islands are South Georgia, the South Shetlands, South Sandwich Group, South Orkneys and Graham Land. Revenue, 1914, £42,923 ; expenditure, £36,046. Imports, £233,379; exports, £1,505,464. Vessels cleared (1914), 139, of 263,965 tons. Wireless telegraphy was installed in 1912 and cable communication established in 1915. There is monthly mail communication with Liverpool (28 days' sailing). The government is vested in a governor assisted by an executive council of four and a nominated legislative council. The capital is Port Stanley, on the east coast of East Falkland (pop. 905). Pop. 3,275, mainly Scottish, except for 980 Norse and Swedish. The islands were discovered by Davis in 1592. A settlement was founded by the French in 1764, but their rights were sold to Spain in 1765, who in turn relinquished them in 1771. A British colony which had been es¬ tablished in 1765 was withdrawn in 1774, but Great Britain maintained her claim from the date of her occupancy, and since 1833 has held uninterrupted occupancy of them. On 8 Dec. 1914 a British squadron, under Sir Frederick Sturdee, attacked and defeated a German squadron under Von Spee, sinking the cruisers Scharnhorst, Gneisenau, Leipsic and Nurnberg. Von Spee went down with his flagship, the Scharnhorst. See War, European.

FALKLAND ISLANDS, Battle of the. A

naval engagement fought on 8 Dec. 1914 be¬ tween a British squadron under Rear-Admiral Sir Frederick Sturdee (q.v.) and the German Pacific squadron under Admiral von Spee. Of the five German battleships four were sunk, also two transports. The Dresden escaped, but was sunk off Juan Fernandez on 14 March 1915. See War, European — Naval Operations.

FALKNER, fak'ner, Roland Post, Ameri¬ can statistician: b. Bridgeport, Conn., 14 April 1866. He was graduated at the University of Pennsylvania in 1885 ; studied economics at Berlin, Leipzig and Halle-on-Saale, Germany; was instructor in accounting and statistics in the University of Pennsylvania in 1888-91, and professor of statistics 1891-1900. He served also as statistician of the United States Senate Committee of Finance in 1891 ; as secretary of the United States delegation to the International Monetary Conference ; and as secretary of the conference in 1892. He is author of numerous essays on criminology, sociology, etc. ; and was editor of Annals of the American Academy of

Political and Social Science 1890-1900. From 1904 to 1907 he served as commissioner of edu¬ cation in Porto Rico; from 1908 to 1911 he was statistician in charge of school inquiries for the United States Immigration Commission, and in 1911-12 was assistant director of the census. He has contributed essays on professional top¬ ics to economic, statistical and other journals, and has published a translation of August Meitzen's (History, Theory, and Technique of Statistics) (1893).

FALKNER, Thomas, English Jesuit mis¬ sionary: b. Manchester, 1707 ; d. 1784. Having studied medicine, he engaged as surgeon on a slave-ship of the South Sea Company, in which he sailed to the coast of Guinea in 1731. He next accompanied a cargo of slaves to Buenos Aires, and while there was taken dangerously ill and was _ carefully tended by the Jesuits. He was so impressed by the work of the order that he became a Catholic and entered the Jesuit order. He became a priest in 1732 and from that time until 1767 labored as a mission¬ ary in Paraguay and the Rio de la Plata region. The expulsion of his order from South America in 1767-68 caused him to return to England where he became a private chaplain. He wrote several works, including (Botanical, Mineral and Like Observations on the Products of America5 (1774) ; (A Description of Patagonia and the Adjoining Parts of South America,5 of which an uncritical and faulty edition was published by one of Falkner's friends.

FALKNER ISLAND, an island in Long Island Sound, nearly opposite Guilford, Conn. Its chief feature is a lighthouse, about 94 feet in height, with a white flash light.

FALKOPING, fal'chˆ'ping, Sweden, town in Skaraborg. It is an important railroad junc¬ tion and is important in Swedish history as the scene of the victory of Margaret of Denmark and Norway over the king of Sweden in 1389. The immediate result was the junction of Sweden with Denmark and Norway. Pop. 4,800.

FALL, Albert Bacon, American legislator: b. Frankfort, Ky., 26 Nov. 1861.

He was edu¬ cated in the country schools, but was principally self-taught. From 1879 to 1881 he taught school and read law, and from 1889 to 1904 was a practising lawyer. He worked on a farm, on a cattle ranch and as a miner. He became in¬ terested in mines, lumber, lands and railroads, and for many years has been engaged in farm¬ ing, stock-raising and mining. He served in the legislature of New Mexico and also as asso¬ ciate justice of the Supreme Court of New Mexico, and member of the Constitutional Con¬ vention. On 27 M,arch 1912 he was elected to the United States Senate for the short term ex¬ piring 4 March 1913. He was re-elected in June 1912, and his credentials not being signed he was re-elected, 23 Jan. 1913 and again in 1918. In March 1921 he became Secretary of the In¬ terior in President Harding's Cabinet.

FALL. See Waterfall and Cataracts.

FALL ARMY WORM, the caterpillar of a gregarious moth (Laphygma frugiperda). See Grass Worm.

FALL-FISH, or SILVER CHUB, a cy-

prinodont fish, or ((minnow55 (Semotilns cor- poralis) of the eastern United States. It is

very common east of the Alleghanies in clear, swift streams and rocky pools, and has been known to reach 18 inches in length. It is steel blue above, sides and belly silvery, but in the breeding season the fins and lower surface of the males are rosy. The fins are of moderate size and unspotted.

FALL OF THE HOUSE OF USHER, The, one of the most famous of the prose tales of Edgar Allan Poe, is to be grouped among the author's stories of morbid psychology. The strange obsession which afflicts the chief char¬ acter may be described as the fear of fear. The (Fall of the House of Usher) conforms admirably to Poe's dictum that every word in a short story should tend toward a preconceived effect. The sense of gloom and depression pro¬ duced in the opening sentence is maintained and if anything deepened to the close. The scene is laid ((Out of space — out of time,® yet it gives a thrilling impression of reality.. The story also illustrates the author's skill in preparing for the end, both by minor details which ex¬ plain later happenings, and by more elusive methods. Thus, the momentary repulsion which the visitor feels on meeting the physician is connected with the decision regarding the tem¬ porary entombment of Madeline, narrated pages later; and the picture painted by Usher inevi¬ tably suggests, though

in no very tangible way, the vault in which the coffin is placed. The poem, (The Haunted Palace, recited by the chief character, is an allegory of a ruined mind. No story of Poe's shows better handling of at¬ mosphere, and it is justly ranked as one of the most admirable of its class. It was first pub¬ lished in Burton's Gentleman's Magazine in 1839, and was revised for the collection of. Poe's tales issued in 1845.*

William B. Cairns.

FALL LINE. The boundary between the Atlantic Coastal Plain and the Piedmont Belt (q.v.) to the west is marked by falls or rapids on most of the streams, due to the fact that the rivers can cut more rapidly on the soft unconsolidated rocks of the coastal plain than on the harder crystalline rocks of the adjacent region. At an early date the falls marked the head of navigation for coastwise trade. Power is also largely developed along the fall line, which has been responsible for the location of numerous cities, among which are Trenton, Philadelphia, Baltimore, Washington, Rich¬ mond, Raleigh, Columbia, Macon and Mont¬ gomery.

FALL OF MAN, a commonly received doc¬ trine of Christianity, founded upon the his¬ torical narrative contained in the third chapter of the book of Genesis, together with the al¬ lusions to the same matter in other parts of Scripture. The history of the fall, as given in Genesis, contains the following particulars: God having placed Adam and Eve in the garden of Eden and forbidden . them under pain of death to eat of the fruit of the tree of the knowledge of good and evil, Eve, tempted by the serpent, first ate of the fruit herself, and after¬ ward gave of it to her husband, who followed her example. Both were driven out of Eden. Punitive sentences were passed upon each of them, and upon the serpent, which is alluded to by Saint Paul as representing the devil. In the subsequent narrative the consequences of the

fall significantly appear. The first man born of the original pair is a murderer, and his de¬ scendants grow in wickedness until a flood is sent to carry them away. As might be expected, this most suggestive narrative has given rise to inexhaustible controversy. The opinions on the fall may be divided into three classes : those which reject the narrative altogether: those which accept it as a mythical or allegorical ac¬ count of the origin of evil; those which regard it as in the main historical. As a mere matter of literary criticism, the uninterrupted flow of the narrative down to times and events evidently historical, together with the uniformity and so¬ briety of its style, leave little ground for the supposition that the writer himself supposed he was dealing in allegory. The historical view of the fall, besides the theoretical controversies to which it gives rise as to its account of the origin of evil, encounters difficulties from two sources — the modern sciences of

chronology and ethnology. In the meantime these remain difficulties only as these sciences are by no means in a state of sufficient maturity to allow their conclusions to be absolutely applied. It is remarkable that in most mythologies the ser¬ pent is worshiped as a beneficent being, though Tylor shows that Aji Dahaka of the Zarathus- trians (Zoroastrians) , which is a personification of evil, may have an historical connection with the serpent of Eden. With regard to the relation of man's fall to that of Adam, Saint Paul says ((by one man's disobedience many were made sinners® (Rom. v, 19), and ((as by one man sin entered into the world, and death by sin, and so death passed upon all men for that all have sinned® (ver. 12). It seems im¬ possible to reconcile the constant appeals made in Scripture to the moral nature of man with the notion that that nature is inherently and radically corrupt. It would also appear that the statements of Scripture with regard to the actual moral condition of man, strong as they are, do not absolutely require this mode of ac¬ counting for them. Without supposing any radical change of man's moral nature, or even any change of it whatsoever it is only necessary to suppose a change in his relation to God to explain all that is said regarding him. It is supposed that man's moral nature consists of capabilities which are good or bad according as they are directed, and that God himself is the object of all its highest aspirations. The fall being supposed to consist in the alienation of man from God, it is easy to perceive that all these aspirations, being deprived of their proper objects, must apply themselves to improper ones, and become evil in their tendency; hence the sudden rise of pride, selfishness, ambition and all evil passions. In as far also as man's nature is affected by the hereditary transmission of qualities it might become actually vitiated in its tendencies and this, together with the accumula¬ tion of evil habits, would produce those climaxes of violence or corruption which have from time to time convulsed or disintegrated society, which have called forth the denuncia¬ tions of prophets and by their very excesses have produced a reaction, which, however, has left human nature as incompetent to guide itself as ever and ready, after a period of re¬ pose, to progress toward another crisis. The fall, according to this view, consists in the moral inadequacy of man's nature when left to itself,

and the actual evils flowing from this inade¬ quacy. It is argued by theologians that in the original sentence pronounced on the trans¬ gressors there is contained the promise of a redemption and they maintain that the whole scope of Scripture is directed to the develop¬ ment of this promise and of the scheme of providence associated with it. It is from the New Testament, however, and not from the Old, that the whole doctrine of the

fall has been built up. Milton seized on this as the groundwork of his two great poems. (See Adam; Original Sin). Consult Brown, Chris¬ tian Theology in Outline) (New York 1906) ; Fisher, (History of Christian Doctrine) (ib. 1896) ; Clarke, 'Outline of Christian Theology) (ib. 1899) ; Harnack, (History of Dogma (Bos¬ ton 1899) ; Mackintosh, Christianity and Sin* (New York 1914).*

FALL RIVER, Mass., city, port of entry, in Bristol County, on Mount Hope Bay at the mouth of the Taunton River; on the New York, New Haven and Hartford Railroad, 49 miles south of Boston. It is connected with New York by the Fall River line of steamers, with Philadelphia by the Merchants and Miners freight line and with New England seaports by passenger and freight lines of steamers. The area of the city is 41 square miles and it is 200 feet above sea-level. It has a good harbor, sufficiently commodious for the largest steamers and excellent water power, as the Fall River, the outlet of Watuppa Lake, has a fall of 129 feet in less than half a mile. The water for city uses comes from Lake Watuppa and the waterworks plant is owned by the municipality. The streets are well laid out; many of the buildings are constructed of the granite which is found in the vicinity. It has excellent public and parish schools, notably the B. M. C. Durfee public high school and the Academy La Ste. Union des Sacres Cceurs; good circulating li¬ braries, a State armory, over half a hundred churches and chapels, daily and weekly news¬ papers and electric street railway connections with neighboring cities and towns. Among educational and charitable institutions are Notre Dame College, the free textile school, free civil service school, the Conservatory of Music, Boys' Club, Home for the Aged. Five public parks have been laid out in various parts of the city, and there are beautiful drives to the suburbs.

Fall River is the largest cotton-milling city in the United States. According to the Federal census of 1910 the city had 288 manufacturing establishments, employing $82,086,000 capital and 37,139 persons; paying $16,853,000 for wages, and $35,524,000 for materials; and hav¬ ing a combined output valued at $64,146,000. The cotton industry, 42 establishments with $46,000,000 capital, and a combined output valued at $30,000,000. Next in value of output was the dyeing and finishing of textiles ($3,000,000). Other important manufactures were foundry and machine-shop products ($1,000,000) ; bakery products ($600,000) . There are also manufactories of calico prints, ging¬ hams, woolen goods, men's hats, fur goods, pianos, knit goods, yarn, thread, boots and shoes, spools and bobbins, carriages, rope and twine, rubber, soap, etc. Granite quarrying also employs a considerable number of men. The city has a number of national banks, with a

capital of about $2,500,000 and several savings and co-operative banks.

The exchanges at the United States clearing-house during the year ending 30 Sept. 1910 aggregated $61,031,300.

The United States census of manufactures for 1914 showed within the city limits 315 in¬ dustrial establishments of factory grade, em¬ ploying 38,097 persons ; 36,834 being wage

earners, receiving annually a total of $16,131,000 in wages. The capital invested aggregated $89,290,000 and the year's output was valued at $64,663,000: of this, $27,502,000 was the value added by manufacture.

The government, under a charter of 1902, is vested in a mayor, chosen annually, a board of aldermen, consisting of 27 members, and subordinate administrative officials. Of these, the school committee of nine members is chosen by popular election. Fall River has an ex¬ cellent system of sewers, is lighted by gas and electricity. It was settled by grantees of the Plymouth Colony, along Mount Hope Bay upon land obtained by treaty with Massasoit, chief of the Wampanoags. Its inhabitants took a prominent part in the War of King Philip and the territory long remained the hunting ground of the tribe. An Indian reservation is still maintained. The village was included within the limits of Freetown until 1803, when it was incorporated as a separate town under its present name. It was called Troy from 1804 to 1834, when its old name was restored. In 1854 Fall River was chartered as a city and in 1862, on the readjustment of the Massachu-setts-Rhode Island boundary, a part of the town of Tiverton, R. I., with a population of 3,590, was annexed. On 2 July 1843, a disastrous fire destroyed several buildings and other property. Consult Earl, (A Centennial History of Fall River) (New York 1877). Pop. 120,485, in¬ cluding over 50,000 persons of foreign birth and about 400 of negro descent. The. population includes also a great number of Canadian French.

FALL TRANK, a drink once reputed to cure the effects of falls ; a vulnerary made from several aromatic and slightly astringent plants which grow chiefly on the Swiss Alps ; hence the name Vulneraire Suisse, given to such dried plants cut into fragments. Within the 19th century, in England, a kind of vulnerary known as black beer was often prescribed in country practice for inward bruises.

FALL WEBWORM. See Webworms.

FALLACY, in logic, an argument used as decisive of a particular issue, which in reality it does not decide. Fallacies are variously class¬ ified by different logicians. A fallacy may either exist in the substance or in the form of the argument. If it exists in the substance it does not belong to logic, as commonly un¬ derstood, to expose it; but logicians differ as to

what constitutes the proper distinction be¬ tween form and substance. T. S. Mill in partic¬ ular extends the sphere of logic in respect to the treatment of fallacies beyond what has been usually assigned to it.

FALLEN TIMBERS, Battle of, 20 Aug. 1794, on the Maumee River, about 15 miles from Toledo, Ohio. The Indians had about 2,000 warriors, with 70 white rangers, French, English and renegade Americans ; they wˆere in a line some two miles long at right angles to

the river, behind a forest blown down by a hurricane. Wayne had some 3,000 men ; 2,000 regulars and 1,000 mounted volunteers from Kentucky, under Charles Scott, who were thrown to the left to turn the enemy's flank. The Indians began the attack and drove in the advance volunteers ; then Wayne sent his regu¬ lar cavalry to repel them, while his first line of infantry advanced with trailed arms, firing at close range and then charging with the bayonet. Both attacks were entirely successful. Less than 1,000 of the Americans were engaged. They chased the Indians up to the British fort some miles away. Their total loss was 33 killed and 100 wounded, the Indians and British probably losing two or three times as many killed. Eight Wyandot chiefs were slain. This defeat, the greatest ever suffered by the north¬ western Indians, led in the following year to the treaty of Greenville (q.v.).

FALLlfcRES, fa'ly'er, Clement Armand,

French politician and statesman : b. Mezin in the department of Lot-et-Garonne, 6 Nov. 1841. He studied law and was admitted to the bar of Nerac and from 1871-75 was mayor of that city. In 1876, 1877 and 1878 he was elected as a Re¬ publican to the Chamber of Deputies, in the latter year being appointed Minister of the Interior, a position which he again occupied in 1882 and 1883. From 1883-85 and again from 1889-90 he was Minister of Public Instruction ; in 1887 Minister of the Interior ; and in 1887-88 and again from 1890-92 Minister of Justice. In 1890 he was elected senator, a position which he has held ever since. In 1899, when Loubet became President of the Republic, Fallieres succeeded him as president of the Senate, a post to which he was elected in 1900 and on 11 Jan. 1906. On 17 Jan. 1906 the National Assembly elected him President of the Republic to suc¬ ceed Loubet (q.v.).

FALLING BODIES. See Acceleration; Force ; Force of Gravity ; Gravitation ; Gravity; Mechanics, etc.

FALLING-SICKNESS. See Epilepsy.

FALLING STARS. See Shooting Stars.

FALLMERAYER, Jacob Philipp, ya'kop fe'lip fal' me-ri-er, German author: b. Tschotsch, Austrian Tyrol, 10 Dec. 1790; d. Munich, 26 April 1861. He fought in the War of Libera¬ tion ; in 1848 was appointed professor of his¬ tory at Munich. As a scholar, especially linguist, and as an explorer of the Orient his fame is international and his work authoritative. He published fragments from the Orient (1845) ; (History of the Peninsula of Morea in the Middle Ages) (1830), and other import¬ ant writings.*

FALLON, Michael Francis, Canadian Catholic prelate : b. Kingston, Ontario, 1867. He was educated at Ottawa College and at the Gregorian University, Rome, and was ordained to the priesthood in 1894. He became a mem¬ ber of the Oblates on his return to Canada and was appointed professor of English literature at Ottawa University of which he was subse¬ quently vice-rector. In 1898-1901 he was rector of Saint Joseph's Church, Ottawa and from 1901 to 1904 of Holy Angels, Buffalo. From 1904 to 1909 he was provincial of the Oblates of Mary Immaculate and in the latter year was consecrated bishop of London, Ontario.

FALLOPIAN TUBES, two ducts or canals about five inches long and one-third of an inch in diameter, attached to the upper corners of the uterus. Within they are lined by a mucous membrane continuous with that of the uterine cavity, but differing in having cilia. Outside of the mucous membrane there is a thin layer of muscle-tissue. The outermost layer is from the peritoneum, in large part a fold of the ((broad ligament.® At the free end the tube flares out into fimbriae, thus exposing a large surface to catch the ova given off from the surface of the adjacent ovary. Aided by the waving cilia, an ovum passes down this tube to the uterine cavity, there to undergo development or to be extruded with menstrual blood. Spermatozoa can pass up the Fallopian tubes and impregnate an ovum within the lumen. Development then becomes possible, giving rise to tubal pregnancy or ectopic gestation.

FALLOPIO, Gabriello, ga-bre-a'lo fal-lop'- pe-o (usually known as Fallopius), Italian anatomist: b. Modena, 1523; d. 9 Oct. 1562. He studied at Ferrara and at Padua, at which last place he is said to have attended the lectures of Vesalius. He became professor at Ferrara, whence, in 1548 he removed to Pisa. He con¬ tinued there three years and was then made professor of surgery, anatomy and the materia medica at Padua, where he remained till his death. The principal work of Fallopius is his (Observations Anatomicae (1561, 8vo.), which, as well as his other writings, has been sev¬ eral times reprinted. He was the first anat¬ omist*

who accurately described the vessels and bones of the foetus and his account of the Fallopian tubes in females has perpetuated his name.

FALLOUX, Frederic Alfred Pierre,

fra-da-rik al-fred pe-ar fa-loo, French writer: b. Angers, France, 7 May 1811 ; d. there, 7 Jan. 1886. Legitimist and clerical sympathies influ¬ enced his career. He was one of the last sur¬ vivors of the Liberal Catholic School, was for a time Minister of Education under Napoleon III and passed an act very acceptable to the clericals.. He was elected to the Academy in 1857. His efforts to reconcile the Orleanist and Bourbon factions in 1876 recoiled upon himself. His typical writings are < Madame Swetchine, Her Life and Works) (15th ed., 1884) ; (Story of Louis XVI) (6th ed., 1881) ; and (Political Speeches and Miscellany*. (1882). His memoirs, edited by Veuillot, were issued in 1888.

FALLOW, land which, after being tilled, is left for a season or more without being planted or sown. The Roman system of wheat raising was a rotation of fallow and wheat, alternately. Under the Romans Britain exported a great quantity of wheat, and for centuries afterward the same system was followed. The method presupposed a moderately fertile soil, and turned out best where clay was present. The object of fallowing is to liberate fertilizing ele¬ ments from the mold, admitting air and destroy¬ ing noxious plants and insects. Improvements in agricultural methods and the multiplication of fertilizing material has caused the abandon¬ ment of this resort to fallowing which, how¬ ever, might in some cases be revived with ad¬ vantage. For summer fallow the land should

be ploughed at the end of May; for winter fallow the land should be ploughed in autumn.

Fallow crops is a term applied to green manuring crops which are of more advantage in moist than in dry climates, where injury is likely to be wrought by autumnal draughts. Bastard fallowing is the Scotch practice of ploughing hay-stubble at the end of summer. It is known in North America as short fallow and is very beneficial.

FALLOW DEER, a species (Cervus dama) of deer native in southern Europe, northern Africa and eastward of Persia, rep¬ resenting a group of Cervidae in which the antlers, borne only by the bucks, are round at the base, but are more or less flattened at the extremities. These deer were introduced into northern Europe many centuries ago and now are one of

the common park deers of Great Britain and elsewhere, while still remaining wild in their native regions. In size they are small (three feet tall at the withers) and in color vary from fawn to dark brown, the fine soft coat ornamented with large whitish spots, which in some varieties have almost disappeared except in the fawns. The under parts, and lower side of the rather long tail are white. The antlers do not reach their full development until the fifth year. These deer assemble in large herds when free, and feed mainly on herbage, but are fond of certain other foods, especially horse chestnuts, which the bucks knock off the trees with their antlers. They are favorites in parks because of their tame¬ ness approaching confidently the persons with whom they are familiar and their flesh is re¬ garded as the best of venison. Two or three fossil species are known, from remains in recent deposits, indicating recent extinction. The most remarkable of these is the animal usually, but erroneously, called (

Giant Fallow Deer. — In the peat-bogs of Ireland, and in caves and superficial deposits in Britain and on the Continent, have been found many skeletons of a fallow deer which surpassed even the moose in stature, standing six feet high at the shoulders, and carrying antlers that in some large specimens measure 11 feet from tip to tip. These antlers were broadly palmate, as in the moose, but their ˆpoints® curled upward. There is much evidence that these magnificent deer continued to exist after the beginning of the human oc¬ cupation of Europe, and probably owes its extinction to extermination by prehistoric man. A similar extinct species, Ruff's deer, is found fossil in Germany.

FALLOWS, Samuel, American Reformed Episcopal bishop : b. Pendleton, Lancashire, England, 13 Dec. 1835. He came to America in 1848, was graduated at the University of Wis¬ consin in 1859, was minister in the Methodist Episcopal Church 1859-75 and later of the Re¬ formed Episcopal Church. He served with dis¬ tinction in the Civil War; was State superin¬ tendent of public instruction in Wisconsin 1871— 74; regent of the University of Wisconsin in 1866-74, and president of Wesleyan University in 1874-75. He became rector of Saint Paul's Reformed Episcopal Church in Chicago in 1875 and bishop in 1876. He was chairman of the Educational Congress of the World's Colum¬

bian Exposition 1893; president of the board of managers of the Illinois State Reformatory 1891-1912; chaplain-in-chief of the Grand Army of the Republic 1907-08, and its national pa¬ triotic instructor 1908-09 ; commander Military Order of the Loyal Legion of the United States for Illinois 1907 ; department commander for Illinois of the Grand Army of the Republic 1914-15; president of the State Illinois Com¬ mission for the International Celebration of the 50th Anniversary of Negro Freedom and Con¬ duct of the Lincoln Jubilee 1913-16. He is the author of numerous

works, including hand¬ book of Abbreviations and Contractions) ; (Life of Samuel Adams) ; (Students' Biblical Dictionary 5 ; hast Noon5 ; (Splendid Deeds5 ; Supplemental Dictionary of the English Lan¬ guage5 ; (Popular and Critical Biblical Ency¬ clopedia5 (1901) ; health and Happiness5

(1908).

FALLS CITY, Neb., city, county-seat of Richardson County, on the Chicago, Burling¬ ton and Quincy and the Missouri Pacific rail¬ roads, about 85 miles southeast of Lincoln. Its chief manufactures are flour, canned goods, cigars, foundry products, furniture, cement, stock powder, cider, vinegar and beer. The trade is chiefly in wheat, corn, cattle and manufactured articles. It has railroad shops, grain elevators and a poultry-packing plant. The electric-light and waterworks plants are owned by the city. It has a good public library. Pop. (1920) 4,930.

FALMOUTH, fal'muth, England, munici¬ pal borough and seaport in the county of Corn¬ wall, at the mouth of the Fal River, 11 miles from Truro, and is an important point of call for steamer lines. It has a good harbor, the docks extending to 100 acres, and a fine and spacious roadstead. There are two castles on the coast, one of which, Pendennis, commands the entrance of the harbor on the west, and the other, on the opposite side, is Saint Mawes Castle. Its trade consists chiefly in engineer¬ ing, shipbuilding and ropemaking. Great im¬ provements have been made on the sea front, and Falmouth has risen into favor, owing to its beautiful surroundings and mild and equable cli¬ mate, as a wintering resort. The borough forms part of the parliamentary borough of Penryn and Falmouth. Pop. 13,132.

FALMOUTH, Ky., city and county- seat of Pendleton County, 59 miles northeast of Lex¬ ington, on the Licking River and on the Louis¬ ville and Nashville Railroad. It is in an agri¬ cultural and dairying region, with a trade in tobacco, grain, clover seed and live stock, and has flour, lumber and woolen mills, tobacco warehouses, a creamery, distillery and cannery. It contains two banks with resources of $600,- 000 and the value of the taxable property is placed at $750,000. The waterworks and electric-light plant are owned by the munici¬ pality. The government is vested in a mayor and six councilmen. Pop. 1,600.

FALM'OUTH, Mass., town in Barnstable County, on Buzzard's Bay, Vineyard Sound and on the New York, New Haven and Hartford Railroad, at the extreme west end of Cape Cod, 50 miles northwest of Boston. It is the centre of an agricultural and cranberry region. It is best known as containing the Wood's Hole (q.v.) Station of the United States Fish Com-

mission. It has a public library and is a popu¬ lar summer resort. Falmouth was settled in 1636 and incorporated in 1686. The town owns the waterworks. Pop. 3,500.

FALSE ACACIA. See Locust Tree.

FALSE BAY, an inlet on the coast of Cape Colony, South Africa, circular in form, about 24 miles long, and so well protected from storms as to render it a good shelter harbor. Simonstown, a British naval base, is in the northwest angle.

FALSE CADENCE, a musical term. When the last chord of a phrase is other than the tonic chord and is preceded by that of the domi¬ nant, the cadence is said to be interrupted, false or deceptive. See Cadence.

FALSE CHINCH-BUG. See Wheat In¬ sect Pests.

FALSE DECRETALS. See Decretals, False or Pseudo-Isidorian.

FALSE DEMETRIUS, The. See De¬

metrius.

FALSE IMPRISONMENT, the unlawful detention of a person, whether in a common prison or a private house, or even by forcibly detaining one in the streets or highways. The law punishes false imprisonment as a crime, be¬ sides giving reparation to the party injured through an action in tort.

FALSE INDIGO, a common name for some American species of the genus Amorpha of the pea family. The most widely known plant called by this name is A. fruticosa, a shrub growing from 5 to 20 feet in height along streams in Ohio, Minnesota and Mani¬ toba, south to Florida, Colorado and Mexico. When found in the Middle States it is an escape from cultivation, its spike of purple flowers making an exceedingly ornamental shrub.

FALSE PERSONATION, for the purpose of obtaining property of others, was formerly a misdemeanor punishable by a fine or impris¬ onment, but is now made penal by special stat¬ ute. The penalties for personation are fre¬ quently heavy. Thus to personate the owner of any share, stock or annuity, etc., is felony, and liable to a term of imprisonment. The false personation of voters at an election is a misdemeanor punishable with imprisonment.

FALSE POINT, a cape (with lighthouse) and harbor of Bengal, 43 miles east of Cuttack. The roadway in which ships anchor is some¬ what exposed and loading and unloading can only be carried on in comparatively fair weather. Large rice shipments are made. The name was given because frequently this projec¬ tion was mistaken for Point Palmyras.

FALSE POSITION, Rule of. An ancient method of reckoning indirectly, now superseded by the method of equations. In the ancient method a number for the unknown quantity was assumed; next a trial was made to see if the assumed number filled the conditions ; it was then corrected by the method of simple propor¬

tion. For example, what number is that whose third exceeds its quarter by 5? Assuming 72 to be the number, we get 24 > 18 = 6, which is too great. Now, by means of proportion we have 6 : 5 :: 72 : 60. Hence 60 is the number whose third (20) exceeds its quarter (15) by 5.

FALSE PRETENSES, for the purpose of obtaining property, is a misdemeanor at com¬ mon law, and punishable by fine or imprison¬ ment. Some kinds of it are now punishable by imprisonment not exceeding five years, the stat¬ utes, however, varying in different States.

FALSE SCORPION, or BOOK SCOR¬ PION, a diminutive spider-like creature of the order Pseudoscorpionida (see Arachnida), allied to the ((harvestmen)) and "false spiders.ˆ They occur in all the warmer parts of the world, under bark, stones and rubbish, or hid¬ den in deep moss ; and one typical species, the "book scorpionˆ (Chelifer cancroides) , infests museums, old libraries and dusty corners gen¬ erally. Unlike the spiders these have no con¬ stricted "waisP separating the abdomen from the foreparts ; and like the true scorpions the pedipalps are developed into relatively enormous chelate arms. The book scorpion thus resembles a minute crab. They are slow in their motions, feeling their way along with their pincers; and several blind species inhabit caverns. They have spinning glands, situated in the cephalothorax, but use the silk only for making small protective cells or cases into which they retreat when lay¬ ing eggs (afterward carried about by the fe¬ male), or molting, or during hibernation.*

FALSE SPIDER. See Scorpion Spider.

FALSE SWEARING. See Perjury.

FALSE WEIGHTS AND MEASURES.

See Weights and Measures.

FALSEN, fal'sen, Christian Magnus, Nor¬ wegian historian and statesman : b. Olso, near Christiania, 1782 ; d. 1830. He entered the legal profession and in 1808 was appointed circuit judge at Folio. He became interested in poli¬ tics about 1814 and helped draw up a constitu¬ tion for Norway after the separation of the latter from Denmark. He divided honors with Sverdrup in parliamentary leadership, became attorney-general in 1822, but lost much of his support among the liberal element through his administration of this office. He was made bailiff for Bergen in 1825 and two years later became chief of the Supreme Court. He wrote (Norges Histone > (1824). Consult the lives by Daa (Christiania 1860) and Vullum (ib., 1881).

FALSETTO (Ital.), in singing, a term applied to the notes above the natural compass of the voice. It is also called a head or throat voice, in contradistinction to the chest voice, which is the natural one. The falsetto voice is produced by tightening the ligaments of the glottis. Its thin, constrained effect is most noticeable in men with deep-set voices the reg¬ ister of which it frequently extends more than an octave above the pure chest voice.

'

.

.

• « c

.

.

.

.

,

.

.

■

■

.

-

,

Vol. 11, FALSTAFF TO FRANCKEN

Americana

i 1 ‘ , V

‘ * ■ ‘t» *; > < i ••"

•

.

.

•

i

I

I

1 1 1

1

1922

. “ *

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK CHICAGO

THE

ENCYCLOPEDIA ” AMERICANA

of

IjBpar Uriveh§al

MgOWLEDGEj

In Thirty Volumes

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 18 1922

©G.A654317

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XI

AMAND, M. De SAINT

Engineer to the Chemin de Fer du Nord

FRANCE — FRENCH RAILWAYS

AULARD, A.

Professor of Revolutionary History, in the Univer¬ sity of Paris

FRANCE — CHURCH AND STATE IN FRANCE

BAILEY, WILLIAM L.

Associate Professor of Political Science, Grinnell College, Iowa

FARM AND FARM PROBLEMS

BARRAULT, HENRY-EMILE

Formerly of the Faculty of Law, University of Paris

FRANCE — THE FRENCH GOVERN¬ MENT

BEACH, CHARLES F., A.B., LL.B.

International lawyer practicing in Paris

FRANCE — FRENCH LAW AND JURIS¬ PRUDENCE

BELLOC, HILAIRE

Author of “ Danton,” “Robespierre,” etc.

FRANCE — HISTORY B.C. 58 TO A.D.

1796

FRANCE — FRENCH CIVILIZATION

BESSEY, ERNEST A., Ph.D.

Professor of Botany, Michigan Agricultural College

FLOWER

FLOWERS AND INSECTS

BIEDERWOLF, CHARLES L.

Secretary of The Commercial Club of Fort Wayne, Ind.

FORT WAYNE

BOTHNE, GISLE, A.B.

Head of Scandinavian Languages and Literatures, University of Minnesota

FATHER, THE

BRADY, CYRUS TOWNSEND, LL.D.*

Author of “ Life of Paul Jones,” etc.

FARRAGUT

CALLAHAN, J. M., LL.D.

Professor of History and Political Science, West Virginia University

FRANCE, DIPLOMATIC RELATIONS OF THE UNITED STATES WITH

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

FERTILIZATION IN PLANTS

CIGRAND, BERNARD J.

Lieutenant United States Navy, author “Real History of the United States Flag ”

FLAG OF THE UNITED STATES FLAGS, CONFEDERATE FLAGS OF FOREIGN NATIONS

COCHRANE, CHARLES H.

Author of “Modern Industrial Progress”

FORGE, FORGING AND FORGING MACHINES

COMITE CENTRAL DES ARMATEURS DE FRANCE

FRANCE — FRENCH MERCHANT FLEET

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

FELIBRIGE

FOLK-TALES AND MYTHS OF THE AMERICAN INDIANS FRANCE — FRENCH LANGUAGE

CUSHMAN, ROBERT EUGENE

Associate in Political Science, University of Illinois

FRANCHISES

DARTON, NELSON H.

United States Gelogical Survey

FORESTS, PETRIFIED’

DEGOUY, ADMIRAL

FRANCE — THE FRENCH NAVY

DELCOURT, J.

Professor of English, University of Montpellier

FRANCE — FRENCH COMMERCIAL AND BANKING SYSTEM

DERRY, JOSEPH T.

Author of “ The Story of the Confederate States ”

FORREST, NATHAN BEDFORD

DODD, WILLIAM E., Ph.D.

Professor of History, University of Chicago

FILLMORE, MILLARD

DOLE, NATHAN HASKELL, A.B.

Author, editor and translator

FATHERS AND CHILDREN FISHERMEN, THE

D’ORLIAC, JEANNE

Poet and Dramatic Author; author of “ Grand Bless6 ”

FRANCE — FRENCH LITERATURE

DUTTON, GEORGE B.

Professor of English, Williams College

FAR FROM THE MADDING CROWD

EDGETT, EDWIN FRANCIS, A.B.

Literary Editor, Boston Transcript

FICTION IN AMERICA

ELLWOOD, CHARLES A., Ph.D.

Professor of Sociology, University of Missouri

FAMILY, THE

EVERARD, L. C.

United States Forest Service

FORESTRY IN THE UNITED STATES

- Deceased.

Contributors to Volume XI — Continued

EYCHENE, COLONEL

Sous-Chef d’ Etat-majordu Gouvernement Militaire et des Arm6es de Paris; Officer de la Legion d’ Honneur, decor£ de la Croix de Guerre, du Merite distingu4 d’ Angleterre

FRANCE — THE FRENCH ARMY

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

FORTIFICATIONS

FERRIS, RICHARD, C.E., ScD.

Editorial Staff of The Americana

FOOD

FOODS, RECENT LEGISLATION RESPECTING

FISHER, HERBERT ALBERT LAURENS, LL.D., M.P.

Author of “ Studies in Napoleonic Statesmanship,” “The Mediaeval Empire,” etc.

FRANCE — THE EMPIRE

FORTHUNY, PASCAL

Art Critic of the Matin (Paris); Literary Critic of Excelsior (Paris)

FRANCE — JOURNALISM IN FRANCE

GODDARD, HENRY H., A.B., A.M., Ph.D.

Director Department of Research, The Training School, Vineland, N. J.

FEEBLE-MINDED, THE

GOSSE, EDMUND, M.A., LL.D.

Author of “History of 18th Century Literature;” “History of Modern

English Literature," etc.

FIELDING, HENRY

GUMM, G. G.

Secretary Fort Worth Chamber of Commerce

FORT WORTH, TEXAS

HAMLIN, ALFRED D. F., A.M., L.H.D.

Professor of History of Architecture, Columbia University

FINE ARTS

HART, ALBERT B., Ph.D., LL.D., Litt.D.

Professor of Government, Harvard University

FEDERAL GOVERNMENT

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor of German Language and Lit¬ erature, College of the City of New York

FONTANE, THEODOR

HERRICK, MYRON T.

President Society for Savings, Cleveland

INGALLS, RALPH

FEDERAL FARM LOAN ACT

HUEBNER, SOLOMON S., B.S., M.S., Ph.D.

Professor of Insurance and Commerce, Wharton School of Finance, University of Pennsylvania

FIRE INSURANCE FIRE PROTECTION

HOWARD, WILLIAM G., A.M.

Assistant Professor of German, Harvard University

FAUST

INGERSOLL, ERNEST

Zoologist; author of “Life of Animals — the Mam¬ mals,” etc.

FISHES, NEST-MAKING BY FLOWERS, FERTILIZATION OF, BY BIRDS

FLYCATCHER

FOSSILS

INGERSOLL, HELEN

Naturalist

FOREST TREES OF AMERICA FOREST TREES, TROPICAL

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

FALSTAFF

FAUST

FAVORITA, LA

FIDELIO

FIGARO

FILLE DE MADAME ANGOT FLYING DUTCHMAN, THE ˆ

JACKSON, A. V. WILLIAM, Ph.D., L.H.D.

Professor of Indo-Iranian Languages, Columbia University

FIRDAUSI.

JAURiDS, JEAN LEON

Late Deputy for the Tam; Formerly Vice-President of the Chamber of Deputies

FRANCE — FRENCH SOCIALISM

JORDAN, DAVID STARR, Ph.D., LL.D.

Chancellor Emeritus Leland Stanford Jr. Uni¬ versity

FISH

FISHES, GEOGRAPHICAL DISTRIBU¬ TION OF

KEEP, WILLIAM J.,

Author of “ Cast Iron,” etc.

FOUNDRY PRACTICE

KLEIN, ABBE FELIX

Professeur honoraire k V University Catholique de Paris

FRANCE — THE SEPARATION OF CHURCH AND STATE IN FRANCE

KLEIN, HENRI F.

Editorial Staff of the Americana

FEMINISM

KOECHLIN, CHARLES

Composer, Music Critic of the Gazette des Beaux Arts, Paris

FRANCE — FRENCH MUSIC

LOWIE, ROBERT HEINRICH, Ph.D.

American Museum of Natural History

FEUERBACH, LUDWIG ANDREAS

LYON, THOMAS LITTLETON, Ph.D.

Professor of Soil Technology, Cornell University

FERTILIZERS

MIMS, EDWIN, A.M., Ph.D.

Professor of English, Vanderbilt University

FLUTE AND VIOLIN

Contributors to Volume XI — Concluded

MOSES, ALFRED J., E.M., Ph.D.

Professor of Mineralogy, Columbia University

FRACTIONAL CRYSTALLIZATION

NOYES, ALEXANDER D., A.B., A.M.

Financial Editor, New York Evening Post

FINANCIAL PROBLEMS OF THE WORLD WAR

PARK, CHARLES LATHROP

President of the National War Garden Commission

FOOD PROBLEMS AND THE WAR

PETIT, CHARLES

Agr6g6 de 1' Universit6; Professor at the Henri IV Lvc£e, Paris. (Revised by Marc de Valette)

FRANCE— EDUCATION AND THE EDU¬ CATIONAL SYSTEM OF FRANCE

PFEIL, STEPHEN

Formerly editor Philadelphia Press

FAMILY LAW

FEDERAL TRADE COMMISSION

RENARD, GEORGES

College of France; author of "Le regime socialiste," etc.

SOCIALISM IN FRANCE DURING THE WAR

RENOUARD, ALFRED

Editor of L'Industrie Textile. (Revised by Marc' de Valette, Attache aux Etudes Economiques de la Banque de France)

FRANCE — FRENCH INDUSTRIES

RICKARD, T. A.

Editor of Mining and Scientific Press, San Francisco

FLOTATION PROCESS IN METAL MINING

RIEGEL, ROBERT

Assistant Professor of Insurance, University of Pennsylvania

FIREPROOF CONSTRUCTION

RODRIGUES, GUSTAVE

Docteur es Lettres, Professeur agr6g6 de Philosophic, Laureat de l'lnstitut de France

FRANCE — FRENCH DRAMATIC ART

RINES, GEORGE EDWIN

Editor of The Americana

FRANCE — HISTORY FROM REVOLU¬ TION TO EMPIRE, 1796-1804

ROUSCH, G. A., A.B., M.S.

Assistant Secretary American Electrochemical Society

FARADAY'S LAWS

SELLARS, R. W.

Assistant Professor of Philosophy, University of Michigan

FICHTE, JOHANN GOTTLIEB

SEYMOUR, E. L. D.

Associate Editor, The Country Life Press

FARM CROPS

SIGER, CARL

Colonial Editor of the Mercure de France

FRANCE — FRENCH COLONIES

SMITH, DAVID EUGENE, Ph.D., LL.D.

Professor of Mathematics, Teachers College, Colum¬ bia University, New York

FINGER NOTATION

SNYDER, HARRY, B.S.

Of the Russell- Miller Milling Company

FLOUR, WHEAT

STANOYEVICH, MILIVOY S.

Former Assistant Professor at Zajecar College, Serbia

FAR EASTERN QUESTION

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

FRA LIPPO LIPPI

VALETTE, MARC de

Attache aux fetudes Economiques de la Banque de France

FRANCE — FRENCH HISTORY SINCE

1815

FRANCE, THE BANK OF

VAUXCELLES, LOUIS

Member of the Committee of the Autumn Salon; Art Critic of the Pays

FRANCE — FRENCH ART

WALSH, JAMES J., Ph.D., M.D., LL.D., Litt.D., Sc.D.

Author of “ The Thirteenth the Greatest of Cen¬ turies ”

FIFTEENTH CENTURY FIRST CENTURY FOURTEENTH CENTURY FOURTH CENTURY

WARREN, GEORGE F., B.Sc., B.S.A., M.S.A. Ph.D.

Professor of Farm Management, Cornell University

FARM MANAGEMENT

WELD, HARRY P., Ph.D.

Assistant Professor of Psychology, Cornell Uni¬ versity

FATIGUE

WILCOX, MARRION, A.B., LL.B.

Co-Editor Encyclopedia of Latin-America

FLORENCE, ITALY

■

KEY TO PRONUNCIATION.

a

far, father

n

Span, h, as in canon (can'yon), pinon (pen'yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

A

a

all, fall

o or o

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. e, as in de; .eu, as in neuf ; and oeu, as in

oi

oil, soil ; also Ger. eu, as in beutel

boeuf, coeur; Ger. o (or oe),

6 or oo

fool, rule

as m okonomte.

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or H

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

u

between u and e, as in Fr. sur,

Ger. Miiller

• w

i or 1

him, it

A

1

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

y

(consonantal) yes, young

•

)

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

h

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents, to indicate

point, Jean, temps

syllabic stress

ALSTAFF, fal’staf, Sir John, a char¬ acter in Shakespeare’s dramas, (Henry IV,) Parts I and II; (Henry V) and (Merry Wives of Windsor, > conspicu¬ ous for lying, cowardice, drunkenness, and boastfulness, yet brimming over with wit and geniality.

FALSTAFF, a lyric comedy in three acts, by Giuseppe Verdi (libretto

by Arrigo Boito, based on Shakespeare's (Merry Wives of Wind¬ sor*), first produced at Milan 9 Feb. 1893. While it is popularly assumed that the last work of a creative artist is the greatest, this is by no means a safe rule to apply. In Verdi's case, however, it holds true; and to call (Fal- stafP his masterpiece is but another way of saying that it is the greatest operatic work that has come out of Italy. Its freshness and vigor would have been remarkable in a young man. As the creative effort of a man of 80, it is without precedent in the annals of art. In Boito, Verdi found a perfect helpmate. His adaptation of the Shakespearian comedy is mas¬ terly and an ideal vehicle for musical treat¬ ment. It is arranged in three acts, each with two contrasted scenes. The Shakespearian spirit is admirably preserved, in spite of the necessary condensation of the original. Verdi applied himself to a grateful task with all the strength of his mature powers, with a technique that had grown equal to the highest demands of modern musical development, with a keen sense of delicious humor that here found an ample outlet, and with a surprising spontaneity of in¬ vention. That he had not remained untouched by the great expansion of emotional expression in music, for which Wagner was largely respon¬ sible, he had already demonstrated in (Aida* and (Othello,* the operas, immediately preced¬ ing. But it would be a mistake to infer that he had succumbed to the Wagnerian influence. Mozart is the master whom in (Falstaff* Verdi most strongly recalls — Mozart, the clear-eyed, the buoyant, the free-spirit in music. But Ver¬ di's music is stamped with his own hall-mark from first page to last. It is difficult to refrain from superlatives in discussing

which informs the entire work. It would be fruitless to single out separate parts, — the scenes between Falstaff and his followers, Bar- dolph and Pistol, his discourse on <(honor** (drawn by Boito from (Henry IV)), the en¬ sembles first of the men, then of the women and then of the two groups together, with fine love episodes between Nan and Fenton worked in and Falstaff's song to Mistress Ford (

Lewis M. Isaacs.

FALSTER, fal'ster, Christian, Danish poet : b. 1 Jan. 1690; d. 24 Oct. 1752. His

FALSTER, one of the Danish islands in the Baltic, separated by narrow straits from Zealand on the north, Moen on the northeast and Laaland on the west ; area, 183 square miles. It is flat, well watered, richly wooded, and so prolific in fruits that it has been called the <(Orchard of Denmark.® The chief products are corn, hemp, sugar beet, hops, cattleˆ honey and wax. Some shipbuilding is carried on. The capital is

Nykjobing. Pop. 37,460.

FALUN, or FAHLUN, fa'loon, Sweden, town, capital of the county (lan) of Koppar- berg, on a stream connecting lakes Varp and Runn, 130 miles northwest of Stockholm. What is now included in the town of Falun was

once nine little villages. Many of the buildings date from the 14th century; one, an old church of this century, has a green copper roof. It is the seat of a mining school, and it contains a hospital, gymnasium and several other public buildings of note. The town owes its prosperity to the rich copper mines in the vicinity. The mines are worked by one of the oldest trading corporations in Europe, dating from before 1347. Gold and silver are also mined, but the rich "copper mines of Falun® have given to the town the name of "The Treasury of Sweden.® There are manufactures of textiles, leather and rolling stock. Pop. 11,955. Consult Nordenstrbm, (LTndustrie Miniere de la Suede1* (1897) ; Sund- barg, (La Suede, son Peuple et son Industrie.
>

FALUNS, fa-lun, a French provincial term for the shelly Tertiary (Upper Miocene) strata of Touraine and the Loire. Though generally compqsed of shelly sand and marl, in some dis¬ tricts they form a soft building stone, chiefly composed of an aggregate of broken shells, bryozoa, corals and echinoderms, united by a calcareous cement. They are found in scattered patches of wide extent, but rarely more than 50 feet in thickness ; they have long been known and utilized for their fertilizing properties. The fossils are chiefly marine, but there occur also land and fresh-water shells, and the remains of numerous mammals.

FAMA, fa'ma, the Roman personification of fame, rumor, reposts, news or tidings of any sort, whether good or evil. A graphic descrip¬ tion is found in Virgil, where Fama is repre¬ sented as winged and with as many ears, eyes and tongues as feathers. She is sometimes pictured with a trumpet, either blowing it or holding it in her hand.

FAMAGOSTA, fa-ma-gos'ta, or FAMA¬ GUSTA, fa-ma-goos'ta (ancient Arsinoe). a seaport on the island, of Cyprus, 40 miles east of Nicosia. Famagosta, during the Vene¬ tian regime, was one of the richest and most populous towns in the Levant. The name, Fama Augusta, shows

its Roman origin. It is now almost in ruins, with its once fine harbor nearly choked with sand, having declined since its conquest by the Turks in 1571. About five miles northeast are the ruins of Constantia, occupying the site of the ancient Salamis, now called Eski, or Old Famagosta. Guy de Lusig- nan was here crowned king of Cyprus in 1101. Since Great Britain obtained control of Cyprus, Famagosta has begun to revive in importance. Pop. 5,000. See Cyprus.

FAMILIAR SPIRIT, one of those demons or evil spirits which were supposed to attend and be at the service of a magician or other favored person. The belief in familiar spirits is very ancient, and by the law of Moses such as had familiar spirits were to be put to death. Where Socrates speaks of his attendant demon, he is generally understood to refer to the inner feelings and promptings of his nature, and not to any familiar spirit. In Eastern countries the belief in familiar spirits is very general. At¬ tendant genii in Oriental tales are represented as sometimes good and sometimes evil. The “slave of the lamp® mentioned in the (Arabian Nights) is a well-known illustration of this su¬ perstition. A belief in familiars was widely diffused over Europe, in the Middle Ages; . J.b

vius says that Cornelius Agrippa was always accompanied by a devil in the form of a black dog; and Goethe makes Mephistopheles first appear to Faust in this shape. Paracelsus was believed to carry about with him a familiar spirit in the hilt of his sword. See Witchcraft.

FAMILIARITY. See Recognition.

FAMILISTˆRE, fa-me-le-star (Fr.), a community living as one family; a familistery. It is especially used as referring to the com¬ munity established by Godin in Guise, France. See Guise.

FAMILISTS, name of a sect founded by Heinrich Nikolaus, which arose in Holland about the middle of the 16th century, and taught that the essence of religion consisted in the feelings of divine love ; hence they were otherwise called the Family of Love. They also believed that absolute obedience was due to all constituted authorities.

FAMILY, a category in the classification of animals and of plants, which falls between the narrower “genus® and the broader “group® order. It designates a natural group deter¬ mined by the common possession of characters of a broader kind than those which determine the limits of a genus, and may be composed of many genera exhibiting the required affinity, or of only a single genus represented by one species. In the former case minor subdivi¬ sions may be convenient

under the designation sub-family ; an example of this occurs in Falconidce (q.v.). On the other hand, certain groups of families, forming subdivisions of an order (q.v.), and called super-families, are sometimes made. In zoology a group of forms is ranked as a family on considerations of form as expressive of structure. This is sometimes very plain, as in the cat family, or the owl family; but frequently the limits are less easily marked, and the rank remains a subject of dispute pending the decisive results of better information. In zoology the technical name of a family, usually derived from that of its most typical or prominent genus, always ends in idee.

In botany the corresponding category — that is, an assemblage of genera — is more frequently designated a “natural order,® and its taxonomic name always ends in acece. It is based upon similar appearance and habit of growth and flowering, as the Ranunculacece, Coniferce.

FAMILY, History of (Lat., Familia, the servants of the household, later, a household). A more or less permanent group of parents and offspring; in human society the group normally comprised of father, mother and children. The word is sometimes used for a much larger group, tracing descent to a common ancestor, that is, a kinship group. See article on Mar¬ riage, History of.

The Origin and Social Function of the

Family. — In the sense of a more or less per¬ manent group of parents and offspring, the family exists to a considerable extent in the animal world below man. Thus it is found beginning with some of the higher fishes, is common among the birds, the higher carnivora and the primates. Strictly speaking, we have a family group only when both parents unite in the care of the offspring. Animal family life apparently, owes its. origin (.1) to the produc¬ tion . of “child® or immature forms that . need

more or less prolonged parental care, and (2) to the parallel development of parental in¬ stincts which keep male and female together for care of the offspring. The same general statement holds true regarding the origin of human family life. In other words, the family group is due not to sex, though that is a neces¬ sary condition, but to parental care. Both in the animal and in the human world family life is essentially a device for the preservation of offspring through a more or less prolonged immaturity.

Modern sociologists generally agree that in the development of human society and of civili¬ zation the family has played a very large part because it is one of the primary social groups. In it are found most of the essential forms of social relationship between individuals. It is characterized by intimate, face-to-face associa¬ tion and by the presence of both sexes and all ages. The family group is usually, therefore, more or less self-sufficing under simple condi¬ tions of life, and in all stages of civilization ex¬ hibits social life at its maximum intensity. For these reasons, some of the older sociologists, such as Comte, regarded the family rather than the individual as the unit of social organization. While this view is no longer held by modern sociologists, the family in human society must be regarded as the primary social structure, and from both a cultural and moral standpoint as the most important of human institutions.

In present society this primary group per¬ forms the following important functions: (1) It continues the life of the species. It deter¬ mines thereby the child’s physical heredity and furnishes the child with physical care and nur¬ ture until maturity is reached. (2) It preserves and conserves social possessions. It transmits property from

generation to generation and thus furnishes the child largely with his eco¬ nomic equipment for life. More important, however, is its preservation and transmission of the immaterial possessions of society. It is the chief institutional vehicle of tradition in the sociological sense; that is, it is the chief medium of handing down from generation to generation knowledge, standards, values along every cultural line. The child gets, for exam¬ ple, his ideas and standards on government, law, religion and morality largely from the family. (3) The family is the chief generator of altruis¬ tic sentiments and ideals in human society. This primary group furnishes the basis upon which such primary ideals as fatherhood, brotherhood, love, service and self-sacrifice have been built up into moral and social traditions. It is, in other words, the chief means of socializing both the child and the adult, and forms, as Comte said, a sort of natural transition from the egoism of the individual to the high degree of service and altruism demanded by civilized society.

The Primitive Form of Human Family Life. — There has been much debate about the primitive form of the family in human society. Bachofen, a Swiss writer, in 1861 put forward the theory in his book called (Mutterrecht) that the original form of sex relation among human beings was that of complete promiscuity. This position was later endorsed by Sir John Lubbock, J. F. McLennan, a Scotch writer, Louis H. Morgan, an American ethnologist, and, with some modification, by Herbert Spen¬

cer. This theory of the primitive form of the family is generally rejected by recent sociolo¬ gists, (1) because a well-developed family life is found among some of the anthropoid apes, man's nearest relative in the animal world; (2) because promiscuity is not found to exist gen¬ erally among the peoples lowest in point of culture; (3) because the feeling of jealousy in the male would make a condition of pro¬ miscuity improbable among early men ; (4)

because the practice of promiscuity is found to interfere with female fertility and to lessen the birth rate; (5) because the upright attitude of man makes it necessary for the male parent to care for both mother and child before and after the birth of offspring if both are to have the best chance of survival. For these reasons the consensus of sociologists and anthropologists at present is that a primitive stage of promiscu¬ ity never existed in the human species, but that the primitive form of human family life was that of a simple pairing monogamy, such as is iound among birds, several of the higher animals, and especially among the most man-like of the higher apes, the chimpanzee. By "simple® we mean that the union was instinctive and without the

legal, moral and religious sanctions of later ages ; by “pairing® we mean that this primitive monogamy was not necessarily of a permanent type, but, as among many animals, lasting often merely through the rearing o£ offspring. The moralized monogamy of later ages should not be confused with this primitive pairing type of family life, which even yet very generally pre¬ vails among the lowest savages, such as the Bushmen of South Africa, the Veddahs of Ceylon, the Andaman Islanders and the Fuegians.

The Maternal Family. — The original type of family in the human species seems to have been of the type which anthropologists and sociologists call “maternal® ; that is, the mother is the centre of the family, the children take her name, and if there is property or hereditary titles they pass along the female line, not along the male line. There are various degrees of this maternal family. As a metronymic (mother-name) system there is much evidence to show that once it was universal. Bachofen and McLennan thought that the reason for this was the condition of original promiscuity which we have just discussed. But it is found among many peoples with a highly developed and comparatively stable family life, as, for example, among many of the American Indians. The causes of this system of naming and of reckoning relationship seems to have been (1) that in primitive society the physiological con¬ nection between father and child was not known, and hence it was impossible to trace blood relationship along, the male line; (2) that in primitive conditions the child was more habitually attached to the mother and the mother’s kin than to the father, as on account of hunting and war the latter was a relatively unstable element in the family. This primitive form of tracing blood relationship persisted among many peoples down to recent times. Even among the European peoples in the earliest historic period we sometimes find survivals of the system.

Among well-developed maternal peoples, chil¬ dren not only bear the name of the mother’s kip- ship -group or. clan, but the husband and father,

while usually belonging to another clan, lives with his wife and his wife’s people. Sometimes the mother’s brothers exercise a certain degree of authority over the children ; but there is little evidence to warrant us in believing Bachofen’s contention that all of this points to a primitive state in which women were dominant socially and

politically. Among many maternal peoples, however, women have a higher social and political status than they came to have under the patriarchal system (q.v.). The maternal system, in other words, was not a true Hnatriarchate.®

The Historical Development of the Family. — By the time we reach the period of written records among European and Asiatic peoples the maternal form of the family had been left behind and the civilized peoples of Europe and Asia had ail developed in varying degrees the paternal family, in which names, property and titles pass along the male line and the father is the head of the household. The main causes of this transition to the paternal system seem to have been wife capture in war, wife purchase and the pastoral system of in¬ dustry. (See article on Patriarchal System). Chinese, Hindus, Hebrews, Greeks, Romans and even the barbarous Teutonic tribes had all, indeed, early in antiquity developed the extreme type of the paternal family which we call ˆpatriarchal.® We have space to notice only the historical development of the family among those ancient peoples whose civilization has formed the basis of our own, namely, the Hebrews, the Greeks, the Romans and the Teu¬ tonic tribes.

Family Life of the Ancient Hebrews. —

Hebrew family life was of the patriarchal type as far back as we have any certain knowledge, though Robertson Smith thinks that there are indications of a pre-existing maternal family. The descriptions in the Old Testament are, indeed, perfect pictures of the patriarchal type of family life. Polygamy (see article on Mar¬ riage, History of) was practised by the patri¬ archs, but monogamy was the prevalent form of family life among the masses of the people, and after the Captivity was practically the only form. Women, especially those who were wives and mothers, held a relatively high posi¬ tion in the Hebrew family and society, though they had no legal rights. Children were re¬ garded as blessings and were greatly desired on account of the patriarchal system. No exposure of children was apparently practised by the ancient Hebrews. The family was practically among them a religious organization, though they left ancestor worship behind before they appear in history. From the Hebrew family life was derived practically all of the ethical and religious phraseology of ancient Judaism. It is through the ethical and religious ideas de¬ rived from their family life that the ancient Hebrews have particularly affected the family in modern civilization. The relative purity and integrity of the Hebrew family, however, was not maintained after contact with Greco-Roman civilization. In New Testament times divorce, which originally had been very rare among the Hebrews and

granted only for adultery and barreness, became very common.

Greco-Roman Family Life. — As among the Hebrews the family among the earliest Greco-Romans was practically a religious

institution, designed to maintain the wor¬ ship of ancestors. The family was of the ex¬ treme patriarchal type, the head of the family or patriarch, as the link between the living and the dead, was considered almost divine. His power over the patriarchal group was accord¬ ingly in theory absolute, though in practice it was limited by many religious scruples. Mar¬ riage was regarded as a religious bond, and among the early Romans was strictly of the monogamic type, though polygamy is recorded occasionally among the Greeks. As the mar¬ riage bond was religious it was practically in¬ dissoluble and divorce was very rare, especially among the early Romans. Among the Romans the patriarchal family line was kept up by resort to the practice of adoption. Although women had no legal rights, the position of wife and mother, especially among the early Ro¬ mans, was singularly high and respected. Among the Greeks, however, the position of women, probably owing to Oriental influences, was less favorable, and the respectable Athenian wife and mother was supposed to remain se¬ cluded in her household.

This relatively high and stable form of the family among the Greeks and Romarfs began early to decay, especially among the Greeks. After the conquest of Greece by Rome the de¬ cay spread rapidly to Roman society. Mar¬ riages began to be formed upon a contract basis and the relationships of the sexes became very unstable. Later Greco-Roman family life was extremely demoralized, and in urban centres, especially in Rome, from the 1st to the 3d cen¬ turies a.d., there was a close approach to a con¬ dition of general promiscuity in sex relations.

Family Life of the Ancient Germans.

— The family life of the ancient Teutonic tribesman seems to have conformed to the same general type as that of the early Greeks and Romans, only it was much cruder. The patriarchal family existed, but it was much less fully developed, and there were survivals of the maternal system. The wife was regarded, as among all patriarchal peoples, as the prop¬ erty of her husband, who theoretically had the' right to sell wife and children. Yet women held a relatively high position, as Tacitus, their earliest historian, testifies. There was little polygamy practised, and divorce was very rare. The ancient German family was, then, of a crude but of a relatively pure and stable type.

Effect of Christianity on the Family.

— The early Christian Church made one of its first tasks the reconstituting of the family life, which, as we have seen, was de¬ moralized in later Greco-Roman civilization, upon a pure and stable basis. It early sought to limit and abolish divorce. This it practically accomplished about the 12th century a.d., through the recognition of marriage as one of the church sacraments, making marriage again a religious bond. At the same time it endeav¬ ored to lessen prostitution, to put a stop to the exposure of children and to exalt the position of women. In all of these endeavors it was more or less successful. Unforturfately, the type of family life which it set up, how¬ ever, was patterned after the patriarchal type found among the Hebrews and in early Greece and Rome. Thus women were again subjected and deprived largely of the legal rights which they had won to some extent under Roman law.

This religious authoritative family persisted down to the Reformation, and practically even to very recent times.. The Protestant reform¬ ers, however, recognized that marriage was a civil relation, created by the state and only to be broken by the state. From this arose the civil marriage laws of modern European states. In the 18th and 19th centuries, however, the view again grew up that the basis of the family was essentially private contract, marriage being made and broken by mutual consent of the parties.

Partly as a result of this contract view of marriage and the family, but even more largely because of certain general social and economic conditions, the family life in many nations of the present has become very unstable. The re¬ ligious view of the family has apparently lost its hold among large masses of the population of many countries in Europe and in America. The recent history of the family, therefore, centres largely about the question of divorce (see article on Divorce) and the toleration of other forms of the family than permanent monogamy in moral and legal standards. See article on Marriage, History of.

Bibliography.— Dealey, J. Q., (The Family in its Sociological Aspects) (Boston 1912) ; Gillette, J. M., (The Family and Society) (Chicago 1914) ; Goodsell, W., (The Family as a Social and Educational Institution > (New York 1915) ; Howard, G. E., (History of Mat¬

rimonial Institutions) (3 vols., Chicago 1904) ; Lecky, W. E. H., (History of European

Morals } (2 vols., London 1869) ; Westermarck, E., (The History of Human Marriage> (Lon¬ don 1901).

Charles A. Ellwood,

Professor of Sociology, University of Missouri.

FAMILY COMPACT, (1) the name given to a compact organized by the Due de Choiseul, first minister of Louis XV, between the various members of the Bourbon family, then sover¬ eigns of France, Spain, the Two Sicilies, Parma and Piacenza, mutually to guarantee each other's possessions. It was signed 15 Aug. 1761. It entailed on Spain a war with England, then at war with France. Other similar agreements, between France and Spain, signed 1721, 1733 and 1743, bear the same name. (2) The nick¬ name given to the group of ultra-Tory leaders who, allied not so much by family ties as by the bonds of political, social and religious sym¬ pathies, held a monopoly of place and power in Upper Canada from the formation of the province in 1791 almost up to the union with Lower Canada in 1841.

FAMILY LAW. Speaking of the superi¬ ority of the historic method of investigation over the prevalent modes of inquiring into juristic facts, Sir Henry Maine remarked the persist¬ ency of social institutions, saying, that to this day ((we are in the midst of legal notions, which are nothing more than the same (ancient) con¬ ceptions, though disguised by the phraseology and by the habits of thought belonging to mod¬ ern times.® The antiquity of the family is not even thus disguised. The names whereby the members of a family group are called, and their relationship to one another is indicated, are traceable back to a past which lies far beyond any historic record, and far beyond even the era of legends and myths. The words "father,®

"mother,® "sister,® "brother,® "daughter® and their cognates in other Indo-European lan¬ guages are derivatives of Aryan prototypes des¬ ignating identical family relationships. Even names indicating more remote degrees of kin¬ ship, whether of blood or merely in law, have been traced by comparative philology to a com¬ mon linguistic origin. The conclusion is in¬ evitable, therefore, that the family not only ex¬ isted, but was organized on the same general plan as now, while the remote ancestors of the Hindus, Persians, Greeks, Latins, Celts, Teutons and Slavs still dwelt together as one nation and spoke one speech. One should not think of the ancient family as constituted

of members of a single household living under one roof ; neither is it to be understood as that larger aggregation of blood relations, which we call a “family,® using the word in the sense of a “house® or gens, as the Romans called it. The ancient fam¬ ily included all of the descendants, in the male line of descent, from a common, living male ancestor. This ancestor was the pater familias — literally “family father,® though, in fact, he might be the grandfather or great-grandfather of the younger members of the family group. Persons legally adopted into a family stood on exactly the same footing with persons born in it ; persons adopted out ceased to be members of the family of their birth and became members of the family to which they had been legally united. Families, not persons, were the units of society; early law took little account of indi¬ viduals. There was a community of interest among the members in the family possessions, and an injury to the person of any one member was avenged by the kindred. The pater familias was clothed with extraordinary authority.

Rome. — In the Roman Commonwealth, where the primitive family organization and ad¬ ministration persisted as anachronisms in the midst of a highly complex civilization, the patria potestas, or “power of the father,® was despotic almost beyond belief. The pater familias had the uncontrolled right to dispose of the per¬ sons under his power. He could provide a male descendant with a wife ; he could give his daugh¬ ter or a son’s daughter in marriage; he could divorce his children of either sex; he could sell his children or give them to another family head for adoption, subject them to corporal punish¬ ment without limit, and he could put them to death. Children under paternal power could hold no property apart from the parent; the latter was entitled to all they earned or acquired ; and on the father devolved all the benefits of his sons’ contracts free of any compensatory obli¬ gations. The arrival of a son at man’s estate did not liberate him from the paternal despotism. The son might be married and preside over a separate household and still remain completely dependent. The patria potestas, however, could not prevail over the jus publicum. Father and son voted together in the comitia; they fought side by side in the wars of the republic, where the son might command the father as his superior officer — or the son, as a public magistrate, might decide a lawsuit against the father and even impose a penalty on him for a criminal offense. In all times, however, influences must have been at work to ameliorate the domestic despotism. Natural love and affection could not fail to soften paternal severity. The fear of social ostracism, no doubt, would have de-

terred a father from an extreme exercise of power over a son, who occupied a high position *n the service of the state or in the esteem of the public. There were legal devices whereby & fili<&$ familias (a son under power) could ob¬ tain his emancipation, and it was not an un¬ common practice for a father to voluntarily emancipate a son. Under the empire the patria ipotestas was gradually weakened. The uncon¬ trolled right to inflict corporal chastisement was reduced to a privilege to bring the domestic of¬ fenses of children to the notice of the public magistrates — the punishment of offenses against the public law, of course, was never in the pa¬ ternal power. The dictation of the father in the marital affairs of the children became a con¬ ditional right of veto; an adoption could not be effected without the consent of the child to be adopted, and the right to sell children was abol¬ ished. This was an approximation to the mod¬ ern law so far as the rights of persons were concerned. With respect to property, the fath¬ er's absolute right of control was preserved to the end. The farthest concessions made by the later law was to limit to a life interest the father's right to property inherited by children from their mother and to property acquired by children otherwise than by inheritance.

On the death of the father the dignity and power of a pater familias devolved upon each son who had attained his majority — and who had acquired sons, daughters or other descend¬ ants over whom he could exercise his authority. Daughters, however, did not gain independence through the demise of the father; women as long as they lived remained under the tutelage of the family in which they were born. If the father died intestate the family property de¬ scended to the children in equal shares and, at nearly all periods, without any preference for male heirs. But the children of a daughter, de¬ ceased before the death of her father, took noth¬ ing in right of their mother — for inheritance by representation could be claimed only through a male progenitor. Though daughters shared in the paternal estate equally with the sons, the legal disabilities of women involved the neces¬ sity of creating trusteeships and guardianships for them. In default of direct descendants the nearest agnatic kindred became the heirs and, these also failing, the estate was distributed among the gentiles, meaning, the whole body of citizens bearing the intestate's family name. These constituted the gens or <(house,® and were assumed to be kindred in blood, though this kinship was a legal fiction more often than it was a fact. Only those children of an intestate who were under power were capable of inherit¬ ing from an intestate. An emancipated son in¬ herited nothing. The act of emancipation, in¬

tended as a mark of distinction and proof of special fatherly affection, would react disas¬ trously by disinheriting the favorite. This pos¬ sibility was avoidable only by a testamentary disposition. The unfairness of a law, which permitted a family domain to pass to strangers and to be dissipated by a division into a very large number of very small parts, explains the Roman aversion to intestacy — an aversion which continued long after its original cause had been removed. An ancient will should not be con¬ ceived as an instrument, like its modern counter¬ part. made in secret and kept secret until the death of the testator. On the contrary a Roman

will could be made only with the fullest public¬ ity and with the approval of the community. This approval was attested by a cloud of wit¬ nesses, originally, the comitia calata, which was the whole body of citizens drawn up in battle array. The reason for this elaborate ceremonial was not a fear that a testator might disinherit his natural heirs ; but the purpose of a will being to defeat the claim of the gens to an escheat, it would have been contrary to then prevalent ideas to permit so important a public act to be done without the demonstrative co-operation of the entire community. Doubtless, an attempt on the part of a father to deprive his children of their patrimony would have failed to receive the necessary public approval ; but no testator would have thought of making such an attempt. Later on, when the formal probate of a will had become less public and less imposing, (

The Teutonic Tribes. — When the Teuton tribes emerged from Cimmerian darkness and came into the light of history the family, with them, as with the Romans, was the social unit. The kindred and their patrimony were under the niund (guardianship) of the living, common male ancestor. This guardianship, however, carried with it the paternal power only in a greatly modified form. The sons were emanci¬ pated from paternal control of their persons when they attained their majority, but women remained under perpetual guardianship, which passed on their father's death to their nearest male relative. It did not pass, as in modern times, to the husband on marriage. The com¬ munity of ownership in family property was pronounced. The allod, or family domain, was held in common by the father and his sons, and the former could not alienate the same without the consent of the latter, though the Anglo- Saxon law seems to have been exceptional in giving the father the right of disposition. Wills and testamentary dispositions of property were unknown. The patrimony passed from father to sons in equal shares, but it was not usually divided. While the rule of primogeniture did not prevail, the quasi-corporate character of the family in its relation to property required some sort of managing directorship. It was not unnatural that

this should fall to the eldest son on the demise of the father. The rights and persons of women were in the wardship of the family. A distinction was made between in¬ herited and acquired property, the acquisitions of a son who had attained his majority being his own and free of parental control — though the acquired property would be subject to the rights of the sons of him who had acquired the same,' Important arrangements respecting prop-

erty, or marriages were compacts between fam¬ ilies, not between individuals — each party act¬ ing through the family head in a representative capacity. We still speak of a conveyance of land as a covenant, not between the parties alone but also their heirs and successors for¬ ever. Until quite modern times a contract of marriage was referred to as a treaty, and the resulting bond is still called a family alliance. By the time the Goths, Saxons and Franks had become firmly established in their new seats within the territorial limits of the decadent em¬ pire, the family law of Rome had attained its final development. Property continued to be held by children, during the life of the father, only by a most precarious tenure. The control of the pater familias over the persons and lib¬ erties of his children, however, was now ended when they had attained their majority; the per¬ petual tutelage of women had been extinct for several centuries. Wills were attested by the seals of seven, instead of by the acclaim of an armed host of witnesses. The great number of laws to prevent the disinheritance of natural heirs, or the unequal distribution of estates, might give the impression that such practices were common. As a matter of fact, attempts to divert the patrimony from the natural line of succession were so infrequent that the preven¬ tive edicts should be regarded as recording prevalent ideas of right, rather than as enjoin¬ ing existing evil practices. The rules of intes¬ tate succession had been made to conform with natural justice, and the Roman tables of con¬ sanguinity have become the basis of our own statutes of distribution. The provisions of the French code civil and other modern codes, which require an equitable partition of estates and for¬ bid the complete disinheritance of any child, have their origin in the Roman law of this pe¬ riod.

The Christian Church. — The Christian churches quite naturally succeeded the heathen temples as depositories of wills. The universal succession was adapted, in principle, to cases of intestacy by the settlement of estates through administrators. A good part of the family

law of Rome in its ultimate stage of development was absorbed without change into the customary law of the nations of Western Europe, not with¬ out the exertion of influence by the Church. A little later the Church succeeded in imposing on these customary laws the right of the widow to her thirds. The Church also assumed the pro¬ bation of wills and the administration of intes¬ tate estates.

A distinction, which still persists, was made by the feudal law between real and personal property. The rules of primogeniture and en¬ tail were at first forced upon weak sovereigns by the more powerful of their vassals, who com¬ pelled the feeble grantors to write these rules into the charters or deeds creating the feudal benefices. The conditions of the grant were then confirmed by pactes de famille (family settle¬ ments or house laws) and, finally, the rules were embodied in the customary or common law. The power to sell or devise land freely by will was attained only after several centuries of struggle in courts and parliaments ; and f rom the great landowners came the most determined opposition to the proposal to relieve their prop¬ erty from feudal bondage. The restrictions upon the conveyance of land were not consid¬

ered a hardship by them. As Sir Henry Maine remarks : (

Modern Legislative Modifications. — In

the modern family law one comes face to face with reminiscences of the old order at every turn. The father is the natural guardian of his children and during their minority he has control over their persons and of their property, except such property as is held in other hands under a trust. The father may restrain the liberty of the children or administer corporal punishment ; but such restraint and chastise¬ ment must not be excessive or cruel. Until quite recently a father had the power to bind out his sons as apprentices and, though this right has been generally discontinued, the father is still entitled to the earnings of his minor children. Theoretically he is also entitled to the earnings of an unmarried daughter of full age, who is a member of his household and not independently engaged in business nor in a sepa¬ rate lucrative employment. Until restrained by child labor laws of comparatively recent enact¬ ment, the father was empowered to hire out his children of any age, even the tenderest, and collect their earnings, subject only to the inter¬ vention, often ineffective, of the Society for the Prevention of Cruelty to Children, if one existed in the vicinity. The father has no con¬ trol, other than moral or persuasive, over the marital arrangements of his grown children ; though the power of the father to disinherit is very apt to be a very strong

influence against inviting his displeasure. Solemnizations -of marriages (or the issue of licenses to marry) in the cases of minors are generally forbidden by law, unless the parental consent have been given; and such marriages are voidable at the instance of the parent. Marriages without pa¬ rental consent, of children under certain legally defined ages, are nullities. The duty of a father

to educate his children has, in general, been taken over by the state ; but in most places the parent is under legal compulsion to send his children of school age either to the schools publicly provided or give them some other and equivalent educational advantages. The obli¬ gation to support his minor and dependent chil¬ dren is enforcible against an unduteous parent by criminal process. Formerly the father had an absolute right to the property of a deceased minor child and, where the rule has not been altered by legislation, he still has this right. The statutes of distribution usually apportion the shares of the next of kin and some of them include the father. In any event, the father would have the first right to administration of the estate of a minor child. The right of the father to the custody of his children is absolute only under normal conditions. Where the family has been disrupted, or the father is not a proper custodian, equity and statutory law intervene to protect the interests and welfare of the child. The latter in some instances is given the right to express its preference between the guardianship of its mother or father. The duty of the child is to obey its parents, and for incorrigible misconduct the father (or mother) may have a child committed to a correctional institution. Parents, under super¬ vision of a competent court, may surrender their children for adoption. In New Jersey the State Board of Children's Guardians has a general supervisory power over adoptions. The duty to care for indigent, incapacitated and depend¬ ent parents is imposed on children capable of doing so, and is enforcible by summary crim¬ inal process. In some States the duty to sup¬ port is extended through two generations, so that the obligation may be enforced in behalf of grandparents against grandchildren, and vice-versa.

The power of a father (or mother) to dis¬ inherit children by will is absolute. The child can be cut off without even the proverbial shill¬ ing. This is not the case in France and other countries where the Roman law has been more closely followed. With us the human law leaves the matter entirely to the regulation of the natural law of

affection. But the birth of a child subsequently to the making of a will, and not provided for therein, has the effect of invali¬ dating the same. Where the inheritance has been ‘diverted from the natural heirs by un¬ due influence or fraud, or where the maker of the will lacked testamentary capacity, the rem¬ edy is a contest of the probate of the instru¬ ment. Deathbed legacies and bequests in favor of religious, charitable and other foundations, which divert a family estate from those equi¬ tably entitled, are void. In case of the father’s intestacy the patrimony, exclusive of the widow’s share, goes to the children in equal parts, irre¬ spective of sex. Where there are no descend¬ ants the estate ascends, so to speak, passing to the grandfather and, through him, to collateral relatives in accordance with their varying de¬ grees of consanguinity. A decedent’s brothers and sisters stand in the second degree, because they would claim through the common ancestor (their father) and not directly from their brother. Nephews and nieces are consanguine to their uncle or aunt in the third degree, and cousins german stand in the fourth degree to¬ ward each other. The lifelong tutelage of

women to the father or other males of the family in which they were born, abolished in the later days of the Roman Empire, was re¬ vived in an accentuated form by the barbarian conquerors. There was superadded the theory of the merger of the wife’s personality in that of her husband; and many centuries had to elapse before equity and, later on, the statute law delivered women from their condition of legal nonentity — but even the Married Women’s Property Acts have left traces of the former disabilities of wives. When a woman becomes the head of a family in consequence of the death of her husband she succeeds to the powers and, also, the obligations of the pater¬ familias. A few judicial definitions of the term (< family® may not be without interest. Under the Homestead and Exemption laws, it has been held that the term * family® includes a house¬ hold composed of parents and children or other relatives, or domestics and servants. But a mere aggregation of persons residing in the same house does not constitute a family; there must be an obligation on the part of the head of the house to support the others, or some of them, and a corresponding state of dependence on the part of those supported. Where a death benefit is payable to the ˆfamily,® the word means next of kin or those entitled to inherit in the case of intestacy. It was a principle of the common law that a family, in its collective capacity, could not inherit, and a 'bequest to a ® family* was void for uncertainty. A different rule prevails in equity, and a bequest by a father in trust for the benefit of his children and their families was declared to be in favor of the testator's sons and daughters and the

latter's children, so long as they live together as mem¬ bers of their parents' households, or from their tender years are entitled to support. Generally speaking the term ˆfamily® in a bequest includes the testator's wife and children; but where the will is made by a wife the husband is not con¬ sidered a member of her family, because he is neither next of kin nor heir to his wife.

Stephen Pfeil.

FAMILY PROTECTION. See Insur¬ ance, Fraternal.

FAMINE, a dire want of food affecting considerable numbers of people at the same time. Irregular rainfalls in tropical climates, imperfect methods of irrigation, or the too ex¬ clusive dependence of the mass of the people on a single article of food which happens to fail, are among the commonest causes of famines. In the early and mediaeval ages they were frequent. The >ˆear 879 was one of uni¬ versal suffering from lack of food. The famine of 1125 diminished the population of Germany one-half. All through the Middle Ages public opinion upheld the city authorities in driving out of the gates the neediest inhabitants and letting them perish. In a famine which devastated Hungary in 1505 parents who killed and ate their children were not punished. It was after a famine of 1586 that the poor law in Eng¬ land had its beginning. As late as the middle of the 17th century famines were a common affliction in Europe and even in the 18th cen¬ tury they still occurred. The last time a period of bad harvests was designated as a famine in Germany was in 1817. The rapidity of modern communication and transport has made severe

famine almost impossible in western or cen¬ tral Europe or North America. In Ireland, famines more or less serious have at various times prevailed owing to failure of the potato crop. In 1846 the dearth was so great that £10,000,000 sterling were voted by Parliament for relief of the sufferers. India has long been subject to great famines, and the government's budget makes annual provision against such need. Under the rule of the English, the popu¬ lation has greatly increased, and as the ma¬ jority of people live from hand to mouth in ordinary times, the slightest failure in the rice crop causes the famine point to be immedi¬ ately reached. In 1769-70 as many as 3,000,000 perished; in 1865-66 about 1,500,000, and in 1877 about 500,000. The authorities grappled very successfully with the famines of 1896-97

and 1899-1901 which extended over large areas, yet there was great loss of life. The recent famine in India cost the government in 1900-01 $250,- 000,000, of which amount $50,000,000 was ex¬ pended in direct relief. Much help was sent from other countries, including very large con¬ tributions from the United States. In 1870-72 Persia lost 1,500,000 inhabitants, a quarter of the whole population. In China 9,500,000 are said to have perished in 1877-78 from famine. In the northern provinces of Shensi, Shansi and Honan, with a population of 56,000,000, dur¬ ing the years following 1877 it was reckoned that between 4,000,000 and 6,000,000 people per¬ ished, and famine visited the empire in 1903. In the famine of 1891-92 in Russia it was esti¬ mated that in 18 provinces 27,000,000 of inhabit¬ ants were affected. Although many of the causes of famine are beyond human control, it is probable that the extension of sound agri¬ cultural knowledge and the adoption of a more rational system as regards the kinds and quan¬ tities of crops grown will in the future render famine almost unknown in most countries.

FAMINE FEVER. See Relapsing Fever.

FAMINTZIN, fa-min'tsen, Andrei Ser- geyevitch, Russian botanist : b. Sokolniki, 1835. He was educated at the University of Saint Petersburg. In 1872 he was appointed to the chair of botany at his alma mater. He made important investigations regarding the develop¬ ment of seed-plant embryos in which field he was a pioneer. He published (Embryologische Studied (1879) ; (Studies of Crystals and Crystallite) (1884) ; (Uebersicht iiber die Leis- tungen auf dem Gebiet der Botanik in Russ¬ ianˆ (1894), also articles issued in publications of the Saint Petersburg Academy.

FAMOUS PAINTINGS. See Paintings of the Great Masters.

FAN-CHENG, fan-cheng', China, city in the province of Hu-peh, on the Hankiang, 380 miles west of Nanking. It is located on one of the principal trade routes between the north¬ ern and southern provinces of China. Pop.

100,000.

FAN CORAL, the spreading fan-like growths of corals of the family Gorgonidee. The coral stock is here horny or calcareous and takes a bushy growth, or frequently spreads from its base into a flat network, making a (

These alcyonarians are numerous not only in the tropics, one beautiful

red or yellow species (Rhipidogorgia flabellnm) flourishing along the coast of Florida, but also in the deep cold waters of the north Atlantic.

FAN CRICKET, a British name for the mole-cricket.

FAN PALM, a name common to all those palms which have fan-shaped (flabellate) leaves, but more particularly applied to those of the genus Chamcerops, of which a common species in the Mediterranean region is C. humilis. The East Indian ((great}) fan palms are species of Corypha, one of which is the taliput-palm (C . umbraculifera) , whose leaves furnish the <(palmleaf fans® of commerce. The West In¬ dian fan palm is Inodes blackbnrniana.

FAN-TRACERY, in architecture, the decorative tracery on the surface of fan vault¬ ing. It was used in late pointed work. Fan vaulting or fan-tracery vaulting is a very com¬ plicated mode of roofing or vaulting in which the vault is covered with fan-tracery. It is peculiar to English Gothic. There are 25 exam¬ ples of it, the finest of which are to be seen in King's College, Cambridge, Henry VII's Chapel, Westminster, and Saint George's Chapel, Wind¬ sor. Consult Bond, (English Church Architec¬ ture) (1913).

FAN VAULTING. See Vaulting. FANARIOTS. See Phanariots.

FANATICISM, excessive zeal ; unreason¬ ing enthusiasm in religious matters. In ancient Rome the term fanatics was applied to such as passed their time in temples, and who, pre¬ tending to be inspired by the divinity, would burst into wild and frantic gestures, utter pre¬ tended prophecies, cut themselves with knives, etc. It has prevailed under different forms in all ages of the world; and one of its most remarkable and dangerous features is the tend¬ ency that it has to spread over large masses of people, as well as to favor measures of persecution. By an extension of the term it is also sometimes applied to other forms of extravagant enthusiasm which in their outward manifestation are accompanied with impetuosity and violence. Thus, we speak of political fanaticism, which, in affairs of state, displays itself in a violent and intolerant partisanship. Not unfrequently both kinds of fanaticism are found combined, and to this combination most of the religious wars which have desolated kingdoms are to be ascribed.

FANDANGO, a lively and voluptuous Spanish dance in triple time, said to be derived from the Moors. It is danced by two persons, male and female, and accompanied by the sounds of the guitar. The dancers have casta¬ nets which they beat in time to the measure, though

sometimes the male dancer beats a tambourine.

FANEUIL, fan'el, or fun'el, Peter, Ameri¬ can merchant: b. of a French Huguenot family, New Rochelle, N. Y., 1700; d. Boston, 3 March 1743. The project of erecting a public market- house in Boston had already been discussed for some years, when in 1740 Faneuil offered, at a public meeting, to build a suitable edifice at his own cost, as a gift to the town; but so strong was the opposition to market-houses

that, although a vote of thanks was passed unanimously, the offer was accepted by a ma¬ jority of only seven. The building was com¬ menced in Dock Square in September of the same year, and finished in two years. It com¬ prised a market-house on the ground floor, and a town hall with other rooms over it. See Faneuil Hall.

FANEUIL HALL («The Cradle of Liberty®), in Dock Square, Boston. There be¬ ing no public market in Boston in 1740, Peter Faneuil offered to build one and give it to the city. It was finished in 1742 — a two-story brick building 100 by 40 containing not only a market in the basement, but rooms for town officers and a public hall for town meetings. It was destroyed by fire 13 Jan. 1761 ; rebuilt 1763, and in 1775, during the English occupa¬ tion of Boston, was used for a theatre. It was the meeting place of the patriots during the Revolutionary period, and thus gained for itself the title of ((1901).

FANFANI, Pietro, pe-a-tro* fan-fa'ne, Italian philologist, humorist and novelist : b. Pistoia, Italy, 21 April 1815; d. Florence, 4 March 1879. He founded in 1847 the Philologi¬ cal Record, and afterward edited several other periodicals of a like character. His Vocabu¬ lary of Tuscan Usage) and other ˆvocabularies® are works of high authority. The (Writ at Random, > and the whimsical satire, (The Laugh¬ ing Democritus: Literary Recreations, > furnish examples of his brimming humor. His novels are (Cecco of AscolP ; (Paolina) ; (The Coach¬ man and his Family, > etc.

FANFARE, in music, a short passage for trumpets especially used on occasions of state ceremonial. Certain flourishes in opera music are also called fanfares. Also any short, promi¬ nent passage of the brass instruments of an orchestra.

FANGWE. See Fans, a tribe.

FANNIN, James W., American soldier : b. Georgia, about 1800; d. Goliad, Tex., 27 March 1836. He removed to Texas in 1834 and in the Texas war of independence raised the (

FANNING, David, American freebooter: b. Wake County, N. C., about 1756; d. Digby, Nova Scotia, 1825. He was a carpenter by trade, but led a vagabond life. Late in the

Revolutionary War he joined the Tories for the purpose of revenge; gathered a small band of desperadoes like himself, laid waste to whole settlements and committed fearful atrocities. For these services he received a lieutenant's commission from the British commander at Wilmington. At one time he surprised a court in session and captured and carried off judges, lawyers, clients, officers and citizens, and soon afterward seized Governor Burke and his suite. The name of Fanning became a terror to the country, and he was outlawed. At the close of the war he fled to New Brunswick, where he became a member of the legislature.

FANNING, Edmund, American loyalist: b. Long Island, N. Y., 1737; d. London, Eng¬ land, 28 Feb. 1818. He was graduated from Yale in 1757; settled in North Carolina, where he became a member of the legislature, and as recorder for Orange County excited general dislike by his exactions. In 1771 he removed to New York, in 1774 was appointed surveyor- general, in 1777 organized the king's American regiment of foot. He was wounded during the Revolutionary War and in 1779 his property was confiscated. He was subsequently (1783- 86) lieutenant-governor of Nova Scotia and was lieutenant-governor of Prince Edward Island 1786-1804. In the English army he rose to the rank of general.

FANNING, John Thomas, American civil and hydraulic engineer: b. Norwich, Conn., 31 Dec. 1837; d. 1911. He was educated in public and normal schools, studied engineering and architecture, and had begun to practise engi¬ neering in his native town when the Civil War broke out. He enlisted and attained the rank of lieutenant-colonel. At the close of the war he resumed engineering practice in Norwich and soon began to specialize in hydraulics. During the next 10 years he was engineer for a number of municipal waterworks in New England. In 1877 he published which, as the first and for many years the lead¬ ing American work on that subject, went through many editions and gave the author much prestige. At that time less than 500 cities in the United States had waterworks. He was subsequently employed as consulting engineer for many waterworks plants, municipal and private. In 1885 he made a report on the improvement of water power

on the Mississippi River at Minneapolis, Minn., and in the following year he was appointed chief engineer of the Saint Anthony Falls Water-Power Com¬ pany in that city, where he lived until his death. He prepared a comprehensive plan for the drainage of 3,000 square miles of the hard- wheat land in the valley of the Red River of the North; was consulting engineer for many large water-power projects, among which were early plants on the Missouri River, at Great Falls and Helena, Mont., and on the Spokane River at Spokane, Wash., and was also asso¬ ciated as consulting engineer with several of the leading railroad companies of the West. He was for 38 years a member, and in 1910-11 a vice-president of the American Society of Civil Engineers and contributed largely to its Trans¬ actions, but as a writer he is best known for the pioneer American treatise already men¬ tioned.

FANEUIL HALL

FANNING ISLANDS — FANS

11

FANNING ISLANDS, a group of coral islands, in the Pacific, between lat. 2° and 5° 49′ N. and long. 157° and 162° W. It comprises the islands of Jarvis, Christmas, Washington, Palmyra and Fanning Island; area of the whole, about 260 square miles. Cocoanut and other tropical trees are found here. The islands of Fanning and Christmas belong to Great Britain ; Palmyra is claimed by the United State. Fan¬ ning Island is a station on the British ((A11- Red}) cable. Pop. 200. The group gets its name from an American sailor, Edmund Fanning, who discovered it in 1798.

FANNIUS STRABO, Gaius, Roman his¬ torian and orator, the son-in-law of Laelius. In his youth he served in Africa under Scipio Africanus, in 146 b.c., and along with Tiberius Gracchus, was the first to mount the walls of Carthage on the capture of the city. He after¬ wards served in Spain with distinction, in 142 b.c., under Fabius Maximus Servilianus. Fannius is introduced by Cicero as one of the speakers both in his (De Republica) and in his treatise (De AmicitiaP At the advice of his father-in-law, Laelius, Fannius had attended the lectures of the Stoic philosopher, Panaetius. Fannius owed his celebrity in literature to his (History. > We have no information respecting the extent of this work; we only know that it treated of contemporary events and that it pos¬ sessed some merit appears from the fact of Brutus making an abridgment of it. Sallust likewise praises its truth.

For the extant frag¬ ments consult Peter, (Historicorum Roman- orum Reliquiae) (Leipzig 1870).

FANNY FERN. See Parton, Sarah Payson Willis.

FANO, fa'no (ancient Fanum Fortune), a seaport of Italy, in a rich and fertile plain on the Adriatic, province of Pesaro e Urbino, 29 miles northwest of Ancona. It is surrounded by walls, built by the Emperor Augustus, and contains a triumphal arch, a cathedral with val¬ uable paintings, a public library, orphan asylum and a fine theatre. Since the filling up of the harbor its commercial importance has lessened, but a canal gives access to the Adriatic. Here the first printing press with movable Arabic type was set up in 1514 by Pope Julius II. Pop. of commune 26,928.

FANON, an ecclesiastical term of various applications. It was used to denote the cloth in which the deacon in the ancient or early me¬ diaeval Church received the oblations, and is now generally applied to a striped, oblong piece of silk gauze worn on the head and shoulders by the Pope in celebrating mass pontifically. It also designates the church banner carried in processions. In surgery, a fanon is a splint of a particular shape, formerly employed in fractures of the thigh and leg, to keep the bones in contact.

FANS, also known as FANGWE PA-

HOUINS, OSHIBA, etc., an African people who emigrated from the interior to the coast of the French Kongo during the first half of the 19th century. They now number about 300,000 in the neighborhood of the mouths of the Ogo- way and the Gaboon. They have been described by Du Chaillu-, Burton, Lenz, Reade and other travelers as a warlike and highly intelligent

people, differing markedly from the surround¬ ing negroid or Bantu tribes. Linguistically, they are allied with the Bantu group. Their complexion is rather light, their beard long, their frontal bone very prominent and they are tall and well built. They were formerly much given to eating human flesh, but their cannibal- » istic tendencies have been checked by contact with the Europeans of the coast regions. Con¬ sult Tessmann, (Die Fangwe> (Berlin 1913).

FANS, instruments for producing an agi¬ tation of the air and consisting of an extended flat surface, generally semi-circular in outline. As hand implements for cooling the air they have long been articles of luxury. Early Egyptian paintings prove familiarity with its

use in a remote period. From a passage in the (Orestes } of Euripides it appears that the Grecian fans were introduced from the East, that they were of a circular form and were mounted plumes of feathers. Dionysius of Hali¬ carnassus describes the courtiers of Aristo- demus at Camae as attended by females bearing parasols and fans. Plautus mentions fan bearers as forming part of a Roman fine lady's retinue, and Suetonius describes Augustus as lying, during the heat of summer, in the shade and fanned by an attendant. In the Middle Ages fans were used in the churches to chase away the flies from the holy elements of the Eucharist. Such a fan, known as a flabellum, is still used in the Greek and Armenian churches. Th-e folding fan is said to have been a Japanese invention which originated in the 7th century, the idea having been supplied by the wing of the bat. From Japan the invention passed to China ; but it was not till about the beginning of the 16th century that such fans began to be used in Europe, being introduced into Italy and Spain. The fan was first brought into European notoriety by Catharine de Medici, who introduced it in the folding form into France. Great sums were spent on the orna¬ mentation of the fans first in vopue, and many were painted by Watteau. During the 16th and 1 7th centuries, they were used by gen¬ tlemen. In various nations and at various periods the manipulation of the fan has formed almost a separate language, especially for co¬ quettes. Addison in his essay on the fan, in the Spectator, and Disraeli in (Contarini Flem¬ ing,) treat of this feminine art. They are said to have been introduced into England from Italy in the reign of Henry VIII; and in the reign of Elizabeth they were framed of very costly materials, the boay of ostrich feathers, the han¬ dle of gold, silver or ivory, of curious work¬ manship. Walking fans were formerly in use. They were of large size and were employed to screen the face from the sun. The Chinese have greatly excelled in the art of making fans, those of the lacquered variety showing especial skill. For common use they make a cheaper sort, con¬ structed of polished bamboo and paper. In Japan, where to this day the fan is an indispen¬ sable adjunct of the daily life of all classes, large rich fans are used in ceremonial dances, in which they are accessories of peculiar signi¬ ficance. In Rome the Pope is escorted on cer- monial occasions by attendants with flabella formed of peacock feathers. In Europe, France manufactures the greatest number of fans used by the world of fashion. A species of large fan known as a punkah is used in India for cooling

the air of rooms and keeping down the temper¬ ature. Fans in the

form of machines are used in agriculture for winnowing grain, tho original form being very simple and dating back to prim¬ itive times. In metallurgy and other branches of manufacture fans are employed for ventilat¬ ing and stimulating the combustion of fires; for the ventilation of mines ; and for various other manufacturing purposes. The modern electric revolving fan is extensively used for cooling the air in public and private buildings. Consult Blondel (Histoire des eventails) (Paris 1875) ; Rhead, (History of the Fan) (London 1910) ; Salwey, (Fans of Japan) (ib. 1894) ; Catalogue of the Loan Exhibition of Fans at South Kensington } (ib. 1870).

FANS, Mine. See Mining.

FANSAGA, fan -sa'ga, Cosimo, Italian

artist: b. Bergamo, 1591; d. 1678. At Rome he studied under Pietro Bernini. He worked chiefly in Naples, where he was eminent as architect, painter and sculptor. At Naples he executed the fountain of Medina, the faqade of S. Teresa degli Scalzi, the church of S. Maria Maggiore and the Palazzo Maddaloni, now the National Bank, and the cloister and dining hall of San Severino.

FANSHAWE, fan'sha, Anne Harrison,

Lady, an English memoirist: b. London, Eng¬ land, 25 March 1625; d. there, 30 Jan. 1680. She was married to Sir Richard Fanshawe (q.v.) in 1644. Her admirably written and ac¬ curate observations of life and manners in many lands, preserved in (Memoirs, > from which extracts have been published, are of historical value.

FANSHAWE, Catherine Maria, English poet: b. Chipstead, Surrey, 6 July 1765; d. Put¬ ney Heath, Surrey, 17 April 1834. A lively fancy, brilliant wit, sound sense and personal charm made this lady and her poetry admired in her own circle ; but she rarely consented to publication and only her riddle on the letter H, sometimes credited to Byron, is generally known, her stanzas not having been collected.

FANSHAWE, Sir Richard, English diplo¬ matist, poet and translator: b. Ware, Hertford¬ shire, June 1608; d. Madrid, Spain, 26 June 1666. On the breaking out of the civil wars in 1641 he engaged actively in the royalist cause. He was made a baronet in 1650, and sent on an embassy to Spain, and afterward appointed secretary of state for Scotland. He was taken prisoner at the battle of Worcester in 1651. He was elected M.P. for Cambridge University in 1660, and in 1661 and 1662-63 he was employed on two several missions to the court of

Lisbon, in the first of which he negotiated the marriage of Charles II with Princess Catharine. In 1664 he was Ambassador to Madrid and negotiated a peace between England and Spain, but having neglected to inform his government that it must either be confirmed by his sovereign within a specified time or withdrawn, he was recalled. His poetical abilities were above mediocrity, as is evinced by his translations of the

FANTAIL, an Australian flycatcher of the genus Rhipidura having a fan-like, and in some species prolonged tail, which the bird opens and shuts gracefully as it tumbles about in the air when pursuing its agile prey. A familiar species is R. motacilloides, whose habits are wagtail-like.

A warbler (Cisticola cursitans) of the Med¬ iterranean countries and eastward, remarkable for its nest, which consists of soft materials en¬ closed in two leaves stitched together to sustain it, much after the method of a tailor-bird (q.v.).

A small variety of domestic pigeon, usually pure white, which holds its tail erect and dis¬ tended like a fan.

FANTAN, a Chinese form of gambling. It is simple in form and rule. A square is marked in the centre of a table, or a square of metal or wood is laid on it, the sides of which are marked 1, 2, 3, 4. The croupier now places on the table a double handful of small coins or similar articles and covers them with a bowl. The players select their sides and place their stakes near the number chosen. When all four sides have been backed the bowl is removed and the croupier withdraws the coins from the heap, four at a time, till there remain at most four. In this case the backer of number 4 wins, if there be three remaining coins, number 3 is declared winner, and so on. A percentage is now deducted by the croupier and the winner receives five times the amount of his stake less the percentage. There is a card game of this name also, played with a pack of 52 and by any number of players up to eight. The game starts by cutting the cards. Ace high deals to the left, one at a time, the cards left over are placed face downward on the table. Each player puts up a stake called the <(ante.® The first player on the dealer's left is called on to play an ace, which he places, face upward, in the centre of the table. If he have no ace, he pays an <(ante® and takes a card from the stack. The second player is then called on, and so on until an ace is played; thereafter the piles are built up from ace to king. The winner of the pool is the player who first gets rid of all his cards. Failure to play, having a playable card, sub¬ jects a player to a fine equalling the amount of the ante for every

card remaining in the hands of all the players.

FANTASIA, fan-ta-ze'a, in music, a species of composition in which the author confines himself to no particular form or theme, but ranges as his fancy leads amid various airs and movements. Some writers in defining this word confine its meaning to extempore com¬ position and make this distinction between capriccio and fantasia; namely, that the former is a collection of singular and whimsical ideas strung together by an excited imagination and written down at one's leisure, but the latter is an off-hand execution of whatever comes across the mind while playing on an instrument. In modern usage it is often an enlargement or embellishment of a popular air or operatic melody, arranged for an instrumental solo.

FANTEE, or FANTI, fan-te', formerly a native state of Africa, on the Gold Coast, which extends about 90 miles along the shore of the Atlantic, and 70 inland; lat. 5° 30′ N. ; long. 1° W. The inhabitants, called Fantees,

were at one time the most numerous and pow¬ erful people situated immediately on the Gold Coast ; but their power was almost entirely broken after 1811 by invasions of the Ashantees. Their country is now included in the British Gold Coast Colony. The soil is fertile, produc¬ ing fruits, maize and tropical vegetation of nearly every variety. The custom of making small scarafications on the upper part of the cheek-bones and the back of the neck prevails among the Fantees. Their government is aristocratic. Their head chief is supreme judge or governor and is attended by a council of old men. Each town has a chief. At one time they had several large cities. The coun¬ try of the Fantees is populous and prosperous, owing to the protection afforded by the British settlements and particularly by Cape Coast Castle. In 1873 they were again attacked by the Ashantees, who also threatened the British settlements and compelled the government of Great Britain to send out an expedition under Sir Garnet (later Lord) Wolseley to suppress them. Subsequently Ashanti (1896) became a British protectorate, and was annexed in 1901. (See Ashanti). Consult Barrow, (Fifty Years in Western Africa* ; Boyle, (Through Fantee- land and Coomassii* ; McDonald, (The Gold Coast Past and Presents

FANTI, fan'te, Manfredo, Italian military leader: b. Carpi, 1806; d. Florence, 5 April 1865. He received his education at the military

school of Modena and, becoming implicated in the Menotti insurrection, he was condemned to death and hanged in effigy in 1831. He escaped to France and there joined a corps of engineers. With Mazzini in 1833 he took part in the at¬ tempted invasion of Savoy, and two years later went to Spain, where for 13 years he served in Queen Christina's armies against the Carlists, gaining distinction after distinction and becoming a member of the general staff. In 1848 he returned to Italy to fight against the Austrians. Being looked upon with suspicion by the Piedmontese officers his success in this campaign was greatly hampered and he was even court-martialled for his operations under Ramorino. Although acquitted he was not again in service until the Crimean expedition of 1855. In the war of 1859 he commanded the second division and was an important factor in the victories of Palestro, Magenta and San Martino. He next organized the army of the Central Italian League (Tuscany, Modena, Parma), numbering 45,000 men and d-eveloped it to a high degree of efficiency. He differed with Garibaldi in the matter of the expediency of invading the papal states and Garibaldi re¬ signed. Fanti became Minister of War and Marine under Cavour in 1860 and incorporated the League army with the Piedmontese. After Garibaldi had invaded Sicily and Victor Em¬ manuel decided to intervene, Fanti was put at the head of a large force with which he took Ancona and other fortresses and inflicted a severe defeat on the papal forces at Castel-fidardo, capturing the papal commander, Gen¬ eral Lamoriciere. In three weeks 28,000 prisoners had been taken and the Marche and Umbria conquered. He now became chief of staff to Victor Emmanuel, organized the siege of Gaeta and defeated the Neapolitans at Mola. Fanti now returned to Turin to reorganize the

various army departments. His opposition to the induction of Garibaldi's officers into the regular army with their own grades caused severe adverse criticism. Fanti resigned in 1861 and took command of an army corps. His health had broken down and the last four years of his life were a period of constant suffering. Consult Carandini, (Vita di M. Fanti) (Verona 1872), and Di Giorgio, A., (I1 Generale M. Fanti* (Florence 1906).

FANTIN-LATOUR, fon'tan-la-toor, Henri (Ignace Henri Jean Theodore), French painter: b. Grenoble, 14 Jan. 1836; d. 28 Aug. 1904. He received his early instruction from his father, a celebrated pastellist, and studied also under Lecoq de Boisbaudran and Couture. He first exhibited at the Salon in 1861, but his distaste for academic tradition caused him to be looked on with little favor and in 1863 he was represented in the Salon des Refuses, with Manet, Whistler and others. He lived in England for a time and many of his portraits are in

that country. He excellea in portrai¬ ture and flower groups. His best known are (Hommage a Delacroix,* a group including Legros, Whistler, Baudelaire, Champfleury and the artist himself; (Un Atelier a Batignolles,* included portraits of Manet, Monet, Renoir and Zola. It is now in the Luxembourg Gallery. In (Un Coin de Table* were presented Camille Peladan, Rimbaud, Verlaine and others. Many of his flower groups are in England. In his later years he gave considerable attention to lithography. In 1876 he exhibited (L'Anniver- saire) at the Salon in honor of Berlioz. He illustrated Jullien's

1909).

FANTOCCINI, fan-td-che'ne, an exhibition of puppets, or a dramatic representation on a small scale, performed by figures or dolls, an amusement of which the Italians are extremely fond, and which is frequently performed in a portable theatre — like that of Punch and Judy.

FANUM FORTUNE. See Fano.

FAR EASTERN QUESTION. The com¬ plex problems involved in the rise of Japan and the awakening of China and their relations to the great European and American powers are known in international politics as the Far East¬ ern Question. The term came into general use in the second half of the 19th century, when both China and Japan were drawn into nearer contact with Western nations. For a long time these countries segregated themselves from the West and pursued a policy of seclusion. The Chinese regarded the outside nations as ((bar- barians** and the foreign rulers as inferior to the Teen-tsze or the Son of Heaven, as they called their emperor. In Chinese official docu¬ ments, for instance, the king of England is described as having been ((reverentially sub¬ missive, >} and he is said to have <(repeatedly presented tribute.® On the occasion of Lord Amherst's embassy to Peking in 1816 it was de¬ manded of him that he should perform the ceremony of thrice kneeling and nine times bowing the head to the ground before the Chinese emperor. In 1887 the American

charge d'affaires wrote to the high commis¬ sioner at Canton that the fountain of all diffi¬ culties between China and foreign nations is the unwillingness of the former to acknowledge England, France, America and other great powers of the West as her equals. The Chi¬ nese

officials, in addressing their own sover¬ eign, spoke of the foreign diplomatic represen¬ tatives as if they were not only the subjects of the emperor of China, but as the subordinates of the Chinese mandarins. The treatment to which the foreigners were subjected cor¬ responded to this haughty language.

However, within recent years China has given signs of a reawakening, and not only China but all Oriental peoples of farther Asia are generally showing impatience of Occidental do¬ minion. As early as 1842 and 1843 the British had signed a commercial treaty with the Chi¬ nese in regard to Hongkong. But the Celestial Empire remained practically closed to the for¬ eigners until the treaties of Tientsin and Aigun (1858) opened to the Chinese a new view of their relations and duties toward Great Britain, France, Russia and the United States of Ameri¬ ca. These treaties provided the admission of foreign ambassadors to the imperial court at Peking, the toleration of Christianity, the postal service, the legalization of opium and the right of trading in the interior of the country. The rise of modern Japan began even before that of China. In 1853 an American, Commodore Perry, with a fleet of four ships of war arrived in Japanese waters to effect some arrangement for the protection of American seamen and to obtain permission for American vessels to enter the Japanese ports. His request was eagerly debated among the Japanese parties. Some were opposed to admitting foreigners into Japan, because by giving the Japanese educa¬ tional advantages, machinery and other curiosi¬ ties they ((will deceive the ignorant people.® The others said that Japan was not in a position to take up arms against the foreign world ; that her true policy was to accept treaties with Western peoples, and so to strengthen herself by learning the arts and sciences of the West. These arguments commended themselves to a majority of the Shogun Council. In conse¬ quence a treaty was concluded (1854) between the Shogun and Commodore Perry, by which the ports of Shimoda and Hakodate were promised to be opened for the reception of American ships. There was also stipulations with respect to the facilities of trading and an article permitting the appointment by the United States of consuls or agents to reside in Shimoda. Similar treaties of amity and com¬ merce with England, France, Holland, Prussia, Portugal and Russia were concluded later. In 1869 the Mikado took the famous Charter Oath, promising to create a deliberative assembly. By the edicts of 1871, 1872 and 1875 he finally abolished the feudal system. Occidental civi¬ lization and European models of war training were rapidly adopted. Japan became a for¬ midable military and maritime state. The war with China over Korea (1894-95) and with Russia over Manchuria and Korea (1904-05) demonstrated Japan’s prowess. It was

only the combined opposition of France, Germany and Russia that prevented her encroachment on Chinese territory.

In the meantime China was lulled by her

reactionaries into a false security which proved disastrous when the days of trial came. In 1895, by the treaty of Shimonoseki, the inde¬ pendence of Korea was recognized (its annexa¬ tion to Japan occurred in 1910), and China promised to cede to Japan the Liaotung Penin¬ sula with Port Arthur, the Pescadores and Formosa, paying also an indemnity of 200,000,- 000 taels and granting to the Island Kingdom new and important commercial advantages. During the years from 1895 to 1897 Germany wrested from China the harbor of Kiao-chow and obtained a ((sphere of influence® in the province of Shantung and the Yellow River Valley. But no sooner had German scored these successes than Great Britain presented a demand (1 July 1898) for the port of Weihaiwei, which was leased to her for 25 years. In the south the French took on lease the port of Kwangchow and the Bay of Pangchangwan. More interesting than the holding of harbors on lease, as indicating the relations of the powers to each other and their spheres of in¬ terest in China, were the many concessions of railroad, mining and other franchises made by China to England, Germany, Russia, France, Belgium and America. These foreign powers practically formed an ((unholy alliance,® as the Japanese called it; and their purpose was to (

Of all the great powers Russia had for a certain time the greatest opportunity toward de¬ veloping its commercial and political activities in the Far East. The Russians had established themselves in large numbers in towns of Chi¬ nese Manchuria, in Kiakhta, Mukden, Kirin and Tsitsihar. The navigation of the Ussuri and Sungari rivers fell wholly into their hands, and colonization in Manchuria was fostered under various pretexts. After the Boxer rising (1900) and the Portsmouth Treaty (5 Sept. 1905) Russia proceeded to carry out her rail¬ way plans across Chinese territory, particu¬ larly through Outer Mongolia. Under the Urga Convention of 3 Nov. 1912 Russia ob¬ tained privileges and concessions to exploit the mining industries and construct the railroads in Outer Mongolia. But as soon as the terms of this convention were published the Republican Parliament in Peking clamored for war with Mongolia and with Russia. After protracted discussion a declaration was signed (3 Nov. 1913) between China and Russia by which Chi¬ nese suzerainty over Outer Mongolia was recognized.

Russia’s aggressive foreign policy in the Far East under the Romanov’s

rule had caused Japan to take into consideration the situation in Inner Mongolia, which borders on her sphere of interest in Manchuria. But these claims were waived, and Japan contented herself in the treaty of 25 May 1915, with China's under¬ taking to open in the interest of trade and for the residence of foreigners certain suitable places in eastern Inner Mongolia. The whole

treaty, which incorporated also an exchange of notes regarding the non-alienation by China of territory in Fukien province for military or naval purposes, was intended to obtain for Japan a demarche and further freedom for commercial and industrial expansion.

As concerns the policy of the United States in the Far East, it has obtained neither terri¬ torial interest nor great political influence there. • America became more intensely con¬ cerned in Far Eastern politics after the acqui¬ sition of the Philippines in 1898. The Ameri¬ can capitalists had secured rights to build a great trunk-line from Canton to Hankow. But this concession had been made over in 1904 to the Belgian syndicate on receiving com¬ pensation of $6,700,000, so that the whole road from Peking to Canton seemed likely to fall under Franco-Belgian control. The American government merely satisfied itself with securing commercial advantages. In 1900 Secretary John Hay, by a statesmanlike diplomatic manoeuvre, obtained from France, Germany, Great Britain, Italy, Russia and Japan what appeared to be a guaranty of the ((open door® policy in the Far East — that is, equal commercial treatment of all — within their respective spheres of influence. In 1908 friendly notes were exchanged between Japan and the United States. Free and peace¬ ful development of Japanese and American commerce in the Pacific Ocean and equal oppor¬ tunity for foreign commerce and industry in China were the principles affirmed by the Jap¬ anese Ambassador at Washington and Mr. Elihu Root. How different were the conditions under which these notes were penned from those existing in 1853 when Commodore Perry delivered his ultimatum to the Shogun !

When the Great War began the Far Eastern Question was still unsettled. It was in August 1914 that the German and Austro-Hungarian war lords let loose their enormous armed forces on Serbia, Belgium, France and Russia. Great Britain took the part of the outraged peoples and asked the Japanese government for assist¬ ance under the terms of the Anglo- Japanese Alliance of 1902 and 1911. On

23 Aug. 1914 the Mikado declared war on the Kaiser. Assisted by a small British force the Japanese uprooted the German settlement in the Shantung Penin¬ sula, destroyed the great German naval base in the Pacific and prevented the Germans from organizing risings in China and Manchuria. On this occasion the Japanese lost a destroyer, a torpedo-boat and three mine-sweepers; also there were killed 416 and wounded 1,542; the British had 12 killed and 61 wounded. The German casualties are said to have been under

1,000.

In China, British and American influence has been predominant for a number of years. It was natural, therefore, that Chinese sympa¬ thies would be with the Entente Allies. Yet China did not come out at first emphatically for the war. She restrained herself to making common cause with the Allies, due to her strained relation with Japan, and on account of the fact that the latter had pressed certain demands which were detrimental to the integ¬ rity of the Chinese Republic. Events, however, rapidly forced China to abandon her attitude of quasi-neutrality. Shortly after America's sev¬ erance of relations with Germany and Austria, China began to discuss similar action, and on

14 Aug. 1917 she formally declared war against Germany and Austria-Hungary. Meanwhile the political situation in Manchuria became acute. Owing to the outbreak of the Russian Revolution (15 March 1917), an international crisis had been engendered in this region, which threatened the tranquillity of the entire Far East. There was some fighting in this province be¬ tween the Russian Bolsheviks and other fellow- citizens who disagreed with them. It became necessary to restore order, and a rumor was circulated in Russia that Japanese troops had been sent to Harbin for that purpose. The re¬ port was false, but a Chinese division was sent to the spot to maintain order. At the beginning of 1918 similar troubles broke out at Vladivos¬ tok. This fortified naval station is in the Rus¬ sian maritime province, and it has been largely used during the war for the transmission of arms and munitions from Japan and the United States of America to Russia. A good many Japanese have settled there in this and other occupations. Tlie full details of the mutiny that broke out in the garrison are not known, but the Japanese government became appre¬ hensive for the safety of its subjects and con¬ siderable amounts of property held there await¬ ing shipment, owing to the uncertain revolution¬ ary conditions prevailing in Russia. A squad¬ ron was accordingly sent to Vladivostok to protect the persons and property of Japanese subjects. In order to show that the Entente Allies were agreed in this matter, the squadron was accompanied by a British

warship. The Japanese government, acting with great circum¬ spection, apprised the American and French governments of its purpose, and thus preserved the appearance of an Allied front. But further than a well-backed-up threat to establish order, Japan was not allowed to go, for the United States did not join Great Britain and France in advocating the insertion of armed force into Russia, at that time.

In May 1918, China and Japan concluded an agreement for a defensive alliance against Ger¬ many. Although the details of this agreement were not generally known, there is no doubt that the United States and other Allied govern¬ ments were informed and probably consulted about the negotiations. The new treaty marked the beginning of a policy the purpose of which will be to check the free hand of Germany and its activities in the Far East.

Bibliography. — Beresford, (The Break-Up of China) (New York 1899) ; Brewster, (The Evolution of New China) (New York 1907) ; Clement, (A Short History of Japan) (Chicago 1915) ; Colquhon, (China in Transformation (New York 1898) ; Conant, (The United States in the Orient) (Boston 1900) ; Cur- zon, (Problems of the Far East) (2 vols., New York 1896) ; Douglas, (Europe and the Far East) (Cambridge 1914) ; Gerard, (Les Etats-Unis et l'Extreme Orient* (Revue des deux mondes, ser. 6, v. 43, Paris, 1918) ; Leroy-Beaulieu, (The Awakening of the East> (New York 1900) ; Macgowan, (A His¬ tory of China> (Shanghai 1897) ; Madrolle, (Chine du Sud> (Paris 1916) ; Marc, (Quelques annees de politique international (Leipzig 1914) ; Millard, (The New Far East> (New York 1906) ; Norman, (Peoples and Politics of the Far East) (New York 1897) ;

Milivoy S. Stanoyevich, Former Assistant Professor at Zajecar College, Serbia.

FAR FROM THE MADDING CROWD.

Published in 1874, this novel has ever since been ranked among the greatest of Thomas Hardy's works. Although it possesses rather less tragic intensity than (The Return of the Native, > it is on the whole a better-balanced book. And it is not without tragic power. The hopeless struggle of Fanny Robin against fate and malign chance, ending in that gasping, stagger¬ ing journey to her death in the workhouse and

the return of the thin coffin through the drip¬ ping gloom, is instinct with pity and terror. But this is not the main portion of the book; and although the love affairs of Bathsheba Everdene with her three suitors, Troy, Bold- wood and Gabriel Oak, likewise have a due portion of the sombre and the tragic, and ex¬ hibit in their development more than traces of the typical Hardy philosophy of pessimism, nevertheless the book ends in the calm sun¬ shine of well-earned happiness for the prin¬ cipals. The characters are all in humble cir¬ cumstances, — shepherds and small farmers, chiefly. But their fortunes are so recounted as to give them all of the significance and epic largeness of <(sad stories of the death of kings.® Various factors contribute to this end; among them, the genius with which Hardy reveals the fundamental- humanity of his characters, and the skill with which he places his human pygmies against a background of nature so potent and so infinite in aspect as to reduce to pettiness the difference between peasants and world- rulers. The author's minor rustics have often and deservedly been termed Shakespearean. Patient, shrewd, simple, rich in native humor, they are portrayed with unerring artistry. Add to these features structural perfection and varied and impressive stylistic achievement, and there results a novel superb in its compound of the comedy and tragedy of life, its elemental power;, falling short of the highest mainly in its occasional pessimistic distortion of truth. Various works may be consulted for a general presentation of Hardy as novelist ; but no crit¬ icism which is of outstanding importance is especially concerned with Ear from the Mad¬ ding Crowd/

George B. Dutton.

FARABI, fa-ra'be, Abu Nasr Muhammad ibn Tarkhan al, Arabian philosopher: b. Farab, Turkestan, 870; d. Damascus 950. He traveled to Bagdad and there studied Arabic, mathe¬ matics, medicine and philosophy. In philosophy he made an exhaustive study of Aristotle. He visited the court of the Hamdanid Saif Addaula, by whom he was cordially received and granted a pension. He lived quietly at court and died at Damascus. His works were long neglected, perhaps because Avicenna was more the fash¬ ion. In 1484, at Venice appeared his compen¬ dium of the (Rhetoric* of Aristotle. Two

works are contained in (Alpharabii opera omnia) (Paris 1638) and a translation of two others is found in Schmolder, F. A., (Docu- menta philosophise Arabum* (Bonn 1836). Consult Dieterici, Fr., (Alfarabi's philosophische Abhandlungen* (Leyden 1890) ; (Alfarabi's Ab- handlung edes Musterstaats) (1895); (Die Staatsleitung von Alfarabi* (1904); Brockel- mann, C., (Geschichte der arabischen Litteratur*

(Vol. I, Weimer 1898) ; Nicholson, (A Literary History of the Arabs * (Cambridge 1907).

FARAD (from Michael Faraday), the stand¬ ard electrical unit, which is measured by the capacity of a condenser that with an electro¬ motive force of one volt is able to overcome a resistance equivalent to one ohm in one sec¬ ond, or in other words the resistance offered by a cylindrical copper wire, 250 feet long, 1/20 inch in diameter, the ohm being the magneto¬ electric unit. See also Faraday.

FARADAY, Michael, English scientist: b. Newington Butts, England, 22 Sept. 1791; d. Hampton Court, 25 Aug. 1867. He received little or no education and was apprenticed to the trade of a bookbinder. During his term of apprenticeship, a few scientific works fell into his hands, which he read with avidity, and forthwith devoted himself to the study of, and experiments in, electricity. Having attended the lectures given in 1812. by Sir Humphrey Davy and taken notes thereon, he sent them to that philosopher and besought some scientific occupation. The reply was prompt and favor¬ able. In 1813 Faraday was appointed chemical assistant, under Sir Humphrey, at the Royal Institution. Faraday discovered in 1820 the chlorides of carbon, and in the following year the mutual rotation of a magnetic pole and an electric current. These were strong encourage¬ ments to proceed on the path of discovery, and led to the condensation of gases in 1823. In 1829 he labored hard and, as he thought at the time, fruitlessly, on the production of optical glass ; but though unsuccessful in his immediate object, his experiments resulted in the produc¬ tion of the heavy glass which afterward proved of great assistance to him in his magnetical in¬ vestigations. In 1831 the series of Experiment¬ al Researches in Electricity/ published in the (Philosophical Transactions/ began with the development of the induction of electric cur¬ rents and the evolution of electricity from mag¬ netism. Three years later Faraday established the principle of definite electrolytic action and in 1846 received at the same time the Royal and the Rumford medals for his discoveries of dia¬ magnetism and of the influence of magnetism upon light respectively. In 1847 he discovered the magnetic character of oxygen, and also the magnetic relations of flame and gases. His papers, including other contributions to the store, of modern science, are too numerous to mention *in detail. It should be observed that the (Researches/ though termed (Experi¬ mental,ˆ contain many hypothetical ideas and many inquiries into theories generally adopted up to their time. Among these may be specified the considerations respecting static induction, atmospheric electricity, and those relating to lines of force,. both physical and representative, on which having sufficiently stated his views, he was content to leave

them for solution to time and future experiment. It may be added

that his last hypothetical view related to the con¬ servation of force, and that one of his latest papers treats of the division of gold and other metals. In 1833 Faraday was appointed pro¬ fessor of chemistry' in the Royal Institution, London, which chair he continued to hold until his death. In 1835 he received from government a pension of $1,500 per annum in recognition of his eminent service to science. From 1829 to 1842 he was chemical lecturer at the Royal Acad¬ emy. He was a knight of several of the European orders, and a member of the chief learned and scientific societies in Europe and the United States. Consult Tyndall, (Faraday as a Discovered (1868) ; Jones, Bence, (Life and Letters) (1870) ; Gladstone, J. H., (Life of Michael Faraday) (1872) ; Thompson, (Michael Faraday: his Life and Work) (1898).

FARADAY. This is the technical name given to the unit quantity of electricity discov¬ ered by Michael Faraday to be necessary for the disposition of the chemically equivalent weight of any element or radical. Since the chemically equivalent amount of materials pro¬ duced by complicated reactions is sometimes rather difficult to determine by one not skilled in analyzing such reactions, it sometimes simpli¬ fies the matter to consider the Faraday from a somewhat different standpoint and define it as the unit quantity of electricity which is neces¬ sary to make a unit change of valence in a gram-atom of any element. This unit is con¬ cerned only with the quantity of electricity passing and does not in any way involve the energy' absorbed in the reactions. (See Elec¬ trochemistry and Electrolysis). The value of this unit was for many years accepted as 96,540 coulombs. The fundamental constants on which this unit depends are by general ac¬ ceptance the atomic weight of silver and the amount of silver deposited per coulomb. Since values for both of these have been accepted by' international agreement, the atomic weight at 107.88 and the grams per coulomb at 0.00111800, the value of the Faraday is thus

107.88

specified as – - = 96,493.7; for ordinary

0.001118

calculations this can be rounded off to 96,500 without introducing any appreciable error.

G. A. Roush.

FARADAY EFFECT. See Light.

FARADAY TUBES. See Electricity.

FARADAY'S LAWS. The two laws of electrochemical change laid down by Faraday about 1835, and known by his name, are two of the most fundamental statements in natural science. Faraday's first law specifies that the amount of chemical action produced by an electric current in an electrolysis is directly proportional to the quantity of electricity' which passes through the circuit. The second law specifies that the quantities of different sub¬ stances that are produced by the same amount of electricity at the electrodes during the electrolysis of different solutions are directly proportional to the chemically equivalent weights of the substances concerned. The quan¬ tities of material produced by an electrolysis are then affected by only three factors, the magnitude of the current, the time that it acts and the chemically equivalent weight of the substances being produced at the electrodes, and

VOL, u — 2

are entirely independent of such factors as con¬ centration or temperature of the solution, the size or distance apart of the electrodes and all other purely physical conditions. These laws hold with great exactness, not only for ordinary aqueous solutions, but also for non-aqueous solutions and for fused salts, or, in other words, for all electrolytes. This, however, does not mean that in every electrolysis there is alway's obtained the yield of any particular product that is called for by Faraday's laws, for this is not always the case. The amount of material actually produced from any given electrolysis is called the (

G. A. Roush,

Assistant Secretary , American Electrochemical Society .

FARADISM. See Electrotherapeutics.

FARAFEH. See Farafra.

FARAFRA, fa-rafra, or FARAFEH, an

oasis of the Libyan Desert, in Africa, containing several ruins of Greek and Roman origin. A coarse woolen cloth and earthenware are the manufactures.

FARALLONES (far'a-lons) ISLANDS, in the Pacific, off the coast of California, about 28 miles from the entrance to the Golden Gate; a group of six small rocky islands. A large number of rabbits are found on the islands; they are prolific in bird life; and many sea-lions are on the coast. The islands were created a Federal bird reserve in 1909. A lighthouse, with all modern equipment, on the southern island, is 360 feet above the water and is visible for 26 miles.

FARANDOLA, fa-ran'do la, or FARAN- DOLE, fa-ran'dol, a dance with various figures, popular among the peasants of the south of France and the neighboring part of Italy. It is in triple time and performed by men and women taking hands and forming a long line and wind¬ ing in and out with a waving motion. The figures of the farandola, by the name, of the Spanish dance, were once well known in Eng¬ lish ballrooms.

FARCE (Ital. farsa, from Lat. farcire, (

FARCY, in horses depends upon the same causes as glanders (q.vD — in fact, is an out¬ ward manifestation of glanders. The absorb¬

ent vessels of the superficial parts of the body, but usually those of one or both hind limbs, are inflamed, tender, swollen, hard and knotted. The vitiated lymph thus poured out softens, and ulcers of farcy buds appear. Unlike the ulcers of glanders, they are sometimes thought to be curable, but an animal apparently cured is not safe to be with other horses, as the cohtagium — the Bacillus mallei — almost in¬ variably remains, and the animal is thus a centre of infection and a source of danger.

FARDEL-BOUND, a term applied to sheep and cattle when suffering from a disease caused by the retention of food in the third stomach, or maniplies. The disease frequently arises from the eating of over-ripe clover, vetches or rye grass. The food being tough and indigesti¬ ble finally causes chronic inflammation.

FAREHAM, far'am, England, a market town in Hampshire, at the northwest extremity of Portsmouth Harbor. It has earthenware and brick-making manufactures. Pop. 9,674.

FAREL, Guillaume, ge-ydm fa-rel, Swiss reformer : b. near Gap, Dauphiny, 1489 ; d. Switzerland, 13 Sept. 1565. At an early period the study of the Bible led him to reject many of the chief doctrines of the Roman Catholic Church. At Basel, in 1524, he publicly sus¬ tained several theses in support of Protestant¬ ism, and he afterward preached in Strassburg, Montbeliard and elsewhere. In 1530 he secured the public adoption of the Reformed doctines in Neufchatel. Geneva, however, became the principal scene of his labors, and through his influence Calvin became leader of the Genevan Reformers. Here, in the religious conferences of 1534 and 1535, he defended his beliefs so successfully that the Reformed parishes not only obtained permission to hold public religious services, but the council formally embraced the Reformation. In concert with Calvin he took an active part in 1536 at the disputation in Lausanne, when the Reformation was embraced. In consequence of a quarrel, arising out of an attempt to enforce a stricter moral discipline, he was banished from Geneva in 1538, and ultimately took up his residence in Neufchatel. His marriage when he was on the border of 70 with a young wife caused a coolness with Calvin. He was a man of intense fervor and proselytising zeal, but holds no place as a theologian. Consult (Life,* by Bevan (1893).

FARENHOLT, far'en-hdlt, Oscar Walter,

American naval officer : b. near San Antonio, Tex.j 2 May 1845. He was educated in the schools of San Antonio, New Orleans, La., and Pittsburgh, Pa. He entered the navy at New York as seaman, 18 April 1861, serving on the frigate Wabash, and participating in engage¬ ments and battles at Fort Hatteras, N. C., Port Royal, S. C., Fort Pulaski, Ga., etc. He was severely wounded at the battle of Poco-taligo, S. C., on 22 Oct. 1862, was sent to the Naval Hospital at New York and discharged from the navy. He recovered from his wounds, re-entered the navy in February 1863 on the monitor Catskill and was in almost daily en¬ gagements with the defenses of Charleston, S. C., from April 1863 to April 1864. He participated in the unsuccessful storming party of Fort Sumter in September 1863, was made acting ensign in August 1864, and commanded

the schooner Henry James attached to squadron in sounds of North Carolina, took part in the recapture of Plymouth and several engage¬ ments on Roanoke, Chowan and Black Water rivers, and the capture of Fort Fisher. He was commissioned ensign 12 March 1868, lieutenant in 1870, commander in 1892 and captain in 1900, reaching the rank of rear-admiral 1 Sept. 1901, when he voluntarily retired from active service. During the Spamsh-American War he was stationed at Shanghai as Admiral Dewey's base of supplies and information. He is the only officer of the navy who beginning as seaman gained the rank of rear-admiral.

FARFA ABBEY, Italian Benedictine mon¬ astery situated 25 miles from Rome. Saint Laurence is said to have founded it in the 6th century ; it was subsequently enriched by en¬ dowments from the Lombard and Carlovin- gian kings. Near the close of the 9th century the Saracens obliged the monks to evacuate the monastery and it was deserted for about 50 years. It was revived, however, at the close of the 10th century and the Cluniac reforms were introduced. The wealth of the monastery now grew apace until it became the wealthiest es¬ tablishment of its kind in Italy, owning nearly 700 churches and convents, two towns and about 130 castles and several villages. In 1842 the monastery was annexed to the bishopric of Sabina by Gregory XVI. An important his¬ torical work. (Chronicon Farfens) was com¬ piled at the monastery by Gregory of Catina in 1105-19. Balzani published an edition of the work (Rome 1903). Consult Albers, (ed.) (Consuetudines Farfenses) (Stuttgart 1900).

FARGO, William George, American capi¬ talist : b. Pompey, N. Y., 20 May 1818; d. Buf¬ falo, N. Y., 3 Aug. 1881. He became Buffalo agent of the Pomeroy Express Company in 1843 ; established the first express company west of Buffalo, in 1844; and in 1868 became presi¬ dent of the great corporation controlling the whole West, the Wells-Fargo Express Com¬ pany, and now consolidated in the American Express Company. Though a Democrat in politics, he paid the wages of every man in his employment who enlisted in the Union Army during the Civil War.

FARGO, N. D., city, county-seat of Cass County, at the head of navigation on the Red River, on the Chicago, Milwaukee and Saint Paul, the Northern Pacific and the Great Northern railroads. It contains a United States land office, Fargo College (Congregational), the State Agricultural and Mechanical College, Oak Grove Seminary (Lutheran), Sacred Heart Academy (Catholic), the Western School of Expression, Saint Luke's Hospital, Saint John's Hospital, high school, courthouse, waterworks, street railroad and electric-light plants,

several banks and a number of daily and weekly news¬ papers. It has large brick yards, a packing plant, creameries, bottling works and manufac¬ tories of flour, harness, candy, corsets, mat¬ tresses, bed springs, artificial limbs, trunks, crackers, etc. The United States census of manufactures for 1914 showed within the city limits 76 industrial establishments of factory grade, employing 933 persons; 689 being wage earners receiving annually a total of $447,000 in wages. The capital invested aggregated $2,970,000, and the year's output was valued at

$3,006,000; of this, $1,265,000 was the value added by manufacture. It is an important grain market and one of the largest distribution cen¬ tres for heavy farm machinery in the country. It has also extensive ' jobbing interests in groceries, fruits and notions; and an automobile industry doing business annually of $15,000,000. Pop. (1920) 22,000.

FARGO COLLEGE, a coeducational insti¬ tution in Fargo, N. D. ; founded in 1888 under the auspices of the Congregational Church. In 1920 there were in attendance 555 students. There were 30 instructors and a library of 8,000 volumes.

FARGUS, Frederick John (Hugh Con¬ way), English novelist: b. Bristol, England, 26 Dec. 1847; d. Monte Carlo, 15 May 1885. He adopted his pseudonym from the school frigate Conway, stationed on the Mersey, which he entered when he was 13, for the purpose of training for a seafaring life. He subsequently entered the auctioneer business, employing his leisure in writing clever newspaper verse and occasional tales. Some songs of his were ac¬ cepted and published in 1878, and a volume of verse in 1879; but it was the issue and rapid sale of his melodramatic story (Called Back' (1883), which made him famous. He then went to London, where he adopted the profession of authorship. His other writings include (Dark Days> *(1884); (1886);

(Slings and Arrows) ;

FARIA, fa-re'a, Manoel Sevrim de, Portu¬ guese author: b. Lisbon, Portugal, 1583; d. Evora, 25 Sept. 1655. He devoted many years to the study of his country's literature, giving his researches and thought a lasting form in (Various Essays) (1624), containing apprecia¬ tions and biographies of Camoens and other great writers. He also wrote (Jottings of Portugal > (1655).

FARIA Y SOUSA, fa-re'a e so*'za, Manoel, Portuguese historian and

lyric poet : b. near Pombeiro, in Portugal, 18 March 1590; d. Ma¬ drid, Spain, 3 June 1649. A passion for a beau¬ tiful girl first awakened his poetical genius. He celebrated her under the name of Albania in his sonnets, married her in 1613 and went to Madrid. But he did not succeed there, and returned to Portugal. He also visited Rome, and gained the notice of Urban VIII. Among his writings are (Discursos Morales y Politi- cos) ; (Epitome de las historias Portuguezas) ; and a collection of poems called (Fountain of Aganippe) (16D 46). His style was pure and strong and his descriptions full of vigor.

FARIBAULT, fa’re-bo*, Eugene Rodolphe,

Canadian geologist : b. L’Assoinption, P. Q., 1860. He received his education at the Ecole Polytechnique and at Laval University, Quebec. He joined the Canadian Geological Survey in 1881, and from 1884 to 1909 was in charge of a survey of the gold fields of Nova Scotia. At the Paris Exposition of 1900 he had charge of the Canadian mineral exhibit and also served as juror there. For his model of the Golden- ville gold mine he was awarded a medal and was the recipient of similar honors in 1904 at the Louisiana Purchase Exposition, Saint Louis.

FARIBAULT, far-i-bo’, Minn., city and country-scat of Rice County at the confluence of the Cannon and Straight rivers on the Pennsylvania and the Chicago, Milwaukee and Saint Paul railroads, 53 miles south of Saint Paul. It has a fine location in a region which abounds in beautiful lakes. It has manufac¬ tories of pianos, carriages, furniture, boiler works, shoes, gasoline engines, butter-tubs, foundry products and rattan goods, and can¬ ning establishments, breweries, flour-, planing- and woolen-mills. Faribault is noted for its fine schools, both public and private. The State schools for the deaf, dumb, blind and feeble-minded are located here. The Seabury Divinity School, the Shattuck Military School for boys and the Saint Mary’s School for girls are flourishing institutions, all three of which are under the auspices of the Protestant Epis¬ copal Church ; Bethlehem Academy is in charge of the Sisters of Saint Dominic. Faribault was the home of Bishop Whipple (q.v.). Fari¬ bault became noted in 1891, because of a con¬ troversy which arose regarding the incorporation of parish schools into the public school system. It was called by many then a new movement; but it was similar to the plans which had long been in

existence in several cities and towns in other parts of the United States; as Pough¬ keepsie, Corning, Ogdensburg and Plattsburg in the State of New York; and several places in Connecticut, Ohio and in other States. Faribault was settled about 1853 and incor¬ porated about 1872. It adopted the commission form of government in 1911. The city owns and operates its waterworks. Pop. 11,089. See Parish Schools.

FARID UD-DIN ATTAR, fa-red'ud den at'tar. Persian poet and philosopher: b: Nis- hapur, between 1119 and 1150 a.d. ; d. about 1229. His real name was Abu Talib Mahom- med ben Ibrahim, and Farid ud-Din was an honorable designation given him late in life and signifying Pearl of the Faith. He fol¬ lowed for many years the profession of drug¬ gist but abandoned it for a study of the con¬ templative life. He studied the mystic theos¬ ophy of the Sufis under Sheik Rukneddin. He visited Mecca, Damascus, Egypt and India, and at Bagdad was invested with the Sufi mantle. He lived the greater part of his life in Shadyakh. He was slain by a soldier of Ghenghis Khan. He wrote about 120,000 couplets ; his greatest work is the (Mantik uttair,* an allegorical poem containing a survey of the doctrine of the Sufis, and the desire of the human soul to be merged with the divinity. In 1857 the text of the (Mantik* was issued by Garcin de Tassy, and in 1863 a complete translation was issued in Paris. Other works by this author are (Pandnama* (French trans., by Silvestre de Sacy, Paris 1819) ; (Bulbul Nama) ;

FARIDKOT, fur'ed-kot', India, a native state in the Punjab, with an area of 642 square miles and a population of 125,000. It lies north of the Nabha state and adjoins the British dis¬ trict of Ferozepore. The gross revenue is about $140,000 and there is no tribute. Two railways cross the country, the Rewari-Feroze-

pore and the Fazilka systems. The capital, Faridkot, is 84 miles distant by rail from Lahore. A branch of the Sirhind canal is used extensively for irrigation.

FARINA, Giuseppe La. See La Farina.

FARINA, fa-re'na, Salvatore, Italian novel¬ ist: b. Sorso , Sardinia, 10 Jan. 1846. He studied law at Turin and Pavia, but after graduation devoted himself to a literary career and made his home permanently at Milan. For many years he was in charge of the literary de¬ partment of the Gazzetta Musicals. His tales were successful from the first, which was Two Amours* (1869). Among the others are A Secret* (1870); (Forbidden Fruit) ; (Romance of a Widower* ; (Dounina's

Treasure* ; Cour¬ age and Onward-* ; (Little Don Quixote*

(1890); (Living for Love* (1890); (For Life and for Death* (1891) ; and (I1 signor Io,* his masterpiece. The sympathy with lowly life and the rich humor of his stories have gained for him the title of (

FARINA (Lat. <(flour**), a term popularly applied to a good product made from white maize, having grains coarser than those, of meal, but finer than hominy. A somewhat sim¬ ple preparation is made from the inner por¬ tion of wheat grain. Generally, .it is applied to the flour or meal of (

FAR I NATO, fa-re-na'to, or FARINATI,

fa-re-na'te, Paolo, Italian painter: b. Verona 1522; d. there 1606. He took his style of painting from Veronese and Guilio Romano. His works are characterized by wealth of imagination, graceful but not always correct drawing, combined with harmonious coloring. He finds his modern counterpart in the Eng¬ lish Rosetti. He painted both in oil and fresco. There are some fine frescoes of his in the choir of San Nazaro at Verona; his wonderful < Miracle of the Loaves and Fishes* (1603) is in the church of San Georgio Maggiore; his (Finding of Christ in the Temple* is in the Berlin Museum, and Abraham and Hagar* in the New York Historical Society's collection.

FARINELLI, fa-re-nel'le (real name Carlo Brosciit). Italian soprano singer: b. Naples, 24 Jan. 1705; d. Bologna, 15 July 1782. He studied under Porpora, and went from Rome to Vienna, where the Emperor Charles VI loaded him with rich presents. In 1734 Farinelli went to London, and by the magic of his singing so delighted the public that Handel was obliged to dismiss a rival company over whom he presided, in spite of all his powers and popularity. Many extraordinary stories are related of Farinelli's vocal skill and his command over the feelings and sympathies of his audience appears to have been unrivaled.

FARINGDON, far'ing-don, or GREAT FARINGDON, England, a market town in the county of Berks ; 16 miles southwest of Oxford. Pop. 2,770.

FARINI, Luigi Carlo, loo-e'je kar'lo- fa-re'- ne, Italian historian: b. Russi, 22 Oct. 1812; d.

1 Aug. 1866. He studied medicine at Bologna, but early entered upon a political career, and

HIS EMINENCE JOHN M. FARLEY

Late Cardinal Archbishop of New York

was expelled from the Papal States in 1843, be¬ coming Minister of Public Instruction in 1851, of Commerce 1860, president of the council in 1861 during Cavour's administration and Premier 1862-63. His influence contributed much to the union of central Italy with the kingdom of Victor Emmanuel II. His (History of the Roman State from 1815 to 1850) (1850) was translated into English; and his (History of Italy, J a continuation of Botta's celebrated work, is a performance of standard merit.

FARJEON, far'jun, Benjamin Leopold,

English novelist of Jewish descent: b. London, 1838; d. Hampstead, 23 July 1903. He spent some years in Australia and New Zealand as journalist and novelist, and was the editor and coproprietor of the first daily newspaper pub¬ lished in the latter country. His first successful novel was (Grif: a Story of Australian Life* (1870). It was followed later by (London's Heart* (1873); (1874);

Featherstone) (1886) ; (The Secret Inheritance) (1887) ; (Devlin the Barber* (1888) ; (Toilers of Babylon* (1888) ; (The Betrayal of John Fordham* (1897) ; (Samuel Boyd of Catchpole Square) (1899) ; (Pride of Race) (1900) ; (The Mystery of the Royal MaiP (1902), etc. He gave readings in the United States in the fall of 1877. Farjeon has been compared with Dickens in his <(sentiment and minute character¬ ization.® The comparison is not altogether a happy one, and the knowledge that it had been made affected the novelist's style somewhat, and not for the better.

FARLEY, Harriet. See Donlevy, H. F.

FARLEY, James Lewis, Irish journalist: b. Dublin, Ireland, 9 Sept. 1823; d. London, Eng¬ land, 12 Nov. 1885. Established in Turkey as a bank official, he became correspondent of two or three great London dailies and speedily made himself an authority on Turkish and Near East¬ ern questions. His books include (The Druses and the Maronites) (1861) ; /Turkey: Its Rise, Progress and Present Condition) (1866); and (Modern Turkey* (1872).

FARLEY, John Murphy, American Roman Catholic prelate: b. Newton-Hamilton, County of Armagh, Ireland, 20 April 1842; d. Mamaroneck, N. Y., 17 Sept. 1918. He began his classical studies in Saint MacCarten's College, Ireland, and completed his course in Saint John's College, Fordham. He continued his studies for the priesthood in Saint Joseph's Seminary, Troy, N. Y., and in the North Ameri¬ can College, Rome. He was ordained in Rome, 11 June 1870, and the same year returned to the United States to begin work in Saint Peter's parish, New Brighton, Staten Island. In 1872 Archbishop McCloskey of New York chose him for private secretary. In 1884 Pope Leo XIII made him private chamberlain with the title monsignor, and Cardinal McCloskey appointed him permanent rector of the church of Saint Gabriel, New York, where he' remained until he was'made archbishop. In 1891 he was made

vicar-general of the archdiocese of New York. In 1892 he was made domestic prelate to Leo XIII, and in 1895 prothonotary apostolic, all of which positions gave him special privileges. In December 1895 he was consecrated titular bishop of Zeugma, and became assistant to the archbishop of New York. When the see of New York became vacant by the death of Archbishop Corrigan (1902), the lists of names sent to Rome by the suffragan bishops and per¬ manent rectors each had at the head the name of Bishop Farley as first choice for archbishop. He received his appointment from Leo XIII, but the pallium was conferred under Pius X, on 15 Sept. 1902. He was the fourth arch¬ bishop of New York and governed one of the largest Roman Catholic dioceses in the world. He was the metropolitan of the ecclesiastical province of New York, which is composed of eight dioceses outside the archdiocese which includes also the Bahama Islands ; six in the State of New York and two in New Jersey. The author of the (Life of Cardinal McClos¬ key, } Archbishop Farley was also a con¬ tributor to various magazines, and took great interest in movements for the social welfare of the city. He was created cardinal by Pope Pius X, 27 Nov. 1911. At the time of his death (1918) the archdiocese of New York comprised a Catholic population estimated at 1,350,000; 1,117 priests; 388 churches; parochial schools attended fly 91,140 children; 25 orphanages; 27 hospitals, and other institutions, benevolent and educational.

FARLOW, William Gilson, American bot¬ anist: b. Boston, Mass., 17 Dec. 1844; d. 3 June 1919. Graduated at Harvard and spent several years in Europe pursuing his favorite study, be¬ coming professor of cryptogamic botany at Har¬ vard in 1879. In 1899 he was president of the American Society of Naturalists, in 1904 of the National Academy of Sciences, in 1905 of the American Association for the Advancement

of Science, and in 1911 of the Botanical Society of America. His publications treat mainly of marine algse, fungi and diseases of plants. Upon these subjects and particularly upon crypto¬ gamic botany, he was considered an authority. He also published (The Potato Rot) (1875) ; (Diseases of Olive and Orange Trees) (1876) ; (The Gymnosporangia or Cedar) ; (Apples of the United States) (1880) ; (The Marine Algae of New England) (1881) ; (A Provisional Host-Index of the Fungi of the United States) (1888) ; (Biographical Index of North Ameri¬ can Fungi > (1905).

FARM, a tract of land devoted to agricul¬ ture, under the management of owner or tenant. The size of farms and their tenure differ very much in different countries. On the continent of Europe, where peasant proprietaries, cultiva¬ tion by the metayer system (q.v.), and mixed tenures prevail, farms are. generally small. In England, where the land is in the hands of a comparatively small number of proprietors and is let out to farmers who pay a fixed rent and make a trade of cultivating their holdings, these are in many localities large compared with con¬ tinental farms. In the United States the major¬ ity of farms are owned by those who operate them. In 1900 between 54 and 55 per cent were so operated. In 1890 tenants operated 284 per cent of all the farms and in 1900, 35.3 per cent.

A comparatively small number are worked by part owners. The short tenure of land usually prevailing in England and Ireland has given rise to many disputes about compensation for im¬ provements effected by tenants, etc. In, Scot¬ land it has been customary to give a lease for 19 years.

In these statistics the term “farm® includes, as defined by the twelfth census of the United States, “all the land, under one management, used for raising crops and pasturing live stock, with the wood lots, swamps, meadows, etc., con¬ nected therewith. It includes also the house in which the farmer resides, with all other build¬ ings used by him in connection with his farm¬ ing operations.® As thus broadly defined the 6,361,502 farms in the United States in 1910 em¬ braced, in addition to the general farm, the cot¬ ton, the sugar and the rice plantations of the country; large ranges in the Western States as well as smaller stock farms, the extensive farms devoted to the raising of grain ; those produc¬ ing chiefly ha}* and forage, tobacco, hemp, or hops, orchard fruits or small fruits; truck farms; dairy farms; poultry

farms; bee farms; florists' establishments; nurseries, etc. In 1910 the farms of the United States comprised 878,- 798,325 acres, of which 478,451,750 acres were improved property. The number of farms in the States has increased so rapidly for several decades that in 1900 there were nearly four times as many as in 1850 and 25.7* per cent more than in 1890. Since 1880 the average size of farms has increased, being in 1900 146.6 acres. The number of farms under three acres was 41,882; and of farms of 1,000 acres and over 47,276. The medium-sized farms contain¬ ing from 100 to 174 acres represented the high¬ est value per acre. The total value of wealth produced on the farms of the United States was, in 1910, $10,501,686,375. This had in¬ creased, in 1916, to $13,448,310,509, of which 67.7 per cent came from crops and 32.3 per cent from animal and other products. There was, on American farms, in 1910, 61,803,866 head of cattle valued at $1,499,523,607, as against 63,617,000 head in 1917; horses 19,833,- 113 valued at $2,083,588,195 as against 21,126,- 000 head in 1917; mules 4,209,769, valued at at $399,338,308, against 2,915,000 head in 1917; sheep 52,447,861, valued at $332,841,585, against 48,483,000 head in 1917 ; swine 58,185,676, valued at $399,338,308, against 2,915,000 heads in 1917; goats 2,915, valued at $6,176,423. The total value of farm property in the United States was, in 1910, over $28,475,674,000. On the same date the farm buildings were valued at $6,325,- 451,528, and the implements and machinery at $1,265,149,783. The average value of the land per acre was $32.40; and with the buildings in¬ cluded $39.60. In 1910 32.5 per cent of the population of the United States were engaged in farming.

In 1917, 76 per cent of the United States farmers under 25 years of age were tenants. This percentage falls to less than 30 per cent for farmers 60 years of age, showing that the tendency of American farmers is for tenants to become proprietors. See Agriculture; Dairy Industry, American; Live Stock; Farm Machinery; Farm Power, Etc.

FARM CREDIT. See Farm and Farm Problems.

FARM CROPS. Definition. — Broadly speaking, the term farm crops may be applied collectively to any plant grown in appreciable quantity on farms. Commonly, and for practi¬ cal purposes, however, it is understood to ex¬ clude the products of specialized lines of agri¬ culture, such as fruits, vegetables and flowers (which come within the field of Horticul¬ ture), timber products (discussed under For¬ estry), etc. Farm crops are, therefore, spe¬ cifically crops grown in fields (as distinguished from enclosed spaces, such as gardens and or¬ chards) on a sufficiently large scale to ren¬ der them essential features of the

operation of the farm as a business enterprise.

Uses. — Every farm crop is grown for one or more of four main purposes. These are :

(1) To be sold off the farm for cash or ex¬ changed for some other valuable commodity;

(2) to be consumed on the farm by the farmer and his household; (3) to be fed on the farm to livestock; (4) to be worked into the soil to improve its condition ; that is, to supplement the manure supply.

While these ends are quite separate and dis¬ tinct, any particular crop may serve different purposes under differing circumstances ; or dif¬ ferent parts of it may be utilized in different directions at the same time, or in the same sea¬ son. For example, oats may be grown for its grain, or as a hay crop ; cowpeas may be al¬ lowed to mature seed, they may be cut and cured as hay, or they may be planted solely as a “cover crop® to keep the ground clear of weeds until they are plowed under to supply “green manure.® To a certain extent any harvested crop that leaves a stubble behind to rot and en¬ rich the soil is in part a source of plant food ; a green manure crop has, however, no other reason for existing.

In the case of corn, the grain may represent either a money crop, human food for home con¬ sumption or feed for domestic animals. In either case the cured stalks become “roughage® or “fodder® for cattle and horses. On the other hand, the whole plant may be harvested when partly mature and preserved as silage — a succulent, slightly fermented, shredded rough- age — or again it may be cut while young, be¬ fore ears or tassels have developed, and fed green to eke out a shortage of pasture grasses.

Still another example, involving a rather specialized farm activity as a side issue of the main enterprise is presented by the practice of farmers in favored localities who grow con¬ siderable acreages of grass and clover (gen¬ erally regarded as hay and pasture plants only) solely for the production of seed, which some¬ times proves one of the most profitable cash crops of the entire farm business.

The relations between the first two uses — namely, sale for cash and home consumption — have undergone considerable change during the last half century. Originally the farm was practically a self-contained, self-supporting unit. Everything grown on it was used there as food, clothing, shelter or fuel, and but few ne¬ cessities were obtained

elsewhere. Gradually, with the specialization of industry, the increase of manufactures, the improvement of transpor¬ tation facilities and the increased dependence of different groups of the population, one upon another, the farmer came to buy more of his

essentials from those who could make them taster, better and more cheaply than he; to sell more of his surplus products in order to get money wherewith to do this ; and consequently, to raise larger acreages of a few crops that brought him the largest net profit and that were especially well adapted to his locality. Thus have grown up the special lines of farming such as wheat-raising, potato-growing, cotton-grow¬ ing, etc., that have become associated with par¬ ticular localities. It should be noted, however, that under certain conditions farmers may tend to revert toward the former system of raising more of their own foodstuffs, as for instance when high prices or transportation difficulties make them difficult to obtain. Such a tend¬ ency has been observed as the result of food shortages caused by the European War.

Classification. — Farm crops may be grouped in several ways other than according to strict botanical relationships. On the basis of utiliza¬ tion — – the most important use of the crop being kept in mind — there are: (1) Food crops, such as potatoes, sugar beets, beans, wheat, rice ; (2) feed crops, such as hay, corn, mangel wur- zels and alfalfa; (3) fibre crops, including cot¬ ton, hemp and flax; (4) soil-building crops, which, as already explained, may include some qualified to fall in groups 1 and 2; (5) special- purpose crops, such as tobacco, castor beans, etc.

There may also be said to be two main classes of farm crops, the first including those that are grown in widely-spaced rows, between which the soil is regularly cultivated through¬ out most, if not all, of the growing season ; and the second, including such Crops as grains and grasses, which are sown in drills close together or even broadcast and allowed to grow without cultivation. This, however, may become a mat¬ ter of preference or expediency on the part of the individual farmer, since, for example, cow- peas grown for hay are usually drilled or broadcasted, while if raised for seed they are planted in rows.

From a geographical standpoint the range of American farm crops is from tropical species suited only to southern latitudes and low alti¬

tudes, such as rice, sugar-cane and cotton, to hardy forms requiring cool, northern sections or the higher elevations of the central part of the country for their best development. Of these, flax, spring wheat and the Grimm variety of alfalfa are illustrations. In this connection the work of plant breeders in developing new strains and varieties of unusual hardiness and wide adaptability is constantly modifying the early notions of crop limitations.

Perhaps the most useful and definite classi¬ fication of farm crops, however, is one based upon somewhat loose botanical relationships combined with practical cultural considerations. Here again the secondary use of any crop may place it in a different group from that to which its primary purpose assigns it. The latter is made the basis for the following lists of Amer¬ ican farm crops arranged approximately in order of their importance. Each of the groups includes both annual and perennial plants, which characteristic occasionally plays an im¬ portant part in determining the value of a par¬ ticular crop in relation to the -established rota¬ tion of farm-cropping system.

A. Cereals

Com (including the grain sorghums) .

Wheat (including emmer and spelt) .

Oats.

Barley.

Rye.

Buckwheat.

Rice.

C. Legumes

Alfalfa.

Peanuts.*

Clovers.

Peas (field).*

Cowpeas.*

Soy beans.*

Beans (field). t Velvet beans.

Vetch.

Lespedeza.

Kudzu.

And a few minor sorts.

B. N ON-LEGUMINOUS FORAGE

Crops

Grasses for hay and pasture. Sorghum.

Rape.

Millet.

Sudan grass.

Teosinte, etc.

D. Miscellaneous Field Crops

Cotton.

Potatoes.

Flaxseed. f Tobacco.

Sweet potatoes.

Sugar cane Sugar beets.

Cabbage.

Hops.

Hemp.

Roots for stock feeding.

Any vegetable crop grown too extensively to be considered a garden or truck crop.

How Grown. — The cultural details for each of these crops are given elsewhere under their respective title. But there are certain re¬ lationships which are best considered at this point of a general discussion. Good farming practice requires, for various reasons a rota¬ tion of farm crops and the most satisfactory rotations include at least one season of each of three types of crop, viz., (a) a tilled or cul¬ tivated crop; (b) a grain crop; and (c) a le¬ guminous crop or at least a grass crop to be plowed under as sod after it has been mowed or pastured. As illustrations of these types there may be 'mentioned (a) corn, potatoes, cabbage or roots of any kind; (b) any of the cereals except corn, and rice which is limited to too small a territory; (c) any of the forage crop legumes, unless the crop is to be left down for less than two or three years, in which case alfalfa is rarely chosen.

The usual sequence in such a rotation in¬ volves growing one, two or even more crops of corn or potatoes, depending on the fertility of the soil, market demands, etc., then sowing a hardy winter grain such as wheat or rye late in the season after the crop is harvested. In some cases a spring grain crop is substituted. In either case a grass and clover mixture is sown with the grain in order to provide hay for a year or two after the grain is harvested and then, if desired, a year or more of pasture be¬ fore it is plowed under in readiness for a new planting of corn.

Another type of rotation by which a soil can rapidly be built up consists of alternate crops of corn or cotton and cowpeas, sov beans, or some such legume, the latter sown between the rows of the tilled crop at the last cultiva¬ tion. These and similar combinations are char¬ acteristic of the most modern agricultural methods by means of which progressive farmers are striving to build up the soils that have been depleted by long years of single cropping, erosion, careless management and general ig¬

norance.

At the same time some crops, < such as to¬ bacco, hops and flax, are so especially adapted to certain soils and localities that even success¬ ful growers may not attempt to rotate fre-

- Raised for seed as well as forage, t Raised only as seed crop in United States, t Raised for dried seed crops only.

quently unless forced to by the invasion of plant diseases or insect pests preferring to de¬ pend on the use of fertilizers to maintain the productivity of the land.

In many cases there is a distinct connection between the size or type of farm and the kinds of farm crop it supports. In view of the de¬ velopment of agricultural machinery, which, however, remains comparatively expensive, the cereals (except corn) are grown as money crops mainly on large farms where enough can be planted to warrant an investment in seeders, harvesters, binders, etc. On the other hand, any farm that supports livestock, especially if it includes dairy cows, is very likely to include some corn, even though it may not be enough to justify the purchase, of horse or power ma¬ chinery and, therefore, entails more hand labor in planting and harvesting.

Similarly, a majority of farms in the United States report potatoes, although many of them probably grow the crop only for home con¬ sumption and not on the same scale or in ac¬ cordance with the improved, economical meth¬ ods found in such sections as Aroostook County, Me., the Greeley District of Colorado, etc.

A distinct tendency on the part of livestock farmers — and one that is approved and urged by investigators, educators and other authori¬ ties — is that of raising all the feed they can at home. Both because it is more difficult and bulky to transport, and because it is becoming a relatively more important factor in feeding operations, roughage (including silage corn, leguminous hays and green forage crops) is given the most acreage in such cases, the farmer preferring and finding it most profitable to buy the grains or mixed feed needed to supplement his home-grown forage. However, grain farm¬ ers are learning that an exclusive grain-growing program is a hard one on any soil, and are, in consequence, tending to include some livestock in their operations. Such a transition natu¬ rally involves the growing of pasture hay and perhaps green forage or ˆsoiling" crops, which ultimately gives rise to a much more beneficial rotation system.

Factors in the Selection of Farm Crops.

— The choice of one or more farm crops as features of a farming enterprise depends in part upon the personal preference of the farmer, but to an even greater extent upon con¬ ditions peculiar to his locality. The more im¬ portant of these are climate, soil type and con¬ dition, labor supply, market demands and trans¬ portation facilities, and the system according to which the farm in question is operated.

Climate. — Five of the most important farm crops of North America show a maximum cos¬ mopolitanism, being grown in all 48 States. These are corn, potatoes, oats, tame grasses and alfalfa. In other words, either these are nat¬ urally adaptable to a wide range of climatic conditions or, as in the case of corn, plant breeders have developed special varieties and strains to meet the needs of or withstand the conditions in different sections. Of the other cereals, winter wheat has a cultural range of 39 States, rye of 38, barley of 34, buckwheat of 23, and winter wheat of 18, the last two being limited in farm practice to the cooler latitudes — the former to the northeast quarter

of the United States and the latter to the North Central and Northwestern States.

Among the forage crops two important grasses — Johnson and Bermuda — also sor¬ ghum and teosinte (a corn-like species of recent introduction) are restricted to the South, as are also velvet beans, lespedeza and kudzu, of the legumes. Peanuts, cowpeas and soy beans are also primarily Southern plants though often grown in the Central and Northern States for hay, soiling, silage and other uses in con¬ nection with which a matured seed crop is not required. The vetches are correspondingly hardy representatives of the legume forage crops, being grown mainly in tlhe North.

Cotton is definitely limited to the 15 States of the <(old South” ; rice to 11 Southern States of which three — Louisiana, Texas and Arkan¬ sas — include nearly 800,000 of the 900,000 acres that represent an average year’s planting; and sugar-cane to an even smaller number, Louisi¬ ana being the chief producing centre.

Tobacco has a range of some 24 States east of the Mississippi River, but is grown on but limited areas of most of them. Hops are re¬ stricted to a half dozen States in the extreme northeast and northwest sections, not so much because of their climatic requirements as be¬ cause they are a special and not widely utilized crop. Flax and the root crops — both sugar beets and the sorts grown for stock feeding — are cool weather sorts and are restricted to the northern half of the country, flax to the States of Minnesota, North Dakota and South Dakota. Sweet potatoes are important in the humid sec¬ tions of the South, especially in the southeast¬ ern group of States.

The moisture supply, and, therefore, to a considerable extent the humidity of any locality, is an important limiting factor in the choice of crops to be grown there. Wheat, oats and barley have attained great

importance in arid and semi-arid sections where they are grown both under irrigation and, as a result of the de¬ velopment of drought-resisting types, by dry farming methods. Alfalfa because of its deep¬ rooting habit is the dominant forage crop of dry-farming localities, whereas clovers are practicable only where there is natural or sup¬ plied water. Corn is grown both east and west of the 100th meridian which roughly separates the humid from the arid territory of the coun¬ try, but in the latter the various grain sorghums, milo maize, kaffir corn and similar forms are, because of their drought-defying qualities, more dependable croppers and, therefore, more valu¬ able. As a general thing all the farm crops grown satisfactorily in eastern (humid) United States can be raised with equal, and often with even greater, success under irrigation in the western part of the country. The only per acre yields of potatoes, for instance, to com¬ pare with those of the famous Aroostook sec¬ tion of Maine are obtained on the irrigated lands of the far West. Owing to the long grow¬ ing season in California and the Southwest, alfalfa there yields six or more cuttings a sea¬ son, whereas three or at most four are all that can be expected in the East. Sugar beets, grasses and the cereals likewise give excep¬ tionally fine returns wherever moisture condi¬ tions can be controlled and maintained at the peak of their efficiency.

There is the associated and significant fact

that in the West, where dry land and irriga¬ tion farming are carried on, the much higher annual percentage of sunshine than in humid sections stimulates all plant growth to the greatest possible extent wherever such condi¬ tions as soil fertility and moisture supply are made favorable.

Soil. — The type of soil, though an important factor in the choosing of crops, to be grown on it, is, however, less likely to influence the larger, geographical distribution of farm crops than their location on the individual farm. For the average farm includes usually a variety of -soils so that with careful planning different fields ■can be given up to crops especially suited to the conditions they present.

Thus a stiff, heavy clay or silt will naturally be reserved for grass and grain crops while a lighter, sandy loam will immediately be chosen for corn, potatoes, beans or some such culti¬ vated crop. Of course the most acceptable type of farm soil — a rich, deep, friable loam — will

suit and permit a good growth of prac¬ tically any crop, so the aim of the good farmer is to bring the largest possible acreage into a condition approximately this as nearly as pos¬ sible with the least delay.

Care should be taken in planting grain and other seed crops on soils abundantly supplied with nitrogenous plant food, since on such their tendency is to develop a growth of straw and leaf surface disproportionate to the seed crop and often so weak as to cause them to <(lodgew or break down and mat on the ground. Such crops as hay and other forages, cabbage, silage corn, sugar-cane, and flax and hemp grown for fibre rather than seed, on the other hand, require plenty of nitrogenous stimulus for a maximum growth of tissue.

In the case of soils obviously deficient in plant food or in poor physical condition, it is generally better policy to raise soil-building crops — less valuable, perhaps, in themselves — rather than more valuable and, as a rule, more exacting sorts. Buckwheat, for example, has won a well-deserved reputation as a (

The successful cultivation of many farm crops is definitely influenced by the degree to which a soil is acid, that is, deficient in lime. While a few species such as beans, corn, flax, rye and millet have been shown by experiment to be practically indifferent to an application of lime to a soil of average quality, practically all others exhibit a distinctly favorable reaction to such treatment. Kentucky blue grass, most of the clovers, and alfalfa are particularly sus¬ ceptible to acidity, but the soy bean and the peanut are reported by scientists to be able to successfully withstand it to a considerable degree.

Poor drainage is another and a very com¬ mon weakness of otherwise satisfactory farm crop soils. Water standing near the surface of a soil causes the development of a shallow root system. Then, when the water level sinks in midsummer, the crops are unable to reach it and consequently suffer from an insufficient

supply. Rice, which is largely grown according to a system of flooding in the course of which it remains submerged for days at a time, is a striking example of a type of crop unusual in its ability to stand <(wet feetˆ

Of the more widely distributed crops, alsike clover and red top grass may be mentioned as satisfactory substitutes for other clovers and blue grass and timothy which do not thrive on moist, heavy soils that tend toward acidity. The fact that no crop can suffer as a result of

good drainage while many are seriously im¬ peded and injured by a lack of it is ample reason for any farmer installing drains at the first opportunity whatever the crop to be grown.

Labor. — A steadily increasing shortage of farm labor, improved methods whereby crops can be raised by machine rather than man power, and farm implements and sources of power with which such methods may be per¬ fected have, fortunately, developed more or less simultaneously during the last quarter cen¬ tury. Consequently nearly all the important farm crops can now be grown with less man power per acre than ever before, provided the work is done on a sufficiently large scale to justify the employing of the labor saving ma¬ chinery. Nevertheless the concentration of the labor required by certain crons, whether it be man power or machine power, involves certain problems that must be taken into account in deciding which crops and how many shall be raised on any one farm.

The small grains, for instance, require in¬ tensive labor at planting time, harvest time and threshing time, but little or none between. Corn, potatoes, sugar beets and cotton are examples of crops that require constant summer cultivation as well. The root crops and cotton, moreover, call for both early thinning or (

Hay crops, on the other hand, may be raised for several years at a cost of one soil fitting and seeding and one or more annual cuttings, mainly at times when other crop or farm work is not pressing. Furthermore, a grass seeding can often be made part of the sowing of a small grain crop to be harvested the year be¬ fore the first cutting of hay is made.

In the case of alfalfa a favorable location and season may combine to keep a farmer harvesting and curing hay crops throughout a good part of the season. Tobacco involves not only the various tasks of field culture but also the exacting and more or less tedious work of growing the plants in seed beds and planting them out in the field later on. Again, hemp calls for the heaviest and most continuous •effort during the preparation and cleaning of the fibre after the crop has been cut.

Consequently the small farmer who must depend mainly on the labor of himself and one or two helpers and limited machinery should avoid a combination of crops of which the busiest seasons correspond or even overlap. Winter rye and winter wheat offer special advantages in that they involve plowing and seeding in the fall and leave the farmer free in the early spring to make preparations for other crops. On the other hand, alfalfa and grass crops may be fitted into a farm schedule

either as spring or late summer sown crops.

In some cases the farmer may find it best

to complete the handling of a crop all al one time as in the case of corn silage ; in others it may be advisable to simply harvest and store it (like wheat, oats, rye or buckwheat) to be threshed out under cover during the greater leisure of midwinter. Hay, too, may be baled for sale in the field, or stacked or stored in a barn to be baled and shipped later in the season if necessary. The problem in any case is to take into account all the conditions that make a crop easy or difficult to grow, both by itself and in relation to other crops, and in re¬ gard to local and contemporary conditions.

Shipping. — Market demands and shipping facilities are local problems that must be taken into account by eadh farmer as his observation and common-sense dictate. Proximity to a large market usually means high priced land, which in turn necessitates crops of relatively high value, although in general farm crops are none of them valuable in the sense that vege¬ tables, flowers, small fruits, etc., are profitable for suburban cultivation. Consequently the problem in most farm sections is one of ad¬ vantageous shipping facilities rather than one of immediate and nearby sale. Bulky crops such as hay, cotton, sugar-cane and, to a less extent, potatoes are obviously less suited to a location involving a long wagon haul to the railroad or market than are grains, seeds, etc. Many crops, of course, are most advantageously and profit¬ ably utilized as feed for livestock and marketed as beef, pork or dairy products. In this con¬ nection also there must not be lost sight of the fact that in this way there is kept on the farm a large amount of plant food, in the form of manure, that would otherwise be sold off the place and have to be replaced ultimately by purchased manure or fertilizer. Thus the type of farming followed influences not only the choice of crops grown, but also the main¬ tenance of the fertility of the soil and through that the ultimate possibilities and success of the whole business of the farm.

E. L. D. Seymour,

Associate Editor , The Country Life Press.

FARM AND FARM PROBLEMS. A

((farm® is, both in the usage of the United States census and of popular speech, the generic name for any agricultural plot. All separate tracts of land, regardless of size, products or income derived therefrom, which require for their management the services of at least one person during the greater part of the year, are ((farms.® The terms <(plantation® and <(ranch® are widely used in the South and West re¬ spectively, and will probably continue to be so, long after these regions have ceased to be dif¬ ferentiated agriculturally from the rest of the country.

A ((farmer® is one who farms. And it is common to speak of <(the farmer,® meaning the farming class as a whole. There is little, however, to justify such a usage, for there are many and widely divergent types of farming and classes of farmers. The various forms of occupation in industry and commerce are not so regarded merely collectively, and the usage in relation to the farmer has led to misconcep¬ tion and misdirected policy.

The (

the Federal and State governments, and the long-continued and widespread discussion of the <(rural problem,® received no such com¬ prehensive or discriminating attention as have other aspects of the national economy. Agri¬ cultural data do not include the numberless city and village <(gardens® with their vast produc¬ tion of vegetables, fruits, flowers and poultry. Fair comparisons with industry are impossible, though such have been repeatedly made and given widespread publicity, too often to the detriment of rural industry and country life.

Eyen the general statistics of the United States census, however, are amply sufficient to show the outstanding importance of agricul- , tural industry, its steady progress and general prosperity; the social and political importance of the farming class : in general, its leading place as a factor in the national life and in nearly every national problem.

Relatively little attention has been given to comparative study of our rural life with that of Europe and other parts of the world. This re¬ mains a real need, both that standards of com¬ parison may be arrived at, and that some of the unique conditions and problems of our agriculture may be appreciated. The more thorough our knowledge of American agricul¬ ture historically, comparatively and internally, the more likely is the resultant attitude to be a general, but well-founded, optimism rather than the modified pessimism which seems to have become traditional.

The American farm and farming have many distinctive features, and the farmer very unique conditions and problems. He has shown almost incredible power of adjustment in the pioneer and homesteading stages of the past, and may well again show his accomplishment in the present period of even more marked and complex changes. With various traditions, different nationalities and even races, widely different regional conditions, great and rapid stages of development, such as only a vast vir¬ gin continent affords, American agriculture has been a C(melting pot® out of which there is only now appearing the form of a system that may be called typical. The upper Mississippi Valley perhaps makes the nearest approach to this in its extent of operations, the employ¬ ment of machinery, its emphasis of tillage and the forms of its institutional life.

Regional and Other Differences. — There is still, however, wide regional difference which makes it difficult to describe the American farm and farming in any general way. The North¬ eastern States owe their systems to the trans¬ planting of English individualism and its grass¬ farming. The agriculture of the Southern States has been profoundly influenced by the aristocratic and feudal traditions, which com¬ bined with slavery and the climatic conditions making cotton the central crop have made it almost a separate economy. These traditions persist in spite of the vast changes effected by national development and the Civil War. Less fundamental and permanent have been the Spanish ideas which have had some effect on the West and Southwest. And much less wide¬ spread, but important nevertheless, have been the Germanic traditions of the Middle Colonies and later in the Middle West: the influence of irrigation agriculture, especially of the Mor¬ mons,

Still, the isolated “farmstead® or “home¬ stead,® miles distant from village centres, may be said to be typical as compared with that elsewhere in the world. The average farm acreage, too, approximating to the original <

The representative American farm, too, is laid out on the rectangular system, as a result of the original survey. Except in the North¬ east and older parts of the South it does not follow the lay of the land, having been tradi¬ tionally accommodated to the relatively flat and homogeneous prairie country. The fields are also rectangular rather than in the strips so noteworthy abroad, and, though differing in size

from 10 acres to 30 acres, depending on the region and type of farming followed, are characterized by their extent and adaptation to machinery. Public roadways are more abundant than in Europe, in general, the farm having a highway on two sides. The cultivated fields are close-in, pastures and wood-lots more remote from the house and barns, which are typically toward the highway side of the farm. The whole lay-out evidences response to our conditions, with traces, however, of traditional usages.

Farm Buildings. — The investment in farm buildings (15 per cent in 1910) is relatively smaller than in older countries, but is steadily increasing. The requirements have undergone and are still undergoing great changes, due to the increased use of machinery, the keeping of more and better stock, superior methods of preparing and using feeding stuffs, and also to the development of fire insurance. The farm-home has undergone less radical changes. The chief tendency evident is to bring the buildings to the centre of the farm, thus em- phasing convenience and economy rather than the social aspects so prominent in the arrange¬ ment of the older States and older countries. The many separate buildings, erected on the place from time to time with changes in farm methods, also show signs of being brought to¬ gether, reducing the number and organizing a few for a great variety of uses. The laborer's cottage is coming to be a part of the farm group of buildings ; the new style feed lot ; the wind¬ mill or pumphouse with underground water sup¬ ply lines; the planting of trees for shade and windbreak; the beginnings of elimination of the old style fence and fencing in general: all are phases of the reorganization of the Ameri¬ can farm.

Types and Tendencies. — "Diversified farm¬ ing® requires the greatest skill in such reorgani¬ zation, and the changes are most noteworthy where this develops, but the simple organization of the old style Southern plantation, as well as the small New England farm, are also being adapted.

The one-family farm of tradition is also passing. More farmable and manageable areas suited to latter-day conditions are being rapidly differentiated. New types of farm-units are appearing which will relieve the- struggle for existence which many American farms have

been experiencing because of too rigid adherence to the traditions. Present-day processes are greatly modifying not only the size of the farm but its internal organization and external re¬ lations.

There is undoubtedly to be an increasing place for the very small

farm. These small and intensively tilled farms will necessarily be near centres of population where the farmer can handle his own market ; and where he will produce high class specialties. Such farms are ideal, but although they give great economic independence, they also require great executive skill. Popular fancy has indeed over-appreci¬ ated this opportunity ; many city people have come to grief in such experiments ; and it has been the goal of most “back to the land® schemes.

Another type of small farm, much more common, and characteristic of our conditions, is the one-man farm, where the owner does the work himself (and his family) with little equipment. These are generally on low-priced land, and devoted to the universal staples, risk being reduced to a minimum. This narrow and traditional type of farming seldom produces the best results for the individual or for the com¬ munity.

Still another type is the representative farm of 160 acres, which is managed with compara¬ tively little outside help, but where the soil is good, the equipment ample, live-stock is kept and relatively little land maintained in tillage. Skill in “management® makes these profitable, and results in a prosperous and suc¬ cessful farm.

Both the “plantations® of the South and the “bonanza farms® or “ranches® of the West are being disintegrated. And throughout the country, while the average acreage per farm steadily decreases, the representative farm meanwhile continues large. In some regions consolidation is active ; in others, subdivision. Both economic and social purposes are being realized in this process : a sufficient acreage for most profitable farming under our conditions and a means of retaining “on the land® the oncoming generations of the farm families.

But this necessarily involves a more “in¬ tensive agriculture.® The “making of a farm® has been succeeded by the “producing of crops^® and is now being replaced by “marketing® as the cardinal farm problem. In the past, Amerh can agriculture has been controlled by the ideal of “bumper crops.® Now, the farmer is realiz¬ ing, under leadership, that the crop must be “worth what it costs.® The days of cheap and rich land are past.

Present conditions and tendencies are indi¬ cated by the general statistics of agriculture presented in the census of 1910. These showed 6,361,502 farms with an average acreage of 138.1, of which 75.2 acres was improved land. The acreage increased only 48 per cent since

1900. The value of farm property (total value $40,- 991,449,090) had risen 100.5 per cent in the dec¬ ade, and that of land alone from $15.57 to $32.40 per acre.

These figures show the wide opportunity for more intensive farming, as well as its necessity, with the practical exhaustion of new lands, and the rapid rise of values resulting from increased productivity as well as speculation. They also

indicate that the American farmer- is still es¬ sentially a (

The population data of the same census also show that the rural population (49,344,883) in¬ creased by only 11.2 per cent while the urban increase for a corresponding population (42,- 623,383) was three-fold (34.8). This represents the climax of a long process of <(rural depopula¬ tion® as the result of unsatisfactory economic and social conditions.

For while great progress has been made in American farming and farm life from colonial days to the present, and the United States De¬ partment of Agriculture, as well as the semi¬ official Country Life Commission (1908), can announce a (

The end of an epoch in American agriculture and rural life was reached with the practical passage of the free land frontier in the years after 1890. The acreage of farm land which had doubled from 1860 to 1900 increased by less than 5 per cent in the next 10 years. The cities continued to grow ; the demand for agri¬ cultural products both at home and abroad in¬ creased. <(Rural depopulation® had to be cor¬ rected and the era of (

An early sign of the new order is the dis¬ appearance of the agricultural ((belts® which had characterized our Axploitive agriculture® of the past. The South is steadily diversifying its crops; the West is passing from the condi¬ tion of range country; stock-raising is spread¬ ing; dairying and horticulture are being found in all parts of the country where general op¬ portunity offers. A great variety of agricultural specialties are appearing locally. The areas de¬ voted to different crops have been greatly extended.

There has been an especially noteworthy de¬ velopment associated with the rise of vast urban markets. In the vicinity of all the large

cities <(market gardening® has become a most profit¬ able branch of agriculture and represents the climax of intensive culture. And not less re¬ markable is the use of <(truck farming,® carried on in places remote from markets, producing the greater proportion of vegetables consumed in cities from 500 to 1,000 miles distant. The South Atlantic States are particularly interested in this industry.

The great growth of the cities has also been responsible for the rise of a new and effec¬ tive type of dairying. The milk and other dairy products for cities are produced not only in the immediate neighborhood but often in

regions quite distant, by the aid of the new system of creameries, and elaborate arrange¬ ments for transportation. Certain States (New York, Iowa, Illinois, Pennsylvania, Arkansas and Ohio) have become leading Alairy States,® and already dairying is the chief industry in a number of States. The use of the silo has been an important aid in this development, as well as is the new stock-raising in general. Dairying has as yet received little development in the South, but beginnings are being made.

But the most notable, and certainly the most fundamental chafige, has been in the development of Animal husbandry.® The live-stock indus¬ try spread west with the opening up of the country and to-day remains quite strongly localized in the West and Middle West. These, however, are not the regions necessarily the best adapted to it, nor will it permanently re¬ main there. Its localization is the result of the presence of the <(public range® and the <(corn belt.® The development of <(stall-feeding,® with the Aoncentrated foods,® gave the Mid-West the advantage over the region of better ((grasses® and water-supply, but this region is learning to produce its own foods. The East and South are already beginning to see the spread of the live-stock industry.

Nor are we any longer bound so closely to a fruit-belt as in the past. Fruit growing has escaped the small Archard,® as a mere subdivi¬ sion of the average farm, and has became a busi¬ ness by itself. The most marked departure of recent years has been its extension on a large scale in Georgia, Texas and the Southern States. A rapid growth of fruit growing on a large scale in the new lands of the Northwest is also proceeding. Systems of transportation, refrig¬ eration, storage and marketing have been worked out and the manufacture of fruit in Aanneries® has grown to large dimensions.

Other forms of special agricultural indus¬ tries, such as the breeding

of animals, fruit culture, poultry raising and bee-keeping, have also made great progress in recent years. Al¬ ready these minor crops and products outrank collectively and even in some cases individually the staple field crops. The centre of gravity of American agricultural production is plainly shifting with the rise of a more intensive agri¬ culture. Diversification also involves more varied and complex system of Arop-rotation,® which in turn enables labor and equipment to be more economically managed and allows of their freer use, thus enlarging the sphere of ((farm management® and developing farm ˆleadership.®

From its aboriginal and pioneer state, Ameri¬ can agriculture has had a relatively short, but rich and eventful, history. Some agricultural progress had been made before the coming of the whites, and the first settlers profited by this. Corn was from the first a staple, as it had been for the Indian. But the forests made progress slow, and for two centuries the superabundant natural resources failed to bring any great in¬ crease in the products. As late as 1845 our farms did not produce enough wheat for our bread. The period 1830-60 was however revo¬ lutionary, in the rise of markets, better trans¬ portation giving access to them; the use of farm machinery; improved live-stock; and the rise of the agricultural fair. Later develop¬ ments have been merely an extension along

these lines. The opening of the Mississippi Valley, both north and south, to agriculture gave the industry the general form which it maintains to-day. Other grains than corn were produced early, but only in the West did it become one of the great crops. Live-stock was produced everywhere, but only found its full development in the new West. Tobacco, early grown and for export, gave place to cotton as the alluvial lands of the lower Mississippi were opened up. The wool industry received its first impetus from the introduction of the Merino sheep, but has achieved its greatest success in the new Northwest. The sugar cane was in¬ troduced in the middle of the 18th century in Louisiana, and soon developed a success¬ ful manufacture of sugar, finally producing one- half of our domestic supply. But about 1900 the sugar beet industry, begun in Colorado, Michigan, California and other States, began a rapid rise (doubling the number of factories 1900-14) and is rapidly becoming capable of supplying the entire demand. Rice is now grown, profitably and widely, especially in Texas and Louisiana, and is capable of great exten¬ sion. Many varieties of

tropical and subtropical products are being grown in Florida and Cali¬ fornia, but this is only in its beginnings. Im¬ mense orchards are appearing in the new States of the Northwest.

As a result, the United States ranks high in the production of the world's staple agricultural products. Even in its present undeveloped condition it may be said to be the world's agri¬ cultural state. For here is produced three- fourths of the world's maize crop, two-thirds of its cotton and one-fifth of its wheat. Ex¬ port of farm products trebled in the last gen¬ eration and under war conditions has grown enormously, assisted by a fundamental re¬ vision of food habits at home, but the increase is not in quantity but rather in value. It repre¬ sents, too, rather extent of new land brought under cultivation, than permanent increased efficiency in farming. Cotton a'nd breadstuffs lead, followed by meat and dairy products and animals. These have been our most successful and staple products in the immediate past, but a thoroughgoing reorganiztion of our agri¬ culture is necessary if we are to maintain our growth and add new elements to our surplus for export. With practically one-half of the present farm area unimproved and with the many lines of leadership already entered upon, this ought not to be impossible.

Factors of Future Development. — It has

been said that there are still three great oppor¬ tunities in American agriculture, viz., the rice lands of Texas, the timber lands of Oregon and the new wheat lands of the Northwest. But there is opportunity, not only as here for in¬ vestment in and development of new lands, but in all parts, even in the oldest States, in fact, wherever a good crop can be grown and a good market can be found. This fact is at the bottom of the ((back to the land® and <(buy a farm® movements to-day. These movements, however, are chiefly of significance as an appre¬ ciation of the real worth of country life, for it must be confessed that the opportunity of to-day can only be surely availed of by those of farm¬ ing and tradition. Never was farming so diffi¬ cult. It will be in those whom country life will keep on the farm, and not in those who come

to it, that the strength of the <(new agriculture® will lie. The immigrant, however, is com¬ ing upon the land, and would seem ideally adapted to its future needs.

Since 1880, irrigation has been employed on a large scale in reclamation of the arid region which Rovers nearly one-third of the country. Already some 14,000,000 acres are irrigated and producing

varied and valuable crops, as well as conducing to a high type of local life. State laws and administration in the dozen States affected, with the National Reclamation Act of 1902, have reclaimed large areas and ultimately more than one-tenth of the entire area will be under cultivation. Not only reservoirs, but pumping and artesian supplies are being used. The new ideas and practices of irrigation farming will have great influence upon agriculture in the older States and hasten the coming of intensive farming.

Improved methods of cultivation are making it possible to grow crops by (

An ever more important phase of the con¬ servation of national resources, directly affecting agricultural progress, is drainage. At least 100,000,000 acres of land, well located and rich, but wholly or partially unproductive, because in swamps or overflowed seasonably, may be re¬ claimed by the co-operation of private owners, aided by State and national action. Much has been done in various States, but the work has barely begun. Even (

Larger returns from land already in use, even more than bringing new lands under cul¬ tivation, will chiefly characterize future farm¬ ing. We may expect to see irrigation even in the humid region (where rainfall, although sufficient in amount, is unevenly distributed) brought into use, as in Europe, as insurance against drought, and as a means of increasing production. Fertilizers are rapidly coming into use where the virginal fertility is lessening owing to single-cropping or a too simple sys¬ tem of rotation, combined with poor tillage. Soil fertility is increasingly guarded by stock- raising, and though soil making is still in its infancy here, as contrasted with Europe, yet better tillage, longer rotation series and better husbandry all round are inevitable, and may forestall the universal need for artificial and commercial fertilizer. Not only will the soil be safeguarded, but better husbandry will, as expe¬ rience shows, save the stock and crops from diseases and pests, such as ((cattle tick® and the <(cotton boll weevil.®

An industry so old and so controlled by custom as agriculture, and which has come to be regarded as characterized above all by sta¬ bility, does not frankly or readily accept change. But the very foundations of American agriculture have been continuously shifting with the various stages of evolution from pio¬ neer to well-settled condition, the movements of population, the advent of machinery, the shifting of regions of production, the rise of markets, the assimilation of foreign immigrants on the land, the adjustment of the freed negro.

FARM AND FARM PROBLEMS

The epochal changes since 1890 have resulted in many maladjustments, giving rise even to alarm, and to a widespread discontent with the agricultural status. All this constitutes the <(rural problem® of the present.

An early and significant aspect of the prob¬ lem was the ((abandoned farm.® As. early as 1840, but more widely about 1875, press and platform discussed the deserted farm, particu¬ larly in New England, but to some degree throughout the older States of the East. The double attraction of the cheap and rich Western lands, and the call of the rising industrial cities, combined with a difficult soil, and partly the disturbing influences of the Civil War, made the condition active and alarming. The State governments were moved to take action about 1889. Investigation showed no wholesale aban¬ donment, although some 5,000,000 acres, mainly improved, had been from time to time abandoned; the causes were seen to be general, not local ; that agriculture was not decadent except relatively with the profits of farming in other regions and other kinds of business ; in general, that it was changing, but not declin¬ ing. Later experience has shown the same phenomena in other parts, even in some of the newest and most prosperous farming regions, and the whole matter has come to be regarded as simply one of the many striking evidences of the sweeping and radical changes our agri¬ culture and rural life is at present undergoing. The reoccupation of these lands is almost com¬ plete, and Eastern land values have arisen sharply, products increased with intensive agri¬ culture, prosperity followed from the access to great urban markets, and every phase of rural social betterment, for example, the centraliza¬ tion and consolidation of schools ; the new country church, social and federated ; traveling libraries ; the ((good roads movement® and the Grange have been most active. The transfor¬ mation of farming and farm life in the East gives promise of successful readjustment else¬ where. Above all it shows the necessity for perspective in judging American agriculture.

In New England also the phenomena of rural depopulation first appeared, but like the abandonment of farms was soon seen to be symptomatic of the great ˆagricultural shift® of an expanding and developing country, that al¬ though it often had serious social consequences in the disruption of the farm family, the coun¬ try school and country church, it always repre¬ sented rather a movement from one farming region to another for the realization of better

conditions and opportunity, and that it never was largely due to the superior attractiveness of industry and city life, for these called only the few — often the elite, but also many unde¬ sirable elements — and never the vast majority of shifting farmers. All parts, except the very newest States, have at some time, and in some degree, been affected thus, and the richest agri¬ cultural State, Iowa, actually suffered slight loss in total population due to rural decrease.

This agricultural shifting, so caused, is now over, however, and the new intensive agricul¬ ture, with the rising farm villages, will doubt¬ less absorb the surplus farming population. The present opportunity on the farm is great, it calls for the freer use of labor, machinery, capital and the exercise of management, as well as for better social institutions, and politi¬

cal reorganization, and though difficult, offers attractions at least as great as those of industry and commerce.

These new conditions may also well lessen the movement of ((retired farmers.® This practice is distinctive of American farming, in contrast with the permanent agriculture of Europe; it has occurred in all parts of the country, but particularly in the Middle States, and mainly as the result of the doubling of land values in the last decade. This has enabled not only aged farmers to retire from the hard¬ ships of pioneer and homestead farming, but also the younger generation to go into town with a small fortune for investment. The re¬ tiring farmer has always largely entered the smaller cities, and though often inactive and unprogressive, has latterly usually entered into active business, and become the builder of our country towns. More and more they seek the business opportunity of the nearby town or village, less seldom sell the farm and more often rent it, thus furnishing a vital connecting link between town and country. Conditions are increasingly in favor of a relative cessation of the whole movement.

One noteworthy result of these phases of the agricultural shift has been the appearance of <(tenancy.® Its rise and rapid increase in a new country like the United States, which in 1880 showed three-fourths of the farmers own¬ ers, and to-day over one-third renters, naturally produced discussion and even alarm. It is most frequent in the South, where the pres¬ ence of the negro occasions its prevalence. It was rare in Colonial days, and even in the pio¬ neering of the first Western States, for the owners of large land holdings sold to small owners. About the time of the Civil War ten¬ ancy became a method of acquiring ownership as land values rose. It was regarded as a mere step, not as a status. The laborer or small in¬ vestor could begin with

enough to equip and pay some or all of the cheap, but rising, price. As these conditions were intensified tenancy increased at an accelerated rate; the retiring farmer grew increasingly common ; ((cash ten¬ ancy® became frequent; but latterly Uandlord- ism® with ((share tenancy® in some form (now twice as common as the cash system) infre¬ quently the (

Inheritance has latterly become an important factor in the acquiring of land ownership. Farmers who are well-to-do usually assist their sons in acquiring land; often the family farm is added to, as the sons grow to maturity, and finally parceled out. The prevalence of part- owned, part-rented farms is evidence of this process. The increase of this necessity and policy will give a new stability to the farm family and domestic relations, by giving mar¬ riage, birth and death, as well as general social relationships, an economic sanction.

A better perspective on these features of the present transition stage show that the re¬ pressive causes that tended to inertia, and even decadence, in agriculture, and virtually created a crisis, are already passing, and a new era to be safely entered upon. The year 1887 may be regarded as the beginning of this period of reorganization for it was characterized by the practical exhaustion of the public lands, the beginnings of a more intensive agriculture in the East and Central States, a rapid rise in land values, the development of irrigation and drain¬ age schemes, and increased activity along all lines of educational and governmental help for the farmer. Conditions during the last decade of the last century were still difficult, despite many steps in rural progress, and never was discussion and agitation more active. The comprehensive appraisement of farm life and conditions by the Roosevelt <(Commission on Country Life® in 1908 made the report that though in a general way the American farmer was never more prosperous, yet that agricul¬ ture was ((not economically so profitable as it is entitled to be for the labor and energy the farmer expends and the risks he assumes.® The social disadvantages resulting were also indi¬ cated, and the three great needs were sum¬ marized as (1) effective co-operation to put the farmer on a level with the organized inter¬ ests with which he has to deal, (2) schools which will prepare children for country life, and (3) better means of communication.

Consequently the lines along which improve¬ ment is being sought

are (1) decreasing the isolation, and hence the unco-operative indi¬ vidualism of the farmer by the extension of rural free delivery of mail, adding parcels post, increase of rural telephones, the continued im¬ provement of roads, and increasing availability of the automobile, (2) the redirection of agri¬ cultural education, to educate the boy and girl toward, rather than away from, the farm, and (3) efforts to increase agricultural credit facili¬ ties, and to organize farmers for mutual benefit in matters of labor and marketing especially.

A discussion of fundamentals in the eco¬ nomic and social life of the farmer was devel¬ oped. It has been found that it is with refer¬ ence to floating capital — labor and credit — that agriculture meets other forms of business in fundamental competition. <(Farm manage¬ ment® has found new farms utilized to their most profitable capacity, for constant and wide¬ spread lack of these two things. Throughout the history of American farming, labor has been lacking, partly due to the general scarcity of labor in a new and developing country, but also to the one-family, or one-man, farm tra¬ dition. The advent of machinery rather made possible Mid-West agriculture without a corre¬ sponding labor force, but did not lessen the need for it. During the years from 1880 to date the farm labor class has increased more than 40 per cent, while the proprietors increased only 35 per cent, and in the cereal States, where the machinery was most used, labor increased three-fold, as rapidly as the proprietors. The labor question is not peculiar ' to agriculture, but, although the data are incomplete, it would seem that so far as wage increase relative to cost of living is concerned, the farm laborer has not made equal progress with other branches of labor. The passage of slave labor,

and also of the traditional one-man farm, where the farmer's family constituted the labor force, has made the labor problem an imminent one, especially with the demands for increased production and the call to the various forms of intensive farming. The real solution is for the farmer to train farm artisans from the rising generation of farm youth not only of those at home but those from the landless generations of the older States, and many village youths. The farmer of the new agriculture cannot rely on the mere co-operation of neighbors, nor upon transient and occasional help, but must provide all-round-the-year employment, the possibility of a home and some social attrac¬ tions for the laborer. The new agriculture calls loudly for a freer application of labor, and its attainment would benefit owners, tenants and labor alike.

So also is credit a great desideratum. It is needed to pay for labor and to conduct farm operations under the new system. Thousands of

farmers are hampered for the lack of it, and lose each year many times the interest charge on the capital needed. Moreover credit is a most important means of acquiring land own¬ ership. It is often more desirable to pay in¬ terest than to pay rent, and this would be more frequently true but for the evil system of (

The country store as the original credit in¬ stitution of the American farmer has been superseded, except in the negro farming regions of the South, by the local bank. These are everywhere found, but are frankly commercial and profit-making. In fact, neither personal nor mortgage credit institutions have reached a satisfactory stage of development, and little to compare with the Raffeisen system of Europe has yet appeared. In the corn belt the life in¬ surance companies have loaned largely on farm mortgages. Elsewhere the local banks furnish the only facilities, with the attendant evils of high interest and frequent foreclosures. Since 1910, however, there has been extensive agita¬ tion and an official commission went to Europe in 1913, with the result of attempted Congres¬ sional action, some State laws favoring credit societies, and action in a number of Western States to allow the loaning of certain State funds (e.g., school moneys) on mortgage. In response to the general agitation many joint stock-loan companies have been organized in Middle Western States.

The need for credit is evident from the fact that the old tradition regarding the unde¬ sirability of mortgages has been latterly lost in view of their indispensability under our sys¬ tem of agriculture to-day. There has been no comprehensive report by the government since 1890, but even at that time 18.6 per cent of all farms were encumbered to one-third of their value. Infrequent in the South, one-half of all the mortgage encumbrance was centred in New York, Pennsylvania, Ohio, Illinois, Iowa and Kansas. The average duration of the mortgage was five years, and only about 3 per cent were indicated as foreclosed, the vast majority of all the adventures being thus of successful issue.

It is doubtful if co-operative credit institu¬ tions of the European variety will become com¬ mon here, but the need for new credit will be met by greater local control of the local banks,

associated with local distribution of funds through the Federal Reserve system. This will provide a solution more in harmony with our need

and the individualistic traditions of our farming population.

Along all lines the need for organization is being felt, not only in matters of business but in re-creating rural social institutions and reor¬ ganizing local politics. The early appearance, widespread scope and great variety of farm¬ er's associations is evidence that the farmer is not incapable of organization, but that wher¬ ever he feels the need and recognizes the pos¬ sibility of results he is ready. For more than a century there have been local, State and even national associations for promoting agricul¬ ture. Soon after 1800 the "fair® took its rise and now over 3,000 fairs are annually con¬ ducted, devoted to general, as well as spe¬ cial, farming interests. The great majority of farmers' organizations have been directed to some form of business co-operation, and often for this sole purpose. In 1908 it was estimated that there were 85,000 co-operative organiza¬ tions with a membership of more than 3,000,000. About 30,000 were irrigation associations, and others were co-operative telephone companies, grain elevators, creameries, insurance com¬ panies, associations for marketing and for the purchase of supplies. In 1913 the United States Department of Agricul¬ ture established a Rural Organization Serv¬ ice to assist farmers and farmers' organiza¬ tions. Several associations have at various times assumed a position of leadership among the rest and even reached the status of a politi¬ cal party. Especially should be mentioned the "Grange,® or Patrons of Husbandry, the "Farmers' Alliance,® and the "Farmers' Na¬ tional Congress.® But although these serve a useful purpose in subserving the larger inter¬ ests of the farmer they cannot take the place of thorough going local reorganization in the home community alike for social, business and political needs.

Education and leadership have always been at a premium in American agriculture. Rapid changes of condition, with the necessity for abrupt and radical changes of idea and practice in farming, make them vitally necessary. Agricultural education developed from the top. down, the agricultural college and ex¬ periment station first appearing, and only re¬ cently agricultural high schools, the introduc¬ tion of agriculture into the common schools, the short course and the general extension services. Farmers' institutes have long been widespread and active, the agricultural press has become a powerful and permeating influ¬ ence, and above all the multitudinous activi¬ ties of the United States Department of Agri¬ culture leaves little to be desired in the way of adequate leadership.

Locally the new country school, especially where consolidated, and the new country church, have become centres of community

leadership and wider social service. Reorgan¬ ization of the social institutions of our farm¬ ing population is perhaps the most backward phase of rural progress. But its importance is being recognized; more than half of all the school children in the nation are in country schools, and nearly two-thirds of all the

churches are in country or village, and the lines of reorganization are clearly seen.

There is danger that the fundamental im¬ portance of the family may be overlooked. The traditional American farm was a family unit; rural social organization has always been patri¬ archal; social life in the country in the past has centred in the home. But later conditions associated with the shift of farming population disintegrated the rural family, and to-day a lowering birthrate, prevalent divorce, many un¬ married, though of marriageable age, may be said to characterize it. The new agriculture calls for reform in the domestic relations on the farm, and is a problem no less pressing than that of the school and the church.

William L. Bailey,

Associate Professor of Political Science, Grin –

nell College, Iowa.

FARM LABOR. See Farm and Farm Problems; Farm Crops; Farm Management.

FARM LOAN ASSOCIATIONS. See

Federal Farm Loan Act.

FARM LOAN BANK. See Federal Farm Loan Act ; Land Credit ; Co-Operative Banking.

FARM MACHINERY. The function of farm machinery is to enable the farmer to produce not only larger crops but better crops than he can with only his simple hand tools. In fact, without the aid of such machinery the farmer of the present day finds it difficult to earn more than a bare living for an average family.

The machinery employed in modern farm¬ ing falls naturally into four groups: (1) tilling machines, which prepare the soil to receive the seed; (2) drills, seeders and planters, for plac¬ ing the seed in the ground; (3) cultivators, for .working the growing crop ; and (4) har¬ vesting machines, for gathering the matured crop. In the first group belong the plows, harrows, drags and rollers ; in the second, the grain and seed drills, the corn-planters and the potato-planters; in the third, the various forms of horse weeders, wheel-hose, fertilizer drills, corn-plows, etc.; and in the fourth, the corn- binders and huskers, the potato diggers, the mowing machines, reapers and binders, the hay rakes and tedders, hay loaders and trolley- forks, fanning mills, corn-shellers and the like.

Tilling Machines. — The plow is the founda¬ tional instrument of all agriculture, and it has been brought to its present state of scientific perfection only after tireless experimentation. The farmer of to-day finds at his disposal a long line of special purpose plows from which he may select the one best adapted to the soil he . wishes to work, and to the condition in which the soil may be at the moment. On the ordinary farm, however, there will be found three types of plow, the sod plow with a long moldboard and a strong twist; the stubble plow, with a shorter moldboard and much less twist ; and the corn cultivating plow, which ap¬ proaches much more cl.oselv the simple wedge shape. The sod plow is designed not only to tear up the sod and turn it upside down, but also to break up thoroughly the texture of the earth clod. It is much more effective if it has a jointer attached. The jointer has the shape and form of a little plow, and gives the sod

its first turn, allowing the plow itself to exert the desired shattering effect. The stubble plow is used to break up land which was in cultiva¬ tion the previous season. Its particular office is to break up

and loosen the soil rather than to turn it over although its action partakes also of the turning movement. These two forms do most of the plowing on the average farm. The draft varies from 400 to 600 pounds, ac¬ cording to the condition and constitution of the soil, and should be provided with such a num¬ ber of horses, that each may have no more than a 200-pound pull. More than that tires the team to such an extent that the efficiency of the machinery is seriously reduced. These plows are also combined into ˆgangs® of two plows or more, and when the motive power is a traction engine, many furrows may be turned at once. With a four-furrow gang plow and five horses one man can break up from five to seven acres per day. A gang of 10 to 20 plows drawn by a traction engine, with two men in attendance, will plow up to 50 acres per day. (See Plow). Following the plow comes the har¬ row, and of this machine also there are many types, adapted to the soil to be worked and the crop to be raised. The object of the harrow is to reduce the soil to a condition of fineness in which the tender roots from the newly germi¬ nated seed will find least resistance, and at the same time an abundance of air and moisture in the interspaces. To get the best results from the harrow it should be sent on to the plowed ground as soon after the plow has passed as may be. The ordinary spike-tooth harrow is a< very effective tool, and if it has long teeth which may be set for deep working it is quite sufficient for most soils. The spring-tooth and disc harrows have particular uses on special soils, and for very lumpy soils a clod-crusher is of great service, to precede the harrow. The drag or planker is used to smooth off un¬ even parts of the harrowed field, and if the soil is very light and fluffy, the roller is indis¬ pensable to produce a seedbed sufficiently com¬ pact to hold moisture through the germination period.

Seeders and Planters. — The ordinary grain drill consists of a long transverse bin with a series of 11 spouts set five inches apart. These spouts furrow the ground as the drill is pulled along, drop the seed in the furrow and cover it to the required depth. Where the soil is so light that it dries out quickly, a pressure wheel may be attached to firm the covering soil over the seed. The feeding gates in the bin of the drill may be adjusted to openings of dif¬ ferent sizes, so as to sow beans and corn, as well as all smaller seeds. In order to space the seeding properly some of the spouts are closed. For example, in sowing mangels, spouts numbered 1, 5 and 9 are allowed to remain open; in sowing beans, spouts 1, 6 and 11 do the work. Beans may be sown in double rows for field culture by allowing spouts l and 3, and 9 and 11 to remain open. Corn is usually sown with spouts 2 and 10. There are special corn-planters which sow the grain in hills, five or six

grains at a time, but the hand- planted cornfield still holds all the records for big crops. Potato-planters are of advantage when more than five acres are to be planted : with less than that the cost of the machine for the very few days in the year when it is at

work is prohibitive. Drills are also of great use¬ fulness in the sowing evenly of lime and com¬ mercial fertilizers. The disc drill is a com¬ bination disc plow and seed drill. The discs plow the land sufficiently for grain without other preparation and the grain is sown at the same time.

Cultivators. — The functions of the cultivator are threefold: to prevent the growth of weeds, to modify the moisture conditions, and to add a dressing of fertilizer to the soil while the crop is growing. A tilting-tooth harrow is an effective form of cultivator when the crop is small. It can be so driven as to straddle the crop rows while it tears up and destroys thou¬ sands of weeds. As the crop becomes larger the horse weeder comes into use. It resembles the harrow in general make-up, but has very long slender spring tines instead of the stocky teeth of the former. The depth to which these tines penetrate is governed by setting the wheels of the machine. For specific crops there are special types of cultivators, with shovel-teeth, wide scuffle-blades and narrow hoe-blades, miniature plowshares for earthing up the plants, discs for deep stirring, etc., in great variety. In light soils the cultivators are sent into the field after every rain to break up the surface and thus form a mulch to conserve the moisture. Several of these machines are made small and light, for hand use.

Harvesting Machines. — The complicated machines used in harvesting operations are the most expensive in the farm's equipment, in spite of the fact that every effort is made by the manufacturers to keep the price down, while producing a machine of the highest efficiency. The great disadvantage attaching to farm machinery is that the use of any particular machine is limited to a few days during the year, and it thus takes on the character of an expensive per diem luxury.. Thus the hay¬ making machinery — the mowers, tedders, rakes, loaders, stackers, etc. — must earn their pro rata cost within a very brief period. And the horses to operate them must be at hand when the crop is ready, even if the farm provides insufficient work for them for the remainder of the year. The relative per diem cost of farm machinery depends largely upon the size of the area devoted to a particular crop. For example, a grain drill used to sow only 20 acres annually, costs $2.97 per day it is in use: if 107 acres are sown the per diem cost is

$1.04. Where 15 acres of grain are harvested, the grain-binder's cost annually per day's use figures at $8.15. If, however, the grain-grow¬ ing area is 85 acres, the annual per diem cost is $2.41. The corn-binder is more expensive by 40 per cent, and the corn-shocker by 300 per cent. These high relative figures have the tendency to induce specialization in the main crop for which the machinery must be pro¬ vided. The problem is partially solved by farmers' associations which buy the machinery and distribute its use equitably among the mem¬ bers. In this way a traction engine may be economically used to provide power for rapid work. The traction engine cannot be profitably employed on a farm area of less than 240 acres.

Farm Equipment. — The usual machinery

equipment of a well-regulated farm of 160 acres consists of the following: 1 manure

spreader ; 1 walking plow ; 1 riding gang plow ; 1 smoothing harrow ; 1 disc harrow ; 1 plank drag; 1 land roller; 1 seed drill; 2 cultivators; 1 corn-planter; 1 mowing machine; 1 hay ted¬ der; 1 hay rake; 1 hay loader; 1 corn-binder;

1 grain-binder; 1 potato digger. Two heavy farm wagons and a hay rack will be needed to handle the crops, fertilizer, etc. The cost of this equipment will come near to $900. The annual cost per acre of these tools figures about as follows : walking plow, 7.2 cents ; gang plow,

18.3 cents; smoothing harrow, 1.9 cents; disc harrow, 4.9 cents ; plank drag, 0.8 cents ; roller,

2 cents ; cultivator, 4.3 cents ; horse-weeder, 3.3 cents; corn-planter, 8.1 cents; seed drill, 13 cents ; mowing machine, 10.5 cents ; tedder,

16.4 cents ; hay rake, 5.5 cents ; hay loader, 24.8 cents ; grain-binder, 26.4 cents ; corn-binder, 36.9 cents; corn-shocker, 84.2 cents.

Performance. — The per diem performance of farm machinery depends somewhat upon the power used. Many of the machines are of too heavy a draught for two horses to work with steadily, and yet three horses will not accom¬ plish 50 per cent more in a day than will two, and in general require another man. The figures as worked out by the United States Bureau of Agriculture are as follows :

Acres

per

day

12-inch walking plow, 2 horses . 1.75

14-inch walking plow, 3 horses . 2.32

14-inch riding plow, 3 horses . 2.49

8-foot spike-tooth harrow, 2 horses . 10.80

10-foot spike-tooth harrow, 3 horses . 15.30

6-foot disc harrow, 3 horses . 7.50

8-foot disc harrow, 4 horses . 12.80

6-foot spring-tooth harrow, 3 horses . 8.20

8-foot spring-tooth harrow, 4 horses . 13.10

8-foot roller, 2 horses . 13.20

6-foot grain drill, 2 horses . 8.80

6-foot grain reaper and binder, 3 horses . 11.10

Hand corn-planter, 1 man . . . 4.40

1- row corn-planter, 1 horse . 6.90

2- row corn-planter, 2 horses . 13.60

Cultivator, 1 horse . 4.40

Cultivator, 2 horses . 6.60

6-foot corn-binder, 3 horses . 7.30

5-foot cut mowing machine, 2 horses . 8.90

Hay rake, 1 horse . 16.30

Hay rake, 2 horses . 17.90

Hay tedder, 2 horses . 14.50

Bean harvester, 2 horses . 7.60

Threshing machine, 10 men, 6 horses . 29.50

Manure spreader, 2 horses (13 loads) . 1.70

A motor plow will break up from 1.29 to 1.63 acres per hour; a tractor and gang plow, 0.74 to 2.18 acres per hour; two engines and a cable plow, 1.04 to 1.25 acres per hour.

Comparisons of the statistics of the crops of 1850 with those of 1910 have shown that the saving to the American farmer in labor-time in the 60 years increased his potential efficiency by 2,000 per cent. To instance a few of the more common farm processes : a quantity of grain may be sown to-day in 33 minutes that formerly required 10 hours and 36 minutes; and a job of harvesting can be done in 1 hour that would have taken 46 hours and 40 minutes in 1850. A planting of corn which now requires but 37 minutes then required 6 hours and 15 minutes; and a husking job which now is completed in 3 hours and 36 minutes would then have consumed 66 hours. The mowing machine does, in 1 hour what the scythe will hardly do in 7 hours; and the potato planter does in 1 hour the work which formerly took 8 hours with a hand hoe. A bushel of

wheat can now be raised with the expenditure of but 10 minutes of the farmer's time; in 1850 it required an average of 3 hours and 3 minutes. Statistics show also the interesting fact that where the farm is generously supplied with machinery, the farm income is much enlarged. For example, in Florida, where the value of the machinery on the farms averages $30.43, the yearly income of the farm-worker averages $119.72; in Iowa, with machinery averaging $196.55 to the farm, the farm-worker's average annual income is $611.11; in North Dakota, where the machinery averages a value of $238.- 84 per farm, the average income per farm¬ worker is $755.62.

Production. — In no other country in the world is there such extensive use of farm machinery as in the United States. Accord¬ ing to the census of 1910 the total value of such machinery was $1,265,149,783, an increase of $515,373,813 (68.7 per cent), over the figures for 1900, and 734.6 per cent greater than those for 1850. In 1910 farm machinery constituted 3.1 per cent of all farm wealth. Measured on the basis of area, for every acre of improved farm land in the United States there was on the the farms in that year a value of $2.64 in

machinery. The production of farm machinery in the United States in 1914 amounted to a value of $168,120,632. The exports for that year were valued at $31,965,789. (See Agri¬ culture ; Dairy Products ; Farm Power ; Stock Raising).. Consult Davidson, J. B.,

< Agricultural Engineering* (Saint Paul, Minn., 1914) ; King, F. H., (Physics of Agriculture * (Madison, Wis., 1901) ; Warren, G. F., (Farm Management (New York 1915) ; United States Department of Agriculture, bulletin 412* (Washington 1916).

FARM MANAGEMENT. Farm manage¬ ment may be defined as the science of the organization and management of a farm for the purpose of securing the greatest continuous profit. Many farmers have learned the art of farm management without clearly understand¬ ing the principles involved; just as a farmer may get a good crop of corn if he plants by the moon, if this happens to be the right time. If the corn is planted at the right time it grows just the same, regardless of the explanation that the farmer makes. But the farmer who under¬ stands the principles of farm management will be able to adapt his farming to new conditions more readily than will a farmer who acts by rule.

A good farmer must be a skilled husband¬ man in the care of his crops and animals. He must invest his available capital and credit with discretion. Between many things that are needed he must choose the most essential, con¬ sidering his capital. He must follow the most profitable type of farming for his conditions, and must have the right number of each class of animals and the right area of each kind of crops. He must know the right amount and kind of labor for his conditions. Must so ar¬ range his buildings and fields that they can be most profitably operated. The above are but a few of the management problems that confront the farmer.

Choosing a Farm.— One of the most im¬ portant decisions that a farmer ever makes is in his choice of a farm. So many details must be

considered that unless one has had experience in buying farms he is likely to forget some of the details even though he may be an experienced farmer. Below will be found some of the ques¬ tions which should be carefully considered by the purchaser in selecting a farm. If one ex¬ pects to make a living on the farm, the crop-producing power of the soil is the basic factor. There are some

exceptions, but ordinarily what grows out of the ground determines whether or not one has a chance to make a profit.

Size

1. Adapted to. kind of farming.

Fields

2. Shape and size.

3. Nearness to farmstead.

Topography

4. As affecting ease of cultivation.

5. As affecting production.

6. As affecting erosion and loss of fertility.

7. As affecting air drainage.

Fertility

8. Natural.

9. Condition.

Physical Properties of the Soil

10. As affecting economy of cultivation.

11. As affecting number of days of labor.

12. As affecting loss of soil fertility.

13. As affecting kinds of possible crops.

Drainage

14. Natural.

15. Artificial.

Condition

16. Freedom from stumps, stones, weeds, waste, etc. Climate

17. As affecting animal and crop production.

18. As affecting number of days of labor.

Healthfulness

19. As an economic factor.

Location

20. Distance to market.

21. Roadways.

22. Local markets.

23. Shipping facilities.

24. Neighbors as an economic factor.

25. Labor supply of neighborhood.

26. R. F. D., telephone, trolleys, etc.

27. Churches, school, grange, etc., as economic factors. Taxes

28. Per cent on cash value.

Water Supply

29. Running water, wells.

Improvements

30. Site of farmstead.

31. House as adapted to needs of farm.

32. Other buildings.

33. Fences; kind, condition, arrangement.

34. Timber, orchards, vineyards, etc.

Investment

35. Probability of an increase in value.

Acreage

36. Total acres.

37. Acres tillable.

38. Acres pasture not tillable

39. Acres woods.

40. Acres roads, waste, etc.

Estimated Total Value of

41. Tillable area.

42. Pasture.

43. Woods.

44. Bams.

45. Houses.

Total.

Price Asked

Types of Farming. — The chief factors that determine the type of farming in any region are : climate, soil, topography, transportation, distance to market or shipping point, market de¬ mand and supply, capital, labor, and insects, fungi or other pests. These factors do not often change suddenly. A new railroad may be built, and change the type of farming, or an insect pest may force a temporary change. Types of farming are in general stable, yet are nearly always gradually changing and some¬ times are subject to sudden and radical change. The farmer must be conservative yet always ready to change when a change is -necessary.

Crops are closely limited by climate, soil and topography. Animal production is also closely limited by these factors, for animal production depends on crops. Cattle and sheep are usually raised in regions where there is land that is good for pasture but not good for crops. If land is good for crops it is usually too valuable to be used for pasture. The length of the grazing season is also of great importance. This is not determined by the length of the warm period, but by the character and amount of grass.

The most important centres of production of products that are easily and cheaply shipped are in regions where the cost of production is least. Sheep can be raised in New York, in Montana, and in Australia. The most important centres of production are where the feed is cheapest, not where the product is used. Wool and mutton can be shipped long distances. Nor is the feed of a portion of the year the domi¬ nating factor; the feed cost for the entire year is the important matter. Butter is readily shipped and the centres of production are largely in the regions of cheapest production. But fresh small fruits, fresh vegetables and fresh milk are shipped with difficulty and at great expense, hence are usually produced near market. Hay is very bulky for -shipment and is therefore usually produced nearer to market than the grains. It costs less to ship hogs than to ship the corn that a hog would eat. For this reason hogs are most abundant in the portion of the corn belt farthest from Chicago. A larger proportion of the corn near Chicago is shipped for manufacturing purposes.

Periods Over and Under Production. — No problem in farm management is more difficult than the problem of forecasting future needs. The farmer who foresees future shortages and raises products to meet them, is a public bene¬ factor and at the same time makes a good profit for himself. The majority of mankind live in the present. If sheep or horses or apples are high, the majority are inclined to rush to these enterprises. But entering at the period of high prices does not mean selling on the high market; for the product comes years later when one must compete with all the others who rushed into the business at the time of high prices. The profit on a colt is not dependent on the prices of horses now, but on the prices of horses four to six years from now when the colt is sold. For every product there is a more or less definite cycle of over- and under-production. When a shortage of hogs occurs it takes two years to bring a surplus. In the meantime too . many are likely to be raised so as to cause a surplus when they go on the market. When a shortage of horses is discovered there is usually a shortage of colts as well. Hence, it takes five to eight years to cause a surplus.

Violent changes in world affairs, such as the Great War, make violent fluctuations in de¬ mand for different products. These call for sudden modifications of agricultural practice and sometimes call for complete changes. At such times the changes that take place are likely to be much too great and are likely to result in serious underproduction of the articles that at first appear to be relatively abundant. As com¬ pared with peace, the war demands call for greatly increased amounts of clothing and for

relatively large amounts of grain. Cotton, wool and grain rise in price more than food animals. The production of animals is at first relatively unprofitable. Later on, owing to the great de¬ crease in animal production, the animals become highly profitable. Usually it pays a farmer to maintain his general type of farming, but make minor shifts to meet market demands.

The Relation of Capital to Type of Farm¬ ing. — Most farmers begin business with a small capital and gradually increase as they save money. With small capital one must economize on the less essential things. Usually land, horses and machinery are the essentials, so that the man with small capital is likely to have fewer producing livestock and sell more crops than he will when his capital increases. As capital increases, not only does he increase the number of livestock but he improves their quality.

Type of Farming and Labor. — In nearly every region there are one or two crops or classes of animals that are much more profitable than others. Usually it pays a farmer to use his available labor and equipment to produce the maximum amount of these products. But other crops can be grown at periods when the most profitable crop does not demand attention. It therefore pays to fill in the time with these less profitable enterprises. In the South, the custom is to grow all the cotton that can be handled, but it pays to fill out with less profit¬ able crops so that one has a diversified farm. In the corn belt the maximum area of corn is grown, but it pays to fill out the season with oats, hay and other less profitable enterprises so as to provide a full year's work.

Intensity of Stocking. — In order to com¬ pare farms as to the livestock enterprises, it is necessary to reduce all animals to a comparable unit. One horse or cow is called an animal unit. Seven sheep, five hogs, or 100 hens are each called an animal unit. In each case twice as many young stock are required. In some of the most intensive dairy regions there are less than two acres of harvested crops per animal unit. In some parts of the wheat regions of the Northwest there are as high as 13 acres of crops per animal unit. In the cotton belt six acres is very common. In most parts of the United States the number is from two to seven acres of crops per animal unit. Regions that have three acres or less of crops per animal unit may be said to be heavily stocked, regions with four or more acres of crops are lightly

stocked.

An animal unit produces about one ton of manure per month. If the animals are in the barn half of the time, six tons of manure will be available per animal unit. In many parts of the North as high as eight tons are com¬ monly recovered for use on crop land. In the South the animals are in the barn so little that only a small amount of manure is recovered. If six tons are recovered per animal unit, and if there are three acres of crops per animal unit, then there will be two tons of manure for each acre of crops each year. An application of 10 tons per acre could therefore be made every five years. Similarly, if there are six acres per animal unit only 10 tons per acre could be applied every 10 years. Under this condition many parts of the farm are likely not to be manured at all.

When manure is spread by hand it is usually applied at the rate of 15 to 30 tons per acre. It is therefore evident that only on the most heavily stocked farms will the entire farm re¬ ceive manure. But with a manure spreader, and by making applications of 5 to 10 tons, the entire farm can be regularly manured in most regions of the North and east of the arid region.

Timeliness in Work. — Probably no other industry calls for such frequent changes in plans. The problem of timeliness is, therefore, much more difficult than in most industries. A farmer may plan to harvest crops, but a rain comes up and he changes to inside work. The storm seems to be over and he starts out to fix a road, but the rain comes on again and prom¬ ises to be a rainy day. He then gives up and goes to town to get machinery repaired and do trading.

Some farm operations, such as driving fence posts, require that the soil be very wet to work to the best advantage. Other operations, like plowing, require that it be moist but not wet. Plowing can be done when it is too wet to cultivate, harrow, or plant. Other operations, such as harvesting, require dry weather. In most regions the greatest problem is to get the dry weather work done. The different fields also differ in their characteristics. One must plow and plant the fields when he has a chance. The best drained land can be. used for the times when the wet land cannot be worked. The decision as to when to be doing a particu¬ lar piece of work is of great importance. The morning may start out wet and one may start doing one of the wet weather jobs but it may clear suddenly and demand a change before noon.

Not only is the problem of quick decisions and frequent changes of plans important, but it is often necessary to do two days' work in one.

If land is fitted for seeding and a rain comes it must be fitted again. If by working as long as one can see the field can be planted, it will save perhaps twice the time later and will avoid the danger of not getting the crop in on time. The rushes of work can be taken care of by a family in a way that is impossible on a very large farm. The farmer, being interested, does not complain about working a long day. He can do less work or easier work on a less important day and so rest up. His wife and children also help, particularly on the days of great pressure, so that there is a reserve supply of energy to meet the critical periods. When there are only one or two hired men working with the farmer he can often arouse in his men the same spirit for extra work at the essential time.

Size of Farm. — The constant vigilance that is required makes it impossible to supervise agricultural operations by the factory method. The one who makes the decision must be ((on the job® all the time.

On the other hand, one man is at a very great disadvantage on a farm. Many operations require two men. On a one-man farm, if the farmer goes to, town, or does chores or other hand labor, the horses are all idle. Some farm operations require four horses, others call for only two horses. Or if he keeps only two men he cannot take advantage of the work that can

be done with four. With two men it is pos¬ sible to so arrange the work as to make much more efficient use of horses. The most efficient farms usually provide work for two or three persons, — a farm that can be run by a farmer and his sons, or by a farmer and one or two hired men. Farms of this size produce food at the lowest cost. The strictly one-man farm or the very large farm find difficulty in competing with the two-man farms. Another reason for the failure of large scale farming is that the distances from the barn to the fields are too great with large farms. Those who attempt to operate large tracts of land are nearly always forced to some sort of a tenant system. By giving the operator a share of the product he becomes personally interested in the success of his operations and his family labor that might not be hired is all available for helping in the work.

George F. Warren,

Professor of Farm Management , Cornell Uni¬ versity.

FARM MORTGAGE BANKERS ASSO¬ CIATION. See Banks and Banking; Bank¬ ers Associations in the United States.

FARM POWER. Aside from the labor of man and the domestic animals on the farm, the sources of power available to the farmer are the natural forces of wind and falling water, and the mechanical power generated by engines through the combustion of some kind of fuel. The power afforded by the windmill, although the cheapest to install and maintain, is uncertain and comparatively feeble, and it has been em¬ ployed only to a limited extent. It has the serious disadvantage of not being portable power, and has to be used where it is located. In some few cases the power of windmills has been converted into electricity and thus dis¬ tributed about the farm. The various types of farm water-wheels develop a larger and more dependable power than windmills, but labor under the same disadvantage in point of porta¬ bility. The cheap, portable, reliable farm power of the present day is the gasoline or kerosene motor. The steam engine is also available but is of much heavier and more complex construc¬ tion, more expensive to buy and requiring more skill to maintain. As to cost of operation, the steam engine is undoubtedly the cheapest where there is wood on the farm. The cost of run¬ ning it is about one-sixth that of doing the same work with horses. Gasoline and oil motors are but little more expensive than steam ma¬ chinery, and consequently are much more in favor.

Gasoline engines for farm use are made in two distinct types : stationary and tractor. The former can be used for many kinds of work which can conveniently be brought to the en¬ gines — such as churning, pumping of water, corn shelling, feed cutting, threshing, etc. ; the tractor engine is for work which cannot be brought to the power — where the engine must go to the work — such as plowing and harrow¬ ing, seeding, mowing and reaping, and harvest¬ ing. The stationary types are adapted to several different kinds of fuel, burning indifferently kerosene, distillate or alcohol, as well as gaso¬ line. The tractor engines are comparatively heavy, ranging from 6,000 pounds upward. A tractor of that weight will do the same amount

of hauling as 12 horses, and do it continuously, without requiring time for rest. Heavier machines of 10,000 pounds will exert tractive power equal to 25 to 30 horses. These tractors are geared down to slow speeds of one and three-quarter to two miles per hour for use in plowing, which cannot be done faster. They burn gasoline as a rule. For farms within reach of an electric power plant there is the portable electric motor which is serviceable in a multi¬ tude of farm operations, even to doing the milking. (See Farm Machinery;

Hydraulic Ram; Water-wheel; Windmill). Consult Eighinger, S. R., and Hutton, M. S., (Steam Traction Engineering) (New York 1916) ; Hirshfield, C. F„ and Ulbricht, T. C., (Farm Gas Engines> (New York 1913) ; Page, V. W., (The Moderfi Gas Tractor) (New York 1913) ; Potter, A. A., (Farm Motors > (New York 1917) ; Shane, A., (Electric Power on the Farm) (New York 1915) ; Stephenson, J. H., (Traction Farming and Traction Engineering) and (Farm Engines and How to Run Them) (Chicago

1913).

FARM TENANCY. See Farm and Farm Problems.

FARM TYPES AND TENDENCIES.

See Farm and Farm Problems ; Farm Manage¬ ment.

FARMAN, Elbert Eli, American jurist: b. New Haven, Oswego County, N. Y., 23 April 1831; d. 1911. He was graduated at Amherst College in 1855, and admitted to the bar in 1858 and to the United States courts in 1862. He studied international law in Berlin and Heidelberg, Germany, in 1864-67; was district attorney of Wyoming County, N. Y., in 1868- 75 ; United States diplomatic agent and consul- general at Cairo, Egypt, in 1876-81 ; was a member of the International Commission to revise the judicial codes of Egypt, in 1880-81; judge of the mixed tribunal of Egypt in 1881— 84; and United States member of the Interna¬ tional Commission which examined the claims of the inhabitants of Alexandria for losses aris¬ ing from the bombardment in 1882, 1883 and 1884. He secured the obelisk <(Cleopatra's Needle® as a gift of the khedive to New York, in 1879 ; made large collections of ancient coins and Egyptian antiquities which he gave to the Metropolitan Museum of Art in New York. His publications include (Along the Nile with General Grant > (1904) ; and (Egypt and Its Betrayal > (1908).

FARMAN, Ella. See Pratt, Ella Farman.

FARMAN, far'mon, Henri, French aero¬ plane builder : b. May 1875. He began life as a painter at the ficole des Beaux-Arts, and then became a cyclist, and was champion several times. He then ran for Panhard cars and won the Paris-Vienna and several local races. He next opened a business in motor cars and is owner of the largest garage in Paris, called Palais de l'Automobile. Having enough of selling cars he turned his attention to flying, which had long been in his mind. His first trials were made at Issy les Moulineaux in No¬

vember 1907, and January 1908. He won the Prix Deutsch Archdeacon of 50,000 francs for the first (

official meeting. He continued his study of new models and made the first cross-country flight with his machine from Buoy to Rheims, alone and with passenger. He was the first man to fly in New York. He opened important works at Billancourt for the supply of machines to the French army and also other countries, in¬ cluding England.

FARMER, Henry Tudor, American poet: b. England 1782; d. Charleston, S. C., January 1828. While very young he emigrated to Charleston, S. C., where he continued to reside till his death. He published a small volume of poems entitled imagination, the Maniac's Dream, and Other Poems) (1819) ; also an (Essay on Taste. >

FARMER, Hugh, an English clergyman and theologian: b. near Shrewsbury, 20 Jan. 1714; d. Walthamstow, Essex, 5 Feb. 1787. He studied in the academy conducted by Philip Doddridge 1731-36. In 1737 he began to serve as chaplain for Mr. Coward and also was pastor of the dissenting congregation at Walthamstow and continued in charge until 1780. In 1761 he removed to London where he was afternoon preacher at Salter Hall (1761-72) and one of the preachers of the Merchants' lecture, 1762- 80. He was a trustee of Dr. Williams Founda¬ tion and of the Coward Trust. His works are (An Inquiry with the Nature and Design of Christ's Temptation in the Wilderne9S) (1761; 5th ed., 1822) ; (A Dissertation on Miracles' (1771); (An Examination of Mr. Le Moine's Treatise on Miracles' (1772) ;

FARMER, John, American genealogist: b. Chelmsford, Mass., 12 June 1789; d. Concord, N. H., 13 Aug. 1838. He published in 1829 a much valued (Genealogical Register of the First Settlers of New England.'

FARMER, John Bretland, English botan¬ ist : b. Atherstone, 5 April 1865. He was edu¬ cated at Magdalen College, Oxford. From 1887 to 1892 he was demonstrator of botany at the University of Oxford and Fellow of Magdalen College from 1889 to 1897. From 1892 to 1895 he was assistant professor of biology. In the latter year he became professor of botany at the Imperial College of Science and Technology, London. He has published (A Practical Intro¬ duction to the Study of Botany' ; (Plant Life,' also a number of memoirs, chiefly botanical and cytological. He edited the Annals of Botany and (The Book of Nature

Study' (6 vols.). With A. D. Darbishire he translated and edited De Vries, (Die Mutationstheorie.'

FARMER, Moses Gerrish, American elec¬ trician : b. Boscawen, N. H., 9 Feb. 1820; d. Chi¬ cago, Ill., 25 May 1893. He was graduated at Dartmouth College in 1844. He invented sev¬ eral electro-motors, one of which he used in his workshop to drive a lathe, and another on a miniature railway. On this railway he transported by electricity the first passengers ever so carried in the United States. In 1847 he moved to Framingham, Mass., and invented the telegraph fire alarm. His was the first house to be lighted (1858-59) by electricity. In

1865 he invented a thermo-electric battery and also built the first dynamo, and in 1880 patented an automatic electric light system. Besides these inventions he brought to light and perfected many others of general utility.

FARMER, Richard, English Shakespearian scholar: b. Leicester, 28 Aug. 1735; d. Cam¬ bridge, England, 8 Sept. 1797. In 1767 he pub¬ lished his (Essay on the Learning of Shakes¬ peare,' which passed through several subse¬ quent editions. In it he showed that Shakes¬ peare's knowledge of classical subjects was entirely obtained through translations, which he often followed very closely. He was ap¬ pointed master of Emmanuel College, Cam¬ bridge, in 1775, and was a prebendary of Canter¬ bury 1782-88, when he was appointed to a resi¬ dentiary prebend in Saint Paul's, London.

FARMERS, Retired. See Farm and Farm Problems.

FARMERS' ALLIANCE, a national or¬ ganization for improving agricultural conditions, advancing social life, securing favorable legisla¬ tion, etc. ; at first non-political, then political, then non-political again. Originating as a State body in Texas about 1876, it coalesced in 1887 with similar State bodies into a national one; and in 1889 joined the Knights of Labor in a common political party called the National Farmers' Alliance and Industrial Union, with a platform demanding more greenbacks, unlimited free coinage of silver, no national banks, anti¬ speculation laws and government ownership of all transportation lines. The southern branch added a demand for government loans at low rates, and sub-treasuries to buy and store farm products. In the West in 1890 the party put up its own candidates ; in the South it adopted and dictated the Democratic ; it carried the Kansas and Nebraska legislatures, held the balance in Illinois, Minnesota and South Dakota, and elected nine national repre¬ sentatives, and one senator each from South Carolina (nominally

Democrat), Kansas and South Dakota. In 1892 it fused with others and called itself the People's Party (q.v.), and nominated for President James B. Weaver, who received 1,041,021 votes; but the southern branch declined to change its political affilia¬ tions, and seceded, the Alliance proper going out of politics again. The Farmers Alliance, uniting with several other similar organizations, formed the Farmers' National Congress in 1914, which claimed to represent a membership of over 3,000,000 farmers. The congress advocated Federal aid for inland communications; proper protection for co-operative enterprises ; the illiteracy test for immigrants and the placing of a poll tax upon them. It opposed ship sub¬ sidies and interstate liquor traffic in dry terri¬ tory.

FARMER'S ALLMINAX, The, a parody

of the Farmers' Almanac issued annually from 1869 to 1880 by Josh Billings. It was very popular, the sales mounting to the hundreds of thousands.

FARMERS' CO-OPERATIVE MOVE¬ MENT, a world-wide phase of propaganda actively carried on in agricultural districts to secure efficient co-ordination and co-operation among farmers, so that the best results may be obtained in the harvesting of crops and food supplies. In the United States the movement

is fostered by the State Department of Agri¬ culture and the National Association of State Commissioners of Agriculture, and is aggres- ively carried on through various agencies. See Agricultural Associations ; Co-operation ; Farmers' Alliance; Farmers' Institutes; Farmers' National Congress; International Institute of Agriculture.

FARMERS-GENERAL, a privileged asso¬ ciation in pre-Revolutionary France, who leased the public revenue of the country. The system originated in the 14th century when the tax on salt was farmed out in order to raise money for the war with England. Thereafter other taxes were so leased or farmed and in 1720 a board of administration was formed with one of the farmers-general as president. The Minister of Finance had the power to select the farmers-general but the system led to the most corrupt practices, court favorites being often given a tax instead of a pension. Just previous to the Revolution the body of farmers-general numbered about 60. They turned in a fixed amount to

the treasury and all tax returns above this fixed amount went into their own pockets. The system was abolished by the consti¬ tution of 1791 and during the Revolution many of the ex-farmers-general were sentenced to the guillotine. The system was one of the principal causes of the Revolution, the farmers- general not being noted for their leniency in exacting the imports from the tax-paying pub¬ lic. Consult De Nervo, (Les finances fran- gaises sous l'ancienne monarchie) (Paris 1863) ; Lowell, (The Eve of the French Revolution (Boston 1892) ; Gomel, C., ˆes causes financieres de la revolution frangaise} (2 vols., Paris 1893).

FARMERS' INSTITUTES, gatherings of farmers held annually in the various States, sometimes under the direct management of the agricultural colleges and sometimes controlled by other State officers. The object of these institutes is in great part the bringing together of the workers in agricultural science and the practical farmers, for the discussion of ques¬ tions of mutual interest. The latest agricultural theories are presented and discussed and com¬ pared with the result of practical tests and long experience. They grew out of the public meet¬ ings held years ago under the auspices of the local State agricultural fairs throughout the United States ; and they stand for improve¬ ment in business and home life. Just as the agricultural fairs were carried on in different ways in different localities so the institute is- free in its general manner of procedure; but it is marked by characteristics common to all assemblies and localities. In some places the institutes meet for a half or a whole day once a month ; in others they are held once or twice a year and last several days. Their activities are more pronounced in the winter when the farmers have more leisure time. The develop¬ ment of farmers' institutes has been chiefly due to the impetus given to the agricultural in¬ terests of the country by the Morrill Land Grant Act of 1862. These gatherings are held regularly in all the States and in all the provinces of Canada. In 1899 over 2,000 insti¬ tutes were held in this country, and the special appropriations for this purpose aggregated over $140,000, not including $30,000 funds esti¬ mated as expended from other sources. In

1913 the funds of the various States had risen to $510,784.

In all the provinces of Canada, as in all the States of the Union, the institutes are regularly organized with officers possessed of both prac¬ tical and technical knowledge to direct them. Very frequently they meet under the auspices of the State Agricultural College in this coun¬ try and under that of the province in Canada. In the beginning of their history they made the mistake of going into politics, and they suf¬

fered for it; but since they have decided to tend strictly to the business for which they were organized, they have made great advance¬ ment.

The institute forms a clearing-house for the exchange of ideas, of experiences and of acquired knowledge ; and not the least valuable members are the graduates of agricultural col¬ leges, the practical teachers of the same, and the modern progressive, scientific farmer. The agricultural experimental stations contribute valuable help, also, to the meetings in the as¬ sistance which they lend to the organizers and promoters thereof. One of the most valuable features of the institute is the popular lecture, which is generally held in the evening, after the more technical work of the day's session. Movable schools also furnish the farmers, their sons, daughters and wives with valuable instruction in subjects relating to the conduct¬ ing of all matters pertaining to the farm. The Department of Agriculture of the United States has contributed to the improvement of the agri¬ culture of the country by collecting publications and placing them at the disposal of the farmer. It has also organized lecture courses in agri¬ cultural subjects, which it furnishes to institutes and lecturers, free of charge. These lectures are generally well illustrated with lantern slides.

In 1913 there were 7,926 regular institutes held in the United States ; and these occupied in all 10,578 days. In addition to these there were 800 independent institutes. The total at¬ tendance at these institutes was over 4,000,000. But this is only a part of the work done by them for they maintained 187 movable schools, which pretty well covered the country in con¬ junction with 25 educational trains. From 1903 to 1913 the attendance at the sessions of the institutes increased over 300 per cent while the increase of the appropriations was 175 per cent during the same period.

Bibliography. — Hamilton, legislation Re¬ lating to Farmers' Institutes* (Bulletin 241) ; (Farmers' Institutes and Agricultural Work in the United States) (Bulletin 83) ; (History of Farmers' Institutes in the United States) (Bul¬ letin 174) ; all of which may be had from the office of the Experimental Stations, United States Department of Agriculture.

FARMER'S LETTERS, a series of po¬ litical tracts, in which was denounced the British policy of taxing the North American colonies without representation or consent. The letters, 12 in number, were published in 1767 and were ostensibly written by a farmer. Later they were traced to a citizen of Pennsyl¬ vania, John Dickinson. The letters had a tremendous influence in educating and forming public opinion on the burning issues of the day.

FARMERS' NATIONAL CpNGRESS,

an organization having for its object the ad¬ vancement of the agricultural interests of the

Union, and composed of the same number of delegates from each State (or Territory) as the latter is entitled to in its representation in the United States Congress. The delegates are ap¬ pointed by the governors of their respective States or by some other State official. All heads of State bureaus of agriculture are con¬ sidered members, and one representative from each agricultural college. In 1916 it represented over 3,000,000 farmers. It urged Federal aid for inland communications, a head tax and illiteracy test for immigration, protection for co-operative enterprises, and opposed ship sub¬ sidies, free distribution of seed and interstate liquor traffic into dry territory. Consult Wood- burn, (Political Parties) (2d ed., New York

1914).

FARMHOUSE, The. See La Barraca.

FARMING. See Agriculture ; Agricul¬ tural Chemistry; American Farm Imple¬ ments; Dairy Industry; Cattle; Farm Man¬ agement; Farm Power; Farms and Farm Problems; Farmers' Institutes, etc.

FARMINGTON, Conn., borough of Hart¬ ford County, eight miles west of Hartford, on the New York, New Haven and Hartford Rail¬ road. It is the seat of Sarah Porter's Semi¬ nary for Young Ladies. Farming and fruit¬ growing are the principal interests . of the borough. Pop. 3,478.

FARMINGTON, Me., town, county-seat of Franklin County, on the Sandy River and the Maine Central and Sandy River railroads, 30 miles northwest of Augusta, on a direct route from the south to Rangeley lakes. It is a business and educational centre, and has several banks, hotels, a courthouse, a weekly paper and some manufactories. The town in¬ cludes several villages, of which Farmington Village (incorporated) is chief. Farmington Academy (1807) was succeeded in 1863 by a State normal school, which has graduated over 1,300 teachers. The Abbott Family School for Boys (1844ˆ opened in 1903 with new build¬ ings. Cutler Memorial Library (1903) is a model granite building. Here for years lived the author Jacob Abbott (q.v.) ; John S. C. Ab¬ bott (q.v.), was once a pastor here; and Lillian Norton

(Mme. Zoltan Dome), the prima donna, known as Madame Nordica was born here. Among the industrial establishments are machine shops, lumber and grist mills, wood¬ turning shops, carriage works and canning fac¬ tories. The waterworks are municipally owned. Pop. (1920) 1,650.

FARMINGTON, Mo., city and county- seat of Saint Francois County, 58 miles south¬ west of Saint Louis, on the Saint Louis, Iron Mountain and Southern and the Cape Girardeau Northern railroads. It is the seat of Carleton College (Methodist Episcopal) and Elmwood Seminary for Girls. A State insane asylum is situated here. It is the centre of a productive lead-mining region and has carriage and wagon works, lumber mills, machine shops, flouring mills, etc. It has three banks with $1,500 000 in resources and the assessed valuation is $1,400,-000. The waterworks and electric-light plant are owned by the city. Pop. (1920) 2,685.

FARMS, Abandoned. See Farm and Farm

Problems,

FARMS, Co-operative. See Farm and

Farm Problems.

FARMVILLE, Va., town, county-scat of Prince Edward County, about 40 miles south¬ east of Lynchburg, on the Appomattox River and the Norfolk and Western Railroad. Here is the State Female Normal School. In the vicinity is the Hampden Sidney College for Young Men. Farmville is in a fertile agri¬ cultural region, is an important tobacco-manu¬ facturing centre and has medicinal springs. There are plow-handle and overall factories and a creamery. The waterworks and electric- light plant are owned by the town. Pop.

(1920) 2,586.

FARMVILLE AND HIGH BRIDGE,

Engagements at (and the surrender of the Army of Northern Virginia at Appomattox Court-House). Farmville, on the south bank of the Appomattox, 70 miles southwest of Richmond, is noted as the place where General Grant opened his correspondence with General Lee which led to the surrender at Appomattox. After the battle of Five Forks (1 April 1865) and the successful assault on the Petersburg lines (2 April), Lee retreated and Grant pur¬ sued. Sheridan, with his cavalry and the Fifth corps, 3 April, pushed for the Danville Railroad,

keeping south of the Appomattox, followed by the Second and Sixth corps in the direction of Amelia Court-house, while General Ord with the Twenty-fourth corps and a division of the Twenty-fifth, moved along the Southside Rail¬ road for Burkesville. On 4 April Sheridan struck the Danville road near Jetersville and learned that Lee was at Amelia Court-house, eight miles northeast. He immediately en¬ trenched the Fifth corps and awaited the arrival of General Meade with the Second and Sixth corps. Meade found the roads so obstructed with Sheridan's cavalry that he did not get up until the afternoon of 5 April. Ord reached Burkesville on the evening of the 5th. He had been directed by Grant to cut the bridges in Lee's front, to intercept his movements toward Danville and Lynchburg, and await orders at Burkesville. To cut the High Bridge, four miles east of Farmville, Ord, before daybreak

of the 6th, sent two small infantry regiments (54th Pennsylvania and 123d Ohio), and 80 officers and men of the 4th Massachusetts cavalry, all under command of Col. Francis Washburn, with orders to push rapidly for the bridge and burn it. After Washburn had gone, Ord sent Gen. Theodore Read, his chief-of-staff, with a small party to overtake him and re¬ connoitre well before moving up to the bridge. Soon after Read had gone, Ord received a dis¬ patch from Sheridan that Lee was moving west of Jetersville and making apparently for Burkes¬ ville, upon which he put his command in position

to meet him and sent an officer to caution Read that Lee's army was in his rear and that he must return by pressing on, crossing the Appomattox, and going around by Prince Edward Court¬ house. This last officer was driven back by Lee's cavalry. Read overtook Washburn, took the cavalry into Farmville, examined the country, returned to the infantry and pushing on, was within two miles of High Bridge, when about noon, he ran into Lee's advance, Rosser's and Munford's divisions of cavalry. Read and Washburn drew up the little band of cavalry and 500 infantry and began one of the most gallant fights of the Civil War. Again and again they led the cavalry in successive charges. Read and Washburn fell mortally wounded, and at last not an officer of the cavalry remained alive or unwounded, to lead the men, and the entire command, cavalry and infantry, was enveloped and surrendered.

At 6 a.m. 6 April, the Second, Fifth and Sixth corps moved from

Jetersville up the line of the Danville road toward Amelia Court¬ house, where it was hoped to intercept Lee, but during the night Lee had moved west, and when this was discovered, after a march of four miles, the advance on Amelia Court-house was sus¬ pended and the three corps marched westward parallel to Lee's line of retreat and endeavoring to head him off or bring him to a stand. The Second corps came up to Gordon's corps at Flat Creek and was for a time checked but, fording the creek, drove Gordon off and fol¬ lowed him to Sailor's Creek, where he made a stand, but was again driven with a loss of 13 colors, three guns, several hundred prisoners and more than 200 wagons. During the day the Second corps had taken about 1,700 prisoners, four guns and more than 300 wagons and ambulances. Its loss was about 400 men. While the Second corps was thus engaged, the Sixth corps on its left, with the cavalry divisions of Crook and Merritt, had overtaken and at¬ tacked the commands of Ewell and Anderson on Sailor's Creek, routed them with a severe loss in killed and wounded, and took many thousand prisoners, among them six general officers, in¬ cluding General Ewell. The Confederates con¬ tinued their retreat. Longstreet with the divi¬ sions of Field, Heth and Wilcox marched to Farmville, crossed to the north bank of the Ap¬ pomattox and, on the morning of the 7th, began to move out on the road passing through Appo¬ mattox Court-house to Lynchburg. Fitz Hugh Lee with all his cavalry followed Longstreet. General Gordon with the other half of Lee's army, crossed at High Bridge. On the morning of the 7th the Union army continued the pur¬ suit, the cavalry, with the exception of one di¬ vision, and the Fifth corps moving by Prince Edward Court-house ; Ord, with his command, the Sixth corps and Crook's cavalry division on Farmville; the Second corps by the High Bridge road. With great difficulty Crook's cavalry waded the river above Farmville, and Gregg's brigade in moving out was fiercely assailed by Fitzhugh Lee and driven back across the river, Gregg and many of his men being captured. Meanwhile, Ord and the Sixth Corps had come up to find the bridges destroyed, the water too deep for fording and Lee's army in plain view on the opposite bank, drawn up for battle. The Second corps, pursuing Gordon, came to High Bridge just as Gordon's corps and Mahone's

division had crossed and set fire to it and the wagon road bridge below it. Barlow, whose division was in advance, threw forward his head of column, which seized the wagon road bridge, extinguished the fire and moved across, Ma¬ hone's division after some sharp skirmishing, retiring in a northwest direction, Gordon's corps moving along the railroad toward Farm¬ ville. Barlow followed Gordon, while Hum¬ phreys led Miles' and De Trobriand's divisions after Mahone

and at 1 p.m. came up to Lee's army in an entrenched position, its left four miles from Farmville, on the crest of a long slope of open ground, covering the roads to Lynchburg. Poague's 16 guns opened on him, he threw forward skirmishers, and an unsuccessful attempt was made to take the position in flank. Barlow was sent for but did not get up until sunset. Meanwhile Miles saw an opening and attacked with part of a brigade and was re¬ pulsed with considerable loss. Barlow, who had followed Gordon, attacked him and succeeded in cutting off a large train of wagons, which he destroyed, and then rejoined his corps, which bivouacked within 100 yards of Lee's position. The loss of the Second corps during the day was 571, and it had captured 19 guns, many wagons, and had held Lee from continuing his retreat, until such time as Sheridan and Ord were fast gaining his line of escape.

At 5 p.m. General Grant, from his headquar¬ ters at Farmville, wrote General Lee asking the surrender of his army. This was sent through the Second corps lines at half past 8, and within an hour Lee replied, asking the terms that would be offered on condition of his sur¬ render. During the night Lee retreated, Gordon leading and Longstreet bringing up the rear. The Second and Sixth corps followed Long¬ street closely, and Sheridan, with his cavalry, followed by the Fifth corps and Ord's com¬ mand, marched on the south side of the Appo¬ mattox, captured at Appomattox Station four trains of cars loaded with supplies for Lee's army, 25 guns, and a large park of wagons, and drove Lee's advance forces back to Appo¬ mattox Court-house. On the morning of 9 April Sheridan advanced but his cavalry was being pushed back just as Ord, who had marched all night, had formed in his rear, and the Army of Northern Virginia had made its last effort. Sheridan and Ord were in its front; the Second and Sixth corps were close on its rear, negotia¬ tions were in progress, hostilities were suspended and about 3 o'clock in the afternoon, 9 April, the terms of surrender were agreed upon and the War of the Rebellion was practically ended.

Bibliography. — (Battles and Leaders of the Civil War > (Vol. IV) ; Chamberlain, J. L., XLVI) ; Powell, his¬ tory of the Fifth Army Corps) ; Schaff, M., (The sunset of the Confederacy * (Boston 1912) ; Walker, (History of the Second Army Corps.*

E. A. Carman.

FARNABY, or FARNABIE, Thomas,

English educator and editor of classic texts; b. London, about 1575; d. Sevenoaks, 12 June 1647. He was educated at Merton College, Ox¬

ford, was converted to the Catholic faith, and

attended a Jesuit college in Spain. He accom¬ panied Drake and Hawkins on their last voy¬ age, saw some military service in the Nether¬ lands and is next found teaching in a grammar school at Martock, Somersetshire. Achieving a large measure of success there he removed to London and opened a school at Goldsmith's Rents, Cripplegate. This school was most suc¬ cessful, being attended by as many as 300 pupils, among whom were many from aristocratic families and many who rose to eminence in church and state. He bought an estate at Ox¬ ford, near Sevenoaks, Kent, and during the great plague of 1636 moved his school thither. In 1643, being suspected of participation in a royalist uprising, he was imprisoned. Farn- aby's works consisted of annotated editions of Latin authors — Juvenal, Martial, Lucan, Ovid, Persius, Seneca, Terence, etc. In 1641 ap¬ peared his (Systema grammaticum/ a Latin grammar which was written at the request of Charles I and intended to supersede those pre¬ viously in use in the public schools.

FARNAM, Henry Walcott, American po¬ litical economist: b. New Haven, Conn., 6 Nov. 1853. He was graduated at Yale in 1874 and studied also at the universities of Berlin, Got¬ tingen and Strassburg, receiving the degree of R.P.D. (Rerum Politicarum Doctor) in 1878. In 1878-80 he was tutor at Yale and since 1880 has . occupied the chair of political economy there. From 1881 to 1903 he occupied a similar chair at the Sheffield Scientific School. In 1914-15 he was nominated Roosevelt professor in Berlin, but was prevented by the war from going to Germany. From 1892 to 1911 he was on the editorial staff of the Yale Review and of the Economic Review from 1911 to 1912. In 1898-99 he served as chairman of the New Haven civil service board, and from 1887 to 1909 of the State Commission of Sculpture. Since 1901 he has served as president of the Connecticut Civil Service Reform Association. He published (Die innere Franzosische Gewor- bepolitik von Colbert bis Turgot* (1878) ; (Die Amerikanischen Gewerkvereine) (1879) ; Me¬ moir of Henry Farnam* (1899) ; (Deutsch- Amerikanische Beziehungen in der Volkwirt- schaftslehre) (in Schmoller Festgabe 1908) ; chapters on government insurance and work¬ ingmen's insurance in Germany in Wale Read¬ ings in Insurance) (1909) ;

FARNBOROUGH, England, an urban dis¬ trict of Hampshire, 33 miles southwest of Lon¬ don, on the London and Southwestern and the Southeastern and Chatham railways : Saint Michael's Catholic memorial Church was erected here in 1887 by the ex-Empress Eugenie and contains the tombs of Napoleon III and the Prince Imperial. The town is also the seat of a French Benedictine convent and is noted for its strawberry gardens, which supply the London markets. Aldershot North Camp is within the parochial limits of Farnborough. The town contains a large government aircraft factory. Pop. about 6,000, exclusive of the military.

FARNE, farn, or FERNE ISLANDS, or THE STAPLES, a group of islands in the North Sea, off the coast of North¬ umberland, England, some of them invisi¬

ble except at low tide. Saint Cuthbert lived for nine years on the largest island of the group (Fame or House) and died here (687) ; ruins of the old abbey of which he was prior, of the ancient chapel and of a peal tower still exist. These islands have been the scene of several dis¬ astrous shipwrecks, one of which, that of the Forfarshire steamer (1838), occasioned a dis¬ play of remarkable heroism by Grace Darling, daughter of the keeper of the lighthouse on Longstone. Another steamer, the Pegasus, going from Leith to Hull, was lost here in 1843 and 60 individuals perished. There are two lighthouses on the islands.

FARNELL, Lewis Richard, English archae¬ ologist: b. Salisbury, 19 Jan. 1856. He was educated at the City of London School and of Exeter College, Oxford. He became Fellow of the latter institution in 1880, went to the uni¬ versities of Berlin and Munich to study clas¬ sical archaeology and visited most of the muse¬ ums of Europe on the same quest. He trav¬ eled in Greece and Asia Minor. In 1883 he was appointed classical lecturer and in 1884 sub-rector of Exeter College, later becoming university lecturer in classical archaeology. In

1893 he became senior tutor of Exeter and in

1894 proctor of the university. In 1909 he was

elected the first Wilde lecturer in comparative religion and in 1911 became Hibbert lecturer. He is rector of Exeter College. His publica¬ tions include (An Englishman's Adventures on German Rivers) ; (Cults of the Greek States) (5 vols., 1896-1909) ; Evolution of Religion> (1905); (1907); /Greece and Babylon* (1911), and various articles on Greek archaeology, reli¬ gion and philology in various journals, Eng¬

lish and foreign. 8

FARNESE, the name of a princely family of Italy, whose origin dates from the middle of the 13th century. At that time it possessed the castle of Farneto, near Orvieto. Pope Paul HI (Alessandro Farnese) instituted the duchy of Parma and Piacenza in favor of his natural son, Peter Louis Farnese, whom he had begotten previous to his entry into holy orders. From 1545 to 1731 the Farnese were the sovereign dukes of Parma. The most celebrated members of this house were Pietro Luigi, natural son of Paul III, b. 1503; assassinated 1547. He built a citadel at Piacenza and ruled with great severity over his subjects. Despised and hated by the latter for his despotism and debauchery he was assassinated and Piacenza was handed over to Ferdinand de Gonzaga, the governor of Milan, by appointment of Charles V. Farnese, Octavius, son of the preceding: b. 1520; d. 1586. After his father's death he managed to retain hold of Parma but was unable to re¬ cover Piacenza at first until he received aid from Pope Julius III. He married Margaret of Austria, natural daughter of Charles V. His son, Alessandro Farnese, b. Rome, 1545; d. near Arras, 1592, followed his mother to Brussels, when she was made regent of the Netherlands. In 1571 he distinguished himself at the battle of Lepanto and a few years later on the death of Don Juan of Austria became governor of the Spanish Netherlands, where he was successful in re-establishing the author¬ ity of the King of Spain throughout the South-

ern provinces, by taking Brabant, Maastricht, Malines, Bois-le-Duc and Tournai. He was less successful in the North because of the sup¬ port given Holland and Zealand by Elizabeth of England. Called to France to help the Cath¬ olic cause he compelled Henry IV to raise the sieges of Paris and of Rouen. He died from the effects of a wound received before Caude- bec. His son and successor, Ranuccio, b. 1569; d. 1622, was a despot who alienated the support of the nobility. He cast his natural son, Ot¬ tavio, into prison where he perished miserably. Despite his cruelty he was a scholar and artist and embellished Parma with many monuments. He married Margaret Aldobrandini, grand¬ niece of Pope Clement VIII. He was succeeded by his second son, Odvardo, b. 1612 ; d. 1646, a prince remarkable for the elegance of his man¬ ners and his fastidiousness in dress. His son, Ranuccio II, b. 1630 ; d. 1694, succeeded him in the duchy. Francis, son of Ranuccio II, b. 1678; d. 1727, during the War of the Spanish Succession, placed himself under the protection of the church, but despite this, the

Imperial forces several times violated his territory. Since Francis had no children, it was agreed in 1720 between England, France, Austria and Spain, that the heritage of the Farnese house should pass to the eldest son of Elizabeth Farnese, consort of Philip V of Spain. With the death of Antonis, brother of Francis, in 1731, the male line became extinct and the suc¬ cession passed into the hands of the Infanta Don Carlos. Consult Gregorovius (History of Rome) (London 1900) ; Scarabelli, (Storia civile dei ducati di Parma5 (Piacenza 1858); Pezzano ˆStoria della citta di Parma5 (Parma

1859).

FARNESE, Alessandro (Duke of Parma), a-les-san'dro far-na'se, Italian general : b. Rome 1545; d. Arras, France, 3 Dec. 1592. He served his first campaign under Don John of Austria, and distinguished himself in the battle of Le- panto in 1571. In 1577 Philip II ordered him to lead back the Spanish troops, which Don John had been obliged to dismiss from Flan¬ ders ; and Don John dying that year, Alessan¬ dro was made governor of the Spanish Nether¬ lands. He recovered Maestricht and several other cities, and succeeded in reconciling the Catholic part of the insurgents to the Spanish government. The Protestants, however, formed the Union of Utrecht (1579), and called in the Duke of Anjou, a brother of Henry III of France, to defend them. He appeared at the head of an army of 25,000 men ; but Alessandro was constantly successful, capturing Antwerp (1585), compelling Henry IV to raise the siege of Paris (1590), and relieving Rouen (1591).

FARNESE, Alessandro. See Paul III, Pope.

FARNESE, Elizabeth. See Elizabeth Farnese.

FARNESE BACCHUS, a torso of Bac¬ chus, an example of Greek sculpture of the 4th century b.c. It is in the National Museum at Naples.

FARNESE BULL, a group of statuary representing Dirce, whom the sons of Antiope, her slave, are preparing to bind to the- horns of the wild bull, which Dirce had intended to be

the instrument of her vengeance upon Antiope. This is the most elaborate and dramatic, almost melodramatic, group to be found among the monuments of Greek art. It is the work of the vivacious Rhodian school, executed by Apollo¬ nius and Tyriscus. It was transported to Rome, and there lost sight of for some hundreds of

years. It was dug up in excavating the baths of Caracalla and in 1786 sent from the Palazzo Farnese to the National Museum at Naples.

FARNESE HERCULES, a colossal statue, dating from the age of Hadrian, supposed to be a marble copy by Glyeon of a bronze by Lysippus. It is an example of the turgidity and exaggeration which marked the decadence of Greek sculpture, wherein passion for scien¬ tific display triumphs over all sense of ideal beauty, proportion and repose. Hercules is represented as leaning on his club, holding in one hand the Hesperidian fruit. The statue was dug up in the baths of Caracalla and passed through the Farnese family to the museum at Naples.

FARNESE HOMER, a bust of the Father of Poetry, which evidently belongs to the later period of Greek sculpture. It is in the Na¬ tional Museum at Naples.

FARNESE JUNO, a colossal head, a copy of a bronze original, representing Hera, <(the Queen of Gods.55 It is in the National Mu¬ seum, Naples.

FARNESE MINERVA, The, an archaic statue of Athene, found at Velletri, at the foot of the Alban Hills, Italy. It is supposed to be a copy of the chryselephantine statue of Phid¬ ias, which stood in the main shrine of the Parthenon.

FARNHAM, farn'am: Eliza Woodson Bur- haus, American philanthropist : b. Rensselaer- ville, N. Y., 17 Nov. 1815; d. New York, 15 Dec. 1864. She traveled extensively; returned to New York in 1841 ; visited the State prison and lectured to the women convicts ; and was ma¬ tron of the Sing Sing State Prison for four years. She was the author of California, Indoors and Out5; (My Early Days5 (1859); and (Woman and Her Era5 (1864), her most finished work.

FARNHAM, Ralph, American soldier: b. Lebanon, Me., 1756; d. Acton, Me., 1861. He was the last survivor of the Battle of Bunker Hill, and the first white settler in Acton. A public concert was given in his honor in Bos¬ ton, October 1860, at which he was present. He was 104 years, 9 months and 19 days old when he died.

FARNHAM, Roswell, American soldier and lawyer: b. Boston, Mass., 23 July 1827; d. 1903. He was graduated at the University of Vermont in 1849, admitted to the Orange County bar in 1857, and served as State attorney 1859-61. During the Civil War he was suc¬ cessively lieutenant of the 1st Vermont regi¬ ment; provost-marshal of Newport

News, Va. ; and lieutenant-colonel of the 12th Vermont regiment from enlistment to disbandment. He was governor of Vermont 1880-82.

FARNHAM, or WEST FARNHAM,

Canada, in the province of Quebec, on the Ya- maska River, the Canadian P. and the C. V. railroads, about 40 miles southeast of Montreal.

There is a Roman Catholic college, convent and hospital. Tobacco growing is an industry; there are railway workshops; beet-sugar manufacture and dairy products. Pop. 3,560.

FARNHAM, England, a market town of Surrey, 35 miles southwest of London, on the Wey, and on the London and Southwestern Railway. It is the seat of Farnham Castle, the ancient palace of the bishops of Winchester, first built by Henry de Blois, brother of King Stephen. It was razed by Henry III, but re¬ built and garrisoned by Charles I. In 1662-84 it was restored by Bishop Morley. Saint An¬ drew's Church is an example of the transition period of Norman and Early English archi¬ tecture. It was originally a chapel of ease to Waverley Abbey, the earliest Cistercian house in England, founded in 1128. The (Annales Waverlienses) are believed to have suggested to Scott the name of his first novel. Farnham town hall and exchange are in the Italian style ; it has also a grammar school, and a school of science and art. It was once noted for the manufacture of cloth. Hops of fine quality are grown in the neighborhood. William Cobbett was born in Farnham and is buried in Saint Andrew's churchyard. Hester Johnson, Dean Swift's ((Stella,® was the daughter of a steward of Sir William Temple, who lived at Moor Park near Farnham. The town is a favorite residential centre and its proximity to Aldershot Camp has stimulated its commercial activity. The town grew up round the castle of the bishops and belonged to the latter for centuries. The waterworks and lighting plants are munic¬ ipally owned. Pop. 7,365.

FARNUM, Dustin, American actor : b. Hampton Beach, N. H., 27 May 1876. He made his debut with the Ethel Tucker Company in 1897, later appeared with Margaret Mather for 18 months and two seasons with Chauncey 01- cott. He appeared in (The Virginian* (1904) ; (The Ranger* (1907) ; (The Rector's Garden) (1908). He toured as Jim Carston in (The Squaw Man* in 1909 and as Lieutenant-Colonel

Morrison in (The Littlest RebeP in 1911. In 1913 he appeared in a revival of (Arizona.*

FARNUM, William, American actor, brother of Dustin Farnum : b. Boston, in the late seventies. His first public appearance on the stage took place at Richmond, Va., in (Julius Caesar.* He was next member, of a stock company in Boston and subsequently toured the country with Margaret Mather and Olga Nethersole. His greatest successes were achieved in 1907 in (Ben Hur) and (The Prince of India. * The following year he played in (Society and the Bulldog) and in 1911 appeared in (The Littlest RebeP in which his brother Dustin was starred.

FARNWORTH, farn'werth, England, an urban district in Lancashire, three miles south¬ east of Bolton. It has a grammar school founded in 1715, and among its industrial es¬ tablishments are paper-mills, iron foundries, cotton-mills, collieries, brick works, etc. The Bolton waterworks are at Farnworth. Pop.

28,131.

FARO, fa'ro, Portugal, a seaport on the south coast, capital of the district of Faro (pop. 272,861), on a bay protected by islands. It con¬ tains an old castle surrounded by Moorish forti¬

fications. The town is well built, and has a fine square, a cathedral and a number of good schools. There is a considerable trade, chiefly in oranges, dried fruits, oil, cork, wine, etc. Deposits of antimony and of salt are in the neighborhood. In 1722 and 1755 the city suf¬ fered great damage and loss of life from earthquakes. Pop. 12,680.

FARO, fa'ro, is a gambling game pure and simple and one of the oldest (games.

A pack of cards is fastened in a clip, face down¬ ward, so that one card at a time can be with¬ drawn. The spectators, before it is turned face upward, bet, some that it will be one kind of card in value, such as ace, king, queen or jack-, others that it will have this or that number of <(pips® on it ; others that it will be red or black. When all have been drawn but the last three the betting is restricted as to their order of ap¬ pearance. Faro was introduced into France by the Venetian Ambassador in 1674, in a form like bassette ; but so many nobles were ruined by this game that Louis XIV made a law against it. To elude this law it was called pour et contre, which gave rise to new prohibitions, to evade which the name Pharaoh was adopted. Faro is

not a common game in the United States, although it is played at the large gam¬ bling houses in certain of the large cities, in the Far West and on the Pacific Coast. See Gam¬ bling.

FAROE, fa'ro, or FAROER ISLANDS

(that is (

FARQUHAR, far'kwar, George, Irish dramatist: b. Londonderry 1678; d. April 1707. The son of a clergyman and himself intended

FARQUHAR-

for the Church, he was a student at Trinity College, Dublin, but became an actor, and' by accident having stabbed a fellow-player during a performance, gave up acting for good. About 1696-97 he went to London, where he com¬ menced writing for the stage. His first pro¬ duction was (Love and a Bottle,' performed with great success in 1699. In 1700 he became a lieutenant in Orrery's Regiment, but later sold his commission. In 1700 he added to his reputa¬ tion by his comedy of (The Constant Couple,' in which, under the character of Sir Harry Wildair, he exhibited a lively picture of the foppish fine gentleman of the end of the 17th century. In 1701 appeared (Sir Harry Wildair,' a sequel to the former; and the following year he published a volume of Miscellanies.' (The Inconstant, or the Way to Win Him,' appeared in 1703, and is among those which have kept possession of the stage. In 1706 appeared (The Recruiting Officer,' one of his most popular plays; and this was succeeded by (The Beaux' Stratagem,' which is reckoned his masterpiece. The last named was written in six weeks during its author's fatal illness ; he had been given £30 for the copyright before beginning it; and it was the rage of the town while he lay dying in poverty. His wit is genuine and spontaneous, and his characters are admirably supported and drawn from nature. Ireland, the recruiting offi¬ cer, the disbanded soldier, love and the bottle — types and subjects are all done to the life. His plots excel in the arrangement of incidents and in unity of action. The libertinism of language and sentiment which his works exhibit cannot be defended ; but it was the vice of the age rather than the writer, who was much less culpable in this respect than Dryden or Wycher¬ ley. Consult his (Dramatic Works,' edited with a by Ewald (London 1892).

FARQUHAR, Norman von Heldreich,

American naval officer: b. Pottsville, Pa., 11 April 1840; d. 3 July 1907. He was graduated at Annapolis in 1859; was acting master in

the African squadron engaged in the suppression of the slave trade 1859-61 ; and, during the Civil War, served in the North Atlantic blockading squadron. He commanded the Trenton when she was wrecked at Apia, Samoa, in 1889 ; be¬ came chief of the Bureau of Yards and Docks in 1890; and commandant of the Norfolk navy yard. He became rear-admiral in 1899, and retired 1902.

FARQUHARSON, Joseph, Scottish painter: b. 1842. He inherited his love for painting from his father, who himself was an artist of some note. He learned his art in Edinburgh, and from 1859 to 1881 his pictures regularly appeared in the annual exhibitions of the Royal Scottish Academy. In 1880 he deter¬ mined to perfect himself by a visit to the Parisian ateliers, and for several winters worked there under Carolus Duran. In 1900 he was elected an associate of the Royal Acad¬ emy and in 1915 an Academician. The repro¬ ductions of his Scottish winter scenes in black and white have attained wide popularity. Among his most noted pictures are (Day's Dying Glow' (1873); 'Wonderland' (1879); 'Joyless Winter Days' (1883) ; (The English Vintage' (1884) ; 'In Cairo' (1886) ; 'Under the Palm Trees' (1887) ; (Summer Days' (1887) ; My Heart's in the Highlands' (1890) ;

(He Led Them Wandering O'er the Sandy Way' (1891); 'Leaving the Hills' (1892), etc.

FARQUHARSON, Martha. See Finley, Martha.

FARRAGUT, far'a-gut, David Glasgow, American naval officer: b. Campbell's Station, Tenn., 5 July 1801 ; d. Portsmouth, N. H., 14 Aug. 1870. His mother, Elizabeth Shine, sprang from the Scottish family of Maclver. His father, George Farragut, was born on the island of Minorca in 1755. He was descended from an ancient and noble Spanish family, originally of Aragon but for 400 years of the Balearic Islands, where they held many positions of trust and responsibility. George Farragut came to America in 1776, espoused the colonial cause and served creditably in the army, is said to have saved the life of Colonel Washington at the.battle of the Cowpens, and was afterward a sailing master in the navy.

Commander David Porter had been a ship¬ mate of George Farragut. The latter had been transferred to the naval station at New Or¬ leans and had bought a plantation on the Pasca¬ goula River, where Porter visited him. The commander took a great fancy to David, and with his father's consent — his mother being dead — practically adopted him

with the intent of putting him in the navy.

David Farragut was warranted midshipman on 17 Dec. 1810, being less than 9l/2 years old. He had been nearly two years at school in Chester, Pa., when in August 1811 he was or¬ dered. to the frigate Essex, Porter's ship. He was in all the -minor engagements before the famous Essex sailed on her unprecedented cruise to the Pacific. Such was the scarcity of officers that in June 1813 the little midshipman, not quite 12, was made prize master of the whaler Barclay. The English captain was sent along as adviser. He attempted to take things into his own hands, but Farragut, with a cool¬ ness and courage remarkable, retained command and brought his vessel into port.

He was slightly wounded in the terrific bat¬ tle in which the Essex was destroyed by the Phoebe and Cherub. During a crisis in the action Porter actually sent this stripling to shoot a seaman who was reputed to be flinching from his gun. Farragut would have carried out his captain's orders if he had been able to find the man. In writing his report to the Secretary of the Navy Porter was compelled to say that Far¬ ragut was too young for the promotion he had earned by his gallant conduct.

After the war he remained in the service, taking advantage of such educational oppor¬ tunities as were afforded him between and dur¬ ing his cruises. In the spring of 1819 he was appointed acting lieutenant of the brig Shark, being then 18 years of age. In 1823 cruised in the West Indies against Cuban pirates. He was married in September 1823 to Miss Susan C. Marchant of Norfolk. He was commissioned lieutenant 23 Jan. 1825. In 1828 witnessed the capture of San Juan de Ulloa by the French while in command of the Erie. Mrs. Farragut died 17 Dec. 1840, leaving no children. He was commissioned commander 9 Sept. 1841 and in December 1843 married Miss Virginia Loyall of Norfolk; by her had one son. During the Mexican War Farragut commanded the Sara¬ toga. Had no opportunity for distinction and

became involved in a dispute with Com. M. C. Perry, commanding naval forces. August 1854 established Mare Island Navy Yard, Cal. ; com¬ missioned captain 14 Sept. 1855. In general, his service between 1815 and 1861 was arduous and exacting and was diligently and successfully performed. His devotion to Union sentiment forced him to

leave Norfolk in April 1861. Removed his family to Hastings-on-Hudson, N. Y., and at first vainly sought orders to active service.

In January 1862 was given command of the Western Gulf blockading squadron and ordered to open the mouth of the Mississippi River by taking New Orleans, which was defended by two forts, a river fleet of 17 vessels, includ¬ ing fireships and rams. The way up the river was barred by a boom. Farragut had a superb fleet of 6 heavy ships, 16 gunboats, 21 mortar vessels and 5 smaller craft.

On 24 April 1862 the boom was broken, the forts passed and the river defense fleet annihi¬ lated after a sanguinary and desperate battle. New Orleans surrendered four days later. The daring of the attack was only equaled by the skill with which it had been planned. Three vessels of the fleet failed to pass the forts. The Vanina was sunk, the flagship Hartford grounded in the midst of the action and was set on fire by a fireship pushed against her by the Confederate ram. She was got off in safety, however. As Farragut said, <(They had a rough time.®

Ordered to clear the Mississippi, in June 1862, Farragut passed the batteries at Vicks¬ burg, but there being no land force there to co¬ operate with him he repassed the batteries and returned to New Orleans. Was commissioned rear-admiral 16 July 1862, the first in the United States service. On 14 March 1863 attempted to take his fleet past the Confederate works at Port Hudson. Grant was then operating against Vicksburg. Farragut perceived that if he could get ships below Vicksburg he could prevent Confederate forces in that city from receiving supplies and reinforcements from west of the Mississippi. Farragut's conception was strategically sound and brilliant. He boldly endeavored to carry it out.

Still in the Hartford, with a gunboat lashed alongside, he passed the batteries under a ter¬ rific fire. None of the other vessels succeeded in getting past. The Mississippi, of which George Dewey was the executive officer, grounded, was set on fire by Confederate shells and burned to the water's edge. Farragut had only partially succeeded. Still the Hartford and the Albatross patroled the river and practi¬ cally cut all communication west of Vicksburg.

After the fall of Port Hudson he returned to New Orleans and on 1 Aug. 1863 sailed for New York to recuperate his health, impaired by his arduous labors. In January 1864 took command of the naval forces acting against Mobile. On the morning of 5 August entered the bay. The mouth was protected by two formidable forts, Morgan and

Gaines. The nar¬ row channel was obstructed by piling and lines of floating torpedoes. Farragut's fleet com¬ prised 30 vessels, of which 8, including the flag¬ ship Hartford, were steam sloops-of-war of the first class. There were 4 monitors and 18 gun¬ boats.

He attempted the passage with seven of his heavy sloops, each one lashed to a gunboat on its port side. The four monitors, the Tecumseh leading, were sent ahead, followed by the Brooklyn-0 ctorara couple, then the Hartford- Metacomet couple, and the other ships in suc¬ cession. Farragut had ordered the column to pass close under the walls of Fort Morgan, through an opening left free of torpedoes for blockade runners.

At 7 :45 a.m. the Tecumseh opened fire. The Confederate batteries did not reply until 20 minutes later. In Mobile Bay lay three gun¬ boats and the ironclad ram Tennessee (Com. Franklin Buchanan), a match, it was believed, for the whole Union fleet. As Farragut approached, the ram took a position behind the torpedo line. In his eagerness to engage this redoubtable foe, Craven, on the Tecumseh, dis¬ obeyed the admiral's order, and instead of pass¬ ing through the opening, headed for the Ten¬ nessee. He struck a torpedo and was blown up just as the Brooklyn got fairly under fire. Striking empty shell boxes thrown overboard from the vessels preceding, it was thought she was in danger of torpedoes. She stopped and swung with her head toward the fort where none of her guns bore. The Confederates poured a rain of shot and shell upon her. The Hartford, coming up fast, nearly fouled the Brooklyn. The hesitant ships were bunched and made a target for every Confederate gun. The battle seemed lost.

Farragut, ascertaining that the Brooklyn had stopped for fear of torpedoes, ordered the Hart¬ ford to the head of the line, giving utterance to that immortal phrase : ((Damn the torpedoes ! Go ahead ! ® The Hartford passed the Brook¬ lyn, narrowly escaping shoals to port and raced up the bay toward the Tennessee. It was now impossible to pass through the designated chan¬ nel and Farragut drove the Hartford across the torpedo line. The example of the admiral put spirit into the Brooklyn and with the other ships she followed the flag. Fortunately no other torpedoes exploded and the whole fleet successfully passed the forts after a bloody and desperate battle.

The Tennessee had ranged along the Union ships and, immune to their fire, had shelled them at will. As soon as the passage had been made, the Union gunboats were cast off from the frigates and the Confederate gunboats were captured or driven to the shelter of Fort

Mor¬ gan. At 9 a.m. the Tennessee, with surpris¬ ing gallantry, came up toward the Middle Ground to engage the Union fleet. To this battle Farragut was nothing loth. By his or¬ ders the wooden ships were hurled upon their antagonist. The Monongahela struck her a ter¬ rific blow at a right angle. The Lackawanna repeated the ramming tactics. The bows of the wooden ships were stove in to the water line. Both ships were raked by the Tennessee's rifles, their return broadsides doing no damage to the iron plating. The Tennessee made straight for the Hartford, which, was bearing down directly upon her, bows on. One or the other ship would have been sunk had not the Tennessee swerved so that the Hartford struck her a glancing blow. The ram was now beset by all the vessels of the Union fleet which could get at her. She was rammed, hammered and

pounded. The monitors with their heavy guns were racking her from stem to stern. In the melee the Lackawanna rammed the Hartford, cutting her down to the water's edge. Finding his ship would still float, Farragut ordered her again to ram the Tennessee. By this time the ironclad's smokestack had been shot away, the casemate was an inferno, the heavy battering had jammed the port shutters, shot had entered through the ports, not a gun could be fired, steam ran down in the boilers. She could neither fight nor fly, so she surrendered, after one hour of as fierce fighting as was ever recorded.

During the passage of the forts Farragut had taken position in the main rigging in order to get above the smoke of the battle and be able to direct the manceuvers of the fleet the better. The quartermaster had passed a lashing around the admiral so that in case he should be wound¬ ed and lose his footing he would not fall to the deck.

In the battle Farragut should have led in the Hartford. It was only the urgent repre¬ sentations of his captains that made him take the second place. The battle was nearly lost by the gallant Craven's disobedience of orders, and that it was finally won was due to the personal initiative of the admiral himself.

This completed his service during the war. He was 64 years old when he fought the battle of Mobile Bay. His health was quite broken. He was commissioned vice-admiral 23 Dec. 1864; admiral 26 July 1866;

sailed 28 June 1867 from New York in the steam frigate Franklin for an extended cruise in European waters, where he received such a welcome and was ac¬ corded such honors as have been tendered no other American save General Grant. He re¬ turned to New York on 10 Nov. 1868, visited the Pacific Coast in the summer of 1869 and died 14 Aug. 1870. He was accorded the honor of a public funeral in New York 30 September, and was buried at Woodlawn Cemetery, West¬ chester County.

Farragut was a rather small man with broad shoulders and a well-knit, vigorous frame. His face was long with a broad high forehead and an aquiline nose. His complexion was dark and his eyes brown. He was a cultivated gentleman of the highest type, a most accomplished officer, a lion in bravery, a woman in gentleness. He was a simple-minded Christian of a high and humble type, a communicant of the Protestant Episcopal Church. A statue of him by Saint Gaudens stands in Madison Square, New York; one by Kitson in Boston; another by Vinnie Ream Hoxie in Washington. In the church of the Incarnation, New York, is a mural tablet, with a bas-relief, of the admiral by Launt Thompson. Consult (Life and Letters, > by his son; Mahan, (Admiral Farragut > in the (Great • Commanders Series) ; Barnes, (Admiral Farra- gut) ; Spears, (David G. Farragut* (1905) ; Parker, (Battle of Mobile Bay) ; Brady, (The Southerners.*

Cyrus Townsend Brady.

FARRAKHABAD. See Farukhabad.

FARRAND, Livingston, American an-, thropologist and educator: b. Newark, N. J., 14 Tune 1867. He was graduated at Princeton in 1888, and at the College of Physicians and Sur¬ geons ol Columbia University in 1891. He

studied at Cambridge University in 1891-92 and at the University of Berlin in 1892-93. From 1893 to 1901 he was instructor in psychology, from 1901 to 1903 adjunct professor, and from 1903 to 1914 professor of anthropology at Co¬ lumbia University. In 1914 he was chosen president of the University of Colorado. In 1921 he became president of Cornell. He has published (Basis of American History * (1904), and contributions to professional publications.

FARRAND, Max, American educator : b. Newark, N. J., 29 March 1869. He was gradu¬ ated at Princeton University in 1892 and re¬ ceived the degree of D.Ph. from that university in 1896. He is a graduate student of history of the universities of Princeton, Leipzig

and Heidelberg. From 1896 to 1901 he was suc¬ cessively instructor, associate professor and professor of history at Wesleyan University. From 1901 to 1908 he was professor and head of the department of history at Leland Stan¬ ford Junior University. In 1905-06 he was acting professor of American history at Cor¬ nell and in 1908 was appointed to the chair of history at Yale University. He has published legislation of Congress for the Government of the Organized Territories of the United States, 1789-1895 * (1896) ; translation of Jel- linek's declaration of the Rights of Man and of Citizens) (1901) ; (Records of Federal Con¬ vention of 1787* (3 vols., 1911) ; (The Framing of the Constitution (1913), and contributions to the American Historical Review and other historical periodicals.

FARRANT, far'ant, Richard, English com¬ poser: b. 1530; d. 1580. Very little is known of his history. He was a gentleman of the Chapel Royal for some time up till 1564, when he be¬ came organist and choirmaster of Saint George's, Windsor, but in 1569 he was again appointed to the Chapel Royal. His music is ecclesiastical, and is distinguished by purity, simplicity, tenderness and elevation of tone. The anthems (Call to Remembrance, > and (Hide not Thou Thy Face,* composed by him, are well known and highly esteemed by lovers of good music. The exquisitely beautiful anthem, (Lord, for Thy Tender Mercies' Sake,* has been attributed to him, but also by early writers to John Hilton.

FARRAR, Adam Story, English clergyman : b. London, 20 April 1826; d. Durham, England, 11 June 1905. He was graduated at Saint Mary's Hall, Oxford, 1850; M.A. Queen's Col¬ lege 1852; B.D. 1864; Michel Fellow of Queen's College, Oxford, 1852-63; public ex¬ aminer in classics and mathematics 1854-56 ; tutor at Wadham College 1855-64; select preacher at Oxford 1856-57, 1869-70; Bampton lecturer 1862 ; select preacher at Cambridge University 1875, 1881. From 1864 until his death he was professor of divinity and eccle¬ siastical history in the University of Durham. He was succeeded by R. J. Knowling. He was made canon of Durham in 1878. His most im¬ portant work is (A Critical History of Free Thought in Reference to the Christian Religion*

(1862).

FARRAR, Edgar Howard, American law¬ yer: b. Concordia Parish, La., 20 June 1849. He was graduated at the University of Virginia in 1871 and studied law at the University of

Louisiana, being admitted to the bar in 1872. In 1878-80 he was assistant corporation counsel and in 1880 corporation counsel of New Orleans. He was for years chairman of the Executive Committee of One Hundred to reform the mu¬ nicipal government of New Orleans. He was chairman of the committee of safety formed to prosecute the Mafia assassins of the chief of police and led the campaign which defeated the proposition to extend the charter of the Louisiana Lottery. He was one of the organ¬ izers of the National Democracy in 1896 and made a notable address on the money question at the Indianapolis Convention. In 1906-08 he was president of the Louisiana Tax Commission and in 1910-11 was president of the American Bar Association. In 1882 he was selected by Paul Tulane as one of the trustees of the fund exceeding $1,000,000 to found Tulane Univer¬ sity.

FARRAR, Eliza Ware Rotch, American writer : b. Flanders, Belgium, 1791 ; d. Spring- field, Mass., 22 April 1870. She married Prof. John Farrar of Harvard University. Her works include (The Children's Robinson Cru- soe) ; (The Story of Lafayette* ; (The Youth's Love-Letters) ; (Congo in Search of His Mas¬ ter } (1854) ; and (Recollections of Seventy

Years* (1865).

FARRAR, Frederic William, English cler¬ gyman and. author : b. Bombay, 7 Aug. 1831 ; d. London, 22 March 1903. He studied at King William's College, Isle of Man, and Trinity College, Cambridge, having gained one of the college scholarships. He was ordained deacon in the Established Church 1854 and priest in 1857, and for 16 years was an assistant master at Harrow. From 1871 till 1876 he was head master at Marlborough College, resigning on his appointment as a canon of Westminster and rector of Saint Margaret's. In 1883 he was appointed archdeacon of Westminster, and in 1895 became dean of Canterbury. From 1890 till 1895 he acted as chaplain to the House of Commons. Besides identifying himself with various social and philanthropic movements, he published many popular and able works of vari¬ ous kinds. In fiction he published (Eric, or Little by Little > (1858) ; (Julian Home: a Tale of College Life) (1859) ; (Saint Winifred's* (1862) ; (Gathering Clouds: a Tale of the Days of Saint Chrysostom) (1895) ; in philology; (Origin of Language) (1860); (Families of Speech) (1870); (Language and Languages* (1878), etc.; and on theological and religious subjects: < Seekers After God) (1868); (The Witness of History to Christ* (1871) ; (Life of Christ* (1874), a work

which achieved ex¬ traordinary popularity; (Life of Saint PauP (1879), also highly popular; (Early Days of Christianity* (1882) ; (History of Interpreta¬ tion (1885) ; (Sermons and Addresses in America) (1886); 'Eternal Hope) (1888); 'Lives of the Fathers* (1889), a popular work; 'The Bible : Its Meaning and Supremacy) (1897); (1897); 'The Life of Lives* (1900). In August 1885, he came to the United States, thereby realizing what he said had been one of the desires of his life. He remained in this country until the beginning of December, traveling, visiting friends and lec¬ turing. He was a man of great eloquence, tremendous energy and was greatly beloved by

all ranks, high as well as low. His most in¬ timate American friend was Phillips Brooks.

FARRAR, Geraldine (Mrs. Lou Tellegen), American grand opera singer : b. Melrose, Mass., 28 Feb. 1882. She began her musical education under Mrs. Long at Boston, and under Madame Thursby of New York. Later she studied at Paris and Berlin. On 15 Oct. 1901 she made her debut at the Royal Opera House, Berlin, as Marguerite in (Faust.) She achieved an instant success and was at once engaged for three years in Berlin, where she was a prime favorite. In 1906 she returned to her native land, and thereafter appeared as a member of the Metropolitan Opera Company, New York. Her principal roles include Marguerite, Butter¬ fly, Manon, Micaela, Mignon, Elizabeth, Tosca, Zerlina, Juliet, Gilda, Violetta, etc.

FARRE, far, Jean Joseph Frederic Albert,

French general: b. Valence, Drome, 1816; d. 1887. In 1859 he led the pioneer corps of the army of occupation at Rome and in the Franco-Prussian War had charge of the fortifications of Arras. In November 1870 he was placed in command of the three divisions of the Army of the North. When Manteuffel drove him from before Amiens, he was replaced by Faid- herbe. In 1879 he was appointed Minister of War, and during his administration he removed from office all officers suspected of favoring the Legitimist or Bonaparte cause. Becoming un¬ popular because of his measures against Tunis he was superseded as Minister in November 1881. He was elected life senator in 1880.

FARRELL, James A., American steel manufacturer: b. New Haven, Conn., 1863. He was educated in the public schools of New Haven and began work in a steel wire mill there at the age of 16. In 1888 he was em¬ ployed as laborer in the mills of the Pittsburgh Wire Company, of which he rose to be super¬ intendent and manager. Subsequently he be¬ came general superintendent of the Oliver Steel Wire Company

and general manager of the Oliver Iron and Steel Company. He organized a wire company at Braddock, Pa., which be¬ came part of the American Steel and Wire Company, of which Mr. Farrell was general manager of exports until 1903. From 1903 to 1911 he was president of the United States Steel Products Export Company and in Jan¬ uary 1911 became president of the United States Steel Corporation.

FARREN, Elizabeth, English actress : b. 1759; d. 1829. Her father, George Farren, was a strolling player and Elizabeth appeared on the boards while still a child. In 1777 she made her London debut at the Haymarket as Miss Hardcastle in 'She Stoops to Conquer.) In the following year she appeared at Drury Lane, where she played for several years, succeeding Mrs. Abingdon in 1782 as leading lady in com- • edy. Her chief roles were Lady Townly, Lady Fanciful, Clarinda in (The Suspicious Hus¬ band,) Lady Betty Modish in (The Careless Husband, 5 Lady Emily Gayville in 'The Heiress,) Julia in 'The Rivals,* and Lady Teazle in 'The School for Scandal.* Her last appearance was as Lady Teazle on 8 April 1797. On 1 May of that year she became Countess of Derby. Her portrait by Sir Thomas Law¬ rence is in the Metropolitan Museum, New

York. Consult Doran, (Annals of the Staged edited by Lowe (London 1888) ; Galt, (Lives of the Players } (ib. 1831) ; Geneste, 'History of the Stage> (Bath 1832) ; Matthews and Hutton, (Actors and Actresses of Great Britain and the United States) (New York

1886).

FARREN, William, English actor: b. 13 May 1786; d. London, 24 Sept. 1861. He was the son of an actor of the same name who was long prominent at Covent Garden. William, Jr. made his debut at Plymouth at the Theatre Royal in (Love a la mode.* In 1818 he ap¬ peared in London at Covent Garden as Sir Peter Teazle, a part in which he achieved great suc¬ cess. For 10 seasons he played at Covent Garden and in 1824 began a series of summer engagements at the Haymarket, always appear¬ ing in comedy roles. In 1828-37 he played at Drury Lane, and here he essayed more ambi¬ tious roles, including Caesar. After 1837 he again appeared at Covent Garden and later be¬ came stage manager at the Haymarket. In 1843 he was stricken with paralysis, and al¬ though he continued on the boards for 10 years more his acting never reached its former high level. In 1850-53 he was lessee of the Olympic. In his later years he played old men parts,

a field in which he was without a rival. His final appearance was at the Haymarket in 1855. His sons William (1825-1908) and Henry (1826-60) were both successful actors. Henry's daughter Ellen ["Nellie®] Farren [b. 1848; d. 1904] be¬ came famous for her portrayal of boy's parts in the Gaiety musical burlesques. Consult Cook, 'Hours with the Players) (London 1881).

FARRER, far'er, Edward, Canadian jour¬ nalist : b. County Mayo, Ireland, 1850. He re¬ ceived his education at Stonyhurst College, England, and at the Jesuit College, Rome. In 1870 he went to Canada and entered on his career of journalist as editorial writer on the Toronto Daily Telegraph, later joining the Mail. In 1874 he returned to Ireland as Canadian immigration agent, and subsequently became foreign editor of the New York World. In 1882-84 he was chief editor of the Toronto Mail, and thereafter was successively editor of the Winnipeg Times and Sun and the Toronto Globe. He retired in 1892, removed to Wash¬ ington, D. C., for some years, but returned to Canada in 1905 and settled at Ottawa, where he corresponded for foreign journals. Farrer is by many considered the ablest editorial writer of Canada, although his animosity toward his old faith caused the epithets of renegade and bigot to be leveled at his head. He also roused the ire of the Loyalists and Tories by advocating the annexation of Canada to the United States.

FARRER, Henry, American artist: b. Lon¬ don, England, 23 March 1844; d. 1903. He was the son of an English miniature painter, Thomas Farrer (1770-1850), and came to New York in 1863. He painted largely in water colors, but was widely known as an etcher also. The best of his etchings are views about New York harbor, in which his treatment of sky is very successful.

FARRER, Thomas Henry, 1st Baron, English economist: b. London, 24 June 1819; d. Abinger Hall, Dorking, 11 Oct. 1899. He received his education at Eton and Balliol Col- vol. ll — 4

lege, Oxford. In 1844 he was called to the bar, but remained in practice only a few years. In 1850 he entered the public service as secre¬ tary to the naval department of the Board of Trade. In 1865 he was appointed one of the joint secretaries of the board and two years later was made permanent secretary. His adminis¬ tration, extending over a period of 20 years, was productive of many reforms, and in 1883 he was created a baronet and retired from office three years later. He was an ardent ad¬ vocate of Free Trade and in 1886

published ‘Free Trade versus Fair Traded in which he dealt with the pressing economic problems of that day. In 1889 he became alderman of the London county council and the following year became vice-chairman of that body. He was raised to the peerage in 1893 and spent his re¬ maining years advocating and expounding his free trade doctrines in press and platform. His ‘Studies in Currency y appeared in 1898.

FARRIER, a professional shoer of horses, or, in a more general sense, a practitioner of the veterinary art. His business is termed farriery. As one who professes skill and a member of a “common calling,® the farrier is obliged to practise his art on demand and to execute it with ordinary skill and care. He is liable in law for negligence and has a lien on the animal shod for expenses. In modern times the term has come to be associated with one who, in addition to horse-shoeing, possesses a knowledge of the anatomy and physiology of the horse’s foot and hoof, and is able to diag¬ nose and prescribe treatment for the various ailments peculiar thereto.

FARRIERY. See Farrier.

FARRINGTON, Oliver Cummings,

American geologist: b. Brewer, Me., 9 Oct. 1864. He was graduated at the University of Maine in 1881, became lecturer on mineralogy in the University of Chicago in 1894 and cura¬ tor of geology at the Field Columbian Museum in the same year. He has published ‘Meteor- ites) ; ‘The Volcanoes of Mexicoˆ ; and ‘Gems and Gem Minerals) (1903).

FARS, fars, or FARSISTAN, far-sis-tan’ (ancient Persis), Persia, province in the south¬ west, about 300 miles long by 250 miles broad. Its chief rivers are the Bandamir, the Sefid- rud and the Mand, and it has several salt lakes, of which the largest is that of Bakhtegan. The climate is not unhealthful, except along the coast, where it is very hot in the summer. The most important products are grain, rice, fruit, wine, oil, cotton, tobacco, silk, cochineal and attar of roses. The manufactures include woolen, silk and cotton goods, and in these and other articles an active trade is carried on, chiefly with India. Many ancient ruins are scattered over the province. The capital is Shiraz and the chief port is Bushire or Abu- shehr. About 30 miles north of Shiraz are the ruins of Persepolis, an ancient city. The people of this province are among the best preserved types of the Aryans. Pop. (estimated) 1,700,- 000. See Persia.

FARSAN (far-san’) ISLANDS, a group of two larger and several small

islands on the east side of the Red Sea. The surface is diversified by hills composed of coral and occasional val¬ leys and plains. Pearl-fishing is here an im¬ portant industry.

FARUKHABAD, fu-rook'a-bad, or FAR- RAKHABAD, fur-ruk-a-bad', India: (1) town in India, in a district of the same name in the United Provinces, about two miles west of the Ganges, 90 miles west-northwest of Lucknow. It forms a single municipality with Fatehgarh, the civil headquarters of the district, situated three miles to the east. An American Presbv- terian mission is located here. Pop. (1911), with cantonment, 59,647. (2) The district of

Farukhabad forms part of the Agra division and lies mainly along the right bank of the Ganges. Area, 1,685 square miles. Pop. about

950,000.

FAR WELL, Charles Benjamin, American merchant and legislator : b. Painted Post, N. Y., 1 July 1823; d. Lake Forest, Ill., 23 Sept. 1903. Having gone in 1838 to Illinois, he was there engaged in farming and government survey work until 1844, when he entered a mercantile career in Chicago. He accumulated a fortune in the dry-goods trade. In 1869 he was a na¬ tional bank examiner, in 1871-77 and 1881-83 a representative in Congress. From 1887 to 1891 he was United States senator, having been elected to fill the vacancy caused by the death of Gen. John A. Logan. He was a figure of some prominence in both State and national politics.

FASANO, fa-sa'no, Italy, city in the south¬ east, near the Adriatic, 45 miles northwest of Brindisi. It is in the midst of an olive district and there are numerous oil presses in the town and neighborhood. The chief trade is in oil and wine. The cottages of many of the peasants have been made from the stone taken from old walls. Fasano was at one time a wealthy resi¬ dential and commercial city. Pop. of the com¬ mune, 20,077.

FASCES, fas'ez (Lat. fascis, a bundle), the most ancient insignia of the Roman magistrates, consisting of bundles of rods, usually birch, bound with which was an axe with projecting blade; used as a symbol of authority. The fasces was carried by an attendant known as a lictor. The number of lictors varied according to rank and for a given dignitary frequently differed at different periods. Fasces were ac¬

corded quaestors in the provinces only.

FASCH, fash, Karl Friedrich Christian,

German musician: b. Zerbst, 1736; d. 1800. His father was court capellmeister at Zerbst and Karl's early instruction was under his direction. In 1756 he was appointed cembalist to Frederick the Great at Berlin. He was capellmeister of the Berlin opera in 1774-76 but resigned his public appointments in the latter year and there¬ after devoted all his attention to composition. He was the founder of the Berlin Singaka- demie. Fasch's church music was published in six volumes (1839). Consult the biography by Zelter (1801).

FASCIA, in anatomy, an animal tissue, con¬ sisting of dense connecting sheets or layers, of the nature of fibrous membrane, close and strong as tendon or ligament. The fascia in the economy of animal anatomy serves the pur¬ pose of confining within its proper area support¬ ing as a sort of fulcrum, separating from one contiguous tissue, or attaching to another, some muscle, part or organ of the body. Consult the works on < Anatomy* of Quain and Morris,

in English ; of Gegenbaur and Rauber, in German; and of Testut and Poirier, in French.

In architecture, a flat band, running hori¬ zontally across an entablature. The architrave in the Corinthian and Ionic orders is divided into three bands which are called fasciae; the lowest being called the first fasciae, the middle one the second, and the upper one the third. When there are only two fasciae, they are called the upper and lower. See Column ; Entabla¬ ture.

FASCINATION (Lat. fascinare, <(to be¬ witch®). Various animals such as toads, hawks and notably certain varieties of serpents have been popularly invested with the power of con¬ trolling by their eyes the movements of intended victims. Such power has never been scientifi¬ cally demonstrated and supposed manifestations have generally been explained as paralysis through fear on the part of the victim. For an account of the belief in the evil eye in human beings see Superstitions, Popular.

FASCINE, fa'sen (Lat. fascina, a bundle of sticks), in fortification, a cylindrical bundle of faggots or brushwood used to form parapets, strengthen ramparts, elevate batteries, prepare temporary field defenses and the like. They vary in size from 6- to 18 feet in length, six to nine inches in diameter and are bound with withes. Fascines

dipped in pitch or other com- bustil !e matter are sometimes used in order to set fire to the enemy's lodgments or other works. In civil engineering fascines are used in making sea and river walls to protect shores subject to washing; or to collect sand, silt and mud to raise the bottom and gradually form an island, either as a breakwater against inroads, or for purposes of cultivation, as in Holland.

FASCIOLARIA, a genus of mollusks. See

Fusidˆ:.

FASHION, conventional usage in the matter of certain details of life, especially the changes and modifications of costume in civilized na¬ tions ; mode or style in dress. Such variations of costume were unknown to most nations of the ancient world and among the Romans only influenced the accessories of the toilet. The unchanging East is as unchanging in its dress as in everything else and the fashions to which savage tribes uncompromisingly adhere remain unaltered for long periods. In some remote districts of European countries peasants still dress in the costume brought two or three hundred years ago by the local nobility from court and the smock-frock of the English agri¬ cultural laborer is a relic of Saxon times. (For detailed history of the costumes of different periods, see article on Costume and for certain principles underlying the subject, see Dress). Survivals in modern costume may sometimes be traced back to unexpected origins. With re¬ gard to the modern evening dress-coat we learn that it owes its peculiarities to its descent from the old-time everyday garment in which a man rode and worked. <(The cutting away at the waist had once the reasonable purpose of preventing the coat skirts from getting in the way in riding, while the pair of useless buttons behind the waist are also relics from the times when such buttons really served the purpose of fastening these skirts behind; the curiously cut collar keeps the now misplaced

notches made to allow of its being worn turned up or down." It is said that the modern cylin¬ drical hat is the indirect descendant of the Puritan steeple-crowned hat, carried across the Atlantic by the Pilgrim Fathers, thence again to France, when Benjamin Franklin and the young Republicans were the height of the fash¬ ion and by the French manipulated into the hat which they have given to all the world. Certain striking features in vogue at different times in the dress both

of men and of women have originated in the lack of bodily symmetry or in other physical defects in various monarchs or other leaders of fashion. Until the 19th cen¬ tury men's clothes were as delicate in color and as rich in material as women's. Pepys records in his diary how he had his wife's gowns cut up into waistcoats for himself. The uniforms of officials or of persons connected with public or special service, the judge's and the clergyman's robe and the student's cap and gown cannot be said to have had their origin in fashion ; nor can the indication of political or religious opin¬ ions by peculiarities of dress, as among Puritans and Quakers, or as illustrated by colored cock¬ ades or other party emblems be called phases of fashion, yet fashion has been sometimes closely connected with political changes. Dress attained its highest point of significance in France during the last half of the 18th century, when it marks unmistakably the various stages of the Revolution. Rousseau's (Emile and Nou- velle Heloise1 and Goethe's XIX Jahrhundert1 (Vienna 1897) ; Hill, (Historv of English Dress) (London 1893) ; Price, (Dame Fashion, 1786-19121 (ib. 1913) ;

Uzanne, (Les Modes de Paris) (Paris 1898). See also bibliography article Costume.

FASHODA (now Kodok), Egyptian Sudan town founded in 1867 by the Egyptian govern¬ ment, situated on the Bahr-el-Abiad or White Nile, 400 miles south of Khartum and about 70 miles northeast of the confluence of the Sobat River with the Nile. In July 1898 it was oc¬ cupied by a French force, but later it was claimed by the British for Egypt. Ultimately the French force retired and the town was then occupied by Sudanese troops. The name was changed to Kodok by the British government.

FASSAITE, fas'a-it, the name applied to a pale green to pistachio or dark green variety of augite, or aluminous pyroxene. It occurs in metamorphic marly limestone in the Fassathal, Tyrol.

FASSETT, fas'et, Cornelia Adele Strong,

American artist: b. Owasco, N. Y., 9 Nov. 1831 ; d. Washington, D. C., 4 Jan. 1898. She studied in New York as well as in Paris and Rome, and from 1875 lived in Washington, where she painted portraits of many prominent statesmen. Her most important work is (The Electoral Commission in Open Session,1 including the portraits of some 200 persons.

FASSETT, Jacob Sloat, American lawyer and capitalist: b. Elmira, N.

Y., 13 Nov. 1853. He was graduated from Rochester University 1875, and was admitted to the bar 1878. In 1879-80 he was district attorney of Chemung County, and in 1880-81 studied constitutional law and political economy at Heidelberg Uni¬ versity. He was State senator 1884-90 and was defeated as Republican nominee for gov¬ ernor in the year last named. He was tem¬ porary chairman at the Republican National Convention in Minneapolis in 1892. In 1905-11 he was a member of Congress from the 33d New York district. He was the proprietor of the Elmira Daily Advertiser from 1879 to 1896, and controls mining, banking and other interests in the Western States.

FAST AND LOOSE, the name of a cheat¬ ing game, also called (

FASTENRATH, Johannes, yo-han'-nes fas'ten-rat, German poet and story writer : b. Remscheid, 3 May 1839; d. 1908. A brief sojourn in Spain (1864) filled him with a permanent enthusiasm for its land and litera¬ ture which inspired nearly all his life-work. He translated Juan Diana's comedy (Receipt Against Mothers-in-Law) ; and compiled a series of volumes which are less translations than transcriptions in the spirit of the originals — (A Wreath of Spanish Romances) ; Hes¬ perian Blooms 1 ; (The Book of My Spanish Friends1 ; (Voices of Christmas.1 He also pub¬ lished several works on the history of Spanish literature; and in Spanish, (Passion-Books of a German-Spaniard,1 a description of the

Oberammcrgau Passion Play; and (Walhalla and the Glories of Germany. > A volume of war songs dedicated (To the German Heroes of 1870) is likewise his.

FASTI, fas'ti (Lat. fasti, lawful, fas, divine law, dies, days), in ancient Rome, days on which the transaction of business before the praetor was legal, days on which court did not sit being dies nefasti. The name thence came to be applied to two sorts of registers or tables : (1) The fasti sacri or fasti kalendares, contain¬ ing the calendars of the year and corresponding to the modern almanacs. These were at first known only to the pontifices, or priests, who announced them to the people, and had thus a source of power and profit. In 304 b.c. Cn. Flavius, who had been secretary to the Pontifex Maximus Appius Claudius Crassus, exposed them to the people. (2) The fasti annates or historici,

which formed a chronicle of con¬ temporary events, containing the names of the chief magistrates of the year and a series of the more remarkable events noted in the order of the days of their occurrence.

FASTING. In its religious or magical signification, and as a social custom, fasting, by which is implied abstinence from food, and sometimes from drink as well, varies among different races. Among savage races the rite was enjoined at certain stages of life, as an act of mourning (when it is the usual precedent, and is occasionally preceded by a feast), as a rite of preparation at the initiation into man¬ hood or womanhood or for sacred and ritual acts, as an act of penitence and as an ascetic practice. It is usually accompanied by con¬ tinence, by other austerities, and by prayer. Among the American Indians the rite was widely observed, was practised both in private and in connection with public ceremonies, and tribal fasts were occasionally ordered by the chiefs to avert some threatened calamity. Among the Melanesians certain foods are for¬ bidden to pregnant women, and fasting is en¬ joined on the fathers of newly-born children. So widely diffused was the custom that it was practised in nearly all the nations of antiquity — in Armenia, Persia, Scythia, Nineveh, Egypt, Greece and Rome. Among the Hindus it has always been an ascetic practice, although Gau¬ tama Buddha enjoined moderation rather than excessive fasting. Among the Jews the fasts were all founded on tradition, except that of the Day of Atonement, which was appointed by Moses, to which five days of compulsory fasting were afterward added, in commemoration of days of humiliation and national misfortune. With the Jews fasting always implies entire abstinence, and lasts, except on the Day of Atonement and the 9th of Ab, from daybreak to the appearance of the first three stars.

Although Our Lord fasted 40 days before the beginning of his public ministry and prob¬ ably kept the Day of Atonement obligatory on his race, he left no direct rules for fasting. It was incongruous, he said, <(that the children of the bridechamber fast when the Bridegroom was with them ; but the days would come when the Bridegroom should be taken away from them, and then should they fast in those days.® (Mark ii, 19-20). Hence it was inferred that from the time of

His ascension the practice was obligatory on His disciples, the temporary cause of exemption hitherto existing having ceased.

During the first two centuries of the Chris¬ tian era fasting was voluntary on the part of the faithful, and was practised before holy acts and rites, such as baptism, communion and ordination. The Pascal

fast is first mentioned by Irenseus (a.d. 195). The fast of 40 hours when Our Lord lay in the grave had gradually expanded in the 6th century into the 40 days Lenten fast, while the mode of fasting varied greatly. Fasts, Hooker explains, were <(set as ushers of festival days,® their object being ((to temper the mind, lest contrary affections coming in place should make it too profuse and dissolute.® The fast days in the Roman Catholic Church are : All the week days of Lent, beginning on Ash Wednesday; the Fridays in Advent; the Ember days, namely, Wednesdays, Fridays and Saturdays following

(1) the first Sunday in Lent, (2) Whitsunday,

(3) the 14th of September, (4) the third Sun¬ day of Advent; also the vigils of Pentecost, the Assumption, All Saints and Christmas. When the vigil falls on Sunday the fast is kept on the Saturday preceding. The days of abstinence (on which flesh-meat is not allowed) are all Fridays in the year and fast days. Illness, old age and other causes may entitle a person to a dispensation from these regulations. The Anglican appoints the following fixed days for fasting and abstinence, between which no dif¬ ference is made: (1) the 40 days of Lent;

(2) the Ember days, at the four seasons; (3) the three Rogation days before Holy Thursday;

(4) every Friday except Christmas Day. The difference between the Roman Catholic and the Anglican Church in regard to fasting is that, according to Hooker, the former holds it as an imperative means of grace, the latter as a use¬ ful exercise preparatory for the means of grace.

The practice of fasting was retained by the Protestant Reformers in Europe. In England it was rigorously enforced by parliamentary sanction, as shown in the acts of Edward VI and James I, and the proclamations of Eliza¬ beth; but the abstinence from flesh-meat on fast days appears to have been enjoined mainly as an aid to the fishing and shipbuilding indus¬ tries. In Scotland pre-communion fast days were appointed by the Presbyterian Church, when business was entirely suspended ; but within recent times these have fallen almost entirely into desuetude.

Our Puritan forefathers brought with them to New England the practice of occasional ap¬ pointments for special causes, named by the churches as well as by civil authority. The day before they left Leyden (21 July 1620), <(when being ready to depart they had a day of solemn humiliation,® in anticipation of the voyage. Owing to a series

of misfortunes that befell the Plymouth colony a solemn fast day was ap¬ pointed, to be observed on Wednesday, 16 July 1623 (Old Style). The prejudice against popish and prelatical ordinances made the observance of Lent or of Good Friday obnoxious to the founders of New England, and no considerable change of sentiment in this regard took place till after the Revolutionary War. The occa¬ sional spring fast gradually passed into an

annual appointment ; but there was no annual spring fast previous to King Philip's War (1675-76). After the winning of independence, fast days were occasionally appointed. Coming to recent times, one was enjoined in 1849 on account of the cholera visitation ; they were ob¬ served on both sides during the Civil War; and on the death of Abraham Lincoln (14 April 1865) a solemn fast was proclaimed for the 1st of June of that year.

Fasting is observed with great severity in the Greek Church. The fasts extend over three parts of the year. The Easter fast, extending for 48 days ; the Advent fast for 39 days ; the fast of the Virgin for 14 days, and that of the Apostles begins on the Monday after Trinity and extends to the 29th of June.

Mohammedanism has adopted the practice of fasting from Jewish and Christian sources. In addition to voluntary fasting during the month of Ramadan (in which the Prophet brought the Koran from heaven), eating, drink¬ ing, smoking and smelling perfumes are strictly forbidden ; but the rigor of the fast is con¬ siderably modified by the removal of these re¬ strictions in the intervening nights.

In fasting the tissues show considerably greater waste during the first few days than on those succeeding. Human beings can maintain life for eight days without food and drink, and longer if they are kept warm and resting. The supply of water wonderfully prolongs life. The 15 survivors of the wreck of the Medusa frigate in 1876 subsisted for 13 days on a raft without food. About the same time some miners were interned for 10 days without food and all recovered. Dogs can subsist from 30 to 35 days if deprived entirely of food and drink. Among famous fasters may be men¬ tioned Sarah Jacobs, the Welsh girl, on whose behalf it was claimed that she had lived for two years without tasting food, but who suc¬ cumbed after nine days when put under the watch of professional nurses; Jacques, who fasted for 30

days at Edinburgh in 1888, 42 days in London in 1890, and 50 days in 1891 ; and Sued, an Italian, who fasted for 40 days in London in 1890.

Bibliography. — Benedict, F. G., (A Study of Prolonged Fasting) (Washington 1915) ; Brewster, (Saints and Festivals of the Chris¬ tian Year) (New York 1904) ; Love,

FASTNET LIGHTHOUSE. See Cape Clear.

FASTOLF, fas'tolf, Sir John, English soldier: b. Caister, near Yarmouth, about 1378; d. there, 5 Nov. 1459. He saw. much service in the French wars and distinguished himself in the battle of Agincourt, the capture of Caen, the siege of Rouen and other events. He was knighted about 1417, and made governor of the Bastile in 1420. In 1429 he was ordered to bring supplies to the English camp in front of Orleans, then in a state of siege. He went to Paris and obtained the provisions, but when re¬ turning was attacked at Rouvray by a French force much stronger than his own. In spite of

this disadvantage, however, he succeeded in driving off the attacking party, mainly owing to the skilful manner in which he used barrels of herrings for defensive purposes. The battle is usually known from the last-mentioned circum¬ stance as the Battle of the Herrings. Some have charged him with cowardly behavior in the subsequent battle at Patay, and it is said that the Duke of Bedford deprived him of the Garter which had been conferred on him in 1426. This charge, however, has never been substantiated. In 1432 he was appointed Eng¬ lish Ambassador to the Council of Basel, and in 1441 he withdrew from the army. The (Paston Letters* (q.v.) contain a long account of his later life in Norfolk, and show him to have been keenly bent on amassing a large fortune. He has been regarded by some authorities as the prototype of Shakespeare's (Sir John Falstaff.*

FASTS. See Fasting.

FAT-BACK, a name for the menhaden (q.v.) and for certain mullets, in allusion to the thickness of the dorsal adipose tissue.

FAT-BIRD, a name among sailors for the guacharo ; and among sportsmen in New Jersey for the pectoral sandpiper.

FAT TISSUE, or ADIPOSE TISSUE,

the deposits of fat in various parts of the animal organism. Fat tissue consists of a specific form of cells which occur usually in groups. When fully developed the distended cell walls filled with fat are

connected by a special delicate form of connective tissue, in which is a network of blood-capillaries en¬ closing each cell. In the living tissue the fat is liquid, but after death it congeals to a solid or semi-solid condition. The fats found in animal fatty tissue are mainly the triglycerides of stearic acid, palmitic acid and oleic acid. In the fat of man oleic acid is the largest con¬ stituent, making up 65 to 90 per cent of the fatty deposit. The proportion of palmitic acid ranges from 8 to 25 per cent; and of stearic acid, from 2 to 6 per cent, according to the part of the body from which the fat is derived. Other components of fat tissue are small per¬ centages of lecithin, cholesterin and free fatty acids and of a yellow lipochrome which gives its hue to the fat. Fat is found in the young of vertebrate mammals from the moment of their birth, and under normal conditions continues to increase till puberty, when a marked diminu¬ tion usually takes place. In middle life fat commonly increases and sometimes is acquired to gross excess. The origin of fat in the tissues has not been accounted for. It has been proved that while some of it is transferred from the fat eaten as food, other deposits seem to be due to a transformation of albuminous substance which is not understood. The function of fat in the body is not known, but it has been ob¬ served that fat in a proper quantity acts as a protective shield against atmospheric changes ; serves as a lubricant to several organs and, above all, stores up the heat energy so essential to animal vitality.

FATA MORGANA, fa'ta mor-ga'na, a re¬ markable aerial phenomenon observed in the Strait of Messina and other points in Italy and Sicily and thus called because supposed to be the work of the fairy Morgana (sister of Ar-

thur and a pupil of Merlin). Objects are re¬ flected sometimes on the surface of the sea and sometimes on a kind of aerial screen. An ob¬ ject has often two images, of which one is inverted.

FATALISM, the doctrine that all things are ordered for men by the arbitrary decrees of God or the fixed laws of nature. In theology it has given birth to theories of predestination, and in moral science to such systems as those of Spinoza and Hegel, and more recently to the philosophy of Herbert Spencer. It is carried out to its most pitilessly logical extreme among the Mohammedans, where everything that can happen is (

FATALITY IN COLOR. The color of a soldier's uniform is based upon a principle of fatality. Experience and statistics prove the relative visibility' of the uniform is reflected in liability to casualties. Red is the most fatal color; the least fatal is Austrian gray. The proportions are : red 12 ; green seven ; brown six; gray or blue five.

FATEGARH. See Fatehgarh.

FATEHGARH, FATHIGARH, FUTTY- GURH, or FUTTIGARH, British India, head¬ quarters of military district of Farukhababad (q.v.), three miles east of the city of that name and municipally joined to it. Pop. 12,500.

FATEHPUR. See Fathipur.

FATEHPUR-SIKRI, or FUTTIPUR- SIKRA, British India, the site of an ancient town in the district of Agra, United Provinces. It was the favorite residence of the Emperor Akbar, dating from 1569, who enclosed and fortified it. It is still surrounded on three sides by a great wall five miles in extent. The part of the palace containing the apartments of his celebrated Prime Minister, Abu-Fazel, is still in good preservation. It is built of dark red sandstone, in a fine style of Oriental Gothic, adorned with numerous pilasters and rich tracery and carvings and crowned by two domes. In a tomb of elaborate workmanship, standing in the centre of an arcaded square and ap¬ proached through a noble gate, several members of the royal family were interred. The modern town has (1911) 6,132 inhabitants. Consult Howell, E. B., (Handbook of Agra and Taj,5 etc. (1904) ; and Smith, E. W., (The Mughal Architecture of Fatehpur-SikrP (1894-98).

FATES, M oipai, Moirai ; Lat. Parca, in an¬ cient mythology, the inexorable sisters who spin the thread of human life. Homer mentions neither their separate names nor their number. The appellation Clotho (the spinner) was prob¬ ably at first common to them all. As they were three in number, poetry endeavored to designate them more precisely; Clotho became a proper name, as did also Atropos and Lachcsis. Clotho means she who spins (the thread of life) ; Lachesis, the disposer of lots ; Atropos, unalter¬ able fate; so that all three refer to the same subject under different points of view. The first spins the thread, the second determines its length and the third cuts it. In Homer and Hesiod they appear as goddesses of human fate and individual destiny, both in life and death.

Among the lyric poets they seem to have a general power over events, and are always present where anything is to be divided. In the

narrowest signification they are the god¬ desses of death, as of that destiny which closes the scene with all. In this capacity they belong to the infernal world, and are daughters of Erebus and Night. As goddesses of fate they are the servants of Zeus and the offspring of Zeus and Themis. The former genealogy is the more modern. As daughters of Zeus, they have a share in the decisions of fate, and are commissioned by him to execute his commands.

FATHER, Duties of a. See Law of

Family.

FATHER, The, a tragedy in three acts by Strindberg. Translated by N. Erichson. Soon after the Swedish original had been completed during a stay in Bavaria in 1887, a French edi¬ tion was published with a preface by Emile Zola, who praises the drama very much, but finds fault ((with too much philosophy® in places, while a stricter realism would be more pleasing. In the preface to (Froken Juliet the author replies to critics who had resented the gloom of (The Father5 : ((Some people

have accused my tragedy of being too sad, as though one devised a merry tragedy. I find joy of life in the powerful, terrible struggles of life ; and the capability of experiencing some¬ thing, of learning something, is a pleasure to me.® (The Father5 belongs to the ((realistic® period in the complex development of the Swe¬ dish genius. When, after years of adverse criticism, this great tragedy was produced in his native country, it proved to be one of the strongest plays of the Swedish stage. Of his dramatic works, it is the most magnificent in composition, most powerful in its effect, most impressive in its condensed energy. All that t'he author has written before or after about married life, when it is a curse, may be regarded as only sketches or outlines in com¬ parison with (The Father.5 With a power unsurpassed in its intensity, he has drawn a picture, so vivid and so pitiless, of the duel be¬ tween the sexes, between husband and wife, for mastery. The captain and his wife become types. The woman, described as very com¬ mon, rather stupid, and insane in her desire to rule and have her way, obtains control and utterly destroys her gifted, good-natured hus¬ band. Love is the man's misfortune and the false woman's lure. Even a mother's love is under suspicion and dangerous to the child, because it is so blindly selfish. Hatred and the thrill of agony rise beyond all limits. The wild symbolism at the close, with the husband in a straight- jacket, is harrowing. The depth of hatred and indignation makes one stand aghast. The shriek of agony shows the deep wounds of suffering which caused it. cThe Comrades5 (1888), a

sort of sequel to

G. C. J. Bothne.

FATHER JOHN, or FATHER-OF- SICKLE, translations of Arabic names for the common or sacred ibis of the Nile region. See Ibis.

FATHER PROUT. See Mahony,

Francis.

FATHERLASHER, a small, ugly, cottoid fish, or bull-head (Cottus bubalis), from 8 to 10 inches in length. The head is large, and is fur¬ nished with several formidable spines. The fish is found on rocky coasts on both shores of the North Atlantic. On the Labrador coast it attains a large size, and is a considerable article of food.

FATHERS, Apostolic, the six fathers of the Church who were the contemporaries or immediate followers of the Apostles. They are Saints Barnabas, Clemens Romse, Ignatius, Her¬ nias, Papias and Polycarp.

FATHERS AND CHILDREN (Otsui i Dyeti). The epithet ˆNihilist® as a theological term dates back to a hoary antiquity; Tur¬ genief made it the synoym of revolutionist, though, oddly enough, the hero of his most successful novel, (Fathers and Sons,* is not even by a hint connected with politics. It was quickly seized on, however, and applied partic¬ ularly to the party that advocated assassination and other violent methods of combating Rus¬ sian tyranny. (Otsui i Dyeti* (literally (Fathers and Children*) was published in 1862 in the Russky Vyestnik and immediately became the storm centre of passionate and bitter recrimina¬ tion. It coincided with the first upheaval caused by the emancipation of the serfs and the uncer¬ tain beginning of a new era. It is meant to contrast one generation with its successor. Both Fathers and their Sons regarded the char¬ acters portrayed as satirical caricatures. The action of (Fathers and Sons) takes place main¬ ly at the country estate of Nikolai Petrovitch Kirsanof, who had made an unambitious but happy marriage and on the death of his wife had entered into illicit relations with the daughter of his housekeeper. Under the same roof with him lives his younger brother, Pavel Petrovitch, who had engaged in an unfortunate love-affair with the notorious Princess X and, disillusioned, had

retired, henceforth to occupy himself with keeping his toilet immaculate, oc¬ casionally helping Nikolai Petrovitch regulate his affairs. Kirsanof's son, Arkady, who had been graduated from the University of Peters¬ burg, comes home to make a visit arid brings his friend, Bazarof, a Nihilist — a Nihilist, ac¬ cording to Arkady, being a man who bows to no authority, takes no principle on faith, no matter how absolutely bolstered with convention it may be. Bazarof is brutally frank, and this seems to endear him to women and to those below him in station ; but his lack of tact renders him particularly obnoxious to Pavel Petrovitch, who, discovering that he is becoming too intimate with his brother's mistress, chal¬ lenges him but is himself wounded. Bazarof returns to his father's humble estate, and while engaged in scientific investigation of typhus, accidentally becomes infected and dies. The de¬ scription of his final illness is a remarkable piece of realism; and the portraits of Bazarof's father and mother, the one a rather ridiculous sentimental doctor, the other a superstitious kindly lady of the petty aristocracy, are sym¬ pathetic but rather satirical. Other episodes take place at the provincial capital, where Tur¬ genief is cruel in his satire of the conceited rural tchinovnik or official, and at the beautiful estate of the widow, Anna Sergeyevna Odint¬

sova, with whom both Arkady and Bazarof fall in love. Arkady finally transfers his affections to her naive young sister Katherina and mar¬ ries her, while at same time his father at the intercession of Pavel Petrovitch ends his illicit relations with Fenitchka and legitimatizes their child. There are other notable figures : the silly widow, Madame Kukshina, with pretensions to liberal views and general culture ; Viktor Sitnikof, who pretends to be a disciple of Bazarof but is depicted as an ass; Matvyii Ilyitch Kolyazin, a relative of Kirsanof's ; a tchinovnik who likes to pose and needlessly to browbeat his subordinates ; various princes and princesses, whom Turgenief, like all untitled Russians of ancient family, despised; the priest Father Aleksyei, and the usual representatives of the peasantry, whom Turgenief always loved, though he was not blind to their faults.

There are several English translations of (Fathers and Sons.* Eugene Schuyler made the first, in 1867 ; another by an anonymous translator appeared in New York in 1883, under the title (Fathers and Children* ; another, (Father and Sons,* appeared in Turgenief's (Works) in London in 1889; also by Mrs. Con¬ stance Garnett ((Complete Works, * London 1894-99) ; another by Miss Isabel Hapgood in 1903. From these a fairly good idea of the novel may be obtained but not one of them is representative of Turgenief's beautiful style.

Nathan Haskell Dole.

FATHERS OF THE CHURCH, a title bestowed upon certain Church writers who stand pre-eminent as authorities in the inter¬ pretation of Scriptures, the ritual practice of the age they lived in and the formulation of doctrine as accepted dogma. They represent the main stream of Christian tradition and belief at the period when the teaching of the Apostles was being crystallized into creeds and dogmas. Authority is weightiest in the Apos¬ tolic Fathers (q.v.). Next come the Fathers of the Greek Church, such as Athanasius, Basil the Great, Gregory Nazianzen, and John Chry¬ sostom. Parallel with these are Fathers of the Latin Church, among whom are Jerome, Am¬ brose, Augustine and Gregory the Great. While these are the most important of the Fathers, the term is employed with some looseness and often made to include Greek writers like Origen, and Latin writers like Tertullian, whose speculations are sometimes charged with being unorthodox. In modern times, when the study of Christian doctrine has a tendency to become largely historical, the value of the patristic monuments is esteemed more highly than ever before.

Bibliography. — Patristic biography and lit¬ erature : Smith and Wace, dictionary of

Christian Biography) (1888) ; Lightfoot, Apos¬ tolic Fathers* (1891) ; Migne, (Patrologia,* containing Greek Fathers, 167 vols. and Latin Fathers, 222 vols. (1878). Translations into English: (The Oxford Library of the Fathers,* 48 vols. (1885) ; Bardenhewer, (Patrology: Lives and Works of the Fathers of the Church) (trans. by Shahan, 1908) ; Roberts and Donald¬ son, (Ante-Nicene Fathers,* 24 vols. (1872) ; Schaff, (Nicene and Post-Nicene Fathers.* 14 vols. (1886). Guides to the study of the Fath¬ ers will be found in the patristic manuals of Alzog (1888) and Nirschl (1885).

FATHERS OF MARY. See Orders, Re¬ ligious — Marists.

FATHIPUR, FATEHPUR, or FUTTE- HPUR, British India, capital of the district of the same name, on the highway between Delhi and Calcutta, 70 miles northwest of Allahabad. It contains government buildings and tombs and a mosque of great historic interest. It is noted for its whips. It was the scene of a massacre of Europeans during the mutiny in 1857. Pop. (1911) 16,939. The district (area 1,618 square miles) forms part of the Doab, or great alluvial tract between the Jumna and the Ganges.

FATHOM. See Weights and Measures.

FATIGUE. A term common both to physi¬ ology and to psychology. In the former, fatigue may provisionally be defined as a cer¬ tain change in function of muscle, nerve or gland resulting from continued stimulation. In psychology two usages of the term are to be distinguished ; qualitatively, fatigue is that perceptual experience which we have when we <(feel tired® ; functionally, it is an explanatory term to account for the decrement in amount and quality of work done by an organism. Whether these three points of view are really three aspects of one and the same thing is a question which cannot now be satisfactorily answered. We shall do well, therefore, to re¬ gard them separately and then correlate where, in the light of present knowledge, correlation is possible.

We begin with physiological fatigue. If an extirpated muscle is successively stimu¬ lated at regular intervals by electric shocks, and the resulting contractions recorded graphi¬ cally, then it appears that the contractions at first increase and then decrease more or less regularly in extent until ultimately they may cease entirely. A similar curve may be obtained from living muscle by means of the ergograph, an instrument in which the flexor muscle of the middle finger is made to lift successively a small weight. In both cases the gradual re¬ duction in contractility is known as fatigue, and the complete loss as exhaustion. Both fatigue and exhaustion are, however, relative terms; if, for example, the interval between shocks is long enough then fatigue does not appear, and if after exhaustion stimulation ceases and the muscle is allowed to rest, then it regains, to some extent at least, its con¬ tractility. The cause of muscular fatigue is two-fold: In active

muscle, certain (

Nervous tissue seems for the most part to resist fatigue. It is true that the appearance of some nerve cells changes with continued activity; there is first an increase and then a

decrease in size and color of cell and nucleus, but this change seems to have no functional significance. Nerve fibres, apparently, also resist fatigue, i.e., impulses will continue to pass over a nerve, that has been stimulated, for several hours. There is, however, a point in the neuro-muscular chain known as the motor end-plate, the point where the motor nerve is attached to the muscle, that according to some investigators is more easily fatigued than the muscle itself. Structurally, this end-plate is a bed of granular protoplasm through which are distributed a number of small nerve fibrils, and it is supposed that the fatigue substances cause these fibrils to contract and thereby to block the conduction of the nervous impulse. It is also held by some physiologists that the synapse, the point of junction between two neurones, is fatigable; the matter is still de¬ bated, however, and awaits further experi¬ mentation.

We turn to the first of the two psychological points of view. Ordinarily, fatigue as a sensory experience or a <(feeling® is not distinguished from weariness, tiredness, jadedness, ennui and the like. There is, however, a typical fatigue which is not the same as the weariness of ennui, that is the mere disinclination to exert one's self, and which is simpler in character than the gen¬ eral lassitude of physical weakness or of long continued exertion. This simple fatigue may easily be induced by the ergograph experiment or by alternately extending and flexing the weighted arm. Under these conditions fatigue appears first as a dragging pressure localized in the muscle and qualitatively identical with muscular sensation. Later it becomes a sense¬ feeling usually but not always unpleasant, and at high intensities the sensory component is an achy pain. There can be little doubt of the correlation of this typical fatigue with the fatigue of physiology, but the specific nature of the correlation is, at present, unknown.

There remains the point of view of func¬ tional psychology. From this aspect, fatigue is commonly regarded as a process which inter¬ feres with the efficiency of an organism in its continuous response to a particular situation. It is important to note that the organism is now functioning both physiologically and psy¬ chologically, i.e., as a whole, and the response is any prolonged activity whether physical or mental.

In the interest of highest efficiency, numer¬ ous attempts have been made to measure the amount of fatigue. The purpose has been not only to forestall serious injury to the organism from overwork, but also to alternate periods of work and periods of rest in such fashion that the largest amount commensurate with the best quality of output might be ac¬ complished. The attempts at measurement have been based upon (1) a distinction between physical and mental work, and (2) certain physiological and mental processes which are regarded as symptoms. Since, however, the organism is functioning as a whole, it must not be supposed that physical fatigue is induced solely by muscular, and mental fatigue by mental effort. On the contrary, the difference is principally a matter of form of activity, and consequently some symptoms such as the feeling of fatigue and decrement in quantity and

quality of work are common to both forms of fatigue. In physical fatigue there is a more constant relation between its degree and the reduction of output, and for this reason its measurement may be made most easily and directly by the measurement of the loss of efficiency. In the case of mental fatigue, on the other hand, the problem is much more com¬ plex and the experimental attempts to measure it cover a period of two and a half decades. The mental symptoms such as the feeling of fatigue, blocking of associations and fluctuation of attention were early disregarded as unre¬ liable because they do not appear under strong emotion, and they disappear under the influence of stimulants. Recourse was then had to the impairment of physical or mental efficiency. It was thought, for example, that we might meas¬ ure objectively the amount of fatigue by the loss of physical ability in terms of the scale of the ergograph or dynamometer ; or by the decrease in sensitivity as measured by the aesthesiometer ; or, again, by the relative num¬ ber of errors and total time consumed in the solution of some test introduced in the course of a period of mental activity; or, finally, that we might assume as an index of mental fatigue the decrement in quality and quantity of the fatiguing work itself. All of these methods have, in fact, been tried and no one found to be fully satisfactory; the curve of fatigue thus obtained is rarely found to co¬ incide with the curve of physiological fatigue. The investigations themselves, however, have revealed the cause; other factors than fatigue determine the course of efficiency. Of these, practice and habituation are, perhaps, the most important; the former means less expenditure of energy, the latter freedom from worry and

from ideas foreign to the task in hand. It has also been found that there may be a “warming up® period before the work gets into full “swing,® and that, later, when the amount of work begins to decrease, a sudden “spurt® may appear because of some novelty in the task or because its end is foreseen. Moreover such factors as competition, hope of reward and fear of penalty, encouragement and persuasion may stimulate the individual in such fashion as to mask the course of fatigue and to maintain efficiency until exhaustion begins. Finally, the course of efficiency is conditioned, in part at least, by the great physiological rhythms. It has been found, for example, that the curve of diurnal mental efficiency rises during the morn¬ ing hours and reaches a maximum about 11 o’clock, it then falls during the noon hours, rises during the early, and falls again during the late afternoon hours. These fluctations are not necessarily the result of fatigue. On the contrary, they seem to be matters of habit; the organism is not accustomed to doing mental work early in the morning and at noon. Nor¬ mal sleep is another intercurrent rhythm which is not now, as formerly, thought to be due to fatigue. In view of these facts we must re- gard’true fatigue not as absolute but as relative — relative to the external and internal stimuli, to the competition of associative paths in the nervous system, to intercurrent rhythms, etc. Whether we shall be able ultimately to separate true fatigue from all other factors which con¬ dition maximum efficiency, and thus arrive at a measure or index of fatigue, is a question

which can only be answered by further investi¬ gation.

Assuming that true functional fatigue is correlated with qualitative and physiological iatigue, the following conclusions seem prob¬ able: (1) Since the fatigue substances are dis¬ solved in the blood and distributed throughout the body, fatigue tends to be general and not restricted to some particular locality; it is wrong to suppose, therefore, that more than local relief is afforded by change from one form of muscular work to another. (2) Physi¬ cal and mental fatigue are inherently the same ; rest from mental fatigue cannot, then, be gained by physical exertion. (3) Sleep is the best restorer because it furnishes the best con¬ ditions for the removal of fatigue substances and for the processes of assimilation. (4) In the or¬ dinary course of our daily lives we may trust the mental symptoms as the most adequate indicators of the degree of fatigue which we now know.

Bibliography. — Binet, A., and Henri, V., (La fatigue intellec.tuelle) (Paris 1898) ; Dodge, R., (The Laws of Relative Fatigue) (in Psy¬ chological Review, XXIV, Princeton 1917) ; Gilbreath, F. B., (Fatigue Study) (New York 1916) ; Herrick, C. J., (Introduction to Neu¬

rology) (Philadelphia 1915) ; Howell, W. H., (Text-book of Physiology) (Philadelphia 1916) ; Mosso, A., (Fatigue) (trans. by M. Drummond and W. B. Hammond, New York 1904) ; Offner, M., (Mental Fatigue) (trans. by G. M. Whipple, Baltimore 1911); Titchener, E. B., 'Beginner's Psychology) (New York 1915) ; Yoakum, C. S., (An Experimental Study of Fatigue) (Chicago 1909). jj. P. Weld,

Assistant Professor of Psycholoqy, Cornell University.

FATIGUE, Industrial. See Industrial Fatigue.

FATIGUE OF MATERIALS. See

Strength of Materials.

FATIGUE UNIFORM. See Uniform, Military.

FATIMA, fa-te-ma, (1) The favorite daughter of Mohammed : b. Mecca, Arabia, about 606; d. Medina, Arabia, 632. She had three sons, Al-Hasan, Al-Husein and Al-Muh- sin. From the first two were descended the Saiyides. (2) In 'Alladin,) the enchantress. (3) In the story of Bluebeard) the last wife, and the only one not murdered.

FATIMIDES, fat'i-midz, or FATIMITES, fat'i-mits (named from Fatima, the daughter of Mohammed and wife of Ali, from whom the founder of the dynasty described in the defini¬ tion professed to have sprung), a race of Mo¬ hammedan kings, whose founder was Abu Ab¬ dallah Husein. They were Shiites of the Ismailian sect. Obeid Allah (909-33), subdued northern Africa from the Atlantic Coast to Egypt, assumed the title Mahdi ("Leader of the Faithful®), established his capital at Mahadi and made himself independent of the Abbassio caliphs. The most important of the dynasty was Al-Mu'izz (955-78), who conquered Sicily and Egypt (972), transferred his court to the latter country and founded Cairo. Al-Hakim (996-1021) persecuted Jews and Christians and destroyed the church of the Resurrection at Jerusalem (1009). His cruelties were a leading cause of the Crusades (q.v.). The dynasty in¬ cluded 14 caliphs, of whom Al-Adhid was the

last (1171). Consult Wiistenfeld, (Geschichte der Fatimiden-Khalifen* (1881) ; Lane-Poole, S., (History of Egypt* (1905).

FATS. In chemistry, this class of sub¬ stances was originally

understood to include all those compounds of carbon, hydrogen and oxygen which leave a permanent, translucent grease-spot upon paper. In more recent times, however, it has been the custom to include only such bodies of this sort as admit of saponifica¬ tion. They are odorless, colorless, tasteless, white or yellowish, insoluble in water, but soluble in ether, chloroform and benzol. Our knowledge of the constitution of the fats is due in large measure to the labors of the French chemist Chevreul, who showed that they are mostly composed of glycerin, in combina¬ tion with certain organic acids, known as the fatty acids (q.v.), prominent among which are oleic, stearic and palmitic acids. Fats may be extracted from animal tissues simply by heat, a temperature of 212° F. being generally suffi¬ cient. From seeds and other vegetable sub¬ stances in which they occur they are commonly extracted by heating the ground-up tissues and subjecting them to heavy pressure. As obtained by these methods, the fats often retain frag¬ ments of the original tissues in which they occur, as well as certain nitrogenous substances that come away with them. The nitrogenous matters may be removed by shaking the fluid fat (or oil) with sulphuric acid, and the fat may be separated from the fragments of tissue by dissolving in ether, carbon disulphid, ben¬ zene or light petroleum and subsequently filter¬ ing the solution and recovering the fat by the evaporation of the solvent. The membranous particles that come away with the animal fats may also be removed by treating the fats with very dilute hydrochloric acid, which dissolves the membranous matter while leaving the fat unaltered.

The fats are decomposed when heated to 400° F., by the separation of their glycerin from the fatty acids with which it is combined. They may also be decomposed by saponification — that is, by boiling them with aqueous solu¬ tions of the alkalis, — the decomposition, in this case, being due to the replacement of the com¬ bined glycerin by the alkali. The glycerin is thereby set free and the resulting compounds of the alkali with the organic acids of the fats are known as soaps, (See Soap). The ran¬ cidity that develops in fats when they are kept for some time is due to the formation or libera¬ tion of certain volatile fatty acids and it may be removed by boiling the fat with water (in which case the objectionable acids are volatil¬ ized), or by treating it with an aqueous solu¬ tion of sodium carbonate (in which case the volatile acids are neutralized by the alkali, with the formation of their unobjectionable sodium salts).

As has been noted above, stearic, oleic and palmitic acids are the commonest of the acids that occur in fats. Their compounds (or “esters®) with glycerin are known, respectively, as stearins, oleins and palmitins and are mark¬ edly similar in their general properties. The

nature of these compounds may be sufficiently illustrated by taking stearin as an example. The formula of stearic acid is H.CisFFsCh and that of glycerin is GH53. If the two are heated together, they may combine in the

following manner: GH53 *F H.CisHasChˆ CsH5 (OH) 2. (CuHssOa) + H?0, in which case the compound that is formed is known as “mon¬ ostearin, ® or they may combine in this manner ;

GH63 + 2H.GbH»0, = GH5.(G« H35OO2 + 2H20, in which case the compound formed is known as “distearin® or, finally, they may combine thus : GHs(OH)s + 3H.C18H35O2— GHb. (CisHssOOs + 3HsO. in which case the compound is called “tristearin.® Similar re¬ actions occur with oleic and palmitic acids. The compounds of these three acids that occur most commonly in fats are tristearin, triolein and tripalmitin.

Fats are classified in industrial chemistry by their saponification values or their iodine values. The saponification value of a fat is determined by the number of milligrammes of caustic potash that are neutralized by the total fatty acid content of one gramme of the fat, during the saponification. The natural fats, being made up of combinations of several esters, have saponification values which are the resultant of the combinations. Thus butter is rated as 220 to 233 ; lard and tallow at about 195. The high saponification value of butter depends on its content of butyrin, which when pure has a saponification value of 557.3. The palmitin component of lard is rated at 208.8 and its stearin component at 189.1. The saponi¬ fication value of lard is about 176.

The iodine value gives the amount of halogen estimated as iodine that the unsaturated fatty acids will take up. It is expressed in a per¬ centage of molecular weight of the fat. For example, triolein (M. W. 884) will absorb six atoms of iodine (6 X 127 =762) or 86 2 per cent of 884. Hence its iodine value is given as 86.2. Iodine values range from about nine for cocoanut oil to 200 for linseed oil. The iodine value of tallow is about 38; of cacao butter about 40; of lard, from 48 to 64; of cod-liver oil about 160. (See Fatty Compounds). Con¬ sult Leathes, J. B., (The Fats) (London 1913) ; Lewkowitsch, J., (Chemical Technology and

Analysis of Oils, Fats and Waxes) (London 1913) ; Wright, . C. R. A., (Animal and Vege¬ table Fixed Oils, Fats, Butters and Waxes1* (London 1903).

FATSHAN. See Fu-Shan.

FATTORI, fat'to're, Giovanni, Italian painter; b. Livorno, 1828. He studied under Guiseppe Bezzuoli and at the Academy of Flor¬ ence. His (Battle of Magenta* (1859) was so successful that thereafter he devoted himself to military subjects. He became professor at the Academy of Florence in 1877 and was also elected member of the Academy of Bologna. His noteworthy works include (The Forty-ninth Regiment at Custozza,* in the National Gallery, Rome; (The Wounding of Prince Amadeo at Custozza,* in Milan; (The Horse Fair in the Piazza Montanara, Rome* ; (The Horse Fair of TerracinaP He was awarded medals at Paris in 1900 and also at Vienna and Phil¬ adelphia.

FATTY ACIDS, a large group of mono¬ basic acids arising from the oxidation of the primary alcohols or aldehydes, and having the general formula Cn H2n 02. When a fat is heated in combination with a stronger base than glycerin, such as potash or soda, the fatty acids leave their combination with the glycerin

and combine with the metallic base, thus form¬ ing soap. The fatty acids most commonly found in nature are formic acid, in ants, some cater¬ pillars and the stinging nettles; cerotic acid, in beeswax; butyric acid in butter and in the perspiration; stearic acid, in the fat of animals; and acetic acid, in odoriferous vegetable oils. The higher members of the group combine with glycerol to form the glycerides and constitute the larger part of the principal animal and vegetable fats, oils and waxes. The lower members of the group — formic acid, acetic acid, propionic acid, etc., — are volatile liquids which mix readily in all proportions with alcohol and ether. As the number of the carbon atoms in¬ creases, the higher members of the group exhibit oily and viscid characteristics and are less soluble in water. Nanthylic acid is not soluble in water. Capric acid and lauric acid are solids. The fatty acids are generally prepared by the oxidation of the primary alcohols or aldehydes, or by decomposing the unsaturated acids with caustic alkali. See Fatty Compounds.

FATTY COMPOUNDS, or ALIPHATIC COMPOUNDS, in organic chemistry, are those compounds whose molecules do not include a closed chain of carbon atoms, as distinguished from the Aromatic Compounds in which this closed chain does obtain. (See Aromatic

Com¬ pounds). The name “fatty® no longer im¬ plies any necessary relation to the fats, but it was originally given to the group because many of .its earliest-known representatives occur in the animal or vegetable fats, or are related to them in a simple manner. The name “methane compounds® has also been proposed for the group, but it has not been generally adopted, although it is a particularly happy designation, since all of the compounds of the group are theoretically derivable from methane, CH4, by addition or substitution. Generally they are grouped, particularly in works on chemistry, under the title “Hydrocarbons.® The fatty compounds may be subdivided, in a general way, into those that are “saturated® and those that are <(unsaturated.® Saturated compounds are those in which the atomic linkage is such that no more atoms can be attached to the carbon chain of the molecule without causing it to split; and unsaturated compounds are those in which this condition is not fulfilled. For example, ethane, C2HC, has the structural for¬ mula :

H H

H— C— dr— H

so that the new compound is also saturated. By continued additions of CH2, butane and pentane are formed. Compounds of such sim¬ ple structure are termed <(normal compounds,® but the same composition may be developed in a different structure, or, as it is called, a <(branched chain,® and these are termed (

The majority of the saturated hydrocarbons are natural substances. The lower members of the series — those containing up to four atoms of carbon — are gases; they are produced during the dry distillation of many organic substances, as in making coal gas. They are also produced in the processes of digestion in animals. The middle members of the series • — those containing from 5 to 16 carbon atoms- — are liquids, and are found naturally in crude petroleum, which consists of a mixture of satu¬ rated hydrocarbons. The higher members of the series are solids, as the natural mineral wax ozokerite and paraffin wax.

The saturated hydrocarbons have a peculiar odor. They are soluble in alcohol and ether, but not in water. They are all inflammable to a greater or less degree. The gaseous members ignite readily and burn with a non-luminous flame. Mixed with air they form explosive compounds. The liquid members in some cases ignite readily, in others after being heated, they burn with a more or less luminous flame. The solids burn with the aid of a wick, with a highly-luminous

flame.

The unsaturated hydrocarbons are so-called because, as they contain less hydrogen in the molecule, the four valencies of the carbon atom are not satisfied by the hydrogen atoms. The unsaturated hydrocarbons bear the terminations ene and ine, as ethene (ethylene) and ethine (acetylene).

Ethylene (q.v.), C2H4 is an unsaturated com¬ pound because a carbon nucleus containing two atoms of carbon is capable of fixing six atoms of hydrogen, as appears in the first of the foregoing structural formulae. It is, therefore, usual to consider that in this case two valencies in the carbon nucleus satisfy each other, so that the structural formula for ethylene is

H H

and it is therefore a saturated compound, be¬ cause there is obviously no way to introduce more atoms without separating the carbon atoms or removing one or more of the hydro¬ gen atoms. If we introduce (say) the group CHa (((methene®), we must place it between the two carbon atoms, or between a carbon atom and one of the hydrogen atoms now at¬ tached to it. In either case the structural for¬ mula of the resulting compound (known as “propane,® CsHs) is

H H H

H— C— C— C— H

I I I

H H H

Here it is obviously possible to introduce two additional monad atoms or radicals, by break¬ ing one of the two valencies uniting the carbon atoms, and attaching one of the monad atoms so introduced to each of the free ends of the valency so broken ; the carbon atoms remaining constantly united by one. of the bonds. If a pair of hydrogen atoms be introduced in this way, ethane is produced, as will be seen by inspecting the structural formula of that substance, given above. In acetylene (q.v.) C2H2, three bonds are commonly assumed to unite the two carbon atoms, so that the structural formula of this substance is H — C = C — H. Acetylene, there¬ fore. is an unsaturated compound. Much at¬ tention has been paid to the theory of these

double and triple bonds between adjacent carbon atoms, and it has been conclusively established (contrary to what might be naturally assumed) that a double or triple linkage between two car¬ bon atoms constitutes a weaker bond than the single linkage. When, for example, an unsat¬ urated compound is broken up by the action of powerful chemical reagents, it is almost in¬ variably the double (or triple) bond that is ruptured. A quantitative study of the heat- energy liberated when compounds of carbon and hydrogen are burned also shows that the force required to break a double or triple bond is smaller than that required to break a single bond.

Although the fatty and aromatic groups of chemical compounds are differentiated so strongly that it is not easy to convert a rep¬ resentative of either group into a representa¬ tive of the other one, such a transformation is nevertheless possible. Thus Berthelot showed that when acetylene gas is passed through a red-hot tube it is converted into benzene, naph¬ thalene and other members of the aromatic group ; and an example of the opposite kind of transformation, in which an aromatic compound is converted into a fatty compound, is afforded by the formation of methyl chloride, CH3C1, when hydrochloric acid gas is passed through boiling metaxylene, GH4 (CH3)2. It has been pointed out that there is probably much signifi¬ cance in the fact that the carbohydrates, which are the chief constituents of plants, are fatty compounds containing six (or a multiple of six) atoms of carbon; while the products ob¬ tained by the dry distillation of coal (that is, the fossilized remains of such plants), are chiefly aromatic compounds, in which six car¬ bon atoms are united in the form of a (

Fundamental among the fatty compounds are three series of hydrocarbons, which contain only carbon and hydrogen and are known re¬ spectively as the paraffins, the olefines and the acetylene series. The simplest member of the paraffin series is methane (<(marsh gas®), CH4, from which the higher members are derived by successive additions of the group CH2, as has already been illustrated in connection with the derivation of propane from ethane. The paraffins are very numerous, and many of the higher members of the series have been but little studied. As will be seen from their mode of derivation from methane, they all come under the general formula CnH2n-f2, where n may have any value from unity up to a limit which probably exists, but is at present undeter¬ mined. Isomeric forms of the paraffins are possible when n is greater than 3, and the num¬ ber of such possible isomeric forms increases rapidly as the value of n

increases. Thus in the case of butane, GHio, there can be but one isomer, while the compound Ci3H28, known as tridecane, is theoretically capable of existing in no less than 802 distinct forms. See Iso¬ merism.

The olefine series of hvdrocarbons begins with ethylene (<(olefiant gas®) C2H4, from which the higher members may be regarded as derived, just as before, by successive additions of CH2.

The general formula for the olefine series therefore is CnH2n and many isomers are known here also. The acetylene series, which has not been so thoroughly studied as the lower paraf¬ fins and the olefines, begins with acetylene gas, GH2, and has the general formula CnH2n-2. See Hydrocarbons.

Among the derivatives of the fatty hydro¬ carbons, the fatty alcohols and fatty acids re¬ quire special mention. Alcohols, as a class, are considered under Alcohol. In general, they may be regarded as derived from the hydro¬ carbons by replacing one or more of the hydro¬ gen atoms by an equal number of molecules of hydroxyl (OH). They are known as <(mono- hydric,® (2, by the substitution of OH for H. The general formula for this series of alcohols therefore is GH2n!. (OH) ; it includes methyl alcohol, ethyl alcohol, and, in fact, nearly all of the more familiar alcohols. The monohydric alcohols of the olefine series of hydrocarbons have the gen¬ eral formula CnH2n-i.(OH), but they include only a single familiar example — allyl alcohol, GHs.OH. Those of the acetylene series have the general formula CnH2n-3. (OH), but they do not include any that are of importance save to the theoretical chemist.

The fatty acids are so called because their higher members occur in the natural fats — which are esters of the fatty acids with gly¬ cerin. They are exceedingly numerous, and play a highly important part in the processes of animal and vegetable life. A complete classifi¬ cation of them cannot be here attempted, but three of the known series must be mentioned. The series derived from the paraffins has the general formula GH2n02 and its members may be derived, by oxidation, from the alcohols of the paraffin series that contain the same number of carbon atoms. The best-known examples of this series are as follows :

Formic Acid . . CH202

Acetic Acid . GH402

Propionic Acid . GH602

Butyric Acid . GH802

Capric Acid . GoH2002

Laurie Acid . G2H2402

Palmitic Acid . GsH3202

Stearic Acid . GsH30O2

Melissic Acid . GoH6o02

The alcohols corresponding to these acids have not all been prepared, but many of them have been and the chemical deportment of the remaining members of the group leaves no doubt of their relation with the normal paraffins from which they are assumed to be derived. All of the foregoing acids are monobasic, containing but one atom of replaceable hydrogen ; and these acids, together with the others that belong in

the same scries, are the ones to which the name <(fatty acids® is often applied, by writers on chemistry, to the exclusion of all other organic acids. According to the definition of ((fatty com¬ pounds® adopted above, however, all organic acids that do not contain closed carbon chains would appear to be logically included under this title.

Two important series of acids are derived, by oxidation, from dihydric alcohols, or <(gly- cols,® of the paraffin series. The general for¬ mula for these glycols being CnH2n (OH)2, the lactic acid series of acids is obtained from them by an oxidation which consists in the replace¬ ment of two atoms of hydrogen by one atom of oxygen. The general formula of the lactic acid series therefore is CnH2nOs. Its most im¬ portant members are as follows:

Carbonic Acid . CH203

Glycollic Acid . C2H403

Lactic Acid . CsHeOs

Hydroxybutyric Acid . CtHsOa

Hydroxyvaleric Acid . GHioOs

Leucic Acid . CflHiaCX

Carbonic acid is included in this list on the hypothesis that it exists in aqueous solutions of the gas in the form C02 + H20. Except for carbonic acid, all the acids of the foregoing list are monobasic. For the reason why carbonic acid is not also monobasic, reference must be made to the more extended treatises on organic chemistry.

The oxalic acid series is derived from the glycol series, given above, by an oxidation which consists in the substitution of two atoms of oxygen for four of hydrogen. The general formula for this series of acids therefore is CnH2n-204. The most important representatives

are :

Oxalic Acid . C2H20*

Malonic Acid . C3H4O4

Succinic Acid . C4H604

Pyrotartaric Acid . CsHsCh

Adipic Acid . C6H10O4

Azaleic Acid . C9H10O4

Sebacic Acid . . C10H18O4

The foregoing acids are all dibasic.

The carbohydrates constitute a large and im¬ portant class of open-chain (or fatty) com¬ pounds. They all contain carbon, hydrogen and oxygen and are called “carbohydrates® because, like water, they contain precisely twice as many atoms of hydrogen as of oxygen and can there¬ fore be regarded as consisting merely of water and carbon. (See Carbohydrates.) The carbo¬ hydrates are more commonly divided simply into (1) glucoses (or hexoses) ; (2) sac¬

charoses; and (3) amyloses. The glucoses com¬ prise glucose (or dextrose), fructose (or levu- lose), galactose and sorbose (or sorbinose) ; and they all have the empiric formula CsHˆOs. The saccharoses include cane-sugar, lactose, melezitose and maltose ; they all have the empiric formula Ci2H22On, and are all derived by the union of two molecules of a glucose, with the elimination of one molecule of water. Their general formula may therefore be written (GsHiiCAOaO, and

they may be regarded as re¬ lated to the glucoses in the same way that ether is related to alcohol. The amyloses include starch, glycogen, dextrin, cellulose, inulin and the gums. They have the general empiric

formula (CeHioOe)ˆ (See also, in this ency¬ clopedia, Alcohol; Carbon Compounds; Hy¬ drocarbons ; Isomerism ; Sugars ; and many other titles). Consult Cohen, J. B., (Organic Chemistry for Advanced Students) (New York 1909-13) ; Pope, F. G., (Modern Researches in Organic Chemistry) (London 1912) ; Remsen, I., (An Introduction to the Study of the Com¬ pounds of Carbon5 (Boston 1908) ; Richter, V. von, (Organic Chemistry, Vol I, Chemistry of the Aliphatic Series5 (Spielmann trans., Philadelphia 1916) ; Stewart, A. W., (Recent Advances in Organic Chemistry5 (New York

1908) .

FATTY DEGENERATION. See De¬

generation ; Pathology.

FATUITY, in present usage, synonymous with idiocy (q.v.). Foolishness or weakness of mind.

FATWA, fut'wa, India, village in Patna dis¬ trict of Bengal, seven miles from Patna city, at the junction of the Punpun with the Ganges. Fatwa is a place of great sanctity to Hindus. It is on the East Indian Railroad, and has woolen and linen manufactures. Pop. about

1,000.

FAUBOURG, fo'boor', French name for a portion of a town or city without the walls, hence a suburb. Many faubourgs are now in¬ cluded within the city limits, e.g., Faubourg Saint Germain, now a part of Paris. The word is derived from the old French, Forbourg, from fors, hors, outside (Lat. foris) and bourg (Lat. burgus), borough.

FAUCES, faw'sez, in anatomy, the hinder part of the mouth, leading to the pharynx. In ancient architecture, narrow passages on both sides of the tablinum, and leading from the atrium to the peristylar court.

FAUCHE-BOREL, fosh-bo'rel, Louis, French Bourbon agent: b. Neuchatel, 1762; d. 1829. He became a printer and was for some time settled as a publisher at Strassburg, whither he repaired to treat with Pichegru for the restoration of the Bourbons. In 1795 the Directoire ordered his arrest, but there being little or no evidence brought forth against him, he was released. After the defection of Pichegru he

continued to treat with Barras, but his activity for the restoration of the monarchy becoming known he was banished from France. He spent eight years in England and Sweden and returned to France in 1814 with the allied armies. He was for a time Prussian consul-general at Neuchatel. He was neglected by his Bourbon masters after the Restoration and it was not until Charles X ascended the throne that he received the tardy recognition of a pen¬ sion of 5,000 francs. Consult his (Memoires5 edited by Beauchamp (4 vols., Paris 1828-29) ; Barbey, (Les Memoires de Fauche-Borel5 (in Revue Hislorique, Vol. Cl, pp. 326-333, ib.

1909) .

FAUCHER, f5'sha, Julius, German econ¬ omist and free trader: b. Berlin, 1820; d. Rome 1878. He was a descendant of a French Huguenot family and was educated in the city of his birth. He was a follower of Adam Smith and embraced the doctrine of the English Free-trade party. In Berlin, in 1846, he founded the first German free-trade society,

later known as the Economic Society of Berlin. He founded the Abendpost at Berlin in 1850, the first free-trade journal in the country. Within a few7 years it was suppressed by the authorities and Faucher removed to England, where he joined the staff of the Morning Star. In 1861 he was back in Germany advocating strenuously for the liberty of domicile, free trade and freedom in industry. He was chosen member of the Prussian Diet and in 1863, with Michaelis, founded the Vierteljahrsschrift fiir V olkswirtschaft, Politik, nnd Kulturgeschichte. During the Franco-Prussian War he was cor¬ respondent of the London Daily News with the German armies. He published, in addition to his articles in the periodicals mentioned above, (Ein Winter in Italien, Griechenland und Konstantinople) (1876) ; (Vergleichende Kul- turbilder aus den vier europaischen Millionen-stadten5 (1877); (Streifziige durch die Kiisten und Inseln des Archipels und des ionischen Meeres5 (1878) ; (Russian Agrarian Legislation of 1861 > (in (System of Land Tenure in Vari¬ ous Countries,5 3d ed., London 1881).

FAUCHER, Leonard Joseph (Leon),

French economist: b. Limoges, 8 Sept. 1803; d. Marseilles, 14 Dec. 1854. His family removed to Toulouse in 1812 and four years later his parents were separated. In those trying years Leon helped support himself and his mother by designing embroidery, the while attending to his studies. He became private tutor in Paris, and managed to pursue his studies in history and archaeology. In 1830 he became active as a Liberal in journalism. In 1830-33 he was on the staff of the Temps and for a time was editor of Le Constitutionel. He launched a journal of his own, Le Bien public, but it turned out a failure. In 1834 he joined the Courier franˆais and was its editor from 1839 to 1842. About this time he began to give his attention to economic questions ; advocated a customs union between the Latin races to offset the Teutonic Zollverein, also propounding a free trade policy, in which connection he visited England in 1843 to study the system there. In 1847 he was sent from Rheims to the Chambre as an advocate of free trade. After 1848 he was a member of the Constituent Assembly, where he opposed several popular measures chiefly because they were sponsored by the Republicans. Under Louis Napoleon he was successively Minister of Public Works and Min¬ ister of the Interior, but in 1849 his attempt to influence the approaching elections compelled his resignation. In 1851 he was again Minister of the Interior. After Napoleon's coup d'etat he retired from politics and went to Italy to restore his shattered health. He died while returning to Paris. Consult (Melanges d'economie politique et de finance) (2 vols., 1856), and (Leon Faucher, biographie et cor¬ respondence5 (2 vols., 2d ed., Paris 1875).

FAUCIGNY, fo-se-nye', a district of France, department of Haute Savoie; area, about 840 square miles. Belongs almost wholly to the basin of the Arve, and not more than one-third of its surface is fit for culture. Pop.

102,000.

FAUCIT, fa'sit, Helen (Lady Martin), English actress: b. London, England, 11 Oct. 1817; d. Wales, 31 Oct. 1898 In 1851 she was married to Theodore (afterward Sir Theodore)

Martin (q.v.). She made her professional debut as Julia in the by her husband, ap¬ peared in 1900.

FAUJAS DE SAINT-FOND, fo'zha' de san'fon', Barthelemy, French geologist: b. Montelimart, 17 May 1741; d. 18 July 1819. He received his education at the Jesuit College of Lyons, studied law at Grenoble and was ad¬ mitted advocate to the Parliament. In 1765 he became

president of the Seneschal's Court, but he soon was attracted to outdoor life and the study of geology. On the occasion of his re¬ peated visits to the Alps he studied the forms, structure and composition of rocks and in 1775 discovered a rich vein of pozzuolana in the Velay. Buffon invited him to Paris, where Louis XVI appointed him assistant naturalist at the Museum and in 1788 he became royal commissioner for mines. In the latter capacity he traveled all over Europe and in his (Recher ches sur les volcans eteints du Vivarais et du Velay5 he developed his theory of the origin of volcanoes. He was the first to -point out the volcanic nature of the basaltic columns in Fingal's Cave, Isle of Staffa. In 1793 he was made professor at the Jardin des Plantes, a post he held until 1818. He wrote (Voyage en Angleterre, en Bcosse et aux lies Hebrides5 (1797; Eng. trans., 2 vols., 1799) ; ˆDescrip¬ tion des experiences de la machine aerostatique de MM. Montgolfier5 (1784) ; (Histoire naturelle de la province de Dauohine5 (1782) ; ˆineralogie des volcans5 (1784); (Essai de geologie5 (1809).

FAULHABER, foul'ha-ber, Michael, Ger¬ man prelate : b. Klosterheidenfeld, Bavaria, 5 March 1869. He was educated at the Schwein- f urt gymnasium, and at the gymnasium, univer¬ sity and Kilaneum Seminary of Wurzburg. In 1887-88 he was a soldier and non-commissioned officer in the Bavarian army and was ordained to the Catholic priesthood in 1892. In 1892-94 he was chaplain and parish priest and in 1894-96 was prefect of the Kilianeum Seminary, Wurz¬ burg. In 1896-99 he was engaged in studying manuscripts at the Vatican and other Italian museums. From 1899 to 1903 he was privat- docent in Greek palaeography, Biblical archaeol¬ ogy, homiletics, exegesis of the Psalms, at the University of Wurzburg, and in 1903-11 was professor of the Old Testament Exegesis and introduction to Sacred Scripture at the Univer¬ sity of Strassburg. In 1911 Dr. Faulhaber was consecrated bishop of Speyer. In 1900 he visited England to study manuscripts of early Christian literature, spending one semester at Oxford. In 1902 he visited Spain for a

similar purpose. He has published (Die griechischen Apologeten der klassischen Vater- zeiU (1896) ; (Die Propheten-Catenen nach romischen Handschriften) (1899) ; (Hesychii Hierosolymitani interpretatio Isaiae prophetae) (1900); (Hohelied-Proverbien-und Prediger CateneiP (1902) ; (Petrus stirbt nicht (1903) ;

(Weltkirche und nationale Anstalten) (1906) ; (Die Vesperpsalmen, weiteren Kreisen erklart) (1906); (Schule und Religion> (1907); (Soziale Charitas> (1910); (1912). He was a collaborator in Kihn, (Patrologie) ; Karo-Lietzmann, ˆatenarum graecarum cataiogus> (1902;; Buchberger, (Kirchliches Handlexicon,* etc. He is a con¬ tributor to the Tlieologische Quartalschrift, B'iblische Zeitschrift, Strassburger Diozesan- blatt , Oriens Christianas, Monatsschrift fur katholische Lehrerinnen, Literarische Rund¬ schau, Theologische Revue, etc.

FAULKNER, fak'ner, Charles James,

American lawyer: b. Berkeley County, Va., 1805; d. 1 Nov. 1884. He was admitted to the bar in 1829, sat at various times in both houses of the Virginia legislature and was a member of Congress 1851-59. In 1860 he was appointed Minister to France. Returning to the United States in 1861 he was imprisoned on suspicion of disloyalty, in Fort Warren, Boston, but was exchanged the same year. He was sent to Congress from West Virginia 1875-77.

FAULKNER, John Alfred, American theo¬ logian; b. Grand Pre, Novia Scotia, 14 July 1857. He was graduated at Acadia College in 1878 and at Drew Theological Seminary in 1881. He also studied at Andover Theological Seminary 1881— 82, at the University of Leipzig 1902-03, and the University of Bonn 1904. In 1883 he was ordained to the ministry of the Methodist Epis¬ copal Church and from 1883 to 1897 held suc¬ cessive pastorates at Beach Lake, Yatesville, Scranton, Taylor and Great Bend, Pa., and Binghamton, N. Y. In 1897 he was made pro¬ fessor of the history of theology at Drew Theological Seminary. He has published (The Methodists* (in

(1906) ; (Erasmus, the Scholar* (1908) ; (Crises in the Early Church) (1912), also con¬ tributions to Flurst's (History of the Christian Church > (1897-1900), and contributions to

encyclopedias and reviews.

FAULKNER'S ISLAND, in Long Island Sound, belonging to Connecticut and about four miles from the mainland. A lighthouse, still in use, was erected here some years ago.

FAULT, in geology, any rock-crack or fis¬ sure with dislocation of the strata so that one wall of the fracture has slipped past the other wall. The rock movement may accompany the formation of the crack, or may come later and the total movement may vary from a small

fraction of a foot to many thousands of feet. Faults are produced by the same strains and stresses which make folds, the rocks breaking instead of bending; a brittle stratum may be faulted, while softer strata above or below may be only bent. The dip of a fault is the amount of inclination of the plane of fracture from the horizontal ; the hade or slope is the complement

of the dip, being the amount of inclination of the plane from the vertical. Thus the hade of a fault with dip of 60 degrees would be 30 de¬ grees. The rock-strata relatively dropped from the downthrow side; the upthrow side is oppo¬ site. In the case of a fault plane that is not verticle, the side of the fracture that overlies the other is the hanging wall; the underlying side is the foot-wall. The trace of the fault plane on the horizontal is its strike. The throw of a fault is the total vertical dis¬ placement, the heave is the total horizontal dis¬ placement, both measured in a plane normal to the strike. If a fault dips 45 degrees the heave and throw are equal.

Faults are classified as normal and reversed. In a normal fault the hanging wall is on the downthrow side. Such faults are usually pro¬ duced bv gravity, the hanging wrall having slipped downward along the fracture. In such faults, the fracture is usually steep and they are often known as gravity faults. In a re¬ versed fault the hanging wall is on the upthrow side, that is, has been thrust up by compression, the beds on one side of the fracture being thrust past those on the other. As a rule thrust faults have lower dips than normal faults, since foi the hanging wall to ride up over the other side, the plane of breaking must usually be in¬ clined at a low angle. The best examples of great normal faults in the United States are in the Arizona-Colorado Plateau. Some of these such as the Grand Wash and Hurricane Faults, have vertical displacements of several thousand feet. A few are so recent that the upthrown side stands as a great wall, overlooking the downthrown side. Such a wall is known as a fault escarpment, or more briefly, as a fault scarp. Erosion, of course, ultimately removes all traces of a scarp, but even after that the structure is still called a fault. Horizontal movements also occur in faulting, offsetting roads and fences, as in the famous San Fran¬ cisco earthquake, the tremor of which was pro¬ duced by a fault movement. Thrust faults are common in the southern Appalachian Moun¬ tains, or in other regions of close compression and intense folding. Such faults are known, in which the plane is nearly horizontal and in which older rocks have been thrust out over younger beds for distances of 15 miles or more. The Lewis overthrust of Montana and the Hart Mountain overthrust of Wyoming are striking examples. Generally a fault-fissure is filled with more or less ground-up material, called breccia, formed from the

dislocated strata and the hanging and foot wall faces are grooved and polished, giving the appearance called slickensidcd.

It is obvious that faults are essentially sur¬ face phenomena ; for with increasing depth and increasing pressure from above, rocks bend rather than break, and we can easily imagine a depth at which all rocks, while not truly molten, are plastic. See Escarpment ; Geology ; Moun¬ tain; Ore Deposit.

FAUN, fan (Lat. Faunas, from favere, to be favorable to), in Roman mythology, a Latin rural deity. See Faunus.

FAUN OF PRAXITELES, a marble

statue in the Museo Capitolino, Rome, the copy of a bronze original which stood in a street of Athens. The only animal attributes of the

satyr leaning against a tree trunk are the pointed tips of the ears, and is the earliest de¬ parture from tradition in this matter. Consult Hawthorne, (Marble Faun.*

FAUNA, fan'a, the animals native to a spe¬ cial locality, region or period of time, as the term <(flora** is used by botanists. The term, when prefixed by certain words, is restricted to a more special usage, as (

FAUNA, in Roman mythology, a Roman goddess, originally called Marica, but after her marriage with Faunus named Fauna. She is sometimes identified with Cybele.

FAUNCE, Daniel Worcester, American Baptist clergyman: b. Plymouth, Mass., 3 Jan. 1829; d. 1911. He was graduated from Am¬ herst College in 1850 and was ordained to the Baptist ministry in 1853. He held various pas¬ torates in New England and elsewhere, and was a member of the board of managers of the American Baptist Missionary Union. He has published (The Christian in the World) ; (Words and Works of Jesus* (1873) ; (Words and Acts of the Apostles) (1874) ; (A Young Man's Difficulties with His Bible* (1877) ; (The Resurrection in Nature and Revelation* (1880) ; (Prayer as a Theory and a Fact* (1890); (Hours With a Skeptic*; (Shall We Believe in a Divine Providence?* (1900) ; (The Mature Man's Difficulties with His Bible*

(1908).

FAUNCE, John, American naval officer : b. Plymouth, Mass., 25 March 1807; d. Jersey City, N. J., 5 June 1891. He entered the United States marine service as third lieutenant in 1837 ; in 1858 he was made commander of the revenue steamer Harriet Lane, which, under his command, accompanied the naval expedition to Paraguay in 1858—59, and which in 1861 was one of the small fleet that was hastened to the relief of Fort Sumter and was fired on by the Confederates at Charleston.

FAUNCE, William Herbert Perry, Amer¬ ican educator: b. Worcester, Mass., 15 Jan. 1859. He is a son of D. W. Faunce (q.v.). He was graduated at Brown University in 1880 and at the Newton Theological Seminary in 1884; held pastorates in Springfield, Mass., 1884-89 and New York 1889-99; was long a trustee of Brown and Rochester universities; lecturer at the University of Chicago 1896-97. He was made president of Brown University in June 1899. He is the author of (The Educational Ideal in the Ministry* (Lyman Beecher Lec¬ tures, 1908) ; (What Does Christianity Mean?* (1912) ; (Social Aspects of Foreign Missions* (1914). He has received the honorary degree of D.D. from Brown, Yale and Harvard uni¬ versities, and the degree of LL.D. from Baylor, Alabama, Dartmouth, Wesleyan, Denison and Amherst.

FAUNUS, an Italian divinity, probably an ancient Italian king, who instructed his subjects in agriculture and the management of flocks

and was afterward worshiped as the god of fields and of shepherds. The festival of the Faunalia, held on 5 December, referred to the protection he exercised over agriculture and cattle. Fauna was his female complement. He was also worshiped as a prophetic divinity. As deity of the woods and of flocks and herds he corresponds to the Greek Pan, and hence with his name became associated the attributes of the latter. The idea also arose of a plurality of fauns, like the Greek satyrs, who were represented with short horns, pointed ears, tails and goats' feet, and to whom all terri¬ fying sounds and appearances were ascribed. Readers of Hawthorne's (Marble Faun* will remember the artistic use there made of the conception.

FAUQUE DE JONQUIERES, fok' de zhon'ke-ar, Jean Phillipe Ernest, French ad¬ miral and mathematician : b. Carpentras, de¬ partment of Vaucluse, France, 3 July 1820; d. 1901. He entered the navy and as chief of staff to Admiral La Grandiere in Cochin-China he organized at Saigon the first agricultural and industrial exposition in the French

Asiatic pos¬ sessions. He was appointed vice-admiral 1 Oct. 1879 and in 1883 became director of the Bureau of Charts arid Plans. He published several val¬ uable mathematical treatises, including ˆMe¬ langes de geometrie pure* (1856) ; (Essai sur la generation des courbes geometriques* (1859) ; (Theoremes fondamentaux sur les series de courbes et de surfaces algebriques, etcP (1865) ; (Systeme de courbes et surfaces algebriques d'ordre quelconque* (1866). He also translated into French the (Epistles* and the (Art of Poetry* of Horace.

FAUQUIER, fa'kwer, Francis, American

colonial governor: b. about 1704; d. 3 March 1768. He became a director of the South Sea Company in 1751, and succeeded Dinwiddie as lieutenant-governor of Virginia in 1758 and re¬ tained the office for the remainder of his life. Upon the passing of Patrick Henry's Stamp Act resolutions he dismissed the Virginia house of burgesses, opposed the Stamp Act Congress and prevented the colony of Virginia from choosing delegates at the invitation of Massachusetts bv refusing to issue writs for summoning the house of burgesses.

FAURE, Frangois Fel'x, fran-swa fa-leks for, French President: b. Paris, 30 Jan. 1841; d. there, 16 Feb. 1899. He was for a time a tanner in Touraine, but became a wealthy ship¬ owner in Havre and an authority on all ques¬ tions concerning shipping, commerce and the colonies. During the Franco-Prussian War he commanded a body of volunteers and gained the ribbon of the Legion of Honor. He en¬ tered the Chamber of Deputies in 1881, served as Colonial Under Secretary and Commercial Minister in the cabinets of Gambetta, Jules Favre and Tirard, and as Minister of Marine in that of Dupuy (1893). A Moderate Re¬ publican and chief spokesman of the Union Republicans, he was elected President of the Republic on the resignation of Casimir Perier in 1895. The consummation of the alliance with Russia was the chief event of his term of office. He opposed the reopening of the Dreyfus case.

FAURl£, fo'ra, Gabriel Urbain, French

composer: b. Pamiers, 13 May 1845. He

studied at the School of Sacred Music under Niedermeyer, Dietsch and Saint-Saens. In 1877 he was appointed chapel master at the Madeleine and in 1896 became organist there. He was Massanet's successor as

professor of composition at the Conservatoire and in 1905 was made director. He was elected to the Academy in 1909. He was twice awarded the Chartier prize for chamber music. He has composed a symphony in D minor, two quartets for piano and strings, a suite for orchestra, sonata for violin and piano, concerto for violin, elegy for violoncello, incidental music for a requiem, a cantata, (The Birth of Venus,) and a number of songs. He occupies a foremost place among modern composers, his music possesses remarkable origi¬ nality and is essentially refined and artistic.

FAURIEL, Claude Charles, eld'd sharl fo¬ re-el, French historian: b. Saint Etienne, France, 21 Oct. 1772; d. Paris, 15 July 1844. He published (History of Southern Gaul under its German Conquerors* (1836) ; (The Origin of the Epic of the Middle Ages) (1833) ; (History of Provencal Poetry* (1846) ; and < Dante and the Origin of the Italian Language and Litera¬ ture J (1854), etc.

FAUSBOLL, fous'bel, Michael Viggo,

Danish philologist : b. Hove, near Lemvig, 1821 ; d. Copenhagen, 3 June 1908. He was appointed on the staff of the Copenhagen library in 1861 and was made professor of Indo-Oriental lan¬ guages at the University of Copenhagen 1878. He devoted most of his attention to editing Pali texts. His publications include (The Dham- mapadam,* with commentary and translation in Latin (Copenhagen 1855; 2d ed., London 1900) ; (Five Jatakas,* with translation (1861) ; (Two Jatakas> (1870); (Dasaratha Jataka* (1871); (Ten Jatakas) (1872) ; (The Jatakas,* with Eng¬ lish commentary (6 vols., London 1877-96) ; (Indian Mythology according to the Mahabha- rata) (1903). He published, under the pseudo¬ nym of V. Kristiansen, (Dictionnaire de la langue des rues) (1866) and other works.

FAUST, foust, Albert Bernhardt, Amer¬ ican Germanic scholar: b. Baltimore, Md., 20 April 1870. He was graduated at Johns Hop¬ kins in 1889, took the degree of Ph.D. there in 1892 and matriculated at the University of Ber¬ lin in 1892. He studied and traveled abroad in 1892-94, was instructor in German at Johns Hop¬ kins, 1894-96, associate professor of German at Wesleyan University, Conn., 1896-1903. In 1903- 04 he was assistant professor of German at the University of Wisconsin and in 1904—10 at Cor¬ nell University, becoming full professor in the latter year. He is a member of the Modern Language Association of America and other learned societies and has published (Charles Sealsfield (Carl Postl), Der Dichter beider Hemispharen* (1897) ; (The German Element in the United States* (1909; Ger. trans. 1911), for which he was awarded the Conrad Seipp

Memorial Prize by the University of Chicago and the Loubat prize by the Royal Prussian Academy of Sciences; (Guide to the Materials for American History in Swiss and Austrian Archives) (1915). He edited (Zschokke's Tales> (1895) ; (Heine's Prose) (1909) ; and wrote (The Problematic Hero in German Fic¬ tion* (1901) ; development of Goethe's Ethical and Religious Views> (1902) ; defense and In- vol. ll — 5

terpretation of Book IX of Wolfram's ParzivaP (1903) ; (Friedrich Spielhagen* (1905).

FAUST, or FUST, Johann, German gold¬ smith of the 15th century and one of the persons to whom the invention of printing was long mistakenly ascribed. It is now well established that he loaned money to Gutenberg, who had pre¬ viously made some attempts with movable types at Strassburg, and took a mortgage on the busi¬ ness. In 1455 Faust prosecuted Gutenberg for money advanced, and seized enough of the ap¬ paratus to cover the mortgage. He improved and used the apparatus, and in the 16th century was hailed as the inventor of printing but mod¬ ern research has established Gutenberg's claims on a firm basis. The third person concerned was Schoffer, who married the daughter of Faust, and who is allowed the honor of having invented punches and matrices for casting types, by means of which this grand art was carried to perfection. The first fruits of the new proc¬ ess, that is, a work printed with cast letters, appears to have been the (Mazarin Bible,* or (Forty-two-line Bible) (the latter name from the number of lines in a column) completed about 1455. Another, early work was (Durandi Rationale Divinorum Officiorum,* published by Faust and Schoffer 1459, followed a year or two after by the (Catholicon Johannis Januensis* ; after which, in 1462, succeeded the (Latin and German Bible,* so much sought for by those fond of early specimens of typography. There is reason to believe that Faust died of the plague in 1466, as the name of Schoffer alone is found in the books printed after that time at Maintz. Owing, perhaps, to a similarity of name some of the noted deeds of Dr. Faust have been ascribed in popular German legends to the printer.

FAUST, foust or FAUSTUS, fas'tus, Dr. John, German magician : b. Knittlingen, Suabia ; d. Staufen 1538. The facts of his life have al¬ most entirely disappeared amid the legends and fables in which they have become wrapped up. He appears to have been a charlatan and adven¬ turer who traveled from place to place, putting himself forward as a physician, alchemist and astrologer, and as a great magician and en¬ chanter. At Wurzburg he professed that he could perform all the miracles that Christ per¬ formed, and at Wittenberg

claimed that the successes of the imperial troops in Italy had been brought about by his magical powers. Among the credulous and ignorant he naturally found many to put faith in his claims and at last his name became associated with a whole series of marvels. The first literary work of which he is the subject was published at Frank¬ fort in 1587, by Johann Spies, and professes to narrate the (History of Dr. John Faust, the Far-famed Enchanter, and Professor of the Black Art.* Enlarged editions soon appeared and the book was translated into English (about 1587), Low German, Flemish and French. In it we find most of the famous stories associated with Faust's name; how he sold himself to the devil for a period of 24 years ; how, by the aid of the fiend Mephistopheles, he and his attend¬ ant and pupil, Wagner, were able for this time to enjoy all sorts of sensual delights and to travel about performing the most marvelous exploits, and how at last, when the end of the fatal compact arrived, after a night of dreadful

tempest, his body was found almost torn limb from limb, lying on a dunghill at the village of Rimlich, near Wittenberg. It was on the Eng¬ lish translation of Spies' book that Marlowe's great tragedy, (The Tragical History of Doctor Faustus,* was based (1589). In 1599 the leg¬ endary history of Faust appeared at Hamburg in a new form, as narrated by G. R. Widmann, a zealous Lutheran, always eager to draw a iesson from the events with which he deals. In an altered edition of this by Pfitzer (1674) we first find the germ of Goethe's Margaret, the maiden whose fate is so tragically connected with that of Faust, in the great drama of the German poet. In the second part of his (Faust, J Goethe has attempted a poetical solution of the legend. Through all vicissitudes he leads Faust to a point where at last he experiences the feel¬ ing of perfect happiness in devoting his intel¬ lectual faculties to the promotion of the welfare of his kind. Then he has attained the end which he has pointed out to Mephistopheles as the object of all his longings, and is removed from this life, not, however, to be lost, but to be saved by love, the ˆever-womanly" that ((leads us on high." Goethe's famous poem attempts to show that man's longing after knowledge may lead him into many errors and failings, but cannot destroy his better nature. The story of Faust is essentially melodramatic and this, combined with its strong dramatic and spectac¬ ular features, has made it a popular story since the days of its first appearance in print. Mar¬ lowe, who followed the popular legend closely, recognized these dramatic elements and handled them with great skill. His drama, therefore, became one of the most successful

plays in Eng¬ land and long held the boards. The legend of Faust took hold of the fancy of all Europe and traditions of the story were made from German into all the languages of the Continent. These formed the bases for countless stories founded upon the spectacular and miraculous elements in the Faust legend, which took strong hold of the religious fancy of the reformers from the days of Luther on. In these semi-religious, semi-pagan stories, Faust is ever represented as siding with or representing the forces of evil. So, therefore, when Goethe presents the salvation of Faust he goes contra to the whole spirit of the popular legend which always made the damnation of Faust the legitimate result of his compact with the devil. In his version, however, Goethe followed the brood of Faust stories of his day, many of which delighted in depicting the outwitting of the powers of evil and the ultimate salvation of him who had entered into relationship with them.

Goethe's

the second in 1832. It at once became popular in Germany and soon translations appeared in most of the languages of Europe. The most noted theatrical production of (Faust) in Eng¬ lish was that by Henry Irving of Will's adapta¬ tion. Two other well-known Faust tragedies in German were written, one by Klingemann (1815) and the other by Lenau (1836). This latter is full of the restless spirit of the age and is only overshadowed by Goethe's greater work. Rembrandt, Christoph von Sichem, Cornelius and Retzsch have illustrated the story of Faust. Naturally there is a vast amount of Faust literature of an explanatory historical and critical nature, the larger part of which has had its origin in Germany and the other Germanic countries. One of the best collec¬ tions of the older Faust legends, stories and writings is that published by K. Engel in 1885.

FAUST. Grand opera in five acts by Charles Francois Gounod (libretto by Barbier and Carre, after Goethe's poem) first produced at Paris, 19 March 1859. Easily the most pop¬ ular French opera of the second half of the 19th century, Gounod's masterpiece has pene¬ trated to the farthest corners of the earth. The romantic story, the appealing figures of the lovers, with the sinister Mephistopheles in the background are admirable operatic material and Gounod's genius found its highest expression in the musical garment with which he clothed it. The opera abounds in sensuous melody that contains a potent magic. Its language was new to France, but the idiom was soon adopted by other composers to such an extent indeed that much of it has become hackneyed. It is not difficult to point to weaknesses, to dwell upon its cloying sweetness, to decry the soldiers' chorus as banal ; but when all

has been said, there remains a bulk of finely felt material used with skill and developed into stirring musical climaxes. There is a distinctive personal note throughout, traceable perhaps most directly in the striking combination of the voluptuous and the religious elements. It seems superfluous to single oui the important numbers. The quartette in the garden scene is one of the most success¬ ful operatic ensembles, almost ranking with that in (Rigoletto) in the success with which the diverse dramatic interests are harmonized. The succeeding love scene is borne along on an uninterrupted stream of delicious melody. The vigorous and dramatic kermesse scene and, above all, the thrilling final terzetto, which has done yeoman's service as a model for other composers, need but to be mentioned to be vividly recalled to mind.

Musical settings of Goethe's poem have been made by other composers. The most important are, Hector Berlioz's a dramatic legend in four parts, first performed in Paris, 6 Dec. 1846, and generally given in concert form, to which it is better adapted, and Arrigo Boito's 'Mefistofele,* a grand opera in a prologue and five acts (later condensed to four) first produced at Milan, 5 March 1868. The latter, which still finds local and spasmodic favor in the opera house, was not without influ¬ ence both on Verdi, with whom Boito, as libret¬ tist, was closely associated in his later years, and on Ponchielli and the later Italian com¬ posers.

An opera on the Faust legend by Ludwig Spohr was first produced at Frankfort, March

1818. The book has no connection with Goethe's poem and the work, which had a certain vogue in its own day, is of slight musical importance.

Lewis M. Isaacs.

FAUST. Goethe's (Faust,* a poetic tragedy in two parts, is unquestionably the greatest, though not the only, treatment of its fruitful theme. Goethe began work on it as early as 1774. In November 1775, he carried with him to Weimar a manuscript, commonly called the

It has been said that every age has its

Some acquaintance with the traditional Faust Goethe acquired as a youth in Frankfort, Leipzig, and Strassburg, and the dramatic treat¬ ment of this problematic character was one of his first literary plans. What attracted him was of course not the vulgar marvels, or the lewd adventures, or even the supernatural powers attributed to the legendary Faust. Goethe saw in Faust, as in Gotz von Berlichin- gen, one of the heroes of a spacious and ex¬ pansive time, a man of like passions with himself, and a character which he could in infinite measure fructify with his own experi¬ ences and his own longings.

Goethe's Faust is a professor and scholar who aspires to penetrate to the essence of things. Unremitting application has made him master of all the knowledge that generations have accumulated. He knows his powers, but also his limitations. He has not found the key to unlock the mysteries of the universe and for this reason he has betaken himself to magic. By its aid he conjures up the spirit of that earth which he has been unable to comprehend. Nevertheless, he cannot bear direct contact with this spirit, which is too wonderful for him. The more readily, therefore, though disdain¬ fully, he falls in with the proposal of another spirit, the mischief-maker Mephistopheles, that he seek enlightenment through experience in a field to which he has hitherto been a stranger, the field of life. Mephistopheles undertakes to introduce him first to the little, then to the great world. The reward for these services shall be the possession of Faust's soul, to be claimed when a moment arrives, so beautiful that Faust shall wish to prolong it.

This is the ground plan of Goethe's entire drama. The First Part comprises Faust's ex¬

periences in the little world, the Second Part, in general, those in the great world. The First part, moreover, best known and most admired, reaches its climax in Faust's seduction of Gretchen, one of the most pathetic tragedies ever written and one written with incomparable directness, simplicity and power.

The Second Part takes Faust to the imperial court, where he ingratiates himself with a frivo¬ lous emperor by arranging a pageant and by the invention of paper money. Here, however, Faust's eyes become opened to another great world which like a new planet swims into his ken. It is a part of the traditional story that Faust shall summon up the shades of great figures of the past for the amusement of his patrons and one of these is Helen of Troy — according to the chap-book, Mephistopheles pro¬ cures him Helen for a concubine. But Goethe transforms the Spartan queen into the embodi¬ ment of the

Greek ideal and when Faust has succeeded in his conjuration, he cannot refrain from seeking to make her his own.

The first instinctive effort fails. An ex¬ plosion occurs which leaves Faust unconscious on the floor. In order to be united with Helen he must join her in her own sphere, and thither he must be furthered by a spiritual coadjutor as ideal as she is. His guide to the realm of antiquity is Homunculus, a spirit without a body, the product of German learning repre¬ sented by Faust's former famulus, the pedantic but indefatigable Wagner.

In Sparta Faust ultimately finds himself the lord of a mediaeval manor. Helen returns after the fall of Troy and for a brief but rapturous time she lives as the wife of Faust; until their son, Euphorion — a personification of the spirit of poetry whom Goethe was pleased to identify with Byron — perishes Icarus-like in conse¬ quence of his irresistible impulse to soar to the heights, and his mother departs with him.'

The episode of Faust and Helen, published separately in 1827 as a ((classic-romantic phan¬ tasmagoria, an interlude to (Faust* **, is, in the economy of the drama, a play within a play, and is surrounded with an operatic, even dream-like atmosphere. At its conclusion we find Faust once more in the German Empire. For aiding the emperor to put down a rebellion he is re¬ warded with the sovereignty over a tract of coastland. He reclaims an extensive domain from the sea, establishes a prosperous com¬ munity, and confesses that in the prospect of benefit to untold future generations his supreme moment has come. He dies, but not to fall into the hands of Mephistopheles. Good spirits defend him ; doctors and saints intercede for him; the spirit of Gretchen pleads for him; and as one who erred so long as he strove, but who strove, though blindly, so long as he lived, he goes to his reward.

The action above outlined constitutes a complete and consistent whole, and there is no reason for questioning Goethe's assertion that from the first he conceived the subject as a whole in essentially this form. Not only, how¬ ever, did he give his work to the public in por¬ tions, but until the very last decade of his life he expected that it would remain a series of fragments. Even now it is fragmentary in exe¬ cution, though not in conception. Some highly important links in the chain — such as, for example, a scene in Hades in which Faust se-

cures from Persephone the release of the spirit of Helen — are left to be forged by the imagi¬ nation. Indeed, (Faust,* by contrast to the (Divine Comedy* or to (Paradise Lost,* goes forward by leaps and bounds, and conveys by implication as much as it sets forth explicitly — or more. Goethe's invariable habit was so to treat a situation or an incident as to give it a connotation of infinite relations. And as to (Faust), he never wrote any passage or scene until he was ready to make what he wished to make of it for itself ; and when he assembled passages and scenes written at widely different times, he gave them little or no editorial re¬ vision. From his point of view they needed none. Hence some inconsistencies, some un¬ deniable difficulties, and even some irrelevancies.

But who would subject to rationalistic ex¬ amination a plot that takes us from heaven through the world to hell, from Leipzig to Sparta, and from Troy to Missolonghi? Goethe's (Faust) is a symbolical representation not merely of a type of character, not merely of the poet's own career, nor yet merely of the history of German culture in its richest period: (Faust* is Goethe's encyclopedic com¬ ment on human life as such. The first words and the last bid us so regard it. It is a play: hence — after the dedication — a prologue in the theatre. It is a play, the chief character of which is a son and servant of God, no less representative of faithful humanity than Job: hence a prologue in heaven, in which the Lord gives Mephistopheles the privilege of tempting the hero. It is a play, the acts and facts of which are neither more nor less real than the acts and facts of our whole mundane existence amid the vain shadows of things. Of this the final chorus mysticus assures us :

All things transitory

But as symbols are sent.

In fine, (Faust * is Goethe's philosophical testament. Even his idiosyncrasies find expres¬ sion here: his preference for neptunism over vulcanism, his abhorrence of pedantry, his im¬ patience with contemporary mediocrity and philistinism, his indifference to the empty framework of dilapidated institutions. But here he also gave utterance to his profoundest convictions concerning being, conduct, life, and destiny. Goethe can write cynically when he speaks for himself as well as from the lips of Mephistopheles. The ((old heathen® could in his own person as little as in the person of his hero

meet the test of Christian catechization ; Faust does not reveal much capacity for repentance, and he reveals none for repining; he appears to be for the most part a ruthless self-seeker. Nevertheless, we may not unfairly call (Faust) a Christian poem. Altruistic activity is the culmination of the course of Faust's develop¬ ment; altruistic intercession is not inoperative in his redemption ; and the restlessly striving spirit in him works out its salvation because,

consciously or unconsciously, it is ever drawn onward and upward by another spirit endowed with the divine attributes of goodness, love, and mercy. Translated by Bayard Taylor (Boston 1870-71) and by Anna Swan wick (London 1878). Edited by Calvin Thomas (Boston 1899). Consult Otto Pniower, (Goethe's Faust; Zeugnisse und Excurse zu seiner Entstehungs- geschichte* (Berlin 1899) ; Veit Valentin, (Goethes Faustdichtung in ihrer kiinstlerischen Einheit dargestellt* (in (2Esthetische Schriften,* Vol. II, Berlin 1894) ; Jakob Minor, (Goethe's Faust; Entstehungsgeschichte und Erklarung* (Stuttgart 1901) ; Friedrich Lienhard, (Ein- fiihrung in Goethe's Faust) (Leipzig 1913).

William G. Howard,

Assistant Professor of German, Harvard

U niversity.

FAUSTA, Flavia Maximiana, fla'vi-a mak"- sim-i-a'na fas-ta, Roman empress : d. probably 326 a.d. She was a daughter of the Emperor Maximianus Herculius and was married to Constantine the Great 307 ; and, for reasons that have never been made clear, was executed by order of her husband.

FAUSTIN I, fo'stan' (Faustin Soulouque), dictator of Haiti: b. Petit Goave, Haiti, 1785; d. 6 Aug. 1867. He came of a poor negro family and in early life was servant to General Lamarre. In 1803 he took part in the negro insurrection and subsequently was made a cap¬ tain by President Boyer. In 1844ˆ47 Faustin was striving for power in the new Haitian Republic, after the defection of La Republica Dominicana, holding at that time the offices of governor of Port-au-Prince, and commander of the Presidential Guard. The Senate chose him President in 1847, thinking that he would be amenable to the will of that body, but he soon showed his independence and instigated a mas¬ sacre of the mulattoes in Port-au-Prince on 16 April 1848. He had himself proclaimed em¬ peror in 1849, and for 10 years ruled with iron severity and cruelty. In 1858 General Geffrard overthrew Faustin's

government, forced him to abdicate and exiled him to Jamaica. # He returned to Haiti a short time before his death.

FAUSTINA, Annia, an'i-a fas-ti'na (sur- named Junior) , Roman empress : d. near Mount Taurus, Asia Minor, 175 a.d. She was a daugh¬ ter of Annia Galeria Faustina (q.v.) and was married to Marcus Aurelius 145 or 146 a.d., who, in spite of her profligacy, was devoted to her. After her death, charity schools were founded in her honor.

FAUSTINA, Annia Galeria (surnamed Senior), Roman empress: b. about 104 a.d.; d. 141. She was the wife of Antoninus Pius, and like her daughter, the wife of Marcus Aurelius, was noted for her licentiousness.

FAUSTUS OF RIEZ, re'ez, Semi-Pelagian monk, who lived m the 5th century. He joined the monastic community of Lerins, where he was a fellow-student of Sechnall, bet¬ ter known as Saint Patrick, Apostle of Ireland. About 432 Faustus was chosen abbot of the monastery and in 457 became bishop of Riez (Regium), in Provence. In 481-85 his Trini¬ tarian views having offended Eurich, king of the Western Goths, Faustus was an exile. He opposed all Eastern heresies but himself fell

into error in regard to divine grace and the freedom of the will. He left letters, dogmatic and moral treatises and sermons. These in¬ clude 'Sermones ad Monachos) ; (De Dei Gratia.5 For text of Faustus' writings consult Migne, (Patrologia Latina) (Vol. LVIT) and Fngelbrecht, (Corpus Scriptorum Ecclesiasti corum Latinorum5 (Vol. XXI, Vienna 1891). Consult Koch, (Der heilige Faustus5 (Stutt¬ gart 1895) and Worter, 'Zur Dogmageschichte des Semipelagianiomus 5 (Munster 1900).

FAUVEL, fo'ver, Sulpice Antoine, French physician : b. Paris, 1813 ; d. 1884. He was edu¬ cated at the University of Paris, went to Tur¬ key and was appointed member of the Sanitary Council of Constantinople in 1848. In 1866 he returned to Paris, and was soon afterward appointed chief of the Sanitary Department of the French government. His long residence in Turkey had made him thoroughly familiar with cholera and typhus. The quarantine regulations of most countries are based on his recommenda¬ tions. He published 'Le cholera, etiologie

et prophylaxie5 (1868) ; ‘Rapports sur l’organiza- tion du service des quarantaines en Turquie5 (1873) ; ‘Reglement general de police sanitaire maritime) (1876).

FAVARA, fa-va’ra, Sicily, town, four miles southeast of Girgenti and nine miles from the Mediterranean, 1,066 feet above sea-level. It has mines of sulphur, tourmaline and alum, and nearby are marble-quarries. It markets fruit and has a castle of the Chiaramonte family, who in the 14th century were politically im¬ portant. Pop. of the commune 21,599.

FAVARO, fa-va’ro, Antonio, Italian mathe¬ matician : b. Padua, 1847. He received his edu¬ cation at Padua, and also at Turin and Zurich. He became professor of graphic statics at the University of Padua in 1872 and five years later he instituted a course in the history of mathe¬ matics at the same institution. He made a close study of Galileo’s works and in 1887 was com¬ missioned to prepare a national edition of the works of that savant. Favaro’s works include ‘La statica grafica nell’ insegnamento tecnico superiore> (1873) ; (Lezioni di statica grafica5 2d ed., 1877) ; (Miscellanea Galileiana inedita) (1887); (Nuovi studi GalileianP (1891); ‘Trent’ anni di studi GalileianP (1907) ; ˆAtti della nazione germanica artista nello Studio di Padova) (1912).

FAVART, Charles Simon, sharl se-mon fa-var, French dramatist: b. Paris, 13 Nov. 1710; d. there, 18 May 1792. At 24 he was writing successful comedies. These and his operettas number about 150 (his wife, Marie Justine Benedicte Duronceray, 1727-72, being his constant collaborator), and are for the most part pretty and realistic scenes of love in the country ; but some of them are amusing drol¬ leries like the mediaeval fabliaux. They spent some time with the army of Marshal Saxe in Flanders, where their performances were so popular that the enemy desired to hear them. In 1745 Favart became director of the Opera Comique, where his wife made the first attempt to harmonize her costume with the character she was representing. His most celebrated com¬ positions are ‘Annette and Lubin) ; ‘The Vil¬ lage Astrologer5 ; (Ninette at Court5 ; (The Three Sultanas5 ; ‘The Englishman at Bor¬ deaux.5 His ‘ Memoirs and Correspondence5

(3 vols., 1808) is of great value for the history of literature and the drama.

FAVERSHAM, fav’er-sham, William, American actor: b. England, 17 Feb. 1868. He was educated at Hillmartin College, London, and served in the English Yeo¬ manry. In 1888 he came to the United States, and

1893 joined the Empire Theatre Company, of which he became leading man in 1896. He left the Empire Company in 1901 and starred as Don Caesar in ‘A Royal Rival. } In 1908 he appeared in New York under his own management in (The World and His Wife.5 The following year he produced Stephen Phillips’ ‘Herod,5 appearing in the title role. Other successful roles were Jim Carson in ‘The Squaw Man5 (1906) ; Antony in (Tulius Caesar5 (1912) and Iago in ‘Othello5

(1914).

FAVERSHAM (ancient Faversfield), England, municipal borough and seaport in the county of Kent, 52 miles by rail southeast of London. It is a corporate member of the Cinque Port of Dover, and it contains three suburbs and has a handsome cruciform church. The chief manufactures are gunpowder, Roman and Portland cement, bricks and beer; it has large oyster fisheries. Its exports are chiefly hops and agricultural produce and imports tim¬ ber and coal. It was once the seat of the Saxon kings, and, in 930, Athelstane held here a Witenagemot, or great national council. There are still in existence remains of the abbey built by King Stephen, in 1147, for the Benedictine monks. The tomb of the king, who was buried in the abbey, is now pointed out in the parish church. In 1688 James II, when trying to escape to France, after the landing of William of Orange, was seized at Faversham and sent back to London. Later he succeeded in reaching France. Pop. 10,619.

FAVIGNANA, fa-ven-ya’na (ancient 2Egusa or TEthusa) : (1) an island of the

yEgades group in the Mediterranean, eight miles from the west coast of Sicily; area, 11 square miles. There is a fine bay on the east on which stand the town and fortress of San Leonardo. San Giacomo, the principal place, is on the north coast. The island has several quarries and extensive tunny and anchovy fisheries, in the produce of which, and in sheep, goats and poultry, it has a flourishing export trade. Pop. 6,079. (2) A town of the same name, with a

fine harbor, is on the north side of the island.

FAVORINUS, Greek sophist and philoso¬ pher, of the 2d century, a.d. He was a native of Arles, Gaul, but early in life began his travels in Italy, Greece and the East. His great learning together with his oratorical powers brought him into prominence both at Athens and at Rome. He was a close friend of the Emperor Hadrian, with Plutarch, Deme¬ trius, Aulus Gellius and other prominent per¬ sons of his day.

His great rival was Polemon of Smyrna. Favorinus wrote very many works, but only a few fragments have been preserved to us. His ‘Pantodape Historia5 (Miscel¬ laneous History) appeared in 24 books and was used by Diogenes Laertius. He wrote also ‘Apomnemoneumata5 (Memoirs) ; ‘Peri Pai- don Trophes,5 a work on child-training; and ‘Pyrroneioi TropoP (Pyrrhonean Tropes). Consult Christ-Schmid, ‘Geschichte der griech-

ischen Litteratur> (Vol. II, 5th ed., Munich 1913) ; Gabrielsson, (Ueber Favorinus und seine Tlavroda-rrij ‘1 oTv/jia’ (Leipzig 1906) ; Schick, ‘Favorin ri p* I latduv T ov

FAVORITA, La, grand opera in four

acts by Gaetano Donizetti (libretto by Royer and Waetz) first produced at Paris 2 Dec. 1840, the same year as the production of his ‘La Fille du Regiment.* In contrast with the latter, it was an immediate success, though time has since reversed the verdict. The sub¬ ject matter of the book is borrowed from a French drama (Le Comte de Commingues* and has a strong dramatic climax. The title refers to Leonora, the favorite of King Alphonso of Castile, whom the Pope will not permit him to marry. She and Fernando, a young novice of the monastery, have fallen in love. The king resolves to aid them, but Fernando learning of her past, seeks refuge in the monastery. Leonora follows him and after convincing him of the purity of her love, expires in his arms. Donizetti never wrote anything more dramatic than the last act of this opera. It is credibly claimed that he composed practically the whole of it (with the exception of the romanza <(Spirito gentil,® which was taken from an un¬ published work) in from three to four hours — a remarkable instance of his facility in writing. In the first act, the aria <(Una Virgine® sung by Fernando, and the duet between him and Leonora may be singled out for mention. The aria (<0 mio Fernando® in the third act is a favorite with all contraltos and the concerted finale of this act is one of the most effective in all Donizetti’s works. The chorus of monks in the first scene of the fourth act, the exquisite “Spirito gentil,® already referred to — the most popular piece in the opera — and the closing duet, full of pathos and beauty, are the most conspicuous numbers.

Lewis M. Isaacs.

FAVOSITIDiE, fav-6-sit'i-de, a palaeozoic family of fossil tabulate corals, having the septa and corallites distinct and little or no true ccenenchyma. The corallites are uniformly prismatic, tall and united by their thick walls, which are perforated by large pores, represent¬ ing aborted buds. The tynical forms (Favo – sites) make large compact masses, taking an important part in the formation of Silurian and Devonian limestones. About 10 genera are in¬ dicated by the numerous and widely distributed species.

FAVRAS, fa'vra', Thomas de Mahy, Mar¬ quis de, French Royalist: b. Blois, 26 March 1744; executed, Paris, 19 Feb. 1790. He came of a poor family of the nobility, entered the army, was a captain of dragoons at 17, and saw some action in the Seven Years' War. He became first lieutenant of the Swiss guards of the Count of Provence (later Louis XVIII) in 1772, and being unable to maintain his rank he retired three years later. In 1787 he raised a legion to help the Dutch against William IV and the Prussians. At the outbreak of the Revolution he returned to France and becoming implicated in schemes for the escape of the king, he was betrayed by officers to whom he re¬ vealed his plans. He was arrested, kept in prison about two months, then tried, convicted and executed. Consult memoir by Freiherr von

Stillfried Ratenic (Vienna 1881) and article by Alexis de Valon in Revue des deux mondes (15 June 1851).

FAVRE, favr, Gabriel Claude Jules, French politician: b. Lyons, 21 March 1809; d. Ver¬ sailles, 20 Jan. 1880. He took an active part in the Revolution of July 1830, studied law, and after distinguishing himself at the Lyons bar came to Paris in 1835, where he became famous as a defender of political prisoners. On the outbreak of the Revolution of 1848 Ledru-Rollin made him secretary to the Ministry of the In¬ terior. He was a leader of the party of opposi¬ tion to the President Louis Napoleon; and after the coup d'etat (1851) retired from political life for six years, till in 1858 his defense of Orsini for the attempt on the life of the em¬ peror again brought him forward and secured his election for Paris. From this time he again became an active leader of the Republican oppo¬ sition to the emperor. In 1868 he founded the Republican journal L'Electeur, and opposed with all his powers the declaration of war against Prussia. On the fall of the empire he became vice-president of the government of national defense and Minister of Foreign Affairs, and as such conducted the negotiations for peace with Prince Bismarck. But his operations both in the matter of the armistice and the peace showed a lack of skill and judgment. His agreement to exclude Bourbaki's army from the armistice was never forgiven him. He was elected to the French

Academy in 1867. He was author of (Rome et la Republique Frangaise* (1871) ; ‘Gou- vernement de la Defense Nationale) (1871-75) ; ‘Conferences et Discours Litteraires* (1873) ; ‘Discours Parlementaires> (1881) ; ‘Melanges Politiques) (1882).

FAVRE, Jean Alphonse, Swiss geologist: b. Geneva, 31 March 1815; d. there, June 1890. He studied at the Geneva academy, and for many years held the chair of geology there. He subsequently became president of the Federal Commission in charge of the geological map of Switzerland. He made special studies in the ancient glacial phenomena of the Alpine regions. He also did notable work on the folding of rocks. He published ‘Recherches geologiques dans les parties de la Savoie, du Piemont et de la Suisse voisines du Mont Blanc* (1867).

FAVRE, Louis, French engineer: b. Chene- Bourg, near Geneva, 29 Jan. 1826; d. 21 July 1879. He was born of humble parentage and received a very indifferent education; but by dint of remarkable genius, untiring energy and fertility of resources became one of the greatest of engineers. He went to Paris and rapidly gained a high reputation as a contractor for public works. In 1872 he gained the con¬ tract for the construction of the Saint Gothard tunnel, a work which was to be completed within eight years, and which engineering feat he had almost accomplished when he died.

FAVUS. See Ringworm.

FAWCETT, Edgar, American poet and novelist: b. New York, 26 May 1847; d. 1904. He was educated at Columbia University, where he was graduated in 1867. From youth onwards he was a frequent contributor to periodicals and wrote many works of poetry, fiction, etc. His works include ‘Short Poems for Short People) (1871) ; ‘Purple and Fine Linen)

(1873); (Poems of Phantasy and Passion) (1878); (The False Friend, } a play (1880); (The New King Arthur* (1883); (Song and Story* (1884); (Romance and Reverie* (1886); (Fair Fame) (1894) ; (Outrageous Fortune> (1895) ; (The Ghost of Gtly Thyrle* (1897).

FAWCETT, Henry, English economist: b. Salisbury, 25 Aug. 1833; d. Cambridge, 6 Nov. 1884. He was educated at King’s Col¬ lege School and at Cambridge University. In 18o8 he was suddenly deprived of his

eyesight by an accidental shot from a gun in his father's hand. This misfortune d.d not deter him from a public career, he walked, rode, skated and fished and studied music. In 1863 he published a (Manual of Political Economy, * which went through several editions. In 1863 he was made professor of pohtical economy at Cambridge. He was elected to Parliament in 1865 as an ad¬ vanced Liberal and advocated many reform measures. He devoted much time to the study of Indian finance, which he regarded as the key to successful government in India. Fawcett fought for a thorough housecleaning in Indian finances and overcame strong official opposi¬ tion. He was defeated at the election of 1874, but was soon after returned for Hackney. He became postmaster-general in Gladstone's Cabinet in 1880, where his administration was most successful. He wrote (Economic Posi¬ tion of the British Labourer* ; (Pauperism * ;

(Essays and Lectures on Social Subjects * (1872) ; (Speeches on Some Current Political Questions* (1873) ; (Free Trade and Protec¬ tion (1878); Undian Finance* (1880). He was one of that school of economists inclined in the direction of emphasizing individual liberty and limiting the interference of the state, although he was willing enough that the state should endeavor to elicit thrift and self-help through the medium of the post office, or protect the interests of those who could not defend them¬ selves, such as children who needed education, or agricultural laborers who were deprived of commons. Consult biography by Sir Leslie Stephen (London 1885).

FAWCETT, Millicent Garrett, English political economist: b. Aldeburgh, Suffolk, 11 June 1847. She was married to Henry Faw¬ cett (q.v.) 1867. She has taken a very promi¬ nent part in movements relating to women, for obtaining the parliamentary franchise for them, and is associated with constitutional as opposed to militant suffragists. Her published works in¬ clude ˆPolitical Economy for Beginners) (1870); (Tales in Political Economy) (1875) ; (Janet Doncaster,* a novel (1875); (Life of Sir Wil¬ liam Molesworth* (1901); (Five Famous French Women* (1906) ; ˆWomen's Suffrage) (1912).

FAWKES, faks, Guy, English conspira¬ tor: b. York, England, 1570; d. Westminster, 31 Jan. 1606. He was of Protestant parentage and brought up in that faith, but under the in¬ fluence of his stepfather, Dionis Baynbrigge, be¬ came a Roman Catholic. He enlisted in the Spanish army in the Netherlands in 1593, and was present at the capture of Calais in 1595. Of a fearless and intrepid temper, he became involved in conspiracies with Catesley and others. He returned to England with Winter, one of the conspirators, in 1604, after agreeing to assist in the Gunpowder Plot (q.v.). He passed under

the name of Johnson, as servant

to Thomas Percy, another conspirator, and was placed to lodge in the house next to the Parlia¬ ment House. After collecting the necessary combustibles, Fawkes worked his way into the coal cellar under the House of Lords, and after storing it with gunpowder, etc., was appointed to the dangerous duty of firing the mine. The government having had timely information of the detestable plot, the House of Lords and its cellar were searched, and Fawkes found secreted amid some casks of gunpowder, 4 Nov. 1605. At midnight (5 November) the authorities returned and arrested Fawkes. He suffered death at Westminster with three of his fellow conspira¬ tors. The anniversary of the discovery of the plot, (Guy Fawkes Day,* was long commemo¬ rated, when his effigy was burnt. Consult (The Gunpowder Plot) (1679) ; Gardiner, (What the Gunpowder Plot Was* (1897); and Howell's (State Trials> (1809-28).

FAY, fi or fay, Andreas, Hungarian author: b. Kohany, Zemplin, Hungary, 30 May 1786; d. Budapest, 26 July 1864. Till the appearance of Kossuth on the scene (1840) he was the fore¬ most leader at Budapest of the Opposition party; thereafter he took no considerable part in poli¬ tics, but promoted many important national en¬ terprises. His volume of poems, (New Garland) (1818), established his fame as a poet, but his admirable prose

FAY, fa, Charles Alexandre, French mili¬ tary officer: b. Saint-Jean-Pied-de-Port, 1827. He received his education at the military school of Saint-Cyr and at the General Staff school. He first saw active service in Africa and in the Crimean War served as aide-de-camp to General Bosquet, winning distinction at the battles of Alma and Inkerman. In 1870 he was a member of Bazaine's staff and was made prisoner at Metz. He was appointed brigadier-general in 1874 and charged with reorganizing the bureau of the general staff. In 1890 he was given com¬ mand of an army corps and retired in 1892. His published works include (Souvenirs de la guerre de Crimee* (1867) ; (Etude sur la guerre d'Allemagne en 1866) (1867) ; (De la loi mili- taire) (1870) ; (Journal d'un officier de l'armee du Rhin) (1871; 5th ed., 1890); (Etudes de marches: Jena, Sedan * (1899).

FAY, Charles Ernest, American educator and alpinist : b. Roxbury, Mass., 10 March 1846. He was graduated from Tufts College in 1868 and has been professor of modern languages there since 1871. A founder of the Modern Language Association of America and of the New England Modern Language Association, also of the New England Association of Colleges and Preparatory Schools (1885) of which he

was president 1888-89. In American moun¬ taineering he has held a prominent place, taking part in the founding of the Appalachian Moun¬ tain Club (1876) and the American Alpine Club (1902), both of which he has served as

president. He has also edited their publications Appalachia and Alpina Americana, furnishing numerous articles for the former and richly illustrated monograph (The Rocky Mountains of Canada> for the latter. He counts among the pioneers in the exploration of the Alpine regions of the Dominion. His activity in these fields has been recognized abroad by his election as an honorary member of the English, Italian and Canadian Alpine Clubs. He is a frequent lecturer on literary and geographical subjects.

FAY, Edwin Whitefield, American edu¬ cator: b. Minden, La., 1 Jan. 1865. He was graduated at the Southwestern Presbyterian University in 1883, received the degree of D.Ph. at Johns Hopkins in 1890, and studied at Leipzig in 1891-92. In 1890-91 he was in¬ structor in Sanskrit and classics at the Univer¬ sity of Michigan, in 1892-93 he was acting asso¬ ciate professor of Latin at the University of Texas, in 1893-99 professor of Latin at Wash¬ ington and Lee, and since 1899 professor of Latin at the University of Texas.

FAY, fi, Joseph, German painter : b. Co¬ logne, 10 Aug. 1815; d. Dusseldorf, 27 July 1875. His art education began in the Diissel- dorf Academy and was continued in Paris where he turned his attention to historical painting. His first picture (Samson and Delilah,5 was exhibited in his 27th year. He painted a series of frescoes in the Council Chamber at Elberfeld, in which was portrayed the history of Germany from the destruction of the Varian legions. His fertile pencil produced among other pictures

FAY, Theodore Sedgwick, American writer: b. New York, 10 Feb. 1807; d. Berlin, Germany, 17 Nov. 1898. He was eminent in periodical journalism for years. To this period belongs his book (Dreams and Reveries of a Quiet Man) (1832). He served with ability in the United States diplomatic service, first as secretary of the legation at Berlin (1837-53), and then (1853-61) as Minister at Berne, Switzerland; and wrote (Norman Leslie) (1835); and ‘The Countess Ida) (1841), tales;

FAYAL, fl-al’ (Port, fl-al), one of the Azores group, in long. 28° 41′ W. ;

lat. 38° 31′ N. It is 14 miles long by 10 broad; area, 69 square miles. It rises abruptly from the sea and the centre is about 3,000 feet in height. The climate is temperate all the year. Volcanic eruptions have taken place, but not in recent years. The soil is fertile and the principal pro¬ ductions are wheat, maize, flax, fruits. Hunt¬ ing small game, fishing, whaling, raising cattle and agriculture are the leading occupations. Horta or Orto (pop. 6,734) is chief port, and has one of the best sites for a harbor in the Atlantic. Fayal is an important telegraph cable and wireless centre. Pop. 22,385.

FAYE, fa, Herve Auguste Etienne Albans, French astronomer: b. Saint Benoit du Sault, France, 5 Oct. 1814; d. Passy, near Paris, 4

July 1902. He studied at the Ecole Poly tech¬ nique, where he was professor of geodesy in 1848-54, and later of astronomy, and in 1878 was appointed director at the Paris Observatory. He discovered the periodical comet which bears his name in 1843; became rector of the uni¬ versity academy of Nancy in 1855; inspector- general of higher education in 1857-62, was made chevalier of the Legion of Honor in 1843 and promoted to grand officer of the Legion in 1889. He wrote several books on astronomical subjects, among which are (Sur l'Origine du Monde5 (1884) ; (Cours d'Astrono- mie de l'Ecole Polytechnique5 (1881-83) ; 'Nouvelle etude sur les Tempetes, Cyclones, Trombes, ou Tornados5 (1897). In collaboration with C. Galusky, he translated Humboldt's 'Cosmos5 (4 vols., 1843-59).

FAYENCE. See Faience.

FAYERWEATHER, far' -wet'h er, Daniel

B., American merchant and philanthropist : b. Stepney, Conn., 1821 ; d. 1890. He was long prominent in the leather business in New York and bequeathed some $5,000,000 to educational and charitable institutions. His will was sub¬ jected to a prolonged contest from which the beneficiaries emerged victorious.

FAYE'S COMET, a periodic comet, dis¬ covered by Faye on 22 Nov. 1843. It reap¬ peared in 1851, 1858, 1865, 1873, 1880, 1888, 1895, 1910 and 1917.

FAYETTE, fa-et', Iowa, town in Fayette County, on the Chicago, Milwaukee and Saint Paul Railroad, 65 miles northwest of Dubuque. It is the seat of Upper Iowa University, a Methodist Episcopal institution founded in 1857, one year after the settlement of the town. The town contains a Carnegie library and has a creamery and agricultural

interests. It was incorporated as a town in 1874 under a general State law. The waterworks and electric-light plant are municipally owned. It is located in an excellent agricultural section. Pop. 1,085.

FAYETTE, Mo., city, county-seat of How¬ ard County, 105 miles east by south of Kansas City, on the Missouri, Kansas and Texas Rail¬ road. It is the seat of the Howard Payne Col¬ lege for women, founded in 1844, and the Cen¬ tral College, coeducational, founded in 1857, both under the auspices of the Mlethodist Epis¬ copal, South, Church. It is in an agricultural section and the trade and industries are con¬ nected with agricultural products. It contains a Carnegie library and owns its waterworks and lighting plant. Pop. (1920) 2,382.

FAYETTEVILLE, fa-et'vil, Ark., city and county-seat of Washington County, on the Saint Louis and San Francisco and the Kansas City and Memphis railroads; in the Ozark Mountains. It is a well-known summer resort and is called the "Athens of Arkansas.55 Fay¬ etteville is a fruit centre for northwestern Arkansas. It is the seat of the Arkansas In¬ dustrial University. A national cemetery, con¬ taining 1,236 graves, 782 of unknown dead, and a Confederate cemetery, in the centre of which stands a handsome monument, are situated here. The city contains also a hospital, county jail and a courthouse. . Fayetteville has manu¬ factures of lumber, flour, wagons, foundry products, etc., and a trade in five stock, grain, fruit and agricultural produce. The waterworks are owned by the municipality. Pop. 5,362.

FAYETTEVILLE, N. C., city, county-seat of Cumberland County, on Cape Fear River, and on the Atlantic Coast Line and the Nor¬ folk Southern railroads, 120 miles south of Wilmington. It contains a high school, mili¬ tary academy, a State colored normal school, an Elks home, a bank and several newspapers. The city is in a fertile agricultural region, carries on a trade in cotton and naval stores, and has extensive manufactures of cotton, silk, cottonseed oil, lumber, furniture, flour, wooden- ware, tools, etc. There is also a large vineyard. Manufacturing has been greatly enhanced by the development of electrical power from the Buckhorn Rapids above the city, and the canalization of the Cape Fear River from Fayetteville to Wilmington, ensuring a depth of eight feet. The city government, under a charter of 1893, is vested in a mayor, chosen annually, and a municipal council, elected on a general ticket. It owns the waterworks and electric-light plant. Settled by the Scotch in 1736 and laid out as

Campbellton in 1762, Fayetteville received its present name during a visit of Lafayette in 1784 and was incor¬ porated as a city in 1893. In 1831 it was almost completely destroyed by fire. On 22 April 1861, the Confederates seized the United States arsenal at this point. General Sherman oc¬ cupied the town 11-14 March 1865, and destroyed the arsenal. Pop. (1920) 8,877.

FAYETTEVILLE, Tenn., town, county- seat of Lincoln County, on the Elk River, the Nashville, Chattanooga and Saint Louis Rail¬ road, 180 miles east of Memphis. The Fayette¬ ville Collegiate Institute, the Morgan Training School and Dick White College are located here. It is the centre of a fertile agricultural dis¬ trict, producing corn, cotton, wheat, tobacco, fruits and live stock. There are lumber, cotton and flour mills, and an ice factory. The water¬ works are owned by the municipality. Andrew Jackson encamped here on 7 Oct. 1813, when he was campaigning against the Creek Indians. He visited the town again in 1826 and was lavishly entertained. Pop. (1920) 3,629.

FAYRER, Sir Joseph, English physician : b. Plymouth, 6 Dec. 1824; d. Falmouth, 21 May 1907. He received his education at the Charing Cross Hospital, London, and at Edinburgh and on the Continent. In 1847 he was appointed medical officer of H. M. S. Victory and later accompanied Lord Mount-Edgcumbe on a tour of Europe, during which he served in military hospitals at Palermo and Rome. In 1850 he became assistant surgeon in Bengal, saw service in the Burmese campaign of 1852 and was Residency surgeon at Lucknow during the Indian mutiny. In 1859-72 he was professor of surgery at the Medical College of Calcutta and in 1874-95 was president of the medical board of the India office, London. He was created a baronet in 1896 and in 1901 was appointed phy¬ sician extraordinary to Edward VII. He pub¬ lished (Clinical Surgery in India) (1866) ; (The Thanatophidia of India5 (1872) ; (Lettsomian Lectures on Fever and Dysentery in India5 (1881) ; (On the Preservation of Health in India5 (1898) ; (Recollections of My Life)

(1900).

FAYUM, or FAYOUM, fi-oom', The (Egypt. Phiom, <(marsh-land55), province of Egypt, consisting of a nearly circular basin or

oasis, 670 square miles in area, sunk beneath the level of the Libyan Desert, about half a degree south of Cairo, and connected with the Nile Valley by a narrow pass, through which an ancient canal flows. This canal is the Bahr- Yusuf, or <(Joseph's stream,® so named after Saladin, who restored an original construction of the Theban

Pharaohs, which pours the fertil¬ izing water which renders the Fayyum one of the most productive parts of Egypt. The irri¬ gation was anciently regulated by a large reservoir, called Lake Moeris, described by the Greeks as a work of extraordinary hydraulic ingenuity, and the overflow now forms the large sheet of brackish water, 35 miles long, known as the Birket-el-Karn, which marks the eastern boundary of the oasis. The site was identified by Linant near the modern capital Medinet-el- Fayyum, though other sites have been suggested by Cope, Whitehouse and others. On the banks of Lake Mceris was the famous Labyrinth, prob¬ ably built by Amenhemhat III, and reckoned one of the wonders of the world. The remains of this vast palace are seen in the ruins of numerous chambers near the brick pyramid of Hawara. The capital of the Fayyum was Croco- dilopolis, afterward named Arsinoe, after the queen of Ptolemy Philadelphus, near the site of which is the modern chief town Medinet-el- Fayyum. Fidimin is a picturesque village in the Fayyum. Recent explorations by Petrie and others have revealed more interesting remains of antiquity in the province than had formerly been suspected. The Fayyum abounds in fruit, oranges, peaches, pomegranates, olives, figs, grapes, etc., and is famous for roses and other flowers. The inhabitants are chiefly agricul¬ turists and fishermen. The construction of the Assuan Dam has immensely increased the pro¬ ductivity of part of this region, three crops being raised in 20 months. The chief prod¬ ucts are cotton and cereals, other crops being rice, sugar, flax and hemp. Pop. 441,583. Consult for an account of excavations in the Labyrinth the ruins at Hawara, etc., Flinders Petrie, (Hawara and Arsinoe5 ; Brown, (The Fayyum and Lake Mceris> (1893) ; Willcocks, (The Assuan Reservoir and Lake Mceris) (1904) ; Beadnell, The Topography and Ge¬ ology of the Fayum Province of Egypt5 (1905).

FAZY, fa -ze (Jean) James, Swiss states¬ man : b. Geneva 1794; d. 1878. He received his education at the University of Paris and de¬ voted himself to a close study of political econ¬ omy. In 1820 he opposed the restoration of the Bourbons, returned to Geneva in 1826 and founded Le Journal de Geneve. Within a few years he was again in Paris engaged in journal¬ ism. He protested against the ordinance limit¬ ing the freedom of the press, took part in the July revolution and advocated the setting up of a republic. His radical views coupled with his opposition to the Due d'Orleans resulted in his imprisonment. In 1833 he returned to Geneva, founded the Revue de Gentve in which he violently opposed the Conservatives and materi¬ ally aided in their overthrow in 1846. For the ensuing 18 years he was the most prominent political figure in the Canton de Geneve and in 1848 was one of the framers of the Federal constitution. In the late sixties he

became professor of international law at the University of Geneva. He published (L'homme aux

portions : Conversations politiques et philoso- phiques) (1821) ; Erincipes d'organisation in- dustrielle) (1830) ; (Histoire de Geneve) (1840) ; (1874). Consult Fazy, H., (James Fazy, sa vie et son oeuvre* (Geneva 1887).

FEA, fe, Allan, English historical writer : b. 25 May 1860. He was employed in the Bank of England 1880-1900, and is the author of (The Flight of the King* ; (Secret Chambers and Hiding Places*; (King Monmouth*; Eooks and Corners of Old England) ; (James II and His \Vives) ; (Quiet Roads and Sleepy Villages,* etc.

FEA, fa'a, Carlo, Italian archaeologist: b. Pigna, Piedmont, 2 Feb. 1753; d. Rome, 18 March 1836. He received the degree of doctor of laws from the University of La Sapienza, but afterward became absorbed in archaeological studies and in order to obtain better facilities for their prosecution he took sacred orders in 1798. In the following year he was imprisoned by the Neapolitans as a Jacobin, but was soon afterward liberated and made Commissario delle Antichita and librarian to Prince Chigi. He revised, with notes, an Italian translation of Winckelmann's (Geschichte der Kunst) and wrote (Miscellanea filologico-critica ed anti- quariaˆ (1790-1837); E'integrita del Panteone rivendicata a M. Agrippa* (1807-20); Eelazione d'un viaggio ad Ostia ed alia villa di Plinio) (1802) ; (Della statua di Pompeio Magno del palazzo Spada* (1812) ; Uscrizioni di monu- menti publici* (1813) ; (Descrizione di Roma) (1822) and Erammenti di Fasti Consolari.*

FEALTY, loyalty; faithful adherence; true service or duty to a superior lord, the obliga¬ tion which bound the tenant, especially in feu¬ dal times. Fealty, suit of court and rent, were conditions upon which the ancient lords granted their lands to feudatories; it being stipulated that they and their heirs should take the oath of fealty or fidelity to their lord, which was the feudal bond (Commune vinculum) between lord and tenant; that they should do suit, or duly attend and follow the lord's courts, and there from time to time give their assistance, by serving on juries either to decide the property of their neighbors in the court baron, or correct their misdemeanors in the court leet ; and lastly, that they should yield to the lord certain annual stated returns,

in mili¬ tary attendance, in provisions, in arms, in mat¬ ters of ornament or pleasure, in rustic employ¬ ments (prsedial labors), or (which is instar omnium) in money, which provided all the rest ; all of these services being comprised under the one general name of redditus, return or rent. The right of fealty still exists in Eng¬ land, but is exacted only from copyholders. It lasted in the United States for a short time after the Revolution, but soon became obsolete.

FEAR, apprehension of approaching evil, danger or harm ; solicitude, dread, terror. The term fear is also used in the sense of respect for and obedience to authority, especially as these take the form of awe and reverence to¬ ward the Supreme Being, with due regard to his law and word. The operation of fear on the mind is often, if uncorrected, attended with the most serious consequences, especially where sickness is present or disease threatened. On

many persons the influence of fear is far more serious in its effect than the worst form of any dreaded malady. In epidemic diseases the ter¬ ror they inspire is often as fatal as the infec¬ tion — paralyzing the system, and robbing the body of the natural elasticity of its nervous stamina, and the mind of the buoyancy of hope, making victims of those who, from age and strength, had the best probability of escaping. Fear is a mental poison, and the most potent of all antagonists to health and medicine; it is often fatally active in the morbid developments which result in various forms of insanity; and as faith has cured more diseases than physi¬ cians ever prescribed for, so fear is more de¬ structive than the worst physical malady. In the conflicts of the modern business world, especially in monetary centres, its contagion now and then breaks out in fright which im¬ perils the fortunes of individuals, or a people's financial stability, as a country's cause is some¬ times lost through panic striking its armies in battle. Recent psychology finds in fear one of its most important subjects for analysis and definition ; and the physician, the teacher, the moralist and the sociologist all deal with it as an element- calling for special study and control in the development of the individual and of society at large. Consult Darwin, (The Ex¬ pression of Emotions* (1892); James, Princi¬ ples of Psychology > (1891) ; McDougall, So¬ cial Psychology * (1911) ; and Encyclopedia of Religion and Ethics* (1912). See Emotion.

FEARN, Richard Lee, American journal¬ ist : b. Mobile, Ala., 31 Aug. 1862. He was educated at the University of the South, the University of Alabama and the Stevens Insti¬ tute of Technology. From 1886 to 1891 he was a member of the staff of the Brooklyn Eagle and in 1891-93 was secretary of foreign affairs of the Columbian Exposition,

Chicago. From 1893 to 1897 he was Washington correspondent and in 1896 London correspondent of the United Press. Since 1896 he has been on the staff and in 1902-09 was chief of the Washing¬ ton bureau of the New York Tribune.

FEARNE, Charles, English jurist: b. Lon¬ don 1742; d. Chelmsford, 25 Feb. 1794. He was educated at Westminster School and en¬ tered the legal profession. His legal talents were of the highest, but he neglected his pro¬ fession and devoted himself to scientific ex¬ periments. In this manner he expended his fortune and at his death his widow and family were left in straitened circumstances. A deci¬ sion of Lord Mansfield in 1772 called forth from Fearne his Essay on the Learning of Con¬ tingent Remainders and Executory Devises,* which at once established his reputation as a legal authority and caused a reversal of the decision. A volume, Eearne's Posthumous Works, > appeared in 1797 for the benefit of his widow.

FEARNLEY, fern'll, Carl Frederik, Nor¬ wegian astronomer: b. Frederikshald, 19 Dec. 1818; d. Christiania, 22 Aug. 1890. He studied at Bonn and Konigsberg, returning to Chris¬ tiania and becoming professor of astronomy at the university 1857, director of the observatory 1861, and head of the geodetic survey of Nor¬ way 1876. He published (Zur Theorie der terrestrischen Refraktion* (1884) ; Eonenbeo- bachtungen der sterne zwischen 64° 50′ und

70° ltf nordlicher Deklination) (1888) ; Cata¬ log von 3949 Sternen> (1890).

FEARNLEY, Thomas, Norwegian land¬ scape painter: b. Frederikshald, 27 Dec. 1802; d. Munich, 16 Jan. 1842. He studied at Copen¬ hagen, and subsequently traveled much, paint¬ ing excellent landscapes, most of which are in England. Among his works are (Copenhagen y ;

' Duck, Shooting * ; <:Ronsdalhorn) ;(Grindelwald Glacier*; (Sorrento) ; (Madumsfall* ; ; (Labrofos Waterfall.*

FEAST, a festival, banquet, solemnity, holiday, etc. Almost every religion has had its solemn feast-days. The ancient Greeks and Romans had them, as well as the Jews and modern Christians. According to the Old Tes¬ tament, several festivals among the ancient Jews were divinely appointed, the first and most an¬ cient of which was the Sabbath, or seventh day of the week, commemorative of the creation.

The Passover was instituted in memory of their deliverance out of Egypt, and of the favor of God in sparing their first-born when those of the Egyptians were slain. The feast of Pente¬ cost was celebrated on the 50th day after the Passover, in memory of the law being given to Moses on Mount Sinai. The feast of Tents or Tabernacles was instituted in memory of their fathers who dwelt in tents for 40 years in the wilderness ; and all Israel was obliged to attend the temple and dwell eight days under tents. These were the principal feasts, but they had numerous others — the feast of Trumpets, the feast of Expiation or Atonement, the feast of the Dedication of the Temple, etc.

In the Christian Church no festival appears clearly to have been instituted by Jesus or his apostles, yet Christians have always celebrated the memory of his resurrection and numerous . other feasts were introduced at an early period. At first they were only appointed to commem¬ orate the more prominent events in the life and death of Christ, and the labors and virtues of the apostles and evangelists ; but martyrs were soon introduced and by the 4th century the number of feasts had very greatly increased. Many of the festivals were instituted on pagan models and were characterized by rites similar to those which the pagans observed.

Feasts are either movable or immovable. Immovable feasts are such as are celebrated constantly on the same day of the year, among them being Christmas Day, Circumcision, Epiph¬ any, Candlemas or Purification, Lady-day or the Annunciation, All-Saints', All-Souls', and the days of the several apostles, as Saint Thomas, Saint Paul. Movable feasts are those which are not confined to the same day of the year. Of these the principal is Easter, which gives law to all the rest, all of them following and keep¬ ing their proper distances from it; as Palm Sunday, Good Friday, Ash Wednesday, Sexa- gesima, Ascension Day, Pentecost and Trinity Sunday. Besides these, which are general, there are others which are local or occasional, en¬ joined by the magistrate or voluntarily set on foot by the people, such as. in the United States, Independence Day, celebrated annually on the 4th of July, and Thanksgiving Day, also held every year on a day set apart by the Pres¬ ident for the occasion.

FEATHER, one of the elastic horny der¬ mal outgrowths of the skin, forming plumage, the characteristic covering of birds. See Plumage.

FEATHER BUNCH-GRASS (Stipa vi- ridula), a rather slender grass, one to three feet high, growing in the Rocky Mountain re¬ gion and on the foot-hills and mesas, from British Columbia southward to Mexico and westward to the coast. On good land, under irrigation, this grass

attains the height of three feet or more, and is by far the most valuable of the Stipas for hay. The leafy culms are terminated by a narrow, many-flowered panicle of comparatively small and rather short-awned spikelets. The seed may be easily gathered. The callus at the base of the fruiting glume is short and barely pointed and not produced into a long, very sharp, spur-like extension, as in porcupine-grass.

FEATHER RIVER, a river of California, rising in the Sierra Nevada and flowing south¬ west and south through Butte County to the Sacramento River, which it joins in Sutter County, about 15 miles above the city of Sacra¬ mento. It has a total length of 200 miles but is navigable only about one-sixth of that distance.

FEATHER-STAR, a crinoid of the exist¬ ing family Comatulidce, which is composed of several genera of highly developed crinoids which differ from the ˆstone-lilies® and other existing forms in swimming freely as adults instead of being rooted by a stalk. The head¬ quarters of the family is in the Malayan seas, but several species occur on the American and British coasts, and one of the latter, the rosy feather-star (Antedon rosaceus), has been exhaustively studied, contributing greatly to our knowledge of the whole group. It has the general characteristics of a crinoid (q.v.), and when young is attached to a long stalk, but when full grown drops off and thereafter creeps and swims about, back downward, by means of five pairs of radiating arms which are so fringed and flexible that they look like feathers. These arms expand about three inches.

FEATHER-TRACTS, one of those regu¬ lated spaces where feathers grow on the body of a bird, the arrangement of which is various and characteristic of groups. This regular dis¬ tribution of feather-growths is known as <(pterylosis,® and the study of it as <(pteryl-ography.® Pterylosis is further treated under Plumage.

FEATHER-WINGS, a plume-moth (q.v.).

FEATHERING FLOAT, the paddle or float-board of a paddle-wheel, so arranged as to turn on an axis to present its broad side to the water at its lowest submergence, but to turn its edge to the water in entering and emerging.

FEATHERING PADDLE-WHEEL, a

wheel whose floats have a motion on an axis, so as to descend nearly vertically into the water and ascend the same way, avoiding beat¬ ing

on the water in the descent and lifting water in the ascent.

FEATHERING PROPELLER, an inven¬ tion of an Englishman, Maudslay, in which the vanes of the propeller screw are adjustable, so as even to be turned into the plane of the pro-

peller-shaft and offer no resistance when the vessel is under sail and the propeller not used.

FEATHERS, Artificial. Artificial feath¬ ers have long been made in the United States. It is probable that the industry was brought here by French immigrants, who had fled from their own country. The number of French people here was soon increased by those who had come hither from the island of Haiti, and one of the first industries they took up was artificial flower and feather making. This work was, more correctly, the artificial grouping and coloring of natural feathers. As long ago as 1840 there were 10 manufacturers in this line in New York. No separate enumeration of these products appears in the early census returns, but the quantity demanded increased greatly. New York has from the first been the prin¬ cipal seat of the industry.

Less than 10 per cent of the ostrich feath¬ ers and tips used in the decoration of ladies' hats are of sufficient elegance in their natural state to be marketable. The practice is to combine three or four natural feathers to pro¬ duce one of the ordinary plumes sold in the shops, and a very fine one requires six natural feathers. In the making over process the quills of all the feathers except the lowermost are cut away or shaved down and the pile of feathers being assembled so as to give the richest effect, the stems of all are made into one by sewing and tying. A wire is sewed into the artificial stem and it is by this that the plume is given its proper curve. The flues are then curled by drawing over a square edge in a fashion peculiar to feather curlers and requir¬ ing special skill. Good feather curlers receive salaries up to $50 a week. Ostrich tips are made in the same way, generally from three feathers. The ((willow plumes® which were in vogue for a time were made by tying the flues stripped from one feather to the tips of the flues of another. With the finest of this type a second rank of ties was made, making the finished flues three times their natural length.

In the making of boas the feathers are sewn so as to lap over one another in strings up to from one yard to three yards in length. These

sewn strings are twisted over a steaming kettle until they have the required shape, and the flues are then curled as described above. See Feather.

FEATHERSTONE, England, town of the West Riding of Yorkshire, six miles east of Wakefield, on the Lancashire and Yorkshire Railroad. Coal-mining is the principal industry. On 7 Sept. 1893 serious riots occurred in the town incident to a strike of the miners. Some of the colliery works were destroyed and two miners were killed by the military. The Local government board approved a proposition in 1912 having for its object the erection of work¬ men's cottages. Pop. 14,377.

FEATHERSTONHAUGH, feth'er-stun'ha, George William, English traveler in Amer¬ ica: b. 1780; d. Havre, France, 28 Sept. 1866. He made geological surveys in the West for the United States War Department 1834—35, and was appointed by Great Britain a commis¬ sioner to determine the northwestern boundary between Canada and the United States, under the Ashburton- Webster treaty. He was the

author of numerous technical reports and papers, including the (Geological Report of the Elevated Country Between the Missouri and Red Rivers) (1834) ; (Excursion Through the Slav.e States) (1844) ; (Canoe Voyage to the Minnesota) (1847), etc.

FEBIGER, feb-i'ger, John Carson, Amer¬ ican naval officer: b. Pittsburgh, Pa., 14 Feb. 1821 ; d. Londonderry, Pa., 9 Oct. 1898. He was appointed a midshipman in the navy in 1838 ; be¬ came commander in 1862, and was assigned to the steamer Kanawha of the Western Gulf blockading fleet. On 5 May 1864, while in com¬ mand of the Mattabeset, of the North Atlantic fleet, he participated with the little squadron under Capt. Melanchthon Smith in defeating the confederate ram Albemarle, in Albemarle Sound, N. C., and was commended for his bravery and skill in that engagement. He was promoted rear-admiral in 1882.

FEBRIF-UGE, feb'ri-fuj, a remedy used to destroy or mitigate fever. When rise in tem¬ perature was considered the important feature of a disease and this single symptom was con¬ sidered apart from the rest of the life history of a disease process, febrifuges were much in use, but at the present time, when a disease is con¬ sidered in its entirety rather than from its purely symptomatic manifestations, this class of remedies has fallen into a position of less prom¬ inence. High temperatures are now looked upon as evidences of a reaction in the body in its struggle with disease and, unless excessive and prolonged,

should not necessarily be interfered with. A temperature of 103° to 104° F. is rarely harmful, but when the thermometer registers above 104° F. it is advisable to reduce it, for which purpose cold packs and cold sponging are among the best means. Such drugs as the newer synthetics, acetanilid, antipyrine, phenace- tin, salol and other like derivatives, and aconite, diaphoretics, etc., are still much in use ; but only within restricted limits may they be said to be curative. In malaria, the high tempera¬ ture being due to the development of large numbers of parasites in the blood, quinine, by killing the parasites, destroys the fever. In typhoid fever and in pneumonia cold water is the best febrifuge. See Animal Heat; Anti¬ pyretics ; Fever.

FEBRILE. See Fever.

FEBRONIANISM (from Tustinus Fe- bronius, a pseudonym assumed by John Nicolaus von Hontheim, archbishop of Treves), a system of doctrines antagonistic to the claims of the Pope, and asserting the independence of national churches, and the rights of bishops to unre¬ stricted action in matters of discipline and church government within their own dioceses. Febronianism is opposed to Ultramontanism (q.v.), and developed into the Old Catholic Movement. See Gallicanism.

FEBRUARY, n. feb'ro-er-T [L. Februdnus, the month of expiation, from februum, an ex¬ piation] : second month of the year; having ordinarily 28 days, but in leap-year having an additional or intercalary day. Among the Romans, it had originally 29 days in an ordinary year, but when the Senate decreed that the eighth month should bear the name of Augustus, a day was taken from February, and given to August, which had then only 30, that it might

not be inferior to July. The name is derived from the fact that during this occurred the Roman festival called the Lupercalia, and also Februalia, from februare, to purify. See Calendar.

FEBRUARY REVOLUTION, The, in

French history, the revolution of 1848, which brought about the fall of the July monarchy. See France.

FEBVRE, Alexandre Frederic, al-ek- son-dr fra-da-rik fevr, French actor: b. Paris 1835. He was a musician till he was called above the footlights to fill, it is said, an acci¬ dental vacancy. He made his debut at Havre, subsequently appearing in Paris at the Beau¬ marchais, the Porte Saint Martin, the Gaiete, the Odeon and the Ambigu theatres. He

was very successful in comedy, among his principal crea¬ tions being Clarkson in (L'Etranger) ; Kobus in (L'Ami Fritz, > and Bourdon in (Les CorbeauxP He went to London with a company in 1877, making his farewell appearance at the Theatre Frangais in 1893, ˆtouring® the principal cities of Europe in 1894, and was sent to the United States to study the drama here in 1895. He is the author of (Album de la Comedie Frangaise* (1880) ; (Au bord de la scene* (1889) ; (L'Heritage de Mme. Naudin* (1893) ; (Le Journal d'un comedien* (1896) ; (La clef des champs) (1899) ; (Le roman d'un m'as-tu-vu.*

FECAMP, fa kan, France, town in the de¬ partment of Seine-Inferieure, at the mouth of a stream of the same name on the English Channel, 23 miles northeast of Havre. It stretches along a narrow valley enclosed by two parallel ranges of hills. It has a parish church, which originally belonged to the famous abbey of Fecamp founded in the 12th and 13th cen¬ turies, in which the painted glass, carved wood¬ work and monuments are notable features ; also a school of hydrography, manufactures of textiles, sugar works, tanneries, oil works, a valuable fishery and a spacious harbor with deep water and good anchorage. The town was cele¬ brated for its herring fishery as early as the 13th century. Pop. 17,383.

FECHNER, Gustav Theodor, goos-taf' ta'o dor feH'ner, German philosopher: b. Gross- Sarchen, Prussia, 19 April 1801 ; d. Leipzig, 18 Nov. 1887. His monumental and epoch-making work (Elements of Psychophysics) (1860) marks him out as the founder of modern pys- chology and psychophysics. He published an enlarged translation of Biot's (Text Book of Experimental Physics) (1828) and his (Three Motives and Grounds of Faith* (1863). Under the name of ((Doctor Mises** he appeared in another and not less characteristic role, as a writer of poems and various popular humorous and satirical works, notably, (A Proof that the Moon is Made of Iodine) (1821) ; Com¬ parative Anatomy of the Angels> (1825) ; and (The Little Book of Life After Death) (1836). Consult Kuntze, (Gustav Theodore Fechner, ein deutsches Gelehrtenleben* (1892) ; Laso- witz, (Gustav Theodor Fechner * (1896).

FECHTER, Charles Albert, sharlz al-bar feH-ter, French actor: b. London, 23 Oct. 1824; d. Quakertown, Pa., 4 Aug. 1879. His father was a German, his mother of Piedmontese ex¬ traction. He made his first public appearance in 1840 at the Salle Moliere, in Paris, after which

he went to Florence with a dramatic company as leading juvenile. Subsequently he appeared as Seide in Voltaire's (Mahomet,) in 1844;

as Valere in Moliere's great comedy; and as the original Armand Duval in (La Dame aux Ca- melias) made his greatest triumph in France. In 1860 he went to London, where he presented (The Corsican Brothers,* (Don Cesar de Bazan,* and (Hamlet,* the last named being one of his outstanding successes. He was lessee of the Lyceum 1863-67. In 1870 he came to the United States, opening at Niblo's Gar¬ den, New York, and playing to crowded houses, being especially popular in (The Count of Monte Cristo.* His imperious and quarrelsome tem¬ per, aggravated by indulgence, led to some un¬ dignified and deplorable quarrels among his colleagues and in the press ; and in 1872 he re¬ tired to the country, where he devoted himself to field sports and to his dogs, to whom he was passionately attached. In his time he was re¬ garded as the best lover on the stage. Consult memoir by Field (1882).

FECIAL. See Fetial.

FECKENHAM, fek'en-am, or FECK- NAM, fek'nam, John de, English prelate : b. Feckenham Forest, Worcestershire, about 1518; d. Wisbech, Cambridgeshire, 1585. He served as chaplain to Bell, the bishop of Worcester, and to Bonner, the bishop of London, going as a prisoner to the Tower upon Bonner's fall 1549. Upon Queen Mary's accession to the throne he was made chaplain 1553, later becom¬ ing dean of Saint Paul's. He held a conference with Lady Jane Grey shortly before her execu¬ tion. He became abbot of Westminster 1556, and was a member of Queen Elizabeth's first Parliament, the last mitred abbot to appear in that legislative body. Being active against the Reformation he was again sent to the Tower 1560, was released 1574, but kept under sur¬ veillance as long as he lived.

FEDERAL APPOINTMENTS. See Ap¬

pointments, American System of.

FEDERAL CONTROL OF ELEC¬ TIONS. See Elections.

FEDERAL COUNCIL OF CHURCHES,

an interdenominational organization composed of representatives of the various Protestant denominations. In October 1894 ((The Open and Institutional Church League was formed,® and in the years immediately following held an annual conference of representatives of many denomi¬ nations. Rev. Charles L. Thompson, Rev. E. B. Sanford and Rev. Frank Mason North were pioneer workers, who especially furthered the cause. There were also several State and county church

federations, and other co-operative inter¬ denominational organizations as the Y. M. C. A. and Y. W. C. A., the American Bible Society, the American Tract Society, the Evangelical Alliance and the American Sunday School Union have tended to foster co-operative work among the various ecclesiastical bodies of America.

On 12 Feb. 1900, a group of Federation workers met in the Twenty-third Street Young Men's Christian Association building in New York, and a National Committee on Federation of Churches was appointed. As the result of their work, 5-6 Feb. 1901, the National Federa¬ tion of Churches and Christian Workers was

held in Philadelphia. Thirteen federations were represented by delegates or members. The next meeting was held in Washington in Feb¬ ruary of the following year. The next Inter¬ church conference on federation met in Carnegie Hall in November 1905. This was a very im¬ portant meeting and made possible the great meeting in Philadelphia held early in December 1908, which perfected the organization of the Federal Council of the Churches of Christ in America. Thirty denominations were repre¬ sented at Philadelphia. It was decided that the body should meet quadriennially and that it should be composed of 400 delegates. In the constitution adopted at this conference the aims of the Council are clearly defined as fivefold. They are :

1. To expiess the fellowship and catholic unity of the Christian Church.

2. To bring the Christian bodies of America into united service for Christ and the world.

3. To encourage devotional fellowship and mutual counsel concerning the spiritual life and religious activities of the churches.

4. To secure a larger combined influence for the churches of Christ in all matters affecting the moral and social con¬ dition of the people, so as to promote the application of the law of Christ in every relation of human life.

5. To assist in the organization of local branches of the Federal Council, to promote its aim in their communities.

The body restricted its powers by refusing to assume any authority over the constituent bodies and denied itself the right of all creed¬ making powers. Provision was made for the admission of other Christian bodies. Each de¬ nomination represented is entitled to four dele¬ gates and to one delegate for every 50,000 members or major fraction thereof.

The Council furthered the religious work undertaken at the Panama Exposition. Under its direction the churches of Canada and the United States observed the centennial of peace with Great Britain. The next co-operative work undertaken was the 400th anniversary of the Protestant Reformation. The Council is largely co-operating in much of the war relief work. The body is now highly organized into various permanent working committees or departments, which in turn have several subcommittees. Con¬ sult Sanford, Elias B., (Origin and History of the Federal Council of Churches of Christ in America) (Hartford, Conn., 1916) ; Macfarland, C. S., (The Progress of Church Federation (New York 1917).

FEDERAL COURTS. See Court.

FEDERAL FARM LOAN ACT, The.

The Federal Farm Loan Act, which became a law on 17 July 1916, provides for the issuance of farm loan bonds through a bureau in the De¬ partment of the Treasury at Washington for financing a farm mortgage system, covering all continental United States except Alaska. The bureau is managed by the Federal Farm Loan Board, composed of the Secretary of the Treas¬ ury, ex officio, the chairman, and four members appointed by the President by and with the ad¬ vice and consent of the Senate. One of the members, designated by the President to serve as active executive officer, is called the Farm Loan Commissioner. The board must submit a report annually to the speaker of the House of Representatives.

For the purposes of the act, the country has been divided into 12 districts, each embracing whole States. The board, which apportioned these districts, may readjust their boundaries.

In each district arc one Federal land bank, established by the board, and such national farm loan associations as the board may deem ad¬ visable to charter. The board appoints one registrar and one or more appraisers for each district, together with such examiners, attorneys, experts, assistants, clerks, laborers and other employees as may be needed for conducting its business. The salaries of the appraisers are

paid by the land banks they serve. The salaries of the members of the board and of all its appointees, except district directors, are paid by the United States. The members of the board, the registrars, appraisers and exam¬ iners are public officers, and must not be con¬ nected with any other banking or land-mortgag¬ ing concern. All appointments and dismissals are made without regard to the civil service rules. The system enjoys a franking privilege for the mails of its bureau, besides various free services of the departments of the treasury, justice and agriculture.

A national farm loan association can be char¬ tered only with the consent of the Federal land bank of a district. The territory may be any part of that district. The incorporators shall be 10 or more natural persons owning or about to own farm land therein. They must also be applicants for loans aggregating at least $20,000. The capital shall be divided into five-dollar double-liability shares that may be issued to and held by borrowers only. Every borrower must subscribe for shares in an amount equal to 5 per cent of his loan, and pay for the same when the loan is granted. Admission to membership after the incorporation requires a two-thirds vote of the directors. The capital may be increased from time to time for the purpose of issuing new shares for the obligatory subscrip¬ tions of borrowers. The shares of every bor¬ rower shall Be held as collateral security for his loan and be paid off and retired upon its full payment. As a result the capital is vari¬ able, but can never be less than 5 per cent of the outstanding loans. Members cannot cast more than 20 votes each. They shall annually elect five or more directors for the term of one year, who shall elect a president, vice-president, a loan committee of three and a secretary- treasurer. All officers, but the latter, and all directors shall be members and so shareholders ynd borrowers. They must also be residents of the territory.

The powers of a national farm loan associa¬ tion are: To endorse and guarantee mortgages taken from its shareholders by its Federal land bank, all defaults to be made good within 30 days after notice; to receive funds from said land bank to deliver to the mortgagors; to acquire such property, real or personal, as may be necessary or convenient for conducting its business; and to issue certificates against de¬ posits, bearing interest for no longer than one year at not to exceed 4 per cent per annum. Such certificates are convertible into farm loan bonds, when presented in any multiple of $25 to said land bank. The deposits must be forth¬ with transmitted to said land bank. Any na¬ tional farm loan association, desiring funds to lend to a member, must subscribe for capital stock of its Federal land bank to an amount equal to 5 per cent of the proposed loan. How¬ ever,

should the association want any money for current expenses, it may borrow back one-

fourth of such stockholdings as an advance bearing 6 per cent per annum and repayable only from dividends belonging to it.

Besides the two-thirds vote of the directors, the granting of a loan requires the unanimous consent of the loan committee and the approval of some appraiser of the district. If any di¬ rector or member of the committee be interested in a loan, the directors shall appoint a sub¬ stitute to serve in his place. All loans shall be secured by first mortgages on farm land within the territory. None may be made except for purchasing or improving the mortgaged prop¬ erty, for purchasing equipment, fertilizers or live stock reasonably necessary for its opera¬ tion, or for liquidating indebtedness of the owner incurred for such purposes. But the purpose is immaterial, if the indebtedness existed be¬ fore the association was formed. The amount in no case shall be less than $100 or more than $10,000, or over one-half the land's value, plus one-fifth the value of its insured permanent improvements. Payment shall be by annual or semi-annual instalments, including interest at a rate not to exceed the rate of the last series of' farm loan bonds in the district, plus a charge for administration and profits at a rate not to exceed 1 per cent per annum on unpaid prin¬ cipal, and such amounts to be applied on the principal as will extinguish the debt within an agreed period of not less than five nor more than 40 years. No prepayments are allowed until five years after the loan has been granted. After that, the borrower has the right to make payment in whole or in multiples of $25 at any regular interest date.

The borrower must cultivate the mortgaged property, pay all taxes, liens, judgments and assessments against it, keep its improvements insured and promptly pay his instalments or be liable to foreclosure. Defaults bear 8 per cent per annum. It is the duty of the secretary-treasurer to collect the borrower's dues and to see that he observes all the conditions of the contract. The association pays for the stock in its Federal land bank with funds com¬ ing from its own shares for which borrowing members have subscribed. But the association may obtain from its land bank the sum needed by any borrower to meet his obligatory sub¬ scription for shares of the association, provided such sum, when added to the principal, shall not cause the loan to exceed

the prescribed credit value of the mortgaged property. Pre¬ liminary costs may likewise be added to the principal and obtained in the same way, pro¬ vided such addition shall not increase the loan above any of the prescribed limits. The asso¬ ciation may retain one-eighth of 1 per cent semi¬ annually upon the unpaid principal of every loan, as a commission to be deducted from dividends belonging to it in its land bank. The stock held by the association in the land bank shall, like the shares held by the borrowers in the association, be paid up in cash and shall be paid off and retired upon full payment of the loans it represents.

Each of the 12 Federal land banks had an initial capital of $750,000, divided into five-dollar non-assessable shares. But this may, upon au¬ thority of the Federal Farm Loan Board, be increased or decreased to any amount, provided it shall never be less than 5 per cent of the ag¬ gregate of bonds in circulation. Most of it was

subscribed by the Secretary of the Treasury for the United States, without right to dividends. But the retirement of all such government hold¬ ings is to be gradually brought about by stock contributions of borrowers. Although any in¬ dividual, firm, corporation or State may be a stockholder, only the Federal Farm Loan Board and national farm loan associations may vote. The board appoints for each Federal land bank three district directors, one of whom must be a farmer ; the national farm loan associations that hold stock as a result of the loan operations elect six local directors. These nine elect a president, a vice-president, a secretary and a treasurer. All directors must be residents of the district.

Each Federal land bank may acquire such property, real or personal, as may be necessary or convenient for conducting its business, and rent the same in part for revenues or otherwise dispose of it. Also the land bank may receive deposits from stockholders, borrow money at interest and give security therefor, buy and sell bonds of any other Federal land bank or of the United States and deposit its securities and its current funds subject to check with any member bank of the Federal reserve system. But its chief function is to buy mortgages on farm lands within its district through national farm loan associations, and to issue and sell its own bonds in order to raise funds for this pur¬ pose. Should its district not be adequately served by such associations, it may then buy the mortgages upon the endorsement and guaranty of any bank, trust or mortgage company, or savings institution chartered under State laws and approved as an agent by the Federal Farm Loan Board. The outstanding mortgages so guaranteed by such an agent shall never exceed 10 times its own capital and surplus, while the

mortgagors shall make a direct contribution to the stock of the Federal land bank in an amount equal to 5 per cent of their loans. A commis¬ sion of one-half of 1 per cent per annum upon the unpaid principal may be given to the agent and deducted from dividends belonging to the mortgagor. The only mortgages allowed are of the kind described above, but no act in excess of powers shall invalidate any loan or mortgage.

The bonds of each Federal land bank shall be prepared and engraved by the Secretary of the Treasury in registered and unregistered denominations of $25, $50, $100, $500 and $1,000. They shall run for specified minimum and maxi¬ mum periods, subject to retirement at the land bank's option five years after date, and be payable at par in gold or lawful money with terms prescribed and with interest fixed by the Federal Farm Loan Board, at a rate not ex¬ ceeding 5 per cent per annum, for which semi¬ annual coupons shall be attached. The bonds may be issued only upon the authority of said board in series of $50,000 or more ; and each shall contain on its face a certificate siened by the farm loan commissioner to the effect that it is issued and secured according to law. Their security shall be at least equal to them in amount and consist either of cash, United States bonds or farm mortgages, approved by the appraisers and trusteed with the registrar of the district. The bonds and any mortgages executed to the land banks are instrumentalities of the United States government. The bonds may be bought and sold by member banks and, with certain restrictions, by the reserve banks

of the Federal reserve system, while they are lawful as security for public deposits and as investment for funds in the hands of fiduciaries and trustees acting under Federal authority. So far 29 States have allowed them similar privileges. The borrower may demand bonds instead of cash for his mortgage.

A Federal land bank shall not obligate itself for outstanding bonds in excess of 20 times its capital stock and surplus, nor buy from any national farm loan association additional mort¬ gages when the unpaid principal of the ones already purchased exceeds 20 times the asso¬ ciation's holdings of its stock. Each Federal land bank must guarantee the bonds of the other Federal land bank, and reimburse the Secretary of the Treasury for that part of his expenses incurred in its behalf. All mort¬ gages executed to it and also its bonds, with their

income, are exempt from Federal, State, municipal and local taxation. Its franchises, capital stock, reserve or surplus, and income derived therefrom are likewise exempted, ex¬ cept taxes on real estate. This is also the case with national farm loan associations. Real es¬ tate taken to secure a debt cannot be held for longer than five years except with the approval of the Federal Farm Loan Board.

A reserve, equal to one-fifth of capital stock, must be created by each Federal land bank by semi-annually carrying thereto one-fourth of net earnings until that proportion shall have been reached, and thereafter by setting aside 5 per cent of net earnings for such purpose. Defaults on mortgages must be carried to a suspense account and at the end of two years, unless collected, shall be debited to reserve. Every national farm loan association must use 10 per cent and then 2 per cent of net earnings in the same way, in order to create a reserve equal to one-fifth of its capital. No limit is set for dividends after such allocations have been made. Reserves shall be invested in ac¬ cord with rules prescribed by the Federal Farm Loan Board. In the event of voluntary dissolu¬ tion, the reserves are subject to the disposal of said board, except that of an association be¬ comes the property of its land bank. But no voluntary dissolutions are lawful without the consent of said board. At least one-fourth of the stock of a Federal land bank that is held by its associations must be kept in quick as¬ sets, of which 5 per cent or more shall be United States bonds.

The Federal Farm Loan Board has power, without intervention of the courts, to place any Federal land bank or national farm loan asso¬ ciation in bankruptcy and wind up its affairs, in case of a failure to meet outstanding obliga¬ tions. But no association can be declared in¬ solvent until the total defaults on loans en¬ dorsed by all associations in the district shall amount at least to $150,000, unless such asso¬ ciation shall have been in default for two years. Any moneys collected by the receiver must be turned over to the United States Treasurer to be held by him subject to the order of said board. Severe penalties are imposed for any offenses committed against the system. Any borrower that knowingly makes a misstatement in his loan application, and any examiner, public or private, that discloses, without authority of the courts or Congress, the name of any borrower is liable to fine and imprisonment.

The act also authorizes the Federal Farm Loan Board to charter joint stock land banks, to be organized with the powers and subject to the requirements above set forth, so far as they are applicable, with a few exceptions. Every joint stock land bank may have a terri¬ tory of not more than two contiguous Stales. The capital stock shall be at least

$250,000, divided into double-liability shares. The United States shall not be a shareholder nor select any of the directors. The number of these shall be five or more, to be elected annually. The loans may be made without any restriction as to pur¬ pose, use or amount, or as to interest, except the rate shall not exceed by more than 1 per cent the rate borne by the latest series of bonds. Borrowers need not become share¬ holders. The bonds must be distinctive in form and color, but are not to be certified by the farm loan commissioner nor guaranteed by other land banks. The bonds, with the mortgages, have all the other privileges and the governmental quality prescribed for those of the Federal land banks.

The Secretary of the Treasury may desig¬ nate either kind of bank to be a depository of public money, except receipts from custom, or employ it as a financial agent of the United States government. But public funds so de¬ posited shall not be invested in farm mortgages or farm loan bonds. However, the Secretary of the Treasury may deposit any not otherwise appropriated funds with the Federal land banks for their temporary use, provided the aggregate of the sums so deposited shall not exceed $6,000,000 at any one time. Each Federal land bank may issue certificates against sums so received, bearing a rate of interest not to exceed the current rate charged for other government deposits, to be secured by farm loan bonds or other collateral, and redeemable at the Secretary's discretion.

Federal land banks are located at Springfield, Mass., Baltimore, Md., Columbia, S. C., Louis¬ ville, Ky., New Orleans, La., Saint Louis, Mo., Saint Paul, Minn., Omaha, Neb., Wichita, Kan., Houston, Tex., Berkeley, Cal., and Spokane, Wash. The government subscribed for $8,891,- 270, and private investors subscribed for the remaining $108,730 of their capital stocks. Up to 1 Aug. 1918 charters had been granted to 3,108 national farm loan associations and $117,- 249,000 loaned among 51,000 farmers at 4*4 and 5 per cent interest per annum for 36 years. The bonds bear 4*4 and 5 per cent interest per annum and run for 20 years. The board had also chartered five joint stock land banks, and approved four banks organized under State laws as agents of the Federal land banks.

On 18 Jan. 1918 the Federal Farm Loan Act was amended so as to authorize the Secretary of the Treasury to purchase at par $200,000,000 of bonds of the Federal land banks within that year and the next. The amendment also pro¬ vided that, as long as that official holds any of the bonds or the majority of the stock of any Federal land bank, its management shall re¬ main in the hands of the government. Several of the land banks in the west received, as the government's

financial agents, the funds set aside by the Secretary of the Treasury to re¬ lieve distress on the Great Plains during the war, and made loans therefrom without real

estate security to impoverished farmers. See Banks and Banking — Federal Reserve Sys¬ tem.

Myron T. Herrick, Ralph Ingalls.

FEDERAL FARM LOAN BOARD, a

board which, according to the provisions of the Federal Farm Loan Act, has control of a sys¬ tem of National land banks. See Banks and Banking; Federal Farm Loan Act, The.

FEDERAL GOVERNMENT. Origin of

Federation. — The first types of human govern¬ ment were groups of a few people — a family or a tribe. In the course of time larger units were formed with a single government by races and regional groups, such as the king¬ doms of Egypt and Assyria. The next step was a system of composite governments, made up of central monarchies with dependent provinces, of which the Roman Empire was the greatest example.

These big centralized powers sought to overwhelm and annex their small neighbors ; and this pressure led to the first crude forms of Federal government, in which small and weak units united in a union which could pro¬ tect its members from outside aggressions, while leaving each free to carry on its own local affairs in its own way. This middle type, which preserved the individuality of small states while securing some of the military power and resistance of great states, appeared first among the Greeks, from whom sprang so many fruitful ideas in government.

Inasmuch as the usual type of a Greek state was a city, the Greek federations were mostly unions of cities, such as the Lycian group in Asia Minor, the Amphictyonic Council and the Achaean Confederation. In one case, the Delian League, Athens secured the leadership and pressed the sister states so hard that at last they revolted. The most famous of the Greek Leagues were two : the ˆEtolian, made up of a group of mountain tribes, north of the Gulf of

Corinth ; and the Achaean, which was the best organized, strongest and longest lived. Twelve cities, including Corinth, came into this federation about 274 b.c. ; and it lasted till crushed by the Romans in 146 b.c. No efforts availed, however, to induce all the Greeks to unite in a similar union, which might have saved them from conquest.

The same idea of unions of city states ap¬ peared among the Etruscans and Latins in Italy, and Rome itself was in its early days a member of a league of 30 towns ; but the idea of a world state overbore the federal theory; and the Roman Empire revived the ancient idea of a central state, with a vast empire of dependent provinces. Out of the ruins of Rome arose a new group of Italian cities ; and there, in the 12th century, . appeared the Lombard League; and similar unions were formed in the rising German cities north of the Alps.

European and American. — Both the Italian and the German unions were opposed by the German emperor, the head of the Holy Roman Empire, who strove to restore the Roman idea of an enormous centralized power. The con¬ flict lasted for seven centuries during which the empire itself gradually lost authority till it be¬ came a loose, weak and irregular federation.

Within its limits were created three other federations, the Hansa, the Swiss League and the Dutch United Netherlands, all of which were built up' from small units into powerful federal unions.

The Hansa was a commercial union of manufacturing and trading cities, the main pur¬ pose of which was to control the Baltic trade. It lasted from 1367 to 1669, included about 60 cities, made treaties, established agencies and warehouses in foreign countries, built fleets and waged war.

The Swiss confederation was founded in 1293 by the mountain cantons of Uri Schwytz and Unterwalden ; 50 years later five more can¬ tons were added, including four strong cities, and later five more city and country states came in. The situation of these united Swiss in heart of the Alps gave them defense. Their own valor and skill as a powerful infantry fighting in mass made them conquerors of neighboring territory, including important valleys south of the Alps. Their success as soldiers drew the attention of the sovereigns of France, who for centuries made Switzerland a recruiting ground for their armies. They passed through the crisis of the Reformation without a breakup ; and their federal government lasted till 1798.

The United Netherlands was composed of seven provinces which revolted from Spain and in 1579 united under a weak and imperfect constitution called the Union of Utrecht. There¬ after they clung together and maintained their own government till 1795. They became a great sea power, having large merchant fleets, strong navies and colonies in the eastern and the western hemisphere ; but their federal government was always weak and subject to the leadership of the largest province, Holland.

The Holy Roman Empire and its two daughters in Switzerland and the Low Coun¬ tries were losing ground throughout the 18th century; but their place as practice grounds for federal government was taken by an unex¬ pected federal government in the New World. The New .England colonists had formed a federation in 1643; but it had disappeared nearly a hundred years before the American Revolution. In 1775 the second Continental Congress practically formed a confederation composed of the 13 colonies which joined in the Revolution. It made war, created a national debt, issued paper money, made rules for naval warfare and on 4 July 1776 took the responsi¬ bility of announcing that <(these united colonies are and of right ought to be free and inde¬ pendent states.® Furthermore it framed a form of federal government under the name of Articles of Confederation, which was adopted by all the States and went into force in 1781.

This constitution proved too weak and was replaced by the Federal Constitution of 1787, which went into effect in 1789 just as the French Revolution was rising; and that Revolu¬ tion gave the finishing touch to the three de¬ caying European confederations. The new Federal Constitution was the most elaborate and effective federal document that had ever been drawn, and with a few amendments has answered the needs of the nation during a cen¬ tury and a quarter.

Nineteenth Century Federation. — After the Napoleonic wars Switzerland was admitted by the Great Powers to form a federation

which included several cantons that had not been a part of the old union. Germany, also, was reorganized under what was called the Germanic Confederation, which was really a device for enabling Austria to dominate cen¬ tral Europe. The Revolution of 1848 caused the Swiss to reform their constitution, follow¬ ing closely the lines of

that of the United States of America. The Germans also in 1849 made a desperate attempt to create a Federal empire with the king of Prussia at the head; but the difficulties could not be surmounted and Austria resumed the leading part.

The American Civil War gave a proof to the world of the ability of a great federation to maintain itself in the face of a formidable rebellion ; and that was the signal for two ad¬ ditional federations, both of which freely used the results of American experience. The Cana¬ dians in 1867 secured from Great Britain the North America Act, by which the former colonies were authorized to unite in a Dominion of Canada. Within a few years all the British possessions in that part of the world, except Newfoundland, came into this union, which thus extended from ocean to ocean.

The Swiss in 1874 again revised their con¬ stitution, in the direction of greater power for the central government ; but the great federal event of this period was the creation in 1867 of the North German Union, which in 1871 was converted into the German Emp.re. Hungary and all the German population in Austria were shut out of this new combination, and formed a dual union having some federal features. The head and front of the German Empire was Prussia with more than half the territory and about two-thirds of the population of the whole empire; the Hohenzollerns as kings of Prussia became also German emperors. The Imperial Constitution in some ways much resembles the American ; but is more centralized, especially in its powers over justice, commercial transac¬ tions and transportation ; and in war is prac¬ tically supreme over all the states and their people. The American system of universal manhood suffrage was adopted for elections to the Reichstag.

The success of federation in Canada led to its adoption in the growing communities of Australia and South Africa. After a discus¬ sion which lasted nearly 40 years, and several conventions, a federal constitution was finally agreed upon by the Australians and went into force in 1900. It includes the five provinces of the continent of Australia and the Island of Tasmania. The Australians secured from the British government a fundamental act under which the Supreme Court of Australia may make certain decisions which cannot be ap¬ pealed to Great Britain.

South Africa was in a state of confusion from the time of the conquest of the Cape Colony from the Dutch in the Napoleonic Wars. Then the Dutch colonists of Transvaal and Orange Free State set up independent states and the British overcame those two states in the Boer War from

1899 to 1902. In 1909 these two colonies, which had been reor¬ ganized, together with Cape Colony and Natal united in the union of South Africa. The con¬ stitution is decidedly more centralized than that of any of the other five active confederations of the world.

Several Latin American states ■ — Mexico, Central America, Venezuela, Colombia, the Ar¬ gentine and Brazil — have had, and most of them still have, the outward forms of a federal government; but the two last named are the only ones that approach the federal spirit or the federal methods of actions, as shown in the other governments of the world.

Nature of Federal Government. — This long experience of federal government, which has been continuous in one part of the world or another for 700 years, has brought out clearly the advantages and conditions of fed¬ eral success and the drawbacks of the federal system as compared with the unitary system. In fact some federations, such as South Africa, are little more than one state divided into dis¬ tricts which enjoy self-government upon some subjects. Thence the character of the federa¬ tion varies till at the other pole may be found a government like the Confederation of the United States from 1781 to 1788 — a group of states which have committed certain general functions to a central authority.

An effort has been made by German publi¬ cists to classify federations into the two types of staatenbund and bundesstaat — league of states and federal state. The importance of this classification is that it calls attention to the relative influence of the two forces, centrifugal and centripetal, which act against each other in every combination of states.

It is impossible to bring all the various fed¬ erations within these two types; some writers have set up a third type, the staatenstaat or union of states, thereby intending to set apart combinations in which the federal tie is strong but concerns itself with communities and not with individuals. There is no fixed criterion for deciding whether a given composite state is a weak centralized power, a true federation or a live combination of small sovereign states. The Austria-Hungarian Empire with its sharp division into two great states, each of which is made up of several communities, which are neither states nor administrative districts, cannot be brought within any of the common definitions of federal government, yet is cer¬ tainly not unitary.

All federations attempt to make their status clear by a formal subdivision of the powers of government between the national and the

state governments. The lack of clearness and defi¬ niteness in this regard is one of the main rea¬ sons for the decay of the mediaeval confeder¬ ations, all of which had constitutional docu¬ ments, but none of them a well-jointed division of powers. In the 18th century the presumption was that all governmental powers were vested in the states, unless the federation could point to specific grants of power. This principle was carried over into the Federal Constitution of the United States ; only here the specific grants were large and included independent authority over foreign affairs, war, finance and commerce. The principle that the federal government has only delegated powers is also that of the Swiss and German constitutions. In the Canadian colonial federation, however, the opposite prin¬ ciple was adopted : the Dominion exercises all the powers that are not specifically assigned to the provinces ; and this principle is less explic¬ itly followed in the South Africa constitution'; while the Australian enumerates 39 federal

powers which include a great part of the field of government.

Power over Individuals.— One of the dis¬ tinctions drawn between a staatenbund and a bundestaat is that the former establishes rela¬ tions between the central government and the states as units ; while the latter type includes also direct governmental relations with indi¬ viduals, such as the obligation of military serv¬ ice, of taxes and in some federations of direct responsibility to the civil and criminal laws of the federation. Furthermore all the federa¬ tions have a federal citizenship, which includes federal control of naturalization and over aliens. Some relics of state citizenship are still to be found, such as the protection of the persons and property of aliens by our state gov¬ ernments instead of the national governments. In general, however, all federations have the acknowledged power to compel the allegiance and service of all citizens within their bounda¬ ries. This includes authority over immigration in all the existing federations, which is vital in the American and British colonial unions. Race questions, such as the status of negroes and Asiatics, are also decided by the federal governments.

Foreign and War Powers — Two fields of authority in which the federations go far are foreign relations, and war and defense. In all federations worthy of the name, external rela¬ tions are in the hands of the central power, which makes treaties, commissions diplomatic

representatives and decides upon a foreign pol¬ icy. Several of the German states still have the nominal right to send ministers and consuls, but they do not exercise it. In the three Brit¬ ish colonial federations, the foreign powers are in the hands of the home government, but it has become the practice to call in a representa¬ tive of the federations in negotiations which especially concern them, and to consult their interest in treaties.

The strongest motive for the grouping to¬ gether of previously independent or separate states is defense. This was the reason for the original United States of America of 1776 and is the binding force in Switzerland and Ger¬ many. Hence all the federations have a central system of armies, navies and war. Only one federation, the United States, leaves to the states any considerable share in organizing and training soldiers ; and that could be altered by an act of Congress. In practice, these federal forces are much more effective than any com¬ bination of state armies could possibly be; and the effect of war in federations is always to give additional strength and weight to the cen¬ tral power.

Finance and Commerce. — The federations are all organized upon the idea that the states remain free to lay internal taxes for their own governmental purposes, including local and municipal taxes, and also to incur public debts ; but certain fields of taxation are everywhere withdrawn from the states, particularly import duties. Where the federation and the states both tax the same thing, as for instance the American income taxes, the federation has the first right to share in the proceeds. In addi¬ tion, all the federations have a machinery of federal taxation almost without limit, and they all have federal debts which in every case were much enlarged during the European War.

Commerce is in general a federal concern, except that in the United States the States have a recognized right to the control of move¬ ments of persons and commodities which begin and terminate within the same State. In all the federations the general commerce from state to state and from any part of the con¬ federation to a foreign country is controlled from the centre. This involves shipping and railroads. Three of the federations, Australia, Switzerland and South Africa, have entered on the policy of national ownership of the whole network of railroads ; and all the others exer¬ cise a strong governmental control over the railroads, including a few federal owned lines. Several of the federal governments also have granted subsidies to steamer lines, and the United States has entered upon a new system of government merchant steamships.

The tendency everywhere is for federal governments to gain power as against the states ; partly because what might be called the natural federal powers, such as have just been discussed, enlarge with the growth of business, commerce and international relations ; partly by constitutional amendments which transfer areas of power to the central authority; and partly by changes of public sentiment which permit the central governments to exercise powers which were earlier considered to be reserved for the states. An example is the growth of national legislation on labor in the United States. An example of the centralizing effect of the larger exercise of national powers is the effect on Germany and the British colo¬ nial federations of the Great War of 1914. The combined powers over war, finance and com¬ merce gave to the federal governments a power and pre-eminence which could not all be resumed by the states after war was over.

Coherence of Federations.— The books mention many reasons for the building up of federal governments — such as common origin in the states, which combine common language, common religion and common race. None of these unities of feeling are essential. Switzer¬ land has three official languages ; in Germany there are three state religions ; the United States is made up of a score of races.. Yet no federation can long exist unless the people of the various states are accustomed to the same general system of law, government and civili¬ zation. Granting these, states will adhere to each other in a federation, if they find in it a protection for their interests and a security from foreign attack which makes the feder¬ ation stronger and safer than any of the mem¬ bers could be by themselves.

Modern federal governments have passed through some terrible shocks. In 1846 in the Sonderbund Krieg, an unsuccessful attempt was made by part of the Swiss cantons to form a separate union. In 1861 a third of the United States threw off their connection with the Federal government and formed the sep¬ arate Confederate States of America. In 1867 Prussia went through the forms of secession from the old Germanic Confederation. In each of the three cases the struggle was followed by a much stronger sentiment of union which included the communities that had tried to withdraw.

The success of the United States govern¬ ment in breaking tip the Southern Confederacy

was a proof to the world of the ability of a well-organized confederation to meet the issue of civil war. It was also a setback to the constitutional theory that states can enter a federal union, reserving to themselves the con¬ stitutional right of withdrawing whenever they felt that they would be better off outside the union. Such a principle once admitted by a federal nation would make of its constitution and government what Washington called the American Confederation — ((a rope of sand.®

The principle of federal government has made great headway during the last 60 years. It made possible Germany and the British colo¬ nial unions. In many ways federation eases the shocks of government in a great country, by taking contested questions out of the national legislature and thus allowing for differences of feeling in the different parts of the union. The British people have for some years been con¬ sidering a plan of Imperial Federation, a scheme which was further brought to the front by the war. Various suggestions have also been made for a World Federation, which would look after international commerce and keep the peace of the world. Such a combination of great empires would go far beyond the prin¬ ciples which have been worked out in any ex¬ isting federation. See Constitution ; Democ¬ racy; Executive; Government; Sovereignty; United States : Articles of Confederation — Growth of Governmental Machinery — The Interpretation of the Constitution — State Constitutions.

Bibliography. — Dodd, W. E., (Modern Con- stitutions) (2 vols., 1909) ; Freeman, Edward A., (History of Federal Government (Ancient times only; 1893) ; Hart, Albert Bushnell, (In- troduction to the Study of Federal Govern¬ ment (with bibliography, 1890) ; Howard, G. E., Comparative Federal Institutions — An Analytical Reference Syllabus-* (1907) ; Lefur, Louis, and Posener, Paul, (Bundesstaat und Staatenbund* (1902) ; Poley, A. P., (The Fed¬ eral Systems of the United States and the British Empire> ; Westerkamp, J. B., (Staaten-bund und Bundesstaat (1892) ; New York Public Library, Cist of Books and Articles Relating to Constitutions, etc.* (1904); specific works on the various federal countries, espe¬ cially Greece; Holy Roman Empire; Nether¬ lands; Switzerland; Germany; United States; Canada; Australia; South Africa.

Albert Bushnell Hart, Professor of Government, Harvard University.

FEDERAL HALL, New York city, origi¬ nally the City Hall, built 1699 in Nassau street, to replace the old Dutch (

FEDERAL HORTICULTURAL BOARD. See Agriculture, Department of.

FEDERAL PURE FOOD AND DRUG ACTS. See Pure Food Acts.

FEDERAL RESERVE LAW. See Banks

and Banking — Federal Reserve System.

FEDERAL AND STATE BOUNTIES.

See Bounties.

FEDERAL STATES. See Federal Gov¬ ernment.

FEDERAL THEOLOGY, a method of stating divine truth, according to which all the doctrines of religion are arranged under the heads of certain covenants (foedera) wh ch God has made with men. As a type of Calvin¬ ism it developed in Holland in the late 17th century and from there spread to England. John Koch (Cocceius) was its chief exponent. He termed a covenant a promise on God's part hypothecated upon man's obedient acceptance thereof. As developed, this method included the covenant of works or of nature made to Adam upon condition that he remain in his pristine state of holiness in return for which eternal happiness would be his portion. This covenant was broken by Adam's fall and was superseded by the Covenant of Grace, under which man was still held to obedience, and being incapable of it, God substituted grace for good works. Christ the Son of God is sent on earth to supply the obedience of which man is no longer capable since the fall. This cove¬ nant includes three periods — the ante-legal, or that promised the patriarchs ; the legal, or the Mosaic law, which are symbolical, and the post-legal, which comprises the advent of Chr st on earth and all subsequent Christian history. The orthodox Calvinists opposed Koch and his followers because their system dwelt little on predestination and he narrowly escaped perse¬ cution. However, they broke away from a for¬ mal scholastic Protestantism and directed a closer approach to the Scriptures. Consult Cocceius, (Opera Omnia) (Amsterdam 1675; 1701) ; Fisher, (History of Christian Doctrine> (New York 1896) ; Zovanyi, (Geschichte des Coccejanismus) (Budapest 1890).

FEDERAL TRADE COMMISSION.

This commission was created by the act of 26 Sept. 1914, in order to provide more expe¬ ditious methods of compelling observance of the Anti-Trust laws of the United States. Suits in equity for decrees to dissolve unlawful combinations were long-drawn out and final orders enjoining restraints of trade could not be obtained, nor could the penalties provided by the Sherman act for violations be enforced until the cases had been successively reviewed by the Circuit Court of Appeals and the Su¬ preme Court of the United States. Moreover, the ‘Sherman act is a penal statute, and com¬ mercial practices, not criminal in their nature nor in their intent, might nevertheless be de¬ structive of competition and contrary to public policy. The act of 26 Sept. 1914 declared ((un- fair methods of competition in commerce® to be unlawful. The act was intended to be regu¬ lative rather than punitive ; accordingly the Federal Trade Commission was directed to prevent the use of such methods. Banks and common carriers, being under the supervision of the Federal Reserve and Interstate Com¬ merce Commissions, were excepted from the provisions of the act. The Federal Trade Com¬ mission proceeds on its own initiative and, whenever it shall have reason to believe that any person, partnership or corporation has been,

or is, using unfair methods of competition, and it shall appear to the Commission that a pro¬ ceeding by it in respect to the matter would be in the public interest, it shall issue and serve on the party complained of a statement of charges with a notice of hearing. The party complained of has the right to appear and show cause why an order should not be entered requiring him or them to desist from the viola¬ tion of law as charged. Any other person, firm or company having an adverse or collateral interest in the decision may apply, and, in a proper case, will be permitted to intervene in and become a party to the proceeding. The orders of the Commission are enforcible by the Circuit Court of the United States, which may affirm, modify or set them aside; but the find¬ ings of fact of the Commission are conclusive. The Commission may, and, on application of the Attorney-General, it must, make an investiga¬ tion to discover in what manner any decree entered in an anti-trust suit has been, or is being, carried out — and it shall make a report thereon with its findings and recommendations, which it may make public at its discretion. It may publish the results of any other investiga¬ tion, excepting only

information obtained with respect to trade secrets and the names of cus¬ tomers. In like manner the Commission may investigate and make recommendations for; readjustment of the business of any corporation alleged to be violating the Anti-Trust laws, in order that the corporation may thereafter main¬ tain its organization or management and con¬ duct of business in accordance with the law. In a word the function of the Commission is to tell the great trading and industrial cor¬ porations what they may, and what they must not do if they would escape dissolution and the other penalties of the law. The term ((unfair competition® is broad enough to cover every¬ thing forbidden by the anti-trust laws, either expressly or by implication ; and the activities of the Commission have almost completely superseded those of the Attorney-General in the suppression of combinations in restraint of trade. While the Commission has no direct control over prices, its powers were great enough to induce a material reduction in the prices of newsprint paper as well as a fair distribution of the available supply thereof. Regulation and “pitiless publicity® may prove beneficial substitutes for “trust busting.®

Stephen Pfeil.

FEDERALIST, The (1787-88). When the text of the Constitution was published in New York, 27 Sept. 1787, the opposition was at first overwhelming ; the State held too advan¬ tageous a position, as general gatekeeper of the commerce of her neighbors and able to sup¬ port herself by levying customs duties on them, to surrender it. Unless New York ratified the Constitution, there could be no Union; and New York certainly would not ratify it as things stood. Alexander Hamilton, therefore, induced James Madison and John Jay to unite with him in publishing a series of anonymous essays to defend the new instrument and urge its absolute necessity; Gouverneur Morris was asked to join, but declined. From 27 Oct. 1787 to 2 April 1788, 77 essays were published in the semi-weekly Independent Journal of New York, entitled, The Federalist, and signed first

“A Citizen of New York,® then (

FEDERALISTS, or FEDERAL PARTY,

in the United States; in power 1789-1801; died nationally about 1817, locally about 1823; the lineal ancestor in succession of the National Republican, Whig and present Republican par¬ ties. Its origin (see Anti-Federalists) was on the question of adopting the Constitution; but it represented two unrelated elements. The commercial interests wished protection at once from foreign aggression and from barriers

set up by independent selfish State legislatures ; the patriots pure and simple wished a strong and energetic nation, able to command respect and secure fair treatment. The union of these, their reinforcement for the time by the more statesmanlike even of the Anti-Federalists and Washington's influence, gave them complete control of the new government. They organ¬ ized the executive departments (see Executive) anew and created the Federal judiciary and the Territorial system. Hamilton, the greatest man of the party and its natural leader, pushed through his schemes for paying the foreign and funding the domestic debt in full, restoring national credit and for assuming the State debts, binding the States to support the new government (see District of Columbia for the ((log-roll® which carried it) ; excise laws, a United States bank, a protective tariff and bounty system to develop manufactures and agriculture, and a postal system, followed rapidly; and in 1794 the crushing of the Whisky Insurrection (q.v.) showed the new national strength. Meantime the refusal to be dragged into an alliance with revolutionary France had fused the Democrats with the Republicans, the successors of the Anti-Federalists; and Jeffer¬ son had organized and Madison joined the new Democratic-Republican party. The most in¬ fluential Federalist leaders besides Hamilton were Adams and Jay; among others w'ere the (

Sherman, Jonathan Trumbull, Rufus King, Gouverneur Morris, Jonathan Dayton, Elias Boudinot, William Bradford, James A. Bayard, John Marshall, Richard Henry Lee, C. C. Pinck¬ ney and William Smith. The party began a new navy, but was prevented by the Democrats from going on with it. This ultimately killed the Federal party; unable to protect commerce by force, it had to do so by humiliating con¬ cessions to England and thus become dependent on and an apologist for that country, which alienated public confidence. By 1796 it had be¬ come almost entirely a northern party. The French war afforded a chance of increasing the navy, which they did ; but they committed the huge folly of passing the Alien and Sedition laws (q.v.), gratifying resentment at the ex¬ pense of votes. Finally, when Adams took away their one issue by ending the French war (see Adams, John), the Hamilton wing broke with his, and the Democrats ousted the party in the elections of 1800. Its course in opposition de¬ prived it of respect ; when the Democrats almost at once dropped their original tenets, practically if not theoretically, and acted on those of the Federalists, the latter (as in the Louisiana Pur¬ chase, a pure Federalist measure) changed coats with the Democrats and fought

them on their own discarded ground. Their best patriotic ele¬ ments deserted them in swarms and in 1804 they carried only Connecticut and Delaware and part of Maryland. But Ihe Embargo (q.v.) and the selfish attempt of the agricultural sections to sacrifice the entire commerce of the country to their own supposed interests temporarily reinforced the Federalists; in 1808 they had every New England State but Vermont (the only one with no seaboard), besides Delaware and parts of Maryland and North Carolina. The War of 1812 was so unpopular in the North that in the elections of that year New York and New Jersey went Federalist also, and Maryland solid; and the balance of power was held by the three backwoods States of Kentucky, Tennessee and Ohio — or by Penn¬ sylvania, whose agricultural west had now swamped the Philadelphia region. But the party as such was really dead ; half the old leaders were gone, several of the others had turned Democrat or Independent, Marshall was imbedding its best principles in the national system from the Supreme bench; the chief men now were King and Pinckney. When the war closed, the issue on which the commercial sec¬ tions had joined them was closed and these at once deserted the party; the Hartford Conven¬ tion (q.v.) had driven all the remaining leaders out of public life with the stigma of secession and treason ; and in 1816 the party carried only Massachusetts, Connecticut and Delaware, with three Maryland electors who would not vote. The scattered Federalists in Congress did not act as a party, having no issues even as a pretense, and as a national party it ceased to exist. State- wise, it controlled Connecticut and Delaware till after 1820 and Massachusetts till 1823, when the Democrats swept even Essex County from the ˆJuntoA It lingered for some time also in Maryland and North Carolina. Consult Bas¬ sett,

1909),

FEDERALS, the name given to those who during the Civil War in the United States fought to maintain the Union of the Federal States, as opposed to the Confederates.

FEDERATED MALAY STATES, a

group of native states of the Malay Peninsula, comprising Perak, Selangor, Negri Sembilan and Pahang, under British protection. The total area of the federated states is 27,506 square miles, of which Perak has 7,800, Selangor 3,156, Negri Sembilan 2,250 and Pahang 14,000 square miles. Generally speaking the country is fertile and has an abundant water supply. There are several mountain peaks, some of which have an elevation of 7,000 feet. The staple cultivations are coconuts, rubber, rice, sugar, pepper, tapioca, gambier and ripah

palms. The chief industrial enterprises are rubber-curing and the mining of tin. In Perak the Krian ir- , rigation works irrigate 70,000 acres of rice-fields and supply drinking water to the entire district. The canal is 21 miles long, with branches ag¬ gregating 16 14 miles and 188ˆ2 miles of minor channels. The total area of rubber plantations (over 100 acres) is 499,500 acres and 182,000 acres are under coconuts. The forests produce excellent timber, besides guttapercha, oils, resins and canes. About 600,000 tons of timber are taken annually from the forests, exclusive of about 120,000 tons for firewood, mining, etc. In 1916, 62,765 tons of rubber were exported ; the annual exports of tin aggregate about 50,000 tons. Gold is produced also : 14,272 ounces in 1914 and 18,641 ounces in 1915. Many other minerals are found, including lead, iron, copper, bismuth, mercury, arsenic, manganese, plum¬ bago, coal, silver and zinc. The miners number about 164,000, of whom 157,000 are Chinese.

Commerce. — The trade, exclusive of bullion and specie, was as follows in a recent year : ex¬ ports, $94,405,565, imports $35,009,295. In' that year the chief items of import were: rice, $8,- 730,400; opium, $1,037,595; tobacco and cigars, $1,721,205; cotton piece goods, $1,180,055; sugar, $934,205 ; condensed milk, $733,835 ; live stock, $1,176,690; spirits, $620,235; petroleum, $1,- 428,610; iron ware, $861,595; machinery, $786,- 190. The chief exports included rubber (44,- 524 tons) $54,486,825; copra, $1,072,465 ; rice, $525,130; tapioca, $130,995; coffee, $125,550; and tin and iron ore, $35,824,840. The exports to the United Kingdom aggregated $16,680,050, to other British possessions, $77,311,300, to other countries, $759,050.

In 1915 the shipping entered, exclusive of native craft, was 4,296 vessels of 1,714,837 tons; shipping cleared 4,290 vessels of 1,714,554 tons. Native craft entered and cleared aggregated 13,795 vessels, 311,763 tons.

Communications, Posts, Telegraphs, etc. — The four states have 2,251 miles of metaled cart roads and 1,923 miles of bridle roads and paths. The government has made, purchased, leased or is making, the railway systems of the whole peninsula south of the boundary of Siam, including the railway on Singapore Island. The system, when completed, will comprise a trunk line throughout the peninsula, diverging at Gemas in Johore into West Coast and East Coast lines, and linking up with the Southern Siamese rail¬ way system on the Perlis-Siam and Kelantan- Siam boundaries respectively. The total mileage open for traffic is at present about 1,000 miles.

There are 90 post offices and 38 sub-stations. In 1915, 17,371,312 postal packets were received and delivered. There are 2,226 miles of tele¬ graph and telephone line under the post office department. The post and telegraph receipts, including stamp sales, excepting sales for fiscal purposes, amount annually to about $42,000, and the expenditure to $500,000. On 1 Jan. 1916 the savings banks had on deposit $375,550 credited to 7,558 depositors. The currency consists of Straits Settlements dollars with subsidiary silver and copper coins. The value of the dollar is fixed at $0.59, or 60 dollars = £7 = : = $35. Cur¬ rency notes and bank notes are also in circula¬ tion, and the British sovereign is legal tender for any amount. Weights and measures are as in the Strait Settlements.

Revenue. — The 1915 revenues amounted to $23,785,405, derived from licenses, customs dues, railways, land revenue, fees of court or office, interest, municipal fees, etc. The disbursements amounted to $24,989,200, mostly on railways, public works, miscellaneous services and per¬ sonal emoluments.

Education. — In Perak, Selangor, Negri Sembilan and Pahang, there are a number of English schools maintained or assisted by the government, with an average enrolment of 5,000 boys and 1,400 girls, and 367 Malay ver¬ nacular schools, with an average enrolment of 19,286 and an average attendance of over 15,000. There are several Chinese schools, but they are not under the control or supervision of the Education Department. Expenditure on educa¬ tion in 1915 amounted to $260,000.

Government, Administration, etc. — The laws in force in each state of the federation are contained in enactments passed by the state councils, up to December 1909, and from that date, where more than one state is affected, by the Federal Council, which consists of the High Commissioner as President, the chief secretary, the sultans of Perak, Selango and Pahang, the Yam Tuan of Negri Sembilan, the four British residents, the legal adviser, and four unofficial members, and in addition to legislation deals with the annual estimates of revenue and ex¬ penditure. All legislative enactments are sub¬ mitted to the High Commissioner and the Sec¬ retary of State for the colonies. There is a Supreme Court, comprising a Court of Appeals, magistrates' courts of the first and second class, and courts of a Kathi and assistant Kathi.

In Perak, Selangor and Sungei Ujong, British residents were appointed in 1874, with a staff of European officers whose duty was .to aid the native rulers by advice, and to exercise executive functions. The supreme authority in each state is vested in the state council, con¬ sisting of the Sultan, the resident, the secretary of the resident, and some of the principal Malay chiefs and Chinese merchants. The residents are under the control of the Chief Secretary and High Commissioner.

In 1883 the relations of the Straits Settlements with the small native states on the frontier of Malacca were consolidated. These states were confederated in 1889, under the name of Neerri Sembilan (((nine. states®). In January 1895; Sungei Ujong, including Jelebu, and Negri Sembilan were placed under one resident and in the following July a treaty was signed by which the administrations were amalgamated.

The new federation, which still retains the old name of Negri Sembilan, comprises the states of Sungei Ujong, Sri Menanti, Johol Jelebu, Rembau and Tampin. In 1887, by agreement with the Rajah of Pahang, the control of his foreign relations, etc., was surrendered to the British government. This was followed by a further agreement in 1888 with the Rajah, now styled Sultan, under which Pahang was taken under British protection, on the same terms as the Protected Native States on the west coast of the peninsula. In July 1896, the treaty be¬ tween the four protected native states, Perak, Selangor, Pahang and Negri Sembilan, and the British government came into force by which the administrative federation of these states under a chief secretary is provided for, and the states agree to furnish a contingent of troops for service in the colony should the British government be at war with any foreign nation.

Military Forces, Police, etc. — The military force of the states consists of an infantry bat¬ talion of Sikhs and Pathans known as the Malay States Guides, to which is attached a mountain battery with mules. The rank and file of the police force consists of an Indian and a Malay contingent. The authorized strength of the force in 1915 was 97 European and five native officers, and 3,347 rank and file, but the actual strength was about 200 below this. There is also a detective branch con¬ sisting of Chinese, Tamils, Malays, etc., in charge of Europeans.

Population. — According to the last census Perak had a population of 494,057, of whom 344,238 were males and 149,819 were females; Selangor, 294,035, of whom 220,939 were males and 73,096 females; Negri Sembilan, 130,199, of whom 87,651 were males and 42,548

females; Pahang, 118,708, comprising 72.234 males and 46,474 females; a total of 1,036,999, of whom 725,062 were males and 311,937 females. The population contained 420,840 Malays, 433,244 Chinese, 172,465 natives of India, 3,284 Euro¬ peans and Americans and 2,649 Eurasians. The preponderance of males over females is due to the number of Chinese immigrants. The largest town in the states is Kuala Tumpur, in Selangor, with 60,000 inhabitants.

Bibliography. — Reports on the Federated Malay States (London annually) ; (Manual of Statistics of the Federated Malay States) ; federated Malay States: General Information for Intending Settlers) (issued by the Emi- grants) Information Office, Westminster) ;

(Perak Handbook and Civil List) (Singapore) ; Belfield, H. C., (Handbook of the Federated Malay States 5 (3d ed., London 1907) ; Dennys, N. B., (A Descriptive Dictionary of British Malaya5 (ib. 1894) ; Harrison, C. W., (Illus¬ trated Guide to the Federated Malay States5 (ib. 1910) ; Jackson, H. M., federated Malay States5 (Report of Survey Department, 1914) ; McNair, F., (Perak and the Malays5 (London 1878) ; Maxwell, G., (In Malay Forests5. (Edin¬ burgh 1906) ; Rathbone, A. B., (Camping and Tramping in Malaya5 (London 1898) ; Skeat, W. W., (Malav Magic5 (ib. 1900) ;. id., (Tribes of the Malay Peninsula5 (2 vols., ib. 1904).

FEDERATION OF LABOR. See Ameri¬ can Federation of Labor.

FEDERMANN, Nikolaus, ne'ko-lous fa'- der-man, German explorer : b. Ulm, Swabia, 1501 ; d. about 1542. He was sent to Venezuela by the Welsers of Augsburg, becoming chief lieutenant of Alfinger, and making explorations into the interior of the country. He returned to Europe 1532, going back to Venezuela 1534, as the lieutenant of George of Speyer. He did not follow the latter on one of his expeditions, as ordered, but made an independent explora¬ tion with 200 men, spending some years in the valley of the Orinoco, and reaching New Grenada in 1539, where he met Gonzulo Kues- ada, already in possession, and relinquished the region to him. Federmann returned again to Augsburg, but was discharged by the Welsers for misfeasance. His account of his first ex¬ ploration was published in German, Hndianische Historian 1557, and in French 1837.

FEDERN, fa'dern, Karl, German author : b. Vienna, 1868. He was

educated in his native city, and from 1891 to 1894 was engaged in the practice of law, after which he devoted himself entirely to literature. He lived successively in Vienna, Berlin, London and Rome. He wrote on Italian literature and also on French and American literature. He published Ger¬ man translations of Emerson's

FEDI, fa'de, Pio, Italian sculptor: b. Viterbo 1815; d. 1892. At the Vienna Academy he studied engraving but afterward abandoned this art for sculpture, studying to this end at the Academy of Florence and also at Rome. His first piece, (Christ Healing the Sick) was a success, and in 1846 Fedi received commis¬ sions from Leopold II of Tuscany for statues of Niccola Pisano and Andrea Cesalpino for the facade of the Uffizi Gallery. His other works include the mausoleum of the daughter of the Russian general Swov; monument to Nicolini in Santa Croce; (Sacred Poetry) in the city museum of Verona and (The Rape of Polyxena,* his greatest work. In 1866 it was placed with the Renaissance groups in the Log¬ gia dei Lanzi.

FEDOTOV, fa'do-tof', Paul Andreievich,

a Russian painter who was born at Moscow in 1815 and died in 1852, is with good reason looked upon as practically the founder of the Russian "purpose painting® school ; but to the circumstances of his life, rather than to any vigorous creative impulse of his nature, he owed that distinction. In (The Russian School of Painting) (New York 1916), A. Benois writes : (

tyranny of Nicholas's government, the air was astir with [intellectual, artistic, spiritual] revolt. The necessity was felt of being renewed, re¬ generated.® These moods — the "tendency,® it was called — first found expression in literature of great power: they were also seeking expres¬ sion in painting, but no echo could be expected from the bureaucratic and half-courtly world represented by and in the Imperial Academy of Art. "Fedotov alone was nearly fit for such a task, but even he, a retired officer, pensioned by the Emperor, a modest, simple man, intelli¬ gent but childishly naive, could hardly come up to the level of the literature. He limited him¬ self to what Gogol did (in Read Souls,) (The Revisers,* etc.), 15 years earlier, that is. to a keen but not very caustic satire of the foibles and follies of his compatriots.® And this turned out to be the most effective form of attack. He made his first appearance before the public with such paintings as (The Fop* satirizing bureaucratic ambitions, and that gay satire on the life of the merchant class, (The Major's Courtships Following these came a series of pictures in which he ridiculed the first phase of the feministic movement, the petty gentry, etc. — all of

this series being conceived in a light vein, their intention being purely satirical, not didactic. <(A field apart is occu¬ pied by his last works, in which he seems to turn to a quieter, more poetic, and more ar¬ tistic way of looking at things. Such are his (His First Decoration, * and (The Choice of a Bride. 5 Both are right: his works at times had the character of mere illustration, but that will not keep a painter from seeing and saying that some of it is “brilliantly® above mere illustration. Consult Mewmarch, R., (The Russian Arts* (New York n.d.).

FEE, John G., American abolitionist : b. Bracken County, Ky., 9 Sept. 1816; d. Berea, Ky., 12 Jan. 1901. He entered the Lane Theo¬ logical Seminary, Cincinnati, Ohio, in 1842, and soon afterward began to preach against slavery. As a result he was mobbed several times, but in 1853 went to Berea, Ky., where he succeeded in founding a church and establishing Berea

College (q.v.), an institution open alike to blacks and whites.

FEE, FIEF, or FEUDUM, is a legal term of feudal origin, signifying an inheritable es¬ tate in land, held by some superior, or lord; as distinguished from allodium, which is land held by absolute ownership. In the United States, however, where land is generally held in allo¬ dium, the private ownership is termed the fee, if subject to no paramount right except that of the State. In England the legal theory is that all the lands of the kingdom, except the royal domains, are held in fee, or by a tenure, of some superior lord, the absolute or allodial property being only in the sovereign, so that all the tenures are strictly feudal. This was a significant doctrine while the feudal system flourished in Europe; and the remnants of it are still blended, in a greater or less degree, in the land titles or rather as a theoretical doc¬ trine, from which certain inferences are drawn, than a plain, direct, practical fact; for the property of a proprietor in land held in fee simple, in England, is as absolute, to all intents and purposes, as where the land titles are allo¬ dial, there being no practical or theoretical doc¬ trine of a tenure, or holding under a superior. Fee tail is any fee granted upon condition ; or a fee limited to any particular heir or class of heirs; a qualified fee as differing from fee simple.

FEE SIMPLE, an inherited estate belong¬ ing to the owner, his heirs and assigns forever. This is the most complete and exclusive interest

that the possessor of lands can have in them, and the word continued to be employed in real estate law after the feudal system had passed away. This is the case even in the United States, where land is generally held in allo¬ dium (q.v.) and subject to no paramount claim excepting that of the eminent domain which be¬ longs to the State.

FEE SYSTEM, a term designating the com¬ pensation of certain officers or certain kinds of official service by fees rather than by salaries. The fees of an office in many instances amount to so large a sum as to make it an object of intense competition and of years of plotting. Before it was put on a salary basis the fees attached to the office of consul-general in Lon¬ don were said to amount to $100,000 a year. In a populous county, the office of sheriff ranges in some cases from $25,000 to $125,000 annu¬ ally. To secure the election or appointment liberal contributions to party funds, political deals of any description, and even open corrup¬ tion have been resorted to. The abolition of the fee system has long been advocated and in many sections of the United States has been abolished and the salary basis substituted. See Salary Grab.

FEE TAIL, an estate limited to a certain line of descent, to certain heirs or to a certain class of heirs; sometimes known as a condi¬ tional fee.

FEEBLE-MINDED, The. Definitions.—

No strictly scientific definition of feeble-mind¬ edness is possible in the present stage of our knowledge. The condition is fairly well indi¬ cated, however, by Tredgold ((Mental Defi¬ ciency*) in the following language: <(A state of mental defect from birth, or from an early

age due to incomplete cerebral development, in consequence of which the person affected is unable to perform his duty as a member of society in the position of life to which he is born.**

Classification. — The feeble-minded are classified according to mental age, that is, the age of a normal child of the same mentality. For example, a feeble-minded person of mental age 6 has a mind approximately like that of a normal child of 6. The feeble-minded are also divided into three groups, idiots, imbeciles and morons. Idiots are those of mental age 1 and 2. Imbeciles comprise those of mental age 3 to 7 inclusive. Morons include those of men¬ tal age 8 to, perhaps, 12 — the upper limit is somewhat uncertain. It is also customary to speak of the I.Q. (Intelligence Quotient) of a feeble-minded person. This is found by divid¬ ing his mental age by his actual age, e.g., a child who is 12 years old and of mentality 9 would have an I.Q. of 9/12 or 75. In

using the I.Q. no higher actual age than 16 is used because it is supposed that the mental age of the average man does not go beyond 16. So that if a feeble-minded person is, say, 30 years old, we divide by 16 and not by 30. (For fur¬ ther discussion of I.Q., consult Terman, L. M., (The Measurement of Intelligence*).

The different groups are rather significantly, though somewhat inaccurately, indicated by the expressions that the idiot cannot speak, the imbecile cannot read, the moron cannot cipher. There are certain exceptions to this since some who are classed as idiots do talk a little and rarely a person who is classed as an imbecile learns to read, while the moron may learn to add, subtract and multiply, less often to use long division and practically never to solve arithmetical problems.

The idiot is the helpless creature that is more or less familiar, almost entirely lacking in intelligence, frequently unable to feed him¬ self, generally unable to control his secretions, and almost entirely incapable of being trained.

The imbecile is the silly, foolish child, com¬ monly recognized as such. He is incapable of learning the ordinary school work, but is more or less trainable for simple tasks, such as sin¬ gle errands and certain kinds of crude and coarse heavy work.

The moron, on the other hand, is usually unrecognized by the layman, at least until he is almost an adult and even then is thought of as being merely peculiar or is characterized by some such expression as ((not quite all there,** ((eccentric,** <(ignorant.** The moron is not profitably trainable in the ordinary school sub¬ jects, reading, writing and number work, even though a certain small percentage of them can learn something of these subjects as the result of great effort on the part of the teacher. They are, however, quite trainable in indus¬ trialˆ and occupational work, anything of rou¬ tine character not requiring judgment. They are almost never self-directing but require more or less constant oversight.

Disregarding the mentality or mental level, as it is called, the feeble-minded are sometimes classified on the basis of the causes of the con¬ dition or of certain accompaniments or pecul¬ iarities either physical or mental. (Consult Ireland, W. W., (Mental Affections of Chil-

drenJ). For example, the hydrocephalic, or large headed, is one who

suffers from hydro¬ cephalus. This may be an accompaniment to feeble-mindedness or possibly a cause.

The microcephalic is the small headed feeble-minded person. The brain has ceased to grow in bulk and the skull has closed over it, giving a very small head of characteristic shape.

The cretin is a feeble-minded person whose condition results from the absence of or hyper¬ trophy of the thyroid gland, the consequence of which is an arrest of development both phys¬ ical and mental. The cretin is of small stature and of low mentality. If, however, the condi¬ tion is discovered in infancy, the child may be fed the thyroid gland of sheep or other animal and develop almost if not quite normally.

The Mongolian type is so called because of its more or less marked resemblance to the Asiatic races, the slanting eyes and general ap¬ pearance of the face. In addition to this the condition is characterized by short, stubby fin¬ gers, absence of the occipital protrusion, show¬ ing a straight line from the neck up, and fre¬ quently, although not always, a deeply fur¬ rowed tongue. They generally have very poor circulation and suffer more or less from affec¬ tions of the eye. They are exceptionally af¬ fectionate. The cause of the condition is not known, but it is something that acts in utero and probably affects the nutrition of the mother. For other types and other details the reader is referred to the works by Tredgold, Barr, Shuttleworth and Potts (see Bibliogra¬ phy)..

History. — The present movement for the care of the feeble-minded was begun in 1837 when Dr. Seguin, called the apostle of the idiot, began his work in Paris. Some sporadic at¬ tempts had been made before this but they were of short duration and amounted to but little. In 1811 Napoleon ordered a census which showed over 3,000 cretins in one canton in Switzerland. In 1816 a school was founded for cretins at Saltzburg, Austria. A few idiots were trained at the asylum for the deaf and dumb at Hartford, Conn., about the year 1820.

The. first institution for idiots was estab¬ lished in Germany in 1835. In 1841 another institution for cretins was founded by Dr. Guggenbuhl on the Abendberg, near Interlaken in Switzerland. This institution lasted 20 years.

In 1848, Dr. Samuel G. Howe started a class for the training of idiots at the Blind Asylum in South Boston, Mass. This led to the found¬ ing of the Massachusetts school, in 1851, for the care and training of the feeble-minded. New York established a similar school at Syra¬ cuse,

N. Y., at about the same time. From that beginning the work has grown in the United States until at present there are one or more State institutions for the feeble-minded in 34 States.

These institutions are caring for approxi¬ mately 35,000 feeble-minded and epileptic per¬ sons, constituting about one-tenth of the esti¬ mated number of feeble-minded in the United States. (For further details consult Fernald, W. E., (The Growth of Provision for the Feeble-minded in the United States*)-

Causes. — In the Vineland study of 300 families Goddard found 66 per cent of feeble¬ mindedness hereditary, that is, the cause is

defective germ plasm, which is transmitted probably in accordance with the Mendelian law of heredity. Of the remainder about 12 per cent appear to be due to what is called neuro¬ pathic ancestry. That is to say, the families are characterized by the presence of neuropathic conditions such as paralysis, hemiplegias, insan¬ ity, alcoholism and the like. Nineteen per cent are classified as being due to <(acci dental® causes including certain diseases. Of the lat¬ ter, cerebrospinal meningitis is the most im¬ portant, although typhoid fever, measles and even whooping cough are supposed by some to cause the condition, though this is doubtful. In 2.6 per cent of the cases no cause could be found. Alcoholism and syphilis are popularly supposed to be potent causes of this condition, but the evidence is inconclusive, since such cases often show also a family taint of feeble¬ mindedness, or neuropathic or other conditions that may 'equally well be causes. The further fact that there are large numbers of alcoholic and syphilitic families who do not have feeble¬ minded children throws doubt upon the prob¬ ability of these conditions being causes.

Diagnosis. — The condition is now usually diagnosed by the aid of mental tests. A system of mental tests called <(A Measuring Scale for Intelligence® was first devised by Drs. Alfred Binet and Th. Simon of Paris. This has since become widely used, has been revised and ex¬ tended and is the stimulus and guide for many other systems of tests.

Scientific Study. — The first systematic scientific study of the condition and the causes of feeble-mindedness seems to have been made under the direction of Dr. Arthur C. Rogers at Faribault, Minn. Dr. Rogers opened a laboratory in 1898 and employed Dr. A. R. T. Wylie as psychologist. This work was dis¬ continued in 1902. Superintendent E. R. John¬ stone organized a laboratory at the training school for the feeble-minded at Vineland, N. J., 15 Sept. 1906. This work has continued and grown until the laboratory now

occupies an entire building with a number of workers. There are also laboratories at Faribault, Minn., Waverley, Mass., Lincoln, Ill., and Eldridge, Cal.

Treatment.— As to treatment in the sense of a therapeutic measure or procedure for ameliorating the condition, there is none. Feeble-mindedness is not a disease. To be feeble-minded simply means that the mind for some reason has not developed to its full and complete maturity and under these conditions there is no drug or treatment known to science that can re-establish the growth when once it has permanently stopped. Much confusion in regard to this matter has existed in the past, largely because feeble-minded persons are subject to many if not all of the diseases that affect normal individuals. From this fact it was thought that the feeble-mindedness itself was caused by the disease and consequently any treatment that, might improve this disease was expected to improve the feeble-mindedness. Experience has abundantly proved the error of this view.

It follows from this that the onlv treatment of which we can speak. is social. The feeble¬ minded person is socially incompetent, that is to say, is not able to take care of himself or live an independent life. He must always be cared

EXPLANATION.

Squares indicate males. Circles indicate females. N means normal mentally. F (white on black background) means feeble¬ minded. E means epileptic Sx. Sexual offender. A. Alcoholic (drunkard). I. Insanity. C. Criminality, d. inf. Died in infancy. T. Tubercular.

Clear square or circle means mental condition not determined. Small black circle signifies miscarriage. Horizontal line con¬ necting a square and a circle means marriage or mating. Symbols pendant from same horizontal line are brothers and sisters. Vertical line (longer) connects parents and their children.

(5o&-r-© dSjk-r-Q

rgrunn

Q-

A

Fig. 2

dh

MW

“f— i

Q® 4

b 6 6 6 6 <*> 0 6 ˆˆ

6

Fig. 3

Fig. 4

{ Ehˆ-O

n] [n] (n] □ [n] \kffky

£

& $ (n) lai (±)

©©

Fig. 5

Types of Hereditary Feeble-Mindedness.

Fig 1. A mildly tainted family. Fig. 2. Two feeble-minded parents have only feeble-minded children. Fig. 3. A thoroughly defective family. Figs. 4 and 6. Almshouse type. Every symbol with heavy black line under it shows that the individual is in an almshouse or other institution at public expense. 5. Showing result of a normal man marry¬ ing a feeble minded woman.

0—1 — © 0-

D-

-©

O-

“Si

InI

INI

0 6 (£) (n) [n] 0(A) (6)0 [£]

N) WI(N)(N)

Fig. 1

4 NORfUFI C.

RONC0U4N

Fig. 2

*■ 77 «•« wire PAJULYM

(sS— r©©

i§rg|grSi5igi] (S©©0

4 • »*n”[m L HAWJNW

i

54NICL N.

[N] (n)© flTIiTJ)

*u. Fig. 3

Types of Non-Hereditary Feeble-Mindedness Showing that there is no other Feeble-Mindedness in the Family — Fig. 1. Girl feeble-minded from cerebro-spinal meningitis. Fig. 2. Feeble-minded ˆoy of Mongolian type. Fig. 3 So-called neuropathic ancestry. Note the nervous instability of various members of the family.

for, just like a child. Indeed, he is a child in all but his physical form. At the present time the most prevalent view as to the treatment of the feeble-minded is that they should be seg¬ regated in institutions or

colonies. The colony for the feeble-minded is nothing more than a group of such persons controlled by intelligent people in an environment as human and normal as possible, but where the conditions of life are simplitied so that these persons of limited in¬ telligence are able to live such a life as their limited mentality will permit; all of the com¬ plexities of modern civilization being removed or taken care of by those in charge.

Within the past decade a more intensive study of the problem of defective mentality has brought about the recognition of the fact that the number of such defectives is vastly greater than had ever been imagined and that large proportions of our criminals, paupers, prostitutes, drunkards, ne'er-do-wells, and even common laborers are mentally defective, in the sense that they have not the mind, the judg¬ ment, the will power to enable them to rise higher than they do in the social scale or to manage their own affairs with ordinary pru¬ dence. In view of this fact, the question of colonization becomes a very serious one. From the standpoint of practicability it is realized by the students of the problem that it is impossible to colonize all of these people, partly because we cannot provide the means necessary for their support ; and largely because many of them still have enough intelligence to wish to be free and independent and do not take kindly to a life in which their affairs are largelv managed for them. The consequence of this is, as stated above, that nine-tenths of the estimated number of mental defectives are not colonized. They are at large. Those of school age are in the public schools, — except the very low grade imbeciles and the idiots. This fact is being recognized and our more progressive cities are providing special classes for the care and training of these dull pupils. The argument for this is two-fold ; first, and perhaps most im¬ portant, that the normal children are vastly better off and more easily cared for and in¬ structed when the defectives are removed from their classes. The second, and the more often realized and appreciated reason, is that the defectives themselves require an entirely different kind of education from the normal child. It is now known that they cannot master abstractions and consequently cannot learn, to any satisfactory degree, the usual subjects of the public school. They can be trained, how¬ ever, to use their hands and to do such manual and industrial work as requires but little judg¬ ment. The policy at present then is to colonize as many cases as can be provided for or as can be induced to go to the colonies and to care for the rest in special classes in the public schools. The objection to the public school care of these children is that, the con¬ dition being so strongly hereditary, the chil¬ dren who do not go to the institutions or to colonies are left free to marry as they grow up

and thus propagate another race of mental defectives. The second difficulty is that these defectives very easily become criminal or anti¬ social beings when not properly handled They are easily influenced by vicious people, or even of their own accord are apt to get into trouble

because all of the lower instincts which in nor¬ mal persons are regulated and controlled by their judgment and reason, their training and experience, are in these cases uncontrolled and consequently lead them into criminality or other anti-social acts. For example, the feeble¬ minded boy will steal, because this is a natural, childish impulse, and he does not learn the abstract principle that stealing is wrong. The feeble-minded young woman will become a sex offender because yielding to the sex impulse is a natural instinct and she cannot learn the abstract principle that out of wedlock this is sin.

The saving fact in the situation is that in many of the feeble-minded these instincts are comparatively mild; and, if the condition is early recognized in childhood and the individual carefully trained and kept away from the knowl¬ edge of vice and very carefully guarded and controlled during life, they may be kept rela¬ tively innocent ; and if wisely trained may be more or less useful. This, of course, does not apply to the lowest grade that have so little mentality that they must have perpetual care.

Bibliography. — Barr, Martin W., (Mental Defectives) (Philadelphia 1904) ; Binet, A., and Simon, Th., (The Development of Intelligence in Children,5 tr. by Elizabeth S. Kite, and (The Intelligence of the Feeble-Minded) (pub¬ lications of the Training School at Vineland, N. J., Department of Research, Nos. 11 and 12, 1916) ; Doll, Edgar A., (Clinical Studies in Feeble-Mindedness) (Boston 1917) ; Fernald, Walter E., (The Growth of Provision for the Feeble-Minded in the United States) (Mental Hygiene, Vol. I, No. 1, January 1917, pp. 34- 59) ; Goddard, Henry H., (Feeble-Mindedness, Its Causes and Consequences5 (New York 1914) ; Huey, E. B., (Backward and Feeble- Minded Children5 (Baltimore 1912) ; Ireland, W. W., (Mental Affections of Children5 (Phil¬ adelphia 1898) ; Lapage, C. P., (Feeble-Minded- ness in Children of School Age5 (Manchester, Eng., 1911) ; Sherlock, E. B., (The Feeble- Minded5 (London 1911) ; Shuttleworth and Potts, (Mentally Deficient Children5 (4th ed., London 1916) ; Terman, Lewis M., (The Meas¬ urement of Intelligence5 (New York 1916) ; Tredgold, A. F., (Mental Deficiency5 (London 1908; 2d ed., New York 1914).

Henry Herbert Goddard, Director Department of Research, The Training School, Vineland, N. J.

FEED PUMP, a force-pump, for supply¬ ing the boiler with water.

FEED-WATER HEATERS are employed to pre-heat the feed water supplied to steam boilers, in order to save fuel, increase the steaming capacity of the boiler, protect the boiler against temperature strains and to elim¬ inate scale-forming and corrosive impurities. For each 11° F. that the temperature of the water is raised, about 1 per cent less fuel will be required or if the same amount of fuel be burned, the steaming capacity will be increased about 1 per cent. Pre-heating of the water prevents chilling of plates, tubes and other metal parts of the boiler and thus avoids injurious contraction strains about riveted joints, tube ends, etc. Certain scale-forming impurities in natural water supplies are precipitated to some extent by heating of th'* water and for that reason are known as <(temporary hardness" in

distinction from substances which are not affected by ordinary pre-heating, known as per¬ manent hardness. The precipitation of calcium carbonate by heat is a phenomenon familiar to most users of water from the ordinary kitchen- range heater. Nearly all water supplies also have in solution oxygen from the air and other gases, which have a corrosive effect upon iron pipes and boilers. Inasmuch as the solubility of these gases is reduced to zero in water heated to atmospheric boiling point, they may be driven off by heating in the open type of heater de¬ scribed below. There are three classes of feed water heaters in general use : so-called closed or tubular heaters, in which the boiler feed water is passed through metal pipes surrounded by steam, usually steam exhausted from pumps, engines or other steam using appliances ; open heaters, in which the water is sprayed over trays in contact with the steam in an open chamber or box; and fuel economizers, in which the water is pumped through cast iron or other pipes, over which are passed the flue gases on the way from the boilers to the chimney. The advantage of the closed heater is that inasmuch as the water does not come into actual contact with the steam there is no danger of the water becoming contaminated by the cylinder oil which is present in the steam exhausted by reciprocating engines and pumps. Its disad¬ vantages are that the heat must be transmitted through a metal wall and that the water cannot therefore be raised to the full temperature of the steam. A temperature of 160° to 180° F. is ordinarily all that is obtained with closed heaters. The exhaust steam in giving up its heat to the water is condensed and, unless an oil separator is used in the steam line, contains grease and oil and must

be thrown away, al¬ though except for the oil, it is pure distilled water. The closed heater receives cold water at temperatures varying from 32° to 100° F., and delivers water at much higher temperatures. It is therefore apt to be subjected to severe temperature strains, causing loosening of the joints and leakage. The heating of the water also causes the deposit of scale-forming matter upon one side of the heating surface, while oil and grease may be deposited upon the other, both interfering with the transfer of heat and requiring frequent cleaning. In open heaters, the danger of contamination from cylinder oil has been averted by the use of oil separators attached to and forming a part of the heater; and because of the higher temperature which such heaters give, also the fact that the exhaust steam condensed in heating the water becomes a part of the boiler feed supply, thus saving the heating of an equal amount of raw cold water, also due to the fact that the water is purified by the driving off of air and gases, the open heater has become practically standard in the United States. The open heater is or¬ dinarily provided with attachments performing functions additional to that of heating the water. It is ordinarily used as a hot well or receiver for water discharged from steam traps, water condensed in heating coils, jackets, etc., and for the condensate from the condenser, by means of which a vacuum is maintained on the engine or turbine exhaust. The additional amount of water, ordinarily known as make-up water, which may be required for the boiler feed pumps, is admitted through a valve con¬

trolled by a float in the water storage space of the heater, which thus takes the place of an automatic make-up water regulator. Where more exhaust steam is available than can be used for heating the boiler feed water, the surplus is often applied to heating buildings or to industrial operations and for such use should be purified of oil, so that the condensate may be brought back to the heater and used for boiler feeding. In such cases the oil separator attached to the heater is made large enough to purify all of the exhaust steam, the surplus not required in the heater passing through a steam-stack attached to the separator, directly to the heating system or other apparatus. Where the raw water supply used for boiler feeding contains troublesome amounts of scale-forming and corrosive substances, such as sulphates of lime and magnesia, which are not precipitated by heat, provision is made for feeding a suitable amount of some transforming reagents, such as hydrate of lime and sodium carbonate, in which case the heater is known as a hot process softener, or softener heater. The reagents em¬ ployed may be the same as those used in the ordinary cold process softener, but the action

of heat is greatly to accelerate the chemical transformations and to form coarser and larger precipitates, which settle out more quickly in the settling chamber. The latter is made larger than in the ordinary open heater, but requires to be only one-sixth to one-third as large as would be necessary with a cold process softener. The reaction in hot water is also more com¬ plete and less reagent is required to give a given degree of removal of the scale-forming substances. The effect of heat in accelerating chemical reactions is a familiar phenomenon, as for example the action of soap upon grease and dirt in the washing of clothes and dishes. Recently a new form of feed water heater has been widely introduced, in which the water is passed over a weir having the form of a V-notch, in order to measure it before it is pumped to the boilers. An automatic clock- driven mechanism constantly records the height of the water on the up-stream side of the weir, thus preserving an accurate record of the amount passed. By comparing the amount of water evaporated by the boiler with the amount of fuel used, a measure is obtained of the effi¬ ciency of the boiler and improvements in effi-

ciency, as by the use of different grades of coal; improved methods of managing the fires, repairing of leaks in the boiler setting, cleaning of scale and soot off the heating sur¬ face of the boiler, etc., are readily recognized. The record supplied by the meter thus becomes a tell-tale of the efficiency of the plant and of its operation. Heaters having this attachment or modification are known as metering heaters. Fuel economizers, in which the water is heated by the exhaust gases, have the advantages that they utilize waste heat not otherwise applicable, except possibly for pre-heating the air supplied to the boiler furnace and that they are able to raise the temperature considerably above atmospheric boiling point, as lo 250° to 350° F. The disadvantages are that a large amount of costly heating surface is required and that it must be kept free of soot on the outside and of scale on the inside. Nevertheless recent

Steam purified of oil.

Water heated.c = ^—

Hot water delivered to still water chamber. Water flows over weir.

Level of water in still water chamber ascertained by float.

Float stem actuates spiral cam.

Cam moves pen carriage equal distances for equal increments of flow.

‘8 Pen records on clock driven chart.

Integrator driven from clock actuated disk.

practice has favored the use of less boiler heating surface, hence the discharge of the gases from the boiler at higher temperatures, the heat being recovered more advantageously by the economizer, since the latter contains water at a temperature lower than that of the water in the boiler. The economizer should in no case receive water at a temperature lower than about 120° F., as otherwise sweating and rapid external corrosion of the tubes will occur. The water may advantageously be pre-heated in an exhaust steam feed water heater, receiv¬ ing exhaust steam from steam plant auxiliaries such as boiler feed pumps, stoker and fan engines, condenser, circulating and air pumps, etc. So long as all of the exhaust steam from the latter is condensed in the feed- water heater, the fuel cost of their operation is practically nil, all of the heat in the exhaust steam being returned to the boiler.

George H. Gibson.

FEEDER, (1) a stream, fountain or chan¬ nel which feeds or supplies a main stream or canal with water. (2) A branch or side rail¬ way, intended to bring traffic to the main line. (3) In hydraulic engineering, a feeder is a watercourse, natural or artificial, carrying water to a canal or reservoir. (4) In mining, the side branch of a vein which passes into a lode. (5) In sewing machines, that part which carries the cloth along the length of a stitch between each penetration of the needle. (6) In machinery, an auxiliary or supplying part of a machine, that which leads along the stuff being operated on. (7) In iron founding, a head or supply of fluid iron to a runner or mold in heavy castings. (8) In nail making, a contrivance with an intermittent oscillating or semi-rotary and forward motion to present the plate to the cutters, so that the head of the nail may be taken from the respective edges alternately. (9) In printing, a device with fingers which take the top sheet from a pile and lead it into the press where it is printed or folded. (10) In steam engineering, a device for supplying steam boilers with water in quantities as re¬ quired. Automatic boiler-feeders act by means of floats on the surface of the water in the boilers. (11) In threshing, the grain-feeder, which forwards the opened sheaves into the throat of the thresher, or the grain into the eye of the

millstone, or the grain and chaff from the hopper to the riddle of a winnowing ma¬ chine, or the grain from the bin to the manger of sheep or other stock. (12) In electricity, a lead in an electric central station distribution system, which lead runs from the station to some point in the district to supply current.

FEEDING, Forced, a mode of putting food into the body of persons who are incapable of feeding themselves, or who refuse, through in¬ sanity or some other cause, to take food. In many protracted diseases, such as typhoid and pneumonia; in certain stages of tuberculosis; in cancer of the stomach; in ulcer of the stom¬ ach, and in other conditions, it may be impossi¬ ble for the patient to hold food in the stomach. The patients may be fed either through the stomach-pump or by means of rectal enemata, the former being the method to be preferred. In this the physician passes a soft rubber tube through the nose into the oesophagus and stom¬ ach, care being taken that the tube does not pass into the larynx. Through the tube, then, either by means of a Davidson syringe or through a funnel, the food, usually milk, is passed. Insane people rarely attempt to vomit their food after it has been once passed in this way, although many refuse to take it and swal¬ low it in the ordinary manner. The object of forced feeding is to introduce into the stomach sufficient liquid and semi-liquid food to sus¬ tain life. The most frequently used form of nourishment in forced feeding is a combination of eggs and milk beaten up. Milk is often combined with somatose, cream, plasmon or beef juice. Sugar and salt are also added fre¬ quently to the mixture. Patients often gain in flesh under forced feeding, which is frequently a necessary prelude to the treatment of certain forms of insanity. Subcutaneous alimentation is sometimes made to serve the purpose of forced feeding.

FEEDING LIVE STOCK. See Live

Stock, Feeding of.

FEEDING MACHINE. By this name are commonly known the machines used to au¬ tomatically supply printing-presses or the like with paper sheets. Printing of a high grade is not done on the great web printing machines, which feed from a roll of paper. Those are built for speed,

but for fine printing presses of the single cylinder type,, using single sheets of paper are almost universally used. Such presses were always fed by hand until about 1895, when the first practical paper-feeding ma¬ chines for printing-presses began to come into use. The first of these machines to secure a considerable sale was the Economic feeder. A little later the Dexter pile feeder came in the market. This machine is attached at the rear of a cylinder printing machine, and lifts a sheet of paper from the top of a pile by first buckling the two rear corners, then blowing air under the buckled sheet to separate it wholly from the rest of the pile, after which the sheet is advanced or pushed forward to the guides of the press by means of rubbers and traveling endless tapes. The pile of paper from which the sheets are fed is placed on a platform that is arranged with mechanism for raising it very slowly, so that the top of the pile is always kept at substantially the same level. The per¬ fecting of these machines has been obtained only after very costly experimenting, and the addition of improvements as defects were found. Paper piled in sheets has a tendency to stick together, in fact, sheets are sometimes actually glued in spots, as by the crushing of an insect between them. The automatic feed¬ ing machine has to provide for such contin¬ gencies, and when a torn sheet is found, or a wrinkled one, or two sheets stuck together, the feeder must not only be stopped, but the print¬ ing-press also must be brought quickly to a standstill or damage results. Ingenious auto¬ matic devices have been introduced for control¬ ling these conditions, and the machines are now commonly used in connection with the printing of magazines of large circulation, some of the larger magazine and book printers employing as many as 30 or more feeding machines in one establishment. The Dexter machines will ac¬ commodate 10,000 to 20,000 sheets of paper at a single loading, which saves the time formerly lost by the hand feeder about once in 1,000 sheets, in stopping to put up another pile. There is also a saving in soiled sheets, in wages paid, and often in the speed at which the print¬ ing-press can be run. A few years ago the Dexter Company brought out the reloading feeder, which has an auxiliary table or piling board, permitting the reloading of the machine with a very trifling stop. Dexter was the first to introduce a machine driven by floor connec¬ tions, which secures greater rigidity than when driven by a chain from the cylinder of the press. Non-electrical devices are employed throughout, some of the most ingenious being the devices for calipering the sheet, to make sure that two sheets do not go into the press together, and the controlling apparatus for trip¬ ping the impression of the printing cylinder if a sheet is missed or fails to come down properly to the guides. The Dexter Company also builds folding machines, and their feeders are adapted to use with these, as well as

for ruling ma¬ chines.

The Cross- continuous paper-feeder, made

also by thje Dexter Company, does not occupy any floor space, as do those previously de¬ scribed, being located above the feed-board of the press. It accommodates several hundred sheets at a time and reloading is accomplished without stopping the press. It requires no ad¬ justments for quality or weight of paper, and is practical for short as well as long runs. The sheets of the pile are combed out, then turned completely over and reversed in direction and guided one by one to the feed-guides of the press. The Harris printing-press, a job rotary machine, built in a great variety of styles, em¬ ploys a feeding mechanism that should be men¬ tioned in this connection. It automatically picks an envelope or card from the bottom of a pile and carries it into the press. It will also feed very light and thin papers with accuracy. All the modern automatic job presses now em¬ ploy feeding mechanism as a part of their equipment. See Printing; Folding Machines.

FEEHAN, Patrick Augustine, American Roman Catholic prelate: b. Tipperary, Ireland, 29 Aug. 1829 ; d. Chicago, Ill., 12 July 1902. He was graduated from Maynooth College, Ire¬ land ; came to the United States in 1852, when he was ordained, and soon after became presi¬ dent of the Seminary of Carondelet. He had charge of Saint John's Church, Saint Michael's and the church of the Immaculate Conception, all in Saint Louis, till 1865, when he became bishop of Nashville, and was installed as first archbishop of Chicago in 1880. During his earlier career he showed great devotion and self-sacrifice in several yellow fever and cholera visitations, and in his administration as arch¬ bishop he founded several new parishes, a col¬ lege of the Christian Brothers and established several religious orders in the archdiocese.

FEEJEE ISLANDS. See Fiji Islands.

FEELING, the sense of touch, emotion. See Emotion; Psychology.

FEER-HERZOG, Karl, karl far-her'tsoH, Swiss statesman : b. Rixheim, Alsace, 2 Oct. 1820; d. Aarau, 16 Jan. 1880. He became a member of the Grand Council 1852 and was twice its president. In 1865 he was made Swiss representative in the Latin Monetary Union, which position he held for the rest of his life. He was director of the Swiss department of the Paris Exposition 1867, and for many years was president of the Swiss Financial Commis¬ sion. Among his works are (L'Unification monetaire international (1869) ; (La France et ses allies

monetaires) (1870) ; (Gold oder Silber?) the latter in German (1874).

FEET WASHING, or WASHING OF FEET, a religious ceremony observed in the Roman Catholic Church on Holy Thursday or the Thursday before Good Friday. This cere¬ mony takes place just after everything has been removed from the altar. The pastor or princi¬ pal prelate of the church washes the feet of 12 men, in imitation of the action of Jesus Christ, when he washed the feet of his apostles. The Pope washes the feet of 13 priests. The cere¬ mony is sometimes called “Mandatum,* from the first word of the antiphon sung during the ceremony : (

FEHLING, Hermann, her’man fa’ling, German chemist: b. Liibeck, Germany, 9 June 1812; d. 2 July 1885. He studied chemistry in Heidelberg, at Giessen in Liebig’s laboratory and at Paris. He became professor of chem¬ istry in the Polytechnic School at Stuttgart and professor emeritus in 1882. He had great au¬ thority in the educational and manufacturing circles of his time as a teacher and prescriber of chemical formulae for commercial products, such as sugar and mineral waters. The so- called Fehling’s Solution (q.v.) is famous. He wrote (Text-book of Organic Chemistry^; translated Payen’s (Precis de chimie industri- elle,* and edited a new edition of (Glossary of Chemical Terms.)

FEHLING’S SOLUTION, a solution much used by chemists for the detection and estima¬ tion of glucose and certain other sugars. In its preparation 34.64 grams of pure sulphate of copper crystals are dissolved in 200 grams of distilled water, and (separately) 173 grams of crystallized neutral tartrate of sodium are also dissolved in 500 or 600 grams of a solution of caustic soda having a specific gravity of 1.12. The copper solution is then gradually added to the caustic soda solution, and the mixed liquid is diluted to one litre. Fehling’s solution must be freshly prepared, for, like all other copper- test solutions it becomes unreliable in a short time, thereafter indicating sugar where none exists. For use a small quantity of the solution is placed in a test tube and diluted with about four times its bulk of water. It is then boiled for a few seconds, and if it remains clear it may be considered to be in good condition. The fluid to be tested is then immediately added, drop by drop, until a bulk equal to that of the diluted test fluid has been added. If glucose is present a yellow precipitate of hydrated cuprous oxide is thrown down, which subsequently loses its water of

hydration and beomes reduced to ordinary red cuprous oxide. When prepared as described above, one cubic centimeter of the standard (undiluted) solution corresponds to five milligrams of glucose. Fehling's solution is of a deep blue color, and in testing a compli¬ cated organic fluid (such as urine) for glucose it often happens that the test solution is de¬ colorized even when no glucose is present. It is, therefore, important to observe whether or not an actual precipitate is formed, as mere de- colorization is not a sufficient indication. Cane- sugar does not reduce Fehling's solution in the cold, but it does so when warmed, because heat changes cane-sugar to a mixture of glucose and fructose in the presence of the alkali that the test solution contains. Maltose (malt sugar) and lactose (milk sugar) reduce Fehling's so¬ lution. The solution is named from Hermann Fehling, who first introduced it into analytical practice. See Pavy's Solution; Urinary Analysis ; Carbohydrates.

FEHMARN. See Femern. FEHMGERICHTE. See Vehmgerichte.

FEHMIC Jfa'mik) COURTS, certain tri¬ bunals, which in the Middle Ages wielded tre¬ mendous power in Westphalia and other parts of Germany. Their institution has been traced back to the time of Charlemagne. They were known as free courts from the fact that all free-born men were eligible for membership.

Their jurisdiction was derived from the em¬ peror, who gave them the power of life and death (blutbann) which they exercised in his name. At times secret sessions were held to which only the initiated were admitted, all others being excluded under pain of death. The organization of the courts spread rapidly about the beginning of the 13th century. The Freischoffen, who constituted the great body of the initiated, were sworn to uphold the Fehme with all their powers, to guard its secrets, and to bring before it anything within its competence that they might dis¬ cover. They were initiated into the secret signs by which members recognized each other and were presented with a rope and knife marked with cabalistic letters. The presi¬ dent of the court was the Freigraf, who was appointed for life by the Stuhlherr who was chief of a centre of jurisdiction and whose superior was the Oberstuhlherr or su¬ preme judge. After 1180 the supreme head was the archbishop of Cologne. The procedure of a session followed closely that of the ancient German courts. It was held by day in some well-known spot. The accusation could be made by a Freischoffe only and if the offense was punishable by death a summons was issued to the accused to whom 45 days of grace were allowed. The judgment was executed on the spot if that was at all possible. If the accused did not appear, the sentence was imparted to

the whole body, and the individual who first encountered the condemned was bound to slay him, leaving a knife with the insignia of the Fehme on the body to show that the deed was not a murder. With many modifications the system survived in Westphalia down to 1811. Consult Tross, L., (Sammlung merkwiirdiger Urkunden fur die Geschichte der Fehmgerichte) (Hanover 1826) ; Dahlmann-Waitz, (Quellen- kunde> (Leipzig 1906, 1907).

FEIA (fa'ya) LAKE, in the province of Rio de Janeiro, in Brazil, near the coast. Area, 192 square miles. Connections by canals have been made with the Parahyba River on the north and the Atlantic on the east.

FEIGNED DISEASE. See Hysteria.

FEIJO, or FEIJOO, Diogo Antonio,

de-o'go aii-to'ne-6 fa zho', Brazilian statesman: b. Sao Paulo, Brazil, 1784; d. 1843. As a priest he did pastoral work for many years, and in 1822 was elected to the Cortes at Lisbon, Portu¬ gal. When Brazilian independence was won he returned to America ; in 1826 was chosen by the Liberal party as their deputy and representa¬ tive, and introduced measures for municipal re¬ form and the abolition of clerical celibacy. He served as Minister of Justice 1831-32; was regent 1835-37, but in 1837 he retired from politics, before the storm of Conservative op¬ position which his liberal policy had called up and was later sent into exile.

FEIj60 (fa-zhoO Y MONTENEGRO, Benito Geronimo, Spanish monk and scholar : b. Santa Maria de Melias, 8 Oct. 1676; d. Oviedo, 26 Sept. 1764. In 1688 he entered the Benedictine order, and his devotion to study brought him to the forefront among the learned of his native land. He was appalled by the superstition and ignorance of his countrymen and exposed them in the Teatro critico from

1726 to 1739 and in the Cartas eruditas from 1742 to 1760. His revelations excited considerable opposition in certain quarters but it was futile and the genuine services of Feijoo to the cause of education and enlightenment were generally recognized and he has been long regarded as the pioneer of educational reform in Spain. See Cartas of Feijoo.

FEILDEN, feld'en, Henry Wemyss, Eng¬ lish naturalist : b. 6 Oct. 1838. He was educated at Cheltenham College, served in the Indian Mutiny 1857-58 and in China in 1860. In the American Civil War he served in the army of the Confederate States with the rank of assist¬ ant adjutant-general, surrendering after the last battle of the war, with the remnant of the Army of Tennessee under Gen. J. E. Johnston to General Sherman. He served as naturalist to the British Polar Expedition of 1875-76 and took part in the wars with the Boers in 1881 and 1900-01. He visited Grinnell Land, Ellesmere Land, Greenland, Spitzbergen, No- vaya Zemlya, Waigats, Lapland and northern Russia for scientific research. He was made Companion of the Bath in 1900.

FEINT, fant, a strategic movement, de¬ signed to deceive the enemy and conceal the main design or purpose. See Tactics.

FEIS CEOIL, fash'k-yol' (Ir. feis, gather¬ ing, convention, ceoil, of music). In Ireland, an assembly at which competitions are held for bands, choirs, vocal and instrumental soloists, etc. The first assembly of the kind in modern times was held in Dublin in 1897 for the pur¬ pose of encouraging native performers and composers. Since that time many such assem¬ blies are held in the provincial towns and even in rural districts. The movement has been most successful and is a result of the general Gaeli- cising program of the Gaelic League (q.v.).

FEISI, Abul Feis ibn Mubarak, a'bool fa es ibn moo-ba'rak fl'si or fa-e-se', Indo-Persian poet and scholar : b. Agra, India, 1547 ; d. there 1595. He surpassed all his contemporaries in philological, philosophical, historical and medi¬ cal knowledge, and about 1572 was crowned <(king of poesy® in the court of the Emperor Akbar. Of his poems the most noteworthy are his lyrics — odes, encomia, elegies and specially his four-line pieces or apothegms. Their ex¬ alted pantheism brought on him the enmity of the orthodox Moslem clergy. He wrote also many double-rhymed poems ; and a Persian imi¬ tation of the famous Indian epic (Nala and Damajanti,* designed to form the third member of an epic cycle of which the first was to be (The Centre of the Circle,* the second Solo¬ mon and Balkis) (the queen of Sheba), the fourth (The Seven Zones of the Earth,* and the fifth (The History of Akbar *; only the first and third were completed. His scientific treatises were numerous.

FEITH, fit, Rhijnvis, Dutch poet : b. Zwoll, Over-Yessel, 7 Feb. 1753; d. there, 8 Feb. 1824. He was made burgomaster and afterward re¬ ceiver at the admiralty college in Zwoll, but did not cease to cultivate the art of poetry and to enrich Dutch literature. He tried his powers in

almost every department of poetry. In his earlier years he was too much inclined to the pensive and sentimental style. It predominates particularly in his romance (Ferdinand and vol. It — 7

Constantia) (1785), and, through his example, has for a long time prevailed in Holland. His is very celebrated. He also made that naval hero the subject of an epic poem. The best of his tragedies are tThirza) ; (Johanna Gray,* and particularly (Ines de Castro. * His poetical (Letters to Sophia on Kant's Philosophy) (1805) are a feeble effort of his old age. Among his prose works, his (Letters on Different Subjects of Literature) (1784), contributed much to the dissemination of good taste, by their finished style and excellent criticisms.

FˆJˆRVARY, fe'yar-va'rl, Geza, Baron, Hungarian soldier and statesman : b. 1832 ; d. 25 April 1914. He entered the army at 19 and fought with distinction at the battle of San Martino in 1859. On the eve of Solferino he carried out a daring reconnaissance and gained information that might have won the day for Austria had it been properly used. When the Dual System was created in 1867 he was transferred to the Honved, or Hungarian de¬ fense army, of which, first as under-secretary and after as minister, he was the principal or¬ ganizer. On the fall of the Tisza government in 1905 the opposition refused to take office unless Magyar words of command were intro¬ duced into the Hungarian regiments of the joint army, which the Emperor Francis Joseph sternly refused to grant. The emperor de¬ sired to place Fejervary at the head of a fight¬ ing cabinet, an honor which the old soldier, who was only two years younger than the em¬ peror, refused. His objections were overruled, however, and he became Premier. All attempts to negotiate with the coalition failing, he launched a campaign for universal suffrage for Hungary and advised the Crown to summon the five coalition leaders, Andrassy, Apponyi, Zichy, Banffy and Kossuth to appear before the mon¬ arch in Vienna. In a five minutes' audience the emperor declared his standpoint and dis¬ missed them with a severe admonition. In February 1906 Fejervary dissolved the Cham¬ ber with a high hand and six weeks later the coalition leaders came to terms, waived their chief demand and took office. Baron Fejervary now stepped aside and lived in comparative re¬ pose as captain of the Hungarian Guard. He was an inveterate gambler and the emperor paid his debts more than once. On the last oc¬ casion, Francis Joseph gave him a roll of bank¬ notes to pay a gambling debt and demanded his word of honor that he would never play again. ((But if the temptation is too strong,® he added, (

FELANITX, fa'la-nech, or FELANICHE,

Spain, town on the island of Majorca, province of Baleares, located in a valley surrounded by steep hills. The noteworthy buildings are the church of San Miguel, the town hall and a Moorish castle. Stock raising and fishing are the principal industries and there is a brisk trade in these products and in wine. It has also manufactories of pottery, cloth, soap, lime and

liquors. Felanitx is the ancient Canati. Pop.

11,223.

FELCH, Alpheus, American lawyer and politician: b. Limerick, York County, Me., 28 Sept. 1806; d. 1896. He was graduated at Bowdoin College 1827, was admitted to the bar and practised law in Michigan, being elected to the legislature of that State 1836 and appointed bank commissioner 1838-39. He was judge of the Supreme Court 1842-45 ; governor of Michi¬ gan 1846-47 ; and United States senator 1847-53; he was appointed professor of law in Michigan University in 1879, holding that posi¬ tion till 1883.

•

FELDER, Cajetan, Baron, Austrian poli¬ tician: b. Vienna 1814; d. 1894. He was edu¬ cated at the University of Vienna, where in 1841 he was appointed to the chairs of political history, statistics and international law. From 1868 to 1878 he was burgomaster of Vienna and in 1869 was elected to the upper house. From 1878 to 1884 he was marshal of Lower Austria. He published papers on entomology in (Reise der Fregatte Novara um die Erde) (1864-75), and wrote (Die Gemeindeverwaltung der Reichshaupt-und Residenzstadt Wien) (2d ed., 1872; 2 additional vols., 1875-78).

FELDKIRCH, felt'kirH, Austria, town in the province of Vorarlberg, 20 miles south of Lake Constance, 1,500 feet above sea-level, on the Ill River. The town is of great military importance because it commands the entrance into the Tyrol from the west through the Arlberg Pass. The town is 24 miles south¬ west of Bregenz. The principal buildings are the parish church, a Capuchin convent and church, a Jesuit educational institution, known as the <(Stella Matutina.® There are also cot¬ ton spinning and weaving establishments, bell founding and dyeworks. The town has wit¬ nessed many armed clashes, notably that of 1799 between the Austrians and the French, when the latter

were driven back. The castle of Schattenberg nearby, the ancient seat of the counts of Montfort, is now used as an alms¬ house. Pop. 5,057.

FELDMANN, Leopold, la‘6-polt feld’- man, German dramatist : b. Munich, Bavaria, 22 May 1802; d. Vienna, 26 March 1882. In 1835 appeared his (Lays of HelP ; next the comedy (The Son on His Travels,* which made a brilliant success at Munich. After five years in travel, chiefly in Greece, as correspondent of the Allgemeine Zeitung, in 1850 he settled in Vienna for life. His comedies were very popu¬ lar in their day. Among them are (Free Choice> ; (Sweetheart’s Portrait ; (The Late Countess1* ; The Comptroller and His Daugh¬ ter. *

FELDSPARS, the most important group of silicate minerals. They are characterized by monoclinic or closely related triclinic crystal¬ lization, the frequent occurrence of twin crystals, cleavage in two similar directions in¬ clined at an angle of 90 degrees or nearly 90 degrees, a hardness of about 6, a specific gravity between 2.5 and 2.9, a light color, usually white, pale yellow or green, or flesh-pink, a white streak and a low relief and low order of inter¬ ference colors as seen in thin sections with the polarizing microscope.

Uses. — The chief usefulness of the potash and potash-soda feldspars results from the fact

that within certain limits of temperature they melt without becoming quite fluid and on cool¬ ing form a strong colorless or very light colored glass. Because of this quality, feldspar is ex¬ tensively used in the manufacture of porcelain, serving as a flux to bind together the other constituents, clay and flint. It is also one of the principal ingredients in the glaze for china- ware and tiles. In almost all forms of pottery it is used both in the body and in the glaze; in the former in the proportion of 10 to 30 per cent, in the latter, 35 to 50 per cent. In the manufacture of corundum and emery wheels, feldspar is used as a binder. Small quantities of the purest grade are used in making artificial teeth. It is one of the essen¬ tial ingredients of opalescent glass. In powdered form it supplies the abrasive in scouring soaps and window cleaners. In crushed form it be¬ comes poultry grit and a surface for the gran¬ itoid® varieties of ready roofing. Many at¬ tempts have been made to extract the potash from feldspar for fertilizing purposes, but with¬ out success from a commercial point of view. The beautiful play of colors in labradorite has led to its use for table tops and inlaid work. The gem moonstone is a variety of feldspar, usually oligoclase; the sunstone is averturine feldspar. The peculiar radiance of these gems is caused by oriented lamellar

inclusions which reflect the light with great intensity.

Production. — The total amount of feldspar sold in the open market in the United States in 1916 was 118,465 long tons, valued at $404,-689. There was, besides, a large production which was ground and consumed by the in¬ dustrial concerns mining it and of which no report was made. The largest production was recorded for North Carolina — 30,955 tons. In Maine the total marketed was 25,000 tons ; and in Maryland, 21,364 tons. The Maryland prod¬ uct brought much the highest price. About 82 per cent of the total output was used in the ceramic industries ; about 7 per cent in the manufacture of roofing and for the facing of concrete; and about 3 per cent in the making of glass. The 8 per cent not accounted for is probably that used in experimenting in the endeavor to release the potash from its com¬ bination in feldspar, so as to render it avail¬ able as a fertilizer in the agricultural industry.

Occurrence.— The feldspars are the most abundant mineral constituent of the majority of the igneous rocks and are abundant in many metamorphic rocks. They are also present in some sedimentary rocks. The limesoda feld¬ spars are more abundant in the igneous rocks, and the potash feldspars in the meta¬ morphic rocks. In the sedimentary rocks they occur as fragments, especially in the arkose sandstones and graywackes. They occur also in veins, where they were deposited from aqueous solutions. The great pegmatite veins or dikes are believed by some geologists to have been deposited in this way. Feldspars are known also to have been deposited from the gaseous exhalations from volcanic vents.

The feldspars now occupy a most important position from a scientific standpoint, since the present scheme of classification of igneous rocks is chiefly based on the identity of the contained feldspar (see Rocks). Orthoclase is an es¬ sential constituent of granite, syenite and porphyry, while it is also one of the constituents

of gneiss and the other granitoid rocks. Its variety sanidine is the feldspar of trachyte and phonolite. Microcline occurs similarly and is not easily distinguished from orthoclase except by an optical examination, though its two prominent varieties, amazonstone and chester- lite, are quite distinct. Albite is an essential constituent of diorite and is one of the com¬ ponent minerals of many crystalline

rocks, oc¬ curring associated with orthoclase and micro¬ line in much granite and gneiss. Albitic granite is often the matrix of the rarer minerals, and especially of some of the gems. Oligoclase abounds in granite, syenite, gneiss, diorite, trachyte, andesite and diabase, often being as¬ sociated with orthoclase. Labradorite is an es¬ sential constituent of various basic, eruptive rocks, in which it is commonly associated with some member of the pyroxene or amphibole groups, as in norite, gabbro, diabase and basalt. Anorthite occurs in gabbro, basalt and porphyry.

In most rocks the feldspar is in grains too small to be of commercial importance. The feldspar which is commercially valuable is that which occurs as a constituent of the peg¬ matites. These vary considerably in composi¬ tion, but fall generally into two groups: (1) the granite pegmatites, being mainly quartz and mica, and (2) the soda pegmatites, which con¬ tain no quartz and little or no mica, but are principally soda feldspar (albite), with a little hornblende. Much the larger number of feldspar quarries in the United States are in granite pegmatites ; only a few in southeastern Pennsylvania and adjacent parts of Maryland are in soda pegmatites. In size, the pegmatite masses vary from bands a few inches wide to deposits half a mile across and traceable for long distances. In form the masses are quite irregular, but more or less lens-shaped, in¬ trusions along the planes of easiest rupture in the enclosing rocks.

In the granite pegmatites are found in addi¬ tion to the feldspar an abundance of quartz, white mica, black mica and black tourmaline and smaller quantities of garnet, magnetite and beryl. If the feldspar is required for use in the manufacture of pottery, quartz up to a proportion of 20 per cent and some white mica are not objectionable. The colored minerals, however, are to be avoided. A quartz content of more than 20 per cent may be overcome by adding pure feldspar until the mixture comes down to that percentage. Some potteries de¬ mand feldspar in which the quartz content is not more than 5 per cent. The quarries are nearly all worked in open pits, some of which are of mammoth size, one in Glastonbury, Conn., having yielded over 200,000 tons, and another at Elam, Pa., over 100,000 tons. In a few instances short tunnels are used. The output is hand picked to remove the larger masses of mica and quartz and the colored minerals. This discarded material is used in making roofing. Feldspar is ground before marketing, sometimes being roasted in kilns before grinding, but the larger part is ground as it comes from the quarry. For use in the potteries, 99.3 to 99.8 per cent passes through a 100-mesh screen and 96.7 to 98.2 per cent through a 200-mesh screen.

The potash and potash-soda feldspars mined in the United States are mostly pale flesh- colored to nearly white. Soda feldspars are

pure white or light gray and pale green. When ground, commercial feldspars are either white or very pale pinkish or salmon in hue.

Alteration. — The feldspars are often altered into other silicates such as talc, chlorite, or the zeolites, but much the most common change is the production of kaolin (see Clay). In¬ filtrating waters containing carbon dioxide dis¬ solve out the alkaline ingredients of the spar, which, entering into new combinations, form various secondary minerals, while the aluminum silicate becomes hydrated and forms kaolin. If the waters contain magnesium salts the feldspar may be altered to talc.

Forms. — Feldspars occur in massive, granu¬ lar, lamellar, cleavable and compact forms, but crystals are very common. The monoclinic feldspars include orthoclase, or common feld¬ spar, and the very rare barium feldspar, hyalo- phane. Triclinic feldspars include microcline, anorthoclase, and plagioclase or the feldspars of the albite-anorthite series, embracing albite, oligoclase, andesine, labradorite and anorthite, (that is, the soda-lime series). Descriptions of these minerals appear as separate topics. The feldspar group presents a striking illustration of the approximation in angle to forms of higher symmetry coincident with a wide differ¬ ence in habit. In orthoclase, for example, the common planes n, y approximate very closely to the cube ; q, to the octahedron ; m, b, c, o to the dodecahedron, and z, x to the trapezohedron. Feldspar crystals usually appear prismatic and are often tabular parallel to the clinopinacoid, b. Twins of most remarkable variety abound, the commonest of which are after the Carlsbad, Baveno, albite and pericline laws (see Crystal¬ lography). Polysynthetic twining is almost universal in the plagioclase feldspars, and, while best observed in thin sections with the polariz¬ ing microscope, it is often detected in large masses by the fine striations which so beauti¬ fully mark some of the cleavage faces of labra¬ dorite, oligoclase or albite.

Optical Characters. — Orthoclase is opti¬ cally negative, with the axial plane usually at right angles to the clinopinacoid, b ; but some¬ times it is parallel to b and always becomes so when the temperature is increased to 600° to 1,000° C., this change also being produced by pressure. Microcline is also optically negative and the axial plane is nearly perpendicular to the fr-pinacoid. Among the plagioclase feld¬ spars the position of the axial plane changes with the composition, there being a regular progression in its position in passing from albite

to anorthite. Albite is optically positive, anor¬ thite is negative, while in some andesine, lying midway between them, the axial angle is prac¬ tically 90 degrees. Microcline is distinguished from all other feldspars by the characteristic gridiron structure which is exhibited by thin basal sections when viewed under the micro¬ scope in polarized light. This is due to poly¬ synthetic twining according to the albite and pericline laws. The plagioclase feldspars may usually be recognized in thin sections, between crossed nicols, by their characteristic polysyn¬ thetic twining, which manifests itself by paral¬ lel bands alternately dark and light.

Composition. — Common feldspars are crys¬ talline compounds of silica, alumina, and one or more of the bases, potash, soda, and lime, and rarely baryta. There are two principal

classes: (1) the potash, and potash-soda feld¬ spars, and (2) the soda, soda-lime and lime feldspars.

Pure potash feldspars are orthoclase and microcline : they are alike in chemical composi¬ tion and in physical properties, and for com¬ mercial purposes are practically identical. Their theoretical composition is : silica, 64.7 per cent ; alumina, 18.4 per cent; and potash, 16.9 per cent. Potash feldspar usually contains some soda in place of the full theoretical comple¬ ment of potash. If the soda content is greater than the potash content, the feldspar is called anorthoclase.

The theoretical composition of pure soda feldspar (albite) is: silica, 68.7 per cent; alum¬ ina, 19.5 per cent; soda, 11.8 per cent. Soda feldspars of the soda-lime group generally con¬ tain lime replacing a part of the normal soda content, or through the intermixture of lime feldspar.

Two or more of the various feldspars may be present in the same deposit, or even in the same crystal. None of the lime feldspars have a commercial value. The feldspar mined in the United States is of the potash or soda varieties, or a mixture of the two. Commonly, the potash variety predominates. The average potash content is 13 per cent, but taking the run of the mine, the yield of potash is not more than 10 per cent.

Orthoclase, or potash feldspar, is a potas¬ sium-aluminum

polysilicate, K A1 Si308. This compound is dimorphous, microcline, having an identical composition. Sodium often in part replaces the potassium, making soda-orthoclase or soda-microcline. When the sodium largely predominates the mineral passes into anortho¬ clase (Na,K) A1 Si308 ; when it replaces all the potassium, the mineral is albite, Na A1 Si308. Anorthite is a calcium-aluminum polysilicate, Ca Al2Si208. Between it and albite lie various triclinic feldspars, which are regarded as iso- morphous mixtures of albite and anorthite.

Bibliography. — Bayley, W. S., (Minerals

and Rocks) (New York 1915) ; Dana, J. D., (Manual of Mineralogy) (New York 1912) ; Iddings, J. P., (Rock Minerals) (New York 1911) ; Phillips, A. H., (New York 1912) ; Rogers, A. F., introduction to the Study of Minerals) (New York 1912) ; United States Geological Survey (Bulletin 420) (Washington 1910) ; United States Mines Bureau bulletin 53) (Washington 1913).

FELEGYHAZA, fa'ledy-ha-zo, or KIS- KUN-FE, kish'koon'fe, Hungary, town about 65 miles southeast of Budapest. Agriculture and grazing are the principal occupations of the people of the surrounding country and the trade is in cattle, dairy and agricultural products. Pop. 34,924.

FELIBIEN, fa'le'byan, Andre, French

architect and historiographer : b. Chartres, May 1619; d. Paris, 11 June 1695. He was educated at Chartres and at Paris and in 1647 went to Rome as secretary of embassy to the Marquis de Marueil. In Rome he diligently studied the ancient monuments and the treasures in the li¬ braries. On his return to Paris his ability was recognized by Fouquet and Colbert and in 1663 he was one of the first members of the Acad¬ emy of Inscriptions. In 1666 he was appointed historiographer to the king and in 1671 became

secretary of the new Academy of Architecture. Two years later he was named custodian of the cabinet of antiques in the palace of Brion. Sub¬ sequently he was made deputy controller-gen¬ eral of roads and bridges. He published several important works including (Entretiens sur les vies et sur les ouvrages des plus excellents peintres anciens et modernes) (5 vols., 1666-88; reprinted with additions, Amsterdam 1706; Tre- voux 1725); (Origine de la peinture} (1660); (Principes de l'architecture, de la sculpture, de la peinture, etc. } (1676-90), and descriptions of Versailles, La Trappe and of the pictures and statues of the royal palaces. He was a man of great probity and sought to conform his life to the motto he had chosen — Bene facere et vera

dicere.

FELIBRES, fa'le'br, Les, members of the Felibrige Society. See Felibrige.

FELIBRIGE, fa'le'brezh', a local associa¬ tion of writers of the south of France founded at the Chateau de Font-Segugne, 21 May 1854 for the purpose of promoting the literary and regional use of the langue d'oc and developing the peculiar life of this ancient tongue. The first article of the constitution of the society, as reformed in 1876, shows the spirit and aims of the organization to be (

fElibrige

lects, continued to live very much to themselves and to maintain an attitude of passivism toward the patriotic campaign of the leaders of thought of the rest of the country. But as soon as the organizers of the Catalan movement began to be active in Spain and the felibres to preach their doctrine in southern France, the whole Provencal land began to take an interest in those voices speaking to inhabitants in their own tongue and voicing their most extreme region¬ alism and their indifference to the somewhat theatrical appeals of the general movement for closer national unity and an exhibition of in¬ tenser patriotism and pride in the glorious achievements of France. A common sentiment bound together the Catalans and the people of the langue d'oc ; and the one encouraged the other in their local aspirations. Soon both be¬ gan to protest against abuses to which they were subjected on the part of the central govern¬ ment in each Case. At this critical moment the Felibrige movement turned the people of south¬ ern France to the glorious past of their Pro¬ vencal ancestors and the writers and poets began to chant the prowess of the mighty men of the langue d'oc ; while across the border the Cata¬ lans were doing the same thing for the people of Catalonia and the other heirs of the Span¬ ish Provengal tongue.

The Felibrige movement stood for the <(racial development of the people of southern France free of all influence directly asserted from Paris.® It consequently protested against the acceptance of an interpretation of patriotism whose accomplishment would mean the disap¬ pearance of the langue d'oc and the blending of the peoples of the north, centre and south of France into one homogeneous mass of a uniform consistency, made of the same thought and stamp of education. (

In 1539 Francis I, by royal edict, prohibited the use of the langue d'oc in all public docu¬ ments. After this date Provencal rapidly de¬ generated into a dialect and as such became more or less despised by the rest of France who began to look upon it as a sort of jargon. Yet numerous writers continued, from century to century, to use the old southern tongue as the vehicle for their expression. Thus the langue d'oc was, in a literary sense, more alive than its sister tongue, Catalan, from the middle of the 16th century to the middle of the 19th cen¬ tury, and the people as a whole were more ready for a langue d'oc revival than were the Catalans for a revival of their Provencal tongue. Not¬ able dialect poets of the first half of the 19th century prepared the way for the Felibrige movement, among them being Fabre d'Olivet (1767-1825), the Marquis of Lafare-Alais (1791-1846), Pierre Bellot (1783-1855), Jacques Jasmine (1798-1864), Trasconais Desanat (1796— 1873). These appealed to a continually increas¬ ing circle of readers and admirers; and read¬ ers and writers reacting upon one another in¬ creased the sectional feeling, which had begun to assert itself in 1823 on the publication of a collected edition of <(trouba'ire® verses by 10 langue d'oc poets headed by the two Achard brothers. In 1839 the Archaeological Society of

Beziers offered prizes for the best compositions of a literary nature in langue d'oc. Bellot and Desanat, about the same time, began the publi¬ cation of a journal in the southern tongue. This was really the beginning of the Felibrige move¬ ment, for it gave the local writers an organ through which they might make themselves heard and work together for the recognition of the tongue d'oc.

In 1852 a congress of <(Provengal Trouba¬ dours® was held at Arles, under the presidency of Joseph Roumanille, a very popular young langue d'oc poet who had just published (Li ProvenqaloP a collection of poems by living langue d'oc poets. This work was warmly wel¬ comed by the local press. The following year another successful congress was held at Aix ; and this was followed by the publication of a second volume of poems by living langue d'oc poets, which was even more popular than the first. On 21 May 1854 seven Provencal poets, among them Roumanille, in a meeting held at the castle of Font-Segugne, resolved themselves into the Society of the Felibres for the express purpose of re-establishing the ((national tongue® of southern France. • The other members of the society, all of whom subsequently became well known in the literary world of the langue d'oc, were Paul Giera, Jean Brunet, Alphonse Tavan, Anselm Mathieu, Theodore Aubanel and Frederic Mistral. They at once began the pub¬ lication of an <(almanac,® printed in the popular tongue, and filled with short stories, verses, sketches and witty sayings. It was welcomed

not only in the south but throughout all France and in Provencal Spain. Its popularity grew and its influence extended with every yearly issue. This was quite natural for it was in a class and a field by itself and the brightest and wittiest intellects of the langue d'oc country were inter¬ ested in making it the best they could ; for the LAlmanac® soon gathered to itself a harvest of young writers, some of whom were destined to become of almost as great influence as the founders of the society. The new movement rapidly measured the depths of the langue d'oc whose capacity for the expression of the range of human activity and thought soon manifested itself.

Felibrige Writers. — The most talented, active and popular of the Felibrige writers was Frederic Mistral who, at the age of 25, pub¬ lished h:s

men of talent. Mistral, the most influential of

them all, did more than any other langue d'oc writer to expurge from the southern tongue foreign words that did not seem to him to have conformed to the genius of the native language. Gras enjoys the reputation of being the best prose writer and historical romancer of the Provencal country. He has also written sev¬ eral long poems. Roumanille had the true poetic touch and his poems, of which several collections have been published, are popular throughout France and Catalonia. Aubanel, too, has had considerable influence upon the younger generation of langue d'oc poets. He has also written good plays, the best of which, (Lou pan dou pecat) had a success in French dress. Much of the most characteristic of the work of the Felibres has been translated into French and considerable of it into Spanish; and thus has increased the intensity of the Felibriges movement. Yet with all this apparent success, which seems to be to some extent at least arti¬ ficial, the Felibrige movement is scarcely likely to make of Provencal anything more than the dialect that it is. The attempt to have it re¬ place French in the south of France and to <(break the shackles of French influence and op¬ pression® as Mistral has expressed it, would be unfortunate were it to succeed, for Provence is no longer an independent race, whatever her poets may say to the contrary. Yet the Feli¬ brige movement is still strong and scores of papers, magazines and reviews are published in Provengal. See Catalan ; Catalonia ; Cata¬ lan Literature; French Language.

Bibliography. — Brousse, J. R. de, UCantholo- gie du Felibrige) (Paris 1909) ; Donnadieu, (Les Precurseurs des Felibres) (Paris 1887) ; Headlam, C., ˆProvence and Languedoc) (Lon¬ don 1912) ; Jourdanne, G., (History of the Feli¬ brige Movement ; Koschwitz, (Grammaire His- torique de la langue des Felibres) (Griefswald 1894) ; (Ueber die provenzalischen Feliber) (Berlin 1894) ; Noulet, (Histoire litteraire des patois du Midi de France) (Toulouse 1872) ; Mistral, (Tesor dou Felibrige) (Aix 1879-86) ; Oddo, (La Provence, usages, coutumes, etcP (Paris 1902) ; Roque-Ferrier, (Etudes meri- dionales> (Paris 1892) ; Taillandier, cEtudes Litteraires) (Paris 1881).

John Hubert Cornyn, Editorial Staff of The Americana.

FELICISSIMUS. The author of a church schism in Carthage in the 3d century. At this time Cyprian was newly elected bishop of Carthage. Felicissimus was appointed deacon by Novatus without consulting Cyprian, who declared that his prerogatives had been en¬ croached upon. At the time of the Decian persecution Cyprian was absent from Car¬ thage for some time. Some presbyters on their own authority began to readmit the lapsi to the communion. Before his return Cyprian interfered and sent a commission to investigate. Felicissimus denounced him for this as encroaching upon his rights as a deacon, and his church became the centre of the lapsi wishing to have their cases decided quickly. When Cyprian returned in 251, a synod met and excluded Felicissimus from the Church and five presbyters who were his ad¬ herents. This did not silence him, but brought him other followers including several African bishops. Fortunatus, one of the five presbyters,

was elected bishop of Carthage. Felicissimus was sent to Rome to win over Cornelius the bishop to their side but was not successful. Not long after, the schism seems to have ceased to exist.

FELICUDI, fa-le-coo'de (ancient Phceni- cusa), one of the Lipari Isles, off the north coast of Sicily, 10 miles west of Salina. It is about nine miles in circumference, has rugged cliffs of basalt, and three lofty summits, evi¬ dently produced by an extinct volcano. The soil is both fertile and well cultivated. Pop.

800.

FELID7E, fe'li-de, the cat family, which contains the most highly developed of the order Carnivora. The characters of the family are the possession of a slender, extremely flexible body of great muscular power; the limbs five¬ toed, the thumb of the anterior limbs not

reach¬ ing the ground ; the skull relatively short, the facial portion much shortened, very broad, and giving, by its capacious zygomatic arches, a rounder outline, and abundant space for the powerful muscles which move the lower jaw. The incisors are three in number on each side, above and below ; the powerful canines are trenchant on both edges, and are sometimes grooved ; the premolars are three above and two below, the molars one above and below — in all, 30 teeth. The premolars are laterally com¬ pressed, the third upper tooth, the carnassial, or sectorial premolar, having only a minute inner tubercle. All are digitigrade. The divisions as given by Carus are: Sub-genus 1. Felis. Claws retractile ; limbs low ; tail as long as the body. A. Old World forms, (a) Lions (F . leo). Color uniform; a mane; Africa and western Asia, (b) Tigers (F. tigris). No mane; body striped ; whole of Asia, from the Altai and Amur to Java and the Cauccasus. (c) Leop¬ ards (F . pardus). Large species, with spots or rings, and round pupils; Africa and South Asia, (d) Serval (F. serval). Small spotted species; South Africa, (e) Cats (F . catus). Small, not spotted, sometimes striped ; pupils elliptic vertical. B. New World forms, (a) Leonine. Color uniform, no mane. Puma (F. concolor). (b) Leopard-like. Jaguar (F. onca). Sub-genus 2. Cyncelurus. Claws not quite re¬ tractile. Hair on neck and between shoulders, long, manelike.. Cheetah (F. jnbata) ; Africa and South Asia. Sub-genus 3. Lynx. With ear-tufts and short tails. A. Old World forms. Caracal (F . caracal) and chaus; South Asia and Africa. B. New World forms. Canadian lynx (F. canadensis) ; Red cat (F . fasciata) ; Bay lynx (F. rufus) — all in North America. The family was represented in Tertiary times by the cave-tiger (F . spelea) ; an American species (F. proto panther) ; and an Indian (F . cristata). Machairodus, within its enormous sabre-like upper canine, ranged from Miocene to Pleistocene times in Europe.

In addition to this formidable apparatus of cutting-teeth, the tongue is covered with small recurved prickles by which they can clean from the bones of their prey every particle of flesh.

There are no quadrupeds in which the mus¬ cles of the jaws and limbs are more fully devel¬ oped. The skeleton presents a light but well-built mechanism ; the bones, though slender, are extremely compact; the trunk, having to con¬ tain the simple digestive apparatus requisite for

the assimilation of highly organized animal food, is comparatively

slender, and flattened at the sides. The muscular forces are thus en¬ abled to carry the light body along by extensive bounds, and thus it is that the larger felines generally make their attack. The five toes of the fore-feet and the four toes of the hind-feet of cats are armed with very strong, hooked, sharp claws, which are preserved from being blunted by a peculiar arrangement of the pha¬ langes. For this purpose the claw-joint of each toe is drawn back by ligaments attached to the penultimate joint, till it assumes habitually a perpendicular position, when the claw which it supports is completely retracted within a sort of sheath, and is entirely concealed by the fur. When, however, the animal springs on its prey, the tendons of the flexor muscles of the toes, overcoming the elasticity of the retractile liga¬ ments, pull forward the claws, and they are ready to be buried in the flesh of the victim. The lower surface of the foot is furnished with thick ball-like pads of the epidermis, on which the animal walks ; this gives them the noiseless tread peculiar to this family.

Members of the cat family hunt in the gloom, and, consequently, while escaping ob¬ servation, require every ray of light that can be made available. The pupil is a long, vertical fissure; but this only obtains among the smaller genera ; in all of the family above the ocelot in size, the pupil is round in form. On the top of the skull there runs a tolerably high bony crest, which reaches its greatest elevation at the very back of the head. This bone ridge is necessary for the attachment of the powerful muscles which operate the jaws and enable the cats to drag away their often very heavy prey.

In the digestive organs of the Felida, the salivary glands are small, and the stomach of a simple cylindrical form. The oesophagus opens at its anterior extremity, and the intestine com¬ mences from the posterior ; so that everything favors a quick passage of the food, which re¬ ceives no mastication, and is retained a very short time in the stomach. The intestine has no valves, is small in diameter but muscular, and the whole canal, when compared with the length of the body, is extremely short, being as 3 or 5 to 1. In the domestic cat they are 5 to 1 ; but in the wild cat only as 3 to 1.

The Felidce are now regarded as including only two genera, Felis and Cyncelurus, the latter reserved for only one species, the chetah.

Wild cats are found in all parts of the world except Australia, but principally in the warmer regions, where alone the larger species are met With.

In the caverns and river deposits of the Quaternary Period in Europe

and America are found fossil remains of cats allied to or identical with living species. Such are the huge cave Lon of Europe (Felis leo, race Spelcea) and others not so well known. During the Tertiary Period they were rare, their place being taken by the Machserodonts or sabre-tooth tigers (q.v.), animals similar to cats in many respects, but less agile, more powerful, and distinguished by enlarged sabre-like upper ca¬ nine teeth, which indicate different habits of at¬ tack on their prey. The appearance of true cats, both in Europe and America, is corre¬ lated with the abundance of modern types of

ruminants, etc. — slender, thin-skinned, long¬ necked and swift-footed, in place oj the pow¬ erful and heavily proportioned pachyderms common through most of the Tertiary Period. It is probable that both sabre-tooth tigers and true cats were evolved from the Palceonictidce, a group of primitive carnivora or Creodonta in the early Eocene; but the proof from fossils is at present fragmentary and incomplete. See Cat ; Cougar ; Leopard ; Lynx, and other names of wild cats.

FELIX I, Saint; a citizen of Rome, reigned as Pope from 269-74. He excommunicated Paul of Samosata, bishop of Antioch, for teaching that Christ was no more than a mere man. A portion of a treatise on the Incarnation, writ¬ ten by Felix I, is still extant. He was mar¬ tyred (274) in the Aurelian persecution.

FELIX II, Saint, a Christian martyr of the 3d century, who with his sister, Regula, was the first to preach Christianity to the inhabitants of Zurich. They were executed by Decius at the instigation of Maximian. Until the time of the Reformers, Felix and Regula were venerated as the patrons of Zurich. Their day in the calendar of saints is 11 September. Consult (Mittheilungen der antiquarischen Gesellschaft zu Ziirich) (1841).

FELIX II, Anti-pope. He occupied the pontifical see during the banishment of Liberius, 355. In reply to a proposition for the recall of Liberius, it was proposed by the Emperor Con- stantius that Liberius and Felix should reign conjointly, but the people exclaimed, <(One God, one Christ, one Pope® and Felix had to give way. He is said to have died a martyr's death in 365.

FELIX III, Pope, succeeded Simplicius in 483, and died in 492. Under him began the Acacian schism, headed by Acacius, patriarch of Constantinople. Acacius was excommuni¬ cated by Felix III at the Roman Synod of 484.

FELIX IV, Pope from 526 to 530. He is noted for his promulgation of the 25 canons adopted by the Council of Orange (529) against Semi-Pelagians.

FELIX V, an Anti-pope : b. Savoy ; d. Geneva 1451. He is better known by his right¬ ful name and titles, Amadeus, Duke of Savoy, Count of Geneva and Cardinal. He was elected Pope by the schismatical Council of Basel (1439), and in 1449 submitted to Nicholas V who had been elected Pope canonically. Felix V is the last one of the anti-popes.

FELIX, Antonius, an-to-'ni-us fe'liks, Roman procurator of Judea. It was before him that Paul ((reasoned of righteousness, temperˆ ance, and judgment to come.® Felix rose from slavery, having been manumitted by Claudius Caesar. His rule in Judea, notwithstanding its severity or rather in consequence of it, was marked by constant disorders and disaffection; he was notoriously accessible to bribes, and but for the interest of his brother (the notori¬ ous freedman Pallas) with Nero, the charges carried up against him to Rome would have caused his ruin. Drusilla, ((the Jewess,® his second wife, had been seduced by him from her husband, Azizus, king of Emesa. Tacitus paints Felix in the darkest colors — a character con¬ firmed by what is related of him in the New Testament, that he had expected a bribe from

Paul, and that, disappointed in this, he left him bound, ((to show the Jews a pleasure® (Acts xxiii, xxiv).

FELIX, Elise Rachel. See Rachel, Mlle.

FELIX, Marcus Minucius, Roman law¬ yer. He embraced Christianity, and wrote an excellent defense of it in a dialogue entitled < Octavius.) The period when he flourished is uncertain, some making it as early as the reign of Marcus Aurelius, while others make it as late as that of Diocletian. The purity of the Latin style, and some of the allusions to the existing state of the Church, would seem to favor the earlier date; but it is not easy to set aside the direct testimony of Jerome, who, in a regular list of Christian writers, places him between Tertullian and Cyprian, thus fixing the period to about 230 a.d. The (Octavius > has been translated into most European languages. Consult (Ante-Nicene Fathers) (Vol. IV,

1889).

FELIX HOLT, THE RADICAL, a novel by George Eliot (1866). It is a picture of upper middle-class and industrial English life of the period of the Reform Bill agitation.

FELIXIANS, a Spanish sect of the latter part of the 8th century, so called from Felix, bishop of Urgel.

FELL, John, English prelate : b. Long- worth, Berkshire, 23 June 1625; d. 10 July 1686. He was graduated at Christ Church, Oxford, 1643, took up arms for the royal cause, and later, at the Restoration, became dean of Christ Church, becoming vice-chancellor of Oxford 1666, which office he held till 1669. He dis¬ played much interest in the development of the University Press, and in 1675 he was appointed bishop of Oxford. Among his works are (The Interest of England Stated* (1659) ; (The Life of Dr. Henry Hammond* (1661) ; (Grammatica Rationis sive Institutiones Logicae) (1673) ; (The Vanity of Scoffing) (1674) ; and a critical edi¬ tion of the works of Cyprian (1682), his greatest work.

FELL (Norw. fjeld, Swed. fj'dll), the name given in Scandinavia to the bare plateaus which occur in its mountainous regions ; they are des¬ titute of vegetation, and generally lie above the snow-line. The word enters as a component into the names of innumerable mountains, owing to the fact that in their formation they have taken on the shape of a fell. Fell is also used in the north of England and south of Scotland to designate a barren hill or moor¬ land ridge. See Middlesex Fells.

FELLAHS, fel'az, or FELLAHIN, fel'a- hen, the people of Egypt who live in villages and cultivate the soil. The name signifies <(tillers.® They form a large part of the popula¬ tion ; are the most ancient race in that country, and are generally believed to be the descendants of the old Egyptians, their physiognomy _ re¬ sembling that which is found on the ancient sculptures. They are a patient and laborious population, and were heavily taxed before the period of English influence in the government. Under British training they have proved excel¬ lent soldiers. See Egypt.

FELLATAHS, fel-la'taz, or FULAHS,

foo'laz, native Fulbe, fool be, a remarkable race, the original locality of which is unknown,

but which is now widely diffused throughout the Sudan, where they form a kind of ruling aristocracy. The states or kingdoms of Senegal-

Futa, Futa-Jallon, Haussa, Sokoto, etc., are in their hands, and they thus extend from Sene- gambia eastward to Lake Tchad. They are a mixture of Negro and Berber blood. In per¬ son they are decidedly handsome, and mostly of a light copper color. They have regular features, small mouths, and noses inclining to aquiline ; silky hair and fine black eyes ; and are tall, well proportioned and of erect and graceful figure. The Fellatahs are shrewd and intelligent ; extremely active, polished and in¬ sinuating* in their manners, and said to possess great bravery and perseverance. They are not very much inclined to trade or agriculture, leaving these chiefly to the subject peoples, but are cattle-keepers and horse breeders, and were slave-raiders at a recent period. They are mostly Mohammedans, to which religion they became converts about 400 years ago. In the beginning of. the 19th century they spread Islamism through the Sudan and established their dominion over a wide territory.

FELLENBERG, Philipp Emanuel von,

fe'lep a-ma'noo-el fon fel'len berH, Swiss edu¬ cational and agricultural reformer: b. Berne, 27 June 1771; d. Hofwyl, 21 Nov. 1844. The years 1795-98 he spent in traveling over France and Germany, visiting in preference the vil¬ lages, and chiefly devoting his attention to the material, intellectual and moral condition of the agricultural classes. He became convinced that the cause of all the existing poverty and misery was the absence of sound and rational instruc¬ tion, and that the remedy lay in combining with a sound general education special training for the pupil's future trade. On his return to Berne he devoted himself to the improvement of the social and intellectual welfare of youth. For this purpose he purchased the estate of Hofwyl, and established successively an insti¬ tution for instructing the children of the poorer classes, a seminary for children in the higher grades of life, and a normal school. The pupils were all trained to work in the fields or at the bench, and the product of their labor was sufficient to cover the expenses of their education. Fellenberg's scheme was at first ridiculed by his countrymen, and looked upon for a time with some suspicion by the govern¬ ment; but ere long its beneficial results at¬ tracted even the attention of foreign govern¬ ments. Alexander I of Russia conferred upon the philanthropist the decoration of Saint Vladimir, and sent seven young nobles to be educated at his institution. Several foreign princes visited the establishment, and founded institutions on a similar plan. The Fellenberg institutions still exist, though on a less ex¬ tensive scale, and are partly carried on by his descendants.

FELLENBERG SYSTEM OF EDUCA¬ TION, Association of the. See

Edu¬ cation, Agricultural.

FELLER, Henrietta (Odin), missionary: b. Montagny, near Lausanne, Switzerland, 1800 ; d. Grande-Ligne, Canada, 1868. Her family removed to Lausanne, where she was married to Louis Feller. The death of their only child quickened her religious sensibilities ; she under-

went conversion, and on the death of her hus¬ band devoted her life to missionary enterprises. In 1835 she arrived in Canada, and thereafter founded the Grande-Ligne Mission near Saint Johns, P. Q., in association with the Baptist Church.

FELLING, England, urban district in Durham County, on the Tyne, two miles south¬ east of Newcastle. It has chemical works, forges, factories and coal mines nearby. Pop.

25,200.

FELLOW SERVANTS, those employed by a common master in a common task, and so correlated that the safety of any one depends, in the ordinary course of things, on the care and proper conduct exercised by the others. The term is used especially in the laws governing the liability of employers to their employees for injuries sustained during their employment due to negligence or other fault on the part of a co-worker. This definition is sustained by the laws of England and by most State jurisdic¬ tions of the United States, but is rejected in some. For the various degrees of liability of the employer and the statutes of the several States consult Bailey (The Law of the Master's Liability for Injuries to Servants) (St. Paul 1894) and McKinney (Treatise on the Law of Fellow-Servants) (Northport 1890).

FELLOWS, Sir Charles, English traveler and antiquarian: b. Nottingham, Aug. 1799: d. London, 8 Nov. 1860. Without any claims to classical attainments, he collected unassisted a vast amount of material for the learned to labor upon. He first explored the valley of the Xanthus in Lycia, in 1838, and discovered the remains of the two cities Xanthus, the Lycian capital and Tlos. Under the auspices of the trustees of the British Museum he made fur¬ ther explorations in 1839 and 1841, and suc¬ ceeded in obtaining the marbles now in the Lycian salon of the Museum. He was knighted in 1845. His principal works are (The Xan- th.an Marbles* ; (Travels and Researches in Asia Minor) ; and (Coins of Ancient Lycia be¬ fore the Reign of

Alexander.*

FELLOWS, John, American author: b. Sheffield, Mass., 1760; d. New York, 3 Jan. 1844, His publications include (The Veil Re- moved) (1843) ; Exposition of the Mysteries or Religious Dogmas and Customs of the An¬ cient Egyptians, Pythagoreans, and Druids* ; (Mysteries of Free-Masonry* ; and a work on the authorship of the Junius letters.

FELLOWSHIP, an institution or feature of ancient origin in certain European univer¬ sities, but of recent introduction in the colleges and universities of the United States. In an English university the fellowship entitles the holder, a graduate, who generally is called a fellow, to participate in the revenues of a cer¬ tain college, or to have the benefit of a special endowment, and also confers a right to rooms in the college, and certain other privileges, as to meals, etc. Fellowships are generally for¬ feited upon the attainment of a certain position in the church or at the bar, and are retained after marriage only by special vote of the col¬ lege. With these exceptions, the tenure was formerly for life, but many fellowships have altered in this respect. In Cambridge the tenure is now limited to six years. Both resi-

dent and traveling fellowships are granted for work in a special line. Formerly the value of some of the fellowships at Oxford and Cam¬ bridge was equivalent to $2,500, and even $4,000, but great changes have been made in the number of emoluments of the fellows at both universities. At Cambridge there are in all about 400 fellowships, some of the colleges having as many as 50 or 60 attached to them. The average annual value is from $750 to $1,250. At Oxford there are now two classes of fellowships, ordinary and tutorial. The emoluments of an ordinary fellowship are $1,000 a year, those of a tutorial fellowship usually $1,500. New fellows are general^ elected by the head of the college to which they belong, and the fellows. There are also fellows connected with Dublin University, and in recent years a few have been attached to the Scotch universities as well as to the new Eng¬ lish universities of Manchester, Sheffield, Birmingham and Leeds. In American univer¬ sities many fellowships have been established by private individuals, to promote research in special departments of knowledge, there being in 1911 a total of 272 for the 13 leading uni¬ versities. Fellowships are frequently awarded for study abroad, but others are for resident holders who, in some cases, give part of their time to instruction. Fellowships, unlike scholar¬ ships, are awarded to graduates only, and gen¬ erally for post-graduate work. The Johns Hop¬ kins University first used the system

ex¬ tensively. The value of fellowships varies greatly. The most common amount is about $500 per annum, but in some cases the income is only $120 and in others it reaches $1,500. Chicago University has nearly 80 fellowships and several other institutions from 22 to 55 each. Annual fellowships may generally be reassigned more than once to the same holder, and there are fellowships with a tenure of several years. There are several fellowships at the American schools of classical studies in Athens and in Rome, open to graduates of American universities. The distinction between fellowship and scholarship is one that is not very marked : the Rhodes scholarship, for ex¬ ample, may be regarded rather in the light of fellowship. The term Mellow® is also applied to members of the governing body of cer¬ tain universities, as at Harvard.

FELO DE SE, fe'lo de se, from the mediaeval Latin, felon or traitor to himself, is the legal technical description for a suicide. See Suicide.

FELON. See Paronychia.

FELONY, in law, a term originally applied to those crimes which were punished by for¬ feiture of lands and goods, in addition to any other punishment prescribed by law. As so used it was distinguished from a misdemeanor, which was an offense that did not entail for¬ feiture as part of the penalty. The word can¬ not now be said to have any very definite mean¬ ing in law. It may be applied to crimes entail¬ ing capital punishment, as well as to others for which capital punishment is not inflicted; and is so applied by statute in the States of New York and Massachusetts. In many States the distinction between felony and misdemeanor has been abolished, an example that in time will

probably be universally followed. Compound¬ ing a felony in refraining from prosecuting a felony for a consideration, constitutes a crime.

FELS, felz, Joseph, American manufac¬ turer: b. Halifax Court House, Va., 1854; d. 22 Feb. 1914. He entered commercial life as salesman for a soap-making concern and in 1874 set up a soap factory in Baltimore, which he later removed to Philadelphia. He amassed great wealth and becoming interested in the single-tax reform he established a fund for its promotion which is known as the Joseph Fels Fund of America. He also subscribed to funds for similar purposes in several

foreign coun¬ tries. He also aided single-tax colonies near Mobile, Ala., and at Arden, Del. He also lec¬ tured and wrote in behalf of the single-tax. He was one of the first employers in America to establish a profit-sharing system in his factories.

FELSITE. As a rock name, felsite is rather indefinite, but is a very convenient name for those dense fine-grained igneous rocks, usually gray but often red or green, that to the naked eye show no crystals of minerals. Fel- sites generally are ancient lavas containing a high per cent of silica, and are composed almost wholly of minute crystals of quartz and feld¬ spar. The percentage of silica varies, and the relationship and probable origin of a felsite can be determined by analysis and examination with the microscope. Igneous rocks having a finely crystalline ground mass with visible crystals are said to have a felsitic ground mass, thus petrographers speak of felsite-porphyry. See Rock; Rhyolite; Trachyte.

FELT, Joseph Barlow, American historian: b. Salem, Mass., 22 Dec. 1789; d. there, 8 Sept. 1869. He was graduated at Dartmouth College 1813 and was ordained Congregationalist minis¬ ter, having churches in Sharon, Mass., and Hamilton, Mass. In 1836 he was appointed to classify the Colonial and State archives of Massachusetts. His 10 years' work at this task was invaluable to the State, and he was recog¬ nized as an authority on New England history. He was recording secretary of the American Statistical Association 1839-59; librarian of the Massachusetts Historical Society 1842-58; and president of the New England Historic-Genea¬ logical Society 1850-53. Among his works are (Annals of Salem > (1827) ; (History of Ips¬ wich, Essex and Hamilton) (1833) ; histori¬ cal Account of Massachusetts Currency) (1839) ; Ecclesiastical History of New England* (1855— 62) ; and Collections for the American Statis¬ tical Association on Towns, Population, and Taxation * (1847).

FELT, from Dutch vilt, a fabric made from wool, or wool and hair, or fur, without weaving, by rolling, beating and pressure, generally with the use of lees or size. The process of felting is similar to that of fulling. The fibres of fur, hair or wool are rough in one direction only, and thus they can glide among each other in such a way that when the mass is agitated the anterior extremities slide forward in advance of the body or posterior half of the hair and serve to entangle and contract the whole mass to¬ gether. Articles of felt, such as rugs, carpets, clothing and hats, have been made from remote antiquity, and are still made and widely used

among various Asiatic peoples. Modern uses of felt include also

carriage linings, piano¬ forte hammers, surgical dressings, etc. Legend ascribes the invention of felt to Saint Clement, who found that carded wool placed in his shoes to protect his feet while on a pilgrimage worked into a felt by the pressure and moisture; but it has a much earlier origin, being apparently known in Homer's time. The Saracens used it for tents, and it was probably introduced into Europe at the time of the Crusades. In Europe and America felt cloths are also made for sev¬ eral purposes, the finer kinds especially for carpets and tablecovers, which may be dyed or printed and finished in various ways. The first mechanical process for the making of felt was invented about 1820 by the American J. R. Williams. Various details have since been added, but the main principle remains the same. The wool is carded into laps of the lengjth and breadth of the web to be made. Layers of these are placed one above another until the desired thickness is secured, the outer layers being generally of finer texture than the inte¬ rior. The whole is now passed between rollers partly immersed in water. In the machinery by which felt fabrics are produced, rollers with a rubbing and oscillating movement have gen¬ erally an important action. The materials com¬ monly used for felt hats are the furs of the rabbit and other animals and the wool of sheep. The latter material is employed for common and medium hats, only the finer felt hats being made from fur. The hats after being stiffened are dyed. They now undergo the operation of blocking, in order to give them their proper shape. Coarse varieties of felt are used for covering steam boilers and cylinders, steam-pipes, and otherwise as non-conductors. Asphalted felt is a coarse felt saturated with pitch, asphalt or coal-tar and used for covering sheds and other buildings, and a superior kind called inodorous felt is used for lining damp walls. Another kind is asbestos felt. For some of these the process of manufacture is similar to that employed in making paper. In the United States the felt industry has about 45 establishments, producing goods valued at approximately $12,000,000 yearly. The principal products are felt cloths, boot and shoe linings, upholstery felts, trimmings and lining felt, felt shirts and belts for paper manufacture. Con¬ sult <(Felt and Felting** in Murphy's (The Tex¬ tile Industries> (Vol. II, London 1912). See Hat.

FELTHAM, Owen, English author : b. Suffolk, in the reign of James I ; d. sometime in 1678. For many years he lived in the Earl of Thomond's family. Other than this very little is known of his history. He was the author of (Resolves Divine, Political and Moral* (1631). It has been printed in many editions; 12 appeared before 1709,

FELTON, Cornelius Conway, American

classical scholar: b. Newbury, Mass., 6 Nov. 1807 ; d. Chester, Pa., 26 Feb. 1862. He gradu¬ ated at Harvard in 1827. In 1834 he became professor of Greek literature at Harvard, in 1860 its president, and in 1858 regent of the Smithsonian Institution. His publications in¬ clude many translations from German, French and Greek, of which

guished; also (Familiar Letters from Europe) (1864) ; < Greece, Ancient and Modern) (1867) ; (Selections from Modern Greek Writers,) etc. Consult Proceedings1* of Massachusetts His¬ torical Society for 1866.

FELTON, John, the assassin of the first Duke of Buckingham. He was a member of an old Suffolk family ; the date of his birth and the name of his father are unknown, but his mother's name was Eleanor Wright, of Dur¬ ham. He served in the army and was a lieu¬ tenant on the expedition to Cadiz in 1625. His moroseness rendered him unpopular and hin¬ dered his advancement. Buckingham refused all his applications for promotion because, it is alleged, of a feud between Felton and Sir Henry Hungate, Buckingham's favorite. Ill- treatment and poverty drove him to despera¬ tion and he began, to regard Buckingham as the cause of all his woes. His animosity to Buckingham was intensified by the "Remon¬ strances® of the Commons and by the charges of Eglesham that James I had been poisoned by the minister. Felton, determined on the assassination of the Duke, bought a knife and journeyed to Portsmouth, where on 23 Aug. 1628 he stabbed Buckingham to death. The crime was popular, as the Duke was cordially hated by nearly all classes, and poems were written in praise of the deed. At his trial Felton pleaded guilty, and was hanged on 27 Nov. 1628.

FELTON, Samuel Morse, American rail¬ road president : b. Philadelphia, Pa., 3 Feb. 1853. He was educated at the Massachusetts Institute of Technology, began railroad work as a rodman in 1868. He rose rapidly, becoming chief engineer, general superintendent and general manager of various railroad lines be¬ tween 1873 and 1885. He was vice-president of the Erie 1885-90; the Memphis and Charles¬ ton, the Mobile and Birmingham 1891-93; and the Knoxville and Ohio 1891-92. He was president of the Louisville Southern and the Alabama Great Southern 1893—95 ; the Cincin¬ nati, New Orleans and Texas Pacific railroads 1890-99 ; the Chicago and Alton 1899-1907 ; and the Mexican Central 1907-09. He was also re¬ ceiver of the Columbus,

Sandusky and Hocking Valley Railway in 1897-99, and the Kentucky and Indiana Bridge Company from 1893 to 1900. In 1909 he became president of the Chicago Great Western Railroad, and in 1912 of the Pere Marquette Railroad.

FELTRE, Henri Jacques Guillaume Clarke, Due de, an re zhak ge yom klark duk de feltr, a marshal of France: b. Landrecies, France, 17 Oct. 1765; d. Neuviller, France, 28 Oct. 1818. In 1781 he entered the military school at Paris and was afterward imprisoned during the Revolution. He was subsequently employed by Carnot ; in 1807 he became Minis¬ ter of War and was created Due de Feltre. Though indebted to Bonaparte for his dukedom he contributed toward the restoration of the Bourbons, was Minister of War 1815-16, and in the latter year he was created marshal of France.

FELTRE, fel'tra, Italy, town of the Prov¬ ince of Belluno, 32 miles northwest of Venice. It contains a cathedral, the Palazzo del Co.n-siglio, now used as a theatre; a large fountain,

an industrial school, hospital and municipal pawnshop. It has a few small industries, in¬ cluding ironware and baskets. It has a trade in silk, wine and oil. There is a monument to Pamfilo Castaldi, a native of Feltre, who, ac¬ cording to the Italians, discovered the art of printing. Feltre is the ancient Feltria and was a station on the Via Claudia between Opitergi- um and Tridentum (Trent). It was of little importance in Roman times. Pop. 5,468.

FELUCCA, fe luk'a, a class of small mer¬ chant-vessels used in the Mediterranean. They have two masts, carrying lateen sails, and are capable of being propelled by oars, and fre¬ quently have a rudder at each end. Formerly feluccas were employed in war and piracy.

FEMALE RHYMES (Fr. rimes , femi¬ nines), double rhymes, or rhymes in which two syllables, one accented and the other unac¬ cented, correspond at the end of each line. They are so called because they end in a weak or feminine syllable; thus, fable, table; motion, notion, are female rhymes.

FEME COVERTE, fern Wert. See Husband and Wife; Family Law; Marriage.

FEMERN, fa'mern, or Fehmarn, fa'marn, an island in the Baltic, taken from Denmark in 1864 and now part of Schleswig-Holstein, Ger¬ many. Area, 70 square miles ; surface, level ; soil, fertile, producing corn. Cattle are abun¬ dant. The inhabitants are mostly engaged in

fishing, agriculture and stocking-making. Capi¬ tal, Burg. Pop. 9,900.

FEMGERICHTE. See Vehmgerichte.

FEMINISM, from the French feminisme, Latin femina, woman : a word coined by the younger Dumas in a pamphlet entitled T'Homme-femme* (1872) to designate the so- called <(rights of women® movement. An advo¬ cate of this movement is termed a ((feminist,® though it must be pointed out that the definition, whether applied to a man or woman, by no means carries the somewhat derogatory sense of ˆeffeminate® or ((unmanly.® Indeed, many of the finest intellects among men have been — and are to-day — ardent feminists. Briefly stated, the tenets of the creed consist in a de¬ mand that women are entitled to absolute eco¬ nomic and social equality with men ; that women have the right to participate in govern¬ ment as responsible citizens, and especially in framing such laws as affect their own lives. Hence, feminism includes woman suffrage, a stepping-stone to unlimited possibilities. Its foremost interpreters contend that woman has too long been regarded and treated as a mere adjunct of man; ((a kind of subordinate beings, and not as a part of the human species.® This was the argument of Mary Wollstonecraft, the pioneer of the modern movement, in her cele¬ brated Vindication of the Rights of Woman, > published in 1792. Although marred by numer¬ ous internal defects the Vindication* remains as one of the most powerful and truly prophetic statements of the woman's case against "man¬ made laws® and a <(man-made world.® _ With merciless logic she flayed the miseducation of girls, ridiculed the generally accepted theories of "chivalry,® and mordantly attacked the double standard of moralitv. Yet she recog¬ nized, in true womanly fashion, that love and

the attraction between the sexes was a cardinal fact in human nature, and "marriage as the foundation of almost every social virtue.® While she claimed that women should be treated as the friends and equals of men, and not as their toys and slaves, she did not demand for women intellectual, physical or moral equality with men. She did not wish women to have power over men, but over themselves. In her time a sickly delicacy was supposed to be an essential part of feminine charm, and cowardice, as well as physical weakness, was regarded as part of what every woman ought to aim at. How far Mary Wollstonecraft was ahead of her time may be judged from the fact that she advocated woman's representation in Parlia¬ ment nearly 70

years before woman suffrage was heard of in the House of Commons, and she proclaimed that the practice of medicine was particularly suited to women 50 years be¬ fore the first English woman doctor was qual¬ ified.

Plato, Aristotle, Euripides and Sir Thomas More propounded arguments and theories on the rights of women that are to-day being car¬ ried into effect in America, Europe and Aus¬ tralasia. We have traveled far since that Council of Macon, quoted by Bescherelle and Larcher, where some 300 ecclesiastics gravely discussed the question of whether women could or should be classified as human beings. In ages past theologians and learned men have wrangled about the etymology of the word sig¬ nifying "woman* in their respective languages, and whether the particular word was derived from God or invented by man. The object of these erudite disquisitions appears to have been to fix the definite status of woman as compared with man. Sympathetic French writers have proved to their own satisfaction that Nature, in her thousand-fold activity, is fenrnine in essence and that woman, not man, is the ((lord of creation.® Basing his argument on biolog¬ ical theory, Mr. George Bernard Shaw makes one of his characters say, ((She [woman] knows by instinct that far back in the evolutionary process she invented him [man], differentiated him, created him in order to produce something better than the single-sexed process can pro¬ duce,® and that "he is welcome to his dreams, his follies, his ideals, his heroisms, provided that the keystone of them all is the worship of woman, qf motherhood, of the family, of the hearth® ((Man and SupermanQ.

However futile and unnecessary such specu¬ lations may appear to the 20th century under¬ standing, it is indisputable that in nearly all ages and among most peoples — ancient and modern — women have been more or less kept in a state of tutelage and dependence upon men. So far back as records exist do we find a con¬ stant stream of depreciation leveled against women, in theology, philosophy and literature. The old Chinese classics contain numerous dis¬ paraging references to women, such as ((long is her hair and short her understanding,® despite the dictum of Confucius that "Woman is the masterpiece.® With deeper insight, Socrates re¬ marked that "woman, once made equal to man, becometh his superior.® The contradictory ab¬ surdities of Rousseau were sufficiently answered by the tender profundity of Jean Paul. Lord Chesterfield ranked women as below men and above children; Tennyson says, "Woman is the

lesser man® ; Lessing wrote, "nature intended that woman should be her masterpiece,® and Herder called her "the crown of creation.®

Sheridan states that (

“What mighty woes To thy imperial race from woman rose,”

which leads to the conclusion that the heroines of antiquity were more absorbed in their pri¬ vate affairs than in those of the state or of their inconspicuous sisters.

The ((Rights of Man,® born of the French Revolution, kindled a feeble but inextinguish¬ able rushlight which- was sedulously fanned for oyer a century by an ever-increasing army of pioneers before it burst into flame. The Eng¬ lish Reform Bill of 1832 prevented woman suf¬ frage by the insertion of the word male before person. The advocates of feminism met with the most strenuous opposition alike from clergy and laity, and particularly from ((the man in the street.® There were those who prophesied the loosening of family bonds and the general collapse of human society if women were raised to a social and political equality with men. As was inevitable, the problem of sex became the predominant factor in the contro¬ versy. A strong grievance of the feminists was the stringency of the English divorce laws, at all times unjustly severe upon the woman. In 1854 the Honorable Mrs. Norton privately

circulated a pamphlet entitled, (English Laws for Women in the 19th Century) — a painful episode of personal history more weighty and pregnant in its simple details of much wrong and suffering than sheaves of subtle contro¬ versy. In July 1855 Mrs. Norton addressed a letter to Queen Victoria on the <(Laws of Mar¬ riage and Divorce,® in which she laid bare her own domestic unhappiness. The letter was dissected and analyzed in periodicals and press, attracting sympathy both for the writer and the feminist cause. At that time a special act of Parliament was necessary in each case to annul a marriage. In 1869 John Stuart Mill’s Sub¬ jection of Women1 appeared, a work marked by generosity and love of justice. ' He made a most effective protest against the prejudices which stunted the development and limited the careers of women on no other ground than “the accident of sex.® Notwithstanding that it en¬ countered much criticism, the book gave a strong impetus to the feminist movement throughout the world, being also translated into other languages.- In 1867 Mill had intro¬ duced in Parliament a bill for female suffrage for imperial 'affairs, which was defeated by 196 votes against 73. Mrs. Mill wrote an able

essay on (The Enfranchisement of Women,1 and numerous pamphlets and magazine articles spread the propaganda. In 1868 the Court of Common Pleas in London decided female suf¬ frage to be illegal, and in the following year the State of Wyoming granted women the vote. By degrees the scope of women's activity wid¬ ened in those fields for which their endow¬ ments peculiarly fitted them, in all that involved moral superintendence and personal administra¬ tion — in educational, charitable, penal and reformatory institutions. From the original "emancipation® and "politico-social equality® stages the feminist campaign assumed a definite economic aspect. With the growth of popula¬ tion it became increasingly necessary to provide employment for women and girls. Hitherto there had been little or no choice for women to earn their living beyond domestic service, in factories, as governesses or teachers. Men resented the invasion of their spheres by women on the ground that the cheaper female labor would cause a lowering of masculine wages. To the male argument that "woman's place is in the home,® the feminists retorted that not all women had homes, husbands and children, and that a woman should be as free to choose her career as any man. Especially hard was the lot of the single woman and the widow left un¬ provided for in the davs when there were so few avenues for female activities. Jules Simon, French philosopher and statesman, pointed out in 'L'Ouvriere1 (1861) that woman is a being naturally fond of work, uneasy of inaction, and loving employment for its own sake. A woman writer of that period expressed this restlessness : "How many women are now waiting, with empty hands and longing hearts ! Will not good men lend us their aid to bring us and our work together ?® The numerous be¬ nevolent societies that were necessary in Great Britain during the early Victorian era for the relief of "distressed gentlewomen,® governesses and female invalids bore testimony to the pa¬ thetic helplessness and silent suffering of gen¬ teel poverty among single women and widows. The Society for Promoting the Employment of

Women labored to open out for them less thronged and footworn tracks than those of tuition and needlework, by directing their ef¬ forts toward printing and the semi-mechanical arts ; above all, in facilitating emigration to the colonies by supplying agents to receive and pro¬ tect them on their arrival overseas. The lack of educational opportunities was the severest handicap to woman's progress. "In imaginative strength she has been proved deficient,® wrote a critic ; "she unfolds no new heaven, she breaks into no new world; she discovers, invents, creates nothing.®

After the repeal of the "combination laws® in 1825, British workmen gradually began to build up those trade unions which later became

such a powerful factor in industrial life. Women were not slow to perceive that organi¬ zation meant strength, political as well as indus¬ trial. Public meetings were arranged and the first meeting of the Manchester National Soci¬ ety for Women's Suffrage was held in 1868, exactly 20 years after a similar convention — the first of its kind — had assembled at Seneca Falls, N. Y. In 1869 a Women's Club and In¬ stitute was opened in London, much to the sur¬ prise and consternation of the male element. The theory of "the weaker vessel® became an exploded myth. Nearly 200 years earlier, Anne Hutchinson had started the first women's club in America, and French women had formed themselves into clubs in Paris during the Revo¬ lution. The feminist movement gathered in strength and momentum among the English- speaking peoples. One barrier after another was broken down by indefatigable and deter¬ mined women leaders supported by many prom¬ inent men. Women had played a most im¬ portant part in the abolition of black slavery; they were now bent on destroying what the extremists called "white slavery® — their own emancipation. Quite a large number of women were unconvinced of the wisdom of the move¬ ment, forming "anti® societies and declaring that most women did not want the vote and had no desire to "mix in politics.® Not a few of these objectors were ladies of h'gh station and titles. While fully agreeing that the deliv¬ erance of women from early prejudices and unnatural trammels was a necessity which the development of culture and the altered condi¬ tions of industrial relations were bound to bring about in time, they were "convinced that the pursuit of a mere outward equality with men is for women not only vain but demoral¬ izing,® and that it led to "a total misconception of woman's true dignity and special mission.® It was pointed out that the question was pre¬ eminently one for the middle classes to decide. While the ladies of the "upper ten® stood aloof, it could have no interest for the women of the lower orders, _ whose right to help their hus¬ bands in providing a living was, unfortunately, but too well established. Particular stress was laid upon the danger of economic competition, of overflooding the labor market. "Women take the places ot men for less pay,® wrote a lady anti-feminist 25 years ago; "the lower a man's earnings, the less is he able to make a home for a wife. Competition between men and women would but tend to still further lessen the ever-decreasing number of mar¬ riages. . . . And it is just this decrease in mar¬ riage . . . which is the sore point in woman's

no

FEMINISM

emancipation. The decrease in marriages first started the question of

W Oman's Rights? The words quoted were written by Mme. Adele Crepaz and received the commendation of Gladstone.

The feminists, however, pursued their cam¬ paign with increasing vigor and persistence. They invaded not only innumerable trades and handicrafts, but also universities and colleges, carrying off degrees and honors in science, law, classics, medicine, mathematics, philosophy, art, music, literature and political economy. They opened women's medical colleges, hospitals and educational institutions. They founded great political organizations numbering many thou¬ sands of members ; they held gigantic parades and demonstrations; and terrorized legislatures and statesmen by actual display of physical violence. Women were elected to education, municipal and trade union boards ; to adminis¬ trative positions on public works, and appointed as government inspectors, as police officers, and even as sheriffs. A woman scientist discovered radium ; women have gained certificates as ships' pilots and aeronauts ; women travelers have explored Africa and Asia; a woman rode on horseback across the continent of Australia, while in France women practise at the bar. In the United States the first woman has entered Congress. Most of this remarkable expansion of feminine activity has taken place within the period of a generation, though the hardy pioneers who laid the foundations of the <(era of woman® did not live to see the completion of their work. If the amazing results obtained up to the summer of 1914 forced the conclusion that women, given the needful opportunities, were but little behind men in productive — if not creative — energy, the course of the Euro¬ pean War must have removed the last doubts that still lingered in the minds of anti-feminists. It is no exaggeration to say that the war gave woman the greatest opportunity in history to display her mettle and capacity. There are, however, two widely divergent views as to the ultimate consequences or effects of the war upon woman's life. In all the belligerent countries — though to a less degree in America — the war has imposed a heavy burden upon the women. In the European countries women have replaced men in almost every sphere of activity. In the munitions factory, in the workshop, on the street and on the land, women are performing the most arduous tasks such as had never fallen to their lot. It is be¬ lieved by not a few that this violent experience must alter the nature of those women ; that those who have learned to be well paid for their labors will gain economic independence, become hardened, and lose their womanly at¬ tributes. Such a contingency, it need hardly be said, would be an unspeakable disaster. On the other hand, it is expected that the physical exertion involved will produce a stronger, healthier race. Doctors have observed a con¬ siderable decrease of

nervous disorders among women in general, while the women of the wealthier classes were said to have ((forgotten their ills by from one-third to one-half.® This was said to be due to the numerous war activities to which women devoted themselves, in Red Cross work, etc. One physician in New York stated that since the war ((a breath of

fresh air® had come over the physical habits of all women, especially improvement in the <(fashionable slouch® walk, which he attributed to the unconscious influence of the military.

Another serious problem is the question of those girls and women who took the places in offices to relieve men called to the colors. Will these drift back into private life when the men return ? Already entrenched in business posi¬ tions by the invitation and acquiescence of man, woman's position must necessarily be strength¬ ened in the business world and her labor be¬ come more indispensable as time passes. It is not impossible that in America as in Europe the situation will adjust itself with a fair de¬ gree of equity, the qualified woman holding her place and the qualified man holding his, with the unfit of both sexes automatically falling out of the ranks. In Great Britain, less than 2,000,000 women were employed be¬ fore the war, mainly in textile mills. In June 1918 there were over 4,500,000 women and girls employed under the Board of Trade. Their devotion to the national cause has earned them the Parliamentary vote for which they had struggled in vain for many years. The suffrage bill passed the Commons by a vote of 385 to 56.

In France the feminist cult has never been strenuously practised; the professions did not appeal to French women. Satisfied to culti¬ vate the domestic virtues, their highest aims were to be good housewives. During the war they proved themselves no less patriotic, self-sacrificing and brave than their men. While there is no demand for the vote, the war is expected to raise the political status of women, but, according to M. Stephane Lauzanne of the Paris Matin, ((they will prefer to exercise it through their husbands and in their social life, rather than through the coarse medium of the ballot box.®

In Germany the feminist movement has not flourished. In her book, (Die moderne Frauen- bewegung,* Dr. Kaethe Schirmacher states that <(the political training of the German man has not yet been extended to include the principles of the American Declaration of Independence . . . his respect for individual liberty has

not yet been developed as in England; therefore he is much harder to win over to the cause of women's rights.® She says that <(Every war,

every accentuation and promotion of militarism is a weakening of the forces of civilization and of woman's influence.®

Despite the backward political and educa¬ tional conditions obtaining in Russia before the war, the position of intelligent women was not without hopeful prospects. There were numer¬ ous female doctors and teachers, many of them trained abroad. In Austria-Hungary and Italy circumstances were less encouraging, woman labor > being poorly paid, while in Spain the feminists have been unable to attract much support. Farther afield, the leaven of Western influence is perceptibly operating in the Orient ; female enlightenment is slowly penetrating into the harem and behind the purdah, smuggled through the barriers of antiquity bv white women doctors and missionaries. Japanese and Chinese women who have visited the United States or Great Britain cannot fail to take home with them the new gospel of free and independ¬ ent womanhood.

FEMMES

FEMUR

111

As mentioned above, it is in the English- speaking world that women have made the greatest strides toward the feminist goal of ab¬ solute economic, social and political freedom. The women of the United States, especially, have played a tremendous part in the creation and development of their country, a country which Europeans, not without justice, call ((the woman's paradise.® How far is feminine in¬ fluence in America responsible for the discon¬ certing mixture of idealism and practical sense, the shattering of conventions and ignoring of obstacles, that blind yet unerring faith in in¬ dividual action, and that callous neglect of all those inhibitions which arrest wild impulses? This intellectual and spiritual activity, more¬ over, has been communicated to millions of im¬ migrants from all parts of the world, of diverse races and nationalities. Whether the full participation of women in what was once regarded as exclusively masculine activity will evolve a <(third sex® — as feared by the pessi¬ mists — remains to be seen. Man has struggled, fought and bled for religious, political and eco¬ nomic freedom during centuries, and modern woman has emulated his example. Her insist¬ ent demands for self-determination and self- expression have gradually and inevitably forced their recognition. See Divorce; Women in the Industries ; Woman Suffrage.

Bibliography. — Anthony, K. S., feminism in Germany and

Scandinavia) (New York 1915) ; Bachofen, ‘Das Mutterrecht5 ; Backer, L. de, ‘Le Droit de la femme dans l’antiquiie5 ; Bader, C., (La femme grecque et la femme ro- maine5 ; Bax, E. B., ‘The Fraud of Feminism) (London 1913) ; Bebel, A., (Woman under Socialism) (New York 1904), and ‘ Woman in the Past, Present and Future) ; Bescherelle and Larcher, ‘La Femme jugee par les grands ecrivains des deux sexes5 (Paris 1846) ; Blease, W. L., ‘The Emancipation of English Women) (London) ; Bosanquet, H., (The Family) (Lon¬ don 1906) ; Braun, L., (Die Frauenfrage) (Leip¬ zig 1901) ; Browne, W. H., (Famous Women of History) (Philadelphia 1895) ; Bruns, Ivo, (New York 1915) ; Hartland, E. S., ‘Primitive Paternity5 ; Hartley, C. G. (Mrs. W M Gallichan), ‘The Truth About Woman5 (New York 1913) ; Hecker, E. A., ‘A Short History of Women’s Rights5 (New York 1914) ; Howard, G. E., ‘A History of Matrimonial

Institutions5 (3 vols., Chicago and London 1904) ; Key, Ellen, ‘The Woman Movement5 (New York 1911) ; ‘Love and Marriage5 (ib. 1911) and ‘The Century of the Child5 (1911) ; Laboulaye, E., ‘Recherches sur la condition civile et politique des femmes5 (Paris 1843) ; La Hire, M., ‘La femme franqaise5 (1917) ; Lange and Baumer, ‘Handbuch der Frauen- bewegung5 (Berlin 1901) ; Lafevre, M., ‘La Femme a travers l’histoire5 ; Legouve, E., ‘His- toire morale des femmes5 ; Letourneau, Ch., ‘La condition de la Femme5 (Paris 1903) and ‘Evolution of Marriage5 (Paris) ; Logan, Mrs. J. A., ‘The Part Taken by Women in Amer¬ ican History5 (Wilmington, Del., 1912) ; Lub¬ bock, John (Lord Avebury), ‘Origin of Civil¬ ization5 (London 1902) ; McCabe, J., ‘The Re¬ ligion of Women5 ; McCracken, E., ‘Women of America5 ; Martin, L. A., ‘Histoire de la femme5 ; Mill, J. S., ‘Subjection of Women5 (London 1869) ; McLennan, J. F., ‘Studies in Ancient History5 (New York 1896) ; North- cote, H., ‘Christianity and Sex Problems5 ; Parsons, Elsie, ‘The Family5 (New York 1906) ; Ploss, H., ‘Das Weib in der Natur- und Volkerkunde5 ; Rembaugh, B., ‘The Political Status of Women in the United States5 (New York 1911) ; Schreiner, Olive, ‘Woman and Labour5 (London 1911) ; Schirmacher, K., ‘The Modern Woman’s Rights Movement5 (New York 1912) ; Seawell, M. E., ‘The Ladies’ Battle5 (New York) ; Snowden, Ethel, ‘The Feminist Movement5 (London 1913) ; Squire, B., ‘The Woman Movement in America5 (Chicago 1911) ; Starcke, C. N., ‘The Primitive Family5 ; Tarbell, Ida, ‘The Book of Woman’s Power5 ; Thomas, W. J., ‘Sex and Society5; Ward, L., ‘Pure Sociology5 ; Wells, H. G., ‘A Modern Utopia5 and ‘Marriage5 ; Westermarck, E., ‘History of Human Marriage5 (London 1903) ; Wiese, L., ‘Zur Geschichte und Bildung der Frauen5 ; Wollstonecraft, M. (Mrs. Godwin), ‘A Vindication of the Rights of Woman5 (London 1792).

Henri F. Klein,

Editorial Staff of The Americana.

FEMMES, Savantes, fam sa'vant, Les. See Learned Ladies, The.

FEMUR, fe'mur, the large bone of the thigh. The femur is the chief supporting bone of the lower limbs and is in man the main or¬ gan of locomotion, for the larger muscles of the thigh and hip are attached to it. It is the largest and longest bone of the body. The upper extremity includes a head, neck, and two bony protuberances which give attachment to the muscles rotating it. The head fits into the socket in the hip-bone, making a ball-and-socket joint. (See Hip-Joint). It is this joint that so frequently becomes affected in tuberculosis, resulting in deformities, and also at this joint that the dislocation of the femur takes place. The main shaft of the femur is nearly circular above; below it is somewhat flattened, and run¬ ning throughout its entire posterior surface there is a rough ridge to which muscles are at¬ tached. The lower end of the femur is en¬ larged, and has two surfaces to articulate at the knee with the tibia and fibula of the leg. These are known as the internal and external condyles, the external one being the broader, the internal the narrower and more projecting

behind and to the sides. The upper portion of the front surface of the lower end of the femur is grooved to receive the patella or kneecap. The femur averages about 18 inches in the male, and is about one inch shorter in the female. It is inclined inward at an angle of about nine degrees in the male. In the female, by reason of the comparatively broader pelvis, the angle of the femur inward is greater. Consult Ger-rish, (Human Anatomy* (1902). See Skeleton.

FEN, a place overflowed with water, or abounding with bogs, as the bogs in Ireland, the fens in Lincolnshire, Kent, and Cambridge¬ shire. These fens abound in duck, teal, mal¬ lards, pike, eels, etc., and an herbage that is very nourishing to sheep and cattle. The soil of fen lands is generally black and rich to a depth of two or three feet.

FENCE, a structure or other barrier set to fend or ward off trespassing upon the lands enclosed. In most of the States the common law does not demand of an owner of land that he build a fence around it, but does require of an owner of cattle that he restrain them within fences upon his own land. But in the case of adjoining owners, one of whom

pas¬ tures cattle upon his land, the law requires that each build one-half of a fence upon the dividing line between them, and that each keeps his half in repair. The common saying in the farming districts is that a fence must be “horse high, bull strong, and pig tight® : that

is, so high that a horse cannot jump it, so strong that a bull cannot throw it down by charging

it, and so tight that a pig cannot crawl through it. In most of the States the legal height is four feet, in some it is four and one half feet. In most of the grazing States of the West and Southwest, the duty of protection by fences devolves upon the owner who desires protection. An owner without fences runs his own risk of damage by roving cattle. In England a ditch constitutes a fence in law.

The simplest fences, common in farming districts, are the snake or worm fence, and the post-and-rail fence. The former is built up of split rails or saplings laid in zigzag panels, the ends of the rails of one panel intersecting alternately with the ends of the next panel, with a pair of stout stakes driven into the ground at each side of the intersections to hold the fence upright. A modification of this fence results from the straightening out of the zigzags, and the tying of the stakes at the top with a withe or wire. Another of the cruder forms of the snake fence is the “grasshopper,® or stake-and- rider fence, in which the stakes are long and inclined so as to cross at about six rails above the ground, and the rider rail is laid in the crotch thus formed. An advance upon these primitive fences is the post-and-rail fence, the posts having (usually) four holes mortised through them, which receive the opposite ends of two lapping rails in each mortise. Another rough fence is the board fence, a simple line of posts 12 to 16 feet apart, according to the length of the boards, which are nailed on length¬ wise. An ornamental variation of this type of fence has the boards cut in short lengths and nailed on upright upon fencing strips set hori¬ zontally between the posts, the line at the top being scalloped on each panel. The picket fence is of better workmanship, the panels being

framed on the posts, and the pickets of various sizes, and set with many ornamental variations of design.

Another fencing material of universal use is galvanized iron wire, either round or as a narrow ribbon, and with or without barbs. This is fastened by staples, as many strands as neces¬ sary for the purpose, to posts set at considerable distances apart, and braced to stand the lateral strain required to stretch and keep the wires taut. The posts may be of wood, in which case the end set in the ground is charred, or

treated with creosote oils. Or they may be of re¬ inforced concrete, either solid or hollow. If wood is used, locust and red cedar are preferred as longest lived, with chestnut second choice. A great deal of wire fencing is made by ma¬ chinery which weaves it into oblong meshes of various shapes smaller at the bottom and larger at the top. Besides this ready made factory fence, machines are furnished for weaving the fence upon the posts in the field. Several com¬ binations are produced in this line, some with wooden pickets twisted into horizontal wires, or with flat or round wire pickets. These fences are cheap to buy, and very economical in endurance. In some localities cast iron fenc¬ ing is in vogue, and some handsome imita¬ tions of hammered wrought iron are produced. This type of fence when set with red brick posts or mounted upon a low red brick wall is very pleasing in appearance, and of great durability.

Stone fences are sometimes mere heaps of loose stones, but oftener are carefully laid up with dry wall faces, when they are sightly and most durable. The masonry fence lends itself to architectural treatment, and many most artis¬ tic effects have been produced especially in the matter of gateways. Rustic fences of cedar and arbor vitae are alwajˆs attractive in rural surroundings, but need frequent repair.

In more recent years the concrete fence has come much into favor, especially where ornamental effects were striven for. Chief of these are the bold treatment of posts outstand¬ ing from the line of the wall at equal intervals, with well-proportioned paneling between, and decorated with square, oval or round medal¬ lions. Variety is also given by mixing the ce¬ ment with variously colored sands, broken brick or coal screenings, or adding red or yellow earths to secure special tints, and gravel or broken stone of different sizes to gain texture. Textural effects are heightened by playing a hose upon the green cement, or using a sand blast on the dry wall.

Live fences, or hedges, are highly favored in most localities. Privet, locust, osage orange, the buckthorn and cockspur thorn, the rose of Sharon, and the Japanese barberry are among the best of the deciduous plants used for hedges. Among the evergreens, arbor vitae, juniper, box, hemlock, and spruce are eminently satisfactory.

Bibliography. — Butterfield, W. H., ‘Mak¬ ing Fences, Walls and Hedges* (New York 1914) ; Colorado Agricultural Experiment Station ‘Bulletins 148 and 161 > (Fort Collins, Colo. 1909 and 1910) ; Illinois Agricultural Ex¬ periment Station ‘Circular 132* (Urbana, Ill., 1909) ; Ohio Agricultural Experiment Station ‘Bulletin 219* (Wooster, Ohio, 1910) ; United States Department of Agriculture ‘Farmers’

Bulletin 403) (Washington 1910) ; Wisconsin Agricultural Experiment Station (Circular of Information 5> (Madison, Wis., 1909).

FENCE LIZARD. See Sceloporus; Swift.

FENCE-VIEWERS, town officers in New England to supervise the erection and repair of fences along the highways, or of boundary fences between private owners if called upon by either party. In early colonial days they had other duties also, including that of build¬ ing inspectors.

FENCED CITIES. Frequently mentioned in the Old Testament scriptures. The village seemed always to be unwalled. The cities were ((fenced in with one or more walls, crowned with battlements, parapets and having towers at regular intervals.® These were made for watchmen in war time or for the placing of engines of warfare. The cities were usually built on mounds or hills that they might be the better defended. The walls were of solid masonry, sometimes including very large stones. Occasionally a wall would be built within a wall. In the centre of the city there was usual¬ ly an acropolis or citadel built as nearly impreg¬ nable as possible, and often made the last refuge of a besieged host and was defended to the very last.

FENCING, the art of attack and defense, with any weapon having either a point or an edge. In the general acceptance of the word, it means the use of the sword or foil, particu¬ larly the latter. All swords may be divided into two general classes, small swords and broadswords ; the former being one with which the attack is delivered with the point only, the latter one that has a cutting edge.

The foil used in fencing represents the small sword. The earliest swords of which there are any authentic records were those of the Assyrians and Greeks. They were straight or leaf-shaped, and made of bronze. The swords of the Romans were of steel, short, straight and double-edged.

Light armor was worn by both the Greeks and the Romans, and a shield was carried for defense. During the Middle Ages when com¬ plete armor was worn, the sword was a long, heavy weapon used for striking blows, reliance being placed entirely upon the armor for de¬ fensive purposes.

When, after the invention of gunpowder, armor began to be discarded, it became evident that some other means of defense must be discovered, and it was in meeting this need that the art of fencing came into existence. The Italians were the first to recognize the fact that the point was more deadly than the edge, and that a thrust could be delivered more quickly than a blow, and to them belongs the credit of laying the foundation of the present school of fence. They invented the rapier, a long, straight sword having a cup-shaped guard with quillons, which was the parent of the small sword and foil. The early rapier was a weapon of offense only, parries being made with a dag¬ ger held in the left hand, or the point avoided by a leap aside. Camillo Agrippa of Milan was the first man to divide the body into four parts and to assign a definite guard to each. Agrippa published a book in 1553 explaining his

system, which is said to have been illustrated by Michelangelo.

When daggers ceased to be worn, the cloak wrapped around the left arm was used in parrying. Later as the art of fence became better known, even the cloak was discarded, and the sword became a weapon of defense as well as offense.

While the Italians were building up their school on practical lines, the Spaniards invented a most complicated system of fence based on mathematical and geometrical principles. It was, however, of little use in actual fighting save that it taught coolness. The French and English were both followers of the Italian school, rapier play being introduced into Eng¬ land during the early part of Queen Elizabeth's reign. During the 18th century, the rapier, which had been constantly growing lighter, was replaced in France by the small sword, a weapon almost as light as our modern foil. The Italians, however, still clung to their ancient weapon and hence arose the two rival schools of fence, the French and the Italian. Fencing masks also came into use at this time.

Broadsword play in some form or other was in existence during the periods of both the rapier and small sword and did not differ in its essential features from the system in use to-day. The Scots have always been especially noted for their dexterous use of the claymore, a species of heavy broadsword.

The French foil used in fencing consists of a quadrangular-shaped blade about 33 inches long, mounted in a slightly curved handle, and

having either a bell-shaped or ring guard. The blade is divided into two imaginary parts, the part nearest the point being termed the ((feeble,® that nearest the guard the ((forte.® Parries are made by opposing the forte of one blade to the feeble of another. The foil is held in the right hand with fingers underneath, the thumb extended along the upper part of the handle and nearly touching the guard. The thumb and forefinger direct the blade, the grasp of the other fingers being tightened or relaxed as oc¬ casion requires. In coming ((on guard® the fen¬ cer raises his hand to the height of his breast, curves his arm so that his elbow will be about six inches from his body, and places the point of his foil on a level with his adversary's eye. At the same time he places his feet at right angles, about 12 inches apart, with the right foot in front, bends his knees, keeping the weight of the body slightly more on the left leg than on the right, and curves the left arm so that the hand will be behind the head. For fencing purposes, the body is divided into inside and outside, and high and low lines; an inside line being one to the left of the blade, an outside line one to the right of it ; a high line one above the hand and a low line one below it. The high inside lines are termed Prime and Quarte, the low ones Septime and Quinte. The high outside lines are Tierce and Sixte, the low ones Octave and Seconde. All attacks, no matter how complicated, must eventually be delivered in one of these lines. For each attack there is a simple and a counter parry. Simple parries are made by turning aside the opposing blade in the line in which the attack is delivered ; counter parries are made by circling round the blade and carrying

it off in the line from which the attack began. To deliver an attack, the right hand is raised quickly to the height of the face, the right arm straight, and the point directed against the place to be attacked. At the same time, the left leg is straightened, the right foot advanced and the left hand dropped to a position about four inches above the left knee. This move¬ ment is termed the "Lunge.®

Whenever fencers are in the position of guard opposing each other, they are said to be ˆ'engaged.® Carrying the blade into another line is called "disengaging.® An opening for an attack is made by feinting in one line and at¬ tacking in another by forcing the blade aside, or by a combination of these movements. Af¬ ter a parry, a fencer delivers a return thrust termed a "Riposte,® with which he endeavors to hit his opponent before he can recover his guard.

Hits only count when the point is placed squarely on the jacket between the neck and the hip. Disarming does not count and is not now practised to any great extent. The Italian foil is a trifle longer than the French one and has a straight handle, a bell guard and quillons. It is held by hooking the first and second fingers of the right hand around the quillons, the other fingers being tightly grasped around the handle, while the thumb is placed over the flat piece of the blade which is between the guard and its crosspiece. Further rigidity of the grasp is often assured by binding the foil tightly against the wrist with a long piece of tape. When on guard, the right arm is nearly straight, on a line with the shoulder, with the point directed at the opponent's chest. The body is. always more effaced (turned away from the opponent) in the Italian school than in the French. The Italians divide the body into eight lines, as do the French, but as a general rule they use only four of them (quarte, tierce, septime and seconde) in making their attacks. Their par¬ ries are made more forcibly than those of the French; in some of them the movement of the forearm being very pronounced. The Italians fence much more vigorously than do the French and have a number of startling tricks, such as dropping under, or stepping away from the op¬ posing blade, which they have retained from their old rapier play. The dueling sword is a heavier kind of foil, having a triangular blade and a large bell guard. It is used in nearly the same manner as a foil, but a hit may be made with it upon, any part of the person.

In the use of the broadsword the attack is delivered with the edge rather than with the point. A limited number of thrusts can be made with it, but it is primarily a cutting weapon. The swords used for this kind of fenc¬ ing are of various weights and shapes, the majority of them, however, are of the sabre model, with blunted edges and rounded points. Wooden singlesticks are also used. In assum¬ ing the position of guard, the sword is held in the right hand with the thumb extended along the back of the grip, the edge to the right, with the hand at the height of the breast. The posi¬ tions of the body and the feet are the same as in foil fencing, but the left hand is placed at the small of the back instead of behind the head. Attacks with the broadswords are made by giving a cutting blow with the edge. Cuts are made for the head, cheek, chest, girdle, flank,

thigh, leg and arm. Thrusts with the point may also be made at the body. Cuts are par¬ ried with the edge; thrusts, with the back of the blade.

The student corps of Germany have a sys¬ tem of fence with a long straight sharp sword called a schlager, which differs from sabre play,

in that the cuts are directed solely against the head. In this kind of fencing, masks are not worn, the eyes, ears and throat alone being protected, the sword arm is heavily padded and the blows are made with a wrist movement only.

The Japanese have a method of sword play which differs greatly from any of the present European systems. Their sword is a weapon some two and a half to three feet in length, having a heavily backed blade, a very sharp edge, a long handle and a small protecting guard. It is wielded with both hands, the right hand being placed close to the guard and the left hand grasping the end of the grip. The first two fingers of both hands control and direct the blow, the grasp of the other fingers being tightened or loosened as occasion requires. The edge is generally kept downward while on guard. Cuts are made for the head, wrist and waist, and thrusts for the throat and abdomen. A marked peculiarity of Japanese fencing is that parries are always made with the back or side of the blade, never with the edge. Bamboo swords are used for practice.

The bayonet attached to the end of a rifle makes a formidable weapon which is wielded in the same general manner as the small sword. In the position of guard, however, the left foot is in front, and the piece is grasped at the small of the stock, with the right hand, and at the balance with the left. When employed against cavalry the footman endeavors if pos¬ sible to attack the horseman from the left side.

Among the famous fencers of the past, four men stand out pre-eminently. These were the Chevalier de Saint Georges ; the Chevalier d'Eon de Beaumont; Henry Angelo; and Jean Louis; all of whom lived during the latter part of the 18th or the early part of the 19th cen¬ tury, and were renowned for their great skill at fence. The prominent fencing masters of the modern days are Merignac, Prevost and Rouleau of the French school; and Conte and Pini of the Italian school. In the United States Gousky, Senac and Rondelle are perhaps the best known masters. Contests for the amateur fencing champions of America are held annually under the auspices of the Amateur Fencers League of America, which was organ¬ ized in 1891 and is affiliated with the Amateur Athletic Union.

Consult Brock, (Fencing in America) (in Outing Magazine, New York 1912-13) ; Castle, E., 'Schools and Masters of Fence) (ib. 1902) ; Czeipek, (Die Fechtkunst im DuelP (Gratz 1897); 'Bazancourt, 'Secrets of the Sword) ; Hergsell, (Die Fechtkunst im XV and XVI JahrhunderP (Prague 1896) ; Hutton, A., 'Old Sword. Play> (New York 1899) ; id., (The Sword and the Centuries) (ib. 1901); Pavese, 'Foil and Sabre

Fencing* (ib. 1905) ; Pollock et al., ‘Fencing, with a Complete Bibliography) (London 1902) ; Ristow ‘Die moderne Fecht¬ kunst ’ (Prague 1896) ; id., ‘Praktische Ba- jonett-Fechtschule nach der Bajonettir-Vor- schrift fur die Infanterie) (Berlin 1889) ;

FENCING

1 On Guard

2 Attack and Parry of Quarte

3 Attack and Parry of Tierce

4 Attack and Parry of Septime

5 Attack and Parry of Seconde

6 A Riposte in Seconde, after a Parry of Tierce

Rondelle, L., Eoil and Sabre) ; Thimm,

Fred Gilbert Blakeslee, Late Swordmaster 1st Regiment, Connecticut

National Guard.

FENDALL, Josias, colonial governor of Maryland: b. England about 1620. He was appointed governor of Maryland 1656 and re¬ ceived a large landed estate from Lord Balti¬ more. He was taken prisoner by the Puritans and released in the same year and went to Eng¬ land ; returned in 1657 ; was in 1660 superseded by Calvert and sentenced to banishment and forfeiture, but pardoned; and was heavily fined and banished for sedition 1681.

FENDER, a metal guard placed about an open grate as a safeguard against the dropping of cinders on the floor or rugs. Fenders are usually of iron, steel or brass and some are very artistic in design. The term is applied also to devices for protecting a ship's side from chafing against a dock or from other injury. These devices are of various kinds ; some being constructed of rope and canvas, others of cork. Heavy pieces of wood are also used, especially by tugboats; and in the United States navy coUon bales lashed with rope have been used while coaling vessels at sea. At present Spanish cane is largely used.

FENELON, Frangois de Salignac de la Mothe, fran-swa de sa-li-nyak de la mo-t fan-ion, French missionary: b. 1641; d. 1679. He was a half-brother of Archbishop Fenelon (q.v.). He sailed for Quebec in 1667 in re¬ sponse to Bishop Laval's appeal for missionary reinforcements. He was ordained in the fol¬ lowing year, and being a Sulpician established a mission to the Cayugas at Quinte Bay. Here he remained till 1673, when the Recollets replaced the Sulpicians on the north shore of Lake Ontario. In 1674 he offended the choleric Frontenac, governor of New France, by a sermon in which a covert attack was made on the governor, was summoned before the council, compelled to leave the country, and on his arrival in France was forbidden to re¬ turn.

FENELON, Frangois de Salignac de la Mothe, French prelate: b. Chateau de Fene¬ lon, Perigord, France, 6 Aug. 1651 ; d. Cambray, 7 Jan. 1715. He was educated at Plessis Col¬ lege in Paris and at the seminary of Saint Sul- pice, where he received holy orders in 1675. In 1678 he was appointed head of an institution, then newly organized

in Paris, for the recep¬ tion of women converts to the Roman Catholic faith; and the success with which he there dis¬ charged his duties led to his appointment in 1686 as head of a mission to Saintonge for the conversion of the Huguenots. In J689 Louis XIV entrusted to him the education of his grandson, the duke of Burgundy, and to his task he devoted himself with unwearied assidu¬ ity. In the result it was held that the duke was brought up on too high ideals, which left him pious but emasculated ; and in 1694 he was created archbishop of Cambray. A theological dispute with Bossuet, his former instructor, on the subject of Quietism (q.v.), terminated in the condemnation of Fenelon's side of the controversy by Pope Innocent XII

and his banishment to his diocese by Louis XIV. To the Pope's decision Fenelon unreservedly and humbly submitted. The rest of his life was spent in devoted labor in his diocese.

His works on philosophy, theology and the belles-lettres have immortalized his name. He was familiar with the best models of ancient and modern times and his mind was animated by a mild and gentle spirit of benevolence. His style is fluent and pleasing, pure and harmo¬ nious. His most celebrated work is (Les Aven- tures de Telemaque, in which he endeavored to exhibit a model for the education of a prince. It was carried off and published by a valet employed to transcribe the manuscript. On the appearance of this work Louis manifested dis¬ pleasure toward Fenelon, conceiving this his¬ torical romance to be a satire on his reign and forbade the completion of the printing. Some malicious persons pretended, what Fenelon him¬ self never thought of, that the characters were thin disguises of personages at the court. But there was nothing singular, apart from the sus¬ picion referred to, in the king's displeasure. Fenelon's liberal ideas, as embodied in the book, that the king existed for his subjects and not they for him, were anathema to an absolute monarch. Nor was he ever dazzled by the veneer of splendor and the military glories of the reign. Among his other works are (Traite de l'Education des Filles) ; (See Telemaque). Consult Ramsay, die de Fenelon* (1725) ; Bossuet, 'Histoire de Fenelon* (1808) ; Gosselin, (His- toire Litteraire de Fenelon* (1843) ; Butler, (Life of Fenelon* (1810); Lamartine (1854); Roy, (Histoire de Fenelon* (1842) ; Werfer, Eeben des Fenelon* (1852) ; Gandar, Eenelon et son Temps) (1864); Lear, Eenelon, Arch¬ bishop of CambraP (1876) ; Crousle, Eenelon et Bassuet* (1895); Sanders, Eenelon; His Friends and His Enemies* (1901) ; Saint Cyres, Erancois de Fenelon* (1901) ; Duclas, (The French Ideal: Pascal Fenelon, and other Essavs* (1911).

FENELON FALLS, Canada, township in Victoria County, province of

Ontario, 16 miles north of Lindsay. A waterfall 300 feet wide, 21 feet high, is the chief attraction of the place. The river affords facilities for the transporta¬ tion of lumber, in which the vicinity abounds. Pop. 1,053.

FENESTELLA, Roman historian: b. about 51 b.c. ; d. 19 a.d. He took Varro as his model and in his works discussed out-of-the-way incidents, social customs and literary history. He wrote the (Annales* in 22 books, which chronicled everything down to his own day. It was used by Asconius Pedianus, Pliny the Elder, Gellius and Lactantius, Monius, etc. The fragments which remain show the great variety of subjects treated by the author. The fragments are found in Peter (Historicorum Romanorum fragmenta) (Leipzig 1883). Consult Mercklin, L.,

(History of Roman Literature.*

FENESTRATION (1) in architecture, is, in contradistinction to columniation, the system of construction, mode of design and arrangement of windows in a building. (2)In zoology and anatomy, the process of being perforated or fenestrated.

FENGHUANG (fung'hwang') CHENG, Manchuria, a town 45 miles northwest of Antung. It was the scene of a conflict between the Chinese and the Japanese on 13 Dec. 1894 and was occupied by General Kuroki on 6 May 1904. See Russo-Japanese War.

FENIANS, a name said to be derived from Fionn or Finn, an Irish hero of the 2d century, assumed in recent times by those Irish who formed a brotherhood in their own and other countries, which aimed at terminating English rule in Ireland by force of arms and the establishment of an Irish republic. It first took shape when James Stephens, working on plans prepared by a group of Irish revolutionary exiles at Paris in 1848, organized in 1853, by aid of the Phoenix Society th'e Irish Revolu¬ tionary Brotherhood, which was the name as¬ sumed in Ireland. He was officially known as chief organizer and had as assistants one repre¬ sentative from each of the four Irish provinces, with officers under them. The movement spread with great rapidity and was linked up with sympathizers of the Irish race all over the world, including the British colonies. The American society was organized concurrently by John D. O'Mahoney as head centre and its

purpose was to supply money and arms for a revolutionary outbreak in Ireland. As a secret society the movement fell under the ban of the Catholic Church.

The close of the American Civil War, when large numbers of trained Irish soldiers who had taken part in the war were released from service, was thought to be a convenient time for taking some decisive steps. Two risings were planned in Ireland, but they were both frustrated by the English government, which had received timely information. The first, in September 1865, was prevented by the seizure of the office of the Irish People, the Fenian journal published at Dublin, in which papers were found which revealed to the government the secrets of the conspiracy and which led to the capture of a number of suspects. The second, in February 1866, was suppressed after the suspension of the Habeas Corpus Act in Ireland.

An invasion of Canada was attempted in the same year. The advocates of Ireland's inde¬ pendence counted upon aid from the veterans of the Civil War, who were incensed at England's attitude toward the United States during the war. In this they were not disappointed; as among the trained men who were under com¬ mand of General Sweeney, himself an ex-officer of the United States army, there were many men not of Irish blood or lineage. The troops under General Sweeney are estimated to have been at least 35,000 in number; but so well was the recruiting done that reserve forces who never went to the frontier numbered about 200,000. General Sweeney's men, in May 1866. were stationed at various points on the frontier from Lake Erie to Lake Champlain; at Saint Albans, Vt., under General Spear; at Rouse's Point, N. Y.f under General Reilly; at

Malone, N. Y. under Col. Michael C. Murphy and around Buffalo, under Gen. John O'Neill. Large quantities of arms and am- mution were sent north, a sufficient amount for 50,000 men ; but the United States officials hearing of the expected raid, seized the con¬ signment of arms addressed to suspected Fenians and when the troops arrived on the frontier they were powerless because of lack of arms. An attempt was made to regain them, but the officers were arrested by the United States government. General O'Neil invaded Canada by way of Fort Erie and two battles followed, in both of which O'Neill was success¬ ful. One known as the "Battle of Ridgeway, w occurred 1 June 1866. Reinforcements not arriving as expected, O'Neill abandoned the place and returned to the American side. He, his staff and men were captured by the United States gunboat Michigan. The whole move¬ ment was crushed at that time by the United States forces under General Meade, who acted under government

instructions in accordance with an arrangement between the United States and England. In February 1867 an attempt to seize arms and ammunition in Chester Castle and convey them to Ireland was frustrated; and on 18 September of that year occurred the release by force of prisoners from a prison van which was conveying Kelly, the Fenian chief, and Deasy, his assistant, to Manchester prison. Later one of the walls of Clerkenwell prison, in which Fenian sympathizers were in¬ carcerated, was blown in. In 1870 and 1871 other and unsuccessful attempts were made to gain a foothold in Canada. Various crimes and attempted crimes against the English government and anti-Home Rule leaders were charged against the Fenians; but they were repudiated and denounced by the Fenians themselves, and all attempts to prove them guilty failed. The Fenian move¬ ment was badly led ; its chiefs lacked the military skill necessary to accomplish great things; there were dissensions within the ranks and in the United States a good deal of “grafU ; the British government was kept well informed as to what was going on. As a mili¬ tary movement it failed; but it impressed on English statesmen the truth that force and repression were no remedies for Irish discon¬ tent. It was the blowing in of the wall of Clerkenwell prison that first drew Gladstone’s attention to the root cause of Irish disaffection, the ascendency of a Protestant minority in a Catholic country, and drew from him the prompt demand for the disestablishment of the Prot¬ estant Episcopal Church in Ireland. Consult for the English point of view, J. Rutherford, (The Secret History of the Fenian Conspiracy> (2 vols., London 1877) ; from the Irish stand¬ point, McCarthy, (Ireland Since the Union* (London 1877) ; Savage, (Fenian. Martyrs and Heroes* (Boston 1864); A. M. Sullivan, (New Ireland* (Philadelphia 1878) ; also MacDonald, (Troublous Times in Canada) (Toronto 1910) ; and the informer Le Caron’s narrative, (Twenty-five Years in the Secret Service) (London 1892).

FENN, George Manville, English novelist: b. ˆ Westminister, 3 Jan. 1831; d. 26 Aug. 1909. His earliest literary ventures were short sketches

published in All the Year Round J Chambers’ Journal and Once a Week (of which he became proprietor in 1873). In 1867 he published (Hol- lowdell Grange,5 a story for boys, which was succeeded by over 100 excellent and highly popular tales and novels, many of them boys’ stories, and over a thousand short stories and magazine articles. He

also produced, either alone or in collaboration, several works for the stage.

FENN, Harry, American artist : b. Rich¬ mond, Surrey, England, 14 Sept. 1838; d. 1911. He removed to the United States in 1856 and achieved great success as an illustrator of books. He was one of the founders of the American Water Color Society. Some of his best work is contained in (Picturesque Ameri¬ ca5 ; (Picturesque Europe5 ; and (Picturesque Palestine. His drawings are spirited, of ex¬ quisite finish, and reveal delicate qualities of perception and feeling for nature. He was a lecturer on Oriental subjects and received a gold medal at the Chicago World's Fair in

1893.

FENN, William Wallace, American Unita¬ rian clergyman: b. Boston, 12 Feb. 1862. He was graduated at Harvard 1884 and at the Har¬ vard Divinity School 1887, and was ordained to the ministry in 1890. He has had charge of churches in Pittsfield, Mass. (1887-91), and Chicago (1891-1901). He was lecturer on bibli¬ cal literature in Meadville Theological School 1892-1901, and in the last-named year was ap¬ pointed professor of systematic theology in Harvard Divinity School and in 1906 dean of the Faculty of Divinity. He has published (Lessons on Luke5 (1890) ; (Lessons on the Acts5 (1894) ; (The Flowering of the Hebrew Religion5 (1894) ; Lessons on Psalms5 (1900).

FENNEC, a small desert animal (Canisor Fennecus zerda) found in the Sahara, which looks like a diminutive fox. It is of a pale creamy yellow color, harmonizing well with its sandy habitat ; its breast is white and the tail tipped with black. It is a graceful little animal, about 15 inches long, with a bushy tail about 7 inches in length, and its small face and large erect ears give it an expression of attentive hearkening for unseen foes. It burrows into the sand and can dig so rapidly as to escape pursuers. It is, like most of its kind, nocturnal in habits, searching for water and its food — small birds, mice and insects • — after the sun sets, spending the day curled up in its burrow.

FENNEL, a genus of plants, F ceniculum, of the Parsley family, consisting of four species of annual or perennial herbs, natives of the Mediterranean region. Common fennel (F . fceniculum) is often grown for its aromatic leaves and seeds, which are used for flavoring. Fennel has run wild in some parts of North America, especially in California, where it is said sometimes to reach a height of 12 to 15

feet and become a great pest.

FENNELL, James, Anglo-American actor: b. London, 1766; d. 1816. He received his edu¬ cation at Eton College and at the University of Cambridge. His habits, however, led to his withdrawal from the university and to make a living he was obliged to go on the stage. In 1787, at Edinburgh, he made his debut as Othello, a role in which he was very successful.

He came to the United States in 1793, having received an invitation from Philadelphia. He played in American cities for many years, but his later years were passed in straitened cir¬ cumstances. Consult his (Apology for the Life of James Fennell5 (Philadelphia 1814).

FENTON, Elijah, English poet: b. Shelton, Staffordshire, 20 May 1683; d. August 1730. He studied at Cambridge, but becoming a non¬ juror he was obliged to leave tne university, after which he accompanied the Earl of Orrery to Flanders as private secretary. Some years later Fenton became associated with Pope, who was then undertaking his version of the 'Odyssey5 and was in quest of assistants. Ac¬ cording to Dr. Johnson, Fenton translated the 1st, 4th, 19th and 20th books of that poem. In 1723 a tragedy, entitled (Mariamne,5 which he brought out, had an immense success and gained him nearly £1,000. In 1727 he published a new edition of Milton's works, to which he prefixed a brief and elegant life of the author. This was soon followed by a fine annotated edi¬ tion of Waller.

FENTON, Reuben Eaton, American states¬ man : b. Carroll, Chautauqua County, N. Y., '4 July 1819; d. Jamestown, N. Y., 25 Aug. 1885. He was admitted to the bar in 1841, was elected to Congress in 1852 and there opposed the fur¬ ther extension of slavery. From 1857-65 he was again a member of Congress, and he was Governor of New York 1865-68. In 1869-75 he sat in the United States Senate, and in 1878 was chairman of the United States Commission to the International Monetary Conference in Paris.

FENTON, England. See Stoke-upon- Trent.

FENUGREEK, the seed of Trigonella fce- numgrcecum, a plant of eastern Europe and western Asia. It is a member of the clover family and has been used, like clover, for many years as a fodder plant. The seed contains an aromatic essential oil and has been very exten¬ sively used as a seasoning. In medicine its use has practically been abandoned, although the seed has unquestionably many excellent prop¬ erties, its food value alone being considerable. It is still very

extensively used in veterinary practice.

FENWICK, George, American colonist : b. England, about 1603; d. 15 March 1657. He came to America in 1636 to take charge of the plantation of Saybrook, so called after Lords Say and Brook, who, with others, in 1632 had procured a patent for the territory from Robert, Earl of Warwick. Returning to Eng¬ land he came back again in 1639, and from that time, as one of the patentees and agent for the others, superintended and governed the settle¬ ment of Saybrook till 1644, when he sold its jurisdiction and territory to the Connecticut colony, as his associates had given up their con¬ templated removal to America. He returned to England in 1645, served in the Cromwellian army and was governor of Berwick in 1648; was appointed one of the judges for the trial of Charles I, but did not act in that capacity. He served in Cromwell's army in Scotland in 1650.

FENWICK, or FENWICKE, John, Amer¬ ican colonist: b. England, 3618; d. 1683. He was a Quaker and settled at Salem, N. J., in

1675 with a colony of Quakers. Disputes arose with Governor Andros of New York and Fen¬ wick was arrested and remained two years in prison, being released on parole. His land grants passed to the possession of others during his life and he died in poverty. Consult A. C. Myers (ed.) (Narratives of Early Pennsylvania, West New Jersey and Delaware) (1912).

FENWICK, Sir John, English conspira¬ tor: b. England, about 1645: d. 28 Jan. 1697. He became major-general in the army and was a member of Parliament in 1677. He con¬ spired with others against William III and was accused of participation in the Assassination Plot in 1696. A bill of attainder being passed, he was executed for high treason, the last execution in Great Britain in consequence of attainder.

FˆNYES, fa'nyesh, Alexius, Hungarian statistician : b. Csokaly 1807 ; d. 1876. He re¬ ceived his education at Grosswardein and at Pressburg. He toured Europe and lived in Budapest for a time, collecting data on the geography and statistics of Hungary. After 1835 he lived in Budapest. He became chief of statistics in the Ministry of the Interior in 1848. He wrote a monumental historical and geo¬ graphical report on Hungary (1839), for which he was awarded a prize by the Learned

Society of Hungary. He published also (Magyarorszag Statistikaja) (2d ed., 1844) and an atlas for schools.

FEODOR I, Ivanovitch, e-van'o*-vich fa'o- dor, Russian tsar: b. 11 May 1557; d. 7 Jan. 1598. He began his reign in 1584, and being weak both in body and mind assigned the gov¬ ernment of his affairs to Boris Godunoff, who seems to have managed them with dexterity and vigor. In his reign the peasants of Muscovy were converted into serfs and attached to the land. Previously they had enjoyed personal lib¬ erty. The conquest of Siberia was achieved by Godunoff, and many remarkable diplomatic rela¬ tions with foreign courts were affected.

FEORDOR II, tsar of Russia and eldest brother of Peter the Great: b. 8 June 1656; d. Moscow, 27 April 1682. He ascended the throne when only 19, and evinced a strength of will and determination of character which, had he lived, might have anticipated the reforms which his younger brother subsequently effected. His reign is rendered memorable on account of his calling into his presence the Muscovite nobles, who desolated the country with broils about their claims of family precedence, and throwing the rolls of the Razriad or ˆArrangement® into the fire. The genealogical records, which did not relate to claims of precedence, were pre¬ served and properly arranged in accordance with his will.

FEODOSIA, fa-6-do'se-a (ancient Caffa or Kaffa), Russia, town and watering place on the west angle of a magnificent bay in the southeast of the Crimea, 62 miles east of Sim- perofol. It is the seat of a cathedral, has an Armenian church dating from 1327, a mosque and a museum of antiquities. It has an excel¬ lent harbor; carpets, rugs and soaps are among its manufactures; it is famous for the quality of the grapes grown in the district. The ancient Theodosia, from which the modern Feodosia takes its name, was founded at a

very early period by a colony of Greeks from Ionia, and its site was probably not far Irom its modern namesake. From 1266 to 1474 or 147 :> this town was in the possession of the Genoese, except for a short interval when it was held by the Venetians. While in the hands of the Genoese it was the seat of an extensive com¬ merce with the East by way of Astrakhan and the Caspian Sea. From the Genoese it was taken by the Turks, and in 1774 it was taken by the Russians. Pop. 37,961.

FEOFFMENT, in law, a grant or convey¬ ance of a freehold or fee in lands; also, the deed granting a fee in such lands. It was for a considerable period the only method by which freehold land could be

alienated in England. It was accompanied originally by a ceremony in which the feoffor gave to the feoffee while both were on the land a twig or a turf, symbolic of the transfer of the property, and declared his intention to deliver possession to the feoffee and stated whether the estate was in fee, in tail, or for life. This was called livery in deed. By another ceremony, the parties being in sight of but not on the land, the feoffor gave pos¬ session to the feoffee by indicating the land and instructing him to enter. This was called livery in law. Writing was unnecessary until so made by the English Statute of Frauds, and by a later statute (1845) a feoffment was declared to be void unless evidenced by a deed. In England feoffments have been rendered superfluous by legislation, but in Scotland to-day the old usage is still followed of acceptance by the superior and the performance of necessary services on such acceptance, alienation of a heritage being incomplete in the absence of formal confirma¬ tion by the superior.

FER-DE-LANCE, far-de-lans, the lance¬ headed or yellow viper (Lachesis lanceolatus) , a serpent native to northeastern South Amer¬ ica, and one of the most terrible members of the rattlesnake family. It is ordinarily six feet in length when full-grown and has no rattle, but the tail ends in a horny spine, which is vibrated rapidly when the snake is excited. It has the general appearance and habits of the rattlesnake (q.v.), attacks without provoca¬ tion and without warning, feeds upon small mammals, frogs and the like, and was long ago introduced into Martinique, Santa Lucia and a few other of the Antilles as a means of de¬ vouring the rats which were a pest to the fields of sugarcane. It flourished and multiplied greatly, producing dozens of young, and has become greatly dreaded by all who work in the fields of those islands. The Indian mongoose was introduced into those islands with the idea of rooting out the fer-de-lance, but he generally leaves him alone, preferring the de¬ struction of poultry. Consult Ditmars, Rep¬ tiles of the World > (1910) ; Gadow, (Amphibia and Reptiles) (1901).

FERZE, fe’re, wild animals; a term adopted by Linnaeus for one of his orders of Mammalia, embracing a variety of carnivorous animals now scientifically reclassified.

FER.7E NATURE, fe’re na-tu’re (((of a wild nature®), the legal name for beasts and birds that are wild or non-domesticated, such as deer, hare, pheasants, partridges, etc., as contra¬ distinguished from those which are domita

naturae, that is, tame animals, such as horses, sheep, etc. The Roman law held such animals as naturally belonging to the first person who should take possession of them, but regarded the right of possession as continuing only as long as the possessor kept them in confinement. As soon as the animal escaped it again became common property, and might be taken pos¬ session of by any other person who could cap¬ ture it, unless the animal had an animum revertendi, that is, an intention of return¬ ing, which it was to be presumed it had, if it had been trained to return to its master's property, and was in the habit of doing so. This principle has been adopted by both British and American law. When such animals as are classed as ferae naturae make nests or burrows on any person's property and have young, the young are held as belonging to this person as long as they are unable to fly or run away. Those persons who have the right of hunting, taking or killing those wild animals which are included under the designation of game have a qualified property in such animals as long as they continue within their liberty, but no longer. A person who keeps an animal indisputably ferae naturae is responsible for any injury which it may do to the person or property of another. Consult Schouler, (Treatise on the Law of Per¬ sonal Property, (1896).

FERAUD-GIRAUD, faTo-zhe'rd, Louis Joseph Delphin, French jurist: b. Marseilles, 1819. He received his education at the Univer¬ sity of Aix and in 1851 was appointed a judge there. He became councillor to the Cours de Cassation in 1878. His published works in¬ clude Servitudes de voirie) (1852) ; (Traite de la grande voirie et de la voirie urbaine) (1865) ; Occupation militaire) (1881); (Code des mines et des mineurs) (1887) ; (Etats et souverains) (1895) ; (Traite des voies rurales publiques et privees et servitudes rurales de passage en-claues) (1896).

FERDINAND I (surnamed The Just), king of Aragon: b. 1379; d. Igualada, 2 April 1416. He was king of Aragon 1412—16, and was succeeded by his son, Alfonso V.

FERDINAND II, king of Aragon. See Ferdinand V of Castile.

FERDINAND I, emperor of Austria: b. Vienna, 19 April 1793; d. Pesth, 29 June 1875. He was a son of Francis I, suffered from epi¬ leptic fits in boyhood and from periods of in¬ sanity in later life. He ascended the throne in 1835, continued to pursue the policy of his father, leaving the chief direction of affairs in the reactionary hands of Metternich (q.v.). In his reign the republic of Cracow was annihilated

and a portion of it added to the empire. During the revolutionary troubles of 1848 lie dismissed Metternich and made several concessions which were found quite inadequate. Vienna revolted in May and the helpless Ferdinand at length retired to Olmutz, and on 2 Dec. 1848, having no children, abdicated in favor of his nephew, Francis Joseph I. Consult Coxe, W., (House of Austria) (Vol. IV, London 1862) ; Stiles, (Austria in 1848-49) (New York 1852).

FERDINAND, duke of Brunswick, Ger¬ man field marshal: b. Wolfenbiittel, 12 Jan. 1721 ; d. Brunswick, 3 July 1792. Entering the Prussian service in 1740 he rose rapidly and

became one of the famous commanders of the age. He held command in western Germany during the Seven Years War, and among his victories were those of Crefeld (1758) and Minden (1759). He was noted for his patron¬ age of science and art as well as for his many benevolences.

FERDINAND I, king of Bulgaria: b. Vienna, 26 Feb. 1861. He is the youngest son of the late Prince Augustus of Saxe-Coburg and Princess Clementine of Bourbon-Orleans, a daughter of Louis Philippe. He received an excellent education and showed a marked apti¬ tude for the study of natural history. The re¬ sults of his botanical observations on a trip which he made to Brazil in 1879 were published at Vienna (1883-88). While serving in the Austrian army he was offered in 1886 the va¬ cant throne of Bulgaria, and on 14 Aug. 1887 took the oath to the constitution and the title of prince. Although thoroughly acceptable to his subjects, he was not recognized by Turkey or the great powers until 1896. In 1893 he mar¬ ried Marie Louise of Bourbon, eldest daughter of Duke Robert of Parma, and the next year the Bulgarian Sobranje confirmed the title of Royal Highness to the prince and his heir. Fer¬ dinand has continued to adhere to the Roman Catholic faith, the constitution making an ex¬ ception in his case only. In 1908 Prince Ferdi¬ nand took as second wife, Eleanor, a princess of the house of Reuss, and in the same year, taking account of the increased prosperity of his country and the difficulties, foreign and domes¬ tic, which beset Turkey, he proclaimed the full independence of Bulgaria and assumed the title of king (tsar). His royal title was recognized by Turkey and the Powers in 1909. Ferdinand favored the formation of the Balkan League and the prosecution of the Balkan War of 1912- 13. In the first period of that struggle the prow¬ ess of Bulgarian arms was such as to enhance the king's prestige, but the lamentable quarrel of Bulgaria with her former allies and the piti¬ able collapse of his country in the Second Bal¬ kan War discredited Ferdinand, both at home and abroad. Although by the final

settlements of 1913 his kingdom had been materially en¬ larged by the incorporation of part of Thrace, including some 60 miles of seacoast on the Higean, Ferdinand was deeply chagrined that a relatively larger territory had not been se¬ cured, and he even considered abdication. On 13 Oct. 1915 Bulgaria joined the Central em¬ pires against the Entente Allies and invaded Serbia, which, with the aid of the Austro-Ger- man armies, it reduced. In July 1916 Rumania entered the war and Russia was enabled to send armies through Rumania to attack the Bul¬ garian armies, which were menaced also by the Anglo-French forces operating north from Salonica. After the surrender of Bulgaria to the Allies at the end of September 1918, Tsar Ferdinand abdicated on 3 October in favor of his son, Prince Boris, and left Bulgaria the following day. The first decree signed by the new monarch was one demobilizing the Bul¬ garian army.

FERDINAND I, German emperor: b. Alcala, Spain, 10 March 1503; d. Vienna, 25 July 1564. He was a brother of Charles V, after whose abdication in 1556 he took the title of emperor of Germany, although his claim to

the title was not recognized by the electors till 1558. In 1526 or 1527 he became king both of Hungary and Bohemia, which he claimed in right of his wife, sister of Louis II of these kingdoms, and after that period they remained attached to the empire. Ferdinand had been chosen king of the Romans in 1531. In 1559 he held a diet at Augsburg, in which the currency of the empire was regulated, and many religious grievances suffered by the Protestants were ex¬ posed. Ferdinand was of a mild and tolerant character, attempted the reconciliation of Cath¬ olics and Protestants, and in 1562 urged on the Council of Trent religious reforms.

FERDINAND II, German emperor: b. Gratz, Styria, 9 July 1578; d. Vienna, 15 Feb. 1637. He succeeded to the throne of Bohemia in 1617, to that of Hungary in 1618, and succeeded his uncle Matthias as emperor of Germany in 1619. His zeal was excited against every devia¬ tion from the decrees of the Council of Trent, and he firmly adhered to an anti-Protestant policy. The Bohemians, jealous of the privi¬ leges which they had secured from Rudolph, and of which they saw that Ferdinand was dis¬ posed to deprive them, declared that he had for¬ feited the Bohemian crown, which they offered to the Elector

Palatine Frederick V, a step which lead to the outbreak of the Thirty Years' war. The support of the Catholic League, and of the Elector of Saxony, John George I, placed him firmly on the throne of Bohemia, where he vigorously pursued the Protestants, whose op¬ position to him was as much political as reli¬ gious. His dismissal of Wallenstein and con¬ nivance at his assassination are blots on his character, and his plans for the effecting of a counter-Reformation were effectually check¬ mated by Gustavus Adolphus.

FERDINAND III, German emperor, son of Ferdinand II: b. in Gratz, Styria, 11 (or 13) July 1608; d. Vienna, 2 April 1657. He was made king of Hungary in 1625, of Bohemia in 1627, and succeeded his father in 1637. In 1648 he signed the Peace of Westphalia, which inter¬ dicted religious persecution in Germany.

FERDINAND I, king of Naples, illegiti¬ mate son of Alfonso I: b. about 1423; d. 25 Jan. 1494. He succeeded his father in 1458. His false and cruel character provoked a civil war, in which John of Anjou took part with the barons, and the king was aided by the Pope Pius II, Sforza, Duke of Milan, and by Scander- berg. The king defeated his rival in 1462, and make peace ; but breaking his word war broke out again. Again the king won, and established order by terror.

FERDINAND II, king of Naples, son of Alfonso II: b. 26 July 1469; d. 7 Oct. 1496. He succeeded his father when the latter abdicated in

1495.

FERDINAND III, king of Naples. See Ferdinand V of Castile.

FERDINAND IV, king of Naples, and I, of the Two Sicilies: b. Naples, 12 Jan. 1751; d. there, 4 Jan. 1825. He ascended the throne in 1759, and after the death of Louis XVI he joined the coalition engaged in the general war against France (1793-96). The victory gained at Aboukir by Nelson again brought Ferdinand into a hostile attitude against the French; in 1798 his troops occupied Rome, but fled panic

stricken on their approach, and he was driven from his kingdom in 1799. In the same year, however, his troops regained possession of the capital. In 1806 Ferdinand was again forced to abandon Naples, the crown of which Napoleon I conferred first on his brother Joseph Bonaparte, and afterward on his brother-in-law, Murat (q.v.), Ferdinand, however, continuing to reign in Sicily under English protection. In 1814 the Congress of Vienna finally established Ferdinand as king of the Two Sicilies. Revolu¬ tionary movements, set

afloat by the Carbonari (q.v.), compelled the establishment of a consti¬ tution, against the advice and interests of Aus¬ tria, Russia and Prussia ; the first named power marched an army across the Po, defeated the Neapolitan army, and occupied Naples. Ferdi¬ nand who, having refused to sanction the liberal declarations of his subjects, had quitted his capi¬ tal, was then re-established, and ruled thence¬ forward with absolute power.

FERDINAND, titular king of Portugal : b. Vienna, 29 Oct. 1816; d. Lisbon, 15 Dec. 1885. He was a son of the Duke of Saxe-Coburg-Gotha, and married -Mjaria de Gloria, queen of Portugal, in 1836. The title of king consort was granted him in 1837, and after the queen's death, in 1853, he was regent till 1855, during the minority of his son Pedro. In 1869 he was offered the crown of Spain. In that year he married an American singer, Eliza Hensler, whom he made Countess of Edla. He possessed not a little skill as artist and engraver and was an ardent book collector, especially of books and pamphlets forbidden by the government or police of European countries.

FERDINAND II, king of the Two Sicilies : (((King Bomba®) : b. Palermo, 10 Jan. 1810; d. Naples, 22 May 1859. He succeeded his father, Francis I, 8 Nov. 1830. The new sovereign at first made some concessions to his subjects. He married Maria Theresa, daughter of the Archduke Charles of Austria, an alliance of sinister omen to liberal measures. He pursued a reactionary policy, giving his subjects to understand that his will was to be their only law and that the least opposition to it would be followed by banishment or incarceration in a dungeon. This was no empty threat. Devoting much time to hunting, he left the government to be administered by favorites and reserved his interference chiefly for occasions requiring the exercise of that mixture of obstinacy and energy which formed the leading feature in his character. After a succession of partial outbreaks, the revolutionary year of 1848 brought matters to a crisis, during which Ferdinand II earned the nickname of ftKing Bomba,® by bombarding Messina from the forts commanding it. At the commencement of the insurrection, which first broke out at Paler¬ mo and threatened to extend over both divisions of the kingdom, Ferdinand issued a decree promising a constitution, but after the Austrian victory at Novara, when he had by main force re-established his ascendency, retracted all his promises and established one of the vilest des¬ potisms which has disgraced modern times. William Ewart Gladstone* who personally vis¬ ited the Neapolitan prisons, denounced his rule as the ˆnegation of God,® a judgment that was endorsed by Lord Palmerston. It was estimated at that time that there were 15,000 persons in

prison accused of political offenses and this number is believed to be greatly underestimated. Great Britain and France endeavored, by friendly remonstrance, to check him, and being only rebuked for presuming to interfere, testi¬ fied their displeasure by withdrawing their ministers from Naples. This measure seems only to have made Bomba more resolute than ever to rule in his own way. He died leaving his dungeons crowded with the best and bravest of his subjects and his kingdom in a state ap¬ proaching dissolution. Consult Dawburn, (Naples and King Ferdinand) (1858); and Gladstone, (Two Letters to Lord Aberdeen on the Neapolitan Prisons) (1851).

FERDINAND I (surnamed The Great), king of Castile and Leon: b. about 1000; d. Leon, Spain, 2 Dec. 1065. He was the son of Sancho II, king of Navarre, and by the death of Bermudo, 1037, he became king of Leon. He then made war against the Moors, from whom he took Toledo, Saragossa and Seville and pushed his conquests as far as Portugal. He next declared war against his brother, Gar¬ cias IV, king of Navarre, in which that prince lost his life, a large part of his kingdom being subsequently annexed (1054).

FERDINAND II, king of Leon: d. 1188. He was the son of Alphonso VII and in a war with Portugal made the king, Alphonso Hen- riquez, prisoner. In the reign of this prince the military order of Saint James was insti¬ tuted, 1177, for the purpose of defending the dominions of the Christian powers against the Saracens.

FERDINAND III (surnamed The Saint), king of Castile and Leon: b. about 1200; d. Seville, Spain, 30 May 1252. He was the son of Alphonso IX and obtained the crown of Castile by the abdication of his mother, Berengaria, in 1217, and that of Leon by the death of his father in 1231. He took Cordova, Jaen and Seville from the Moors and reduced their holding in Spain to Granada, codified the laws of Christian Spain, persecuted the Albi- gensian heretics, is regarded as the founder of the University of Salamanca and was canon¬ ized by Pope Clement X.

FERDINAND IV, king of Castile and Leon (The Summoned): b. Seville, 1285; d. 1312. He succeeded to the throne of Castile in 1295, at the death of his father, Sancho IV. He received his singular nickname from the traditional report that two brothers of the name of Caravajel, whom he had cruelly and un¬ justly put to death, summoned him to

appear within 30 days to answer for his crime at the judgment seat of God.

FERDINAND V (surnamed The Catho¬ lic), king of Spain, II of Aragon, V of Cas¬ tile : b. Sos, Aragon, 19 March 1452 ; d. Madrigalejo, Spain, 23 Jan. 1516. On 18 Oct. 1469 he married Isabella of Castile (q.v.) and thus brought about a close connection between Aragon and Castile, although both kingdoms continued to be governed separately, for Isa¬ bella allowed her husband no other share in the government of Castile than the privilege of affixing his signature to the decrees and of uniting his arms with her own. He had none of the attractive qualities of his wife; but with Cardinal Ximenes they raised Spain to an emi¬

nence which she had never before attained. After a fierce war of 10 years they conquered Granada (1491), the only kingdom of which the Moors yet retained possession in Spain; but the most brilliant event of their reign was the dis¬ covery of America, for which Isabella had furnished the ships and which made them sovereigns of a new world. (See Columbus). This politic prince laid the foundation of the Spanish .ascendency in Europe by the acquisition of Naples (1503), by means of his general, Gonsalvo of Cordova, and by the conquest of Navarre (1512); but he was lacking in gener¬ osity, faithless to his covenants and unscrupu¬ lous. These stains obscure the great qualities which made him, next to his consort, the first monarch of his time. It was during his reign that the banditti were suppressed and the heri¬ table jurisdiction of the nobles suppressed. The king himself assumed the grand mastership of the military orders of Calatrava, Alcantara and Santiago. He founded universities ; and estab¬ lished in 1480 the court of the Spanish Inquisi¬ tion. In 1492 he expelled the Jews from the king¬ dom — a measure that was ultimately followed by disastrous consequences — and in 1501 gave the Moors the alternative of baptism or banish¬ ment. Two years after the death of his wife, Is¬ abella, which took place in 1504, he married Ger¬ maine de Foix. Consult Prescott, (Ferdinand and Isabella) (1837).

FERDINAND VI (The Sage), king of Spain: b. 23 Sept. 1712; d. Villaviciosa, 10 Aug. 1759. He was the son of Philip V, and ascended the throne in 1746. Under the tutelage of his consort, Barbara of Braganza, he re¬ linquished a policy of foreign entanglements in which his country had nothing to gain, pro¬ moted its internal welfare, reorganized the navy, encouraged manufactures and by his judicious political conduct placed his elder brother on the throne of Naples, and another under the ducal canopy of Parma.

FERDINAND VII, king of Spain: b. San Ildefonso, 13 Oct. 1784; d. Madrid, 29 Sept. 1833. He was the eldest son of Charles IV. From the earliest years he manifested a strong dislike to the favorite Godoy, who ruled both the king and queen ; and in 1807 was arrested as a conspirator. After the popular rising at Aran- juez, in March 1808, his father was forced to abdicate in his favor — an act which he presently repudiated. A month later, having been induced to meet Napoleon at Bayonne, he himself abdicated in turn, placing the crown at the disposal of Napoleon, who at once gave it to his brother Joseph. Ferdinand was kept a prisoner at Valengay till 1813, when Napoleon offered to re-establish him on his throne. He returned to Spain in March 1814, having previ¬ ously promised to maintain the constitution of 1812. In spite of his promise he annulled this constitution and dissolved the Cortes two months after his return. In consequence of this and of his arbitrary rule a military insurrection broke out 1 Jan. 1820. The rebels were at first successful and Ferdinand was obliged to swear to the constitution of 1812; but having received support from Louis XVIII of France, who sent an army to his aid in 1823, he was ulti¬ mately enabled to suppress the insurrection and to make his authority once more absolute in Spain. Ferdinand was under control of the

clericals, and proved himself cruel, ungrateful and unscrupulous. Ferdinand was married four times, but only left one daughter, Isabella, by his fourth wife, Maria Christina of Naples. By a decree issued 29 March 1830, called the Pragmatic Sanction, he abolished the act of 1713, by which Philip V had excluded women from the throne of Spain. He then left his crown to his daughter, Isabella, to the ex¬ clusion of his brother, Don Carlos. It was during the reign of this king that the Spanish colonies in South America broke away from the mother country.

FERDINAND III, Joseph John Baptist,

grand duke of Tuscany and archduke of Aus¬ tria: b. 6 May 1769; d. Florence, Italy, 18 June 1824. He succeeded his father, the Emperor Leopold II, as grand duke of Tuscany, in 1790. He was the first sovereign to acknowledge the French Republic, and although compelled to join the first coalition against it, took the first opportunity of withdrawing. In spite of this he was, in 1799, at the time of the second coali¬ tion, deprived of his dominions, which, at

the Peace of Luneville, in 1801, were given to the Prince of Parma. He afterward received as compensation the duchy of Salzburg, in Ger¬ many, with the. title of elector. In 1805 he ex¬ changed Salzburg for the grand duchy of Wurz¬ burg; in 1806 he joined the Confederation of the Rhine, and till 1813 remained a faithful ally of Napoleon. By the first Peace of Paris (30 May 1814) he recovered his hereditary domin¬ ions. He was an enlightened and clement ruler, who encouraged commerce and was a liberal patron of art and science. Consult Inghirami, (Storia della Toscana> (1843) ; Thayer, (Dawn of Italian Independence) (1893) ; Tivaroni, (Italia Durante il Dominio Aus- triaco* (1892-94).

FERDINAND IV, grand duke of Tuscany: b. 10 June 1835; d. 17 Jan. 1908. He was a son of Leopold II, whom he succeeded in 1859. After his father's abdication (21 July 1859) he issued a formal protest ; in 1860 his country was incorporated with the kingdom of Sardinia and subsequently with the kingdom of Italy, and he withdrew to Salzburg.

FERDINAND, Victor Albert Meinrad,

king of Rumania : b. Sigmaringen, Prussia, 24 Aug. 1865. He is the second son of Prince Leopold of Hohenzollern and nephew of the late Charles I of Rumania, and was declared heir presumptive to the Rumanian crown in November 1888. In the following March he was granted the title of Prince of Rumania and declared successor to the crown. He mar¬ ried Maria, eldest daughter of the Duke of Saxe-Coburg and Gotha, in January 1893. He succeeded to the throne as Ferdinand I on 11 Oct. 1914.

FERDINAND, a noted figure in Shakes¬ peare's tempest.* He is the son of the king of Naples, and after being shipwrecked through the magic of Prospero, on the latter's en¬ chanted island, falls in love with Prospero's daughter, Miranda.

FERDINAND ALBERT II, duke of Brunswick: b. 1680; d. 1735. He fought with the Imperial armies in the war of the Spanish Suc¬ cession and was appointed lieutenant-general in 1711. In the Turkish wars he fought with

Prince Eugene. In 1733 he was field marshal of the empire and two years later became duke of Brunswick-Wolfenbuttel. He was grand¬ father of Ivan VI, Tsar of Russia and father- in-law of Frederick the Great.

FERDINAND OF PORTUGAL, known as <(The Saintly Prince®: b.

1402; d. 1443. He was the sixth son of John I, and took part in the Tangier expedition with Henry, his brother, in 1437. When the Portuguese forces were repulsed Henry left Ferdinand as a hostage with the Sultan of Fez and. promised the city of Ceuta as ransom. The king and parliament refused to give the city to the sultan and Ferdinand remained a prisoner for six years. His body was at length brought to Lisbon for interment. Ferdinand was beatified in 1470-

FERENTINO, fa-ren-te'no (ancient Feren- tinum), Italy, city in the province of Rome, 50 miles southeast of the city of Rome. The city stands at an elevation of 1,450 feet. It belonged to the Volsci, under whom it rose to be a place of considerable importance, and it still exhibits the remains of ancient walls, built of hewn stone without mortar. The cathedral occupies the site of an ancient necrop¬ olis. Pop. of commune 12,928.

FERENTO, fa'ren-to, Italy, a ruined city five miles north of Viterbo, near the ancient Ferentinum, a city of the Etruscans. There are the remains of Roman walls, baths and a theatre. Consult Dennis, G., (Cities and

Cemeteries of Etruria1* (London 1883).

FERETORY, fer'e-td-ri, the bier or shrine containing the relics of saints borne in pro¬ cessions, which was usually done upon their feast days, as a token of gratitude in times of public rejoicing, or to obtain some favor in sea¬ sons of calamity. The type of a feretory is a coffin, but the form is usually that of a ridged chest, with a roof-like top. It was made of precious metals, wood or ivory. Also, a small room or chapel attached to an abbey or church, in which shrines were deposited.

FERGHANAH, or FERGANAH, fer- ga'na, a province, since 1876, of Russian West Turkestan, central Asia, formerly the khanate of Kokand, lying among the western ranges of the Tian-Shan Mountains; area, 55,483 square miles, four-fifths of which are mountain¬ ous, the Tchotkal Mountains being in the north, and the Ala-tau and the Trans-Alatau chain in the south. The climate is warm, but deficient in rainfall. The rest of the province consists of the fertile irrigated plain of the Sir-Daria (Jaxartes), which traverses Ferghanah from northeast to southwest. About 1,000,000 acres are in forests. There is great and as yet un¬ developed mineral wealth. Two railways traverse part of the province: the Trans¬ caucasian and the Orenburg-Tashkent. The province was annexed to Russia in 1876. The chief towns are Kokand, capital (pop. 112,000), Margelan, Namangan and Andidjan. Pop. esti¬ mated 2,134,000. predominantly Mohammedan in religion, consisting

mainly of Sarts and Usbegs.

FERGUS (fur'gus) FALLS, Minn., city and county-seat of Otter Tail County, on the Red River, the Northern Pacific and the Great Northern railways. It is in the heart of the ˆpark" section of the State, being surrounded

by prairie land and forests of pine and hard¬ wood and the Park Region. It contains the Norwegian Lutheran College, high school, pub¬ lic library, State Hospital for the Insane, water¬ works, electric lights, several banks and news¬ papers. The manufactures are flour, lumber, wagons, sleighs, woolen goods, furniture, brooms, etc. Fergus Falls, chartered as a city in 1883, is governed under the charter of that date, which provides for a mayor, elected annu¬ ally, and a city council. Pop. (1920) 7,581.

FERGUSON, Donald, Canadian legisla¬ tor: b. Marshfield, Prince Edward Island, 1839. He received his education in the public schools and entered journalism. He was elected to the provincial legislature as a Conservative in 1878 and was re-elected until 1891. He served also as Minister of Public Works and as Provincial Secretary and Commissioner of Crown Lands. He became Dominion senator in 1893 and in 1894 became a member of Bowell's Cabinet and later in that of Sir Charles Tupper.

FERGUSON, Elsie (Louise), American actress: b. New York, 19 Aug. 1885. She was educated at the Normal College, New York, made her debut in (The Liberty Belles) at the Madison Square Theatre, New York, in 1901 and made her first London appearance as Ella Seaford in (The Earl of Pawtucket* at the Playhouse in 1907. She toured the United States in (Pierre of the Plains,* (The Battle,* (The Traveling Salesman* (1908), later starred in (Such a Little Queen,) in (Dolly Madison) and (The Strange Woman, (The Unseen Em¬ pire. *

FERGUSON, James, Scottish physicist: b. Keith, Banffshire, 25 April 1710; d. London, 16 Nov. 1776. As soon as his age would permit he was employed by a farmer to tend his sheep, in which situation he acquired a knowledge of the stars and constructed a celestial globe. This extraordinary ingenuity becoming known he was enabled to obtain instruction in mathematics and drawing, in which latter art his improve¬ ment was so rapid that he drew portraits in miniature,

commencing in Edinburgh in 1734, by which employment he supported himself for over 20 years. In 1743 he went to London, where he published astronomical tables and lectures and lectured on experimental philos¬ ophy illustrated by aid of ingenious machines and diagrams of his own. In 1763 he was chosen a Fellow of the Royal Society, without the usual fees. His chief works are Astron¬ omy Explained on Sir Isaac Newton's Prin- ciples) (1756 — many editions); (Lectures on Select Subjects in Mechanics, Hydrostatics, Pneumatics and Optics) (1760); Analysis of a Course of Lectures on Mechanics, Pneumatics, etc.* (1763) ; (Young Gentleman's and Lady's Astronomy-* (1768); Untroduction to Electricity* (1770) ; ˆSelect Mechanical Exercises) (1773) ; (The Art of Drawing in Perspective) (1775). Most of his works were very popular. Consult the

FERGUSON, James, American astrono¬ mer and civil engineer : b. Perthshire, Scotland, 31 Aug. 1797; d. 26 Sept. 1867. In his infancy he was brought to New York (1800), and on reaching manhood worked as an assistant en¬ gineer in the excavation of the Erie Canal (1817-19). The three following years he was

employed as assistant surveyor to the boundary commission appointed to carry out the pro¬ visions of the Treaty of Ghent. From 1822 to 1827 he was astronomical surveyor on the same work. The pursuit of practical astronomy oc¬ cupied his later life, and as assistant astrono¬ mer of the United States Naval Observatory, he discovered several asteroids and was a fre¬ quent contributor to scientific magazines.

FERGUSON, James Edward, American public official : b. Bell County, Tex., 31 Aug. 1871. He was educated in the district school, spent two years on the Pacific Coast and in the Rocky Mountain region as laborer, miner, team¬ ster, etc. He became foreman of bridge-build¬ ing crews on various railways in Texas, en¬ gaged in farming in Bell County and is now an extensive landowner there. He was admitted to the Texas bar in 1897, practised in Belton, and later in Temple, Tex. In 1907 he was one of the organizers of the Temple State Bank. Al¬ though almost unknown outside the confines of his native county, he announced himself as candidate for governor of Texas on a business man's platform in 1914; was nominated at the primaries and elected governor for the term

1915-16.

FERGUSON, John Calvin, American in the Chinese service : b. Ontario, 1 March 1866. He. was graduated at Boston University in 1886. From 1888 to 1897 he was president of Nanking University and

from 1897 to 1902 of Nanyang College, _ Shanghai. He became sec¬ retary of the Chinese Ministry of Commerce and from 1903 to 1907 was chief secretary of the Imperial Chinese Railway Administration. He also served as foreign adviser to the viceroys of Nanking from 1898 to 1911 and of Wuchang from 1900 to 1910. In 1911 he was foreign secretary to the Ministry of Posts and Com¬ munications, but resigned to devote himself to literary and art studies. Since 1915 he has served as counsellor of the Chinese Department of State. He was a member of the Chinese commission to revise treaties with the United States and Japan in 1902-03, and was sent on special missions for the Chinese government to the United States in 1901, 1904, 1907, also to the ninth convention of Red Cross societies at Washington in 1912. He has received many honors and decorations from the Chinese and other governments. From 1907 to 1911 he was proprietor of the Shanghai Times.

FERGUSON, Louis Aloysius, American electrical engineer: b. Dorchester, Mass., 19 Aug. 1867. In 1888 he was graduated at the Massachusetts Institute of Technology and in the same year joined the staff of the Chicago Edison Company as engineer of the under¬ ground department. He was promoted assistant electrical engineer of the construction depart¬ ment in 1889, electrical engineer of the com¬ pany in 1890 and general superintendent from 1897 to 1902. He was also general superin¬ tendent of the Commonwealth Electric Companv from 1898 to 1902 and second vice-president of both corporations in 1902. He has done much notable work in central station practice. In 1895 he was appointed on the staff of lecturers of the University of Wisconsin. He is a mem¬ ber of the American Institute of Electrical Engineers, and served a term as president in

1908-09.

FERGUSON, Margaret Clay, American botanist : b. Phelps, N. Y., 20 Aug. 1863. She began her career as a teacher in the public schools in 1886-88 and in 1892-93 was in charge of the department of science at Harcourt Place Seminary, Gambier, Ohio. In 1894—96 and in 1902-04 she was associate professor and head of the department of botany and after 1906 professor of botany at Wellesley College. She is a graduate of Cornell University. In 1901-02 she was assistant in botany at the .Cornell Summer School and instructor there in 1903. She is the author of scientific papers dealing with problems in plant physiology

and embryology.

FERGUSON, Patrick, British soldier and inventor of the first breech-loading rifle used in the British army: b. Pitfour, Scotland, 1744; d. King's Mountain, S. C., 7 Oct. 1780. At the age of 15 he became a cornet in the Scots Greys and afterward served in Germany and Tobago. The skill of American marksmen shown at the beginning of the War of Independence directed his attention to the improvement of the rifle; in 1776 he patented a breech-loading rifle, firing seven shots a minute and sighted for ranges from 100 to 500 yards; and with it he armed a corps of Loyalists, who helped at the battle of Brandywine (1777) to defeat the American army. He himself had a chance there of picking off an officer, but <(let him alone, disgusted with the idea of firing at the back of an unoffending individual, who was acquitting himself very coolly of his duty.® Next day he learned that the officer was Wash¬ ington. Three years later, Ferguson fell, de¬ fending King's Mountain, S. C., with 800 auxiliaries, against 1,300 Americans.

FERGUSON, Robert (surnamed The Plotter), Scottish conspirator: b. near Al¬ ford, Aberdeenshire, about 1637; d. 1714. He went to England about 1655 and in 1662 under the Act of Uniformity was ousted as a Presby¬ terian from the Kentish vicarage of Godmer-sham. He played for 10 years a leading part in every treasonable scheme against the last two Stuart kings. He was a vigorous pamph¬ leteer, in one of which he sought to prove the legitimacy of Monmouth. He acted as chaplain and secretary to Monmouth during his rebellion and after the battle of Sedgmoor fled to Hol¬ land. He also accompanied the expedition of William of Orange that set him on the throne. But after the Revolution he changed sides and while holding a post under William conspired as busily for the losing Jacobite cause, and was more than once in prison but not brought to trial. He wrote (History of the Revolution' (1706) ; Qualifications Requisite in a Minister of State' (1710), etc. Consult Ferguson, James, (Ferguson the Plotter' (1887) ; ib., (Two Scot¬ tish Soldiers ' (1888).

FERGUSON, Sir Samuel, Irish poet: b. Belfast, Ireland, 10 March 1810; d. Howth, Ire¬ land, 9 Aug. 1886. In early life he was a prominent member of the Irish bar; in 1867 was appointed deputy keeper of the public records of Ireland; and in 1878 was knighted in recognition of his antiquarian and literary accomplishments. He will best be remembered as the author of the stirring poem (The Forg¬ ing of the Anchor,' which first appeared in Blackivood's Magazine. Chief among his other

publications are (Lays of the Western GaeP (1865) ; (CongaP (1872), a

poem in five books; and (Poems > (1880). His most important

antiquarian work is (Ogham Inscriptions in Ireland, Wales and Scotland,' published post¬ humously in 1887.

FERGUSON, Samuel David, American

negro bishop: b. Charleston, S. C., 1 Jan. 1842; d 3 Aug. 1916. In 1848 he emigrated to Liberia, Africa, was educated in the mission schools there, was made teacher in 1862, ordained deacon 1865 and priest of the Protestant Epis¬ copal Church in 1868. He was elected mis¬ sionary bishop of Cape Palmas and parts ad¬ jacent by the House of Bishops assembled in New York in 1884 and was consecrated in Grace Church of that city, 24 June 1885. He was the first African to be raised to the Episco¬ pate of the Protestant Episcopal Church of America.

FERGUSSON, Arthur Walsh, American

linguist : b. Benicia, Solano County, Cal., 4 Dec. 1859; d. Manila, P. I., 29 Jan. 1908. He was graduated at Saint Augustine College, Benicia, in 1877, and at the Georgetown University Law School in 1885. In 1889 he became official in¬ terpreter of the American conference at Wash¬ ington. Subsequently he was secretary of the International American Monetary Commission in 1891 ; official interpreter of the Intercontinen¬ tal Railroad Commission in the same year; sec¬ retary of the United States Chilean Claims Commission in 1893 ; secretary of the United States and Venezuelan Claims Commission in 1894; chief translator of the Bureau of Ameri¬ can Republics in 1897 ; official interpreter of the American and Spanish Peace Commission at Paris in 1898; and Spanish secretary of the United States Philippine Commission in 1900.

FERGUSSON, James, Scottish writer on architecture and archaeological subjects: b. Ayr, Scotland, 22 Jan. 1808; d. London, 9 Jan. 1886. He went to India as partner of an important commercial house, started an indigo factory on his own account and after some years retired from business to devote himself to the study of architecture and early civilizations. In 1845 he published (Illustrations of the Rock-cut Tem¬ ples of India' ; in 1849 (A Historical Enquiry Into the True Principles of Beauty in Art' ; in 1851 (The Palaces of Nineveh and Persepolis Restored' ; in 1855 ˆIllustrated Hand-book of Architecture' ; in 1862 (History of the Modern Styles of Architecture,' a sequel to the hand¬ book, both being afterward combined in his (History of Architecture in All Countries, from the

Earliest Times to the Present Day' (1865-67), and completed by a (History of Indian and Eastern Architecture' (1876). He also wrote (Fire and Serpent Worship' ; (Rude Stone Monuments in All Countries.' He ranks among the foremost writers upon architecture.

FERGUSSON, Robert, Scottish poet: b. Edinburgh, 17 Oct. 1750; d. 16 Oct. 1774. He became clerk in a law office and wrote poems both in pure English and in the Scottish dia¬ lect, the latter being much superior to the former. His best productions display a rich fund of natural humor, keen powers of obser¬ vation and an excellent command of language. He was buried in the Canongate churchyard, Edinburgh, where Burns erected a monument to

the memory of this kindred genius. His (Poems) first appeared in 1773 and have been often reprinted.

FERGUSSON, Sir William, English sur¬ geon: b. Prestonpans, Scotland, 20 March 1808; d. London, 10 Feb. 1877 ; and educated at Edin¬ burgh University. Sir William was one of the leading consulting surgeons in Europe, the au¬ thor of (A System of Practical Surgery) (1842) ; and the inventor of numerous surgical instruments embodying ingenious improve¬ ments. He was created a baronet in 1866* ((in consideration of distinguished merit and emin¬ ence as a surgeon.®

FERIZE, fe'ri-e, in ancient Rome, public holidays, during which all labor ceased, and all judicial and political proceedings were suspend¬ ed. The feriae were divided into two classes, general holidays and private holidays, observed by certain families or individuals. On these days the temples were visited, and prayers and sacrifices offered.

FERINGHEE, or FERINGEE, fe-ring'ge, the name given by the Hindus to the English and other Europeans. The word is intended to be disrespectful rather than complimentary.

FERINO, Pierre Marie Barthelemy, pe-ar ma-re bar-tal-me fa-re'-no, Count of, French general : b. Caravaggio, Lombardy, 1747 ; d. Paris, 28 June 1816. Having entered the Aus¬ trian army, he served in the Seven Years' war, but being unjustly treated by the Austrian gov¬ ernment, went to France in 1789, and rose to prominence in the French army. The courage which he displayed at the defense of the bridge of Huningen procured for him the rank of grand-officer of the

Legion of Honor (1804), as well as the title of senator. In 1808 he was made a count. Having voted for the deposition of Napoleon, Ferino received from Louis XVIII the cross of Saint Louis, as well as letters of naturalization which in consequence of the sep¬ aration of Lombardy from France had become necessary in order to entitle him to sit in the new Chamber of Peers. The name of this general is written on the east side of the triumphal Arc de Yetoile.

FERLAND, fer-lon', Jean Baptiste Antoine,

Canadian historian : b. Montreal 1805 ; d. Que¬ bec 1865. He was educated at Nicolet and entered the priesthood, becoming a professor in his old college, and in 1850 a member of the archiepiscopal staff at Quebec. His later years were devoted to historical research. He was the author, among other works, of (Cours d'Histoire du Canada. }

FERLAND, Joseph Auge-Albert, Canadian poet and artist : b. Montreal 1872. He studied art, literature and theology in his native city. He has executed several historical portraits of a high order but is more generally known from his poetical works. He was a frequent contribu¬ tor to Les Soirees du Chateau de Ramesay and was one of the founders of L'Ecole Litteraire de Montreal. He was chosen corresponding mem¬ ber of the French Academy of Literature and Biography in 1903. His principal works are (Melodies poetiques) (1893) and (Femmes revees) (1899). Consult article (French-Ca- nadian Literature> (in (Canada and its Provin¬ ces^ Vol. VI, Toronto 1914).

FERMANAGH, fer-man'a, an inland county, in the province of Ulster, Ireland; area, 714 square miles, of which a considerable part is bogland. The county is divided lengthwise into two nearly equal portions by Lough Erne. Limestone and sandstone are abundant. The county is divided into two divisions for parlia¬ mentary purposes, each returning one member. The principal towns are Enniskillen and Fer¬ managh. Its port is Ballyshannon. Pop., which has steadily declined from 156,481 in 1841, was in 1911 61,636 (56.2 per cent. Roman Catholics).

FERMAT, Pierre de, pe-ar de far-ma, French mathematician: b. Montauban, 1601; d. Toulouse, 12 Jan. 1665. He was elected a counsellor of the Parliament of Toulouse in 1631. He was engaged in his youth with his friend Pascal in very profound investigations as to figured numbers, on which he afterward founded his calculation of probabilities, of which he may be considered the inventor. He also devoted particular attention to the general theory of numbers, and made many important discoveries in regard to it, far outstripping any

of his predecessors; he squared the parabola in a much simpler way than Archimedes had done, and contributed greatly to the progress of geom¬ etry. His method of finding the greatest and least ordinates of curve lines is closely analo¬ gous to the method of the differential calculus, then unknown. He carried on a keen contro¬ versy with Descartes, whose (Geometry and Optics) were at variance with his (Theoria de Maximis et Minimis.) Letters of his, written in 1636, prove that he was acquainted with the method of representing curves by equations be¬ fore the publication of the (Geometry } of Des¬ cartes, hence M. Libri has declared that he shares with Descartes the honor of having in¬ vented the mode of applying algebra to geometry. His collected works were published after his death, under the title of (Varia Opera Mathematica) (1670-79).

FERMATA, fer-mat'a (ˆclosed®), in music a pause marked by the sign The notes af¬ fected by this sign are prolonged beyond the ordinary, usually double the time.

FERMAT'S LAST THEOREM, the cele¬ brated proposition that the equation Xn + Yn = Zn cannot be satisfied by integral values of X, Y and Z, and when n is an integer .greater than 2. It was stated, though without proof, by the French mathematician Pierre de Fermat, about 250 years ago. Proofs have been found for many other remarkable theorems in the theory of numbers that were given by Fermat in the same manner, but this one has resisted all attempts at demonstration. There is no sufficient reason to believe it false, and it has indeed been proved to be true for every value of n from 3 up to about 97, and also for many special values greater than this ; but no general proof, valid for all values of n, has yet been given. Many interesting things about the equa¬ tion have been established, however. Only cases where the highest common factor of X and Y, of Y and Z, and of X and Z is 1, need to be considered. It is true for n, for example, if it is true for any factor of n; and this has led mathematicians to limit their study of it to the case in which n is a prime number. When n is prime, it is easy to show that the equation can¬ not be satisfied if any one of the three numbers

X, Y and Z is prime. It is also easy to show that when n is prime there is no solution unless X + Y — Z is divisible by n. Many other simi¬ lar properties are also known, but the general demonstration of the proposition does not ap¬ pear to be possible by any of the methods

with which mathematicians are now familiar. A prize of 100,000 marks has been offered by the Royal Academy of Sciences at Gottingen for the solution of the problem. This prize, which does not expire until about the end of the 20th century, has caused the solution of the problem to be undertaken by a large number of people from all walks of life, in the same manner as the old problem of the quadrature of the circle. Of course, the greater part of these attempts are not of the slightest value. However, Kummer developed his valuable theory of ideals in con¬ nection with this theorem, and Zermelo and Mirimanoff have brought the problem distinctly nearer solution. Consult Dickson, L. E., Fer¬ mat's Last Theorem and the Origin and Nature of the Theory of Algebraic Numbers,* in Annals of Mathematics , Vol. 18 (Lancaster, Pa.,

1916-17).

FERMENTATION (fromLat. fermentare, from fervere, to boil), the decomposition of complex organic material into substances of simpler composition under the influence of nitrogenous organic subsances called ferments. The meaning of the term has undergone con¬ siderable change at different times in conse¬ quence of the progress of chemistry and biology. By the alchemists it was often used to describe any reaction accompanied by an ebullition of gas or effervescence, even when purely inorganic, but among older meanings that which comes nearest to its present signi¬ fication has reference to its use to describe such familiar processes as the transformation of grape-juice into wine, the formation of alcohol from the saccharine fluids prepared from cereals, and the raising of dough in bread mak¬ ing. Closer examination has shown that these processes are only a few out of many of a similar kind, and now all such processes are included under the name fermentation. In its present sense it may be defined as including all chemical changes brought about through the agency, immediate or at least apparently im¬ mediate, of living micro-organisms or of organic substances immediately derived from the vegetable or animal kingdom, these sub¬ stances remaining essentially the same after the reaction as they were before it, and adding nothing to the fermented substance. The or¬ ganism or substance which produces the fer¬ mentation is known as a ferment , and in ac¬ cordance with the foregoing definition fer¬ ments may be divided into two main groups, namely, (1) organized or formed ferments and (2) unorganized, unformed or soluble fer¬ ments, usually called enzymes. Both kinds are nitrogenous organic bodies of somewhat un¬ stable character, and in both cases the amount of ferment required to transform a given amount of the fermentable substance is rela¬ tively very small. The organized ferments are, however, living bodies of

microscopic size be¬ longing to the groups of fungi and bacteria, and are therefore capable of growth and reproduc¬ tion, while the enzymes are lifeless substances of definite chemical composition. The action

of the enzymes, accordingly, is often separated from that of the organized ferments and not included under the term fermentation, but the present state of our knowledge does not seem to offer sufficient warrant for such a course.

The enzymes or unorganized ferments play an important part in the vegetable and animal kingdoms. Thus, the solid, insoluble reserve materials stored up in the seeds, roots, under¬ ground stems and other parts of plants are by their means transformed into soluble substances capable of being diffused throughout the plant- body. These enzymes are of protoplasmic origin, and are apparently complex compounds, some of them proteid, but not all. Diastase, the best known among them, is believed not to be proteid. The exact nature of their action is unknown, but all, or nearly all, produce their changes by a process known as hydrolysis, the nature of which may be best elucidated by cit¬ ing a particular instance, the action of the enzyme invertase or invertin (see below) on cane-sugar. The molecule of cane-sugar under the influence of the ferment takes up a mole¬ cule of water, which becomes fixed, that is, in¬ corporated with it, and then the combination resolves itself into ‘the two simpler sugars, dextrose and levulose. The equation is as follows : $C_{12}H_{22}O_{11} + H_2O = G_5H_{12}O_6$ H~ $C_6H_{12}O_6$. The enzyme remains apparently unchanged, and a very small quantity of it seems capable of transforming an indefinite amount of the sub¬ stance on which it acts. In one case, however, it has been proved that the enzyme forms a compound with the fermentable substance, and that the final products, including the enzyme, are then produced by the solution of this com¬ pound in water. This is probably the mode of action in all cases, and it is certainly much more intelligible than the former explanation by catalytic or contact action. The optimum temperature for most enzymes is between 85° and 120° F., (at 160° their activity ceases) and they are most active in the dark. The best- known enzyme is diastase, which is present in malted grain and converts starch into maltose and dextrin. Other enzymes are invertase, al¬ ready referred to; cytase, which acts chiefly on the cellulose of the cell-walls of grain and other seeds ; inulase, which transforms inulin into levulose in various bulbs and tubers; emuU sin, which decomposes the glucoside amygdalin of many rosaceous plants into glucose, benzoic aldehyde and hydrocyanic acid ; pepsin, found in gastric juice; trypsin, secreted by the pan¬ creas ; zymase, to which the alcoholic fermenta¬ tion has

been ascribed ; and urase, to which the decomposition of urea into ammonium car¬ bonate is primarily due — all of which actions are now regarded as fermentations. A further extension now under investigation regards miasmatic diseases, and virulent and contagious diseases, and the putrefaction of dead bodies as fermentations.

The organized ferments, or micro-organisms concerned in fermentation, all belong to the group of crytogamic plants known as Fungi, and their near allies the Bacteria. The most highly organized members of this group con¬ cerned jn fermentation are some of the molds, but their part in fermentation is of little im¬ portance, and we need not further consider them. We may therefore discuss the micro¬ organisms of fermentation under the two

heads: (1) Saccharomycetes, or Yeast- Fungi, and (2) Schizomycetes, or Bacteria. The Sac¬ charomycetes are minute unicellular plants of an oval shape, surrounded by a cell-wall and containing granular protoplasm in which several vacuoles are conspicuous. They re¬ produce themselves by gemmation or budding, and by this means chains of cells closely re¬ sembling the hyphae of a mycelium are formed; but very few species develop any true mycelium, such as we find in the molds and other fungi. The Bacteria, Schizomycetes, or Fission-Fungi, are a very important group of microscopic cryptogams usually classed with the fungi. Their importance arises not only from the part they play in fermentations, but also from their widespread activity in the order of nature, and especially from their action in producing numerous zymotic diseases in man and other animals. See Bacteria.

The yeast-fungi cannot assimilate free nitro¬ gen, but they can extract it from salts of am¬ monia and from various organic bodies. They can take up carbon from sugars, glycerin, tar¬ taric acid, citric acid, acetic acid, ethyl alcohol, benzoic acid, phenol and other organic bodies ; but they can obtain their nutriment only in the presence of such substances as potash, lime and phosphoric acid. Unlike nearly all the bacteria, the yeasts can live in acid media if the acid be not present in excessive quantity. The presence of free oxygen is very favorable to the growth of yeast-fungi, but under these conditions the transformation of sugar into alcohol greatly diminishes in vigor. If, however, free oxygen be excluded, fermentation proceeds vigorously. The optimum temperature for the growth of yeast-fungi is from 77° to

86° F., and they seem to be quite indifferent to light and electric¬ ity. Bacteria assimilate nitrogen most readily from peptone, but many other substances can also yield. Carbon is most readily taken up from sugars, glycerin, tartrates, citrates, lac¬ tates, acetates, etc. Most bacteria are unfavor¬ ably influenced by light, and in respect to temperature there is a great diversity among the different species, some flourishing at 60° to 70° C. and others at freezing point, but for several of the best-known species the optimum temperature is 25° to 35° C. The obligate aerobic forms cannot live in the absence of free oxygen, while the obligate anaerobic kinds are destroyed by the smallest trace of free oxygen. Between these two extremes we have facultative aerobic species, which are generally anaerobic, but can tolerate some free oxygen, and facultative anaerobic species, generally aerobic but able to live when the free oxygen is much diminished. Phosphoric acid, potash, lime and similar bodies are necessary to their growth.

The most important of all fermentations due to Saccharomycetes is that by which alcohol is obtained from sugar (the sugar itself being largely that derived from the starch of barley or other cereal), and it is in connection with this process that the subject has been most thoroughly studied. The species of fungus or yeast used in this process is known as Saccharo- myces cerevisice, but of this two kinds are dis¬ tinguished, namely, top yeast and bottom yeast. The former is used in top fermentation, which is carried on at a rather high temperature (60° to 85° F.) and is rather vigorous, carbon

dioxide being freely evolved and carrying the yeast to the surface. Bottom yeast is used in the slower bottom fermentation at about 40° to 50° F., in which carbon dioxide is more gently evolved and the yeast therefore remains at the bottom. Bottom fermentation is chiefly used in the manufacture of lager beer. The sugars directly fermentable by this process are those with the formula CaFUOo, namely, dextrose, levulose and galactose. Cane-sugar (C12H22O11) is first changed by an enzyme invertase (see above) contained in the yeast into dextrose and levulose, which are then fermented. The chief products of the fermentation are alcohol and car¬ bon dioxide, but other bodies, such as glycerin, succinic acid, propyl, amyl and other higher alcohols, are also produced. The process of fermentation continues until the alcohol forms about 14 per cent of the solution, when the yeast-plant cannot continue its action any longer.

Many theories of alcoholic fermentation have been advanced. Lavoisier, treating sugar as an oxide, thought that it was chemically re¬ solved by fermentation into two other oxides, carbon dioxide and

alcohol. When the organic nature of yeast was proved beyond doubt, the physiological theory was advanced, according to which the sugar is the food of the plant and the products of fermentation are its excretions. The celebrated chemist Liebig, however, con¬ tended that fermentation was a purely chemical process, and his later opinion has been in part reverted to by more recent observers. Pas¬ teur championed the Schulze theory that fer¬ mentation was produced directly by living or¬ ganisms. Traube regarded the cells as centres for the production of enzymes, thus reducing fermentation by organized ferments to that produced by unorganized ferments. Traube's theory has gained considerable ground lately on account of the successful extraction from yeast by Buchner of an enzyme, zymase, which can produce all the phenomena of alcoholic fer¬ mentation. In consequence, Buchner held that the fermentative process is a result of the activ¬ ity of the enzymes produced by the living micro-organisms, and that the process could be initiated and carried on independently of the presence of the living organisms.

The chief micro-organism of the vinous fer¬ mentation is N. ellipsoideus. The elliptical cells of this species are found on the grapes and in the air of grape-growing districts, and fermen¬ tation is thus set up spontaneously without the actual addition of yeast. Recently pure cul¬ tures of the wine-yeast have been prepared and used with very good results in the fermenta¬ tion of grape-juice. E. C. Hansen, an able Danish investigator, has added greatly to our knowledge of the chief yeast-fungi, and has prepared and thoroughly examined several pure cultures of the three most important species, S. cerevisice , S. pastorianus and S. ellipsoideus. He has described six kinds in all, two belong¬ ing to the last species, three to the second and the sixth to the first, the distinctions being founded on the temperature of spore-forma¬ tion and the conditions under which a surface film forms in a liquid medium. Hansen has also cultivated two pure forms of brewers' yeast, known as Carlsberg No. 1 and No. 2. Both are bottom yeasts, but the beer produced by No. 1 has less carbon dioxide than that of No.

2, and is used chiefly for bottling, the No. 2 beer being preferred for export.

Of the fermentations set up by bacteria only some of the most important can be referred to here. (1) Acetic Acid Fermentation. In

this fermentation alcohol becomes oxidized into acetic acid, the total reaction being represent¬ able by the equation :

gh6oh + o2 = gh4o2 + h2o.

The microbe concerned in the fermentation, if allowed to continue its action, will oxidize the acetic acid into carbon dioxide and water. Two bacilli, namely, Bacillus aceti and B. pasteuri- anus, have been described as taking part in this important fermentation, which is the basis of the commercial manufacture of vinegar from wine. (2) Lactic Fermentation. The souring of milk which has stood for some time is due to this fermentation, by which the milk-sugar becomes transformed into lactic acid through the agency of bacteria. Carbon dioxide is an invariable product of the fermentation. (3) Butyric Fermentation, often set up in milk which has undergone the lactic fermentation. (4) Nitrification of Ammonia, a process of vital importance in nature, by which organic nitrogen becomes fixed in soils as nitrate and nitrites. The process of decay and putrefac¬ tion, with the production of ptomaines, also be¬ long to this section of the subject of fermenta¬ tion. See Alcohol; Brewing and Malting; Distilled Liquors; Enzymes; Vinegar; Wine.

Bibliography. — Bayliss, W. M., (The Nature of Enzyme Action' (London 1911) ; Conn, H. W., (Bacteria, Yeasts, and Molds in the Home' (Boston 1903) ; Fowler, G. J., (An Introduction to Bacteriological and Enzyme Chemistry* (London 1911) ; Harden, A., (Alcoholic Fer¬ mentation (London 1911) ; Jorgensen, A., ˆicro-organisms and Fermentation (London

1911).

FERMENTED LIQUORS. See Distilled

Liquors.

FERMENTS. See Fermentation.

FERMO, fer'mc> (ancient Firmum Pice- num), Italy, city in the province of Ascoli Piceno, 32 miles south-southeast of Ancona. It stands over 1,000 feet above sea-level, and com¬ mands a magnificent view of the Adriatic. It was founded by the Sabines before Rome ex¬ isted ; and has remains of old walls. It has a cathedral built on the site of a mediaeval castle and with some interesting 16th century monuments, and an archiepiscopal palace dating from 1391, a town-house, part of which dates from the 14th century; collections of statuary and paintings. Its harbor is situated on the Adriatic, about

three miles distant. Pop. of commune, 22,570.

FERMOY, fer-moi', Ireland, urban district in the county of Cork, 22 miles north-northeast of the city of Cork, on the Blackwater. On the river opposite to the town are infantry, artillery and cavalry barracks, accommodating about 3,000 men. There are here Fermoy Col¬ lege, Saint Coleman's Roman Catholic College, two convents and a handsome Roman Catholic cathedral. It is situated in a rich agricultural district, and has some large flour-mills and a brewery. Pop. 6,863.

FERN FANNY. See Parton, Sara Pay- Son Willis.

FERN, Male (Dryopteris filix-mas), a native fern of the northern part of the United States and of Europe, Asia, Africa and South Amer¬ ica. In medicine the rhizome is used. It con¬ tains an active oleoresin, the most important constituent of which is filicic acid, and is a very efficient remedy for the treatment of tapeworm, particularly of the genus Tcenia. Other Amer¬ ican species of the same genus, D. marginale, D. goldianum, contain small amounts of the same oleoresin as that found in male fern, and can be used for much the same purposes.

FERN-OWL, the common British nightjar (Caprinmulgus europceus) , which goes by many other provincial names, as (

FERNALD, fer'nald, Bert M., American statesman: b. West Poland, Me., 3 April 1858. He was educated in the public school of West Poland, at Hebron Academy and in business and preparatory schools of Boston. He was elected to various offices in his town, county and State, including that of representative to the legislature, two terms as State senator and in 1909 governor. He served two years as governor of Maine. On 11 Sept. 1916 he was elected to the Senate of the United States for the term ending 3 March 1919. He is president of the Poland Telephone Company, and direc¬ tor of the Fidelity Trust Company of Portland, and of the Poland Dairy Company.

FERNALD, Charles Henry, American zo¬ ologist : b. Mount Desert, . Me., 16 March 1838. He was an acting ensign in the United States navy during the Civil War; and profes¬ sor of natural history at the Maine State Col¬ lege in 1871-86. From 1886 to 1910 he was professor of zoology at the Massachusetts Agricultural College. He also became entomol¬ ogist to the State Board of Agriculture. He was made honorary director of the graduate school in 1910. His publications include (Tortricidae of North America) (1882) ; (The

Crambidae of North America) (1896) ; (The Pterophoridae of North America) (1898) ; (Pyralidae of North America) ; (The Brown- Tail Moth' (1903) ; (The Genera of the Tor- tricidae and Their Types' (1908), etc.

FERNALD, Chester Bailey, American playwright and author: b. Boston, Mass., 18 March 1869. He was educated at the Episcopal Academy, Philadelphia, and by private tutors. In 1889 he settled in California, where he was assistant draftsman in the United States navy for four years. In 1893-94 he was Washington correspondent of the San Francisco Chronicle. He traveled extensively in the United States, Alaska, China, Japan and European countries, especially in England where he became a resi¬ dent in 1907. His plays include (The Cat and the Cherub) (1897) ; (The Moonlight Blossom' (1899) ; (1899) ;

(190*).

FERNALD, James Champlin, American Baptist clergyman and author : b. Portland, Me., 18 Aug. 1838; d. Upper Montclair, N. J., 11 Nov. 1918. He was graduated at Harvard 1860 and at Newton Theological Seminary 1863, and was ordained in 1864. He settled in Ohio, hold¬ ing pastorates in Granville and Springfield, re¬ moving to New York in 1889. He was editor of Synonyms, Antonyms and Prepositions in the (Standard Dictionary) and editor-in-chief of the (Students' Standard Dictionary } ; the (Desk Standard Dictionary > (1915) ; also of the Com¬ prehensiveˆ the (Concise) and the

FERNANDEZ, Angel, an-hal' fer-nan'deth, Spanish writer: b. Madrid, Spain, 27 July 1821 ; d. Paris, 18 June 1880. He founded a number of journals some of which, on account of their anti-monarchial tendencies, were short lived. His active participation in republican politics finally resulted in his banishment, and from 1866 to 1868 he lived in Paris. After his return to Spain in 1869 he was made a senator and somewhat later headed a Spanish mission to Portugal. In 1876 he was again exiled and returned to Paris where he continued to live until his death. Besides a large number of essays on the politics and resources of the Peninsula he wrote (Tesoro de Cuentos,) a collection of stories; Cuia de Madrid) (1876), a history of Madrid; (0 Todo 6 Nada* (1876), an anti-Bourbon prose study of social condi¬ tions; (Mi Mision en PortugaP (1877) ; (La Exposicion de 1878) (Paris 1879) ; (Luchas Politicas) (1880).

FERNANDEZ, Juan, hoo an' fer nan'deth, Spanish navigator and explorer : b. probably Cartagena, Spain, 1536; d. Ligna, Chile, 1602. He was a leading pilot on the South American coast. In sailing between the ports he began the practice of standing out to sea, benefiting by the trade winds and thus shortening the time of the voyage, and for his expeditious passage narrowly escaped condemnation as a sorcerer. He discovered the island which was named after him, 1563, and tried to establish a colony there, but failed in this enterprise. He also discovered the islands of Saint Felix and Saint Ambrose 1574. He is also reputed to have discovered either Australia or New Zea¬ land. The sojourn of Alexander Selkirk upon the island of Juan Fernandez probably sug¬ gested (Robinson Crusoe) to Defoe.

FERNANDEZ DE CASTRO, Manuel,

Spanish geologist : b. Madrid 1825 ; d. 1895. He received his education at the School of Mines of Madrid and subsequently traveled in several countries with the object of investigating their

railway systems. In 1857 he published (La electricidad y los caminos de hierro,* in which he proposed a signal system which was long popular in Europe. For the ensuing 10 years he was employed in mining and geological in¬ vestigations for the government, and in 1869 was appointed professor at his alma mater. In 1873 he was made chief of the commission charged with bringing out a geological map of Spain.

FERNANDEZ DE CORDOVA, Diego, de-

a'go fer-nan'deth da kor'do-va, Marquis of Guadalcazar, Spanish statesman : b. Cordova about 1580; d. after 1629. He was made vice¬ roy of Mexico in 1612, being the 13th incum¬ bent of this office and holding the office till 1621. He founded there the cities of Lerma, Cordova and Guadalcazar, completed the Mexi¬ can aqueduct from Chapultepec to Mexico and was viceroy of Peru from 1622-29. He gave to the latter country an administration resulting in a considerable amount of peace and pros¬ perity, after he had successfully repelled an attempt of a Dutch squadron to blockade Callao and to capture Lima. Consult Bancroft, H. H., (History of Mexico) (Vol. Ill, San Francisco 1883) ; Lavalle, J. A. de, (Galeria de Retratos de los Gobernadores y Virreyes del Peru, 1532-1824) (Barcelona 1909) ; Rivera, M., (Los Gobernantes de Mexico, etc.* (Vol. I, Mexico 1872).

FERNANDEZ DE ENCISO, en-the's6, Martin, Spanish jurist: b. about 1470; d. 1528. In 1500 he set out for America and settled as advocate in Santo Domingo. He invested nearly his entire fortune in Ojeda's expedition for colonizing Tierra Firme, and he followed the latter in 1510. He found that Ojeda had left the colony to seek ammunition and pro¬ visions and gathering the survivors Fernandez founded Darien. Balboa deposed him and he returned to Spain, returning with Pedrarias in 1514. His (Suma de geografia) (1519) was the first account of the Spanish dominions over¬ seas and for a pioneer work of the day and period is remarkably accurate.

FERNANDEZ DE LA CUEVA, da la

kwa'va, Francisco, Duke of Alburquerque, Span¬ ish statesman : b. about 1610. He was appointed viceroy of Mexico 1653, being the 22d incum¬ bent of this office and holding the office until May 1661. In March 1660 a soldier made an unsuccessful attempt to assassinate him while he was saying his prayers in the cathedral. During his term the city of Mexico was greatly developed and the cathedral completed. His later years were spent as viceroy of Sicily. The date of his death is not known. Consult Ban¬ croft, H. H., (History of Mexico) (Vol. Ill, San Francisco 1883) ; Rivera, M., (Los Gober¬ nantes de Mexico, etc.* (Vol. I, Mexico 1872).

FERNANDEZ DE LIZARDI le-thar'de, Jose Joaquin, Mexican novelist : b. City of Mexico 1774; d. there, 21 June 1827. Most of his books were written over the pseudonym ((E1 Peusador Mexicano.** His most famous work is (Periquillo Sarniento) (Mexico 1816, 9th ed., 1884). He also published three other novels: (Noches Iridtes) (Mexico 1818);

(Don Catrin de la Fachenda* (Mexico 1832) ;

Obregon, L. G., (Don J. J. Fernandez de Lizard) (Mexico 1888).

FERNANDEZ DE PALENCIA, pa-len'- the-a, Diego, Spanish-American historian : b. Palencia, Spain, about 1520; d. Seville 1581. About 1545 he went to Peru. He was apparently a soldier of fortune, lured to the scene of Pizarro's great conquest in the hope of fabulous wealth. He had some fighting experiences, but later was given the official title of chronicler of Peru by one of the Spanish viceroys. He wrote (Primera y segunda parte de la Historia del Peru* (Seville 1571), a narrative of

Peru¬ vian history from about 1545-65. It is a com¬ paratively well-written work, full of details, and, though naturally strongly biased in favor of the Spanish government, an authentic source for the events of its period as the author had full access to the official Spanish documents. Consult Prescott, W. H., (History of the Con¬ quest of Peru) (2 vols., New York 1847, London

1902).

FERNANDEZ MADRID, ma-threth, Jose, Colombian poet and statesman : b. Cartagena, Colombia, 9 Feb. 1789; d. near London, Eng¬ land, 28 June 1830. He studied law and medi¬ cine and participated in the popular revolt against the Spanish rule in 1810. After its suc¬ cess he was made, in the same year, Attorney- General of the new republic of New Grenada and in 1811 was elected to Congress. He was for a short time President of his country in 1816, but was captured by the Spanish and sent as a prisoner to Cuba where for nine years he was prominent as a physician. In 1825 he es¬ caped and returned to Colombia. In the same year President Bolivar sent him on a diplomatic mission to Paris. In 1827 he went to London where he represented his country until his death. He published a volume of poems

FERNANDEZ NAVARRETE. See Nav- arrete, Juan Fernandez.

FERNANDINA, fer-nan-de'na, Florida, city, port of entry and county-seat of Nassau County, on Amelia Island, Amelia River and the Seaboard Air Line Railroad, 33 miles north by northwest of Jacksonville. The city's ex¬ port trade amounts to about $7,000,000 annually, the principal articles of shipment being blue- fish, phosphates, turpentine, lumber, naval stores, cotton, etc. Its manufactures are lum¬ ber, canned oysters, plastering fibre (made from palmetto) and cotton goods. It exports cotton, phosphates, lumber, plastering fibre and canned goods. It is a favorite winter resort and con¬ tains a public library and county courthouse. A shell road leads to Amelia Beach, and nearby is Cumberland Island, the home of Gen. Na¬ thanael Greene (q.v.). Settled by Spaniards in 1632, Fernandina was laid out in 1856 and incorporated in 1859. The government is ad¬ ministered under a revised charter of 1899, which provides for a mayor, elected biennially, and a city council. The waterworks and electric- light and ice plants are owned and operated by the municipality. Pop. (1920) 5,457.

FERNANDO DE NORONHA, fer-nan'd6 da no-rdn'ya, an island of volcanic origin, in

the South Atlantic, lat. 3° 50′ S., long. 32° 25′ W., about 225 miles east-northeast of Cape Saint Roque, belonging to Brazil ; area, about 12 square miles. It has a rugged, mountainous, wooded surface and is used as a penal settle¬ ment for Brazilian male criminals. Its popula¬ tion is about 2,000, of which some three-fourths are convicts who cultivate the fairly produc¬ tive soil. It is reached by steamer from Per¬ nambuco and was named after the Portuguese Count de Noronha who discovered it and the few smaller islands nearby in 1503. Due to its location outside of the regular roads of travel, little was known of this island for many years after its discovery. Darwin stopped there for a few hours on his famous trip around the world. The Challenger expedition made a landing in 1873, but was not permitted to make any extensive explorations and not until 1876 when the Imperial Geological Survey of Brazil paid an official visit, did facts concerning its geology, fauna, etc., become generally known. Consult Anon., (A Brazilian Convict Island) (in Chambers' Journal, .Vol. LXX, p. 116, London 1893) ; Branner, J. C., (Notes on the Fauna of the Islands of Fernando de Noronha) (in American Naturalist, Vol. XXII, p. 861, 1888) ; Branner, J. C., and Williams, G. H., (Geology of Fernando Noronha > (in American Journal of Science, Vol. CXXXVII, pp. 145 and 178, New Haven 1889) ; Pereira da Costa, F. A., (A Ihla de Fernando de Noronha, etcP (Pernambuco 1887) ; Rattray, A., (A Visit to Fernando No¬ ronha J (in Royal Geographical Society Journal, Vol. XLII, p. 431, London 1872) ; Thomson, Sir C. W., (The Voyage of the Challenged (2 vols., New York 1878; 40 vols., Edinburgh

1880-95).

FERNANDO PO (Spanish fer-nan'do po'), an island which belongs to Spain, in the Bight of Biafra, 20 miles from the West African coast. It is of volcanic origin, about 40 miles in length by 20 miles in breadth ; area, 1,185 square miles. It is mountainous and covered with dense forests of valuable timber, while the land gradually rises from the steep and rocky coasts culminating in Clarence Peak, 10,190 feet above sea-level. It is well watered, and is one of the most fertile spots on the West African Coast. Sugar cane and oil palms, cot¬ ton and indigo plants grow in abundance ; mahogany, ebony and African oak are among the woods. Yams form the staple food; birds and fish are plentiful. The climate is hot and very unhealthful. The capital is Port Clarence (Santa Isabel). It is inhabited by Bubis and Portos. This island was discovered in 1471 by the Portuguese, who ceded it to Spain in 1778. The Spaniards eventually abandoned it, and the British, in 1824, selected it as a suitable military depot and naval station. They, in their turn, abandoned it in 1834, on account of its unhealthfulness. The Spaniards again took possession in 1844. It was- used by them as

a penal settlement, and to it Cuban patriots were deported. Considerable development has taken place since the Spanish-American War Pop. 25,000.

FERNE ISLANDS. See Farne Islands.

FERNEY, or FERNEX, far-na, France, town in the department of Ain, about five miles north of Geneva. It is noted for having been the chief residence of Voltaire (who in fact

founded it) from about 1760 to 1778. The house in which he lived is still standing, and the church, with the inscription aDeo erexit Vol¬ taire? is now a farmhouse. Pop. 1,172.

FERNIE, Canada, an important town of the Kootenay district of British Columbia, on the Crow's Nest branch of the Canadian Pacific Railway, at the confluence of Coal Creek and the Elk River, 300 miles east of Vancouver. It has a custom house, public and high schools, courthouse and two hospitals. Its industrial establishments comprise saw mills, railroad re¬ pair shops, foundries, machine shops and brick yards. The chief industry is coal-mining; there being extensive mines nearby. Pop. 6,000.

FERNKORN, Anton Dominikus, an'ton, do-mi-ni-koos' fern'korn, Austrian sculptor: b. Erfurt, Saxony, 17 March 1813; d. Irrsin, near Vienna, 16 Nov. 1878. He studied under Stiglmayer and Schwanthaler 1836-40, and at¬ tracted attention by his first group, (Saint George and the Dragon, > the Austrian govern¬ ment then appointing him director of the Im¬ perial bronze foundry at Vienna, where he exe¬ cuted his masterpiece, a colossal statue of Arch¬ duke Karl 1860, and his statue of Prince Eugene 1865. Among his other works are a colossal bust of Radetsky; a marble statue of the poet Frederick Heffel, and a monument of Ressil.

FERNOW, Bernhard Eduard, American scientist: b. Inowraclaw, Germany, 7 Jan. 1851. He was educated at the University of Konigs-berg and Academy of Forestry, Miinden ; re¬ moved to the United States in 1876 and engaged in metallurgical work; and was chief of the division of forestry in the United States De¬ partment of Agriculture in 1886-98. In the latter year he was made director and dean of the New York State College of Forestry at Cornell University until 1905. He then organ¬ ized the faculty of forestry at State

College, Pennsylvania. In 1907 he was called to the Uni¬ versity of Toronto as dean of the newly created faculty of forestry. He became a member of the Commission of Conservation of Canada on its organization in 1910. He is the author of (The White Pine) (1899) ; (Report upon Forestry Investigations of the United States Department of Agriculture 1877— 98} (1899) ; besides many other official reports and bulletins, and of three volumes, (Economics of Forestry > (1902) ; (History of Forestry > (1907) and (The Care of Trees* (1911). He is publisher and editor of the only American professional jour¬ nal of forestry, the Forestry Quarterly, since

1902.

FERNS and FERN-ALLIES. The ferns are representatives of an extensive branch of the plant world technically known as pterido-phytes, standing between the mosses and hepatics (bryophytes) on the one hand and the cycads and conifers (gymnosperms) on the other, at the head of the now obsolete subdivision of plants known as cryptogams. They resemble the former groups so closely in their method of sexual reproduction and in showing alternating phases of growth that both mosses and ferns are often united under a single primary division of plants as archegoniates, so called from the common possession of a structure described be¬ low as the archegone.. The ferns differ from the mosses in their highly developed vascular or woody system seen in the fibrous strands of

the leaf-stalks and the veins of the leaves, and so are still sometimes called vascular crypto¬ gams. Besides the ferns, popularly so known, there are various groups of plants closely allied to ferns which with them make up the branch pteridophytes. Among these fern-allies are the running-pine or ground-pine, familiar in its use for Christmas decoration, the selaginellas fre¬ quent in cultivation, the field horsetail and the scouring-rush. These will be treated in their proper sequence below.

The mature fern-plant, which may stand as a representative pteridophyte, consists of a woody axis bearing scattered or clustered leaves ac¬ cording as this axis is a creeping structure or an upright trunk. In our northern species this axis is either below the surface of the ground or just at the surface, but in some of the spe¬ cies of tropical regions it often forms a trunk from 1 foot to 50 feet in height, or even more, bearing its leaves at the summit and forming a treefern.

On the under surface of certain leaves of ordinary ferns little clusters of stalked bodies (sporangia) appear, which are variously ar¬ ranged

in different species, in rounded or linear masses (sori) or in a few species are scattered over the surface of the leaf. These structures consist of a membraneous wall enclosing minute bodies — the fern-spores. These are the re¬ productive bodies of the fern asexually pro¬ duced by repeated division of the interior por¬ tion of the young sporangium, and are often popularly known as ˆfern-seeds.® This is a misnomer, for they rather find their homology with the pollen-grains and young embryosacs of the higher plants. In the sporangia of some ferns a series of peculiar cells serves the pur¬ pose of rupturing the sporangium wall, and by an elastic movement scatters the spores at some distance from the plant producing them. Either at once or after a period of rest the fern-spore sprouts and produces a green hepa- tic-like structure known as a prothallus. This is a flat expense of soft green tissue, usually more or less heart-shaped, and ranging up to a half inch or more in diameter. It forms root-hairs beneath, and grows exactly like an ordinary new plant. On its under surface among the root-hairs two sorts of structures are produced: (1) A series of rounded bodies known as antherids, in which minute motile cells are formed known as antherozoids, these being the male or sperm cells connected with the sexual reproduction of the fern; (2) a series of flask-shaped bodies (archegones) more deeply imbedded in the tissues of the pro¬ thallus, which contain a single specialized cell at the bottom of the flask, known as the egg, this being the female reproductive cell. The sperm-cells escaping from the antherid swim in the delicate film of moisture which may bathe the surface of the prothallus, swarm about the mouth of the archegone, and one of them enters the neck of the flask-like structure, penetrating the mucilaginous contents of its tube, and fuses with the egg, thus effecting a true sexual reproduction. The fertilized egg soon commences division, increases in size and develops a primary root and leaf, ultimately growing into a new fern-plant. The two alter¬ nating phases of growth in the life period of the fern are thus strongly marked ; the sexual phase (prothallus) is often known as the ga-

metophyte, and the asexual phase (the fern- plant) which follows is known as the sporo- phyte or spore-producing phase.

In some of the fern-allies like Marsilia and Selaginella the plants produce two kinds of spores, (1) microspores, which develop into prothalli producing only antherids, and (2) macrospores, which develop into prothalli pro¬ ducing only archegones. In these plants,

par¬ ticularly Selaginella, the prothallus is much re¬ duced in size, and the sexual reproduction ap¬ proaches that of the pines and other conifers, except that it takes place away from the plant producing the spores. The microspores of Selaginella are thus the exact counterparts of the pollen-grains of the pine, and the macro¬ spores correspond to what is known as the embryo-sac in the young pine-cone, to that part of the ovule in which the egg-apparatus ap¬ pears, and in which the seed is ultimately developed.

Ferns are distributed all over the world but diminish in the number of species, in the pro¬ fusion of individuals, and in the relative pro¬ portion to the total vegetation of the locality as we pass from tropical to polar regions. Moist insular climates are best adapted to their devel¬ opment. Java has 575 species of ferns, while New York State with about the same area has scarcely one-tenth as many. Jamaica, with about the area of Connecticut, has nearly 500 species; Hawaii, Samoa, New Zealand and the Philippines are other prolific regions. While moist conditions favor fern-growth and devel¬ opment, certain species have adapted themselves to dry climates and grow on open exposed rocks of semi-arid regions. Such ferns are provided with woolly hairs, tangled scales, waxy powder or other mechanical contrivances to conserve their moisture. One species of the so-called <(resurrection plants® (Selaginella lepidophylla ,y of the arid regions of the Southwest conserves its moisture during the dry season by coiling its branches inward so as to form a compact ball. On the return of moisture it flattens out and exposes its fresh green surface. The <(resur- rection-fern® curls up in a similar way, its under surface being protected by a layer of scales. It grows on trees in the Southern States and the West Indies.

The ferns of temperate regions are terres¬ trial in their habit, but as we approach the tropics a large number become epiphytic, grow¬ ing with mosses and orchids on the trunks and branches of trees. The filmy ferns frequently cover the trunks of tree-ferns completely.

There are over 5,000 described species of pteridophytes in the present flora of the world, which are grouped according to their charac¬ ters under seven distinct orders. Of these we have nearly 290 species within the limits of the United States.

Geologically, the pteridophytes are a very old group dating back to the Devonian and reaching their first culmination during the Carboniferous Age, in which they formed the bulk of the vegetation of the coal-measures. Many of the fossil formerly described as ferns, however, are really primitive seed-plants closely allied to the ferns.

(See Pteridosperms) . Be¬ sides ferns, some of the fern-allies of those times attained very great size, as shown in the giant trunks of Lepidodendron and Sigillaria, re¬ lated to the modern club-mosses, and in the large

stems of Catamites, related to our present di¬ minutive scouring-rushes. The various types of the modern pteridophytes and their distinctive characteristics will be treated under their re¬ spective orders, arranged, as nearly as a lineal series can show it, in their relative rank in the scale of vegetable life.

I. Filicinae. A. Eusporangiatce. — The adder- tongues and grape-ferns are eusporangiate ; that is, their sporangia develop from the interior tissues. They include plants of a fleshy tex¬ ture, bearing their thick-walled sporangia in spikes or panicles. The prothallus, so far as known, is subterranean and colorless.' We have in the United States seven species of adder- tongue (Ophioglossnm) , and 17 species of grape-ferns (Botrychinm) , the former having the sporangia in spikes and the latter having them in panicles. All our northern species are terrestrial plants with fleshy roots. Cheiro- glossa palmatia of Florida and the West Indies is a hanging epiphyte growing on palmetto-trunks and on other trees, and the curious strap-like Ophiodernia of Hawaii and other Pacific isles grows in similar situations, with its pendant leaf from two to five feet long. The order Ophioglossales represents the sim¬ plest type of fern-growth in existence, and probably the oldest type as well. The species (about 60) are not numerous, but are very widely distributed.

The Marattiacese include only tropical ferns of a coarse habit, ranging from 2 feet to 10 feet in height. They are eusporangiate like the last order, but have the coiled-bud form of the true ferns. They also bear their sporangia dorsally, that is, on the under surface of the leaf, but these are formed in special boat-like receptacles known as synangia. Marattia and Dancea are the two principal genera. Two spe¬ cies of the former and nine of the latter are found in the North American tropics. The order is a smaller one than the last and, like it, consists of a single family.

B. Leptosporangiatce. — The ferns proper, including nearly 4,000 species, are divided un¬ equally among the eight families of this sub¬ class. They are leptosporangiate (that is, the sporangia develop from the epidermal tissues), and all produce green prothalli of the type de¬ scribed above. Except the Matoniacece, a small family of two species, all are represented in America. Two families are tropical only, while the remaining five are also represented in the United States.

1. The flowering ferns, so called because the sporangia are panicled, are among the conspic¬ uous features of our northern swamp vegeta¬ tion in spring and early summer. The cinna¬ mon-fern grows in great crowns, sending up its spore-producing leaves, which have a rich cin¬ namon color, a short time in advance of its rich crown of foliage-leaves. The royal flow¬ ering-fern grows in similar locations, but is larger, has more compound foliage, and bears its panicle at the summit of the foliage-leaf. The flowering ferns (Osmunda) , with two genera from New Zealand and Africa, make up the family Osmundacece with 16 species. In this family the ring of the sporangia is rudi¬ mentary and the sporangia opens longitudinally.

2. The Hartford fern or climbing fern (Lygodium) is the type of a second small family. Our species is low-growing, only two

or three feet high, and twines closely about other vegetation. It is quite local, but where it grows it sometimes forms tangles. In Connec¬ ticut it is so rare that it is protected by law. The tropical species of this genus often climb trees for 40 feet or more. Another member of the same family is the curious curly-grass (Schizcea) of the pine-barrens of New Jersey. It is wholly unlike ordinary ferns, the foliage- leaves resembling curled grass-leaves and the spore-bearing leaf resembling a small sedge. The entire plant is only four or five inches high. These two species with two subtropical species of Ornithopteris form our four representatives of the family Scliizceacece, whose 80 species are largely South American, though several species occur in the Old World. They are character¬ ized by their pear-shaped sporangia with an apical ring. The sporangia are usually borne in spikes or panicles.

3. The Gleicheniacece are found in the trop¬ ics of both hemispheres, several species of Dic- ranopteris occurring in the uplands of the West Indies, forming almost impassable tangles or thickets. These ferns, instead of uncoiling at once, produce buds in the axils of the forked branches, and as the lower portions mature these buds develop successive upper growths. The tangles thus formed are often sufficient to bear the weight of a man, and it is possible to walk for some distance on these thickets.

4. The floating-fern (Ceratopteris) , found rarely in Florida and Louisiana, and occasion¬ ally throughout the tropics of both hemispheres, is almost the only aquatic representative of the order. Its

sterile leaves float on the surface of shallow waters, and its pad-like fertile ones project above the surface. The name Ceratop¬ teris is derived from this fertile leaf, which branches like a deer's horn, and gives the name to the family Ceratopteridacece.

5. The tree-ferns of both hemispheres form a separate family Cyatheacece, though several members of this family are very diminutive, and ferns with trunks occur occasionally in other families. No tree-ferns occur in the United States, but 30 species or more are found in the higher altitudes of the West Indies, and many more occur in other tropical regions. In some portions of the mountains of Jamaica tree-ferns form half or three-fifths of the for¬ est vegetation, the trunks ranging from 6 to SO feet in height. A well-developed tree-fern forms one of the most beautiful types of vege¬ tation, rivaling the palms in grace and perfec¬ tion of form. Some 200 species have been de¬ scribed, belonging • chiefly to the genera Cya- thea, Alsophila, Hemitelia, Dicksonia and Cibotium.

6. The great mass of our ferns belong to the family Polypodiacece, often known as the true ferns, perhaps for no better reason than that they were the first to be called by the name of ferns. The members of this family have defi¬ nitely stalked sporangia, always provided with an elastic vertical ring which causes the sporan¬ gium to burst transversely and thus disperses the spores. In some species, like the stag-horn fern, the sporangia are spread over the under¬ leaf surface in a uniform layer; in others, like the spleenworts and bird's-nest fern, they are in definite lines; while in our common poly¬ pody, the maidenhair, and the wood ferns they

are in smal'i rounded masses (sori). In some species the sorus is naked, but in most it is covered by a small membrane (indusium), pri¬ marily for the purpose of protecting the young sporangia. In some ferns, like the spleenworts, the indusium develops along a vein ; in others, like the Christmas-fern, it is attached at one point and covers the sorus like an umbrella; in still others, like the maidenhair, it is formed of a modified portion of the margin of the leaf folded under so as to cover the young sporan¬ gium. The nature and position of the indusial covering forms one of the leading characters for the separation of genera under the Hook- erian scheme of classification, while the Pres- lian scheme lays stress on the character of the venation, the fundamental branching of the fibro-vascular system of the plant. A more rational and natural scheme combines with these the habitual and biological characters that serve to group in each genus ferns that really have a natural relation to one another.

In so large a group of plants as that pre¬ sented by this family we must expect to find the greatest diversity of size and structure, depend¬ ent on the geographical distribution, the altitu¬ dinal distribution, and on the ecological condi¬ tions under which the various members of the family have become developed. Marsh, swamp, rocky hillside, cliff and moist ravine each have their characteristic species in every country, while the trees of every tropical region support an extensive epiphytic series which varies with every considerable change of altitude. Even ex¬ posed cliffs in semi-arid regions support their own peculiar ferns, which have become adapted to conditions that at first would appear wholly unsuited to fern-growth. Obviously only a few of the more common species which grow wild or in cultivation can be mentioned here.

The sword-fern (Nephrolepis) , some forms of which are known in cultivation as the <(Bos- ton Fern,® is a native of tropical America, oc¬ curring frequently in peninsular Florida. In its native haunts it is more commonly found on the trunks of palm-trees, though it often grows on the ground or on rotten wood. It is a favorite in cultivation, either in hanging baskets or in jardinieres, and requires a rich soil and moist surroundings to thrive best. The sori are provided with a kidney-shaped indusium.

The maidenhairs (Adiantum) are perhaps the most graceful of the herbaceous ferns. Over 60 species are known, many of which have long been in cultivation. The luxuriant split-leaved A. Farleyense and the numerous fine-leaved varieties of A. cuneatum and A. gracillimum are among the most graceful in cultivation. Owing to their readiness to wilt most maidenhairs thrive best in Wardian cases.

In late years Japanese fern-balls have be¬ come popular in cultivation, consisting of the slender rootstocks of a species of Davallia wrapped about a mass of peat-enclosed soil, and held in form by wires. The Davallias are graceful ferns mostly confined to the Old World, though related genera are found in the American tropics. Numerous species are found in cultivation in the larger conservatories. Among our wild species the ostrich-fern (Mat – teuccia) is one of the best for out-of-door cultivation, to which it readily yields. It grows in graceful crowns from an erect rootstock, and

has a bright green color. Its spore-bearing leaves are curiously rolled

together so as to have the appearance of pods containing the copious sporangia. It requires a moist soil for its growth, and when growing wild thrives best in low ground. Other ferns suited for bed- cultivation are the graceful wood-ferns (Dryopteris spinulosa, and related species) and the Christmas-fern (Polystichum) , both with dark foliage and crown-like habit, and the hay- fern (Dennstcedtia) with a foliage of lighter green and a more scattered habit of growth re¬ sulting from its creeping rootstocks. The wood-ferns and Christmas-fern are firm in texture, and remain green throughout the win¬ ter; the hay-fern dies down with the early frosts. Another delicate pale-green species suitable for cultivation is the New York fern (Dryopteris N oveboracensis) , which, however, has a range from New England to Alabama.

For rockeries the bladder-fern (Filix frag- ilis), the smaller spleenworts (Asplenium tri- chomanes and A. platyneuron) , the rock-brake (Pellcea), and the curious walking-leaf are common among the best native species ; and all thrive best if the rocks are part limestone. The last-named fern has a peculiar habit among our native species, shared, however, by many exotic ferns. The leaf, which is simple and tapers to a slender point from a rounded lobed base, takes root at the apex and forms a new plant, whose leaves may again take root and form still other plants. This peculiarity of taking steps away from the mother plant has given the name walking-leaf to this small fern, whose leaves range from 4 to 10 inches in length.

Aside from decorative value, ferns have lit¬ tle utility. The matted tufts of soft hair-like scales of some of the Hawaiian tree-ferns (Cibotium) are collected in commercial quan¬ tities and used for filling mattresses under the name ((pulu.® The male-fern (Dryopteris filix- mas) and some of its near allies are used in medicine as a vermifuge, and the soft parts of certain species are used for food. The mission of the fern, however, seems to be an aesthetic one, to minister grace and beautify the duller and more prosaic sides of nature.

7. In point of grace and delicacy none of the ferns as ordinarily known can equal the filmies, which flourish best at the higher eleva¬ tions of tropical lands. These ferns differ from the true ferns not only in the form of the sporangium, and its attachment to a thread¬ like receptacle, but also in the texture of the leaf, whose blade is often only a single cell thick, so that the leaf is strongly translucent. The filmy ferns belong chiefly to the genera Trichomanes and Hymeno phylhim, and although many are apparently so simple, the Hymeno-phyllacece form one of the most highly differ¬ entiated families among the ferns. A few others simulate them in texture, like the deli¬

cate New Zealand species of Leptopteris and some species of Asplenium in the American tropics, but these are representatives of two distinct families. The genus Loxsoma repre¬ sents a structural connecting-link between the genus Davallia and the filmy ferns, and this is apparently their only point of kinship. Two species of Trichomanes occur under moist rocks in some of our Gulf States, one of them scarcely over a half inch in height.

C. Salviniales. — Next to the ferns are the members of this order, in which spores of two sorts are produced in special conceptacles re¬ sembling small pods or spheres. There are two types of habit represented, one series (Salvin – iacece) floating on the surface of water, and the other (Marsiliacece) rooting in mud. Sal- vinia, with oval leaves, is occasionally seen in cultivation but is rare in a wild state. Azolla is found in great abundance in Florida, some¬ times covering the surface of ponds with its delicate branching small-leaved stems. A sec¬ ond species occurs in California. Marsilia is the type of the second family, and has a four- parted leaf resembling that of Oxalis. It grows on the wet borders of ponds, or if the water becomes high, it elongates its leaf-stalks and the leaves float on the surface like four- leaf clovers. Its conceptacles are oval and are borne on short stalks. One species grows abundantly at Bantam Lake, Connecticut, and others in Florida and in the Far Northwest where they are more common. Pilularia is a second genus of the family with thread-like leaves, and spherical pill-like conceptacles. Our single species occurs in California, Oregon and Arkansas.

II. Equisetinae. — About 25 species forming a single genus and family make up this order. There are two types of growth, both common species of Equisteum, which have received dif¬ ferent popular names. One is the field horsetail, which appears in low sandy ground early in spring, sending up a flesh-colored stalk termi¬ nating in a cone, followed by the ˆhorsetails,® which are the vegetative parts of the plant, con¬ sisting of a central hollow stalk with angular whorled branches. The leaves are reduced to sheaths encircling the stem. Under the surface- shields that cover the cone, the spores, which in mass resemble a fluffy mold, are borne in spo¬ rangia. The peculiar appearance of the spores is due to the fact that each is surrounded by an outer covering which splits spirally into four branches arranged cross-like at one end of the spore. These are exceedingly hygroscopic, and they absorb water and coil up at the slightest breath ; then uncoiling as soon as the moisture dries, they jostle each other about. The pur¬ pose of this mechanism is to scatter the. spores gradually from the sporangia at maturity. The second type of Equisetum grows on banks with stiff, jointed, rush-like, often clustered stems

surrounded at the joints by a light-colored sheath. These also bear cones in late spring similar to those of the field-horsetail. These plants are sometimes called <(scouring-rushes,® from the fact that their roughness caused by silica in the epidermis led to their use for scour¬ ing floors and woodenware.

III. Lycopodinae. A. Isoetacece — This order likewise contains a single genus (Isoetes) and family. The plants are aquatic, either grow¬ ing submerged or on the shores of ponds and rivers. They consist of a short fleshy base, bear¬ ing a cluster of leaves which are broadened at the base and contain an axillary sporangium, and end in awl-like joints. The position of the order is problematical, as these obscure plants seem to show unexpected affinities with several other groups. They are eusporangiate and pro¬ duce spores of two sorts.

B. Lycopodiacece. — This order contains the ground-pines or club-mosses and the selaginellas

or little club-mosses, which are alike in produc¬ ing their spores in the axils of leaves, but differ in the spore-characters. The club-mosses (Ly¬ copodium) have yellow dust-like spores, which are used commercially under the name of lyco¬ podium powder for the relief of chafing and for producing flash-lights, since they contain a large amount of oil and are highly inflam¬ mable. The lycopods are familiar as Christmas greens, but are rarely seen in cultivation. Over 100 species are known of which at least 12 are found within the limits of the United States.

C. Selaginellacece. — This order, whose sole extant representatives belong to the genus Sela- ginella, is distinguished from all extant Lycopo- daceae by the possession of two kinds of spores — microspores , from which develop the male prothalli, and macrospores, from which develop the female prothalli. Selaginella is freauent in cultivation, some of the species being exceed¬ ingly delicate and graceful ; but most of our native species are inconspicuous and little known. The ˆresurrection-plant® has already been men¬ tioned. Some of the tropical species attain enormous size as climbing-plants. Over 600 species have been described, of which at least 12 are found in the United States.

IV. Psilotaceae. — This group of Pterido¬ phytes, which is represented by Psilotum, a leafy epiphyte in our Southern States, used formerly to be assigned to the Lycopodinae, but it is now recognized that its closest allies are to be found in the Spenaphyllinae, an extinct class of Pterido- phytes intermediate between the Lycopodinae and the Equisetinae.

Fossil Pteridophytes are abundant in the Car¬ boniferous period, when indeed they dominated the entire terrestrial flora, assuming arboreal proportions. Equisetinae. Lycopodinae and Fili- cinae all have their representatives. Many groups possessed two types of spores whose present relatives have but one. See Paleo¬ botany.

Affinities. — We have already seen that the Cycadofilices form a transition between the Pteridophytes and the flowering plants. The origin of the Pteridophytes is perhaps to be sought in some such liverwort as Anthoceras, whose sporophyte begins to show signs of an independent existence, and in which the spore¬ bearing tissue gives indications of a segmenta¬ tion and a superficial position.

FERONIA, fe-rc/ni-a, (1) An ancient Italian goddess, who presided over woods and orchards. The ancient grove, not far from Anxur (Terracina), was consecrated to her, and is very celebrated. Emancipated slaves re¬ ceived a cap in her temple as a badge of free¬ dom. (2) A genus of beetles of the family Cara- bxd < £. (3) A genus of plants allied to the orange.

FEROZEPUR, fe'roz-poor, India, a town and district in the Jullundur division of the Punjab; the town is situated on the North- Western and Rajputana railways, and is about four miles from the Sutlej. It contains the largest arsenal in India and is the headquarters of an army corps. The town is an important commercial centre and has a large trade in grain. It came into British hands in 1835 and was a place of the first military importance during the Sikh wars. Pop. 49,000.

The district of the same name has an area

of 4,302 square miles. Barley, wheat, millet, cotton, tobacco and other crops are raised. Cotton and wool-weaving are the only indus¬ tries. The district is healthful, having a very dry climate. Pop. 958,072.

FERRAND, fa'ran, Joseph, French jurist: b. Limoges, 1827 ;■ d. 1903. In 1871-74 he served successively as prefect of Haute Savoie, Aisne, and Calvados, and in 1888 became corresponding member of the Academy of Moral and Political Sciences. He published (De la

propriete com- munale en France et de sa mise en valeur) (1859) ; (Les institutions administratives en France et a 1'EtrangeU (1879) ; (La reforme municipale en France et en Italie) (1881) ; (Les pays fibres, leur organization et leur education d'apres la legislation comparee) (1884) ; (L'Organization municipale de Paris)

(1887).

FERRAND, fe-raii, Marie Louis, French soldier: b. Besangon, France, 12 Oct. 1753; d. Santo Domingo, 7 Nov. 1808. He served as a volunteer in the American Revolution, was im¬ prisoned during the French Revolution as a friend of Lafayette, but was released and placed in command of a brigade in the armies of Ar¬ dennes and Sambre-et-Meuse. He went with General Leclerc to Santo Domingo 1801, suc¬ ceeding Leclerc as governor-general 1802. He was besieged by General Dessalines 1804, but withstood until the arrival of reinforcements under Admiral Missiessy, holding the eastern part of the island for several years, but, de¬ feated at Paolo Fincado by Ramireshu, he shot himself on the battlefield.

FERRAR, Nicholas, English clergyman: b. London, 1592; d. 4 Dec. 1637. At 14 he en¬ tered the University of Cambridge. In 1612 he went abroad and studied at Leipzig and Padua, also visiting Rome. In 1618 he re¬ turned to England and busied himself with the affairs of the Virginia Company and was chosen deputy governor of the colony and was secretary of the company for some time. He was a man of ascetic temperament and formed a religious community at Little Gidding in Huntingdonshire. Close to this he established a school and free instruction was given the children by his masters. He was held in great reverence by King Charles I, who visited his society several times. In 1624 he was a member of Parliament.

FERRARA, fer-ra'ra, province of Italy; on the north boundary is the Po River and on the east the Adriatic Sea; area, 1,019 square miles. The low ground is marshy, but good crops are raised on the uplands. The climate is unhealthful. Ferrara was once a duchy of Italy; it was held by the House of Este as a papel fief till 1597. It became a part of the States of the Church in 1598. In 1860 it was incorporated into the kingdom of Italy. Pop.

326,447.

FERRARA, city in northern Italy, capital of the province of Ferrara, 30 miles north- northeast of Bologna, in a fertile but unhealth¬ ful plain, at a short distance from the north- branch of the Po. It is a large and

well-built town, with spacious and regular streets, and is enclosed by a wall seven miles in circuit. It is defended on the west side by a citadel regu¬ larly fortified. In the middle of the city is a

castle, flanked with towers and surrounded by wet ditches, which was once the residence of the dukes. Ferrara, though still retaining many traces of its former grandeur, has long been falling into decay; its pavements are over¬ grown with grass and the staircases and bal¬ conies of many of its noble palaces are overrun with ivy, while others are without either doors or windows. The population has also fallen to one-fourth of its former number. It has a cathedral and numerous churches, most of which contain valuable paintings, together with some interesting specimens of sculpture. There are here a public gallery of paintings, called the Palazzo del Magistrato, containing many excellent works by the leading painters of the Ferrara school, of which Dosso Dossi was one of the leaders. The city contains a university, originally founded in 1264 and after a check¬ ered history reopened in 1815. The university library contains about 100,000 volumes and 2,000 manuscripts, the latter including some of those of Ariosto and Tasso. The house in which Ariosto was educated and that in which he lived during his latter years, and known by the names respectively of the Casa degli Ariosti and the Casa d'Ariosto, are shown to strangers. The latter is now national property and is ranked among the national monuments. An¬ other object of interest is the cell in the Hos¬ pital of Saint Anna, in which Tasso was im¬ prisoned. The house occupied by Guarini, the author of the Pastor Fido — the Casa Guarina — is still inhabited by the marquises of that name. Ferrara is an archbishopric; the bishop¬ ric dates from 661 ; its archbishopric was founded by Clement XII in 1735. Savonarola was born here in 1452. It carries on some trade in corn and other produce of the soil. There are manufactures of silk ribbons, wax candles and brazen utensils ; tanneries and glass works. Pop. of the commune 95,219.

Ferrara in the course of its long history has passed through many vicissitudes and seen many changes of masters. In 1597 — to take more recent history only — it was claimed as a fief of the Holy See by Clement VIII and until 1797 was governed as part of the papal states, when it was united to the Cisalpino Republic, afterward becoming part of Napoleon's King¬ dom of Italy. In 1814 it was restored to the papal states and in 1859 was incorporated into the Kingdom of Italy.

FERRARA-FLORENCE, Council of.

Upon the fall of Salonika to the Turks in 1429 the Emperor John Palasologus approached Mar¬ tin V, Eugene IV and the Council of Basle to secure help against the Turks and to convoke a council for the reunion of the Greek and Latin churches, as the only means of effica¬ ciously resisting the hordes of Islam. At first it was proposed to hold the council in some seaport town of Italy; then Constantinople was suggested. The members of the Council of Basle held out for Basle or Avignon. Finally, 18 Sept. 1437 Eugene IV decided that the coun¬ cil would be held at Ferrara, that city being acceptable to the Greeks. The council was opened 8 Jan. 1438 by Cardinal Albergati, and the Pope attended on 27 January. Before the Greeks arrived, proclamation was made that all further action by the Council of Basle as such would be null and void. The Greeks, i.e., the

emperor, with a train of archbishops, bishops and learned men (700 in all), landed at Venice 8 February and were cordially received and welcomed in the Pope's name by Ambrogio Traversari, the general of the Camaldolese. On 4 March the emperor entered Ferrara. The Greek bishops came a little later. Questions of precedence and ceremonial caused no small difficulty. For preparatory discussions on all controverted points a committee of 10 from either side was appointed. Among them were Marcus Eugenicus, of Ephesus ; Bes'sarion, of Nicaea ; Balsamon, Livopolis and others, for the Greeks ; while Cardinals Giuliano Cesarini and Nicolo Albergati, Giovanni Turrecremata and others represented the Latins. The Greek emperor at first prevented a discussion on the Procession of the Holy Spirit and on the use of leavened bread. For months the only thing discussed or written about was the ecclesiastical teaching of purgatory. The uncertainty of the Greeks on this head was the cause of the delay. The emperor's object was to bring about a general union without any concessions on the part of the Greeks in matters of doctrine. Everybody deplored the delay, and a few of the Greeks, among them Eugenicus, attempted to depart secretly, but they were obliged to return. The sessions began 8 October, and from the opening of the third session the question of the Procession of the Holy Spirit was before the council constantly. Twelve sessions were devoted to this controversy. On both sides many saw no hope of an agreement, and once more many Greeks were eager to return home. Finally the emperor permitted his followers to proceed to the discussion of the orthodoxy of the ((Filioque.® In the meantime the people of Florence had invited the Pope to accept for himself and the council the hospitality of their city, hoping in this way to reap great financial profit. The offer was accompanied by a large gift of money. Eugene IV,

already at a loss for funds and obliged to furnish hospitality and money to the Greeks, gladly accepted the hospitality of the Florentines. The Greeks on their part agreed to the change. The council thus quitted Ferrara without having accom¬ plished anything, principally because the em¬ peror and Eugenicus did not wish to reach an agreement nor compromise in matters of doc¬ trine. Consult Hefele,

FERRARI, fer-ra're, Benedetto (also

known as ((Della Tiorbaˆ), Italian poet: b. Reggio 1597; d. 1681. He received his educa¬ tion at Rome. In 1637 he wrote the libretto of the opera (Andromeda, > which was the first opera produced publicly, a public performance being given at the author's expense at the San Casiano Theatre, Venice.

FERRARI, Ettore, Italian sculptor : b.

Rome, 1849.- He was educated at the Academy of Saint Luke and subsequently was appointed to a professorship there. He soon established his reputation as one of the great sculptors of his day. His principal works are a statue of Ovid, statue of Giordano Bruno at Rome, equestrian statue of Victor Emmanuel at Venice, figure of Latium on the Victor Emman¬ uel Monument at Rome, a bronze lyre on Shel-

ley's grave, Rome. He is a commander of the Crown of Italy.

FERRARI, Gaudenzio, Italian painter: b. Valduggia, Piedmont, about 1480; d. Milan, 31 Jan. 1546. A scholar of Stefano Scotto, he also caught some inspiration from Perugino and Raphael. The chief characteristics of his style are correct and vigorous delineation, strong but often hard coloring, considerable power of invention and skill in the arrange¬ ment of drapery. He lived and worked in Varallo, Vercelli and Milan, and executed in¬ numerable paintings both in fresco and in oil, the greater part of which are possessed by the Piedmont and Lombard galleries. A few speci¬ mens of his work are in England in private galleries. The London and the Berlin Na¬ tional Gallery, as well as the Paris Louvre, possess one example each of his oil paintings on wood. Some of his drawings are to be found in the galleries of Berlin, Dresden, Florence, London, Milan, Munich, Turin and Venice. His most comprehensive work, the frescoes at Varallo, in

Piedmont, represents the passion ; another good specimen of his work, the (Martyrdom of Saint Catharine,) in oil on wood, painted about 1545, is in the Brera Gallery at Milan. The chief of his pupils was G. B. della Ceroa. Consult Caccia, (I1 Sacro Monte di Varallo) (Novara 1565) ; Colombo, G., (Vita e Opere di Gaudenzio FerrarP (Turin 1881) ; id, (Documenti e Notizie In- torno gli Artisti Vercellese) (Vercelli 1883) ; Crowe, J. A., and Cavaceselle, G. V., (History of Painting in North Italy) (Vol. I, London 1871) ; Halsey, E., (Gaudenzio FerrarP (Lon¬ don 1904) ; Lomazzo, G. P., (Idea del Tempio della Pittura) (Milian 1584) ; id.,

FERRARI, Giuseppe, Italian philosopher and historian: b. Milan, Italy, 7 March 1812; d. Rome, 1 July 1876. He was graduated at the University of Pavia in 1831 and became a fol¬ lower of the philosophical ideas of Romagnosi and Vico. In 1835 he brought out a complete edition of the latter's works, (Opere di G. B. Vico) (6 vols., Milan). Soon after this he went to Paris where he published in French (Vico et l'Italic> (Paris. 1839) ; (La Nouvelle Religion de Campanella) (Paris 1840) ;

senator. Besides works alreadv mentioned his writings include (Idees sur la Politique de Platon et d'Aristote> (Paris 1842) ; (Machiavel Juge dps Revolutions de notre Temps) (Paris 1849) ; (La Federazione Repubblicana) (Capo- lago 1851) ; (La Filosofia della Rivoluzione> (Capolago 1851) ; (LTtalia dopo il Colpo di Stato) (Capolago 1852) ; (Histoire des Revo¬ lutions d'ltalie, ou Guelfes et Gibelins) (3 vols., Paris 1858; Milan 1871-73) ; (Histoire de la Raison d £tat) (1860); L' Annexion des Deux- Siciles> (1860) ; (Corso sugli Scrittori Politici ItalianP (1862-63) ; (Teoria dei Periodi Poli¬ tici ' (1874). Consult Mazzoleni, A., (Giuseppe FerrarP (Milan 1876) ; Uberweg, F., (History of Philosophy-* (Vol. II, New York, new ed., 1902) ; Werner, C., (Die Italienische Philoso¬ phic des 19. Jahrhunderts) (Vol. Ill, Vienna

1885).

FERRARI, Paolo, Italian dramatist : b. Modena, 5 April 1822; d. Milan, 9 March 1889. He studied law, but became interested in his¬ tory and literature. As a result he began writ¬ ing and in 1847 produced his first comedy, (Bartolommeo il CalzolajoP later called (!l Codicillo dello zio VenanzioP Of his many later works, (Goldoni e le Sue Sedici Com- medie (1852), and (Parini e la Satira) (1857) rank as the finest examples of modern Italian comedy, and are distinguished — as, indeed, are most of his plays — by a piquancy and sparkling dialogue, as well as cleverness of con¬ struction and occasional sharp contrasts,

such as have been mostly identified with French comedy. A collection of his (Opere dram- matiche> was published at Milan in 14 volumes (1877-80). In 1860 he became professor of history at Modena, and afterward in the Acad¬ emy at Milan. Consult Anon., (Paolo FerrarP (in Saturday Review, Vol. LXVII, p. 310, Lon¬ don 1889) ; Ferrari, V., (Paolo Ferrari, la Vita, il Teatro} (Milan 1899) ; Fortis, L., (Paolo Ferrari, Ricordi e Note) (Milan 1889).

FERRARI-FONTANA, Edoardo, Italian tenor : b. Rome, 1878. He entered the medical profession, but abandoned it in 1902 for the diplomatic service, becoming secretary to the Italian consul at Montevideo, Uruguay. While in the South American city he studied music and made his debut in light opera. He re¬ turned to Italy in 1906 and entered on a long period of success. At Turin, on 2 March 1910 he made his debut in grand opera as Tris¬ tan. His appearance was due to the illness of the principal tenor. His success was immense and he became one of the greatest interpreters of Wagnerian roles. He has since appeared in Rome, Naples, Milan, Bologna and Buenos Aires. In 1912 he married the contralto Mar- garete Matzenauer. He created the .role of Avito in (Amore dei tre re> at Milan in 1913. He was subsequently engaged by the Boston Opera Company and has appeared in New York, where he became a prime favorite.

FERRARIS, fer-ra'res, Carlo Francesco, Italian political economist and statistician: b. Moncalvo, Alessandria, Italy, 15 Aug. 1850. In 1878 he was appointed professor extraordinary in the University of Pavia and in 1885 profes¬ sor of statistics at Padua. He was a member of the Italian Chamber of Deputies in 1886-87. Among his works are (La Statistica e la Scienza delle Amministrazione nelle faculta.

Giuridicheˆ (1878) ; (Moneta e Corso Forzoso) (1879) ; (Saggi di Economia Statistica e Sci- enze delle Amministrazione) (1880) ; (La Sta¬ tistica del Movimento dei Metalli Preziosi fra l'ltalia e l'Estero* (1883) ; (L'assicurazione ob- bligatoria e la risponsibilita dei Padroni, ed im- prenditori' per gli sufortuni sul lavoro) (1890) ; (Principii di scienza bancaria} (1892) ; (Di alcuni caratteri internazionali dell' instruzione superiore) (1911).

FERRARIS, Galileo, Italian physicist and electrician: b. Livorno,

Piedmont, 31 Oct. 1847; d. Turin, 7 Feb. 1897. He was graduated at the University of Turin in 1867 and in 1869 in civil engineering at the Royal School of Engi¬ neering. On being appointed in 1879 professor of physics in the Industrial Museum and in the Military College at Turin, he devoted himself to the study of technical physics and was in a short time recognized as one of the foremost electricians in Europe. In 1886 he founded the electro-technical school for engineers in Turin. In 1897 he was made a senator. A monument was erected in Turin to his memory in 1903. In 1885 his investigations into the properties of various electrical transformers resulted in the discovery of the rotatory magnetic field, produced by two alternating currents with a quarter difference of phase. This discovery made possible the two-phase motor. In 1893 he published a theory of the single-phase alternat¬ ing motor, and to him the present develop¬ ment of alternating currents must largely be credited. His works on such subjects are standard authorities, and among them must be mentioned (Le Proprieta Cardinali degli Instru¬ ment Diottrici, Teoria di Gauss) (Turin 1877, Leipzig 1879) ; (Sulla Illuminazione Elettrica) (Turin 1879) ; (Sulle Differenze di Fase delle Correnti ; sul Ritardo dell' Induzione e sulla Dissipazione di Energia nei Trasformatori, etcP (Turin 1888) ; (Lezioni di Elettrotecnica) (Turin 1898, translated into German as (Wis- senschaftliche Grundlagen der Elektrotechnikp Leipzig 1901). His complete works were pub¬ lished as (Opere di Galileo Ferraris) (3 vols., Milan 1902-04). Consult (In Memoria di G. Ferraris) (in Rivista Tecnica, Vol. Ill, p. 257, Turin 1903).

FERRATA, Domenico, Italian prelate: b. Gradoli, 1847; d. Rome, 1914. He received his education at Orvieto and in 1885 was conse¬ crated bishop of Thessalonica in partibus in- fidelium and was appointed Nuncio to Belgium and subsequently to France. He was created cardinal 22 June 1896 with the titular church of S. Prisca. His term of Nuncio at Paris was marked by the objections lodged against him at Rome by the government leaders of Austria and Hungary who complained that he favored France over much. He subsequently was chief of the Congregation of the Sacraments and member of other congregations. In 1913 he presided over the Eucharistic Congress at Malta and in the following year, on the election of Cardinal Della Chiesa to the Papal throne as Benedict XV, Ferrari became Papal Secretary of State.

FERRATE, fer'-at, in chemistry, a salt re¬ sulting from the union of some base with ferric acid (HzFeCh), the latter a compound of hydrogen, oxygen and iron which has never been produced by itself. See Iron.

FERRAZZI, fer rat'se, Giuseppe Jacopo,

Italian author: b. Cartigliano, Italy, 20 March 1813; d. Bassano, Italy, 3 May 1887. He studied theology at Vicenza and then taught at Bassano. As a result of his freely expressed patriotic sentiments he was deprived of this position by the Austrians, then ruling part of Italy. After the latter country's unification he was made a professor at Bassano. He pub¬ lished (Di Bassano e dei Bassanesi IllustrP (Bassano 1847) ; (Della Poesia Pastorale, etcP (Bassano 1849) ; (Manuale Dantesco) (5 vols., Bassano 1865-77) ; (Bibliografia Petrarchesca* (Bassano 1877) ; (Studi Biografici, Critici, Bibliografici su Torquato Tasso, etcP (Bas¬ sano 1880) ; (Bibliografia Ariostesca) (Bas¬ sano 1881). He also translated with comments the works of Virgil (3 vols., Bassano 1853-55). Consult Brentari, O., (Della Vita e degli Scritti dell' Ah. Prof. Comm. G. J. FerrazzP (Bassano 1887) ; Vaccari, G., (G. J. FerrazzP (in Museo Civico • di Bassano Boll., Vol. X, Nos. 3 and 4, Bassano 1913).

FERREE, James Barr, American architect and art critic: b. Philadelphia, Pa. He was graduated from the University of Pennsylvania 1884. He was the president of the department of architecture in the Brooklyn Institute of Arts and Sciences ; is a member of several American and foreign architectural societies, and has written many professional papers for leading architectural and other periodicals. From 1902-08 he edited American Homes and Gardens.* He has published Pennsyl¬ vania: A Primer) (New York 1904); Ameri¬ can Estates and Gardens) (New York 1906) ; (The Bombardment of Reims) (New York 1917). He also edited (The United States and the War; Addresses by .J. M. Beck, etc.* (New York 1916).

FERREIRA, fer-ra'i-ra, Antonio, Portu¬ guese poet: b. Lisbon, Portugal, 1528; d. there, 29 Nov. 1569. He studied law and classic liter¬ ature at the University of Columbia. Later he held a professorship at his alma mater, and subsequently became judge of the supreme court at Lisbon. During his leisure he composed sonnets, odes and epigrams, which earned for him the title of the Portuguese Horace.® His high literary reputation, however, is due to his (Epistles* and the tragedy of (Inez de Castro) (Lisbon 1587), the second regular tragedy pro¬ duced in Europe. The subject is a popular Por¬ tuguese legend; and the play is modeled upon the Greek tragic drama. It has been translated into English by Musgrave (London 1825), into German (1782) and into French (1835). He also wrote two comedies, (Comedia do Bristo> and (Comedia do Cioso,* which have been published together with the comedies of Sa de Miranda (q.v.) at Lisbon (1622). There is also an Eng¬ lish translation of the second of

these by Mus¬ grave (London 1835). His poems, (Poemas Lusitanos) were brought out by his son, M. L. Ferreira (Lisbon 1598). His complete works have been collected in two volumes (Lisbon 1771, 1829, 1875; Paris 1865). One of his best sonnets has been translated into English by John Masefield under the title (Sonnet on the Death, of his Wife> (in Philip the King, etc.,* Lon¬ don 1914). Consult Castilho, J. de, Antonio Ferreira, Poeta Quinhentista) (3 vols., Rio

1865).

FERREIRA DE VASCONCELLOS, da

vas"kon-sel'osh, Jorge, Portuguese dramatist: b. Coimbra or Montemor o Velho; d. 1585. His prose comedies, (Eufrosina> (written 1527; printed Coimbra 1560); (Ulyssipo' (written 1547; printed Coimbra 1616); (Aulegraphia' (printed Coimbra 1619), are strictly national, and are valuable both philologically and for the proverbs in which they abound. He wrote also, in 1554, a romance of chivalry (Triumpho de Sagramor' (Coimbra 1567; Lisbon 1867).

FERREIRO, fer-ra'i-ro*, a Brazilian tree- frog (q.v.).

FERREL, William, American meteorolo¬ gist: b. Bedford County, now Fulton County, Pa., 29 Jan. 1817; d. Maywood, Kansas, 18 Sept. 1891. He was graduated at Bethany College, Virginia, in 1844, and early attracted attention by his researches in meteorology, of which science he was the first to propound the funda¬ mental principles. From 1844 to 1857 he taught school in Missouri and Tennessee. In the latter year he went, by invitation of the publisher of the (American Ephemeris and Nautical Alma¬ nac, } to Cambridge, Mass., and became associ¬ ated in taking part in making the computations for this work. In 1867 he was appointed to the United States Coast and Geodetic Survey. From 1882 to 1886 he was an assistant in the Signal Service Bureau, and the maxima and minima tide-predicting machine which he invented has been used for many years in government coast surveys. After his resignation from public serv¬ ice, he moved to Kansas to live with his brothers and sisters. His official bibliography, published by the National Academy of Science, of which as well as of many other domestic and foreign scientific societies he was a member, contains 109 separate publications from his pen. By far the largest number of these were published in scientific journals and in the official reports of

the various governmental departments with which he was connected. Of his larger works there were published in bookform (Tidal Researches) (Washington 1874) ; (Meteorological Researches for the Use of the Coast Pilot) (3 parts, Washington 1877-82) ; (Popular Treatise on the Winds, etc.' (New York 1889). Consult Abbe, C., (Memoirs of J. H. Lane and W. FerreP (Washington 1892).

FERRER (Y GUARDIA), Francisco,

Spanish revolutionist : b. Allela, near Barcelona, 1859; executed Barcelona, 13 Oct. 1909. He went to work in Barcelona when he was 13, and it is recorded that he <(soon became a free thinker.® He was a railway employee from 1877 to 1885, and in the latter year he took part in the Catalonian rebellion. After that he went to Paris, where he acted as secretary to Ruiz Zorrilla, former president of the Spanish Re¬ public, became a teacher of the Spanish lan¬ guage, inherited about $150,000 from one of his pupils, and formed a friendship with the radical Senator Nacquet. In 1901 he returned to Bar¬ celona and established his <(Modern School,® which was both anarchistic and anti-religious. In 1906 he was accused of complicity in the at¬ tempted assassination of the king and queen of Spain, but was acquitted. He went to England in 1909, but when word came of the Riff rising he hurriedly returned to Spain, and was accused of being a leader in the movement to seize Barcelona and set up a provisional, republican

and anti-Catholic state. He was arrested, tried, found ginlty and shot. His death created great feeling abroad against Spain and Catholicism and a ministerial crisis resulted. Consult Mc¬ Cabe, (Martyrdom of Ferrer) (New York (1909) ; (Origins and Ideals of the Modern School (New York 1911) ; and Archer, (Life, Trial and Death of Ferrer) (1911).

FERRERAS, fer-ra'ras, Juan de, Spanish historian: b. Labaneza, Spain, 18 June 1652; d. 8 June 1735. He was a scholarly priest, con¬ fessor of Cardinal Porto Carrero, and a mem¬ ber of the Spanish Academy since its founda¬ tion. He contributed to its great dictionary. His careful (Historia de Espana' (18 vols., Madrid 1700-16), is authoritative for the pe¬ riod prior to 1598. It has been translated into French (10 vols., Paris 1751) and into German (13 vols., Halle 1754—72). He also wrote a number of theological treatises and a volume of poems, (Varias Poesias) (Madrid 1726). Consult Nasarre y Ferriz, (Elogio Historico de J. de Ferreras) (Madrid 1735).

FERRERO, Guglielmo, Italian historian: b. near Naples, 1872. He is the

son of a rail¬ way engineer, and was educated in the law at Pisa and in belles-lettres at the University of Bologna. He collaborated with Lombroso in (La donna delinquente' (1893) and with Bianchi and Sighele is author of HI mondo criminale italiano) (1894), the preface of which is by Lombroso, whose daughter, Gina, Ferrero married. Ferrero's socialistic outbursts caused his banishment for a few months. In the late 90's he became well known as a publicist and in 1898 lectured on militarism at Milan. His fame as a historian is founded on (Grandezza e decadenza di Roma' (1902-08; (Greatnes= and Decline of Rome,' in English 1909). Here he shows his psychological training as well as his knowledge of economics. The work has been greatly overrated. Ferrero was unable to avoid the pitfalls into which his understanding and sympathy with Lombroso's theories led him and his work bears well nigh all the faults which may possibly be drawn from the great criminologist's wrong views and concep¬ tion of the part that heredity plays in our social order. Ferrero's criticisms of the Greek and Latin historians are likewise not well- founded. . His ultra-radical view of things led him to adopt a strange one-sided stand on many questions. And more than once his real or pretended ultra-modernism has led him astray. Ferrero was lecturer at the College de France in 1906, traveled in South America in 1907 and lectured in the United States the following year. Other works by him are Characters and Events of Roman History' (1908); (Fra i due mondP (1913; English trans., (Between Two Worlds') ; (Ancient

Rome and Modern America : A Comparative Study of Morals and Manners' (1914), a rather warped view of American life.

FERRERS, fer' rerz, Norman Macleod, English mathematician: b. Prinknash Park, Gloucestershire, 1 1 Aug. 1829 ; d. Cambridge, England, 31 Jan. 1903. He was educated at Eton and Gonville and Caius College, Cam¬ bridge. Even during his college life he showed great interest and special talent for mathe¬ matics, being a senior wrangler in 1851. After

leaving college he studied at first law, but finally took orders and became a fellow, mathe¬ matical lecturer, tutor, and, in 1880, master of his college. He took a deep interest and an active part in the affairs of his university, being a member of its council for many years, and

vice-chancellor in 1884—85. In 1877 he was made a Fellow of the Royal Society of London. He also acted as editor of the Quarterly Jour¬ nal of Mathematics from 1855 to 1891. He wrote many papers, a list of which may be found in Royal Society of London, (Catalogue of Scientific Papers) (Cambridge 1867-1916), and edited (The Mathematical Papers of the late George Green) (London 1871).

FERRET, a small and slender variety of the genus Mustela, closely allied to the polecat (q.vj, usually an albino, yellowish white, with pink eyes. It is a native of Africa, but has been introduced into Europe where it is bred chiefly as a domestic exterminator of mice and rats, and is used also in rabbit hunting. Un¬ like the ordinary polecat, it is exceedingly sen¬ sitive to cold, and must be well protected in northern climates which do not at all affect the polecat. Though bred in confinement, the ferret exhibits no affection, even for its mas¬ ter; and must be carefully secured, lest it es¬ cape and do injury. It has been known to hurt infants, and, if it gets at poultry, it will kill far more than it can eat. The female even, at times, devours her young. A cross between the ferret and the polecat is sometimes used. Con¬ sult Everitt, N., (Ferrets > (London 1897).

FERRET, Col de, col de fe-ra, a pass in the Mont Blanc district of the Alps, in Switz¬ erland, connecting Orsieres, in the latter coun¬ try, with Courmayeur, in Italy. Height 8,320 feet above sea-level. (See Alps). Consult Ball, J., (The Western Alps* (London 1898).

FERRETING, the sport, well known in England, of chasing rabbits or hunting vermin (rats) with trained ferrets (q.v.). To pounce upon the victim and kill (ˆpith®) it by a single bite in the neck, is regarded as a mark of high excellence in a ferret by ferreters. The prin¬ cipal use of ferrets, however, is not to kill the prey, but to go into their burrows and hiding places, muzzled, and drive out the animals.

FERRI, Ciro, che’ro fer’re, Italian painter, architect, and engraver : b. Rome, 1634 ; d. there, 13 Sept. 1689. He was a pupil and imi¬ tator of Pietro da Cortona, but displays less grace and less richness of color than his mas¬ ter. His canvases are scattered through Italy. He completed the frescoes in Pitti Palace, be¬ gun by Dla Cortona, and among his other paint¬ ings are the ceiling of the Annunziata and the cupola of Saint Agnese, Piazza Navona, Rome, unfinished, and especially his frescoes in S. Maria Maggiore at Bergamo. Samples of his oil painting are in a number of galleries : Corsoni Gallery, Rome, Pinakothek, Rome ; Versailles, Caen. Vire Ajaccio, France; Hamp¬ ton Court, England ; Petrograd, Warsaw, Russia ; Imperial Court Museum, Lichtenstein Gallery, Harrach Gallery, Vienna, Austria ; Ger¬ manic

Museum, Nuremberg, Erlangen, Speyer, Darmstadt, Gotha, Oldenburg, Potsdam, Dres¬ den, Germany. Among his architectural pieces are the altars of Chiesa Nuova and of other churches in Rome. He left a great number of

etchings which are to be found especially in the Uffizi Gallery, Florence, and in the Paris Louvre and National Library. Consult Kurz-welly, J., (Ciro Ferri* (in Thieme-Becker, 'Kiinstler-Lexikon,* Vol. XI, Leipzig 1915) ; Pascoli, L., (Vite de' Pittori, Scultori ed Ar- chitetti Moderin) (Vol. I, p. 171, Rome 1730).

FERRI, Enrico, Italian sociologist : b. San Benedetta-Po, Mantua, 25 Feb. 1856. He was educated at Bologna, Pisa and Paris, and was admitted to the bar. He practises law at Rome, having been a member of the Chamber of Dep¬ uties since 1886, representing a socialistic fol¬ lowing. Among his works are (Sociology Criminelle* (1893, English translation 1896) ; (La Scuola positiva di dirrito criminale* (1883) ; (Difese penali e studi di giurispru- denza* (1898) ; (Deliquenti nell' arte) (1901).

FERRI, Luigi, Italian philosopher : b. Bologna, 15 June 1826; d. Rome 1895. He en¬ tered the normal school, Paris, 1847, teaching philosophy in Chalon, Evreux, Dieppe, Blois, and Toulouse 1850-55. Returning to Italy he became secretary of public instruction 1860, professor of philosophy and history at the In¬ stitute of Florence 1863, and at the University of Rome 1871. In 1885 he succeeded Mamiani as editor of the Filosofia delle Scuole Italiane which he renamed Rivista Italiana di Filosofia. His work is eclectic, showing the influence of his French and Italian teachers, amongst the latter especially Mamiani. 'Among his works are (I1 Genio d'Aristotele) (1866) ; (Studii su Leonardo da Vinci* (1871) ; HI senso commune nella filosofia > (1872) ; (Sulla dotrina psicolo- gica dell' associazione) (1878); (La Psicologia di Pietro Pomponazzi* (1877) ; and in French (Essai sur l'histoire de la philosophic en Italie au XIXme siecle* (Paris 1869) ; and (La Psy¬ chology de T Association depuis Hobbes jus- qu'a nos jours) (Paris 1883).

FERRIC OXIDE, or SESQUIOXIDE OF IRON. See Hematite; Iron.

FERRICYANIDE OF POTASSIUM.

See Hydrocyanic Acid.

FERRIER, fer'i-er, Sir David, Scottish neurologist : b. Woodside, near Aberdeen, 1843. In 1872 he became professor of forensic medi¬ cine

in King's College, London, a chair which he exchanged in 1889 for that of neuro-pa¬ thology, specially founded for him. He has gained a wide reputation by his investigations of the structure of the brain, particularly in con¬ nection with the localization of its functions.' His results are stated in his works on the "-Functions of the Brain) (1876) ; and (Cerebral Localization (1878). His researches necessi¬ tated a large number of experiments on living animals, and he has, in consequence, been strongly attacked by the anti-vivisectionists. He was knighted in 1911.

FERRIER, James Frederick, Scottish

philosopher : b. Edinburgh, 16 June 1808; d. 11 June 1864. In 1831 he was graduated at the University of Oxford and in 1842 became pro¬ fessor of civil history at Edinburgh. In 1845 he was appointed to the chair of moral philos¬ ophy and political economy in the University of Saint Andrews. He enunciated the ((theory of knowing and being® in which the ego forms an essential part of every possible conception of the mind. Thus to be knowable the object

must coexist with the subject. He wrote (In¬ stitutes of Metaphysic) (1854); (Lectures on Greek Philosophy and other Philosophical Re¬ mains of J. F. Ferrier> (published posthum¬ ously, 1866).

FERRIER, far'ya', Paul, French dramatist: b. Montpelier, 29 March 1843. He wrote sev¬ eral dramas previous to 1873, when he attained his first great success with (Chez l'avocat5 and (Les Incendies de Massoulard.5 These were followed by other successful pieces including (Les Compensations5 (1876) ; (Les mousque- taires au couvent5 (1880); (Babolin> (1884); (Josephine vendue par ses soeurs) (1886); (L'Art de tromper les femmes5 (1890) ; (Calen- dae5 (1894); (Le Carillon5 (1896); and the opera libretti, (La Marocaine5 (1879), music by Offenbach;

FERRIER, Susan Edmonstone, Scottish novelist: b. Edinburgh, Scotland, 7 Sept. 1782; d. there, 5 Nov. 1854. She was an intimate friend of Sir Walter Scott and of some of the most eminent literati of her day. She wrote three novels: (Marriage5 (1818); (The In¬ heritance5 (1824) ; and (Destiny, or the Chief's Daughter5 (1831), all of which appeared at first anonymously. A collected edition, cor¬

rected by the author herself, was published in six volumes in 1841, and republished in 1850, 1881 and 1894. They are vigorous and lively pictures of Scottish life and character, full of social satire and clever caricature, but exhibit a certain hardness and want of sympathy at times. They enjoyed a great popularity in their day and the first of the three, especially, was highly praised by Sir Walter Scott. Con¬ sult Douglas, Sir George, (The Blackwood Group5 (New York 1897) ; Doyle, J. A., ed.,

(Memoir and Correspondence of Susan Fer- rier5 (London 1899) ; Howells, W. D., hero¬ ines of Fiction5 (New York 1901) ; Saintsbury, G., (Miss Ferrier's Novels5 (in Fortnightly Review, Vol. XXXVII, p. 314, London 1882).

FERRIERES, far'ryar', France, village in the department of Seine-et-Marne, 15 miles southeast of Paris. It contains a church dat¬ ing from the 13th century and a magnificent chateau in Renaissance style, built in 1860. The chateau was the headquarters of the king of Prussia from 19 Sept.-5 Oct. 1870 and here Jules Favre vainly sought to conclude an ar¬ mistice with Bismarck.

FERRIS, Albert Warren, American physi¬ cian : b. Brooklyn, N. Y., 3 Dec. 1856. He was graduated at the New York University 1878, and at the Columbia University College of Phy¬ sicians and Surgeons 1882. He became assist¬ ant in neurology, Columbia University, 1893, and assistant in medicine in the New York University medical department 1898. He was president of New York State commission in lunacy, 1907 to 1911 ; and senior resident physi¬ cian Glen Springs Sanitarium, Watkins, N. Y., 1912-13; superintending director for commis¬ sioners of State reservation at Saratoga Springs, N. Y., since 1913; incorporator, di¬ rector and financial secretary Pringle Memorial Home for aged men, Poughkeepsie, 1899-1908; editor-in-charge medical department, (New International Encyclopedia5 since 1901 ; princi¬

pal medical contributor to it and to Unter- national Year Book5 since 1898. He is a con¬ tributor to several medical journals; depart¬ ment editor of The Modern Hospital, and is a member of several medical societies.

FERRIS, George Washington Gale,

American engineer: b. Galesburg, Ill., 14 Feb. 1859; d. Pittsburgh, Pa., 22 Nov. 1896. He was graduated at Rensselaer Polytechnic Institute, Troy, N. Y., in 1881. From 1883-85 he lived in Louisville, Ky., and

from then on in Pitts¬ burgh, Pa. In 1892 he conceived the idea of a gigantic revolving wheel which, in spite of at¬ tempts of his friends to discourage him, he built successfully in Pittsburgh and erected for the World's Columbian Exposition in Chicago in 1893. The wheel could hold more than 1,000 passengers, and during the exposition it was one of the great attractions. It was named after its inventor (Ferris Wheel5 and copies of it, modified as to size, are still used as popular attractions at fairs and pleasure parks. Con¬ sult Snyder, C., (Engineer Ferris and His

Wheel5 (in Review of Reviews, Vol. VIII, p. 269, New York 1893).

FERRIS, John Mason, American clergy¬ man: b. Albany, N. Y., 1825; d. 1911. He was graduated at New York University in 1843 and subsequently studied at the New Brunswick Theological Seminary. In 1849 he was or¬ dained to the ministry of the Dutch Reformed Church and held successive pastorates at Tarry- town, N. Y., 1851-54, Chicago 1854-62 and Grand Rapids, Mich., 1862-65. He was pro¬ fessor for one year at the Western Theological Seminary of Holland, Mich., and in 1865 be¬ came secretary of the Board of Foreign Mis¬ sions of the Dutch Reformed Church, becom¬ ing treasurer of the board in 1886. He edited the Christian Intelligencer from 1881 to 1906.

FERRIS, Woodbridge Nathan, American educator and public official : b. Spencer, N. Y., 6 Jan. 1853. He was educated in the Oswego Normal and Training School and the medical department of the University of Michigan 1873-74. In 1875-76 he was principal of a business college and academy at Freeport, Ill., and in 1878-79 was principal of Dixon Business College and Academy. In 1879-84 he served as superintendent of schools of Pittsfield, Ill. In 1884 he removed to Big Rapids, Mich., where he founded Ferris Institute of which he be¬ came president. He was the Democratic can¬ didate for Congress in 1892, and for governor of Michigan in 1904. He was elected governor for the term 1913-14, and was re-elected for the term 1915-16. His administration came in for considerable criticism as a result of the methods employed in handling the striking copper miners.

FERRO, fer'ro, or HIERRO, yer'ro, the most westerly of the Canary Islands, and the smallest of those which are inhabited; longi¬ tude of the western extremity, 18° 9'. It is about 18 miles long and 9 miles broad. It is a rocky, volcanic island, rising to the height of over 4,100 feet, and has numerous extinct craters, and a number of warm springs. It is by no means fertile, but good wine and brandy are made, and

excellent figs are grown on the island. This island was once considered the most westerly point of the Old World, and geographers reckoned longitude from it. For

this purpose the longitude of Ferro was in France taken as exactly 20° west of that of Paris, though this meridian really passes some miles to the east of the island. German geographers adhered longest to the meridian of Ferro in constructing their maps. Pop. 7,667.

FERRO-ALLOYS. See Electrochem¬ ical Industries.

FERROL, fer-rol', or EL FERROL,

Spain, seaport in the province of La Coruna ; about 12 miles northeast of the town of La Coruna; on the Bay of Betanzos, a few miles from the ocean. The bay forms one of the best natural harbors in Europe, and the narrow channel which leads to it is defended by the forts San Felipe and Palma. Charles III built here an arsenal for the Spanish navy, which is still in use and there is an extensive shipbuild¬ ing yard. The manufactures consist chiefly of military and naval equipments, linen, hardware, sail-cloth and leather. The sardine fishery is also important. Ferrol has figured in recent history, was the scene of a British repulse in 1800, and has twice (1809, 1823) been occupied by the French. Pop. 26,270.

FERROMAGNETISM. The property of being strongly attracted by a magnet, pos¬ sessed by iron, steel, nickel, cobalt and certain alloys. See Magnetism.

FERRON, fa'ron, Theophile Adrien, French general: b. Pre-Saint-Evroult, Eure-et- Loire, 1830; d. 1894. He was educated at the Ecole Polytechnique and in 1852 joined the engi¬ neers corps. He gained distinction in the cam¬ paign in the Crimea and subsequently was ap¬ pointed professor of military science at the Ecole d' Application de Metz, was employed at the war office in 1880 and in 1887 became Minister of War. In 1878 he became colonel and in 1886 general of division. He has published Considerations sur le systeme defensif de la France) (1873) ; Considerations sur le systeme defensif de Paris) (1875) ; (Instructions som- maires sur le combat > (1883) ; (Quelques in¬ dications pour le combaD (1892).

FERROTYPE, or ENERGIATYPE, in

photography, a process first made public by Robert Hunt in 1844, in which the negative was developed by a saturated solution of pro¬ tosulphate of iron, with mucilage of gum-arabic, and fixed by soaking in water to which a small quantity of ammonia or hyposulphite of soda had been added. See Photography.

FERROUS SULPHATE, FERROUS COMPOUNDS. See Iron.

FERRUCCI, fer-roo'che, Andrea, Italian sculptor: b. Fiesole, 1465; d. 1526. He studied under Francesco di Simone Ferrucci and Michele Maini and in 1512-18 superintended the work on the cathedral at Florence, for which he himself executed a statue of Saint Andrew. His greatest work is a baptismal font at Pistoia. The Fiesole cathedral possesses a marble reredos from his hand and the Bargello, Flor¬ ence, has a

FERRY, fe're, Gabriel, the Younger, French author, dramatist and novelist : b. Paris, 30 May 1846. He is a son of Gabriel the Elder and employs the same pseudonym. At first he was connected with a bank, but soon followed in his father's footsteps and devoted himself to literature. He has written a number of plays, (Reginald (1874), being one of the best. His miscellaneous prose includes (Les dernieres annees d' Alexandre Dumas) (Paris 1882) ; (Les patriotes de 1816) (Paris 1883) ; (Les deux maris de Marthe* (Paris 1884) ; (Balzac et ses amies) (Paris 1888) ; (Cap de fex} (Paris 1889) ; (Les exploits de Cesar* (Paris 1889) ; (Les exploits de Martin* (Paris 1890) ; (Les pronesses de Martin Robert) (Paris 1890) etc.

FERRY, Jules Frangois Camille, French statesman: b. Saint Die, France, 5 April 1832; d. Paris, 17 March 1893. He was admitted to the Paris bar in 1854, and speedily identified him¬ self with the opponents of the empire. His hostility was carried into journalism, and a series of articles in the Temps (Times), were republished as (The Fantastic Tales of Hauss mann) (1868). In 1869 he was elected to the National Assembly, where he voted against the war with Prussia; and during the siege of Paris by the Germans (1870-71) he played a prominent part as central mayor of the city. He was Minister to Athens 1872-73, and in 1879 became Minister of Public Instruction and began an agitation against the Jesuits. Their expulsion was effected, and brought about the dissolution of the ministry in September 1880. M. Ferry then formed a cabinet, which remained in office till November 1881. In February 1883 he again became premier, with a policy of ((colonial ex¬ pansion,ˆ involving a war in Madagascar and the invasion of Tonquin, where a minor reverse to the French troops was followed by a storm of criticism directed against the premier which

caused his downfall in March 1885. On 10 Dec. 1887 he narrowly escaped assassination at the hands of a madman, one of whose shots was ultimately the cause of his

death. In 1890 he was made senator,

and three weeks before his death was elected president of the Senate. The Panama scandal left his reputation unscathed. He was a strong anti-clerical who in the re¬ modeling of primary instruction, placed educa¬ tion on a free, non-clerical and obligatory basis. His (Discours et Opinions) appeared in seven volumes (1893-98). Consult King, (French Political Leaders) (New York 1882) ; Rambaud, (Jules Ferry * (Paris 1903) ; Sylvin, (Cele- •brites contemporaines) (Paris 1883).

FERRY, Orris Standford, American states¬ man and solider : b. Bethel, Conn., 15 Aug. 1823; d. Norwalk, Conn., 21 Nov. 1875. He was graduated at Yale in 1844. He studied law and was admitted to the bar in 1846. After fill¬ ing important political places in his native State he was in 1859 elected to Congress as a Re¬ publican, and sat as one of the famous Com¬ mittee of Thirty-Three appointed to consider and report upon the condition and relations of the seceded States. He was colonel of the Fifth Connecticut Volunteer Infantry (1861), and served from 1862 to the end of the war as brig¬ adier-general of volunteers. He was elected to the United States Senate as a Republican in 1866, and re-elected in 1872.

FERRY, Thomas White, American politi¬ cian : b. Mackinac, Mich., 10 June 1827 ; d. Grand Haven, Mich., 13 Oct. 1896. Early in life he moved with his family to Grand Haven, Mich., and was educated in its public schools, entering business there. He served in the State legis¬ lature and from 1865 to 1871 was a Republican member of Congress. He was elected to the United States Senate and served from 1871 to 1883. On the death of Henry Wilson he became acting Vice-President of the United States and president of the Senate pro tempore from 1875 to 1877. He presided over the high court of impeachment of Secretary of War Belknap and over the 16 joint meetings of the two houses of Congress during the Hayes-Tilden contest. After the end of his term as acting Vice-Presi¬ dent he was re-elected president of the Senate pro tempore in 1877, 1878 and 1879.

FERRY, a franchise or right to maintain a boat upon a river or other

body of water and carry people, animals, vehicles and other prop¬ erty between certain places for a reasonable toll. It is considered to be in the nature of a public highway over the water, and the franchise can only be acquired by legislative authority, either directly, as by a special act, or indirectly, through courts, municipalities, counties, commis¬ sioners or other subordinate bodies acting under powers conferred by the legislature. The grant by which the franchise is given usually specifies certain conditions as to time, service, etc., and whether the privilege is exclusive within certain limits or not. Either an individual or a cor¬ poration may hold this franchise, and preference is given to riparian owners. A ferryman is a common carrier, subject to the same duties and liabilities.

Ferry-Boats. — Steam vessels are now em¬ ployed for carrying passengers and vehicles for short distances across rivers, lakes and straits. On narrow rivers, ferries are frequently oper¬ ated by means of a chain, lying along the bottom of the river, secured at both ends and passing over a drum on board the ferry-boat, the drum being revolved by the engine, or in small boats, by hand. This method is particularly suitable for working in foggy weather, or where there is a strong current. Another type of ferry¬ boat, used on the Rhine and elsewhere, is moved across by the combined efforts of the current and the pull exerted by a long moving chain which is fixed upstream. By directing the bow upstream, the pressure of the current against the side of the boat causes it to cross from one side to the other. The large ferry-boat for passenger traffic is now usually a screw-vessel having a screw at either end, it having been found that greater speed and more room could thus be obtained than with paddle-wheels. These vessels are found in large numbers in New York harbor where thousands of people are trans¬ ported across the rivers and bay every day. There are also many large paddle-vessels, this type being usually selected for small or medium¬ sized ferry-boats. Large vessels are employed for conveying railway trains in places where it is impracticable or undesirable to construct bridges. These vessels are almost exclusively paddle-steamers, owing to the greater facility which they possess for stopping and reversing when being brought into position for running the trains on board. Vessels of this type plied

on Lake Baikal before the opening of the circum-Baikal section of the Trans-Siberian Railroad. They are also employed at San Fran¬ cisco and New York and on Lake Michigan.

FERRYLAND, Newfoundland, the capital of a district of the same name, 35 miles south of Saint Johns. It has a good harbor with a lighthouse. Sir George Calvert, afterward Lord Baltimore, founded a

settlement here named Avalon. There exist remains of an old fort. Pop. 600.

FERSEN, fer'sen, Fredrik Axel von,

Swedish statesman: b. Stockholm, 1719; d. 1794. He was descended from a Scottish family named McPherson, entered the Swedish Life Guards in 1740 and from 1743 to 1748 was in the French army, in which he rose to the rank of brigadier- general. He was in the Swedish service in the Seven Years' War in which he won signal suc¬ cesses over the Prussians. He became field marshal in 1770. His later years were occupied with politics : he was one of the leaders of the ˆHats® and for several years obstructed the measures of Gustavus III, whom he treated with colossal insolence. He was arrested in 1789 and thereafter remained aloof from politics. His (Historiska SkrifteU is mainly autobiogra¬ phical, but its historical accounts are often biased. Consult Bain, R. N., (Gustavus IIP (London 1895).

FERSEN, Hans Axel, Count von, Swedish military officer and diplomat : b. Stockholm, Sweden, 4 Sept. 1755; d. there, 20 June 1810. He came to America in 1780 on the staff of Rochambeau ; fought under Lafayette and re¬ ceived from Washington the Order of the So¬ ciety of the Cincinnati. Later he returned to Paris where he had already been stationed in 1778-80; he became a favorite at court, and was the disguised coachman at the flight of the royal family from Versailles during the Revolu¬ tion. He was deeply devoted to Queen Marie Antoinette and made a number of unsuccessful attempts to save her. His relations with her have been the subject of a number of books. He returned to Sweden, where he was received with honor, and in 1801 was made grand marshal of that country. He was entrusted with a number of important diplomatic missions. On suspicion of complicity in the death of Prince Christian of Sweden he was seized by a mob while mar¬ shaling the funeral procession, and beaten to death. After his brutal assassination his entire innocence was clearly established. Consult Carnegy, M., (A Queen's Knight; the Life of Count Axel de Fersen) (London 1912) ; Fersen, Comte J. A. de, (The French Army in the Revolutionary War} (in Magazine of American History, Vol. XXV, pp. 55 and 156, New York 1891) ; Gaulot, P., (Un Ami de la Reine) (Paris 1894; translated into English as (A Friend of the Queen* by C. Hoey, 2 vols., London 1894) ; Granath, W., (Fersenska Mordet. Historisk Roman) (Stockholm 1904) ; Hansson, O., ˆ'Assassinat de Fersen * (in Revue d'Histoire Diplomatique, Vol. XXV, p. 195, Paris 1911) ; Heidenstain, O. G. de, (Marie- Antoinette, Fersen et Barnave; leur Correspondance) (Paris 1913) ; Klinckowstrom, R. M. de, ed., (Le Comte de Fersen et la Cour de France) (2 vols., Paris 1878) ;

O'Connor, T. P. (Some Old Love Stories* (London 1895).

FERTILIZATION. See Embryology.

FERTILIZATION OF FLOWERS BY INSECTS. See Pollination.

FERTILIZATION OF THE OVUM.

See Embryology.

FERTILIZATION IN PLANTS. Fer¬ tilization is generally defined as the union of definitely organized male and female elements. This definition is strictly correct for plants in which the uniting elements can be called sperms and eggs ; but in many of the lower plants — algae and fungi — the elements which unite are alike in size and appearance, not being differentiated as male and female. Many botan¬ ists use the term conjugation to describe the union of such similar gametes, as the uniting elements are called. Between these cases in which the gametes are alike and those in which they are very different, there are all imaginable gradations. However, in all cases, the essen¬ tial feature is the union of the two nuclei of the gametes, whether the gametes be alike or unlike. It is still quite generally believed that the two nuclei fuse in the resting condition and that the chromatin of the two parents becomes mixed. A thorough cytological study of fertilization has been made in only a few plants, and in most of these the chromatin — at the time of fertiliza¬ tion — is in the form of separate chromosomes. (See Chromosome). There is no doubt that the chromosomes of the male and female, in these cases, are entirely separated and that the first division of the egg takes place without any fusion or even close association of chromo¬ somes. The two nuclei resulting from the first division of the egg pass into the resting condi¬ tion and the chromatin of the male and female parents becomes indistinguishable. During all the rest of the life history no one has yet been able to identify the male and female chromosomes ; but there is such strong evidence that the chromosome is an individual organ of the cell, maintaining its identity throughout the life history, that most cytologists believe there is never any real fusion of male and female chromosomes, although there is a very close contact.

Fertilization serves two purposes: it acts as a stimulus to development and it keeps the characters of the species approximately con¬ stant. As a result of the stimulus, the ferti¬ lized egg divides repeatedly and

builds up the embryo. There seems to be a limit to the duration of the stimulus and, when that limit is reached, the organism grows old and dies, but, as it reaches maturity, it produces eggs, which, stimulated by fertilization, begin the process again. That fertilization functions in keeping the species approximately constant is generally admitted. Variation is universal and no two individuals are exactly alike. If an individual varies widely from the type, we generally call it a freak or sport. Such freaks or sports are cither incapable of fertilization and conse¬ quently leave no progeny, or they are fertilized by some individual of the species which has not varied much, and the union with a normal indi¬ vidual reduces the aberrant form to the ordi¬ nary plane of the species. A perennial illus¬ tration is the six-fingered man, an obvious freak. Intermarriage with normal individuals for generation after generation finally breeded the six-fingered condition out of the family. Doubtless, plants behave in the same way.

Variations which maintain themselves and stubbornly refuse to be reduced to the type are called mutations (q.v.) It is very probable that many <(species* have arisen in this way. Con¬ sult Wilson, E. B., (The Cell in Development and Inheritance) ; Mother, D. M., ‘Fecundation in Plants) (Carnegie Inst, of Washington. Publication No. 15).

Charles J. Chamberlain.

FERTILIZERS. Any substance applied to the soil to aid the growth of plants may prop¬ erly be called a fertilizer. The name has, however, become associated with a class of materials manufactured and sold for this pur¬ pose, the handling of which now constitutes an important industry.

The constituents of the plant that it derives from the soil are’ nitrogen, phosphorus, sulphur, potassium, sodium, calcium, magnesium, iron, aluminum, manganese, silicon, chlorine. Of these nitrogen, phosphorus or phosphoric acid, and potassium or potash, are the substances most likely to be deficient in the soil and therefore the ones that are. contained in fertilizers. A fertilizer may contain any one or more of these substances.

The chief distinction between the functions of farm manure and commercial fertilizers may be stated in a general way to be that farm manure increases crop production by improving the condition of the soil, as well as by furnish¬ ing plant nutrients, while commercial fertilizers may act directly as a plant-food material with¬ out materially affecting soil structure.

It is evident, therefore, that commercial fertilizers are not an adequate substitute for farm manure or green manures for producing permanent improvement. Their function con¬ sists in supplementing the available supply of plant-food in a soil which may be deficient in any one or more of the substances usually con¬ tained in fertilizers. On virgin soils commercial fertilizers are usually superfluous ; but as loss of plant-food goes on under cropping, restitution must be made and, as this is usually not ade¬ quately done with farm manure, fertilizers are finally called upon.

Where there is large loss of plant-food from soil constituents due to leaching, there must be a large excess of potential fertility, in order that the growing crop shall at all times be sup¬ plied with available plant-food. A deficiency in any constituent will check growth by com¬ pelling the plant to depend upon a less readily available supply. Commercial fertilizers are useful by presenting readily available food to the plant when it is beginning growth and when a deficiency in the supply is likely to produce a permanent injury.

As the price of land increases, as the cost of labor becomes greater and as the value of the crop augments it becomes more important that maximum crops shall be raised, and for these reasons commercial fertilizers usually have greatest sale where agriculture is most intensive. There are also many special crops requiring more of one plant-food element than of another, and the needs of these can best be met by the use of commercial fertilizers.

Historical. — The value of animal excre¬ ments applied to soils on which crops were grown has been appreciated by the husbandman as far back as records go. Why this manure

is beneficial, and what relation its constituents bear to those of plants, are matters which have only been worked out during the last century, and knowledge of which has led to the use of fertilizers composed of mineral salts, commonly known as commercial fertilizers.

The earliest record of the use of artificial manures for increasing the yield of crops is contained in a book entitled (A Discourse Con¬ cerning the Vegetation of Plants.* The title page also contains the following announce¬ ments : “Spoken by Sir Kenelm Digby, at Gresham College, on the 23d of January 1660.® The author advocates

the use of saltpetre to increase the yield of crops, and says : ((By the help of plain saltpetre, dilated in water and mingled with some other fit earthly substance, that may familiarize it a little with the corn into which I endeavored to introduce it, I have made the barrenest ground far outgo the richest, in giving a prodigiously plentiful har¬ vest.® His dissertation does not, however, show any true conception of the reason for the in¬ crease in the crop through the use of this fertilizer. The almost total absence of any knowledge of the composition of plants, and the crude state of chemistry at that time, made this quite impossible.

It was not until 1804 that any light was thrown upon the subject. In that year was published (Recherches Chimique sur la Vegeta- tion) by Theodore de Saussure. This brilliant French investigator was the first to appreciate the significance of the ash ingredients of plants ; to point out that without them plant life was impossible, and to show that only the ash of the plant was derived from the soil.

Justus von Liebig is commonly regarded as having laid the foundation upon which the commercial fertilizer industry has been built. Certainly his reports to the British As¬ sociation in 1840 and again in 1842 made the British agriculturists regard as they never had done before the importance of a sufficient sup¬ ply of certain readily soluble mineral sub¬ stances in the soil. He supported the conten¬ tion of De Saussure regarding the importance of mineral matter in the plant, and its extrac¬ tion from the soil. He refuted the theory, at that time popular, that plants absorbed their carbon from humus, but made the mistake of attaching little importance to the presence of humus in the soil. He showed the importance of potash and phosphates in manures, and in his earlier writings spoke of the value of nitrogen for fertilizing crops, but afterward made the mistake of denying the usefulness of nitrogenous manures for plants, holding that the ammonia washed down by rain affords a sufficient supply.

By the middle of the 19th century it was well understood that potash, phosphoric acid and nitrogen were valuable constituents of fertilizers, and that the other mineral elements of plant-food, with the occasional exception of calcium, were always present in sufficient quantity in arable soils. It has since been shown that the family of plants known as the Leguminosce have the ability to secure a large part, at least, of their nitrogen from the air, and that as these plants are very rich in nitro¬ gen they leave a supply of nitrogen in organic matter in the soil when plowed under.

Complete and Incomplete Fertilizers. — .

Fertilizers, containing nitrogen, phosphoric acid and potash, mixed together so that an appli¬ cation of the preparation will result in bringing each of these substances in contact with the soil wherever applied, are called complete fertilizers. The proportions in which the con¬ stituents are mixed vary with the different brands and factories. Sometimes a fertilizer of this kind will be advertised for use on a certain crop, and will contain the nitrogen, phosphoric acid and potash in the proportion in which the manufacturer believes they will produce the best yields of that crop. He has, however, no means of knowing the require¬ ments of the soils on which the fertilizer is to be used.

Incomplete fertilizers contain only one or two of the customary fertilizer ingredients.

Available and Unavailable Fertilizer Ma¬ terial. — The fertilizing constituents in a fer¬ tilizer may be present in a readily soluble or difficultly soluble condition, depending upon the chemical combinations and, to some extent, upon the physical condition in which they are found. Thus phosphoric acid when in the form of phosphate rock as it is taken from the deposits is a very difficultly soluble substance, and plants can avail themselves of it only in small quantities. After the same rock has been treated with sulphuric acid the phosphoric acid is in a form in which it can be readily used by plants. To a more limited extent the same is true of the phosphoric acid in basic slag, which, when the slag is in an unground condi¬ tion, is not of much use to plants, but when the slag has been finely ground furnishes a valuable form of plant-food.

When the fertilizing material is in a condi¬ tion in which it can be readily used by the plant it is said to be “available,® and when it can be used only with great difficulty it is said to be “unavailable.® It is important that the purchaser should know in what form the con¬ stituents are present in a fertilizer.

Nitrogenous Fertilizers.— Nitrogen is ab¬ sorbed by most plants only in the form of a soluble salt ; hence for the cereals and many other crops it is desirable either to have it in this form or to incorporate it in the soil in a condition in which it will be readily converted into a soluble condition. Plants like the clovers, alfalfa, peas, beans, etc., have the power of using the nitrogen of the air, and hence do not require nitrogenous fertilizers in such large amounts. These plants may be used to increase the supply of nitrogen in the soil. Nitrogen is

the most expensive constituent of fertilizers, and is extremely important, as it is used in large amounts by plants and is likely to be deficient in soils. The form in which nitrogen is present in a fertilizer may make a great difference in its value and in the way in which it can be best applied. Nitrogenous fer¬ tilizers differ in having their nitrogen either in the form of a soluble salt or combined as organic material.

Nitrate of Soda. — This now constitutes one of the principal sources of inorganic nitrogen in artificial manures, having largely taken the place of Peruvian guano, which was used for many years, and the profitable use of which did much to promote the extensive use of com-

mercial fertilizers. The salt occurs in the crude condition called caliche, in enormous deposits, principally in the province of Tarapaca in northern Chile. The earlier records of these deposits extend back to 1820, but it was not until several years later that they were ex¬ ploited. The portion of the country in which the deposits lie is a sandy desert where rain never falls. The altitude is 3,000 to 4,000 feet al>ove the sea-level. The deposits have been attributed to the action of minute organisms fixing in the soil, through countless ages, the nitrogen of the atmosphere, and leaving the product finally in the form of sodium nitrate that has crystallized out of solution in which it has at some time been held. Several other theories have been advanced but no wholly ade¬ quate explanation has yet been offered.

The raw product is found beneath a covering consisting of two layers, the upper one of sand and gypsum and the lower of baked clay and gravel. The thickness of the caliche varies from a few inches to 12 feet. It is extracted by boring through the upper layers and intro¬ ducing a charge of blasting-powder, which, when fired, exposes a considerable quantity of the material. The nitrate is somewhat purified by crystallization before shipping. Iodine is a by-product in the purification process. The nitrate, when ready for shipment, contains about 96 per cent sodium nitrate, or about 16 per cent of nitrogen, 2 per cent of water, and small amounts of sodium chloride, sulphates, and insoluble matter.

The development of the nitrate industry may be appreciated from the fact that the product, which amounted in 1884 to 550,000 tons, increased to 1,000,000 tons in 1890, and to 1,660,000 tons in 1907. The output is ex¬ ported almost entirely to Europe and the United States. It is held by persons who have examined these deposits that at the present rate of mining they will be exhausted by the year 1930, in which case a serious deficiency in fer¬ tilizer nitrogen will occur, unless a new supply shall meanwhile have been discovered. *

Because of its easy availability, sodium ni¬ trate acts quickly in inducing growth. For this reason it is used much by market gardeners, and for other purposes when a rapid growth is required. It is the most active form of nitro¬ gen, with the possible exception of calcium ni¬ trate. A light dressing on meadow land in early spring assists greatly in hastening growth by furnishing available nitrogen before the conditions are favorable for making available the more inert nitrogen of the soil. On small grain a similarly useful purpose is served where the soil is not rich.

Owing to the fact that nitrate is not ab¬ sorbed by the soil in large quantities/it is easily lost in the drainage water; for this reason it should be applied only when crops are growing on the soil.

Ammonium Sulphate. — When coal is dis¬ tilled a portion of the nitrogen is liberated as ammonia, and is found in the gas and in the ammoniacal liquor which condenses when the gas is cooled. Coal is distilled commercially in coal-gas plants and in by-product coke-oven works, the latter being the larger in tonnage. In either case the ammonia is recovered from the gas by washing it with water or with dilute

sulphuric acid. Where water is used a’mmonia- cal liquor is produced,

this being a mixture of various ammonia compounds, among them the carbonate, sulphide, hydrosulphide, cyanide, sul¬ phate, sulphite, thio-sulphate and chloride. The first four of them are classed as volatile because they give up their ammonia on boiling, whereas the remaining ones do not. The liquor is treated by steam distillation and the am¬ monia is driven off, the non-volatile portion being freed by adding lime. The ammonia gas then passes to a saturating box where it is bubbled through dilute sulphuric acid and sul¬ phate of amjmonia is formed. This is dipped from the box with long-handled copper ladles, drained and dried in a centrifugal, and is then ready to bag for shipment.

Where the washing of the gas is done with sulphuric acid, the sulphate is formed directly, and may be dried and bagged without further treatment. This process requires less appara¬ tus and produces an equally high-grade of product.

Chemically pure sulphate of ammonia con¬ tains 21.2 per cent of nitrogen. The commer¬ cial product contains about 20 per cent of nitro¬ gen. It is the most concentrated form in which nitrogen can be purchased for use as a fertilizer. Its effect on crops is not so rapid as that of sodium nitrate, but it is not so quickly carried from the soil by drainage water, as the ammonium salts are readily absorbed by the soil. A pound of nitrogen in the form of am¬ monium sulphate has about the same agricul¬ tural value as the same amount in the form of nitrate of soda if the soil on which it is used is abundantly supplied with lime ; but on an acid soil ammonium sulphate has less value.

The long and extensive use of ammonium sulphate on a soil has a tendency to produce an acid condition, through the accumulation of sulphates which are not largely taken up by plants. Ammonium sulphate, like sodium ni¬ trate, should not be applied in autumn, as the ammonia is converted into nitrates and leached from the soil.

Chemical Processes for the Fixation of Nitrogen. — There are now several chemical processes for the fixation of atmospheric nitro¬ gen, two of which are well known and were in use on a commercial scale before the out¬ break of the present war, the others are more recent, and exact knowledge regarding them is rather difficult to obtain.

Calcium Cyanamide.— The fertilizers pro¬ duced by the older processes are calcium cya- namid and calcium nitrate. The former is sold in this country under the trade name <(Cya- namid.® One process for its production con¬ sists in passing nitrogen into closed retorts con¬ taining powdered calcium carbide heated to a high

temperature ; the product being calcium cyanamide and free carbon: —

$CaC2 + N2 = CaCN2 + C$

In preparing the calcium carbide for this process it must be ground out of contact with air. The nitrogen required for the process is obtained either by passing air over heated cop¬ per, or by the fractional distillation of liquid air.

The fertilizer, as placed on the market, is a heavy black powder or granulated material with a somewhat disagreeable odor, the dark

color being due to the carbon set free in the process and which, remains distributed in the cyanamid.

Cyanamid as manufactured in this country has about the following composition :

Calcium cyanamide . CaCN2.

Calcium carbonate . CaCOj

Calcium sulphide . CaS _ ‘

Calcium phosphide . Ca3P2

Calcium hydroxide . Ca (OH) 2

Free carbon . C .

Iron and aluminia . R2O3.

Silica . Si02 . . . . .

Magnesia . MgO .

Combined moisture . .

Free moisture . H2O

Undetermined .

Per cent

45.92 4.04 1.73 0.04 26.60 13.14 1.98 1.62 0. 15 3.12 0.35 1.31

100.00

According to this' composition the material would contain 16 per cent of nitrogen. Lime in the form of carbonate and hydroxide would add something to its value, and the residue of calcium cyanamide, which upon decomposition becomes calcium hydroxide, is likewise bene¬ ficial to the soil.

Calcium cyanamide must decompose in the soil before its nitrogen becomes available to plants. There are several steps in the decom¬ position process by which the nitrogen finally emerges in the form of ammonia. The inter¬ mediate products formed during decomposition will vary somewhat with the condition of the soil. When, for instance, a soil is saturated with water, or when it is acid some more or less injurious substances may be formed. For this reason ˆcyanamid® is not likely to be so satisfactory on soils of this nature as on better soils. To very sandy soils it is not well suited. Under good conditions its fertilizing value is not greatly below that of sodium nitrate and is about equal to that of ammonium sulphate when not used in heavy applications.

It should be incorporated with the soil at least a week before planting, as it may injure the young plants if decomposition has not pro¬ ceeded far enough to remove its somewhat toxic properties. As it must undergo this de¬ composition before its nitrogen becomes avail¬ able to young plants, there is an added reason for this precaution. It does not give its best results as a top-dressing because it requires incorporation with the soil for its proper de¬ composition.

Other Fixation Processes. — -The first com¬ mercial process for the fixation of nitrogen was the arc process. Its use, however, is confined to Norway where 250,000 kilowatts of electricity are employed in its use. By this process nitro¬ gen and oxygen are directly burned to nitric acid under the influence of the electric arc. The resulting product is nitric acid, which is neutralized with lime forming calcium nitrate, a fertilizer somewhat similar to nitrate of soda. Owing to the enormous electrical power required the operation is an expensive one unless the electricity can be cheaply developed, as when water power is abundantly available, which is the case in Norway. It does not seem likely that the process will be extensively adopted in this country.

There are several very promising processes that have been brought forward since the be¬ ginning of the present war, but which on ac¬

count of the great demand for explosive com¬

binations of nitrogen have not been applied to the production of fertilizers.

Organic Carriers of Nitrogen. — Organic nitrogenous fertilizers include cotton-seed meal (7 per cent nitrogen when free from hulls), linseed meal (5.5 per cent nitrogen), castor- pomace (6 per cent nitrogen), and a number of refuse products from packing houses, consist¬ ing of red-dried blood (13 per cent nitrogen), black-dried blood (6 to 12 per cent nitrogen), dried meal (13 per cent nitrogen), hoof-meal (12 per cent nitrogen), ground fish (8 per cent nitrogen), and tankage (concentrated 10 to 12 per cent, crushed, 4 to 9 per cent nitrogen), also leather-meal, and wool-and-hair waste, which last two on account of their physical condition are of little value.

The forms in which combined nitrogen is available to most agricultural plants are nitrates, ammonium salts and certain organic com¬ pounds. Of the latter the simpler compounds, like urea, appear to be most readily taken up by plants. Decomposition is therefore a necessary process for most of the organic fertilizers be¬ fore their nitrogen becomes available, and their usefulness is, in general, proportional to the readiness wfith which aerobic decomposition proceeds, or to the proportion of available com¬ pounds which they contain in their original con¬ dition. Guano, for instance, apparently, con¬ tains much nitrogen that is available without further decomposition. Dried blood quickly decomposes and soon forms available sub¬ stances. In fact, it produces results more quickly than any other form of organic nitrogen.

Dried meat contains a high -percentage of nitrogen, but does not decomoose so readily as dried blood, and is not so desirable a form of nitrogen. Hoof meal while high in nitrogen, decomposes slowly, being less active than dried blood. Ground fish is an excellent form of nitrogen, and is as readily available as blood but has a lower nitrogen content. Tankage is highly variable in composition, and the con¬ centrated tankage being more finely ground, undergoes more readily the decomposition nec¬ essary for the utilization of the nitrogen. Crushed tankage contains from 3 to 12 per cent of phosphoric acid, in addition to its nitrogen. Leather meal and wool-and-hair waste when untreated are in such a tough and undecom- posable condition that they may remain in the soil for years without losing their structure. They are therefore not to be recommended as fertilizers.

Phosphate Fertilizers. — Bv the term phos¬ phate fertilizers is meant

those substances that are used for manures chiefly because of the phosphorus they contain. The phosphorus is generally present in the form of a phosphate of lime, iron and alumina mixed with other substances. Some of these phosphates also contain organic matter, in which case they generally carry some nitrogen, which adds something to their value as fertilizers. Phos¬ phates associated with organic matter decom¬ pose more quickly in the soil than purely mineral phosphates, and are therefore more readily available fertilizers.

Bone-Phosphate. — The bones of animals have been for a great many years an im¬ portant form of phosphate manure. Formerly bones were used entirely in the raw condition, either ground or unground. In the ground con-

dition they are a more quickly acting fertilizer. Raw bones contain about 22 per cent phosphoric acid and 4 per cent nitrogen. The phosphoric acid is in the form of tricalcium phosphate.

At the present time most of the bone used as manure is first boiled or steamed. This frees it from fat and nitrogenous matter both of which are used in other ways. Steamed bone is a more valuable fertilizer than raw bone, as the fat in the latter retards decom¬ position and also because the steamed bone is in a better mechanical condition. The form of the phosphoric acid is the same as in the raw bone and varies from 28 to 30 per cent, while the nitrogen is reduced to about lp2 per cent. Bone tankage, which has already been spoken of as a nitrogen fertilizer, contains from 7 per cent to 9 per cent phosphoric acid, largely in the form of tricalcium phosphate. All of these bone-phosphates are slow-acting fertilizers and should be used finely ground and for the per¬ manent benefit of the soil rather than as direct plant-food material.

Mineral Phosphates. — There are many natural deposits of mineral phosphates scattered over the earth, some of the most important of which are in America. The phosphorus in all of these is in the form of tricalcium phosphate, but the materials associated with it vary greatly.

Coprolites are concretionary nodules found in the chalk or other deposits in the south of England and in France, the name having -been given them on the assumption that they con¬ sisted of fossilized animal excrement. They contain 25 to 30 per cent of phosphoric acid,

the other constituents being calcium carbonate and .silica.

Apatite is found in large quantities in the provinces of Quebec and Ontario, Canada. It occurs chiefly in crystalline form. The calcium phosphate of which it is composed is in one form associated with calcium fluoride and in the other with calcium chloride. The Canadian apatite contains about 40 per cent phosphoric acid, being richer in this ingredient than that found elsewhere. Phosphorite is another name for apatite, but is chiefly applied to the impure amorphous form.

South Carolina phosphate occurs in the form of lumps from the size of a pebble to a mass weighing a ton. These are distributed through a deposit varying from 1 to 20 feet in thick¬ ness, which occurs both on the land and in the river beds. It contains from 26 to 28 per cent of phosphoric acid and but a very small amount of iron and aluminum. As these substances interfere with the manufacture of superphos¬ phates from the rock, their presence is very un¬ desirable, rock containing more than 3 to 6 per cent being unsuitable.

Florida phosphates are found in the forms of soft phosphate, a whitish product somewhat resembling clay and largely contaminated with it; pebble phosphate, consisting of hard pebbles; rock or boulder phosphate, consisting as the name implies of rocks or boulders. Soft phos¬ phate contains from 18 to 30 per cent of phos¬ phoric acid and on account of its being more easilv ground than most of these rocks is ap¬ plied to the land without being first converted into a superphosphate. Pebble rock constitutes the major portion of the Florida phosphate. It contains from 20 to 40 per cent of the phos¬

phoric acid, being very variable in composition. Rock or boulder phosphate is much more uni¬ form in composition than the other kinds, but there is less of it. It contains about 40 per cent of phosphoric acid.

Tennessee phosphate differs from the Caro¬ lina and Florida phosphate in that it does not exist as nodules, pebbles or boulders, but in

veins and pockets and does not need to be washed previous to its treatment. It contains from 30 to 35 per cent of phosphoric acid.

Utah, Wyoming and Montana contain de¬ posits of mineral phosphate interbedded among limestones and shales with amount estimated at nearly six billion tons. At present they are not producing much, the output in 1916 being only 1,700 tons. This is because of the small

local demand for fertilizer and high cost of transportation to distant markets. In Idaho there is high grade phosphate on both sides of Blackfoot River, in Fort Hall Indian Reserva¬ tion, near Montpelier and north of Bear Lake. In Utah the deposits are in the Wasatch, Oquirrh and Uinta ranges and east of Bear Lake. In western Wyoming the deposits are mostly in Wind River, Gros Ventre, Salt River and Owl Creek ranges, and in Montana the deposits are near Ellison, Garrison, Philips- burg and Melrose. The material is generally an even-bedded gray to brown or black oolitic rock, closely resembling limestone, and emitting a fetid odor when struck with a hammer. Weathered surfaces have a light-bluish or white coating commonly in reticulated pattern. Many of these deposits carry 65 to 81 per cent of tricalcium phosphate and are four to six feet thick. On places there are two or more beds and they extend for many miles. Most of the areas underlain by the thicker beds are govern¬ ment land, parts of which have been withdrawn from entry in order to preserve them for a reserve which can be developed for the use of the people.

Basic slag, or as it is also called, phosphate slag, or Thomas phosphate, is a by-product in the manufacture of steel from pig iron rich in phosphorus. The phosphoric acid present is in the form of tetracalcium phosphate (CaO)4Ps- Os. It also contains calcium, magnesium, aluminum, iron manganese, silica and sulphur. On account of the presence of iron and alum¬ inum and because its phosphoric acid is more readily soluble than the tricalcium phosphate, the ground slag is applied directly to the solid without treatment with acid. It is produced in large quantities in England, Germany and France.

Superphosphate Fertilizers. — In order to

render more readily available to plants the phosphoric acid contained in bone and mineral phosphates, the raw material, purified by being washed and finely ground, is treated with sul¬ phuric acid. This results in a replacement of phosphoric acid by sulphuric acid with the formation of monocalcium phosphate and cal¬ cium sulphate, with a smaller amount of dical¬ cium phosphate, according to the reactions:

Ca2 (P O4) + 2H2 SO4 — Ca H4 (P 04) 2 + 2CaS04 and Ca3 (P 04)2 + H2S 04 = Ca2 H2 (P 04)2 + Ca S 04.

The tricalcium phosphate, being in excess of the sulphuric acid used, a part of it remains unchanged.

FERTILIZERS

In the treatment of phosphate rock part of the sulphuric acid is consumed in acting upon the impurities present, which usually consist of calcium and magnesium carbonates, iron and aluminum phosphates and calcium chloride or fluoride, converting the bases into sulphates and freezing carbon dioxide, water, hydrochloric acid and hydrofluoric acid. The resulting super¬ phosphate is therefore a mixture of monocal¬ cium phosphate, dicalcium phosphate, trical¬ cium phosphate, calcium sulphate and iron and aluminum phosphates.

In the superphosphates made from bone the iron and aluminum sulphates do not exist in any considerable amounts. However, as long as the phosphoric acid remains in the form of monocalcium phosphate the value of a pound of available phosphoric acid in the two kinds of fertilizer is the same, but the remaining tricalcium phosphate in the bone superphos¬ phates has a greater value as before explained.

The superphosphates made from animal bone contain about 12 per cent available phosphoric acid and 3 or 4 per cent of insoluble phos¬ phoric acid. They also contain some nitrogen. Bone-ash and bone-black superphosphates con¬ tain oractically all of their phosphoric acid in an available form, but they contain little or no nitrogen. South Carolina rock superphos¬ phate contains from 12 to 14 per cent available phosphoric acid, including from 1 to 3 per cent reverted phosphoric acid. The best Florida superphosphates contain from 17 per cent downward of available phosphoric acid, part of which is reverted. The Tennessee superphosphates vary from 14 to 18 per cent available phosphoric acid.

Reverted Phosphoric Acid. — On standing, a change sometimes occurs in superphosphates by which a part of the phosphoric acid becomes less easily soluble and to that extent the value of the fertilizer is decreased. This change, known as ˆreversion,® is much more likely to occur in superphosphates made from rock than in those derived from bone. It also varies in different samples, a well-made article usually undergoing little change even after long stand¬ ing. It is supposed to be caused by the presence of undecomposed tricalcium phosphate and of iron and aluminum sulphates.

The decrease in solubility of the superphos¬ phate is due in part at least to the interaction of monocalcium phosphate and tricalcium phosphate leading to the formation of dical¬ cium phosphate and perhaps to the formation of ferric and aluminum phosphates by the action of monocalcium phosphate upon the iron and aluminum

sulphates.

Double Superphosphates. — In making super¬ phosphates, a material rich in phosphoric acid must be used, not less than 60 per cent trical¬ cium phosphate being necessary for their profit¬ able production. The poorer materials are sometimes used in making what are known as double superphosphates. For this- purpose they are treated with an excess of dilute sulphuric acid; the dissolved phosphoric acid and the ex¬ cess of sulphuric acid are separated from the mass by filtering and are then used for treating phosphates, rich in calcium phosphate, forming superphosphates. The superphosphates so formed contain more than twice as much avail¬ able phosphoric acid as those made in the ordinary way.

Relative Availability of Phosphate Fer¬ tilizers. — Superphosphates and double super¬ phosphates contain their phosphoric acid in a form in which it can be taken up by the plant at once. They are therefore best applied at a time when the crop is planted or just before, or they may be applied when the crop is grow¬ ing. Well-made superphosphates contain no free acids and therefore are not injurious to vegetation unless used in excess.

Reverted phosphoric acid, although not soluble in water, is readily soluble in dilute acids. Its value as a ready source of food for plants has been the subject of much discussion among agricultural chemists. It is now quite generally believed that it furnishes an avail¬ able supply of phosphoric acid to the plant.

Crude phosphate rock is sometimes used as a fertilizer without being treated with acid. Owing to the slight solubility of this material it acts slowly and should be applied in very large quantities — enough to last several years. It should also be very finely ground. It ap¬ pears to be used more profitably on the rich prairie soils of the Middle West than in the Eastern States. Experiments in Indiana, Ohio and several States further east have given results unfavorable to the use of ground phos¬ phate rock, or ((floats® as they are sometimes called.

Potash Fertilizers. — The production of potash fertilizers is largely confined to Ger¬ many, where are inexhaustible beds varying from 50 to 150 feet in thickness lying under a region of country extending from the Harz Mountains to the Elbe River and known as the Stassfurt deposits. These deposits of potash salts have been mined since 1862, during which time they have constituted the world's princi¬ pal supply of potash. They are operated by a syndicate comprising all the large owners and maintaining a uniform price on the output. The

principal salts placed on the market are sylvine (potassum chloride) ; sylvinite, a mix¬ ture of sylvine, rock-salt and kainite ; carnallite (magnesium chloride and potassium chloride) ; schoenite (magnesium sulphate and potassium sulphate) ; kieserite (magnesium sulphate with carnallite) ; kainite (magnesium sulphate and potassium chloride, or magnesium and potas¬ sium sulphates and magnesium chloride) ; polyhalite (potassium, calcium and magnesium sulphates).

The potash fertilizers contain their potassium either as chloride or sulphate. The chloride has the advantage of being more diffusible in the soil but in most respects the sulphate is preferable. Potassium chloride has an injurious effect upon such crops as tobacco, sugar-beets and potatoes. In tobacco the potassium chloride in the ash prevents the proper burning of the tobacco. In the case of clover, corn and grass, however, potassium chloride appears to have no harmful effects.

Kainite. — The potash contained in kainite is in the form of sulphate, but because of the large quantities of other salts it. contains, chiefly sodium and magnesium chloride, it has the same effect upon plants as has the chloride. It contains from 12 to 20 per cent of potash and 25 to 45 per cent of sodium chloride, with some chloride and sulphate of magnesium. Kainite should be applied to the soil a con¬ siderable time before the crop which it is in-

tended to benefit is planted. It should not be drilled in with the seed. By this method of application the injurious properties of the chlorides will not affect the crop. Indirectly kainite serves to supply the plant with food other than potash. The salts associated with the potash, particularly the chlorides, aid plant- growth by making other substances in the soil, particularly phosphoric acid, more available to the plant, besides improving the physical con¬ dition of the soil.

Sylvinite. — This salt contains its potash both as chloride and as sulphate. It also contains sodium and magnesium chlorides. It contains about 16 per cent potash. Owing to the pres¬ ence of chlorides it has the same effect as kainite.

Muriate (Chloride) of Potash. — This is a more concentrated form of potash than either of those just mentioned. It contains about 50 per cent of potash, making it 80 per cent potas¬ sium chloride. The

impurities are largely so¬ dium chloride and insoluble mineral matter. A purer form of muriate of potash may be ob¬ tained which contains 98 pe#r cent pure potas¬ sium chloride.

Sulphate of Potash. — High-grade sulphate of potash contains from 49 to 51 per cent of potash. Its advantage over muriate is that it is not, like the latter, injurious to any crops; but it has the disadvantage of being more ex¬ pensive.

Schoenite. — This is a double sulphate of potash and magnesium. It contains about 26 per cent of potash. The cost of the potash is greater than in the muriate. The sulphate of magnesium it contains is supposed to have a beneficial effect upon the soil.

Potash Production in the United States. — The potash resources of the United States are most inadequate to meet the present needs owing to the loss of the German supply from the autumn of 1914 to the present (1918). In 1911 this country imported, mainly from Ger¬ many, 672,639,518 pounds of potash salts valued at $11,826,106. There have recently been many efforts made to obtain potash in a form suit¬ able for use as a fertilizer. Wood ashes con¬ stituted about the only domestic source of pot¬ ash supply previous to 1914. At present the largest quantity comes from some of the alkali lakes of the arid or semi-arid regions, the waters of which carry enough potash in solution to make its recovery profitable at present prices.

Another source of potash is the kelp or giant sea weed that grows in the Pacific Ocean from Lower California to Alaska. The ash of the plants contain about 30 per cent of potash. Machinery has been built for harvesting the plants and the operation of recovering potash has been conducted on a small scale. It is not likely, however, that the quantity of potash secured in this way will ever constitute any large part of the total amount required by the fertilizer industry of this country.

Alunite, a hydrous sulphate of potash and alumina, is a possible source of potash and one that has been worked in a small way. Several processes for the extraction of potash from this mineral have been proposed and the recovery of potassium sulphate appears to be a rather simple matter.

Another enterprise that has been tried with some degree of success is the recovery of

potash from the flue dust of Portland cement plants, some potash

bearing rocks or minerals being added to the raw products used in the burning process.

The extraction of potash from silicate rocks has received a great deal of attention during the last few years. Among the materials used experimentally for this purpose are feldspar, of wrhich there are small deposits scattered widely over the United States ; leucite, occurring as one constituent of a rock of which immense quan¬ tities are found in Wyoming; sericite, in ex¬ tensive beds in Georgia, and green sand, of which large deposits are found in New Jersey.

By application of heat and fluxes to lower the melting point of the slag, it has been found possible to convert almost all of the potash into a form soluble in 2 per cent citric acid or into a condition considered to be available to plants. One distinct disadvantage which these silicates possess is that their content of potash is low and much material must be handled in order to obtain the rather small percentage of potash.

By means of these various processes there were produced in the United States during 1916 a total quantity of 20,000,000 pounds of potash salts, valued at $3,500,000.

Other Fertilizing Materials. — There are a number of fertilizers not included in the classes already mentioned. Many of them are very valuable sources of fertility.

Wood Ashes. — For some time after the use of fertilizers became an important farm prac¬ tice, wood ashes constituted a large portion of the supply of potash. They also contain a con¬ siderable quantity of lime and a small amount of phosphoric acid. The product known as un¬ leached wood ashes contains 5 to 6 per cent of potash, 2 per cent of phosphoric acid and 30 per cent of lime. Leached wood ashes contain about 1 per cent of potash, 1.5 per cent of phosphoric acid and 28 to 29 per cent of lime. They con¬ tain the potash in a readily available form as potassium carbonate. The lime conduces to a good physical condition of the soil.

Guano. — This fertilizer has been formed from the excrement and carcasses of sea-fowl. The composition of guano depends upon the climate of the region in which it is found. Guano from an arid region contains nitrogen, phosphoric acid and sometimes potash, while that from a region where rains occur contains only phosphoric acid, the nitrogen and potash having been leached out. In a dry guano the nitrogen occurs as uric acid, urates and in small quantities ammonium

salts. A damp guano contains more ammonia. The phosphoric acid is present as calcium phosphate, ammonium phosphate and as phosphates of other alkalies. A portion of the phosphate is readily soluble in water. All of the plant food is thus either directly available or becomes so soon after ad¬ mixture with soil. The composition is ex¬ tremely variable. Guano wTas formerly a very important fertilizing material but the supply has become so nearly exhausted that it is rela¬ tively unimportant at the present time. South America, South Africa, Australia and certain islands in the Pacific contribute to the supply. Other fertilizers of less value are pow'der- waste, agricultural salt, cotton-hull ashes, coal ashes, seaweed, king-crab, mussel and lobster shells, muck, peat, marl, tobacco stems and

stalks, crude fish-scrap, wool and hair waste, sewage, street sweepings, etc.

Catalytic Fertilizers. — The term catalytic fertilizer has been used rather loosely to desig¬ nate a class of substances that, when added to a soil, increase plant growth by apparently ac¬ celerating the processes that normally take place in soils. They do not really function as fertil¬ izers because their value does not lie in the nutrients that they possess. The term cataly¬ sis is employed in a chemical sense to mean a change brought about in a compound by an agent that itself remains stable. When an at¬ tempt is made to study these phenomena in soils, it becomes difficult, owing to the multi¬ plicity of factors and reactions, to determine whether the agent is acting in a purely catalytic manner.

A large number of substances have been found to act as catalytic fertilizers. Among these are various salts of manganese, iron, alum¬ inum, zinc, lead, copper, nickel, cobalt, uranium, boron, cerium, lanthanum, and the like. These substances when used in small quantities stimu¬ late plant growth, but are toxic in large amounts.

Of the various plant stimulants mentioned manganese is the only one that gives promise, at the present time, of usefulness on a commer¬ cial basis. The manganese salts that have been found to be effective as fertilizers are the sul¬ phate, chloride, nitrate, carbonate and dioxide. Of these the first has been most often used, and in quantities up to 50 pounds an acre it has in most cases not been toxic. It is supposed to be most effective on poor soils that are not acid.

Lime. — This substance is not a fertilizer in the same sense as are the materials previously discussed. It is because of its effect on the soil rather than directly on the plant that lime is applied to soils. The forms in which it is used are (1) ground limestone, (2) marl, (3) air-slaked lime, (4) quick-lime, (5) water-slaked lime.

Lime is applied to soils to correct what is called acidity of the soil, which arises from a large removal of basic material by crops and drainage water and to other minor causes. This condition is widespread in soils and is in¬ creasing so that the agricultural lime industry is growing rapidly. The tendency in the busi¬ ness at the present time is to produce ground limestone rather than burnt lime. The ground limestone is somewhat more bulky to transport, but it is much easier for the farmer to handle and it may be kept without danger of heating. Owing to its bulk and the large quantities ap¬ plied per acre lime is not usually transported long distances, and this is one reason why the grinding mills are scattered so widely over the regions in which limestone is found. Dolomitic limestone may be used on most soil with profit, but the trade usually prefers a lime with only a small percentage of magnesia.

Home Mixing of Fertilizers. — Fertilizers are ordinarily sold as (1) complete fertilizers containing nitrogen, phosphoric acid and potash, which in different mixtures are to be found in different relative amounts; and (2) incom¬ plete fertilizers, or raw. material containing only one of these ingredients. . Authorities at a number of the experiment stations have urged that it is in many cases more profitable for the

farmer to purchase the incomplete fertilizers and mix them himself. The arguments ad¬ vanced in favor of this practice are that tne materials can be purchased more cheaply in that form than when mixed by the manufacturer ; that they can be used in the proportion desired, which may effect a saving in the amount of some ingredient, and that the form in which each ingredient is present is then known, which is not always the case when mixtures are pur¬ chased.

On the other hand, it is more difficult to obtain the raw materials from the small dealer, and when purchased they are not generally so finely ground as they are in the mixtures.

State Control of Fertilizer Sales. — In most States in which fertilizers are largely used laws are in effect compelling manufacturers or dealers in fertilizers to state the actual amounts of the fertilizing ingredients contained in the fertilizers offered for sale, and also to state in what

form each of these ingredients exist. A chemical control is provided and a penalty im¬ posed for any failure to comply with the law. The control authorities publish each year a state¬ ment of the commercial value per pound of nitrogen, phosphoric acid and potash in each of the various forms in which they occur in fertilizers. Fertilizer control is in most States attached to the State agricultural experiment stations, and information concerning the pur¬ chase and use of fertilizers may be obtained from these institutions

Statistical. — The quantity of fertilizers manufactured and consumed is increasing in all portions of the crop-producing world; and especially in the United States there has been a rapid increase from one decade to another. In 1859 the value of the entire output of the fertil¬ izer factories was $891,344; in 1869, $5,815,118; in 1879, $23,650,795; in 1889, $39,180,844; in 1899, $44,657,385 and in 1909, $103,960,213. Not all of this is used on farms in this country, there being $8,700,640 worth exported in 1910. The imported fertilizer materials consisted largely of nitrate of soda and potash salts, while the exported fertilizers were animal ref¬ use and phosphate fertilizers.

Although the commercial fertilizer industry is little more than half a century old, the sale of fertilizers in the United States in 1909 amounted to $114,883,000, an increase of 115 per cent as compared with the expenditure in 1899. This large quantity of fertilizer was largely used in a rather narrow strip of country lying along the Atlantic seaboard. The South Atlantic states show a higher rate of increase in expenditures for fertilizers between 1899 and 1909 than any other, such increase amounting to 162.3 per cent, but Ohio shows an increase of 155 per cent and Indiana of 141 per cent for the same period, which indicates a westward movement of the practice of using fertilizers.

As is naturally to be expected, the first settled and longest cultivated portion of the country is that using the greatest quantity of fertilizers. This region lies nearest to the large centres of population and hence of con¬ sumption; it produces crops of greatest acre value; and it is so situated that the distances which it is necessary to transport fertilizers are generally less than they would be for the non- fertilizer-using portion of the country. It is true in the United States, as it is in Europe,

that a large consumption of fertilizers usually goes hand in hand with a highly developed and intensive system of agriculture.

T. Lyttleton Lyon,

Professor of Soil Technology, ‘ Cornell Univer¬ sity.

FESCENNINE VERSES, an early kind of Italian poetry, originally sung at harvest fes¬ tivals, and finally spreading to the towns where they became common at private gatherings, especially weddings. Later they were restricted to weddings altogether. They were somewhat coarse and often degenerated into malicious raillery and licentiousness. Festus states that the verses were introduced from Fescennia, in Etruria, but such origin is problematical. (See Latin Literature). Consult Knapp (in American Journal of Philology, XXXIII, 146- 148, 1912) and Schanz, (Geschichte der romi- schen Litteratur) (3d ed., Munich 1907).

FESCH, fesh, Joseph, French ecclesiastic: b. Ajaccio, Corsica, 3 Jan. 1763; d. Rome, 3 May 1839. He was half brother to the mother of Napoleon. After Bonaparte in 1801 concluded the concordat with Pius VII, he became in 1802 archbishop of Lyons, and next year a cardinal. He was likewise appointed French ambassador at Rome, and made himself very acceptable to the Pope by his ultramontane tendencies. On the approach of the Austrians in 1814 he fled with his sister, Madame Bona¬ parte, to Rome, but Napoleon’s return brought him back to France, and he acted as a peer during the Hundred Days. When called upon by the Bourbons to resign his episcopal rights he decidedly refused, but in 1825, after a papal brief interdicted him from exercising spiritual jurisdiction, he renounced the office, but re¬ tained the dignity.

FESCUE, the popular name of a genus of grasses (Festuca) , numbering upward of 80 species. The genus is of wide geographical distribution, but particularly numerous in the temperate regions, where they are among the most important of the pasture and fodder grasses. About 25 species are found in North America, many of them naturalized from Eu¬ rope. The red fescue (Festuca rubra) serves to bind loose soil, and is also a good hay grass. The tall meadow fescue (F . elatior, var. par- tensis) is a fibrous-rooted perennial, growing from two to three feet high in low meadows and pastures, where it forms fresh herbage among the earliest of the cultivated grasses. The sheep’s fescue (F . ovina) is much smaller. Sheep’s fescue exists in many varieties in the northwestern States, especially in the Rocky Mountain region. Some of the varieties attain the height of two or three feet, but for the most

part they are rarely more than a foot high, producing a large amount of fine herbage, which is valuable for grazing, especially for sheep. Some of the native varieties are well worthy the attention of the agriculturist. All the forms of F. ovina are ˆbunch-grasses,® and are devoid of the creeping roots, the presence of which distinguishes the red fescue (F. rubra) from this species. Sheep's fescue is well adapted for cultivation on light, dry soils, especially those which are shallow and silicious. A tall species is the giant fescue (F. gigantea), which occurs in shady woods and similar situa¬

tions, from Maine to New York, adventive from Europe.

FESSENDEN, Reginald Aubrey, Ameri¬ can electrician : b. Milton, Quebec, Canada, 6 Oct. 1866. He was chemist-in-chief in Thomas Edison's laboratory from 1887 to 1890 and the two following years an electrician with the Westinghouse Company of Newark, N. J. He was elected professor of electrical engineering in the Western University of Pennsylvania in 1893. He is the author of many inventions in electrical and chemical engineering and has written numerous scientific papers.- From 1900 to 31 Aug. 1902, he was a special agent of the United States Weather Bureau, in charge of in¬ vestigations in wireless telegraphy as an aid to the collection of daily weather reports.

FESSENDEN, Thomas Green, American author: b. Walpole, N. H., 22 April 1771 ; d. Boston, 11 Nov. 1837. He was graduated from Dartmouth College in 1796. He went to Lon¬ don in 1801, and while there published anony¬ mously a satirical poem, (Terrible Tractoration) (1803). He returned to the United States; did literary work in New York; went to Boston and founded the (New England Farmer) (1822). Some of his publications were (The American Clerk's Companion (1815) ; (The Ladies' Moni- tor) (1818) ; and

FESSENDEN, William Pitt, American statesman: b. Boscawen, N. H., 16 Oct. 1806; d. Portland, Me., 8 Sept. 1869. He was gradu¬ ated at Bowdoin College in 1823 and ad¬ mitted to the bar in 1827. He entered politics and soon acquired a national reputation as a lawyer and a Whig. He was elected to the United States Senate in 1854, and a week after he took his seat made a speech against the Kansas-Nebraska Bill which placed him in the front rank of senatorial orators. During the Civil War he was conspicuous for his efforts to sustain the national credit. He was made Secretary of the Treasury in 1864, and having placed it on a firm basis, resigned in 1865 to return to his seat in the Senate.

FESSLER, fes'ler, Ignaz Aurelius, Hun¬ garian historian: b. Czurendorf, 18 May 1756; d. 15 Dec. 1839. He joined the Capuchin order in 1773 and six years later was ordained to the priesthood. In 1784 he sent a letter to Joseph II in which he suggested methods for bettering the education of the clergy and calling attention to irregularities in the monasteries. An inves¬ tigation followed and Fessler found he had made many enemies. In that year he became professor of Oriental languages and herme¬ neutics in Lemberg. His tragedy (Sidney, > published in 1788, raised another storm and Fessler fled to Silesia. He was converted to Lutheranism in 1791 and five years later re¬ moved to Berlin where he joined the Masonic order and founded a humanitarian society. He held a government post for a time but lost it in 1806 and spent three lean years until summoned to Saint Petersburg in 1809 by Alexander I, who made him court councillor and professor of Oriental languages at the Alexander-Nevski Academy. After many other changes he finally became chief superintendent of the Lutheran communities of Saint Petersburg. He was the author of many works of which his (His-

tory of Hungary* is still of value. Consult his (Ruckblick auf meine Liebzigjahrige Pilger- schaft* (2d ed., Leipzig 1851).

FESTA, Costanzo, cos-tan'zo fes'ta, Italian composer: b. Rome about 1496; d. there, 10 April 1545. He became a member of the pontifical choir 1517, and composed much church music, many madrigals for three voices, motets and litanies, many of his manuscript scores being still preserved in the archives of the pontifical chapel and the Vatican. His (Te Deum* is sung at the election of new popes, the appoint¬ ment of new cardinals and at the Festival of the Holy Sacrament. It was published in Rome in 1596.

FESTIN DE PIERRE. See Don Juan.

FESTINIOG, Wales, town of Merioneth¬ shire in the northern division, at the head of a valley of the same name, 30 miles from Con¬ way. There are large slate quarries nearby, in which many thousands are employed. The town is reached by the London and North¬ western, the Great Western and Festiniog rail¬ ways. Pop. 11,435.

FESTIVAL. This word for celebration or merrymaking comes to us from the Latin (festum , feast) through the Old French tongue. The

festival is an occasion of public rejoicing, of a religious, seasonal, national, local or com¬ plimentary character; in olden times always connected with the ecclesiastical ceremonies. In point of fact there can be no feasts in the sense covered by this article unless there be some form of organized religion ; and the de¬ velopment of these two, — festivals and religion, — run parallel throughout all ages. The earliest of all festivals in the space of recorded time were connected with the cult of the dead, or ancestor worship. At such ancient banquets — feasting in common being a great civilizer — – there was community with departed spirits and offerings and sacrifices. For a profound study of antique customs and survivals, and much other data on the whole subject, consult the monumental work on the Principles of Soci¬ ology* by Herbert Spencer (New York 1877— 97). In the next and higher phase the wander¬ ing tribes, depending so much on the great luminaries, and particularly on the moon, are constrained to celebrate the monthly changes: these general notes holding good for all the great branches of the human family. Settling down to the pastoral and agricultural condition, calling forth a sensitiveness to the procession of the seasons and the aspects of the weather, the great solar festivals of the solstices and equi¬ noxes were initiated and developed. Then society becoming still more complex with the rise of great empires, the gregarious and self¬ preserving instincts would prompt the setting apart of certain days for feasts of gratitude for deliverance, celebrations to mark great vic¬ tories and in veneration of distinguished mili¬ tary and religious leaders.

Festivals of the American Indians. — The Indians of the great middle belt of North America, living mainly by hunting and agri¬ culture, show these same characteristics in their festivities. Some tribal calendars are rich in a variety of festivals, all tending more or less toward the agricultural character. This < is also seen in the basic simplicity with which

the celebrations are conducted. On the other hand, there are tribes quite indifferent to time and season ; and in such cases, it is essential to note, there are no festal ceremonies. Luna¬ tion is beyond all question the most important time division of the North American Indians. There are tribes that divide the year into 12 moons, and those that divide it by 13. Some of the feasts are very highly elaborated, oc¬ cupying many days in the observances. It is customary for them to consist of a preliminary fast followed by symbolic dances or magic in¬ cantations terminating with a gluttonous orgy. Speaking broadly, there is a wide similarity in the festival customs of the various tribes ; obvious differences being accounted for by ques¬ tions of climate and environment. Fasting is generally practised among the tribes of North

America; and, though often observed in con¬ nection with public ceremonials, is perhaps more often carried out in private. The first fast is usually the puberty fast. A militant expedition, a great hunt, or initiation into secret or reli¬ gious societies, are invariably preceded by ab¬ stinence, more or less vigorous.

The Algonquin Indians of Virginia appor¬ tioned the year into the Budding or Blossoming seasons (Spring), Highest-Sun-season (Sum¬ mer), Corn-or-Gathering season (Autumn) and Cohonk (Winter), a name taken from the cry of the wild geese during that quarter. The months were designated as the Moon-of-Stags, Corn-Moon, etc. They held regularly recurring festivals to celebrate ripening of fruits and grain, and more irregular feasts to mark return of wildfowl and hunting in a general way. The most important of all their celebrations was the harvest festivals, which lasted for several days. The dances were serious affairs and the recital of heroic songs goaded the young and thrilled the whole community. In a word, they would seem to be practically iden¬ tical with present day observances.

The modern Creek Indians commence the New Year immediately after the celebration of the Busk, or ripening of the new corn, in August. They divide the year into summer and winter, and subdivide 12 successive moons: Heyothluccour (Big-ripening Moon)

August; Atauwooskochee (Little Chestnut Moon) September; Otauwooskolucco (Big Chestnut Moon), October, etc. The Cherokees, at the end of their year, burnt all rubbish, cleansed houses, fasted three days and took purgatives. All crimes but murder were par¬ doned that they might commence the year free of sin. Feasting and dancing announced the new year. These festivities also celebrated the four winds (the rain-bringers), the four my¬ stic ancestors of the human race.

The Mandan (Dakotas) held a most elab¬ orate pageant festival, the ((Buffalo Dance,** to mark the beginning of the annual hunting season.

The festivals of the Thompson River In¬ dians have been fully investigated and described by Teit. They appear to be almost wholly social in character and to possess little true seasonal significance.

The Hopi, or Moki, of Arizona, present us with one of the most perfectly developed and elaborate festival systems of the American In¬ dian, exhaustively studied by several prominent anthropologists. Two factions, representing the

old school and the new, are said never to take part in the same festival.

The harvest festivals of the Pima tribe of the southern branch of the Athapascan family are wild occasions of animal pleasure and could not strictly be called ceremonies.

The Apache Indians commonly celebrate ˆIllness Feasts® for the purpose of banishing sickness. Their principal celebration is the aScalp Dance,® held after successful combats. They have few religious festivals.

The Iroquois have a <(Feast of the Dead,® which occurs once in 12 years. The tribe pro¬ ceeds to the burying place and after reviving the names of those who have been dead for 12 years, exhume their bodies and cast them into a pit along with clothing and provender.

The festivals of the tribes of California have been fully described and analyzed by Stephen Powers in (Tribes of California* (1877). A curious festival of the Pomu race, called the ((Grand Devil Dance,® is held once in seven years under the auspices of the frater¬ nity of (

The ancient Toltecs and Aztecs of Mexico and the Incas of Peru had a richly developed calendar of festivals connected for the most part with the new moons and the summer and winter solstices and equinoxes. Another relic of ancestor worship is seen in the Peruvian custom of periodically assembling embalmed bodies of dead emperors in the great square of the capital to be feasted in company with the people.

Greek Festivals. — For the festive customs of primitive Greece the older Homeric poems are our main authority; these customs being simple in comparison with the highly developed system of festivals with which we become ac¬ quainted in the post-Homeric literature. Each of the peoples of ancient Greece had their own fes¬ tivals, more or less similar at the root, but often quite distinctive in all other respects. In such a climate, with so hearty a people, we may well take Strabo seriously when he tells us that the Tarentines came to have more holidays than working days. The Athenian calendar con¬ tained about 60 festival days during which the administration of public affairs, and all regular business, was suspended. These included, in Gamelion (January), the Lencea or wine feast in celebration of Dionysus (or Bacchus) ; in Anthesterion (February), the Anthesteria of

Dionysus, the Diasia of Zeus, and the lesser Eleusinia; in Elaphebolion (March), the Elaphebolia of Artemis, the Pandia of Zens, and the greater Dionysia; in Munychion (April), the Munychia of Artemis and the Delphinia of Apollo; in Thargelion (May), the Thargelia of Apollo and the Plynteria and Callynteria of Athena; in Scirophorion (June), the Diipolia of Zeus and the Scirophoria of Athena; in Hekatombaion (July), hecatombs were offered to Apollo, the summer-god; and in this month also were held the Cronia of

Cronus and the Panathencea of Athena (the most famous of all the festivals of Attica) ; in Metageitnion (August), the Metageitnia of Apollo; in Boedromion (September), the Boedromia of Apollo, the Nemcscia, the an¬ niversaries of the battle of Marathon, and the downfall of the 30 tyrants, and the cele¬ bration of the greater Eleusinia ; in Pyanepsion (October), the Pyanepsia of Apollo, the Osehophoria of Dionysus, the Chalkeia or Athcncea of Athena, the Thesmophoria of Demeter and the • Apaturia ; in Maimacterion (November), the M aimacteria of Zeus; and in Poseideon (December), the lesser Dionysia.

Nearly all these events were nature-festi¬ vals, mainly associated with the procession of the seasons. Some commemorated mighty his¬ torical events ; and the Nenieseia, or festival of the dead, was probably a survival of the old ancestor-worship of the East. The national feasts at which the games and the mighty dramas were played took a leading place in the life of Athens. For the games, see Isth¬ mian, Nemean, Olympic, Pythian.

Roman Festivals. — The chief of the very numerous festivals of the Roman calendar during the Augustan Age were as follows : In January, New Year's day, the Agonalia, and the Carmentalia ; in February, the Fannali, the Lupercalia, the Quirinalia, the Peralia, the T erminalia (in earlier times the last day of the Roman year), the Rcgifugium or Fugalia, and the Equiria; in March, the Matronalia (a repetition of the Equiria), the festival of Anna Perenna, the Liberalia or Agonalia, and the Quinquatria; in April, the Megalesia, the Ceralia, the Palilia, the Vinalia, the Robigalia and the Floralia; in May, the festival of the Lares Prcestites, the Lemuria, the Ludi Martiales, and the festival of Mercury; in June, the feast of Semo Sancus, the Vcstalia, the Matralia and the Qmnquatrus Minusculce ; in July, the Ludi Apollinares, and the Nep- tunalia; in August, the Nemoralia (Diana's Day), the Consulia, the Vinalia Rustica , and the Vulcanalia; in September, the Ludi Magni to celebrate Jupiter, Juno and Minerva; in October, the Meditrinalia (new wine festival), the Faunalia, and the Equiria; in November, the Epulum Jovis; in December, Faunalia,

Opalia, Saturnalia, Larentalia. Of all these new and old festivals of the Augustan Age the most recent were the Megalesia, the Ludi Apollinares, the Floralia and the Cerealia, added to the calendar about the close of the 3d century b.c. mainly by foreign influence. Among the most ancient were the Lupercalia to celebrate Lupercus (fertility) ; the Equiria (Martial) ; the Palilia (a spring festival for the purification of the flocks and herds) ; the Ludi Magni, and the great winter solstice festi¬ val, the Saturnalia, the Roman equivalent of our Yuletide. In earlier times in Italy the festivals were comparatively few in number; some, like the Lemuralia and the Feralia, be¬ ing expressions of animism. Later, Imperial Rome followed her usual receptive plans in dealing with conquered states and gave a warm welcome to many of the festival customs of her colonies. To such an extent were these importations carried that at one time there were more feast-days than work-days. The mimic battles on sea and land, the wild beast fights and gladiatorial combats, were often at-

tended by great loss of life in the face of multitudes of admiring spectators. These con¬ tests, in which as many as 10,000 men would oppose each other, were suppressed at the be¬ ginning of the 5th century of the Christian era.

Miscellaneous. — The festivals of the an¬ cient Zoroastrians (or Mazdasnans) of Persia were chiefly solar, and held at the equinoxes and solstices. The New Year's feast (the Fra- vardigan) was associated with relics of earlier barbaric rites and ceremonies ; though the Zo¬ roastrians, being a forward people, were singu¬ larly free from superstition. The great feast of the winter solstice, a prominent feature of the Mithra cult of Persia, influenced other pop¬ ular religious forms of the Orient and is re¬ puted to have originated Christmas for the Occident. Buddhism, another religion which re¬ acted against much outward display, has gradu¬ ally adopted some festive customs. In India the most important of these are Holi, held in March or April, and continuing for five days and the Dasahara which is observed in October, In Siam, the 8th day of the month, as well as the 1 5th, are analogous to our Sunday. In China, sects holds sacred the traditional anni¬ versaries of the three respective days on which Buddha returned to earth to take up the burden of the world, on which he departed from the home of his parents and on which he fulfilled his destiny and entered into Nirvana. For all details of the intricate festival system of the Chinese, consult Doolittle's (Social Life of the Chinese.) The most

important of all these annual occasions in China is in honor of the dead at the winter solstice.

The Phrygian festivals were developed un¬ der the belief that the All-powerful fell asleep during the winter ; therefore, at the autumnal equinox the Phrygians solemnized the eve of h's retirement; and, at the spring equinox, they roused him from his bed with music and danc¬ ing and all manner of mirth, that as they thought he might be fully awake during the summer season.

It is customary among Mohammedans to observe the 10th day of each month, and also every Friday (called El-Gumah, the assembly). Though the latter is frequently described as the Mohammedan Sunday the administration of affairs goes on as usual, except during the time given to public devotions. Of the annual festi¬ vals the two most important are, first, the Fed es-Sagheer (or minor festival), ending the rigorous fast of Ramadan (((burning hot®) which occasions an outburst of general rejoic¬ ing among Moslems the world over, continuing for three days (see Ramadan) ; and, second, Eed el-Kebeer (or great festival) beginning on the 10th day of the last month of the Mo¬ hammedan calendar. It is a rather less hearty celebration than the one called the minor, though it also continues for three or even four days. The first 10 days of the first month of the year, Muharram, beginning at the autumnal equinox are kept in pious form, all ceremonies culminating on the 10th day, Yom Ashoora. Besides these, there are the birthday of Mohammed in the third month, the birthday of El-Hoseyn in the fourth month, the anni¬ versary of Mohammed's mystic flight to Para¬ dise on the 27th day of the seventh month, and several other anniversaries of a like kind.

In ancient Egypt the feasts were as various as the divinities. Lunar feasts in honor of the dead were general observances. But the cele¬ brations which typically expressed the orthodox Egyptian mind supported a fanciful interpreta¬ tion of the solar system : Osiris, the Sun-god, departed after the autumnal equinox, was found again about the winter solstice, and en¬ tered into the moon at the beginning of spring; all these occasions giving rise to special feasts and services, and the life-producing attributes of the sun were celebrated in orgies of sex. In later days, however, the festivals of Isis, under the dominance of Pantheism, were of a mystical rather than of a physical character. The annual rising of the worshipful Nile was also a festive occasion.

Jewish Festivals. — Not the least important events of the Jewish calendar are those con¬ nected with the institution of the Sabbath

(meaning ˆsecession from labor®) closely asso¬ ciated from time immemorial with the feasts celebrating the new moon and the four phases of the moon. Seven was an occult number among both the Assyrians and Hebrews. On the appearance of the new moon on the sacred seventh month Tisri, the Feast of Trumpets was held, with additional burnt offerings and sacrifices. The Sabbatical Year, during which the land lay fallow and only what the earth of herself offered was taken, recurred every seventh year. The harvest was given to the poor and a cancellation of all debts prescribed. The law in its completeness was read to the people at the Feast of Tabernacles which opened the Sabbatical year. This Feast of Tabernacles, with the Passover and Pentecost, were annual solar festivals. The Passover (or Neap® feast) was held at the vernal equinox : the word hav¬ ing reference to the gamboling of lambs ; the firstlings of the flocks, by antique custom, being sacrificed. This festival was held in conjunction with the Feast of Unleavened Bread, which was a celebration of a people who had developed from the pastoral into the agricultural state, and quite dissimilar in character. The Mazzoth cakes, which alone were eaten at this feast, simply originated among harvesters too busy at this time to superintend the slow operation of preparing yeast bread. The whole seven weeks, or 50 days, between this barley harvest and the gathering in of the wheat crop (the Feast of Weeks or Pentecost) was a season of merrymaking. The Feast of Tabernacles was observed from the 15th to the 22d of Tisri, and followed five days after the only fast day prescribed by the law, the Day of Atonement. The feast marked the completion of the harvest of fruit, olives and oil and wine, and closed the tribal year. The sacrifices were far more nu¬ merous than at any other feast. Historically it commemorated the wanderings in the wilderness.

Of the minor festivals the most important were the Feast of Purim held on the 14th and 1 5th of the month of Adar, the 12th month (said to have been instituted by Mordecai to commemorate the overthrow of Haman and the failure of the plots against the Jews, as de¬ tailed in the Book of Esther), the Feast of the Dedication of the Temple (which commenced on the 25th of Chislev, the ninth month, and lasted for eight days, instituted by Judas Mac- cabseus in b.c. 164; when the temple, which had been desecrated by Antioclms Epiphanes, was

once more purified and rededicated), and the Feast of Wood Offering

on the 1 5th of Abib : being the last of the nine occasions on which offerings of wood were brought for the use of the temple.

Christian Festivals. — The early Christian festivals were observed with a view to com¬ memorating Christ and the canonized person¬ ages of the Church. We have good authority for the statement that very early in the history of the Church the weekly day of rest was trans¬ ferred from Saturday to Sunday and called the Day of Joy or Resurrection. Gradually, in the course of the 2d century, two separate celebra¬ tions were held in the place of the Jewish Pass- over: the Pascha Staurosimon was the festival of the Death, the Pascha Anastasimon, of the Resurrection of Christ. The festival of Pente¬ cost became the festival of the outpouring of the Holy Ghost and of the inauguration of the New Covenant.

Two new festivals were introduced in the course of the 4th century: Epiphany (q.v.), which had its origin in the East, and Christmas (q.v.). Of still later date are the festivals of the Cross , of the Transfiguration, of the Trinity, Circumcision, Corpus Christi and many others ; and attendance at church was obligatory on all important occasions from about the beginning of the 6th century. Also, about this time, the calendar was divided into the three cycles of Advent, Easter and Pente¬ cost. The adoration of Mary, the Mother of Jesus, found inevitable expression in the con¬ secration of special days to her service. Of these (in addition to the month of May and each Saturday of each week, which in some parts of Christendom were entirely given up to her worship), the most widely known were the Presentation, Annunciation (Lady Day), As¬ sumption, Visitation and the Immaculate Con¬ ception. Then gradually there came into the calendar the festivals of Angels, of Apostles, Saints, Martyrs, Souls, Ordinations, etc. So greatly did they increase, indeed, and so far did they depart from the ancient simplicity of their pious founders, that many ordinances were issued from time to time in an attempt to curb extravagance and unseemly practices. But it was only after generations of vigorous propa¬ ganda that Pope Urban VIII was at last per¬ suaded in 1642 to reduce the number. Other pontiffs followed in his steps; notably, Bene¬ dict XIV in 1742, and Clement XIV in 1773. The festivals of the Christian churches have been divided into ferice statute e (being those that return annually without variation) indictee (being proclamations extraordinary), duplicia (to be (

rubrics of the breviary. The Greek Church has an even more highly complex calendar than that of the Latin. The Church of England (Episcopalian), in the spirit of most of the Protestant churches of the Reformation, made various changes in the festal calendar. The

following is the annual order of the Saints' days and Festivals, compiled from the English calendar, with some few exceptions.*

January 1 — New Year's Day (Feast of the Circumci¬ sion).

6 — Twelfth Day (Old Christmas Day).

Epiphany.

1 2 — Saint Agnes.

25 — Conversion of Saint Paul.

February 1 — Saint Bridget.

2 — Candlemas (Feast of the Purification).

3 — Saint Blaise.

5 — Saint Agatha.

14 — Saint Valentine.

March 1 — Saint David (Welsh National Day).

17 — Sa nt Patrick (Irish National Day).

Shrove Tuesday (Movable Feast: the Mardi Gras of the French and the Pan¬ cake Tuesday of the English).

Mothering Sunday (Movable).

Carling Sunday (Movable).

25 — Lady Day (Fe st of the Annunciation). Palm Sunday (Movable).

Good Friday (Movable).

Easter Day (Movable).

April 23 — Saint George's Day (English National

Day).

25 — Saint Mark, Rogation Sunday (Movable). May 1 — Feast of SS. Philip and James.

3 — Invention of Cross, Ascension Day. Whitsuntide (Movable).

June Trinity Sunday (Movable).

Corpus Christi (Movable).

24 — Nativity of Saint John the Baptist (Mid¬

summer Day).

July 15 — Saint Swithin.

25 — Saint James, Saint Christopher.

26 — Saint Anne.

August 1 — Lammas Day.

15 — Assumption of Blessed Virgin Mary.

24 — Saint Bartholomew.

September 14 — Holy Cross Day.

29 — Michaelmas Day (Saint Michael and All

Angels).

October 18 — Saint Luke.

25 — Saint Crispin.

November 1 — – All Saints.

2 — All Souls.

11 — Saint Martin (Martinmas).

23 — Saint Clement.

25 — Saint Catherine.

30 — Saint Andrew (Scottish National Day). December 6 — Saint Nicholas.

21 — Saint Thomas.

24 — Christmas Eve.

25 — Christmas Day (Yuletide).

26 — Saint Stephen.

28 — Childermas Day (Holy Innocents).

31 — Last Night of the Old Year.

Bibliography. — Anon., ‘Some Suggestions for Community Christmas Celebrations : in¬ cluding lists of Xmas mysteries and plays, Xmas music, etc.) (including the American Pageant Association Bulletin, No. 41, Boston 1916) ; Anon., ‘Suggestions for Celebrating In¬ dependence Day) (in the Playground, April 1910) ; Beegle, Mary P., and Associates, ‘The Shakespeare Tercentenary: Suggestions for School and College Celebrations of the Ter¬ centenary of Shakespeare’s Death in 1916) (New York 1916) ; Brown, J. D., ‘Character¬ istic Songs and Dances of all Nations: His¬ torical notes and a bibliography: Music ar¬ ranged for the pianoforte) (London 1901) ; Burchenal, Elizabeth, ‘Dances of the People) (New York 1913) ; Burchenal, Elizabeth, ‘Folk-dances and Singing games : European : with the music, etc.) (New York 1909) ; Burton, F. R.,

- Where no special observances are connected with par¬ ticular Saints’ Days these have been omitted from the lists.

‘American Primitive Music) (New York 1909) ; Chappell, William, (01d English Popular Music’ (new ed. by H. S. Woodbridge, London 1893) ; Chubb, Percival, Community Christmas’ (in the Drama , Chicago, November 1914) ; Craig, A. A. T., ‘The Dramatic Festival: the Lyrical Method for Preparatory Schools’ (New York 1912; contains fine original plays for schools) ; Dawson, W. F., ‘ Christmas: Its Origins and Associations’ (London 1902; standard work, dealing with ancient and modern customs) ; De Sulleville, L. P., (Histoire du Theatre en France au Moyen-age’ (Paris 1880-86; the standard French work for mediaeval staging and festivals) ; Delehaye, Hippolyte, (Les Legendes Hagiographiques’ (Brussels 1905; for Christian festivals) ; Edersheim, Alfred, ‘The Temple: Its Ministry and Services’ (Lon¬ don 1910; for Jewish festivals) ; Elson, L. C., (National Music of America and Its Sources’ (Boston 1900) ; Foster, S. C., and others, (01d Plantation Melodies’ (New York 1913) ; Gu- lick, L. H., (Folk and National Dancing’ (2 vols., New York 1908) ; Hoper, Marie, ‘Old and New Singing Games’ (Chicago 1901) ; and (Popular Folk Games and Dances’ (Chicago 1901) ; Holt, Arden, (How to Dance the Re¬ vived

Ancient Dances' (London 1907) ; John¬ son, G. E., (The Playground as a Factor in School Hygiene' (Philadelphia 1909) ; Kim- mins, G. T., (Guild of Play Book of National Dances' (London 1907) ; Kimmins, G. T., and Woolworth, M. H., 'Guild of Play Book of Festival and Dance' (London 1907) ; Kreh- biels, H. E., (Folk Songs in America' (New York 1895) ; Langdon, W. C., ' Christmas

Mysteries and Masques' (in the Countryside Magazine, December 1914); Levien, S., (New York: Her First Civic Christmas Tree' (in the Survey, New York, 4 Jan. 1913) ; Lincoln, Jeanette, 'Festival Book' (New York 1912) ; Moffat, Alf., 'Carols for Christmastide'

(London – ; an excellent work) ; Needham,

Mrs. M. M., 'Folk Festivals: Their Growth and How to Give Them' (New York 1912) ; Newell, W. W., 'Games and Songs of Amer¬ ican Children' (New York 1903); Riis, Jacob, 'Rescuing* Our National Festivals' (in the Craftsman, New York, February 1913) ; and 'The New Christmas' (in the Ladies Home Journal, December 1913) ; Sandys, W., 'Christ¬ mastide: Its History, Festivals and Carols) (New York 1852); Sharp, Cecil J., 'Book of British Songs' (London 1902) ; and 'English Folk-song' (London 1907).

Duncan Macdougall,

Formerly Lecturer on Public S peaking at Saint Andrews College, Sydney, Australia, and Lec¬ turer for the New York Board of Education.

FESTOON, a string or chain of any ma¬ terial suspended between two points, usually consisting, however, of flowers, foliage, dra¬ pery, so suspended as to form one or more de¬ pending curves. In architecture, the term desig¬ nates a sculptured ornament in imitation of a garland of flowers. It occurs frequently in Roman and Renaissance buildings.

FESTUS, Porcius, Roman procurator in Palestine about 60-62 a.d. It was he before whom Saint Paul was accused by the Jews; but the apostle appealing to the emperor, Festus sent him to Rome

FESTUS, Sextus Pompeius, Roman gram¬ marian of the 3d or 4th century of our era, author of an abridgment of a work by Verrius Flaccus, called 'De Verborum Significatione,' a kind of dictionary, very valuable for the in¬ formation it contains about the Latin language. The original work of Festus has been pre¬ served only in imperfect MS., now at Naples, but it is more fully preserved in the abridgment made by Paul Diaconus.

FESTUS, Mo., city in Jefferson County, 30 miles southwest of Saint Louis, on the Frisco Lines, and the Mississippi and Bonne Terre Railroad, and on the Mississippi River. In the neighborhood are large deposits of silica sand, which is of great commercial importance to the city's manufactories of glass bottles and plate glass. The city owns the electric-lighting plant. Pop. (1920) 3,348.

FET (Shenshin), Afanasy Afanasevich,

Russian poet: b. Orel 1820; d. 1892. He was educated in law and philology at the University of Moscow, where he was graduated in 1844. He entered the army in 1845 and saw active service in the war with Turkey in 1853-56. He assumed his mother's name, Fet, and was so known until permitted in 1874 to take his real name Shenshin. 'The Lyric Pantheon' ap¬ peared in 1840 and was well received. In 1850 another volume of his verse was published which had a large measure of success. He settled in the country in 1860 and in the next 17 years wrote occasional articles on agricul¬ ture. He removed to Kursk in 1877 and there issued scholarly translations of Goethe's 'Faust' ; Schopenhauer's 'The World as Will and Idea', also of Horace, Virgil, Ovid, Juvenal, Propertius, Catullus and Tibullus. A third vol¬ ume of poems, 'Fires of the Night,' appeared in 1883. Consult his (My Reminiscences' (2 vols., 1890) and 'The Early Years of My Life'

(1893).

FETE NATION ALE, fate' na-seo' nal', the national holiday of the French Republic. In 1880, the 14 July, the anniversary of the fall of the Bastille, was made a national holi¬ day, on which date were to be held military parades, also banquets and receptions, while the citizens throughout the land displayed the tri¬ color. The 22 September, the day on which the Republic was found, was made a national holiday in 1892.

FETERITA, fet-er-e'te, a sorghum of the durra group and native to the Sudan. It was introduced into the United States in 1906. It grows to a height of from 4Jˆ to 7 feet and produces branches which mature after the main stems. It is planted, cultivated and harvested like corn. It is used for forage. About 50 bushels to the acre is an average production.

FETI, fa'te, Domenico ("II Mantuano"), Italian painter: b. Rome 1589; d. 1624. He studied under Lorenzo Cardi and was made court painter to the Duke of Mantua. His works include frescoes in the cathedral of Man¬ tua, 'David and Goliath,' now in the Dresden Gallery, 'The Flight into Egypt,' now in Vi¬ enna and 'Melancholy,' now in the

Louvre. His works are numerous and examples are found in all important galleries of Europe.

FETIAL, or FECIAL, fe'shial, one of n college of priests in ancient Rome, said to have

been instituted by Numa, consisting of 20 mem¬ bers, who presided over all the ceremonies con¬ nected with the ratification of peace or the formal declaration of war, including the pre¬ liminary demand for satisfaction, as well as the actual denunciation of hostilities. Their chief was termed Pater Patratus. When sent to a distance to conclude a treaty, they carried with them certain sacred herb-s called verbenas, or sagmina, which were gathered on the Cap- itoline Hill, and which were considered indis¬ pensable in their rites.

FETIS, fa tes, Frangois Joseph, Belgian musical author and composer : b. Mons, Bel¬ gium, 25 March 1784; d. Brussels, 26 March 1871. He studied at the Paris Conservatoire under Boieldieu and Pradher. In 1821 he was made professor of counterpoint and fugue at this institution and in 1827 became its librarian. In 1833 he received and accepted a call to be¬ come director of the Brussels Conservatoire and maitre de chapelle to the king of Belgium in which position he continued until his death. He was a prolific writer of church, piano and chamber music and also composed a number of overtures, symphonies and four operas. Of the last the most popular was (La Vielle5 (1826). His chief fame, however, rests on his writings on the theory, history and literature of music. He may also be considered the father of French musical journalism, having founded the first important French musical paper, La Revue Musicale, which he edited from 1827 33. His writings include (Manuel des Com¬ positeurs, ou Traite Methodique de l'Harmonie) Paris n. d.) ; (La Musique Mise a la Portee de Tout le Mond5 (Liege 1830) ; translated into English as (The History of Music, or How to Understand and Enjoy its Performance) (Lon¬ don 1846), and as (Music Explained to the World, etc.5 (Boston 1842) ; and into German as (Die Musik, etc.5 (Berlin 1830) ; (Curiosites Historiques de la Musique, etc.5 (Paris 1830) ; (Biographie Universelle des Musiciens, etc.5 (Brussels 1835 — 44) ; (Histoire Generale de la Musique, etc.5 (5 vols., Paris 1869-73; trans¬ lated into German as (Geschichte der Musik aller Nationen5). Of his smaller works may be mentioned (Notice Biographique sur Nicolo Paganini, etc.5 (Paris 1851, translated into Eng¬ lish by W. Guernsey as (

Biographical Notice of Nicolo Paganini,5 London n.d.) ; (Antoine Stradivari, etc.5 (Paris 1856, translated into English by J. Bishop as (Notice of Stradivari, etc.,5 London 1864). The following musical textbooks have had a wide circulation: (Traite du Contre-point et de la Fugue, etc.5 (2 vols., Paris 1824) ; (Traite du Chant en Chceur, etc.5 (Paris 1837, translated by T. Helmore as (A Treatise on Choir and Chorus Singing,5 Lon¬ don and New York 1854) ; (Traite Complet de la Theorie et de la Pratique de l'Harmonie, etc.5 (Paris 1849) ; (Traite elementaire de la Musique5 (Bruselles n.d.).

FETISHISM, or FETICHISM, fe'tish- izm, the worship of material things (fetishes) as the abodes of spirits, or more strictly the belief that the possession of a thing can procure the services of a spirit lodged within it. It closely grades into idolatry, but differs in that the power is supposed to reside in the spirit, not the thing or image. It is the lowest of the unsystematic forms of worship found

among uncivilized tribes, and exists especially among the negroes in Africa, but also among the natives of both Americas, the Polynesians, Australians and Siberians. The word itself is ultimately due to the Portuguese, the first Euro¬ peans to trade on the west coast of Africa, and is the Portuguese word feitigo, ((artifast.55 Comte used it as a term to describe what he believed to be a necessary stage in the develop'ment of all religions in which all external bodies, natural or artificial, are supposed to be animated by souls essentially analogous to our own. Any object may become a fetish, provided it is capable of being appropriated literally or meta¬ phorically by an individual. Such objects are Hints, shells, claws, feathers, earth, salt, plants, manufactured articles, anything peculiar or un¬ known or not understood, trees, streams, rocks, and even certain animals, as the serpents of Whydah. It is enough for an object to be accidentally associated with an event for it to be regarded as the cause and even the author of that event, whence its elevation to the rank of a fetish. Fetishes may be natural or arti¬ ficial. Artificial fetishes are either public, pre¬ served by priests, or private, purchasable from them usually at a very high price. In some countries kings and princes have large collec¬ tions of fetishes, and every family has at least one. They are hereditary, and either hung up in the dwellings or worn on the neck or else¬ where, and are even fastened on domestic ani¬ mals. They are made to resemble the human form, and the public fetishes are sometimes of gold and very large. The worshipers prov'de their fetishes liberally with food, but if prayers are not granted they frequently maltreat them, throw them away or beat them to pieces. In

connection with fetish worship there are festi¬ vals and sacrifices. For the latter the Victims are oxen, swine and other animals ; but sometimes, when the royal and priestly pow-er are united in the sacrificer, criminals, prisoners or persons of the lowest classes of the tribe are immolated. The festivals — among which the Yam and Adai festival with the Ashantees, and the fes¬ tival in honor of Khimavong, the god or divine messenger, are especially celebrated — are gen¬ erally attended by excess in drinking, thefts, fights and gross licentiousness. It must, how¬ ever, be observed that the limits of the term fetish have not yet been agreed upon, as some exclude from it the worship of forests, moun¬ tains, rivers, etc. In the luck tokens of gamblers and other superstitious persons there is an anal¬ ogy to the fetish of the savage. (See Familiar Spirit; Witchcraft). Consult Denett, R. E., (At the Back of the Black Man's Mind5 (New York 1906) ; Jevans, F. B., (Introduction to the Study of Comparative Religion5 (New York 1908) ; Milligan, R. H.,

(Fetishism in West Africa5 (New York 1904).

FETOR, fe'tor, a peculiarly offensive odor, usually considered to be due to some sort of animal putrefaction. Fetor of the breath may be due to sores of the tongue, cheeks or gums, to necrosis of the teeth or abscess of the teeth cavities, to poisoning of mercury and the sordes of scurvy. Diphtheritic and streptococcus in¬ flammations of the throat cause bad odors that closely resemble fetor. Gangrene and abscess of the lungs cause the most persistent and pene-

trating fetor. In various diseases of the stom¬ ach and intestines accompanied by the absorp¬ tion of products of putrefaction, fetor of the breath is common. Fetor of the feet is due to lack of porosity of their leather covering and to uncleanliness and excessive perspiration. These conditions result in a maceration of the skin and if infection with certain forms of bacteria takes place this macerated skin is apt to be infected with putrefactive bacteria and consequent upon this there is more or less fetor. The treatment of the condition consists in clean¬ liness, improvement of the foot-gear and anti¬ septic washes.

FETTERLOCK, or FETLOCK, a her¬ aldic form of padlock. It was adopted by Ed¬ ward IV of England in 1471.

FEU, fii', in Scots law, the holding of lands based on an annual rent of

grain or money or on agricultural service; also, lands so held. This is the commonest form of land tenure in Scot¬ land. It is, in effect, a sale for an annual pay¬ ment, more resembling in form a copyhold es¬ tate than a freehold and is a relic of the feudal system, which prevails to-day to some extent in the alienation of land in Scotland. This system of tenure, in contrast with leasehold estates in England and elsewhere, has tended to encourage holders of land to erect and main¬ tain buildings of a more substantial character.

FEU DE JOIE, a kind of musketry fire in celebration of some state festival. Troops are disposed in line, in two ranks and at open order. When the order to present arms is given care is taken that the rifle barrels are elevated at a uniform angle. Upon the command to fire the right-hand man of the front rank dis¬ charges his piece and is followed at scarcely perceptible intervals by the man on his left. When the extreme left of the front rank is reached the left-hand man of the rear rank fires and the second rank rifles are fired in turn until the right is again reached. Three rounds of such firing are fired on special occasions.

FEUCHTERSLEBEN, foik'ters-la ben, Ernst, Baron von, Austrian philosopher and poet: b. Vienna, 29 April 1806; d. there, 3 Sept. 1849. He was educated at the Thesesian Academy and at the University of Vienna, where he was graduated in medicine in 1833. He became a lecturer at the university and be¬ came dean of the faculty of medicine in 1844. He was on intimate terms with Grillparzer, Laube and other literary lights, took a deep interest in educational matters and in 1848 be¬ came under-secretary of state in the Ministry of Education. He wrote (Ueber das Hip- pokratische erste Buch von der Diat) (1835) ; (1848) ; (Lehrbuch der arztlichen Seelenkunde) (1845), of which a translation in English appeared; the poetical works (1838, 50th ed„ 1906);

FEUCHTWANGER, foiHt'vang'-er, Lewis, American chemist: b. Fiirth, Bavaria, 11 Tan. 1805; d. New York, 25 June 1876. He early displayed a fondness for natural science and made that studv a specialty at the Jena Uni¬ versity. In 1829 he came to New York, where

he opened its first German pharmacy. He soon won a reputation as a chemist, mineralogist and manufacturer of rare chemicals. He was the first to introduce the alloy, German silver, and unsuccessfully attempted to have it adopted by the government in place of nickel or copper for coinage purposes. His works are (Popular Treatise on Gems) (1838) ; (Elements of Mineralogy > (1839) ; (Treatise on Fermented Liquors) (1858) ; Practical Treatise on Solu¬ ble or Water

Glass) (1870) ; (A Handbook on Silex, etc.* (New York 1871).

FEUD, fud, a permanent condition of hos¬ tilities between tribes or families. It was com¬ mon in northern Europe for many centuries and gave way very gradually before the introduc¬ tion of law and order. It survives in the Italian vendetta and in the feuds of the moun¬ tains of Kentucky and Tennessee in America.

FEUDAL ARCHITECTURE, a term sometimes applied generally to the architecture of the feudal period and specifically to the military structures of that period. Of these the principal was the castle (q.v.).

FEUDAL SYSTEM. A fee, feud or fief is a possession, of which the vassal receives the right of use and enjoyment, of disposition and alienation, on condition of fidelity, that is, of affording assistance or counsel, and avoiding all injurious acts, together with the performance of certain services incident to the tenure while the feudal lord still retains a paramount right. A fief is distinguished from allodial possessions by the circumstance that it cannot be alienated without the consent of the feudal lord, by the services usually due from the vassal and by a peculiar kind of inheritance. The system origi¬ nated among the German tribes and the nature of feudal property is explained by its origin. Such was the passion of the ancient Germans for war, that in time of peace private feuds took the place of public contention ; and in default of these the men of military age spent weeks and months and years in adventures and made in¬ cursions into the territory of the neighboring tribes, or took part in the quarrels of the dis¬ tant ones. In the expeditions of particular ad¬ ventures against the adjacent tribes or the Roman provinces, their booty consisted of gar¬ ments, arms, furniture, slaves. But when the northern hordes broke into the south and in the partition of the conquered lands large dis¬ tricts fell into the hands of kings or dukes and their subordinates, they gave certain portions of the territory to their attendants to enjoy the possession for life. These estates were called beneficia or fiefs, because they were only lent to their possessors, to revert after their death to the grantor, who immediately gave them to an¬ other of his servants. From this custom of the ancient Germans arose the feudal system and feudal service, which is purely German. As the son commonly esteemed it his duty, or was forced by necessity, to devote his arm to the lord in whose service his father had lived, he also received his father's fief ; or rather, he was invested with it anew. By the usage of cen¬ turies this custom became a right; and to de¬ prive one of his paternal fief, though it was prohibited by no law, seemed an act of injustice. This change took place between the 9th and 11th centuries. A fief rendered vacant by

the death of the holder was at once taken possession of by

his son, on the sole condition of paying homage to the feudal superior. In the case of ecclesias¬ tical fiefs the right of succession belonged, un¬ der the same condition, to those who succeeded the last holders in their ecclesiastical office. The castle-fiefs, so called, were a peculiar kind of military fiefs, the possessor of which was bound to defend the castle belonging to his lord. The vassal who directed the defense was called, in the imperial fortresses, a burgrave. Thus the several orders of vassals formed a system of concentric circles, of which each was under the influence of the next, and all moved around a common centre, the king, as the supreme feudal lord. With military vassals another class arose. From the oldest times in the courts of kings and the governors whom they appointed, as well as in those of the bishops, were certain officers who at first performed active service, but were afterward rather a splendid appendage to the court. The four offices of the marshal, the chamberlain, the cup-bearer and the sewer, are the oldest and most honorable, but by no means the only ones ; offices, on the contrary, were as numerous as the employments which could be devised at court. These officers, at a period when money wras scarce and the old German notion in full vigor which considered none but landed proprietors as citizens and none but the owners of large estates as noble¬ men, were naturally rewarded by grants of land during the time of service ; and these es¬ tates, like the military fiefs, but somewhat later, certainly not before the time of Frederick I (1152-90), became by degrees hereditary. The splendor of the court and the advantages ac¬ cruing from these services induced many noble¬ men to solicit them. They became the first in the new class of servants or ministers which was thus formed; and under them there was a multitude of other servants, particularly on the estates of the nobility.

A refusal to perform feudal service, or any other violation of fealty, was styled felony. Upon this and other difficulties incident to feu¬ dal property, as in cases growing out of the succession, surrender, alienation or under-ten¬ ure of a fief, the lord decided in a feudal court, filled by vassals, who were required to be of equal rank with the accused. To appear in these courts at the summons of the lord of the manor and accept the place of an assessor there was reckoned among the duties incident to a fief. As the relations of lords and vassals (at that time one of the most important relations in life)

became more and more widely spread and the number of vassals increased at the expense of the ancient immediate subjects of the empire, the latter were thrown into the background and at length nearly forgotten.

In the 10th and 11th centuries no duty due from subjects was known except feudal duties; the whole German Empire was one vast feudal possession and the idea of feudal lords and national sovereigns were wholly confounded. If any one was neither a lord nor a vassal he was scarcely looked upon as a citizen. Hence few rich landed proprietors ventured to rely upon their own strength, without a feudal connec¬ tion. And even most of these at last yielded to the spirit of the age and became royal vassals. The emperor, likewise, used every means to induce them to adopt such a course.

From the feudal system, the only social

organization of the European states in the Mid¬ dle Ages, a new system of civil rank arose. The inferior nobility, a rank intermediate between the higher nobility (princes) and freemen, owes its origin, it is said, to this institution ; and a regular scale of rank was formed among the vassals, without detriment, however, to the prin¬ ciple of equal birth. The king formed the first class; the spiritual princes, bishops and imme¬ diate abbots constituted the Second ; the lay princes, dukes, landgraves, margraves and im¬ mediate counts, the third; those barons, or rich landed proprietors, who owed fealty to no one, but yet, on account of their limited rights or possessions, were the vassals of the emperor, the fourth; those freemen who stood in the same relation to the princes, the fifth; the vas¬ sals of the former and the servants of the princes, the sixth ; and the possessors of small fiefs, the seventh. Besides these ranks, after some centuries, the order of citizens was formed, as being included under no one of them. The spirit of the feudal system, grounded on the prevalence of landed property, was necessarily foreign to cities which owed their origin to industry and personal property and founded thereon a new sort of power. The principles of the feudal laws were developed and established by the Lombard lawyers of the 12th century. The collection of feudal laws and customs which is appended to the Roman code under the title of Libri Feudorum became the code of feudal law over a great part of Europe.

The feudal form of government, at a period when a spirit of independence and of opposition to despotism was abroad in the land, was well suited to put into the hands of one governor, as supreme feudal lord, the reins of the national power, to be employed against

foreign enemies without endangering domestic freedom. But the purity and influence of feudal relations in time became less ; and the strength of the national government declined amidst a spirit of disaffection and sedition, which became univer¬ sal when nobles began to perceive that the feudal government was not naturally dependent on kings, but kings on it. Indeed, the sovereigns had no other security for their sub¬ jection than the feudal oath and the menaces of punishment, which the king might not have the ability to carry into effect, when his power was< divided in most of his states, either by in¬ vestiture or by the usurpations of the princes. Thus the vassals of the crown in Germany, Italy and the older districts of France suc¬ ceeded in depriving the king of almost all power, even of the external honors of royalty ; and never, in the two first countries and in France only after the extinction of the great baronial families, could he succeed in establish¬ ing a new authority independent of the feudal power. See Middle Ages.

Bibliography. — Abdy, feudalism: Its Rise, Progress and Consequences* (London 1890) ; Guizot, (Histoire de la Civilisat'on en France) (1845) ; Hallams, (Middle Ages) (London 1818) ; Munro, W. B., (The Seigniorial Sys¬ tem in Canada) (New York 1907) ; and (The Seigneurial System in New France) (in Vol. II, of (Canada and Its Provinces,* Toronto 1914) ; Petersen, (Uber den Kurmarkischen Adel im 17 Jahrhundert* (Berlin 1911) ; Prutz, (The Age of Feudalism and Theocracy)

(Philadelphia 1905) ; Round, (Feudal England y (London 1909) ; Seebohm, (The English Vil¬ lage Community0 (London 1883) ; Seignobos, 'Feudal Regime, > translated by Dow (New York 1908) ; Stubbs, Constitutional History of England) (Vol. I, 1897 ed.) ; Waitz, 'Deutsche Verf assungsgeschichte) (1843-78) .

FEUERBACH, foi'er-baH, Anselm, Ger¬ man painter: b. Spires, 12 Sept. 1829; d. Venice, 4 Jan. 1880. He studied at the art schools of Diisseldorf and Munich, and later at Antwerp and Paris. He worked at Carlsruhe, Venice, Rome and Vienna. His Roman period was productive of several splendid works, in which are apparent his close study of the Italian masters. He became professor at the Vienna Academy in 1873, but disappointed at the recep¬ tion of one of his works resigned and removed to Venice. Among his principal works are

FEUERBACH, foi'er-baH, Ludwig An¬ dreas, German philosopher : b. Landshut, Ba¬ varia, 28 July 1804; d. 13 Sept. 1872; the fourth son of the illustrious jurist, Paul Johann Anselm Feuerbach. After a secondary educa¬ tion he studied divinity at Heidelberg and Ber¬ lin, but fell under the sway of Hegel and took his doctor's degree in philosophy. After a brief period as privatdozent in Erlangen, he be¬ came persona non grata on account of an heret¬ ical pamphlet embodying 'Thoughts on Death and Immortality.* From a follower of Hegel he developed rapidly into an out-and-out free¬ thinker and democrat. Besides a more technical 'History of Modern Philosophy0 and a mono¬ graph on Leibnitz he wrote reviews and essays for the most radical periodical of the time, Arnold Ruge's Jahrbiicher. In 1841 appeared his most significant work 'The Essence of Christianity* (translated by George Eliot), which won him a place among the foremost ad¬ vanced thinkers of the day. He entered into cor¬ respondence with Karl Marx and is indeed re¬ garded by Socialists as a precursor of their classic authorities. He sympathized with the revolutionary uprising of 1848 but took no active part beyond delivering a course of lectures to the Heidelberg students on the "Essence of Religion.® During the dark period of reaction his prestige waned but he continued his re¬ searches into the nature of religion, producing in 1857 the 'Theogonie,* in which unfulfilled desire was defined as the core of religious feel¬ ing. Financial failure threatened him in 1860, but the loyalty of his friends saved him from actual want and in the last few years of his life he was once more able to attack in a volume on 'God, Freedom, Immortality, * the religious problems to which he had so persistently de¬ voted himself.

Feuerbach was not a systematic philosopher and became progressively more averse to meta¬ physics, developing an affection for the methods of natural science and a popular, vivid style, though at times marred by diffuseness and dithyrambs. As an absolutely honest and un¬ compromising champion of free-thought and political liberalism he exerted a tremendous influence both on Socialists and natural scien-

tists of the materialistic school. He has been appropriately compared to a powerful ferment. Richard Wagner, Ferdinand Lassalle and Gott¬ fried Keller are among those who were deeply stirred by his writings. Feuerbach's philosophy of religion is remarkable for the bold assump¬ tion of a purely psychological point of view, while historical problems and social factors (as Marx pointed out) are ignored. The neglect of concrete historical conditions distinguishes his method of approach from that of Strauss, while his concentration on individual psychol¬ ogy required supplementing by modern sociologi¬ cal and

ethnological considerations. Neverthe¬ less, the insistence on the purely human rather than metaphysical aspects of the problem marked an epoch-making departure in the his¬ tory of the subject. His essays on ‘The Neces¬ sity of a Reformation of Philosophy,* ‘Pre¬ liminary Theses,* and ‘Principles of a Phi¬ losophy of the Future* (1842-43) are remark¬ able anticipations of modern pragmatism with the emphasis on democratic aspirations.

Bibliography. — Bolin, Wilhelm, ‘Ludwig Feuerbach, seine Wirken und seine Zeitgenos- sen) (Stuttgart 1891) ; Grim, Karl, ‘Ludwig Feuerbach in seinem Briefwechsel und Nach- lass* (Leipzig 1874) ; Jodi, Friedrich, ‘Ludwig Feuerbach* (Stuttgart 1904) ; Kohut, Adolph, ‘Ludwig Feuerbach* (Leipzig 1909).

Robert H. Lowie,

American Museum of Natural History.

FEUERBACH, Paul Johann Anselm von,

powl yd’han an’zelm fon, German jurist and criminal law reformer: b. Hainichen, near Jena, 14 Nov. 1775; d. Frankfort-on-Main, 29 May 1833. He was professor at Jena (1801), Kiel (1802), Landshut (1804) ; planned a new penal code for Bavaria, which was enunciated in 1813, and was subsequently adopted by other governments. He was later president of the Court of Appeals at Anspach. Among his best-known works are ‘Critique of Natural Law) (1796); ‘ Anti-Hobbes) (1798); ‘Lehr- buch des gemeinen in Deutschland geltenden peinlichen Privatrechts* (1801) ; ‘Merkwiirdige Kriminalrechtsfalle* (1808-11) ; ‘Kaspar Hau¬ ser: An Instance of a Crime Against a SouP (1832). His works rendered notable service in the humanizing of judicial punishment and in paving the way for a psychological treatment of criminal cases.

FEUILLANTS, fe-yon, in ecclesiastical history, a religious order clothed in white and going barefoot, and a branch of the Cistercians. Their name was derived from an abbey, founded about 1145 in the diocese of Rieux and called first Fuliens, later Les Feuillans. In 1577 the abbot, Jean de la Barriere, introduced reforms in order to weed out the relaxations which had crept in, and from then on the Feuillants lived under the strict observance of the rule of Saint Bernard. In 1589 they were established as a Separate Congregation by a brief of Pope Six¬ tus V, who two years before had given them a church in Rome. In the same year, 1587, King Henry III of France also built a monastery for them in Paris. In 1595 Clement VIII de¬ prived the Cistercians of all

control over the Feuillants. A second monastery was given to them in Rome in 1598. Pope Urban VIII in 1630 decreed the separation of the French and Italian branches of the order; the former con-*

lGJi

tinued to be known as Feuiilants; the latter were called reformed Bernardines and finally combined with the order of Citeaux. At the outbreak of the French Revolution the order had 24 abbeys in France. These were suppressed in 1791, a fate which was also suffered by the convents of nuns, known under the name of Feuillantines because they had embraced the same rules after the first of them had been established in 1588 by Jean de la Barriere. The Paris monastery was taken possession of by a club celebrated in the political history of France under the name of the Feuiilants. It was a weak rival of the Jacobin Club, and fell before the clamor of a mob in March 1791.

FEUILLET, Octave, ok-tav fe-ya, French novelist and dramatist : b. Saint Lo, Manche, 11 Aug. 1821; d. Paris, 29 Dec. 1890. Between 1848 and 1858 he gained a good deal of notice with his novels and a series of comedies and tales, some of which were published in the Re¬ vue des Deux Mondes. In 1857 the appearance of (Le Roman d'un Jeune Homme Pauvre) raised Feuillet to first rank of the novelists of the day, and it was immediately dramatized by the author himself. Next followed ˆHistoire de Sibylle) (1862), and in the year in which it appeared Feuillet was elected to the French Academy. Among his other numerous novels are (Monsieur de Camors) (1867); (Julia de TrecGeur1 (1872); (Un Mariage dans le Monde) (1875) ; (Le Journal d'une Femme1 (1878) ; (Histoire d'une Parisienne) (1881) ; (La Morte) (1886) ; (Le Divorce de Juliette1 (1884); (Honneur d'Artiste1 (1890). His works have a refined humor, and are free, especially the earlier, from coarseness. He was a master in depicting the fine shades of emotion and character; his creations are distinctly individual¬ ized, his society women being remarkably life¬ like ; his later works are marked by a growing cynicism of outlook. His dramas met with con¬ siderable success, but they are on the whole in¬ ferior to his novels and have not survived. Feuillet's (Theatre Complet1 appeared in 1892-93. Consult Deries, L., (Octave Feuillet1 (Saint Lo 1902).

FEUILLETON, fe'ye-ton ("leaflet11), the literary section of a French newspaper, usually appearing on the lower portion of the first page. It includes essays, criticisms and fiction, the latter of the serial type. In America the so-called "magazine section11 of a daily paper

corresponds to the feuilleton. Bertin the elder invented the system in France.

FEVAL, fa-val, Paul Henri Corentin,

French novelist: b. Rennes, 28 Nov. 1817; d. Paris, 8 March 1887. He first studied law and was admitted to the bar of his native cityˆ, but soon went to Paris unable to resist his desire to write. His first story, (Club des phoques1 (1841), and others, having given him some note, he was offered a large sum to write, under the pseudonym “Sir Francis Trolopp11 (as though an Englishman), a sensational story

(Paris 1843, London 1847) ; (Les Amours de Paris1 (Paris 1845, London 1856); (La Quit¬ tance de Minuit1 (Paris 1846) ; (Le Fils du Diable1 (Paris 1847) ; (Histoire des Tribunaux Secrets1 (8 vols., Paris 1851) ; (Compagnons du Silence1 (Paris 1857) ; (Mme. Gil Bias1 (Paris 1857) ; (Le Bossu, ou le Petit Parisien1 (Paris 1857, London and New York 1863) ;

FEVER, a condition in which the tempera¬ ture of the body is above normal. The average daily range of temperature in men is from 98° to 99° F., and in women from quarter to half a degree higher. In children temporary eleva¬ tion even as high as 100° F. may occur from conditions of excitement and from over-exercise, but this should not be termed fever. .Slight daily variations in temperature are usual. Thus the maximum temperature occurs usually from 5 to 9 p.m. There is then, as a rule, during sleep a decrease until a minimum is reached, some time between 2 and 4 a.m. It is probable that diminished muscular activity and lessened food absorption are responsible for much of this variation. Temperature usually rises during strong muscular exercise and also after a meal. These # slight rises are balanced by heat-loss from increased perspiration. The temperature of man in the tropics and in the Arctic zone does not vary more than 1° C. (For discussion of bearable extremes of heat and cold, heat-production, heat-loss and the nervous mechan¬ ism that controls the general phenomena, see Animal Heat).

Modern pathology teaches that fever is the index of a reaction of the human body in its struggle with some foreign invader and is brought about by excessive oxidation and diminished heat-loss. Fever is usually accom¬ panied by an increase in the number of respira¬ tions, by an increased number of contractions of the heart, raised pulse-rate, an increase in the blood-tension in the blood vessels and by other symptoms of general malaise. These are head¬ ache, dry mouth, dry skin and at times in¬ creased mental excitement. Fever from this point

of view is a conservative process and is nature's own method of overcoming some form of infection or intoxication. Fever as a gen¬ eral process should be distinguished from the many special kinds of so-called fevers that are described. Thus the term fever as used in typhoid fever, scarlet fever, lung fever, etc., is a relic of earlier medical teachings, in which the rise in temperature was considered the es¬ sential part of the disease. It is now recog-

nized that fever is only one of the features in the general history of the development of the disease-process. The height of the temperature during fever may vary considerably. If the temperature is not above 100° F. (37.7° C.), it is spoken of as light fever; when between 100° and 103° F. (37.7° and 39.4° C.) it is called moderate fever; between 103° and 105° F. (39.4° and 40.5° C.) it is spoken of as high fever ; while above 105° F. (40.5° C.) hyperpyrexia is the term that is applied. Temperatures as high as 110° F. have been recorded in patients who have recovered.. The course of most fevers is, for purposes of convenience, divided into (1) the initial stage, which usually starts with chilliness and often with a distinct chill ; (2) the hot stage, when the temperature has risen and is at a fairly constant normal, during which the blood vessels at the surface are dilated, the skin is flushed and feels hot and dry; this con¬ dition perhaps lasting a few hours, or it may be several weeks, according to the disease-proc¬ esses that produce it; and (3) the terminal stage. This may be ushered in by a previous perspiration, with sometimes increased urination and prompt subsidence of the temperature ; or the temperature may slowly sink to normal by a process of lysis. Each type of disease- process manifests its own peculiar temperature- variation and the study of temperature-curves is extremely important in the determination of the disease.

Fever results not so much from an increase in the heat-production alone, but in a disturb¬ ance of the heat-regulation or thermotaxis for it is perhaps true that the amount of heat produced by an athlete in a mile run is vastly greater than that produced throughout the entire four weeks of a severe typhoid fever yet the heat-loss keeps pace in the runner with the heat-production. It is the relation between these two factors that is disturbed in fever. Fever is largely a conservative process and a moderate degree of temperature is believed to be rather beneficial than harmful. The real danger in fever is not the temperature, unless it is excessively high — from 104° to 105° F. — but it is the poison that is being made in the body, either by perverted

metabolism or by bacterial or chemical intoxication. Therefore, in the treatment of disease with rise in tem¬ perature the reduction of the fever is not the only point to be attained.. During fever there is increased oxidation, increased elimination of uric acid, diminution of most of the secre¬ tions, notably the saliva, the gastric juice, the bile and, save in the terminal stages, the sweat. The kidney-secretion is also decreased during the hot stage, because more water is being lost through the skin and lungs than usual. Changes in the blood are constant and usually consist in an increase in the number of leuco¬ cytes, or white blood-cells. High temperatures may produce degeneration in a number of tis¬ sues of the human body. The most important ones are those of the nerve-cells. These changes may take place if the temperature gets above 105° F„ and even lower temperatures acting for a very long time may cause serious structural changes in the nervous system. The treatment of fever, as has been indicated, should mean the treatment of the disease that is causing the fever and will be considered under each particular topic of fever. (See Malaria;

Meningitis; Pathology; Relapsing Fever; Scarlet Fever ; Typhoid Fever; Typhus Fever; Yellow Fever). Consult Hektoen, (American Text-book of Pathology) (1901) ; Schafer, (Text-book of Physiology > (1900).

FEVER-BUSH (Benzoin benzoin), an American shrub of the laurel family (Lauraceae) . It grows from 4 to 20 feet high, in moist woods and along streams from Massa¬ chusetts, through Ontario, to Michigan, south to Kansas, and eastward to North Carolina. An infusion of the sweet-smelling bark is used as a tonic in fevers. The bright berries of the tree, ripe in August and September, are some¬ times ground and used as spice, for which rea¬ son it is locally called spice-bush or wild allspice. It is also known as Benjamin-bush. The name fever-bush is also applied to the Ilex verticillata.

FEVER WORT (Triosteum perfoliatum), a perennial of the honeysuckle family (Capri – foliacece) , a native of North America, where its dried and roasted berries have been occa¬ sionally used as a substitute for coffee; its roots act as an emetic and mild cathartic. The plant grows in rich soil from Quebec westward to Minnesota, and south to Kansas, Kentucky and Alabama. It has a number of common names, and is known locally as fever-root, horse- gentian, wood ipecac, tinker’s root, wild coffee, etc.

FEWKES, fuks, Jesse Walter, American anthropologist: b. Newton, Mass., 14 Nov. 1850. He was graduated from Harvard in 1875, took degrees A.M. and Ph.D. in 1877 ; University of Arizona, LL.D. 1915.

Studied with Louis Agassiz at Penikeese in 1873, and was for 10 years at the Maine Laboratory of Alexander Agassiz at Newport, R. I. He was assistant curator of the Museum of Comparative Zoology, Cambridge, Mass., 1880-89; and has been ethnol¬ ogist of the Bureau of American Ethnology, Smithsonian Institution, since 1895. He has written extensively on marine zoology, ethnology and archaeology of American Indians. He was editor of the Journal of the American Ethnology and Archaeology 1881-94; and was in charge of the excavations of the Casa Grande in southern Arizona, Spruce-tree House, Cliff Palace and Sun Temple in the Mesa Verde National Park, Colorado. He is member of many ethnological societies, including the Amer¬ ican Society, American Academy of Arts and Sciences and National Academy of Sciences; Knights of Isabella the Catholic, and recipient of a gold medal from King Oscar of Sweden for researches in anthropology.

FEYD, John. See Fyt, John.

FEYEN, fa-yan, Eugene, French painter: b. Bey-sur-Seille, Meurthe-et-Moselle, France, 13 Nov. 1815; d. 1908; one of the many suc¬ cessful pupils of Paul Delaroche. While he began as a painter of portraits and of the nude, he gradually drifted into genre sub¬ jects, which were evidently congenial to his talent, and his pictures of the seaside and the fisher folk are distinguished for clever compo¬ sition and refreshing color. (The Harvesters of the Sea* (1872, in the Luxembourg); (The Bay of Cancale* (1885) ; and (The Sailor's Sweetheart (1890) are his best works. He was created a chevalier of the Legion of Honor in 1881.

FEYER-PERRIN, fa-ya-pe-ran, Francois Nicolas Augustin, French painter: b. Bey-sur- Seille, Meurthe-et-Moselle, 1829; d. Paris, 14 Oct. 1888. He began his career as an artist in the drawing school at Nancy and subsequently attached himself to the studios of Cogniet and Delaroche at Paris. At first he hesitated in choosing a specialty between subjects of poetic allegory, genre subjects, or varying race type, or historic painting. Since 1864 he has con¬ fined himself to painting the scenery and people of the seashore, especially in Brittany. His work has been successful, because it is distin¬ guished by poetic feeling, delicate characteri¬ zation and transparently brilliant coloring. His most famous pictures are in the Luxembourg, namely, (The Return from Oyster-fishing* (1874) and (The Fisher-girls of

Cancale at the Spring* (1873).

FEYJOO Y MONTENEGRO, Benito

Jeronimo. See Feijoo y Montenegro, B. J.

FEZ, Morocco, city, capital of the province of Fez, 95 miles from the Atlantic, 225 north¬ east of Morocco. Fez is a city whose ancient glories have departed. The walls which en¬ circled it have gone to ruin, and its curiously contracted thoroughfares are ill-kept, dirty and sunless. In place of its reported population of 400,000 in its palmy days it has dwindled to a fourth of that number. It contains over 100 mosques, one of which, El Carubin, has a cov¬ ered place for women who may choose to par¬ ticipate in public prayers, something unusual in Mohammedan places of worship. Good public baths are numerous. It is the entrepot of northwest Africa for goods of European manufacture. Its chief manufactures are leather and silk shawls and it was at one time the seat of a trade in red caps (fez), the dye for which was almost exclusively obtained here. Twice a year caravans go from Fez across the desert to Timbuktu. Fez has always been con¬ sidered one of the chief seats of Moslem learn¬ ing. Old Fez was founded in 793 by Edris II, a descendant of Mohammed, and continued the capital of an independent kingdom till 1548, when it was, together with its territory, con¬ quered and annexed to Morocco. For upward of a thousand years Fez has been one of the sacred places of Islam. When the pilgrimages to Mecca were interrupted in the 10th century, the western Moslems journeyed to this city, as the eastern did to Mecca ; and even now none but the Faithful can enter Fez without express permission from the emperor. Pop. (estimated)

100,000.

FEZ, fez, Kingdom of, once independent, but now the most northern section of the em¬ pire of Morocco; bounded north by the Med¬ iterranean ; east by Algeria ; south by the river Om-er-begh or Morbeza, which separates it from Morocco proper; and west by the Atlantic. It was conquered and united to Morocco in 1548. See Morocco.

FEZ, a red, brimless cap, usually of felt or wool, first made in the town of Fez, Morocco. It is the Turkish national headdress, but is also found in Greece, Egypt, the Balkan states and Persia.

FEZZAN, fez-zan’, Africa, political division of the Italian province of Tripoli. The capital is Murzak; area about 156,200 square

miles. In the northern part are low mountains, or hills, one of which, Jebel-es-Sudah, or Black Mountain, is composed largely of basalt. Sandy plains and a few fertile valleys are in the south¬ ern part. There are no streams of water and but few natural springs; but good water may be obtained at a depth of from 10 to 12 feet. There are a few small lakes, usually covered with a thin crust of carbonate of soda. Rain seldom falls ; in some places years intervene be¬ tween the short periods of rainfall. Jackals, gazelles and foxes, the ostrich, vulture and falcon are found in the hills. The manufactures are coarse linen and cotton goods and some ornamental articles made from gold and silver. Trade with neighboring cities is carried on by means of caravans. As Phanazia, Fezzan was held by the Romans after 19 b.c. It was after¬ ward independently ruled as a Christian state; was conquered by the Arabs and reverted to Mohammedanism ; in the 16th century it fell under Turkish domination, and became a lieu¬ tenant-governorship in 1835. After the war between Italy and Turkey in 1911-12, it was, under the Treaty of Ouchy, placed with Tripoli, under the control of the former power. Pop. (estimated) 70,000, consisting of Tuaregs, Arabs, Moors, and Negroes.

FIACRE, fya'kr', or FIACHRA, Saint,

Irish monk of the 7th century. He was of noble family, became an anchorite and went to France. He was kindly received by Saint Faro, bishop of Meaux, to whom he indicated his de¬ sire to live as a hermit. The bishop assigned him a part of the forest of Brodolium (Breuil), in the province of Brie. There he built a monastery with a guest house, where he gave refreshment to wayfarers in that region. He acquired a reputation for miracles and his remains were long venerated at the monastery he had founded. In 1568 they were transferred to the cathedral of Meaux, where his shrine is still to be seen. In the ecclesiastical calen¬ dar he is commemorated on 30 August. He is the patron of Brie and the protector of garden¬ ers. French public cabs were first provided by the proprietor of the Hotel Saint Fiacre, Rue Saint Martin, Paris, in 1640. From this circumstance all public vehicles came to be called fiacres. Consult O'Hanlon, J., (Lives of the Irish Saints* (Vol. VIII, 1875-1904).

FIALA, fe-a'la, Anthony, American ex¬ plorer: b. Jersey City Heights, N. J., 19 Sept. 1869. He was educated at Cooper Union and the National Academy of Design, New York. He began business life as stone artist and de¬ signer in lithography, was for five years assist¬ ant in a physical and chemical laboratory and in 1890 became a newspaper artist and cartoon¬ ist. He studied the processes of photo-engrav¬ ing and photo-gravure, installed a photo-engrav¬ ing plant

for the Brooklyn Daily Eagle in 1894 and was in charge of the art and engraving de¬ partment of that journal from 1894 to 1899. He served in Troop C, 1st New York Volunteer Cavalry during the Spanish-American War, act¬ ing meanwhile as war correspondent for the Brooklyn Daily Eagle. He was photographer to the Baldwin-Ziegler Polar Expedition in 1901-02 and was commanding officer of the Ziegler Expedition of 1903-05, which pene¬ trated to 82° 4′ North. This expedition sur¬ veyed the Francis Joseph Archipelago, but the

ship was lost. A relief party was sent out and Fiala was found at Cape Dillon in July 1905. He accompanied ex-President Roosevelt on his trip through the Brazilian wilderness in 1913— 14, explored the Papagaio River and descended the Jurnena and Tapajos rivers of Brazil. He published c Troop “C” in Service* (1899) and (Fighting the Polar Ice* (1906).

FIAT, fi’ at, an order of a judge or of an officer whose authority, to be signified by his signature, is necessary to authenticate particu¬ lar acts; a short order or warrant of the judge, commanding that something shall be done. See 1 Tidd, Pr. 100, 108. Fiat in bankruptcy, in English law, was an order of the lord chan¬ cellor that a commission of bankruptcy should issue. Fiats in bankruptcy are abolished by 12 and 13 Viet. c. 116.

FIAT MONEY, money made legal tender solely by fiat or decree of the government. Such money is not based upon bullion, coin or an intrinsic value, and no provision is made for its conversion into specie. Such money was issued by the American colonies and the term was again applied to the irredeemable paper currency during the greenback controversy in the late sixties and early seventies.

FIBICH, fe’bik, Zdenko, Bohemian com¬ poser: b. Vseboric, 21 Dec. 1850; d. Prague, 10 Oct. 1900. He studied at Leipzig under Mo-scheles, Richter and Jadassohn in 1865-67, studied a year in Paris and also under Lachner at Mannheim. He settled as a teacher at Vilna in 1870 and six years later was appointed con¬ ductor at the National Theatre, Prague. In 1878 he became chorus master of the Orthodox Church at Prague but resigned three years later to devote himself to composition exclusively. He takes a foremost place among the compos¬ ers of his race. He was very prolific, produc¬ ing in all about 700 works, including the operas (1874);

1899).

FIBIGER, fe'bi-ger, Johannes Henrik

Tauber, Danish poet and clergyman : b. Nyk- jobing, 27 Jan. 1821 ; d. 1897. He wrote dramas founded on biblical history: (Jephtha's

Daughter) (1849); (Jeremiah* (1850); (John the BaptisD (1857) ; also a few secular trag¬ edies, the most notable among them being

FIBONACCI, fe-bo-na'che, Leonardo, called LEONARDO PISANO, Italian math¬ ematician: b. Pisa about 1180; d. about 1228. Little is known of his life except from his writings, which were collected .1857-62 by Prince Boncompagni and include (Liber Abaci * (1202) ; Practical Geometrise* (1220) ; (Liber quadratorum) (1225) ; (Flos) ; (A Letter to Theodore.) He traveled in Egypt, Syria, Greece, Sicily and elsewhere, placing himself wherever

he journeyed in communication with the lead¬ ing mathematicians of the region visited. The (Series of Fibonacci,* sometimes called the (Series of Lame,* is as follows: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34 — each term being equal to the sum of the two which precede it, indicated

algebraically as — 7^ = — and having n + 2 w t 1 n

several other remarkable characteristics import¬ ant in higher arithmetic.

FIBRE. In the commercial sense the un¬ modified term ((fibre** signifies the vegetable tissues used in the arts, and does not include the animal fibres, such as wool, hair and silk, which are classed as textile fibres, along with, however, several of the vegetable fibres, as cotton, linen, ramie, etc. Vegetable fibre is derived from the cellular structure or tissue of plants, the cells of which vary in diameter from one three-hundredth to one five-hundredth of an inch, the smaller sizes admitting of 125,000,- 000 cells to a cubic inch. The walls of these cells are composed of a substance of starch¬ like chemical composition, called cellulose, en¬ closing the living element of the plant, known as protoplasm. There are three forms of cells, simple cells, woody cells and ducts. Woody fibre is formed by the lengthening and thicken¬ ing of simple cells. The ducts or vessels are large cylindrical cells whose walls have been absorbed and broken away. Wood cells con¬ sist of tubes one or two thousandths of an inch in diameter, their ends pointed and overlapping, so that when detached they form a continuous thread of cell structure of fibre proper, such as a filament of flax ; and when they occur in the bark of dicotyledonous

plants, or exogens, they are known as bast fibre. In monocotyledons, like the palms, and the century plant, the fibrous cells are built up with vessels into a com¬ posite structure known as ((fibrovascular bun¬ dle.** These bundles of elongated, thickened cells pressed firmly together, and often em¬ bedded in soft cellular tissue, constitute, so to speak, the bones or structural part of the plant, and are called structural fibres, sisal hemp be¬ ing an example. Even the common or simple cells form a valuable fibre material when they are produced on the surfaces of the leaves, stems and seeds of plants, in the form of hairs. This form of fibrous substance is known as surface fibre, cotton being an example. In this instance the hairs envelop the seeds produced in the boll or capsule. The Mown" on the stems and surfaces of the leaves of plants is another example.

The term fibre is also given to other forms of vegetable growth where the fibrous material is not employed in the form of detached fila¬ ments, like flax sisal and cotton. The stems and twigs, and even wood of exogenous trees, divided into splints and used for basket-making are designated as fibre ; and in like manner the stems and leaves of endogenous plants split or used entire, as rattan, or when coarsely sub¬ divided for plating into such articles as hats, mats, etc., are also classed commercially as fibre. The stripped epidermis of palm leaves, such as the raffia of commerce, is considered fibre, yet it is not in any sense filamentous. Even some species of mosses, marine weeds and fungous growths, on account of their economic employ-

ment, arc regarded as fibre substitutes, and are mentioned in the category of fibres. In general terms, however, ˆfibre® is composed of bundles of bast or fibrovascular tissue in the form of long flexible filaments, such as flax, hemp or manila ; or of hairs, such as cotton, capable of being twisted or spun into yarns or threads, to be manufactured into fabrics or cordage.

The following classification illustrates the different forms of fibrous material recognized by experts and shows the positions of the different fibres in their relations to each other:

All fibrous material is classed in two grand divisions : A, Fibrovascular structure and, B, simple cellular structure. A is again divided into three groups: (l)Bast fibres; (2) Woody fibres, and (3) Structural fibres; B is divided into two groups, (4) Surface fibres and (5) Pseudo-fibres

or false fibrous material.

1. The bast fibres are derived from the inner fibrous bark of the stems of dicotyledonous plants and are composed of bast cells, their ends overlapping to form in mass a continuous filament. Their utility is to give strength and flexibility to the tissue.

2. Woody fibres may be: (a) the stems and twigs of exogenous plants, or (b) the roots of exogenous plants entire, or subdivided into withes for use in basketry or a rough kind of cordage, or for coarse thread for stitching and binding (as in canoe manufacture) ; or (c) the wood of exogenous trees reduced to layers or splints, for baskets, or for excelsior; or (d) the wood of certain exogenous trees reduced to pulp for paper.

3. Structural fibres are derived (a) from the structural system of the stalks, leaf stems and leaves of monocotyledonous plants (as the agaves and palms) occurring as isolated fibro¬ vascular bundles, surrounded in nature by a pithy, spongy, corky or often soft cellular mass, covered with a thick epidermis. They give the plants rigidity and also serve as water ducts ; or (b) the entire stems or leaves of the same plants, simply split or shredded (such as straw plait) ; or (c) the fibrous portions of the leaves or fruits of certain exogenous plants when de¬ prived of their epidermis and soft cellular tissue (the vegetable wool from pine needles).

Under division B, simple cellular structure, the (4) Surface fibres are recognized as (a) the hairs surrounding the seeds or seed envel¬ opes of exogenous plants, and usually contained in a pod or capsule (as cotton) ; (b) hair-like growths, or tomentum, produced on the surfaces of stems, leaves or leaf-buds of plants (as pulu) ; or (c) fibrous material produced in the form of epidermal strips from the endogens (as raffia). The (5) Pseudo-fibres, strictly speaking, are not simple fibres, but fibrous ma¬ terial employed as substitutes for the true fibres. These are: (a) certain mosses, used as pack¬ ing substances; (b) certain leaves and marine weeds, also used for packing; (c) seaweeds wrought into fish-lines or cordage, and (d) fungus growths employed in some of the eco¬ nomic uses to which true fibres are put.

A review of the uses of fibres in the arts, by man, shows seven general classes of eco¬ nomic employment, each of which may be sub¬ divided further to illustrate special utility.

1. The Spinning Fibres enter into the high¬ est forms of manufacture, such as the produc¬

tion of cloth and woven or netted fabrics, and they also include the cordage fibres. Among spinning fibres those for the production of fabrics naturally are the most important com¬ mercially. The fibres of the first rank, which enter into fine and coarse textures for wearing apparel, house furnishings, awnings, sails, etc., are chiefly cotton, flax, hemp, ramie, pineapple fibre and the finer manila hemps ; those of the second rank, jute, coconut fibre or coir; and some of the agaves which find use in burlap or gunny, webbing, rough sacks, coarse floor cov¬ erings, etc. The netting fibres, also included in the spinning fibres, are derived from a very much wider range of plants, many of which are not in cultivation. Besides cotton, flax and ramie, employed chiefly in laces and knit goods, nets, etc., there are scores of tree basts, agave, palm and grass fibres which find use, both commercial and native, in the manufacture of all kinds of nets, hammocks and similar articles. A third group of the spinning fibres comprises those employed in cordage manufacture. They include all of the fabric fibres mentioned above, the so-called hard fibres, Manila and sisal hemps, coir, etc., as well as Sunn hemp, Mauri¬ tius hemp, the bow-string hemps, New Zealand flax and Tampico, used for making twines, and many forms of fibre used in the hand manu¬ facture of rope and by natives in their rude domestic economy.

2. Tie Material. — The fibres employed as tie material are legion ; many of them can scarcely be called commercial forms as they are used only by the natives in the countries where they are produced. The tie material is usually the peeled bark of trees rich in bast, stripped or shredded palm leaves, the tougher grasses, and even twigs and roots used with no special preparation, but merely twisted when green, or freshly cut, into rough cordage for the building of huts, enclosures and even for con¬ structing rope suspension bridges. Raffia, used by nurserymen as a ready-to-hand tying ma¬ terial, is an example.

3. Natural Textures. — These are the nature- woven fabrics of tropical countries, which are used as substitutes for cloth, and which are prepared by simply stripping from the plant, in sheets or layers of fibrous substances, and beating. The Tappa or Kapa cloth of the Pacific Islands is an example. Others are the lace barks, the satin-like Cuba bast, employed in ladies hats, the ribbon-like bast used for ciga¬ rette wrappers, etc. ; also the fibrous sheaths from the bases of the leaf-stalks of certain palms. The separated and hand-twisted fila¬ ments of many of these cloth substitutes are also used for rough cordage.

4. The Brush Fibres. — These include such commercial forms as

Tampico, Palmetto, Pal¬ myra, Kitool, Monkey Bass, Piassaba and cocoa fibre, employed in the manufacture of brushes, and as substitutes for animal bristles as well as the coarser forms, such as broom- corn, broom-root and even twigs and splints as employed in street-sweeping machines.

5. The Plaiting and Rough Weaving Fi¬ bres. — This is another large group, which in¬ cludes many kinds not to be classed as commer¬ cial, yet of greatest importance to the natives of the countries where they grow. They are em¬ ployed in articles of attire and ornament and for

use in the domestic economy. The most important commercially are the straw-plaits from wheat, rye, barley and rice straw (the Tuscan and Japanese braids). Other forms are split from palm leaves, such as Carludovica palmata, used in weaving Panama hats ; plaits are also pro¬ duced ■ from various fibrous substances used entire, as the tree basts, and even thin shavings of close-grained woods — the <(chip® in millinery trimmings. This group also includes the com¬ mercial matting fibres produced from grasses and sedges, as well as thatch materials of every description. The basketry fibres are likewise classed in this group, and they are legion, for they include not only the entire range of palm fibres, the grasses, reeds and rushes, yucca fibre, the leaf stems of ferns, etc., whole or split, but osier and splints from the common woods, pine, ash, hickory and others. Then there are many miscellaneous uses such as for (

6. The Filling Fibres are of less import¬ ance than any of the preceding, though alto¬ gether they form a large group and include some valuable commercial forms. Their most common employment is in upholstery; wadding, from cotton; feather substitutes for filling pil¬ lows and cushions, as the silk cottons (<(vege- table silk®), (

7. Paper Materials. — This group of fibres might include the whole category of fibrous sub¬ stances, for there is scarcely a fibre that cannot be made into paper, the expense of preparation being the main question in determining its avail¬ ability. The Textile papers employ the spinning fibres, in the raw state, in the form of waste, tow, jute butts, old manila rope, cotton and linen rags, etc. The Bast papers include such Eastern fibres as Japanese paper mulberry, the tree basts, etc. The Palm papers are made from palmetto, yucca and many of the

tropical palms. The Bamboo and Grass papers include bamboo, esparto and other grasses, straw and maize ; and lastly, the Wood pulp papers are made from the cellulose, chemically prepared, from spruce, poplar and other native woods.

The employment of fibre in the domestic economy must go back to the most primitive times, for among the uncivilized races of man the world over we find a dependence upon fibre plants for utensils, cordage, clothing, the building and furnishing of their huts, second only in importance to their dependence upon edible plants for food. And these plants supply hundreds of fibres which the inventive genius of the age cannot afford to use commercially. So we have two great groups of fibres, eco¬

nomically speaking. The (

While the ((native® or emergency fibres, that are known, make a list of upward of 1,500 species, the commercial fibres of value to the world would hardly reach two score in num¬ ber, and those that interest the United States scarcely half that number. Altogether, count¬ ing the more unimportant forms, 25 to 30 species may be enumerated, the larger number of which figure as imported kinds, although they are imported in such small quantities and at such irregular intervals that they cut a small figure indeed. Eight species of imported fibres would include all of the really important kinds representing the material of the great textile industries. They are cotton, flax, hemp, jute, manila hemp, sisal hemp, Tampico and coir or coconut fibre. The fibres of lesser importance are China grass or ramie, raffia, Mauritius hemp, Sunn hemp, New Zealand flax, a few of the Mexican Agaves and Yuccas, Piassaba or Brazilian bass, broom root, Esparto, Crin vegetal, rattan and vegetable sponge. Straw plait (and its manufactures) are also imported in considerable quantities, and there is some bamboo, kittool and palmyra.

Of native fibres, commercially employed, we use in manufacture slough grass, Spanish moss, two species of Florida palmetto and the woods of several species of forest trees in basketry and wood pulp, besides straw and maize husks. Many native fibres are used by the North Amer¬ ican Indian tribes, but as these are in no way commercial they are not included here. While the fibres of lesser importance are briefly re¬ ferred to in this article, the references to the more important textile forms will be found alphabetically arranged under their common names, as cotton, flax, hemp, etc. Among spin¬ ning fibres of lesser importance are ramie, or China grass, Mauritius and Sunn hemps and New Zealand flax.

Sunn hemp, Crotalaria juncea, is a legumi¬ nous shrub which abounds in India and Aus¬ tralia. Synonyms : Conkanee hemp, Indian hemp, Kenna and Madras hemp. A bast fibre which takes the place of jute in portions of India, though it is lighter in color and a better fibre, with a tensile strength which adapts it for cordage; used for rope making in this country. In India is used for cordage, nets, sackcloth, twine and paper, 50,000 acres hav¬ ing been cultivated in northern provinces in a single year.

Mauritius hemp, Furcrcea gigantea, is im¬ ported from Africa, as its name implies ; thrives in the West Indies and Central and South America. Introduced into India, Ceylon and Australia. The plant is closely allied to the Agaves (such as the sisal hemp plant), the fibre being derived from the leaves, which are four to seven feet long and four to six inches wide. A structural fibre, it is very similar to sisal hemp though not quite as strong, and is used for the same purposes. The commercial supply is derived only from Saint Helena and Mauritius, where the plant is cultivated. In Venezuela the native supply of this fibre is made into bags, halters, horse blankets, fish nets and cordage, and is known as fique.

New Zealand Flax, Phormium tenax. A structural fibre derived from the leaves of a liliaceous plant, resembling the flag, native to New Zealand, but found in other portions of Australia. Distributed to the Azores, Saint Helena, Algiers, southern France and the Brit¬ ish Isles. Thrives in California, where its leaves are used as tie material. Its many varieties produced in New Zealand yield fibre capable of manufacture into cloth of the tex¬ ture of linen, satchels, table mats, sandals, sacks, rugs and mattings, threads and twines of superior strength, cordage and cables. An in¬ ferior grade has been imported into the United States for the manufacture of binding twine. The staff used in the construction of exposition buildings is stiffened with a low grade of this fibre. At the present time 9,000 tons of the fibre is being imported annually, worth about $255 per ton.

Broom Root, Epicampes macroura. Also known as Mexican whisk and Rais de Zacaton. A fibre of a bright yellow color, wavy as though crimped, stiff and harsh, measuring from 10 to 15 inches in length. Is a substitute for Venetian whisk and is used in this country for clothing and velvet brushes, scrub and other household brushes, brooms, etc. The fibre is simply the cleaned roots of a grass which abounds in a

wild state in southern Mexico. The roots of Chrysopogon gryllus are also solid under the name (

Piassava. Two species are represented in the commercial product known as <(true piassava,® the Para fibre, Leopoldina piassaba, also known as monkey bass, and Attalea funifera, both derived from Brazilian palms. An African species, Raphia vinifera, known as West African bass, has been imported to a slight extent in late years. The Bass fibres, from these three species, are stiff and wiry, bright chocolate in color, and are used for very stiff household brushes and brooms, and for street¬ sweeping machines. The fibre is obtained from the dilated bases of the leaf stalks, which separate into a long coarse fringe; this is col¬ lected by the natives, sorted and tied in bundles, and baled for market.

Palmyra, Borassus flabellifer also sold as ((piassava,® is a similar palm fibre from Ceylon, a little finer, redder in color, and about two feet long. It is obtained from the base of the petioles or leafstalks. It is also found in India and tropical West Africa; used as a brush material ; first came into notice in 1891. Trade name, Cassine.

Kittool, a similar fibre, derived from the jaggery palm, Caryota urens. Structural fibre ; brownish black, the filaments straight, smooth and glossy, showing considerable tenacity, and capable of twisting as the fibre is elastic. Com¬ mon in India and Ceylon. We have imported as high as $16,000 worth of kittool in a single year for the manufacture of brushes for brewers' use. The fibre is taken from the bases of the leafstalks. For further information con¬ cerning this and other fibres briefly mentioned consult (A Descriptive Catalogue of Useful Fibre Plants of the World,* and ˆDictionary of the Economic Products of India. *

Palmetto fibre. Two species of the Florida palmetto supply commercial brush fibre. The fibre from the saw palmetto, Serrenoa serrulata, is derived from the macerated stems of the leaves, which are sometimes five feet long. It is a harsh, brittle fibre, white in color when well prepared, and makes a very cheap substitute for bristle brushes. Also used as a substitute for cow's hair in plaster, while the shredded leaves have been employed as mattress filling. The cabbage palmetto, Sabal palmetto, yields fibre reddish in color, somewhat resembling cocoa fibre. It is derived from the <(boots® or spathes of the leaf-stems which surround the bud or ˆcabbage,® and in securing the bud the tree is killed. After a process of steaming and crush¬ ing the boots, the mass is combed and the softer, tangled fibre extracted, leaving the stiff, straight, coarse brush material, which repre¬ sents about 25 per

cent of the original fibrous substance of a boot. This product goes into cheap brushes for household use.

Crin vegetal, or African fibre, Chamcerops humilis, is derived from an Algerian species of palm similar to the Florida palmetto. The com¬ mercial product is produced by shredding the leaves, and as imported resembles twisted ropes of hay. It comes ip two colors, a pale greenish (called white) and in black. The twisting crinkles the fibre so that when again opened it retains the (

Spanish moss, Tillandsia usenoides. This is a native filling fibre. The plant is parasitic on trees and is seen hanging in dense gray masses in many portions of tropical and sub¬ tropical America. The fibre is the entire plant in mass, after the gray epidermis has been re¬ moved. It is black in color, and resembles curled horse hair, for which it is a tolerable substitute. Manufactured chiefly in Charles¬ ton, S. C., and in New Orleans, La.

Pulu, a Hawaiian surface fibre, useful for stuffing pillows, etc., is simply the hairs which grow at the bases of the leafstalks of several species of Cibotium, a genus of tree ferns. It is regularly exported from Honolulu to San Francisco. The substance is yellowish in color and resembles wool. The golden moss of the Chinese is a similar fibre.

Raffia, Raphia ruffia, is a palm fibre, im¬ ported from Madagascar. The commercial product comes in the form of narrow ribbons of fibrous material, derived from the cuticle of the leaves of an African palm, taken before they are fully expanded, by peeling the leaf on both sides. Imported as a tie material for

FIBRE PLANTS

1 Sisal Hemp 3 Cocoanut Plant

2 Istle or Tampico Hemp 4 Mauritius Hemp

FIBRE PLANTS

1 California Hemp 4 China Grass, or Ramie

2 Sunn Hemp 5 Cabbage Palmetto

3 Louisiana Jute 6 Sponge Cucumber

FIBRE

nurserymen ; used also for the manufacture and trimming of ladies' hats ; has recently come into extensive use in connection with splints of rattan, for hand-made fancy baskets, the art now being taught in all of our larger cities. Takes dye readily, and can be purchased in several colors.

Another millinery trimming fibre is the Cuba bast, Hibiscus elatus, which comes in the form of thin ribbons of bast, which are the separated layers of the inner bark of a large tree. These ribbons or strips are plaited into ladies' hats, either in the flat, or twisted forms, the white color and satiny sheen making the product peculiarly adaptable to the purpose. In this connection may be mentioned the poplar and willow shavings, or thin strips of wood known as ˆchip," and imported from Germany for the same purposes.

Straw is imported from Italy, Germany and Japan, wrought into ((straw plait" or ((b raids" for the manufacture of hats, fancy baskets, etc. The Tuscan braids are the finest and are pro¬ duced from wheat straw specially grown, al¬ though rye straw is also employed in Italy. The braids from China and Japan are from rice and barley straw, while the Bohemian straw plait is from wheat. Two native American grasses, Poa pratensis and Sporobolus indicus, have also, in past time, been employed for the same pur¬ pose.

The Eastern or Oriental floor mattings im¬ ported into this country are made from several species of rushes or sedges. The Chinese and Korean are produced from Cyperus tegetiformis ; the Japanese from Cyperus unitans and J uncus effusus; the Indian from C. corymbosus, C. esculentus and C. tegetum. Other species are also employed, though the above are the most common. The Japanese mat rush industry is very extensive, over $400,000 worth of mats hav¬ ing been exported in a single year. Cyperus unitans is the Shichito-i of Japan, from which the cheaper, coarser mats, for the common peo¬ ple, are produced, while J uncus effusus is the Bingo-i, or form employed for the mats of the higher classes, both being cultivated. The technique of mat making is practically the same in China, Japan, India and Ceylon. The culms are either used entire or split into two or more parts, and woven upon a warp of thread, these often stretched upon the floor, for much of this material is woven by laborious hand methods.

In the United States a new form of floor matting has recently come into vogue, produced from slough grass, Carex filiformis, also known as the slender sedge. The material grows wild over vast areas of the

river bottoms of the Mis¬ sissippi, and streams tributary. It is cut in July or August, dried, and by means of special ma¬ chinery worked into a continuous strand, bound with thread or fine twine. It is afterward woven into mattings, the warp being cotton yarns in high colors. The grass twine as prepared for weaving is also used as binder twine for grain.

The sponge cucumber or snake gourd, huff a cylindrica, is imported from Japan in consider¬ able quantities as a substitute for the bath sponge. The commercial article is the entire gourd with the epidermis and seeds removed, presenting the appearance of a network of straw-colored fibre. It is extensively cultivated in Japan, for export. Grows in the southern United States, but has never been produced

commercially, though used for bath sponge, flesh brush, dish cloths, and even for fancy baskets and bonnet crowns.

Among high-grade fibres that have been the subject of experiment in the United States but which are not produced commercially may be mentioned pineapple fibre, from Ananasa sativa. Fibre extracted in Florida was found to be fine, soft, flexible and very resistant. The filaments yield to treatment in the alkaline bath and are easily subdivided, producing an admirable spin¬ ning fibre. In the Philippines, the fibre is used to some extent in the fabric known as pina cloth, which is becoming known in Europe and America, and may become of commercial im¬ portance. Consult Special Report No. 5, Office of Fibre Investigations, Department of Agricul¬ ture, Washington, and Bulletin No. 4, Philippine Bureau of Agriculture, Manila, for further in¬ formation regarding pineapple fibre.

Another valuable but unemployed spinning fibre that might be produced in the United States is the bowstring hemp, various species of Sansevieria. The plant grows to perfection in southern Florida, and yields a fibre which com¬ bines all the good qualities of length, strength, fineness, color and divisibility, which adapts it for employment in the manufacture of fine threads, and even fabrics. There are eight or more species of bowstring hemps, all of which are considered valuable for fibre. The Florida species is S. longiflora.

Mexico abounds in fibre plants, many species of Agave and Yucca not recognized as standard commercial forms being employed for rope, coarse bags and mattings. A little of this fibre finds its way to the United States for employ¬ ment in coarse twine manufacture, though not in appreciable quantities at present. Palma Istle and Pita Sylvestre are local trade names applied to a harsh, low-grade fibre produced

from two species of Yucca. Pita is a Mexican name applied to several Agave fibres, and to some allied species, though pita is generally un¬ derstood to mean the fibre of Agave ameri- cana. There are several species of Agave, known in Mexico as Mescals, which produce fibre of good strength, which might be employed in cheaper grades of cordage.

Since the annexation of the Philippines, re¬ search has been made throughout the islands with the special object of discovering valuable fibre plants. A large number has been found, tested and classified. The groups of plants which have yielded commercial fibres include the ferns, pandans, grasses, bamboos, sedges and rushes, palms, agaves, pineapples, cottons (including Kapok) and basts of several shrubs and trees.

Both climbing and non-climbing ferns are used, the fibres being made into hats, ropes and baskets. The pandan fibres are of both fine and coarse grades, and are wrought into hats, sleeping mats, baskets, wall-pockets, picture frames and slippers.

The fibres of grasses make hats, slippers, ropes and brooms. Of the bamboo fibres are made hats, baskets and furniture. Sedges are used entire for mattings and the fluff of the cat¬ tail spikes forms a stuffing for upholstery. From certain of the palm leaves are obtained the fibrous strips which are made into Buntal, Calasiao and Bangkok hats. Pineapple cloths are woven of the fibre of the leaves from the

finest gauze to a coarse net. There are three varieties of jute growing wild over immense areas and dozens of trees and shrubby plants yielding basts.

The processes of preparing the fibres for commerce are of two general types : in one fer¬ mentation is first resorted to in order to dis¬ integrate binding substances, as with jute and ramie. This is followed by beating and scrap¬ ing and hackling. ‘ With the fibres of fleshy plants like the agaves, sisal and New Zealand hemp, the leaves or stalks are simply run through a crushing machine and the soft pulp then removed by scraping. Washing and dry¬ ing complete the preparation.

The imports of raw commercial fibres for the year ending 31 Dec. 1917 were valued at over $95,000,000, though this sum should not be

taken as alone representing the consumption of fibre manufactures in the United States, for we import vast quantities in the manufactured form. As an illustration, the importation of flax manufactures in a single year has been seven times greater than the imports of raw and hacked flax for the same period. The principal items with their values imported in the calendar year 1917 were as follows : flax, 7,331 tons, $5,276,777 ; hemp, 9,745 tons, $2,829,- 518; istle, 29,156 tons, $2,539,146; jute, 87,682 tons, $8,315,121; kapoc, 7,565 tons, $1,855,673; manila, 92,112 tons, $27,321,018; New Zealand flax, 9,019 tons, $2,28 6,922; sisal, 143,871 tons, $43,053,717. In addition to this raw material, there were imported 486,161,880 pounds of bur¬ laps and plain woven jute fabrics, valued at $53,472,680, and 34,473,234 pounds of jute bags, valued at $2,850,323. Binding twine and coir yarn, gunny cloth for cotton bales, etc., totaled a value of over $14,000,000. The increases in importation have been phenomenal since the war began, the 1917 figures being nearly double those of 1914). (See Coir; Cordage; Cordage Industries; Cotton; Flax; Hemp; Istle; Jute; Manila Hemp; Matting; Ramie; Sisal Hemp). Consult Carter, H. A., (Ram:e) (Lon¬ don 1910) ; Dodge, C. R., (A Descriptive Cata¬ logue of Useful Fibre Plants of the World) (United States Agriculture Dept., 1897) ; Goulding, E., (Cotton and Other Vegetable Fibres) (London 1917) ; Hannan, W. I., (The Textile Fibres of Commerce> (London 1902) ; Mitchell, C. A., and Prideaux, R. M., (Fibres Used in Textile and Allied Industries) (Lon¬ don 1910) ; Muller, T., Undustrial Fibre Plants of the Philippines* (Manila 1913) ; Posselt, E. A., (Fibre Structure) (Philadelphia 1892).

FIBRE. See Chemistry, Progress of.

FIBRE PLANTS. See Esparto; Fibre; Flax; Jute; Ramie; Sisal, etc.

FIBRIN, fi'brin, the chief substance formed in the coagulation of the blood-plasma. It may also be found in coagulation of lymph and in other fluids that contain fibrinogen. It is usu¬ ally taken from the blood by whipping it with a bunch of wire or glass rods as it falls into a vessel, before it has had time to coagulate into a solid mass. When obtained from fresh blood in this way, fibrin is a stringy substance while wet, and dries to a glue-like mass. It is a pro- teid, and consists of at least two globulins, one coagulating at 50° C., the other at 56° C. Un¬ der the action of pepsin these are converted

into acid albumin, proteoses and peptones. Blood yields from .2 to 4 per cent of its weight of dry fibrin. Fibrin decomposes peroxide of hydrogen without itself suffering any chemical change. See Blood; Fibrinogen; Globulins.

FIBRINOGEN, fi'bri-no-jen, a substance found in the plasma of the blood, and which brings about spontaneous coagulation of that fluid. It is also found in the lymph and in a number of other fluids of the body. Fibrinogen may be precipitated from the blood-plasma by the addition of magnesium sulphate or sodium chloride. It is soluble in dilute alkalis, and is precipitated from solutions in these weak alka¬ lis by acetic acid. Fibrinogen is probably not a simple substance, but a mixture existing in loose combination of at least three substances. These as given' by Schafer are fibrinogen proper, coagulating at 56° C., a globulin, de¬ scribed by Hammarsten, and termed fibrino-globulin, and a nucleoproteid. The relation¬ ships of fibrinogen and fibrin and the blood- ferment are expressed by Schafer as follows : (((1) That the coagulation of blood, that is, the transformation of fibrinogen into fibrin, re¬ quires for its consummation the interaction of a nucleoproteid (prothrombin) and soluble lime salts, and the consequent production of a fer¬ ment (thrombin) ; (2) that either nucleoproteid is not present in appreciable amount in the plasma of circulating blood, or that the inter¬ action in question is prevented from occurring within the blood vessels by some means at pres¬ ent not understood; (3) that the nucleoproteid (prothrombin) appears, and the interaction oc¬ curs, as soon as the blood is drawn and is al¬ lowed to come into contact with a foreign sur¬ face, the source of the nuceloproteid being in all probability mainly the leucocytes (and blood- platelets?) ; (4) that, under certain circumstan¬ ces and conditions, either the nucleoproteid does not appear in the plasma of drawn blood, or it appears, but the interaction between it and the lime salts is prevented or delayed; (5) that the nucleoproteid (prothrombin) appears in the plasma of circulating blood under certain con¬ ditions, being in all probability shed from the red blood-corpuscles ; and that when shed out under these conditions from the corpuscles, or when artificially injected into the vessels, it tends to interact with the lime-salts of the plasma and to form fibrin ferment (thrombin), intravascular coagulation being the result; (6) that, under other conditions, either the shed¬ ding out of nucleoproteid from the corpuscles, or its interaction with the lime-salts of the plasma, may be altogether prevented and the blood rendered incoagulable, unless nucleopro¬ teid be artificially added, or unless a modifica¬ tion of the conditions is introduced which will permit of the interaction of the nucleoproteid with lime to form ferment; (7) that nucleo¬ proteid (prothrombin) is incompetent, in the entire absence of lime-salts to promote the transformation of fibrinogen into fibrin ; but, as a result of its interaction with lime-salts, it becomes transformed into a ferment (throm¬ bin), which, under suitable conditions of tem¬ perature and the like, produces fibrin; (8) that either the place of

nucleoproteid in coagulation may be taken by certain albumoses, such as those found in snake-venom, and by certain artificial colloidal substances, such as those pre-

pared by Grimaux, or that such substances may act by setting free nucleoproteid from the leu¬ cocytes and other elements in the blood or from the cells of the blood vessels, and thus indirectly promote coagulation.ˆ See Blood; Coagula¬ tion; Fibbrin; Globulins.

FIBRO CARTILAGE. See Cartilage.

FIBROLITE. See Sillimanite.

FIBROMA. See Tumor. FIBROPSAMMOMA. See Tumor.

FIBROSARCOMA. See Tumor.

FIBULA. See Anatomy; Osteology.

FIBULA PRZENESTINA, fi-bu'la pri'nes- ti'na, a gold brooch found at Prseneste in 1886. It bears an inscription in Old Italic lettering, which is the oldest extant specimen of Latin. The inscription reads : Manios med Fhefhaked Numasioi, which in later Latin would be writ¬ ten: Manius me fecit Numasio. The brooch dates probably from the 6th century b.c. Con¬ sult Egbert, (Latin Inscriptions y (New York

1896).

FICHEL, fe-shel, Eugene, French painter: b. Paris, 30 Aug. 1826; d. there, 2 Feb. 1895. He entered the ficole des Beaux-Arts in 1844 and became a pupil of Delaroche, but painted very much more under the inspiration of Meis- sonier, whose exquisite handling is suggested in numerous small canvases of his which by their refined technique and vivid action recall the characteristic intensity and directness of composition which belong to the painter of ˆriedlandP The principal works of Fichel are of a high order of genre, and include, (The End of Dinner* ; (A Festival in the Year 1 776) ; (The Capture of a Spy) ; (The Wandering Singers,* etc., and the following historic pic¬ tures, which have the freedom and imagination of pure genre: (The Night of August 24, 1572) ; (Founding of the French Academy.* He was a chevalier of the Legion of Honor and, in 1857, received a medal for his painting in the Salon of that year. In the latter he exhibited a canvas every year,

up to a few years before his death. Many of his pictures are in galleries all over the world. Two of his paintings, (A Violin Player, * executed in 1871, and ˆwait¬ ing an Audience,* painted in 1881, are in the New York Metropolitan Museum of Art. Con¬ sult Montrosier, E., (Les Artistes Modernes) (Vol. IV, Paris 1884).

FICHTE, fm'te, Immanuel Hermann von, German philosopher: b. Jena, 18 July 1796; d. Stuttgart, 8 Aug. 1879. He was a son of Johann Gottlieb Fichte (q.v.). He was gradu¬ ated at the University of Berlin in 1818. Soon after he became a lecturer in philosophy at this institution. As a result of semi-official suggestions, based on official disapproval of his supposedlv liberal views, he decided, in 1822, to leave Berlin, and accepted a professorship at the gymnasium in Saarbriicken. In 1826 he went in the same capacity to Diisseldorf. In 1836 he was appointed extraordinary, and in 1840 ordinary professor of philosophy at the University of Bonn, where he quickly became a successful and much admired lecturer. Dis¬ satisfied with the reactionary tendencies of the Prussian Ministry of Education, he accepted a call to the chair of philosophy at the Uni¬ versity of Tubingen in 1842 where he con¬

tinued to give lectures on all philosophic sub¬ jects until his retirement in 1862 when he moved to Stuttgart. As a philosopher he was of lesser importance than his father. In his philosophy he was a theist and strongly opposed to the Hegelian School. The additional char¬ acteristics of mysticism and eclecticism, which are frequently attributed to him, are only partially deserved. His greatest gift, perhaps, was his breadth of vision, enabling him to do justice to and give a philosophic interpretation of practically every new development and dis¬ covery throughout the long period of his in¬ tellectual activity (1818-1879). He was a very prolific writer. Many of his shorter works ap¬ peared in the Zeitschrift fiir Philosophic und S pe dilative Theologie, which Fichte founded in 1837 and which he edited from then on, later with Ldrici and Wirth, when the name was changed to Zeitschrift fiir Philosophic und Philosophische Kritik after a short period of suspension (1848-52). Of his many pub¬ lished works the following may be especially mentioned : (Satze zur Vorschule der Theologie) (Stuttgart 1826) ; (Beitrage zur Charakteristik der Neueren Philosophic* (Sulzbach 1829) ;

(Uber Gegensatz, Wendepunkt und Ziel Heuti- ger Philosophy (3 parts, Heidelberg 1832-36) ; (Grundziige zum Systeme der Philosophy (3 parts, Heidelberg 1833-46) ; (Religion und

Philosophic in ihrem Gegenwrartigen Verhalt- niss) (Heidelberg 1834)

; (Die Idee der Per- sonlichkeit und der Individuellen Fortdauer* (Elberfeld 1834) ; (Die Spekuiative Theology (3 parts, Heidelberg 1846ˆ47) ; (Grundsatze fiir die Philosophic der Zukunft) (Stuttgart 1847) ;

(System der Ethik) (2 vols., Heidelberg 1850— 53) ; (Anthropology (Heidelberg 1856) ; (Zur Seelenfrage, etc.* (Leipzig 1859) ; (Psychologie* (2 vols., Heidelberg 1864-73) ; (Vermischte Schriften* (2 vols., Heidelberg 1869) ; (Die Theistische Weltansicht und ihre Berechtigung* (Heidelberg 1873) ; **Der neuere Spiritual- ismus) (Heidelberg 1878). He also edited his father's writings under the title (Leben und BriefwechseP (2 vols., Sulzbach 1830) ; (Nach- gelassene Werke) (3 vols., Bonn 1834-35) ; (J. G. Fichte's Samtliche Werke) (8 vols., Berlin 1845-46) ; (Der Materialismus unserer Zeit in Deutschland, etc.** (Leipzig 1866) ; a translation from the French work by P. Janet published originally in Paris in 1864, likewise bore his name as editor. Some of his works have been translated into English by T. D. Morell as < Contributions to Mental Philosophy* (London 1860). Consult Erdmann, J. E., (History of Philosophy) (3 vols., London 1890) ; Euckcn, R., (Zur Erinnerung, I. H. Fichte* (in Zeit¬ schrift fiir Philosophic, Vol. CX, Bonn-Leipzi g 1897) ; Hartmann, K., (I. H. Fichte) (in

Allgemeine Deutsche Biographic, Vol. XLVIII, Leipzig 1904) ; Scherer, C. C., (Die Gottesleh/' von I. H. Fichte* (1902).

FICHTE, Johann Gottlieb, German phi- losopher : b. at Rammenau in Lusatia, 19 May 1762; d. Berlin, 27 Jan. 1814. He came of healthy peasant stock which had lived in the region for many generations. A tradition in the family was to the effect that a Swedish sergeant, left wounded in the village during the wars of Gustavus Adolphus, had recovered and later married the daughter of his kindly benefactor. From this marriage sprang the

Fichtes, a family noted in the neighborhood for its probity and piety. Christian Fichte, Johann Gottlieb's father, married somewhat above his station. It has been suggested that a certain impatience which Fichte himself displayed throughout his life was an inheritance from his mother.

Young Fichte received the rudiments of his education from his father. He early showed remarkable ability, and it was owing to his reputation among the villagers that he gained the opportunity for a better education than he otherwise would have received. The story runs that Freiherr von Militz, a country land- owner, arrived too late to hear the local pastor preach. He was, however, informed that a lad in the neighborhood would be able to repeat the sermon practically verbatim. The upshot of the affair was that the lad was taken under Von Militz's protection. He was placed in the family of Pastor Krebel at Niederau near Meissen and there received thorough ground¬ ing in the classics. The kindly home of the good pastor must have made the parting from his parents less severe than it would otherwise have been. From this time onward, Fichte saw little of his parents. In October of the year 1774, we find him at the celebrated founda¬ tion-school at Pforta near Naumberg. This famous school is associated with the names of Novalis, the Schlegels, Fichte and Nietzsche. The spirit of the institution was semi-monastic and, while the education given was excellent in its way, it is doubtful whether there was enough social life and contact with the world for a pupil of Fichte's temperament and ante¬ cedents. Perhaps his education strengthened a tendency toward introspection and independ¬ ence, characteristics which appear strongly in his doctrines and writings. In 1780, he en¬ rolled himself in the theological faculty at Jena. How far his heart was given to the career for which this was an opening it is im¬ possible to say. His mother desired it, and it was the path of least resistance for a poor boy of pietistic heritage. It is well to bear in mind that Schelling and Hegel, two other leaders of German romantic idealism, entered philosophy from theology, a fact not without bearing upon the drift of their thinking. Fichte seems to have supported himself at this period of bitter poverty and hard struggle, years which surely had their effect upon his spirit. He now be¬ came a tutor and spent two of the happiest years of his lif-e at Zurich in Switzerland. Here he met Johanna Rahn who was afterward to be his wife.

Thus far, Fichte had not discovered his vocation. He had already become acquainted with the philosophy of Spinoza and shown a tendency to adapt its monism to the problems of theology. This influence of Spinoza re¬ mained with him throughout his life and affected his interpretation of Kant. It was not until about 1790, however, that he studied the Kantian philosophy. In it, he at last found what he had been seeking, a satisfactory way of approach to speculative problems; a way of approach, moreover, which did justice to those moral demands which were such a dominant part of his nature. He now occupied himself with the task of thinking through the

implications of the Kantian position and of perfecting it. But while he was assimilating

the Kantian philosophy and preparing to de¬ velop it, fate gave him another blow. Financial reverses were suffered by the Rahn family, and the impending marriage had to be post¬ poned. He went as a tutor to Warsaw, but was soon released. Now came his chance to see Kant at Konigsberg. After a disappoint¬ ing first interview, he shut himself in his lodg¬ ings and threw all his energies into the com¬ position of an essay which would compel

Kant's attention and interest. This essay, com¬ pleted in five weeks, was the (Versuch einer Kritik aller Offenbarung) ((Essay toward a Critique of all Revelation*) . Kant's interest

was awakened and led to the publication of the essay. Fichte's name having been omitted

from the title-page by accident, it was taken by reviewers for Kant's own production. Fichte's reputation was thus made as the best interpreter of the critical philosophy. In

October 1793, he was married at Zurich, where he remained the rest of the year. Stirred by the events and principles of the French Revolu¬ tion, he wrote and published anonymously two pamphlets which mark him as a devoted de¬ fender of liberty of thought and action and an advocate of political changes. In December of the same year, he received an invitation to fill the position of extraordinary professor of philosophy at Jena. He accepted and began his lectures in May of the next year. His success was immediate. He seems to have ex¬ celled as a lecturer because of the earnestness and force of his personality. These lectures were later published under the title (The Voca¬ tion of the Scholar.* He gave himself up to intense production, and a succession of works soon appeared. Among these are his chief work, foundation of the whole Theory of Science) (1789); (Theory of Morals) (1798), and several introductions* to his system. It is generally admitted that his theoretical phi¬ losophy reflects his practical philosophy. The primacy of the moral will is his starting-point. After weathering a couple of academic storms, he was finally dismissed as a result of a charge of atheism (1799). The whole affair was un¬ fortunate, to say the least. For Fichte, God should be conceived primarily in moral terms. To many this seemed to rob Him of personality. Since all the German states except Prussia had joined in the cry against him, he was forced to go to Berlin. Here he associated himself with the Schlegels, Schleiermacher, Schelling and Tieck. The

disaster at Jena in which Napoleon completely crushed the Prussian army drove him abroad for a time, but he re¬ turned the next year (1807) and continued his literary activity. The deplorable situation of Germany stirred him to the depths and led him to deliver the famous (Addresses to the German Nation* (1808) which guided the uprising against Napoleon. He became a professor of the new university at Berlin founded in 1809, and its rector in the succeeding year. But, once more, his impetuosity and reforming zeal led to friction, and he resigned in 1812. The campaign against Napoleon began, and the hospitals at Berlin were soon full of patients. Fichte's wife devoted herself to nursing and caught a virulent fever. Just as she was re¬ covering, he, himself, was stricken down. He did not have the force to recover and died 27 Jan. 1814.

JOHANN GOTTLIEB FICHTE

FICHTE

173

Fichte's philosophy was a speculative de¬ velopment of certain aspects of Kant's doctrines. It can best be understood when considered an audacious attempt to simplify the (Critique of Pure Reason J in the light of the (Critique of Practical Reason. > Fichte's genius was ethical, as we have already pointed out, and he instinc¬ tively took the active ego of the second Critique as his point of departure. For a proper ap¬ preciation of the importance of this remodeling and speculative interpretation of Kantianism, a brief analysis of the structure of the latter philosophy is necessary. Kant began his con¬ structive thinking in an attempt to meet Hume's atomistic sensationalism. His problem was to determine how an assumed manifold of sense could be organized into the world of law and order with which science is acquainted. Only, Kant argued by the agency of a synthetic ego working through a priori forms such as space, time, substance, causality, etc., which are contributed by the mind. These forms were painstakingly enumerated and grouped together by him, but he was unable to deduce them from the ego or relate them to it in a satisfactory way. Moreover, he granted the existence of things-in-themselves, outside of experience and unknown, yet productive of the manifold of sense which the mind had to weave into an ordered phenomenal realm.. Fichte believed that Kant had not been critical enough of his as¬ sumptions and had consequently failed to pro¬ duce the harmonious system which a deeper insight could yield. His double clue was to re¬ ject the thing-in-itself and so to interpret the active ego as to make it the source of the struc¬ ture of experience. The

result of this double reform was the speculative type of ethical ideal¬ ism which appears in the (WissenschaftslehreP The fundamental principle of his theory of knowledge is, that there can be nothing in the ego which is not a product of the activity of the ego. Kant had accepted a manifold of sense foreign to the ego. Fichte rejects this as pure dogmatism. If the ego alone is active, it is impossible to account for the origin of our ideas by means of a non-ego, for this would be passive and incapable of originating anything. The careful reader who is acquainted with the his¬ tory of philosophy will realize that we have here the same motive which led Berkeley to reject matter and Leibnitz to substitute monads for Descartes' extended substance. Having chosen idealism, Fichte proceeds to deduce the general character of experience from the laws of the ego's activity. The ego is the veritable essence of our nature and, in moments of care¬ fully prepared intuition its free, spiritual energy can be glimpsed welling up within us. Such an intuition requires effort and a char¬ acter distinguished by self-reliance. The reader should again note a parallel. M. Henri Berg¬ son's philosophy stresses just such a prepared effort of intuition. The first act of the ego is to posit itself. But there is much in experience besides the ego, much which we are not aware of producing. Hence, another principle is neces¬ sary. The ego posits a non-ego. But analysis of consciousness shows that the empirical ego is a limited ego in relation with a limited non¬ ego. We are thus led to a third principle : The ego posits a limited ego in opposition to a limited non-ego. These three principles are

fundamental for Fichte and constitute together an example of his antithetical method.

In order to bring out the speculative, or ap- rioristic, tone of his thinking, it may be well to give an example of that deduction of the forms of the mind which he put in the place of Kant's scholastic enumeration. The form of time arises when the different acts of the ego occur in such a manner as to be dependent on each other in a definite order. As Hoffding points out, Fichte did not have a rich enough psychology at his disposal and he was tempted into arbitrary applications of his principles and method.

Two questions of extreme significance for the interpretation of Fichte's philosophy re¬ main : What is the relation of the limited em¬ pirical ego to the infinite ego? Why does the ego posit a non-ego? In answer to the first question it is best to admit that Fichte assumes an infinite ego which works within us and which is more than we are. Had he a right to call this something an ego? It seems that, in his later years, mysticism more and more triumphed and he drifted toward Spinoza,

the inspirer of his earliest thinking. The answer to the second question brings the ethical bias of his system into relief. The ego limits itself by the non-ego in order that it may have a field of opposition against which it may struggle and so develop itself. We may connect with this idea the ethical law which he formulates some¬ what as follows : Every particular action must form a part of a series which leads me to com¬ plete spiritual freedom.

Fichte's ethics may be characterized as a vitalizing of the rather formal teaching of Kant. Duty is grounded upon the capacity for self-reliant freedom which man possesses; it is never rightly that which is urged upon the in¬ dividual by authority and so from the outside. True freedom is an achievement which creates or realizes itself. Fichte succeeds in giving this outlook a social setting which looks to the co¬ operation of personalities as the goal. In this connection, it is of interest to note that his book (Der geschlossene HandelsstaaC (The Exclu¬ sive Industrial State}) is one of the first in which what is now called state socialism was advocated. No international trade is to be per¬ mitted in order that the internal growth of each nation may take a natural course. The aim of the state should be to assign to every individual the means to culture and genuine freedom.

Bibliography. — (Sammtliche WerkeC edited by his son J. H. Fichte (8 vols., Berlin 1845— 46) ; also (Nachgelassene Werke) (3 vols., Bonn 1834—35) ; Fichte's (Popular Works) (tr. by W. Smith, 4th ed., London 1889) ; Kroeger, A. F., (The Science of Knowledge) (transla¬ tions of the (Grundlage der gesammten Wis- senschaftslehre) ; (Grundriss des Eigenthum- lichen der Wissenschaftslehre,* etc., London 1889) ; (The Science of Rights* (id.. 1889). The following are important critical works : Adam¬ son, (Fichte* (London 1881) ; Everett, C. C., (Fichte's Science of Knowledge) (Chicago 1884) ; Weber, M., (Fichtes Sozialismus und sein Verhaltnis zur Marx'schen Doctrin* (1900). Consult also Hoffding, (History of Modern Philosophy.*

Roy W. Sellars,

Assistant Professor of Philosophy, University of Michigan.

FICHTELGEBIRGE, fiH'tel-ge-ber'ge, a mountain range, chiefly situated in the north¬ east of Bavaria, once covered with pines (

Fichte , ˆpine®), and constituting a watershed between the head-feeders of the Elbe, the Rhine and the Danube. The elevation of the eaks ranges from 2,700 to 3,400 feet. The ighest summits are Schneeberg (3,461 feet) and Ochsenkopf (3,334). In their northern extremities the Fichtelgebirge are connected by intermediate chains, on the one hand with the Erzgebirge, and on the other with the Thuringian Forest. They are composed prin¬ cipally of granite and primitive crystalline slates, with bands and intrusions of gneiss, micaceous slates, basalt and some strata of the Tertiary Age (Oligocdn) . The climate is moist and disagreeable in the elevated sections ; snow lies on the summits from October to May. The former rich ore deposits are now exhausted ; quarrying, timbering and glass manufacture are the chief industries. Of recent years the Fichtelgebirge have come much into vogue with tourists. Consult Ruchdeschel, hand¬ book of Bavaria.)

FICINO, fe-che'nd, Marsilio, Italian phi¬ losopher of the Platonic school : b. Florence, 19 Oct. 1433 ; d. Careggi, 1 Oct. 1499. His father was physician to Cosimo de' Medici and the son's early display of talent attracted the notice of Cosimo, who made it possible for him to translate the writings of Plato and of the Neo-Platonists into Latin; he afterward taught Platonic philosophy at the Academy established by Cosimo about 1440. Ficino engaged in this work the more readily, because he viewed the Platonic philosophy as a sort of preliminary to, and confirmation of, the Christian faith. In his accounts of this philosophy he did not al¬ ways make an accurate distinction between Plato and the New Platonists, as appears from his (Theologia Platonica; de Immortalitate Animorum ac aeterna Felicitate) (Florence 1482), in which he particularly defends the immortality of the soul against the Aristotelians of his age. Mystic and fanciful views are interwoven with this defense; astrological doctrines, for example, which he afterward re¬ jected. In 1476 he took orders and was pre¬ sented by Lorenzo de' Medici with the rector¬ ship of two Florentine churches, and a canonry in the cathedral. His Latin works were first published complete as (Opera, etcP (2 vols., Basel 1576). He also wrote (De Christiana Religione) (Florence 1474) ; (De Triplica Vita* (Florence 1489) ; (De Sole et lumine) (Florence 1493). His chief claim to fame, however, rests on his translations into Latin of the works of Plato and his followers : (Platonis opera) (Florence 1483-84; Paris 1846) ; (Plotini operum philosophicorum omnium libri LIV) (Florence 1492; Oxford 1835; Paris 1855). Consult Conti, A., (Di M. Ficino e dell' Accademia Platonica, etc.* (in Archivio Storico Italiano, 3d ser., Florence 1865) ; Corsius, J., (M. Ficini Vita* (Pisa 1771); Ferri, L., (I1 Platonismo di Ficino)

(in La Filosofia delle Scuole Italiane, Vol. XXIX, Florence 1884) ; Galeotti, L., (Saggio Intorno alia Vite ed agli Scritti di M. Ficino1* (in Archivio Storico Italiano, n.s., Florence 1859) ; Puccinotti, F , (Della Filosofia di M. Ficino* (in Nuova Antologia, Vol. V, Flor¬ ence 1867) ; Roscoe, W., (Life of Lorenzo de'

Medici* (2 vols., Liverpool 1795; new; edition, London 1883) ; Sieveking, K., (Geschichte der Platonischen Akademie zu Florenz) (Gottingen 1812); Symonds, J. A., (Renaissance in Italy: The Revival of Learning) (London 1877) ; Weitenweber, W. R., (t)ber des M. Ficinus Werke) (Prague 1855).

FICK, fik, Adolf, German physiologist: b. Cassel, 3 Sept. 1829; d. Blankenberghe, 21 Aug. 1901. He studied at the universities of Berlin and Marburg, receiving from the latter the degree of M.D. in 1851. In 1852 he became a lecturer in anatomy and physiology at the University of Zurich, in 1856 extraordinary professor, and in 1862 ordinary professor of physiology at that institution. In 1868 he ac¬ cepted a similar position at the University of Wurzburg which he occupied with great success until his retirement in 1899. He was deeply interested in all natural sciences and a strong advocate of teaching them in elementary and high schools. He was also a professed total abstainer and an active prohibitionist. The re¬ sults of his extensive and careful researches in many branches of science, especially con¬ cerning the mechanics of the body and the dynamics of circulation, were published in numerous papers, a complete list of w'hich may be found in Royal Society of London, (Cata¬ logue of Scientific Papers) (Vols. II, VII, IX, XII, XIV, Cambridge 1868-1915). He also published (Die Medizinische Physik* (Braun¬ schweig 1857) ; UCompendium der Physiologie des Menschen) (Vienna 1860) ; (Lehrbuch der Anatomie und Physiologie der Sinnesorgane) (Lahr 1862) ; (Untersuchungen fiber Elek- trische Nervenreizung) (Braunschweig 1864) ; (Die Naturkrafte in ihrer Wechselbeziehung* (Wfirzburg 1869) ; (Ursache und Wirkung) (Cassel 1882) ; (Gesammelte Schriften* (4 vols., Wfirzburg 1903). Consult Anon., (Adolf Fick) (in Nature, Vol. LX VI, p. 180, London 1902) ; Voit, C., (Adolf Fick) (in Konigl.

Bayer. Akademie der Wissenschaften, Sitzungs- herichte der Math.-Phys. Classe, Vol. XXXII, p. 277, Munich 1902). '

FICK, August, German philologist : b. Petershagen, Westphalia, 5 May 1833. He studied at Gottingen 1852—57, becoming pro¬ fessor of comparative philology there 1876, and occupying the same chair at Breslau 1888. He is an authority on the primitive Indo-Germanic

languages and Greek philology. Among his works are (Die ehemalige Spracheinheit der Indogermanen Europas> (1873) ; (Vergleich- endes Worterbuch der Indogermanischen Sprachen,* his masterpiece (1874-76) ; (Die griechischen. Personennamen* (1877) ; and (Die homerische Ilias nach ihrer Entstehung betrachtet und der ursprfinglichen Sprachform wiederhergestellt* (1885); (Gesammelte Schriften) (4 vols., 1903-06) ; (Vorgriechische Ortsnamen* (1905) ; (Hattiden. und Danubier in Griechenland ; weitere Forschungen zu den Vorgriechischen Ortsnamen) (1909) ; (Die Entstehung der Odyssee und die Vcrsabzahlung in den griechischen Epen* (1910). His nupils and friends issued a volume entitled (Tepas* in honor of his 70th birthday.

FICORONI (fe'ko-ro'ne') CIST. The, a

celebrated ancient jewel case, found at Praeneste in 1738, and so named from Ficoroni, the antiquarian, who presented it to a museum at

Rome. It is about 13 inches in diameter and 18 inches high. It has representations of the Argonautic legend incised on its surface and of the finest workmanship. The names of the artist and the owner are also upon it. It dates probably from the 2d century b.c.

FICTION, in law, is an assumption made for the purposes of justice, though the same fact could not be proved, and may be literally untrue. There are many fictions in the civil law, and a fiction in law is said by civilians to be the assumption of an untruth for a truth, in a thing possible to have been done, but which was not done. The declaring that a note or bond made in a foreign country was made in the county where a suit is commenced upon it is an instance of a very common fiction, adopted on the ground that suits can be brought in the county only on causes of action existing within its limits ; and so the practice has been introduced of declaring that the contract on which an action is brought was made in the county, though the fact seems to be entirely im¬ material ; for transitory actions follow the per¬ son, and it is only of such that the fiction is admitted. The fictitious characters of John Doe and Richard Roe for the purposes of various actions are well known. It is a rule that a fiction of law shall work no wrong; and the fictions in use generally come within this rule.

FICTION IN AMERICA. While the art of fiction writing in America is scarcely more than 100 years old, its genesis may be traced far back into the records of literature. Prior to 1798, when Charles Brockden Brown laid the foundations of his fame with the writings and the publication of (Wieland,) the art of writ¬ ing fiction in this country was scarcely known. Novels were published, imported and read, but they were largely the wTork of English writers or translations from foreign languages. With the advent of Charles Brockden Brown, how¬ ever, imaginative literature began to gain a foothold, and the literary man to secure a standing in the professional world. Brown has usually been styled the precursor of the Amer¬ ican novelist and the founder of American fic¬ tion. There had been isolated attempts at fic¬ tion writing before his day, but the results were meagre both in quantity and in quality. The list is virtually complete with 'The Pretty Story, > by Francis Hopkinson ; 'The Power of Sympathy,* by Mrs. Morton; 'The Foresters,* by Jeremy Belknap; (Modern Chivalry,) by Hugh Henry Brackenridge ; 'The Algerine Captive, * by Royall Tyler (who also holds posi¬ tion as one of the earl}'- American dramatists) ; (History of a Corporation of Servants,* a satirical romance, by John Witherspoon; fe¬ male Quixotism : the Romantic Opinions and Extravagant Adventures of Dorcasina Shel¬ don, } by Mrs. Tabitha Tenny; and 'The Co¬ quette, } by Mrs. Hannah Foster. Of these early novels (The Foresters,* by Jeremy Bel¬ knap, was the most important. The poet Bryant describes it as "a work which sought to embel¬ lish our literature with the charms of wit and humor.® Susannah Rowson's (Charlotte Tem- ple) can scarcely be accounted an American novel, for it was first published in England and its author was of English birth and residence, although she lived for a considerable length of time in this country.

It is a somewhat curious fact that Charles Brockden Brown (q.v.) reveals in his work little of the American character, the American temperament and the American people. On the other hand, he shows in his own trend of thought and choice of subjects that longuig for the mysterious in life which was later to find its fullest expression in Poe and in Hawthorne. He was a student of the mystic and his novels presage the beginning of modern psychical re¬ search. His and 'Jane Talbot* were varied expositions of experiences now classed exclusively as psychical phenomena, although by him they were treated merely from the curious and spiritual points of view. His life ended 22 Feb. 1810, before he had reached the age of 40, and so slow was the growing interest in American fiction that little advancement had been made prior to his death. With the advent of Washington Irving (q.v.) and James Fenimore Cooper (q.v.), the imagi¬ native

literature of America proved the force and might of its English heritage. As early as 1809 appeared Irving's Knickerbocker History of New York,* which may fairly be classed as a romance if not as a novel. It was Irving's sec¬ ond published work, his first being the volume of reprinted miscellany called ' Salmagundi, * which had appeared the year before. Sur¬ rounded by a group of brilliant men, Irving set¬ tled down to a life of literary leisure, and in time 'The Sketch Book,* 'Bracebridge HalP and 'Tales of a Traveled took their place in literature. James Kirke Paulding (q.v.), his friend and comrade, shared the honors of the 'Salmagundi* essays with Irving, and in 1813 his 'Diverting History of John Bull and Brother Jonathan* led the way to a continuous flow of volumes in fiction, poetry and essay which did not cease until his death, 6 April 1860. 'The Dutchman's Fireside) was his most important novel.

It was not, however, until 1821-22 that the novel of American life, written by a typical American author, began its vogue. In that year, with the publication of 'The Spy,* fhe fame of James Fenimore Cooper had its beginning. He had already written 'Precaution (1820); but that novel was a romance of English society life and does not form a part of Cooper's most characteristic work. After 'The Spy) came 'The Pioneers) ; 'The Pilot* ; 'Lionel Lin¬ coln ; 'The Last of the Mohicans) ; 'The Bravo) ; 'The Prairie) ; and 'The Red Rover* ; and for 30 years, until his death, 14 Sept. 1851, Cooper was the pre-eminent American novelist who was equally expert in chronicling the life of the Indians and in writing the narratives of perilous adventures by sea. During this period the American novel and the American novelist proved their position secure. John Pendleton Kennedy, with his 'Swallow Barn* ; 'Rob of the BowP ; and 'Horseshoe Robinson) ; Dr. Robert Montgomery Bird, with his 'Nick of the Woods) ; William Ware with his 'Zenobia) and 'Julian* ; Herman Melville with his 'Typee) ; 'Omoo) ; and other remarkable sea stories ; William Gilmore Simms, next to Cooper the most voluminous American novelist, with his many revolutionary and border ro¬ mances; Charles Fenno Hoffman with his many romances of historical and legendary lore; Mrs.

Caroline M. Sedgwick with her (Redwood) ; 'Hope Leslie) ; and (The Linwoods> are among the few names of novel writers who flourished during the period following the advent of James Fenimore Cooper. One name alone — the greatest of them all — that of Edgar Allen Poe, has been omitted. Poe's (q.v.) work cov¬ ered so many branches of

literature and the man himself is so assuredly one of the world's great writers that he needs no more than pass¬ ing mention in this review of American fiction. As a master of the short story and as a writer of some of the finest tales known to any lan¬ guage — (The Murders in the Rue Morgue*; (The Tell Tale Heart* ;

Fittingly after Poe comes the name of Na¬ thaniel Hawthorne (q.v.), for it was in 1850, the year following Poe's death, that (The Scarlet Letter1* was published. This was the first if not the only great American novel. There had been nothing like it in American literature, and scarcely anything like it in the world's literature. At the time of its publi¬ cation, Hawthorne was 45 years of age ; he had been writing since boyhood and his name had been known for 15 years as that of a novelist and short-story writer of peculiar style, extraordinary gifts and sombre tenden¬ cies. (The Scarlet Letter, * however, imme¬ diately showed the unique and unapproachable power of his genius, and with (The House of the Seven Gables) (1851), (T'he Blithedale Romance) (1852) and (The Marble Faun> (1860), which followed, it placed Hawthorne among the greatest of the world's fiction- writers. During this era of Hawthorne's prog¬ ress the art of writing fiction was growing apace. In 1852, (LJncle Tom's Cabin* achieved three things: it made Mrs. Harriet Beecher Stowe (q.v.) a famous woman, it aroused an enormous public sentiment against slavery and it created a desire for novel reading among hundreds of thousands of people who could not before have been persuaded even to look into a work of fiction. Mrs. Stowe, as was to be ex¬ pected, never repeated the triumphant success of (Uncle Tom's Cabin,* although during her long life she wrote many novels. Nathaniel P. Willis, at this time at the height of his fame, was turning out volume after volume of fan¬ tastic work in poetry, fiction and essays. George William Curtis' long and versatile career cov¬ ered both the ante-bellum and the post-bellum periods; his (Prue and I,* his (Potiphar Papers, * and his trumps5 being simply imag¬ inative wanderings into a form of fiction and social satire somewhat apart from his general literary interests. Susan Warner had, in the year of the publication of (The Scarlet Let¬ ter, * gained for herself an extraordinary popu¬ larity with

which has led to better things. At this time, too, there appeared the first American historical novelist, Jeremiah Clemens, of Alabama, who wrote and published (The Rivals* (1859), and other novels. To this period also belongs Rev. J. H. Ingraham, who from writing many lurid, sensational novels turned in his later days to sacred history and evolved (The Prince of the House of Davids In the sixties, Theodore Winthrop, a descendant of an historic family, a brave young soldier and a gifted writer, began a career in letters which was untimely cut

short by his death in the Civil War. He was only 33 years of age, but his (Cecil Dreeme,* his (John Brent,* and his other stories pub¬ lished after his death gave evidence of the power he might have become in American literature.

As early as 1839, the poet Longfellow (q.v.), returned from a European trip which had filled his receptive brain with Old World fancies and mediaeval legends, wrote his (Hyperion,* a ro¬ mantic tale, the heroine of which was Miss Frances Appleton, of Boston, whom he married in 1843. Ten years later Longfellow again turned his thoughts to prose romance, produc¬ ing in (Kavanagh) a story remarkable more for its psychological elements than for any of those active phases of thought which should characterize a notable work of fiction. His success was so slight, however, and he was so keenly criticized for his venturesomeness in at¬ tempting to leap the bounds of his own field of poetry into an untraveled highway, that there¬ after he was content to express his romantic feelings wholly in verse. Among the other American poets whose versatility led them to the writing of novels, Oliver Wendell Holmes (q.v.) is the best known. His famous break¬ fast Table) series is a compound of romance, essay and poesy, and its four volumes of genial miscellany and philosophy will doubtless live long after his two novels — (Elsie Venner> (1861), and (The Guardian Angel* (1867) — are forgotten. It was also in the same decade that Bayard Taylor (q.v.) added his first work of fiction to his rapid lengthening list of works in almost every branch of literature. His novels comprise (Hannah Thurston, > (John God¬ frey's Fortunes, *

Abbott, whose chief claim upon posterity he owes to the famous

The modern epoch of American fiction begins with the close of the Civil War, and henceforth romance writers and novelists multiplied rapidly. The post-Civil War writers, those whose repu¬ tations were established prior to 1880 and after 1865, are meagre in numbers compared with those who became popular during the last 20 years of the 19th century. Of the writers who arose in the latter period, four names naturally come to mind — William Dean Howells, Thomas Bailey Aldrich, Bret Harte and Henry James the younger. Their names are here given in the chronological order of their appearance be¬ fore the public. Mr. Howells, who through his facility as a writer and his ability to adapt himself to many varied forms of composition — the

novel, the essay, the poem and the play — has practically become the most distinguished, if not the greatest American man of letters, be¬ gan his apprenticeship in the exacting field of journalism with a strong tendency toward the romantic school. After the publication of (A Chance Acquaintance) (1874), he turned his attention to the making of realistic novels, and it was not long before he was accepted as the exponent of a distinctive school of American fiction whose claim is its dictum that the commonplace and generally ignored facts of life shall form the true province of the novelist. His books written in pursuance of this method followed one another in rapid succession, the most notable of them being (A Foregone Con¬ clusion, } (A Modern Instance, > (The Rise of Silas Lapham,> (The Minister's Charge, > (April Hopes) and (A Hazard of New Fortunes. J Although Mr. Howells has been extraordinarily active in all phases of literary work, it is dis¬ tinctly as a ˆrealistic® novelist that he is now known and will be remembered by posterity. As Mr. Howells is the exploiter of a theory in fiction, so Bret Harte was the discoverer and creator for literary purposes of an undiscovered country, the California of 1849. He was pre¬ eminently a short story writer, and it needs only a knowledge of (The Luck of Roaring Camp,* (Tennessee's Pardner,> of (M'liss) and a hun¬ dred more of his tales to realize how thoroughly his art was restricted and how its very perfec¬ tion made it impossible for him to succeed with (Gabriel Conroy, J and the other long novels he attempted. Thomas Bailey Aldrich, singularly enough, became a novel writer through the vogue of a juvenile tale, (The Story of a Bad BoyC published in 1869, after serial appearance in a monthly magazine. Mr. Aldrich also pub¬ lished (Prudence Palfrey,* (The Stillwater Tragedy,* and many volumes of short stories. Although Henry James, Jr., resided in England for many years, he still held his position as an American author of unique style and genius. He made no bid for popularity, being content to express his own individuality and thought, and to expound his philosophic views of liter¬ ature and life to a public which is able to understand and appreciate such novels as (The American, * (Daisy Miller,* (The Bostonians) and (The Tragic Muse.* Although Edward Everett Hale and Thomas Wentworth Higgin- son antedate the foregoing writers by almost a score of years, they practically belong to the VOL. 11 — 12

same literary epoch, for it is since the Civil War that they have contributed liberally to the supply of American fiction, mainly in the form of short stories. For 20 years or more E. P. Roe's name was held high in the esteem of a large class of fiction readers who 'delighted in the placid commonplaces of (The Opening of a Chestnut Burr,* and its companion tales, but his repute was ephemeral and he is now almost

forgotten. With the mention of Frank R. Stockton, who wrote (The Lady or the Tiger, * Edward Eggleston, George W. Cable, Elizabeth Stuart Phelps, Joel Chandler Harris, Francis Marion Crawford, Albion W. Tourgee, Lew Wallace (whose (Ben Hur> became immediately popular upon its publication in 1881), Hamlin Garland, Harold Frederic and Sarah Orne Jewett, the story of American fiction is brought down to a time when the beginnings of present- day reputations may be remembered by the reader of to-day. Of Mark Twain and his work much could be said, for his later years were productive of famous novels: (The Prince and the Pauper, * (Teanne D'Arc,* (Pud'nhead Wil¬ son, J (Tom Sawyer, * and his other classics of American humor rank him among the great lit¬ erary figures of the present era.

With the exception of Howells, Wallace, Mark Twain and one or two others, the first 80 years of our fiction is concerned wholly with writers native to the eastern and the southern portions of the United States. But toward the close of the 19th century the western country began to develop writers of fiction such as Owen Fister. About the same time Mary E. Wilkins arose in the East, and James Lane Allen in the South, and each has gained no little reputation for the skilful man¬ ner in which he has set down the mingled characteristics of his own locality. Miss Wil¬ kins has brought the short story into high es¬ tate through her picturesque handling of com¬ monplace incidents and through her delinea¬ tions of New England character, while Mr. Allen has been especially adept in his analysis of the human soul. Hopkinson Smith also sounds a distinctively American note. The numerous novels written by Julian Hawthorne show the influence of heredity, and it is alto¬ gether likely that the son of Nathaniel Haw¬ thorne might have made a higher position for himself in his chosen profession had he not been obliged to remain in the shadow of his father's great reputation. Frances Hodgson Burnett, although of English birth, may be ranked, through her long residence in this country, as an American author. (That Lass o' Lowrie's,* (A Lady of Quality) and the juvenile (Little Lord Fauntleroy,* are evidence that she is not lacking at least in exceptional versatility. In (The Prophet of the Great Smoky Mountains,* (In the Clouds* and other volumes of lengthy novels and short stories, Mary N. Murfree (Charles Egbert Craddock) has made herself the historian of the Tennessee mountain region. In 1888 Margaret Deland's (John Ward, Preacher,* attracted wide atten¬ tion to a writer, the excellence of whose work has ever since been kept at high standard. Robert Grant, with his (Confessions of a Frivolous GirP and (Unleavened Breads may be called the novelist of Jhe social East ancl Henry Harland, although his long residence in

England has caused him to lose something of

his American identity is well known by such fantastic stories as (The Cardinal's Snuff Box} and (The Lady Paramount. > Paul Leicester Ford, historian and bibliographer, wrote (The Honorable Peter Stirling,* an artistic novel of political life notable from every point of view and (Janice Meredith,) a popular flamboyant novel. As a writer of animal tales Ernest Thompson Seaton has become popular and Bliss Carman, as a poet of the poets, has won a high place for himself.

The modern extravagant vogue of the his¬ torical novel has been stimulated and fostered, especially by Mary Johnson and Winston Churchill. In the late nineties Booth Tarking- ton achieved a veritable tour de force with a remarkable little story called (Monsieur Beau- caireV The story of American fiction may fit¬ tingly be brought to a close with the name of Edith Wharton, whose genius as expressed in (The Touchstone, * (The Greater Inclination* and (The Valley of Decision,* gives her un¬ questioned place among modern novelists. See American Literature.

Bibliography. — Abernethy, (American Fic- tion) (1902) ; Bates, (American Literature) (1896) ; Beers, (A Century of American Litera- ture) (1878) ; Howells, (Literary Friends and Acquaintances) (1901) ; Matthews, (Aspects of Fiction) (1896) ; Richardson, (American Litera- ture) (1889) ; Sears, (American Literature in the Colonial and National Periods) (1902) ; Tyler, (History of American Literature* (1897) ; Wendell, (A Literary History of America* (1901).

Edwin Francis Edgett, Literary Editor, Boston Transcript.

FICUS, plant genus of the Moraceae, which includes about 600 species, mostly all of which are tropical. The common rubber plant (F. elastica) is of this genus.

FICUS RUMINALIS, the fig tree under which Romulus and Remus were sheltered after being abandoned. Many legends surround it. Consult Platner, (The Topography and Monu¬ ments of Ancient Rome) (2d ed., New York

1911).

FIDDLE. See Violin. FIDDLE-BEETLE. See Fungus-eaters.

FIDDLE-FISH. See Monk-fish.

FIDDLER-CRAB, one of the small and active crabs of the genus Gelasimus, termed <(calling crabs** by the English, who say they are waving the enormously developed front claw of the male on the right side in beckoning, while Americans imagine them to be fiddling. This great claw is brightly colored, and is thought to be used by the males not only as a weapon, but to be displayed as an attraction be¬ fore the females, whose claws (chelipeds) are feeble and alike in their small size. These crabs throng in thousands in salt-marshes near high-water mark, where they dig burrows, some of which have a sort of hood over their en¬ trances where the crab lies in wait for prey, such as beach-fleas, on which it pounces. These crabs have a breathing apparatus so modified that it serves the purpose of both gills and lungs, and all the species spend much time in the air, and in the case of some, as those which swarm along the 'shores of the Philippines, make long excursions on shore.

FIDEICOMMISSUM, fi'da-i-kom'mis-sum, in Roman and civil law, a trust bequest, orig¬ inally oral, or in writing by codicil effected by the request of the decedent to the heir by law or by testament to present to a named third person a portion of the estate bequeathed. Under the earlier practice the obligation of the trustee was merely moral, depending on his honor and good faith. Later the bequest might be made in the will itself, and when cer¬ tain words, as of wish or command, were used by the testator in the bequest the obligation be¬ came binding on the trustee. A special officer, known as a prcetor fideicommissarius, was in the early Roman days placed' in charge of such trusts. Certain bequests could be legally made by the fideicommissum that could not be made directly by testament, as for instance to aliens, which were in derogation of the civil law. The fideicommissum must not be confused with the common-law trust, in which latter the interest of the cestui quc trust and the trustee coexists, while in the fideicommissum the interest of the fideicommissary does not vest until after per¬ formance by the fiduciary. Furthermore the interest of the fideicommissary lapses with his death if he predeceases the fiduciary.

Fideicommissa later became a regular part of the law of succession, and through them a form of entail was evolved, which could not be accomplished by testament. Subsequently, however, it was found necessary to restrict by legislation this feature of its use, to prevent property from being tied up through an objec¬ tionable number of generations. It is believed that the English law of entail, as well as of some other countries, at least in part, is founded on this branch of

Roman law.

The fideicommissum in a modified form still exists in modern legal systems, as Holland, Germany, France and Spain. In Germany a permanently entailed estate is called a fideicom- miss. In Louisiana, where the civil law is in force, the fideicommissum has been abolished by the civil code of the State.

Edward F. Donovan.

FIDELIO, grand opera in two (originally three) acts by Ludwig von Beethoven (libretto adapted by Sonnleithner and Breuning from Bouillys' (Leonore ou l'Amore conjugal), first produced at Vienna 20 Nov. 1805. The story of the fortunes and misfortunes of Beethoven's only work for the stage would fill a volume. After three poorly attended per¬ formances, it was withdrawn and in a revised and condensed form again brought forward the next year. A quarrel between composer and theatre manager cut short this production. It was then shelved for eight years when, again further revised, it was tried out a third time before the Viennese public and gradually made its way through the musical world. A promi¬ nent writer wrote that it was <(quite devoid of music ; one cannot understand why people take the trouble to weary themselves with it.® Bee¬ thoven's infinite capacity for taking pains is evidenced by the four overtures which he com¬ posed for (Fidelio.) A still stronger confir¬ mation appears in the sketch book which con¬ tains the material for the opera — a volume of 346 pages with 16 staves to the page — which shows no fewer than 18 distinct begin¬ nings for Florestan's air (

lingstagen® and 10 for one of the choruses. The plot, unlike most operatic texts of the day, dealt with one of the noblest of human emo¬ tions, conjugal devotion, which, impels Leonore at the risk of her life to seek service in dis¬ guise with Rocco, the jailor of her husband, Florestan, to defeat the attempt to kill him made by Pizzaro, the governor of the prison. At the critical moment a trumpet call announces the arrival of the minister who is Florestan's friend and the rescue is completed. Undeni¬ ably the book is loose- jointed and as a whole lacking in dramatic value. The music is with¬ out essential theatrical qualities-, but it is deeply felt and epical in its conception, and ranks with the first masterpieces of composition. Yet it stands alone in the literature of stage music. It has had but little influence on

theatrical works of succeeding generations and there is nothing else with which to compare it. As one writer has well expressed it,

Lewis M. Isaacs.

FIDELITY INSURANCE. See Insur¬ ance.

FIDENZE, fi'de-ni, an ancient city of La- tium, and the greatest rival of early Rome. It was built by \he Etruscans, and was fre¬ quently at war with Rome, being subdued finally in 426 b.c. when its inhabitants were sold into slavery. It was long important as a fron¬ tier and post station. The ancient ruins are few. Consult Tacitus,

FIDES, fi'dez, the Roman goddess of faith and honesty. Numa was the first who paid her divine honors.

FIDUCIARY, a law term signifying a rela¬ tion of trust and confidence, generally by one acting as trustee, executor or administrator, or a director of a corporation.

FIEDLER, fe'dler, Max, German orchestral leader: b. Zittau 1859. His father was a teacher of music and from him he received his early instruction in piano, studying later at Leipzig under Jadassohn and Reinecke. He was appointed teacher at the Hamburg Conserv¬ atory in 1882 and became director in 1903. lie organized orchestral concerts which were very successful and in 1904 became conductor of the Hamburg Philharmonic Society. He appeared in New York in 1907 as a guest of the New

York Philharmonic Society and in 1908 be¬ came conductor of the Boston Symphony Or¬ chestra, where he remained for three years. He returned to his old post in Hamburg in 1911.

FIEF, fef. See Fee.

FIELD, Barron, English writer: b. 23 Oct. 1786; d. 11 April 1846. He was a friend of Charles Lamb and one of a distinguished group of literary men which included Coleridge, Haz- litt, Wordsworth and Leigh Hunt. He gradu¬ ated in law but turned his attention to literature and became theatrical critic to the London Times. He contributed to Leigh Hunt's Re¬ flector, the Quarterly Review and other per¬ iodicals. He became advocate fiscal at Ceylon and later on, judge of the Supreme Court of New South Wales and its dependencies; and went to Sydney in 1817 where he remained seven years. On his return to England he re¬ newed his intimacy with Lamb ; but he was not long at home before he was appointed chief- justice of Gibraltar

where he remained most of his life. He published an analysis of Blackstone's (1819) ; Geographical Memoirs of New South Wales) (1825), including also (First Fruits of Aus¬ tralian Poetry.) He edited for the Shakespeare Society the (First and Second Parts of King Edward IV Histories,) (The True Tragedy of Richard I II, > the Latin play of (Richardus TertiusP (The Fair Maid of the Exchange) and (Fortune by Land and SeaP The best of the contributions to the Reflector was (Student of the Inner TempleP a rich collection of anec¬ dotes of bar and bench. Barron Field has been claimed by Australian anthologies as an Australian writer, but there is nothing Aus¬ tralian about him except the fact of his having lived in that country for a while and having made it a subject of some of his writings which are all essentially English in form and atmosphere.

FIELD, Charles W., Confederate general : b. Woodford County, Ky., 1818; d. Washing¬ ton, D. C., April 1892. He was graduated at West Point in 1849; was commissioned brevet second lieutenant ; for five years served against the Indians on the frontiers of New Mexico and Texas and on the plains; was chief of cavalry and assistant instructor of cavalry tactics at West Point, 1856-61 ; on 31 Jan. 1861 was commissioned captain in the 2d Cavalry; but on 30 May resigned to enter the Confeder¬ ate army. By August he had become colonel of the 6th Virginia Cavalry and on 9 March 1862 became brigadier-general, being assigned to an infantry brigade in A. P. Hill's division and fighting throughout the Seven Days' battles, Cedar Run and Second Bull Run, where he was wounded. After a year's absence he reported for duty, on 12 Feb. 1864 being commissioned major-general and rendering conspicuous serv¬ ices at the Wilderness, Spottsylvania, Cold Harbor, Petersburg, Bermuda Hundred and other important battles. From 1875-77 he was colonel of engineers in the Egyptian army, serv¬ ing as inspector-general in the Abyssinian cam¬ paign, 1875-76; from 1878-81 was doorkeeper of the House of Representatives in Washing-

ton ; 1881-85 was civil engineer in the service of the United States; and from 1885-89 was superintendent of the Hot Springs reservation in Arkansas.

FIELD, Cyrus West, American merchant: b. Stockbridge, Mass., 30 Nov. 1819; d. New York, 12 July 1892. He was the son of Rev. D. D. Field (q.v.). He early attained an im¬ portant position in the

mercantile world, and began to interest himself in ocean telegraphy. Having obtained a charter giving him ex¬ clusive right for 50 years of landing ocean tele¬ graphs on the coast of Newfoundland, he organized an Atlantic telegraph company for the purpose of laying telegraph cables across the ocean. Attempts to lay cables were made in 1857 and 1858, but without permanent success, though ships had been provided by the English and the American governments. The scheme was interrupted by the outbreak of the Ameri¬ can Civil War, but a renewed attempt to lay a cable was made in 1865, the Great Eastern now being engaged in the work. About 1,200 miles had been laid by that vessel when the cable parted; but at last, in 1866, a cable was successfully laid by the Great Eastern, and the broken one recovered and completed. Mr. Field subsequently took active part in establishing telegraphic communication with the West In¬ dies, South America, etc., and was connected with various important enterprises.

FIELD, David Dudley, American Congre¬ gational clergyman: b. East Guilford (now Madison), Conn., 20 May 1781; d. Stockbridge, Mass., 15 April 1867. He was graduated at Yale in 1802; in 1804-18 held a pastorate at Haddam, Conn. ; and in 1819-37 at Stockbridge, Mass. In 1837-51 he was again at Haddam. In addition to sermons he published (History of Middlesex County, Conn.* ; (History of Berk¬ shire County, Mass.* ; (Life of David Brainerd.*

FIELD, David Dudley, American jurist: b. Haddam, Conn., 13 Feb. 1805; d. New York, 13 April 1894. He was a son of the preceding; was graduated at Williams College in 1825, studied law first in Albany, N. Y., and after¬ ward in New York city. He was admitted to the' New York bar in 1828; and practised till 1885, distinguishing himself especially by his labors in the direction of a reform of the judi¬ ciary system. In 1857 he was appointed by the State to prepare a political, civil and penal code, of which the last was adopted by New York, and all have been accepted by some other States. The new system was intended to wipe out the distinction between the forms of action and be¬ tween legal and equitable remedies so that all rights of the parties in relation to the subject under litigation could be decided in one and the same forum and in a single action. The system is the basis of the reformed procedure established in England by the Judicature Act of 1873. In 1866, by a proposal brought before the British Social Science Congress, he procured the appointment of a committee of jurists from the principal nations to prepare the outlines of an international code, which were presented in a report to the same congress in 1873. This movement resulted in the formation of an asso¬ ciation for the reform of the law of nations, and for the substitution of arbitration for war, of which Mr. Field was the first president. He was a stanch supporter of

Lincoln during the

Civil War, although a Democrat in his political convictions. He was a member of Congress for a short time in 1876 to fill a vacancy. Many of his papers on law reform are contained in his (Speeches, Arguments and Miscellaneous Pa¬ pers * (New York 1884—90).

FIELD, Edward, American author, statis¬ tician and artist : b. Providence, R. I., 4 Oct. 1858. He has published (Tax Lists of the Town of Providence during the administration of Sir Edmund Andros and his Council 1686-1689** (1895); Revolutionary Defenses in Rhode Is¬ land* (1896); (The Colonial Tavern) (1897); (Esek Hopkins, Commander-in-Chief of the Continental Navy During the American Revolu¬ tion 1775— 1778) (1898) ; (Diary of Col. Israel Angell, Commander of the Second Rhode Is¬ land Regiment 1778— 1 781 > ; (The Remains of General Nathanael Greene) (1903) ; (Memorial of Robert Folger Westcott* (1902) ; (Memorial of Horatio Rogers) (1904) ; (Fugitive Essays and Statistics) (1905-15) ; and other works. He is a member of the Connecticut Academy of Fine Arts.

FIELD, Eugene, American poet and jour¬ nalist: b. Saint Louis, Mo., 2 Sept. 1850; d. Chicago, Ill., 4 Nov. 1895. After his mother's death, he was brought up by his cousin, Miss Mary French, at Amherst, Mass. He received his early education at Monson, Mass., and entered Williams College in 1868. His father's death in the following year necessitated a change of plans, and he was taken by his guar¬ dian, John Burgess, to Galesburg, Ill. A year at Knox College sufficed for the restless young Field. In 1870 he joined his brother at Mis¬ souri University, where he spent another joy¬ ous year, taking little interest in his studies but an active share in promoting all the pranks and nonsense of the school. He refused to take his education seriously; and, after three years of it, resolved to enter a profession. The theatrical world attracted him at first, but he soon discovered his limitations and began to consider journalism. Then he was informed that a division of his parental estate left him in possession of a few thousands. The light¬ hearted Field packed off to Europe, visiting the southern countries and letting his patrimony dwindle away. He landed penniless in America, full of the joy of his trip, and soon after mar¬ ried Miss Julia Comstock of Saint Joseph, Mo. With new responsibilities to be met, Field set to work at journalism and rose to be city editor of the Saint Joseph Gazette (1875-76). He wrote in a dashing, breezy, gossipy style, with rampant humor. His subsequent career in journalism was very successful. From 1876- 80 he was editorial writer on the Saint Louis Morning Journal and the Times-J ournal of the same city; managing editor of the Kansas City Times (1880-81) ; managing editor of the Den¬ ver

Tribune (1881-83), and special writer on the Chicago Daily News and Record from the latter year until his death. His independent literary activity began in 1879, when his first volume of verse appeared under the title of (Christian Treasures. * In 1889 he again spent a year in Europe — a trip necessitated by his ill-health. His other works include (Denver Tribune Primer) (1882) ; (The Model Primer) (1882) ; (Culture's Garland) (1887) ; (Little Book of Western Verse> (1889) ; cLittle Book

of Profitable Tales' (1889) ; (Echoes from the Sabine Farm' (1891) ; (With Trumpet and Drum' (1892); (Second Book of Verse' (1892) ; (Holy Cross and Other Tales' (1893) ; (Dibdin's Ghost' (1893) ; (First Editions of American Authors' (1893) ; (Facts, Confes¬ sions and Observations' (1894) ; (Love Songs of Children' (1894) ; (Love Affairs of a Biblio¬ maniac' (1896) ; (The House' (1896) ; (Second Book of Tales' (1896) ; (Auto- Analysis' (1896) ; (Field Flowers' (1897) ; and (Lullaby Land' (1897).

It is as a poet of children that Mr. Field is best remembered. For this work his generous humor, his playfulness and naivete were aptly suited. Mr. Cowen, one of his earliest com¬ mentators, characterizes him thus : (

FIELD, George Wilton, American biolo¬ gist: b. North Bridgewater, Mass., 29 Sept. 1863. He was graduated at Brown University in 1887 and studied also at Johns Hopkins, Naples and Munich. In 1891-92 he was assist¬ ant in biology at Johns Hopkins and in 1893-96 associate professor of cellular biology. From 1896 to 1901 he was biologist of the Rhode Is¬ land Agricultural Experiment Station, was in¬ structor in economic biology at the Massachu¬ setts Institute of Technology in 1902 and since 1904 has served as chairman of the Massachu¬ setts Commission on Fisheries and Game. He is a member of several scientific societies and has published reports on numerous original bi¬ ological investigations.

FIELD, Henry Martyn, American clergy¬ man and scholar : b. Stockbridge, Mass., 3 April 1822; d. there, 26 Jan. 1907. He was gradu¬ ated at Williams College, and was ordained to the ministry in 1842. In 1854 he became editor and proprietor of the New York Evangelist. He was a lifelong traveler. Among his works are (Summer Pictures from Copenhagen to Venice' (1859) ; (History of the Atlantic

Tele¬ graph' (1866) ; (From the Lakes of Killarney to the Golden Horn' (1876); (From Egypt to Japan' (1878); (On the Desert' (1883); (Among the Holy Hills' (1883) ; (The Greek Islands and Turkey After the War' (1885) ; (Our Western Archipelago' ; (The Barbary Coast' ; (01d Spain and New Spain' ; Gibral¬ tar' ; (Bright Skies and Dark Shadows.'

FIELD, Joseph M., American actor and dramatist: b. London 1810; d. 1856. He came to America early in life, and for several years led a precarious life, wandering throughout the country as an itinerant player and sometimes venturing on writing the pieces in which he ap¬ peared. His success as an actor and dramatist was little and in 1852 he became manager of a theatre in Saint Louis. In that city he acquired a few years later a controlling interest in the Reveille , of which he became editor. He was better known, however, as a contributor of

sketches to the Picayune of New Orleans, and which he usually signed (

FIELD, Marshall, American merchant : b. Conway, Mass., 18 Aug. 1835; d. New York city, 16 Jan. 1906. He received a common school and academic education in the intervals of labor on his father's farm. At 17 he entered a dry goods store in Pittsfield, Mass., as clerk, soon mastered the details of the business, and in 1856 removed to Chicago, where he entered the employ of Cooley, Wadsworth & Co., a pioneer mercantile house. In 1860 he was ad¬ mitted to a junior partnership in the firm, which then became Cooley, Farwell & Co., and later Farwell, Field & Co. On the dissolution of this partnership the firm of Field, Palmer & Leiter was formed in 1865, and on the retire¬ ment of Palmer, two years later, the firm name became Field, Leiter & Co. In 1881 the Leiter interest was purchased by Mr. Field and the business was afterward continued under the firm name of Marshall Field & Co. Prior to the Chicago Fire of 1871 the sales amounted to $12,000,000 annually, but have since steadily in¬ creased to more than $60,000,000, the firm being now the largest dry goods house in the world. The single large building, which it occupied before the fire, has been replaced by one much larger devoted to the retail trade, the wholesale business being carried on in an immense build¬ ing covering an entire block. In addition to these two vast establishments the house has of¬ fices in New York, England, France, Germany, Switzerland and Japan. Avoiding ostentation Mr. Field was a liberal and discriminating giver. In addition to the Field Columbian Mu¬ seum (q.v.) given by him to Chicago, he be¬ stowed gifts upon the University of Chicago, and to his native town of Conway he gave and endowed a public library, at a cost of $200,000 in memory of his

parents.

FIELD, Stephen Dudley, American in¬ ventor: b. Stockbridge, Mass., 1846; d. 1913. He took out patents on very many inventions, of which the most noteworthy were a dis¬ tance-telegraph box, an electric elevator, a stock ticker and a dynamo quadruplex telegraph. In 1879 he applied dynamos to telegraphy, the first person who successfully accomplished this and in 1909 he was first in applying the quad¬ ruplex telegraph to a submarine telegraph cable.

FIELD, Stephen Johnson, American jurist: b. Haddam, Conn., 4 Nov. 1816; d. Washington, D. C., 9 April 1899. He was the second son of the Rev. David Dudley Field (q.v.), and a brother of David Dudley Field (q.v.), jurist and law reformer, and of Cyrus W. Field (q.v.), the projector of the Atlantic cable. When he was 13 years of age young Field journeyed to the East with his brother-in-law, who was a missionary and spent three years in Smyrna and Athens studying Greek and other lan¬ guages. After returning to America he gradu¬ ated at Williams College and for a time there¬ after studied law in New York city. In 1848, soon after he was admitted to the bar, he went to Europe where he remained for one year. In 1849 he joined the rush of easterners to the new gold diggings in California and settled at the mining camp known as Yubaville, since called Marysville. Here he was elected first alcalde under the old Mexican law of that

region, holding office until the organization of the judiciary under the Constitution of the State. In 1850 he was elected to the State legislature and was placed on the judiciary committee. He drew up several bills providing for articles in the State Code and some of his laws for min¬ ers and mining were afterward adopted by other States. In 1857 he was elected judge of the Supreme Court .of California and two years later succeeded Judge Davis S. Terrv (q.v.) as chief justice. The decisions of Justice Field in the next few years had much to do with the law of real property and large areas of disputed prop¬ erty were assigned to legal ownership through his decision. In 1863 President Lincoln ap¬ pointed him an associate justice of the Supreme Court of the United States, which important position he held until 1897. Among his im¬ portant decisions and opinions were those of the income tax cases, test oath cases and legal- tender cases. He became eminent as one of the most celebrated authorities on constitutional law. In 1876 he was a member of the famous Electoral Commission

which decided the Presi¬ dency in favor of Rutherford B. Hayes of Ohio, as against Samuel J. Tilden of New York. His service on the bench of the Supreme Court was the longest in the history of that learned body.

FIELD, Magnetic, or Field of Magnetic Force, a term introduced by Faraday to desig¬ nate any space possessing magnetic properties. A space may possess magnetic properties in three ways : on account of the natural mag¬ netism of the earth; on account of magnets in its vicinity; or on account of currents of electricity passing through or around it. (See Electricity; Electro-Magnetism; Faraday; Magnetism). Consult Martens, F. F., (Physi- kalische Grundlagen der Elekteotechnic) (Vol. I, Brounschweig 1913).

FIELD ARTILLERY. See Ammunition.

FIELD OF THE CLOTH OF GOLD, a

spot in the valley of Andren, between the Eng¬ lish castle of Guisnes and the French castle of Ardres, celebrated for the meeting between Henry VIII of England and Francis I of France, attended by the flower of nobility of both nations. The meeting took place 7 June 1520 and concluded on the 24th, and had been planned by Cardinal Wolsey, to enable the two kings to come to an understanding as to an alliance against Charles V of Spain. The con¬ ferences led to no political results.

FIELD COLUMBIAN MUSEUM, a sci¬ entific institution of Chicago, Ill., established through gifts by Marshall Field (q.v.) and other citizens and opened on 2 June 1894. It was in¬ corporated on 16 Sept. 1893 as Columbian Museum of Chicago. In 1894 its name was changed to Field Columbian Museum and again in 1905 to. Field Museum of Natural History. Many of the exhibits shown at the World's Columbian Exposition held in Chicago in 1893 were either dedicated or purchased for the museum and formed the nucleus of its collections which have since then been greatly enlarged. Originally they were housed in some of the buildings erected for the World's Fair, which, in part, have been supplanted by new and more up-to-date buildings. Marshall Field endowed it at its inception with a gift or $1,000,-

000 and in his will left an additional gift of $8,000,000. At present the museum consists of the following departments: anthropology, botany, geology, zoology and the N. A. Harris Founda¬ tion of Public School Extension. The latter loans, for purposes of exhibition in public schools, exhibits collected in show cases and is rapidly increasing its

usefulness. The museum does, in its various departments, scientific re¬ searches, supports explorations on the part of its curators, and issues a series of publications for each department. It also possesses a gen¬ eral and various special libraries, totaling 71.316 volumes in 1918. Its receipts and dis¬ bursements balanced at $214,277 for 1917 ; dur¬ ing the same year it registered a total attend¬ ance of 191,197. Consult (An Historical and Descriptive Account of the Field Columbian Museum* (in Field Columbian Museum Publi¬ cations, Historical Series, Vol. I, No. 1, Chicago 1894) and the annual reports of the director and of the various departments.

FIELD CRICKET, a large European cricket. (Grylius campestris) , found in hot, sandy localities, * where it burrows. See Cricket.

FIELD DOGS, a general name applied by sportsmen to such dogs as assist them in field sports, such as pointers, setters, spaniels, fox¬ hounds, greyhounds, beagles and the like. (See Dog). Consult Graham, J. A., (The Sporting Dog) (New York 1904).

FIELD FORTIFICATIONS. See Forti¬ fications.

FIELD GLASS, a portable binocular tele¬ scope which combines a maximum of magnify¬ ing power with a minimum of size and weight. It has an achromatic conclave eye-glass, and a large achromatic object glass. Improved types secure a long focal length through an arrangement of prisms thus obviating the ne¬ cessity of long unwieldy tubes.

FIELD GUN. See Artillery; Guns; Ordnance.

FIELD HOSPITALS. See Hospitals, Field.

FIELD LARK. See Meadow-Lark.

FIELD-MARSHAL, the highest military dignity in Great Britain, Germany, Austria Russia and Sweden. George II introduced the title into England when, in 1736, he created the Duke of Argyll and the Earl of Orkney field- marshals but it had been long in use in the German armies, and is of German origin. In Great Britain the dignity is conferred by selec¬ tion and is held by but few officers and chiefly for distinguished services or on the ground of royal descent and by courtesy to sovereigns of friendly states, the Emperors William II, of Germany, and Francis Joseph I, of Austria, having both been British field mar¬ shals. The corresponding rank in the British navy is admiral of the fleet.

FIELD MICE, or VOLES, any wild mouse, dwelling in fields and open places may be called a field mouse ; but the name applies more strictly to the robust, short-tailed mice of the arvicoline group of the family Muridce , representatives of which occur throughout the north temperate zone and are known in Great

Britain as Woles.® The same group includes the lemmings, muskrats and other vole-like mice dwelling in the woods. The common field-mice of the United States and Canada are of the genus Microtus and the common eastern ‘Aeadow-mouse® (M. pennsylvanicus) is dis¬ tributed over the whole continent, showing many local varieties in color and form. It is five and one-half inches long, with a tail one and one-half inches, grayish-brown with chestnut tinges, blackish on the spine and hoary below. A near relative of the upper Mississippi valley is the prairie meadow- mouse (M. austerus), which is larger and more uniformly gray; and another is the southern pine-mouse (M . pinetorum), whose coat is rusty brown, short, dense and silky. Other species are distinguished on the Pacific coast. These mice feed mainly upon seeds and bark and often do vast damage in grain fields, where they not only eat or shake down a large percentage of the crop, but occasionally over¬ run the country in vast hordes suitably de¬ scribed as “plagues.® This has happened re¬ peatedly in Europe, where the offending species was the very common field- vole (M. agrestis), whose inroads have sometimes nearly produced famine in southern Russia. In winter these ests of the farmer are likely to nibble the ark from young fruit-trees until they have been fatally girdled. These mice dwell in shal¬ low burrows, or make nests of grass in various hiding places, being especially fond of working their way into grain sacks and storage-cellars. They pass the winter in these retreats, sus¬ tained by a store of seeds, etc., but hibernating only during the severest weather. The best way to combat them is not to kill off their natural enemies, the hawks, owls, harmless snakes and small carnivores. To the unwise destruction of these is due most of the “plagues® of mice. Consult Audubon and Bachman, (North American Quadrupeds > (1846) ; Godman, (Natural History* (1834) ; Kennicott’s papers in the Annual Report of the United States Department of Agriculture for 1857; Ingersoll, (Wild Life of Orchard and Field) (1901) ; and Stone and Crane, Ameri¬ can Animals. >

FIELD OFFICER, a title given all officers between the ranks of captain and general officer. See Army Organization.

FIELD PLOVER, a sportsmen's name for several different shore-birds, most commonly meaning the upland or Bartramian sandpiper (Bartramia longicauda), which resembles a killdeer (q.v.) in habits, but is not a true plover. It is 12 to 13 inches long, light-brownish, marked with ochraceous and blackish ; throat nearly white and tail-feathers mostly marked with white. It is related to the European ruff.

FIELD SERVICE REGULATIONS, a

military guidebook for the use of armies. The (Field Service Regulations, United States Army* is written and revised from time to time by the General Staff of the Army and approved and published ((for the information and government of the Regular Army and the Organized Militia, and in time of war, the Volunteer and other forces. . . . The basic principles of the combat tactics of the different arms are set forth in the drill regulations of these arms for units as high as brigades. . . .

While the fundamental principles of war are neither very numerous nor complex their ap¬ plication may be difficult and must not be lim¬ ited by set rules. Officers and men of all ranks and grades are given a certain inde¬ pendence in the execution of the tasks to which they are assigned and are expected to show initiative in meeting the different situa¬ tions as they arise.®

FIELD SPANIEL. See Dog.

FIELD SPARROW, a small familiar sparrow (Spizella pusilla) of North American fields and meadows, closely related to the gar¬ den chipping sparrow (q.v.), from which it differs in being slightly larger and much paler in colors. Its song, however, more resembles that of the song sparrow. It .nests on the ground and lays white eggs speckled with red¬ dish and purple.

FIELD WORKS. See Fortifications.

FIELDFARE, a European thrush (Turdus pilaris) prevailingly grayish-brown with darker markings and lighter under parts. It breeds in Scandinavia and northern Russia, making nests in companies in trees and visits Great Britain and southern Europe in winter, where it is shot largely for market.

FIELDING, Anthony Vandyke Copley,

English painter in water colors : b. about 1787 ; d. Worthing, Sussex, 3 March 1855. He early attracted attention by his water-color land¬

scapes ; gained also considerable reputation as a teacher and for many years before his death was president of the Society of Painters in Water Colors. His pictures are chiefly taken from English scenery, the various features of which, both in rich woodland and open plain, he has represented with great delicacy and truth.

FIELDING, Henry, English novelist: b. Sharpham Park, near Glastonbury, in the county of Somerset, 22 April 1707 ; d. Lisbon, Portugal, 8 Oct. 1754. His parents were Lieut. Edmund Fielding and his wife Sarah, daughter of Sir Henry Gould. It is believed that in the characters of Lieutenant Booth and Amelia, Fielding long afterward revived the figures of his young father and mother. By an old legend, put into magnificent form by Gibbon, the novelist was supposed to have descended from the Hapsburgs, but their connection with the ancient family of the Earls of Denbigh, to which the novelist certainly belonged, is now exploded. The Fieldings of Sharpham, though of moderate means, were well connected; the novelist's cousin was the famous Lady Mary Wortley Montagu. In 1710 his parents re¬ moved, on the death of Sir Henry Gould, to East Stour in Dorsetshire, where Sarah Field¬ ing (1710-68), Henry's sister and the gifted author of (David Simple, * was born. To his childish adventures by the ((pleasant banks of sweetly-winding Stour® Henry gives due record in (Tom Jones. > He was 11 years of age when the family moved again, after the death of Mrs. Fielding in 1718, and Henry was trans¬ ferred to Eton. There is no record of his resi¬ dence in the registers of the school, so that he was probably an oppidan. Murphy tells us that Fielding, when he left Eton, about 1726, "was said to be uncommonly versed in the Greek authors, and an early master of the

Latin classics® ; Fielding himself tells us that he knew Italian and French, could write Latin and could read Greek. The early idea that he was a poorly-educated man was based on preju¬ dice and ill-will. Pitt and Fox were among his comrades at Eton. Before he left school, he fell in love with Sarah Andrew, a young lady of Lyme Regis, and even planned her ab¬ duction, but the affair was discovered by her guardians, who prevented the romantic act, al¬ though, as the archives of the town still record, going in fear of their lives "owing to the be¬ havior of Henry Fielding and his attendant, or man.® This Miss Andrew was said to be the original of Sophia Western.

From Eton, Fielding proceeded to study law at Leyden for two years,

which he did ((with a remarkable application.® He settled in London early in 1728, doubtful whether to adopt, as Austin Dobson says, the profession of hacknev- writer or that of hackney-coachman; his father could no longer support him, and it was neces¬ sary for him to subsist upon his wits. He de¬ termined to turn playwright, but his earliest drama, the comedy of 'Love in Several Masques, 5 had no great success. It is difficult to trace the history of Fielding further during the next two years, but in 1730 he brought out another comedy, (The Temple Beau,5 and an extravaganza, 'The Author's Farce. 5 These were not unsuccessful, and they opened a long series of dramatic performances, by means of which it would seem that Fielding obtained a precarious livelihood for the next seven years. The very entertaining burlesque of Tom Thumb5 (1730), especially in its extended form as 'The Tragedy of Tragedies) (1731), de¬ serves a high position among these plays, most of which were of somewhat ephemeral import¬ ance. In 1732 Fielding produced (The Modern Husband,5 'The Covent Garden Tragedy,5 (The Debauchees,5 and (The Mock-Doctor5 ; the last- mentioned comedy was highly successful, and so was (The Miser,5 of 1733, but Fielding's share in the profits of these pieces cannot have been large. He lived, no doubt, on what he could borrow, earn or beg; sometimes in a London garret, sometimes in the country-house of a wealthy acquaintance. A satirist of the period describes him at this time as a ((rough play-house bard,® and (

must be inexact in detail, yet it probably gives not an unfair impression of the lavish way in which, for about a year, Fielding lived in Dor¬ setshire in a magnificence far beyond his means. His cousin, Lady Mary, said that Henry Fielding <(would have wanted money if his hereditary lands had been as extensive as his imagination,® and in a few months he was back in London, again obliged to work for a precarious living. He returned to the drama, and in 1736 took the little French Theatre in the Haymarket, where he produced the success¬ ful burlesque of 'Pasquin,5 by which he made more money than by any of his previous efforts. His career as a dramatic author, however, was checked by a Bill of 1737, in which Parliament restrained the license of the stage, and reduced the number of playhouses. The rest of the few and slight puppet-shows and farces which Fielding wrote need not be named here. His plays (they are 25 in number) although skilful and sprightly, have not the value of his novels, nor anything like their originality, and they are read to-day, if they are read at all, because they are Fielding's, and not because of their intrinsic merit.

When his company of actors was dispersed, Fielding turned to the law

as a profession, and in November 1737 became a student of the Middle Temple. According to Murphy, he studied with great assiduity, but little is known of his life at this time. He eked out his legal work with the writing of ((a large number of fugitive political tracts,® which were probably anonymous, and have disappeared. Late in 1739 he started a newspaper, the Champion, on the model of the Tatler, and in this journal he wrote much, until June 1740, when he was called to the Bar. He traveled the Western Circuit, and <(assiduously attended the Wiltshire sessions.® He seems to have taken his duties as a barrister very seriously, but they did not prevent him from writing, and publishing in February 1742, the novel of (Joseph Andrews.5 This began as a parody of the popular 'Pa- mela) of Richardson, but soon passed on into an independent and highly entertaining study of contemporary manners. The fresh and breezy genius of Fielding mocked at the senti¬ mentalities and the wire-drawn psychology of his predecessor, but he soon got beyond the point where it was enough for him to ridicule Richardson. He created two magnificent comic figures of his own, and he enriched English literature forever with Parson Adams and Mrs. Slipslop. It was thus that, at the age of 35, Fielding discovered, as it were by accident, the nature of the genius which he possessed. He did not, however, at once perceive the value of the discovery, but returned to his plays and his pamphlets. It was now that he published two early farces, 'Miss Lucy in Town) (1742), and 'The Wedding Day5 (1743), as well as a much more important work, his Miscellanies,5 in three volumes. This was a collection of Field¬ ing's shorter writings up to that date, and in¬ cluded his poems, occasional and satirical, his essays, his 'Journey from this World to the Next,5 some of his farces, and the remarkable ironic novel called Jonathan Wild.5 The 'Journey5 is a Lucianic allegory, full of wit and observation, but unfortunately left unfin¬ ished by the languor of the author, who evi¬ dently became weary of his design. 'Jonathan

Wild* is a work of far greater importance. It takes for its hero a notorious rogue who was hanged at lyburn in 1725, and there is internal evidence that although not printed until 1743, it was written some years before. It is prob¬ able that it preceded 'Pamela,* and ought to take its place as the earliest of the novels of the new school of romance. It is a powerful and painful book, <(a picture of complete vice, unrelieved by anything of human feeling, ** and more unflinching than anything else which Fielding has left. It is a curious

thing that from this date until 1749 we have a period of six years, during which Fielding was at the height of his powers, and was not without a certain measure of celebrity, yet which have left scarcely any mark at all upon his history. H ow was this great man engaged from his 37th to his 44th year? Strange as it sounds, we cannot tell. Austin Dobson has brought for¬ ward arguments to show that it was a time of poverty, darkened by successive bereavements, particularly that of the loss of his wife, to whom he was most tenderly attached. A re¬ markable preface, prefixed to the second edi¬ tion of his sister's 'David Simple,* appeared in 1744; in this he denies his authorship of the work itself. He describes himself as applied to the legal profession ((with so arduous and in¬ telligent a diligence® that he has no time for the practice of literature. He wrote a little, however, for The True Patriot and other journals. In November 1747 Fielding married for the second time, and took a house at Twickenham ; Mary Daniel, the second Mrs. Fielding, is said to have been her predecessor's "cook-wench.® Fielding had by this time se¬ cured an invaluable friend in George, after¬ ward the first Lord Lyttelton (1709-73), who procured for him, in December 1748, the office of a justice of the peace for Westmin¬ ster. Up to this date he had been a wanderer on the face of England, now at Salisbury, now at Twiston, at Hagley, at Twickenham, but in January 1749 he settled for good in London. John, Duke of Bedford, lent or rented to him a house in Bow Street, under terms which were described as a "princely instance of generosity.® But Lyttelton was the closest of all Fielding's influential friends, and there is a remarkable passage in which the novelist states that he partly owed to Lyttelton his existence during a great part of the time spent in the composi¬ tion of 'Tom Jones,* a book which, without Lyttelton's help, <(had never been completed.® It used to be stated that Tom Jones) was written at Bow Street, but this is impossible ; it was evidently the work of the desultory months of poverty which preceded Fielding's appointment as a magistrate. The famous novel was published, as 'The History of Tom Jones, a Foundling,* on 28 Feb. 1749, in six volumes, at the price of 16 shillings a set. It had an instant success, so great that, three months later. Fielding had already received £700 from Millar, the publisher. That this did not much alter the random habits and easy negligence of the author seems to be proved by a picturesque although spiteful description given by Horace Walpole, in May 1749, of Fielding dining at the house in Bow Street ((on some cold mutton and. a bone of ham, both in one dish, and on the dirtiest cloth,® in the com¬ pany of some very questionable persons. It is

well to look at the other side, and to remember, with Murphy, that

Fielding <(kept his table open to those who had been his friends when young, and had impaired their own fortunes.® It is certain, moreover, that he was increasingly re¬ spected by those who could overlook the care¬ lessness of his habits and his easy nonchalance of manners.

In May 1749 he was unanimously elected chairman of Quarter Sessions, and his magis¬ terial charges were received with all the respect which their gravity and courage demanded. How seriously he took the duties of his office is seen in his (True State of the Case of Bosav- ern Penlez) (1749), in which he vindicates the severity of the law against rioters. This was a time of great lawlessness among the London lower classes, and Fielding eminently distin¬ guished himself by his vigilance against violent criminals and by his plans for reform. But his health was already failing; he had lived too hard and too fast, and on Hurd, who met him in 1751, the novelist produced the impression, at 44, of ((a poor, emaciated, worn-out rake.® There was, however, no intellectual decline, and, at the close of this same year, there ap¬ peared the very vigorous and pathetic romance, In 1753 he was deeply interested, like all his contemporaries, in the mysterious case of Eliza¬ beth Canning, who professed to have been kid¬ napped, and he published a pamphlet on the subject. But he was by this time greatly re¬ duced by successive attacks of the gout, and in August of that year was ordered to retire to Bath. His going, however, and the proper treatment of his disease, were delayed by his great wish to break up a congeries. of gangs of street robbers, who were committing murders in London so frequently as to alarm the govern¬ ment itself. But when, in December, he had at length completed this public duty, his was “no longer a Bath case,® and he was so much weak¬ ened by jaundice, dropsy and asthma, that he looked upon his condition as. almost desperate. He struggled through the winter, and in June 1754 started, in search of relief, for Portugal. The tediousness and multiplied discomforts of the transit are described, with a great deal of heroism, in the ‘Journal of a Voyage to Lis¬ bonˆ which was the latest and one of the best written of Fielding’s works. He traveled with all his family, and they arrived in the Tagus

in August. No further particulars have been preserved, but that Fielding died at Lisbon, on 8 Oct. 1754, and was buried in the beautiful cemetery of Os Cyprestres, opposite the Church of the Estrella.

With regard to the importance of Fielding's work in the development of English literature there is a complete unanimity of opinion among all competent critics. Indeed, there is scarcely a reputation which is less liable to be challenged than his. Without insisting on the title of () and in so doing he indicated the extraordinary range of sympathy which marks his delineation. There is nothing unnatural or extravagant about the incidents which he introduces, but they are such as might be expected inevitably to happen to such very natural characters as the novelist depicts.

It has been said that Fielding lacked the imaginative faculty. It would be more correct to say that he distrusted the fantastic and pre¬ posterous parts of invention, since, if imagina¬ tion is the power to bring up before one's own mental vision, and to reproduce for others with fidelity a consistent chain of phenomena, then Fielding was fully endowed with that gift. His pictures are remarkable for their brightness, their freshness, the sharpness and illumination of their outline. His invention occupied itself, not with the unusual, but with the obvious scenes of life, which in his day were, fortu¬ nately, still unhackneyed. He wrote slowly and finished late; he did not hasten to exhaust the stores which adventure and experience had given him; he had warmed both hands before the fire of life, and he gave back to the world in his books what he received from it in his own rough-and-tumble youth. From Fielding we must not look for pathos or romantic senti¬ ment, — although even these are not wholly missing, — but we must look for humor, breadth of sympathy, a general buoyancy, a wholesome recognition of the appetites, a philosophic con¬ sideration of the limitations of human frailty, and these we find in his wonderful novels to a degree which we may without fear of exaggera¬ tion confess to be elsewhere unparalleled. See Tom Jones ; Joseph Andrews.

Bibliography. — Fielding's earliest biogra¬ pher was Arthur Murphy (1727-1805) who pre¬ fixed an essay on his life and genius to the first collected edition of his (Works) (1762). Mur¬

phy's inexactitudes were pointed out by Law¬ rence in 1855, and by Keightley in 1858, but by far the most accurate and dispassionate life of Fielding is that published by Austin Dobson in 1883. Subsequent editors and biographers have been content to borrow the main part of their information from this admirable monograph, which has been corrected by the author in suc¬ cessive editions, and is now not likely to be superseded as the standard authority on the life and bibliography of Henry Fielding. Ad¬ mirable critical introduction will be found pre¬ fixed to the novel in the edition edited by G. E.

Saintsbury (10 vols., London 1908). Consult also Cross, W., “The Legend of Henry Field¬ ing,® in Yale Review (New Haven, October

1918).

Edmund Gosse,

Author of ‘ History of 18 th Century Liter¬ atureˆ ; ‘ History of Modern English Liter¬ ature’* ; etc.

FIELDING, Sarah, English novelist: b. East Stour, Dorsetshire, 8 Nov. 1710; d. Bath, Somerset, April 1768. She was the third sister of Henry Fielding (q.v.). She was the author of the novel ‘David Simple* (1744) ; (The Governess* (1749) ; (The Cry, a Dramatic Fable) (1754) ; Xenophon’s ‘Memoirs of Soc¬ rates, * translated from the Greek; ‘The Coun¬ tess of Dellwyn) ; ‘The History of Ophelia) ; ‘The Lives of Cleopatra and Octavia) ; etc.

FIELDING, William Stevens, Canadian statesman: b. Halifax, Nova Scotia, 24 Nov. 1848. He was educated in Halifax; for 20 years was connected with the Halifax Morn¬ ing Chronicle, becoming managing editor, and resigned that position to enter public life. From 1882-96 he represented the city and county of Halifax in the provincial legislature, soon after his election becoming a member of the Cabinet and from 1884-96 Prime Minister. In 1896 he resigned to enter the Cabinet of Sir Wilfred Laurier as Minister of Finance, which position he held till 1911. During his period of office he made important tariff readjustments, intro¬ duced the British, preference which resulted in a tariff war with Germany, negotiated a com¬ mercial treaty with France, and concluded the Taft-Fielding reciprocity agreement which was the dominant issue in the Dominion elections of 1911, and which suffered defeat at the hands of the electorate.

FIELDS, Annie (Adams), American poet and essayist, wife of James T. Fields (q.v.) : b. Boston, Mass., 6 June 1834. She has long been prominent in charity organizations and has pub¬ lished ‘Under the Olive, * poems (1881) ; ‘Biography of James T. Fields) (1884) ; (How to Help the Poor) (1885) ; (The Singing Shep¬ herd* ; ‘Authors and Their Friends) ; ‘A Shelf of Old Books) (1896) ; ‘Life and Letters of Harriet Beecher Stowe) (1897) ; ‘Whittier: Notes of His Life and Friendships1* ; ‘Nathaniel Hawthorne* (1899) ; ‘Orpheus, a Masque* (1900) ; ‘Charles Dudley Warner* (1904).

FIELDS, James Thomas, American pub¬ lisher and author: b. Portsmouth, N. H., 31 Dec. 1817 ; d. Boston, 24 April 1881. He went

to Boston in 1834, becoming junior partner of the firm of Ticknor, Reed & Fields in 1839, later known as Ticknor & Frdds, and Fields & Osgood. He edited the Atlantic Monthly

(1862-70) ; and was an acceptable lecturer on literary subjects and authors. He published (Poems) (1849) ; (A Few Verses for a Few Friends) (1858) ; (Yesterdays with Authors) (1872); (Hawthorne) (1875); 1 Old Acquaint¬ ance: Barry Cornwall and Some of His Friends) (1875) ; (In and Out of Doors with Dickens) (1876); (Underbrush) (1881), Essays ; (Ballads and Other Verses) (1881) ; and (with E. P. Whipple) edited (The Family Library of British Poetry> (1878).

FIELDS, John, American agricultural writer and leader, was born at Davenport, Iowa, 29 July 1871. His early life was spent on a farm and, at the age of 16 he entered the Pennsylvania State College, from which he graduated in 1891, immediately after which he entered the service of the Pennsylvania Agri¬ cultural Experiment Station as assistant chem¬ ist. In 1896 he became an associate chemist of the Oklahoma Agricultural Experiment Station and, in 1899, was made chemist and director of the same institution, a position which he re¬ tained until 1906. In 1902 he took up the work of editing the Oklahoma Farm Journal , con¬ tinuing until 1915, when that paper was merged with the Oklahoma Farmer, since which time he has been editor of the latter. Throughout his career in Oklahoma he has been active in all lines that have tended to advance the farm¬ ing interests of the region in which he is most interested. Especially has he urged that farm¬ ing methods must be adapted to local needs and conditions regardless of means and methods in common use in other parts of the world and especially has he urged the growing of the grain sorghums (i.e., kafir-corn, milo-maize, feterita, etc.), instead of Indian corn in the subhumid region along the eastern border of the Great Plains, where the drouth resistant qualities of the grain sorghums are such as to render their successful culture much more cer¬ tain than that of Indian corn, and basing his arguments upon the known facts that have been demonstrated as the result of long experience and experimentation. In 1914 he was the Re¬ publican nominee for governor of Oklahoma and was defeated by a small plurality, though his party was in a hopeless minority. He is the author of a book

entitled (Sure Feed CropsP

FIELDS, John Charles, Canadian mathe¬ matician : b. Hamilton, Ont., 14 May 1863. He received his education at the universities of Toronto, Johns Hopkins, Paris, Gottingen and Berlin. From 1889 to 1892 he was professor of mathematics at Allegheny College, from 1892 to 1900 he studied and traveled in Europe and from 1902 to 1905 he was special lecturer at the University of Toronto and since 1914 has been professor of mathematics there. He has published (A Treatise on the Algebraic Func- tions} (1906) ; (Abelian Integrals,* and other subjects.

FIELITZ, fe'lits, Alexander von, German composer: b. Leipzig, 28 Dec. 1860. He studied piano under Schulhoff and composition under Kretschmer of Dresden. He spent the 10 years 1887-97 in Italy to improve his shattered health and in the late 90's taught in a conservatory in Berlin. He came to America in 1905 and be¬ came teacher in Ziegfeld's Conservatory, Chi¬

cago, and conductor of the Symphony Orchestra of that city, which he organized. He returned to Berlin and to his former post there in 1908. He has composed several songs, some pieces for piano, suites for orchestra and the operas, (Vendetta) (1891) and (Das stille Dorf*

(1900).

FIERDING (fer'ding) COURT, a district or local court having jurisdiction over civil causes wherein the matter in dispute was not in excess of three marks. Such courts were general among all the Germanic nations in the period preceding the feudal system.

FIERI FACIAS, fi'e-ri fa'shi-as, in law, is a judicial writ of execution issued on a judg¬ ment, by which the sheriff is ordered to levy the amount of the judgment on the goods and chattels of one party, for the benefit of an¬ other. Abbreviated to fi. fa. See Execution.

FIESCHI, or FIESCO, fe-es'ke or fe- es'ko, Giovanni Luigi de, Count of Lavagna, Italian conspirator: b. Genoa 1523; d. there, 2 Jan. 1547. He became master of a large patri¬ mony at the age of 18, and being surrounded with dependents and flatterers, and really pos¬ sessing considerable talents and eloquence, was readily induced to aim at that power and dis¬ tinction in the state which was then possessed by the family of Doria, headed by the famous Andrea Doria, doge of Genoa. He attempted to kill the doge and overthrow the government, but was unsuccessful in both endeavors, and in his efforts to seize the public

galleys was accidentally drowned.

FIESCHI, Giuseppe Maria, Corsican con¬ spirator: b. Corsica, 3 Dec. 1790; d. Paris, 16 Feb. 1836. Having conceived a hatred for the French king, Louis Philippe, he constructed an infernal machine of about 100 gun-barrels fixed in a frame, which he discharged simul¬ taneously, by means of a train of gunpowder from a house in the Boulevard-du-Temple, dur¬ ing a review of the National Guard, 28 July 1835. The king escaped unhurt, but Marshal Mortier and 17 people were killed, and many more wounded. Fieschi and his accomplices, Pepin and Morey, were guillotined.

FIESOLE, Fra Giovanni Da. See Fra

Angelico.

FIESOLE, fe-a'so-le (ancient Fa:sulˆe), Italy, city about three miles northeast of Flor¬ ence. Under the name of Fsesulae it was one of the 12 Etruscan cities, and a place of import¬ ance. It submitted, with the rest of Etruria, to the Roman power (90 b.c.), and was colo¬ nized by Sylla. In the commencement of the 11th century it was destroyed by the Floren¬ tines, and a number of its inhabitants trans¬ ported to Florence. It contains many interest¬ ing Etruscan ruins, notably in the city wall, constructed of huge blocks of stone, and in the fortress, now occupied by a convent. The cathedral of San Romolo, built in the Roman¬ esque style, was founded in the 11th century. Fiesole is famous as being the place where Fra Angelico (q.v.) lived for a number of years. Pop. of commune, 10,434.

FIEVEE, fya-va, Joseph, French journal¬ ist: b. Paris, 10 April 1767; d. there, 7 May 1839. His experiences during the French Revolution were not happy, largely in consequence of his

work (On the Necessity of a Religion } (1795) ; but the Napoleonic rule proved more favorable to him. He subsequently wrote two novels, (Suzette's Dowry) ; and

FIFE, Alexander William George Duff,

6th Earl and 1st Duke of: b. 10 Nov. 1849; d. 29 Jan. 1912. He was descended from Mac¬ duff, Thane of Fife, immortalized in Macbeth. > He was educated at Eton ; was member of Parliament for the

counties of Moray and Na- vin, 1874-79; and was one of the founders of the Chartered Company of British South Africa. He married in 1889 Princess Maud (afterward Princess Royal), the eldest daughter of the Prince of Wales (afterward King Edward VII). On 13 Dec. 1911 he suffered shipwreck off the coast of Morocco, and the consequent shock and exposure is understood to have con¬ tributed to his last illness.

FIFE, a wind-instrument, known from very early times and used chiefly in military music. It resembles a small flute in its form and method of performance, seldom having any keys, and never more than one. It has six finger holes. Fifes are of several kinds. Those tuned to the key C are shortest and highest, and are much oftener used; they have a com¬ pass of two octaves. The instrument is char¬ acterized by a clear and piercing tone.

FIFENESS, flf-nes', a headland on the northside of the Firth of Forth, and the east¬ ernmost point of the County of Fife. In the 9th century a wall was constructed here by the Danes, traces of which are still to be seen. North of the point lie the Carr rocks, marked by an iron beacon.

FIFER, Joseph Wilson, American soldier and public man : b. Staunton, Va., 28 Oct. 1840. When a boy he went with his parents to Illi¬ nois, and enlisted in the Union army in 1861 ; he was wounded at the battle of Jackson in 1863, but rejoined his regiment and served un¬ til 1864. After the war he was graduated from the Illinois Wesleyan University, studied law, and was admitted to the bar. He was corpo¬ ration counsel for the city of Bloomington, Ill., in 1871, and State's attorney for McLean County 1872-80. In 1880 he was elected to the State senate and served four years; in 1888 he was elected governor of Illinois on the Republican ticket, but in 1892 was defeated for re-election by Altgeld. In 1904 he was appointed a mem¬ ber of the Interstate Commerce Commission.

FIFESHIRE, Scotland, an eastern mari¬ time county, bounded on the north by the Firth of Tay, east by the North Sea, south by the Firth of Forth, and west by Perth, Kinross and Clackmannan. It includes the Isle of May, Inchcolm, Inchgarvie and the little island of Oxcar; the area is 504 square miles, with a coastline of over 100 miles. The Eden is the largest river and flows through the shire a total distance of 25 miles. The surface consists of a succession of hills and vales, the latter being exceedingly fertile and under intensive cultiva¬ tion. The shire has large deposits of coal, iron and limestone, all of which are being worked. The principal manufactures are linens, oil cloth, and paper. Cupar is the chief town. Pop. 267,739. See Scotland.

FIFTEEN DECISIVE BATTLES OF THE WORLD, a noted work by Sir Edward Shepherd Creasy, first published 1852. It was very successful and has gone through many editions. It describes and discusses (in the words of Hallam) ((those few battles of which a contrary event would have essentially varied the drama of the world in all its subsequent scenes.® The volume treats, in order : The Battle of Marathon, 490 b.c. ; Defeat of the Athenians at Syracuse, 413 b.c. ; The Battle of Arbela, 331 b.c. ; The Battle of the Metaurus, 207 b.c. ; Victory of Arminius over the Roman Legions under Varus, 9 a.d. ; The Battle of Chalons, 451; The Battle of Tours, 732; The Battle of Hastings, 1066; Joan of Arc's Victory Over the English at Orleans, 1429; The Defeat of the Spanish Armada, 1588; The Battle of Blenheim, 1704; The Battle of Pultowa, 1709; Victory of the Americans over Burgoyne at Saratoga, 1777; The Battle of Valmy, 1792; The Battle of Waterloo, 1815.

FIFTEENTH CENTURY. Walter Pater declared : <(That solemn fifteenth century can hardly be studied too much, not merely for its positive results in the things of the intellect and the imagination, its concrete works of art, its special and prominent personalities with their profound aesthetic charm, but for its general spirit and character.® ((The Renaissance)). The first part of the Renaissance undoubtedly contains many of the most significant achieve¬ ments of history and the productive careers of many of the most interesting men who have ever lived. It is the age of Columbus, of Lorenzo de' Medici (the Magnificent), of much of Leonardo da Vinci's best work and Michel¬ angelo's youth, of scores of great painters ; — Montagna, Fra Angelico, Botticelli, Fra Barto- lemmeo, Perugino, Titian, the Bellinis and the Vivarinis, Signorelli, Correggio, — and not alone in Italy but in the other countries, for there are Memling, Roger Van der Weyden, Quentin Matsys, Albrecht Diirer's youth ; but almost as many sculptors, — Ghiberti, Donatello, Veroc- chio, Luca della Robbia, Adam Kraft, the Vischers, and the great architects, Alberti and Bruneleschi, with Bramante's early work. In all of these departments of aesthetics there are a number of other successful workers besides those named who in any other period- would be leaders, though in this environment they are only sec9ndary. More interesting monuments of painting, sculpture and architecture have been the subject of constant admiration ever since than from any other century. It was an era not only of art, and of the arts and crafts, but also of great practical discoveries; casting in bronze and porcelain sculpture and art work were both highly developed. The invention of printing has probably more revolutionized human life than any other. Leonardo da Vinci made a series of inventions from the wheel¬

barrow and the self-dumping derrick to locks for canals and the coffer-dam and a number of experiments with flying toys. He gathered material which practically laid the foundation of a group of sciences. The most beautiful manuscript books were made immediately be¬ fore the invention of printing, and served as models for the _ printers, so that the century has the finest printing in the history of the art. Bookbinding reached a similar height of excel-

lence. In a word, in every line of work in which the century was interested it achieved unsurpassed marvels.

The word Renaissance, ® rebirth,® applied to the time is often misunderstood. For many, it means that there occurred a rebirth of interest in the intellectual life and in art and education after presumably a prolonged period of neglect in the Middle Ages, the ((Dark Ages® as they were called. What really happened; was a renaissance or a rebirth of interest in Greek literature and art, with the stimulus to mental development which intimate contact with Greek sources has always given. Sir Henry Maine's expression, ((Whatever lives and moves in the intellectual world is Greek in origin,® is far from being absolutely true, but is eminently suggestive of Greek values. The 15th century, conceited by its cultivation of Greek, proceeded to despise the forefather generations that lacked similar advantages. In their interest in the revival of Greek architectural forms, erudites of the Renaissance called the pointed architecture of the Middle Ages Gothic, — as if it were worthy only of the barbarous in¬ vaders, the Goths, who had wiped out the older culture. The literature and art of the preceding time which we have learned to value highly was in similar strain spoken of as Gothic and was considered almost beneath notice. It has taken centuries to counteract the tradition thus created. Only in our day has due sympathy for the preceding ages developed. This lack of proper critical appreciation of the work of their predecessors is probably the worst fault of the Renaissance. It has led to a reaction which has reacted on the Renaissance itself. In its ad¬ miration for Greek things generally, the Renais¬ sance took up also the Olympian religion and without accepting it, at least allowed interest in it to sap reverence for Christianity. Goethe's corresponding state of mind in the latest renais¬ sance of Greek in Germany illustrates what happened. There was a distinct pagan spirit abroad, and while of course expressions used in the fashionable Latin letters are only conceits of antiquarian elegance,

there was undoubt¬ edly a widespread lessening of reverence for Christian forms. This is not so noticeable among the really great minds of the Renais¬ sance, for such men as Michelangelo, Regiomontanus, a Kempis, Nicholas of Cusa, Columbus and Leonardo da Vinci were even devout. Many great Renaissance leaders were members of religious orders. A number of the lesser minds of the time were carried away completely by their admiration for the ancient and lost their firm footing of solid religious principles. This served to make the time ripe for the religious revolt which took up so much of the attention of men in the next century.

The 15th century holds the transition be¬ tween the Middle Ages and modern history. The end of the Middle Ages is usually said to be the Fall of Constantinople in 1453, though occasionally it has been suggested that a better date for a boundary between the two periods would be the discovery of America in 1492. The fall of Constintinople is the most important military and political event of the century. It was led up to from the very beginning. Tamerlane, Timur the Mongol or the Lame, a successor of Jhenghis Khan, occupied the Caucasus, Armenia and Mesopotamia, after re¬

ducing Persia towards the end of the 14th cen¬ tury and then proceeded to add southern Russia and India to his empire. Just at the beginning of the 1 5th century he was forced by a re¬ bellion in Syria to turn, and in 1401 destroyed Aleppo, burned Damascus and stormed Bagdad. He defeated Bajazet or Bajezid, the Sultan of the Turks, who died in prison in 1403, but Timur himself followed his prisoner to death in 1405. Timur's empire then fell to pieces and left the Turks free for their long con¬ templated capture of Constantinople. A series of attacks were made upon the city. It was clearly but a question of time before the capital of the Eastern Empire would fall. The recog¬ nition of this impending disaster aroused some of the serious thinkers of Europe to the neces¬ sity for a Crusade, but without avail. A series of Popes took up the subject and the result was at least a bringing together of the Eastern and Western Churches. . A council was held at Ferrara for the union of the Latins and the Greeks, but in spite of Cardinal Bessarion's in¬ fluence, and the fact of Pope Eugenius IV, the long years of religious differences between the peoples prevented the reunion from being more than short-lived. A European army was sent to aid the Greeks, and the Turks were defeated, Sophia and Nissa being conquered by Hunyadi the Magyar Christian hero (1443). Another ex¬ pedition under the heroic Skanderbeg (Cas- triota), Prince of Albania, was defeated (1444). The Hungarians and Albanians were the only champions of Western Christianity, and their efforts proved vain against the overpowering numbers of the Turks. In

the spring of 1453 Mohammed besieged Constantinople by both land and sea with 150,000 men, and 420 ships, and the place fell by storm, 23 May.

The year of the fall of Constantinople (1453) was also that of the end of the Hundred Years' War between France and England, which had served to hamper the intellectual develop¬ ment of both these countries to a very serious extent. Now they might have had time for other thoughts and the Renaissance been given an opportunity to exert itself to the full, but it was seriously set back in England by the unfortunate civil wars of the Roses and by in¬ ternal dissensions of many kinds in France. The English who had laid claims to- French territory ever since the time of William the Conqueror had been able to vindicate those claims to some extent in the later 14th century, but Henry V with a small army of English soldiers won the Battle of Agincourt, 1415, and marrying the French king's daughter, was to succeed to the title of King of France on the death of the poor mad French monarch, Charles VI. His son Charles VII found a fol¬ lowing in France that enabled him to hold out for a time against the English under the Duke of Bedford, but he was nearly at the end of his resources in every way when Joan of Arc, a young shepherd maiden of Domremy offered to lead his army, awakened the country, relieved Orleans and had Charles crowned King of France at Rheims. Her marvelous story is one of the strangest in history. This country girl from the confines of Lorraine was at the age of 17 the general-in-chief of the armies of France. When her heavenly appointed task, as she proclaimed it, was done, she asked to be allowed to withdraw into obscurity once more,

but her presence was deemed too valuable for the morale of the French army to permit this and after a time she was captured by the Eng¬ lish. To discredit her they put her to death as a witch, but her trial only served to em¬ phasize her virtues. Her life, the only one in all history as Mark Twain has said, every de¬ tail of which we have under oath from eye witnesses, remains the marvel of history.

The Wars of the Roses absorbed English attention for a generation and caused an im¬ mense amount of suffering and death before it could be settled whether the House of York, whose symbol was the white rose, or the House of Lancaster of the red rose should rule in England. The Lancastrians were supported mainly by the north of England, the

Yorkists by the south. More important than any of the kings of the time was the Duke of Warwick, the king-maker as he came to be called, whose adhesion to one side or the other again and again turned the scale. The pathetic character of the time is Henry VI, the gentle, kindly but weak monarch who probably deserves the name of saint which some people have ac¬ corded him, though others have proclaimed him simply a fool. He will ever be recalled for his liberality in the cause of religion and learn¬ ing and for his foundations at Eton and Cam¬ bridge. The villain of the Wars of the Roses is Richard III, whom historians have been vin¬ dicating in recent years and who was un¬ doubtedly an able man and popular among the people. The stigma upon his name for the murder of the little Princes in the Tower of London has never been wiped out, and this makes it easy to understand why historians should have been ready to credit other evil traditions with regard to him.

After varying fortunes, the Yorkists winning the first battle at Saint Albans, 1455, and others in 1459 and 1460, Margaret, the undaunted wife of Henry VI, refusing to accept the compromise by which Henry was to reign for life and be succeeded by the Duke of York, moved heaven and earth for her son Edward, and won the Battle of Wakefield, where York was slain. She also won the second Battle of Saint Al¬ bans. Decisively defeated by Warwick at Towton Heath, Margaret still kept up the struggle, until her son was slain at Tewkesbury (1471). When the Yorkists won Tewkesbury, York seemed assured of the throne. The death of Edward IV, however, leaving Edward and Richard, the little Princes in the care of their uncle, Richard Duke of Gloucester, who mur¬ dered them, gave the chance for Lancaster in the person of Henry VII to make a popular appeal, gather an army and defeat Richard at Bosworth. By marrying Elizabeth, the eldest daughter of Edward IV, Henry united the two houses. He proved to be a very thrifty king who imposed taxes and gathered immense sums of money, consolidating the kingdom for his son Henry VIII, who proceeded to spend roy-ˆ ally until his treasury was exhausted.

Italy was the most significant country for the early Renaissance and the important polit¬ ical development there was the prominence of Florence and the rise of the Medici family. Florence at the end of the Middle Ages was a city of beautiful buildings, unsurpassed works of art, with its citizens famous for practical interest in commerce and in the development of

trade, but even more interested in the arts and crafts. The most important family in Florence was the de' Medici, whose name first

appeared in the chronicles of the 13th century,- and may have been due to the fact that they were mem¬ bers of the Guild of the Apothecaries at a time when these dealt not only in drugs but in per¬ fumes, jewels, and precious Eastern stuffs of various kinds, and thus laid the foundation of an immense fortune. Giovanni, the son of Bicci de' Medici, the founder of the family, ignored politics and devoted himself to trade and especially to international banking. The fortune thus acquired gave his descendants their immense influence in the city. Giovanni died in 1429, leaving two sons, Cosimo and Lorenzo. Cosimo's descendants exercised the most ab¬ solute sway over Florence for generations. The younger branch of the family reached dis- tincton later, becoming Dukes of Tuscany. Cosimo, without holding any office in Florence, established a domination over the city, all the more surprising because Florence was a pure democracy whose citizens were jealous of their liberty. In spite of this, without official title, the de' Medici ruled Florence for more than a century. Historians have searched history for parallels. <(It was a very different matter than with the lords or tyrants in old Greece, and it was much more than Pericles was to Athens, for the authority was passed on from father to son. It was more like the power of Augustus and the other Roman Emperors who respected the forms of the Commonwealth.® (Freeman). The best parallel for an American would be that of a political <(boss® holding no office yet dictating elections and maintaining power quite apart from the completely democratic form of our government. The one great difference is that the Medici exercised their power for the benefit of the city and had as much pride in maintaining Florence's prestige as any of her citizens, though of course, they carefully looked out for the family interests.

The greatest of the Medici was Lorenzo, the grandson of Cosimo, who owed his popu¬ larity to the immense prestige which his grand¬ father had left him as an inheritance. After Cosimo's death, the citizens of Florence con¬ ferred on him for all that he had done for the city, the title of Pater Patrice (Father of his Country). Lorenzo was very much less inter¬ ested in the commercial affairs of the house than his ancestors but was possessed of distinct literary talent, and had, besides, a fine taste in literature and the arts. He was a thoroughly practical politician, however, and succeeded in neutralizing the schemes of his enemies of whom there were not a few. His brother Giuliano became a victim to a conspiracy from which Lorenzo escaped but very narrowly. Lorenzo died at the age of 53 in 1492, but what he accomplished for Florence by his patronage of arts and letters during his short life em¬ inently merited for him the title of the Mag¬ nificent, which he has received in history. His influence

served to make Florence the centre of the intellectual and artistic world of the period, and the men who gathered around him achieved some of the greatest masterpieces that the world has ever known. His own part in the literature of the time, for he was a poet of merit, give him a distinction from the other Maecenases of history. The Medici palace became an academy.

Distinguished scholars like Politian, Ficino and Pico della Mirandola were in constant attend¬ ance upon Lorenzo, and the Platonic academy they organized, fostered the knowledge of Greek literature and art as well as philosophy. In addition, however, scholarship and classic erudition were not more welcomed at court than poetry in the vernacular. Pulci gave read¬ ings of his (Morganti Maggiore,* and Lorenzo read his own poems and encouraged Italian poetry in every form. Artists found a munifi¬ cent patron in him. It is said that Lorenzo himself could speak with equal fluency on paint¬ ing, sculpture, music, philosophy and poetry. He was imbued with the idea of creating a true national literature for Italy and refining the Tuscan speech as his country's language. His faults are evident and particularly his thorough¬ going ways with his enemies and his readiness to meet treachery and underhand means by similar weapons. He was a beneficent autocrat in so far as his autocracy replaced the democ¬ racy of Florence.

This century saw a revolution in education and aˆ always happens with such an event, there was a wide-spread awakening of interest in edu¬ cational matters. The Latin and Greek classics became the favorite foundation in educa¬ tion under the name of the Humanities or the New Learning. The universities at first, with some notable exceptions, as Florence, re¬ fused to admit these studies to their curriculum. They had as the basis of their teaching the seven liberal arts, the Trivium and the Quad- rivium, which were really seven important dis¬ ciplines taught from a scientific standpoint. Very much the same situation developed then as in the last generation of the 19th century when university faculities, conservative as al¬ ways, refused to replace the classical training of undergraduates which had finally gained ground in the Renaissance by the newly de¬ veloped physical sciences. Denied admittance to the universities of the 15th century, the classics were taught in special schools of the New Learning, founded by princes and cities, and special schoolmasters were invited to take charge of these schools. The greatest of these teachers of the

Humanities was Vittorino da Feltre, who was invited to Mantua to teach the Gonzagas and their friends. His course in¬ cluded besides Latin and Greek, philosophy, mathematics, grammar, logic, music, singing, and dancing. He emphasized however that the principal aim of education was to teach scholars (

are of special interest because they formed the model for other teachers.

Italy was not alone in developing schools of the New Learning in this century. The Human¬ ities were the subject of profound attention in the Teutonic countries and such distinguished teachers as Rudolph Agricola, Reuchlin who was known as ((the three-tongued wonder of Ger¬ many, » Jacob Wimpfeling to whom the title of Schoolmaster of Germany® has been given, did their works largely in this century. Erasmus was 35 years of age before the century closed and in its later years exercised a deep influence on the classical scholarship of England during his stay there. The most important classical schools outside of Italy at this time were those of the Brothers of the Common Life. The best proof of their success as teachers is to be found in the names of such pupils as Cardinal Nicholas of Cusa. Thomas a Kempis, Agricola, Alex¬ ander Hegius, Erasmus, Wimpfeling, not to mention others scarcely less prominent in the intellectual life of the time. The main purpose of their teaching was to afford instruction to the poor and often they assisted those who were unable to pay their living expenses.

Their schools multiplied rapidly, as well in numbers as in attendance, and Deventer the most famous of them counted some two thou¬ sand students about the time of the discovery of America. The period owed much to (

The most interesting feature of this revival of education in the 15th century was that women were admitted to it as well as men. Vittorino da Feltre made two conditions on his coming to teach at Mantua : — one was that poor students who showed ability should be allowed to enter his classes, and that women should also be students. Some of the young women were his favorite pupils. Cecilia Gonzaga began the study of Greek under his direction at the age of seven, could read Chrysostom at eight, and could write Greek with singular purity at the age of 12. Issotta Nogarola the favorite pupil of Guarino of Verona, the serious rival of Vit¬ torino da Feltre as a teacher, is scarcely less famous than Cecilia Gonzaga and there are many stories which reveal how deep was fem¬ inine interest in education at this time. Sandys, in his Harvard lectures on (The Revival of Learning,* notes that wthe

studious temper was often associated with habits of piety and strong

religious feeling,® and names some of these learned young ladies who later entered religious orders. Most towns in Italy of any importance had their school of New Learning and with it opportunities of higher feminine education. It would seem that by the end of the century as many young women in proportion to the rather meagre population of the time were enjoying the privilege of education as in our time.

The distinguished women of the Italian Renaissance include besides the Gonzagas and the d'Estes, such names as Vittoria Colonna of the great Roman family of that name, Lu- crezia Tornabuoni, the mother of Lorenzo the Magnificent, and such less well known names as Tullia d'Aragona, noted for her precocious¬ ness, Olympia Morata, Hippolita Sforza, Bat¬ tista Montefeltro, both famous for addresses delivered in Latin on important occasions, Leonora Cibo and Pellegrina Lascara who translated the JEneid of Virgil and the Odes of Horace, and others who might be mentioned. These learned women of the Renaissance made erudition fashionable and study a social duty, but they are famous mainly for making their homes beautiful and devoting themselves to the beautification of their surroundings. These traits have only come to be properly appre¬ ciated since we have paid more attention in recent years to the house and garden beautiful and have realized that the home and its sur¬ roundings must reflect the owner's tastes. The models left by the Renaissance women are now an inspiration and exemplar.

Women of the century played an extremely important role in its political as well as its in¬ tellectual life. The most important character ,of the first half was Joan of Arc. The greatest personage of the second part was Isabella of Castile, the greatest of women rulers and one of the greatest of all rulers. Joan's career ended at the stake but Isabella after the ex¬ pulsion of the Moors and Columbus' discoveries, lived to be the ruler of one of the largest em¬ pires the world has ever seen. Her character was equal to the occasion, hence her place in history. She and her husband were so poor on their marriage that they could not give the presents usual according to Spanish custom. She is said to have repaired one of her hus¬ band's coats no less than seven times. Beau¬ tiful specimens of her needle work are shown in many Spanish churches. Anxious to learn Latin, she shared her children's lessons. She made a magnificent collection of books, fos¬ tered the universities, was a generous patron of Cardinal Ximenes who did so much for Spanish scholarship at this time, helped him to •found the University of Alcala, invited prom¬ inent scholars to Spain and made it clear in every way that she felt education to be the most important thing for her people. Under her reign, the Inquisition was 'established

but nothing shows so well the original intention of the institution as a means to prevent internal dissension among her people as Isabella's well known tenderness of heart. In the midst of the almost continual wars of her early reign, she found time and means to organize camp hos¬ pitals, the first it is said, in history. She was solicitous to spare captured enemies and insisted that wounded prisoners must be treated like their«own wounded. The poor were always her special care and nothing so aroused her indigna¬ tion and her prompt action for justice as to

learn that a noble had been imposing on them. She often put herself to great personal incon¬ venience to maintain their rights. When Co¬ lumbus offered some of the Indians he had brought home with him to some of the Spanish nobles, the Queen indignantly demanded, ((Who gave permission to Columbus to parcel out my subjects to any one?® Hearing that some of the Indians were held as slaves in Spain, she ordered that they should be returned to their own country at the expense of the person who held them. She was a woman of inexhaust¬ ible energy. The mother of many children, she spent nights in the saddle when maternal duties might seem to make that impossible. She was the very life of her soldiers in their struggle with the Moors. Her reign issued in a period of greatness for Spain which lasted for many generations. She encouraged education for women so successfully that in the following century practically every university in Spain had women professors. Prescott compares her to Queen Elizabeth, but sets Isabella far above her English rival.

The national spirit that had been aroused in France under the stimulus of Joan of Arc's inspiration served to unify the country, but the consolidation of modern France in this cen¬ tury is mainly due to the machinations of Louis XI. Louis is one of the most despicable char¬ acters in history. He succeeded however in bringing low the power of the nobles and con¬ solidating France during his troubled reign with its devious political ways and his many broken pledges, in the midst of internal dissensions, until he created the beginning 'of the modern France that we know. Louis succeeded in in¬ corporating Burgundy and Picardy with the ter¬ ritory of Boulogne into the royal domain, and obtained, moreover, the cession of Artois and Franche-Comte as the dowry of the daughter of Maximilian, while he extended his rule over Armagnac and Rousillon, so that the troublous times of the preceding reigns with the nobles against the king could be no more. As Corn- mines said on the death of the Duke of Burgundy, Charles the Bold, who for so long successfully opposed the king: <(Never afterwards did the King of France find a man bold enough to raise his head against him or to contradict his will.®

The French literature of the 1 5th century contains some writers destined to world in¬ fluence, at least among literary men, ever since. The most prominent of these is undoubtedly Francois Villon (1431-84), the vagabond poet, who has had a striking revival in our time. Another is the royal poet, Charles d'Orleans (1391-1467) whose ballade for his dead wife has been a favorite poem for poets at least, for some five centuries. Villon owed his life when forfeited to the state for theft to Charles, but the poetry of the ne'er-do-well far surpassed in interest for the modern time that of his royal contemporary and benefactor. A third poet was Alain Chartier (died 1449), better known however as an orator <(the father of French eloquence.® French prose is very well represented by Commines (1445-1511), often spoken of as a chronicler, but really one of the first of modern historians. No one would think of trving to understand the period with regard to which he wrote without reading his work.

The Popes of the second half of the cen¬ tury, once the effects of the Great Schism

passed, bulk large in history. Pope Nicholas V (1448-55) was a generous patron of the New Learning and founded the Vatican Library. Pope Calixtus III (1455—58) , the first Borgia pope, continued this liberal policy as a man of cultivated mind and fine taste. With Spanish zeal against the Mohammedans, he stirred up the rulers of Europe against the Turks. Menzel, the German historian, says ((that anything at all that was done against the Turks was wholly due to the exertions of the Pope.® He encouraged the coming of Greek scholars into Italy and such men as Theodore Gaza, George of Trebizond, Chalcondyles of Athens, Argyrop- ulos and Gemistes Pletho of Constantinople brought with them literary treasures while their teachings stimulated an enthusiasm for Greek learning. Calixtus began the unfortunate policy of Papal nepotism by creating two nephews Cardinals on the same day and the third Duke of Spoleto and Governor of the Castle of Saint Angelo, thus initiating the prominence of the Borgia family in Italian politics. His successor was Eneas Silvius Piccolomini the distin¬ guished Renaissance scholar who took the name Pius II (1458-64). Born in poverty because of his father's exile, he was 18 before he began his studies but he became famous for the ele¬ gance of his Latinity, his poetry and — strange combination — of deep knowledge of canon and civil law. In the midst of a most successful career as a diplomat, a serious illness led him to realize the emptiness of earthly ambitions and taught him as he said himself that ((the sum of all knowledge is to know how to die.® He be¬ came as distinguished for his piety as for his learning and having passed through the various degrees of the hierarchy, was elected Pope. He made it the task of his life to rouse the Christian

nations against the Turks but with little avail. He tried to bring about the con¬ version of the Mohammedan ruler to Christian¬ ity with like failure. The Christian Princes were divided bj

their own ambitions, the Sul¬ tan Mohammed was bent on his. The failure of his efforts hastened his death. His suc¬ cessor Pope Paul II (1464-71) feared the danger to religion of pagan learning unless properly regulated and endeavored to moderate the tide of enthusiasm. As a result he became the subject of bitter aspersion in the scholarly writings of the time. His successor, Pope Sixtus IV (1471-84), is a most difficult char¬ acter to estimate. He enlarged the Vatican Library, appointing the scholarly Platina, in disgrace under his predecessor, its librarian. He built the Sistine Chapel and invited Perugino, Ghirlandaio and other great painters to decorate it. He adorned Rome with a number of magnificent public structures and was a munificent patron of literature and the printing press. He continued, however, the unfortunate nepotism which marked Papal policies at this time, and used some most dishonorable means to further his political aims. His successor Innocent VIII (1484-92) had been married earlier in life and his son had married the daughter of Lorenzo de' Medici. As Pope, he entered into a close alliance with the de' Medici and made Lorenzo's son, Giovanni, a Cardinal when only 13. He debased Papal power for political purposes, yet devoted himself to ally¬ ing the Christian princes and peoples in a new Crusade against the Turks but without success.

He succeeded however in reconciling the rival¬ ries of the great noble houses in Rome and putting an end to the feuds which had dis¬ turbed the city so that the Romans conferred on him the honorable title of "Father of his country.® Innocent's successor was another Borgia, Pope Alexander VI (1492-1503), whose character is one of the most disputed in his¬ tory. Roscoe, the English historian of Lorenzo de' Medici, began the protest against the tradi¬ tional history of Alexander. His life was ir¬ regular before he ascended the Papal throne. He has suffered for the faults of his children, whom he idolized. Historians are agreed now that he has been fearfully calumniated. The charges of poisoning and other horrible crimes imputed to him by the scandal mongers of the time have been completely disproved. As a Spaniard making his way in Italy, he was the subject of bitter ill-will and his repression of the feudal aristocracy at Rome and his political opposition to the French made him enemies who stopped at no mode of discrediting him. His daughter Lucrezia has been completely vindi¬ cated by Gregorovius and though her name was a by-word in history, her people of Ferrara followed her to the tomb as a saint and her husband, the Duke d' Este, was

inconsolable.

The end of the century was the scene of the career of Girolamo Savonarola (1452-98) who about the time that Columbus discovered America, alarmed by the pagan elements which had been stealing into social customs during the Renaissance, preached penance and reform to the Florentines. He stirred them so deeply that the women brought their finery and jewelry and the ornaments, personal and of the household, and piled them in the streets to be burned. The fervid preacher then suggested that Florence should become a Theocracy and Christ be proclaimed king. This invasion of politics brought about his downfall, and he was condemned to death, burned, and his ashes thrown into the Arno.

Savonarola has often been proclaimed a pre- Reformation reformer, but he was a faithful Dominican, the prior of his monastery, and a devout adherent of the old Church. He recog¬ nized abuses and strove to correct them and never doubted for a moment that the mission of the Church to men had been impaired by these abuses. Even popes since have suggested the possibilitv of his canonization and his name has been thoroughlv vindicated.

The characteristic product of the time in contrast with Savonarola, showing how the same period may produce the opposite extremes, is Machiavelli. He was born in the next decade after Savonarola (1469), and went through the penitential period at Florence as an acquaint¬ ance at least, of the great Dominican, and yet was the writer early in the next century of works in political philosophy that represent a climax of utter lack of principle.

The early century was the scene of the re¬ bellion of John Hus, the Bohemian reformer, who had taken up Wyclif's doctrines and was condemned for them by the Council of Con¬ stance (1415). He was handed over to the civil authorities and put to death because it was felt that the teaching of his doctrines would be subversive of authority in both Church and State. Hus's doctrines had been examined by Jean Gerson. the Chancellor of the University

of Paris, who warned against their heretical character. Hus's execution was followed the next year by that of Jerome of Prague, but this was only the beginning of very serious religious disturbances which waged

in Bohemia for more than a generation. The most impor¬ tant question was whether the laity should par¬ take of the chalice as well as of the Host of the Sacrament of communion, and it was not settled until 1485, when King Wladislaw granted equal liberties and rights to both parties. By degrees then, the Utraquists (from Latin, utraque, both, in reference to the Sacra¬ ment in both kinds) conformed to the Roman rights and in the next century resisted the Lutheran reform even better than the Sub- unists (under one kind).

This century saw the invention of printing which has been declared the most important and the most perilous discovery in the annals of history. Printing blocks for the making of playing cards and of certain pious pictures had been in use during the later Middle Ages. On these were cut some lines of text and from this to the making of whole pages in this way was but a step and a number of books were printed in this fashion in the first half of the 15th century. The next step was the invention of movable letters and this was accomplished very probably by John Guttenburg (1400-68) of Mainz in Germany. The oldest printed book from movable types was a Latin Bible issued by Guttenburg and Faust at Mainz about 1455. Before the close of the century, there were presses everywhere. Italy particularly took up the new art with the greatest enthusiasm and Venice alone had some two hundred printing presses before 1500. The most important chapter in the history of printing is the story of Aldus Manutius (1450-1515) who established the Aldine Press. He published some magnificent editions of the classical authors, securing as editors some of the great scholars of the time. The most beautiful printed books ever issued were produced during this first half century of printing. When William Mor¬ ris in England in the last generation of the 19th century wanted to restore printing to the art that it had been, from the mere cheap handi¬ craft that it had become, he went back to take as models for his work. some of the beautiful printed editions of the later 15th century. It was a time too of beautiful bindings, so that books fitted admirably into the charming in¬ teriors that were being made at this time. The first half of the century had seen the making of beautiful illuminated books so that the printers had fine models before them and it is not surprising to hear that when a great book collector of the time was asked to purchase printed books, he scornfully refused to add any <(machine made volumes® to the beautiful col¬ lection of hand-made books that had been his life's devotion. Books were extremely valu¬ able and even printed books were very dear, so that in libraries to which any number of people were admitted, books were chained to the shelves, quite as in our time we lock up ex¬ pensive editions.

The 15th century continued that striking evolution of education which had marked the 14th. Altogether 18 universities were founded in the 14th century, and some 29 in the 15th. Saint Andrew's in Scotland is a type of the

university foundation of the time. It was es¬ tablished by Bishop Wardlaw in 1411, but he was very proud to announce to the masters and students that his authority for doing so came from the Pope, and when the university had completed its first year a formal Papal Bull of erection was issued. The practice, in a word, was not unlike that in effect in our time, schools being required to do some work and a report as to their efficiency and the need for them being demanded before formal recognition by authorities. Glasgow followed Saint An¬ drew's in 1454, and Aberdeen received its charter 1477. Altogether some 80 universities, for there is some dispute as to whether certain institutions deserve the name of university or not, had been founded before the 16th century.

No less than seven universities were founded in Germany in the second half of the century, and this fact alone shows how deep was the interest in things intellectual at this time. They are Greifswald (1456) ; Basel and Freiburg (1460); Ingolstadt (1472); Treves (1473), and Tubingen and Mainz (1477). As Wittenberg was founded in 1502- and Frankfort-on-the-Oder in 1506 no less than nine universities were estab¬ lished in Germany in these 50 years. The en¬ dowments of these came in the order of im¬ portance from the clergy, the princes, nobles and burghers, though even the poorer classes and those living on the land were sufficiently interested in education to leave legacies for the benefit of needy students which did much to encourage the educational movement.

As the Renaissance advanced, the Greek classics were read not only for their value as literature but also for their content in science. The result was a reawakening of interest in the physical sciences which was destined to produce important results. The study of Ptolemy aroused an interest in mathematics and astron¬ omy, while the issue of Galen in the original re¬ awakened attention to clinical medicine. Piir- bach at Vienna (1423-61) and Johann Muller (1436-76) known as Regiomontanus after the fashion of Latinizing the names of scholars at that time, devoted themselves to the study of Ptolemy, and though both died in early middle life, their names have been deservedly re¬ membered. The most important personality in the scientific development of the time was Nicholas of Cusa, a fellow student at the Uni¬ versity of Padua of Toscanelli who influenced Columbus so much. The attitude of the Church toward science at the time is well

illustrated by the fact that Cusanus as he is called was made Bishop of Brixen, Apostolic Delegate to Ger¬ many and finally Cardinal. Cantor in his (History of Mathematics } devotes a score of pages to Nicholas. His ideas in astronomy are well represented by his declarations that the earth was not the centre of the universe ; that it moved in the heavens as the other stars, and could not be absolutely at rest. • His thoughts with regard to the constitution of the sun are surprising anticipations of modern ideas. He suggested the correction of the calendar and the use of laboratory'- methods in the study of dis¬ ease that give him a place in the history of medicine. Cusanus' best known work is his (De Docta IgnorantiaP (On Learned Ignor¬ ance) — in which he points out how many things there are which people think they know that are not so.

FIFTEENTH CENTURY

The curiosity of men was aroused, and astronomy received an impetus which was to culminate in the career of Copernicus, who was 27 before the century closed. The physical science of the time came in geography. The Portuguese proved hardy navigators and under the inspiration of Prince Henry the Navigator (1309-1460) penetrated farther and farther into the mysterious seas to the south of them baring the secrets of the African coast. In 1448 the Azores were discovered. About the middle of the century, the Guinea coast was explored and some of the black men carried to Portugal as slaves, creating the negro problem as well as the slave trade. The explorations continued be¬ cause it was hoped to find a trade route to the Indies. It was not until 1486 that Bartholomew Diaz reached the southern part of Africa which he called the Cape of Good Hope, because at last the road to India lay open. The extreme length to which Africa extended made the jour¬ ney long and rounding the Cape was dangerous, and so with the idea that the earth was only half the size it really is, Christopher Columbus, a native of Genoa, proposed to travel westward. After his scheme had been rejected as visionary by a number of governments, Columbus finally obtained the help of Isabella and rediscovered the Western Hemisphere 1492. He thought he had reached some part of the Indies, hence the name West Indies and the term Indians. Up to his death he probably never knew that he had really found a New World. Amerigo Vespucci a few years later reached the Con¬ tinent and described it in a widely read book and the Western Hemisphere was named America for him. In 1498 the Portuguese reached India proper by the African route and founded the Indian Empire. This led to dis¬ location of the eastern trade from

Venice to Portugal.

Medicine received a new impulse at the end of the 1 5th century, and the two most important personages in it are Leonicenus and Linacre. Leonicenus was professor of medicine at Padua, Bologna, and Ferrara and noted for his knowledge of Latin as well as of medicine. He made a famous translation of the Aphorisms of Hippocrates. He was no mere translator and commentator however but a practical scientist whose most important work was the correction of the botanical errors in Pliny's Natural His¬ tory. Leonicenus also wrote on certain clinical problems of his day, notable lues. The prob¬ lem whether syphilis was introduced into Eu¬ rope from America or not at the end of this century is considered by some as unsolved, but there are now many documents and traditions pointing to its European existence for centuries before, and the treatment of it by mercury had even been worked out. The technique of some of the surgeons of this century show that the old form of anaesthesia survived, and that a great many operations subsequently abandoned, to be revived at the end of the 19th century were being performed.

The greatest 'benefit conferred upon medi¬ cine at this time, was the printing in magnifi¬ cent scholarly editions of some of the classics in medicine. This led to their preservation, and though many of them were lost sight of and their significance unappreciated until the last generation, the printed editions were in many libraries waiting for modern students and ready

to be reprinted. Above all, the Renaissance printers preserved for us the books of the great teachers of the later Middle Ages, of the sur¬ geons of Salerno, of Theodoric and Bruno, of Guy de Chauliac, and of others which were cir¬ culating in manuscript and were liable to be lost. The Italian medical schools were waking up to the study not only of Greek medicine but also of clinical medicine by observation and the value of pathology for the real meaning of disease. Beniveini (died 1502), besides being an able surgeon wrote ((the only work on pathology which owes nothing to any one,® (Malgaigne). Medical students from many countries in Europe found their way to Italy; among them Linacre from distant England, and Copernicus, physician as well as as¬ tronomer, from Poland, so that the tradition of going to Italy for advanced medical studies became the condition so notable in the next century.

The obligations which wealthy men felt toward their less favored brethren during this century can be readily appreciated from the careers of some of the men who, having made a fortune in trade in

London, proceeded to spend it for the benefit of their fellows. Dick Whittington of the nursery tale, who became Sir Richard Whittington, Mayor of London, made most of his benefactions early in this century, but his career belongs more to the 14th and has been treated there. The typical merchant prince of the 1 5th century is Sir Hugh Clopton of Stratford-on-Avon, who having left his native town and made his fortune in Lon¬ don, returned to Stratford to lavish benefactions on his townsmen. He built the beautiful stone bridge across the Avon which still stands and which was sadly needed, for the old wooden bridge was dangerous in the spring freshets and even lives had been lost. He rebuilt the Guild Chapel in the charming form that has made it the admiration of visitors to Stratford ever since and restored the almshouses meant particularly for old couples to live together during their declining years when they had passed their usefulness. Mr. Sidney Lee in his (Stratford-on-Avon> has told of Sir Hugh's beneficence in his will. (

Author of iThe Thirteenth the Greatest of Centuries ?

PRINCIPAL EVENTS OF THE FIFTEENTH CENTURY.

1401. The Renaissance in Italy awakens the spirit for learn¬ ing and the fine arts.

1403. Yunglop, son of Hong-wu, dethrones his nephew and makes Peking the capital-of China. Frames the- Chinese code of laws. Maintains a fleet that dominates the East, and receives foreign ambassadors.

1411. Saint Andrew's University, Scotland, founded.

1413. Henry V becomes king of England.

1415. Battle of Agincourt. Henry V of England conquers Normandy. John Hus condemned by the Council of Constance and burned.

1416. Jerome of Prague burned for heresy.

1420. Hussite wars begin.

1422. Henry V of England becomes king of France. Con¬ stantinople besieged by Amurath, the Turkish emperor. 1429. Joan of Arc raises

the siege of Orleans.

1431. Joan of Arc burned at Rouen by the English.

1440. Printing, long known by the Chinese, invented in Germany by Gutenberg.

1448. The Azores discovered by Portuguese navigators.

1450. Jack Cade insurrection in England.

1451. The English evacuate Rouen and other French towns.

1453. The Turks capture Constantinople under Mahomet II, and with the extinction of the Comneni and Palseologi the Eastern Empire ends.

1454. Glasgow University founded.

1455. War of Roses begins in England. The battle of Saint Albans. First book printed from movable types.

1456. Siege of Belgrade. Turks repulsed by Hunyadi. 1456-1477. Seven universities founded in Germany.

1457. Glass first manufactured in England.

1461. Louis XI of France begins to reign.

1468. Louis XI imprisoned by Charles the Bold.

1469. Machiavelli born.

1477. Aberdeen University founded.

1479. The kingdom of Spain formed by the union of Aragon and Castile.

1483. Richard III of England the usurper.

1484. The Inquisition established in Spain.

1485. King Ladislas of Bohemia grants religious liberty.

1485. Battle of Bosworth, England. Richard III slain. Henry VII succeeds.

1486. Bartholomew Diaz reaches the Cape of Good Hope.

1487. The Court of Star Chamber instituted in England. 1492. Columbus rediscovers America. Granada falls and

the Moors are driven out of Spain.

1494. Charles VIII invades Italy.

1497. Cabot discovers North America.

1498. Portuguese navigators reach India around the Cape of Good Hope. Savonarola condemned to death and burned.

FIFTH, one of the five equal parts into which any unit may be divided. In music, the dominant or fifth note above the tonic or key¬ note ; the second of the consonances in the order of their generation; a combination comprising four intervals, of which there are three kinds, namely, the perfect fifth (C — G), consisting of three whole tones and a semitone ; the flat, di¬ minished, or imperfect fifth (B — F), consist¬ ing of two whole tones and two semitones ; and the extreme sharp, or superfluous fifth (C — G sharp), composed of four whole tones. As consecutive fifths do not produce a good effect, they are not allowable in harmony.

FIFTH CENTURY. Th- 5th century has its special place in history as the period of culmination of that decadence of human inter¬ ests under the stress of barbaric invasions which is coincident with the fall of the Western Em¬ pire. The last of the Roman emperors whose title Romulus Augustulus so fittingly concludes the list of rulers at Rome, was dethroned by Odoacer, king of the Herulii, who founded the kingdom of Italy (476). The battle of Adrian- ople (378), in which the Goths defeated and slew the Roman Emperor Valens, destroyed the prestige of the Empire. The barbarians, as all those who were not Romans were called, had learned that they could defeat the Roman le¬ gions, and while they were induced to accept peace for the time, it was only by strengthening the Roman army by taking into it foreign sol¬ diers and leaders that even a precarious peace

at intervals could be procured. Among the Germans given an important post in the Roman army was Alaric. He collected an army com¬ posed mainly of West Goths or Visigoths and, dissatisfied with the treatment accorded him, marched on Rome which he captured and plun¬ dered (410).

He did not seriously damage the city but Rome’s reputation suffered disaster. After this, barbarians were not deterred by any feeling of the inviolability of the capital of the Empire, and the Empire itself ceased

to be an object of respect. Alaric died and the West Goths wan¬ dered through Gaul and then into Spain where they established a kingdom under Eric (468). They found in Spain another German tribe, the Vandals who began their wanderings shortly before Alaric captured Rome. After ravaging Gaul, they had settled in Spain but now under pressure from the Visigoths, they crossed the Straits of Gibraltar and established a kingdom in northern Africa. Wherever they went they left destruction in their path, so that the word <(Vandal® became the term for such destructive¬ ness. Meantime the Angles formed their king¬ doms of Anglia (England), the kingdom of France was founded by Clovis (481), Italy was conquered by Theodoric, the king of the Ostro¬ goths who put Odoacer to death (493). While the Western Empire was thus dismembered, the Eastern Empire was stripped of Pannonia, Dal¬ matia and Noricum. For a time, the Eastern Empire, under the regency of the young Em¬ peror's sister Pulcheria in the early century, en¬ joyed a period of peace and prosperity, but the one saving feature of the century's almost con¬ tinual warfare is the battle of Chalons-sur- Marne, the first battle of the Marne in history, which ended with the complete defeat of Attila and his Huns (451). Attila had created an em¬ pire reaching from China to the Atlantic at the north and he was endeavoring to extend his sway over the southern countries when he met this severe check. Undefeated in spirit, the Hun went on another raid in 452, this time in north¬ ern Italy, destroying Aquileia, the mistress of the Adriatic, so completely that only a trace of it remained. The inhabitants took refuge in the lagoons, to found what has since become Venice. Verona, Padua, Bergamo and Fienza shared Aquileia's- fate, while Milan and Parma had to buy off ((the Scourge of God,® who did not hesi¬ tate to attribute to himself Divine assistance and direction in his work of destruction. He an¬ nounced that he was the agent of God's ven¬ geance on the western nations. In 453, Attila led his troops toward Rome. He was met not far from Mantua by Pope Leo I, the Great, who succeeded in persuading him to withdraw his troops from Italy, and obtained from him the promise of opening negotiations for peace with the emperor. Under the influence, it is said, of a dream in which he had seen this venerable man who had come to plead with him, Attila consented, and a treaty with the Emperor Va- lentinian was signed. The Hun returned to Pannonia, where he died not long afterward, and his great army without a leader gradually disintegrated. The protagonists who thus met on the banks of the Mincio are the two men who for good and ill have most deeply impressed themselves on the century. The position of moral influence which the Pope had acquired

by this time may be appreciated by a similar incident two years later when Gaiseric King of the Vandals captured Rome. At the inter¬ cession of the Pope, Gaiseric spared the city.

Leo I, the Great, as he has been called, be¬ gins the line of popes of that name, so many of whom have been distinguished. It has been said that his pontificate, next to that of Saint Gregory I, is the most significant in Christian antiquity. He acquired prominence very early, being sent to Gaul as a comparatively young man by the Emperor Valentinian III, to bring about a reconciliation between the military and civil authorities of the province, who were at loggerheads and threatened a disruption of the peace of the empire. He was somewhat known in the west of Europe before this for the great mystical writer Cassian had dedicated a book to him. He accomplished his mission for the emperor so well that though he was absent in Gaul at the death of the Pope, he was chosen as successor. His pontificate was in a stormy time, as can well be understood from his experiences with Hun and Vandal, and besides, there were serious internal trou¬ bles in the Church, widespread heresies, that threatened disruption. In spite of all these handicaps, Leo succeeded in maintaining eccle¬ siastical discipline and fostering the intellectual and spiritual life of Europe.

The greatest political character of the cen¬ tury is Theodoric, King of the Ostrogoths. He defeated King Odoacer at the first battle of the Isonzo (489), and after several further defeats, concluded peace with him. The two kings were to live together in Italy, Odoacer being subordinate. The following year Odoacer was slain at a banquet, and Theodoric became the sole ruler. He came to be the subject of a whole series of myths, particularly in the old High German, under the name of Dietrich of Bern (approximate German pronunciation of Theodoric of Verona). He ruled in northern Italy for 33 years, and succeeded in incorporat¬ ing in his dominions Sicily, Noricum, Istris, Pannonia and Dalmatia. He was the first ruler of history to maintain a standing army. He had 100,000 men, all Goths, and a fleet of 1,00C ships, manned also by Goths, for the protection and extension of his domains. He used his own people for war, employing the Romans in the business of administration and encouraging their devotion to commerce and industry. At heart a barbarian, he had many good traits, and his motto is said to have been ((Let other kings gain booty and half-ruined towns by war and slaughter; my object is, by God's help, to conquer in such a way that my subjects may regret that they did not come under my rule before.® His reign in many ways justified even that lofty maxim. He stained his reign by the martyring of

Boethius, but was very fortunate in the Prime Minister to whom he gave his confidence, Cassiodorus, but these de¬ tails belong to the next century. In the clos¬ ing year of the 5th century, Theodoric issued an edict embodying the principles upon which he hoped to govern. It was founded on Ro¬ man law and its aim was to secure the educa¬ tion of the Goths in Roman culture until there could be a union of the two peoples on an equal plane. In his youth a hostage in Con¬ stantinople, Theodoric had come under the

influence of Byzantine art and literature, not yet in that decadence which was to come a little later. The memory of the city aroused in him a sense of rivalry and created a rever¬ ence for the old monuments of art in Italy, and he did his best to preserve the magnificent Roman remains then in existence, and to adorn further the Italian cities. While a Christian, Theodoric had embraced Arianism and this serously complicated matters in the ruling of his kingdom.

The greatest intellectual force of the 5th century was Saint Augustine (354-430), Bishop of Hippo, whose work has continued to in¬ fluence men deeply ever since. Schaff says of him, ((Compared to the great philosophers of past centuries and modern times, he is the equal of them all ; among theologians he is undeni¬ ably the first, and such has been his influence that none of the Fathers, Scholastics or Re¬ formers has surpassed it.® His life is the best key to his times. He received a Christian edu¬ cation but put off receiving baptism. He prayed, he tells in his Confessions, but without the sin¬ cere desire of being heard and drifted through the experiences of many a young man in the larger cities at almost any time. The surprise is to see how closely the elements which in¬ fluenced Augustine 1,500 years ago resemble those of our generation. As he tells himself, the licentious example of other students, the attraction of the theatre, the intoxication of his success as a writer and a scholar, and his pride of always being a leader in everything even evil, joined to the seductions of a great city, still more than half pagan, led him into sad ways in Carthage where he was studying law. The devotion of his mother Monica finally brought him to his better self but not until he had experiences that gave him the material for his Confessions, } the most attractive per¬ sonal book, it has often been declared, that was ever written.

He was 33 when he went to Saint Ambrose at Milan to be baptized on Easter Day. Now he was whole-hearted in his Christianity. He resolved to give up all he possessed to the poor and take up a life of poverty, prayer and study. He kept his resolutions so well that in admira¬ tion at his change of heart so finely maintained, the people demanded that he be made a priest, and the old Bishop of Hippo forced him to

become his coadjutor with the right of succes¬ sion. As Bishop of Hippo Augustine wrote his immortal works in defense of the Church. He has more deeply influenced the thought of Christianity than any other except possibly Saint Paul. He treated the most difficult ques¬ tions, grace and free-will for instance, ex¬ haustively and a great many heretics have in¬ sisted on finding a foundation for their teach¬ ings in expressions of his. Augustine is the principal Christian authority on nearly all the difficult problems of faith and it is surprising how many anticipations of what is often considered to be modern thought are in his writings. Augustine's teaching was for in¬ stance, that the seven days of creation were not literal periods of 24 hours but that creation had been instantaneous and only the seeds of things had been created (scmina rerum), and these had gone on developing afterward. (See Man, Christian Anthropology of). His

philosophic and theological teaching with regard to the human will and its place between its own freedom and divine grace is a marvelous con¬ tribution to human psychology in the deep analysis of motive and purpose which he has made. Augustine's exposition of human ways and moods as he saw them makes it per¬ fectly clear that men have not changed in any way in the millenium and a half since his time.

A series of events that were to have great significance on the continent of Europe began in Ireland about 432. Saint Patrick converted the Irish to Christianity, and in the course of the next century Ireland became the land of saints and of scholars. While the Continent was in the throes of perpetual conflict through the Goths, Eastern and Western, and the Van¬ dals and Huns, a series of Christian schools developed in Ireland which were to send out scholarly missionaries bearing Christianity and education to the Continental barbarians for the next three or four centuries. Ireland, un¬ touched by the Romans, — Csesar had planned to send an expedition there, but was prevented by death and his successors in command of the Roman armies were too much occupied, — failed to share in Roman decadence. Saint Patrick found a people who had an abiding in¬ terest in poetry and other phases of literature, a genius for music and a great talent in the arts and crafts. Their tribal rule had fostered dissensions among them and Christianity did not tame their martial instincts but it turned the national energy into higher channels and their high stage of social life and their respect for the rights of others was refined by Chris¬ tianity.

The result of this educational development was that Ireland protected from the disturb¬ ances of the Continent at this time became a Mecca for students from Britain, Iberia, Gaul and it is said even more distant countries. Be¬ sides Irish missionaries went to the Continent and founded schools, not only in Gaul and in what is now Germany and Switzerland, but even in Italy where the great monastery of Bobbio is one of their foundations. Mrs. Rich¬ ard Green suggested that any one in Western Europe who spoke Greek during the 6th and 7th centuries owed it either to an Irishman or to some one who had been taught by an Irish¬ man. The great Irish schools were situated at Armagh, Bangor, Clonfert, Clonmacnoise, Glen- dalough, Tuam, and on the Island of Arran More. The women of Ireland shared with the men in this educational development, and Saint Brigid's school at Kildare became as well known as Saint Patrick's school at Armagh, and ac¬ cording to tradition had hundreds of pupils devoted not only to book learning but above all to the arts and crafts. Kildare became famous for its fine lace making, needle work, beauti¬ ful church ornaments, marvelous illuminated copies of the Scriptures, rivals of the Book of Kells, still preserved at Trinity Col¬ lege, Dublin, for one of them has been de¬ scribed by Giraldus Cambrensis who fortunately saw it not long before the destruction of Kil¬ dare by the Danes. Gerald the Welshman was most enthusiastic in his descriptions of this book. Some of the earliest poems in rhyme ever written were composed here at Kildare as a recent revival of Gaelic literature has revealed,

and manifestly there was a high state of intel¬ lectual development. The abbesses at Kildare, successors to Saint Brigid, had the privilege of vetoing the names of candidates for the bishopric of Kildare whenever they felt they might not be in sympathy with the educational work done there. The abbess ruled over a monastery for men as well as a convent for women, though the men were much fewer in number. It was this Brigittine tradition that was in force at Whitby (North England) when the Abbess Hilda ruled the convent and monas¬ tery. The Irish opportunities for feminine edu¬ cation form a striking pioneer epoch in history.

Ozanam, in (La Civilization au Cinquieme SiecleC declared that (declared that ((these Irish missionaries were teachers of every known branch of science and learning of the time, possessors and carriers of a higher culture than was at that period to be found any¬ where on the Continent, and can surely lay claim to have been the pioneers, to have laid the cornerstone of Western culture on the Con¬ tinent.®

The Franks come into prominence in this century. They gave a new name to Gaul and became the nucleus of the modern French nation.

At the fall of the Roman Empire, one of their chieftains, Clovis (later form, Louis), ventured to attack Svagrius, the Roman Gov¬ ernor of Gaul, and gained a decisive victory at Soissons (486). He then began to extend his authority over neighboring Teutonic tribes who had also crossed the Rhine and taken possession of different portions of the country. He ex¬ tended hjs kingdom as far south as the Loire and then proceeded to conquer the Allemani to the east. One of his battles with them repre¬ sents a great turning point in history. Clovis was not yet a Christian, though his wife was, and he had learned to respect her religion deeply. In the midst of a battle with the Allemani the fighting was so fierce that his troops began to give way, and bethinking him¬ self of the God of the Christians, he promised that he would become a Christian if the Franks should gain the victory. The great Bishop Gregory of Tours, in his famous (History of the Franks, > written in the next generation, has told the story of how, when the battle was won, Clovis kept his word, and with more than 3,000 of his warriors, was baptized.

Clovis thus founded the Merovingian dy¬ nasty, so called from one of their earlier chief¬ tains, Merovig, and before the end of the cen¬ tury ruled from the Rhine to the Bay of Biscay, except Brittany, all of what is now North France and the Netherlands, while to the southeast the Burgundians, another German

people, ruled the country round Lyons and the Visigoths held the southwestern France and Spain. These barbarian folk, however, instead ot clinging to their own language and laws, almost without exception adopted the customs and the language of the Romans. This makes it clear that they must have been comparatively few in number, but their bravery enabled them to impose themselves as the ruling class though they were soon absorbed into the populations among whom they dwelt. Their Teutonic brothers left beyond the Rhine, kept their own language, but the Franks adopted the conver¬ sational Latin of the time and then gradually modified it more, as also happened in other southern countries, until the modern Romance languages came into existence. Even their own special laws came to be written in the Latin language for use in the established courts along¬ side the Roman Law.

The work of Clovis is the most far-reaching of the time. That of Theodoric was destined to destruction within a generation but the

king¬ dom of the Franks was under successive dynas¬ ties to remain a power in Europe and to be the great bulwark against further Germanic inva¬ sion of the South, even as late as the 20th century. It was extremely difficult even for Christianity to modify the nature of these rude Germanic peoples, and their barbaric traits were constantly manifesting themselves in the bitter internal dissensions which occurred for several centuries and in the cruelties which they prac¬ tised. Recent discoveries reveal, however, that in the arts and crafts they did some very beautiful work in the Merovingian period, specimens of which fortunately have been un¬ earthed in our time. Gradually the spirit of Christianity refined their natures, but without overcoming the vigorous racial peculiarities which made their presence in the decadent Roman Empire so important for the renewal of civilization that was destined to come.

The women of the 5th century played a much more important role than would usually be thought possible at the beginning of what used to be called the Dark Ages. Indeed, a period of comparative peace and opportunity for progress in the Eastern Empire was due mainly to a great woman ruler. When Arcadius, the son of Theodosius the Great, to whom the Eastern Empire had fallen by his father's will, died in 408, he left the empire to his son, Theodosius II, who was only seven years old. Arcadius' reign of 30 years had been one long series of disturbances after another. Rebellion within the empire was due to tyrannical inva¬ sions of the rights of the people, palace quar¬ rels, incursions of barbarians from without. The outlook was not bright for the boy emperor. Fortunately his sister Pulcheria, much older than he, was a strong character and maintained her brother's rights. In 414 she was proclaimed Augusta and became Regent. She fulfilled her duties as a ruler with magnificent adminis¬ trative ability and selected generals who com¬ pelled the Huns to retire from Thrace and the Scythians, a people scarcely less to be feared than the Huns, were entirely subdued. The Illyrian towns were better protected than they ever had been before under the Eastern Empire.

With all this administrative ability, Pulcheria was a woman of strong piety yet of a very simple, retiring disposition, and her sister being much like her, the imperial palace took on the appearance almost of a convent. She had no ambition to continue in power, and when Theo¬ dosius was 20 years of age she turned over the government to him and helped to arrange for him the marriage with Athaneas, daughter of the Athenian philosopher Leontius, who at baptism took the name of Eudoxia or Eudokia. Theodosius continued to depend on her how¬ ever, and Pulcheria's talent for administration materially helped the Empire in stormy times. Pope Leo the Great who had turned aside the

wrath of Attila and of Gaiseric from Rome, looked upon her as his ablest coadjutor for the conservation of Christianity. He wrote to her that the suppression of the dangerous Nestorian and Eutychian heresies were due largely to her. In the midst of all this, Pulcheria somehow found the time to spend many hours in personal service to the poor. She came to be looked upon according to an expression of the time as <(a tender sister of those who needed help.® Saint John Chrysostom, the famous Bishop of Constantinople, consecrated 398, had at the beginning of the 5th century erected a hospital at Constantinople and made a magnificent be¬ ginning of the organization of social work which had been rudely interrupted by his ban¬ ishment. Pulcheria took up this work, founded a series of hospitals and of shelters for the poor — multa publica hospitum et pauperum doniicilia (Old Chronicle). Her example of piety and charity had much to do with miti¬ gating the asperities of the religious division which in the East at this time was so prone to take on a character of bitter intolerance and cruel persecution. No wonder she is venerated as a saint by the Greek and the other Oriental churches and by the Latins.

It is a noteworthy fact that after the ex¬ ternal persecution of the Church stopped, in¬ ternal dissensions and heresies of various kinds seriously disturbed Christian peace. The end of the 4th century saw the beginning of the unfortunate series of divisions, but there was scarcely a decade of the 5th century that did not witness some heretical development. Arian- ism declined, but subtle distinctions were made, and the Monophysite heresy declared that there was but one nature in Christ. Then the ques¬ tion of free will and predestination came up, and Pelagianistn had to be controverted and then semi-Pelagianism, a sort of compromise. The Nestorians insisted that the Incarnation meant no more than, an indwelling of the divine nature in Christ, and that consequently God had not been truly made man. There were two persons, one divine and the other human, and it was of the human person that Mary was the mother. It was around this last question that the popular heresy turned. A series of Ecu¬ menical, that is universal, councils were held to contradict these heresies. The first of these, held in Nicea or Nice (325) , corrected the Arian teaching. The second Ecumenical Council of Constantinople (381) concerned the teaching as to the Holy Ghost ; -the third that of Ephesus (431), corrected the errors of Nestorius and Palagian, and the fourth, that of Chalcedon, was against the Monophysites (451), In the

meantime a number of less important Councils and Synods were held in various parts of the world for the correction of various phases of these heresies and the development of church regulations.

Eudoxia, the contemporary of Pulcheria, was almost an exact contrast in many ways to her sister-in-law — a contrast historically illu¬ minating, for it exhibits the same variety of character in the 5th century as at all other times. She finds a place in history as the result of a romance which would usually be supposed to be reserved for modern centuries and be quite impossible under the conditions of Oriental life even among Christians. She was just the handsome, vivacious 20-year old daughter of a professor at Athens who lavished his erudition on her. The young emperor Theodosius saw her and was struck with her beauty and intel¬ ligence and fell in love with her. His sister Pulcheria arranged the marriage. The young Empress of the East soon found to her dis¬ appointment that while she swayed her hus¬ band's heart, she could not influence his ad¬ ministration as she wished, for with regard to that he turned to his sister Pulcheria. After 20 years of Imperial life, she fell under the suspicion of marital infidelity, probably unjustly, but was forced into retirement at Jerusalem. Here she spent the last 20 years of her life in good works and quiet meditation at the Holy Places. She wrote a series of poems, mainly on religious subjects, though one had for its theme her husband's victory over the Persians. Her most famous work is a paraphrase of the Bible in verse which has been warmly praised by commentators. Her excellent sense of liter¬ ary values is best revealed by the fact that we owe to her the primitive literary form of one of the world's great stories. This is the tale of Cyprian and Justina, that is of a man who sold his soul to the devil for knowledge and when dissatisfied with this, afterward for a woman. This later became the Faust legend, so often turned to by great poets as a nucleus around which to gather their thoughts with regard to human life. Calderon uses the story in its earlier Christian form almost as it came from the hand of Eudoxia as a plot for his greatest play, (E1 Magico Prodigioso> ; Mar¬ lowe in the specious Elizabethan period wrote his greatest drama around it, while Goethe made from it the great literary masterpiece of the 19th century. The Faust legend and the Arthur legends, both from this time, have been great resources for the modern poets.

The literature of the 5th century is of no great significance and yet there are some names in it that have lived. Claudian or Claudianus, the Latin poet, probably died just as the cen¬ tury was opening. Prudentius and Ausonius, Christian Latin poets, left verses that are well known and some of the hymns of Prudentius are still in use in the

Church. Macrobius, a Platonic philosopher, and Isidore and Socrates who wrote ecclesiastical history and Orosius, a Spanish disciple of Saint Augustine, are still referred to by those who care to know the history and thought of the time as it appeared in the eyes of contemporaries. Sozomen and Theodoret, further ecclesiastical historians, are also well known, The time was waking up to

the necessity of telling its story if that was to be known by posterity.

James J. Walsh,

Author of (The Thirteenth the Greatest of Centuries P etc.

PRINCIPAL EVENTS OF THE FIFTH CENTURY.

400. Alaric the Visigoth invades Italy.

406. German tribes invade Gaul.

407. The Salians. the chief tribes of the Franks settled in Belgium. Burgundians from the Vistula cross the Rhine.

409. German tribes invade Spain.

410. Alaric captures and plunders Rome.

411. Burgundians pass through Germany into France and settle on the Rhone.

418. The Visigoths enter Gaul and Spain, and found the kingdom of the Visigoths at Toulouse.

420. The Long dynasty is established in China by General Lieoyu.

426. The Romans, threatened at home, withdraw from Britain, advising the Britons to arm and trust in them¬ selves.

431. The council of Ephesus.

432. Patrick the apostle converts Ireland to Christianity.

439. The Vandals who had absorbed Alani invade Africa and capture Carthage.

440. Leo I, the Great, bishop of Rome.

447. The Huns under Attila ravage the Eastern Empire and make

Constantinople tributary.

449. Vortigern, king of the Britons, asks the aid of Saxons from the Elbe and Weser against the Scots and Piets. 451. The Council of Chalcedon. Attila invades the West and is defeated at Ch&lons.

453. He invades Italy, and dies suddenly.

454. The Ostrogoths are subdued by the Huns.

455. The Vandals under Genseric or Gaiseric return from Africa and loot Rome. The Saxons establish them¬ selves in Kent, England, under Hengist and the Britons are driven into Wales and Cornwall.

462. The Visigoths in Gaul and Spain.

474. Having extended their territory in Galicia, Spain, and on the Rhone and Loire, Gaul, the Visigoths adopt the written law.

475. Romulus Augustulus, the last Roman emperor.

476. He is deposed and the western Roman empire ends. Odoacer becomes king of Italy.

482. Clovis becomes king of the Franks occupying the territory from the Rhine to the Seine and Loire.

489. The Goths under Theodoric invade Italy.

492. Gelasius becomes Pope of Rome.

493. Theodoric becomes king of Italy.

495. The West Saxons land in Britain.

496. Clovis, king of the Franks, becomes a Christian. Sclavonian tribes from Russia, following the migration of nations and occupying Eastern Europe from the Oder to the Adriatic, seize Poland and Bohemia.

FIFTH MONARCHY MEN, a set of

politico-religious enthusiasts who sprang up dur¬ ing the Protectorate of Cromwell. They be¬ lieved that the four great kingdoms mentioned by Daniel, the Assyrian, the Persian, the Gre¬ cian, and the Roman, were to be followed by the descent of Christ, to establish a fifth mon¬ archy, which was to be of world-wide extent. They thought that this advent was close at hand, and that physical force should be em¬

ployed to pave the way for Christ's reign. When the sect, who were of the extreme re¬ publican type, fancied Cromwell was aiming at the royal title as well as power, they raised a conspiracy against him (1657), which was quickly discovered. Their leaders were thrown into prison, and were only liberated on the death of the Protector. The sect became ex¬ tinct shortly after the Restoration, not, how¬ ever, until on 6 Jan. 1661, they had attempted to obtain possession of London. Most of the participants were either killed or captured and ten of the latter, together with their leader, Venner, were executed for high treason later in the month. Consult Brown, L. F., (Polit¬ ical Activities of the Baptists and Fifth Mon¬ archy Men, etc.1* (in (Prize Essays of American Historical Association,) Vol. V, Washington 1912), containing a very full bibliography.

FIFTH NERVE, the chief sensory nerve of the face, also called trigeminus, or trifacial. It is one of the fifth cranial pair of nerves. The fifth nerve is one of the most important sensory nerves of the body, its name trafacial meaning that it has three large divisions which are distributed to the face, and its name tri¬ geminus being given because it has three roots inside the skull. It is really a mixed nerve containing both motor and sensory fibres. The motor root rises from a group of cells lying deep in the floor of the fourth ventricle. The sensory portion arises in a series of ganglia, the Gasserian ganglion being the most important one. The ophthalmic and Meckel's ganglia are also smaller ganglionic centres. The chief branches go to supply the entire area of the skin of the face and head, and neuralgias and neuritides of the face and head are due to affections of this nerve. The chief division is the first or ophthalmic division, which supplies the region over the superior surface of the nose, forehead and eye, running as far back as the top of the head. The second branch is the superior maxillary, which supplies the tooth and the region of the skin beneath the orbit, the upper lip, and the region of the temple. The superior maxillary nerve contains a few motor fibres. The third branch, the interior maxillary, or mandibular, is the largest branch of the fifth nerve, and contains most of the motor fibres. It supplies the surface of the skin of the lower jaw, front of the ear, and temporal region, lying close behind the area supplied by the maxillary. The muscles of the jaw, the masseters, tem¬ porals and buccinators are supplied by the motor fibres of this branch. See Cranial Nerves; Facial Neuralgia; Neuralgia.

FIFTY-FOUR FORTY OR FIGHT, the

slogan of the Northern Democrats in 1844; meaning the insistance upon the line of lat. 54° 40′ N. as the southern limit of English posses¬ sion, even at the price of a war. The Ashbur¬ ton Treaty of 1842 had created great dissatis¬ faction as a surrender of American rights (and in England as a surrender of British rights), and the hot-heads wished to abrogate it. But the Southern leaders did not wish to make war for the increase of the free territory, and in¬ stead diverted the war sentiment against Mex¬ ico, forcing on the Mexican war of 1847. See Boundaries of the United States ; Oregon Question.

FIG, the fruit of the Ficus carica, a native of Asia, Africa, and the south of Europe, which has been cultivated from antiquity in the coun¬ tries surrounding the Mediterranean, where figs form a principal article of food in many places. It belongs to the family Moracece. The male and female flowers are mixed indiscriminately on the inside of a fleshy receptacle, which is concave in form, with its edges drawn together into a narrow opening. What are called the seeds in the ripe fig are really the fruits, each containing a single seed. The fig-tree is dis¬ tinguished from almost all others by the extra¬ ordinary property of producing two crops of fruit in the same year on distinct shoots, in climates congenial to its growth. The shoots formed by the first or spring sap put forth figs at every eye as soon as the sap begins to flow again in July and August. These figs which form the second crop of the year ripen in their

native climate during the course of the autumn. The shoots formed by the second flow of sap, commonly called midsummer shoots, put forth figs in like manner at every eye, but elsewhere not until the first flow of sap in the following spring. These last-mentioned figs, which form the first crop of each year, ripen in warmer climates during the months of June and July, but not in the United States before September or October. The fig-tree, in its wild state, is a low, distorted shrub, bearing fruit destitute of any agreeable flavor. Dried figs are easier of digestion and more nourishing than the fresh fruit, and form a considerable article of com¬ merce. The best come from Turkey, Italy, Spain and Provence ; those of the Archi¬ pelago are inferior in quality. Dried figs, with barley bread, are now the ordinary food of the lower classes in Greece and the Archipelago. While the edible fig of commerce can be raised over the whole United States south of Philadelphia, fig culture was never considered a practical venture until a few years ago. American figs even in such a climate as California were shrunken and sour for the most part, and the dried Smyrna fig was still imported to the United States to the value of

about $700,000 a year. As the price of other kinds of native fruit decreased, because of overproduc¬ tion, many Californian orchardists and horticul¬ turists turned their attention to the fig, which is among the costliest of dried fruits, being valued at from $200 to $400 a ton in the New York market. Cuttings of the Smyrna fig were imported to this country as early as 1880, but the fruit proved shrunken and tasteless. It was found necessary to start from seedlings and for this process caprification (q.v.) was necessary. In 1891 a consignment of Blasto- phaga grossorum was brought to this country. It was received by James Shinn of Niles, Cal., who had planted a caprifig tree in his orchard as a hospice for the insects. He failed of suc¬ cess through the lateness of the season at which he made the experiment, which, however, was repeated by George C. Reeding of Fresno, Cal., who met with complete success, and now Smyrna figs are produced in California as large and highly sugared as those which can be imported.

A modern discovery of great importance to the fig industry is that insect-bearing capri- figs may be packed in boxes with alternate layers of figs and sand and so preserved through severe winters. Besides the caprifig and the Smyrna fig numerous other species are grown. Most of these attain an edible perfec¬ tion without the aid of pollen of the caprifig and without developing seeds. Of these Mis¬ sion figs bear two crops annually in California and most of the Southern States. The San Pedro figs, grown in the same regions, bear only one crop. The fig is propagated by bud¬ ding, grafting or by cuttings. Cuttings serve the purpose best and are usually made from the ripened wood of the previous season's growth. The tree is long-lived and requires about 40 feet each way to avoid crowding. In America the most extensive orchards are in California where the low rainfall permits the fruit to reach its full development. In this State are produced all the dried figs grown in America. The output is increasing steadily and

now exceeds 10,000,000 pounds annually. The canned-fig industry is assuming important pro¬ portions in the Gulf States within recent years. Consult Bailey, (Cyclopedia of Horticulture) (New York 1914) ; Van Velzer, (Fig Culture) (Houston, Tex., 1909) ; <(The Fig® (California Board of Horticulture, Sacramento 1890) ; <(The Fig® (Bulletin 9 of the United States De¬ partment of Agriculture, Division of Pomology, Washington 1901).

FIG-EATER, a beetle of the genus Allo- rhina, harmful to figs. See June Beetle.

FIG FERTILIZATION BY INSECTS.

It was known to the ancients, according to Pliny and others, that the cultivation of certain varieties of figs was dependent for fertilization (technically termed caprification) upon the friendly aid of a minute hymenopterous insect termed the fig-wasp (Blastophaga grossorum) . Beginning about 1890 numerous attempts were made to introduce the Smyrna and caprifigs in fig-growing sections of America. Recog¬ nizing our inability to fertilize the female varieties which were introduced, experiments were made with mechanical pollination the fol¬ lowing year on the Smyrna fig by Dr. Gustav Eisen. Attempts were then made to introduce the Blastophaga, but without success, until the United States Department of Agriculture suc¬ ceeded in establishing the insect in 1899 in the fig orchard of Geo. C. Reeding, at Fresno, Cal. The principle of the fertilization is that the Blastophaga in its native home in the Mediter¬ ranean region breeds naturally in the wild or caprifig. The Smyrna fig does not mature fruit unless the flowers are cross-pollinated by hand methods or through the agency of the Blastophaga, which carries pollen from the male caprifig to the female Smyrna fig, hence both the caprifig and the Blastophaga are necessary in order that the commercial fig bear edible fruit. The results of the introduction of this fig-fertilizing insects have exceeded the most sanguine expectations In 1900 a large crop of Smyrna figs were raised, dried and placed on the market and tests made by experts showed that California figs fully equal the im¬ ported product and that they contain a larger percentage of sugar, a superior flavor and are cleaner and more attractive in appearance. With this introduction a new horticultural in¬ dustry of great future value to the country has been established. Over 10,000,000 pounds of figs are produced annually in California. The United States Department of Agriculture has published much infprmation on this subject, two important papers being Howard's (Fig- culture in the United States > (1900) ; and

Eisen's, (The Fig, Its History, Culture and Curing) (1901). Consult also Bailey, (Standard Cyclopedia of Horticulture* (New York 1914) ; Van Velzer, (Fig Culture) (Houston, Tex., 1909) ; ((The Fig® (California Board of Horti¬ culture, Sacramento 1890).

FIG SHELL, the shell of several species of gastropods, so called from its shape. It is especially used to designate the shells of the genera Ficula and Pyrula.

FIGARO, fe'ga'ro', Le Nozze di, opera buffa in four acts by Wolfgang Amadeus Mozart (libretto by Lorenzo da Ponte after Beaumarchais' (

self suggested the use of the satirical comedy that had made all Europe its home and the success of the opera was from the first assured. The complicated plot, laid in Spain, tells of the cross-currents of intrigue of Count Almaviva with Susanna, the countess' maid, who is be¬ trothed to Figaro, the barber of Seville and of the countess with the page Cherubino. Figaro, becoming jealous of the count's actions, conspires with the countess and the other two to punish him for his love-making. Needless to say, he is pardoned and all ends merrily with the union of Figaro and Susanna. Mo¬ zart's treatment of the story lifts it far above the cynical atmosphere of the original text into a purer ether where it is invested with the poetic and delicate charm that Mozart's genius alone could create. The situations are vivid and picturesque and the delineation of character full of subtle touches. Figaro, the countess, Cherubino and Susanna are creations which stand upon their own feet and .breathe their own air, vitalized with the life and art perhaps of another day, but none the less reasonable and consistent. The music is one steady flow of motion and melody, an irresistible combina¬ tion of grace, serene beauty and musicianship. In spite of its age and the great intervening musical development, it has lost none of its freshness. In the first act, occurs Figaro's celebrated aria <(Non piu andai,® the effect of which at the first general rehearsal, was elec¬ trical, cast and orchestra calling out ((Brava, brava, Maestro ! Viva ! Viva ! il grande Mozart.® In the second act are the countess' aria (

Lewis M. Isaacs.

FIGEAC, J. J. Champollion. See Cham-

pollion-Figeac.

FIGEAC, fe'zhak', France, the capital of an arrondissement in the department of Lot, on the Orleans Railway, 45 miles east northeast of Cahors, on the Cele River. It contains several old houses of the 13th and 14th centuries, the church of Saint Sauveur, dating from the 12th century and 'Notre Dame du Puy of the same period. Figeac is the seat of a subprefect and has a tribunal de premier instance and a com¬ munal college. Its industries comprise brewing, printing, tanning, weaving and the manufacture of agricultural implements. It has also a large trade in cattle, wool and grain. The town grew up around a monastery founded here in the 8th century and for several centuries was the property of the monks. Pop. 5,808.

FIGGIS, John Neville, English clergyman and author: b. Brighton, 2 Oct. 1866. He was educated at Brighton College, Saint Catherine's College, Cambridge, Wells Theological College. In 1894-95 he was curate of Kettering and in 1895-98 at Great Saint Mary's, Cambridge. From 1895 to 1901 he lectured in Saint Cather¬ ine's College and was chaplain of Pembroke College in 1898-1900. In 1900 he was Birbeck

lecturer in Trinity College and from 1901 to 1907 was rector of Marnhull, Dorset. He was Noble lecturer at Harvard in 1911 and Bishop Paddock lecturer at the General Theological Seminary, New York, in 1913. In 1915 he was Bross lecturer at Lake Forest, Ill. Since 1909 he has been a member of the Community of the Resurrection. His publications include (The Divine Right of Kirfgs) (1896) ; (Illustra¬ tions of English History, 1660-1715) (1902); Christianity and History* (1904) ; (From Ger- son to Grotius) (1907) ; (The Gospel and Human Needs) (1909) ; (Religion and English Society * (1910); Civilization at the Cross

Roads1* 0912) ; (1914) Come Defects in Eng¬ lish Religion* (1916) ; (The Will to Freedom.1* lectures on Nietzsche (1917) and contributions to the Cambridge Modern History* ; with R. V. Laurence he edited Lord Acton's Cectures and Essays.1*

FIGHTING-FISH (Betta pugnax), a small fish of the climbing perch family (Ana – basidee) a native of the southeast of Asia, remarkable for its pugnacious propensities. In Siam these fishes are kept in glass globes for the purpose of fighting and extravagant gam¬ bling takes place on the result. When the fish is quiet its colors are dull, but when irritated it glows with metallic splendor. The king of Siam derives a considerable revenue from the licenses for fish-fights.

FIGHTING JOE HOOKER, a nickname popularly applied to Gen. Joseph Hooker (qv.).

FIGHTING PARSON, The, a nickname given to William Gannaway Brownlow (q.v.), in reference to the vigorous anti-secession leaders written by him for his newspaper, The Whig of Knoxville, Tenn.

FIGIG, fe-geg, a town of considerable importance in Morocco ; situated on the east bank of the Wady Zusfava, which separates Algeria from Morocco. Figig is several hun¬ dred miles from the seacoast.

FIGLINE, fe-lye'na', Italy, city of central Italy, 25 miles southeast of Florence on the Cerno. Straw hats and knives are manufac¬ tured and there is a brisk trade in oil, silk and wine. Nearby many fossil remains of the mastodon, hippopotamus, etc., have been found. Pop. 12,035.

FIGUEIRA (fe-ga'e-ra) DA FOZ, Portu¬ gal, a seaport in the district of Coimbra, on the Mondego River and on the Lisbon-Figueira and Guarda-Figueira railroads, 25 miles south¬ west of Coimbra. It has a large coast trade in grain, fruit, wine, oil and cork, but its port is hampered by a bar at the mouth. It has manufactures of glass and its climate and sea¬ bathing facilities attract a great number of summer visitors. It became a city in 1882. Pop. 6,221.

FIGUERAS, fe-ga'ras, Spain, town, 14 miles from the French frontier in a plain 21 miles north-northeast of Gerona. It is defended by a fortress, considered the strongest in Spain and the key to the Pyrenees. It is large enough to accommodate 16,000 soldiers. It has some manufactures, chief of which are woolen

and linen fabrics, leather, soap, corks, etc., and a trade in these and in grain, oil and liquors It has been four times in French occupation, in 1794, 1808, 1811 and 1823. Pop. 11,778.

FIGUERAS Y MORACAS, fe-ga'ras e md-ra'kas, Estanislao, Spanish statesman : b. Barcelona, 13 Nov. 1818; d. Madrid, 11 Nov. 1882. He studied law at Madrid and early in life began political activity in the Republican party. He was elected deputy from . Barcelona 1851, becoming a leader of his party, but was exiled for participation in the plot against Narvaez for a few months in 1867. After the fall of Queen Isabella he continued to oppose actively the restoration of the monarchy. Upon the abdication of Amadeus in 1873 he became president of the council of ministers, but after the restoration of the monarchy in December 1874, took no further part in public affairs.

FIGUEROA, fe-ga-ro'a, Francisco de,

Spanish poet: b. Alcala de Henares, 1540; d. 1620. He was called by his contemporaries ((the Divine Figueroa,® and at Rome he won the poet's crown. He wrrote verse with equal facil¬ ity and elegance in Castilian and Italian. When dying he burned all his verses ; but they were published — including the celebrated volumes of eclogues in blank verse, the (Tirsi* — from copies in the hands of his friends.

FIGUEROA, Francisco, Mexican annal¬ ist: b. Toluca 1730; d. City of Mexico 1800. He was a Franciscan priest and taught and lec¬ tured

acceptably, but his great service to litera¬ ture consisted in the compilation of materials for a history of Mexico, among them a his¬ tory of the Conquest of New Galicia,* by Mota Padrilla, besides diaries and letters.

FIGUEROA, Francisco Acuna (a-koon'- ya) de, Uruguayan poet: b. Montevideo, 1791; d. there, 6 Oct. 1862. A civil-service post afforded him leisure to prepare his (Poetic Mosaic) (1857), a verse collection, and his more notable Paraphrases of the Psalms1* ; and (The Toraidas,* a series of Paraguayan notes. He has been assigned a high rank by competent European critics; lofty inspiration and sonorous diction being his characteristics, as exemplified in the (National Hymn of Uru¬ guay.1*

FIGUIER, fe-gya, Guillaume Louis,

French scientist: b. Montpellier, 15 Feb. 1819; d. Paris, 12 Nov. 1894. He wˆas for a time pro¬ fessor in the School of Pharmacy of his native town, and in 1853 wras appointed to a post in a similar school at Paris. Among his works are Exposition et Histoire des Principals De-couvertes Scientifiques Modernes) (6th ed. 1862) ; (Histoire du Merveilleux dans les Temps Modernes1* (1859-62) ; E'Alchimie et les Alchimistes* ; (Vies des Savants Illustres depuis l'Antiquite jusqu'au XIX Siecle* (2d ed 1875) ; (Les Grandes Inventions) ; (Le Tab¬ leau de la Nature1* (1862-73); (Le Lendemain de la Mort) (10th ed. 1894) ; etc. Several of his works have been translated into English, in¬ cluding different sections of the

FIGULINE, potter's clay; also, ware made from potter's clay, especially pottery decorated with reliefs of natural objects.

FIGURE, in arithmetic, a character em¬ ployed to represent a number. The Arabic fig¬ ures are 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, by combina¬ tions of which any possible number can be rep¬ resented. In logic, the form of the syllogism with respect to the position of the middle term. In music, a form of melody or accompaniment maintained throughout the phrase in which it is suggested. In a melody, figure is called se¬ quence. In harmony, a figure relates to the rhythmical observance of a certain form in all the accompanying chords to the melody. Also a musical phrase, or a florid melody. See Notation.

FIGURE or FORM in philosophy. See Form.

FIGURED BASS, or THOROUGH¬ BASS, in music, a bass having the accompany¬ ing chords suggested by certain numbers above or below the notes. It is a satisfactory sys¬ tem of musical shorthand which originated in the 16th century. As a simple method for musicians to distinguish at sight the harmonies of extended compositions. The whole of the notes are not always indicated by a correspond¬ ing number of figures, because one number gen¬ erally implies two or more to complete the chord. When there is no figure, it is under¬ stood that the common chord of such a note is to be used as its harmony.

FIGUREHEAD, an image, either head or bust, placed at the prow of ships. Such figures were carved in wood in the days of wooden vessels, and there was generally some connec¬ tion between the figure and the name of the vessel. Thus, a vessel called the Lion would have at its prow a lion's head carved in wood and gilt. In modern vessels of iron and steel, with the usual straight stem, the old forms of figurehead, etc., have disappeared. Whenever ornamentation is now employed on the prow it is generally limited to a shield bearing a coat of arms, or scroll-work in gold, but the general tendency is to dispense writh such ornamenta¬ tion altogether.

FIJI (fe'je) or VITI (ve'te) ISLANDS, a large group of islands in the South Pacific, be¬ longing to Great Britain, situated between lat. 15° 48′ S. and 20° 4′ S. and between long. 177° 51′ E. and 178° 38′ E. There are 255 islands, great and small, of which about 80 are inhabited. The uninhabited islands scarcely rise above the level of the sea. Including Rotumah, which belongs to the same jurisdiction, they have an area of 7,435 square miles, of which the main island Viti Levu takes up 4,250 square miles, and Vanua Levu 2,600 square miles. Suva, on the south coast of Viti Levu, is the capital and has a fine natural harbor. The whole group is of coral formation, and all the islands seem origin¬ ally to have formed portions of Viti Levu, some of them probably of Vanua Levu. The conformation of the main island is volcanic and side by side with volcanic deposits are granite, diorite, gabbros and syenite. The silent cra¬ ters are most numerous in Taviuni. Among valuable metals found in the islands are gold, copper and iron. The. islands lie in the track of the monsoons, which blow strongly from April to November, rendering the islands ex¬ ceedingly healthy; there is an abundant rain¬ fall (109-112 inches), the maximum tempera¬ ture is 90° and it seldom falls below 60°, The

flora of the Fijis is very like that of the East Indian mainland. Up to the summits of the vol¬ canic peaks stretches a luxuriant growth of tropical vegetation. The forest has little under¬ wood, but abounds in

palms, tree ferns, bam¬ boo and orchids of tree-like dimensions. The fauna belongs to the south Australo-Polynesian group ; bats and rodents are the only mam¬ mals in the islands. There are about 50 species of birds, of which the most notable are doves and parrots. The native population is gradu¬ ally decreasing. The Fijians were once idola- tors, but since the arrival of English Wesleyan preachers in 1835 they have turned to Chris¬ tianity. There are 10,880 Roman Catholics in the islands and 84,185 Wesleyans. The princi¬ pal occupation of the people is agriculture; the sugar, maize and cocoa culture is prosperous, but cotton growing has declined. Tropical fruits are exported to Australia and New Zea¬ land. Many herds of swine run wild in the forests. Imports (1914) £911,274; exports,

£1,389,865. Revenue (1914) £279,845; exports, £301,351. In 1914, 143 vessels entered, of a total of 351,345 tons.

A disquieting feature in the life of the islands has been the decline in the native popu¬ lation, which has fallen from 150,000 to 87,000. The ravages of measles, typhus and dysentery operating in virgin soil, especially among in¬ fants, has brought about this decline, which is now, however, arrested. The natives, who be¬ long to the Malayo-Polynesian race, are of fine physique, muscular and athletic ; their language is Melanesian, with an admixture of Polynesian words. They are intensely conservative in habits and customs : the loin-cloth has not given place to pants ; they still fashion a tree- trunk into canoes and live in thatched huts just as their forefathers did. They are skilful navigators and expert potters. The greater part of the land is in their hands, one pecu¬ liarity of tenure being that ownership of fruit- trees and crops is held quite independently of ownership of the soil. The islands form an important link in the chain of British trade and influence in the Pacific, having steam communi¬ cation with Australasia, Samoa, Honolulu and Canada, and serve as links in the All-Red Cable Route between Australia and Canada.

Some of the Fiji Islands were discovered by Tasman in 1643; they were visited by Captain Cook in 1773; and explored by Dumont d'Ur¬ ville in 1827. They were constituted a British colony in 1874. The governor is assisted by a nominated executive council, and by a legisla¬ tive council, 11 of whom are officials and seven elective (including two natives). Pop. (1911) 139,341 (Europeans 3,707) ; estimated (1915) 155,167. Consult Cumming, (At Home in Fiji) (London 1887) ; Churchill, (The Polynesian Wanderings) (Washington 1911) ; Grimshaw, (Fiji and Its Possibilities5 (New York 1907) ; Thomson, (Fiji Past and Present5 ' (Melbourne 1899), and (The Fijians: A Study in the Decay of Custom5 (London 1908) ; Williams, (

Fiji and the Fijians5 (London 1870).

FILAMENT, in botany, the stem of a sta¬ men, supporting the anther. (See Flower). It is usually filiform, but sometimes curiously modified.

FILANDER, fi-lan'der, a small kangaroo (Macro pus bruni), native to New Guinea. It

was the first of the kangaroos (q.v.) known to Europeans.

FILANGIERI, fe-lan-ja'-re, Gaetano, Italian political economist: b. Naples, 18 Aug. 1752; cl. 21 July 1788. His great work, entitled c The Science of Legislation, } notwithstanding it was never completed according to his orig¬ inal design, attracted great attention, from its bold and original views and the liberality of its sentiments. In 1787 he was made a member of the supreme council of finance.

FILARETE, fe-la-ra'te, Antonio, or An¬ tonio Averulino, called Antonio de Firenze, Florentine sculptor: b. Florence, c. 1400 ; d. Rome, c. 1469. He worked under Ghiberti on the famous baptistery gates. Pope Eugene IV gave him a commission to make the bronze doors for Saint Peter's in Rome, and he began their execution about 1439, finishing them 1445, the whole being a feeble imitation of Ghiberti, in bad taste and entirely lacking in spontaneity. He also made a bronze reduction of the eques¬ trian statue of Marcus Aurelius for the Capi¬ tol, now at Dresden, and a mausoleum of the cardinal of Portugal, which disappeared in the 17th century. He is, however, more noted as an architect. Banished from Rome 1449, on the accusation of stealing relics, he entered the service of the Sforza family at Milan, draw¬ ing plans for a great hospital in the antique style, only one wing of which he finished. He is the author of a remarkable book, (Tratto di Architettura,) written before 1465, a treatise on architecture in 25 volumes, a sort of a verbose and finical romance, of which the motive is the construction of an ideal city, called Sforzinda. The undercurrent of the work is a mixture of pagan and Christian philosophy and ethics and an inculcation of didacticism in art.

FILARIA, long slender threadworms or Nematoda (q.v.), parasitic in man and other vertebrates. The species found in man para¬ sitize the connective and lymphatic tissues in the adult condition; their minute larvae (micro¬ filariae) produced in countless numbers, circu¬ late in the blood from which they are trans¬ ferred to new hosts by the

mosquito, or are discharged into standing water, as in the Guinea worm, and reach man again after a stage in small water animalcules (Cyclops).

FILARIASIS, fil-a -ri'a-sis, a group of dis¬ eases caused by nematode worms (see Nema¬ toda) of the genus Filaria, some species of which are parasitic in man and domestic ani¬ mals. The Filarice are very slender worms, mostly parasitic in subdermal connective tissue and in serous cavities. The developmental his¬ tory is not entirely elucidated, but they seem to undergo indirect development in the body of some crustacean or insect, species of mosquitoes notably serving as intermediary hosts. Under the term filarice sanguinis hominis, old authori¬ ties include the species F. bancrofti, F. diurna, and F. perstans, the last the parasite to which the sleeping-sickness of the negroes in Africa has been attributed. The most important one of these is F. bancrofti , whose numerous em¬ bryos enter the blood through the lymphatics, and are present at night in the blood, although usually absent in the daytime. This worm (the male) is about 1}4 inches long and from 1-10 to 1-12 of an inch broad. The female is al¬ most twice this size. This parasite may be pres¬

ent in the blood without giving rise to any symptoms, but frequently they block the lymph- channels and produce the conditions of elephan¬ tiasis. These forms of lymph-scrotum, and of hematochyluria, exist very extensively in Asia and Africa, and within recent years have been found in cities in the southern United States. (For lymph-scrotum and elephantiasis, see Elephantiasis). In hematochyluria the pa¬ tient, while in excellent health, suddenly passes a large amount of urine of a peculiar whitish or milky- whitish appearance, occasionally bloody; or frequently a fluid resembling chyle, which on settling shows the presence of a blood-clot. This chyluria seems to be intermittent, the pa¬ tient being well for weeks or months at a time, and then passing large quantities of this modi¬ fied urine. The embryos are to be found in this urine. Occasionally there are symptoms of un¬ easiness in the loins and lumbar region, but as a rule the general health is not affected. The treatment is prophylactic solely.

Another form of filariasis is ˆguinea-worm,® a disease produced by F. medinensis. It has been known from time immemorial, and it has been fancied that the plague of fiery serpents which afflicted the children of Israel in the wil¬ derness was really an irruption of such worms. This worm is thought to be bred in the body of some minute aquatic crustacean, as Cyclops , and thence to enter its final host, which may be the horse, dog, wildcat or jackal, as well as man, by the drinking of

the water. The form of dis¬ ease brought about by F. medinensis is ex¬ tremely common among African negroes. In certain provinces of India sometimes nearly one-half the entire population are affected; and it is known in Russia, Turkestan and Hindu¬ stan. The adult female worm usually finds its way into the subcutaneous connective tissue, generally in the lower extremities, especially in the feet or ankle. It has also been found in the arm, eyelid, tongue, perineum, scrotum and trunk. The presence of the worm is not ap¬ parent until it bores its way to the skin. Here it produces a painful swelling which later be¬ comes irritable and sore, and finally there de¬ velops a suppurating sinus. The worm may be expelled spontaneously from the sore, or it may be taken out in native fashion. F. loa is a sim¬ ilar species, limited in its distribution to the west coast of Africa, where it is not uncom¬ mon, and is introduced into man by means of drinking-water. It is an active worm, passing rapidly through the connective tissue, and is very frequently found in the region of the eye, where it bores its way to the conjuctival sur¬ face. Filaria loa was for a long time consid¬ ered a very rare human parasite but in the last ten years many cases of human infection by this wTorm have been described. Hitherto consid¬ ered a parasite invading the eye only it has been found in a number of other localities. In fact its presence may be anywhere in the con¬ nective tissues following the bite of an infected insect. It then bores through various tissues of the body, often giving rise to local swellings, named variously, Calabar swellings, etc., and may emerge from any part of the body. In as much as emergence from the eyeball makes a striking difficulty the idea originated that it was an eye parasite. The loa parasite is chiefly a native of Africa. It was introduced into the West Indies, and the chances are that with the

very active mingling of races incident to the World War there will be numerous cases in the United States. There are a number of minor filaria parasites the exact nature of which can be ascertained from monographs published.

Consult Stedman, (Reference Hand-Book Medical Sciences’* ; article, (Nematodes and Trematodes) ; Manson, (Tropical Diseases) ; Nuttall, (The Role of Insects, etc., in the Spread of Parasitic Disease) ; (Johns Hopkins Hospital Reports, Vol. VIII, No. 1) ; Braun, (Thierichen Parasiten) (1902).

FILBERT. See Hazlenut.

FILDES, fildz, Sir (Samuel) Luke, Eng¬ lish portrait and genre painter : b. Liverpool 1844. His first Academy picture was (Night- falP (1868), and among other pictures since then he has exhibited (The Loosened Team5 (1869) ; (Fair, Quiet, and Sweet Rest5 (1872) ;

(Simpletons5 (1873) ; applicants for Admis¬ sion to a Casual Ward5 (1874) ; (Betty5 (1875) ; (The Widower5 (1876) ; (Playmates 5 (1877) ; (The Return of the Penitent5 (1879) ; (The Village Wedding5 ; (Venetian Life5 ; (The Al-fresco Toilette5 ; (The Doctor5 (1892), and state portraits of King Edward and Queen Alexandra. Several of these, par¬ ticularly his famed (Casual Ward,5 show powers of realism in painting not unlike those of Dickens in fiction — for whom he illustrated (Edwin Drood5 — but his later works are more striking from their color-effects. He was knighted in 1906.

FILE-FISHES, the fishes of the plectog- nath family Monacanthidce, so-called from their skins being roughened by minute rough scales. The species are numerous, small, plain in color, herbivorous, lean and not good for food ; and are mainly found in the tropical seas. The best known American species is Alutera sch&pfii, which ranges as far north as Cape Cod, and often shows a decided orange tint upon its olive-gray sides. It reaches a length of 24 inches, as also does its relative the unicorn- fish (A. scripta) of the West Indies. A differ¬ ent and much smaller file-fish is the widely dis¬ tributed <(leather-fish55 or (

FILELFO, fe-lel'fo, Francesco, Italian philosopher: b. Tolentino 1398; d. 1481. His early studies in grammar, rhetoric and Latin were made at Padua. In 1417 he was invited to teach eloquence and moral philosophy at Venice. He acquired a great reputation and became in¬ timate with the leaders of literature and politics in Venice. In 1419 he was honored with the appointment as secretary to the Venetian consul-general at Constantinople. There he mastered the Greek language under Chryso- loras, whose daughter he married. He acquired a priceless collection of Greek manuscripts, which he brought to Italy in 1427. The re¬ mainder of his life was spent in lecturing in various cities, Bologna, Florence, Siena, Milan, in writing numerous works illustrating

authors, and in disputes with rival scholars. He did much for learning through his enthu¬ siasm for the ancient school and his collection of writings. Consult Rosmini, Carlo de', (Vita di Filelfo5 (Milan 1808) ; Symonds, J. H., (Renaissance in Italy5 (London 1877).

FILES AND FILE-MAKING. The file is a steel instrument with sharp ridges or teeth made by the indentations of a chisel, and used in cutting down and shaping metals or other hard substances. It is one of the oldest of hand tools. It is mentioned in the Old Testament scriptures, and probably came into use not very long after man began to work iron. Files were commonly made by hand until about 1850, when machine-made files became general. The first machine proposed for making files was suggested to the French Academy of Sciences in 1702, but it was not until 1812 that the first United States patent on a file-making machine appeared, being taken out by Morris P. Belknap. The files in ordinary uses are made of high- grade steel, from 6 to 14 inches in length being the most common sizes. The pointed end that fits into the wooden "handle is called a tang, and the corner formed by the junction of the tang to the body of the file is called the heel. Occa¬ sionally they are made with a tang at both ends. The cutting face or faces of a file are formed by the blows of a chisel struck in the file-blank, while the steel is still soft. The closeness and depth of these cuts determines the character of the file, as rough, middle-cut, bastard, second-cut, smooth and dead smooth. When the cuts are crossed so as to form teeth, as in the more common styles, it is a double¬ cut file. When the spacing between the chisel cuts is varied it is ˆincrement cut.55 Files are also named from their cross-section, as round (usually tapered, for enlarging holes), half- round, square or flat. Files for sharpening saws take their names from the kind of saw whose teeth they are shaped to fit, as cross¬ cut file, cant-saw file, pit-

saw file, etc. Dentists' files are made with the handle in the centre, and the filing surface on either end. They are styled bicuspid file, plug file, stump file, etc., according to use. A somewhat similar file, only larger, with bent ends, is called a riffler. The files most commonly used by comb-makers are called slitting and topper files.

Double or checkering files, used by cutlers, gunmakers, etc., are practically two files riveted together, with the cutting teeth so placed that one is half way ahead of the other. These are used to produce the checkered effect peculiar to gunstocks. The files used by watchmakers are exceedingly small, fine and delicate, many of them being of less section than a fine sewing needle, and about half the length. These are named according to the part of a watch or clock on which they are used, as clock-pinion file, balance-wheel file, barrel-hole file, etc. The file proper is not a rubbing or abrading tool, as many non-technical persons suppose, but a true cutting tool, whose teeth point in one direction, and which can be used effectively only in that direction, that is when pushed away from the user. The horseshoer's rubber and the ordinary rasp are kindred tools that perform their func¬ tion by being rubbed back and forth, but the file is not intended to be used in that way.

In the case of a rasp, a pointed tool is used

to indent the surface of the blank, and this raises prominences on the surface that make it useful as a rubbing or rasping tool. In making files, the blank is first stamped or drop-forged from a high-grade steel, inferior or blistered steel being usable only for rubbers. The file- blank in a soft, unannealed condition, is fixed on the reciprocating carriage of a file-making machine, on a surface of lead designed not to injure the cut side of a file when down. The blank is passed slowly forward under a re¬ ciprocating chisel, whose blows descend on the blank at distances determined by the speed at which the carriage moves. In a common type of machine the chisel is moved upward by a cam and thrown down to deliver its blow or cut by a powerful spring. The cuts may be deepened by running the blank through the ma¬ chine a second time. Old files may be recut in the same way. After the cutting, the file is hardened by tempering, and is then ready for use. In using a file the filer takes the handle in his right hand, with the back of the hand downward. He takes a firm hold of the point with the left hand, placing the thumb or ball of the thumb on top ; or he may reverse the

hands to rest his muscles. He advances the file, that is, pushes it away from him, with a parallel motion, bearing down as the file goes forward, and brings it back without pressure. The learner always has a tendency to see-saw or rock the file, which can be overcome only by practice. Unless the file is kept level, the surface cannot be cut down to a level. The use of the file in machine work has been much superseded during recent years by the introduc¬ tion of the emery wheel, operated by power, against which the work is held and ground down with much reduced labor. But the emery wheel will not accomplish a great many things that can be done with the hand file, hence its manufacture is not endangered by the increased use of the wheel. See Hardware Trade in America.

FILIBUSTERING IN LEGISLATION,

a term applied to the methods by which party or factional obstructionists delay the proceed¬ ings of a legislative assembly. These minority obstruction methods are usually effected by the interposition of dilatory motions, or through the refusal of members to answer to the roll or to vote, thus breaking a quorum. Before 1890, obstruction by dilatory motions had be¬ come a serious abuse, which was only remedied by the action of Speaker Reed refusing to entertain such motions. The rules of Congress as revised in 1911 declare that no dilatory mo¬ tion shall be entertained by the Speaker. See Legislation or Law-making ; Legislature.

FILIBUSTERS (Sp. corrupted from Dutch vrijbueter, our “freebooter”), originally the West Indian buccaneers; in the 19th cen¬ tury and now, any lawless band who attack a foreign country not at war with their own. Especially, the United States companies who used to make descents on the Spanish-Ameri- can states or colonies, either from personal ambition tempted by their anarchic state, or to annex them to the Union as slave territory. Burr’s Southwestern Empire was to have been the fruit of the most stupendous filibustering expedition of modern times (1806-07) ; Texas actually was the fruit of another, disguised as

colonization. The later ones, 1850-60, were all of the second type. One of their chief promot¬ ers was J. A. Quitman of Mississippi. In 1850 he aided the adventurer Lopez to fit out abortive expeditions to Cuba, for which both com¬ panions were arrested but acquitted. In Au¬ gust 1851 Lopez sailed from New Orleans with 500 men and landed in Cuba, but the Cubans would not rise. Lopez’s force was routed and scattered to the mountains, and he was caught and garroted. Pierce’s proclamation of 31 May 1854 showed that the government would

tolerate no more of this against Spanish territory ; Mexico was too strong to attack privately; and Central America being the only available North American section left, William Walker (q.v.) raised a California company in 1855 and as¬ sailed Nicaragua. He defeated the government troops, captured Granada the capital, executed his principal antagonists and set up a govern¬ ment recognized by Pierce, which re-established slavery and invited Southern immigration. But his performances raised an insurrection, helped by other Central American states, and by a United States corporation he had foolishly plundered, and he was driven out in April 1857. On a second expedition in November, he wTas seized and brought back; a third was stopped by the government; with a fourth he landed in Honduras, 27 June 1860, and was defeated, court-martialed and shot. There was no more filibustering till after the War; but from 1868 till the Spanish War of 1898 there was more or less, in co-operation with the Cubans. The most noted case was of the Virginias (q.v.) in 1873, which was captured by the Spaniards, and the commander, Fry, with 36 of the crew, were shot.

Filibustering enterprises when they meet with failure entail loss of life and of liberty, as well as denunciation from the nation in whose aid they were organized, whereas in case of success filibusters are acclaimed as national heroes.

Among modern filibusters may be mentioned Dr. Jameson (q.v.) and his raiders in South Africa in 1895. After having been condemned to death and to terms of imprisonment by the Boer government, they were eventually turned over to the English authorities for punishment, and taken to trial in London, where they were convicted and sentenced to terms of imprison¬ ment.

Perhaps the most noted filibuster in modern times was the Italian patriot Garibaldi (q.v.). In 1862 the Italian government was compelled to arrest him at Aspromonte in order to pre¬ vent him from carrying out his project of an armed expedition against the papal states, with which King Victor Emmanuel was then at peace, and in 1867, having managed to evade the watchfulness of the Italian authorities, he actually invaded the papal states, defeating the Pope's troops at Monte Rotonda, being after¬ ward himself routed at Mentana by the French military force that occupied Rome. For this violation of the Italian laws on the subject of filibustering he was arrested by the Italian gov¬ ernment after his retreat from Mentana and imprisoned for a time in the fortress of Ales¬ sandria. Other modern filibusters were M. De Mayrena, the Parisian clubman and counter¬ part of Alphonse Daudet's (Tartarin de

Tarascon,* who established himself as king of the Sedangs, and who died as such in his palace in the island of Tio-Man, in the Indo- China Seas; and the Franco- American soldier of fortune and Parisian journalist <(Baron® Harden Hickey, who figured for a time as prince and ruler of the island of Trinidad, on the Brazilian coast. See Buccaneers; Free¬ booter; Pirate. See also Filibustering in Legislation.

FILICAIA, fe-le-ca'ya, Vincenzo do, Ital¬ ian lyric poet : b. Florence, 30 Dec. 1642 ; d. there, 25 Sept. 1707. Some of his patriotic sonnets are famous ; but his verse, though not without beauty and spirit, is disfigured by the rhetorical tricks and false conceits of the period. An edition of his works appeared at Florence in 1864.

FILICALES, fil'i-ka'lez. See Fern.

FILIGREE GLASS, one of the kinds of ornamental glass for which Venice was for¬ merly celebrated, the manufacture of which has been recently revived. Small filigree canes of white and colored enamels are drawn, made of the required lengths, arranged in clusters in a cylindrical mold of the required shape, and then fused together. The canes are then aggre¬ gated by flint glass at a welding heat, and the mass twisted if a spiral ornament is desired. Vases or other objects are made of orna¬ mental masses of this glass, blown in the usual manner.

FILIGREE WORK, a kind of ornamental work in fine gold or silver wire, wrought deli¬ cately, and generally more or less varied by the intermixture of grains or small beads of the metal, and of bands, strips or bars, to give greater strength. An immense variety of pat¬ terns can be produced, the wire being made to assume the forms of arabesques, leaf-work, etc., the parts being joined together by gold or silver solder with the use of the blow-pipe. Work¬ ing in filigree is one of the most ancient and widely-spread arts. Specimens have been ob¬ tained from ancient Egyptian, Greek and Etrus¬ can tombs, and in various parts of Asia articles in filigree have been made from the remotest times down to the present day, as in China and India. In the latter country the wire-work bears much resemblance to the old Greek fili¬ gree. An exquisite frosted effect marks the surface of some of the Greek work. After the method »f producing this frosting had been lost it was revived or rediscovered. Greek filigree work was especially fine during the 4th or 5th centuries. Among the Celts, Anglo-Saxons and Scandinavians, excellent specimens of filigree were early produced,

being employed in such articles as bracelets, ear-rings, brooches, etc. Old Irish filigree work was of especially high quality, particularly during the 10th and 11th centuries. The Byzantine workers in filigree were also famous, and the influence of their work was widely felt in Europe during the Middle Ages, books, reliquaries, etc., being orna¬ mented in this manner. At Venice, and in sev¬ eral of the French and German towns, elegant specimens of this delicate art were manufac¬ tured as early as the 12th century. In the 17th century the art was carried to its highest per¬ fection in Italy. The Italian peasantry, as well as those of other countries, still produce filigree

work for personal adornment ; and the Malta filigree is world-famous. The Chinese filigree, made mostly of silver, has not the extraordinary delicacy of some of the Malay and other east¬ ern work. Filigree objects of great beauty of workmanship are produced in the United States.

FILIOQUE, fil-i-6'kwe («and from the Son®), a phrase inserted in the creed of Nicsea, or rather the Nioeo-Constantinopolitan creed, as an expression of the Catholic Church's teach¬ ing concerning the relation of the Third Per¬ son of the Holy Trinity to the Father and the Son. Before the insertion of Filioque that creed, in its Latin version, contained these words, Et in Spiritum Sanctum . . . qui ex

patre procedit (and in the Holy Ghost . . .

who proceeds from the Father). The addition of Filioque (and from the Son) after patre, appears to have been made first in the churches of Spain as early as 447 ; it was commanded by the Synod of Toledo 653. But the addition was not adopted or approved by the Roman Church till as late as the 9th century; this, not because the Filioque imported into the creed a doctrine not accepted in that Church, but simply because it was not considered wise to add any¬ thing to the ancient formula of Catholic be¬ lief. The Greek Church never accepted the addition till in the council of Florence, 1439, the large number of Greek bishops and metro¬ politans, with the patriach of Constantinople at their head, who attended that council, solemnly subscribed to the Nicaeo-Constanti- nopolitan symbolum as amended by insertion of Filioque, and thus effected, as they believed and as the Latin bishops believed, a reunion of the Eastern and Western Churches. At the same time the bishops representing the Latin Church in the same council, signed a solemn declaration that the formula which had been used by the Greeks, ˆproceeding from the Father through the Son® was thoroughly ortho¬ dox and consonant with the Filioque. The Greek Church itself did not ratify the action of its

representatives in the Florence council until 1452, when they were acknowledged and promul¬ gated in the church of Saint Sophia at Constan¬ tinople ; but in a council held by the Greeks in 1472 the acts of the council of Florence were formally repudiated, and the act of re-union canceled. The two churches have ever since been separate. (See Christian Doctrine, De¬ velopment of, and related references). Consult Ffoulkes, E. S., historical Account of the Addition of the Word Filioque to the Creed) (London 1867).

FILIPINO, fil-i- pe'-no, a native of the Philippine Islands. The Filipinos form a very mixed population, numbering in all about 8,000,000, and seem to represent almost every type of the human race. Some of the tribes have become more or less civilized, others live in the same barbarism as prevailed before the Spanish occupation. In the make-up of the composite Filipino, the darker substratum has been supplied by the Negrito, the Papuan, and the African negro. A copper tint has been added by the Malay and Polynesian. This in¬ fusion of fierce blood has given to the islanders their fighting qualities. There exist among them certain arts of life, and a skin of a paler hue, inherited from Japanese, Chinese and Cambodian sources. Hamite. Semite and Aryan

are each said by ethnologists to contribute some elements to the life, physical, intellectual and religious of this strange people, and two centuries of uninterrupted commerce between the archipelago and South America has intro¬ duced also a strain of American Indian blood into the Filipino race.

When we come to analyze the tribes, as far as they are at present known to scientific men, it appears that the Indios, the more or less civilized natives of the archipelago, divide themselves naturally into four groups, namely, Tagals, Vicols, Visayas and Llocanes. The Tagals are palpably the most advanced in the arts of life, and number about 1,500,000. Most of them live in the island of Luzon, preferring to settle in the low-lying plains, or near streams and on the seacoast. From Luzon they extend southward, in scattered groups, through Mindoro, Marinduque, and smaller islands farther south. They cultivate the soil, raise large quantities of rice and are bold and skilful fishermen ; and this active in¬ dustrious life shows itself in their vigorous physique and powers of endurance. The Taga- log language is more widely spoken than any other Filipino dialect. The Llocanes, who num¬ ber over 800,000, occupy territory in the ex¬ treme

northern peninsula of Luzon. They form but a small tribe, and seem to be distinguished from the Tagals merely by the dialect they use. The island of Visaya is wholly occupied by the tribe from which it takes its name, ana the Visayas are said to number some three millions and a quarter and to speak a distinct language which separates them from the other Malayan races of the archipelago. The Vicols number about 560,000 and are scattered over the Camarines peninsula, and occupy also the islands of Catanduanes, Burias, Ticao and a half of the Masbate. In physical type and habits of life they largely resemble the Tagals. The Sulu chain of islands, which stretches be¬ tween Mindanao and North Borneo, is peopled by the Moros, who are also found on the south¬ west coasts of Mindanao and Balabec, as well as on the south coast of Palawan, or Paragua Island. Their original seat was undoubtedly Borneo, from which they have derived their Mohammedan faith and most of their social usages. They have nothing in common with the peoples farther north and have stoutly resisted all attempts to Christianize them. They were once the fiercest pirates of the archipelago and lived by ravage and robbery. The natives of the northern islands, upon whom they once preyed, as they learned from the Spaniards the use of firearms and modern methods of war¬ fare, were able successfully to repel the raids of the Moros, whose primitive weapons could not cope with repeating rifles and Gatling guns.

As the mountains are the last refuge of liberty in a conquered country, so also are they the last lurking place of savagery and barbar¬ ism. The interior of Luzon and several other islands is mountainous and uncultivated; here lurk the savage tribes whom 200 years of Span¬ ish rule failed to civilize or even subdue. These are reckoned at half a million souls, have many languages and dialects, and are in greatest force among the mountain fastnesses of central Mindanao. While some of these tribes are peaceful and inclined to commerce and industry,

a large section shows the warlike spirit that urges them to live on rapine. The Negritos, or Little Negroes, dwell in the higher ranges of Luzon and Negro; they are black in skin, and dwarfish in stature; they are of low mentality, incapable of assimilation and are evidently doomed to early extinction.

The Spaniards appear to have done very little to investigate the antiquities of the Filipino races. There is a vast field of exploration open to ethnologists and archaeologists in this re¬ markable archipelago, which possesses a liter¬ ature of its own in poetry and

folk-lore, and has derived from Malay and Indian invaders such arts as metallurgy and weaving, in both of which arts many of the tribes are exceed¬ ingly expert. The ethnologists of the Smith¬ sonian Institution have already turned their at¬ tention in this direction, and the United States Treasury Department is putting every possible facility in the way of those who are trying to unravel the story of the savage navigators who first cruised in the channels of the Philippine archipelago. (See Philippines). Consult Saw¬ yer, F. C, 'The Inhabitants of the Philippines > (London 1900) ; Worcester, D. C., 'The Philip¬ pines, Past and Present* (2 vols., New York 1914) ; and (The Philippine Islands and their People) (New York 1898) ; and the publications of the Ethnological Bureau of Washington.

FILIPPI, fe-lip'pe, Filippo de, Italian ex¬ plorer: b. Turin, April 1869. Becoming a mem¬ ber of the Alpine Club he made several Alpine ascents and accompanied the Abruzzi expedi¬ tion to Alaska, of which he later wrote the narrative. He accompanied the Duke of Abruzzi to Ruwenzori, Africa, in 1906 and five years later went to Kashmir. He published accounts of these expeditions and in 1913-14 organized a second expedition to Kashmir.

FILITE. See Explosives.

FILIX. See Fern, Male.

FILLANS, James, Scottish sculptor: b. Wilsontown, Lanarkshire, 27 March 1808; d. Glasgow, 12 Sept. 1852. After acquiring some local celebrity in Paisley by his portrait-busts, he proceeded to Glasgow. He subsequently visited Paris to improve himself in his art and in 1836 took up his abode in London. A life-size group in marble, the 'Blind Teaching the Blind,* was exhibited by him in Glasgow and produced a great sensation. Other admir¬ able works of his are 'The Boy and Fawn,* a statue of Sir James Shaw (in Kilmarnock) and a bust of Professor Wilson.

FILLE DE MADAME ANGOT, fey de

ma'dam on'gd, La. Opera bouffe in three acts by Charles Lecocq (libretto by Clairville, Siraudin and Konig) first produced at Brus¬ sels in November 1872 and shortly thereafter at Paris. With this operetta Lecocq placed himself well in the forefront of the group of gifted men, of whom Jacques Offenbach was the leader who contributed so much to the gaiety of the Second Empire. Indeed the music was so lively, clever and characteristic and made such a hit (the original production ran 500 consecutive nights), that Offenbach's laurels seemed to be

endangered. The plot, laid in Paris, in the period of the French Revolution, is chiefly concerned with the doings of Clairettc, child of the market and daughter

of the late Madame Angot and Ange Pitou, a revolutionary street singer, whose political songs invariably get him into trouble. Their paths cross those of Larivaudiere, a powerful police official and Mile. Lange, comedienne and favorite of Barras. But all the complications are at last happily disentangled in a more than ordinarily coherent manner. There is not a dull page of music in the score and many of the numbers are familiar even to those who have never heard a performance of the oper¬ etta. The couplets that tell the story of Madame Angot (((Marchande de maree®) and the Revolutionary song (((Jadis les rois, race proscrite®), in the first act, the charming sen¬ timental duet of Clairette and Mile. Lange, the irresistible chorus of conspirators (((Quand on conspire®) and the waltz finale of the second and in the third act the sparkling quarrel coup¬ lets (<(Ah! e'est done toi®) of Clairette and Mile. Lange and the <(Mme. Angot was my mother® are only a few of the many bright numbers.

Lewis M. Isaacs.

FILLE DU REGIMENT, La. See

Daughter of the Regiment, The.

FILLET. (1) In ordinary language, a nar¬ row band of metal linen, or ribbon worn round the head. Sacred fillets were those worn by the priests of Greece and Rome. Also por¬ tions of meat or fish removed from the bone and served either flat or rolled together and tied. (2) In architecture a ' small flat face or band used principally between moldings to separate them from each other in classical architecture ; in the Gothic, Early English, or decorated styles of architecture, it is also used on larger moldings and shafts. Also the pro¬ jection between the flutes of a column. (3) In anatomy, that part of the sensory nervous tract lying in its passage from the decussation of the sensory columns to the internal capsule. Disease or disturbance of the fillet usually re¬ sults in a form of generalized anaesthesia. See Hemianesthesia; Hemiplegia.

FILLEY, Chauncey Ives, American poli¬ tical} : b. Lansingburg, N. Y., 17 Oct. 1829. He received a private and academic education and

entered commercial life as a clerk. He de¬ signed and controlled his own pottery patterns and became the largest importer and distributor of queensware in the Mississippi Valley. He became interested in politics and was a delegate to the Republican National Conventions from 1864 to 1896 and was a member of the National Committee of his party in 1876-92. In 1863-65 he was mayor of Saint Louis and was a member of the convention which abolished slavery in that State. In 1873-78 he was post¬ master of Saint Louis. He did much to im¬ prove the politics of his city and State.

FILLMORE, Millard, American states¬ man, 13th President of the United States: b. Summer Hill, Cayuga County, N. Y., 7 Feb. 1800; d. Buffalo, 8 March 1874. He was de¬ scended from New England parentage and reared to the hard life of a frontier farm in western New York. He studied law at Buffalo and began the practice of his profession in 1827 in the neighboring town of Aurora. In 1830 he moved to Buffalo and formed, with Nathan K. Hall and Solomon G. Haven, a law partnership which soon became well-known

throughout the region. But he had already served two years in the New York legislature and identified himself with the repeal of the harsh law of the State for the imprisonment of debtors. In 1832 he was sent to the national House of Representatives as a follower of Henry Clay. During the next decade he alter¬ nated between membership in the House and the work of his profession, building all the while a state-wide reputation as a political leader. As a result of the ˆlandslide® of 1840 he found himself in Congress and chairman of the House committee of ways and means and as such he drew the tariff bill of 1842 which became a law and also set in motion the free trade influences of the lower South. He was thus a representative of the industrial and finan¬ cial interests of the North against which the South and West made an alliance in the presi¬ dential campaign of 1844. He became a candi¬ date for the governorship of New York upon the retirement of William H. Seward in 1844 and was defeated by Silas Wright, the demo¬ cratic candidate. Three years later he was elected comptroller of the State of New York from which office he was chosen in 1848 to be a candidate for the vice-presidency with Gen¬ eral Taylor. Taylor and Fillmore were elected. By this time a sharp difference of opinion be¬ tween the Seward and the Fillmore men had developed. Seward, Weed and Greeley labored hard and long to gain the favor of the new President. They were successful. Fillmore naturally tended to a closer support of Clay, who manifested a hearty ill will toward Taylor. Fillmore was inaugurated vice-president in March 1849; Seward became a member of the Senate in December following. The division in the Whig party of New York was typical of

the larger division in the party as a whole. When President Taylor took a vigorous stand against the threats of Southern leaders to secede in 1849-50, Seward and most of the Northern Whigs supported him and seemed ready to take the chance of civil war. But Fillmore drew still nearer to Clay and the southern Whigs, endeavoring to avoid conflict by compromise. Thus when Congress took up the problem of restricting slavery in the territories acquired from Mexico, the administration took one view while the great leaders of the party in Con¬ gress took another. Fillmore's position as pres¬ ident of the Senate was, therefore, very diffi¬ cult. After several months of debate and an ap¬ parently complete deadlock, President Taylor suddenly died. Fillmore succeeded to the pres¬ idency on 9 July 1850. The Taylor cabinet promptly resigned. A new one was formed with Webster at its head. Clay was now in close touch with the administration, if he did not actually advise and direct its course. There was no longer a question of the peaceable solu¬ tion of the pending issues. Clay, Webster, Fillmore and the Southern Whigs, aided bv the Northern Democrats, arranged for the admis¬ sion of California, the organization of New Mexico, the payment of the Texan claims, the prohibition of the slave trade in the District of Columbia and the return of fugitive slaves. Although Clay died two years later the popular hero of the compromise struggle, Webster and Fillmore lost standing in the North. When the next Whig convention met, Fillmore en¬ deavored to secure the nomination for the pres-

idency. Webster's friends pressed his claims, but Seward and the irate Northern Whigs would not permit either nomination. The for- eign policy of the Fillmore administration was strong and vigorously American, although it was not expansionist like so many others of that period. Fillmore indicated to Europe very plainly that American ideals were still strongly democratic through Webster's famous Hulse- man letter in which the government of Austria was told that the people of the United States always sympathized with democratic revolu¬ tions, especially with the Hungarian uprising against government imposed from without. There has never been a stronger presentation of the American attitude than that put forth by Fillmore and Webster in 1852. At the close of the administration Fillmore returned to Buffalo

where he spent the remainder of his life ex¬ cept two or three prolonged visits to Europe. In 1856 the American or Know Nothing party nominated him for the presidency but he re¬ ceived only a small popular vote and the one electoral vote of a single State, Maryland. He and his supporters in the North, men like Ed¬ ward Everett and Robert Winthrop, were known as the Silver Grey or Cotton Whigs. But when President-elect Lincoln passed through Buffalo on his way to Washington in 1861 Fillmore was chosen to greet him on be¬ half of the city. Nor was there ever any question of his loyalty to the cause of the Union. There is no good life of Fillmore, al¬ though a great many of his papers have been published in volumes X and XI of the Buffalo Historical Society publications. Consult also Rhodes, J. F., (History of the United States* (Vol. I), and Bancroft, Frederic, (Life of Wil¬ liam H. Seward* (Vol. I).

William E. Dodd,

Professor of History, University of Chicago.

FILM, a transparent, flexible substance used as a substitute for glass plates for port¬ able photographic work. It consists of a strip of celluloid which is treated with a sensitized coating, the same as is used on plates. (See Photography). The strip is wound on rollers and so placed in the camera that it may be unwound from one roller, exposed, and rolled on another. The ordinary photographic film is made from liquid cellulose, formed by dis¬ solving gun-cotton in amylacetate or other solvent. It can be made in any length desired by stripping the liquid from polished sur¬ face by a revolving wheel. The introduction of the photo-picture gave a great impetus to the manufacture of photographic films; and much experimenting had been done in 1917 with a view to producing a non-inflammable film. Though the object had not been attained the quality of the films produced had been improved.

FILMER, Sir Robert, English political writer of the Caroline age: d. 1653. He was educated at Trinity College, Cambridge, and be¬ came an active Royalist. He wrote in advo¬ cacy of the divine right of kings and was knighted by Charles I. His uncompromising de¬ fense of absolutism made him a marked man and his views were strongly controverted by Algernon Sidney and Locke. Undoubtedly his most important work is (Patriarcha; or the Natural Power of Kings) (1680).

FILMY FERNS. See Ferns and Fern Allies, Filicales (7).

FILON, f e-lon, Auguste, French historian: b. Paris, France, 7 June

1800; d. there, 1 Dec. 1875. A commanding point of view and allur¬ ing style are conspicuous throughout his Com¬ parative History of France and England* (1832) ; (The Spiritual Power in its Relations with the State* (1844) ; (History of the Roman Senate* (1850) ; History of the Athenian Democracy* (1854); and several other im¬ portant historical works.

FILON, Pierre Marie Augustin, French critic: b. 1841. He is the son of A. Fiion (q.v.), and was tutor of the Prince Imperial 1867-70. He is the author of (Guy Paton* (1862) ; (Les manages de Londres* (1875) ;

‘ Histoire de la litterature anglaise* (1883) ;

(Prosper Merimee* (1894) ; (English Profiles* ; cLe Theatre anglais* (1896) • cDe Dumas a Rostand* (1898) ; (La caricature en Angle-terre* (1902).

FILTER and FILTRATION. In chem¬ ical technology the process of filtration consists in passing a liquid through a porous or fibrous body such as paper, cloth, felt, or biscuit pot¬ tery, for the purpose of removing certain solid substances from the liquid. In chemical analy¬ sis in the wet way, filtration is resorted to con¬ tinually, in order to separate precipitates from the liquids in which they are floating. The filters used for this purpose consist of sheets of a special kind of bibulous paper, which con¬ sist of almost absolutely pure cellulose, so that it will leave practically no ash when burned. The precipitate, when it has all been deposited upon the filter paper, and has been thoroughly washed, is transferred, together with the paper, to a platinum crucible, in which it is heated until the paper has become entirely burned away, and nothing is left but the precipitate that is to be weighed. Gelatinous precipitates filter very slowly, and for this reason it is usual for chemists to pay careful attention to such little details of manipulation as tend to cause the precipitate to take as granular a form as possible, so that the filtration may be per¬ formed rapidly. When the object of the filtra¬ tion is merely to remove solid particles that are suspended in a liquid, and it is the liquid and not the solids which is important, other mate¬ rials than paper are often used as filtering media with advantage. Thus the liquid may be passed through plugs of asbestos fibres, or of glass wool, these particular substances being very useful when the liquid to be filtered is of a corrosive nature, like a strong mineral acid. Filter <(stones** are in common use in chemical factories. These are of pottery make, the clay being mixed with sawdust or cork filings. When the stones are (

filters, exposing a very large area of filtering material at once in a small space. Rapid filtra¬ tion is also accomplished by centrifugal motion, the revolving drum being lined with paper or cloth, as may be needed. When it is desired to remove such minute bodies as bacteria from a liquid in which they are suspended, it is com¬ mon to pass the liquid through a solid septum of unglazed porcelain, though it has been found that nearly all such bodies can be re¬ moved by filtration through a sufficiently thick mass of sand. Cities which must obtain their drinking water from rivers polluted by sewage from other towns and cities are now supplied with water of very good quality by filtering the river water through beds of sand several feet in thickness, and statistics, in such cases, have shown that the installation of such filtration plants is often attended by a remarkable de¬ crease in the death rate from typhoid fever and other diseases the germs of which may be conveyed by drinking water. See Water Sup¬ ply.

FILTER PRESSES, a combination of a filter or filters with a press. Their purpose is to hasten the process of filtration. The force is applied by hand, steam, electric or water power according to the design, size and capacity of the press. Cheese and cider presses are in reality forms of filter presses. Compressed air is used to operate presses dealing with matter contain¬ ing a high percentage of water.

FILUM AQU.£E. See Riparian Rights.

FIMBRIA, Gaius Flavius, Roman sol¬ dier : d. 84 b.c. In 86 b.c. he was sent as legate to L. Valerius Flaccus in Asia but quarreled with his chief soon after his arrival, and in the latter's absence caused a revolt among the army and killed Flaccus in Nicomedia. Fimbria now placed himself at the head of the army and led it against Mithridates against whom he ob¬ tained several successes, shutting him up in Pitane. Fimbria was a violent partisan of Marius and treated with great severity all who sided with Sulla or resisted Roman arms. He gained admission to Ilium by ruse, massacred the citizens and burned the town. Sulla crossed to Asia in 84 b.c., made peace with Mithridates, and then led a campaign against Fimbria, who, seeing himself hemmed in, committed suicide. See Marius; Sulla.

FIMBRIATED, in heraldry, a term ap¬ plied to an ordinary with a border of different hue.

FIN DE SIECLE, fan de si-a’kl («the end of the century®), supposed to particularly mark the close of the 19th century, regarded as a period of emancipation from the tradi¬ tional moral and social state of disorder.

FINALE, .fe-na’le (

FINALE NELL’ EMILIA, nel’la-me’ly’a, Italy, a city of Modena, 25 miles northeast of the city of that name, and on the Panaro River. Silk manufacturing is the chief industry. There is a considerable trade in cattle and agri¬ cultural products. Pop. 13,422.

FINANCIAL PROBLEMS OF THE WORLD WAR. The financial problems cre¬ ated by the war naturally divide themselves into four classes, each of which has to be dealt with in the light of the immediate circumstances under which the problems arose. The problems which were believed, before the war began, to be inevitable in case such a war should occur, make up the first of these four classes. The problems which actually arose for instantaneous solution, and in extremely urgent form, at the moment when the war broke out, come second ; they differed in many respects from what had been predicted. Into the third class fall the practical problems which arose from time to time as the actual task for providing for the financial needs of war developed. These prob¬ lems to a greater or lesser extent changed their shape as the war continued, and were depend¬ ent, both in their origin and in their character, on the actual events of the war itself. Finally there come up for consideration the problems, financial and economic as well as social and political, which confronted practically the whole world on return of peace.

The question, what problems would have to be met in case of war between the first class European Powers, had been seriously consid¬ ered and carefully discussed in financial circles during a generation “before 1914. So far as they had been outlined, the main questions which suggested themselves were those which would affect international commerce, interna¬ tional exchange and the home and international money markets. It seemed probable in advance that such a war would be fought very largely on the sea, with the navy of each belligerent power destroying the merchant ships of its an¬ tagonists, and that this would largely destroy international commerce until one side or the other, as a result of protracted sea fights- — a process which occupied a considerable series of years in the Napoleonic wars — should have destroyed the enemy fleet and gained control of the ocean.

It appeared to be inevitable that bankruptcies on a portentous scale would occur in every country engaged in international finance (not¬ ably England) as a result of inability by bank¬ ing houses to collect their immense mass of foreign credits while their home liabilities were coming to maturity. This of itself, it was imagined beforehand, would make the financ¬ ing of war on a modern scale a task of supreme difficulty; in addition to which, the cost of such a war under modern conditions would be beyond the powers even of a solvent money market to sustain for any great length of time. Recourse to fiat money, on a scale never wit¬ nessed in previous history, appeared therefore to be an inevitable consequence. One of the corollaries from this argument was that neutral countries, dependent in a financial and economic way on such belligerent countries as England, France or Germany, would be financially ruined, not only by the shutting off of supplies to which they were accustomed, but by the sudden recall of capital from them by the belligerent markets. Actually, experience proved that these expectations were in each case to a certain extent and in some form real¬ ized, but not in the least to the degree which had been anticipated.

When the war actually did break out, the

problem of international trade was settled al¬ most immediately by the refusal of the German navy to fight, and by the consequent complete control of the seas by the British navy, after a few German raiders had been captured or de¬ stroyed. The problem of international ex¬ change, however, of the assets and liabilities of concerns doing an international business, be¬ came at once a most formidable problem for all financial markets. It was especially so at London, whose investments in bills of exchange payable by enemy bankers and merchants were of immense magnitude; but it also affected every other market doing an international business.

The stock exchanges were instantly and very powerfully affected; first because, so long as any stock exchange dealing in the securities of foreign countries remained freely open for business, it would be possible for the enemy or his agents to sell on that market stocks held by them, and to convert them into money; but, second, because merchants and bankers, con¬ fronted with loss of the funds due them on foreign account, would be driven to realize in their own stock markets on their own holdings of negotiable securities. The whole

compli¬ cated structure of finance was threatened with collapse as a consequence, and the problem called for instantaneous solution.

The solution consisted first in the adoption of a ˆmoratorium® on payment of debts. In countries affected by these conditions payment of certain maturing obligations was by law de¬ ferred to a future date. Next, notably in the case of England,, the matter was dealt with through the assumption by the National Bank of non-collectible foreign bills of international bankers, the government pledging its own credit to support the bank in the matter. The mora¬ torium on debts lasted in most cases only dur¬ ing a few months. The assumption of non¬ collectible bills of exchange continued through¬ out the war.

In addition to these expedients, and indeed in advance of them, the London Stock Ex¬ change was closed down. Further liquidation of securities, whether by home or foreign holders, and further demoralization of prices were thereby prevented, and this was followed by similar action on the part of all other stock exchanges in the world, whether located at belligerent or neutral centres. That action pro¬ vided a temporary solution of one problem of the neutrals ; for there had been apprehension, not only of enemy markets selling securities on stock exchanges of belligerents, but of belligerents selling on neutral stock exchanges. But the direct recall of capital in the form of bank credits from neutral markets became at once an extremely disquieting problem. The first result, in the case especially of the United States, was an export of gold, even before the declaration of war, which threatened to exhaust New York bank reserves.

Then, while control of the seas for a week or so was in doubt and gold could consequently not be shipped, exchange rates of the neutral markets on Europe — especially New York ex¬ change — rose to quite unprecedented heights, measuring the urgency of demand for remit¬ tance of capital to belligerent markets. When the ocean highway was available again,

practically all neutral markets established a moratorium on payments for their own ac¬ count. The United States was the conspicuous exception. There was only a brief period of hestitation, after which the bankers of this country united to provide all the gold which should be required to meet the markets and maturing foreign obligations.

There remained for solution in the bellig¬ erent states the problem of money hoarding and of disappearance of currency. This was instantly met by issues of paper money, some¬ times (as in England) under government auspices, sometimes (as in Germany) through so-called

((loan bureaus,® to whose notes the government gave the right to circulate as money.

These various drastic measures were of a purely protective character. They met, as they were designed to meet, the problems which were instantaneously created by the outbreak of the war and the breakdown of international finance. All markets, after passing with these emergency safeguards through the period of immediate panic, regained a certain stability; in virtue of which they proceeded, in due course, to deal with the equally grave problems which arose as the economic situation and the gov¬ ernmental requirements for war on its present scale unfolded themselves. The problems which then arose — some of them at once, others not until after two or three years of exhausting economic strain — had to do in the main with the following considerations.

How was the money to be raised to pay the expenses of war on the present enormous scale? How were the currencies of the various states to be managed in order to maintain the circulating medium, to prevent the exhaustion of gold supplies, and at the same time to facili¬ tate financial operations of such magnitude as were foreshadowed? What would be the result, whether on ordinary trade or on the prices of materials, of governmental requisitions from productive industry for war purposes ; requisi¬ tions which presently rose to an almost un¬ believable magnitude? What would happen to the transportation industry and its usual cus¬ tomers, on land or on sea, when governments were using the railways to move troops and military supplies, and were seizing merchant ships to act as naval convoys? Finally, how would the world be provided with food, when some of the most populous states were de¬ pendent on imports from foreign producing countries, and yet when some of the largest grain producers, such as Russia, were shut off from other markets through the enemy's block¬ ade, when the supply of farm labor in every belligerent state was depleted by military con¬ scription, and when some of the most fertile districts of continental Europe were being devastated by the hostile armies?

These questions, though by no means com¬ prising the whole of the difficulties created by the war, may be taken as fairlyˆ summing up the main problems which arose in the course of the war itself, and as a result of the steadily increasing absorption of financial, physical and industrial energies in providing means for prosecuting the war. In meeting the war ex¬ penditure, all of the belligerent nations relied on loans to an extent wholly unprecedented in

history. Prior to this war the largest loan ever raised in a single and limited subscription pe¬ riod was the $300,000,000 British government loan in the second year of the Boer War in 1901. In February 1917 England placed a loan of $4,900,000,000, and the United States in the autumn of 1918 opened subscriptions for the $6,000,000,000 loan to be taken within three weeks.

It was roughly estimated toward the end of 1918 that the total governmental indebtedness of all belligerent states, which had been $27,- 000,000,000 in 1914, had risen to $180,000,000,000. These enormous requisitions were partly facil¬ itated through virtual prohibition by govern¬ ments of any other issues of new securities in their markets. Since as much as $1,300,000,000 had been thus invested in all sorts of miscel¬ laneous securities at London during a single year in the period before the war, this con¬ servation of investment capital naturally helped. But when the war expenditure subsequently got as high as $12,480,000,000 in England for the fiscal year ending 31 March 1918, with $24,000,000,000 planned for the fiscal year 1919 in the United States, other resources had to be discovered.

Some nations, notably France and Russia, borrowed heavily from the national banks on security of new government obligations ; the Bank of France reporting at one time $4,000,- 000,000 in loans thus outstanding to the govern¬ ment. But in the main, the loan flotations were effected through the immense number of in¬ dividual subscribers who drew to the extent of their ability on their own accruing income and other accumulated savings. In the first Ameri¬ can war loan 4,000,000 separate subscriptions were received; in the second loan, 9,400,000; in the third, 18,308,000.

In cases where certain governments were unable to raise the necessary loans, or where their purchases of war material in foreign countries made payment through exchange a practical difficulty, advances were made by one belligerent government to its own allies on a scale never imagined in the period of <(Pitt's subsidies. Such advances by the English and United States governments had by the autumn of 1918 exceeded $7,000,000,000 apiece. Along with the raising of loans came a wholly un¬ precedented increase in taxes; the United States raising one-third of its war costs in that way; England something like 16 per cent of them. Even Germany, after endeavoring during the first year or

two of war to finance its whole war expenditure through loans, was driven to a similarly rapid increase in the taxes.

The paper currencies of the belligerent states were enormously increased. In France, largely through issue of notes against new government obligations, outstanding circulation increased from $1,330,000,000 at the beeinning of the war to $6,000,000,000 in 1918. That of the Bank of Russia rose from $1,160,000,000 on 30 July 1914 to $9,100,000,000 at the time of the Boishevik revolution in the autumn of 1917. How much was issued under the Bolsheviki is a matter of pure conjecture.

The Imperial Bank of Germany's note is¬ sues increased from $470,000,000 in 1914 to $3,200,000,000 in the middle of 1918, and in addition, the German loan bureaus established

for the war issued $2,500,000,000 of their own notes. In England a special issue of paper money through the banks, known as "currency notes,)} reached in the autumn of 1918 a total of $1,358,000,000. In the case of England, a gold reserve was maintained against these notes, though the total amount of that reserve did not change after 1915, and the Bank of Eng¬ land continued to issue its notes only against an equivalent reserve of gold. Gold payments were suspended entirely by belligerent states on the European continent. But both Germany and France made special appeals to their people in 1915 to turn over gold to the government in exchange for notes ; with the remarkable result of adding some $250,000,000 to the gold reserves in the hands of each nation.

In all belligerent countries, the problem of the rise in prices for materials was met through establishment of maximum prices by the gov¬ ernment; this policy being strenuously applied in the case of materials bought by government for war purposes, and in the case of food. Generally, these prices were adjusted some¬ where near the figures reached through the rise of nearly 100 per cent in average prices on the markets during the early years of war. They were designed primarily to prevent further speculative advance in prices and to obstruct the withholding of products by the producers themselves with a view to a higher price.

Even in the United States, maximum prices thus established for wheat and steel, for in¬ stance, were higher than any prices reached in those markets for any length of time between the Civil War period and the outbreak of this war. Along with this fixing of maximum prices, all belligerent nations and many of the neutrals adopted systems of

restricting the dis¬ tribution of supplies of such materials. This policy was adopted most stringently in the case of fuel ; the general view being that the gov¬ ernment's needs must first be absolutely en¬ sured, and that thereafter the needs of private consumers should be equitably adjusted.

The transportation problem early became acute. Railways in continental Europe were al¬ ready controlled by the state. In England such control was assumed within two months of the outbreak of hostilities, and the United States government took similar action regarding the American railways in December 1917, eight months after its own entry into the war. In both the United States and England this public control was based on a system of compensation whereby earnings of the railways during the three-year period preceding the war were guar¬ anteed by the government. The British govern¬ ment did not explicitly commit itself to the re¬ turn of railways to their owners after the war. The Railway Control bill passed in the United States Congress provided for such return 18 months after the proclamation of peace.

As for ocean transportation, it became neces¬ sary, particularly during the later years of the war, for belligerent governments with access to the sea to apply restrictions on essential and non-essential export and import of freight. This necessity arose not only because of the extensive use of existing shipping facilities for transportation of government material, but more especially because of the actual shortage

of such facilities, after the wholesale destruc¬ tion of Allied merchant vessels by German sub¬ marines had begun.

Regulation of exports to neutral countries from England began early in the war, being then based on the program for blockading Germany, and having as its immediate purpose the preventing of reshipment, through the neutral countries into Germany, of supplies ac¬ quired from England. After its own entry into the war the United States pursued a similar policy, which by that time had the further justification of the shortage both of supplies and of ship room. In the meantime, both Eng¬ land and the United States devoted themselves to construction of new merchant ships on a scale never witnessed in the history of the shipping industry.

The problem of food proved to be one of the most difficult of all. It became acute in 1917 and the early part of 1918; its less aggra¬ vated form in the earlier years of war being due to special reasons. In the two years men¬ tioned, not only had wheat harvests of the largest producing countries turned out deficient, but shortage of ships had made it impracticable to transport wheat from distant producers like Australia to the European market. In some countries, Germany in particular, actual ration¬ ing of the supply of flour and bread was adopted by the government. In all belligerent countries the situation was met by the required use of substitutes for wheat, and by compul¬ sory observance of certain days on which wheat should not be sold or eaten. Similar restric¬ tions were subsequently applied to consumption of meat, sugar and other foodstuffs. In both England and the United States, and by all other producing belligerents, distribution of foodstuffs from producer to market was placed in the hands of a government commission.

These expedients, especially the reduction in consumption through the restrictive regula¬ tions, served to meet the emergency. In 1914 and 1915 the United States had raised grain harvests far beyond any precedent in its his¬ tory ; it was this which postponed until later in the war any actual Mood crisis® of the Entente Allies. But the American wheat harvests of 1916 and 1917 were not only 30 to 40 per cent below the yield of the two previous years, but were actually below the average of recent years preceding them, and it was not until the raising of another American wheat crop in 1918, sec¬ ond in magnitude only to that of 1915, that the strain relaxed. Meantime, however, and despite the maximum price fixed for wheat, most urgent efforts were made to stimulate the planting of new wheat acreage by farmers in every wheat producing country. The result of this propaganda was seen in the autumn of 1918, when England's acreage under grain, and its average yield of crops, were the largest in 40 years, and when the results in Continental countries, except in the actual area of warfare, were better than in any preceding season since the first year of the war.

The economic and financial problems which arose on conclusion of the war, and as a result of the war, belong in a class apart. To attempt to state with exactitude their nature and the probable solution of them would be as futile as the predictions regarding war-time

problems, made before 1914, have already turned out to be. It was felt, indeed, that some post-bellum problems would arise which could not have been foreseen at all beforehand. Ex¬ perience of the war itself, however, converged interest and discussion on the following

definite problems as certain to arise in that period :

(1) Management of the enormous war debts of . the. belligerent governments — a question which involves the possibility of repudiation in some countries ; in others the possibility of a “levy on private capital® heavy enough to pay off all or a good part of the principal of the debt. Interest on the war debt in one or two belligerent countries already equals the entire public revenue of such countries in the year before the war.

(2) Reduction of the paper currency where excessive inflation has prevailed, and resump¬ tion of gold payments ; reforms which have al¬ ways been slow and difficult of achievement in the past.

(3) Readjustment of prices, in cases where such prices have been raised to abnormal heights through the war, demands of govern¬ ment on products of a given industry or (as in grain) through the cutting-off of previous large sources of supply by the war itself.

(4) Readjustment of the wages of labor, where those wages have been abnormally ad¬ vanced through demand for workers in new war industries or through curtailment of the labor supply by army conscription. If wages were not adjusted then the problem of indus¬ try’s adjustment to such a scale of wages under peace-time conditions would remain. This whole question was naturally affected by the resump¬ tion or prohibition of emigration from one country to another, and by the extent to which the industrial employment of women in war¬ time, to replace men, turned out to have been temporary or permanent.

(5) Problems peculiar to international trade, when some of the largest exporting states of the period before the war were partly or en¬ tirely cut off from their previous export market, and when neutral states, or partial belligerents like Japan, largely assumed the task of supply¬ ing the important countries. The question of after-war competition between different export¬ ing markets, which of itself had to do with the question of labor and wages in the different countries, was connected with this.

(6) The largest problem of all ; the extent to which, in control of railways, telegraphs and other enterprises in regulation of prices, pro¬ duction, distribution and consumption, and in actual ownership of facilities, governments re¬ tained after the war the immensely increased powers necessarily granted to them during the period of war.

Alexander D. Noyes, Financial Editor, New York Evening Post.

FINBACK, a whalebone whale of the genus Balcenoptera, having the dorsal fin, which in most whales is small or altogether wanting, well-developed. This genus is widely distrib¬ uted and contains a number of species, which include the largest cetaceans known. The spe¬ cial finback or (

etc. Despite their huge size, finbacks yield so little oil, and such inferior quality of whale¬ bone that they are little sought for.

FINCH, Francis Miles, American poet and jurist: b. Ithaca, N. Y., 9 June 1827; d. there, 31 July 1907. lie was graduated at Yale; and wrote the well-known lyrics (Nathan Hale* and (The Blue and the Gray,* and a popular college song beginning (Floating away like the fountain's spray. *

FINCH, Heneage, 1 sr Earl of Aylesford : b. about 1647 ; d. 1719. He was the second son of Heneage Finch, first Earl of Nottingham. Educated at Christ Church, Oxford, he was ad¬ mitted as a barrister of the Inner Temple. He soon became known as the author of various reports of celebrated trials and other legal tracts. He was appointed king's counsel in 1677, solicitor-general in 1679, and entered Par¬ liament as member for the University of Ox¬ ford in the same year. He was deprived of his solicitor-generalship by James II, and two years later pleaded as leading counsel on the side of the seven bishops. He represented Guildford in Parliament in 1685, the University of Oxford in the Convention Parliament of 1689-90, and in all subsequent ones until his promotion to the peerage in 1703, as Baron Guernsey, when he became a member of the privy council. On the accession of George I he became Earl of Aylesford, and chancellor of the Duchy of Lancaster, which office he resigned in 1716. Consult Burnet, (History of His Own Time) (ed. 1823, Vol. II, pp. 106, 397) ; Collins, (Peer-age> (ed. 1779, Vol. IV, p. 316).

FINCH, William Albert, American law¬ yer and author: b. Newark, N. J., 1855; d. 1912. In 1880 he was graduated at Cornell University and in the same year entered on the practice of law at Ithaca, N. Y. From 1891 to 1912 he held the professorship of law at Cornell University. He was widely recognized as an expert in the law of real property. He published (Finch's Selected Cases Qn the Law of Property and Land,*

and (The Law of Property and Land — A Syllabus.)

FINCH, one of the small, seed-eating birds, typical of the family Fringillidoe (q.v.). The term as now commonly used refers to the smaller, more ornately dressed genera and species, and especially to those generally kept as cage-birds, as the canary, chaffinch, gold¬ finch, hawfinch, greenfinch (qq.v.), and similar well-known kinds of the Old World. In the United States the name is reserved for the American goldfinch and its greenish relative of the north, the pinefinch; for the purple finch (q.v.), the rosy finches of the genus Leucosticte ; the housefinch (q.v.) of California; and especially for the small gaudily colored southern birds of the genus Cyanospizci, represented in the Northern States by the indi¬ go-bird (q.v.). In these little seed-eaters, such as the nonpareil (C . ciris), the lazuli finch (C. amcena), and the Mexican varied (C. versi¬ color), the plumage of the male abounds in the richest tints of changeable blue and green, varied by other colors in pleasing contrast. All utter sweet and varied notes, and are prized not onty as garden visitors but as cage-birds. The name is also commonly given in the northeast¬ ern United States to the **(grassfinch,*** more properly a sparrow (PoocceUs gramineus), a

brown bird which breeds and spends its life in open fields, singing most sweetly at dusk, and easily recognized by the fact that when it takes flight it exhibits a white feather on each side of the tail.

FINCH-FALCON, one of the genus (Mi – crohierax) of tiny falcons, or ˆfalconets,® of the East Indies. One, Microhierax coerulescens, is found in the Himalayas and Burmese coun¬ tries. Not one of these little hawks is seven inches in length ; they are said to be used by native chiefs for hawking insects and button quails, being thrown from the hand like a ball. They sit solitary on high trees, and, according to native accounts, feed on small birds and insects.

FINCHLEY, England, an urban district of Middlesex, about five miles northwest of Lon¬ don on the Great Northern Railway. It is situated at an elevation of over 300 feet and this has helped to make it popular as a resi- dental district. Finchley Common was formerly the resort of highwaymen, such as Dick Turpin and Jack Sheppard. The Common has not been preserved, its site being now occupied by build¬ ings. The district owns and operates an elec¬ tric-lighting plant. Pop. 39,419.

FINCK, fink, Henry Theophilus, Amer¬ ican musical critic : b. Bethel, Mo., 22 Sept. 1854. He was graduated at Harvard in 1876; and from 1878 to 1881 studied physiological psychology at Berlin, Heidelberg

and Vienna. In 1876 he attended the Bayreuth Festival, of which he wrote accounts for newspapers and magazines. In 1881 he became musical critic of the New York Evening Post, and entered upon his long propaganda for Wagner's music, be¬ coming the leading American advocate of that composer's theories. His works include (Wag¬ ner and His Works* ; (Romantic Love and Personal Beauty) (1887) ; (The Pacific Coast Scenic Tour) (1890); Chopin, and Other Musical Essays) ; (Lotos Time in Japan) (1895) ; (Spain and Morocco) ; (1900) ; (Eduard Grieg) (1905) ;

(Massenet and His Operas) (1910) ; (Henry Strauss; The Man and His Works) (1917), etc.

FINDLATER, Andrew, English encyclo¬ paedist: b. Aberdour, 1810; d. Edinburgh, 1 Jan. 1885. He was educated at the University of Aberdeen, and for a time studied with the view of entering the ministry. In 1853 he en¬ tered the publishing house of W. and R. Chambers, Edinburgh, for whom he prepared a revised edition of Unformation for the People) (1857). His success in this work caused him to be selected as editor of Cham¬ bers' Encyclopaedia,* and the character of this work bears throughout the impress of his di¬ recting hand. He contributed to the work sev¬ eral important articles. He was employed on the encyclopaedia until 1868, and in 1874 he edited a revised edition. He also edited other works of the same firm and was a regular con¬ tributor of the Scotsman. He retired in 1877, but remained a consulting editor of the Messrs. Chambers. Aberdeen University conferred on him the degree of LL.D. in 1864.

FINDLAY, George Gillanders, English educator and Biblical scholar: b. 3 Jan. 1849. He was educated at Wesley College, Sheffield,

SONG FINCHES

9 Hawfinch

2 Greenfinch

l Linnet

4 Chaffinch

5 Mountain Finch

Richmond Theological College, and London University, being graduated at the last named institution in 1867. In 1870-74 he was assistant tutor at Headingley College, from 1874 to 1881 classical tutor at Richmond, and after 1881 tutor of exegesis and classics at Headingley. He retired in 1917. He published several com¬ mentaries on Saint Paul's Epistles in the Expositor's Bible,* 'The Expositor's Greek Testament,* etc.; also 'The Church 'of Christ in the New Testament (1893) ; 'Christian Doctrine and Morals) (1894) ; 'The Books of the Prophets and their Historical Succession (3 vols., 1896-1907) ; 'Sermons on the Things Above* (1902) ; 'Fellowship in the Life Eter¬ nal * ; 'An Exposition of the Epistles of Saint John ; 'Life of William F. Moulton (1910) ; 'Wesley's World Parish, * etc.

FINDLAY, Ohio, city and county-seat of Hancock County, Ohio, on the Toledo and Ohio Central, the Lake Erie and Western and other railroads, 44 miles south of Toledo. It is in the heart of the oil and gas fields of Ohio. It con¬ tains Findlay College, electric lights, electric railroads, several banks, and numerous daily, weekly and monthly periodicals. Findlay is widely known on account of its phenomenal yield of natural gas. In November 1888 the Tippecanoe gas well was drilled and yielded 31,000,000 cubic feet of gas per day. In the vicinity are rich beds of clay and large de¬ posits of gravel and sand. There are manu¬ factories of glass, pressed bricks, furniture, wooden implements, nails, and an oil refinery', machine shops, foundries, extensive potteries and rolling-mills, and manufactories of auto¬ mobiles, traction ditchers, electric insulators, gloves, shoes, etc. Settled in 1813, Findlay was first incorporated in 1837. The government, under a charter of 1902, is administered by a mayor, chosen biennially, a city council and members of public safety and service. The waterworks are owned and operated by the municipality. Pop. (1920) 17,021.

FINDLAY COLLEGE, a coeducational institution in Findlay, Ohio ; founded in 1882 under the auspices of the Church of God; re¬ ported at the close of 1915 : Professors and in¬ structors, 19 ; students, 531 ; volumes in the library, 6,125.

FINE, Henry Burchard, American mathe¬ matician : b. Chambersburg, Pa., 14 Sept. 1858. He was graduated at Princeton in 1880 and re¬ ceived the degree of Ph.D. at the University of Leipzig in 1885. Since 1881 he has been connected with the faculty of mathematics of Princeton, successively as tutor 1881-84, assistant professor 1885-90, Dod professor of mathematics since 1891, dean of the faculty 1903-13, and dean of the department of science since 1911. He was president of the American Mathematical So¬ ciety in 1911-12. He published

‘Euclid’s Ele¬ ments* (1891); ‘Number System of Algebra) (2d ed., 1903) ; ‘College Algebra* (1904) ; ‘Co¬ ordinate Geometry, } in collaboration with H. D. Thompson (1909).

FINE (in criminal laze). In modern usage, a pecuniary penalty imposed by a legal tribunal o* an offender as a punishment. The term originated in England about the 13th century, when criminals were allowed to shorten the terms of their imprisonment by paying a des¬

ignated sum of money into court. From early days in England until recently it had been the usual practice, under the common-law rules, when a prisoner was sentenced to pay a fine, to include in the judgment an order that he be committed to jail until the fine be paid. This practice, either by the rules of the common law or by statutes, subject to constitutional limita¬ tions, has been continued in the United States. The maximum amount of fines for specific of¬ fenses is usually fixed by statute, but within certain limits it is often discretionary. Fre¬ quently a fine is an alternate to a term of im¬ prisonment, at the discretion of the presiding judge. On failure to pay the fine, the prisoner is ordinarily, in most of the jurisdictions in the United States, committed to the penitentiary or the county jail. x\fter payment of the fine, the prisoner is entitled to an immediate discharge. Excessive fines are prohibited by the Eighth Amendment to the Federal Constitution, and whether a fine is excessive or not is a question of law for the court to determine. Various State statutes fixing heavy fines for different offenses have been declared void by the Federal courts of the United States, from time to time, on the ground that such statutes came within the above-named constitutional prohibition. In some States, by statute or by common law, a fine may be enforced by execution against the property of the defendant, but in other States a fine can be enforced only by imprisonment. At common law and in the absence of statutory- prohibition, a commitment of an offender until the fine be paid may be for an indefinite period if the fine be not paid, and this has been held not to be in violation of a constitutional pro¬ vision against indefinite imprisonment. In some States offenders who have been convicted and fined may be compelled to pay it by working on a public improvement or by being hired out to private individuals, on the basis usually of credit at a certain rate per day.

FINE (probably from Latin finis, “end**), in English law, formerly signified “an income or a sum of money paid at the entrance of a tenant into his land ; a sum paid for the renewal of a lease; and an assurance by matter of record founded on a supposed previously existing right. In every fine which was the compromise of a fictitious

suit, and resemble the transactio of the Romans, there was a suit supposed, in which the person who was to recover the thing was called the plaintiff conusee or recognizee, and the person who parted with the thing the de- forceant, conusor or recognizor. Besides the specific uses above referred to, fine has the sig¬ nification in general law, in America as well as in Europe, of a pecuniary penalty exacted either in punishment of, or in compensation for, an offense, whether committed against an individ¬ ual, in contravention of the laws of the com¬ munity, or against the community itself. Fines in this sense are of very ancient origin, and have been sanctioned by the practice of all na¬ tions, ancient and modern, from the lowest to the highest degree of civilization. In the earlier stages of society fines form, for an obvious rea¬ son, one of the principal modes of punishment. Prisons and artificial restraints impose a bur¬ den on society which it is not yet able to bear, and demand an organization which it has not reached. There remain only fines, corporal

chastisements and death. The last is suited only for the gravest offenses; the second is rendered impracticable in the case of many of¬ fenses by the dignity of the offenders; the first in many others by their impecuniosity.

In the most civilized nations of antiquity, Greece and Rome, fines were numerous and fre¬ quently excessive. In the early period fines were imposed in cattle, the highest amount of the mulcta or damnum being 2 oxen and 30 sheep. The ancient Germans, being a people who highly valued freedom, admitted hardly any punishments but fines, and their influence extended the use of this penalty among other European nations. A murder was commuted by a payment to the family of the deceased. In the ancient French law fines were divided into two classes, according as they were fixed by law or left to the discretion. This distinc¬ tion has been abolished since the Revolution by the fixing of maximum and minimum limits for all fines. In England the common law recog¬ nizes fines, but does not determine their amount, and this is usually fixed in particular statutes, with a discretion to the judge. The rule in Eng¬ land from an early period, and which was in¬ corporated in Magna Charta, was that no man should be amerced beyond his circumstances and personal estate, leaving to the landowner his land, to the merchant his stock and to the husbandman his wainage or team and instru¬ ments of husbandry.

The fine, as distinct from an amercement assessed by a jury, originated in English law as a means of purchasing freedom from a sentence of imprisonment. The alternative of fine or imprisonment is still in common use for the punishment of misdemeanors and imprisonment for a relatively brief period is often adjudged for the non-payment of a fine.

FINE ARTS is the generic term for those arts intended primarily to affect the emotions, such as sculpture, painting, music, etc., as dis¬ tinguished from the useful arts which serve the physical needs of life. Art in general may be defined as the exercise of human activity for the accomplishment of a predetermined end; or more specifically, an exercise of the creative faculty or imagination according to rules deter¬ mined by experience or laid down by science. (See Art). The useful arts are those whose works are intended to serve some practical end or material need of man — that is, for a pur¬ pose external to themselves. The fine arts are, on the other hand, those whose products are created to be contemplated or enjoyed, that is for a purpose which ends in the works them¬ selves. A picture is painted for its own sake, not to be used as an instrument of some activ¬ ity, but to be looked at ; the emotions it arouses terminate, as it were, in the picture, which is itself the object of interest: it is a work of fine art. The same is true of a sym¬ phony or of a song, of a poem or of a drama, of a statue or of a noble building. Each is a work of fine art; apart from any practical or utilitarian end, each appeals to the aesthetic emotions, and these emotions, thus aroused, con¬ stantly direct the attention to the work which called them into action. In this sense the work exists for and by itself. There is a broad field to which we may assign all that large class of works which, although primarily intended for

use, are at the same time objects of beauty. All rich and beautiful work in furniture, pot¬ tery, metal-work, textile fabrics, bookbindings, vases and the like, upon which the designer and craftsman have bestowed their efforts in order to make them appeal to the sense of beauty in the beholder, are so far works of fine art. There is no distinctive name for these arts which thus combine the character of useful art' and fine art. They may be called the industrial arts, but this term is quite as often used to designate the useful arts gener¬ ally, while the classification of the decorative arts includes various arts associated with archi¬ tecture which, since the purpose of their prod¬ ucts terminates in themselves, or in the struc¬ tures of which they are a part, are properly classed among the fine arts : such are mosaic and stained glass. Architecture stands on the borderland of both domains, being the noblest of the useful arts, and yet, in all those elements in which the architect seeks after pure beauty as distinguished from mere

utility or fitness, entering into the field of the fine arts, and sum¬ moning painting and sculpture to serve it as sister arts. Those, then, of the decorative arts which are applied to the beautifying of useful objects, may properly be called the industrial decorative arts. (See Interior Decoration). Under this classification would be included all decorative weaving, textile work and basketry ; decorative metal-work in iron and bronze, silver and gold, etc., applied to the adornment of implements or furniture; decorative woodwork in furniture, including wood inlay; and all deco¬ rative pottery and ceramics. When, however, any of these arts is applied to the decoration of permanent or immovable structures instead of movable objects, they become ancillary to architecture, and are often called ((the allied arts® or (

Literature as a fine art comprises all those kinds of writing in which beauty of language and of literary form is aimed at, taking on often an importance equal to that of the substance of the writing, as in much lyric poetry. Poetry, elo¬ quence or oratory and the drama, and some¬ times fiction, belong in the domain of literary fine art. But inasmuch as all writing is con¬ ceived primarily as a means of information and of communicating ideas, and is addressed to the intellect quite as much as to the aesthetic emotions, literature is always classed apart from the other fine arts. See Belles-Lettres.

Besides the major fine arts — painting, sculp¬ ture, architecture and music — there are certain minor arts which minister to the lower forms of aesthetic pleasure. Dancing belongs in this category, when practised not as a social diver¬ sion, but as an artistic sequence of beautiful and rhythmic movements, as in the ancient Greek choral dances, the modern Samoan dances, the operatic ballet, folk-dances and other forms of the art made familiar to us by Russian and American performers. Fire¬ works are also a form of fine art, having no other purpose than to delight the aesthetic sense by beautiful combinations of luminous form and color. Whether, therefore, a given work belongs among the ((pure® or ˆindependent® or <(major® fine arts, or the decorative arts, is really a question of how far it has been created for its own sake, and how far its artistic value

FINE ARTS

Rotunda Panels in the State Education Building, Albany, N. Y. Mura*. Paintings, Copyright by Will H. Low

1 ARCHITECTURE. The standing figure, typifying Architecture, with compasses in hand, studies upon a scroll before her the proportions of the Corinthian capital in which order of architecture the Education

Building is designed. Her left knee, upraised, rests lightly upon a slab covering a basket, recalling the legend by which Callimachos, an architect of Corinth, having lost his daughter, placed upon her grave a basket containing objects for her journey beyond the Styx, covering it with a tile to preserve it from the weather. On visiting her grave he found an acanthus had grown up around the basket in so graceful a manner that it suggested to him the design of the Corinthian capital

2 MUSIC. Standing erect before a harp over which her fingers stray, the figure of Music is shown upon a carpeted terrace, to denote the near proximity of a house, as music is essentially an art of indoors, while, as the most modern manifestation of the arts, as music is now understood, her cost! me suggests a less classic form than the figures in the other panels

•

and merit can be dissociated from the object or structure which it embellishes. Thus the sculptures of the Parthenon pediments, although ostensibly created as decorations for a temple, are really of such surpassing merit as works of sculpture, quite apart from their architectural setting, that they are universally recognized as masterpieces of pure sculpture. On the other hand, the charming figures of nymphs of the Seine carved in low relief by Jean Goujon, in the Fountain of the Innocents in Paris, are so evidently designed for the special places they occupy in that structure and lose so much of their value and significance when detached from it, that they are universally recognized as master¬ pieces of decorative art.

The Appeal of the Fine Arts. — In the ap¬ peal which works of fine art make to the emo¬ tions there is nearly always a large element more or less purely intellectual, which must be distinguished from the purely aesthetic quality of the work. Thus a picture represents a scene or an episode ; a poem tells a story or extols a religious or moral conception ; a statue pre¬ sents the effigy of a hero, or the embodiment in allegorical form of some abstract conception ; a song expresses an idea of love, patriotism or war; a building excites admiration by its bold construction and logical planning. Each of these works addresses itself in these particulars rather to the mind than directly to the feelings. In judging them, therefore, purely as works of fine art, we must eliminate the element of purely intellectual satisfaction from our

judg¬ ment in order to weigh correctly the purely aesthetic excellence of the work. A picture aesthetically beautiful may be uninteresting from the intellectual point of view. Still more often does it happen that a picture appeals power¬ fully to the reason, and even reaches the emo¬ tions through the intellect, and is nevertheless totally lacking in aesthetic excellence, as is often the case with political cartoons and clever caricatures. Its appeal is primarily to the in¬ telligence, and the emotions which are aroused as the final but secondary result are moral and intellectual emotions rather than aesthetic. The appeal of a work of fine art to the aesthetic emotions is the direct appeal of beauty of form or color, harmony, rhythm, balance, proportion, movement. It is often difficult to distinguish between the direct aesthetic effect of a work of art and its indirect appeal through the intellect, but the distinction is important in any close analysis or detailed criticism, and the failure to recognize it is the root of many erroneous judgments and criticisms by writers on art. This error is frequent in Ruskin's writings, for in¬ stance, where moral and intellectual apprecia¬ tions often dominate what are advanced as purely aesthetic judgments. See Criticism.

It does not, however, by any means follow that those are the highest forms of art which appeal most exclusively to the aesthetic sense. Dancing and pyrotechny are completely free from intellectual and non-artistic elements, but they can hardly be classed as the highest forms of art. Intellectual satisfaction is a natural accompaniment of the pleasure we experience in many forms of art; and, other things being equal, the higher the form and grade of the work the higher will be the intellectual satis¬ faction experienced. The artist who can at once

touch our deepest emotions and appeal to our highest intelligence while he delights our aes¬ thetic sensibilities, has reached a higher plane of art than one whose work makes no such intellectual impression. And while it is true that any philosophical analysis must make the distinctions above set forth, it is also true that the spectator seldom or never makes them, and is in no wise called upon to do so. The phil¬ osophical analysis of art is one thing, the sub¬ jective enjoyment of it is another. The total impression it makes is very complex, and not easy to divide into its constituent elements.

Principles and Technic. — The underlying principles of all the fine arts are the same ; the application and development of these principles vary with the art, its medium of expression, the purpose of the work, the personality of the artist, the time and place in which he lives and many other circumstances. The particular method of the application

and development of the underlying principles in a given form of art constitute its technic ; the shape and direc¬ tion imposed upon this technic by external con¬ ditions of time and place, and the resulting characteristics or habits and manner of design, constitute its style. It is of course impossible to lay down in a brief expose like the present article the laws which are recognized as com¬ mon to all the arts. We can only observe that they relate to composition, which deals with the general plan of the work and the relations of its various parts in that plan or scheme, deter¬ mining the sequence, balance, proportion and rhythm both of the whole and of its parts ; and to expression or the manner in which the under¬ lying sentiment, conception or idea of the work is developed and made clear and effective.

Composition. — In every perfect work of art, whether of music, poetry, drama, painting, sculpture or architecture, there should be a fundamental theme, a dominant idea or concep¬ tion which controls the whole, giving coherence and significance to all its parts. The aesthetic conception is to be distinguished from the subject of the work, since a noble subject may be made commonplace by inadequate aesthetic treatment, and a commonplace subject exalted by the way it has been handled by a superior artist. In giving form to the underlying con¬ ception the artist must secure predominant unity of character or spirit, harmony in the assem¬ blage and relation of all the parts, and such variety in details as to avoid the danger of wearisome monotony and secure that pleasur¬ able aesthetic emotion which comes from changes not too rapid or violent. This variety may, and generally should, introduce the element of contrast, but discreetly, so as not to destroy the harmony and general unity of the whole. Proportion should be just, giving to each part and to the whole suitable relative amounts and dimensions; and the whole work should possess both rhythm and balance. Balance is equilib¬ rium between features or groups of features, an equilibrium of size, of intensity of color or tone, of importance or of accent; rhythm is the ordered succession of variations of accent or emphasis. There are those who believe that in all the great works of fine art, “pure® or “decorative,® these qualities have been secured by the application of secret mathematical for¬ mulae, but this contention, despite the ingenuity

and learning of its supporters, is not as yet generally accepted by critics and artists.

Expression depends, as has already been said, upon many elements — the sentiment or conception to be expressed, the medium of ex¬ pression, the technical resources of the art, and the personality of the artist being the chief. Music is peculiarly expressive of moods, of emotions apart from definite mental concepts; poetry of lofty moral and spiritual ideas ; paint¬ ing of the beauty of nature as interpreted through the artist's personality; architecture of sublimity, splendor, grace and elegance revealed in the triumph of mind over matter; sculpture of feeling revealed in the form and attitude of living beings. Each art has its own range and capacity for expressing feelings, emotions and definite ideas which it carries over from the mind of the interpreting artist to that of the spectator or listener, so that expression is al¬ ways measured by impression. In general, if the inquiry be limited to the strictly aesthetic field, what is expressed is not a categorical idea capable of statement as a proposition, but rather an abstract emotion, sentiment, or quality, as of grandeur, elegance, power, sublimity, grace, pathos or the like. In works of repre¬ sentative art, such as painting and sculpture, fidelity to nature enters largely into this power of expression. This is a different thing from the photographic mimicry of nature which is sometimes admired by undisciplined minds, and which often characterizes the periods of de¬ cline in the history of art. This close mimicry is an affair of skilful technic, not of high art. To paint a key hanging on a nail so that the spectator shall mistake it for a real key is clever painting, but not high art. A great painting is one which seizes most completely and con¬ veys through the eyes to the soul most effec¬ tively the essential truth, the deep underlying aspects of a scene, subordinating to this end whatever details would interfere with the force and completeness of this impression. These aspects and this impression must first exist in and possess the artist's mind ; he can put into his work only what he himself possesses; he must be himself inspired if his work is to be inspiring, for a truly great work cannot be pro¬ duced by accident, nor by an inferior artist. Great works of art may be marked by flaw¬ less technical execution, but this perfection of technic is not essential to their greatness. It is, indeed, oftener found in decadent art than in the periods of greatest inspiration ; for it is when inspiration flags that technical finish be¬ gins to be exalted into the place of first im¬ portance.

Style. — However various the moods, emo¬ tions and conceptions of artists of different races and ages, and however manifold the forms in which they are expressed, the men of any one land or period are in general so conditioned by like circumstances and environment, by simi¬ larity of customs, traditions and education, ideals and

aspirations, and even by popular taste and fashion, that they are unconsciously con¬ strained into certain similarities of subject and manner by which the art of their time and place is clearly distinguishable from that of any other. The resulting predominant manner, form of expression, quality and habit of design we call the style of that age and place. The most daringly original artist cannot wholly escape

the influence of his environment and education, and those who succeed most completely in dis¬ regarding these influences are so few in number that they rarely affect the general set of the art-currents of their day, though they may sometimes prove to be the heralds of new ideas and methods — that is, of a new style — which comes into recognizable existence at a later date. Styles are therefore not mere fashions, nor can they be created or abolished. They are growths, the natural characteristic interpreta¬ tion of the spirit of the age. The fine arts are therefore rightly studied as the true exponents of the civilizations which produced them. Greek art differs from Roman art as Greek civiliza¬ tion differed from that of Rome. Gothic art differs from that of the Renaissance; French from American art; the art of the end of the 19th century from that of its beginning. The phenomena of style are true of all the arts — of literature and poetry as unmistakably as of music and sculpture, of painting and architec¬ ture. It is, however, in the last-named art that styles are most clearly distinguished, not only because of the definiteness and permanence of its forms, but also and chiefly because architec¬ ture touches the daily life and habits of a people at more points than any other art, and deals with materials and technical processes which of necessity vary widely in different lands and ages. See Architecture.

History. — A history of the fine arts is really a history of the rise, growth, decay and succession of styles in the various arts, with special mention of those masterpieces which embody in the highest degree the qualities and characteristics of those styles, or which mark the various stages of their developiment. It is manifestly impossible within the limits of this article even to sketch in outline the historic developments of the several fine arts; for this, the reader is referred to the histories of art mentioned in the bibliography at the close of this article, and to the briefer notices in this encyclopedia under the several titles : Archi¬ tecture; Dancing; Drama; Interior Decora¬ tion ; Mural Decoration ; Music ; Painting ; Poetry; Sculpture.

Bibliography.— The bibliography of the Fine Arts is enormous. The inquirer is re¬ ferred to the lists of books under the above titles, and under ˆEsthetics, and Criticism.

Alfred D. F. Hamlin, Professor of History of Architecture, Columbia University.

FINETTA, a fairy tale by La Comtesse I'Aulnoy, published in 1682. It is merely a version of the story of Cinderella very thinly disguised.

FINFOOT, one of the extraordinary trop¬ ical birds of the family Heliornithidce, now considered near allies of the rails, so called on account of the broad scalloped webs along each toe. The best known one is Heliornis fulica of northeastern South America, which is about 13 inches long and mainly brown, with a white throat, red bill and feet banded with yellow and black. Other larger species belong to Africa and the Malayan Peninsula. These birds which frequent the swamps or rocky streams of inland woods, fly heavily and push themselves out of the water with their feet.

They swim and dive well and run swiftly on land.

FINGAL, fing-gal, a once popular epic by James Macpherson, which appeared in 1762. The poet being a favorite, < Fingal > had an im¬ mense sale. The subject of the epic is the inva¬ sion of Ireland by Swaran, king of Lochlin, Denmark, during the reign of Cormac II, and its deliverance by the aid of the father of Ossian, King Fingal of Morven, on the north¬ west coast of Scotland. The poem opens with the overthrow of Cathullin, general of the Irish forces, and concludes with the return of Swaran to his own land. See Ossian ; Macpherson, James.

FINGAL'S CAVE, a curious cavern formed of basaltic columns, in the Isle of Staffa, one of the Hebrides, on the west coast of Scotland, 25 miles from Oban. See Staffa and Columnar Jointing.

FINGER. See Hand.

to retain the numbers erased during operations on the sand abacus, and probably on the other forms as well (see Abacus) ; (2) the one leading to a kind of international language, helpful in bargaining at the great fairs of antiquity and the Middle Ages and still used in the East; (3) that of actual computation, the so-called finger reckoning, still somewhat used in certain parts of the world. Of these three the first was the most important and with the second it resulted in a number language quite as international as the Hindu-Arabic numerals

(see Numerals) which led to its decay. The antiquity of the system in Egypt, Greece, and Rome is attested by several classi¬ cal writers, Juvenal, for example, speaking of the aged Nestor as numbering his years upon his right hand, that being the one used for numerals exceeding 99. Herodotus, Pliny, Macrobius, Plautus, Seneca, Suetonius, and probably Aristophanes and Solomon (Proverbs iii, 16) are among the other witnesses to its

FINGER-GRASS, a crab grass (Panicum sanguinale, Linn.), a well-known annual, com¬ mon in nearly all parts of the United States, growing in cultivated fields and about dwell¬ ings. It is a weed in gardens and among hoed crops. In grain fields after harvest it fre¬ quently springs up in such quantity, particularly in the Southern States, as to yield one or even two good cuttings of hay. This spontaneous growth affords excellent pasturage, as well as hay of first quality if properly cured. The stems are much branched and in good soil at¬ tain a length of three to four feet. This grass contains little fibre and dries quickly when cut, but if after cutting it is wet by rains or heavy dews its value for hay is almost wholly de¬ stroyed.

FINGER NOTATION, a method of rep¬ resenting numbers by the position of the fingers or hands, analogous to the digital language of deaf-mutes. The system is an ancient one and has had three distinct ramifications: (1) The obsolete one of mere numerical representation,

use among the common people in ancient times. In the early centuries of the Christian era it was well known, for it is mentioned by Tertul-lian (c. 200 a.d.), Saint Ambrose (c. 375 a.d.), and Saint Augustine (c. 400 a.d.). To the Venerable Bede, however, we are indebted for our most definite knowledge of the mediaeval system in the West, and to his treatise, (De loquela per gestum digitorumR in his (Opera omnia, > (Paris 1862, tomus I, p. 689), the stu¬ dent should refer for the best description ex¬ tant. The same notation, not so fully ex¬ plained, appears in a work written about 800 a.d., although assigned to Cyril of Alexandria ((Liber de computo S. Cyrilli Alexandrini,* published by L. A. Muratori in his ˆnecdotaR Napoli 1776), and in one by Rudulph of Laon, c. 1100 a.d. (Consult (Abhandlungen zur Geschichte der MathematikR Bd. V, p. 91). The international character of the system is further evident from two poems, one in Arabic (Marre, (Maniere de compter des anciens avec les doigts des mains, d' apres un petit poeme inedit arabe

de Chems-Eddin el Mossouli,* in the Bon- compagni

The most common form of finger reckoning was that involving multiplication, the factors being between 5 and 10, thus rendering the table beyond 5 X 10 superfluous. This form is very old and is not yet obsolete. For example, to multiply 9 by 8, think: 5 and 4 are 9 (raising 4 fingers on one hand) ; 5 and 3 are 8 (raising 3 on the other hand) ; 4 + 3 (raised fingers) = 7 tens; 1X2 (bent fingers) = 2 units; 70 + 2 =

72.

In addition to the sources above cited, con¬ sult Stoy, (Zur Geschichte des Rechenunter- richtes,* dissertation (Jena 1876) ; Treutlein, in the (Abhandlungen zur Geschichte der Mathe- matik* (Bd. I, p. 21) ; Bombelli, (L' antica nu- merazione Italica* (Roma 1876, p. 102) ; Gunther, (Geschichte des mathematischen Un- terrichts im deutschen Mittelalter) (Berlin 1887, p. 12), and (Untersuchungen zur Ge¬ schichte der mathematischen Wissenschaften* (Leipzig 1876).

David Eugene Smith,

Professor of Mathematics, Teachers College, Columbia University, New York.

FINGER-PRINTS, impressions from the terminal phalange of the fingers or thumbs, valuable in the identification of individuals be¬ cause of the fact that the lines vary in each individual from all others. This method of identification of persons has been known and practised in the East since a very early period. In later days it was used with success in legal documents, to prevent false personation, on re¬ ceipts paid to laborers for wages, etc. More recently it has obtained greater prominence on account of the certainty of its results in identi¬ fying criminals, particularly when used in con¬ nection with Bertillon's (Descriptive Signal-

ment) and his (Signalment by peculiar marks.) It is claimed that the use of the finger-print makes forgery impracticable and is of value on documents wnere illiteracy is prevalent. Some elaborate plans have been perfected, after much experiment, of classifying finger-prints. Some experts have distinguished four principal types, known as arches, loops, composites and whorls, with seven subclasses. Others have distin¬ guished nine chief classes with many subordi¬ nate classes. Investigators, however, find real difficulty in agreeing on a clear, comprehensible method of classification which would be of universal application and this perhaps is the chief handicap to the

system at present.

G. Tyler Mairs states that (

On the researches of Herschel and Sir Francis Galton (qq.v.) Sir Edward Richard Henry, G. C. V. O., commissioner of police of the metropolis, London, England, ((built the ex¬ tensively used Henry System of Finger Print Classification, which enables one familiar with its intricacies to make a set of ten apical impres¬ sions or derma.tographs, classify it, and produce the person's history record (assuming one on file) in a period of time varying from five to fifteen minutes. Under this scientific system nothing is. required of the subject save the set of ten apical dermatographs. Given this and nothing. more, no name, no address, no physical description or photograph, the identifier (solves for x, > to use an algebraic term. A record be¬ ing produced, the subject's medical historv, for instance, in the case of a hospital or clinic for the feeble-minded or insane, is at once avail¬ able, no matter how long the interval between

treatments, or the changed facial appearance of the subject, or similarity in names.®

Many extraordinary cases are on record of criminals having been traced after accidentally leaving finger-prints at the places where the crimes were committed. In a few instances such evidence has been used in court, but cases of conviction are rare because evidence of identity is not equivalent to evidence of guilt, which must be shown by other proofs of a convincing or corroborative nature. There is a tendency to-day among criminologists to hold to the opinion that the system is most valuable when used in conjunction with other systems of identification. Consult Mairs, G. T., identifi¬ cation of Individuals by means of finger-prints, palmprints and soleprints) (in Scientific Monthly, Lancaster, Pa., October 1918).

FINGER AND TOE, a plant disease {Plasmodiophora Brassicce) which attacks cab¬ bages, radishes, turnips and other members of the order Crnciferce. It is also known as Club Root or Anbury and is one of the Slime-fungi or Myxogastres. Its presence is heralded by the appearance of warty outgrowths on the root, which sometimes swell out to a large size and rot, the while emitting an unpleasant smell.

Spores in the soil enter the root and bring on the disease. When the root decays great masses of spores are set free in the soil. Quicklime is the best preventative, as a single application suffices to destroy the spores in the soil. Dis¬ eased plants should be burned.

FINIAL, in architecture, the termination of a pinnacle, buttress, gable or canopy, consisting of a carved ornament, usually a bunch of foliage, formed by joining the crockets running up the gable, buttress or spire, as the case may be. Finials were common in Greek architecture and are frequently met with in all styles.

FINIGUERRA, fe'ne-gwer'ra, Maso (Tommaso), Italian goldsmith and engraver: b. Santa Lucia d'Ognissanti, 1426; d. December 1464. Vasari's account of this artist, in which he is honored as the inventor of line engraving, is no longer accepted, recent research having proved it erroneous. From contemporary docu¬ ments we know that he was the son of Antonio and grandson of Tommaso Finiguerra, both goldsmiths. He was educated in his father's profession and became distinguished in that field. In 1449 we find mention of one of his works and in 1452 he delivered a niellated silver pax to the baptistery of Saint John. About this time he was a partner of Piero di Bartolommeo di Sali and of Antonio Pollaiuoli in 1457. He executed waist buckles for the wealthy Cino di Filippo Rinuccini in 1462 and in the following year drew cartoons, the heads of which were colored by Alessio Baldovinetti, for several fig¬ ures for the sacristy of the duomo. Consult Baldinucci, (Notizie dei professori di disegmP (Florence 1845) ; Colvin, S., (A Florentine Pic¬ ture Chronicle) (London 1898) ; Duchesne, (Es- sai sur les nielles) (Paris 1824) ; Cellini, Ben¬ venuto, (I Trattati dell orificeria.)

FINING, the process of clarifying turbid liquors such as beer or wine. The simplest process of clarification is that of passing the li¬ quid through charcoal or other porous material. Soluble albumen is used extensively for clarify¬ ing liquids containing mucilaginous or gummy

matter. Malt liquors are clarified by means of gelatin, as isinglass. Alum, sodium carbonate and salts are used for spirits, but the use of salts is objectionable because many are poison¬ ous. Consult Gardner, (Brewer, Distiller and Wine Manufacturer) (London 1883).

FINSTER MOUNTAINS, a chain in Kaiser Wilhelms Land, which reaches an ele¬ vation of 11,312 feet.

FINISTERE, fe'ne'-star, or FINISTERRE,

the most western department of France, formed from part of the old Duchy of Brittany and bounded on the north by the English Channel, west and south by the Atlantic Ocean and east by the departments of Cotes-du-Nord and Mor- bihan. Its area is 2,713 square miles. Two chains of hills cross the department from east to west and divide it into three zones. The Douron, Penze, Fleche, Elorn, Odet, Aven, Isole, Elle and Aulne are the principal rivers. The coast is rugged, steep and rocky and dangerous at several points. The chief indentations are the Brest roadstead and the bays of Douarnenez and Audierne. There are a number of islands and rocks lying off the coast, the chief of which are Ushant and Batz. The climate is temper¬ ate, but very humid. Much of the surface of the department is covered by forest, heath and waste land, but the remainder (about two- thirds) produces buckwheat, barley, oats, rye and wheat in considerable quantities. Hemp, flax, fruits, asparagus, artichokes, onions and melons are extensively grown in the neighbor¬ hood of the Brest roadstead. Farm and dairy produce is plentiful and cattle and horses are raised in large numbers. The coast fisheries, particularly the pilchard fishery, are of prime importance and furnish employment to a large number of persons. Finistere has coal deposits and quarries of granite, slate, potter's clay, etc. The lead and silver mines of Poullaouen and Huelgoat were formerly large producers of these metals, but are no longer worked. The department's manufactures comprise earthen¬ ware, candles, fertilizers and chemicals from seaweed, ropes, sail-cloth, linens and wool¬ ens, paper, leather and agricultural implements. Brest has large iron foundries and shipyards. The chief ports are Brest and Morlaix. Quimper is the capital. Pop. 809,771.

FINISTERRE, Cape. See Cape Finis-

TERRE.

FINITE SERIES. See Series.

FINK, Albert, American civil engineer: b. near Frankfort-on-the-Main, Germany, 1827 ; d. 1897. He was graduated at the Polytechnic In¬ stitute of Darmstadt in 1848 and came to Amer¬ ica in 1849. He entered the employ of the Baltimore and Ohio Railroad Company as a draughtsman and for that company he designed and built some of the earliest iron bridges in the United States. For the Louisville and Nash¬ ville Railroad he built a bridge over the Ohio River at Louisville, Ivy. In the Civil War he was engaged by the Federal government as superintendent of the road and machinery de¬ partment. From 1865 to 1875 he was general manager and from 1870 to 1875 vice-president of the Louisville and Nashville Railroad. He brought about a

merger of four trunk railroads of the South and worked out the details of

operating the system, which in its day was revolutionary.

FINK, Louis Maria, American Roman Catholic prelate: b. Triftersberg, Bavaria, 1834; d. Leavenworth, Kan., 17 March 1904. He came to the United States in 1852, was ordained priest 1857 and was successively stationed at Belle- fonte, Pa.; Newark, N. J.; Covington, Ky. ; and Chicago. Later he became prior of the Bene¬ dictine monastery, Leavenworth, Kan. In 1871 he was consecrated titular bishop of Eucarpia and appointed coadjutor to Bishop Miege, vicar apostolic of Kansas. He was transferred to the diocese of Leavenworth in 1877.

FINLAND (called by the natives, Suomen- maa, ((land of marshes®), since 1917 a republic of northern Europe, including, with the excep¬ tion of part of Lapland, a territory on the northwest of Russia. It is bounded on the north by Russian Lapland; east by the province of Archangel and Olonetz; south by Lake Ladoga, the province of Petrograd, and the Gulf of Finland ; and west by Sweden and the Gulf of Bothnia ; length, 600 miles ; average breadth, about 240 miles ; area, 144,255 square miles.

Topography. — Finland, which was formerly divided into eight provinces, consists principally of a tableland from 400 to 600 feet above the level of the sea and interspersed with hills of no great elevation. In the north, however, the Manselka Mountains have an average height of between 3,000 and 4,000 feet. The coasts, par¬ ticularly on the south, are surrounded by a vast number of rocky islets, separated from the mainland and from each other by intricate and narrow channels, rendering the shores of the country easy of defense in case of hostile at¬ tack by sea. The chief natural feature of Fin¬ land is its many lakes, which extend like a net¬ work over a large proportion of its surface; some of them being of very considerable size. The greater number of these are in the south and east ; several of them have intercommunica¬ tion and they generally abound with islands. There are numerous rivers, but none of much importance.

Climate. — The climate is rigorous. Even in the south the winter lasts from six to seven months, and in the north from eight to nine months.

Dense fogs are very frequent; heavy rains take place in autumn, and in May and June the thaws put a stop to nearly all travel¬ ing. In the north the sun is absent during De¬ cember and January; but during the short sum¬ mer, while the sun is almost constantly above the horizon, the heat is often very great; and near Uleaborg, in about latitude 65°, the corn is sown and reaped within six or seven weeks. Crops in all parts of the duchy are exposed to the double danger of being destroyed by sudden frosts, and by the ravages of a variety of cater¬ pillar called turila by the natives.

Various. — The principal geological forma¬ tions are granite, which very easily disinte¬ grates, hard limestone and slate. The soil for the most part is stony and poor. Iron, copper, marble and sulphur are the chief minerals. Rye, oats and barley are grown. The most im¬ portant products are timber, potash, pitch, tar and resin, which are extensively exported. Next to agriculture, stock breeding and fishing form the leading occupations of the inhabitants. The chief imports are salt, grain and articles of

clothing. Finland's imports in 1914 amounted to $76,032,800 and exports to $57,036,000.

History. — The Finns were pagans and most aggressive. They frequently attacked the neigh¬ boring countries, but especially Sweden. They continued to live under their own independent kings till the 12th century, about the middle of which the country was conquered by the Swedes, whose king followed up the physical conquest by sending to the Finns the English- born bishop of Upsala, to preach Christianity to the people. The province of Wiborg was conquered and annexed to Russia by Peter the Great in 1721 ; the remainder of the country became part of the Russian dominions (also by conquest) in 1809. The Russian government endeavored, by conciliating the Finnish party and promoting objects of national importance, to attach the bulk of the population to its interests; but in this it was not successful, and from 1897 a repressive policy, aiming at the thorough Russification of the grand duchy was pursued.

Government and Education. — The basis of the constitution is that established in 1772 under Swedish domination, although this, re-formed in 1789, slightly modified in 1869 and 1882, was again substantially or radically re-formed in 1906. Before that time the National Parlia¬ ment or Diet consisted of the four estates, the nobles, clergy, burghers and peasants ; at present there is but one Chamber of 200 members chosen by direct vote. Every Finnish citizen (man or woman) 24 years of age or over and not disqualified by pauperism,

etc., has the right or privilege of suffrage. Both sexes are eligible to the Diet. The grand duchy is divided into 16 electoral districts and each district is sub¬ divided into voting circuits. The Diet lasts for three years unless sooner dissolved and each session continues for about 90 days. On 6 Dec. 1917, the National Diet unanimously pro¬ claimed Finland an independent and sovereign state. Invaded by a German force a treaty was signed 7 March 1918 establishing Finland's independence under German suzerainty. The treaty was nullified by the 1919 Peace Con¬ ference. Through the March elections in 1919 the following parties are represented in the Diet: Social-Democrats, 80; Agrarians, 42; Coalition Party, 28; Progressive Party, 26; Swedish Party, 22; Christian Labor Party, 2.

The educational system is well planned and has good results. According to statistics for 1915 the number of students at the university was 3,435, including 799 women, and the technical high school had 516 students, in¬ cluding 27 women. There are in the capital 2 commercial high schools, 72 lyceums, 16 continuation classes for boys and girls, 22 ele¬ mentary schools for boys and girls, 25 girls' schools, 40 preliminary schools; in the country 3,179 primary schools (of higher grade) with 149,026 pupils, and schools of lower grade with 73,335 pupils. There are also training colleges for teachers, navigation schools, com¬ mercial, technical, horticultural and forestry schools, etc.

Language and Literature. — The language of the Finns (Finnish or Chudic) belongs to the northern division of the Ural-Altaic family of languages and is most nearly allied to the languages of the Esths, Lapps, Mordvins,

Voguls and Hungarians. It possesses all the German vowels, a, e, i, o, u, a, o, ii, which again give eight double vowels and 12 diphthongs. Like the other Altaic languages it adheres to the ((law of harmonic sequence of vowels,® according to which the vowels are divided into classes, heavy (a, o, u) and light (e , i, etc.), and only vowels of the same class can occur in the same word. The language is remark¬ ably rich in declensional forms, there being as many as 15 different cases expressing such re¬ lations as are expressed in English by near, to, by, on, in, with, without, along, etc. By this means these cases are made to express the relations of space, time, cause, etc. There is no dis¬ tinction of gender in Finnish nouns. The pos¬ sessive pronoun is

indicated by suffixes. The verb resembles the noun in its capability of tak¬ ing on different shades of meaning by corre¬ sponding modifications and is in this respect a remarkable philological phenomenon. The Fin¬ nish proper is divided into three principal dia¬ lects, the Karelian or eastern ; the Savo in cen¬ tral Finland; and the Tavastian in the west. This latter was used in the original translation of the Bible and thus became the parent of the literary Finnish.

Finnish literature is valuable chiefly for its rich stores of national poetry, which has been collected only in modern times. Longfellow's (Hiawatha > is, in style, an imitation of the Fin¬ nish epic. The old and popular poetry of the Finns, as it appears in the various run or or bal¬ lads, is governed by rules of Quantity® as in that of the Greeks and Romans, not by accent ; rhyme occurs only rarely; alliteration is em¬ ployed as a rule. These poems, which had been preserved by oral tradition, were collected by Lonnrot, and in 1835 he published them, under the title of ˆalevala,* with a second enlarged edition in 1849. He also published in 1840 'Kanteletar,* a collection of 592 ancient lyric poems and 50 old ballads; the (Suomen kansan sanalaskuja) (1842), a treasury of 7,077 popular proverbs; and (Suomen kansan arwoituksia) (1844), a collection of 2,188 riddles. Another work that deserves notice is Eero Salmelainen's collection of legends and stories in prose, (Suo- men kansan satuja ja tarinoita) (4 vols., 1854- 62). The first book in the Finnish language was printed at Abo in 1544, its author being Michael Agricola, afterward bishop of Abo, who also translated the New Testament and part of the Old into Finnish. A complete Fin¬ nish Bible appeared in 1642. Lonnrot's Finnish-Swedish dictionary has been published by the Finnish Literary Society and Dr. Donner has a dictionary of the Finno-Ugric languages in German. Finnish is becoming more and more the vehicle for imparting instruction. There are many establishments for the higher educa¬ tion of both sexes in which the Finnish tongue is used, and about half of the students at Helsingfors University speak Finnish. Works on science and history, as well as poetry, have been written in Finnish in recent times, and there are now a considerable number of Fin¬ nish newspapers. Population (estimate by the Russian Central Statistical Committee 1 Jan. 1914), 3,241,000. Pop. of Helsingfors, the cap¬ ital (with Sveaborg), 167,083.

Bibliography. — Consult Caspar, J. J., (La Resistance Legale en Finlande> (Paris 1913) ; Chalhoub, M., (La Finlande) (Paris 1910) ;

Feodorov, Y., (The Finnish Revolution in Preparation 1889—1905 }

(Petrograd 1911) ; Pouvreau, Y., (La Question Finlandaise) (Rev. Internat. de Sociologie, Year 23, Paris 1915) ; Reade, A., (Finland and the Finns) (New York 1915) ; Renwick, G., (Finland To-day) (London 1911) ; Travers, R., ˆLetters from Finland* (London 1911) ; Vallaux, C., (Le Pays et le Peuple de Finlande* (Revue du Mois, Tome XV, Paris 1913) ; Young, E., Fin¬ land: the Land of a Thousand Lakes) (London

1912).

FINLAND, Gulf of, an arm of the Baltic Sea, on the east side, having Finland on the north and the Russian governments of Esthonia and Petrograd on the south. The length of the gulf from east to west is about 250 or 260 miles ; breadth at the entrance or narrow¬ est part, 40 miles ; toward the head, where it is widest, about 80 miles. It receives but few rivers, and none of them, with the exception of the Neva, which enters it at its upper ex¬ tremity, of any great size. There is river-and- canal connection with Lakes Ladoga and Onega. It contains numerous islands of which Kronstadt (q.v.) is the largest. Helsingfors, Reval and Viborg are on its shores ; Petro¬ grad is on its eastern extremity.

FINLAY, Charles John, American physi¬ cian : b. Puerto Principe (Camagiiey), Cuba, 3 Dec. 1833; d. Havana, Cuba, 20 Aug. 1915. His collegiate education took place at the Rouen Lycee, France, his medical studies at Jefferson Medical College, Philadelphia, Pa., under the preceptorship of Dr. Mitchell (S. Weir Mitchell's father), from which he gradu¬ ated in 1855. Shortly afterward he estab¬ lished himself in Cuba. His scientific life was very active, his principal achievement being the discovery in 1881 of the theory of trans¬ mission of yellow fever by the mosquito, con¬ firmed later on experimental lines. His work received full confirmation at the hands of the American Commission in 1899. In 1881 he was a delegate to the International Sanitary Con¬ ference at Washington, and on the establish¬ ment of the Cuban Republic was several times sent to different scientific congresses in the United States as delegate for Cuba. In 1902 he was appointed chief sanitary officer of Cuba which position he held till 1909 when he wras retired with a pension and the honorary title of president of the Board of Sanitation and Charities. He was a member of all the local medical societies and corresponding mem¬ ber of numerous foreign societies. He was awarded the Mary Kingsley Medal, the Briand Prize, and was named Officier de la Legion d'Honeur and corresponding member of the French Academy of Medicine.

FINLAY, George, English historian: b. Faversham, Kent, 21 Dec. 1799;

d. Athens, Greece, 26 Jan. 1875. Fired with enthusiasm on behalf of Greece he went to that country to help it in shaking off the Turkish yoke, and spent some time at Missolonghi in close in¬ timacy with Lord Byron. He purchased land in Attica, and henceforth lived chiefly in Greece. His great work on Greek history came out at intervals between 1844 and 1861, and shortly after his death it was published as thoroughly revised and greatly improved by himself, entitled (A History of Greece from its

Conquest by the Romans to the Present Time, 146 b.c. to 1864 a.d.) It has been described as the greatest historical work in English since Gibbon's (Decline and Fall.*

FINLEY, John Huston, American author and educator: b. Grand Ridge, Ill., 19 Oct. 1863. He was educated in the public schools of Illinois, at Knox College, A.B. 1887, A.M. 1890, and at Johns Hopkins University. He served, 1889-92, as secretary of the State Charities Aid Association of New York, founding and editing the State Charities Record 1889 and The Charities Review 1891, and es¬ tablishing for the first time on an adequate basis professional American literature of scien¬ tific philanthropy. He was called to the presi¬ dency of Knox College, 1892-99, returned to New York, 1899, to enter upon editorial work with Harper and Brothers and the S. S. Mc¬ Clure Company, but was the next year called to a newly established chair of politics in Princeton University, 1900-03. From this position he was elected president of the College of the City of New York 1903-13. Under his able administration the City College not only was reorganized and moved into its magnificent new buildings on Washington Heights but be¬ came a prototype of a new kind of educational institution, the municipal university supported by the city, free to the youth of. the city and having its function in the development of an alert, intelligent, municipal spirit. He was President of the University of the State of New York and State Commissioner of Education 1913-20, resigning to become a member of the New York limes staff. As head of the entire educational system of the State he was able to revitalize the ancient conception of its founders : the idea of a real "federation of learning® to include all the educational and cultural institutions of the State. Mr. Finley was Harvard University exchange lecturer at the Sorbonne, Paris, on the Hyde Foundation 1910-11. He rendered great service to the cause of industrial peace as a member of the Arbitration Board in the Eastern Railway Con¬ troversy 1913, and to his State as chairman

of the State Commission for the Blind, 1913, and as a member of the New York Constitutional Convention Commission, 1914. In 1914 King Victor Emmanuel awarded the title of Cheva¬ lier of the Crown of Italy to Dr. Finley in recognition of his efforts to create interest in Italian art and literature. He was also awarded the gold medal of the Conrad Malte-Brun Prize by the Geographical Society of Paris in recog¬ nition of his book, (The French in the Heart of America. > In the European War, he served as chairman of the committee of the Red Cross and allied subjects of the National Edu¬ cation Association, and as colonel in charge of a Red Cross unit visited Palestine in 1918, traveling from Egypt to Jerusalem by airplane. He is a frequent contributor to educational and literary magazines, and is the author of taxa¬ tion in American States and Cities > with R. T. Ely (1888) ; the American Executive and Executive Methods, } with Mr. J. F. Sanderson (1908) ; the French in the Heart of America > (1915), and is editor-in-chief of (Nelson's Encyclopedia. }

FINLEY, John Park, American meteorolo¬ gist : b. Ann Arbor, Mich., 11 April 1854. He

was educated at the State Normal School and State Agricultural School. He became assist¬ ant to the chief signal officer at Washington. He instituted the system of meteorological re¬ ports from localities where there were no regular signal-service officers by means of volunteer observers. He was placed in charge of the Signal Service Bureau on the Pacific Coast, where his observations were of great value. In this position he has given much at¬ tention to the phenomena of meteorology, and has written extensively upon the subject. His works include (Tornadoes> (1887) ; (Manual of Instruction in Optical Telegraphy } (1889);

(Sailor's Handbook of Storm-Track, Fog, and Ice Charts of the North Atlantic and Gulf of Mexico) (1889); (Essay on the Development of Tornadoes) (1890) ; (Certain Climatic Features of the Two Dakotas) (1893).

FINLEY, Martha (pseudonym of Martha Farquharson), American writer for girls: b. Chillicothe, Ohio, 26 April 1828; d. Elkton, Ind., 30 Jan. 1909. She published (Elsie Dins- more) (1868); (Wanted — A Pedigree) (1872) ; (The Thorn in the Nest) (1886) ;

FINLEY, Robert, American clergyman, founder of the Colonization Society: b. Prince¬ ton, N. J., 1772; d. 1817. He was graduated at Princeton College in 1787, and was successively teacher in Princeton, Allentown, N. J., and Charleston, S. C. He returned to New Jersey in

1794, was licensed as a minister at New Brunswick, and in the following year became pastor at Basking Ridge, N. J. He was an earnest student of the negro question and con¬ vinced himself that the sole solution of that question lay in the colonization of the negro in some region remote from the whites. In 1816 he founded the Colonization Society at Wash¬ ington, D. C. He returned to New Jersey early in 1817 and there organized an auxiliary society. In the same 3'ear he became president of the University of Georgia.

FINLEY, Samuel, American Presbyterian clergyman : b. Armagh, Ireland, 1715; d. Phila¬ delphia, 17 July 1766. Arriving in America in 1734, he was licensed to preach in 1740. The first part of his ministry was much occupied with itinerant labors in promoting the revival of religion, at that time so remarkable through¬ out the country. His zeal at one time brought him into unpleasant circumstances ; for preach¬ ing in New Haven, Conn., contrary to a law of the colony forbidding itinerants to enter parishes of settled ministers without their con¬ sent, . he was seized by the civil, authority and carried as a vagrant beyond its limits. In 1744 he was settled at Nottingham, Md., where he remained for seven years, and where, in addi¬ tion to his ministerial duties, he carried on an academy which acquired a high reputation. In 1761 he became president of the College of New Jersey, now Princeton University.

FINN, Frank, English naturalist, author and lecturer: b. Maidstone 1868. He was edu¬ cated at the Maidstone Grammar School and at Brasenose College, Oxford. In 1892 he went on a collecting expedition to East Africa, was first assistant superintendent of the Indian

Museum, Calcutta, in 1894, and deputy super¬ intendent from 1895 to 1903. He edited the Avicultural Magazine in 1909-10 and the Zoologist in 1915-16. His publications include 'Fancy Waterfowl * (1900) ; (Fancy Pheas¬ ants } (1901) ; 'Birds of Calcutta J (1901) ; In¬ dian Ducks > (1901) ; (Garden and Aviary Birds of India) (1906) ; (Indian Waders* (1906) ;

(Ornithological and Other Oddities) (1907) ; 'Birds of the Countryside) (1907) ; 'Pets and How to Keep Them) (1907); (The World's Birds) (1908) ; 'Wild Beasts of the World) (1909) ; (Eggs and

Nests of British Birds) (1910); ‘Talks about Birds* (1911); (The Game Birds of India and Asia) (1911) ; (Wild Animals of Yesterday and To-day * (1913) ;

(Indian Sporting Birds) (1915), and many scientific papers, chiefly in Journal of the Asi¬ atic Society, and popular articles. He was collaborator of Douglas Dewar in ‘The Mak¬ ing of Species> (1909).

FINNEY, Charles Grandison, American Congregational minister: b. Warren, Conn., 29 Aug. 1792; d. Oberlin, Ohio, 16 Aug. 1875. He went to Oneida County, N. Y., in early life and was ordained minister 1824, becoming professor of theology at Oberlin College in 1835 and its president in 1852. He was one of the most famous of American revivalist preachers. Among his works are (Lectures on Revivals* (1835; new ed., 1868); (Lectures to Pro¬ fessing Christians> (1836); (Sermons on Im¬ portant Subjects) (1839); (Lectures on Syste¬ matic Theology* (1847) ; (Autobiography, * and ‘Sermons on Gospel Themes * (1876).

FINNS, in their own language called Suomalainen, and by the Russians Chudes, are in the narrower sense a race of people inhabit¬ ing the northwest of European Russia (govern¬ ments of Archangel and Olonetz), but espe¬ cially the grand duchy of Finland. In a wider sense Finnic is the name applied to the Finno- Ugric, one of the five chief branches of the northern or Uralo-Altaic family of peoples and languages. These peoples were formerly spread over the whole north of Asia and north of Europe, and they are divided into the five fam¬ ilies, the Tungusic, Turkic, Mongolic, Samoie- dic, and Uralo-Finnic or Finnic family proper. The last or most westerly family still forms the population of north Europe and northwest Asia, and formerly covered the greater part of Scandinavia. It is again divided into four groups or branches (1) the Ugric, to which the Ostiaks, Voguls and Magyars belong; (2) the Bulgaric or Volgaic, consisting of the Tchere- misses and the Mordvins; (3) the Permic, composed of the Permians, Sirianes and Vo- tiaks; and (4) the Chudic or Baltic group. To the last belong, besides the Finns proper, the Esths of Esthonia and the Lives or Livonians, the Chudes (in the narrower sense), ‘that is, Karelians, Vepses and Votes, in the govern¬ ments of Novgorod and Olonetz, and the Lapps in Archangel and the northern parts of Fin¬ land, Sweden and Norway. The Finns proper are divided into two branches : the Tavastians in the southwest, and the Karelians in the east of Finland. The Finns may properly be iden¬ tified with the Scythians, and their earliest seats appear to have been the Ural Mountains and the neighborhood of the Caspian Sea. They originally led a peaceful nomadic life, but sub¬

sequently practised agriculture and adopted set¬ tled habits. They seem to have been compelled to migrate more to the northwest about the be¬ ginning of the Christian era by the pressure of the Gothic tribes, and the country west of the Ural Mountains, more particularly the region where the Great and Little Volga unite, became their second home. From this the bulk of them had again to remove to their present abodes, though considerable numbers were left on the Volga, Oka, Kama, about the sources of the Dwina, in the Ural, and others again spread eastward, some of them as far as the Altai Mountains. The Finns are a serious people, and their so-called amusements show this trait. They are educated and have most decided opin¬ ions as to "Woman's rights,** political rights be¬ ing accorded to both sexes ; coeducation is the rule. Although Finland has been united with Russia, or a part of Russia, since 1809, yet the better educated Finns speak the Swedish lan¬ guage. The emperor encourages the use of the Finnish language. The Finns are communica¬ tive on business matters and often do not hesi¬ tate to tell what other people might call "family secrets.® They ask freely about the affairs of others. They have choirs and musical socie¬ ties in Finland, and where found in other coun¬ tries they show a love for music, although their music lacks all suggestions of joyousness. See Finland.

FINOTTI, Joseph Maria, American Ro¬ man Catholic clergyman and author: b. Ferrara, Italy, 1817 ; d. Denver, Colo., 1879. He studied theology in the Jesuit College, Rome, and in 1845 removed to the United States. In 1852 he left the Jesuit Society and became literary editor of the Boston Pilot. His works in¬ clude 'A Month of Mary > (1853) ; 'Italy in the 15th Century,* 'The French Zouave) (1863) ; 'American Catholic Bibliography) (un¬ finished) .

FINS (of Fishes). See Fish.

FINSBURY, England, a metropolitan and parliamentary borough in central London ; area, 586 acres. It is a poor and densely pop¬ ulated district, the centre of the watch and jewelry trade, printing and paper making being the other important industries. The Charter- house (q.v.) is its most interesting historical building. Bunhill Fields marked the site of an old Non-Conformist place of interment, in which John Bunyan, Defoe and George Fox were buried. Saddler's Well was at one time a fa¬ vorite place of resort. The borough returns three members to Parliament. Pop. 87,923. Consult Cromwell, 'History and Description of the Parish of ClerkenwelP (1828) ; Milton, 'Fascination of London* (1906) ; Pink, 'His¬ tory of ClerkenwelP (1865).

FINSEN, Niels Ryberg, Danish physician, scientist and discoverer of

the method of cur¬ ing lupus or tuberculosis of the skin, and other skin diseases, with light rays : b. Iceland in 1860; d. Copenhagen, Denmark, 24 Sept. 1904. Professor Finsen's great discovery, that sun¬ light and electric light rays contain properties that can be used to cure skin diseases and blem¬ ishes, was the outgrowth of his experiments be¬ gun as a student in the Copenhagen University.

In 1890 Finsen was graduated from the Copenhagen University, receiving his doctor's

degree. Three years later he published in a medical journal an article on (The Influence of Light on the Skin,* which aroused general attention because of his assertion that cases of smallpox could be cured by putting red curtains at the windows of the sick-room. Smallpox became epidemic in 1894 in Copen¬ hagen and the new method was put to the test. The red-room treatment became popular with both the medical profession and the public, for by it not only was the disease cured, but the red rays prevented suppuration and left the patient unmarked by the dreaded scars.

The red-light treatment was but one applica¬ tion of Finsen's theory that light rays contained healing, and at the best it was but a negative result ; it cured only when the disease had run its course. To develop the positive element of the light-ray cure, Finsen began experimenting with artificial light rays. Soon he found it possible to concentrate rays of the ordinary electric light in such a way as to cure a lupus patient who for eight years had tried every known method. The cure attracted great at¬ tention, and both moral and financial support came to the young investigator and discoverer. In 1896 the municipal hospital of Copenhagen gave room on its ground for several small buildings, in which Finsen's experiments con¬ tinued on an increasing scale. Then the Danish government came to the support of the institu¬ tion and it was enlarged and removed to Rosen- vaenget, a pleasant suburb of Copenhagen. Many cures of cases previously deemed hope¬ less were made through the new and enlarged apparatus, the high-power Finsen lamp, which was used under the direction of a staff of phy¬ sicians of national renown, expert electricians and specially trained nurses, headed by Finsen. To Finsen is due also the discovery that certain rays of the sun's spectrum are bacteria-destroy- ing, while others are of a healing and curative nature. In December 1903 Finsen received the Nobel medical prize from the Norwegian Par¬ liament. Institutions for

the use of the rays are now established in every civilized country. See Finsen Light; Phototherapy.

FINSEN LIGHT, Finsen ray, blue light, actinic ray, violet and ultra-violet ray, light cure. The Finsen Light takes its name from its dis¬ coverer, Niels R. Finsen, who discovered that the actinic rays, those represented in the blue, indigo, violet and ultra-violet sections of the solar spectrum, possess strong bactericidal power, and when concentrated and applied, they will destroy bacteria in five or six minutes.

While the bactericidal features of the violet rays were known experimentally in 1877, lack¬ ing the scientific basis, believing the discovery to be a cure-all, ((the blue light0 was laughed at as quackery. It remained for Finsen to make a practical application of the facts in treating certain diseases previously supposed to be in¬ curable. The Finsen Light is a large, specially constructed arc lamp of 40,000 candle power, or 40 times stronger than an ordinary arc street lamp, and uses from 60 to 80 amperes of current of 110 voltage. This lamp burns a specially made carbon. In the upper holder is a large carbon, while a smaller one is used in the bottom holder. When properly adjusted for arcing, a maximum number of violet and ultra-violet rays are produced. The light from this lamp

is so intense it is impossible to look at it with the naked eye, and it is necessary for all the attendants and patients to wear smoked glasses while the lamp is in operation. An aluminum hood about two feet wide surrounds the lamp, which hood is fringed on its lower border with a deep crimson-colored paper skirt to further aid in excluding the diffused light from the patient. The concentrated rays are carried from the arc to the patient through four telescopic tubes, known as converging tubes, suspended at an angle of 45 degrees. Each tube contains a series of rock crystal lenses, which are very expensive, but are used because they absorb a greater amount of heat rays, but do not inter¬ fere with the passing of chemical rays. These rock cystal lenses are so arranged that reservoirs for running water exist between them. By means of these water screens and the rock crystal lenses, all rays but the violet are elimi¬ nated. These rays are converged, concentrated and filtered, thus vastly increasing the healing and bactericidal effects. The heat from the original arc is so intense, that to prevent crack¬ ing of the lenses a stream of cold water is kept constantly circulating through the upper reser¬ voirs or water screens. To further concentrate and cool the rays a compressor is provided which consists of two rock crystal lenses so ar¬ ranged in a brass band that a chamber for running water exists between them. This part of

the apparatus is used to compress the af¬ fected area and make it bloodless during treat¬ ment, which facilitates deeper penetration, as the red blood corpuscles have a tendency to obstruct or absorb the actinic rays. See Finsen, N. R. ; Phototherapy.

FINSTERAARHORN, f m'ster-ar'horn, Switzerland, the highest peak of the Bernese Alps, with an elevation of 14,025 feet. See Alps.

FINSTERWALDE, fin'ster-varde, Prus¬ sia, a town on the Schackebach, a tributary of the Little Elster, 28 miles southwest of Cottbus and 40 miles north of Dresden. It has a Gothic church, built in 1581, a chateau, schools, and manufactures cloth, cigars, castings, machinery, furniture, rubber goods, soap, glass, bricks, etc. The town is first mentioned in 1288 and came into the possession of the Elector of Saxony in 1635 and was joined to Prussia in 1815. Pop 13,111. y

FIOCCHI. See Fenestella.

FIOGO. See Kobe.

FIONN. See Fionn MacCumhail.

FIONN MAC CUMHAIL, fin mac-cool

(O. I. Find Mac Cumhail, Fionn, son of Cum¬ hal), Irish epic hero, leader of the Fianna, or Fenians, a band of professional warriors and hunters of the 2d or 3d century of the Christian era. In Scotland he is often called Fingal, which is variously interpreted as Fionn the Gael (Fionn Gaedhal) or Fionn the Stranger (Fionn Gall), which would indicate an alien origin. As in all ancient sagas, there is much of myth in the story of his life and exploits, but there appears no reason to doubt of his having actually existed and to have been the leader of a band of warriors. His father, Cumhal, mac 1 renmoir, was uncle of Conn Ceadcathach, Ardri of Ireland, who died a.d. 157. Cumhal was a prominent leader of the

warriors of Leinster but was slain by Gol mac Morna, leader of the Connacht warriors, in revenge for his having carried off Murna Munchaem, the daughter of a druid. Fionn was born after his father's death and on reaching manhood became leader of the Fianna, sup¬ planting Gol mac Morna, who assumed the leadership after the death of Cumhal. Fionn's headquarters were generally located at Almhain

(Allen), in Kildare. But he often led the forces of the Fianna in other parts of Ireland in repelling invaders on the coast, etc. His wooing of Grainne, daughter of Cormac, and her elopement with Diarmuid form the subject of one of the most celebrated sagas of the so-called Fenian cycle. Fionn at length overcame Diarmuid and became the husband of Grainne. The sagas have much to say of his principal aides, of whom the most important were his son Oisin (Scottish Ossian), his grandson Oscar, Cailte mac Ronain, and the aforemen¬ tioned Diarmuid. The sagas also dwell on the magnificence of Fionn's abode, his hospitality, the chivalry of his followers and even give lists of his hounds, the most celebrated of which was Bran. Fionn is said to have come to his death by treachery in 252 or 283 a.d. Tales of Fionn and his warriors are told to this day in Scotland and Ireland. (See Celtic Literature; Macpherson, James; Ossian). Consult Hull, E., (Textbook of Irish Literature) (2 vols., Dublin 1910) ; Hyde, Douglas, (Literary His¬ tory of Ireland) (London 1906) ; Maclean, (Literature of the Celts5 (ib. 1906).

FIONNI, fe -on'ne, Matteo, Italian geog¬ rapher: b. Felizano, Piedmont, August 1827; d. Bologna 1901. He was instructor in the University of Turin 1848-60, then becoming professoi of geodesy at the University of Bo¬ logna. Among his works are (Le Allusione5 (1878) ; (Le Proiezioni della carte geografiche5 with atlas (1878) ; (Note ipsometrische sopra la regione bolognese5 (1883) ; (Mesure offerte delle carte geografiche5 (1887) ; (Le Projezione cuneiform5 (1889).

FIORD, fyord, a long, narrow and deep arm of the sea, extending far back into the land. Fiords frequently have the broadly U-shaped cross section and the hanging tribu¬ taries characteristic of glaciated valleys. In some cases it is believed that the great thick¬ ness and weight of the ice enabled the glaciers to actually erode the valley bottoms below sea- level, and that as the ice melted away the sea entered the valleys. In other cases the coast has probably been drowned, allowing the sea to enter the embayments. The coasts of Nor¬ way, Alaska, Greenland and Chile are famous for their fiords, and the Hudson River from the head of tidal water at Troy down to New York Bay has the characteristics of a fiord.

FIORE, fyo'ra, Pasquale, Italian jurist: b. Terlizzi, Bari, 1837. He was appointed to the chair of constitutional and inter¬ national law at the University of Urbino in 1863, removing to Pisa in a similar capacity in 1865, to Turin in 1876 and to Naples in 1881. His publications include (Elementi di diritto constituzionale5 (1862) ; (Diritto internazionale privato5 (1869) ; (Trattato di diritto internazi¬ onale

pubblico5 (1879) ; (Trattato di diritto internazionale peonale5 ; (Diritto internazionale

privato5 (1901) ; (Le droit international codifie et sa sanction juridique5 (1911).

FIORE D'URBINO, II. See Barocci, Federigo.

FIORELLI, fyo'rel'le, Giuseppe, Italian archaeologist: b. Naples, 1823 ; d. 1896. He was appointed inspector of the excavations and ruins at Pompeii in 1845, but his political views soon rendered him obnoxious to the authorities and his removal followed. In 1860 when the king¬ dom of Italy was established he was appointed superintendent of antiquities in southern Italy and professor of archaeology at the University of Naples. From 1860 to 1875 he directed systematically the excavations at Pompeii and in the latter year became director of all exca¬ vations in Italy. He published (Osservazioni sopra talune monete rare di citta greche5 (1843) ; (Monete inedite dell' Italia antica5 (1845) ; (Notizia dei vasi dipinti rinvenuti a Cuma dal conte di Siracusa5 (1853) ; (Pom- peianarum Antiquitatum Historia5 (1853) ; (Descrizione di Pompei5 (1875). Consult Man- Kelsey, (Pompeii: Its Life and Art5 (2d ed., New York 1902).

FIORENZO, fycVren'tso, Di Lorenzo, Ital¬ ian painter of the Umbrian school : b. Perugia, about 1440; d. there, 1521. Very little is known concerning him and he is not even mentioned by Vasari. Critics, studying the works ascribed to him, most of which are in the Pinacoteca of Perugia, have attempted to tell the masters under whom he studied. His principal works are (The Nativity5 ; (The Adoration of the Magi5 ; (The Adoration of the Shepherd5 ; all in the Perugia Pinacoteca; the fresco of Saints Romano and Rocco at Saint Francesco at Deruta. Other works in the Pinacoteca, in the London National Gallery and elsewhere, have been attributed to him, but there exists a doubt in each case as to the attribution. One of these is a (Saint Jerome5 in the Jarves col¬ lection, New Haven, Conn. Perugino was his most famous pupil. Consult Berenson, Cen¬ tral Italian Painters of the Renaissance5 (New York 1908) ; Graham, Carlyle, (The Problem of Fiorenzo di Lorenzo5 (Perugia 1903) ; Hutton, Edward, (The Cities of Umbria.5

FIR, a name sometimes used as coexten¬ sive with the term pine and including the whole genus Pinus. In a narrower and stricter sense it is the name of a genus of trees (Abies) be¬ longing to the order Coniferce, and the sub¬ order Abietinece, having solitary leaves growing round the branches. The fir is thus distin¬ guished from the

pine, the leaves of which grow in twos, threes, fours or fives; and from the cedar and the larch, both of which have the leaves fasciculated The term fir, thus limited, is applied only to the different varieties of the silver fir and the spruce fir. The silver firs are distinguished by having the cones erect, scales deciduous and leaves flat. The common silver fir is the Abies picea of botanists, the Pinus picea of Linnaeus. It is a native of the middle and south of Europe. The finest trees of this species are found in southern Italy; but the largest forests are those on the slopes of the Pyrenees, especially on the French side. It always prefers mountainous regions and is sometimes found at a height of nearly 6,000 feet. The height of the trunk is sometimes

150 feet and the diameter above 6 feet. It is the sapin of the French and the abies of the ancient Romans. It is from this tree that Strassburg turpentine is procured ; and its wood is of great use in shipbuilding (for masts, yards and spars), in house-carpentry, etc. To this genus also belong the A. sibirica, found on the Altaian Mountains ; the Indian silver fir, a native of the slopes of the Himalaya Moun¬ tains ; and the A. canadensis or hemlock spruce fir. Other species of Abies, found in western North America (as also in the Hima¬ layas), are trees sometimes rivaling in size the Douglas fir (mentioned below), and likewise yielding excellent timber. Among them are A. grandis, a Californian tree of 170 to 200 feet in height; A. amabilis, a species much resem¬ bling it; A. nobilis, a majestic tree, which forms vast forests on the mountains of northern Cali¬ fornia; A. bracteata, a Californian species re¬ markable for its slender stem, which rises to a height of 120 feet, and yet is only about one foot in diameter at the base, and likewise for the manner in which the middle lobe of each bractea of its cones is produced so as to re¬ semble a leaf. Very similar to the silver fir, but generally of much smaller size, and indeed seldom much above 30 feet high, is the balm of Gilead fir (A. balsamea), a native of North America from Virginia to Canada. The wood is of little value, but the tree yields Canada balsam (q.v.).

The spruce firs have the cones pendulous, scales persistent and leaves tetragonous. Of this division the common or Norway spruce fir (A. excelsa) is the most important. It gets the name of Norway spruce from the fact that in that country it constitutes the principal timber; but it is also extensively cultivated in the middle of Europe and is found all over Si¬ beria to lat. 70° N. The average height of the tree is from 80 to 150 feet; and it attains its maturity in about 70 or 80 years.

The branches, regularly arranged round the main stem and gradually diminishing toward the top, give the tree a pyramidal form. Nearly every part of this tree is of use. The wood (white or Christiania deal) is adapted to various ordinary purposes ; the longest and thinnest stems are very valuable in shipbuilding for making masts ; • and the stems of those trees that are found at a great height, and in which accordingly the yearly rings are very narrow, are eagerly sought by musical instrument makers for sounding- boards. The bark is used in tanning ; the young buds or shoots are used in making the drink known as spruce beer; and the resin which exudes from the tree supplies the common frankincense and the Burgundy pitch of com¬ merce. The so-called Scotch fir is really a pine (q.v.).

The Psendotsuga douglasii, closely related to the firs, and often regarded as a fir, is named after the Scotch botanist, David Douglas, who visited the Pacific Coast during the first half of the 19th century, and is known as the Douglas fir or spruce, red fir, yellow fir, Oregon pine (q.v.), etc. It is one of the most import¬ ant trees of western America, especially of the Pacific States and British Columbia. It is a noble tree, often attaining a height of more than 250 feet and forms immense forests, espe¬ cially from lat. 43° to lat. 52°. The bark, when

the tree is old, is rugged and is from six to nine inches thick. The tree abounds in a clear, yellow resin. The timber is heavy, firm and valuable, and the growth of the tree is very rapid. See Spruce; Hemlock.

FIRANGI, fe-ran'ge, an Oriental name for the inhabitants of the Occident, which region is known by the name Firangistan. By some the name is said to be a corruption of Frank and to have originated during the Crusades, by others it is derived from the Varangians or Warings, the Norse mercenaries of the Byzantine emperors. The descendants of the Bengal Portuguese are also known by this name.

FIRBOLGS, or FIR-BOLGS (fir-man; bolg'bag; bag-men), a name given to the de¬ scendants of one of the colonies of Nemedians, who fled from Ireland to Greece in about 1900 b.c. Nemedia, or Neimheidh, and his wife, Macha, his four sons, 34 ships with 30 persons in each ship, went from Greece to Ireland because some of the lineage of Nemedia had some years before gone from Greece to Ireland. They found in possession of the country Afri¬ cans called Fomorians or Fomharaighs, and sometimes pirates. After several conflicts be¬ tween the Nemedians and Fomorians, the Nemedians were reduced to slavery or flight; they chose the latter. Simon Breac led a colony to Greece, where they were also persecuted and made to serve the people

whom they found in the country. One of their tasks was to dig (

FIRDAUSI, fer-dow'-se, FIRDOUSI or FIRDUSl, Persian poet: b. Shadab, near Tus, in Khorassan, about 935; d. there, 1020. With the name of Firdausi in the 10th century of our era, modern Persian poetry may be said to be¬ gin. Firdausi, however, really forms only one link in the long chain of Iranian literature which extends over more than 25 centuries, and whose beginnings are to be sought in the Avesta, 500 years before the birth of Christ.

The Mohammedan conquest of Iran by the Arabs somewhat resembles, in its effect upon Persian literature, the Norman conquest of England. Hardly two centuries had elapsed before an Iranian renaissance is begun to be felt in Persia. Firdausi comes 300 years after the battle of Nihavand, in which the eagle of the Persian military standard sank before the crescent of Allah's prophet and the Mohamme¬ dan sword; just as Chaucer followed the battle of Hastings by 300 years.

Such was the literary situation at the end of the 9th century. Firdausi was the poet in whom the wave of the national epos culminated in the 10th century. But as there were Eng¬ lish poets who struck the note before Chaucer, so in Persia, Firdausi had his literary predeces¬ sors. Abbas of Merv (809) was one of these earlier bards. Of greater repute was Rudagi (d. 954) who is said to have composed no less than a million verses. But Firdausi's di¬ rect predecessor and inspirer in the epic strain w'as Daqiqi, cruelly murdered w'hen he had

sung but a thousand lines. Yet these thousand verses were immortal, as Firdausi has incorpo¬ rated them into his poem and has thus happily preserved them. They are the lines that de¬ scribe the founding of the religion of Zoroaster, priest of fire. There was possibly a certain amount of tact on Firdausi's part in using these, or in claiming to employ Daqiqi's rhymes ; he thus escaped having personally to deal with the delicate religious question of the Persian faith in the midst of the fanatical Mohammedans, who are said to have assassinated Daqiqi on ac¬ count of his too zealous devotion to the old- time creed. With Firdausi, then, the new Per¬ sian era is auspiciously inaugurated in the 10th century; its further development through the romantic, philosophic, mystic, didactic and lyric movements must be sought under the names of Nizami, Omar Khayyam, Jalal-ad-din Rumi, Sa'di. Hafiz and Jami.

Firdausi is pre-eminently the heroic poet of Persia. His full name seems to have been Abul- qasim Hasan (Ahmad or Mansur) ; the ap¬ pellative ˆFirdausi® (Paradise), by which he is known to fame, was bestowed upon him, ac¬ cording to some accounts, by his royal patron, the Sultan Mahmud. By descent he was heir to that Persian pride and love of country which the Arab conquest could not crush. By birth, therefore, this singer possessed more than ordi¬ nary qualifications for chanting in rhythmical measures the annals of ancient Iran. He had undoubtedly likewise made long and careful preparation for his task, equipping himself by research into the Pahlavi or Middle Persian sources, from which he drew material for his chronicle-poem. From statements in the {Shah NamalP itself, we may infer that Firdausi was nearly 40 years of age when he made the real beginning of his monumental work. We like¬ wise know, from personal references in the poem, that he had been married and had two chil¬ dren. The death of his beloved son is mourned in touching strains. One of the crowning events now in the poet's life was his entrance into the literary circle of the court of Sultan Mahmud of Ghazni, who ruled 998-T030. To Mahmud the great epic is finally dedicated and the story of Firdausi's career may best be told in connection with the masterpiece.

The removal of the heroic bard Daqiqi by fate and by the assassin's dagger had left open the way for an ambitious epic poet. Firdausi was destined to be the fortunate aspirant. This poet laureate lived long in the sunshine of the court, and was promised a gold piece for each line he composed. The liberality of Sultan Mahmud's favor called forth from Firdausi a splendid poetical panegyric, that is only eclipsed by the fierce savageness of the scathing satire which later the poet poured out against his royal patron, when disappointed in old age of the promised reward that was to crown his great work.

Tradition narrates that Firdausi was a sep¬ tuagenarian when he finished the last line of the 60,000 rhyming couplets that make up the

when the elephant laden with the money-bags arrived. On discovering the deception, the in¬ jured poet rejected the gift with scorn, and dividing the silver into three portions, he pre¬ sented one of these to the bath steward, the second to the elephant-driver and he gave the last to the man who brought him a glass of cordial He then wrote the famous satire upon Mahmud, and fled from the city for his life. For 10 years the aged singer was an exile, and he would have been a wanderer but for the friendly protection extended to him by a prince of Iraq, who apparently also tried, without ef¬ fect, to reconcile the sultan and the aged poet. Enjoying the solace of this prince's shelter,

Firdausi composed his last work, the (Yusuf and ZulikhaP a romantic poem nearly as long as the Iliad, on Joseph and the passionate love of Potiphar's wife for him as related in the Koran.

But Firdausi was now advanced to his 80th year, and he seems to have longed to visit his native town of Tus once more. A sad story is preserved of his death of a broken heart. It is also told that Mahmud relented and sent to the city of Tus a magnificent caravan conveying gifts and robes for the aged singer, and bearing likewise the 60,000 gold pieces that had once been promised. But all too late. The treasure¬ laden camel procession met at the city gate the funeral cortege that was conducting the dead poet's body to the grave. Firdausi's death oc¬ curred in 1020. His tomb at Tus is still a place of pious pilgrimage.

The story of the (Shah NamahP — Book of Kings, — may be described in briefest words as the chronicle-history of the empire of Iran, from the moment of its rise in legendary antiq¬ uity and during the golden reign of King Jamshid, through its glorious ascendency under the majesty of the Kayanian rulers, and down to the days of Zoroaster; thence onward to the invasion of Persia by Alexander the Great. The poem from this point follows the various fortunes and changes of the Persian sover¬ eignty, until its downfall and ruin before the Mohammedans and Islam. Firdausi naturally treats his subject as a poetic chronicler, not as a historian; but there is history in the poem, and he has given a certain unity to his long epic by keeping sight of the aim that he had in view, which was to exalt the fallen glory of Iran. The epic is written in a style befitting the theme.

Up to the beginning of the 19th century the poem existed only in manuscript form. At the expense of the French government it was then published with a French translation in a very elaborate folio edition by J. Mohl (6 vols., Paris 1831-68). A separate, less expensive edi¬ tion of this French translation was published in seven volumes (Paris 1876-78) under the title (Le Livre des RoisP Other editions of the original are by T. Macau (4 vols., Calcutta 1829) and by J. A. Vullers and S. Landauer (unfinished in 3 vols., Leyden 1877-84). Nu¬ merous translations are also in existence. There is an English abridgment with versions in prose and in rhyme by James Atkinson, (1832; cheaply reprinted in the (Chandos Series, } New York 1886). Several versified selections are found in Robinson, (Persian Poetry for English Readers> (pri¬ vately printed; Glasgow 1883). A partly

rhymed and partly unrhymed translation has been published by A. G. and E. Warner (6 vols., London 1905-12). A partial translation was made by A. Rogers (London 1907). Matthew Arnold used one of the episodes of the epic for his famous poem ˆSohrab and Rustum) (1853). An Italian prose rendering, the only entirely complete translation, has been made by Italo Pizzi (Firdusi, II Libro dei ReP (8 vols., Turin 1886-89) ; and Pizzi has given ex¬ tensive metrical renderings in his (Storia della Poesia Persiana* (Turin 1894). In German there is a running paraphrase of the story by Gorres, (Heldenbuch von Iran* (2 vols., Berlin 1820). Spirited renderings of selections have also* appeared in German; by A. F. von Schack, (Heldensagen des Firdusi* (3 vols., Stuttgart 1877) ; and by Riickert (unfinished), (Firdosi's Konigsbuch Schahname) (ed. Bayer, 3 vols., Berlin 1890-95). Of the (Yusuf and Zulikha* there is a complete German translation into rhymed verse by O. Schlechta-Wssehrd, (Jussuf und Suleicha* (Vienna 1889). A critical edi¬ tion of this poem has been published by H. Ethe (Oxford 1908). The latter also pub¬ lished some fragments of Firdausi's lyric poems with German translations (in Kgl. Bayer. Akad. der Wissenschaften, Sitzungsberichte der Philosophisch-Philologischen und Historischen Classe, Vol. II, p. 275, Munich 1872). Con¬ sult Browne, E. G., (A Literary History of Persia) (2 vols., London 1902-06) ; Ethe, H., (Neupersische Litteratur) (in (Grundriss der Iranischen PhilologieP Vol. II, p. 130, Strass- burg 1896-1904) ; Guerber, H. A., (Book of the Epic) (Philadelphia 1913) ; Horn, P., (Ge- schichte der Persischen Litteratur* (Leipzig 1901) ; Noldeke, T., (Das Iranische National- epos) (in (Grundriss der Iranischen Philolo¬ gies Vol. II, p. 212, Strassburg 1896-1904); Pickering, C. J., (Lyrical Poetry of FirdausP (in National Review, Vol. XIV, p. 798, London 1889-90) ; Robinson, S., (Sketch of the Life and Writings of FerdusP (London 1876).

A. V. Williams Jackson, Professor of Indo-Iranian Languages, Colum¬ bia University.

FIRE, the agent of purification; one of the so-called four elements which burns, inflames, warms or heats; the igneous principle; heat and light emanating visibly, perceptibly and simultaneously from any body; caloric; the effect of combustion. The terrific energy of fire, the most important agent of civilization, the similarity of its effects with that of the sun, its intimate connection with light, its terrible and yet genial power, and the beauty of its changeful flame, easily account for the reverence in which it was held in ancient times. At a period when cause and effect, form and essence, were not dis¬ tinctly separated,

fire became an object of re¬ ligious veneration, a distinguished element in mythology, an expressive symbol in poetry, and an important agent in the systems of cosmogony. It gained a place among the elements, and for a long time was believed to be a constituent part in the composition of all bodies. At a later period, fire, under the name of phlogiston, was considered to be the source of all chemical action. See Combustion; Heat.

FIRE, Saint Anthony's. See Erysipelas.

FIRE ALARM, a system of signals for announcing the location of a newly-discovered

fire and summoning fire-fighters to extinguish it. In cities, what is known as the municipal type of fire alarm is in use. It is a highly organized telegraphic system, partly automatic. The signal boxes are located at convenient points throughout the city, close enough to¬ gether so that no one wishing to send in an alarm has far to go to reach a box. In New York city the farthest distance to be traveled is 400 feet. These signal boxes are connected with wire circuits or loops which pass through fire department headquarters. Here the alarm is received and repeated mechanically or by hand to the fire companies detailed to protect that particular locality.

When an alarm is to be sent, the outer door of the signal box is opened (as provided), and in some boxes a tell-tale bell rings to notify the bystanders or a nearby policeman that the box is being used. This is to prevent the mis¬ chievous use of the box. On the inner door is a hook or handle which, being pulled down, releases a mechanism operated by clock-work, setting in motion a disc wheel having notches cut in its rim. The notches operate a lever key which makes and breaks contact as with a telegraph key. The number and spacing of these notches determines the signal reaching headquarters. Here a gong strikes the number of the box several times at the same moment, printing on a recording telegraph instrument dashes in accordance with the notches on the dispatching wheel in the signal box; thus,

— – - – represents box 134.

Upon receipt of this signal the operator takes from its case a disc bearing the same number of notches, slips it into the dispatch box of the fire-house circuit and releases the mechanism ; or he may send it by hand with a telegraph key, or, if either of these lines is out of order, he may use the telephone. The signal may go to all the engine houses in the city or it may go only to the companies who are to go to

that particular fire. At the engine house the signal sounds twice on a small bell and once on a big gong located on different circuits, so as to pro¬ vide against a chance breakdown of one or the other circuit. The time which elapses between the pull of the box and the last stroke of the big gong in the engine house averages in New York city 50 seconds, and the engine is gen¬ erally out of the house and on its way to the fire before the big gong has ceased sounding.

The signal boxes are connected in series on the circuit, the approved number for one cir¬ cuit being from 7 to 10. In a large city the number of these loops becomes very large and consumes a great deal of wire, which must be kept in repair, and it has been the custom to place as many as 50 boxes on a single circuit. In one case now remedied there were 94 boxes on one circuit. With the regular type boxes it was quite possible for two boxes to be pulled at the same moment and the signals be confused at headquarters. The more boxes on a circuit, the more chance of such confusion, so that Succession® boxes have been installed in some cities. These boxes hold their signals by means of a special magnet as long as the circuit is being used to transmit another alarm, the armature dropping and releasing the automatic mechanism when the regular current is restored. By this device alarms from any number of

boxes on a given circuit will go in to head¬ quarters consecutively.

In towns where there is no paid -fire depart¬ ment, and the fire-fighting force is composed of volunteers, the box alarms are arranged to be struck automatically on a large fire-bell, or the same mechanism may be made to blow a fire-whistle.

Private fire alarms — those protecting large or small private factory plants — are usually arranged in the same way as for towns, with the addition in most cases of a fire-detecting system. The latter consists of a series of thermostats placed in every enclosure, including closets, at suitable distances apart in the build¬ ing to be protected. In the event of fire the thermostat, through making or breaking of electrical contact (according to its pattern), sends its alarm to an alarm box which auto¬ matically rings a fire-bell or blows a fire- whistle. Or it may go simply to a watchman’s office, whence the general alarm is given by hand.

The thermostat system is used also in schools and other buildings, and in cities may be made to connect with a trip-box which sets off the alarm in the nearest street signal box.

The chief improvement in fire alarm systems in recent years have been, besides the succession box, the speeding up of the strokes of the alarm from an interval of two seconds apart to one second. This cuts in two the time required to receive and to transmit any given alarm. An addition has been made to the signal-box mech¬ anism, affording telephone communication with headquarters, and also patrol and ambul¬ ance calls. The electric current is now fur¬ nished by storage batteries instead of cell-bat¬ teries, affording a constancy of current formerly unknown. In the larger cities the fire alarm wires have been placed in underground con¬ duits, thus avoiding accidents to the system from falling poles.

FIRE-BACK, or MACCARTNEY COCK,

any of the small Malayan pheasants of the genus Acomus, or of the Indo-Chinese genus Lophiura , in which the plumage of the back or rump dis¬ plays glowing metallic reds. The rest of the plumage is very gorgeous, especially in the cocks, which, in Lophiura, are adorned with a magnificent crest. See Pheasant.

FIRE-BALLOON, a balloon whose ascen¬ sional power is derived from a body of heated air rising from a fire beneath the open mouth of the bag.

FIRE-BALLS, (1) Balls filled with powder or other combustibles, intended to be thrown among enemies, and to injure them by explosion, or to set fire to their works. (2) A popular name applied to a certain class of meteors which exhibit themselves as globular masses of light moving with great velocity, and not unfrequently passing unbroken across the sky until lost in the horizon. They differ from or¬ dinary meteors, probably more in volume and brilliancy than in any other distinctive char¬ acteristic. They are not to be confounded with another class of meteors, that explode in their passage and appear to let fall a dull-red body (meteorolite) to the earth. See Meteorology.

FIRE-BAR, a grate bar in a furnace resting on a frame, called the fire-bar frame; inside the

FIRE BOAT

fire box in a locomotive engine, wedge-shaped iron bars fitted to the fire box with the thick side uppermost, to support the fire ; the ends

rest on a frame; they are inclined inward, with an air space between each, to promote combus¬ tion, and are jointed at one end, and supported by a rod at the other, so that the rod being withdrawn, the bars fall, and the fire box is emptied.

FIRE-BELLIED FROG. See Fire-toad.

FIRE BLIGHT, or PEAR BLIGHT, a

bacterial disease of trees of the Pomidae, -in¬ cluding apples, pears, etc. The prime cause is the Bacillus amylovorus , which enters the blossoms and gradually works down to the leaves, twigs and trunk, killing the parts as it goes. Bees and insects spread the bacilus dur¬ ing the time the trees are in blossom. The best method of eradicating the disease is to cut out and burn all affected parts during the late fall and winter when the trees are dormant. Care must be taken to prune off well beyond the af¬ fected limb and the trees must be carefully watched the following season, when all limbs that appear to bear the infection should be cut and burned. The disease is common through¬ out the United States but is almost unknown in Europe.

FIRE BOAT. The great desirability, not to say necessity for facilities of fighting water¬ front fires from their water side led at first to the placing of fire engines on scows and tow¬ ing them into position. From this primitive makeshift has developed the highly organized modern fire boat with an efficiency surpassing a dozen land engines, to be found in all cities possessing water frontage to be protected.

The first requirement of a fireboat is speedy movement. It must get quickly to the fire. For this its propelling engines must be power¬ ful beyond the ordinary. In addition to power it must be able to manoeuvre swiftly. Its streams of water must be thrown with much greater force than is the case with a land engine, and its pumps must therefore be of great power. To operate this mechanism a very large boiler capacity is necessary. The adjustment of all these requirements has de¬ veloped a fire boat of 120 to 125 feet in length, from 25 to 28 feet molded beam, about 15 feet molded depth and with a draught of from 8 to 9 y2 feet and a displacement of from 450 to 500 tons. The propelling mechanism consists of twin screws of 6 feet diameter and 8 feet pitch, and give a running speed of 14 to 16 miles per hour. To save boiler space and weight the pumps are of the two-stage centrifugal type and operated by turbine engines, which require only half as much steam as recipro¬ cating pumps. In some recently built fire boats (for Chicago) the propellers are driven by electric motors served by generators. These may be controlled direct from the pilot house without calling upon the engineer. The fuel used is generally coal, and steam sufficient to run the boat is kept up night and day. Upon receipt of a summons to a fire the fireroom hatch is closed and the blower started, pro¬ ducing in the fireroom the forced draught

neces- . sary to raise the steam pressure to full working capacity — from 200 to 225 pounds per square inch. In a Seattle fire boat the fuel is oil, sup¬ plied to four boilers by four burners to each.

When lying idle only one or two burners on each boiler are needed to keep up steam and the others can be instantly lighted when an alarm is received. The water delivery system is oper¬ ated by two sets of pumps which take the water through 14-inch intakes at the level of the bilge of the boat, and pump it into a 12- inch or 14-inch main which encircles the vessel. The pressure exerted upon the main is from 180 pounds per square inch upward for a de¬ livery of 9,000 to 11,000 gallons per minute. The two pumps can be compounded so as to deliver 5,000 gallons per minute at 250 to 300 pounds per square inch. The nozzles are dis¬ tributed about the boat, all being connected with the main. The principal nozzles are the two monitors, one located (usually) on top of the pilot house and a second one aft. They range from 4ˆ2 to Sy2 inches diameter. Be¬ sides these there are from 8 to 12 hose con¬ nections for 2l/2 to 3ˆ-inch hose. In some of the newer New York fire boats there is a standpipe 27 feet in height placed near the stern of the boat. This has at its top a deck or platform from which the firemen are able to fight a fire in the second story of a pier with much greater efficiency than from the water level. Fire boats carry usually up to 1,500 feet of hose, of 2j/2-inch size for interior work and 3ˆ4-inch for outside work. These hose lines may be extended inshore as far as 500 feet and do effective service. The New York fire boats have also connections by which they can couple to the pipes of the high-pressure service at the water's edge, and by their power¬ ful pumps aid in fighting fires which are far inland. Consult West, C. C., (Centrifugal

Pump Fire Boats > (in Transactions of the So¬ ciety of Naval Architects and Marine Engineers, Vol. 16, pp. 211-228).

FIRE BOX. See Locomotive.

FIRE BRICK, a brick capable of sustain¬ ing, without fusion, the extreme action of fire. They are used for lining furnaces, and for all kinds of brick-work exposed to intense heat which would melt common bricks. They are made from a natural compound of silica and alumina, which, when free from lime and other fluxes, is infusible under the greatest heat to which it can be subjected. Oxide of iron,

how¬ ever, which is present in most clays, renders the clay fusible when the silica and alumina are nearly in equal proportions, and those fire-clays are the best in which the silica is greatly in ex¬ cess over the alumina. When the alumina is in excess, broken crucibles, glass-house pots, and old fire brick, ground to powder, are substituted for the common siliceous sand used in the or¬ dinary processes of brick making, but which, in this case, would be injurious, as having a ten¬ dency to render the clay fusible. Fire-clay being an expensive article, it is usual, when making fire brick at a distance from mines, to mix with it burnt clay, for the sake of econo¬ mizing the clay and diminishing its contraction. See Brick.

FIRE BRIGADES. See Fire Protection.

FIRE CHIEF or MARSHAL, an officer in some of the larger American cities who has the supreme command of the fire department of the municipality, and who directs the work of extinguishing fires. He is generally clothed

with large powers of discretion, and has also police authority.

FIRE-CLAY is distinguished from ordinary clay by its refractoriness and infusibility, which render it an excellent material for bricks, cru¬ cibles, glass pots, retorts and similar vessels which are to be exposed to a constant and very high temperature, at which ordinary bricks and clay vessels would fuse and become vitri¬ fied. This difference is due to the purity of fire-clay, or at least to the absence from it of iron, lime, magnesia and alkalis, in appre¬ ciable quantities. It consists of hydrated sili¬ cate of aluminum almost entirely, but may con¬ tain traces of organic matter, and of some of the bases mentioned above. Fire-clays are com¬ monly found associated with the coal forma¬ tions, and usually form a stratum immediately below the coal. It seems, indeed, to be part of the soil on which the coal vegetation flourished and died. Fire clays are generally plastic, but the United States furnishes a variety known as flint clay, which is non-plastic. In the United States fire-clay is found in the Carboniferous rocks of Pennsylvania, Missouri, Kentucky and Ohio; in the Cretaceous of New Jersey, Colo¬ rado and other States and in the Tertiary formations of the Gulf States. Flint clay, which is non-plastic, resembles flint in appearance; ganister is a refractory clay with a high per¬ centage of silica; pot clay is used in the manu¬ facture of glass pots and burns dense at a low red heat; fire mortar is a sandy fire clay used for making mortar to set fire bricks; retort clay is very plastic and is used in the manu¬ facture of gas retorts. About 1,750,000 tons are produced annually in the United States and are valued at about

$2,375,000. Consult Bischof, (Die feuerfesten Thone5 (Leipzig 1895), and Ries, (Clays: Occurrence, Properties and Uses) (New York 1908). See also Clay; Coal.

FIRE-CONTROL. See Gunnery.

FIRE-DAMP, the name given by coal miners to carburetted hydrogen or marsh-gas, CH4. It is an inflammable gas, lighter than air, and is often found in coal mines, it being one of the products of the retarded decay of plant remains. A mixture of fire-damp and air in certain proportions is highly explosive; hence many frightful disasters with great loss of life mark the history of coal mining. The lowest explosive limit is a mixture of one part marsh gas with Sy2 parts of air. The explosive violence increases with the addition of air, reaching a maximum with 9l/2 parts air ; beyond this the explosive violence decreases and with 13 parts air to 1 part gas becomes inert. White Damp is carbon monoxide; Stink Damp or sulphur gas is hydrogen sulphide; Black Damp is carbon dioxide. Afterdamp is the mixture of gases formed by an explosion. See Coal Mining; Gases, Mine; Methane; Safety- lamp.

FIRE DISTRICT. See District.

FIRE-EATERS, in United States history, the violent, swaggering and defiant Southern ex¬ tremists before the War, threatening vengeance on Northern interferers with slavery or gov¬ ernment interferers with the slave States. The name is used in a general sense for a blustering hot-head, especially a professional duelist.

FIRE ENGINE, a machine for throwing water or extinguishing chemicals upon fires. As it is commonly understood it is a portable pumping apparatus designed to throw water; but it applies equally to the so-called (

In their earliest form fire engines were large syringes, which were filled with water to be squirted on the fire by the united exertions of three or four men. Later they were in the form of reciprocating pumps connecting with a pres¬ sure chamber from which hose was employed to conduct the water to the place where it was needed. This idea passed through many devel¬ opments, and even before the application of steam as a motive power some very efficient hand-pumping apparatus was in use, operated by a double acting rack with 25 to 30

men on a side. This machine is still in vogue in several parts of the United States, chiefly in the South and the Middle West. These early types of fire engine were, as a rule, drawn by hand. With the advent of steam as a motive power for working the fire pumps, the long familiar up¬ right boiler with its duplex or triplex pumps came into use, and, being very heavy, was drawn by horses. The next step forward was to make them self-propelling, using their own steam to get them to the fire, and afterward to do the pumping. A great stride in efficiency was thus achieved, for the time in getting to the fire was practically cut in two, and this, in the case of a newly starting fire, meant often an enormous saving in the fire loss.

The development of the gasoline motor car led to the production of a new type of fire engine which is gradually displacing the ˆsteamer,® both horse-drawn and self-propel¬ ling. The motor engine requires no heavy boiler, and no fire has to be kept up when the engine is waiting a call. It is ready to start on the instant, to travel to the fire at a speed of 35 miles per hour and to go instantly to work with its pumps when arrived. The same en¬ gine drives the car and operates the pumps. A favorite type with city fire companies ha< = 6-cylinder motors of 70 horse power, with a maximum speed of 60 miles an hour, and a water delivery of 700 gallons per minute. This truck carries also 1,000 feet of 2ˆ4-inch hose and two 3-gallon chemical extinguishers, with pikes and axes, and a crew of seven men.

In many cities the steam pumping engine is still in use, the horses having been done away with by installing a motor traction drive on the front of the truck. A flash type of boiler, burn¬ ing kerosene, has supplanted the coal-burner, in some cases.

In small towns the motor chemical engine has found great favor, and its success has given this type place even in large cities as <(scout® engines. It has been found by experience that these small trucks are able to handle 80 per cent of all fires for which alarms are sent out. They carry a 30-gallon or 60-gallon chemical tank, 150 feet of chemical hose, an extension ladder of 24 feet and a roof ladder of 12 feet. They are easily operated by a crew of three men or by two in case of emergency. In some cities they are scattered all about the protected area, and are depended on for quick work.

The saving of motor-driven engines over horses varies from $160 to $200 per year for each horse displaced, and even the first cost of motor apparatus is somewhat lower than the older types. The motor engine will take care of three times the area that can be covered by the horse-drawn engine, and entirely outclasses the latter in deep

snow or on muddy roads in the suburbs.

The chemical engine, motor-driven, is com¬ ing more and more into favor. The damage done by water in this case is but a small frac¬ tion of that done by the large water pumps, and the low first cost makes them available even for the smallest towns. A novel outfit of this type is mounted on a sea-plane, and forms part of the fire equipment of the city of San Diego, Cal. It flies to the fire at a speed of 75 miles an hour with its crew of two men besides the pilot. It is intended only for use on water-front fires, as it must <(land® on the water.

Another special type of fire engine is in use on Canadian railways. A 10, 000-gallon tank is built upon a flat-car and equipped with a pump operated by the train-heating apparatus of the locomotive which draws it. The pump is pow¬ erful enough to throw two one-inch streams to a distance of 200 feet from the car without stretching hose.

FIRE-ESCAPE, the name applied to any means of escape from a burning building. Many suggestions have been made for contriving the means of effecting this, some of them being for apparatus to be used in the interior of a building, and some to be used from without. Of the contrivances to be used within a building the simplest are a rope firmly attached to something near a window, or a rope sliding over a pulley fixed to the window-sill, and the like. And of the different machines that have been made for use from without, that which is found to be the most useful is the one invented by Wivell, and consists of a wheel-carriage sup¬ porting a long ladder with a net underneath. The ladder consists of extensions, the main ladder and the upper ladders, the upper folding over the main ladder. When used the ladder is set to the window of a building which is burn¬ ing; the attendant mounts it, and assists those who are in danger to descend it.

FIRE-EXTINGUISHER, an apparatus for extinguishing fire. It is charged with water and a mixture of dried ferrocyanide of potas¬ sium, sugar and chlorate of potassa. It is set in action by a blow on a glass bottle containing sulphuric acid, which flows over the charge and liberates gas, which, with the water, is emitted at a nozzle and expended upon a fire to quench it. The earliest of modern fire-extinguishers seems to have been that invented by W. A. Graham, of Virginia, about 1837. It consisted essentially of a contrivance by means of which carbonic acid gas dissolved in water under pressure could be liberated and directed upon burning objects. Many subsequent improvements have made Gra¬ ham's fire-extinguisher more useful. In the upper part of the cylinder a glass receptacle is placed, containing sulphuric acid and closed with a loosely fitting

stopper. When in use the cylinder is inverted, the stopper drops out and the acid mixes with a solution of carbonate of soda. Carbon dioxide is generated instantly and produces considerable pressure, forcing the

liquid through a flexible nozzle which is directed on the fire. The Babcock extinguisher consists of a vessel filled with a solution of bicarbonate of soda. In the upper part of the vessel there is a smaller one containing sulphuric acid, sus¬ pended by pivots below its centre. When not in use this inner vessel is kept upright by a rod passing through the stopper of the larger vessel, but in case of fire the rod is withdrawn, thus permitting the inner vessel to topple over and mingle its contents with the bicarbonate of soda. The result, of course, is that carbonic acid gas is at once liberated. Many automatic fire-extinguishers, intended to be brought into opera¬ tion by the rise of temperature caused by fire, have been used with more or less satisfactory results. The best known of these are the sprinkler systems, in which water pipes are laid to every room of a building, and in each room is placed a nozzle held closed by an easily fusible metal. When the temperature rises to the danger point, the metal melts, open¬ ing the nozzle and water at high pressure is released in the room. Extinguishers charged with chloroform or carbon tetrachloride mix¬ tures are used in fires caused by electric currents as these solutions are non-conductors.

FIRE-FLIES, any of various forms of noc¬ turnal insects belonging to different orders hav¬ ing the power of voluntary self-luminosity, usually more or less intermittent and exhibited in flashes. After the death of the insects the luminous segments, at least in many forms, can be distinguished by their paler usually yellow color which contrasts with the darker color of the remainder of the insect. The true fire-flies, commonly termed also <(lightning bugs,® are found in the family Lampyridee, and particu¬ larly in the genus Photuris. Throughout a considerable portion of our country, including the District of Columbia and vicinity, P. pyralis is the most prominent form of fire-fly. Far¬ ther north Pyractomena borealis and related species are the more common fire-flies, while a large species, Photuris pennsylvanica, extends from north to south. One of the most re¬ markable forms of fire-flies is found in the genus Phengodes, in which the females are wingless and larviform ; the males are not luminous. The historic and poetic <(glow- worm® is the wingless female of the

European Lampyris noctiluca. In America the glow¬ worms are scarce, and are usually the larvae of the genera which have been mentioned, most of which are luminous in both sexes. In other countries various other insects are reported to have the power of luminosity, among which are the lantern-flies of South America (Ful – gora lanterneria and Candelaria) . The lumi¬ nous power of the lantern-fly, however, is doubted. In Central America and the West Indies and in South America the most abun¬ dant fire-flies belong to the genus Pyrophorus, large snapping-beetles (Elateridce) , in which the luminous portions of the body are on the sides of the thorax in the form of two large pale eye-like spots. Numerous other forms of insects, including another genus of Elateridce , an Asiatic buprestid beetle, some forms of poduras, the maggots of certain flies, especially of the fungus gnats (Mycetophilidce) , are luminous ; but next after the Lampyridce per¬ haps the myriapods are most remarkable for

the possession of this power of self-illumina¬ tion. The luminous or photogenic organ is re¬ garded by Wielowiejsky and also by Emery ((as morphologically a specialized portion of the fat- body, being a plate consisting of polygonal cells, situated directly under the integument, and supplied with nerves and fine tracheal branches® ; while Lang, in writing of the physiology of insect-phosphorescence, briefly states that <(the cells of this luminous organ secrete, under the control of the nervous system, a substance which is burnt during the appearance of the light; this combustion takes place by means of the oxygen conveyed to the cells of the lumi¬ nous body by the tracheae, which branch pro¬ fusely in it and break up into capillaries.® Emery, writing of the luminosity of females of Luciola, states that its use appears to be a means of defense, a warning or danger signal against insectivorous animals, but there is little doubt that it also serves to attract the sexes, especially in the case of the wingless females whose powers of locomotion are so limited, while the males fly freely. Prof. S. P. Langley, secretary of the Smithsonian Institution, has made considerable study of the <(cucujo® or Pyrophorus, as has also Heinemann, the latter reaching the conclusion that the light depends on a process of oxidation. The cucujos are the most interesting of all the fire-flies, and they are much used by the South and Central Americans in furnishing amusement for the children, while the ladies employ them as ornaments for their evening toilet, fastening great numbers of them to their ball dresses.

The literature of this subject is very exten¬ sive ; a list of important articles compiled by A. S. Packard may be found in the (Journal of the New York Entomological Society) (Vol. IV, 1896).

FIRE-INSURANCE. Loss through fire constitutes one of the great hazards confront¬ ing society to-day, and the scientific conduct of business requires that some organized method for the elimination of this risk be used by property owners. Three methods of elimination may be employed, viz.: (1) the adoption of measures designed to prevent the origin and spread of fire; (2) so-called self- insurance, designed to enable the property owner to carry the risk himself; and (3) insur¬ ance, as commonly understood, whereby for a definite consideration, called the premium, the risk of loss is transferred to some other per¬ son. or group of persons called the insurer. While all the foregoing methods are employed extensively to-day, it should be stated that self- insurance can be used safely and scientifically only by corporations or individuals whose prop¬ erty consists of a sufficiently large number of separate units so widely distributed and so nearly equal in value as to make the applica¬ tion of the law of average possible and to render negligible the conflagration hazard. It is for this reason that many large corporations, while carrying most of their insurance in a self-insurance fund, nevertheless insure the more costly items of their property with insur¬ ance companies. Moreover, should self-insur¬ ance become possible in a given business, it is important that the transition from a system of insurance by companies to a plan of self-insur¬ ance should be gradual.

Statistics clearly indicate that self-insurance has its serious limitations and that with every succeeding decade a larger proportion of the nation's wealth, subject to destruction by fire, is being protected by insurance with regular insurance companies. In other words, less and less of the fire hazard is assumed by capital itself, and an increasing reliance is being placed upon insurance and fire prevention, the latter serving the purpose of reducing the cost of fire insurance rather than in eliminating the need for insurance itself. From an average of $6,394,000,000 of insur¬ ance carried by American and foreign com¬ panies in the United States during the years 1877-80, the total outstanding risks carried by these companies increased to an average of $10,992,000,000 during 1881-90, to $18,368,000,- 000 during 1891-1900, to $31,924,000,000 during 1901-10, to $46,276,000,000 in 1911, and to over $63,000,000,000 in 1916. Since 1900 the aver¬ age rate per $100 of risk carried also shows a very appreciable decline, namely, from $1.1116 to $.9915, or approximately 10 per cent, and this despite the fact that the period under con¬ sideration has been noteworthy for a material rise in prices along nearly all lines.

In the meantime the companies have greatly increased their financial strength. Thus, as regards the joint-stock fire insurance companies licensed in New York State, and writing probably 80 to 90 per cent of the nation's fire insurance, it appears that during the half century between 1867-1917 (with approximately the same num¬ ber of companies operating) the capital has more than doubled, the assets have increased by nearly 860 per cent, while the net surplus is larger by about 22 times.

OUTSTANDING RISKS OF AMERICAN AND FOREIGN COMPANIES TRANSACTING BUSINESS IN THE UNITED STATES

(Compiled in the 1917 Insurance Year Book)

Year

Amount

covered

Premiums

charged*

Rate on $100

1877-1880 .

$25,575,178,350

$246,116,917

.9623

1881-1890 .

109,928,038,845

1,137,444,741

1.0347

1891-1900 .

183,680,184,497

1,905,280,004

1.0373

1901-1910 .

319,237,036,712

3,548,853,251

1 .1116

1911 .

46,276,992,650

491,072,474

1.0612

1912 .

48,840,386,151

514,594,534

1.0536

1913 .

52,856,280,672

544,836,753

1 . 0308

1914 .

56,012,859,329

570,687,566

1.0189

1915 .

58,867,095,439

588,701,918

1 . 0000

1916 .

63,355,299,583

628,209,683

.9915

Briefly outlined, the history of fire insur¬ ance in the United States divides itself into four distinct periods, viz.: (1) the pioneering stage, ending with the New York fire of 1835; (2) the period from 1835 to the close of the Civil War; (3) the period from 1866 to 1880; and (4) the years from 1880 to the present.

During the first period fire underwrit¬ ing was largely of a personal or partner¬ ship character, the interested parties being usually leading merchants in the principal manufacturing and mercantile cities. The Philadelphia Contributionship, in many re¬ spects patterned after the Hand-In-Hand of London (established toward the close of the 17th century), was organized on 13 April 1752, and was the first fire insurance company to be established in the United States. This effort at corporate underwriting was followed by the establishment of the Mutual Assurance Com¬ pany in 1784, the Knickerbocker Fire in 1787, the Baltimore Equitable Society and the In¬ surance Company of North America in 1794, the Mutual Assurance Company of the city of Norwich in 1795, the Columbian Insurance Company in 1801 and the Hartford Insurance Company in 1803. It is noteworthy that the first two companies mentioned are still in ex¬ istence and still continue their original plan of issuing so-called perpetual policies. By 1820 some 28 stock companies had been estab¬ lished, of which 17 were located in New York, 6 in Pennsylvania, 2 in Connecticut and 1 each in Rhode Island, New Jersey and Massa¬ chusetts. With few exceptions, the companies of this period were purely local in character and seldom transacted business outside of the cities where they were located. Most of the companies also transacted both fire and marine insurance, many placing greatest emphasis upon the latter. The contracts issued usually furnished no securitv beyond current receipts and the good faith of the men behind the com¬ panies. Foreign companies, it should also be added, were generally forbidden to transact business in this country, a policy continued in certain States even after 1835. The New York conflagration of 1835 proved the undoing of most of the New York stock companies, and thus served to pave the way toward the elimi¬ nation of many serious shortcomings

in the business. Not only did the leading companies begin a policy of classifying risks and of treat¬ ing the conflagration hazard with some sort of scientific consideration, but a greatly increased emphasis was placed upon the necessity for

- Gross less reinsurance.

FINANCIAL STRENGTH AND VOLUME OF BUSINESS TRANSACTED BY JOINT-STOCK FIRE INSURANCE COMPANIES* LICENSED IN

NEW YORK STATE

(Compiled in The Spectator , 23 May 1918)

Year Ended

31 December

Num¬ ber of com¬ panies

Capital

Assets

Net

surplus

Net

premiums

Losses

paid

Ratio of losses to premiums

1917 .

186

$106,238,9901

$825,275,667

$231,866,309*

$506,114,518

$239,249,320

Per cent

47.3

1867 .

170

48,158, 390t

86,035,408

10, 193 , 086f

44,478,173

27,300,264

61 . 3

Increase .

16

$58,080,600

$739,240,259

$221,673,223

$461 ,636,345

$211,949 056

- Includes inland and ocean marine risks of certain companies which could net be separated from their lire insurance business.

t Capital of American companies only. , „ .

t Includes surplus as to policyholders of United States branches of foreign fire insurance companies.

making proper provision for the financial stabil¬ ity of companies. Thus Massachusetts, in 1837, provided that companies should maintain a fund to insure contracts; while New York, in 1853, followed with a reserve law. Such stat¬ utory acts constituted the beginning of what are known as reserve or unearned premium fund laws, to be found at present on the statute books of nearly every State, and also marked the entrance of the State into the field of fire insurance, a movement which was subsequently to become of much greater importance. Despite such legislation, however, fire insurance com¬ panies generally continued to pursue a policy throughout this period of keeping up dividend payments at the expense of an adequate sur¬ plus. In fact it was not until after the Chicago and Boston conflagrations that the companies came to a full realization of the necessity and duty of maintaining a large working surplus. Practically all the companies also continued at this time to devise their own policy contracts, and little effort was apparently made to give to the business community the benefits of the greater certainty and fairness resulting from the mandatory use of a well-constructed stand¬ ard policy by all underwriters.

Two other main features marked the develop¬ ment of the fire insurance business during this second period, viz., the development of the mutual idea, and the employment of special agents. The great majority of New York companies having been wiped out by the New York con¬ flagration, it was only natural, as a result of great distrust against stock companies, that one of the so-called <(mutual waves, w to which the fire insurance business has been subject from time to time, should sweep over the country. The extent of the movement may be inferred from the fact that no fewer than 62 of these concerns reported to the comptroller of New York by 1853. Most of these concerns, how¬ ever, were organized on incorrect principles, and operated over too large an area and upon too small a capital to assure the safeguards necessary to mutual insurance, with the result that the whole idea soon proved unsatisfactory and became highly discredited. The stock com¬ panies, on the other hand, took advantage of the opening of the West, and began to spread their business beyond their immediate home localities. Such a movement naturally required greater dependence upon field representatives ; hence we find the companies employing special agents, or field men. But the function of these representatives, unlike the later practice, was still limited mainly to the adjustment of losses.

With the close of the Civil War the business entered, for the first time,

into a period of co-operation. In 1866 the leading companies of the country organized the National Board of Fire Underwriters for the purpose of se¬ curing adequate rates and uniformity in the use of proper forms and the handling of all matters of common interest. This event prob¬ ably marked the most important change that had thus far occurred in a business so essen¬ tially co-operative in character. Other events during this period, however, also serve to show the increasing tendency to place the business on a scientific foundation. Thus the daily report system came into general use in place of the so-called monthly statement. Local representa¬

tives were thus entrusted with much greater responsibility, since they were required in the preparation of their daily reports to pass upon the business accepted by the home offices. As a consequence a better class of men was needed in the field. It therefore followed, in turn, that the functions of special agents, formerly limited to the adjustment of losses, were now greatly enlarged and extended to the appoint¬ ment o.f new agents, the examination of im¬ portant risks, and the supervision of agency accounts and methods. Incompleteness in the information of risks as furnished by the field men in their daily reports also led to the use of fire maps, a feature to be later universally adopted by companies for all the larger towns and cities.

Unfortunately, the spirit of co-operation, referred to above, was rudely checked by the great Chicago and Boston fires. So many companies were destroyed by these conflagrations and so many others weakened financially that the business of fire insurance was forced into a period of utmost demoraliza¬ tion, especially from 1874 to 1880. Not only were numerous irresponsible companies formed, but to aggravate the situation the National Board of Fire Underwriters discontinued the making of rates in 1877 and relegated this all- important function back to the local boards. Competition in rates now became the order of the day, with the result that adequate rates could no longer be maintained. With cut-throat competition holding supreme, profits soon dis¬ appeared for most companies and only the fittest found it possible to survive. Such dis¬ integration of the fire insurance business, so inherently co-operative in character, could not long continue, and with the beginning of 1880 (this date marking the start of our last epoch) we witness a renewed effort at co¬ operation. Thus in rapid succession we had the organization of the Western Union in 1879, the Underwriters Association of the Middle Department in 1881, the Southeastern Tariff Association and the Illinois State Board of Fire Underwriters in 1882, and the Underwriters' Association of New York State and the New England Insurance Exchange in 1883. Upon these and numerous other associations fell the important work of rate-

making, of readjusting the numerous local boards, of applying scien¬ tific principles to the business, of unifying forms and practices, and of inculcating educa¬ tion along insurance and fire prevention meth¬ ods. Space limits make impossible a discussion of all the important changes that have occurred in the fire insurance business during the last few decades. The following changes, however, constitute so vital a place in the fire insurance business of to-day that somewhat more than passing mention is justified. Briefly described, they are:

(1) The Adoption of a Standard Policy.

— When all companies used their own policy forms, sometimes designed purposely to limit their liability, there was bound to be much doubt and litigation. The advantages of a carefully worded contract, mandatory upon all companies, are so apparent that one wonders why the matter was delayed until 1873 when Massachusetts provided a standard contract and later, in 1880, made it obligatory upon all com-

panies doing business in the State. In 1886 New York adopted a standard contract (made mandatory in January 1887) which subse¬ quently became the law, with slight changes here and there, in numerous other States. Recently the original New York contract has been revised in New York and various other leading States, and at present it may be said that a standard contract is in general use throughout the country. Since certain States require the use of a standard by all companies, it follows that these companies find it con¬ venient to use the same contract elsewhere although no statute may prescribe a standard. Through the operation of underwriters' asso¬ ciations a remarkable uniformity has also been developed in the use of standard clauses and riders.

(2) Schedule Rating . — As properties became more complex in character, it necessarily fol¬ lowed that accuracy and justice in rate-making required a departure from the old method of arriving at a rate through personal judgment. Accordingly we have the adoption of rating by schedule, a system which makes possible the scientific determination of rates by taking into account the numerous factors that must neces¬ sarily enter, such as the good and bad features of the locality, the good and bad features of construction, the presence or absence of fire appliances, the occupancy, exposure and man¬ agement of the risk, and the presence or ab¬ sence of coinsurance,

adverse legislation, etc. Such a procedure gives, among other things, the advantages of greater accuracy in rate¬ making and greater equity between different property owners as well as communities. It also encourages proper construction and the in¬ stallation of fire preventive appliances, tends to lessen discrimination between different classes of risks, exerts a salutary effect in reducing unwholesome competition and cutting of rates, and discourages the enactment of so-called anti-compact laws.

In 1893 F. C. Moore and various associates promulgated the ((Universal Mercantile Sched¬ ule, and in the late 90's A. F. Dean prepared his so-called ((Mercantile* Tariff and Exposure Formula for the Measurement of Fire Hazards.® These two schedules, or modified forms thereof, soon became the prevailing basis for rates in the United States, the Universal Mercantile Sched¬ ule being adopted most generally in the East and the Dean Schedule winning greatest favor in the West. Both schedules, however, are still ((judgment systems® in that they represent col¬ lective estimates rather than actual experience. They represent, however, a decided improvement over the old system based on individual judg¬ ment. Within the last few years a further de¬ velopment is occurring in the direction of rate¬ making on the basis of actual experience. The most important step thus far in this direction has been the formulation by E. G. Richards of the <(Experience Grading and Rating Schedule,® or the so-called ((E. G. R. Schedule.® While not in actual use as yet, this proposed schedule has been the subject of much discussion and would seem to indicate that actual experience will soon, as far as it is possible to do so, figure prominently in fire rating systems.

(3) Improved Inspection Systems. — On the theory that the prevention of fires is cheaper than the payment of losses, numerous so-called

iactory mutuals developed exceedingly efficient systems of inspections and fire preventive ap¬ pliances. The competition that resulted from such methods had to be met by the stock com¬ panies. Accordingly, they were forced to create organizations (such as the Factory Insurance Association organized in 1890) which would specialize in the inspection of special properties and the writing of large policies upon pro¬ tected risks. Moreover, the companies also be¬ gan to participate actively in the spread of fire preventive methods, especially through their national associations, by enlisting the co¬ operation of manufacturers, architects, chemists and civic organizations, and by creating a special laboratory for the testing of new ap¬ pliances and processes designed to cut down the fire waste. Loss adjustments also came in for decided improvement. Not only

were special organizations created for the adjustment of losses, whereby companies unwilling to have special agents for the purpose were enabled to secure the* services of trained experts, but special corporations or company organizations were created for the salvaging of damaged goods.

(4) General Use of Coinsurance. — Although resisted in various States through the adoption of so-called anti-coinsurance laws, the fire in¬ surance companies of the country have suc¬ ceeded in enforcing the use of coinsurance in one form or another. Briefly defined, coinsur¬ ance means that the insured shall have <(any loss paid in the proportion that the insurance carried bears to the insurance required.® Usually the amount of insurance required is 80 per cent of the value of the property insured, but any other percentage may be used, depend¬ ing upon the extent to which the property is considered subject to destruction by fire. In other words the insured agrees to maintain his insurance to at least a certain specified percent¬ age, but in case it proves to be less it is under¬ stood that the insured shall be regarded as a self-insurer for the deficit. Violation of the agreement does not invalidate the insurance, but instead places the insured in the position of being coinsurer with the insurance company.

It is remarkable, indeed, that recognition of the justice of coinsurance should have been so long deferred and that the practice should have been so violently resisted, particularly in the form of anti-coinsurance laws. Not only is coinsurance necessary to enable the companies to secure an adequate income, but, from the standpoint of the public, fire insurance must be regarded as a community affair. Fire insur¬ ance premiums constitute a tax on the com¬ munity and each property owner should be asked to contribute his proper share to the total fire insurance fund. Moreover, coinsurance protects small property owners against large owners whose property may consist of various items, so scattered as to render each a separate risk. Thus, if large corporations, for example, were not compelled to insure their total prop¬ erty to a certain percentage of the value (thus being compelled to pay premiums in the same proportion) they could secure full protection by simply taking out a blanket policy for an amount equal to the value of the largest item. The coinsurance principle is also necessary in the rating of fire-proof risks where manifestly the rate per $100 of insurance should decrease as the proportion of the risk insured increases.

It may be added that, in view of the difficulty of using the coinsurance clause in certain localities, particularly where anti-coinsurance laws exist, companies frequently use the so- called graded rate system. Mathematically the graded rate system (under which, in view of a higher premium rate, the property owner is promised all losses in full) and the use of the coinsurance clause (under which prooerty own¬ ers paying the same premium are promised pay¬ ment of their losses only in the proportion that the insurance carried bears to the insurance re¬ quired) can be made to approximately equal each other.

(5) Co-operation through Underwriters' Associations. — Success in the use of standard forms, the maintenance of adequate and scien¬ tifically made rates, and the enforcement of just principles and practices requires a high degree of co-operation between the numerous companies operating throughout the country. This united action has been attained chiefly through the medium of so-called underwriters' associations, and at present there are few of the regular stock companies that are not sub¬ ject to, and there is scarcely a section of the country that does not fall within, the jurisdic¬ tion of some association. Classified according to territory covered, the various underwriters' organizations (designated under the various names of ˆassociation,® <(union® or ˆexchange®) may be divided into (1) Local (urban or sub¬ urban), such as the New York Fire Insurance Exchange and the Philadelphia Underwriters' Association; (2) Sectional , such as the Eastern Union, the Western Union, the Department of the Middle States, the Underwriters' Association of New York State, the New England Fire In¬ surance Exchange, the South Eastern Tariff Association, the Rocky Mountain Fire Under¬ writers' Association and the Underwriters' As¬ sociation of the Pacific, and (3) National, . such as the National Fire Underwriters' Association and the National Fire Protection Association. Since most of the leading companies transact business in different sections of the country, it follows that they hold membership and exert their influence in various associations. Con¬ sequently there has developed a tendency toward uniformity of practices throughout the country, unless local conditions dictate otherwise.

The local and sectional associations occupy themselves largely with the more practical and operating phases of the fire insurance business. Their activity relates chiefly to the maintenance of survey and inspection departments, the mak¬ ing of rates, schedules and standards which shall be binding on all members, the regulation of brokers' and agents' commissions, the standardi¬ zation of long and short-term rates, the adoption of clauses and endorsements, the elimination of objectional practices, such as rebating and rate¬

cutting, the expulsion of undesirable members and the securing of the benefits of mutual council and assistance. The national associations, on the other hand, concern themselves primarily with matters that may be described as technical and educational. Most of their work is performed through special committees. Briefly summar¬ ized, the principal services rendered thus far have been the following:

(1) Education of the public in the protec¬ tive value of fire insurance. (2) Lowering of

expenses, particularly in the reduction of arson and incendiarism and the elimination of unjust and unwise legislation. (3) Comparison of company data and the compilation and publica¬ tion of statistical experience. (4) Inspection of the protective facilities of cities and towns and the suggestion of improvements. (5) Prepara¬ tions of standards for the installation of light¬ ing and heating devices. (6) Formulation of correct building codes. (7) Improvement in the methods of adjusting losses. (8) Adoption of a standard fire policy and the formulation of standard clauses. (9) Testing and inspec¬ tion of fire preventive and protective devices of all sorts and the establishment of efficiency standards in connection therewith.

(6) State Regulation. — Legislation affects fire insurance at so many points that almost every phase of the business may be said to be regulated. The earliest legislation concerned itself chiefly with the organization and financing of companies, the supervision of agents, brok¬ ers and officials, the prohibition of discrimina¬ tion and the establishment of reserve stand¬ ards. Later the legislatures saw fit to adopt laws designed to compel the companies to pur¬ sue a certain course of action, and this type of legislation proved for the most part to be inimicable to the best interests of the business. Four such types of legislation, all of an adverse character, deserve mention, viz.: (1) anti-coin¬ surance laws; (2) valued policy laws which, in the case of a total building loss, compelled the company to settle for the full face value of the policy, although the actual loss suffered might be less; (3) retaliatory laws which aimed to place the State passing the same in such a position of preparedness that it might promptly retaliate upon the companies of another State whenever that State saw fit to inflict harsh measures upon foreign companies doing busi¬ ness within its borders; and (4) so-called anti-compact laws which sought to prevent com¬ panies from joining underwriters' associations of any kind and thus gave expression to the current incorrect belief that open competition was the life of trade and that co-operation was unnecessary and indicative of collusion for purposes of extortion and unfair treatment. As time went on, and financial needs increased, the

States also took full advantage of their taxing power, with the result that heavy taxation, frequently imposed without any ref¬ erence to the profits realized from indem¬ nities, has become one of the most serious problems confronting the business. In re¬ cent years some States, like Texas, Kansas, Nebraska, Louisiana, Kentucky and South Car¬ olina, also saw fit to bring the subject of rating under their immediate control, either through a commission or department appointed for the purpose. Fire insurance, however, cannot be said to have State limits. The subject is also so highly technical in character and so depend¬ ent upon the national experience of the com¬ panies that it is questionable whether State- made rates will ever be accepted as a solution of the rating problem. Both the Illinois and New York Commissions appointed for an in¬ vestigation of the subject reported to this effect in 1911. The tendency just now seems to be in favor of rate regulation rather than rate fixing. Several leading States, including New

York and Pennsylvania, have already passed laws which permit rating organizations to exist and which leave with them the fixing of rates. But this power is not given free from restric¬ tions. Instead, underwriters' associations are brought under the full regulatory control of the State, and all discrimination against com¬ panies or property owners is prohibited. More¬ over, full publicity is required as regards all plans and methods in arriving at any property owner's rate, the State reserving power to order such changes as may be deemed necessary.

No discussion of fire insurance would be com¬ plete without a reference to the principal types of underwriters transacting the business. Five such types of insurers (or plans of insurance) furnish practically all of the insurance in the United States to-day, viz.: (1) individual underwriting in the form of Lloyds associa¬ tions; (2) assessment mutuals (township, county and State); (3) factory mutuals; (4) inter-insurer or reciprocal underwriters' associations, and (5) joint-stock companies. Individual underwriting through Lloyds as¬ sociations, named after the famous Lloyds of London, is on the decline in this country and ranks as the least important of the several classes enumerated above. Although some of these organizations involve unlimited liability on the part of their members, they usually represent voluntary partnerships in which each member assumes liability only for the payment of losses up to a specified amount. The

secu¬ rity behind the contract therefore depends chiefly upon the personal and financial standing of the members composing the partnership, although in some cases additional security exists in the form of a special guarantee fund for loss pay¬ ments. It is important not to confuse American Lloyds associations with the famous London Lloyds. This latter organization also transacts a considerable volume of fire insurance in the United States and has acquired a position of the highest international reputation. While it is true that all business is assumed by the mem¬ bers of the organization as individuals (no re¬ sponsibility being assumed by the corporation for the solvency of its members), London Lloyds presents the advantage of a well-organ¬ ized institution, which limits admission to per¬ sons of recognized standing and safeguards the transactions of its members by the rigid en¬ forcement of a strict code of rules and business honor.

Local mutuals are exceedingly numerous and transact a considerable share of the nation's total fire insurance. They were usually organized with a view to charging lower rates- than those obtainable from the regular stock companies and then to provide for additional payments in case of necessity through some kind of assessment arrangement. Where their ac¬ tivity is limited to a restricted territory, thus enabling the members to know each other, such mutuals have demonstrated the advantages of economy and the practical elimination of the moral hazard and over-valuation. Past history, however, shows a heavy mortality among this class of companies. The reason's for this ex¬ perience have usually been three, viz., restric¬ tion of the business in such a way as to make inapplicable the law of average in case several losses occur within a short space of time, in- vol. it — 16

ability to enforce the payment of assessments, and unscientific procedure in the determination of rates. Past experience also shows that State mutuals possess the further serious disadvan¬ tages of an increased moral hazard, due to the larger area over which they operate, and the tendency to charge inadequate rates to meet the competition of well-established stock companies. To overcome the aforementioned disadvan¬ tages, a number of legislative restrictions have been adopted with reference to local mutuals. In most instances this legislation has aimed to prohibit their operation in cities subject to a conflagration hazard, to restrict their business to risks of the non-hazardous type and to a limited area of one or a few counties, to limit the volume of insurance placed on any one risk and to require a certain volume of applications, usually from $50,000 to $200,000, before per¬ mitting the transaction of business.

As distinguished from ordinary mutuals, so- called ˆfactory® or ˆmill®

mutuals confine them¬ selves to the insurance of factory properties or special types of industries, which under ordinary conditions rank among the most hazardous of risks. Like the local mutuals, this type of organization originated largely as a protest to the high rates charged by stock companies, but, unlike local mutuals, it was begun with the set purpose of making fire prevention and not insurance the primary pur¬ pose. In this respect factory mutuals soon proved a powerful competitor to the regular companies; in fact much of the progress of stock company insurance of factory risks is traceable to this competition. Like ordinary mutuals, the factory mutual plan also incor¬ porates the assessment feature, usually to an amount equal to three to five times the gross premium. But there are very few, if any, cases on record where assessments have been levied to pay losses. Not only are redundant premiums charged with the idea of refunding the unused portion in dividends, but in the great majority of instances it has been a de¬ liberate policy to accumulate a surplus much in excess of a total year's losses. The members of these mutuals being business men, it follows that an assessment could be easily collected if it should ever prove necessary to levy one.

As supplementing the aforementioned fac¬ tors, several other essential principles are strictly observed. The installation of automatic sprinklers and the standardization of properties from the fire prevention standpoint are almost universally insisted on. Rigid inspections are also made periodically with a view to making suggestions for improvements and to termi¬ nate the insurance if recommendations are not complied with. Moreover, most of the associa¬ tions have combined into reinsurance unions for the purpose of apportioning large risks over the entire membership. Combining all the aforementioned factors, it is not surprising that factory mutuals should present a remarkable record of success. It is reported that they have succeeded in bringing the average rate down to the remarkable figure of about 7 cents per $100 of insurance. The premiums charged, as already indicated, are much larger, but unused portions of the premium are returned at speci¬ fied periods. During recent years it appears that many of these mutuals have regularly paid

dividends equal to from 60 to 94 per cent of the premium income.

<(Inter-insurer® or (

While all of these types of underwriters are important in their respective spheres, sight should not be lost of the fact that probably over 80 per cent of the nation's total fire in¬ surance is carried by joint-stock companies. In return for a certain premium these com¬ panies make a definite promise, and, unlike mutual concerns, do not reserve the right to collect assessments. As a rule, they operate over a large territory and therefore require a large and intricate organization. They assume all types of risks and are necessary since many classes of property are not acceptable elsewhere. Owing to the miscellaneous nature of the risks underwritten, these companies have found it necessary to use science in the determination of their rates, to organize in underwriters' as¬ sociations for reasons already indicated, and to apply the most highly organized methods in both field and office. No type of under¬ writer is so well fitted to assume the con¬ flagration hazard prevailing in American cities. Moreover, during the last quarter of a cen¬ tury American stock companies have pursued a policy of building up a large capital and surplus (over and above their legal reserve liability), thus greatly increasing the security back of their contracts.

Bibliography. — Huebner, S. S., (Property Insurance) (New York 1911) ; Riegel, R., (Fire Underwriters' Associations in the Upited States) (New York 1916) ; American Academy of Political and Social Science, (Modern Insur¬ ance Problems) (Philadelphia 1917) ; Zartman, L. W., Wale Insurance Readings in Fire Insur- ance) (New Haven 1909) ; Insurance Year Book (Fire Volume) (New York 1917) ; Amer¬ ican Academy of Political and Social Science, (Insurance) (Philadelphia 1905) ; (Report of the Illinois Fire Insurance Commission (Springfield 1911) ; (Report of the Joint Com¬ mittee of the Senate and Assembly of New York on Fire Insurance) (Albany 1911).

S. S. Huebner,

Professor of Insurance and Commerce, Whar¬ ton School of Finance, University of Penn¬ sylvania.

FIRE ISLAND, the most westerly end of a strip of the Great South Beach, Suffolk County, New York, 40 miles long, averaging

one-half mile wide, off Long Island, between Great South Bay and the Atlantic Ocean. It is reached by ferry from Babylon. The beach took its name from the fires built there as sig¬ nals to vessels during the war

with England in 1812. Between the beach and the mainland, in Great South Bay, are five small islands. About 45 miles east of the inlet to the bay Great South Beach joins the mainland. The entire strip is dotted with popular watering-places ; the air here is said to be a specific for hay fever. There is a large hotel on Fire Island Beach, and within a few rods to the east a lighthouse, 185 feet high, with a revolving white light. There is also a station from which transatlantic liners bound for New York are first sighted. Margaret Fuller Ossoli, her husband and child were drowned on this beach 19 July 1850.

FIRE LIMITS. See Building Laws; Fire Protection.

FIRE-MAKING, the art of producing fire. It was believed by the ancients that man was without fire till Prometheus stole some from the chariot of the sun, but the whole story has a mythical look. Plutarch says that in his time there were fireless races of mankind, and the geographer Pomponius Mela indicates Ethiopia as the locality of one of these. A certain Eu¬ doxus, however, taught them how to produce it. This story cannot be tested now, but Edward Tylor, after passing in review the alleged mod¬ ern instances of fireless races, rejects them one and all. He believes that there was a time when man was without fire, but it now every¬ where appears to have passed away. The old¬ est method known of making fire is the South Sea Island one by means of a stick and a groove. There followed next, it is believed, the method of striking fire by means of a flint, a piece of iron pyrites and tinder. This process was known to the ancients, which is the reason why they called one of the two minerals used pyrites — that is, fire-stone. The Greeks, in the time of Aristophanes, knew how to concentrate the sun's rays by a burning-glass, and the Ro¬ mans in the age of Pliny (23-79 a.d.) effected the same result by concave mirrors. In the case of the need-fire, a superstitious rite con¬ nected with sun worship, and of which an in¬ stance occurred near Perth as late as 1826, fire was obtained by the revolution of a wind¬ lass in the hole of an oaken post smeared with tar. _ The preceding generation remembered the time when fire was obtained by flint, steel, and a tinder box, till superseded by the lucifer match. Consult Hough, (Smithsonian Report y (part II, pp. 531-587, Washington 1888) ; id., pp. 395-409 (ib. 1890) ; Tylor, (Researches into the Early History of Mankind) (New York

1905).

FIRE MARSHAL. The concern felt in recent years in the matter of fire prevention has found concrete expression in the creation of the office of State fire marshal in two-thirds of the States of the Union and in

most of the provinces of Canada. In the leading countries of Europe property owners and occupiers have long been answerable for fires on their premises, and this has tended to eliminate hazardous con¬ ditions, as have also the more substantial con¬ structions of these older lands. In America, with much more wood construction and the

absence of responsibility for damage to sur¬ rounding property, hazardous conditions have tended to increase, so that the annual loss from preventable fires has become appalling. Mu¬ nicipal fire marshals have for some years exer¬ cised a limited authority in controlling danger¬ ous conditions. The office of State fire marshal, sometimes under another title and joined with some existing State department, is designed to grasp the problem of fire control in a broad way by providing for the gathering of statistics, the investigation of conditions that are hazard¬ ous, by installation of safeguards and by the spread of intelligent interest among owners and occupiers, as well as among the young through school instruction. In certain cases, the fire marshal is empowered to order the re¬ moval of sources of danger and to condemn and require demolition of buildings that are so dilapidated so to endanger neighboring prop¬ erty. There is no room to question that the present average yearly fire loss of nearly a quarter of a billion dollars value and much coincident loss of life can be greatly lessened by a strict supervision of property with a view to fire prevention. The fire marshals of the United States have formed an association for annual conference and the furtherance of the objects of their office.

FIRE OPAL. See Opal.

FIRE PHILOSOPHERS, certain religion¬ ists, who in the 16th and 17th centuries at¬ tempted by the aid of fire to penetrate to the primary elements of things. They attributed little to human reason and reflection, but nearly everything to experience and divine illumina¬ tion. One of the most notable among them was Jacob Boehme, a shoemaker, of Gorlitz, whom his patrons called the German theos-ophist. He lived in the 17th century. The others were also called theosophists.

FIRE PREVENTION deals with the avoidance of fires. In its usual application the term has reference especially to the safe¬ guarding of buildings and their contents from destruction by fire: it applies as

pertinently to preventing fires in mines, forests, etc., and is discussed in those connections under articles on such subjects.

The field in which fire prevention finds its usefulness, not to say necessity, is best outlined by the mere statement of the amount of the annual loss by fires in the United States : in the year 1914 this was calculated at $462,429,- 350 — which included the actual loss by fires, amounting to about $240,000,000, to which was added the cost of upkeep of fire departments and the provision of the water they used, and the excess paid for insurance above the sums returned by the insurance companies for fire losses. In European countries the fire loss is about one-tenth as much per capita as it is in the United States. With the same precaution the annual cost of fires in this country could be reduced by $300,000,000.

Obviously the study of fire prevention be¬ gins with identification of the sources of fires; for even a highly inflammable building will not burn unless it is in some way set on fire.

The fire marshal of the State of Iowa in 1914 made an exhaustive investigation into the causes of the 4,296 fires occurring in that year

in his State. In the cases of 969 of these fires the cause could not be discovered. Of the re¬ maining 3,327 the causes were as follows :

Sparks escaping from chimneys, 527 ; set by fires on adjoining property, 451 ; defective chimney flues, 375; lightning, 271; children play¬ ing with matches, 139; spontaneous combus¬ tion, 131; incendiarism, 120; carelessness with matches, 78; carelessness of smokers, 69; gaso¬ line and oil stove explosions, 68; sparks from locomotives, 66; over-heated stoves, 64; defec¬ tive electric light wires, 60; automobile back¬ fires, 42; unprotected wood near stoves, 40; etc. It appears from this summary that aside from the two items lightning and incendiarism fully 95 per cent of the fires in which the causes could be traced were preventable, and should not have occurred. In cities the ratios of ascer¬ tained causes differs to a considerable extent. In New York City in 1916 there were 13,677 fires, of which 2,093 could not be traced to their cause. Of the remainder, 1,606 were due to smokers' carelessness; 1,573 to bonfires, brush fires and burning rubbish ; 1,475 to care¬ lessness with matches; 975 to hot coals falling from stoves and ranges and over-heated stove¬ pipes; 824 to defective chimney flues; 772 to gaslights and redhot stoves ; 757 to children playing with matches ; 545 to explosion of vapors of naphtha and gasoline; 540 to defect¬ ive insulation of electric wires; 515 to careless use of candles; 331 to spontaneous combustion; 286 to

malicious mischief ; 179 to fats igniting on the stove ; 162 to lamps falling or exploding.

Primarily, of course, the foundation of effi¬ cient fire prevention is in fire-proof building, but this is a condition to be realized only step by step, and in the more or less distant future. The two most potent agencies which are avail¬ able in prevailing circumstances are (1) educa¬ tion of the public; and (2) rigid inspection under enlightened fire laws. Marked success has been achieved in the educational line, the number of fires being largely and immediately reduced. The approved procedure is the inaug¬ uration of the campaign by lectures to children in the schools, preferably by the fire chief of the locality. This step alone served to cut down the fire loss in the State of Washington by 20 per cent. This is to be followed up by the celebration of Fire Prevention Day as an annual event. An excellent concrete illustra¬ tion is presented by the city of Yonkers. In 1915 this city established a municipal fire-pre¬ vention commission, which began operations by the formation of a Fire Prevention League among the school children of the city. A bat¬ talion, made up of several patrols, was organ¬ ized in each school ; the parents of each boy member being required to give written consent, and with it a pledge to assist the boy in carry¬ ing out his particular duty. By this provision the interest of the whole family was aroused in the prevention idea. The first duty laid upon the boy member was the inspection of his own home, in the safeguarding of matches; the protection of all wood in close proximity to stoves and stovepipes ; the elimination of ac¬ cumulations of rubbish; the providing of safe receptacles for hot ashes, etc. The second duty was a public one : the ˆpatrols® were on the constant watch for street-bonfires, dangerous rubbish piles and fire-trap conditions generally,

which were reported to the nearest fire station. The movement was crystallized by a Fire Pre¬ vention Day, in which the 2,000 boys who joined the League paraded with the city fire department. Frequent meetings were held with speakers from the city fire department, and a very effective body of public opinion was de¬ veloped. The practical results were immediate. The fatalities resulting from street bonfires and children playing with matches ceased en¬ tirely, and hundreds of fires were prevented and many extinguished by the watchful members of the League. With this aid alone the number of fires reported in the city annually was re¬ duced by 50 per cent.

In the matter of building inspection by fire department officials under the law, the history of many cities gives incontrovertible evidence of its efficacy in the prevention of fires. In Massachusetts fire prevention legislation and inspection reduced the annual fire occurrence in 25 cities from an average of 400 to 100, and the annual recorded losses by $2,000,000. In 1913 the fire prevention bureau was established in the fire department of New York City. In 1912 15,633 fires were reported, with a total loss of $9,069,500. In the first year of the ex¬ istence of the bureau the number of fires was less by 1,800, and the loss by $2,300,000. In the bureau's second year there were 2,600 fewer fires than in 1912, and the loss was $3,500,000 less. The bureau has a staff of about 200 offi¬ cers, who inspect 70,000 buildings annually, and average 14,000 cases for fire prevention work. This is ordered by the proper authority, and its execution is attested by another inspec¬ tion. The chief of the bureau has the power to order any building vacated in which the precautions ordered are not carried out ; but this drastic power has never had to be utilized. See also Fireproof Construction; Fire Pro¬ tection.

Bibliography. — Croker, E. F., (Fire Pre¬ vention (New York 1912) ; Freitag, J. K., (Fire Prevention and Fire Protection as Ap¬ plied to Building Construction (New York 1912) ; Holt, H. G., (Fire Protection in Build- ings) (London 1913) ; Hutson, A. C., (Fire Prevention and Protection (New York 1916) ; Matthews, W. D., (The Insurance Engineer's Handbook (Louisville, Ky. 1910) ; National Board of Fire Underwriters' (Reports 95, 113, 116, 123 and 179) (New York 1910—17) ; Na¬ tional Fire Protective Association, (Suggestive Programs for Guidance in the Observation of Fire Prevention Day) (Boston 1913) ; New York City Fire Prevention Bureau, (Fire Pre¬ vention Lessons for Use in Schools) (New York 1916) ; Weeks, A. D., (The Avoidance of Firesˆ (a class book, Boston 1916).

FIRE PROTECTION. Statistics relating to the fire waste of America present an appall¬ ing situation, and justify the oft-repeated criticism that we, as a nation, exhibit in this respect an unusual degree of carelessness and irresponsibility. For 1917, according to the report of the National Board of Fire Under¬ writers, the nation's fire loss is estimated at $250,753,646. This represents a daily average loss of $686,996, and an average hourly loss of $28,624. Extending the period to 10 years the loss amounted to $2,106,558,510, an annual average of nearly $211,000,000. Since 1875 the

aggregate fire loss has reached the stupendous total of $6,606,586,750. Compared with leading European cities, the American per capita loss is approximately 10 times as much ; while

the number of fires per thousand population shows a frequency nearly five times as great.

These figures, however, relate only to the direct fire loss and do not take into account the cost of maintaining expensive fire de¬ partments and other extinguishing facilities made necessary by the greater frequency and destructiveness of fires in this country, nor the huge indirect losses resulting from fires, such as loss of profits and demoralization of busi¬ ness. Direct fire losses mean an annual fire tax of about $15 per family. If the cost .of fire departments and special equipment be in¬ cluded a similar amount can be conservatively added, thus making the annual total $30 per family. This huge waste represents an irre¬ coverable loss, since insurance does not serve to replace but simply shifts the distribution of fire waste. In the long run the consuming public must bear this loss in the form of in¬ creased rentals and increased prices for goods and services. The regrettable thing is that the larger part of this extraordinary waste is pre¬ ventable and that it is so difficult, even in these days when conservation of resources is uppermost in the public mind, to educate the American people to change their careless and irresponsible habits in this important matter. <(Preventable fire,® as President Wilson has so well said, <(is more than a private misfortune; it is a public dereliction. At a time like this, of emergency and manifest necessity for the conservation of natural resources, it is more than ever a matter of deep and pressing conse¬ quence that every means should be taken to prevent this evil.®

To bring about this much desired result, greatest emphasis has been placed by fire pre¬ vention experts upon some eight leading lines of effort. It shall be our purpose to briefly present the most essential phases concerning each. Only by using all of these factors, each in proper combination with the others as cir¬ cumstances justify, can preventable fire waste be reduced to a minimum.

Construction of Building. — This factor is of utmost importance in the prevention of the spread of fire after it has once obtained a good start. Various classifications of buildings from the fire prevention standpoint have been published ; but the one most commonly used groups structures into four main classes, viz., ordinary, slow-burning, semi-fireproof and fireproof. Slow-burning or <(mill construc¬ tion® buildings are so designed as to separate the several stories by a flooring of sufficient thickness (without openings, water-proof in structure, and supported by heavy timbers rest¬ ing on stout wooden posts) to confine a fire on a given floor for a considerable period despite the presence of large stocks of com¬ bustible goods. The

primary purpose is to prevent the spread of fire to the stories above or below before the fire department may be reasonably certain of bringing the blaze under control.

Semi-fireproof structures, unlike the fore¬ going, are built of non-inflammable material, but differ from the fireproof type in not having

their structural or tension metal members properly insulated against heat. They are in¬ tended chiefly for dwellings, apartments, office purposes or other uses which do not involve the presence of combustible goods in amounts so large as to produce heat sufficiently great to endanger the iron work. Such structures are in common use, partly because of their greater cheapness as compared with the fireproof type, and also because their erection is not pro¬ hibited by the building codes of many cities.

In considering so-called (

In furthering up-to-date construction, prob¬ ably no organization has done so much as the National Board of Fire Underwriters. Through its Committee on Construction of Buildings this national organization has pre¬ pared a national buildings code which is recog¬ nized to-day as the best and most feasible standard yet devised. Thousands of copies of this code have been distributed, and many cities have already made their building ordi¬ nances conform in whole or in part with this standard. Expert advice is also freely given by this committee to public authorities and all others interested along all lines relating to building ordinances and fire resistive con¬ struction.

Fire Protective Devices. — The large amount of wood construction has made the conflagra¬ tion hazard an ever present one in practically all American cities. Unfortunately, we are confronted in this respect with <(a condition and not a theory,® and our cities must be con¬ sidered as they stand. But much can be done along the line of limiting fires to the building of origin through the more general use of wired glass, metal window frames, automatic alarm systems, metal waste and ash cans, fire- buckets, chemical extinguishers, adequate standpipe systems, private fire departments and automatic sprinklers. The importance of these various devices in reducing the conflagration hazard, when used at strategic points in our cities, is well described by Franklin H. Went¬

worth, Secretary-Treasurer of the National Fire Protection Association in the following:1

In the heart of nearly every city there are streets cros¬ sing at right angles along which for a very considerable distance are buildings of brick, stone and concrete. This shows a more or less complete Maltese cross of buildings which are not wood and which operate to divide the wooden-built district into quarter sections and which might hold a fire in any one of these sections if they were equipped to do so. These brick and stone buildings are ordinarily valueless as fire stops, because their windows are of thin glass and their window frames of wood. At Baltimore and San Francisco the conflagration attacked such buildings easily, breaking out the panes, consuming the frames and converting every story of these brick structures into horizontal flues full of combustible contents. Brick and stone buildings are logical and capable fire stops if the fire can be kept out of them. The small city that will trace out its Maltese cross of such buildings and equip them with metal window frames and wired glass will immediately possess the equivalent of substantial fire walls crossing at right angles in its centre, dividing it in*o four sections. By such a simple, inexpensive, yet strategic procedure many a city may save itself from destruction which now awaits only the right kind of a fire on the right kind of a night. . . .

This form of protection is equally imperative in the brick, stone and concrete districts of all large cities where great values are housed in close proximity. ... We must come eventually to the equipment of all commercial, factory and office buildings with metal window frames and wire glass.

. . . Fires will then be unit fires, extinguished easily by a

competent fire department within the buildings in which they originate; for the protection of window openings not only prevents fire from entering, but prevents fire from issuing out of the burning building. . . . Having thus fortified city buildings one against the other, extensive fires within individual structures can be prevented by the use of the now well established automatic sprinkler system. The automatic sprinkler applies the water without the help of human agencies while the fire is still incipient. It will operate in a dense smoke as well as in a clear atmosphere. It will not throw excessive deluges of water in wrong places as the fire departments are continually forced to do. With our window openings protected and our buildings equipped with such extinguishers, the conflagration hazard in mercantile districts will be eliminated. There will then remain for

consideration our immense residence districts constructed almost wholly of wood surrounding the mercantile centres, like fagots around a funeral pyre. We can lessen the loss here by the abolition of the use of wooden shingles.

Experience justifies the increasing reliance placed upon automatic devices for extinguish¬ ing fires in their incipiency, and here the auto¬ matic sprinkler stands supreme. Briefly de¬ scribed, this system consists of an elaborate ar¬ rangement of pipes regularly spaced under the ceilings for all portions of the building and supplied with water from elevated tanks, pumps or city connections. At regular intervals (for about every 75 or 80 square feet of floor area) there are so-called ((sprinkler heads® which are so arranged as to open whenever a sufficient rise in temperature will soften the fusible metal with which the joints have been soldered. To meet the nature of the risk protected, the solder may be adjusted to fuse at any ar¬ ranged temperature, usually from 165 to 360 de¬ grees. When once started the flow of water will continue, and to avoid unnecessary water damage after the extinguishment of the fire it is necessary to have the system supplemented with some automatic fire alarm device con¬ nected with the city's fire department or some other central station.

The manifest advantage of such an auto¬ matic system lies in the fact that it is always on duty, and as has been well said, <(applies the right amount of water in the right place at the right time,® and does this without the in¬ tervention of human help. The efficiency of the plan is indicated by the fact that fully 95

1,1 American Fire Waste and Its Prevention,'1 Annals of the American Academy of Political and Social Science, March 1917, pp. 163-171.

per cent of the fires occurring in properties equipped with sprinklers have been controlled without serious losses resulting. Out of a total of 18,795 fires, reported with the National Fire Protection Association and covering all types of properties equipped with sprinklers, nearly 65 per cent were extinguished and nearly 31 per cent held in check. The efficacy of automatic sprinklers is further shown by the large reduction in fire insurance rates granted upon the installation of the system, the reduction in the premiums frequently amounting to 75 per cent or more. But in ad¬ dition to the lower cost of insurance, the property owner has also the greater assurance of protection against

the indirect losses oc¬ casioned by fire, such as the loss of time and profits and the demoralization of his business.

Along all the foregoing lines of fire pro¬ tection the various underwriters' associations of the regular companies have brought about great improvements. Not only do the local associations maintain inspection departments for the regular inspection of sprinkler systems and other devices, but the National Fire Underwriters' Association and the National Fire Protection Association have rendered much valuable service through some of their standing committees. Thus the National Fire Underwriters' Committee on Fire Prevention has inspected the fire protection facilities of nearly 300 cities with a view to presenting con¬ clusions as to the degree of the conflagration hazard and the way in which the fire depart¬ ments and other protective features of these cities should be improved. On the other hand, the Underwriters' Laboratories, a corporation formed by the National Board of Fire Under¬ writers in 1902, was organized for the special purpose of testing all fire preventive devices and fire resisting materials submitted to it from time to time. The purpose of the organi¬ zation, as expressed in its literature, is <(to bring to the user the best obtainable opinion on the merits or demerits of appliances in respect to fire hazards. Such appliances in¬ clude those designed to aid in extinguishing fires, such as automatic sprinklers, pumps and fire appliances, hose, hydrants, nozzles, valves, etc. ; materials and devices designed to retard the spread of fire, such as structural methods and materials, wire doors and shutters, wire windows, etc. ; and machines and fittings which may be instrumental in causing a fire, such as gas and oil appliances, electrical fittings, chemi¬ cals and the various machines and appurte¬ nances used in lighting and heating.®

Upon the approval of any device or ma¬ terial, after a full test, the same is recom¬ mended and listed in the periodical publica¬ tions of the National Board. Mention should also be made of the service rendered by the National Fire Protection Association in obtain¬ ing and circulating information on fire protec¬ tion and prevention devices, and in securing the co-operation of its members in adopting approved safeguards. In this respect its in¬ fluence is far-reaching, since the membership comprises national, State and municipal depart¬ ments, chambers of commerce, business mens' associations, architects, engineers, etc. Accord¬ ing to recent reports, at least 37 subjects have received the special study of this association. Not only have standard specifications been pre¬

pared along all these lines but the information obtained and compiled has been given the broadest possible dissemination among the varied

membership already indicated.

Equipment of Buildings. — Heating, light¬ ing and ventilating systems represent important items in all buildings, and an increasing pro¬ portion of the total number of fires is at¬ tributable to faulty installation and mainte¬ nance along these lines. Great care should be exercised in purchasing systems best suited for the business under consideration and in having them properly installed and frequently in¬ spected thereafter. Standard specifications along these lines, and particularly in connection with the installation of electrical systems, have been prepared by the Committee on Lighting, Heating and Engineering Standards of the Na¬ tional Board of Fire Underwriters. These have been furnished to numerous associations, bu¬ reaus, public bodies, etc., and embody the best opinion of technical experts in the insurance business.

Occupancy Regulation. — Nearly every busi¬ ness has connected with it certain processes and materials which inherently constitute a danger¬ ous fire hazard. It is, therefore, important, as the experience of American Factory Mutuals has so well demonstrated, to study the nature of each business with a view to isolating all processes of manufacture and all stocks of goods which are likely to cause a fire or to accelerate it if caused in some other part of the building. Reference is had to the segrega¬ tion of the power plant or any other very hazardous process, and to the most judicious lo¬ cation of the several occupancies, so that the most dangerous process or contents will not be located where access in case of fire is most difficult or where the extinguishment of a fire will occasion heavy water damage to surround¬ ing goods. Judicious planning in this respect will not only render many fires comparatively harmless, but will greatly reduce the indirect loss through water, heat and smoke.

Control of the Exposure Hazard. — An ex¬ amination of any fire-rating schedule will clearly show that a substantial part of the premiums on mercantile risks in cities is charged to allow for the exposure hazard. Many property owners are made to suffer in the form of heavier premiums by the careless¬ ness or indifference of the owners of adjoining properties. But while the action of neighbors may be beyond control, much may be done to counteract the exposure hazard, thus propor¬ tionately reducing the extra premium, by the use of various protective devices. In most in¬ stances their adoption will be found to yield a saving, in the form of a reduced insurance premium, considerably beyond ail ordinary re¬ turn on the capital outlay. Property owners should, therefore, study the location of their business with reference to surrounding build¬ ings and stocks of

inflammable goods. Then, in view of the existing facts, they should seek to improve their own buildings by fireproofing doors, windows, shutters, walls and roofs, by extending fire walls above the roof and by installing automatic sprinkler protection.

Management of Properties. — It has been estimated that half of America's fire waste is traceable to needless accumulation of rubbish,

disorder, lack of organization in detecting and extinguishing fires and failure to promptly call the fire department. All leading rating sched¬ ules include a list of additions to the insurance premium for faulty management ((easily cor¬ rected, » such as improper protection of walls and floors against heating apparatus, the use of bottoms of elevator shafts for closets or waste, untidiness or carelessness in disposing of rub¬ bish and ashes, cracked or bulged walls, broken windows, open or unprotected lights in show windows, the use of inflammable oils in sprink¬ ling floors, steampipes in contact with wood, crowded merchandise without proper aisles, etc. The reduction in the premium upon the elimina¬ tion of these easily corrected faults of man¬ agement is so large as to clearly indicate that their continuance must be due to pure careless¬ ness. As one expert puts it : (

Public Regulation and the Enforcement of Legal Liability. — While many of the improve¬ ments in fire protection must depend upon vol¬ untary action, an increasingly large number of the best informed students of the subject have, in recent years, come out in favor of state regulation. Why should not a matter of such vital importance to the whole community, they argue, be made the subject of compulsion in the most important particulars? Thus a special committee of the National Board of Fire Un¬ derwriters reported at the Joint Conservation Conference at Washington as far back as 1908 that the States <(should adopt and enforce a building code which shall require a high type of safe construction, essentially following the code of the National Board of Fire Under¬ writers® ; that municipalities should <(adopt ordi¬ nances governing the use and keeping of ex¬ plosives, especially inflammable commodities and other special hazards, such as electric wiring, the storing of refuse, waste, packing materials, etc., in buildings, yards or area ways and seek to the enforcement of such ordi¬ nances® ; that the States should establish and support the office of fire marshal and entrust it with adequate

powers ; and that in all cities <(there be a paid, well disciplined, non-political fire department adequately equipped with mod¬ ern apparatus.®

It is also recommended by most students of the subject that this nation should begin to fol¬ low the practice of certain European countries in placing a legal responsibility upon individuals for fires which damage their neighbor's prop¬ erty when occasioned by gross carelessness or the failure to observe specified requirements. By thus fixing responsibility, it is argued, we would change the attitude of mind of the American public more effectively than can be done through any system of voluntary educa¬ tion ; in fact the man who has a fire that could

- P. H. Wentworth, " American Fire Waste and Its Prevention," Annals of the American Academy of Political and Social Science, March 1917, pp. 163-171.

have been easily avoided would be regarded as a public offender. Quoting again the afore¬ mentioned special committee :

In a portion of Europe a landlord is responsible to his tenants and neighbors for any fire loss due to his negligence and tenants are responsible to the landlord and to their neigh¬ bors for any loss due to their negligence. In this country a whole city might be destroyed by the unmitigated careless¬ ness of some person and there would not be the slightest penalty incurred. In Europe wastefulness is generally viewed as indefensible and a person who has a fire is regarded in an unfriendly light, since he has endangered his neighbor's property and comfort. In this country everybody is per¬ mitted to endanger his own and his neighbor's property almost ad libitum, either by the absence of wholesome regu¬ lating ordinances or by their non-enforcement. The reckless wastefulness of our people is nowhere more apparent than in the unnecessary fire drain on their resources. Our people appear to have a very erroneous idea of fire insurance and to think that insurance payments re-create destroyed values; whereas the fact is that insurance companies are in a sense tax collectors and distributors of such taxes among those suffering loss by fire.

As a supplement to state regulation it is also suggested that fundamental facts and principles concerning fire hazards should receive proper attention in the teaching program of our public school system. Educational efforts along fire prevention lines, in other words, should not be limited to insurance and technical organizations alone, but should be undertaken by the schools and the press. Public interest,

it is argued, may also be aroused to a due appreciation of the subject through the use of the leading chan¬ nels of advertising and the annual observance of so-called <(fire and accident prevention days.® Additional good may be accomplished by utiliz¬ ing fire departments for inspection purposes, instead of confining their function exclusively to the extinguishment of fires as is done to-day. To quote F. H. Wentworth:

In every fire department uniformed firemen should be regularly detailed for inspection service. Three or four hours a week for each man, going into basements, attics, courts and alleys, keeping down accumulations of rubbish — which spring up over night — locating the storage of inflammable oils and explosives, would keep the city clean of its most persistent fire dangers. Every fireman should in turn cover every section in the course of six months. One would thus check up the inspections of the other, and local conditions would become a matter for educative conversation about headquarters.

There is, however, a most important result to be achieved by such an inspection system over and beyond keeping the city clean; and that is the education of the fire-fighters in the exact physical character of the city. To know exactly which passageways are open and which are closed ; to know which are fire walls and which are not; to have a mental picture of the exposures, the windows, the roof openings, the cornices, and all the other physical details important in fire-fighting, would so heighten the team work of a department that, like expert swordsmen, they could make their thrust without loss of time straight at the vulnerable part. There are a few cities in the United States where such practice, partially in effect, has already demonstrated its singular efficiency. The citizens of every town and city should demand this sort of service from its fire department.

Study of Fire Causes and the Prevention of Dishonest Fires. — Since a large part of the nation's fire waste is traceable to the moral hazard, it is important that the origin of all fires should be carefully investigated. Even where no dishonesty is detected, a full record of the causes of fires will furnish much valu¬ able information as to the relative importance of the various factors that make up the fire hazard. To attain this worthy end, it is essen¬ tial that every State should establish the office of fire marshal with a sufficient working per¬ sonnel. This department should have con¬ ferred upon it the power to examine under oath and to make arrests. The law should also make it the duty of this department to examine into the origin of all fires, and where a crime

has been committed to submit its findings to the prosecuting authorities. Much has been done to eliminate dishonest and easily prevent¬ able fires by the National Board of Fire Under¬ writers through its two committees on <(Statis- tics and Origin of Fires® and ((Incendiarism and Arson.® But such voluntary efforts, it is believed, can be improved upon and certainly assisted by the efforts of the State through some regularly organized department.

Bibliography.— Crosby and Fiske, hand¬ book of Fire Protection for Improved Risks) (5th ed., New York 1914) ; Evans, Powell, (A Five-years' Fight Against Fire Waste and Its Possible Control in the United States by Fire Prevention and Protection (Philadelphia 1912) ; hire Prevention and Control Supple¬ ment 1 (issued by the Evening Post, New York 1918) ; Freitag, J. K., hire Prevention and Fire Protection1 (New York 1914) ; Gephart, W. F., hrinciples of Insurance1 (Vol. II, Chapter 11) ; Huebner, hroperty Insurance1 (New York 1911); Riegel, Robert, hire Un¬ derwriters' Associations in the United States1 (New York 1916); ((The Fire Waste in the United States® (address by Special Committee of the National Board of Fire Underwriters at the Joint Conservation Conference held in Washington, D. C., 1908) ; Wentworth, F. H., <(American Fire Waste® (published in (Modern Insurance Problems,1 Annals of the American Academy of Political and Social Science, Phila¬ delphia 1917) ; Zartman, L. W., (Yale Readings in Fire Insurance1 (Chapters 13, 14, 15 and 16, New Haven 1909).

S. S. Huebner,

Professor of Insurance and Commerce, Whar¬ ton School of Finance, Univerity of Penn¬ sylvania.

FIRE QUARTERS, the name given on board ship to the drilling of the crew for a possible or actual case of fire. Every member of the crew has his appointed station and duty, and upon hearing the special signal for this drill must at once leave the task in hand and repair to his station. On the larger passenger steamships fire drills are frequent, as also boat drill and other measures for the safety of the ship and its passengers.

FIRE SALAMANDER. See Salamander.

FIRE-SHIPS are generally old vessels filled with combustibles, fitted

with grappling- irons, to hook enemies' ships and set them on fire. If they are used on a river they are al¬ lowed to be carried down by the current, if they are used at sea advantage is taken of a favorable wind to bear them into the midst of the enemy and set their ships on fire. In ancient times the Tyrians employed them against Alexander, and the Carthaginians against the Romans. The invention of Greek fire in 673 brought them into more frequent use ; and they were employed by the Crusaders at Ptolemais (Acre). In the time of Philip II the Spaniards suffered severely by them on two well-known occasions. The first was at the siege of Antwerp in 1585, when by means of fire-ships Gianibelli utterly destroyed a bridge that the Duke of Parma was attempting to throw over the Scheldt, with the aid of some other vessels which he had prepared so as to explode when they reached the bridge. The second case was when Lord Howard of Effing¬

ham used them with such effect against the Armada in 1588. In this case also their use is said to have been suggested by Gianibelli. Fire¬ ships were employed during the siege of Que¬ bec in 1759; on one of these the gallant Dubois de la Milletiere perished. The Greeks in their war of liberation against Turkey also em¬ ployed them with great success.

FIRE-TOAD, or FIRE-BELLIED FROG, one of the commoner and more aquatic of the European toads or frogs (Bombinator igneus), so called because of the flame-colored patches upon the bluish-black abdomen. They are one and one-half to two inches long and have many peculiar and interesting habits, and make good use of the colors. <(When these toads,® says Gadow, <(are surprised on land, or roughly touched, they curl themselves into an extraordinary attitude displaying the red of their bellies and throats, and remain so until the danger is past, expecting that the enemy will let them alone after having been shown with what a terrible creature it had to deal.® In fact the secretions of the skin are very poisonous, and not even turtles will eat them knowingly. This toad inhabits north-central Europe, and two other species of the genus are known, one in China. It is called (VIII, London 1901).

FIRE WALKING, a religious ceremony common to many races in widely separated parts of the world. Its origin and meaning are obscure but it is known to have been widespread in all ages and still survives in Tahiti, India, Fiji Islands, Japan, the Straits Settlements and Mauritius. The essential feature of the cere¬ mony is the passing of priests or other devotees barefoot over heated stones or smoldering ashes. Though at times severely burned the devotees claimed that they would have been uninjured if they had faith. The feat in many

instances so surprising is susceptible of a rational explanation. For instance, at Tahiti it was found that the volcanic rock used in the fire ceremony is a poor conductor of heat, so that while the bed of stones would be very hot underneath the upper part would be ‘con¬ sidered only very warm. Akin to this cere¬ mony is the fire dance of a number of North American Indian tribes, wherein the dancers stamp out the glowing embers of a fire with their feet during the dance. Consult Fraser,

(Golden Bough1 ; Lang, A., (Magic and Re¬ ligion1 (London 1901) ; Crooke, W., (Intro- duction to Popular Religion and Folklore of Northern India1 (1896); Langley, S. P., (in Nature, 22 Aug. 1901).

FIRE WORSHIP. See Nature Worship; Mythology.

FIRE WORSHIPPERS, the Zoroastrians, called also Guebres, Guebers, Ghebers, Gebers or Gabers. See Guebers; Parsees ; Zoroaster.

FIREARMS, a. general term for all sorts of cannon, guns, rifles, fowling-pieces, pistols, etc., which effect their discharge by the com¬ bustion of gunpowder or other explosive. See Guns ; Pistol ; Rifle.

FIREBIRD. See Tanager.

FIRELESS COOKER, an appliance by means of which foods that have been heated or partially cooked are kept hot until the cooking process is completed. The usual design is a box lined with insulating material in which the pot containing partially cooked foods is placed. There are many designs on the market but all are on the same principle, differing only in de¬ tails of construction, and the kind of insulating material used. Some types are provided with soapstone or iron plates which are heated dur¬ ing the preliminary cooking on the stove and then placed in the fireless cooker either over or under the cooking pot. In these types a non- inflammable insulating material is used. Fire¬ less cookers have successfully been made at home by taking a box so large that the cooking pot when plkced in it may be surrounded by a thick layer of non-conducting material, such as hay, excelsior or crumpled paper. A cushion is placed over the pot and a tight-fitting lid is placed over all. The advantages claimed for the fireless cooker are economy of fuel, convenience and economy of time. Consult Davis and Wood, illustrated Lecture on the Home-made Fire¬ less Cooker) (United States Department of Agriculture, Syllabus 15, Washington

1914) ; Huntington, E. H., (Fireless Cooker > (Univer¬ sity of Wisconsin Bulletin 217, Madison 1908) ; Lovewell, Whittemore and Lyon, (The Fireless Cooker) (Topeka 1908) ; Mitchell, M. J., (The Fireless Cook Book) (New York 1909).

FIRENZE. See Florence.

FIRENZUOLA, fe'ren-zwo'la', Agnolo, Italian poet and litterateur : b. Florence, 28 Sept. 1493; d. about 1546. He was destined by his family for the legal profession, and studied first at Siena and afterward at Perugia. He asso¬ ciated with the vicious Pietro Aretino, and his life was very licentious. He practised law for a time in Rome but met with little success. It is said by several of his biographers that he be¬ came a monk at Vallombrosa, but this is doubted by Tiraboschi, for lack of evidence, and it is not borne out by his mode of life which was far from being ascetic. By Clement VII he was guaranteed an income sufficient to permit him to pursue a literary career in Florence whither he removed from Rome. His works are partly in prose and partly in verse, and belong 1 6 the class of light literature. The prose works in¬ clude (Discorsi degli animali,* in imitation of Esop; (Dialogo delle bellezze delle donne) ; (Ragionamenti amorosP ; ˆiscucciamento delle nuove lettered a translation of (The Golden Ass> of Apuleius, and the comedies (I LucidP and (Le TrinuziaP His poems are satirical for the most part. His works are regarded as models of literary excellence. Consult Bianchi's edition of Firenzuola (Florence 1848) ; Guerrini, (Novelle di Firenzuola > (ib. 1886) ; Rosai, M., (L'Asino d'oro di Agnolo Firenzuola } (Cittadi Castello 1901).

FIREPROOF CONSTRUCTION * Fire prevention and fire protection, of which latter fire-resisting construction is a part, are two divisions of the effort to reduce the danger and waste incident to hostile fire. The immense property loss alone from this cause and the

- The text cuts are reproduced from J. K. Freitag's 'Fire Prevention' by permission of J. Wiley and Sons, pub¬ lishers.

consequent significance of this effort are seen from the following figures of the annual fire losses in the United States :

1908 .

. .. $217,885,850

1913. . . .

.. $203,763,550

1909. . . .

188,705,150

1914. . . .

221,439,350

1910. . . .

214,003,300

1915. . . .

172,033,200

1911 ....

217,004,575

1916. . . .

214,530,995

1912. . . .

206,438,900

1917

*230,000,000

- Approximate.

Such losses far exceed the liabilities in com¬ mercial failures in 1916, the normal expenditures of the War Department, the gold and silver production of the United States and the interest on the national debt. A street, lined on both sides with the buildings destroyed in one year, 1917, by fire, would reach from New York to Chicago. One hundred and forty acres of property and 1,343 buildings were destroyed in the Baltimore fire of 1904 and 3,000 acres and 25,000 buildings in the San Francisco earth¬ quake and fire of 1906. That the greater por¬ tion of this loss is unnecessary is shown by the fewer fires and the smaller fire loss per capita in European cities.

The universal construction of buildings de¬ signed to prevent the radiation, absorption and transmission of fire would reduce the annual

value destroyed by this agency to a mere shadow of its present size and produce a tremendous social benefit. Undoubtedly also such efforts would bring pecuniary profit to the individuals of the community in the majority of instances. A fireproof building in the real sense of the words must at present, however, be viewed as an ideal rather than a reality. Important con¬ flagrations have shown on the one hand the value of fire-resisting construction and on the other its limitations. Individual buildings of this nature cannot stand unharmed by a con¬ flagration in the midst of inferior construction and even isolated fires have damaged them in some instances to the extent of 75 per cent, where important defects in construction existed. The problem of fire-resisting construction is, therefore, one of degree; the solution involves a study of comparative values of types of design, kinds of materials and protective appliances.

A fire-resisting building may be defined as one which will confine a fire originating in the building to the unit of area of origination, will protect itself and its contents from adjacent fires, and will not transmit fire to buildings be¬ yond. It, therefore, comprises far more than an agglomeration of non-combustible and fire- defying materials.

The struggle to reduce the immense fire losses previously mentioned involves (1) fire prevention (see Fire Prevention), or removal of causes and (2) fire protection or defense subsequent to ignition. (See Fire Protection). Fire protection, with one phase of which we are here concerned, includes (a) fire-resisting con¬ struction and (b) protective devices for the automatic detection and instant extinguishment of fire.

Fire-Resisting Construction. — While popu¬ lar attention has been primarily attracted to the materials used for fire resistance, because their significance is readily perceived, careful reflec¬ tion will indicate two equally important divi¬ sions : (1) material employed for fundamental structural parts, insulating and protective pur¬ poses and the reduction of combustible finish ;

(2) design, which is of equal importance with material. The circumstances of every building will produce a unique problem, to be individually considered. Fire-resistance does not merely comprehend the presence of some fireproof paint, protected columns, terra-cotta floors, etc., important as these individual features may be, but demands a plan or arrangement for the en¬ tire structure, provision of

the details adequate to the consummation of the plan, intelligent application of material to necessary purposes and supplementary appliances for the discovery and extinction of fire.

MATERIALS.

Space does not permit of a discussion of the value of every conceivable variety of build¬ ing material and attention must therefore be directed to those which are commonly used or are of especial importance and utility. .

1. Wrought Iron, Steel and Cast Iron. — Wrought iron and steel are largely used as beams, girders, columns or trusses, supporting not merely their own weight but also bearing an additional load — often a very great one. Subjection to tests and the exacting conditions of conflagrations show that, unprotected, these materials are very unreliable. Unprotected

steel, for example, will expand with each 100 degrees Fahrenheit so as to increase one inch in each 125 feet of length, an expansion at times sufficient to overthrow masonry bearing-walls. Steel columns are estimated, as a result of tests, to yield at temperatures of from 1,000 to 1,200 degrees Fahrenheit. With efficient pro¬ tection, however, the steel framework of modern construction has demonstrated its value. Under these conditions, the end of the San Francisco fire found it usually uninjured. Cast-iron is most frequently used for columns supporting light loads and for ornamental construction. In moderate fires it may stand unprotected with insignificant damage. Above 1,500 degrees, however, the limit of its endurance is reached, with the consequent possible collapse of struc¬ tures. Unprotected steel and iron members bearing loads are therefore a source of con¬ siderable uncertainty and danger.

2. Stone. — Granite, limestone, marble, sand¬ stone and all other building stones may be briefly dismissed with the statement that they will, under the action of heat, crack, disinte¬ grate into sand, decompose into lime and spall. They have not the value which cursory thought would indicate. A photograph of a public storehouse in Baltimore showed granite columns completely destroyed by the fire and the per¬ centage of loss to value of stone fronts is very high. Beautiful ornamental masonry fronts emerged from the San Francisco fire as ruins. The use of stone should therefore be confined to situations where severe exposure to heat is not anticipated.

3. Brickwork— The value of this material has been conclusively

demonstrated by many fires and conflagrations, the degree of value depending principally upon the chemical com¬ position of the clay. Sand-lime bricks are said to be of value at least equal to the ordinary type. Conflicting testimony makes a conclusion as to pressed-brick difficult and glazed brick showed considerable scaling in the Baltimore and San Francisco conflagrations.

4. Terra-cotta. — This differs from brick in that it consists of two or more specially selected clays, used in definite proportions, with the addition of grit. Each piece is made, further¬ more, according to design and is not of stock form. It is extremely durable and impervious to water. The results of architectural terra¬ cotta were disappointing in the two great fires above mentioned, the loss of value being often 70 to 75 per cent. This was principally due, however, to <(mechanical damage caused by poor construction or the expansion of covered steel members.® Terra-cotta fronts suffered con¬ siderable damage in San Francisco, although the material retained its form. Opinions re¬ garding structural terra-cotta vary widely, the relative value of concrete and structural terra¬ cotta being a question brought into prominence by the large conflagrations. Important uses of these materials are for floors and column pro¬ tection. An intermediate opinion seems to be that porous and semi-porous tile withstands a reasonable test, if intelligently used in sufficient quantity — a condition, however, seldom ful¬ filled in the past.

5. Concrete. — There are three primarily im¬ portant uses of this material, which has been in the limelight of discussion for some time — (a) floor construction, (b) column protection and (c) reinforced concrete buildings. Broadly speaking, concrete is used for floor construction under two types of conditions ; where steel columns, girders and beams furnish the support and where the entire construction is of concrete. From previous remarks it is evident that steel supports require protection and columns will be more fully discussed later. The applicability of concrete to floor and roof construction has largely been made possible by the introduction of forms of metal reinforcement, which on the one hand add tensile strength while on the other they reduce the thickness and weight. Tests show that concrete floors may be so constructed as to embody a high degree of fire resistance and great load-carrying ability under emer¬ gencies. Opinions as to their value, emanating from authorities on the basis of actual condi¬ tions in San Francisco, are divergent. Some, regarding it as a fireproofing material, are dis-

tinctly favorable, while others, from the stand¬ point of load-bearing ability, are less enthusi¬ astic. To a considerable degree results de¬ pend upon the type of construction. There should also be mentioned the combination terra¬ cotta and concrete floor, on which little data under actual conditions is as yet available.

For two reasons interior columns are ex¬ tremely important factors in fire-resisting con¬ struction ; in the first place they support im-

Concrete Roof Construction. U. S. Public Building,

Los Angeles, Cal.

mense loads increasing with the area and height of the building, and secondly, they stand ex¬ posed to fire on all sides. Concrete, among other materials, has been used as a protection. The San Francisco fire furnishes the only im¬ portant test of efficiency under actual conditions and the general conclusion that concrete was only excelled in value by bricks laid in cement mortar. The latter protection, however, is both heavy and expensive.

The use of concrete for building construction has been steadily increasing, and due to the high cost and scarcity of other materials this increase was accelerated in 1916 and 1917. Of the three ingredients of concrete, cement has been most perfected. Stone is also fairly well standardized, and the third factor, water, is now assuming importance. The fire-resisting qualities of the material depend upon its com¬ position and handling. Its principal use at the present time is for the construction of factories and industrial buildings. The destruction in Canada in 1917 of the large Quaker Oats fac¬ tory, composed almost entirely of concrete, is another indication of the fact that the term ˆfire-proof® is as yet a purely relative one.

6. Mortar and Plaster. — Many grades of this material are used for fire-resisting purposes, and as the effect of fire upon the material it¬ self is only a question of the duration and in¬ tensity of heat it must be employed with care. Suspended ceilings of metal lath and plaster, however, have demonstrated usefulness purely

Concrete Roof Construction. U. S. Public Building, San

Francisco.

as a protection to floors and floor-beams ; their destruction is

inevitable but the effect of fire upon essential structural parts is delayed and subdued. As a column protection plaster is far inferior to concrete and brick.

7. Sorel Stone. — This artifical stone is chiefly employed in the production of monolithic floors. Those made with sand as a base or the granular variety are often dusty but a satisfactory floor has excellent fire-resisting properties.

8 .Fire-retardant Wood. — The process of treating the wood is to withdraw the sap, resin and gum by a vacuum, introduce an ammonia solution under pressure and kiln-dry the wood. Crystals of the absorbed solution remain in the wood and these, fusing at high temperatures, retard combustion. Ignition of hard woods, which would otherwise ensue in a few seconds, has been shown by tests to be delayed for five minutes by this treatment.

9. Asbestos. — Asbestos is non-combustible and non-conductive and may be used to delay the progress of fire but loses its life and powders under intense heat. A well-known use is in theatre curtains, where the object is to confine the fire to the stage a sufficient time to permit the evacuation of the building. It is also used in composition with hydraulic cement for the manufacture of so-called asbestos lumber, sheathing and shingles and in such combinations is a valuable fire-resistant.

10. Glass. — Ordinary glass cracks under heat and affords no protection whatever from fire. Wireglass, known since 1855 but only re¬ cently employed for its fireproof qualities, is ordinary glass with a wire mesh imbedded, made with one pouring and rolling. The wire mesh prevents the heat-cracked glass from falling away and renders glass available for use in windows, doors, elevator shafts and skylights, where other material is unsuitable by reason of light requirements.

It should be noted that in the use of all materials cost, durability and weight are im¬ portant factors from an engineering stand¬ point, to which factors no consideration has been given here.

DESIGN.

The objects of fire-resisting construction are (1) to confine a fire originating in the building to the area-unit of origination, (2) to guard the contents from destruction, (3) to protect itself in absolutely essential respects so as to keep reconstruction costs at a minimum and

(4) to prevent the spread of fire. This will involve not merely the specification of fire- resisting materials but the proper subdivision of area, protection from adjacent exposures which may transmit and radiate hazard, adequate pro¬ vision of light and air without dangerous fire¬ conducting shafts, suitable location of elevators and stairways and a construction scheme enabling the employment of proper materials ; in other words, appropriate design. Many illustrations might be cited of important con¬ siderations overlooked in apparently well- protected buildings, such as the Granite Build¬ ing in Rochester with 2,000 square feet of unprotected communicating openings to a hazardous adjoining building and the Parker Building in New York with unprotected stair and elevator shafts, unsuitable corridor par¬ titions and lack of auxiliary aids and automatic detection facilities.

1. Character of Building. — An essential factor in any plan is the determination of its primary purpose or purposes, since the general scheme of construction will quite evidently de¬ pend upon whether occupants, contents, the structure itself or a combination of these are to be safeguarded. In places intended for public assembly, for illustration, preservation of life must take precedence over other desirable

features; in large retail establishments safety of life and contents are both to be considered; in nearly all manufacturing establishments special hazards deserve attention • — materials and processes which are more or less peculiar to the special industry. The importance of this latter factor is apparent from the attention devoted to it by fire underwriters and fire- protection engineers. The isolation of danger¬ ous features of production by confinement to separately safeguarded buildings, floors or com¬ partments will serve to decrease loss of life, reduce the extent of material damage and elim¬ inate consequential loss through subsequent dis¬ turbance of work in other departments. The importance of the above considerations, though readily admitted and indeed self-evident, is often overlooked and submerged in the mass of construction details, as is evidenced by many notable fires of the past.

2. Limitation of Occupancy. — Private enter¬ prise and public regulation necessarily go hand in hand in the repression of unnecessary fire loss. The preceding paragraph has referred to

buildings designed for a particular occupancy, but through economic . changes buildings are often diverted from their original purposes and the character of occupancy entirely changed. In order to guard against possible unfortunate results from such changes careful municipal regulation is necessary.. While great restric¬ tion is obviously impossible, some limitation of the number and character of tenants is abso¬ lutely requisite to avoid at least partial nullifi¬ cation of original designs.

3. Stairways , Elevators and Fire-escapes. — Aside from provision of emergency exits such features must be considered as facilities for fire-fighting and possible avenues of fire trans¬ mission. They furnish exceptional assistance when adequately isolated so as to be safe for firemen, while on the other hand insufficient and unsafe provision is merely a detriment and a menace to the safety of persons as well as property. The importance of all floor openings in the transmission of fire is readily perceiv¬ able. Fire-resisting floor construction is of little avail if unprotected vertical passages are introduced. Just as fire-resisting material in walls should be supplemented by window pro¬ tection, so should vertical openings in other¬ wise non-communicating floors be supplemented by protection of floor openings. In a sense the entire Baltimore conflagration is ascribable to neglect of this principle, since otherwise the fire might have been extinguished or controlled at its inception. The protective methods are more fully discussed later.

4. Exposure Hazard. — The site of the pro¬ posed building is a governing factor in its de¬ sign by reason of the existent surrounding hazards. At least 25 per cent of fire losses are due to exposure. Against particularly danger¬ ous neighbors blank brick walls- or at least walls with but few openings, of minimum size should be provided. In this connection the character of the roof is not to be neglected.

5. Subdivision of Area. — This is an accepted fundamental feature of fire-resisting construc¬ tion, from which has developed the analogous idea of the subdivision of city areas by ((fire walls.® In the first place it localizes the .fire by confining it to the unit of area of origina¬ tion, thus definitely limiting the consequences.

Thus the entire compartment contents may be destroyed and the trimming consumed without appreciably affecting the remaining area. Even more or less inadequate partitions will prevent strong drafts and furnish barriers for fire¬ fighting. Secondly, just as a building with non-resistive floors may become a gigantic ver¬ tical flue so may a single undivided floor assume the function of an immense horizontal

flue. The division of area prevents strong drafts from the openings nearest the exposure across the building to those opposite. Past conflagrations are testimonials of the accel¬ erated transmission and the greater intensity of fire on undivided floors. Thirdly, a large area presents additional difficulty in fire-fight¬ ing, augmenting the difficulty of surrounding the fire, setting out the apparatus and the cover of smoke.

The importance of the factor of area is recognized in all the widely-used fire insurance rating schedules by charging an extra premium for areas exceeding the “standard.® In the Universal Mercantile Schedule, widely used in modified form in the East, 2,500 square feet is figured as a basis. In the Analytic Schedule also provision is made for this feature and recent schedules have shown no tendency to minimize its importance. It is nevertheless true that, practical considerations often restrict its application. In office buildings, hotels and apartment houses comparatively little difficulty is presented, but in factories, warehouses, man¬ ufacturing plants and even wholesale, retail and department stores, large areas are often deemed indispensable. The same is true of transporta¬ tion terminals, armories and theatres. Often, however, ingenuity will suggest at least partial measures of protection if the necessity is recognized.

6. Non- communicating Floors and Vertical Openings. — If the above facts demonstrate the necessity for the subdivision of horizontal areas, the surpassing need for the subdivision of vertical areas is a corollary. It is this neces¬ sity which has given the principle of the fire- resisting floor its importance, an importance so great that the name “fireproof® is now sel¬ dom applied to a building with non-isolated floors. But. the effectiveness of floor protection and fire-resisting design may be largely nulli¬ fied by a building feature in common use be¬ cause of its pretentiousness and the difficulty of otherwise, obtaining adequate illumination. This is the interior court or open light-well, prominent in many hotels and office buildings. In some cases it emanates from practical diffi¬ culties of otherwise obtaining light and in others. from the. desire to give the impression of extensive interior area. But past experience shows that this, feature has resulted in rapid spread of fire, impossibility of extinction and threatened suffocation by smoke. A classic illustration, of the results are found in the Horne Building fire,, where a fire in an ex¬ tremely hazardous adjoining risk was communi¬ cated to the Horne store and office buildings, Pittsburgh. The store building was pierced vertically by a 20 x 50 light-well, extending from the first floor to the roof. The intense heat and tremendous uprush of flame thus in¬ duced and promoted was the immediate cause of a $2,500,000 loss. The building was recon¬

structed, with the retention of several of the

vital defects, and in 1900 was again seriously damaged by fire. Again the open light-well made a generous contribution to the damage.

All vertical openings, including elevator shafts, stairways and small light and ventila¬ tion shafts are open to the same defects. Where vertical openings must exist their haz¬ ard should be ameliorated by protective de- • vices, preventing them from functioning as fire passageways. This necessity has given rise to numerous mechanical devices and protective construction, which are described later.

7. Isolation of Special Hazards. — Whenever a known hazard exists, of course, special meas¬ ures of protection should be taken. The most common illustration of the application of this idea is the isolation of boiler and engine rooms, a requirement enforced by all good municipal building codes. In connection with many manu¬ facturing enterprises there are numerous spe¬ cial hazards incidental to the processes and ma¬ terial used which should be isolated and since conditions vary greatly a general discussion is without value.

8. Reduction of Combustible Material. — The extent of the fire loss would be considerably reduced by the elimination of combustible mate¬ rials in trim and finish. A study of 23 so-called “fireproof® buildings in the Baltimore conflagra¬ tion showed, even in these better types of con¬ struction, a ratio of insurance losses to total insurance on this item of about 90 per cent. A study of eight of the larger buildings showed the proportion of fire damage to value on the various construction items to be :

Foundations . 4 Per cent

Steel Frame . 13 ”

Mason Work . 40

Equipment . 63 ”

Trim and finish . 84

General Expenses . 62 ”

The San Francisco fire also exhibited large losses sustained on ornamental fronts, com¬ bustible finish and trim, ornamental columns, etc.

Protective Devices. — In addition to design and material human ingenuity has been exer¬ cised in another and supplementary field of pro¬ tection, devising more or less mechanical inven¬ tions for extinguishing, preventing the spread and giving warning of fire. They form an im¬ portant adjunct to the other factors in fire prevention and protection and are described elsewhere under the designation Fire Protec¬ tion.

Special Features of Construction. — It is

desirable to consider at greater length a few of the more important individual features of fire¬ proof buildings, including some which are usually fundamental to the support of the building, such as walls, girders, columns, arches and others which contribute to the safety or peril of these fundamental features such as vertical and horizontal openings.

1. Walls. — Exterior walls in fire-resisting buildings may be of three types; (1) those which support a load in addition to their own weight, or “load-supporting,® (2) those which support merely themselves or “self-supporting® and (3) those which are dependent for sup¬ port upon a steel framework, sometimes called “curtain walls.® Prior to the skeleton-con¬ structed buildings exterior walls were built of masonry, without the support of metal columns

and this is still feasible in buildings of mod¬ erate height. In the earlier skeleton-constructed buildings self-supporting walls were employed, the loads being borne by metal columns within the walls. The modern fireproof building has entailed the curtain wall, which is hung upon the steel frame like a masonry or concrete en¬ velope ; in reality each story has its own four walls.

“ New York ” Reinforced End-construction Arch.

As regards fire-resistance the walls may be viewed from two standpoints, the extent of fire damage and cost of reconstruction. It has been conclusively demonstrated that the self-support¬ ing masonry wall suffers less from fire damage than the curtain wall. In the latter the wall¬ carrying beams are frequently so near the sur¬ face as to permit expansion and bending, thus wrecking the wall. From the standpoint of re¬

construction cost, however, the curtain wall is superior, assuming always that it is sufficient for the protection of the enclosed steel frame. Damage to a portion of a self-supporting wall often involves the removal of large unaffected areas, while the load-bearing function renders this type of wall liable to complete collapse. Parts of the curtain wall, however, may be easily removed and replaced.

Side-construction Arch, Radial Joints and Arched Webs.

The most satisfactory wall materials are brick, terra-cotta and concrete. Iron and stone are sometimes employed but the latter cannot be relied upon as a protection for the steel framework. Stone work should be absolutely free from any load-bearing function as it suffers

severely under high temperatures. The use of brick as a fire-resisting material has already

been discussed. Structural terra-cotta may be used for walls where the building contains no large amount of combustible material and has no severe exposure. Concrete walls strengthened

Deep End-construction Arch with Side-construction Key.

by reinforcing iron rods are also very satisfac¬ tory, being made either solid or double with an enclosed air space.

As stated, exterior walls frequently contain iron or steel columns. The protection of these is not a serious problem usually, due to the pro¬ tection and additional strength derived from the wall itself. The problem of the protection of interior columns is more difficult.

2. Column Protection. — The most important load-supporting members of a building are the interior columns and yet these stand isolated and exposed to fire on all sides, so that their protection becomes a primary consideration in the fire-resisting building. The requirements for an efficient column protection are (a) re¬ sistance to fire and water, so that the column may be protected through a long fire; (b) non¬ conductivity of heat so that the metal column will not expand, bend or buckle from heat; (c) tenacity of position so as not to crack and fall ; (d) adequate thickness; (e) good construction. It was formerly considered advisable in column protection to leave an air space between the col¬ umn and its protecting coat to act as heat in¬ sulation. The testimony of investigators of the

Circular Terra-Cotta and Concrete Column Protection.

San Francisco fire, however, proves this method to be inferior to the solid covering. The types of column protection principally used are as follows :

(a) Metal Lath and Plaster. — This consists in wrapping the column with wire netting to which plaster is applied. If wrapped too tightly the plaster does not take hold and falls quickly under fire. Furring strips are therefore used to permit the proper application of plaster. This method is improved by a double applica¬ tion of lath and plaster, with a space between. All such protections, however, were shown at

Baltimore and San Francisco to be insufficient to endure severe conditions and must be con¬ sidered merely as suited to withstand moderate temperatures.

(b) Plaster Blocks. — These are entirely un¬ reliable, due to disintegration by heat and water.

(c) Terra-cotta. — This method consists of surrounding the column with terra-cotta blocks, either solid or hollow, shaped to conform to the column. Any space intervening between the

column and the protection should be filled with concrete or additional terra-cotta. It is difficult to estimate the efficiency of the terra-cotta pro¬ tection from actual experience because of the poor quality of construction in the past, which has already made the method insufficient in practice, however good theoretically. In the , San Francisco and Baltimore fires this material did not equal others, partly from this cause.

(d) Concrete. — This method is simply the application of solid concrete to the exterior of the column and received its first practical test

Guastavino Construction, Chicago and Northwestern Terminal, Chicago.

in the San Francisco fire. The showing made was exceptionally good, being only equaled by brick protection and the use of concrete for the purpose has subsequently considerably increased as a consequence.

(e) Brick. — Brick column protection must be conceded to be the most efficient general form. This was demonstrated in the Baltimore fire, where brick was practically the only satis¬ factory protection found and in the San Fran¬ cisco fire, where both brick and concrete pro¬ tection could be observed, with the consensus of opinion in favor of the brick. It is, however, undesirable from the standpoint of weight and expense.

(/) Reinforced Concrete Columns. — In spite of their constituent material these columns re¬ quire protection. Tests show a loss of 70 per cent load-carrying capacity under extreme heat but no such loss when protected.

3. Floors, Beams and Girders. — Floors may be constructed of terra-cotta, concrete and com¬ binations of these. Brick must be practically eliminated because of its weight and expensive¬ ness. There is great variation in the evidence

Brick Arch Construction in Post Office Building, Los Angeles. Cal.

afforded by actual tests of terra-cotta arches. In individual building fires the damage has sometimes been small and sometimes great, while in the San Francisco conflagration the use of hard-burned tile exclusively and poor workmanship make a judgment difficult. The conclusion seems to be that in the main hollow- tile arches will carry the necessary loads and are usually damaged little by fire. Concrete floors, as shown by tests, may be so constructed as to sustain heavy loads and a very high de¬ gree of heat. Stone concrete and gravel con-

Detail of 2-in. Soffit Tile Beam Protection.

Crete, however, lose some strength under tem¬ peratures unusual in ordinary building fires. On the other hand if damage to the floor en¬ sues complete replacement is generally neces¬ sary.

The protection of beams and girders is of the highest importance, judging by the failures which have taken place in many instances, and terra-cotta and concrete are chiefly used for the purpose. Both are satisfactory if the work¬ manship is good.

4. Fire Doors, Windows and Shutters. — On the general principle that openings should not be

Detail of Beam Protection with Shoe Tiles.

materially weaker from the standpoint of fire protection than the wall, partition or floor in which they are placed, fire-resisting doors are an important part of the construction. These are tin-clad, plate-iron, composite, corrugated

iron, rolling steel, kalamine and hollow-metal¬ lic. Tin-clad doors are the best cheap protection available, although they are subject to deteriora¬ tion and damage by rust, bending and breaking.' Plate-iron doors are superior to tin-clad except that they radiate twice as much heat. Corru¬ gated-iron doors are accepted by underwriters as the equivalent of the standard door. Steel rolling doors are excellent, though expensive, and are generally automatic in action, a feature discussed later. Kalamine doors are wood-con¬ structed, covered with asbestos paper and en¬ closed with sheet metal, being extensively

used in office buildings, but are not approved by the underwriters for fire walls. One of the most important features of the fire door is an ar-

Double I-Beam Girder Protection.

rangement which will close the door auto¬ matically at a high temperature, usually con¬ sisting of a fusible link, pulley and weight. This insures that at the important moment the door will not be left open through carelessness or inability to reach it. The importance of the fire door as a means of protection is illustrated in the San Francisco disaster by the experience of the Pacific States Telephone and Telegraph Company building, which would probably have suffered little damage except for an open rear door, the effect of which was disastrous.

SECTION OF SOFFIT TILE

Double I-Beam Girders projecting below Ceiling.

Fire shutters and fire-resisting windows are particularly important by reason of the enor¬ mous number of losses caused by exposure. Conditions within the owner's own building can be controlled, but this does not eliminate the danger from neighboring buildings. It will be remembered that a fire-resisting building was defined as one which would protect itself and . the contents against contiguous and adjacent fire. In addition there is the danger of fire spreading from floor to floor by means of the windows. For the purpose of protecting win¬ dows open sprinklers, shutters and metal frames in combination with special glass are used. Open sprinklers are intended to throw a cur¬ tain of water over the windows to prevent fire from entering and to extinguish any ignition.

(See Fire Protection). The shutters employed are similar to the fire doors already described, both in material employed and methods of auto¬ matic operation. Shutters should be capable of being opened from the outside to allow access to firemen and protected hose holes should be provided. A less efficient but more pleasing protection is a combination of metal frames and sash and wire-glass panes. Automatic opera¬ tion of the sash is also employed. The wire- glass used for the window has already been described and is not a new invention although its extensive use for fire protection is com¬ paratively recent. Wire-glass radiates heat and therefore is far from

complete protection. In¬ flammable contents may be ignited by the heat passing through ordinary wire-glass ; double- glassed sash is therefore frequently employed and shutters are an important auxiliary. An excellent illustration of the value of the wire- glass window is the California Electrical Works in the San Francisco fire, which would probably have been burned but for this pro¬ tection.

Aside from facts regarding materials and construction the primary purposes of this arti¬ cle, briefly stated, have been to show :

(1) That the popular term Preproof® must be taken in a relative rather than an absolute sense, because the best fire-resisting buildings with unsuitable surroundings often suffer con¬ siderable damage in large conflagrations.

(2) That fire-resisting construction is a phase of fire protection which is closely corre¬ lated with fire prevention.

(3) That materials, design and construction are three equally important factors in the crea¬ tion of an efficient structure. It has been clearly indicated that an agglomeration of non-com¬ bustible materials without appropriate design does not constitute a fire-resisting building. The design, secondly, must be such as to permit of the use of fire-resisting mate¬ rials. Thirdly, several instances have been mentioned, such as the use of terra-cotta, application of protective material to columns, protection of beams and girders, etc., where poor construction has rendered both design and material futile. Furthermore, all the various individual features of protection are closely in¬ terrelated ; adequate walls may be rendered use¬ less by unprotected windows and doors, other¬ wise well-constructed floors may be rendered useless by the existence of unprotected stair¬ ways and elevator shafts, the division of area should be supplemented by an automatic sprinkler system, proper stairways are essential to fire extinguishment and so on, almost in¬ definitely. Immunity from the danger and waste of fire consists not of the provision of non-combustible materials, nor of special types of design, nor of miscellaneous protective de¬ vices, but of an intelligent combination of these, coexistent with building restrictions, public fire protection, auxiliary devices and the elimination of preventable causes.

Bibliography. — American Concrete Insti¬ tute's Report of Committee on Edison Fire (Vol. Ill, No. 8, August 1915) ; ˆCyclopedia of Fire Prevention and Insurance) (Chicago 1912) ; American Society of Civil Engineers, (Effect of the San Francisco Earthquake and Fire on Engineering Construction (in Trans¬

actions of the Society, Vol. LIX) ; (Hollow Tile Floors, Past and Present* (in Transac¬ tions, Vol. XXXIV) ; American Society of Civil Engineers, (Report of General Committee and Six Special Committees of the San Fran¬ cisco Association of the Society) (Transactions, Vol. LIX) ; Atkinson, Edward, Prevention of Loss by Fire* (Boston 1900) ; Atkinson, Ed¬ ward, (Report on Slow-burning or Mill Con¬ struction * (Boston 1908) ; Atlas Portland Cement Co., (Reinforced Concrete in Factory Construction*; id., (Concrete Garages*; Baker,

I. O., (Treatise on Masonry Construction * (New York 1899) ; Brearley, H. C., (History of the National Board of Fire Underwriters* (ib., 1916) ; British Fire Prevention Committee, Ped Books* on Tests of Materials and Construc¬ tions; Buell and Hill, (Reinforced Concrete > (New York 1906) ; Crosby, E. U., (Exposure Fires Analyzed) (in Insurance Engineering , June 1905) ; Crosby and Fiske, (Handbook of Fire Protection* (Louisville 1909) ; Dana, Gor¬ ham, Pxtracts from Report on Chelsea Con¬ flagration) (in National Fire Protection Quar¬ terly, July 1908) ; Eckel, E. C., (Cements, Limes and Plasters) (New York 1905) ; Falk, M. S., (Cements, Mortars and Concretes) (ib., 1904) ; Freitag, J. K., Pire Prevention and Fire Pro¬ tection (New York 1912) ; id., (The Fireproof¬ ing of Steel Buildings > (ib., 1899) ; Fuller Pireproof Building Construction (ib., 1904) ; Gottlieb, A., Pehavior of Iron Columns at High Temperatures) (in Journal of Association of Engineering Soc., February 1892) ; Griswold,

J. , Pire Underwriters' Textbook) (Montreal

1899) ; Himmelwright, A. L., (The San Fran¬ cisco Earthquake and Fire) (New York 1906) ; Holt, H. G., Pire Protection in Buildings) (London 1913) ; Howe, M. A., (Masonry *

(New York 1915) ; Unsurance Engineering Handbook > (ib., 1911) ; Johnson, J. B., /The Materials of Construction (ib., 1910) : Kidder, F. E., Architects' and Builders' Pocketbook) (New York 1898) ; Marsh, C. F., Peinforced Concrete) (New York 1904) ; Moore F. C., Pire Insurance and How to Build) (ib.,

1903) ; (How to Build Fireproof* (ib., 1898) ; (How to Build a Home > ; National Board of Fire Underwriters, (Report on the Ad¬ justed Fire Losses on the Fireproof Build¬ ings at Baltimore, Md.* ; Puilding Code*; (Specifications, Rules and Requirements for Electric Wiring and Apparatus, Fire Doors and Shutters, Railway Car Houses, Skylights, Sprinkler Equipments, Uniform Requirements, Wired Glass and Window Frame Construc¬ tion, and others* ; National Fireproofing Co., (Trial by Fire at San Francisco) (Pitts¬ burgh) ;

National Fire Protection Associa¬ tion, (Report of Committee on Fire-Retard- ents of Wood) (5th Annual Meeting) ; Pulle- tins on Special Hazards * ; (Report of Com¬ mittee on Baltimore Conflagration* ; New York, State Education Department, Pire Tests on

.Some New York Building Stones* (in Bull. No. 100, Albany 1906) ; New York Board of Fire Underwriters, Peport on Asch Building Fire* ; Peport on Fire in the Equitable Build- ing) ; 'Reconnaissance of Baltimore and Roch¬ ester Fire Districts) ; Reed, S. A., Peport to the National Board of Fire Underwriters on San Francisco Conflagration* ; Peport of Committee of Twenty on the San Francisco

Fire) (New York 1906) ; Riley, J. W., (Build¬ ing Construction for Beginners5 ; Sabin, L. C., (Cement and Concrete) (New York 1905) ; Sachs, E. O., cWhat is Fire Protection (in Pub. No. 1, British Fire Prevention Committee, London 1898) ; Schaaf-Regelman, E., (As¬

bestos ; Its Mining Preparation, Markets and Uses) (in Engineering Magazine, October 1907) ; Soule, Gilbert, Humphrey and Sewell, (The San Francisco Earthquake and Fire) (U. S. Geological Survey, Bulletin No. 324, Washington 1907) ; Spectator Company, (Fire Prevention and Protection (New York 1904) ; Taylor and Thompson,

Robert Riegel,

Assistant Professor of Insurance, University of Pennsylvania.

FIREPROOF SAFES. See Safe; Safe Industry in America.

FIRES, Notable. Among the more im¬ portant and disastrous conflagrations of history were the following :

64. Rome burned for eight days ; most of city destroyed.

1086. London ; great part of the city destroyed. 1212. London ; great part of the city destroyed. 1666. London ; Great Fire, 2-6 September; 436 acres ; loss, $50,000,000.

1794. London ; 650 houses burnt ; loss, $5,000,000. 1812. Moscow fired, 14-20 September; loss,

$150,000,000.

1835. New York, 16 December; loss, $15,000,000. 1842. Hamburg, 5-7 May; loss, $35,000,000.

1845. New York, 20 July; loss, $7,500,000.

1861. London, Tooley Street, 22 June-22 July; loss, $10,000,000.

1871. Paris, Communist outrages in May; loss,

$150,000,000.

1871. Chicago, 8-10 October; 2,124 acres; loss,

$200,000,000.

1872. Boston, 9-10 November; loss, $75,000,000.

1903. Chicago, 30 December, Iroquois Theatre;

531 lives lost.

1904. Baltimore, Md., 7 February; loss, $70,-

000,000.

1904. New York, steamer General Slocum, June, nearly 1,000 lives lost.

1906. San Francisco, Cal., 18-21 April; earth¬ quake and fire ; loss about $300,000,000.

FIREWORKS. S ee Pyrotechnics.

FIRING MACHINES, blasting batteries, electric blasting machines or exploders are elec¬ tric generators which are used in firing charges of explosives, in blasting and in military and vol. 11 — 17

naval operations. Broadly speaking, there are three types: (1) In which the current is in¬ duced in coils of wire surrounding the poles of a permanent magnet, by suddenly detaching a soft-iron armature therefrom; (2) in which a coil-wound armature is rotated between the poles of a permanent magnet; (3) in which a coil-wound armature is rotated between the poles of an electro-‘magnet as in an ordinary dynamo. It has been found advantageous in practice to construct the dynamo-electric ma¬ chines on the series method of winding, that is, the field-magnet coils, armature and external circuit (which in this case is the firing-line) are joined together in series. These machines

are operated by cranks or by means of racks and pinions, many mechanical arrangements having been devised by which to secure the continu¬ ously accelerated motion and automatic switch- off which is desired. The general principle upon which the dynamo-electric machines work is that an armature, rotated between the poles of an electromagnet, has set up in' its coils a feeble electric current, due to the magnetiza¬ tion produced by the residual magnetism in the iron. By continuing rotation (with the firing- line short-circuited) the weak current thus started passes round the field-magnet coils, in¬ creases the intensity of the field, and, conse¬ quently, the volume of current in the armature. This gradual increase or building up of the current goes on, until the maximum capacity of the machine is reached. At the limit of mag¬ netic saturation, the short circuit previously ex¬ isting is automatically broken and the whole available energy is switched on to the firing- line, through the binding posts or terminals on the side or top of the machine, to which the leading wires are attached. Machines are rated in the market at the full number of detonators which a machine of that pattern will fire, but, to ensure freedom from ((miss-fires,55 a machine should never be worked up to its rated maxi¬ mum capacity. The diameters of the leading wires should vary with their lengths, thus for distance up to 600 feet No. 16 B. W. G. (0.065 inch) wire should be used, for 800 feet No. 14 (0.083 inch) and for 1,000 feet No. 13 (0.095 inch). To prevent accidental explosions, it should be the invariable rule, that the leading wires are not attached to the binding posts of a firing machine, until all other preparations for firing are completed and everyone has got to a safe distance from the blast or mine; and it should be also the invariable rule that the leading wires are detached from the machine as soon as the blast has been fired.

FIRISHTAH, fe-resh'ta, more properly MOHAMMED KASIM, Persian historian: b. Astrabad, about 1550; d. about 1612. He went to India, and was for some time the tutor of a native prince. He wrote a (History of the Mohammedan Power in India till the Year 1612, 5 which is the best yet written on the period which it embraces.

FIRMAMENT, in ancient astronomy, the eighth heaven or sphere, with respect to the seven spheres of the planets which it surrounds. It is supposed to have two motions, a diurnal motion, given to it by the primtim mobile from east to west, about the poles of the equator; and another opposite motion, from west to east, which last it finishes, according to Tycho, in

25,412 years; according to Ptolemy, in 36,000; and according to Copernicus, in 25,800; in which time the fixed stars return to the same' points in which they were at the beginning.

FIRMAN, fer'man or fer-man', in Turkey, any decree issued by the Porte and authenti¬ cated by the sultan's own cipher or signet. Each of the ministers and members of the divan has the right of signing firmans relative to the busi¬ ness of his own department, but only the grand vizier is authorized to place at their head the cipher containing the interlaced letters of the sultan's name, which alone gives them force. A decree signed by the sultan's own hand is called hatti-sherif. The name firman is also applied to a passport issued either by the Porte or a pasha, enjoining the subordinate authori¬ ties to grant protection and assistance to the traveler in whose favor it is granted. (See Turkey). In India, a written permission to trade is called a firman.

FIRMIAN, fer'me-an, Karl Joseph, Count, Austrian statesman : b. Deutschmetz, Tirol, 1716; d. 1782. He received his education at Erthal, Innsbruck, Salsburg and Leyden. In 1753 he was appointed ambassador to Naples and three years later became governor-general of Lombardy. He was a liberal patron of ar¬ tists and scholars, including Winckelmann, An¬ gelica Kauffmann, etc. He established several libraries and made his own library accessible to scholars and investigators. This was the cele¬ brated Bibliotheca Firmiana of 40,000 volumes, which was afterward in great part incorporated with the Brera Library of Milan.

FIRMICUS, Maternus Julius, Latin writer of the 4th century a.d. In or about 346 he wrote a work entitled (ib. 1911).

FIRMINY, fer'me'ne, France, town of the Department of Loire, eight miles southwest of Saint Etienne, with which it is connected by rail. It has important coal mines which have been worked since the 14th century and also manufactories of iron and steel goods, includ¬ ing railway equipment, machinery and cannon. Fancy woolen hosiery is also manufactured. Pop. 19,580.

FIRN, the German equivalent for Neve. See Neve.

FIROZPUR, fe-roz-poor', or FEROZE- PORE, India, town, Punjab, three miles from the southeast bank of the Sutlej River, capital of a district of the same name. It has a large arsenal and has a trade in grain and manufac¬ tures of cotton. Pop., including the military cantonments

two miles south of the city,

49,341. Ferozepore is also the name of a town in Gurgaon district, Punjab. Pop. about 7,000.

FIRST AID, the term applied to a plan for popularizing the knowledge of certain simple measures for the relief of the injured and dis¬ tressed. The movement began with the forma¬ tion of the Saint John's Ambulance Association, London, England, in 1877, and was shortly fol¬ lowed by the rise of similar organizations in the United States, lectures and practical class demonstrations being established. Instant ap¬ plication is necessary in many cases of sudden illness or accident if remedial measures are to succeed. Thus a slight knowledge of the course of arteries and of means for compressing them will enable one to stay a fatal flow of blood. Antidotes for poison rapidly lose value as time elapses. The resuscitation of the drowning is largely a matter of persistence in artificial res¬ piration. General knowledge of the cleansing of wounds is all-important. This knowledge is now widely used in armies and among people most liable to witness accidents, as trainmen, etc., circulars of instruction and packets con¬ taining the most necessary articles for dressing wounds being often furnished by those in au¬ thority.

FIRST-BORN (Heb. bekor, Gr. prototokos, Lat. primogenitus), in scriptural use, signifies the first male offspring, whether of man or of other animals, due to the Creator by the Mo¬ saic law as a recognition of his supreme do¬ minion. The first-born male, whether of men or of animals, was devoted from the time of birth to God, and the first-born male child had to be redeemed one month after birth by an of¬ fering not exceeding in value five shekels of sil¬ ver (Exod. xiii, 13), provided the child lived longer than that period. The first-born male of animals also, whether clean or unclean, was equally regarded as devoted to God. By the Mosaic law primogeniture had certain privileges attached to it, the chief of which were the head¬ ship of the family and a double portion of the inheritance. Among other nations considerable variety existed as to the succession of children to the inheritance of their parent. See Inher¬ itance; Primogeniture.

FIRST CENTURY. The most important series of events for all after history in the 1st century of our Christian era are those con¬ nected with the Lord Jesus Christ. They took place almost without any inkling on the part of the generation in which they occurred ex¬ cept for the few who were immediately in con¬ tact with Him. Christ, the Son of God, was born 4 b.c. and died 29 a.d., the anomaly of His birth date being due to the fact that while the Christian era was meant to

begin from the year of Christ's birth, by a mistake in chro¬ nology made at the time when the new calendar was introduced (516) His birth was placed four years after it really occurred. He worked as a simple carpenter until He was 30 years of age and then preached His sublime doctrines in Palestine until seized and put to death for political reasons by the Jews. His crucifixion took place in the year 29, on Friday, April 3d, at 3 p.m. His followers were first called Chris¬ tians at Antioch 10 years later (40). He had chosen 12 fishermen — poor, ignorant, unre¬ fined — whom He made ®fishers of men® for His kingdom upon earth. Before the end of the

century, His doctrines were not only known throughout the East, but also in Rome, in south France, in Spain, in the islands of the Medi¬ terranean, in Africa, and they have continued to be the most absorbing interest of men ever since.

When Christ was born, Octavius, the great nephew and adopted son of Julius Caesar, had reigned over the Romans for more than a quarter of a century with the titles of Augustus and Imperator. Augustus is one of the su¬ premely great men of history. He succeeded in ruling the immense Roman Empire with such wisdom and moderation that the Augustan Age is rightly looked upon as (

The one serious setback of Augustus' reign was also one of the most important events of this century for after history. This was the defeat (9 a.d.) of a great Roman army under Varus, the governor of the Germanic province, by Arminius (Hermann), a German leader, who had been trained in the Roman military service. This defeat at the forest of Teuto- berg prevented Germany from becoming a Roman province. Arminius' victory deserves for that reason to be counted one of the deci¬ sive battles of history; that it was no accident his subsequent successes against the Romans show. He was defeated by Germanicus, 16 a.d., but succeeded in maintaining the independence of the right bank of the Rhine. Roman do¬ minion here would surely have changed the history of the world very considerably for it would almost inevitably have prevented the invasion of England by the Saxons and Angles and perhaps even kept the Northmen much more within their own confines. Arminius was indeed a great German patriot who more than any other succeeded in gathering the Germans about him for united resistance against the Romans and he continued to make head against them until he fell by treachery 21 a.d.

Augustus was the second of the 12 Caesars whose names have probably been better known to mankind ever since than any other group of men. They were Julius Caesar, Au¬ gustus and Tiberius, Caligula, Claudius and Nero, who represent the Julian family by na¬ ture and adoption. These were followed by the three military Caesars, Galba, Otho and Vitellius, who together reigned only for a year and a half, throned by the sword and perishing by it. Next came the three Flavian emperors, Vespasian, Titus and Domitian. Domitian

died in 96, to be followed before the end of the century by Nerva and Trajan who began a happy era for Rome. There is probably no more difficult problem in history than to estimate properly the true character of the Caesars. Even the character of Augustus is in some dispute, and all of his immediate suc¬ cessors, after passing through a period of his¬ torical condemnation of the bitterest kind, are now vindicated to a considerable extent. The contemporary sources of their history are Suetonius, who loved to delve in all that is worst in human nature, Tacitus who was a politician, and Juvenal the satirist.

Tiberius suffered under the misfortune of being compared to the great Augustus. He was a lover of solitude which rendered him unsuitable for his position but he seems to have been a great ruler, though with many personal faults. Caligula was the youngest son of Germanicus. His reign is a typical ex¬ ample of what may happen when inheritance dictates the choice of a ruler for he proved to be quite insane and a very monster of cruelty. He was murdered by an officer of the Praetor¬ ian Guard and then the army dictated that Claudius the uncle of Caligula, and brother of Germanicus, should be chosen as Emperor and the Senate had to confirm their choice. Clau¬ dius in person led the Roman army in Britain and made that a Roman province, and he added Mauretania, Lycia and Thrace to the Empire and did much for Rome, making the harbor of Ostia and draining the neighborhood. Claudius was even more unfortunate than Au¬ gustus in his domestic life and was poisoned by his last wife, Agrippina, who made him adopt her son, Nero, as his successor, while his first wife Messalina, goes down in history, proverbial for wickedness. Nero is one of the worst abused men of history, and yet probably does not deserve it all. In the first part of his reign he accomplished much for the Roman people. Then a strain of madness came over him and he committed some of the worst crimes. He initiated the persecution of the Christians and whether he set Rome on fire or not is uncertain, but he took advantage of the fire to rebuild the city much more safely and substantially and in more magnificent style. The Greeks sincerely mourned his death for he had a fine appreciation of their art and literature and seems to have possessed no mean artistic talents in

music and in acting, though of course his desire to exhibit these was counted a deep stigma on his dignity at that time.

The three military Caesars' were succeeded by Flavius Vespasian whose sons, Titus and Domitian followed him on the throne, as the Flavian line. Vespasian was chosen Emperor by the Eastern troops. He had to take Rome by siege, during which the ancient temple on the Capitoline was burned. The disorder in the choice of emperors for several years led to insurrection among the subject peoples, but these were suppressed by Vespasian firmly and completely. When Vespasian was elected em¬ peror, he was on an expedition against the Jews who had declared their independence of Rome (67) and his son Titus was left in com¬ mand in Palestine. Titus captured the city and destroyed the Jewish temple (70), which led to the dispersion of the Jews throughout the

the world, and undoubtedly helped in the propa¬ gation of Christianity. Vespasian proved a great emperor who brought peace and security to Rome. He built the Coliseum as well as a number of other magnificent buildings and established a system of schools with regularly paid professors. In 79 he was succeeded by his son Titus who had been associated with him in the government. Titus made himself the most loved ruler that Rome ever had. From him comes the expression (

The Golden Age of Latin literature was finished before the Christian era began. Virgil, Horace, Catullus, Tibullus, Propertius, all being dead, though Ovid and Livy lived over into the 1st century even longer than Augustus himself, both dying in 17 a.d. What has been called the Silver Age marks this century as a great though not one of the greatest periods in the history of literature. The important names in it are Seneca, Tacitus, Juvenal, Quintilian and the Plinys beside whom deserve to be mentioned Lucan, Persius, Martial and Petronius. Tacitus is often spoken of with Herodotus and Thucy¬ dides as one of the three greatest of historians and there is no doubt that he had a wonderful power of penetrating human motives and a marvellous condensation of style, but the ques¬ tion whether the satirist and politician did not eclipse the historian in him has come to be discussed more' and more in recent years. Quintilian is one of the first successful men of letters in history, who rose to wealth and honor through literature; Juvenal is perhaps the greatest of satirists who ever lived,

though Martial in his Epigrams has given a fuller picture of the characteristic frivolous life of Rome at the end of the 1st century. Roman literature of the Golden Age had much less of native originality and of the national char¬ acter than that of the Silver Age. Greek models were more consciously imitated in the first period but the time of the. Caesars with its tyranny and lack of true national spirit could not be favorable to the growth of a really great national literature. Livy's fervid belief in the greatness of Rome so beautifully

expressed at the beginning of the century had little chance to be lived under the Claudian Emperors, though the Flavian era and the be¬ ginning of the times of the Spanish Caesars at Rome gave the opportunity for the Silver Age literature which has always influenced deeply all subsequent periods of conscious literary devel¬ opment.

One of the characters in the political his¬ tory of this 1st century is almost more import¬ ant even than the emperors. This is German¬ icus, the nephew and adopted son of the Em¬ peror Tiberius. He was the son of Drusus who had proved such an active leader against the western barbarians. Germanicus hastened from Gaul in 14 a.d. to quell a mutiny which had broken out on the news of the death of Au¬ gustus in a Rhenish camp. He found so much disaffection among the Roman soldiers that he felt that active service would be the only thing to restore anything like loyalty. He won a series of triumphs and salved the Roman feel¬ ings by paying funeral honors to the dead whose bones were the mute but emphatic testimony to the defeat of Varus by Arminius, though a little later, Germanicus himself re¬ ceived a set back from Arminius. His fleet was lost in a storm, one of his lieutenants was defeated, and even Germanicus himself, after immense preparations, was compelled to with¬ draw from the enemy so that Tiberius, thinking it better not to risk Roman prestige further, recalled him to bring order out of the con¬ fusion that had arisen in the East. Even his incomplete defeat of the Germans endeared Germanicus to the Roman people and his title of honor constantly reminded them of their vindication, because they had taken the de¬ struction of the legions under Varus to heart. When Germanicus died in the East at the early age of 34, the Romans were quite willing to listen to stories that he had been poisoned. There is no evidence for that however and Germanicus is just one of the early cases in history in which untimely and unexpected death was attributed to poisoning. There are too many affections which may cause unex¬ pected death in a comparatively short time, or by lingering illness in spite of all treatment, for any but the most direct proof of poisoning to be accepted in history. In spite of the popu¬ lar impression to the contrary, there are very few poisons that do not give symptoms that

will readily reveal their presence. Germanicus' remains were brought back to Rome in triumph. Later his wife, suspected of plotting to have the imperial throne bequeathed to one of her sons, was banished by a decree of the Senate and she and her son died of hunger. The second son, Drusus, was put to death on a similar charge of ambition and only Caius, afterward called Caligula, remained, but he be¬ came the successor of Tiberius who died at 78 at Misenum (37).

Another character of the 1st century whose reputation among scholars at least has been very well preserved in Celsus. His works are an in¬ dex of the scientific interest of the time. Though probably not a physician, he wrote a work on medicine, (De re medical He lived about the time of Christ. For the purity and precision of his Latin he has been given the title of < Cicero Medicorum.> With the exception of the Papyrus Ebers, Celsus' is the oldest medical

document after the Hypocratic writings. Hy- pocrates is the only one of the 72 medical authors whom Celsus mentions whose writings have come down to us. The interest in him can be understood then. His works are full of anticipations of modern developments in medicine and surgery that were supposed to be novel. Surgery evidently had developed mar¬ vellously about that time and surgical instru¬ mentation in particular was highly specialized. Over 200 different surgical instruments have been found at Pompeii which was buried 79 a.d. Unfortunately, we know almost nothing of Celsus himself.

Another important writer on the sciences related to medicine who was very often quoted in the after time was Dioscordies, a Greek army surgeon in the service of Nero, called the father of the materia medica and the first to write on medical botany and applied science. Aretaeus the Cappadocian who also lived under Nero, was a wonderful observer and (

Manifestly the Romans were deeply in¬ terested in science and above all in what re¬ lated to human health. This makes the fact that Luke the Evangelist was a physician all the more significant, for as Harnack has shown, the Gospel written by him contains many of the technical medical terms of the time, and there¬ fore would have an especial appeal to the edu¬ cated classes. There is some question as to whether Luke was not a relative of Gallio, the proconsul of Achaia before whom Paul was tried at Corinth for Lucanus, his Latin name, is not

Greek at all but a surname in the great family of the gens Anncea to which Seneca, Gallio and Lucan all belonged. Philippi, where Luke was stationed, was a Roman colony. Perhaps this accounts for some of the strongly Christian character of Seneca's writings. The fact that Christ had devoted Himself so whole¬ heartedly to the relief of suffering and the cure of the diseased among mankind made it all the more striking that a physician, learned in the medical lore of his time, should describe in medical terms the miraculous healings worked by the Lord, and thus give them the stamp of his approval.

After extensive controversy during the 19th century as to whether Saint Peter was ever at Rome, there seems to be now no doubt left in the minds of most historians that both Saint Peter and Saint Paul spent some years in the preaching of Christianity at the capital of the Roman Empire. Saint Peter seems to have been in the city with a considerable interval on two separate occasions and there is a universal

tradition as to his 25 years Pontificate in Rome. He, together with Saint Paul, were victims of the persecution under Nero (67 or 68), Saint Paul as a Roman citizen, being put to the sword, while Saint Peter was crucified, head downward, according to tradition at his own request, not deeming himself worthy to die as did his Divine Master. The scene of his martyr¬ dom was the Vatican hill in the Jewish quarter of the city, where in Constantine's time, two centuries and a half later, a great church in his honor was erected, and where Saint Peter's and the Vatican still stand.

Rome was sadly in need of Christianity when these great doctrines which gave new values to life were first preached. An intense selfishness combined with utter disregard for others had come to the Roman people just in proportion as their city became the centre of the world of the time. The more one knows of the intimate details of the social life of this 1st century, the more the need of Christianity is recognized. Until recently, history has to a great extent been limited to the story of the wars and politics of older periods, and we have failed to know the people. With the develop¬ ment of social history, this Roman chapter of the 1st and 2d centuries bears a striking resem¬ blance to the history of other periods when a high degree of civilization, so-called, followed wealth and luxury. The all-important thing in the Rome of the 1st century was to make money. A number of men became immensely wealthy. Some five ways of making large fortunes at this time have been enumerated. The first was by. insurance, and speculation in connection with it, for the Rome of the period was rather flimsily built, the people living, or rather sleeping,

for they lived mainly out of doors, in rather confined quarters in apartment houses of five or more stories which, according to law, had to be built with streets all round them, and were therefore called insulce (islands). The second was by speculation. It is said that Cicero himself the attorney of the <(big interests® of his time at Rome, lost his fortune several times because of his tendency to speculate. The Forum was full of brokers' offices, and foreign exchange, because of the many different kinds of money current in the Empire, was a favorite object of speculation. The third way of making money was by cor¬ nering foodstuffs and selling them dear. Rome was a very large city of some two million inhabitants which had grown up in a few generations and had to be fed from a distance, the grain crops being grown down on the North African coast. This facilitated food hoarding and profiteering. The fourth way of making money was by speculation in land. Rome grew rapidly out over the estates sur¬ rounding it, and these were split up into parcels and sold at great profit. The fifth way was by corruption in politics, usually not in Rome itself, but out in the provinces and by the farming of taxes, and other abuses. There are surprising similarities with later times in all this.

The money having been made very much as in our day, it was spent largely as our genera¬ tion spends. Wealthy Romans had a home in the city, but spent comparatively little time in it, for they had a villa down near Naples, where they passed the winter months, a house at the

seashore for the summer; some of them went up to Lake Como near the foothills of the Alps for the early fall, and only appeared in Rome for a brief fashionable winter season. They ate 12 and 15 course dinners, taking Roman punch, made from snow brought down from the Alps, about the middle of the dinner so as to drive away the blood from the stomach for the moment and then have it come back by a re¬ action which produced a renewal of appetite. They affected all sorts of delicacies brought from long distances, indulged in the pleasures of the table, and dreading indigestion very much, sometimes relieved their stomachs after a heavy dinner by tickling their throats, and then went back to eat a more simple meal. Their pleasures were the baths and the amphitheatre. Here they saw gladiators fight with each other to the death, or with wild animals at great risk and sometimes fatal results, or saw wild animals kill each other. It is said that the luxurious Romans received an especially poignant pleasure

from seeing the Christians thrown to the lions. They had not become savages but were only wealthy sybarites think¬ ing but of themselves and referring everything to their own feelings regardless of others. Divorces became extremely common and could be secured for even trivial reasons, children grew to be fewer in the families; the men lost courage and the women lost virtue and the beginning of the end of Rome was very clear. There were to be periods as under the Spanish Caesars, which began just as the 1st century closed when degeneration and decadence seemed to be held up for a time, but the seeds of dissolution had been sown and Rome's destiny was upon her.

James J. Walsh,

Author of cThe Thirteenth the Greatest of Centuries,) etc.

PRINCIPAL EVENTS OF THE FIRST CENTURY.

A.D.

9. Arminius, German leader, defeats the Roman army under Varus.

14. Augustus, Roman emperor, dies. Tiberius succeeds.

16. Germanicus defeats Arminius.

21. Arminius treacherously slain.

25. Pontius Pilate becomes governor of Judea.

29. Crucifixion of Christ at Jerusalem.

37. Tiberius dies. Caligula, youngest son of Germanicus, becomes Roman emperor.

41. Caligula, insane tyrant, murdered. Claudius, his uncle, succeeds.

51. Caractacus, British king, defeated in great battle, carried in chains to Rome. Claudius poisoned by Agrippina. Nero becomes Roman emperor.

61. Boadicea, British queen, defeats the Romans. Con¬ quered soon after by Suetonius, Roman governor of Britain, she kills herself.

64. Nero persecutes the Christians. Sets fire to Rome.

65. China, under Ming-ti, sends an embassy to India, who on their return introduce Buddhism into China.

66. Revolt of the Jews.

67. The Christian apostles Paul and Peter executed at Rome.

68. Nero kills himself.

69. Galba, the penurious, slain. Otho, the prodigal, stabs himself. Vitellius, the debauchee, assassinated. Ves¬ pasian becomes emperor of Rome.

70. Destruction of Jerusalem by Titus, surnamed “ the good.”

79. Vesuvius in eruption overwhelms Herculaneum and Pompeii. Titus becomes Roman emperor.

81. Domitian, last of the “ Twelve Caesars.” Julius Agricola, governor of South Britain, conquers northward to the Grampian Hills.

85. Agricola sails around Britain which he discovers to be an island.

95. Persecution of the Christians.

96. Domitian murdered by his wife. Nerva becomes Roman emperor.

98. Trajan succeeds.

FIRST-FOOTING, a Scottish custom still existing. Late in the evening of Hogmonay (31 December) in each year thousands of the com¬ mon people assemble in the vicinity of the Edinburgh Tron Church, to ascertain on good evidence when the new year commences. When the clock is about to strike 12 they cheer so loudly that the strokes are not heard. Instantly that it has finished, they depart for the purpose of first-footing; that is each one tries to be the first person that year to cross the threshold of his friend’s house and wish him the compli¬ ments of the season. On such occasions also not a few are accustomed to drink their friends’ health at the manifest risk of their own. It is considered unlucky to go into a house empty- handed, and good luck is supposed to attend the resident whose ((first foot® is dark-com¬ plexioned.

FIRST-FRUITS and FIRSTLINGS are

terms of the Mosaic and Jewish law, denoting respectively those portions of the fruits of the earth and of the increase of live stock which were to be offered to the Lord. (For First- fruits consult Exod. xxii, 29; Num. xviii, 12 etc.; for Firstlings, consult Exod. xiii, 12; Num.

xviii, 15, etc.). A custom which had its rise in the Roman Catholic Church as early as the 6th century was that men ordained to ecclesiastical offices made to the bishop who ordained them an offering of some portion of the first year's revenue of the office. In course of time the claim of the See of Rome to the whole of the first year's income of a bishopric or an abbey or other office or benefice was recognized and enforced. When in 1531 King Henry VIII for¬ bade the payment of this tax to the papal see by his subjects, the amount of the first-fruits annually forwarded from England to Rome was about £3,000. When Henry was made supreme head on earth of the Anglican Church, the tax of the first-fruits was still exacted, but the pro¬ ceeds were turned into the royal treasury. Such was the disposition made of the first-fruits in England till in 1704 Queen Anne, for herself and successors, relinquished the income from first-fruits and other imposts on the profits of spiritual preferments and, under an act of the Parliament, formed this income into a fund for the relief of clergymen holding poor liv¬ ings : this is <(Queen Anne's Bounty.® The official name of first-fruits is Annates, or An- nalia, from annus, year; they are also called primitice, the Latin equivalent of first-fruits.

FIRTH, Charles Harding, English his¬ torian : b. Sheffield, England, 16 March 1857. He was educated at Clifton and Oxford and since 1883 has devoted his attention to literary work and teaching at Oxford, having been lecturer at Pembroke College there 1887-93, and since 1904 regius professor of 'modern his¬ tory at that university. He has published (The Clarke Papers) (1891-1901) ; (Scotland and the Commonwealth) (1895) ; Scotland and the Protectorate) (1899) ; (OHver CromwelP (1900); (Cromwell's Army) (1901); (Naval Songs and Ballads> (1907) ; (The Last Years of the Protectorate) (1909) ; (The House of Lords during the Civil War} (1910), etc.

FIRTH, Mark, English steel manufacturer: b. Sheffield 1819; d. 28 Nov. 1880. In 1849 with his father and brother he established in

Sheffield the great Norfolk steel works, whose specialty soon became the manufacture of steel ordnance. He was a munificent benefactor to his native town, his gifts including almshouses (1869), a public park of 36 acres (1875) and the Firth College (1879) in connection with university extension, with an endowment of £5,000 a year.

FIRTH, or FRITH, in Scotland, the name of deep inlets of the sea.

Firths are in many respects similar to the Norwegian fiords.

FIRTH OF FORTH. See Forth.

FIRUZ, the name of the three rulers of Persia. Firuz I, who reigned from 78 to 103 a.d., was of the Arsacide dynasty and has been identified with Pacorus II of the classical writers. Firuz II (Peroz) ruled from 457 to 484. He was of the Sarsanide dynasty. He was on friendly terms with the Romans, but lost his life on an expedition against the Ephtalites or White Huns. Firuz III, also a Sarsanid and the last of the line, was expelled from Persia by the Mohammedans in 641 and sought refuge with Kao-Tsung, emperor of • China, who tried to restore him to his throne.

FIRUZ SHAH I, Rukn ud-Din, Mo¬ hammedan king of Delhi, who succeeded to the throne in 1236 a.d. He was deposed after a reign of seven months and was succeeded by his sister, Firuz Shah II, Jalal Ad-Din, sultan of Delhi, founder of the Khalji dynasty and one of the noblest of Mohammedan rulers. He suc¬ ceeded to the throne in 1290 a.d. and was famed for his humility and clemency even to his greatest enemies. He campaigned against the Mongols in 1292 and four years later was assassinated by his nephew Ala-ad-Din. Firuz Shah III, king of Delhi: b. 1296; d. 1388. He succeeded to the throne in 1351 and enjoyed a quiet and prosperous reign. He abdicated two years before his death.

FIRUZABAD, fe-roo'za-bad, Persia, town in the province of Fars, 70 miles south of Shiraz, on the River Khoja. The town is sur¬ rounded by a mud wall and ditch. To the northwest are the ruins of the ancient town and of a large building called the fire-temple of Ardashir. The ancient city was destroyed by Alexander the Great, who built a dam across the river at the gorge where it leaves the plain, where the city was located, thus submerging the city. The lake remained until the 3d cen¬ tury when it was drained by Ardashir. He built a new city which he called Gur. The name was changed in the 5th century by Firuz II, who built here a famous palace 342×178 feet. It was a combination of Mesopotamian, Byzan¬ tine and Roman architecture. Pop. 3,000.

FISC, the public treasury. In Roman times the term at first designated the emperor's pri¬ vate purse, but later was used to designate the imperial treasury, and in the latter sense is used in most modern countries. In law it is consid¬ ered a juristic person. Consult Sohm, Hnsti- tutes of Roman Law1* (2d ed., Oxford 1901).

FISCAL LANDS, lands, among the Franks, set apart for the use of the

sovereign to sup¬ port his dignity and to give him the means of rewarding merit or valor.

FISCHART, fish'art, Johann, German satirist: b. Mainz, between 1545 and 1550; d.

Forbach, about 1590. As a satirist he is the most unrestrained of his age, inexhaustible in droll, humorous and witty thoughts, not sel¬ dom guilty of equivoque and obscenity, inti¬ mately acquainted with the follies of his age, and never at a loss whether to ridicule or lash them. He treats the German language with the greatest freedom, coining new words and turns of expression without any regard to analogy, and displaying, in his most arbitrary formations, erudition and wit. In the broad comic and bur¬ lesque he is not to be surpassed, and even in his most satirical effusions there is an honesty and good nature always observable. His most celebrated works are a rifaccimento of the Gar- gantua of Rabelais, first printed in 1575; (Das gluckhaft Schiff von Zurich* (The Lucky Ship of Zurich) (1576) ; (Aller Praklik Gross- mutter) (1572) ; (Eulenspiegel Reimensweiss) (1572), and several others. We find in Fisch- art the first attempt at German hexameters.

FISCHBACH, fish'baH, Friedrich, German textile designer: b. Aix-la-Chapelle, 1839; d. 1908. He received his education at the Berlin Academy of Industrial Design. In 1862 be re¬ moved to Vienna where he followed the pro¬ fession of decorator and designer. He became teacher of ornamentation at the Royal Acad¬ emy, Hanau, in 1870, and from 1883 to 1888 served as director of the Industrial Art School of Saint-Gall. In 1889 he removed to Wies¬ baden. He founded many societies for the ad¬ vancement of industrial art and by his work exercised a great influence on textile designing in Germany. In 1909 the Metropolitan Museum of Art, New York, acquired his collection of antique embroideries and fabrics. He pub¬ lished (Ornamente der Gewebe) (1874-81) ; (Geschichte der Textilkunst* (1883) ; (Siid-slavische Ornamente) (2d ed., 1872) ; (Album fur Stickerei* (130 patterns in gold and colors, 1872; 1880); (Neue Muster fur Stickerei und Plakelarbeiten* (3 series, 1880-83) ; (Stickerei- muster) (1888) ;

FISCHER, fish'er, Abraham, South Afri¬ can statesman: b. Green Point, Cape Town, 1850; d. 1913. He was educated at the South African College, became interested in the poli¬ tics of the Orange Free State and in 1878 be¬ came a member of the Volksraad. In 1896 he became a member of the Executive Council of the Volksraad and. took part in many colonial and interstate conferences. He headed a joint deputation from Transvaal and Orange Free State to Europe and

America during the South African War. From 1907 to 1910 he was Premier of the Orange River Colony and in the latter year became Minister of Lands in the new Union of South Africa government. He was made Privy Councillor in 1911 and be¬ came Minister of the Interior and Lands in

1912.

FISCHER, Bernhard, German bacteriolo¬ gist : b. Coburg, 1852. He was educated at the University of Berlin, received the degree of M.D. in 1875, and went to Egypt and India as member of the German Cholera Commission. In 1889 he was a member of the Plankton Ex¬ pedition and 10 years later became professor at the University of Kiel. There he also be-

came head of the Institute of Hygiene. He be¬ came generally known for his classification of bacteria. His Structure and Functions of Bac- teria) (2d ed., 1900), is the standard in its field.

FISCHER, Emil, German chemist: b. Eus- kirchen, 1852; d. Berlin, 16 July 1919. In 1879 he was appointed professor extraordinary at the University of Munich and became profes¬ sor of chemistry at Erlangen 1882, filling a sim¬ ilar chair at Wurzburg 1885. He was ap¬ pointed professor of organic chemistry at the University of Berlin 1892, succeeding the cele¬ brated A. W. Hofmann ; and in 1902 received the Noble prize for chemical research. His researches were along the lines of synthetic sugar, in which field he was a pioneer; and he also made significant investigations of the composition of the ((purine group,® the poly¬ peptides (synthetic proteids) and the depsides. He is author of (Anleitung zur Darstellung organischer Praparate5 (Eng. trans. by Stan¬ ford, 1909), a popular text-book; numerous papers which have since been collected into book form, and (Die Chemie der Kohlenhydrate und ihre Bedentung fiir die Physiologie) (1894), and (Chemical Research in its Bearings on National Welfare5 (1912).

FISCHER, Ernst Kuno Berthold, Ger¬ man historian of philosophy: b. Sandewalde, Silesia, 23 July 1824; d. Heidelberg, 5 July 1907. He studied at the universities of Leipzig and Halle and in 1849 became a lec¬ turer on philosophy at the University of Hei¬ delberg. However, he was interdicted from teaching philosophy at Heidelberg in 1853 ; but after filling professorships in Berlin and Jena, had the satisfaction

of being called to the chair of philosophy and history of modern German literature at Heidelberg in 1872. He was a brilliant lecturer and possessed a remarkable gift for clear exposition. His fame rests pri¬ marily on his work as a historian and commen¬ tator of philosophy. As far as his philosoph¬ ical views were concerned, he was, generally speaking, a follower of the Hegelian school. His writings in this direction, especially his in¬ terpretation of Kant, involved him in a quarrel with A. F. Trendelenburg, professor of philos¬ ophy at the University of Berlin, and his fol¬ lowers. His greatest work was his (Geschichte der Neueren Philosophic5 (6 vols., Stuttgart- Mannheim-Heidelberg 1854-77 ; new edition, Heidelberg 1897-1901), written in the form of brilliant monographs on Descartes, Kant, Fichte, Schelling and other great philosophers down to Schopenhauer. He also published (Diotima. Die Idee des Schonen5 (Pforzheim 1849) ; (Die Interdict meiner Vorlesungen5 (Mannheim 1854) ; (Die Apologie meines Lebens5 (Mann¬ heim 1854) ; (System der Logik und Meta- physik oder Wissenschaftslehre5 (Stuttgart 1852) ; (Franz Baco von Verona5 (Leipzig 1875; translated into English by J. Oxenford, London 1857) ; (Kants Leben und die Grund- lagen seiner Lehre5 (Mannheim 1860) ; (Akad- emische Reden : J. G. Fichte ; Die Beiden Kan- tischen Schulen in Jena5 (Stuttgart 1862) ; (Lessings ((Nathan der Weise55 5 (Stuttgart 1864; translated into English by E. Frothing- ham, New York 1868) ; *B. Spinozas Leben und Charakter5 (Heidelberg 1865; translated into English by F. Schmidt Edinburg 1882) ;

(Shakespeares Charakterentwickelung Rxhards III5 (Heidelberg 1868) ; (Uber die Entstehung und die Entwickelungsformen des Witzes5 (Heidelberg 1871) ; (Kritik der Kantischen Philosophic5 (Munich 1883; translated into English by W. S. Hough, London 1888) ; (Goethe-Schriften5 (8 vols., Heidelberg 1888- 96) ; (Kleine Schriften5 (Heidelberg 1888-98) ; (Schiller-Schriften5 (2 vols., Heidelberg 1891) ; (Philosophische Schriften5 (3 parts, Heidel¬ berg 1891-92). Other translations of his works are Mahaffy, J. P., (A Commentary of Kant's <(Critic of Pure Reason55 5 (London-Dublin 1866) ; Gordy, J. P., (Descartes and his School5 (New York 1887). In honor of his 80th birth¬ day, celebrated in 1904, there was published by O. Liebmann, W. Wundt, T. Lipps and others, XLIV, p. 189, Berlin 1908) ; Trendelenburg, A. F., (Kuno Fischer und sein Kant5 (Leipzig 1869) ; Vaihinger, H., (per Streit zwischen Trendelenburg und Fischer5 (in (Commentar zu Kants <(Kritik der Reinen Vernunft,55 5 Vol. II, pp. 290 and 545, Stuttgart 1882-92) ; Windelbrand, W., (Kuno Fischer5 (Heidelberg 1907).

FISCHER, Johann Georg, German poet : b. Gross Siissen, Wurtemberg,

25 Oct. 1816; d. Stuttgart, 4 May 1897. From 1833-85 he held various positions as school teacher, most of the time in connection with schools in Stuttgart. Early in life he showed deep interest in nature and many of his poems show this influence. He excelled in popular songs and ballads ; and in his love songs nobly idealized nature and passion. He wrote four dramas: (Saul 5 (1862) ; (Friedrich II von Hohenstaufen5

(1863); (Florian Geyer5 (1866); (Kaiser Maximilian von Mexico5 (1868). In (Aus dem Leben der Vogel5 (1863) he notes the charac¬ teristic phenomena of the psychic life of ani¬ mals with the acuteness of a naturalist and the sympathy of a poet. His other works, practi¬ cally all of them published in Stuttgart, were (Gedichte5 (1838) ; (Dichtungen5 (1841) ; (Gedichte5 (1854) ; (Neue Gedichte5 (1865) ; (Den Deutschen Frauen5 (1869) ; (Aus Frischer Luft5 (1872);

1897).

FISCHER, Joseph, German clergyman and cartographer: b. Quadrath, Rhein, Germany, 19 March 1858. He was educated at the gymna¬ sium. Rhein, Westphalia, and the universities of Munster, Munich, Innsbruck and Vienna, and Jesuit scholasticates in Holland, Austria and England. In 1881 he entered the Society of Jesus and was ordained to the priesthood in

1891. Since 1895 he has been professor of geog¬ raphy and history at Stella Matutina College, Feldkirch. His scientific achievements com¬ prise the discovery of the maps of Waldsee- miiller of 1507 and 1516 and of Jodocus Hon- dius in Wolf egg Castle, Wurttemberg in 1891. In 1903-04, and again in 1909-10, he visited Italy, France and England as member of the Austrian Institute of Historical Studies for the purpose of cartographical research. He has published (Die Beziehungen Kaiser Rudolfs II zu Erzherzog Matthias bis zum Vertage von Lieben) (1608) ; (Der sogennante Schottwiener Vertrag vom Jahre 1600) (1897) ; Her Linzer Tag vom Jahre 1605 in seiner Bedeutung fur die Osterreichische Haus und Reichs- geschichte) (1898); (Die Entdeckungen der Normannen in America) (1902; Engl, trans., 1903) ; Hie alteste Karte mit dem Namen America a.d. 1507, und die Carta Marina aus dem Jahre 1516 des M. Waldsee- miiller) (German and English eds., 1903) ; (Map of the World by Jodocus Hondius, 161 U (1907) ; (Introduction of the Cosmographiae Introductio of Martin

WaldseemulleH (1907) ; (Der ((deutsche Ptolemaus® um 1490) (1910). He collaborated in Jahrbuch des historischen Vereins von Liechtenstein (1910) and contrib¬ uted to the Innsbrucker theologische Zeit- schrift, Innsbrucker F ernandeums Zeitschrift, historical Records and Studies, > (Gottinger Gelehrte Anzeigenˆ (The Catholic Encyclope¬ dia, J and (Stimmen aus Maria-LaachP

FISCHER, Ludwig Hans, Austrian painter : b. Salzburg, 2 March 1848. After a course of art study he traveled extensively, settling finally in Vienna. Among his works are nine landscapes for the Museum of Natural History, Vienna, and etchings and engravings forming historical landscapes from Austria- Hungary. He is the author of hie Technik der AquarellmalereiP Three of his oil paint¬ ings, including a (View of Jerusalem,) are in the Vienna Museum. He also painted many excellent water colors and wrote numerous magazine articles accompanied by clearly de¬ fined and spirited drawings.

FISCHER, Paul Henri, French naturalist: b. Paris 1835; d. 1893. He studied science and medicine, securing doctorates in both, and became assistant in paleontology at the Museum of Natural History. He was made assistant naturalist there in 1872. After 1856 he was joint editor of the Journal de Conchyliologie and served several terms as president of the Societe Geologique de France and the Societe Zoologique de France. He published (Fauna conchyliologique marine de la Gironde et du sud-ouest de la France) (1865; enlarged ed., 1875) ; (Recherches sur les Actinies des cotes cceaniques de France) (1876) ; (Manuel de con- chyliologie> (1885) ; Haleontologie de File de Rhodes> (1887).

FISCHER VON ERLACH, Johann Bern- hard, Austrian architect: b. Vienna 1650; d. 1723. He spent some time at Rome in prepara¬ tion for the profession of architect. On his return to his native city he received commis¬ sions for several important buildings, including the castle of Schonbrunn, the Hofbibliothek, the palace of Prince Eugene, Church of Saint Charles Boromeo, etc., all in the Baroque style. He also was employed at Prague and Breslau.

FISCUS. See .Tlrarium.

FISET, fe'za', Louis Joseph Cyprien,

Canadian poet : b. Quebec, 3 Oct. 1825 ; d. 17 Aug. 1898. He received his early education at the hands of private tutors and at the Seminaire de Quebec. In 1848 he was called to the bar and soon after became protho- notary of the Superior Court of the province of Quebec. He

wrote the ode of welcome on the occasion of the visit of the Prince of Wales to Quebec in 1860. He was a frequent contributor to French-Canadian pe¬ riodicals. He was one of the founders of L'Institut Canadien, and served a term as its president. He wrote (Jude et Grazia, ou les malheurs de Immigration canadienne) (1861).

FISET, Sir (Marie), Joseph Eugene, Ca¬ nadian soldier: b. Rimouski, 15 March 1874. He was educated at Rimouski College and at Laval University, being graduated with the de¬ gree of M.D. in 1896. He joined the volunteer militia service, became major in 1898, and was brevetted lieutenant-colonel in 1901 for his serv¬ ices in South Africa. In 1903 he was made lieutenant-colonel in the army medical service and staff adjutant of medical services. In 1906 he became Deputy Minister of Militia and De¬ fense. He was made commander of the Legion of Honor in 1917 and was knighted the same year.

FISH, Hamilton, American diplomatist: b. New York, 3 Aug. 1808; d. Garrison, N. Y., 7 Sept. 1893. He was the son of Nicholas Fish (q.v.). In 1827 he was graduated at Columbia College, and admitted to the bar in 1830. A Whig in politics, he was elected a congressman in 1842, lieutenant-governor of New York in 1847 and governor in 1848. In 1851 he was returned to the United States Senate, where he opposed the repeal of the Missouri Compromise and joined the Republican party on its forma¬ tion. During the Civil War he acted as chair¬ man of the Union Defense Committee of New York city and later was appointed by President Lincoln as a member of the commission on the exchange of prisoners. He was Secretary of State under Grant 1869-77, signing, as one of the commissioners, the Washington Treaty of 1871 with Great Britain in the formulation of which he took an important part, and carrying through the settlement of the <(Alabama ques¬ tion.® He was also instrumental in settling the so-called (LXXIII, p. 215, Boston 1884) ; Gardiner, A. B., Hamil¬ ton Fish) (in New York Genealogical and Bio¬ graphical Record, Vol. XXV, p. 1, New York 1894) ; Hunt, G., (The Department of State of the United States, etcP (New Haven 1914) ; New York State Legislature, (Proceedings in Memory of the Honorable Hamilton Fish) (Al¬ bany 1894) ; Spring, A., Hamilton Fish, Sec¬ retary of State y (in American Law Review ,

Vol. XL, p. 801, Saint Louis 1906) ; United States State Department, (Papers Relating to the Foreign Relations of the United States, etc.*

(Washington 1869-78).

FISH, Hamilton, Jr., American lawyer and politician : b. Albany, N. Y., 1849. He was graduated at Columbia in 1869 ; became private secretary to his father, Hamilton Fish ; was graduated at the Columbia Law School in .1873 and was appointed aide-de-camp to Governor John Adams Dix of New York. In 1890 he was Republican leader of the assembly and speaker in 1895. In 1903-08 he was assistant treasurer of the United States and in 1909-11 served as member of Congress.

FISH, Nicholas, American military officer: b. New York, 28 Aug. 1758; d. there, 20 June 1833. He joined the Continental Army, par¬ ticipated in the battles at Saratoga in 1777 ; led a corps of light infantry in the battle of Mon¬ mouth ; and otherwise distinguished himself during the Revolutionary War. He was bre- vetted lieutenant-colonel in 1783 and retired in the same year. He was adjutant-general of New York from 1784—93; President Washington appointed him supervisor of United States rev¬ enue in 1794. From 1797 to 1805 he served as president of the New York State Society of the Cincinnati. From 1806-17 he was an alderman of the City of New York. He was married to Elizabeth Stuyvesant, a lineal de¬ scendant of Peter Stuyvesant; the last Dutch governor of Nieuw Netherlands.

FISH, Nicholas, American diplomatist : b. New York, 19 Feb. 1846; d. there, 16 Sept. 1902. He was educated at Columbia and the Harvard Law School, practised law in New York, be¬ came second secretary of legation in Berlin 1871, secretary in 1874, and in 1877-81 was charge d'affaires in Switzerland. From 1882 to 1886 he was United States Minister to Belgium, and in 1887 entered the firm of Harriman & Company, bankers of New York. He was the oldest son of Hamilton Fish (q.v.) ; successively vice-president and president of the New York chapter of the Society of the Cincinnati, and a member of many clubs.

FISH, Stuyvesant, American banker and railroad official: b. New York, 24 June 1851. In 1871 he became clerk in the New York office of the Illinois Central Railroad, became a director of that road in 1876, second vice- president 1883-84, vice-president 1884-87 and president 1887-1906. He also served as vice- president of the Chicago, Saint Louis and New Orleans Railroad in 1882-84. He was trustee of the Mutual Life Insurance Company of New York from 1883 to 1906, and director of the National Park Bank and other corporations. He published (The Nation and the Railways*

(1908).

FISH. In the popular sense a fish is a cold¬ blooded, chordate or vertebrate animal, adapted for life in the water, breathing by means of gill- slits all its life, having its limbs, if present, de¬ veloped as fins, never as fingers or toes. This definition excludes invertebrates as having no notochord and no backbone. It excludes the tunicates and enteropneustans as not fish-like in form when adult and as being at all stages without fins. It excludes the amphibians, be¬ cause these develop, in the adult state, jointed

limbs with toes and most of them cease to breathe with gills or gill-slits. The fishes, as thus defined, include all members of the groups known as the lancelets (Leptocardii) , the lam¬ preys (Cyclostomi) , the sharks (Ehasmo – hranchii), and the true fishes (Teleostomi) , as also all of the varied series of extinct fish-like forms. In technical writings the lancelets and the lampreys are usually excluded from the class Pisces or fishes and many writers would still further limit the name of Pisces by the exclusion of sharks and skates and also the chimaeras (Holocephali) . Still others exclude the Dipneusta and the extinct Placodermi or Ostracophori and Arthrodira. It is perhaps not necessary to regard Pisces or fishes as a technical term at all. In this case there is no violence in using the word fish as coextensive with the popular definition as given above. Taking this significance, we may recognize two classes of chordates (Tunicata and Enterop- neusta) as lying below and to one side of the series of fishes, while this series is itself composed of nine classes or sub-classes unequal in size and in taxonomic value, Leptocardii, Cyclostomi, Ostracophori, Cyclice, Elasmo- branchii, Arthrodira, Crossopterygii, Dipneusta, (Dipnoi) or (Plagiostomia) and Actinopteri. The first three groups differ widely from the others and must in any scheme of classification be regarded as forming distinct classes. The last-named class or sub-class includes the great majority of recent fishes. The Cyclice, Os¬ tracophori and Arthrodira are wholly extinct; the Crossopterygii and Dipneusta nearly so.

Taking the true fishes, or Actinopteri, as typ¬ ical of the group, we see at once that these have .the general structure of the higher verte¬ brates, but with less complexity of structure, with various adaptations that fit these animals for life in the water.

Form of the Body. — The body is in gen¬ eral boat-shaped, the head in the same axis, without neck in most cases, the shoulder-girdle being attached to the skull at the nape and in the more specified forms of the pelvic girdle joined to the shoulder-girdle below. The form is fitted for swift progress through the water. The body is longer than deep and the greatest width is in front of the middle, leaving in most cases the

compressed paddle-like tail to serve as the organ of locomotion. To all of these statements there are numerous excep¬ tions. Most fishes depend on speed to secure their food or to escape from their enemies, but there are some which preserve themselves by lying prone on the bottom, by hiding in crevices of one sort or another, or which are defended from all attacks by pungent, sometimes en¬ venomed, spines or by a bony coat of mail.

Exoskeleton of the Fish. — The surface of the fish is typically covered by an exoskeleton of overlapping scales. To this there are many exceptions. Some are naked, some covered with prickles, spines or bony plates. The scales may be ganoid (enameled, like teeth), placoid (reduced to shagreen-like roughness), ctenoid (with a comb-edge), or cycloid (smooth, with concentric striae), or they may be. variously coalescent, forming bony plates. Historically the placoid scale precedes the ganoid scale. This is followed by the cycloid, and finally by the ctenoid type. Bony plates

may be formed by the coalescence of scales of any type.

Fins of the Fish. — In most cases the motion of a fish is mainly produced by the lateral movement of a caudal or tail fin, the other fins exerting chiefly the function of direction. In the more primitive of existing fishes the dif¬ ferent fins are composed of soft rays con¬ nected by membrane. The soft rays are finely jointed and usually branched, as distinguished from the spines, which are without branches or joint and which are usually stiff and pungent. In the more specialized fishes spines are usually present, these occupying the front of the dorsal and anal fins, the first ray of the ventral fin being also spinous.

The fins usually present are of two kinds — the paired fins and the vertical fins. The paired fins are represented on either side of the body, the anterior or uppermost pair, the pectoral fins, representing in the fish the arms or forelegs of

the vertical fins, supporting bones are devel¬ oped. These bones, called interspinal bones (interneural along the back, interhaemal be¬ low), stand in some definite relation to the bones of the vertebral column, to which, how¬ ever, they are not directly joined.

The pectoral fin is attached, by means of certain intermediate bones,

to the shoulder- girdle. The ventral fin is similarly joined to a pelvis. The pelvis in all the lower fishes is detached from the rest of the skeleton and placed beneath the body cavity. In the more specialized modern forms the pelvis is moved forward, usually connected with the shoulder- girdle, but sometimes attached at the throat well in front of the latter. In accordance with the insertion of the pelvis, the ventral fins are said to be abdominal (free from the shoulder- girdle, as in tihe whitefish), thoracic (con¬ nected with the shoulder-girdle), or jugular (in front of the shoulder-girdle).

Great Lake Whitefish (Coregonus elupeiformis).

Showing the location of fins and mouth parts (after Jordan and Evermann).

1. Dorsal fin.

2. Adipose dorsal.

3. Caudal fin.

4. Anal fin.

5. Pectoral fin.

6. Ventral fin.

7. Lower jaw or mandible.

8. Upper jaw or maxillary.

8a. Supplementary maxillary.

9. Opercle.

10. Branchiostegals.

11. Caudal peduncle.

12. Lateral line.

13. Series of crosswise scales usually

counted.

14. Snout.

15. Eye.

16. Head.

17. Depth of body (measured in

number of times to base of caudal) .

18. Base of caudal.

19. Distance from snout to nape or

occiput.

the higher vertebrates, the lower or posterior pair (ventral or pelvic fins) representing the hinder legs. The verticle fins are on the median line of the body, the dorsal on the back, the caudal on the tail and the anal on the lower side behind the body cavity. Each of these fins is subject to great variation.

The vertical fins, with their appendages, arise from the modification and specialization of a dorsal median fold of skin. This is found in embryos and in the lancelet and other forms of low organization. It is generally taught that the paired fins, with the bones which support them, have been derived from a lateral fold of skin, similarly modified, and still more specialized. As to this, the evidence is much less complete than in the case of the vertical fins. But there is some evidence which would show that the paired fins arose from modifica¬ tion of gill structures.

At the base of each ray or group of rays in

Muscular System of the Fish. — The move¬ ment of the fins is accomplished through the agency of muscles. These organs lie band-like along the sides of the body forming the flesh of the fish. They are little specialized and not as clearly differentiated as in the higher verte¬ brates. In the typical fishes there are several distinct systems of muscles, controlling the jaws, the gills, the eyes and the different fins. The largest of these is the great lateral muscle, composed of flake-like segments, these cor¬ responding in general in number to the num¬ ber of vertebrae. In general the muscles are white in color and tender in substance. In a few fishes muscular tissues are modified into electric organs.

The skeleton of the fish is cartilaginous in the more primitive forms, bony in the more specialized types. In all cases the bones con¬ tain

less of mineral matter than do the bones of the higher vertebrates.

Skeleton of the Fish. — In the process of development the vertebral column is built up about a soft cartilaginous cord extending lengthwise of the body, called the notochord. This exists in all young fishes and is more or less completely persistent through life in the more primitive types, as the lamprey or the sturgeon. This notochord is not the backbone, but it indicates where the backbone is to be. In the higher forms the vertebrae are developed around it, strung spool-fashion, as it were, until finally in most recent fishes the original chord is entirely obliterated.

Explanation of plate of the skeleton of the striped bass (Roccus lineatus) after Edwin Chapin Starks.

1.

Vomer.

44.

Suspensory pharyngeal.

2.

Ethmoid.

45.

Upper or Superior

3.

Prefrontal.

pharyngeals.

4.

Frontal.

46.

Lower or Inferior

5.

Sphenotic.

pharyngeals.

6.

Parietal.

47.

Gill-rakers.

7.

Epiotic.

48.

Supraorbital.

8.

Supraoccipital.

49.

Preorbital.

9.

Pterotic.

50.

Suborbitals.

10.

Opisthotic.

51.

Nasal.

11.

Exoccipital.

52.

Supra-temporal.

12.

Basioccipital.

53.

Post-temporal.

13.

Parasphenoid.

54.

Supraclavicle.

14.

Basisphenoid.

55.

Clavicle.

15.

Prootic.

56.

Postclavicle.

16.

Alisphenoid.

57.

Hypercoracoid.

17.

Hyomandibular.

58.

Hypocoracoid.

18.

Symplectic.

59.

Mesocoracoid.

19.

Quadrate.

60.

Actnosts.

20.

Pterygoid.

61.

Pectoral rays.

21.

Palatine.

62.

Pelvic girdle.

22.

Mesopterygoid.

63.

Ventral spine.

23.

Metapterygoid.

64.

Abdominal vertebrae.

24.

Preopercle.

65.

Caudal vertebrae.

25.

Opercle.

66.

Centrum.

26.

Subopercle.

67.

N europophyses.

27.

Interopercle.

68.

Neural spine.

28.

Articular.

69.

Haemapophyses.

29.

Angular.

70.

Haemal spine.

30.

Dentary.

71.

Zygapophyses.

31.

Maxillary.

72.

Parapophyses.

32.

Premaxillary.

73.

Rib.

33.

Interhyal.

74.

Epipleural spines or

34.

Epihyal.

Epipleurals.

35.

Cerathoyal.

75.

Intemeural spines or

36.

Basihyal.

Interneurals.

37.

Glossohyal.

76.

Dorsal rays and spines.

38.

Urohyal.

77.

Interhaemal spines or

39.

Branchiostegal.

Interhaemals.

40.

Basibranchials.

78.

Anal rays and spines.

41.

Hypobranchials.

79.

Hypural.

42.

Ceratobranchials.

80.

Caudal rays.

43.

Epibranchials.

The skull of the fish consists of a great va-

riety of bones, the names of which are given on the accompanying plate. In the naming of the bones of the head and shoulder-girdle of fishes great confusion has arisen. This is due mainly to ineffective attempts to trace the homologies of these bones with bones occupy¬ ing similar positions in the skeleton of man ; while, no doubt, the skeleton of the higher vertebrates is derived by descent from that of primitive fishes, homologies can be traced only in a general way. The skull of the one corresponds to the skull of the other, but the specialized fishes have developed many more bones than were found in ancestral types and many more than exist in man. In like fashion the shoulder- girdle in the one represents that of the other, but the fish has more bones than can be cov¬ ered by the names scapula, coracoid and clavicle.

In the accompanying plate of the bones of the striped bass (after Edwin Chapin Starks) we use the terminology now adopted by Gill, Starks and most American osteologists. The

bones of the head may be roughly divided into those of the cranium, the jaws, the suspensory (of the lower jaw), the gill-structures and the membrane-bones. The latter, on the outside of the head, are formed by ossification of the skin and have no homologies among the higher vertebrates. They are also wanting in the

Striped Bass (Roccus lineatus). Branchial arches

(after Starks).

40. Basibranchials. 43. Epibranchials.

41. Hypobranchials. 44. Suspensory pharyngeal.

42. Ceratobranchials. 45. Upper pharyngeal.

The shoulder-girdle in the lower forms con¬ sists of an arch of cartilage. In the progress of specialization this is divided into several pieces as indicated in the plate. It is separate from the skulls in sharks and skates, as in the higher vertebrates. In the typical fishes its uppermost bone (post-temporal) is joined to the temporal bone of the cranium. In some groups it is immovably consolidated with the latter. In the eels, by a process of degenera¬ tion, it loses its connection with the skull. The

Buffalo-Fish (Ictiobus bubalus). Inner view

shoulder-girdle, showing mesocoracoid arch.

55. Clavicle. 59. Mesocoracoid.

57. Hypercoracoid. 60. Actinosts.

58. Hypocoracoid. 61. Pectoral rays.

of

pelvis in fishes usually consists of a single bone on either side, more or less fully coalesced with its fellow.

The vertebral column may be divided into abdominal and caudal vertebrae. The former have their lower processes divergent, to in¬ clude the body cavity. In the caudal vertebrae, the haemal processes unite, leaving opening only

SPINY-FINNED FISHES (Chsetodontidge)

Banner Fish (Chaetodon setifer) 3 The Clipp Fish (Chaetodon vittatus) 5 The Prince Fish (Chaetodon diacanthus dux)

Coral Fish (Chaetodon fasciatus) 4 The Lash Fish (Heniochus macrolepidotus) (> The Emperor Fish (Chaetodon imperator)

ANATOMY OF FISH

2&

ˆSSSˆm

1, 2, 3, 4 Skull

SKELETON OF STRIPED BASS 5 Face-bones, shoulder-girdle and hyoid arch (For explanation of small figures, see text)

6 Vertebral column and fins

for the haemal canal or place of the large artery. The neural processes of each vertebra unite above the centrum or body of the verte¬ brae, leaving space for the spinal cord. The pointed upper continuation of each is called the neural spine as the downward projection is called the haemal spine. In the primitive fishes generally the tail is extended to a point, the last vertebrae being progressively reduced and the caudal fin lying below the axis. This forms the heterocercal tail, characteristic of the shark, sturgeon and of various extinct types of fish. In the modern types, the vertebrae cease more or less abruptly at the base of the caudal fin, the tail being homocercal.

The number of vertebrae is least in the more specialized, spiny-rayed fishes. In several families of these there are 24 vertebrae, 10 ab¬ dominal and 14 caudal. This number is much greater in all the soft-rayed and all the primi¬ tive forms. It is also materially increased by a process of degeneration in most arctic or sub¬ arctic derivatives from these families and in general in fresh-water, pelagic and deep-sea forms derived from forms having 24 verte¬ brae. In cold waters, fresh waters and the oceanic abysses, the processes of competition called natural selection are apparently less active and we have the phenomenon of reduc¬ tion of parts with the increase in number of similar structures. This statement must be re¬ garded as hypothetical. While it is a rule almost universal, that in each group cold water forms have the vertebrae smaller and more numerous, we have yet to find an adequate ex¬ planation of the cause of the phenomenon.

The cause for the vegetative increase in the numbers of vertebrae as we leave the tropical shores may perhaps be found in the reduction of the stress of natural selection. For such (

Organs of Nutrition. — The organs of nutri¬ tion in the fish are generally homologous with those of higher vertebrates. Some fish feed ex¬ clusively on vegetable food. These have gen¬ erally incisor-like teeth loosely planted in the gums and a greatly elongate alimentary canal.

Most fishes feed on animal food, other fishes, crustaceans, mollusks,

worms, insects and whatever else may be found in the sea. The mouth and teeth are adapted to the kind of food and the varieties in form and armature are even more varied than the forms of the body among fishes.

The mouth is usually capacious. It may have no teeth; it may have teeth on the jaws only, or any bone in its circumference may be armed with them. In most fishes additional teeth of one sort or another may be found on the pharyngeals, in the gullet behind the gills.

The stomach may be U-shaped — an opening at either end — or it may have the form of a blind sac, the two openings close together. Often glands, called pyloric caeca, secreting a digestive fluid, occur at the end of the stomach.

The intestine may be a single tube, or it may be variously complicated, wound in spiral, or as in the shark, having its surface increased by means of a spiral valve within. . The liver gall-bladder and spleen are usually developed in fishes much as in the higher forms.

Fishes lack salivary glands. The tongue is cartilaginous or bony, with few nerves of taste, although taste buds may exist in the barbels, as in the cat-fish. Kidneys lie along the inner edge of the backbone, less specialized than in the higher vertebrates, their ducts leading into a common cloaca. In the lower fish-like forms (lancelets) the structures which serve the pur¬ pose of kidneys bear a close resemblance to similar glands (nephridia) in worms.

Organs of Respiration and Circulation. — In the lowest fish-like forms (lancelets), the heart is reduced to a simple pulsating tube. In the typical fishes it consists mainly of three parts, the auricle, the ventricle and a thickened part of the large artery, known as the bnlbus arteriosus. These parts correspond in a gen¬ eral way to right auricle and right ventricle in the higher vertebrates. The blood reaches the heart from the vein-system of the body. It is passed from auricle to ventricle, then sent through a large artery to the gills to be puri¬ fied. From the gills it is distributed through the main artery or aorta to the different parts of the body, to be again gathered up from the capillaries into the veins.

It is not returned to the heart after purifi¬ cation, as in the higher vertebrates. Its flow is therefore relatively sluggish, and, as in rep¬ tiles and amphibians, its temperature is little above that of the environment. In some of the more primitive fishes the heart is more

com¬ plex than in the typical forms, the arterial bulb being provided with a large number of valves.

All the chordate animals, including the tun- icates and the Enteropneusta, have the purifica¬ tion of the blood effected through some form of gill-slit. In the lower forms these are merely slits, admitting water to the pharynx, where it comes in contact with thin membranes covering capillaries filled with blood.

In the typical fishes a much more elaborate apparatus is developed. There are usually five long bony arches attached to the cranium above and to the base of the tongue below. Each of these' has two rows of slender filaments, the gills. The blood flows in and out of these filaments, where it comes in contact with the water. This water is swallowed through the mouth, and is forced out through the gill¬ opening. Behind the true gill-arches is a fifth arch, more or less similar usually without gills, being modified to form a pair of gullet- jaws, the pharyngeals. On the anterior edge of the first gill-arch is a series of projections, sometimes forming a straining apparatus. These are the pharyngeals. A small accessory gill, the pseudobranchia, is usually developed on the inner sideof the opercle or gill-cover.

In sharks and skates, the gills are fastened by their longer side, like the leaves of a book. In other groups there are many minor modifi¬ cations.

In the sharks and skates there is no trace of lung or air-bladder. In the more primitive forms ancestral to the true fishes, there is a well-developed lung, which assists in the purifi-

cation of the blood in exactly the same way as the lung of the higher vertebrates. Most of the forms known or supposed to possess lungs (Dipneusta Crossopterygii, Ganoideii) are now extinct. In the few living forms with this character (Neoceratodus , Lepidosiren, Protop- terus, Polypterus, Lepisosteus and Amia) this lung is either of one or two lobes. It is con¬ nected by a trachea with the pharynx. In the earliest forms this windoipe opens below the oesophagus, as in the higher vertebrates, but in the other forms, the opening is transferred to the dorsal side. These early fishes were there¬ fore literally amphibious, being capable both of breathing atmospheric air with the lungs and the air dissolved in water, with the gills. There is little

doubt that from some of these forms, probably crossopterygians, the whole series of land vertebrates is descended, while from the same stock has arisen the great body of the typical or bony fishes. In the former case we have the gradual obliteration of the gills, which are developed only in embryonic or larval stages. Among the typical fishes we have the gradual degeneration of the lung and the loss of its function as a breathing-organ.

In this case we have first the reduction of the lung to a single sac, the loss of its cellular structure. It assumes in the soft-rayed fishes the form of an empty sac, sometimes divided by a cross-constriction, the anterior part con¬ nected with the oesophagus by a very slender membranous tube. This tube is gradually lost in the spiny-rayed fishes, no trace of it usually existing except in the embryo. The air-bladder is then a hollow sac filled with air containing an excess of nitrogen, this air being secreted from the blood of the fish. The air-bladder has some value in enabling the fish to hold itself in place in the water. In pelagic fishes, and in fishes which habitually lie on the bot¬ tom, the air-bladder is often greatly reduced, or entirely obliterated, when the fish is fully developed. The different stages of the air- bladder must be looked on as steps toward the gradual loss of the lung, an organ which be¬ comes progressively less important in the more complete adjustment of the fish to continuous life in the water.

The Organs of Sense. — -The sense-organs of the fish correspond in general to those of the higher vertebrates. The sense of taste is, however, feeble, and that of hearing is muffled and without much power of acute discrimina¬ tion. The sense of smell resides in the nos¬ trils, which have no relation to the work of breathing. No fish breathes through its nos¬ trils, and only in a few of the more generalized types does the nostril pierce through the roof of the mouth. In the bony fishes the nostrils are cavities, one on either side, lined with delicate or fringed membrane, well provided with blood-vessels, as with nerves from the olfactory lobe. In most cases each nasal cavity has two external openings, either simple or with the rim of the nostril forming a papilla or barbel. The openings may be round, slit-like, pore-like, or may have various other forms. In certain families of bony fishes there is but one opening to each nostril. In the sharks, rays, and chimaeras there is also but one opening on either side and the nostril is larger and highly specialized, with valvular flaps controlled by muscles which enable them

<(to scent actively as well as to smell passively.®

In the lancelet there is a single median nos¬ tril, a small depression at

the front of the body covered by ciliated membrane. In the hagfish the single median nostril pierces the roof of the mouth and is strengthened by cartilaginous rings, like those of the windpipe. In the lam¬ prey the single median nostril leads to a blind sac. In all other fishes there is a nasal sac on either side of the head. There is no doubt that the sense of smell in fishes is relatively acute, and that the odor of their prey attracts them to it. It is known that flesh, blood, or a decaying carcass will attract sharks and other predatory fish are drawn in a similar manner. At the same time, the strength of this function is yet to be tested by experi¬ ments.

The Organs of Sight. — The eyes of fishes differ from those of the higher vertebrates mainly in the spherical form of the crystalline lens. This extreme convexity is necessary be¬ cause the lens itself is not very much denser than the fluid in which the fishes live. The eyes vary much in size and somewhat in form and position. They are larger in fishes living at a moderate depth than in shore-fishes or river fishes. At great depths, as a mile or more, where all light is lost, they become aborted or rudimentary, and may be covered by the skin. Often species with very large eyes, making the most of a little light, or of light from their own luminous spots, will inhabit the same depths with fishes having very small eyes, or eyes useless for seeing, these being re¬ tained as vestigial structures through heredity. Fishes which live in caves become also blind, the structures showing every possible phase of degradation. The details of this gradual loss of eyes, either through reversed selection or hypothetically through inheritance of atrophy produced by disuse, have been given in a num¬ ber of memoirs on the blind fishes of the caves of Kentucky, Missouri and Cuba by Dr. Carl H. Eigenmann.

Many of the sharks possess a distinct nicti¬ tating membrane or special eyelid, moved by a set of muscles. The iris in most fishes sur¬ rounds a round pupil, without much power of contraction. It is frequently brightly colored, red, orange, black, blue or green.

In the lowest of the fish-like forms, the lancelet, the eye is simply a minute speck coated by black pigment, connected with the spinal cord by a short nerve. In the development of such a pigment-spot the vertebrate eye doubt¬ less has its origin. In the hagfishes, which stand next highest in the series, the eye, still incomplete, is very small and hidden by the skin and muscles. This condition is very dif¬ ferent from that of the blind fishes of the higher groups in which the eye is lost through atrophy, because in life in caves, or under rocks, the organ is no longer necessary.

The Ear of the Fish. — The ear of the typical fish consists of the labyrinth only, in¬ cluding the vestibule and three semi-circular canals, these dilating into one or more sacs which contain large, loose bones, the ear-stones or otoliths. There is no external ear, no tym¬ panum and no Eustachian tube. The ear-sac on each side is lodged in the skull or at the base of the cranial cavity. It is commonly sur-

rounded by bone, but sometimes it lies near a fontanel or opening in the skull above.

The otoliths, two in each labyrinth, a*e usually large firm bone with enameled surface and peculiar grooves and markings. Each spe¬ cies has its peculiar type, but they vary much in different groups of fishes. The sense of hear¬ ing in fishes cannot be very acute and is prob¬ ably confined chiefly to the perception of dis¬ turbances in the water. Most movements of the fish are governed by sight rather than by sound.

Voices of Fishes. — Some fishes make dis¬ tinct noises, variously described as quivering, grunting, grating or singing. The name grunt is applied to species of Hcemulon and related genera and fairly describes the sound these fishes make. The Spanish name ronco or ron- cador (grunter or snorer) is applied to several fishes, both scisenoid and haemuloid. The noise made by these fishes may be produced by forc¬ ing air from part to part of the complex air- bladder, or it may be due to grating one on an¬ other of the large pharyngeals. The grating sounds arise, no doubt, from the pharyngeals, while the quivering or singing sounds arise in the air-bladder. The midshipman, Porichthys notatus, is often called singing-fish, from a peculiar sound it emits. These sounds may pos¬ sibly be useful to the species, but they are not well differentiated, nor have they been so in¬ vestigated as to be well understood.

Sense of Taste. — It is probably certain that fishes possess a sense of taste, though it is little differentiated and is in some species located in the barbels about the mouth. The tongue is without delicate membranes or power of mo¬ tion. In some fishes certain parts of the palate or pharyngeal region are well supplied with nerves, but no direct evidence exists that these have a function of discrimination among foods. Fishes swallow their food very rapidly, often whole ; and mastication, when it takes place, is a crushing or cutting process,

not one likely to be affected by the taste of the food.

Sense of Touch. — The sense of touch is better developed among fishes. Most of them flee from contact with actively moving objects. Many fishes use sensitive structures as a means of exploring the bottom, or of feeling their way to their food. The barbel or fleshy filament, wherever developed, is an organ of touch. In some fishes, as the moray, barbels are out¬ growths from the nostrils. In the catfish the principal barbel grows from the rudimentary maxillary bone. In the horned dace and gud¬ geon the little barbel is attached to the maxil¬ lary. In other fishes barbels grow from the skin of the chin or snout. In the goat-fish and surmullet the two chin-barbels are highly specialized. In the cod-fish the single beard is little developed. In the gurnards and related forms, the lower rays of the pectoral are sepa¬ rate and barbel-like. Detached rays of this sort are found in the thread-fins and in various other fishes. Barbels or fleshy flaps are often developed over the eyes and sometimes on the scales of the fins.

The sense of pain is very feeble among fishes. A trout has been known to bite at its own eye, placed on a hook and similar insensi¬ bility has been noted in the pike and other fishes. ftThe Greenland shark, when feeding on the carcass of a whale, allows itself to be

repeatedly stabbed in the head without aban¬ doning its prey.})

The Nervous System. — The nervous sys¬ tem in the fish, as in the higher vertebrates, consists of brain and spinal cord, with sensory or afferent and motor or efferent nerves. As in other vertebrates, the nerve-substance is divided into gray matter and white matter, or nerve- cells and nerve-fibres. In the fish, however, the whole nervous system is relatively small, its structures feeble and the gray matter less de¬ veloped than in the higher forms. According to Gunther the brain in the pike (Esox) forms but 1— 1305th part of the weight of the body; in the burbot (Lota) about l-720th part.

The cranium in fishes is relatively small, but the brain does not nearly fill its cavity, the space between the dura mater, which lines the skull cavity and the arachnoid membrane, which envelops the brain, being filled with a soft fluid containing a quantity of fat.

It is most convenient to examine the fish- brain in its higher stages of development, as seen in the sun-fish, striped bass or perch. As seen from above, the brain of a typical fish seems to consist of five lobes or ganglia, four of them in pairs, the fifth posterior to those on the median line. The posterior lobe is the cere¬ bellum or metencephalon

and it rests on the broadened termination of the spinal cord, called the medulla oblongata.

In front of the cerebellum lies the largest pair of lobes, each of them hollow, the optic nerves being attached to the lower surface. These are known as the optic lobes or mesen¬ cephalon. In front of these lie the two lobes of the cerebrum, also called the hemispheres, the prosencephalon. These lobes are usually smaller than the optic lobes and solid. In some fishes they are covered by a fold, but are never cor¬ rugated, as is the brain of the higher animals. In front of the cerebrum lie the two small olfactory lobes, which receive the large olfac¬ tory nerves from the nostrils.

In the hollow of the optic lobe are small pro¬ tuberances, supposed to represent the corpora quadrigemina of the higher vertebrates. From the lower surface of the brain is suspended the hypophysis or pituitary gland.

In most of the bony fishes the structure of the brain does not differ materially from that seen in the perch. In the sturgeon, however, the parts are more widely separated, so that the connecting nerve-substance is more clearly seen between the several parts. In the dipnoans the cerebral hemispheres are united, while the optic lobe and cerebellum are very small. In the sharks and rays the large cerebral hemispheres are usually coalescent into one, and the olfac¬ tory nerves dilate into large ganglia below the nostrils. The optic lobes are smaller than the hemispheres and also coalescent. The cerebel¬ lum is very large, and the surface of the medulla oblongata is more or less modified or specialized.

Besides the structures noted in other fishes, the epiphysis or pineal organ is largely de¬ veloped in sharks and traces of it are found in most or all of the higher vertebrates. In some of the lizards this epiphysis is largely developed, bearing at its tip a rudimentary eye. This leaves no doubt that in these forms it has an optic function. For this reason the structure,

wherever found, has been regarded as a rudi¬ mentary eye, and the <(pineal eye® has been called the ((unpaired median eye of chordate® animals.

It has been supposed that this eye, once pos¬ sessed by all vertebrate

forms, has been grad¬ ually lost with the better development of the paired eyes, being best preserved in reptiles as wan outcome of the life-habit which concealed the animal in sand or mud and allowed the fore¬ head surface alone to protrude, the medium eye thus preserving its ancestral value in enabling the animal to look directly upward and back¬ ward.® This we may doubt, as in none of the fishes is the epiphysis more than a nervous en¬ largement and neither in fishes nor in amphibia is there the slightest suggestion of its connec¬ tion with vision. It seems probable, as sug¬ gested by Dr. Hertwig, that the original func¬ tion of the pineal body was a nervous one, and that its connection with, or development into, a median eye in lizards was a modification of a secondary character.

The brain of the cyclostomes (hagfishes and lampreys) differs widely from that of the higher fishes and the homologies of the dif¬ ferent parts are still uncertain. The different ganglia are all solid and are placed in pairs. It is thought that the cerebellum is wanting in these fishes, or represented by a narrow commissure (corpus restiforme) across the front of the medulla. In the lancelet there is no trace of brain, the band-like spinal cord tapering toward either end.

The spinal cord extends from the brain to the tail, passing through the neural arches of the different vertebrae when these are developed. In the higher fishes it is cylindrical and in¬ elastic. In a few fishes (head-fish, trunk-fish) in which the posterior part of the body is shortened or degenerate, the spinal cord is much shortened, and replaced behind by a structure called cauda equina. In the head-fish it has shrunk into <(a short and conical append¬ age to the brain.® In the cyclostomes and chimaeras the spinal cord is elastic, and more or less flattened or band-like, at least posteriorly.

The nerves of the fish correspond in place and function with those of the higher animals. They are, however, fewer in number, both large nerve-trunks and smaller nerves being less de¬ veloped than in higher forms. The olfactory nerves and optic nerves may be regarded as outgrowths of the brain. The olfactory nerves, or first pair, extend through the ethmoid bone to the nasal cavity, which is typically a blind sac, with two roundish openings, but is subject to many variations. The optic nerves, or sec¬ ond pair, extend from the eye to the base of the optic lobes. In cyclostomes these nerves run from each eye to the lobe of its own side. In the bony fishes or Teleostei each runs from the eye to the lobe of the opposite side. In the sharks, rays, chimaeras and ganoids the two optic nerves are joined in a chiasma as in the higher vertebrates. The other nerves arising in the brain need not be mentioned in detail.

A sympathetic system corresponding to that found in the higher vertebrates is found in all the Teleostei or bony fishes, and in the body of sharks and rays when it is not extended to the head.

The operations of the nervous system in fishes are essentially those of the higher verte¬

brates, the instincts being relatively weak and the intellect or power of choice among com¬ peting responses to external stimulus being ap¬ parently wanting. All acts of the fish may be regarded as reflex, the results of external stim¬ ulus or of stimulus arising within the body of the fish. These actions in each species tend to run in grooves or to be repeated in a special way for each species. These ways constitute the habits of the fish.

Organs of Reproduction. — In most fisher the germ-cells are produced in large sacs (ovaries, testes) arranged symmetrically one on either side of the posterior part of the ab¬ dominal cavity. The sexes are generally but not always similar externally, and may be dis¬ tinguished on dissection by the difference be¬ tween the sperm-cells and the ova. The ovary with its eggs is more yellow in color and the contained cells appear granular. The testes are whitish or pinkish, their secretion milk-like and, to the naked eye, not granular.

In a very few cases both organs have been found in the same fish as in Serranus, the sea- perch of Europe, but all fishes seem to be normally dioecious, the two sexes in different individuals. There are no external genital organs, but in some species a papilla or tube is developed at the end of the uro-genital sinus. This may exist in the breeding season only, as in fresh-water lampreys, or it may persist through life, as in some gobies.

The great majority of fishes are oviparous, the egg-cells being fertilized after deposition. The eggs are laid in gravel or sand or other places suitable for the species, and the milt or sperm-cells of the male is discharged over or among them in the water. A very small quan¬ tity of the sperm-fluid may impregnate a large number of eggs. In a number of families the species are ovoviviparous, the eggs being hatched in the ovary or in a dilated part of the oviduct. In no case is a real uterus developed. In the case of viviparous fishes actual copula¬ tion takes place, and there is usually a modifica¬ tion of some organ to effect transfer of the sperm-cells. This may be the sword-shaped form of the anal fin in many top-minnows, the fin itself being placed in advance of its usual position. It may be an alteration of the struc¬ ture of part of the anal fin as in the surf-fishes (Embiotocidce) ; or, as

in the Elasmobranclii, large bony organs (claspers) may be developed from the ventral fins.

In some viviparous fishes, as the rock-fishes and rose-fishes (Scorpcenidce) , the young fishes are very minute at birth. In others, as the surf-fishes, they are relatively large and few in number. In the viviparous sharks, which con¬ stitute the majority of the species, the young are large at birth and prepared to take care of themselves.

The eggs of fishes vary much in size and form. In those sharks and rays which lay eggs the ova are deposited in a horny egg-case, in color and texture suggesting the kelp in which they are laid. The eggs of the bull-headsharks (Heterodontus) are spirally twisted, those of the cat-sharks (S cylliorhinidce) quadrate, with long filaments at the angles. Those of rays are wheelbarrow-shaped, with four handles. One egg-case may sometimes contain several eggs, and develop several young. The eggs of lance- lets are small, but those of hagfishes and lam-

Keys are large, ovate, with fibres at each end, each with a triple hook at tip. The chimaeras have also large egg-cases, oblong in form.

In the higher fishes the eggs are spherical, large or small according to the species, and varying in the firmness of their outer walls. All contain food-yolk from which the embryo in its earlier stages is fed. The eggs of the eel (Anguilla) are microscopic. According to Gunther, 25,000 eggs have been counted in the herring, 155,000 in the lumpfish, 3,500,000 in the halibut, 7,635,200 in the sturgeon and 9,344,000 in the cod. Smaller numbers are found in species with large ova. Where an oviduct is present, the eggs are often poured out in glutin¬ ous masses, as in the bass. When, as in the salmon, there is no oviduct, the eggs lie separate and do not cohere together. It is only with the latter class of fishes, those in which the eggs remain distinct, that artificial impregnation and hatching are practicable. In this regard, the adaptability of the salmon and trout is pre¬ eminent. In some fishes the ovary of but one side is developed.

In most fishes the parents take no care of their eggs or young. In a catfish (Buno – cephalns) the eggs adhere to the under surface of the females. In a kind of pipefish (Sole – nostomus) a large pouch for retention of the eggs is formed on the belly of the temale. In the sea-horses and pipefishes a pouch is formed in the skin, usually

underneath the tail of the males. Into this the eggs are thrust, and here the young fishes hatch out, remaining until large enough to take care of themselves.

In certain sea catfishes the male carries the eggs in his mouth, thus protecting them from the attacks of the female. In numerous cases the male constructs a rough nest, which he de¬ fends against all intruders, against the female as well as against outside enemies. The nest¬ building habit is especially developed in the sticklebacks (Gasterosteida?) , a group in which the male fish, though a pigmy in size, is very fierce in disposition. In a minnow of Europe (Rhodens amarus) the female is said to deposit her eggs within the shells of river mussels.

In the relatively few cases in which the sexes are unlike, the male is usually the brighter in color and with more highly developed fins. Blue, red, black and silvery white pigment are especially characteristic of the male, the olivaceous and mottled coloration of the female. Sometimes the male has a larger mouth, or better developed crests, barbels or other ap¬ pendages. In some species the pattern of coloration in the two sexes is essentially different.

In various species the male develops peculiar structures not found in the female, and often without any visible purpose. In the chimaera, a peculiar cartilaginous hook, armed with teeth at the tip, is developed in the male only. In the skates -or true rays (Raja) the pectoral fin has near its edge two rows of stout incurved spines. These the female lacks.

In the breeding season the male sometimes becomes much brighter by the accumulation of bright red or blue pigment or of black or white pigment-cells. This is especially true in the minnows, darters, and other fresh-water species which spawn in the brooks of northern regions in the spring. In the minnows and suckers horny excrescences are also developed on head,

body or fins, to be lost after the deposition of the spawn.

In the salmon, especially those of the Pacific, the adult male becomes greatly distorted in the spawning season, the jaws and teeth being greatly elongated, and hooked or twisted so that the fish cannot shut its mouth. After the act of spawning, all the individuals of these species die, both male and female. The Atlantic salmon and the trout

show also some elonga¬ tion of the jaws, but not to the same extent, and in these species the individuals mostly sur¬ vive the act of Spawning.

In fishes generally the eggs are laid in the spring, to be hatched in warming water. Among the salmon, trout and cod-fishes, a reverse con¬ dition obtains. The eggs are laid in fall or winter, being deposited in water which is grow¬ ing colder, hatching when the temperature of 54° F. is passed. In those fishes which pair, the relation seems not to be permanent, nor is any¬ thing to be called affection recorded among them.

Embryology and Growth of Fishes. — The

egg of the fish develops only after fertilization, the union of its nuclear substance with that of a sperm-cell from the male. When this process, known as a'mphimixis, takes place, the egg is ready to begin its segmentation. The eggs of all fishes contain more or less of food-yolk at¬ tached to the structures of the germ-cell proper and included with it in the same spherical mass. The presence of this food-yolk affects the man¬ ner of segmentation.

The process of cell-division or segmentation common among fishes need not be described in detail, as it is essentially that of the higher vertebrates. When the food-substance or yolk is consumed, and the little fish is able to shift for itself, it leaves the egg-envelopes and is said to be hatched.

The young fish usually differs from the adult chiefly in size and proportions. The eye is larger, the head larger, the fins are lower, the appendages less developed, and the body more slender in the young than in the adult. But to most of these distinctions there are numerous exceptions, and in some fishes there is a change so marked as to be fairly called a metamor¬ phosis. In such case the young fish in its first condition is properly called a larva. The larva of the lamprey (Petromyzon) is nearly blind and toothless, with slender head, and was long supposed to belong to a different genus from the adult. The larva of sharks and rays and of some dipnoans are provided with bushy exter¬ nal gills, which disappear in the process of de¬ velopment. In most soft-rayed fishes the em¬ bryonic fringe, which precedes the development of the vertical fins, persists for a considerable time.

Hybridism is very rare among fishes in a state of nature. Two or three peculiar forms among the snappers (Lutianus) in Cuba seem fairly

attributable to hybridism, the single speci¬ men of each showing a remarkable mixture of characters belonging to two common species. Hybrids may be readily made in artificial im¬ pregnation among those fishes with which this process is practicable. Hybrids of the different salmon or trout usually share nearly Equally the traits of the parent species.

The age of fishes is seldom measured by a definite period of years. Most of them grow

as long as they live, and apparently live until they fall victims to some stronger species. It is reputed that carp and pike have lived for a century, but the evidence needs verification. Somes fishes, as the salmon of the Pacific (Oncorhynchus) have a definite period of growth (usually four years) before spawning. After this act all the individuals die — so far as known — without exception.

Fishes differ greatly in tenacity of life In general, fishes of the deep seas die at once if brought near the surface. This is due to the reduction of pressure. This forces the stomach out through the mouth and may burst the air- bladder and the large blood-vessels. Marine fishes usually die very soon after being drawn out from the sea. Some fresh-water fishes are very fragile, dying soon in the air, often with injured air-bladder or blood-vessels. They will die even sooner in foul water. Other fishes are extremely tenacious of life. The mud-min¬ now {Umbra) is sometimes plowed up in the half-dried mud of Wisconsin prairies. The re¬ lated Alaska black-fish (Dallia) has been fed frozen to dogs, and has escaped alive from their stomachs after being thawed out. Many of the catfishes (Ameiurus) will live after lying half- dried in the dust for hours. The dipnoan (Lep – idosiren) lives in a ball of half-dried mud dur¬ ing the dry season, and the fishes, mostly Asiatic, which possess an accessory breathing organ, can long maintain themselves out of water.

Some fishes can readily resist starvation, while others succumb as readily as a bird or mammal. The limits of distribution of many fishes are marked by changes in temperature. Few marine fishes can endure any sudden or great change in this regard, although fresh¬ water fishes adapt themselves to the seasons. Those fishes which are tenacious of life and little sensitive to changes in climate and food are most successfully acclimatized or domes¬ ticated. The Chinese carp (

Cyprinus carpio) and the Japanese goldfish (Carassius auratus) have been naturalized in almost all temperate and tropical river-basins. Within the limits of clear, cold waters, most of the salmon and trout are readily transplanted. But some of these, as the grayling, are very sensitive to the least change in conditions. Most of the catfish (Siluridce) will thrive in almost any fresh waters except those which are very cold.

The eggs of many salmon placed on ice to retard their development have been success¬ fully transported to great distances. The king salmon has been thus transferred from Cali¬ fornia to Australia. It has been found possible to stock rivers and lakes with desirable species, or to restock those in which the fish-supply has been partly destroyed, through the means of artificially impregnated eggs.

Fishes have little power to reproduce lost parts. Only the tips of fin-rays or filaments are thus restored after injury. Sometimes a fish in which the tail has been bitten off will sur¬ vive the injury. The wound will heal, leaving the animal with a truncate body, fin-rays some¬ times arising from the wounds.

Fishes as Food for Man. — Among all races of men fishes are freely eaten as food, either raw, as usually preferred by the Japanese and Hawaiians ; or else as cooked, salted, dried or otherwise preferred

The flesh of most fishes is white, flaky, read¬ ily digestible, and with an agreeable flavor. Some, as the salmon, are charged with oil, which tends to give an orange hue known as salmon-color. Others have colorless oil which may be of various consistencies. Some have dark red flesh, which usually contains a heavy oil that becomes acrid when stale. Some fishes, as the sharks, have tough, coarse flesh. Some have flesh which is watery and coarse ; some are watery and tasteless. Some, otherwise ex¬ cellent, have the muscular area, which consti¬ tutes the chief edible part of the fish, filled with small bones.

The writer has tasted most of the noted food fishes of the northern hemisphere. First in the ranks as a food-fish (when properly cooked, for he is no judge of raw fish) he would place the eulachon or candlefish (Thaleichthys pad ficus). This little smelt, about a foot long, ascends the Columbia River, Frazer River, and streams of Southern Alaska in the spring, in great num¬ bers, for the purpose of spawning. Its flesh is white, very delicate, charged with a white and very agreeable oil, readily digested, and with a sort of fragrance peculiar to the species.

Next to this he is inclined to place the ayu (Plecoglossus altivelis), a sort of dwarf salmon, which runs in similar fashion in the rivers of Japan and Formosa. The ayu is about as large as the eulachon, and has similar flesh, but with little oil and no fragrance.

Very near the first among sea-fishes must come the pampano (Trachinotus carolinus) of the Gulf of Mexico with firm, white, finely flavored flesh.

The red surmullet of Europe (Mullus bar- batus) has been long famed for its delicate flesh, and may perhaps be placed next. Two related species in Polynesia, the Upeneus bifas- ciatus and Upeneus porphyreus, are scarcelv inferior to it.

Side by side with these belongs the white- fish (Coregonus clupeiformis) of the Great Lakes. Its flesh, delicate, slightly gelatinous, moderately oily, is extremely agreeable. It has long been known among hunters that one can eat the flesh of this fish longer than any other without the feeling of cloying. The salmon cannot be placed in the front rank because, however excellent, the stomach soon becomes tired of it.

The Spanish mackerel {Scomberomorus maculatus), with flesh at once rich and delicate ; the great opah (Lampris luna) , still richer and * more delicate; the bluefish (Pomatomus salta- trix), similar, but a little coarser; and the king- fish (Scomberomorus cavalla) firm and well- flavored, represent the best of the fishes allied to the mackerel.

The shad (Alosa sapidissima) , with its sweet, tender, finely oily flesh, stands also near the front among food-fishes, but it runs above all others in the matter of small bones. The weakfish (Cynoscion regalis) and numerous relatives rank first among those with tender white, savorous flesh. Among the bass and perch-like fishes, common consent places near the first the striped bass (Roccus lineatus), the bass of. Europe (Dicentrarchus labrax) the su- suki of Japan (Lateolabrax japonicus), the red tai of Japan (Pagrosomus major), the sheepshead (Archosargus probat ocepha1 us) , the muttonfish or pargo criollo of Cuba (Lutianus

emails), the European porgy (Pagrus pagrus), the uku (Aprion virescens) of Hawaii, the spadefish (Chce to dip terns faber), and the black bass (Microptcrus dolomieu) .

The various kinds of trout have been made famous the world over. All are attractive in form and color ; all are gamy ; all have the most charming of scenic surroundings; and finally, all are excellent as food-fishes — not in the first rank, perhaps, but well above the second. Notable among these are the European charr (Salvelinus alpinus), the American speckled trout (Salvelinus fontinalis), the dolly varden (Salvelinus malma), and the oquassa trout (Sal¬ velinus oqnassa). Less attractive are the true trout, the brown trout or Forelle in Europe (Salmo fario), the rainbow trout or steelhead (Salmo irideus), the Tahoe trout (Salmo hen- shawi), and the cutthroat trout (Salmo clarkii) in America; and the Ito-uwo (Hucho perryi) of Japan. Not least of all- these is the grayling (Thymallus) , of different species in the streams of northern regions.

All these are the choicest prizes of the angler, and they have few rivals in any part of *the world. Other most excellent food-fishes are the eel (Anguilla species), the sole of Europe (Solea solea), the pike (Esox lucius), the muskallonge (Esox masquinongy) , the sardine (Sardinella pilchardus) , the atka-fish (Pleurogrammus monopterygius) of Bering Sea, the pescado bianco (Chirostoma estor and other species) of Lake Chapala in Mexico, the Hawaiian mullet (Mugil cephalus), the Cali¬ fornia pesce rey (Atherinopsis calif orniensis) , the Channel catfish (Ictalurus furcatus) , the turbot (Psetta maxima), the barracuda (Sphy – rcena), and the young of various sardines and herring known as whitebait. Of large fishes, probably the swordfish (Xiphias gladius), the halibut (Hippoglossus hippoglossus) , and the king-salmon or quinnat (Oncorhynclius tsch- awytscha) may be placed first. Those who feed on raw fish prefer, in general, the large parrot-fishes (as Callyodon jordani) in Hawaii, or else the young of mullet and similar species.

In general, the economical value of any spe¬ cies depends not on its toothsomeness, but on its abundance and the ease with which it may be caught and preserved.

It is said that more individuals of the her¬ ring (Clnpea harengus in the Atlantic; Clupea pallasii in the Pacific) exist than of any other species. The herring is a good food-fish, and wherever it runs it is freely caught. According to Bjornson, wherever the schools of herring touch the coast of Norway, there a village springs up, and this is true in Scotland, New¬ foundland, and from Killisnoo in Alaska to Otaru in Japan and to Strielok in Siberia. Goode estimates the herring product of the North Atlantic at 1.500,000,000 pounds annually. In 1881, Professor Huxley used these words:

It is said that 2,500,000,000, or thereabouts, of herrings are every year taken out of the North Sea and the Atlantic. Suppose we assume the number to be 3,000,000,000 so as to be quite safe. It is a large number, undoubtedly, but what does it come to? Not more than that of the herrings which may be contained in one shoal, if it covers half a dozen square miles, and shoals of much larger size are on record. It is safe to say that scattered through the North Sea and the Atlantic, at one and the same time, there must be scores of shoals, any one of which would go a long way toward supplying the whole of man's consumption of her¬ rings.

The codfish (Gadus callarias in the Atlan¬

tic; Gadns macrocephalus in the Pacific) like¬ wise swarms in all the northern seas, takes the hook readily, and is better food when salted and dried than it is when fresh.

Next in economic importance probably stands the mackerel of the Atlantic (Scomber scombrus), a rich oily fish which bears salting better th,an most.

Scarcely less important is the great king- salmon or quinnat (Oncorhynclius tschawy- tsclia) and the blueback salmon or red salmon (Oncorhynchus nerka). The canned product of the latter in Alaska alone amounts to nearly $5,000,000 annually.

The salmon of the Atlantic (Salmo salar), the various species of sturgeon (Acipenser), the sardines {Sardinella) , the halibut (Hippo¬ glossus), are also food-fishes of great import¬ ance.

In the tropics no one species is represented by the enormous numbers of individuals, as is the case in colder regions. On the other hand, the number of species regarded as food-fishes is much greater in any given part. In Havana about 350 different species are sold as food in the markets, and an equal number are found in Honolulu. Upwards of 600 different species appear in the markets of Japan. In England, on the contrary, about 50 species make up the list of fishes commonly used as food. Yet the number of individual fishes is probably not much greater about Japan or Hawaii than on a similar stretch of British coast.

Catching Fishes. — In general, fishes are caught in four ways, by baited hooks, by spears, by traps and by nets. Special local methods, such as the use of the tamed cormorant, in the catching of the ayu, by the Japanese fishers at Gifu, may be set aside for the moment, and all

general methods of fishing come under one of these four classes.

Of these methods, the hook, the spear, the seine, the beam-trawl, the gill-net, the purse- net, the sweep-net, the trap, and the weir are most important. The use of the hook is again extremely varied. Sometimes for codfish long sunken lines, each baited with many hooks, are used. For pelagic fish a baited hook is drawn swiftly over the surface, with a ˆspoon® at¬ tached which looks like a living fish. In the rivers the line is attached to a pole, and when fish are caught for pleasure or for the joy of being in the woods, recreation rises to the dig¬ nity of angling. Angling may be accomplished with a hook baited with an earthworm, a grass¬ hopper or the larva of some insect. The angler of to-day, however, prefers the artificial fly, as being more workmanlike and also more effective than bait-fishing.

With the mutiplicity of apparatus for fish¬ ing, there is the greatest variety in the boats which may be used. The fishing fleet of any part of the world is a most interesting object, as are also the fishermen with their quaint garb, plain speech, and their strange songs and calls with the hauling-in of the net.

Evolution of Fishes. — When a fish dies its body is at once attacked by hundreds of crea¬ tures ranging from the one-celled protozoa and bacteria to individuals of its own species. Its flesh is devoured, the bones are scattered, the gelatinous substance in them decays, and the phosphate of lime is in time dissolved in the water. For this reason few fishes of the mil-

lions that die each year leave any trace for future preservation. At the most, a few teeth, a fin-spine, or a bone buried in the clay might remain intact or in such condition as to be recognized.

But now and then it happens that a dead fish may fall in more fortunate conditions. On a sea-bottom of fine clay the bones, or even the whole body, might be buried in such a way as to be sealed up and protected from total de¬ composition. The fish would in any case dis¬ appear and leave no mark, or at the most a mere cast of its surface. But the hard parts might persist, and now and then they do per¬ sist, the lime unchanged or else silicified or sub¬ jected to some other form of chemical substi¬ tution. Only the scales, the teeth, the bones, the spines and the fin-rays can be preserved in the rocks of sea or lake

bottom. In a few localities, as Fossil Station, near Green River, Wyo., Monte Bolca in Tuscany, and Mount Lebanon in Syria, and in lithographic slates in Germany, many skeletons of fishes have been found pressed flat in layers of very fine rock, their structures traced as delicately as if actu¬ ally engraved on the smooth stone. About Ceara in Northern Brazil, many cretaceous fishes have been beautifully preserved in nodules of clay, the eyes and even black spots on the scales being distinctly shown. Fragments pre¬ served in ruder fashion abound in the clays and even the sandstones of the earliest geo¬ logical ages. In most cases, however, fossil fishes are known from detached and scattered fragments, many of them, especially of the sharks, by the teeth alone. Fishes have oc¬ curred in all ages from the Lower Silurian or Ordovician to the present time, and no doubt the very first lived .before the Silurian.

No one can say what the earliest fishes were like, nor do we know their real relation to the worms, their presumable ancestors, nor to the tunicates and other chordate forms, not fish¬ like, but still degenerate relatives of the primi¬ tive fish.

From analogy we may suppose that the first fishes which ever were, bore some resemblance to the lancelet, for that is a fish-like creature with every structure reduced to its lowest terms. But as the lancelet has no hard parts, no bones, nor teeth, nor scales, nor fins, no traces of its kind are found among the fossils. If the primi¬ tive fish was like it in important respects, all record of it has necessarily vanished from the earth. It is, however, by no means proved that the ancestral fishes were really soft-bodied or worm-like. Professor Patton of Dartmouth College has shown many reasons for believing that the earliest known types (Ostracophores) were allied to crustaceans, and that from marine forms, ancestors to the modern horse¬ shoe crab (Limulus) and to spiders, the fishes have been derived.

The next group of living fishes the cyclo- stomes, including the hagfishes and lampreys, fishes with skull and brain but without limbs or jaws, stands at a great distance above the lancelet in complexity of structure, and equally far from the true fishes in its primitive sim¬ plicity. In fact, the lamprey is farther from the true fish in structure than a perch is from an eagle. Yet for all that, it may be an off¬ shoot from the primitive line of fish-descent. There is not much in the structure of the

lamprey which may be preserved in the rocks and no trace of fossil lamprey is actually known to exist.

The oldest unquestioned fragments of fishes have been very lately made known by Charles D. Walcott, from rocks of the Trenton Period in the Ordovician or Lower Silurian. These are from Canon City, Colo. Among these is certainly a small ostracophore (Asterapis desid¬ erata). With it are fragments of a vertebral column, thought doubtfully to belong to an ex¬ tinct type of chimaeras (Dictyorhabdus) and other fragments of bony plates, referred with some doubt to the crossopterygian genus Eripty- chias. This renders certain the existence of ostracophores at this early period, and their association with chimaeras and primitive sharks is also possible. These early remains were from shallow, muddy water, more favorable perhaps for ostracophores than for sharks.

The fish-remains next in age in America are from the Bloomfield sandstone in Pennsylvania, of the Onondaga Period in the Silurian ; the earliest in Europe are found in the Ludlow shales, both of these being in or near the hori¬ zon of the Niagara rocks, in the Upper Silu¬ rian Age.

It is, however, certain that these Ordovician remains do not represent the beginning of fish- life. Doubtless sharks, ostracophores and arthrodires, with perhaps chimaeras, crossop- terygians, and dipnoans existed at a far earlier period, possibly preceded by unarmed, limb¬ less forms, without jaws, of which no trace whatever has been left.

Next appear more or less simultaneously, in the early or middle Silurian, fin-spines, thought to belong to primitive sharks, remains of acan- thodean and other sharks and with these numer¬ ous bony shields of the mailed ostracophores, and somewhat later those of the more highly specialized arthrodires. Later appear cestra- ciont sharks, chimaeras, dipnoans and cross- opterygians.

In the Devonian Age the ostracophores in¬ crease in size and abundance, disappearing with the beginning of the Carboniferous. The arthrodires also increase greatly in variety and in size, reaching their culmination in the Devonian, but not disappearing entirely until well in the Carboniferous.

These two groups (often but wrongly united by geologists under the older name placoderms, given by McCoy), together with sharks and chimaeras, made up almost ex¬ clusively the rich fish-fauna of Devonian times. The name ganoid has been associated with these forms but the true Ganoides are genuine fishes. The sharks were chiefly acan- thodian and cladoselachean (Pleuropterygii) , so far as our records show. The supposedly most primitive known type, that of

Ctadose- lache, appeared in the middle Devonian. The lchthyotomi (Pleuracanthus) , sometimes re¬ garded as still more primitive, are not known before the Carboniferous. In any case it is clear that the records of early shark-life are still incomplete. Chimaeroids abound in the Devonian, and with them a considerable variety of crossopterygians and dipnoans. The true fishes appear also in the Devonian, in the guise of ganoid ancestors and relatives of PaJceonisciim, all these with diamond-shaped enameled scales. In the Devonian too, we find

the -minute, lamprey-like forms (Palceospon – dylus), our ignorance of which is concealed under the name Cyclice.

In the Carboniferous Age the sharks in¬ crease in number and variety, the ostracophores disappear and the arthrodires follow them soon after, in the Permian. Other forms of dipnoans, crossopterygians and some ganoids follow, giving the fauna a somewhat more modern aspect. The Acanthodei and Ich- thyotomi pass away with the Permian, which follows the period of coal.

In the Triassic the earlier types of ganoids or mailed fishes of relatively modern type give place to forms approaching the gar-pike and sturgeon. The crossopterygians rapidly de¬ cline. The dipnoans are less varied and fewer in number, and notidanoid sharks made their first appearance. All the ancient types of shark meanwhile have passed away, the Cestraciontcs being the only group continued from the Permian to the Triassic. Here are found the first true bony fishes, derived from ganoid stock, the allies and predecessors of the great group of herrings. These become more numerous in the Jura, and in this age appear other forms which give the fish-fauna of this period something of a modern appearance. In this age the sharks become divided into sev¬ eral groups, Notidani, cat-sharks, lamnoid sharks, angel-fishes, skates and finally typical sharks, being well differentiated from each other. Chimaeras are still numerous. The Acanthodei have passed away, as well as the mailed ostracophores and arthrodires. The dipnoans and crossopterygians are few. The early ganoids have given place to more modern types, still in great abundance and variety.

This condition continues into the Cretaceous Period. Here the rays and modern sharks in¬ crease in number. The ganoids hold their own, and other groups of soft-rayed fishes, as the smelts, the lantern-fishes, the

pike and the fly¬ ing-fishes, join the group of herring-like forms which represent the modern bony fishes. In the Cretaceous appear the first spiny-rayed fishes, derived perhaps from pike-like forms, the ancestors of the living genus Beryx. From the berycoids spring the perch-like and mackerel-like forms so numerous in recent times.

In the Eocene great changes have taken place. The earlv families of bony fishes nearly all disappear. The herring, pike, smelt, salmon, flying-fish and berycoids remain and a multi¬ tude of others seem to spring up to replace them. Among these are the bowfins, the globe-fishes, the trigger-fishes, the catfishes, the eels, the butterfly-fishes, the porgies, the perch, the bass, the pipe-fishes, trumpet-fishes, the mackerels and the John-dory, with the sculpins, the anglers, the flounders, the blen- nies and the cods. That all these groups, gen¬ eralized and specialized, arose at once is im¬ possible, although all seem to date from Eocene times. Doubtless all of them had their origin in earlier times and the simulta¬ neous appearance is related to the fact of the thorough study of Eocene shales which in numerous localities (Green River, London, Monte Bolca, Licata, Mount Lebanon) have been especially favorable for the preservation of their forms. Practically fossil fishes have been studied only in a very few parts of the

earth. Scotland, England, Germany, Italy, Switzerland, Syria, Ohio and Wyoming have .furnished the great bulk of all the fish-remains in existence. In some regions perhaps col¬ lections mav be made which will give us a more just conception of the origin of the dif¬ ferent groups of bony fishes. We can now only say with certainty that the modern families were largely existent in the Eocene, that they sprang from ganoid stock, found in the Trias and Jura, that several of them occurred in the Cretaceous also, that the berycoids were earliest of the spiny-rayed fishes and forms allied to herring the earliest of soft-rayed forms. Few of the modern' genera go back to the Eocene ; many of them arose in the Miocene ; and few species have come down to us from rocks older than the end of the Plio¬ cene. The general modern type of the fish- faunas was determined in the later Cretaceous and the Miocene; the changes which bring us to recent times have largely concerned the abundance and variety of the individual species. From geological distribution we have arising the varied problems of geographical distribu¬ tion and the still more complex conditions on which depends the extinction of species and of types.

For much information on the fishing appa¬ ratus in use in America, the reader is referred to the reports of the Fisheries in the 10th census (1880), under the editorship of Dr. G. Brown Goode. In these reports

Goode, Stearns, Earll, Gilbert, Bean and the present writer have treated very fully of all economic relations of the American fishes. In an admirable work entitled (American Fishes) Dr. Goode has fully discoursed of the food and game fishes of America, with especial refer¬ ence to the habits and methods of capture c>f each. A later work of the same character is (Food and Game Fishes of America,5 by Jor¬ dan and Evermann. A still more elaborate work is the (Guide to the Study of Fishes,5 by the present writer. To these sources and to many others of similar purport in other lands, the reader is referred for an account of the economic and the human side of fish and fisheries. See Fishes, Geographical Dis¬ tribution of; Ichthyology.

David Starr Jordan,

Chancellor Emeritus, Leland Stanford Junior U niversity.

FISH, Royal, certain large fish, such as the whale, which by the common law of England become the property of the king when thrown on shore or trapped near the coast. It is a remarkable exception to the rule that animals of a wild nature (ferce natures) belong to him who first secures possession of them. See Game Laws.

FISH-CROW, a small species of crow (Corvus ossifragus), with a violet-green head, found along the Atlantic and Gulf coasts, where it limits its wanderings to the sea-coast and tidal rivers, finding its food mainly along the beaches. It is perhaps the most destruc¬ tive robber of biros' nests in the country. A similar species (Cornus minutus) inhabits Cuba. Consult Ridgway, R., (The Birds of North and Middle America, etc.5 (Part III, Washington 1904). See Crow.

FISH CULTURE, or PISCICULTURE,

the artificial propagation, fertilization, breeding, rearing, training and protecting of fishes, par¬ ticularly food-fish. The art or industry was known in the early ages in China, and later in Germany and Sweden. In 1350, a monk, Dom Pinchon, hatched fish eggs by an artificial proc¬ ess, but the honor of introducing the modern plan of propagation is generally conceded to Stephen L. Jacobi, a Prussian soldier of West¬ phalia, who, in 1763, devised the process now in use in Europe and the United States, of strip¬ ping the ova from the female fish and mixing them with milt taken from the male. Fifty years after Jacobi's discovery, Joseph Remy, a fisherman of the Vosges

Mountains, made the further discoveries upon which the culture de¬ pends — that the impregnation of fish eggs dif¬ fers from that of all other oviparous animals in taking place after all eggs have left the body of the creature and can therefore be performed as well artificially as by the animals them¬ selves.

The first government fish culture station was established in 1850 at Hiiningen, Alsace, and the following year a similar institution was estab¬ lished on the Tay in Great Britain. The proc¬ ess was introduced in the United States in 1865, when Dr. Garlick of Cold Springs, N. H., imported salmon eggs from Canada to hatch in the waters of his trout ponds. The process was also introduced in other sections of the country. The United States Commission of Fish and Fisheries, established by Congress 9 Feb. 1871, embraced in the scope of its work ((the propa¬ gation of useful food-fishes, including lobsters, oysters and other shellfish, and their distribu¬ tion to suitable waters.®-

Technically, the process now in use consists in taking the ripe eggs from the female fishes and the milt from the male, mixing them arti¬ ficially and leaving them until impregnation has been effected, after which the eggs separate of themselves and are placed in water, washed and treated in different ways according to the spe¬ cies or variety of the fish. Those of the sal¬ mon are placed in a filter-box or trough, through which passes a stream of pure water and left to hatch into <(fry,® which process takes from 35 to 70 days. The advantage of piscicul¬ ture consists in the saving of multitudes of eggs which would otherwise be lost, the pro¬ tection of the young fish from the dangers incident to their exposed condition and the transplantation of species and varieties to other localities, where they soon become naturalized.

The operation for obtaining the ova and milt consists simply in pressing the body of the fish from the head toward the tail and in col¬ lecting the excluded particles in a common ves¬ sel ; the contents are occasionally put in motion in order to prevent the growth of parasites upon the eggs, which are very sure to destroy them. A low temperature and even desicca¬ tion is not necessarily fatal, so that many kinds in a nearly mature state may be transported for considerable distances. It has been estimated that 1,000,000 trout may be raised in this way at a cost of less than $200. Fish readily adapt themselves to new localities. Pickerel were easily introduced into ponds in Berkshire County, Mass., and the great pike of the north¬ ern lakes have been transplanted to the Con¬

necticut River. The salt water smelt lives con¬ tentedly in ponds at Jamaica, Mass., and the tantog has found a new home in Massachusetts Bay. The expense of fish culture is small and the labor slight. There have been numerous inventions to aid the fish culturist, among them McDonald's fish-hatching jar which keeps the eggs in motion and automatically separates the dead fish from the living.

The United States government has estab¬ lished large salmon-breeding establishments in California and in Maine. It operates 34 hatch¬ eries in various localities, owns four railroad cars for transporting eggs and young fish and a steamer, the Fishhawk, is under its supervision. The vessel is in reality a floating hatchery. Western waters have been stocked with Eastern fish and exhausted streams have been restored with a new supply. In 1901 the government handled either as eggs, fry, fingerlings, year¬ lings or adults 3,863,000,000 in United States waters. Of this number nearly one-fifth were shad and one-fourth whitefish.

Aquatic birds are known to be of more or less assistance to the government in the dissem¬ ination of fish spawn. Naturalists tell us that these birds frequently carry the eggs from river to river and from lake to lake, by having their feet covered with the eggs. In the course of their flight the birds come to an inland sheet of water or small creek, where they dive in or wade into the water and the eggs are washed from their feet. In this way the waters be¬ come populated with new species and propaga¬ tion progresses.

Fish culture has been found exceedingly profitable, too, as a private business or industry. There are over 400 fish hatcheries in Europe, and more than one-half of these are owned by individuals. The Trout Pond Association, at Cold Springs, N. H., which began business in 1866, added a black bass branch in 1868, and erected salmon-breeding works in 1879, which in the first year yielded 450,000 eggs.

Several of the States have organized inde¬ pendent State Fish Commissions for the ex¬ press purpose of disseminating the ((fry® of food-fish in public waters. This is true of New York, whose commission of five members is ap¬ pointed by the governor. The commission has established five hatcheries for the propagation of the ((fry® from the eggs of the female fish, as hollows : The Adirondack, Saranac ; Cold Spring, Long Island; in Franklin County; Old Forge in the Fulton chain; at Newton Corners, and in Chautauqua County.

Bibliography. — Armistead, (Angler's Para¬ dise 5 (London 1895) ; Bund, (Fishery Manage¬ ment (ib. 1899) ; Day, (Fish Culture> (ib.

1883) ; Gobin, (La pisciculture en eaux douces) (Paris 1889) ; id., (La pisciculture en eaux salees5 (ib. 1891); Maitland, (On the Culture of Salmonidae and the Acclimatization of Fish) (London 1883) ; Mather, Modern Fish Cul¬ ture5 (New York 1900) ; Max von dem Borne, (Fischzucht5 (Berlin 1881) ; Meehan, dish Culture5 (New York 1913) ; Stone, domesti¬ cated Trout5 (Charlestown, N. H., 1877) ; Townsend, Cultivation of Fishes in Natural and Artificial Ponds5 (New York 1907) ; An¬ nual Reports5 of the United States Fish Com¬ mission (Washington 1871 et seq.) ; (Bulletins5 of the United States Fish Commission (ib. 1882

et seq.) ; < Manual of Fish Culture,* issued by the United States Bureau of Fisheries (ib.

1900).

FISH DAVIT, in shipbuilding, a spar or small crane projecting from the bow of a ship for the suspension of the tackle, called the fish fall, used in hauling up the arms of the anchor in getting it abroad. The fish davit is such a distance abaft the cat-head as the length of the anchor may require, and is used to lift the fluke of the anchor to the bill-board; a roller keeps the fluke from bruising the vessel's side.

FISH DUCK, a merganser (q.v.).

FISH AND FISHERIES, Commission of,

in the United States, was created by Congress in 1870, headed by the Commissioner of Fish and Fisheries, with an assistant commissioner. When in 1903 the Department of Commerce and Labor was created, its name was changed to Bureau of Fisheries and it became part of the new department. At the time of the subdivi¬ sion of the latter, it was attached to the De¬ partment of Commerce. Originally it collected statistics of fisheries in the country, inves¬ tigated the life histories and food of fish, and conducted experiments. Its functions, how¬ ever, have been extended from time to time and now it embraces the following divisions : Scien¬ tific Division ; Division of Inquiry Respecting Food Fishes ; Statistical Division ; Fish Cul¬ ture. It is also charged with the enforcement of laws relating to the fur-bearing animals in Alaska. The bureau issues four series of pub¬ lications ; annual reports of the Commissioner and special papers on the different divisions of the bureau ; annual bulletins containing tech¬

nical papers ; economic circulars and reports ; statistical bulletins. Consult the above, all published in Washington, and Franc, A., (Use Your Government* (New York 1918).

FISH-FLY, one of the aquatic neuropter- ous insects of the family Sialidce, and especially of the genus Chauliodes, represented by the hellgrammite and other species whose crawling larvae are useful as fish-bait. See Corydalis.

FISH-HAWK, or OSPREY. This almost cosmopolitan bird is known throughout North America as the ((fish-hawk,** never in popular speech as <(osprey.** The species {Pandion haliaetus) occurs on all continents, gathering in the neighborhood of the sea and other large bodies of water, where it dexterously procures the living fish that constitute its food, by plung¬ ing from a great height and seizing them in its talons. These gains it is frequently obliged to relinquish to the fish-loving sea-eagles, espe¬ cially our own bald eagle, which pounces upon the osprey and forces it to drop its property to be caught and swallowed by the robber. Fish-hawks have increased rather than dimin¬ ished in most of their American haunts where they are protected by law and good-nature, and for the picturesqueness they lend to the land¬ scape. Their nests are huge masses of sticks, placed on a ledge of rocks, or along low shores, in trees, and reoccupied for a long series of years. On the New England coast fish-hawks often make nests in belfries or on platforms set up on stout poles for their accommodation. In the absence of trees it will form a great heap of sticks on the ground. The eggs are dirty white, marked with irregular purplish and

red-brown blotches. This fish-hawk (Pandion haliaetus) is about 25 inches long, and has long pointed wings giving it great power and grace in flight. The general color of the tipper parts is brown, but the head, neck and all under parts are white, except a band of brown spots across the breast. It stands alone among fal- coniform birds in a family (Pandionidce) equiv¬ alent in rank to the Falconidee, from which it essentially differs in the reversibility of the outer toe ; the toes are nearly equal, and have no connecting membrane, but with spicules on their under surfaces and much curved claws enabling the birds to take a firm hold of their slippery prey. A general guide to further information as to the osprey in the Old World may be found in Newman's dictionary of Ornithology* ; and as to the American fish-hawk, in Dr. Fisher's dawks and Owls of the United States* ; Bar- rows' (Birds of Michigan) and other books mentioned under Bird.

FISH-KILLER, one of the huge hetorop- terous bugs (q.v.) of the

aquatic family Belos- tomidce, some of which reach a length of four inches, and are able to overcome small fishes. They are oval in outline, dull brown in color, and possess powerful mouth-parts by which they first stab their prey, then seize it and suck its blood. Their legs are flattened, and form powerful paddles, but are also useful for walk¬ ing; and, supplied by the bubbles of air they take down with them, these big bugs lurk on the muddy bottoms of sluggish waters, ready to rush at and capture their living food. They are highly destructive among the fry in piscicul- tural ponds, and should be carefully eradicated. They come out of the water in early summer and fly in swarms at night, gathering about lights : and in some places so throng the street- lamps that they have become known as <(elec- tric-light bugs.® Consult Howard's (Insect Book) (1901) ; and see Fresh-water Insects.

FISH-LICE, any of many copepod crusta¬ ceans, mainly of the group Siphonostoma, para¬ sitic on marine animals. All are of small size, often very unlike ordinary Copepoda (q.v.) in appearance, and usually transparent. They are born of eggs attached to stones, plants and the like, and begin life as normal larvae, but some become parasitic and retrograde ;' yet some spe¬ cies are able as adults to swim about and change their hosts. These copepods attach themselves to the host by the suckers at the mouth, or by a sucking probiscis, and in some cases by hooks on the forward swimming appendages. While generally they confine their attacks to the ex¬ terior of the host, some live in the gills of fishes, and others embed themselves in the muscles. Argulus is a temporary epizoon. With four pairs of swimming-feet, it moves freely, and is not confined to a single host, entering the gills of a fish, there living for a time, and then en¬ joying a free life until it is hungry, when it enters another host. Caligus is sessile, and at¬ taches itself to the gills of a fish, on whose blood it lives permanently. Lernea, and related forms, are worm-like, and anchor in the gills or in the skin of all kinds of fishes, and are some¬ times so numerous as finally to cause the death of the host. Not only fishes, but all sorts of marine animals, including whales, are infested by these parasites, which have been extensively studied and reported upon by the United States

Fish Commission, whose publication should be

consulted.

FISH MANURE, fertilizer obtained from dried or ground fish, or fish guano. The chief sources of such fertilizers are the rtfuse from fish packing and canning factories and the pom¬ ace from the extraction of oil from fish. Such fertilizer is valuable as a source of nitrogen, which sometimes amounts to 8 per cent. Fish manure is prepared in large quantities in Nor¬ way, in the North Atlantic coast and the North Pacific coast of the United States, and in gen¬ eral wherever there is abundant material. Con¬ sult Aikman, (Manures and the Principles of Manuring) (Edinburgh 1894) ; Voorhees, (Fer¬ tilized (New York 1912) ; Turrentine, (The Fish Scrap Fertilizer Industry of the Atlantic Coast) (United States Department of Agricul¬ ture, Bulletin 2) ; 'American Fertilizer Hand¬ book0 (Philadelphia 1913).

FISH OF PARADISE. See Paradise

Fish.

FISH TRAP, a box or basket set in a river, and containing bait to attract fish. A basket, net or staked area with a divergent-sided or funnel-shaped opening through which fish pass, and in which they find a difficulty in retracing their course, owing to obstacles or blind sacs.

FISHER, Albert Kendrick, American biologist : b. Ossining, N. Y., 21 March 1856. He was graduated at the College of Physicians and Surgeons of Columbia University in 1879, was with the Death Valley Expedition of 1891, sent out by the Department of Agriculture, and which made biological surveys of portions of California, Nevada, Arizona and Utah. He also made biological surveys in various other West¬ ern States and was a member of the Harriman Alaska expedition of 1899. Since 1906 he has been in charge of the economic investigations of the United States Biological Survey. He was a founder of the Amercan Ornithologists' Union. He has published (Hawks and Owls of the United States1 (1893) ; (Ornithology of the Death Valley Expedition of 1891 5 (1893), and bulletins of the Department of Agriculture of the United States.

FISHER, Alvan, American artist: b. Need¬ ham, Mass., 1792; d. Dedham, Mass., 1863. He studied art under difficulties, but painted rural scenes and portraits with financial suc¬ cess which permitted him to travel and study in Paris in 1825. On his return to America, he was represented in a successful exhibit of paintings at Boston in 1831 along with Harding, Alexander and Doughty, an association which became known as the "Boston group of artists.® His talent henceforth was chiefly devoted to portraiture, some of which is notable,

especially his picture of Spurzheim.

FISHER, Andrew, Australian statesman: b. Kilmarnock, Scotland, 29 Aug. 1862. He went to Queensland in 1885, and entered Parlia¬ ment there in 1893. He was Minister of Rail¬ ways in the Dawson Cabinet of 1899. He repre¬ sented Wide Bay in the Commonwealth Parlia¬ ment for the first 15 years of the Parliament; was Minister of Trade and Customs in 1904 and in 1907 became leader of the Federal Par¬ liamentary Labor party. He was Prime Minis¬ ter of the Commonwealth in 1908-09, but was defeated on the issue of adequate defense for

Australia. He was again Prime Minister in 1910-13 and 1914-15. Pie resigned office and in 1916 was appointed High Commissioner of Aus¬ tralia in England.

FISHER, Clara, American actress: b. Lon¬ don, England, 14 July 1811; d. Metuchen, N. J., 12 Nov. 1898. She made her first appearance on the stage in London when six years old, as Lord Flimnap in ‘Gulliver in Lilliput.1 Her success at this early age was phenomenal. Later under the direction of her parents she made tours of the United Kingdom, and besides other parts played Norval and Sir Peter Teazle for five years with great financial success. She made her first appearance in the United States as Albina Mandeville in (The WilP at the Old Park Theatre in New York in 1827. Her success was immediate. Later she visited all of the larger cities of the Eastern, Southern and Western States. In 1834 she married James Gaspard Maeder, a well-known musician, and settled in Albany, N. Y. She, however, con¬ tinued on the stage till 1889, when she retired.

FISHER, Frederic Henry, English jour¬ nalist : b. London, 13 April 1849. He has been editor of the Literary World from 1883 and has published ‘Cyprus, Our New Colony, and What We Know About It> (1878) ; Afghan¬ istan and the Central Asian Question1* (1878).

FISHER, George Jackson, American phy¬ sician: b. Westchester County, N. Y., 27 Nov. 1825; d. 1893. He was graduated from the med¬ ical department of New York University in 1849; was physician and surgeon at Sing Sing State Prison 1853-54; surgeon to the 7th Bri¬ gade National Guard, State of New York, ini 1853-73 ; and president of the New York Medi¬ cal Society in 1874. He succeeded Dr. Samuel’ D. Gross as the contributor of a ‘History of Surgery1 to the international Encyclopaedia of Surgery1 (1886). He published (On Animal Substances Employed as Medicines by the An- cients) (1862) ; and many other professional! monographs.

FISHER, George Park, American edu¬ cator: b. Wrentham, Mass., 10 Aug. 1827; d.. 20 Dec. 1909. He was graduated at Brown University in 1847; studied theology at the Yale Divinity School, at Andover, and in Germany,, was professor of divinity 1854-61, and subse¬ quently of ecclesiastical history at Yale. Ini 1901 he became professor emeritus. He was; a famous teacher and a prolific writer. In 1898 he was president of the American Histori¬ cal Association. He is the author of ‘Essays, on the Supernatural Origin of Christianity1, (1865) ; ‘History of the Reformation1* (1873) ; (The Beginnings of Christianity) (1877) ; ‘Faith and Rationalism1* (1879) ; ‘The Christian Re- ligion> (1882) ; ‘The Grounds of Historic and Christian Belief1 (1883) ; ‘Manual of Christian Evidences1 (1890) ; ‘Colonial History of the United States1 (1892) ; ‘Manual of Natural Theology1 (1893) ; ‘History of Christian Doc¬ trine1 (1896) ; ‘Brief History of the Nations1 (1890), etc.

FISHER, Harrison, American artist: b. Brooklyn, N. Y., 27 July 1876. He was educated by his father and at the Mark Hopkins Institute of Art, San Francisco. At 16 he began his career of illustrator for a San Francisco paper and subsequently joined the staff of Puck , He

is now illustrating for The Saturday Evening Post, McClure’s Magazine, Life, Puck, the Ladies’ Home Journal, Scribner’s , etc. He pub¬ lished (The Harrison Fisher Book,* a collec¬ tion of drawings (1907).

FISHER, Irving, American political econ¬ omist : b. Saugerties, N. Y., 27 Feb. 1867. He was educated at Yale (A.B., 1888; Ph.D., 1891), where he remained as member of the faculty, becoming professor of political economy in 1898. He spent 1893-94 in study at Berlin and Paris. From 1896 to 1910* he edited the Yale Review. He was a member of Roosevelt’s National Conservation Commission. He is president of the American Association, for Labor Legislation and Fellow of the American Statistical Association. He is a member of the American Economic Association and many other societies. He has published (Mathematical In¬ vestigations in the Theory of Value and Prices> (1892; trans. French, 1916); (Elements of Geometry,* with Prof. A. W. Phillips (1896, trans. into Japanese 1900) ; (Bibliography of Mathematical Economics) in (and assisted in translating and editing) Cournot’s Mathematical Theory of Wealth) (1897) ; (A Brief Introduc¬ tion to the Infinitesimal Calculus* (1897, trans. into German 1904, Italian 1909) ; (The Nature of Capital and Income*

(1906, trans. into French 1911, Japanese 1913) ; (The Rate of Interest (1907, Japanese condensation with (Nature of Capital and Income,) 1912) ; Na¬ tional Vitality) (1909) ; (The Purchasing Power of Money* (1911, trans. into German and French 1916) ; (Elementary Principles of Eco- nomics) (1912) ; (Why is the Dollar Shrinking? * (1914) ; Now to Live,* joint author with Dr. E. L. Fisk (1915) ; also numerous articles, mono¬ graphs, etc.

FISHER, John, English prelate: b. Bev¬ erley, Yorkshire, 1459; d. London, 22 June 1535. He was educated at Michaelmas College, Cam¬ bridge, graduating in 1487. In 1501 he was made vice-chancellor of the University of Cam¬ bridge (chancellor 1504), and in 1503 became the first Margaret professor of divinity at Cam¬ bridge and in the same year president of Queen's College. In 1504 he was promoted to the see of Rochester. Deeply prepossessed in favor of the ancient faith he opposed with zeal and perseverance the principles of Luther and his followers. But the same conscientious motives which induced Fisher to become the champion of Henry VIII impelled him to offer resolute opposition to the king's measures for procuring a divorce from his wife, and declaring himself head of the Church. In 1527 he was the only prelate who had the courage to refuse to sign a declaration that the marriage of the king was unlawful. He was subsequently sent to the Tower for refusing to submit to the provisions of an act of Parliament which annulled the king's marriage with Catharine of Aragon and confirmed his subsequent union with Anne Boleyn. Pope Paul III thought proper to re¬ ward his zealous adherent by giving him a car¬ dinal's hat (May 1535). The king exclaimed in a passion, "Mother of God! he shall wear it on his shoulders, for I will leave him never a head to set it on.® As no evidence against him existed sufficiently strong to affect his life, Henry employed erafty emissaries to entrap Fisher into a positive denial of the king's su¬

premacy in the Church. The plot succeeded, the bishop was tried and convicted, and was be¬ headed on Tower Hill. Bishop Fisher was an able theologian, genuinely attached to learning, and the author of a commentary on the Seven Penitential Psalms ; of sermons, controversial and devotional treatises, etc. ; his writings being partly in Latin, partly in English. Consult his

FISHER, Sir John Arbuthnot, 1st Baron- Fisher of Kilvorstone, British naval officer:: b. 25 Jan. 1841, the son of Capt. William Fisher,. 78th Highlanders. He entered the navy in 1SI4,. took part in the capture of Canton and Peifc©' forts. He served in the Crimean War; in the: China War of 1859-60; and was in command of the Inflexible at the bombardment of Alexan¬ dria, 1882, taking part in the subsequent

cam¬ paign. He was director of naval ordnance 1886- 91, one of the Lords of the Admiralty 1892-97, and commander-in-chief on the North American and West Indies station, 1897-99. He was British naval representative at the Peace Con¬ ference at the Hague, 1899 ; commander-in- chief in the Mediterranean, 1899-1902 ; was Second Sea Lord of the Admiralty, 1902-03 ; and commander-in-chief at Portsmouth, 1903-04. From 1904-10 he was First Sea Lord of the Admiralty, and he made it a condition of his acceptance of office that he should be allowed a free hand in the introduction of sweeping reforms. He began by improving the discipline of the service, “scrapped® no fewer than 150 obsolete warships, and created a system of nucleus crews that added to the efficiency of the fleet. When he took up office the British fleet was distributed over the Seven Seas ; but profiting by the teaching of Mahan on the: lessons of sea power, and on the principle that “your battleground should be your drill ground®’ he made the North Sea instead of the Mediter¬ ranean the headquarters of the British fleet,, concentrating 86 per cent of the battleship^ strength in or near its waters, and forming a “pivot® fleet between it and the Atlantic. In massing his ships on the North Sea he showed’ a sure anticipation of his country’s require¬ ments consequent on the rise of Germany as a sea power, and subsequent events have justi¬ fied his policy. He was the pioneer in the intro¬ duction of the all-big-gun ships, the dread¬ noughts and battle cruisers, and other success¬ ful modern types of warship. Toward the end of 1914 he succeeded Prince Louis of Batten- burg in his old post as First Sea Lord, and to him fell the task of planning to avenge the British disaster off Caronel, and to cope with the German submarine menace. He opposed the employment of capital ships in the attack by Allied forces on the Dardanelles, a campaign favored by Mr. Winston Churchill, his civil chief; his objections were overborne, capital ships were lost in the undertaking and he resigned. Since that time his services have been utilized as chairman of the Inventions Board. He received the Order of Merit in 1905, and in 1909 he was raised to the peerage.

FISHER, Sydney Arthur, Canadian states¬ man: b. Montreal, P. Q., 12 June 1850. He was educated at the Montreal High School and at McGill University and Trinity College, Cam-

bridge. He gave his attention to scientific farm¬ ing, fruit growing, and the raising of live stock. He entered the Parliament of Canada as

Liberal member for Brome Countv in 1882, securing re-election in 1887, 1896, 1900, 1904 and 1908. He was Minister of Agriculture in the Laurier Cabinet from 1896 to 1911. He was chosen first vice-president of the International Institute of Agriculture, convened at Rome in 1908. He has written (Some Economic Aspects of Agri¬ culture in Canada5 ; Conservation of Our Natural Resources 5 ; (Rural Education in the Province of Quebec) ; Canada and its Position in the British Empire.)

FISHER, Sydney George, American law¬ yer and historical writer : b. Philadelphia, Pa., 11 Sept. 1856. He was graduated at Trinity College 1879, studying law at Harvard, and being admitted to the bar 1883. His works include 'The Evolution of the Constitution (1887) ; 'The Making of Pennsylvania5 (1896) ; 'Pennsylvania: Colony and Commonwealth5 (1897); 'Men, Women and Manners in Colonial Times5 (1898); 'The True Ben¬ jamin Franklin5 (1899) ; 'The True William Penn5 (1900) ; (The True History of the Revolutionary War5 (1902) ; 'The Struggle for American Independence5 (1908) ; (The True Daniel Webster5 (1911). He has written many legal articles and articles on public ques¬ tions, game, bird preservation and nature study. In 1880 while still a student he wrote for the New York Nation one or two letters signed F. S. S., which led to the formation of the Civil Service Reform Association, which has accomplished so much in introducing the merit system instead of the spoils system in appointments to office. In later years his magazine articles on the effects of immigration had much to do with the formation of the Immigration Restriction League.

FISHER, Walter Lowrie, American pub¬ lic official: b. Wheeling, Va., (now W. Va.), 4 July 1862. He was educated at Marietta College and Hanover College, was admitted to the bar in 1888 and practised at Chicago from 1888 to 1911. From 1911 to 1913 he was Secretary of the Interior in the Cabinet of President Taft. He was member of the execu¬ tive committee of the Municipal Voters' League, and in 1908-09 was president of the Conservation League of America. He has published 'Address on Alaskan Problems5 (1911), and 'Alaskan Coal Problems5 (1912).

FISHER, William Arms, American musician and composer: b. San Francisco, Cal., 27 April 1861. He was a pupil in counterpoint, canon and fugue of H. W. Parker ; in com¬ position of Dvorak, and in singing of William Shakespeare. In 1897 he became an editor for Oliver Ditson and Company, the Boston music- publishers. His compositions number an 'Elegie5 for violin and piano, some 40 solo songs, a volume of 60 Irish songs and many part-songs and anthems.

FISHER, or PEKAN (Mustela pennanti), a fur-bearing animal, the largest of North American martens; also called pennants, black cat or black fox. In the fur market it is commonly called Canadian fisher and its pelt is valued at prices but little lower than the sable. The fisher has a range throughout the wooded regions of North America between the

parallels 35° and 65°. It chooses locations which are near water, quite the opposite of its near relative, the pine marten, with which it battles fiercely. The animal has a body from two to three feet in length, with a tail about one foot long. In color it is black or very dark gray. It breeds in a hole high up in a tree, having from two to four young in the litter. See also Marten.

FISHERIES, a term which includes the taking of all kinds of water products as a business and thus applies to the pursuit of whales, seals, otters and other mammals ; to the hunting of frogs, turtles and alligators; to the taking of oysters, clams, lobsters, crabs, shrimp and other shellfish; and to the gather¬ ing of corals, sponges and seaweeds, as well as to the capture of fish proper. Closely re¬ lated to the fisheries is fish culture, by which the supply of water animals is maintained and increased; and the various shore industries hav¬ ing for their object the utilization or preser¬ vation of the products as brought in by the fishermen.

The countries whose fisheries, are of great¬ est commercial importance, being worth upward of $5,000,000 yearly, are the United States, Great Britain, Japan, France, Canada, Russia, Norway, Germany and the Nether¬ lands, in the order given. Countries which may be regarded as of second-rate importance in this respect, whose fisheries are worth be¬ tween $1,000,000 and $5,000,000 annually, are Portugal, Spain, Sweden and Italy. No data are available for China and India, whose fisheries must be very extensive, and perhaps entitled to rank with those of the leading countries. An estimate based on official data and all other available information gives $350,000,000 as the approximate annual value of the commercial fisheries of the world. Water animals which are of great economic import¬ ance in both hemispheres are whales, seals, sea- herring, mackerel, tunny, cod, halibut, lobsters, shrimp, oysters and sponges. The most valu¬ able of all fishery products are oysters ; the most valuable of all fishes are sea-herring, salmon and cod.

United States. — The importance attained by the United States fisheries has been due to the abundance, variety, excellence and wide distribution of the products, augmented by cultivation and

acclimatization. The abun¬ dance of food fishes had a marked influence on the original colonization of the country and was also an important factor in the subsequent development of various regions. At the out¬ break of the Revolutionary War, some of the vessel fisheries had already become very ex¬ tensive and sailor-fishermen, mostly from New England, manned our naval vessels and pri¬ vateers and rendered valiant service.

For the years between the regular decennial fisheries census, returns are but fragmentary. For 1915 it is estimated that they exceed those of 1908 by about 2 per cent. According to the fisheries census, last compiled bv the Census Bureau (for the calendar year 1908), the num¬ ber of persons engaged in the fisheries of the United States in that year was 143,881, of whom 141,031 were sea fishermen and 2,850 shoresmen. The capital employed was $42,021,- 000, of which $13,806,000 was the value of the vessels ; $7,269,000 of the open boats ; $13,025,-

FISHERIES

1 Seining for Salmon on the Columbia River

2 Fish Wheel at Cascades, Columbia River

1.

000 the value of apparatus and appliances; $5,- 342,000 the value of shore property; and $2,- 579,000 the amount of cash capital invested. The number of fishing vessels was 6,933 (ag¬ gregating 126,453 tons) and the number of open boats and vessels under 5 tons burden was 83,548. The equipment of the fisheries was 233,256 gill nets; 81,191 fyke and hoop nets; 16,104 pound nets, trap nets and weirs; 7,966 seines; and 17,787 other nets; lines valued at $476,000; dredges, tongs and rakes valued at $375,000. The total value of the catch was $54,031,000, representing an aggregate weight of 1,893,450,000 pounds — including the weight only of the edible parts of the oysters, clams, scallops, etc. Of the total catch 60 per cent was taken with nets and seines, 8 per cent with lines and baited hooks and 7 per cent with dredges and rakes. Of the whole, food fish amounted to 1,046,541,000 pounds, valued at $29,254,000 ; menhaden amounted to 394,776,000 pounds, valued at $893,000; oysters, clams, etc., amounted to 347,799,000 pounds, valued at $18,- 752,000; lobsters and crabs,

96,225,000 pounds, valued at $3,466,000 ; whale products, 4,028.000 pounds, valued at $497,000; and sponges, 622,- 000 pounds, valued at $545,000.

As to individual species, the oyster fishery yields the largest value — $15,713,000, or 29 per cent of the total value ; salmon is second in value, yielding $3,347,000, or 6 per cent ; cod is third, $2,914,000, or 5 per cent ; then follow shad, $2,113,000 (4 per cent) ; lobster, $1,931,000 (4 per cent) ; clams, $1,896,000 (4 per cent) ; squeteague (weakfish), $1,776,000 (3 per cent) ; halibut, $1,562,000 (3 per cent) ; haddock, $1,308,000 (2 per cent) ; German carp, $1,135,000 (2 per cent).

In the order of weight the catches were : menhaden, 394,776,000 pounds ; oysters allow¬ ing 7 pounds of meat to the bushel, 233,309,000 pounds; herring, 125,050,000 pounds; cod, 110,- 054,000 pounds; salmon, 90,417,000 pounds; alewives (river herring), 89,978,000 pounds; haddock, 59,987,000 pounds; crabs, 52,913,000 pounds ; squeteague, 49,869,000 pounds ; Ger¬ man carp, 42,763,000 pounds; lake herring, 41,- 118,000 pounds; halibut, 34,441,000 pounds; hake, 34,340,000 pounds ; mullet, 33,703,000 pounds ; pollock, 29,462,000 pounds ; shad, 27,- 641,000; flounders, 23,346,000 pounds; shrimp and prawn, 19,080,000 pounds; catfish, 17,817,000 pounds ; buffalo fish, 16,729,000 pounds ; pike perch, 15,247,000 pounds; red snapper, 13,498,- 000 pounds; mackerel, 12,103,000 pounds; lake trout, 12,024,000 pounds ; mussels, 8,543,000 pounds; scup, 8,414,000 pounds; suckers, 8,199,- 000 pounds; yellow perch, 7,898,000; whitefish, 7,708,000 pounds. The above named fishes con¬ stitute 97 per cent of the entire catch of the country.

The distribution of the several species of food fish, regarded commercially, is as follows :

Alewives are caught chiefly in Virginia and Maryland; black bass in Florida and Illinois; bluefish in New York and New Jersey; carp in Illinois and Ohio; catfish in Louisiana; cod in Massachusetts and Maine; eels in New York and Massachusetts ; flounders in Massachusetts, California and New York; haddock in Massa¬ chusetts and Maine; halibut in Washington; herring in Maine ; mackerel in Massachusetts ; mullet in Florida; pike perch in Ohio; pollock in Massachusetts; salmon in Washington, Ore¬

gon and California; sardines in California; sea bass in New Jersey; shad in Virginia, North Carolina, Maryland, New Jersey and Florida;

squeteague in New York and North Carolina; whitefish in Michigan ; crabs in Virginia and Maryland ; lobsters in Maine ; oysters in Mary¬ land, Virginia, Connecticut, Louisiana, New Jersey, New York and South Carolina, in the order named.

The Fisheries Bureau divides the country for supervisory and statistical purposes into five <(Divisions® : these, with the several amounts of their catch, and percentages of the whole catch for the year 1908, are as follows: Atlantic Coast Division, 1,344,655,000 pounds; 71 per cent. Gulf of Mexico Division 117,723,- 000 pounds ; 6 per cent. Pacific Coast Division, 176,150,000 pounds; 10 per cent. Mississippi River Division, 148,2S4,000 pounds ; 8 per cent. Great Lakes Division, 106,632,000 pounds; 5 per cent.

The relative importance of the fisheries in the several States may be gauged by the values of their individual catches (in 19*08) as fol¬ lows :

Massachusetts, $7,095,000; chiefly cod, had¬ dock and mackerel, with herring, pollock and halibut of less importance.

Virginia, $4,716,000; chiefly oysters, with shad, menhaden, clams and crabs secondary.

New York, $4,594,000; chiefly oysters, with squeteague, bluefish, flounders and clams secondary'.

Washington, $3,513,000; chiefly salmon and halibut, with oysters secondary.

Florida, $3,380,000; chiefly mullet and sponges, with red snapper, shad and oysters secondary.

Maryland, $3,306,000 ; chiefly oysters, with crabs, shad and alewives secondary.

Maine, $3,257,000 ; lobsters, with cod, her¬ ring, haddock and clams secondary.

New Jersey, $3,069,000; chiefly oysters, with squeteague, clams and shad secondary'.

Connecticut, $2,982,000; chiefly oysters.

California, $1,970,000; chiefly salmon, with oysters secondary.

North Carolina, $1,776,000; chiefly shad and oysters.

Rhode Island, $1,752,000; chieflv oysters.

Louisiana, $1,569,000; chiefly oysters and shrimp.

Michigan, $1,473,000; chiefly lake trout and herring.

Illinois, $1,436,000; chiefly German carp.

Oregon, $1,356,000; chiefly salmon.

Wisconsin, $1,067,000; chiefly lake trout and herring.

Ohio, $840,000; chieflv lake herring and carp.

Georgia, $701,000; chiefly oysters.

Mississippi, $556,000; chiefly oysters.

Delaware, $541,000 ; chiefly oysters and menhaden.

Pennyslvania, $513,000; chiefly shad.

Texas, $446,000; chiefly oysters.

Alabama, $387,000 ; chiefly oysters.

South Carolina, $288,000; chiefly oysters.

Missouri, $271,000; chiefly German carp.

Indiana, $223,000; chiefly mussel products.

Iowa, $215,000; chiefly German carp.

Arkansas, $207,000: chiefly buffalo fish and catfish.

Minnesota, $192,000; chiefly lake herring.

Tennessee, $112,000; chiefly buffalo fish and catfish.

Kentucky, $110,000; chiefly catfish.

New Hampshire, $53,000; chiefly lobsters.

Kansas, $28,000; chiefly German carp.

Nebraska, $22,000; chiefly German carp.

South Dakota, $4,200; chiefly buffalo fish.

West Virginia, $2,000; chiefly carp and cat¬ fish.

Oklahoma, $300; chiefly drumfish.

With the object of restoring and main¬ taining the commercial fisheries of the country, and the stocking of its interior waters, the Bureau of Fisheries has 50 permanent hatcheries and 76 auxiliaries — subhatcheries and egg col¬ lecting stations. Nearly all the output of these establishments goes to the original sources from which the eggs were obtained. Besides the eggs, which are distributed mainly to State fishery commissions, young fish are widely distributed to all sections. These young fish are graded as ((fry® up to the time the yolk- sac is absorbed and the fish begins to feed ; <(advanced fry® from the first classification up to the time they are one inch in length ; “fingerlings,® from one inch in length up to one year old; “yearlings,® from one year old up to two years. In the fiscal year ended 30 June 1915, the number of eggs distributed was 536,260,143, of which 326,350,000 were pike perch ; 98,940,000 whitefish ; and 34,466,- 923 chinook salmon. The number of fry dis¬ tributed was 3,694,281,699, of which 1 ,294,156,- 000 were flounders ; 500,730,000 pollock ; 405,- 400,000 whitefish ; 2§2,820,000 pike perch ; 260,- 133,000 cod; 195,267,000 yellow perch; 194,670,- 000 lobsters and 161,980,000 white perch. Of yearlings, fingerlings and adults, there were distributed 58,215,96 2. The total distribution of fish and eggs was 4,288,757,804, comprising 44 different species. The widest distribution was of brook trout: 5,700,263 fry and 6,965,167 fingerlings, yearlings and adults were sent to over 2,400 different

localities.

A characteristic feature of the New Eng¬ land fisheries is the employment of a large fleet of fine schooner-rigged vessels in the off¬ shore fisheries for cod, haddock, hake, halibut and mackerel. Cod is the principal fish so taken, part of the catch being made on the Grand Banks and other banks lying off New¬ foundland and Nova Scotia; and part on the very extensive and .prolific banks adjacent to the New England shore, the most noted of which is Georges Bank. The most important of the New England boat and shore fisheries are those for sea-herring (caught chiefly in brush weirs), lobsters (caught in pots made of laths), soft-shell clams and oysters. In the catch of herring, soft-shell clams and lobsters, Maine surpasses all other States.

The oyster industry of the Middle Atlantic States gives to that region the importance which its fisheries have attained. The principal oyster grounds are in Long Island Sound, Delaware Bay and Chesapeake Bay, a large part of the output now being taken from planted beds. An immense fleet of sailing ves¬ sels and boats is engaged in dredging and tonging oysters and running them to market. Other important salt-water products of this section are bluefish, menhaden, sea bass, squeteague, hard clams and crabs. The anadromous fishes, the shad the alewives and

the striped bass, support valuable fisheries. The South Atlantic region has no noteworthy vessel fisheries, but its pound-net, gill-net and seine fisheries for alewives, shad, sea mullet and squeteague are important, shad being the leading product. The most prominent products of the Gulf States are mullet, red snappers, squeteague, oysters, shrimp and sponges.

The Pacific States have very important ves¬ sel fisheries addressed to cod, halibut and whales, and very extensive shore fisheries for salmon, herring and oysters. The salmon fish¬ ery is the most valuable in the world, immense quantities of quinnat, blue-back, silver and other salmon being caught in the Sacramento and Columbia rivers, in Puget Sound and in Alaska. Much of the yield is canned. Statistics for the Alaska fisheries for 1914 show the total investment for that year at $37,038,632, of which 80 per cent was in the salmon fishery. There were 21,200 persons en¬ gaged, of whom 11,178 were white. The product was valued at $21,242,975. The pack of salmon for the season was 4,056,653 cases of 48 pounds each — a total of 294,719,344 pounds. The number of salmon caught was 54,651,915. The other fishery of importance in Alaska is the whale fishery. In 1914, 482 whales were captured by the two shore stations, and about 50 by the

4 whaling vessels in the Arctic. The total value of products was $317,349. From the 5 private salmon hatcheries in Alaska there were liberated in the year ended 30 June 1915, 79,619,500 fry of red varieties of salmon; and from the 2 government hatcheries, 51,163,100 fry. Besides this restocking of the Alaskan waters there are several streams used by sal¬ mon in spawning, which are closed by law against fishing. Waste of fish at the canneries is very severely dealt with by the government under the law of 1906.

The fisheries of the Great Lakes are the most important lake fisheries in the world, those in the United States waters producing over 100,000,000 pounds of excellent food fish annually. Lake Michigan has the largest catch, amounting to 41 per cent of the total. Lake Erie yields 34 per cent : Lake Huron, 13 per cent; Lake Superior, 9 per cent; Lake Ontario, 2 per cent. The principal fishes are whitefish, lake herring or cisco, lake trout, ‘ pike perch and yellow perch. The numerous interior waters of the country are well supplied with economic animals and support valuable fish¬ eries. The most productive waters are the Mississippi River and tributaries. The species figuring most conspicuously in the catch are black bass, buffalo fish, carp, crappies, suckers, frogs and mussels, the shells of the last named being extensively used in making pearl buttons.

Canning and Preserving. — The 1914 cen¬ sus of manufactures reported 538 establish¬ ments in the United States in that year engaged in canning and otherwise preserving fish and oysters, with products amounting to $58,283,404 — an increase of 44.1 per cent since 1909. Canned fish amounted in value to $41,321,593. The largest item was canned salmon, $27,633,- 284 ; sardines were second, with $6,238,933 ; fol¬ lowed by oysters, $2,676,951 ; shrimp, $1,725,- 621; tuna, $1,638,675; clams, $670,363; all other canned fish, $737,766. Of smoked and dried fish there were prepared 28,713,806 pounds, valued at $2,759,341, The largest item was

AMERICAN FOOD FISHES

mmm

2reˆ*rit

i. Alewife.

5. Spanish Mackerel.

9. Runfish.

2. Red Snapper.

6. Rainbow Trout.

10. Bluefish.

3. alack Sea-bass.

7. Whitefish.

11. Sauger.

4. Steel-head.

8. Striped Basi 12. Fall-fish.

herring, 11,504,126 pounds, valued at $719,640. Salmon was second, 4,248,896 pounds, valued at $638,975. Finnan haddie was third, 4,095,- 693 pounds, valued at $327,877. Of salt and pickled fish, there were prepared 156,153,589 pounds, valued at $9,200,162. The largest item was cod, 83,502,295 pounds, valued at $5,661,- 770. Herring was second, 22,150,974 pounds, valued at $668,838.

United States Insular Possessions. — The

fisheries of Hawaii give employment to about 3,600 persons, who employ 967 boats. The value of fishing property is $300,000. The catch comprises 7,250,000 pounds of fish besides other products, mostly eaten fresh and is valued at $700,000. The principal fishes taken are the akule, aku and ulua. The Philippine Islands have valuable fishing resources which are but little developed. The leading fishery is that for pearls and pearl shells in the Sulu Archipelago; from time immemorial the pearls from this region have been famous. No statis¬ tics are available. The fisheries of Porto Rico are comparatively unimportant, although capa¬ ble of development; at present the catch is only for local consumption and is eaten fresh.

Canada. — The fisheries of the Dominion of Canada are very extensive and closely resemble those of the United States. The aggregate yield according to official report, amounted in the year ended 31 March 1914, to $33,207,748, of which sea fisheries contributed $29,472,811. These figures include the value of canned prod¬ ucts and hence

exceed by several million dol¬ lars the actual value of the fisheries proper.

The number of men actually engaged in fishing was 71,776, and there were employed 1,992 vessels and 37,686 boats.

Among the provinces, British Columbia led with a catch valued at $13,891,398; Nova Scotia was second, with $8,297,626; then fol¬ lowed New Brunswick, $4,308,707 ; Ontario, $2,674,685; Quebec, $1,850,427, and Prince Edward Island, $1,280,447.

The catches of largest value were : salmon, $10,833,713; lobsters, $4,710,062; cod, $3,387,- 109; herring, $3,173,129; halibut, $2,036,400; mackerel, $1,280,319. In weight of catch, her¬ ring led with 248,421,900 pounds; cod was second, with 166,459,900 pounds; salmon, 155,- 141,100 pounds; lobsters, 51,464,600 pounds; haddock, 40,563,300 pounds. See Canada — Fisheries.

Newfoundland. — In proportion to popula¬ tion, the fisheries of this island are more valu¬ able than those of any other country. The hair-seal fisheries employ (1914) 20 steamers, aggre¬ gating 12,067 tons, and employ 3,959 men. Their catch was 233,719 seals, weighing 1,200,000 pounds. The “Banks® fisheries employ 105 vessels, of 7,790 tons, and 1,892 men, and their catch was about 140,000,000 pounds. The value of fishery products exported is about $8,000,000, and the value of products consumed locally was estimated at $1,000,000. The leading fish are cod and herring, the cod fishery being more valuable than in any other country.

Great Britain and Ireland. — The fisheries of the British Isles surpass those of any other country of Europe, and are about equal to those of the United States. Besides extensive coast fisheries, there are very important offshore ves¬ sel fisheries for cod, haddock, herring and flat¬

fishes; gill-nets being set for herring and beam trawls used for the other species. About 106,500 persons find employment in fishing, of which 39,500 are in England and Wales, 37,400 in Scotland and 28,000 in Ireland. The registered fishing vessels and boats numbered 25,000, of which 3,375 are steamers. In 1910 the value of the catch of Great Britain and Ireland was $58,702,675. Herring constituted the largest item in value, reaching $16,064,040 ; followed by haddock, $8,798,725 ; cod, $8,011,855; plaice, $5,- 198,490; hake, $3,154,805; halibut, $2,266,015; and sole, $2,065,395. In 1911 the weight of fish landed on the shores of the British Isles was nearly 3,000,000,000

pounds, valued at about

$57,000,000.

Russia. — This country has vast fishery re¬ sources and the annual catch exceeds in value that of any other country of Europe except Great Britain. The ocean fisheries are insignifi¬ cant, but those of the Caspian Sea and the fresh waters, especially the Ural and Volga rivers, are very highly developed. The herring fisheries of the Caspian Sea, Kamchatka and Saghalen are famous, and millions of pounds are caught annually. The sturgeon fisheries are the most valuable in the world, the caviare product alone for 1911 amounting to 5,300,000 pounds. The roach is so abundant and cheap that it may be considered the national fish ; between 200,000,000 and 300,000,000 pounds are taken annually in the Caspian Sea. Other important products are carp, catfish, bream, whitefish, yellow perch and lampreys. The total catch in 1910 was 1,582,- 228,000 pounds, valued at $49,985,000.

France. — Fisheries of great magnitude are prosecuted in the coast waters of France and by French fishermen in Newfoundland, Iceland and the North Sea. The number of vessel and boat fishermen is about 97,000 and of shore fisher¬ men 62,000; and the value of the products taken was $21,240,000. In the cod fisheries of New¬ foundland, Iceland and the North Sea, 44,600,000 kilograms of fish, valued at $3,800,000, were caught ; and in the high-sea fisheries 56,300,000 kilograms of herring, mackerel and other fish, valued at $5,600,000, were taken. The principal coast fishery is that for sardines, large quanti¬ ties of which are canned and sent to all parts of the world; the quantity taken was about 40,200,000 kilograms, worth $2,400,000. Other valuable products are tunny, lobsters, spiny lobsters, crayfish, oysters, mussels and seaweeds. The cultivation of oysters has reached great perfection and upward of 1,000,000,000 oysters, grown in artificial enclosures, are marketed annually.

Norway. — In 1910 more than 120,000 peo¬ ple were employed in the Norwegian fisheries, with a fleet of 183 steamers, 2,407 motor vessels, 3,779 sailing vessels and 7,571 open boats. The principal products are cod, valued at about $6,000,000; herring, valued at $3,250,000; mack¬ erel, $800,000; pollock, $700,000; and sprat, $460,000. The cod fishery is carried on chiefly at the Lofoten Islands, where 35,000 fishermen are engaged. Other important fisheries are the lobster, whale, seal and shark. The total value of the fisheries was $13,151,080. A large part of the catch is exported to other European coun¬ tries and the United States. #

Other European Countries. — Germany has cod and herring fisheries, in the Baltic and North seas, and minor fresh-water fisheries.

Upward of 32,000 persons are reported to be employed, and the catch in 1910 was valued at $8,905,140. The Netherlands have valuable her¬ ring fisheries, which yield about $1,478,000. Other valuable products are cod, anchovy and oysters. The total yearly production is valued at $8,500,000. The fisheries of Denmark are valued at about $4,000,000. The fishermen of Belgium catch chiefly herring and cod, the out¬ put being about $1,350,000 annually. Portugal has 4,000 vessels and boats, mostly engaged in the sardine and tunny fisheries ; the products taken have a value of about $4,182,000. The fisheries of Spain are estimated to be worth $2,500,000, but no definite information regard¬ ing them is obtainable. Italy has nearly 100,000 fishermen engaged in the tunny, coral, sponge and general food-fish fisheries. The aggregate value of water products is estimated at $3,500,- 000 yearly. The Swedish fisheries are valued at about $3,850,000 annually. The principal species sought is the herring; the herring fishery of Bohuslan is famous, employing 7,500 men. Other important products are cod, mackerel, eels, salmon and lobsters. The sea fisheries of Austria-Hungary give employment to about 15,300 persons, and yield about $2,200,000 annu¬ ally. Greece and Turkey have valuable sponge fisheries.

The total yield of the fisheries of Europe for the year 1910, as reported (May 1914) by the Permanent International Council for the Study of the Sea, was 5,670,221,200 pounds, of which herring constituted 26.48 per cent ; cod, 18.5 per cent ; haddock, 9 per cent ; plaice, 6 per cent ; mackerel, 3.09 per cent ; sole, 2 per cent ; halibut, 2 per cent ; eels, 1 per cent.

The total value was about $126,000,000, of which England took $40,971,385; France, $23,525,005; Scotland, $1 5,853, 140 ; Norway, $13,151,080; Germany, $8,905,140; Netherlands, $8,437,615; Denmark, $3,912,745; Sweden, $3,849,255; Iceland (about), $2,000,000; Ire¬ land, $1,878,150; Russia, $1,347,335; Belgium,

$1,347,250.

Statistics kept for the North Sea fisheries, covering an area of 152,473 square miles, show that the average quantity of fish taken in 1910 per

square mile was 16,115 pounds. The average total catch per day from North Sea waters was 3,360,000 pounds.

Japan. — The fisheries of Japan are in some respects the most important in the world, and in value rank next to those of the United States and Great Britain. In 1913, the fishing fleet of Japan comprised 133 steamers and 414,834 sailing craft and about 2,500,000 persons were employed in fishing and preparing fishery prod¬ ucts. The total catch was valued at $47,532,924. All the coast waters abound in excellent food fishes, mollusks, crustaceans and other prod¬ ucts, together with many objects used for orna¬ mental, artistic and other purposes besides for food. The leading products are sardines (of which 500,000,000 pounds are annually caught), herring, bonito, cuttlefish and squid, tai, yellow tail, mackerel, tunny, salmon, cod, whales, coral and algae. The herring, salmon, cod and other fisheries of Hokkaido, the most northern of the main islands, are very extensive, yielding nearly 1,000,000,000 pounds. The aggregate output -of the Japanese fisheries is probably not less than 6,000,000,000 pounds a year, with an estimated value of $30,000,000.

Bibliography. — Alflalo, P., (The Sea Fish¬ ing Industry in England and Wales) (London 1904) ; (Great Fisheries of the World) (Lon¬ don n.d.) ; Herbel, M. A.,

1908).

FISHERIES, Bureau of, a branch of the Department of Commerce, and originally of the Department of Commerce and Labor, before its division into separate bodies, 4 March 1913. Directed by a commissioner, its chief purpose is to foster the national fisheries principally by the propagation of food-fishes and the inspec¬ tion of commercial fisheries. Situated in 31 States, 32 fish hatcheries and 92 auxiliaries and egg-collecting stations, cooperating with State fisheries commissions, carry on the propagation of food fishes, and also bio¬ logical research and experiments for the promotion of scientific knowledge concerning fishes and marine animals. The total output of fishes and eggs in a recent year amounted to 3,687,535,911. Applications in the interests of more than 10,000 different bodies of water were received for fish for stocking purposes. The Alaska salmon and fur-seal fisheries have re¬ ceived considerable attention, especially for the development of the territorial fur resources, the annual value of which has reached $370,579. Consult department of Commerce — Annual Reports> (Washington, D. C.).

FISHERIES QUESTIpN. The prov¬ inces of British North America in

1760-76 en¬ joyed mutual fishing rights on the entire North Atlantic coast, but when the Revolution severed Canada from the rest of the seaboard, Great Britain proposed to deny the United States the right to fish there, on the ground of Canadian opposition. As this meant ruin to a great New England industry, the Canadian waters being the cream of the fishing grounds, John Adams refused to sign the Treaty of Paris (7 Sept. 1783) until the right was granted, though his fellow commissioners would have sacrificed them ; and his stubbornness secured their reten¬ tion. Fishing could still go on ; but we could not dry or cure fish on the coast of Newfound¬ land, or the settled coasts or river-banks of Nova Scotia, the Magdalen Islands or Labra¬ dor, except by agreement with the inhabitants. Under these provisions, the energetic American fishermen occupied many excellent fishing sta¬ tions along the Canada shore, to the envy and dissatisfaction of the British ; and when the War of 1812 broke out, the latter seized the opportunity to declare the Treaty of Paris ab¬ rogated, and order the Canadian officials to re¬ fuse American fishermen access to the grounds. The Americans declared the fishery provisions of the treaty unavoidable. The Treaty of Ghent, of 1814, ignored this question, as it did so much else of vital import, and the subject of the fisheries was left open as an unsettled subject of difference, or, as Henry Clay put it, ((as a nest-egg for another war.® Collision and friction arose relative to the inshore fisheries; in 1816, 1817 and 1818 American fishing vessels

were seized in the Bay of Fundy. After pro¬ longed negotiations, a treaty was entered into at London which revised the fishery provisions, and under which American rights were cur¬ tailed; the United States were to have the right of fishing only in deep sea waters at least three miles from shore, except in certain specified areas off the eastern, western and southern coast of Newfoundland and the Magdalens and Labrador, and the right to dry and cure fish was limited to a small part of the coast of New¬ foundland and Labrador. They were, how¬ ever, to be able to enter bays and harbors for wood or water or for refuge. The three-mile provision proved a bone of contention; Great Britain claiming that the three-mile limit must be measured from the headlands of the <(bays,® and she pointed to the maps published at the time of the treaty, with the waters in dispute marked as <(bays.® The United States, on the other hand, contended that the <(bays® must be confined to small indentations, and that the three marine miles must be measured from a line following the

sinuosities of the coast. In 1845 Lord Aberdeen, at that time British For¬ eign Secretary, offered as a <(relaxation® from the full rights of Great Britain to open the Bay of Fundy to American fishermen, and this was done ; but the American government de¬ clined to accept as a favor what they demanded as a treaty right, and pressed for an extension which the British government, urged thereto by Nova Scotia, refused, and both parties thereupon reverted to the strict letter of their rights. Another question also arose, as to the right of Great Britain to control the fisheries by local laws and regulations. Finally, the Reciprocity Treaty of 1854 abolished all mutual restrictions on deep-sea fishing except for shell¬ fish. The United States abrogated this treaty in 1866, and conditions reverted to those of 1818, but the Treaty of Washington in 1871, to take effect in 1873, revived it again in full down to lat. 39° N. The Canadians, however, as¬ serted that their waters were much the more valuable, and on arbitration provided for in the treaty, they were awarded $5,500,000 in 1877, on a claim of $14,280,000. In 1885 the United States abrogated the reciprocity provision of the treaty of 1871, under pressure from fishing interests, and returned to the 1818 status with its disputed meanings. Our fishing vessels were seized as before and a period of acute ten¬ sion ensued. In 1887 Congress authorized the President at his discretion to lay an embargo on all Canadian commerce to American ports, which, however, has not been done. In 1888 the Chamberlain-Bayard Treaty arranged these difficulties, but the Senate rejected it; a modus vivendi, however, was reached in the same year. A joint high commission to settle the question met in Washington in 1899, but adjourned with¬ out coming to a decision. By a treaty of Jan¬ uary 1909 the questions in dispute were referred to The Hague Tribunal, which . assembled on 1 June 1910, the award being issued on 7 September. The tribunal of arbitration was chosen from the general list of members of the permanent court at The Hague, Dr. H. La:m- masch, professor of international law at the University of Vienna, presiding. George Grey, judge of the United States Circuit Court of Ap¬ peals. was the American representative, and Sir Charles Fitzpatrick, chief justice of Canada,

represented Great Britain. On the important <(headland theory,® the verdict was mainly in accord with the British contention, but no prin¬ ciple applicable to all bays was laid down. On the question of Great Britain's right to regulate the fisheries in dispute, the answer of the tribu¬ nal effected a compromise. The abstract right was conceded as in her favor, but she was forced to agree to the appointment of a commission of experts to pass her regula¬ tions in order that American fishermen may be protected from unfair and discriminatory

legis¬ lation. Thus was brought to an end an irri¬ tating and vexatious controversy, which for up¬ ward of a century had from time to time threatened the peaceful relations existing be¬ tween Great Britain and the United States. Consult (The United States and the North- Eastern Fisheries) (Minneapolis 1887) ; and Wormwith, W. B., (The North Atlantic Coast Fishery Disputes > (in (Canada and Its Prov¬ inces^ Toronto 1914).

FISHERMEN, The.

element of good triumphs. 'The Fishermen' was published toward the end of Grigorovitch's most brilliant and fruitful period, which lasted from 1847 until 1855. An English translation, anonymous, was published in New York in 1917, with a brief foreword by Dr. Angelo S. Rappoport.

Nathan Haskell Dole.

FISHER'S HILL, about 20 miles south of Winchester, Va., between the Massanutten and North Mountains, and with its base washed by a branch of the Shenandoah. This place was the scene of an action, 22 Sept. 1864, between a National force under General Sheridan, and one of Confederates commanded by General Early.

FISHER'S HILL, Battle of. General Early was defeated at the battle of the Opequon, Va., 19 Sept. 1864, and retreated during the night 20 miles up the Shenandoah Valley to Fisher's Hill, two miles south of Strasburg, Va. General Sheridan followed at daylight of the 20th up the Valley pike, General Wilson's cavalry division covering his left and General Averell's division on his right. During the afternoon of the 20th, Wright's Sixth corps and Emory's Nineteenth corps arrived at Cedar Creek, crossed and took position on the heights fronting Strasburg. Crook's Eighth corps halted on the left bank of the creek. On 21 September Sheridan pushed through the town, drove Early's skirmishers to the entrenchments and reconnoi- tered the position, which, naturally strong, Early had strengthened with works of earth and stone, behind which was Wharton's division on the right, then Gordon's, Pegram's and Ramseur's, with Lomax's division of dismounted cavalry on the extreme left. Fitz Hugh Lee's cavalry was at Millford, 12 miles above Front Royal, guard¬ ing Luray Valley and Early's right. Sheridan ordered General Torbert, with Merritt's and

Wilson's cavalry divisions, to the Luray Valley to drive out any force of the enemy in that quarter, and cross over from the valley to New Market, and intercept Early's retreat. During the afternoon the Sixth corps, after a serious re¬ pulse, succeeded in gaining a commanding posi¬ tion near the Confederate works, which was immediately entrenched and artillery put in posi¬ tion. Early's right was too strongly posted to attack in front, so Sheridan concluded to turn and attack his left. During the night of the 21st Crook crossed Cedar Creek and, hidden in a clump of timber, remained until daylight, when, under cover of woods and ravines, he marched in rear of and beyond the right of the Sixth corps, and was again concealed, while Rickett's division of the Sixth corps was pushed out and confronted the left of Early's infantry, ready to join Crook's left when he should attack. While Rickett's division was threatening in front, Crook marched unobserved into the dense timber on the eastern face of Little North Mountain, until he gained the rear of Early's works when, facing to the left, he marched down the mountain side, at sunset. He was seen by Lomax, artillery was turned upon him, but too late ; he struck Lomax's dismounted men in flank and rear, driving them back on Ramseur, who endeavored to change front, but Rickett's division advancing struck Ramseur in the act, joined Crook's left, and the two commands moved along in rear of Early's entrenchments, his men giving way all along the line, abandon¬

ing many guns. The swinging movement of Rickett's division on the right was taken up from right to left, and between sunset and dark¬ ness Early's entire army was defeated and in disorderly retreat. Early reported next morn¬ ing to General Lee that the enemy <(succeeded in driving back the left of my line which was defended by the cavalry, and throwing a force in the rear of the left of my infantry, when the whole of the troops gave way in a panic and could not be rallied.® Early retreated four miles beyond Woodstock and Sheridan pursued him all night, to Woodstock, 12 miles, which was reached at daybreak next morning. The Union loss was 509 killed and wounded. Early re¬ ported a loss in infantry and artillery of 240 killed and wounded and 995 missing. The loss in Lomax's cavalry would swell the entire Con¬ federate loss to about 1,400. Consult Lane, J. H., (The Battle of Fisher's HilP (in Southern Historical Society Papers, Vol. XIX, p. 289, Richmond 1891) ; Pond, G. E., (The Shenandoah Valley in 1864' (New York 1883) ; Sheridan, P. H., (Personal Memoirs' (2 vols., New York 1888) ; United States War Department, (The War of the Rebellion, Official Records' (Ser. I, Vol. XLIII, parts 1 and 2, Washington 1893; Atlas, Washington 1891-95).

E. A. Carman.

FISHER'S ISLAND, at the entrance of Long Island Sound, about six miles southeast of New London harbor and only about three miles off the coast of Connecticut. The island, how¬ ever, belongs to the State of New York; it is a part of Southold township, in Suffolk County, Long Island, N. Y. It is about eight miles long, but its greatest width is only one mile. Its total area is about 4,000 acres. There are many fresh water lakes on it. Its undulating surface is covered with rich soil, though vegetation is not very plentiful. In recent years the island has been developed to a considerable extent as a summer resort. Its permanent population is about 400. The United States government has acquired considerable property on the island which has been named Fort Wright and which has become an important military and naval reservation on the Atlantic Coast. Consult Palmer, H. R., (Fisher's Island' (in New Eng¬ land Magazine, N. S., Vol. XXVIII, p. 567, Boston 1903).

FISHES, Eggs of. See Egg.

FISHES, Geographical Distribution of.

The laws governing the distribution of animals are reducible to three very simple propositions. Each species of animal is found in every part of the earth having conditions suitable for its maintenance, unless :

(a) Its individuals have been unable to reach this region through barriers of some sort ; or,

(b) Having reached it, the species is unable to maintain itself, through lack of capacity for adaptation, through severity of competition with other forms, or through destructive conditions of environment; or else,

(c) Having entered and maintained itself, it has become so altered in the process of adaptation as to become a species distinct from the original type.

Under the first head, numerous illustrations may be given. The absence of loaches, Nile- fishes (Mormyrus) in America and of sun-

fishes, suckers and mooneyes in Europe may serve as examples.

Of species under (b), those that have crossed the seas and not found lodgment, there is, in the nature of things, no record. Of the existence of multitudes of estrays there is abundant evidence. Now and then one among thousands establishes itself permanently, and by such means a species from another region will be added to the fauna. The rest disappear and leave no trace. A knowledge of the currents of the sea and their influence is essential to any detailed study of the dispersion of fishes.

In the third class, that of species changed in the process of adaptation, most insular forms belong. As a matter of fact, at some time or another almost every species must be in this category, for isolation furnishes the most potent elements in the initiation and intensification of the minor differences which separate related species. It is not the preservation of the most useful features, but of those which actually ex¬ isted in the ancestral individuals, which dis¬ tinguished such species. In many cases the per¬ sistence of characters rests not on any special usefulness or fitness, but on the fact that indi¬ viduals possessing these characters have, at one time or another, invaded a certain area and populated it. In other words over and beyond the <(Survival of the Fittest,® we have the (

Barriers Checking Movement of Fishes. —

The limits of the distribution of individual species or genera must be found in some sort of barrier, past or present. The chief barriers which limit marine fishes are the presence of land, the existence of great oceans, the differ¬ ences of temperature arising from differences in latitude, the nature of the sea-bottom and the direction of oceanic currents. That which is a barrier to one species may be an agent in dis¬ tribution to another. The common shore-fishes would perish in deep waters almost as surely as on land, while the open Pacific is a broad highway to the albacore or the swordfish.

Again, that which is a barrier to rapid dis¬ tribution may become an agent in the slow ex¬ tension of the range of a species. The vast continent of Asia is undoubtedly one of the greatest of barriers to the wide movement of species of fish, yet its long shore-line enables species to creep, as it were, from bay to bay, or from rock to rock; till, in many cases, the same species is found in the Red Sea and in the tide- pools or sand-reaches of Japan, or even in the brooks or coral pools of Tahiti or Samoa. In the North Pacific the presence of a range of half submerged volcanoes, known as the Aleu tain and the Kurile islands, has greatly aided the slow movement of the fishes of the tide-pools and the kelp. To a school of mackerel or of flying fishes such

rough islands might form an insuperable barrier.

Temperature the Central Fact. — It has long been recognized that the matter of tempera¬ ture is the central fact in all problems of geo¬ graphical distribution. Few species in any group freely cross the frost-line, and except as borne by oceanic currents, few species extend their range far into waters colder than those in . VOL. 11 — 19

which the species is distinctively at home. Knowing the average temperature of the water in a given region, we know in general the types of fishes which must inhabit it. It is the sim¬ ilarity in temperature and physical conditions, not the former absence of barriers, which chiefly explains the analogy of the Japanese fauna to that of the Mediterranean or the Antilles. This fact alone must explain the resemblance of the Arctic and Antarctic faunae. Like forms lodge in like places.

Ocean Currents. — We may consider again for a moment the movements of the great cur¬ rents in the Pacific as agencies in the distribu¬ tion of species.

A great current sets to the eastward, cross¬ ing the ocean just south of the tropic of Cancer. It extends between the Gilbert and the Marshall islands and passes on nearly to the coast of Mexico, touching the Galapagos Islands, Clip- perton Island, and especially the Revillagigedos. This may account for the number of Polyne¬ sian species found on these islands, about which they are freely mixed with immigrants from the mainland of Mexico.

From the Revillagigedos the current moves northward, passing the Hawaiian Islands and thence onward to the Ladrones. The absence in Hawaii of many of the characteristic fishes of the Samoan Islands and the Gilbert Islands is perhaps due to the long detour made by these currents, as the conditions of life in these groups of islands are not very different. North¬ east of Hawaii is a great spiral current, moving with the hands of the watch, forming what is called Fleurieu's Whirlpool. This does not reach the coast of California. This fact may account for the almost complete distinction in the shore-fishes of Hawaii and California.

It is, of course, not necessary that the move¬ ments of a species in an oceanic current should coincide with the direction of the current. Young fishes, or fresh-water fishes, would be borne along with the water. Those that dwell within floating bodies of seaweed would go whither the waters carry the drifting mass. But free-swimming fishes,

as the mackerel or fly¬ ing-fishes, might as readily choose the reverse direction. To a free-swimming fish, the tem¬ perature of the water would be the only con¬ sideration. It is thus evident that a current which to certain forms would prove a barrier to distribution, to others would be a mere con¬ venience in movement.

Centres of Distribution. — We may assume in regard to any species, that it has had its origin in or near that region in which it is most abun¬ dant and characteristic. Such an assumption must involve a certain percentage of error or of doubt, but in considering the mass of species, it would represent essential truth. In the same fashion, we may regard a genus as being autoch¬ thonous or first developed in the region where it shows the greatest range or variety of species. Those regions where the greatest number of genera are thus autochthonous may be regarded as centres of distribution. So far as the marine ‘ fishes are concerned, the most important of these centres are found in the Pacific Ocean. First of these in importance is the East Indian Archipelago, with the neighboring shores of India. Next would come the Arctic Pacific and its bounding islands, from Japan to British Columbia. Third in importance in this regard

is Australia. Important centres are also found in temperate Japan, in California, the Panama region and in New Zealand, Chile and Pata¬ gonia. The fauna of Polynesia is almost en¬ tirely derived from the East Indies; and the shore fauna of the Red Sea, the Bay of Bengal and Madagascar, so far as genera are concerned, seems to be not really separable from the Indian fauna generally.

In the Atlantic the chief centre of distribu¬ tion is the West Indies; the second is the Mediterranean. On the shores to the north¬ ward or southward of these regions occasional genera have found their origin. This is true especially of the New England region, the North Sea, the Gulf of Guinea and the coast of Argen¬ tina. The fish-fauna of the North Atlantic is derived mainly from the North Pacific, the differences lying mainly in the relative poverty of the North Atlantic. But, in certain groups common to the two regions, the migration must have been in the opposite direction ; exceptions that prove the rule.

Realms of Fresh-Water Distribution. — If

we consider the fresh-water fishes alone we may divide the land areas

of the earth into districts and zones, fairly agreeing with those marked out for mammals and birds. The river-basin, bounded by its water-sheds and the sea at its mouth, shows many resemblances, from the point of view of a fish, to an island considered as the home of a mammal. It is evident that with fishes the differences in latitude outweigh those of continental areas, and a primary divi¬ sion into Old World and New World would not be tenable.

Distribution of Fresh-Water Fishes. — As

to their distribution in the streams, the fresh¬ water fishes may be subdivided as follows :

1. Lowland fishes; as the bowfin, pirate- perch, large-mouthed black bass, sun-fishes and some calfishes.

2. Channel fishes ; as the channel catfish, the mooneye, the goldeye, garpike, buffalo fishes and drum.

3. Upland fishes ; as many of the darters, shiners and suckers, and the small-mouthed black bass.

4. Mountain fishes ; as the brook-trout, and many of the darters and minnows.

To these we may add, (5) the more or less distinct classes of lake fishes, inhabiting only the waters which are deep, clear and cold, as the various species of whitefish, lake herring, cisco and the Great-Lake trout ; (6) anadro- mous fishes, or those which run up from the sea lo spawn in fresh waters, as the salmon, stur¬ geon, shad and striped bass; (7) catadromous fishes, like the eel, which pass down to spawn in the sea; and (8) brackish-water fishes, which thrive best in the debatable waters of the river- months, as most of the sticklebacks and the killifishes.

As regards the range of species, we have every possible gradation from those which seem to be confined to a single river, and are rare even in their restricted habitat, to those which are in a measure cosmopolitan, ranging every- vrhere in suitable waters.

Barriers to River Fishes. — The existence of boundaries to the range of species implies the existence of barriers to their diffusion. We may now consider these barriers and, in the

same connection, the degree to which they may be overcome.

Least important of these are the barriers which may exist within the limits of any single basin, and which tend to prevent a free diffu¬ sion through its waters of species inhabiting any portion of it. In streams flowing south¬ ward, or across different parallels of latitude, the difference in climate becomes a matter of importance. The distribution of species is gov¬ erned very largely by the temperature of the water. Each species has its range in this re¬ spect — the free-swimming fishes, notably the trout, being most affected by it; the mud-loving or bottom fishes, like the catfishes, least. The latter can reach the cool bottoms in hot weather, or the warm bottoms in cold weather, thus keeping their own temperature more even than that of the surface of the water. Al¬ though water communication is perfectly free for most of the length of the Mississippi, there is a material difference between the faunas of the streams in Minnesota and in Louisiana. This difference is caused chiefly by the differ¬ ent temperature occupying the difference in lati¬ tude. That a similar difference in longitude, with free water communication, has no appre¬ ciable importance, is shown by the almost ab¬ solute identity of the fish-faunas of Lake Win¬ nebago and Lake Champlain. While many large fishes range freely up and down the Mis¬ sissippi, a majority of the species do not do so, and the fauna of the upper Mississippi has more in common with that of the tributaries of Lake Michigan than it has with that of the Red River or the Arkansas. The influence of climate is again shown in the paucity of the fauna of the cold waters of Lake Superior, as compared with that of Lake Michigan. The majority of our species cannot endure the cold. In general, therefore, cold or northern waters contain fewer species than southern waters do, though the number of individuals of any one kind may be greater. This is shown in all waters, fresh or salt. The fisheries of the northern seas are more extensive than those of the tropics. There are more fishes there, but they are far less varied in kind.

But in most streams the difference in lati¬ tude is insignificant, and the chief differences in temperature come from differences in elevation, or from the distance of the waters from the colder source. Often the lowland waters are so different in character as to produce a marked change in the quality of their faunas. These lowland waters may form a barrier to the free movements of upland fishes ; but that this bar¬ rier is not impassable is shown by the identity of the fishes in the streams on the uplands of middle Tennessee with those of the Holston and French Broad. Again, streams of the Ozark Mountains, similar in character to the rivers of East Tennessee, have an essentially similar fish- fauna, although between the Ozarks and the Cumberland Range lies an area of lowland bayous, into which such fishes are never

known to penetrate. We can, however, imagine that these upland fishes may be sometimes swept down from one side or the other into the Mis¬ sissippi, from which they might ascend on the other side. But such transfers certainly do not often happen. This is apparent from the fact that the two faunas are not quite identical, and

_ T 1 Gurnard (Trigla hirundo) 2 Gourami (Osphromenus olfax)

A Indian Spring Eel (Mastacembelus armatus), above; and Golomynka or Oilfish of Lake Bailkal (Comephorus baikalensis), below 4 Grayling (Thymallus thymallus) 5 European Goby (Gobifls fluviatilis)

in some cases the same species are represented by perceptibly different varieties on one side and the other. The time of commingling of these faunas is perhaps now past, and it may have occurred only when the climate of the in¬ tervening regions was colder than at present.

The effects of waterfalls and cascades as barriers to the diffusion of most species is self- evident; but the importance of such obstacles is less, in the course of time, than might be ex¬ pected. In one way or another very many spe¬ cies have passed these barriers. The falls of the Cumberland limit the range of most of the larger fishes of the river, but the streams above it have their quota of darters and minnows. It is evident that the past history of the stream must enter as a factor into this discussion, but this past history it is not always possible to trace. Dams and artificial waterfalls now check the free movement of many species, especially those of migratory habits; while, conversely, numerous other species have extended their range through the agency of canals.

Every year fishes are swept down the rivers by the winter floods ; and in the spring, as the spawning season approaches, almost every spe¬ cies is found working its way up the stream. In some cases, notably that of the quinnat-sal- mon and the red salmon, the length of these migrations is surprisingly great. To some spe¬ cies rapids and shallows have proved a sufficient barrier, and other kinds have been kept back by unfavorable conditions of various sorts. Streams whose waters are charged with silt or sediment, as the Missouri, Arkansas or Brazos, do not invite fishes ; and even the occasional floods of red mud, such as disfigure otherwise clear streams, like the Red River or the Colorado

(of Texas), are unfavorable. Extremely unfavor¬ able also is the condition which obtains in many rivers of the Southwest; as for example, the Red River, the Sabine and the Trinity, which are full from bank to bank in winter and spring, and which dwindle to mere rivulets in the autumn droughts.

In general, those streams which have condi¬ tions most favorable to fish-life will be found to contain the greatest number of species.

There can be no doubt that the general tend¬ ency is for each species to extend its range more and more widely until all localities suit¬ able for its growth are included. The various agencies of dispersal which have existed in the past are still in operation. There is apparently no limit to their action. It is probable that new “colonies® of one species or another may be planted each year in waters not heretofore inhabited by such species. But such colonies become permanent only where the conditions are so favorable that the species can hold its own in the struggle for food and subsistence. That various modifications in the habitat of certain species have been caused by human agencies is of course too well known to need discussion here.

Of watersheds in the United States the most important and most effective is unquestionably that of the main chain of the Rocky Mountains. This is due in part to its great height, still more to its great breadth, and most of all, perhaps, to the fact that (Two Ocean Pass excepted) it is nowhere broken by the passage of a river. In the few cases when species have crossed this barrier, some break in the chain (as the Two

Ocean Pass in Wyoming connecting the Snake River with the Yellowstone) has now been re¬ corded.

Habitat of Species. — Each species finds its habitat fitted to its life, and then in turn is forced to adapt itself to this habitat. Any other kind of habitat then appears as a barrier to its distribution. Thus to a fish of the ripples a stretch of still water becomes a barrier. A spe¬ cies adapted to sandy bottoms will seldom force its way through swift waters or among weeds or rocks.

The stream that has the greatest variety of animals in it would be one (1) connected with a large river; (2) in a warm climate; (3) with clear water, and (4) little fluctuation from winter to summer; (5) with little change in the clearness of the water ; (6) a gravelly bottom ; (7) preferably of limestone, and (8) covered in its quiet reaches and its ripples with water- weeds. These conditions are best realized in the

United States in the tributaries of the Ohio, Cumberland, Tennessee and Ozark rivers among American streams, and it is in them that the greatest number of species of fresh-water animals (fishes, crayfishes, mussels, etc.) has been recorded. These streams approach most nearly to the ideal homes for animals of the fresh waters. The streams of Wisconsin, Michigan and the Columbia region have many advantages, but are too cold. Those of Illi¬ nois, Iowa, northern Missouri and Kansas are too sluggish, and sometimes run muddy. Those of Texas and California shrink too much in the summer, and are too isolated. The streams of the Atlantic Coast are less isolated, but none connects with a great basin, and those of New England run too cold for the great mass of the species. For similar reasons the fresh-water animal life of Europe is relatively scanty, that of the Danube and Volga being richest. The animal life of the fresh water of South Amer¬ ica centres in the Amazon, and that of Africa in the Nile, the Niger and the Kongo. The great rivers of Siberia, like the Yukon in Alaska and the Mackenzie River in British America, have but few species of fresh-water animals, though the kinds fitted for life in cold, clear water exist in great abundance. See Fish ; Ichthyology. David Starr Jordan,

Chancellor Emeritus Leland Stanford Junior University.

FISHES, Nest-making by. While the great majority of fishes cast their eggs (spawn) and the fertilizing milt of the males loose in the water, many follow a much less wasteful method, even taking good care of them and of the resulting fry. All who have had experi¬ ence with aquariums know of this habit in the little sticklebacks, the males of which construct, in crevices of rocks, or among water-weeds, elaborate muff-shaped nests of small sticks and plant-fragments, woven together with glutinous threads spun from an organ connected with the kidneys. In such a nest the female then de¬ posits her few and relatively large eggs, which are zealously watched and brooded by her fierce little mate. This case is nearly paralleled by some of the European gobies; and also by that curiosity of mid-ocean, the Sargasse-fish, which spends most of its life resting upon the floating gulf-weed of the sea. Here it glues together, by means of a pasty secretion from its body, the

twigs and leaves of a single plant of the gulf- weed (Sargassum) into a sort of bag, within which large numbers of eggs are hung by silky fibres like clusters of grapes. Somewhat simi¬ lar is the precaution of

the gouramis and para¬ dise-fish of Oriental waters, which form a floating raft of bubbles of air and mucus blown from their mouths, in wrhich the eggs are entan¬ gled and float about guarded by the male. An¬ other sort of floating nest, composed of bits of weed, is constructed as a raft for its thousand or more eggs by one of the great mormyrs (Mormyrus) of the Nile and its tributaries. This is a big, strange-looking, beaked fish re¬ lated to the pike, and representing a group (Scyphophori) venerated by a sect of the an¬ cient Egyptians and depicted on their monu¬ ments. Its nests are carefully avoided by the negroes, for the fish will attack anything that approaches its property, and it can bite cruelly.

Most of the nest-builders are fresh-water fish, and represent a variety of groups. The habit is familiar to us, indeed, in the case of our bass and sun-fish. As soon in early summer as the water is suitably warm the male black bass (of both species) betakes himself to the shallow margin of the river or pond, where he lives, where the bottom is sandy, or better, is covered with small pebbles. There he scoops out with nose and fins a saucer-like depression, into the centre of which he pushes a layer of little stones. Having prepared the place to his satisfaction, he searches for a fertiale bass who is “ripe,® as they say — that is, carrying eggs sufficiently matured for extrusion. Others do not attract him ; or his attentive addresses may be repulsed. Having discovered a female ready to spawn he appeals to her by such af¬ fectionate inducements as fishes understand, and endeavors to lead her to the home he has prepared. She may be reluctant and coy, but he persistently entices her until together they halt above the plate of pebbles, which he now cleans anew by his waving fins. Often he will sidle up to her, and, pressing against her body, will appear to try to assist her in discharging her eggs; and as soon as this discharge begins he supplies the milt that contains the fertilizing element necessary to their development. This done she goes her way without further atten¬ tion from him. Henceforth his interest is solely in the eggs that have fallen among the pebbles, and he never leaves them for more than a minute or two, fanning them steadily as he poises above the nest, and watching that no big water-beetle, or crayfish, or predatory min¬ now invades his domain. It is comical to see the fierce anger with which he will dash at any fish that ventures near, and when, as frequently happens, a dozen or so bass are nesting within a yard or two of one another, everyone fearful of his neighbor, vigilance and courage are called for every instant. This care extends to the fry after the eggs hatch, until they have grown somewhat, after which they are more in danger of being eaten by their parent than by anything else. Many other fishes show this fatherly zeal.

Sunfish have similar habits, but they seek places for their nests more sheltered by vegeta¬ tion, they are less quarrelsome and their tend¬ ency to cannibalism is far less.

Some fishes, however, carry this building of pebble-nests to greater perfection. One of

these is our common little black-nosed dace (Rhinichthys atronasus), which clears a space, puts a layer of stones, then a layer of eggs, then layer of pebbles, and so on until the laying is finished. Both sexes work together, bringing the pebbles in their mouths. In deeper rivers the lamprey eels (Petronyzon) do something similar, and are known as “stone-toters.® A silurid (Arms) of Australia makes mounds of alternate layers of stones and eggs ; and those brilliant sea-fish, the wrasses, are even more industrious, for a pair, working together, will form a nest of sea-weeds, broken shells, corals, etc., in which their eggs safely hatch. That strange little fish of the rivers of the Mississippi Valley, the bowfin, or grindle (Amia calva), which is so interesting as a survivor of a race that almost became extinct in the early ages, digs in the mud of sluggish streams an excavation two or three feet in diameter, and several inches deep, which is garnished all around the edge with bits of plant-roots or perhaps a ridge of sand. This done he awaits the coming of a female, not often seeking one ; for some Lady Bowfin pres¬ ently comes along, and the pair consort for a considerable time, followed by spawning, after which the male guards the eggs that stick in great numbers to the bordering weeds and root¬ lets. Very similar care is shown by a larger relative in West Africa (Protopterus) which removes all the grass from a wide space of bottom, thus made perfectly smooth and walled in by the debris swept out of it. Here the eggs are dropped on the bare mud. “Until the eggs are hatched, which occurs about the eighth day, and while the larvae are in the nest, the male remains on guard, and is apt to bite severely an incautious intruder. Probably with a view to aerating the eggs, the water is continually lashed about by the tail of the guardian parent.® A fish of Gambia (Heterotis) attends to the security of its eggs in the same way. Several kinds of fishes hide their eggs in natural or artificial cavities. Thus some British blennies attach them in a single layer to the sides of cavities in rocks or among stones, where they are watched by the male parent. The little male European sand-goby scoops out the sand from beneath an empty shell, usually that of a scal¬ lop, whereupon a female deposits her adhesive eggs on the under surface of the shell and leaves the male on guard. Several kinds of catfish stow away their spawn in crevices of a steep bank, or even dig a burrow into the bank, as is done by our common bullhead. Certain South American silurids even line the excava¬ tion with grass

or leaves amid which the eggs are hidden. All these deposits are guarded. That this guardianship all over the world is the office of the males alone, whatever the char¬ acter of the fish, is notable ; and also that in all such cases he continually agitates the water about the nest, which is precisely what fish-cul- turists have found it necessary to do in their troughs and jars, when they attempt to hatch fish-eggs artificially.

Ernest Ingersoi.l.

FISHGUARD, Wales (Welsh, Aberg- waun), market town and seaport of Pembroke¬ shire, near the mouth of the Gwaun. It has an excellent harbor and within recent years transatlantic steamships have made it a port of

call to receive and discharge passengers for London and the Continent. The fishing in¬ dustry is a thriving one. Here in 1797 oc¬ curred the so-called (

FISHING. See Angling; Fishing Tac¬ kle; Fish and Game Laws.

FISHING BIRDS are those that subsist on fish and whose structure is adapted to enable them to capture fish. Many different forms come under this designation and they cannot be assigned to any single scientific group. Under fishing birds are to be classed the loons, penguins, puffins, auks, frigate- birds, gannets, cormorants, pelicans, herons and a few species of duck. Of these some are powerful swimmers and divers while others are skilful in lying in wait and snatching any fish that comes sufficiently close to them. Of the fishing birds perhaps the most interesting is the cormorant which has been trained by man to fish for him.

FISHING BOUNTIES, governmental aid to the fishing industry in order to keep up the industry, and especially to provide an adequate number of men trained to the sea. Thus statutes of Edward VI compelled the people of England to observe the days of fast and ab¬ stinence of the Roman Church although that Church and its doctrines had been proscribed. Under Elizabeth certain duties onerous to the fishing industry were removed, and special bounties were given to whalers in the 18th cen¬ tury. The American Congress offered bounties in order to build up the fishing industry in 1789, 1792, 1797 and 1799. In 1792 bounties to the cod fishers off Newfoundland varied from $1.50

to $2.50 per ton, according to the size of the vessel ; five-eighths of the bounty went to the fishermen and three-eighths to the owner. These bounties continued until 1854. Consult (United States Statutes at Large) (Vol. I, 229 et seq., 260, 533, 692).

FISHING CAT, a wild cat (Felis viver- rina), native to eastern India and eastward. It is nearly three feet long, and has a tapering tail about a foot in length. It is dark-gray or brown, striped and spotted with darker color; the tail is barred, and the throat and breast are quite white. Though it is a fierce animal and a keen hunter of game, and has been known to carry off infants, it lives largely by catch¬ ing fish and shellfish.

FISHING EAGLE, a large eagle of the Orient (Polioaetiis ichthyaetus) . As the name indicates it subsists by catching fish and in its habits is very similar to the osprey.

FISHING FROG, a fish. See Goosefish.

FISHING LAWS. See Game Laws.

FISHING TACKLE, the equipment — rod, line, hooks, flies, etc., with which the angler provides himself for the sport of fish¬ ing. So much of the success and enjoyment of this sport depends upon the tackle that the selection of an appropriate and adequate out¬ fit is a matter of considerable moment, es¬ pecially to a beginner. If possible, the per¬

sonal advice of an enthusiastic angler should be obtained. Failing this the tyro will have to gain from reading such knowledge as he can, and, in addition, bring into play his coolest judgment. For the prodigious variety of every essential in an outfit, as offered in the shops, is more than enough to bewilder even an ex¬ perienced devotee of the sport. A few gen¬ eral suggestions may be offered as fundamental guides.

Rods are of two classes: The solid wood rods, and the built-up rods. Of rods made from the solid wood, lancewood and green- heart are the usual materials, and for many purposes, and in the hands of many fishermen, have given satisfaction. One advantage is their comparative cheapness — that is, a good lance¬ wood rod can be bought for the price of an indifferent built-up rod, and of the two is much to be preferred. The built-up rods are made from the outer siliceous layers of the bamboo. These are carefully worked out in strips of triangular section, and six of these are glued together, forming a rod of

hexagonal outline. There is a grade of rod made up of eight strips of bamboo. Their one advantage is that the rod so made is almost round, but they lack other qualities of more importance. A well-made six-strip bamboo rod is the best there is for fly-fishing and for most bait-cast¬ ing. It has a certain springy flexibility which is wanting in the lancewood, although the lat¬ ter has its place, and the comprehensive sports¬ man will have both. Steel rods may be noted in passing: in the hands of a few they have found favor, but to the many they lack the qualities which all fishermen have valued most in the bamboo rod. For fly-fishing the favorite rod is from 9 to 10 feet long, weighing from 5>2 to 6 ounces. For bait casting, it is 6 feet long, weighing about 6 ounces if of bam¬ boo, and about 7 ounces if of solid wood. The fly rods come generally in three sections, with an extra tip, or in four or five sections for convenient packing in a trunk. The bait¬ casting rods are usually in two sections, but may be had in shorter lengths.

Lines. — The line universally recommended by practical anglers as the only perfectly satis¬ factory line is that known as the enameled, waterproof silk line — in its several varieties. The highest grade of this type is the vacuum process line; most expensive of all, but by no means indispensable. Two models are pro¬ duced : the Uevel" line, which is of the same diameter throughout ; and the (

Reels are of many patterns, and either single action or multiplying. For trout fishing the single action reel is preferred by a vast majority of experienced fishermen. The pat¬ tern most in favor is the narrow spool, as light as may be to have substantial strength, and not too stiff in action of the click. It should hold without crowding 30 yards of double tapered line.

Leaders are of plain gut, or stained to ren¬ der them less visible as a connection between the line and the fly. They are offered in

lengths of three, six and nine feet. The six- foot length is commonly used, but for long casting the nine-foot length is favored.

Hooks. — It goes without saying that the hook must be adapted to the size of the fish expected to be caught as well as to the variety, and these considerations are of far greater importance than the specific design. There is this to be said, however, that the eyed hooks are in all cases to be preferred to snelled hooks, unless the latter have been

newly snelled — and this cannot be depended upon in the case of purchased flies, which are ready dressed on the hooks. The eyed hooks are of two models, those with the eyes turned up, and those with the eyes turned down. That the difference is not a serious matter is proved by the fact that there are just about as many advocates of one style as of the other. For trout-fishing the size most in use is No. 10. Occasionally some No. 12 will make all the difference between a full creel and an empty one. For bass, the hooks will range consider¬ ably larger. Other fish, other hooks : if a definite advance knowledge cannot be had as to the catch to be expected, the only rational pro¬ cedure is to provide a variety. It is to be noted, however, that the sizes of hooks, as indicated by the numbers, differ with different makers, so that no advice in this respect is to be taken literally.

Flies. — The artificial (

Artificial ((minnows® in a score of designs, <(frogs,® (

Camp Life) (New York 1906) ; Henshall, J. A., Wass, Pike, Perch and Others* (New York 1903); McCarthy, E., Wamiliar Fish: Their Habits and Capture* (New York 1909) ; Rhead, L., (American Trout-Stream Insects* (New York 1916).

FISHKILL LANDING, or FISHKILL- ON-HUDSON, N. Y., formerly a village in Dutchess County, on the east bank of the Hud¬ son River, the New York Central and Hudson River, and a branch of the New York, New Haven and Hartford railways. It is connected with the West Shore Railroad at Newburg by ferry and with many of the towns and cities along the Hudson River by electric railways. It is about 55 miles north of New York. In 1913 it was combined with the village of Matte-awan, becoming a city under the name of Beacon. It was used as a Handing® as early as the times of exploration along the Hudson, and the first settlement was made about the last decade of the 17th century. During the Revolution the New York Provincial Conven¬ tion met here, and it shares with Newburg and Matteawan the distinction of being the military depot for supplies for the American troops and frequently the headquarters of Washington. When peace was restored, its advantages as a trading post for the settlements on the east side of the Hudson gave it opportunities that caused it to become quite a good-sized village in the early part of the 18th century. In 1783 the Society of the Cincinnati was organized in its immediate vicinity. Its chief manufactures are the Corliss engines, rubber goods, bakers' .machinery, hats, woolens, silks, brick and tile. Coal and food products are shipped here in large quantities from New York. Pop. (1910) 3,902. Consult Anon., XIV, p. 676, Boston 1896).

FISHWAY, a device to enable fish, espe¬ cially salmon, to ascend a fall. It may consist of a series of steps over which the water descends, turning a fall into a cascade, and sometimes known as a fish ladder; or it may consist of a chute for diminishing the velocity, and assisting the fish to the level above the dam. Consult Atkins, C. G., (On Fish-Ways* (in United States Commission of Fish and Fisheries, Re¬ ports for 1872-73, part 2, p. 591, Washington 1874) ; Bayer, F. von, (Fishways* (in United States Bureau of Fisheries, Bulletins, Vol. XXVIII, Washington 1908) ; Gehrhardt, P., (Fischwege* (in (Handbuch der Ingenieurwls- sen-schaften,* Section III, Vol. II, part 2, Leip¬ zig 1912).

FISK, Clinton Bowen, American poli¬ tician : b. Clapp's Corners, now Greigsville, Livingston County, N. Y., 8 Dec. 1828; d. New York, 9 July 1890. Early in life he removed with his parents to Michigan where he grew up and became a successful merchant and banker. As a result of the financial panic of 1857 he lost

practically all that he possessed. In 1858 he moved to Saint Louis, Mo., as representative of a large eastern insurance company. Hav¬ ing been an abolitionist for many years he was one of the first to volunteer after Fort Sumter had been fired upon. He served for a number of years and rose from private to brevet briga¬ dier-general of volunteers, holding successively positions as colonel of the 33d Missouri regi¬ ment, commander of an infantry division, com¬ mander of the district of Southeast Missouri, of the district of Saint Louis, and of the district of North Missouri. In 1865 he was made as¬ sistant commissioner in the Freedmen's Bureau for the States of Kentucky and Tennessee with headquarters at Nashville, Tenn., where he founded, in 1866, the Fisk School for Freedmen, which in 1867 was chartered as Fisk University (q.v.), an institution for the education of colored persons of both sexes. On 1 Sept. 1866 he was mustered out of the United States mili¬ tary service and returned to Saint Louis. Soon afterward he accepted an appointment as State commissioner of the South West Pacific Rail¬ road. After a few years he and some of his associates took over the road which was rechar¬ tered as the Missouri Pacific and of which he was vice-president until 1877, removing in 1872 to New York. He became a member of the Indian Commission in 1873 and his interest and influence in public affairs steadily increased. He became especially active in the affairs of the Methodist Church. In politics he was a member of the Republican party for many years, but

finally left it and joined in 1884 the Prohibition party, running as its candidate for the gov¬ ernorship of New Jersey in 1886, and for the presidency in 1888, receiving about 250,000 votes at the latter occasion. Consult Hopkins, A. A., (The Life of C. B. Fisk> (New York 1888).

FISK, Fidelia, American missionary: b. Shelburne, Mass., 1816; d. 1864. She was edu¬ cated at Mount Holyoke College and from 1843 to 1858 served as a missionary of the American Board with the Nestorians. She was the first principal of the Urumiah Women's Seminary. She published (Recollections of Mary Lyon> (1866). Consult Fisk, D. T., (A Memoir of Fidelia Fisk: Faith Working by Love) (Bos¬ ton 1869).

FISK, James, American stock speculator: b. Bennington, Vt., 1834; d. New York, 7 Jan. 1872. His father was a peddler and the son had few chances for educational improvement, but soon displayed considerable mercantile genius. He became a member of the Boston mercantile firm of Jordan & Marsh, drove shrewd bargains with the government during the Civil War; later opened a broker's office in New York, and was employed with one Belden by Daniel Drew (q.v.) as agent in Drew's struggle with Cornelius Vanderbilt for control of the Erie Railway. The Drew-Fisk and Gould-Eldridge interests in concert succeeded in forcing out Vanderbilt and in placing Gould and Fisk in power, the former as president, the latter vice-president and comptroller of the road. The activity of the two in bribery and corruption involved city, State and Federal officials, and at its climax brought about the gold conspiracy of 1869 and the well-known «Black Friday^ (24 Sept. 1869), when the efforts qf the combination to corner the gold market

resulted in financial panic. Fisk was shot after a quarrel, by E. S. Stokes, a business associate. Consult Anon., (James Fisk, Jr., etcP (Phila¬ delphia 1872).

FISK, Pliny, American Congregational mis¬ sionary: b. Shelburne, Mass., 1792; d. 1825. He was graduated at Middlebury College, Ver¬ mont, in 1814 and four years later at Andover Seminary. He was appointed agent of the American Board of Commissioners of Foreign Missions. He was sent to Palestine in 1819 and the year of his death joined the mission at Beirut, Syria. He left in manuscript an Eng- lish-Arabic dictionary which was published some years after his death. Consult Bond, (Life of Pliny Fisk) (Boston 1828).

FISK UNIVERSITY, coeducational in¬ stitution in Nashville, Tenn. ;

founded in 1866 by the American Missionary Association of New York and the Western Freedmen's Aid Commission of Cincinnati, for the education of colored persons. The university early be¬ came well known through the efforts made on its behalf by. Gen. Clinton B. Fisk, from whom the institution took its name, and from the (

FISKE, Amos Kidder, American editor and author: b. Whitefield, N. H., 12 May 1842. He was graduated at Harvard 1866 and admitted to the bar 1868. He collaborated with George Ticknor Curtis in the (Life of Daniel Webster* and was a large contributor to the revised edi¬ tion of the (American Encyclopaedia* (1873-76). He served for 20 years on the editorial staff of the New York Times, joining the staff of the Mail and Express 1900. Since the beginning of 1903 associate editor and chief editorial writer of the New York Journal of Commerce and Commercial Bulletin. His published works are (Midnight Talks at the Club* (1890) ; be¬ yond the Bourn* (1891) ; (The Jewish Scrip- tures) (1896) ; (The Myths of IsraeP (1897) ; (The Story of the Philippines1* (1898) ; 'The West Indies) (1899) ; (The Modern Bank) (1904); (The Great Epic of IsraeP (1911); (Honest Business) (1914).

FISKE, Bradley Allen, American naval officer: b. Lyons, N. Y., 13 June 1854. He was appointed a cadet midshipman in the United States navy in 1870 and became lieutenant- commander 30 March 1900. He was made rear-admiral in 1911, and was aid for operations of the navy from 1913 to 1915, when he re¬ signed. He invented a boat detaching and attaching apparatus for warships in 1877 ; the first electric ammunition used in the navy in 1888; electric gun-training apparatus and elec¬ tric steering gear the same year; range- and position-finders in 1889; improvements of the range-finder and electric steering gear in 1895 ; and an electrical apparatus for transmitting the orders of a ship's commander from the deck bridge to the engine room in 1896; a system of turning turrets of warships by electricity, a

speed and direction indicator, the naval tele¬ scope and mount, the wireless control of moving vessels and a system of launching automobile torpedoes from air craft. The naval telescope sight has been adopted by all navies and is the main cause of the recent great improvement in the accuracy of naval gunnery. He was awarded the Elliott Cresson gold medal by the Franklin Institute (1893) and a gold medal by the United States Naval Institute (1905) for the prize essay (American Naval Policy.' Author (Electricity and Electrical Engineer-

ing) ; Electricity in Theory and Practice' (1883), and (War Time in Manila' (1915).

FISKE, Harrison Grey, American theat¬ rical manager and journalist: b. Harrison, N. Y., 30 July 1861. He was educated at New York University and began his career of jour¬ nalist on the Jersey City Argus, of which he was also dramatic critic. Later he joined the staff of the New York Star. He became a contributor to the New York Dramatic Mirror in 1879, of which he soon became a stock¬ holder and editor and of which he obtained a controlling interest in the paper. In 1890 he married Minnie Maddern Davey for whom he was afterward manager as also for the Man¬ hattan Company. He is author of the plays (Hester Crewe' ; (The Privateer,' and (A White Pink.'

FISKE, John (originally Edmund Fiske Green), American historian and philosopher: b. Hartford, Conn., 30 March 1842 ; d. Glouces¬ ter, Mass., 4 July 1901. In 1855 he assumed the name of his maternal great-grandfather, John Fiske, of Middletown, Conn. In 1863 he was graduated from Harvard, in 1865 from the Har¬ vard Law School, in 1864 was admitted to the Suffolk bar, but never entered legal practice. In 1861 he published, in the National Quarterly Review, a notable critical article ((Mr. Buckle's Fallacies') on Buckle's (History of Civilization in England.' From 1869 to 1879 he was at Harvard, first as a brilliant university lecturer in philosophy, and from 1872 as assistant libra¬ rian. He lectured again at Harvard from 1895-97. He was also an overseer from 1879 to 1891 and from 1899 to his death. He held honorary degrees from Harvard and from the University of Pennsylvania, and was a member of numerous American and foreign scientific societies. In 1884 he was non-resident pro¬ fessor of American history in Washington Uni¬ versity (Saint Louis, Mo.), where for some years he held annual lecture courses. His reputation as a lecturer was considerable also in Great Britain, where he delivered addresses on Amer¬ ican history in 1879 at University College, Lon¬ don, and in 1880 at the Royal Institution. His earlier recognition, however, was chiefly as a thinker and writer in evolutionary philosophy, in particular as the foremost expounder to Eng¬ lish-speaking students of Herbert Spencer's philosophic system. In this popularization of Spencer, best represented by his (Outlines of Cosmic Philosophy' (1874), his lucidity won strong approbation from Darwin. From 1879 his attention was turned toward American his¬ tory, largely through researches made by him in American aboriginal life in connection with a projected work on the Aryans. Thenceforth his philosophic studies took subordinate place, though he wrote in this field occasional volumes

of much interest, and in his Udeal of God' (1885) and (Origin of Evil' gave ultimate pres¬ entation of his confirmed views on questions of philosophy and religion. In his series of his¬ torical writings, forming broadly a continuous account of events from the earliest discoveries to the beginnings of Federal government, he displayed a marked ability for clear and inter¬ esting narrative, and infused a particular in¬ terest into the adventurous characters and dar¬ ing deeds of the period of exploration. He fails at times in points of minor accuracy, but in ar¬ rangement, judgment, proportion and dramatic interest he exercised a strong influence on the progress of American historical studies in this country. His style here is not inferior to that of his philosophical treatises. He worked with tremendous energy, and, though dying prema¬ turely, had accomplished an impressive amount of literary labor. Among the titles of his other volumes are (Myths and Mvthmakers' (1872) ; (The Unseen World' (1876) ; Dar¬ winism and Other Essays' (1879; rev. ed., 1885) ; Excursions of an Evolutionist' (1883) ; (The Destiny of Man' (1884); (American Political Ideas' (1885) ; Dow the United States became a Nation' (1887) ; (The Critical Period of American History' (1888) ; (The War of Independence' (1889) ; (The Begin¬ nings of New England' (1889); (Civil Gov¬ ernment in the United States' (1890) ; (The American Revolution' (1891) ; (The Discovery of America' (1892) ; Distory of the United States for Schools' (1894) ; Edward Livings¬ ton Youmans' (1894) ; (01d Virginia and Her Neighbors' (1897) ; (The Dutch and Quaker Colonies in America' (1899) ; (Through Na¬ ture to God' (1899) ; (A Century of Science' (1899) ; (The Mississippi Valley in the Civil War' (1900) ; Eife Everlasting' (1901) ; Dew France and New England' (1902) ; Essays, Literary and Historical' (1902); (Colonization of the New World' (in Distory of All Na¬ tions,' Vol. XXI, Philadelphia 1902) ; Unde¬ pendence of the New World' (Ibid., Vol. XXII, Philadelphia 1902) ; (Modern Development in the New World' (Ibid., Vol. XXIII, Phila¬ delphia 1902) ; (Unpublished Orations' (Bos¬ ton 1909). He also wrote an introduction to an English translation of (A History of Eng¬ lish Literature,' by H. A. Taine, to which his name is attached as editor (1872). From 1887 to 1899 he acted as editor of (Appleton's Cyclopedia of American Biography.' Consult Clark, J. S., Eife and Letters of John Fiske' (2 vols., Boston 1917) ; Green, S. S., (Remi- niscences of John Fiske' (Worcester 1902) ; Hubbard, E., (John Fiske' (in Eittle Journeys to Homes of Great Scientists,' Vol. XVII, p. 135, East Aurora 1905) ; Van Rensselaer, m! G., (Mr. Fiske and the History of New York' (in North American Review, Vol. CLXXIII p. 171, New York 1901).

FISKE, Minnie Maddern, American actress: b. New Orleans, 1865. Her

father, Thomas W. Davey, was a theatrical manager and from infancy Minnie spent much of her time about the theatre, appearing in a child's part when three years old. At 12 she was alternately playing leading roles and old women parts, and at 15 became a star under the name of Minnie Maddern. She played with many stars of the American stage, including John

McCullough, Laura Keene, Barry Sullivan, etc. In 1890 she was married to Harrison Grey Fiske and retired from the stage for five years. She returned to the stage in her husband's play, (Hester Crewe, > and starred in various plays, scoring noteworthy successes in etc. In 1901 she opened the Manhattan Theatre, an inde¬ pendent concern, and there produced (The Unwelcome Mrs. Hatch > and

FISKE, Stephen, American journalist and dramatic critic: b. New Brunswick, N. J., 22 Nov. 1840; d. New York, 27 April 1916. He was graduated from Rutgers College in 1862 and was admitted to the New York bar in 1864. Mr. Fiske soon abandoned the law for journal¬ ism and became an editorial writer on The New York Herald, later accompanying, as cor¬ respondent, the Japanese princes* the Prince of Wales, later King Edward, and President Lin¬ coln on their tours. In addition he acted as war correspondent for the Herald during the Civil War and also became dramatic critic for that paper, from which he resigned in 1866 to go to England in the yacht Henrietta during the Atlantic Ocean race. Following this, Mr. Fiske was with Garibaldi in Rome during the revolution and then returned to London, where he became manager of the Saint James Theatre and the Royal English Opera Company.

On his return to this country Mr. Fiske became manager of the old Fifth Avenue Theatre and during that time introduced Mme. Modjeska and Mary Anderson to the Ameri¬ can public. Later he founded the New York Dramatic Mirror and became one of the orig¬ inators of the Actors' Fund. Most recently Mr. Fiske had been dramatic editor of The Field, Illustrated. Among his plays were (Corporal Cartouche } (Martin Chuzzlewit,*

and (My Noble Son-in-Law,* while some of his books were (English Photographs* ; (Holiday Tales, * and (Offhand Portraits of Prominent New Yorkers) (1884), the latter containing much interesting material originally published in the Knickerbocker Magazine.

FISKE, Thomas Scott, American educator: b. New York, 12 May 1865. He was graduated at Columbia University in 1885, where he was successively fellow, assistant, tutor, instructor, adjunct professor and since 1897 professor of mathematics. He served as acting dean of Barnard College in 1899 and since 1902 has been secretary of the College Entrance Examination Board. In 1909-11 he was examiner in mathe¬ matics for the New York State Education De¬ partment. He wrote (Theory of Functions of a Complex Variable* (1906; 4th ed., 19,07) and is author of mathematical and educational papers and articles in American and foreign periodicals.

FISSILITY, a term used by some as a synonym for fracture cleavage; by others as a synonym for cleavage. See Rock-cleavage.

FISSION, fish'on, a term in biology applied to various separation processes, as cell-division of the bacteria and related algae, and the divid¬ ing of chromosonus (see Embryology). When

used in reference to hydroids and related ani¬ mals it means the process of reproduction by germination or budding, in which the offspring arises as a bud from the parent and is then con¬ stricted off. See Budding.

FISSIROSTRES, fic-i-ros'trez, one of the four or five tribes or sub-orders into which the insessorial birds were divided by early orni¬ thologists. The term is no longer used, as the group it represented was not a natural one. It contained the nightjars, swifts, trogons and various other more or less related families.

FISSURE, fish'ur. Any rock fracture or crack is a fissure, but generally the term is ap¬ plied to fractures of some size. If accompanied by dislocation of the rocks the fissure is termed a fault. The term true fissure vein so frequently used by miners should be applied to a vein formed along a fault. Such a vein is apt to have considerable length and sometimes great depth. As the term is commonly used by mine promoters it really means • nothing except that the promoter wants to give the impression that the mine he is trying to sell is on a vein that will go down indefinitely. See Fault; Joint; Ore Deposits.

FISSURE. See Brain; Rectum.

FISSURE NEEDLE, a spiral needle for drawing together the gaping lips of wounds. By revolution, the point is made to pierce the lips alternately, carrying its thread or silver wire with it. See Surgery.

FISTULA, a burrow or tract through the tissues. Usually the term is

applied to tracts be¬ tween cavities lined by mucous membrane or from a cavity to the body surface. The lining tissues of the tract are easily infected or continuously irritated, thus causing granulation tissues, which make it difficult to heal. Fistulae are formed by suppuration, or by a low grade of infection along the course of a false passage made by foreign bodies or surgical instruments. The most frequent sites are the anus, the rectum, the intestines, the bladder, the vagina and the sal¬ ivary ducts. Fistula in ano is always secondary to an abscess in the rectum or an abscess in the perirectal tissue. Abscesses here are difficult to heal, owing to constant infection from the faeces and the construction of the parts. Chronic alcoholics, consumptives and otherwise debili¬ tated subjects are particularly liable to these abscesses, and consequently to fistulae. When the passaere is from the bowel to the skin, with openings at both points, it is said to be com¬ plete. Blind internal and blind external fistulae are two other common varieties. The tissues about the anus may be riddled with these tracts. The conversion of the tract into an open wound must be made before a positive cure will result.

FISTULINA. See Fungi.

FIT, a sudden but temporary seizure of illness or disease, especially one accompanied by convulsive paroxyms. The term is also applied to a passing attack of gout, coughing, fainting, etc. In a borrowed sense it is used of any irregular period of action or inaction.

FITCH, Clyde. See Fitch, William Clyde.

FITCH, Ebenezer, American clergyman: b. Norwick, Conn., 26 Sept. 1756; d. West Bloomfield, N. Y., 21 March 1833. He was

graduated at Yale College in 1777, where in 1780 he was appointed tutor, and continued to act as such for several years. In 1790 he was chosen preceptor of the academy in Williams- town. Mass., and when in 1793 it grew into and was incorporated as Williams College, he was elected its first president, which office he filled with ability and success till 1815, when, resign¬ ing, he was chosen pastor of the Presbyterian Church in West Bloomfield, N. Y. This charge he held till 1827.

FITCH, John, American inventor : b. East Windsor, Conn., 21 Jan. 1743; d. Bardstown, Ky., 2 July 1798. He had few educational op¬

portunities and at the age of 17 went to sea for a short time. Later he worked as clockmaker, brassfounder and silversmith. At the outbreak of the Revolution he became a gunsmith for the American troops, with whom he wintered at Valley Forge. He next made surveying and trading tours in the West, as a result of which he made a map of the Northwest, and after es¬ caping from captivity among the Indians re¬ turned to Pennsylvania, where at Warminster in 1785 he completed his first model of a steam¬ boat ; this had wheels at the sides, which were replaced in the following year with paddles or oars. In the face of discouragement and neglect he succeeded in constructing a vessel, 45 feet long and 12 feet beam, with an engine of 12- inch cylinder, which made a successful trial trip on the Delaware, at Philadelphia, 22 Aug. 1787. Larger vessels were built in 1788 and 1790, the latter being run as a passenger boat, at eight miles an hour from Philadelphia to Burling¬ ton, Trenton, Chester and Wilmington through¬ out the summer. Misfortune, however, dogged (

Northwest, 1785, by John Fitch* (Washington 1916) ; Preble, G. H., (A Chronological His¬ tory of the Origin and Development of Steam Navigation, 1543-1882* (Philadelphia 1883) ; Purdy, T. C., deport on Steam Navigation in the United States* (in United States Census Office, 10th Census, Vol. IV, p. 653, Washington 1883) ; Rumsey, J., (A Short Treatise on the Application of Steam, etc.* (Philadelphia 1788) ; Thurston, R. H., (Growth of the Steam Engine* (New York 1878) ; Westcott, T., (Life of John Fitch, Inventor of the Steamboat* (Philadelphia 1857) ; Whittlesey, C., (J°lin Fitch* (in dibrary of American Biography,* Jared Sparks, ed., Vol. XVI, Boston 1845).

FITCH, Leroy, American naval officer : b. Indiana, 1835; d. 1875. In 1856 he was grad¬ uated at the United States Naval Academy. During the Civil War he served with the Mis¬ sissippi squadron and was made commander in 1870. He took part in the capture of Fort Donelson and as commander of the Moose pre¬ vented Morgan's forces from crossing the Ohio River and captured some of his supplies. He defended Johnsonville, Tenn., against the Con¬ federate General Forrest.

FITCH, Ralph, English merchant and voy¬ ager of the 16th century. He dealt in Eastern goods, and, excited by the narratives of Drake and other voyagers, persuaded John Newberie and others to join him in an expedition to the East by way of the Mediterranean. The ad¬ venturers set sail in January 1583, landed in Syria, went to Aleppo, and traversing Mesopo¬ tamia reached Bagdad. From that city they sailed down the Tigris and through the Persian Gulf to Ormus, where they began a profitable traffic. But their success roused the jealousy of

other European merchants in those parts, one of whom denounced them as heretics to the Portuguese inquisition. The Englishmen were thrown into prison at Goa, but finally released, and seeing reason to apprehend further injus¬ tice, they secretly escaped. After passing through Golconda, they traveled north through the Deccan, and visited successively Burham- poor, Mandoo, Agra, Allahabad, Benares, Patna, Tanda in Bengal, and a country called by Fitch Couche, which appears to be at the foot of the mountains of Bootan. In Septem¬ ber 1585 Newberie left to return to England, but was never again heard of. Fitch continued his journey and traveled south to Hoogly and through Orissa, passing by a port called An- geli, which he described as the seat of a great trade. It cannot now be identified. Returning to the Ganges, he saw Serampore and other towns on its lower branches, made an excursion into Tipperah, and took passage in a vessel to Negrais, in Pegu. He visited Malacca, went back to Bengal, shipped for Ceylon, and thence doubling Cape Comorin sailed to Cochim and Goa, and returned to England in 1591, by the same route he had come, after having per¬ formed the most extensive journey that had yet been made by any European in India. Fitch's narrative of his travels, which may be found in Hakluyt (Vol. II, pt. 1, pp. 245-271, London 1599), is exceedingly interesting not less for its quaint style than for the mass of information which it contains. Consult Ryley, J. H., (Ralph Fitch, etc.* (London 1899), which also contains the greater part of his narrative.

FITCH, William Clyde, American play¬ wright and author: b. New York, 2 May 1865 ; d. 1909. He was graduated at Amherst College 1886. His first play, (Beau Brummell,' was brought out by Richard Mansfield in 1890. This was followed by several adaptations from the French and German and a large number of original pieces. He quickly sprang into promi¬ nence and was the first American dramatist whose name was sufficiently well known to at¬ tract people to the theatre. His work often suffered from carelessness and haste, but it had about it an unmistakable mark of distinction. He wrote many successful plays, among them, (Beau Brummell' ; (The Climbers > (1905) ;

(The Way of the World) ; (The Girl and the Judge) ; (Barbara Frietchie' (1899); (The Moth and the Flame) ; (The Stubbornness of Geraldine) (1902) ; (The Girl with the Green Eyes) (1902) ; (Her Own Way' (1903) ; (The Woman in the Case) (1904) ; (The Truth' (1906) ; (The Straight Road' (1906) ; (The City' (1909). He is also the author of

(The Knighting of the Twins, and Ten Other Tales) (1891) ; (Some Correspondence and Six Con- versations) (1896) ; (A Wave of Life,' a novel. See Truth, The. Consult Moses, M. J., (The American Dramatist (Boston 1911), and Win¬ ter W., (The Wallet of Time) (2 vols., New York 1913).

FITCHBURG, Mass., city, one of the county-seats of Worcester County, on the New York, New Haven and Hartford and the Bos¬ ton and Maine railroads, 50 miles northwest of Boston. It comprises the villages of Traskville, Rockville, South Fitchburg, West Fitchburg and Cleghorn. It contains a public library, high school, State normal school, large musical library, Burbank Hospital, an old ladies' home, a home for working women, a children's home, electric street railroad, electric lights, several national and savings banks, and a number of daily and weekly newspapers. The various in¬ dustries employ about 5,000 people. There are manufactories of pianofortes, tools, machinery, paper, saws, electrical apparatus, turned-wood novelties, axle grease, boilers, lining metals, castings, pumps, steam-engines, bicycles, fire¬ arms, cotton and woolen goods, etc. The United States census of manufactures for 1914 showed within the city limits 137 industrial establishments of factory grade, employing 9,- 570 persons ; 8,837 being wage earners receiving annually a total of $4,815,000 in wages. The capital invested aggregated $24,881,000, and the year's output was valued at $23,983,000 : of this, $7,886,000 was the value added by manufacture. Fitchburg was settled in 1719, but formed a part of Lunenburg until 1764, when, it was in¬ corporated. It was chartered as a city in 1872. The government is administered, under the original city charter, by an annually elected mayor. Fitchburg owns its waterworks. Pop. 41,029. Consult Torrey, . (History of Worcester County) (Philadelphia 1889).

FITCHfE, or FITCHEE, fi-cha, in heraldry, pointed, like a dagger; sharpened at the lower part. Fitche is usually applied to crosses to in¬ dicate that they taper from the centre down¬ ward, or fitche at the foot, when the tapering commences only at the bottom of the cross. See Heraldry.

FITCHEW. See Polecat.

FITGER, fit'ger, Arthur Heinrich Wil¬ helm, German poet and painter : b. Delmen- horst, Oldenburg, 4 Oct. 1840; d. 1909. He was a pupil of Cornelius and Genelti at the Munich Academy; later he studied at Antwerp, Paris and Rome, and in 1869 established his studio in Bremen. As a painter he is known for his large decorative works. He has painted several important friezes and other decorations at Bre¬

men and Hamburg. He wrote several suc¬ cessful dramas: (Adalbert of BremeiP (1873), with the afterpiece (Here Empire! Here Rome !) (1875); (The Witch' . (1878) ;

FITTING, fit'mg, Heinrich Hermann,

German jurist: b. Manchenheim, 1831. He re¬ ceived his education at Wurzburg, Heidelberg and Erlangen and in 1857 became professor of Roman law at the University of Basel. Five years later he removed to Halle in a similar capacity. He retired in 1902. He published the Archiv fur die civilistische Praxis from 1864 to 1878 and is the author of (Der Reichs- civilprozess' (7th ed., 1890) ; (Das Reichscon- cursrecht und Koncursverfahren' (latest ed., 1904) ; (Die Anfange der Rechtsschule zu Bo¬ logna' (1888).

FITZ (old French for fils, son), a syllable frequently forming a prefix in English surnames (Fitz-Herbert, Fitz-Clarence, Fitz-James), like the Scottish Mac, and the Irish O'. Latterly Fits usually denoted illegitimate descent, espe¬ cially from English kings or princes of the royal blood. There are several noble families of such origin, who include their royal progen¬ itors in their genealogical tables.

FITZALAN, Henry, 12th Earl of Arun¬ del, English statesman: b. about 1511; d. 1580. Henry VIII was his godfather and pa¬ tron. In 1544 he was made Lord Chamberlain and held this position also under Edward VI. He was removed at the instigation of Warwick in 1550. He was implicated in several of the plots of the time, but his fidelity to Mary was rewarded by his being made her Lord Steward. Under Elizabeth he became Lord High Con¬ stable but resigned in 1564. He was discovered plotting in behalf, of Mary of Scotland, but escaped arrest until 1571 when he was impris¬ oned for one year. He was at length released and spent his last years in seclusion. Consult article by Nichols in the Gentleman's Magazine for 1833.

FITZALAN, Richard, Earl of Arundel and Warenne, English soldier: b. about 1307; d. 1376. He succeeded to the title in 1331 and six years later was made joint commander against Scotland and later placed in sole com¬ mand. In 1340 he was created admiral by Par¬ liament. He was present at Sluis and at the siege of Tournai. He commanded a division at the battle of Crecy and was afterward sent on diplomatic missions to Scotland and France. In 1355 he was regent of England. Little is known of his later years.

FITZALAN, Richard, Earl of Arundel and Surrey, English admiral: b. 1346; d. 1397. He succeeded his father in 1376, took a promi-

ncnt part at the coronation of Richard II and in 1380 was appointed commissioner to regulate the royal household. He was also made ad¬ miral of the West and won a signal victory over the French off Margate in 1387. He be¬ came a leader of the barons in their opposition to Richard, and in 1387 the king retaliated by having his judges declare Arundel's commission illegal. In the following year he returned with much booty from La Rochelle. He quarreled with John of Gaunt and joined his brother, the archbishop of Gloucester and Warwick, in a conspiracy against the king. After discovery, Arundel surrendered, was condemned and executed.

FITZALAN, Thomas, Earl of Arundel, English soldier: b. 1381; d. 1415. After his father's death in 1397 he was placed under the guardianship of the Duke of Exeter, by whom he was brutally treated. He effected his escape, joined his uncle, the archbishop, and allied him¬ self with Henry of Derby. Fitzalan regained his estates and titles and opposed Owen Glen- dower for several years. In 1405 he entered Wales in the company of the king. He was appointed treasurer, constable of Dover and guardian of the Cinque Ports. He died at Harfleur.

FITZBALL, Edward, English dramatist: b. Burwell, Cambridgeshire, 1792; d. 1873. His name was originally Ball, but he substituted the present form in 1819. He made his first dra¬ matic success with (The Innkeeper of Abbe- ville) (1820). This was succeeded by a drama¬ tization of (The Fortunes of NigeP (1822) ; and (Joan of Arc,* and he soon became a pro¬ lific dramatist, turning out plays to order in great number, and some of them having enor¬ mous success. Among his works are adapta¬ tions of Scott's (Peveril of the Peak) (1823) and (1828) ; Jonathan

Bradford) (1838) (400 nights) ; (Walter Tyr- relP (1835); (Zazezizozu> (1836); (The Mo¬ mentous Question) ; (The Miller of Derwent- water) ; and libretti for several of Balfe's, Donizetti's, Bishop's and Wallace's operas, and of the popular song (The Bloom is on the RyeP He was the author of (Thirty-five Years of a Dramatic Author's LifeP

FITZGERALD, fits-jer'ald, Desmond, American civil engineer: b. Nassau, Bahama Islands, 20 May 1846. He was educated at Phillips Academy, Andover, Mass., and was for 40 years in practice as hydraulic engineer, principally in connection with the Boston water-

supply system. He was department en¬ gineer of the Metropolitan Water Board of Boston; chairman of the Topographical Sur¬ vey Commission of Massachusetts ; chairman of the Brookline Park Commission and con¬ sulting engineer of the water supply and sew¬ age systems of Manila, P. I. He is past presi¬ dent of the American Society of Civil Engi¬ neers. He published (History of the Boston Water Works from 1868 to 1876) (1876) and (A Short Description of the Boston Water Works > (1895).

FITZGERALD, Edward, Lord, Irish patriot: b. near Dublin, Ireland, 15 Oct. 1763; d. 4 June 1798. He was a son of the first Duke of Leinster. He distinguished hirpself

for intrepidity as aide-de-camp to Lord Raw- don in the American Revolution, and was severely wounded in the battle of Eutaw Springs. He was fond of the woodsman's life and made a journey from Fredericton to Que¬ bec, was admitted at Detroit a member of the Bear Tribe and went down the Mississippi to New Orleans (1790). When the French Revo¬ lution broke out he supported its principles and in 1793 hastened to Paris. Here he married Pamela, the reputed daughter of Louis Philippe, Duke of Orleans, and Madame de Genlis, but in reality the daughter of Brisey, a French cap¬ tain, and Mary Sims, and a native of Fogo Island, Newfoundland. On his return to Ire¬ land, Fitzgerald was desirous of effecting a separation of that country from England and induced the French Directory to furnish him with a fleet and troops. A landing was at¬ tempted on several occasions, but without suc¬ cess, and Fitzgerald was seized, tried and con¬ demned to death. He died of his wounds before the time fixed for his execution, 1798. His wife married a second time, Mr. Pitcairn, the American consul at Hamburg, from whom, however, she separated soon afterward. Con¬ sult

FITZGERALD, Edward, English poet and translator: b. near Woodbridge, Suffolk, 31 March 1809; d. Merton, Norfolk, 14 June 1883. At 17 he entered Trinity College, Cambridge, where he graduated in 1830. At school and college he formed several lifelong friendships with men who afterward became celebrated in different spheres, among them being Spedding and Thackeray. At a later period he gained the friendship of Tennyson and Carlyle. His life was passed quietly — almost in retirement — in various parts of Suffolk, first at Bredfield, his birthplace, then near Ipswich, where he con¬ tracted friendships with George Crabbe, the son of his favorite English poet, and Bernard Barton, the Quaker poet; and lastly at Boulge Hall and Woodbridge. Books were his chief indoor recreation ; out of doors he occupied himself at first chiefly with boating and after¬ ward with his

garden. He married in Novem¬ ber 1856 Lucy Barton, daughter of the Quaker poet; but it was an ill-assorted union, and they soon separated. While a man of large and generous impulses he had no liking for the conventional usages of society. Fitzgerald's works are not numerous, by far the most im¬ portant being his celebrated translation of the (Rubaiyat) (or quatrains) of the Persian semi- pessimistic astronomer-poet, Omar Khayyam. His first translation from the Persian appeared in 1856, an edition of Jame's (Salaman and AbsalP Three years later his magnum opus fell on an unregarding public. Declined by Frase/s Magazine in 1858, it was originally published at 5s. and had been relegated to the ((penny box® when in 1860 it was discovered by Dante Gabriel Rossetti, who was soon joined by Swinburne in appreciation of the poem. Even so, it was nine years before a second edition was called for. Fitzgerald took great liberties with his original, picked and chose his material and strove rather to express the atmosphere than to give a faithful translation. In the result, he has rendered both poet and trans-

lator immortal. Edition after edition has fallen from the press and it would be impossible to overpraise it as a work of literary art. «De-lightful picture follows delightful picture; thoughts that have occupied the world's great¬ est thinkers in all ages are clothed in the finest language; the perfect word falls into the precise place; everything is compact, polished, subtle and magnificent." Other works by Fitz¬ gerald are cEuphranor: a Dialogue on Youth) (1851) ; (Polonius : a Collection of Wise Saws and Modern Instances > (1852) ; both of which appeared anonymously; (Six Dramas of Cald¬ eron, freely translated by Edward Fitzgerald) (1853) ; and translations of zEschylus' < Aga¬ memnon and the <(Edipus) plays of Sophocles. Tennyson's poem (Tiresias,) was dedicated to Fitzgerald. Consult ˆLetters and Literary Re¬ mains of Edward Fitzgerald, > edited by W. Aldis Wright (1889; new ed., 1894); (Life,> by Thomas Wright (1904) ; (Variorum Edition of the Poetical and Prose Writings of Fitz¬ gerald, } edited by Bentham (1902-03); and (Edward Fitzgerald,) by A. C. Benson, in Eng¬ lish Men of Letters, > series (1905).

FITZGERALD, James Newbury, Amer¬ ican Methodist bishop: b. Newark, N. J., 27 July 1837; d. Hong Kong, China, 3 April 1907. He studied law and was admitted to the New Jersey bar in 1858, but in 1862 entered the Methodist ministry. He was recording secre¬ tary of the missionary society of his denomina¬ tion 1880-88 and was

appointed bishop in 1888. In 1895 he made the episcopal visitation of the South American and European conferences. For many years he was a trustee of Drew Theological Seminary and vice-president of the board. In 1897-1907 he was president of the Ocean Grove Camp Meeting Association, a position which conferred upon him the duties and powers of mayor of a prominent summer resort, famous as a centre of religious and musical activities. He died at Hongkong, on an episcopal visitation to the Oriental mission conferences.

FITZ-GERALD, John Driscoll, II, Amer¬ ican Hispanic scholar: b. Newark, N. J., 2 May 1873. He was graduated at Columbia University in 1895. He studied Romance philology at Berlin, Paris and Madrid. From 1898 to 1902 he was assistant, in 1902-07 tutor, 1907-09 instructor in Romance languages and literatures at Columbia University. From 1909 to 1915 he was assistant professor of Romance languages and literatures and since 1915 has been professor of Spanish at the University of Illinois. He is corresponding member of the Real Academia Espahola de la Lengua. In 1914 he was sent to South America by the American Association for International Con¬ ciliation. He edited (La vida de Santo Domingo de Silos, par Gonzalo de Berceo) (1904) ; Lope de Vega, (Novelas a la Senora Marcia Leonarda) (1913). He is associate editor of the Romanic Review and has written (Versification of the Cuaderna Via as found in Berceo's Vida di Santo Domingo de Silos) (1905) ; (Rambles in Spain* (1910), and articles in encyclopedies, periodicals etc.

FITZGERALD, John Francis, American public official: b. Boston. Mass., 11 Feb. 1863. He was educated in the. Eliot Grammar School

and the Boston Latin School and took a short course at Harvard. He is principal owner of the weekly journal called the Republic ; was elected a member of the Boston common council in 1892 and in 1893-94 was a member of the State senate of Massachusetts. Pie was elected to the 54th, 55th and 56th Con¬ gresses (1895-1901), and in 1906-07 served as mayor of Boston. He was re-elected to this office in 1910, serving until 1 Jan. 1914.

FITZGERALD, Oscar Penn, American Methodist bishop : b. Caswell County, N. C., 24 Aug. 1829; d. 1911. He was ordained a Methodist minister in Georgia 1853, went to California 1855 and became editor of the Pacific Methodist and Christian Spectator , serving as State superintendent of public in¬ struction in California 1867-71 and being ap¬ pointed editor of the Nashville Christian Advo¬ cate 1878. He was made a bishop of the Methodist Episcopal Church, South, 1890. His works include ˆCalifornia Sketches*; (Christian Growth) ;

(Glimpses of Truth) ; (A Life Study* ; (Century Cameos* ; (Bible Nights* ; (Eminent Methodists*; (The Whetstone) ; (The Epworth Book) ;

FITZGERALD, Percy Hetherington,

Irish novelist and miscellaneous writer: b. Fane Valley, South Ireland, 1834. Educated at Trinity College, Dublin, and was called to the Irish bar in 1855. 'He has produced some 200 volumes, including fiction, travel, biog¬ raphies, essays and books of devotion. He has also shown talent as a sculptor.

FITZGERALD, Ga., city and county-seat of Ben Hill County, 70 miles southeast of Macon, on the Atlanta, Birmingham and At¬ lantic, the Seaboard Air Line and other rail¬ roads. It has cotton compresses, cotton mills, oil mills, railroad shops, etc. Lumber and tur¬ pentine are important articles of commerce. The city owns the electric-lighting plant and the waterworks. Pop. (1920) 6,870.

FITZGIBBON, Mary Agnes, Canadian author: b. Belleville, Ontario, 1851; d. 1915. She was educated in Belleville and at Pinehurst Academy, Toronto. She founded the Women's Canadian Historical Society in 1894 and in 1905 took part in founding the Female Immi¬ grants' Receiving Home in Toronto. She pub¬ lished (A Trip to Manitoba, or, Roughing It on the Line* (1880) ; (Home Work* (1887) ; (A Veteran of 1812) (1895; 2d ed., 1898); (Historic Davs) (1898) ; (A Trip to Niagara* (1909); (The Cabot Calendar, 1497-1897,* with Sara Mickle (1898).

FITZGIBBON, Mary Irene, American philanthropist: b. London, England, 12 May 1823; d. New York, 14 Aug. 1896. She re¬ moved to New York early in life; entered the community of the Sisters of Charity at Mount Saint Vincent in January 1850 where she was known from then on as Sister Mary Irene, and became sister superior of Saint Peter's School,

Barclay street, New York in 1856. In 1869 Archbishop (later Cardinal) McCloskey re¬ quested her to organize a home for the care of the waifs of the diocese. On 11 Oct. 1869 the New York Foundling Hospital was opened and within a month was caring for 45 children. During the same year the legislature authorized the city to grant the asylum a site and to ap¬ propriate $100,000 toward a building,

providing an equal amount should be provided by sub¬ scriptions. This amount was soon raised. At the time of Sister Irene's death, the buildings of the asylum covered an entire block and were valued at over $1,000,000. Aside from having full charge of this institution from its inception, Sister Irene raised $350,000 with which she founded the Seton Hospital for Incurables at Spuyten Duyvil.

FITZHERBERT, Sir Anthony, English jurist: b. Norbury, Derbyshire, 1470; d. 1538. He was educated at Oxford, was called to the bar and in 1523 was appointed justice of the Court of Common Pleas. He signed the im¬ peachment of Cardinal Wolsey in 1529 and presided at the trial of John Fisher and Sir Thomas More. He had a high reputation for integrity and his legal learning is attested by his works. He is the author of Wa Graunde Abridgement, ' a digest of cases written in Old French (1514) ; (The Office and Authority of Justices of the Peace) (1538, 1794) ; (New Natura Brevium' (1534; last ed., 1794). To him are attributed the (Book of Husbandry' (1523) and (The Book of Surveying' (1523), but these are in all likelihood the work of an¬ other.

FITZHERBERT, Maria Anne (Smythe),

morganatic wife of King George IV of Eng¬ land; b. Brambridge, England, 26 July 1756; d. Brighton, England, 27 March 1837. Her first husband was Edward Weld, to whom she was married in 1775. He died within a year and she was married to Thomas Fitzherbert 1778. He died in 1781 and she was married to the Prince of Wales 21 Dec. 1785. The mar¬ riage was never either publicly avowed or dis¬ avowed by George, but it was known to both that the Marriage Act of 1772 invalidated any marriage contracted by a member of the royal family under 25 years of age without the king's consent. Mrs. Fitzherbert was a Roman Catho¬ lic and by the Act of Settlement, if the heir apparent married a Roman Catholic, he for¬ feited his right of succession. There was a general understanding that a marriage had taken place, however, and she was received by the best society and by members of the royal family and was treated by Prince George as his wife. Some time before his marriage to Caroline he ceased for a time to live with her, but in 1800 the connection was resumed and continued until 1803, when it was finally ter¬ minated at her desire because of his attentions to Lady Hertford. William IV offered to make her a duchess and allowed her to use the royal livery. Consult Wilkins' (Mrs. Fitz¬ herbert and George IV' (London 1905).

FITZ-HUGH, Thomas, American edu¬ cator : b. Longwood, Goochland County, Va., 12 Oct. 1862. He was graduated at the Univer¬ sity of /

irginia in 1883 and made postgraduate studies in classical philology at Rome and Pompeii and at the University of Berlin. In

1883-84 he was professor of Latin at Central University, Kentucky, professor at the Univer¬ sity of Texas from 1889 to 1899 and since 1899 professor of Latin at the University of Virginia, He published (The Philosophy of the Humani¬ ties' (1897) ; (Outlines of a System of Classi¬ cal Pedagogy' (1900) ; Bulletins of the School of Latin, University of Virginia, and contri¬ butions to philological journals.

FITZ-JOHN PORTER CASE, The. See

Porter, Fitz-John.

FITZMAURICE, Sir Maurice, English civil engineer: b. 11 May 1861. He was edu¬ cated at Trinity College, Dublin, was appren¬ ticed to the late Sir Benjamin Baker. He was engineer of the Rotherhithe tunnel, the new Vauxhall bridge, Kingsway and Tramway Sub¬ way and the duplication and extension of the London Main Drainage System. In 1913 he visited Australia to advise on naval harbors and works; visited the British front in Flanders in 1915 at the request of the War Office to advise on questions of drainage. He wrote (Plate Gir-' der Railway Bridges' and (Main Drainage of London.'

FITZMAURICE-KELLY, James, English scholar: b. 20 June 1858. He was appointed Gilmour professor of Spanish in Liverpool University in 1909, and has published (The Life of Miguel de Cervantes Saavedra' (1892) ; (History of Spanish Literature' (1898) ; Wope de Vega' (1902) ; (Chanters on Spanish Liter¬ ature' (1908) ; (A Memoir of Cervantes' (1913) ; and he has edited the complete works of Cervantes.

FITZPATRICK, Charles, Canadian lawyer and politician : b. Quebec, 19 Dec. 1853. He was graduated at Laval University in 1873 and being admitted to the bar in 1876, was appointed Crown prosecutor for the city and district of Quebec 1879 and 1887. He was a member of the Quebec assembly 1890-96 and was elected to the Dominion Parliament 1896 was Solicitor- General 1896-1902, Minister of Justice 1902-06 and became chief justice of the Supreme Court of Canada in 1906. He was British representa¬ tive on The Hague Tribunal on the North At¬ lantic fisheries reference before that tribunal in 1910, to which Canada and the United States were parties.

FITZPATRICK, William John, Irish

author: b. Dublin, 1830; d. 1896. He received his education at the Jesuit College of Clon- gowes Wood and at Trinity College, Dublin. He

became professor of history at the Royal Hibernian Academy in 1876. He was the author of several biographical and historical works, which are of great value to the student of Irish history. They include Wife of Lord Cloncurry' (1855) ; (The Life, Times and Cor¬ respondence of Dr. Doyle, Bishop of Kildare and Leighlin' (2d ed., 1880) ; Word Edward Fitzgerald' (1859) ; (The Sham Squire' (1866); Wish Wits and Worthies' (1873); Wife of Charles Lever' (1879) : Wife of Thomas N. Burke O. P.' (1886); Waniel

O'Connell the Liberator: His Letters and Cor¬ respondence' (1889) ; (Secret Service Under Pitt' (1892).

FITZRALPH, Richard, English prelate: b. Dundalk, Ireland, about 1300; d. Avignon, 16 Nov. 1360. He took orders, becoming Fellow

of Balliol College, Oxford, and being made chancellor 1333. He was appointed archbishop of Armagh 1347. He earned a great reputa¬ tion as a preacher and was much in favor with the Pope at Avignon. He took a prominent part in the refutation of the heresies of the Armenian Christians, and took up the cause of the secular clergy against the mendicant friars in England, declaring that mendicancy had no warrant either in Scripture or primitive tradi¬ tion. In connection with the former he wrote an argument, (Summa in Questionibus Arme- niorump and in reference to the latter a treat¬ ise (De Pauperie SalvatorisP When summoned by the friars before Pope Innocent VI he de¬ fended himself in a notable sermon, (Defensio CuratorumP but died before the case was de¬ cided. His bones were taken to Dundalk 1370, where his tomb became an object of veneration.

FITZROY, Augustus H. See Grafton, Duke of.

FITZROY RIVER, the name of two Aus¬ tralian rivers, one in western Australia and one in Queensland. The former rises in the King Leopold Mountains, empties in King Sound and is navigable for 100 miles ; length 300 miles. The Queensland River is formed by the junction of the Mackenzie and the Dawson, discharges in Keppel Bay and is navigable to Rockhamp¬ ton, 35 miles from its mouth.

FITZSIMMONS, Robert, Australian- American pugilist : b. Helston, Cornwall, 4 June 1862; d. Chicago, — Oct. 1917. At the age of nine he migrated with his parents to New Zealand, and was settled as a

blacksmith at Timaru when Jem Mace promoted a local heavyweight competition, which Fitzsimmons won. Within a year after his debut in the ring he was champion of New Zealand. A success¬ ful contest with Herbert Slade, the big Maori, who afterward fought Sullivan, induced the blacksmith to adopt fighting as a profession. He went to Australia, won various contests, and met his first defeat at the hands of Jem Hall for the middleweight title. He reversed this verdict three years later, when he knocked Hall out in four rounds at New Orleans. On his arrival at San Francisco Fitzsimmons was matched against Jack Dempsey for the middle¬ weight championship*of the world. The Amer¬ ican fell in the 13th round. Peter Maher, the Irish heavyweight, was next beaten in 12 rounds. Except for a draw with Joe Choynski in Boston in June 1894 and a dubious ((foul)) verdict against him in a fight with Tom Shar¬ key in December 1896, Fitzsimmons enjoyed an uninterrupted series of victories for the next six years. On 17 March 1897 he defeated James J. Corbett at Carson Citv and won the heavy¬ weight title. He met the gigantic Jim Jeffries at the Coney Island Athletic Club on 9 June 1899 and was defeated. He determined to fight Jeffries again, meanwhile knocking out all who came before him, including Gus Ruhlin, (

tempts — -against Jack Johnson in July 1907, and against Bill Lang, when 50 years of age. Fitz¬ simmons flourished in the palmy days of the boxing ring; he held simultaneously the heavy, light-heavy and middleweight championships of the world. He never fought in England, his native country; though Australian by training, it was in the United States that he won most of his fame. He was a naturalized Amer¬ ican citizen.

FITZWALTER, Robert, English baron, leader of the opposition to King John: d. 1235. He was a member of the official aristocracy and a follower of John in his Norman wars. In 1212 he was an opponent of the king because, as he alleged, the latter had attempted to se¬ duce his daughter. Being implicated in the baronial conspiracy he escaped punishment by fleeing to France. He returned under an am¬ nesty and continued his agitation against the king, being chosen ftmarshal of the army of God and Holy Church® in 1215. Linder his leadership the barons forced the king to sign the Magna Charta and was appointed one of the 25 executors of the famous charter. He en¬ countered bitter opposition from the royal party and was constrained to seek aid from France. He was disliked by the French, but served King Louis faithfully until his capture at Lincoln in 1217. Fitzwalter joined the Da- mietta crusade in 1219, and soon after returned to England. Consult Michel, F. (ed.), (His- toire des dues de Normandie et des rois d'An- gleterre) (Paris 1840).

institution at Cambridge University. England, founded by a bequest of Richard, 7th Vis¬ count Fitzwilliam (1745-1816). He left to it a large collection of books, paintings and en¬ gravings, to which successive additions have since been made, the most important being the Marlay Collection, added in 1912. It contains many artistic treasures, including works of Holbein, Turner, Rubens, Gainsborough, Ho-‘ garth and Rembrandt. The collections are housed in a fine building in Grecian style.

FIUME, fe-oo’me, free town and seaport of the Adriatic, geographically a part of Croatia, but forming, together with its adjoining terri¬ tory, since 1920 a free state under the Treaty of Rapallo. It is picturesquely situated at the head of the Bay of Quarnero, an inlet of the Adriatic, and is about 40 miles southeast of Trieste. The views of the ba}r and town are beautiful, and the environs are attractive. Fiume consists of the old town built on a hill, with crooked narrow streets, and the new town stretching along the shore, with fine broad streets, handsome squares and numerous ele¬ gant public buildings. The public garden is par¬ ticularly worthy of mention. Among the edi¬ fices, the most interesting are the cathedral (founded 1377), with a modern facade in the style of the Pantheon at Rome; the church of Saint Vitus; the Pilgrimage Church, ap¬ proached by a stairway of 400 steps ; the town hall, the government buildings, the Naval Acad¬ emy and the municipal theatre. There is a Roman triumphal arch, supposed to have been erected to Emperor Claudius II Gothicus. Fiume has several harbors, the largest, begun in 1872, being capable of accommodating 15C large vessels. It is protected by a breakwater

3,250 feet in length, flanked by a quay nearly two miles long. The entire port is lighted by electricity. The city, owing to the active inter¬ est shown by Hungary in this, its only important seaport, has an extensive and steadily increas¬ ing commerce. The chief articles of import are wine, rice, tobacco and raw jute; of export, flour, sugar and lumber. The manufactures of Fiume are flourishing. The chief industrial es¬ tablishments are the government tobacco fac¬ tory, the large Whitehead torpedo works, an enormous petroleum refinery, a rice-shelling factory, an extensive paper mill, flour mills, saw mills, tanneries and rope factories. The fisheries are important, those of

tunny being especially rich.

Fiume is fully equipped with banks, com¬ mercial unions and industrial associations. *It is administered by a governor, who is a member of the Upper House of the Hungarian Parlia¬ ment. The town sends one representative to the Lower House. The chief educational in¬ stitutions are the Naval Academy, a royal gym¬ nasium and two high schools. There is a Uni¬ ted States consul. Fiume with its territory has an area of 21 square kilometers (8.1 square miles). Pop. (1910) 49,886, chiefly Italians, Illyrians and Croatians. Fiume was a town of the Byzantine empire. In the 9th century it was ruled by its own dukes. In 1471 it came into the possession of Austria and in 1779 was attached to the Crown of Hungary. From 1849 to 1870 it formed part of Croatia. The city was seized in September 1919 by Gabriele D'Annunzio, who tried to hold it for Italy. The latter, however, was obliged by the Entente to denounce D'Annunzio's act. By the Treaty of Rapallo, 12 Sept. 1920, the city was made a free state. See Annunzio, Gabriele d'.

FIVE-CENT PIECE, HALF-DIME, or "NICKEL.® Silver half-dimes (originally they were called in official language "half- dismes®) were the first coins struck in October 1792 at the first United States Mint in Phila¬ delphia under the Coinage Act of 2 April 1792. They contained 18 9/16 grains of pure or 20 4/5 grains of standard (alloy) silver. These weights were changed at various times by the successive acts of 1837, 1853 and 1873. The sil¬ ver half-dime was discontinued by the act of 1873. Its place was taken by the five-cent piece, commonly known as "Nickel,® authorized by the act of 16 May 1866, weighing 77.16 grains and consisting of 75 per cent copper and 25 per cent nickel. Both half-dimes and five-cent pieces have undergone various changes in de¬ sign. None were coined in 1798, 1799, 1804 or 1806 to 1828. (See Coin; Numismatics). Con¬ sult Anon., (The Monetary Legislation and Currency System of the United States) (in United States Mint Bureau, 23d Annual Report of the Director, pp. 116-189, Washington 1895) ; Evans, G. C., ed., (Illustrated History of the United States Mint, etc.} (.Philadelphia 1890) ; United States Mint Bureau, (Catalogue of Coins, etc., in the Numismatic Collection of the Mint of the United States in Philadelphia) (3d ed., Washington 1914).

FIVE CIVILIZED TRIBES. See In¬

dian Affairs.

FIVE FORKS, Battle of. At the close of the battle of Dinwiddie Court House, 31 March

1865, General Sheridan was holding a position in front of the place, General Pickett, with in¬ fantry and cavalry, confronting him. At 12 p.m. Pickett, threatened by Warren's Fifth corps on his left, ordered a retreat to Five Forks, some 15 miles to the southeast, to protect his communications with the South Side Railroad. Sheridan followed him at daylight with Devin's and Custer's divisions, Crook's division being thrown on roads to the left. Pickett was found entrenched at Five Forks. By 1 p.m. Sheri¬ dan's cavalry had worked close up to Pickett's lines, and Sheridan ordered up the Fifth corps. MacKenzie's cavalry division, advancing on the extreme right, drove back Robert's cavalry and gained the White Oak road.

At 4 p.m. Warren had formed his lines, Ayres' and Crawford's divisions in double lines, with one brigade in reserve, on the left and right respectively of the Gravelly Run Church road. A few 'moments brought Warren to the White Oak road, and Ayres, whose right had crossed it, received a severe fire upon his left, and at once changed front and attacked the return of the entrenchments. Crawford kept straight on through the woods and, receiving fire from Munford's cavalry, swerved to the right, thus isolating his division from Ayres, and Griffin followed Crawford. But Griffin and his bri¬ gade commanders, taking in the situation, soon marched by the left flank and protected Ayres' flank, which had been thrown into some con¬ fusion. Ayres meanwhile, connecting with the cavalry on his left, had made a gallant charge, carried the left of the Confederate works and, with support on the left and right, swept down inside them to and beyond Five Forks, captur¬ ing many prisoners. The only stand the Con¬ federates tried to make was on the road leading to the railroad, and at this point they were pressed so closely by Griffin and Crawford that they soon gave way. On the right Warren took Crawford's division in hand, changed its direc¬ tion to the left and, advancing in rear of the Confederate infantry line, with MacKenzie's cavalry on the right, drove Munford's cavalry, continually turning the left of the Confederates opposing Ayres and Griffin, gained the road leading to the South Side Railroad, forced Munford north of Hatcher's Run, and took four guns and many prisoners. On the extreme left Custer had a severe fight with cavalry and in¬ fantry, and gained but little ground until Devin and Ayres advancing behind the works drove the infantry out. The Confederate cavalry made no further stand, save to cover the retreat, and just before dark Custer, in connection with an attack by a small body of the Fifth corps, led by Warren in person, drove the last of the Con¬ federates westward on the White Oak road, and followed them until long after dark. The bat¬ tle was one of the most decisive of the war. The Confederates were totally routed, losing over 5,000

men captured, 6 guns and 11 colors. The Union loss was 830 killed and wounded, of which the Fifth corps lost 634. The Confed¬ erate loss in killed and wounded is not defi¬ nitely known. Consult Humphreys, A. A., (The Virginia Campaign of ’64 and ’65, etcP (New York 1883) ; Powell, W. H., (The Fifth Army Corps) (New York 1896) ; Sheridan. P. H., (Personal Memoirs> (2 vols., New York 1888) ; United States War Department, (The War of

the Rebellion. Official Records) (Ser. I, Vol. XLVI, part 3, Washington 1893; Atlas, Wash¬ ington 1891-95). E. A. Carman.

FIVE HUNDRED, Council of (Conseil des Cinq Cents), the lower house of the legis¬ lature, created under the French constitution of 1795 (HI). According to the constitution two-thirds of the council was to be made up from the membership of the convention. All legislation was to be initiated and debated by the council which reported its action to the Conseil des Anciens, or upper chamber. The council was dissolved by Bonaparte on 10 Nov. 1799 (19 Brumaire, of the Year VII). See France; History.

FIVE MEMBERS, The, a collective name applied to the five members of Parliament whom Charles I attempted to arrest by appearing in the House of Commons with an armed force on 4 Jan. 1642. They were John Pym, John Hampden, Denzil Holies, Sir Arthur Haselrig and William Strode, representing in the Com¬ mons Tavistock, Buckinghamshire, Dorchester, Leicestershire and Beeralston respectively. The king, expecting an impeachment of the queen, determined to prevent it by impeaching these commoners along with Lord Kimbolton and at the same time take revenge on these men for the leading part which they had taken in the mat¬ ter of the Grand Remonstrance (q.v.). On 3 Jan. 1642 he sent their impeachment to the two houses and demanded their delivery to him. The impeachment was subsequently abandoned when the Commons had declared against the il¬ legality of his procedure. (See England). Con¬ sult Forster, J., (Arrest of the Five Members by Charles I’ (London 1860) ; id., (The Debates on the Grand Remonstrance, 1641) (London 1860) ; Gardiner, Cordery, B. M., and Phill- potts, J. S., (King and Commonwealth) (Phila¬ delphia 1876) ; Gardiner, S. R., (The Fall of the Monarchy of Charles P (2 vols., London 1882) ; id., (The Constitutional Documents of the Puritan Revolution) (Oxford 1889).

FIVE MILE ACT. An act known as the Clarendon or Oxford Act passed by Parliament in 1665. It prohibited any clergyman ejected from his living in 1662 by the enactment of the Act of Uniformity from approaching nearer than five miles to any town, city or parish where he had formerly preached. The penalty for disobedience was £40. It was a severe blow to the Puritans. The text of the act is in the volume of (Documents, ' edited by Gee and Hardy, pp. 620-623.

FIVE NATIONS. See Iroquois.

FIVE POINTS, New York, a locality be¬ tween Centre and Worth streets and Park street. At one time it was noted as a resort for crim¬ inals and ((hard cases.® Under the auspices of the Woman's Home Missionary Society of the Methodist Episcopal Church, the late Rev. L. M. Pease and Mrs. Pease began reform work at Five Points in 1850. The church of the As¬ cension for a few years contributed funds to establish an industrial school which, in 1854, was incorporated and became a separate insti¬ tution. The mission secured by purchase and by building an excellent home, which they oc¬ cupied until 1909 when the institution was moved to the country. A city reception house is still maintained at 454 West 23d street, New York.

In 1911 Mr. and Mrs. W. C. Osborn presented a 286-acre farm at Pomona, Rockland County, N. Y., on which the institution is now located in form of a farm colony. Since its founda¬ tion it has been instrumental in the reclamation of thousands of destitute, especially of chil¬ dren, on whom, during most of its existence, the work has been centred. Many years previous to its removal the institution was an important factor in changing the entire neighborhood greatly for the better. The most important step in this direction was the creation of a park and playground, on immediately adjoining ter¬ ritory. In more recent years the entire neigh¬ borhood has practically lost its identity by the purchase and destruction of most of its build¬ ings on the part of the city of New York to make room for a new courthouse and other municipal improvements which, however, have not been carried out, so that for a number of years the region has been unused. Consult Anon, (The Five Points ' (in National Maga¬ zine, Vol. II, pp. 169 and 267, New York 1853) ; Barnard, W. F., (Forty Years at the Five Points' (New York 1893) ; Five Points House of Industry, < Annual Reports of the Trustees' (New York 1855 ff.) ; Five Points Mission, (The Old Brewery and the New Mission House at the Five Points, etc.' (New York 1854).

FIVE POINTS OF DOCTRINE, the

principal subjects of doctrine which are dis¬ puted topics between Arminians and Calvin¬ ists. They are: (1) extent of the atonement; (2) predestination; (3) free will; (4) grace; (5) final perseverance. Various efforts have been made to settle the differences; they were fully discussed at the Synod of Dort (q.v.), in Holland, in 1618-19; at Cambridge, in Eng¬ land, in 1594, and at two other conferences held in England in 1626.

FIVE-TWENTIES (that is, redeemable after 5 years and payable in 20 years), 6 per cent gold bonds issued in 1862, 1864 and 1865.

FIVES, (1) English game, in the United States usually called handball, in which the ball is struck against a wall with the hand, usually protected by a glove. It is played either in close or in open courts, though more fre¬ quently in the open, of various shapes and pro¬ portions. In England there are two varieties, the Eton and the Rugby game. The origin of the name is disputed. (See Handball). Con¬ sult Heathcote, J. M., (Tennis, Lawn Tennis, Rackets, Fives' (London 1890) ; Tait, A..

(Fives' (in (All England Series,' London 1893-date). (2) Also a disease in horses, resem¬ bling the staggers, and consisting of an inflam¬ mation of the parotid glands ; written cor¬ rectly vives.

FIXED AMMUNITION. See Ammu¬ nition.

FIXED OILS, in medicine, non-volatile oils used as demulcents, laxatives and in ex¬ ternal application as emollients. Some, notably linseed oil, while still in the seed, are very useful in poultices because of the high specific heat of the oils. By means of this specific heat the poultice stays warm much longer. Others of the fixed oils are useful as foods — cod-liver oil, peanut oil, etc. See Oil.

FIXING. (1) In machinery, a piece of cast iron adapted to carry pillow blocks and the

like. When it is built into a wall it is called a wall fixing, or wall box; when attached to a wall by bolts it is a plate fixing. There are also beam fixings, as when wheels are intended to work at the position where the fixing is situated; and when the fixing is adapted to them, it

is then commonly called a wheel fix¬ ing. (2) In metallurgy, the material used in preparing the hearth of a puddling or boiling furnace for receiving its charge. It is called fettling in some parts of England. (3) In photography, of a negative ; the removal, by a solution of hyposulphite of soda or cyanide of potassium, of the unaffected deposit of iodide and bromide of silver in' the collodion film after exposure and development of the picture. Of a positive ; the removal of the unaltered chloride of silver from the surface of the photographic paper after exposure under the negative.

FIXTURES, in American and English law, chattels so attached to the freehold as to con¬ stitute, in legal contemplation, a part of it. The harshness of the common law favoring the freeholder in this matter has been much modified in late years by statutes and by de¬ cisions of the courts, both in the United States and in the British Empire. The question as to whether a chattel is to be treated as such or as a fixture and therefore a part of the realty is important because of the radically different rules of law which apply to the disposition or acquirement of personalty and of realty. The question arises very frequently in the relations of landlord and tenant, of buyer and seller, of executor and heir, and of executor and re¬ mainderman or reversioner.

As to what constitutes a fixture is largely determined by the circumstances in each case, but a controlling factor is whether there has or has not been any actual annexation to the soil. The general rule at common law is that if a tenant affixes a chattel to the freehold during his tenure he may not remove it except by the permission of the owner. Both in the United States and Great Britain, an exception has been made in the case of trade fixtures, subject to the qualification that the removal must be made by the tenant before the close of his term. However, it has been held that even trade fixtures cannot be removed by a tenant if such removal causes injury to the freehold, changes the nature of the articles or is contrary to the usual custom of the com¬ munity. Buildings erected by the tenant may or may not be fixtures. They are not such if built upon rollers, blocks or the like. Orna¬ mental fixtures, as chandeliers, marble chim¬ ney-pieces and pictures, particularly when se¬ cured by screws, have been held to belong to the tenant. Heavy objects, as monuments, unattached to the realty in any manner except by their own weight, if intended to improve the freehold permanently, have, on the contrary, been held to be fixtures.

In both England and the United States the rule as to what constitutes fixtures varies some¬ what with the parties in controversy. The American decisions are not in accord with the English holding that a

tenant, in the absence of an express agreement or permission by the landlord, cannot remove buildings erected by the former for agricultural purposes. English

decisions favor the heir as against a remainder¬ man. As between seller and buyer the tend¬ ency in both countries is to consider all ques¬ tionable articles as fixtures, although the in¬ tention of the parties has weight, and the same rule applies as to mortgagor and mortgagee. Likewise the heir is favored as against the executor.

Annexation may be either actual or con¬ structive. As examples of articles held to be constructively annexed may be cited deeds and chattels relating to the title of the inheritance, and these go to the heir.

A tenant for years may . exercise the right of removal after his term if he is in possession and rightfully holding over.

FIZEAU, fi -zo', Armand Hippolyte Louis,

French physicist: b. Paris, 23 Sept. 1819; d. Venteuil, 18 Sept. 1896. His first researches were in photography. Together with J. B. L. Foucault (q.v.), he carried on researches con¬ cerning the interference of heat and of light. The results as to the velocity of light (q.v.) that constitute his best-known work were pub¬ lished in 1849; and in 1850, with the collabora¬ tion of E. Gounelle, he determined the speed of the electric current. His later investigations dealt with the use of condensers in connection with the induction coil, and with the expan¬ sion of solids by heat and its measurement by means of the interference of light. In 1860 he was elected to the French Academy and from 1878 on he was a member of the Bureau des Longitudes.

FJORD. See Fiord.

FLABELLUM. See Fans.

FLACCUS, Caius Valerius, ka/yus va- le'ri-us flak'us, Roman poet of the latter half of the 1st century. Very little is known about him definitely, except that he died about 90 a.d. in which year Quintilian laments his recent death. Some authorities add Setinus Balbus to his name, but it is doubtful whether these two words were really part of his name, though they appear on a manuscript of his work in the Vatican. He is also frequently confused with a poet friend of Martial. He sung the expedi¬ tion of the Argonauts in an epic poem, (Argo-nauticaP of which seven books and part of the eighth have remained to us. It is partly a translation and partly an imitation of a sim¬ ilar

work by Apollonius of Rhodes. It was dedicated to Vespasian and apparently took him at least 10 years to write. The estimates of his work vary greatly. He has little originality and is most of the time deadly monotonous and very artificial. On the other hand his Latin is pure, and both in style and versification he is very nearly perfect. His work is comparatively unknown, though there are a number of edi¬ tions (Bologna 1474; Florence 1503; Paris 1519; Venice 1523, etc.). More recent editions are by Walker, W. S. (London 1848) ; Thilo, G. (Halle 1863) ; Schenke, C. (Berlin 1871) ; Baehrens, H. (Leipzig 1875) ; Lanzen, P. (Ber¬ lin 1896). It has been translated into French (Paris 1811, 1826, 1850) ; German (Erfurt 1805) ; Hungarian (Pesth 1873) ; Italian (Milan 1731, 1754; Verona 1776) ; Spanish (Madrid 1868-69). Of English translations the following should be mentioned: Noble, T., (The First Book of Argonautica) (in (Black-

heath, etc.,5 London 1808) ; Pinder, N., Selec¬ tions from the Less Known Latin Poets 5 (in (Clarendon Press Series,5 Oxford 1869) ; a new translation of the complete work has been begun by H. G. Blomfield of which the first volume has appeared so far: Valerius Flaccus, Caius, (The Argonautica) (Oxford 1916). Consult Butler, H. E., (Post- Augustan Poetry) (London 1909) ; Harmand, R., (De Valerio Flacco Apollonii Rhodii Imitatore, etc.5 (Nancy 1898) ; Merivale, C, (History of the Romans under the Empire) (7 vols., London 1852-62) ; Peters, J. V., (De Caii Valerii Flacci Vita et Carmine 5 (Konigsberg 1890) ; Samuel- son, J., (Studia in Valerium Flaccum5 (Upsala 1899) ; Schenkl, K., (Studien zu den Argo- nautica des V. Flaccus) (in Kaiserliche Aka- demie der IVissenschaften, Philos. Hist. Classe, Sitzungshervchte, Vol. LXVIII, p. 271, Vienna 1871) ; Summers, W. C., Study of the Argo nautica of Valerius Flaccus> (Cambridge

1894).

FLACCUS, Marcus Verrius, Roman teacher of the 1st century b.c. He was a freedman, was among the most eminent of the savants of his time and became tutor to the grandson of Augustus. In (De Verborum Significatu) he gave in vocabulary order an explanation of obsolete terms and phrases. Festus wrote an abridgment of this work which is now lost. Flaccus also wrote the (Fasti Praenestini,5 a calendar of Roman festivals. It was set up in the form of Prseneste, and fragments have come to light in modern times. Consult Schanz, (Geschichte der romischen Litteratur) (3d ed., Munich 1911) ; and Teuffel, (Geschichte

der romischen Litteratur) (6th ed., Leipzig 1910).

FLACH, flash, Geofroi Jacques, French historian : b. Strassburg, Alsace, 16 Feb. 1846. He studied classics and law at the University of Strassburg, where he received the degree of LL.D. in 1869. He endeavored to explain law problems by means of history, a method new to the France of his day. The Franco- Prussian War, however, led him into new activities and he spent two years in rebuilding the library and museum, which had been de¬ stroyed by the Prussian bombardment. When at last he came to choose definitely between French and German citizenship, he removed to Paris, where he resumed his studies. In 1879 he was made assistant to Edouard Laboulaye at the College de France, and in 1884 became pro¬ fessor of comparative legislation there. He was also professor of comparative law at the Lcole Libre des Sciences Politiques. In connection with his duties in these positions he studied the various civilizations of the world. He con¬ centrated, however, on early French law which led him to study extensively the origin and de¬ velopment of the feudal system, of which his (Les Origines de l'ancienne France) (3 vols., 1886-1904) is an exhaustive treatment. He was elected member of the Academy in 1912. Other works by him are (Histoire du regime agraire de lTrlande) (1883) ; Considerations sur This- toire politique de l'Irlande) (1885) ; Jonathan Swift, son action politique en Irlande5 (1886) ; (L'origine de l'habitation et des lieux habites en France) (1899) ; (Cujas, les glossateurs et les Bartolistes) 0883) ; fitudes critiques sur 1'histoire- du droit romain au moyen age, avec textes inedits5 (1890).

FLACIUS, fla'shi-us, or VLACICH, Matthias, mat-te'as fla'siH, German Lutheran theologian: b. Albona, Illyria, 3 March 1520; d. Frankfort-on-Main, 11 March 1575. He is usually called Flacius Illyricus. After studying at Venice, Basel and Tubingen he went in 1541 to Wittenberg, where he became a pupil of Luther and Melanchthon. In 1544 he became professor of the Hebrew Scriptures at Witten¬ berg University. From this time he took an active part in all the theological discussions of the time ; and for his attacks on Melanchthon's compromise, known as the Leipzig Interim, he was, four years later, deprived of his professor¬ ship. Nor did he procure another appointment until 1557, when he became professor of theology at Jena. This post he again lost, after four years, on account of his doctrine that orig¬ inal sin was essentially inherent in man's nature. From then on he was continuously in trouble with church and civil authorities, and was driven successively from Regensburg, Ant¬ werp and Strassburg. He finally went to Frankfort-on-Main from where he was again to be deported when he was taken mortally ill. He

published a large number of works, most of which were comparatively short and of a controversial nature. Of his larger writ¬ ings the following deserve mention: (Catalogus Testium Veritatis) (Basel 1556) ; (Ecclesiastica Historia,5 more frequently called (Magde- burger Zenturien5 (Basel' 1559-74) ; (Clavis Scripturae Sacrae (Basel 1567). Consult Hollander, A., (Der Theologe M. Flacius Illyricus in Strassburg (in Deutsche Zeit- schrift fur Geschichtewissenschaft, n. s. Vol. II, p. 203, Freiburg 1897) ; Preger, W., (M. Flacius Illyricus und seine Zeit5 (2 vols., Erlangen 1859—61) ; Ritter, J. B., (M. Flacci Illyrici Leben und Tod) (Frankfort-on-Main 1725) ; Schaef¬ fer, C. F., (Flacius Illyricus and his Times) (in Evangelical Quarterly Review, Vol. XIV, p. 481, Gettysburg 1862-63) ; Twesten, M., (M. Flacius Illyricus) (Berlin 1844).

FLACOURT, fla'koor, Etienne de, French colonial pioneer : b. Orleans 1607 ; d. at sea, 10 June 1660. From 1648 to 1655 he was in com¬ mand of the troops in Madagascar, having been made governor by the French East India Company. Being cut off from France he acted on his own initiative, .restored order among the troops, but was very severe in his treatment of the natives, who harassed him throughout his term of office. Soon after his return to France in 1655 he was made director-general of the French East India Company, but returned again to Madagascar and was drowned on a voyage home to France. He published (Petit catechisme madecasse et frangais5 (1657) ; (Dictionnaire de la langue de Madagascar5 (1658) ; (Histoire de la grande ile de Madagas¬ car5 (1658). Consult Malotet, A., (Etienne de Flacourt, ou les origines de la colonisation frangaise a Madagascar 1648-1661 5 (Paris

1898).

FLAD, Henry, American civil engineer: b. Bavaria, Germany, 1823 ; d. 1898. He was edu¬ cated at the College of Spire, Rhenish Bavaria, and at the University of Munich. He became assistant engineer on various government public works, chiefly with improvement of the Rhine, but in 1849 became a captain in the Baden revo¬ lutionary army. The failure of the revolution

rendered his position in Germany insecure and he fled to the United States, where he was engaged in the engineering departments of sev¬ eral railroads until the outbreak of the Civil War, when he enlisted and rose to the rank of colonel of engineers. From 1867 to 1874 he was chief assistant to James P. Eads on the great bridge over the

Mississippi at Saint Louis. After 1877 he was president of the Board of Public Improvements of Saint Louis and for many years served as member of the Missis¬ sippi River Commission.

FLAG, a strip of cloth of a light fabric, varying in form and color, frequently bearing some emblematic design, and ordinarily fixed by one end to a staff, pole, rope, etc., while the other is allowed to fly free. The length of a flag from the part near the staff to the free end is called the fly, and the measurement at right angles to this is known as the hoist, height or depth.

The uses of flags are numerous. They serve in a variety of ways as signals. They convey definite information of various kinds, and are used as general symbols of rejoicing, congratu¬ lation, sympathy, mourning, etc. In a classifi¬ cation of the uses of flags, that which stands first, as the most general, is their use as na¬ tional emblems. Next in order comes their use as distinguishing emblems of the naval and military forces of particular nations. In the army each regiment is distinguished by its par¬ ticular flag or colors. This usage is general, and the colors of regiments come to be dis¬ tinctive of their services and of their esprit de corps, as well as of their position in the army. Flags are sometimes presented by persons of rank or official station, or by other individuals or groups of people, and often bear names and emblems commemorative of past achievements. In the majority of countries the presentation of regimental flags is attended by a religious ceremony. This use of flags is of great an¬ tiquity. In the Bible the standards of the different tribes are referred to in the arrange¬ ment of the camp of the Israelites in the desert. The Greek and Roman armies had their dis¬ tinctive flags. In the French army distinctive flags were introduced during the wars in Italy in the 16th century. The word drapeau in French (which, in its most extended significa¬ tion is equivalent to our <(flag") is used spe¬ cifically for the colors of an infantry regiment ; etendard for those of a cavalry regiment; pavil¬ ion for the colors used in the naval service.

The union of Saint Andrew and Saint Patrick marks, first, the union of England and Scotland into the kingdom of Great Britain and then this kingdom with Ireland. This is the union flag of Great Britain, and was brought by colonists to America. (See Flag of the United States). The flags of the British do- •minions and colonies differ from those of the mother country by the badge of the colony being placed in the centre of Union Jack. Every battalion of infantry in the Brit¬ ish army, except the Rifles, has two colors ; namely, the king’s color and the regimental color. The former consists, for all regiments, of the union device, with the name of the regi¬ ment in the centre and the number

of the bat¬ talion on the upper part near the staff. The regimental color is of the same color as the

collars and facings of the regiment ; but if these are white, it bears a Saint George's cross in red. On it are emblazoned the name of the regiment, the names of the battles in which it has served, and its various badges, crests, mottoes, etc. Among cavalry regiments, only the guards, dragoon guards and dragoons have standards, as cavalry flags are termed. These are made of crimson silk, and are emblazoned like those of infantry regiments. The stand¬ ards of the guards and dragoon guards are rec¬ tangular, -like those of the infantry, but the dragoons carry standards with the end farthest from the staff rounded and scalloped. The lancers have red and white pennants on their lances.

The standard is the war-flag, and bears the royal or other arms of the nation. Ensigns are flags carried by ships to indicate their national¬ ity. The place for the ensign in a steamer or large ship is on a pole over the taffrail ; in schooners and similar ships, at the peak of the main gaff; in cutters and sloops, at the peak; in yawls, at the mizzen-peak; and in rowing- boats, over the stern.

Jacks are national flags used for signaling and various other purposes. Pennants or pendants are small pointed or swallow-tailed flags generally used in connection with signals. The best known is the answering pennant used in the international signal-code. A burgee is a swallow-tailed flag used by yachts and mer¬ chant vessels, usually with the ship's name on it. Shipping companies generally have square flags with distinctive colors and devices ; these are known as house-flags. A plain white flag indicates a clean bill of health* and is also used in war as the flag of truce (q.v.). The quaran¬ tine flag is yellow. Vessels carrying explosives display a red flag. A flag hoisted upside down is a signal of distress, and one borne half-mast high is a sign of mourning. Striking the flag is a token of surrender, and the placing of the flag of one country over another is a token of victory for the former. The dipping of a flag is a mark of respect. See Flag of the United States ; Flags, Confederate ; Flags of Foreign Nations ; Signal Service.

Bibliography.— Abbott, Samuel.

(1897).

FLAG, Sweet, an aquatic, flag-like plant (Acorns calamus) of the family Aracece, which grows in wet places throughout the northern

hemisphere, and is well known for its sweetly odorous leaves and root. The leaves are sword¬ shaped, one to three feet long, and the spadix is lateral with bisexual flowers. The creeping woody rhizome has long been employed in medi¬ cine as an aromatic stimulant, considered useful in ague in Great Britain, and in India as a remedy for intestinal ills, among children. It is also employed in flavoring beer, and by makers of snuff and vinegar ; and is chewed by singers to clear the voice.

FLAG ASSOCIATION, The American,

an organization formed in the council chamber

of the city hall, New York, 12 Feb. 1898, with the object of honoring the national flag and of protecting it from desecration by securing the enforcement of present laws and the enactment of others for that purpose. Its motto is (

FLAG DAY. The 100th anniversary of the birth of the American flag was on 14 June 1877, the Continental Congress having adopted the stars and stripes on 14 June 1777, and the government at Washington requested that all public buildings float the flag in honor of the day. A like respect was shown for the natal day of the flag in New York, where all government and mu¬ nicipal buildings hoisted the colors ; Boston, too, observed the day by exercises and display of American flags ; Philadelphia was equally eager to show reverence and at Independence Hall a program was given as also at the old home of Betsey Ross, where the first American flag was constructed. At the celebration in South Church, Boston, the centre of attraction was the original Fort McHenry flag which in¬ spired Francis Scott Key to write the (Star Spangled Banner.) The earliest effort to make the day into an annual and national holiday was when Dr. B. J. Cigrand wrote in the June issue of the Chicago Argus an article entitled, ((The Fourteenth of June,® in which he advo¬ cated a national holiday for every month of the year; while teaching school at Fredonia, Wis. in 1886, he directed attention to the memorable event and the pupils wrote essays on the theme, he having furnished the item from the Youths' Companion of 1883. In many magazine and newspaper articles he advocated recognition of this memorable day in the history of the Amer¬ ican flag — calling it ((Flag-Birth-Day,® notably The Home , School and Nation (Vol. Ill, No. 1, 1891) ; The Student (Vol. II,

No. 7, page 396) ; (Heraldic History of United States Flag) (Vol. II, 1st ed., 1889) ; Our Country, June 1889. In an address to the Sons of America, June 1888, he emphasized the good that would come from such a flag holiday, which resulted in the Sons organizing a corporation and publishing monthly a magazine, The American Standard, to inculcate reverence for American emblems, and he was its editor-in-chief. The outgrowth of this patriotic work was that his efforts along these lines brought much encouragement.

A similar flag respect was shown by George Balch, teacher in a free kindergarten of New York city, where he, on 14 June 1889, ob¬ served the natal day of the U. S. flag. The Bet¬ sey Ross home at Philadelphia, on 14 June 1890, likewise, celebrated the day; the New York Society, Sons of the Revolution, celebrated 14 June (to commemorate 14 June 1777) in 1891 and have ever since observed the day, by erecting a monument on some spot of historic

interest. Col. George A. Cantine of Newburg, N. Y., a veteran of the Civil War, conducted a patriotic flag celebration 14 June 1891, and in 1893 Le Roy Van Horn, of Chicago, a veteran of the Civil War, conducted with the aid of G. A. R. men a flag drill and exercise at Douglas Park, Chicago, on the third Saturday of June, and in 1893 Le Roy Van Horn and Dr. B. J. Cigrand were brought together and the latter issued a newspaper call reading ((A11 persons who desire to commemorate the birth¬ day of the American flag, adopted 14 June 1777, are invited to meet at 8 p.m. in the assembly hall of the Grand Pacific Hotel.® This was in 1894 and was the origin of the Illinois Cor¬ poration known as The American Flag-Day Association, whose purpose was to celebrate the third Saturday in June and to conduct the exercises in the interest of public school chil¬ dren. The officers were Gen. Theodore F. Brown, president; Dr. B. J. Cigrand, secretary; Blanch E. Reynolds, vice-president (authoress of the <(Living Flag® in which people formed the stripes and stars at the World's Fair 1893) ; Capt. E. R. Lewis, treasurer; LeRoy Van Horn, musical director. Annually this organization held celebrations in the five large parks of Chicago, but always on the third Saturday of June; but in 1896 when Dr. B. J. Cigrand be¬ came the State president, he directed that the actual date, 14 June, be observed and on that date celebrated the day at Humboldt Park, Chicago. Because of the great success of the actual date celebration a national organization was effected of which Dr. Cigrand became the president and the directing spirit; and to this National Society, 36 governors,- scores of mayors and five Presidents of the United States have sent delegates and approving credentials that (

— the pupils of the parochial, private and pub¬ lic schools, academies, colleges, universities, clubs and industrial institutions to join annually and participate in Flag Day; and by this liberal policy exemplify the broad and tolerant spirit of the Flag itself, so well expressed by Presi¬ dent Wilson at the Flag Day celebration at Washington, D. C, 14 June 1914:

((This flag for the future is meant to stand for the just use of undisputed national power. No nation is ever going to doubt our power to assert its rights, and we should lay it to heart that no nation shall ever henceforth doubt our purpose to put it to the highest uses to which a great emblem of justice and gov¬ ernment can be put.

((It is henceforth to stand for self-possession, for dignity, for the assertion of the right of one nation to serve the other nations of the world

— an emblem that will not condescend to be used for purposes of aggression and self-ag¬ grandizement; that is too great to be debased by selfishness ; that has vindicated its right to be honored by all nations of the world and feared by none who do righteousness.®

On 14 June 1916 President Wilson issued the <(Flag Day® proclamation calling for a nation-wide Flag Day observance on 14 June.

FLAG OFFICER, in the navy of the United States, an officer who by his rank may carry a flag at the masthead instead of a pen¬ nant. Such officers are admirals, whose flags are carried at the main mast, vice-admirals, rear-admirals. Until the abolition of the grade commodores were flag officers.

FLAG OF THE PROPHET, the sacred banner of the Mohammedans, at first made of the white turbans of the Koreish, and later of the black curtain that hung before the tent of Ayesha. It was held in great honor at Damas¬ cus, and later fell to the caliphs of Bagdad. Amurath III brought the relic to Europe. The original has disappeared long since, but the populace still hold to the belief that the original banner is still in existence, and by them is held to be the most sacred relic of Islam.

FLAG OF TRUCE, a white flag carried by an officer sent to

communicate with the enemy. The bearer cannot insist upon being admitted. He must always be admitted with great caution. Unnecessary frequency is carefully to be avoided. If the bearer of a flag of truce offer himself during an engagement, he can be admitted as a very rare exception only. It is no breach of good faith to retain such a flag of truce if admitted during the engagement. Firing is not required to cease on the appearance of a flag of truce in battle. If it be discovered, and fairly proved, that a flag of truce has been abused for surreptitiously obtaining military knowledge, the bearer of the flag thus abusing his sacred character is deemed a spy. See Truce.

FLAG OF THE UNITED STATES, The. Colonial Period (Part I). — Colonial

Americans with hereditary instincts early manifested the inclination to symbolize local heraldic devices, in accord with the civic seals and tokens (see Great Seal of the United States) of the different colonies, — aside from the flags of the various mother countries to which they acknowledged allegiance,— Spain, Holland, England and France.

The first attempt to create flags came when banners were needed for the colonial military companies which were raised in 1747. Ben¬ jamin Franklin in his (Autobiography) relates that in 1747, when England was at war with Spain and attacked also by France, threatening a general intercolonial disturbance in America, he was among the first to note the unprepared¬ ness of the English colonies to resist invasion or attack. He assisted in organizing military companies in Pennsylvania and awakened colo¬ nial interest in military preparations by his famous article entitled ((Plain Truth® which was published throughout the colonies.

Besides organizing these military companies he further relates that he saw to it that (

While in England representing the colonies he had devoted considerable time and effort in following the study of heraldry, and this art

and science appealed to him throughout his en¬ tire life. To his many accomplishments he added that of being a skilful pen-artist, and the Philadelphians, evidently acquainted with Frank¬ lin's heraldic skill and artistic abilities, chose him to design the colonial banners. This is cor¬ roborated by Halley who conveys the following further interesting information : ((The women furnished the respective corps with the requisite banners, which were handsomely emblazoned with

bearings devised by Franklin, who was elected colonel of the Philadelphia regiment.® Curiously enough, no description of these flags was known, until a French transcription was discovered in Paris among literary material that had been omitted from the (AutobiographyP The following translation from the French gives us in Franklin's own words the description of these flags and was deciphered and reproduced after years of research by the writer :

1. Lion erect, a bared scimitar in one paw, the other holding

the escutcheon of Pennsylvania. Motto: P atria

(" Our Homeland ").

While the impression is likely that the lion is repre¬ sentative of England, such is not the case. The arms are those of the Penn family and the lion refers to the same people, as the crest of William Penn was a demi- lion.

2. Three arms, dressed in various stuffs or cloth, gathered,

smooth and striped, the hands grasping at the wrist, signifying the union of all classes. Motto: Uniia Virtus Valet (" United in Virtue We Conquer ").

3. An eagle — emblematic of victory — descending from the

sky. Motto: A Deo Victoria (" From God the Victory ").

4. The figure of Liberty seated upon a cube, holding a lance,

upon the point the bonnet of Liberty. Motto: Inestimabilis (" The Incomparable ").

5. A man in armor with naked sword in hand. Motto:

Deus Adjuvat Fortes (" God Aids the Brave ").

6. An elephant emblematic of the warrior always on the

alert. This beast is said never to stretch out upon the earth, being always on his legs and ready for defense. Motto: Semper Paratus (" Ever Ready ").

This motto is found on the arms of the family of Francis Hopkinson. The earliest instance of the elephant appearing in this idea as associated with America, occurs in the early coinage of the Carolinas.

The elephant to-day is employed to symbolize the Republican party.

7. A city surrounded by ramparts. Motto: Salus Patriae

Summa Lex (“ The Safety of the Country the Highest Law ”).

8. A soldier with his piece covered. Motto: Sic Pacem

Quaerimus (“ Thus We Seek Peace ”).

9. A crown with plumes (or tufts). Motto: In God We

Trust, the first use in America of this- subsequently much discussed motto. Franklin changed the Black Prince’s German motto “ Ich Dien ” “I serve” to “ In God We Trust ” — motto in English.

10. A man, with sword pointed heavenward. Motto: Pro

Aris et Focis (“ For Hearth and Home ”).

11. Three members of an association marching with muskets

on shoulders, clothed in various costumes, signifying the unanimity of the different peoples in the associa¬ tion. Motto: Vis Unita Fortior (“ United Force Is Strength ”).

12. A musket and sword crossed. Motto: Pro Rege et

Grege (“ For King and People ”).

13. Representation of a glory, in the centre of which is

inscribed Jehovah Nissi (“ The Lord Our Banner ”).

14. Feudal home, at door of which a soldier stands sentinel.

Motto: Cavendo Tutus (“ Safety in Preparedness ”).

15. David advancing toward Goliath and hurling the stone

from his sling. Motto: In Nomine Domini (“ In the Name of the Lord ”).

16. A lion, rampant, holding in his right paw a scimitar; in

the other a sheaf of wheat. Motto: Domine Protege Alimentum (“ Lord, Protect our Harvests ”).

17. A sleeping lion. Motto: Rouse Me, If You Dare.

Motto in English.

18. Hope represented by a standing woman, clothed in blue,

holding in one of her hands the shield and device of an anchor. Motto: Spero per Deum Vincere (“ Through God I Hope to Conquer”).

19. The Duke of Cumberland as a general. Motto: Pro

Deo et Georgio Rege (“ For God and King George ”).

20. A soldier on horseback. Motto: Pro Libertate Patriae

(“ For the Liberty of the Homeland ”).

1

m/rrr

tifiwaimjtyE

*tNV%£

ˆTHE LORD

\ 0(jt – ˆ

J emˆy

. rt’

ETC

9ˆ ˆ

ˆCM5E

r— ,

COLONIAL FLAGS OF 1747

Reproduced by Dr. B. J. Cigrand

f

•

.

a ˆ11C ˆa* = s were n˚t only designed and pro¬ duced, but were used at the drills as shown in Pennsylvania Gazette of 12 Dec. 1747, which says: “A great body of soldiers met and

marched to the court-house, with drums beating and colors flying — both the gifts of the women.® Historians of the past have completely overlooked these colonial flags and only after years of diligent search has the writer found and deciphered them.

In 1766 the Sons of Liberty of New York floated a flag above one of their meeting places with the words, ((The King, Pitt and Liberty,® but the British soldiers took offense at the white cloth, and chopped down the flagstaff and disposed of the flag. The remark that it referred too lightly or slightingly to the king caused the “Sons® to hoist another with this change, “To His Most Gracious Majesty — Wil¬ liam Pitt — and Liberty.® This, too, the British guards destroyed. Having been forbidden to hoist any but the British flag on public prop¬ erty, the Sons purchased a piece of land 100 feet by 11 feet and on a tall pine-tree-ship-mast, and at elaborate exercises hoisted a flag upon which was the single word, “Liberty.®

Four years later (1770) the Sons of Liberty of Boston hoisted upon a tall pine tree in a grove on Harvard Campus (at Washington and Essex streets) a plain red flag. This deviceless flag later was improved by sewing upon it a Green Pine Tree (used on Massachusetts coins in 1652) — majestic symbol of American liberty. It later played an important part in the Amer¬ ican Revolution, introductory triumph at the battle of Bunker Hill. The colonies also had a flag in 1745 at the capture of Louisbourg, Sir William Pepperell, a native of Maine, fur¬ nished the motto. Nil Desperandum Christo Dnce, meaning “Never Despair, Christ Leads.®

The flag of the New England colonies, used as early as 1737, had a blue field with a red cross quartering a white canton (or union) and in its first quartering it had a globe in token of the new world. Hence here was in reality the first use of red, white and blue as a flag of union in the colonies, and it is possible the com¬ mittee which designed the Cambridge or Grand Union flag wished to retain the red, white and blue, hence with slight change approved of the tinctures.

The earliest attempt to unite the New England colonies dates 1643. The New England honor flag (1686) in respect to the king was white quartered by a wide red cross ; on the centre of cross, the initials J. R. (James Rex) with gold crown above.

Flags of the American Revolution Prior to Stars and Stripes (Part II). — Prior to the adoption of the Stars and Stripes, and before the acceptance of the Boston Flag, the colonies had a multiplicity of flags of various designs con¬ taining a great variety of devices. Not only did the respective colonies have these different flags, but (as already shown in Part I), regi¬ ments in the same colony had special banners, and even counties had their own standards. While this phase of the evolution of our flag might be interesting and instructive it would require a large volume to portray and describe those flags which antedated our present glorious flag — commonly and affectionately called the “Stars and Stripes.®

It has been thought by many and even recorded by writers that this was the first

instance where 13 stripes were employed in the new world as a symbolism, but close research discloses that a number of flags contained this idea before the creation of the first Continental flag. In fact, when Washington was escorted from Philadelphia to Boston to take command of the troops, the guard of honor which accom¬ panied him was the famous Philadelphia Light Horse, which carried a flag upon which was blazoned 13 stripes, alternate blue and white.

The uniqueness and logic of this 13-striped banner no doubt appealed to the Congressional Committee and it required no great change to make it adaptable to the new requirements m the civil strife with England. Just change the blue to red and they had the 13 stripes, alter¬ nate red and white. Nor was that the only prior flag which contained the 13 stripes, since we find that the East India Company in its colonial trade ambitions had a flag which had a red cross on a white union and 13 stripes, alternate red and white, and this standard was seen in American harbors from 1704 to 1834. This remarkable flag may be seen in The British Museum, and pictures of it in the fourth edition of J. Beaumont, Jr.’s book, ‘The Present State of the Universe) (London

1704) . It appears that the East India Com¬ pany did not always float this flag, but in the ‘Dominion and Laws of the Sea) (London

1705) the flag had but 10 stripes, five red and five white.

A Holland book on flags shows a colonial trade flag with 13 stripes, yellow and red; the date on the flag is 1738. This antedates our flag of 1775 by 37 years. A similar Holland flag of even earlier date can be seen in heraldic entry in the Paris Municipal Library in the vMume entitled, (La Connoissance Des Pa¬ vilions ou Bannieres de La Plupart Des Nations, > published at La Haye in 1737. Then there is also the English flag called “Pavilion De Rang ou de Division d’escadre,® having 13 stripes, alternate red and white, a union argent (white) with red cross of Saint George, floated in 1736. A flag of North Holland had 13 stripes, alternate yellow and red, floated in

1736.

In the interest of truth we must enter this matter, even if it seems to set aside that the colonies were first to thus symbolize or that the idea of such striped flag had never existed before the Grand Union flag which was devised by the committee in the last days in December 1775, and hoisted and saluted by General Wash¬ ington and his soldiers on 2 Jan. 1776. And in the south a flag of 13 stripes, alternate blue and red, with a serpent diagrammed bend dexter and the words above it “Don’t Tread on Me,® also contained the emphatic idea of rep- resentating the colohies and employing the idea of the stripes. The same idea appeared in a southern flag of 13 stripes, alternate red and white.

Writers and speakers are mistaken when they state that the first raising of a starry flag in the new world was at the birth of the United States emblem. Rhode Island in 1776 and early 1777 had a blue flag with white stars; and Cortez had a flag with stars in a circle more than 200 years before. Hon. J. W. Foster, who saw this flag in the Mexico City Museum, says that the Cortez flag has 12 stars.

It came to the writer’s notice while studying the writings of John Dryden, English poet (b. 9 Aug. 1631; d. 1 May 1700), that his lines well express our unity :

“ A constellation is but one Though it is a train of stars.”

These lines were written near 100 years before our forefathers chose the constellation of stars as a symbol of unity and harmony, and Dryden’s writings were well known to the colonists. The constellation idea also em¬ phatically indicated that the stars were to travel by laws

of concord and not each star for itself and independent or indifferent to its neighbors, but with a destiny of the entirety — a united, concerted body of stars or states. This was a wonderful conception; time has attested its truth and established the fact that the stars are not a mere collection, but a con¬ stellation, and represented a new ideal in polit¬ ical and governmental affairs. Charles J. Lukens has told it well in this poem :

“ Thirteen blazed at once in their new constellation The daughters of Freedom, a star for each mate;

A new silver star is the fine augmentation Of honor they granted for every new State.

As the Stars and the Stripes are our States interwoven Having grown thus from weakness to far spreading might Then perish the villain who, wanting them cloven.

Would quench their resplendence in treachery’s night ”.

Another favorite flag in the New England dis¬ tricts was a white field with a green pine tree in the middle with the motto : (

“Resolved that the uniform of the officers be green and white, and that they furnish themselves accordingly, and that the colors be a white flag with a green pine tree and the inscription “An Appeal to Heaven.”

In the Southern Colonies a blue flag with the word “Liberty® in large white (sometimes golden) letters waved over many a fort and battle. It was such a banner which Sergeant Jasper restored at the Sullivan fortress on 28 June 1776; the news of the victory was an added impulse to the signers of the Declaration of Independence.

The Washington Life Guard was organized in 1776, soon after the siege of Boston while the American army was encamped near New York. Its flag was said to have been in the museum at Alexandria, Va., which was burned soon after the Civil War began and nearly everything was lost. It was of white silk with the design painted on it. The uniform of the guard was as follows: blue coat with white facings, white waistcoat and breeches, with blue half gaiters, a cocked hat and white plume. Some authors give the American shield a place on this banner, but only a later design contained the shield, since the United States shield did not appear until 20 June 1782.

There was a flag which floated above the heads of the brave colonists

on 19 April 1775, when they defied the British at Lexington and Concord, Massachusetts. That flag, known as the Bedford Flag, is on exhibition in that Massachusetts town. It is of maroon shade, and contained these words: Aut Vince Morire, meaning “Conquer or Die.® It was carried by Nathaniel Page, captain of the Bedford Minute

Men on that memorable and historic 19 April

1775.

The device of a rattlesnake was popular among the colonists, and its origin as an Amer¬ ican emblem is a curious feature in our na¬ tional history. It has been stated that its use grew out of a humorous suggestion made by a writer in Franklin’s paper — the Pennsyl¬ vania Gazette — that, in return for the wrongs which England was forcing upon the colonists, a cargo of rattlesnakes should be sent to the mother country and “distributed in Saint James’ Park, Spring Garden, and other places of pleasure.®

Colonel Gadsden, one of the marine com¬ mittee, presented to Congress, on 8 Feb. 1776, “an elegant standard, such as is to be used by the commander-in-chief of the American navy ; being a yellow flag with a representation of a rattlesnake coiled for attack.® The words ((Don’t Tread on Me® do not appear on this golden flag.

A blue flag with a union of white, upon which was a red cross with a pine tree in the upper dexter quarters, floated at the battle of Bunker Hill, 17 June 1775, and another flag of the same pattern, except that the flag was red and the cross red, was also used at Bunker Hill, and bore these inscriptions : On one side, “An Appeal to Heaven® and on the other ((Qui Transtulit Sustinet,® meaning, “He who trans¬ ported will sustain.®

These were beautiful flags and research shows that both colors were used.

Trumbull gives the red in his celebrated painting in the capitol at Washington and other authentic accounts show that the blue flag was carried also — the color being the only differ¬ ence in the two.

Massachusetts banner, 1659, white, a hand holding a dagger, marked <(Thre County Trom.® was used.

Another New England flag of white had a pine tree and curled about its trunk a ser¬ pent, below which were the words ((Don’t Tread on Me®; above the tree, “An Appeal To Heaven.®

The Crescent flag of 1776, a flag in blue with a white sign of the Crescent in upper dexter corner, was made by Col. William Moul¬ trie, a Southern patriot. Another Crescent device flag had the word “Liberty,® in white under the crescent also in white, on blue cloth.

Another flag bearing the symbol of a rat¬ tlesnake was the “Culpepper Minute Men,® words which appeared across the top, while below were the words “Don’t Tread on Me,® and across the centre these words “Liberty or Death.®

As early as 1754, 21 years before, the battle of Lexington, Benjamin Franklin urged the colonies to unite. (He also advised it in 1747 and suggested flags, see Part I). In his paper the Philadelphia Gazette, that editorial was embellished by a wood-cut of a snake divided into 10 parts, with the initials of some of the various colonies, all New England forming one part — the head. The idea was also placed on some of the early banners and devices.

Then there were such other flags, as the White Plains banner, of white with a naked sword crossed by a pole upon which was a liberty cap. In ancient times when a slave was

set free he was permitted to wear a blue cap to indicate that he had obtained his freedom, hence blue and a cap have been for centuries associated with liberty.

The Taunton flag was used early in our Revolution, and a design of the British flag with the word “Liberty® painted or sewed upon the flag.

The Newbury port design consisted of a green clotlh, a white canton, with red cross. Also a circle of a 14-link chain with a green pine tree ; at each link a hand holding the link represented that the 13 colonies were joined in a chain of union.

Early in the Revolution, John Hancock pre¬ sented to a colored troop a flag upon which appeared a pine tree, and aside of it, a deer, above which the initials ((G. W. and J. H.® are pictured. The letters refer to George Washington and John Hancock who presented the flag.

The Proctor flag consisted of a red ground with a rattlesnake in the attitude of striking at the Union Jack of Great Britain. Beneath the

snake the words ((Don’t Tread on Me.® The initials J. P. 1 B. W. C. P. mean John Proctor, 1st Brigade, Westmoreland County, Pennsylvania. The original is at New Alex¬ andria, Pa.

The London Chronicle (January 1776) states : ((A captured Provincial cruiser had a

flag of white — a pine tree ; opposite side words, (An Appeal to Heaven. > ®

A Martinique harbor entry (September 1776) states that an ((American Continental brig, Reprisal, floats a flag of 13 stripes of white and yellow.®

The London artist, Thomas Hart, on 22 Aug. 1776 drew a picture of an American vessel having a white flag with words <(An Ap¬ peal to God® under a tree ; above tree, words ((Liberty Tree.®

There were also a few anti-religious flags — and some few anti-creed banners, but they were the outgrowth of groups of people, rather than the action or authorized action on the part of civil authorities or representative as¬ semblies.

In the latter part of 1775 the Continental Congress, knowing the necessity for a continen¬ tal flag, appointed a committee composed of Benjamin Franklin (Pennsylvania), Benjamin Harrison (Virginia), and Mr. Thomas Lynch (South Carolina). This committee journeyed to Boston and there conferred with Gen. George Washington and other leaders of the rebellion, as it was then called by both the colonists and the English. But some of the distinguished advocates of self-defense were not so outspoken as to rebellion ; and even separation from England was not the com¬ monly accepted idea that prevailed. In fact the idea of a new and opposing flag was not entertained by even General Washington, who rather at that time had great hopes of recon¬ ciliation and felt that England would soon see the folly of her oppressive measures and grant the colonies what they desired and all would soon be restored to peace. But when the conference committee which also had the fiag problem in charge landed in Boston 13 Dec. 1775, there was considerable discussion, much of it of a heated character. The com¬ mittee finally decided that a flag should be de¬

vised which should contain symbolisms of loyalty to the mother country, but should also contain a rather bold element which would typify that the colonies were united and that union or combination of military strength be a prominent feature in the flag. The delibera¬

tion devised such a combination and the union of that flag contained the crosses of Saint George and Saint Andrew on a blue field; and the 13 colonies were indicated by 13 stripes, alternate red and white.

Writers and speakers have in the past ac¬ cepted Martin Tupper's (English poet) sugges¬ tion made in 1850, that the American flag with its stripes and stars was evolved from the Washington coat-of-arms, but careful search now shows that the stripes as well as the stars were prominently blazoned on colonial and continental flags before George Washing¬ ton figured in the flag-creating proposition. It's a mere coincidence that these devices are some¬ what similar.

The National or "United States Flag® (Part III) . — The gradual merging of the col¬ onies into a spirit of national importance, together with the unexpected military triumphs begot the idea that a mere confederated stand¬ ard as the Grand Union flag, — raised by Gen¬ eral Washington at Cambridge on 2 Jan. 1776- — had outlived its symbolism. That flag con¬ tained 13 stripes, alternate red and white, but its union of the crosses of Saints George and Andrew, strictly British emblems, were not in good favor now, and hence a committee, com¬ posed of Gen. George Washington, Robert Morris and Col. George Ross, was instructed by the Continental Congress to devise and pro¬ duce a flag for the United States of North America. The committee, with the aid of Mrs. Elizabeth Ross, evolved the basic idea of the present flag of the United States. The adoption of the Declaration of Independence of July 1776, prompted the delegates to see that a na¬ tional Seal be designed at once, (see Great Seal of the United States) — while the na¬ tional flag was not acted upon for upwards of 10 months later and adopted, as suggested by Washington, Morris and Ross, on 14 June 1777. Hence the Grand Union or Cambridge flag was the Continental emblem from 2 Jan. 1776 until 14 June 1777, when the Continental Congress made the Stars and Stripes the standard of the United States. In fact they fought under that Boston flag until 2 Aug. 1777, when a "hurry up® or (

a flag. The necessity of having one had, upon the arrival of the enemy, taxed the invention of the garrison a little ; and a decent one was soon contrived. The white stripes were cut*out of an ammunition shirt ; the blue out of the camlet cloak taken from the enemy at Peeks- kill, while the red stripes were made of differ¬ ent pieces of stuff procured from one and another of the garrison.® Another witness of the . garrison

states in his letters home that (

Things original are always sought after and it will certainly be gratifying to Americans to see the original resolution which gave birth to our national flag. The State Department fur¬ nishes the actual photograph copy of this greatest sentence in the history of the United States ; and we reproduce it with its corrections. This gives the reader the exact entry on the record pages of the Continental Congresses, and reads :

Tjj-jJuHL/4 ‘A<*WV J**

‘ _ –

The original resolution creating the flag of the United

States.

The question is often asked what was in¬ tended by the words ®a new constellation,® and had it any reference to any particular heavenly group of stars. It may be stated that the con¬ stellation Lyra, known >as the harmony or unity group, was intended as its complement in the sky. John Adams was for a period chairman of the Continental Board of War, and he left a tradition in his family that the constellation Lyra was intended, and his son John Quincy Adams, when Secretary of State in 1820, had a seal made for passports which had the Amer¬ ican eagle holding in his beak the constellation Lyra, the entirety surrounded by 13 stars repre¬ senting the colonies. Charles Francis Adams, grandson of John Adams, also confirms the tradition and brings correspondence of his dis¬ tinguished sire to prove the item. And it was proposed that the blue union of our flag have the symbolic Lyra, but it was not accepted, as the idea of the stars in a circle seemed more beautiful and could mean as the Lyra con¬ stellation, harmony and purity, without the ex¬ act irregular location of stars and the em¬ blem — Lyra.

While the creative resolution does not specify just what the arrangement of those stars should be, yet it was left to the will of the executive departments to agree upon some plan. The earliest flags always displayed these heavenly bodies in a circle, though there were many revolutionary flags which arranged them otherwise.

But on 26 Oct. 1912 the executive order of President William H. Taft was made concern¬ ing the specific location of the stars and their definite representations; they were to be ar¬

ranged in six rows of eight stars each, the stars to symbolize the States in the order of the States' ratification of the United States Con¬ stitution, viz., Delaware, Pennsylvania, New Jersey, Georgia, Connecticut, Massachusetts, Maryland, South Carolina, New Hampshire, Virginia, New York, North Carolina, Rhode Island, Vermont, Kentucky, Tennessee, Ohio, Louisiana, Indiana, Mississippi, Illinois, Ala¬ bama, Maine, Missouri, Arkansas, Michigan, Florida, Texas, Iowa, Wisconsin, California, Minnesota, Oregon, Kansas, West Virginia, Nevada, Nebraska, Colorado, North Dakota. South Dakota, Montana, Washington, Idaho, Wyoming, Utah, Oklahoma, New Mexico, Arizona.

i/ On the admission of Vermont in 1791, the citizens complained that their new State was not represented in the flag in either star or stripe. Then in 1792 Kentucky also joined the Union, and she, like Vermont, was not sym¬ bolized with the star or stripe, and so it can be said that these two States were without heraldic representation on the National flag until May 1795 when Congress ordered: ((That from and after the first day of May 1795 the flag of the United States be 15 stripes, alternate red and white; and that the union be 15 stars, white in a blue field.®

But this did not solve the problem of flag standardization, for in 1796 Tennessee came into the Union and wished a star and a stripe, as did also Ohio in 1802; Louisiana in 1812; Indiana in 1816; Mississippi in 1817 ; and Illinois in 1818. And it was the latter, Illinois, which would not be stilled, and she insisted that her star or stripe, or both, must come into heraldic significance, and so Congress, on 4 April 1818, ordered : ftThat from and after the fourth day of July next, the flag of the United States be 13 horizontal stripes, alternate red and white; that the union have 20 stars, white in a blue field.® And the Illinois, or 21st star, legally went into the flag, 4 July 1819.

Congress, in three basic laws, has always referred to our National flag as <(The Flag of the United States,® and, strictly speaking, the designation <(The American Flag® is wrong, as there does not legally exist such * an emblem, but there is a Flag of The United States, as decreed in the law of 14 June 1777, 1 May 1795 and 4 April 1818. On 9 Sept. 1776 Congress ordered that the words ((United States® be used where heretofore the words <(United Colonies® were used.

And so Tennessee, Ohio, Louisiana, Indiana, Mississippi and Illinois were for sometime without symbols on the flag, and in order that all new States in the future would not pester Congress for a star and a stripe, Section 2 of the order or bill which became a law in 1818,

provided : <(That on the admission of every new State into the Union, one star be added to the union of the flag; and that such addition shall take effect on the fourth of July next suc¬ ceeding such admission.® (Approved 4 April 1818.) Hence on 4 April 1818, the third and last law establishing the creation of our Na-ˆ tional flag was instituted. The legal name for our emblematic cloth is ((The Flag of United States® ; permissible terms, <(The American Flag,® «Our National Flag,® «The Star Spangled Banner,® <(Stars and Stripes,® ((01d Glory® and <(Flag of the Free,® ((Stripes and

\

1

16

DONT TREAD ON ME.

18

4

YowTjˆ

PONTTjrADON me

6

16 20 26

EVOLUTION OF THE UNITED STATES FLAG. Designed by Lieut. B. J. Cigrand, U. S. N.

T New England, 1772

2 Taunton, 1774

3 Newbury, 1774

4 East India, 170S

5 Col. Moultrie, 1775

6 Philadelphia, 1774

7 Fort Sullivan, 1776

8, 9 Virginia

10 Sons of Liberty, Pennsylvania

11 Minute Men, 1775

12 Sons of Liberty, New York

13, 15, 23 South Carolina

14 Pennsylvania device, 1776

16 Lexington-Concord, 1775

17 Continental Navy, 1776

18, 19, 20, 22 New England, 1775 21, 23, 25 Bunker Hill, 1775 24 Col. Gadsden, 1776 26 Virginia, 1776

27 Union Flag, 1776

28 United States, June 14, 1777

29 United States Flag, 1795

30 Present United States Flag

Stars® — as the stripes came before the stars, by 1 iy2 months. In the army it is called ˆStandard,® while in the navy it is known as <(Ensign.®

First Salute to the Stars and Stripes. —

On the same page upon which on 14 June 1777 appears the resolution creating our flag, also appears by a strange coincidence, the ap¬ pointment of Paul Jones, Captain of the Amer¬ ican Navy. This coincidence led the young officer, who was later to achieve such marked success for the American Navy in the cause of liberty, to declare :

“ That flag and I are twins, born the same hour and the same day out of the womb of destiny. We cannot be parted in life or in death. So long as we can float we shall float together. If we must sink we shall

go down as one.”

At Portsmouth, N. H., three weeks later, on the first anniversary of the Declaration of Independence, Jones hoisted the flag to the peak of the Ranger, — the first time the Stars and Stripes ever floated from an American man-of- war. In November 1777, the Ranger left American shores to carry to France the despatches announcing the surrender of Bur- goyne at Saratoga. Upon his arrival, in Feb¬ ruary 1778, Jones sent the following letter to William Carmichael, secretary to the commis¬ sioners who were sent to France to arrange the treaty of alliance between the French gov¬ ernment and the colonies :

“ Ranger, 13 Feb. 1778, Off Quiberon.

“ My Dear Sir:

“You will confer a singular obligation upon me by presenting my respects to the French Admiral, whom I mean to salute with 13 guns under American Colors- — provided he will Accept the Compliment and return Gun for Gun. This proposal I hope will be the more acceptable to him as it may be a prelude to future amity between the United States and his Court.

“ I shall be happy to see you here as soon as possible after you have the Admiral’s answer. Meantime pray excuse this trouble — I am my dear Sir with sentiments of esteem and Respect

“ Your very Obliged

“ Very Obedient “ Most humble Servant ” Jno. P. Jones.”

The salute thus arranged was fired on Satur¬ day evening, 14 February, and was repeated on the morning of Sunday the 1 5th. Dr. Ezra Green, at that time a surgeon on the Ranger, thus referred to the event in his diary:

“ Sat. 14 Feb. 1778. Very squally weather; came to sail at 4 p.m. ; saluted the French Admiral and received 9 guns in return. This is the first salute ever paid the American flag.” See Jones, John Paul.

A New Flag for Every War. — In every war since the creation of our flag, on 14 June 1 777, it has had a different arrangement of either stars or stripes, or both. While the basic elements are alike, the design is different.

Flag of Revolution, 1777 — First War with England.

Thirteen white stars in a circle in a blue field; seven red stripes and six white stripes.

Flag of War 1812 — Second War with England.

Fifteen white stars in a blue field; Eight red stripes and seven white stripes.

War with Mexico (1846).

Twenty-nine white stirs in a blue field; Seven red stripes and six white stripes.

Civil War of 1861.

Eleven States declared that their stars were taken out of the Union, but Lincoln left them in the Flag making 34 white stars in a blue field; seven red and six white stripes. Before the war closed two new stars were added to represent West Virginia and Nevada.

War with Spain (1898).

Forty-five stars in white on a blue field; seven red and six white stripes.

War with Germany, or World's War (1917-18).

In a field of blue are 48 white stars. Seven red and six white Stripes. The proportion of the flag has been improved in that the flag is now a trifle longer and not so wide.

Initial Events of Stars and Stripes. —

The earliest request for a United States flag occurs in the recommendation of the Conti¬ nental Congress of 3 June 1777, in which docu¬ ment appear these lines :

" The President laid before the council three (3) strings of wampum which have been delivered to him some time before by Thomas Green, a nominal Indian of the nation, requesting that a flag of the United States might be delivered to him to take to the chiefs of the nation, to be used by them for their security and protection, etc."

This request from the Indians may have been the very item which induced Congress to provide a flag of the United States. The first starry emblem was made by Mrs. Elizabeth Ross in Philadelphia in 1777.

The National flag was adopted 14 June 1777 and the first salute to the Stars and Stripes came on 14 Feb. 1778, at Quiberon Bay, France, when the French admiral, La Motte Piquet, gave his recognition to the flag on the Ranger, commanded by Capt. Paul Jones. The starry emblem was first carried around the world on a ship happily called Columbia, which left Boston 30 Sept. 1787, returning to Boston 10 Aug. 1790. And on 11 May 1792 the same ship and flag sailed up the scenic stream of the northwest and called it the Columbia River. An improvised earliest Stars and Stripes was made and hoisted at Fort Schuyler on 2 Aug. 1777. Our flag was first to ride the Atlantic wave 1 Nov. 1777, when Paul Jones left the harbor to carry the news to France that ((Bur- goyne has surrendered.® On 11 Sept. 1777, the flag went into battle, and its terrific attack at the Brandywine was a bloody baptism. Cap:. William Moores raised the flag in London, 3 Feb. 1783, on his ship the Bradford. Its first engagement in battle on land in the old world was at Londonderry, Ireland, when our soldiers defended an American, Engineer Lemuel Cox, who was building a bridge of ((American Oak® over the Foyle River. This skirmish took place 22 Nov. 1790. The English first saluted the Stars and Stripes on 2 May 1791, when Capt. Isaac Coffin of the British man-of-war Alligator, gave it 13 guns, and the guns from the shore responded to that kindness. New York city was the last city to be permitted to salute the Stars and Stripes, as the British were in control until 25 Nov. 1783, but at 3 o'clock p.m. of that day the Americans took possession and the flag was hoisted and cheered. The flag was carried to the Holy Land in 1848, by Lieu¬ tenant Lynch. The first American flag manu¬ factured from American material was hoisted over the Capitol at Washington 24 July 1866; English bunting having been previously used. Gen. Benj. F. Butler donated the flag.

Most people believe that the patriotic cus¬ tom of placing a flagpole on the schools and floating the flag during the school hours is of recent date, but in May 1812, at Colrain, Mass., on Catamount Hill, a flag-raising program was carried out on the school grounds where a newly chopped pine tree served as the Liberty Pole. Three of the men who helped to rear

the natural staff were shortly afterward en¬ listed in the second war with England, giving the occasion a most patriotic atmosphere

Respect or Reverence for The Flag. — The flag, like the cross, is

sacred. Many people employ the words or term (

For centuries the flags of nations have been saluted by individual and organized civic or military bodies. In the United States the salute with right hand, while the person stands at attention, is the common and accepted method. The uncovering of the head is also recognized as a salute. Placing hat above the heart or hand on left breast is also esteemed reverential.

Pledges of allegiance offered to flags are of antiquity, and the British government exacted a form of loyal expression of our colonies in particular. Our nation has been slow to adopt any definite pledge aside from an oath of alle¬ giance, but the change the writer made, in 1898, gives the pledge a definite and distinct expres¬ sion, as binding as an oath and leaves no doubt in the mind of either the listener or speaker that the pledge is to the American Flag and not my flag; this version is accepted by State superintendents of instruction, boards of educa¬ tion and civic societies and lodges.

The important word capitalized, impress the allegiance and it reads :

“ I pledge allegiance to the AMERICAN FLAG, and to the REPUBLIC for which it stands:

One NATION, indivisible, with LIBERTY and JUSTICE for all.”

Meaning of the Colors. — The three ele¬ mental tinctures Red, White and Blue, have a definite meaning. The Continental Congress has (see Great Seal of the United States) bequeathed the following actual definition, as the writer found in 1889:

White signifies Purity and Innocence;

Red, Hardiness and Valor;

Blue signifies Vigilance, Perseverance and Justice.

The foregoing sentence, designating the meaning of white, red and blue, sets aside all guess-work or unnecessary calculation ; it is explicit, definite and expressive.

Positions for the Colors. — In the United States and her possessions, the American flag always goes to the right of all flags, foreign or domestic. Even in the parade at the inau¬ guration of a governor, the State flag is to the left of the Star Spangled Banner In memorial or funeral parades the flag may be either dip¬ ped, or dropped forward

or may have a shroud tied about it as it is wrapped about the staff. While in military or civic parades it should be held on a staff raised at more than 45 degrees and on the staff may float beneath the flag a pennant denominating the character of the regi¬ ment or division.

Dimensions of Original Representative American Flag. — Length, 12 feet; width, 7 feet 4 inches; width of each stripe, 6J4 inches; stars, 3*4 inches from centre to points; blue field, 47ˆ4 inches wide, 60 inches long; two one-

‘half inch blue field between point of star, out¬ side line of flag; 1J4 inch canvas binding.

Use of the Flag. — In order that a flag may be printed in printers’ black ink, and still in¬ dicate the tinctures or colors it possesses, heralds of modern times have devised a simple yet perfect system which aids us in the study of national flags.

Horizontal lines indicate blue or azure.

Plain surface, without any marks, is white or argent,

Perpendicular lines indicate red or gules.

Dotted or spotted indicates yellow, gold or or.

Lines crossing indicate black or sable.

Lines from right indicate green or vert.

Lines from left indicate purple.

The right side of the shield is on the viewer’s left.

In their regular heraldic order with heraldic terms, they are white, argent; yellow, or; red, gules; blue, azure; black, sable; green, vert; and purpure, purple.

The National flag should not be used as a red flag of danger; as a warning to automobiles at crossings, or at danger spots in the street or roadway. The American flag is not a token of (

In bad or stormy weather it is considered unkind to permit the flag to fly. Use a smaller and less costly one for such weather if you feel you must, because of the occasion, fly your colors. The only place where in times of peace the flag may float all night is at the grave of Francis Scott Key, to make always true his famous lines : (

The flag which Key wrote about floated at the Fort McHenry, Baltimore. It was 30 feet square, had 15 stars and 15 stripes; the stars measured two feet from point to point. This same flag is government property and he wrote the poem while the battle was raging, 13 Sept. 1814. (See Francis Scott Key). Key's poem (The Star Spangled Banner* is the National anthem, made so by executive orders from the Navy and War Departments. The song, (The Red, White and Blue,* by Thomas Becket of Philadelphia, in another popular tribute to our colors. The poem, (The American Flag,* classic picture of its purpose, was written by Joseph Rodman Drake in 1819. (The Flag of Our Union* was written in 1851 by George P. Morris, journalist. Later poetic contributions are (The Flag Goes By,* by Henry H. Ben¬ nett, and (My Flag and Your Flag,* by Wilber Nesbit. While the most popular march com¬ posed in honor of the flag comes from Lieut. John Philip Sousa, entitled (The Stars and Stripes Forever.*

The one hundredth anniversary of the birth of the American flag was observed on 14 Tune 1877 in Philadelphia and Boston. See Flag Day.

Whenever the Speaker of the House of Rep¬ resentatives or the Vice-President of the United States, presiding officer of the Senate, call these legislative bodies to order the American flag is hoisted above their halls, as a sign that these bodies are in session. Upon the adjournment of either, their respective flags are lowered.

The National salute to the flag requires one gun for every star.

According to naval regulations on the Poto¬ mac River, on all vessels passing the tomb of

Washington, the flag is lowered to half mast, and the bugler sounds taps, guards present, of¬ ficers salute.

Few people seem to comprehend the exact outline and subordinaries of the shield of the United States. Stores with their profuse deco¬ rations at holiday times never have it correct and store windows can and should be made educational. Our shield does not contain Stars. It is a blue chief (on top) and the pales or stripes below are red and white; but these 13 pales are seven white and six red, while on the flag there are seven red and six white stripes.

The only emblem which is permitted above our flag is the sign of the

cross and this only during community, army, navy or congrega¬ tional prayer; and in the midst of devotional service. Every battleship carries this Christian flag and the new regulation demands that this (

Tassels, which are often pendent from tip of flagstaff, come to us from ancient times and are symbolizers that the banner is of sacred history. To those flags which had been in actual battle and had returned with victory or under which great heroism was displayed, the authorities in public ceremonials often at¬ tach the tassels as marks of distinction. In modern times the tassel has less important significance, though tassels should be granted to flags which are in actual army or navy service or have had or will have a memorable career. The same is true of the fringe on flags. It, too, had a similar distinguishing meaning.

While we frequently speak and write of our tri-color, strictly it is but a bi-color, as white is argent and supposed to represent silver in heraldry. The blue in our chief is of highest tincture, considered the superlative, and hence neither in the flag nor shield should it be at the bottom or hung upside down. Hence, in streamer cloth decorations, the blue should be at top, the white next, the red below. And when the blue bunting or streamers contain stars, the blue with the stars belong at the zenith or top.

This same blue <(streamer bunting" is often used to decorate vehicles and the commonest sight is to see it bound or wound about the spokes and even the tires ; this is emphatically unpatriotic as at every revolution of the wheels the colors are crushed through the dirt and dust. Decorate the machines, wagons, buggies and carriages, but in a manner that will pro¬ tect the national tints from being dragged through the mud or slopped in any soiling material. When you wear the flag as an em¬ blem on your coat, waist or shirt, see to it that no other token is pinned above the flag, other¬ wise it will show one of two things, either you have purposely disregarded the flag or that you are ignorant of heraldic or patriotic usages.

The stars on flags are often misplaced and too often are put on upside down. A star to be right must have one point directed to the zenith. Even when stars are in a circle every star must have one point to zenith. Expensive

flags sometimes have the stars in gold; this is wrong, our stars are always white, or in heraldic langauge, argent or silver.

Whence the Name of <(01d Glory." — At the outbreak of the Civil War, there lived a man at Nashville, Tenn., who in his eagerness to

preserve an American flag, which had been presented to him for a brave act while in the navy, had it safely concealed in a bedquilt. To his family and trustworthy Federal friends he said: (

general and it was hoisted on the staff of the capitol building of Tennessee, while the old man shouted to the happy throng: ((There once again floats Old Glory.”

The Department of Justice has issued a warning against the desecration of the Ameri¬ can flag by aliens, in the following words :

“ Any alien enemy tearing down, mutilating, abusing or desecrating the United States flag in any way will be regarded as a danger to the public peace or safety within the meaning of regulation 12 of the proclamation of the President, issued 6 April 1917, and will be subject to summary arrest and punishment.”

In the meaning of the Federal law regarding the use of flags in connection with trade-marks it has been determined that the flag must not be used in connection with advertising matter of any kind. This applies equally to the coat-of- arms of the United States (see Great Seal of the United States). It does not, however, apply to the use of the colors, red, white and blue, concerning which there are no statutes.

The Post-Office Department does not object to the use of envelopes bearing pictures of the flag, when placed upon the back of the envelope. When on the face of the envelope in most cases the stamp cannot be canceled, nor the letter postmarked, without defacing the flag.

Sub-ordinary United States Flags (Part IV).- Next to the United States flag — the offi¬ cial flag of the President merits the greatest respect. The President’s flag is blue or azure with four white stars, one in each corner of the flag, and in the centre appears in proper heraldic tinctures the President’s official seal, which is strikingly like the Great Seal of the United States, and hence many writers and speakers have pronounced it the national Coat of Arms. This difference however exists between the two designs: On the Great Seal (see Great Seal of the United States) the 13 stars are argent, arranged over the eagle’s head so as to form one large star, while on the President’s device nine stars arch across the eagle’s head and the other four stars are on the dexter side of the eagle’s beak; the President’s device has a glory break¬ ing back of the eagle and the streams illumi¬ nate the stars and clouds which hover over the stars ; the clouds in the Great Seal are made as 13 and encircle the group of stars; the motto ((E Pluribus

Unum” on the National Seal is placed in a double streamer ribbon, on the dexter stream the words (

States his official flag is broken at the main, as he steps upon the deck of the ship, and re¬ mains so until he leaves the boat. It is also expected as this flag is unfurled to have a salute of 21 guns; and when the President de¬ parts a similar salute is fired, the last shot as the flag is gathered in. When the President visits on land and makes a hotel, summer home or camp his personal headquarters, his flag is floated from sunrise to sunset. His flag is one of the most difficult and handsome emblems ever constructed ; made of silk and embroidered, involving expert needlework, it is considered the most gorgeous design in our national heraldry.

The flag of the Secretary of the Navy is blue or azure with four white stars, one in each corner and in the centre of the flag the <(Anchor of Hope,® that early device of the United States navy.

The Assistant Secretary of the Navy has a flag of white or argent, four blue stars, one in each corner and an anchor in azure.

The flag of the Secretary of War is a later conception and consists of red silk with four white stars, one in each corner, and in the centre of the flag, and in proper heraldic tinctures the exact device known as the Great Seal of the United States. His flag has a narrow white border.

The flag of the Assistant Secretary of War is white with four red stars, one in each corner of the flag, and in the centre in proper heraldic tinctures the Great Seal of the United States. His flag has a narrow red border.

The flag of the United States infantry is blue with the Great Seal of the United States in proper tinctures, and beneath that device a red scroll with the words (

The flag of the coast artillery is red with the Great Seal of the United States in proper tinctures ; beneath two cannons crossed ; below which, a yellow scroll with these words in red, <(United States Coast Corps Artillery® ; the border is yellow.

The flag of the Chief of Staff is half red and white, the division being

on a bias, the upper triangle or pole side being red with a white star in the upper corner and the float end tri¬ angle white with a red star in lower corner; in centre of entirety on a large white star ap¬ pears the Great Seal of the United States and in heraldic tinctures; the border is narrow and yellow.

The flag of the engineer corps is red with Great Seal of United States in centre, beneath which the symbol of the fortress, below which on a white scroll are the words in red ((First United States Engineers® ; the border is narrow and white.

The Secretary of the United States Treasury flag is blue with two white anchors crossed and entirety surrounded by 13 white stars. This flag is flown when the secretary is on board vessels in the treasury service, he being the commander-in-chief of the Coast Guard and Public Health service.

The flag of Assistant Secretary of the Treas¬ ury is same as foregoing except the flag is white and devices in blue.

The Secretary of Commerce flag is blue with

four white stars, one in each corner; with a shield in centre displaying at chief a vessel in blue at full sail, in base a lighthouse as a beacon light in blue.

The Assistant Secretary of Commerce same as foregoing except flag white with shield blue and charged device white.

The United States custom flag is of 16 stripes or pales alternate red and white, as a union an American eagle in blue, on its breast the United States shield and 13 stars arched over all; the eagle's left talon holds three arrows ; the right talon an olive branch.

The Secretary of Labor flag is white with four blue stars, one in each corner and in centre his department seal which consists of a shield possessing the plow, above shield the American eagle in gold.

The Bureau of Navigation flag is blue with a large circle, red upon which in white a vessel in full sail.

The Weather Bureau flags are five, as fol¬ lows : (1) white flag ((clear and fair®; (2)

blue flag (

United States Public Plealth flag is yellow with the anchor crossed by medical device (serpent entwined about staff and double wings) ; these devices are in blue on the yellow field. The surgeon-general has a blue flag, the devices are in white.

The United States yacht flag is the same as the United States flag but instead of the union in blue with 48 stars the union is blue with a white anchor surrounded with 13 white stars.

The Commissioner of Fisheries has a flag of blue upon which appears a fish in white.

The United States coast survey is a flag of blue with large white circle upon which the largest possible triangle in red appears.

The flag of the cavalry is yellow or gold with Great Seal in centre in heraldic tinctures below which is a scroll in red with these words in white (

The flag of the field artillery is red with Great Seal in centre beneath which appears a yellow scroll and in red letters the words ((U. S. Field Artillery.® The border is narrow and yellow.

The United States signal corps flag is red with Great Seal in centre beneath which is a white scroll and in red letters the words <(United States Signal Corps® ; narrow border in yellow.

The flag of the United States marine is blue or azure in centre, globe showing the western hemisphere; above it the American eagle with wings extended, over his head a red scroll with “United States Marine Corps,® in white letters and below the anchor position the entirety sur¬ rounded by green wreath. The flag has a narrow yellow border.

The United States naval academy flag is blue, a white diamond or square upon which in blue appears the anchor of hope, just above the square in white letters “United States® and

below the square (

Secretary of the Interior flag is green with four golden stars (one in each corner of flag) and in centre a buffalo in gold.

The submarine flag is red, in centre two white cannons crossed in saltire, at crossing point a mine topshaped device. Above the cannon the words Submarine,® and below the cannon “Defense® ; flag is without border.

The flag and distinguishing mark of the United States flying machines is a circle of blue upon which a large white star appears, whose tips touch the circumference of the circle ; in centre of star a red disc or circle. We might add here that our ally’s, the French, mark, is a circle divided by three inner circles ; the outer one red, the next inner white and the central disc blue. Belgium the outer circle red, next inner yellow and the central disc blue. The British use the crosses of Saints George, Pat¬ rick, Andrew on a blue field. Russia a square with three broad stripes, the top white, the centre blue, the lowest reel. Italy has a square of green, white and red and has used a red shield upon which is a large white cross.

The hospital flag is white and in the centre is a large red cross.

The ambulance company flag is maroon with the fly end swallow tailed and the medical symbols of serpent entwined on staff with the two wings white to indicate speed. It has the symbolic letters (

The naval militia flag is blue and in centre a yellow diamond with the anchor of hope in blue.

The United States naval reserve flag is blue with the fly end swallow tailed and, as the de¬ vice, has the American eagle in white perched on the United States shield in proper heraldic tinctures.

The United States consular flag is blue with a large letter C for consular, and sur¬ rounding same the 13 stars in white.

The religious flag is white and in pennant form (triangular) with a large blue cross.

The United States cadet flag is silver with the American eagle perched on the United States shield; below a red scroll, white letters “United States Corps of Cadets.® On centre of shield the cap of Mars.

Submarine Warning flag red flag .with large white square upon which appears a figure of a torpedo in black.

The wigwag flag of the army and navy is a red square with a white square in centre, one- third the entire width of the red flag. With the use of this flag by a system of dots and dashes words are spelled out

by the flourish¬ ing of flag either from right to left.

The World War has also given us the serv¬ ice flag, a white field upon which is a red bor¬ der one-third the width of the white. And for every person who has actually enlisted there is placed a blue star within this field. Firms wishing to indicate their patriotism place one large blue star, with the number of men enlisted in figures below the one blue star. Death to any one of the enlisted men places a gold star above the blue star.

The Red Cross nurse service, also recognized by the War and Navy departments with a white device, upon which is blazoned a red cross for

every person entered from the family. Firms too indicate the number of nurses in service from the firm by a red cross and the number below in figures. Schools, colleges, universities, clubs, lodges and churches have flown the service flag and the red cross nurse device with this same meaning.

State Flags (Part V). — The States of the Union found it of value to possess State flags — and hence the legislatures made the emblems possible; and military progress also approved of these distinguishing devices, especially in interstate parades and drills. Many of these State colors appeared on the battlefields of Europe and State pride contributed much to national valor. Taking them in order in which the States accepted the present Federal Consti¬ tution, these State flags in brief description are as follows :

Delaware State Flag. — A blue flag, accepted 1914, has centre a large diamond field or, upon which in centre appears the device of the State Great Seal, in proper colors under it “December 7, 1787.®

Pennsylvania. The State Flag is blue and in centre the device of the State Seal in heraldic tinctures. Adopted 13 June 1907.

New Jersey State Flag, adopted March 1896, is yellow with the devices of the State Seal in the centre.

Georgia State Flag is blue the first third horizontally at pole side upon which appears the State Seal. The remaining two-thirds is divided with three horizontal stripes : upper and lower red, the centre one white. It was adopted in 1879.

Connecticut State Flag is blue with the de¬ vices of State Seal at centre.

Massachusetts State Flag is white with the devices of State Seal at centre. Approved

1908.

Maryland State Flag is shield of the State which is the personal shield of Lord Baltimore ; the tinctures are red, black, gold and silver. Adopted 1904.

South Carolina State Flag is blue with an Arg. crescent at the point in union and a white palmetto tree in centre of flag. This flag was adopted in 1861.

New Hampshire State Flag is blue and has the State Seal in the centre. It was adopted

1909.

Virginia State Flag is blue with State Seal in centre. Adopted 1861.

New York State Flag is blue with the de¬ vice of the State Seal in the centre. It was adopted in 1909.

North Carolina State Flag, adopted in 1885, has one-third blue (horizontal stripes at pole or hoist side) and upon it a yellow scroll with “May 20, 1775,® under this the letters “N. C.® divided by a white star; under the foregoing a scroll in yellow with words “April 12, 1776.® The remaining two-thirds divided by two hori¬ zontal-stripes, the upper one red, the lower one white.

Rhode Island State Flag, adopted in 1877, is white with anchor in gold. Scroll under it in blue upon which the word “Hope® appears in gold. The entirety surrounded by 13 golden stars.

Vermont State Flag is 13 stripes alternate red and white with a blue union, and upon which is a large eight-pointed star-like emblem,

in the centre of which is the State Seal. It was adopted in 1862.

Kentucky State Flag is blue, in centre the device of the State Seal. Accepted in 1880.

Tennessee State Flag is red, in centre a circle of blue upon which

appears three silver stars; at the fly end is a narrow blue stripe. Adopted in 1905.

Ohio State Flag, adopted in 1902, is pennant formed. At staff or pole side appears a blue triangular field with a circle at centre, of white with red disc, and clustered about the circle which stands for “O® in Ohio are 17 stars; the pennant swallow tailed reaches out full width of the blue triangle and has five stripes alter¬ nate red and white.

Louisiana State Flag is blue, and a pelican in white is feeding its young. Below device the words: ((Union, Justice and Confidence.® Adopted 1912.

Indiana State Flag is blue, in centre a torch in yellow, above the flame a large star above which the word Indiana in gold appears. Sur¬ rounding the entirety are 13 stars and within the lower part of this starry circle are five other stars. Adopted 1901.

Mississippi State Flaˆ adopted after the Civil War, is of three stripes, blue, white and red with a red union upon which appears a blue cross of Saint Andrew with 13 white stars.

Illinois State Flag is white with the device of the State Seal in the centre. It was adopted

1915.

Alabama State Flag, adopted 16 July 1895, Saint Andrew’s cross in red upon a white field.

Maine State Flag, adopted in 1909, consists of a field of blue upon which in centre is the device of the State Seal.

Missouri State Flag, adopted 1913, is of three stripes, red, white and blue, in the centre a blue broad circle upon which are 24 white stars and within this circle the devices and motto of the State Seal.

Arkansas State Flag is red and a white diamond upon which appears in blue letters the word “Arkansas,® a blue star above and two blue stars below that word. Surrounding the white diamond is a blue border upon which are 25 white stars. Adopted 26 Feb. 1913.

Michigan State Flag is blue with the device of the State Seal in centre. The word “Michi¬ gan® in white letters under the device — adopted in 1911.

Florida State Flag adopted in 1899 is white with a red Saint Andrew’s cross at the centre of which are the devices of the State Seal.

Texas State Flag is of white and red stripe with a broad blue perpendicular stripe at hoist or staff side and upon it a large white star. It was the colors of the embryo republic.

Iowa State Flag, adopted in May 1917, is white with an American Eagle holding in his beak the scroll with letters in blue these words : “Our Liberties We Prize and Our Rights We Will Maintain.® Under these words in red is the word “Iowa.®

Wisconsin State Flag, adopted 1913, is blue and in centre the devices of the State Seal. The word “Forward® in red above device.

California State Flag, adopted 1911, is white with a red stripe below and a red star at the union. A grizzly bear at centre of flag, under

that device the words in black, “California Re¬ public.®

Minnesota State Flag is blue and at centre devices of State Seal. The tip of the staff has a golden gopher. Adopted 1893.

Oregon State Flag is blue with the devices of State Seal at centre.

Kansas State Flag is blue and in the centre the State Seal appears as the emblem.

West Virginia State Flag is white, in the centre the device of the State Seal appears, under same on a red scroll the words in gold “West

Virginia.® Adopted in 1904.

Nevada State Flag is blue and in centre the State Seal device appears ; arched above it are 18 golden stars and below are 18 stars in silver.

Nebraska State Flag is yellow or gold with State Seal in centre.

Colorado State Flag is of three stripes alter¬ nate blue and white ; at the hoist end a large red letter, an open “C® for Colorado, em¬ braces or holds a circle of gold. Adopted

1908.

North Dakota State Flag is blue with a dis¬ played American Eagle, over his head a burst of glory and 13 stars. Under device on scroll of red the words “North Dakota® in white letters. Adopted 1911.

South Dakota State Flag, adopted in 1909, is blue with State Seal at the centre.

Montana State Flag, adopted in 1905, is blue and at centre device of State Seal.

Washington State Flag while not of legis¬ lative creation is of military design and con¬ sists of a green field of hope upon which in centre is the State Seal which is the front view of the face of George Washington.

Idaho State Flag is blue with device of State Seal at centre. Under same on a scroll of red the words “State of Idaho® in white letters. Adopted 1909.

Wyoming State Flag, adopted January 1917. The flag is blue and has a border of red, and border of white next to the field of blue. In centre a white buffalo on which appears in proper tinctures the State Seal.

Utah State Flag is blue and in centre a golden circle within which are the State em¬ blems in proper heraldic colors, draped on dexter and sinister sides with American flags. It was adopted in 1911.

Oklahoma State Flag adopted 1911 is red with a large white star of blue border, within the star the figures 46 in blue which express that this State was No. 46 to enter the union of States.

New Mexico State Flag is of turquoise blue; as the union appears the American flag with 47 stars ; in the upper fly corner the figures 47, in

the lower fly corner the State Seal and across the centre of flag in white the words “New Mexico.®

Arizona State Flag is of two stripes, upper red and lower blue; the upper stripe is of 13 rays of glory alternate red and yellow. In the centre of the flag a large golden star over¬ laps the two stripes of which the flag is com¬ posed.

District of Columbia Flag as carried by its National Guard is blue; on centre an ax or hatchet, under which are these words on a scroll, “District of Columbia Militia.®

Hawaii Flag is of nine stripes alternate,

white, red and blue, and as a union of blue the crosses of Saints George, Patrick and Andrew.

Alaska happens to be the only Territory of the United States without a flag but with propriety could carry a white field (snow covered) with the Alaska seal in yellow or gold.

Philippine Islands use the device American Shield, at centre the ancient arms of Manila. As a crest the American spread eagle. Adopted

1905.

Porto Rico has the ancient arms of the Spanish colony with letters ((F and I,® Ferdi¬ nand and Isabella. Adopted 1905.

Tokens and Trophies (Part VI). — The Federal government has many flags, banners and standards of historic value; some of odd design, yet filled with American symbolisms and spirit, while others are trophies captured from the enemies. These memorable flags are on exhibition at the National museums at Washington, D. C., Annapolis Naval Acad¬ emy and West Point Military Academy, and other remarkable flags are displayed at the State Capitol, Albany ; Memorial Hall, Chicago ; Springfield, Ill.; Madison, Wis. ; Trenton, N. J. ; Boston, Mass. ; Independence Hall, Phila¬ delphia, Pa.; Atlanta, Ga. ; Nashville, Tenn. ; Saint Louis, Mo. ; Richmond, Va. ; Harrisburg, Pa.; New York city. While all other States, ‘ especially such as sent regiments to the wars of the Revolution, of 1812, of 1846 and of 1861 also have trophies and tokens on exhibition. At the Washington, D. C.,

National Museum can be seen the repaired and restored American flag which floated over Fort McHenry in 1814 and inspired Francis Scott Key to write the Na¬ tional anthem, ((The Star Spangled Banner;® this flag has 15 stars and 15 stripes. Many trophies of the Revolution, War of 1812, Mexi¬ can War, Civil War and of the Spanish-Amer- ican War are also at this National Museum. The Paul Jones flag of 13 stripes and 12 stars is also here on exhibition. The flag of the Maine, the ship whose sinking precipitated the Spanish-American War, is at Annapolis, Md. The standards Admiral Dewey captured from the Spanish are near by, as are trophies from Santiago and Cuba. At the same Annapolis Naval Academy are the Com. O. H. Perry flag of blue with the dying words of Captain Lawrence : ((Don't Give Up the Ship,® used by Perry 10 Sept. 1813. Also a royal British flag captured in 1813 when the capital of Canada fell into American hands. There are a few unique or curious flags, which are not in ac¬ cord with the Continental law of 14 June 1777; as an example, the one hoisted 16 Aug. 1777 at the battle of Bennington, as it contained 13 stripes, seven white and six red, and its union of blue contained 11 seven-pointed stars arched over the figures (<7 6® with one star in the dexter and one in the sinister parts of that azure union. A similar incorrect flag waved at the fall of Yorktown, 19 Oct. 1781; it had the union proper but it contained 13 stripes alternate white and red instead of alternate red and white. The writer made a copy of this flag from the pen and ink sketch left by Major Se¬ bastian Bauman, only officer in the New York regiment of artillery not a native-born Amer¬ ican. He was also an original member of the New York Society of the Order of Cincinnati.

His drawing of this unique flag is in the col¬ lection of the New York Historical Society.

At the State House, Annapolis, is exhibited an original 13-star, 13-stripe American flag of pattern form, law of 14 June 1777.

The Philadelphia Light Horse flag, earliest colonial flag to have the 13 stripes of blue and white, is deposited in the safe of that troop.

The entire Peter Force flag collection of captured naval ensigns, recently donated to the Library of Congress, has been deposited in the National Museum. Here too is the flag of the Kearsarge in use at the time of surrender of the Confederate cruiser Alabama. Also the first flag of the United States of America to be raised over Richmond after its surrender to the Federal troops. A score or more Spanish flags are

here as trophies, but the token which attracts great attention is the pennant which was flown on the Brooklyn during the naval battle off Santiago.

An interesting item relates to the placing of the stars and stripes in Saint Paul's Cathe¬ dral, London, in honor of the American Le¬ gion composed of Americans who were fight¬ ing in the British army before the United States joined the Allies. The members of the legion hailed from the United States and crossed the Atlantic to assist in defeating the Germanic designs against freedom. Other American flags have been deposited in English historic buildings, notably as a decoration in the Guild Hall, London.

The American flag is receiving equally memorable consideration in France and Bel¬ gium ; in the former at Paris in innumerable places of note the American flag is donated and deposited as a heritage of the spirit of liberty. The American flag of the Foreign Legion, composed of Americans serving in the French divisions, was requested by the French government as a token of fraternal spirit and was deposited in the museum of the army in the Hotel des Invalides, Paris.

Trophies also which have a pathetic inter¬ est in American progress and unity are those of the Confederate States flags. See Flags, Confederate.

Bernard J. Cigrand,

Lieutenant United States Navy; Author (Real History of United States Flag) ; (History of American Emblems, > etc.; Member of Faculty University of Illinois ; former President of the Chicago Public Library.

FLAGELLANTS, flaj'e-lants (Lat. flagel- lare, to lash or scourge), a sect which arose in 1260 at Perugia, called by the French Perouse, and spread throughout and beyond Italy. Its adherents, said to have numbered 10,000, at¬ tempted to expiate their sins and obtain mercy by self-inflicted suffering. They ran through the cities scourging their bare shoulders and exhorting bystanders to repentance. Led by priests bearing banners and crosses, they moved in procession through the streets. They could be seen going about by night as well as by day, even in the cold of winter. They went in thou¬ sands from country to country begging alms. In 1261 they crossed the Alps in Alsatia, Ba¬ varia, Bohemia and Poland, and found there many imitators. In 1296 a small band of Flag¬ ellants appeared in Strassburg, who, with cov¬ ered faces, whipped themselves through the

city, and at every church. At first the Flagel¬ lants were noted for sanctity, and made many converts even from the most abandoned classes, but doubtful characters beginning to join their ranks, they fell into disrepute, and were re¬ strained from their processions by the civil and ecclesiastical authorities, and the sect gradually died away. The terror produced by the dread¬ ful disease called the black death, which de¬ stroyed many millions of people in Europe in the middle of the 14th century, produced a re¬ vival of the flagellation mania, which spread over most of Europe and was attended by greater extravagances than before. In the reign of Edward III, a band of 120 Flagellants, male and female, made their appearance in London on a missionary enterprise, but had to leave the country without having made one proselyte. In 1349 Clement VII declared the Flagellants heretics and took steps to repress them. In 1360 an effort was made in Thurin¬ gia to revive them, under a form marked by

authorities to suppress them. (See Flagellation). Consult Boileau, J., (Historia Flagellantium 5 (Paris 1700) ; Collas, G. F., (Geschichte des Flagellantismus, etc.5 (in progress, Leipzig 1913) ; Cooper, W. M., (Flagellation and the Flagellants5 (London 1898) ; Deane, I., (The New Flagellants5 (in Catholic World , Vol. XXXIX, p. 300, New York 1884) ; Doring, G. C. W. A., (Die Geisselfahrt5 (Frankfort-on- Main 1833) ; Forstemann, E. G., (Die Christ- lichen Geisslergesellschaften5 (Halle 1828) ; Runge, P., ed. (Die Lieder und Melodien der Geissler des Jahres 1349, etc.5 (Leipzig 1900) ; Schneller, C., (Statnten Einer Geissler-Bruder- schaft in Trient aus dem 14. Jahrhundert5 (in Zeitschrift des Ferdinandemus Geschichtliche Abteilung, Series III, part 25, p. 3, Innsbruck

1881).

FLAGELLATA, a group of Protozoa, sometimes regarded as a division of the class Infusoria, sometimes as a distinct class by itself. The group is characterized by having a body-

Various Flagellata. A, Bicoseca; B, Englina vividis (Autoflagellatis) ; C, Noctiluca miliaris (Cystoflagellate) ; D, Ceratium tripos (Dinoflagellate).

wild fanaticism and by strange doctrines which were condemned by the Council of Constance. The burning alive of their leader, Conrad

Schmidt, and 90 of his followers, in 1369, par¬ tially checked the project, though the extirpa¬ tion of the sect was found a work of extreme difficulty. One form of fanaticism which marked some of the Flagellants was violent hatred and persecution of Jews. Generally speaking the Flagellants gradually disappeared, beginning with the 14th century. There were, however, spasmodic and more or less isolated revivals, as in France in the 16th century, in Germany in the 1 7th century, and in various countries outside of Europe, especially in South America, frequently as a result of over-zealous attempts at conversion on the part of religious orders. The most striking example, perhaps, of this last type of Flagellants were the Hcr- manos Penitentes amongst converted Indians of New Mexico and Colorado who as late as the end of the 19th century practised ceremonial flagellation going frequently to great excesses in spite of attempts of civil and ecclesiastic

form usually fixed and definite for the species, and by having as organs for locomotion and taking of food one or more long vibratile whip¬ lash-like processes, the ((flagella.55 Like all Pro¬ tozoa (q.v.) the body is composed of a single cell. The group is divided into three orders : Auto flagellata, Dinoflagellata and Cysto flagel¬ lata. In the Autoflagellata the body is usually oval and has both nucleus and contractile vacuoles ; sometimes the body is naked and ca¬ pable of amoeboid motions, but usually it has a cuticle, and enveloping cases are not uncom¬ mon. In one sub-order (Choano flagellata) a peculiar collar-like structure is developed around the flagellum. Some of the group closely approximate plants, some forms like Euglena and Volvox being claimed by the bot¬ anist. A few are' human parasites. The Dino¬ flagellata have a firm external armor of hard cellulose plates, divided by a groove around the body, and with a second longitudinal groove. At the junction of the two grooves are the two flagella, one lying in the circular groove, the other projecting freely. These forms occur in

salt and fresh water. In the Cystofiagellata the large gelatinous body is enclosed in a stout membrane. The best-known form is Noctiluca (q.v.), noted for its phosphorescent powers. These minute creatures exist in countless swarms and form the food of a host of marine creatures a little larger or higher in rank of organization.

FLAGELLATION, scourging or whipping, either self-inflicted or

administered by another person, especially as a religious practice. Orig¬ inally it was used primarily as a corrective pen¬ alty for clerics. Its use spread with the grad¬ ual growth of monastic institutions. Its ap¬ plication as a means of religious penance is an old Oriental custom, admitted into Chris¬ tianity partly because self-torment was consid¬ ered salutary as mortifying the flesh, and partly because both Christ and the apostles underwent scourging. It was also practised as a devotional measure toward certain deities in Greece and Rome. From the 1st century of Christianity religious persons sought to atone for their sins by voluntary bodily torture. Like the Abbot Regino, at Prum, in the 10th cen¬ tury, many tried to imitate the sufferings of Christ, in order to make themselves the more certain of forgiveness through him. It be¬ came general in the 11th century, when Peter Damian of Ravenna, abbot of the Benedictine monastery of Santa Croce d'Avellano, near Gubbio, in Italy, afterward cardinal bishop of Ostia, zealously recommended scourging as an atonement for sin, to Christians generally, and, in particular, to the monks. His own example and the fame of his sanctity rendered his ex¬ hortations effective. Clergy and laity, men and women, began to torture themselves with rods, and thongs and chains. They fixed certain times for the infliction of this discipline upon themselves. Princes caused themselves to be scourged naked by their father confessors. Louis IX constantly carried with him for this purpose an ivory box, containing five small iron chains, and exhorted his father confessor to scourge him with severity. He likewise gave similar boxes to the princes and princesses of his house, and to other pious friends, as marks of his peculiar favor.

The expectation of being purified from sin by flagellation prevailed throughout Europe in the last half of the 13th century. <(About this time,® says the monk of Padua in his chronicles of the year 1260, ((when all Italy was filled with vice, the Perugians suddenly entered upon a course never before thought of ; after them the Romans, and at length all Italy. Men of noble and ignoble birth, old and young, traversed the streets of the city naked, yet without shame. Each carried a scourge in his hand, with which he drew forth blood from his tortured body, amidst sighs and tears, singing at the same time penitential psalms.® The penitents united into fraternities called the Flagellants (q.v.). After the Council of Constance (1414-18) both clergy and laity gradually abandoned flagellation. The Franciscan monks in France (Cordeliers) ob¬ served the practice longest.

Flagellation was sometimes voluntary and sometimes imposed as a penance. Henry II of England allowed himself to be scourged at the tomb of Thomas a Becket (q.v.). In its theo¬ logical aspect flagellation

has no especial merit

in itself and is classed merely as a form of penance or self-mortification. It is meritorious only as a means of expiation of sins repented for and absolved, or as a method of mortifica¬ tion of the flesh for the suppression and con¬ trol of the passions. Any excess in it is pro¬ hibited. (See Penance). For an exhaustive bibliography on this topic consult Haupt, H., (Flagellation) (in Schaff-Herzog, Encyclo¬ pedia of Religious Knowledge, > Vol. IV, New York 1909).

FLAGELLUM DEI, fla-jeTlum da'e (((Scourge of God®), a title commonly bestowed on Attila, King of the Huns.

FLAGEOLET, flaj 'o-let, a small wind-in¬ strument, the notes of which are exceedingly clear and shrill. It is a sort of whistle with a mouth-piece that is usually inserted in a bulb. In appearance, etc., it may be said to belong to the flute family of musical instruments ; but it is always used in a vertical instead of hori¬ zontal position. It is generally made of box or other hard wood, though sometimes of ivory, and has six holes for the regulation of its sounds, besides those at the bottom and mouth¬ piece, and that behind the neck. Its compass is two octaves, and a set of five different sizes is needed to take all the semitones in this range. Its inventor is said to have been Sieur Juvigny in the latter part of the 16th century. Pre¬ viously, however, similar instruments had been used for many centuries by a number of peoples of comparatively primitive civilization, as the North American Indians. The use of the flageolet is never indicated in orchestral scores, though it was used with considerable fre¬ quency both as a solo instrument and in small wind bands in England and in most countries of the continent for more than 200 years. It became more or less obsolete in the beginning of the 19th century. Occasionally, in the French and English provinces, it is still employed chiefly for dance music. Very little music has ever been composed for it. Double and triple flageolets, slightly more complicated variations of the single instrument, have been built, but are seldom used. Consult Burney, Charles, (A General History of Music, etcP (4 vols., London 1776-89) ; Cresson, H. T., Construction of Ancient Terra-Cotta Pitch-Pipes and Flageolets) (in American Natural¬ ist, Vol. XVIII, p. 498, Philadelphia 1884) ; Greeting, T., (Pleasant Companion; or New Lessons and Instructions for the Flageolet } (London 1675) ; Mersenne, M., (Harmonie Universelle) (Paris 1636).

FLAGET, fla-zha, Benedict Joseph, Amer¬ ican Roman Catholic bishop: b. Contournat, Auvergne, France, 7 Nov. 1763; d. Nazareth, Ky., 11 Feb. 1850. He was educated in France, joined the order of

Sulpicians and after his ordination taught for some years at the theo¬ logical seminary at Nantes. In 1792 he came to America and was assigned by Bishop Carroll of Baltimore to the mission of Vincennes, Ind. His work as a missionary in what was then the outposts of white civilization was highly suc¬ cessful, both amongst the white settlers and the Indians. In 1795 he joined the faculty of Georgetown College. From 1798-1801 he was in Havana, Cuba, and from 1801-09 he taught at Saint Mary's Seminary, Baltimore. In

1810 he was consecrated bishop of Bards- town, Ky. His diocese was of vast extent, reaching to the Mississippi River and to the Great Lakes, and very undeveloped. He worked in it untiringly and with great suc¬ cess, being assisted later by two coadjutors. In 1841 the see was removed to Louisville, Ky., and his title was changed to Bishop of Louis¬ ville. From 1835-39 he spent abroad, being received with many honors at Rome. At the time of his death his see had become wonder¬ fully developed. The number of Catholics in it had greatly increased and many educational, charitable and ecclesiastic institutions had been founded and securely established. Consult Howlett, W. J., (Bishop Flaget's Diary* (in American Catholic Historical Society of Phila¬ delphia, Records, Vol. XXIX, Philadelphia 1918) ; Spalding, M. J., (Life of Bishop Flaget* (Louisville 1852).

FLAGG, Charles Noel, portrait painter: b. Brooklyn, 25 Dec. 1848; d. Hartford, Conn., 10 Nov. 1916. He was the son of Rev. Jared Bradley Flagg, artist and clergyman, and his brothers were Ernest Flagg, architect of the Singer Building, New York city, etc.; and Montague Flagg, artist and national academi¬ cian. He studied art under L. Jacquesson de la Chevreuse. In 1888 he founded the Connecti¬ cut League of Art Students, now the Flagg Night School of Drawing for Men, of which he was director. He was a member of the Connecticut State Capitol Commission of Sculpture, president of the Connecticut Acad¬ emy of Fine Arts, and other civic and art associations. A member of the National Acad¬ emy of Design, his portrait of Paul Bartlett, the sculptor, won the portraiture prize in 1908. He became recognized as one of the foremost portrait painters in this country and painted many of the portraits of governors of Connecti¬ cut for the State capitol collection. Outside portraiture one of his greatest pictures was the (Seizure of the Charter) in the capitol at Hart¬ ford. He was a frequent contributor to art and other magazines and was the author of (The Evolution of an Equestrian Statue >

(1909).

FLAGG, Ernest, architect, brother of Charles Noel Flagg: b. Brooklyn, N. Y., 6 Feb. 1857. He studied under Blondel, in Ecole des Beaux Arts at Paris, and in 1891 became an architect in New York. Among his most notable works are the Singer Building and Saint Luke's Hospital, New York; the national Naval Academy, Annapolis, Md. ; the Corcoran Gallery of Art, Washington, etc. He is also a prolific contributor to magazines and other periodicals on good roads and pavements, model tenements, etc.

FLAGG, George Whiting, American artist: b. New Haven, Conn., 26 June 1816; d. Nantucket, Mass., 5 Jan. 1897. He showed re¬ markable artistic ability very early in life. Some of the paintings of this period are now in the collection of the Historical Society of New York city. He studied under Washington All- ston and later for nine years in Europe, es¬ pecially in London, England ; on his return to the United States he opened a studio first in New Haven and later in New York. He was elected a member of the National Academy of Design in 1851. Among his best-known paint¬

ings are (Landing of the Pilgrims) ; (Washing¬ ton Receiving His Mother's Blessing) ; (The Good Samaritan) ; (The Scarlet Letter) ; and (The Execution of Lady Jane Grey. * The second of these is especially well known through the many engravings which were made after it. Much of his work is of a highly ideal type and throughout his entire career he was never influenced by any commercial con¬ siderations. His works consist of historical and genre pictures and of a few portraits.

FLAGG, Isaac, American Greek scholar: b. Beverly, Mass., 7 Sept. 1843. He is a son of Wilson Flagg (q.v.), and was prepared for college at Andover Phillips Academy, was graduated from Harvard 1864, and was tutor in the College 1865-69. He studied in Gottin¬ gen and Berlin, and received the degree of Ph.D. at Gottingen 1871. He was professor of Greek in Cornell University 1871-88, professor of classical philology in the University of Cali¬ fornia 1890-99, professor of Greek 1899-1909, since then professor emeritus. He has edited the (Hellenic Orations of Demosthenes) ; (Seven against Thebes) of ˆEschylus; the (Iphi- genia in Tauris) of Euripides; Plato's Apol¬ ogy* and

Dramatic Fantasy) (1910) ; and other poems.

FLAGG, James Montgomery, artist and author: b. Pelham Manor, N. Y., 18 June 1877. After early studies in New York, under Her- komer

in England and Marec in Paris, he be¬ came speedily known by his magazine contri¬ butions and his illustrated volumes of poetry and prose, which revealed remarkable versatility, technical ability and vivacious humor, whether in oils, pen and ink, charcoal or crayon. His first drawing was published in Life at the age of 14. His portrait in oils of Mark Twain, one of his best, is in the Lotos Club, New York. His illustrated volumes of prose and poetry in¬ clude (Tomfoolery* (1904); (If : a Guide to Bad Manners* (1905) ; (Why They Married (1906) ; (All in the Same Boat) (1908) ; (City People* (1909) ; (I Should Say So) (1914).

FLAGLER, Henry M., American capital¬ ist: b. Canandaigua, N. Y., 1830; d. 20 May 1913. He began life as a clerk in a country store, then going to Saginaw, Mich., he became a salt manufacturer. He afterward removed to Cleveland, Ohio, and formed one of the firm of Rockefeller, Andrews and Flagler, now known as the Standard Oil Company and with which he was associated until 1911. He was the proprietor of some 600 miles of railroad in Florida and of the Ponce de Leon and Alcazar hotels at Saint Augustine. As builder and owner of these palatial hotels he did much to make Saint Augustine, Fla., a popular winter resort.

FLAGS, Confederate. Early in the ca¬ reer of secession designs for flags were of¬ fered to the Confederate Congress. Devices were sent in daily and a mass of ideas was col¬ lected, illustrating a still lingering love for the United States flag, while most of them were radical departures from its heraldic character. The entire political, educational and religious spirit of the Confederacy took a deep concern

hCMfri/’

Ju*t, Cu

ud e**r *

jir/d ft* ■M La ffc~ c l~ˆ(t n>

‘Xh* tffc hfcdd fumeu Th&%

$‘obL&, ˆcf >ˆto clCtd i*Mtltr~Jtii

Jˆxe, n cd>{ˆ skrouctidb j Jtud *.*f fcttiZtU Qt

yfv t$T eu fh piAˆtcweL

t

J

>

in the proposition of a flag, and even Stephens, Tombs, Clinton, Wickham, and Semmes took the time from legislative and military duties to devise some flag symbols. In the midst of the deliberations a committee, the Confederate Congress, decided to • turn the matter, with the hundreds of suggestions, to a committee, which was composed of Miles (S. C.), Mor¬ ton (Fla.), Shorter (Ala.), Barton (Ga.), Sparrow (La.) and Harris (Miss.), which committee reported 5 March 1861. Some of the introductory sentences copied from the original read: “Whatever attachment may be felt, from association, for the stars and stripes (an attachment which your committee may be permitted to say they do not all share), it is manifest that, in inaugurating a new govern¬ ment, we cannot retain the flag of the govern¬ ment from which we have withdrawn, with any propriety, or without encountering very ob¬ vious practical difficulties. It is idle talk of re¬ taining the flag of the United States when we have voluntarily seceded from them.® And this sentence, “It must be admitted, however, that something was conceded by the committee to what seemed so strong and earnest a desire to retain at least a suggestion of the old stars and stripes. So much for the mass of models or designs more or less copied from or as¬ similated to, the United States flag.® The long report indulges in some historical refer¬ ences and strongly argues that the colonists forgot the glories of the British flag and wound up with this stand: Wet under that British flag the colonists fought in their in¬ fancy for their very existence, against more than one determined foe. Under it they had repelled and driven back the relentless sav¬ age, and carried it farther and farther into the decreasing wilderness as the standard of civilization and religion. Under it the youth¬ ful Washington won his spurs in the memor¬ able and unfortunate expedition of Braddock, and Americans helped to plant it on the Plains of Abraham when the immortal Wolf fell. But our forefathers, when they separated themselves from Great Britain . . . they

cast no lingering, regretful looks behind.® And summed it up : ((The committee, on examin¬ ing the representations of the flags of all coun¬ tries, found that Liberia and the Sandwich Islands had flags so similar to that of the United States that it seemed an additional if not a conclusive reason why we should not keep — copy — ■ or imitate it. They (the committee) feel no inclination to borrow at second hand what had been pilfered and appropriated by a free negro community and a race of savages.®

The committee reported (5 March) the fol¬ lowing which was adopted on same day, but by vote the flag of the Confederacy, as by committee suggestion, was ordered on the books of 4 March, to be of even date with Abraham Lincoln's inauguration. The report and law reads :

What the Flag of the Confederate States of America shall consist of a red field with a white space extending horizontally through the center, and equal in width to one-third the width of the flag. The red spaces above and below to be of the same width as the white. The union blue extending down through the white space and stopping at the lower red

space. In the center of the union a circle of white stars, corresponding in number with the States in the Confederacy.®

This flag with its seven stars (representing the seven states which rebelled) was unfurled over the State House at Montgomery, Ga., on 4 March 1861. But the new flag did not prove satisfactory to many radical politicians, nor was it satisfactory in military or naval actions because of its striking similarity to the Star Spangled Banner; at the first battle, 21 July 1861 — Bull Run (called by Southerners as the battle of Manasses), the opposing commanders accused the enemy of displaying the colors of the antagonizing forces. By a strange coin¬ cidence, one of the flag committee, Mr. F. S. Barlow (General at the battle of Bull Run) was killed attempting to serve that duplication. It became evident that a new flag for battle pur¬ poses must be created. A flag of that character was devised by Edward C. Hancock of New Orleans, and by end of October it was in general use as adopted by Confederate officers, and was as follows : (

The national emblem of the equestrian South is the Horse. Its colors are black and white; its shield is the sable horse of Manassas on a silver field; its flag is the white flag with the black horse. Neither belong to any other nation of Christians.®

This proposal met with considerable favor, especially because of the

incorporation of the Horse, but it was rejected, only to be later ac¬ cepted on the signature of the South. See Great Seal of the Confederacy.

Innumerable wrere the suggestions, and finally came the short lived National Flag adopted 4 March 1864 by the Confederacy — as follows: ((The width, two-thirds of its length, with the union (now used as the Battle Flag) to be in width three-fifths of the width of the flag, and so proportioned as to leave the length of the field on the side of the union twice the width of the field below it; to have the ground red and a broad, blue saltier thereon, bordered

with white and emblazoned with mullets or five pointed stars, corresponding in number to that of the Confederate States; the field to be white except the outer half from the union to be a red bar exending the width of the flag.®

What Rear-Admiral George H. Preble, U. S. N., wrote in 1880 has during the World War come true : ((Should, unfortunately, our coun¬ try engage in another war foreign or domestic it is to be hoped that our dear old flag the (Star Spangled Banner> — of The Union, will be soul inspiring to the soldiers of the common country, whether Northern, Southern, Eastern or Western, and that all sectional emblems will be subservient beneath the folds of the United States Flag.®

This was true in the Spanish- American War but in a more emphatic way today as a United American folk, love and revere the flag of the Revolutionary forefathers.

Bernard J. Cigrand,

Lieutenant United States Navy; Author

FLAGS OF FOREIGN NATIONS. It

is but proper that in the study of flags those of foreign nations be considered : the English from which we withdrew, as well the French, from whence we derived considerable aid, de¬ serve to be treated at some length; while the neighboring flags of the Western Continent, as those across the two oceans, merit considera¬ tion.

When in 1066, William the Conqueror, Duke of Normandy, invaded England and defeated the Saxons, at the battle of Hastings, he had as his principal flag a dragon device ; it was not painted nor embossed on the cloth, but was a floating figure, and as the wind struck into it it filled the two walls of the device and thus made an inflated living creature. Later he had a banner of white bordered with blue and in the union a large cross in gold. Richard the Lion-hearted also displayed a dragon standard, but not until Henry the III was it designed to portray the dragon of red silk, sparkling all over with fine gold, the tongue representing a shooting flame, with the eyes of sapphire.

Gradually the Christian device, The Cross, came into the English standard because of the British activities in the Crusades. The Cross was in white generally on a field of red ; but in the wars of the Black Prince, the English cross was red on a field of white, this is best known as the cross of Saint George (white flag with red cross). About this same period of the Crusades the Scottish standard was that of the cross of Saint Andrew (a large X white on a blue field), as the legend tells the white cross was seen in the actual blue sky during a great battle in 940, when the Scots and Piets defeated England. When the – Scotch became a part of Britain they enforced their Saint Andrew's flag upon the united standard. The royal flags of Britain, since the time of King Richard I in 1194, have always borne the Coat of Arms of the reigning monarch. But in 1606 King James I ordered a joint device, the Union Jack — called so, as he always signed his name Jack or Jacques, the French for James. The Irish device in the union of 1801 was the saltire red on a white field. It is this device (Union Jack), which is the union of the British flags made in red. Innumerable

have been the changes in the British standards, and various the symbolic designs.

The French Flag with its three broad stripes or pales of blue, white and red may well be said to have had their origin from General Lafayette, who doubtless was inclined to the choice of these heraldic tinctures from having served under the Stars and Stripes; in 1789, when Lafayette was chosen by acclamation commander-in-chief of the National Guard of France, he was delegated to design a distin¬ guishing mark for these soldier bodies. He chose a cockade made of blue, white and red, the first represented the royal family, the red and blue were the ancient colors of Paris and hence Lafayette either by coincidence or de¬ sign gave to France the same colors he so dearly loved in America, and it was but natural when a flag was desired for the National Guard, to convert the tinctures of the cockade into the

banner. Prior to the present tricolor of France the kings had their own royal standard. Charles IX had <(pillars® ; Henry II, <(a half moon® ; Henry III, ((three crowns® ; Philip Augustus, ((a lion®; Louis VIII, ((a boar®; Saint Louis, (VII and VIII, <(a winged stag® ; Louis XII, <(a porcupine® ; Francis I, ((the Salamander® ; Louis VII, wthe fleur de lis.® To France we owe appreciation for evolving heraldic science and the French classification of symbolic de¬ vices is the most perfect in military annals. Most of the early French flags terminated in three points to illustrate that the French people believe in the Trinity. The French Church and Crusade flags were red with a green border emblematic that they would give their blood and the green as a sign of hope, new life, or springtime. In 1364 King Charles V placed three fleurs-de-lis on an azure or blue field, and up to Louis XIV, 1644, the blue flag with the three fleurs-de-lis was the national military standard of France. The pure white standard of the Huguenots with Henry III and Henry IV as their leaders became also the argent colors of the Bourbon and royal France flag. The French President's flag is the same as the flag of France, with the addition of the letters <(R.F.® in gold meaning ((Republic of France.®

Italy. — The royal standard, white with a blue border, displays the full armorial achieve¬ ments of the king. The naval flag displays three vertical stripes of green, white and red; in the centre is a red shield charged with a white cross, and bordered with blue crested with the crown. The arms of the House of Savoy are displayed on the ensign and merchant flag.

Germany. — The imperial standard dis¬ plays on a yellow or gold field the iron cross (or cross of the Teutonic knights) with the motto <(Gott mitt uns.® In the centre is an eagle, and on a yellow field are mingled im¬ perial crowns and eagles in black. The naval ensign is white, divided by a black cross. On the outer section of the cross is the Prussian eagle on a white field. The upper quarter next to the flagstaff is composed of three horizontal stripes of black, white and red, with the iron cross in the centre — red representing the old Hanseatic League, and black and white the kingdom of Prussia. The merchant flag is red, white and black.

Austria-Hungary.— The Imperial standard is yellow of a deep tint, bearing a black double¬ headed eagle, — an evolution from the eagle

standard of the Roman Empire. The warship flag, created in 1786, has three equal horizontal bars of red, white and red with a crowned shield (the ancient device of the dukes of Austria) similarly divided.

Spain. — The royal standard is entirely occu¬ pied with the quarterings of the Spanish es¬ cutcheon armorially displayed. The naval flag has two broad bands of red with a yellow bar between, on which appears the Castle of Castile and the Lion of Leon, the ancient kingdoms whose union marked the origin of Spain. The merchant flag is yellow, with two horizontal bars of red crossing it.

Russia. — The Russian Imperial standard displayed the black double-headed eagle bear¬ ing on its breast a shield with Saint George slaying the dragon, and arms of several Russian cities. The naval ensign had a blue saltire on a white ground. The merchant flag is a hori¬ zontal tricolor of blue, white and red.

Japan. — The standard has a gold chrysan¬ themum with 16 petals on a red field. The naval flag is a representation of the rising sun — a red central disc with alternate red and white spreading rays. The merchant flag is white with a red disc in the centre.

China. — When the Chinese Empire gave place to a republic, the old standard — an an¬ cient dragon on a yellow field — was abolished, and a national design adopted, five equal stripes of colors horizontal, representing China proper, Manchuria, Mongolia, Tibet and the Moham¬ medan races.

Other National Flags. — Abyssinia. — Three stripes, upper green, centre yellow, lower red.

Albania.— Red field, upon which is imposed a black double-headed spread eagle.

Argentina. — Three stripes, the upper and lower are blue and the centre one, upon which is imposed a golden face.

Belgium. — The vertical tri-color, black, yellow and red, the ancient colors of Brabant, is flown by Belgium. This, with the royal arms, on which the shield is the golden lion on black of Brabant, is the standard; and with¬ out the arms, it is the flag of warships and mercantile vessels.

Bolivia. — Three stripes, upper red, centre yellow, lower green.

Brazil. — Green field triangle of yellow; the blue disc in centre

represents the heavens, and the white stars add to its celestial representa¬ tion. Motto : “Ordem e Progresso.ˆ

Bulgaria. — Three stripes, upper white, centre green, lower red.

Chile. — Two stripes, white above and red below, in a blue union a large five-pointed star in white.

Canada. — Same as British, except that it has the Dominion shield in lower fly end. All British colonial flags contain the colonial badge in the fly end of the British flag.

Colombia. — Upper half yellow, lower half blue and red, in centre the shield of Colombia.

Costa Rica. — Five stripes in this order, blue, white, red, white and blue.

Cuba. — At staff end a red triangle, upon which is blazoned a white star and five stripes stream from triangle; these are alternate blue and white.

Denmark. — The flag, the ancient Danne- brog, red with a white cross, and one of the oldest in continuous use, is a memorial of the wars against the Norsemen and Slavs. It is traditionally believed to have been adopted after the appearance of a cross in the sky at one of the battles of Waldemar in 1219. The standard and man-of-war ensign are swallow¬ tailed; the merchant flag is like the ensign, but rectangular.

Ecuador. — Three stripes, yellow, blue and red, with national arms on the blue stripe.

Greece. — The standard is a white rectan¬ gular cross on dark blue, with the royal arms in the centre, the shield of which has the Danish giants as supporters, with a white rectangular cross on a blue field. The naval ensign has nine horizontal stripes, blue and white alter¬ nating; the upper quarter next the staff is blue, with a white cross, in whose centre is a crown. The merchant flag is similar, minus the crown.

Guatemala. — Three vertical bars of blue, white and blue, upon the white the national device.

Hayti. — Two stripes, upper blue, lower red, supporting white square, upon which, in green, appears the coat of arms of that country.

Honduras. — Three stripes, upper and lower blue, centre white, with national arms on the white stripe.

Liberia. — Eleven stripes, alternate red and white with a union of blue, upon which appears a large white star.

Luxembourg. — Three stripes, top red, centre white, lower blue.

Mexico. — Three vertical bars, green at staff, red at fly end and white in centre, upon which appears the national arms.

Monaco. — Smallest nation on earth (eight square miles), the flag is white, in the centre, shield of the nation.

Montenegro. — Three stripes, upper red, centre blue and lower white. On centre the national shield appears.

Morocco. — A plain red flag.

Netherlands. — When Holland came into ex¬ istence as an independent state in 1579, the colors of the House of Orange were adopted; but probably due to the fugitive nature of orange dye in the sea atmosphere, it was altered in 1643 to horizontal red, white and blue. The standard bears the royal arms, the shield being occupied by the Lion of Nassau. The arms are not displayed on naval and mer¬ chant vessels.

Nicaragua. — Three stripes, upper blue, lower blue, centre white with national device.

Norway. — Red swallow-tailed field with blue cross.

Panama. — Quartered; 1st quarter white with blue star, 2d quarter red, 3d quarter blue, 4th quarter white with red star.

Paraguay. — Three stripes, red at top, white at centre and blue below.

Persia. — White with two borders, the inner one green, the outer one red. In the centre of the white field is golden lion.

Peru. — Three vertical bars, staff side red, fly end red, centre white, with national shield in the centre.

Portugal. — Prior to the Revolution of 1910, the colors were blue and white. The repub¬ lican ensign is green and red vertical with the shield framed in an armillary sphere.

Rumania. — Three vertical bars, blue at staff, red at fly end, and yellow in the centre, upon which appears the national shield.

San Domingo. — *Quartered by white cross, 1st quarter blue, 2d red, 3rd red, 4th blue; in centre, national device.

Serbia. — Three vertical bars, top red, centre blue, lower white; in centre to overlap the three stripes, the shield of Serbia.

Siam. — Red with white elephant.

Sweden. — Blue swallow-tailed field, charged with cross of yellow.

Switzerland. — Red field with white cross.

Turkey. — The device on the Imperial standard consists of the ruler's name, with the motto ((Ever Victorious.® The Crescent, which appears on the national and mercantile flags, was the device of Constantinople in the time of the Greek Empire. The naval flag is red, charged with a decrescent moon, and 8-pointed star, both white. The merchant flag is green, with a red circle in the centre, on which is a white decrescent moon.

Uruguay. — Nine stripes, alternate white and red, union with golden sun.

Venezuela. — Three vertical bars, top yellow with national shield, lower red, centre blue, charged at staff side with stars.

Bernard J. Cigrand,

Lieutenant United States Navy; Author of iReal History of United States Flagd (His¬ tory of American Emblems B

FLAGSTAFF, Arizona, an important rail¬ road town in Coconino County, on the Atchison, Topeka and Sante Fe Railroad. It has an al¬ titude of 6,935 feet. The town has extensive live-stock and lumber interests. Tourists going to the Grand Canon of the Colorado make Flagstaff their base of supplies. Pop. 3,186.

FLAGSTONE, a rock which splits into slablike masses of various sizes and thickness along the planes of stratification. Consult Ries, (Building Stones and Clay Products) (New York 1912).

FLAHAUT DE LA BILLARDERIE,

fla'o de la be'yar'dre, Auguste Charles Joseph, Comte de, French soldier and statesman: b. Paris, 21 April 1785; d. 1 Sept. 1870. His father, the Comte de Flahaut, was beheaded in 1793 and his mother, afterward Madame de Souza, took him to England. He was generally regarded, however, as the offspring of his mother's liaison with Talleyrand, who be¬ friended him through life. In 1798 he re¬ turned to France, entered the army in 1800, and was commissioned lieutenant after Marengo. He formed a liaison with Hortense de Beau-harnais and their son, the Duke of Morny, was born 21 Oct. 1811. Flahaut distinguished himself in the Russian campaign of 1812, and was made general of division in 1813. He submitted to the new government in 1814 but was retired in that same year. He was present at Waterloo and sought to place Napoleon II on the French throne. Talleyrand saved him from exile, but Flahaut soon removed to Eng¬ land, where he married Lady Keith. He re¬ turned to France in 1827 and three years later was made lieutenant-general and peer of France by King Louis Philippe. He was appointed Minister to Berlin in 1831 and to Vienna in 1841. He remained at the latter post until

1848 when he was dismissed and retired from the army. After the coup d'etat of Napoleon III in 1851, Flahaut again came into prominence, helping to draw up the constitution of 1852. He became senator in 1853 and in 1860-62 was Ambassador to England. Consult Haricourt, A de, (Madame de Souza et sa famillc^ (Paris

1907).

FLAIL, a farm implement used for thresh¬ ing oats, barley or wheat. It is made of a short stick or club called the "swipple® which is attached by a leather thong to a wooden handle in such a way that it may be swung freely by the operator who grasps the handle. In the Middle Ages an adaptation of this imple¬ ment was used in warfare.

FLAMBARD, flaim'bard, Ranulph or Ralph, Norman prelate and statesman: d. 5 Sept. 1128. Of obscure parentage, in his youth he became connected with the Conqueror's court and being handsome, clever and unscru¬ pulous, gained great influence with the king and rose to still greater fav.or with Rufus, whom he encouraged in his tyrannical and rapacious courses. His flagrant extortions earned the hatred of the people, and his character is painted in the blackest characters by the chron¬ iclers. In 1099 he was made Bishop of Dur¬ ham; but on the death of Rufus he was com¬ mitted to the Tower by Henry I. He managed to escape, however, by means of a rope con¬

veyed to him in a vessel of wine and instigated Robert, Duke of Normandy, to invade England. He was subsequently forgiven by Henry and restored to Durham, where he spent his last years absorbed in architectural works con¬ nected with the city and the cathedral. Con¬ sult Freeman, (William Rufus} (1882) ; Stubbs, Constitutional History) (Vol. I,

1897).

FLAMBOROUGH (flam'bur'-o) HEAD, a bold promonotory of England, on the York¬ shire coast, forming the north horn of Brid¬ lington Bay, 18 miles southeast of Scarborough. On its summit a lighthouse, 214 feet above high water, shows an alternating flashing light which is visible 25 miles. Vast caverns, haunted by myriads of sea-fowl, penetrate deeply through this headland. For the battle of Flam-borough Head, see Jones, Paul.

FLAMBOYANT, a term applied to the decorated and very ornamental style of archi¬ tecture of French origin, usually designated as the late French Gothic architecture, and employed in France contemporaneously with the Perpendicular style in England. One of the most striking and common features is the wav¬ ing and somewhat flame-like arrangements of the tracery of the windows, panels, etc. The Church of Saint Maclou, Rouen, erected 1432- 1500, is said to be one of the finest specimens of this style. Other characteristic specimens are to be seen on the western part of the Cathedral of Tours, the Cathedral of Saint Pol de Leon, Saint Wulfran at Abbeville, Saint Riquier near Abbeville and the Church of Broug at Broug-en Bresse. Consult Enlart, C., Eng¬ ine Anglaise du Stvle Flamboyant* (in Bul¬ letin Monumental , Vol. LXX, p. 38, Paris 1906) ; Jackson, Sir T. G., (Gothic Architecture in France, England and Italy) (2 vols., Cambridge 1915) ; Martin, C., (L'Art Gothique en France >

(Paris 1911-14); Saint-Paul, A., (Les Origines du Gothique Flamboyant en France > (in Bul¬ letin Monumental, Vol. LXX, p. 483, Paris 1907) ; West, G. H., (Gothic Architecture in England and France) (London 1911).

FLAME, the phenomenon exhibited when gas or a gaseous mixture is actively undergoing combustion. Solid bodies (such as coke) which do not contain inflammable volatile constituents, that is, constituents

which become gaseous and ignite upon the application of heat, become in¬ candescent when they burn, but their combus¬ tion is not attended by the development of flame. The flames that appear to issue from such solid combustibles as wood and coal are in reality attendant upon the combustion of gases distilled from the fuel by the heat, as may be very easily proved by subjecting these bodies to the same temperature in closed vessels which prevent the access of air. Abundant quantities of combustible gases are then given off and these may be led away in pipes or stored in tanks, to be burned at more convenient times or places. The gas obtained from coal in this way has been used for many years for lighting through the luminous flame with which it burns. Flames are usually very hot and luminous, though in some cases there is but little light developed. The flame of an alcohol lamp, for example, is barely visible, although it is intensely hot ; and the flame of burning hydrogen is an even more striking case of the same sort. (See also Phosphorescence). The luminosity of flames is due in some cases to the incandescence of tiny particles of solid carbonaceous matter that they hold in suspension; in the majority of instances, however, the luminosity of the flame is due to incandescence of some gas at a very high temperature. Experiments have demon¬ strated that luminosity of a flame depends on the density of the gases which are present in the flame and that flames which are but feebly luminous in an atmosphere of normal pressure become luminous when the burning gases are compressed. Even the hydrocarbon flames owe their luminosity not to the solid particles of car¬ bon present, but to the glow of dense hydro¬ carbon vapors. A pertinent instance is that of the contrary phenomenon of the loss of luminosity of a candle flame when placed in a situation where the normal atmospheric pres¬ sure upon it can be considerably reduced.

In studying the action which takes place in a flame the round type has been found simplest in structure — that is, the flame issuing from a round pipe. The flame in such case is conical. This is due to the fact that the cylinder of flowing gas burns only on the outside — where it is in contact with the air. The gas on the inner section of the flame has to travel farther before it meets the air, and the central part of the flow gets to the farthest point. The flame then is a hollow cone of combustion, filled with gas which has not yet burned because it is not in contact with oxygen. It is the incandescence of this inner gas which produces the light. On the other hand it is the outer shell of actual combustion which produces the heat. It is a common experiment in physics to conduct the gases from the interior of the cone of a candle flame by means of a small glass tube to a dis¬ tance of a few inches away from the flame and to ignite them as they issue from the tube.

When a piece of wire gauze is brought down over the flame of a candle,, the gauze permits the gases that arise from the wick to pass through it, but it conducts away their heat so that they are no longer capable of combining with one another and hence the flame does not extend above the gauze. That the gases developed at the wick really rise up through the gauze is easily proved by igniting them with a burning match. A certain degree of heat is needed to cause gas to ignite and burst into flame, but with most inflammable gases, once they are ignited the heat evolved in their com¬ bustion is sufficient to continue the condition of flame. The ignition points of some of the com¬ moner combustible gases are as follows — in degrees Fahrenheit: hydrogen sulphide, 685°; acetylene, 800°; ethylene, 1,000°; ethane, 1,060°; hydrogen, 1,085°; carbon monoxide, 1,200°; methane, 1,300° ; cyanogen, 1,550°. The temper¬ atures of some of the flames used in the indus¬ tries as sources of heat are: acetylene, 3,114°; alcohol vapor (with air), 3,384° ; coal gas with air — in the Bunsen burner, 3,400°; hydrogen, with air — in the Bunsen burner, 3,452°; oxy¬ gen-coal gas blowpipe, 3,992°; oxyhydiogen blowpipe, 4,388° ; alcohol blowpipe, 4,618° ; oxy- acetylene blowpipe (about), 5,700°. See also Explosion.

Flames may be colored, and often very bril¬ liantly, by the presence within them of certain metallic salts. Thus sodium compounds pro¬ duce a strong orange-yellow color, potassium a violet and strontium a crimson. Advantage is taken of this fact for the production of gorgeous color effects in pyrotechny (q.v.). In chemical analysis, too, the color that a given substance yields when placed in a hot but normally non-luminous flame often gives valuable information concerning its composition. See Blow-pipe Analysis ; Spectroscope.

FLAME-FLOWER. See Tritoma.

FLAMEL, flaTnel', Nicolas, French al¬ chemist and scrivener : b. probably at Pontoise, about 1330; d. Paris, 1418. He practised his art in Paris and was made scrivener to the univer¬ sity there. He established a school for the teaching of penmanship, illumination of manu¬ scripts, etc., and by this means and probably also through money-lending, amassed a large fortune, which the people believed to have been gathered by his skill as alchemist. He wrote treatises on alchemy in which he detailed his supposed discoveries in turning baser metals into gold. The real facts were first disclosed by Vilain in (Essai sur l'histoire de Saint- Jacques-la-Boucherie> (1758) and (Histoire critique de Nicolas Flamel et de Pernelle sa famme recueillie d'actes anciens qui justifient l'origine et la mediocrite de leur fortune contre les imputations des alchimistes) (1761).

FLAMEN, flamen, a priest of ancient Rome consecrated to the service of a particular divin¬ ity. They are said to have been established by Numa and were at first three in number : flamen Dialis, the priest of Jupiter; flamen Martialis, the priest of Mars, and flamen Quirinalis, the priest of Romulus. These three constituted the flamines majores, and were always of the patri¬ cian class. Later twelve flamines minores were created, chosen from the plebeians. The flamines held office for life, but were removable for

neglect of duty or contamination and were re¬ quired to resign and remain single upon the death of their wives, the flaminica, who assisted them in their duties and were governed by the same rules as their husbands. The flamen was distinguished by the apex, a conical cap in the top of which was fastened a pointed twig of olive wood bound at its base with a lock of wool. He was not required to take an oath, was an ex-officio member of the Senate, was entitled to the use of the toga prcetexta and the curule chair. He was entitled to the assistance of a lictor and for himself and for his house held the right of sanctuary and of pardon. He could not leave the city for a single night or sleep out of his own bed for three consecutive nights, mount or touch a horse, touch a dead body or engage in a long list of occupations that were considered to contaminate him. The flamens were selected by the Pontifex Maximus from three candidates nominated by the pon- tifices. When the emperors were deified they had flamens, as the flamen Augustalis. There were also flamines curiales and a flamen arvalium. The principal duty of the flamines was to offer daily sacrifices ; on 1 October the three flamines majores were required to drive to the capitol and to offer sacrifices to Fides Publica, the Honor of the People. Consult Bouche-Leclercq, A., (Les pontifes de l'ancienne Rome) (Paris 1871) ; Greenidge, A. H. J.,

(Roman Public Life) (London 1901) ; Mar- quardt, J., (Romische Staatsverwaltung' (Leip¬ zig 1885) ; Samter, E., 'Flamines' (in Pauly-Wissowa, 'Real-Encylopadie der Classischen Altertunisurssenschaft,' Vol. VI, Stuttgart

1907).

FLAMENG, Frangois, fran-swa fla-man, French painter: b. Paris, 1856. He began his art studies under his father, Leopold Flameng (q.v.), the engraver, and studied subsequently under Cabanel, Hedouin and Jean

Paul Laurens. In 1879, after winning the Prix de Salon, he went to Italy for further study. In 1899 he won the Grand Prix. He is an officer of the Legion of Honor, a member of the French Institute and in 1905 became a profes¬ sor at the Ecole des Beaux-Arts. He lives in Paris. An artist of distinguished ability as a figure painter, he has used this ability with great effect in his many historical paintings. In more recent years he has become especially noted by his brilliant portraits of well-known personages and of beautiful women. Pictures by him are in the museums of Beaune, Liege, Rouen, Sydney (Australia), and in the Lux¬ embourg. He has also done a great deal of decorative work in public buildings in Paris (Sorbonne, Opera-Comique) and elsewhere, proving that he is one of the most versatile of modern French artists. Among the most strik¬ ing works of his are: 'Le Lutrin) (1877) ; (Barbarossa Visits the Tomb of Charlemagne) (1878); 'The Girondins Summoned' (1879); 'The Conquerors of the Bastille' (1881) ; 'Camille Desmoulins' (1882) ; (The Duel' (1883) ; (The Massacre of Machecoul' (1884) ; (The Bowlers' (1885); (C'est lui' (1893); 'Waterloo' (1898); 'The Flight into Egypt' (1900); 'Eylau'; etc. One of his pictures, 'Grolier in the House of Aldus' is in the Grolier Club of New York. Consult Cain, G., (Frangois Flameng' (in Art Journal, Vol. XLIII, p. 65,

London 1891); Flameng, F., 'My Way of Work' (in Cosmopolitan Magazine, Vol. XLVIII, p. 408, New York 1910) ; Hamerton, P. G., 'Frangois Flameng' (in Scribner's Mag¬ azine, Vol. XVI, p. 63, New York 1894) ; Thompson, V., 'Frangois Flameng' (in Cosmo¬ politan Magazine, Vol. XLVIII, p. 402, New York 1910); also a number of articles in a special issue of Figaro Illustre (Annee XVI, No. 104, Paris 1898).

FLAMENG, Leopold, French engraver: b. Brussels 1831; d. 1911. He studied at Brussels under Gigoux and Calametta, went to Paris in 1853, where at first he met with little success. He joined the staff of the Gazette des Beaux- Arts in 1859 and in the pages of that journal soon made his ability widely known and ac¬ quired the reputation of one of the foremost engravers of the time. His versatility was re¬ markable ; he received a medal of honor in 1886, first prize in 1900. He was an officer of the Legion of Honor. His best works are : 'The Artillery Charge,' after Schreyer, Ge- rome's 'Phryne' ; Gainsborough's 'Blue Bay' and 'Miss Graham' ; Ingres' 'The Source' ; Rembrandt's 'Hundred Florin Piece' and 'Night Watch' ; Schoen's 'Death of the Vir¬ gin' ; and <0 etchings for Blanc's 'CEuvres com- plets le Rembrandt' (1859) and etchings for 'Theatre complet de Moliere' (1873).

FLAMINGO, fla-min'go, a peculiar web¬ footed bird of the group

Phcenicopteri, which may be regarded as intermediate between the storks and the ducks, the long legs and necks giving it a resemblance to the former, while the webbed feet connect it with the latter. There are six species of true flamingoes, widely spread over the warmer regions of both hemispheres: Our North American species {Phoenicopterus ruber), once common all along the southern shores of the United States, but now almost exterminated even from Florida and ranging southward to Argentina, is light vermilion with brighter wing coverts. The other forms are rosy white (scarlet on the wing coverts) with black wing-quills. All have small goose-like bodies, but the long legs and neck give them a height of four or five feet. Their most extraordinarv part is the bill, which is large, swollen and bent upon itself so that the upper half is turned downward when the bird feeds, with its head twisted and crown down¬ ward. The edges of both upper and lower jaw are furnished with small transverse plates, which serve, as in ducks, for a seive, allowing the escape of the mud, but retaining the small worms, cruetaceans, mollusks, fishes, etc., on which the birds feed. The upper surface of the tongue is beset on the sides and base with flexible, recurved, horny spines. Flamingoes live and migrate in large flocks, warning one another of danger by a loud trumpeting note, which is the signal for the flock to take wing. When flying, they form a triangle.

They breed in companies in mud-flats or inundated marshes, where they spend most of their time wading about, raising up the mud into a small hillock, which is concave at the top so as to form a nest. In this hollow the female lays her eggs and hatches them by sitting with her legs doubled up under her. The young, one or two in number, do not fly till they have nearly attained their full growth, though they

FLAMINGO (Phcenicopterus antiquorum)

From a Photograph provided by the American Museum of Natural History

can run very swiftly and swim with ease almost immediately after their exclusion from the shell. This bird was held in high repute among the luxurious Romans; and Apicius, so famous in the annals of gastronomy, is recorded by Pliny to have discovered the exquisite relish of the flamingo’s tongue and a superior mode of dressing it. When taken young they soon grow familiar, but they are not generally

found to thrive in the domesticated state. The European flamingo (P . roseus) is abundant in marshy regions of Spain and southern France and is found as far south as Cape Colony and as far east as Lake Baikal. In northwestern India it may be seen in flocks numbering tens of thou¬ sands. Another very similar species (P. minor), but of less size and with the chin feathered, is found from Madasgascar around the whole cir¬ cuit of the shores of the Indian Ocean. Three other species are known in South America, P. andinus of the central Andes, the largest of the family; P. jatnesi, of southern Peru and Chile, and P. chilensis of the region south of Brazil, which has greenish shanks. In addition to the various ornithologies, the reader may consult an article by H. A. Blake, Nineteenth Century) (December 1887) ; Chapman and Buck, (Wild Spain ' (1893) ; and F. M. Chap¬ man, (Bird Lore' (1902).

FLAMINIAN (fla-min'i-an) WAY (Via Flaminia), the most important northern road which led from ancient Rome toward the Po valley, the Alps and the Roman colonies beyond. It was constructed by Caius Flaminius the elder in 220 b.c. during his censorship and led through Etruria and Umbria, from Rome to Ariminum (Rimini) on the Adriatic, 222 miles. It was restored by Augustus and both Vespasian and Trajan were responsible for improvements of it. It started from the Porta Ratumena, between the Capitoline and the Quirinal (now Via di Marforio). Remains of it are yet extant in various places. Consult Bormann, E., (Corpus Inscriptionum Lati-

narum) (Vol. XI, part 2, p. 995, Berlin 1893, etc) .

FLAMININUS, Titus Quinctius, ti'tus kwin'-shi-us flam-i-nl'nus, Roman general : b. about 230 b.c. ; d. about 175. He was a mem¬ ber of a well-known patrician family. Elected consul in 198, he undertook the conduct of the war against Philip V of Macedon. By pre¬ tending that his object was to remove from Greece the Macedonian yoke, he detached many of the Greek states from Philip and defeated him at Cynoscephalae (197) in Thessaly. By the treaty soon after concluded Philip surrendered all the Greek towns which he possessed in Europe and Asia, and paid a heavy contribu¬ tion to the Romans. At the Isthmian games in 196 Flamininus proclaimed, to the great joy of the assembled Greeks, the freedom of those states which had been subdued by Macedon. In 195 he diminished the power of the tyrant Nabis of Sparta. In 192 he was again sent to Greece where, thanks to his tact and diplomacy, he succeeded in preventing the Greek states from allying themselves to Antiochus III of Syria, whom the Romans were then fighting. In 189 he occupied the censorship and in 183 was sent to Bithynia, where he accomplished negotiations resulting in a promise to deliver to the Romans the person of Hannibal. The

latter, however, committed suicide before the promise could be carried out. Plutarch has written his life. Consult Gerlach, F. D., (T. Quinctius Flamininus) (Basel 1871) ; Momm¬ sen, T., (History of Rome' (trans. by \V. P. Dickson, 5 vols., London 1894) ; Niese, B., (Geschichte der Griechischen und Makedonis- chen Staaten, etc.' (3 vols., Gotha 1893-1903).

FLAMINIUS, Gaius, ka'yus, Roman gen¬ eral and statesman, belonging to a prominent plebeian family: d. 23 June 217 b.c. He was tribune of the people in 232, consul in 223 and 217, and censor in 220. As tribune he carried against the opposition of the Senate an agrarian law. In his first consulship he with his col¬ league, P. Furius, attacked the Gauls beyond the Po, and was defeated. The Senate then recalled the consuls, but Flaminius resisted the order by refusing to open the letter and ob¬ tained a victory over the Insubrians. A triumph was refused him on his return, but he was re¬ warded with demonstrations of popular favor. The circus Flaminius and via Flaminia (q.v.) were the monuments of his censorship. In his second consulship he marched against Han¬ nibal and rashly giving battle, was, together with most his forces, slain near Lake Trasi- menas. The principal sources for his life, etc., Livy and Polybius, are considerably biased, both of. these writers belonging to the opposite political party. Consult Miinzer, F., (C.

Flaninius> (in Pauly-Wissowa, Neal Ency- clopadie der Classischen Altertums-Wissen- schaft,' Vol. VI, Stuttgart 1907).

FLAMMARION, Camille, ka-mel fla-ma- re-oii, French writer on astronomy: b. Montigny- le-Roi, Haute-Mame, 26 Feb. 1842. In 1858 he entered the Paris observatory as pupil, being transferred in 1862 to the Bureau des Longi¬ tudes, where he remained till 1866. Although still a youth, he had already published the first of his many works, namely (La Pluralite des Miondes habites' (1862; 36th ed. 1892);

topography and physical constitution of Mars and the moon ; sun-spots, and the proper motion of the stars ; but is much better known for his excellent, well-written and accurate popular hand-books. Among his other works are (Etudes et Lectures sur 1' Astronomie' (1867- 80); (Dieu dans la Nature' (1867; 22 d ed. 1892); Tumen' (1872; 40th ed. 1890);

‘Astronomy for Amateurs) (1904) ; ‘Thunder and Lightning* (1906) ; (Mysterious Psychic Forces) (1907).

FLAMMENWERFER, or FLAME THROWER. See Liquid Fire.

FLAMMOCK’S REBELLION, an insur¬ rection led by Thomas Flarrumock, which oc¬ curred in Cornwall in June 1497. The insur¬ gents resisted a tax levy for the expenses of the war with Scotland. The insurgent forces were defeated on Blackheath, 17 June 1497.

FLAMSTEED, John, English astronomer : b. Denby, near Derby, 19 Aug. 1646; d. Green¬ wich, 31 Dec. 1719. He began his mathematical and astronomical studies at an early age, and was in constant correspondence with scientific men. He found the astronomical tables of the day to contain large errors, and was anxious to make more detailed and accurate observations. This having come to the knowledge of Charles II he was appointed astronomical observer to the king (the first astronomer royal) in 1675 and carried on his observations at the Queen’s House at Greenwich, until the observatory was built for him in the following year. Here he passed the remainder of his life amidst his astronomical labors, which are considered as the foundation of modern practical astronomy. He was so ill supported that he had to teach for his own support, and erect instruments at his own expense. In the same year in which he was appointed astronomer royal (1675) he took orders in the Church of England, and in 1684 he was presented with a small living, and his father dying in the same year, he was en¬ abled to provide soime needful apparatus at his own expense, which, on his death, was claimed by the government as public property. His later years were somewhat embittered by a quarrel with Newton and Halley. In his (Historia Ccelistis Britannica) (1723) he gives an account of the methods and results of astro¬ nomical observation nearly up to his death. Consult F. Baily’s (Account of the Rev. John Flamsteed* (1835).

FLANAGAN, John, American sculptor : b. Newark, N. J., 1865. He studied under Augus¬ tus St. Gaudens at New York and under Henri Chapu and Alexandre Falguiere at the Lcole des Beaux-Arts, Paris. He executed the monu¬ mental clock for the library of Congress, Wash¬ ington, the statue of Joseph Henry and decora¬ tive groups for the Saint Louis Exposition of 1904, the tinted marble relief

FLANDERS, Henry, American lawyer: b. Sullivan County, N. H., 13 Feb. 1826; d. 1911. He was educated at Ki’mball Academy and at

the Newbury Seminary, studied law, and after 1850 practised his

profession in Philadelphia. He published (Maritime Law) (1852); ‘The Law of Shipping) (1853) ; ‘Lives of the United States Chief Justices) (1855-58) which contains excellent biographical sketches of Jay, Rutledge, Cushing, Ellsworth and Marshall, and has long been a standard work; ‘Memoirs of Richard Cumberland) (1856) ; ‘Life of John MarshalP (1905) ; ‘An Exposition of the Constitution of the United States) (1869) ; ‘Law of Fire insur- ance) (1871) ; ‘Adventures of a Virginian. *

FLANDERS (French, Flandre; Gertman and Flemish, Flandern; Dutch, Vlaandtren) , a former country or district of Europe, now in¬ cluded in the Holland province of Zeeland, the; Belgian provinces of East and West Flanders, and French Flanders, comprising the depart¬ ments of the Nord and Ardennes. It stretched from the Schelde, below Fort Lillo, west along the Hond, or West Schelde, and west-southwest along the German Ocean to the entrance of the Straits of Dover, near Gravelines, and was bounded east by the duchy of Brabant, south by Plainaut, and west by the French provinces of Artois and Picardy. At the time of Caesar’s conquest of Gaul the country was occupied by the Atrebates, Morini and other tribes of Cel¬ tic origin. Later the country was invaded by the Germans and it finally passed to the Franks. When Charlemagne’s empire was broken up in 843, by the treaty of Verdun, the Scheldt was made the boundary between Lothaire’s kingdom of East Francia (Austrasia) and that of Charles the Bald or West Francia (Neustria). In 855 the northern part of Austrasia passed to Lothaire II, after whom it became known as Lotharingia, or Lorraine. Baldwin of the Iron Arm emerges as the first strong ruler of Flanders. He married Judith, daughter of Charles the Bald, and widow of Ethelwulf of England. From Charles he received the mar- gravate of Flanders as a hereditary fief. He defended the country from the Norsemen, who at that time were making frequent incursions southward. Baldwin II, his son and successor, was equally successful in repelling the north¬ ern hordes and by his marriage to Aelfthryth, daughter of Alfred the Great, greatly strength¬ ened his position. About the 10th century the margraves of Flanders became counts. In the following decades the territory of the Counts of Flanders was increased under Bald¬ win IV, who received from Henry II Valen¬ ciennes, Ghent, the land of Waes, and Zealand and who became at the same time a feudatory of the Holy Roman Empire. His son, Baldwin V, extended his power and territory, received from Henry IV the territory between the Den- der and the Scheldt as an imperial fief, and the margravate of Antwerp. His daughter, Ma¬ tilda, became the wife of William the Con¬ queror. By additions of territory and through commerce the Counts of Flanders were in the 11th and succeeding centuries more powerful

and wealthy than many of the kings of Europe. Internal strife for a time hindered develop¬ ment at the beginning of the 12th century, there being in 1127 six candidates for the courtship on the death of Count Charles. Thierry, Count of Flanders, distinguished himself in the Sec¬ ond Crusade in 1146 and retired in 1157. He

was succeeded by his son, Philip of Alsace, who did much for the great towns of his dominions, Ghent, Bruges, Ypres, Lille, Douai, etc. He was a wise ruler and sternly repressed all up¬ risings against his authority. He died in 1191 at Acre during the Third Crusade. He was succeeded by Baldwin of Hainaut, and thus Hainaut was united with Flanders under one ruler. In the following century the growth of the free towns brought a new danger to the supremacy of the Counts of Flanders. Their authority over these communities became merely nominal and some cities did not hesitate to take up arms when they believed their rights in¬ vaded. The Flemings even induced Edward III of England to assume the title of King of France and this coupled with his invasion, was the moving cause of the Hundred Years' War. After 1300 Flanders was little more than a French province, the counts being obliged to resort thither for aid in their troubles with the free municipalities. The latter under the lead¬ ership of Artevelde became allies of Edward III. Flanders was joined to Burgundy in 1369 under Philip the Bold. Thereafter Flanders was never a separate state. The Burgundian rule was marked by revolts in the towns but these were repressed with a stern hand, espe¬ cially those of Bruges in 1440 and of Ghent in 1540. The War of Dutch Independence brought ruin to Flanders, which in 1599 came under the rule of Albert and Isabel. In 1633 Flanders came under Spanish rule and in 1648 the northwestern part (Dutch Flanders) was ceded to the United Provinces by Philip IV. In 1659, 1668 and 1679 portions of the south were ceded to France forming the section known as French Flanders. In 1795-1814 Flan¬ ders formed part of France and was divided into the departments of the Scheldt and of the Lys. This division corresponds to the modern division into East and West Flanders in modern Belgium. (See Belgium, History; War, Eu¬ ropean). Consult Kervyn de Lettenhove (His- toire de Flandre) (5th ed., 4 vols., Bruges

1898).

FLANDERS, East (Fr. Flandre Orien¬ tate), a province of Belgium, bounded north by Holland, east by the provinces of Antwerp and Brabant, south by Hainaut, and west by West Flanders; length, north to south, 34 miles; central breadth, east to west, 32 miles ; area, 1,158 square miles. The surface forms an ex¬ tensive plain, sloping gently eastward. It wholly belongs to the basin of the Schelde, which by itself, its tributaries, and canals connected with them, furnishes ample water communication. Its soil, partly of a sandy and partly of a clayey nature, is so industriously and skilfully culti¬ vated that it has the appearance of a vast garden, and presents one of the richest rural landscapes which anywhere exists. The principal crops are wheat and flax, but almost all the plants which can be grown under the same latitude are cultivated with success. There are no forests properly so called, but owing to the general practice of planting hedge-row trees, there is no want of wood. In general, however, it consists of poplar and other soft-wood trees, and makes only indifferent timber. There are no minerals of any value, but manufactures have made great

progress, and all the ordinary, as well as the fine tissues of wool, cotton and flax are well and largely made. There are also numerous tanneries, breweries, distilleries, soap-works, roperies, sugar and salt refineries, etc. The trade includes, in addition to these articles, flax, “hops, and oil. For administrative purposes the prov¬ ince is divided into six arrondissements — Gand, or Ghent, the capital; Alost, Audenarde, Ter- monde, Saint Nicolas and Eecloo. Pop. (est.)

1,134,079.

FLANDERS, West (Fr. Flandre Occi¬ dent ale) , a province of Belgium, bounded north and northwest by the German Ocean, west- southwest and south by France, southeast by the province of Hainaut, east by East Flanders, and northeast by Holland ; greatest length, north-northeast to south-southwest, 54 miles ; greatest breadth, 48 miles; area, 1,249 square miles. The surface is generally flat, but a few low hills occur in the south and east, and a range of sand hills or downs lines the greater part of the coast. The most important crops are flax, both abundant in quantity and excellent in quality ; oats, barley, hops, oil-seeds, tobacco, madder, and chicory. The cattle, of all sorts, are of excellent breeds ; and fish, poultry and game abound. The most important branch of industry is linen, ordinary and damask. Great quantities of lace also are made, and there are numerous breweries, distilleries, tanneries, dye-works, oil- works, soap-works, salt and sugar refineries, etc. The province is divided into eight arrondisse¬ ments — Bruges (the capital), Courtrai, Ypres, Furnes, Thielt, Roulers, Ostend and Dixmude. Pop. (est.) 884,777.

FLANDIN, flan-dan, Eugene Napoleon,

Italian painter and archaeologist: b. Naples, Italy, 15 Aug. 1809; d. Tours, France, 1876. He was a pupil in Paris of H. Verne, and spent much of his time in traveling in Algiers and the Orient. In 1840 — 41 he traveled with Pascal Coste in Persia and later published with him (Voyage en Perse) (8 vols., Paris 1844-54). In 1843-45 he traveled with Botta through the country of the Tigris, and illus¬ trated his fellow traveler's (Monuments de Ninive) (Paris 1849-50), with drawings of the sculptures of Khorsabad. He finallv made a full artistic exposition of Oriental life in his elaborately illustrated work,

FLANDRIANS, or FLEMINGS, a sub¬ division of the Mennonite Anabaptist sect. They arose in the 16th century, and were rigid in their procedure. In 1630 a.d. the majority of them entered into a union, confirmed in 1649, with their more moderate brethren, who were often called Waterlanders.

FLANDRIN, Jean Hippolyte, zhon e-pd- let flan-dran, French historical and portrait painter : b. Lyons, 23 May 1809 ; d. Rome, Italy, 21 March 1864. He worked under Ingres, and from him he imbibed that love of severe and

definite form and that classical feeling which he used for his own ends in his religious paint¬ ing. In 1832 he won the Prix de Rome by his Recognition of Theseus) ; and before his five years' residence in Italy was completed he had produced his (Saint Clair Healing the Blind, } now in the cathedral of Nantes. Henceforward he was mainly occupied with decorative monu¬ mental work, though he also executed many admirable portraits. In 1842 he began his great frescoes of (Christ Entering Jerusalem, } and (Christ Going up to Calvary, } in the sanctuary of the Church of Saint Germain-des-Pres, Paris, deeply impressive works, which already entitled their painter to rank as the greatest religious painter of the century. The choir of the same church he adorned (1846-48) with figures of the Saints and the Virtues. He also decorated the church of Saint Paul at Nimes (1847-49), the church of Saint Martin d'Ainay at Lyons (1855), and painted the magnificent frieze that adorns the church of Saint Vincent de Paul, in Paris, in which is figured a procession of saints and martyrs. In 1855 he began his last great work in the nave of Saint Germain-des-Pres, consisting of subjects from the Old and New Testaments, of which

some were left uncompleted at his death, at Rome, 21 March 1864. His artistic conceptions were majestic, the embodiment of a spirituality that was somewhat austere and cold. But his place as the greatest religious decorator of the 19th century is assured. His (Lettres et Pensees,* with a memoir and a catalogue of his works, were issued 1865. Consult Rives,) by Poncet (1864) ; (Montrard) (1876) and Flandrin

(1902).

FLANDRIN, Jean Paul, zhon pol, French painter: b. Lyons, 8 May 1811; d. 1902. A younger brother of the portrait and historical painter Hippolyte Flandrin (q.v.), and a land¬ scape painter whose compositions are of an ideal character and represent a survival of the classical school of Poussin and Claude. He studied at the Ecole des Beaux-Arts in Lyons, accompanied his brother to Paris, studied with Ingres, and went to Rome in 1834. He ex¬ hibited at the Salon frequently and won several medals, but spent most of his life as the assist¬ ant of his brother Hippolyte. After the latter's death he finished the decorations of the nave of the church of Saint-Germain-des-Pres from his designs. He was employed independently in the church of Saint-Severin and the Palais de la Chancellerie.

FLANK, a wing or extremity of a mili¬ tary formation, made up of the companies or regiments on the right and left extremities of the main forces. See Tactics, Military.

FLANK GUARD, a body of troops sent out to shield a column from a flank attack or to give warning of such an attack. It is in general organized after the fashion of an advance guard. Flank guards will be com¬ posed of troops of all arms in the case of large units. They may advance abreast of the column, or may be stationed at favorable positions on threatened flanks, and regain the column after it has passed, returning to their units at the end of the day. Flank guards may be sent out by the advance guard or by the main body. In addition to flank guards, or in place of them,

flank patrols may be sent from any of the com¬ ponent elements of the advance guard, rejoining the main column after their mission is accom¬ plished. See Advance Guards.

FLANNAN or FLANNEN ISLANDS, or THE SEVEN HUNTERS, a group of small rocky islands in Scotland, in the Outer Hebrides, included in the county of Ross and Lewis, about 15 miles west-northwest of Gal¬ lon Head. They are frequented by large num¬ bers of seabirds, and

sheep used to be pastured on some of them. There are a number of ancient monuments, and a lighthouse of recent erection, standing at a height of over 200 feet, the structure itself being 75 feet high, with a light visible 24 miles.

FLANNEL, a woolen or cotton fabric of more or less loose texture and various degrees of fineness, much used as an article of clothing both in hot and cold countries, and for outer as well as inner garments, being very commonly worn next the skin. Flannel made in Wales from the wool of the native mountain sheep has the highest reputation.

FLANNEL-MOUTH, a local name for the great Mississippi catfish (Ameiurus la- custris). (See Catfish). Another fish, one of the suckers (Catostomus latipinnis) is so called in the neighborhood of the Colorado River.

FLANNEN ISLANDS. See Flannan Islands.

FLASHLIGHT, Electric. See Fog Sig¬ nals.

FLAT, in music, a character (b) denot¬ ing a tone lower by half an interval than the natural. The word also designates the tone itself marked by such a character, i.e., the flat of B.

FLAT FOOT, or PES PLANUS, a very common deformity of the foot due to a loss of the natural arch. A strong ligament holds the os-calcis and astragalus in such a position that an arch is formed by the bones of the foot and the weight of the body is transmitted through that arch. There is a congenital variety that is said to be due to lack of the normal fatty pad in the hollow of the new born infant's foot. During the first five years of life this fatty pad takes the place of the bony arch and if the pad be lacking the arch does not develop. The acquired variety affects those suddenly called upon to stand for long hours upon the feet. A very large number of nurses, soldiers, waiters and policemen suffer more or less with this de¬ formity in their early months of training. Rickets, knock-knees, sprains and badly set fractures of the leg may give rise to flattening of the arch. Flat-foot is a physical disability which, in most countries having universal mili¬ tary service, is considered to unfit the person affected for military service.

The bones are not changed from their nor¬ mal shape except in the very young, but their relation to each other is altered. There is also a stretching of the extensor tendons of the foot and the muscles and fascia of the sole. Besides the flattening of the foot there is a more or

less marked turning out of the toes and a tendency to walk on the inner side of the foot. This gait becomes quite characteristic.

In the acute cases particularly there is apt

to be severe pain in the spring ligament, the inner malleolus or the ball of the great toe. Because of this, the affection is very commonly thought to be rheumatism, gout or disease of the bone.

The normal marking of the sole of the foot is an impression of the heel, a narrow margin of the outside of the foot and a broad line made by the ball of the foot. When the arch becomes weakened there is a gradual increase of the outer margin until almost the whole foot makes its impression. This simple test is of great value.

Congenital flat foot may be greatly improved if discovered in time by manipulative massage, bandaging and the use of supports until the bony arch is formed. Acute cases of flat foot in adults sometimes require rest for a time. Prop¬ erly made shoes without braces frequently suffice to prevent a return of the trouble. Others require the constant use of felt or well-adjusted steel springs in the shoes. Exercises of the extensors of the foot, massage and electricity are of value.

The bad cases of deformity that cannot be corrected require operation under an anaesthetic, the joints being forcibly freed and kept in nor¬ mal position by plaster cast for a period and then kept up by a support. Consult Kahler, C. O., (Our FeeO (New York 1903) ; Munson, E. L., (The Soldier's Foot, etcP (Fort Leaven¬ worth 1912).

FLAT RIVER, Mo., village of Saint Fran¬ cis County, on the Mississippi River, 65 miles south of Saint Louis, on the Illinois Southern and other railroads. The lead mines of the vicinity furnish the principal occupation of the inhabitants. Flat River lost its charter in 1911. Pop. 5,112.

FLATEYJARBOK, flat'e-yar-bok («Diary of Flatey®), a collection of sagas, once pre¬ served in the island of Flatey, Iceland, but at present kept in the Royal Library in Copen¬ hagen. It was written in 1380-95 by two priests of Iceland, and is important as one of the main sources for the Norse discovery of America.

FLATFISH, a fish of the Heteromomata, including the families Pleuronectidce and So- leidco, which are characterized by their greatly compressed form, distorted skulls and the habit of lying and moving on the side. They are somewhat related to the cod family, and inhabit the seas of all parts of the world, more than 500 species, classified in some 55 genera, being known to ichthyologists. All are oval or ellip¬ tical in outline, very thin and flexible, and habitually rest, half covered, or move sidewise along sandy sea-bottoms, some species near shore or even ascending rivers, others only in deep water. They are carnivorous, taking as food mainly mollusks, worms, sand-dollars and the like, found in such places, for the crushing of whose shells they are provided with strong teeth, chiefly developed on the inferior side of the mouth. The flatness of these fishes is not a broadening laterally but a compression of the body whereby they become high and thin in a dorso-ventral direction, lie over on one side (usually the left), and have the head perma¬ nently twisted to the side uppermost in their customary position. This, however, comes about only with age. The very young flatfish are born in the normal shape of fishes, and

swim in the ordinary vertical position, but soon begin to assume the adult peculiarities. This tendency causes profound changes in structure. The skull gradually becomes so distorted that its facial part is twisted at right angles to the plane of the cranial part, and both eyes, set close together, look upward, so that the fish has a seeing and a blind side. In order to get into this position the eye of the under side is ro¬ tated around, or in some species right through the young skull, when the fry is only an inch or so in length and the bones not yet ossified. The curious condition of the dorsal fin in the flatfish is nevertheless a greater mark of dis¬ tinction. The external ethmoid bone belonging to the blind side is much enlarged, and sends back a process outside the eye belonging to that side to meet another process from the cranial region of the skull. Thus, says Cun. ningham, the eye which has migrated is en¬ closed in a complete bony orbit, while the other (lower) eye is merely bounded on its outer side by the jaw muscles. It is on this bony bridge entirely foreign to the anatomy of an ordinary fish that the dorsal fin is supported, and is able to extend from the tail clear to the snout, not passing between the eyes, but sepa¬ rating the hidden from the exposed side. Simi¬ larly the ventral and anal fins form a continu¬ ous growth along the ventral keel, defining there the upper side from the lower. The les¬ ser forward fins, like the mouth, are usually asymmetrical. They are able to swim well when they please, and sometimes appear at the surface, progressing with a curious sideways undulatory movement very

graceful. This is a dangerous excursion, however, and flatfish as a rule cling to the bottom, trusting to be over¬ looked because of their close resemblance to the sand or mud.

The young flounder or other species is brown on both sides alike ; but when it turns on one side and lies flat, the under side becomes nearly white while the upper assumes the color of the bottom upon which the fish habitually rests. This is an excellent example of protec¬ tive resemblance (See Coloration, Protec¬ tive) ; and that it arises from the habits of the fish and is the effect of persistently keeping the under side in shadow, is plain from the fact, demonstrated by experiment, that when flatfish are confined in aquaria with glass bot¬ toms, through which light is reflected upon the under side, color will develop there. Some flatfish are spotted, increasing their likeness to a pebbly bottom. All these circumstances make it evident that flatfishes originated from sym¬ metrical ancestors related to those of the cod, but what were the inducing causes of the extra¬ ordinary changes that have characterized their evolution are not plain. Little help is derivable from palaeontology for fossil flatfishes are ex¬ tremely rare, the oldest known being a sole-like form from the Upper Eocene of southern Europe.

The group includes two families, the floun¬ ders (Fleur one c tide?) and the soles (Soleidce). Jordan subdivides the former into three sec¬ tions, namely Hippoglossince, halibut tribe; Pleuronectiruu, flounder tribe; and Psettince, turbot tribe. The soles are a small family dis¬ tinguished by the hidden, adnate character of the gill-cover, the small, much twisted eyes and

mouth, and the absence of teeth. The whole group yields excellent flesh, and furnishes some of the most important food-fishes of commerce as well as several regarded as especial delica¬ cies. They are treated of at length in Goode's (Fishery Industries,' Sec. 1 (1884) ; and in Jor¬ dan and Evermann's (Fishes of North and Middle America) (1898). See Flounder; Fluke; Halibut; Plaice; Sole; Tongue-fish; Turbot.

FLATHE, Heinrich Theodor, hln'riH ta'odor fla'te, German historian : b. Tanneberg, near Nossen, Germany, 1 June 1827; d. 26 March 1900. He attended the Fiirstenschule in Meissen, studied philology and history in Leip¬ zig and in 1867 was appointed teacher in the

Fiirstenschule at Meissen. He retired from active life in 1895. He was an indefatigable writer and editor, his special field being Saxon and modern history. His main achievement was the revision and rearrangement of F. W. Bottiger's (Geschichte des Kurstaats und Konigrech's Sachsen) (1867), which he trans¬ formed into a new work, for he not merely added new details, but rewrote much of the main argument. He has also among other works written (Allegemeine Weltgeschichte) (1883) ; (Das Zeitalter der Restauration und Revolution 1815-51 ' (1883) ; (Deutsche Reden, Denkmaler zur vaterlandischen Geschichte des 19ten Jahrhunderts) (1893-94). This work, covering the period from 1789 to 1887, has ap¬ peared in an English translation in four vol¬ umes, comprising vols. XVI-XIX in the (. His¬ tory of All Nations Series' (Philadelphia

1902).

FLATHEAD, or (properly) SALISH INDIANS, a tribe of Indians belonging to the Salishian family to which they gave their name, with uncompressed skulls as distinguished from the "peaked-heads" who did compress their skulls, and who gave the others the name of Flatheads. These Flatheads are a superior tribe, originally dwelling around the Flathead Lake and River in northwestern Montana; much respected by the traders and explorers as at once very brave against their enemies (chiefly the Blackfeet) and honorably requiting friendly treatment. The famous Flathead mis¬ sion, known as Saint Mary's and located in the Bitter Root Valley, Mont., was one of the most successful in the Northwest and was established among them in 1841 by the Jesuit missionary P. J. De Smet. On 16 July 1855 the Flathead, Kutenai and Upper Pend d' Oreille Indians turned over their lands by treaty to the United States. They were thereafter located there on reservations, the whole territory being known as Flathead Indian Reservation. By various acts, passed since 1904, most of these lands have been opened to settlement, irrigation, etc. In 1909 the number of Flathead Indians was officially given as 598. Consult Baudot, V., (Au Pays des Peaux-Rouges, etc.' (Lille 1911) ; Curtis, E. S., (Indian Days of the Long Ago) (Yonkers 1914) ; Hodge, F. W. ed., 'Handbook of American Indians North of Mexico' (Smithsonian Institution, Bureau of American Ethnology, Bulletin 30, 2 vols., Wash¬ ington 1907-10) ; O'Connor, Jas., (The Flathead Indians' (in American Catholic Historical So¬ ciety of Philadelphia, Records, Vol. Ill, p. 85, Philadelphia 1891) ; Ronan, P., historical

Sketch of the Flathead Indian Nation, etc.' (Helena 1890) ; Smead, W. H., hand of the Flatheads, etc.' (Missoula 1905) ; U. S., Public Lands Committee, (Flathead Indian Reserva¬ tion Acts Relating to the

Flathead Indian Res¬ ervation, etc.' (compiled by C. W. Draper, Washington 1914).

FLATHER, John Joseph, American me¬ chanical engineer: b. Philadelphia, Pa., 9 June 1862. He was graduated from the Sheffield Scientific School of Yale, and after several years' experience in American and foreign machine shops was instructor in mechanical engineering at Lehigh University 1888-91 ; professor of the same at Purdue University 1891—98 ; and he has filled a similar post at the University of Minnesota from 1898. He has published 'Treatise on Steam Boilers' (1889) ; hope Driving' (1892) ; 'Dynamometers and the Measurement of Power' (1900) ; (Kine¬ matics' (1904) ; transmission of Power' (1908) ; thermodynamics' (1915), also many contributions to technical journals.

FLATTERY, Cape. See Cape Flattery.

FLATULENCE. See Indigestion.

FLATWORMS, the common name of the phylum Plathelminthes. Some forms (Turbel- laria) are free living and widely distributed in salt and fresh waters. Others (Trematoda, Cestoda) are characteristic parasites and the causes of serious diseases in man and other animals. See also Parasitism.

FLAUBERT, flo-bar, Gustave, French novelist: b. Rouen, France, 12 Dec. 1821; d. Rouen, 8 May 1880. He was the son of a house surgeon at the Hotel-Dieu. From his earliest childhood literature was his absorbing passion. At the age of 10 or 11, he wrote scenarios of plays of which nothing but the titles remain, 'The Avaricious Lover,' 'The Ignorant Antiquary,' etc. On his father's billiard table he acted out his own plays with his little sister Caroline and his two chums

Ernest Chevalier and Le Poitevin as his mummers. He was obsessed by the desire to write plays, and it is surprising that he did not persevere in that line of work. At a very youthful age he wrote for Le Colihri, a theatri¬ cal review. His favorite dramatic authors were Victor Hugo and Shakespeare and he patterned after them most carefully. In 1838 and 1839 he wrote (Smark' and 'The Dance of Death,' in the form of a dialogue or a sort of

poem in prose. At that time at the Fair of

Saint Romain, a play entitled 'The Temptation of Saint Anthony' was being acted. This

made a very decided impression upon his youthful mind for later on in 1845 when in Genoa and gazing at the painting of ‘Hell’ by Breughel in the Balbi Palace, he conceived the idea for what eventually proved to be one of his masterpieces, ‘The. Temptation of Saint Anthony.’ Upon reaching maturity, however, he became greatly interested in the psychology and sentiments of his time, and to make a close and comprehensive presentation of human motives he realized that the stage was inade¬ quate for the expression of his philosophy.

The legend that Flaubert studied for the medical profession is false. It is based on his profound knowledge and technical documenta¬ tion of the pathological cases which he

described, but it must not be forgotten that his knowledge of every subject which he handled bore the same hall marks of profundity and exactness. Medicine interested him and he read profusely and did an immense amount of research work. Bouilhet, his classmate, who was later in the elder Flaubert’s office, helped him greatly in his investigations. Throughout his life Flaubert was quite sincere in an honest indifference to public opinion. His first and greatest book (Madame Bovary’ (1857) achieved a great vogue because of a certain rumor of immorality which kept growing until the matter was threshed out in the law courts of France. It gave the code of the modern naturalistic school, and <(the formula of the modern novel,” according to Zola. Flaubert was more or less a recluse, residing at a sub¬ urban house in Rouen, spending entire months in unremitting study, relieved by an occasional visit to Paris. He hated democracy and the bourgeoisie, and in (Madame Bovary * he pro¬ duced the bitterest satire on romanticism.

85).

FLAVIAN I, Saint, patriarch of Antioch: b. probably in Antioch about 320; d. February 404. He inherited considerable wealth, but de¬ voted his riches and talents to the service of the Church. He was ordained priest by the Patriarch Meletius in 361, and succeeded the latter in 381. His election was opposed by the Eustathians who chose Paulinus as patriarch. At length in 398 through the efforts of Chrysostom and Theodosius Flavian was ac¬ knowledged by Rome as the legitimate bishop of Antioch, but many of the Eustathians still vol. 11—22

remained aloof, the schism not being finally healed until 415. Flavian is venerated as a saint in both the Greek and Latin churches. Consult Loof, (Flavianus von Antiochien' (in Herzog-Hauck, (Realencyklopadie. '

FLAVIAN II, patriarch of Antioch : d. 518. He was named patriarch by Anastasius I about 498, and at once was involved in difficul¬ ties over the acceptance of the Chalcedon de¬ crees. His final course angered Anastasius, who made a pretext of the rioting between the factions in Antioch to depose Flavian in 512. He was banished to Petra, where he died. Soon after his death his name was placed in the roll of Greek saints, and after some opposi¬ tion he was accorded similar honors in the Latin church.

FLAVIAN, Saint, bishop of Constanti¬ nople : d. 449. He succeeded Proclus in 447 and in the following year presided at the coun¬ cil which deposed Entyches, but was himself deposed soon after by the council of Ephesus. His death was attributed to ill-treatment by his opponents. He was canonized as a martyr and in the western church is commemorated on 18 February.

FLAVIAN C2ESARS, the Roman emperor Vespasian and his sons and successors, Titus and Domitian, who were of the house of Flavius.

FLAVIN, a yellow or orange dyestuff. American flavin is got from quercitron bark and is said to be the same as quercitrin.

FLAVORING PLANTS. See Herbs, Culinary.

FLAX (Linutn usilatissimum) . The use of flax has a greater antiquity than any other com¬ mercial fibre. It was cultivated and manufac¬ tured by the Swiss lake dwellers in the Stone Age in Europe, well preserved specimens of straw, fibre, yarn and cloth being preserved in the museums. Our name for this cloth, (

While the plant can be grown in nearly every portion of the temperate world, it is produced commercially throughout Europe and in portions of Africa and Asia, Japan and the Australian colonies. It thrives in Canada, the United States and Mexico, and in some of the South American countries. Good flax has been grown as far north as Alaska and the flax of Archangel, in Russia, is famous.

Its cultivation was brought to this country by the American colonists, the records showing that considerable quantities were grown in eastern Massachusetts as early as 1630. Its growth was early extended to other States*

though for the most part it was a household rather than commercial industry. In the middle of the last century three-quarters of a million pounds of llax were produced in the United States — Vermont, Connecticut, New York and New Jersey leading in the culture. With the increased use of cotton fine flax culture steadily declined and while, as late as 1869, 13,000 tons of flax were produced, a very small proportion was fine line, the bulk being mere tow for the bagging factories. A year or two later, when jute was admitted free of duty, the industry collapsed. At the present time we are growing flax to the extent of a million acres annually, but for the seed, for linseed-oil manu¬ facture and not for the fibre. The straw, which is rough and coarse, is largely thrown away, although in recent years attempts are being made to use the rough product for paper.

Good commercial fibre could be grown in many localities, notably in Michigan, Wiscon¬ sin, Minnesota, Oregon and Washington. In a series of government experiments, conducted by the writer in the Puget Sound region of Wash¬ ington, flax straw was produced from which was hackled out a fibre valued by experts at $500 per ton. Very little line-flax is produced at the present time, however, our commercial supply coming, previous to the great war, from Russia, Holland, Belgium and Ireland; a little comes from Italy and Canada.

Nearly every country producing commercial flax has established grades and marks, save the United States and Canada. In portions of Rus¬ sia the grades bear the names of the districts where grown. The grades of Archangel flax are known by the terms first, second or third Crown, etc., and first Zabrack, second Zabrack, while Riga flax is graded from the standard K as HK, PK, HPK, HSPK, etc. French flax is known by the districts where produced and Irish flax by the counties where the flax is grown (consult (Descriptive Catalogue Useful Fibre Plants of the World, } p. 222).

The culture of flax requires a deep, well- tilled soil, in high state of fertility, such as moist, deep, strong loams upon upland ; a wet soil is disastrous and clays are therefore avoided; and a soil filled with the seeds of weeds is equally fatal to flax culture. The land must be deeply plowed and reduced to fine tilth by harrowing and rolling. In the preparation of the soil, especially in Europe, a systematic rotation of crops is practised, flax occupying the same land not oftener than once in 5 or 10 years. Imported Riga seed gives the best re¬ sults, although

Belgian Riga (Belgian seed pro¬ duced from one sowing of Riga seed) gives a fine fibre. The common seed of the oil-mills should never be used for fibre culture. When flax is grown for the production of seed alone, to be sold to the oil-mills, the ground is seeded at the rate of two to three pecks to the acre. For fibre culture one and a half to three bushels is the proper quantity per acre.

After the seed has vegetated and is about two inches high the weeding begins,, for no fine flax can be produced if the crop is choked with weeds. Flax is harvested by pulling the straw out of the ground, roots and all, the straw being laid in handfuls to dry, and afterward made into bundles, which are stacked in the field. Practice varies, however, in different

countries as to the handling before the retting period. In Flanders the greatest care is given to drying and storing, in order to keep the flax clean and bright for the final process of retting.

There are three methods of soaking or ret¬ ting the straw: Dew retting is the simplest and the least careful, the .straw being spread over the field like hay, to be retted by the dew and by the action of the elements. Pool retting is practised by immersing the straw in pools of stagnant water, the softest water giving the best results. The pools are dug in the ground for the purpose, though a great deal of the Irish flax is retted in wbog holes.® Retting in running wrater is the third method, this form of retting being practised in Belgium; the famous Courtrai flax is retted in the sluggish and murky waters of the river Lys, the straw, in bundles, being placed in large crates and weighted with paving stones until the crates sink sufficiently to fully cover the flax. The flax of Courtrai, retted in the Lys, is the finest flax in the world. It is very light in color, clean and even, and shows a superior tensile strength. The flax is given two immersions, the straw being taken from the crates and carefully dried before the second immersion.

The first operation in cleaning or extracting the fibre is to pass the straw through a breaker, which loosens the woody portions of the stem, and reduces them to fragments, to facilitate the next operation, the scutching, which whips out the (by A. R. Turner, Jr., in Jubilee num¬ ber of (New York Dry Goods Economist* and (Etudes sur La Culture le Rouissage et el Teil- lage du Lin,* by Alfred Renouard. See Cord¬ age; Cordage Industries; Fibre; Linen.

Charles Richards Dodge, Commercial Fibre Expert.,

FLAX, New Zealand, fibre of the lily-like Phorminum tenax , native of New Zealand and Norfolk Island. The fibre is taken from the leaves which attain a length of from 30 to 70 inches and a width averaging about three inches. Before the advent of the whites the New Zealand aborigines used the fibre for dresses, twine, ropes, etc. It has been introduced in California, where it is being successfully grown.

The leaves are cut upon attaining their full size and are next macerated in water, the fibre being then combed out by machinery.

FLAXMAN, John, English sculptor and draughtsman: b. York, England, 6 July 1755; d. London, 7 Dec. 1826. From his earliest years he exhibited and cultivated his talent for de¬ signing and was also attracted by the pictur¬ esque conceptions of Greek mythology. He began to study at the Royal Academy in 1770, earning for some time a living by making de¬ signs for Wedgwood, the potter, and other persons. He went to Italy in 1787 and acquired the highest reputation by three series of de¬ signs, the illustrations to Homer, yEschylus and Dante. He became a member of the Royal Academy 1797 and professor of sculpture there in 1810. The monument to Lord Mansfield in Westminster Abbey, the group of (Cephalus and Aurora, > (Psyche, > the group of the Arch¬ angel Michael and Satan, } are among his best works. He executed many exquisite bassi- relievi, compositions from Scripture subjects and marked by some special religious sentiment. The monuments to Nelson, Howe and Reynolds in Saint Paul's are by his hand. One of his latest and finest productions is the (Shield of Achilles. , The sculptures and sketches of Flaxman are now deposited and exhibited in a gallery called the <(Flaxman Hall,® at University College, London. His ˆLectures on Sculpture* appeared in 1829, and passed through a new edition in 1866.

FLAXSEED, the seed of the flax plant (linum) largely used for domestic and medicinal purposes, produced in large quantities in the south of Europe, Egypt, parts of Asia and in the United States. (For a detailed description of the plant see Flax; and for its commercial qualities other than seed, see Fibre and Linen). The seeds of flax are dark brown, glossy, oval oblong, flattened, with acute edges and pointed at one end. The seed is rich in an oil of such superior drying qualities as render it an indis¬ pensable ingredient in paint and varnish, and in the manufacture of linoleum, oilcloth, printer's ink, patent leather and other products and man¬ ufactures. The cultivation

of the plant for fibre requires harvesting before the seed is fully ripe, which impairs the quality and reduces the quan¬ tity of the crop of flaxseed. The cultivation of flax for the seed requires a seeding of two or three pecks to the acre, and while it yields an increase of seed, the fibre straw is coarser; hence flax must be raised exclusively either for fibre or for seed. European countries cultivate flax for fibre, while the United States, Argentina and British India produce the world's commercial crop of flaxseed.

Introduction in America. — Flax for fibre was introduced in the United States soon after the landing at Plymouth. The seed for which there was obviously a limited domestic demand, gradually developed as an article of commerce. So long ago as 1791 the exports of flaxseed from the United States amounted to 292,460 bushels. In the same year began the manufacture of lin¬ seed oil in this country. In 1810 there were 283 linseed oil mills located in 14 States, 1 71 mills being in the State of Pennsylvania. The total annual output of these mills amounted to 770,583 gallons, representing 300,000 bushels of seed. In 1839 the first cargo of flaxseed ever brought into

the United States was imported from Russia, and a few years later ships carrying ice to India brought flaxseed on the return voyages. From 1850 to 1870 India shipped a larger quantity of flaxseed to the United States than was produced in this country. From 1850 to 1860 half the entire crop here was grown in Ohio and Ken¬ tucky. The linseed oil mills divided or arranged themselves about 1891 into two groups, eastern and western. The former utilized the India imports of seed, while the western mills used the home product. In 1892 the United States took rank among the surplus flax-producing nations of the world and became an exporter of im¬ portance. In 1894 a short crop necessitated the import of 4,000,000 bushels. After that the crop increased, but recent years show a reduced acreage and production. The acreage and pro¬ duction of flaxseed in the United States fell off greatly after 1914, due to giving the soil to more favored crops. As a result importation in¬ creased, being in 1917 12,394,000 bushels valued at $25,150,000.

The Western Crop. — The flaxseed industry has migrated from its original western home in Ohio and Kentucky, until its present area in¬ cludes North Dakota, South Dakota, Minnesota, Montana, Iowa and Wisconsin (known as the northwestern crop), and in Kansas, Missouri, Nebraska, Oklahoma and Indian Territory (known as the southwestern crop). Up to 1869, Ohio was the leading producing State. In 1879 Illinois produced the largest crop, 1,812,438 bushels. In 1889 North Dakota took the lead with a production of 7,776,610 bushels, and in

1902, out of a total record production in the United States of 29,284,880 bushels North Da¬ kota produced 55 per cent or 15,552,000 bushels. In 1915 its acreage was over one-third of the total United States, and Minnesota's about one- sixth, Montana and South Dakota being the other large producing States. There are two varieties of seed produced in the West. The small-grained seed of the Southwest yields an average of 17 pounds of oil to the bushel, while the larger-grained seed of the Northwest yields 20 pounds of oil to the bushel (56 pounds).

FLAXSEED PRODUCTION IN THE UNITED STATES.

STATES

1915

1916

1917

North Dakota .

Bushels

3,764, 000

Bushels

8,137,000

Bushels

6,534,000

Montana .

1,266,000

3,088,000

2,625,000

Minnesota .

1,980,000

1,700,000

3,150,000

South Dakota .

980,000

930.000

1,100,000

Other states .

483,000

441,000

821,000

Total United

States .

8,473,000

14,296,000

14,230,000

The great falling off of United States pro¬ duction of flaxseed since 1914 has been accom¬ panied with an almost steady increase in price. From 1890 to 1909 the farm price of flaxseed varied normally between $1 a bushel and $1.50. In 1901 it rose to $1.80, but the bumper crop of 1902 brought the figure down; in 1910 it rose to $2.34 in October, and in 1911 was $2.05. It fell off again in 1912 to 1914; in 1915 stiffened to $1.48, in 1916 during the later months to $2, and steadily rose to the close of 1917, when the usual quotation was $3 per bushel. A large im¬ portation from South America resulted.

Flaxseed Products. — The principal product as understood is linseed oil. The residue after the extraction of the oil is the by-product the oilcake, a valuable cattle food, which, when ground, is known to commerce as linseed oil meal. Out of a crop like that for 1909 (39,-000,000 bushels), there could be manufactured over 75,000,000 gallons of oil and upward of 1,000,000,000 pounds of oilcake. Of this vast quantity of oil the foreign demand only amounts to 100,000 gallons a year. Linseed oil has many uses and the monopoly of its field is so complete it has no substitutes nor adulterants. Probably 75 per cent of the oil manufactured is com¬ pounded with pigments and gums and used as paint and varnish. The remainder is utilized in making linoleum, oilcloth, printer's ink, water¬ proof fabrics not made of rubber, enamel for buttons, for making soap and for a few me¬ dicinal purposes. The oilcake, used only as a cattle food, finds an extensive market abroad.

FLAXSEED PRODUCTION OF THE WORLD.

COUNTRY

1899

1912

1917

United States .

Russia .

Bushels

19,979,000

18,022,000

17,116,000

Bushels

28,073,000

22,177,000

25,680,000

26,130,000

23,413,000

3,000,000

Bushels

8,473,000

British India .

Canada .

15,440,000

South America .

Other countries .

Total .

8,639,000

2,592,000

40,134,000

66 , 348 , 000

128,473,000

r-‘

It is highly prized by European stockraisers, but little appreciated in America. In the fiscal year 1909-10 oilcake to the value of $19,251,012 was shipped to foreign countries, but this trade has fallen off. In 1912 there was imported 737,256 gallons, and in 1914 192,282 gallons. In the manufacture of linseed oil from flaxseed two processes are used, one known as the ((old® or hydraulic press process, and the other as the <(new® or naphtha process. The old process is in use generally throughout the United States, the new process being represented principally by one mill in Chicago. In the banner year of 1902 there were 40 linseed oil mills in opera¬ tion in the United States. They contained 750 presses with a crushing capacity, if operated 250 days in the year, of 25,000,000 bushels, with an output of 70,000,000 gallons of oil.

The manufacture of linseed oil in the West has become largely localized in cities on and near the Great Lakes — Minneapolis, Chicago, Toledo, etc. Flaxseed in its natural state has no domestic uses on the farm, so that internal com¬ merce involves the entire crop.

FLEA-BEETLES, small leaf-beetles of the tribe Halticini, of the family Chrysomelidc f, differing from other forms of this family by their extraordinary leaping power due to the enormously developed hind femora. Many of them are injurious to vegetation from their habit of eating the starting leaves full of holes, causing the drying up and death of the plant; hence certain species are known, as ((tobacco flea,® <(potato flea,® <(cabbage flea,® etc. In their larval state some species live on the root system of various weeds, the adults doing the principal damage to useful plants. Some species are also leaf-miners, while a few feed on the upper

surface of leaves like the young of common leaf-beetles, but most species feed on both sur¬ faces. One of the best remedies is bordeaux

mixture, doubly efficient when mixed with paris green and administered in the form of a spray. See Leaf-beetles.

FLEA-HOPPER, either of two species of injurious minute black bugs of the family C ap¬ sides?. The commonest is the garden flea-hopper (Halticus uhleri), which feeds and breeds nor¬ mally on clover, but attacks all garden vege¬ tables, commonly on the under sides of leaves, which it punctures so as to cause the death of the tissue in small irregular white patches. It somewhat resembles a flea-beetle (q.v.), but is remarkable in being dimorphic, a portion of the females having well-developed wings, the re¬ mainder being short-winged. The best remedy is kerosene emulsion as an under spray, and the avoidance of planting susceptible crops after the cutting of clover fields. A related species is known as the false flea-hopper (Agalliastes associatus) .

FLEA-LOUSE, one of the jumping plant- lice of the family Psyllidce, familiarly repre¬ sented by a pest of the pear-tree (q.v.). Some of the species make galls.

FLEABANE. See Erigeron.

FLEAS, minute wingless insects with bodies covered by a strong armor of fine scaly plates and mouth-parts formed for sucking. They constitute the order Siphonaptera and are re¬ lated to the Diptera. Everyone is familiar with these troublesome parasites of man and domestic animals, but few persons have studied them sufficiently to know the larval and pupal stages, or to recognize the fact that there are many species. Only recently has it been es¬ tablished that the flea most annoying to human beings in America is not the human flea of the Old World (Pulex irritans), but the so-called dog-and-cat flea (Pulex serraticeps) . Both species are of cosmopolitan distribution, but the former is fortunately extremely rare in this country, while the latter is to be found everywhere. Observations conducted by the United States Department of Agriculture have shown that the development of these insects is hastened by a moist or humid atmosphere. The egg stage is very short, the larvae, which are worm-like, spin cocoons in which the pupal stage is formed in from 7 to 14 days after hatching and the imago appears five days later, showing that in the warmest weather an entire generation may develop in little mo e than a fortnight. ˆ Fleas will develop successfully in any situation where they are not too much dis¬ turbed, as in rugs, mats or in straw or litter on which cats or dogs have slept; and they are also carried from one place to. another by rats and mice and other animals. Dr. C. F. Baker ascertained in 1895 that there were 47 valid species of fleas

in the United States; and probably this number might be doubled if all of the parasite of our larger animals were known. While many persons are indifferent to the pres¬ ence of fleas others suffer severely from their attacks. Very many alleged cases of <(hives® have been found to be produced by fleas, and epidemics of fleas in restricted areas as for ex¬ ample, in several neighboring houses, have been traced to the body of an animal which had died near by. The fleas desert the dying

body of their host, jump on the clothing of any person passing and are thus carried from house to house. _ One means of protection against them consists in avoiding carpets, and keeping the floors painted and covered with rugs, which should be frequentlv moved, swept and aired. Household pets should be kept out of the house during the summer time ; in fact, it is better to exclude cats entirely, because they cannot be washed and freed from parasites so readily as dogs. Rats and mice also carry these and other parasites. The best remedy for those who suffer from fleas is to apply ammonia as strong as can be borne and as soon as possible to the bite, which in some persons is followed by an eruption as big as a dime, attended by severe itching. The free use of baking soda would serve nearly the same purpose where ammonia cannot readily be obtained. Consult Howard & Marlatt, (Household Insects of the United States,* is¬ sued by the Department of Agriculture ; Anon., Teaching Fleas to Act (in Illus¬ trated World, Vol. XXIV, p. 768, Feb. 1916) ; Anon., Huge Model of the Flea (in Scientific American, Vol. CX, p. 259, New York 1914) ; Bishopp, F. C.,

FLECHE, La. See La Fleche.

FLECHIER, Valentin Esprit, French preacher and author: b. Perne Vaucluse, 10 Tune 1632; d. Montpellier, 16 Feb. 1710. He was brought up at Tarascon by an uncle who was superior of the Christian Brothers, which order he entered and soon acquired fame by the elegance of his style and his facility in Latin verse. In 1658 he left the teaching order • and about 1660 repaired to Paris. Becoming tutor in the household at Caumartin, a Council¬ lor of State, he accompanied the latter in 1665 to Clermont, where he wrote an account of the trip embellished with anecdotes of the people of the provinces through which he passed. Soon afterward he was appointed reader to the Dauphin and about this time established his reputation as a preacher, to which he added in the course of the next 20 years. In 1673 he was

received member of the Academy, the same day as Racine. Becoming bishop of Lavaur in 1685 he was transferred to Nimes in 1687 and in this difficult seat exercised moderation in enforcing the ordinances in re¬ gard to the Protestants. As an orator he is inferior to Bossuet and Bourdalone, but as a writer he is charming. His principal efforts are (Orasion funebre de Turenne) ; (Memoires sur les Grands jours tenus a Clermont en 1665. > Consult Fabre, (Flechier orateur) (Paris 1885).

FLECHSIG, flex'iH, Paul Emil, German physician : b. Zwickau 1847. He received his education at the University of Leipzig and in 1884 became professor of psychiatry there. In 1882 he became director of the Clinical Insti¬ tute of Psychiatry and Neurology at Leipzig. He made personal investigations of the Euro¬ pean systems for the treatment of the insane, on which he is a recognized authority. He published (Die Irrenklinik der Universitat Leipzig in den Jahren 1882-86) (1887) and (Die Leitungsbahnen im Gehirn und Riicken-

mark des Menschen auf grund entwicklungs- geschichtlicher Untersuchungen dargestellt.*

FLECKHEISEN, flek'hi-zen, Carl Fried¬ rich Wilhelm Alfred, German philologist and critic: b. Wolfenbiittel, 20 or 23 Sept. 1820; d. 7 Aug. 1899. He was educated at Helmstedt and at the University of Gottingen. He held several educational posts at Frankfort-on-the- Main and at Dresden, becoming in 1861 vice¬ principal of the Vitzthum'isches Gymnasium at Dresden. He is best known for his work on Plautus and Terence, in which Ritschl was his only equal. After 1855 he edited the depart¬ ment of classical philology of the Jahrbucher fiir philologie und Pddagogik. His works in¬ clude _ (Exercitationes Plautinae* (1842) ; (Plauti Comoediae* (Vols. I and II, 1850—51) ; (P. Terenti Afri Comcediae (latest ed., 1898) ; (Funfzig Artikel* (1861). Consult Bursian, C., (Biographisches Tahrbuch fiir Altertumskunde) (Vol. XXIII, 1901).

FLEECE, Golden, in Grecian mythology the fleece of gold taken from the ram on which Phrixus and Helle escaped from being sacrificed. See Argonauts ; Golden Fleece, Capture of.

FLEECE, Order of the Golden, a military order instituted by Philip the Good, Duke of Burgundy, at Bruges, 10 Jan. 1429, on the occa¬ sion of his marriage with the Portuguese prin¬ cess Isabella. The order now belongs to both Austria and Spain. See Golden Fleece, Order of.

FLEET, an appellation sometimes used in place of the more common word creek; an inlet or arm of the sea, as North-fleet, etc.; more

specifically the name of a tidal stream, contributary to the Thames. In olden times it was partially navigable. It gradually de¬ generated into an open sewer and changed its name from Fleet River to Fleet Ditch. In modern times it has been covered up, but still forms part of London's sewerage system. The origin of its name is disputed, being by some ascribed to the swiftness of its current, and claimed by others to have been derived from the word float. Originally it was called the River of Wells. Its source is in Hampstead Heath. See Fleet Street.

FLEET MARRIAGES, irregular and clan¬ destine marriages performed by imprisoned clergymen in Fleet prison, London, after 1696, when by Act of Parliament a penalty of £100 was imposed on any clergyman who celebrated a marriage otherwise than by banns or license. To the imprisoned clergymen in the Fleet prison such a law had no terrors for they had neither liberty, money nor credit. Marriages had been performed in the prison and vicinity from 1613 onward, but it was only after the passage of the act referred to that they became clandestine. The great expense of the public ceremony was the impelling motive of these clandestine marriages and many tavern-keepers near the prison kept a room fitted as a chapel for their performance. The scandals and abuses incident to such a system became so great that they became the object of special legislation in 1753, when an act was passed, which required, under pain of nullity, that banns should be published according to the rubric or a license obtained, and that, in either case, the

marriage should be solemnized in church. This effectually put an end to clandestine mar¬ riages in England, and thereafter couples were obliged to travel to Gretna Green. The orig¬ inal records of such marriages, celebrated be¬ tween 1686 and 1774, are called Fleet books or Fleet registers. They are now kept at Somer¬ set House, London. Consult Ashton, J., (The Fleet, its River, Prison and Marriages) (Lon¬ don 1888) ; Burn, J. S., 'The Fleet Registers, etcP (London 1833).

FLEET PRISON, or FLEET, a historic prison in London, so called from its situation by the side of the Fleet (q.v.). In it were con¬ fined debtors, bankrupts and persons com¬ mitted for contempt of the courts of chancery, exchequer and common pleas. It existed from the 12th century until its abolition in 1846. During its long existence it housed tempora¬ rily many prominent persons, amongst whom may

be mentioned William Penn, who was there in 1707. A vivid description of its life, customs and abuses may be read in Dickens' 'Pickwick Papers. J Perhaps the most out¬ standing of the last were the so-called "Fleet Marriages® (q.v.).

FLEET STREET, London, one of London's historic highways. It derives its name from the Fleet River (q.v.). It extends from Lud- gate Hill to Temple Bar at the east end of the Strand. As early as the 13th century it seems to have been known as Fleet Bridge street and in the early part of the 14th century it began to be mentioned frequently by its present name, spelled, of course, in accordance with the cus¬ toms of those days. The west part of the street was destroyed by the great fire that dev¬ astated such a large part of London in the 17th century. For many years Fleet street was especially noted for its taverns and coffee¬ houses. Many notable persons of literary and political fame used to frequent these, and a few have survived to this day, in name at least. Three old London churches must also be men¬ tioned as belonging to the Fleet street region : Temple Church, Saint Dunstan's and Saint Bride's. Fleet street witnessed throughout its long career many notable processions. Coro¬ nations, funerals, etc., never failed to pass through it. Famous men in large numbers had frequently close relations with Fleet street, either by living there or in one of its many side streets, or by being regular frequenters of its taverns. Amongst these should be men¬ tioned especially Ben Jonson, Milton, Izaak Walton, Dryden, Dr. Johnson, Burke, Gold¬ smith and Lamb. In the 18th and 19th centu¬ ries Fleet street became the home of publishers of books, magazines and newspapers, after hav¬ ing housed quite a number of printers and booksellers in the two preceding centuries. Among these should be noted the famous publishing house of Murray, Gentleman1 s Mag¬ azine, Punch, Daily Telegraph, Daily News, Standard, Daily Chronicle, etc. Hardly a for¬ eign or provincial newspaper, possessing Lon¬ don offices, is located elsewhere than in Fleet street and, though some of the big London dailies are located in some other part of Lon¬ don, Fleet street of to-daj' is still the journal¬ istic street of London. In this connection should also be mentioned two volumes of poetry by John Davidson, bearing the title (Fleet

Street Eclogues* (London 1893 and 1896) and describing life from the point of view of a journalist. Consult Baker, H. B., 'Stories of the Streets of London) (London 1899) ; Bell, W. G., 'Fleet Street in Seven Centuries) (London 1912) ; Besant, Sir W., 'London in the 18th Century* (London 1902) ; Id., Lon¬ don in the Time of the Tudors) (London 1904) ; Id., (Mediaeval London) (London 1906) ; Id., 'London in the 19th Century* (London 1909) ; Id., 'London City* (London 1910) ; Id., Lon¬ don North of the Thames) (London 1911) ;

Chancellor, E. B., ‘The Annals of Fleet Street, etc.* (London 1912) ; Fitzgerald, P., ‘Dr. Johnson and the Fleet Street Taverns) (in Gentleman’s Magazine, U. S., Vol. XXVI, p. 305, London 1881) ; Hutchings, W. W., Lon¬ don Town Past and Present* (2 vols., London 1909) ; Hutton, L., (Literary Landmarks of London* (New York 1897) ; Jesse, J. H., ‘London and its Celebrities> (2 vols., London 1850) ; Lang, E. M., (Literary London* (Lon¬ don 1906); Lemon, M., ‘Up and Down the London Streets> (London 1867) ; Smith, J. T., ‘An Antiquarian Ramble in the Streets of London) (2 vols., London 1846) ; Taylor, G. R. S., ‘An Historical Guide to London) (London 1911) ; Welch, C., ‘Modern History of the City of London> (London 1896) ; Wheatley, H. B., London, Past and Present* (3 vols., London

1891).

FLEETWOOD, Charles, English soldier: b. Northamptonshire, England; d. Stoke New¬ ington London, 4 Oct. 1692. He was of good family, studied law, enlisted as a trooper in the Parliamentary forces, and commanded a regi¬ ment at the battle of Naseby (1645). He was elected member of Parliament in 1646, and ap¬ pointed governor of the Isle of Wight in 1649. He took no part in the trial of the king. He was made lieutenant-general of cavalry in. Cromwell’s army, distinguished himself at the battle of Worcester (1651) and married Brid¬ get, Henry Ireton’s widow, the daughter of Cromwell. He was thoroughly in accord with Cromwell’s policy, but opposed the movement to make Cromwell king. He became a mem¬ ber of Cromwell’s House of Lords, and headed the army’s opposition to the Parliament. He was put in command of the troops in Ireland, where he resided as Lord Deputy until 1655. He was appointed commander-in-chief of Rich¬ ard Cromwell’s army 18 Oct. 1659. At the Restoration, having taken no part in the death of Charles I, he was permitted to retire to obscurity.

FLEETWOOD, George, English regicide: b. in Buckinghamshire, England: d. about 1665. He represented his native shire in the Long Parliament (1647). He was . one of the judges at the trial of King Charles, signed the death warrant of the king, raised a troop of horse for Cromwell’s army and was by the latter raised to the peerage. By the government of Charles II he was condemned to death as a regicide, but by an act of the royal clemency the sentence was mitigated to confiscation of his estates, and he is believed to have emigrated to America.

FLEETWOOD, William, English clergy¬ man: b. Tower of London, 1 Jan. 1656; d. Tottenham, 4 Aug. 1723. He was educated at

Eton and at King's College, Cambridge. Tak¬ ing holy orders, he was appointed rector of Saint Austin's, London, and lecturer of Saint Dunstan's in the west about 1689. In 1702 he was made canon of Windsor and six years later Queen Anne, with whom he was a favorite, made him bishop of Saint Asaph. In 1714 he was translated to Ely. He was reputed the best preacher of his generation, but in 1712 his opposition to the doctrine of non-resistance embroiled him with Swift and the Tories. He wrote (Essay on Miracles) (1701) ; (Free Ser¬ mons > (1712), the preface of which displeased the Tory ministry. It was condemned to public burning but, being circulated in The Spectator, it secured the widest publicity. A collected edi¬ tion of Fleetwood's works, together with a bio¬ graphical notice, appeared in 1737.

FLEETWOOD, or BRANDY STATION, Battle of. General Hooker, suspecting that General Lee was gathering his forces on the upper Rappahannock for a movement north¬ ward and informed that General Stuart's Con¬ federate cavalry was at Culpeper Court House, ordered General Pleasonton, who was at Cat¬ lett's Station, to cross the Rappahannock at Beverly and Kelly's Fords, attack Stuart and ascertain Lee's intentions. Pleasonton had the cavalry divisions of Buford and Gregg, and Hooker sent him two picked provisional in¬ fantry brigades of 3,000 men, under Generals Ames and Russell, making in all, cavalry and infantry, a force of 10,900 men. Stuart had five brigades of 10,200 men. At day¬ break 9 June 1863 Buford, with his cavalry and one brigade of infantry, crossed at Beverly Ford and encountered one of Stuart's brigades, under command of Gen. Sam Jones, and a severe contest ensued, in which the 8th New York cavalry, Col. B. F. Davis, was routed and its commander killed. A charge Of the 8th Illinois cavalry drove Jones back two miles, where he joined Stuart and the two brigades of Wade Hampton and W. H. F. Lee. Mean¬ time Gregg, with his cavalry division and an infantry brigade crossed the river at Kelly's Ford and pushing back Robertson's brigade, approached Fleetwood Hill from the east, as Buford moved on Brandy Station from the northwest. Fleetwood Hill is a few hundred yards north of Brandy Station, and a hard hand-to-hand struggle ensued at both points, with varying success. Buford held his own near Brandy Station, but Gregg, at Fleetwood Hill, was finally compelled to withdraw, leav¬ ing three of his guns in the hands of the enemy. Pleasonton, satisfied that a great part of Lee's army was in his front, recrossed the Rappahannock with about 100 prisoners. The

Union loss was 484 killed and wounded and 382 missing. The Confederate loss was 485, of whom 301 were killed or wounded. This en¬ gagement marks the beginning of the Gettys¬ burg campaign. There were also various other actions and skirmishes in the same locality in August 1862 and in , August, September, Oc¬ tober and November 1863. Consult Johnson, R. U., and Buel, C. C., ed., ˆBattles and Leaders of the Civil War} (Vol. Ill, New York 1884) ; Ropes, J. C., and Livermore, W. R., ed., (The Story of the Civil War> (Part III, book 2, New York 1913) ; U. S. War Department, (War

of the Rebellion, } (Official Records, etcC (Se¬ ries I, Vol. XXVII, Washington 1889-1902).

FLEETWOOD, or FLEETWOOD-ON- WYRE, England, seaport and military station in Lancashire, at the mouth of the Wyre, 230 miles northwest by north of London, on the London and Northwestern and the Lancashire and Yorkshire railways. It was laid out in 1836 by Sir Peter Fleetwood. It is important as a watering place, and its fisheries are in a prosperous condition. There are salt-works in the neighborhood. There is steamer communi¬ cation with Belfast and Londonderry and the Isle of Man. The tramway lines, slaughter¬ houses, electric-lighting plant and other public utilities are the property of the municipality. It contains military barracks, a military hos¬ pital and a rifle range. Pop. 15,876.

FLEGEL, fla'gel, Eduard Robert, German traveler: b. Vilna, Russia, 1 Oct. 1855; d. Brass, mouth of the Niger, 11 Sept. 1886. He received a commercial education and in 1875 was em¬ ployed by a company at Tagos, West Africa. Four years later he surveyed the Benue River, penetrating about 125 miles beyond the far¬ thest point hitherto explored. The German African Society commissioned him to explore the entire Benue district and in 1880 he as¬ cended the Niger to Gomba, and secured a permit from the sultan at Sokoto for an expedi¬ tion to Adamawa. In 1882 he discovered the source of the Benue at Ngaundere. In 1883- 84 he led another expedition up the Benue, visited Europe in the latter year and returned with a commission from the German African Company to open the Niger-Benue district to German trade. Flegel arrived to find that the district had been taken over by the English Niger Company. Although very ill he at¬ tempted the ascent of the Benue, but turned back at Yola and died soon after arriving at the coast. He wrote (Lose Blatter aus dem Tagebuche meiner Haussafreunde) (Hamburg 1885) ; Worn Niger-Benue; Briefe aus Afrika) (Leipzig 1890).

FLEISCHER, fli'sher, Charles, American divine: b. Breslau, Germany,

23 Dec. 1871. Coming to America in 1880 he was graduated at the College of the City of New York in 1888 and from the University of Cincinnati in 1893, and rabbi from the Helven Union College of Cincinnati in the same year. In 1894 he suc¬ ceeded Rabbi Solomon Shindler at Temple Israel, Boston, where he remained until 1911, founding in the latter year an independent re¬ ligious institution, known as the ((Sunday Com¬ mons® of Boston, of which he has since been leader. He is also known as a lecturer and contributor to magazines and newspapers. He wrote (American Aspirations) (1914).

FLEISCHER, Heinrich Leberecht, Ger¬ man Orientalist: b. Schandau, Saxony, 21 Feb. 1801 ; d. Leipzig, 10 Feb. 1888. He studied at the University of Leipzig from 1819-24. In the latter year he went to Paris where he con¬ tinued his studies of the Arabic, Turkish and Persian languages under de Sacy. From 1831— 36 he taught at one of the Dresden high schools. In 1836 he accepted the chair of Oriental languages at the University of Leipzig, which he occupied until his death in spite of invitations to accept similar positions in Saint

Petersburg and Berlin. He was one of the few foreign members of the French Academy of Inscriptions, a member of many German and foreign scientific societies, possessor of honorary degrees from the universities of Konigsberg, Prague, Saint Petersburg, Dorpat and Edinburgh, and one of the founders of the Deutsche Morgenlandische Gesellschaft. He edited Abulfeda's (Historia Ante-Islamica* (Leipzig 1831) ; Samachshari's (Golden Neck¬ laces y (Leipzig 1835) ; (Ali's Hundred Sayings) (Leipzig 1837) ; Beidhawis, Commentary on the Koran } (2 vols., Leipzig 1846-48) ; cata¬ logues of oriental manuscripts in the Royal Li¬ brary at Dresden and in the Town Library at Leipzig. After Habicht's death he continued his edition of (The Thousand and One Nights, > bringing out Vols. IX-XII (Leipzig 1842-1843). He also published a German edition of Mirza Mohammed Ibrahim's (Grammar of the Mod¬ ern Persian Language> (Leipzig 1847) ; Her¬ mes Trismegistus an die Menschliche Seele) (Leipzig 1870) ; (Kleinere Schriften) (3 vols., Leipzig 1885-88) .

FLEISCHMANN, flish'man, Wilhelm, German agriculturist and chemist : b. Erlangen 1837. He received his education at Nuremberg, Wurzburg, Erlangen and M>unich. In Liebig's laboratory in 1862 he began work on agri¬ cultural chemistry and in 1864-67 while teaching in the Realschule at Memmingen conducted ex¬ periments

there. From 1867-76 he was prin¬ cipal of the Realschule at Lindau and for the following 10 years directed the first dairy experiment station of Germany, in the vicinity of Lalendorf, Mecklenburg. From 1886 to 1896 he was director of the Agricultural Institute at Konigsberg and of that at Gottingen after 1896. He did important work in the chemistry of milk. His works include (Handbuch des Molkereiwesens) (1876) ; (Altgermanische und altromische Agrarverhaltnisse) (1906) ; (Lehrbuch der MilkwirtschafC (1908; English and Russian translations), and (Casar, Tacitus, Karl der Grosse, und die deutsche LandwirtschafC (1911).^

FLEMALLE, Le Maitre de, Flemish painter, whose proper name is thought to have been Jacques Daret: He flourished in the 15th century. At Tournai he . studied art under Campin in 1427 and five years later became a member of the guild of painters there. Subse¬ quently he labored at Lille, Bruges and Arras. In the latter city he painted a huge altarpiece, which is now divided in sections and held in different countries, (The Nativity) in the Met¬ ropolitan Museum, New York; the (Visitation* and (Adoration of the Magi) in the Museum of Berlin, and (The Presentation in the Tem¬ ple* in Paris. In 1468 Flemalle is last men¬ tioned in being present at the nuptials of Charles the Bold, at Bruges. His career is shrouded in considerable mystery; some author¬ ities are of opinion that he is none other than Campin of Tournai, who left several important works, including (The Descent from the Cross, * now in the Stadel Institute, Frankfort; (The Annunciation * at Brussels; (The Adora¬ tion of the Shepherds,* at Dijon; (Madonna and Child with Angels,* in the Metropolitan

Museum, New York; and (The Marriage of the Virgin,* in the Prado, Madrid. Consult Houtart, (jacques Daret) (Tournai, no date) ; Hulin de Loo in Burlington Magazine (1909; 1911) ; and Winckler (Der Meister von Fle¬ malle und Rogier von der Weyden* (Strass- burg 1913).

FLEMING, George. See Fletcher, Julia Constance.

FLEMING, John, Scottish naturalist and clergyman: b. near Bathgate, Linlithgowshire, 1785; d. 1857. After securing his license as a preacher he settled in Fifeshire, where he gave most of his attention to the study of natural science. He soon gained the reputation of the first zoologist of Scotland and in 1834 became professor of physics at the University of Aber¬ deen. He was afterward summoned to the chair of natural history at Edinburgh. He originated the dichotomous or binary system of classifi¬ cation, which he sought to establish despite the opposition of Cuvier and the adherents of the latter. His works include (Economic Mineral¬ ogy of the Zetland and Orkney Islands * (1807) ;

(Philosophy of Zoology) (1822) ; (History of British Animals* (1828).

FLEMING, John, American clergyman and missionary : b. Mifflin County, Pa., 12 April 1806; d. Ayr, Neb., October 1894. He was edu¬ cated at Jefferson College and New Jersey Col¬ lege, was graduated from the latter in 1829, and from Princeton Theological Seminary, in 1832. He was ordained to the ministry of the Presby¬ terian Church, by a synod at Lewistown, Pa., in October 1832, shortly after which he left for the Creek Nation, in the Indian Territory, where he had been assigned to work by the American Board of Commissioners for Foreign Missions. Being one of the first missionaries to go among the Creek people, he devoted himself to the study of the Creek, or Muskogee language, for which he devised an alphabet which enabled him to reduce it to writing. He prepared and published several primary textbooks in the Creek language and also translated and pub¬ lished hymns. His work encountered much opposition from some of the less progressive members of the tribe and finally, as the result of baseless charges, he was ordered to leave the tribal reservation, which he did in 1836. In 1838 he was assigned a mission at Green Bay, Wis., but the station was soon discontinued. He then settled in a pastorate in Westmore¬ land County, Pa., where he remained until 1851, when he removed to La Salle County, Ill., and engaged in home mission work. In 1876 he settled at Ayr, Neb., where he made his home until his death. Though his service as a missionary among the Creek Indians was com¬ paratively brief, his work in reducing their language to writing formed the basis of the more successful efforts of those who followed in later years.

FLEMING, John Ambrose, English elec¬ trical engineer: b. Lancaster, England, 1849. He was educated at the Royal College of Chemistry and Saint John's College, Cambridge, has been professor of electrical engineering in the Uni¬ versity of London since 1910, and for the past 25 years associated with the develop¬ ment of electrical science. He has published (Treatise on the Alternate Current Trans-

former' (1889-92) ; (Electric Lamps and Elec¬ tric Lighting' (1894) ; (Magnets and Electric Currents) (1897) ; (Waves and Ripples in

Water, Air and Ether (1902) ; (The Principles of Electric Wave Telegraphy and Telephony) (1906) ; (The Wonders of Wireless Teleg¬ raphy' (1913), etc.

FLEMING, or FLEMMING, Paul, Ger¬ man lyric poet: b. Hartenstein, Saxony, 5 Oct. 1609; d. Hamburg, 2 April 1640. He studied at the University of Leipzig, and later at that of Leyden where he received his M.D. degree. In the meantime, having joined as an attache an embassy to Russia and Persia, he had an opportunity (1635-39) of studying many peoples. His (Deutsche Pcemata' appeared in 1642 in Liibeck. They have been reprinted re¬ peatedly. The best modern edition is that by

J. M. Lappenberg (2 vols., Stuttgart 1863). The same editor also brought out his (Latin Poems) (Stuttgart 1866). There are likewise a number of editions, containing selections of his works (Stuttgart 1820; Leipzig 1822; Leipzig 1870; Stuttgart 1885). A German translation of some of his Latin poems was published by Kirchner (Halle 1901). Fleming was an admirer of and considerably influenced by Martin Opitz (q.v.). Many of his lyric poems show considerable depth of feeling and great sincerity. In some of his religious poetry he achieves expressions of the truest piety and especially one of them has become a well-known and much-sung hymn (In alien meinen Taten, lass ich den Hochsten raten.' Consult Boremann, A., (Paul Fleming) (Stettin 1899) ; Naumann, G., (Paul Fleming) (Giistrow 1874) ; Olearius, A., (The Voyages and Travels, etc., to Muscovy and Persia, etc.' (trans. by J. Davies, 2 vols., London 1662) ; Schmitz, F. W., (Metrische Untersuchungen zu Paul Flemings Deutschen Gedichten) (in Quel- len und F orschungen zur Sprach und Kultur- Geschiclite der Germanischen V olker, Vol. CXI, Strassburg 1910) ; Straumen, J., (Paul Flemings Leben und Orientreise' (Leipzig 1892) ; Tropsch, S., (Flemings Verhaltnis zur Romis- chen Dichtung) (in Grazer Studien zur Deuts¬ chen Pliilologie, Part III, Graz 1895) ; Unger,

K. , (Studien fiber Paul Flemings Lyrik >

(Grief swald 1907) ; Wenderoth, G., (Paul Flem¬ ing als Petrarkist' (in Archiv fiir das studium der Neueren Sprachen und Litteraturen, Vol. CXXIV, n. s. Vol. XXIV, p. 109, Braunsch¬ weig 1910).

FLEMING, Richard, also spelled, FLEM¬ MING, FLEMYNG, and FLEMMYNG, Eng¬ lish prelate: b. Yorkshire, about 1360; d. Slea¬ ford, 25 Jan. 1430 or 1431. At first a supporter of Wycliffe's doctrines he subsequently, when bishop of Lincoln, became staunchly orthodox and is remembered as the prelate who, at the command of Pope Martin V, dug up and burned the body of Wycliffe and cast the ashes into the Swift (1427). He was educated at Uni¬ versity College, Oxford, and took orders. From 1406-19 he held various prebends. In the latter year he was made bishop of Lincoln. In 1423 he acted as

president of the English delegation to the general councils of Pavia and Siena. Upon his return to England he was appointed by the Pope to the archbishopric of York, but could not obtain the royal consent and was forced to remain in Lincoln as bishop. For a number of years previous to his death he

planned a college at Oxford to be a bulwark against heresy. Although a royal charter was granted to him for that purpose and he drew up part of the statutes of the new college, the institution, which was named Lincoln College, was not founded until after the bishop's death. He was buried in Lincoln Cathedral where his altar tomb and effigy may still be seen. Consult (Statutes of Lincoln College' (Oxford 1853) ; Thompson, A. H., ed., (Visitations of Religious Houses in the Diocese of Lincoln) (in Canter¬ bury and York Series, Vol. XVII, London 1915) ; Wood, A., (The History and Antiq¬ uities of the Colleges and Halls in the Uni¬ versity of Oxford) (Oxford 1786-90).

FLEMING, Sir Sandford, Canadian engi¬ neer: b. Kirkcaldy, Fifeshire, Scotland, 7 Jan. 1827 ; d. Halifax, Nova Scotia, 22 July 1915. He went to Canada in 1845, was for a time on the staff of the Northern Railway, and was engineer-in-chief in the construction of the Canadian Pacific railways. He was the author of (The Inter-Colonial: a History, 1832-76'; (England and Canada' ; (Time and its Nota¬ tion' ; etc. He was knighted in 1897.

FLEMING, William Hansell, American Shakespearian scholar : b. Philadelphia, Pa., 23 Aug. 1844; d. New York, 1 Oct. 1915. He was educated at Princeton University and pub¬ lish (How to Study Shakespeare' (1897-99), and edited the (Bankside Shakespeare.' He wrote (A Bibliography of Shakespeare First Folios in New York City,' also many papers on Shakespearean subjects in Werner's Magazine, the Looker-On, and other journals.

FLEMING, Williamina Patton Stevens,

American astronomer : b. Dundee, Scotland, 1857; d. 1911. From 1871 to 1876 she taught school at Dundee, coming to the United States she was appointed assistant at the Harvard College Observatory in 1879. In 1898 she be¬ came curator of astronomical photographs there and subsequently was placed in charge of the Astrophotographic Building. In 1897 and again in 1902 she found the spectrum of meteors on exposed plates. She discovered several new stars. She was honorary member of the Royal Astronomical Society of London after 1906. Her published works are (A Photographic Study of Variable Stars' (1907) and (Spectre and Photographic Magnitudes of Stars in

Standard Regions' (1911).

FLEMINGS. See Germany — Political History.

FLEMINGSBURG, Ky., town and county- seat in Fleming County, on the Cincinnati, Flemingsburg and Southeastern Railroad, 64 miles southeast of Cincinnati. It is in an agricultural region, has a trade in tobacco, poultry and live stock, and manufactures to¬ bacco, flour, lumber, etc. Pop. (1920) 1,516.

FLEMINGTON, N. J., town and county- seat of Hunterdon County, on the Pennsylvania, the Lehigh Valiev and the Central Railroad of New Jersey, 50 miles west of New York. It is the commercial centre for a productive agricultural region and has manufactures of foundry and machine-shop products, shutters, vinegar, gloves, stoneware, flour, brick and cut glass. There is a public library. As early as 1712 nearly all the land comprising the site of the present borough was owned by the three proprietors,

William Penn, Daniel Coxe and Joseph Kirk- bridge. During the Revolution, Flemington was in some degree a centre for military operations, and in 1776 a skirmish took place here in which the British troops were routed. Pop. 2,590.

FLEMISH ART. See Flemish School.

FLEMISH BOND, in bricklaying, a method of positioning or bonding bricks in a wall, so as to tie and break joints. It consists of a header and stretcher alternately, the headers binding two courses.

FLEMISH LANGUAGE AND LITER¬ ATURE. Vldmisch or Duytscli, the Low Ger¬ man vernacular spoken by the Vlamingen or Flemings inhabiting the Belgian provinces of East and West Flanders, parts of Holland and the French department of Nord, is akin to the Frisian and to the Hollandish or Dutch which is its younger branch. The latter differs from Flemish in having been reformed and simplified, while Flemish retains the greater part of the archaic features of its 16th century spelling, pronunciation, and words and forms of speech of French and Spanish origin. Since Belgium became an independent kingdom in 1830, a strong desire has been manifested to foster Flemish traditions and to cultivate and promote its language and literature ; before that date its history is identified with that of Dutch

language and literature. (See Holland). Among early Flemish literature is the (Spiegel historical* (historic mirror) of Jacob van Maerlant (1235-1300), a translation of (Boece) or (Boe- thius) by Jacob Veit of Bruges in the 15th cen¬ tury, and the (Hive of the Catholic Church,* by Philip van Marnix (1569). The modern movement to rehabilitate the vernacular was largely due to the efforts of Jan Frans Willems who before the separation of Belgium from Holland had strenuously advocated its use as a literary language. With the able co-operation of such authors as Van Ryswyck, Ledeganck, Rense, Van Duyse, Blieck, Serrure, David Con¬ science and others, the movement made great progress, received official support, and was crowned with success in 1886 when the Konink- lije Vlaamsche Akademie (Royal Flemish Academy) was founded and the use of Flemish, as well as French, was adopted as the legal and official language of the kingdom. Prominent amid modern Flemish literature is the verse of Ledeganck: (De drie Zustersteden,* (De Hut in 't Wowd,* etc.; of Ryswyck, (Antigonus,* (Eppenstein,* and (Oorspronkelikje Verhalen* ; of Van Beers, (Begga,* (Levensbeelden,* (Ge- voel en Leven) ; and (Gedichten, Gezangen en Gebeden) of Guido Gezelle. Among works of fiction are Hendrick Conscience's (Artevelde* ; Delcroix's, (Geld of Liefde* and Philippine van Vlaanderen* ; Sleeckx's, (In't Schipperskwatier* and (Dirk Meyer* ; and Sneiders' (De gasthuis- non.* Other well-known novelists are Berg- mann, Madame Courtmans, and the two poetesses, Rosalie and Virginie Loveling, poets also including Dantzenberg, De Cort, and Van Droogerbroeck. Representative drama is Sleeckx's (Mester en Knecht,* and (Zannekin.* Among the newest names in the various literary genres are Hilda Ram, Pol de Mont, Geyter, Cyril Buysse, Streuvels, Saabe, Woestvne, Baekelmans, De Clercq, Rooses and De Potter. Consult Willems, (Sur la langue et la lit- terature neerlandaises, par rapport aux prov¬

inces meridionales des Pays-Bas) (1818) ; Ver- coullie, (Spraakleer van net Westvlaamsch* (1894) ; Hamelius, (Histoire politique et lit- teraire du mouvement flamand* (1894) ; the (Vlaamsche Bibliographic* of the Flemish Academy of Ghent, for publication between 1830 and 1890; Kurth, (La frontiere linguistique en Belgique1* (2 vols., Bruxelles 1895-98) ; Coopman, (Geschiedenis der vlaamsche letter- kunde) (Antwerp 1910).

FLEMISH SCHOOL, a school of painting which originated in Flanders in the early part of the 15th century, with the invention, or at least the first practice, of painting in oil. It has been generally attributed to Jan Van Eyck, who was accustomed to varnish his distemper pic¬ tures with a composition of oils. In course of practice he came to mix his colors with oil in¬ stead of water, which rendered them brilliant

without the trouble of varnishing From this and subsequent experiments arose the art of painting in oil. The chief early masters of the school were Jan Van Eyck and his brother and sister, Hubert and Margarete, Matsys, Mabuse, Memling, Weyden and Moro ; to the second period belong Rubens, VanDyck, Snyders, Jor- daens and the younger Teniers.

FLEMMING, Walter, German anatomist: b. Sachsenberg, 21 April 1843 ; d. 1905. He received his education at Gottingen, Tubingen, Berlin and Rostock. In 1871 he became privat- docent at the University of Rostock, removing to Prague in 1872, and to Kiel in 1876 as pro¬ fessor of anatomy. He made valuable con¬ tributions to our knowledge of cell structure and of mitosis. His works include (Zellsub- stanz, Kern und Zelltheilung) (1882) ;

(1891).

FLENSBURG, flans'boorg, Prussia, town in the province of Schleswig-Holstein, on the Baltic, 40 miles northwest of Kiel. It was a place of importance as early as the 12th century, but subsequently suffered much from wars and conflagrations. It is again prosperous, and is now the most important town in Schleswig. The industrial establishments include shipbuilding yards, sugar-refineries, tobacco-factories, soap-works, machinery, paper, cement, breweries, dis¬ tilleries, etc. In 1866 it fell to Prussia as part of the duchy of Schleswig-Holstein. Pop.

60,922.

FLERS, fler, France, town in the Depart¬ ment of Orne, on the Vere, 40 miles south of Caen. It contains an old chateau, a Roman¬ esque church, communal college, and manu¬ factures of cotton and linen fabrics, drugs and chemicals, bricks and tiles, flour, dyes, etc. Pop

13,610.

FLESCH, Karl, Hungarian violinist: b. Moson 1873. He studied at the Vienna Con¬ servatory under Grfin in 1886-89 and at the Paris Conservatory under Marsick in 1890-94. In 1895 he made his debut in Vienna and from 1897 to 1902 was professor at the Bucharest conservatory and leader of the private quartet of the Queen of Rumania. From 1903 to 1908 he was professor at the Conservatory of Am¬ sterdam. In 1909 he gave five historical violin recitals in Berlin, which had a phenomenal

success. In that year he settled in Berlin as a private teacher and virtuoso, meeting with signal success in both ventures. In 1910 he published (Urstudien) for violin, which proved him to be among the foremost teachers of violin. He made a concert tour of the United States in 1913-14 which was very successful. He pub¬ lished editions of the violin works of Mozart, Mendelssohn, Beethoven, Kreutzer and Paganini.

FLESH. The softer tissues of the animal body, as the muscle and fat, but excluding the fluids, bones, skin and hair. Viewed as food, it is composed of the proteids, myosin, musclin, myoglobulin and myo-albumin, together with varying amounts of fats, salts and nitrogenous extractive substances, and about 75 per cent of water. Of the three classes of foodstuffs common to the human economy, meat supplies most of the proteid and fat, while the vegetable kingdom supplies the carbohydrates. The pro¬ teids are more properly the tissue-building ele¬ ments, while the fats and carbohydrates are more readily oxidized, and supply the body with energy. Proteids must be taken as such, since the human economy cannot cause conver¬ sion of the other sorts of food into proteids. The minimum of these various substances for the proper preservation of life has not been positively determined, but approximately the average healthy man requires 100 grams of fat, 400 grams of carbohydrate, and 100 grams of proteid per diem. The necessary amount of proteid material can be obtained from the vege¬ table kingdom, and there is no doubt that some systems are better suited for this diet ; but the popular opinion is that a mixed diet, con¬ taining a certain amount of meat, is more read¬ ily taken care of. The meat proteids are usually more quickly and completely digested. Vegetarians do not agree with this view, contending that the use of animal flesh for food is not requsite to health, and involves cruelty and brutality toward helpless creatures.

The nitrogenous extractive substances, cera- tine, the xanthin bases, and the like, are also of value to the system because of their power of exciting gastric secretions and stimulating cir¬ culation. The various meat extracts contain a large proportion of these substances, and most of them have little else. An overabundance of meat very frequently causes a nervous, irri¬ table condition. This is less true of the so-called white meats, a difference not to be ex¬ plained on the ground that the white meats contain less of the extractives, since the op¬ posite is the case. As a general rule the diet of the well-to-do in America is entirely too high in the amount of albuminous foods. These constant errors find their expression in the well-nigh universal

complaint of dyspepsia and so-called uric-acid disturbances. Such intoxi¬ cations are almost sure to follow if more ani¬ mal food is taken than can be digested and absorbed. Putrefaction of .the unabsorbed food takes place, with generation of toxic sub¬ stances and absorption of them into the general circulation. (See Food). Consult BJyth, doodsˆ (1909) ; Cocroft, (Foods, Nutrition and Digestion) (1912).

FLESH BIRD, in North America, a name often applied to the Canada jay, from its habit of approaching camps and dwellings in search of meat fragments which it devours

avidly. The name is given to other birds of similar habits in other parts of the world.

FLESH-FLY, any of a large group of showy flies (family Sarcophcigidcz) , the more familiar and typical members of which breed in decaying flesh. Some, however, pass their larval stages in dung, or decaying vegetables, or are parasitic in the wounds and sores of animals and man. Most of them look like large house-flies, sometimes bright with metallic blue or green, or gray with black stripes; com¬ mon names are ˆblue-bottle® (for Lucilia ccesar, which often comes into houses in stormy weather), or (

FLESHLY SCHOOL, The. See Decad¬ ents.

FLETA, an ancient English law treatise, with the subtitle (

FLETCHER, Alice Cunningham, Ameri¬ can ethnologist : b. Boston, Mass., 1845. She was instrumental in securing land in severalty to the Omaha tribe by Act of 7 Aug. 1882 ; ap¬ pointed special agent to allot Omaha tribe 1883-84; appointed special agent by the Presi¬ dent under the Severalty Act of February 1887 ; allotted the Winnebago tribe 1887-89 ; Nez Perces tribe 1889-92. She was originator of the scheme by which loans are made to Indians to build houses on their lands; was connected with the Anthropological Depart¬ ment of the Chicago Exposition 1893 and served on the International Jury, also on Inter¬ national Jury of the Saint Louis Exposition 1904; assistant in Ethnology, Peabody Museum 1882; holder of the Thaw Fellowship, Peabody Museum, Harvard University 1891 ; ex-presi¬ dent of the Anthropological Society of Wash¬ ington, D. C. ; ex-president of the American Folk Lore Society; Fellow of A. A. A. S., vice-president in 1896; officer of the Archaeol-

ogical Institute of America. She is author of numerous papers on anthropology; (Study of Omaha Music) (1893); (Thi Ha-ko) ; (The Omaha Tribe, } published by the United States Bureau American Ethnology; (Indian Story and Song from North America) (Boston 1900) ; (Indian Games and Dances with Native Songs) (Boston 1915).

FLETCHER, Andrew, of Saltoun, Scot¬ tish political writer and patriot : b. Saltoun, Haddingtonshire, 1655 ; d. London, September 1716. His tutor was Gilbert Burnet, afterward bishop of Salisbury, then minister of Saltoun. In 1681 he entered upon his public career. Having been prominent in opposition to the oppressive measures of Lauderdale and the Duke of York, he deemed it prudent to retire to Holland; and on his non-appearance to a summons from the lords in council he was outlawed. In 1683 he took part in the Rye House conspiracy. In 1685 he joined the en¬ terprise of the Duke of Monmouth, but in a quarrel about a horse, he shot dead the mayor of Lyme, fled to Spain, then made his way to Hungary and fought against the Turks. He subsequently joined the Scottish refugees in Holland, and when the revolution of 1688 took place returned to England with William of Orange, resumed possession of his estate and became a member of the convention for set¬ tling the new government in Scotland. He be¬ came interested in the ill-fated Darien Scheme. A republican in principle, and a patriot at once courageous and disinterested, he was the leader of the opposition to the union of the Parliaments of England and Scotland in 1707, favoring instead a federal union. He it was who introduced winnowing fanners and the pot-barley mill in Scotland. He will always be remembered for his saying (; and also, (Two Discourses Concerning the Affairs of Scotland. > His tracts and some of his speeches appeared in one volume, entitled (The Political Works of Andrew Fletcher, EsqP (1737). Consult Omond, (Fletcher of Saltoun > (1897).

FLETCHER, Banister Flight, English architect: b. 15 Feb. 1866. He was educated at University College, London, and at the Royal Academy. He won a number of pro¬ fessional prizes and studentships, including the Architectural Association Medal for Design in 1888. He was formerly lecturer and assistant professor at King's College, London, and ex¬ aminer to the City and Guilds of London In¬ stitute ; university extension lecturer on archi¬ tecture at London University. He also studied law and became barrister-at-law of the Inner Temple and partner in the firm of Banister Fletcher and Sons, architects for a number of country houses, schools, churches, banks, insti¬ tutes and city buildings. He has traveled ex¬ tensively on sketching expeditions

in Belgium, Holland, central and northern France, Ger¬ many, Italy, Sicily, Greece, Asia Minor, Con¬ stantinople, Crete, Egypt, North Africa, Pales¬ tine, Spain, the United States and Canada. He has published (A History of Architecture on the Comparative Method* (5th ed.) ; Andrea Palladio: His Life and Work) ; Architecture

and the Humanities) ; (The Influence of Ma¬ terial on Architecture) ; (The English Home* ; Architectural Hygiene,* and other textbooks.

FLETCHER, Benjamin, English colonial governor of New York. He was appointed by William and Mary in 1692, after serving dur¬ ing the war in the Low Countries, as well as in Ireland. When William Penn was for a time deprived of his proprietary rights Fletcher served as governor in Pennsylvania (1693-94). He was in 1698 forced to resign from his post in New York, and many charges were made against him. Consult Wilson, (Memorial His¬ tory of the City of New York* (1892).

FLETCHER, Duncan Upshaw, American legislator: b. Sumter County, Ga., 6 Jan. 1859. He was graduated at Vanderbilt University in 1880, was admitted to the bar in the follow¬ ing year and established his practice at Jack¬ sonville, Fla. In 1893 he became a member of the Florida House of Representatives, served as mayor of Jacksonville in 1893-95, and 1901- 03; was chairman of the Democratic State Committee in 1905-08, and United States sena¬ tor from 1909 to 1915. He was re-elected for the term 1915-21. He is a trustee of John B. Stetson University, Deland, Fla.

FLETCHER, Frank Friday, American naval officer : b. Oskaloosa, Iowa, 1855. In 1875 he was graduated at the United States Naval Academy, became captain in 1908 and rear-admiral in 1911. He was aide to the Secre¬ tary of the Navy in 1910, and in the following year commanded the fourth division of the Atlantic fleet, and later the third division. He commanded the naval forces which took Vera Cruz on 21 April 1914 and in June of the same year succeeded Rear-Admiral Badger as com¬ mander-in-chief of the North Atlantic fleet. He invented the breech mechanism and gun mounts known by his name.

FLETCHER, Giles, English poet: b. Wat¬ ford, Hertfordshire, about 1549; d. London, March 1611. He was Ambassador to Russia in 1588, but his description of that country, (Of the Russe Common Wealth,* appearing in 1591, was suppressed. It was reprinted for the Hakluyt Society 1856. He also wrote (Licia: Poems of Love) (1593).

FLETCHER, Giles, English poet: b. about 1588; d. 1623. He was a son of Giles Fletcher the elder, and wrote the poem, (Christ's Vic¬ tory * (1610). A new edition appeared in 1824.

FLETCHER, Horace, American sociologist and nutrition expert : b. Lawrence, Mass., 10 Aug. 1849; d. Copenhagen, 13 Jan. 1919. He received his education at Dartmouth College, then traveled extensively making special re¬ searches. He advocated certain theories con¬ cerning the mastication of food and thus gave rise to the well-known cult known as Fletcherism. He was consulting editor of the Christian Endeavor W o rid, the Ladies' Home Journal and Good Health Magazine. In Eng¬ land he was chosen vice-president of the Food Reform Society and also served as president of the American Health and Efficiency League. He was a Fellow of the American Associa¬ tion for the Advancement of Science. He has written ABC of Snap Shooting) ; (Menti- culture) ; (Happiness) ;

nomic Nutrition5; 'Nature's Food Filter, or What and When to Swallow5 ; 'Glutton or Epi¬ cureˆ 'Fletcherism, What It Is ,5 In recent years he was occupied as food economist of the Commission for Relief in Belgium and in travel and research work connected with nu¬ trition and child-conservation.

FLETCHER, John. See Beaumont, Francis, and Fletcher, John.

FLETCHER, John, or FLECHERE, de

la, English clergyman : b. Nyon, Switzerland, of Swiss parentage, 12 Sept. 1729; d. Madeley, England, 14 Aug. 1785. He was educated at Nyon and at the Academy of Geneva, now Gen¬ eva University, where he spent seven years. Later he studied at Lenzburg. He offered his services to Portugal when it was fighting Brazil and raised a company of his countrymen and received a captain's commission in the Portu¬ guese army. An accident prevented his going on shipboard with his company. The ship was never heard of again. When he recovered he returned to Switzerland. In 1749 or 1750 he visited London. The first 18 months he spent in the home of a school teacher named Mr. Burchall. In 1752 he became tutor to the two sons of Mr. Thomas Hill of Tern Hall in Shropshire. While on a journey to London he first met Methodists and soon after joined them, about the year 1756. In 1757 he was ordained deacon and priest by the bishop of Hereford. He

received the appointment of curate of Madeley which was only a nominal position. In 1760 he became vicar of Madeley and lived there the rest of his days excepting three years spent in Switzerland. He was a close friend of the Wesleys and often assisted them. He was designated by John Wesley as his successor. He was the chief writer of Methodism excepting John Wesley. His most important work was ‘Checks to Antinomian- ism) ; which has passed through many editions.

FLETCHER, John Gould, American writer: b. Little Rock, Ark., 3 Jan. 1886. He studied at Harvard, and spent several years in Europe, visiting Italy, France and England. He is best known as one of the exponents of the Imagist school of poets. His poems are in vers fibre, polyphonic and are of indifferent merit. They include ‘Irradiations- — Sand and Spray> (1915) ; ‘Goblins and Pagodas) (1916) ; ‘Japanese Prints> (Boston 1918). For. a par¬ tisan appreciation consult Lowell, Amy, ‘Tend¬ encies in Modern American Poetry5 (New York 1-917).

FLETCHER, Julia Constance, novelist and dramatist: b. Brazil, 1858. Her father was a missionary and she received her educa¬ tion in the United States and Europe. She took up her residence in Italy and under the pseudonym “George Fleming® published the novels ‘A Nile Novel5 (1877) ; ‘Mirage> (1878) ; ‘Head of Medusa) (1880) ; ‘Vestiga5 (1884) ; ‘Andromeda) (1885) ; and the plays ‘Mrs. Lessingham5 (1894) ; ‘A Man and His Wife) (1897) ; ‘The Canary1* (1899) ; ‘The Fantasticks) (1900) ; ‘The Light that Failed5 based on Kipling’s Story (1903); and ‘The Conquest5 from the French (1909). She col¬ laborated with Mrs. Frances Hodgon Burnett in ‘The First Gentleman in Europe5 (1897) ;

and is the aurhor of ‘For Plain Women Only: Dissertations on Feminine Interests5 (1896).

FLETCHER, Lazarus, English mineral¬ ogist : b. Salford, England, 3 March 1854. He was educated at Balliol College, Oxford, was appointed keeper of minerals in the British Museum in 1880 and director of the natural history department in the same institution in 1909. He has published ‘Introduction to the Study of Meteorites) (1881) ; ‘Introduction to the Study of Minerals) (1884) ; ‘The Optical Indicatrix5 (1892) ; ‘Introduction to the Study of Rocks5 (1895).

FLETCHER, Phineas, English poet : b. Cranbrook, Kent, April 1582; d. 1650. He was a son of Giles Fletcher the elder and a cousin of John Fletcher (q.v.). He was the author of ‘Siceides,5 a pastoral drama (1614) ; ‘The Purple Island and Piscatory Eclogues5 (1633). ‘The

Purple Island5 is an allegorical descrip¬ tion of man, the body being the island, the bones its foundation, and the veins the streams, and founded upon an allegory in the ninth canto of the second book of the ‘Faerie Queene.5 It is composed in the Spenserian manner, and is not without passages of strong fancy and beauty of description. In the first five cantos, however, the poet is buried under in the anatomist — a character but little adapted to the handling of poetry. When, however, he steps from the physical to the intellectual man, he not only attracts, but secures attention by a profusion of images, many of which are distin¬ guished by much boldness of conception and brilliancy of coloring. The ‘Piscatory Ec¬ logues5 have considerable sweetness of versifi¬ cation, and much descriptive elegance. Milton was indebted to both Phineas and his brother Giles for inspiring different passages of the ‘Paradise Lost5 and ‘Paradise Regained.5 Consult Grosart, A. B., ‘Fuller Worthies Li¬ brary5 (1868) ; and F. S. Boas’ edition in the ‘Cambridge English Classics5 (1908-09).

FLETCHER, William Isaac, American librarian: b. Burlington, Vt., 28 April 1844; d. 15 June 1917. From 1883 to 1911 he was libra¬ rian of Amherst College, where he also taught library economy in the summer school, 1891-1905. In 1891-92 he served as president of the Amer¬ ican Library Association. He was coeditor of Poole’s Index to Periodical Literature (1882- 1911) ; and is the author of ‘Public Libraries in America5 (1895) ; the ‘A. L. A. Index to General Literature5 (1893) ; and the ‘Co-oper¬ ative Index to Periodicals5 (1883-1911).

FLETCHERISM. This is a term invented to apply to the mastication of food to the point of complete pulpifaction as taught by Mr. Horace Fletcher (q.v.). He ascertained the fact that the average human being did not masticate his food as thoroughly as he should, and set about ascertaining what would happen if every mouthful were masticated until it had been completely dissolved and reduced to a creamy pulp. It was soon found that some * foods required several hundred motions of the jaw to be sufficiently reduced; others lost their taste and became noxious when submitted to this prolonged mouth-treatment ; in other cases, solid portions of the food — husks, etc., — came to the front of the mouth of their own accord; and could be swallowed only with difficulty. If

mastication be followed to the point required, it will be found, Mr. Fletcher concludes, that no voluntary movements of swallowing are re¬ quired; it ((swallows itself,® as it were by phys¬ iological action.

This, it is claimed, throws less work on the stomach and intestines, by reason of the fact that the food is more completely broken up be¬ fore being swallowed. Further, certain chem¬ ical changes take place in the mouth, which do not take place when mastication is less perfect. The body is thus nourished more fully on a less amount of food, and in consequence of this les¬ sened intake of food, the body is cleansed, and rids itself from a host of ills to which it has been heir. Consult Fletcher's works, (The New Glutton or Epicure, * and ABC of Our Nutrition.*

FLETT, John Smith, British geologist: b. Kirkwall, Orkney, 1869. He was educated at Kirkwall Burgh School, George Watson's Col¬ lege and the University of Edinburgh. He be¬ came assistant to Prof. James Geikie and lec¬ turer in petrology in Edinburgh University. He joined the British Geological Survey in 1900 becoming assistant to the director in charge of the survey of Scotland in 1911. He was sent by the Royal Society to the West Indies along with Dr. Tempest Anderson to report on the volcanic eruptions at the Soufriere in 1901. He published 'Report on West Indian Eruptions> (Royal Society 1902) ; and is joint author of many memoirs of the geological surveys of Land's End, Lizard, Bodmin and Saint Austell, Edinburgh, Ben Wyvis.

FLEUR-DE-LIS, fler-de-le, an heraldic em¬ blem probably derived from the iris-plant. As a decorative device it was common in ancient times in India and Egypt and is also found fre¬ quently on Etruscan bronzes. Some of the great families of France (most of whom are now extinct) bore the emblem on their shields from the very commencement of the practice of blazoning, and a large number of families in Germany, Sweden, Switzerland, and other parts of Europe have borne the fleurs-de-lis on their coats of arms from the 12th century. The great popularity of this emblem in France dates from the 13th century. The royal coat of arms of France consisted of three golden lilies on a blue ground, with the device, "Lilia neque nent neque laborant .** The shield of France was anciently, in heraldic language, seme de fleurs-de-lis , that is, bore this emblem scattered over the shield. It is commonly be¬ lieved that it was Charles V (1364-80) who reduced the number to three ; but this is dis¬ proved by the fact that two seals have been preserved, the one belonging to Philip the Fair (1285-1314), the other belonging to Philip of Valois (1328-50), both of which bear three fleurs-de-lis ; and the town library of Rouen contains a collection of charts relating to the celebrated abbey of

Savigny, to one of which, bearing the date 1212, a seal is attached, which is still in a state of perfect preservation, repre¬ senting three fleurs-de-lis exactly similar to those used on the shield of France. Hence it appears that the use of this emblem in a triple form is much more ancient than is usually thought. (See Heraldry). Consult Rothery, G. C., 'The fleur-de-lis and its Variations1* (in The Ancestor, No. II, p. 99, London 1902).

FLEURIEU, fler-ye, Charles Pierre Claret,

Comte de, French naval officer: b. Lyons 1738; d. 1810. In 1751 he joined the French navy. With Berthoud he invented the marine watch or chronometer and in 1768 commanded the Isis in an expedition to try out the invention. He became inspector-general of ports and navy yards in 1776, was Minister of the Navy in 1790-91 and became councillor of state under Napoleon in 1800. He was appointed senator in 1805, admiral the year following and gover¬ nor of the Tuileries in 1808. In signing the treaty ceding Louisiana to the United States he was Minister Plenipotentiary of France. His published works include 'Voyage fait par ordre du roi pour eprouver les horloges mari,nes> (2 vols., 1773) ; and 'Decouverte des Frangais en 1768 et 1769 dans le sud. est de la Nouvelle Guinee* (1790).

FLEURUS, fle-riis, a town in Belgiuim, province of Hainaut, on the left bank of the Sambre, seven miles northeast of Charleroi. It has manufactures of coarse woolens and flax, with some tanneries and salt-works, and a trade in agricultural produce. In the vicinity, on 29 Aug. 1622, the Spaniards under Gonzales de¬ feated the German Protestant army commanded by Ernst von Mansfield; 1 July 1690, the French under Luxembourg defeated the allied Dutch, Spanish and German forces ; and 26 June 1794, the French republican forces under Marshal Jourdan defeated the Austrians and their allies under the Prince of Saxe-Coburg, forcing thereby the evacuation of Flanders and thus saving France from the menace of inva¬ sion. The battle of Ligny also in which Napo¬ leon defeated the Prussians (16 June 1815) is sometimes known as the battle of Fleurus, Ligny being only about two miles from Fleu¬ rus. Pop. 6,600.

FLEURY, Andre Hercule de, an-dra ar-ciil de fle-re, a cardinal and prime minister of France under Louis XV : b. Lodeve, Langue¬ doc, France, in 1653; d. 29 Jan. 1743. Coming to court, he won general favor by his pleasing person and fine understanding; became bishop of Frejus; and, through the interest of Madame de Maintenon, was appointed instructor to Louis XV. In 1726 he was made cardinal, placed at the head of the ministry, and from his 73d to his 90th year

administered the affairs of his country with great success.

FLEURY, Claude, clod, French Church historian : b. Paris, France, 6 Dec. 1640 ; d. there, 14 July 1723. His learning and unaffected sim¬ plicity made him a notable figure at the court of Louis XIV, and later at that of Louis XV, whose confessor he became. An (Ecclesiastical History* in 20 volumes (1691-1720) forms his claim to enduring renown ; the work coming down to 1414, at which point a later writer has attempted, though not sympathetically, to round out the master's performance. 'A History of French Law* (1674) and a historical Cate¬ chism* (1679) are less important achievements.

FLEURY, Frangois Louis Teis-seidre,

Marquis de, French soldier: b. Samt-Hyppolite, Languedoc, 1749; d. 1794. In 1768-69 he served with the French army in Corsica and came to America in 1776 in order to aid the colonies in their struggle with England. In 1 777 he was made captain of engineers, took part in the

battle of Brandywine, where a horse was killed under him. With John Laurens he attempted to fire the Chew House at Germantown. In October 1777 he became brigade major to Pu¬ laski and was wounded at Fort Mifflin the fol¬ lowing month. He was made lieutenant-colonel soon after and took part in the battle of Mon¬ mouth. He also served in Rhode Island under General Sullivan and in 1779 became commander of a regiment of light cavalry. In July of that year he was voted a silver medal by the Con¬ gress for his gallantry at the engagement of Stony Point, being the first to enter the fort there and taking away the British standard with his own hands. After a short visit to France he was present at the capture of Yorktown. He later returned to France, entered the army there, served in Pondicherry and attained the rank of marechal de camp. Consult Balch, 'The French in America) (Philadelphia 1895).

FLEURY, Maurice de, French physician: b. Bordeaux 1860. He received his education • at the University of Bordeaux. He served on the medical staff of hospitals in Bordeaux and afterward in a similar capacity in the hospitals of Paris. He has published Contribution a l'etude de l'hysterie senile) (1890); 'Traite- ment rationnel de la neurasthenic 1 (1894) ;

'Pathogenie de I'epuisement nerveux) (1896) ; Untroduction a la

medecine de 1'esprit1 (1897) ; 'L'Ame du crimineP (1899) ; 'Le corps et lame de l'enfant1 (1899); (Manuel pour l'etude des maladies du sysleme nerveux> (1904); 'Nos enfants au College1 (1905) ; 'Breviaire de l'arthritique1 (1912).

FLEURY, in heraldry, objects adorned with fleurs-de-lis or parts of fleur-de-lis are said to be fleury. See Heraldry.

FLEURY-HUSSON, Jules. See Champ-

FLEURY.

FLEXIBILITY, in physics, the property which all bodies possess to a greater or less de¬ gree, and which is evinced in their disposition to yield or change their form without fracture when a force is applied. See Physics.

FLEXNER, Abraham, American educator: b. Louisville, Ky.', 13 Nov. 1866. He is brother of Simon Flexner (q.v.) ; was educated at John Hopkins (A.B. 1886), Harvard (A.M. 1906) and Berlin in 1906-07. He began teaching at the Louisville High School in 1886; was ex¬ pert to the Carnegie Foundation for the Ad¬ vancement of Teaching 1908-12, and in the latter year was appointed assistant secretary to the general education board. He is a Fellow of the American Association for the Advance¬ ment of Science and has published (The Ameri¬ can College 1 (1909) ; (Medical Education in the United States and Canada1 (1910) ; (Medical Education in Europe1 (1912) ; Prostitution in Europe1 (1913), also educational papers in periodicals.

FLEXNER, Simon, American pathologist: b. Louisville, Ky., 25 March 1863. He was graduated from the University of Louisville as M.D. in 1889. He then became a post-graduate student at Johns Hopkins University and sub¬ sequently pursued his pathological studies at the University of Strassburg. He was professor of pathology, Johns Hopkins University, 1891— 98; and of pathological anatomy 1898-99, and professor of pathology in the University of

Pennsylvania 1899-1904. He was also director of Ayer Chemical Laboratory, Pennsylvania Hospital, 1901-03 ; and pathologist of University Hospital and Philadelphia Hospital 1899-1903. His ability was further recognized by his being chosen in 1903 director of laboratories of the Rockefeller Institute for Medical Research in New York, established to promote the study of the origin of disease. Among his publica¬ tions are (The Pathology of Tox-Albumin In¬ toxication1 ; (Micro-organisms1 ; (The Bacillus Pyogenes Filiformis1 ; (The

Aetiology of Dysentery-* ; ‘•Terminal Infections1 ; Experi¬ mental Pancreatitis1 ; (The Nature of Snake Venoms1 ; ‘The Serum Treatment of Epidemic Meningitis1 ; numerous papers on epidemic poliomyelitis, including the nature of its microbic cause, mode of infection, means of prevention, etc., and many other papers and monographs relating to bacteriological and pathological subjects.

FLEXURE, in mechanics, is a species of strain in which a solid body is distorted so that certain of its original planes become converted into cylindrical or conical surfaces. The term is most commonly used in connection with beams, where it signifies the elastic yield of the beam under the influence of its load. When a beam is supported at both ends and loaded in the middle, it sags in such a manner that its originally straight longitudinal fibres become curved into approximately circular arcs. The radius of these arcs is very large, of course, in practical construction, where the beams are composed of steel or wood. In a beam that is supported and loaded as described above, the upper fibres of the beam are in compression, and the lower ones in tension. The compressive strains in the upper parts, and the tensile strains in the lower parts, decrease toward the middle of the beam, and somewhere about the middle there is a sur¬ face (called the “neutral surface,11 or “neutral axis11), on wfflich there is neither tension nor compression. The flexure of such a beam is measured by the depression of its centre under the influence of the load; this depression being directly proportional to the product of the load by the cube of the length of the beam between supports, and inversely proportional to the con¬ tinued product of the horizontal thickness of the beam, multiplied by the cube of its vertical depth, and again by the value of Young’s modu¬ lus for the material of which the beam is made. (See Elasticity; Strength of Materials). Consult also Rankine, ‘Useful Rules and Ta¬ bles.1

FLICK, Lawrence F., American patholo¬ gist : b. Carroll Township, Cambria County, Pa., 10 Aug. 1856. He was educated at the Bene¬ dictine College near Latrobe, Pa., and was graduated in medicine at Jefferson Medical Col¬ lege, Philadelphia, in 1879. He took up tuber¬ culosis as a specialty and early in his career began a movement for the prevention of this disease. In June 1888 he read a paper upon the contagiousness of phthisis before the Medical Society of the State of Pennsylvania, showing that houses which had been occupied by con¬ sumptives gave the disease to subsequent occu¬ pants, and that the malady was essentially a contact disease. He subsequently published many monographs upon this topic, and in 1890 started a movement for the establishment of

consumption hospitals which culminated in the founding of the Rush Hospital for diseases of the chest. In 1892 he founded the Pennsylvania Society for the Prevention of Tuberculosis, of which he was president for some years. In 1895 he helped to found the Free Hospital for Poor Consumptives and was elected its president. In 1903 he was entrusted with the establishment of the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis and was appointed its medical director. He has written Consumption a Curable and Prevent¬ able Disease) (1903) ; also numerous pamphlets and articles on tuberculosis and pulmonary dis¬ eases.

FLICKEL, Paul, German artist: b. Berlin, 8 April 1852 ; d. 1903. He studied three years in the Art School at Weimar, and in 1874 went to Diisseldorf and in a year began his career as a landscape painter. He traveled for the sake of studying art in Germany and Austria. In 1877 he continued his wandering in Italy and on the spot painted many pictures, such as (The View of Naples from Capo di Monte11 ; Carden at Monte Carlo) ; (Fountain of the Villa Borghese,* scenes in which he showed a skilful manage¬ ment of bright sunlight effect, and complete mastery in handling the luxuriant vegetation of the south. His pictures of mountain forest scenery in Austria attracted notice and his (Beech Forest,* which was based on studies made near Prerau, Moravia, gained for him the “Great Gold Medal® at the Berlin Exhibition of 1886. It is now in the National Gallery, Berlin. Among others may be noted (The Ilse Valley in the Harz* (1888) ; (Sylvan Solitude)

(1892).

FLICKER, one of the many local names of the North American golden-winged wood¬ pecker (Colaptes auratus). The name is de¬ rived from one of the bird’s characteristic calls. It is also well known as the yellow-hammer or pigeon-woodpecker. A description of the bird will be found under Woodpecker.

FLICKINGER, Daniel Kumler, American bishop of the denomination of United Brethren : b. Sevenmile, Ohio, 25 May 1824; d. 1911. In 1857-85 he was corresponding secretary of the United Brethren Missionary Society, in 1885 became foreign missionary bishop, and in that capacity made 12 journeys in Africa. His pub¬ lications, besides a volume of sermons, include ˆOff-Hand Sketches in Africa* (1877) ; (Ethio- pia) (1877) ; (The Church’s Marching Orders) (1879); (Our

Missionary Work) ; (Fifty-five Years of Ministerial Life) (1907).

FLIEDNER, fled'ner, Theodor, German Lutheran clergyman: b. Eppstein, Nassau, Ger¬ many, 21 Jan. 1800; d. Kaiserswerth, 4 Oct. 1864. He became pastor in Kaiserswerth 1822. He gradually amassed in this poor parish an en¬ dowment fund for a church, school and poor- house. In 1833 he founded an asvlum for re¬ leased female convicts, and in 1835 an infant school, at Diisseldorf, the earliest in Germany; a similar institution was organized by him at Kaiserswerth, the year following. In the same year he founded the Deaconesses' Association, which was his greatest and most notable work. Among his writings, which are principally de¬ votional and educational, may be mentioned **Das Buch der Martyrer.**

FLIES, two-winged insects of the order Diptera (q.v.), whose larvae are legless, soft and cruciform and are termed "maggots.® The group is world-wide in its distribution, and probably quite as numerous as either the beetles or the group of wasps, bees, ants, etc. It is now-known to contain about 40,000 species, most of which are incalculably numerous in individuals; so that "swarms® of flies is a proverbial ex¬ pression. Entomologists believe that 8 or 10 times 40,000 species really exist. The vast abun¬ dance is due to the plenitude of their food, and to their fecundity; and it is accompanied by a very high state of organization, so that certain families of flies are held by some students to stand at the head of the insect tribe in speciali ¬ zation of structure. Intellectually, however, they are far behind the Hymenoptera; and to this fact, to the small size and unattractive ap¬ pearance of most specimens (although great brilliance of color is to be found among some families), and to the comparatively uniform and uninteresting nature of their metamorphoses, are to be charged the relatively small amount of study that has been given to the group. The life-history of the ordinary flies is detailed be¬ low; but many peculiarities exist in other fam¬ ilies of the order. "With some,® says Howard, "no eggs are laid, and living larvae issue from the body of the female. Such flies then become practically viviparous or riarviparous.* With others, although these are few in number, the development within the body of the female goes even farther, and when the insect emerges from the body of its mother it is already in the pupal condition. Such forms are called (pupip- arous.* . . . Many species — comprising, in fact, whole families — are aquatic or subaquatic in their early stages, and some possess the faculty of living under what appear to be most disadvantageous conditions.® Some of the flies of the family Ephydrida (whose eggs or larvae are eaten by American Indians, — see Koo- chah-bee) live in the strongly alkaline lakes of the Far West

where little else can exist.

Flies are mainly day-flies, and fond of sun¬ shine, but some appear only at night or in the dusk; a section of the tribe does not fly at all, being wingless and parasitic. They live in the most diverse manner; some attack large ani¬ mals and suck their blood; some prey on smaller insects; some suck honey, and in search of it take part in the cross-fertilization of flowers (see Flowers and Insects) ; and many find their food in decaying animal and vegetable matter. A large number of dipterous larvae eat refuse or carrion, — whence arise serious evils to mankind, — others feed inside growing vege¬ tables ; and some maggots prey, or are parasitic upon, other animals.

A type of the group is found in the house¬ fly (Musca domestica) , which represents the great family Muscidce, in which most of the familiar flies about houses and stables are in¬ cluded, and its life-history represents that of its kind generally. Its eggs are laid preferably on horse-manure, but also on human or other ex¬ crement, decaying vegetables, etc., and hatch in six or eight hours, producing white maggots. These mature in four or five days, when their skins harden and turn brown, forming a pu- parium, or case, within which the true pupa forms, and five days later gives birth to a per-

HOUSE, STABLE AND GARDEN FLIES

1 Apple-worm Fly

2 Orange-belted Gadfly

3 Horn-fly

4 Common House-fly, with maggot and

5 Stable-fly

6 Forest-fly or Bird-tick

7 Meat-fly

puparium 8 American Flesh-fly

9 Green-bottle Flesh-fly

10 Egg of Pomace-fly

11 Dung-fly

12 Pomace-fly

fected fly. Thus a total life cycle requires in midsummer only about 10 days, and a dozen generations may thus be born in warm climates within a single season. As each fly deposits on the average 120 eggs, and as the maggots of 1,200 house-flies may be sustained by a pound of manure, the possible rapidity of their multi¬ plication is apparent. Most flies live but a few weeks, and toward the end of the season they die with great rapidity, becoming infested with reddish mites, which suck their juices, or with fatal fungous diseases. (See Fungi). In warm houses a few may survive a winter, but as a rule all adult flies die in the fall, and the species survives and recovers in the spring from the eggs or pupa left over winter in the manure- heap or other feeding-place. It is plain that at¬ tempts to mitigate the annoyance and danger resulting from many flies may best be directed toward the destruction of their eggs and young. That such destruction is desirable and the duty of society is plain when one considers the vast amount of injury these insects may do. Many sorts attack vegetables and fruit, for example the hessian-fly, which is perhaps the most de¬ structive insect in the United States, the apple- fly, the gall-flies, fruit-midges, potato-scab gnat and others. Others harm domestic animals, as the bot-flies, sheep-ticks, horn-flies, tsetse and all the horse-flies, bee-killing robber-flies and bee-flies, black-flies, mosquitoes and many more. This catalogue of harmfulness (to which can be opposed only the beneficial work done by the tachina-flies which cause the. death, by para¬ sitism, of other kinds of injurious insects) be¬ comes of small importance, however, beside the enormous evil flies do in spreading virulent diseases from man to man and place to place. Were this not so it might be true, as formerly alleged, that their services as scavengers, as parasites, and in the cross-fertilization of plants, balanced the damage caused by some, and left something to their credit.

Flies as Carriers of Disease. — Considera¬ tion of the habits of house-flies and their rela¬ tives will show how prone they are to feed upon excrementitious matter, and to be attracted to any decaying or purulent substance. When this is the product of wounds, sores or diseased bodies it is likely to contain the germs of dis¬ ease ; and these may be sucked into the blood or cling to the body of the insect. If, then, the fly alights upon a human being or a susceptible animal, and punctures the skin with its sucking proboscis (for ordinary flies do not <(bite,® properly speaking), it is likely to leave in the puncture

some of the germs it has fed upon, and so infect the person with the disease to which they give rise. Wounds may thus be inoculated with (

That this theoretical transmission of disease actually occurred has been demonstrated since the latter part of the 19th century by observa¬ tion and experiment. It was first ascertained of certain mosquitoes, whose responsibility for

much if not all of the malaria from which men suffer was shown. This may be found more fully treated under Mosquitoes, where the agency of these small ubiquitous flies in spread¬ ing other diseases is also shown. Dr. Joseph Leidy attributed the spread of gangrene in the hospitals at Washington during the Civil War to the flies; a few years later it was shown that gad-flies that had settled upon the dung of cattle afflicted with anthrax would communicate the disease to healthy kine. In 1888 an Italian in¬ vestigator showed that flies fed upon a bacillus culture would drop virulent bacilli in their ordure, capable of infecting new cultures; further experiments in India showed that flies fed with a culture of the bacilli of bubonic plague and of Asiatic cholera survived and con¬ veyed the plague to man. An English physician asserted that typhoid fever was spread by in¬ sects ; and this was abundantly proved during the prevalence of that disease in the military camps during the Spanish-American War of 1898. Flies which have access to the excreta of patients and afterward alight upon food so infect the food that whoever eats it is in danger of falling ill with the fever. Howard demon¬ strated that the common house-fly was the prin¬ cipal agent in this transmission. Subsequent investigations showed that the danger of the propagation by flies (and other household in¬ sects) was equally great in diphtheria and yel¬ low fever. In another series of cases, as among mosquitoes, the fly acts as intermediary host for disease germs which develop in its blood to the point where they are virulent when introduced into the circulation of man or beast. Such is the case with the African tsetse fly (q.v.), which transmits a greatly dreaded cattle-disease. The purulent ophthalmia, known as (

Dr. L. O. Howard, of the United States Department of Agriculture, has given special attention to this matter, and has found that no less than 77 species of flies frequent human excrement and are therefore liable to obtain and carry disease germs. As the innumerable in¬ sects themselves are beyond reach, the measures for protection must be preventive. Dr. Howard says that in order to avoid epidemics of typhoid fever it is necessary to abolish the box privy, prevalent in

rural and village districts, and sub¬ stitute earth-closets, where water-closets can¬ not be installed; to place stable manure in recep¬ tacles and treat it with chloride of lime to destroy the maggots, throwing a shovelful over each day's addition. Pantries, dining-rooms and kitchens should be carefully screened to keep out flies ; and especial pains taken in summer to keep flies out of sick-rooms. Detailed instruc¬ tions and the reasons for them are given by Howard in his pamphlet, (How Insects Affect Health in Rural Districts, } issued as Farmers' Bulletin 155, by the United States Department of Agriculture.

Classification.— The classification of the Diptera has proved difficult. An early division was based on the structure of the antennse : Nemocera — those having the antenna thread¬ like and with 6 to 36 joints; and Brachycera, those with the antenna three-jointed and bristle¬ like. A later and more widely accepted sub¬ division was based upon the way the pupa-case

splits on emergence of the fly; in the Orthora- pha, the pupae escape from the larval skin through a T-shaped orifice; in the Cyclorapha the pupae escape through a circular opening at the anterior end. American entomologists, fol¬ lowing the special investigations of D. W. Coquillet, now usually divide the order into two sub-orders based upon the character of the mouth-parts, and characterized as follows :

Sub-order Proboscidea. — Antennae con¬ spicuous, inserted at upper end of the face, sometimes many-jointed, proboscis usually fur¬ nished with terminal lips, body rather soft and brittle, legs approximated, wings usually present and frequently furnished with a discal cell; adults oviparous or larviparous, never in all their stages living externally on mammals, birds or honey-bees.

In this group are placed, in order, the fol¬ lowing important families: Tipulidee (crane- flies), Culicidce (mosquitoes), Cecidomyiidee (gall-gnats), Mycetophilidee (fungus-gnats), Simuliidce (black-flies), Leptidee (snipe-flies), Stratiomyiidce (soldier-flies), Tabanidee (horse¬ flies), Bombyliidee (bee-flies), Asilidee (robber- flies), Syrphidee (syrphus-flies), CE stride? (bot¬ flies), T achinidce (tachina-flies) , Sarcophagidee (flesh-flies), Muscid.ce (house-flies), Anthom- yiidee (fruit-flies), Trypetide? (fruit-flies), Ephydridc? (edible salt-water flies), and Os- cinidee (grass-stem flies) ; besides various less important ones.

Sub-order Eproboscidea. — Antennse usu¬ ally inconspicuous, commonly inserted near the middle of the sides of the face and composed of from one to three joints, the apex furnished with a style or bearing several long bristly hairs, proboscis never furnished with terminal lips, body integument tough and leathery, legs on one side of the body usually widely sepa¬ rated from those on the other side, wings, when present, never furnished with a discal cell ; adults pupiparous, living externally upon mam¬ mals, birds or honey-bees.

This second sub-order comprises only two families the parasitic bird-ticks (Hippobos – cidee) and the bat-ticks (N ycteribidiide?) , which owe their vernacular names to their- resem¬ blance to true ticks in appearance and habits.

Bibliography. — L. O. Howard's (Insect Book) (New York 1901) contains the most fully illustrated general account of the flies, and also a large list of books on the subject, especially those relating to systematic descrip¬ tion. S. W. Williston has an excellent illus¬ trated account in (The Standard Natural His- tory) (Vol. II). His (Manual of American Diptera) (New Haven 1896) ; Comstock's (Manual for the Study of Insects) (Ithaca, N. Y., 1895) ; Packard's (Half Hours with In-sects) and (Text-Book of Entomology) ; and Miall's (Natural History of Aquatic Insects* (London 1895) ; and Ross's (The Reduction of Domestic Flies* (Philadelphia 1913), may be consulted with profit.

FLIGHT. Flight, strictly speaking, js prog¬ ress through the air in any desired direction by any agent or object heavier than the air, as opposed to the floating of an object lighter than the air, such as a balloon. Animals accomplish flight mainly by means of wings, which may be special organs as in the insects, or modified fore legs, as in the case of bats and birds. The

wings of insects are always thin membranes supported by a stiffer framework. In bats they consist of extensible membranes stretched over the immensely elongated fingers and joined also to the sides of the body and the hind legs. The wings of birds are composed of long stiffened feathers attached to the rudimentary fingers and to the bones of the forearm; the individual feathers overlapping one another so as to form a continuous more or less arched surface. The tail feathers constitute another sail area which plays an important part in flight, while in many bats a continuation of the flight-membrane be¬ tween the hind legs has much the same func¬ tion.

Besides these special organs the structure of aerial creatures is modified in many other re¬ spects with a view to facilitating flight.

Thus the hollow bones of birds are lighter than the solid bones of terrestrial animals and relieve birds of much unnecessary weight; while the general shape of the bird's body and the smooth rounded contour of its feather covering are calculated to give the least possible resistance to the air during flight. Birds are also pro¬ vided with large distensible air sacs under the skin, the function of which has been a matter of much dispute, but which, as suggested by von Leudenfeld, may aid in shifting the centre of gravity of the body, a matter of the utmost importance to the bird in holding to its course or in turning in flight. The centre of gravity, we may note, is also kept well below the plane of the wings by the distribution of the heavy parts of the body on the pectoral side. So that as the bird flies the heavy breast muscles, which con¬ stitute the bulk of its weight, are well down while the wings are attached to the back of the thorax. Thus the body becomes essentially a weight hung directly below an outstretched sail area.

So much for the general structure of flying creatures. Turning now to the principles of flight we have as the main agencies (1) the mus¬ cular propulsion on the part of the bird; (2) the support offered to the <(sail area® by the air; (3) the force of the wind, both in raising and in propelling the bird. Mechanical and physi¬ cal problems are involved in the study of flight which it will be impossible to consider here, but one or two principles may be mentioned which are of fundamental importance, and the appli¬ cation of which may be seen in all forms of flight. We know that the resistance (that is, support) of the air to a flat surface is greatly increased when the surface is traveling rapidly through the air in its own plane, and it follows that when a bird is once on the wing the buoy¬ ancy of the air relative to it is greatly height-, ened; and having gained a certain momentum it will be possible for the bird to. sail some dis¬ tance without loss of altitude. Again when a flat surface is sailing diagonally through the air the maximum pressure (that is, support) of the air is not under the centre of the surface, but under the forward edge. It is on this prin¬ ciple that we find a tendency to force up the anterior edge of the wings 'of a sailing bird and in order to counteract it the bird is com¬ pelled to shift the centre of gravity of its body farther forward. To do this it may draw the wings back, spread the tail or perhaps extend the head and neck. On the same principle to turn the direction of flight it is merely neces-

sary to flex or raise one wing or one side of ‘the tail. Flight proper may be of two sorts, (1) by flapping the wings, and (2) by soaring. The former is the most familiar and is practised by all birds, while the latter is possible only for birds of large expanse of wing, such as vul¬ tures, eagles, gulls, etc.

In taking flight it is very important for the bird to ((get a start,® as we say; that is, to acquire some relative velocity, and to accom¬ plish this we often see birds which are about to fly run along the ground for a few steps or flap along the surface of the water, while starting head toward the wind with wings properly spread accomplishes the same result. Rising into still air by flapping is very laborious work, and som’e heavy-bodied birds, as the loons, for instance, are utterly unable to take flight when confined within a small area.

When once in the air and fairly started in flight the wing action is far less laborious than at the start and the upward stroke is often relative to the body only and not necessarily a muscular effort. When this stroke is active, the individual feathers, as instantaneous photographs show us, are more or less separated to reduce the resistance of the air on the recovery. Most birds mingle flapping and straight sailing in various ways and when once on the wing flight is mainly a matter of presenting their sail area to the air currents in such a way as to gain the greatest benefit from them.

Soaring is flight in circles with set wings and without any visible muscular action on the part of the bird. In spite of this the bird is able to mount higher and higher in the air, gaining impetus enough on the flight with the wind to carry it above its initial altitude when returning on the other half of the circle against the wind. Many theories have been advanced to explain the ˆsoaring bird,® some of them purely fan¬ tastic. This method of flight is possible only in the presence of currents of air; the unequal velocity of air at different altitudes doubtless having much to do with it. It has been ascer¬ tained that the flexibility of the tips of the wing feathers of a bird renders soaring pos¬ sible to it. Mr. Everett H. Bickley, after elab¬ orate experiments, claims to have solved the riddle. <(The flexibility of the wing feathers,® he says, ((act like the flap in a pump valve, which offers resistance to fluid motion in one direction and freedom in another.®

Aeronauts naturally look to birds for sug¬ gestions in artificial flight. They have paid particular attention to the poise and flight of the herring-gull in arriving at the principles of aerial navigation. The cutting edge of the monoplane from which the machine obtains its

lifting capacity corresponds with the cutting edge of a bird's wing, the edge in the case of the bird being composed of living muscle and bone. (

guides the bird to its destination. Huebner's investigations also demonstrated the fact that bird flight is not affected by temperature, snow or ice and that <(only a sudden blizzard from an unknown direction, or a fog, compels the bird to seek refuge on islands or the nearest mainland.® These facts have not been lost on aeronauts, and it is believed that the path of the storm will be found materially to assist in¬ stead of interfering with aerial flight. The methods of birds in attacking their prey have been copied by air-craft. Birds vary very much in wing power according to their method of flight ; the humming-bird and pigeon being abundantly supplied with wing muscles to main¬ tain their rapid strokes, while the frigate-bird, a notorious (

Our familiar small birds do not travel at anything like such a rate, but their endurance is very great, as we can realize in view of their migrations, which often reach from the north¬ ern United States to equatorial South America, while the small waders travel from one end of the hemisphere to the other. See Migration.

Flying creatures occur among mammals, rep¬ tiles and fishes. The extinct pterodactyls were evidently experts on the wing, and some of them constituted the largest flying animals of which we have any record. Of mammals the bats are the only true flyers, the flying squirrels and lemurs having merely parachute-like ex¬ pansions of skin on the sides of the body which when the legs are stretched out enable them to sail obliquely downward from the tree tops to the lower branches.

In the flying-fish (q.v.) there is an enormous development of the pectoral fins which simulate wings. Their flight, however, consists only of a short sail through the air on an impetus gained as they leap from the waves with the fins rig¬ idly extended. Consult Marey, E. J., (Vol des Oiseaux) (Paris 1890) ; Roy, Chas. S., article ((Flight® (in (Newton's Dictionary of Birds, y 1896) ; Langley, S. P., (The Greatest Flying Creature> (Smithsonian Report 1901) ; Head- ley, (The Flight of Birds) (London 1912) ;

. MacMechen and Dienstbach, (Bird Flight and Aerial Navigation > (in the Century, Vol. LXXX, pp. 297-307).

FLIGHTLESS BIRDS. Certain birds are quite unable to fly, or fly very

poorly, or use their wings only as paddles or balancers, or in extreme cases have lost not only the use of wings but the wings themselves have disap¬ peared. Examples of this degeneration will be found treated of in the articles upon Apteryx; Dodo; Garefowl; Moa; Ostrich; Penguin; Ratitˆe; Solitaire.

FLINCH, a card game said to have had its origin in Kalamazoo, Mich., and to have been

invented by a man named Flinch. The game is played with a pack of 150 cards, numbered con¬ secutively from 1 to 15, there being 10 cards of each numeral. All are of the same color; there are no hearts, diamonds, clubs or spades, and the court cards are, of course, also missing. The cards are shuffled and 10 cards are dealt to each player for his flinch pile, then 5 more to each to play with. Each player must place his flinch stack face up, with only the top card exposed. The other five cards are kept in hand, spread out like a fan to see the num¬ bers. The object of the game is to get rid of the flinch pile, and whoever first succeeds wins the game. To this end the flinch pile must be played from whenever possible. When this is not done, the opponent will call ˆflinch® and the player will have to draw a card from the opponent's flinch pile and place it on the bot¬ tom of his own. In case two or more of the opponents call <(flinch® at the same time, the negligent player must draw a card from the pack. The game may be played by any num¬ ber from two to eight. After shuffling, the en¬ tire pack is usually stacked up criss-cross into hands of five, to facilitate drawing new hands. The name is also applied to a somewhat similar game played with the ordinary pack of 52 cards.

FLINCK, Govaert, Dutch painter: b. Cleves, 25 Jan. 1615; d. Amsterdam, 2 Feb. 1660. At Amsterdam, where he took up his permanent residence, he became a pupil of Rembrandt, whose manner and technique he so closely imi¬ tated that he comes nearer to the master than any other of his pupils, with the exception of Eeckhout. He was much sought after as a portrait painter and has also left many religious pictures and a few genres, such as (Die Wach- stube,* which is equally Rembrandtesque in sub¬ ject, conception and treatment.

FLINDERS, Matthew, English navigator: b. Donington, Lincolnshire,

England, 10 March 1774; d. London, 19 July 1814. He did much toward mapping out the coastline of Australia. In his first voyage of discovery he sailed in 1795 from Port Jackson and skirting the south¬ east coast reached Van Diemen's Land, now Tasmania. In a subsequent voyage of discov¬ ery, on which he was dispatched by the British government with but poor equipment, he sailed along the south coast to Cape Leeuwin and the bay which now bears his name. He next ex¬ plored the east coast of Australia, from Port Stephens to Cape Palmentone, threaded the formidable Barrier Reefs and coasted the Gulf of Carpentaria. Then turning back he made for Europe by way of Sydney. He was ship¬ wrecked on this voyage and detained by the French in Isle de France for seven years. From the effects of this imprisonment he never recovered. On his arrival home he published (A History of Terra Australis. > The coast of South Australia was long called after him Flinders Land. His name is still attached to the southernmost county in Eyre Peninsula and to Flinders Island off that coast; to the Flin¬ ders Range in South Australia, rising near the head of Spencer Gulf and running north (high¬ est peaks, 3,100 feet) ; also to a town in Vic¬ toria, 61 miles southeast of Melbourne. Con¬ sult Life by Thynne (1896).

FLINDERS-PETRIE, William M. See

Petrie. William Matthew Flinders.

FLINDERSIA (named after Capt. Mat¬ thew Flinders), a genus of trees of the order Meliacece, allied to the mahogany, to which, however, it is generally inferior. The trees of this genus are tall, with a correspondingly great diameter, and furnish large quantities of valuable timber. F. australis, the Queensland ash, is used in Australia for staves, etc. ; F. oxleyana is a hard-wood tree, yielding excellent material for cabinet-work and also furnishing a yellow dye. The wood of F. greavesii is used in house-building, for which it is well adapted by its durability.

FLING, Fred Morrow, American historian: b. Portland, Me., 1860. He was graduated at Bowdoin College in 1883 and received the de¬ gree of D.Ph. at the University of Leipzig. Since 1891 he has been professor of European history in the University of Nebraska. He founded the Association of the Nebraska Teachers' of History in 1897 and is a member of the American Historical Association and of the Societe de la Revolution Frangaise. He was one of the 100 electors to the Hall of Fame. He published (Outline of Historical Method) (1898) ; (Studies in Greek Civiliza¬ tion (1898) ; (A Source Book of Greek His- tory) (1907) ; (History of France* (1907) ; 'Source Studies on the French

Revolution (1907) ; (The Youth of Mirabeau) (1908) ; ‘Source Problems on the French Revolution

(1913).

FLINT, Albert Stowell, American astrono¬ mer: b. Salem, Mass., 1853. He was gradu¬ ated at Harvard University in 1875 and re¬ ceived the degree of A.M. at the University of Cincinnati in 1880. In 1881-83 and again in 1888-89 he was computor of the United States Naval Observatory and in 1883-88 was assistant to the United States Transit of Venus Com¬ mission. From 1889 to 1904 he was assistant astronomer of the Washburn Observatory at the University of Wisconsin, and in the latter year was appointed astronomer. He is Fellow of the American Association for the Advance¬ ment of Science. He published (Meridian Observations for Stellar Parallax) (Vol. IX, Publications of Washburn Observatory, 1902).

FLINT, Austin, American physician: b. Petersham, Mass., 30 Oct. 1812; d. New York, 13 March 1886. He was graduated at the medi¬ cal department of Harvard College in 1833. After practising in Northampton, Mass., Bos¬ ton and Buffalo, where he established the Buffalo Medical Journal in 1846, he was one of the founders and for six years a professor of the Buffalo Medical College. He was a pro¬ fessor in Louisville University 1852-56; pro¬ fessor of pathology in the Long Island College Hospital in 1861-68 ; president of the New York Academy of Medicine in 1872-75, and of the American Medical Association in 1884. He was the author of numerous textbooks, clinical re¬ ports and medical papers. Consult his biog¬ raphy, by Carpenter (New York 1886).

FLINT, Austin, American physician, son of the preceding: b. Northampton, Mass., 28 March 1836; d. New York, 23 Sept. 1915. He was graduated from the Jefferson Medical College, Philadelphia 1857. For the two years following, he combined the duties of editor of the Buffalo Medical Journal, surgeon of Buffalo City Hos-

pital and professor of physiology and micro¬ scopical anatomy at the University of Buffalo. He then set up a practise in New York city, and occupied the chair of physiology at the New York Medical College. He filled a simi¬ lar position at the New Orleans Medical Col¬ lege (1860). After a year of study in Europe, he returned to the United

States and taught physiology and microscopic anatomy at Bellevue Hospital, resigning in 1898 to accept the pro¬ fessorship of physiology at Cornell University Medical College (New York city). Dr. Flint's researches in the function of the liver were significant. He demonstrated the separation of the cholestrin from the blood by the liver, and its final conversion into "stercorin," the factor determining the odor of the feces. In 1874 he was appointed surgeon-general of New York State. He wrote (The Physiology of Man' (1888) ; (Chemical Examinations of Urine in Diseases' (6 eds., 1870-84) ; 'Effects of Severe and Protracted Muscular Exercises) (1871) ; (Source of Muscular Power) (1878) ; text¬ book of Human Physiology) (1875) ; Experi¬ ments Regarding a New Function of the Liver' (1862) ; the Physiology of the Ner¬ vous System' (1872) ; 'Mechanism of Reflex Nervous Action in Normal Respiration (1874); the Treatment of Diabetes Mellitus' (1884) ;

(Chemical Examination of the Urine in Dis¬ ease' (1893) ; 'Stercorin and Cholesteraemia' (1897); 'Handbook of Physiology' (1905).

FLINT, Charles Ranlett, American mer¬ chant: b. Thomaston, Me., 1850. He was edu¬ cated at the Brooklyn Polytechnic Institute, where he was graduated in 1868. He became a partner in the firms of Gilchrist, Flint and Company, and W. R. Grace and Company, en¬ gaged in South American trade. He was ap¬ pointed consul of Chile at New York in 1879, retaining the position for two years, and later being appointed consul-general of Costa Rica and Nicaragua in the United States. In 1890 he was a delegate to the International Conference of American Republics. In 1895 he supplied a war fleet for Brazil and built torpedo boats and submarines for Russia. He established the Coast Clipper Line in 1896 and in 1898 nego¬ tiated abroad for the purchase of warships for the navy of the United States. He also organ¬ ized several corporations, including the com¬ pany controlling the street railway system of Syracuse.

FLINT, Joseph Marshall, American sur¬ geon : b. Chicago 1872. He was educated at Princeton and Chicago universities, being graduated from the latter in 1895. He was graduated in medicine at Johns Hopkins in 1900, went abroad and studied at the universi¬ ties of Leipzig, Vienna, Bonn and Munich. In 1897 he became assistant in anatomy and in 1900 associate at the University of Chicago. He went as assistant to the Johns Hopkins Medical Commission to the Philippines in 1901. From 1901 to 1907 he was professor of anatomy at the University of California, and in the lat¬ ter year became professor of surgery at Yale. He was editor of the American Journal of Anatomy from 1903 to 1907 and has been a frequent contributor to

medical journals on anatomy and surgery.

FLINT, Robert, Scottish theologian: b. Dumfriesshire 1838; d. 1910. He was edu¬

cated at the University of Glasgow, held pastorates at Aberdeen and Kilconquhar in 1859-64, and from 1864 to 1876 was professor of moral philosophy and political economy at Saint Andrews, removing in the latter year to Edinburgh as professor of theology. In 1880 he was Stone lecturer at Princeton and in 1887 Croall lecturer at Edinburgh. He wrote (Christ's Kingdom on Earth' (1865); Philos¬ ophy of History in Europe' (1874); 'Theism and Anti-Theistic Theories' (1877) ; 'Histori¬ cal Philosophy in France' (1894); 'Socialism' (1894); 'Sermons and Addresses' (1899); 'Agnosticism' (1903); 'Philosophy as Scientia Scientiarum' (1904) ; 'On Theologi¬ cal, Biblical and Other Subjects' (1905).

FLINT, Mich., city and county-seat of Genesee County, on the Flint River and on the Chicago and Grand Trunk and the Flint and Pere Marquette railroads, 64 miles northwest of Detroit. Flint has a courthouse, the State Institution for the Deaf and Dumb, a private retreat for the insane, a high school, water¬ works, gas and electric lights, public library, Federal buildings, courthouse, city hall, a national bank and several daily, weekly and monthly period-cals. The manufacture of auto¬ mobiles, buggies, aeroplane motors, carriages and varnishes is extensively carried on, and there are also minor manufactures of flour, iron products, electric-stoves, cigars, bricks and tiles. The United States Census of Manu¬ factures for 1914 showed within the city limits 93 industrial establishments of factory grade, employing 9,963 persons; 8,722 being wage earners receiving $7,235,000 annually in wages. The capital invested aggregated $27,-151,000, and the year's output was valued at $53,375,000; of this, $18,941,000 was the value added by manufacture. It is well known as a centre for the grain trade, large elevators accommodating this enterprise. Originally set¬ tled in 1820 under the name of Grand Traverse of Flint, the city received its charter in 1855. The waterworks are owned by the municipality. The city has about 40 miles of paved streets and there is a sanitary sewer system with an in¬ tercepting system to carry sanitary sewage to a disposal plant. There are a large park and boulevard drive system and a large, well- equipped amusement park and many theatres. Pop. (1920) 91,599.

FLINT, or FLINTSHIRE, North Wales, a maritime county having on the north the Irish Sea and on the east the river Dee and Cheshire, with the county of Denbigh on the west. Its area is 256 square miles, and it

is the smallest county in Wales. The low and sandy coast becomes fertile along the estuary of the Dee. Wheat and oats are the principal crops, and dairy products are manufactured. A range of hills running parallel to the Dee rises in the highest part to 825 feet. Carbonif¬ erous rocks underlie Flintshire, and the chief minerals are coal, iron, copper, lead, zinc and limestone. Mining is the principal industry, and there are some manufactures of cotton, pottery, chemicals, etc. The chief towns are Flint and Saint Asaph, Holywell. The county returns one member to Parliament. Pop. 92,700.

FLINT, Wales, a municipal borough and seaport, the capital of Flintshire, 13 miles south¬ west of Liverpool. It has a handsome parish

church in the Gothic style, erected in 1848. Near the town, on the shore of the estuary, stands the ancient castle of Flint, an object of some historical interest. It was completed by Edward I, was the prison of Richard II and was twice taken after siege by the Parliamen¬ tary forces in the Great Civil War. It has re¬ mained in ruins since 1667. Flint is on the Chester and H. Railroad. Pop. 5,472.

FLINT, a subvitreous variety of quartz, somewhat resembling chalcedony, but more opaque and commonly of a gray or smoky-brown color, darker in the interior than on the surface. It occurs abundantly in the United States and in various other parts of the world. In England and France it occurs chiefly in the chalk formations and a microscopic examina¬ tion of it often shows the remains of diatoms and other minute organisms, from whose sili- cious skeletons the silica of the flint was doubt¬ less largely derived. In other cases the flint was probably formed by the replacement of lime by silica held in solution by the ground water. The coloring matter of flint is chiefly carbonaceous matter, with some iron sesqui- oxide. Flint was used for many ages in the manufacture of stone implements, a use for which it is well adapted by its hardness and also from the fact that it breaks with a con- choidal fracture, leaving sharp cutting edges. Previous to the invention of matches, flints were greatly used for the production of fire, the flint being struck repeatedly against a piece of steel, from which it detached small parti¬ cles that were rendered red-hot by the friction. These were caused to fall into a mass of very dry and highly inflammable matter, known as ˆtinder,® which took fire from them as dry grass beside a railroad takes fire from the sparks of

passing locomotives. Before the in¬ vention of the percussion cap, flints were also used on musket locks, for igniting the powder.

FLINT-GLASS. See Glass, Varieties of.

FLINT IMPLEMENTS, tools, weapons, etc., made of silicious or flinty stones ; a term particularly denoting implements used by man before the use of metals. See Stone Age.

FLINT MILL, (1) In pottery, a mill in which burnt flints, having been previously stamped to reduce them below a certain size, are ground to powder for mixing with clay to form slip for porcelain. The flint-mill is a strong circular pan 10 to 12 feet in diameter, having a bottom of quartz or feldspar blocks and a runner or runners of hard silicious stone called chert, lime in any form being in¬ admissible, as it forms a flux for the other material which would vitrify in the seggars or become blistered by the escape of carbonic acid. (2) In mining, a mode formerly adopted for lighting mines, in which flints studded on the surface of a wheel were made to strike against a steel, the blows producing a quick succession of sparks, which lighted the miner at his work.

FLINT RIVER, one of the largest rivers in Georgia, rising near Atlanta and flowing 350 miles to the extreme southwestern ex¬ tremity of the State, where it unites with the Chattahoochie (q.v.) to form the Apalach¬ icola (q.v.). It drains an area of 8,000 square miles. See map of Georgia.

FLINTLOCK, the historical lock for fire¬ arms, in which the cock held a piece of flint and came glancing down upon the steel cap of the pan which contained the priming. See Firearms; Musket.

FLITTERMOUSE. See Bat.

FLOATING BATTERY, a vessel strength¬ ened so as to be shot-proof, or as nearly so as possible, and intended for operating in com¬ paratively smooth water, for defending harbors or attacking fortifications. Floating batteries were employed by the French to contest the passage of the Saint Lawrence by the British at the siege of Quebec in 1759 and after¬

ward by the British to clear the river. The most notable attempt to make use of floating batteries against maritime fortresses, till the time of the Crimean War, was during the

siege of Gibraltar in 1782, when batteries of this description, invented

by the Chevalier d'Arcon, were employed at first with con¬ siderable effect. On this occasion, how¬

ever, they turned out in the end a complete failure, being destroyed by the red-hot shot directed against them from the fort. After

this failure no more attention was paid to them until Napoleon III suggested the use of floating batteries, protected by iron plates, in attacking the Russian fortresses in the Black Sea and the Baltic. The suggestion was actually car¬ ried out and the floating batteries then con¬ structed proved very effective in 1855, during the operations against Sveaborg and Kinburn, as well as on subsequent occasions.

FLOATING BEACONS. See Buoy; Lighthouse.

FLOATING BRIDGE. See Bridge.

FLOATING DOCKS. See Harbors,

Docks and Breakwaters.

FLOATING FERN. See Ferns and Fern Allies, Filicales (4).

FLOATING GARDENS. See Floating Islands.

FLOATING HOUSES, abodes so con¬ structed as to be movable at will upon the sur¬ face of a river or other water. Floating houses form whole streets in Bangkok, being anchored in rows and capable of being moved from one position to another. From the depth of water, large vessels of from 200 to 300 tons burden can sail up to this picturesque town and pass along the houses of the inhabitants. These floating houses are made of bamboo stems, wicker-work and palms, with a veranda in front; and they are built on large rafts. See Bangkok.

FLOATING ISLANDS, islands formed either by the aggregation of driftwood in rivers and the deposition thereon of soil and vege¬ table matter, or by the detachment of portions of a river bank or lake shore. Tall trees are sometimes seen standing erect on such islands as they are carried down by the river current. Floating islands are sometimes seen 50 or 100 miles distant from the mouth of the large rivers of America, Asia and Africa. Portions of the alluvial soil from river-deltas, held together by the roots of mangroves and other trees, are sometimes detached by hurricanes or typhoons and then swept out to sea ; such islands have been met with in the Philippines, in the seas of

the East Indies and in the Pacific. A floating island is mentioned by Herodotus as existing in Egypt. In that country blocks of jungle growth composed in part of masses of papyrus, called sudd, obstruct the river, and have been known to stop entirely the navigation of the White Nile. They are so firmly compressed by the force of the current that men can walk over them. Some of these blocks or floating islands removed in 1902 were a mile long and 20 feet thick. Floating islands were known to Roman writers. Those on Lake Vandimona were, according to the younger Pliny, capable of supporting sheep. Loch Lomond in Scot¬ land long possessed a floating island, which has now, however, disappeared or become attached to one of the stationary islands of the loch. In Ireland large masses of peat float about some of the bogs. In England, in Lake Der- wentwater, there is an instance of an island •which appears and disappears from time to time in the same spot. Perhaps the most sat¬ isfactory of the many theories which have been proposed to account for this phenomenon is that which attributes its rising from the bot¬ tom of the lake, where it ordinarily rests, to the permeation of its mass by marsh-gas during hot weather, the upward motion being assisted by the growth of bouyant water-plants on its surface. Between 1696 and 1829, similar islands were observed at irregular intervals, generally, however, after great droughts • and violent storms, in Lake Ralang in the Swedish province of Smaland. Oceanic floating islands some¬ times perform important service in the trans¬ portation of vegetable seeds from place to place, also in the distribution of animal species, by carrying insects, land mollusca and small mam¬ malia, more rarely reptiles. Darwin met with islands floating on Lake Tagua-Cagua in Chile which passed from side to side of the lake and carried cattle and horses as passengers. In northern India and on the borders of Tibet, and in Persia, floating gardens are often erected by the natives for the purpose of raising melons, cucumbers and other similar vegetables and plants, which require a very aqueous soil for their cultivation. These gardens, however, are of a very fragile nature, and rarely exceed a foot in depth of soil, their prime structure being composed of wicker-work, interlaced with reeds and wattles and covered with mat¬ ting, over which the earth is placed. In the Vale of Cashmere the lakes contain floating gardens devoted to the same purpose, but these are in reality portions of the marshy ground made to float artificially by cutting through the roots of the reeds and other plants about two feet below the surface. The Chinese, too, de¬ vote considerable attention to this style of hor¬ ticulture, but more by way of ornamentation. Floating gardens, or chinampas, also existed in Mexico before the Spanish

conquest. Clavi- gero describes them as formed of wicker-work, the stems of water-plants, and mud, the largest sometimes having on them a tree or a hut. Both flowers and vegetables were grown on them.

FLOAT-STONE, a variety of opal, or hydrated silica, occurring in concretionary masses of such a porous texture that they float on water. They are of a gray or white color, break with uneven fracture and sometimes have a hard nucleus of flinty appearance,

FLOATS. (1) In angling, the quill or cork from which the bait line is suspended, and whose motion indicates the bite of a fish. (2) An inflated bag or pillow to sustain a person in the water. (3) The small piece of ivory on the surface of the mercury in the basin of a barom¬ eter. (4) The hollow, metallic ball of a self¬ acting faucet, which floats on the water in the cistern or boiler. (5) A raft, or collection of timber fastened together for conveyance down a river. (6) In hydraulic engineering, one of the boards or paddles attached to the radial arms of a paddle wheel or water wheel. (7) In machinery, a single-cut file, or one in which the teeth are parallel and unbroken by a second row of crossing teeth. The usual horizontal obliquity of the teeth relatively to the central line of files is 55 degrees, but single-cut files are much less inclined, and the teeth of floats arc sometimes square across the face of the file. (8) In plastering, a plasterer's trowel used in spreading or floating the plaster on to a wall or other surface. The long-float is of such a length as to require two men to use it. The hand-float is that in ordinary use. The quick- float is used in finishing moldings. An angle-float is shaped to fit the angle formed by the walls of a room. (9) In masonry, a polishing- block used in marble working; a runner. (10) In shoe making the serrated plate used by shoe¬ makers for rasping off the ends of the pegs inside the boot or shoe. (11) In tempering, a contrivance for affording a copious stream of water to the heated steel surface of an object of large bulk, such as an anvil or die in the process of tempering. The rapid production of steam prevents the constant contact of cold water when the object is merely dipped, as a body of steam intervenes. The dashing stream of water constantly exposes a new body of . water to the hot surface and makes the harden¬ ing more complete. (12) Theatrical: A stage name for the footlights, derived from the use of a row of oil-pans, with floating wicks, along the stage front, previous to the invention of gas. (13) A trench for navigation. (14) A notice of intention to occupy lands in tracts of the United States newly opened for settle¬ ment.

FLODDEN, hamlet in Northumberland, England, about five miles southeast of Cold¬ stream, near which was fought the celebrated battle in which James IV of Scotland was de¬ feated by the Earl of

Surrey (9 Sept. 1513). An unhewn pillar of granite now marks the spot where the Scottish king was slain. See Scotland.

FLODOARD, flo'do-ar, French ecclesiastic chronicler: b. Epernay, 894; d. 966. Fie re¬ ceived his education at Rheims and was made canon of the cathedral there. He was twice deprived of his benefices by the Comte de Vermandois, because of his opposition to the latter's infant son to appointment as arch¬ bishop. In 952 he entered a monastery, where he devoted himself to literary work. His (Historia Remensis Ecclesiae) is his most im¬ portant work. He built it up from original texts which he reproduced in full. From 919 to 966 he wrote year by year the ˆnnales,* which are of great historical importance by reason of the author's probity. His poetical works are also of great interest historically. For the

de textes5 (Vol. XXXIX, Paris 1905). Con¬ sult Molinier, (Les sources de l'histoire de France5 (Vols. I, V, Paris 1902; 1904).

FLOE-RAT. See Seals.

FLOGGING, the infliction of stripes or blows with a whip, lash or scourge, especially as a judicial punishment. In Britain it long existed as a punishment in the army and navy; but it was totally abolished in the former in 1881, and in the latter it is practically extinct. It was made a punishment for certain violent crimes, such as garrotting, in 1863; and for juvenile offenders in 1847 and 1850. In these cases, however, the number of stripes is lim¬ ited by law, 50 being the maximum in some instances, 25 in others and so on. A judge in sentencing a prisoner to flogging must specify the instrument and the number of stripes. In the case of juveniles under 14 years of age the instrument must be a birch rod, and the num¬ ber of stripes must not exceed 12. As a pun¬ ishment for school children it has been abol¬ ished in most civilized countries, although many people still believe in its efficacy. In many parts of the United States it is illegal to use it in schools. In English schools, especially in some of the old public schools, it still sur¬ vives. The punishment of the knout in Russia and of the bastinado in the East are severe forms of punishment. In the United States flogging was discontinued in the navy and on merchant vessels in 1850. In the army, it was abolished 1861. As a means of prison disci¬ pline, it has been used till verv recently, but has no longer any official standing. For the subject of its use as a legal

punishment for certain offenses, see Corporal Punishment; Whipping Post. Consult Napier, Sir C. J., (Remarks on Military Law and the Punishment of Flogging) (London 1837) ; Salt, H. S., (The Flogging Craze, etc.5 (London 1916).

FLOOD, Henry, Irish orator and poli¬ tician: b. near' Kilkenny 1732; d. Farmley, County Kilkenny, Ireland 2 Dec. 1791. He was educated at Trinity College, Dublin, and Christ Church, Oxford, entered the Irish Par¬ liament in 1759 and soon became the most prominent and eloquent member of the popular opposition. He was privy councillor for Great Britain as well as for Ireland 1775-81 and vice¬ treasurer for Ireland 1775-81. In 1783 he had a personal dispute in the house with Grattan, when a remarkable display of the power of invective was made on both sides. In the same year he became a member of the British Par¬ liament for Winchester and later for Seaford. By his will he left part of his considerable property to Trinity College, Dublin, for the establishment of a chair of Gaelic and the pur¬ chase of Gaelic books. The will, however, was contested and the gift was declared void. Two of his speeches were published in book form (Dublin 1787 ; London 1790). Others are to be found in (The Parliamentary Register, etc., of the House of Commons of Ireland, etc.5 (3 vols., Dublin 1784) ; and in Caldwell, J.

(Debates Relative to the Affairs of Ireland, etc.5 (2 vols., London 1766). Consult Bowers, C. G., (The Irish Orators, etc.5 (Indianapolis 1916) ; Flood, W., (Memoirs of the Life and Correspondence of Henry Flood5 (Dublin 1838) ; Froude, J. A., (The English in Ireland5 (2 vols., London 1903) ; Grattan, H., Mem¬

oirs of the Life and Times of Henry Grat¬ tan5 (5 vols., London 1839-46) ; Hardy, F., (Memoirs of the Earl of Charlemont5 (Lon¬ don 1812) ; Hunt, W., ed., (The Irish Parlia¬ ment, 1775 5 (London 1907) ; Lecky, W. E. H., history of England in the 18th Century5 (8 vols., London 1878-90) ; id., (Leaders of Public Opinion in Ireland5 (2 vols., New York 1873); MacNeill, J. G. S.,

1820).

FLOOD PLAIN, the plain formed by a river in broadening its valley. The first work done by a river is to cut a trench-like valley; this having been cut so deeply that the slope of the river-bed toward the sea so slackens the current of the river that it cannot carry its load of detritus, this detritus is partly dropped. Then the upbuilding of the river channel causes the river current to swing from side to side. In this way first one side, then the other of the valley is attacked by the

river. In time of flood the plain of waste thus accumulated may be entirely covered by the swollen river. The flood plain of the Mississippi west of Tennessee is 50 miles wide. See Rivers; Val¬ leys; Geology.

FLOODS. See Hydraulic Engineering.

FLOODS AND INUNDATIONS are

caused by excessive rains, giving rise to an overflow of the rivers ; by the bursting of the banks of rivers, lakes and reservoirs ; by the sudden melting of ice and snow ; and by ir¬ ruptions of the sea, produced by high tides, wind-storms driving the sea-water inland, earthquakes, volcanic outbreaks and the burst¬ ing of sea banks. The felling of forest trees throughout extensive tracts of mountainous country also tends to make the rivers which have their origin there swell rapidly after a heavy rainfall ; good and complete drainage of land has the same tendency. (For the Noachian flood, see Deluge). The subjoined list embraces some of the most disastrous floods and inundations of which we have record.

684. a.d. Japan; 780 sq. m. of Isle of Shikoku covered by sea.

968. Persian Gulf; many cities destroyed and new islands formed by irruption of sea.

1014. Many English seaports destroyed by sea.

1098 or 1100. East of Kent inundated; Goodwin Sands formed.

1100 or 1108. Flanders inundated.

1161 or 1165. Sicily; irruption of sea; thousands drowned. 1170. Holland and Friesland; great flood.

1173. Holland; Zuyder Zee much enlarged.

1219. Nordland, Norway; lake burst; 36,000 people perished. 1228. Friesland; invasion of sea; 100,000 people drowned. 1277. Friesland; the Dollart formed.

1286-87. Holland on both sides of Zuyder Zee inundated in consequence of a storm.

1396. Holland; islands of Texel, Vlieland and Wieringen separated from mainland, and Marsdiep, the channel between Texel and North

Holland, formed.

1421 or 1446. Holland; 72 villages inundated, of which 20 permanently, about 100,000 persons drowned, Biebosch formed east of Dordrecht, and this town separated from mainland.

1521. Holland; 100,000 lives lost by an inundation.

MANUFACTURE OF OIL-CLOTH

SS

■

b

1 Fire Wall and Railroads

2 Sizng Machine

3 Calender End of the Sizing Machine

4 Painting Machine and Drying Racks

5 Rubbing Machine

6 Printing Machine Running Nine Colors

7 Hand Printing a Mosaic Pattern

8 Varnishing the Printed Oil-Cloth

1570. Holland; storm drove in the sea, destroying numerous villages and 20,000 people in Friesland.

1617. Catalonia, Spain; 15,000 perished in floods.

1629. Mexico (city) inundated.

1642. China, at Kaifong; 300,000 drowned.

1646. Holland and Friesland inundated; loss of life, 110,000. 1726. Floods and inundations all over Europe.

1745. Peru; Callao destroyed by irruption of sea caused by earthquakes.

1767. England; irruption of sea on east coast.

1782. Formosa; west side of island submerged, and Taiwan destroyed.

1787—88. India, in Northwestern Provinces and Punjab; 15,000 lives lost by floods.

1791. Cuba; floods from excessive rain; 3,000 drowned.

1811. Hungary; 24 villages swept away by overflow of Danube.

1813. Austria, Hungary, Poland and Prussian Silesia; floods caused by rains; 4,000 perished in Poland, 6,000 in Silesia.

1824. Saint Petersburg and Cronstadt; 10,000 lives lost from

overflow of Neva.

1825. Denmark; sea broke through from North Sea to

Limfjord making northern Jutland an island; one- third of Friesland submerged.

1840. France; overflow of Saone and Rhone swept away many villages and inundated Lyons, Avignon, Nimes, Marseilles, etc.

1851. Northern China; Yellow River burst its banks, and

made a new outlet into Gulf of Pechili.

1852. Floods throughout Europe from Belgium to Switzer¬

land.

1856. South of France; floods did damage to extent of

$28,000,000.

1868. Peru; Arica and Iquique nearly destroyed by earth¬ quake

waves.

1874. United States; Mill River Valley (Mass.) inundated

by bursting of a dam; 144 drowned. Also floods in western Pennsylvania; 220 drowned.

1875. Disastrous floods throughout central Europe, in

United States, Burma, India and West Indies.

1876. China; floods in northern provinces; in Bengal 200,000

persons perished from inundation of a tidal wave. 1883. Java and Sumatra; parts submerged by volcanic wave. (See Krakatoa).

1887. China; the Hoang-ho in Ho-nan; millions of lives lost. 1889. Johnstown, Pa.j reservoir burst; 2,209 lives lost.

1891. Consuegra, Spain; 1,200 lives lost.

1893. Queensland; great destruction of property.

1896. Japan; 27,000 lives lost.

1900. Galveston, Tex.; 6,000 lives lost and 3,000 buildings destroyed.

1903. Kansas City, Mo., and Mississippi River towns;

millions of dollars in property destroyed.

1903. Heppner, Ore.; cloudburst; 300 lives lost.

1910. Paris, France; rising of Seine; loss of property $200,- 000,000; loss of lives unknown.

1910. Anram; 1,000 lives lost.

1911. Owari Bay, Japan; inundation; 100 lives lost.

1911. Philippine Islands; tidal wave; 850 lives lost.

1911. Japan; typhoon; 500 lives lost.

1911. China; Hoang-ho River; 5,000 lives lost.

1911. China; Yang-tse Kiang River formed lake 80 miles long, 35 miles wide; 100,000 lives lost, 3,750,000 persons homeless.

1911. Formosa; typhoon; 500 lives lost.

1911. Austin, Pa.; town destroyed; 100 lives lost.

1911. Holland; coast inundated; 240 lives lost.

1912. Omsk, Asiatic Russia; 168 lives lost.

1912. Bolivar County, Miss.; 200 lives lost; property loss,

$45,000,000.

1912. Guanajuato, Mexico; 300 lives lost.

1912. Japan; typhoon; 400 lives lost.

1912. Nago, Japan; 282 lives lost.

1912. China; coast inundation; 700 lives lost.

1912. Philippine Islands; 500 lives lost.

1912. Central America; 1,000 lives lost.

1913. Arabia; 350 lives lost.

1913. Ohio and Indiana; 730 lives lost; 60,000 buildings flooded; property loss, $180,873,000.

1913. Kathiawar, India; 800 lives lost.

1913. Bengal; 500 lives lost.

1913. Japan; typhoon; 1,000 lives lost.

1913. Constantinople; cloudburst; 260 lives lost.

1913. Texas; 500 lives lost.

1914. China; West River Valley; 3,300 lives lost; 3,000,000

homeless; $43,000,000 property loss.

1915. China; West River country; 80,000 lives lost.

1915. Galveston, Tex.; inundation; 300 lives lost, property loss, $5,000,000.

FLOOR. (1) In architecture and building, the lower surface of the different levels of a structure ; the material on which one stands and walks and that bears the furniture. By extension the entire story, as a first-floor apart¬ ment. The most common material for floor¬

ing is wood, made in matched boards, which are forced together and nailed to the joists or beams. A high type of wood floor is made double, with the first thickness of boards often at an angle with the walls and the surface boards, carefully cut and fitted to a pattern, blind-nailed to the sub-surface. Very ornamental woods are sometimes employed and artistic patterns followed. Since concrete con¬ struction came in, the tendency to all-fireproof construction has led to making floors of con¬ crete, and for ornament a pattern of tiles is often set in a bed of cement or asphalt. In less costly construction, a semi-fireproof con¬ dition is obtained by placing asphalt or asbestos paper between layers of boards. Modern steel and concrete buildings are now commonly made with floor beams of steel or reinforced con¬ crete, with flattish arches of masonry between, which may be smoothed over on top so as to make a concrete or cement floor. In factory buildings, by a recent refinement of fireproof method, the floors are sometimes slightly sloped and guttered, so as to carry off water like a ship's deck. When water is turned on to quench a fire it runs off to conduits ar¬ ranged so that there is no flooding of the floors below. (2) In geology and archceology, the part of a cavern corresponding in situation to the floor of a house. Here frequently there is now cave earth, covered, and therefore her¬ metically sealed for the purpose of the investi¬ gator, by stalagmite, which has been formed by droppings, from the stalactites hanging from the roof. (3) As a nautical term, the bottom part of the hold on each side of the keelson ; the flat portion of a vessel's hold. (4) In hydraulic engineering, the inner piece of the two which together form the bucket of an overshot water wheel. (5) In mining, the bot¬ tom of a coal seam ; the underlay on which the coal, lead or iron ore rests.

FLOOR-CLOTH, or OIL-CLOTH. A

stout canvas cloth, heavily painted, for use as a floor covering. ' The basis of floor-cloth is a strong, open canvas, woven of flax, with a slight admixture of hemp. Owing to its great width, sometimes six to eight yards, it has to be woven in special looms. It is made in lengths of 100 or more yards. A length of 60 to 100 feet is stretched in a frame, brushed with glue-size and rubbed with pumice stones. It then receives two or three foundation coats of paint on each side. A thick paint is used commonly made of linseed oil and ochre and laid on with a trowel. Each coat on the front is smoothed with pumice-stone.

When this operation is completed the cloth is transferred to the printing-room, where the pattern is printed by blocks, as in calico-printing. There is a block for each color. See Linoleum.

FLOQUET, flo-ka, Charles Thomas,

French statesman; b. Saint Jean de Luz, 5 Oct. 1828; d. Paris, 18 Jan. 1896. He began life as a lawyer in Paris, where he defended the Re¬ publican journalists. On the fall of the empire he was appointed one of the deputy mayors of Paris, but was forced to resign on account of his complaisance toward the Red Republicans. Later he was elected to the Paris municipal council and in 1876 became one of the deputies for Paris. He sat in the Chamber till 1882, when he was appointed prefect of the Seine ;

re-entered the Chamber in 1882 and was elected its president in 1885, but resigned in April 1888 to become Prime Minister. In 1889 he was again elected president of the Chamber. He aspired to the presidency of the republic for which office he was the Radical candidate in 1887 ; but his career was cut short by the Panama Canal scan¬ dal and he lost his seat in the elections of 1893, but was elected to the Senate in 1894.

FLOQUET, Pierre Amable, pe-ar a-mabl, French historian: b. Rouen, France, 9 July 1797 ; d. Formentin, 6 Aug. 1881. He made Normandy's annals and personages the objects of his painstaking study in (Norman Anec- dotes) ; (History of the Parliament of Nor-mandy) (1840-43) ; and (Studies in the Life of BossueC (1885), the last two of which were crowned by the Academy.

FLOR, Roger di, military adventurer: b. Brindisi, about 1262; d. 4 April 1306. At the age of eight he went to sea in a galley belong¬ ing to the Templars. Later he entered the order and became commander of a galley. In Palestine he was accused of robbery in 1291, was denounced by the Pope and escaped to Genoa, where he entered on a career of piracy. He entered the service of Frederick, King of Sicily, by whom he was made vice-admiral. In 1303 he induced Frederick's mercenaries to fight against the Turks who at that time were ravaging the Eastern Empire. Roger's serv¬ ices were accepted by the Emperor, he was adopted into the imperial household and ap¬ pointed commander of the army and fleet. He entered Asia Minor and warred

with consider¬ able success against the Turks. In 1304 he rescued Philadelphia from the Turks. He plun¬ dered the Greeks and his forces were depleted by the latter. Roger intrigued against the Em¬ peror, but the young Emperor, Michael Palaeo- logus, unable to oppose him openly with success, invited him to Adrianople, where he contrived his assassination. His death was avenged in a fierce war with the Greeks. Consult Pears, destruction of the Greek Empire) (London

1903).

FLORA, Ill., city in Clay County, 95 miles east of Saint Louis, on the Baltimore and Ohio Railroad. It is the seat of Orchard City Col¬ lege and contains a Carnegie library, butter and ice cream factories, a canning establishment, dehydrating plant and a railroad roundhouse and repair shops. The city owns the water¬ works and electric-lighting plant Pop. 3,558.

FLORA, the Roman goddess of flowers and spring, whose worship was established at Rome in the earliest times. She is represented as a beautiful female, with a wreath of flowers on her head or in her left hand; in her right hand she generally holds a cornucopia. Her temple at Rome was situated near the Circus Maximus, and her festival, the Floralia, was celebrated from 28 April to 1 May. The later Romans identified Flora with the Greek god¬ dess Chloris.

FLORA, the plant-life collectively of any given space. Thus botanists speak of the flora of meadows in distinction from that of forests, of a desert, of the seacoast, etc. ; also locally of a state, county or other specified district. Paleontologists use the term with reference to geological periods, as the flora of the carbon¬

iferous period, or of the Florissant beds. The word in short is the botanical equivalent of the zoological term fauna (q.v.).

FLOREAL, flo-ra-al (((month of flowersˆ), the eighth month in the calendar of the first French republic (1794). It began 20 April and ended 20 May. See Calendar.

FLORENCE, William Jermyn (stage name of Bernard Conlin), American come¬ dian: b. Albany, N. Y., 1831; d. Philadelphia, Pa., 1891. He began his career as an actor at Brougham's Lyceum, New York, in 1850, and soon became a great favorite with the public, especially in such characters as (Bob Brierly) ; (Sir Lucius O'TriggerC which latter he played to Joseph Jefferson's (Bob Acres) with great success in a series of joint performances dur¬ ing the last two years of

his life. He was the author of several Yankee and Irish plays.

FLORENCE, Ala., city and county-seat of Lauderdale County, on the Tennessee River and on the Southern and the Louisville and Nash¬ ville railroads. Here are located Florence Syn¬ odical Female College, the State Normal Col¬ lege, Mars Hill Academy, Florence Institute, Paxton High School and a Congregational school. There is a beautiful park of 250 acres. During the Civil War a military road was built by Jackson from New Orleans to Nashville, which passes through Florence. Important in¬ dustries are the manufacture of wagons, stoves, boilers and cotton goods. With the proposed development of the great water power sup¬ plied by Muscle Shoals, Florence anticipates great increase in manufactures. The Muscle Shoals Canal terminates here, and affords an outlet for trade. Settled in 1819, it was char¬ tered in 1889, and in 1914 voted to be governed on the commission plan. Pop. (1920) 10,529.

FLORENCE, Colo., city in Fremont County, 30 miles northwest of Pueblo, on the Atchison, Topeka and Santa Fe, the Denver and Rio Grande and other railroads and on the Arkansas River. It is popular as a summer re¬ sort and has important coal-mining and petro¬ leum industries. The waterworks are the property of the municipality. Pop. 2,712.

FLORENCE (Italian, Firenze), Italy, province in the region of Tuscany; area, 2,261 English square miles. The surface is beau¬ tifully diversified by mountains, valleys and plains. The climate is generally mild and healthy, and the soil very fertile, producing wheat, maize, beans and all kinds of legumi¬ nous crops. The vine, olive, orange, citron and fig thrive well in the low grounds ; while the mountainous districts afford excellent pas¬ ture, admirably adapted for the rearing of sheep. The minerals include mines of copper, lead and mercury; and quarries of marble, ala¬ baster and fine building stone. Pop. 1,028,740.

FLORENCE (Italian, Firenze ; Latin, flos, a flower, and florere, to bloom, etc.), Italy, metropolis of Tuscany, capital of the province also called Florence. It is exceeded in number of inhabitants by six of the other Italian cities; in distinction and interest, however, it is sur¬ passed by Rome alone.

Situation and Climate. — Florence is built on both banks of the Arno at a point (lat. 43° 46′ N. and long. 11° 15′ E.) which is properly

characterized as the true centre of Italy in the sense that it is the point of intersection of the two great routes, from Rome to Milan and cen¬ tral Europe, and from Pisa to Bologna and Venice. In this circumstance we find the ex¬ planation of the development of its commerce during the Middle Ages and the diffusion of its language in all parts of Italy. (See Italy — Language and Literature). For good weather, the month of May is to be commended as per¬ haps the most perfect. Autumn is apt to be cloudy; in winter icy winds from the Apen¬ nines blow bitterly down the valley of the Arno ; during summer the heat is often overpowering: “i7 caldo di Firenze ® is the Italian way of say¬ ing <(hot as Florence® ; and that has become proverbial.

Early History. — In its origin, probably Etruscan, Florence absorbed colonists whom the Romans called Tuscans and who, three cen¬ turies before the foundation of Rome, estab¬ lished a kingdom extending between the shores of the Mediterranean at the mouth of the Arno to the Apennines. Sylla, as proconsul, em¬ bellished the town ; Attila’s hordes reduced it to ashes ; 250 years later Charlemagne rebuilt and favored it; next, Countess Matilda, sover¬ eign lady over all Tuscany, presented it to the Holy See. That donation was ratified by the Florentines, indeed, but not by Frederick Bar- barossa, who, esteeming himself the successor of the Roman emperors, in 1153 conferred the investiture upon Guelph of Este.

Guelphs and Ghibellines. — Pope Innocent III maintained his claim by force of arms. Forthwith Italy was divided into two hostile camps. Florence itself, however, declined to take sides positively until, in 1215, the blood- feud of the Buondelmonte and the Amadei, both powerful Florentine families, proved to be the origin of that famous quarrel which, cen¬ tury after century, distracted all Italy with civil wars, led to the exile of the greatest citi¬ zens and made the peninsula an easy prey to invaders. Florence constituted itself an inde¬ pendent republic. Then the Emperor Frede¬ rick II, intent upon recovery of domain over Tuscany, joined forces with the Amadei (polit¬ ically, the Ghibellines) and drove the Buondel¬ monte partisans (the Guelphs) from Florence. Thus banished, the Guelphs fortified and held Valdarno (1247), and from that time the two parties (the Ghibelline, party of the Emperors, and the Guelphs, naturally or necessarily driven to embrace the cause of the Popes) contended for supremacy. Reconciliation was indeed ar¬ ranged; but it was merely a truce, for then the factions known as “Whites® and “Blacks® revived such contentions as had become tradi¬ tional ; and in 1301 Charles of Anjou, at the request of the Pope and the Neri (“Blacks®), crossed the

Alps, entered Florence, and banished the “Whites® — among whom was Dante Alighieri.

The Plague.— In 1348 the plague (“coming from the East,® it is asserted) caused the death of 100,000 Florentines, according to Machia- velli. That disaster set loose elemental pas¬ sions, and in that century the strife between families of the old aristocracy — that of birth — merged in a more significant struggle be¬ tween the people (Popolari) and a new aristoc¬ racy of wealth. At the beginning of the 1 5th century the Popolari were in power. Then it

was that the Medici family began to exercise influence over the masses.

The Medici. — First of that fa’mily to re¬ ceive notice, Giovanni, who died 28 Feb. 1428, was. merely a merchant prince ; but his son Cosimo (known as Cosimo the Elder and “Father of the Country®) laid the foundation of the fame of his house. Official authority he neither possessed nor desired, since he gov¬ erned by moral supremacy to which the people gave voluntary adhesion, and which became his family’s hereditary privilege — to such de¬ gree that in course of time Florentines came to regard the Medici as the natural depositaries of power. Cosimo’s grandson was that Lorenzo who fairly earned and by his personality added new meaning to his title “the Magnificent.® All-powerful in Tuscany from 1469 to 1492, he is identified with a period in a century that brought forth lovers of beauty, lovers of learn¬ ing, lovers of adventure ; discoverers or creators in many a field; the Florentine Vespucci, whose name was to be given to all the New World. Machiavelli wrote concerning Lorenzo as fol¬ lows : “He governed the republic with great judgment, and was recognized as an equal by various crowned heads of other countries. He was the greatest patron of literature and art that any prince has ever been, and he won the people by his liberality and other popular quali¬ ties. By his political talents he made Florence the leading state in Italy, and by his other qualities made it the intellectual, artistic and fashionable centre of Italy.® He it was who caused Ghirlandaio’s frescoes in Santa Maria Novella and Santa Trinita to be painted — a detail to which we refer because we wish to speak again about Ghirlandaio. Only by cour¬ tesy & “prince,® the Magnificent Lorenzo nei¬ ther held nor claimed official rank. The first Grand Duke of Tuscany, Duke of Florence (1519-74), was a member of a lateral branch of the family de Medici, the line of Cosimo the Elder failing. Last of the Medici line in office was Gian. Gastone (1723-37) who, as Yriarte writes, was “a queer mixture of virtue and vice, but at his death the people remembered only his goodness and the generous use he made of the

money that might have been spent upon pomp and show.® His sister survived till 1743, when the grand-ducal house of Medici became extinct.

Amerigo Vespucci. — The reader is referred to the articles America: a brief account of the derivation and meaning of the word, and Ves¬ pucci, Amerigo, for facts in relation to the native of Florence who has clearest title to undying fame. But this is the appropriate place for citation of an interesting passage in Mr. Davies' Ghirlandaio. } Mr. Davies writes that the fresco by Ghirlandaio at Florence in which occurs Amerigo Vespucci's portrait was overlooked by earlier writers. Vasari says that Ghirlandaio's first paintings were "in Ognis- santi, the chapel of the Vespucci, where is a Dead Christ and some saints and above in the arch a Misericordia ; in which is the portrait of Amerigo Vespucci who made the navigation to the Indies.® The fresco with the Vespucci family above was whitewashed over in 1616, the chapel having passed to the possession of the Baldovinetti family, and it was lost to sight practically until the end of the 19th century. It is in two parts, the lower part being a

Descent from the Cross, the upper part showing the Madonna della Misericordia spreading her mantle wide over the members of the Vespucci family. It is to the upper part of the fresco that the chief interest attaches, owing to the presence there, as Vasari assures us, of Amer¬ igo Vespucci. The explorer, whose name was to be given to half a world, was, when this pic¬ ture was painted, still trying to learn Latin, wherein he failed, and astronomy, wherein he succeeded, from his uncle Giorgio Antonio Ves¬ pucci. <(The bright-faced boy whose head only is seen to the left of the Virgin is said to be Amerigo. He is judged to be about 20 years old — to myself he would seem younger.® In this fresco <(there is not a face which does not carry with it a sense of character — not one which does not convince us that we are looking at the very people who lived in the Vespucci home in Florence and spent their festa days and Sundays on the family estate at Peretola, with the boy who was to be so famous.®

After the Medici. — Tuscany fell, when the centuries of control by the Medici ended, to a Duke of Lorraine (afterward Emperor Francis I) whose wife was Maria Teresa. In 1799 the French expelled the grand duke and in 1801 Tuscany (as the <(Kingdom of Etruria®) was presented to Infante Louis of Parma. In 1808 ceded to France, a scant

six years later it was given back to Grand Duke Ferdinand — who in 1859 was compelled to abdicate. The following year, Tuscany became a part of the progressive kingdom of Victor Emmanuel, and, from 1863 to 1871, was its capital ; but then, surrendering its pre-eminence to Rome, it thereby escaped some of the predestinate innovations that have defaced the latter; howbeit the reign of Victor Emmanuel was, as Augustus J. C. Hare says,

Florentine Art. — The discriminating pas¬ sage that follows forms part of a valuable study by Mr. Bernhard Berenson : <(Florentine painting between Giotto and Michelangelo con¬ tains the names of such artists as Oreagna, Masaccio, Fra Filippo, Pollainolo, Verrocchio, Leonardo and Botticelli. Put beside these the greatest names in Venetian art, the Vivanni. the Bellini, Giorgione, Titian and Tintoret. The difference is striking. The significance of the Venetian names is exhausted with their signifi¬ cance as painters. Not so with the Florentines. Forget that they were painters, they remain great sculptors ; forget that they were sculptors, still they remain architects, poets and even men of science. They left no form of expression un¬ tried; to none could they say, (This will per¬ fectly convey my meaning.) The history of the art of Florence never can be, as that of Venice, the study of a plain development. Each man of genius brought to bear upon his art a great in¬ tellect, which, never condescending merely to please, was tirelessly striving to reincarnate what it comprehended of life in forms that would fitly convey it to others, and in this en¬ deavor each man of genius was necessarily compelled to create forms essentially his own. But because Florentine painting was pre-emi¬ nently an art formed by great personalities,

it grappled with problems of the highest in¬ terest, offered solutions that can never lose their value.®

Essential Characteristics of the Florentine Genius. — Yoiarte (see Bibliography) writes that <(Italy in the 13th century carried on and brought to its crowning point the work of civili¬ zation which France in the 12th century had started by means of the crusades, the establish¬ ment of communal franchises and the founda¬ tion of the University of Paris. The symbol of the successive labor of generations, repre¬ senting runners passing their torches from hand to hand, had never been realized with so much grandeur. The sacred torches had fallen from French hands, and had been picked up by Italy, in whose grasp they emitted a light which dazzled the whole world.® But at that time (

Important Buildings. — The Duomo, begun by Arnolfo di Lapo toward

the close of the 13th century, continued by Vespignano, Taddeo Gaddi and Andrea Orgagna, and finished in the 15th century by Filippo Brunelleschi, forms, with associated buildings, the most impressive architectural group. Beside it rises the tower by Taddeo Gaddi, who followed the design of his master, Giotto; over against which stands the Battisters di San Giovanni (Octagonal in form) with its incomparable Ghiberti door. The church of San Lorenzo, founded in 1390 and rebuilt by Brunelleschi, contains the tomb of Cosimo, <(Father of the Country,® and of his father, the merchant prince, Giovanni; and in its sacristy are the celebrated monuments by Michelangelo, of Giuliano de Medici and Lo¬ renzo, Duke of Urbino. Adjoining the church is the Laurenziana Library, which Michelangelo planned, and Vasari, his loyal disciple and friend, completed. The church of Santa Croca, begun in 1294, was adorned by Cimabues and Giotto's paintings. Arnolfo was architect of that church and also of .the Palazzo Vecchio, begun four years later. The Loggia dei Lanzi

(Andrea Orgagna, architect) looks out on an open square and is famous (to speak quite frankly) because it is a moderately successful Renaissance adaptation of motives in architec¬ ture and sculpture supremely realized at Athens during the age of classic perfection. The Palazzo Pitti, begun by Brunelleschi and com¬ pleted by Ammanato, contains not only the splendid gallery of paintings, but also a library with unique treasures. Next to be appreciated is Brunelleschi's church of Santo Spirito; and by no means to be overlooked are the palaces Riccardi and Strozzi, the two most important theatres, the Accademia di Belle Arti, the Mag- liabechiana Library, the Galleria degli Uffizi, with its inestimable collection of paintings, statues, bronzes, etc.

Character of Inhabitants. — The Floren¬ tines are polite, industrious, temperate, active, economical and of courteous bearing; and though talkative and sometimes satirical, we must account them sweet withal and of amiable disposition. Moreover, in Boccardo's Italian Encyclopedia,* their city of flowers that dis¬ places, according to tradition, a field of lilies, is described as ((the pleasantest in all Italy.®

Education. — See the study of this subject in the general article Italy, with its subdivi¬ sions.

Industries.— Manufactures of wool, silk and wood, together with goldsmith's work and the agricultural products of the fertile valley of

the Arno, in days of old enriched Florentine merchants ; and the value of the chief materials of commerce was enhanced by the touch of that fine artistic hand distinguishing Florentine craftsmen. Commerce approximated art. In recent years the tendency has become apparent to specialize strictly art products and to ((manu- facture® them on a large commercial scale. Art is tending toward shrewd commercializa¬ tion, though its splendid traditions are still traceable in such minor works as the modern mosaics, the wood-carvings and stained glass. Other products, also noteworthy, are jewelry, silk and porcelain.

Population. — The estimated number of in¬ habitants of the commune of Florence was given as 242,147 on 1 Jan. 1915. Accordingly it ranked as seventh among the cities of Italy in respect to population, being exceeded by Naples, Milan, Rome, Turin, Palermo and Genoa.

Bibliography. — • Berenson, B., (The Floren¬ tine Painters of the Renaissance-* (3d ed., New York 1909) ; Brinton, S., (The Medusa of Flor- ence) (London 1908) ; Cruttwell, M., (A Guide to the Paintings in the Churches and Minor Museums of Florence) (London 1908) ; Fer- rigni, M., (Madonne Fiorentine) (Milan 1912) ; Hare, A. John, XXIII, London 1906) ; Tarchiani, N., (Firenze) (Bergamo 1915) ; Vasari, G., (Lives of the Most Eminent Painters, Sculptors and Archi- tects) — invaluable for delineations of Florentine 16th century achievements (Medici Socy. ed., trans. De Vere, in 10 vols., London 1912-15) ; Vaughan, H. M., (Florence and her Treasures* (London 1911); Young, G. F., (The Medici* (London 1909); Yriarte, C. E., (Florence: Its

History, the Medici, the Humanists, Letters, Arts* (New York 1882).

Marrion Wilcox.

FLORENCE, S. C., city and county-seat of Florence County, on the Atlantic Coast Line and the South Carolina Western systems. It is the centre of trade for the surrounding region, trading considerably in tobacco and cot¬ ton. The preparation and manufacture of these products are the important industries. The South Carolina Industrial School, a Federal building, national cemetery and an old Con¬ federate prison comprise the chief points of interest. The municipality owns and operates its waterworks and sewage plant. It has been governed under the commission plan since 1913. Pop. (1920) 10,968.

FLORENCE CRITTENTON MISSION.

An organization of national scope founded by Charles Nelson

Crittenton in honor of his de¬ ceased daughter Florence. He gave up his busi¬ ness and spent most of his time in establishing homes and schools for the care of friendless, homeless and unfortunate girls. In 1895 the work in various cities was combined under the charter of the corporation known as the Na¬ tional Florence Crittenton Mission. There are 68 homes and schools in the United States and five abroad.

FLORENCE OF WORCESTER, English chronicler: d. 1118. He was a monk of Wor¬ cester, wrote (Chronicon and Chronicis,* a compilation from Marianus, an Irish monastic chronicler, which is of the highest authority in early British and Irish history.

FLORENTINE EXPERIMENT, in

physics, an experiment made in 1661 by some academicians at Florence to test whether or not water was compressible. They enclosed it in a globe of thin gold, afterward hermetically sealed. In compressing the globe the water, in¬ stead of yielding, forced its way through the pores of the gold, and stood in drops on its outer surface. See Physics.

FLORENTINE FRESCO, a variety of fresco painting, first practised at Florence dur¬ ing the flourishing period of Italian art, for decorating walls. Like common fresco, the lime is used wet, but in this process it can be moistened, and kept damp and fit for painting upon.

FLORENTINE LAKE, in painting, a pig¬ ment prepared from cochineal. It is now ob¬ solete, the greater durability in oil-painting of the lake prepared from madder having entirely superseded those prepared from cochineal.

FLORENTINE MOSAIC, the term ap¬ plied to the art of inlaying tables and other plane surfaces with pietra dura and pietra com – merse, carried on principally at Florence. See Art; Florence; Italy.

FLORENTINE SCHOOL, an Italian school of painting during the 14th and 15th centuries remarkable for greatness; for atti¬ tudes seemingly in motion ; for a certain dark severity ; for an expression of strength by which grace is perhaps excluded; and for a character of design approaching to the gigantic. The Tuscan artists, satisfied with commanding the admiration, seem to have considered the art of pleasing as beneath their notice. This school

has an indisputable title to the veneration of all the lovers of the arts, as the first in Italy which cultivated them. See Art.

FLORES, flo'raz, Juan Jose, Venezuelan soldier and statesman: b. Porto Cabello, Vene¬ zuela, 1801 ; d. Guayaquil, Ecuador, 1 Oct. 1864. He distinguished himself as Bolivar's lieutenant in the war that secured the independence of South America. In 1823 he was governor of Pasto, and head of the army in Ecuador. His victory at Tarqui (1828) ended the war with Peru and he was made President of the re¬ public of Ecuador (1831-35). He filled the same office in 1839 and from 1843 to 1845, when he resigned in consequence of a revolution stirred up by the Liberals. He was defeated by Mos- queza in the war with Colombia at the battle of Cuaspuda, in 1863.

FLORES, Venancio, va-nan'thi-o, South American soldier and statesman : d. Monte¬ video, Uruguay, 19 Feb. 1868. In 1853 he took part in an insurrection against Giro, the Presi¬ dent of Uruguay, and was elected President of the Republic in January 1854. The two parties in the government were the Colored (Liberals), and the Whites (Conservatives), and the former being the stronger had elected Flores. A di¬ vision in this party made it possible for a former President, Oribe, to land with troops, and Flores laid down his office, and in 1858 took refuge in Buenos Aires. He returned later and with the help of Brazil stormed the city of La Floradi in 1864 and in 1865 made a triumphant entry into Montevideo, and assumed the title of provisional governor of the republic. On 4 May 1865, he concluded a treaty of alliance with Brazil and the Argentine Republic in the war against Paraguay. He won over the party of the Whites by his clemency, regained the presidency in 1866, but was assassinated on his way to the city hall, or capital of Montevideo.

FLORES, flo'res. (1) Ende or Mandfirei F lor is, a large island (Dutch) of the Indian Archipelago, forms one of the chain of islands which extend east from Java; length, about 225 miles ; breadth, about 35 miles. It has a moun¬ tainous surface, with several volcanic peaks, of which Lobetob is 7,425 feet high and Gwnong Rokka 7,940 feet. Little is known of the in¬ terior. Sandal-wood, once abundant, has be¬ come scarce. Ende, near the middle of the south coast, is said to be the principal port, and to have safe anchorage for any number of ships. The passage between the east end of the island and those of Solor and Adenara is called Flores Strait ; and the part of the Pacific north of the Flores chain and south of Celebes is called the Flores Sea. The population is estimated as 250,000, and almost wholly Papuan savages. (2) The most western island of the Azores, about 30 miles long by 9 miles broad, with a hilly surface, containing an extinct

crater now converted into a lake. The chief products are wheat, pulse and poultry, and great numbers of small cattle are reared. (3) An island of the North Pacific, off the west coast of Van¬ couver's Island; lat. 49° 20′ N; long. 126° 45′ W ; length, northwest to southeast, 15 miles; breadth, from two miles to six miles. (4) A department, also a small island off the coast of Uruguay. (5) A river in Brazil in the province of Piauhy.

FLOREZ, flo'reth, Henrique, Spanish his¬ torian : b. Valladolid, Spain, 14 Feb. 1701; d. Madrid, 20 Aug. 1773. He was an Augustinian ordinary who taught theology and history by presenting dogmas and annals from the stand¬ point of their human interest. (Sacred Spain' (1747-73), and (Memorials of Catholic Queens y are his most important works.

FLORIAN, flo-ryan, Jean Pierre Claris de.

French poet : b. near Anduza, Gard, France, 6 March 1755; d. Sceaux, France, 13 Sept. 1794. He made his debut with some pleasing farces (1779), and added greatly to his fame with the two pastoral stories, (1787), sentimental romances in the dom¬ inant taste of that time. He also wrote (Med¬ leys of Poetry and Literature) ; and Florian's Youth,' in which he recounts the story of his boyhood. In 1788 he became a member of the French Academy. While there, engaged in fin¬ ishing his poem, (Ephraim, ' he was arrested by the orders of the Committee of Public Safety, but the fall of Robespierre saved him from the guillotine.

FLORIAN, Saint, a martyr honored as the patron Saint of Upper Austria. Puoche was said to be the site of his tomb and there was built the great monastic house of the canons regular of Saint Augustine which still exists. Accord¬ ing to tradition Florian suffered martyrdom by being thrown into the Enns, weighted wTith a stone, during the prosecution of Diocletian. Tra¬ dition also has it that his remains were re¬ moved to Cracon in the 12th century. Florian is generally represented as a warrior holding a vessel from which flames are poured out. His protection is often sought against fire. In the calendar of saints he is honored on 4 May. Consult Cahier, C., (Caracteristiques des saints' (Paris 1867).

FLORIANOPOLIS, Brazil (formerly Des- terro, Nossa Senhora do Desterro, or Santa Catharina), the capital of the state of Santa Catharina. It is situated on a long and narrow island near the mainland, and its foreign trade passes through the port of Sao Francisco, which is one of the best on the coast of southern Brazil.

This city is finely built. A wide plaza occupies the centre of the city, around which are grouped the principal buildings : the arsenal, lyceum and hospital. There is a well-fortified harbor and considerable trade in rice, coffee, sugar, manioc flour and artificial flowers. During the revolt of the navy in 1893 Florianopolis was the headquarters of the rebellion. Pop. 30,000.

FLORICAN, or FLORIKIN, large game birds of India comprising the genus Sypheotis bengalcnsis, and closely connected with the bustards. They are powerful flyers, are very wary and are greatly prized as food. They offer good sport for the hunter in winter. Con¬ sult Baker, (Journal of the Bombay Natural History Society) (Vol. XXI, Bombay 1912).

FLORICULTURE IN AMERICA —

Growing flowers as a business was unknown in America previous to about 1825; and, indeed as late as 50 years ago it was impossible to buy cut flowers in some of our leading cities. Owing to the increase of population of the Eastern cities, and consequent increase of wealth and luxury, a demand for flowers began to be felt

in the second quarter of the last century; and thus began the development of commercial floriculture in this country. This branch of horticulture first became prominent in the vicin¬ ity of Philadelphia and Boston. In the early days more wealth was centred in these cities, and the people there paid more attention to luxuries in home surroundings. New York was less prominent in the development of this in¬ dustry. From 1830 to 1840 floriculture made considerable progress, owing to improved meth¬ ods in the construction and management of greenhouses, as well as to the increased demand for flowers. The application of hot-water heat to greenhouses gave an impetus to the work, making it possible to grow better plants than had been done when heated air conducted through brick flues was the only means of keep¬ ing out the frost. After the Civil War the development of the industry was rapid and varied, as to extent and methods, and as to the kinds of flowers cultivated. Up to about 1885 the cultivation of plants was the leading feature of floricultural work ; but since that time the rapid increase of wealth and luxury in the large cities has developed a tremendous demand for cut flowers, thus making this branch of the business the all-important one for the

florist. This increased demand for cut flowers has led to specialization in floriculture and has produced the best work of the florist. Older flowers, such as the once popular camellia, have been dropped, and the rose, carnation, violet and chrysanthemum have been substituted. In this way floriculture, as we find it to-day, has been gradually evolved. There are two distinct de¬ partments of the work, viz., the growing of plants, and the cultivation of cut flowers. The plants grown mostly are various kinds of palms, ferns, rubber plants and dracaenas ; also orna¬ mental and bedding stock for outdoor pur¬ poses. There has been specialization in both of these main branches of floriculture. For in¬ stance, certain growers devote all their energies to palms ; other concentrate on ferns ; others raise bedding-plants exclusively. In flower- growing there has been even greater specializa¬ tion ; and it would now be difficult to find an important establishment where more than one of the leading flowers is grown. While one florist will grow roses exclusively, another will devote all his time and ingenuity to the im¬ provement of the carnation, a third will grow nothing but violets, and a fourth will concen¬ trate on chrysanthemums. These four flowers are the most important cut flowers, their com¬ mercial importance being in the order named. The most recent statistics on floriculture in the United States, those of the census of 1910, show that the total number of farms and florists' es¬ tablishments reporting the production of flow¬ ers and plants in 1909 was 10,614; the total acreage reported as devoted to these products was 78,248 and their value was $34,872,000. The acreage of flowers and plants increased 96.1 per cent between 1899 and 1909, while the value in¬ creased 85.9 per cent, the value per acre thus showing a decline during" the decade. About 99 per cent of the value of flowers and plants in 1909 was produced in 7,444 establishments that had an output valued at more than $250, the average value for these establishments being ., $4,630. As would be expected a large part of

these establishments were located near large cities. The leading States in value of flowers and plants were :

New York . . . , Pennsylvania .

Illinois . .

New Jersey . . , Massachusetts

Ohio .

California. Indiana .....

Michigan . . . . Connecticut. .

$5,110,000 3,761,000 3,681,000 2,839,000 2,432, 000 2,357,000 1,374,000 1,202, 000 1,132,000 1,042,000

No other State reported the value of flowers and plants as great as $1,000,000.

Since the figures given above are something less than the wholesale price, and the profit of the retailer is about 100 per cent, it is clear that the public spends annually some $70,000,000 on flowers.

See Botany; Plant Breeding; Horticul¬ ture; Flower; Flowers and Insects; Garden; Inflorescence; Greenhouse; Cross-Fertiliza¬ tion ; Fertilization, etc.

Bibliography. — Bridgeman, T., (Flower- gardening) (Philadelphia 1880) ; Hampden, M., (Every woman's flower garden) (New York 1915) ; Harrison, C. S., (The gold mine in the front yard and how to work it, showing how millions of dollars can be added to the value of prairie farms* (Saint Paul 1905) ; Henderson, P., (Practical floricuhure) (New York 1874) ; Holland, L. B., (The garden blue-book) (Gar¬ den City, N. Y., 1915) ; Shelton, L., (Continous bloom in America) (New York 1915) ; White, E. A., (The principles of floriculture) (New York 1915). Consult also Bailey's Garden- Craft* series, and his (Cyclopedia of American Horticulture. *

FLORIDA (Sp. <(flowery,® a name given to the country by Juan Ponce de Leon because he discovered it on Easter Day, Sp. Pascua florida or de flores, (

Boundaries, Area, etc. — It is situated be¬ tween lat. 24° 30′ and 31° N. and long. 79° 48′ and 87° 38′ W. Alabama and Georgia bound it on the north, the Atlantic Ocean on the east. On the south, Florida Strait, which connects the Gulf of Mexico with the Atlantic, separates the peninsula from Cuba and the Bahamas. West of the peninsula and south of the western ex¬ tension of the State is the Gulf of Mexico. The extreme western boundary is the Perdido River which separates it from Alabama.

Florida is mainly a peninsula of irregularly rectangular form. The northern part is con¬ tinental, and extends about 400 miles from east to west. From north to south the peninsula extension is about 375 miles in length, and nearly 100 miles in width, the total length of the State north and south being about 450 miles. From Biscayne Bay, near its southeastern ex¬ tremity, stretches a series of islets or keys, the

most important being Key West, situated at the lower end of the chain. Its area is 58,,666 square miles, 3,805 being lakes, lagoons and rivers. Its coastline, excluding islands is 1,145 miles, 470 miles of it facing the Atlantic Ocean.

Geology. — The oldest formation recognized in Florida is the Vicksburg limestone of the Oligocene period. It is composed of the shells of foraminifera and also of larger shells and is in most places of a thickness of several hun¬ dred feet. Over this Vicksburg limestone especially in the northwestern part of the State are the so-called Alum Bluff and Chattahoochee formations lying at or near the surface. On the Hillsborough and Manatee rivers these forma¬ tions are visible. The Miocene formations in the State consist of the Jacksonville limestone and Choctawhatchee shell marls. They lie at or near the surface along the Apalachicola River and from Jacksonville south. Marine shell marls, hard rock and pebble phosphate deposits of the Pliocene period are frequent in the southern part of the State and are exposed on the Caloo- sahatchee. Coral formations abound along the Keys. Under the Everglades lie the Miami oolite limestone, and oolite deposits are also frequent in the southern Keys. More recent formations are shell mounds, sand dunes, In¬ dian mounds, etc. From the above it is seen that the only foundation rock throughout the State is limestone, topped by other limestone, shell marls, sands, clays, etc. For many years it was thought that the State was made up ex¬ clusively of alluvial deposits, then a theory of coral formation was broached about 1850 only to give way 30 years later to the demon¬ strations of Eugene A. Smith and others, who showed conclusively the exact geological age and construction of the several underlying strata. Since 1907 the official survey under the State geologist, E. H. Sellard, has solved many of Florida's geological problems.

Topography. — The physical features of the State are decidedly dissimilar to those of the other Southern States. The geological upheaval resulting in its formation left neither table-land nor mountain from which to view ocean and gulf, the most elevated portion of the State barely reaching the dignity of a hill country. The northwestern part, continuing the Ala¬ bama uplands, is a hilly rolling country sinking to a flat strip of coast. The east is part of the Atlantic coastal plain. The peninsula is a surface of sand and marsh. A ridge running north and south forms a divide and separates the streams to the east and west. Its greatest elevation is almost 300 feet. From the

central ridge low sand-terraces decline each way to the sea, with countless swamps and lakes at their bases. On the higher levels the terraces are covered with a magnificent growth of large pine trees ; on the lower levels are prairies and marshes timbered with cypress-trees, and in which are <(hammocks,® which are dry eleva¬ tions covered with a great variety of hardwood and cabbage-palms. The basins of the draining streams are mostly marshy jungles of cane- brake and vines and semi-tropical trees. In the southernmost portion are the remarkable Ever¬ glades, forming a district 160 by 60 miles in extent, estimated at 5,000 square miles, both land and water, and overflowed marsh hidden by tall grass, and thickly dotted with dry (

cape, and stretch up along the Atlantic coast. The Everglades are now being drained and many hundreds of acres of fertile lands are being put under cultivation there. See Ever¬ glades.

The Coast. — The Florida coast-line, exclud¬ ing islands is 1,145 miles in length, of which 470 miles are on the Atlantic Ocean. This stretch of 470 miles is bordered by a line of sand reefs, sand-spits, and narrow islands, which enclose bodies of water, variously termed lakes, lagoons, bays, etc. This is also typical of the whole southern coast. In recent years these bodies of water have been connected by a series of canals so that an inner passage by water is now possible for almost the entire length of the eastern coast. The chain of islets, known as the Florida Keys are now connected with the mainland and with one another by a railroad which extends southward to Key West. On the Atlantic coast the principal harbors are those of Fernandina, Saint Augus¬ tine and Miami. Much of the Gulf coast is also bordered with low sand reefs and islets. From the Western border to the Ocklocknee embouchure it is marked by sand bars ; thence to Tarpon Springs it is free of indentations and sand bars but very low and flat. Sand bars are again a feature of the coast between Tarpon Springs and the embouchure of the Caloosahat- chee, and from there to the Keys it is low and swampy. Tampa, Key West, Pensacola, Santa Rosa, Saint Andrews, Saint Georges, Apalachee, Hillsboro, Charlotte, Oyster, Ponce de Leon and Cedar Keys are the principal bays and harbors on this coast.

Lakes and Rivers. — The central part of the State contains a very great number of lakes, approximately 30,000 in all. They are mostly due to depressions caused by the solution of the limestone underlying the greater part of the State. Many of the lakes are aggregates of the great springs, some of which are charged with carbonates and sulphuretted hydrogen ; many contain fresh water and are of immense size, and of crystal clearness. The wonderful Silver Spring, at the head of

navigation on the Ock- lawaha River near Ocala, Marion County, has an estimated outflow of 300,000,000 gallons daily. The Blue, in the same county, the Wekiva in Orange County, and the Wakulla near Talla¬ hassee, are also famous. The largest lake is Okeechobee in the south, 1,200 square miles in area and 25 feet above sea level, its waters sinking into the Everglades; a bordering rim of sand about 25 miles wide divides it from the Atlantic. Other lakes are Monroe, Georgia, Kissimmee, Crescent, Dexter, Apopka, Harris, Orange, Tohopekaliga, Istokpoga, and Eustis. Most of these are shallow and are usually con¬ nected by fresh water streams. There are many swamps within the State; the largest are the Big Cypress Swamp to the west of the Ever¬ glades and Okefinokee Swamp which extends over the Georgia border in the north.

The drainage system of the State is peculiar in the number of subterranean streams, such as are common in limestone regions. The great river of Florida Is the Saint John's, rising in Cypress Swamp, just west of the Everglades and flowing north parallel with the ocean, threaded on a series of lakes; 150 miles from its mouth it becomes a mile wide, and in its lower course six or seven, a miniature Amazon

FLORIDA

Estimated Population, 893,493

COUNTIES

Pop. 1915 „ „

35,366 Alachua . *

Baker . ˆ ~

5,136

13,518

16,778

7,270

4,763

7,468

5,235

7,315

16,024

24,536

22,194

94,834

41,147

5,433

22,989

12,484

6,291

83,682

14,097

35,351

16,196

7,860

12,421

8,684

20,135

11,992

4,920

Bay.

D 2

Bradford . K 2

Brevard . A* 6

Broward . * 7

Calhoun . E 2

Citrus . E 5

Clay . E 3

Columbia . J 2

Dade . F 8

De Soto . M8

Duval . L 2

Escambia . A 1

Flagler . -M 4

(Pop. incl. in St.Johns and Volusia Cos.)

Franklin . F 3

Gadsden . FI

Hamilton . J 2

Hernando . K 5

Hillsborough . K 7

Holmes . D 1

Jackson . E 1

Jefferson . H 2

Lafayette . .13

Lake . E 5

Lee . M 10

Leon . G 2

Levy . J 4

Liberty . F 2

Pop. 1915

17,834 Madison . I 2

15,736 Manatee . K 8

28,757 Marion . K 4

19,618 Monroe . E 8

10,005 Nassau . LI

. Okaloosa . B 1

(Pop. incl. in Santa Rosa and Walton Cos.)

. Okeechobee . N 8

(Pop. incl. in Osceola, St. Lucie and Palm Beach Cos.)

15,397 Orange . M 6

10,937 Osceola . M 7

9,669 Palm Beach . N 9

9,634 Pasco . K6

18,814 Pinellas . 6 7

37,423 Polk . L 7

15,863 Putnam . L3

20,745 Santa Rosa . B 1

9,453 Seminole . M5

13.473 St. John . M3

8,589 St. Lucie . N 8

7,517 Sumter . K 5

20,286 Suwanee . 12

10,783 Taylor . . .H 2

21,790 Volusia . M 4

7,606 Wakulla . G2

16.474 Walton . Cl

11,123 Washington . D 2

Pop. 1915

550 Trenton . J 3

527 Umatilla . L 5

550 Waldo . K 3

1.839 Wauchula . L8

307 Webster . K 5

294 Welaka . L4

341 Welborn . J2

4,090 West Palm Beach O 9 269 West Pompano . O 10

Pop. 1915

11,968 West Tampa, Sta.

of Tampa, P. O.J 7

900 White Springs . J 2

385 Wildwood . L 5

800 Williston . J 4

648 Winter Garden. ...L 5

787 Winter Park . M 5

350 Zolfo . L 8

Incorporated Cities, Towns, and Villages

744

406

3,400

598

3,504

282

3,412

250

182

927

1,107

670

3,305

411

1,385

950

800

495 1,571

400

1,932

807

389

809

900

1,950

512

4,526

582

2,142

3,490

304

429

979

122

543

340

1,148

279

3,114

488

2,150

3,244

1,942

329

6,737

286

731

2,287

297

622

131

349 558 486

496 592

1,265

378

350

76,101

1,631

682

21,724

4,221

832

. K 3

3,422

int.hnnv .

. K 4

786

Apalachicola ....

Apopka .

Arcadia .

.E 3 .L 5 .L 8 . K 4

7,287

324

552

300

. L 7

532

Bell .

J 3

1,360

Belle view .

Blountstown ....

.K 4 . E 2 .D 1

3,294

368

1,763

Bowling Green . . .

.L 7 .K 8

145

1,487

Branford .

Brooksville .

Carrabelle .

roH or K RVS .

. J 3 .K 5

F 3

.1 4

2,357

719

500

408

Center Hill .

L 5 .D 1

191

15,592

.K 4

617

niear WatP.r .

J 7

1,415

.N 6

295

. K 5

2,040

Crescent City . • • Crystal River .

Fiarlp PI tV .

.L 4 .J 5 .K 6

296

576

1,121

.F 7

1,716

Davtnnft, .

.M 4

1 ,000

Daytona Beach . • De Funiak Springs

De Land .

Deleon Springs . .

.N 4 i.C 1

.M 4 .M 4 .J 7

2,012

832

250

5,370

506

.K 4

341

Eatonville, OrangeM 6 Eau Gallie . ■ N ®

Ti’c + prn . 1 U

6,448

857

1,000

.L 5

4,622

Federal Point . . .

Fernandina .

Floral City .

Fort Meade .

TTrir-t MVRTS .

.M 3 .L 1 .K 5 • L 7 .L 9

734

1,625

2,013

26,272

TTr.-rr ‘Piprrfi .

.C 8

1,941

Fort White . . J 3

Gainesville . K 3

Goldsboro, Orange M 6

Grace ville . E 1

Green Cove

Springs . E 3

Greensboro . F l

Greenville . H 2

rjrpfna . FI

3,229

438

1,071

1,772

3,451

191

1,400

5,471

7,186

.K 3

131

Hasting .

M 3 .G 1

4,998

tt o wthorn .

.K 3

327

Hernando, Citrus High Springs .

TT Will .

.K 5 . .J 3 .M 4

840

433

571

Interlachen, Putnam

Lj 6

Jacksonville . L 2

150

1,522

1,239

5,193

.11

53,886

C 10

1,938

Kissimmee .

Lake Butler ....

.M 6

K 3

449 1,310 ‘

Lake City . J 2

Lake Helen . M 5

Lakeland . L 6

Lakewood . Cl

Largo . J 7

Laurel Hill . B 1

2

5

Lawtey . K

Leesburg . L

Live Oak . I 2

Macclenny . K 2

Madison . 12

Maitland . M 5

Manatee . K 8

Marianna . El

Mayo . 13

Mayport . M2

Melbourne . N 6

Melrose . L 3

Miami . F

Micanopy . K

Milton . B

Montbrook, Levy..J

Monticello . H

Morriston . J

Mount Dora, Lake . L

Mulberry . L

New Augustine . . ,M

Newberry . J

New Smyrna . N 4

Noma . D 1

Oakland, Orange.. M 6

Ocala . K 4

Orange City . M 5

Orange Park . L 2

Orlando . M

Ormond . M

Pablo Beach . M

Palatka . L

Palatka Heights,

Putnam . L 3

Palmetto . K 8

Panama City . D 2

Pensacola . D 2

Perry . H 2

Plant City . K 6

Pomona . .L 4

Port Tampa City . . K 7

Punta Gorda . L 9

Quincy . G 2

Reddick, Marion. . K 4

St. Andrews . D 2

St. Augustine . M3

St. Petersburg . J 7

San Antonio,

Pasco . K

Sanford . M

San Mateo . M

Sarasota . K

Seabreeze . N 4

Sneads . FI

Sopchoppy . F 2

South Jacksonville .L 2

Starke . K 3

Tallahassee . . .G

Tampa . J

Tarpon Springs . . . J

Tavares . L

Titusville . N

Longitude W,est\ fromlqi

N^l’l.lrala _

23«Lk«wood

t\ot* D«i linRton0 Sterling®

[oroervtlle

” OrubJ”-

, f’i0”” ° lc in

Hr© L M A S

Raoepond

. Uain, > WllU*D Tnv* oJQ

*rtll. «m.

- ° Grcprtwoorti’tj,] j ® *} b

Js®N

rriTV,MarIuniin

-I /TSl’arynto | ,

;rhl“iin>..aCvMuuˆri®

k— viiuijfelvl LmrtrtS’Ssˆd Sf

,* d mini rib “rau

UlOUXltBtQWirO I

Old BlopnUto-Aˆ©

leuU Landing P’

HlfKlUt

CAMDEN -ih > , ,»w”&

Ocblncj

AND

ty wood \iL

c- Bolnbrittgeˆn ˆ DECAY cji

‘ (/Harden.

ter/

THOMAS

yoiiistoi

L/V/ W mviUe , • / ’ro’

iTOSTHINGIjON”

w\ / Millers „ 1 CHi

o’w*crrj~

5 jf /Grecnheadi I’

Boulogne ,v£Ve b Andrews’ A

\ YuleS.

ˆXHUllardb?

Furgy C.HARLT 0 N;

Stntcnvlllo

Sta.

ˆMELyi/ Island’

■Saria uyiou nU\

,y[,, “Canton

k’Hlo if nr,,

O fbennett s°* » i Spray Mani

/Gretnaˆ

: Greensboro

issssl

fcnUiV

JVi V ,

, GreenvUˆ’ | M u < 1 Iso rw ˆv*a

*M A Dlis(

C liedOftkˆairuun: Waco

ISLAND

iiirksi

_ Hogan

Iwuckdontt

’estljM.,

Buy head*

Tˆoldwin

Maxvllle’

Ti ro

■24ˆ“3,LakJoit£

Vcreen’

W A K Crawford \ vlllc A / Asbmortf/V taopchoj > P7 Caito Mill* /

”’••Oil!: 0

!yv.

•

rxiL-ˆZrJ,

Raiford/££lloJ$

k DPO R D •«.

ohnstown*0/ j

I umuw l*iu4feri“ XorJcnUSa,

ilgbland cyˆyj Cˆrnˆ&jre \|

Hsaofe-Sa .

ircen i?oveVpkoiuta ST.N\S?t. Vo irkc Spr«.\/ y

uc la y

\ cstˆTocoiVU- .fRqcey °f W lttNAftt

B°nlper’viˆ\(i jcvh Nsteps

liy / *NO“utnau) H*ll/ A\U > olr’

\ * HJMelr Jseˆ- Tensdalo V, / M federal 1 »lnt V&Mdt ˆFairbanks / LC,af Mate ” J c./J\

i aine8\ til cp u XniAiˆC”ˆ!ˆ— ˆ – -joflata

U.A) yfi*Si-:ZZ&Z

■ ’ APiJ, 3\

Uiini)ell\

lt AjDupont

-Cook \ir

■4t A -m |

W 11 marl h EstdlcO

CoUUKCli I – I x N I .

i4 > m lack ceˆidijˆsˆ

/ > < = *

‘acmdldt

‘ Wilnlji

■ MNS

‘St > Jbsegj

Jarrabelu

‘Cyrlf

Hague/

ˆAlacbdS

i – yJZz’ i \lA :ington

Komokoˆ Newberry\ Kananaui Jjdxra- H*!f.MooiiA

Bronsonˆ9 .

n7 AEcIo /vˆ‘lUi5ton\

ˆCape\ˆan\BlatP

(Liyht uoutci sy y y &

Mlaa

1oˆV{

RochelW

it’omon

Tacomtn-oc Arche y&-

[orseahoo

rtwiasefe:

‘ •M»r = um ‘ ‘ \;

ˆ°y£y Connor AhA’V •

w.g O n cyX

Sp«“8AM Ws

Pittman/ ˆ

- – — 6 Altoona

:l°y. o/ Umatilla’

wˆtj/Eusti*

Vista]

ToxvJ Karoretta’J ˆ l Ifatmnnd TotnokRˆmˆ vSeftillfl OnnondX,

1

. TP’crunn _Tv.»_JC®e

\f.Barbervllleˆ DaytontTsX

Art Ay OLUSIA 1

\De Leon Springs . I

Y Glen*

nlt\ Woodˆe Spfllc*Cr. rnd M Tj

/V Lennon

■ Otter Creek

spi’jtoii

U.r. .•>’■/.••

Morrlston’

Ocalaˆp ˆtA .

.. V’Sbadj ».

““rP’ T:n?g

vTCTh

■f c„,»irtes.,s

fflf H ER iN A KDOlvj J&ooksvtltew^^teˆ

MWOOt

Jjijˆintier

Gulf .T<

ctˆonr’f®.

— St. A aRtinh

‘R.TLF

S EKI.N,OLl

■fficfi’vE: L!lJb<;

JfltVtMffiland rt}oU’

\Locfv>mfj/ “” “■ ‘ f A , V< Xw inter Pa\rk <

“ˆOrlando

R,1A N G \E

tike ˆPinecrstle

«m\\v

SgBwrAvCy\\ \

lAOQiyE RCANAL

tfnC»r»«*i IlillTVt ■bilfrlF. Aj>opka\v

’Ocoee,

t*f”

Ornne# \ Center

-MnLai

‘Herndon? Zephyrtiills !j V Godwin

iDav’enport- ■vˆv-anrj) bd

s«T7^g

‘.0- S^pNilV. A»S_

fConlin \

Gentry

Washmgton\ y ° Lanier <

Tliahtw

Big Clearwater lilViaej

-Eloise!

WiUkdiiA

m$sl

ydei™.

v,.>7-‘r.-T>“*,/ic” |rJ> Ew^wwia /™it» Cltlsboro ~i / Ricnolt S’/«.Koj*rilfle J< n<$ Boy*tt/m„,

‘7 _• / Ji

Grant v|

.MW

lUaKaTnn

(a C a i:\Vi

BROv,

VpA|sfcbor,k c“ij pTYohl-L CrooJcetl «jAl«,V.Pt.Meaa y ./ Fort Meade

ltrmlli y Dillon® oPicofc;

3 baKt ToiodckWsU.:

mington ? \\ i baw Gifford\ wjl W\

ST . v.‘oIibJ!

-A* Oslo MW I Y

p-LUClf^

Hrt-p/e”S

lopall VFhfto City v

/ i, . Ankoto

Okeechobee ^Jensi

jJL 1 -^Fort Van >

i*VrV«*isia“ s„

Ar buckle r Plna^lsiand

.Borenb

Baird

oFredonia.

illovr i

ea. Jc- DieXel Oak Knoil> •jr.j’iV*

e wl Oaowaw XI Ft. Drum>

:e echobe

/ I llilolo, •Bauenger J

;indtan\if iver,

;k sift ;‘U\\

-IHL’TCMINSaj

SeOtt 9 / \ ^

/bZolfo / Scbrlng X.

/ \ 0 / L.Jacksonu\

\ I Mplhtt oCrewBvlllo \

^Sweetwater I-\

J.orraTne

Ui Xo Mg ˆ .“i Bee Rldgeˆy^^^V’

I GardVieft#

lRunkerb//grownviii#

lv°V” t// Arcadia

, Venus

Indian Mound

CUaneV »aV J Vokeechobeeˆ V

vAV-‘-ˆOlE-OAbˆ1-

•,mu> i®

. . s

-’ll’ IV’ “Jl

>aliiulalc

fTJSatina

X Cleveland / Punla Gorda kˆAcline I Lester

Hnil City >

Mounds

foorfeˆlfavi

Ulohrlst

- JKlverla

L Mwest 1

.Palm Beach S ,V — Palm. Bel »£ ACM canaTJ Xakc W ortbj Hypoluxo ,t JJoynton A

% D’ira> ,(Yamatu/ BSˆaatonei

SouGˆtfe.

Bay V-

... A lb) gr // lort

au”’ ˆyTˆPunta Rassa ˆ Estet0

7 /

yA

A- t . I T/l. f-1 . I A P. ru u I

ZaA-tf p Traffotil,

ˆ /almniolaTcfl

fEfffGi

)f”5 Deerfield) Went Pompano °/

Fwk Lmidrrtlnle

BRO\

Everglade /ˆy

tV/qiixe/Wlˆ -‘;G

‘-i.r

v i i.i.k-n . K r.Y .■p*4,yj

„lLUUte%ˆ

IIaruiso.s Kf.v

Mlamrv

Coooanut Grove/J

A D EL,,Vin＞7$

Kendall/ˆ

Rockdale/

Peters/

Black Point / y: NarnnjX/’°br O « Homestead tr I .o’ |V”

Fort Harrell

Is^AMiS

Lawson* Itu n ~Jyf/

- , s /$ >

Key I,a lt. ii un \Af

1. rer Point

Ponce lie Leon

her Jit-V

Arscpic

CardsIP

A«P

Northlvest CapcOi)Yh ii* ion’ tv)- Lakc\

V\s^um4

’laminjo

dWti. Key, . -V? ^Vvt#

■ ■■■•:■ . sAK’V

y- ^r.. 77′ l,ia’

K*’ v ‘ “5

L< <

FLORIDA

SCALE

Statute Milos, 39 = 1 Inch.

30 40 50 00 70

Rand McNally's New id '*14 Map of Florida. Copyright by Rand McNally & Co.

in size and character and draining a similar country. It empties into the Atlantic below Jacksonville. Pleasure-steamers navigate it 250 miles, and the tributary swamp-rivers sev¬ eral hundred more. Its total course is 350 miles. The Kissimmee, flowing into Lake Okee¬ chobee from Kissimmee Lake, is also a favorite with tourists and sportsmen. The leading streams of the west are the Suwanee ; the great Apalachicola from Georgia, 90 miles long under that name, with a course of nearly 600 miles through the Chattahoochee; the Chocktaw- hatchee, 180 miles ; and the Escambia, 250 miles with the Conecuh, from Alabama, the latter navigable to the Conecuh. Other im¬ portant rivers are the Ocklawaha, Withlacoo- chee, Caloosahatchee, Chipola, Saint Mark's, Saint Mary's, and the Holmes, all of which are navigable for short distances from their mouths. The fall of all these streams is so slight that they furnish little or no water power. Attempts have been made in recent years to build dams to furnish power and have met with some success.

Soils. — The soils of Florida are mere sur¬ face deposits with no volcanic upheaval and all have sand as a common ingredient. Lime¬ stone is almost everywhere the underlying rock (see Geology above), but in the northeast siliceous sands have been brought down by the rivers and have been distributed by marine action. Three classes of soils may be distin¬ guished: that of the pine lands which often contains a surface of dark vegetable mold or humus and is very productive ; that of the "hammocks® which also contains dark mold mixed with marls and clays. It is met with in Alachua, Citrus, Levy, Hernando, Pasco, Leon, Gadsden, Jefferson, Jackson, and Madison coun¬ ties ; lastly that of the swamp lands and contain¬ ing muck and peat soils and lying mostly in the east and southern parts of the State. These are the richest and most productive of all soils within the State, but they require adequate drainage systems to fit them for cultivation. Truck crops are now grown profitably on the sandy uplands, long deemed unfit for cultiva¬ tion.

Climate. — Florida may be divided into three climatic zones. The continental portion of the State north and west of a line drawn through Cedar Keys, Gainsville, Starke and Jacksonville has a climate similar to that of the Gulf States and is warm-temperate in character. South of this line to the southern boundary of Hillsboro, Polk and Brevard counties the climate is semi- tropical, and the part of the peninsula south of this is sub-tropical in climate. The semi- tropical and sub-tropical zones have very uni¬ form temperatures due in no small degree to the proximity of the Gulf Stream and to the trade winds which blow steadily across them. Indeed the climate of the entire State due to these factors is not subject to prolonged and severe winters with great ranges in tempera¬ ture. The normal mean temperature for Janu¬ ary ranges from 60° to 70° F., that for July being 80° and above. The hottest months are June, July and August, but even then the heat is tempered by frequent showers. West Indian hurricanes are infrequent but they are not un¬ known and at times have done great damage. In the south the growing season extends throughout the entire year, but frosts are not

unknown and at times have brought disaster to the citrus and tropical fruit orchards. Key West is exempt from frost, however. In the northern counties there are a few days of frost in mid-winter and snow falls in some years but never in the south. The annual precipita¬ tion is from 58 to 60 inches, ranging from 6 to 8 inches in the fall and winter — the dry season — to 18 and 20 inches during the sum¬ mer. Precipitation much greater than this has been recorded at different places at wide intervals, thus 85 inches of rain were recorded for Miami in 1908, but this is abnormal, and the general rainfall is as indicated above. Key West has the lowest precipitation, about 39 inches. The normal sunshine is about 60 per cent. Its warm climate, dry winters, and me¬ dicinal springs have combined to make Florida the Riviera of America. In its many resorts for health and pleasure it occupies a unique place among the States of the Union. The more important of these resorts are Saint Au¬ gustine, Ormond, Palm Beach, Miami, Tampa, Daytona, Hampton Springs, Orange Springs, White Springs, and Worthington Springs.

Fauna. — In general the fauna of the State is similar to that of the southern and eastern States. Buzzards, bear, deer, otter, wildcat (lynx), coons, possums, rabbits, squirrels are found. The puma, manatee (sea cow), alli¬ gator and crocodile were formerly present in great numbers but have decreased rapidly in recent years owing to the settlement of their native haunts by man and the increased effi¬

ciency of the modern hunter through the intro¬ duction of weapons of precision, like the breech-loading magazine rifle. Ducks and wild turkeys are still numerous in the more remote regions. Snakes are by no means as scarce as some venders of grape-fruit groves would have us believe, but probably Florida is no worse off in this respect than its neighboring States of the South. Of the larger birds pelicans and egrets were once plentiful, but the latter have been almost exterminated by hunters seeking their plumes. Sponges are cut in considerable quantities along the Gulf Coast.

Flora. — The northern or continental part of the State has a flora similar to other parts of southeastern North America, while that of the south is affiliated with the flora of South America and the West Indies, and appears to form a connecting link between the latter and the flora of North America. About four-fifths of the species of southern Florida are common to the West Indies, Mexico, and South Amer¬ ica. The forests are estimated at 27,000,000 acres, two-thirds the area of the State; largely consisting of live-oak, hickory, long-leaved pine, pitch-pine, and cypress. Yellow pine is also plentiful. Florida has about half of the varieties of forest trees found in the United States, com¬ prising 202 species and including 281 native and cultivated trees. Peculiar to the State are the “Florida mahogany® or red bay, cachibou, satin-wood, kino-gum, manchineel, Indian almond, wild orange, coconut, yew and savin. Gum trees, magnolia, several species of palmetto, and red maple are common also. Whole districts in the State are covered with a dense undergrowth of shrubs, with little or no grass beneath. The spruce pine covers large areas together with several kinds of evergreen shrubs. “Flor-

ida scrub® is the popular name for this dense type of vegetation.

Forest Products. — The lumber and timh&r product of Florida, with the tar, turpentine, and ship stores, amount to about $40,000,000 yearly, or 75 per cent more than all the rest of the State’s manufactures together. The private timber holdings in the State exceed 17,000,000 acres and the stand of timber is estimated at 74 billion feet, board measure. This stand is made up of 80 per cent of pine, 15 per cent of cypress, and the remainder of hard¬ woods. In a recent year the 490 saw mills of the State turned out over 1,000,000,000 feet of pine lumber, laths, etc. ; 85,000,000 feet of cypress; 1,300,000 feet of hickory; about the same quantity of oak,

yellow poplar, and cedar ; and lesser quantities of ash, cottonwood, red gum, elm, tupelo gum, etc. This was all dressed lumber, exclusive of poles, railway ties, staves, etc,, and was valued at $17,000,000.

The production of turpentine has greatly increased in the last decade, about 20,000,000 gallons being now produced annually at a value of about $14,000,000. Rosin is produced at the rate of over 2,000,000 barrels annually, and brings over $5 per barrel. Tar is also produced in ever-increasing quantities. Since the entry of the United States into the World War, and owing to the unprecedented demand for ships, both of wood and steel, the quantities of turpentine, tar, rosin, and ship stores pro¬ duced in Florida have been greatly increased as has also the timber cut.

Fish and Fisheries. — Florida's enormous coast-line in the mid-continental seas gives its fisheries the greatest extent and value of any State south of Virginia ; they employ over 9,000 men. The total number of species of fish in the coastal waters of Florida is estimated at 500, and many species found off the Atlantic are not found off the Gulf coast and vice versa. The tarpon and the kingfish afford splendid sport to fishermen, while shad, mullet, red- snappers, trout, pompano, sheepshead and Spanish mackerel are taken for their economic value. Pensacola is the most important fresh fish market on the Gulf. About 350 vessels are engaged in the fishing industry, the catch is over $3,500,000 a year ; it is usually packed in ice and shipped to the populous centres of the North. The sponge fishery is peculiar to Florida, and centres in Key West; it has pro¬ duced as much as $550,000 a year. Alligators are caught for their skins, but their number is fast diminishing.

Minerals and Mining. — Florida has no metals, and its mineral industries are of rock and earths. The chief is the mining of phos¬ phate rock for fertilizers, in which it rivals any other district of the world. It is in various forms — hard and soft rock, land and river pebble, and vertebrate remains. The hard rock — much the most valuable, containing 80 per cent phosphate of lime — is found in a belt skirting the Gulf from Tallahassee nearly to Tampa. The centre of the industry is Dun- nellon, Marion County, and pebble phosphate is found in Hillsborough, De Soto, Citrus, Os¬ ceola and Hernando counties. Phosphate was discovered in 1888, and since then the product has risen to important proportions. The pebble

phosphate was long unpopular, but improved methods of treatment now make it as desirable as the hard rock phosphate, which for many years was the only kind that figured in the ex¬ ports. In 1915,

1,358,611 long tons, valued at $3,762,209 were produced. Production that year was at a low ebb, the industry being in poor condition because of the war. Shortly after the outbreak of hostilities production was cur¬ tailed by many companies and some suspended operations altogether. The year 1916 witnessed a gradual improvement in this industry, still the production in that year was only about 65 per cent of that of 1913, the last normal year before the war. The 1916 figures are 1,515,845 long tons, valued at $4,170,165. Florida in that year produced 76 per cent of the total of phos¬ phate rock in the United States.

Most of the fuller's earth used in the United States is also from Florida. There are exten¬ sive deposits at Ellenton, on the Manatee River and at Quincy. The demand for this substance in the refining of animal, vegetable and mineral oils has led to a vastly increased production within the last 20 years. The value of the yearly output in Florida is about $300,000. Kaolin is produced to the value of about $50,- 000 annually. Florida ball clay is in great de¬ mand by potters because of its. high plastic qualities. The output of the brickyards is val¬ ued at $300,000 yearly.

Lime and mineral waters are also produced. The whole mineral output in 1914 was valued at $8,497,688, and in 1915 at $4,886,010. In nor¬ mal years its value is well above $10,000,000.

Agriculture. — The soil, while much of it seems a sterile sand, is helped to fertility by the moisture. Florida furnishes abundantly the rich fruits and valuable products of the tropics. Large areas are devoted to orange orchards, while lemons, limes, grapes, pineapples, bananas, pears, guavas, etc., grow with equal luxuriance and coffee, rice, cotton and tobacco are natural products. Sea-Island cotton, so valuable and elsewhere limited to a few islands, here grows far inland. Coconuts also are grown in the sub-tropical region. Horticulture is one of the most profitable pursuits, and of late years market-gardening has assumed con¬ siderable dimensions in many parts of the State. An abundance of fruits and vegetables may be had fresh every month in the year, and during the winter and early spring months they are in great demand in northern markets. Agriculture is pursued generally in all parts of the State. At the last census there were 50,016 farms, with a total acreage of 5,253,538, of which 1,805,408 acres were improved. The total value of all farm property was placed at $143,183,183. About three-fourths of the farms are cultivated by their owners, but the tenantry system has increased within the last two decades, and is especially common in the dis¬ tricts where cotton is the principal crop. About one-third of the farms are operated by

negroes, but one-half of the negro farms are rented and the value of farm property held by negroes is $18,000,000 or about one-eighth the value of the farm holdings of the whole State.

In 1916, 840,000 acres were planted with corn ; the product was 12,600,000 bushels valued

FLORIDA

1 The Plaza, St. Augustine

2 Jupiter Light

FLORIDA

1 Capitol

2 Governor’s Mansion

FLORIDA

at. $11,340,000. In the same year cotton was grown on 197,000 acres and the product was valued at $6,412,000. Tobacco was planted on 2,500 acres to the extent of 3,025,000 pounds and sold for $908,000. In the same year 1,- 110,000 bushels of potatoes, valued at $2,220,000 were grown on 15,000 acres. Hay was pro¬ duced on 56,000 acres to the extent of 70,000 tons, valued at $1,120,000. Oats to the extent of 900,000 bushels was grown on 60,000 acres and sold for $639,000. In the same year 18,000 bushels of rice, valued at $14,000, was raised from 700 acres. In 1917, 3,410,000 pounds of tobacco were produced and 21,000 bushels of rice. Peanuts are grown on about 100,000 acres and the value of the annual crop is well over $2,000,000. In 1917 the cotton area was 183,000 acres and the yield 40,000 bales. The cotton area is confined almost entirely to the northern part of the State. Gadsden County is the centre of the tobacco growing district and about four-fifths of the State’s crop is pro¬ duced within its borders. Sugar-cane is being planted to an ever increasing acreage ; about 150,000 tons of cane are now grown annually. The value of the 1917 potato crop was $4,664,- 000, from 25,000 acres. Other vegetables in the same year were produced to the value of over

$8,000,000.

Horticulture. — The orchard crops are rich in tropical products —

lemons, limes, guavas, Japanese plums, olives, figs, coconuts, etc.; but the leading crops are oranges, grape-fruit and pineapples. The orange industry has been sub¬ ject to immense vicissitudes. Early in the 90s it was the one speculation of central Florida, and the product rose to 5,000,000 boxes in one year ; then the terrible cold wave of 1894—95 froze millions of young trees to the roots, often splitting them in two. The older trees, where well handled, generally sur¬ vived, but another cold wave in 1899 • — giving native Floridans the unprecedented sight of several inches of snow — destroyed a large part of those also ; the two disasters killed three-fourths of all the orange trees in the State. The crop sank to 125,000 boxes or there¬ abouts, and most of the growers abandoned the business, thinking a permanent change of climate had set in; but it is now known that heavy frosts occurred now and again in earlier times as well, and growers are recovering courage, though the industry is shifting toward the southeast coast. The orange crop in a recent year amounted to 4,769,312 crates, valued at $5,665,415. The industry is now well estab¬ lished in Brevard, Orange, Volusia, Hillsbor¬ ough, Lake, De Soto, Putnam and Polk coun¬ ties. The grape-fruit industry has extended rapidly within the last decade particularly in Dade, Lake, Lee, Manatee, Orange, Brevard, Palm Beach and Pinellas counties. In a re¬ cent year 1,405,308 crates, valued at $2, 684,525, were produced. Saint Lucie County is the centre of the pineapple district, but great quan¬ tities are produced also in Dade, Lee and Palm Beach counties. In a recent year 355,658 crates of pineapples were produced, valued at $383,- 155, also 11,810 crates of lemons, valued at $32,763 ; 27,061 bunches of bananas, valued at $26,346; 19,373 crates of avocado pears, valued

at $53,730; 26,500 crates of mangoes, valued at $26,500; persimmons valued at $6,650; 56,170 crates of guavas, valued at $49,000; 16,500 crates of figs, valued at $25,580; peaches valued at $225,576; 30, 900A barrels of pears, valued at $78,250; 17,700 bushels of plums, valued at $23,000; 1,000,000 founds of grapes, valued at $74,000, and coconuts to the value of $8,400.

Of tropical fruit trees there are over 40,- 000,000 of bearing age. The annual value of the tropical fruit crop is now well over $10,- 000,000. Strawberries are grown in large quantities for the northern markets ; the an¬ nual value of the crop is about $350,000.

Live Stock.— On 1 Jan. 1918 the State had 62,000 horses, valued at $6,100,000 ; 33,000 mules, valued at $4,950,000; 120,000 sheep, valued at $300,000; 1,375,000 pigs, valued at $12,375,000; 145,000 milch cows, valued at $6,184,000, and 891,000 cattle other than

milch cows, valued at $16,038,000. The total value of all farm animals in the State on 1 Jan. 1918 was $45,- 947,000, an increase of 126 per cent over the value of the live stock in 1910, which was $19,818,905, and an increase of 47.7 per cent over the value of the live stock on 1 Jan. 1914, which was then estimated by the United States Department of Agriculture at $31,828,000.

Manufactures.— The greatest industry of Florida, aside from the forest products, is the manufacture of cigars and tobacco, of which the heart is Tampa and Key West; it was de¬ veloped by the immigration of Cuban cigar- makers and still use great quantities of Havana leaf. The total value of tobacco prod¬ ucts manufactured annually is $21,575,000; the industry gives employment to 12,280 wage earners in 229 establishments. The capital in¬ vested in the industry amounts to $11,164,000, and the operatives receive as wages $7,169,000 yearly. Of the total value ($21,575,000) of the products of this industry, $12,890,000 is the value added by manufacture. The lumber and timber industry with the by-products of tar, rosin, turpentine and naval stores is the great¬ est industry at present in the value of the product which is estimated at $40,000,000 yearly. These industries employ over 37,000 people, but in the turpentine and ship stores industry convict labor was employed to a very great ex¬ tent until 1915. In these industries the greater part — nearly two-thirds — of the value of the product is added by manufacture. Next in im¬ portance comes the fertilizer industry which, with an invested capital of $3,758,000 employs nearly 1,000 people .in 12 establishments. The value of the products in a recent year was $4,170,165, of which about one-third repre¬ sented the value added by manufacture. The next industry of great proportion is that of cars and general shop construction and rail¬ way repair shops. There are 12 establishments of this kind in the State, with 1,753 wage- earners, who receive $1,018,000 in wages an¬ nually. The invested capital amounts to $1,- 251,000 and the value of the output to $1,743,- 000, of which $1,142,000 represents the value added by manufacture. The printing and pub¬ lishing industry is next in importance with 174 establishments employing about 1,000 wage- earners, and paying yearly $529,000 in wages.

The capital invested in this industry amounts to $1,683,000; the value of the product is esti¬ mated at $1,866,000, of which $1,432,000 is added by manufacture. Other industries with annual products less

than $1,000,000 in value are those of wooden boxes and barrels, cedar for lead pencils, sugarcane syrup, cottonseed oil and meal, brick and tile, canning and pre¬ serving, foundry and machine shop products, gas and ice, and boat building. The United States census of manufactures for 1914 showed within the State 2,518 industrial establishments of factory grade, employing 63,296 persons, of whom 55,698 were wage-earners receiving an¬ nually a total of $24,822,000 in wages. The capital invested aggregated $88,319,000, and the year's output was valued at $81,112,000; of this $47,296,000 was the value added by manu¬ facture; the materials used having cost $33,-

816,000.

The industrial progress in Florida was slow until the Civil War and afterward until the end of the Reconstruction period. It has made rapid strides, however, in the present century, but it suffers from several natural handicaps which preclude Florida from ever becoming of prime importance as an industrial State. The chief drawbacks are the lack of coal and of water power, two necessary requirements for any great industrial State. Another handicap is the system of leasing convict labor, a feature common to many States of the South. Great industries do not thrive on such a system and the sooner legislation is adopted to bring about its abolishment the sooner will industry show a healthful activity in all lines. As stated above the State's industries give employment to 55, 698 wage-earners, who receive compensation for their services to the amount of $24,822,000 yearly, an average of $446.39 per person. The same authority (United States census of manu¬ factures) gives the capital invested as $88,- 319,000, 6 per cent interest on which would amount to $5,229,140. The value added to the raw materials by manufacture was $47,296,000. By deducting from this the amount of wages and the interest on the capital — $30,051,140- — we have $17,244,860 left for depreciation of plant, machinery, etc., and as compensation for the 8,000 other persons engaged in industry and not classed as wage-earners. This reward for the masters of industry appears unduly high in comparison with the $446.39 per annum paid to the average wage-earner. Of the wage-earners in industry in Florida only 3,000 are women and less than 1,000 . are under 16 years of age. The average hours of labor are 58 hours per week and in about one-sixth of all establishments the hours were more than 60 per week. Tampa, Key West, Jacksonville and Pensacola are the chief industrial centres and contain nearly one-half of all industrial estab¬ lishments in the State. Tampa and Key West lead with tobacco establishments, Jacksonville in fertilizer works, while at Pensacola all in¬ dustries are about equally represented.

Commerce and Transportation. — Florida's position makes it the natural outlet for ex¬ ports to the West Indies; but till late years un¬ improved harbors and inferior railroad equip¬ ment checked the volume of commerce. The

export trade of the State amounts to about $30,000,000 annually, with about $4,000,000 im¬ ports. About 3,000,000 tons of shipping clear yearly from Florida ports. The tar, resin and turpentine exported from Pensacola are valued at over $2,500,000 annually, and cotton to the value of $9,030,000 is exported from this port, but some of this comes from Alabama and Georgia, as also some of the tobacco and phos¬ phate exported from here. The State's chief exports are timber and lumber (over $19,000,000 annually), naval stores, fruits, corn, cotton, tobacco and cigars, phosphate rock and fertil¬ izer, fish, and horses, mules and cattle to Cuba. The largest exporting points are Pensacola, Tampa, Jacksonville and Key West. There are important steamer lines running from Jackson¬ ville to Charleston, New York and Boston; from Tampa to Havana and Porto Rico; from Key West to Havana, Galveston, New Orleans and New York, and from Miami to Nassau and Cuba, also coasting lines from Fernandina, Apalachicola, Carrabelle and Punta Gorda.

Great improvements have been made in the principal harbors in recent years. The harbor channel of Pensacola is now 30 feet deep at low water and 500 feet in width. At Jackson¬ ville harbor improvements are being carried out, which when completed will insure a chan¬ nel 30 feet in depth and about 300 feet wide from the inner harbor to the ocean. There is much tourist traffic and business navigation on the rivers and bays. The Saint John's has been greatly improved as also the channel of the Apalachicola.

Of prime importance in the development of the State have been the railways. In 1880 the State had only 518 miles of railway, in 1917 it had 6,060 miles, of which 5,040 were single track and 3,833 were main track. The mileage of electric roads in the same year was 128. The largest railway system is the Atlantic Coast Line with 947 miles of main track lines. The Seaboard Air Line is next in importance with 928 miles,, followed by the Florida East Coast, 522 miles; the Louisville & Nashville, 216 miles ; the Georgia Southern & Florida, 152 miles, and the Apalachicola Northern, 102. The Florida East Coast Railway extension to Key West was opened 22 Jan. 1912. This ex¬ tension was a remarkable engineering feat, linking up the Keys for about 100 miles. The construction comprised numerous concrete via¬ ducts over channels and embankments across the Keys. Railroad rates are regulated by a State railroad commission, which may fix any rate

it deems equitable provided that the revenue from such rates does not sink below the sum required to meet operating expenses and general maintenance charges.

Banks, Finance, etc.— There are 46 na¬ tional banks in the State, with a paid capital in excess of $6,000,000, and total deposits amounting to $29,000,000. The 143 State banks have deposits aggregating $23,000,000, of which about $6,000,000 are classed as savings depos¬ its. The four savings banks in the State had 7,197 depositors in 1916, with $1,759,612 placed to their credit, being $244.49 to each depositor. There are seven private banks in operation and

five loan and trust companies with deposits aggregating $732,127.

The assessed value of real property for 1917 was $214,771,689 ; for personal property, $107,444,383, making a total for that year of $322,216,072. In the same year the financial status of the State Treasury was as follows:

Balance on hand, 1 Jan. 1917 . $1,077,710

Received from all sources in 1917 . 4,922,028

Total . $5,999,738

Disbursed during 1917 . 4,935,929

Balance in Treasury, 1 Jan. 1918 . $1,063,809

The public debt of the State, 1 Jan. 1918, consisted of refunding bonds to the amount of $601,567 at 3 per cent interest, all of which were held by State educational funds. Under recent legislation special tax districts are pro¬ vided which are empowered to issue ‘bonds for the construction of free public schools.

.Education. — It was not until 1835 that a public school system was provided for by pub¬ lic funds. In the census of* 1840, 18 academies were reported and 51 public schools. In 1849 a State appropriation provided in a manner for the education of white children and the Federal government in the same year made a grant of land for the same purpose. In 1860, the State reported 2,032 pupils in public schools and 4,486 in academies and other schools. The Civil War

wrought havoc with the growing educa¬ tional system and it was not until 1869 that the work was well in hand again. The problem in Florida, as elsewhere in the South, is made very difficult by the scattered rural population ana by the great number of negroes. The State constitution prescribes that white and colored children shall not be taught in the same school, but impartial provision shall be made for both. The percentage of illiteracy in 1910, was 13.8, a decline from 21.9 per cent in the previous decade. The percentage of illiterates among negroes was 25.5 per cent. In 1916, there were in operation 2,916 public elementary schools, with 198,365 enrolled pupils. There were in the same year 4,380 female teachers and 1,485 men teachers. In 103 public high schools there were 176 men and 211 women teachers and 6,339 pupils. The total ex¬ penditure on education in that year was $3,818,675. Higher education is provided in a University of the State of Florida, at Gaines¬ ville; a State College for Women at Tallahassee, with 550 students; Rollins College at Winter Park, with 175 students. There is also the John B. Stetson (Baptist) University at De Land, founded in 1887, having (1920-21) enrolment of 500 students. There is a colored normal and industrial school at Tallahassee. Colored secondary education is provided for by three institutions at Jacksonville and one at Live Oak.

White male teachers receive an average monthly salary of $55; white females, $37; negro male teachers, $39; and negro female teachers, $31. Florida has a local option com¬ pulsory school attendance law, passed by the last legislature. Duval County has compulsory school attendance.

Religion. — The Baptists are the strongest religious denomination, including about 41.6 per cent of all church members in the State. The Methodists are a close second with 37.2 of the total membership. The remainder is made up

of Roman Catholics, numbering 51,000, Protest¬ ant Episcopalians and Presbyterians.

Charities and Penal Institutions. — There is a State Hospital for the Insane at Chatta¬ hoochee, a school for the blind and for deaf- mutes at Saint Augustine, a State Industrial School for Boys at Marianna, a Confederate Soldiers' and Sailors'. Home at Jacksonville, an Industrial School for Girls, and the State Prison Farms at Raiford and Ocala. Juvenile courts are administered by the regular county court judges but separate juvenile records are kept. According to the last census statistics there were 207 paupers in almshouses, being 27.5 per 100,000 of the popoulation. Indigent mothers are pensioned by the

State.

There is no penitentiary in Florida, the con¬ victs are leased under contract for their labor as in other States of the South. Previous to 1913 they were hired out to the highest bidder who also undertook to lease all other persons committed during the term of his lease. It was usual for this party to sub-lease the prisoners. A supervisor of convicts was ap¬ pointed in 1889 and additional supervisors might be appointed at the will of the governor under a statute passed in 1905. Special legis¬ lation was enacted from time to time to curb the abuses inherent to the leasing system. Over $200,000 was realized many years by the State under the system, which until 1906 included fe¬ male as well as male prisoners, and the decrepit as well as the able-bodied. In that year pro¬ vision was made for excluding all feeble pris¬ oners upon examination by the State prison physician. Females continued to be leased until 1913. The law passed in that year or¬ dered the Board of Commissioners of State In¬ stitutions to allot able-bodied male convicts for work on the public roads to such counties as might apply for them. For each convict so al¬ lotted $120 was assessed against the county. Under this provision only 50 convicts were placed at road work in the counties ; the other able-bodied convicts were leased to the highest bidders throughout the State for a term of two years. All these were employed in the turpentine industry. The decrepit prisoners were placed on the State farms at Ocala and Raiford, where all able to do manual labor, were put at farm work, budding, etc. County probation officers were appointed under the act of 1913. All prison camps are under the super¬ vision of the governor and the supervisors ap¬ pointed by him. Each camp is inspected at in¬ tervals not exceeding 30 days. According to the last census there were in the State 1,836 prisoners, being 243.9 per 100,000 of the popu¬ lation. In 1915 this number was reduced to

1,082.

Government. — The State constitution now in being was framed in convention in 1885, was ratified by the people at the November elections of 1886, and went into effect on the first of January of the following year. Minor amend¬ ments have since been made. Compared with the earlier constitution of 1868, it made many sweeping changes in the direction of democracy. The State and county officers had formerly been mostly appointed bv the governor, and the Supreme Court justices were appointed for life; under the present constitution all are elected, except circuit judges, and the judges' terms are six years. An amendment to the constitution

may originate in either branch of the legislature in the course of a regular session. If such amendment receive the votes of three-fifths of the members of both houses, it is submitted to the people for ratification at the next general election following. A two-thirds vote of the members of both houses of the legislature is required to submit a revision of the constitution to the people. If ratified by a majority of the latter, a constitutional convention is then pro¬ vided for by the legislature, to meet within six months after the law providing therefor and to be composed of delegates equal in number to the membership of the Lower House, and ap¬ pointed among the counties similarly to the members of the Lower House.

Executive. — The highest executive power is vested in the governor, who is elected for four years, and cannot be re-elected for an immedi¬ ately succeeding term. His salary is $6,000. His veto may be overridden by a two-thirds vote of the members present in both branches of the legislature. In case of vacancy, the succession devolves on the president of th-e senate and the speaker of the house successively. Other officers wielding executive power are the sec¬ retary of state, the attorney-general, the comp¬ troller, the treasurer, the superintendent of pub¬ lic instruction and the commissioner of agri¬ culture. All these officials are elected the same year as the governor and for a like term of four years. With the governor they form the Board of Commissioners of State Institutions. The Board of Pardons is constituted of the same State officers, except the superintendent of public instruction.

Legislative — The legislative power resides in a State legislature, composed of two cham¬ bers, a senate of 32 members and a house of representatives of 68 members. The legislature meets biennially, with sessions limited to 60 days except at their own expense. Extra ses¬ sions may be convened by the governor by proclamation, but such extra sessions are not to exceed 20 days. Senators are elected for four years. Representatives are elected for two, the senate being renewed by one-half every two years. The regular sessions begin on the Tuesday following the first Monday in April in alternate years.

The Judiciary. — This branch of the State government is composed of a supreme court, circuit courts, criminal courts, county courts, county judges' courts, and local justices of the peace. The five justices of the supreme court serve for six years ; they are elected under the new

constitution but previous to 1885 were appointed for life. The chief justice is selected every other year by lot. A majority constitutes a quorum. The 15 justices of the circuit courts also, serve for six years. They are nominated by the governor but before qualifying must be confirmed by the senate. In the circuit courts all cases in equity are tried and these courts have exclusive orig¬ inal jurisdiction in such cases. They are also the final courts of appeal in civil and criminal cases first tried in the county courts. State's attorneys are appointed to the circuit courts and serve for terms of four years. The minor courts, criminal courts of record, county courts, county judges' courts, and justices of the peace, are all of limited jurisdiction. Twelve men are required on a jury in all capital offenses, but

in all other criminal and in all civil cases six men only are required.

Suffrage, etc. — The constitutional qualifica¬ tions for an elector are that he be a male citi¬ zen of at least 21 years of age. If a natural¬ ized citizen naturalization certificates must be presented at the place of registration. The prospective voter must also have resided in the State one year and in the county six months next preceding election and must register. In addition to these requirements the payment of a poll tax for the two years preceding election has been added as a qualification for voting by act of the legislature, such enactment having been authorized by the constitution. For per¬ sons who have been residents of the State for only one year this provision is modified accord¬ ingly, requiring payment of the poll tax for one year only. The State has the pure Aus¬ tralian ballot and in order to control the negro vote non-partisan tickets are usually put for¬ ward. General elections take place biennially on the Tuesday next following the first Monday in November in even years. In accordance with the provisions of the 17th amendment to the Federal Constitution, United States senators are elected by the people at the general elections which precede the expiration of a senatorial term of office. In case of a vacancy the gover¬ nor is empowered to make a temporary ap¬ pointment until such vacancy is filled at a gen¬ eral election.

In 1913 a primary election law was passed by the legislature which contained provisions for the nomination to all elective offices in the State, regulated campaign expenditures, and instituted severe penalties for corrupt practices. Under this law to secure representation as a party on the ballot a political party must have polled at the preceding election at least 5 per cent of the vote of the entire State.

Local Government. — The county is the polit¬ ical unit, and at its head is a board of five commissioners which exercises general

jurisdic¬ tion over county affairs. These commissioners are elected for a term of two years. Other county officers are the sheriff, the treasurer, tax assessor, tax collector, surveyor, superintendent of public instruction, clerk of the circuit court and constables. It is within the province of the legislature to define the powers and jurisdiction of municipalities and these are generally set forth in the charters establishing such munici¬ palities. All towns may adopt the commission form of government. Pensacola and Tampa are the largest cities which have done so.

Special Constitutional Provisions. — A wife holds in her own name property acquired before or after marriage; she is not liable for debts incurred by her husband. Intermarriage of whites and negroes, or persons of negro de¬ scent to the fourth generation, is prohibited. A homestead of 160 acres, or of one-half of an acre in an incorporated town or city, owned by the head of a family who is a resident of the State, with personal property not to exceed $1,000 and the improvements on the real estate is exempt from enforced sale except for pur¬ chase money, delinquent taxes, or mortgage. It is further ordered by legislative enactment that whites and blacks living in adultery are to be punished by imprisonment or fine; divorces may be secured only after two years' residence within the State and on the ground of adultery,

extreme cruelty, habitual drunkenness, habitual indulgence in violent temper, desertion for one year, previous marriage still binding, physical incapacitv, or such relationship of the parties as prohibits by law their entering into lawful wedlock. Legitimacy of natural children can be established by subsequent marriage of the parents. The legal age of consent is 16 years.

AMERICAN GOVERNORS OF FLORIDA.

Territorial

Andrew Jackson .

William P. Duval .

John H. Eaton .

Richard K. Call .

Robert R. Reid .

Richard K. Call .

John Branch .

1821-22

1822-34

1834-36

1836-40

1840- 41

1841- 44 1844-45

State

William D. Moseley .

Thomas Brown .

James E. Broome .

Madison S. Perry .

John Milton .

William Marvin .

David Shelby Walker .

Harrison Reed .

Ossian B. Hart .

Marcellus L. Stearns .

George F. Drew .

William D. Bloxham .

Edward A. Perry . .

Francis P. Fleming .

Henry L. Mitchell . . .

William D. Bloxham .

William S. Jennings .

Napoleon B. Broward .

Albert W. Gilchrist .

Park Trammel .

Sidney J. Catts .

Cary Hardee .

Democrat . .

_ 1845-49

Whig .

_ 1849-53

Democrat . .

. . . . 1853-57

U

_ 1857-61

U

. . . . 1861-65

Provisional .

_ 1865-

Democrat . .

. . . . 1866-68

Republican .

. . . . 1868-72

U

_ 1873-74

u

_ 1874-77

Democrat. .

_ 1877-81

U

_ 1881-85

u

_ 1885-89

u

. . . . 1889-93

u

_ 1893-97

u

. . 1897-1901

u

1 . .

_ 1901-05

a

_ 1905-09

a

_ 1909-13

u

_ 1913-17

u

_ 1917-21

u

. .. . 1921-25

Population. — In 1900, Florida had a popu¬ lation of 528,542, comprising 297,812 whites and 320,730 negroes, or 9.6 persons to each square mile of area. In 1910, it returned 752,619, com¬ prising 443,950 whites and 308,669 negroes, or 13.7 persons to the square mile. This was an increase of 42.1 per cent for the decade. In 1915, the population by sex and birth comprised 291,684 white males, 268,103 white females, 187,295 negro males, and 173,099 negro females, 226 Asiatics and 129 Indians, making a grand total of 921,618. Of the total (752,619) re¬ ported by the 1910 census, 33,842 were foreign born, of whom 1,896 were from the West Indies, 2,917 from England, 2,442 from Ger¬ many, 4,538 from Italy, 1,698 from Canada, and 4,183 from Spain. The population in 1920, ac¬ cording to the United States census, was 968,470. The largest cities in the State are Jacksonville, with population of 91,558 in 1920; Tampa, 51,252; Pensacola, 31,035; Key West, 18,749; Tallahassee, the capital, 5,637; Miami, 29,549; St. Petersburg, 14,237 ; St. Augustine, 6,192.

Indians. — The greatest and the most heroic stand of the American aborigine in defense of his home land was made by the Seminoles of Florida, who for centuries after the advent of the white man roamed in undisputed possession all over the peninsula. The Spaniards at¬ tempted to found only a few settlements on the coast and rarely penetrated inland; during the later colonial period they treated the In¬ dians with kindness and interfered not at all with their freedom of action. Soon after the

peninsula was ceded to the United States, grasping white settlers from Georgia beean to encroach on the red man's domain and exhibited

little sympathy, no charity and a minimum of honest dealing toward him. Trouble ensued and

one of the great conflicts of American history took place in which superior force prevailed, the Indians were decimated, and the greater part of the survivors were torn from their native haunts and removed to western reser¬ vations. Some, however, concealed themselves in

the Everglades, refused to yield and to-day their descendants occupy a unique position. They are still unconquered and have never acknowledged allegiance to the government of the United States. Their number is estimated at present as a little less than 500 souls. They are expert hunters and trappers as their forebears were, but the drainage enterprises and the ever advancing settlements of the whites are rapidly depriving them of their hunting grounds and consequentˆ of their means of subsistence, for they do not take kindly to agri¬ culture.

Since 1889 the State legislature made several attempts to set aside land for the Indians. Congress took a hand in the matter and pro¬ vided funds for the purchase of 23,000 acres for a reservation. In 1913, Congress appointed a special agent to look after the interests of this tribe. In 1917, the State legislature set aside 100,000 acres near the Ten Thousand Islands, on which industrial schools are to be erected and where the Seminoles will be assisted to be¬ come self-supporting through agriculture, stock- raising, etc. The difficulty to be faced is that most of the tribe still look upon agriculture with disdain and their peculiar tribal customs render efforts for their education especially dif¬ ficult. The measles, elsewhere a mild disease, is one of the great enemies of the Seminoles. Because of the lack of sanitation, it spreads rapidly, and the medicine man of the tribe often proves an efficient aide in increasing mortality from the disease. For the ethnography, his¬ tory, customs, etc., of this tribe see Seminole Indians.

Counties and County-Seats. — The State has 54 counties, which, with their capitals, are as follows :

Alachua, Gainesville Baker, MacClenny Bay, Panama City Bradford, Starke Brevard, Titusville Broward, Fort Lauderdale Calhoun, Blountstown Citrus, Inverness Clay, Greencove Springs Columbia, Lake City Dade, Miami De Soto, Arcadia Duval, Jacksonville Escambia, Pensacola Flagler, Bunnell Franklin, Apalachicola Gadsden, Quincy Hamilton, Jasper Hernando, Brooksville Hillsborough, Tampa Holmes, Westville Jackson, Marianna Jefferson, Monticello Lafayette, Mayo Lake, Tavares Lee, Myers Leon, Tallahassee

Levy, Bronson

Liberty, Bristol

Madison, Madison

Manatee, Braidenton

Marion, Ocala

Monroe, Key West

Nassau, Fernandina

Okeechobee, Okeechobee

Okaloosa, Milligan

Orange, Orlando

Osceola, Kissimmee

Palm Beach, West Palm Beaoh

Pasco, Dade City

Pinellas, Clearwater

Polk, Bartow

Putnam, Palatka

St. John, St. Augustine

St. Lucie, Fort Pierce

Santa Rosa, Milton

Seminole, Sanford

Sumter, Sumterville

Suwanee, Live Oak

Taylor, Perry

Volusia, De Land

Wakulla, Crawfordville

Walton, De Funiak Springs

Washington, Vernon

Defense. — The militia, known officially as the National Guard of Florida, is composed of infantry, artillery and a detachment of sanitary troops. The headquarters are located at Talla¬ hassee. On 30 Tune 1917 its total strength was 2.842 officers and men. The Federal govern¬ ment maintains naval stations at Key West and Pensacola.

History. — Exploration Period. — The earliest attempted colonization of the North American mainland was in Florida, and the first white settlement was Saint Augustine. The history of the early expeditions is fascinating. It was not the lure of gold that drew thither the Spanish conquistadores from the islands of the Spanish Main, but the search for a mysterious island named Bimini where there was a fountain which banished age and its disabilities. On 23 Feb. 1512 Juan Ponce de Leon received from the Spanish Crown a patent of discovery and permission to proceed to discover and settle the Island of Bimini. With the wealth he had accumulated in his public employments in Porto Rico and elsewhere he proceeded to equip vessels for his expedition. In that day of great discoveries he found no difficulty in securing followers for his chimerical journey in search of the Fountain of Youth. Troubles beset him, however, and after a detention of a year in Porto Rico, where he aided in the subjugation of the aborigines, he set out on his voyage of exploration in March 1513. On the 27th he discovered the coast a little north of Saint Augustine ; he cruised along the coast and on 2 April 1513 made a landing in lat. 30° 8′ From the appearance of the land, and because he first came upon the coast on Easter Sunday (Sp. Pascua florida), the name Florida was given to the island, as he then supposed it to be. Formal possession was taken in the name of His Most Catholic Majesty, the King of Spain, and all swore allegiance to that monarch. Af¬ ter two. months spent in further exploration Ponce de Leon reembarked and proceeded south¬ ward along the coast. His next landing was attempted near an Indian village, but the hostil¬ ity of the latter prevented a landing and the voyage was continued around Cape Corrientes, where a chain of islands was discovered, to which was given the name of The Martyrs. Hostility of the natives obliged the explorer to push on and he discovered and named the Tortugas. He returned to Porto Rico without finding the object of his quest, the Fountain of Youth.

His glowing account of the riches of ((the island of Florida,® on his return to Spain, caused him to be appointed Adelantado of this land and a new patent was granted him. Delay upon delay ensued and it

was not until 1521 that he again set forth. Meanwhile other Spaniards had visited Florida and proved it to be a peninsula. Ponce now dreamed of founding a great empire and set about the conversion of the aborigines to the Christian faith. The exact place of his debarkation is unknown; he was attacked by hostile Indians; was himself severely wounded; sickness spread among his followers, and he decided to abandon the attempt to colonize Florida. He withdrew to Cuba, where he died soon after. Between 1520 and 1526 Vasquez de Ayllon raided Flor¬ ida for slaves but made no attempt at settle¬ ment or exploration. The second man to at¬ tempt its exploration was Panfilo de Narvaez, who in 1529 began his fatal expedition west¬ ward from Pensacola Bay. After treading un¬ known wildernesses to the westward, the leader perished at sea, and of his followers only five escaped the fevers and the hostile natives. One of these was Cabega de Vaca, who after

seven or eight years of servitude among the Indians finally reached the Spanish settlements of Mexico. The next expedition was on a more pretentious scale. Its leader was Her¬ nando de Soto, who had been one of the lead¬ ing generals of Pizarro in Peru. Led on to dreams of empire by the returned adventurer, Cabega de Vaca, De Soto determined to con¬ quer the supposedly rich land of Florida, deter¬ mined to write his name as high as those of Cortez and Pizarro who had conquered whole empires for Spain. On 6 April 1538 he put to sea from Spain in 10 vessels with a great band of followers. He stopped off at Santiago de Cuba and at Havana, and not until 25 June 1539 did his expedition reach Tampa Bay. De Soto explored a great part of the peninsula in 1539 and the following year, but great num¬ bers of his followers were slain by the Indians, all of whom manifested the greatest hostility to the white men. After weary months of wandering through the primeval wilderness his party reached the Mississippi where De Soto died of fever. In 1559 an expedition on a large scale was prepared to conquer the penin¬ sula, where so much disaster had attended the Spaniards. In that year Don Tristan de Luna set out from Vera Cruz with 1,500 soldiers and a number of priests and monks. On 14 Aug. 1559 he arrived in Pensacola Bay; an expedition was sent into the interior, but disaster after disaster followed, the ships were lost in a hurri¬ cane, food supplies became exhausted ; the party became divided in its counsels, and De Luna was recalled in 1561, having accomplished nothing.

The Huguenots. — Coligny, designing to found a Huguenot colony and refuge in the New World, sent out a company, in 1562, under Jean Ribaut, who founded the colony of Port Royal, S. C. In 1564, Ribaut's colony hav¬ ing failed, Rene de Laudonniere, in charge of a new

company of Huguenots, built Fort Caroline on the Saint John's River. The col¬ ony did not prosper and Laudonniere was about setting out for home, when he was joined by Ribaut and 300 men from France. On 28 Aug. 1565 Pedro Menendez de Avilez at the head of a Spanish expedition cast anchor in the Bay of Saint Augustine. His object was to exterminate the Huguenot settlement. He captured Fort Caroline and put to the sword nearly the entire garrison ((not as Frenchmen but as heretics.® Menendez thereupon founded Saint Augustine, explored the coast and built forts at San Mateo (Fort Caroline), Avista, Guale and Saint Helena. Menendez returned to Spain in 1567. The brutal murder of the French Huguenots did not long remain un¬ avenged despite the indifference manifested at the French court. Dominique de Gourgues, friend of Jean Ribaut, but probably a Catholic, gathered a body of picked men with the osten¬ sible object of kidnapping slaves on the African coast, keeping the true design to himself until his ships were nearing the coast of Florida. His followers after he made it known to them endorsed the project for revenge and with the aid of the Indians De Gourgues took Fort San Mateo in 1568. On the very spot where Menendez had executed the garrison of Fort Caroline, De Gourgues hanged all of the Span-

iards that remained after the assault on the fort, and inscribed a tablet of firewood : (

do not this as unto Spaniards, not as unto Mariners, but as unto Traitors, Robbers, and Murderers.® The Spaniards at Saint Augus¬ tine being in too great force, De Gourgues re¬ frained from attacking them and returned to France, his mission accomplished.

Colonial Period. — After the stirring events just narrated a century elapsed without any attempt being made by the Spaniards to ex¬ tend their settlement beyond the Atlantic coast. The total results of 100 years of Spanish domination were three small fortified posts and a few scattered missions among the ab¬ origines. In 1586 Saint Augustine was burned and destroyed by Sir Francis Drake, and in 1665 English buccaneers under John Davis plundered it. In 1696 the Spaniards, jealous of the extension of the French settlements in Louisiana, turned for the first time toward the Gulf coast and founded Pensacola. French settlements by 1702 limited Florida to the Per¬ dido River on the west while to the north the English colonial grants placed another limita¬ tion on the claims of Spain in that direction. All through the 17th and early 18th centuries the Spaniards in

Florida are alleged to have harassed or set on the Indians to harass, the English settlements, especially after . Georgia was settled. Saint Augustine was captured and burned by a force from South Carolina in 1702, Spain and Great Britain being then at war. The fort was not reduced, however, and the English withdrew upon the approach of reinforcements to the Spaniards. In 1708 and again in 1722 the Carolinians invaded Florida and in 1740 Gen. James Edward Ogle¬ thorpe, governor of Georgia, attacked Saint Augustine, and made a second attempt in 1745. Pensacola was taken by the French in 1719 and held by them for five years. In 1763 East and West Florida — the latter west of the Apalachicola, and including parts of modern Alabama and Mississippi — were ceded to Great Britain under the terms of the Treaty of Paris. Civil government now displaced the military and a period of great prosperity ensued. Roads were laid out and many of them built, and in 20 years more than 25,000 white immigrants settled in Florida. During the War of Inde¬ pendence most of the white population of Florida remained loyal to England. Plans were made to invade Georgia and South Carolina, and in 1778 a Florida expedition took part in the siege of Savannah, Ga. In 1779 the Span¬ iards of New Orleans seized the English post in West Florida and took Pensacola in 1781.

In 1783 Florida was retroceded to Spain at the Treaty of Paris. Since that treaty did not guarantee the religious liberty of the English settlers many of the latter withdrew. In 1795 the northern boundary was placed at the line of 31 north latitude by treaty with the United States. In the same year West Florida was sold to France. After the Louisiana Purchase of 1803 the United States claimed up to the Perdido as part of <(Louisiana® ; the claim was not then pressed, for fear of war; but in 1810, the Spanish monarchy being overthrown and the king a prisoner, the United States took

possession of all but Mobile, which was occu¬ pied in 1813 at the time of the War with Britain. West Florida was declared an inde¬ pendent State on 26 Sept. 1810 by the settlers, who set up a government and asked for ad¬ mission to the Union. President Madison de¬ clared West Florida under the jurisdiction of the United States, and in 1812 that part of West Florida between the Pearl and Missis¬ sippi Rivers was added to Louisiana and that between the Pearl and Perdido Rivers was in¬ corporated with Mississippi.

During the War of 1812 the English in 1814 landed a garrison at Pensacola, with the con¬ nivance of the Spaniards. Their stay was short, however, as Gen. Andrew Jackson took Pensacola in November 1814. The British next built a fort on the Apalachicola from which Indians and fugitive slaves were sent against the Americans. The so-called Spanish ˆgovernment® at this time was mere anarchy, partly from there being no stable home gov¬ ernment to control it; Indian bands raided Georgia and

escaped over the border, British and Spanish traders intrigued with them, and it was an Alsatia for fugitive slaves which drove the slaveholders wild. Congress author¬ ized Madison to take ((temporary possession® in 1811, but nothing was done; in 1818 Jack- son invaded it to punish Spanish assistance to the Seminole raids and the withholding of fugitive slaves, captured Saint Marks and Pen¬ sacola, and hanged Arbuthnot and Ambrister, two British adventurers making profit by fur¬ nishing supplies and possibly other help to the Indians.

Annexation and Statehood. — The district be¬ ing both profitless and untenable to Spain, she ceded it to the United States by treaty of 22 Feb. 1819, in exchange for government as¬ sumption of $5,000,000 claims of American citi¬ zens against Spain. The treaty was ratified in 1821, and in March 1822 it was admitted as a Territory of the United States and the mili¬ tary authority was superseded by the civil. The two sections, East and West Florida, both from geographical and political reasons, had no sym¬ pathy with each other, and repeatedly peti¬ tioned Congress for separation, without avail. Especially West Florida, as late as 1869. voted for annexation to Alabama, which offered Florida $1,000,000 for it; but no further steps were taken. Self-government was very lim¬ ited at first. The government consisted of a governor appointed by the President and a council of 13, appointed annually. After 1826 members of the council were elected by the peo¬ ple, and after 1834 there were 26 members in the council. A stable government and the im¬ migration of white settlers from the Southern States ushered in a period of prosperity which was handicapped by frequent forays of the Indians. From 1835 to 1842 the Seminole War was waged and at its close all but a few hun¬ dred of the Seminoles were placed on reserva¬ tions in Indian Territory. On 11 Jan. 1839 a convention passed a constitution for the State of Florida, but it was not admitted to the Union till 3 March 1845, paired with Iowa, as a slave State with a free State. The constitu¬ tion, forbidding emancipation of slaves by the

legislature, roused a violent debate in Congress over admission.

Civil War and Reconstruction. — On 10 Jan. 1861 Florida passed an ordinance of secession by a vote of 62 to 7 ; on 21 January her sena¬ tors withdrew from Congress; on 4 February her delegates took their seats in the Confederate Congress, and on the 17th she became a mem¬ ber of the Confederacy. The government posts in the State nearly all fell into Confederate hands; but Fort Pickens, off Pensacola, and the forts at Key

West and the Tortugas were re¬ tained and formed a nucleus for recapture. Most of the coast towns were captured by the Federals during the first two years of war. But the State remained in the Confederacy. After 1863, however, the Union forces were employed in other quarters ; and by the battle of Olustee, 20 Feb. 1864, the State was ac¬ knowledged lost to the Union till the close of the war. On 20 May 1865 all slaves in the State were freed. On 13 July 1865 a pro¬ visional government was formed ; on 25 Octo¬ ber a State convention met, which on the 28th annulled the ordinance of secession. A new constitution was adopted without slavery and a legislature organized in 1866; but on 2 March 1867 it was brought under the Reconstruction Act, and became a part of the Third Military District. A constitution was ratified by popu¬ lar election in May 1868, the legislature met the 8th June following and ratified the 13th and 14th Amendments to the Federal Constitution, and on 25 June 1868 Florida was reorganized as a State. On 4 July the government was transferred to the civil authorities and the new State officials assumed office. The extrava¬ gances of the Reconstruction government brought about a great increase in the State's indebtedness and taxes were burdensome for many years. Only in 1873 did the yearly reve¬ nue of the State equal the current expenses of government and the interest on the State debt.

Modern Development. — The 70's were marked by bitter political contests, power grad¬ ually passing back to Democratic hands. In 1876 the State's electoral vote was disputed, but the vote was at length given to Hayes, after a visit of a commission to Florida. The late 80's witnessed the discovery of the great deposits of phosphate rock and economic con¬ ditions began to improve rapidly. This decade and the 90's saw railroads extended through¬ out the State, and the east coast became a popular winter resort.

Railroad development was in great part due to the foresight of Henry M. Flagler, who saw the latent wealth of the State and its possibili¬ ties as a fruit-growing centre as well as a health and pleasure resort. The investments of Northern capital in industries and railroads, the Federal work on harbors, rivers, etc., have made Florida a strong and thriving State. In State elections the Democratic majority is well over 30,000. Except in a Presidential year, it is not usual for the Republican party to nominate a full State and congressional ticket. Since 1910 Florida sends four representatives to the lower house of Congress.

Bibliography. — General': Aflalo, F. G., 1 Sunshine and Sport in Florida and the West

Indies5 (New York 1907) ; (Climate, Soil and Resources of Florida5 (United States Depart¬ ment of Agriculture, Washington 1882) ; Cock¬ erell, T. D. A., (West Indian Fauna in Florida5 (in Nature, Vol. XLVI) ;

Cory, C. B.,

(Hunting' and Fishing in Florida5 (Boston 1896); Dimock, A. W. and J. A., (Florida Enchantments5 (New York 1909); hlorida: A Pamphlet Descriptive of its History, Topog¬ raphy, Climate, Soil, etc.5 (Florida Department of Agriculture, Tallahassee 1904) ; Gifford,

(Everglades and other Essays Relating to Southern Florida5 (Kansas City 1911) ; Mac- Gonigle, J. N., Geography of Florida5 (in National Geographic Mazagine, Vol. VII) ; Matson and Sanford, Geology and Ground Waters of Florida5 (in United States Geo¬ graphical Survey, (Water Supply Paper 319, 5 Washington 1914) ; Millspaugh, C. F., (Flora of the Sand Keys of Florida5 (Chicago 1907) ; Norton, C. L., handbook of Florida5 (2d ed., New York 1892) ; Packard, W., (Florida Trails5 (Boston 1910) ; Preliminary Report on the Soils of Florida5 (Bulletin 13, United States Department of Agriculture, Division of Soils, Washington 1898) ; Pourtales, L. F., (Flora and Fauna of the Florida Keys5 (in The American Naturalist, Vol. XI) ; Rhodes and Dumont, (Guide to Florida5 (New York 1912) ; (Reports of the Thirteenth Census of the United States5 (Washington 1910 et seq.) ; Smith, E. A., Agricultural Features of Florida5 (Vol. VI of Reports of the Tenth Census, Washington 1884); Winter, Nevin O., hlorida: The Land of Enchantment5 (Boston 1918). Government, Education, etc.: Brevard and Bennett, Gov¬ ernment of Florida5 ; Bush, history of Edu¬ cation in Florida5 (United States Bureau of Education, Circular No. 7, Washington 1888) ; (Revised Statutes of Florida5 (1892); Thorpe, F. N., (Federal and State Constitutions5 (1909) ; Yocum, Wilbur F., (Civil Government of

Florida5 (De Land, Fla., 1904). History : Bab¬ cock, K. C., (The Rise of American Nationality5 (1906) ; Brinton, D. G., (Notes on the Floridian Peninsula, its Literary History, Indian Tribes, and Antiquities5 (Philadelphia 1859), with bibliography; Campbell, R. L., historical Sketches of Colonial Florida5 (Cleveland 1892) ; Carpenter, E. J., (The American Ad¬ vance5 (1903) ; Chadwick, F. E., (The United States and Spain5 (1909) ; Chambers, H. E., (West Florida and its Relation to the Historical Cartography of the United States5 (Johns Hop¬ kins Studies in Historical and Political Science, Series 16, No. 5) ; Davis, W. W., (The Civil War and Reconstruction in Florida5 (New York and London 1913) ; Fairbanks, G. R., history of Florida5 (Philadelphia 1871), the standard history of the State; Foster, J. W., (A Cen¬ tury of American Diplomacy5 (1906); French, Benjamin F., historical Collections of Louis¬ iana5 (New York 1846-75) ; Fuller, H. B., (The Purchase of Florida5 (1906); Garcia, (Dos antiguas Relaciones de la Florida5 (Mexico, D. F. 1902) ; Green, E. L., history of Florida5 (1898); Lanier, Sidney, (Florida: Its Scenery, Climate, and History5 (Philadelphia 1875) ; Long, Ellen Call, (Florida

Breezes5 ; Lowery,, Woodbury, (The Spanish Settlements within the Present Limits of the United States5 (New York, Vol. I, 1901; Vol. II, sub-title (Florida5 ib., 1905) ; Moore, (Certain Aboriginal Remains5 (Philadelphia 1901-05) ; Moore, J. B., Unter-

national Arbitrations (1898); id., (Digest of International Law* (1906) ; Morse, J. T., (John Quincy Adams * (1897); Smith, Buckingham, (Coleccion de varios documentos para la his- toria de la Florida y tierras adyacentes) (Lon¬ don 1857) ; Torrey, Bradford, (Florida Sketch- Book* (Boston 1894).*

FLORIDA, Gulf of. See Florida Straits.

FLORIDA, Treaty of. In American his¬ tory, a treaty signed between Spain and the United States, 22 Feb. 1819, by which Spain conceded the FlOridas to the United States. Until the final ratification of the treaty Con¬ gress had passed a law empowering the Presi¬ dent to appoint a governor, and Gen. Andrew Jackson assumed command of the Florida re¬ gion. General Jackson issued a proclamation at Pensacola requiring obedience to United States authority. See Florida; United States — Arbitration in the.

FLORIDA, University of, located at Gainesville, Fla., dates from 6 July 1905 when the State Board of Education and the Board of Control in joint session, acting under powers conferred by the legislature, co-ordinated pre¬ vious State efforts at higher instruction and or¬ ganized the Florida Female College at Talla¬ hassee and the University of the State of Flor¬ ida at Gainesville. Both these institutions be¬ gan their scholastic work in September 1905. In 1909 an act of the legislature changed the name of the one to the Florida State College for Women; of the other to the University of Flor¬ ida. Now ranking with the best universities of the nation its departments comprise the Col¬ lege of Arts and Sciences leading to the de¬ grees of B.A. and B.S. ; the College of Agri¬ culture which confers the degree of B.S. A. ; the College of Engineering leading to the de¬ gree of B.E. ; the College of Law, the LL.B. de¬ gree of which admits to the bar without fur¬ ther examination; the Teachers' College confer¬ ring the degrees of B.S. and B.A. in philosophy and education and providing normal training for those desiring to enter any department of the public school service, State certificates are granted to Normal School and Teachers' Col¬ lege graduates without further examination ; the Graduate School offering courses leading to the degrees of M.A. and M.S. ; the Agricul¬ tural Experiment Station for agricultural re¬ search ; and the University

Extension Division serving Farmers' Institutes, Boys' and Girls' clubs, correspondence courses, lecture bureau, etc. Apart from legislative appropriations, the annual income of the university derived prin¬ cipally from Federal grants amounts to $34,750; for the support of the Agricultural Experiment Station the Federal government makes two an¬ nual grants totaling $30,000. Three fellowships and four scholarships are offered deserving stu¬ dents and a loan fund enables students to enter the College of Agriculture. The university occupies a tract of 604 acres, 90 of which are devoted to campus, drill-grounds and athletic fields; the remainder is used bv the College of Agriculture. Handsome buildings have been erected furnished with all modern improvements and appliances. The faculty numbers 73; the average annual student enrolment is 800, with an additional 200 to 230 enrolled in boys' short course and in correspondence courses.

FLORIDA AGRICULTURAL COL¬ LEGE, an important educational institution at Lake City, Fla., established in 1884 and affiliated to the University of Florida (q.v.). It is under the direct control of a State board appointed by the governor. There is an average annual attendance of 200 students of both sexes.

FLORIDA BLANCA, flo-re'tha blan'ka, Jose Monino, Count of, Spanish statesman : b. Hellin, Murcia, 21 Oct. 1728; d. Seville; 20 Nov. 1808. He was Spanish Ambassador at Rome during the pontificate of Clement XIV and particularly distinguished himself by his activity in the abolition of the order of the Jesuits and in the election of Pius VI. In 1777 he became Minister of Foreign Affairs and at once acquired almost unlimited authority in Spain. He introduced post-coaches and caused the post-roads to be made practicable; directed his attention to the most important subjects of general police, particularly in the capital ; embellished Madrid, and was on every occasion the active friend of the arts and sciences. His attack upon Algiers in 1777 and the siege of Gibraltar in 1782-83 were unsuc¬ cessful ; but the result of his co-operation with the English colonies of North America in se¬ curing their independence was more favorable to Spain. After the accession of Charles IV, his enemies succeeded, in 1792, in effecting his disgrace. He was imprisoned in the citadel of Pampeluna, but was soon restored to liberty and banished to his estates. He appeared once more upon the political stage in 1808, when he was president of the extraordinary Cortes.

FLORIDA CAPE. See Cape Florida.

FLORIDA JAY. See Jay.

FLORIDA KEYS, or REEFS, in Florida, a chain of small islands, keys or

reefs, of coral or limestone, extending southwest from Cape Florida, about 220 miles. They are very con¬ siderable in number, but only a few are of any importance. Among these may be mentioned Cayo Largo, Indian Key, Long Island, Old and New Matacombs, Cayo de Boca and Key West, on which the city of Key West is built. In 1910 the railway to Key West joined 41 of the keys. The only local industry of importance is sponge fishing, which returns upwards of $650,000 annually.

FLORIDA STATE COLLEGE FOR WOMEN, reorganized by act of the legisla¬ ture 5 June 1905, is situated at Tallahassee, Fla., where, first as a seminary, it had been in operation from February 1857. Six State in¬ stitutions of learning were merged 5 June 1905 into the University of Florida for the educa¬ tion of men at Gainesville, and the Florida State College for the education of women at Tallahassee. The college grounds comprising campus and farm cover 150 acres; five com¬ modious modern buildings are fully equipped with all facilities for higher instruction; and 11 scholarships attract promising students. The departments are college of arts and sciences, school of education and normal school and spe¬ cial schools of business, art, music and home demonstration work, leading to the degrees of B.A., M.A. and M.S. The faculty numbers 42; the average annual attendance of students, regular term, is 600, summer school 360; total enrolment, excluding duplicates over 950.

FLORIDA STRAITS, or NEW BA¬ HAMA CHANNEL. The gulf waters sepa¬ rating Florida from Cuba and the Bahamas, and traversed by the Gulf Stream. The total length is 300 miles, with a width of from 50 to 150 miles. The main channel has been sounded to a depth of over 6,000 feet.

FLORIDIA, Sicily, city on the River Ciani, six miles west of Syracuse. Grain, wine and olives are produced in the vicinity. Pop.

12,500.

FLORIDSDORF, Austria, a suburb of Vienna, three miles north of that city. It is a thriving industrial centre, with manufactures of locomotives, carriages, chemicals, rubber goods, pottery, hardware, etc. In 1896 it was made the seat of a district. Pop. 38,700.

FLORIEP, Robert, German physician: b. Jena 1804; d. 1861. He received his education at the University of Bonn, and after 1833 was connected with the Pathological Museum of the Charite in Berlin. His work (On the Thera¬ peutic Application of Electro-Magnetism in the Treatment of

Paralytic and Rheumatic Af¬ fections > (Eng. trans. by R. M. Lawrence 1850) was the most important contribution to electrotherapy of its day. He is also well known for his medical and surgical atlases, the principal of which were (Chirurgische Kup- fertafeln (1820-47) ; (Klinische Kupfertafeln) (1828-37) ; (Atlas der Hautkrankheiten)*

(1837) and (Atlas Anatomicus) (6th ed.,

1877).

FLORIKIN. See Florican.

FLORIN, a coin first struck in Florence in the 13th century. The silver florins of Hol¬ land are worth about 40 cents. The British and Austrian florins are each worth 50 cents. The English florin was first coined in 1849. See Numismatics.

FLORIO, Caryl. See Robjohn, W. J.

FLORIO, John, English author: b. London, about 1553; d. Fulham, 1625. His father was a Florentine Protestant, who fled to England to escape persecution. He taught Italian at Oxford and London, having among his pupils several men of note. He achieved repute as a translator and lexicographer. His (First Fruits which yield Familiar Speech, } a ser¬ ies of dialogues in English and Italian, ap¬ peared in 1578 and was followed in 1580 by an English version of Ramutius' Italian translation of Jacques Cartier's 'Two Voyages to New France. y Encouraged by the success of the former he issued in 1591 a volume of similar nature entitled (Second Fruits.) In 1598 ap¬ peared the well-known Italian-English diction¬ ary (A World of Words, dedicated to the Earl of Southampton, and which gave the author wide distinction. In 1601-03 he trans¬ lated into English Montaigne's*

FLORIS, Frans. See De Vriendt, Frans.

FLORISSANT BEDS, a group of sedimen¬ tary rocks, occupying the site of a. lake, near Florissant, Colorado. The group is famed for its Tertiary fossils. Consult reports of the United States Geological Survey.

FLORISTICS. See Ecology ; Plants, Dis¬ tribution of.

FLORIZEL, in Shakespeare's

FLORUS, Roman historian, of the 2d cen¬ tury a.d., probably a native of Spain or Gaul. He is variously styled in the manuscripts ; in some L. Annaeus Florus, in others L. Julius Florus, in others L. Annaeus Seneca and

in one simply L. Annaeus. He wrote an abridgment (epitome) of Roman history in four books, from the foundation of the city to the first time of closing the Temple of Janus, in the reign of Augustus. His style is florid, and not suffi¬ ciently simple for history. The best edition is that of Duker (Leyden 1744) ; later ones are by Titze (1819) and Seebode (1821).

FLOSS SILK, the portions of raveled silk broken off in reeling the silk from the cocoons, carded and spun into a soft untwisted yarn and used for embroidery, etc. See Silk and Silk Industry.

FLOTATION. See Chemistry, Progress of; Gold Mining.

FLOTATION PROCESS IN METAL MINING, The. Flotation is a metallurgic process in which valuable metallic minerals are extracted from ores by methods that cause the mineral particles of the puln to float. A pulp is a mixture of finely crushed ore and water. It has been assumed that this new process is a physical contradiction of the old methods of concentration, in which the force of gravity was the principal factor. Such an interpreta¬ tion is not permissible because gravity has not been outlawed by flotation ; on the contrary the new process is dependent upon the action of the same force. The mineral particles that ascend in the new apparatus are as obedient to gravity as the particles that descend in the old machines. The difference lies in the inter¬ play of molecular forces, notably surface-ten¬ sion, which is a phase of cohesion, that is, the attraction that binds molecules of like kind to each other. In consequence, the surface of a liquid acts as if it were a stretched membrane or an elastic film.

The earliest practicable method of flotation was invented by F. E. Elmore in 1898. It was based directly upon the buoyancy of oil. This is a simple manifestation of gravity, whereby an oil, lighter than water, will rise to the surface of a pulp and carry with it any mineral parti¬ cles that have become entrained in it. The oil plays the part of a raft or boat. Owing to the small flotative margin offered by common oils, which have a specific gravity of about 0.9 as against the 1 of water, this method involved the use of so much oil that it proved imprac¬ ticable in metallurgic practice. As first used it required a ton of oil to treat a ton of ore

Next, the direct effect of surface-tension

on water was utilized in methods invented in Australia, where they were patented by G. D. Delprat and C. V. Potter in 1902. Such proc¬ esses come under the heading of film-sus¬ pension; they are typified by the floating of

a needle on water. In the familiar experiment a small needle is greased, although it will float without the aid of grease. Little or no oil is employed in these processes, which show that bubbles of air entangled in the pulp, or of gas generated therein by the addition of acid, are effective for flotation.

Then came the third and much the most im¬ portant development of this branch of metal¬ lurgy. Several investigators, notably, H. L. Sulman and H. F. K. Pickard, made use of the experience obtained in the Australian mills and, in 1904, developed a process in which bubbles of air became the principal agent. This phase of flotation may be called bubble-levita¬ tion; it depends upon the attachment of bubbles of air to the metallic minerals in preference to the gangue, such preference representing an affinity or selectiveness that is enhanced by the presence of a small proportion of oil, even less than 1 per cent on the weight of the ore. Whether the result be due to the oiling of the bubble-film or to the oiling of the metallic sur¬ face of the mineral particles is not yet clear, but it is recognized that the oil affects the sur¬ face-tension of the water of the pulp in such a way as to strengthen the bubble-films and cause the bubbles to last longer. The bursting of a bubble is due to the contractile force of surface-tension, and it must be moderated if the bubble is to last long enough to perform its metallurgic function.

The process now in use on a big scale in the United States is one in which a multitude of bubbles, developed in a pulp of ore, is utilized as a means for separating the valuable minerals from the valueless gangue. This separation is based on the fact that sundry minerals (especially sulphides) exhibit a preference for air-bubbles when these are made in a liquid modified for the purpose by the addition of a substance that produces a variable surface-tension. The bubbles result from the dis¬ persion of air in the pulp, whether entrained by agitation or blown through the porous bot¬ tom of the vessel in which the operation is conducted. These bubbles rise, and the vari¬ able surface-tension produced by the modifying agent added to the water hinders the coales¬ cence of the bubbles while they are rising. The modifying agent may be a constituent of various oils or it may be any one cri many other substances, including chlorides of the alkalis ; it enters into the bubble-films between water and air, where the mineral particles are caught and held at the interface. The mineral-laden bubbles, arriving at the surface, aggregate into a froth, which is withdrawn, to be collected as a concentrate, which is then drained, filtered, and dried previous to reduction by smelting in the ordinary way.

The first successful application of this method in the United States was made by James M. Hyde, in the mill of the Butte & Superior Mining Company, at Butte, Montana, in 1911. This was followed immediately by a suit for infringement of patent brought by the Minerals Separation

company, the British cor¬ poration owning the Sulman and Picard

patents. The litigation is still in progress, after a number of decisions of an indeterminate character, reflecting the lack of scientific knowl¬ edge concerning the fundamental physical prin¬ ciples involved in the process. It is even doubt¬ ful whether oil is necessary, for experiments have been made indicating that plain sea-water, without an addition-agent, will produce a min¬ eral-bearing froth adequate for the concentra¬ tion of chalcopyrite in the presence of pyrite and pyrrhotite. This calls to mind the fact that flotation can be made preferential as between minerals bv creating conditions that affect some and not others. For example, lead sulphide can be separated from zinc sulphide by a super¬ ficial oxidation of the lead in a roasting-furnace without affecting the zinc, so that the latter is amenable to flotation, whereas the former be¬ comes refractory.

The cost of operation can be given only in general terms ; suffice it to say that the proc¬ ess usually requires no new methods of crush¬ ing or of preliminary treatment, but it does demand finer reduction of the ore, say, to 80- mesh. Flotation machines are relatively simple and inexpensive, costing about $8 to $12 per ton for a capacity of 200 tons daily and $4 to $6 per ton for a capacity of 5,000 tons daily. The cost of operating them, including labor, power, and reagents, is about 10 to 15 cents per ton for a 500-ton plant. The oils used are classified as brothers® and ˆcollectors.® The selection of them is empirical. Products of distillation from wood and from coal are used; also petroleum products. The creosotes and kerosene-acid sludge are common agents for froth-flotation.

The process is applicable to a remarkable variety of ores, including those of copper, lead, and zinc, as well as those of gold and silver. Apparently minerals having a high metallic lustre are particularly amenable. This includes most of the sulphides of the useful metals and excludes most of their oxides ; indeed the presence of oxidized material in the copper ores now being treated is the principal reason for a relatively low recovery, say, 70 per cent, as against the high recovery, say, 90 to 95 per cent, on clean copper sulphides. However, methods for treating the oxidized ores of cop¬ per and of lead have been devised, and have been tried on a working scale. The most prom¬ ising of these are based upon the sulphidizing, or coating of the oxides with a film of arti¬ ficial sulphide, so as to present a surface suit¬ able for flotation. Hydrogen sulphide is used for this purpose ; or the sulphides of calcium and sodium ; also sulphur in various combina¬ tions. As yet, a sodium sulphide, in 1 per cent solution, has given the best results on oxidized lead ore. The process has an application as much wider than that of cyanidation as cyanida- tion was more comprehensive than chlorination. About 30,000,000 tons of ore are being treated annually by flotation in the United States, and as soon as the embargo of royalty or of

liti¬ gation is lifted from the process there should be an extension of its usefulness in this and in other countries.

A large body of technical literature has grown around the subject during the last three years. The principal textbooks are Hoover, Theodore J., Concentrating Ores by Flotation, (1912) ; Rickard, T. A., (The Flotation Process**

(1916); Rickard, T. A., and Ralston, O. C, ˆFlotation (1917).*

T. A. Rickard,

Editor of (Mining and Scientific Press, > San

Francisco.

FLOTOW, Friedrich (fred'riH flo'to-) von, German musical composer: b. Teutendorf, Mecklenburg-Schwerin, 27 April 1812 ; d. Wiesbaden, 24 Jan. 1883. His earlier operas (which include one called (Rob Roy0) did not find favor among the Parisian opera house di¬ rectors, so he had to content himself with performances in the private theatres of the aristocracy. This brought him gradually into notice, however, and his (Naufrage de la Meduse) was publiclv produced in 1839. Ales¬ sandro Stradello1 was first performed at Ham¬ burg in 1844 and his most successful opera, * Martha^ was originally given at Vienna in 1847. His subsequent works, such as (Indra) (1852), (RubezahP (1854); (Albin> (1856); A'Ombre* (1869), achieved but small success. He was elected to the French Institute in 1864.*

FLOTSAM, JETSAM, and LIGAN, in

law, flotsam, or floatsam, is derelict or ship¬ wrecked goods floating on the sea; jetsam, goods thrown overboard which sink and remain under water ; and ligan, goods sunk with a wreck or attached to a buoy, as a mark of owner¬ ship. When found such goods may be returned to the owner if he appear; if not, in England, they are the property of the Crown. See Dere¬ lict ; Salvage.

FLOUNDER, any of several of the more common and useful flat fishes (q.v.) of north¬ ern waters. There are at least 500 species. The commonest American species are the ˆsummer® and ((winter0 flounders. The latter (Pseudo pleuronectes americanus) is dark rusty brown, more or less

spotted, about 15 inches long when mature and weighs one to two pounds. It is caught in the colder months from Chesapeake Bay to Labrador, and is ex¬ cellent eating. The ˆsummer® flounder (Paralichthys dentatus) becomes twice as large, is light olive brown, studded, when adult, with numerous small white spots and is esteemed for the table. The <(four-spotted):> flounder (P . oblongns) and the Gulf species (P. albiguttus) are closely related. On the Pacific coast several good species are known ; and the British coast has a valuable species in Pleuronectes flesus, closely resembling the plaice (q.v.). The halibut (q.v.) is closely re¬ lated and the turbot (q.v.). Consult Jordan, (Guide to the Study of Fishes) (1905). See Fluke; Fish.

FLOUR. See Flour, Wheat.

FLOUR, Wheat, a finely ground and bolted product used for food. Ordinary white or bread flour, of which there are a number of grades, is composed of the interior portion of the wheat kernel subjected to processes of pulverization and purification. In the prepara¬ tion of white flour either the major portion or all of the bran, germ and other offal parts are removed. When the entire wheat kernel is ground into a meal, it is called graham flour. When a portion of the bran is removed the product is usually called purified graham or entire wheat flour.

The history of wheat milling shows that many and gradual changes have taken place since the early times when wheat was pulver¬ ized between stones to the present time when it is reduced by steel rolls. Wheat has vari¬ ously been reduced to flour by means of stone crushers, saddle stones and stone mortars. The ancient Greeks, Romans, Chaldaeans and Egyptians used saddle stones for grinding wheat into flour, the wheat being placed in a concave stone and rubbed with a convex stone rocked backward and forward. Saddle stones are still in use among the native Africans, and are known to have been used from earliest times. They are also found among the re¬ mains of the prehistoric Swiss lake-dwellers and mention is made of them in the earliest literature. Their use appears to have been common among all primitive races and they are in use to-day by many barbarous and half- civilized nations. Near the beginning of the Christian era, querns or crude crushers in which the parts were fitted mechanically came into use. The upper stone or pestle revolved upon the lower concave stone. The quern was the forerunner of the millstone. Querns are still in use in some Asiatic and European countries. The millstone came into use about the 14th century and was the result of gradual evolution from the stones shaped by nature and operated by hand to specially hewn and dressed millstones propelled by various forms of motive power. In ancient times, flour was prepared in each household, the grinding being done by women, slaves and menials. During the Middle Ages when the feudal system was at

its height, crude flour-mills or querns formed a part of the outfit of each castle or estate. In some countries, the right to operate these mills was vested in the clergy, and in early English history frequent mention is made of contests between the people and the landlords and clergy relative to their right to operate these mills or querns.

Until the beginning of the 17th century wheat milling was simply a crude agricultural industry, the earlier mills being operated by slaves, then by oxen. Later water wheels and windmills were used as motive power. About 1820, a flour-mill was first operated by steam. Bolting cloths for removal of the bran have been in use for about two centuries.

About 1870 the present roller process of flour production was introduced from Hungary into America. The process consists of the gradual reduction or pulverization of the floury portions of the wheat kernel between corru¬ gated and smooth steel rolls and of the purifica¬ tion of the product by means of aspirators. During the process of milling, the granular middlings undergo gradual reduction and are passed from roll to roll. At each break or grinding, the fine flour is removed by bolting, the middlings are separated and passed to other rolls and the tailings are subjected to further reduction. Before passing to the rolls, the wheat is screened to remove loose dirt and weed seeds and occasionally washed to re¬ move adhering dirt and debris; then dried or tempered with steam, as may be necessary in order to more easily effect reduction. The first break simply flattens the kernels after splitting them in halves along the longitudinal groove. The germ is pinched off by the rolls

and is readily separated. The flour passes automatically from one break or set of rolls to another. Each break is regulated so as to pulverize a little finer than the preceding one. Each middlings stream is purified by passing through the middlings purifier, suction being applied to remove the fine dust and dirt. Fi¬ nally the various streams are blended so as to form different grades of flour. In large mills, the cleaned wheat is usually elevated to the top of the mill and then passed on to the rolls, and the various resultant flour streams blended in such a way that the final flour product is obtained after being separated into 40 or more separate streams.

The introduction of the roller process of milling has made it possible to use varieties of wheat from which high-grade flour could not be made by the old stone process. By the roller process of reduction a portion of the hard granual middlings which were formerly excluded from the flour and sold

with the by¬ product used for animal feeding are now re¬ duced and added to the patent grades of flour. About 75 per cent of the cleaned wheat is re¬ turned as merchantable flour, 72 per cent being straight grade or ordinary white flour. In or¬ dinary milling, the grades are as follows: (1) patents; (2) straight, sometimes called stand¬ ard patent; (3) first clear: (4) second clear. Patent flour is the highest grade manufactured. Its gluten has greater power of expansion and absorbs more water than that from any other grade. Patent flour produces the whitest and largest sized loaf of bread. Straight or stand¬ ard patent flour is similar to the patent, but the bread is slightly darker in color and the gluten does not possess quite so high a power of expansion. First clear grade flour is ob¬ tained after the removal of the first patent grades. This flour is slightly darker in color and produces a less pleasing loaf than the patent grades. Second clear or low grade is the name given to a small amount of flour ob¬ tained after the removal of the first clear. In some mills about 12 per cent of the cleaned wheat is recovered as first clear flour and about 5 per cent as second clear or low grade. When the wheat is milled so that the patents and the first clear are all obtained as one flour, the product is called straight grade. This is the flour that is extensively used for bread-making purposes. Straight flour is the sum of the patents and the first clear. The lowest grade of flour manufactured is called red dog; it is dark in color and possesses but little power of expansion. It is secured largely from those portions of the wheat kernel adjacent to the germ and aleurone layers. Red dog flour is not generally used for human food, but is em¬ ployed in the arts, for the feeding of animals and occasionally in the preparation of some cereal breakfast food. It has a high per cent of protein or nitrogenous material, but is not valuable for bread-making purposes because the gliadin and glutenin (see Bread and Bread Making) are not present in the right propor¬ tions to form a balanced gluten. By blending the different streams of flour, various com- merical grades sold under different trade names are secured. The composition and prop¬ erties of different kinds of flour result from the kind of wheat used in preparation (see Wheat) and the method of milling employed.

The percentage amounts of bran, shorts and standard grades of flour obtained by the roller process vary widely with different kinds of wheat. Some wheats yield more flour than do others. The average yields are approximately as follows:

Per cent of cleaned wheat recovered

1 . Patent (about) . 60

*2. Straight or standard patent * . 70 to 73*

3. First clear or first bakers . 10 to 15

4. Second clear or low-grade . 0.5 to 3

5. Red dog. . . I5 to 2

6. Shorts or middlings . 11 to 12

7. Bran . . 13

By the roller process of milling, the germ is excluded because of its poor bread-making properties and its fermentable nature. The wheat offals of which shorts and bran form the main portion are by-products used for the feeding of animals. About 25 per cent of the cleaned wheat finds its way into the offals. Bran is the episperm or outer covering of the wheat kernel. As human food, it is indigestible and does not yield as large an amount of available . nutrients as the floury part of the wheat kernel. As an animal food, however, it has a high value. Shorts consist mainly of the fine bran mixed with some of the floury portions of the wheat kernel. When the wheat screenings, consisting of weed seeds and other refuse, are ground and mixed with the offal, the product is known as bran or middlings, with ground screenings. From 1.3 to 1.6 per cent of the weight of the cleaned wheat is recovered as germ.

Wheat flour is composed of starch, gluten proteins, water, fat, ash, or mineral matter and small amounts of other compounds, as sugars, cellulose, organic acids, amids, etc. The proximate composition of the different kinds of flour when milled from the same lot of hard wheat is given in the following table :

(The two types of patent flour could not be milled at the same time),

Water, Per Cent

Protein (Nx 5.7) Per Cent

Fat Per Cent

Carbohydrates

Per Cent

Ash Per Cent

Phosphoric Acid Per Cent

Acidity Per Cent

Heat of Combus¬ tion per Gram. De¬ termined. Calories

Wheat .

Special patent

8.50

12.65

2.36

74.69

1.80

0.75

0.18

4.140

flour .

10.55

11.08

1.15

76.85

.37

.15

.08

4.032

Patent flour.

10.49

11.14

1.20

76.75

.44

. 17

.08

4.006

Straight flour First clear

10.54

11.99

1.61

75.36

.50

.20

.09

4.050

grade .

Second clear

10. 13

13.74

2.20

73.13

.80

.34

.12

4.097

grade .

10.08

15.03

3.77

69.37

1.75

.56

.27

4.267

Red dog flour Shorts, mid-

9. 17

18.98

7.00

61.37

3.48

....

.59

4.485

dlings .

8.73

14.87

6.37

65.47

4.56

.14

4.414

Brau .

9.99

14.02

4.39

65.54

6.06

2.20

.23

4. 198

From the table, it will be observed that there is a gradual increase in the amount of ash, proteins and fat from the first patent flour to the red dog or lowest grade of flour. In fact, the variations in ash content of the different

- *Straight grade flour is composed of first and second patents and first clear grade.*

grades of flour are so regular that the percent¬ age of ash can, at times, be taken as an index to the grade of flour. The highest grade flours, as first patent, contain least ash because of the more perfect exclusion of the bran and en¬ dosperm parts. In the straight grade or ordi¬ nary bread flour, there is only from .6 to .7 per cent less nitrogenous material as proteins than in the wheat from which it was milled. Second clear and red dog flours contain a large amount of protein, fat and ash, and judged by their proximate composition only, would appear to have a higher nutritive value than the patents or straight grade flours. But when judged on the basis of digestibility, available nutrients and physical character of the bread, these flours are found to have a much lower value than the patents or straight grade flours. (For nutritive values, see article on Bread and Bread Mak¬ ing). During the process of milling, the flour particles pass through bolting cloths containing from 12,000 to 16,000 meshes per square inch, which

results in even and fine granulation of the flour particles. The character of the flour particles as angular or spherical depends largely upon the character of the wheat as hard or soft, and to a less extent upon the method of milling. The flour granules from hard wheat are angular and have a sharp feeling akin to fine sand, while soft wheat flours produce small spherical particles lacking in gritty feel¬ ing.

Flours made from strong hard glutinous wheats contain more protein and have a higher food value than those made from soft starchy wheats.

In the testing of flour, particular attention is given to physical characteristics, as color, purity as indicated by absence of dirt and fine pieces of bran, capacity to absorb water, quality of gluten and character of the bread product. For bread-making purposes, the quality of the flour depends largely upon the amount and quality of the gluten. The gluten is obtained by making a stiff dough of the flour and then washing this dough with an abundance of water, which removes the starch, leaving the gluten in the form of a gum-like mass. Gluten from high-grade flours is firm, elastic, white or of slightly yellowish tinge and possesses good qualities of expansion. Poor gluten is dark in color, sticky and lacking in elasticity. The color of the flour depends largely upon the quality of the wheat and the method of milling employed. Some wheats produce creamy or yellowish flours, others chalk white flours and others dark-colored flours. Dark-colored flours, however, produce bread of inferior quality, creamy and white flours producing the best grades of bread. The granulation of the flour is also taken as an index of its quality, as it reveals to the experienced miller and baker the character of the flour. Comparative baking tests are generally resorted to in order to determine the bread-making value of flours. By these tests, under uniform conditions with the same amount of flour, yeast, water, etc., in each case, differences in the bread-making qualities of the flour are readily revealed. When flour is stored for a long time, it some¬ times becomes inferior through fermentation. Ordinarily, flour will not deteriorate until after it has been kept for many months or more. Some wheats produce flours of better keeping

qualities than do others. The soundness of the wheat, as freedom from rust, smut or other blemishes, influences the keeping qualities of flour as well as does also the process of mill¬ ing, particularly the extent to which the clean¬ ing and purification are perfected.

Wheat flour is not ordinarily adulterated, although at times attempts have been made to add other cereals and mineral adulterants. The national flour law requiring all mixed flours to be branded and to pay a slight revenue tax has prevented extensive adulteration. At one time, corn flour produced by milling corn was used for adulterating wheat flour. This, however, was

only practised for a very short time when corn was cheap and wheat was high in price. The blending of wheat and corn flours has never proven succes ful as an inferior bread product results, and the practice since thˆ pass¬ ing of the national flour law has been discon¬ tinued. Wheat flour appears to be less subject to adulteration than many other articles of food. See Adulteration.

Wheat flour is used not only for bread mak¬ ing but for other purposes. Crackers, cakes, pastry and many food articles are made largely of flour. Flour is also used in the arts and industries and in various manufacturing opera¬ tions. The comparative value of bread made from different kinds of flour, as graham, entire wheat and straight, is discussed in the article Bread and Bread Making.

*As a conservation measure during the war with Germany, the United States Food Admin¬ istration requested that 100 pounds of standard wheat should be milled so as to produce not less than 74*4 pounds of flour; the residue, about 25 pounds, consisted of wheat by¬ products, the flour milled in accord with the United States Food Administration regulations being designated 100 per cent flour; no separa¬ tions in patent and clear grades being made. One hundred per cent flour, comprising all the flour separated from the wheat, is about a 75 per cent extraction (not less than 74ˆ4), that is it represents about 75 per cent of the wheat milled. This flour should not be confused with 100 per cent extraction flour, which is a graham flour. The 100 per cent flour contains no bran or wheat by-products, while the 100 per cent extraction flour contains all the bran and by¬ products of the wheat. To make the short wheat crop of 1917 go as far as possible in bread-making, bakers were required to mix from 20 to 25 per cent of other flours as corn flour, barley flour or oat flour with the wheat flour used. By this and other means a large amount of wheat and flour was made available for export to other countries at war with Germany, and also to neutral countries.*

It is estimated that four and a half bushels of wheat, equivalent to about 200 pounds of flour, are consumed annually per capita in the United States. More flour is consumed in the Northern than in the Southern States. The consumption of flour as food has, during recent years, gradually increased. Some political economists and scientists have feared that at no distant date the consumption of flour would exceed the production of wheat. But improved methods of agriculture and the opening up of large tracts of land suitable for wheat culture, as in northwestern Canada, render this improb¬ able. From earliest times wheat and wheat

flour have taken an important part in the dietary of man and there is every reason to believe that it will continue to be one of his staple articles of food. The extent to which it should be used in the dietary depends largely upon the individual and the cost of food. Ordi¬ narily wheat flour is one of the cheapest articles of food and when it forms a part or even the main portion of a ration, it supplies a large amount of nutrients in a digestible form and at a low cost.

Production.— According to the special census of manufactures for the calendar year 1914 the production of wheat flour in the United States for that year totaled 116,045,090 barrels, valued at $542,051,752 — an increase of 9.7 per cent in quantity, but a decrease of 1.5 per cent in value, as compared with the figures for 1909. The amount of wheat consumed in making this product was 543,970,038 bushels, an increase of 9.6 per cent over that consumed in 1909. A large quantity of bran and middlings amounting to nearly 4,000,000 tons, and valued at nearly $100,000,000 was also turned out as a by-product, besides a large output of “offal,® used as stock feed. Exact figures were not reported for these products of the flour mills, the whole output for all grist mills being grouped. The totals may be found under the article Flour Milling, American.

Harry Snyder,

Of the Russell-Miller Milling Co.

FLOUR BEETLE, name given to several species of minute beetle which infest all sorts of manufactured cereals. Some species such as the Tribolium ferrugineum lay their eggs in cracks of barrels or containers. These beetles cause great losses in warehouses and mills. Painted barrels or containers are a great aid in keeping them out, but once well established in a place a thorough scalding is necessary to abate the pest.

FLOUR AND MEAL INSECTS. Various forms of small whitish caterpillars and darker- colored ˆworms® are commonly found in flour and meal and manufactured cereal products of different kinds. The most prominent of these is the Mediterranean flour moth (Ephestia kuehniella) , which has been termed a veritable scourge in flouring-mills. It was practically unknown as a pest until 1877, and in North America is still limited to portions of Cali¬ fornia, Minnesota, New York and Pennsylvania, where flour-milling is an important industry. The moth has a wing-expanse of a little less than an inch, and is of a pale lead-gray color. The caterpillars are whitish, with long but in¬ conspicuous hairs, and make the trouble while searching for a proper place for transforming to the pupa stage. Wherever it

crawls it drags after it a large quantity of silk, with the result that flour becomes felted together and lumpy and the mill machinery gets clogged, requiring frequent and expensive stoppages. The entire life cycle of this insect may be accomplished in 38 days, hence in well-heated mills or other buildings inhabited by the insects from four to six generations may be produced. When a mill is found infested the entire building must usually be fumigated. Sometimes a whole dis¬ trict becomes overrun, and in this case great care must be observed that the insect does not spread from one mill to another. Various reme- vol. ll — 25

dies are used for eradicating the pest, including the free use of bisulphid of carbon and hydro¬ cyanic-acid gas, the use of "steam-sweepers® and "elevator brushes.®

The Indian-meal moth (Plodia interpuncc- tella) somewhat resembles the preceding, but is smaller; the outer halves of the fore-wings are dark greasy brown with metallic reflections, and the larva usually has a reddish or greenish tinge. It has the same habit of webbing up flour, but is not so great a pest as the Mediter¬ ranean flour-moth, possibly because it has a larger range of food material, feeding on nearly all forms of dried vegetable matter, among which are dried fruits and jellies, which have earned it the title of "pantry moth.® It is to be found in nearly every store and household, and particularly where dried vegetable foods are neglected for any length of time. The meal snout-moth (Pyralis farinalis) is rarer than the preceding, and seldom does injury to flour or meal, although it spoils clover hay.

Two species of beetles (Tenebrio molitor and obscurus) and their larvae are popularly known as "meal-worms,® both in this country and abroad. The former is a shining brown beetle over half an inch long, and produces a yellow meal-worm ; the latter is dull black, and produces a dark brown meal-worm. They are most apt to be troublesome in dark locations, in feed-stores and in stables ; but are useful when raised under control, since they are sala¬ ble as food for mocking-birds, nightingales and other cage birds.

Flour beetles or "weevils® are little flattened reddish beetles of the same family (Tenebrio – nidce) as the meal-worms and are great pests in mills and storehouses. The chief source of an¬ noyance from these insects is due to their im¬ parting a highly offensive and persistent odor to the substances which they infest, which in¬ clude various drugs, snuff, capsicum, ginger, dried peas and beans, baking powder, nuts and cabinets of dried insects. Several species occur in America. They differ somewhat in struc¬ ture and in habits, but may be controlled by the use of bisulphid of carbon. See Weevil.

FLOUR MILLING, American. Flour milling is of two kinds ; one the primitive, small industry that supplies a natural local demand ; the other a commercial enterprise, which goes into the open markets for its raw material and disposes of its product in the markets of the world. One dates from the early settlement of the country, or as soon as wheat was grown in America ; while the other had its beginning about the time of the Revolution, though it assumed no really great importance until after the middle of the last century. While the country has, and probably always will have, a large number of small mills situated in the rural districts, the flour-milling industry proper — -considered commercially — is on a larger and more important scale than ever before. In fact, the special census of 1914 gives it fourth place among the manufactures of the United States in value of products following: (1) slaughtering and meat packing; (2) foundry and machine shop products; and (3) iron and steel products of steel works and rolling mills.

The small mill that supplies a purely local village or rural demand may properly be termed an "agricultural adjunct,® and, from this point

of view, the history of farming in this country is the history of the grist-mill. Its early growth is of some interest. In 1626, a horse-power mill was built on Manhattan Island, and a windmill in New England, near Watertown, about two years later. Windmills soon became common on the Atlantic coast. The first water-mill in New England was probably built on the Dorchester side of the Neponset, in 1634. Before the middle of the century, New England was exporting wheat and flour to Portugal. In 1649, Virginia had four windmills, five water-mills and numer¬ ous horse-mills, and was also an exporter of wheat and flour. By 1678, New York had a number of mills, and, moreover, had a monop¬ oly on the process of bolting flour.

For over 100 years the development of mill¬ ing reflected the growth of the country, with some extension of trade in the West Indies and South America. Still, the processes were crude, and the industry, with few exceptions, had hardly gone beyond the agricultural or local basis. Not until the mills began to cen¬ tralize, until <(milling centres® began to form, did the industry shape itself on a commercial basis. The period commenced shortly after the Revolution. Yet milling then, as compared with to-day, was as the stage coach of 1776 compared with the luxurious express train of the present century. The mills of Delaware, however, were celebrated for their flour. This district on the Brandywine, had 130 mills within a radius of 40 miles, and Wilmington was an exporter of

<(superfine® flour.

The next milling centre of importance, and which later took first rank, was Baltimore. In 1787 the mills of that city made 325 barrels of flour daily, and it was there that the first marked improvements in the process of flour making were adopted. Up to 1785 the different stages of milling were separate and largely done by hand, as they are even to-day in the Hungarian process. But Oliver Evans introduced the ele¬ vator and conveyor, and combined the several steps into a continuous system; thus dispensing with much labor, and making a saving in the cost of production. Owing to the failure of the Delaware millers to adopt these improve¬ ments, Baltimore became the more important centre, and the Patapsco River, with its fine water power, became celebrated during the next 50 years. In 1840, the Patapsco, within 30 miles in which the fall is 800 feet, had 60 mills, which ground several hundred thousand barrels of flour a year. A considerable export trade was done with the West Indies.

Still another milling centre was formed at Richmond, Va., at the falls of the James River. The district is now not known as a milling point but in 1845, Richmond had the largest mills in the United States, the ((Gallego® and the ˆHaxall.® The number of mills there was 21, and their trade besides the local and nearby territory, was with South America. The "Gal- lego® mills, in 1864, had 31 pairs of buhrs or millstones, with an annual capacity of 190,000 barrels of flour. The "HaxalD mills had a capacity of 160,000 barrels.

From the Atlantic coast the milling centre moved westward, following the wheat-growers. Rochester, N. Y., in the Genesee valley, was the next centre, and while it retained its im¬ portance for many years, it was surpassed

eventually by newer districts farther west. At one time Cincinnati gained considerable im¬ portance as a milling point, but Saint Louis was destined to supplant Rochester as the great milling centre. While Rochester has lost its relative importance, Saint Louis has retained its mills, although Milwaukee has developed a slightly greater milling capacity than Saint Louis ; but all have more recently been out¬ classed by Minneapolis. For many years, how¬ ever, Rochester was recognized as the first milling city of the country, having as early as 1835 no less than 21 mills, with 95 run of stones. The flour from these mills was sold throughout the Atlantic Coast States. In 1865, the flour output of Rochester was 800,000 barrels.

With the development of the great central wheat States, mills were built wherever there was increased population. In 1840, Ohio, Ken¬ tucky, Indiana, Illinois and Michigan had a total of 1,200 mills, producing about

30 per cent of all the flour made in the country, yet very few of them belonged to the commercial class, such as those of the centres. The scattered country mills supplied the farming communities and the small towns, while the few larger mills and those of the centres supplied the large mar¬ kets and the districts where wheat was not raised.

Saint Louis began as a milling point in 1840, with two small mills. The city, due to its loca¬ tion, was then the principal city in the West. By 1860, the Saint Louis 'mills were making 800,000 barrels of flour a year. In 1870 the output was over 1,000,000 barrels, and in 1880 over 2,000,000. Saint Louis led all other centres until 1881, when Minneapolis began its rapid development. Among the other important mill¬ ing centres are Toledo, Buffalo, Detroit, Indian¬ apolis, Chicago, Kansas City and Milwaukee, already mentioned.

A small, crude mill was built at the Falls of Saint Anthony, now Minneapolis, by a detach¬ ment of soldiers in 1823, but the first merchant-mill was erected in 1854. Flour was first shipped to the east from Minneapolis in 1859. In 1865, the city had six mills, with a total daily capacity of 800 barrels. It was not until 1878 that the total annual output reached 1,000,- 000 barrels, and the . direct export shipments were about 100,000 barrels.

In tracing the movement of the milling centre, it may be of interest to investigate the causes that brought a large number of milling interests together. The importance of the first milling district, the Brandywine, in Delaware, was due principally to convenient wheat sup¬ plies. The Patapsco district owed its import¬ ance to fine water power, local wheat supplies, and water transportation, while Richmond would probably never have gained any prominence but for its water power, though its transportation facilities, down the James, enabled it to build up an export trade. The fine water power of the Genesee River, at Rochester, was a natural inducement for the miller to build there, while the rich agricultural valley gave an abundant supply of raw material. Then, too, the opening of the Erie Canal gave Rochester unexcelled transportation facilities to other markets. Until other conditions entered into the situation to affect it, Rochester was particularly favored. Saint Louis had no water power, but it had

river transportation both for wheat and flour, and it was for years the principal distributing point for a vast territory. Milwaukee was a market for

early wheat and was the lake outlet for the Northwest before Chicago became a shipping point of importance. It was thus that mills began to be built at Milwaukee, and its milling importance may be ascribed to its favored position on the lake.

The greatness of Minneapolis as a milling centre is due partly to the water power from the Mississippi River and partly to the position of the city, which is the gateway between the wheat fields and the markets, but it is also largely due to the quality of the wheat of Minnesota and the Dakotas, the greatest spring- wheat territory in the world. Lastly, the pre¬ eminence of Minneapolis as a milling centre is in large part due to the men of genius, who in the early days grasped the situation and made the name "Minneapolis® known the world over. Given all the other advantages, — geographical position, water power, and even the annual pro¬ duction near by of some 200,000,000 bushels of superb hard spring wheat, — yet without the business genius and enterprise that inspired the early Minneapolis millers, the city might never have been known as the greatest flour-milling centre in the world.

The number of mills in Minneapolis has not increased materially since 1884, although the capacity has more than trebled. This increase, without even the enlargement of any of the mill buildings, was due to improved and condensed machines. There are seven milling companies in Minneapolis, having 22 mills with a maxi¬ mum daily capacity of 75,000 barrels of flour. The capacity of the individual mills is from 600 barrels daily to 15,000 barrels. The Pills- bury "A® mill, having the latter capacity, is the largest mill in the world. Four of the seven companies are small ones, having but one mill each. The mills of the three large companies have a maximum daily capacity of approximately 31,000, 27,500 and 18,000 barrels respectively. The greatest actual flour produc¬ tion for a single week was 443,800 barrels.

The present time may be called a commercial era in the flour-milling industry. The period from 1870 to 1900 might fittingly be termed the mechanical era, for during that time greater changes and improvements were made in the process than in all the 200 years preceding it. During the mechanical period, there was also the export era, when the building of new mills and the increasing output of old ones, together with the increase in wheat raising of the country, caused an over-production of flour, if domestic markets alone were depended upon. In fact, the increased output was to keep pace with the growing export trade. After review¬ ing the natural development of the milling in¬ dustry, which up to 1870 was identical with the growth of the country, these' three divisions, — the mechanical, the export and the commercial, — seem most important. Of the mechanical period it may be said tihat from its introduction in 1787,

the milling system invented by Oliver Evans dominated the milling industry until about 1870. The millstones were set close together, so as to secure as much flour as possible with one grinding. There was a great deal of fric¬ tion, and the resultant heat often brought about chemical changes which injured the color and

taste of the flour and lowered its grade. This process, well adapted to the soft, starchy com¬ position of winter wheat, was unsuccessful with the hard spring wheat rich in gluten, produc¬ ing from the latter a dark-hued flour which brought a low price in the market. For this reason also spring wheat commanded a com¬ paratively low price. In 1868 efforts began to remedy this condition by the invention of a middlings purifier, and this was successful in clearing the color and thus raising the market grade of spring wheat flour, and consequently of the grain from which it was made. At this stage of development interest was centered upon the Hungarian "high-milling® or gradual roller process of flour milling, and a delegation of American millers went to Europe to inspect that system. Its superiority was immediately recognized, and with several important and in¬ genious modifications the process was adopted by all the larger merchant mills of the country. The former millstones were replaced by chilled iron or porcelain rolls, and the gradual crack¬ ing, breaking and crushing of the grain was arranged to produce as large an amount of middlings as possible, where the old process made every effort to avoid them. For it had been found that out of the middlings came the high-grade "patent® flour with its large and valuable content of gluten. The roller mill was invented in the United States by John Stevens of Neenah, Wis., about 1870, but patents were not awarded to him until 1880. The merchant mills of the country generally acknowledged his rights by paying for the use of his inventions long after they were installed. In the roller mills of the present day there are five reductions of the grain and six separa¬ tions of the middlings before the actual grind¬ ing into flour. The product consists of 61.5 per cent of "patent® flour; 9.2 per cent of baker's flour; 3.7 per cent of "low grade® flour; 2.4 per cent of "red dog® ; and 23.5 per cent of "offal,® which includes the bran and shorts.

Like the development of milling in this country, the export flour business was not placed upon a high commercial basis until the Minneapolis millers, in the early eighties, be¬ gan a systematic campaign. From that time until 1900, the export trade increased steadily. Since then some adverse factors have arisen. The early mills of the Atlantic coast, as al¬ ready mentioned, were the first to export flour, probably to meet an actual demand because these mills were the most convenient to buy from, rather than to supply a trade that had been built up by the mills. The early export business doubtless came of itself — a natural demand. The uncertain export flour trade of the first part of the last century reached its climax in the 40's, and

then, when competi¬ tion of European mills was felt, dropped off markedly, about the year 1850. During the next 25 years large amounts of wheat were exported annually, while the percentage of the flour pro¬ duction that was sent out of the country was small. The flour trade with the United King¬ dom which is now an important part of the export flour business of this country, fell al¬ most entirely away by 1865. This, perhaps, was because the American millers could not hold their own on even terms against the foreign millers, who were then becoming more pro¬ gressive than ever before. The building up of

the export flour trade, beginning with about, 1875, makes an interesting chapter of com¬ mercial history.

The statistics of the flour milling industry in the United States, gathered by the census of manufactures for 1914, include only those mills which do merchant grinding as distin¬ guished from those which do strictly custom work. Some mills which do both are included in the reports. The decrease of the number of establishments in the milling industry since the 1909 census is due partly to the general depres¬ sion existing in 1914, and in part to the fact that a number of grain elevators discontinued their former milling work. Besides these rea¬ sons, another appears in the fact that several mills which had been doing both custom and merchant grinding discontinued the latter busi¬ ness, and thus dropped out of the census tabu¬ lation.

As reported, the number of establishments engaged in merchant milling in the United States in 1914 was 10,788 (11,691 in 1909). The number of persons engaged in the indus¬ try was 65,635 (66,054 in 1909), of whom 39,718 (39,453 in 1909) were wage-earners, receiving $24,593,162 annually in wages ($21,464,386 in 1909). The capital employed was $380,257,420 ($349,151,779 in 1909). The amount of grain ground was 818,929,321 bushels (806,247,961 bushels in 1909), and the value of the product was $877,679,709 ($883,584,405 in 1909). The cost of materials was $752,270,021 ($767,576,- 479 in 1909), the value added by manufacture being $125,409,688 ($116,007,926 in 1909). An additional output properly to be credited to the milling industry is that of 40 establishments engaged primarily in other industries but which manufactured gristmill products valued at $9,- 046,499. A large quantity of grain was used also by establishments whose products are known as ((breakfast foods,® but which the census classifies as ((Food Preparations.® Be¬ sides these, the manufacturers of starch and glucose

ground about 44,000,000 bushels of corn.

Of the total quantity of grain ground by the 'milling industry proper in 1914, 545,728,431 bushels were wheat; 180,115,704 bushels were corn ; 50,227,050 bushels were oats ; 20,288,396 bushels were barley; 12,813,831 bushels were rye; 5,478,045 bushels were buckwheat ; and 4,277,- 864 bushels were of other grains. The produc¬ tion of wheat flour totaled 116,403,770 barrels, valued at $543,839,508 — showing an increase of 11.9 per cent in production over the 1909 figures, but a decrease in value of 1.1 per cent. The figures include 573,979 barrels of graham flour. Of rye flour and rye graham, 1,937,385 barrels were made; in value, $7,845,213 — 'an increase of 25.8 per cent since 1909. Of corn meal and corn flour, the production was 16,327,993 barrels, valued at $54,963,301 — a falling off of 24.2 per cent from the production of 1909. The produc¬ tion of buckwheat flour amounted to 125,622,- 189 pounds (value, $3,754,857) ; and of barley meal, 14,000,789 pounds (value, $242,343) — a de¬ crease of 28.7 per cent in the former and of 51 per cent in the latter from the respective pro¬ ductions of 1909. In connection with the other fiouring-mill products there were reported the manufacture of 870,364,453 pounds of hominy and grits (value $13,767,561) ; and 30,451,581 pounds of oatmeal (value $757,804) ; and 92,-

676,085 pounds of various cereal (

In the 1914 census flour mills and grist¬ mills were reported for every State in the Union and for the District of Columbia. In some of the States the mills are still operated by waterpower and equipped with buhrstones. These mills reported 2,905 runs of stone for 1914 as against 10,609 runs in 1909, the change being due to the fact that the steel attrition mill is replacing the buhrstone. The equip¬ ment of the mills reporting for 1914 consisted of 42,841 stands of rolls, 7,704 runs of stone, and 6,793 attrition mills or steel grinders, in¬ cluding steel buhr mills.

The following table gives the output of the several States arranged in the order of their relative importance in the milling industry, the number of mills in each, and the value of their 1914 production :

Minnesota, 286 mills . $148,243,708

New York, 891 mills . 77,408,764

Kansas, 360 mills . 72,894,736

Illinois, 406 mills . 49,493,224

Ohio, 649 mills . . . 45,171, 200

Pennsylvania, 1,265 mills . 43,626,356

Missouri, 641 mills . 38,686,309

Indiana, 512 mills . 37,488,223

Texas, 191 mills . 35,110,301

Wisconsin, 252 mills . 28,697,413

Michigan, 427 mills . 27,381,474

Tennessee, 512 mills . 26,413,574

California, 132 mills . 24,078,735

Washington, 100 mills . 23,665,382

Kentucky, 442 mills . 21,229,203

Virginia. 533 mills . 18,084,413

Oklahoma, 253 mills . 16,688,690

Nebraska, 211 mills . 15,022,126

Iowa, 227 mills . 14,336,576

North Dakota, 59 mills . 12,029,905

Oregon, 95 mills . 11,192,573

North Carolina, 293 mills . 8,963,501

Maryland, 247 mills . 8,163,869

Colorado, 83 mills . 7 , 535 , 633

West Virginia, 229 mills . 7,052,814

Georgia, 128 mills . 6,083,760

Arkansas, 102 mills . 5,802,099

South Dakota, 72 mills . 5,556,996

Montana, 33 mills . 4,890,275

Maine, 148 mills . 4,425,824

New Jersey, 196 mills . 4,320,424

Vermont, 125 mills . 4,142,854

Massachusetts, 105 mills . 3,811,377

Idaho, 7 1 mills . 3,395,942

Utah, 70 mills . 3,155,513

New Hampshire, 79 mills . 2 , 733 , 820

Alabama, 73 mills . 2,179,165

Connecticut, 85 mills . 1 , 881 , 481

Delaware, 60 mills . 1 , 483 ,410

Arizona, 8 mills . 1 ,064,996

Rhode Island, 20 mills . 797,553

Wyoming, 16 mills . 721,818

Louisiana, 7 mills. . . 687,387

New Mexico, 17 mills . 424,501

South Carolina, 37 mills . 420,629

Mississippi, 17 mills . 410,332

Nevada, 7 mills . 386,566

Florida, 13 mills . \ . 166,237

District of Columbia, 3 mills . 78,048

The census shows a tendency of the milling industry to concentrate in large establishments under the control of corporations. Of the whole number of 10,788 mills reported, 153 manufactured products valued at $1,000,000 or over, and these made 42.9 per cent of the total production of the entire number, 21 per cent were controlled by corporations which made 73.5 per cent of the entire output, and employed

63.5 per cent of all the wage-earners engaged in the industry. In 1,887 mills there were no wage-earners ; the business was carried on by the proprietor. In 7,067 establishments there were not more than five wage-earners. In but 19 establishments were there upwards of 100 wage-earners.

The horsepower employed in the industry totaled 822,384. Of this, 403,186 was generated by steam engines; 112,441 by electricity; 229,-328 by waterpower ; and 77,429 by internal com¬ bustion engines.

Of the 10,788 establishments making flour mill and grist-;mill products in 1914, there were 3,912 which did not grind wheat flour, leaving 6,876 mills which did produce that commodity, — a figure 809 less than in 1909.

In the production of wheat flour in 1914 the States producing the largest number of barrels with the value of this output were as follows :

Minnesota, 27,132,155 bbls . $117,988,654

Kansas, 12,777,582 bbls . 56,514,360

New York, 8,522,011 bbls . 40,798,737

Illinois, 6,643,983 bbls . 31,904,077

Ohio, 5,707,781 bbls . 27,852,222

Missouri, 5,402,391 bbls . 25,633,116

Indiana, 4,526,879 bbls . 21,183,688

Texas, 4,089,378 bbls . 21,805,623

Pennsylvania, 3,975,031 bbls . 19,795,116

Washington, 3,765,070 bbls . 15,685,353

Tennessee, 3,093,197 bbls . 15,620,227

Wisconsin, 3,056,954 bbls . 13,817,821

Michigan, 3,056,744 bbls . 16,056,043

Kentucky, 2,728,464 bbls . 13,880,767

Nebraska, 2,383,097 bbls . 10,944,855

North Dakota, 2,165,078 bbls . 9,864,400

Virginia, 2,161,767 bbls . 10,702,588

Oklahoma, 2,072,240 bbls . 9,832,201

Oregon, 1,791,334 bbls . 7,749,619

California, 1,783,007 bbls . 10,341,920

Iowa, 1,488,811 bbls . 7,149,334

Colorado, 1,229,225 bbls . 4,923,302

Maryland, 1,105,577 bbls . 5,152,538

North Carolina, 951,805 bbls . 5,231,853

South Dakota, 920,070 bbls . 4,458,144

Montana, 871,918 bbls . 3,919,318

Idaho, 571,965 bbls . 2,261,403

West Virginia, 520.940 bbls . 2,732,789

Utah, 505,224 bbls . 2,242,417

No other State made as many as 500,000 barrels.

The great corn milling States were Tennes¬ see, 1,601,607 barrels; New York, 1,470,365 barrels; Virginia, 1,099,215 barrels; and Texas, 1,042,654 barrels. The largest output of rye flour came from Minnesota, 579,648 barrels ; and Wisconsin, 501,475 barrels. The largest pro¬ duction of hominy and grits came fro:m Indiana, 292,131,101 pounds; Illinois, 154,209,222 pounds; and Wisconsin, 94,955,277 pounds.

The number of mills grinding only feed for live-stock was 2,940. These mills consumed 53,507,330 bushels of corn; 23,050,719 bushels of oats; and 17,687,860 bushels of other grain. The feed produced amounted to 2,287,127 tons, valued at $74,800,863.

When the United States entered the European War it became necessary to

adjust the wheat supply equitably among the Allies, and to spare from the United States crop an unusual amount for export, substituting the flour of other grains for a part of the normal consumption of wheat flour. This condition already prevailed in other countries, and had been met in part by milling a larger percentage of the grain into fine flour than had been the custom. In Great Britain it was required that 81 per cent of the wheat be returned in flour; an admixture of from 5 to 15 per cent of other grain — rye, rice, corn, oats, barley, or beans — being permitted, and in many

instances quite essential to bring the required percentage. In France, 80 per cent was tfle re¬ quirement ; in Germany, 94 per cent for wheat, and 80 per cent for rye; in Austria, 85″ per cent for wheat and 82 per cent for rye. In the United States the requirement was 80 per cent for wheat and 66 per cent for rye. In Great Britain the attempt was made to grind wheat and corn together, which proved at first a fail¬ ure owing to the moisture content of the corn germ, always removed by American millers. The American mills adhered strictly to grinding the different grains separately, and produced their mixed flours by mixing the flours of the separate grains.

The greatest commercial problem before the milling industry is that of competition, but this is no longer a problem of individuals, but of nations. It is first a competition for the raw materials, and then for the flour trade. Europe buys immense quantities of American wheat (259,642,533 bushels in the fiscal year 1914- 15), and with the flour made therefrom enters the world's markets against American flour. The American miller will not feel that all his problems have been solved until the surplus of the wheat crop of the United States is no longer exported as raw material, but as manufactured flour. See Flour, Wheat. Consult Amos, P. A., Processes of Flour Manufacture) (Lon¬ don 1912) ; Millers' Almanack and Trade Year Book, 1915—16 (Minneapolis 1915) ; Oliver, C. E., (The Miller and Milling Engineer > (Indi¬ anapolis 1913) and the reports of the 1914 Census of Manufactures (Washington 1917).

FLOURENS, floo'ran', Gustave, French revolutionist and author: b. Paris, 4 Aug. 1838; d. Rueil, 3 April 1871. In 1863 he delivered at the College de France a course of lectures on the history of mankind. The theories advo¬ cated by him in these lectures gave offense to the clergy and he was hindered from further lec¬ turing. He went to Belgium, where he pub¬ lished his lectures under the title (Histoire de l'homme) (1863). He also traveled in the Near East, visiting Constantinople and Athens, took part in the Cretan revolution of 1866. An article of his in the Popolo d'ltalia caused his imprisonment, and soon after his return to France he fought a duel with Paul de Cassag- nac, editor of Le Pays. Flourens was an ar¬ dent republican and in February 1870 attempted a revolution at Belleville, but was obliged to flee to England. He returned to Paris on the downfall of the

Empire, but was imprisoned by the provisional government. In January 1871 his followers effected his release and in March he joined the Communists by whom he was made colonel. He became an active leader and lost his life in a hand to hand conflict with the Versailles troops.

FLOURENS, Leopold Emile, French statesman: b. Paris 1841. In 1863-68 he served as auditor of the Imperial Council. In 1879 he became head of a department under the Minis¬ ter of Education. Six years later he became chief of the divisions of Foreign Affairs, Jus¬ tice and Legislation in the Council of. State and also chief of a department in the Ministry of Foreign Affairs. He was appointed Minister of Foreign Affairs in 1886 under Goblet, and remained in this relation under the successive premierships of Rouvier and Tirard until 1888,

when he became one of the moderate Republi¬ can party in the Chambre des Deputes. He secured re-election in 1889 and 1893, failed of election in 1898, but was again elected in 1902. His published works include Organisation ju- diciaire et administrative de la France et de la Belgique de 1814 a 1875 > (1875) and Alexan¬ dre III; sa vie et son ceuvre) (1893).

FLOURENS, Marie Jean Pierre, French physician and physiologist : b. Maureilhan, de¬ partment Herault, 15 April 1794; d. Mont- geron, near Paris, 6 Dec. 1867. His first scien¬ tific writings, which were distinguished by their perspicuous style and analytical precision, ap¬ peared in 1819. In 1828 he was elected a mem¬ ber of the Academy of Sciences, in 1830 was appointed to the chair of comparative anat¬ omy at the Jardin des Plantes, and in 1833 suc¬ ceeded Dulong as permanent secretary to the Academy of Sciences. In 1840 he was admitted a member of the French Academy. In 1846 he was created by Louis Philippe a peer of France, he was deprived of this dignity by the revolu¬ tion of 1848. Flourens combined with pro¬ found scientific knowledge great literary talent. His works are very numerous, but the follow¬ ing may be mentioned particularly : (Recherches

experimentales sur les Proprietes et les Fonc- tions du Systeme nerveux > (1824) ; Experi¬ ences sur le Systeme nerveux) (1825) ; (De- veloppement des Os) (1842) ; (Anatomie de la Peau) (1843) ; (Memoires d'Anatomie et de Physiologie comparees > (1844) ; (1841) ; (De la Longevity (1854) ;

FLOWAGE. See Rock-flow age.

FLOWER, Benjamin Orange, American editor and author: b. Albion, Ill., 19 Oct. 1858; d. 24 Dec. 1918. Publisher and editor of the Arena at Boston until 1896; from 1904 to 1909 had charge of the Coming Age, which was finally combined with the Arena; and from 1909 to 1911 was editor of the Twentieth Century Magazine. Among his numerous works are Civilization's Inferno; or Studies in the Social Cellar (1893) ; (1894) ; (Gerald Massey: Poet, Prophet and Mystic) (1895) ; (The Century of Sir Thomas More) (1896) ; Eessons Learned from Other Lives) ; Eersons, Places and Ideas) (1896) ; (How England Averted a Revolution of Force) (1901 ; new ed., 1911) ; Christian Science as a Religious Belief) (1910) ; Progressive Men, Women and Movements of the Past Twenty-five Years)

(1914).

FLOWER, Roswell Pettibone, American financier: b. Jefferson County, N. Y., 7 Aug. 1835 ; d. Eastport, Long Island, 12 May 1899. He began his business and political career in Watertown, N. Y., where he organized the Jef¬ ferson County Democratic Club. His success in politics attracted the attention of Samuel J. Tilden, through whose influence he was ap¬ pointed chairman of the Democratic State Com¬ mittee in 1877. Four years later he was elected to Congress and in 1886 was appoi tiled president

of the Subway Commission. He was re-elected to Congress in 1888 and 1890 and in 1891 was elected governor of New York. From the close of his term till his death he applied himself to the interests of his large banking house and to a systematic course of philanthropy. A statue in his memory by Saint-Gaudens was placed in Watertown in 1902.

FLOWER, Sir William Henry, English zoologist: b. Stratford-on-Avon, 30 Nov. 1831; d. London, 1 July 1899. After a medical train¬ ing he served as an assistant-surgeon in the English army during the Crimean War; in 1861 was conservator, and from 1870-84 Hunterian professor of comparative anatomy in the Royal College of Surgeons. From 1884-98 he was director of the natural history departments of the British Museum. He was president of the Zoologist Society 1879-99, of the Anthro¬ pological Institute 1883-85 and of the British Association, in 1889. He was made a knight commander of the Bath in 1892. He rendered distinguished service by his admirable classifi¬ cations and in the realm of discovery elucidated many new facts about the anatomy of mammalia and was the first to demonstrate that the denti¬ tion of the marsupial remains throughout life unchanged with the exception of a single tooth. Several important treatises came from his pen, including introduction to the Osteology of the Mammalia) (1870; 3d ed. 1885) ; (Fashion in Deformity) (1881) ; (The Horse) (1890); and Essays on Museums and other Subjects)

(1898).

FLOWER, that portion of the anthophytous plant which consists of the organs of sexual reproduction, with the accompanying envelopes, if present. Popularly this term is applied only when one or both sets of floral envelopes are conspicuous, or even to showy groups of flowers. The flower consists of an axis, fre¬ quently very much shortened or otherwise modi¬ fied, called the torus. From this there arise typically, in basipetal succession, the pistil (or pistils), stamens, petals and sepals. In many types of flowers, however, one or more of these sets of organs may be lacking. Production of seeds follows the application of pollen, pro¬ duced by the stamens, to the pistil, within which the seed or seeds are developed.

Detailed Anatomy. — The pistil may be simple, i.e., consisting of but one megasporo- phyll (carpel), in which case the number of pistils in the flower may be more than one, or compound, i.e., consisting of two or more par¬ tially or completely united megasporophylls. Ex¬ cept in monstrosities never more than one com¬ pound pistil occurs in a flower. The pistil usually shows two or three fairly well marked portions, the ovary, style and stigma, the second often being absent. The ovary is the enlarged basal portion of the pistil and is hollow, con¬ taining the ovule or ovules; the stigma is a specially modified region, usually apical or nearly so, to which the pollen grains adhere and find suitable conditions for their germination leading to the fertilization of the ovules ; the style is the slender, elongated upper portion of the pistil situated, when present, between the ovary and the stigma, thus raising the latter up, away from the ovary. The ovary may possess one cavity or locule ((

■*gnnw*

MORPHOLOGY OF FLOWERS

1 Bulrush flower with perianth

reduced to bristles

2 Grass flower showing two petals (lodicules)

4 Female cone of Yew Orchid flowers Iris

Aristolochia

8 Flower of Aristolochia with calyx cut

away

9 A single pistil

10 Section of Ranunculus flower

11 A single carpel of Ranunculus

12 Gynoecium of Ranunculus

13 Androecium of Mallow with united filaments

14 Compound pistil of Mallow with styles united at base

15 Ovary of Gentian with two united carpels

16 Ovary of Violet with three united carpels

17 Gynoeceum of Hypericum with a part of the stamens

MORPHOLOGY OF FLOWERS

1 Flower of European ash

2 Section of flower of Hippuris

3 Hypogynous flower (rock-rose)

4 Perigynous flower (cherry)

5 Epigynous flower (whortleberry)

6 Flower of English elm

7 Funnel-shaped flower of Gentian

8 Bell-shaped flower of Harebell

9 Salver-shaped flower of Gentian

10 Rotiform corolla

11 Tubular corolla (bluebottle)

12 Section of bluebottle flower

13 Two-lobed flower

14 Labiate flower

15 Papilionaceous corolla

16 Parts of a papilionaceous corolla

17 Personate corolla (spurred)

18 Male (staminate) flower (melon)

19 Female (pistillate) flower (melon)

pistil is compound. The stigma and style may be single or several in number. A single style may possess several stigmas. The ovules' may be numerous or but one and attached at various points on the interior of the ovary. These regions of attachment are called placentae. The

Fig. 1. — Pistil of wild buckwheat in longitudinal section.

megasporophylls are open in the very young flower buds but gradually fold together and unite by the time of opening of the flower. The ovules are attached at the united edges. In a simple pistil the ovary has but a single cavity and the ovules are attached to only one placenta, the style is single and the stigma also. In a compound pistil the component megasporophylls may be closed, as in simple pistils and then

Fig. 2. — Female gametophyte (embryosac) showing fertilization.

united by their adjacent outer faces, forming a pistil with as many locules as there are carpels, with the ovules in the central angles (placenta axillary), e.g., lily, or they are joined edge to edge, forming a one-loculed ovary with as many placentae against the outer wall as

there are component megasporophylls (parietal placenta), e.g., violet. In the Pink family the placenta is axial, as in the lily, but the thin septa are

dissolved early in the growth of the pistil, so that the placenta seems to have arisen free in the centre of the ovular cavity (free central placenta) . The ovules are the future seeds. They consist of a- central body, called the nucellus, in reality a sporangium (mega¬ sporangium) surrounded by one or two protec¬ tive coats (integuments), which enclose the nucellus entirely, except for a small apical open¬ ing (micropyle) . The ovule may be sessile or provided with a short or long stalk (funiculus) . It may be straight or bent back upon the funi¬ culus or curved. It may arise from the bottom of the ovary (basal), or from the sides, or may hang from the top (suspended). Within the nucellus are produced typically four spores (megaspores) , one of which develops into a

Fig. 3. — Embryo Sac.

rudimentary female plantlet (gametophyte) , the so-called embryo sac, entirely enclosed within the ovule. Within this is produced a single egg. The pollen grain (microspore) germinating upon the stigma produces a long tube contain¬ ing several cells (representing a small male plantlet or gametophyte) which grows down through the style into the cavity of the ovary and enters the ovule through the micropyle (rarely through the funicular or ˆchalazaP end). On reaching the embryo sac a sperm nucleus is set free which fertilizes the egg. The latter now grows and divides, produc¬ ing the embryo plant for the new generation. This is at first nourished by the embryo sac which may develop into a considerable mass of tissue (endosperm) , taking its nourishment in turn from the tissues of the ovule. As the seed matures this endosperm may be all con¬ sumed or part of it may remain, resulting in respectively exalbuminous or albuminous seeds.*

The integuments of the ovule become the seed

coats.

The stamens have their position next below the pistils on the torus. Technically a stamen is a microsporophyll and consists of a stalk (filament) and an enlarged extremity (anther). The anther consists of a usually narrow portion (connective) bearing on each side two microsporangia or pollen sacs. Within these are produced the microspores or pollen, consisting of round or angular, sometimes elongated, usually yellow or orange, less often green cells. These are smooth or marked in characteristic patterns by ridges, spines, pits,

Fig. 4. — Cross section of stamen showing the four microsporangia.

etc. They escape by the rupture of the pollen sacs by a longitudinal split or by the opening of little lids, usually at the apex. The pollen may be dry and dust-like and adapted to distri¬ bution by the wind or sticky and occurring more or less in masses, depending upon insects, in the main, for distribution. The stamens may be very numerous and arranged spirally on the torus or few in number, forming one or two whorls.

Next to the stamens are the petals (collec¬ tively the corolla). These are more or less leaf¬ like, thin, mostly white or brightly colored struc¬ tures, less often green or dull in color. They may be numerous and spirally attached to the torus or in a single whorl of but a few petals. In some flowers they are entirely lacking (apetaly). The petals of a flower may be united to each other to form a gamopetalous corolla.

The outermost members of the flower are the sepals (collectively the calyx). They are usu¬ ally green and more leaf-like than the petals

Fig. 5. — Longitudinal section of flower of Geum, with petals re¬ moved, slwwing elongated torus and beginning of perigyny.

and form the outer layer of the flower bud, enclosing the other parts. They may be numer¬ ous and spirally arranged or few and in a whorl. In the absence of the petals the sepals of some kinds of flowers are brightly colored, as in the anemone, four-o-clock, buckwheat, etc. Like the petals the sepals may be separate or united.

In some flowers the calyx also is lacking, in which case the flower is called naked or achla- mydeous.

The torus may be more or less elon¬ gated, so that the pistil or pistils, stamens, petals and sepals follow one another downward, e.g., buttercup or magnolia, or flattened so that the pistil is in the centre with the other organs successively further from the centre, e.g., pink, or it may be saucer- or cup-shaped bearing the pistil or pistils in the centre and the stamens, petals and sepals on the rim of the cup, e.g., plum and rose. Flowers of the last type are called perigynous and of the first two hypogy- nr us. A still further modification is that where the hollowed out torus is grown fast to the enclosed pistil so that the remaining organs of the flower appear to arise from the top of the ovary (epigynous flower), e.g., apple, evening primrose, etc.

Variations in Structure and Arrangement.

— In general the flowers of the Monocoty- ledoneae have their parts in

threes, those of the Dicotyledoneae in fives or fours, with numerous exceptions in both groups. Probably the majority of the former group possess pentacy- clic flowers, i.e., with five whorls, sepals, petals, stamens (two whorls) and carpels (usually united into a compound pistil). The members of each whorl alternate in position with those of the next whorl, so that the petals stand op¬ posite the stamens of the inner whorl and alter¬ nate with those of the outer whorl as well as with the sepals. Since the number three pre¬ vails largely throughout this class it is apparent that where but two or only one member is present the others have been lost in some way, leaving a gap. In the Dicotyledonese many flowers are spiral in their arrangement, others have their sepals and petals in alternating whorls of five each with numerous stamens and pistils ; the most, however, possess a penta- cyclic or even more frequently a tetracyclic type of flower. In the latter case it is usually the inner whorl of stamens that is missing; in the Primroses, however, the outer whorl. There is also a great tendency toward the reduction of the carpellary whorl to three or even two carpels, the other whorls remaining in fives. It is true that in the Mints and Foxgloves (respectively Lamiacew and Scrophulariacece) we frequently find but four or even two stamens while the petals and sepals remain in fives. In these cases we can see the gaps left by the miss¬ ing stamens and reconstruct it as an incomplete whorl of five. In these same flowers the carpels are but two.

The petals and sepals may be entirely free from each other in the same whorl or their bases may be united, leaving the remainder free, as with the corolla in Old-Man's-Beard (Chion – anthns), or the union may be practically com¬ plete, as in the corolla of Morningglory (Ipomoea). Various other unions may be found in parts of flowers. Thus in the pea family (Fabacece) very commonly the filaments of nine of the stamens are united into a tube which is open at one side, the tenth stamen standing in this opening but not united to the others. In the Composites (Asteracece , etc.), the anthers of the five stamens are united into a ring around the stigmas, the filaments remaining free. In a great many gamopetalous flowers and some others the filaments are grown fast

FLOWERS

1 Poppy (Papaver somnifera)

2 Peony (Paeonia arborea)

3 Primrose (white Chinese variety)

4 Italian Petunia

to the inner face of the corolla so that the stamens seem to have their origin from this instead of from the torus. In the Orchids (Or chid ace ce) the two (or one) stamens are united with the style to form the peculiar structure called the column.

The simplification of the flower by the re¬ duction in the number of parts may be very great. In some species of maples the flowers have showy petals and large sepals; in other species the petals are lacking and the sepals rather small; in still others the sepals are mi¬ nute. The elm flower lacks petals but has rudi¬ mentary sepals; the flowers of the spurge (Euphorbia) lack both petals and sepals. In¬ deed the latter are the simplest flowers known, consisting respectively of a single stamen or a single pistil for the male or female flower. That this is not the simplicity of primitiveness is shown by the fact that the pistil is compound and that the near relatives within the same family show all degrees of reduction from flowers with all parts, those without petals and those with sepals missing also. Along with such reduction of parts often goes the segre¬ gation of sexes into different flowers on the same plant (monoecious plant) or upon differ¬ ent plants (dioecious plants).

As flowers are reduced to greater and greater simplicity we find that there is a tendency to¬ ward being more and more crowded together, e.g., catkins of willow' and birch, or very much more numerous, e.g., grasses, elm, maple, etc. This reduction in complexity of structure and increase in numbers often goes hand in hand with the loss of insect pollination (entomophily) and the acquirement of anemophily (pollination by air borne pollen).

Flowers may be single on long or short stalks or in various types of clusters. (See Inflores- cense). Frequently they are associated with modified leaves, called bracts. These are some¬ times brilliantly colored, adding to the conspicu- cusness of the cluster. Sometimes the flowers themselves are inconspicuous and only the bracts are showy. Such is the case with the cultivated Poinsettia, Snow-on-the-Mountain, etc.

Pollination. — Especial interest attaches to those modifications of floral structure which provide for pollination or prevent self-pollina¬ tion while favoring cross-pollination. Those modifications that provide for pollination by means of insects are discussed more fully in the article Flowers and Insects.

It was shown by Darwin that some flowers are infertile or only partially fertile when pol- lenized with their own pollen ; on the other hand plants like wheat, bean, pea, etc., are reg¬ ularly fertilized within the bud before the flower opens, by their own pollen without any discoverable loss of fertility or vitality. Many flowers have contrivances which prevent self-pollination. Thus the stigma may be receptive at a different time from that when the pollen is being shed. In this regard the flower may be proterogynous, with the pistil receptive be¬ fore the pollen is set free, or proterandrous, in which case the pollen has all been shed before the stigma is receptive ; the plantain being an example of the former, a comparatively rare condition, the proterandrous flowers being very numerous.

Certain plants, such' as the violet, jewel weed (Impatiens), etc., have two kinds of

flowers, the showy ones which are visited by insects and cross pollinated, and which may or may not produce seeds, and the so-called cleistogamous flowers, which remain small, are rudimentary in structure (petals often lacking), and do not open, pollination taking place within the unopened flower by the setting free of the pollen from the anthers so that it comes into direct contact with the stigmas. In some plants it is only the cleistogamous flowers that produce seeds. For a number of cases it has been demonstrated that the production of one or the other kind of flower depends upon the nutrition of the plant.

Evolution of the Flower. — The old idea that the flower represents a modification of a leafy shoot, with the sepals, petals, stamens and pistils as successively further and further de¬ viations from the leaf structure has been aban¬ doned since it is clear that the reproductive leaf (sporophyll) is probably older in the evolution¬ ary history of the vegetable kingdom than the strictly vegetative leaf. In most ferns the leaves serve a dual purpose, that of reproduc¬ tion (by producing spores) and of food manufacture. As we advance along the line of evolutionary development we find that there is a progressive sterilization of part of these leaves until the re¬ productive function is confined to only a few leaves (sporophylls) , the remainder of the leaves having lost the capacity to produce spores and being the vegetative leaves. These sporophylls may resemble the vegetative leaves in being able to manufacture food, and in that case usually differ from them very little in appear¬ ance. However, once the cleavage has ap¬ peared we find that it progresses until they are very different, even in some groups not very far advanced. Along with this differentiation there occurred a segregation of the sporophylls from the vegetative leaves; thus in the ostrich fern the vegetative leaves are produced earlier in the season and the sporphylls in a cluster in the centre toward the season's close. In some of the extinct forms that are on the path to¬ ward the higher plants

(Bennettitales) the sporophylls are of two kinds, producing respec¬ tively megaphores (female spores and micro¬ spores (male spores) on the megasporophylls which are crowded together at the apex of a modified shoot, below which the micro- sporophylls occur, also in large numbers, the whole being subtended by several large pro¬ tective leaves. This type of flower is so sug¬ gestive of the flower of Magnolia that many botanists now see in the latter the most primitive type of the modern Anthophyta. A further dis¬ cussion of the lines along which evolution carried the modification of this type of flower structure will be found in the article Plants, Morphological Evolution of.

Colors of Flowers. — Although the colors of flowers are very numerous and of many hues and shades, yet it is possible, usually, to segre¬ gate the flowers into two groups, the blue and the yellow. With each of these we may find red and white. It has been estimated that in an average collection of 1,000 plants about 284 have white flowers, 226 yellow, 220 red, 141 blue, 73 violet, 36 green, 12 orange, 4 brown and 2 black. Of these those with white flowers are almost universally fragant, with agreeable odors. Red flowers are usually more fragrant

than yellow ones. The colors are due to pig¬ ments either dissolved in the cell sap or held in the chromoplastids. The latter is the case with many of the reds, oranges and yellows, which are due to carotin or some of its deriva¬ tives. The blues, violets and purples are due to a variety of substances in solution, known col¬ lectively as anthocyanin. In reality this is not a single substance but a group of chemically related compounds. Other groups of pigments are also present in some flowers. The whole subject is a very difficult one as on account of the non-crystalline nature of some of these coloring matters they cannot be obtained in a pure state and so are not easily investigated chemically.

Flowers of the Garden. — The features that make flowers attractive or useful to man are chiefly the bright colors, form and odor. These may be combined, all in the same flower, as in the Easter lily whose beautiful white color is matched by its graceful form and delightful odor; or the flower itself may be inconspicuous and have only its odor to make it welcome, as in the Mignonette. Other flowers may attract by their color and shape and entirely lack scent or even be disagreeable in odor. There is a fashion in flowers as in dress, so that many flowers popular a generation ago are not found now except in old-fashioned gardens.

In a large number of cases the flowers culti¬ vated have undergone ˆdoubling,® i.e., instead of the single whorl of petals there are many petals. The extra ones represent perhaps most often stamens that have been transformed to petals under the influence of conditions that are not well understood. In heads of flowers such as those of the sunflower where usually only the external circle of flowers is showy and the remainder rather inconspicuous, the doubling consists of the transformation of these central inconspicuous flowers into showy ones like those at the margin. This is also the case in the cultivated snowball bush in which all the flowers are sterile and showy instead of merely the marginal ones of the cluster as in the wild form.

Many of the most beautiful of the cultivated flowers are not found in nature but are the re¬ sult of the plant breeder's art. See Plant Breeding.

Some of the commoner flowers have been in cultivation from antiquity, as in the case of the rose and pink, and have been discussed even in the writings of the ancients. On the other hand it has been only within the past hundred years or so that the systematic exploration of the world has revealed myriads of new plants many of which have been brought directly into cultivation or been made the subjects of the breeder's skill in improving sorts already known. It should be noted, for example, that in America the Canna was rarely grown until at the World's Fair at Chicago in 1893 the exhibit of new and gorgeous sorts in massed groups showed the value of this plant. The common blue Iris has been found in gardens for centuries but until recent years it has been only in large estates and botanical gardens that the showy sorts, white, cream, yellow, red and vari-colored were to be found, while now they are accessible to every flower lover. See Botany ; Flowers and Insects; Fruit; Garden; Inflorescence;

Plants, Structure Kingdom.

of; Seeds; Vegetable Ernst A. Bessey,

Professor of Botany, Michigan Agricultural College.

FLOWER BEETLES, scarabeid beetles of several genera. One of the most abundant and destructive of these insects is the rose-chafer which annually does great damage to roses and other flowers and fruits. Several species of the genus Euphoria, more especially E. inda, is frequently found on flowers eating pollen, but it also attacks corn in the milk and eats into various forms of fruit. Other flower beetles belonging to the genera Hoplia and Tri-chius are commonly found on flowers through¬ out the country and take some part in the cross¬ fertilization of useful plants. Numerous other beetles frequent flowers among which, are beau¬ tiful species of the genera

Clerus and Trichodes of the Cleridce ; Leptura and many related genera of long-horned beetles ; and many genera of small families such as the Mordel- lidce.

FLOWER-BUG, a very minute bug (Triphleps insidiosus) also ((insidious flower- bug,® and related to the bedbug. It is found on the foliage of various plants and preys upon other minute insects.

FLOWER MONTH, in general any month in any country in which flowers are springing most abundantly; in the United States, June is specially the month of flowers. Specifically, the month Anthesterion, the eighth of the Attic year, corresponding nearly to February ; so called because that time was, in that country, the season of flowers.

FLOWER-PECKERS, general name for a large family (Dicceidce) of small insectivorous birds allied to the creepers (q.v.) which get their food largely by searching flowering plants and their blossoms, picking up minute insects largely by aid of a curious tongue which is separated at the end into four tubular pro¬ jections. They inhabit the Indo-China region and thence throughout the archipelagoes to Australia, where the white speckled diamond- birds (Pardalatus) and the swallow-dicaeum (Dicceum erythrorhynchum) are familiar friends of the gardener. They frequent bushes and trees, hopping briskly about the branches and creeping and clinging like titmouses. Some make extremely beautiful, highly decorated nests, while others are content to deposit their eggs, which in most of the species are white, in holes in trees, or earthen banks, or old birds' nests. Some are plainly dressed, but most of the flower-peckers are gaudily colored and several sing sweetly.

FLOWERING FERNS. See Ferns and

Fern Allies, Filicales (1).

FLOWERS, in chemistry, a term formerly applied to a variety of substances procured by sublimation in. the form of slightly cohering power, hence in all old books we find men¬ tion made of the flowers of antimony, arsenic, zinc and bismuth, which are the sublimed oxides of these metals in a more or less pure state. We have also still in use, though not generally, the terms flowers of sulphur, of benzoin, etc.

FLOWERS, Artificial, flowers made from various materials to imitate natural blossoms.

CANADA

GOLDEN

ROD

MARSH

PINK

BUTTERFLY WEED ‘

MOUNTAIN (iiANT LAUREL SUN-

£ flower

OX-EYE DAISY

SOAPWART

TANSY

MARSH

MARIGOLD

CANADIAN LILY

SWAM P I ROSE f MALLOW

PURPLE

VIOLET

BEE BALM

BLUE FLAG

BLOOD-

ROOT

WILD COLUM BINE i

WILD

HONEY¬

SUCKLE

NEW

ENGLAND

ASTER

EVENING-PRIMROSE

COPYRIGHT, 1913, BY F. E. WRIGHT.

FLOWERS

395

These are not a modern invention. The famous floral wreaths made by the ancient Egyptians were formed from thin plates of horn stained in different colors, sometimes also of leaves of copper, gilt or silvered over. The Romans ex¬ celled in the art of imitating flowers in wax and in this branch of the art attained a degree of perfection which has not been approached in modern times. Crassus, renowned for his wealth, gave to the victors in the games he celebrated at Rome crowns of artificial leaves made of gold and silver. In modern times the Italians were the first to acquire celebrity for the skill and taste they displayed in this manu¬ facture, but they are now far surpassed by Eng¬ lish, American and French manufactures, more especially by the last-named. The Chinese and Japanese show great dexterity in this work.

The first artificial flowers made in modern times in civilized countries were manufactured out of many-colored ribbons which were twisted together and attached to small pieces of wire. But these first attempts were decidedly crude. In course of time feathers were sub¬ stituted for ribbons, a more delicate material, but one to which it was not so easy to give the requisite shades of color. The plumage of the birds of South America is admirably adapted for artificial flowers on account of the bril¬ liancy and permanence of the tints and the natives of that continent have long practised with success the making of feather flowers. The Zoological Gardens in Regent's Park, Lon¬ don, contain a magnificent collection of artifi¬ cial flowers made out of the feathers of hum¬ ming-birds. In South America artificial flowers are also composed of the wing cases and other parts of some brilliant specimens of beetles. In Italy the cocoons of silkworms are fre¬ quently used for the purpose, as these take on a brilliant color and have a velvety appearance. Among the other materials used in this manu¬ facture are cambric, muslin, satin, velvet and other woven fabrics, blown glass, mother of pearl, brass, thin layers of whalebone, etc., be¬ sides the various vegetable and mineral color¬ ing matters. Flowers were at one time made of porcelain and were perfumed. Great skill has been attained in the making of glass flowers and a remarkable collection of

this kind is owned by Harvard University. The art of artificial flower making was introduced in the United States by French immigrants, whose workmanship successfully imitated the form and hue of natural flowers. In 1909 there were 225 artificial flower establishments in the United States employing 4,835 persons and products of a value of $9,041,447.. Consult Van Kleeck, M., Artificial Flower Makers) (New York 1913).

FLOWERS, Fertilization of, by Birds. —

That insects and especially bees, carry pollen from flower to flower as they visit them in succession in search of the nectar hidden deeply in their corollas, is familiarly known to most readers. The insects entering a flower brush against the anthers, rub off the pollen (usually a little sticky) and in entering the next flower leave some of it on the pistil by means of which it reaches the seed. Many flowers appear to have become adapted in their structure to this external means of cross-fertilization (q.v.).

It is not so well known, however, that birds perform a similar service to plants which, al¬

though far more limited than that of insects, is still of great importance in certain plant families, especially in the tropics. A large variety of minute insects penetrate blossoms in search of food and some virtually live there as long as the flowers last. This fact is well known to birds of many sorts and the long slender bills characteristic of some families are especially adapted to probing the big, tubular, nectar-holding and fly-infested corollas pro¬ duced by tropical trees and herbs. Thus the banana plantations of the West Indies and Central America may be said to depend largely for successful crops on the prevalence of the banana quit (Certhiola flaveola), a small, plainly dressed creeper that searches the blos¬ soms for these insects ; in doing so the creeper's head becomes heavily dusted with yellow pollen, which is rubbed off against the pistil of other flowers as it pushes its head into them. These quits, or sugar-birds, of which tropical America has several species, have long curved bills and tongues frayed at the tip into a tiny brush. They search many sorts of flowers for insects, but neglect the nectar, or at anv rate that is not the first attraction. The hummingbirds, how¬ ever, which may be said as a class to live on w'hat they find in flowers (accessible to them in the tropics the year round), feed upon both the insects and the sugary juices to be found there. For this their structure particularly adapts them. Their small size permits them to enter completely into the larger flowers, while their powerful wings enable them to poise in front of smaller ones and explore them with the long slender bill characteristic of the tribe. See Hummingbird.

About 500 species of hummingbirds have been described, differing much in

details of size and color, especially in respect to the beak, for the straight bill of a Docmastes may measure five inches, while in Rhamphomicron it is only a quarter of an inch long. In some the bill curves slightly upward, in others downward and in Eutoxeres it is bent like a sickle. All these varieties of shape indicate special requirements, that is, the choice of particular blossoms; and Fritz Muller says that various species of abutilon in southern Brazil are sterile unless fertilized by the one kind of hummer that frequents each one. The hummingbirds dart into and out of a long list of tropical blossoms, gathering and leaving pollen, and several other cases of mutual dependence between them and plants might be mentioned. Thomas Belt ((Naturalist in Nicaragua5 London 1873) describes the flowers of certain vines of the genus Marcgravia in which the corolla con¬ sists in part of a ring of pockets, or "pitchers55 in various positions. In spring these fill with a sweetish liquid that attracts insects in large numbers, and these in turn lure hummingbirds, which alone among birds can reach the freely swaying flowers; but in order to rifle these sweet pockets, the bird must push past the generative parts (stamens and pistil) and thus give and take pollen on its glittering head or breast. The sabre-like flower of Erythrina offers a still more curious case of the need of hummingbirds, help in effecting healthful cross¬ fertilization.

The hummingbirds of America are repre¬ sented in the warm parts of the Old World by the sun-birds and honey-suckers, which also

are small and brilliantly plumaged, have rather long, and usually curved, fine-pointed bills, and protrusile tongues with split or else brush-like tips, with which it is easy to entangle a small bug or to extract nectar from its deep cup, for the tongue of these birds may be rolled into a sucking-tube. These resemblances to the American hummingbirds, with which they have no real relationship, merely show the ac¬ quirement by different kinds of birds of similar means to the same end — the rifling of flowers of honey and attendant mites of insects. The honey-suckers are Australian and are es¬ pecially addicted to the eucalyptus trees and shrubs that profit by feeding the beautiful little creatures. The eucalyptus groves of Australia are also frequented by the peculiar parrots called lories or brush-tongued parrakeets. They are distinguished by the dense coating of papillae on the tongue, with which they lick up honey and insects together from the big nectar- ous blossoms ; and more than one writer has mentioned that their foreheads are smeared with yellow pollen as they fly from tree to tree.

It is a very significant fact that Australia and its neighboring islands are

deficient in insects, especially bees and butterflies. It was necessary to import and acclimate bumblebees before clover could be raised there for fodder. This deficiency in healthful cross-fertilization for plants is supplied by birds and bats. In¬ terdependence of certain tropical trees and lowlier plants and their birds is illustrated elsewhere. The West Indian logwood is not found except where a certain sugar-bird lives; and the same companionship is noticeable in the East Indies, according to Layard. Forbes ((Wanderings in the Eastern Archipelago 1885), notes a plant in Sumatra dependent on a certain spider-eater (bird). Darwin con¬ cluded ((that the beaks of birds are specially adapted to the various flowers that they visit® ; and Grant Allen believes, conversely, that <(many of the most brilliant and beautiful bell¬ shaped tropical flowers have been specially de¬ veloped to suit the tastes and habits of those comparatively large and powerful fertilizers.®*

Ernest Ingersoll.

FLOWERS, Language of. See Flowers, Symbolism of.

FLOWERS, Symbolism of, a special sig¬ nificance attached to flowers by means of which they are made to represent various ideas and sentiments. This mode of communicating thought has developed in certain countries into a language of remarkable elaboration. Among the Greeks and Romans the use of flowers was full of significance. Though the well-developed floral speech of the Romans was probably lost to a great extent, the study was revived in Europe during the Middle Ages, being es¬ pecially appropriate in connection with such a romantic institution as chivalry. The Orientals have developed the language of flowers into a vehicle for communicating sentimental and amatory expressions of all degrees of warmth. Still further complexity is added by the habit of employing flowers the Turkish or Arabic names of which rhyme with the other really significant words. The language of flowers is, of course, arbitrary, and a bouquet which a Persian girl would understand would be un¬

intelligible to an Egyptian inmate of the harem. Yet among European nations certain flowers have a common significance. The rose is widely accepted as the symbol of majesty, and of love and beauty; the forget-me-not of true love; the lily of purity; the violet of modesty; the daisy and white violet of innocence; the rosemary of remembrance ; the amaranth of immortality; the asphodel of death and the unseen world ; the pansy of thought ; the hyacinth of sorrow; the narcissus of self¬ admiration ; the poppy of oblivion. The almond expresses hope; the lily-of-the-valley uncon¬ scious sweetness; the wallflower, love faithful in spite of adversity; the primrose, early youth ; and the cyclamen, diffidence. So surely as the orange-blossom is associated with mar¬ riage does the finding of white

heather betoken good-fortune to come, while the future chances of love may be revealed from the daisy and poppy by a simple method of divination. The laurel has long been accepted as the emblem of glory, the oak of patriotism ; the bay the poet's crown, and laurel the crown for beauty. In the Grecian games wreaths were placed upon the brows of the victors, but these were of leaves rather than blossoms. Floral gar¬ lands were much used at the feasts of the ancients, and in India it is customary to show special honor to a guest by encircling his neck with a wreath of flowers.

Historical and national associations cluster about certain flowers. The violet was the flower of Athens. The broom plant (planta genista) was worn by Geoffrey of Anjou, and hence arose the name Plantagenet represented in a line of English kings. The red and the white roses of Lancaster and York gave name to a great civil war. Particular families and clans have their floral badges and there are national and heraldic emblems drawn from the floral kingdom, such as the rose of England, the thistle of Scotland, the shamrock of Ire¬ land, and the fleur-de-lis (q.v.) of France, the latter being associated for centuries with the royal crown. The corn flower or Kaiser-blume is the national flower of Germany. The pome¬ granate became a Spanish national emblem having previously been the emblem of Moorish Granada. In Japan, the chrysanthemum is the flower of the nation, and in India the lotus has an especially sacred significance, as it had formerly in Egypt. In the latter country it often figured in architecture. In the decora¬ tive art of India it is represented in bronze and in paintings in connection with divinities or exalted sages. The cactus is the national em¬ blem of Mexico. No flower will ever become the national emblem of the United States in the manner in which such floral emblems have become connected with other nations, but an attempt has been made to gain an expression of popular opinion on the subject of a national flower and the golden-rod appears to lead in the contest, as it has done in the case of the Empire State, of which it has been chosen as an emblem. The legislatures of certain States have taken action on the choice of a State flower, Utah selecting the seg lily; Vermont, the red clover; Oregon, a native grape; Nebraska, the golden-rod; Michigan, the apple- blossom ; Maine, the pine tassel and cone ; Iowa the wild rose; Montana, the bitter root; Colorado, the white and blue columbine ; and

ORCHID

CYCLAMEN

SWEET PEAS

FREESIA

CHRYSANTHEMUM

NARCISSI

.OLDEN -BANDED LILY

CARNATION

PANSIES

VIOLETS

HYACINTH

COPYRIGHT, 1012, BY F. E. WRIGHT.

BRILLIANT AND FRAGRANT FLOWERS

FLOWERS AND INSECTS

Oklahoma, the mistletoe. In England what may he called a party emblem is illustrated in the adoption of the primrose generally but mis¬ takenly known as Lord Beaconsfield's flower, by the Conservatives. Before the "Hundred Days® in French history, the violet was used by the adherents of Napoleon I to symbolize the hope of his return from exile. Consult Folkard, (Plant Lore (London 1884) ; Hale, (Flora's Interpreter } (Boston 1835) ; Haig, (The Floral Symbolism of the Great Masters) (New York 1913) ; Welsh, C., (The Language Sentiment and Poetry of Flowers) (New York 1912).*

FLOWERS AND INSECTS: Their Re¬ lations. The lower plants are dependent upon water for the accomplishment of fertilization in the course of their sexual reproduction. They possess nothing in the nature of flowers and are independent of insects. It is impos¬ sible now to determine whether the first plants with true flowers were of such nature that insects served for pollination. In view of the present rather generally accepted belief that the first flowers were of a type represented now most closely by the magnolia, it seems probable that the mutually beneficial interrela¬ tions of flowers and insects began at an early date in the development of the flowering plant phylum. The simplified flowers of grasses, sedges, pigweeds, oaks, elms and other plants dependent upon wind for pollination are now seen clearly to be descended from flower types of a more showy nature that were in- sect-pollinated.

The insects are benefited in this relation by the food that they obtain. This is of two kinds, nectar and pollen. It is probable that the first insect visitors of flowers, ages ago, were pollen gatherers which used the pollen for food just as many insects do now. Later, probably, came the production of nectar by the flower; a lure that is attractive to still larger numbers of insects and that saves to a certain extent the precious pollen. The additional lure of special odors was presumably developed at about the same time. The development of bright or showy colors on the flowers them¬ selves or on adjacent bracts to attract the in¬ sects by the sense of sight must have taken place rather early also, but the fossil records are so imperfect that the exact period cannot be determined. It is unfortunate that as a whole the flower is rather poorly adapted for preservation as a fossil, and especially such delicate parts as petals, stamens, nectaries, etc. Consequently we know more about the struc¬ ture of the reproductive cones of the fossil Bennettitales, which are considered to be the forerunners of flowers than we do of the ear¬ liest true flowers themselves.

The earlier investigators of the relations of insects to flowers, such as Sprengel, Darwin and Hermann Muller, laid perhaps too much stress upon the value of the bright coloration of the flowers as a lure for insects. There is no doubt that a great many insects are guided to the flowers by the sense of sight. Thus it is noteworthy that night blooming flowers are usually large and white, thus being more con¬ spicuous- than if of any other color. On the other hand it must be admitted that the large amount of perfume given off by such flowers

cannot fail to attract night flying moths and other insects, even from great distances, until they are near enough to see the flowers. This is probably the case, too, with many day bloom¬ ing species. The work of Plateau, in Belgium, and of others has shown that if the odors be present many insects will continue to visit flowers, even if they are so mutilated by the removal of petals and other showy parts as to be comparatively inconspicuous. Possibly some groups of insects pay no attention at all to the shape or color of the flower but are guided solely by the odor. On the other hand the existence of (to us) odorless flowers which are very showy and freely visited by insects would seem to indicate that the colors are of advan¬ tage. Indeed, experiments with differently colored pieces of cloth, all scented in the same way so as to be attractive to insects, demon¬ strated that although the amount of odor for each piece was the same yet the brighter col¬ ored pieces actually drew more insects from a distance than the dull or inconspicuous pieces. The fact that some inconspicuous flowers that are nectariferous and sweet scented are freely visited by insects demon¬ strates that however advantageous it may be to have showy flowers to allure the insects, still that is not an absolutely indispensable feature.

In some cases the flower appears to secrete no nectar although the odor is sweet. Other flowers emit a very disgusting odor. So, for example, the flowers of a South African genus of the milkweed family, Stapelia, give out the odor of carrion. The large star-shaped blooms are marked with a brown or purple mottling, resembling in some species the belly of a toad. The carrion scent is very intense and attracts various carrion-moving flies which wander over the flower in an attempt to find a suitable place to deposit their eggs. In this process they lead to the pollination of the flower.

The actual benefit to the flower of this inti¬ mate relation between insects and flowers lies in the transfer of the pollen from the stamens to the stigma of the pistil, upon which is de¬ pendent the production of the seeds. In flowers that are dependent upon insects (ento- mophilous flowers) the stigma and stamens are not in sufficiently close juxtaposition to permit of the direct transfer of the pollen or this transfer is prevented by other means. The pollen, moreover, is often of such a character that it is not easily transported by the wind, either because of its size, on account of its sticky nature, its location, etc. Insects (more rarely birds, snails and other animals) that visit the flower in search of the pollen or nec¬ tar or for any other purpose become more or less covered with pollen. Their bodies and appendages are to a considerable extent cov¬ ered with hairs to which the pollen adheres or with which they become entangled. In addi¬ tion, some of the bees and wasps have special structures for holding pollen. It is a familiar sight to many to see bees on their return to the hive laden with nectar and with the two posterior legs bearing large masses of pollen. In moving about in the flower some of the pollen may be transferred directly from the stamens to the stigmas; when the insect visits

another flower some of the pollen from the first flower is carried to the next one. Soon after pollination has occurred we find that the emission of odors and the secretion of nectar cease, and in most cases the petals fall or shrivel so that the flower no longer exerts a lure for insects.

Floral Modifications. — As noted in the article Flower (q.v.) some plants do not set seed well and others not at all when pollenized by pollen from the same flower. In many cases the floral structures are so arranged that self- pollination is impossible, even when the flower is visited by insects. In the simplest cases the stamens set free their pollen at a time other than that when the stigma is receptive. Such flowers may shed all their pollen first (pro- terandry) or they may wait until after the stigma has passed the receptive stage before the pollen begins to be set free (proterogyny). In such

cases the period during which perfume and nectar are produced may be considerably longer than in those flowers where stamens and stigma are mature at the same time. In more specialized cases the flower assumes a

shape such that the visiting insect must enter it at a definite place, thus insuring that any pol¬ len obtained from a flower previously visited shall be brought into immediate contact with the stigma. In the sage (Salvia), for example, the flower is strongly two lipped. The bee settles on the lower lip and can enter the flower only one way. (See Fig. 1). In inserting the head and tongue into the flower in search for the nectary the tongue comes into contact with the peculiar extensions of the hinged stamens and in pushing these up so as to get at the nectar causes the anterior, pollen-bearing portion to curve downward until in contact with the back of the insect which is thus dusted with the pollen. In flowers at this stage the style and stigma lie concealed under the arching upper lip of the corolla. As the flower gets, older the style curves somewhat so that the stigma now comes in contact with the back of a visiting bee, thus receiving the pollen deposited there by the hinged stamens of another flower. The stamens having discharged their pollen twist to the sides so as to be out of the way. In the Lady's Slipper (Cypripedium) the lower lip is a large

sack with a median opening through which in¬ sects, bees chiefly, may easily enter, attracted by the odor. Downward pointing hairs and the incurving of the border of the opening prevent the insects escaping by the opening through which they entered. There are, however, two other openings, leading up by the stigma and stamens. After the bee has fed sufficiently on the sugary secretions of the hairs it climbs up to one of the small openings and squeezes out. In doing this it comes into close contact first with the stigma and then against a stamen, be¬ coming covered with pollen from the latter. On visiting the next flower this pollen is brushed off upon the stigma and perhaps a second load of pollen acquired. Charles Darwin studied the relation of insects to this and other orchids and found that many orchids are incapable of being pollenized except by certain insects, so fully are the flowers adapted in structure to fit the structure and dimensions of these particu¬ lar insects. Kronfeld noted that all of the species of monkshood (Aconitum) are confined to those parts of the world where bumble bees (Bombus) are native. Because of their rather deep-seated nectaries their nectar is not avail¬ able to short-tongued bees and flies which are not built in such a way as to be able to pollenize the flowers. .

Sprengel, who at the close of the 18th century was the first to study closely the relation of flowers to insects, pointed out that the various rows of dots or lines with which flowers are marked lead to the places where the nectar was concealed. He called these nectar guides and proposed the theory, still

generally accepted, that they indicate to the insects visiting the flower the position of the nectar and thus lead them to assume positions best suited for the process of cross-pollination. He also pointed out that the nectar is almost always well pro¬ tected from rain. Nearly 90 years later, the Austrian botanist, A. Kerner von Marilaun, drew attention to the fact that not only was the nectar carefully protected from washing by rain but even more completely so from robbery by insects not suited to effect pollination. Thus ants are kept away from the flowers of many species of catchfly (Silene) by bands of a sticky secretion at or near the nodes, and a great many flowers are protected from these same unwelcome guests by sticky hairs on the stem or on the flower stalk or outside of the calyx. In the teasel (Dipsacus) the leaves are joined together at their bases to form cups which become filled by rain water and thus effectually bar the way for small creeping insects. Many flowers have tufts of soft or sometimes stiff hairs in such positions that small insects that reach the flower by flight cannot pass down to the nectar although the larger and stronger insects are able to push their tongues past the hairs to the nectaries, and in so doing to pol¬ lenize the flower. Night-blooming flowers usu¬ ally dispense no attractive odors during the day and frequently are without nectar until night, so that they are not liable to visits from the undesired day insects. Some flowers main¬ tain such positions that only certain insects are able to enter them or to extract the nectar. Nevertheless many flowers are subject to rob¬ bery by short-tongued bees which, instead of entering, the flower by the regular way, a method impossible for them on account of the

shortness of their tongues, go directly to the exterior of the flower just opposite the nectary and gnaw a hole through the base of the co¬ rolla and in this manner gain possession of the nectar, without, of course, pollenizing the flower. Thus some species of monkshood (Aconitum) show a high percentage of their blossoms rifled in this manner. Even the flowers of red clover are frequently robbed by short-tongued bees that cannot reach the nec¬ tar from the top of the flower.

Heterostyly. — Sprengel noticed that in cer¬ tain plants the stamens and pistils were of dif¬ ferent length in the flowers of some plants than in those of others of the same species. It was not, however, until Darwin studied the subject that the matter was cleared up. He showed that the common yellow cowslip or primrose of England (Primula officinalis) had two forms of flowers, the long-styled and the short-styled. (See Fig. 2). In the former the stigma is on a level with the top of the tube of the salverform corolla and the stamens are attached to the inside of the tube about half way from the

base to the top. In the other form the stamens are attached at the top of the corolla tube and the short style brings the stigma only about half way to the top. The two forms are always on separate plants. When visited by insects, chiefly bumble bees, the base of the proboscis becomes covered with pollen in the case of the short-styled flowers, and the middle portion with the long- styled flowers. Upon visiting a flower of the opposite type the pollen upon the base of the proboscis is brushed off upon the stigma of the long-styled flower while that upon the mid¬ dle of the proboscis pollenizes the stigma of the short-styled form. Darwin's further ex¬ periments showed that while pollenization of a flower with pollen from another flower of that same type would result in a certain amount of good seed, yet these ˆillegitimate® unions were not nearly so productive of good seed as when short-styled flowers were pollenized with pollen from the long-styled flowers and vice

Fig. 2. — Heterostyly in Primrose.

versa. The ratio was as 35 to 54. When the legitimate union took place the seeds produced would give rise to both kinds of plants.

Even more complicated than the case of the primrose is that of the loosestrife (Ly thrum salic aria) in which three types of flowers exist,

those with (1) long styles and medium and short stamens, (2) medium styles and long and short stamens, and (3) short styles and long and medium stamens. (See Fig. 3). When pollenized by pollen from stamens differing in length from the style (illegitimate unions) the

Fig. 3. — Heterostyly .in Loosestrife.

flowers are absolutely sterile in some cases and only partially fertile in others, while when the pollen comes from stamens of the same length as the style (legitimate union) the fertility is very high.

Spanish Bayonet. — The relation between insect and flower in the various species of Spanish Bayonet {Yucca) is one that has led to a great amount of speculation in the attempt to explain the evolution of such habits. The plants have large white or cream-colored, bell¬ shaped flowers which hang with the opening directed downward. The blossoms are free from nectar or nearly so. The stamens are much shorter than the pistil and are curved away from it. The stigmatic surface is not at the summit of the pistil, as is the usual arrangement, but on the interior of the hollow style, where there is no possible chance of the pollen being brought by the wind or by ordi¬ nary insect visitors. Fertilization is effected by the females of moths (see Fig. 4) of the genus Pronuba , the species common east of the Rocky

Mountains being Pronuba yuccasella, which visit the flowers at dusk and go to each stamen, scraping off the rather sticky pollen with specially modified mandibles, massing it into a large ball held beneath the head. After collecting the pollen the moth usually flies to another flower and deposits one to several eggs in the ovary, after each act rushing to the top of the pistil and pushing down into the hollow style part of the pollen from the ball, putting it as far into the hollow as she can reach. She then flies to another flower, lays more eggs, and pollenizes that flower, and so on until the eggs are all deposited. Sometimes in the mean-

lime she stops and collects more pollen. The eggs hatch into small larvae which destroy a few of the very numerous seeds. However, as no seeds are set without the activities of this in¬ sect the plant can well afford to spare the few seeds consumed.

Fig. — The flowers of the fig are very minute and crowded on the inner surface of an urnlike receptacle, which becomes the fig fruit. The wild forms of the fig, called capri- figs, have three kinds of flowers in their re¬ ceptacles, female flowers that upon fertilization are capable of producing seeds, female flowers (gall flowers) of such a structure that the female insect can easily lay her eggs in them, they serving as food for the young insects, and male flowers. The fig cultivated for its fruit has only the first kind of flowers. A fe¬ male fig wasp (Blastophaga) emerging from a gall flower of a capri-fig finds the male flowers mature and shedding an abundance of pollen

t Fig. 4. — A hawk-moth sucking nectar from a tiger-lily.

so that as she works her way around in the rather limited space in making her exit from the receptacle she becomes covered with pollen. She immediately seeks out an¬ other young receptacle and forces her way in through the narrow opening, leaving her wings behind in the process. She hunts around in the receptacle for the gall flowers and lays an egg in each one she finds. In her search she passes over the stigmas of the other type of female flowers and pollenizes them. Or it may be that she enters the receptacle of a fig in which case she searches in vain for the gall flowers but in her search pollenizes the female flowers. She at length dies of exhaustion, but her work is done so far as the plant is concerned. It is customary for growers of figs to hang branches of capri-figs from which the gall insects are just emerging in the fig trees in order that the latter may set fruit. There are many species of the genus Ficus and many species of Blas¬

tophaga corresponding. In most species of Ficus there is not so strong a differentiation

into gall flowers and fertile flowers as in the capri-fig.

Origin of the Special Modifications. —

Much has been written to try to explain the minute correspondence of structures of flowers and the insects that fertilize them. In view of the fact that we are as yet far from any agreement as to the kinetic factors of evolution it may be imagined that these attempted ex¬ planations are mostly in the nature of specula¬ tions in which the writers attempt to find sup¬ port for preconceived theories, rather than to draw up a hypothesis to fit observed facts. It seems almost beyond doubt that natural selec¬ tion has had a large part in the elimination of unfavorable modifications, but we still do not know what causes these variations in the first place or even whether there is an observable relation between the kind of modification and the conditions under which the plants and in¬ sects have developed. Until these questions are in more universal agreement it may be well to leave the subject without further specu¬ lation.

Bibliography. — Darwin, (Forms of Flow- ers) (London 1877) ; Knuth, (Handbook of Flower Pollination (Eng. trans., Oxford 1906) ; Kerner von Marilaun, (Flowers and their Unbidden Guests) (Eng. trans. 1878).

Ernst A. Bessey,

Professor of Botany, Michigan Agricultural College.

FLOWING WELLS. See Artesian Wells.

FLOY, James, American Methodist clergy¬ man : b. New York 1806; d. 1863. He was edu¬ cated at Columbia College and at the Royal Botanical Gardens, London. He was for some¬ time a clerk in the employ of the Methodist Book Concern, entered the ministry of the Methodist church and held several pastorates in New York city and vicinity. He was censured by his Conference because of his presence at an Abolition convention. He edited the Metho¬ dist Hymnbook of 1849, served as secretary of the Tract Society and edited the National Magazine from 1856 to 1860. He was the au¬ thor of (Biblical Morality y (1861) ; (Lessons in Bible History } (1861) ; (01d Testament Char¬ acters Delineated and Illustrated) (1864) ;

(Occasional Sermons, Reviews and Essays) (1865). Consult Methodist Quarterly Review (issue of January 1864).

FLOYD, John Buchanan, American states¬ man : b. Smithfield, Montgomery County, Va.,

1 June 1807; d. near Abingdon, Va., 26 Aug. 1863. He was educated at Columbia College, South Carolina, graduating in 1829 ; studied law and settled in southwest Virginia; was a member of the Virginia legislature several terms and was governor of the State 1850—53, • his term being notable for his advocacy of the policy of public improvements. In 1857 he was appointed Secretary of War in the Cabinet of President Buchanan, and remained in it until 29 Dec. 1860, when he resigned because he considered the action of Major Anderson in occupying Fort Sumter a breach of faith to South Carolina. He went to Abingdon, Va. On 29 Jan. 1861 the grand jury of the District of Columbia indicted him as privy to a defal¬ cation in the Department of the Interior. He returned to Washington, gave bail and de-

manded a trial, and the government thereupon, on 7 March 1861, entered a nolle prosequi. After his departure he was also accused of having transferred arms from Northern to Southern arsenals in order to arm the South for the Civil War. This charge was investi¬ gated by a Congressional committee, which, on 18 Feb. 1861, made a report showing it to be groundless, the arms transferred having been condemned arms, removed in order to make room in the Northern arsenals for modern ones. In the summer of 1861 he was appointed a brigadier-general in the Confederate army and raised a brigade which served in West Virginia until ordered to join the army of Gen. A. S. Johnston in the West. He was sent to Fort Donelson, arriving there after fighting had be¬ gun. When surrender was discussed, he trans¬ ferred the command to Buckner and extricated his brigade; in consequence of which he was removed from command by Jefferson Davis. The State of Virginia thereupon appointed him a major-general in its service. Consult Davis, (Rise and Fall of the Confederate Govern¬ ment (1881) ; Nicolay and Hay, (Life of Lin¬ coln (1890).

FLOYD, William, American statesman : b. Brookhaven, Long Island, N. Y., 17 Dec. 1734; d. Weston, Oneida County, N. Y., 4 Aug. 1821. He entered political life as a delegate to the Philadelphia Congress of 1774. The next year he was appointed a delegate to the first Con¬ tinental Congress and continued by successive reappointments a member of every Continental Congress up to 1782 inclusive. From 1777 to 1788 he also was a State senator under the first Constitution of New York, and in the Presiden¬ tial

elections of 1792, 1800 and 1804 was a Presidential elector.

FLUCKIGER, fluk'e-ger, Friedrich Au¬ gust, German pharmacognosticist : b. Langen- thal, Switzerland, 1828; d. 1894. He was edu¬ cated at Berlin, Ban, Geneva and Heidelberg, became president of the Swiss Association of Apothecaries in 1857 and in 1881 was member of a committee appointed to revise the pharma¬ copoeia of the German Empire. He wrote, in conjunction with Hamburg, (Pharmacography : A History of the Principal Drugs of Vegetable Origin met with in Great Britain and British India (1879), and works in German and French on the nature and history of drugs.*

FLUDD, Robert, English philosopher and physician: b. Bearsted, Kent, 1574; d. 1637. He received his education at Oxford and traveled extensively in Europe for six years. He studied medicine after his return and was li¬ censed to practice in 1606. He became inter¬ ested in natural philosophy and invented sev¬ eral machines, including an automatic dragon and, according to some, the barometer. He wrote several pamphlets in defense of the Rosicrucians, in whose doctrines he became in¬ terested about 1615. He attempted the formu¬ lation of a system of philosophy identifying physical with spiritual truth and based mainly on Paracelsus. Kepler, Gassendi and others published refutations of Fludd's system. He wrote (Tractatus theologophilosophicus) (1617) ; (Veritatis Proscenium) (1621); (Philosophia Sacra et vere Christiana) (1629) ; Chilosophia Moysaica, (1638) ; (Sophiae cum Moria Certa- vol. ll — 26

men) (1629). Consult Waite, (Real History or the Rosicrucians) (London 1887).

FLUE. (1) A passage for the conveyance of the volatile results of combustion from the fireplace to the open air, or into another pas¬ sage ; a smoke duct, the passage in a chimney ; one of a cluster of smoke ducts in a stack of chimneys. Also a passage in a wall for the conveyance of heat from one part of a build¬ ing to another. (2) In organs, a pipe of flute quality; also one with a lip; hence, one of the divisions of stops. (3) In a steam-boiler, loco¬ motive, etc., a pipe for the conveyance of the caloric current through a boiler, to heat the surrounding water, as distinguished from a pipe for water or steam. It is usually secured in the sheets of the fire box and smoke box respec¬ tively, as in the locomotive.

FLUELEN, flu-el'en (Ital. Flora), Switz¬ erland, village in Uri Canton, situated near the southern end of Lake Lucerne. Its location at the junction of the Axen and Saint Gotthard roads makes it of great military importance, and a large number of Swiss troops are per¬ manently stationed there. Pop. 1,084.

FLUELLEN, a humorous character in Shakespeare's play, (Henry the Fifths He is a disputatious little soldier, pugnacious, and as voluble as his Welsh accent permits him to be when attempting to speak English.

FLUGEL, flu'gel, Ewald, German-Ameri- can philologist : b. Leipzig, 1863 ; d. 1914. He received his education at the University of Freiburg and at Leipzig, where he received the degree of Ph.D. in 1885. From 1888 to 1892 he was privatdozent at Leipzig, and coming to America in the latter year was appointed pro¬ fessor of English philology at Leland Stanford Junior University. In 1901-02 he was presi¬ dent of the western branch of the American Philological Association. He published Car¬ lyle's Religiose und Sittliche Entwickelung) (1887; Eng. trans., 1890); Sidney's Astrophel and Defense of Poesy) (1889); (Neuenglisches Lesebuch P : (Periode Heinrichs VHP (1895) ; (Die nordamerikanische Litteratur (1907) ; Prolegomena to Chaucer Dictionary) (Vol. I, 1911-13), and articles in philological periodi¬ cals. He edited (Mitteilungen Beiblatt zur Anglia* (2 vols., 1890-91) ; Chaucer Lexicon * (1891 et seq.) ; and Anglia (1889-).*

FLtjGEL, Gustav Leberecht, German ori¬ entalist : b. Bautzen, 18 Feb. 1802; d. Dresden, 5 July 1870. He was educated at the gymnasium of his native town and studied theology and philology at the University of Leipzig. Later he made special studies in Oriental languages at Vienna and Paris. In 1832 he became pro¬ fessor at the Furstenschule of Saint Afra at Meissen. He resigned in 1850 and in the fol¬ lowing year went to Vienna, where he was en¬ gaged to catalogue the Arabic, Turkish and Persian manuscripts of the court library. His principal work is an edition of the bibliographi¬ cal and encylcopaedic lexicon of Haji Khalfa, with Latin translation (7 vols., London and Leipzig 1835-58). Other works are an edition of the Koran (Leipzig 1834 and 1893) ; Con¬ cordance Corani Arabicae (ib. 1842; 1898); (Mani, seine Lehren und seine Schriften* (ib. 1862) ; (Die grammatischen Schulen der Araber* (ib. 1862) ; (Ibn Kutlubugas Krone der*

Lebcnsbeschreibungen) (ib. 1862) ; an edition of

FLUGEL, Johann Gottfried, German lexi¬ cographer: b. Barby on the Elbe, 22 Nov. 1788; d. Leipzig, 24 June 1855. He spent many years in the United States prior to 1820 in business, diplomatic and official occupations, and became professor of English in the University of Leipzig in 1824. He compiled a (Complete English-German and German-English Dic¬ tionary J (1830), besides publishing (A Series of Commercial Letters

(9th ed., 1874) ; Prac¬ tical Handbook of English Business Corre¬ spondency (9th ed., 1873); triglot; or Mer¬ cantile Dictionary in Three Tongues — German, English, French) (2d ed., 1854) ; and other useful manuals, all revised or brought down to contemporary needs by his son.

FLUGEL, Otto, German philosopher: b. Liitzen 1842. He studied at Schulpforta and Halle, and took up pastoral work; was made editor of the (Zeitschrift fur exacte Philosophic im Sinne des Neueren Philosophischen Realis- mus, and in 1894 was one of the founders of Peitschrift fur Philosophic und PadagogikP He supports Herbartian realism, as opposed to New-Kantian speculations, yet he believes in the necessity of a revelation. Among his works may be mentioned Pie Spekulative Theologie der Gegenwart* ; Pas Ich und die sittliche Idee im Leben der Volker (1892) ; Pber die personliche Unsterblichkeit* (1902) ; Monismus*

und Theologie) (1908).

• •

FLUGGE, flii'ge, Karl, German sanitation expert: b. Hanover, 1847. He studied at the universities of Gottingen, Bonn, Leipzig and Munich. In 1878-83 he was lecturer at the University of Berlin and in 1883 became pro¬ fessor of hygiene at the Gottingen Hygienic Institute. He removed to Breslau in a similar capacity in 1887 and in 1909 was appointed pro¬ fessor of hygiene at the University of Berlin. He has made important investigations in ex¬ perimental hygiene and bacteriology. His works include (Beitrage zur Hygiene) (1872) ; Pie Mikroorganismen) (3d ed., 1896) ; (Grun- driss der Hygiene (new ed., 1902) ; Peber das Absolute in den asthetischen urteilen Langensalza* (1901). With Koch, he was joint editor of Zeitschrift fiir Hygiene after 1886.*

FLUGGEN, flii'gen, Gis'bert, German painter: b. at Cologne, 9 Feb. 1811; d. Munich, 3 Sept. 1859. In his youth he learned the manu¬ facture of novelties in his native town, and in 1833 began his art studies at Munich, which he made his permanent home. He is a German counterpart of Llogarth and Wilkie, whom he rivals in masterly grouping and life-like ex¬ pression, while in the technique of the brush he excels them both.

FLUID LENS, in optics, a lens in which a liquid is imprisoned between circular glass disks of the required curvatures. Attempts to obtain achromatism have been made by using metallic solutions and other liquids having a higher dispersive power than flint glass.

FLUKE, a fish, one of the smaller deep¬ water flounders (Glyptocephalus cynoglossus) , common near both coasts of the North Atlantic, caught by

means of beam-trawls in great quantities, and highly prized as food, especially in Great Britain, where it is considered little

inferior to the sole. It is the ((craig fluke® of Scotland. See Flounder.

FLUKE, a parasitic flatworm of the class Trematoda (q.v.). The blood fluke, liver fluke and long fluke are important parasites of man, producing serious diseases in some parts of the world.

FLUME (Latin flunien, stream), an arti¬ ficial channel or conduit used to convey water for power development, hydraulic mining and irrigation. Flumes are commonly built of wood, but may be of steel or concrete; they are placed above ground, frequently supported on trestles, as it is necessary to maintain a gentle grade. The construction of flumes in mountainous re¬ gions is often attended with considerable engi¬ neering difficulties. They are made rectangular and circular, the latter being often of matched boards bound with steel bands, like a barrel. See Irrigation ; Logging ; Mines and Mining.

FLUOR-SPAR. See Fluorite.

FLUORESCENCE, that property of cer¬ tain bodies in virtue of which they become self- luminous when exposed to light of certain wave¬ lengths. All bodies reflect a part of the incident light, but fluorescence is more than a mere re¬ flection, as may best be shown by an example. <(Canary glass® (glass colored slightly with oxide or uranium) exhibits a beautiful yellowish-green surface color when well illuminated, and for this reason it is much used for the production of ornamental effects. If a ray of sunlight be admitted into a darkened room through a piece of cobalt glass that is so dense that the feeble violet light that it transmits is barely visible, the canary glass shows its yellow-green color bril¬ liantly when placed in its path. This shows that the phenomenon is not simple reflection, and further evidence of the same sort may easily be had. Glass that is tinged brownish-yellow by oxid of gold is almost perfectly transparent to the golden light from the canary glass, but if the violet light from the cobalt glass is caused to traverse the gold-oxide glass before striking the canary glass, the fluorescence is no longer ob¬ served. Furthermore light that has passed through one piece of canary glass is incapable of exciting fluorescence in a second piece. These and other equally remarkable phenomena indi¬ cate that a fluorescent substance absorbs a por¬ tion of the light that strikes it, modifies it pro¬ foundly in some manner, and then radiates it again. Stokes has shown that the modifica¬ tion consists in increasing the wave-length of the incident light ; and it is now known that fluorescent light invariably has a greater wave¬ length than the primary light that excites the fluorescence. This fact has an important bearing upon many of the

phenomena of physics. When it had been determined, for example, that the (

Many substances exhibit fluorescence to a

greater or lesser degree. An aqueous infusion of horse-chestnut bark shows it brilliantly, and so also does a solution of sulphate of quinine. Certain of the coal-tar colors (q.v.) are con¬ spicuously fluorescent, fluorescein taking its name from this fact. Kerosene is fluorescent, and sometimes strongly so. Most fluorescent substances cease to emit light almost instan¬ taneously when the incident light is cut off from them. Some, however, such as calcium tungstate and the sulphids of calcium, barium, and strontium, continue to emit their rays for a sensible time, fading gradually away into dark¬ ness after the incident light ceases to excite them. Instruments consisting of screens that are coated with some fluorescent material and protected from ordinary light by shields, or by enclosure within a light-tight box, are known as "fluoroscopesA and are used for studying the X-rays (or Rontgen rays), and the shadows cast by them. It is to be observed that fluores¬ cence differs from phosphorescence (q.v.) not only because it is usually of very short dura¬ tion, but primarily because it is induced by the exciting action of light-rays. Phosphorescence may be due to very different causes. The light emitted by phosphorus, for example, is probably due to the slow oxidation of that substance. That which is observed in the ocean at night, and in connection with various fungi and in¬ sects, is due to causes which are more or less obscure ; but in any event these various phos¬ phorescent phenomena are quite different from true fluorescence. The name fluorescence was coined by Sir George G. Stokes in 1852, from the fact that the mineral fluorite some¬ times exhibits the phenomenon. Previous to 1852 fluorescence was known as ((epipolic dis¬ persion. Consult Stokes, (Burnett Lectures on Light) (1884-87) ; Preston,

(1905).

FLUORIDES. See Fluorine.

FLUORINE, a gaseous, non-metallic ele¬ ment, possessing properties resembling those of chlorine, and exhibiting powerful chemical ac¬ tivity. It occurs in nature widely but sparingly, and always in combination, notably in the minerals fluorite and cryolite, from the former of which it takes its name. It is found in the topaz, in fluorcerite and yttrocerite, in apatite,

wavellite, and wagnerite, in sea water and various mineral springs, and in the siliceous stems of grasses. In the animal kingdom it appears as a component of bones, blood, the brain, the enamel of the teeth, milk and urine, but always in minute quantities. The ele¬ mentary character of fluorine was first recog¬ nized by Ampere and Davy about 1810 ; but although many attempts were made to isolate it, none was certainly successful until 1887, when Moissan succeeded in preparing it in the ele¬ mentary state by electrolyzing a solution of hydrogen potassium fluoride, HF.KF, in perfectly anhydrous hydrofluoric acid, the solution being contained in a platinum vessel whose tem¬ perature was maintained at 10° F. below zero, and the electrolysis conducted by means of 20 Bunsen elements connected in series. When thus prepared fluorine is a gas of a light green¬ ish-yellow color. It has a penetrating odor, quite disagreeable, and resembling that of hypo-

chlorous acid, and it produces irritation in the membranes of the eye and nose. Many of the elements take fire when immersed in it, and burn with the formation of their fluorides. Water is decomposed by it, with the formation of hydrofluoric acid, HF, and the liberation of ozonized oxygen ; and in fact fluorine appears to combine with all known elements except oxygen and carbon, and argon, helium, and the other recently discovered inert gases of the at¬ mosphere. Fluorine has the chemical symbol F, is a monad, and has a density of 1.310, a molecular weight of 38.10 and an atomic weight of about 19. Few of the physical properties of the element are yet known, on account of the difficulty of handling it. It corrodes glass rapidly, for example, and for this reason glass vessels cannot be used in experimenting with it. It attacks violently all organic substances, car¬ bonizing and setting fire to cork almost in¬ stantly. Alcohol, ether, benzine and turpentine take fire at once when brought into contact with it.

Fluorine combines with hydrogen directly even in the dark, and with detonation, even at the temperature of liquid hydrogen, the com¬ pound, HF, that is formed being known as hydrofluoric acid. Hydrofluoric acid is more conveniently prepared by means of the action of strong sulphuric acid upon the mineral fluorite (calcium fluoride, CaF2). The reaction is as follows: H2SO4 + CaF2 = 2HF + CaSO<. Hydrofluoric acid is a colorless gas at ordinary temperatures and pressures, fuming strongly in the air. It condenses at 5° F. below zero to a colorless, mobile liquid having a specific grav¬ ity of about 0.988, boiling, at ordinary atmos¬ pheric pressure, at 67° F., and solidifying at — 152° to a transparent white crystalline mass, which melts again at — 134°. As thus prepared, liquid hydrofluoric acid contains traces of water; but these may be removed by electrolysis, the liberated fluorine combining with the water as noted above, and the oxygen of the water escaping in the free state. When the water has all been eliminated, electrolysis ceases. The compounds of fluorine are

antiseptics, useful especially in breweries. Added to cider and sweet wines, sodium fluoride is effective as a preservative. The commercial importance of hydrofluoric acid depends upon the fact that it attacks glass freely, and hence is much used for etching upon glass, the reaction between the glass and the acid being 4HF + Si02 = 2H20 + SiF* ; the acid attacking the silica of the glass, with the formation of water and a gaseous com¬ pound of silicon, known as silicon tetrafluoride. When silicon tetrafluoride is passed into water, it is decomposed according to the equation 3SiF* + 4HaO "rˆfLSiFe+KUSiO* ; the substance rep¬ resented by the last term in this equation, silicic acid, separates out as an insoluble precipitate, while the compound H2SiF6, known as hydro- fluo-silicic acid remains in solution. Hydro fluo-silicic acid forms salts which are known as silico-fluorides. Potassium silico-fluoride, K2Si- F6, is one of the few potassium compounds that are insoluble in water. The fluosilicates are antiseptics still more powerful than the fluor¬ ides. They are not poisonous, have no odor, and a barely perceptible alkaline taste. They are therefore well adapted to use as food pre¬ servatives. They are also of use in the surgical

dressing of wounds, as they are not irritating and have greater antiseptic power than any dilution of mercuric chloride which is safely non-poisonous.

Liquid anhydrous hydrofluoric acid does not attack glass, but the action is vigorous when traces of water are present. The diluted acid is therefore used in practical etching, the article that is to be treated being immersed in it, after the parts that are not to be attacked have been protected by a coating of wax, or of a special ˆetching varnish.® Hydrofluoric acid in aqueous solution acts very similarly to hydrochloric acid, forming salts which are known as fluorides ; hydrogen being liberated when the acid acts upon a metal, and water when upon an oxide.

FLUORITE, or FLUOR SPAR, a native fluoride of calcium having the formula CaF2, crystallizing in the isometric system with cubical habit, and also occurring massive. It has a hardness of 4. and a specific gravity varying from 3.00 to 3.25. It has a vitreous lustre, and is transparent to subtranslucent, varying in color from white through yellow, green, red, blue and brown. The green and violet-blue varieties are most common, and the red is rare. Certain specimens exhibit a bluish fluorescence (q.v.), and the mineral develops differences of electrical potential under the influence of heat and of light. Fluorite occurs in England, Ger¬ many and many parts of the United States, and the commercial supply comes from chiefly Ken¬

tucky, Illinois, Arizona, Tennessee and New Hampshire. It is a chief source of fluorine and hydrofluoric acid (see Fluorine), and is also used as a flux for promoting the fusion of cer¬ tain refractory minerals, deriving its name from this latter circumstance (Latin, fluor, a flow). Colorless specimens have been used for the manufacture of lenses, for which they are well adapted on account of their small dispersion.

FLUOROSCOPE. See Fluorescence.

FLURSHEIM, fliirs'him, Michael, Ger¬ man social reformer: b. Frankfort-on-Main, 24 Jan. 1844; d. 1912. He emigrated to the United States in 1867, and resided there for five years. He then returned to Europe and established an iron foundry in Gaggenau, Baden (1888). After 1892 he lived at Castag- nola, near Lugano, Switzerland, engaged in dis¬ seminating his ideas through his writings. He believed private property is the cause of im¬ mense wealth to some and profound poverty to others, and advocates the government posses¬ sion of land. His works are (Auf friedlichem Wege) (1884) ; (Deutschland in 100 Jahren) (1894) ; (Papst und Sozialreform) (1891) ; (Der Einzige Rettungsweg) (1894) ; (Rent, Interest and Wages) (1891); (Clue to the Economic Labyrinth (1902) ; (The Economic and Social Problem) (1909).*

FLUSHING (Dutch Vlissingen), a forti¬ fied seaport with a rich mediaeval history, on the island of Walcheren in the province of Zee- land. Formerly a naval station, it has been since 1867, through canal, railway and steamer, made a centre of commerce and manufactures and the terminal of the steamer route to and from England. Pop. about 18,893. Its chief historical interests to Americans lies in the fact that here, in 15 Dec. 1585, Robert Dud¬ ley, Earl of Leicester (q.v.), sent by Queen

Elizabeth, arrived with his imposing English fleet and 6,000 "help troops,® as allies of the Dutch Republic, in the service of which every one of the military leaders of English and Dutch colonies in America and active from 1609 to 1690 received their training.

In 1586, the seven states of the Republic contributed 10,000 guilders to build a chapel for the 1,000 British soldiers, English, Irish, Scottish and Welsh, who occupied the town until 1616. The chaplains were Episcopalian and Presbyterian, and later Scottish, the first of whom married the daughter of Admiral De Ruyter whose statue is in the town. Despite wars, this church, in which the English lan¬ guage is used, continues to this day. One of its ministers was the Rev. Samuel Megapolen- sis (1667-89) who conducted the negotiations at the English conquest of New Amsterdam, in 1664, and secured the rights of the Dutch people. Another from 1759 to 1763, was the Rev. Archibald Laidlie: b. 4 Dec. 1727, who was called to

the Collegiate (four congrega¬ tions in one) church, still flourishing on Fifth Avenue in New York city, to preach to the people in English. Despite lawsuits and other opposition, Laidlie served until 1779, dy¬ ing in that year at Red Hook, N. Y., where, because of his ardent Americanism, he had been in exile from the first British occupation of the city. With his attractive personality he won the ultra-conservative Dutch to the use of the English language, especially since their young people were so numerously flocking into the Episcopal churches. He translated the Heidelberg Catechism from Latin into Eng¬ lish and the whole of the Dutch liturgy — largely framed by John Calvin and A'Lasco — and the creeds into English. His achievement was probably the first and most successful of the efforts to Americanize the speakers of other than English. His portrait hangs in the lecture room of the church on 29th Street and Fifth Avenue. On 27 June 1918, ex-President Roosevelt, in addressing the minister of his ancestral Reformed Church in America, ad¬ vised them to follow Laidlie's example — a process which, since the word ((Dutch® was dropped from the corporate name, being now the Reformed Church in America, has been in continuance since 1628. Consult Stevens,

*(Scottish Church in Rotterdam * (1832) and Griffis, (The American in Holland) (1899).*

William Elliot Griffis.

FLUSHING, N. Y., former village on Long Island, now a part of the borough of Queens, New York, on Flushing Creek and on the Long Island Railroad. The new rapid transit lines and tramways afford easy and rapid means of communication with Manhattan. Flushing, at first known as Vlissingen, the Dutch form of the name, was settled in 1645 and about 20 years later the majority of its in¬ habitants were Quakers. It contains a Carnegie library, a high school, Saint Joseph's Orphan¬ age, the New York Parental School, motion picture studios. It has also chemical works, asphalt works, chicory factories, electric sign manufactories, and several nurseries. Consult Waller. H. D., (History of the Town of Flush- ing) (Flushing 1899).

FLUTE, a musical wind instrument, con¬ sisting of a tube furnished with a number of

holes in it for the purpose of varying its sounds. The oldest form of the English flute had seven holes which could be stopped by the fingers, but it

had no finger-keys. This was in use till about the beginning of the 18th century, when it gave place to the German flute, an instrument which, in its best form, was over two feet in length, consisted of four pieces fitting into one another, and had six finger-holes for the normal tones, and from 6 to 12 keys for the semi-tones, with a compass of nearly three octaves, count¬ ing from middle C upward, the higher octaves being obtained by overblowing. The improve¬ ments made on this instrument, by Bohm, a German, acting in conjunction with Gordon, an Englishman, enable the player to perform music on any key, with all the chromatic intervals. The chief improvement consisted in the applica¬ tion of a system of keys, by which several holes could be stopped at one time, by one movement of the finger. The flutes made by Bohm are now taken as the models by most makers in all countries. In modern flutes the number of keys varies. The materials of which flutes are made are box, ivory, ebony, silver, glass, etc. Consult Welch, < History of the Bohm Flute> (1896) ; Fitzgibbon, (Story of the Flute) (1914). See Flageolet; Fife.

FLUTE SHRIKE, a bright-colored shrike native of Africa, and belonging to the genus Laniarius. It emits a shrill whistle, and certain of the species prey upon the small birds of their locality.

FLUTE AND VIOLIN. In 1891 James Lane Allen's (Flute and Violin, with its sub¬ title (Other Kentucky Tales and Romances,* indicated a new departure in Southern litera¬ ture. In a sense the author was continuing the work of portraying various aspects of Southern life and scenery begun by George W. Cable, Joel Chandler Harris, Charles Egbert Craddock, Thomas Nelson Page and others. In the first volume of Allen's stories a new province was added — that of the blue grass region of Kentucky. Either because the country itself was richer in its picturesqueness and more romantic in its types of character, or the author himself had a more comprehensive cul¬ ture and a wider perspective of history, there were a note of idealism in the new volume and a suggestion of the deeper currents of history and of the inner life, than were yet evident in the writings of his colleagues. In this first vol¬ ume of stories were manifest the same qualities that were to be developed and perfected in (The Choir Invisible) and (The Kentucky Cardinal.* The story that was most like that of his con¬ temporaries among Southern writers was en¬ titled (Two Gentlemen of Kentucky) — an old- time negro and an old-fashioned Southern aristocrat who could not adjust themselves to the post-bellum life of Kentucky. More dis¬ tinctive of Allen's art is the story of the (Flute and Violin) with its historical back¬ ground of the early 19th century and its chief characters, a clergyman-professor in the old Transylvania University, whose inner life found expression in the silver-clear simple melodies of a magic flute, and a boy whose passion for music and for art was utterly in¬ commensurate with the poverty of his life. In the two stories, (The White CowP and (Sister*

*Dolorosa, * are evidenced all of the author's*

feeling for nature in her more mystic moods, all of his power to reveal the infinite depths of a struggling soul, and all of his rare visual¬ ization of the mystic springs of life. Never outside of the inmost circle of Catholic devo¬ tees have the poetry and art and the spiritual appeal of the Catholic Church been more sub¬ tly delineated. No American writer has at¬ tempted more than Mr. Allen in such stories as these; his failure to achieve perfection of art is somehow more significant than perfection in a more limited field.

Edwin Mims,

Professor of English, Vanderbilt University. FLUTED SCALE. See Scale Insects.

FLUTING, in architecture, one of a series of parallel channels cut perpendicularly in the shafts of columns, particularly Doric, Ionic and Corinthian. It seems probable that this kind of ornament had some relation to the original type ; perhaps the furrowed trunk might have suggested the idea. It is, however, a beautiful ornament, which is applied with equal happi¬ ness to break the otherwise heavy mass of a Doric shaft, or to obviate an inconsistent plainness in the other orders. When the lower parts of the flutes of a column are filled with a convex bead, they are said to be cabled. The name is also extended to spiral channels, as on columns or balusters. See Architecture.

FLUTING MACHINE, a machine for corrugating or crimping sheet metals or Hie like. It consists essentially of a pair of fluted cylin¬ ders, or very broad-toothed gears, set well apart, so that a sheet may be passed between them and corrugated. The distance between the fluted cylinders is regulated by an adjust¬ ing screw.

FLUVTO-GLACIAL DEPOSITS. See

Glacio-fluvial Deposits.

FLUX, a substance or mixture added to assist the fusion of minerals. In the large way, limestone and fluor-spar are used as fluxes. In the smelting of iron great attention has to be paid to the fluxes, because on their character depends to some extent the complete separation matter of the ore and form a slag, which must be such that it will combine with the earthy matter of the ore and form a slag, which must neither be too refractory nor fusible. Hence if the ore abound in clay or sulphur, lime or lime¬ stone, and possibly sand, must be added ; if in quartz, lime and clay are requisite, otherwise the quartz is slagged by combining with part of the iron, which is thus lost. Frequently ores are so selected that the earthy matters present

may flux each other, but this requires skill and experience. The fluxes used in pottery are very various and are distinguished by different names ; but they almost all consist of litharge or red-lead, with sand or boracic acid, some¬ times singly, sometimes together. They are, therefore, essentially colorless glasses used as vehicles for infusible colors. See Copper; Iron ; etc.

FLUX OF LIGHT. See Photometry.

FLUXION, fluk'shon, (1) in medicine, an unnatural flow or determination of blood or other humor toward any organ; a catarrh. (2) In mathematics, a method of calculation resulting from the operation of fluents, or flow¬ ing numbers. Thus a mathematical line may

be considered as produced by the fluxion or flowing of a point ; a surface by the fluxion of a line, and a solid by the fluxion of a surface. A mathematical point in motion will really make a line ; a revolving radius which is a line will make a circle which is a surface, and its revolu¬ tion about its diameter will generate a sphere which is a solid. The same principle may be applied to purely numerical calculations, like the formulae of algebra. This branch of the higher mathematics was invented by Newton in 1665. In 1676 he communicated his method to Oldenburg in a sentence with all the letters dis¬ arranged so that his correspondent could not possibly have put them in order. If he had succeeded in doing this the sentence would have been Data cequatione quotcunque fluentes quanti¬ tates involvente fluxiones invenire et vice versa. [((Given it makes no matter how many equations involving fluent quantities, fluxions are to be discovered, and the reverse is true® (that is, where fluxions occur the fluents are to be found).] Leibnitz received this letter in 1677, and in 1684 explained a discovery which he had made. It was that of the differential calculus, which was essentially the same as that of flux¬ ions. What Newton called fluxions, Leibnitz called differences. An angry controversy sub¬ sequently arose between Newton and Leibnitz as to the priority of discovery, the Royal Soci¬ ety of London taking the part of the former, who was then its president, and the scientific men of Germany that of the latter, who was their countryman. Both appear to have made the discovery independently. In the slight dif¬ ferences of method which exist, the advantage lay with Leibnitz, and while the term fluxions is now scarcely ever used, that of differential calculus is in common use. The first element¬ ary treatise on fluxions published in England was by John Harris in 1702. A description of the process by Newton himself followed in 1704, in his Quadrature of Curves^ See Mathematics.

FLY, an insect. See Diptera; Flies; and the names of various groups and species of flies.

FLY, Spanish. See Blister Beetle.

FLY-BLISTER, a collection of blood- serum between the layers of the skin, caused by the application of some preparation of the Spanish fly. It is used to extract fluid from underlying tissues, and to cause desired changes in local circulation. Absorption from appli¬ cations sometimes takes place, giving rise to the irritation and inflammation of the kidneys, bladder and genital organs which chracterize the drug when taken internally. See Blister- Beetle.

FLY-CASTING, the art of throwing an artificial fly in angling. (For the various methods employed see Angling). Aside from its use in actual fishing the art is employed by some in competitive contests, and ((national tournaments® are held annually in both Great Britain and the United States, sustained by a federation of clubs devoted to the sport, in which the championship and prizes are com¬ peted for.

FLY-UP-THE-CREEK, a local name

for the little green heron (Ardea virescens) , a common bird throughout eastern North America. See Heron.

FLY MUSHROOM. See Amanita ; Fungi.

FLY RIVER, a considerable stream in New Guinea (British) which has its source in the Victor Emanuel Mountains and empties into the Gulf of Papua. Its length is 350 miles. There is a delta at the mouth of Fly River in which lies the island of Kiwai.

FLY WEEVIL, a local name of the Gelechia cerealella or grain moth of the United States.

FLYCATCHER, one of many birds which catch insects in the air. More restrictedly, in ornithology, birds of the Old World insectivo¬ rous family Muscicapidce, allied to the thrushes ; this is a group very difficult to limit or define. All these are small, active birds, with great activity in flight and skill in seizing their agile prey; and all have broad flattened beaks, at the base of which is a growth of long stiff rictal bristles. The feet are usually weak and the wings long and pointed. Four or five species are common summer visitors to Europe, in¬ cluding the familiar and typical spotted fly¬ catcher (Muscicapa grisola) and the pied or blackcap (M . atricapilla) . In all the hotter latitudes of the Old World the species are very numerous, and ornate, many being crested, or having, in the case of the males at least,

very long tail-feathers, which are handled most gracefully. Such are the paradise flycatchers (genus Tersiphone) of India and eastward, the Japanese species of which is so commonly rep¬ resented on painted oy embroidered screens. The <(fantail® (q.v.) is another species re¬ markable in its flight. Most of these flycatch¬ ers are birds of the woods, and are usually solitary and silent, feeding on little except in¬ sects, which are habitually caught upon the wing with an audible snap of the bill. Some of the smaller ones are sometimes called ftfly- snappers.® They nest in various situations, and many make highly beautiful receptacles for their variously decorated eggs.

None of the muscicapids is to be found in the New World, but America has a large family of flycatchers (the Tyrannidi e) just as suitably so-called as are the others, so far as habits are concerned ; nor are they far removed in struc¬ ture. This family contains some 400 species, mainly tropical, and chiefly of an olive-green, or black-and-gray complexion, often with orna¬ mental touches of scarlet on the head or wings. The bill is rather stronger as a rule than in the Old World flycatchers, and often decidedly hooked, like that of vireos or shrikes. The wings are usually short, and the tail varies greatly, sometimes being beautifully prolonged, as in the scissor-tailed flycatcher of the west¬ ern United States. The genus Alectrurus pre¬ sents still more striking examples of very long and beautifully modified tail plumes. Good ex¬ amples of this group are the king-birds, pipiris, pewees, vermilion flycatcher, and. scissor-tail, elsewhere described. An excellent general ac¬ count of these families will be found in Evans' 'Birds (London and New York 1900).*

Ernest Ingersoll.

FLYING BOAT. See Aeronautics.

FLYING BRIDGE. See Bridge; Movable Bridges.

FLYING BUTTRESS, a construction by means of which the thrust of a vault or arch is

FLYCATCHERS

1 Spotted Flycatcher

2 Pied Flycatcher

3 White-collared and Red-breasted Flycatchers

4 Kingbird

carried across an open space to a buttress (q.v.). Nearly every instance of the use of the flying buttress is in connection with Gothic architecture, and some of the earliest forms are very curious and illustrate well the growth of the style. The (

FLYING COLUMN, in military organiza¬ tion an independent corps of troops usually composed of all arms and assigned to a par¬ ticular task. Mobility is always the prime con¬ sideration, and a minimum of baggage is taken along. Such a force is at almost all times act¬ ing apart from its first base of operations and is only employed on occasions of very great necessity, such as the relief of garrisons in dis¬ tress, or to obviate some move of the enemy, or to cut off some of his supplies, etc. Flying or mobile columns were extensively employed by the British in the war in South Africa in

1899-1902.

FLYING DRAGON, a flying lizard (q.v.) of the Oriental genus Draco.

FLYING DUTCHMAN, a phantom ship said to be seen in stormy weather off the Cape of Good Hope, and thought to forebode ill luck. One form of the legend has it that the ship is doomed never to enter a port on account of a murder committed on board; another, that the captain, a Dutchman, swore a profane oath that he would weather the Cape though he should beat there till the last day. He was taken at his word, and there he still beats, but never succeeds in rounding the point. He sometimes hails vessels and requests them to take letters home from him. The legend is supposed to have originated in the sight of some ship reflected from the clouds. It has been made the groundwork of one or two novels and of Wagner's opera (Der Fliegende Hollander^

FLYING DUTCHMAN, The. A ro¬ mantic opera in three acts by Richard Wagner, who also wrote the book, first produced at Dresden, 2 Jan. 1843, under the baton of the composer and with Mme. Schroeder-Devrient as Senta. Although measured by Italian opera standards, Wagner may not have been an ex¬ tremely rapid worker, he composed this entire opera, except the overture, in seven weeks. To the public, which had looked for another <(Rienzi,® the production was a disappointment, and after a few performances it was with¬ drawn and not again heard for 10 years. The legend upon which the story is based was a

familiar one and the idea of using it came to Wagner during a storm which had overtaken him in his voyage from Riga to Paris. The Flying Dutchman, compelled to sail the seas without a rest until he finds a maiden who will be faithful unto death, meets Senta, daughter of a Norwegian captain, who is betrothed to Erik. She is romantic and imaginative and ' fascinated by the story of the Dutchman, be¬ comes convinced that she is destined to save him. She is reproached by Erik for her faith¬ lessness and the stranger, overhearing this, fears that she will prove untrue to him and decides to leave. As he sails away, Senta rushes to the cliff and hurls herself into the sea. The phantom vessel sinks, the waters grow calm and in the distance the two are seen rising transfigured into the heavens. With this work, Wagner broke finally the bonds of tradition and started his uniquely individual series of music dramas. While there are still many instances of the conventional operatic forms — for example, the sailors' chorus, the duets between Senta and Erik and Senta and the Dutchman, the spinning song, Senta's ballad — there are significant manifestations of the Wagner of the future. The overture is a brilliant example of dramatic puissance and the opening solo of the steersman, followed by the storm and the appearance of the phantom ship, the Dutchman's solo in the first act, the choruses in the last, are true and worthy ex¬ pressions of the composer's genius. The sys¬ tem of leading motives is also found here in embryo. In the realism, the richness and the variety of the instrumentation are also evi¬ dences of the greater Wagner. But, viewed as a whole, {The Flying Dutchman) is a work of promise, not of attainment. Its interest to¬ day is historical, rather than musical. The first American performance took place at the Academy of Music in New York, 26 Jan. 1877, with Clara Louise Kellogg as Senta. The first German performance followed 12 March 1877 with Eugenie Pappenheim in the same role.

Lewis M. Isaacs.

FLYING-FISH, a fish able to leave the water when alarmed or pursued, and sustain itself for several seconds in the air. In tropical seas the flying-fish rise from the water in flocks, or, more properly, shoals, of many thousands at a time, when disturbed by the passing of a ship, or pursued by such foes as the bluefish and albicore. They spring from the crest of a wave, and, darting forward, plunge into another to wet the membrane of the fins, and in this manner continue their flights for several hundred yards, often pur¬ sued by marine birds in the element to which they are driven for protection against the tyrants of their own. The sole motive power is the propulsion obtained by the work of the tail in giving the rushing leap from the water;

but the great pectorals act to some extent as supporting air-planes. In all the species be¬ longing to the genus Exocoetus (which is typical of the family Exoccetidcu, allied to the sauries), the pectoral fins are very much

de¬ veloped, and the superior lobe of the caudal fin shorter ; the head and body are invested with large soft scales, and the body has a ridge or carina extending longitudinally along

each flank, which gives it somewhat of an angular appearance. The head, when viewed from the front, is triangular; the eyes and air- bladder are very large. Flying fish are inhabit¬ ants of every temperate sea, though abounding in the vicinity of the equator. In length they rarely exceed 13 inches, and are commonly found about eight. The flesh is pleasant. Several species are described by naturalists, some of which have very long fleshy filaments depending from the lower jaw, the use of which is not known. The Exocoetus volitans, or common flying-fish of the Atlantic, is also known in Pacific waters ; and the coast of California is visited by a large species, 18 inches long (E . calif ornicus) called volador by the Spanish fishermen. About 65 species are contained in this and other genera, among which is Fodiator, with at least one common flying-fish (F. acus), distinguished by sharp¬ ness of its snout. Another sort of flying-fish is the gurnard or sea-robin (q.v.).

FLYING-FOX, or FOX-BAT, one of the

great fruit-bats (q.v.) of the Oriental region; specifically the kalong (Pteropus edulis), which is regarded as good food by the people of Java and neighboring islands. It is the largest of known bats, measuring five feet in expanse of wings, has rusty red fur, woolly upon the neck, and a long pointed fox-like muzzle, short, triangular ears and large eyes. These bats belong to a very large widespread genus, and have the general characteristics and habits of the fruit-bats (q.v.). The name is also some¬ times applied to the flying-lemur or colugo (q.v.).

FLYING FROG, a Malayan tree-dwelling frog of the genus Rhacophorus, which has large webbed feet with adhesive dicks. Some 40 species are known in various parts of the tropics, one of which was believed by Wallace to sail down from trees in a long slanting flight; but there is no direct evidence of it as to any species. A full account of the varied habits of the genus will be found in Gadow's. (Amphibia and Reptiles > (1901).

FLYING-LEMUR. See Colugo.

FLYING LIZARDS. Various lizards are provided with something more or less elaborate in the way of a parachute assisting them in springing from branch to branch, and perhaps in frightening off would-be enemies. Thus a

Malayan gecko (Ptycliozoon homalocepliialon) , about eight inches long, with membranous ex¬ pansions along the sides of the neck, body, tail and limbs, which are supposed to enable it to make long, sliding leaps ; but its habits are very little known. The term applies especially, however, to the East Indian ˆflying-dragons® or showy lizards of the genus Draco, which have loose folds of skin distensible by the erection of several movable ribs, and spread as a parachute. There are various species, harmless, pretty and tamable.

FLYING MACHINE, a device for ena¬ bling man to navigate the air. The feat of fly¬ ing has often been attempted; even among the ancients it was tried, and succeeded to some slight extent. Friar Bacon affirms in his writings that this feat is not only possible, but he also informs us that he himself knew how to construct a machine in which a man, in a

sitting position, might be able to transport him¬ self through the air like one of the feathered tribe. The secret of Friar Bacon consisted of a very simple mechanical contrivance. It was a pair of globes made of hollow copper, ex¬ hausted of air, on which a chair could be sup¬ ported, by which means a man cotild float in the atmosphere above the earth, and could buoy himself along. Another friar asserts the truth of this invention, or, at least, of one similar. Father Francisco Lana declares that a round vessel of plate-brass, 14 feet in diameter, weighing three ounces per square foot, will only weigh 1,848 ounces ; whereas a quantity of common air of the same bulk will weigh 2,155ˆ ounces; consequently he deduces the fact that the globe will not only be sus¬ tained in the air, but that it will be capable of supporting a weight of 37ˆ5 ounces; and also that a globe of the same weight, but greater in capacity, would support a man. This, however, is a fallacy; for, from the fact of nature abhorring a vacuum, the globe would be crushed in by the superior force of the atmosphere. At many periods this subject has been taken up by philosophers, particularly in the reign of Charles II. See Aeronautics ; Aeroplane.

FLYING MOUSE. See Phalangers. FLYING-ROBIN. See Flying-Fish.

FLYING-SQUID, a squid of the genus

Ommastrephes, having two large lateral fins, which enable it to leap so high out of the water that sometimes these mollusks fall on ships' decks. See Squid.

FLYING SQUIRREL, a tree-dwelling squirrel having the skin along the sides of the body between the fore and hind legs loose and capable of being drawn out by extending the legs, so as to form a parachute, enabling the animal to take long, sailing leaps. The fur is peculiarly soft and dense and

the tail is long, flat horizontally and broadly furry. The two North American species are the common eastern squirrel (Sciuropterus volucella) and the northern one (S. sabrinus). The former is to be found from Maine to Florida, and westward to the treeless plains, but is rarely visible during the day, when it remains hidden in some hole in a tree, going out at dusk in search of food, which consists of buds, nuts, insects, etc., like other squirrels. In such a hole the family dwells in winter, snugly bedded in fur and other soft materials, and having a store of nuts laid up near by; but most of the time in the colder part of its range is passed in sleep. Occasionally in summer an old bird's nest is converted into a cooler home. When abroad these squirrels creep about the trunks of trees, and take large slanting leaps, some of nearly 30 yards from higher to lower points, swinging up gracefully to their alight¬ ing. They can make little if any change of direction in these glides. The common eastern species measures about nine inches, and the tail and additional four inches. It is bluish-gray tinged with brownish or buffy. Throughout Canada, as far north as forests extend, lives a larger species (S. sabrinus), which is glossy wood-brown above and white below, becoming sooty-drab in summer. It has similar habits to the other. Dwelling in winter in warmly fur-

nished holes made by woodpeckers, as a rule, and in summer constructing globular nests of twigs and leaves. A variety (alpinus) is peculiar to the Rocky Mountains. Several other species of this genus inhabit Asia and northern Europe, one also occurring in India.

Siberia has a species of the genus Ptromys which is 18 inches long in body, and has a tail exceeding this length. Its parachute extends from the hind leg to the tail. Another species (Eupetaurus cinereus) is confined to the high Himalayas, and subsists principally on moss. A more remote family (Anomalurida , the scaled squirrels) in Africa contains several species with similar power of flight.

FLYNT, Josiah. See Willard, Josiah Flynt.

FLYSNAPPER, a remarkable bird (Phai – nopepla nitcns) of the southwestern United States, which belongs to the wax-wing family (Ampelidce) , but has the shy yet active move¬ ments of a flycatcher with a habit of jerking its tail. The male is shining bluish-black, with white wing-quills and vent, and a noble crest; his mate is gray-brown and white. It catches insects on the wing, by leaping from its perch and snapping at them noisily; but also eats mistletoe berries, etc. It makes a shallow nest in a low

tree and lays eggs with dark dots about the small end. The term ˆflysnapper® is also given to some of the smaller flycatchers (q.v.).

FLYWHEEL, a wheel designed to pre¬ serve or store momentum, as in a machine which is called upon to do considerable work set at intervals. It is always made with a heavy rim, and as it acquires speed its inertia assists its maintaining that speed, so that any sudden demand for extra power is available, and any tendency to run away or <(race,® be¬ cause of sudden release of load, is avoided. It affords a simple means of overcoming a dead centre, and of balancing a machine subject to irregular demands. The principles of the fly¬ wheel are those of inertia and centrifugal force. It is well known that a rotating body tends to continue its motion and resist any change either of acceleration or retardation. The heavier it is and the larger its diameter and speed the more it resists a change, because of its inertia. It is thus apparent that a heavy fly-wheel may be speeded gradually, and then becomes a store of energy, so that if there is a sudden demand for an excess of power, with no noticeable change of speed, as when a heavy press comes together to stamp metal, the mechanism moves continuously, without the stopping or jerking which would occur if there were no attached fly-wheel. It may be called an equalizer of load. Fly-wheels for steam- engines were formerly built very large and heavy, but rather numerous bursting accidents caused closer investigation of the strains to which they were subjected. In Benjamin's tests it appeared that cast iron fly-wheels might burst at from 190 to 425 feet per second speed of rim. It is now, therefore, deemed unsafe to design a cast iron fly-wheel to run faster than 100 feet rim-speed per second. Cast steel, however, is made that will safely sustain a speed of 230 feet per second. Well-made wooden fly-wheels are considered safe at 150

feet per second speed. It has been found con¬ venient in transmitting power to utilize fly-wheels for carrying belts, and very large wheels with heavy belts are so employed in many factories. A steam-engine driving a lot- of heavy machinery would ((race® or fun away when a number of the machines were discon¬ nected suddenly, if it were not for the fly- wheel, that equalizes conditions. The four- cycles combustion engine cannot be operated at all without a fly-wheel, as it explodes only once in four revolutions. See Steam and Steam- Engines and Internal Combustion Engine.

FO, the name given by the Chinese to Buddha. See Buddhism.

FOA, foa, Eugenie, French author: b. Bordeaux 1795; d. 1853. Her maiden name was Fradis, and she was of Spanish- Jewish descent. Separated from her husband she sup¬ ported herself by her pen, often writing under the name <(Maria Fitzclarence.® Her tales' for young children are delightfully clever. Notable among her works are (Les Memoires d'un Polichinelle) (1839) ; (Le Petit Robinson de Paris) (1840) ; and (Le Vieux Paris) (1840).

FOAKES-JACKSON, Frederick John,

English theologian : b. Ipswich, 10 Aug. 1855. He was educated at Eton and at Trinity Col¬ lege, Cambridge. He was ordained in 1879 and from 1897 to 1912 was examining chaplain to the bishop of Peterborough. He became hon¬ orary canon of Peterborough in 1901, and from 1882 to 1916 was lecturer at Jesus College, Cambridge, where he was dean after 1895. In 1916 he was Lowell lecturer at Boston and in the same year became Briggs professor of Christian institutions at the Union Theo¬ logical Seminary, New York. He published (History of Christian Church to a.d. 337) (1891; 6th ed. to a.d. 461, 1914); (Christian Difficulties in the Second and Twentieth Centuries) ; (A Biblical History of the He- brews) (1903; 3d ed., 1910) ; (Biblical His¬ tory for Schools (1912-13) ; (St. Luke and a Modern Writer) (1916) and contributions to the Athenoeum, Church Quarterly, Cambridge Review, Hastings' dictionary of Religion and Ethics,* Harvard Theological Review, etc.*

FOCA, fot'cha, Jugo-Slavia, town situated at the confluence of the Cehotina and Drina rivers, near the frontier of Montenegro. It is sur¬ rounded by wooded mountains and contains several beautiful mosques, which are the most ancient in Bosnia. Its only industries are silver filigree-work and inlaid weapons. It was the scene of many conflicts during the Middle Ages and in the 14th century became one of the principal trading stations of the Ragusans and in the 16th century was the seat of the Turkish governor of Herzegovina. Pop. 4,500.

FOCH, fosh', Ferdinand, French marshal, <(the hero of the Marne® : b. Tarbes, department Hautes-Pyrenees, 2 Oct. 1851, within a few miles of, and only three months before his illustrious colleague, Marshal Joffre. Of Basque descent, his father, Napoleon Foch, was a civil servant under Napoleon III. One of his broth¬ ers, a lawyer, also bears the martial name of Napoleon, and the other is a Jesuit priest. The three brothers received their early education together at the local college, and then turned each to his respective vocation, the Church,

the Army, and the Law. The strongest points in the mental composition of Ferdinand Foch were geometry and mathematics. He entered the Polytechnic School and graduated as an artilleryman. At the age of 19 he served as a sub-lieutenant in the Franco-German War, and at 26 had won his commission as a captain of artillery. Rising to lieutenant-colonel, he was appointed professor of strategy and general tactics at the Lcole de Guerre (War College). After five years he returned to his regiment, held various commands for several years, and then went back — a brigadier-general — to the War College as Director. This high position, conferred upon him without being sought, by Premier Clemenceau, brought him into close and confidential contact with the War Depart¬ ment. About this time a small but seriou's band of French officers was formed, men then un¬ known to the outer world and hardly even recognized in France, but whose names have since become celebrated in military history — Joffre, Castelnau, Petain, Nivelle, Foch and a few others. Each realized that France would some day be called upon to face an ordeal like that which confronted her in 1870, and each toiled strenuously to prepare himself and his colleagues against the day. They had not for¬ gotten the lessons of Gravelotte, Metz and Se¬ dan. For his part, Foch devoted his energies to training and teaching officers. For years his two great works, (The Principles of War> and (The Conduct of War} (translated into different lan¬ guages) had been highly prized by military stu¬ dents both in Europe and America. But Foch was a preceptor of a new type; he laid equal stress upon the philosophical as upon the mate¬ rial aspect of war; he did not regard war as an exact science, but rather as a condition in which character or morale counted for as much as strategic and tactical skill. On the other hand, he possessed a deep knowledge of the mechan¬ ical details of war machinery. Dressed in workman's overalls, he would spend months at a time going around the famous Creusot cannon works, experimenting, watching, testing and analyzing. After leaving the War College Foch commanded successively the 13th Division, the 8th Corps at Bourges, and the 20th Corps at Nancy. The European War gave him the first opportunity of putting his theories into actual practice; destiny called the professor from the lecture room to demonstrate his teachings on the field of battle, and it was in the most thrill¬ ing and momentous event of the war that he justified them and distinguished himself.

At a critical moment of the battle of the Marne General Foch, commanding the 9th French Army, was informed by his airmen that a gap had been left in the alignment of the German armies between von Hausen's right and von Buelow's left. In the night of 8 Sept. 1914, he thrust his left wing behind von Buelow's exposed flank and pushed his right wing for¬ ward; by dawn next morning he had driven a wedge between the forces of the two German

commanders. After a fierce battle he drove two corps of von Buelow's right into the muddy marshes of Saint Gond and made the largest Allied capture of prisoners and guns up to that date. Von Buelow retreated, closely pursued by Foch, whose right meanwhile harassed von Hausen and threw him back upon Chalons. Within a few hours the whole German line was

in full retreat. The Allied victory at the Marne was due, according to most military critics, to the error of von Kluck in exposing his flank and, secondly, to the swift decision and prompt action of General Foch in recognizing that error and seizing the advantage. Up to that moment of the battle the 9th Army had suffered severe punishment; with a force already more than half defeated, Foch passed to the offensive and accomplished what appears almost a miracle. Altogether he had no more than 120,000 men in his command to oppose some of the finest Ger¬ man troops, who were stated to have numbered 200,000. At the battle of Ypres General Foch was in control of the successful operations by the French, British and Belgians which pre¬ vented the enemy from breaking through to Calais. In May 1917 he succeeded General Petain in Paris as Chief of the Staff of the Army, and in March 1918, during the great Ger¬ man offensive on the Western front, the grim logic of events dictating the necessity for a unity of command, General Foch was nominated supreme commander of the French and British armies on that front. On 28 March 1918, the commander of the United States forces in Eu¬ rope, General Pershing, placed the whole strength of the American army in France at the immediate disposal of the Generalissimo. The combined strategy under his command cul¬ minated in victory. On 8 Nov. 1918 he received the German commission empowered to sue for an armistice, which was signed 11 Nov. 1918. (See War, European — Battle of the Marne; Battle of Ypres). Consult Johnston, Major R. M., (General Foch, the Man of the Hour) (New York 1918); Le Goffic, C., 'General Foch at the Marne) (New York 1918).

FOCUS (plural foci), a word introduced into science by Kepler in 1604. It literally means a hearth round which all the members of a family gather, and takes the acquired meaning of the centre, into which certain activities are gathered. In optics it denotes the point at which divergent rays of light are brought to meet again, and from which they appear to proceed. The principal focus of a lens is the focus of rays falling upon the lens in a line parallel to its axis. The conjugate foci of a mirror or lens are two points so situated that the rays emitted from a light, or a luminous object, at either point, are reflected or refracted to the other. In photography the word is familiarly used of the image reflected on the screen of ground glass, which is said to be in focus when it is fixed at a true focal point, and so as to procure a focal or un¬ distorted effect. It is also used of the lens, with regard to its distance from the screen of ground glass. The lens is in focus when it transmits to the screen an image without blurring or aberration.

The term is employed in geometry in the description of the ellipse, which has two foci, of which it- can be proved that the sum of the distances of any point of an ellipse from its foci is constant, and the difference of the distances of any point of a hyperbole from its foci is constant. See Ellipse; Lens; Light; Mirror; Optics.

FODDER (A. S. fodor, cog. with Ger. flitter), the food collected by man for the use of the domestic herbivorous quadrupeds. In English the term is commonly restricted to

FERDINAND FOCH

Generalissimo of the Allied Annies in Europe (1918)

dried herbage, as hay and straw; but in other languages it is more comprehensive, and in¬ cludes all the food of cattle, except what they gather for themselves in the field. The prin¬ cipal part of the food of the domestic herbivora is furnished by grasses, most of which are eaten by them when fresh and green. Besides the supplies which they receive of the surplus of corn cultivated for human food, they are also, to a considerable extent, dependent on the straw or dried herbage of the corn-plants for their winter provender; and that of many other grasses, cultivated on this account alone, is converted into hay for their use. Hay, be¬ ing cut and rapidly dried while the plant is still full of sap, contains more nutritious matter than the ripened straw of the cereals. In the United States the best grasses are timothy, red top or Rhode Island bent, white top, orchard grass, and June grass or Kentucky blue grass. In California the best fodder grass is the alfalfa of which three or even four crops a year are obtained.

Next to the grasses are ranked the Legumi- nosce, affording food for cattle in their seeds — as beans, peas, lentils, lupines, etc. — and in their herbage, on account of which many of them are cultivated, as clover, lucerne, vetch, tares, sain¬ foin, etc. When consumed green, the produce of these crops is usually termed forage or green forage (See Silage). Some of them enter also largely into the composition of hay, being cut and dried with the grasses along with which they have been sown. Some of the Cruciferce are cultivated to a considerable extent as forage- plants, cattle being fed on their green herbage, although they are not suitable for drying as fodder. Among these are kale and cabbage, rape, etc. In some parts of the world cattle are not unfrequently fed on the leaves of trees, as in the Himalayas, where the leaves of different species of Aralia, Grewia, elm and

oak are chiefly employed for this purpose, and are col¬ lected, dried and stacked for winter fodder. In seasons of drought in India cattle are kept alive on the green leaves and pods of acacia and Inga dulcis. See Alfalfa; Clover ; Grasses; Hay; Pasture; etc.

FODDER, Green. See Silage.

FODERE. See Pradier-Fodere.

FODIENTIA, the aard-varks (q.v.) ; also Edentata.

FCEDERA, fed'er-a, name given to a col¬ lection of state documents bearing on trans¬ actions of the kings of England and other states from 1100 to 1654. Thomas Rymer com¬ piled 15 volumes in 1693-1713 and the work was continued by Robert Sanderson from 1715 to 1735. Rapin compiled a French abridgment of the work and Stephen Whatley's

FOEHN (fen) WIND, a warm wind that blows from the Alps in some of the northern valleys of Switzerland. At one time the foehn was supposed to be an air-current that had been warmed by passing over the Desert of Sahara. Now it is known that the foehn is warm because it is a south wind which, robbed of its moisture by expansion and cooling in passing over the Alps, is warmed by compression in descending through the increase of atmospheric pressure

with decreased altitude. It corresponds to the Chinook wind of Montana, Washington and British Columbia. See Chinook Wind.

FCENICULUM. See Fennel.

FCETUS, fe'tus, an unborn child, or unborn young of an animal. In the human foetus the growth is most pronounced after the fourth month. The convolutions of the brain, dis¬ tinguishable organs of sex, ossification and muscular movement advance in the fifth month, during which nails and hair appear. During the sixth month the pubic bones ossify, eyelids and eyelashes form, fat develops under the skin. In the seventh month, the fat increases, the eyelids are open. During the eighth month the nails are fully developed, and the normal foetus at¬ tains a weight of from five to nine pounds. See also Embryo.

FOG, a very thick mist ; small hollow vesi¬ cles of water suspended in the air, but so low as to be but a short distance from the earth, in place of rising high above it and becoming so illuminated by the sun as to constitute clouds of varied hue. Fogs often arise when the air above warm, moist soil is colder than the soil itself. The hot vapors from the ground are then condensed by coming in contact with the colder air above, as the warm

steam of a kettle is by the comparatively cold air of a room. But no fog arises till the cold air has absorbed vapor enough to bring it to the point of satura¬ tion. Fogs often hang over rivers. Their cause is the condensation by contact with the cold water, of the vapor in a hot and moist air current passing over the river. The "pea-soup® fogs of London life are produced by the carbon of the smoky atmosphere coloring the fog vesi¬ cles ; a fog which is brown in London's busi¬ ness district is generally white a few miles off, and wanting altogether at the further extrem¬ ities of the city. On hills and mountains of any size it is easy to rise above a fog, and see it like an ocean beneath one's feet. Ocean fogs are dangerous to vessels traveling at high speed, as in the case of the Titanic disaster in 1912. Where cold-water currents underlie warm air, a common condition off the Newfoundland banks, the formation of fog is often rapid and dense. Such fogs persist after the temperature has altered, and also the fog drifts with the wind ; it is therefore a most uncertain quantity. It has been noted that electric potential is very high during a fog. Consult McAdie, "Fog Studies® (in (American Inventor, 5 Vol. IX, p. 209, 1902).

FOG-SIGNALS, signals given by means of sound or light to warn vessels of danger during fogs. Various kinds of fog-signals are used, among which may be mentioned bells, drums, gongs, guns, compressed-air whistles, steam-whistles and fog trumpets or horns, and latterly powerful electric flashlights. Gongs are not very powerful as signals, often failing to be heard at more than the distance of a quarter of a mile. Bells may be heard during fogs at a distance of from one to three miles. Guns have been heard as far as 10 miles, with a lightbreeze blowing across the sound. One of the most powerful signals is the siren fog-horn, the sound of which is produced by means of a disc perfo¬ rated by radial slits made to rotate in front of a fixed disc exactly similar, while a long iron

trumpet forms part of the apparatus. The disc is made to revolve rapidly, and when the slits are opposite each other openings are formed through which electricity, steam or compressed air is forced. This causes a sound of very great power, which the trumpet collects and com¬ presses, and which under favorable circum¬ stances is heard from 20 to 30 miles out at sea. Fog-signals are also used on railways during foggy weather. They consist of cases filled with detonating powder, which are laid on the rails and exploded by the engine when it comes up to them. Bell-buoys, common to the coast of the United States, are operated by the cur¬ rent, by the ebbing and flowing tide, by the swaying of the waves, by the wind and by clockwork impelled by weight or spring. As to construction, they are

adapted for anchorage on spits, sand-bars, or shoals. The use of elec¬ tricity in fog-signals is well illustrated at Sandy Hook, N. J., where a powerful searchlight flashes every few moments in varying directions. In clear weather this flashlight can be observed a distance of 50 miles at sea. There are in the United States under government control nearly 10,000 fog-signals of all kinds, 3,000 of which are lighted.*

Germany erected in 1903 a fast flashing light on the island of Helgoland in the North Sea. The system or principle employed is said to be entirely new. Not only that, but it was said to present absolutely insurmountable difficulties. The revolving light on Helgoland is not only the largest in the world, it is the most unique, for Germans claim that it never had a model.

They built upon the superiority of the Ger¬ man reflector, with its exactly parabolic ground- glass mirror or speculum, and the marvelous success of the Helgoland fast-flashing light has justified itself. In these lines, for a long time, France was in the lead. The reflector invented by Schuckert, with its parabolic mirror, has earned a place by the side of the world's very best work. The bright fires — feux eclairs — of the system, based upon a combination of Fresnel lenses and totally reflecting ring prisms, which were built by the French with marvelous skill and accuracy, blocked the way to the new lights. About the middle of the 90's German experts were sent to France by the German Imperial government for the express purpose of study¬ ing flashlights. The experts stayed long enough to find out all that was best in the French system, aided thereto by the kindness of the scientific men of the republic. Before their return they were convinced that by means of two or more reflectors, erected upon a re¬ flector with Schuckert's glass parabolic mirror, results equal to those of France could be pro¬ duced.

Experiments were made in Nuremberg. They went far beyond what the most sanguine had believed possible. The revolving reflector of the German apparatus was fully equal to the Frenchman's revolving light. As soon as the experts had demonstrated their point, work was begun on a light reflector or projector equal to the largest ever used. It was to represent 30,-000,000 candlepower and to last no longer than one tenth of a second. The flashes must follow each other every five seconds. When the weather is favorable the beams go far beyond the central fires of light rays. On the first night that the new light was used, its peculiar,

flashing beams were seen by people standing on the mole at Busum, a distance of 65 kilometers, or a trifle over 40 miles. The watchers in the lighthouse at Amrum, about the same distance, were able in unfavorable weather to see the same beams as they rapidly appeared and dis¬ appeared. It was noted that the otherwise bluish-white light of the electric

arc appeared red. Attempts, which are still in the stage of experimentation, are being made by means of radiography to ascertain position in fogs, and to determine direction and distances in fog by means of radio signals. The unreliability of sound waves in a medium like air, which is not of uniform density, and thus give rise to <(silent zones,® add an element of uncertainty to all apparatus so far invented. See Buoy ; Electric Lighting; Fog; Lighthouse; Mega¬ phone; Siren; Topophone.

FOGARASSY, Janos, yan'osh fo-ga-rosh-i, Hungarian lawyer and philologist : b. Kas- mark in Austria-Hungary, 1801; d. 11 June 1878. He studied at Saros-Patak and was grad¬ uated in law, became an advocate, and was ap¬ pointed to an office in the government bureau of finance. His principal claims upon the memory of posterity are his legal works written in the Hungarian tongue. He also published a (Hungarian Dictionary ' (1836), and began, at the suggestion of the Hungarian Academy, a complete dictionary of the language in colla¬ boration with G. Ezuczor, after whose death he finished the work single-handed. It was published in 1861, and for this achievement he was awarded a gold medal by the Academy.

FOGAZZARO, Antonio, an-to'ne-o fo-ga- tsa'-ro, Italian novelist and poet : b. Vicenza, Italy, 1842; d. 1911. He is by far the ablest leader and exponent of Catholic idealism and of the Catholic movement generally in modern Italy. He first came into notice with 'Miranda,' a story in verse (1874), and added greatly to his reputation as a poet with 'Valsonda,' a volume of lyrics (1876). He was author of several novels which were received with marked favor, among them (Master Chicco's Fiasco' (1885); (Daniel Cortis) (1887); 'The Poet's Mystery' (1888) ; 'Piccolo mondo antico) (1895) ; (Piccolo mondo moderno) (1901) ; 'II Santo' (1905) ; 'Leila' (1910). His character delineation and portrayal have few equals in modern Italy. Consult 'Life' by Molmenti (Milan 1900) ; McKenzie in Yale Review (1912) and Thayer in The Nation (1911). See Little Old World, The.

FOGELBERG, Bengt Erland, bengt er'- lant fo'-gel-berg, Swedish sculptor : b. Groten- burg, 8 Aug. 1786; d. Trieste, 22 Dec. 1854. He began his art studies in the Academy at Stock¬ holm and in 1820 went to Rome, where he soon made a name. He was among the first to in¬ vest the mythologic figures of the North with the graces of the Grecian antique, and the in¬ fluence of Thorwaldsen is plainly, seen in his 'Odin and Thor' in the museum at Stockholm. He also vied with Thorwaldsen in such purely classic subjects as 'The Dying Argus'; 'Venus' ; 'Cupid and Psyche.' He executed two statutes o{ Gustavus Adolphus, and, in. collaboration with Bystrom, the series of colos¬ sal statues of the Swedish kings at Stockholm.*

FOGGIA, fdd'ja, or CAPITANATA,

cap-e-tiin-a'ta, Italy, province on the Adriatic,

between the provinces of Campobasso and Bari. It possesses rich pastures. Among its special products are wines, oil, grain, cattle, capers, saf¬ fron and fruits. The principal town is Foggia. Area, 2,688 square miles. Pop. 484,557.

FOGGIA, Italy, city, capital of the province of the same name, in the centre of the great Apulian plain, 46 miles east by south of Campo Basso. It is well built, most of the houses being reconstructed since an earthquake which hap¬ pened in 1732. It has large storehouses for keeping corn, and is the place where the flocks that feed on the great plain of Apulia are reg¬ istered. Piazza Federigo Secondo, with its Emperor's Fountain, commemorates the fre¬ quent sojourns here of Frederick II, who held a parliament here in 1240. The city contains a fine customhouse, theatre, gymnasium, technical institute, a school of industry, city park, botani¬ cal gardens and a public library. Pop. 79,213.

FOGHORNS. See Fog Signals.

FOGLAR, fo'glar, Ludwig, Austrian poet : b. Vienna, 24 Dec. 1819; d. Rammer, 15 Aug. 1889. Among his poems mostly lyric are (Cypresses) (1842) ; (Sunbeams and Shadows) (1846) ; (Clara von Vissegrad, an epic (1847) ; (Freedom's Breviary) (1848) ; (Joyful and Sor¬ rowful } (1867) ; (Saint Velocipede* (1869), a satire (under the pseudonym <(Lebrecht Flott®).*

FOGO, FUEGO, fwa'go, or SAINT PHILIP. (1) One of the Cape Verde islands, in the Atlantic Ocean, having its highest point 9,760 feet above sea-level, and presenting the appearance of one single mountain, though, on the sides, there are deep valleys; area 170 square miles. Pop. estimated at 16,000. It has no rivers and a scarcity of fresh water pre¬ vails, yet it is one of the most fertile islands of the archipelago, producing excellent maize and fruits. The chief town is Nossa Senhora da Luz. (2) Fogo, a port of entry and capital of Fogo Island, Newfoundland, at the south¬ west entrance to Notre Dame Bay, 122 miles northwest of Saint John's, N. B. See Cape Verde Islands.

FOHI, fo'he. the first Chinese emperor and legislator. He is said to have founded this kingdom 2,207 b.c. Nothing certain is known of his reign ; but

there are attributed to him the institution of marriage, the invention of fish¬ ing, hunting, music and writing. He acknowl¬ edged and worshipped a supreme deity. He is

supposed to be the Noah of the Bible.

• •

FOHR, fer, Germany, an island of Schles¬ wig, in the North Sea; area 31 square miles. The town of Wyk is a fishing centre, and was a bathing resort. The population numbers 4,200, mostly Frisians.

FOIL. A leaf or extremely thin sheet of metal used for a variety of purposes, as for protecting articles from moisture. Foil is often applied in sheets of tin amalgam behind mir¬ rors to make them reflect perfect images. Foil is made of a variety of metal alloys in nu¬ merous beautiful colors, which under the name of Dutch foils are much used for backing gems and imitations of precious stones, thus adding to their lustre. Various ornamental foils of metal are used in stamping the titles on the cloth covers of books, and for other ornamenta¬ tion. A mottled or variegated foil, is made by

superimposing a group of foils of different colors and beating them out until they become one sheet. The separation of the colored sheets is assisted by a system of punching. The sheet lead which is used for the lining of tea chests is a familiar application of foil. The thinnest sheets of metal are termed leaf, while slightly thicker is foil. (See Gold-Beat¬ ing). When still thicker it is sheet metal.

FOIL, Fencing. See Fencing.

FOIX, fwa', an old and distinguished French family which flourished from the 11th to the 15th century taking the title of Count from the district of Foix. Consult Flourac, L., (Jean Ier, comte de Foix, vicomte souverain de Bearn (Paris 1884) ; Castillon, (Histoire de comte de Foix* (Toulouse 1852) and Frois¬ sart, (Chroniques) (ed. by Luce and Raynaud Paris 1869-97).*

FOIX, Gaston, Count de, and Viscount de Bearn, French military officer: b. 1331; d. 1391. He acquired the surname of Phoebus. He spent his life in war and the chase. His first service in arms was against the English in 1345. During the revolt known as la Jacquerie he contributed to the rescue of the Dauphin at Meaux. He wrote a book on the pleasures of the chase, of which several editions were pub¬ lished.

FOIX, Gaston de, French soldier: b. 1489; d. Ravenna, Italy, 11 April

1512. He had the command of the army of Italy, and on account of the daring exploits was denominated the <(Thunderbolt of Italy.® After performing prodigies of valor he was killed at the battle of Ravenna.

FOIX, France, capital of the Department of Ariege, on the River Ariege, 50 miles south of Toulouse, on the Southern Railway. It con¬ tains an ancient chateau and a Gothic church, which was built in the 14th century, a lyceum, library, training school, court of assizes and a tribunal of the first instance. Flour-milling and iron-working are the chief industries. In the Middle Ages Foix was the capital of the counts of Foix. Pop. 4,498.

FOKIEN. See Fu-Kien.

FOKSHANI, fok-sha'ne, town in Ru¬ mania. Extensive vineyards are in the neigh¬ borhood and the best brands of Moldavian wines are produced here. The town is well- known historically. It was destroyed by the Russians in 1789 and by the Turks in 1822, and was captured by the forces of the Central Powers in their campaign of 1916. Pop. 24,183.

FOLCM'OT, fo-lk'mot. See Folk moot.

FOLDING MACHINES. The folding of printed sheets for books or newspapers was performed by hand up to 1856, when Cyrus Chambers, Jr., of Philadelphia, invented a prac¬ tical folding machine, which was manufactured by him and his brother Edwin, who within a few years 'produced a considerable line of folders of various sizes and capacities. The folding machine of C. S. Forsaith, of Man¬ chester, N. H., designed for folding newspapers only, came out some years later. A good many Stonemetz folders were sold between 1880 and 1890. The leading folders on the American market are the Dexter, Chambers, Brown, Cleveland and Eclipse. The vital prin-

ciple, on which nearly all paper folders arc based, is the descent of a dull blade on the paper sheet at the point where the fold is to be made, the blade thrusting the paper between rotating rollers which draw it in folded. The making of a second fold is accomplished in the same way, the paper being passed along by traveling tapes from one stage to another, up to three or four folds. The earlier machines were not positive in their register, that is, the fold was apt to vary slightly in position, but the modern machines are very accurate, and large 64-pagc sheets are commonly folded on the machines with entire satisfaction. The heavy coated paper introduced about 1890 to 1895 developed a tendency to buckle or crease slightly on the last

fold of a large sheet, and the most recent folding machines have intro¬ duced devices to overcome this difficulty. The most conspicuous improvement of recent years has been the drop-roll, which has added mate¬ rially to the speed of the machines. This was introduced by Dexter, and enabled the sheet to be fed sideways — that is, the shortest way. Registering by means of points, that slip into holes or slits in the sheet, is another feature of modern machines. The equipping of machines with pasters was accomplished early in the history of the folding machine, and this feature has been brought to a high degree of perfec¬ tion. The paste is held in fountains and laid on the paper in strips as it passes by.

Folders are now made in so many styles that the mere enumeration of them requires considerable space. They may be either drop- roll or point-feed; there are quadruple 16s and double 32 folders some of which insert one sheet within another; there are marginal folders for books and pamphlets and for job¬ bing work; also large single and combination periodical folders, rapid circular folders, plain circular folders, jobbing circular folders and various so-called newspaper folders. Then there are special newspaper and periodical folders, combinded folding and wire-stitching machines, combined folding and feeding machines and combined feeding, folding and wire-stitching machines.

The Dexter combined folding and wire- stitching machine was introduced in 1897, and it is continuous and strictly automatic. It takes the sheets from the platforms of the feeders, and folds, gathers, collates, covers and wire-stitches, delivering completed copies with¬ out intermediate handling.

There are various other combinations and arrangements for special w6rk, which, together with those above named, have greatly reduced the cost of binding books, pamphlets and periodicals.

On fast web newspaper printing presses there is used a rotary type of folder that was brought out by the Hoes, and controlled by them for many years, being probably their most valuable patent in connection with these presses. Three folding blades were mounted on a single cylin¬ der, catching the paper three times in a single revolution, thus securing immense speed. The device is not accurate enough for book folders, but it made possible the enormous speeds ob¬ tained by the so-called lightning newspaper presses.

The job folding machines for doing odd work of varying sizes have come into extensive

use within a few years. They are small and comparatively simple machines capable of operating at high speed. See Newspapers,, American.

FOLDS, a term applied to bends or flexures in the rocks of the earth's crust. They vary from a few inches across to structures many miles in extent. Up-arches from which rocks dip outward in both directions are known as anticlines. Down folds, or troughs, toward the centre of which beds dip from both direc¬ tions are known as synclines. A flexure in the rocks with dip in only one direction is a monocline. Anticlines and synclines mav be broad gentle folds of simple character, or they may be composite, with many minor crumplings on the limbs of the major fold. Such com¬ posite folds are known as anticlinoria and synclinoria. Very broad, gentle, simple folds are sometimes spoken of as geanticlines and goesynclines. Nearly circular anticlines, from which the beds dip outward equally in all directions from the central point, are known as domes or quaquaversal folds. Nearly cir¬ cular synclines are called centroclinal folds. Sometimes folds are so closely compressed that the two sides become nearly parallel, in which case they are called isoclines. Of course there may be isoclinal synclines and isoclinal anticlines. If folding has gone so far that one side of the fold has passed the vertical and the beds are upside down, the fold is said to be overturned. If overturned so far that the reversed beds are nearly horizontal the fold is recumbent. Overturned and even recumbent folds are common in closely folded mountain regions, such as the southern Appalachians. The trough or crest of the fold is called the axis. It is rarely horizontal over any consider¬ able distance. The angle of inclination of the axis is called the pitch of the fold.

After folds have been made (see Moun¬ tains), erosion starts cutting them down, and if given a sufficiently long time will plane the topographic irregularities away completely. They are still folds, however. In such a case any given bed will outcrop in two narrow bands, one on each flank of the fold. If the fold is without pitch the bands will be parallel, but if the fold pitches the beds will meet at one end or the other in the shape of a long narrow <(V.)> Closely folded regions are also often cut by large faults (q.v.) and are frequently areas of intense metamorphism, (q.v.). For a discussion of the origin of folds, see Mountains.

FC5LDVAR, feld'var (ancient Sussuinum), a walled town of Hungary, on the slope and summit of a hill, on the right bank of the Danube, 49 miles south of Budapest. The popu¬ lation, 12,087 in 1910, is mostly Magyar.

FOLENGO, Teofilo, ta-o'fe-16′ fo-len'go (pseudonym ((Merltno Coccajo®), Italian poet: b. near Mantua, Italy, 8 Nov. M91 ; d. near Bassano, Italy, 9 Dec. 1554. He was the first to win fame as a writer of macaronic verses. His (Macaronic Work of Merlino Coccajo, Mantuan Poet) (1517-25) comprises the comico-heroic poems, (Baldus) and

Italian the epic satire of (Orlandino) (1526), in ridicule of the story of Poland5 ; then, partly in macaronic, partly in pure Italian, partly in pure Latin, (The Chaos of Three by One (1527), in which he darkly recounts the events of his own life.*

FOLEY, John Henry, Irish sculptor: b. Dublin, 24 May 1818; d. Hampstead, England, 27 Aug. 1874. His (Ino and Bacchus (1840) attracted much notice, and was followed by a succession of admirable classical and ideal works, including (A Youth at a Stream* ; (Caractacus* ; and several excellent subjects from Shakespeare. The most noteworthy fea¬ ture of his work, however, was his careful and artistic execution of his statues and busts, which included the Hampden and Selden figures in Saint Stephen's Hall, Westminster; Goldsmith, Burke and O'Connell, in Dublin; and the eques¬ trian statues of Lord Hardinge and Sir James Outram, for India, which rank among the finest equestrian sculptures of modern times. The statue of the Prince Consort for the Albert Memorial is also Foley's work, and the bronze statue of Stonewall Jackson for the State of South Carolina.*

FOLGER, fol'jer, Charles James, Amer¬ ican jurist: b. Nantucket, Mass., 16 April 1818; d. Geneva, N. Y., 4 Sept. 1884. He was grad¬ uated at Hobart College in 1836 and admitted to the bar in Albany, N. Y., in 1839. He be¬ came judge of the Court of Common Pleas of Ontario County in 1843; was a member of the State senate in 1861-69; elected associate judge of the State Court of Appeals in 1871 ; suc¬ ceeded to the chief justiceship of that court in 1880; and was Secretary of the United States Treasury in 1881-84. In November 1882 he was the Republican candidate for governor of New York, but was defeated.

FOLGER, Henry Clay, Jr., American capitalist: b. New York, 18 June 1857. He was graduated at Amherst College in 1879 and in law at Columbia in 1881. From 1879 to 1911 he was with the Standard Oil Company of New Jersey and in the latter year was made presi¬ dent of the Standard Oil Company of New York. He is president also of several other concerns, mostly ancillary companies of the Standard Oil Company. He has written many monographs on Shakespeare and has what is regarded as the finest library of Shakespeareana in America, comprising about 20,000 volumes. Amherst conferred on him the degree of Litt.D. in 1914.

FOLGER, Peter, American colonist and author : b. England 1617 ; d. Nantucket 1690. He emigrated from Norwich, Norfolk, to America and settled at Martha's Vineyard in 1635. He was grandfather of Benjamin Franklin, his daughter Abia having married Josiah Franklin and borne the

illustrious statesman and phi¬ losopher among her 17 children. He was clerk of the courts in 1673 and possessed a literary sprightliness which descended to his grandson, as may be seen from a perusal of his (A Look¬ ing-glass of the Times, or the Former Spirit of New England Revived in this Generation

(1675).

FOLGER, William Mayhew, American naval officer: b. Massillon, Ohio, 19 May 1844. In 1864 he was graduated at the United States

Naval Academy, was promoted through the several grades, attaining the rank of captain in 1898 and rear-admiral in 1904. In 1890-93 he was chief of the Bureau of Ordnance with rank of commodore, in 1894-95 commanded the Y ork- town, in 1896-98 was lighthouse inspector, in 1898 commanded the Kearsarge , was again light¬ house inspector in 1901-04. He commanded the Philippine squadron of the Asiatic fleet in 1898 and the cruiser squadron until March 1905, and was commander of the Asiatic fleet at his retirement 30 June 1905.

FOLGORE, foTgo-ra, Italian poet. He flourished at the end of the 13th century, but the dates of his birth and death and the incidents of his life are unknown. He wrote a number of sonnets, all of which have been translated into English by Dante Rossetti and J. A. Symonds. Their poetic merit is far from contemptible and they are particularly interesting from the vivid light which they throw on Italian society. Their prevailing tone is one of refined epicureanism and their style is mainly remarkable for afflu¬ ence of imagery. ((Every line,® says Mr. Sy¬ monds, ((1874) ; and Navone, (Le Rime di Folgore (1880).*

FOLIATION, a term restricted by Darwin, and subsequently by geologists, to the arrange¬ ment of the constituent portions of a rock in alternating and more or less parallel layers or folia of different mineralogical nature. It differs from cleavage (q.v.), which is applied to certain superinduced divisional planes that render a rock fissile in that it may or may not be accom¬ panied by a tendency for the rock to split parallel to the foliation ; and from lamination, in which the planes of separation in a rock are the result of deposition in successive layers. If foliation postdate the formation of the rock, the structure is practically the same as that known as schistose. The folia are conspicu¬ ously lenticular, thickening and thinning out and reappearing after an interval on the same or a different plane. These alternately lentic¬ ular folia are usually more or less closely welded or felted into each other, so that they are not readily separable; and they frequently present the appearance of being puckered or crumpled. The crystalline texture and the foliated char¬ acter of the schists distinguish

them at once from any ordinary bedded < (fragmental rock.® See Schist; Cleavage; and Metamorphism.

FOLIES-BERGfiRE, fo.'le'ber'zhar', a vaudeville hall of Paris, in the Rue Richer, founded in 1869. It acquired a world reputation for the genre of amusement presented on its stage.

FOLIGNO, fo-le'nyd, Italy, a town and episcopal see in the province of Perugia, on the Topino, 25 miles southeast of Perugia. It is 770 feet above sea-level and is a most pic¬ turesque and interesting town. Its churches contain paintings by several of the Umbrian masters ; the cathedral fagade was restored in 1903. The town has two palaces of the Renais¬ sance period, a gymnasium, technical school and seminary. Leather, paper and soap are the principal manufactures and the bulk of the town's trade is in silk and oil. Foligno was

founded in the 8th century and changed hands frequently until it was destroyed by the Peru¬ gians in 1281. The Trinci family ruled it from 1305 to 1439, when it became part of the states of the Church. In 1860 it was ceded to Italy. It suffered from a severe earthquake in 1832. Pop. (town) 9,532; (commune)

28,373.

FOLIO, (1) in printing: a. The running numbers placed at the top or bottom of the page of a book. The even folios are on the left-hand pages, the odd upon the right. The folios or prefatory matter are frequently in lower-case Roman numerals, b. A sheet of paper once folded, c. A book of the largest size, whose sheets are folded but once, four pages to the sheet; hence it is used generally for any large volume of work. (2) In book¬ keeping, a page or opening in an account book. (3) In law, a certain number of words in legal documents. The number varies in the States; thus in some of them, as in England, in law documents, conveyances, deeds, etc., the folio is 72 words ; in chancery and parliamentary proceedings 90 words. In New York and other States 100 words constitute a folio.

FOLIUM OF DESCARTES, da-kart, in mathematics, a curve such that the simultaneous increments of two lines drawn from the gen¬ erating point of the curve to two fixed points have always to each other a constant ratio. If the ratio is equal to — 1, the oval becomes an ellipse; if it is equal to + 1, it is an hyperbole.

FOLK, Joseph Wingate, American law¬ yer and public official: b. Brownsville, Tenn., 28 Oct. 1869. He was graduated with degree of LL.B. at Vanderbilt University 1890, LL.D., University of Missouri, 1905, William Jewell College, 1906, Drury College, 1907, West¬ minster College, Fulton, Mo., 1907, South¬ western Baptist University, Tennessee, 1908; was admitted to bar 1890; practised, Browns¬ ville, four years ; moved to Saint Louis, Mo., 1894; circuit attorney, city of Saint Louis, 1900-04; exposed vast amount of political and official corruption and prosecuted numerous bribery cases .which attracted wide attention. He was governor of Missouri 1905-09, carrying the State on Democratic ticket by a majority of 30,000, the only successful candidate on the State ticket; author of Missouri Anti-Lobby Law; State-Wide Primary Law; Initiative and Referendum Law; 2-Cent Fare Railroad Law; Child Labor Law ; Compulsory Education Law ; public utility commission for cities; Anti-Race Track Gambling Law; law removing derelict officials for failing to enforce the statutes. He was delegate-at-large from Missouri to Demo¬ cratic National Convention, Denver, 1908, and made lecture tour of the United States 1909—10 ; was appointed solicitor for Department of State, by President Wilson, 22 Sept. 1913 and chief counsel for Interstate Commerce Com¬ mission 1 March 1914.

FOLK-LORE, the science which embraces all that relates to ancient observances and cus¬ toms, to the notions, beliefs, traditions, super¬ stitions and prejudices of the common people. Gomme's divisions are (1) Traditional nar¬ ratives: (a) folk-tales, (b) hero tales, (c) ballads and songs, (d) place legends; (2)

traditional customs: (a) local customs, (b) festival customs, (c) ceremonial customs, (d) games; (3) superstitions and beliefs: (a) witchcraft, (b) astrology, (c) superstitious practices and fancies; (4) folk-speech: (a) popular sayings, (b) popular nomenclature, (c) proverbs, (d) jingle rhymes, riddles, etc.

Folk-lore has been observed and noted by countless writers of early days, but it was not till after the beginning of the 19th century that its value for the elucidation of the social history of mankind had become apparent to thinkers and its systematic study been seriously begun. Meantime the reawakening to natural poetry and to the beauty of free emotional ex¬ pression in literature, which lay at the founda¬ tion of what it is usual to call Romanticism, had already commenced even in the 18th cen¬ tury. The publication of Percy's (Reliques of Ancient English Poetry) (1765) had given a powerful impulse to Scott and others in Eng¬ land, to Herder and to Arnim and Brentano in Germany, who found a rich wealth of tradi¬ tional poetry, the poetic value of which they fortunately had the eyes to see. But the study of folk-songs really began with Scott's Min¬ strelsy of the

Scottish Border) (1802-03). It was perhaps an advantage rather than a disad¬ vantage that the first worker in this new field was but the folk-lorist unawares and mere great poet and romancer of genius that he was; for our folk-poetry would never have enriched and permanently influenced all later English liter¬ ature but for its own intrinsic and genuine poetic quality, any more than our detached folk-lore facts would ever have risen above the dignity of the whimsical pastime of an idle hour but for their inherent though unsuspected faculty for throwing light backward on the his¬ tory of human civilization. All, or nearly all, the facts of comparative mythology are to be found in folk-belief in solution; a great many facts of folk-belief are to be found in compara¬ tive mythology crystallized. The facts are es¬ sentially the same in both cases, but the study deals with them at different stages.

First in importance of . the collections of material is still the earliest, the (Children and House Tales) (1812-14) of the brothers Grimm (q.v). Grimm's 'German Mythology (1835) is still unequaled in the range of its erudition and in the systematic thoroughness with which the mythology and superstitions of the ancient Teutons are traced back to the dawn of direct evidence and downward in decay and diminution to the popular tales, traditions and phrases in which they still unconsciously survive. These two works of Grimm created a school, whose abundant labors later folk-lorists have entered into, while they have enlarged the horizon of the science, because the stamp of soundness and sufficiency so far as it goes is impressed in all the work of Grimm and his successors, of whom, in Germany, the most eminent were Kuhn, Mannhardt, J. W. Wolf and W. Schwartz. To the English-speaking world Max Muller's essays revealed a new world of un¬ dreamt-of affinities and the combined charm of their literary grace, wide learning and rare powers of exposition converted every reader to a theory which, as has been seen, L only now being displaced by another with a sounder basis of real philosophy and facts. Since then the study of folk-lore has become fashionable,*

indeed almost an article of patriotism, and societies have been formed in most countries to further its study. Of these the most im¬ portant is still the Folk-lore Society of Eng¬ land, established in 1878, with its official organ, the Folk-lore Journal. The American Folk¬ lore Society was instituted at Cambridge, Mass., early in 1888: (1) For the collection of the

fast-vanishing remains of folk-lore in Amer¬ ica, namely: (a) Relics of old English folk¬ lore (ballads, tales, superstitions, dialect, etc.) ; (b) lore of

negroes in the Southern States of the Union; (c) lore of the Indian tribes of North America (myths, tales, etc.) ; (d) lore of French Canada, Mexico, etc. (2) For the study of the general subject and the publica¬ tion of results of special studies in this de¬ partment. The journal of the American so¬ ciety has amply justified its existence by series of articles of striking originality and value.

Folk-lore, though it takes cognizance of many apparently trivial matters, is of great im¬ portance in the science of comparative mythology and helps to throw much light on the relationships between races and on the origin and development of religious beliefs and cere¬ monies. It is therefore of great assistance to the ethnologist, the sociologist and the his¬ torian, as well as to the student of compara¬ tive mythology and of the science of religion. It has attracted much attention in recent times. See Astrology; Fable; Fairy Tales; Legend ; Mythology ; Superstition ; Witch¬ craft.

Bibliography. — Aubrey,

FOLK-MOOT (Anglo-Saxon folcgemote or folcrnot), the old English parliament of the shire or of the township; the meeting of the people to discuss and decide on public af¬ fairs. Its guiding principle was the common law of England, called the folc-riht, public right, of pre-Norman times. There was never in England a true folk-moot of the whole na¬ tion until the establishment of the House of Commons about the middle of the 13th century. According to Tacitus, the Germans of his time consulted the whole nation on all important matters, and the Campus Martius or Madius of the Franks was in later times the folk-moot of that nation. Such moots continued to a much later age among the Scandinavian peoples, as, for instance, the Icelandic Althing and the Swedish Ting at Upsala. The Witenagemot (q.v.) in England, though indirectly a national senate, was in reality an assembly of magnates. The shire-moot or county court was composed of the representatives of every township within its jurisdiction, and thus was a complete folk- moot for the district comprised in the shire. By concentrating those representatives of the shires in a single assembly the modern House of Commons was formed. Consult Kemble, (The Saxons in England' ; Stubbs, Constitu¬ tional History. ' vol. 11 — 27

FOLK-MUSIC. The music of a nation is generally based on folk-music, or the folk tunes that arc handed down from generation to generation along with its folk-lore. It is thus to be distinguished from art music, the studied compositions of the professional musician. Folk-songs generally exhibit strong racial characteristics, those of northern peoples mainly in melancholy minor strains, those of the southern, on the other hand, being vivacious and lively. The wandering refrains of the countrysides in Scotland formed the basis of the songs of Robert Burns. The words of many

national folk-songs . have survived ; but the music, which was never submitted to writ¬ ing, has been lost. Some of these melodies, however, have survived in a remarkable man¬ ner: by the Church musicians of the 12th cen¬ tury adopting the tunes and making additions of their own ; and the music of many great masses, notamly Palestrina's, is based on the folk-song. Haydn was familiar with the peasant music of Croatia, and he embodied their spirit by writing many of his own com¬ positions in the same vigorous and direct style. Germany of all countries is the richest in folk-music ; the folk-songs have been the themes of many compositions of Mendelssohn, Mozart and Weber; but as Germany is one of the countries which has set the standard in art music, few of the tunes have remained un¬ altered. Liszt and Schubert utilized the music of the Magyars and the Gypsies; Dvorak the folk tunes of Bohemia; Chopin those of Po¬ land; and Brahms and others the characteris¬ tically national, melancholy music of Russia. Wales, Ireland and Scotland are rich in folk- music ; Beethoven went to Scotland and Ire¬ land for some of his melodies; the Norwegian composer Grieg drew part of his inspiration from Scotland; and Puccini traveled as far as Japan for one of his operas. From the fact that dance music preponderates in the music of nations whose musical culture has remained in a primitive stage, it is concluded by some au¬ thorities that vocal music in its origin may have been a mere accompaniment of the dance.

Folk-music has within recent times en¬ gaged in an increasing degree the serious at¬ tention of students of the art of music; and societies have been formed to collect and ar¬ range them in musical notation. (See Folk¬ lore; Music). Consult Engel, 'The Litera¬ ture of National Music) (London 1879) ; 'In¬ troduction to the Study of National Music' (ib. 1886) ; Finck, 'Songs and Song-Writers' (New York 1900) ; Parry, 'Evolution of the Art of Music' (New York 1896).

FOLK PLAYS. See Rural Theatres.

FOLK-PSYCHOLOGY, an ethnological study of the psychology of races and people, differing from folk-lore, which studies survivals. Among modern students of this science are Baldwin, Wundt, Lombroso, Lazarus, Steinthal and Felix Adler. Folk-psychology considers the habitat and food conditions of a people, its somatology, sex, technology, aesthetics, ju¬ risprudence and pathology. It deals with the psychology of groups rather than individuals. Nearly all the books written upon this sub¬ ject have been published only in German. The whole science is regarded by some American psychologists as misleading and tending to a

mechanical interpretation of the universe and these theories of might makes right, which have characterized German thought. See Ethnology.

FOLK-RIGHT, the native laws and cus¬ toms in Early English history as distinguished from the rules and observances introduced by William the Conqueror and his followers. See England.

FOLK-TALES AND MYTHS OF THE AMERICAN INDIANS. Creation Myths.—

When primitive man began to reason about himself and the world around him, among the first questions he was bound to ask himself were how he came to be upon the earth and what was the origin of the earth itself and the creatures on it and the inhabitants of the heavens above. All these questions he settled to his own satisfaction, however childish his reasoning may seem to us with our more per¬ fect knowledge of the laws of nature. Very various are the .answers given to these ques¬ tions. The Bella Coola tell us that their great goddess, Afraid of Nothing, who dwells in the Far East, created the world. Then the moun¬ tains were monster human beings and tyrants. She defeated them, made them smaller and confined them each to a certain place so that they might no longer do harm. In general, however, the Indian mind accepts the eternal existence of the world or of primary matter; and he troubles himself only with accounting for its specific forms. The Zuni Awonawilona, the Maker and Container of All, created the primal fogs and mists and took upon himself the form of the Sun with all his personal at¬ tributes. Then, by his own brightness and light, he thickened the cloud-mists into water, thus creating the World-holding Sea. With his own flesh he fecundated the sea and made two worlds. Out of this came Mother Earth, she of the four divisions or wombs from which sprang all beings. In the lower cave or womb of the earth remained many half-formed beings crawling over one another. Then up sprang Poshaiyandkya, the All-wise-one, from the sea, after passing through a long and ter¬ ribly dark passage and made hisˆ way to the Father-sun and begged him to deliver the ‘men and creatures in the earth-cave. Thus was the Earth Mother delivered. The Thompson River Indians combine the functions of the Creator and the culture god in The Old One who created the earth and the people and taught them how to spear fish, to make bows and arrows and spears, to shoot the deer, to dress skins, cook and preserve meats and, in fact, all they know and do. Another version of the myth, which is probably the earlier, says that Old One taught them whence they came, which would seem to imply that he had no hand in their creation. According to a west-coast myth the Raven-man was the creator of the sun, the moon and the stars. The Maidu have a com¬ plete

chain of creation myths which divide themselves naturally into periods, much as the Aztec and the Maya myths do. In the fifst of these Coyote is the discoverer and Codoyanape is the earth-namer of this world. Together they prepare it for the first people. Then fol¬ low the creation of the First People, the mak¬ ing and planting of the germs of human be¬ ings. The third witnesses the transformation

of the human race into animals, after a long period of strife. Another cycle describes the dark tricks of Coyote and the attempts of the Earth-namer to overcome him. Finally the latter is defeated in the contest and takes his departure to the bright Eastern-land, after the appearance upon earth of the present human race. The Achomawi, a neighboring tribe, have the same myth, but say that, in the be¬ ginning there was nothing but the vast shore¬ less sea and the cloudless sky above it. At first a tiny cloud appeared in the sky and, condensing, became the Creator, Silver-gray Fox. A fog arose, condensed and became Coyote. Thus we have the birth of the two creators. The Wyandot people once lived in the Land-beyond-the-sky until one day the shaman told them to dig round the roots of a wild apple tree which stood in the great lodge of the chief. They broke through the floor of the sky-land and the chief's daughter fell through the hole thus made. Below on the great World of Waters a white swan swimming heard a heavy peal of thunder, the first on earth, and saw the apple tree and the woman falling from the sky-land. On the soft down of the swan's back she fell and rested there. Big Turtle called a council of all the animals and they decided to try to get earth from the apple tree's roots at the bottom of the sea. Otter, Muskrat and Beaver all were succes¬ sively drowned in attempting to dive for it. Finally Frog too came up dead but with a few grains of earth between her toes. From these grains an island was made around the body of Big Turtle, which finally grew into the great earth world. When there are earthquakes it is because Great Turtle gets tired, or is moving his feet. The second part of this myth, with some slight variations, is told by the Crees. Wisagatka, sailing on a raft on the primaeval ocean, tied a string to a muskrat and sent him down to bring up some mud from the bottom of the waters ; but he was drowned. The Crow was sent on the same errand ; but he came back without performing his mission. Then Wisagatka took some small pieces of moss from the raft and ((made medicine® over them. Then he gave the moss to Wolf and told him to run round the raft. Wolf con¬ tinued running for a week and the raft got larger and larger, till it grew into a great land. Wolf never came back. The reason there are so many springs on earth is because the water comes up between the logs of Wisagatka's old raft. According to the Thompson River In- dinas Old One lives in the Sky-land, which is reached only from the tops of the high, snow¬ capped mountains. Once there was no earth but only a great waste of waters. Old One took some earth from the Sky-land,

made a large, hollow ball and threw it down on the waters, where it flattened out into a very large island. This is why the earth is full of flats, hollows and mountains, with islets, rivers and lakes. Then Old One came down and made grass and trees to grow. This is why all around the earth is water. The Haidas say that at first there was no land, but only a great sea. Then the Raven appeared upon a speck of earth. This increased rapidly; and Raven divided it into two parts, one large and one small. Practically all the Indian tribes of America have their creation myths ; so that

there are literally hundreds of them; but the above will give a general idea of what they are all like.

Migration Myths. — Quite frequently mi¬ gration myths are mistaken for creation myths and classified as such. So often is this done, in fact, that it may be taken as the general rule. Yet they should be carefully distin¬ guished from one another. The true creation myths make an attempt to explain how and why the earth, man, animals and all other ex¬ isting things came into being. Migration myths state the appearance of certain races in certain places with some incident connected with their first appearance there. Midway between these two extremes is the discovery myth which is made to take the place of a real creation myth. Here some great tribal or racial hero, after a series of adventures, discovers the earth, the heavens, the region of the dead or of the Supernatural People. He seems to embody the spirit of the wandering tribes ; and such myths should not be classed as creation stories. These migration myths are quite common throughout the American continents and often they take the place of true creation myths. This is prob¬ ably why they have been confounded with them by most writers on mythology. The Peruvians and the Chibchas of Colombia say that their first ancestors made their appearance from the bottom of a sacred lake. The Musk- hogees assert that on the top of a great mount stood the house of Esaugetuh Emisse, the Master of Life (Breath). Standing on this hill he directed the waters back into their proper channel. This seems to be a migration myth which has got mixed up with the Biblical narrative of the creation. The first ancestor of the Minnetarees emerged from a lake with an ear of corn in his hand. This idea of coming out of the waters or from the re¬ gion under the earth probably had its origin in the fact that all vegetation comes up out of the earth and all life depends upon it; while all fish come out of the water. A Mandan myth is typical of this class of stories, which have become real epics in the hands of the Mayas, the Chinooks and several other American races. The first Mandans lived in an underground village near a great lake. Some of them climbed the roots

of a monster grape vine which penetrated there from the earth overhead and thus reached the regions above, which they found to be a land flowing with milk and honey. When the adventurers returned and related the story of their ad¬ ventures all the other Mandans wanted to go to the land of light. So they began to climb the grape vine root. When a part of them had got out of the underground world, the weight of a very fat woman broke the root ; so part of the people were left behind, where they still reside. In the hands of the Aztecs and other Nahuatl tribes this story becomes frankly a migration myth attached to that period in their very early traditional history when the Nahuas all came out of the seven caves, each cave representing the original habitat of one of the tribes.

The Coming of Light. — The myths of the creation of light are almost as plentiful as those of the creation of the earth. A legend common across the great woodless plains of the northwest of Canada says that the Sun-

man and the Earth-woman were once husband and wife. The Sun deserted his wife and took all his relatives, the stars, with him. Old One passing by found the woman crying and learned from her what had happened. He went to the Sun's camp and drove the Sun, Moon and the stars up into the sky, saying: (

and paler than the sun. Some of the Iro¬ quois tribes account for the lesser brilliancy of the moon by saying that she became the wife of the sun ; but she ran and hid in a cave, because she could not bear the heat of her hus¬ band. This made the sun very angry and he stormed terribly at his wife who remained trembling for fear in the cave; and it was only after a long time that she was persuaded to come out. When she did she had already be¬ come thin and pined away until she was nearly dead. She has never recovered her original brightness since that day. Whe i she fattens up a little she immediately thinks of her hus¬ band's great anger; and she grows thin and pines away again. An Eskimo legend also accounts for the paleness of the moon thus : The house of the moon is covered with white deer skins which he keeps hanging out there to dry. So the moon's light is always dim. An Alaska myth asserts that the house of the moon is made of very clear, transparent ice and within it there is wondrously bright light, which shines through the walls. When this is more than usually brilliant its reflection causes the Northern Lights. Afraid of Nothing, the west-coast female divinity already mentioned, is represented as a wonderful woman-warrior who resides in the house of the sun. She is much feared, for her visits, like those of the Aztec moon goddess, cause sickness and death. She

is said to have given the light to the moon ; and she is herself undoubtedly the moon. It was dark in the Lillooet country because the sea gull had all the light hidden away in a box and would let out only enough for her own use, which was not very much. Now Raven was a great necromancer and he planned to get light for his people, so he went to the house of the Sea Gull, upset the box and let the light out so that it spread all over the world. A Pacific Coast version of the same myth says that Raven stole the baby of the Fire People and ran away with it to his coun¬ try up among the great mountains. The Fire People sent messengers to him in an effort to get the baby back again. Finally he exchanged it for fire. Another version says he ex¬ changed it for light to lighten the world. The Fire People agreed to teach him all the uses of fire including cooking.

The Rape of the Fire.— To account for how man first learned the use of fire the American Indians invented and told scores of myths all the way from Greenland to Tierra del Fuego. These myths show more invention than those of the creation. Most of them make the fire hero obtain his gift for man by rob¬ bery, stealth or deception, as in the preceding myth. The fire was usually guarded by some terrible, supernatural being. Frequently the guardian of the fire lived on the top of a great mountain or deep down in the earth. Sometimes the fire was gotten from the light¬ ning, or from the Thunder Bird or from the clouds. The reason for these sources is evi¬ dent. From the heart of the earth the volcano throws forth its fire ; and out of the clouds comes the lightning. According to various American myths the fire was most jealously guarded because there existed a strong belief that some day it would burn up the world, as it had already done in the Aztec, Mava, Cen¬ tral American and at least one United States

myth. Hence the desperate efforts made by the culture gods to obtain it and the difficulties placed by the story teller in the way of their achievement of their object. It was dark throughout all the land, so a west coast myth runs, and it was cold; so all the people suffered. The Raven resolved to find both light and fire. After many adventures he arrived at the home of the Great Thunder Bird, and from him he obtained a little fire. Some of this he hid in the trees, where any one still can find it, and with the rest he made a tiny sun, which he threw up into the sky. There it grew large and lighted the whole earth. Many people had tried to steal the fire from the Fire Spirit, so the Algonquins say; but no one had succeeded. Nanabozho's grandmother was old, and she felt the cold very much as did all the old people. So Nanabozho went away eastward in his bark canoe, determined to find some fire and bring it back to his people. When he had crossed the Great Sea-water, he hid his canoe and changed himself into a white hare, and in this shape he came to the wigwam where the Fire Spirit guarded the sacred fire ; and where he lived with his two great, strong, fierce daughters. Nanabozho wet himself in the lake near by, and apparently miserable and

suffering from the cold, he crawled into the sacred wig¬ wam, where one of the 'women took pity on him and set him by the fire to warm himself and to dry his fur. There they left him while they went to attend to their duties about the place in a distant part of the big lodge. Nana¬ bozho the Hare moved closer to the fire; but his tread caused the earth to tremble so that the women ran up to see what had happened ; and the Fire Spirit, who had been dozing by the door, woke up in a terrible fright. But the hare looked so miserable and bedraggled they did not suspect him. Finding everything ap¬ parently all right, the old man went to sleep again and the women went about their work. When all was quiet once more, Nanabozho transformed himself into a swift young Indian runner, seized a fire-brand and ran out of the wigwam in the direction of the Great Sea¬ water where he had hidden his canoe. The Fire Spirit and his daughters ran after him and, by their superior magic, gained rapidly on him. Nanabozho set fire to the prairie grass and raised a great thick smoke which blinded his pursuers and hid him from sight, and al¬ lowed him to reach his canoe in safety. But the fire people went round the smoke and, reaching the lake, followed Nanabozho across it. Nanabozho called to his canoe that went- by-itself to go faster and faster. Faster and faster it went and so it reached the shore ahead of the fire people. There Nanabozho hid the fire in a hollow log. The fire people looked everywhere for it but could not find it. When they had gone away Nanabozho took the fire out of its hiding place and warmed his grandmother and all the old people. But ever since that day there has been fire in wood and more in. dry logs. According to the western Algonquins, Sistinakoo, the Fire King, who was a very great magician, held the fire imprisoned in the heart of the earth, in the very centre of four corrals, one within the other. In each of these corrals there was only one door. At the first door a monstrous venomous snake stjood guard; at the second a great savage panther;

at the third the King of the Grizzly Bears and at the fourth mighty Sistinakoo himself. At a council of all the animals, the Fox was sent out to try to break through the barricades, but he failed. Then the dhief of the Coyotes was sent. By his cunning he succeeded in passing all the guards one by one as they slept; and fastening a fire brand to his tail, he got through with all the inhabitants of the infernal re¬ gions on his track. He reached home in safety. This legend is common to various other United States tribes. It naturally varies in the re¬ counting of the obstacles Coyote met with and the means by which he overcame them. The Carrier Indians had light, but they had no fire, and so they were terribly cold. Up on the top of a very high mountain old Old Chief had all the fire guarded and as

he would not give the people any they resolved to get it by stealth. So they called upon Caribou and Muskrat, two great magicians, to help them. They all put on their dancing aprons and masks and entered the Fire Chief's lodge and began to dance and sing. All uninvited they did this. Muskrat sang magic words of his tribe, and all the people sang these words of Muskrat. Young Caribou jerked his head from side to side, very fast he jerked it, as he danced, and his magic mask of fine shavings, which he had made before he started out, caught fire. Old Old Chief sprang up and put the fire out. But Muskrat danced, Young Caribou danced, the people all danced; very swift they danced and the fire came again stronger than before, and again old Old Chief put it out. Once more the people and Caribou danced swifter and swifter. But Muskrat didn't dance. Behind the dancers he burrowed and burrowed with swift magic through the earth. Suddenly some one cried : ((Look, look !J) and pointed to a great mountain from which rose dense clouds of smoke. There stood Muskrat scattering the fire upon the land below. According to another story Bear had a wonderful medicine tree which he valued very highly for in it he had hidden the fire. Chip¬ munk discovered this secret and one day he shook the tree so violently that it set itself on fire and thus fire came into the world.

Day and Night. — Further west the Thomp¬ son River Indians have this same myth ; but with them it refers not to the bringing of fire, but to the division of day and night. When Chipmunk set fire to Bear's medicine tree Bear put the flames out, for they were at the foot of the tree, by throwing earth on the fire. For some time a battle raged, Chipmunk alter¬ nately lighting and Bear putting out the flames. At last they both grew tired and agreed to have it alternately dark and light. This is how daylight and darkness came about. The Shuswaps have a very similar myth. They assert, however, that at first there was plenty of light, light all the time. But Grizzly Bear did not like this, so by very great medicine, singing and dancing, he tried to make it dark. When Coyote found what he was up to he at once called up all his big medicine, singing and dancing and crying in a very loud voice : <(Light, light, light !® Bear danced and cried : <(Dark, dark, dark ! Sometimes it was dark when Bear shouted the loudest ; sometimes it was light when Coyote shouted the loudest. But with so much dancing, singing and shout¬ ing they both grew very tired after a while*

and agreed to have it dark half the time and light half the time. This is why darkness always follows the sun's path. According to the Blackfeet, Napi, their traditional hero, had a wife who was in love with a rattle snake. He set fire to the wood where the rattle snake lived, and when his wife came at him in a rage, he severed her head from her body. The head rolled along the ground after the children who had run away and the body still lived

and was as terrible as before. So Napi ran for his life with his wife after him. To-day Napi the sun is still followed by his wicked, headless wife, the moon.

The Seasons. — Very few Indian tribes have no myth to account for the seasons. Fisher, the Ojibway hero, went to the Swallow- land, the Sky-land, far to the south where the swallows live. There the Swallow-man had them all tied together so that they could not wander. After numerous adventures, Fisher liberated the birds and allowed them to escape through a hole in the sky. But the Summer- man closed the hole before they all got through. This is why it isn't summer all the time. The Algonquins, the Iroquois and other tribes picture Spring as a Young Man and Winter as an Old Man continually at strife with one another. Sometimes one conquers, then the other. Thus it is warm and cold alternately. Another and much more detailed myth tells of Glooskap's journey to the land of the guardian of Winter, where he was enter¬ tained by the old man with stories. And as he told his stories Glooskap fell asleep and slept for six long months. Then he awoke and wandered further southward. As he went the air began to be warmer, the grass and flowers appeared and the leaves came again upon the trees. He came to a great forest where the little Summer-Woman lived. He caught her and abducted her and ran away with her fol¬ lowed by all the people of Summer-land. Out¬ distancing them he came again to the home of the guardian of Winter. There the old man again tried to throw his magic spell over Gloos¬ kap. But the latter, with the little Summer- Woman in his bosom gave the guardian of Winter back story for story. He described all the beauty of the southland and the little Sum¬ mer-Woman listening was pleased and put forth all her magic and the snow and ice house of the Winter melted away and he fled to the north as the leaves came again upon the trees and the birds sang in them and all nature awoke once more to hail the coming Spring. Then came the Summer-people ; and Glooskap left the land with them. Since then the Summer- people go to the northland every year from the Summer-land far to the south. The Blackfeet say that the Lord of Cold Weather is a tall white-haired old man clothed all in white who lives in a wonderfully sunlit white tepee far in the Northland, where he sits and smokes in silence all the dreary winter months through. Across his yellow face run two lines, one com¬ pletely round the mouth and another across the forehead, just above the eyes, from ear to ear. He it is who sends the fierce Winter of the northwest of Canada and the great plains of northern United States. Estoneapesta, he of the Yellow-painted Snow-tepee, is his name and he is the lord of all the snows and biting winds of the Northland.

The Culture Gods or heroes appear in vari¬ ous forms in American myth from the cold northern regions to the far southern lands; but they have ever the same characteristics. They are always the personification of the winds or of one of them and they are the messengers of some higher power which has sent them upon earth to instruct man. Through them man¬ kind has learned all that he knows. The cul¬ ture gods go about the earth teaching and generally doing good. About them, however, there have collected, in the course of time, many stories that show plainly they are the invention of the various storytellers through which the original myth has passed in the course of its long history. The American cul¬ ture myths have not been studied comparatively as they deserve, but such studies as have been made would seem to indicate that they are all, or nearly all, closely related. Almost every¬ where, in addition to being the patrons of learn¬ ing, of the arts and of all knowledge, they are also the special divinities of games of chance and, curiously enough, the patrons of thieves. The shadowy figure of the culture god stalks through the history of all the more cultured races of the American continents. He was the great patron divinity of the Toltecs, the most cultured of all the American races and the superstition of his second coming paralyzed the hand of the warlike Moctezuma and made it possible for a handful of Spaniards to con¬ quer the greatest empire of the Western World. Hiawatha, Nanabozho, Wakiash, Quetzalcoatl, Yucano, Awonawilona, Glooskap, Poia, Ku- kulkan, Gucumatz and a score of other heroic figures stand prominent out from the lives of the various Indian races as the great in¬ structors of their people. Of these the greatest in the United States is Nanabozho, whom Long¬ fellow has immortalized as Hiawatha. See also American Mythology.

Bibliography. — Brinton, D. G., (American Hero-Myths) (Philadelphia 1882) ; Canfield, W. W., (The Legends of the Iroquois) (New York 1902) ; Curtis, E. S., (Indian Days of the Long Ago) (New York 1914) ; Curtis, Natalie, (The Indian Book) (New York 1907) ; Dorsey, J. O., (Osage Traditions) (Washington 1888) ; Dunn, J. P., (True Indian Stories) (Indian¬ apolis 1908) ; Fynn, A. J., (The American Indian) (Boston 1907) ; Grinnell, G. B., Paw¬ nee Hero-stories and Folk-tales) (New York 1889) ; (Blackfoot Lodge Tales5 (New York 1892) ; Hodge, F. W., (Handbook of the American Indians5 (Washington 1907) ; Long¬ fellow, H. W., (The Song of Hiawatha5 ; Lumis, C. F., (Tlhe Man who Married the Moon and other Pueblo Indian Folk-stories5 (New York 1894) ; Skinner, C. M., (Myths and Legends of our own Land5 (Philadelphia and London 1896) ; Smith, E. A., (Myths of the Iroquois5 (Washington 1883) ; Swanton. T. R., (Haida Texts and Myths5 (Washington 1903) ; (Tlingit Myths and Texts5 (Washington 1909).

John Hubert Cornyn, Editorial Staff of The Americana.

FOLKESTONE, or FOLKSTONE, fok'-

ston, England, fortified seaport town in Kent County 62 miles southeast of London and seven west of Dover. The town is situated on a level plain near a range of low hills. Until the ad¬ vent of the railway it was of little importance.

Since then a steamer service has been inaugu¬ rated with Boulogne and extensive improve¬ ments have been made in the harbor and docks. The fishing industry is thriving. There is a large trade with France amounting to about $100,000,000 annually. The town is very old, containing remains of the successive conquerors, Roman, Saxon and Norman. Its modern facili¬ ties include promenades, pleasure gardens, an amusement pavilion and a fine bathing beach. It has electric light and an electric street rail¬ way system. It was the birthplace of William Harvey (b. 1578), the discoverer of the circula¬ tion of the blood and to whom a fine monument was erected in 1881. Pop. 33,502.

FOLKLAND, or FOLCLAND, fok'land, the land of the people, that portion of Anglo- Saxon England which was retained on behalf of the community. It might be occupied in com¬ mon or possessed in severalty, but could not become allodial estate or absolute private prop¬ erty except with the consent of the Witan or highest council in the land. From time to time large grants were made both to individuals and to communities; and land thus cut off from folk- land was called bocland or (

FOLKMAR, Daniel, American anthro¬ pologist: b. Roxbury, Wis., 28 Oct. 1861. He was graduated at the Western College of Iowa in 1884 and continued his studies at Paris, Brus¬ sels and Berlin. He subsequently taught in several Western institutes of learning (1895- 1900) and was professor of anthropology in the Universite Nouvelle of Brussels 1898-1901. From 1903 to 1906 he was anthropologist and lieutenant-governor in the Philippine Civil Serv¬ ice; and special agent of the United States Im¬ migration Commission 1908-09 ; special agent of the Census Bureau 1910-14; and since 1914 on the editorial staff of the United States De¬ partment of Commerce. Among his many writings are (L'Anthropologie Scientifique (1899) ; and (Legons d'Anthropologie Philoso- phique5 (1900) ; (Album of Philippine Types5 (1904) ; dictionary of Races5 (1911) ; (Mother Tongue of Foreign Stocks5 (1910); also nu¬ merous articles and reports.

FOLKMOOT, fok'moot', formerly FOLC- MOTE, in Anglo-Saxon England, an assembly of the people to consult respecting public affairs.

FOLKRIGHT, the body of customs which came to have the force of law in

Anglo-Saxon England. In Norman times the term desig¬ nated the native laws and customs apart from the laws imposed by the conqueror, and later it became synonymous with "common law,55 which superseded it. See Common Law.

FOLKS, foks, Homer, American sociolo¬ gist : b. Hanover, Mich., 18 Feb. 1867. He was graduated from Albion College (Michigan), in 1889, from Harvard in 1890, was superintend¬ ent of the Pennsylvania Children's Aid Society 1890-93, and in 1893 became secretary of the New York State Charities Aid Association. In 1900 he assisted the United States military gov¬ ernment of Cuba in reorganizing the public charities of the island. In 1902-03 he was com¬ missioner of charities for New York City. He

was president of the New York State Probation Commission after 1907, and in 1911 president of the National Conference of Charities and Cor¬ rection, in which he had been prominent for many years. His literary work includes the edit¬ ing of the Charities Review, numerous reports and magazine articles, and the volumes his¬ tory of the Care of Destitute, Neglected and Delinquent Children in the United States dur¬ ing the 19th Century); and (Problems in the Administration of Municipal Charities) (1904).

FOLLEN, August, later ADOLF LUD¬ WIG, German poet : b. Giessen, Germany, 21 Jan. 1794; d. Bern, Switzerland, 26 Dec. 1855. He became extremely popular as the author of (Sons of Fatherland,) a patriotic hymn; (Malegys and Vivian) (1829), a romance of chivalry; and numerous translations and poetic appeals to the instinct for liberty. He was a brother of Charles T. C. Follen (q.v.).

FOLLEN, Charles Theodore Christian,

American professor and Unitarian clergyman : b. Romrod, Hesse-Darmstadt, 4 Sept. 1795; d. 13 Jan. 1840, in the burning of the steamer Lex¬ ington, on Long Island Sound. He was edu¬ cated at Giessen, and became professor of Latin and history at Coire, Switzerland. His liberal¬ ism in politics and theology caused him to be driven from that town, and he was afterward forced to leave Basel, where he lectured on law and metaphysics, for the same reason. He finally took refuge in the United States and for five years (1830-35) was successful as professor of German at Harvard. He then took charge of the First Unitarian Church of New York, a position which he retained for a year (1836- 37). He removed to

East Lexington, Mass., in 1839.

FOLLEVILLE, •foi'vel, Gabriel Guyot de,

French ecclesiastic and adventurer: b. Brittany, 1760; d. Angers, 1794. He at first studied law, but at the outbreak of the Revolution abandoned this profession to enter the Church. In 1790 he was assistant at Dol and the following year was obliged to flee to Paris, when he retracted the oath to the Constitution civile du clerge. In the autumn of that year he abandoned Paris and went to Poitiers, where he entered on his remarkable career of impostor. Forging cre¬ dentials of a papal delegate and dressing in bishop's costume he announced himself at the Convent of the Filles de la Sagesse as bishop of Agra, and in a short time wielded great in¬ fluence in Poitiers. He was made chief of the ecclesiastical council of Saint-Laurent-Sur- Sevre and of the administrative and judicial councils of a neighboring district. At priest of Saint-Laud on making inquiries in Rome about Folleville learned that there was no bishop of Agra. Soon after the defeat at Le Mans, Folleville was captured, tried and sent to the guillotine at Angers. Consult Boss- ard, (L'Invention de l'eveque d'Agra) (1893) and Chassin, (La preparation de la guerre de Vendee > (1892).

FOLLY ISLAND, a small island off the coast of South Carolina, in Charleston harbor. It is separated from the mainland by Folly Island channel. It was the scene of several engagements during the Civil War.

FOLSOM, Charles, American scholar: b. Exeter, N- H-, 1794; d, 1872. He was graduated

from Harvard in 1813, was in the navy as chap¬ lain and midshipmen's instructor in mathemat¬ ics. In the latter capacity he had David G. Farragut as one of his pupils. He was tutor at Harvard 1821-23, and librarian in 1823-26. In 1824 he was associated with William Cullen Bryant in the editorship of the United States Literary Gazette. As a member of the printing firm of Folsom, Wells & Thurston he long prepared for the press the classical works used at Harvard. In 1883 with Andrews Norton he was an editor of the Select Journal of Foreign Periodical Literature. He published an edi¬ tion of Cicero's selected orations (1811), and an edition of selections from Livy (1829).

FOLSOM, Charles Follen, American phy¬ sician : b. Haverhill, Mass., 3 April 1842 ; d. 1907. He was graduated from Harvard in 1862, was in the Southern States in connection with the Freedmen's Bureau from 1862 to 1865, and after study in the Harvard Medical School practised medicine in Boston from 1870. In 1873-75 he studied at the universities of Vienna, Berlin and Munich. In 1877-82 he was lecturer on hygiene at Harvard,

and in 1879-88 lecturer in and assistant professor of mental diseases. In 1882 he became a member of the National Board of Health, Lunacy and Charity. His writings include (Mental Diseases) and (The Present Aspect of the Sewage Question as Applied to Boston) (1877).

FOLSOM, George, American antiquary : b. Kennebunk, Me., 23 May 1802 ; d. Rome, Italy, 27 March 1869. He was graduated at Harvard in 1822, studied law and removing to New York in 1837 became librarian of the New York Historical Society. He was a member of the New York State senate 1844-48, and was appointed charge-d'affaires at the court of the Netherlands 1850-54, and was for some years president of the American Ethnological Society. Among his publications are (History of Saco and Biddeford, Maine) (1830) ; edition of the Collections of the New York Historical Society) (1841), translation of despatches of Hernando Cortes) (1843) ; (Political Condition of Mexico) (1843) ; documents Relating to the Early History of Maine) (1858).

FOLSOM, Joseph L., American soldier: b. Meredith, N. H., 19 May 1817; d. San Jose, Cal., 19 July 1855. He was educated at West Point, and served four years in Florida against the Indians (1840-44), and in California in the Mexican War. He communicated officially to the government the discovery of gold in that State; and Folsom City on the American River, near the earliest found gold deposits, is named after him, as one who became identified with the development of the State and especially of San Francisco, where he was a large prop¬ erty owner.

FOLSOM, Nathaniel, American soldier and statesman: b. Exeter, N. H., 1726; d. there, 26 May 1790. During the French and Indian War he was at the head of the company of New Hampshire militia, and at Fort Edward was under the command of Sir William Johnson. In 1755 he took part in capturing Baron Dies- kan. When the War of the Revolution began Folsom was made brigadier-general of New Hampshire volunteers ; was present at the siege of Boston and becoming major-general served until the end of the war, He was New Hamp-

shire delegate to the Continental Congress in 1774, 1777 and 1778-80. He presided at the Constitutional Convention of New Hampshire in 1783.

FOLSOM CITY, Cal., city of Sacramento County, 21 miles northeast of Sacramento, on the Southern Pacific Railroad, and on the American River.

Fruit and stock-raising, dairying and crushed rock are the principal in¬ dustries of the town, which in the halcyon days of gold-mining in California was a place of considerable importance. A State prison is situated in the neighborhood. Pop. 699.

*FOLTZ, f o*l t s , Philipp von, German painter: b. Bingen, 11 May 1805; d. Munidh, 5 Aug. 1877. At Munich he was a pupil of Cornelius, whom he assisted in the decoration of the Glyptothek and the arcades in the Hof-garten. He was later a professor in the Acad¬ emy, and in 1865-70 director of the Central Gal¬ lery. His historical paintings are minute and faithful in detail and skilfully designed in their pictorial arrangement, but they have been criti¬ cized as exhibiting stilted drawing and dryness of color. The Cologne Museum possesses his Minstrel's Curse) (after Uhland's ballad) ; the Maximilianeum, Munich, his humiliation of the Emperor Frederick I before Duke Henry the Lion,* and (Pericles attacked by Cleon and his Followers.*

FOLWELL, William Watts, t American educator: b. Romulus, Seneca County, N. Y., 14 Feb. 1833; was student in Ovid Academy and was graduated from Hobart College (B.A. 1857 ; M.A. 1860; LL.D. 1878). Teacher of languages in Ovid Academy, 1857-58; adjunct professor of mathematics in Hobart College, 1859-60. Student in the University of Berlin, 1860-61 ; first lieutenant, captain, brevet major, major and brevet lieutenant-colonel, 50th New York Engineers, 1862-65; in business in Ohio, 1865-69; professor of mathematics in Kenyon College, 1869; president of the University of Minnesota, 1869-84; professor of political science, 1885— 1907 ; professor emeritus since ; member of the Minnesota Centennial Commission, 1876; presi¬ dent of the Minneapolis Society of Fine Arts, 1882-92; member of the Minneapolis board of park commissioners, 1889-1907 ; president of same, 1894-1900; acting president American Economic Association, 1892 ; chairman State Board of Charities and Corrections, 1895-1901 ; Phi Beta Kappa ; member of the Hennepin County Bar, Minnesota Historical Society, corresponding member Wisconsin Historical Society. Author of (Minnesota, The North Star State ; university addresses and numer¬ ous published papers and addresses.*

FOMENTATION, a method of relieving pain through applying warm water or moisture to the afflicted part. The usual method is to apply a cloth just wrung out of boiling water, but turpentine, belladonna and other substances are sometimes added.

FONBLANQUE, fon'blanc', Albany Wil¬ liam, English journalist: b. London, 1793; d. 1872. At the age of 14 he was sent to Woolwich to prepare for the Royal Engineers, his health failing, his studies were suspended for two years, and he then studied law. In 1812, how¬ ever, he

began writing for the newspapers and poop attracted attention by the boldness of hi?

opinions and the superiority of his style. From 1820 to 1830 ha was successively employed upon the staff of The Times and the Morning Chronicle, whilst he contributed to the. Examiner and the Westminster Review. In 1828 the Ex¬ aminer was given over to his complete control and until 1847 he directed the fortunes of that journal with great brilliancy and success. Fon- blanque was offered the governorship of Nova Scotia, but although it offered him a chance to advocate a more liberal political system in colonial government he decided to remain with the Examiner. In 1847 he was appointed statis¬ tical secretary of the Board of Trade. During his later years he took no prominent part in public affairs. His political views may be best judged from his (England under Seven Admin- istrations) (1837). As a journalist he must be ranked as a reformer. Journalism before his day was regarded with disfavor, and men of high attainments hesitated to enter the field. Fonblanque showed, however, that the pro¬ fession was one in which a man of sterling character and high literary ability might honor¬ ably put forth his best gifts. Consult (Life and Labors of Albany Fonblanque, edited by his nephew, Edward Barrington de Fonblanque (London 1874), a collection of his articles preceded by a brief biographical notice.*

FONCIN, fon' san', Pierre Francois Charles, French educator: b. Limoges, 1841. He was educated at the Ecole Normale, Paris, and became professor of geography at Bor¬ deaux in 1876. Three years later he became director of the Academy of Douai and in 1881 was made director of secondary education in the Ministry of Public Instruction. In 1882 he was appointed inspector-general of secondary education. He was one. of the founders of the Alliance Frangaise, of which he served terms as president and general secretary. He published (Textes et recits d'histoire de France> (1872) ; (La premiere annee de geographic (1874) ; (Geographie generale* (1887) ; (Le pays de France* (latest ed., 1903) ; (La France* (Eng. trans. by H. H. Kane, 1903).*

FOND DU LAC, fon'do-lak, Wis., city and county:seat of Fond du Lac County, on Winnebago Lake, at the mouth of Fond du Lac River, and on the Chicago, Milwaukee and Saint Paul, the Chicago and North Western and other railroads, about 60 miles northwest of Milwau¬ kee. Fond du Lac was first settled in 1836 by Germans ; became a village 1 March 1847, and a city in April 1852. Fond du Lac has import¬ ant manufactures and is noted for its dairy and agricultural products. The chief industries, be¬ sides agriculture, are lumber, grain, flour, leather, paper, machinery, refrigerators, sash and doors, shoes, wagons, furniture, shirts, etc. The United States census of manufactures for 1914 showed within the city

limits 100 indus¬ trial establishments of factory grade, employ¬ ing 2,292 persons; 1,925 being wage earners receiving annually a total of $1,000,000 in wages. The capital invested aggregated $6,353,000, and the year's output was valued at $6,761,000; of this, $1,142,000 was the value added by manu¬ facture. The city has four banks, with a com¬ bined capital of $500,000, and an annual busi¬ ness of $15,000,000. The principal buildings are the Carnegie Public Library, Elks' Club House, Saint Mary's Springs Sanitarium, Saint

Agnes' Hospital, Henry Boyle Roman Catholic Home for the Aged, Grafton Hall School for Girls, State women's reformatory. The city has also an excellent public school system (10 buildings), a parochial school and a cathedral school. The city adopted the commission form of government in 1914. Pop. (1920) 23,427.

FONDA, N. Y., town and county-seat in Montgomery County, on the New York Central and the Fonda, Tohnstown and Gloversville railroads, on the Mohawk River, 27 miles north¬ west of Schenectady. Fonda contains a pub¬ lic bathhouse with mineral water, an industrial school for girls, and large ginseng gardens ; is the centre of a large agricultural region. The principal industries are knitting and flour¬ ing mills, a broom factorv, silk mills, machine shop, bottling works, paper container factory etc. The village owns the water system. Pop.

(1920) 747.

FONDI, fcm'de, the ancient Fundi, a town of Italy, Naples, in the province Terra di La- voro, near a lake to which it gives name. It is a bishop's see, and contains a cathedral. The Lake of Fondi (ancient Lacus Fundanus or Amyclanus) lies between the road and the sea ; it sends forth noxious exhalations. Pop.

9,930.

FONNI, fon'ne, Sardinia, town in the province of Sassari,, 3,280 feet above sea-level, 20 miles south of Nouro. Just north of the town is the site of the Roman station of Sora- bile. Excavations made in 1879-80 led to the discovery of the remains of this station, ar¬ ranged round three sides of a courtyard some 100 feet square, including traces of baths and other buildings. Nearby are several menhirs, called pietre celtiche (Celtic stones) in the dis¬ trict. Pop. 4,323.

FONSAGRADA, fori'sa-gra'da, Spain, town of the province of Lugo, 25 miles north¬ east of Lugo, and 3,166 feet above sea-level. It is a market for the agricultural products of the region and has manufactures of linen and frieze. Pop. 19,219.

FONSECA, fo-n-sa'ka, Antonio Manuel

da, Portuguese artist: b. Lisbon, 1796; d. 1893. He studied in the Academy at Lisbon, became a professor there, was in 1839 appointed court painter and in 1862 was elected corresponding member of the Academy of Fine Arts at Paris. Several of his pictures, which are chiefly of a historical character, were exhibited in the Paris Exposition of 1855.

FONSECA, Juan Rodriguez, Spanish ec¬ clesiastic and statesman : b. Toro, near Seville, 1451 ; d. Burgos, 4 Nov. 1524. He passed through many grades of preferment from the archidiaconate of Seville, to the archbishopric of Burgos, where he became limosiuero or pri¬ vate chaplain to the king and queen. In 1493 Ferdinand and Isabella appointed him to su¬ perintend the preparations for the second voy¬ age of Columbus and practically to administer the affairs of the New World. He became first president of the Council of the Indies (q.v.), organized in 1511. His conduct in the discharge of this office has been stigmatized by modern historians, and he has been charged with shortsightedness, if not with malignity, in his treatment of Columbus, Cortes and Las Casas.

FONSECA, Manoel Deodoro da, Brazil¬ ian soldier and politician : b. province of Ala- goas, 5 Aug. 1827; d. Rio de Janeiro, 23 Aug. 1892. He was educated as a soldier and grad¬ uated with the rank of sub-lieutenant of artil¬ lery in 1849. He saw active service in the Paraguayan war (1868-70), and attained the rank of major-general. In 1887, although a conservative and personally attached to the Emperor Dom Pedro II, he and others felt bound to protest against the acts of the govern¬ ment. They were punished for insubordina¬ tion, revolted and proclaimed a republic, which was recognized by the United States and later by the powers of Europe. Dom Pedro was banished and Fonseca was elected President of the government 24 Feb. 1891. In November of the same year he was accused of arbitrary acts and compelled to resign. He was suc¬ ceeded by the Vice-President, Peisoto.

FONSECA, a bay or gulf on the Pacific Coast of Central America, one of the largest in the South Pacific and affording one of the finest harbors in the world. It is bounded by Nicaragua, Honduras and San Salvador (q.v.).

FONSECA BENEVIDES, Francisco da,

Portuguese author: b. Lisbon, 1835. At first he studied medicine, but at 16 joined the navy and in 1854 became professor of physics in an in¬ dustrial school of Lisbon. In the following year he became a member of the faculty at the Naval Academy. In 1866 he was elected to the Lisbon Academy and represented his govern¬ ment at several international expositions. He became inspector of industrial schools in 1884. He is the founder of the Industrial Museum at Lisbon. His writings include (Curso de artilheria) (1850) ; (Curso de physica) (1863) ; (Relatorio sobre a exposigao de Paris em 1867) (1867); (Principios de optica) (1868); (0 Fogo) (1869) ; (Nogoes de physica moderna> (2d ed., 1880) ; (Elementos de balistica) (2d ed., 1882) ; (Memoire sur la vitesse de propa¬ gation des flammes) (1880) ; (As rainhas de Portugal (2 vols., 1880). Consult da Silva, I. F., (Diccionario bibliographico portuguez) (Vol. IX, Lisbon 1870).*

FONSECA LIMA E SILVA, Manuel da,

Brazilian soldier: b. Rio de Janeiro, 1793; d. 1862. He entered the Portuguese army in Brazil, and was appointed lieutenant-colonel in the struggle which subsequently took place for the independence of the country. Under the new regime the Emperor Pedro I chose him as lord chamberlain. When Pedro abdicated (1831) Fonseca sided with the Liberals and rose to high rank in the government, being Min¬ ister of War (1831), Minister of the Interior (1836), and in 1851 he was appointed general and commander-in-chief of the army.

FONT. (1) In church architecture, the vessel which contains the water for baptism. It is frequently sculptured in stone or marble, with richly decorative designs. The form of font with which we are now familiar seems to have been introduced in mediaeval churches. In the early Latin Church, from the time of Con¬ stantine, baptism was administered in baptis¬ teries, which were buildings separate from but adjoining the church. (See Baptistery). (2) An assortment of any particular kind or size of type used in printing, each font containing a

proportionate number of letters, figures, spaces and punctuation marks. See Type.

FONTAINE, foii-tan, Pierre Frangois Leonard, French architect and author: b. Pon- toise, France, 20 Sept. 1762; d. Paris, 10 Oct. 1853. He took the second grand prize of Rome 1785, going to Italy in 1786, and there connecting himself with Percier (q.v.), who, as director of the decorations

of the Opera Paris, called him to his aid, a partnership then being formed which lasted till the fall of Napoleon, when Percier retired. They con¬ structed a beautiful stairway in the Louvre; the Arc du Triomph du Carrousel; the arcades of the Rue de Rivoli as far as the Rue de l'Echelle. He retained the favor of the Bour¬ bon kings, constructing the Galerie d'Orleans at the Palais-Royal, the Chapelle Expiatoire, the Chapelle Ferdinand, repairs of the Louvre and the Tuileries, and the hospital at Pon- toise. He is regarded as one of the first ecclesiastical decorative artists of the 19th cen¬ tury.

FONTAINEBLEAU, fon-tan-bld, France, town of northern France, in the department of Seine-et-Marne, and in the midst of the forest of same name, about two miles from the left bank of the Seine, and 37 miles east of Paris. It is well built, partly of stone and partly of brick, with spacious and regular streets ; is the seat of a court of first resort and several public offices ; contains fine barracks and a military college, a communal college, school of design and engineering, public library of 28,000 volumes, public baths and several hospitals; and has manufactures of calico, gloves, porce¬ lain and stoneware; quarries of sandstone, ex¬ tensively used in paving the streets of Paris and the roads of the surrounding districts; and a trade in wine, fruit, preserves, cattle, etc. Pop. of commune 14,679.

The castle or palace of Fontainebleau, from which the town derives its chief im¬ portance, lies to the southeast of the town, is one of the most magnificent in France and is indeed one of the world's most famous public monuments. Many of its sovereigns have made it their favorite residence and vied with each other in lavishing upon it all the embellishments that art could furnish, without any limitation as to expense. Henri IV, Louis XIV, Napo¬ leon I, Louis Philippe, and Napoleon III all expended large sums upon it. It is now a sum¬ mer .residence of the President of the republic. Fontainebleau holds a great place in French history; it was here that the revocation of the Edict of Nantes was signed in 1685; it was here that Pope Pius VII was held a prisoner by Napoleon in 1812-14; and here also Napoleon signed his own acts of abdication in 1814 and 1815.

The Forest of Fontainebleau has for cen¬ turies been the haunt of and a source of in¬ spiration to the artists of France. It covers an area of about 65 square miles and is renowned for its sylvan loveliness. The village of Bar- bizon on its northwest edge has been made celebrated by such artists as Willet and Corot. Fontainebleau has given its name to a school of painters.

FONTAINEBLEAU, School of, a group of artists assembled at Fontainebleau in France by Francis I, where they were employed in

decorating the palace. There were two branches, Flemish and Italian; the influence of the latter, led by Rosso dei Rossi (1495-1541), eventually dominated French art (q.v.).

*FONTANA, fon-ta'ria, Carlo, Italian archi¬ tect : b. Brusciato, Italy, 1634; d. Rome, 1714. He was a pupil of Bernini. While still very young he executed important commissions, in¬ cluding the Grimazzi and Bolognetti palaces, the monument of Queen Christina of Sweden in Saint Peter's, and the fountains of Saint Peter and Santa Maria in Trastavere. He also built the cathedral at Fulda. Among his published works are (I1 Tempio Vaticano e sua origine, con gli edifici piu cospicui antichi e modernP (1694) ; (Ultissimo Trattato delle acque correntP (1697) ; (L'Anfiteatro Flavio**

(1725).

FONTANA, Domenico, Italian architect: b. Mili, Italy, 1543; d. Naples 1607. Cardinal Montalto (afterward Pope Sixtus V) engaged him to construct a chapel in the church of Sta. Maria-Maggiore, and a palace in the garden of the same church. But the pecuniary resources of the cardinal failed and the undertaking would have been interrupted had not Fontana himself supplied the means for continuing the work. Sixtus V wished to remove the great obelisk now in front of Saint Peter's Church, which was then nearly buried under the rub¬ bish, to the middle of the square. Fontana happily executed this gigantic operation in 1586. Among other buildings erected by Fon¬ tana by the command of Sixtus V, the library of the Vatican and the aqueduct (ac qua f dice), deserve particular mention. Having been accused of converting to his private use the money received for public purposes, he was de¬ prived of his office by the Pope, but imme¬ diately received the offer of the post of archi¬ tect and chief engineer of the king of the Two Sicilies, and in 1592 went to Naples. He there constructed several canals to prevent inunda¬ tions, a new road along the bay and the royal palace in the capital.

FONTANA, Felice, Italian physiologist: b. Pomarolo, in the Italian Tyrol, 1730; d. 1805. He was appointed professor of natural philosophy in the University of Pisa, and while retaining this position he formed the museum at Florence which contains an immense number of anatomical preparations in colored wax, which exhibit all parts of the human body in the minutest detail, and in all imaginable posi¬ tions. They are executed with the greatest skill, and were made by different artists under the direction of Fontana. Fontana wrote several works on scientific subjects, some of which have been translated into German and French. He also made discoveries relative to the application of carbonic acid, and different sorts of gas. He was buried in the church of Santa Croce by the side of Galileo and Viviani.

FONTANA, Lavinia, Italian portrait- painiter, daughter of Prospero Fontana : b. Bologna, 1552; d. Rome, 1614. She received her early instruction from her father, but gradually adopted the Caraccesque style with quasi-Venetian coloring. She was greatly em¬ ployed by the ladies of Bologna, and, going to Rome, painted the portraits of many illustrious personages, being under the patronage of the Buoncampagni, of which Gregory XIII was

the most powerful member. Her principal works are a Venus in the Museum of Berlin; ˆVirgin lifting a Veil from the Infant Christ,' in the Escorial, Madrid; and (The Queen of Sheba visiting Solomon. ' Her own portrait was perhaps her masterpiece. It belongs to the. counts Zappi of Imola, the family into which she married. She was elected member of the Academy of Rome.

FONTANE, Marius, French writer and administrator : b. Marseilles, 4 Sept. 1838. He met Ferdinand de Lesseps in the Orient and became his secretary, shortly afterward being appointed chief of exploitation and secretary of the Suez Canal Company and later adminis¬ trator and member of the Committee of Di¬ rection of the Panama Canal Company. He was implicated with the other officers in the downfall of that company, was condemned in 1893 to two years' imprisonment, but this ver¬ dict was set aside on appeal, and after another trial he was acquitted. Among his works are (Les Marchands de Femmes) (1863); Con¬ fidences de la vingtieme annee' (1863) ; (Selim l'egorgeur' (1865); (Zara la rebelled (1866); (La Guerre d'Amerique' (1866) ; (Le Canal maritime de Suez> (1869); (Essais de poesie vedique' (1876) ; (L'Histoire universelle) (Vol. I, 1881, Vol. X, 1899).

FONTANE, Theodor, German novelist: b. Neuruppin, Prussia, 30 Dec. 1819; d. Berlin, 20 Sept. 1898. He was of French Huguenot descent, but few writers have limited them¬ selves with such affectionate single-mindedness to subjects connected with German life. He prepared at first for the career of an apothe¬ cary, hoping to take over his father's shop, but came into contact with literary men in Berlin, who inspired him with a desire to take up a literary occupation. He visited England several times (1844, 1852-60) and became inti¬ mately acquainted with the social and political conditions of that country, concerning which he wrote reports for the Prussian government. On his final return to Germany he became an editor of the Preussische Zeitung (better known as the Kreuz- Zeitung ; then as now the organ of the agrarian Junker class) until 1870, when he

accompanied the troops invading France and was taken prisoner by the French. After his return to Germany, he was dramatic critic for the V ossische Zeitung until 1889. It is particularly interesting to note, in con¬ nection with the last period of Fontane's life, that it displays a greater and better literary activity than his earlier years, and that he re¬ tained a faculty for understanding younger men and rejoicing in new literary forms. Thus he hails with prophetic appreciation the rising naturalistic school in German novel and drama, and finds himself regarded, perhaps even against his will, as a sort of party leader of the younger literary generation, of which Ger¬ hart Hauptmann is the leading spirit (1884-89). Fontane's (Wanderungen durch die Mark Brandenburg' (1862-81) are a series of travel studies of the province of Brandenburg, Prus¬ sia, in which he displays a thorough sense of landscape, milieu and provincial types, but his more enduring contribution is in a few of the historical and contemporary novels of realistic tendency produced in his later years.. (Grete Minde' and (Schach von Wuthenow) are

psychological romances taken from the history of Brandenburg, while (L'Adultera,' Hrrungen Wirrungen,' (Effi Briest,' (Stine,' (Cecile' represent his most successful stories of modern city and country life, usually of the upper classes, in Germany. His (Works' (22 vols., Berlin 1905-11), include much autobiographical matter, as well as letters and literary studies. Erich Schmidt's (Charakteristiken' has an au¬ thoritative article on Fontane.

Jacob Wittmer Hartmann, Assistant Professor of German Language and Literature, College of the City of New York.

FONTANEL, the soft spots on the heads of newly-born infants. Usually four such spots are discernable on the skull, the anterior or great fontanel, the posterior, the sphenoidal and the mastoidal. Of these all but the first close within a few months after birth. The an¬ terior or great fontanel closes about one year after birth, but in some cases persists during the second year of life. At one time the term was used to denote an artificial ulcer, caused by practitioners under the mistaken idea that the resultant pus drained away the disease from an¬ other part of the body.

FONTANES, Louis, Marquis de, French writer: b. Niort, Poitou, 6 March 1757 ; d. Paris, 17 March 1821. He went in 1777 to Paris, where he acquired a reputation by his poems (Le Cri de mon Cceur' (1778) ; (Le Verger' (1788) ; (L'Essai sur l'Astronomie' (1789), and (L'Epitre sur l'Edit en Faveur des Non-Catholiques' (1789). He also wrote a metrical translation of Pope's (Essay on Man' (1783). In 1802 he was made a member and in 1804 president of the legislative body. His admiration of Napoleon was great; and his oratorical talents were often employed in eulogizing the emperor's acts. In 1810 he entered the Senate, and passing

on the fall of Napoleon into the service of the Bourbons, was raised to the peerage by Louis XVIII. His writings, prose and poetic, which are regarded as models of elegance and correctness, were edited by Sainte-Beuve in two volumes in 1837, with a critical and biographical memoir.

FONTARABIA. See Fuenterrabia.

FONTENAY-LE-COMTE, font'na'le- kont', France, capital of an arrondissement in the department of Vendee, 30 miles northeast of La Rochelle, on the Vendee River. It con¬ tains two ancient churches and many old houses, a public fountain in Renaissance style, from which the town is named. Its industries in¬ clude the manufacture of felt hats, oil, soap, flour, leather, lumber, etc. It has a good trade in horses, mules, grain, lumber, etc. The town has had a continuous existence from Gallic times. In 1360 it was ceded to the English but was retaken in 1372 by Du Guesclin. It suffered greatly in the religious struggles of the 16th century, was dismantled in 1621 and was occupied by the Republicans and Vendean insurgents in 1793. It was the capital of Ven¬ dee from 1790 to 1806. Pop. 10,379.

FONTENELLE, font-nel, Bernard le Bovier de, French poet and miscellaneous writer: b. Rouen, 11 Feb. 1657; d. Paris, 9 Jan. 1757. Although he lived to the age of nearly 100 years and retained till his death a remark¬ able degree of activity, he came into the world

so weak that it was not thought possible that he could survive. In 1674 he went to Paris and soon became known by his poetical effusions and learned works. Before the age of 20 he had assisted in the composition of the operas of

FONTENOY, font -nwa, Battle of, one of

the most famous battles in the war of the Austrian succession. It was fought at a small village of the same name, in western Belgium. Here 11 May 1745, the French under Marshal Saxe defeated the Allies under the Duke of Cumberland, with very heavy loss on both sides.

FONTEVRAULT, < fon'te-vrd («Fons Ebraldi®), France, town in the department of Maine-et-Loire, 10 miles southeast of Saumur. Its interest centres in its abbey, which for over a century has been abused as a place of deten¬ tion for convicts. In a chapel are effigies of Henry II of England and of Eleanor of Guienne, of Richard I of England and of Isa¬ bella of

Angouleme, wife of John of England. Details and diagrams pf this famed abbey are found in Viollet-le-Duc, (Dictionnaire de 1' architecture. > Pop. 2,248. Consult Bosseboeuf, (Fontevrault, son histoire, et ses monuments) (Tours 1890) and Edouard, (Fontevrault et ses monuments) (2 vols., Paris 1875).

FONTEVRAULT, Order of, a branch of the Benedictine order of monks; so named from the place in France where the first monastery of the sect was erected. The order was started in the 12th century by Robert d'Abrissel, who brought monks and nuns under one roof and placed them under the government of a female, because Jesus placed John in subjection to the Virgin Mary, saying : (

FONVIELLE, fdn'vyel', Wilfrid de,

French aeronaut and author: b. Paris, 1824; d. 1914. In his early career he taught mathe¬ matics, but becoming interested in aeronautics about 1858, thereafter made several ascents with Tissandier. In 1870, during the siege of Paris, he escaped from the city in a balloon and went to London, where he lectured on republican in¬ stitutions. He published (L'Homme fossile (1865) ; (Les merveilles du monde invisible) (1866); (Eclairs et tonnerres) (1867; English trans.) ; L'Astronomie moderne) (1868); ˆven¬ tures aeriennes) (1876) ; (La prevision du temps> (1879) ; (Histoire de la lune) (1886) ; (Mort de faim) (1886). Consult ˆTravels in the Air* (London 1871). Containing an inter¬*

esting account of Fonvielle's exploits as an aeronaut.

FOOCHOW, foo-chow', or FU-CHAU,

China, capital of the province of Fu-Kien, in a plain surrounded by an amphitheatre of hills, on the left bank of the Min, 125 miles north¬ east of Amoy. It consists of the town proper, surrounded by walls and of extensive suburbs, which, stretching along both sides of the river, communicate by a stone bridge. The walls, 30 feet high and 12 feet wide at top, are over¬ grown with grass, and the gates, seven in num¬ ber, are overlooked by high towers. The streets are extremely dirty, and the lines of shops, crowded with goods or with workmen in the act of making them, make the whole place look like one vast series of market-stalls. The prin¬ cipal edifices are the Ching-hwang Miau and several other temples. Foochow is one of the five ports thrown open by the Treaty of 1843. The trade is extensive ; there is a good drydock and adequate wharfage accommodation, but the navigation of the river from the sea to the harbor is difficult. Principal exports — timber, bamboo, fruits, tobacco, potash, paper and espe¬ cially for the foreign trade — tea. A disastrous cyclone visited the port on 15

Sept. 1909, in which over 1,000 persons lost their lives. In 1912 the net value of the trade of the port was $13,800,000, the Jmports from foreign countries totaling $5,460,000. In the same year 679 ves¬ sels entered with a total tonnage of 520,534. Pop., including suburbs, about 624,000.

FOOD. Commonly speaking, foods are those substances eaten or drunk for the build¬ ing up and maintenance of the human body, and to supply energy for its activities. In the more exact scientific sense, only those constit¬ uents of the foods consumed which are actually assimilated are considered foods : the non- assimilable constituents being regarded as waste. Some scientific writers classify air as a food, but generally the term is limited to the sub¬ stances taken into the stomach in eating and drinking.

The processes of assimilation are discussed in the article Nutrition, and the scientific selec¬ tion of foods for specific purposes in the article Dietetics.

There have been several different classifica¬ tions of foods, from various bases. The most practical seems to be that which is used in the study of Nutrition and Dietetics. This group¬ ing is first broadly into Inorganic and Organic foods, referring to their origin in nature.

The inorganic foods are : water, and the mineral salts. Water, indeed, may be regarded as the most important of all foods, as it con¬ stitutes nearly 70 per cent of the human body, and is an absolute necessity in the continuance of the processes which maintain the body. The average amount of water consumed per day is about four pounds, much more than the dry weight of all the other foods combined.

Of the mineral salts, common salt (sodium chloride) is the one taken in largest quantity, and the only one eaten in its natural state. Other mineral constituents of ordinary foods, which are essential in the body economy, are lime, phosphorus, iron, potash, magnesia and sulphur ; and in much smaller quantities, iodine, fluorine and silica.

The organic foods are subdivided into three

general sections': (1) carbonaceous foods, in which carbon is the principal element; (2) nitrogenous foods, in which nitrogen is the element of chief importance; and (3) carbo- nitrogenous foods, in which both carbon and nitrogen are contained in notable proportions.

Carbonaceous foods include starches, sugars, vegetables, fruits and fats. Nitrogenous foods include lean meats and eggs. Carbo-nitrogenous foods include the cereals, leguminous seeds (as peas, beans, lentils, etc.) milk and its deriva¬ tives and nuts.

The pure starch foods in common use are cornstarch, tapioca, sago and arrowroot.

The sweet sugars are derived from the juices of the sugar-cane and the sugar beet, and the sap of some varieties of the maple. The sweet¬ less sugar known as corn syrup, or glucose, is obtained from the starch of corn by chemical process.

Vegetables fall naturally into two groups: the roots and tubers, in which the food ma¬ terial is stored in a more or less enduring form ; and the so-called ((green® vegetables, which are perishable, and must be consumed while fresh.

In the first group will be sweet potatoes, white potatoes, parsnips, onions, beets, turnips and carrots. The second group will contain cabbage, cauliflower, the several kinds of ((sprouts,® green peas and green beans, spinach, asparagus, rhubarb, etc. With these are usually grouped squashes, tomatoes and cucumbers, which, strictly speaking, are fruits, though served as vegetables.

The typical fruits contain more or less sugar, and the valued fruit acids, and besides, a con¬ siderable proportion of starchy matters, as in the case of the banana. In the common dried fruits — dates, figs, raisins and prunes, the car¬ bonaceous content is very high.

The fats, though classed with the carbo¬ naceous foods, have so small a proportion of oxygen (as compared with the others) that they are sometimes put in a class by themselves, and called hydrocarbons. Besides the fats of the various meats, this group includes butter, cream, olive oil, cottonseed oil, cocoa and palm oils, and even cod liver oil, to be regarded as a food rather than a medicine.*

The nitrogenous foods are chiefly the flesh of animals, birds, fish, shellfish, etc., and eggs. With these also belong the meat extracts and similar preparations.

The carbo-nitrogenous group includes the grains — wheat, oats, rice, etc. — and the flours, meals and special preparations made from them, including breads and crackers. Green corn be¬ longs in this group, and also dried peas, beans and lentils and peanuts. All sorts of nuts are also included, though the nitrogen content of the chestnut and coconut is so low

as almost to place them with the carbonaceous foods. Milk is put into this class because of its casein. This substance in the form of cheese is one of the most valued of the carbo-nitrogenous class, as, besides the nitrogen, it contains a large proportion of fat.

Among the liquid foods, or beverages, prep¬ arations of tea and coffee are to be classed as stimulants rather than foods. Their food value is nearly all owing to the sugar and milk added to them. Chocolate and cocoa, however, possess large food values with a notable nitrogen con¬ tent. Other articles of food are the condiments,

spices and sweet herbs, which, while they have some small tood value, are useful chiefly in rendering other foods more palatable. For an intimate study of the food question see the articles Dietetics, and Nutrition of Man.

Bibliography. — Bailey, (Source, Chemistry and Use of Food Products) (1914) ; Carpenter, (Foods and their Uses) (1908); Carrington, (The Natural Food of Man> (1912) ; Chris¬ tian, (Uncooked Foods and How To Use Them (1904); Forward, (The Food of the Future) (1904) ; Greer, (Food: What It Is and What It Does) (1915) ; Sherman, (Food Products) (1914); Snyder, (Human Foods) (1910); Vulte and Vanderbilt, (Food Industries) (1914).*

FOOD, Adulteration of. The first pro¬ tective food law on record was English and bears date of 1203. It was designed to restrain dishonest British bakers from preying upon the public. A few years later butchers, brewers and wine makers were added to those needing legal restraint against fraudulent adulterations. At that time the utmost publicity was given to the offense, the culprit being hauled in a filthy wagon throughout the city or town to receive the execrations of the populace. And, in some cases, at the end of his ride he was placed in the pillory, where, doubtless, the rabble saw to it that a due portion of contempt should be meted out to him. Subsequently, hardened of¬ fenders were punished by the destruction of their shops, and banishment from the scenes of their nefarious labors. Nevertheless, the prac¬ tice of adulterating food continued, and even increased, until nearly every line of standard food was the subject of a special law — a con¬ dition indicating that food adulteration was rife.

In Germany, as early as 1390 wine sellers were banished for selling <(false wine,® and some of them were branded, as evidence to every one that they were frauds.

In the early part of the 18th century the British government combated continuously the adulteration of teas, at first with large fines, and later with imprisonment. Coffee and beer also received special attention in the

prohibi¬ tory laws. About 1850 the London Lancet made a raid on the adulterators of foods, printing the charges openly with the names of the offend¬ ing firms. From this crusade grew the British ((Adulteration of Food and Drink Act® of 1860, the first comprehensive attack upon food adulteration made in the name of the public.

One serious defect in this law was the shield¬

ing of the offender from publicity until the second conviction, a leniency which robbed the law of much of its power for protection. Another defect, and a fatal one, placed the penalty at <(not to exceed $25,® which, of course, an active offender would cheerfully spare from his ill-gotten gains for the privilege of cheat¬ ing the uneducated public. The continued suc¬ cess of the adulterators led to the passage in

1872 of the (

Act® which raised the penalty to a fine not ex¬ ceeding $250 for the first offense, and imprison¬ ment for the second. This seems to have been entirely too stringent for the fraudulent food manufacturers, for three years later it was superseded by the <(Sale of Food and Drugs Act® of 1875. This act specifically forbids the selling to a purchaser <(any article of food or any drug which is not of the nature demanded

by the purchaser® under penalty of not more than $100 fine. A following section of the law throws the burden largely upon the vigilance and intelligence of the purchaser by providing that there shall be no liability under the act if the adulterations are not made fraudulently, that is, to increase the weight or bulk, or to conceal inferior quality, and provided that the customer receives notice by a label distinctly written or printed that the article is adulter¬ ated. A placard hung upon a wall in the store where the adulterated food was sold was ad¬ judged sufficient legal notice, whether the pur¬ chaser read it or not. The burden of reading such notice was placed on the purchaser, and the adulteration of food was permitted on that basis. The warfare between the food adultera¬ tors and the agents of the people (inspectors) went on without cessation. The percentage of adulterations had been reduced from 19.2 in 1877 to 10.3 per cent in 1885, but the number of analyses had increased by 300 per cent, so that the actual number of adulterations found by the inspectors had nearly doubled. A special committee appointed to investigate the opera¬ tion of the food law reported that the penalty of a fine was insufficient to deter

adulterators, their profits being so enormous that they were willing to pay over and over again any fines imposed. It was therefore recommended that imprisonment should be made the penalty for the third offense. The committee's findings re¬ sulted in the ((Sale of Food and Drugs Act® of 1889. This, however, was not a new law, but merely an addition to the act of 1875. It still continued to be a "labelling® act, and not a pre¬ ventive of adulterations.

An outbreak in 1900 of a mysterious illness among beer drinkers turned out to be arsenical poisoning from the use in the beer of glucose made with sulphuric acid which had been ob¬ tained from iron pyrites — which is always arsenical unless specially purified. Investigation disclosed the fact that this same glucose was used in the manufacture of many common acids employed in preparing foods and medicines, and in jams, jellies, honey and candies.

In 1904, examinations of 84,678 samples of food articles revealed adulterations in 7,173 instances, a proportion of 8.5 per cent. Of all wines inspected, 17 per cent were adulterated; of spirits, 12 per cent; of milk, 11 per cent; of cocoa, 9 per cent; of oleomargarine, 7 per cent; of beer, 7 per cent; of coffee, 6 per cent; of butter, 6 per cent; of confectionery and jams, 5 per cent; of sugar, 5 per cent; of mustard, 5 per cent. At the other end of the list were bread and lard with one-fifth of 1 per cent.

In the United States public opinion was very slow in crystallizing into the Federal "Food and Drugs Act® of 30 June 1906. Several previous attempts had been made to get such a law upon the statute books, but powerful inter¬ ests had succeeded in preventing it. As early as 1895 the State of Michigan had passed a very complete pure food law along practically the line of the later Federal law. Wisconsin, in 1898, had passed a still better law, and these laws with some few modifications are still in force in these States. Massachusetts in 1902, and Minnesota in 1905, antedated the Federal law with effective food laws of their own. These State laws in fact established the basis of the National law.

At the time of the passage of the law it was vigorously opposed by patent medicine manu¬ facturers, rectifiers of spirituous liquors, whole¬ sale grocers and druggists — a vast army who were flourishing upon practices forbidden by the new law. When it had actually become the law, the objectors at once took steps to prevent its thorough enforcement. In the act it was stipulated that the Bureau of Chemistry should decide cases of alleged adulteration. This provision was practically annulled by the arbi¬ trary appointment of a board of food and drug inspection whose findings were made binding upon the Bureau of Chemistry. The personnel of this board was influenced by the opponents of the law, and it immediately

espoused the interests of the manufacturers and not those of the public. The adulterations continued in full blast, almost as before.

The Federal Food and Drugs Act operates directly in the District of Columbia and the Territories, and upon interstate commerce and imports, but not at all upon the vast bulk of intrastate traffic in foods. The State laws alone cover the intrastate trade, and at the time of the passage of the national food law such State laws as there were along this line were lack¬ ing in uniformity. Within a year or two most of the States passed food law's following gen¬ erally the national law, and unfortunately, in most cases, repeating its inadequacies. How¬ ever, not a few of them have added many protective restrictions and prohibitions not existing in the national law to the very great benefit of those commonwealths.

The effect of the Federal law and the State laws which closely imitate it is twofold: (1) it prohibits the manufacture and sale of harm¬ ful foods, and of all foods in which harmful substances have, for any reason, been placed ; (2) it compels the truthful labelling of foods which are adulterated with harmless substances. The effect of the latter section has been to make the law primarily a labelling law, for all of the misbranding and most of the adultera¬ tions made statutory offenses under the law can be corrected and the penalties escaped by cautious labelling. The Secretary of Agricul¬ ture in his report for 1909 says: <((Adulteration > is an ugly word in the popular mind. It carries with it the idea that there is grave danger to the public health when adulterated foods are consumed. This may or may not be true. Under section 7 of the Food and Drugs Act, adulterations are of two kinds, namely, (1) those which may be injurious to health, and (2) those which are not unwholesome, but which debase the character or value of the food. Adulteration of the latter type wholly disappears when the foods are properly branded so that the consumer knows exactly what is being purchased.® The burden of selecting the food which is pure and wholesome and eco¬ nomical is thus made to depend altogether upon the education of the purchaser. The ignorant are the ones who will suffer, and they are the ones who need the protection which, however, the law gives to the manufacturers. For ex¬ ample, a jar of food labelled (

may be "debased in character and value® but, in the eye of the law as explained by the Secretary who enforces it, the adulteration "wholly disappears® with the proper label.

The arrangements for the administration of the law are all that can be

desired. Manu¬ facturing in disobedience of the provisions of the law is made a crime. The penalty for a first offense is a fine not to exceed $500, or imprisonment for one year, or both; for a second offense, a fine of not less than $1,000, or imprisonment for one year, or both. For offenders outside of the manufacturing indus¬ try the penalties are less. In addition, the adulterated or misbranded goods are subject to libel proceedings, and may be seized and destroyed. The Department of Justice has charge of prosecutions, and the United States district attorneys everywhere are required to act upon the presentation of satisfactory evi¬ dence. The judgments of the courts are given publicity by the Department of Agriculture. In the year ending 30 June 1915 the Depart¬ ment of Agriculture transferred 767 cases of infraction of the Food and Drugs Act to the Department of Justice for prosecution: 276 for criminal proceedings and 491 in which seizures were recommended. During the year there were terminated (including 492 cases com¬ ing over from the preceding year) 501 criminal cases and 457 civil cases. In 220 of these, fines were imposed ranging from $1 up to $400. The majority of the fines were small, more than half being $25 or less: there were but 15 fines above $100. The total amount collected was $10,831. Decrees of condemnation and for¬ feiture were entered in 387 cases; in 209 the goods were actually destroyed ; in 140 they were released on bond to be made over to con¬ form to the law ; and in 30 cases they were sold on account of the government for uses not contrary to law.

The laws of many of the States which follow in the main the Federal law are much more rigid, and a large proportion of goods salable under the Federal law cannot be sold in those States. In Alabama, for example, any foreign matter mixed with sugar syrup or mo¬ lasses makes it unsalable in the State, no matter how it is labelled; in California, truthful label¬ ling does not exempt an adulterated article from the penalties of the law; in Colorado, wines, beers and liquors containing any ingre¬ dient not normal cannot be sold however labelled ; Georgia forbids absolutely the sale of bleached flour; in Michigan, maple products adulterated in any way cannot use the word "Maple® on the label; in New York, maple syrup and maple sugar and honey may not be sold if adulterated, no matter if so announced on the label ; in Pennsylvania such preparations as "Coffee Com¬ pound® may not be sold ; the law says it is not coffee if compounded with another substance; in Rhode Island adulterated or impure spiritu¬ ous liquors may not be sold under any label ; in Wisconsin the prohibitions are many and in¬ flexible, and goods which may be sold freely in most of the other States are barred from Wis¬ consin trade. The State Food Department of Illinois calls the attention of the people of that State to the fact that while the Federal law forbids misrepresentation on the label, it does not require the labelling, except in a few in¬ stances. On the other hand, the Illinois law

requires that "every manufactured article of food and all foods sold in package form shall be branded with the true name of the article.® Maple sugar is instanced as an example. In other States such sugar is usually sold without a label and is generally heavily adulterated with glucose and cane sugar. In Illinois it must be labelled, and it cannot be sold as maple sugar unless bearing a label declaring its purity. The department warns the people of the State that "the consumer can protect himself by reading the label, and reading all of it, not only the prominent words.® A warning is also given that though the law is complied with when the words "Artificially Colored® are placed upon the label, at the same time a deception is prac¬ tised, as when green fruit is made to look like ripe, in preserves; when canned old peas are made to look like fresh; when catsup that has been made from over-ripe tomatoes is colored to look as if from new and freshly ripened fruit. Attention is also called to the trick of putting two labels on the same package, a small and inconspicuous truth-telling one on a side of the package where it is not readily noticed. The State of Wyoming requires that the full statement of contents shall be placed on the principal label. North Carolina meets this trickery by prohibiting the placing of two different labels on one package. Tennessee decides that inconspicuous type on a label is in itself an evasion of the law. In several of the States an exaggerated picture, or a name which closely resembles some well-known brand, is an attempt to deceive, and incurs the penalty therefor.

The widespread use of benzoate of soda as a preservative in certain kinds of foods had aroused so much question as to its harmfulness that upon passage of the law the Bureau of Chemistry under the direction of Dr. Harvey W. Wiley, its chief chemist, began an investi¬ gation to decide the matter. A so-called "poison squad® of healthy young men were fed with benzoate of soda in varying quantities for a period of several weeks. The most careful scientific watch was kept upon them, and de¬ tailed records were made at great length. The conclusion of the bureau was that benzoate of soda was a "deleterious substance® in the mean¬ ing of the law. Its use in foods was thereupon forbidden by the Secretary of Agriculture. The food manufacturers who were using it in im¬ mense quantities appealed from the decision of the Secretary of Agriculture direct to Presi¬ dent Roosevelt, who suspended the decision pending a report of the referee Board of Consulting Scientific Experts which he ap¬ pointed to make the examination. This board also conducted a series of experiments with a "poison squad® and brought in a report that in the small quantities used in preserving food benzoate of soda could not be proved injurious to health. The Secretary of Agriculture then issued a new ruling permitting the use of ben¬ zoate if the percentage used in the food was truthfully stated on the label. The other chemical substances claimed to be injurious to health were submitted to the same board after the Bureau of Chemistry had condemned

them. After two years the board decided against the use of saccharine, and after two more years against sulphate of copper in foods. In April 1914 the board reported that alum baking

powders were no more injurious than other baking powders. The question as to sulphur¬ ous acid and sulphites had not been decided up to 30 June 1915, and in all States whose food laws follow closely the Federal law, sausages and preserved meats may lawfully contain sulphites, and often in so large a per¬ centage as to be plainly evident to the taste. In some States, however, these preservatives are absolutely forbidden, in accordance with the adverse decision of the Bureau of Chem¬ istry, published in Bureau of Chemistry Circular 37. The controversy as to flour bleached by the so-called <(nitrate® process was taken to the United States Supreme Court, which held that this process could lawfully be used under the Food and Drugs Act until distinct proof was given that the flour so bleached was poisonous, or deleterious to health. Nevertheless, many States have specifically condemned this nitrated flour, and forbidden not only its sale, but also its manufacture within the State boundaries.

Under prevailing conditions, therefore, the market is full of foods lawfully adulterated because labelled correctly as to their compo¬ sition, and containing chemical preservatives lawfully permitted. It is incumbent upon the purchaser to read the labels, and decide to the best of his information whether he shall buy the goods offered at the prices asked. Some of the allowed adulterations are detailed below.

In canned, chopped or devilled meats, starch may be added to give bulk and weight, and sulphite or benzoate of soda as a preservative.

Lard may be adulterated with beef fat to which has been added sufficient cottonseed oil to give it the same melting point as lard. This adulteration is permitted if the mixture is called (

Beef extract is adulterated by an inordinate quantity of salt. Some of the (

Cheese is adulterated either by the substitu¬ tion in whole or in part of some cheaper fat for the natural butter-fat of the milk: or by making the cheese of skimmed milk. The gov¬ ernment requires that at least 50 per cent of the water free substance of cheese shall be pure milk fat, but recognizes a variety of cheese as ftskim-milk cheese® under which title so-called cheese with a cheap fat filling may be legally sold. The retail purchaser has no way of finding out just what he is getting when he buys

((cheese.®

Flours are more or less adulterated with the fine flour of corn. This is true particularly of package flours, and especially of buckwheat flour, which sometimes has also an admixture of rye flour. The package is generally labelled truthfully, in which case the adulteration <(dis- appears.® Unfortunately the price is usually the same as for pure buckwheat flour, and the purchaser has insufficient information upon which to decide what price is just. Rye flour is also adulterated with wheat and corn flour.

Baking powders are largely adulterated with starches or flours so that in several of the States the law requires a certain produc¬ tion of leavening gas per pound, below which the powder is condemned as adulterated.

Canned fruits are rarely adulterated except

by thickening the juice with glucose. The saccharin formerly used for sweetening in place of sugar is now almost universally for¬ bidden.

Fruit syrups are often preserved with ben¬ zoic acid, a wholly unnecessary addition. A placard hung upon the soda fountain where such syrups are used makes them lawful.

Jams and jellies have generally large per¬ centages of glucose, a judiciously chosen coloring matter and an artificial flavor. The basis of most of these preparations is (

Olive oil in any grade but the best is adul¬ terated with cottonseed oil, which imparts to the olive oil neither flavor nor unusual color.

Syrups are adulterated with glucose which too often contains sulphurous acid used in bleaching it, and probably also sulphate and chloride of lime. Molasses which has been bleached with zinc and acids may carry salts of lead, tin and zinc which are distinctly pernicious.

Honey is so readily adulterated that the wonder must be that it is ever found pure. The fact is, however, that it is rarely adul¬ terated. When it is, the chief adulterant used is invert sugar, prepared by treating cane sugar with a dilute acid. The high price of honey offers a large margin of profit. Honey in the comb is assumed to be necessarily pure, but it is a well-known fact to beekeepers that bees will store almost any kind of a sweet liquid in any empty comb they have on hand. Strained honey, therefore, is more likely to be pure than is comb honey, if the label claims purity.

Mincemeat, pie-fillers and similar substances offer a wide field for adulteration, as they have no particular formula of manufacture. Chem¬

ical preservatives and colors are the question¬ able adulterants. The law permits benzoate and certain coal-tar colors, if the label so states.

It is to be observed that while the foregoing specifications apply under the United States law and under most of the State laws there are some States in which the laws are much more critical, and the protection of the con¬ sumer far more efficient. See Adulteration; Foods, Recent Legislation Respecting.

Richard Ferris,

Editorial Staff of The Americana.

FOOD CONTROL LAW. The much in¬ creased demand for food from abroad as a re¬ sult of the Great War made it imperative upon the United States, upon its entry into the war, to safeguard its vast food supplies, that they might be sufficient to provide not only for the home consumption and for our soldiers abroad, but for any and all shortages on the part of our allies. The methods of food control in

France and Great Britain were, therefore, thoroughly studied, and their experience drawn upon, that this nation might legislate most wisely on so important a subject. The prin¬ ciples of food control in Great Britain are well expressed in the words of Lord Rhondda, the food controller: «My aim is to safeguard the interests of the consumer and to do away with profiteering altogether. The framework of our machinery is formed on the civil service. They are the administrators, but we secure the best available business men to advise them, as well as expert committees dealing with every food commodity.®

After thorough study of the food problem, the United States Congress passed the National Food Control Law, which became operative 10 Aug. 1917. The act set forth that, owing to the exigencies of war, the President was au¬ thorized to make regulations for carrying out a long set of provisions, giving him very broad powers to cover all emergencies. Any¬ thing approximating bribery or influencing of officials purchasing food supplies was made punishable by not over $10,000 fine and five years' imprisonment. The destruction of food, wasteful practices, methods of

limiting out¬ put or exacting of excessive prices was pro¬ hibited. The President was authorized to license parties engaged in food storage, dis¬ tribution and sale, and to prohibit others from engaging in such work; licenses to be revo¬ cable for bad conduct. This licensing did not apply to farmers and retailers.

To stop hoarding of necessities methods were indicated, and violations made punishable by fine not exceeding $5,000 and two years' imprisonment. It was also provided that any District Court might seize and sell such hoarded food, returning the surplus over costs to the owners. Conspiracy to interfere with trans¬ portation, handling and distributing necessities upon conviction called for a possible $10,000 fine and two years in prison. The President was authorized from time to time to requisition foods and fuels for the army and navy and common defense, under stated restrictions; also when necessary to requisition and take over for the use of the government any fac¬ tory, packing-house, pipe-line, mine, plant, etc., essential for national security and defense, providing means of payment for same.

The broadest powers were extended to the President in dealing with excessive and unjust food prices, this section being particularly aimed at control of exchanges, clearing-houses and boards of trade. Violations carried a penalty not exceeding $10,000 and four years' imprisonment.

A long section of the law was devoted to wheat prices, and the President was empowered to fix a guaranteed price to stimulate produc¬ tion. Regulations were inserted against the use of foods, fruits and feeds for distillation into beverages, the extent of such limitation being largely left to the President's discretion. He was also authorized to commandeer all dis¬ tilled liquors needed for redistillation in the manufacture of munitions. Not over $1,000 fine and a year's imprisonment was the penalty for violation of this clause. For carrying out the provisions of the Food Control Law $2,-500,000 was appropriated, and the further sum of $150,000,000 under certain provisions safe- voi.. it — 28

guarding the disbursements, one of which was a detailed report to Congress on each first of January.

The Food Control Law stipulates that its provisions shall end with the war with Ger¬ many, and that the exact date of termination shall be determined and announced by the President. The act goes beyond mere food, covering very completely the production and distribution of coal and coke, empowering the fixing of prices and determination of who is and who is not entitled to use coal, and per¬ mitting the taking over of mines or methods of distribution, the looking into the books and records of mine

operators, and the fixing of prices, both for producers and dealers. The penalty for asking, demanding or receiving a higher price than fixed by the government, is fixed at not over $5,000 fine and two years' imprisonment. The act concludes with em¬ phasized clauses for restricting employees and officials of corporations for acts tending to limit the supply of foods and fuels, providing not over $5,000 fine and two years' prison penalty for violation. It specifically exempts farmers in retaining their own crops so far as needed for their family use. A separate clause of the law appropriates $10,000,000 for the purchase of nitrate of soda in 1917 and 1918, this added clause being evidently an afterthought or rider.

Immediately after the passage and approval of the law, the President appointed Herbert Hoover United States food administrator, and plans were announced for the control of wheat, flour and bread. The minimum price for wheat was set at $2 for the 1918 harvest, and as regulated by the committee wheat sold at varying prices in different cities ; in Kansas City the price was $2.15; in Chicago, $2.20; in Baltimore and Philadelphia, $2.29; in New York, $2.30. Proprietors of grain elevators and mills were promptly licensed ; grain exchanges were asked to suspend operations in ® futures.® To conserve the wheat, the patriotism of the people was appealed to, and (

FOOD OF PLANTS. See Plant Foods.

FOOD-POISONING, a form of poison¬ ing from food, which in times past was thought

to be extremely common, but at the present time is known to occur but rarely. One of the most important features in food-poisoning is individual idiosyncrasy. It is well known that certain foods, such as strawberries and toma¬ toes, affect susceptible people uncomfortably, but instances of this are rare, and are often of mental origin. Epidemics of food-poisoning have occurred, as when, for instance, a baker has used a yellow coloring matter in his cake to obviate the necessity of using eggs, which coloring matter was largely made up of lead.

Food-poisoning may be classified under three main types: (1) Poisoning by means of metals ; (2) poisoning by means of animal

parasites; (3) poisoning by means of plant parasites, bacteria and fungi and allied organ¬ isms. The metals which have been known to cause poisoning in food are particularly arsenic, lead, copper, antimony, tin and

zinc. During 1900 there was a widespread epidemic from poison by arsenic, in Manchester, England, and neighboring cities, from the drinking of beer. On investigation it was found that the arseni¬ cal poisoning, which in some cases had proved fatal, was due to the glucose used in the manu¬ facture of the beer. This glucose had^ been prepared by a sulphuric acid which had in turn been made from iron pyrites containing large amounts of arsenic. It entered into the glu¬ cose, and thus became an ingredient of the beer. This epidemic was extremely severe, thousands of cases of arsenical poisoning having been ob¬ served. Lead-poisoning very frequently fol¬ lows the use of water which has been conveyed through new lead pipes. It may also result from the use of leaden coloring matters used in bread, biscuit, cake, etc. Zinc and copper poi¬ soning have resulted from the use of canned vegetables, copper frequently being used to im¬ part a good color to the vegetable.

Food-poisoning resulting from animal para¬ sites or from animal poisons are of extreme in¬ terest. Trichinosis from the flesh of hogs, which has been imported in pork and pork sausages, while rare in this country, is common among those people who habitually eat their sausages without thorough cooking. A form of poison results from the eating of mussels which have developed the ptomaine mytilotoxine, and similar forms of poisoning from decom¬ position products in meat have been observed. A special form of meat-poisoning, botulism (q.v.), is extremely common in certain coun¬ tries. It seems to be due to the development of the Bacillus botulinus. This form of poi¬ soning has been observed in those who have eaten ham. The symptoms are late in onset; from 24 to 36 hours after eating gastric pains with frequent vomiting occur ; and constipation is at first obstinate. Practically all the cases of botulism have shown eye-symptoms. There is disturbance of vision, the eyes become fogged, the lids droop, people see double, and there is dilatation of the pupils, while burning thirst and constriction of the throat are frequent signs. Extreme muscular weakness with per¬ haps loss of ability to speak, or of power to empty the bladder, may develop.

Other forms of food-poisoning have been described resulting from eating sausages and other meats which were diseased at the time of killing, or which have become tainted after¬ ward, and a number of poisonous bacteria have

been isolated. Bacillus enteritidis, Bacillus morbificans, Bacillus breslaviensis, Bacillus Friedebergensis, have been some of the forms that have been obtained in poisonous meat. Fish-poisons are not unknown, and in Russia and Switzerland and the West Indies a num¬ ber of cases have been described as resulting from fish-poisoning. A peculiar type of poison¬ ing from milk, ice-cream, cream-puffs, frozen custards and cheeses is

known. This poison seems to be due to the presence of a toxic sub¬ stance which has been named by Vaughan of Ann Arbor, Mich., as tyrotoxicon.

The most important general poisons from vegetable foods are those due to eating the poi¬ sonous mushrooms, and the grains affected by ergot and allied species. Thus ergotism as found in Russia, Spain, Italy and its close ally pellagra are types of this form of food-poison¬ ing. A well-known disease in eastern Japan and neighboring parts of Asia termed beriberi (q.v.), is thought to be due to poisonous rice. See Fungi; Mushroom; Ptomaines; Toxi¬ cology.

Through the vigilance of local boards of health, cases of ice-cream poisoning and sau¬ sage poisoning are now rare in the United States. Accidents, however, happen through prepared foods not being kept cold enough to prevent a putrefaction which cannot be noticed by any change of taste or odor.

FOOD PRESERVATION in a technical

sense relates to the processes adopted for the preservation of organic substances used as food, either animal or vegetable. It is gener¬ ally understood that the ˆspoiling® of foods and food materials is due to the activities of bacteria, and the various preservative processes are therefore contrived to prevent bacterial action. They may be considered under the fol¬ lowing heads: (1) Preservation by cold; (2) Preservation by drying; (3) Preservation by salting; (4) Preservation by smoking; (5) Preservation by sterilization by heat and the exclusion of air; (6) Preservation by chemical or antiseptic substances; (7) Preservation with sugar and with brandy, and by pickling with vinegar in the customary household processes.

1. Cold. — The application of cold for the preservation of meat and vegetables may now be conducted under modern methods of apply¬ ing this agent, at temperatures varying from 0° F. (— 18° C.) to 40° F. or more. In the large cold storage plants now established in many cities, in which the expansion of liquid ammo¬ nia is chiefly used for the production of vari¬ able degrees of cold, it is customary to provide several large compartments or rooms for the preservation of food in which different tem¬ peratures are maintained, fruit being kept at temperatures a little above the freezing point, and meats, fowl and especially fish at consid¬ erably lower temperatures.

In densely settled countries like England, where the land area is insufficient to produce the necessary amount of meat for the food of the people, frozen meat from other countries forms a considerable part of the food supply. If the meat is frozen before rigor mortis (ri¬ gidity following death)

supervenes the meat keeps well, but if it is frozen later it rapidly decomposes after thawing. Freezing arrests putrefaction and has a tendency to conceal the

odor of decomposition. Hence bad condition of frozen fish may not be detected until the heat necessary for cooking is applied. Meat which has been frozen is often unusually ten¬ der on account of the loosening of the inter¬ muscular tissue by freezing; bacteria can more readily penetrate into the interior of thawed meat, and bring about rapid decomposition. Frozen meat and fish, especially when thawed too suddenly, lack the flavor of fresh meat. Bacteria in general and especially those which are concerned in the production of putrefac¬ tion, seem to be endowed with extraordinary powers of resistance to the action of cold. Colemann and Mickendrick kept flesh six hours in hermetically sealed boxes at temper¬ atures from — 21° to — 202° F., but in every instance the flesh after being removed to a slightly warm temperature, though protected from infection, began to decompose in from 10 to 12 hours. But cold, though it may not de¬ stroy all micro-organisms, prevents the devel¬ opment of putrefactive bacteria. There are, however, certain bacteria which are capable of developing in frozen meat, and especially in that which is kept at about 32° F. Lafar attributes to this cause the unpleasant flavor sometimes acquired by meat which has been kept in a refrigerator for several days. This is confirmed by Popp, who says that the walls of such ice chambers when moist swarm with bacteria, which in his opinion produce the ob¬ jectionable flavor often developed in stored meat. The ordinary household refrigerator has been found ineffective, less than 20 per cent registering 45° F., the degree of cold required to preserve food. Of 100 pounds of ice placed in such refrigerators 80 pounds was consumed in cooling the air which leaked in.

The Detection of Freezing in Meat. — Mal- jean describes a method of detecting freezing in meat by microscopic examination of the blood of the meat. A drop of the blood is ex¬ pressed from the suspected meat upon a glass slide, covered with a thin glass, and examined as soon as possible to preclude solidification. The juice of fresh meat shows numerous red corpuscles of normal color and shape floating in a nearly colorless serum. But the corpus¬ cles of meat which has been frozen are more or less distorted in form and are completely decolorized, while the surrounding fluid is rela¬ tively dark in color. On placing a fragment of such meat in a test tube, containing some water, the liquid becomes colored more rapidly and intensely than in the case of fresh meat.

2. Drying. — This is one of the oldest and best known of the various processes of preser¬ vation, and is applied to both animal and vege¬ table products. By this means, beef and fish of many kinds, grapes, figs, apples, peaches, currants and many other kinds of fruit and several vegetables are annually preserved by drying, and are thus rendered suitable for transportation to distant markets, in conse¬ quence of great reduction in weight and bulk, as well as preservation from decay. The more rapidly the drying process is conducted the bet¬ ter. Drying is conducted in the open air by the aid of the sun's heat, or by artificial means. The curing of fish by drying constitutes an im¬ portant industry in most northern maritime countries, the principal edible fish employed for this purpose being cod and herring, of which

large numbers are dried in the fishing ports of the Atlantic coast north of Cape Cod, and in the British Isles and on the coast of Norway and Sweden. Fish are prepared for drying by the removal of the entrails, slitting them length¬ wise. They are then dried in the open air.

3. Salting. — Salting is one of the oldest and best-known methods of preserving meat and fish. The most common method of preserving meat, especially pork, is by placing the meat in casks in layers, with salt between. The salt withdraws water from the meat, and the brine thus formed penetrates the fibres of the meat. In Eckart's Munich quick-salting process, pork is impregnated under pressure with a 25 per cent solution of common salt for 24 hours and then smoked. It is claimed that by this process the loss consists, mainly, of only water and a little phosphoric acid, that the meat has a better flavor and that trichinae, if present, are com¬ pletely destroyed. As one of the results of salting meat is the removal of its natural color, it is customary to add a small quantity of salt¬ petre to counteract this effect. According to Lehmann, a small percentage only should be used on account of its harmful effect. A dose of five grams of this salt has caused severe ill¬ ness and eight grams has been known to cause death. The effect upon the human system of the continued use of meat containing saltpetre has not been determined by observation or ex¬ periment.

Influence of Salting upon Bacteria. — For¬ ster's experiments show that the streptococci of erysipelas and many other well-known bacteria can live for weeks and even months in salted meat. The bacilli of tuberculosis retain their virulence for more than two months, and while the bacteria of anthrax perish in less than a day, their spores retain their vitality for a much longer period.

Effect of Salting upon Flesh. — Salted meat is harder and more difficult of digestion than fresh meat. Voit shows by analysis that the nutritive value of meat is only slightly dimin¬ ished after 14 days' salting. He found the per¬

centage loss to be for water 10.4, organic matter 2.1, albumen 1.1, extractives 13.5, phosphoric acid 8.5. The amount of salt taken up by 1,000 grams of fresh meat was 43 grams. Polenske, on the contrary (Jahresbericht Nahr. u. Genuss- mittel 1891, p. 40), found that the meat, after

Fresh

herring

Salt

herring

Water .

80.7

46.2

Nitrogenous substances .

10.1

18.9

Fat .

7.1

16.9

Ash .

2.1

16.4

Salt .

14.0

being salted for three weeks, lost 7.7 per cent of its nitrogenous constituents, and 34.7 per cent of its phosphoric acid, and after three months and six months the loss was still greater. He therefore concluded that the meat was greatly altered in its nutritive character, and that it could not be used continuously without injurious effects. Salted pork constituted a very import¬ ant part of the food ration of the Union army in the Civil War, and when accompanied with

an abundant supply of fresh vegetables, it was considered a wholesome article of food. Ab¬ sence of the latter, however, was often the cause of serious illness. Strohmer gives the preced¬ ing analyses of fresh and salted herring.

Caviare. — This is the salted roe of tne stur¬ geon and other fish. It is prepared by washing the roe with salt water, leaving it i,n the brine for some time, pressing it, again treating it with salt water, passing it through a hair sieve, and finally packing it in salt. The most highly prized is the Astrakhan caviare, which is pre¬ pared at the mouth of the Volga. The follow¬ ing analyses of caviare are compiled from the works of Gobley and of Konig:

Caviare

Pressed

caviare

W ater .

43.89

30.89

Nitrogenous substances .

30.79

40.33

Fat .

15.66

18.90

N-free substances .

1.67

Ash .

8.09

9.88

j i N-substances .

54.89

58.36

The dry Jp .

24.02

27.35

substance] Nitrogen . . .

8.78

9.36

4. Smoking. — The preservative qualities im¬ parted to meat or fish by smoking are due partly to the drying action of heat, and partly to the antiseptic action of some of the sub¬ stances of which smoke is composed, namely, creosote, formaldehyde and pyroligneous acid. The smoke coagulates the albumen outside of the meat, and forms a protecting envelope. The best woods for the production of smoke for preserving are hickory, beech, birch and poplar, the conifers being unsuitable in consequence of the resin which they contain. There is no loss of nutriment, and Strohmer found that smoked meat is as digestible as fresh meat. Smoking may be conducted in two ways: (1) by slowly smoking the meat for 24 hours at 77° F., or in the case of sausages and fish at 158° F., and then for a short time at 212° F. ; (2) the meat may be placed directly in the hot smoke. Prod¬ ucts prepared by the slow process have been found to contain more micro-organisms than those made more rapidly. The smoking should be continuous and not intermittent. A substi¬ tute for smoking largely employed is dipping the meat three times into dilute pyroligneous acid, allowing it to dry off in between.

The following analyses of smoked and salted meats and fish are from the works of Strohmer and Konig:

Water

Nitrogen¬ ous sub¬ stances

Fat

Ash

Common

Salt

Ham .

Smoked beef .

Smoked herring . . American bacon .

Mackerel .

Salmon .

59.73

47.68

64.49

9.15

44.45

51.46

25.08 27.10 21.12 9.72 19. 17 24. 19

.

8.11 15.35 8.51 75 . 75 22.43 11.86

7.08

10.59

1.24

5.38

13.82

12.04

11.42

10.87

Action on Bacteria. — Serafini and Ungaro found that smoke acts energetically on pure cultures of bacteria, those of anthrax being

killed in two and one-half hours, and anthrax spores in 18 hours. Bacilli in the interior of the meat were not killed. Forster found the bacilli of tuberculosis still virulent in the inte¬ rior of meat after it had been salted and smoked.

During the process of salting and smoking the coloring matter of meat is changed, as shown by the spectroscope. Smoked ham and other meats have an alkaline reaction.

5. Preservation by Exclusion of Air After Sterilization by Heat. — In early times food was preserved to a limited extent by heating in earthen vessels, and sealing hermetically by such crude processes as were available. At the present day such methods have given place to preservation, either in tin cans or boxes or in glass. In the former instance food may be pre¬ served

for long periods by means of soldering and in the latter by means of tight-fitting joints and rubber rings. The latter method is not so much used in trade but is largely employed for household purposes. In the canning operations of the home, about one-fourth of a pound of sugar is added to the pound of fruit when it has been sufficiently cooked. The hot fruit and its juice is then poured into the glass jars up to within one-quarter of an inch from the top, the drip is carefully wiped away with a wet cloth and the rubber band is adjusted. One at a time the jars are filled full with briskly boiling water from a tea-kettle and the convex glass cover pressed down immediately into the steam¬ ing liquid and the jar clamped. The use of the boiling water not only conduces to cleanliness about the rubber ring, but, by its steam, expels the last particle of air which might supply oxygen for fermentation. The later and better method employed in home canning is that of first thoroughly sterilizing jars, tops and rubber rings; then filling with the fresh fruit and syrup, prepared from sugar and boiling water — the amount of sugar varying according to the variety of fruit; cover jars, but do not seal, and place in boiler of water. When fruit is cooked, remove jars, fill if need be with boiling water and seal. This process prevents fruit, as well as vegetables, which are also canned in this way, from cooking to pieces and does not tend to change the natural color.

In the United States the preservation of meats, poultry, fish, vegetables and fruits in this manner has become an important industry and branch of commerce, both domestic and inter¬ national. The canning of meats is conducted to a great extent in those cities where great slaughtering establishments are located. The canning of vegetables and fruits is carried on at places located in the great fruit-producing re¬ gions, while the fish canneries are mostly upon the rivers and in the seacoast towns of the Northeast and Northwest States and provinces where the fish are taken from the water. The cans filled with their contents are either heated in steam retorts or partially immersed in boil¬ ing water. A small hole is left in the cover and while still hot the hole is closed with a bit of solder. In a few days the cans are tested by tapping them with a wooden mallet or ham¬ mer. If the cap sinks slowly the can has been properly sealed, but if it is elastic, and springs back, it is rejected as a ˆswell-head.® In the preservation of corned beef, the cans are

>

pierced to allow the water and fat to escape, and are then soldered and placed in boiling water again for several hours.

Canned-roast-beef is largely used as a part of the army and navy ration, especially during the time of war, and upon the frontier. The method of preparation is thus described by Munson : ((The beef is first placed in water and maintained at a temperature of 204° F. until well cooked. It is then removed, trimmed and placed in cans, a little gelatine being added to bind the meat together. The cans are then sealed and either submerged in boiling brine or placed in superheated steam at 25 7° F. The steam in the can escapes through a puncture made in the top of the can which is immediately afterward closed with solder. The meat being sealed while hot, any unfilled portion of en¬ closed space becomes a partial vacuum when the cooling of the can condenses the steam ; consequently a good can of meat will usually present a concave appearance on the outside, from atmospheric pressure.

When a can is bulged it is bad — unless frozen — and should be rejected. Freezing causes a bulging of the ends of the cans with¬ out injury to their contents. The ends, after the contents are thawed, return to their former shape, unless this mishap has been several times repeated.

The process of canning involves the making and soldering of two punctured holes in the top of each can. The presence of three such holes is evidence that the can had been im¬ perfectly treated, and that it was reheated, the gas allowed to escape and the hole punctured for this purpose again sealed. The contents of such reheated cans are more likely to be of inferior quality than those of properly pre¬ pared cans. On this account the packers are careful to make the third puncture as incon¬ spicuous as possible, and often to conceal it entirely by making it on the side of the can near the top and pasting the label over it. This may usually be detected by running the finger around the rim of the can.

Sometimes newly-packed cans are so much swollen that reheating is not sufficient. In such cases the cans are opened, the contents sorted and the sound parts repacked in cans as before. The quality of such articles can only be deter¬ mined by opening the cans and examining their contents, which present an overcooked appear¬ ance. First-class canned goods have the name of the manufacturer and often that of the wholesale house through which they are sold upon the labels, while doubtful goods have a fictitious factory name and no dealer's name.

Canned peas are subject to great variations in quality. Dried peas are bought in large quantities, soaked, cooked and canned. Such articles can usually be recognized by their ap¬ pearance and taste on opening the cans. To such an extent is this done as to have led to legislation in some States requiring all such cans to be legibly marked ˆsoaked.®

French canned peas and beans are often colored with sulphate of copper, which im¬ proves their appearance, but not their taste. The sale of such articles is forbidden in some countries.

The Composition of Canned Meats. — Konig found the following results in samples of

canned meats and salmon. From 48 to 65 per cent of water, from 15 to 33.8 per cent of nitrogenous substances, from 0.2 to 21.6 per cent of fat and from 2.3 to 21 per cent of ash. Of the water-free substances, there were from 43 to 78 per cent of nitrogenous substances and from 0.3 to 43 of fat. The albuminous sub¬ stances were generally less than those of fresh meat, the actual figures varying in different kinds of meat, from 87.06 to 93.94 per cent as much as that of fresh meat.

The preservation of food by hermetic seal¬ ing in cans has, within the last half century, grown to be an important factor in the com¬ mercial and industrial development of the United States. Before 1795 drying and the use of salt and sugar were the only methods used to any extent in the preservation of food. Nicholas Appert, a Frenchman, stimulated by the offer of a reward for a mode of preserving food for use at sea in the navy, submitted to his government a treatise upon the hermetic sealing of all kinds of food. His principle, as set forth in this work, was practically the same as that which is now in use in canning, the exclusion of air and the application of heat for the purpose of sterilization. France first purchased his process and the industry soon spread to England and Ireland.

One of the first persons who introduced the industry into the United States was Ezra Dag¬ gett, who arrived in New York between 1815 and 1818. In 1819 he was engaged in the manu¬ facture of hermetically sealed goods, chiefly salmon, oysters and lobsters. William Under¬ wood arrived at New Orleans from London in 1817, having learned the trade of pickling and preserving with the house of Mackey & Com¬ pany. Not liking the climate of the South he .went from New Orleans to Boston, where he and Charles Mitchell introduced the same in¬ dustry, applying it to pickles, sauces, jams and fruit. Glass jars were at first used, but on ac¬ count of their expense and fragile nature, they were soon largely supplanted bv tin cans, which were introduced in 1825 by Thomas Kensett. The making of tin cans for this purpose be¬ came an important industry, various improve¬ ments being made from time to time in the processes of manufacture.

During the Civil War large quantities of canned meats, tomatoes and other vegetables and fruits were furnished both to the army and to the navy, and during the Spanish War the use of preserved meats treated with chemical antiseptics at one time threatened to become a government scandal.

According to the 1910 census there were in the United States in 1909 3,787 establishments for the canning and preserving of fruits and vegetables, fish and oysters, pickles, preserves, jellies and sauces. They employed an aggre¬ gate capital of $119,207,127. This was divided thus: $67,313,424 in fruit and vegetable can¬ ning; $18,796,180 in fish canning; $3,647,136 in oyster canning and $29,450,387 in making pick¬ les, preserves and sauces. The total number of wage-earners employed was 59,968, and the amount paid in wages $19,081,843. (These fig¬ ures and the following do not include those for the canning of meats in packing-houses, nor the canning of condensed and evaporated milk, for which separate statistics are not collected).

The States having the largest number of canning establishments were: New York, 790; Maryland, 468; Virginia, 325; Maine, 245; Cali¬ fornia, 196; Texas, 158; Indiana, 134; Illinois, 118; Ohio, 107; Michigan, 104; New Jersey, 84; Wisconsin, 83, and Delaware, 77.

The value of the products in the 10 leading States were: In California $32,914,829; in New York, $19,039,735; in Maryland, $13,709,449; in Washington, $9,595,387 ; in Pennsylvania, $9,484,- 026 ; in Indiana, $8,758,343 ; in Maine, $7,688,833 ; in Illinois, $7,619,586; in Massachusetts, $6,840,306; in Michigan, $4,970,911.

Of the whole number of establishments, 2,789 were devoted to fruit and vegetables, with a product valued at $91,439,161 ; 328 were de¬ voted to fish, with a product valued at $25,- 514,436; 70 to oysters, with a product valued at $2,813,857, and 580 to pickles, preserves and sauces, with a product valued at $37,333,747. The total production for the year was 32,752,- 469 cases of canned vegetables; 5,501,404 cases of fruit; 400,328,767 pounds of dried fruit; 235,418,713 pounds of oysters and fish; 39,- 814,989 pounds of smoked fish, and 128,539,299 pounds of salted fish.

The fruits and vegetables preserved in lar¬ gest values were: Tomatoes, $18,747,941 ; peas, $10,247,363; corn, $10,332,106; beans, $6,013,098; peaches, $3,753,698; pears, $1,833,214; apples, $1,898,720; apricots, $1,825,311; prunes, $5,130,- 412 ; raisins, $4,837,933 ; dried apples, $3,098,095.

The drying of fruit is confined chiefly to California, which has 84 per cent of this in¬ dustry. New York comes second in this re¬ spect, with 8 per

cent of the total number of pounds. Louisiana leads in the oyster canning, closely followed by Mississippi and South Caro¬ lina. Maryland leads in the canning of to¬ matoes, with Delaware second and New Jersey third ; Illinois leads in the canning of corn, with Iowa second and Ohio third ; Wisconsin leads in the canning of peas, with New York second; California leads in the canning of peaches and pears and New York in the can¬ ning of apples. Maine is the leading State in sardine canning.

Fish Canning and Preserving. — The num¬ ber of establishments devoted to fish canning and preserving in the United States in 1905 was 373, having increased from 110 in 1890. Of the total number in 1905, 141 were in Maine, 50 in Massachusetts, 63 in Alaska, 36 in Washington, 25 in Oregon and 13 in California. The value of products in 1905 was $26,377,210, of which Maine produced $5,055,091, Washington $3,187,- 149, Alaska $7,735,782 (or about the same amount paid Russia for this territory), and Oregon $2,577,746.

By far the greatest capital employed in any single city in fish preservation was in Glou¬ cester ($1,479,647), and secondly in Seattle, Wash., $336,620.

The canning of fish was introduced at East- port, Me., in 1843, lobsters and mackerel be¬ ing preserved in this manner. Establishments for salmon canning were started on the Co¬ lumbia River in 1866 and at Klawak, Old Sitka and Cook Inlet in Alaska in 1878 and 1882. The labor in these salmon canneries is chiefly per¬ formed by Chinese. The sardine canning of Maine is next in importance to the salmon can¬ ning of the Pacific coast. Sardine is a general

term applied to various small fishes, the best known being the young of the pilchard (French) and the young of the sea-herring (coast of Maine). The fish are first fried in oil and then placed in a can with oil. Olive oil or peanut oil are chiefly used in France for this purpose, and cottonseed oil in Maine.

The number of establishments engaged in oyster canning in the United States in 1905 was 69, of which 11 were in Maine, 7 in Florida and 9 in South Carolina ; $2,599,563 in capital was devoted to this industry, and the products were valued at $3,986,239, of which two-thirds were produced in Maryland. In canning oysters in large quantities, steam is employed ; the oysters, while in the shell, being put into a steam-tight box and submitted to the action of steam for 15 minutes, by which process they are more readily opened and made ready for canning.

The extent and importance of the food can¬ ning industry of the United

States may be esti¬ mated by the fact that 400,000 persons are em¬ ployed in the work of canning, manufacture of cans, packing boxes, etc. It would require 60,000 freight cars to transport a year's prod¬ uct; 750,000,000 cans, 2,000,000 boxes of tin plate for the cans and 30,000ˆ)00 wooden packing boxes.

6. Preservation by Chemical Substances.

— For many years it has been the custom to em¬ ploy salt, sugar, alcohol and saltpetre for the purpose of preserving meat and fish, and some of these substances for the preservation of fruits and vegetables, and no objection has been made to this practice ; but in more recent times, and since preserved food has come into more general use, the practice of using other sub¬ stances has also largely increased. The ques¬ tion whether the use of such articles for this purpose may be injurious to the health of the consumer does not appear to have been yet satis¬ factorily settled. The experiments of Tunni- cliffe and Rosenheim would appear to show that food mixed with boric acid and borax, taken separately and together in such quantities as are ordinarily employed, may be eaten with im¬ punity, but earlier observers have arrived at contrary conclusions. On account, therefore, of the possibility of the use of such chemicals in the preservation of food by persons wholly unacquainted with their physiological properties, legislation appears to be tending in the direction either of prohibition of the use of chemical preservatives or of regulating their use by mak¬ ing their presence known to the consumer. Many substances have been experimented upon with reference to their preservative quality, among which are sulphur dioxide, sulphites and bisulphites, boric acid and its compounds, fluorides, chlorides, alum, lime, sodium carbon¬ ate, formaldehyde, benzoic and salicylic acid and their compounds. At the present time ben¬ zoate of soda, boric acid, salicylic acid and formaldehyde appear to be most frequently used.

Benzoic Acid and Benzoates. — The chemical preservatives used most extensively are ben¬ zoic acid and benzoate of soda. For a time they were the subject of heated discussion. The Bureau of Chemistry decided from extended experiments that these chemicals were harm¬ ful, and recommended that they should be for¬ bidden,. The manufacturers who were using

them in large quantities made a strong pro¬ test against this prohibition, and the «Referee Boards of distinguished physiological chemists were

appointed to make independent tests, and report to the Secretary of Agriculture. This board in 1909 reported that sodium benzoate in Moses® up to one-seventh of an ounce daily did not exert any recognizable deleterious effect upon health, and that this chemical up to that amount could not be classed as a poison within the meaning of the Pure Food and Drug Act ; and also that the admixture of such small quantities of sodium benzoate with foods did not injuriously affect their food values. The regulations of the government based on this report permit the use of not more than one- tpnth of 1 per cent of benzoate as a preserva¬ tive in manufactured foods, but require that its presence in the food be plainly stated on the label. In order to consume the maximum daily Mose® of one-seventh of an ounce it would be necessary to eat daily a quantity equivalent to nine pounds or five quarts of food so preserved.

Boric acid is most often used for the preser¬ vation of meats, certain kinds of fruits and cat¬ sup, and upon hams and fish. The latter are found to keep longer if the boric acid is rubbed over the outside. Two grams per kilo is suffi¬ cient for fish. According to Le Fere boric acid is eliminated slowly from the . system, having been detected in the urine 40 to 50 days after it had been taken. It does not appear to interfere seriously with digestion so far as could be con¬ cluded from experiments. Cases of flesh poison¬ ing have been reported from Switzerland, where meat had been preserved with borates, which had not acted sufficiently as preservatives, but had only masked incipient putrefaction. An in¬ vestigation of the United States Department of Agriculture showed that borax and boric acid in daily doses of 800 grains will be borne by most systems for a limited period. But when used continuously or in large quantities it in¬ terferes noticeably with digestion and the gen¬ eral health.

Sulphurous acid and its compounds have been used to some extent for the preservation of food, but not so much at present as formerly. These compounds and especially sulphur di¬ oxide have a powerful germicide action. Au¬ thorities differ as to their physiological action. Polli found that 8 to 12 grams of sulphurite were not injurious to adults. Ostertag, Bernatzik and Braun found that one gram of magnesium sulphite caused disorders of the stomach in women. Fischer found that 50 per cent of the preserved meat products sold in Breslau in 1895 contained sulphites, the quan¬ tity of sulphur dioxide varying from .34 to .01 per cent. According to Riche, sulphurous acid and its salts, especially calcium bisulphite, have a considerable action on meat, altering its normal condition. This action causes changes in the soluble proteid substances. An addition of 1 per cent of a sulphite to meat is not per¬ ceptible to taste or to smell. On cooking the meat the sulphite is only partially decomposed and expelled. Fischer states that meat con¬ taining more than 0.1 per cent of sulphur di¬ oxide should be regarded as injurious to health. The United States Bureau of

Chemistry in its Bulletin 84 shows that the sulphurous acid compounds produce serious disturbance of the

bodily functions and injury to digestion and general health ; imposing an unusual burden of work upon the kidneys.

Salicylic acid is one of the constituents of many of the modern meat preservatives. Bersch placed a portion of the flesh of a recently slaughtered animal in a concentrated aqueous solution of salicylic acid, and found that after four days the exterior of the meat was perfectly sound, but the interior showed signs of putre¬ faction, and contained many micro-organisms. He, therefore, concluded that the preservation of fresh raw meat by salicylic acid was not practicable. In such meat compounds as sau¬ sages and potted meat, where the salicylic acid is uniformly distributed through the mass, its germicidal properties would obviously exert a more decided action. On account of its decided taste it cannot be used so freely in meat prepa¬ rations as in other kinds of food in which the taste of the preservative is concealed. Here again authorities differ as to the action of this preservative on the human economy, when used in connection with food substances. The Paris Academy has forbidden even the least addition of salicylates to food, on account of their lia¬ bility to injure the kidneys or digestive organs, when any weakness of these organs exists. The United States Bureau of Chemistry con¬ demns the use of salicylic acid and salicylates in foods as tending to reduce the weight and produce discomfort. Besides, they are wholly unnecessary in the foods in which they are used.

Formaldehyde. — >In recent years formalde¬ hyde has been introduced as a preservative in consequence of its powerful antiseptic action. A proprietary preservative known as ((Carnolin® consists of a 1.5 per cent solution of formalde¬ hyde slightly acidified. In very small amounts it exerts a decided antiseptic action on milk. The effect of formaldehyde upon the system, when employed in the small proportions re¬ quired for food preservation, has not yet been well determined, but its power of forming insoluble compounds with proteid substances, and its hardening power upon animal tissues, would seem to render meat treated with it much less digestible than otherwise. Mahery and Goldsmith found that formaldehyde in the proportion of 0.2 gram per cent limited the artificial peptic digestion of blood fibrin. Lud¬ wig states that formalin is not applicable to the preservation of meat products. Ehrich tried the effect of an 8 per cent solution of for¬ maldehyde on various food substances. He found that horseflesh was completely preserved by it, but that the odor developed was such that the meat could not be eaten. Beef thus treated did not develop this odor, but was fit to be eaten only for a short time after addition of the preservative, on account of the chemical changes which it produced. According to Bloxam formaldehyde causes fish to become so hard as to be

unsalable even if the solution con¬ tains only one part in 5,000. The United States Bureau of Chemistry found that formaldehyde retards the nitrogen and sulphur metabolisms and accelerates the phosphorus metabolism of the human body, and concludes that its pres¬ ence in foods is deleterious especially to in¬ fants and invalids.

British Investigation Relative to the Use of Preservatives .— A committee was appointed in

1899 to report to Parliament upon the (

1. Whether the use of such materials, or any of them, for the preservation and coloring of food, in certain quantities, is injurious to health, and if so, in what proportions does their use become injurious?

2. To what extent and in what amounts are they used at the present time?

This committee held many hearings and ex¬ amined 78 witnesses, among whom were the principal experts in England, physicians, health officers, chemists, grocers, dairymen and repre¬ sentatives of different food interests.

The committee reported that the preserva¬ tives found in use other than alcohol, oils, vine¬ gar, salt and sugar, were boric acid and other boron preservatives, sulphurous acid, and sul¬ phites, fluorides, salicylic acid, benzoic acid and formalin or formaldehyde. A list of 4,251 articles of food examined at the government laboratory for preservatives was presented, of which 1,659, or 39 per cent, were found to con¬ tain preservatives. These consisted of 35 dif¬ ferent kinds of food and beverages. Of the articles examined the following named samples were found to contain preservatives, the percentages indicating the proportions to the number of samples respectively : Lime and lemon juice, 88.5 per cent; ham, 82.7 per cent ; cream, 77.9 per cent ; margarine, 77.4; pork-pies, 70.8; cordials, 70.8; bacon, 70.5; sausages, 66.4; fruit syrup, 65.2; butter,

57.1.

Of the 1,659 samples treated with preserva¬ tives, 1,249 contained boron compounds, 320 salicylic acid, 20 formalin and 143 sulphites.

The committee were of the opinion that pre¬ servatives should not be used in milk, since the milk producer might be liable by such use to protect

himself against the immediate results of scrupulous cleanliness. Under the influence of preservatives milk may be exposed without sensible injury to conditions which would otherwise render it unsalable. It may remain sweet to the taste and smell, and yet may con¬ tain disease germs of various kinds, whereof the activity may be suspended for a time by the action of the preservative, but may be re¬ sumed before the milk is digested.

The following were the general conclusions of the committee, so far as preservatives are concerned :

a. That the use of formaldehyde or for¬ malin or preparations thereof, in food and drink, be absolutely prohibited, and that salicylic acid be not used in a greater proportion than one grain per pint of liquid food, and one grain per pound of solid food; its presence in all cases to be declared.

b. That the use of any preservative or color¬ ing matter whatever in milk offered for sale in the United Kingdom be constituted an of¬ fense under the food and drug acts.

c. That the only preservative which it shall be lawful to use in cream be boric acid or mix¬ tures of boric acid and borax, and in amount not exceeding 0.25 per cent expressed as boric acid, the amount of such preservative to be notified by a label upon the vessel.

d. That the only preservative permitted to be used in butter and margarine be boric acid,

or mixtures of boric acid and borax, to be used in proportions not exceeding 0.5 per cent ex¬ pressed as boric acid.

e. That in the case of all dietetic prepara¬ tions, intended for the use of invalids or in¬ fants, chemical preservatives of all kinds be prohibited.

The following statement appears in the 33d annual report of the State Board of Health of Massachusetts (1901). Out of 7,323 samples of milk examined with special reference to the presence of preservatives, 184, or 2.5 per cent, contained formaldehyde; 42, or .6 per cent, con¬ tained boric acid, and 7 contained carbonates. These samples were all obtained in the summer months.

Legislation Relative to the Use of Preserva¬ tives. — At present Austria has no law upon this subject. In Belgium the use of preservatives in milk is forbidden; in Denmark the use of all preservatives except salt in butter and mar¬ garine. In France the sale of food containing either salicylic acid or formalin is prohibited. In Germany, spoiled goods sold in a state con¬ cealing their real condition make the vendor liable to a penalty. The

addition of alum, boric acid and salicylic acid to wine is also for¬ bidden. The following conclusions have been reached by the Imperial Health Board of Ger¬ many regarding the use of sulphurous acid in mince meat:

(1) That mince meat can be made, if kept at a low temperature, to retain its natural color without preservatives for more than 12 hours; (2) that the addition of preservatives can im¬ prove the natural color of meat, but not the meat itself ; (3) that the consumption of mince meat treated with acid salts may be in¬ jurious, especially to people of delicate health.

The Imperial Health Board has also con¬ ducted experiments that have shown danger in the use of boric acid and its compounds.

7. Preservation by Preserving, Pickling, etc. — In making preserves, jams, jellies and fruit juices, the sugar, vinegar, brandy and spices are the preservatives. In the case of preserves, jams and jellies, the fruits and their juices are sterilized by boiling, and a quantity of sugar large enough to render it impossible that fermentative bacteria can thrive in the product is added. This is generally in the pro¬ portion of a pound of sugar to the pound of fruit, though considerably less will suffice with most fruits. The only other attacks to be guarded against are those of mold, whose spores float freely in the air. Protection from the air is, therefore, secured by tying a waxed paper cover over the containing jar or bowl, or, better, by pouring a layer of melted paraffine wax directly on the jelly or jam. Bottles of fruit juice are corked, and the corks dipped into melted beeswax. In brandied fruits, enough liquor is added after the boiled or scalded fruit has cooled to assure a content of from 15 to 20 per cent of alcohol, which is an effective preservative.

In pickles, the preservation is accomplished by scalding to sterilize, and then adding so much vinegar as to form a liquid in which the fermentative bacteria cannot exist. The spices added to the vinegar aid in preserva¬ tive effect, and so also does the sugar added to sweet pickles. See Adulteration; Food;

Foods, Recent Legislation Respecting; Meat Packing; Milk; Refrigeration, etc.

Bibliography — Brannt, Practical Treatise on the Manufacture of Vinegar; Preserva¬ tion of Foods by Canning, > etc. (1914) ; Duck- wall, (Canning and Preserving of Food Prod¬ ucts' (1905); Eccles, (Food Preservation' (1905); Hausner, (Manual of Preserving Foods and

Sweetmeats' (1912) ; Tucker,

Richard Ferris,

Editorial Staff of The Americana.

FOOD PROBLEMS AND THE WAR.

From the moment that the European War started it was realized by many people that food would play an important part in deciding the outcome of the conflict. It is doubtful, how¬ ever, if anybody during the early days of the struggle realized the vital importance this prod¬ uct would assume ; and certainly none among the masses of the various populations were aware of the significance of this factor. It was only by the development of facts concerning supply, by the application of voluntary and com¬ pulsory systems of distribution and rationing, by the knowledge that starvation was depleting the peoples of some countries while shortage was being felt almost everywhere, and by a long process of education that the general pub¬ lic was made to recognize the great truth of the slogan : ((Food Will Win the War"

The magnitude of the problem, the vast amount of adjustment and readjustment which would be necessary to make supplies equal to demands, was not grasped during the first year or two of the war. There was a food prob¬ lem, to be sure, almost from the moment the first German soldier set foot on Belgian soil. But this problem with its hundreds of ramifi¬ cations kept growing with the progress of the war until, long before the conflict was ended, it had become the greatest, the most absorbing, the most vitally necessary problem among all those which had to be solved. Most of the other problems of the war were in a sense na¬ tional while that of food was international. It led to the appointment of international bodies to deal with its various phases and to under¬ standings and agreements between the different countries as to what amounts of this and that product could be exported and imported. The carrying out of national measures pertaining to the distribution and consumption of food was secured by a general interallied understanding. An interallied <(wheat executive" was established in December 1916, and later a "meats and fats" executive appointed by France, Great Britain and Italy, thereby providing interallied buying and apportionment of imported supplies. At the suggestion of Herbert C. Hoover, Food Administrator of the United States, there was established in September 1917, an international sugar committee in New York to centralize the purchase and allocation of Cuban and American sugars. The interallied meat and fat executive, consisting of one British, one French and one Italian representative, collected information on the monthly requirements of these countries and the purchases which they

decided on were made

by the allied provisions export commission con¬ sisting of members from the countries named.

There were in a general way five great prob¬ lems which presented themselves in connection with the feeding of the nations outside the con¬ trol of the Central Powers. One was to bring about an increased production ; a second, to reg¬ ulate distribution ; the third, to limit consump¬ tion ; the fourth, to provide for the needs of Belgium and other countries wdiich became de¬ pendent on the Allies for their meagre supplies; and the fifth, to see that large quantities of food from the neutral nations did not fall into the hands of the enemy and thus increase his power of offensive and of resistance.

In point of time, the first of these which had to be considered was that of providing for the needs of Belgium. With that country overrun and placed at the mercy of Germany within a few months after the war had started, it was necessary to take prompt action. This was done by the appointment of a commission which under the untiring leadership of Mr. Hoover performed a task of humanitarian service such as the world up to that time had never wit¬ nessed. As far as was humanly possible under the circumstances the civilian population of Bel¬ gium was furnished by the outside nations with the necessities of life. A similar effort to pro¬ vide for the needs of Poland was not so suc¬ cessful because of the impossibility of reaching a complete understanding on the subject with the German government. But to the extent of their ability the allied nations continued through¬ out the war to look out for the food demands of the unfortunate peoples who through the in¬ vasion of their territory, the cutting off of their natural resources or the loss of their crops were unable to support themselves.

The system of compelling their peoples to limit themselves to a fixed quantity of various foods was never carried out as fully in the allied countries as in Germany and the other Central Powers. By the late summer of 1916, for instance, Germany had rationed bread, pota¬ toes, sugar, milk, meat, butter and fats, cheese, cocoa, tea, rice, macaroni and other articles, while in Great Britain in the spring of 1918 national rationing had been extended only to sugar and meat, although before that time local rationing of butter and margarine had become almost general throughout the British Isles ex¬ cept in the agricultural districts. Germany's first experiments were with butter tickets. Re¬ duction of consumption in the allied countries was accomplished for the most part more largely through other methods and by popular appeals and voluntary conservation. Actual food control did not take a very definite form until toward the end of 1916, although much had been done long before that time, of course, both

to increase production and to provide for proper distribution and con¬ sumption. It was not until 5 Dec. 1916, for instance, that the public meals order was issued which limited the number of courses at lunch¬ eons and dinners in hotels, restaurants and clubs. Shortly after this Lloyd George became Prime Minister, and one of his first acts was the appointment of a Food Controller.

The problem of increased production did not begin to present itself in a pressing form in Great Britain and France until the submarine

warfare of Germany assumed serious propor¬ tions and began to take toll of many commerce carriers and precious cargoes of food. With the labor left at home heroic France was doing all it possibly could to keep the yield large, but between 1914 and 1917 there was a decrease of about 50 per cent in the production of that country. Great Britain was still depending to a large extent on supplies from the outside world; and in 1916-17 the United Kingdom raised only enough of its own foodstuffs to last for about ten weeks. This was increased in the following year through the plowing up of much hitherto unused land, although not by a great amount; but by the season of 1918-19 it had grown to such proportions that England and Wales were producing within their own borders wheat, oats, barley, corn and potatoes to care for the food demands for forty weeks, or four- fifths of a year. Improved methods of farm¬ ing, the use of tractors and other labor-saving machinery; the addition of many millions of acres to the farm territory; the patriotic and unselfish work of women in going on the farms ; and the cultivation of hundreds of thousands of small tracts in and around the cities and towns, were among the principal means by which this enlarged home grown supply was brought about.

The United States, which in the meantime had been supplying an increasingly growing amount of wheat, beef and other foods to the Allies was also devoting itself intensively to the problem of turning out vaster quantities of food stuffs. It was not until the United States en¬ tered the war in the spring of 1917 that any unusual help was required by the farmers in this direction. Even before that time they had lost some of their help which had been drawn off by munition factories that were manufacturing guns, ammunition and other material for the Allies. After the entry of the United States into the war the question of production here took on a different aspect. It was realized what the effect of the draft would be on the farmer; and so the government did all it could to help him and to make the drawing off of so much labor bear as lightly as possible on

the producer. The call was made to him to plant as much as he could; emergency help to aid in gathering the harvests was secured for him through the employment service of the United States De¬ partment of Labor and the United States Boys' Working Reserve ; and the use of much new machinery was advocated. At the same time another new factor in production was intro¬ duced. This was the appeal to the people liv¬ ing in cities, towns and villages to cultivate all the idle land, the back yards, vacant lots and open spaces and turn them into war gardens. A national organization known as the National War Garden Commission was formed by Charles Lathrop Pack, president of the Amer¬ ican Forestry Association, to stimulate this form of food production; and the results were eminently satisfactory. As to what England was doing in the same direction, a report pub¬ lished in August 1918, says :

<(The cultivation of these allotments is, pos¬ sibly, the change most noticeable in the physical aspect of England. Everywhere in town and country evidences of the widespread interest may be seen. The

*borders of flowers but a vegetable garden. Potatoes are growing in the flower beds of the old moat at Windsor Castle. Parks, club grounds, vacant lots and railway borders, all are under cultivation. No space is too large and no corner too small. At this season the impression is gained that England is one vast market gar¬ den. All this food production is, of course, re¬ lieving the food condition in a great degree.^*

The women of France, along with the men too old for service and the boys, took up the work on the farms ; and the manner in which they toiled to raise the crops needed was worthy of the same high praise as that bestowed on the brave fighters of the country.

The decrease in the production of wheat and other foodstuffs in France was accom¬ panied by an increase in price of about 50 per cent for wheat, meat and all the main foodstuffs. In regard to the regulation of consumption and victualling the most impor¬ tant public provision was the buying of all wheat imports by the government. This regulated automatically the prices of native wheat and prevented speculation in interior markets. After December 1916 the food prob¬ lems of France were in the hands of a Minis¬ try of Supplies (Ministere du Raviteillement). Among the food laws which were adopted to meet the situation in France was one providing for an increase in the amount of wheat grain used in bolting for the making of flour. An¬ other law instituted two meatless days a week and reduced the menu of meals in hotels and restaurants to three courses only. A third pro¬ vided for sugar cards which Reduced the monthly consumption of sugar for each person to 750 grammes and later to 400 grammes. On 1 Jan. 1918 a new system for the control of the

cereal supply of the country went into oper¬ ation in France. It provided among other things for the requisition by the state of all crops of native cereals except what was retained by the grower for family consumption, for seed and for fodder for his live stock; state control of all mills ; the fixing of a uniform price for flour which affected bread also; the control of all transports of cereals by rail, water or road on a system of transport permits ; and the alloca¬ tion to each department of a monthly quota of cereals based on a declaration of requirements in accordance with the number, occupation, etc., of the population. Bread rationing did not be¬ come an institution in France until the last days of January 1918; but the measure was ap¬ proached with considerable hesitation. Pre¬ vious to the introduction of this system nothing in the way of general or national bread ration¬ ing had been actually in force.

The immediate enforcement of this bread rationing was decided on after an interallied conference on the subject of distribution of grain supplies in January 1918. A flat ration was provided of .300 grammes (10.5 ounces) a day to each individual regardless of age or con¬ dition. The scheme was introduced in Paris and suburbs and gradually extended. Tickets were issued to applicants presenting sugar cards, those not possessing the latter having been required to supply proofs of identity satis¬ factory to those, in charge. No tickets were re¬ quired of individuals for bread served in res¬ taurants; but permits were issued to the resˆ

taurants entitling them to purchase to an amount estimated on 3.5 ounces for each meal served. Up to the time this regulation went into effect the supply commission which had been estab¬ lished by a decree of 8 Sept. 1914 had suc¬ ceeded in keeping the price of bread down by buying foreign wheat and reselling it to the departments in need; but the shortage of the 1917 crop made even the work of the commis¬ sion inadequate to meet the situation. Sugar had been the first article of food subjected to rationing in France and it remained the only one until the bread-rationing scheme went into ef¬ fect in January 1918.

The sugar card permitted the holder to buy one and a half pounds of sugar a month for each person in the family if all three meals were taken at home ; or an annual allowance of 18 pounds for each person.

Except for a gradual and sustained upward movement of prices of most articles of common consumption the food problem in Great Britain had not offered any serious difficulties during the first two years of the war, that

country hav¬ ing been largely a spectator of the food troubles of enemy countries ; but there was a perceptible change in the latter part of 1916 and a growing belief among the working people that an unfair distribution enabled the wealthy to get supplies without trouble whereas the poor were not get¬ ting supplies without difficulty. Food control in Great Britain did not take definite form until the end of 1916 when wide powers were con¬ ferred on the Board of Trade for the use of food. Several days after the granting of this power a milling order was issued which made obligatory a 76 per cent extraction of flour from wheat. In the following month a food con¬ troller was named, Lord Devenport being the first to hold this office, which he occupied five months. He made an appeal for a voluntary ration of bread, meat and sugar. This did not accomplish all that was desired, although many people did obey the request. Profiteering be¬ came marked and Lord Devenport finally re¬ signed. He was succeeded by Lord Rhonnda, who obtained by an Order in Council the power to deal with speculation and profiteering, and for the requisitioning of supplies and con¬ trol of prices.

The first direct attempt at rationing was made in the order issued 5 Dec. 1916, regu¬ lating meals in hotels and restaurants. In February 1917 an appeal for voluntary ration¬ ing of bread, meat and sugar according to a specified scale was made. The first products after sugar to be rationed in Great Britain were butter and margarine, although meat cards followed rapidly. On 1 Jan. 1918 the weekly sugar ration was fixed at one-half pound per person. Under the rationing system one and a quarter pounds of meat per person was allowed and one quarter pound of butter. Owing to the difficulties in fixing general maxi¬ mum retail prices over the whole country, the Ministry of Food allowed considerable latitude to the local food committees in fixing the charges permitted to retailers. In the first part of January 1918, the Ministry of Food issued to all local control committees a memo¬ randum for their guidance in schemes of rationing. With the consent of the food con¬ troller any food committee was permitted to adopt any practicable scheme for controlling

within its area the distribution and consumption of any article of food. An order allowing a supplementary ration to persons engaged in heavy work was issued in the spring of 1918.

The most serious situation which developed any time during the war in connection with the food supply doubtless was during the winter of 1917-18 when the ravages of the submarine and other causes had depleted the available stocks of the allies to a very low point. How near this came to being a real calamity to the cause of the Allies was not generally known until a considerable time after danger was past. Thanks to the conservation which the Ameri¬ can people had been practising during the year or so

preceding this period and to extraordi¬ nary efforts which were made to ship large quantities of food to Europe in a hurry, the critical situation was overcome. Throughout the whole North American hemisphere the crops of 1917 were in general bad. In addi¬ tion to inevitable reduction of crop areas at¬ tributable directly to the war, the harvests pro¬ duced were not as large as they should have been. And yet out of a scant crop in 1917 more was sent to the Allies than had been sent out of the abundant crops of the preceding years. This was due to the wonderful savings made by the conservation measures in effect in the United States. The voluntary reductions in wheat alone during the first year of the Food Administration's operation in the United States saved 125,000,000 bushels out of the normal consumption. Taking into account the fact that generally speaking the 1917 crops were far below normal and that in spite of that fact $1,400,000,000 worth of food was shipped to Europe, the accomplishments of the United States in helping to feed the Allies looms large. There was an increase of 844,600,000 pounds in the exports of meats and fats. In 1916-17 there was sent from the United States to the Allies a total of 2,166,500,000 pounds of meats and fats, which includes all sorts of meat and meat products, canned and powdered milk, but¬ ter, cheese, vegetable oils, lard, etc. In 1917— 18 there was sent 3,011,100,000 pounds. That increase was the result of saving.

The full effect of the American Food Ad¬ ministration's work began to bear its best results in the last half of the fiscal year, 1917- 18. There was a gain of 80,900,000 bushels of cereals over the amount which had been shipped in the previous fiscal vear. In a letter which Mr. Hoover addressed to President Wil¬ son giving some of the results of this year's saving, he said : ((It is interesting to note that since the urgent request of the Allied Food Con¬ trollers early in the year for a further ship¬ ment of 75,000,000 bushels from our 1917 wheat than originally planned we shall have shipped to Europe or have en route, nearly 85,000,000 bushels. At the time of this request our sur¬ plus was more than exhausted. This accom¬ plishment of our people in this matter stands out even more clearly if we bear in mind that we had available in the fiscal year 1916-17 from net carry-over and as surplus over our normal consumption about 200,000,000 bushels of wheat which we were able to export that year without trenching on our home loaf. This last year, however, owing to the large failure of the 1917 wheat crop, we had available from net carry-over and production and imports,

only just about our normal consumption. Therefore our wheat shipments to

Allied desti¬ nations represent approximately savings from our own wheat bread.

((These figures, however,® added Mr. Hoover, (

With the allied nations in Europe dependent for 70 per cent of their deficiency in essential foodstuffs on North America, it is readily seen what an important factor the conservation sys¬ tems adopted by the United States and Canada were in furnishing this deficit. The great dan¬ ger which but few realized that the allied nations in Europe would be forced to make peace by food shortage was happily averted by the resolution and-self-sacrifice of the people of the United States and Canada. Italy's sup¬ plies were dangerously low in December 1917, and again in March 1918, but the crisis was passed. Three meatless days a week became necessary in Italy. The weekly ration of bread for sedentary people was three pounds eight ounces of war bread, with an additional allowance for heavy workers, while macaroni, rice and maize flour were also rationed. The weekly ration of sugar was placed at two and a quarter ounces.

The world food situation as it stood in the latter part of 1918 was summed up in a resolu¬ tion adopted at a conference in London of the food controllers of Great Britain, France and Italy and the food administrator of the United States. The resolution read :

((Resolved, that while the increased produc¬ tion of the United States and Canada renders it possible to relax some of the restrictions, which have borne with peculiar hardship upon all our peoples, yet it is absolutely necessary that rigid economy and elimination of waste in the con¬ sumption and handling of all foodstuffs, as well as increased production, should be maintained throughout the European Allied countries and in North America. It is only by such economy and elimination of waste that the transportation of the necessary men and supplies, from North America to the European front, can be accom¬ plished, and that stocks of foodstuffs can be built up in North America as an insurance against the ever-present danger of harvest failure, and the possible necessity for large and emergency drafts to Europe. We cannot ad¬ minister the food problem on the basis of one year's war. We must prepare for its long continuance if we are to ensure absolute victory.®

Following his return from this European conference, Mr. Hoover made a statement in which he showed something of the great con¬

tinuing demands of the Allies for food, and that too in spite of the fact, as he said, that (

A food conservation program, effective in the United States, 21 Oct. 1918, for all places where cooked food was sold to be eaten on the premises, affected every hotel, restaurant, cafe, club and dining car service in the country. It carried into effect the announcement of the Food Administration issued a short time prior which stated that in fulfilling the American promise to the Allies to send them 17,500,000 tons of food during the year, the public eating places would be called on ((to undertake in many particulars a more strict program than last year.® There were 12 "General Orders® in the plan which set forth the specific measures by which it was proposed to carry out a direct reduction in the consumption of all foods, particularly staples, rather than a series of emergency regulations such as meatless and wheatless days and meals, and the substitution of one food for another. The proprietors were told that it had not been deemed advisable or necessary at the time to license their operation but that (

The prohibition against serving any bread that did not contain at least 20 per cent of Wheat flour substitutes was announced; and of this ((Victory Bread® no more than two ounces could be served to a patron at one meal. No bread could be served until the first course was on the table. Four ounces of other bread, such as corn bread, muffins or Boston brown, could be served instead of the Victory bread. Only one kind of meat could be served at a meal. Bacon could not be served as a garni-

ture. One-half ounce of butter only was al¬ lowed to a person at a meal. The same ap¬ plied to Cheddar (American) cheese or butter. No sugar bowl was allowed on the table or lunch counter ; and one teaspoonful was all that could be served one person at a meal. All waste food had to be saved to feed animals or reduced to obtain fats. Double cream or cream containing more than 20 per cent butter fat was prohibited.

On one memorable occasion Lloyd George said: (

The food problems with which the Allies had to struggle were enormous. They kept changing from time to time and new provisions had to be adopted during the progress of the conflict. The tremendous difficulties required the most consummate handling, the employment of the best brains of the countries involved and a vast amount of administrative work in addi¬ tion to the education of whole peoples to the needs of the time. The exertion of strenuous efforts to bring about increased production, accompanied by enforced or voluntary systems of conservation on all the various articles of food, were the main factors in the successful solution

and carrying out of these problems.

Charles Lathrop Pack, President of the National War Garden Com¬ mission.

FOOD PRODUCTS, Composition of.

See Nutrition of Man. .

FOODS, Recent Legislation Respecting. The Food and Drugs Act of 30 June 1906 commonly called the (

if it consist in whole or in part of any filthy, decomposed or putrid animal or vegetable sub¬ stance; or if it is the product of a diseased animal, or one that has died otherwise than by slaughter.

It is deemed misbranded if it be an imita¬ tion of, or offered for sale as, another article ; or if it be labelled so as to deceive or mislead the purchaser, or purport to be imported when it was not; or if the contents of the original package shall have been removed and other contents shall have been placed therein ; or if it fail to bear a label stating the amount of any certain drugs (designated) contained therein ; or, being in package form, the con¬ tent in weight or measure is not plainly stated on the outside of the package; or if the pack¬ age or its label shall bear any statement, de¬ sign, or device (including pictures), which shall be false or misleading in anv particular. But, in the case of food mixtures or com¬ pounds sold under distinctive (that is, trade or proprietary) names, they shall not be deemed misbranded if the label states where the article is produced or manufactured, or, in the case of compounds, imitations or blends, if they are so labelled. Manufacturers of proprietary foods are required to state on their labels the per¬ centages only of such ingredients as the Secre¬ tary of Agriculture shall deem needful to as¬ sure freedom from adulteration.

Unlabelled foods in packages are adjudged misbranded if they are imitations. Untruthful geographical names are forbidden.

Food products for export may contain added ingredients not permitted in foods to be sold in the United States, when the addition of such substances does not conflict with the laws of the country to which such food products are to be exported, and when such additions are made at the request of the foreign pur¬ chaser.

Articles condemned as being adulterated or misbranded, or of a poisonous or deleterious character, are to be confiscated by the govern¬ ment and destroyed, or sold under conditions not contrary to the provisions of this act.

Dealers are exempt from prosecution under this law if they can establish a genuine guar¬ anty by a wholesaler, jobber, manufacturer or ((other party® residing in the United States, from whom the unlawful articles were pur¬ chased.

Under rulings of the Department of Agri¬ culture seven coal-tar colors may be used in foods, viz. : 107 Amaranth ; 56 Ponceau 3R ; 517 Erythrosin ; 85 Orange I; 4 Naphthol Yel¬ low S ; 435 Light Green SF ; 692 Indigo disul- foacid. The prefixed numbers identify the dyes as listed in A. G. Green's (Survey of Organic Coloring Matters > (1904). The law is administered under the direction of the Secretary of Agriculture and provides that the Secretary of the Treasury, the Secretary of Agriculture and the Secretary of Commerce and Labor shall make uniform rules and regu¬ lations for carrying out its provisions. Such regulations have been made and are printed, together with the act, for distribution by the Department of Agriculture (Chemistry Bureau Bulletin 112). The opinion of this department regarding various features of the law is ex¬ pressed in Food Inspection Decisions published from time to time from the office of the Secre-

tary. Under date of 17 Oct. 1906, 40 rules and regulations for the enforcement of the act were adopted by the three secretaries. Since then, up to 23 July 1910, seven of these regu¬ lations (Nos. 3, 9, 15, 17, 19, 28 and 34) were amended by Food Inspection Decisions. These amendments refer to sections of the law relat¬ ing to the collection of samples ; change in form of guaranty legend ; permitting the addi¬ tion of 'harmless coloring matter or flavors in proportion not to exceed 1 part to 800 of the food; permitting the use of seven specified coal-tar colors; forbidding the use of sac¬ charine; permitting benzoate of soda in any amount if stated on the label ; relating to ar¬ rangement and size of type on labels, character of name, labelling of derivatives, denaturing and permitting the use of copper salts and sulphur dioxide if so stated on the label.

The organization conducting the enforcement of the Pure Food Law includes: (1) Inspectors who procure samples for analysis and informa¬ tion regarding the manufacture and sale of food and drugs; (2) chemists and clerks, in the laboratories of the Bureau of Chemistry in Washington and in the branch laboratories in other cities, of which 19 are in operation ; (3) Board of Food and Drug Inspection, whose duties are to consider all questions arising in the enforcement of the Food and Drugs Act, upon which the decision of the Secretary of Agriculture is necessary; to consider

and super¬ vise all correspondence involving interpreta¬ tions of the law; and to conduct hearings based upon alleged violations of the Food and Drugs Act. Information secured by the inspectors and laboratories regarding violations of the law is reported by the chief of the Burepu of Chemistry to the Board of Food and Drug In¬ spection which, when the charges appear to be sustained, makes recommendations to the Secretary of Agriculture regarding the ex¬ clusion of adulterated and misbranded food and drugs offered for importation, and prose¬ cutions for the sale of domestic goods in vio¬ lation of the law. All persons charged with violations of the law are afforded a hearing at which they may introduce testimony. When requested, the hearing is conducted personally by the Secretary of Agriculture. The act pro¬ vides that its penalties shall not be visited upon dealers protected by a guaranty by a resident of the United States that the articles com¬ plained of are in accordance with the pro¬ visions of the law, and in enforcing the law the department attempts to protect the retail dealer who may be acting in good faith, and to place the responsibility upon the shipper or manu¬ facturer who is aware, or should be, of the nature of the product. The enforcement of the law naturally proceeds along two lines : First, products imported into the United States from foreign countries ; and second, products manufactured or sold in the District of Colum¬ bia or the Territories introduced into interstate commerce, or exported from the United States. In the case of imported foods and drugs no prosecutions are made. The effort of the de¬ partment in enforcing the law is confined to preventing the importation of illegal goods and causing their reshipment beyond the jurisdic¬ tion of the United States.

From the nature of the case the method of inspecting domestic foods and drugs is neces¬

sarily widely different from that employed with imported goods. For this purpose inspec¬ tors visit all sections of the country to secure samples for analysis and such information as may be required by the department. One in¬ spector is located at each of the branch labor¬ atories and others have their headquarters at Burlington, W. Va., Des Moines, Oklahoma City, Dallas, Tucson, Salt Lake City, Spokane and Fargo.

The duties of the inspectors are as follows:

(1) To investigate the wholesale and retail market and obtain samples of foods and drugs shipped in interstate commerce; (2) to inspect manufacturing establishments and secure infor¬ mation in regard to the nature of the foods shipped in interstate commerce; (3) to inves¬ tigate the manufacture and use of substances which are or may be employed for the adultera¬ tion of foods and drugs and methods of prepa¬ ration which

may lead to the damage or deterioration of foods and drugs, or to the use of improper materials in their manufacture ; (4) to inspect foods and drugs imported at ports where branch laboratories have not been established. Special investigations are fre¬ quently made concerning sanitation and proc¬ esses of manufacture. The efficient and com¬ plete enforcement of the law depends to a large degree upon the originality and initiative of the inspectors.

The act provides that the determinations as to adulteration and misbranding shall be made in the Bureau of Chemistry of the Department of Agriculture. In the division of foods of this bureau, there is a special laboratory for in¬ vestigating the methods of preparation and purification of edible oils, fats and waxes.

In the division of drugs of the same bureau, laboratories were established 1 July 1908, as follows :

(1) A drug inspection laboratory, for the examination of drugs sampled in connection with the enforcement of the Food and Drugs Act, excepting those for which special arrange¬ ment is made at the branch laboratories. This includes a general investigation of drug prod¬ ucts, bought on the market, to determine their standard composition and adulterants.

(2) A synthetic products laboratory, to in¬ vestigate synthetic products and preparations containing them, develop methods for the analysis of organic synthesis, and study the preparation of organic compounds and their analysis.

(3) An essential oils laboratory, to investi¬ gate the essential oils and products in the man¬ ufacture of which the same are used. This necessitates studies relative to the chemical con¬ stitution and physical character of essential oils, the development of methods of analysis, and the improvement of those now existing; also the study of analytical processes for the examination of products containing essential oils.

(4) A pharmacological laboratory to in¬ vestigate the pharmacological action of drug products under the Food and Drugs Act. This includes a study of the physiological and path¬ ological effects produced on animals by the medicinal substances which enter into the com¬ positions of commercial drug products and by the derivatives and preparations of the same. See Pharmacopoeia, Revision of.

There is also a miscellaneous division in the Bureau of Chemistry, the principal lines of work of which are the examination and study of waters, cattle foods, forage crops, grains, insecticides and fungicides, trade wastes and certain hygienic problems.

The Bureau of Chemistry publishes a great many bulletins and circulars, a list of which can be obtained by application to the Department of Agriculture.

In the several States, legislation has in the main been in uniformity with the National Food and Drugs Act. The general tendency is toward stricter regulations, with certain local peculrari- ties.

Alabama. — The Food and Drugs Act of Alabama was approved 26 Aug. 1909. It is administered by the commissioner of agricul¬ ture and industries. It follows closely the Federal law, but specifies particularly the mix¬ ing of ((any foreign matter or substance® with sugar, syrup or molasses, lard and butter, and makes liable to the law's penalties any clerk or agent who shall act for an owner in the sale of prohibited foods. It forbids the sale of all forms of fabricated imitations or adulterations of spirituous, vinous or malt liquors even if so labelled. The manufacture of ((com- pound lard® is permitted within specified limits.

Arkansas. — The Arkansas Food and Drugs Acts, 28 May 1907, and amended 31 May 1909, are administered by the State commissioner of mines, manufactures and agriculture, with the aid of the State Board of Health whose duty it is to examine specimens of foods or drugs which may be offered for sale in violation of the act. This board reports its findings to the commissioner of mines, manufactures and agriculture, who prosecutes offenders. The Arkansas law follows closely the Federal law but is more rigid. It forbids particularly the addition of burnt sugar or any other coloring matter or saccharine to vinegar or cider. To be exempt from prosecution for the sale of adulterated articles an Arkansas dealer must cite guaranty by wholesaler in the State. Foods prepared under (

California. — The California law was ap¬ proved 11 March 1907, and amended 22 Feb. 1909, 13 March 1909 and 26 April 1911. It is administered by the State Board of Health. It follows the Federal law but is more stringent. Truthful labelling does not render an adulter¬ ated article exempt from penalty. Guarantees to be accepted must be under the State law and by a resident of the State. The laws of this State are strong in their application to dairy products and wines especially. It is unlawful for any person ((to produce, manufacture or prepare for sale, or to sell, or offer for sale, or have on hand for sale, any milk or product of milk to which has been added, or that may con¬ tain, any compound of boron, salicylic acid,

formaldehyde, or other chemical or substance for the purpose of preventing or delaying fer¬ mentation.® Likewise, it is unlawful to pro¬ duce, etc., any milk, cream or condensed milk to which any coloring matter has been added by any person, or to which any gelatin or other substance has been added to increase its con¬ sistency, or make it appear richer; but it is not

unlawful to use harmless coloring matter and common salt in butter and cheese. The win¬ dows and doors of all places where foods are made must be screened, and rigid cleanliness is prescribed. Pure wine in California is defined as in the laws of the United States relating to the fortification of pure sweet wines. A uni¬ form wine nomenclature is in force, consisting of the use of the prefix (

Colorado. — The Pure Food Law of Colorado was approved 7 March 1907. Federal food standards are adopted (

Connecticut. — This State has given especial attention to dairy laws. Its Pure Food Law was approved 31 July 1907 and amended 26 July 1909. It is administered by the State dairy and food commissioner with the co-operation of the director of the Agricultural Experiment Sta¬ tion. The law in general follows the Federal law and in addition provides minute instruc¬ tions for labelling and branding foods and drugs of all kinds. Specific regulations prohibit sac¬ charine, boric acid and borates, salicylic acid and salicylates and formaldehyde. Bleached flour may not be made or sold in the State ; and sugar may not be added to canned vege¬ tables. Rice may be coated and copper salts used to green vegetables and pickles if the labels so state. Underground bakeries are dis¬ approved and to be eliminated. A scale of al¬ lowances of legal shortages in weights and measures ranges from one-half ounce in the pint to one-eighth ounce in the pound, from the statement on the label.

Delaware. — The Delaware Pure Food Law was approved 9 April 1907. It follows the Fed¬ eral law closely with the following exemptions : (((1) Where the order calls for an article of food or drug inferior to such standard and such difference is made known at the time; (2) where the article of food or drug is mixed with any matter or ingredient not injurious to health and not intended fraudulently to increase its bulk, weight or measure, or conceal its in¬ ferior quality, if at the time such article is de¬ livered to the purchaser, it is made known to him that such article of food or drug is so mixed.® The standard measure of milk and

cream is specified as 57.75 cubic inches to the quart.

District of Columbia. — The Federal law applies directly in the District and there are added specifications as to the amount of butter fat in milk ; the prohibition of salicylic acid in cider and of alum in bread ; and the same ex¬ emption from standards when so ordered as in the Delaware law. The prevention of the sale of unwholesome food and the distribution of medicinal and poisonous substances is regu¬ lated by the Health Department.

Florida. — The Florida Pure Food Law was approved 5 June 1911. It is administered by the commissioner of agriculture with the aid of the State chemist. An elaborate schedule of standards of purity for food products is in force. These standards are based upon data representing materials produced under Amer¬ ican conditions and manufactured by American processes or representing such varieties of for¬ eign articles as are chiefly imported for Amer¬ ican use- A departure of the article above the maximum or below the minimum limit pre¬ scribed is evidence that it is inferior or of ab¬ normal quality. Bleached grain and flour and all chemical preservatives and antiferments are prohibited. Oysters may not be floated, nor green citrus fruits "colored® by artificial heat, nor may copper salts be used to green vege¬ tables or pickles. The schedule of standards is published by the State Department of Agri¬ culture at Tallahassee. The commercial fertil¬ izer, feeding stuffs and cottonseed meal laws are specifically retained.

Georgia. — Bulletin No. 51, published by the commissioner of agriculture, in 1910, contains the Food and Drugs Law approved 21 Aug. 1906 and amended later, and also the rules and regulations. It contains also a report on all foods and drugs inspected and analyzed from 1 June 1908 to 1 June 1910, including the names of manufacturers and dealers. Georgia forbids in food saccharine "absolutely,® also formal¬ dehyde, boron compounds, sulphurous acid and sulphites, salicylic acid, fluorides, abrastol and beta-naphthol. Sulphur dioxide is permitted, but an ((abnormal quantity® is forbidden. Flour bleached with nitrogen peroxide cannot be made or sold in the State. Saltpetre (for the present) and cereals are allowed in sausage, but the label must so state. Copper salts in vegetables and pickles are permitted when the label states such use. No compound can be named after one ingredient. Unfit food care¬ lessly sold renders the seller liable for dam¬ ages. Any person adding dirt or rubbish or any other material to cotton, wool, provisions or other article to add to its weight is to be ad¬ judged a <(common cheat® and punished by fine and imprisonment. The law is administered by the State Department of Architecture. Particu¬ lar attention has been given to the sale of dam¬ aged corn, which produces the disease pellagra. The standards of purity of foods and drugs of the United

States Department of Agriculture are the official standards of Georgia. The standards for lard, mixed edible fats and cot¬ ton-seed oils, however, are defined by the Geor¬ gia law.

Hawaii. — The Federal law applies directly. The sale of intoxicating liquors that are adul¬ terated is prohibited.

Idaho. — The Pure Food Law of Idaho follows generally the Federal law. It was ap¬ proved in March 1911 and is administered by the State dairy food and sanitary inspector. Bulletin No. 5 of the Board of Health, published in October 1909, gives the food and drug standards of this State. All animal and vege¬ table products and beverages are standardized. Chemical preservatives are forbidden, except¬ ing only benzoate of soda in quantity not ex¬ ceeding one-tenth of 1 per cent. Saccharine and salts of copper, zinc and other metals may not be added to foods, and vegetable substances may not be added to sausage or other meats. Foods sold under coined names are not ex¬ empted for that reason. Adulteration of wines, beer and spirituous liquors by any substance not a normal constituent is unlawful. Foods made with lard substitutes in bakeries, hotels and boarding-houses cannot be served except with a printed card stating the fact. Slaughter¬ houses, creameries and dairies are subject to careful regulation ; and there are general regu¬ lations in regard to labelling, branding, adul¬ teration, cold storage, imitations, etc.

Illinois. — The Illinois Dairy and Food Law was approved 14 May 1907 and amended 14 June 1909 and 6 June 1911. A State food commissioner looks after the enforcement of the laws relating to adulterated and unbranded foods. Standards of purity and strength have been fixed for a few articles in the act itself. The making or selling of adulterated spirituous, malt or vinous liquors is prohibited ; also the sale of unclean or unwholesome dairy products and meats. A board of live-stock commis¬ sioners make, by the State veterinarian or a live-stock inspector, an examination of animals which they believe to be afflicted with any con¬ tagious or infectious disease, which would render the carcasses unfit for human food, and have power to confiscate and kill such animals. Chemical preservatives, except benzoate of soda to the amount of one-tenth of 1 per cent, arc forbidden. Hamburger steak, however, may con¬ tain sulphite to the amount of thirty-five one- hundreths of 1 per cent, if so labelled. Bleach¬ ing and subsequent coloring of food is permitted if the labels so state, but bleached flour it decep¬ tive and so unlawful. No preservative may be added to milk and cream. Saccharine is per¬ mitted if the label so states. Bulk foods com¬ pounded and wholesomely adulterated cannot be sold unless notice is given to each customer by placard. Any wording on the label which deceives in any way renders the article mis¬ branded.

Indiana. — The State Board of Health regu¬ lates the enforcement of the Pure Food Laws of this State which were first enacted in 1907, following the Federal statute. The Sanitary Food Law of 1909 provides for the sanitation of bakeries, canneries, packing – houses, slaughter-houses, dairies, creameries cheese factories, confectioneries, restaurants, hotels, meat markets, and all other food-producing establishments, and vehicles in which food is placed for transportation. Section 8 of this law provides that ((No employer shall require, permit or suffer any person to work, nor shall any person work, in the building, room, base¬ ment, cellar or vehicle occupied or used for the production, preparation, manufacture, packing,

storage, sale, distribution and transportation of food, who is afflicted with any infectious or contagious disease.® The law specifically pro¬ hibits the use of any arsenic, formaldehyde or antiseptic injurious to health. Sugar substi¬ tutes are forbidden in foods and alum may not be added to pickles. Bleached flour may not be sold. The labels on all compound foods must bear first among the ingredients the name of the one in largest proportion. The Board of Health authorizes the issuing of letters or orders by the State food and drug commissioner relating to such subjects as sidewalk display of foodstuffs, sausages with cereal added, etc. These are for the guidance of the trade.

Iowa. — A ruling under the 1907 Pure Food Law of this State points out that this State law "cannot touch the shipment or sale of foods across the State line and that for this reason the manufacturer without the State is perfectly safe, so far as prosecutions are con¬ cerned, in sending into this State goods that do not comply with the Iowa law.® The law was amended 6 April 1909 and 14 April 1911. Strict rules are in force as to the sanitary pro¬ tection of all foods on sale and in the process of manufacture. A guaranty by others does not exempt the dealer. The national and State laws are quite different in their labelling provisions and goods sold in this State must bear the labels required by the State law. The two laws are nearly alike in regard to prohibi¬ tion of ingredients, such as chemical preserva¬ tives, harmful colors and flavors and similar adulterations which are prohibited by both laws. In the case of goods which, to be legally sold, require specific form of labels, the provisions of the two laws are different and the dealer who buys to sell again inside this State cannot rely upon the national guaranty for his label¬ ling under the Iowa statute. In the case of compound and mixed foods the name first upon the label must be that of the largest ingredient. The laws of Iowa are strong in regard to dairy products ; standards fixed for various kinds of vinegar are also notably

complete ; floated oysters and shucked oysters to which ice or water has been added are specifically de¬ clared adulterated.

Kartsas. — The Food and Drug Law of this State was approved 14 Feb. 1907 and amended 12 March 1909. It is administered by the State Board of Health. It is almost an exact copy of the Federal law, the only dif¬ ference as applied to foods being that in sec¬ tion 6 under the definition of food, as used in this law, are added the words "or in the preparation of food.® These added words are meant to cover all condiments, flavors, extracts, baking powders and such other articles as enter into the preparation of food, which is not clearly set forth in the national law. In sec¬ tion 7, under <(Foods,® the word (

made or sold and of all vehicles in which it is transported. Sidewalk displays must be dust and fly proof. Oysters may not contain added water and must test to 10 per cent solids. Meat products may not contain sulphites or any secret preparation. All fish, fowl and game animals, rabbits, etc., placed in cold storage must first have the entrails drawn.

Kentucky. — The Pure Food Law of Ken¬ tucky was approved 13 March 1908 and amended 25 March 1909. It is administered by the director of the Agricultural Experiment Station who makes analysis of samples of food and drugs which are manufactured or on sale in the State, or are suspected by the Board of Health or Board of Pharmacy of being adulter¬ ated or misbranded, at the fixed fee of $7.50 and necessary expenses. He fixes standards of purity, quality or strength when such standards are necessary, or are not fixed by statute. The standards of the United States Depart¬ ment of Agriculture are followed wherever possible. Adulterations, if not unwholesome and truthfully stated on the label, are permitted. Every buyer of foods which have been bleached by sulphurous acid must be notified personally or in writing to that effect. Benzoic acid and benzoates are declared injurious to health and foods containing them may not be sold. Guar¬ antees to be protective of the retail dealer must be by a resident of the State.

Louisiana. — The food and drug regulations of the Louisiana Board of Health were estab¬ lished 7 July 1906 and have the force of law. They are a lengthy detailed schedule of stand¬ ards in connection with a general law, very nearly the same as the national Pure Food Law.

Maine. — The Maine Food and Drug Act was approved 28 March 1911 and is adminis¬ tered by the director of the Maine experiment station. It follows closely the national Pure Food Law. Pure milk and water are

protected by special legislation. Lobster meat must be sold in the shell. Sulphurous acid is permitted in molasses and dried fruits (

Maryland. — The Maryland Food and Drug Act was approved 5 April 1910. It is admin¬ istered by the State Board of Health. Federal standards are adopted for foods generally. Ice-cream is specifically defined and must con¬ tain not less than 4 per cent of milk fat and may have eggs incorporated with it and not to exceed 1 per cent of gelatine or vege¬ table gum. Such ice-cream may be sold with¬ out label. When containing more than 4 per cent of milk fat it must be labelled and the percentage stated. Nut ice-cream must con¬ tain 6 per cent of milk fat. Floated oysters may be sold if so labelled. Benzoate of soda is permitted to the amount of one-fifth of 1 per cent and sulphur dioxide to the amount of thirty-five one hundredths of 1 per cent.

Massachusetts. — The pure food regula¬ tions date back to 1902 and are administered by the State Board of Health. The 1911 re¬ visions incorporate many provisions of the Federal law. All chemical antiseptics except saltpetre are prohibited. Sellers of oleomar¬ garine are licensed but the possession or sale

of imitation butter is prohibited. The sale of candy containing more than 1 per cent alcohol to a person under 16 years of age is prohibited. Various other articles are the sub¬ ject of special enactment, such as vinegar, meats, dairy products and fish. Monthly bulle¬ tins are issued by the State Board of Health showing results of inspections.

Michigan. — A dairy and food commissioner directs the enforcement of the general food law passed in 1895 prohibiting and aiming to prevent adulteration, misbranding, fraud and deception in the manufacture and sale of articles of food and drink, and drugs. Several public acts refer specifically to various articles, including buckwheat flour, cheese, vinegar, renovated butter, corn syrup, ice¬ cream, etc. Articles containing benzoate of soda ((or other harmless preservatives® must be so labelled. Imitation jellies and jams may be sold under truthful labels, but they must not be colored in imitation of the real. Maple products, if adulterated, must not have the word ((maple® on the label. The law is pub¬ lished with a digest of rulings on some of these articles.

Minnesota. — The General Pure Food Law of 1905, amended in 1907, is administered by the dairy and food commissioner. Various articles of food

have received special enact¬ ment for the protection of the public against impurity, imitation and fraud. Any false or misleading statement, design or device on labels is unlawful. A distinction must be made in labelling for example, between pure honey and honey substitute, and between raw linseed oil and boiled linseed oil. Intent to deceive is made the test for penalizing adulteration, and the sale of adulterated goods. The making, selling or serving of adulterated liquors is forbidden. The sale of the veal of calves killed when less than four weeks old is pro¬ hibited. There is a strong act relating to the inspection of canneries, and establishing grades for canned fruits and vegetables. Various rulings and regulations define the standards and methods of labelling of other articles.

Mississippi. — A pure food law was passed 15 April 1910, following closely the Federal statute. The State chemist is charged with its enforcement. Underweight of flour, meal, pork, etc., is unlawful, and forfeits the articles. Preservatives in sausages are forbidden. Any sale of food known to be unwholesome is un¬ lawful.

Missouri. — The Missouri Pure Food Law was approved 13 March 1907. The definitions of adulteration and misbranding, and provisions relating to exemption under guaranty, inspec¬ tion, prosecution, etc., are the features of this law, as in nearly all the States. The United States standards of purity have been adopted. There is a special act relating to the inspection of apiaries to detect diseases among honey bees. There is also a Bureau of Dairying. The De¬ partment of Food and Drug Inspection has issued a handbook of the laws, which are both general and special, with rules and regulations, standards for foods and liquors, notes and com¬ ments. Bleached flour and coated rice may be sold if labelled accordingly. Borax and sul¬ phite may not be added to sausage or other meats. Spirituous, vinous and malt liquors

may not be adulterated except by druggists in making medicinal preparations. Substitutions of ingredients in package foods are permitted if they are not injurious, of equal food value, and tne label so states, but saccharine may not be substituted for sugar.

Montana. — The Food and Drugs Act was approved 8 March 1911. It is administered by the State Board of Health, under extended and explicit regulations. The Montana law is modeled on the Federal law, but elaborates some of the protective provisions. No adul¬ terated foods of any kind may be placed on the tables of hotels, restaurants or boarding-houses unless placards are conspicuously placed stating that <(Harmfully adulterated foods are not served.®

Nebraska. — The Food and Drug Act went into effect 5 July 1907, and

was amended in 1909 and 1911. It is administered by the Food, Dairy and Drug Commission, and executed by the gov¬ ernor as special commissioner. In the main it follows the Federal law, but is more explicit, and has some special provisions. Oleomar¬ garine may not be sold if colored. Butterine may be served at public tables only if notifica¬ tion to that effect is given to guests. Ice-cream is adjudged adulterated if it contains less than 14 per cent of butter fat. Provisions against bleaching of foods are suspended in the case of flour bleached by nitrogen peroxide. Coated rice may be sold if labelled accordingly. A deceptive label renders the goods under it mis- . branded. A guaranty does not protect the re¬ tail dealer unless given by a resident of the State.

Nevada. — The Food and Drugs Act was approved 13 March 1909, and is administered by the State Agricultural Experiment Station as a board of control. It is modeled on the Federal law, but makes many specifications in addition. Foods are misbranded if the name of the real manufacturer and the location of the factory are not given on the label. Liquors may not be adulterated with any substance which injuriously affect their Equality, purity or strength.® Sausage may contain cereal additions only if so placarded in the shops where sold, or so labelled on each package. Meat products may contain sulphur dioxide to the amount of thirty-five hundredths of 1 per cent, or benzoate of soda to the amount of one- tenth of 1 per cent.

New Hampshire. — The Food and Drugs Act of 7 March 1907, amended 6 April 1909, is, with one or two exceptions, like the national act, and there is co-operation of action between the State and Federal authorities. The State Board of Health issued a sanitary bulletin under date of October 1907, containing the pure food and drug laws of the State. It is made up of various separate statutes passed from 1895 to 1907, inclusive, relating to candy, vinegar, dairy products, etc., and also the general act with the rules and regulations for enforcing it. Adulterations to be permissible must be whole¬ some and truthfully labelled. Chemical pre¬ servatives, excepting (

as follows : < (For self-protection, every dealer in New Hampshire should demand of the manu¬ facturer or jobber a guaranty that the foods comply with the New Hampshire laws; and, further, the foods should be so marked, upon their receipt, that he may be able to identify, conclusively, the vendor, else he will be de¬ prived of the protection provided for in the guaranty.®

New Jersey. — The New Jersey Food and Drug Act was approved 20 May

1907, and amended in 1908, 1909, 1911 and 1912. It fol¬ lows closely the Federal law, but specifically provides that the oleomargarine law shall not be affected thereby. It is administered by the State Board of Health, which has formulated an exhaustive schedule of rules. The board published a pamphlet of the important acts relating to the sale or distribution of food or drugs. The national rules and regulations and food inspection decisions, in so far as they are applicable to the Food Law of their State (Re¬ vision of 1907) are regarded as indicating the policy of the board with respect to the en¬ forcement of the act. The act contains several distinct prohibitions relating to the manufac¬ ture and sale of various articles. The board enforces an elaborate schedule of food stand¬ ards; vinegar and bread being the subject of special enactments.

New Mexico. — The food laws of 1897 pro¬ hibit adulterations which are injurious to health or which are fraudulent in effect, and all sales of damaged goods unless purchaser is notified to this effect. Goods delivered to a purchaser must be those asked for, without substitution or adulteration.

New York. — The Pure Food Law of 1909 is administered by the State commissioner of agriculture. Bread, dairy products, adulterated vinegar, feed for animals, diseased animals, apples, pears, peaches and quinces are the subjects of special enactment; but the laws relating to adulteration or misbranding of food and food products rest upon two brief sections following the definitions of the Federal statutes in regard to confectionery in particular and foods in general. The rules of the State De¬ partment of Health practically cover the whole subject of the preparation and sale of foods. Examinations of milk are made monthly and of other foods semi-annually. Adulteration of maple sugar, maple syrup and honey is ex¬ pressly forbidden. The Sanitary Code of the City of New York is, in effect, a pure food law with special regulations. Misrepresenta¬ tion of identity, quality, manufacture or weight is penalized as a misdemeanor.

North Carolina. — The Food and Drug Act was approved 25 Feb. 1907, and amended in 1909. It is administered by the State Depart¬ ment of Agriculture. It follows closely the Federal law, and adopts the Federal standards. Special provisions forbid the addition of any habit-forming drug to any liquor except by a druggist upon a physician's prescription. Labels must be truthful, and different labels may not be placed on the same package. Imitation but¬ ter may be served at public tables only when notice of such use is given upon conspicuously placed placards, or printed on the bill of fare. Ice-cream which is in any sense an imitation or contains gelatine, gum or eggs must be so la¬

belled, or announcement made by placarding the room where it is served.

North Dakota. — The Pure Food Law was approved 8 March 1907 and is administered by the State Agricultural Experiment Station under rigid sanitary laws. It defines the adul¬ terating and misbranding of foods and bever¬ ages, specifying exceptions in the case of can¬ dies and chocolates and baking powders. The State law of 1907 affecting dairy products, en¬ forced by a dairy commissioner, is an import¬ ant feature. The State itself does not furnish its food laws in pamphlet form ; they are found in chapters 195 to 198, Laws of 1907, and chap¬ ters 188 and 189, Laws of 1909. Federal stand¬ ards are adopted where the State has not made specific regulations. Foods of quality or strength below the standards are declared mis¬ branded. Any deceit, direct or indirect, in any sale of foods is a misdemeanor. Stale, tainted or spoiled food may not be sold or even stored, and the sale of undrawn poultry is forbidden. No chemical preservative, alum, copper or iron salts, bleaching agents, or fillers may be used in any foods. An exception is made as to ben¬ zoate of soda in the case of perishable foods in bulk, where it is necessary to their preserva¬ tion, and not otherwise ; and must not exceed one-twentieth of 1 per cent. The use of ˆliquid smoke® in preserving meats or fish is forbidden and coal-tar dyes may not be placed in foods. Coated rice and bleached flour may not be sold in the State.

Ohio. — A general food and drugs law is included in the General Code of Ohio, 1910. It is administered by the State dairy and food commissioner; and printed in a book of the laws (1910), and a bulletin of patent and pro¬ prietary medicines. Vinegar, wines and liquors, dairy products, veal, candy, feed, maple sugar and syrup, flavoring extracts, canned products and linseed oil have special provisions, in ad¬ dition to the general laws. Commissioner Dun¬ lap stated in his report of 1908, ((Publicity is a great help in the enforcement of the food and drug laws. A small fine is easily paid and soon forgotten, but a public condemnation of a cer¬ tain brand of foods not only affects present dividends, but is very likely to affect those of the future and, in some cases, drives the dis¬ honest manufacturer entirely out of business.®

Oklahoma. — The Food and Drug Law was approved 20 March 1909 and is administered by the State commissioner of health. It is largely a copy of the Federal law. Extended sanitary regulations cover the inspection of premises where food is made, stored or sold and there are special provisions relating to bakeries, sidewalk and floor displays and slaughter-houses. Federal food standards are adopted and bread, confectionery, dairy prod¬ ucts, flavoring extracts, flour, lard, preserva¬ tives, spices and condiments are specially pro¬ vided for. The selling and buying of damaged foods is forbidden. The seller of spoiled eggs is personally responsible. Acid drinks may not be kept in or sold from a metallic container which is not enamelled. Artificial coloring matters which are

((regarded as harmless® may be used, but consumers are warned that they have not been proved harmless except in very small quantities. The use of imitation or com¬ pound foods, or ingredients of foods, in hotels and other public houses must be announced to

guests by placards or conspicuously on the bill of fare.

Oregon. — The Pure Food Law of 1910 is administered by the dairy and food commis¬ sioner. It embodies most of the provisions of the Federal law. Coated rice may not be sold unless with printed instructions to wash off the coating before cooking it. Tomato catsup may contain benzoate of soda to the amount of one- tenth of 1 per cent, but no other goods may be so treated except upon the decision of the com¬ missioner that it is necessary to preserve them. A "reasonable® variation in weight from that stated on the label is permitted if the specimens examined are as often overweight as under¬ weight. There are special provisions regarding the licensing of fish canners, the duties of the fish warden, the branding of fruit boxes and the inspection of orchards and packing-houses.

Pennsylvania. — The Pure Food Act was approved 13 May 1909. It is modeled after the Federal law, but especially preserves the pro¬ visions of the 1897 act relating to milk and cream, the oleomargarine act, the butter, cheese and game laws and the vinegar regula¬ tions. It is administered by the dairy and food commissioner with the aid of the factory inspector and the State Livestock Sanitary Board and under its extended rules and regu¬ lations. Unwholesome foods and foods with unwholesome additions may not be sold. Oth¬ erwise, substitutions and additions to foods are permitted if the quality is not depreciated and the label states the facts. However, no word may be used on the label which is misleading. It is ruled that "Coffee Compound® is mis¬ branding, inasmuch as the added substances are not coffee. Second-hand bottles (except milk and beer bottles) may not be used as food containers. There are separate acts relating to non-alcoholic drinks, ice-cream, fresh eggs, lard, fruit syrup, renovated or process butter and fresh meat, poultry, game and fish. There are also rules and regulations issued by the commissioner relating to other articles of food. The State Department of Agriculture pub¬ lishes a bulletin containing the food legislation together with a digest of numerous court de¬ cisions relating thereto.

Philippine Islands. — Here the United States Food and Drugs Act, 30 June 1906, is adopted in toto, excepting that, instead of the United States

Secretary of the Treasury, the Secre¬ tary of Agriculture and the Secretary of Com¬ merce and Labor making the rules and regula¬ tions to carry out the provisions of the act, as in the Federal law, this duty devolves upon the insular collector of customs, the director of health and the collector of internal revenue of the Islands, subject to the approval of the Phil¬ ippine Secretary of the Interior. All examina¬ tions are made by the Philippine Bureau of Science.

Porto Rico. — The Federal Food and Drugs Act is administered by the Insular Board of Health. Adulterations are unlawful only if of unwholesome material or fraudulently labelled.

Rhode Island. — The Pure Food and Drug Act was approved 26 May 1908, and is admin¬ istered by the Board of Food and Drug Com¬ missioners under an extensive code of defini¬ tions and rules. It follows in general the Fed¬ eral law, and the government standards are adopted. Additions to foods permitted by the

Federal law are modified in some cases. The seven coal-tar colors allowed by the govern¬ ment may be used also in Rhode Island, but only if no other colors are used in the same foods. Adulterated or impure spirituous liquors, however labelled, may not be sold, of¬ fered for sale nor kept for sale in this State. Possession of such liquors by a dealer is re¬ garded as evidence that he keeps them for sale. A State assayer of liquors has charge of this section of the law. There are also general State laws relating to milk, beef and pork.

South Carolina. — The Food and Drugs Act was approved 20 Feb. 1907. It is administered by the State Board of Health. The definitions contained in the national act are followed in regard to adulteration and misbranding, label¬ ling and guaranty. Bleached flour requires a label "on each sack.® False or misleading statements on labels as to "identity, strength, quality, quantity, or purity,® or place of manu¬ facture are forbidden, but this is held not to apply to advertising. A special act protects the water supply.

South Dakota. — The Pure Food Act was approved 4 March 1909, and amended in 1911. It is administered by the food and drug com¬ missioner. Standards are set for flavoring ex¬ tracts and other articles. "Floated® oysters may be sold if so labelled. Canned oysters must not have added water unless the number of ounces of oyster "meat® is stated on the label. "Unnecessary water® may not be added to canned fruit and vegetables, unless that fact is plainly stated on the label. The manufac¬ ture, sale and shipment of bleached flour is for¬ bidden because (1) by that process it is made to appear of a better grade and (2) injurious nitrites are added. Sulphur dioxide and .salts of copper are permitted pending a decision as to

their wholesomeness. Compounds of boric acid and sulphites may not be used in meat products. Sausage may contain cereal only if so labelled. Impure ice may not be sold for food purposes and dealers are required to no¬ tify customers of such impurity. In view of the fact that nearly all the catsup on sale in the State "has been made in part from decom¬ posed fruit,® the whole State is warned against its sale and consumption in Bulletin 21. The commissioner is required to publish from time to time in all official county papers a list of the foods found to be adulterated or misbranded.

Tennessee. — The Food and Drug Act was approved 9 April 1907, and amended in 1911. The Federal law is followed closely. Stand¬ ards of dairy products are established by a spe¬ cial act. Saccharine and "liquid smoke® may not be used in foods, cider may not be colored nor have added sugar, and no beverage com¬ posed only in part of apple juice may be called or labelled "cider.® Labels are required to tell the exact truth as to the goods under them. Inconspicuous or obscure type and statements on the label is declared a punishable evasion of this law. Where the strength of a food prep¬ aration (as vinegar) is not stated it shall be assumed as of standard strength, and goods which fall below the standard are declared mis¬ branded.

Texas. — The Federal law is followed here by the Food and Drugs Act approved 13 March 1911. It is administered by the dairy and food commissioner. The standards of the United

States Department of Agriculture are formally- adopted. There are separate rulings relating to alcoholic beverages, baking powder, cider, cof¬ fee, confectionery, dairy products, extracts, fish, flour, honey, lard, meat, preserved fruit and vegetables, syrups, spices and condiments, and vinegar. Benzoate of soda may 6e used only in catsup, sauces, fruit juices and jams, and then only if the percentage is stated on the label. Oxides of sulphur may be used in bleaching, clarifying and refining food products, and phos¬ phoric acid is approved ; but no other (

Utah. — The Food and Drugs Law approved 25 March 1907 is modeled after the Federal law. It is administered by the dairy and food com¬ missioner, with the aid of the State chemist. An extensive code of sanitary regulations is provided. The use of benzoate of soda is re¬ stricted to catsups and fruit jellies and pre¬ serves, and <(such other perishable articles as the State food inspector may determine,® but not in excess of

the amount of one-tenth of 1 per cent, and only when stated on the label. Soda fountains serving syrups containing coloring matter or benzoate of soda must display a placard stating such facts. The adulterating of or mixing of intoxicating liquors, or the sale of such liquors at a bar or in bottles, is for¬ bidden unless the container shall be labelled with the exact formula of the adulteration or mixture. No ingredients not normal may be added to spirituous, vinous or malt liquors, not even common salt or sugar.

Vermont. — 'The Pure Food and Drug Law approved 3 Dec. 1908 and amended in 1909 is to a considerable degree modeled after the Federal law. It is administered by the State Board of Health. Whisky is held to be both food and drug, and no addition may be made to it nor any substance abstracted from it which shall reduce its normal strength or constitution, nor may it be colored to improve its appear¬ ance : nor shall any such treated liquor be sold in the State. Untruthful and misleading state¬ ments as to foods in advertising have been held not to be an infringement of this law. A com¬ plete schedule of food standards, for both ani¬ mal and vegetable products (the latter including beverages of all kinds), and for salt, and baking powders, is published in pamphlet form with the general law relating to pure food and drugs. Both the law itself and the rules and regula¬ tions for its enforcement are original in form and statement, although the effect is similar to that of the Federal act.

Virginia. — The Pure Food Law was ap¬ proved 14 March 1908. It is modeled after the Federal law. It is administered by the dairy and food commissioner under a sanitary code which was added to in 1911. The retail dealer is protected by a guaranty only when it is given by a resident of the State, and on the goods remaining in original packages. The use of copper salts to <(green® vegetables and pickles is permitted Spending further investiga¬ tion and rulings.® Any food product which ˆcontains naturally a poisonous or deleterious ingredient® is held not to come under the pro¬ visions of the law. Sulphite may not be used in preserved meats, and borax only in <(very limited quantity® on bacon. Alum may be used in the preparation of pickles if they are after¬ ward well washed, and labelled (

alum.® Benzoate may be added to cider, but not to exceed one-tenth of 1 per cent. Ice-cream may contain a (

Washington. — The Food and Drugs Act was approved 15 March 1907, and amended 1909. It is administered by the State dairy and food commissioner. In the main it fol¬ lows the Federal law, but is more rigid. Chem¬ ical preservatives may not be used in soft drinks, soda water syrups or fruit syrups, nor in fresh meat, milk or cream. The addition of formaldehyde to milk (

West Virginia. — The Food and Drugs Act of 19 Feb. 1907 is similar to the Federal law in providing against fraudulent and deleterious adulteration, but it has no provisions against misbranding. External preservatives (like liquid smoke) are not forbidden. False or mis¬ leading statements on a

package or its label de¬ termine the food to be adulterated. The sale of unwholesome food is a felony.

Wisconsin. — A dairy and food commis¬ sioner publishes the dairy and food laws, and the decisions of the courts relating thereto. They were first enacted in 1898, and were amended and added to in 1907 and 1909. The law of 1909, taking effect 1 Jan. 1910, and pre¬ scribing legal definitions and standards for a large number of food products, is one of the most important food laws ever enacted by a State legislature. Coatings, colorings and stainings of articles of food and the bleaching of grain with sulphur, and the sale of such foods and foodstuffs is forbidden. Chemical preservatives may not be used, except benzoate of soda as an external application, and then only when the food to which it is applied may be easily washed clean of it. Specific provi¬ sions are made as to canned goods, baking powders, syrup, molasses, glucose mixtures, maple mixtures, sausage mixtures, jelly and jams, dairy products and liquors. There are important chapters also referring to the sani¬ tary production and distribution of food.

Wyoming. — The Food and Drugs Act of 2 March 1911 is administered by the dairy, food and oil commissioner. It is modeled after the Federal law. The food standards of the United States Department of Agriculture are formally adopted and foods not up to those standards are declared adulterated. The mak¬ ing and selling of bleached flour is forbidden. The statement of facts required by law to be placed on the label must be on the principal or "face label.®

Bibliography. — Dunn, C. W., (Pure Food and Drug Legal Manual > (New York 1913) ; Greeley, A. P., (The Food and Drugs Act, June 30, 1906: A Study) (Washington 1907);

Philippine Islands Statutes No. 1655 (Manila 1910) ; Scientific Standards for the Government Regulation of Foods (in Popular Science Monthly, Vol. 83, pp. 344-354, Lancaster, Pa., 1913). See Food, Adulteration of.

Richard Ferris,

Editorial Staff of The Americana.

FOODS FOR THE SICK. See Sick,

Foods for.

FOOL. See Jester.

FOOL OF QUALITY, The, a curious novel by Henry Brooke, published originally in five volumes (1760-77). It was considered of such spiritual value by John Wesley, the founder of Methodism, that he prepared a special edition of it for the use of his follow¬ ers. Toward the close of the book its mystic¬ ism becomes exceedingly exalted and visionary, suggesting the author's acquaintance with the teachings of the German mystic, Jacob Boehme.

FOOLS, Feast of. Festivals under this name were regularly celebrated, from the 5th to the 16th century, in several countries of Europe, by the clergy and laity, with the most absurd ceremonies, and form one of the strangest phenomena in the history of man¬ kind. Among the heathen festivals which the Christians could not easily abolish were the Saturnalia, which, in the confusion of all dis¬ tinctions of ranks, and in extravagance of merriment, exceeded the gayest carnivals. The feast of fools, among Christians, was an imi¬ tation of the Saturnalia, and, like this, was cele¬ brated in December. The chief celebration fell upon the day of the Innocents, or upon New Year's Day; but the feast continued from Christmas to the last Sunday of Epiphany. At first only the boys of the choir and young sacristans played the principal part in them ; but afterward all the inferior servants of the Church, and even laymen, engaged in them, while the bishop, or the highest clergyman of the place, with the canons, formed the audience. The young people, who played the chief parts, chose from among their own number a bishop or archbishop of fools, or of unreason, as he was called, and consecrated him, with many ridiculous ceremonies, in the chief church of the place. This officer then took the usual seat of the bishop, and caused high mass to be said, unless he preferred to read it himself, and to give his blessing to the people, which was done with the most ridiculous ceremonies. During this time the rest of the performers, dressed in different kinds of masks and disguises, engaged in indecent songs and dances, and practised all possible follies in the church. Except from their association with the Saturnalia nothing is known of the origin of these extravagancies, which appear to have been very ancient. The most celebrated, and probably one of the most ancient, of these festivals was held in the city of Sens, in France. By an ordinance in 1245, intended to abolish it, it is alluded to as a very ancient celebration. So general was the custom of these celebrations in France, that it is said there were few towns at the end of the 17th or even as late as the middle of the 18th cen¬ tury in which associations did not exist. Sim¬ ilar antics seem to have been played in other countries, as Germany, England and Scotland, but it is to be hoped that the height of pro¬

fanity reached in some of the extant liturgies and rubrics was not

commonly attained in these fooleries. The fete des fous at Sens was suppressed in 1547. These fetes were fre¬ quently prohibited, but until the Reformation period, when they were considered dangerous by the ecclesiastical authorities, they were com¬ monly tolerated. To account for these cele¬ brations, so opposed to all our ideas of re¬ ligion, decency and common sense, we must transfer ourselves to times when men com¬ bined, with childish simplicity, the most ridicu¬ lous with the noblest subjects, and often with less injury than we should suppose to the latter.

FOOL'S ERRAND, A, a story by Albion W. Tourgee, published in 1879. It is the first of a series dealing mainly with events con¬ nected with the Civil War. <(The Fool® is Comfort Servosse, a Union colonel, who re¬ moves from Michigan to a southern plantation after peace is declared. The story of his re¬ ception there and the difficulties encountered, arising out of old prejudices upon the one hand and his own training and convictions upon the other, is told with much detail and strong local coloring.

FOOL'S PARSLEY. See Dog Parsley.

FOOT. The lower end of the leg that rests on the ground. In the human foot the bony structure is made up of three divisions, the tarsus, metatarsus and phalanges. Seven bones form the tarsus ; the os calcis or heel- bone, the largest and strongest of all, carries the principal part of the body's weight. On its posterior surface the large muscles of the calf find their attachment through the tendon Achilles. Half in front of the os calcis and superimposed upon it is the next largest bone, the astragalus. This bone bears directly the weight of the body through the large leg-bone, the tibia, resting on the upper surface. On the outer side in front of these two bones is the cuboid, and on the inner side the scaphoid or navicular bone. In front of the scaphoid there are the three small cuneiform bones, internal, middle and external. These three bones with the cuboid form articulations with the next row or division. The metatarsus is formed of five so-called long bones ; that is, each bone has a shaft and articulating extremities. To each of these is joined one of the next division or phalanges. These are also long bones, the great toe made up of two bones, and the others of three each. Strong ligaments bind these bones to one another in such a way as to form and maintain an arch extending forward and back¬ ward, and somewhat from side to side, the points of contact with the ground being only with the os calcis behind and the metatarsus and phalanges in front — the so-called ball of the foot. By this arrangement shock is trans¬ mitted through an arch or spring, pads at these two points also further eliminating jars. The sole of the foot is also covered with small muscles, which move the toes, and tendons that flex the toes and extend the foot on the ankle. Across the dorsum or instep pass the flattened tendons that flex the foot and extend the toes. The chief artery to the sole comes down on the inner side of the

heel, passing across to the outer side, then arching across to the inner

side again, giving off branches to the toes. On the dorsum the main artery comes to the sur¬ face at the instep and forms an arch of supply to the toes. The nerves on both surfaces closely follow the arteries.

Among the lower animals, monkeys have feet that approach nearest to those of the human. The separation of the great toe, in a way corresponding to the thumb, and the ab¬ sence of the arch are the points of difference. In many of the animals, as in the cat tribe, there is a greater or less tendency toward a rudimentary inner toe, and an increase of the function of the ball of the foot, with a lessen¬ ing of the importance of the heel. In the cattle and equines the toes are fewer, and the nails or claws become converted into hoofs. The horse walks on the end of his single digit.

In measure of length, the foot is derived from the assumed length of the human foot, containing 12 linear inches. A square foot is a square whose side is one foot, and is there¬ fore equal to 144 square inches. A cubic foot is a cube whose side is one foot, and the cube contains 1,728 cubic inches. The foot is a com¬ mon measure in various countries, but its dimen¬ sions vary somewhat. In poetry, a measure consisting of a variety of syllables, two, three or four, in combinations of long and short, or accented and unaccented syllables. The num¬ ber of possible varieties of feet is reckoned at 28. (See Rhythm). In mechanics and popular usage, the lower part of a thing, especially the lower end of a leg, as of a table, desk, etc.

FOOT AND MOUTH DISEASE. See

Murrain.

FOOT-POUND, the unit of work or of energy that is commonly used in engineering calculations in England and the United States. It is defined as the quantity of work expended in raising a weight of one pound through a vertical distance of one foot. As the attraction of the earth for a pound of matter varies some¬ what in different latitudes and at different heights above the sea, the foot-pound is sub¬ ject to coresponding variations as we pass from one locality to another. To give the unit greater definiteness it has been proposed to de¬ fine it as the quantity of work done in raising one pound of matter through a vertical dis¬ tance of one foot, at the level of the sea in latitude 45°. This definition differs from the ordinary one, it will be observed, solely by speci¬ fying the locality at which the experiment is supposed to be performed. See Units of Measurement.

FOOT-ROT, a disease in the feet of sheep, the more common form of which is an in¬ ordinate growth of hoof, which at the toe, or round the margin, becomes turned down, cracked or torn, thus affording lodgment for sand and dirt. In the second form of the dis¬ ease the foot becomes hot, tender and swollen, with ulcerations between the toes, followed by the sprouting of proud flesh. The inflammation is due to suppression of the secretion of the gland between the toes, usually the result of standing too much in wet ground. The best remedy is to pare away the diseased and ragged parts of the hoof, thoroughly applying a lotion made by dissolving one pound of blue vitriol in a quart of water, and keeping the animal al¬ ways in a dry place.

FOOT- WALL. In mining language, the foot-wall of a vein is the rock boundary of its lower side, the side on which a miner would stand in breaking down the ore. The term is also used in speaking of a fault or rock disloca¬ tion, the foot-wall of a fault being formed by the edges of the rock strata that underlie the plane of displacement. See Fault; Mines and Mining; Ore Deposit.

FOOT WASHING, a religious ceremony which was very general in the early Christian Church and still survives in the Roman Catho¬ lic denomination. It arose in the desire to emulate the example and humility of Christ who at the Last Supper laved the feet of His dis¬ ciples. It came to be observed generally on Maundy Thursday of Holy Week, was prac¬ tised by the popes during the Middle Ages and also by Catholic monarchs. At present nearly all Catholic bishops perform the cere¬ mony and it is also observed by the emperor of Austria and the king of Spain. Among the Reformers, it was retained only by the Ana¬ baptists, Moravians, members of the Church of the Brethern (Dunkers), Sandemanians and a few minor sects. In the Russian Church it is observed during Easter week by the pilgrims to Jerusalem.

FOOTA-JALLON. See Futa-Jallon.

FOOTBALL IN AMERICA, as in Eng¬ land, is of different varieties, but by far the most prominent is the game played in the col¬ leges. This type is the outgrowth of the Eng¬ lish Rugby and still possesses points of similar¬ ity to the game from which it was derived. Association football is played in and around some of the mill towns where the foreign popu¬ lation predominates, and previous to 1870 a mongrel kind of football made up of a com¬ bination of Association and Rugby had some vogue, and was the original form of the sport in America.

The type, however, known as American foot¬ ball suggests now only one variety and that is the one mentioned above as prevailing in col¬ leges and

universities. This sport draws to each of its chief annual contests from 25,000 to 40,000 spectators. During its season, which consists of October and November, it tempo¬ rarily eclipses all other athletics in interest. For this reason it is the money maker in col¬ lege athletics, in a great number of universities the receipts from the football contests prac¬ tically supporting the other athletic branches throughout the year.

This sport, developed as it now stands, was originally introduced into American colleges by Harvard, whose team, having visited Canada and played under the Canadian rules, became enamored of the style of the English Rugby, and, although in 1875, as a matter of considera¬ tion for her ancient rival, Yale, Harvard agreed to compromise between what was then known as American football and English Rugby, in the next year, 1876, both teams adopted the Rugby Union rules as they stood at that day. Unfortunately for the peace of mind of the legislators, but probably fortunately in another way, in that the final result was the develop¬ ment of still another distinct type of football, there were no traditions in America regarding the English Rugby code and what was for¬ bidden by letter was accepted as barred, whereas

anything that was not thus distinctly prohibited the American player thought was perfectly legitimate. Contentions arose over the interpre¬ tation of the rules and these discussions led to conventions, and, in the settlement of the problems arising, the rules rapidly multiplied, until in a few years there were more than twice the original number. While this was happen¬ ing, some of the old English rules apparently became dead letters and were, therefore, dropped. When captains and players attended any of these conventions it was only human that they should contend for possible advan¬ tages for their own teams rather than for the improvement of the game as a sport and this led to the appointment of an advisory commit¬ tee of graduates. In their hands was placed the matter of rules to this extent, that yearly they met and recommended changes which were then submitted to an intercollegiate association for discussion and usually for approval. This lasted as long as there was an intercollegiate association or league of colleges indulging in football. This league finally dissolved and for the season following there were two codes of rules in existence adopted by two different sets of universities. This was wholly unsatisfactory and led to the intervention of the University Athletic Club of New York. This club selected football enthusiasts and asked from them a recommendation as to a code of rules. These gentlemen met and framed such a code, which was then adopted by the various colleges throughout the country. This method of

pro¬ cedure lasted for several years, even after the dissolution of the University Athletic Club, and it is from this body that the football rules emanated, until at the end of the season of 1905 a general conference of colleges not repre¬ sented upon the Rules Committee appointed seven delegates with whom the old committee amalgamated, forming a new committee of 14. This committee made the rules for 1906 and introduced what was known as the 10-yard rule, which practically did away with the old mass plays that had caused the game to become too contracted.

As for a brief description of the game and the way in which it is played, the following gives the main points :

The game is played on a field rectangular in shape, 160 feet wide and 330 feet long. The outline of this field is made by heavy white lines marked, as are the lines in a tennis court, with lime. This field is also traversed by transverse lines five yards apart marked for the conven¬ ience of the referee in judging the distance gained or lost by either side. In addition to these transverse lines the field is marked by longitudinal lines also five yards apart in order to assist the referee once more in measuring dis¬ tance rapidly with his eye. This latter mark¬ ing was rendered necessary by a rule providing that within that section of the field the quarter¬ back may run with the ball providing he goes a certain distance out, that is, toward the side line, from the man who puts the ball in play in the centre. This same five yard distance gov¬ erns a forward pass. The lines which mark the ends of the field are called goal lines, and in the middle of each is a goal made by erect¬ ing two posts 18 feet 6 inches apart with a cross bar 10 feet from the ground. The ball

is a prolate spheroid in shape consisting of a rubber bladder in a leather cover.

The game is played by 11 men on a side, these 11 men being called a team. For the purpose of general distinction, although differ¬ ent formations are possible, the seven men who play in the forward line, that is on a line with the ball when it is put in play, are called the rushers, the men behind them the backs. The distinguishing terms for the men in the line are of interest. First there is the centre rusher, or centre, or snap-back, which term designates the man who stands in the middle of the line and usually puts the ball in play in a scrim¬ mage. The men on his right and left are called guards, the men next beyond them toward the ends are called tackles, and the two men on the ends of the line are called the ends. The man close behind the centre rusher is called the quarter-back. The two men some feet behind him are called the half-backs and the fourth man behind the line is called the full-back. In executing various plays the men take up differ¬ ent positions on the field, but they are usually distinguished by their positions

as above.

The game is started by placing the ball in the middle of the field and a man of the side in possession must then kick it at least 10 yards into the territory of the opponents, his own men being behind him when he kicks the ball and the opponents standing at least 10 yards back from the middle line of the field. The choice of goals and the possession of the ball having been determined by the toss of a coin, the side winning has the privilege of thus either kicking off or selecting either goal. When the ball is once kicked off any man who is on side, that is, between the ball and his own goal, may secure it and run with it and when he is thus running may be tackled by his opponents and brought to a stop. If he is thus tackled and stopped he calls Mown® and the ball is placed on that spot for a scrimmage. When the ball is thus down the two teams line up opposite each other, the side with the ball en¬ deavoring to protect its men so that one of the backs may be able to secure the ball and make a run with it, kick it, or pass it, while members of the opposing side are endeavoring to break through and stop this. The men of the side which has the ball in its possession may not use their hands or arms to obstruct their op¬ ponents, but may do this with the body only. The players of the side not in possession of the ball on the other hand are privileged to use their hands and arms to break through the ranks of their opponents. The man who has the ball in his possession, that is running with it, may use his hands and arms to ward off the opponents, but the rest of his side may not. The play thus continues by a succession of downs and runs interspersed with kicks, for a side may kick or pass the ball under certain limitations instead of running with it if they so desire.

In order to prevent a side holding the ball indefinitely without making progress there is a rule providing that in three attempts the side must advance the ball 10 yards or surrender it to the opponents. For this reason it is quite customary after two attempts, if the desired ground, has not been gained, for the side in possession to kick the ball, thus transferring it

to the possession of their opponents as far into the opponents' territory as possible. One forward pass is allowed to a scrimmage under certain restrictions, and a kicked ball striking the ground puts all the players of the kicker's side <(on side,® otherwise a man who gets ahead of the ball when last touched by one of his own side behind him may not touch the ball. When the ball goes across the side line it is out of bounds and if it has gone out of bounds through being kicked, it belongs to the oppo¬ nents, but if a man carries it out of bounds, in his possession, his own side has the

right to it. The ball is brought back to the spot where it crossed the line and is put in play by the holder walking in a certain distance and putting it on the ground for a scrimmage as already de¬ scribed.

The game thus proceeds until the ball ap¬ proaches one or the other goal line and here begins the question of generalship for scoring. If the ball be kicked by a drop kick over the cross bar of the opponent's goal it counts the side thus kicking it four points. If the ball be carried by the player of that side across his opponent's goal line or secured by him after it has been kicked across it scores a touch-down, which counts five points and also entitles the side making it to a try at goal. This is per¬ formed either by kicking the ball out to a player who catches it and makes a mark with his heel, the ball then being kicked from any point be¬ hind that mark, or being brought directly out by a player of the side which has touched it down and held on the ground for another of his side to kick. In either event if the touch¬ down be converted into a goal by the kicking of the ball over the cross bar it adds an addi¬ tional point for this scoring.

There is one other possible means of scoring and that is when a side is pressed by the opponents, and, instead of the opponents secur¬ ing the ball, the defenders of the side secure it and either kick, pass or carry it across their own goal-line and touch it back behind their own goal. This entitles them to carry the ball out 25 yards for a kick. The opponents stand on the 25-yard line while this kick is made. This safety, however, as it is called, counts two points against the side making it.

The game is divided into two halves of 35 minutes each with a 10-minute intermission, and the side which has scored the greater number of points at the end of the full period of play wins the game.

American football, while it started from the English Rugby Union rules, has developed in many directions so that the game would not now be recognizable to an Englishman. The one thing that he would see that possibly re¬ minded him of Rugby would be that occasion¬ ally a man runs in the open field with the ball. But the various formations and the tactics adopted would puzzle him exceedingly. Like the Rugby Union, however, there is some kick¬ ing in it, but far less than in the English As¬ sociation. In the English scrimmage the two lines of forwards push until the ball pops out somewhere, whereas in the American scrimmage the man in the centre who has possession of the ball snaps it out with his hand whenever he is ready to do so to the quarter-back who stands directly behind him and this man passes it to some other player of his own side. This enables

the Americans to carry out their very elab¬ orate system of plays because

the ball can be absolutely directed at any time to any spot. So perfect has this development become that the quarter-back gives signals for the plays by means of which signals the entire team knows exactly what man is to receive the ball and where he is to run with it when he has re¬ ceived it. Thus the others may assist him very materially in making his gain. Some idea of the variety of plays can be gathered from the fact that teams can without difficulty execute no less than 40 to 50 plays, each distinct from the other. It is not difficult to imagine that with this highly developed form of attack a most thorough and well-studied plan of defense is equally necessary. It is also not difficult to understand that this development on both sides has brought about specialization in the work of various players so that almost every position on the field has a distinct line of duties which its incumbent must be able to perform with skill and accuracy. The signals are quite elaborate codes, devised for easy memorizing, but at the same time sufficiently intricate and bewildering as to render the liability of discovery by the opponents very small.

In the American game the quarter-back usu¬ ally gives these signals, although the captain sometimes prefers to give them himself.

The history of the game in America as in England and elsewhere has been one of dis¬ cussion and opposition, the latter coming from those who believe that the sport is too strem uous. Kingly edicts were issued in the old days in England and in the United States State legislatures have been asked at various times to forbid the pastime. Yet it has lived on. In America the game has had already three great epochs as it were. The first in the 80's when the (

A widespread public sentiment was advanced in favor of such a change in the rules as might bring about more <(open play,® and it was further felt by the committee and their ad¬ visers that the rules should be so modified and the powers of the officials so increased as to eliminate to the greatest possible extent un¬ sportsmanlike tactics, and with these ends in view the committee decided upon the incorpora¬ tion of two important changes. The first of these was the adoption of the 10-yard rule together with the forward pass and on side kick. The second general change was the incor¬ poration of rules that in some cases greatly increased the penalty for unfair tactics, and in others did away with all excuses for indulgence in certain rough plays, at the same time pro¬ viding for more efficient work by officials. To make sure that the wishes of the committee were carried out in this matter, the duties of the linesman were enlarged and he was made practically an assistant to the umpire and given absolute power to deal with certain classes of fouls. A second umpire was added. The American game thus has for its conduct four officials, the referee, whose duties are prin¬ cipally related to the progress of the ball, the umpires who have charge as it

were of the conduct of the players, the linesman who acts as an added umpire, at the same time assisting

the referee in the matter of measurements and time keeping. Walter Camp,

Yale University.

FOOTE, Allen Ripley, American econ¬ omist : b. Olcott, N. Y., 1842. He received a common school education and served with the Union forces in the Civil War. From 1899 to 1905 he edited Public Policy and in 1907 was made president of the National Tax Associa¬ tion. Two years later he became president of the Ohio State Board of Commerce. He pub¬ lished (Economic Value of Electric Light and Power) (1899) ; (Municipal Public Service In- dustries) (1899) ; Constitutional Municipal Government* (1900) ; (Public Policy Edi¬

torial (3 vols., 1901—03) ; (Employers and Employees* (1902) ; (Labor, Capital and the Public) (1905) ; Regulation of Public Utilities > (1911) ; Compensation for Industrial Injuries)

(1913).

FOOTE, Andrew Hull, American naval officer: b. New Haven, Conn., 12 Sept. 1806; d. 26 June 1863. He entered the navy as a midshipman in 1822, and in 1849-52 he was en¬ gaged in the suppression of the slave trade on the coast of Africa. In command of the China station in 1856, when the Chinese and English were at war, he exerted himself to protect American property, and was fired upon by the Celestials. His demand for an apology was re¬ fused and he stormed and captured four Chinese forts. Previous to the War of Seces¬ sion he was commandant at the Brooklyn Navy Yard. In 1861 he commanded the expedition against Fort Henry and Fort Donelson (q.v.) on the Tennessee and Cumberland rivers, and directed the attack on Island Number 10. In 1862 he was promoted rear-admiral. He wrote (Africa and the American Flag) (1854). He was appointed commander of the fleet at Charleston to succeed Admiral Dupont, but died before occupying the command.

FOOTE, Arthur, American composer: b. Salem, Mass., 5 March 1853. He was grad¬ uated at Harvard 1874, became a teacher of the piano, and was organist of the First Church in Boston 1878-1910. He has devoted much time to composition, in which field he has been very successful, having published a cantata (Hia- watha,* a trio in C major for piano, violin and ’cello ; suites for the orchestra ; an overture,

FOOTE, Henry Stuart, American states¬ man: b. Fauquier County, Va., 20 Sept. 1800; d. Nashville, Tenn., 20 May 1880. He was ad¬ mitted to the

bar in 1822 ; removed to Missis¬ sippi in 1826 and entered politics. In 1847 he was elected to the United States Senate, and in 1852 was elected governor of the State. He was a strong opponent of secession at the con¬ vention held in Knoxville, Tenn., in 1859, but when secession was an assured fact, he accepted an election to the Confederate Congress, where he opposed most of President Davis' measures. He evidently sympathized strongly with the North, for immediately ®n the close of hostili¬ ties he located in Washington to practice law.

He became an active supporter of President Grant, and his policy of reconstruction, and was rewarded with the post of director of the United States Mint at New Orleans. He wrote several books of reminiscences, including a (History of the Civil War (1867).*

*FOOTE, Mary (Hallock), American novelist: b. Milton, N. Y., 19 Nov. 1847. She studied art in New York, and in 1876 she was married to Arthur D. Foote, a mining engineer. Since her marriage she lived in California, Colorado and Idaho, which have furnished themes for her novels and drawings. She also furnished elaborate illustrations for Long¬ fellow's (Skeleton in Armor) and (The Hang¬ ing of the Craned She has published (The Led Horse Claim) (1883) ; (John Bodewin's Testimony * (1886) ; (The Last Assembly BalP (1889) ; (In Exile and Other Stories) (1894) ; (The Chosen Valley) ; (Coeur d' Alene* (1894) ; (The Cup of' Trembling and Other Stories* (1895); (The Little Fig Tree Stories) (1900); (The ProdigaP (1900) ; (The Desert and the Sown> (1902) ; (A Touch of Sun and Other Stories * (1903) ; (The Royal Americans*

(1910); Ricked Company (1912); (The Val¬ ley Road) (1915); etc.*

FOOTE, Samuel Augustus, American statesman; b. Cheshire, Conn., 8 Nov. 1780; d. there, 15 Sept. 1846. He was graduated at Yale College in 1797; served in the legislature for many years ; was member of Congress in 1819 — 21 and 1823-25 ; served one term in the United States Senate; was governor of Connecticut, and one of the presidential electors on the Clay and Frelinghuysen ticket in 1844. It was he who in 1821 introduced the bill <(on the public lands® that occasioned the memorable debate between Daniel Webster and Senator Hayne of South Carolina.

FOOTMEN, a collector's name for the small gray and yellowish moths of the family Lithostidce, which have simple antennae, rather narrow fore wings, beneath which the broad hind wings are folded when at rest.

FOOTSCRAY, foots'kra, Australia, city of Bourke County, Victoria, on Saltwater River, four miles west of Melbourne. It has large bluestone quarries from which much of the building stone of Melbourne and vicinity

is obtained. It is also the seat of important manufactures, including sugar mills, soap works, jute factories, foundries, woolen mills, chemical works, etc. Pop. 23,643.

FOPPA, fop'pa, Vincenzo, Italian painter: b. Brescia, about 1427; d. 1515. We know very little of his early life, but about 1456 he settled in Pavia, where he was employed by the Sforzas and became the leader of the Lombard school of painting. He returned to Brescia in 1489. He enjoyed a wide popularity in his lifetime. His most noted works are a fresco in the Brera Gallery, Milan, (Martyrdom of Saint Sebas¬ tian/ and a (Crucifixion in Bergamo. At least two of his Madonnas are owned in Amer¬ ica, one by Theodore Davis of Newport, R. I., and another by J. G. Johnson of Philadelphia, Pa. Consult Ffoulkes, C. J., and Maiocchi, R., (Vincenzo Foppa* (London 1910) and Beren- son, (North Italian Painters of the Renaissance> (ib. 1907),*

RHIZOPODS

li

ilH

HI

1 Cyrtophormis spirall

2 Clathrocanium reginae

3 Anthocyrtium campanula

4 Pterocorys rhinoceros

5 Lithornitbium falco

6 Alacorys Bismarckii

7 Calocyclas monumentum

8 Pterocanium trilohum

9 Stichophaena Ritteriana

10 Dictyocodon Annasethe

11 Artopilium elegans

FORAGE, in agriculture. See Stock- feeding.

FORAGE, in military parlance, the food issued by the commissariat for animals. Con¬ sult (Field Service Regulations, United States Army) (Washington 1914).

FORAGING ANTS, the large, powerful ants of the tropical American genus Eciton, which from time to time march in hosts across the country, with the precision of an army un¬ der the control of officers. These marching columns are composed almost wholly of work¬ ers, apparently directed by a larger, lighter- colored kind ; and they search every inch of ground, rubbish-heap or thicket, hunting for what they can eat and driving every living thing out of their way in terror. Several species exist, differing in various respects. One, for example, devotes its forays entirely to find¬ ing and robbing the homes of a smaller and very different ant (Hypoclinea) , whose larvae and pupae it carries off, but lets the adults go free. Ordinarily no insect that can be caught is spared. These ants have no settled abode, but make nests in hollow stumps, or under¬ ground, and change them each season or of- tener. Their colonies exhibit a high degree of organization, and contain five separate castes, instead of the three of ordinary ants. (See Ants). Consult Belt, (Naturalist in Nicara¬ gua* (1888).

FORAIN, fo-'ran', Jean Louis, French caricaturist and etcher : b. Rheims 1852. He studied at the Lcole des Beaux-Arts, but was in great measure self-taught. He has been eminently successful in his delineation of the social and political life of Paris. In 1876 appeared his first drawing in La Cravache, after which his work appeared in Le Figaro, Le Rire, Le Courrier Frangais, and other jour¬ nals. In 1898 he was one of the founders of the anti-Semitic periodical Psst. The best col¬ lection of his works is that in the Dresden Print Room. Among his drawings in album form are (La comedie parisienne> (1892); (Les temps difficiles) (1893) ; (Doux pays) (1897). Consult Guerin, (Forain, Lithographe* (Paris 1910) ; Singer, lithographs and Etch¬ ings by Forain> (in international Studio, New York 1909).

FORAKER, Joseph Benson, American statesman: b. on farm near Rainsboro, High¬ land County, Ohio, 5 July 1846; d. Cincinnati, 10 May 1917. He pursued his education on through various Ohio institutions and in 1862 enlisted as a private in A company, Eighty- ninth Regiment, Ohio Volunteer Infantry, and served until the close of the Civil War, when he was mustered out with the rank of first lieutenant and brevet captain. After the war he was graduated in 1869 from Cornell Uni¬ versity, and began the practice of law in Cin¬ cinnati. In 1882 he was elected judge of the Superior Court at Cincinnati and in 1883 was nominated on the

Republican ticket for gov¬ ernor of Ohio. He was defeated by former Governor Bishop, but two years later, with the backing of John Sherman, then United States Senator from Ohio, he was elected and was re-elected in 1887. He accepted the nomina¬ tion for a third term in 1889 and went down to defeat in the great landslide against his party

in that year. He resumed his practice of law in Cincinnati but was considered at all times a political factor. In 1897 he became United States Senator from Ohio, succeeding Calvin S. Bryce. He was chairman of the Ohio Re¬ publican State Conventions in 1886, 1890, 1896 and 1900, was a delegate at large from Ohio to the national Republican conventions of 1884, 1888, 1892, 1896, 1900 and 1904, and in the 1884 and 1888 conventions presented the name of John Sherman for the nomination for the Presidency. He also presented the name of William McKinley for the Presidency in 1896 and 1900. His last term as United States Senator expired 4 March 1909. He supported McKinley but friction developed between him¬ self and Roosevelt, many of whose measures he opposed. The only active part taken in politics by Senator Foraker after his retirement from public life was his candidacy for the Re¬ publican nomination for United States Senator in 1914, in an effort to clear himself of charges based on the testimony of Colonel Mulhall before an investigation committee of the Senate. He was defeated by Senator Warren G. Hard¬ ing. Senator Foraker after his retirement from the Senate devoted most of his time to the practice of law.

FORAMINIFERA, an order of animals in the phylum Protozoa and the class Rhizopoda. The body is contained within a calcareous test or shell, which is many chambered. It may be cylindrical or spiral, or it may tend to the pyramidal form. The outer surface presents a punctate or dotted appearance, produced by the presence of very numerous small apertures, or "foramina.® The chambers in some are per¬ fectly distinct from others, though so aggre¬ gated as to form a compound shell ; in others they are connected with a funnel-like tube. The texture of the shell in one group is porcelain¬ like, in another glassy. The inside of the shell has an extensile and contractile sarcode (pro¬ toplasm) of a reddish or yellow color, which streams through the openings and thinly covers the outside. Foraminifers are always of small size, and often microscopic. With the exception of Gromia and one or two related genera which occur both in fresh and salt water, they are exclusively marine and many dwell only in the abysses. Sometimes their shells constitute sea- sand. In the Atlantic, at a depth of 3,000 fath¬ oms, there is an ooze composed almost entirely of Giobigerince which belong to this order. See Globigerina.

The exceedingly antique Eozoon (q.v.) of the Laurentian rocks, if organic, as is generally believed, was apparently a foraminifer. Forms more

unequivocal, some of them very like recent species, occur in the Silurian, the Carbonifer¬ ous, and other strata. They are found through all the Secondary Period, chalk (q.v.) being almost entirely composed of their cases. They increase in number and importance in the Ter¬ tiary. The flat, coin-shaped nummulites of the Middle Eocene form the principal bulk of great series of limestone rocks that furnish excellent building-stone. The type of the order has re¬ mained wonderfully constant from the earliest times till now.

FORBACH, for'bacH, Lorraine, town situ¬ ated at the foot of the Schlossberg, on a tribu-

tary of the Rossel, five miles southwest of Saar- briicken. It has manufactures of glass, paste¬ board and soap. In August 1870, the German troops occupied the town after the battle of Spichern on the 6th. Pop. 10,107.

FORBES, forbz, Archibald, English jour¬ nalist and war correspondent: b. Morayshire 1838; d. London, 30 March 1900. From 1857 till 1867 he served in the Royal Dragoons, but abandoning the army for journalism, joined the staff of the Daily News as war correspond¬ ent. In this capacity he accompanied the Ger¬ man army through the war of 1870-71, and was present in Paris at the downfall of the Com¬ mune. Was in India during the 1874 famine, and shortly afterward the Carlist and other troubles kept him for a time in Spain. He ac¬ companied the Prince of Wales on his Indian tour in 1875-76, and on returning described as an eye-witness the Servian war of 1876. In the following year he was with the Russians in their campaign against the Turks, being present at the siege of Plevna, and in 1878 he went to Cyprus. He was under fire during the Af¬ ghanistan campaign of 1878-79, next visited Mandalay, and then went to Zululand. He af¬ terward devoted himself mainly to lecturing at home and in America and Australia. His chief publications are (My Experiences in the Franco-German War1 (1872) ; 'Glimpses through the Cannon Smoke) (1880) ; (Chinese Gordon) (1884) ; (Souvenirs of Some Conti- nents) (1885) ; ' William I of Germany)*

(1888) ; 'Barracks, Bivouacs and Battles5 (1891); 'Havelock5 (1891); 'Afghan Wars5 (1892) ; 'Colin Campbell, Lord Clyde5 (1895) ; 'Camps, Quarters and Casual Places5 (1896) ; 'Memories and Studies of War and Peace5 (1896); 'The Black Watch5 (1896); 'Battles of the Nineteenth Century5 (1896) ; 'Life of Napoleon III5 (1898).

FORBES, David, English geologist: b. Douglas, Isle of Man, 6 Sept. 1828; d. London 5 Dec. 1876. As a civil engineer he traveled all over the world, studying rock formations and fossils, and writing 'On the Relations of the Silurian and Metamorphic Rocks of the South of Norway5 (1855) ; 'On the Geology of Bolivia and Southern Peru5 (1861) ; and kindred treat¬ ises.

FORBES, Duncan, Scottish jurist: b. near Inverness, Scotland, 10 Nov. 1685; d. 10 Dec. 1747. He studied at Paris, Utrecht and Edin¬ burgh, and rose, in 1737, to the rank of president of the Court of Sessions. It was mainly owing to his exertions that the rebellion of 1745 was prevented from spreading more widely among the clans ; but so ungratefully was he treated by the government that he was never able to obtain repayment of the various sums he had expended to uphold it. He was the author of : 'Thoughts on Religion5 ; the 'Culloden Papers5 ; etc.

FORBES, Edward, English naturalist: b. Douglas, Isle of Man, 12 Feb. 1815; d. Wardie, near Edinburgh, 18 Nov. 1854. He was a brother of David Forbes (q.v.). He became professor of botany in King's College, London, in 1842, and curator of the Geological Society; in 1851 professor of natural history in the School of Mines ; and in 1854 he was elected to the chair of natural history in the Univer¬

sity of Edinburgh. He did much to advance and systematize special departments of natural history, both by his own labors and by the stimulus which he imparted to his associates and pupils. His classification of the British star¬ fishes opened a new era in that branch of zool¬ ogy; and his discovery that air-breathing moll¬ uscs lived at the period of the Purbeck beds rectified many erroneous hypotheses. Of his separate works, papers and monographs upward of 200 were published; among them, 'Star¬ fishes5 (1841) ; 'The Mollusca and Radiata of the 2Egean5 (1843) ; 'Travels in Lycia5 (1846) ; 'Naked-eyed Medusae5 (1847) ; 'British Moll¬ usca5 (1848-52) ; 'Literary Papers5 (1855).

FORBES, Edwin, American landscape and genre painter: b. New York 1839; d. Flatbush, L. I., 1895. He was a pupil of A. F. Tait and became special artist for 'Frank Leslie's Maga¬ zine5 during the Civil War. The drawings which he made during that time are now in the war office at Washington and are of historic value.

FORBES, George, English electrical engi¬ neer: b. 1849. He received his education at the universities of St. Andrews and Cambridge, was formerly professor of natural philosophy at Anderson's College, Glasgow. He was elec¬ trical engineer for the power works at Niagara Falls. He published 'The Transit of Venus5 (1874) ; 'The Theory of the Glaciers of Savoy5

(1874) ; 'Lectures on Electricity5 (1888) ; 'Alternating and Interrupted Electric Current5 (1895) ; 'Elektrische Wechselstrome und Unter- bochene Strome5 (1896) ; 'History of Astron¬ omy5 (1909); 'Puppets: A Work-a-Day Phi¬ losophy5 (1911) ; 'David Gill, Man and As¬ tronomer5 (1916).

—

FORBES, Harriette Merrifield, American

writer: b. Worcester, Mass., 22 Oct. 1856. She was married to W. T. Forbes 5 Feb. 1884. She has published 'The Hundredth Town5 (1889) ; 'The Dairy of Rev. Ebenezer Parkman5 (1899).

FORBES, Henry Ogg, Scottish explorer: b. Drumblade, 30 Jan. 1851. He was educated at Aberdeen and Edinburgh universities. He traveled in Portugal in 1875-77, making biologi¬ cal and geological investigations ; was engaged in exploration in Keeling Islands, Java, Sumatra, Banda, Burn, Timor, where he made large col¬ lections and numerous observations on ethno¬ logy, biology and geography of these islands in 1878-84. In 1885-86 he led an expedition to explore Mount Owen Stanley, New Guinea; from 1886 to 1889 was acting deputy commis¬ sioner of British New Guinea and in the latter year led a second expedition to Mount Owen Stanley. From 1890 to 1893 he was director of the Canterbury Museum, New Zealand. He was British association lecturer to operative classes at Toronto in 1897 and explored the island of Socotra in 1898-99. From 1894 to 1911 he was director of museums to the Cor¬ poration of Liverpool, in 1911-13 was commis¬ sioned by the government of Peru to report upon the birds of the Guano Islands. He pub¬ lished 'A Naturalist's Wanderings in the East¬ ern Archipelago5 ; 'Handbook to Primates5 ; 'British Birds' Eggs and Nests,5 with Mrs. Forbes. He is editor and part author of 'Natural History of Socotra and Abd-el-Kuri5

(1903).

FORBES

FORCE

461

FORBES, James David, Scottish physic¬ ist : b. Colinton, near Edinburgh, 20 April 1809 ; d. Clifton, England, 31 Dec. 1868. In 1833 he was appointed to the chair of natural philosophy in the University of Edinburgh and in 1859 be¬ came principal of the University of Saint An¬ drews. His fame rests chiefly on his study of glaciers. His chief publications on this subject are (Travels Through the Alps of Savoy5 (1843); (Norway and its Glaciers5 (1853) ; (Tour of Mont Blanc and Monte Rosa) (1855) ; and

Occasional Papers on the Theory of Glaciers5 (1859). Forbes' theory was that glacier ice moves in its channel, like a viscous fluid, the middle moving faster than the sides, and the upper portions faster than the lower. His (Life and Letters) was published in 1873.

FORBES, John Colin, Canadian artist : b. Toronto, Canada, 3 Jan. 1846. He studied at the Royal Academy, London, England, and on the continent, and returning to Canada he be¬ came a successful landscape and portrait painter. Among his works are (Foundering of the Hibernia) ; (The Mount of the Holy Cross) ; (The Glacier of the Selkirk> ; (The Lily) ; and portraits of King Edward VII and Queen Alexandra, Gladstone, Sir H. Campbell-Ban- nermann, Sir John A. Macdonald and the Marquis of Dufferin.

FORBES, Stanhope Alexander, English artist: b. Dublin, Ireland, 18 Nov. 1857. He studied art at the Royal Academy Schools, and under Bonnat in Paris, and was elected a member of the Royal Academy in 1910. Among his pictures exhibited at the Royal Academy are (The Fish Sale) ; (The Health of the Bride) ;

FORBES, Stephen Alfred, American en¬ tomologist: b. Silver Creek, Ill., 29 May 1844. He received his education at the Illinois State Normal University and the University of In¬ diana. For five years he was curator of the Museum of the Illinois Natural History So¬ ciety. In 1877 he founded and became director of the State Laboratory of Natural History. In 1882 he was appointed State entomologist and in 1894 became head of the Illinois Biological Station. In 1884 began his long connection with the University of Illinois, successively as professor of zoology and professor of en¬ tomology. From 1888 to 1895 he was dean of the college of science. At the Chicago World's Fair of 1893 he organized the International Congress of Zoologists. His writings are con¬ fined to sundry entomological reports.

FORBES, W(illiam) Cameron, American public official : b. Milton, Mass., 1870. In 1892 he was graduated at Harvard University; spent some time in Boston as employee of a banking firm. In 1897-1902 he was chief of the finance department of Stone and Webster, engineers, and in 1899 became a partner of the banking house of J. M. Forbes & Co. of Boston. From 1904 to 1908 he was member of the Philippine Commission, was made vice-governor in 1908 and served as governor-general from 1909 to 1913 under the Taft administration.

FORBES-ROBERTSON, Sir Johnston,

English actor: b. London, 16 Jan. 1853. He is the son of John Forbes-

Robertson, was

educated at Charterhouse, studied art at the Royal Academy Schools, and at the age of 21 took up acting as his profession. He was at various times associated with the Ban¬ crofts, Sir John Hare, Sir Henry Irving and Mrs. Patrick Campbell. In 1895 he first or¬ ganized a London season, and began a series of Shakespearian revivals that definitely estab¬ lished his fame, his rendering of the part of Hamlet being regarded as the finest on the stage. Other successes achieved by him were in (The Light That Failed5 and (The Passing of the Third Floor Back5 — the latter running two entire seasons. He made his first visit to the United States in 1885, and included that country in his farewell tour, — undertaken while in the plenitude of his powers — in the season of 1913-14. He was knighted in 1914. His wife, Gertrude Elliott, an American actress, was an admirable support to her distinguished husband, 'playing with him in all the leading parts.

FORBONNAIS, for'bcp-na, Francois Ve-

ron Duverger de, French economist : b. Le Mans Sarthe 1722; d. 1800. He studied com¬ merce and trade methods at Nantes, traveled in Italy and Spain, and in 1756 was appointed inspector-general of the mint. Three years later he was made chief of the office of the Comptroller-General of Finance but was re¬ tired in 1763. In 1794 he was made a member of the Institut de France. His advice was often sought by the Revolutionary rulers of France especially in regard to financial mat¬ ters. He was a contributor to the (Encyclo¬ pedic5 and wrote several works on economics, which are still of value. These include Ele¬ ments du commerce5 (2 vols., 1754) ; (Recher- ches et considerations sur les finances de France depuis 1595 jusqu'en 1721 5 (1758) ; Erincipes et observations economiques5 (1767) ; (Analyse des principes sur la circulation des denrees5 (1800). Consult de Sales, Delisle, (Vie lit- teraire de Forbonnais5 (Paris 1801).

FORCADOS, f6r-kad'd6,s, Nigeria, town and port of call situated on the delta of the Niger on land which has been reclaimed. Pop.

3,000.

FORCE, Manning Ferguson, American soldier and author: b. Washington, D. C., 1824; d. 1899. He was the son of Peter Force (q.v.) He was graduated at Harvard College 1845 and at the Harvard Law School, entering the army in the Civil War as major of the Twentieth Ohio Volunteers, and attaining the rank of brevet major-general of volunteers. Refusing a colonelcy in the regular army, he resigned from the service, practised law and was judge of the Court of Common Pleas of Hamilton County, Ohio, 1867-77, and judge of the Supe¬ rior Court of Cincinnati

1877-88. He published Erom Fort Henry to Corinth5 (1881) ; March¬ ing Across Carolina5 (1883); (Personal Recol¬ lections of the Vicksburg Campaign5 (1885); Eife of Justice John McLean5 (1885) ; (Life of W. T. Sherman5 (1889). He edited Wal¬ ker's (Introduction to American Law5 (1878), and Harris' (Principles of Criminal Law5

(1880).

FORCE, Peter, American historian : b. near Little Falls, N. J., 26 Nov. 1790; d. Wash¬ ington, D. C, 23 Jan. 1868. His life work, en¬ titled (American Archives,5 a valuable collec-

tion of 22,000 books and 40,000 pamphlets, was bought by the government (1867) and placed in the Library of Congress. He published also (Grinnell Land: Remarks on the English Maps of Arctic Discoveries in 1850-51 > (1852) ; and (Notes on Lord Mahon's History of Amer¬ ican Declaration of Independence) (1855).

FORCE, the impulse which tends to impart motion to a body at rest, or to increase or di¬ minish the velocity or change the direction of a body already in motion. This impulse is attribut¬ able to the action of some other body. It is to be noted that while force tends to produce motion, that may not be the result. The force acting may be inadequate to overcome existing forces, and it becomes simply pressure; — as, for exam¬ ple, a force of 10 pounds acting against a mass of stone weighing 10 tons. In this case the attraction of the earth is the greater force which the impulse of 10 pounds is insufficient to overcome. But, in general, force is con¬ sidered in its visible effect motion. In this connection Newton's Laws of Motion become applicable. They are: (1) If a body be at rest, it will remain at rest; or if it is in motion, it will move uniformly in a straight line until it is acted upon by some force. (2) If a body be acted on by several forces at once, it will be influenced by each as though the others did not exist, whether the body be at rest or in motion. (3) If a force act to change the state of a body with respect to rest or motion, the body will offer a resistance equal to and directly op¬ posed to the force: in other words, to every action of a force upon a body is opposed an equal and opposite reaction.

The quantity of motion possessed by a body is called its momentum. The value of the mo¬ mentum of a body is found by multiplying its mass by its velocity. The change in quantity of motion possessed by a body under the action of a force is proportional to the magnitude of the force and to the

time during which the force acts.

Forces are classified as (1) Momentary, or impulsive forces; and (2) Continuous, or per¬ manent forces. If a continuous force is uni¬ form in its action it is called a constant force, and is measured by the momentum it imparts to the body upon which it acts.

A force is said to be <(central,® when it acts always toward a definite centre, which may be either fixed or in motion. The gravitative forces with which the heavenly bodies act upon one another are of this character, and are often popularly called ˆcentripetal® (that is, <(centre- seeking®) forces for this reason. When a body is caused to move in a curved path, it exerts a force which acts along the radius of curvature of the path, and in a direction away from the centre of curvature. Forces of this nature are called ˆcentrifugal® (or <(centre-fleeing®), and familiar examples are afforded by the pressure of swiftly moving water against the curved vanes of a turbine water-wheel, and by the ten¬ sion produced in a string when a stone that is attached to the string is whirled rapidly about in a circle. The nature of centrifugal force has been the subject of more or less controversy, some authorities maintaining that it should not be classed as a true force, since it does not produce any acceleration in the direction in which it acts ; — that is, a particle on the rim of a swiftly revolving wheel does not fly off

radially when it is liberated, but merely con¬ tinues its motion with unaltered speed, in the direction in which it was moving at the instant of its liberation ; — or tangentially to the wheel. The subject is too technical for extended dis¬ cussion in this place, but it may be pointed out that such a particle is actually subject to a radial acceleration, if its motion is considered relatively to the wheel.

Forces are said to be ˆconservative® when the principle of the conservation of energy holds true for the system in which they occur. (See Energetics). All forces of nature are believed to be fundamentally conservative, al¬ though this has not yet been rigorously proved for the forces that prevail within animals and plants.

A <(field of force® is any region in which a given force has a sensible magnitude. A con¬ ductor charged with electricity, for example, exerts an attractive (or repulsive) force upon all bodies that are exterior to it, and, from the point of view of theoretical physics, this force still exists at an infinite distance from the charged body, though at such a distance it becomes infinitesimal in intensity. A familiar illustration is the operation of the earth's at¬ traction upon the moon. From a practical standpoint, however, the <(field of force® due to the charged body can be considered to be limited by an indefinite but finite boundary, whose distance from the

body depends upon the intensity of the charge, and also upon the order of minuteness of the forces that can be re¬ garded as negligible, so far as any effect upon the problem that happens to be under considera¬ tion is concerned. Within a closed conductor there is no field of electric force, so long as the charges upon the conductor itself, and in the region external to it, are in equilibrium. This fact may be demonstrated mathematically, and it was abundantly proved experimentally by Faraday.

The unit of force among English-speaking people is the <(pound.® This term is used to designate that impulse which would give to a body weighing one pound a motion of 32.1740 feet per second, or, if the body were already in motion, would accelerate its motion by so much, for each second of time during which it acts. Suppose, for example, that a uniform force of magnitude represented by F acts for T seconds upon a body having the mass M, thereby in¬ creasing (or diminishing) its velocity by V units. The magnitude of the force F will be equal to MV divided by T, and by substituting numerical values for the symbolic letters a con¬ crete result may be obtained. If M is ex¬ pressed in grammes and V in centimeters per second, the resulting value for F will be in dynes. Consult Poorman. A. P., (Applied Mechanics (New York 1917). See Elasticity ; Electricity; Gravitation; Mechanics.*

FORCE BILL, a popular name in the Uni¬ ted States for four different congressional bills, used at the time of their passage ; all aimed at the South, and intended to suppress by na¬ tional force direct or indirect nullification (q.v.) of national laws. (1) The bill of 2 March 1833 to enforce the tariff law ; drawn out by Cal¬ houn's nullification ordinance passed by the South Carolina legislature (see Compromise of 1833) ; also called the <(Bloody Bill.® It was not put in action, because South Carolina first suspended and then repealed the Nullification

Ordinance. (2) The bill of 31 May 1870 to put down the forcible resistance which the Southern leaders were preparing to offer to the recon¬ struction governments. It punished by fine and imprisonment, or both, and gave the Federal courts exclusive cognizance of any interference with the registration, voting, etc., of any one, or going on his premises to intimidate him, or personating him in voting or violating State or Federal election laws, or violating the Civil Rights Bill of 1866. (3) The bill of 20 April

1871 to suppress the Ivuklux Klan (q.v.). It gave the Federal courts cognizance of suits against any one depriving another of any con¬

stitutional rights ; punished as conspiracy any combination to delay the execution of any Fed¬ eral laws, or deter any one from voting, hold¬ ing office, or acting as Federal juror or witness; (this clause was held unconstitutional by the Supreme Court) ; authorized the President to employ the national forces to suppress disorders intended to deprive any class of their constitu¬ tional rights, in case the State authorities were unable or unwilling; suspended the habeas cor¬ pus "during the continuance of such rebellion® — this provision to remain in force only till the end of the next regular session; authorized the judges to exclude from the juries persons they suspected to be in complicity with the proscribed acts ; authorized civil action for damages against all persons who neglected to give warning of such a conspiracy or intended injuries, if they had good reason to suspect them ; and confirmed former civil-rights legislation. An attempt was made to extend the fourth suspension of the habeas corpus to May 1872, and the Senate did so, but the House refused. (See Reconstruc¬ tion). (4) The Lodge Election Bill, 2 July 1890, "to amend and supplement the election laws of the United States, and to provide for a more efficient enforcement of such laws.® It passed the House, but was tabled in the Senate by a free-coinage fusion of Democrats and Re¬ publicans who wished to pass to currency legis¬ lation.

FORCE DE CHEVAL, fors de she-val' (horse power), a French unit of power equal to 736 watts and is analogous to our "horse- power® unit, which is equal to 746 watts. See Mechanical Units.

FORCE OF GRAVITY. The force of gravity finds expression in that law of physics which declares that every mass is attracted by every other mass with a force varying di¬ rectly as the product of the masses, and in¬ versely as the square of their distances from one another. In the matter of movable bodies upon the earth's surface the term gravity has been given in a restricted sense to the pull which the mass of the earth exerts upon a body near the earth and free to move toward it, or, as we say, a falling body. Under the law quoted the falling body attracts the earth up¬ ward in the proportion of its mass,, but the effect is so infinitesimally small that it. cannot be considered. It is found that gravity acts upon a body allowed to fall from a height with a pull that is uniform within experimental dis¬ tances at the same latitude, and that this pull is greater the nearer we are to the centre of the earth ; that is, the pull is greater at the poles than at the equator, because the distance from the poles to the earth's centre (3949.790 miles)

is less than from the equator to the centre (3963.225 miles). The device which scientists have made use of to determine the force of gravity acting at different points on the earth's surface is the pendulum, which, of course, swings because of the action of gravity. (See Pendulum). Where the pull of

gravity is greatest, a pendulum of a given length will swing faster than where it is less : that is, a pendulum of a certain length will swing faster at the poles than at the equator. The procedure, therefore, is to select the length of pendulum which will beat seconds of time at every place of investigation. Then, from the equator as we approach the poles the pendulum to beat exactly one second at each swing must obviously be continually lengthened, and from these changing lengths may be calculated the force of gravity which necessitated the changes. The following table shows the lengths in inches of the second- pendulum at latitudes five degrees apart, from the equator to the poles (north or south), and the resulting value for the accelerating pull of gravity per second upon a falling body.

Equator, 39.0131 inches: 32.0875 feet per second 5° 39.0152 inches: 32.0888 feet per second

10° 39.0200 inches: 32.0927 feet per second

15° 39.0274 inches: 32.0989 feet per second

20° 39.0378 inches: 32. 1074 feet per second

25° 39.0506 inches: 32.1178 feet per second

30° 39.0652 inches: 32.1299 feet per second

35° 39.0816 inches: 32. 1433 feet per second

40° 39.0990 inches: 32. 1576 feet per second

45° 39. 1169 inches: 32.1724 feet per second

50° 39. 1348 inches: 32.1871 feet per second

55° 39. 1524 inches: 32.2015 feet per second

60° 39. 1687 inches: 32. 2150 feet per second

65° 39. 1835 inches: 32.2271 feet per second

70° 39.1962 inches: 32.2377 feet per second

75° 39.2067 inches: 32.2462 feet per second

80° 39.2143 inches: 32.2525 feet per second

85° 39.2190 inches: 32.2564 feet per second

90° 39.2206 inches: 32.2577 feet per second

The above values are for sea-level at the latitudes noted. For localities above the sea- level the velocity will be 0.0002 for each 1,000 feet of elevation. As a rule, the force of gravity is a little less than the value given for places far inland, and a little more for places directly on the seacoast. The theoretical length of the pendulum in feet is expressed by the formula 3.25114 [1 +0.005302 sina $ — 0.000007 sin 2 4>]. This is the length at the sea-level, 4> standing for the latitude north or south of the equator.*

The acceleration due to gravity at the places named below are from figures published by the Smithsonian Institute at Washington.

Calais, Maine — 32.1728 feet per second New York City — 32.1612 feet per second Washington, D. C. — 32.1558 feet per second Charleston, S. C. — 32.1372 feet per second St. Georges, Bermuda — 32.1446 feet per second Key West, Fla. — 32. 1184 feet per second New Orleans — 32.1883 feet per second Kansas City, Mo. — 32.1518 feet per second Denver, Colo. — 32.1393 feet per second J Pike's Peak — 32.1178 feet per second Salt Lake City — 32 . 1462 feet per second San Francisco — 32.1528 feet per second Port Simpson, B. C. — 32.2000 feet per second Yakutat Bay, Alaska — 32.2122 feet per second Fort Egbert, Alaska — 32.2237 feet per second Honolulu — 32.1 184 feet per second Tokio — 32.1182 feet per second Sidney, Australia — 32 . 1435 feet per second Singapore — 32 . 0892 feet per second Cape Town — 32 . 1395 feet per second Pampaluna, Spain — 32 . 1633 feet per second Geneva, Switzerland — 32 .1723 feet per second Berlin — 32.1935 feet per second Paris — 32.1837 feet per second Kew, England — 32.1915 feet per second Spitzbergen — 32.2528 feet per second

FORCELLINI, for'chel-le'ne, Egidio, Ital¬ ian philologist: b. near Padua 1688; d. 1768. He was educated at the Seminary of Padua, where he came under the favorable notice of Giacomo Facciolati who made him his associate. Forcel- lini spent most of his active life in compiling a single large lexicon, the preparation of which involved the most painstaking and arduous labor for many years.

FORCHHAMMER, fork'ham-mer, Peter Wilhelm, German archaeologist : b. Husum, Schleswig, 23 Oct. 1801; d. 8 Jan. 1894. He received his education at the Liibeck gymna¬ sium and at the University of Kiel, with

which he was connected for 65 years. In 1830-34 and 1838-40 he traveled in Italy, Greece, Asia Minor and Egypt and in 1843 was appointed professor of philology at Kiel. In 1871-73 he represented the progressive party of Schleswig- Holstein in the German Reichstag. His pub¬ lished works deal mostly with topography and ancient mythology. According to him the myths arose from definite local, especially at¬ mospheric and aquatic, phenomena, and repre¬ sented the annually recurring processes of nature as the acts of gods and heroes. These theories are elaborated in his (Hellenika) (1837); Griechenland ; (1853); (1875) ; (Die wanderungen der Inachostochter Io) (1881) ; (Erklarung des Ilias auf Grund der topischen und physischen Eigentiimlichkeiten der troischen Ebene) (1884) ; Prolegomena zur Mythologie als Wissenschaft und Lexikon der Mythensprache) (1891); (Homer: Seine Sprache, die Kampf- platze seiner Heroen und Gotter in der Troas) (1893). Consult Bursian (Biographisches Jahr- buch fur Altertumskunde> (Vol. XX, Berlin*

1897).

FORCHHEIM, fork'him, Bavaria, town of Upper Franconia near the confluence of the Wiesent and the Regnitz, 15 miles south-south¬ east of Bamberg. It has fine churches, a progymnasium and an orphanage. Its indus¬ tries include spinning and weaving, bone and glue works, brewing and papermaking, bleach¬ ing and dyeing establishments, etc. Forchheim is of ancient origin and in the 9th century was the residence of the Carlovingians, including Charlemagne. In 1007 the town passed to the bishop of Bamberg, in whose possession it re¬ mained almost continually until 1802, when it was ceded to Bavaria. In 1838 its fortifications were dismantled. Pop. 9,150.

FORCIBLE ENTRY AND DETAINER.

A phrase belonging to law which relates to the keeping of real property, by threats or vio¬ lence, from its rightful owner. In such cases as clearly show intentional exclusion of the real owner from his property, the latter can have recourse to law ; but even he may not force an entrance into his premises — so sacred is the presumptive right of possession in the eyes of the law. Public peace, too, would seem to be the other valid consideration involved in seeking to compel disputants to settle their dis¬ putes in a court of justice.

This law dates from the time of Richard II of England, before which time an owner had full right to take possession of his property by force, if necessary. Since that time, how¬ ever, a number of statutes have limited the owner's right to his property as indicated above.

The owner, however, does not forego any prop¬ erty rights by merely abstaining from forcible entry thereto ; nor does this passivity on his part establish the least bit of presumption in favor of the illegal possessor. The law, which has been enacted in every State in this coun¬ try, merely limits his mode of retaking posses¬ sion to a legal process. Further than this, the owner's rights to his property are not invali¬ dated in the slightest degree. Besides the United States and England, most other civilized countries have similarly modified the common law by statutes affecting forcible entry.

FORCING, in gardening, is a term used to designate a process in which artificial heat is applied so that flowers, fruits or other prod¬ ucts of plants are obtained at a date or season other than that at which they may be had in the ordinary course of culture. Thus, for ex¬ ample, kinds of grapes which by the simple influence of the heat of the sun in a vinery do not ripen till September or October are in¬ duced by forcing to ripen in March or later, according to the period the process is com¬ menced; and strawberries, which ripen from June to September, in the forcing-house yield their fruit from February onward. Conducted, as the system is, during the short days of the year, the chief obstacle the gardener has to contend with is diminished light. This in the case of forcing fruits taxes his skill to the utmost, because abundant light is essential both to the proper fertilizing of the flowers and to the perfecting of the fruit. Some vegetables and salads and many flowers are, however, more successfully forced in the dark than in light. Rhubarb, seakale, mushrooms, lily of the valley, lilac, are all forced in greater or less darkness. A hotbed of fermenting manure is used to force rhubarb. Among flowers, roses, carnations, lilies of the valley, azaleas, deutzias, violets, mignonette and sweet peas are those most commonly forced, along with such bulbs as hyacinths, tulips and narcissi. By the application of an atmosphere containing ether, the forcing of certain flowers, particularly lilacs, has been much accelerated, and a quick and regular development secured, but the proc¬ ess is yet in an experimental stage. Consult (The Forcing Book, by L. H. Bailey (1897) ; Greenhouse Construction and Greenhouse Management,* by L. R. Taft (1903) ; W. T. May's Greenhouse Management (3d ed.,*

1900).

FORD, Edward Onslow, English sculptor: b. London 1852; d. 23 Dec. 1901. He studied in Antwerp and Munich, and was made a Royal Academician of London in 1859. His artistic faculty was displayed in felicitous portraiture, and he executed striking statues of many emi¬ nent contemporaries, including Queen Victoria, Huxley, Gladstone and "Chinese® Gordon. The Marlowe Memorial at Canterbury and the Shelley Memorial at University College, Ox¬ ford, are also from his chisel.

FORD, Sir Francis Clare, English diplo¬ mat: b. 1828; d. 1899. He became a lieutenant of the Fourth Light Dragoons, entered the diplomatic service in 1851 and was appointed secretary of legation at Washington. He be¬ came secretary of embassy at Saint Peters¬ burg in 1871 and was appointed to a similar post at Vienna. Subsequently he was succes-

sively minister to Argentina and Uruguay, Brazil, and Greece. In 1884 he was made min¬ ister to Spain, becoming ambassador in 1887 ; in 1892 he went as ambassador to Constanti¬ nople and was transferred to Italy the year fol¬ lowing. In 1884-85 he was British Commis¬ sioner to settle the question of the Newfound¬ land fisheries and served in a similar capacity before the International Commission at Hali¬ fax in 1897 over the Washington fisheries.

FORD, Henry, American automobile man¬ ufacturer: b. Greenfield, Mich., 30 July 1863. He was educated in the district school of Green¬ field and learned the trade of machinist. Since 1887 he has lived in Detroit. He was for a time chief engineer of the Edison Illuminating Company; in 1903 he organized and has since been president of the Ford Motor Company, the largest manufacturer of automobiles in the world, employing 20,000 persons and turning out nearly 5,000 machines per day. In January 1914 Mr. Ford announced his plan of profit- sharing involving the distribution of $10,000,000 annually to employees. He chartered a ship and at his own expense conducted a party to Europe, leaving New York 4 Dec. 1915, with the object of organizing a conference of peace advocates to influence belligerent governments to end the war. He returned home after reach¬ ing Christiania, Norway, but the members of his party proceeded to Stockholm and Copen¬ hagen, and through Germany to The Hague, effecting an organization represented abroad by a special committee. After the entrance of the United States into the war Mr. Ford's various plants were in great part converted to the pro¬ duction of aeromotors, etc. In 1918 Mr. Ford, at the instance of President Wilson, announced his candidacy for the Senate of the United States. He won the Democratic nomination at the September primaries, but lost the Republi¬ can nomination. Among his numerous public benefactions is the Henry Ford Hospital built at a cost of $2,000,000.

FORD, Henry Jones, American publicist: b. Baltimore, Md., 25 Aug. 1851. He was grad¬ uated from the Baltimore City College in 1868, was connected with the American and Sun of Baltimore and the Sun of New York, and in 1901 became editorial manager of the Pittsburgh Commercial

Gazette and Chronicle-Telegraph. He entered university work in 1906 as lecturer in the Johns Hopkins University, and also in the University of Pennsylvania. . In 1908 he was elected professor of politics in Princeton University, and still occupies that chair. He has published (The Rise and Growth of Ameri¬ can Politics) (1898) ; (The Cost of Our Na¬ tional Government ' (1909) ; (The Scotch-Irish in America> (1915) ; (The Natural History of the State) (1915); (Woodrow Wilson: the Man and His Work,' and has also contributed numerous articles to periodicals. In 1911 he was for some months Banking and Insurance Commissioner of New Jersey, pending a reor¬ ganization of that department, on the comple¬ tion of which he resigned the office.

FORD, James Lauren, American journal¬ ist: b. Saint Louis, Mo., 25 July 1854. He was educated at Stockbridge, Mass., removed to New York in his youth and there entered the journalistic field. He also became interested in the drama and successfully adapted two plays.

In his works he satirizes freely the affectations and unrealities of many things in American life and literature. He has written several volumes among which are (Hypnotic Tales) (1891); (The Literary Shop) (1894) ; (Bohemia In¬ vaded' ; (Dolly Dillenback.' He is also the author of books for young readers, (Dr. Dodd's SchooP (1892); and (The Third Alarm) (1893) ; (Cupid and the Footlights) (1899) ; (The Story of Du Barry' (1902) ; (The Brazen Calf' (1903); (1906). He also edited, with Mary K. Ford, (Every Day in the Year' (1902; new ed., 1914).

FORD, Jeremiah Denis Matthias, Amer¬ ican educator: b. Cambridge, Mass., 2 July 1873. He was educated in Ireland, at Harvard University and the University of Paris. From 1895 to 1907 he was instructor and assistant professor of Romance languages, in 1897-98 Harris traveling fellow, and after 1907 Smith professor of French and Spanish languages. Since 1912 he has served also as chairman of the department of Romance languages at Harvard University. In 1904 he was lecturer at the Catholic Summer School, and in 1913 represented Harvard in a tour of Latin Amer¬ ica in which he visited the principal institu¬ tions of higher education. From the Univer¬ sity of Santiago de Chile he received an invi¬ tation to return as visiting lecturer in Spanish on Spanish literature. He is a member of the Royal Spanish Academy, Madrid, and vice-pres¬ ident of the Modern Language Association of America. He wrote (01d Spanish Sibilants) (1900) ; (Spanish Composition' (1901) ; Span¬ ish Anthology) (1901) ; (Spanish Grammar) (1904) ; (Romances of Chivalry in Italian

Verse' (new ed. 1906) ; (01d Spanish Read- ings) (1906). He edited

Selections from Don Quixote' and various texts for schools, and is a contributor to Modern Language Notes, the Romanic Review , Romania, etc.

FORD, John, English dramatist: b. Devon¬ shire 1586; d. after 1639. He printed his first tragedy of the (Lover's Melancholy' in 1629. This, however, was not his first play, as a com¬ edy of his, entitled (A Bad Beginning has a Good End,' was acted in 1613. His genius is seen at its highest in the tragedy, ('Tis Pity Shee's a Whore> (1633), though the subject is repulsive. He wrote, or assisted to write, at least 11 dramas. Most of these were exclusively his own. composition ; but some of them were written in conjunction with Decker and others. Other plays by him are (The Broken Heart' (1633); Move's Sacrifice' (1633); (Perkin Wharbeck' (1634) ; ˆhe Fancies Chast and Noble' (1638) ; and (The Ladies' Trial' (1638).

FORD, John Donaldson, American naval officer: b. Baltimore, Md., 19 May 1840; d. 8 April 1918. Graduated at the Maryland School of Design in 1861 and the Potts School of Mechani¬ cal Engineering in 1862. He entered the United States navy in 1862 as third assistant engineer, was made second assistant engineer in 1864, first assistant in 1868, passed assistant in 1874, and chief engineer in 1890. During the Civil War he took part in the recapture of Baton Rouge, La., 1863, and the battles of Mobile Bay, 1864. He was on board the Arizona „ which was destroyed by fire off Poverty Point in the Mississippi 27 Feb. 1865, and was wrecked in the Sacramento on the Coramandel coast

of India in June 1867. He served also on many expeditions and stations. In 1884 he was de¬ tached and ordered to start the Baltimore Manual Training School. In 1896-98 he was on the U. S. S. Brooklyn and in the latter year became fleet engineer of the Pacific sta¬ tion. He joined the Asiatic fleet and took part in the actions of 1 May and 13 Aug. 1898; the destruction of the Spanish fleet off Cavite ; the destruction of the batteries at Ca¬ vite and at Sangley Point, and the capture of the forts at Corregidor and the capture of Manila. He was commissioned commander in 1899, was promoted captain in March 1902, pro¬ moted rear admiral and retired 19 May 1902, but continued on duty as inspector of machinery and ordnance at Baltimore and Sparrows Point, Md., until 25 Dec. 1908. He is the author of several pamphlets on manual training;

FORD, John Thomson, American the¬ atrical manager : b. Baltimore, Md.,

1829 ; d. 1894. He was manager of the Holliday Street Theatre of Baltimore, was elected president of the city council in 1858 and also served two years as acting mayor. He built and operated three playhouses in Washington, D. C., in one of which President Lincoln was assassinated. Ford was suspected of complicity, and was im¬ prisoned for 40 days, but was released as no evidence against him was forthcoming. A few years later (1871) he built Ford's Opera House in Baltimore.

FORD, Patrick, editor of The Irish World for 43 years : b. Galway, Ireland, 12 April 1837 ; d. Brooklyn, 23 Sept. 1913. At 19 he came to America with his parents and found employment in Boston in William Lloyd Garrison's printing office, where The Liberator was published. He began writing for Boston newspapers in 1855, and in 1860 became editor of the Boston Sunday Times. He served in the Civil War and later founded the Charles¬ ton Gazette in South Carolina. In 1870 he started in New York The Irish World, which became famous as a champion of Irish Home Rule. For the Land League Fund the paper raised $343,072 during 1880-81. He wrote (Criminal History of the British Empire) (1881) ; (The Irish Question and America Statesmen (1885).*

FORD, Paul Leicester, American author: b. Brooklyn, N. Y., 23 March 1865; d. New York, 8 May 1902. He founded and edited the Bibliographer which he kept at a high stand¬ ard. Besides numerous pamphlets relating to American historiography his works include (The Honorable Peter Sterling) (1894), a novel of New York society; (The True George Washington (1896) ; (Bibliotheca*

Hamiltonia ; (Franklin Bibliography1* ; and an edition of the works of Thomas Jefferson (1897), with notes, biographical introduction, etc. ; (The Story of an Untold Love* ; (Tattle Tales of' Cupid* (1898); (Short Stories*; (Janice Meredith* (1899) ; (Wanted — a Match¬ maker* ; (Wanted — a Chaperon* (1902).*

FORD, Richard, English critic and au¬ thor: b. London, 1796; d. 1858. Having traveled in Spain visiting the various art centers, he contributed articles dealing with Spanish art

and architecture to the Quarterly Review, and published (Handbook for Travellers in Spain (1845), describing the countries and cities, the natives and their manners, antiquities, religion, legends, fine arts, etc., with notices on Spanish history.*

FORD, Simeon, American hotel proprie¬ tor: b. Lafayette, Ind., 31 Aug. 1855. He was educated in the public schools and engaging in the hotel business was for many years proprie¬ tor of the Grand Union Hotel, New

*York. He is a member of the firm of Ford and Shaw and president of the official Hotel Red Book and Directory Company, and of the Zeeland Realty Company. He is treasurer of the Apollinaris Agency Company and director of the Rye Land and Improvement Company, the Columbia Bank, the Henry Morganthau Com¬ pany, etc. He is a favorite at all gatherings of hotel men and is widely known as a witty and popular speaker. He published some of his speeches under the title (A Few Remarks**

(1903).

FORD, William Webber, American bac¬ teriologist: b. Norwalk, Ohio, 15 Dec. 1871. He was graduated at Western Reserve University in 1893 and in medicine at Johns Hopkins in 1898. In 1899-1901 he was fellow of McGill University and in 1901-02 of the Rockefeller Institute, New York. In 1903-05 he was in¬ structor, in 1905-06 associate, and since 1906 associate professor of hygiene and bacteriology and lecturer on legal medicine at Johns Hop¬ kins. He is a member of the Maryland State Board of Health, of the American Association of Pathologists and Bacteriologists and of other scientific societies, American and foreign. He has published papers on bacteria, toxins and anti-toxins, milk, sewage, water supply, etc.

FORD, Worthington Chauncey, American

author and statistician: b. Brooklyn, N. Y., 16 Feb. 1858. He is a brother of P. L. Ford (q.v.). He was chief of the bureau of statistics, Department of State, 1885-89, and of the bureau of statistics in the Treasury Depart¬ ment in 1893-98 ; was connected with the Boston Public Library 1897-1902, and was chosen lec¬ turer on statistics in the University of Chicago in 1901. From 1902 to 1909 he was chief of the division of manuscripts in the Library of Congress. In 1909 he was made editor of the publications of the Massachusetts Historical Society and lectured at Harvard in 1910. He published (American Citizens' Manual (1883) ; (The Standard Silver Dollar* (1884) ; (George Washington* (1899) ; and numerous mono¬ graphs on historical, biographical and economic subjects. He revised David A. Wells' Nat¬ ural Philosophy* (1879); and edited the Cor¬ respondence and Journals of Samuel Blachley Webb* (1893-94) ; (The Writings of George Washington* (1889-91) ;*

FORD CITY, Pa., borough of Armstrong County, 40 miles northeast of Pittsburgh, on the Allegheny River and on the Pennsylvania Railroad. Agriculture, coal-mining and plate glass-making are the principal industries. The borough owns the electric-lighting plant and the waterworks. Pop. (1920) 5,665.

FORD PEACE PARTY. See Ford, Henry.

FORDHAM, N. Y., in the borough and county of Bronx. Prior to 1874 it was a village in Westchester County, N. Y. It be¬ came part of the city of Greater New York in 1898. In 1671 Jan Area bought the land from the Indians and Andrian von der Donck and settled here. Fordham University was founded here in 1841 at Saint John's College. Edgar Allan Poe lived at Fordham from 1844 to 1849 and wrote

FORDHAM UNIVERSITY, formerly Saint John's College, an institution in New York, opened 24 July 1841, under the auspices of the Roman Catholic Church. The land upon which the college stands is a part of the old Dutch village of Fordham, and is of historic interest. In 1639 the land between the Harlem and Bronx rivers was purchased by the Dutch West India Company, from three Indian sachems. In 1694 the land which is now the college property came into possession of the Corsa family. The farm was known as <(Rose Hill,® a name which still clings to the place and by which the college was known in earlier years. In 1787 the (

In June 1904 law and medical 'departments were authorized by the trustees in addition to the arts course, and in 1907 the charter was amended by the Board of Regents of the State University to establish these and to change the name from Saint John's College to Ford¬ ham University. A college of pharmacy was provided for in 1912. The average student en¬ rolment is 1,600. There are 150 professors and instructors and 65,000 volumes in the li¬ brary. Consult Taafe, T. G., (History of Saint John's College, Fordham> (New York 1891).

FORD'S THEATRE, a Washington the¬ atre in which President Lincoln was shot by

the assassin, Booth, 14 April 1865. The Uni¬ ted Slates government purchased the building in 1866 and it was at first used as the Army Medical Museum, but after 1887, as the Pen¬ sion and Records Bureau of the War Depart¬ ment. It gradually fell into ruin, however, and suddenly collapsed with the loss of sev¬ eral lives, 9 June 1893.

FORDUN, John of, known as the father of Scottish history: b. probably at Fordoun, Kincardineshire, about 1310; d. about 1386. He wrote the first five books of his (Chronica Gen- tis Scotorump bringing the history down to the middle of the 12th century, and also a part of the sixth volume, which was completed by Walter Bower, abbot of the monastery of Inchcohn. He enlarged the first five books and added 11 new ones, bringing

the history down to 1437. Several editions have been printed, the best probably being that of W. F. Skene (Edinburgh 1871-72).

FORDYCE, for'dis, Ark., town and county- seat of Dallas County, 76 miles south of Little Rock, on the Chicago, Rock Island and Pacific and the Southwestern railroads. It contains manufactories of lumber, spokes and staves. Pop. (1920) 2,996.

FOREARM. See Arm.

FORECASTING THE WEATHER.

See Meteorology.

FORECLOSURE is the process of law by which right of a mortgagee, or of anyone having interest in a mortgage, in the event of the conditions of the mortgage being violated, may compel the mortgagor to redeem the pledge or forfeit his right of redemption. This is done by filing a bill for foreclosure. The court may, on application of the mortgagee, mortgagor or any encumbrancer of the mortgage, grant, under certain conditions, a sale of the subject instead of foreclosing the mortgage, the money raised by the sale being applied to the payment of the mortgage, any surplus being claimed by sub¬ sequent mortgagees, or in the event of no other claim, being paid to the mortgagor. The laws of the United States vary in the matter of fore¬ closure. See Mortgage.

FOREFATHERS' DAY, the day cele¬ brated as the anniversary of the landing of the Pilgrims; first commemorated in 1769. Owing to a mistake in the change of Old Style (11 December) to New it was made 22 instead of 21 December.

FOREIGN ATTACHMENT. See At¬

tachment; Garnishment.

FOREIGN BUDGETS. See Budgets, Foreign.

FOREIGN COINS AND THEIR

AMERICAN EQUIVALENTS. See Coins,

Foreign, American Equivalent of.

FOREIGN CORPORATIONS. See

Corporations, Legal.

FOREIGN EXCHANGE. See Banks and Banking — Foreign Exchange (Article 5).

FOREIGN INDUSTRIAL ORGAN¬

IZATIONS. See Labor Departments, For¬ eign ; Labor Legislation, Foreign ; Labor Or¬ ganizations, Foreign.

FOREIGN JUDGMENT, in law, is the term applied to the judgment of a foreign tri-

bunal. Such judgment is proved in common law by exemplifications certified under the great seal of the state or country where the judgment is recorded, or under the seal of the court where the judgment remains; the fulfilment of its con¬ ditions depends upon treaty stipulations or on international comity.

FOREIGN LAWS, the laws of a foreign country. The courts do not judicially take notice of foreign laws; and they must, there¬ fore, be proved as facts. Exemplified or sworn copies of written laws and other public docu¬ ments must, as a general thing, be produced when they can be produced. The effect of foreign laws, when proved, is probably refer¬ able to the court; the object of the proof is to enable the court to instruct the jury what is, in point of law, the result from foreign laws to be applied to the matters in controversy before them. The court is, therefore, to decide which is the proper evidence of the laws of a foreign country, and when evidence is given of those laws the court is to judge of their applicability to the matter in issue.

FOREIGN STATES. In law, every na¬ tion is foreign to all other nations; and the several States of the American Union are for¬ eign to each other, with respect to their munici¬ pal laws. The reciprocal relations between the National government and the several States, however, are considered not as foreign, but as domestic.

FOREIGN WEIGHTS AND MEAS¬ URES. See Weights and Measures.

FOREKNOWLEDGE AND FOREOR¬ DINATION. See Foreordination.

FOREL, f c/rel, Auguste [Henri], Swiss psychologist: b. Morges, Vaud, 1848. He was educated at the universities of Zurich and Vienna and in 1877 was appointed lecturer at Munich. In 1879 he was made professor of

psychiatry at the University of Zurich, from which he resigned in 1897. He published (Les fourmies de la Suisse11 (1874) ; (Der Hypnotis- mus' (1889; 6th ed., 1911; Eng. trans. 1906); (Gehirn und Seele) (11th ed., 1910) ; (Die psychischen Fahigkeiten der Ameisen und einiger anderen Insekten) (1904; Eng. trans. by Wheeler, (Ants and Some Other Insects, 1912) ; (Hygiene der Nerven und des Geistes) (1903; 4th ed., 1913; Eng. trans., (Hygiene of the Nerves and Mind,* 1907) ; (Die Sexuelle Frage) (9th ed., 1909; 1913; Eng. trans., (The Sexual Question,* 1908) ; (Sinnesleben der In- sekten* (1886; 1910; Eng. trans., 1908).*

FORELANDS, North and South, two

headlands on the southeast coast of England, county of Kent. North Foreland projects into the sea in the form of a bastion and consists of chalky cliffs nearly 200 feet high. South Foreland consists also of chalky cliffs about 400 feet in height, and has two lighthouses, with fixed lights, erected upon it.

FORENSIC MEDICINE. See Medical Jurisprudence.

FOREORDINATION, or PREDESTI¬ NATION, a term appropriated by theology, and the basis of long discussions and contro¬ versies in the 19th century. The doctrine is now generally abandoned. In the Calvinistic system, the assignment of the Deity, at the time of creation, of some of his creatures to eternal

life and happiness and others to eternal death or suffering. Of course the decree was not, as usually stated, irrespective of the spiritual merits of the subjects; but if human beings it was irrespective of their actual conduct on earth. This was supposed to be irrelevant, as through the fall of Adam they had lost all possibility of merit and owed any escape they might have from utter destruction to God's grace and Christ's vicarious atonement, which restored some of them to moral health. As none of them deserved anything, there could be no injustice in leaving such as he chose to suffer the penalty assigned. It was not alone Adam's dereliction which had caused this lib¬ erty of choice, however, as angels were in¬ cluded: the Westminster Confession says, <(By the decree of God, for the manifestation of his glory, some men and angels are predestinated unto everlasting life and others foreordained to everlasting death.® This implies that no cre¬ ated being has any claim to other than de¬ struction except by divine grace. Being con¬ trary to the principle that ((God is love,® modern Christians rarely endorse it.

FORESHORE, the part of the seashore which lies between the ordinary high-water and low-water mark at ordinary tides. At common law, title to

the foreshore rests prima facie in the Crown, except where it may be vested in a subject by ancient grant or charter from the Crown, or by prescription. For rights and lia¬ bilities in respect to the foreshore consult Moore, S. A., (History of the Foreshore.)

FORESHORTENING, in drawing in perspective, the shortening of a part whose length is mainly between the artist and his point of sight. It is more or less difficult for a student to grasp the correct reproduction of say an arm that is thus shortened. In the case of mural paintings that are viewed from below, the artist deliberately alters the natural fore¬ shortening up and down to produce a normal effect on the observer.

FOREST. See Forestry in the United States.

FOREST CITY, Pa., borough of Susque¬ hanna County, 22 miles northeast of Scranton, on the Delaware and Hudson, the Erie and the New York, Ontario and Western railroads. It has extensive agricultural, coal-mining and silk manufacturing interests. It was incorporated in 1888 and its government is vested in a burgess and a council of one chamber. Pop.

(1920) 6,004.

FOREST FIRES. Fire is probably the worst of the many destructive agencies at work in the forests of the United States. Until recent times, however, the attitude of settlers and lumbermen toward fires in the woods was either one of indifference because the supply of timber seemed inexhaustible or of inertia because fires were considered un¬ avoidable. It required enormous losses of life and property to arouse the people to the neces¬ sity of systematic fire protection. During the last 50 years an annual average of about 70 people lost their lives in forest fires and at least $25,000,000 worth of timber a year was de¬ stroyed. In addition, immense damage was done every year to young tree growth, crops, livestock, buildings and improvements, water courses and the soil. Some of the great fires

have become historical on account of the num¬ ber of lives lost or the property destroyed. The Peshtigo, Wis., fire in 1871 burned 1,280,000 acres of timber and cost 1,500 human lives. The Hinckley fire of 1894 burned over 160,000 acres in Minnesota, destroyed property valued at $25,000,000 and cost the lives of 418 persons; the great Idaho fire in 1910 burned 2,000,000 acres of timber and caused the death of 85 people. But these great fires, though they partake of the nature of national calami¬ ties, are not the ones that cause most of the damage; it is the

smaller fires, of which little notice is taken but which occur year after year and with great frequency, that cause the great¬ est loss in the aggregate. At least 35,000 of these occurred in the United States in 1915. It is customary to distinguish three classes of forest fires; surface fires, which burn dry leaves, grass, brush and small trees ; ground fires, which burn the vegetable mold; and crown fires, which burn through the crowns of the trees. Surface fires are fought by beating them with blankets, gunny sacks, green brush, etc., by throwing water or dirt upon the flames, or by running a trace in front of them by rak¬ ing away the leaves and- other litter and then beating out the flames when they are checked. Sometimes a furrow is plowed as an emergency fire line. Ground fires are usually hard to check. If the layer of vegetable mold is not very deep, it may be possible to put out the fire with water or sand. Otherwise it is necessary to dig a trench down to the mineral soil. Crown fires are very unusual and extremely hard to check. They usually burn themselves out, are stopped by some natural obstacle such as a stream, or are checked by means of back firing. The most important of the known causes of forest fires are lightning, sparks from locomotives and carelessness with camp fires, matches, cigarettes, etc. Though lightning causes a great many fires, much the larger pro¬ portion are started through the malice or care¬ lessness of men and are therefore preventable. The most effective safeguard against fire in the woods is an enlightened public sentiment in regard to it. Such a sentiment is now being created not only in the national forests and their vicinity but, through the co-operation of the State and Federal agencies, in other tim¬ bered portions of the country. It is impossible to prevent all fires, however, and a patrol and fire-fighting system is necessary. Great prog¬ ress in this direction has been made lately. Organized fire protection has been established in the national forests and in most of the State forest reservations. On the national forests the protective system is highly organized and efficient and over 45 per cent of the fires that start are put out before they have covered more than a quarter of an acre and over 70 per cent before they have covered more than 10 acres. This result is secured by means of patrols and lookouts, the building and mainte¬ nance of roads, trails and telephone lines through the forests and the preparation before the opening of each fire season of plans for the mobilization of fire-fighting forces. Thus the moment a fire is seen by the lookout or patrol it is necessary only to ascertain its exact location, its size and the direction and force of the wind; the ranger in charge knows from his plan just where he can secure most quickly

men and equipment and how to get them to the fire. A number of States have developed sys¬ tematic fire protection on private lands through the organization of State fire wardens. In some instances private owners have formed co-operative associations for fire protection and employ a regular

force of rangers for patrol during the fire season. Fire protection in the States has been greatly stimulated through the operation of the Weeks Law. In spite of all that has been done, however, a large proportion of the forests of the country, particularly those that are privately owned, are inadequately pro¬ tected from fire. See Forestry in the United States.

FOREST-FLY, the British name for the minute parasitic, flea-like flies called bird-ticks, bat-ticks and the like, in America ; specifically Hippobosca equina, which is especially a tor¬ ment to horses by thrusting its long beak through the skin and sucking the blood. See Bird-tick.

FOREST LAWS, in English law, legal restrictions regarding forests of the king. Forest laws applied not only to the royal for¬ ests of England but to Scotland as well.

The area subject to the jurisdiction of these courts in England included not only woodland but often pastures and villages. Some of these forests dated from the Anglo-Saxon period. Up to the time of Edward I their area was constantly added to by various kings by a sum¬ mary proceeding known as afforestment. This consisted of a proclamation made by the king to the effect that any tract of land he desirea, without compensation to the owner, was to be constituted a forest, after observing certain formalities, a right which it seems he had by common law. All offenders in such forests were punished by forest law and not by com¬ mon law. There were three forests courts : woodmote, swainmote and justice seat. The woodmote was a court of attachment and had jurisdiction over minor offenses only, but could not convict. This court was presided over by verderers, officers chosen by freeholders of the forest. The swainmote had power to try and convict, but no power to pass judg¬ ment. It was presided over by the verderers, and all freeholders were obliged to attend. The court of justice seat had jurisdiction over all civil and criminal offenses committed in a forest. This court sat every third year and was presided over by the justices in eyre.

Under some of the kings of England the penalties for violations of the forest laws were • inordinately severe, blinding and even 'death being the penalty for killing game during the reign of Henry I. These laws were mitigated by King John, but only under compulsion. Ed¬ ward I finally abolished afforestment 'by force, yielding to the earnest desires of his subjects.

There were many royal forests in Scotland, but the code to which they were subject con¬ tained no such severe- penalties as that of Eng¬ land, although otherwise the codes are very similar.

During the latter half of the 19th century Parliament disafforested, under the plea of public necessity, three royal forests, those of Whittlewood,

Wichwood and Hainault. Ep- ping Forest, which forms part of the ancient Waltham Forest, was the subject of legislation

by Parliament in 1871, and as a result was de¬ clared open to the public by Queen Victoria in 1882, the ancient court of verderers being re¬ vived. There are still royal forests in England and the Crown has certain rights in private forests in a limited number of places to this day.

FOREST OAK, commercial name of the timber of Casuarina torulosa and allied species of Australian trees. It is much used for shingles and makes a good fuel. Certain species are used in cabinet work.

FOREST PARK, Ill., village in Cook County, on the Illinois Central and the Chicago and North – Western and other rail¬ roads, about four miles from Chicago and near Oak Park. The first permanent settlement was made in 1854, and the village of Forest Park was incorporated -as Harlem in 1883, and its name was changed in 1907. It adopted the commission form of government in 1912. It is a residential suburb of Chicago, and is noted for its race track. (See Horse-Racing). Wald¬ heim and Forest Home cemeteries are in Forest Park. A monument to the men executed as anarchists who were connected with Chicago riots of 1886 is in the Waldheim cemetery. The village owns the waterworks and electric light plants. Pop. (1920) 10,763.

FOREST PARK COLLEGE, Saint Louis, Mo., incorporated and chartered by the State of Missouri in 1889, to give a full college course exclusively to women, has full 'power to confer such literary and other degrees and honors as are usually conferred by the Asso¬ ciation of American Colleges, of which it is a member. The four buildings, the main one 187 feet long, in grounds covering nine acres, occupy a beautiful site on a high plateau, slop¬ ing down to Forest Park and overlook the city of Saint -Louis. The departments com¬ prise junior college of liberal arts, preparatory college, college of music, school of art, school of oratory and expression, and school of house¬ hold economics. The faculty numbers 23.

FOREST REGIONS. See Forestry in the United States.

FOREST RESERVES. See Forestry in the United States.

FOREST SCHOOLS. The earliest prac¬ tical course in forestry in the United States was given in 1897, in the State University of Montana, under Maj. George P. Ahern, U. S. A., who later took charge of the Bureau of

Fores¬ try of the Philippine Islands. Major Ahern discontinued the course in the spring of 1898, on account of the breaking out of the Spanish-American War. There were no schools of forestry in this country before 1898. In that year the first effort was made to establish pro¬ fessional instruction in forestry in this country when the Biltmore Forest School was opened at Biltmore, N. C., and the New York State College of Forestry was established in connec¬ tion with Cornell University. The former school offered a one-year course, supplemented by six months of work in the forest familiar¬ izing the student with the practical problems of the woods. Because of its organization and methods this school remained in a class by it¬ self until its disbandment in 1914. The Cornell school, which offered a four-year course of

training and had begun to graduate students, was discontinued in 1903. Instruction was re¬ sumed at Cornell in 1911 by the New York State College of Agriculture in connection with the university. A five-year course is offered, leading to the degree of Master of Forestry. The Yale Forest School, which offers a two- years' post-graduate course leading to a Master's degree, was established in 1900. Pro¬ fessional schools of forestry were established not long after, in 1903, at the State universi¬ ties of Minnesota, Michigan and Nebraska. In the same year the Pennsylvania State Forest Academy was created for the purpose of train¬ ing men for the Pennsylvania State Forest Service. The attendance is small and limited to residents of the State. Students are ap¬ pointed after competitive examination, and must serve the State for three years after graduation. In the Pacific States, forest in¬ struction was first given at the University of Washington in 1907. Numerous other colleges and universities established courses, and the rapid growth of instruction in forestry has been phenomenal. At present there are 23 forest schools offering courses leading to pro¬ fessional degrees. These schools are at the University of California, Colorado State Agri¬ cultural College, Colorado College, Cornell Uni¬ versity, University of Georgia, Georgia College of Forestry, Harvard University, University of Idaho, Iowa State College of Agriculture, Uni¬ versity of Maine, Michigan Agricultural Col¬ lege, the universities of Michigan, Minnesota, Missouri, Montana and Ohio, Oregon Agricul¬ tural College, the Pennsylvania State College, Pennsylvania State Forest Academy, Syracuse University, State College of Washington, Uni¬ versity of Washington and Yale University. Twelve of these confer the degree of Master in Forestry upon the completion of post-grad¬ uate courses. The Harvard and Yale Forest Schools are graduate schools, requiring for ad¬ mission a Bachelor's degree from an institution of standing. Ranger courses, fitting men for work as rangers, or guards, and other prac¬ tical woods work, are offered at Oregon Agri¬ cultural and Washington State colleges and the universities of California, Georgia, Idaho, Missouri,

Montana, Syracuse and Washington. In addition to these professional and ranger courses, short courses covering the different phases of forestry and related subjects are given in over 40 technical schools, colleges and universities. See Forestry in the United States.

FOREST SERVICE. See Forestry in the United States.

FOREST TREES OF AMERICA. Out

of the great mass of forest growth in the United States and Canada, stretching from the palms on the southernmost keys to the birches and willows that creep into the Arctic Circle, certain trees stand forth as possessing unusual interest. Some of them are noted principally for the beauty of their flowers, conspicuous among these being magnolias, dogwoods (Cornus) ; the gay red-bud (Cercis) ; the buck¬ eyes (Alsciilus) ; and the wild-crab (Mains coronaria) ; or, for their equally attractive fruit, which is sometimes much sought by birds, animals, aborigines or even by civilized folk. Thus the service berries (Amclanchier) ; the

mountain-ashes (Sorbus) ; the wild cherries and plums (Primus) ; and the persimmon (Dios- pyros) furnish food for man, bird and beast. Thorns (Crateegus) ; hollies (Ilex) ; sumachs (Rhus) ; manzanita (Arctostaphylos) ; madrono (Arbutus) ; mesquit (Prosopis) , are very orna¬ mental as well.

Other trees have historical connections that lend them interest, as is the case of the sassafras (Sassafras) to which were attributed so many medicinal virtues that the earliest ex¬ plorers of the Atlantic coasts came partly in quest of cargoes of its spicy bark. The little palmetto of the Southern States (Sabal) ap¬ peared on the cockades, flag, medal and seal of South Carolina, possibly because the de¬ fenses of Charleston during the Revolution were constructed of their trunks, which ab¬ sorbed the British cannon balls instead of splitting and thus resisted destruction. The white pine (Pinus strobus) has a similar dis¬ tinction, having been depicted, very appro¬ priately, upon some of the earliest American- Colonial, naval and New England flags. The giant pines, sometimes over 100 feet high, of this New England region furnished masts not only for shipping in general but for the Royal Navy, although the Royal reservation of selected trees for this purpose was continually disputed, especially in New Hampshire. Pepys notes with relief in 1666 “Very good news is come of four New England ships come home safe to Falmouth with masts for the king; which is a

blessing mighty unexpected and without which, if for nothing else, we must have failed the next year." Outside of its naval uses, until it became too scarce, white pine was the most used of its family, of which it is also the most valuable, having soft, fine-grained, buff-colored heart-wood easily worked, glued and painted, neither warping nor shrinking, and therefore of great value for furniture and interior finish, as well as for more ordinary purposes. Its place now, perforce, is taken by the heavier, more resinous southern pines, one of which (Pinus palustris) also yields southern naval stores; and by the giants of the race, the yel¬ low Western pine (Pinus ponderosa) and the sugar pine (P. Lambertiana) , so called from the sweet exudation of its cambium layer, that flourish on the mountain ranges of the Far West, and occasionally reach a height of more than 175 feet. The latter furnishes the widest and clearest boards of any pine. Pine nuts yielded by P. Sabiniana, P. monophylla, and other species are esteemed by men and squirrels who harvest them regularly.

Growing in restricted groves in California mountains, their distance from the sea said to be limited by the range of sea-fogs, are the marvelous redwoods (Sequoia), including those "Big Trees,® a few of which are saved from destruction only by State and Federal protec¬ tion. These giants often more than 250 feet in height and thousands of years old present a tempting mark for lumber interests, who would split them up for the soft red, light, very durable timber, invaluable for shingles, grape¬ vine stakes and many other uses, since the wood is straight-grained, easily split and worked and will receive a high polish. Other coniferous groups of the West include those Douglas firs or spruces (Pseudotsuga taxi- folia), next to the Sequoias, the most gigantic

trees of the Pacific forests, ordinarily growing 180 feet high. In dense stands their straight¬ ness and clearness of bole especially adapts them for masts and spars and derrick-booms. They resemble the graceful hemlocks (Tsuga) growing on both sides of the continent, the timber furnished by the Western species being the most valuable. Hemlock bark is an im¬ portant tanning material and served with rancid salmon oil formed a peculiar item of the dietary of some of the Northwestern Indians. Spruces (Picea), many of which are planted for orna¬ ment for the sake of their symmetrical growth, thick foliage and color, yield a wood for rough construction work and are also one of the im¬ portant sources of wood-pulp. Another genus of conifers likewise crushed for paper pulp is Abies, the firs. The aromatic balsam fir (Abies balsamea), moreover, stores a thin turpentine in its "blisters® called Canada balsam and its nearly scentless wood is liked for food-tubs. The rest of the genus furnish rough lumber. But the great source of pulpwood lies in the otherwise unimportant aspens, trees which cover the plains of northwestern Canada, and the larger poplars (Populus) .

There are a number of trees which yield wood that is pre-eminently suitable for cabinet work or for interior finish of the finer sort, or for beautiful furniture. Two of them, black walnut (Jug Ians nigra) and the wild cherry (Prunus serotina), are so scarce at present that they have become very valuable. Wild cherry was formerly plentiful, especially along the northern Appalachians, where it attained to its greatest size, about 100 feet in height. It has shining and poisonous foliage, a medici¬ nal bark and bears heavy crops of small black berries, most attractive to birds. The heart-wood is reddish-brown, readily seasoned,

. straight and fine of grain, capable of receiving a satiny finish. It was a favorite material for furniture and cabinet work since it did not warp or shrink and took glue well. Early set¬ tlers finding cherry growing on the best farm¬ ing soils destroyed it ruthlessly before dis¬ covering its value, consigning it to the fire or fence. They did the same to the easily-split black walnut which encumbered the earth with huge trunks that shot up for a hundred feet, clear of trunk if crowded in the forest, throw¬ ing out great limbs when growing in open spaces. Its rich-brown heartwood, straight¬ grained in general, but mottled and waved in crotch and root, heavy, hard and durable, satiny when polished, was in great demand as a cabinet wood and also valuable for gun-stocks and veneers. Nowadays the demand has re¬ vived and old fence-rails, stumps and even furniture are being sought for veneers and the like. Its congener, the butternut (Juglans cinerea) or white walnut, is also used for in¬ terior finish, having a charming satiny wood of a paler tint and lighter weight than black wal¬ nut. Both have rich-kerneled nuts that are valuable and were made into a kind of paste or milk by the Indians. Bark and shells of the latter species furnished that Colonial dye called "butternut brown.®

Beeches (Fagus) are favorite trees for lawn planting on account of their splendid forms, delicate spray and silvery, smooth bark. They bear many small, sweet, triangular nuts that are a favorite food of hogs, beinej

known as "mast." The wood is close-grained and hard, used for turning, for tool handles and particularly for clothes-pins. The heart- wood of certain birches (Betnla), a favorite material for spools, also serves for furniture, being sometimes stained to resemble cherry and mahogany. The black birch (Betnla lenta) is one of the best species for this purpose and its spicy bark is distilled for the sake of its essential oil, very like and sometimes sub¬ stituted for wintergreen oil. The gray or white bark of other species has caused them to be planted for ornament ; Indians bent the

great sheets of parchment-like bark of the paper birch {Betnla papyrifera) into baskets and light canoes. Other trees of lesser importance in cabinet-making are the great tupelos and red gums (Nyssa), (Liquidamber) of south¬ ern bottom-lands, whose pale-brown heart- wood has been hitherto considered too diffi¬ cult to season and too gnarled and interlaced of fibre for profitable use except in paving blocks or small articles where its non-splitting qualities were an asset, but is now being util¬ ized for barrels and boxes, flooring, interior finishing and furniture, under such names as Circassian walnut. The Western larch {Lari. v) also yields a red cabinet wood capable of a high finish.

Maple, especially in its waved and mottled forms, oak and ash are also made into furni¬ ture, but their wood is of greater general value. Maple particularly is in demand for flooring. The sap of the most important species {Acer Saccharum) is sweet and is crystallized into sugar, an art learned from Indians. Being regular in form and prodigal of handsome foliage the maples are adapted for ornamental uses. The leaves assume very brilliant colors, flaming scarlet in the soft maple {A. rubrum). This species, with the large-leaved {A. macrophyllum) and the silver maple {A. saccharinum) are to be planted in France to mark the graves of fallen Canadian soldiers, a maple leaf being the badge of that country and of its troops.

The slow-growing white oak {Quercus alba), often spared by the farmer to shelter his stock in pastures, where it spreads wide its heavy branches, forming a wide dome-shaped head, represents the most durable, strongest and most generally suitable wood of all the valuable timber trees in this group, for the in¬ finite variety of uses to which the timber is put. The acorns of certain Western species furnish a regular crop of acorns gathered by Indians in the locality as a staple food. The bark of other species, particularly that of the chestnut oak {Q. Prinus) of the East, and the tanbark oak {Q. densiflora) of the West, is used for tanning, while that of the quercitron (Q. velntina) or black oak, contains a yellow dye-stuff. The Garry oak {Q. Caxryana) of the West is important because it is the only oak of that region which has valuable wood The pin oak {Q. palustris) is often planted for ornament, its lower branches sweeping the ground, while the middle ones are horizontal and the upper ones ascending.

Carriage- and wagon-building has always called for woods that are tough, elastic, pliable, strong and durable or unsplittable, according to their predestined use. Tough ash {Fraxinus) , which is also a favorite material for oar-mak¬

ing and agricultural implements, is one of these necessary woods. The white ash {Fraxinus Americana) , is one of the straight¬ stemmed forest trees

that exceed 75 feet in height and are scattered more or less among other hardwoods throughout the East, arriv¬ ing at its best estate in the bottom-lands of the lower Ohio. Ash trees, on account of their rapid growth and comparative freedom from disease, are favorite ornamental trees for street and lawn and pasture. But the graceful elm is more frequently seen, especially in New England. Although distressed by noxious in¬ sects, the American elm {Ulmus Americana) is one of the most beautiful trees that can be planted, its slender arching branches forming a vase-shaped head, with pendulous spray. Like that of the ash, its tough, hard wood, split with difficulty, is used in agricultural im¬ plements as well as vehicles, for small cooper¬ age, the bottoms of wheelbarrows and for other purposes where its peculiar qualities are utilized. The slippery elm (U. julua) furnishes a mucilaginous bark.

Several hickories {Hicoria) are employed in vehicle-building, the wood being unique for its toughness and elasticity, which makes it in¬ valuable for light but strong carriages. The hickories also bear edible nuts, those from trees with "shag" or "shell" bark as {H. ovata) being preferred. H. Pecan bears the thin- shelled, sweet pecan nuts of commerce. Linden trees (Tilia) whose drooping flowers are so prodigal of nectar and so alluring to bees that they are often called "bee trees," supply a soft, fine-grained wood that by steaming can be bent into shapes suitable for carriage panels. In the spring, too, its bark can be separated into "bast," long, tough ribbons used by florists as a tie-material instead of strings, . whence its common name of basswood. The tulip-tree {Liriodendron tulipifera) has several names, yellow poplar being perhaps the most common one, although carpenters speak of the pale-tinted kinds as "whitewood." Among the soft woods it ranks next to white pine and "cuts like cheese" and is superior to linden for carriage panels. The tree has a a characteristic¬ ally straight tapering trunk if grown in for¬ ests, arriving at more than 100 feet, but throws out limbs forming a huge cone where it has room. The orange-splashed, tulip-shaped, lemon-colored flowers borne at the tips of branches among pale-green quaintly-shaped foliage, as well as its stately growth, make this a fine ornamental tree.

There is a great demand for trees that are strong and tough, and above all durable when in contact with the ground, for telephone and telegraph poles, fence-posts, railway sleepers or "ties" and sills. Before blight threatened to exterminate them, chestnut trees {Castanea dentata) were chosen and even planned for this purpose, their timber being light, strong in young trees and easily split for these purposes, as well as for furniture, interior work, founda¬ tions for veneers and the like. It also bears delicious, thin-shelled nuts in prickly burrs. The locust {Robinia pseudacacia) , that is often planted as an ornamental tree on account of its heavy clusters of fragrant, honey-yielding white flowers and is known as "Acacia" in Europe, is

another source of a hard, heavy, durable timber for fence-posts. The varying

FOREST TREES

1 Shagbark Hickory (Hicoria ovata)

3 a. Cohune Palm (Attalea colume) ; b. Mahoe (Hibiscus elatus)

2 Tulip Tree (Liriodendron tulipifera)

4 Sago-palm (Cycas circinalis) (right); Screw-pine (Pandanus utilis) (centre)

;>

/

/

✓

♦

color of the heartwood has caused it to he called yellow, green, red and even black locust. Out of it are made tough ringing policemen's clubs. Its good qualities are shared by the heavily-armed honey locust (Gleditsia tri-canthos), of which the fruits are heavy pods filled with sweet pulp. The osage orange (Toxylon pomiferum), although of moderate size only, furnishes a hard yellow wood used somewhat as a substitute for fustic and is suitable for ties and fence posts; it is, more¬ over, a favorite hedging plant where it is hardy. Hardy catalpa (Catalpa speciosa) is another tree which has been planted experi¬ mentally to furnish ties and poles. It grows very rapidly and produces wood that is among the most durable kinds known, but the trees have a tendency toward crooked growth.

Among conifers the Douglas fir is used for poles and ties where more durable timber does not exist, and the long leaf pine (Pinus palustris), rapidly vanishing, is used in the South. The red cedar of the East (. Juniperus Virginiana) has ruddy heartwood which is one of the most valuable in America, not only for posts but for pencils, this soft, easily-cut, fra¬ grant. wood superseding every other kind for the latter purpose, when it can be cut from the great trees that form groves in middle Ten¬ nessee.

Since its odors repel insects, clothes- chests and closets are often made of cedar. Bald cypress (Taxodium distichum), very often used in place of pine, especially when exposed to the weather, is another post tree ornamental as well for its height and symmetry, growing to great height and bulk in swampy land, where it thrusts out of the water peculiar growths called "Knees.® It is deciduous like the tamarack (Larix laricina), a common tree in Canada, whose tall slender boles are considered to be the strongest and most durable of Canadian woods not only for posts but for ship's keels and masts. Tall-growing white cedars, or arbor- vitae (Thuya), whose flattened, fan-like spray is familiar in hedges, are very durable when exposed to the weather as posts or shingles. The giant Western species (T. plicata) averages more than 150 feet in height, having in maturity a curiously fluted conical trunk, covered with a tough stringy bark, inner layers of which are converted by Indians into fabrics and baskets. It is called red cedar or simply "cedar® in the West, more than half of the shingles in the United States being manu¬ factured from its fragrant, reddish, light and durable wood. Consult Browne D. 'The Trees of America (New York n. d.) ; Elliott, S. B., (Important Timber Trees of the United States) (Boston and New York 1912) ; Fuller, A. S., Practical Forestry) (New York 1884) ; Henkel, A., 'American Medicinal Barks) (United States Department of Agriculture, Bureau of Plant Industry Bulletin 139, Wash¬ ington 1909) ; Small, H. B., 'Canadian Forests) (Montreal 1884) ; Sudworth, G. B., 'Forest Trees of the Pacific Slope) (United States Department of Agriculture, Forest Service, Washington 1908), and many pamphlets issued by the United States Department of Agricul¬ ture.*

Helen Ingersoll.

FOREST TREES, Tropical. Most inter¬ esting trees grow between the tropics, some of which have traveled quite around the globe. A

vast number of economic products, exclusive of the more important tropical fruits, derived from them, have been carried far and wide since the dawn of commerce. The character of these forests varies greatly, influenced by waterfall and altitude. This is illustrated in Porto Rico where "the various formations in the order of their occurrence from the coast toward the interior are as follows : Littoral woodlands, moist deciduous forests, and tropical rainforests on the north or humid side, and the dry de¬ ciduous forest on the south or semi-arid side.® These different formations overlap more or less, or disappear but are to be recognized everywhere in the tropics.

The most obvious difference lies between those trees growing on hot dry areas like the Liguanea plain in Jamaica, where rain falls perhaps twice a year and then in torrents, and those forming dense forests on the nearby

mountains, where rain and fogs are frequent. In dry soil the trees grow sparsely, and are apt to be low and broad of head, with foliage subdivided, and sometimes armed with thorns. The leguminous tribe is usually well repre¬ sented. In the jungle, however, the arbores¬ cent growth is more interesting to the eye. The foliage is often evergreen, thick and glossy with waxen coatings designed to shed water, and simple of outline.. In the heat and mois¬ ture of these damp deciduous and tropical rain forests, as Colonel Roosevelt remarks, "The struggle for life among the forest trees and plants is far more intense than in the North. The trees stand close together, tall and straight, and most of them without branches, until a great height has been reached; for they are all striving toward the sun, and to reach it they must devote all their energies to produc¬ ing a stem which will thrust its crown of leaves out of the gloom below into the riotous sunlight which bathes the billowy green upper plane of the forest.® The trunks of these trees are usually pale gray or pallid in hue, and many of them have brilliant flowers such as those crowning the bois immortelle, which are, however, unsuspected by the stroller be¬ neath, unless the forest floor be littered with gay petals fallen from their place under the sun, where only an aeronaut or mountain climber can see them. Huge vines or lianes, which rise upward with the trees that they em¬ brace, are characteristic of these forests; some are as straight and thick as saplings, others are twisted and contorted; others cling insepa¬ rably to the boles. Some clothe the tree-trunks with verdure, others hang naked like ropes dangling from a ship's rigging. The trees are moreover loaded with masses of epiphytic plants, ferns and mosses. Orchids form huge tufts, or trail in long flowering streamers, and stiff wild pines hold water in the cup-like bases of their leaves in which little batrachians bathe. These features are most easily seen at the edges of clearings laboriously hacked out with cutlass or machete for garden patches. Tropical forests are continuously destroyed and steep hills left bare for the action of erosive forces, by these small cultivators who supply most of the constant supply of green¬ stuff used in towns. They cut down the giant trees with all their burdens and either consume them in charcoal kilns or in huge bonfires that are a characteristic sight among the mountains,

burning like beacons night and day, and often burning over more territory than is required. The ashes supply fertilizer, and when the ground is exhausted in a few years the gar¬ deners repeat the process.

As in the north, certain tropical trees are notable. Such are the banyan (Ficus Benga- lensis), an individual tree soon becoming an umbrageous

grove by sending down roots from its branches, and its near relative, the sacred bo-tree, or peepul (Ficus religiosa) in whose ever-quivering foliage dwell India/n gods. Sometimes eccentric growth, like those swollen trunks of bottle trees (Sterculia) of Australia, makes them noticeable or some peculiar usage, as when the easily-hollowed trunks of baobabs (Adansonia dig it at a) , are utilized for cisterns for storing water caught in near-by tanks dur¬ ing the rainy season — an adaptation of great service during the recent campaigns in Africa. Often it is the flowers that attract, as is the case of the flaming Spathodea Nilotica, or of the royal poinciana (Poinciana regia). The succulent, golden corollas of the Indian mahwa (Bassia latifolia), falling profusely, bring the peasantry in crowds to feast on the fleshy petals, that sometimes save them from starva¬ tion, and to distil from them a nauseous intoxi¬ cating liquor. The sacred and fragrant asoka (Saraca lndica) and champaca (Michelia Champaca) , on account of their flowers are planted about Eastern temples for ceremonial use. The delightfully-scented flowers of the latter are used as a cheap drug and are also the source of a perfume said to be substituted for that of the more valuable ylang-ylang (Can- anga odorata), a huge tree of the Philippines, whose tassel-like flowers retain their odor even when dried and were hawked about the streets of Manila in trays for sachets. The fluffy, yellow flower-balls of several acacias, more particularly those of the aromo, huisache, cassie or popinac as the Acacia Farnesiana is vari¬ ously denominated, are similarly plucked for their odor. Likewise, nearly the whole of the citrus tribe contribute essences for perfumers' uses, as does also the Eucalyptus citriodora, and that very large South American tree, Dip- teryx odorata, whose fruits — tonka beans — were formerly scented snuff. Balsams of Peru and of Tolu (Myroxylon) and other fragrant gums and resins extracted from tropical trees, as well as the odorous heartwood of lign aloes (Aquilaria) and sandalwood (Santalum), find their way into perfumery.

Pungent camphor is distilled from the wood of Camphora officinalis and many other drugs are taken from tropical trees, sometimes from the fruit, as from the cylindrical pods of the golden flowered Cassia fistula, or from those red and white nuts of Kola, which are so greatly sought by Africans that they pass from hand to hand as currency; or from the bark, as in the case of Cinchona, so long jealously guarded by its Andean discoverers; of the West Indian quassia (Picraena excelsa), a substitute for the Oriental Quassia amara ; or the Jamaica dogwood (Piscidia erythrina) ; or of the win¬ ter's bark (Drimys Winteri).

Saponaceous materials are obtained from soap bark (Quillaia) and from the soapberry (Sapindus) . Cocum butter is extracted from the seeds of Garcinia lndica; shea butter, used for food and illumination along the Niger,

from the nuts of Bassia, a genus that is rich in oil-yielding species. Candlenuts (Aleurites moluccana) are so oily that they were formerly strung on grasses in Hawaii and burned as candles. The cohune palm (Attalea Cohune) and the African oil palm (Elceis Guineensis) , among others, yield commercial oils, and wax is shaken or scraped from those two palms Copernicia and Ceroxylon. Ben oil, a favorite with perfumers, comes from the horseradish tree (Moringa) .

Even the juices of tropical trees are utilized. South America boasts of the cow-tree (Galac – trodendron utile), from which when gashed flows a quantity of thick white fluid, cream-like in consistency, and bearing a slight astringency in taste. The naseberry (Achras Sapota) secretes ˆchicle® gum, and a number of differ¬ ent trees furnish that milky sap which hardens into rubber or guttapercha. The pigment gamboge is derived from the yellowish sap of Garcinia Morelia.

An orange red dye, used for coloring dairy products, is obtained from the arils of annatto or achiote seeds (Bixa orellana) ; but more important dye-stuffs are the heartwood of fustic (Chlorophora tinctoria) tinting yellow; of Bra¬ zilwood (Ccesalpinia Brasiliensis) dyeing red, and of the graceful logwood (Hcematoxylon Campechianum) yielding fine blues and blacks. Logwood flowers profusely, and bees make one of the finest kinds of honey from the fragrant blossoms.

Cabinet woods are another commercial prod¬ uct of the tropics that is very valuable. Sandal¬ wood, camphorwood and cedar (Cedrela odor¬ ata) are favorite materials for clothes-chests and boxes, since the aromatic and fragrant woods repel insects. Cabinet makers went to the East for their hard sable ebony (Diospyros ebeneum), for the blackwood (Dalbergia) so much used by the Chinese, for teak (Tectona grandis) for carving, and for the shimmering satinwood (Chloroxylon Swietenia) ; but South America and the West Indies have their satin- woods (Fagara and Simaruba) , and also an ebony (Brya ebenum), besides rosewood and the peerless mahogany (Swietenia mahogoni) which seekers discover by climbing other trees to locate the mahogany by its delicately-cut pale foliage, among other methods. Thev also have the ale-brown wavy-grained yacca (Podo-carpus), a conifer, and the mountain mahoe (Hibiscus elatus) vividly striped with green and white. In the Philippines the yellow or red¬ dish heartwood of molave (Vitex), narra (Pterocarpus) , tindalo (Pahudia rhomboidea) and the dark-brown walnut-like acle (Pithe- colobium acle) are valued for furniture and cabinet making.

The wealth of the tropics in timber trees is scarcely realized or drawn upon. Some of the trees are so hard and heavy that carriage from their site is prohibited, even if their habi¬ tat were not often in utterly inaccessible

loca¬ tions; and if they could be fetched away they would be too difficult to work with profit, oV too limited in usefulness. On the other hand some tropical woods are surprisingly soft and light. The Lauan group of the Philippines may be compared to soft pine, being used for light construction and furniture. Ochroma, or balsa-wood (Ochroma lagopus) of the West Indies is so buoyant that it is used as a substitute

for cork, and is said to be the lightest wood in the world; its relative, the silk cotton or ceiba (Cciba pentandrd) , a huge tree regarded by negroes with much respect if not worship- fully, is not much heavier. Its enormous boles, braced by those sinuous narrow-walled, but¬ tressing roots that are so characteristic of many gigantic tropical trees, dominate open glades in the forest. They have been hollowed out for dug-out canoes by the natives, who made paddles, from the thin walls of the but¬ tresses. The "floss® or "silk,® a soft fibrous material surrounding the seeds, is more import¬ ant than the timber, being used as an upholstery material called "Kapok,® and as a moisture- defying, weightless padding for soldiers' bed¬ ding in the trenches. It resembles the red silk- cotton of the Eastern "Simal® (Bombax Mala- baricum) of the same family.

Among the heavy woods, teak {Tectona grandis), second only to mahogany in value, is famous for its durability in tropical climates. When properly seasoned — in Burma, the tree is girdled and left standing dead on the stump for years, — it can be floated out of the forests. It is also partially resistant to insect attacks and those of teredos which is a very important property in the tropics, and is mainly used for shipbuilding and for carving, as are also the bibiri (Nectandra rodioei) or greenheart, which is the chief article of export from British Guiana, which is insect and teredo proof and is therefore especially useful for under-water construction.

Trincomali wood (Berria Ammomila) and Sal (Shorea robusta) are valuable Oriental trees for general construction, and timber from various species of gums (Eucalypti) and Kauri (Dammar a Australis) , which include some of the tallest trees of the world, are invaluable to Australasia. The ubiquitous tamarind (Tama – rindus Indica) offers another useful wood, and in the countries about the Caribbean we find the small but exceedingly hard lignum-vitse (Guaiacum officinale) famous for its wearing qualities, the locust (Hymencea Courbaril) , the yokewood (Catalpa longissima) of very general usefulness ; the ausubo (Sideroxylon fcetid- dissima) ; the candlewood, or tabanuco {Da- cry odes excelsa) ; the lance wood (Oxandra lanceolata) very elastic and exported for shafts

and fishing rods; the crab-wood (Carapa guienensis) ; the tropical cedar (Cedrela odor- ata) made up into cigar boxes; and a host of other trees. The Philippines produce the ipil (Intsia), particularly durable when cut for ties; betis (Illipe betis), and the aranga (Homaliunt) and liusin {Parinarium griffithia- num) valuable for salt-water construction as in wharfs.

Bamboos attaining to the height of trees, although really enormous grasses, have an in¬ finite variety of uses ranging from food to house construction and surround the globe. The curious mangrove swamps that lie on shel¬ tered shores are eaually common throughout the tropics, and are raided for fuel, pilings, and, in the Far East, for tanbarks and dyes. Other tannins are obtained from the twisted pods of divi-divi (Ccesalpinia coriaria), and from Australian wattles, especially from the golden wattle (Acacia pycnantha) and the black wattle (A. decurrens) , the latter being cultivated also in Hawaii. Cutch is a product

of A. Catechu. Acacias, moreover, yield fine and durable wood, sometimes fragrant, and many commercial gums, as gum arabic. The kair tree (A. Catechu) of India is there con¬ sidered to be even more durable than teak, and to be uninjured by insects, while A. Koa of Hawaii is said to be the best timber in that territory.

A common tree on tropical shores is the yellow-flowered tulip-tree, or emajaguilla (Thespesia populnea) which is a favorite shade, timber and ship-building tree in India. Its bark yields a strong fibre for tying bundles.

It belongs to the mallow family famous for its fibres, which also includes the emajagua or mountain mahoe (Hibiscus elatus) that fur¬ nishes a fibre compared to jute, used for cord¬ age and also for millinery. Its inner bark was stripped for tying cigars and was known as "Cuba bast.® An extraordinary form of these netted bast fibres exists in the lace-bark- tree (Lagetta lintearia) which can be pulled into open meshes much resembling a coarse white fabric. A white cloth is manufactured in Africa from Uganda bark-cloth trees (Bra – chystegia) . The mulberry family is also re¬ dundant in bark fibres, clothing and sacks being evolved from the bark of the upas tree (Anti – aris toxicaria) , while the finest and whitest cloth and mantles worn by Hawaiians were made from the beaten bark of Broussonetia papyrifera, also famous as a paper-stock. Simi¬ lar lacy bark layers are found in the Australian flame tree (Sterculia acerifolia) and other species of this genus ; and in nettle-trees (Laportea ; Trema) of both Australia and India.

The leaves of screw-pines (Pandanus utilis) are plaited into coarse sacks, and the fibres otherwise employed, but the greatest source of basket

material in the tropics and of fibre for innumerable purposes lies in the palm family, which is probably the most useful as well as picturesque of any in the equatorial zone. The foliage of the round-leaved species, when properly trimmed, becomes fans ; others are torn into strips such as raffia, from Raphia, which are woven into hats, baskets and the like. The huge leaves of many serve as thatch for the slight tropical buildings. The stringy fibre of other species, like that of Mauritia • flexuosa; of the tecuma palm (Astrocaryum tucuma) ; or that known as piassaba fibre de¬ rived from the extraordinary Leopoldinia piassaba and from Attalea funifera and still other species, is twisted into cordage or made into brooms and brushes. Kittool fibre comes from the jaggery palm (Caryota urens) ; and coir, woven into cocoa-matting and said to make the finest cables on account of its elasticity, lightness and durability under water, comes from the fibrous husks of the coconut {Cocos nucifera) .

The dried kernel of the coconut palm is called copra and is one of the chief articles of export from the Philippines and other archipelagos of the Southern Seas, an import¬ ant commercial oil being extracted from the desiccated flesh. Before the kernel has hardened at all the soft green husk is filled with a clear fluid, as pure and tasteless as water, which is the safest and most refreshing drink of the tropics. The husk is slashed with a heavy knife and the native pours the fluid down his throat

directly from the nut. Oil is yielded by the fruits or nuts of other species, especially from those of the Cohune palm (Attalea Cohune), and from the more important African oil palm (Eleeis Guinensis), yellow and violet scented, extensively exported for soap and candles. The small nuts of a stemless palm (Phytelephas macrocarpa) have white kernels that become so hard that they are used instead of ivory, the tree therefore being called ivorynut palm. Areca Catechu furnishes those fruits known as betel-nuts, chewed by Orientals with a bit of lime and betel pepper.

The twin nuts of the coco-de-mer (Lodoicea callipyge) found floating on the ocean, caused endless speculation among mariners who con¬ cluded that they were borne on a submarine palm, before the great trees were discovered in the Seychelles. Other palm fruits are the well-known dates from the cultivated Phoenix dactylifera, so important a food and article of export from Africa; those of several Ameri¬ can species are sought for by the natives, espe¬ cially the small bitter fruits of the mucuja (Acrocomia lasiospatha) , and of the peach- palm (Giiilielma speciosa). A favorite Brazil¬ ian drink was extracted from the macerated thin pulp of the tiny

fruits of the graceful assai (Euterpe oleracece).

Not a few beverages, intoxicating or other¬ wise, are concocted from palm sap. In the Philippines, the fresh or mildly fermented sap drawn from the inflorescence of the coconut and nipa palm is called (

Carnauba wax is shaken from the encrusted foliage of the wax palm of Brazil (Copernicia cerifera) sometimes used to adulterate bees¬ wax ; and another vegetable wax is scraped from the trunks of Ceroxylon Andicola of New Granada, where it is mixed with vege¬ table tallow for candles. Several palms are robbed of their terminal buds, so that they may be cooked as vegetables ; hence they are called cabbage palms. One, the tall West In¬ dian palm (Oreodoxa olcraccea), is a relative of the magnificent royal palm (Oreodoxa regia).

Bibliography. — Cook, O. F., and Collins, G. N., (Economic Plants of Porto Rico) (Con- trib. United States Nat. Herb. Vol. VIII, pt. 2, Washington 1903) ; Fawcett, W., (Guide to the Botanic Gardens, Castleton, Jamaica) (Kingston, Jamaica, Hope Gardens 1904) ; id., Undex to Economic Products of the Vege¬ table Kingdom in Jamaica) (Jamaica 1891) ; Gifford, J. C., (Luquillo Forest Reserve, Porto

Rico) (United States Department Agriculture, Bureau of Forestry Bulletin 54, Washington 1905) ; Harris, W., timbers of Jamaica) (Imp. Department of Agriculture for West Indies, Reprint from West Indies Bulletin, Vol. IX, No. 4, pp. 297-328, 1909) ; Murphy, L. S., ˆForests of Porto Rico) (United States De¬ partment of Agriculture Bulletin 354, Wash¬ ington 1916) ; Philippine Commission Report, pt. 3 (United States War Department, Vol. IX, Washington 1907) ; Shinn, C. H., Economic Study of Acacias) (United States Department Agriculture Bulletin 9, ib. 1913) ; Smith, J. G., (Black Wattle in HawaiP (Hawaii Agricultural Experiment Station Bulletin 11, ib. 1906) ; ˆUseful Fibre Plants of the World, > and many pamphlets issued by the United States Agri¬ cultural Department.

Helen Ingersoll.

FORESTALLING, in criminal law, the buying of produce with the object of enhancing the price in open market, coming to market, or making any bargain for buying such goods before they shall be in the market ready to be sold, etc. This was an offense at common law and was the subject of frequent legislation. Modern conditions have made most such prac¬ tices legitimate, but many abuses have arisen, under which come ˆcorners,® or monopolies. The Sherman Anti-Trust Act forbidding under certain conditions the elimination of competi¬ tion and restraint of trade is a modern attempt to prevent the abuses which have grown up about the

system.

FORESTER, Frank. See Herbert, Henry William.

FORESTERS, Ancient Order of, a fra¬ ternal order founded 1745, at Yorkshire, Eng¬ land. The order was introduced into the United States in 1832 by the establishment of Court Good Speed in Philadelphia. There are at present three high courts, and about 440 subordinate courts in the United States, with a membership of about 50,000. The total membership of the Ancient Order in all countries is about 1,600,000 members. It has courts in 36 countries, with reserve funds exceeding $50,000,000. Over $5,000,000 are dis¬ bursed annually in benefits. The revenue de¬ pends on fixed dues.

FORESTERS, The Independent Order of,

was organized in 1874 at Newark, N. J. It was reorganized in Canada by the Hon. Dr. Oronhyatekha, a full-blooded Mohawk Indian of scholarly distinction, high character and great ability, Who was educated under the pat¬ ronage of the late king of England, in 1881. In 1881 the Society consisted of 369 members and was in debt. It now numbers 218,074 and has a surplus of $6,700,000 in its treasury, hav¬ ing already paid to widows and orphans of de¬ ceased brethren about $45,861,180. The mem¬ bership extends throughout all of the provinces of Canada, nearly all of the States of the American Union, England, Ireland, Scotland, Wales, Norway, Denmark, France, Belgium, India, Newfoundland and Australia. The Society rejects a large percentage of applicants, being very careful in the selection of its risks. The order is governed by a supreme body, which meets once in three years. The local juris¬ dictions are governed by high courts of the various States and provinces. The funds,

however, are all forwarded to the head office, there being invested under the insurance law of Canada which prevents ' investment in anything except first-class gilt-edge securities. The last reports show that no losses have ever been made in investments. The head office of the order is in Toronto, Canada, the building being a magnificent structure, known as the Temple Building, which was built and is owned by the order. In addition to the head office it contains a number of banks, loan companies, insurance companies, and is the headquarters of Masonry for the city of Toronto. The order disbursed in 1915 the sum of $3,950,032 to widows and orphans, and in sick and funeral benefits. The rates of premium may be judged from the following: Age 35; amount $1,000; mortuary premium $1.38 (small court dues in addition). All premiums cease at 70 years of age, or at any

time when the members become totally and per¬ manently disabled, at which time they are allowed to take in- cash one-half of the amount of their policy, the balance to be paid to their heirs at death. After 70 years of age members are permitted to draw one tenth of their policy for each of 10 years if they live so long, the balance to go to their beneficiaries at death. The order also has a sick and funeral benefit division. It admits lady members, these being called companions, who are gathered in separate courts. Of its total membership of 218,074 about 20,000 are companion members.

FORESTERS OF AMERICA, a benevo¬ lent and. beneficent order which had on 7 June 1916 a membership of 201,637. Its history be¬ gins with the institution of a <(court® in Leeds, England, in 1790. The American period dates from the establishment of a <(court® in Phila¬ delphia in 1832. Up to 29 Dec. 1874 the order was under the jurisdiction of the English or¬ ganization ; but on that date a subsidiary high court was created in the United States, and on 15 Aug. 1889 the members of the latter seceded ; a declaration of independence was read at the Minneapolis Convention, and the Foresters of America started as a purely and distinctively American organization. During the year 1915 the increase in membership was 19,863, and benefits paid amounted to $1,483,221.13. Since the organization was instituted, the expenditure (to 7 June 1916) for sick benefits, management, etc., has amounted to $42,099,148.26.

FORESTI, fo-res'te, Eleutario Felice, Italian patriot: b. Conselice 1793; d. 1858. He was graduated at the University of Bologna, studied law and practised his profession at Fer¬ rara and became praetor at Crespino in 1816. Becoming a member of the Carbonari he was imprisoned from 1819 to 1836 and on his release came to the United States. He was professor of Italian at Columbia University for several years and became consul of the United States at Genoa in 1858. His publications included an edition of Ollendorff Italian grammar (1846) and (Crestomazia italiana) (1846).

FORESTRY ASSOCIATIONS. In 1875, The American Forestry Association was. formed at Chicago with the object of collecting and disseminating information on forestry and of fostering the conservation of the existing for¬ ests. This association was merged in 1882, into the American Forestry Congress., which be¬ came at once nationally influential in promot¬

ing the cause of forestry. In 1889 the original name was resumed. During the early years of its existence, the Association relied on annual reports, occasional bulletins, and the general press for the publication of information about forestry; but in 1897 it took over from the New Jersey Forestry Association the publication of the periodical The Forester, changing the title later to Forestry and Irrigation, Conservation, and,

finally, American Forestry. American Forestry appears monthly and is one of the best forest periodicals in existence. The Associa¬ tion now has about 10,000 members, and is very active and influential in educating public sentiment and in shaping forestry legislation. Minnesota and Pennsylvania forestry associa¬ tions were organized in 1876 and 1886, respec¬ tively; and for some years the latter's maga¬ zine Forest Leaves was the official organ of the American Forestry Association. Many State and local associations carry on similar work in various parts of the country. The Society of American Foresters, organized in 1900, is a professional society whose active membership is composed entirely of technically trained for¬ esters of achievement. Its meetings and publi¬ cations have contributed a great deal toward the solution of the forest problems of America. Under its auspices is published The Journal of Foresty, which was called until 1917 The Pro¬ ceedings of the Society of American Foresters. Another class of associations of great import¬ ance in the preservation of the forest is the fire protective associations organized by timber owners in many States. Most of these are local in character; one State possesses 16 of them ; in all, 43 have been formed in 13 States. In the Far West these protective associations are combined under one large organization, the Western Forestry and Conservation Associa¬ tion. They are in general a direct result of the work of the Government Forest Service, and side by side with it have been a powerful factor in bringing Federal, State, and private protec¬ tive agencies together in close co-operation, in educating the public regarding the value of fire protection, and in shaping legislation for the re¬ duction of the fire loss.

FORESTRY IN THE UNITED STATES. The purpose of forestry is to secure the perpetuation and at the same time the full use and benefit of the forest. Forestry seeks to serve the people by making the highest and most profitable use of large areas of land not well suited to agriculture, by conserving the water supply, and by fostering the economical production of wood commodities. The direct benefits to be secured from the practice of for¬ estry are chiefly a continuous supply of wood for all its various uses and the even distribution of the water supply through protection of the watersheds. Conditions peculiar to the western part of the United States have made it neces¬ sary for government forest work to deal also with a very important use of the forest not di¬ rectly pertaining to forestry, namely, the graz¬ ing-? I livestock on the national forests.

"Forest Regions. — The problems of forestry and the methods employed in solving them are to a large extent determined by the nature, lo¬ cation, and extent of the forests themselves. The forests of the United States cover approxi¬ mately 550,000,000 acres, or about 29 per cent

of the total land surface. There are five great forest regions, three stretching from the At¬ lantic seaboard to the Great Plains, which are destitute of timber except along the margins of the streams and on occasional elevations, and two west of the Great Plains, (a) The Northern Pine Forest extends from western Minnesota eastward to the Atlantic Ocean and from Canada southward to northern Illinois, Indiana, Ohio, and New Jersey. From northern Ohio and New Jersey there is a gradually nar¬ rowing extension along the ridges of the Appa¬ lachian Mountains, taking in nearly all of Penn¬ sylvania and West Virginia, western Maryland and western Virginia, and reaching as far south as northern Georgia. The characteristic tree of this forest is the white pine (Pinus strobus, Linn.).

White pine is a tree of the first commercial importance; and of all the trees of North America, it best combines the qualities of utility, rapid growth, heavy yield, and ease of management. Its former abundance and the cheapness and varied usefulness of its lum¬ ber made it an important factor in the de¬ velopment of the States in which it grows. After an enormous exploitation the original forests are now approaching exhaustion. The most rapid reduction has taken place in its western and more important centre of distri¬ bution ; but the greatest bodies of white pine in the country are still to be found in the north¬ ern portion of the Lake States. _ The cut of white pine reached its maximum in 1890, when the production in Michigan, Wisconsin, and Minnesota amounted to 8,597,623,000 board feet. In 1900 the cut in these States had fallen to 5,419,333,000. In 1913, the total cut of white pine in the United States was 2,568,636,000 board feet. The reduction in cut has been ac¬ companied by a marked fall in the quality of the lumber; and the large-size, high-grade white pine lumber, once abundant on the market, has become scarce and expensive. The demand for low-grade white pine lumber has made it pos¬ sible, from a business standpoint, to cut and market second-growth timber when compara¬ tively small and young. For many years the pine output of the northeastern States has consisted almost wholly of second growth. Had fires not been allowed to run repeatedly over the slash left in logging the original stand, a large part of northern Michigan and other noted white pine regions would probably now be covered with second growth, much of it of merchantable value.

Since the partial destruction of white pine in the eastern States, red spruce (Picea rubens, Sarg.) has become the principal commercial tree of this region. It grows usually in mix¬ ture with hardwoods, such as beech, birch, and maple. At high altitudes, however, there occur comparatively pure red spruce and balsam fir stands. The amount of spruce lumber sawed in Maine, New Hampshire, Vermont, Massa¬ chusetts, New York, and West

Virginia in 1914 was 781,292,000 board feet, a large proportion of which was red spruce. Spruce is now cut principally for paper pulp ; and the production of spruce pulpwood in the United States in 1911 amounted to 1,612,355 cords. This in¬ cludes all the other varieties of spruce as well as red spruce. The cut of balsam fir lumber in the United States in 1914 was 125,212,000

board feet, more than half of the total being produced in Maine. Balsam fir has nearly always been cut to some extent along with spruce for pulpwood; and in 1911, the consump¬ tion of 191,779 cords of balsam fir pulpwood was reported, (b) The Southern Pine Forest has its northern extremity in southern New Jersey and thence widens out southward and westward until it reaches the Gulf of Mexico and the open country in Texas, Oklahoma, and Missouri. Its principal trees are longleaf pine (Pinus palustris, Mill), shortleaf pine (Pinus echinata, Mill), loblolly pine (Pinus tee da, Linn.), and bald cypress {Tax odium distichum, Linn.). The hardwoods of this region- are chiefly the oaks, hickories, and gums. Long- leaf pine is especially valuable as structural timber, and for this purpose is one of the most important trees in the world. The southern pines (known collectively in the lumber trade as southern yellow pine) supply a large pro¬ portion of the lumber cut of the United States. Out of a total of 37,346,023,000 board feet in 1914, southern yellow pine supplied 14,472,- 804,000 board feet. The southern pines, espe¬ cially longleaf, also supply a large amount of turpentine and resin. In 1909 the value of these products amounted to $25,295,017. The bald cypress is a swamp tree of great commercial importance, especially for purposes requiring clear, durable, and easily worked lumber. The cut of cypress in 1914 was 1,013,013,000 board feet, (c) The Central Hardwood Forest occu¬ pies the territory between the southern and northern pine forests and stretches from the Atlantic Ocean to the treeless plains west of the Mississippi River. It is the only region in the United States in which the hardwoods pre¬ dominate over the conifers. The principal trees are the oaks, hickories, ashes, chestnut, – and yellow poplar. Many hardwoods are also to be found in the northern and southern pine forests, and much hardwood lumber is produced in the pine regions. The Central Hard¬ wood Forest does not differ greatly in com¬ position from the neighboring pine forests ex¬ cept in the comparative absence of the conifers. The hardwood lumber cut in the United States in 1914 was as follows: Oak, 3,278,908,000; ma¬ ple, 909,743,000 ; red gum, 675,380,000 ; chestnut, 540,591,000; yellow poplar. 519,221,000; birch, 430,667,000; beech, 376,464,000; basswood, 264,- 656,000; elm, 214,294,000; cottonwood, 195,- 198,000; ash, 189,499,000; tupelo, 124,480,000; hickory, 116,113,000; walnut, 25,573,000; syca¬ more, 22,773,000. (d) The Rocky Mountain

Forest extends along the Rocky Mountains from Idaho and Montana

through Wyoming, Utah, and Colorado to Arizona and New Mexico. It is sub-arid in character and occu¬ pies more or less isolated mountain masses, separated from each other by grazing lands, deserts, or cultivable valleys, and from the Pa¬ cific Coast forest by desert areas. This forest is almost entirely coniferous, the principal species being western yellow pine (Pinus pon- derosa, Laws.), Engelmann spruce {Picea cngel- manni, Engelm.), lodgepole pine {Pinus con¬ torts, Loud.), and Douglas fir {Pseudotsuga taxifolia, Lam. Brit.). In 1914 the lumber cut of western yellow pine was 1,327,365,000 board feet; and the cut of lodgepole pine, 18,- 374,000 board feet. On account of the semi-arid character of the region, this forest is of great

value as a conserver of water; for all the vast irrigation projects situated nearby depend for their success upon the flow of water from the forested slopes of the mountains. It is in this forest that the summer range for grazing live¬ stock is most important, the whole stock rais¬ ing industry of the region depending largely for its summer feed on the ranges near or within the forests. (e) The Pacific Coast Forest occupies Washington, Oregon, and the northern half of California. The merchantable species are, with slight exception, conifers. The forest is characterized by the large size of the trees and the tremendous masses of timber it contains. The chief species are Douglas fir (Pseudotsnga taxifolia, Lam. Brit.), bigtree (Sequoia washing toniana, Winsl. Sud.), sugar pine (Pinas lambertiana, Dough), western yel¬ low pine (Pinus ponderosa, Laws.), western hemlock (Tsuga heterophylla, Raf. Sarg.), giant arborvitse (Thuja plicata, Don.), and Sitka spruce (Picea sitchensis, Bong., Trautv. and Mayer). The forest of the California Sierras, characterized by the bigtree, the sugar pine, and numerous magnificent firs, is one of the most beautiful in the world. In 1914 the total lumber cut of Douglas fir was 4,763,- 693,000 board feet; of redwood, 535,199,000 feet; and of sugar pine, 136,159,000 feet.

Distribution of Stand. — The estimated total stand of timber in the United States is 2,800 billion board feet. Over one-fourth of this is located in the Pacific Northwest, in the States of Washington and Oregon. The ad¬ joining region on the east in Idaho and Mon¬ tana, known as the Inland Empire, contains a little over one-eighth and the State of Cali¬ fornia a little less than one-eighth of the stand¬ ing timber of the country. Altogether, the Pacific and northwestern States contain over half the country's timber. About half the re¬ mainder is to be found in the southern pine States. Smaller portions, approximating one- twelfth and one-twenty-fifth of the total stand, are found in the northeastern and Lake States,

respectively. The remainder is scattered.

The principal species composing this stand are: Douglas fir, found principally in Wash¬ ington and Oregon, constituting a little over one-fourth the total; southern yellow pine (in reality consisting of shortleaf, longleaf, lob¬ lolly, and other pines, but usually sold and spoken of as ((southern yellow pine®), found principally in the Gulf and South Atlantic States, aggregating about one-seventh of the total ; and western yellow pine, found princi¬ pally in the Pacific and southwestern States, about one-eighth of the total. No other soft¬ wood composes such a large proportion of the total stand as any of these, the next largest — spruce, which grows principally in the north¬ eastern States and on the high mountain ranges of the West — comprising less than one- twentieth of the total stand. Although form¬ ing comparatively small portions of the country's total supply, other species such as redwood and sugar pine in California, western hemlock, western cedar, and spruce in Wash¬ ington and Oregon, white pine in Minnesota and eastern hemlock in the Lake and north¬ eastern States, compose a large portion of the local stands and are of importance in the regions where they are found. The hardwood species grow in the eastern half of the country,*

principally in the northern part, but constitute also a considerable proportion of the stand in the southern pine States. Altogether, they com¬ prise about one-fifth of the total stand of the country.

The Forests of Alaska. — The southeast coast forests of Alaska, which occur along the streams and lower slopes of the mountains, are composed of large merchantable trees. The principal species are western hemlock, Sitka spruce, yellow cedar (Chamcecy paris nootka- tensis. Lamb., Spach.), and giant arborvitse. The vast interior forests contain chiefly small trees valuable for mining timbers, and are much injured by severe forest fires. The principal species are white spruce (Picea canadensis, Mill., B. S. P.), black spruce (Picea mariana, Mill., B. S. P.), paper birch (Betula papyrifera, Marsh.), and aspen (Populus tremuloides, Michx.).

Forests of the Philippine Islands. — The

Philippine Islands contain about 49,000,000 acres of wooded land with an estimated stand of 123 billion feetˆ of merchantable timber. There are about 750 species of valuable woods on the islands of which 160 are marketable. The low¬ lands and lower mountain slopes are occupied by the broad leaved trees, of which the banyan tree, and the bamboo, coco, and other palms are characteristic species; and the higher slopes, by the conifers.

The Forests of Hawaii and Porto Rico. —

The Hawaiian and Porto Rican forests are both tropical, the large proportion of tropical hardwoods and palm-like trees being their dis¬ tinctive characteristic They are rich in species and are of great importance as a source of wood supply to the local population. Their greatest value, however, is for the protection of the watersheds of the islands.

History of American Forestry. — The first forestry legislation in America consisted merely of protective measures designed to preserve a certain kind of wood, such as oak for ship¬ building, or large straight pine trees for masts, or ordinances whose chief purpose was to secure the proper use of the timber that was cut. In 1699 a royal surveyor of the woods for New England was appointed, but his duties seem to have been merely the protection of the property rights of the different colonists in the timber of the forests. William Penn endeavored to establish a forest policy in Pennsylvania by requiring those who settled on the land to agree to leave one acre in forest for every five acres cleared. This plan, how¬ ever, was apparently not adhered to.

After the Revolution, the forest legisla¬ tion was much the same as it had been in colonial times. In 1799, the Federal govern¬ ment set aside $200,000 to buy standing timber for the navy. The act appropriating this money contained a provision for the protec¬ tion of the timber for future use, and was followed bv other acts of the same nature, most of them applying especially to the preservation of the live oak, which was partic¬ ularly valuable for shipbuilding.

These early measures were probably with¬ out effect on the general timber supply. In fact, the timber laws were disregarded for the most part, and little effort was made to en¬ force them for the reason that the supply of timber seemed inexhaustible. And, indeed,

this was pretty nearly true so long as no prog¬ ress was made beyond the primitive methods of lumbering then used and the petty scale on which operations were conducted. With the development of sawmill machinery and modern methods of lumbering and the extension of railways, however, the destruction of the for¬ ests took on a new aspect. The lumber in¬ dustry increased in proportions so swiftly and the forest disappeared, under the saw and the fires that followed in the wake of careless lumbering, at so rapid a rate that thinking men were finally aroused to the danger of the

possible failure of the country's timber supply unless measures could be taken to protect and renew the forests. In 1873, the committee on forestry of the American Association for the Advancement of Science memorialized Con¬ gress on the subject and recommended the ap¬ pointment of a commission of forestry.

Government Forest Work. — In 1876, an agency was established in the United States Department of Agriculture for the study of forest conditions in the United States, the consumption of wood, the probable future sup¬ ply of timber, etc. This agency was held by Dr. Emerson B. Hough. In 1881, the agency became the Division of Forestry. In 1886, a professional forester, Dr. B. E. Fernow, was placed in charge ; technical investigations were begun ; and the results were published in bulletin and circular form, so that they be¬ came available to all who were interested in forestry. For a long time the Division of Forestry received an annual appropriation of less than $30,000, so that its activity was much restricted by lack of money. The field of work gradually expanded, however, and the division grew (1901) into the Bureau of Forestry, and finally into the Forest Service (1905) with an appropriation for the fiscal year 1915 of $6,007,461.24, of which about $4,- 750,000 was spent for the administration and protection of the National Forests.

National Forests. — In 1891, Congress au¬ thorized the President to set aside forest re¬ serves, as National Forests were then called, in order to protect the remaining timber on the public domain from destruction and to ensure a regular flow of water in the streams. The first one — Yellowstone Park Timberland Reserve — was created by President Harrison that same year, and placed under the administration of the Land Office of the Department of the Interior.

Government administration of the reserves soon made apparent the necessity for scientific forestry. It was the duty of the Secretary of the Interior to prescribe regulations which would ensure the fulfilment of the objects aimed at in creating the reserves. Timber cut¬ ting must not destroy the forests, but must provide for the growing of a new timber crop. Grazing had grossly abused the range; it was necessary to devise methods for increasing the forage. Both timber use and grazing use must be so managed that water supplies would be maintained and bettered. All the resources of the forests needed to be given careful con¬ sideration and plans devised for their best de¬ velopment. Without such plans, little of the value of the forests could be made available to the people. Technical problems were involved which the officials of tne Interior Department

felt to be outside their province. They there¬ fore at first requested the aid of the experts of the Department of Agriculture as advisers, and soon

recommended the transfer of adminis¬ tration of the reserves to the latter department.

This transfer took place in 1905 and the Forest Service was put in charge of the work. The following year the name Forest Reserves was changed to National Forests, to indicate that their resources were not locked up as "reserves® for a distant future. In administer¬ ing the National Forests the first aim of the Forest Service has been to protect their re¬ sources so that they will always be there to use, and at the same time to see to it that as many of the people as possible have an equal chance to use them.

There are now 152 National Forests with an area of about 155,407,920 acres, including the Alaska and Porto Rico forests. Within the forest boundaries are also some 21,179,035 acres in private ownership, consisting of lands granted or taken up for one purpose or another before the forests were created or of home¬ stead entries made since.

Since the first establishment of the national forests the government has been carrying on a systematic stock-taking as the basis, from one standpoint, for systematic and regulated management. An immense area has already been covered, and the Forest Service will ulti¬ mately be in possession of fairly complete in¬ formation regarding the amount of timber of various kinds on the forests and the conditions in each case which are important as haying some bearing on the best method of utilization.

Ripe timber on the forests, of which there is a large amount, is sold at a fair price to the highest bidder. Anybody may purchase tim¬ ber, but no one can obtain a monopoly of it or hold it for speculative purposes. The govern¬ ment is anxious to sell the mature timber on the forests because it is no longer growing at a profitable rate and should give way to young trees and seedlings. As few restrictions as possible are imposed upon purchasers of tim¬ ber, only such as will ensure cut-over areas be¬ ing left in the best condition for future growth. Experienced woodsmen estimate the quantity and quality of National Forest timber and its approximate value, as a basis for the price to be charged. In fixing this, all factors which affect the cost of lumbering, such as accessibil¬ ity, number, and kind of improvements neces¬ sary, etc., as well as general market conditions, are taken into account. The prices asked allow the purchaser of National Forest timber opportunity for a fair profit. Attractive log¬ ging chances are made known to the public ; and full information regarding them and the conditions of sale are given to inquirers.*

The trees to be cut on a sale area are marked in advance by forest officers, the ob¬ ject being to make provision for a second crop of timber on the same land, unless the land is more valuable for agriculture. The method of

cutting is always determined by technically trained foresters and in conformity with silvi¬ cultural principles ; but the practical difficulties attendant on each operation are given full con¬ sideration. The system under which any partic¬ ular forest is managed and under which the cuttings are done depends chiefly on the char¬ acter of the timber and the main purpose for

which the forest is managed. Timber on the watersheds of streams is never cut enough to impair the protective cover that the forest affords; for one of the chief objects of the National Forests is to regulate streamflow. Where the main purpose of the forest is tim¬ ber supply, the system of cutting depends chiefly on the species present ; and concessions made to the practical difficulties of the moment are equivalent in most cases to adopting a deferred cutting plan, by which ideal condi¬ tions for reproduction not secured at once will be made possible at the next cutting. In Douglas fir stands it is usually possible to secure more nearly ideal conditions for re¬ production after a cutting operation than in the other types of virgin forest. The usual method with Douglas fir on the National Forests is to leave groups, strips, or single seed trees to reproduce the forest; the rest of the mer¬ chantable timber is cut clear. In western yel¬ low pine and sugar pine stands, what might be called improvement cutting is usually prac¬ tised; large, over-mature, and defective timber is cut and the medium-sized, thrifty, and younger classes are left. Where there is not enough young timber, the selection system is used in order to secure sufficient seed trees. In the mixed Douglas fir and larch stands of northern Montana and Idaho, a selection sys¬ tem is used, the large timber and all inferior timber being cut generally. Here, operations conducted to secure sawtimber amount to im¬ provement cuttings. Operations producing hewn cross-ties and making use of smaller tim¬ ber are permitted only where the conditions are such that no disadvantage can result. In the lodgepole pine stands, a selection system is used, but it is not the European selection sys¬ tem. In some stands, heavy thinnings and im¬ provement cuttings are used ; in others the straight improvement cutting is employed. In tie operations, the smaller sized timber is taken out only where no financial or silvicul¬ tural disadvantage is likely to result. As yet, spruce is cut comparatively little in the West because it is for the most part at too high alti¬ tudes. Where it occurs lower down it is taken out along with other species. In the National Forests of the East the general prac¬ tice is to use improvement cuttings, both in the pine and oak of the Arkansas forests and in the hardwood and spruce of the Appala¬ chians.

Small sales of timber are made by forest officers on the ground to avoid delay. Larger sales are made either by the supervisor of the forest, the district forester, or the forester, according to the amount desired. Small sales of timber for local use are encouraged. This is one of the ways in which the National Forests are made to serve the small lumberman and consumer. Though single sales have been made for as much as 800,000,000 board feet, over nine-tenths of the sales are for less than $100 worth of timber. Of the 10,905 timber sales made on the National Forests in the fiscal year 1915, 10,621 were of this latter kind. Home¬ stead settlers and farmers may obtain National Forest timber for their own use at the actual cost of making the sale. No charge is made for the timber itself.

Sometimes natural regeneration of the for¬ est fails and planting has to be resorted to. vol u — 31

Furthermore, there are within the National Forests, and now bearing little or no tree growth, about 5,600,000 acres of land which are capable of producing valuable timber and are suitable for no other purpose. The Forest Service is planting these areas as rapidly as it can be done advantageously. Reforestation operations now cover from 12,000 to 15,000 acres yearly. Most of the land being refor¬ ested consists of old burns, where recurring fires have ruined the former forest. In select¬ ing the sites for sowing and planting, prefer¬ ence is given to watersheds of streams supply¬ ing water for irrigation or municipal use, lands which will produce quick-growing and valuable trees, and regions where the supply of timber is not sufficient for local uses. Early attempts at reforestation often met with poor success; but after a great deal of experiment¬ ing, methods of collecting seeds, nursery prac¬ tice, and methods of sowing the seed directly or planting seedlings or transplants raised in the government nurseries have been so im¬ proved that plantations are now established with good assurance of success. The best time for planting, the exposure most favorable to the species to be planted, and many other details which have an important bearing on the probable success of a plantation can now be determined with reasonable certainty. Eight experiment stations are maintained in the West, however, where investigations are being continued; and while denuded areas are being reforested in accordance with the prin¬ ciples already determined, new data are con¬ stantly being sought and the uncertainty that formerly attended planting operations is being done away with more and more.

Along with the timber on the National Forests, there is a great deal of pasture land, used at present by some 7,280,000 sheep and goats, and 1,725,000 cattle and horses every year, in addi¬ tion to their natural increase. Local settlers and stockmen have the first right to the use of the range, and every man who grazes stock on the forests under permit is allotted a cer¬ tain area for the grazing season. In this wa,, unfair competition between the big man and the little man, which in the old days worked so much harm, is done away with. A good supply of forage year after year is ensured by not allowing the land to be overcrowded with stock. Under regulation the range is improved, instead of being overgrazed and denuded, as has been the case with many of the outside public lands.

Mineral deposits within National Forests are open to development exactly as on unreserved public land. The only restriction is that min¬ ing claims must be bona-fide ones and not taken up for the purpose of acquiring valuable timber, or a town or power site, or to monopo¬ lize the water supply on stock ranges. Pros¬ pectors may obtain a certain amount of National Forest timber free of charge to be used in de¬ veloping their claims. More than 500 mineral claims were patented within the National For¬ ests during the fiscal year 1915.

Along the streams within the National For¬ ests are many sites suitable for power develop¬ ment. These are open to occupancy for such purposes and have the advantage of being on streams whose headwaters, are protected. The government does not permit the monopolization.

of power in any region or allow power sites to be held without prompt development. Per¬ mits tor power development on the National Forests usually run for a term of 50 years, and may be renewed at their expiration upon com¬ pliance with regulations then existing. Such permits, while granting liberal terms to ap¬ plicants, contain ample provision for the pro¬ tection of public interests.

The total receipts from the National Forests on account of timber sales, grazing fees, and special uses, during the fiscal years 1912, 1913,

1914, and 1915, were as follows: 1912, $2,157,-

356.57; 1913, $2,391,920.85; 1914, $2,437,710.21;

1915, $2,481,469.35.

It could not be expected, of course, that rugged, inaccessible mountain lands, such as constitute by far the greater part of the Na¬ tional. Forests, would soon yield a revenue to the government over and above the cost .of administration. Many of the forests are meant to supply the country's future needs, while others are chiefly valuable for watershed pro¬ tection, which, though of the greatest import¬ ance to the people and industries of the coun¬ try, does not yield the government a return in dollars and cents. In the case of almost every forest, moreover, a great deal of money must be spent for roads, trails, bridges, and telephone lines before the resources can be used. Never¬ theless, 44 of the National Forests paid their local operating costs in 1914. Land more valu¬ able for agriculture than for timber growing is excluded from the National Forests, so far as is possible, when the boundaries are drawn. Small tracts of land which cannot be thus excluded are opened to settlement under the Forest Homestead Act of 11 June 1906. Taken as a whole, however, the proportion of land within the forests more valuable for agriculture than for growing timber or other purposes is trifling. The greater part of the really valu¬ able agricultural land within the forests has already been taken up, and most of what there is left has a severe climate and lies at high altitudes, often remote from roads, schools, villages, and markets. Therefore the chances offered the prospective settler in the immediate vicinity of the forests are far better than in the forests themselves.

Government Investigative and Co-opera¬ tive Work. — Besides administering the National Forest, the Forest Service conducts a number of special investigations relating to the growth and management of forests and their utiliza¬ tion. It studies the characteristics and growth requirements of the principal tree species of the United States, in order to determine how different types of forests should be handled, and also the best methods of forest planting, both for the National Forests and for other parts of the country. At experiment stations maintained in connection with the National For¬ ests, it investigates the scientific problems underlying the management of forests, and the relation of forests to streamflow and climate. It co-operates with the States in studying their forest conditions, with the object of developing forest policies adapted to their needs, and with private owners by furnishing advice concerning the best methods of managing and protecting their forest holdings. It also co-operates with States, under the terms of section 2 of the Weeks Law, in protecting from fire the

forest cover on the watersheds of navigable streams.

One of the aims of forestry is to see that the products of the forest are put to their best use with the least waste. Through studies of wood uses the Forest Service aids the wood¬ consuming industries to find the most suitable raw material and to develop methods of utiliz¬ ing their waste

products. It also investigates methods of disposing of wood waste, collects statistics on the price of lumber at the mill and on the market, and studies lumber specifi¬ cations and grading rules.

To carry out the idea still further, a forest products laboratory is maintained at Madison, Wis., in co-operation with the University of Wisconsin. Here, among other things, the physical, structural, and chemical properties of wood are studied. Studies are also made at the laboratory of seasoning and kiln-drying, preservative treatment, and the use of wood for the production of paper pulp, fibre board, etc., and in the manufacture of alcohol, turpentine, resin, tar, and other chemical products. Besides strictly forest investigations, the Service studies the life history and growth requirements of forage plants, in order that the National Forest ranges may be maintained in the best condition.

Forest Service Organization. — The work of the Forest Service is administered by the forester and associate forester, and is organ¬ ized under the branches of operation, lands, sil¬ viculture, research, and grazing. A separate unit is charged with the acquisition of lands in the southern Appalachians and White Moun¬ tains under the Weeks Law. The branch of operation has general supervision of the per¬ sonnel, quarters, equipment, and permanent im¬ provement work on the National Forests. The branch of lands examines and classifies lands within the National Forests to determine their value for forest or other purposes, conducts all work necessary in connection with claims on the National Forests, and assists the chief engi¬ neer of the Service in all business connected with the use of National Forest lands for hydro¬ electric power purposes. The branch of silvi¬ culture supervises the planting, sale, and cutting of timber on the National Forests, and co-oper¬ ates with States in protecting forest lands under section 2 of the Weeks Law. The branch of research has supervision over the investigative work of the Service, including silvicultural studies, studies of State forest conditions, inves¬ tigations of the lumber and wood-using indus¬ tries and lumber prices, and the work carried on at the forest products laboratory and the forest experiment stations. The branch of grazing supervises the grazing of livestock upon the national forests, allotting grazing privileges, and dividing the ranges between different owners and classes of stock. It is also charged with the work of improving depleted grazing areas and of co-operating with the Federal and State authorities in the enforcement of stock quaran¬ tine regulations.

Lands in the southern Appalachians and White Mountains are being purchased by the National Forest Reservation Commission, in ac¬ cordance with the Act of 1 March 1911, com¬ monly known as the Weeks Law, which pro¬ vides for the acquisition of forest land on the watersheds of navigable streams. The Forest Service has been designated as the bureau to

examine and value such lands as may be offered for purchase. Up to 1 July 1916, a total of 706,974 acres had been purchased and 578,753 acres in addition approved for purchase. These lands will be administered as National Forests.

In order to prevent delay and "redtape® in the administration of the National Forests, seven field districts, each containing approximately 26,000,000 acres of government forestland, have been established, with a district forester in charge of each. In each district office, assistant district foresters are in charge of operation, lands, silviculture, and grazing work in that dis¬ trict. Each National Forest (approximately 1,- 000,000 acres of forest land) is in charge of a forest supervisor, who is the general manager of his forest, planning the work and seeing that it is carried out. On forests where there is a particularly large volume of business the super¬ visor is assisted by a deputy. Every National Forest is divided into ranger districts (about 200,000 acres) with a district ranger in charge of each. Rangers perform the routine work involved in the supervision of timber sales, grazing, and free use and special use. They also help to build roads, trails, bridges, tele¬ phone lines, and other permanent improvements on the forests. For organization for fire pro¬ tection on the National Forests see Forest Fires.

Forestry in the States. — There were many early laws on the statute books of various States aiming at fire protection or the encour¬ agement of tree planting. Permanent State forestry work of importance was not begun, however, until 1885, when New York established a forest commission charged with the organi¬ zation of a service under technically trained men to administer the State's forest reserve according to the principles of forestry. In the same year there were organized a Forestry Bureau in Ohio and a State Board of Forestry in California, and a forest commissioner was appointed in Colorado; after a brief period, however, and until they were reorganized, in Ohio and California in 1905 and in Colorado in 1911, all these were either discontinued or became inactive through lack of appropriations. In 1895 a commissioner of forestry was ap¬ pointed in Pennsylvania. Except in New York and Pennsylvania the entrance of the States into the forestry field with permanent organiza¬ tion has been the direct outgrowth of the work of the National government. At the present time 32 of the States have forest departments, 24 employ professional foresters, and practically all have recognized the need of a State forest policy. The appropriations for the yearly sup¬ port of State forestry departments vary from $500 to approximately $315,000. Some of the

objects of State work have been to educate pub¬ lic sentiment regarding the value of State for¬ est resources and the importance of their con¬ servation, to give technical advice to private owners, to develop a systematic fire protective system, to provide planting stock for citizens, to secure the modification of tax systems so as to lessen the burdens of those who plant forests or otherwise endeavor to provide a permanent timber supply, and to establish State forests. The northeastern States have paid most atten¬ tion apparently to the production of a new for¬ est crop and have encouraged the practice of forestry by private owners to that end. Plant¬

ing material has been provided, tax laws have been modified in several States, and technically trained foresters employed to give advice to ap¬ plicants. Fire protection has also been supplied by State action, special attention being given to the protection of young growth. In the far West, the chief interest has been in protecting the vast supplies of mature timber from fire. Fire protection has had first place in the Lake States also, but here more attention is given to young timber than in the West. The South has been comparatively slow in adopting State for¬ estry, though Maryland and North Carolina were among the first to have State foresters. The Weeks Law has greatly stimulated the or¬ ganization of systematic State fire protective systems. Under this law the Federal govern¬ ment, through the Forest Service, co-operates with individual States in the protection of the watersheds of navigable streams. The Federal government contributes not more than half the cost (nor more than $8,000 in one year) of a State fire protective system established under this law. The government funds are used al¬ most exclusively for the employment of look¬ outs and patrols. An area of about 13,000,000 acres is guarded at an average cost of about three-fourths of a cent an acre. Twenty-one States have entered into co-operative agree¬ ments with the government as follows : Maine, New Hampshire, Vermont, Massachusetts, Con¬ necticut, New York, New Jersey, Maryland, Virginia, North Carolina, Kentucky, Texas, Wisconsin, Minnesota, Michigan, South Dakota, Montana, Idaho, Washington, and Oregon. New York maintains a State Preserve of 1,825,882 acres in the Adirondack and Catskill moun¬ tains; Pennsylvania has more than 1,000,000 acres of State forest, chiefly in the mountains of the central part of the State; Minnesota has 43,000 acres now in State forests and approxi¬ mately 1,000,000 acres of school lands which are to be made into State school forests ; Wisconsin has a reserve of 400,000 acre§ ; Michigan, 589,- 000 acres; South Dakota, 75,000 acres (in the Black Hills); New Jersey, 13,720 acres; and New Hampshire, Vermont, California, Connec¬ ticut, Indiana, Massachusetts, and Maryland, from 2,000 to 9,000 acres each. The New York <(Forest Preserveˆ is protected from fire, but it is not under forest management because the State

Constitution forbids timber cutting on the reservation. The whole central portion of the Adirondack and Catskill mountain regions is protected from fire by a State ranger system. In Pennsylvania the State forests are under forest management, and the State maintains a ranger school at Mont Alto. The following States distribute planting material : Pennsyl¬ vania, Maine, New Hampshire, Vermont, Con¬ necticut, Maryland, Kentucky, Ohio, Kansas, Michigan, Wisconsin, Minnesota, North Dakota, Idaho. In New York citizens are furnished tree seedlings from the State nurseries at cost. Taxes on timbered land may be levied chiefly on yield in Vermont, Massachusetts, Connecticut, New York, Pennsylvania, and Michigan.

Towns, cities, and counties, as well as the States, have begun to take an interest in for¬ estry. In many cases it amounts to no more than the employment of a municipal forester whose business is the planting and care of street, road¬ side, and park trees. A number of them, chiefly in the older and more thickly settled portions of

the country, have acquired forested tracts which they now manage for the protection of the com¬ munity reservoirs or some other local purpose. There are over 130,000 acres of such forests in the United States, in tracts varying in extent from 40 to 25,000 acres.

Forestry by Private Owners. — The first example of professional forest management in the United States was begun in 1891 on the Biltmore Estate of Mr. G. W. Vanderbilt of Asheville, N. C., in a mixed forest of pine and hardwoods. To be sure, a large number of private owners had exercised care in handling their timberlands prior to this date. In some cases it was merely protection from fire; in other cases there was a rather crude selection of the trees to be cut, or grazing was restricted, or attempts were made to protect the young growth in logging. The Biltmore Estate, how¬ ever, was the first to be managed in accordance with the principles of forestry. The work done on the estate was in the nature of an experi¬ ment to determine whether the introduction of forestry was practicable under the conditions obtaining in the lumber trade in the United States. The area under management was in¬ creased from the original 3,600 acres to 130,000 acres. Even in the first year, the forest work paid for itself and has been conducted success¬ fully ever since. Most of this forest land has now been purchased by the government and is to become part of the national forest areas being established in the East. In general, the private owner of timberland has confined his efforts to fire protection, which is usually ac¬ complished by means of associations such as have already

been mentioned and by co-opera¬ tion with the State and Federal governments. A number of private owners have practiced forest management profitably, however, since the Biltmore experiment. Conspicuous among these are wood pulp and paper manufacturers, who largely own the forests from which they get their logs. Because of the large investment in their mills and the impossibility of moving them to where there are new supplies of timber, these men are in many cases taking care of the young growth and limiting the cut to what the forests grow each year, thus insuring a perma¬ nent sustained yield. Of course, they also guard against fire, for that is the prerequisite to any successful forest management. The practice of forestry by pulp and paper com¬ panies is largely localized in New England and the Adirondacks. On several tracts in New Hampshire, Michigan, and New York, and on the forest lands of the University of the South at Sewanee, Tenn., forest management for the production of salable timber has proved suc¬ cessful. Abandoned farms in New England are often planted in timber and allowed to grow up from seed supplied by neighboring forests and are protected from fire and cut in short rotation for various uses. Several rail¬ roads are managing their forest properties for the production of a sustained yield of cross¬ ties. Many lumber companies are now employ¬ ing technically trained foresters as a part of their woods force. This does not mean, of course, that they practice forestry; but it does indicate that the value to the lumberman of a technical knowledge and training is recognized. A large number of farmers and other small

woodlot owners are now taking an interest in the proper cutting, protection, and reproduction of their timber; and in some of the States a part of the duty of the State forester is to assist farmers in the management of their woodlots. In the eastern States and the central hard¬ wood region the woodlots are especially im¬ portant. In the southern pine region and in the Douglas fir region of the Pacific North¬ west fire protection is receiving more and more attention. In both of these regions second- growth timber is now being cut. On the whole, the practice of forestry by private owners is increasing but has become nationally important only in one branch — fire protection.

Forestry as an Investment. — Returns from timber raising are realized perhaps once or twice in a lifetime, hardly more often at best. The amount of capital required is large. In the practice of private forestry certain carry¬ ing charges like taxes, interest, and protection costs must be met annually, while the return on the investment must be deferred. There¬ fore, only long-lived agencies, such as the State and corporations and large capitalists, are able to engage in it with any certainty of profit. Furthermore, where capital and interest are mixed together in an investment, as is the case with an investment in forestry, the pressure of

competition or the necessity of meeting fixed charges leads very readily to forced exploita¬ tion of the timber — in other words, to the uneconomic anticipation of the harvest. The element of time and the consequent temptation to private owners to turn from scientific man¬ agement to mere exploitation makes it easier for the State than for even large capitalists to practice forestry. When the forests are owned by the public, the infrequent returns are of no disadvantage, while taxes and interest charges do not have to be met; and as a result of the assurance of stable ownership systems of man¬ agement beneficial to the forest but requiring long periods of time may be undertaken with the certainty of success.

Technical Forestry. — In order to utilize the present forest most economically and profit¬ ably and at the same time to provide for a new growth which will produce timber and other forest products in the future, the science of forestry concerns itself with both forest man¬ agement and forest production. Forest pro¬ duction comprises silviculture, forest protec¬ tion, and forest utilization; forest management, the mensuration and valuation of forests, work¬ ing plans, and forest policy.

The practical aims of silviculttire are to se¬ cure quick reproduction after the removal of timber, to reproduce valuable species rather than those which are less marketable, to secure a large yield, to produce timber trees of good quality, and to secure the most rapid growth compatible with good stands and good quality. More broadly, silviculture has to do with the improvement of forest stands and with their establishment by natural reproduction or by artificial seeding and planting. Various so- called silvicultural systems which are adapted for use under certain conditions, are made use of for the accomplishment of these aims. These are known as the selection system, clear cutting systems, the shelterwood system, and the coppice system. In practice these are combined

and modified in various ways. Forest protec¬ tion is concerned with the protection of the forest against fires, animals, insects and fungi, and all other detrimental influences. In Amer¬ ica protection against forest fires is the most important, although such pests as various kinds of beetles, white pine blister rust, chestnut blight, and mistletoe are common and have to be fought and guarded against. Forest utilisa¬ tion deals with the best methods of utilizing all classes of forest products. This involves put¬ ting different classes of material to the use for which they are best fitted, determining the proper season for cutting and logging, and the methods of transportation from the forest to the mill and from the mill to market. Utilisa¬ tion takes

into account not only the timber but all the by-products, such as pasturage, tanbark, extract wood, firewood, naval stores, etc. For the calculation of the material standing on a given area, the yield to be expected, and the value of single trees or whole stands, methods of forest mensuration are employed based on the determination of the dimensions, age, vol¬ ume, the increment of trees and forests. These also serve as a basis for calculating the effect of different methods of treatment of the forest. Forest valuation aims to determine the value of the growing stock in the forest and the value of the forest soil. It is based, of course, on the knowledge derived from silviculture and men¬ suration ; and is usually expressed as expecta¬ tion value (the present value of all returns ex¬ pected less the present value of all expenses which will be necessary to obtain those re¬ turns), cost value, or sale value. These expressions are applied to the forest soil, the growing stock, and the rental of a forest prop¬ erty. Forest management accomplishes the ob¬ jects of forestry by means of forest working plans, which are based upon all other knowl¬ edge which has been gathered regarding the forest. The character of the working plan de¬ pends upon the object for which the forest is to be managed, so that the working plans for forests with different objects would be entirely different. The working plan takes special cognizance of the fact that for every tree or forest there may be three different kinds of increment ; that is, volume, quality, and price increment. It usually includes a detailed de¬ scription of the stand, the topography and cli¬ mate, cost of logging, fire hazard and means of protection, the market for the product, the unit divisions of the forest, known technically as compartments, the length of the rotation, the objects of the silvicultural system, the treatment of the different species, and the general object of the forest management. Detailed description of the means to be used in handling the forest such as maps, organization, etc., are also necessary.

American Practice. — In the practice of forestry in America the general principles of management worked out in Europe through centuries of experience are being taken up as rapidly as economic and other conditions per¬ mit. For many reasons, however, European practices cannot be adopted as they stand, but must be modified to suit American conditions. The use in America of forms of management different from those in vogue in Europe is made necessary by the highly developed and specialized methods and machinery of American

lumbering, the extremely moderate price and enormous supply of low-grade forest products, such as firewood and the cheaper kinds of lum¬ ber, the difficulties attendant on getting out much of the timber, transportation facilities which make most places in the country much less dependent on the local supply than is the case abroad, the vast number of small holdings of forest land, and the high taxes on forest property. The fundamentals of

American prac¬ tice are protection from fire, conservative lum¬ bering, and care of the young growth. Ameri¬ can practice has not aimed to secure a sus¬ tained annual yield; nor to adopt as they stand European systems of cutting; nor to maintain permanent forces of laborers or permanent log¬ ging-road systems. . The American forester has to deal with different species, as well as differ¬ ent conditions, and in a large measure is com¬ pelled to work out his own methods. In the cutting of timber generally, the method hitherto practised by the lumberman, with such modifi¬ cations as will insure the perpetuation of the forest, is still adhered to. This method is the selection of the large and the defective trees and the inferior species for cutting, the young growth of preferred species being preserved during the logging operation and sufficient large trees being left to restock the area or to furnish protection for the young growth as the case may be.

Summary. — Forestry has made great prog¬ ress in America in the last 15 or 20 years. During that time it has been built up from almost nothing to a point where it is recognized as being of vital importance to the continued prosperity of the country. The technical equip¬ ment and training of the American forester have been brought to a very high standard ; many of the essentials of American practice have been worked out ; great advances have been made in the study of conditions peculiar to America ; and intensive and specialized in¬ vestigations have been made of the problems of forest management and wood utilization. The investigative work of American foresters now bids fair to rival in accomplishment the work which has been under way in Europe for several centuries. In the 25 years since the first forest land was dedicated by the govern¬ ment to the practice of forestry, a tremendous advance has been made in the forest policy of the nation. In the beginning, the creation of the national forests met with much opposition, due chiefly to the ideas of speculation prevalent in the great timber regions of the West and to the fear of special interests that public owner¬ ship of the forests would interfere with their plans. This opposition has not died away alto¬ gether, and at times manifests itself strongly, but it no longer has any considerable popular support and no longer appears in open attempts to do away with government ownership. It is now reduced to indirect attacks on details of the forest policy. A national forest policy has been firmly established, based upon government ownership and control of a sufficient amount of forest land of the United States to assure a continuous and perpetual supply of timber. See. Forest Fires; Forest Laws; Forest Schools; Forestry Associations.*

Bibliography. — Beveridge, Albert J., :

Washington, 1907) ; Bruncken, Ernest, (North American Forests and Forestry; their Relation to the Life of the American People) (New York 1908) ; Compton, Wilson, (The Organiza¬ tion of the Lumber Industry, with special refer¬ ence to the influence determining the prices of lumber in the United States) (Chicago 1916) ; Defebaugh, James Elliott, (History of the Lum¬ ber Industry of America) (2 vols., Chicago 1906-07) ; Elliot, S. B., (Important Timber Trees of the United States (Boston 1912) ; Fernow, Bernhard Eduard, (Forestry in the United States Department of Agriculture dur¬ ing the period 1877— 98> (Washington 1899, United States 55th Congress, 3d Sess., House Doc. No. 181) ; (Economics of Forestry) (New York 1902), and (A Brief History of Forestry in Europe, the United States and other Coun- tries) (Toronto 1911) ; Gifford, John Clayton, Practical Forestry for Beginners in Forestry) (New York 1902) ; Graves, Henry Solon, (The National Forests and the Farmer) (United States Department of Agriculture, Year¬ book 1914, pp. 65-88) ; (Forest Mensuration ; (New York 1906), and (The Principles of Handling Woodlands) (New York 1911) ; Green, Samuel Bowdlear, Principles of Amer¬ ican Forestry* (New York 1903) ; Hawley, R. C, and Hawes, A. F., (Forestry in New Eng¬ land } (New York 1912) ; Kellogg, Royal Shaw, (Lumber and Its Uses> (Chicago 1914) ; Na¬ tional Conservation Commission, (Report of the Commission (Vols. I— III, pi., maps, diagrs., Washington Government Printing Office, 1909, 60th Cong., 2d Sess., Senate Doc. No. 676) ; Pinchot, Gifford, (The Government's Forest Policy* (Cyclopedia of American Agriculture, Vol. IV, pp. 152-154, New York 1909), and (The Training of a Forester* (Philadelphia 1914) ; Recknagel, A. B., (Theory and Practice of Working Plans> (New York 1913) ; Record, Samuel James, (The Mechanical Properties of Wood, including a discussion of the factors af¬ fecting the mechanical properties, and methods of timber testing) (New York 1914) ; Roth, Filibert, (First Book of Forestry* (Boston 1902), ˆForest Valuation (Vol. II, 171 pp.,*

(Michigan Manual of Forestry) Ann Arbor, Mich., 1916) ; Sargent, Charles Sprague, Man¬ ual of the Trees of North America) (Boston 1905) ; Schlick, William, (Manual of Forestry (Vol. I, Introduction to Forestry, Vol. II, Sil¬ viculture, Vol. Ill, Forest Management, Vol. IV, Forest Protection, Vol. V, Forest LTiliza- tion, London 1894-1911) ; Schwappach. Adam Friedrich, (a manual for- the guidance of forestry students, foresters, nurserymen, forest owners and farmers (New York 1916) ; Van Hise, Charles Richard, (The Conservation of Natural Resources in the United States) (ib. 1910) ; Weiss, Howard Frederick, (The Preservation of Structural Timber) (ib. 1915) ; White, Stewart Edward, (The Fight for the Forests * (American Maga¬ zine, Vol. 65, New York, January 1908) ; The publications of the Forest Service, United States Department of Agriculture.*

• *L. C. Everard,*

United States Forest Service.

FORESTS, Petrified. Logs of trees petri¬ fied or replaced by silica and buried in sands and clays occur in various geological formations

*in many parts of the world. Probably the most notable occurrence of this kind is the petrified forest in northeastern Arizona. This forest or series of forests lies 9 to 16 miles south of Ada- mana, a small station on the Santa Fe Railroad. They are so remarkable that in 1906 they were made a National Monument by President Roosevelt and placed in charge of a keeper under control of the Department of Agriculture. The trunks are all prostrate and mostly broken. They were of Araucarioxylon arizonicum, now extinct but related to the Norfolk Island pine, and existed in Triassic time. They grew near by and after falling drifted down a water course, lodged in some eddy, and were finally deeply buried by sand and clay. The conver¬ sion to stone was effected by gradual replace¬ ment of woody matter by silica deposited by underground water. A small amount of iron has given the beautiful brown, yellow and red tints for which this ˆwood** is noted. In thin slices under microscope the original cell struc¬ ture of the wood is beautifully distinct. Some of the trunks are six feet in diameter and more than 100 feet in length, one forming a small natural bridge, the clay having been washed out beneath it. Some logs are in place where buried, but most of them roll down slopes as the sand and clay is washed away. Petrified wood occurs at other places in Arizona and New Mexico, and there are many trunks, some upright, in the eastern part of the Yellowstone Park. See Paleobotany.*

N. H. Darton,

United States Geological Survey.

FOREY, Elie Frederic, a-le fra-da-rik fo-ra, French military officer: b. Paris, France, 10 Jan. 1804; d. there, 20 June 1872. He took part in several Algerian campaigns as well as in the Crimean and Sardinian wars, and when the expedition to Mexico was decided upon in 1861, Forey received the command of the French troops. After several sanguinary en¬ gagements, he attacked and stormed the strong post of Puebla, thereby throwing open the road to the city of Mexico. For this service he was made marshal of France.

FORFAR, for'fer, Scotland, a municipal borough and capital of the county of Forfar, at the east end of Loch of Forfar, 13 miles northeast of Dundee. It contains a courthouse, county hall, town hall, the Meffan Institute, an

infirmary and Reid hall. The principal indus¬ tries are linen and jute manufactures, brewing, tanning, rope-making, and iron-founding. The parliaments of Scotland once met within the walls of the old castle of Forfar. It was made a burgh by David I in the 12th century, was burned down in the 13th, and thereafter dwin¬ dled to a country village. Witches were perse¬ cuted in Forfar, and there is shown in the county hall a witches' bridle, a gag used to pre¬ vent them from speaking whilst being led to the place of execution. Pop. 12,254.

FORFARSHIRE, or ANGUS, Scotland,

an eastern maritime county, bounded north by Kincardine and Aberdeen, west by Perthshire, south by the Firth of Tay, and east by the North Sea. Its area is 873.7 square miles. The island of Rossie and the Bell Rock be¬ long to Forfar. Its surface is irregular and hilly. The Sidlaw Hills and the Binchinnin

PETRIFIED FORESTS

1 Group of Petrified Log Sections, Petrified Forest, South of Adamana, Arizona

2 Natural Bridge, Petrified Forest, South of Adamana, Arizona, formed by a petrified tree

group are the most important. None of the rivers is navigable, and only three are of any importance, the Isla and the North and South Esks. The largest lakes are the Loch of For¬ far and Loch Lee. The climate is healthful and favorable to agricultural pursuits. Wheat, barley, oats and potatoes are the principal crops. Sheep and cattle are raised in large quantities. Jute and flax manufactures are the county's principal industries. Shipbuild¬ ing is also carried on, as are also manufactures of soap and chemicals, leather, machinery, etc. Sandstone quarries and the deep sea fisheries employ many hands. The chief towns are borfar, Arbroath, Brechin, Broughty Ferry, Dundee and Montrose. Pop. 281,417, of whom about 1,200 speak Gaelic. Consult Jervise, A., (Memorials of Angus and Mearns) (Edin¬ burgh 1895), and Warden, (Angus or Forfar- shire) (4 vols., ib. 1880-83).

FORFEITURE, for'fit-ure, a legal penalty, by which an owner is absolutely deprived of his property for crime or other unlawful act. This applies to personal as well as real property, and forfeiture may be a decree of civil as

well as criminal courts. The penalty is of feudal origin. The lord owed protection to the life and property of the vassal ; the latter owed fealty and service to his lord. When the vassal failed to yield these, he lost the shelter of the law, became an outlaw, and incapable of hold¬ ing property. Loyalty to the feudal relation being the condition on which life and property were secured to him, when he failed in loyalty he had no longer any claim on life or property.

Treason was punished by forfeiture long be¬ fore the Norman Conquest in 1066. After that period forfeiture became the ordinary penalty for felony, which was styled petty treason; while treason or disloyalty in regard to the sovereign was called high treason. Forfeiture was accompanied by what was styled corruption of blood. This was the sentence of legal bas¬ tardy passed on the offender so that he could neither inherit nor bequeath property.

Felony in the United States has never been considered ground for forfeiture. The Federal and State laws have modified all precedents in the matter of forfeiture, which they restrict within very narrow limitations. (See Attain¬ der). During the War with Germany there was frequent agitation in the United States for the forfeiture of German property in this country. The German ships in Hoboken were seized by the United States government and put into service; they were not, however, forfeited to the stockholders.

In England civil forfeiture may be incurred by tortious alienation, by wrongful disclaimer, by alienation in mortmain (see Mortmain), by breach of condition, and by the commission of waste. (See Waste). In Scotland civil for¬ feiture may arise either from statutory enact¬ ment, at common law, or by agreement. In the United States civil forfeiture is only imposed for acts of waste committed by tenants for life or years, or for breach of contract in violating the conditions on which lands were granted. Some States have abolished even this degree of forfeiture. By particular statutes enacted by Congress smuggling, or importing goods on fraudulent invoices involve confiscation, and forfeiture of the entire invoice (see Invoice), or the balance wrongly imported. Piracy has

always entailed confiscation or forfeiture of the piratical craft.

FORGE, FORGING and FORGING MACHINES. A forge is a furnace or open fireplace, having a forced draft, for heating metals, especially iron and steel, to be shaped by hammering or pressure. Previous to the 19th century, most iron work was forged by smith on anvils. The coal used now is usually soft, and is sometimes termed blacksmith's coal. Portable forges are made for light work, and a common form of these has four legs made of iron tubing, a shallow bowl to hold the coal and contain the fire, and a

hood above. At the rear is a small rotary fan, operable by a wheel-crank. As forges increase in size and capacity, they develop into what are more properly called furnaces, such as the immense heating furnace of a steel works. In forging iron by hand the smith thrusts the metal into the centre of his fire, and its color tells him when it is ready to be worked. As it heats, it becomes black red, then a low red, then bright red, then a white heat, and if the heating continues it next begins to burn. If the smith desires the iron to be very soft, that it may yield quickly to his blows, he lets it come to a white heat, then takes it with his tongs on to his anvil, and begins to hammer it rapidly into the desired shape. Often a helper stands by to strike blows alternately with the smith, in order that as much hammer¬ ing as possible may be done before the iron cools to a point where it requires reheating. Long practice makes very expert smiths, and many of them will shape a bar of iron into intricate form in a surprisingly short space of time. When the smith desires to weld together two pieces of iron, be must heat both pieces at the same time to a uniform white heat. As the iron approaches a white heat he throws sand on it, which, if done at the proper tem¬ perature, adheres and melts, forming a liquid glass-like fluid that flows over the surface of the iron and keeps the air from it, thus pre¬ venting its burning. If the ends of two bars are to be welded, each is first brought to a flat point, so that there will be considerable surface to weld together. After the surfaces adhere, the weld may be reduced by reheating and hammering down to the size of the other portions of the bars. When pieces are joined end to end, this is termed a butt-weld, which is not apt to be as strong as a lap-weld. Where forgings are so large that a smith and helper cannot work them satisfactorily, because there is too much and too heavy hammering to be accomplished in the short time the metal re¬ tains its great heat, the machine hammer is resorted to. This was made in various forms, and was an important tool during the early part of the 19th century, finding its culmination in the great steam-hammer of Neysmith, which was devised especially for such large forgings as the shafts of paddle-wheel steamships, then coming into use. The trip-hammer and the steam-hammer were the chief tools used for large forgings until about 1890, when the hydraulic press began to supersede the hammer for large work. About 1884, when the United States government began to seriously take up the rebuilding of the navy, and the construction of steel battleships and cruisers, there came a demand to American manufacturers for very

large forgings, which had not previously been produced here. The forges of that date were equipped with power hammers, of a capacity suited to welding wrought iron into forgings of moderate size. The introduction of

steel rails taught American iron manufacturers that steel forgings were desirable in all classes of machinery as greatly reducing the size of the parts, because of the increased strength.

The hydraulic compression system of forg¬ ing, which was introduced in America when our steel plants were called upon to provide the large forgings for the navy, has met with general approval, and is steadily increasing in use. It has been demonstrated that forgings made by hammering were subject to all sorts of internal strains due to differences in com¬ pression and differences in cooling. When such a forging is cut, as for making a keyseat, a distortion of form follows as the result of certain strains that have been relieved. A large forging requires a pressure great enough to penetrate to every part of the mass of metal, so that the flow of metal resulting shall take place uniformly throughout. Such a flow re¬ quires time and a pressure that cannot be ob¬ tained by a quick hammer blow, and a series of blows does not produce the same effect as does the persistent pressure of the hydraulic forging machine. Fluid steel begins to crystal¬ lize at the point where the degree of heat is reduced so that it solidifies (about 2,600° F.), and the more slowly it is cooled from this point downward, the larger will be the crystals of the ingot. Forging during the cooling tends to check crystallization, just as stirring water at a temperature below the freezing point would check the formation of ice crystals. The more irregular the method of forging is, as in the case of hammer blows, the more it interferes with an even crystallization. The pressure system not only interferes much less than hammering, but forgings are farther im¬ proved in modern practice by reheating above the recalescent point, which is between 1,200 and 1,300° F., depending on the percentage of carbon and annealing to secure a new crystal¬ lization, and oil tempering.

An examination of the grain or fibre of hydraulic forgings shows that the steel tends to arrange itself in layers following the outer con¬ tour of the piece of metal, thus securing the most strength. A sharp angle in the pattern will tend to cut off the flow of metal, and if such is required, the method is to round out the place in the forging, to secure the best flow of metal, and then machine off the surplus later.

To avoid internal strains as much as pos¬ sible such large forgings as steamship shafts are preferably made hollow. That is to say, the cylindrical ingot from the furnace after cooling is bored through the centre, mounted on a steel mandrel, heated and forged by com¬ pression. Ingots produced with fluid compres¬ sion are well adapted to being bored and hol¬ low-forged, and this method produces the most perfect forgings. These large forgings are sub¬ jected to a hydraulic pressure of about 7,000 pounds to the square inch, which pressure is maintained while the mass slowly cools.

Shafts of more than a foot diameter are best bored, as the bore hole not only assists uniform heat¬ ing, but gives opportunity for inspection.

As the art of forging advanced, small forg¬ ings of iron, steel and other metals were com¬ monly produced by drop-forging. A press containing a top and bottom pattern (die and counter) received the roughly shaped hot metal, and at one or more blows it was brought to the desired shape. This method has been im¬ proved upon by the use of pressure, as de¬ veloped in forging machines which accomplish, on a smaller scale, work similar to hydraulic forging presses. See Machine Forging; Bel¬ lows; Furnace; Hammer; Iron; Press; Steel; Welding.

Charles H. Cochrane, Author of (Modern Industrial Progress P

FORGERY, the fraudulent making or al¬ teration of a writing to the prejudice of another man's rights, or making of any written instru¬ ment for the purpose of fraud and deceit; the word making, in this last definition, being con¬ sidered as including every alteration of or ad¬ dition to a true instrument. The offense of forgery may be complete though there be no publication or uttering of the forged instru¬ ment; for the very making with a fraudulent intention, and without lawful authority, of any instrument which, at common law or by stat¬ ute, is the subject of forgery, is of itself a sufficient completion of the offense before pub¬ lication. Most of the statutes, however, which relate to forgery make the publication of the forged instrument, with knowledge of the fact, a substantive offense. Motive has everything to do with deciding forgery. To endorse another's name on the back of a check in order to steal the money is forgery. Yet it is not uncommon for a business man to sign on a check the name of another and his own im¬ mediately below, thus assuming the responsibil¬ ity for collecting the money. He is considered justified in doing this to meet the bank's rules for cashing checks, and no forgery is com¬ mitted where none is intended. A deed forged in the name of a person who never had existence is forgery at law. A writing is forged when a person drawing up a will for an invalid inserts legacies therein falsely. It is not material whether a forged instrument be drawn in such manner that if it were in truth that which it counterfeits it would be valid. The punishment of forgery at common law is, as for a misdemeanor, by fine, imprisonment, and such other corporal punishment as the court in its discretion might award. The penalty varies in different States, in some the statutes having been much enlarged to include acts which were not punishable formerly as forgery. The punishments ordained for the offense by the statute law in England were once, with scarcely an exception, capital.

FORGET, for-ja', Amedee Emmanuel,

Canadian statesman: b. Marieville, P. Q., 1847. He received his education at the College of Marieville, was admitted to the bar in 1871, and entered on the practice of his profession in Montreal. After some years he removed to the West and was appointed private secretary to the lieutenant-governor of the Northwest Territories in 1876, and clerk of the assembly at Regina in 1888. He afterward served as assistant commissioner of Indian Affairs for Manitoba and Northwest Territories, was mem¬ ber of the council of public instruction of the

Northwest Territories after 1893, Indian Com¬ missioner from 1895 to 1898 and lieutenant- governor from 1898 to 1905. In the latter year he became lieutenant-governor of Saskat¬ chewan and was elected to the Dominion Sen¬ ate in 1911.

FORGET, Jacques, Belgian clergyman and author: b. Chiny, Belgium, 6 Jan. 1852. He was educated at the seminaries of Bastogne and Namur and the University of Louvain. He studied Semitic languages in Rome, Beirut and Berlin and was ordained to the priesthood in 1876. In 1885 he was appointed professor of Arabic language and literature at Louvain, and in the following year was appointed to the chair of dogmatic theology at the same institu¬ tion. He was president and founder of the African Seminary for missionaries to the Congo in 1886-89 and was made honorary canon of the cathedral of Namur. He took part in the Inter¬ national Congress of Catholic Scholars at Brussels in 1895, the International Congress of Orientalists at Algiers in 1905, the International Congress of Apologetics at Vich 1910. He pub¬ lished (De vita et scriptis Aphraatis> (1882) ; (Le Liban> (1887) ; (Ibn Sina, Le Livre des theoremes et des avcrtissements) (1892); (Les missions sous le pontificat de Leon XIII > (1888) ; (Principes de philosophic morale) (1906) ; (Le concile du Vatican) (1906) ; (Les conciles oecumeniques) (1910) ; (Synaxarium AlexandrinunV (2 vols., 1909, 1911) ;

valeur historique du quatrieme evangile) (1911). He was director of the Arabic section of Cor¬ pus scriptorum christianorum orientalium) and collaborated in Jaugey (Dictionnaire apologet- ique) ; Vacant-Mangenot, (Dictionnaire de theo- logie catholique> ; (The Catholic Encyclopedia, etc. He is a contributor to the Revue neo- scolastique, Le Moyen Age, Revue Apologetique, etc., etc.*

FORGET, Sir Joseph David Rodolphe,

Canadian capitalist: b. Terrebonne, P. Q., 10 Dec. 1861. He was educated at Masson College, Quebec, engaged in business, entering the Mon¬ treal Stock Exchange in 1890. He amassed great wealth and is a director of a great number of corporations in the financial and industrial fields. He founded La Banque Internationale du Can¬ ada in 1911, of which he became president. In 1904 he was elected to the Dominion House of Commons as an Independent Conservative and seven years later declined a portfolio in the Borden Cabinet. He was knighted in 1912.

FORGET-ME-NOT, popular name of the small annual or perennial herbs of the genus Myosotis of the order Boraginaceae. It is represented by a number of species in Europe, North Asia, North America and Australia. The most common species are M. scorpioides, M. laxa, M. sylvatica, M. Azorica, M. versicolor, and M. virginica. The flower is a favorite with poets, and is the symbol of constancy. Accord¬ ing to tradition it received its name from the last words of a knight who was drowned in an attempt to pluck the flower for his lady.

FORK, an implement formed of two or more prongs fastened to the end of a shaft or handle. On the farm the fork is a familiar implement used for pitching hay, manure, crops, etc., and for digging and preparing the soil for crops. The most familiar type of fork is the table-fork for use in eating. For the develop¬

ment and use of the table-fork consult La Croix, Paul, (Manners, Customs and Dress during the Middle Ages (London 1874) and Sumner, G., (Folkways* (New York 1907).*

FORLI, Melozzo da, ma lots'o da for le, Italian painter: b. Forli, about 1438; d. 1494. He was the first who applied the art of fore¬ shortening to the paintings of vaulted ceilings. About 1472 he painted the (Ascension in the great chapel of the Santi Apostoli at Rome for Cardinal Riavio. In 1711, when the chapel was being rebuilt, this painting was cut out of the ceiling and placed in the Quirinal palace, where it still remains.*

FORLI, for'le (Forum Livii), Italy, town and capital of the province of the same name, 40 miles southeast of Bologna, on the River Montone. Its churches and picture gallery con¬ tain works by Alessandro dei Bigni, Palmezzano and other eminent artists. The old citadel now serves as a prison. There are a lyceum, town hall, seminary and technical school, a library, and a hospital. There is a good trade in grain, live stock, and wine and there are manufactories of machinery, hats, silk goods, pottery and furniture. In the 12th century Forli was in league with Ravenna. It surrendered to Mar¬ tin IV in 1282. It was taken by Caesar Borgia, but in 1504 became a part of the papal states. Pop. 45,994. Consult Baedeker, (

*Central Italy * (latest ed., Leipzig 1909).*

FORM, in philosophy, a term used (1) ob¬ jectively, to denote the assemblage of qualities which makes a thing what it is. Only the es¬ sential and permanent is considered, the acci¬ dental or adventitious being disregarded. The word is employed also (2) subjectively, to ex¬ press the idea which the mind may supply of a figure or object, as distinguished from that ob¬ ject in itself. In this sense it is peculiar to the philosophy of Kant, who postulated two such ideas, namely space and time, supplied to the object by the mind through the operation of experience.

*In botany, the term used to designate the unit of ecology, as that division of the study which treats of the relations existing between plants and their environments is now called. The word is frequently met with in such com¬ binations as <(form of vegetation** or <(plant form.® See Bionomics; Plants, Distribution of.*

In music, that theory in the general art of composition in accordance with which themes, tonalities, phrases and sections are so arranged as to obtain a correlated and symmetrical whole. The principal three recognized forms are those of the lied, rondo and sonata. These admit of numerous variations. In so-called cyclical forms, as, for example, the symphony, the neces¬ sary correlation and symmetry is secured by the relation of the movements as to proportion and key, the succession of various tempi, and some¬ times also the employment in one movement of a theme previously used in another.

FORMA PAUPERIS, for'ma pa'per-is, In, signifying — in the character of a poor person — is the legal term both in Great Britain and the United States for suits carried on by in¬ dividuals who are too poor to pay the usual fees. As early as the reign of Henry VII a statute provided that anyone taking oath that he was not worth £S beyond his wearing-apparel

and the subject in dispute, was entitled to have writs, according to the nature of the case, with¬ out paying fees, and the judges were to assign him counsel and attorney who should act gra¬ tuitously. This indulgence is granted to plain¬ tiffs only at common law, and is granted to defendants only in prosecutions. A plaintiff must have a counsel's certificate of a good cause of action, and an affidavit of the party or his attorney must be laid before court that the case contains a full and true statement of material facts. A person admitted to sue in forma pauperis is not entitled to costs

from the oppo¬ site party, unless by order of the court or of a judge. In several states of the United States the provision is governed by statute, while in others it is considered part of the common law.

FORMA URBIS ROMiE, a map of an¬ cient Rome executed in marble and placed on the wall of the Templum Sacrae Urbis, now the church of Saints Cosmus and Damian. From 1559 to the present time excavations have brought to light about 600 pieces of this Marble Plan, as it is known. All the pieces are housed in the Capitoline Museum. It represented the city after the reconstruction by Severus and Caracalla, and is of the greatest interest to archaeologists in identifying existing ruins. Con¬ sult Platner, (Topography and Monuments of Ancient Rome) (2d ed., Boston 1911).

FORMALDEHYDE. See Bactericide; Disinfectants; Fumigation.

FORMALIN, a solution produced by dis¬ solving in 60 to 70 per cent of water 30 to 40 per cent of formaldehyde gas, CH20. This solu¬ tion has come to be recognized as a powerful disinfectant. Dr. Charles C. Barrows was among the first to employ formalin as a specific for sepsis or blood poisoning. About 500 cubic centimeters of formalin solution was forced into a patient's circulation. The temperature fell al¬ most immediately and the pulse showed an in¬ stantaneous improvement. The day after another injection was made and examination showed that bacteria were no longer present in the blood. A third injection into the patient's left arm introduced 750 cubic centimeters into the circulation. The temperature fell to normal, no more bacteria were developed and the patient recovered rapidly. Since then formalin, as a 37 per cent solution, has won extended use as a germicide, disinfectant and preservative, though the latter use is regarded as injurious. It is compounded with gelatin as a local anti¬ septic.

FORMAN, Justus Miles, American novel¬ ist : b. Le Roy, Genesee County, N. Y., 1 Nov. 1875 ; d. 7 May 1915. In 1898 he was graduated at Yale University, thereafter went to Europe, where he studied painting for three years. He published very many short stories in magazines up to the time of his death on the Lusitania. His works in book form include (The Garden of Lies> (1902); (Journey's End> (1903); (Monsigny) (1904) ; (Tommy CartereP (1905) ; ˆBuchanan's Wife) (1906) ; (A Stumbling Block> (1907); (Jason) (1909); (Bianca's Daughter (1910) ; (The Unknown Lady) (1910) ; (Court of the Angels) (1912) ; (The Opening Door) (1913) ; (The Blind Spot) (1914) ; (The Six Rubies) (1914).*

FORMATES. See Formic Acid.

FORMATION. See Ecology ;' Plants, Distribution of.

FORMATION, in geology, a term used of groups of rock, whether stratified or unstrati¬ fied, having a similar origin or character. Thus it is usual to speak of a limestone, a sandstone or a clay formation. The word has also been by some extended to be synonymous with sys¬ tem, or to denote a group of strata of the same age, as Canadian series, Carboniferous system, etc. By the United States geological survey, the term is used to indicate a group of rocks mapped as a single unit, that is, given one color on a geologic map.

FORMENTERA, for-men-ta'ra, Spain, one of the Balearic Islands, in the western Medi¬ terranean, off the coast of Spain, in the province of Baleares. It has an area of 38 square miles. Fishing and salt-making are the principal in¬ dustries. Wheat is the chief crop and cattle are raised in considerable numbers. Pop. 2,600.

FORMIA, Italy, city in the province of Caserta, on the Gulf of Gaeta, 65 miles north of Naples. It was long known as the Mola di Gaeta but resumed its ancient name. It com¬ mands several splendid views and, lying on the ancient Via Appia, it was a favorite resort of wealthy Romans. There are numerous remains of ancient villas along the coast and on the slopes above the city. The sheltered hillsides are covered with lemon, orange and pomegran¬ ate gardens. The ancient Formiae was a town of the Volsci and in 332 b.c. received the cvuitas sine suffragio from Rome. It received full citizenship in 188 b.c. Cicero owned a villa near Formiae and was murdered in the neigh¬ borhood. Pottery and oil are the only manu¬ factures. Pop. 8,734.

FORMIiE. See Formia.

*FORMIC ACID, a monobasic organic acid having the formula CH202, or H.COOH, the final H in the last of these formulae being the one that is replaced when the acid combines with bases to form its salts (which are known as ˆformates**). It is an important substance in organic chemistry, and may be obtained by the oxidation of methyl alcohol, as well as of starch, sugar and other organic substances. The most convenient method of preparing the acid is by heating anhydrous glycerin with crystallized ox¬ alic acid. The reaction is not a simple one, monoformin being one of the intermediate prod¬ ucts ; but the obvious part of the reaction is that the oxalic acid is converted into formic acid with liberation of carbon dioxide. Pure anhy¬ drous formic acid is a pungent, colorless liquid, boiling at about 212° F. at ordinary atmospheric pressure (its vapor burning with a bluish flame), and freezing at about 47° F. into a white crystalline mass. Formic acid is completely resolved by strong sulphuric acid into water and carbon monoxide, H.COOH = HaO + CO. It reduces Fehling's solution (q.v.), and alˆo re¬ duces gold and platinum to the metallic state, from*

their .solutions. When boiled with the nitrates of silver and mercury, formic acid pre¬ cipitates these metals in the form of grayish metallic powders. Formic acid is a strong re¬ ducing agent and a powerful antiseptic ; both the acid and its salts are used as disinfectants and preservatives. It is also used in dyeing. The acid takes its name from the fact that it

exists, in the free state, in the bodies of red ants (Formica rufa), from which it may be obtained by crushing the ants and distilling the mass with water.

FORMICA, for-mi'ka; FORMICIDiE,

for-mis l-de, the genus and family respectively which contain the typcial ants. See Ant.

FORMICARIIDiE, for"-mi-ka-ri'i-de, a family of small, tropical American birds, the so- called <

FORMIGE, for-me-zha, Jean Camille,

French architect: b. Bouscat, Gironde, 1845. He was a pupil of Laisne, and received from the French government a commission for a series of plans for, and restoration of, pub¬ lic structures; the latter including the Roman theatre at Orange, Vaucluse. He executed decorations in the Paris Hotel de Ville, be¬ came architect of Paris streets and parks in 1885, built the Liberal Arts and Fine Arts buildings at the Paris Exposition of 1889, and the buildings of the Rumanian govern¬ ment at that of 1900. He was made an officer of the Legion of Honor and also of the Academy.

FORMING MACHINES, a term that has been applied generally to the lathe, planer, shaper and all that class of tools used by the machinist to produce the parts of machines that he manufactures. It has also been used to designate presses used for drop-forging, and for shaping metal in the cold, particularly to drawing-presses that receive a sheet of metal, grip it between two surfaces and then subject a part of it to slow pressure until it is drawn out to a cup-shape or the like, if properly done without any wrinkling. A form of rope-twist¬ ing machine is also known as a forming machine as well as a machine for forming tin cans. See Forge; Press.

FORMOSA, for-mc/sa, called by the Chinese Taiwan, an island lying off the coast of the Chinese province of Fu-chien, from which it is separated by a strait from 90 to 220 miles wide. Formosa, which, with a group of about

12 islands called -the Pescadors, was ceded by China to Japan in 1895, is crossed by the meri¬ dian 121° E. and the tropic of Cancer, and has a maximum length of 235 miles, while its breadth varies from 70 to 90 miles; area, 13,839 square miles. Forming one .link in the volcanic chain that extends from the Aleutian Islands southward to New Guinea, it constitutes the eastern escarpment of what was once the great Malayo-Chinese continent, and is connected by a submarine plateau with the Chinese main¬ land. The back-bone of the island, extending north and south, is formed of a range of densely wooded mountains, called by the Chinese Chu-Shan, which rise to upward of 14,000 feet, the highest known peak, Mount Morrison, being given as 14,362 feet. Eastward of this range lies a narrow strip of mountainous

country, presenting to the Pacific a precipitous cliff-wall with in many places a sheer descent of from 3,000 to 7,000 feet, while a very short distance farther east the floor of the ocean sinks to a great depth at an extremely steep gradient. The western side of the range consists of a single broad alluvial plain, stretching from north to south of the island, seamed by innu¬ merable water . channels, and terminating at the coast-line in mud flats and sand-banks. Yet on this side of the island the land is rapidly encroaching upon the sea, as the conse¬ quence of the gradual elevation of the western seaboard and the deposition in and around the embouchures of the rivers of the large amount of sediment brought down by them from the mountains. This latter process is primarily due to the heavy rainfall of the northern, cen¬ tral and eastern portions of the island, where the rain-clouds of the northeast monsoon, after crossing the warm Kiosiwo or Japanese Gulf Stream, on coming in contact with the moun¬ tain barrier of the island become chilled and discharge their contents in rains of excessive violence.. Apart from this heavy rainfall, the climate is not exceptional, the insular position ensuring a modification of the heat by sea- breezes. The mean of summer is 80° to 90° F. ; of winter, 50° to 60°. Malarial fever is, how¬ ever, prevalent in the north, and violent ty¬ phoons are very common at certain seasons.

The island is famous for the luxuriance of its vegetation; many of the hothouse plants of warm temperature climes grow wild on the mountain slopes and in the valleys, such as orchids, azaleas, lilies, rhododendrons and con¬ volvulus ; besides which there is a profusion of ferns, treeferns, camphor- and teak-trees, pines, firs, wild fig-trees, liquidambars, bananas, bamboos, palms, indigo and other dye plants, fibre and paper plants, oil and soap plants, tobacco, coffee and tapioca. (

Since the treaty of Tien-tsin, in 1858, there have been ports open for foreign commerce; those opened in accordance with the conditions of the treaty are An-ping, Tainan, Takow and Tam-sui. An-ping and Tam-sui

have the largest amount of commerce. The principal exports (valued at £1,543,021 in 1915) are camphor, tea, rice, sugar, jute, hemp and dye-woods. The chief imports (valued at £1,2 77,- 295 in 1915) are a coarse cloth for clothing, opium, fruits, lumber, metal goods and manu¬ factured tobacco. The most of the trade is with Japan, China and the United States being next in importance. Imports from the United

States were valued at about $1,000,000 in 1912, and exports at about $2,500,000. Formosa con¬ trols the camphor markets of the world. The eastern slope of the mountains is covered with the largest camphor forest yet discovered. The value of camphor exported in 1914 was £384,801 ; and from Formosa alone there is shipped be¬ tween 6,000,000 and 7,000,000 pounds. Since Formosa was annexed to Japan, the Japanese government has made most successful efforts to preserve the sources of supply of camphor. When the island belonged to China the cam¬ phor-trees killed to collect the gum were not replaced and the camphor forests were being destroyed. The Japanese government insists that for every tree destroyed another one must be planted; and it is also establishing camphor plantations, so that in future the Formosa cul¬ tivated camphor will be a commodity of com¬ merce. The price of the camphor varies be¬ cause of the dangers incurred in collecting it. Savage tribes which have never been subdued inhabit the camphor forests, and they never hesitate to attack the camphor gatherers unless the latter are well armed and in bands large enough to protect each other. The Japanese government has now a large armed force of policemen, to protect the camphor gatherers, and the cost of protection is added to the selling price of the gum. The sale of the camphor is a government monopoly; it is not difficult to obtain a permit to gather camphor, but every pound must be sold to the Japanese government, which determines the price. Japan limits the amount to be exported, and will not buy a pound in excess of the limit. The cultivation of the tea fields is receiving attention from Japan, the export of this product being in 1914 valued at £635,874. The chief town is Kainan City (Pop. 53,794). There were 312 miles of railway and 125 miles of light rail¬ way in 1914. Shipping entered at Formosan ports in 1913, 438 vessels with a tonnage of 792,724 tons. The currency is Japanese. For¬ mosa was visited by a disastrous earthquake on 17 March 1906, when over 1,200 persons lost their lives.

The inhabitants, numbering 3,654,000 in 1920, consist of Chinese settlers, some Japanese, and the aborigines. A system of colonization from Japan has been adopted by the authorities. Respecting the ethnological origin of

these lat¬ ter there exists some doubt ; they seem to con¬ sist of several different tribes, mainly of Malayan and Negrito descent. The Chinese distribute them into three classes, Pepohwan, a race of civilized and sinicized agriculturists; Sekhwan, settled tribes who acknowledge Chinese rule ; and Chinhwan, the untamed sav¬ ages of the mountains. The administrative headquarters were formerly at Taiwan, but on the constitution of the island into an independ¬ ent province of the Chinese Empire in 1887 — it had formerly been incorporated with Fu- chien on the mainland — they were transferred to Tai-per or Bangka. The island was known to the Chinese before the Christian era, but does not seem to have seriously attracted their attention until the year 605 or 606 a.d. In the 14th century they established several colonies in Formosa, which however, were withdrawn in the middle of the 17th century. Although Portuguese and Spanish navigators began to visit the island a century earlier, the first Euro¬

pean people to establish themselves on it were the Dutch, who in 1624 built Fort Zealandia, near the modern Taiwan. They were, however, expelled in 1661 by a Chinese adventurer, Koxirtga, who retained possession of the island for 22 years. Some years later a regular Chinese colonization of the western half of the island was carried through, the colonists com¬ ing principally from Fu-chien and Kwang-tung. Subsequently the island became notorious for the piracy of its inhabitants and the ill-treat¬ ment they inflicted upon navigators who chanced to be wrecked on their coasts. Accordingly in 1874 the Japanese invaded Formosa; but on the Chinese undertaking to check the evils com¬ plained of they withdrew. Ten years later the French, during their contest with China in Tongking, held for a time the coal districts of Kelung. The occupation by the Japanese troops did not take place without opposition from the natives and Chinese ((Black Flags,55 but the Japanese were practically in full possession of the island before the end of 1895, and set them¬ selves at once to the work of reorganization. Consult Psalmanazar, description of For- mosa) (1705) ; Cordier, (Bibliographic des ouvrages relatifs a File Formosa) (1903) ; Swinhoe, (Notes (a naturalist's) on Formosa) (1863) ; Mackay, (From Far Formosa) (1896) ; Davidson, (The Island of Formosa5 (1903) ; Campbell, (Formosa under the Dutch5 (1903) ; Tekekoshi, Japanese Rule in Formosa5 (trans. by Braithwaite, 1907) ; Terry, Japanese Em¬ pire in Korea and Formosa5 (1914).

FORM'OSA, South America, a province of Argentina, in the northeastern portion of the republic, lying between the rivers Pilcomayo and Bermejo. It has an area of 41,402 square miles, and population estimated in 1915 of 27,- 920. Capitol, Formosa on the Paraguay River (pop. about 6,000).

FORMOSAN DEER, a small spotted deer (Cenms taevanus), allied to the

Japanese sika (q.v.) and a favorite pet among the people of Formosa, who catch the fawns in the moun¬ tains.

FORMOSUS, Pope: b. about 816; d. 896. He became cardinal bishop of Porto in 864 and succeeded Pope Stephen VI in 891. He con¬ demned Photius, excommunicated the Emperor Lambert, Duke of Spoleto, and nominated in his place Arnoul, king of Germania. Stephen VII had his body disinterred as that of a usurper, but under John IX, in 898, his pontifi¬ cate was pronounced valid.

FORMS, or QUANTICS, in mathematics, an integral, homogeneous, rational function of two or more variables. According to their di¬ mensions they are named quadric, cubic, quartic, or quintic, etc., denoting forms of the second, third, fourth, fifth degree, etc. Another divi¬ sion, based on their content of variables, is linary, ternary, quaternary, etc. See Func¬ tions ; Mathematics ; Real Variable, Theory of, Functions of the.

FORMS OF ACTION, the classes into which actions are divided in pleading and practice under the common law. See Plea and Pleading.

FORMS OF ADDRESS in the United States are neither so complicated nor so rigidly arranged as in countries where careful grada-

tions of rank and title obtain. Usage, how¬ ever, sanctions the forms given in the follow¬ ing list :

The President of the United States, governors of States, ambassadors and ministers, — “ His Excellency.”

the Vice-President of the United States, the heads of the executive departments, justices of supreme and superior courts, lieutenant-governors of States, and mayors, — “ The Hon. .”

Senators and representatives of the United States,

or of States, — “ The Hon. – .” By courtesy the title is

extended to members of State legislatures.

Ex- Presidents, or ex-othcials of any of the ranks above cited, — ” The Hon. – .”

Archbishops, if cardinals, — “ His Eminence the Car¬ dinal Archbishop of

– .”

Archbishops, if not cardinals, — “ The Most Rev. the Archbishop of – .”

Bishops, in the Roman Catholic and Protestant Episcopal Churches, — “ The Right Rev.” or “ The Right Rev. the Bishop of –

Bishops, in the Methodist Episcopal Church, — “ The Rev. Bishop. ’

The designation “ Esquire,” once chiefly applied to lawyers, is now frequently employed in addressing gentle¬ men of position.

The forms of address used in foreign coun¬ tries, particularly those monarchical in govern¬ ment, are arbitrary and elaborate.

FORMULA, Chemical. See Chemistry.

FORMULARY, National, a volume pub¬ lished by a committee of the American Phar¬ maceutical Association containing prescrip¬ tions with directions for making a large num¬ ber of widely used combinations of drugs. These combinations are the familiar ones that have been used in the treatment of disease for many years.

FORNICATION, illicit carnal intercourse by an unmarried person with one of another sex, whether married or unmarried. It has been the subject of repressive legislation in nearly all countries and in England in 1650 the repeated act of fornication was made a felony without benefit of clergy on a second conviction. In most modern jurisdictions its repression is left to the restraints imposed by public opinion. In some States, fornication is by statute made a misdemeanor, punishable by fine and imprisonment, but in most it is ignored at common law.

FORNIX. See Brain.

FORRER, Ludwig, Swiss statesman: b. Islikon 1845; d. 29 Sept. 1921. Educated at the University of Zurich, entered the police de¬ partment and served some years as attorney of the canton of Zurich. In 1873 he entered on the practice of law in Winterthur, soon after manifested an interest in political life and in 1891 was made president of the Nationalrat. In 1900 he became director of the central office for railways, two years later was elected to the Bundesrat, in which he led the Radical party. He was president of the Swiss Confederation in 1906 and 1912.

FORREST, Edwin, American melodramatic actor: b. Philadelphia, 9 March 1806; d. there, 12 Dec. 1872. In 1820 he made his first ap¬ pearance in public in the part of Douglas in Home’s tragedy of that name, and coming

before the New York public in 1826 in the character of Othello, at once gained popularity. In 1836 he crossed the Atlantic and entered on a season at Drury Lane Theatre, London. In the parts of Macbeth, Lear and Othello he achieved distinguished success, and acquired the friendship of Macready, Kemble and others.

He again visited England in 1845, and on this occasion quarreled bitterly and causelessly with Macready, whom he accused of trying to damage his reputation from professional jealousy. This quarrel crossed the Atlantic, and when Macready was playing in the Astor Place Theatre, New York, in 1849, the partisans of either actor stirred up a riot that was ac¬ companied by serious loss of life. Between 1853 and 1860 he retired from professional life, but when he returned to the New York stage he filled the role of Hamlet with all his former acceptance. His last engagement was in 1871. He was a man of fine presence, well equipped for his profession, naturally frank and engaging. He left a large fortune. Con¬ sult Rees, (The Life of Edwin Forrest > (1874) ; Alger, (Life of Edwin Forrest } (1877); Bar¬ rett, (Edwin Forrest) (1882).

FORREST, French, American naval officer: b. Maryland 1796; d. 1866. He served as midshipman in the War of 1812 and won distinction at the battle of Lake Erie. Five years later he' was commissioned lieutenant, was made commander in 1837 and captain in 1844. He was adjutant-general during the Mexican War. He threw in his fortunes with the Confederates on the outbreak of the Civil War and was made commandant of the navy yard at Norfolk, later serving as acting As¬ sistant Secretary of the Confederate Navy.

FORREST, Sir George William, British public official and historian: b. Nusseerabad, 8 Jan. 1846. He was educated at Cambridge University, read for the bar in 1870-72 and con¬ tributed to the Saturday Review and other London journals. He was appointed by the Secretary of State for India to the Bombay Education Department in 1872; acted as Census Commissioner at Bombay in 1882 ; was em¬ ployed on special work in connection with Bombay Record. In 1887 he was appointed professor of English history at Elphinstone College and from 1884 to 1888 was director of records at Bombay. He is assistant secretary to the government of India and was knighted in 1913. His publica¬ tions include Selections from the State Papers preserved in the Bombay Secretarial ; Selec¬ tions from the State Papers preserved in the Foreign Office Government of India, relating to Warren Hastings) ; (The Administration of Warren Hastings) ; Selections from the State Papers preserved in the Military Department of the Government of India, relating to the Mutiny) (2 vols.) ; (The Administration of the Marquis of Lansdowne) ; Sepoy Gen- erals) ; (Cities of India) ; (History of the Indian Mutiny (3 vols.) ; (Life of Sir Nevile*

Chamberlain) (1909) ; (Life of Lord Roberts)

(1914).

FORREST, Sir John, Australian explorer and politician : b. Western Australia, 22 Aug. 1847. He entered the survey department of Western Australia in 1865, and in 1874 was at the head of a party which explored the interior from Champion Bay on the west to the over¬ land telegraph line connecting Adelaide on the south with Port Darwin on the north coast. After holding various government posts he was returned unopposed in 1890 to the first Western Australia legislative assembly for Bunbury, and was premier and treasurer 1890-

*1901. He was Postmaster-general of Australia 1900-01 ; Minister of Defense 1901-03 ; Minis¬ ter for Home Affairs 1903-04; Treasurer 1905 — 07, and again in 1909-10, and 1913-14; and since 1901 has represented Swan in Parliament. He was acting Prime Minister of the Com¬ monwealth from March to June 1907. He represented Western Australia at Queen Vic¬ toria's two jubilees, 1887 and *1897; and at¬ tended as a privy councillor the coronation of King Edward VII 1902, and of King George V in 1911. His publications are Explorations in Australia) (1876) ; and*

FORREST, Nathan Bedford, American soldier: b. Bedford County, Tenn., 13 July 1821 ; d. Memphis, Tenn., 29 Oct. 1877. Moving with his father to Marshall County, Miss., he was in a short while, by the death of his father, left to support his mother and family with a small hill farm. He undertook this work with devotion and energy, and, getting into business in Memphis, became able to purchase a large plantation, and was at the outbreak of the Civil War one of the wealthiest planters in Tennessee. Circumstances had forced him to neglect his own education, though he provided liberally for that of his brothers and sisters. On 14 June 1861 he entered the Confederate service as a private in White's Mounted Rifles, but soon obtained authority to raise a regiment, which he did, purchasing at his own private expense its equipment in Louisville, Ky. These supplies he carried to Memphis, displaying remarkable in¬ genuity and daring both in eluding the Federal authorities and in defeating a body of their troops with 75 Kentucky Confederates who had come to his assistance. Joining his regiment to the force defending Fort Donelson in February 1862, he was distinguished in the fighting at that point, and, when his superiors had deter¬ mined upon surrender, led his men through a sheet of icy water past

the Federal lines and escaped. Joining Albert Sidney Johnston (q.v.), he wras distinguished at Shiloh, where he re¬ ceived a painful wound, which, however, did not long keep him from the field; and bv a series of successful movements in Middle Ten¬ nessee, then occupied by the Federals, he rapidly rose to great distinction as a cavalry leader, and on 21 July 1862 was promoted brigadier-gen¬ eral. During Bragg's Kentucky campaign he performed great services both on the advance and retreat. Among his most famous exploits in Middle Tennessee was the expedition in which, with less than 1,Q00 men, he captured McMinnville, and, surprising a garrison of 2,000 Federals at Murfreesboro, captured all the sur¬ vivors of the fight, including General Critten¬ den. On 8 May 1863 he captured a raiding force of Federals under General Streight, near Rome, Ga., the Federal force being so much larger than his own that he pressed into service all the citizens in reach in order to form an adequate guard.

After highly distinguished service at the battle of Chickamauga, he was so dissatisfied with the failure to reap the full fruits of that great victory that he tendered his resignation. This was not accepted, but, instead, he was pro¬ moted major-general and assigned to the com¬ mand of all the cavalry in West Tennessee and North Mississippi. Entering West Tennessee

with a small force, he was reinforced by several thousand hardy volunteers, who, with his veteran troops, were soon welded into an invincible body known as <(Forrest's cavalry.® In Febru¬ ary 1864 he routed Gen. S. Smith at Okatona, Miss. ; then swept northward through Tennessee to the Ohio River, capturing Fort Pillow, Union City and other posts, with their garrisons. In June 1864, with a much smaller force than the enemy, he defeated General Sturgis at Brice's Cross Roads (or Tishamingo Creek), near Guntown, in North Mississippi, capturing all his trains and a third of his men. Gen. A. J. Smith then advanced against him, but after fighting a desperate battle at Harrisburg, near Tupelo, in Mississippi, retreated. Receiving reinforce¬ ments from Memphis, Smith ad'vanced again, but Forrest foiled him by making a 60-hour ride to Memphis with half of his force, and by his daring entry into that city compelled Smith's rapid retreat. Then Forrest made havoc with Federal transportation, capturing garrisons and depots in Tennessee, and crowning his exploits by the capture and destruction of $6,000,000 worth of Federal supplies and a gunboat fleet at Johnsonville. Sherman wrote of this as a feat of arms which excited his admiration. Upon Hood's advance into Tennessee, Forrest joined him at Florence and performed import¬ ant services. As commander of the rear guard of the Confederate army during the retreat from Nashville, his display of heroic qualities and brilliant leadership increased his already great fame. In February 1865 he was pro¬ moted lieutenant-general, and to him was as¬ signed the duty of guarding the Confederate frontier from Decatur, Ala., to the Mississippi River. The surrender of the remnant of his

command took place on 9 May 1865. During his career he had captured 31,000 prisoners. After the war he returned to civil life.

Joseph T. Derry,

Author of cThe Story of the Confederate States . >

FORREST CITY, Ark., city and county- seat of Saint Francis County, 90 miles north¬ east of Little Rock, on the Chicago, Rock Island and Pacific and the Saint Louis, Iron Mountain and Southern railroads. It is the seat of Crowley Ridge Institute and has manu¬ factures of cotton, veneers, ice, spokes, lumber, etc. It has a large trade in the agricultural products and live stock of the surrounding dis¬ trict. The city owns the electric plant, water¬ works and sewage system. Pop. (1920) 3,377.

FORRESTER, Fanny, pen-name of Emily Chubbuck Judson (q.v.).

FORSBERG, Nils, Swedish artist: b. Rise- berga, Skane, 1842. He came of peasant stock and was made a house-painter's apprentice at Goteborg. He executed a statue of Minerva which attracted, very favorable notice and se¬ cured for him a government pension. He went to Paris in 1867 and there studied painting under Bonnat. He sketched many military scenes of which he was an eyewitness during the siege of Paris. His works include (An Acrobat Family,' in Goteborg Museum ; (A Hero's Death,' in the Museum of Stockholm. His later work has been chiefly in historical subjects and portraiture. In 1901 he was made chevalier of the Legion of Honor.

FORSKAL, for'skal, Peter, Swedish botanist; b. Helsingfors, 11 Jan. 1736; d. Djerim, Arabia, 11 July 1763. In 1761 he was selected by Frederick V of Denmark to join the scientific expedition to Arabia, to take charge of the department of natural history. He set out on this expedition with Niebuhr, Von Haven and Kramer, and collected plants in the environs of Marseilles, of which he pub¬ lished a (Flora) at Malta. Neibuhr collected Forskal's papers, accompanied them with re¬ marks, and published them under the titles (Descriptiones Animalium, Avium, Amphibio- rum, Piscium, Insectorum, quae in Itinere Orientali observavit P. ForskaP (1775) ; 'Flora ZEgvptiaco-Arabica (1775); 'leones Rerum Naturalium, quas in Itinere Orientali depingi curavit ForskaP (1776).*

FORST, Prussia, town on the Neisse, in the province of Brandenburg, 44 miles south of Frankfort-on-Oder. It contains two schools, two hospitals and four churches. Cloth manu¬ facture is the principal industry, but

spinning, the making of artificial flowers and dyeing are also important industries. It was founded in the 13th century, became part of electoral Saxony in 1740 and was ceded to Prussia in 1815. Pop. 33,875.

FORSTER, fer'ster, Heinrich, German Catholic prelate: b. Grossglogau 1800; d. 1881. He received his education at Breslau, was or¬ dained to the priesthood in 1825 and subse¬ quently became chief preacher at Breslau Cathe¬ dral. He was elected bishop of Breslau in 1853, and in the subsequent religious strife in Ger¬ many proved himself a staunch advocate of the Roman Catholic Church. At the Vatican Coun¬ cil he opposed the promulgation of papal in¬ fallibility, but submitted to the will of the majority. During the Kulturkampf of the sev¬ enties he was frequently embroiled with the authorities because of his excommunicating priests who submitted to the May laws. He was deposed by the state in 1875. He published (Der Ruf der Kirche in die GegenwarC (4th ed., 1879) ; 'Die christliche Familie> (6th ed., 1893) ; 'Kardinal Diepenbrock (3d ed., 1878) ; 'Gesammelte Kanzelvortrage) (5th ed., 1879). Consult Franz, A., (Forster, Fiirstbischof von Breslau) (Breslau 1875).*

FORSTER, Johann Reinhold, German naturalist: b. Dirschau, Prussia, 22 Oct. 1729; d. Halle, 9 Dec. 1798. In 1753 he became pastor at Nassenhuben, but devoted most of his time to the study of mathematics, natural philosophy, natural history and geography. In 1772 he re¬ ceived the offer of naturalist to Captain Cook's second expedition to the South Seas. In asso¬ ciation with his son, he published a work on the botany of the expedition, and 'Observations Made During a Voyage Round the World. He wrote also (Introduction to Mineralogy ; (Flora of South America * ; 'Zoology of India,* etc.*

FORSTER, John Cooper, British surgeon: b. Lambeth 1823 ; d. London, 2 March 1886. He entered Guy's Hospital in 1841, was made demonstrator of anatomy in 1850, assistant sur¬ geon in 1855 and surgeon in 1870. In 1844 he became a member of the College of Surgeons, was Fellow in 1849 and president in 1884. He was a prompt and efficient operator and per¬

formed practically the first gastrostomy in Eng¬ land. He wrote many papers on acupressure, syphilis, hydrophobia, intestinal obstruction, cancer, etc., and the work 'Surgical Diseases of Children) (I860).

FORSTER, Wendelin, German philologist: b. Wildschiitz, Bohemia, 1844. He received his education at the University of Vienna, and from 1874 to 1876 he was professor there and at the University of Prague; after 1876 he taught at the University of Bonn. He definitely estab¬ lished the Breton origin of the Arthurian legend. His publications include 'Elie de Saint Gille) (1876-82) ; 'Li Chevaliers as deus espees (1877) ; 'Altfranzosische*

Bibliothek) (Vols. I-XI, 1879-87) ; 'Romanische Bibliothek) (Vols. I-XX, 1888-1913) ; 'Die sammtlichen Werke von Christian von Troyes) (Vols. I-IV, 1884- 99) ; 'Worterbuch zu Christian von Troyes)

(1914).

*FORSTER, William Edward, English statesman: b. Bradpole, Dorsetshire, 11 July 1818; d. London, 5 April 1886. He was edu¬ cated at the Friends' School at Tottenham, and was active in the woolen trade in Bradford. In 1850 he married the eldest daughter of Dr. Arnold of Rugby. In 1865 he became under¬ secretary for the colonies ; in 1868 was ap¬ pointed vice-president of the council on educaˆ tion and a privy councillor; and in 1870 accepted a seat in Gladstone's Cabinet, and carried through Parliament the Elementary Education Bill (1870) and the Ballot Bill (1872). In 1880 he accepted the post of chief secretary for Ire¬ land at a time when that country was dis¬ tracted by political and agrarian tumults. To mitigate the severity of the numerous evictions he introduced a Compensation for Disturbance Bill (1880), which was rejected by the House of Lords. The following year he introduced a Land Bill and a Coercion Bill, both of which were passed, and in order to check the growing power of the Land League he declared that organization illegal, and imprisoned Parnell and other members of his party. In April 1882 the government resolved to release the Parnellites and adopt a more conciliatory policy, where¬ upon he resigned his office. Subsequently he was often found acting in opposition to the government, chiefly in reference to foreign af¬ fairs, and he was also opposed to a separate Irish Parliament in Dublin. His opinion on the latter question carried great weight because of his well-known sympathy for Ireland, his abili¬ ties as a statesman, his experience in affairs and his unquestioned honesty. Consult Reid, Wemyss, 'Life of Forster * (1888).*

FORSYTH, Andrew Russell, English mathematician: b. Glasgow, 18 June 1858. He was educated at Liverpool College and at Trin¬ ity College, Cambridge. From 1881 to 1910 he was Fellow of Trinity; from 1884 to 1895 was university lecturer in mathematics, and from 1895 to 1910 was Sadlerian professor of pure mathematics at Cambridge. He is chief pro¬ fessor of mathematics in the Imperial College of Science and Technology, South Kensington, since 1913. He became Fellow of the Royal Society in 1886, was president of the London Mathematical Society in 1904-06, and is mem¬ ber of many scientific bodies of England and the colonies. His publications include 'Treatise

on Differential Equations5 (1885) ; (Treatise on the Theory of Functions5 (1893) ; lectures on Differential Geometry5 (1912) ; (Lectures on Functions of two or more Complex Variables) (1913). He edited Cayley's (Collected Mathe¬ matical Papers5 (1895-98), and has published mathematical papers in various transactions and journals.

FORSYTH, George Alexander, American military officer: b. Muncy, Pa., 7 Nov. 1837; d. Rockport, Mass., 12 Sept. 1915. He served with distinction in the Civil War; was brevetted colonel for gallant services at Five Forks, and brigadier-general in 1868 for his action in an engagement with hostile Indians. He was a member of the board of officers to inspect the armies of Europe and Asia in 1875-76, and on staff and frontier service till 1890, when he was retired on account of disability due to the ef¬ fect of wounds received during the Civil War and in subsequent Indian campaigns. He has published (Thrilling Days in Army Life) (1900) ; (The Story of the Soldier) (1900).

FORSYTH, James William, American soldier : b. Ohio 1836 ; d. 1906. In 1856 he was graduated at the United States Military Acad¬ emy and in the Peninsular and Maryland cam¬ paigns of the Civil War was captain on the staff of General McClellan. For bravery at Chick- amauga he was brevetted major and in 1864-65 he was chief of staff to General Sheridan. In 1866-67 he was assistant inspector-general of the Gulf Department and from 1869 to 1873 served as aide to Lieutenant-General Sheridan. From 1873 to 1878 he was secretary of the Mis¬ souri Division, was made colonel of the 7th Cavalry in 1886, brigadier-general in 1894 and was retired in 1897 with the rank of major- general. With F. D. Grant he published Re¬ port of an Expedition up the Yellowstone River) (1875).

FORSYTH, John, American politician: b. Fredericksburg, Va., 1780; d. Washington, 21 Oct. 1841. He was graduated at Princeton Col¬ lege in 1799, and was admitted to the bar in Augusta, Ga., in 1802. He was elected attorney- general of the State in 1808, representative in Congress in 1812 and United States senator in 1818. In 1820 he was sent to Spain as resident minister, where he conducted the negotiations concerning the ratification and execution of the treaty by which Florida was ceded to the United States. In 1823 he was again chosen to the House of Representatives, and was one of the main supporters in Congress of Governor Troup of Georgia in his contest with the national gov¬ ernment concerning the removal of the Creek and Cherokee Indians. He became governor of Georgia in 1827, and in 1829 was again returned to the United States Senate. He opposed the South Carolina movement of nullification from its beginning, and voted in favor of Mr. Clay's compromise act of 1833. In the debate in 1834 on the removal of the deposits from the United States Bank, he supported the President, who

afterward appointed him Secretary of State, an office which he retained till the retirement of President Van Buren in 1841.

FORSYTH, Peter Taylor, English Non- Conformist divine : b. Aberdeen 1848. He was educated at the Grammar School and University of Aberdeen, and later studied under Ritschl at

Gottingen, and at New College, Hampstead. He held ministries at Shipley, Hackney, Manches¬ ter, Leicester and Cambridge, and in 1901 was made principal of Hackney Theological College, Hampstead. In 1907 he delivered the Lyman Beecher lectures on preaching at Yale Univer¬ sity, published as 'Positive Preaching and Mod¬ ern Mind.5 His other publications include Children's Sermons) ; 'Religion in Recent Art5 ; 'The Charter of the Church5 ; 'The Holy Father and the Living Christ5 ; 'On Christian Perfection5 ; 'Rome, Reform, and Reaction5 ; (Taste of Death and Life of Grace5 ; 'Missions in State and Church5 ; 'The Cruciality of the Cross5 ; 'The Person and Place of Christ5 ; 'The Work of Christ5 (1911) ; 'Faith, Free¬ dom, and the Future5 (1912) ; 'The Religion and Ethic of Marriage5 (1912); 'The Prin¬ ciple of Authority5 (1913); 'Theology in Church and State5 (1915) ; 'The Christian Ethic of War5 (1916) ; 'The Justification of God5 (1916); 'The Soul of Prayer5 (1916); 'The Church and Sacraments5 (1917), and arti¬ cles in the Contemporary Review, London Quarterly, Hilbert Journal, etc.

FORT. A permanently garrisoned post in the United States. For the various individual posts, their location, armament, etc. see Mili¬ tary Posts.

FORT ADAMS, R. I., United States mili¬ tary post established 1841, at Brenton's Point, R. I., near Newport. There was a garrison here during the Revolution. It is the headquarters of the coast defenses of Narragansett Bay and has a garrison of five companies of coast artil¬ lery.

FORT ANCIENT. See Mound Builders and Mounds.

FORT ANDERSON. See Wilmington, Capture of.

FORT ANN, N. Y., village and former fort in Washington County, on Wood Creek and Champlain Canal, 67 miles north of Troy, on the Delaware and Hudson Railroad. It has manufactories of condensed milk, lumber mills and knitting mills. It is popular as a summer resort. A fortified camp was erected here in 1690 by Fitz-John Winthrop and in 1709 Fort Peter Schuyler was erected. This was rebuilt in 1757 and the name changed to Fort Ann. Nearby engagements were fought during the French and Indian War and the Revolutionary War. The fortifications were partially disman¬ tled by the British in 1777. Pop. 436.

FORT ATKINSON, Wis., city in Jeffer¬ son County, 54 miles southwest of 'Milwaukee, on the Rock River, and on the Chicago and Northwestern Railroad. It has meat-curing es¬ tablishments, knitting mills, farm implement works, carriage factories and creameries. The government is vested in a mayor, elected for a term of two years, and a council. The water¬ works and electric-lighting plant are the prop¬ erty of the municipality. In 1836 a military post was established here bv General Atkinson during the Black Hawk War. Pop. (1920) 4,915.

FORT BARRANCAS. See New Orleans, Campaign and Battle of.

FORT BLAKELY, Siege and Capture of.

Fort Blakely was erected by the Conf ederates as one of the inland defenses of Mobile, on th§

east bank of the Apalachee River, and opposite its confluence with the Tensas, about 10 miles northeast of the city. It was on high ground and nearly three miles in extent, with nine well- built redoubts or lunettes armed with about 40 guns. In front was a deep and broad ditch, also an abatis. The garrison consisted of Gen. F. M. Cockrell's division of veteran troops and Thomas' division of Alabama Reserves, in all about 3,500 men, under command of Gen. Saint John Liddell. On 20 March 1865 Gen. F. Steele set out from Pensacola and, by a circuitous march of 100 miles, reached the rear of the fort 1 April and invested it on the 2d with Gar¬ rard's division of the 16th corps, Veatch's and Andrews' divisions of the 13th, and Hawkins' division of colored troops, in all 13,000 men. Gradual approaches were made accompanied by heavy and constant skirmishing, and by the 8th Steele had portions of his advanced lines within 450 to 600 yards of the works and 28 guns in position. A general assault was made about 6 p.m. of the 9th; there was a severe struggle in overcoming the obstructions in front of the work ; but they were carried and the main works taken by assault, with 3,432 prisoners, 40 guns and 16 battle-flags. The Union loss was 113 killed, 516 wounded. The Confederate loss is not known. The assault on Blakely was the last considerable engagement of the war, and was followed by the fall of Mobile and sur¬ rounding forts and by the surrender of the Con¬ federate navy in the harbor. Consult (Official Records) (Vol. LI) ; Andrew, (Siege of Mobile. }

FORT BUSS, Tex., United States military post at El Paso. The size of the garrison de¬ pends greatly on whether the border conditions are peaceful

or otherwise. In 1915-16 all mobile arms of the service were stationed here, to¬ gether with a division of the National Guard, mobilized and placed in the Federal service for border patrol duty.

FORT BOWYER, bo'yer, Ala. (present site of Fort Morgan), a former United States fort at the entrance of Mobile Bay. On 14 Sept. 1814 the garrison of 160 men under Gen¬ eral Jackson was unsuccessfully attacked by naval and land forces under Capt. W. H. Percy. On 8 Feb. 1815 the British again made an attack and the fort was surrendered to them on the 11th. (See New Orleans, Campaign and Battle of). Consult Adams, (History of the United States> (Vol. Ill, New York 1889-91), and Lossing, 'Pictorial Field Book of the War of 1812 > (ib. 1868).

FORT BRAGG, Cal., city in Mendocino County, 125 miles north of San Francisco. It has a public library, lumber mills, canning fac¬ tories, sash and door factories, bottling works and a creamery. The city owns the waterworks. Pop. (1920) 2,616.

FORT CANBY, Wash., United States military post formerly called Fort Cape Disap¬ pointment, established on the north shore of the mouth of the Columbia River in 1864. It is a subpost of Fort Stevens, Ore. It was re¬ named in honor of the distinguished officer, who was killed by the Modoc Indians. Its gar¬ rison was temporarily withdrawn in 1905-06 while the post was rebuilding. vol. it — 32

FORT CASWELL, N. C., a United States military post, established 1825, on Oak Island, Cape Fear River.

FORT CHIPPEWYAN, or CHIPE- WAYAN, Canada, a trading station at the western extremity of Lake Athabasca, owned by the Hudson's Bay Company.

FORT CHURCHILL, a trading station situated at the mouth of the Churchill River, on the west shore of Hudson Bay. It belongs to the Hudson's Bay Company.

FORT CLINTON, N. Y., a fort built on the Hudson River, near West Point, in 1777, intended to make the river impassable for the British fleet. It was soon after abandoned.

FORT COLLINS, Colo., city and county- seat of Larimer County, on the Colorado and Southern and the Union Pacific railroads, 74 miles north of Denver. The State Agricul¬ tural College is here. A theological seminary (Lutheran) and the headquarters of the Colorado National Forest are also situated here. Other features include a Carnegie library, Federal building, courthouse, hospital and several fine parks. The city is the centre of a

fertile region, watered by extensive and efficient systems of irrigation. It has a large beet-sugar factory, alfalfa and flour mills, brick and tile works, and a steel-headgate plant. The United States census of manufactures for 1914 showed within the city limits 34 industrial establishments of factory grade, employing 144 persons, 85 being wage earners receiving an¬ nually a total of $27,000 in wages. The capital invested aggregated $392,000 and the year's output was valued at $489,000; of this $189,000 was the value added by manufacture. Fort Collins adopted the commission form of gov¬ ernment in 1913. The waterworks are owned by the city. Pop. (1920) 8,755.

FORT DARLING (Drewry's Bluff), AU tack on, 7 May 1862. President Lincoln, then at Fort Monroe, received a dispatch from Gen¬ eral McClellan that his cavalry had made a re¬ connaissance to Jamestown, on James River, that a Confederate battery at that point had been abandoned, and if it were possible for the Galena and other gunboats to move up James River, it would aid him in his movement up the Peninsula on Richmond. The President di¬ rected Flag-officer Goldsborough, if he deemed it proper, to send the Galena and two gun¬ boats. On the morning of 8 May Capt. John Rodgers, with the Galena, Aroostook and Port Royal, went up the river and engaged two bat¬ teries of 10 guns each, one of which he silenced; the other he passed, two Confederate gunboats retiring up the river as he approached. Rodgers worked his way up the river, meeting with no serious opposition until he arrived at Fort Dar¬ ling, on Drewry's Bluff, eight miles below Rich¬ mond, a strong position on the right bank of the river, about 200 feet above it, and mounting five heavy guns, manned by the crews of the de¬ stroyed Merrimac and other ships at Norfolk, under command of Captain Farrand, C. S. navy. The guns were mounted in such position as to give a close and plunging fire upon an advanc¬ ing vessel. At the foot of the bluff the river had been obstructed by piles and sunken vessels secured by chains, and the shore was lined with rifle-pits, sheltering sharpshooters. Rodgers

was now joined by the Monitor and Naugatuck, and on the morning of the 15th ran up and opened fire, the Galena leading and anchoring within 600 yards of the fort. The Monitor could not bring her guns to bear, and the action was principally confined to the Galena, which, after a contest of nearly three and a half hours, withdrew, having been struck 28 times, and los¬ ing 24 men killed and wounded. Two of the Confederate guns were dismounted, and Far- rand reported a loss of 7 men killed and 8 wounded. Two or three days later, recognizing the fact that the co-operation of the

*army was needed to carry the position, Goldsborough pro¬ posed to McClellan a joint attack, but McClellan preferred waiting until he got his army across the Chickahominy. The Confederates strength¬ ened the position and it remained in their pos¬ session until the close of the war, an obstacle to the advance of the gunboats up the James to Richmond, and also to the operation of the army investing Richmond and Petersburg. Consult (Naval War Records) (Vol. VII) ; Allan, (Army of Northern Virginia^*

FORT DEARBORN, a fort built in 1804 by the United States government on the south bank of the Chicago River near its mouth and on the site of the present city of Chicago. At that time the river took a sharp turn to the south just east of the fort and flowed into the lake over a heavy sandbar, which was not ca¬ pable of being crossed by anything larger than a small boat, and all large vessels bringing sup¬ plies to the garrison were compelled to anchor outside and land their passengers and cargoes in small boats. The site of the fort was on a reservation of six square miles which by Wayne's treaty with the Indians, made at Green¬ ville in 1795, had been set aside from the United States. It was named in honor of Gen. Henry Dearborn (q.v.), then Secretary of War.

The fort consisted of a stockade with two block-houses, built in the fashion of all military posts of that period which were situated on the frontier in the vicinity of Indian tribes. The quarters of the garrison were inclosed within the stockade and the first garrison consisted of one company of infantry (of the First regi¬ ment).

The growth of the settlement at Fort Dear¬ born was not rapid until after the War of 1812, owing to the numerous depredations of the In¬ dians upon the white settlers and to the fact that it was so far in the wilderness, being reached from Detroit by a trail through the woods and from Mackinac by lake schooners, generally one in the spring and one in the fall.

Fort Dearborn owes its notoriety, however, to the massacre which occurred near there on 15 Aug. 1812. The second war with Great Britain had broken out and in the beginning in the Northwest all the advantage lay with the British forces and their Indian allies. Mackinac had been captured, thus securing control of the upper lakes to the British, and the American government, apprehensive that a post among the Indians, so far from the frontiers, could not be successfully maintained, thought best to aban¬ don it. Accordingly, Gen. William Hull, in command at Detroit, issued orders to Capt. Nathan Heald, in command of the garrison, to evacuate the fort and that the surplus stores should be divided among the Indians. These

orders were executed and on 15 August the garrison and a body of

supposedly friendly Miami Indians, escorting a number of women and children, marched out of the fort and set out for Detroit by a road which wound along the lake shore. At a point among the sandhills about two miles from the fort an ambushed band of about 500 Potawatomie Indian savages, in conjunction with the party of Miami who ac¬ companied the troops, attacked the little expe¬ dition and the whole body of whites were either captured or killed. Two of the women and 12 children were butchered during the fight, and a number of the wounded men were killed after¬ ward, but some were fortunate enough to be ransomed later. The Indians then sacked the fort and burned it.

In 1816 after peace was concluded the fort was rebuilt under Captain Bradley and its out¬ lines were much extended, under the protection of its larger garrison a small village springing up. In 1823 the fort was again evacuated, but continued to be occupied from 1828 to 1837 when, the Indians having left the country, it was again abandoned, and finally, in 1856, de¬ stroyed. Consult Quaife, (History of Fort Dearborn) (1913).

FORT DE FRANCE, for de frans, or FORT ROYAL, for-rwa-yal, Martinique, French West Indies, a town, seaport and capital of this island of the Lesser Antilles, which, ex¬ cept Guadeloupe, is the largest in the Caribbean chain. It is situated in the southwestern part of the island and on the north side of a deep and well-sheltered bay protected by a fort. The city is important as it is the military and naval headquarters and rendezvous of the French An¬ tilles, and the terminus of the French trans¬ atlantic steamers, and of the West Indies cable system. The principal buildings are the parish church, government offices, the barracks, arsenal and hospital. Fort Royal is the residence of the French governor. There is a law school in the city. In the public gardens is a statue of the French empress, Josephine, who was born in Martinique. In 1839 Fort de France was partially destroj^ed by an earthquake, and in 1890 fire nearly consumed the entire city. The eruption of Mont Pelee (q.v.), in May 1902, did no material damage to the city and it be¬ came the distributing centre for the supplies sent to the island from outside sources. Pop.

27,069.

FORT DE L'ECLUSE, for de la'kliiz', a fortress in the department of Ain, France, on the Rhone River, 14 miles south of Geneva, standing upon a crag 1,385 feet high at the foot of Mont Credo, which commands the passage of the Rhone River from Switzerland through the defile of the Lcluse. It was erected by the duke of Savoy, and during the 16th century was repeatedly the object of attacks by the Swiss armies, and was several times destroyed. During the reign of Louis XIV it was rebuilt by Vauban at the king's command, but in 1815 was captured and demolished by the

Austrians. Again coming into French possession it was completely restored, and since then the fortifica¬ tions have been remodelled and strengthened.

FORT DODGE, Iowa, city and county-seat of Webster County, on the Des Moines River, and on the Illinois Central, the Chicago Great Western and the Minneapolis and Saint Louis

railroads, 135 miles east of Sioux City, 200 miles wesj of Dubuque, 85 miles north of Des Moines and 200 miles south of Minne¬ apolis. The city has many natural advantages, being an important railroad centre (the rail¬ road shops employing, on an average, 1,200 men) ; in the vicinity are large deposits of coal, gypsum and potter's and bricˆ: clay; and it is a jobbing centre for the surrounding territory. Among the industries are a shoe factory, oat¬ meal mill, several plaster mills, gypsum and clay products works, brick plants, pottery works, boiler works and foundries. The edu¬ cational facilities comprise high and public schools, parochial schools, Tobin College and Elmwood School. Nearly all religious denom¬ inations are represented in the city. Among the notable public buildings are the county courthouse, government building and public li¬ brary. There are five banks in the city with a combined captalization of $475,000. Fort Dodge was first settled in 1854 by Maj. William Williams, became a borough in March 1854 and was incorporated as a city in 1869. The affairs of the city are administered under the commission form of government, it being one of the first cities- in the State to adopt the new method. The city owns and operates the waterworks. The predominating foreign na¬ tionalities represented in the population are Scandinavians, Germans and Irish-Americans. Pop. (1920) 19,347.

FORT DONELSON, a fort erected in 1861 by the Confederates in Stewart County, northwestern Tennessee, just south of the boundary line between Kentucky and Ten¬ nessee, on the left bank of the Cumberland River, and about 63 miles northwest of Nash¬ ville and 12 miles from Fort Henry. It was on a hill 120 feet above the level of the river and, having a line of rifle pits two and a half miles in extent to defend the land approach, and three heavy batteries commanding the river, was considered one of the best fortified posts along the Confederate line of defense in the Mississippi Valley. Here, on 13-16 Feb. 1862, an important battle was fought between General Grant in command of the Union forces, and General Buckner in command of the Con¬ federates, resulting in the surrender of the fort by Buckner, together with 57 guns, 14,500 men and immense quantities of provisions and munitions of war. See Fort Henry and Fort Donelson.

FORT DOUGLAS, Utah, United States military post on the Union Pacific Railroad, three miles east of Salt Lake City and 37 miles from Ogden. It was established in 1862, oc¬ cupies a reservation of over 9,000 acres at the base of the Wahsatch Mountains and has quar¬ ters for about 500 soldiers. It was established to prevent depredations by Indians along the line of the overland mail route.

FORT DUPONT, Del., United States military post in New Castle County, opposite Pea Patch Island. It occupies a reservation of about 175 acres and has quarters for two com¬ panies of infantry. The nearest post office and telegraph station are at Delaware City, Del.

FORT DU QUESNE, kan, colonial fort in Pennsylvania erected at the confluence of the Allegheny and Monongahela rivers and upon the site of the present city of Pittsburgh (q.v.).

It was begun in February 1754 by a force of Virginians under Capt. William Trent, and Ensign Ward, who had been sent forward by Governor Dinwiddie, of Virginia, to erect a fortification of sufficient size to be a warning to the French against further intrusion on Eng¬ lish territory. On 17 April, before the work had been completed, the Virginians were at¬ tacked by a force of 700 French and Indians and were compelled to leave the fort, which was then enlarged and completed by the French, who named it Du Quesne. Near the fort, on 9 July 1755, took place the terrible defeat of the British General Braddock (q.v.), who was ambushed there by a detachment of French and Indians while on his way to retake the fort from the French. The fort and surrounding territory remained in the possession of the French until 25 Nov. 1758, when General Forbes, leaving Philadelphia early in July in command of an army of 10,000 British and Colonial troops, with a few Indian allies, met Col. George Washington (q.v.), and together cap¬ tured it, not, however, till the French had fired it and fled. It was then, at Washington's sug¬ gestion, renamed ˆPittsburgh,® in honor of the British Prime Minister, William Pitt.

The fort was occupied for the winter by a small garrison and in 1759 General Stanwix built Fort Pitt, which was the scene of many engagements during the Indian wars and the French and Indian War. During the period of Pontiac's Conspiracy in 1763 the Indians be¬ sieged the fort, then under command of Cap¬ tain Ecuyer, from 22 June to 6 August, but were twice defeated by troops from the fort and were finally driven off by a force of 500 British regulars under Col. Henry Bouquet, who had been sent by General Amherst. Bou¬ quet, a short time afterward, built a brick blockhouse not far from the fort and this ((01d Blockhouse,® which is still standing, is the only remnant of the extensive fortifications erected by the British during their occupancy of the vicinity till the outbreak of the

Ameri¬ can Revolution. This remnant is now owned and is being preserved by the Daughters of the American Revolution. See Colonial Wars in America, 1755-63 — Seven Years' War; 1758, Louisburg . . . Du Quesne ; 1763-64, Pon¬ tiac's War.

FORT EDWARD, N. Y., colonial, on the upper Hudson at its great bend, where stands the present village of Fort Edward; known as the Great Carrying Place during the 17th and 18th centuries (that is, to Lake George and Lake Champlain), and an obvious advanced post for Canadian wars. Francis Nicholson built a stockade there for that purpose in 1709; it rotted away in disuse, but in 1755, at the open¬ ing of the French and Indian War, Phineas Lyman began another called by his name. It was completed by Colonel Eyre under Sir William Johnson, who after the battle of Lake George (q.v.) renamed it Fort Edward, after the Duke of York, grandson of George II. In 1757 it was raided from Canada and 11 soldiers killed. Later the survivors of the massacre of Fort William Henry (q.v.) were sent here by Montcalm, and shortly afterward several thou¬ sand militia flocked thither to the rescue, but had to be sent home on arriving too late. In March 1758 an expedition from there under Maj. Robert Rogers was nearly destroyed by

the Indians. During this period Fort Edward was known to the French as ((Fort Lidius® or (2d series, Vol. II (1867). Fort Edward village is located on the Delaware and Hudson Railroad, Champlain Canal and Hudson Valley Railway. Here through a system of locks the Glens Falls Feeder empties into the Champlain Canal. The manufacture of pulp and paper constitutes the principal industry of the village, and here are large mills of the International Paper Company Trust. It is noted as the home of the Fort Edward Collegiate Institute, has a good union school system, a flourishing national bank, five churches and brewing, shirt-making and pot¬ tery industries. Fort Edward possesses many points of interest to the antiquarian and his¬ torian on account of its intimate connection with the events of the French and Indian and the Revolutionary Wars. Pop. (1920) 3,871.

FORT ERIE, Canada, a post village in Welland County, Ontario, on Lake Erie, at the head of the Niagara River, opposite Buffalo, N. Y., with which it is connected by a railroad bridge. Three railways enter the town, which is a port of entry and has an American consu¬ late. Pop. about 1146. The present town stands upon the site of old Fort Erie, which was the scene of considerable fighting during the War of 1812. On 28 May 1813 the British forces abandoned the fort and partially demol¬ ished it, and during the

next few months, with the varying fortunes of war, it was held alter¬ nately by the American and British forces. Early in July Maj.-Gen. Jacob Brown (q.v.) with 5,000 troops, backed by 4,000 New York militia, which had been ordered out and authorized for the war, invaded Upper Canada from Buffalo, and one of his first objects of attack was Fort Erie, which surrendered to him on 3 July. Two days later at Chippewa he successfully attacked General Riall, who lost 511 men killed and wounded. After the bloody battle of Lundy's Lane (q.v.) on 25 July, fought between the American generals Brown and Winfield Scott and the Canadian general Sir Gordon Drummond (q.v.), the American forces, numbering about 2,000 men, under command of General Ripley (both Brown and Scott having been wounded), were forced to return to the fort, having suffered a loss of 743 men as against a British loss of 878. The American forces were shortly afterward (7-14 August) unsuccessfully attacked by Drummond, who, after an almost constant bombardment during the seven days, retired with a loss of 500 men. Brown was, however, blockaded within the

walls of the fort until September. The fort re¬ mained in possession of the Americans till 5 November, when, upon retiring from Canada, they blew up the fortifications. These were never again rebuilt. See United States — the War of 1812.

FORT ETHAN ALLEN, Vt., United States military post located near Essex Junc¬ tion, about five miles east of Burlington, occu¬ pying a reservation of 761- acres. It was estab¬ lished in March 1893, has accommodations for about 800 troops, and was designed to form a link in the chain of military posts along the northern frontier of the United States.

FORT FAIRFIELD, Me., town in Aroos¬ took County, 140 miles north of Bangor, on the Aroostook River, and on the Canadian Pacific and other railroads. It has a Carnegie library, is situated in a thriving agricultural region, noted for its production of potatoes. Pop.

(1920) 1,993.

FORT FISHER, in North Carolina, erected by the Confederates on the peninsula between Cape Fear River and the Atlantic to defend the entrance to the port of Wilmington, was one of the most formidable earthworks on the Atlantic coast and was built to withstand the heaviest artillery fire. Its parapets were 25 feet thick, with an average height of 20 feet, and mounted 44 heavy guns. At the close of 1864, when it was determined by the United States forces to reduce it and close the port of Wilmington to blockade-runners, it had a garri¬ son of 1,400 men, under command of Col. Wil¬ liam Lamb. The combined naval and army ex¬ pedition sent against it was under command of Adm. D. D. Porter and Gen. B. F. Butler.

Porter's fleet of about 150 vessels, the largest that had ever sailed under the Union flag, left Hampton Roads 13 Dec. 1864 and arrived in sight of the fort on the 20th. As a preliminary to the attack the old steamer Louisiana was loaded with 215 tons of powder which was to be exploded under the walls of the fort, with the expectation that the explosion would dis¬ mount the guns, level the works and demoralize the garrison, thus allowing the troops to land and easily take the works. At 1.40 a.m. of the 24th, without notifying Butler of the fact, when the Louisiana was within 300 yards of the beach and 400 yards of the fort, the powder was exploded, but did no damage, scarcely disturb¬ ing the slumbers of the garrison. At daylight the fleet ran in, and at 11 o'clock opened a furi¬ ous fire, which was continued several hours, doing no material damage, and was responded to with spirit and effect. On the 25th the bom¬ bardment was renewed and under cover of it Butler landed 3,000 men two miles above the fort, and was assured by Porter that the navy had so completely silenced the work that all he had to do was to march his troops into it. But Butler and Weitzel, who was in immediate command of the troops, after a careful recon¬ naissance found the fort uninjured, deemed it unadvisable to attack it, re-embarked the men and returned to James River to assist in the siege of Petersburg. Porter's fleet lost 83 men killed and wounded. The Confederates had 58 killed and wounded. The failure to take the fort produced great disappointment; it is now generally conceded that Butler and Weitzel

acted wisely in not making the attempt. A second expedition against the fort sailed 12 Jan. 1865, and on the 13th 8,000 men were landed under Gen. A. H. Terry, who had been designated to command the land forces, which, as before, were under the immediate command of General Weitzel. At 3.30 p.m. the fleet stood in and began a furious bombardment, which was continued next day, causing a loss to the garrison of 200 men, and silencing many of the guns. A combined naval and land attack was planned for the 15th, and 1,600 sailors and 400 marines were landed to co-operate with the army. The fleet opened fire at 9 a.m. and con¬ tinued it until 3 p.m., when 50 steam-whistles from the fleet gave the signal for the land as¬ sault. The naval column, armed with cut¬ lasses and pistols, charged the right flank or sea-face of the work, reached its foot, and those in advance began to climb the parapet, but the Confederates mounted on it repulsed them, and the entire body retreated in disorder with a loss of 82 killed and 269 wounded. The army was rtiore successful ; advancing on the left flank or land-face of the work, it forced a lodgment, and after a hard struggle, which was continued far into the night, carried the entire

work, capturing, as reported by General Terry, about 2,000 men, with a loss of over 900. The Confederate defense of the fort was one of the most gallant of the war, and cost them about 500 killed and wounded. The Union loss, army and navy, was 266 killed, 1,018 wounded and 57 missing. The fall of Fort Fisher closed the port of Wilmington, and was soon followed by the fall of that city. Consult (Official Rec¬ ords (Vol. XLII) ; (Naval War Records) (Vol. XI) ; Ammen, (The Atlantic Coast* ; Maclay, (History of the Navy> (Vol. II) ; The Century Company's (Battles and Leaders of the Civil War) (Vol. IV).*

FORT GAINES, Ga., city and county- seat of Clay County, 140 miles southwest of Macon, on the Central of Georgia Railroad, and on the Chattahoochee River. Cotton and fruit are the principal crops of the region. The city has brick works, fertilizer works and cot¬ tonseed oil mills. It owns the electric-lighting plant and the water-supply system. Pop. 1,237.

FORT GAINES and FORT MORGAN. Fort Gaines was a walled work on Dauphine Island, at the western entrance of Mobile Bay, and with Fort Morgan, a much larger work, on Mobile Point, nearly four miles distant, at the eastern entrance, was seized by the governor of Alabama 5 Jan. 1861. Both forts remained in Confederate possession until August 1864, at which time Fort Gaines had 30 guns. Fort Morgan was armed with over 40 guns, and had a mortar battery in front of seven heavy guns. Admiral Farragut attacked and passed both works when he ran into Mobile Bay, 5 Aug. 1864, and virtually destroyed the Confederate squadron. Gen. Gordon Granger landed troops on Dauphine Island on the 4th and began to invest Fort Gaines ; on the 6th Farragut shelled it, and on the 7th the fort and its garrison of 818 officers and men surrendered. Fort Mor¬ gan held on longer, but Granger transferred his troops from Dauphine Island to the rear of the fort, invested it, got 34 guns in position to bear on it, and on the morning of the 22d, in co-operation with Farragut's fleet, opened his

guns upon it, and kept up a continuous fire until the morning of the 23d, when the fort surrendered to Farragut.

FORT GARRY, Canada. See Winnipeg.

FORT GEORGE, Canada, a former fort on the Canadian side of the Niagara River. On 27 May 1813 it was captured by the Ameri¬ can forces under Col. Winfield Scott. On 10 Dec. 1813 the fort was evacuated by General McClure. See Fort George, Battle of.

FORT GEORGE, Battle of, 27 May 1813, in the War of 1812. The fort was near the mouth of the Niagara River, on the Canada side, nearly opposite Fort Niagara, and was garrisoned by about 1,000 British regulars

and several hundred militia under General Vin¬ cent. The American force of some 4,000 under¬ took to take it in the rear and capture the garrison ; the nominal commander was Morgan Lewis, the real one Winfield Scott. The forces were landed from the fleet under nominal com¬ mander Chauncey, the real one being Oliver Hazard Perry, and a joint attack was made. The fleet enfiladed the beach ; Scott advanced along the shore, and made a flanking move¬ ment. Vincent evacuated the fort, spiked the guns and slowly retreated, parallel to the river, beyond Queenston Mount, losing 51 killed and 305 wounded and missing, from his regulars, while most of the militia were captured. Amer¬ ican loss, 40 killed, 120 wounded. The other forts on the river were soon abandoned by the British.

FORT GRANT, Ariz., a former United States military post and reservation at the foot of Mount Graham, established in 1863 by the California volunteers as a protection against the Apaches to the southern line of travel to Cali¬ fornia. It occupies a reservation of 42,341 acres, originally called ((Camp Grant, w 26 miles from Wilcox, Ariz. In 1911 it was relinquished by the War Department and turned over to the Interior Department.

FORT GRISWOLD, Conn. See Fort Griswold, Massacre of.

FORT GRISWOLD, Massacre of, 6 Sept. 1781. Hearing of Washington's southern march, Sir Henry Clinton, as the only available diversion, sent an expedition against New Lon¬ don, Conn., where a quantity of stores was col¬ lected, with slight defense from Fort Trumbull on the New London side and Fort Griswold on the Groton side of the Thames, and which was a nest of privateers that had greatly annoyed the British. Benedict Arnold was selected to head it, as a Connecticut man ; an ugly method of sealing his new allegiance. On taking posses¬ sion of Fort Trumbull, it became evident that the American shipping would escape unless Fort Griswold were captured also; it was re¬ ported unfinished and occupied only by 20 or 30 men, and Arnold ordered an attack on it. Shortly seeing that it was stronger than he sup¬ posed, and garrisoned by those who had escaped from Fort Trumbull, and that the ships were escaping up the river, he countermanded the order, but too late. The British detachment of 600 regulars had assailed the fort, where 157 militia had gathered; and after 40 minutes' as¬ sault, with the loss of 192 men, the British car¬ ried it, and despite appeals for quarter, mas-

sacred nearly the whole garrison. Colonel Led- yard, the commander, and 70 others were killed, 60 wounded, 35 mortally, and only 26 escaped

unhurt. The British officers, however, did their best to stop the slaughter, and the atro¬ cious story formerly told of the murder of the colonel is fiction. The massacre of garrison in terrorem, to teach them not to defend un¬ tenable places, was justified by the European rules of war at the time, but had not been prac¬ tised in America. Even American officers, how¬ ever, spoke of it at the time as a regrettable but almost inevitable incident of war. Consult (The Massacre of Fort Griswold) (in (Magazine of American History, Vol. VII, 1880).*

FORT HAMILTON, N. Y., United States military post at the Narrows, on the southwest shore of Long Island, New York Bay, estab¬ lished in 1831. It is one of the principal de¬ fenses of New York city. During the Amer¬ ican Revolution the British landed here prior to the battle of Long Island, 1776.

FORT HANCOCK, a Federal military station established at Sandy Hook, N. J., in 1892, as one of the outer fortifications of New York Harbor. It is the headquarters of the coast defenses of southern New York. A prov¬ ing ground of the Ordnance Department is located here. The fort was named in memory of Winfield Scott Hancock, U. S. A.

FORT HARRISON, Battle of (including Chaffin's Farm, Fort Gilmer and New Market Heights). In the latter part of September 1864 General Grant ordered a movement against the Confederate troops north of James River, de¬ fending Richmond. Grant hoped to make Gen¬ eral Lee so weaken the garrison at Petersburg that the Union forces might carry it. The great object, however, was to prevent Lee sending reinforcements to Early in the Shenandoah Val¬ ley. September 28, during the night, General Ord crossed from the south to the north bank of the James, and on the 29th, with 4,000 men, driving before him the Confederate outposts, appeared before Fort Harrison, on Chaffin's Farm, the strongest work on the Confederate line. Birney, with 10,000 men, moved by roads farther to the right. Stannard's division, which led the advance of Ord's column, moved to the assault of Fort Harrison, under a very severe fire of artillery and musketry, and after a sharp encounter carried it with its 16 guns and nearly 300 prisoners, at a loss of over 500.

Ord being severely wounded, the command of his corps fell to General Heckman, whose division, following Stannard's, passed to the right of Fort Harrison, attacked Fort Gilmer and was repulsed with heavy losses. Mean¬ while General Birney had advanced on the New Market road, captured some of the advanced rifle-pits, running northeast from Fort Harri¬ son, and established connection with Heckman. General Grant now appeared and ordered an advance on the right. At 3 p.m. Birney made another assault upon Fort Gilmer, but was badly repulsed. Grant ordered the troops

to entrench. General Lee transferred seven brigades from his lines at Petersburg to the north side of the river, and massed 10 brigades at and near Fort Gil¬ mer to assault and retake Fort Harrison. The assault was made 2 p.m. of the 30th by Gen. R. H. Anderson, commanding Longstreet's corps, with five brigades, and was repulsed. Twice

the Confederates reformed and renewed the assault, but were repulsed, leaving a large num¬ ber of killed and wounded and seven battle- flags on the ground, and the effort to dislodge the Union troops was abandoned. The Union loss on the 29th and 30th was 383 killed, 2,299 wounded and 645-missing, an aggregate of 3,327. The loss of the Confederates is not definitely known, but it was near 2,000 in killed, wounded and missing. Consult (Official Records) (Vol. XLII) ; Humphreys, (The Virginia Campaign of 1864-65. >

FORT HENRY AND FORT DONEL¬ SON. These forts were constructed by the Confederates just south of the boundary line between Kentucky and Tennessee, the former on the right bank of the Tennessee River, the latter on the left bank of the Cumberland, the distance between the two being 12 miles. On 28 Jan. 1862 Commodore Foote and General Grant asked General Halleck's permission to take Fort Henry. Halleck assented, and on the morning of 2 February Foote's flotilla of ironclads and gunboats, followed by a fleet of transports, carrying Grant's troops left Cairo, anchoring six miles below Fort Henry on the morning of the 4th. The fort was defended by 17 heavy guns, and its land approach was covered by rifle-pits held by 3,000 men. Gen. Lloyd Tilghman was in command. About 11.20 a.m. of the 6th Foote steamed up toward the fort and attacked it with four ironclads, Tilgh¬ man, with about 90 men to work 11 guns bear¬ ing on the river, returning the fire. After a contest of an hour and a quarter Tilghman hauled down his flag and surrendered with 78 men, having lost 16 killed and wounded. The 3,000 men in the rifle-pits retreated to Fort Donelson. The fleet had 29 killed and wounded. Grant, who had landed his troops six miles be¬ low the fort, arrived too late to take part in the action.

Grant reported to Halleck that on the 8th he would take and destroy Fort Donelson. Foote, however, was compelled to return to Cairo for repairs to his fleet, and the movement was de¬ ferred until the morning of the 12th, when Grant marched across the country, with about 16,000 men, arriving before Fort Donelson in the evening. The fort was on a commanding hill, 120 feet above the level of the Cumberland, with three heavy batteries commanding the river, and a line of rifle-pits to defend the land approach. On the morning of the 13th the fort and works were held by 18,000 men, under com¬ mand of General Floyd. The rifle-pits, two and a half miles in extent, were held by General Buckner on the right and General Pillow on

the left.

Grant formed his line of investment with General McClernand on the right and General Smith on the left, and at dawn of the 13th opened a furious cannonade and sharp skir¬ mishing. In the evening Foote's flotilla and re¬ inforcements for Grant arrived — Crufts' bri¬ gade and several regiments from Fort Henry and Cairo. These were formed into a division of 10,000 men, under Gen. Lew Wallace, and put in the line between McClernand and Smith, raising Grant's force to 26,000 men. At 2 p.m. of the 14th Foote attacked the fort, and at the end of an hour and a half was compelled to withdraw, two of his ironclads being entirely

disabled and the other two partially so. He had 54 men killed and wounded. It was then concluded that Foote should return to Cairo and repair damages, while Grant should perfect his investment, fortify his lines and await the ar¬ rival of reinforcements and the return of Foote.

The Confederates shaped the course of events otherwise. They decided to break the right of Grant's investing line and escape by roads lead¬ ing to Nashville. In pursuance to the plan adopted, Pillow, on the Confederate left, sup¬ ported by a part of Buckner's command, ad¬ vanced at daybreak of the 15th, with 10,000 men, and after a hard fight gained the right of McClernand's line and forced it back. McCler- nand called for assistance and, in the absence of Grant, who had gone to confer with Foote, Lew Wallace sent Crufts' brigade to his support, but the Confederates continued to gain the advan¬ tage, pushing back McClernand's two right bri¬ gades and their supports. Buckner made an at¬ tack upon McClernand's left and was repulsed; but rallying his men, he renewed the attack, and the whole right wing of Grant's army was forced back, the Confederates still following up their advantage, when Wallace threw Thayer's brigade to the right and across their line of advance and after a sharp fight, checked them, driving some back to their entrenchments. It was 2 p.m. when Grant came on the field to find nearly half his army driven from position and the way open for Confederate escape. He ordered a counter-attack. Smith, commanding on the left, formed a brigade in column, led it under severe fire, and seized the Confederate works in his front and on the high ground sur¬ rounding the fort. Wallace and part of Mc¬ Clernand's forces, advancing on the right, gained the greater part of the ground lost early in the day, and by night the line of investment was re-established. Grant made preparations to renew the attack early next morning, but during the night the Confederate commanders came to the conclusion that escape was impos¬ sible, that

Grant was too strong to be beaten and that nothing remained but a surrender. Floyd, senior in rank, announced personal rea¬ sons against a surrender and passed the com¬ mand to Pillow, who in turn passed it to Buck¬ ner. Floyd and Pillow, with the aid of two small steamboats, succeeded in getting away with about 1,200 officers and men, principally of Floyd's old brigade, and Colonel Forrest, with some 500 cavalry and other small detach¬ ments, escaped in the night by the river road.

At an early hour of the 16th, as Grant was about to renew the attack Buckner sent him a note proposing ((the appointment of commission¬ ers to agree upon the terms of capitulation, and suggesting an armistice until 12 o'clock. Grant replied: ((No terms except unconditional and immediate surrender can be accepted. I propose to move immediately upon your works.* Buckner surrendered 14,500 men, 57 guns and a large amount of ammunition and stores. The Union loss, army and navy, was 510 killed, 2,152 wounded and 224 missing. The Confederate loss, killed and wounded, was about 2,000. The capture of Forts Henry and Donelson broke the first line of Confederate defense in the Missis¬ sippi Valley, and caused the abandonment of Columbus, Bowling Green and Nashville. Con¬ sult ˆOfficial Records> (Vol. VII) ; Force,*

(From Fort Henry to Corinth ; Swinton, deci¬ sive Battles of the War* ; The Century Com¬ pany's (Battles and Leaders of the Civil War> (Vol. I) ; Grant, (Personal Memoirs) (Vol. I).*

FORT HINDMAN, or ARKANSAS POST, Battle of. After General Sherman's failure at Chickasaw Bayou (26-31 Dec. 1862), his army and Admiral Porter's fleet returned to Milliken's Bend, where, 4 Jan. 1863, Gen. J. A. McClernand superseded Sherman in com¬ mand and moved against Fort Hindman, situated on the north bank of the Arkansas River, 50 miles from its mouth, commanding the approach to Little Rock and protecting the valley of the Arkansas. The fleet, three ironclads and six gun¬ boats, entered White River, and from it passed through a cut-off to the Arkansas, 9 January. The army of 29,000 men landed about four miles below the fort, a large square-bastioned work, on high ground, at the end of a horse¬ shoe bend in the river, mounting 18 guns, and garrisoned by about 5,000 men, under command of Gen. T. J. Churchill. A line of rifle-pits surrounded it. The ironclads began the attack on the 10th, and the entire fleet, gradually moving up, shelled the Confederates out of the rifle-pits and back into the fort. On the 11th the navy opened a furious fire upon the fort, McClernand's artillery joining in the fire from the land side. Churchill's guns were silenced, and McClernand ordered a general assault. After a severe contest the fort was carried with a loss to the Union army of 134 killed, 898 wounded and 29 missing. The naval loss was 6 killed and 25 wounded. The Confederate loss was 60 killed, about 80 wounded and

4,791 captured. On the 12th McClernand received peremptory orders from General Grant to re¬ turn to Milliken's Bend with his entire com¬ mand. The prisoners were sent to Saint Louis, the fort was dismantled and blown up and the fleet and troops went down the Arkansas to Napoleon, on the Mississippi. Consult (Official Records (Vol. XXII) ; Greene, (The Missis- sippP ; Mahan, (The Gulf and Inland Waters) ; Maclay, ˆHistory of the Navy* (Vol. II) ; The Century Company's (Battles and Leaders of the Civil War> (Vol. III).*

FORT HOLMES, Mich. See Mackinac Island.

FORT JACKSON and FORT SAINT PHILIP. Fort Jackson was built between 1824 and 1832 on the right bank of the Missis¬ sippi, about 80 miles below New Orleans. Together with Fort Saint Philip on the opposite bank, half a mile above, it defended the city from water attack. Both forts were seized by Louisiana State troops 11 Jan. 1861, were strengthened and garrisoned, and remained in Confederate possession until taken by Admiral Farragut in April 1862, at which time they were garrisoned by about 700 men each. Fort Jack- son was armed with 74 guns, Fort Saint Philip with 52. In March 1862 Farragut assembled a powerful fleet at Ship Island and at Southwest Pass, at the mouth of the Mississippi, for the capture of New Orleans, and 18 April Com¬ modore Porter, in command of a strong flotilla, opened fire upon Fort Jackson and Saint Philip. During six days he threw 16,000 shells, but was unable to reduce the forts.

It was found necessary to run past the forts and destroy the Confederate navy above before

New Orleans could be taken. On the 24th Far- ragut, with 17 vessels, in a single line, carrying 192 guns, steamed up the river, engaging both forts with heavy broadsides of shot, shell, and canister, receiving heavy fire in return. Passing the forts and obstructions, he engaged and de¬ stroyed the Confederate fleet, in one of the most spectacular naval battles of the war. Within an hour and a half after leaving its anchorage Farragut's fleet had passed the forts and destroyed 11 Confederate vessels. With 13 of his own vessels Farragut proceeded up the river, and at noon of the 25th anchored before New Orleans, which was abandoned by the Confederate troops holding it, and sur¬ rendered by the civil authorities. Porter, who had remained below, continued his bombard¬ ment of the forts, which were surrendered on the 28th. The Union loss was 37 killed and 147 wounded. The loss in the forts was 14 killed and 39 wounded ; that in the*

Confederate navy is not known. Consult The Century Company's (Battles and Leaders of the Civil War, (Vol. II) ; Mahan, (The Gulf and Inland Waters) ; Maclay, (History of the Navy* (Vol. II).*

FORT KENT, Me., village in Aroostook County, 200 miles north of Bangor, on the Fish River, and the Bangor and Aroostook Railroad. It is the seat of the Madawaska Training School and the Convent of Saint Louis. Lumbering is the principal industry. In the village are preserved relics of the Aroostook War. Pop. 3,710.

FORT LEAVENWORTH, Kan., United States military post and reservation, three miles from Leavenworth. The post was established in 1827 by Colonel Leavenworth as a protection to the old Santa Fe trail against the depreda¬ tions of the Indians. The station includes a military prison, army service schools, a post- office and telegraph office, and a garrison made up of all divisions of the service. The reserva¬ tion is located to the west of the Missouri, 500 miles above its junction with the Missis¬ sippi. It is situated on the lines of the Missouri Pacific and the Kansas City, Wyandotte and Northwestern railroads.

FORT LEE, N. J., borough in Bergen County, 15 miles north of Jersey City, across the Hudson River from New York. It has a picturesque situation on the Palisades and is a favorite residential suburb of the metropolis. The Institute of the Holy Angels is located here. Its industrial establishments are few, but the motion picture industry is important, and there are also piano actions made here. On 20 Nov. 1776 General Greene and the American forces evacuated Fort Lee, and narrowly escaped capture by 5,000 British under Corn¬ wallis. Pop. (1920') 5,761.

FORT McALLISTER, an earthwork

erected by the Confederates at Genesis Point as one of the defenses of Savannah. It was 12 miles south of the city and six miles from Ossabaw Sound. On 27 Jan. 1863 Admiral Du¬ pont attacked it with five vessels, and again on 1 .February, but without effect. On 3 March three monitors, under command of Commodore Drayton, bombarded it, but did little injury. When Sherman, marching from Atlanta, ap¬ peared before Savannah the fort prevented

communication between his army and the Union fleet, and Hazen's division of the Fifteenth corps was ordered to assault it. Hazen reached the vicinity of the fort about 11 a.m., 13 Dec. 1864, drove in the Confederate skirmishers, and at 4.15 p.m. had deployed nine regiments within 600 yards of the work. At that time the bugle sounded, and the line went forward over ex¬ ploding torpedoes and under a close and severe fire of

artillery and musketry, carrying the fort at 5 p.m. and capturing its garrison of about 250 men, 22 guns and a large amount of am¬ munition. The Union loss was 24 killed and 110 wounded. The Confederate loss was about 50 killed and wounded.

FORT McHENRY, Md., former United States military post, established in 1794. It was located on Whetstone Point, Patapsco River, about three miles from Baltimore. It was first occupied by the military in 1775 and was made a permanent fortification in 1794. In September 1814, it was bombarded by the British fleet under Admiral Cockburn but with¬ out result. (The Star Spangled Banner) was written under the inspiration of the heroic defense of the fort on this occasion. It was used as a rendezvous and military prison. See Baltimore, Md., Attack on.

FORT MACON, N. C., a work command¬ ing Beaufort Harbor, constructed of brick and stone, and mounting nearly 50 guns. It was seized by Governor Ellis, of North Carolina, about the middle of April 1861. After Burn¬ side's capture of Newbern, 14 March 1862, General Parke was sent to reduce the fort, then garrisoned by about 450 men. Parke captured Moorehead City and Beaufort, and then pro¬ ceeded to invest the fort. He cut off its com- • munications, planted 11 siege-guns, and at 5.40 a.m. 25 April, in co-operation with four vessels of the navy, opened fire, and at 4 p.m. the fort surrendered with its entire garrison. Parke occupied it next morning and it remained in Union possession until the close of the war.

FORT MADISON, Iowa, city and county- seat of Lee County, 18 miles from Burlington, on the Chicago, Burlington and Quincy and the Atchison, Topeka and Santa Fe railroads and the Mississippi River. Here is the State pen¬ itentiary and the Cattermole Memorial Library, the Santa Fe and Sacred Heart hospitals and several public parks. The Mississippi is crossed by a great railroad and street bridge here. The city's industries comprise a pork-packing-house,, railroad shops, grain elevators, brickworks,, cement-block works, foundries and machine shop, flour and saw mills, farm implement works, wrapping-paper mills, heater works and manufactures of over-gaiters, buttons, boots and shoes, furniture, canned goods, fountain pens, boxes, tools, etc. The government is vested in a mayor and council. There was a fort here as early as 1808, but was abandoned in 1832 when the town was established. Pop.

(1920) 12,066.

FORT MEADE, a Federal military station at Sturgis, S. D. It was established in 1878 during the period when Indian forays were frequent in the border country. The reserva¬ tion comprises 7.842 acres and is reached by the Fremont, Elkhorn, and Missouri Valley

Railroad. The defensive works were recon¬ structed in 1902.

FORT MEIGS, megz, Ohio, a former fort on the Maumee River, where the Ameri¬ cans made a gallant defense during the War of 1812 against the British and Indians. General Harrison constructed the fort in February 1813 and in the following May it was attacked by a force of 2,200 British and Indians under General Proctor. After a heroic defense of five days reinforcements arrived with General Clay and on 9 May General Proctor retreated. He made a second attempt to take the fort on 20 July but the defection of his Indian allies obliged him to relinquish the attack. Consult Lossing, (Pictorial Field Book of the War of 1812) (New York 1869), and Slocum, (ib. 1910). See Frenchtown, Mich.

FORT MERCER, N. J., former fort at Red Bank, on the Delaware River, that figured somewhat prominently in the Revolution as one of the defenses of the city of Philadelphia. In 1777 Sir William Howe saw that for him the capture of Fort Mercer had become im¬ perative, if he continued to occupy the city of Philadelphia, as otherwise he would be cut off by the water route from New York and would be practically in a state of siege. He made an attack, accordingly, late in October, with 2,500 Hessians who were supported by the fleet. The garrison was at length obliged to withdraw when Fort Mifflin fell. The fortifications were razed by the British. Consult Lowell, (The Hessians in the Revolutions* (New York

1884).

FORT MIFFLIN, Pa., a United States military post on Mud Island in the Delavvare River, near the mouth of the Schuylkill River. It was built in 1771 as one of the defenses for Philadelphia. It figured in numerous engage¬ ments in the Revolution. Because it shut off the British in Philadelphia from communication by water with New York, Sir William Howe decided to attack it and also Fort Mercer. On 23 Oct. 1777 it was bombarded for several hours, but with little effect by a British fleet. Finally the British erected a strong battery on Province Island and greatly reinforced their fleet. On 10 November they again attacked and after an almost constant bombardment for six days the Americans evacuated the fort and crossed over to Fort Mercer. Consult Wallace, < An Old Philadelphian, Colonel William Brad¬ ford* (Philadelphia 1884), and Dawson, bat¬ tles of the United States) (New York 1858).

FORT MIMS, Ala., Massacre of, a mas¬ sacre of whites by Creek Indians at Fort Mims, a temporary stockade, 35 miles north of Mobile, Ala., 30 Aug. '1813. When the war began there gathered within the stockade 553 persons led by Dixon Bailey. The latter was warned of an impending attack but nevertheless a great force of Indians succeeded in surprising the improvised garrison. Of 553 men, women and children only 15 whites escaped slaughter while the Indians made captive some negroes and mestizos. Consult Pickett, (History of Ala¬ bama (Charleston 1851) ; Lossing, (Field Book of the War of 1812> (New York 1869) ; and Dawson (Battles of the United States) (ib. 1858).*

FORT MONROE, Va., United States military post at Old Point Comfort, command¬ ing the entrance to Hampton Roads. It is the headquarters of the coast defenses of Chesapeake Bay. There are a post office and telegraph station at the post, which includes a reserva¬ tion of 282 acres. The station of the Artillery School (post-graduate), with quarters for 100 officers and 900 men, is located here. Jefferson Davis (q.v.) was kept a prisoner here for two years after the Civil War.

FORT MORGAN, Ala. See Fort Gaines and Fort Morgan.

FORT MOULTRIE, mdl'tri, S. C. When Major Anderson transferred his garrison from Fort Moultrie to Fort Sumter, 26 Dec. I860, he spiked and dismounted the 52 guns of the fort and burned the gun carriages. The South Caro¬ lina authorities took possession of the fort on the 27th, remounted the guns, strengthened the work, increased its armament, and it became one of the strong defenses of Charleston Har¬ bor, resisting all efforts of the Union fleet to pass it, or reduce it, and remained in Confed¬ erate possession until the evacuation of Charles¬ ton and all the forts in the harbor 17-18 Feb. 1865. See Fort Sumter; Fort Wagner. For early history see Fort Sullivan.

FORT NECESSITY. After the capture of Jumonville's force (see Great Meadows), Washington threw up earthworks and made a stockade fort, which he named as above. It soon became crowded with Indians and colonial companies, and a South Carolina company of regulars under Captain Mackay; and Washing¬ ton left the latter in command and moved 13 miles farther on, where was a small settlement. But the place was indefensible; and after sum¬ moning Mackay and his men it was decided to retreat to Fort Necessity. The next morning the French were upon them, 900 men besides Indians. Washington led out his men to battle, but the enemy kept off and fired from the woods, in a heavy rain. Washington withdrew his men behind the low, flimsy embankment ; and after an entire day of mutual firing, with heavy loss on both sides, the French proposed a parley. The English were at the last extremity, with food and ammunition

nearly exhausted, and guns in bad condition; and Washington would not consent to let them send an officer to his camp to observe this, and only yielded when they proposed to have him send one to theirs. The French terms were that the English should retire with all their baggage except artillery, agree to build no mqre forts beyond the Alle- ghanies for a year, return the Jumonville pris¬ oners and leave two officers with the French as hostages. The terms were accepted ; but had the French held out a few hours more they could have killed or captured the entire force.

FORT NIAGARA, N. Y. As earlv as 1669 La Salle built a stockade at the mouth of the Niagara River, and Fort Conti, a fortified trading post, was built here 10 years later. In 1686 it was called Fort Denonville and in 1725 it was named Fort Niagara. In July 1759 it was captured by the British and Indians under Johnson. (See Colonial Wars). Here, in 1764. Sir William Johnson made treaties with several tribes of Indians. During the struggle for independence many , expeditions started westward from this point and John Butler and

Joseph Brant at different times made their headquarters here. The British abandoned the fort in 1796 under the stipulations of the Treaty of Paris of 1783, and an American garrison took immediate possession. In the War of 1812 it was bombarded and captured by the British on 19 Dec. 1813. In 1815 it again be¬ came an American station. Becoming of no importance as a strategic point it was aban¬ doned in 1826. Consult Porter, (A Brief History of Old Fort Niagara (Niagara Falls 1896) ; Marshall, (The Niagara Frontier) (1865) ; Emerson, (The Niagara Campaign of 1759> (2d ed., ib. 1909).*

FORT NINETY-SIX, S. C. See Ninety- six.

FORT PAYNE, Ala., city and county-seat of De Kalb County, on the Alabama Great Southern Railroad, 92 miles northeast of Birm¬ ingham. It has large coal and iron industries, and also brick and cooperage plants and a hosiery mill. Pop. (1920) 2,025.

FORT OGLETHORPE, a Federal military station situated at Dodge, Ga., about 10 miles from Chattanooga, Tenn. After the entrance of the United States into the World War, in 1917, great numbers of Germans, mostly crews of the liners seized in American harbors, were interned at Fort Oglethorpe for the duration of the war.

FORT PICKENS, a strong work on Santa Rosa Island, Fla., commanding

the entrance to Pensacola harbor, and with forts Barrancas and McRee opposite, defending the harbor and United States navy yard at Warrington. Early in January 1861 it was under command of Lieut. A. J. Slemmer and practically unoccupied, Slemmer, with a small garrison, being at Fort Barrancas. Fearing that the Secessionists would seize the fort, Slemmer, 10 January, transferred to it his garrison of 81 men from Barrancas, and on the 12th the governor of Florida seized forts Barrancas and McRee, with 175 heavy guns, also the navy yard, and demanded the surrender of Fort Pickens, which was refused. A second demand was made on the 15th and a third on the 18th, both of which were refused. Slemmer strengthened the work and held it until relieved by the arrival of re¬ inforcements 12-13 April, when Col. Harvey Brown assumed command. Additional rein¬ forcements were sent, and in June a regiment of New York troops, known as Wilson's Zouaves, was landed on Santa Rosa Island and encamped. On 9 October a body of Confederate troops, that had crossed from Pensacola and landed on the island during the night, surprised the camp of the Zouaves, and drove them back toward Fort Pickens, but the Zouaves being reinforced by four companies from the fort, the Confeder¬ ates were driven in disorder to their vessels, with a loss of about 90 killed, drowned and wounded. The Union loss was 67 killed, wounded and captured. No other serious at¬ tempt was made upon the fort, which remained in the possession of the United States govern¬ ment.

FORT PILLOW, constructed by the Con¬ federates on the east bank of the Mississippi, about 40 miles above Memphis. It was bom¬ barded by the Union fleet in its descent of the river and attack upon the Confederate fleet near Memphis, abandoned by the Confederates

4 June 1862, and 5 June was occupied by a small Union force. On 12 April 1864 it was garrisoned by parts of the second and fourth (colored) United States Artillery, and a de¬ tachment of the 13th Tennessee Cavalry, in all 557 men, with six guns, under com¬ mand of Maj. L. F. Booth. At daybreak of the 12th Gen. J. R. Chalmers of For¬ rest's cavalry command appeared before the fort with about 1,500 men, and after some hours of hard fighting drove the Union troops from their advanced rifle-pits back into the fort, which was attacked, and the Confederates re¬ pulsed, but securing a sheltered position within 100 yards of it. Forrest had come up while the fighting was in progress, and at 3.30 p.m. de¬ manded the surrender of the fort, saying that he had sufficient force to take it, and would not be answerable for consequences should he be compelled to assault. Major Booth had been killed, but in his name an hour was asked for consideration. There were United States gun¬ boats in the river, and believing that the re¬ quest for an hour's consideration was to gain time for reinforcements to arrive, Forrest would give but half an hour. When the time was up the bugles sounded the charge, the as¬ sault was made, there

was a short and severe struggle, many of the garrison were killed in the fort, and those who attempted to escape by the river were shot or, rushing over the bluff into the river, drowned. More than half of the garrison were killed or wounded, a very large proportion being killed. About 160 white and 40 colored prisoners were taken. The defend¬ ers of the fort fought bravely, but were simply overpowered. Forrest says in his report : C(The river was dyed with the blood of the slaughtered for 200 yards. The approximate loss was up¬ wards of 500 killed ; but few of the officers escaped. There was in the fort a large number of citizens who had fled there to escape the conscript law. Most of them ran into the river and were drowned.® Forrest reports his own loss as 20 killed and 60 wounded. Consult ˆOfficial Records (Vol. XXXII); The Century Companv's (Battles and Leaders of the Civil War> (Vol. IV).*

FORT PLAIN, N. Y., village in Mont¬ gomery County, 35 miles southeast of Utica on the Barge Canal, and on the New York Cen¬ tral and Hudson River Railroad. It contains machine shops, furniture factories, creameries, wagon works, piano factory, condensed milk factory and silk and knitting mills. The water supply system is the property of the village. Pop. (1920) 2,747.

FORT PORTER, N. Y., United States military post on the Niagara River in the city of. Buffalo. It was established in 1867, but prior to that date the government maintained a defensive work at Black Rock.

FORT PREBLE, Me., United States mili¬ tary post, at Spring Point, in Portland Harbor, established in 1808.

FORT PULASKI, erected by the United States on Cockspur Island, for the defense of Savannah, Ga., and commanding both channels of the Savannah River. It was a brick work, with walls seven and a half feet thick and 25 feet high above water. It was seized bv Georgia State troops 3 Jan. 1861 and in January 1862 mounted 48 heavy guns and was gar-

risoned by nearly 400 men. Gen. Q. A. Gill- more was put in charge of operations to reduce it, and in February 1862 two regiments of in¬ fantry, two companies of engineers and two of artillery were landed on Tybee Island, mostly a mud-marsh, lying southeast of the fort, and soon constructed 11 batteries of 36 heavy guns, at distances from the fort varying from 1,650 to 3,400 yards. Causeways had to be constructed

across marshes, over which mor¬ tars of 17,000 pounds were moved; the work was done entirely at night ; all difficulties were overcome; and on 9 April the batteries were ready to open fire, the three breaching bat¬ teries being established at a mean distance of 1,700 yards from the fort. At sunrise of the 10th the fort was summoned to surrender; its commander, Col. C. H. Olmstead, replied that he was there ((to defend the fort, and not to surrender it.}> Fire was opened at 8 a.m., and an hour later all the batteries were in full play, the Confederates replying vigorously, the fire continuine on both sides until dark. Firing was resumed at sunrise on the 11th, and the Confederates replied steadily; but by noon sev¬ eral of the guns were dismounted; the walls of the fort began to crumble under the weight of metal; and at 2 p.m. the white flag was raised, firing ceased, and 385 officers and men were surrendered, several of whom were severely, one mortally, wounded. The Union loss was one man killed. The result of the fall of Fort Pulaski was the closing of the Savan¬ nah River to blockade runners.

FORT RILEY, Kan., United States mili¬ tary post on the Kansas River, near Junction City, Kan. It was established in 1852 on a reservation of 19,000 acres and was first called Camp Centre, being near the geographical cen¬ tre of the United States but was subsequently named after Gen. B. C. Riley, U. S. A. It is about 140 miles from Fort Leavenworth, with which place it is connected by a military road completed in 1854. An appropriation of $100,000 was made by Congress in 1855 for the extension of this road to Bridger's Pass, be¬ tween Nebraska and Utah, making it one of the finest roads in the country. The fort is the seat of the United States Cavalry and Field Artillery School and has accommodations for a large force of cavalry and infantry.

FORT ROBINSON, Neb., United States military post in the Red Cloud Agency, sit¬ uated in the western part of. Dawes County, and on a fork of the White River, about three miles southwest of Crawford. The post dates back to 1874 and occupies about 20 square miles. There are accommodations for over 500 troops, with stables for the same number of horses.

FORT ROYAL, West Indies. See Fort de France.

FORT SAINT DAVID, a ruined fortress now included within the modern municipality of Cuddalore, in the presidency of Madras, Hindustan, on the Coromandel coast, situated on the Tripapolore River about 12 miles south-southwest of Pondicherry. It was besieged by the French in 1746, but withstood the siege and finally forced the French to retire. It re¬ mained in possession of the British and was the capital of their possessions in that section of India until 1758, when the French army

under General Lally again attacked the fort, this time with success, and razed the fortifi¬ cations. Abandoned by them in 1760, it was reoccupied by the British, again captured by the. French in 1782, and successfully withstood a siege in the following year, falling perma¬ nently into British possession in 1785.

FORT SAINT PHILIP, La., a fort lying on the Mississippi River about 80 miles below New Orleans and nearly opposite Fort Jackson. The Spaniards originally built the old river front and it was not until the War of 1812 that the works were entirely enclosed by the United States government. Extensive altera¬ tions were made by the government after 1841. At the outbreak of the Civil War it was taken by the Confederates, but fell before the attack of Admiral Farragut's fleet in April 1862. See Fort Jackson and Fort Saint Philip; New Orleans, Capture of.

FORT SAM HOUSTON, hus'ton, Tex., United States military post near San Antonio, established 1865. There is a reservation here of 469 acres. It is a valuable strategic point on the Southern frontier. There is a post office at the post.

FORT SANDERS. See Knoxville, Siege of.

FORT SCHUYLER (Old), N. Y. See

Fort Stanwix ; Rome, N. Y.

FORT SCHUYLER, a Federal military, station, situated on a 52-acre reservation at Throgg's Neck, Bronx County, N. Y. It was established in 1856 and forms one of the northern defenses of New York Harbor, its guns governing the passage of the Long Island Sound.

FORT SCOTT, Kan., city and county-seat of Bourbon County, on the Marmaton River, and on the Saint Louis and S. F., the Missouri, K and T. and the Missouri P. railroads, 100 miles south of Kansas City. The chief income of the city is derived from the railroad shops, the Saint Louis and S. F. employing 500 hands and the Missouri Pacific 550 hands. The city is situated in a rich agricultural and dairy region, this in itself a valuable source of in¬ come. Besides these industries there are manu¬ factories of cement, syrup, brick, flour and ma¬ chinery. The United States census of manu¬ factures for 1914 showed within the city limits 33 industrial establishments of factory grade, employing 527 persons ; 422 being wage earn¬ ers receiving annually in wages a total of $247,000. The capital invested aggregated $892,000, and the year's product was valued at $1,580,000; of this, $496,000 was the value added by manufacture. Fort Scott is the largest horse and mule market in the State. There are three

*banks with a combined capitalization of $200,000. Among the public institutions are the library containing over 20,000 volumes, the Goodlander Home for Children, the old government fort buildings which have been preserved, the Na¬ tional cemetery and a 160-acre natural public park. Religious services are held in 11 church edifices. The educational system is excellent, con¬ sisting of a high school and seven public schools. There are two commercial colleges in the city. The city was first settled as a military post in 1844, became a municipality in 1850 and was chartered as a city of the first class in 1882**

The public administration is vested in a mayor and four commissioners who are elected every two years. The major portion of the popula¬ tion are native born, with a sprinkling of negroes, Germans, Jews and Irish. Pop.

(1920) 10,693.

FORT SHERIDAN, Ill., is 26 miles north of Chicago and 59 miles south of Mil¬ waukee, Wis., on the shore of Lake Michigan, 119 feet above the level of the lake. The oc¬ currence of the railroad riots of 1877 and the Haymarket riot in 1886 alarmed some of the business men of Chicago, who foresaw that the city might be at the mercy of any mob that found a leader. Mr. A. C. Bartlett as their representative purchased 632J4 acres in Deer¬ field township and presented it to the govern¬ ment in 1886. It was accepted by the Secretary of War, 19 Nov. 1887. Later two plots of land, one containing 84 and the other 7l acres, were added by purchase to the reservation. The buildings erected on it have cost nearly $2,000,000. It was first occupied by United States troops 8 Nov. 1887 when it was gar¬ risoned by two companies of the Sixth In¬ fantry. It was officially named, by order of the President, Fort Sheridan, 27 Feb. 1888, in honor of Lieut. Gen. Philip Henry Sheridan. It was a centre of interest in the Spanish-American War. In 1917 it was used as a Re¬ serve Officers' Training Camp for men from Illinois, Michigan and Wisconsin.

FORT SILL, Okla., a United States mili¬ tary post in Comanche County, on the Chicago, Rock Island and Pacific Railroad, 90 miles southwest of Oklahoma City. A railway station, telegraph office and post office are lo¬ cated here. The buildings of the permanent post were erected in 1869-70. The ground was staked off by Gen. Philip H. Sheridan, who named the post in honor of Gen. Joshua Sill, who was killed at the battle of Stone River, Tenn., 31 Dec. 1862. In the seventies •the post was the scene of considerable military activity and here came most of the Comanches and Kiowa Indians to surrender after the failure of their last general outbreak in 1874- 75. In the eighties, Geronimo, the Apache chief, was brought to

Fort Sill and kept there as a prisoner of war. New buildings were erected in 1909-10, and in 1917, one of the great cantonments of the new National Army was established at Fort Sill and named Camp Doni¬ phan. Consult Thoburn, J. B., (Fort SilP (in Oklahoma Home and School Herald, April

1918).

FORT SLOCUM, a Federal military sta¬ tion, 2 miles from New Rochelle, N. Y., on Long Island Sound and forming an outer de¬ fense of New York Harbor. It has a post office and telegraph station, also a recruit depot.

FORT SMITH, Ark., city and county-seat of Sebastian County, situated on the western border of the State at the junction of the Arkansas and Poteau rivers, and on the Saint Louis and San Francisco, Missouri Pacific, Kansas City Southern, Midland Valley and other railroads. The city is in a rich agri¬ cultural region and derives a greater part of its income from this source. There are also coal mines near by. The city has a wagon factory, several furniture and chair factories, a wood-working establishment, machine shops,

cotton compress and oil wells, manufactories of dry goods, drugs, leather goods and a trade in coal, corn, cotton. There are two daily and several weekly papers published. The city has eight public schools, a high school, two commercial colleges, a Catholic Girls' Academy, three parochial schools and two conservatories of music. There are 13 churches, represent¬ ing nearly all denominations. There are four banks (three national and one savings), having a combined capital of $900,000. Among the notable public buildings are the Federal and county courthouses, the United States jail and a hospital, Saint Anne's Academy, Carnegie li¬ brary, city park and an opera-house. A Na¬ tional cemetery is located on the site of the former ˆost® burying ground. Fort Smith was originally a French trading post, and in 1817 became the headquarters for the gathering and distribution of supplies for the United States army in the Southwest. It was called Belle Point by the early settlers, was incor¬ porated in 1842, and received its city charter in 1886. The city adopted the commission form of government in 1913. The city is lighted by electricity, gas and natural gas, owns its own waterworks and possesses an excellent system of electric railways. Pop. (1920) 28,870.

FORT STANWIX, N. Y., a former fort near the present site of Rome, N. Y., originally built in 1756, but abandoned, and rebuilt in 1758 by Brigadier Stanwix. Here in the fall of 1768 a treaty was negotiated by Sir William Johnson (q.v.), the British superintendent-gen¬ eral of Indian affairs in

North America, with the Six Nations, about 3,200 Indians being present. For the sum of $10,000, the Indians surrendered title to Kentucky, West Virginia and western Pennsylvania. Soon after this the fort was again abandoned, but in 1776 it was once more rebuilt and named after that intrepid old officer, Gen. Philip Schuyler. In 1777 the fort was the object of an attack by General Saint Leger with 1,700 British soldiers and allies, but the garrison held out for 19 days, from 3-22 August when they were relieved by a force of Continentals under Gen¬ eral Arnold. In 1781 the fort was destroyed by flood and fire, and when rebuilt was again named Fort Stanwix. It was here on 22 Oct. 1784 that the three United States commissioners negotiated the treaty with the Iroquois Indians, known as the ((Treaty of Fort Stanwix, }) which provided for the cession to the United States of Western lands claimed by them. Consult Sloane, W. M. (The French War and the Revolution (New York 1901).*

FORT STEDMAN, Assault on. In

March 1865 General Lee prepared to abandon Richmond and Petersburg, unite with Johnston at Danville, and attack Sherman, who was marching northward from Savannah. In order that he might wait for favorable weather, he decided on a sortie against Grant to hold him., near the Appomattox. The sortie was com- 1 mitted to General Gordon, with about one-half of the army. The point of Gordon's attack was Fort Stedman. At 4 a.m. 25 March the attack was made, and a rush of Gordon's men overcame the pickets and advance guards, took from 400 to 500 yards of the main line (Willcox's), including Fort Stedman, the de¬ fenders of which, after a spirited resistance,

FORT STEPHENSON — FORT SUMTER

were overpowered and captured, turned its artillery upon the Union line, captured between 500 and 600 prisoners, and endeavored to sweep down the intrenchments, but met with a repulse. It was so dark that friend could not be dis¬ tinguished from foe, but General Parke ordered Willcox to recapture the works, General Hart- ranft to support him. By 7.30 a.m. Parke had regained a part of the line and drawn a cordon around Fort Stedman, and Tidball's artillery had concentrated a heavy fire upon it and the line adjacent. Hartranft advanced at 7.45 a.m., attacked detachments of the enemy that were moving in the direction of City Point, captur¬ ing or driving them back, and at 8 a.m. Fort Stedman and the entire line was recaptured, to¬ gether with 1,949 prisoners and nine stands of colors, the Federal loss (Ninth corps) being 72 killed, 450 wounded and 522 missing. The Sixth corps now attacked and captured the Confederate picket-line, losing 449 killed and wounded and 30 missing; and the Second corps did the same, capturing 365 prisoners, and losing 51 killed, 462 wounded and 177 missing. The Confederates made several efforts to re¬ capture their own advanced lines but failed. The entire Union loss in this engagement was 170 killed, 1,323 wounded and 729 missing, an aggregate of 2,222. The Confederate loss is not definitely known ; General Meade estimates it at 5,000 men ; it was probably not more than 4,000, of whom one-half were prisoners. Con¬ sult (Official Records) (Vol. XiLVI) ; Hum¬ phreys, (The Virginia Campaign of 1864-65 -1 ; Walker, (History of the Second Army Corps) ; Powell, (History of the Fifth Army Corps) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. IV).

FORT STEPHENSON, Ohio. See Fre¬ mont, Ohio.

FORT STEVENS, Ore., United States military post situated in the extreme northwest¬ ern part of the State at the mouth of the Co¬ lumbia River, and on the Seattle, Spokane and Portland Railway. It is a little more than 100 miles northwest of Portland and about nine miles west of Astoria, the fur trading post, which was established by John Jacob Astor in 1811. The grounds surrounding the post which was established in 1864 comprise 1,250 acres, and, beside the quarters for the officers and artillerymen stationed there, has a post office and railroad station.

FORT SULLIVAN, S. C., the early name of Fort Moultrie, in Charleston Harbor ; notable for its defense against the British in the Rev¬ olutionary War. See Colonial Wars; Charleston, S. C, Attacks on.

FORT SUMTER, built upon a shoal in the narrowest part of the channel of Charles¬ ton Harbor, three and a half miles from the city and three-fourths

of a mile from the north end of Morris Island, was constructed on a rip-rap foundation, its walls of brick being 38 feet high and 71/ 2 feet thick. When South Carolina seceded, the fort was unfinished and not garrisoned, but men were engaged in the work and in mounting guns. South Carolina passed an ordinance of secession on 20 Dec. 1860, and the Secessionists looked to the im¬ mediate possession of all the forts in the har¬ bor, one of which, Fort Moultrie, was held by Maj. Robert Anderson, with a garrison of 75

men. Fort Moultrie was indefensible from a land attack, and Anderson, believing that he was about to be attacked, on 26 December, skilfully transferred his command to Fort Sumter, the strongest and most inaccessible work in the harbor. Governor Pickens de¬ manded Anderson's immediate return to Fort Moultrie. Anderson refused, and the gover¬ nor took possession of Fort Moultrie and all other works in the harbor, and seized the arsenal, post office and custom house in Charles¬ ton, raised the Palmetto flag over them, and thus inaugurated war against the United States. He began the construction of batteries on James, Morris and Sullivan Islands to com¬ mand the harbor and reduce Fort Sumter. On 9 Jan. 1861 the merchant steamer Star of the West endeavored to land reinforcements and provisions for Fort Sumter, but was fired upon by the Secession batteries and driven back. Again Governor Pickens demanded the sur¬ render of the fort, again Anderson refused, and negotiations were transferred to Washington. The construction of batteries continued and 1 March General Beauregard was assigned to the command of all the Confederate forces at Charleston, with instructions to perfect prep¬ arations for reducing Fort Sumter. Anderson was now in danger of being starved out and, in accordance with promise given, Governor Pickens, was informed 8 April by a special messenger sent by President Lincoln, that an attempt would be made to land provisions, and provisions only, at Fort Sumter. Beauregard notified the Confederate government, and re¬ ceived orders 10 April to demand the evacua¬ tion of the fort, and to reduce it if refused. The demand was made at noon of the 11th. Anderson refused, but made the casual remark to the messengers carrying Beauregard's de¬ mand that, if left alone, he would be starved out in a few days, and Beauregard, ((to avoid effusion of blood,® asked when he would be ready to leave the fort. Anderson said he would evacuate the fort by noon of the 15th, should he not prior to that time receive ((con- trolling instructions® from his government or <(additional supplies.® The reply was not satis¬ factory, and 3.20 a.m. of the 12th Anderson was notified that fire would be opened within an hour. At 4.30 a.m. the signal-gun was fired from Fort Johnson on James Island; all the batteries opened fire ; Anderson replied de¬ liberately; in 24 hours 2,500 shot and shell struck the fort or fell inside of it ; the bar¬ racks were burned and the fort much damaged; the relieving*

fleet could not land; and on the afternoon of the 13th terms were arranged under which, on the afternoon of the 14th, An¬ derson saluted his flag and, with drums beating and colors flying, marched with his garrison out of the fort, was conveyed to a steamer and sailed for New York. During the bom¬ bardment not a man was killed on either side.

When Fort Sumter fell into Confederate possession it had 78 serviceable guns. Addi¬ tional guns were mounted in it and it was well garrisoned. The Union authorities sunk a number of old whalers filled with stones in the main channel of Charleston Harbor to close the port to blockade-runners, and a blockading force was maintained off the harbor; but it was not until 7 April 1863 that any serious operation was attempted against the fort. Then

Dupont, with nine ironclads, made an un¬ successful attack upon it. One of the ironclads, the Keokuk, which had approached nearest to the fort, was struck 90 times, and so much in¬ jured that she sunk off Morris Island, and her armament fell into the hands of the enemy, while the others withdrew after an engage¬ ment of 40 minutes, most of them disabled by the fire of the 69 heavy guns brought to bear upon them. The fleet fired 151 shots, not more than 34 of which struck the walls of the fort. Sumter discharged 810 shot, Fort Moultrie and other batteries 1,399, in all 2,209, of which 520 struck the different vessels. It had been expected that the fort would be re¬ duced to a pile of ruins before the sun went down, but the result convinced the Union au¬ thorities that the fort and adjoining works could not be reduced by a purely naval attack.

It was now determined that Fort Sumter and Charleston should be taken by combined land and naval attacks, the land attack being by the way of Morris Island, the capture of the batteries there and the establishment of bat¬ teries to reduce Fort Sumter. For this pur¬ pose General Gillmore was selected. He landed on Morris Island 10 July, made two unsuccess¬ ful assaults on Fort Wagner, 11 and 18 July, and then concluded to attempt the destruction of Sumter from ground already in his posses¬ sion, so that the fleet could enter the harbor and command Charleston. (See Fort Wagner). A sufficient number of breaching-guns were in readiness 16 August ; fire was opened on the 17th, and on the 24th Gillmore reported the practical demolition of the fort. From 18 guns he had thrown 5,009 projectiles, weighing 552,- 683 pounds, of which 4,147 struck the fort. Before daylight 23 August five monitors ap¬ proached to within about 800 yards of the fort and opened fire, which was kept up until 6 a.m.

Confederate officers now held a council, and the proposition was offered to abandon the fort, but as a matter of sentiment it was re¬ solved to hold \t. On 30 August Gillmore re¬ sumed fire, dismounting the remaining barbette guns and leaving but one casemate gun serv¬ iceable. As a means of defense against the fleet the fort was entirely useless, and it was held merely as an infantry outpost. On 2 Sep¬ tember six monitors opened fire on it, but it remained silent, not a single gun being in work¬ ing order to reply. Early on the morning of 7 September, after the abandonment of Fort Wagner, Admiral Dahlgren demanded the sur¬ render of Fort Sumter, which was refused. Meantime the Confederates were removing the guns from the fort and placing them in other parts of the harbor. During the night of 8 September a naval force of about 400 men, under Commander F. H. Stevens, attempted to carry the fort by assault. It was then de¬ fended by about 450 men, under command of Maj. Stephen Elliott, Jr. Stevens' men were in boats, and when towed within 800 yards of the fort the boats were cut loose and rowed for the fort, on approaching which they were met with a fire of musketry; as the men landed, hand-grenades and shells were thrown upon them; and simultaneously, at a signal from the fort, all the Confederate batteries on James and Sullivan Islands, with one of their gun¬ boats, opened fire, and the attack was repulsed, all who had landed being killed or taken pris¬

oners. The reported loss was 4 killed, 19 wounded and 102 captured. On 26 October Gillmore again opened fire with his heavy guns from forts Wagner and Gregg, aided by the cross-fire of 150-pound rifles on board the fleet, which completed the ruin of the fort, and all aggressive operations for the season against Charleston ended, although a desultory fire was kept up against Sumter during November and December to prevent the remounting of the guns. The casualties in the fort from 12 Aug. to 11 Dec. 1863 were 43 killed and 165 wounded. From a tabular statement prepared by an officer in the fort it appears that from 12 Aug. to 31 Dec. 1863, 26,867 shot were fired at it, 19,808 falling against or into it. On the approach of Sherman's army the fort was evacuated 17 Feb. 1865, and 14 April following the same flag that Anderson lowered in 1861 was raised over it with imposing ceremonies. Consult (Official Records) (Vols. I, XXVIII) ; Doubleday, (Reminiscences of Forts Sumter and Moultrie) ; Crawford, (Genesis of the Civil War) ; Gillmore, (Engineer and Military Opera¬ tions Against Charleston in 1863) ; The Cen¬ tury Company's (Battles and Leaders of the Civil War} (Vols. I and IV) ; (Naval War Records) (Vol. XIV).

E. A. Carman.

FORT TOTTEN, N. Y., United States military post, established in 1862 at Willett's Point, on Long Island Sound, near W'hitestone, and strategically

placed at the western end of Long Island Sound. The School of Sub¬ marine Defense and the torpedo supply depots are situated here. The fort guards the north¬ ern entrance to New York Harbor. The entire military reservation here has an area of 136 acres.

FORT VALLEY, Ga., city of Houston County, on the Central of Georgia and the Southern railroads, 28 miles south of Macon. It has cotton gins, cotton and yarn mills and a crate factory. The city owns the water supply system and electric-lighting plant. Pop. 3,223.

FORT WADSWORTH, N. Y., United States military post on Staten Island, at The Narrows, in New York Bay. It was established in 1827, and was first called Fort Richmond. The post office is Rosebank, N. Y., and the tele¬ graph station is Quarantine, Clifton, S. I. It was named for Gen. J. S. Wadsworth, who was killed in the battle of the Wilderness in

1864.

FORT WAGNER, a work constructed by the Confederates near the north end of Morris Island, a low, narrow, sandy strip of land, about three and a half miles in length, on the south side of Charleston Harbor. It was 2,600 yards directly south of Fort Sumter, to which it was an outpost, and was constructed to hold and control all that portion of the island upon which effective breaching-batteries against Fort Sum¬ ter could be established. On the northern end of the island was Fort Gregg, and the southern end was held by a small force of infantry and artillery. Preparatory to a combined naval and land attack on Fort Sumter and Charleston, it was determined to reduce Fort Wagner and take possession of the entire length of Morris Island, and General Gillmore, an engineer of¬ ficer of skill, was selected to command the land

forces. On 10 July 1863, Gillmore, who had concentrated 6,500 men and secretly placed 47 siege guns and field guns in position on the ex¬ treme northern end of Folly Island, attacked the Confederate position on the south end of Morris Island, effected a landing, carried the Confederate batteries of 11 guns and by 9 a.m. occupied three-fourths of the island and pushed his skirmishers to within 600 yards of Fort Wagner. The navy assisted with four ironclads. At daylight of the 11th an attempt was made to carry the fort by assault, which failed, with a Union loss of 172 killed and wounded, and 119 taken prisoners, of whom 40 were wounded. The Confederate loss was 12 killed and wounded. After this failure counter¬

batteries were established against the fort, and it was determined to attempt, with the aid of the ironclads, to dismount its guns, and either drive the Confederates from it, or open the way to a successful assault. The navy kept up an almost incessant fire upon it, and the land bat¬ teries were established at distances ranging from 1,330 to 1,920 yards of it. Soon after midday of the 18th the navy and 41 light guns and siege- mortars opened a furious fire upon the fort, which was continued until nearly all its guns were silenced and its defenders driven into bomb-proofs, when about sunset, after 900 shot and shell had been discharged, Gen. G. C. Strong's brigade of six small regiments, sup¬ ported by Col. H. S. Putnam's brigade of four regiments, made an assault. As the head of the column left the trenches the guns of forts Wag¬ ner, Gregg and Sumter opened on it, and as it neared Fort Wagner the Confederates mounted the parapet and poured in such a destructive fire of musketry that the leading brigade was repulsed; but the supporting brigade gained a foothold, which it kept for over an hour, when it was driven back. The Union loss in this sec¬ ond assault was 1,128 killed and wounded, and 389 missing; among the killed or mortally wounded being General Strong and Colonel Putname, John L. Chatfield, and Robert G. Shaw (q.v.). The Confederate loss was 56 killed and

133 wounded. _ .

Gillmore now turned his attention to Fort Sumter (q.v.), which, with the aid of the navy, was, by 23 August, reduced to a shapeless mass with almost every gun dismounted or silenced. Meanwhile regular approaches were made against Fort Wagner, thousands of heavy shells were thrown against and into it, and by 26 August the trenches were within 250 yards of it, the intervening space being a flat ridge of sand, scarcely 25 yards wide, and for a great part planted with torpedoes. The Confederates were driven from position behind this flat ridge and the approaches continued until within a few yards of the fort, when the heavy guns of the army and navy opened on it. Final operations were inaugurated 5 September at daylight, and in 42 consecutive hours 17 siege guns dis¬ charged 1,411 shells at the work, 1,247 of which struck it, the ironclad New Ironsides joined in the attack, the fort was silenced, over 100 of the garrison killed and wounded, and an assault was ordered for the 7th. When morning came the fort had been abandoned and its garrison, with that of Fort Gregg, had escaped, leaving the entire island with the 25 guns of the two works in Union possession. The Union loss on Morris Island (10 July-7 September) was 381 killed,

1,372 wounded and 565 missing, an aggregate of 2,318; the Confederate loss was 157 killed, 674 wounded and 238 missing, an aggregate of 1,069. Consult (Official Records (Vol. XXVIII) ; Gillmore, (Engineer and*

Artillery Operations Against Charleston, 1863 ; The Century Com¬ pany's (Battles and Leaders of the Civil War* (Vol. IV).*

E. A. Carman.

FORT WALLA WALLA, Wash., United States military post, established in 1857, at Walla Walla.

FORT WARREN, Mass., United States military post on Georges Island, near Boston, established in 1837. During the Civil War it was used as a military prison. It is the head¬ quarters for the coast artillery district of Boston.

FORT WASHINGTON, Md., United States military post on the Potomac River, near Washington, D. C. It was established in 1815 as Fort Warburton. It comprises a reservation of 334 acres.

FORT WASHINGTON, N. Y., the site of a former fort at 182d street, New York city, overlooking the Hudson River. After the battles of Kip's Bay and Harlem Heights (qq.v.), Washington retreated to White Plains (q.v.) where a battle was fought 28 Oct. 1776. A council of war had decided to garrison and de¬ fend Fort Washington, it being supposed that, if compelled to evacuate, the garrison could cross the river into Jersey. Having sent part of his troops in pursuit of Washington, Howe invested Fort Washington, then defended by 3,000 men under Col. Robert Magaw. The as¬ sault occurred 16 Nov. 1776 but so intrepid was the defense that the British and Hessians lost 400 before the outworks were taken. How¬ ever, when the British had come within 100 yards of the fort, Magaw could not persuade his men to face the withering fire and accord¬ ingly surrendered his remaining 2,700 troops, 2,800 muskets, 400,000 cartridges, 161 cannon and other stores. Washington then began his retreat through the Jerseys, fighting battles at Trenton and Princeton (qq.v.). Consult De- Lancey, (The Capture of Fort Washington (in Magazine of American History, February 1877) ; Lowell, (Hessians in the Revolution* (pp. 78-84) ; Gordon, (American Revolution* (Vol. II, p. 348) ; Jones, (New York in the Revolution* (Vol. I, p. 626) ; Stedman, Amer¬ ican War* (Vol. I, p. 217) ; Lossing, (Field- Book of the Revolution* (Vol. II, pp. 619-621) ; Force, American Archives* (5th series, Vol. Ill) ; Wiley and Rines, (The United States* (Vol. II, pp. 455-459) ; and biographies of Washington, Greene, Knox, etc.*

FORT WAYNE, Ind., city and county- seat of Allen County, situated in the north¬ eastern part of the State, 102 miles northeast of Indianapolis, upon the Saint Joseph, Saint Mary's and Maumee Rivers, confluence of the first two within the city's limits forming the last named. It is notable as a railway centre, the following lines passing through or termi¬ nating there:

*Pittsburgh, Fort Wayne and Chicago, of the Pennsylvania Railway system; Wabash; New York, Chicago and Saint Louis; Grand Rapids and Indiana; Cincinnati, Rich¬ mond and Fort Wayne; Lake Shore and Michi**

gan Southern; Fort Wayne, Cincinnati and Louisville ; Cincinnati, Hamilton and Dayton. The city is central in a rich and highly de¬ veloped agricultural region that produces abun¬ dant crops of the cereals of temperate climates. Considerable tracts of hardwood timber yet re¬ main in what was once one of the most richly wooded sections of the Northwest. These cover a wide range and embrace numerous establishments of large magnitude including shops of the Pennsylvania and Wabash rail¬ roads. In the various industries 13,416 persons were engaged in 1914. The capital invested in 1914 in 228 establishments was $31,167,000; the cost of the materials used in the same year was $14,148,000. The salaries – and wages amounted to $8,935,000 in the same period. The manufactures include car-wheels, Corliss and other steam engines, boilers, gas engines, gas machinery, iron and steel bars, freight and passenger cars, locomotives, electrical machin¬ ery and electrical fittings and fixtures, hosiery, gloves, caps, oil tanks, organs and pianos, wom¬ en's garments, road construction machinery, carriages, wagons, washing machines, furniture, paper boxes, lumber, sash, doors, malt liquors, cigars, harness and leather findings and a con¬ siderable variety otherwise of products in iron and steel, wood and textile fabrics. The value of the manufactured products was $30,205,000 in 1914, an increase of 30.8 per cent over 1909. The municipality owns and operates the public waterworks system, an abundant supply of pure •water being poured from wells bored deeply into the rock, and distributed by means of three thoroughly equipped pumping stations. There is a handsome and substantial city hall and police headquarters and eight modern and thor¬ oughly equipped houses advantageously situated shelter the city fire department.

The public buildings in the city are a court¬ house (county), completed in 1902 at a cost of $1,000,000; United States post office and court¬ house; a public library erected at a cost of $100,000 through a donation of Mr. Andrew Carnegie; county jail; high school and manual training school building, completed in 1904 at a cost of $300,000, and 15 grammar and ward school buildings, most of which are of very modern construction and beautiful architecture. The free-school system maintained by the city embraces a high school and manual training school, a training school for teachers and 15 ward and grammar schools, together with kindergarten departments. The free-school system is governed by a board of three

trustees, elected triennially by the city council, the im¬ mediate executive head of the schools being a superintendent elected by the board. There are six Roman Catholic parish schools in addi¬ tion to a high school for boys and an academy for girls; and six German Lutheran parochial schools. Concordia College, founded in 1850, is seated in Fort Wayne and is maintained under auspices of the German Lutheran Church. Near the city is an academy main¬ tained under auspices of Catholic sisters, an academy for the higher education of young women. Among other institutions of learning are a college of medicine and surgery, a con¬ servatory of music, a school of art, two busi¬ ness colleges and a school of oratory, expres¬ sion and physical culture. There are 47 re¬

ligious congregations and 40 church edifices, many of them beautiful and costly examples of ecclesiastical architecture. The congrega¬ tions are distributed denominationally as fol¬ lows: Baptist, two; Christian, three; Congrega¬ tional, two; Episcopal, two; Evangelical Asso¬ ciation, one; Evangelical Lutheran (English), three; Evangelical Lutheran (German), four; German Lutheran, three ; Methodist Episcopal, five; Free Methodist, one; African Methodist Episcopal, one; Presbyterian, four; United Presbyterian, one; Reformed (German), two; Roman Catholic, seven; United Brethren, one; Baptist Brethren, one; Christian Science, two. The city is the see of the Catholic diocese of Fort Wayne. The city has a central charities organization and many of the religious con¬ gregations maintain comprehensive societies for charitable and benevolent work. There are four large hospitals of modern equipment, one non-sectarian, two under Roman Catholic and one under German Lutheran administration. There are three orphan asylums, two sectarian and one maintained by the county; home for emergencies and a refuge for women. Just beyond the city limits is the State School and Home for Feeble-Minded Youth of both sexes and Home for Epileptic Women. The city has many national and private banks, trust companies and building and loan associations. Its banks represent a capitalization of about $5,000,000. The total public park acreage of the city is 95.49, distributed as follows : Swinney, 45.24; Lawton, 31.20; Reservoir, 13; McCulloch, 4; Hayden, 1.12; Piqua, .75; Old Fort (site of stockade built by General Anthony Wayne in 1794), .18. There are five cemeteries: Achduth Weshalom (Hebrew), Concordia (German Lutheran), Saint John's (German Lutheran), New Catholic (Roman Catholic), and Lindenwood (non-denomina- tional). The city is governed under a special charter, conferred by the State legislature, which provides for a municipal legislative body of one councilman from each of the 10 wards and five at large, chosen biennially, a mayor and city clerk, chosen quadriennially, and a board of waterworks trustees, chosen biennially. The board of public works, board of public safety, health commissioner and park and street superintendents and city attorney and city comptroller are appointed by the

mayor. Council fixes all municipal tax levies and ap¬ propriations and has final approval of all con¬ tracts and franchises. Fort Wayne is an im¬ portant and flourishing trade centre and has a commerce that embraces extensive wholesale and jobbing operations in dry goods, groceries, light and heavy hardware, drugs, millinery, paper, etc. The total volume of wholesale trade has a value of about $10,000,000. The total post office receipts are about $200,000 annually. The city takes its name from a fort built on a part of the present site of the city by Gen. Anthony Wayne in 1794. The place, however, had a history that long antedated this. There is evidence that LaSalle had visi¬ ted the locality as early as 1670. It was the site of Ke-ki-on-ga, the (

an expedition against the Miami city, but was signally defeated in a fierce engagement on the Maumee River within what is now the limits of the city of Fort Wayne. In 1791 General St. Clair in a similar expedition was over¬ whelmed a short distance southeast of Fort Wayne by the Indians under the famous Miami chief, Little Turtle. General Wayne in 1794 headed a third expedition against the Indians in the Northwest and after utterly defeating them at the battle of Fallen Timbers on the Lower Maumee in northwestern Ohio marched to Ke-ki-on-ga and in September of that year built his stockade on an eminence overlooking the confluence of the Saint Joseph and Saint Mary's rivers. There was no further serious trouble with the Indians until August 1812, when the conspiracy of Tecumseh and his brother The Prophet ensued in' a close invest¬ ment of Fort Wayne and its meagre garrison. The siege was vigorously pressed for about two weeks, when it was raised by a force that had been dispatched to relief of the beleaguered garrison. Fort Wayne at once assumed im¬ portance as a trading post and in 1825 the town itself was laid out. In 1840 Fort Wayne took rank as a city. Between 1850 and 1860 began the era of railroads, when growth received fresh and powerful impetus and Fort Wayne came to be one of the foremost industrial and commercial cities of the State. Pop. (1910) 63,933; (1920) 86,549. Consult Dillon, J. B., (History of Indiana) (Indianapolis 1859) ; Smith, (History of Indiana) (2 vols., Indian¬ apolis 1893) ; and Levering, (Historic Indiana) (New York 1909).

Charles L. Biederwolf, Secretary of The Commercial Club of Fort Wayne.

FORT WILLIAM, Canada, city in the district of Thunder Bay, Ontario, at the head of lake navigation on Lake Superior. It is on the Canadian Pacific, Canadian Northern, Grand Trunk Pacific and Mount McKay and

Kakabeka Falls railways. Ogilvie's flour mills, with a capacity of 15,000 barrels daily, are located here and the city has important hard¬ ware and stove manufactures, foundries, brick¬ yards, shipbuilding and car works, sash and door factories, starch works, etc. Value of manufactured products $534,097 in 1910 and rapidly growing. Traffic, both by railways and the lake steamers, is active ; there is good water power and the harbor is excellent. Noteworthy public buildings are the city hall, public library, two hospitals, courthouse, collegiate institute, etc. Grain elevators numbered 17 in 1914, wifti a capacity of 27,401,000 bushels. Lumbering is an important industry. Tramway (26 miles), telephone and electric light services and water¬ works are owned by the city. Founded by fur traders in the early years of the last cen¬ tury, Fort William became a town in 1887 and a city in 1907. The government is vested in a mayor and a council of eight members, elected annually. The population numbered 16,499 in 1911, showing an increase of nearly 13,000 in a decade.

FORT WILLIAM HENRY, a fort

erected in 1755 at the head of Lake George, on the site of the present town of Caldwell, N. Y. It was a starting point for expeditions against the French during the French and In- vol 11 — 33

dian War. In 1757 it was attacked by Rigaud and later in the same year the English garrison surrendered to Montcalm who permitted it to march to Fort Edward escorted by some French regulars. On the march the party was set upon by hostile Indians and many were slain and about 200 carried into captivity. Consult Park- man, (Montcalm and Wolf) (3 vols., Boston 1906) ; and Sloane, W. M., (The French War and the Revolution } (New York 1901).

FORT WORTH, Tex., city and county- seat of Tarrant County, 175 miles northeast of Austin, on the Trinity River, and Texas and Pacific, Santa Fe, Frisco, Trinity and Brazos Valley, Rock Island, Cotton Belt, Houston and Texas Central, Fort Worth and Denver City, International and Great Northern, Missouri, Oklahoma and Gulf and Missouri, Kansas and Texas railroads. Fort Worth is an important railroad centre and handles more than five times the number of freight cars yearly than any other city of North Texas. During 1915, 1,136,201 freight cars were inspected through the local yards and a large proportion of these stopped to receive and discharge freight. At the present time there are approximately 4,000 railroad men who receive their pay in Fort Worth. With an average of four to a family this would give about 16,000 people dependent on the railroads for support. Its importance as a railroad centre has been recognized by 1 1 large grain companies who have built ele¬ vators there, having a daily capacity of 1,198,- 000 bushels, and a storage capacity of bulk grain of

2,120,000 bushels. There are also eight warehouses with a capacity of 275,000 sacks. Seventy-five per cent of the traffic of Texas passes through Fort Worth, and each day 174 package cars leave the city to supply quick and efficient service to the out of town merchants.

Fort Worth is also an important banking centre and seems likely to become the greatest west of the Mississippi and south of Kansas City for the reason that it is located in the heart of a great farming and stock raising country. It is the live-stock market for the Southwest. Stockmen realize $250,000 in Fort Worth daily. It is also a fruit and produce centre, and has the asset of good roads and Tarrant County is building more. These roads connect with avenues of traffic leading into surrounding counties. It received more than $5,000,000 for horses and mules sold in the live¬ stock market to the warring nations in the first six months of 1916. Its building permits have increased substantially in the same period. An extensive trade js carried on in hogs, sheep and cattle, cotton oil, grain, fruit and produce. The industrial establishments include stock- yards whose daily capacity is about 27,500 head, large packing-houses, grain elevators, flour, cornmeal and stock-feed mills, breweries, roll¬ ing mills, railroad repair shops, foundries and machine shops, cotton and oil mills, tin silo plants and manufactories of clothing, furniture, chemicals, candy, wagons and carriages, etc. The United States census of manufactures for 1914 showed within the city limits 180 industrial establishments of factory grade, employing 3,044 persons: 2,308 being wage-earners, re¬ ceiving annually a total of $1,542,000 in wages. The capital invested aggregated $8,595,000, and

the year's output was valued at $9,974,000; of this $4,142,000 was the value added by manu¬ facture. The deposits for the largest banks and financial institutions as shown by the last report, compared with those of 1914, ale in total as follows: 1914, $16,142,998; 1915, $25,395,000. The business transacted through the clearing¬ house averages about $1,250,000 a day. The an¬ nual bank clearings of Fort Worth clearly indi¬ cate the high volume of the manufacturing and jobbing business conducted in this city. In 1915 the bank clearings totaled $435,289,425.17.

The schools and colleges of Fort Worth are among the best in the Southwest. One univer¬ sity; two colleges, nine private and preparatory schools and four business colleges augment the public school system. Aside from 18 buildings used for public school students, Fort Worth has two high schools for whites and one for negroes. The scholastic census for 1915 was

almost 14,000. In the denominational institu¬ tions are represented Christian, Methodist, Bap¬ tist, Catholic and Episcopal. These schools have been progressive in recent years and their at¬ tendance is increasing. It contains a Carnegie library, Court of Civil Appeals Law library and the Medical College medical library. Fort Worth has 31 parks consisting of 433 acres, 216 miles of paved streets, and Tarrant County has 650 miles of improved roads. Fort Worth has a large and modern electric power plant with a capital of $3,680,000 supplying current to neighboring towns and cities to the extent of 100 miles, and owns a large reservoir with a capacity of 30,000,000,000 gallons, covering an area of 6,000 acres, offering cheap water for all purposes. Founded as a military post by Maj. R. D. Arnold in 1849, Fort Worth became the county-seat in 1860 and was first incorporated in

1873. The commission form of government was adopted in 1907. Pop. (1880) 6,663; (1910)

73,312; (1920) 106,482.

G. G. Gumm,

Secretary, Chamber of Commerce.

FORT YELLOWSTONE, a Federal mili¬ tary station, established as Camp Sheridan in

1874, located on a 28-acre reservation, on Beaver Creek, in the Yellowstone National Park. It is reached by the lines of the Northern Pacific Railroad, and is about five miles distant from Gardiner. Mammoth Hot Springs is the nearest telegraph station. The duty of the gar¬ rison is to enforce the regulations of the govern¬ ment in regard to camping, wood-cutting, etc., in the park and to protect travelers.

FORT YUKON, an old trading-post sit¬ uated at the great bend of the Yukon River and within the Arctic Circle. A native school here is in receipt of government aid.

FORTALEZA, or CEARA, Brazil, city, port and capital of the state of Ceara, seven miles from the mouth of the Ceara River on an open plain overlooking the sea. It is regularly laid out, and has broad, well-paved streets arid numerous squares. It is connected by rail with fertile inland regions. The temperature is mod¬ ified by strong sea winds. It contains a gov¬ ernment house, legislative chambers, bishop's palace, a lyceum, hospital and asylums. The port is the principal outlet for the products of the state, but the harbor is an open roadstead. Improvements are under way to make it safer

for sea-going vessels. Sugar, coffee, rubber, cotton, rum, rice, beans, hides and skins are the principal exports. Fortaleza originated in a small village which grew up around a fort estab¬ lished here in colonial times. In 1654 it be¬ came known as Villa do Forte da Assumpgao. In 1810 it was made the capital of Ceara and in 1823 received its charter as a city. Pop.

45,000.

FORTE (Ital. loud), in music, the term for loud usually designated on the scores by /. Fortissimo, very loud, is designated by ff.

FORTESCUE, Sir John, English jurist: b. Norris, Somersetshire, about 1394; d. about 1476. He was educated at Exeter College, Ox¬ ford. In 1441 he was made king's sergeant at law and in the following year chief justice of the King's Bench. He was a favorite with Henry VI, to whom he remained most loyal and whom he served most efficiently. He was at¬ tainted of treason in the first Parliament of Edward IV. In 1463 he accompanied Queen Margaret into exile and afterward returned with her to England. While on the Continent he wrote for young Prince Edward the cele¬ brated work (De Laudibus legum Angliae. He made his submission to Edward IV, and from him received a general pardon. In 1714 was published Fortescue's (The Difference between an Absolute and a Limited Monarchy.'* In a revised version it appeared in 1885 under the title of (The Governance of England. > Con¬ sult Foss, (Lives of the Judges) (1870).*

FORTESCUE, Sir John, English states¬ man: b. about 1531; d. 23 Dec. 1607. He was a distant relative of Queen Elizabeth; his father was executed in 1539, but the son was restored to his title and estate in 1551. During the reign of Mary he was instructor to the Princess Elizabeth, on whose accession he was appointed keeper of the great wardrobe. In 1572 he en¬ tered Parliament and in 1589 was made Chan¬ cellor of the Exchequer, in 1592 he was knighted and in 1601 was made chancellor of the Duchy of Lancaster. James I deprived him of the chancellorship of the exchequer, but he re¬ mained in favor with the king. He was a can¬ didate for Buckinghamshire in 1604, in an elec¬ tion declared void by the Lord Chancellor on the ground of a sentence of outlawry under which Fortescue's opponent lay. He served with unswerving honesty and fidelity and was also noted as a scholar.

FORTH, forth, a river of Scotland, rising on the east side of Ben Lomond, in Sterling- shire.

FORTH BRIDGE. .See Bridge.

FORTIER, Alcee, American educator and author: b. Saint James Parish, La., 5 June 1856; d. 1914. He received his education at the Uni¬ versity of Virginia and at Paris. He held the posts successively of teacher in the high school, New Orleans, and principal of the preparatory department of the University of Louisiana. In 1883 he became professor of French at the University of Louisiana, was re-elected to this post, when the university became Tulane Uni¬ versity. In 1894 he was made professor of Romance languages and in 1913 was made dean of the graduate department. For many years he was a member of the Louisiana State Board of Education and was president of the Catholic

Winter School of America in 1897-1902. He also served terms as president of the American Folklore Society, the Modern Language Asso¬ ciation and the Alliance Franqaise, and was a chevalier of the Legion of Honor. He pub¬ lished 'Gabriel d'Ennerich) (1886); (Bits of Louisiana Folk-Lore) (1888) ; 'Sept grands auteurs du XIXe siecle> (1889) ; 'Histoire de la litterature frangaise) (1893) ; Louisiana Studies > (1894); 'Louisiana Folk-Tales>

(1894) ; 'Voyage en Europe) (1895) ; 'Precis de l'histoire de France> (1899) ; 'History of Louisiana (4 vols., 1904) ; 'History of Mex- ico) (1907) ; 'Cyclopedia of Louisiana His- tory) (1909). He edited various French texts and was a contributor to the 'Catholic Ency¬ clopedia. J*

FORTIFICATIONS. From the remotest civilization the art of fortification, in some guise or another, has been in practice by all nations and its character has been more or less influenced not only by the natural features of the country, but by the political and social conditions of its inhabitants. In its earliest applications, we find men resorting to one or more simple enclosures of earthen walls; or of these surmounted by stakes placed in juxta¬ position ; or of stakes alone firmly planted in the ground, with a strong wattling between them. A resort of such feeble means shows not only a very low state of this branch of the military art, but also of that of the attack. This class of fortifications for the defense of entire frontiers was mostly em¬ ployed in the east of Europe and was at the time found to be a sufficient protection against those nomadic tribes that for ages roamed over its vast plains. The next obvious and necessary step was to form walls either of rough blocks of stone, or of these interlaced with the trunks of heavy trees. Obstructions of this kind could be used only to a limited extent, and were confined to the defenses of places forming the early centres of population. As human inven¬ tion was developed, these, in turn,

were found to present no serious obstacle to an assault by escalade; giving to the assailed only temporary advantage of a more commanding position, and they gave place to walls of dressed stone or brick, whose height and perpendicular face alike bade defiance to individual attempts to climb them, or the combined effort of an escalade. These formidable defenses, with flanking towers, were in their time found to be insuffi¬ cient against the ingenuity and skill of the as¬ sailant, who, by means of covered galleries of timber, sometimes above ground and sometimes beneath, gradually won his way to the foot of the wall, where, by breaking his way through it, he removed the sole obstruction to a bodily collision with the assailed. Changes in the attack led to new modifications in the defense, which consisted in surrounding the place by wide and deep ditches, of which the walls formed the scarp, the counterscarp being either of earth or revetted. The gigantic pro¬ file often given to the fortifications of antiquity seems almost incredible, as well as their ex¬ tent. In many cases a double wall of stone or brick was filled in between with earth, form¬ ing a wide rampart upon which several vehicles could go abreast. The wall built by the Romans between Carlisle and Newcastle to restrain the

incursions of the Piets into the southern por¬ tions of the island was 16 miles in extent, about 12 feet in height, and 9 feet in thick¬ ness. The dimensions and extent of this work sink almost into insignificance when compared with those of the celebrated wall of China, built to restrain the incursions of the Tartars. This structure was about 1,500 English miles in length, having a height of 27 feet and a thick¬ ness at top of 14 feet. The mode of attack of fortified places resorted to by the ancients was reduced to settled rules, and brought to the highest state of perfection by the Greeks, about the time of Alexander the Great and the immediate successors to his conquests. An essential feature in it, whether in the sieges of inland fortresses or those on the seaboard, was to cut off all communication between the place and the exterior by hemming it in by sea and land with stationary forces, covering themselves by lines of entrenchments strengthened by towers, and, in the case of seacoast places, also by fleets, from assaults both from with¬ out and from the place invested. The Romans evinced their decided military aptitude not only in the employment of the ordinary systematic methods of the attack and defense of fortified places, but in their application of the cardinal principle of mutual defensive relations be¬ tween the parts of a fortified position, obtained by advanced and retired portions of the en¬ ceinte, and also in the adaptation of entrench¬ ments to the natural features of the site.

With the invention of gunpowder and its application to military purposes, a gradual revolution took place in the general forms and details of fortification. Naked walls alone did not offer either suitable conveniences for the new military machines, or sufficient protection against the

projectiles thrown from them. This led to the introduction of earthen ram¬ parts and parapets which were placed against the walls and suitably arranged to meet the exigencies of the moment. The art received something like a scientific basis about this time in Italy, from which the names and forms of most of the elements of fortification now in use are derived. It was at this epoch that the bastioned form of fortification first appeared.

Bastioned System. — The improvements made in siege-artillery toward the end of the 16th century caused Sully, the Prime Minister of France, Grand-master of Artillery and Su¬ perintendent of Fortifications, to take measures to modify and strengthen the fortifications then existing in France. The noted military engi¬ neers, Errard, of Bar-le-Duc, De Ville and Count de Pagan, were successively charged with these modifications and left their impress upon the works entrusted to them. They were followed by Vauban, and he by Cormontaigne. Although modifications have been made in the bastioned system since the time of Cormon¬ taigne, its essential basis is that of his method. A knowledge of the bastioned system would not be complete without an acquaintance with his method and those of Vauban.

A bastioned enceinte consists of a series of bastions, which occupy the salient angles of the polygon within which the enceinte is en¬ closed; the flanks of the bastions being usually connected by straight curtains. The sides of the polygon which connect the salient angles

of the bastions are termed the exterior sides, in contradistinction to the sides of an interior polygon which, being parallel to the first and occupying the positions of the curtains, are termed the interior sides. The polygon may be regular or irregular. The bastioned enceinte, when its relief and plan are suitably arranged, possesses the advantage of hawing its ditches thoroughly swept from within the enceinte itself, thus securing the flanking arrangement of the scarp; of bringing a cross and flank fire to bear upon the approaches on the salients of the enceinte; and furnishing a strong direct

the length of curtain and to diminish the in¬ terior space in the bastion, the maximum length has been restricted to 50 yards.

The face of the bastion is usually directed on the curtain-angle. In this case the entire fire of the flank can be brought to bear on the enceinte-ditch along the foot of the scarp- wall of the face. Circumstances may require a different position : directing it on some point on the curtain, or on some

point' on the flank. With the advantages gained there will be cor¬ responding disadvantages. Their relative values will decide it. The relative positions of the

French System of Fortification. The ordinary Front with located Masks, Ditches, Slopes and Communications.

and cross fire upon the site in advance of the curtains and the faces of the bastions.

The position of the flank will vary between the limits, a perpendicular to the curtain, and a perpendicular to the opposite face let fall from the point where the curtain intersects the line of defense. A position intermediate to these has been generally adopted ; in most cases, placing the flank so as to make an angle of about 100 degrees with the curtain. The length should be sufficient to allow it to be armed with at least two pieces of artillery; this will determine the least length of flank. It may be increased beyond this, to any extent demanded by the circumstances of the defense. From the effect had in so doing to increase

curtain, flanks and lines of defense, and their respective lengths affect the length of the faces. If the line of defense is equal only to the distance between the curtain-angle and opposite shoulder-angle, the corresponding length of face will be zero; if the curtain and the flanks have their least and the line of de¬ fense its greatest length, the resulting face will be the longest that we can have.

Bastioned Fort. — The bastioned fort has been devised to remedy defective flanked dis¬ positions. It may consist of a polygon of any number of sides, but for field-forts the square and pentagon are generally preferred. To plan a work of this kind, a square or pentagon is first laid out, and the sides bisected by per-

pendiculars, HI ; a distance, GH, of one-eighth of a side in a square (one-seventh in a pen¬ tagon) is set off on the perpendiculars; from the angular points of the polygon, lines DA, CF are drawn through the points thus set off ; these lines give the direction of the lines of defense ; from the salients of the polygon, dis¬ tances equal to two-sevenths of a side are set off on the directions of the lines of defense, which give the faces ; from the extremities of the faces the flanks are drawn perpendicular to, or making an angle of 100 degrees with, the

manned and vigorously defended. Another consideration that must not be omitted is the number of men that can be collected for work¬ ing, whether there are tools enough and time enough to do it.

An examination of the arrangement of a bastioned front will show that there are neither dead-angles nor sectors without fire; that the salients, and all the ground within the range of fire, are protected by formidable columns of direct, flank and cross-fire. There is one point in this system that demands particular atten-

Scaleof Feet

*9 $0*00 aoo 390 490 590*

1000

1

Plan of Fort Issy — Defenses of Paris (1870).

lines of defense; the extremities of the flanks are connected by curtains, CD.

In deciding on the general plan to be car¬ ried out, the following considerations require attention: the object the work is expected to fulfill, and its situation with respect to the enemy; whether it is likely to be attacked by overwhelming forces ; whether artillery is likely to be brought against it, or infantry, and whether it can be surrounded; the number of men there will be for its defense, observing that it is better to have a force concentrated, and that it is therefore injudicious to make works of a greater extent than can be well

tion, which is, that the counterscarp of the ditch, if laid out parallel to the interior crest, would form a dead-angle along each face near the shoulder; because the fire of the flank would be intercepted by the crest of the counterscarp. To prevent this, either the counterscarps of the faces must be prolonged to intersect, and all earth between them and the scarp of the flanks and curtain be exca¬ vated, or the ditch of each face must be inclined up in a slope from the bottom, opposite the shoulder, so that it can be swept by the fire of the flank. The first method is the best, but re¬ quires most labor; the second is chiefly objec-

tionable as it gives an easy access to the ditch, which might be taken advantage of in an assault.

Forts have been proposed with half-bastions, but being very little superior to the redoubt and much more difficult of construction, they ought never to be used. The exterior sides of the bastioned fort should not exceed 250 yards, nor be less than 125 yards, otherwise the flank¬ ing arrangements, with the smooth-bore musket in the former case, and the flanks too short in the latter, will be imperfect. With a relief of 24 feet, which is the greatest that, in most cases, can be given to field-works, and an ex¬ terior side of 250 yards, the ditch of the curtain will be perfectly swept by the fire of the flanks, the lines of defense will be nearly 180 yards, a length which admits of a good defense, and the flanks will be nearly 30 yards. With a relief of 14 feet, the least that will present a tolerable obstacle to an assault, and an ex¬ terior side of 125 yards, the ditch of the cur¬ tain will be well flanked, the flanks will be nearly 20 yards .in length, and the faces between 30 and 40 yards. Between these limits, the dimensions of the exterior side must vary with the relief.

Dutch School. — The Dutch school takes its rise in the political necessities of the times in which the national spirit was aroused to throw off an onerous foreign yoke. The aquatic character of the country, and the want of time and pecuniary means, led to those expedients of defense which are never wanting under like circumstances. The deficiency of earth led to the formation of low parapets for the main enceinte and wide ditches filled with water. The main enceinte was usually preceded by a second one with a very low parapet to sweep the surface of the wet ditch ; and this second enceinte was separated from the first day by a dry ditch, which favored sorties, and which was provided with all the means, as palisades, tambours and block-houses, for offensive re¬ turns and surprises. The second enceinte was generally covered from an exterior command by a glacis in advance of the main ditch. The covered-way between the glacis and the ditches was, to a great extent, deprived of its essen¬ tial offensive feature by an exterior wet ditch made at the foot of the glacis and inclosing it, over which communication with the exterior was kept open by temporary bridges. The whole of the defensive measures of this school seem to have had solely for their object a strictly passive resistance. With this view, long lines of entrenchments, supported from dis¬ tance to distance by forts, connected their frontier towns and villages, affording a suffi¬ cient obstacle to marauding expeditions, and requiring the efforts of a strong force to break through them.

French School. — What may be termed the characteristics of the French school are to be seen rather in the method of Cormontaigne than in the practice of Vauban, although his authority has exercised a preponderating

in¬ fluence throughout Europe, and is appealed to in all great problems of the art. This school is characterized by the retention of the profile of the Italian school, combined with the out¬ works of the Dutch, and a systematic arrange¬ ment of all the parts. The French have

evinced in this, as in all the other arts, that spirit of systematic combination which forms one of their most striking national traits.

It has been observed how the natural features of the country, like Holland, and the national characteristics of the people, like the Spanish, have modified the plan and profile of their works. This is particularly true in Sweden and partly so in Germany. The part played by Sweden upon the theatre of Europe, under Gustavus Adolphus and Charles XII, served to develop in this nation every branch of the military art, and produced a number of distinguished generals and engineers, Virgin holding the first place. In this school the bastioned system seems to have been generally adopted for the enceinte, great attention being paid to covering the faces of the works from enfilading fire ; in providing casemates having reverse views on the besiegers' works ; and particularly in so arranging the interior dis¬ positions that each part should not only con¬ tribute to the defense of the others, but be capable of an independent resistance. These dispositions necessarily led to great complica¬ tion and multiplicity of works.

The introduction of cannon, although it led to important changes in the measures both of the attack and defense, still did not, for a con¬ siderable period, bring about any very decisive results in the length of sieges. The means which it afforded the defense of reaching the besiegers at a distance, and of destroying all the methods of approaching and annoying the place which had hitherto been used, led to the substitution of the ordinary trenches for the wooden galleries and other similar expedi¬ ents for approaching under cover, and to the erection of batteries at distant points to open breaches in the walls. Lines of circumvallation and countervallation, which formed so promi¬ nent a feature previously to this epoch, was the only one which still kept its place to a greater or less extent to the present day. For the pur¬ pose of effecting an entrance into the place, breaching-batteries were erected opposite the points deemed most favorable. The approaches were made by zigzags along the capitals of the salients to the counterscarp, where a covered descent was made into the ditch opposite the breach preparatory to its assault. When the wall was not exposed to a distant fire, the be¬ siegers were obliged to carry the covered-way by assault, and established their breaching-bat¬ teries on the crest of the glacis.

But little deviation was made in the above described methods until Vauban appeared upon the scene. Before him, Montluc, a distinguished French

general and engineer, had introduced short branches of trenches, which were run out from the angles of the zigzags, to post a few troops for the immediate protection of the workman ; but these were found to be very in¬ sufficient in repelling sorties of any strength. The event which seems to have had the great¬ est influence on the subsequent progress of both the attack and defense was the memorable siege of Canada, in which volunteers from all parts of Europe engaged, and who, after its close, disseminated throughout their respective countries the results of the experience they had there acquired.

FORTIFICATIONS

519

Field Fortifications. — The art of fortifica¬ tion includes, generally speaking, two branches — strategical or deliberate and tactical or hasty fortification. The first includes defensive works, executed largely in time of peace for the protection of harbors, cities, arsenals, etc., while tactical fortifications are those executed

east bank of the Bobr River, along a ridge covered with woods, affording good artillery positions which commanded the opposite bank, where positions were poor. There were ex¬ tensive marshes along the river which in winter were frozen over. The Germans first tried to turn the positions, but failing in this, brought

(H SO)

.6 00 – .J

Profile of a French Permanent Fortification (1909).

to meet the immediate tactical needs of the mobile army in the field, and are generally known as field fortifications, the immediate pur¬ pose of which is to increase the power of resistance of the troops occupying them by de¬ creasing their exposure to the fire of the enemy and increasing the accuracy and volume of their own fire. Generally speaking, field for¬ tifications increase the fire effect of the troops. The great strength of field fortifications to-day comes largely from their low visibility as targets, whereby they force the attack to obtain with volume the effect formerly obtained with accuracy of fire. To compensate for scarcity of men the Germans make use of a great num¬ ber of automatic and machine guns. It is estimated that on the French front they had one machine gun to every 10 or 12 metres of front. It is evident that a line thus strongly held cannot be captured unless use is made of mobile protection, for the attacking personnel or the hostile trenches are overwhelmed with high explosives,

liquid fire and asphyxiating gases. The offensive is still the achieved victory, in spite of the changes in methods. The solution

Profile of Field Fortification.

of the problem must be sought in the develop¬ ment of mechanical means to supplement the moral and material forces of the offensive.

The fortresses guarding Warsaw and the Russian frontier were quickly taken in the Teutonic advance of 1915, either by manoeu¬ vring the defenders out of their fortifications, or, as at Novo Georgievsk, by shattering them with the heavy siege guns. The fortress of Ossowetz on the Niemen-Bobr-Narew line had a different history. Ossowetz stands on the

up their heavy siege guns. The Russian batter¬ ies were, however, so well concealed that they suffered very little damage and succeeded in silencing several German batteries. As the warm weather advanced, the marshes made it difficult for the Germans to emplace their guns. Ossowetz, although first attacked in February 1915, did not fall until 22 Aug. 1915, in the general retreat after the fall of Warsaw.

The failure of the forts is due to several causes: (1) Their location and details of con-

Cross-section of a Fort.

struction were known some years before the war, and guns were especially designed to de¬ stroy them. (2) Their armament was not up to date and, therefore, easily overpowered by the latest types of guns, the existence of which was unknown to the defense. (3) The garri¬ sons permitted the enemy to emplace his guns within effective range, but beyond the range of the guns of the defense. (4) The advantage of concealment as a defensive measure is il¬ lustrated by the operations against Ossowetz. (5) The advantage of keeping the enemy at a distance is illustrated by the operations around Verdun and Nancy.

The experiences of the European War con¬ firm the conclusion reached during the siege of Port Arthur in 1904, that the mounting of large-calibre guns in a fort for use against siege guns of the enemy is a fatal error.

A modern fortress should consist of a large area, so organized as to ensure extreme mobility to troops and guns. Concealment is all im¬ portant. Permanent gun emplacements should therefore be constructed only at important points with the primary intention of delaying the ertemy in bringing up his heaviest siege guns. The main reliance should be placed upon mobile guns, some of which should be at least as powerful as any

which the enemy can bring up. These mobile guns should be located in earthen emplacements, well concealed from

hostile observation. Unless the garrison is strong enough in both mobile troops and mobile guns to prevent the enemy from coming Within effective range of his objective, then there is no hope of offering a prolonged resist¬ ance. Consequently, entrenched areas with mobile troops and mobile guns are a more de¬ pendable protection than a stereotyped system of permanent forts.

Permanent Fortifications. — The tendency to dissemination in permanent fortifications began in 1885, after experiments by Van Sauer and Mangin, who demonstrated the effect of high explosive shells and advocated very small armored forts. From these experiments and those of other French officers arose the system of small, isolated forts, heavily armored and united by a belt line railroad, on which ran

against assault. (4) Disposition such that, if the enemy occupies part of the line, he cannot maintain himself against counter attack.

These conditions are obtained by successive lines and a development of the front to the maximum permitted by the terrain. There should be a first line of continuous trench en barbette, supported by small armored forts — all in front of the main lines, consisting of small works for rapid fire and heavy guns under cover of a heavy mass of concrete, in rear of which another defiladed line of the same char¬ acter covers the intervals and supports the works in front. The gorge is closed and the entrance is through a subterranean passage.

Forbenius believes that the fortified places that have been captured during the European war may be placed in three groups — those

Cross-section of the Mougin Subterranean Concrete Fort (1887), with Armaments of Four 15-cm. Guns

and 8 Machine Guns.

trucks carrying heavy guns. Later this system was adopted by the Germans at Metz.

Colonel Voelki bases his calculations on a firm belief that it is not necessary greatly to increase defensive means ; contending that analogous

conditions obtain for the attack and defense; and that small forts with movable heavy artillery form a correct defense. This principle relies upon the small size of targets and the consequent difficulty of hitting and destroying them ; and thus discards the idea of utilizing heavy centres of passive resistance except when absolutely unavoidable.

A typical work should fulfil the following conditions: (1) Efficacious fire against the

attack until the last moment. (2) Support to neighboring works with defiladed guns under cover to sweep the intervals. (3) Protection

that capitulated after a brief bombardment, those that were evacuated without resistance and those that surrendered after a siege of. 7 to 12 days. The first were taken by storm on account principally of the superiority of the attacking artillery, which occupied good posi¬ tions and fired effectively on visible and well- defined targets without interference. The second group, although abandoned without re¬ sisting, would have suffered the same fate had they held out; while the third suffered from lack of offensive initiative on the part of the garrisons, though also in these cases the artil¬ lery preponderance greatly favored the Ger¬ mans. Others, such as Toul, Verdun and Bel¬ fort, have survived because the mobile armies have co-operated in their defense by taking advantage of all the accidents of the terrain

to construct advanced lines, such as above out¬ lined. Still others, such as Paris, Przemysl, Cracow and Koenigsberg, have assisted the field armies with their garrisons.

From these cases it may be deduced that the enemy must be held at a distance, and that a large target must not be presented to him. The first is obtained by providing the forts with high power heavy guns for grazing fire to oppose vigorously the large calibre guns em¬ ploying high angle fire, the only class that up- to-date has sufficient mobility for siege trains. And to avoid the destruction of the works the thickness of armor and concrete cannot be much further increased, but the field fortifica¬ tion system must be used ; that is, the elements must be disseminated and a close co-operation with the field army must be maintained, while the latter, resting on the works, must not inter¬ fere in the zone of action of the garrison.

Colonel Marrullier of the Italian engineers presents two propositions : one purely technical and the other tactical. He would have (a) a line of

auxiliary defenses, held by infantry and small calibre artillery; (b) a line of isolated turrets, separated by 30 or 40 metres; (c) a line of protected storehouses, to supply these turrets, 50 metres to the rear; (d) a line of shelters for personnel and material, 150 to 200 metres from the turrets; (e) a network of com¬ municating trenches for every purpose in rear and between the lines. This general plan con¬ forms to what appears to be necessary for future fortification.

Other writers agree in general with these ideas. All insist on an intimate co-operation between garrisons of fortified places and the field armies, so as to prepare for the latter an advantageous field of battle. On the defensive the problem is to secure protection against the transportable heavy artillery of the assailant. The idea that permanent fortification is a thing of the past is fallacious. On the contrary, the correct tactical employment of troops still re¬ quires the support of fortified places; and a proper use of these points of support embar¬ rasses the enemy and increases the power of one's own troops.

The fortress of Ossowiez is a classical ex¬ ample that a modern extensive field fortifica¬ tion, which offers no concentrated targets to the enemy, can absolutely neutralize the power and effect of the latest siege mortars and howitzers. The hopes placed in the strongest fortified place in the world, Antwerp, were blasted by the wonderful progress made in the science of ordnance construction. The greatest ordnance triumph was the Austrian 42-centi¬ meter howitzer, firing an 850-kilogram pro¬ jectile, maximum range 15 kilometers. It was employed for the first time in the forcing of the Dunajec.

Most modern armored turrets for inland barrier forts are made of armor from 25 to 35 centimeters in thickness. The surrounding concrete is from 2 to 2.5 meters in thickness. Nevertheless this mass was absolutely de¬ molished by the large calibre mortars used by the Germans and Austrians. Considering the terrible effect of these modern heavy mor¬ tars, we must concede their overwhelming superiority over the most modern armored forts. They reduced Fort Loncin to a confused mass of twisted steel and broken

concrete. Fort Manonvillers, the most power¬ ful individual work in the world, was reduced to ruins. At Loncin an armored cupola 250 millimeters in thickness was completely perfor¬ ated. At Longwy a shell pierced not only the armored cover but also went through three floors of the casemates.

Coast Fortifications. — The defense of coast line involves the use of both naval and land forces and the objects for which coast fortifications are established are as follows : (1) For the protection of important harbors and

the shipping lying therein ; (2) to prevent the bombardment of the largest coast cities; (3) to afford safe refuge to the fleet when con¬ fronted by a superior enemy; (4) to protect the naval bases established in distant seas along the routes of trade. The limitations of coast fortifications are great and perhaps the most vulnerable element in most cases is the fire- control system, the stations of which are not adequately concealed nor properly covered. Since accuracy of plotting requires that observ¬ ing points be fixed, mobility is not applicable to these stations.

The service of security and information in coast defense, as in the field, implies collection of military information, its transmission and its correlation and use. In the future coast patrol will undoubtedly become one of the strongest arms of the service of security and information and this patrol or guard must, when organized, be thoroughly efficient in num¬ bers, personnel and equipment. Its men must be well-disciplined soldiers, intelligent and keen, skilled as observers and trained in the use of the telegraph and all mechanical appliances. In addition to fire-control systems there must exist both within and without artillery districts the factor of coast defense, that includes lines of information, whether electrical or visual, by means of which artillery headquarters are kept in touch with the interior of the country and with centres of control, the factors and elements of the defense brought into co-ordination, fixed positions connected and the district bound into a whole under the control of one commander. In general, artillery lines of fire-control and of information are, in times of peace, permanent in type ; but in war to permanent lines are added a network of temporary systems both flexible and extensive, in character resembling those of an army in campaign. The tem¬ porary lines of artillery districts must include many aerial systems, and even the permanent communications cannot be electrical alone.

The war of to-day is one of position, the front of which resembles a vast factory con¬ taining every class of machine, each machine and its operator having a definite task to per¬ form. The front is formed of numerous lines of continuous trenches, redoubts, fortified towns and woods placed in state of defense, all connected with lines of communication ; the whole forming an enormous system of earth¬ works, which may extend in a direction perpen¬ dicular to the front, for a great distance. This complex system of trenches is divided into three zones, the organization of which varies with their mission as zones of combat, defense works or of rest.

Bibliography. — Army Field Engineer School, (Notes on Field Fortification ; Army War College, (Report of National Coast De-

fense Board) (Washington, D. C., 1906) ;

Clarke, G. S., fortification* (New York) ; Farrow, (Manual of Military Training) (New York 1918) ; Fiebeger, Permanent Fortifica- tions) (United States Military Academy, West Point), and field Fortifications* (New York 1913) ; Thuillier, Principles of Land Defense) (New York 1902) ; United States Engineer School, (Lectures on Sea Coast Defense) (Washington Barracks, D. C.).

Edward S. Farrow,

Consulting Military and Civil Engineer.

FORTIFICATIONS, Modern Seacoast.

See Fortifications.

FORTIGUERRA, for-te-gwa'ra, Niccolo, Italian poet and prelate: b. Pistoia, 7 Nov. 1674; d. Rome, 17 Feb. 1735. A prelate at the court of Pope Clement XI. In his epic poem (Ricciardetto,* so-called from one of the Paladins of Charlemagne, he wished to show that it was easy to imitate Ariosto. He wrote the first canto of this poem in one night, and continued it to 30 cantos. It appeared (1738) under the name of Carteromaco, which had been assumed by the author during his life. Its principal excellence consists in the descrip¬ tion of situations. His short poems and sonnets are to be found in different collections of Italian poets.

FORTIS, Alessandro, Italian statesman: b. Forli, 1841 ; d. 1909. He studied at the Uni¬ versity of Pisa, later joined Garibaldi, with whom he fought at Mentana. In 1874 his radi¬ cal views brought about his arrest during the elections of that year. Six years later he was elected deputy from Bologna as a radical Re¬ publican. In 1888 he abandoned this for the Dynastic party and was made undersecretary in the Ministry of the Interior. He was Minis¬ ter of Agriculture and Commerce under Pel- loux in 1898-99 and was Prime Minister and Minister of the Interior from March 1905 to February 1906. During his premiership the purchase of the railways was effected by the government.

FORTOUL, for-tool', Hippolyte Nicholas Honore, French statesman: b. Digne, 1811; d. 1856. In 1845 he was appointed professor of the history of literature at the University of Toulouse, removing in a similar capacity to Aix in 1846. Three years later he was elected deputy from Les Basses Alpes and became one of the supporters of Louis Bonaparte. He was for a short time in the Ministry of Marine and after the coup d'etat of Napoleon III,

became Minister of Public Instruction. He stopped the courses of Jules Simon at the Sorbonne and suppressed other courses and professors in a high-handed manner. He introduced courses in farming in the primary schools and courses of drawing in the lycees. He published (Grandeur de la vie privee (1838) ; (De l'art en Allemagne* (1841) and (Etudes d'archeologie et d'nistoire) (1854).*

FORTRESS. See Fortifications.

FORTS. See Fortifications.

FORTUITISM (Lat. fors, chance), a doc¬ trine or theory of causation which denies the existence of a final end or object in the course of things. Such a doctrine in the domains of nature results in theories such as that of Dar¬

win, who has been charged with denying design in the changes and developments of organized creatures, that is, the design of a single con¬ trolling mind, namely, of a supernatural creator. The opposite to fortuitism is teleology (q.v.), which is the theory of a final end or object in the processes of nature and history, as resulting from the plan or scheme originating in the mind of the Supreme Being.

FORTUNA (Gr. Tvxd), the goddess of Fortune. According to Hesiod she was a daughter of Oceanus ; according to Pindar, a sister of the Fates. She had temples at Corinth, Elis, and Smyrna, and worshipped in Italy be¬ fore the building of Rome, and had a celebrated temple at Antium, in which were two statues, which were consulted as oracles, and gave re¬ sponses either by signs or by lot. She had also a temple at Prseneste, whence she was called Dea Prcenestina. No less than 26 temples were erected to her in Rome, the first of which was built by Servius Tullius. She is generally de¬ lineated with two rudders, with one of which she guides the ship of prosperity, with the other that of misfortune. At a later period she was represented with a bandage over her eyes and had a sceptre in her hand, and sitting or standing on a wheel or globe. She is usually dressed as a matron. On a coin of the Em¬ peror Geta she is represented sitting on the earth with her bosom bare, her right hand rest¬ ing on a wheel, and holding in her left hand, resting on her lap, a horn of plenty. Consult Roscher, (Mythological Lexicon.

FORTUNATE ISLANDS. See Canary Islands.

FORTUNATIANUS, Atilius, Roman

grammarian of the 4th century of the Christian era. For one of his pupils he wrote a treatise on Horatian metres. The work begins with a discussion

of metres in general and the chief rules of prosody. The latter portion of the work is devoted to an anlysis of the metres of Horace. Fortunatianus was probably of Afri¬ can origin. Consult Keil, H., frammatici Latini> (Vol. VI).

FORTUNATUS, Venantius Honorius Clementianus, bishop of Poitiers and poet : b. Ceneda, near Treviso, 530 a.d. ; d. 609. He was educated at Milan and Ravenna with a view to excelling as a rhetorician and poet, in 565 he journeyed to France and took up his residence at the court of Sigbert. After two years he again traveled over France, but was finally in¬ duced to stay indefinitely at Poitiers. He was the friend of Gregory of Tours and of other eminent ecclesiastics, and in 599 was elected bishop of Poitiers. His poems were collected in 11 books and consist of hymns, epitaphs, epistles, verses in honor of his patrons. His best-known hymn is the fexilla regis pro- deunt, sung at processions . in the Catholic Church. He wrote a poem in four books in honor of Saint Martin, and lives of saints in prose. Consult Migne, fatrologiae cursus completus* (Vol. LXXXVIII, Paris 1844-80) and Lives by Nisard (Paris 1880) and Meyer (Berlin 1901).*

FORTUNATUS, the hero of a German collection of tales which originated about the end of the 15th century, though many of the tales and legends included in it are of much

older date. The substance of the book is that Fortunatus and his sons after him were the possessors of an inexhaustible purse of gold and a wishing-cap, which however, in the end, proved the cause of their ruin. The moral is that worldly prosperity alone is insufficient to produce lasting happiness. The oldest printed edition of the book now extant bears the date 1509. Later German editions mostly bear the title, (Fortunatus, von seinem Seckel und Wunsch-hiitleinP It has been reprinted in the third volume (1846) of Simrock's (Deutsche VolksbiicherP Versions of the story have ap¬ peared in French, Italian, Dutch, Danish, Swedish and even Icelandic. The first to dram¬ atize the subject was Hans Sachs, in (Der For¬ tunatus mit dem WunschseckeP (1553), after whom comes the English Thomas Dekker, with his (Pleasant Comedie of Old Fortunatus) (1600), a work which made its reappearance in German about 1620. The most poetical edition of the story is that given by Tieck in his (Phan- tasusP Consult Schmidt, in Ersch and Gru¬ ber's XLVI).

FORTUNE, Robert, English author and botanist: b. near Berwick-on-

Tweed, England, 1813 ; d. Scotland, 16 April 1880. He learned gardening in early life, and gained a position in the botanical garden at Edinburg. In 1842 he was appointed collector of plants for the Botanical Society of London in northern China. He published the results of his inquiries in his (Three Years' Wanderings in the Northern Provinces of China) (1853). In 1848 the East India Company engaged him to visit China to compare the qualities and commercial value of different kinds of tea. He visited the East several times afterward and published an ac¬ count of his numerous botanical discoveries in (Two Visits to the Tea-countries of China) (1852) ; (Residence Among the Chinese, In¬ land, on the Coast, and at Sea) (1857) ; (Yedo and Peking) (1863).

FORTUNE, Temple of, a temple of ancient Rome and one of the best preserved monuments of that city, erected by Servius Tullius in the Forum Boarium, near the Pons PEmilia. It was rebuilt in the 3d century b.c. and in the 9th century a.d. was transformed into the church of Saint Mary of Egypt, the spaces between the pillars being filled up with masonry. It is pure Ionic style and was cov¬ ered with painted stucco. Consult Platner, (Topography and Monuments of Ancient Rome) (New York 1911).

FORTUNE BAY, a bay on the southern coast of Newfoundland, embracing extensive fishing grounds. By the fisheries treaty of 1871 with Great Britain (see Fisheries Question), the American fishermen were granted equal rights on all British coasts. The Newfound¬ landers were very jealous of this intrusion on their fishing grounds, and in 1878 the Fortune Bay fishers attacked and drove away some Glou¬ cester vessels. Demand was made on Great Britain for damages, and £15,000 was ultimately paid.

FORTUNE-TELLING, predicting the future or fortune of an individual, by means of alleged signs or indications noticed by the fortune-teller. Chiromancy or palmistry is the art of reading the lines or wrinkles on the

palm of the hand, as indicative of the future for the person so marked. (See Palmistry). Necromancy is the art of consulting the dead about the future. In chartomancy playing cards are supposed by their suit or denomina¬ tion, when turned up after being dealt out, to reveal coming events. The ancient astrologer used to decide from the stars the good or bad fortune of an individual, the hour and day of whose birth was taken as data in calculating the planetary conjunctions on which the horo¬ scope was based. In every great city, even of the modern world, there are numbers of people who make a profession of fortune-telling, and there are many more who are credulous enough to believe in their pretensions. The law does not recognize the power of anyone to foretell the future, and the deluded victim of such charlatans, who had paid the wizard for a sup¬ posed revelation of the future, can bring the latter to justice for obtaining money on false

pretenses. In the ancient world there was a strong belief in fortune-telling, or the power to predict the future. At Rome the government appointed pfficial fortune-tellers of the state, who from the flight of birds or the appearance presented by the entrails of sacrificial victims made calculations as to coming events. The oracles of Delphi and Dodona were consulted by the wisest and best pagan Greeks. At Rome fortunes were told, or believed to be told, by Fortune herself in her temple at Antium. The literature of the Middle Ages is full of allusions to fortune-telling, which also played a part in the fiction and drama of all countries up to the middle of the 19th century. The belief in fortune-telling has largely disappeared among educated people. This results from the ad¬ vances made in physical science, the views which prevail concerning causation, and the limits of human experience. Rationalism, in its newest form of agnosticism, has likewise cleared the intellectual atmosphere, and made delusion and imposture less and less liable to obtain a footing or exercise an influence over sane minds. There remains, however, a con¬ siderable body of people of various religions who believe to some degree in inspiration, prophecy and clairvoyance (q.v.), which latter is coming to be recognized by material science. See Second-sight.

FORTUNES OF NIGEL, The, an his¬ torical novel, with scene laid in the London of James I, published by Sir Walter Scott in 1822. The introduction to this work contains inter¬ esting self-criticism by the author.

FORTUNY Y CARBO, ne e kar'bo, Mariano, Spanish painter: b. Reus, near Bar¬ celona, 11 June 1838; d. Rome, 21 Nov. 1874. He studied at Madrid, traveled in Morocco and settled at Rome, where he became the centre of a school of artists in revolt against over-study of the ˆmasters.® In 1866 he went to Paris, where his pictures, mostly genre subjects from Southern and Oriental life, had a great success. Among the best known are (A Spanish Mar- riage) ; (A Fantasia at Morocco) ; {The Aca¬ demicians at Arcadia) ; (The Seashore at Por- ticiP The Metropolitan Museum of New York contains his (Lady in Blacky and (Camels at Rest, and many other pictures of his are contained in public and private Ameri-*

can art collections. He was also known as an able etcher. Consult Lives by Davillier (1875), and Yriarte (1886); Muther, (History of Modern Painting) (1890).

FORTY, a number that has sometimes been regarded as peculiarly significant. The idea may have originated with readers of the Bible, who notice that Moses was 40 days on the mount; Elijah was 40 days fed by ravens; the rain of the hood fell 40 days, another 40 days expired before Noah opened the window of the ark ; 40 days was the period of embalm¬ ing; Jonah gave Nineveh 40 days to repent; our Lord fasted 40 days. He was seen 40 days after his resurrection, etc.

The weather on Saint Swithin's Day por¬ tends, as it is foul or fair, 40 days' rain or dry weather; a quarantine extends to 40 days; 40 days, in the old English law, was the limit for the payment of the fine for manslaughter; the privilege of the sanctuary was for 40 days ; the widow was allowed to remain in her husband's house for 40 days after his decease; a knight enjoyed 40 days' service of his tenant; a stranger at the expiration of 40 days was com¬ pelled to be enrolled in some tithing; members of Parliament were protected from arrest 40 days after the prorogation of the House, and 40 days before the House was convened.

FORTY IMMORTALS, The, the mem¬ bers of the French Academy. See Institute of France.

FORTY-NINERS. See Argonauts of '49.

FORTY THIEVES, a band of robbers in the tale (Ali Baba) in the (Thousand and One Nights. > They dwelt in a cave, the door of which opened at the words <(Open, Sesame.®

FORUM (Lat. for a market-place; con¬ nected with foris, out of doors), the open space in the centre of a city, in Roman times, where the people assembled, as on common ground, for amusement or the transaction of business. Here elections were held ; here were the public buildings, civic and administrative. Included in the forum was the comitium, with its tribunals for the orators who addressed the people. The curia or Senate house stood, with other build¬ ings, on the forum ; and between the public edifices stretched lines of shops or tabernce.

In the days of the kings and under the early republic there was but one forum in each city, small or great. In this open space all public business, political and legal, and all mercantile transactions were carried on. Dramatic repre¬ sentations, exhibitions of gladiators, combats of wild beasts and horse races also took place in the forum. The single forum eventually gave place to two forums, one of which was given up to law administration and politics, and the other to mercantile traffic. Eventually, each important commodity has its own forum. There was the forum boarium, cattle market; forum suarium , hog market; forum olitorium,

vegetable market ; and forum piscarium, fish market. The trade shops, as of gold- and silver-smiths, saddlers, blacksmiths, tinsmiths, money-lenders, book¬ sellers, etc., were ranged round these fora, or occupied streets adjacent to them. The temples that edged the forum at Rome, like the mediaeval cathedrals, were sometimes used for secular purposes. Thus, the Senate often held meetings in the Temple of Concord, while the Temple

of Saturn was used as state treasury, and was also the depositary of public archives, before the erection of the Tabularium. There are a great many ruins which enable us to gain a fair idea of the fora of other cities besides Rome. The fora at Pompeii are as follows : the prin¬ cipal forum; 450 feet from north to south: in its north side was the Temple of Jupiter, the Basilica, or law court, and the temple of Apollo ; on the west and on the east side the macellum (meat market), the senaculum or curia, the Temple of the Genius of Augustus, and the Scholcc or corporation building. The triangular forum, forum triangulare, contained a Doric temple to the south, and an Ionic portico at the entrance.

In the open spaces of the forum were set up many statues of distinguished men. Even in the days of the republic it was necessary to order the clearing out of such statues, together with crowds of altars, arches and memorial columns which blocked up the place.

The forum par excellence was of course the original Forum Romanum. It was situated in the hollow between the Palatine, Capitoline and Quirinal hills. The early tribes met on this common and neutral ground. Under the Tar- quins the consolidation of the tribes is suggested by the completely adorned and enclosed appear¬ ance of the Forum. The Temple of Saturn appeared in 497 b.c., that of the Dioscuri in 484 b.c., that of Concord in 367 b.c. The first courthouse, Basilica Porcia, was not built be¬ fore 184 b.c. ; three more were built later, and it was this increase of buildings that occupied so much of the vacant space that the fish, meat, hog, vegetable and other markets were obliged to retire to other quarters of the city.

Julius Caesar was the first to add special forums to those already in existence, and his Forum Julium was followed by the Forum Martis of Augustus, sometimes called Forum Augustus. Then came the Forum Pads of Ves¬ pasian, the Forum Transitorium of Domitian and Nerva, the Forum Trajani of Trajan. These all lay side by side, north and east, with the Forum Romanum. The Forum Julium had in its centre a temple of Venus Genetrix, the patron goddess of the Julian gens round which it formed a sort of sacred precinct. The Forum Augustum was dedicated to Mars and in it was situated the Temple of Mars Ultor. This build¬ ing was flanked by two triumphal arches, and Caesar had intended that it should commemo¬ rate, with appropriate statues, the extension of Roman dominion. The

Forum Nervae was dedi¬ cated to Minerva and contained her temple. As the main thoroughfare through this district of the city crossed this forum it was commonly known as Forum Transitorium. The most gor¬ geous architectural group in the imperial city was exhibited in the Forum Trajani, which had its own special Basilica, like the great forum. It was entered by a triumphal arch, surrounded by a double colonnade; an equestrian statue of the emperor stood in the centre, flanked on each side by a half circle. The Library, Column and Temple of Trajan completed the cluster of marble structures.

The appearance of the Forum Romanum during the last days of the empire may be de¬ scribed as follows : Looking toward the Capitol the spectator would see the Temples of Concord, of Vespasian and the Dii Consentes. The Tem-

pie of Saturn stood between the slope of the Capitol and the Vicus Jugarius. Beside it was the arch of Tiberius, near that of Septimius Severus. Between these two arches were the rostra. The political buildings stood on the farther side of the arch of Severus. Here was the Senate house of the Curia, while the Temple of Janus rose side by side with the Basilica Emilia. On the south and opposite side was the vast Basilica Julia, and the beauti¬ ful Temple of the Dioscuri. East from this group of buildings was an open space occupied by the Temple of Julius, side by side with which was the triumphal arch of Augustus, and be¬ yond these is the most interesting tract of the old forum, the centre of antique and primitive Roman religion. The Shrine of Vesta, the Temple of Antoninus and Faustina, the Templum Urbis made up a magnificent range of noble and solemn structures, and we are reminded also that at this point once stood the arch of the Fabii at the opening of the ancient Via Sacra.

The invasions of the Goths did not bring much destruction upon the forum. It was in the 11th century that the buildings were dev¬ astated at the sacking of Rome (1084), when Gregory VII was delivered from the Castle of San Angelo by Duke Guiscard. The rarest monuments of the antique world were employed as fortresses. The 16th century witnessed the antiquarian curiosity and reckless vandalism of the Renaissance. The Forum of Cicero and Augustus became a wilderness with only a few isolated columns to mark the site of temples or palaces. Under the learned and liberal Pius VII the relics were preserved from further destruction and the archaeologist Carlo Fea then began those excavations which have been continued by Lanciani.

In modern usage, the term forum has come to mean any public place for discussion, or trial, as the stage of an assembly room, the columns of a newspaper, a court of justice, etc.

Bibliography. — Jordan, (Topographie der Stadt Rom im Alterthum5 (1871) ; Middleton, (The Remains of Ancient Rome5 (1892) ; Nicholas, (The Roman Forum5 (1877) ; Lan¬ ciani, (Ruins and Excavations of Ancient Rome5 (1897) ; Boni, official report of excavations, (Notizie degli scavi5 (1899 et seq.) ; Platner, (Topography and Monuments of Ancient Rome5

(1904).

FORUM ALIENI. See Ferrara.

FORUM APPII, a post station on the Via Appia, 43 miles south of Rome. It was the usual halt at the end of the first day's journey from Rome. From here a canal paralleled the road through the Pomptine Marshes to the neighborhood of Terracina. It is mentioned as a halting-place in the narrative of Saint Paul's journey to Rome in Acts xxviii, 15. Few relics of antiquity have been found here; Pius VI re-established the post station here after the reconstruction of the Via Appia.

FORUM AUGUSTUM. See Forum.

FORUM BOARIUM. See Forum.

FORUM ECCLESIASTICUM, a church tribunal or court. It is either internal or ex¬ ternal — Forum Internum, Forum Externum. The Forum Internum is what is known as the tribunal of penance, the confessional, where the penitent is both accuser and accused; and the

confessor is the judge who condemns or ac¬ quits or pardons and exacts satisfaction for wrongs and reparation of injury done to oth¬ ers whether in reputation or property. The Forum Externum is any ecclesiastical tribunal outside of the sacrament of penance that is concerned with Church government. What are the sanctions by which the judgment of the Church's tribunals are enforced? Has the Church the right to inflict temporal pains and penalties on offenders against her laws? That the Church does possess such power is the teaching of the Church herself : the doc¬ trine which declares she does not possess it has been explicitly condemned. The proposition that ((the Pope or the whole Church collec¬ tively cannot punish any man, however wicked he may be, with a coercive penalty55 unless the civil power gives them authority to do so, is condemned by Pope John XXII and a similar proposition was condemned by Pope Pius VII in the bull Auctorem Fidei: one of the proposi¬ tions condemned by Pope Pius

IX in the Sylla¬ bus (1864) declared that ((the Church has no power to employ force.55 In proof of the neces¬ sity of such power in the Church, the case of a bishop is cited who teaches heretical doctrine : has not the Church, it is asked, power to depose him; or must the matter go before a tribunal of the civil power? It is held that to make such resort to the secular courts necessary is to render the Church powerless to execute her divine commission and to make a civil judge the judge of a purely ecclesiastical cause. On the ground of the canon law the Church has the right in herself ((to inflict stripes, to impose fines, to imprison in a monastery55 offenders against her laws; in short, to impose all pen¬ alties short of the effusion of blood, citra san¬ guinis effusionem, or its equivalent. Practi¬ cally, the power of the Church at present is confined to the infliction only of her spiritual penalties, and these only when they do not in any degree directly or indirectly impair the civil rights of the person who incurs the spiritual censures ; when they do so trench his civil rights, the person has recourse to the secular courts. Thus in this country cases are often brought into the civil tribunals of rectors of parishes or pastors of churches who have been deposed by bishops or other ecclesiastical su¬ periors; and courts find it within their compe¬ tence to decide whether the act of the superiors has been done in entire conformity with the constitution and laws of the religious body con¬ cerned, and the civil and contractual rights of the complainant.

FORUM JULII. See Friuli.

FORUM JULIUM. See Forum.

FORUM LIVII. See Forli.

FORUM OF NERVA. See Forum. FORUM OBLITORIUM. See Forum. FORUM PACIS. See Forum.

FORUM ROMANUM. See Forum. FORUM OF TRAJAN. See Forum.

FORWARD, Walter, American statesman: b. Connecticut, 1786; d. Pittsburgh, 24 Nov. 1852. He studied law and was admitted to the bar in 1806. In 1822 he was elected to Congress; and in 1841 was appointed by President Harrison first Comptroller of the Treasury, and was

reappointed by President Tyler in September of the same year. On retiring from the Cabinet in 1843 he resumed law practice. In 1849 he was appointed charge-d'affaires to Denmark, but re¬ signed in 1851. Later he

was presiding judge of the Allegheny County District Court.

FORWOOD, William Henry, American military surgeon: b. Delaware, 7 Sept. 1838; d. Washington, D. C., 11 May 1915. He was graduated at the medical department of the University of Pennsylvania and at George¬ town University, Washington, D. C. ; entered the regular army as an assistant surgeon in 1861 and served throughout the Civil War. He also served in many Indian campaigns ; was surgeon and naturalist with the exploring ex¬ pedition through Wyoming, Montana and Idaho in 1883 ; located military hospitals in Savannah, Ga., and the camp hospitals in Mon- tauk Point, during the Spanish War ; and was appointed surgeon-general of the army with the rank of brigadier-general in 1902. He retired on 7 Sept. 1902 and became professor of sur¬ gical pathology at Georgetown Medical Col¬ lege. He wrote many articles on military sur¬ gery and natural history.

FOSCARI, fos-ka're, Francesco, Doge of Venice: b. 1373; d. Venice, 1 Nov. 1457. In 1416 he was named procurator of Saint Mark's, and in 1423 was elected Doge. His son Giacopo, being accused of ordering the assas¬ sination of a Senator Donati, the enemies of the family created such commotion in the state that, unable to clear himself to their satisfac¬ tion of the charge, he was banished from the city, the father having to ratify the sentence. Love of his country and devotion to his wife compelled the banished Foscari at all hazards to revisit his beloved Venice, where, being dis¬ covered by his enemies, he was denounced, again made prisoner, put to the question of the rack, and a second time banished, dying soon after of his wounds, or the torments of his secret punishment, and of grief at separation from his idolized family. The fate of the son had such an effect on the Doge that the bereaved father went mad, in which state the enemies of his family compelled him to abdicate. He died three days after in a spasm, upon hearing the bells of Saint Mark's announce to Venice the election of a new ruler. Byron has written on the subject a tragedy entitled (The Two Foscari. >

FOSCOLO, Ugo, oo'go fos'ko-lo, orig¬ inally Niccolo, Italian author: b. Zante, one of the Ionian isles, 26 Jan. 1778; d. Turn- ham Green,- near London, 10 Oct. 1827. A man of passionate temperament, and withal an ardent patriot, Foscolo was bitterly disappointed when by the Treaty of Campo Formio Venice was given to Austria, and his disappointment found vent in the (Lettere di Jacopo Ortis5 (1802), a sort of political Werther. Becoming finally undeceived as to Napoleon's intentions with regard to his native land, he returned to Milan, where he published in 1807 his best poem, (I Sepolcri, a work composed in the spirit of the ancient classic writers, and re¬ markable for its smooth and polished versifi¬ cation. About this time he wrote a translation of Sterne's ˆSentimental Journey, }*

and two tragedies,

pointed to the chair of eloquence in Pavia. His inaugural address, (DeH' Origine e dell' Ufficio della LetteraturaF although full of the same love of classic beauty which marks the

FO.SDICK, Charles Austin (((Harry Cas- tlemon®), American writer of juvenile books: b. Randolph, N. Y., 6 Sept. 1842; d. Westfield, N. Y., 22 Aug. 1915. He served in the Union navy in the Civil War from 1862 to 1865. Be¬ sides contributions to periodicals, he has pub¬ lished under the pseudonym <(Harry Castle- mon8 over 30 books for boys, among which are (The Gunboat Series (1864-68); Rocky Mountain Series* (1868-71) ; Rod and Gun Series) (1883-84); lThe Buried Treasure*; (The Steel Horse> ; (Jack the Trader) ; (The Houseboat Boys* ; (The Mystery of Lost River Canyon) ; (The Young Game Warded ; Re¬ bellion in Dixie) ; (The Ten-Ton Cutter) ; (The Pony Express Rider*; (Carl the Trailer,* etc.*

FOSDICK, James William, American ar¬ tist : b. Charlestown, Mass., 13 Feb. 1858. He was educated in the public schools of Boston and studied art at the school of Boston Museum of Fine Arts and from 1881 to 1888 studied drawing and painting in Paris. He specialized in mural painting and pyrography and is the founder of the art of fire etching in America. He decorated many private residences in New York and elsewhere. His principal works are (Glorification of Joan of Arc) in the National Gallery of Fine Arts, Washington; (Portrait of Louis XIV) in Pennsylvania Academy of Fine Arts; and (Arethusa. He has published (The Honor of the Braxtons) (1902) and has contributed stories, travels and art articles to the Century, Saint Nicholas and other maga¬ zines.*

FOSS, Eugene Noble, American public official : b. West Berkshire, Vt., 24 Sept. 1858. In 1877-79 he studied at the University of Vermont, engaged in manufacturing at Boston in 1882 and was interested in various commer¬ cial enterprises. Since 1902 he has been promi¬ nent as an advocate of tariff revision and re¬ ciprocity. In 1910 he was elected to the 61st Congress as a Democrat. In the same year he was elected governor of Massachusetts, securing re-election in 1911 and 1912. He was defeated at the election of 1913 partly because of his hostility to trades unions during his last term of office.

FOSSA, or FOUSSA, a large, brown, un- striped carnivorous mammal of Madagascar (Cryptoprocta ferox), which has the form of a huge weasel (twice the size of a house-cat), and like a weasel is lithe, active and bloodthirsty. Its systematic place is by no means decided. It

is placed by Beddard as representing a distinct sub-family of the civets; while Mivart and Lydekker regard it merely as a genus of civets. It differs from the civet, however, in that its tail is incompletely ringed, and it has no scent- pouch. Zittel, in view of its dentition and the retractibility of the claws, among other features, regards it as occupying an intermediate place between the civets and the cats, and associated with such composite extinct forms as Dinictis, Procelurus and Pseudcelurus, but classifies it in the Felidce. It is the largest carnivore in Mada¬ gascar, nocturnal in its habits, and preys chiefly on birds and lemurs.

FOSSANO, Italy, town in the province of Cuneo, 15 miles northeast of Cuneo, on the Stura, 1,235 feet above sea-level. It has an ancient cast'le, cathedral, seminary, gymnasium, an academy of science, etc. Silk, leather, gun¬ powder, paper and baskets are manufactured. It belonged to the house of Savoy after 1340 and was the scene of conflicts between the Austrians and French in 1796 and 1799. Pop.

18,731.

FOSSE (or FOSS) WAY, early English name of a Roman series of roads in Britain, running from Lincoln by Leicester and Bath to Exeter. Almost the entire line is still in use as modern road. Consult Codrington, (Roman Roads in Britain) (London 1903).

FOSSIL FOOTPRINTS. See Ichnol-

OGY.

FOSSIL FORESTS. See Forests, Pet¬ rified.

FOSSIL PLANTS. See Paleobotany.

FOSSIL VERTEBRATES. See Fossils; Paleontology.

FOSSILIFEROUS ROCKS, rocks in which are found embedded the petrified re¬ mains, or molds of plants and animals. See Fossils ; Paleontology, etc.

FOSSILS, the impressions or remains of plants or animals preserved in rocks by nat¬ ural causes. Fossils supply data, from which the geologist can determine the relative ages of sedimentary rocks. The first man to realize their chronological importance was the English surveyor, William Smith, known as the father of historical geology, although acute observers like Leonardo da Vinci had pointed out long before that fossil shells were not freaks of nature, but had been laid down where found in the sediments of

some body of water.

Most fossil remains are of marine types ; many are of fresh-water and land-and-water types ; comparatively few are of land types. The reason is plain. Animal remains lying on the ground are eaten by animals, or if not eaten, soon decay, and the bony skeleton, if buried by sand or loam, is slowly dissolved by percolating water. Plant remains decay even more rapidly. In water, decay is retarded. Thus mastodon remains have been found in swamps where the animals were occasionally mired, but of the infinitely greater number of mastodons that died on drier ground, no trace is left. Old lake beds are frequently rich in plant and animal remains. Fishes, insects, birds and land animals, and the leaves, flowers, and fruits of trees are preserved in the fine-grained shales or the sands and clays of the lake deposits in several Western States. It is evident in many

cases that the animals have been drifted into the lake by rivers; and in some cases large de¬ posits of disjointed skeletons of many species are found jumbled together. In old swamps plants formed thick masses of vegetable matter, now turned to coal, imprints of leaves and stems being common in the shale overlying a coal-seam. In the sea, conditions are most favorable for the preservation of organic re¬ mains, and marine deposits have formed thick and extensive beds. Hence, of all the fossils found, marine types are most numerous. Fos¬ sils are preserved in several ways, which may be classified under four heads. (1) Some of the original substance may be preserved, as the carbon in a leaf, or in the bone or shell of some animal. (2) All the original substance may dissolve away, but its shape may be pre¬ served. This may happen in two ways: (a) the external form may be preserved in the sedi¬ ments, forming a mold, or (b) the internal form may be preserved, forming a cast. A mollusk dies; its soft parts decay; the interior of the shell fills with sand or ooze; the shell is deeply buried. The sediments consolidate; the cal¬ careous material of the shell may dissolve ; but both its external and internal form are pre¬ served. (3) Less commonly the structure of organic remains is preserved by a true petri¬ faction, the organic substance being replaced, atom by atom, by some mineral compound, like silica or calcium carbonate. A striking illus¬ tration of this method of preservation is fossil wood, in which the replacing silica preserves minute details of structure. (4) In certain circumstances animals of long past ages may be preserved unchanged wholly or in part by a fortunate accident. The Siberian mammoths and woolly rhinoceroses frozen into perpetual ice, and the insects protected from decay in the Baltic amber and other ancient resins, are good examples, elsewhere described.

The study of fossils (palaeozoology, palaeo- botany) has carried our knowledge of the life of the globe back to its beginning, and illus¬ trated by actual examples the steps in its evolu¬ tion. It has also, by means of

chemistry and the microscope, taught zoologists many new things in respect to anatomy and histology. Finally, the delicate art of extracting fossils from their matrix, and preparing them for in¬ telligent use, has developed a technique that amounts to a regular industry in connection with museums. See Coal; Coral Islands; Geology; Paleontology; Paleobotany.

Ernest Ingersoll.

FOSSOMBRONE, Italy, city in the prov¬ ince. of Pesaro e Urbino, 10 miles north of Urbino, in the valley of the Metauro. It has a splendid 1 5th century cathedral,, which has a high altar by Domenico Rosselli. It contains also a library, technical school and a mediaeval castle. Two miles to the northeast are the ruins of the Roman Forum Sempronii, from which the city is named. Silk, and oil manu¬ facturing are the chief industries. Pop. 9,701.

FOSTER, Ben(jamin), American artist: b. North Anson, Me., 1852. A pupil in New York of Abbott Thayer, and in Paris of Luc Oliver Merson and Aime Morot, he obtained various recognition of his excellence in land¬ scape, including a bronze medal at the Paris Ex¬ position of 1900; the Webb prize of the Society

of American artists in 1901, and the Inness gold medal of the National Academy of Design in 1908. Among his works are (Mists of the Morning,5 for which he received the Webb prize, and (Night Scene at the Paris Exposi¬ tionˆ purchased by the French government for the Luxembourg Gallery. (Lulled by the Mur¬ mur of a Brook) is also in the Luxembourg Gallery and he is represented in the Brooklyn Institute Museum by (Misty Moonlight Night5 and in the Metropolitan Museum, New York, by (In the Connecticut Hills } (1914).

FOSTER, Charles, American legislator and Cabinet officer: b. near Tiffin, Ohio, 12 April 1828; d. Springfield, Ohio, 9 Jan. 1904. He entered a mercantile career at Rome, now Fostoria, Ohio, and became the proprietor of the largest country business in the State. At the time of the Civil War he was active in the recruiting of troops. In 1870 he was elected to Congress in a district previously strongly Democratic, and in 1872, 1874 and 1876 was rechosen. While in Congress he was for some time a member of the Ways and Means Committee. He was elected governor of Ohio in 1879, and again in 1881, his administration being marked by special attention to the non¬ partisan management of public institutions. In 1891 he was

appointed Secretary of the Treas¬ ury by President Harrison, and in that post he negotiated a loan of $25,364,520 at the un¬ precedentedly low rate of 2 per cent. Subse¬ quently he was a commissioner on several diplo¬ matic missions of importance and performed his duties with great skill and satisfaction to his government.

FOSTER, Sir Clement Le Neve, English mineralogist : b. Camberwell, 23 March 1841 ; d. London, 19 April 1904. He was educated at Boulogne and Amiens and at the Royal School of Mines in London, also at the Mining College of Freiburg, Saxony. In 1860 he joined the Geological Survey in England, spending five years in field work. After 1865 he devoted his attention to mineralogy and mining in Corn¬ wall, Egypt and Venezuela. In 1872 he was made inspector of mines in England and in 1890 became professor of mining at the Royal College of Science. In 1892 he became a Fellow of the Royal Society and was knighted in 1903. He published (Ore and Stone Mining) (7th ed., 1910) ; (Elements of Mining and Quarrying)

(1903).

FOSTER, David Skaats, author and mer¬ chant: b. Utica, N. Y., 23 Jan. 1862. He re¬ ceived a public school education and is the head of David S. Foster Sons & Co., iron and coal merchants. He is master of half a dozen languages, and has published (The Romance of the Unexpected) ; (Rebecca the Witch) ; (Elinor Fenton5 ; (Spanish Castles by the Rhine5 ;

(Prince Timoteo5 ; (Flighty Arethusa5 ; (The Road to London5 ; (The Divided Medal5 ; (Our Uncle William5 ; (Nate Sawyer5 ; (The Kid¬ napped Damozel5 ; (The Oval Diamond5 ; (Alraschid in Petticoats.5

FOSTER, Frank Hugh, American Congre¬ gational clergyman : b. Springfield, Mass., 18 June 1851. He was graduated at Harvard in 1873, and at Andover Theological Seminary in 1877. He was ordained to the Congregational ministry in 1877. In 1882-84 he was professor

of philosophy at Middlebury College, and from 1884 to 1892 was professor of Church history at Oberlin Theological Seminary. From 1892 to 1902 he was professor of systematic theology at the Pacific Seminary, Berkeley, Cal. In 1904 he removed to Olivet, Mich., as pastor of the college and church there, and since 1907 has been professor of history at Olivet College. He published (Seminary Method of Study in the Historical Sciences5 (1888) ; fundamental Ideas of the Roman Catholic Church5 (1899) ; (Christian Life and Theology5 (1900) ; (Genetic History of the New England Theology5 (1907). He was joint editor of Bibliotheca Sacra and a contributor to other reviews and religious periodicals.

FOSTER, George Burman, American clergyman: b. Alderson, W. Va., 2 April 1858; d. 22 Dec. 1918. He was graduated from the University of West Virginia (1883) and the Rochester Theological Seminary (1887). Later he studied at Gottingen and Berlin. He entered the ministry of the Baptist Church 1879 and was pastor at Saratoga, N. Y., 1887-91. He was professor of philosophy at McMaster Univer¬ sity 1892-95. In 1895 he went to Chicago Uni¬ versity, where he remained until his death. He served first as professor of systematic theol¬ ogy, and from 1905 as professor of the philosophy of religion. He is the author of (The Finality of the Christian Religion5 (1906) ; (The Function of Religion in Man's Struggle for Existence5 (1909).

FOSTER, Sir George Eulas, Canadian statesman: b. Carleton County, New Brunswick, 3 Sept. 1847. He graduated at the University of New Brunswick in 1868, studied also at Edinburgh and Heidelberg, was professor of classics and history in the University of New Brunswick in 1872-79, and in 1882 was elected to the Canadian Parliament. From 1885-88 he was Minister of Marine and Fisheries; from 1888-96 Minister of Finance; and in 1911 he accepted the portfolio of Trade and Commerce in the Borden administration. He is one of the finest debaters the Canadian House of Com¬ mons has ever produced, with almost unrivalled powers of criticism, and as a platform orator he is strong and effective. He was created K. C. M. G. in 1914.

FOSTER, Isaac, American physician and surgeon: b. Charlestown, Mass., 1740; d. 1781. He was graduated at Harvard in 1758, went to London and Paris to prosecute his studies in medicine, and on his return established his practice in Charlestown. In 1774 he was a delegate to the Massachusetts Provincial Con¬ gress and on the break with England joined the Continental army as volunteer surgeon. In 1775 Washington made him acting director- general of the military hospital system. Two years later he was surgeon in chief of the East¬ ern Department. Ill health obliged him to retire in 1780.

FOSTER, John, English essayist: b. Hali¬ fax, Yorkshire, 17 Sept. 1770; d. Stapleton, near Bristol, 15 Oct. 1843. A Baptist clergy¬ man, self-educated and with an advanced point of view, he contributed to the Eclectic Re¬ view regularly as well as delightfully; but his volume of (Essays5 (1805) constitutes his chief title to recognition. Four in number, these com-

positions are, respectively, (On a Man's Writ¬ ing Memoirs of Himself' ;

(On Decision of Character' ; (On the Application of the Epithet Romantic' ; and (On Some of the Causes by which Evangelical Religion has been Rendered Less Acceptable to Persons of Cultivated Taste.' All are marked by great solidity and depth of thought, combined with a lucidity and nervousness of style which no English author has surpassed. Of the four essays the palm is generally given to that (On Decision of Char¬ acter,' though in the opinion of Robert Hall the fourth of the series was the work on which Foster's fame with posterity would rest. As a preacher Foster never succeeded in attracting much attention. His discourses, though solid and philosophical, were of too abstract and un¬ adorned a nature to be readily appreciated by a popular audience. In 1817 he wrote his (Essay on the Evils of Popular Ignorance,' in which he exposed the fearful condition of the masses in the large towns of England, and strenuously urged the establishment of a national system of education.

FOSTER, John Gray, American military officer : b. Whitefield, N. H., 27 May 1823 ; d. Nashua, N. H., 2 Sept. 1874. He was graduated at the United States Military Academy in 1846, entering the engineer corps. In the Mexican War he was seriously wounded at Molino del Rey. At the outbreak of the Civil War he was assigned to duty at Fort Sumter and was one of its garrison during the siege. In 1861 he wras commissioned a brigadier-general of volun¬ teers ; took a leading part in the capture of Roanoke Island in 1862; was promoted major- general of volunteers ; and became commander of the Department of North Carolina, defend¬ ing that region with skill. Subsequently he commanded the Departments of Ohio and Florida, and in 1865 was brevetted major-gen¬ eral, United States army. Later he was placed in charge of engineering projects in the East, notably in Boston Harbor and Portsmouth.

FOSTER, John Watson, American states¬ man and diplomat : b. Pike County, Ind., 2 March 1836; d. Washington, D. C., 15 Nov. 1917. The son of Judge Matthew Watson Fos¬ ter, he was educated at the University of In¬ diana and the Harvard Law School. He served in the Civil War and was promoted for gal¬ lantry at Fort Donelson and Shiloh. For some years after the war he edited the Evansville Daily Journal and later acted as postmaster of the town and chairman of the State Republican Committee. From 1873 to 1880 he was Minister to Mexico, then to Russia for a short time, and from 1883 to 1885 in Spain. As special pleni¬ potentiary he negotiated treaties with the Brit¬ ish West Indies, Spain and Germany, and be¬ came Secretary of State in 1892, in succession to Blaine, who had resigned after his quarrel with President Harrison. Foster made a treaty with the Americans in Hawaii providing for the annexation of the islands, which was withdrawn by President Cleveland before it could be rati¬ fied. At the Bering Sea arbitration held in Paris Mr. Foster represented the United States and at the invitation of the emperor of China he took part in

the peace negotiations which ended the Chino- Japanese War by the Treaty of Shimonoseki in 1895. He was afterward en¬ trusted with a special mission for the United

States to Great Britain and Russia and was successively appointed a member of the Anglo- Canadian Commission and United States agent at the Alaska Boundary Tribunal. A remark¬ able tribute was paid Mr. Foster in 1907 when, by request, he represented the Chinese govern¬ ment at the second Hague Conference. In 1916, on Foster's 80th birthday, the late Presi¬ dent Yuan Shi Kai of China conferred the Order of the Golden Grain upon him — a very rare distinction. Mrs. Robert Lansing is a daughter of Mr. Foster. The following works were published by Mr. Foster: (American Diplomacy in the Orient' ; (A Century of American Diplomacy' ; Arbitration and The Hague Court'; diplomatic Memoirs'; (The Practice of Diplomacy.'

FOSTER, John Wells, American geol¬ ogist: b. Brimfield, Mass., 1815; d. 1873. He was graduated at Wesleyan University in 1834 and having removed to Ohio studied law and was admitted to the bar there ; in 1837 became an assistant in the Geological Survey of Ohio ; and in 1847 was appointed an assistant to Pro¬ fessor Jackson in a survey of the region about Lake Superior. The results of this survey, executed in connection with J. D. Dana, ap¬ peared in several volumes published by author¬ ity of Congress. Foster aided in the organiza¬ tion of the Republican party in Massachusetts and from 1858 was resident in Chicago, where he made a notable study of the ethnology and palaeontology of the Mississippi Basin. Among his works are (The Mississippi Valley' (1869) ; Prehistoric Races of the United States' (1873).

FOSTER, Lafayette Sabine, American statesman: b. Franklin, Conn., 22 Nov. 1806; d. Norwich, Conn., 19 Sept. 1880. He was graduated at Brown University in 1828 and admitted to the bar in 1830; took an active part in Connecticut politics and was elected to the legislature in 1839, serving several terms. He was elected to the United States Senate in 1854; was president pro tempore of the Senate in 1865; and, after Andrew Johnson became President, was acting Vice-President of the United States. His senatorial term expired in 1867, but on account of his moderate and con¬ servative course in the Senate his re-election was strongly opposed and he withdrew his name. In 1870 he was again elected to the State legislature, but resigned in June of that year to take his seat on the bench of the Connecticut Supreme Court. In 1878 he was appointed a member of the commission to devise simpler forms of legal procedure for State courts and in 1878-79 was commissioner from Connecticut to settle the disputed

boundary question with New York.

FOSTER,' Myles Birket, English painter : b. North Shields, 1825; d. 1899. In 1839 he was apprenticed to Ebenezer Landells, a wood en¬ graver of some repute. Here he learned the graver's art and contributed designs and cuts for the Illustrated, London News and Punch. At the age of 21 he established himself in busi¬ ness, and received commissions to illustrate Gray's (Elegy,' (The Ancient Mariner,' (01d English Ballads,' (Evangeline,' (L'Allegro,' (I1 Penseroso and Goldsmith's (Traveler,' About 1860 he became interested in water colors and soon devoted himself entirely to this art.

He was fond of body colors, and executed his work with extreme delicacy of detail and finish. Landscapes, rustic figures, children and country scenes furnished the themes for his paintings. He became exceedingly popular, and in 1862 was elected member of the Royal Society of Painters in Water Colors at whose exhibits his works were given a prominent place. (Bird's Nest,5 (Feeding the Ducks, 5 (Castle of Rhein- fels) and (In Full Cry5 are among the most important of his paintings. Consult Huish, M. B., (Birkert Foster, his Life and Work5 (in the Art Journal 1890) ; and Cundall, H. M., 'Birket Foster, R. W. S.5 (London 1906).

FOSTER, Robert Frederick, American authority on card games : b. Edinburgh, Scot¬ land, 31 May 1853. He followed the profes¬ sions of architect and civil engineer until 1893, when he became a writer on games of cards. Since 1895 he has been card editor of the New York Sun. He is the inventor of Foster's whist markers and of self-playing whist and bridge cards and originated the <(eleven rule® at bridge. He has published

'Foster's Whist Manual5 (3d ed., 1894) ; 'Whist Tactics) (1895) ; 'Foster's Complete Hoyle- (1909); 'Foster's Bridge ManuaP*

(3d ed., 1908) ; (Foster's Bridge Tactics)

(1903) ; 'Bridge Maxims) (1905) ; 'Practical Poker5 (1905); 'Call-ace Euchre) (1905);

'Foster's Skat ManuaP (1906) ; 'Auction Bridge) (3d ed., 1910) ; 'Cab No. 44, 5 a novel (1910); 'Royal Auction Bridge5 (1914);

'Cooncan5 (1913).

FOSTER, Robert Verrell, American theo¬ logian: b. Wilson County, Tenn., 12 Aug. 1845; d. Lebanon, Tenn., 27 Jan. 1914. He was educated at Cumberland University (Lebanon, Tenn.), and the Union Theological Seminary, and after 1877 was professor in the former, originally of Hebrew and New Testament Greek, subsequently of systematic theology. Of his publications may be named 'Old Testa¬ ment Theology5 (1890) ; 'Systematic Theology5 (1898) ; 'Commentaries on International Sun¬ day School Lessons5 (1881-95) ; also many articles for the daily and periodical press.

FOSTER, Roger, American lawyer: b. Worcester, Mass., 1857. He studied at the University of Marburg, Yale and the Colum¬ bia Law School, in 1880 was admitted to the New York bar, and was special counsel to the board of health of New York in 1896-98. He has been retained as counsel in many important cases. His writings include, besides many pamphlets and articles in periodicals, 'A Treatise on Federal Practice5 (1890-92); 'A Treatise on the Income Tax of 18945 (1895); and numerous pamphlets and articles in periodicals and a treatise on the Income Tax of 1913.

FOSTER, Stephen Collins, American songwriter: b. Pittsburgh, Pa., 4 July 1826; d. New York, 13 Jan. 1864. He was educated at Athens Academy and Jefferson College, Pennsylvania. He composed the music and wrote the words of over 125 popular songs and melodies, among which are 'Old Folks at Home5 ; 'Nelly Gray5 ; 'Old Dog Tray5 ; 'Come Where My Love Lies Dreaming5; 'Su- wanee River,5 etc.

FOSTER, Stephen Symonds, American abolitionist: b. Canterbury, N. H., 1809; d. 1881. He was graduated at Dartmouth Col¬ lege in 1838; studied theology at the Union Seminary, became an anti-slavery orator and was known for his radical methods. His at¬ tacks upon the Church for its position in re¬ gard to abolition aroused hostility against him and his practice of interrupting church serv¬ ices was the cause of several mob disturbances. He published 'The Brotherhood of Thieves: A True Picture of the American Church and Clergy5 (1843).

FOSTER, Theodosia Toll ("Faye Hunt¬ ington55), American author: b. Verona, N. Y., 1838. She was married to James H. Foster 1869. She was educated at the Oneida Semi¬ nary, and was for many years principal of a school at Verona. From 1890 to 1906 she was president of the Women's Christian Temper¬ ance Union of Oneida County, N. Y. She has also held the office of secretary in the Women's Board of Home Missions of the Presbyterian Church of America. She became blind in 1911. Her works include a long series of volumes of action, such at 'Mr. McKenzie's Answer5 (1876); 'Ripley Parsonage5 (1877) ; 'From Different Standpoints5 (1878) ; 'Echoing and Re-Echoing5 (1879; new ed., 1906);

‘Mrs. Dean’s Way5 (1880); ‘Millerton People5 (1884) ; ‘What Fide Remembers5 (1885) ; ‘The Boynton Neighborhood5 (1895) ; ‘A Modern Exodus5 (1897); ‘His First Charge5 (1897); ‘Lewis Elmore — Crusader5 (1898); ‘Oppor¬ tunity Circle5 (1901) ; ‘A Break in Schedule Time5 (1901); and ‘Those Boys5 (1903).

FOSTER, William Trufant, American ed¬ ucator: b. Boston, 18 Jan. 1879. He was gradu¬ ated at Harvard in 1901. In 1901-03 he was instructor in English at Bates College and in 1904-10 at Bowdoin. In 1910 he became presi¬ dent of Reed College, Portland, Ore. In the summer of 1909 he lectured on the principles of education at Harvard and at Columbia in 1911. He has published ‘Argumentation and Debat¬ ing5 (1908) ; ‘Administration of the College Curriculum5 (1910); ‘Essentials of Exposition and Argument5 (1911); ‘Social Hygiene and Morals5 (1913).

FOSTORIA, Ohio, city in Seneca and Hancock counties, 35 miles from Toledo, on the Baltimore and Ohio and Lake Erie and West¬ ern railroads. In the midst of a rich agricul¬ tural region with valuable oil fields, it is a thriving manufacturing centre whose develop¬ ment is largely due to Charles W. Foster, father of Charles Foster, governor of Ohio (1880-84) and Secretary of the United States Treasury (1891-93). The United States census of manufactures for 1914 showed within the city limits 47 industrial establishments of fac¬ tory grade, employing 1,498 persons; 1,252 being wage earners receiving annually a total of $635,000 in wages. The capital invested ag¬ gregated $3,121,000, and the year’s output was valued at $6,125,000: of this, $1,736,000 was the value added by manufacture. The output in¬ cludes flour, planing mill products, glass, lime, incandescent lamps, automobile engines and parts, and railway torpedoes. It operates municipal waterworks, has a Carnegie library and hand¬ some Y. M. C. A. building. The administration is by a mayor elected every two years and a

city council, with public service and public safety departments. Pop. 10,000.

FOTCHA. See Foca.

FOTHERINGHAY CASTLE, the site of which was near Peterborough, England, 27 miles northeast of Northampton. The castle to which a melancholy interest attaches as the scene in 1587 of the imprisonment, trial and execution of Mary Queen of Scots, was de¬ molished by her son

James I. Several of the illustrious Plantagenets are buried in its church.

FOTTINGER, fet'tin-ger, Hermann, Ger¬ man engineer: b. Nuremberg, Germany, 1877. He received his education at the gymnasium of Nuremberg and at the technical institute of Munich. In 1899 he became engaged in the construction of ship machinery and in 1906 was awarded a silver medal for his turbine inven¬ tions. Since 1909 he has been professor at the Royal Technical Institute of Danzig. He wrote (Effektive Machinenleistung und effek- tives Drehmoment und deren experimentelle Bestimmung) (1904).

FOUCAULT, foo-ko, Jean Bernard Leon,

French scientist: b. Paris, 18 Sept. 1819; d. there, 11 Feb. 1868. He was scientific editor of the Journal des Debats from 1845, in 1854 be¬ came physicist to the Imperial Observatory, and in 1855 received the Copley medal of the Royal Society of London for his measurement of the velocity of light, and in 1864 became an officer of the Legion of Honor. His inven¬ tions include a device much used in the em¬ ployment of the electric light in microscopic and optical researches. He also demonstrated (1851) by means of the pendulum and the gyroscope the rotation of the earth upon its axis. Consult Lissajous, (Notice historique sur la vie et les Travaux Scientifiques de Leon Foucault (Paris 1875). See Foucault Currents ; Foucault's Pendulum Experi¬ ment.*

FOUCAULT CURRENTS, or EDDY CURRENTS, are electrical currents gener¬ ated by induction within the substance of a massive conductor that is moving in a magnetic field, or which is exposed to the influence of a variable field. If the conductor is filiform, like a wire, no current can be produced in it save in the direction of its length. If a mas¬ sive conductor be thought of, however, as com¬ posed of an infinite number of closed circuits, each composed of a single wire and all tangled up and then melted into a solid mass, it is evi¬ dent that (in general) currents will be in¬ duced in all of these imaginary circuits when the conductor moves, or when the field to which it is subjected varies. In the actual case the conductor is not composed of wires melted together, but currents are nevertheless generated within it just as though these wires had an actual objective existence. Mathemat¬ ical equations can in fact be written down, from which it is possible to compute the direc¬ tion and intensity of the current that is flowing, at any given instant, through any proposed point of a conductor in a known but varying field. Such calculations are seldom made out¬ side of college classrooms, however, because it is known from the general principle of the conservation of energy that the direction of the Foucault currents is everywhere such as to oppose the change (of whatever sort it may be)

which produces them. Hence such currents tend to diminish the efficiency

of all motors, dyna¬ mos and transformers in which they occur and designers therefore strive to avoid them so far as possible. In armatures and in transformers, for example, it is customary to laminate the masses of iron that are exposed to changing fields, the individual parts being insulated from one another by air gaps or otherwise and their surfaces of separation disposed (as nearly as practicable) so as to be perpendicular to the direction in which the Foucault currents tend to flow. In galvanometers, masses of copper are often purposely disposed near the sensitive needle with distinct advantage ; for while they do not affect the total deflection of the needle, they cause it to come to rest very quickly after the circuit is broken, the motion of the needle inducing Foucault currents in the copper, which tend always to bring the needle to rest. The energy that is expended in the generation of Foucault currents is transformed into heat and raises the temperature of the mass within which the currents are flowing. The name refers to the French physicist, Jean Bernard Leon Fou¬ cault (q.v.), who studied the subject with much care.

FOUCAULT'S PENDULUM EXPERI¬ MENT, a curious and remarkable method in¬ vented by Jean Bernard Leon Foucault (q.v.), of showing rotation of the earth on its axis, by observing a vibrating pendulum and his ex¬ periment goes under the above name. In this experiment a gradual disc is seen to turn, while a pendulum freely suspended maintained its plane of oscillation. If a heavy ball is sus¬ pended by a fine wire and set to vibrate like a pendulum, it may easily be shown, either mathematically or by experiment, that the point of suspension, with the wire and ball, may be rotated round an axis, passing along the length of the wire without interfering with the vibration. In other words, the pendu¬ lum will continue to vibrate in the same plane, although the point of suspension be turned round the axis of suspension. It follows im¬ mediately from this that if we could sus¬ pend a pendulum at the north or south pole and set it vibrating it would continue to swing in the original plane of vibration; and as the earth is turning on its axis, a marked line on the earth's surface would appear to turn under¬ neath the pendulum ; or rather, it would seem to an observer, accustomed to feel as if the earth were at rest, that the plane in which the pendulum vibrates turns round relatively to the marked line on the earth's surface. It is easily shown that a similar phenomenon may be observed in any latitude except at the equator; the amount of rotation, however, that the plane of vibration of the pendulum seems to undergo is not so great in low latitudes as in high latitudes; but still in our latitudes rotation takes place to an extent easily observ¬ able. The performance of this experiment re¬ quires the greatest nicety. The pendulum is suspended on a fine wire, the support of the wire being constructed with great accuracy, so as not to interfere with the vibrations. The motion of the pendulum must be strictly con¬ fined to one plane; and, for that reason, in

setting it to vibrate the bob is drawn aside and fastened by a silk thread and when everything has come perfectly to rest the bob is released

by burning the silk thread. During its subse¬ quent motion it is protected from currents of air by glass screens. It need scarcely be re¬ marked, however, that this experiment is noth¬ ing more than an illustration. Our knowledge of the rotation of the earth, drawn from astronomical considerations, cannot be strengthened by it. This experiment was first made public in 1851, when it was exhibited by M. Foucault before the French Academy.

FOUCHE, foo-sha, Joseph, Duke of Otranto, French politician and detective : b. Nantes, 21 May 1759; d. Trieste, 25 Dec. 1820. The Revolution, into which he entered with en¬ thusiasm, found him teaching philosophy in Nantes; he became advocate and was sent to the convention by the department of Loire-In- ferieure. Here he was placed on the Commit¬ tee for Public Eduction, voted for the death of the king and was implicated, at least nominally, in the atrocities of the period. In 1793 he was sent to the department of Nievre to take ven¬ geance on such persons as had incurred sus¬ picion, which he carried through with vigor. In 1794 he incurred the hatred of Robespierre, and thus had a strong stimulus to assist in his downfall. In August 1795, he was expelled from the convention and kept a prisoner till the amnesty in October. In 1796 he communi¬ cated important information to the director Barras as to the designs of Babeuf and was rewarded in 1798 by being sent to Milan as Am¬ bassador to the Cisalpine Republic. Here he labored with General Brune to establish a second 18th Fructidor; both were in conse¬ quence recalled. He appeared in Paris in 1799, after Barras had gained the ascendency, and was appointed Ambassador to Holland. Shortly after Fouche was recalled and named Minister of Police. This post he held, with intervals, until 1815. Here he first had full opportunity to display his great talents and exercise an important influence on the internal policy of France. His elaborate system of espionage gave him great power and proved at times almost intolerable to Napoleon, who dismissed him in 1802, and rewarded him with a senatorship; but he was recalled. After the battle of Waterloo, Fouche urged Napoleon's second abdication and advised him to seek an asylum in the United States. He placed him¬ self at the head of the provisional government, negotiated the capitulation of Paris, obtained the removal of the army behind the Loire and thus prevented useless bloodshed. Louis XVIII made him again Minister of Police; and he labored so zealously in favor of moderate measures as to incur the hatred of all the ultra¬ royalists. He therefore resigned his office in 1815 and went as French Ambassador to Dresden. As he was struck at by the decree issued in 1816

against the murderers of the king, he sought an asylum in Prague. He afterward went first to Lintz, and then to Trieste.

Adroit, skilful, politic and unscrupulous, a Jacobin and the persecutor of Jacobins, Repub¬ lican, Bonapartist or Royalist as the occasion demanded, Fouche loved intrigue for its own sake; from first to last he fought for his own hand and was carried through all the dramatic and startling changes of the stirring times in which he lived without hurt to his own person

FOUILLEE

by sagaciously preparing a line of retreat for himself under all eventualities and by an in¬ stinct of self-preservation that amounted al¬ most to genius. The volumes of memoirs pub¬ lished posthumously under his name have been pronounced forgeries by his family. Consult Martel, (Etudes revolutionnaires : Etude sur Fouche5 (1819) ; and his life by Madelin (2 vols., Paris 1901).

FOUCHER, foo-sha, Jean, early explorer and colonizer in South America : b. Cambrai, Flanders, 1508; d. 1567. He was with Sebas¬ tian Cabot at the discovery of the Paraguay River, in 1534 shipped as pilot to Mendoza's expedition to Paraguay, led an exploring party to the foothills of the Peruvian Cordilleras, and was a counsellor of Cabeza de Vaca (q.v.), with whom he was sent prisoner to Spain. Having received pardon he was appointed gov¬ ernor of Entre Rios, where he maintained a friendly attitude toward the natives and made further explorations.

FOUCHET, foo-sha, Jean Antoine Jo¬ seph, Baron, French diplomatist: b. Saint Quentin, France, 1763. The date of his death is not known. He was a law student in Paris when the Revolution broke out and pub¬ lished a pamphlet in defense of its principles. Soon afterward he was appointed a member of the executive council of the Revolutionary government, and was French Minister to the United States in 1794—95. Subsequently under Bonaparte he was prefect of Var and, in 1805, of Ain. , On Napoleon's return from Elba he was made prefect of the Gironde.

FOUCQUET, foo-lca, Jean, French

painter : b. Tours about 1415 ; d. Paris about 1485. He received his early artistic training in Italy, where he painted a portrait of Pope Eugenius IV, and later entered the service of Louis XI of France. For the king he executed several portraits. His best work consists of 40 miniatures in a prayer-book for Etienne Chevalier. Only in comparatively recent times has he been recognized as a founder of the French school.

FOUGERES, foo-zhar', France, town and capital of an arrondissement in

the depart¬ ment of Ille-et-Vilaine, 25 miles northeast of Rennes, on the Nangon River. It contains many interesting remains of mediaeval times, particularlyˆ an ancient castle and the churches of. Saint Leonard and Saint Sulpice. It is the chief industrial town of the department, being a centre for the manufacture of boots and shoes, leather, sail-cloth, dairy products. Nearby is a great forest with prehistoric megalithic and Celtic remains. Pop. 13,753.

FOUILLEE, foo-ya', Alfred Jules Emile,

French philosopher and sociologist: b. La Poureze, department of Maine-et-Loire, 18 Oct. 1838; d. Lyons, 16 July 1912. He was to all in¬ tents and purposes self-educated, as he never had attended a university. From 1864 to 1868 he taught in obscure provincial schools, and in 1869 received an appointment at the Bordeaux Lycee. Here he founded his reputation as a teacher of philosophy. In 1872 he was ap¬ pointed to the chair of philosophy at the Ecole Normale Superieure at Paris. His eyes and health failed him in 1875 and he gave up leaching for writing. He wrote several works

FOUL BROOD

FOUNDATION

533

on philosophy in the narrower sense on Socrates, Plato, on the problem of free-will and determinism, between which he tried to mediate, on idealism, positivism, anti-intel- lectualism, Nietzsche and Kant. One of his best-known books is his (Critique des systemes de morale contemporainsP The tendency to apportion praise and blame with judicial fair¬ ness is everywhere apparent and his philosophy consequently assumes the character of a media¬ tion between opposing opinions. These tend¬ encies find their counterpart in his sociologi¬ cal investigations, for which he is most famous. In (La science sociale contemporaine) he com¬ bines the ideas of the social organism and the social contract and accepts the organic theory of social genesis, the contractual theory of social rights and wrongs. In (L'Idee du droit) he synthetizes the views of the basis of law as farce, as equity and as utility. An analogous weighing of antithetic claims characterizes (La propriete sociale et la democratic.) In (Le socialism et la socialogie reformiste) he com¬ bines a strongly democratic tendency with an opposition to revolutionary methods. He was the author of several psychological works, in which he lay great stress on the notion of ideas as agents in evolution. He was a mem¬ ber of the Institut de France and of numer¬ ous foreign academies. At one time he was president of the Institut

International de Sociologie. His wife, formerly Madame Guyot, was active in educational matters and was the author of (La tour de la France par deux en- fantsP under the pseudonym of G. Bruno. Consult (La Philosophic et la sociologie d'Alfred Fouillee, by his stepson, J. M. Guyan, and Worms, Rene, ((Alfred Fouillee® (in the (Archiv fur Geschichte der Philosophies Vol. XXVI, N. S. Vol. XIX, Berlin 1913).*

FOUL BROOD. See Bee-keeping, Dis¬ eases of Bees.

FOULA (foo'la) ISLAND, the most west¬ erly of the Shetland group, lying 16 miles southwest of the nearest point of mainland. It is a little over three miles in length and is two and one-half miles in breadth.

FOULD, fool, Achille, French financier: b. Paris, 17 Nov. 1800; d. Tarbes, 5 Oct. 1867. The son of a banker, he entered the financial field and succeeded his father in the latter's banking business. In 1842 he entered the. politi¬ cal arena, being elected to the Chamber in that year. He acquiesced in the Revolution of 1848 and his knowledge of financial matters was of supreme importance to the provisional govern¬ ment. He opposed the use of paper money and to this end published the pamphlets (Pas d' As¬ signats! > and Observations , sur la. question financiered He was four times Minister of Finance under Louis Napoleon. In 1852 he resigned this office in consequence of the con¬ fiscation of the property of the Orleans family. He was appointed senator and soon became Minister of State and of the Imperial House¬ hold. He resigned in 1860 but was recalled to the Ministry of Finance in 1861.

FOULIS, fowlz, Robert and Andrew, emi¬ nent Scottish printers and publishers : b. Glas¬ gow, the former in 1707; d. 2 June 1776; the latter b. 1712; d. 18 Sept. 1775. In 1741 Robert commenced business in Glasgow as a book¬

seller; and in 1741, having obtained the ap¬ pointment of printer to the university, began in that capacity to issue editions of the ancient classics, which have made his press famous, both from the beauty of their type and their accuracy. For 30 years they issued the most accurate editions of the classics, in English, French, Italian, Latin and Greek. Their edition of Horace stands pre-eminent, and is hence known by the name of the ˆImmaculate® edi¬ tion. In their later years they promoted an academy of painting and sculpture in which their fortune was lost.

FOULKE, William Dudley, American au¬ thor: b. New York, 20 Nov. 1848. He was graduated at Columbia in 1869, at the Law School of the university in 1871, practised law in New York, removed to Indiana in 1876, where he was for 15 years an attorney of the Pittsburgh, Cincinnati

and Saint Louis Rail¬ road, and for one year (1883), editor of the Palladium and afterward of the Evening Item. He became a member of the State senate (1882- 86). In 1889-90 as chairman of a special com¬ mittee of the National Civil Service Reform League, he made important investigations in connection with the United States civil service. In 1893 he was chairman of the Suffrage Con¬ gress at the World's Columbian Exposition. He was United States Civil Service Commis¬ sioner in 1901-03 and president of the National Municipal League from 1910 to 1913. His pub¬ lications are (Slav or Saxon) (1887) ; (Life of O. P. Morton) (1899); (Maya: A Tale of Yucatan) (1900) ; (Protean Papers) (1903) ; a translation of (History of the Langobards by Paul the Deacon) (1906) ; (Dorothy Day (1911) ; – (Mava : A Dramatic Poem) (1911); (Some Love Songs of Petrarch) (1915).*

FOULQUES, foolk, or FULCO OF NEUILLY, the preacher of the Fourth Crusade who flourished in the 12th century. He studied in Paris and there became cele¬ brated as a pulpit orator. He wandered throughout the country, preaching and ex¬ horting the populace to amend their ways. In 1198 he began to preach the Crusade and in three years he claimed to have influenced 200,000 to undertake it. He did not live to see the result for he expired at Neuilly early in 1202. Consult Villehardouin, (La conquete de Constantinople) (Paris 1874).

FOUNDATION. The term designates either the lower courts of a masonry structure, or a specially prepared surface or bed in con¬ tact with the soil or bed-rock upon which a building or other weighty structure of any kind is to be built. In practice there are many cases, however, in which the bed and the lower courses of the masonry structure jointly com¬ prise the foundation proper, and render difficult or unnecessary the drawing of any marked dis¬ tinction between them. The earlier Romans erected their buildings on the most solid foun¬ dations constructed of large blocks of concrete, composed of quarry rubbish, gravel or burnt earth, bonded by an excellent mortar. This material formed under the superstructures homogeneous basements of veritable artificial rocks capable of sustaining the heaviest of buildings without rupture or settlement. Dur¬ ing the later Roman period, however, the foun¬ dations were much neglected, so that the archi-

tects of the 12th century afforded many ex¬ amples of important edifices fallen on account of bad foundations.

The architectural and engineering works of to-day have passed from the types of com¬ paratively light superstructures to those of mammoth size and enormous weight, requir¬ ing the strongest and most permanent founda¬ tions that modern engineering skill is capable of designing, and the application of reinforced con¬ crete or concrete steel methods to the construc¬ tion of practically all classes of foundations appears to represent the best practice of modern times.

The employment of a particular type of foundations depends upon the character of the soil and the presence of water, and the widely varying conditions met with in practice have developed several classes of foundation struc¬ tures which may be briefly designated as peat foundations, sand foundations, hard soil foun¬ dations, pile foundations, etc.

Foundation Soils. — These vary in char¬ acter from hard and solid bed-rock, hard-pan, and firm sand to liquid mud, quicksand and silt. It is clear that hard bed-rock, hard-pan, firm sand and various kinds of compact clays are the best materials to sustain foundation struc¬ tures ; but practical experience has very satis¬ factorily demonstrated that almost every sub¬ stance in nature is capable of supporting the weight of other substance, no matter how small the sustaining capacity of that material may be, provided the weight to be sustained is distrib¬ uted over a sufficiently large area, and provided the conditions of the soil are permanent.

The sustaining power of soils depends upon their composition, the amount of water which they contain or which may drain through them and the degree to which they are confined. Sound hard bed-rock of ledge formation will support loads up to 36 tons per square foot, but if the rock is seamy, rotten or in slippery inclined layers its sustaining capacity will be materially less. In general, the latest practice assumes the following safe allowable pressures : For hard-pan, eight tons per square foot ; com¬ pact sand and clean gravel free from lateral movement, five tons per square foot; dry clay, three tone per square foot; and loam, one ton per square foot. Soft, watery clays, mud, quicksand and silt have very little or no sus¬ taining power, and have to be penetrated until firmer material is reached and require to be compacted by draining, or consolidated by other means. If piles are employed, and they are driven to bed-rock or to refusal, the sustain¬ ing power is determined by the crushing strength of the material of the pile — timber, iron or concrete, as the case may be.

Peat Soil Foundations. — In soils such as peat, it is almost impossible to carry the walls down to a sufficient depth to reach a solid base. In such cases one of three methods has to be adopted — laying a strong concrete

floor spread over a sufficient area ; planting masses of iron or brickwork; or driving of piles. If a con¬ crete floor is employed, it may cover the entire surface to be occupied by the building, and even extend to some distance beyond the foot¬ ings of the walls in order to prevent cracks and settlements. These injuries are usually caused by heavy walls being placed too close to the edge of the concrete floor, causing it to

buckle and crack, and to settle irregularly under the unequal weights of walls of different thick¬ ness. This condition is somewhat obviated un¬ der the French system by forming a lip under the edge of the concrete floor, converting it into a kind of inverted tray which confines the substratum within its limits.

Sand Soil Foundations. — In hard stable sand or gravel, or in compact dry clay above water level, the construction of strong, perma¬ nent foundations require comparatively simple methods. If the location is in cold countries, the preliminary excavation is carried well be¬ low the frost line, and the bottom is carefully leveled off to receive the concrete bed, or the broad footing formed by the lower courses of the masonry.

In the case of compressible soils, artificial means in the form of piles or of beds of con¬ crete are first employed, and upon the plat¬ forms thus obtained the foundation proper is constructed. If foundations have to be con¬ structed upon running sand, a satisfactory method is to make a good concrete floor the entire width of the trench, putting it in quickly, sealing up the sides and then pumping out the water when it reaches the level of the top of the concrete.

Clay Soil Foundations. — The construction of foundations in dry clay calls for the appli¬ cation of the simplest methods ; but, in clay strata impermeated with water, and having a tendency to slide, especially in the case of hill¬ side excavations, the problem is difficult and complex. As a rule, such soils do not slide piecemeal, but, where they do move, will slide as a mass with an almost irresistible energy capable of rupturing the strongest timbers as if they were toothpicks. The only way to pro¬ ceed in such cases is to disturb as small a sec¬ tion as possible at a time so that any forward impulse may not be communicated to the entire mass, and to provide strong cross walls in the basement to act as buttresses. The foundations should be carried down to or below the ulti¬ mate drainage level so as to prevent shrinkage by any subsequent draining of the subsoil.

Pile Foundations. — These consist of groups of piles of timber, iron or concrete, plain or reinforced, sunk into the substrata and capped with platforms of timber or concrete upon which the superstructure is finally built.

Timber piles are tree trunks of varying diameter and length, with the bark removed and the knots and lateral branch stems cut off. Iron piles are of two kinds : the screw pile, consisting of a shaft of iron or wood, equipped at the foot with an iron casting in the form of two screw blades ranging in size from one to five feet in diameter; and the disc piles, con¬ sisting of hollow tubes carrying discs at their lower ends instead of screw blades. Concrete piles consist of tapering cylinders of concrete formed in place, and of columns of reinforced concrete of rectangular cross-section made above ground and subsequently driven into place by means of a pile-driver.

Various methods are employed to sink or drive piles into place. Timber piles are driven by the use of hammers which are raised and dropped by some form of engine. They have also been sunk by the aid of jets of water under pressure, as suggested by Sir James Brtinlees as early as 1850, and first employed by him in

connection with the sinking of iron piles in the construction of the foundations to carry a rail¬ way across the treacherous sands of Morecambe Bay. Some of the most notable deep pile foun¬ dations constructed by the driving method are found in Chicago, where the soil is soft, as those under the Public Library building, and the Illinois Central Railway passenger station. The latter is a structure 180 by 220 feet in plan, 9 stories high, with a tower of 13 stories and a station 3 stories high connected with a train shed 680 feet long. Borings taken on the site showed the substrata to consist of 10 to 20 feet of rubbish accumulated by dump¬ ing, and below that, several irregular layers of stiff blue clay and quicksand down to bed-rock, more than 60 feet below the surface. These conditions led to the adoption of a deep pile foundation, and about 1,700 piles, arranged in groups or clusters, were driven under the col¬ umns. These piles ranged in size from 40 to 60 feet in length, and from 11 to 16 inches in diameter at the butt. Thirty-two per cent were black gum, 22 per cent pine, 21 per cent oak, 7 per cent basswood, and 15 per cent hickory, with a few maple and elm. They were driven with drop hammers weighing 2,800, 3,200, and 3,800 pounds respectively, the fall ranging from 35 to 50 feet. A cast-iron cap was fitted over the heads of the piles to prevent them from being crushed or split, but in spite of this pro¬ tection over 8 per cent of the heads suffered serious injuries of that character. The piles were all driven in groups until the tops of all were below the leads, then the driving was completed by the use of a follower. Water was kept running continuously around the pile at the surface during the driving operations and was found to materially aid in the sinking of the piles. After the piles

had been driven home, the tops were sawed off to a uniform height of three feet below datum, thus placing all the timber below low water level. As this was at least 10 feet below the surface, the trenches had to be sheathed, and were kept drained by continual pumping. The earth was excavated to the depth of 18 inches below the top of the piles and carefully mixed concrete was tamped in flush with the tops. Finally, oak caps 12 inches square were drift-bolted to the centre of each pile, and the space between the timbers was filled with concrete.

When piles are sunk with the aid of jets of water, the work is accomplished much more simply and rapidly than by driving. A pipe two or three inches in diameter is attached to the side of the pile and connected to a pump. The pile is first covered with pitch and then the water is forced through the pipe under the bottom of the pile, so that the sand is converted to a degree of fluidity that allows the pile to descend rapidly to the desired depth. When one pile has been put down home, the feed pipe is detached and spiked onto another and the operation is repeated. The accuracy and cer¬ tainty of this method is so great, that it is a common practice to make the holes for the bolts in the piles before they are brought into position. After the pile is down and a reason¬ able length of time has been allowed for the churned up sand to subside, it recovers its so¬ lidity and grips the pile so tightly, that it is almost impossible to start it again.

When hollow iron piles are used, the water

is conveyed through the centre of the tube un¬ der hydraulic pressure, disturbing the sand under the piles and allowing them to sink by their own weight to the proper depth. Upon withdrawing the pressure and stopping the flow of water, the sand returns to its former con¬ sistency and holds the pile stationary.

Concrete piles have been used during a com¬ paratively recent period, but their success has been so preat that their development in the future promises to bring them into general use in the place of timber and iron piles. These piles, as previously mentioned, are either formed in place, or they are molded above ground. A great many methods have been suggested for forming the hole to contain the concrete when the pile is formed in place. One

method consists in driving a double shell of metal into – Air/n/et the ground and then

*withdrawing the in- *- iron Tube ner shell, leaving*

the outer shell as a mold for the con¬ crete. Another method, shown by Fig. 1, employs a single shell equip¬ ped with a concrete or a steel point. The shell is first driven to the desired depth and then withdrawn slowly and the space it occupied filled with concrete, the surface being kept at a sufficient depth below the end of the tube to maintain the head required to resist the pressure of the ground. Con¬ crete piles used for under-pinning are sometimes sunk with the aid of the water jet to a depth suf¬ ficient to reach firm strata and the bot¬ tom of the excava¬ tion is enlarged by means of a spiral expanding device so as to form a base, as shown in Fig. 2.

Piles made in place may be reinforced, if desired, but usually reinforced concrete piles are formed above ground. They are designed like columns, the reinforcement consisting of vertical bars of steel connected at intervals with horizontal wire rods or plates. They are made usually in square and triangular cross- section, circular molding being too expensive and the arrangement of the required reinforce¬ ment being too complex. The general char¬ acter of these piles is illustrated by Fig. 3.

The supporting power of piles depends upon their action as a column resting on a hard base, or upon the friction against their sides devel¬ oped by the gripping action of the material through which they have been driven. Very often the supporting power is a combination of both actions. The amount of this power may

Oak Head

Ground

txpano Mefai- Concrete\ Point –

536

FOUNDATION

be calculated in various ways, but at their best the results are of necessity only approxima¬ tions. The supporting power of a pile driven to bed-rock is determined by the crushing strength of the material of which it consists, but it it is supported wholly or in part by side friction, as is almost always the case, its sup¬ porting power is calculated by a formula based upon factors obtained by experiment, or upon the distance penetrated by the pile under the blow of the driving hammer.

The construction of the pile foundations for the Chicago Public Library building afforded valuable information relative to the supporting power of piles as determined under actual con¬ ditions. Piles of Norway pine were driven with a steam hammer having a total weight of 8,300 pounds, the hammer alone weighing 4,500 pounds and delivering 54 blows per minute, with a stroke of 42 inches. The last 20 feet of driving was accomplished by means of a fol¬ lower. The piles were placed about two and one-half feet centre to centre, and the sup¬ porting power of four piles was tested by building a platform on top of them and loading it with pig-iron. Levels were carefully taken on each pile. They stood four days with a loading of six tons on each pile, eight days with a loading of 37 tons per pile, and 10

days with a load of 50 tons per pile. The The settlement did not exceed 0.01 of a foot. These tests indicate that if 250 pounds per

*- [12— — **

Soft-sfetfRods 1% Dim.

1

m.

*it**

■*A *.*

\-Concrere

square inch be assumed for point resistance, the average frictional resistance will amount to about 3.2 pounds per square inch of side sur¬

face of pile, or about 432 pounds per square foot. In the case of an ordinary pile, seven inches through the top and 14 inches at the butt, driven in a fairly solid soil, the point of resistance might be 6,000 pounds and the frictional resistance 59,000 pounds, a total earth •resistance of 65,000 pounds, equivalent to the supporting power of the pile considered as a column and al¬ lowing a safe support for 25,000 pounds.

*Usually, the deter¬ mination of the point at which a pile . is considered as having been driven to a firm bearing depends greatly upon the judgment of the en¬ gineer in charge, based upon his ex¬ perience in the par¬ ticular locality in which the work is being performed. The best practice, how¬ ever, affords the fol- \'An*rv 'owing s*fe specifica-*

-WatrMtPfoe tlons of allowable nrateympe penetration. For piles

meeting a hard re¬ sistance a penetration of one inch under each blow of a 2,000- pound hammer fall¬ ing 10 feet, and a penetration of two inches under the blows of a 2,000-pound hammer falling 15 feet. The minimum distance between centres depends upon the hardness of the sub-strata, the size of the butts and the weight to be carried. Spruce piles may be often driven 24 inches be¬ tween centres, while large and long piles need not usually be driven closer than 30 inches between centres. Another factor that must be carefully considered is the supporting power of the soil as a whole. For example, if that power is. equal to two tons per square foot and each pile is capable of sustaining 18 tons, it is useless to place the piles closer than three feet between centres.

In connection with the use of timber piles in places where the durability of the timber is very liable to be seriously impaired by the at¬ tacks of the Teredo worm, the latest practice appears to favor the system of armoring them With concrete. In such cases the timber piles are usually driven in sets of three to a firm bearing. They are then cut off, one two feet, one four feet and one eight feet, below the level of the wharf platform. A wooden stave

Cast-indn Point Fig. 3.

*cylinder of three-inch planking is then placed around the piles and driven into the mud to a depth of , perhaps 12 feet, and the bottom of the cylinder sealed. The contained water is then pumped out and a cylinder of expanded metal is set *within the wooden cylinder, and the re¬ maining space filled with concrete.*

Another method still more recently intro¬ duced consists in the use of terra-cotta pipes as an outer covering for the piles. In this case the armoring is limited to individual piles.

. "Skyscraper® Foundations.— In the con¬ struction of the tall steel and concrete build¬ ings commonly called "skyscrapers,® which are so common in Manhattan, N. Y., the usual plan is to excavate the foundations 30 to 50 feet, and then to sink steel caissons as may be necessary to permit concrete piers to go to bedrock. The size and number of these piers is determined by the weight of the superstruc¬ ture. If it is not possible to spread the foundations beyond the line of the walls, steel trusses are placed at the footings of the walls to transfer the weight to the centre of the piers, distributing it uniformly. It is common to cap the piers with large blocks of granite or stout iron castings. The foundations of one of these tall buildings, when nearing com¬ pletion, presents the appearance of a group of concrete piers rising from the soil to the level of the cellar. A great deal of ingenuity is re¬ quired to sink deep foundations in a large city without disturbing the support of adjacent buildings.

Platform Foundations. — These structures are designed to distribute a concentrated weight over a large area in soft substrata when piles are not employed. They may consist of beds of concrete, or of masonry or brick inverted arches sprung between supporting piers or columns, as shown by Fig. 4. They may also consist of platforms of timber grillage — tim¬ bers placed across each other in alternate layers, or of platforms of concrete or masonry reinforced with a grillage of steel bars, as illustrated by Fig. 5, which shows the platform foundations of a World's Fair building in Chicago, consisting of a concrete bed rein¬ forced with a steel rail and I-beam grillage, to support the base castings of the main columns.

Subaqueous Foundations are those con¬ structed in the substrata of river beds or other bodies of water, or where the existing condi¬ tions necessitate the building of structures in

water and below the level of its surface. This class of work is accomplished by the use of cofferdams, cribs and open caissons, pneumatic caissons, by dredging through wells, by forcing cement into the substrata under pneumatic pressure, and by by freezing the substrata.

Cofferdam Method. — The use of coffer¬ dams is limited to the construction of founda¬ tions in shallow waters where the depth of the necessary excavation to reach a firm bearing is small, or in water-bearing substrata on land. They are usually constructed by driving a

Sectional Elevation

Half Length

Fig. 5.

double row of sheet piles — heavy timber or steel planking — around the area in which the foundation is to be built. The space between the piles is then tamped in solidly with clay, and the water pumped out of the enclosure, so that the work of excavating and the subsequent masonry construction may be carried on in the open air. Cofferdams are sometimes con¬ structed of walls composed of bags of clay piled around the foundation area, and rein¬ forced with barrels of sand banked on the outer side of the walls.

Crib and Open Caisson Method. — Under this method, the foundation bed is first pre¬ pared by dredging until a solid material is reached, or by driving piles to a sufficient depth to reach a firm bearing. When piles are em¬ ployed they are cut off at a uniform depth be¬ low the level of the water surface and con¬ stitute the supporting bed of the caisson. The caisson consists of a water-tight box-like structure open at the top. It is floated over the position of the bed, previously prepared by dredging, and the masonry work built up in its interior until it gradually sinks and rests upon the bed. The side walls are then re¬ moved, leaving the bottom of the structure — the crib — in the foundation between the ma¬ sonry and the supporting bed. Fig. 6 illus¬ trates the foundation for a pier constructed by this method, the rib being supported by piles.

Pneumatic Caisson Method. — In this method two water-tight box-like structures built of timber or of metal are used. They are connected together one above the other, the lower caisson being inverted, and the upper

t»ne open at the top. This structure is floated and anchored over the position selected for the pier and the masonry built inside the upper caisson until the k)\ver edge of the lower cais¬ son rests on the bed of the body of water. The contained water in the lower caisson is

then expelled by compressed air, allowing men to enter and excavate the underlying material within the limits of the caisson. As the ex¬ cavated material is discharged by being passed out through an air-lock in the top of the cais¬ son, and the masonry work is added to course by course, thus keeping it always above the surface of the water, the caisson sinks lower and lowered into the substrata until it reaches solid rock or other firm material. The lower caisson is then filled with concrete, and the sides of the

upper caisson are removed, leav¬ ing the masonry on the foundation formed by the lower caisson with its concrete filling. Fig. 7 shows the longitudinal section of a cais¬ son of this type.

The pneumatic method, although one of the most effective, is limited in its application to work at a depth of about 100 feet below the surface of the water, as it is impossible for men to work conveniently and effectively under ei greater air pressure than that required to sustain a column of water of that height.

A clear idea of the application of the pneumatic caisson method to works of great magnitude may be obtained from a description of the caissons used in constructing the foun-

Fig. 7.

dations for the piers of the Williamsburg sus¬ pension bridge, completed between Manhattan and Brooklyn, N. Y., in 1904.

The following description is that of the north caisson of the New York tower, pictured .as Fig. 8, but it also applies in almost every

particular to the other three. The river bed consisted principally of sand, and some clay and boulders. Below this, at a depth varying from 45 to 75 feet below high water level, the formation consisted of gneiss rock with a very irregular surface. The caisson was sunk through the sand, clay and boulders until it restea on the rock, which was then blasted awav and stepped so as to make a fair bearing for the edge on all sides. The caisson measured 60 feet by 76 feet on the sides, with a total depth of 19 feet, and a working chamber 7J4 feet in height. The walls were 2 feet 9 inches thick and were built of two courses of 12 by 12-inch timbers, the outer course placed longi¬ tudinally and the inner vertically. Two layers of 3-inch planking were placed on the outside, and one layer on the inside. The bottom of

Fig. 8.

the. walls was provided with a cutting edge, which extended continuously around the whole caisson. This cutting edge was not provided for the purpose of cutting through the bed of the river, but to enable the workmen to use their tools close to the outer edge of the walls of the caisson, which were nearly three feet in thickness, and also to facilitate the removal of boulders. The roof of the working chamber was 5 feet in thickness, and consisted of several layers of 12 by 12-inch timbers. The whole caisson was stiffened with massive steel-plate riveted-trusses, which extended across from wall to wall. All the timbers of the caisson and of the roof were drift-

bolted together so as to give great rigidity to the structure, and to make it water-tight. Additional strength was given to fhe working chamber by two solid

bulkheads, which extended entirely across and divided it into three compartments, openings being provided for the passage of workmen. A massive framework or gridiron formed of 16 by 16-inch timbers was bolted together and to the side walls at the level of the lowermost timbers with 1 ˆ4-inch steel tie- rods. From each intersection of this framework vertical posts reached to the roof and were tied to¬ gether and stiffened to resist lateral distortion, by diagonal struts and tie-rods, as shown in Fig. 9, practically forming two steel trusses 9 feet 3 inches in depth, with a weight of 10 tons each. They were a novel feature in this class of work, but were rendered necessary on account of the shallowness of the caisson. The roof was pierced with 7 shafts, each about 3 feet in diameter, for the passage of men and

which was in the form of drift-bolts. Without the concrete filling it weighed 1,965 tons, and contained 6,000 yards of concrete above the roof of the working chamber. The upper cais¬ son was 50 feet deep and contained 29,000 cubic feet of timber and 32 tons of iron.

The sinking and concreting was accom¬ plished in three months and six days. Down to the depth of 55 feet the men worked in eight-hour shifts. Below this depth the shifts were successively shortened as greater depths were attained. Although the air pressure at the depth of 107 feet was 46 pounds per square inch, there was very little sickness among the workmen.

Other notable examples of the pneumatic caisson method are the foundations of the centre pier of the Harlem River bridge, New

AirLock

Leve/

Fig. 9.

material, and several pipes ranging from 1 to 5 inches in diameter, for supplying air and water, blowing-out sand, and for carrying electric light wires. These shafts were of circular section, and were put in place in lengths of 8 feet as the masonry work was carried upward.

The piers on the Brooklyn side were con¬ structed in a similar manner, with the exception that they were carried to a depth of 107 feet below high water. The last caisson to be sunk passed through 50 feet of water, 20 feet of sand, gravel and boulders, 30 feet of hard clay and hard-pan, and 12 feet of rock. The ex¬ cavating of the rock was rendered necessary by the steepness of its slope.

The lower caisson measured 63 feet by 79 feet, and contained 74,700 cubic feet of timber, and 98 tons of iron, the greater portion of

York city ; the Benares bridge over the Ganges River, India; the Poughkeepsie bridge over the Hudson River, New York; the Hawkesbury bridge, New South Wales, Australia; and the Jubilee bridge over the Hooghly River in Ben¬ gal. The centre pier of the Harlem River bridge supports the thrust of a 510-foot steel arch on each side of it, and stands on a timber caisson 54 feet, by 104 feet, .with a depth of 13 feet. It is divided into three compartments by vertical partitions which not only serve to strengthen the caisson, but protected the men during the blasting operations necessitated by the greatly inclined surface of the rock.

. Foundations for piers or abutments of bridges or for the main columns of high build¬ ings, where the individual piece of work is of lesser magnitude than those already cited, are

usually constructed by the use of cylinders of iron as illustrated by Fig. 10. The arrange¬ ment consists of a cylinder of metal divided into two unequal parts bv a horizontal partition — the upper and larger part, essentially a cof¬ ferdam, being the caisson proper, and the lower part within which the excavating operations are carried on being the working chamber. It is provided with one or two shafts made of boiler¬ plate, which are connected with the air cham¬ ber on top adjoining the equilibrium chamber or air-lock through which the workmen and materials must enter. A pipe from the air compressor furnishes the air chamber with compressed air which is subsequently intro¬ duced by a system of locks to the working chamber below.

Dredging in Wells. — Beyond the limit of the effective application of pneumatic methods, about 100 feet below the water surface, . all excavating must be accomplished by dredging, and special care has to be exercised in plan¬ ning the method of operations to prevent any contingency arising at the bottom that would require to be dealt with by the

use of human labor, as diving operations are impossible. It is also important to- observe that the skin fric¬ tion, quite unimportant in a cylinder of mod¬ erate depth, becomes so great at lower levels that special means have to be employed to over¬ come it. In the Benares bridge the principal piers are sunk to the depth of 140 feet below the level of the water and consist of oval brick wells each 28 feet by 65 feet in diameter, the bottom lengths being cased in iron, as it was necessary to begin operations in the water.

Each well is divided into three vertical com- partments in which the dredging was carried on. In constructing the Poughkeepsie bridge, the caisson is of timber 60 X 160 with a depth of 125 feet. It is divided into 40 vertical cells and was sunk to a depth of 130 feet by filling in some of the cells and excavating in others. In the case of the Hawkesbury bridge, the caisson is of steel and iron, of oval form 20 X 48 feet, and splayed out at the bottom an additional two feet all around. It is divided into three dredging wells set on the centre line and paral¬ lel to its length. They splay out at the bottom so as to meet each other and the outer skin, thus forming a cutting edge. It was sunk to a depth of 161 feet below the water level by dredging in the wells, and then the space be¬ tween the wells and the outer skin was filled with concrete. This is probably the greatest depth ever reached in the construction of a bridge foundation.

Pneumatic Forcing Method. — This is an improved method of constructing subaqueous foundations in sand or gravel substrata by con¬ verting it into a solid in the form of sand. or gravel concrete. This is effected in place, with¬ out excavating operations, by forcing, cement in the form of the dry powder in which it is furnished commercially, through a pipe by air pressure into the substrata. The charging pipe, called the lance pipe, may have an internal di¬ ameter of one and one:half inches, and be

drawn to a point at the lower end, and

perforated with three or more holes three-

eighths of an inch in diameter. The upper

end of the pipe is connected by means of a bend and rubber tubing with the air pressure supply pipe, suitable arrangements being pro¬ vided to raise, lower or move it while in oper¬ ation. The air pressure supply pipe is pro¬ vided with suitable branches fitted with stop¬ cocks to permit of its being connected to an injector device by which any desired quantity of cement powder may be fed into the current of air. In operation, the air pressure forces the cement powder through the small openings at the lower end of the lance pipe and drives it into the substrata of wet sand or gravel, with

which it combines and forms sand or gravel concrete as the case may be. The lance tube may be sunk to depths of 16 or 19 feet in a comparatively short time and in order to insure a uniform mixture in the foundation pit, the foundation area is divided into small fields 8 to 12 inches square, into each of which the proper quantity of cement is blown. The proper amount of the cement charge is determined by dividing the cubic contents of the field by the required proportion of the mixture. This method of converting a sand-bed into concrete was employed in the construction of the subway under Brooklyn, to prevent the undermining of some of the large and heavy buildings which were passed in tunneling.

Another method by which bodies of cement or concrete may be placed in quicksand sub¬ strata employs pipes in the following manner: Two or more iron pipes are sunk through the quicksands to the desired depth and water pumped into one of the pipes, thus converting the substrata into a condition of fluidity suf¬ ficient for the purpose of pumping it out through the other pipe. The cement is then in¬ troduced through the forcing pipe and filled

into the agitated area at the bottom of the pipes.

Bibliography. — For further information consult Baker, (A Treatise on Masonry Con¬ structionˆ (2d ed., New York 1906) ; Buell and Hall, (Reinforced Concrete) (New York 1904) ; Fowler, (The Cofferdam Process for Piers' (New York 1898) ; id., (Practical Treatise on Sub-Aqueous Foundations) (3d ed., ib. 1914) ; Jacoby and Davis, foundations of Bridges and Buildings } (ib. 1914) ; Kidder, Architects' and Builders' Pocket Book (16th ed., ib. 1914) ; Patton, (A Practical Treatise on Foundations) (New York 1893) ; Taylor and Thompson, (Concrete, Plain and Reinforced) (New York 1905) ; and special articles on the subject in the various engineering magazines and periodicals.*

FOUNDATION PRINCIPLES, Hook¬ er's, the basic suggestions of Thomas Hooker (q.v.) in 1638, which, a year later formulated as Fundamental Orders (q.v.), created the Com¬ monwealth of Connecticut.

FOUNDER, also called LAMINITIS, is

a disease characterized by inflammation of the vascular sensitive laminae of the horse's foot. Occasionally the laminae are strained from severe exertion ; more frequently they suffer from the morbid effects of cold, which is es¬ pecially injurious after excitement and over¬ fatigue. The shoes should at once be removed, and the toes, if long, reduced, but no

further rasping or cutting is permissible. The feet should be enveloped in hot bran poultices, and kept off the hard ground by a plentiful supply of short litter. Purgatives, if required, should be used with extreme caution. See Horse. Dis¬ eases and Care of.

FOUNDERS AND PATRIOTS OF AMERICA, The, a society founded in 1896 and incorporated 18 March of the same year, the object stated in the articles of incorpora¬ tion being ((to bring together and associate congenial men whose ancestors struggled to¬ gether for life and liberty, home and happiness, in the land when it was a new and unknown country, and whose line of descent from them comes through patriots who sustained the colonies in the struggle for independence in the Revolutionary War; to teach reverent re¬ gard for the names and history, character and perseverance, deeds and heroism of the found¬ ers of this country and their patriot descend¬ ants; to teach that the purpose of the founders could have had no lasting result but for their patriot sons ; to inculcate patriotism ; to dis¬ cover, collect and preserve records, documents, manuscripts, monuments and history relating to the first colonists and their ancestors and their descendants, and to commemorate and celebrate events in the history of the colonies and the republic.® The order admits to mem¬ bership any male citizen of the United States above the age of 21 years who is lineally descended, in the male line of either parent, from an ancestor who settled in any of the colonies prior to 13 May 1657, and whose in¬ termediate ancestors in the same line during the Revolutionary period adhered as patriots to the cause of the colonies. William Cary Sanger, of Sangerfield, N. Y., was governor- general of the society in 1917. There are State organizations in New York, Pennsylvania, Massachusetts, Illinois and New Jersey.

FOUNDING. The art of making molds in sand, loam or plaster of Paris, with or without the aid of patterns. The molds thus made arc filled with molten metal which is subsequently allowed to cool and solidify into a metal casting corresponding to the form of the mold.

The various founding processes are charac¬ terized by the kinds of metal employed in the castings, such as iron, steel, brass, bronze, etc., and by the class of work produced, such as water pipes, car-wheels, ordnance, statues, bells, etc., involving the applications of special meth¬ ods in the work of molding; in the melting of the metal ; in the filling of the mold with the molten metal ; and in the manner in which the metal is allowed to cool.

Molding in Sand. — The process of mold¬ ing in sand by means of patterns embedded in flasks containing sand, is substantially as fol¬ lows : The flasks, which are box-like arrange¬ ments provided with suitable handles by which they may be lifted and moved around, are gen¬ erally

used in pairs — the upper flask being commonly designated the (

The use of a separate appliance for a drag is very often dispensed with, the pattern being embedded in a bed of sand upon the foundry floor. This method is especially applicable when a large number of small castings are made at each pouring. Also, very often the patterns are made in two parts, that is, divided in the mid¬ dle horizontally, so that one-half of the mold is made in the drag and the other half in the cope. In the case of hollow cylindrical castings such as water pipes and the tubes of heavy ordnance, a cylindrical core of the proper dn mensions is suspended in the drag mold before the cope is placed in position, and the annular space between the core and the interior walls of the mold is filled in with the molten metal.

Molds are made either in green or in dry sand. Those in green sand are suitable for the making of small and simple castings ; but molds in dry sand are employed in the produc¬ tion of castings of large size and great intricacy of design. In such cases, after the molds have been finished, they are placed in drying ovens until they are thoroughly dried.

Molding in Loam. — In this process, the molds instead of being made by the embedding of patterns in sand, are formed by means of cores of metal or of brickwork which are covered by several coatings of loam — mixed sand and clay, to correspond with the form and dimensions of the desired castings. An outer

shell constructed around the core thus thick¬ ened, provides the annular space for the re¬ ception of the metal. The method is especially applicable to the founding of hollow cylinders, bells and statues. Consult Sharp, (Modern Foundry Practice) (1900) ; Hall, (The Steel Foundry) (1914). See Foundry and Forge Shop Terms.

FOUNDLING, a child abandoned by its parents, and found by strangers. Though infanti¬ cide was not punished among the ancient nations, with the exception of Egypt, where the child's corpse was fastened to the guilty parent's neck for three days and nights, yet natural feeling would prompt parents to expose their offspring, and leave their fate to accident rather than kill them. They usually selected places which were much frequented, where there was a greater chance of the child being saved. In Athens and Rome they were exposed in especially appointed places. In the 4th century under the Emperors Valentinian, Valerius and Gratian, the practice was prohibited. The bishop of Treves in the 6th century allowed foundlings to be

placed in a marble basin in front of the cathedral, thus entrusting them to the care of the Church. In 787 a foundling hospital was established at Milan and in the same year the Council of Nicaea determined that each large city should maintain such an institution. Foundling hos¬ pitals were established at Montpellier in 1070; in Rome, 1212; in Paris, 1362; and in Vienna, 1380. Among the most famous of modern in¬ stitutions is the foundling hospital in Paris formerly established in 1670. With the found¬ ing of the institution which it superseded Saint Vincent de Paul was closely identified. It re¬ ceives not only foundlings strictly so called, that is, deserted children of unknown parent¬ age, but also deserted children of known parents, and destitute children generally, as well as children pronounced incorrigible by the courts or declared to be so by their parents.*

England has no foundling hospital properly so called; all exposed children are brought up at the expense of the parish in which they are found. The Foundling Hospital in London, es¬ tablished by Thomas Coram, a master-mariner, in 1739, was originally a hospital for exposed and deserted children. It for a time fulfilled the purposes intended by its founder, and it was repeatedly assisted by parliamentary grants ; but the enormous increase of abandon¬ ments, and the expense which they occasioned, produced such an alteration in public senti¬ ment that the hospital was changed to what it now is, a hospital for poor illegitimate first¬ born children whose mothers are known and of good character before conception. About 500 children are maintained till the age of 15.

Under the old Russian system foundlings were received at the church windows by a staff of women paid by the state ; but they are now in the hands of the provincial officers of public charity. In Mexico, Rio de Janeiro and Buenos Aires there are large foundling hospitals. Sim¬ ilar institutions are maintained for destitute and abandoned children in China.

In the United States foundlings are usually consigned to the county poor farm, but found¬ ling and maternity hospitals exist in the prin¬ cipal cities. Foundling hospitals are said to diminish not only the exposing of children, but

also to render infanticide and intentional abor¬ tion less frequent. The objection that they contribute to the corruption of morals, if they receive children indiscriminately, and that they encourage parents to rid themselves of responsi¬ bility, is the strongest which can be urged against such institutions, and is not easily an¬ swered. In Massachusetts foundling hospitals are legally forbidden. In New York city found¬ lings are sent to Bellevue Hospital — where the finger-print method of identification has re¬ cently been adopted — and formerly were trans¬ ferred to the Infants' Hospital on Randall's Island or in the borough of Brooklyn, to Flat- bush.

The rate of mortality among them was alarming; in 1897 all children received at the Randall Island institution died before reaching the age of two years, chiefly owing to the change of food and neglect before and exposure during abandonment. At baby farms, private institutions where babies were boarded for gain, the same conditions also prevailed. The at¬ tempt to remedy these deplorable conditions has in recent years met with great success. Found¬ lings of whose parentage nothing is known are baptized alternately Roman Catholic and Prot¬ estant, the Roman Catholic children being in charge of the Guild of the Infant Saviour, while the committee care for the Protestants. In connection with this admirable work is an agency for providing- situations in the country for destitute mothers with infants. The mothering system has been long enforced in the Chicago Foundling Asylum, where the death rate is very low, and is being adopted in sim¬ ilar institutions throughout the States. A strong public sentiment has sprung up in favor of placing all dependent children in family homes as the normal environment in which children may best be reared, and against institutional treatment. Consult Folks, H., (Care of Neg¬ lected and Dependent Children) (New York 1901) ; Gorst, (Children of the Nation) (ib. 1907) ; Henderson, dependents, Defectives and Delinquents) (Boston 1901) ; Hill, F. D., Chil¬ dren of the State (2d ed., 1889).*

FOUNDLING HOSPITAL or ASY¬ LUM. See Foundling.

FOUNDRY AND FORGE SHOP

TERMS. The following list of terms in¬ cludes some of the most significant words and phrases commonly used in connection with foundry and forge shop operations :

Angles. — Strengthening pieces which are sometimes formed around the angular portions of castings.

Annealing. — The subjection of brittle and non-elastic metals to the action of long continued heat, which effects a re¬ arrangement of the ultimate molecules, and makes the metal tougher or more homogeneous. Steel castings, old chains and rods, and other forms of hammered work, which have been used for a long time, may be improved by annealing; but, newly rolled plates and bars, the fibrous condition of which has not deteriorated, may be weakened in tensile strength by the process, though there may be gains in the removal of internal strains. Annealing is carried on by means of " annealing-ovens " into which the " annealing- pots " containing the articles which require to be annealed are run, and exposed to the action of the heat for periods ranging from several hours to several days as the circum¬ stances may require. The function of the annealing-pots is the preservation of the contained articles from the action of the atmosphere

during the process of annealing.

Bars. — The stays or bridges placed in molding boxes to support the sand which encloses the pattern. They are purposely cast as rough as possible in order to insure the adherence of the sand. Vertical or " cope-bars " have their edges kept about three-quarters of an inch away from the pattern and about the same distance from the joint of the box. " Flat-bars " or " drag-bars " are placed in the

drag " or bottom-half of the mold, and, therefore, do not follow the outline of the pattern.

Battering-off. — ■ The finishing of the surfaces of forged work by hammering while the metal is dropping to a low red or black heat.

Bead Slickers or Bead Tools. — Slicking tools used by molders for smoothing the impressions of beaded work such ns the ornamental fillet or strip curved around the edge of a casting.

Bedding-in. — A method of molding in which the pattern is embedded in sand on the foundry floor instead of being placed in a box mold and " rammed-up " with sand.

Binders. — Rosin, glue, wheat and rye flour, linseed oil, etc., employed for the purpose of giving strength to " core¬ mixtures."

Blackening. — Pulverized charcoal, coal, coke and plum¬ bago or graphite used by molders for slicking over the surface of a mold in order to secure a smooth surface for the casting.

Black Wash. — A solution used on loam molds and dry- sand molds for the same purpose that blackening is used in green sand molds.

Blast. — A volume of air artificially forced into furnaces and forges by means of bellows, blowers and rotary fans, to accelerate the combustion.

Blowers.- — Machines employed for the production of blast, ventilation, etc. The principal forms consist of blowing cylinders and pistons, and the rotary blowers or centrifugal fans which are operated by power-driven belting. A desirable blast for a foundry may range from four to six ounces, approximating to a pressure ranging from seven to ten inches as indicated by the water gauge, to higher pressures for ventilation.

Blowholes. — Hollow cavities in castings caused by the presence of bubbles of air or gas in the mold due to imperfect venting. When of a bluish color, they indicate the presence of sulphur in the metal.

Bottom Board. — The board on which the joint of a pattern is placed when it is being rammed-up, either to sustain a weak pattern, or to make the molders' " sand-joint."

Burning-off. — A process of drawing temper from a spring. The spring to be tempered is first hardened by immersion in linseed oil. When cold, it is taken out and the adhering film of oil ignited and allowed to burn off, thus producing a temperature of at least 600° Fahr., which draws the temper of the spring and coats it with a black surface that makes it practically rust proof.

Burning-on. — The replacing of a broken-off or incomplete portion of a casting. A mold of the portion which is to be burned-on is placed in the proper position against the main casting, and the molten metal poured in. The metal is allowed to flow over the broken face of the casting and out through a gate at the side of the mold, until the broken face is in a state of local fusion. The gate is then stopped, and the metal allowed to cool. Perfect amalgamation may be attained by the method.

Case Hardening. — The treatment by which wrought iron is hardened on the surface. It is first heated to a red heat in the presence of carbon, and absorbs enough of the carbon to transform it into steel on the outside. It is then chilled suddenly to harden the steel.

Chaplet. — A metallic device used for supporting the " core " of a mold. Chaplets are of various forms — the single¬ headed chaplets, the double-headed chaplets, the spring chaplets and the adjustable chaplets. They are placed under the cores to support them, or above the cores to hold them down, or at the sides of the cores to enable them to resist the lateral pressure exerted by the flowing metal.

Charging. — The supplying of furnaces w;ith fuel and ore. In a reverberatory furnace, the " charging-door " or the opening through which the charge is introduced, is located at the side ; while in a blast furnace or a cupola it is located at the top.

Chart Method. — A method for computing the weight required for holding down the cope and core against the raising effort of the head of flowing metal. It consists in drawing to scale the outline of the form and size of the lifting surface, and the height of the fluid head, and com¬ puting from the figure thus obtained, the cubical contents which multiplied by the decimal

.26 gives the data for the necessary weight.

Chills. — Metallic molds into which specially mixed molten iron is poured for the production of chilled or surface hardened castings. They are made of a quality of iron of sufficient strength and ductility to allow for the alternate expansion and contraction to which they are subjected, otherwise they would not last longer than one heat. Chills used for casting chilled-rolls are made in sections. " Con¬ tracting-chills " are used for casting chilled car wheels, and are so constructed that as the metal of the wheel cools and contracts, the chills close in and keep in constant contact with it.

Cinder-bed or Coke bed. — The first layer of coke placed in a cupola previous to the introduction of the iron. Its weight bears a definite relation to that of the iron, but varies with the condition of the furnace. The term "cinder-bed" is also applied to the beds of cinders some¬ times placed under the molds and with which the vents are connected.

Clamping. — The weighting down of the cope of a closed mold preparatory to " pouring," to prevent its raising by the lifting force of the metal. It is accomplished by means of various forms of clamps and weights, the latter con¬ sisting usually of pig iron piled on the cope, or cast-iron bars ranging from 1,000 to 2,000 pounds in weight, which are hoisted into position by a crane.

Cleaning or Cleaning-up. — The smoothing of the surfaces of a foundry mold with trowel and cleaners, and blackening, preparatory to " closing " and " casting." Also, the removal of sand from castings by means of wire brushes and files, by means of tumbling-barrels, and by various pickling processes.

Closing-up. — The placing on of the top-box or cope of a mold in readiness to pouring in the molten metal.

Cold Shuts. — When cast metal pours thick, or when it is poured into the mold too slowly, it is liable to thicken and partly solidify in those portions of the mold where the casting is thin, thus preventing the metal, which follows, from properly amalgamating with it. The imperfectly united contact surfaces thus formed are called " cold-shuts," " cold-shorts," or " cold-shots."

Cope. — The top box or upper half of a green-sand mold.

Core.- — A form for shaping an interior hollow portion of a casting. It may consist of a body of green or dried sand placed in a mold to exclude molten metal from the central or inner portion of a casting. They are made either in boxes called " core-boxes," or struck to shape upon a revolving bar, a

mixture of loam being used for the body and the required outline imparted to it by revolving it against the beveled edge of a templet board called the " loamboard."

Drag. — – The bottom section of a mold. In " bedding-in " work, the portion of the mold in the foundry floor.

Drawing. — See Rapping.

Drawing of Temper. — The heating of steel to redness and then allowing it to cool slowly in the air. The reverse of " hardening " and " tempering."

Drop Forging. — The method of forging iron by driving or pressing it into a die placed under a drop hammer. It is employed when a number of forgings of the same pattern are required. A great deal of this class of work is now accomplished by the use of steam-hammers and forging- presses. See Machine Forging.

Fagoting. — The piling up of lengths of puddled bar iron in fagots or bundles for the purpose of reheating and rolling.

Feeding. — When molten metal cools, the outside portions will set first, while the inside portions will remain fluid for some length of time. As the inner portion cools, it will contract and shrink upon itself and leave a depression on the top face of the casting. To avoid this condition the heavier portions of the casting are fed with metal through a small rod called the " feeding-rod," inserted through the runner or the riser, which by its motion keeps a passage open for the inflow of the fresh metal introduced to com¬ pensate for the contraction. The metal used for this pur¬ pose is called the " feeding-head."

Flask. — The box which holds the sand in which the pattern is rammed-up in the making of a mold. Flasks are made either of wood or of metal, and are parted horizontally into two or more sections. In a mold composed of two parts, the lowermost or the one which is molded first is called the " drag," and the uppermost, or the one which is on top when the casting is poured, is called the " cope." When a flask consists of more than two parts, the sections between the cope and the drag are called " checks " or " inter¬ mediates." Flasks are provided with two loose covers called top and bottom boards, and they are designated as " two-part flasks," " three-part flasks," " four-part flasks," etc., according to the number of the component parts.

Floor Rammer. — A flat-ended iron tool employed for ramming over large surfaces of sand.

Fluxes. — Substances used in a smelting furnace for com¬ bining with the

earthy and other infusible matter present in ores, and which require to be separated from the metal, and which cannot otherwise be rendered fluid at the tem¬ perature of the furnace. The flux most widely used is a carbonate of , lime in the form of limestone, clam and oyster shells, chalk, dolomite and calcite. Magnesia, fluorspar, feldspar and calcspar are also suitable for this purpose. The by-product of the furnace secured by such flux is called " slag."

Forge. — ■ The structure upon which a smith's fire is main¬ tained. Forges are constructed of brick, or brick and iron combined, or entirely of iron. A forge consists of a hearth, tuyere, chimney, bonnet and troughs for water and coal. The blast may be produced either by bellows, or by rotary blowers or a fan.

Gaggers. — Short, conical projections cast upon the core¬ plates and the plates of loam-molds for the purpose of assisting the adhesion of the loam. The term is also applied to the hooks of cast iron or of wrought iron which are hung from the cross-bars of a molding box into the mold to prevent the sand from sliding out when the cope is lifted. They are necessary when the body of sand is more than sixteen inches square in area.

Gate. — The opening in the sand of a mold, which connects the " sprue " with the interior of the mold. The sprue is the orifice through which the molten metal is poured into

the mold. Both terms are also applied to the bodies of metal which occupy the respective passages after the cast¬ ing has been poured.

Hardening. — The hardening of a metal is the result of an increase in its density. Few metals are capable of being hardened. The hardening of steel is effected by heating it to a cherry-red temperature and then chilling or cooling it suddenly by plunging it in water, oil or other suitable solution, or by exposing it to a cold blast. The degree of hardness that may be attained depends upon the suddenness of the chilling. In hardening and tempering tools, such as machine knives, taps, long twist-drills, reamers, milling cutters, etc., the danger of warping them by uneven heating or by cold draughts, is avoided by heating them in special hardening and tempering furnaces. See Case Hardening and Tempering.

Lifting. — The drawing out of a pattern from a mold. Also applied to the raising up or springing up of the cope or top-part of the mold caused by the pressure due to the head of the molten metal. This tendency is counteracted

by the use of screw-bolts, clamps and dead-weights. See Clamping.

Loam Work. — The making of molds in loam, as distinguished from that of molding in sand. The loam used in foundries consists of a mixture of clay, sand and horsedung, ground up with water by means of a form of mortar mill called the " loam-mill." When cold, the loam has sufficient con¬ sistency to be struck up to any desired outline by means of a " loam-board." See Core.

Match-plate. — A form of mold-board or plate of metal on the opposite faces of which two different portions of a pattern are attached. When the boxes containing the impressions are brought together, they constitute a com¬ plete mold. In some cases they are very useful for facili¬ tating the making of joints, but they are generally used for making molds for castings having plain outlines, without sharp corners, cores or projections.

Mold-boards.— Boards used for making molds for small castings having irregular joints. Their chief advantage consists in the saving of time and labor in forming the joints. The wooden mold-board is carved out in the desired shape of the joint. The plaster of Paris mold-board is used in cases where the pattern is very crooked, and where the other types cannot be made as cheaply, or to fit with the same amount of accuracy. The sand-and-composition mold-boards are the kind generally used, and obviate the necessity of ramming the sand. The composition consists of 20 parts of fine dry sand to one part of litharge, tem¬ pered with linseed oil.

Molding or Founding. — The making of molds for metal castings. The molds are made in sand, loam and plaster of Paris, with or without the aid of patterns. There are three classes of molding — green-sand molding, in which damp sand is used, and the castings are made in damp molds, or in molds the surfaces of which have been " skin- dried;" dry-sand molding in which the damp sand molds are thoroughly dried in an oven preparatory to casting; and loam molding. See Loam Work.

Molding Sand. — Sand is used for molding, in preference to all other materials, on account of its refractory nature, which enables it to resist the destructive action of molten metal at high temperatures; on account of its porosity, which allows the free escape of the gases generated in casting; and on account of its peculiarly compact and adhesive properties, which not only permit of its being molded to any desired shape, but also enable it to resist a great amount of pressure exerted by a liquid. The best molding sand is obtained from the coal measures, and the later red sandstone formations. Sand from the green-sand and chalk formations is also very satisfactory. The most suitable sand is that which contains a large percentage of silica, with alumina and magnesia present in small quan¬

tities. The various grades of molding sand are designated as green-sand, dry-sand, core-sand, facing-sand, and parting sand, according to the purposes for which they are used.

Molding Tools. — The molder's small tools are a variety of spoonlike slicking tools, a lifter, an oval or " dog-tail," a heart and square, and square and half-round corners, for more perfectly shaping the sand molds.

Nowel. — The inside or core of a large mold. The name is also sometimes given to the drag.

Odd Sides.— See Mold-boards.

Parting. — The act of separating the different parts of a mold-box. Also applied to the process of making the sand-joint between two contiguous mold -boxes; also to the joint itself.

Pouring. — The filling in of a mold with molten metal in making a casting.

Print. — A projection placed upon a pattern toTindicate the position of a cored hole, and to form an indentation for the reception of the end of the core. " Pocket-prints " and " parallel-prints " are used at the sides of the patterns.

Rapping. — The process of loosening a pattern from the sand by gentle rapping previous to its withdrawal. This is effected by inserting the pointed end of the " rapping- bar " into the " rapping -hole " bored in the pattern or in a plate of malleable iron called the " rapping-plate," screwed on the face of the pattern. Small round-faced wooden mallets, called " rapping-mallets," are used in the actual

process of withdrawal, whicn, unless carefully performed, will not only damage the pattern, but will enlarge the molds of small castings to a very appreciable extent.

Riddle.— A coarse sand sieve of about half-inch mesh, used for sifting coarse and old sand.

Riser or Air Gate. — A vertical opening which extends from the mold, through the cope, to the outer air. When it fills up with the molten metal it indicates that the mold itself is full.

Sprue. — A projection on a casting caused by the opening in the gate. It is designed to be cut off and discarded. Tempering. — In foundry work, the process of mixing various grades of sand. In forge shop work, the imparting of a definite degree of hardness or elasticity to steel. It is effected by either

raising or letting down the metal to a certain temperature and then cooling it from that tem¬ perature by plunging it in water or oil. The degree of temperature is indicated by the various colors assumed by the steel during the heating part of the process. It may also be determined by the flashing point of a fat.

Venting. — The piercing or honeycombing of the sand of a mold by means of a long wire-rod, one-eighth or one- quarter inch in thickness, thrust in all directions, for the purpose of allowing the free escape of the gases generated by the decomposition of the moisture in the sand by the heat of the inflowing metal.

For further information relative to the vari¬ ous processes akin to founding see Boiler Shop Terms, Workshop Terms and Machine Forging.

William Morey, Jr., C.E., Consulting Civil and Mechanical Engineer.

FOUNDRY PRACTICE. Casting.—

The casting of brass has been practised from the earliest times and is mentioned in the oldest books of the Bible. Before the year 1300 wrought iron was made directly from the ore. This nearly pure ' iron cannot by ordinary methods be made sufficiently fluid to run into molds. By special methods in recent years it is made into steel castings (q.v.). At ordinary casting temperatures it is pasty and can be forged into various shapes. Until 1700 castings were generally made directly from the blast furnace in which cast iron was made from the ore. The first casting known to have been made in America was a small round-bottomed kettle with a cover, made at Lynn, Mass., in 1642, at the first blast furnace erected in this country. In 1722 a French founder made the first primi¬ tive cupola. Foundry practice dates from that time. The ordinary cupola was an upright iron furnace thickly lined with firebrick, in which were placed alternate layers of pig iron and fuel. A tap-hole at the bottom served to draw off the molten metal to fill the molds in cast¬ ing. Before the beginning of the last century rarely more than a single casting was made from one pattern. Each new form required a new pattern as well as mold.

The only foundry equipment until recent years was the cupola, a blower, a gib-crane, ladles, cleaning mills, sweeps for loam work and the molder's individual tools : a shovel, bellows, rammer and trowels, some of which are called slicks. By the duplication of castings from patterns in later years molders have become expert in special classes of work, especially when working by the piece. When large num¬ bers of a single kind of castings are to be made a molding machine can be employed advantage¬ ously and these are rapidly coming into use. Machines can be operated with

comparatively unskilled labor. Modern foundries are equipped with electricity and compressed air, traveling cranes and trolleys, which are used to trans¬ port materials, and to do the heavier part of the molder's work. While permanent metal molds are used for the softer metal castings,

they have not been made successful for brass or iron. The improvements in machine forging have led to the discarding of many parts of machines formerly cast, but now made much more durable in wrought iron or steel. See Machine ForginC.

Sand of various grades is used almost uni¬ versally for molds, and the founder's art con¬ sists in the making of sand molds. Molding sand is a mixture of silica sand and clay with from 10 to 15 per cent of impurities. It is strong if when dampened and pressed into shape it will not fall apart. Fine sand gives light castings a smooth skin. Heavy castings require a coarse open sand. The reddish color of molding sand comes from iron oxide. After the castings are removed from the sand it is shoveled into a row, then, with the shovel, opened up and sprinkled evenly with water. The next morning beginning at one end the heap is cut over, giving each shovelful a twist to scatter the sand evenly over a new heap. About once a week enough new sand is added to make up for what is burned out.

Molding . — The different branches of mold¬ ing have much in common. We will describe the simplest form and then show where the other forms differ.

Bench Molding. — The patterns for toys, hardware, small parts of stoves, light malleable iron and many brass castings are made of metal, gated together so that the card of pat¬ terns is handled as a single piece. Melted iron is poured into a vertical sprue and runs to the mold through horizontal passages called gates. The card of patterns is bedded in a mold-board called a match which closely conforms to every parting or horizontal edge of the pattern.

The molder works standing, his match of patterns being placed on a frame or bench, with his heap of sand beneath and at the side. The mold is made in a snap flask, the lower part of which is the drag and the upper part the cope. These are guided together by flask-pins and both are hinged at the corner and hooked together at the opposite corners. The pattern is thoroughly brushed when the drag is inverted on the match. About half an inch of sand is riddled over the surface of the pattern. The drag is then heaped up with sand with a shovel. Then with a hand rammer, about 13 inches long, in each hand, the molder penes the edges of the drag twice

around with the flat pene of the rammers, and levels off the surface with the side of the rammers. With the round butt ends the whole surface is rammed solid. The surplus sand is struck off with a straight edge, a little sand is sprinkled over the surface and a bottom board is rubbed to a fit. This with the drag and match are rolled over and the match is lifted off leaving the pattern bedded in the sand, when all loose sand is blown off with a bellows, and necessary repairs are made with a slick. The cope is put on, the sprue pattern is set on a pin in the gate pattern and a little parting sand is dusted over the surface. This burned parting sand, cleaned from castings, prevents the cope from sticking to the drag.

The cope is rammed the same as the drag, the loose sand brushed off, the sprue removed and the hole smoothed with the fingers. The cope is lifted and placed on edge just behind the drag. The pattern is drawn and is held in VOL 11 — 35

the left hand while a bag of charcoal facing is shaken over the mold with the other. The pat¬ tern is printed back, rapped and drawn. The cope is then replaced on the drag, the flask is unhooked and the sand mold with its bottom board is set on the floor.

A molder in seven hours will make from 70 to 150 molds. They are stacked two or three high. Wooden frames or jackets are slipped over some molds to prevent the iron from bursting out at the sides. In pouring the molds, cast-iron weights with slots in them to expose the sprue holes are placed on the row of molds nearest the bench to prevent the iron from rais¬ ing the cope. These weights are changed as fast as a row is poured.

Floor Molding. (Stove plate, etc.). — Each piece is' molded in a wooden or in an iron flask. The cope is barred with cross bars six or seven inches apart, with the lower edges con¬ forming to the shape of the inside of the pat¬ tern and about one inch away. If the bars are of iron they have holes cast in them and if of wood nails are driven in the lower edges to pre¬ vent the sand from dropping out. The pattern, usually of iron, is fitted to a wooden mold- board. The gates are generally separate from but set against the pattern. Whenever possible flat gates are used.

The molder's floor is perfectly level and gen¬ erally of brick or cement. The sand heap ex¬ tends the whole length and the flasks and mold- boards are piled at one side.

The pattern on its mold-board is placed on the front of the floor. The pattern is brushed, the drag is inverted on the board, sand is riddled on and

then heaped up with a shovel.

The rammer for all floor work is about four feet long with a metal pene and butt. Sand is pcned twice around the edge of the flask to prevent the iron running out and to make a hard parting. The sand is leveled with the hand and then stepping on the sand, by a series of backward jumps, the molder jumps it off, in rows lengthwise and crosswise. He then butts it all over, a little harder under the gates. He fits the bottom board, then removes it, cuts gutters across especially under where the gates will be and runs a vent wire one- eighth of an inch in diameter all over the drag nearly to the patterns. Then replacing the bot¬ tom board and clamping together the bottom board, drag and mold-board the mold is rolled over. After knocking the clamps off, the molder removes the mold-board, puts on the cope, and fastens it to the bottom board with clamps opposite each sprue. The sprue pattern is put in place, sand is riddled on, and then shoveled one quarter full. Then with a hand on each side of each bar, the sand is tucked with the fingers under the bar and around the sprues. The cope is heaped with sand and is pened around the sides of the cope and on each side of each bar. Then the sand is gathered by the hands between the bars and jumped off. The molder cleans the bars of sand and butts the sand all over, being careful not to hit the bars or the sand will not lift.

All loose sand is brushed off the surface of the mold and the sprue is removed. Metal wedges are pressed in between cope and drag at each corner, the clamps knocked off, and the wedges pushed clear in. The cope is rolled up

nearly perpendicular and held there by an old file or piece or rod. The sprue is taken out and with a bellows all loose sand is blown from the drag and from the front and back of the cope. The sand is sponged at the edges of the pattern and the set gates.

After the pattern is drawn lead facing is dusted from a bag all over the mold to prevent the sand burning into the iron. Then charcoal facing is dusted on to prevent the lead sticking to the pattern. After printing the pattern back in the mold the set gates and pattern are drawn and the flask is closed and clamped. The iron should be poured as dull as possible to prevent the sand from burning into the iron. In the molding thus described the man molds the same piece over and over and becomes very expert, and generally working by the piece makes very good wages.

General Jobbing and Machinery Castings.

(Roll Over Work.) — The previous description applies to this class also. Patterns are generally of wood and are made one-eighth inch per foot larger than the casting to make up for shrink¬ age. The pattern tapers at least one-eighth inch in a foot to help in drawing the pattern. Any overhanging parts of a pattern must be held by dowel-pins and such parts are drawn after the other part of the pattern is out.

It is better to have iron enter a mold from the bottom and for this purpose the sprue passes down to the bottom of the pattern and across to the mold through a hollow core molded into the drag. One or more risers are placed on the highest points of the mold through which the iron will rise after the mold is full. Dirt and gas will rise also and the riser may be large enough to allow churning with a rod to keep open a channel to the centre of the casting and through which melted iron may be poured to prevent spongy spots form¬ ing in the parts that cool last.

Flasks may be of three or more parts. Deep molds are rammed up in courses and harder in the lower portions to resist the head of metal. No soft spots, causing swells, or hard spots, causing scabs, must be made near the pattern. For heavy work about one inch of sand mixed with seal coal (ground bituminous coal) is riddled on all surfaces of the pattern to make a smooth casting.

When possible a pattern is made in two parts, divided at the parting line, allowing the drag part to be laid on a flat board. When an odd job is made without a mold-board a cope is inverted on a bottom board and rammed with sand and struck off. The pattern is roughly bedded in this sand.

Parting sand is thrown over the surface and the drag is rammed up. Then the, mold is rolled over, the cope is taken off and the sand shaken out. The drag is then finished and the cope put on and the mold is finished.

Where there are deep places in the pattern the molder tucks sand around large nails with the heads down near the pattern, or sticks called soldiers, or gaggers, L pieces of rod or of cast iron, the toe being near the pattern and the long end along the side of the bars. These must be tucked with the fingers and pened thoroughly. The molder then finishes the cope, venting thor¬ oughly, especially around the sprues.

Molding by Bedding In. — In the foundry floor are pits filled with molding sand level

with the floor. A hole is dug in this sand to take the pattern, around which the sand is packed. To allow for the escape of gas gener¬ ated by a large

quantity of iron, the hole is dug deeper than required for the pattern and a bed of very fine cinders is packed and connected by a pipe with the surface of the floor. The cin¬ der bed is covered with sand. If the pattern is not deep or for open sand molds, the sand is leveled off even with the floor. Sand is packed in four small piles at the corners of the bed and two straight edges are leveled on these piles. Sand is tucked solid about these straight edges. Sand is then shoveled inside and out¬ side and rammed hard outside the straight edges. The sand between is struck off.

After the molder has riddled sand three- quarters of an inch thick over the whole sur¬ face he places two strips about eight inches long and one-quarter to one-half inch thick on the ends of the straight edges. With a third straight edge on these strips he with his helper presses down first one end of the straight edge and then the other, moving across the bed, mak¬ ing all of an even hardness. He strikes off and vents all over the surface down to the cinder bed. Then with a fine sieve, a little facing sand is riddled over the whole surface and it is smoothed with a trowel. Strips of wood equal to the thickness of the casting are laid on the bed to represent the outside of the casting and the outside of the mold, and the gates are built up with sand. If pins or lugs are required on the lower surface, a pattern for them is pressed into the sand at the required points. A casting more than three inches thick is made with a cope.

Bedding In with a Cope. — If the upper

surface of a casting is to be perfectly flat the cope with sprue holes may be rammed on any flat surface and can be set on the mold already bedded in the floor.

If a pattern with an uneven top surface has been bedded in the floor a cope is set in place and stakes are driven about it in the floor to insure its location, and the cope is then rammed. To raise the cope, flat boards are laid on the sand and with crowbars the corners are started, then it is lifted with the crane.

The cope is replaced and held down with iron weights so that the head of metal cannot raise it. Very large and complicated molds can be made in green sand. The mold may be formed by templets and by parts of patterns.

Sand may be built out from the sides by in¬ serting anchors, or separate cores may be used. Such molds are faced by painting on lead fac¬ ing with a camel's hair brush or by rubbing facing on with the hand.

Dry Sand Molds. — These are made from sand richer in loam than that used for green sand molds. They are made in iron flasks with iron bottom

boards. The molding is substan¬ tially the same as green sand except that all joints are beveled back from the mold so that when the cope is put on the edges will not crush. This causes a fin on the casting which is chipped off. The cope and drag are placed in an oven and thoroughly dried. Dry sand cast¬ ings are more sound than if made in green sand.

Skin Dried Molds. (To obtain the advan¬ tages of dry sand molds, and of green sand bedded in work.) — Ordinary floor sand is used for the mold except the two inches of sand

which faces the mold which is as rich in loam as for dry sand work. If the surface of an or¬ dinary mold is to be only slightly dried, mo¬ lasses water or thin clay water may be sprayed on the surface to make it strong when dry. A mold when finished is generally skin dried to a depth of one or more inches. Iron baskets filled with burning charcoal are hung in differ¬ ent parts of the mold or heated plates may be held near the surfaces or gas flames may be directed against the surfaces.

Loam Molding. — The body of the mold is built on iron plates with ordinary red brick laid in black mud, which is ordinary floor-sand mixed with clay wash. Some mix sawdust with the mud to make it porous and to help in dry¬ ing the mold. Straw is sometimes laid in the joints for the same purpose. Pushing a vent wire between the joints also gives vent. This body is built about three-quarters of an inch away from the surface of the finished mold. On the brick surface is spread loam which is a mixture of sand, clay and water. This is faced off with trowels or sweeps. If the mold is cir¬ cular such as a cylinder or a kettle, a spindle is located at the centre of the mold. On this is fixed arms on which are fastened sweeps or templates. Made up cores are also used for giving shape to parts of the mold.

The outside or the inside of the mold with the bottom can be finished first as is most con¬ venient. It is then taken to the oven by the crane. While this is drying the other part is built up and finished and dried. All parts are then put together, the bottom and top plates being bolted together with rods. A crib is built about the mold with steel or cast plates bolted together. Sand is rammed between the brick work and the casing, as hard as possible, form¬ ing also the gates for taking iron to the bottom of the mold. Water pipes and other specialty castings are made in iron molds fitted for the purpose and molding machines are used to a great extent for such work. Every different pattern presents problems which require differ¬ ent

treatment.

Cores are used in all classes of molds. An iron anchor may be coated with green sand and set in a mold. Dry sand cores are made of silica sand mixed with a binder such as floor, rosin or oil. When baked these binders make the core hard and strong, and the melted iron burns the binder so that the core sand falls out when the casting is cold. Cores are generally made in boxes. Wires or iron frames are molded in to give strength. Cores are vented by making channels with wires or by molding in a core and then drawing it out. For in¬ tricate cores cords of beeswax are molded in which melt out in baking. Cores are located by core prints in the mold left by the pattern and are held in place by chaplets of various shapes placed beneath to prevent sagging and above to prevent the iron from raising the cores. Nails forced into the mold are often used, the core resting on the heads. Tinning chaplets prevents rusting and helps the iron to fuse their surfaces.

Chilling.— To produce a hard face or sur¬ face on castings, chilling is resorted to. as in cast iron car wheels. In this instance the cir¬ cumference of the mold is made of a heavy ring or iron which tends to cool quickly the sur¬ face of the casting. The hardening may extend to a depth varying from 1-32 to 1-2 inch. In

some forms of chills a circulation of cold water is maintained to continue the resistance to heat.

Melting Iron. — Iron is melted in a cupola, a firebrick lined vertical cylinder in which is charged layers of coke and iron. A blower forces air through tuyeres near the lower end. The melted iron is tapped out at the front into fire clay lined ladles and taken to the mold by hand ladles or by crane. For very large cast¬ ings several cupolas are used and melted iron may be held in large ladles for some time while more is being melted. Air furnaces are also used for heavy castings.

Quality of Iron for Castings. — Silicon softens cast iron and decreases shrinkage; there¬ fore a standard measure of shrinkage tells whether more or less silicon is needed. Strength depends very largely upon the size of grain, which is not wholly dependent upon the chem¬ ical composition. A thin portion of a casting shrinks more and sooner than a thick part which often causes fracture. It has been erroneously said that cast iron expands at the instant of solidification.

Iron becomes rigid at the surface of the mold while the central part is fluid. When all is solid, and just about as it ceases to be red hot, the casting expands more or less at the same time that carbon crystallizes into graphite.

In a casting one inch square this expansion occurs about 15 minutes after the iron enters the mold, but in a casting four inches square it occurs two hours after. This expansion at dif¬ ferent times of parts of a casting of varying thickness, at the same time that the casting is shrinking unevenly from the loss of heat, pro¬ duces severe strains which often fracture the casting. The remedy is to make all parts of equal thickness and to uncover thick portions as soon as solid. There are 50 factories in the United States making foundry supplies, giving employment to about 500 men, and adding more than $1,000,000 to the value of the products they handle. They supply various mixtures of sand and plumbago and sea-coal, as well as charcoal facings to keep the metal from adher¬ ing to the molding sand. They also sell parting compounds to facilitate separation of the parts of the molds ; for this purpose clay and hydro¬ carbons are employed. Their other products are brazing and welding compounds, foundry ˆflour,® plumbago and founders' small supplies, as brush-wheels, rammers, sieves and flasks.

William J. Keep, Author of {Cast Iron ,y etc.

FOUNTAIN, or ARTIFICIAL FOUN¬ TAIN, in hydraulics, a construction by which water is violently spouted or darted up ; called in French a jet d'eau. There are various kinds of artificial fountains, but all formed by a pressure of one sort or another on the water, namely, either the pressure or weight of a head of water, or the pressure arising from the spring and elasticity of the air, etc. When these are formed by the pressure of a head of water, the fountain will spout up nearly to the same height as that head. In ancient Greece every principal town had public fountains or conduits, some of which were of handsome design and of beautiful execution. The most famous of these were at Megara, at Corinth (the Pirene and the Lema), in the sacred wood

of ZEsculapius, at Epidaurus, and the two at Messina called Arisinoe and Clepsydra.

The ancient fondness for fountains still exists in Italy and the East. The French are celebrated for their fountains, but Italy, more particularly Rome, is still more so. The foun¬ tains of Paris and of the Tuileries, of the orangery at Versailles, at Saint Cloud, and other places in the neighborhood, are splendid structures. The principal and most admired fountains at or near Rome are those in front of Saint Peter's, of the Villa Aldobrandini at Frascati, of the Termini, of Mount Janiculum, of the

gardens of the Belvedere, in the Vatican, of the Villa Borghese, which has also in the audience chamber a splendid fountain of silver, five Roman palms in height, ornamented with superb vases and flowers; the fountains of Trevi, the three fountains of Saint Paul, of the Aqua Acetosa, etc.

In the United States the ornamental type of fountain is the one in common use. Large display fountains were attractive features of the Centennial Exhibition, and at the Chicago World's Fair, Buffalo Pan-American Exposi¬ tion and San Francisco Exposition. Among these was the Fountain of the Republic of Chicago, which was designed by MacMonnies, and at Buffalo were costly examples dedicated to Man, Nature, Progress, etc. In Central Park, New York; Fairmount Park, Philadelphia; Lincoln Park, Chicago; Golden Gate Park, San Francisco and other large parks, will be found numerous fountains of elaborate design. In all the larger cities drinking fountains for men and animals have been erected by individuals and local humane societies.

FOUNTAIN PENS. See Office LABOR-

SAVERS.

FOUNTAINS ABBEY, one of the larg¬ est and best-preserved monastic edifices in England, in the West Riding of Yorkshire, three miles southwest of Ripon. Founded for Cis¬ tercians in 1132, it was not completed till the 16th century, and' thus presents examples of every variety of style, from Norman to Per¬ pendicular.

FOUQUE, foo-ka', Friedrich Heinrich Karl, Baron de la Motte, German poet and novelist: b. Brandenburg, 12 Feb. 1777; d. Ber¬ lin, 23 Jan. 1843. He was a grandson of H. A. Fouque (q.v.) ; served as lieutenant of the Prussian guards in the campaign of 1794, and was present in 1813 at the most important battles in the War of Liberation. As a writer he is remarkable both for variety and fecundity, and published poetry in almost all its forms — dramatic, epic, romantic, etc. Several of his short romantic tales in prose, such as (Der Zau- berring) (1813), (Aslauga's Ritter, > but more especially his (Undine) (1811), enjoy an extra¬ ordinary popularity. The last mentioned tale, a charming mixture of fairy ideality, the reality of humble life, and the glow of chivalry, has gone through many editions, and has been translated into every European language. It must be admitted that Fouque, while possessing many of the virtues of the romantic school, was guilty of all its extravagances, and that the descriptions of chivalric and feudal life, in which he delighted, are mere fancy pictures. His autobiography appeared in 1840. Sec Undine.

FOUQUE, Heinrich August, Baron de la Motte, Prussian general : b. The

Hague, Hol¬ land, 4 April 1698; d. Brandenburg, 2 May 1774. Fouque possessed the confidence of Frederick the Great; and the (Memoires du Baron de la Motte Fouque) (1788, by Büttner, the secretary of Fouque), which contain his correspondence with Frederick the Great, are of great interest.

FOUQUET, or FOUCQUET, Jehan,

French artist: b. Tours, about 1420; d. about 1480. He studied at Tours, Paris and Italy, and was greatly influenced by the Flemish and Florentine masters. While in Italy about 1445 he painted the portrait of Pope Eugenius IV, which has lately been lost. He was after his return made court painter to Charles VII and afterward to Louis XI. Long remembered solely as a miniature painter it is only in recent years that his importance as a founder of the French school has been recognized by his¬ torians of art. Specimens of his art are in the Louvre, in Vienna, in the Antwerp Museum, and probably one in the Berlin Museum. Of his illuminations the best known are the series of miniatures for a French edition of Boccaccio now. in the Munich Library. Others are illustrations for Josephus' (History of the Jews in the Bibliotheque Nationale, Paris. Consult ((Euvres de Jehan Foucquet* (Paris 1867) ; Lafenestre, (Jehan Fouque) (Paris 1905) and Richter, (Chantilly in History and Art* (London 1913).*

FOUQUET, foo-ka, Nicolas, French statesman, Viscount de Melun and de Vaux, and Marquis of Belle Isle: b. Paris, 1615; d. Pignerol, 23 March 1680. He received in 1650 the important appointment of procureur-general to the parliament of Paris, and three years later was advanced to be superintendent of finance. His rapid advance made him ambitious of suc¬ ceeding Mazarin as first minister, but he had a formidable rival in Colbert. Fouquet's plans were, however, brought to naught ; for in the first place Louis himself took the reins of power into his own hands when they slipped from the grasp of the dead cardinal, and in the second place, instigated thereto by Colbert, he suddenly arrested Fouquet in September 1661. After a trial extending over three years, Fouquet was sentenced to perpetual exile and the loss of all his property, but the sentence was afterward altered to life-long imprisonment. From the circumstance of his imprisonment at Pignerol, Fouquet, in spite of the fact that he died in 1680, has been misidentified with the Man With the Iron Mask (q.v.), who, however, lived till 1703.

FOUQUIER-TINVILLE, foo-ke-a tan-vel, Antoine Quentin, French revolutionist: b. Herouelles, near Saint Quentin, 1747; d. Paris, 7 May 1795. As a member of the revolutionary tribunal he distinguished himself by his alacrity in pronouncing the verdict of guilty, and at¬ tracted the attention of Robespierre, who gave him the office of public accuser before

this tribunal. The victims now became numberless. Fouquier drew up the scandalous articles of ac¬ cusation against the queen, Marie Antoinette. His thirst for blood seems to have been in¬ creased by gratification, until it became a real insanity. He proposed the execution of Robe¬ spierre and all the members of the revolutionary tribunal 9th Thermidor, 1794, was himself

removed on the 14th Thermidor (1 Aug.), 1794, and arrested. He died under the guillotine. There does not appear to be a trait in the life of this monster which can entitle his crimes to the same palliation as those of Robespierre, who considered the extermination of the aristocracy as a necessary evil. Consult Domenget, ˆouquier-Tinville, et le tribunal revolution- naire) (1878).

FOUR-EYED FISH, a fish of the genus Anableps.

FOUR-HORNED ANTELOPE, or CHOUSINGHA, the genus Tetraceros of the antelope group, native to India, and differing from all other living ruminants in that the male generally bears two pairs of horns. It is closely related to the African duikerbok (q.v.), which it resembles in the position of its larger horns, and the shape of its eyes, as well as in other ways. The smaller horns rise from just above the eyes. This antelope is a pretty, brownish creature, standing about 25 inches at the withers, and is found from the foot of the Himalayas southward over India, in wooded hill-country, but it avoids dense jungles. It drinks daily, and hence never wanders far from the water. It is exceedingly shy, and escapes, when discovered, in a series of jerky, though very rapid, bounds, into the cover of long grass or low bushes.

FOUR LAKES, a chain of lakes in Dane County, Wis. ; known respectively as First, Second, Third and Fourth lakes. First Lake, the smallest and lowest of the chain, is about

3 miles long by 2 miles wide ; Second Lake is 3ˆ4 miles long by 2 broad; Third Lake is 6J4 miles long by 2 miles wide ; Fourth Lake, the largest and most beautiful, is 6 miles long by

4 wide. The waters of these lakes are navigable for small steamers. The two last are now called lakes Monona and Mendota.

FOUR-O'CLOCK. See Friar-bird.

FOURCHAMBAULT, foor-sham'bo', France, town in the department of Nievre, on the Loire, four and one-half miles northwest of Nevers, on the Paris- Lyon Railway. It has large iron works, which produce engineering material for railway, military and other pur¬ poses. Pop. 4,882.

FOURCROY, foor-krwa, Antoine Fran¬ cois de, French chemist: b. Paris, 15 June 1755; d. 16 Dec. 1809. Having adopted the profession of medicine he applied himself closely to the study of the sciences connected with it, especially to chemistry, and published in 1776 a translation of Ramazzini's (Treatise on the Diseases of Artisans. He was pro¬ fessor of chemistry at the Jardin du Roi, 1 780— 1805. He organized the central school of pub¬ lic works, out of which the polytechnic school afterward sprang, and co-operated in the estab¬ lishment of the normal schools. In 1799 Bona¬ parte gave him a place in the council of state, in which place he drew up a plan for a system of public instruction, which, with some altera¬ tion, was adopted. His works are numerous, among which the following are the most im¬ portant: (Legons Elementaires d'Histoire natu- relle et de Chimie* (1791) ; (Systeme des Con- naissances chimiques, et de leurs Applications aux Phenomenes de la Nature et de l'Art) (1805); (Philosophie chimique) ; (Tableaux*

synoptiques de Chimie) (1805) ; and (La Mede- cine eclairee par les Sciences physiques.)

FOURDRINIER (foor-dri-ner') MA¬ CHINE, a paper-making machine, the first to make a continuous web. It was invented by Louis Robert, of Essonne, and patented by him in France. A Mr. Gamble and the brothers Fourdrinier improved it. The machine was perfected by others. See Paper.

FOURIER, foo-re-a, Francois Charles Marie, French social economist: b. Besangon, 7 April 1772; d. Paris, 10 Oct. 1837. He studied at the college in his native town, and obtained a mercantile position at Rouen ; he later entered into business on his own account at Lyons, hav¬ ing inherited a small fortune from his father, but the siege of the city by the troops of the convention in 1793 and the subsequent dis¬ orders were fatal to his prosperity ; he was ar¬ rested and kept a prisoner for some time, and afterward served two years in the Revolu¬ tionary army, being discharged in 1796 because of failing health. While employed at Mar¬ seilles, in 1799, his employers retained a cargo of rice in order to keep up the price, and when it became unfit for use ordered Fourier to throw it into the sea. This experience led him to question the righteousness of the exist¬ ing industrial system and to develop his own social theory known as Fourierism (q.v.). He first published (Theorie des quatre mouve- ments et des destinees generates (1808), in which he explained the basis of his system, which he developed more completely in (Traite de 1'association domestique agricole)*

(1822), republished under the title (Theorie de l'unite universelle, and in (Le Nouveau Monde) (1829-30). Consult Pellarin, (Charles Fourier, sa vie et sa theorie* (5th ed., Paris 1871; American translation, 1845) ; and Fourier's (Oeuvres choisies) (1890), with biographical notice by Charles Gide.*

FOURIER, Jean Baptiste Joseph, Baron, French mathematician: b. Auxerre, France, 21 March 1768; d. 16 May 1830. He was an active Jacobin during the French Revolution. His later energies were divorced from politics and given up to science. (Analytical Theory of Heat> (1822) is his most noted work; but in mathematics his speculations and methods are of high permanent utility.

FOURIER SERIES, in mathematics, a trigonometric series first extensively employed by the French mathematician Jean Baptiste Joseph Fourier, in connection with the theory of the movement of heat in a solid body. It was primarily intended for effecting the de¬ velopment of an arbitrary periodic function in the form of a series whose terms are sines and cosines of increasing multiples of the variable. The subject is too technical for discussion in a general encyclopaedia. Consult Fourier, (The Analytical Theory of Heat) (translated by Alexander Freeman) ; and more especially, Byerly, (An Elementary Treatise on Fourier's Series, and Spherical, Cylindrical and Ellip¬ soidal Harmonics.

FOURIERISM, the social system advo¬ cated by F. C. M. Fourier (q.v.). It was based on the theorv that the social order de¬ pends upon fixed moral and intellectual laws, and that man must discover and live according

to these laws. According to Fourier society must be so organized as to give freedom to the passions or desires of man, since these are naturally capable of harmony, and if developed under proper conditions, would, in accordance with the law of attraction, lead to a perfect society. He first intended that marriage should be abolished as imposing an unnatural bondage on human passion and a system of licenses sub¬ stituted ; but this was afterward abandoned. In this society industrv should be carried on by phalanxes. Each phalanx was to consist of 1600 persons, residing in a common building; the phalanx to be divided into series, and the series combined in groups; each group was to have charge of one kind of work, and each series of one special branch of that work. In the distribution of products a certain minimum was to be assigned to each member of the so¬ ciety, whether capable of labor or not ; the re¬ mainder to be shared

among the three elements, labor, talent and capital in the proportion of five to labor, three to talent, and four to capi¬ tal. The capital of the communitv might be owned in unequal shares by different members of the community; inheritance was to be per¬ mitted, and the individuals could expend the remuneration they received as they pleased. The government was to be republican, with elective officers. Fourierism, though socialistic, is not properly socialism, and is related to modern socialism bv its sharp criticism of existing conditions rather than by its plan for the future of society.

Fourierism won many converts in France; and so sanguine was its originator that for the last 10 years of his life he waited at noon every day in his apartments for the advent of the financial magnate who was to furnish means toward the realization of his scheme. Among those who advocated the theory were Victor Considerant and Mennier ; an associa¬ tion was formed; a periodical, The Phalange, was published for a short time ; and a number of communities were organized in accordance with the Fourieristic plan, onlv one of which has survived the co-operative stove factory founded at Guise by Jean Godin, a disciple of Fourier, with its workmen's colony and phalanstery accommodating 400 families. Fourierism was introduced into the United States in 1842, by Albert Brisbane, who for a time published The Phalanx in New York. He was welcomed by the members of the Brook Farm community, and the Fourieristic organization was adopted there. For a time the Brook Farm Phalanx published The Harbinger, the most important periodical pub¬ lished by the Fourierists in the United States. An organization, known as the American Union of Associationists, was formed for the "popular diffusion of the principles of the asso¬ ciative sciences as discovered by Charles Fourier, with a view to their ultimate realiza¬ tion by the establishment of phalanxes.® Horace Greeley (q.v.) became its president, and George Ripley (q.v.) secretary. A large convention of the "associationists® was held in New York in 1844. In 1847 The Harbinger was transferred to New York under the charge of this association, and was published till 1849. About 34 communities were organized by the Fourierists, of which the most important (be¬ sides Brook Farm) were the North American

Phalanx, which lived 12 years, and the Wis¬ consin Phalanx. Most of them existed but a short time, and by 1850 the Fourierist move¬ ment had practicaly come to an end. Consult Bebel, (Charles Fourier (1888) ; Brisbane, (Social Destiny of Man* ; Ely, (French and German Socialism* ; Noyes, (History of Ameri¬ can Socialisms * ; Shaw, (A Forgotten Social-ism) (New England Magazine, new series Vol. VIII, p. 773). See Brook Farm; Com¬ munism; North American Phalanx; So¬ cialism.*

FOURMIES, foor'me', France, town in the department of Nord on a tributary of the Sambre, 40 miles southeast of Valenciennes and close to the Belgian frontier. There are iron mines in the vicinity and the town was a chief centre of the wool combing and spinning in¬ dustry in France. Here were established the first glassworks in France. In August 1914 after the fall of Namur the German armies oc¬ cupied the town, which had suffered severely from bombardment during the retreat of the French forces. Before the war it had a popu¬ lation of 14,143.

FOUR NET, foor'na', Joseph Jean Bap¬ tiste Xavier, French meteorologist: b. Strass- burg, 1801 ; d. 1869. He was educated at the Paris School cf Mines and was a member of several geological exploring expeditions. He was appointed professor of geology at the Uni¬ versity of Lyons in 1834. His knowledge of the geology of the Alps and of southeastern France was unequalled. He made a notable discovery in connection with the sulphurization of metals, which is known as "Fournet's law.® His publications include

(1862).

FOURNIER, foor'm'a', August, Austrian

historian : b. Vienna, 1850. He was educated at the University of Vienna, was employed in the Ministry of the Interior and after 1875 served as instructor in history at the University of Vienna. He removed to Prague in 1883 and in 1903 returned to the University of Vienna as full professor of history. In 1891-1900 he was a member of the Reichsrat, and of the Bohemian Diet from 1892 to 1901. His most noteworthy work is < Napoleon I, Eine Biog¬ raphy (1886-89; French trans.; Eng. trans. by Corwin and Bissell 1903, and by Adams 1912). Other works are

Ungarn und Polen urn die Mitte des 18. Jahrhunderts (1887); IIP (1912) ; (Die Geheimpolizei an dem Wiener Kongress) (1913).*

FOURNIER L'HERITIER, Claude,

French revolutionist, called "l'Americain® : b Auzon, Haute-Loire, 21 Dec. 1745; d. 1825. He went to America and at Santo Domingo started an establishment for the manufacture of rum, but he lost his fortune in a fire and re¬ turned to France. He took part in all the revolutionary activities in France in 1789-92 and was accused of complicity in the murder

the Orleans prisoners many of whom per¬ ished while in his charge in 1792. He was ac¬ quitted of this charge, but was soon in difficulty

FOURTEENTH CENTURY

again and was deported, not returning until 1809. Two years later he was caught plotting again and was confined in the Chateau d'lf. At the First Restoration he secured his liberty, was later involved in a plot against the Bour¬ bons, was imprisoned and released finally in 1816. His last years were spent importuning the government to recompense him for his lost fortune in Santo Domingo. Consult his (Memoires secretes) (ed. Aulard, Paris 1890).

FOURTEENTH CENTURY. Following the great outburst of human achievement which came in the 13th century, the 14th might be ex¬ pected to present a still higher step in culture in accordance with the law of progress that is often presumed to rule in human affairs. On the contrary, as is so often noted, this great artistic period was followed by a time when art became more conscious, and elements of degeneracy are readily noted. The century witnessed a culmination of its art and philos¬ ophy in Dante, who was 35 years of age when it opened. His great poem belongs to the cen¬ tury however, so that the period possesses the greatest poem, if not the greatest poet of all times. The mid-century was subjected to the severe trial of the Black Death, the Bubonic Plague, which ravaged most of Europe, carry¬ ing off more than half the population, sparing neither sex nor age, and perhaps as a rule carrying off more of the vigorous individuals than of the weaklings f®r they were more ex¬ posed, and resistive vitality was seldom suf¬ ficient to protect any one however vigorous once infection took place.

Medical factors have seldom been given due weight by historians, but the Black Death above all has not been estimated at its true value as a determiner of historical tendencies, for a cen¬ tury afterward. To appreciate this, some of the figures of the losses are needed. Florence lost 60,000; Siena, 70,000; Venice, 100,000; Avignon, 60,000; Paris, 50,000; the compara¬ tively small town of Saint Denis, 14,000; while there were smaller towns in France in which but 2 out of 20 of the inhabitants sur¬ vived, and in Sardinia and Corsica only one- third of the population was left. England is said by some to have suffered even more severely than this, one almost contemporary au¬ thority saying that there was scarcelv 1 in 10 of the population left. Hecker ((The Black Death, > New Sydenham Society) declares this an exaggeration, yet it serves to show some¬ thing of the awful ravages that must have been inflicted. He calculates the deaths throughout Europe from the disease at 25,000,- 000. Historians generally have represented that a great wave of irreligion followed close on the heels of the disease, but Hecker em¬ phasizes exactly the opposite, — a great wave of religious enthusiasm, and above all of peniten¬ tial exercises. The plague recurred at irregular intervals, and when there came to be a feeling

of security there was a reaction toward license, but mainly on the part of the cowards who had fled from various posts of duty and thus saved themselves. It is easy to understand what a revolution in the social order was effected by these immense losses. A great many institu¬ tions were seriously paralyzed in efficiency. As pointed out by Gasquet, the clergy suffered particularly. Their duties of affording re¬

ligious consolation to the sick, which were bravely fulfilled as a rule, exposed them to in¬ fection. Large numbers of the religious orders perished because of this, and because the duty of nursing the sick so often incumbent on them was peculiarly dangerous and community life led to the spread of the infection. There were religious communities entirely wiped out or only a few left. A great many of the hierarchy fell victims through their zeal for their flocks and unworthy men, schemers for place, obtained high ecclesiastical positions which they would not have received in the more exemplary times before the Plague. Gasquet has traced a lively picture of conditions that developed in England which may be applied to other countries. The result was a sad de¬ generation in Church efficiency that gave good grounds for the bitter criticisms of ecclesiastics which are found in the literature at the end of this century and the beginning of the next. A corresponding degeneration took place in every serious phase of life, the progress of art was sadly interfered with, education interrupted for a generation and required several more to catch up with its previous state, while com¬ merce and industry of all kinds suffered in like manner.

The intense interest in education of the be¬ ginning of this century is well illustrated by the number of important university foundations during the first 10 years. The University of Lyons was founded in 1300-01 ; the University of Avignon, 1303 ; Orleans, 1305 ; Perugia, 1307 ; Coimbra in Portugal, 1308. Many of these universities had existed as schools of some importance as a rule, before this, but now were raised to university rank by some formal recognition, usually a Bull of the Pope. The University of Dublin for instance was thus refounded in 1320, a Bull for the erection of a university near Dublin having been granted by Clement V to Archbishop Lech, 11 July 1311.

The Pope as the international authority of the time, regulated the interchange of scholars and professors and the maintenance of stand¬ ards, and Papal Bulls required the same stand¬ ards as those of Paris and Bologna, and some¬ times demanded that the first professors should be graduates of one of these older universities in order that university traditions might be properly established. The Papal Decrees enacted that examinations for degrees should be conducted under oath so as to insure fair¬ ness and even dictated the details. of the time to be spent in study and the subjects, before permission would be given to come up for

examination. . In erecting the University of Perugia, for instance, which was in the Papal States, Pope John XXII insisted that those who were to receive the degree of Doctor of Medicine should have devoted seven years, three of them hearing lectures, in medical science in accordance with the terms for taking the same degree at Paris or Bologna. In erect¬ ing the University of Cahors in his native town in France, the same Pope at the end of the first quarter of the century said in his Bull that he wished that here <(a copious, refreshing fountain of science should spring up and con¬ tinue to flow, from whose abundance all the citizens might drink, and where those desirous of education might become imbued with knowl¬ edge so that the cultivators of wisdom might

sow seed with success and all the student body become learned and eloquent and in every way distinguished.®

The first university deliberately founded as such, and not growing out of a school which had developed to a point where a studium gen¬ erate (the mediaeval name for University), was the natural next step, was the University of Prague. It was founded by Charles IV in 1348, who ascended the Bohemian throne only two years before. Charles had been a student at Paris and now <(in memory of his student life, wished to have a copy of the university there in his Kingdom of Bohemia.® (Dollinger). He founded it with all the faculties, conferring on it all the rights, privileges and immunities common to universities. For this he had ob¬ tained a Bull of foundation from the Pope in the preceding year, which as Laurie says, gave catholic (universal) validity to its degrees. The Archbishop of Prague became its chancel¬ lor. After this date, we find that important universities had usually two charters, the one papal, the other royal or imperial. The Uni¬ versity of Prague is noteworthy as the starting point of the great German system. Before the end of the century, universities of the Parisian type were founded at Vienna, Erfurt and Heidelberg, and the University of Leipzig was founded by withdrawal of students and pro¬ fessors from Prague early in the next cen¬ tury, similar to earlier corresponding incidents at Paris and Oxford.

So great was the interest of the first part of this century in education that it seems literally true to say that there were more students at the universities of Europe in proportion to population at this time than at any other in history. The population of the European countries was very small compared to our time. England probably did not have more than three millions, and other countries had inhabitants in the same ratio. There were many

thousands of students at the English universi¬ ties and even with all the discounting of con¬ temporary statistics sometimes deemed neces¬ sary, the universities of tha't time were un¬ doubtedly ahead of ours in the numbers of students in attendance. University students included boys of 12 and over up to mature men well beyond 40. The boys seem to us entirely too young for university work, but it may be recalled that some of our distinguished states¬ men of the 18th century received their college degree at 16 or even earlier, and that our present method of delaying graduate work until well beyond 20 is as yet on trial and not favorably viewed by all. The maturer students of the universities of the early 14th century were doing true university work in many cases. They were preparing to be lecturers and were often actually doing what would be called docent or seminar duties of various kinds ; they were writing books and taking part in disputa¬ tions, sharpening the wits of students, and mak¬ ing the philosophical and theological principles clearer by elaborate distinctions. This inten¬ sive work led to an abuse of dialectics in this century, so that the means of getting at truth, that is, logical processes of various kinds, were often mistaken for an end in themselves. The tendency is an academic fault at all times, and technics have in the course of the development of the physical sciences in later days, shared

this fate. Students for the degree of Doctor in Philosophy have in modern as in mediaeval times occupied themselves often with recondite subjects of very little interest to the public and of still less practical value. The 14th century did witness, however, a decadence in the uni¬ versity thinking out of great principles and their application to pertinent problems, religious and social, which had characterized the 13th century.

Before the end of the century, Italy received its introduction to Greek and accepted it with an enthusiasm which augured well for the evolution of classical study. The Eastern Em¬ peror harassed by the Turks and realizing that it would not be long unless he received aid from the West before his capital must fall, sent an embassy headed by Manuel Chrysoloras, an eminent Greek scholar, to Italy. The Florentines welcomed Chrysoloras to their city and at once offered him a professor's chair in the University (1396). His lecture room was crowded. Not only the young, but the old came to hear him, and it is said that men past 60 Melt the blood leap in their veins® at the thought of being able to learn Greek. Addington Symonds says that <(if it be true that except the blind forces of nature, nothing moves in this world which is not Greek in its origin, we are justified in regarding the point of contact between the Greek teacher Chryso¬ loras and his Florentine pupils as one of the most momentous crises in the history of civil¬ ization.®

Scholarship rather than literature was the occupation of the university men

of this cen¬ tury. Petrarch went so far as to write what he hoped was to be his greatest poem, the work by which he was to live, his epic, (Africa, in Latin, though this was a generation after Dante had written his (Divine Comedy) in Italian. Petrarch could scarcely think that the vulgar tongue was elegant enough to hold thought for any length of time. Italian might do for love sonnets to be read for a generation or two but not for enduring literature. His Latin epic is never looked at now while his sonnets are a world possession. Petrarch's spirit influenced all the universities. It was a time of classical learning, but only of the Latin classics. Greek attracted attention only in the next century. Translations of the Scriptures into the modern languages were being made, and the sublimity of thought in the Bible made even translations of literary value while the familiarity of the people with Scriptural expressions began the fixation of the mother tongues.*

The literary monuments of the 14th century make it immortal. Dante's (Divine Comedy) has been proclaimed by some the greatest poem ever written. It has not only lived, but with certain brief intervals has been a constant source of inspiration to poets, artists and serious students of every kind ever since. Now that the 600th anniversary of his death (1321) is approaching, Dante is higher in' world honor than ever. There have been periods of com¬ parative neglect of their greatest poet which have only served to illustrate Cornelius' law, that whenever the Italians appreciate Dante properly, art and literature flourish finely, while whenever he is neglected they are in decadence. The profound influence of Dante over subse¬ quent literature all over Europe can be best

gauged by the number of works written with regard to him. The Dante Library at Cornell contains some 9,000 volumes and thousands of other titles of Danteana, and the Dante section of the British Museum contains some material not represented at Cornell. Petrarch in one mode of literature, the sonnet, had a more immediate effect upon European literature than Dante, and gave rise to a flood of sonnets all over Europe. He continues to be the poets' poet at least. Boccaccio created out of older elements a 'fictional literary mode scarcely less influential than that of Petrarch and his book has been read in all languages ever since, though not so much for its literary value as its abiding appeal to human nature. Italy anticipated the other countries of Europe in the creation in this century of a national literature that was to be a living force ever afterward, but other countries mainly under her influence succeeded in the same achievement. After Italian, English literature had the highest development at this time. Chaucer (1320-1400), probably a student of Cambridge, visited Italy when

nearly 50 years of age and came under the influence of Petrarch, then the most illustrious man of let¬ ters in Europe. It was after his return from Italy that in imitation of Boccaccio he wrote his greatest and most original work, (The Canterbury Tales. } Written in an English not very different from that of our time, this is one of the world's great works of literature, full of wit, humor, pathos and knowledge of humanity; written from so close to the heart of nature that it has lived and will live.

John Gower's (1325-1408) (Confessio AmantisP a collection of stories like the (Tales,> written after his friend Chaucer had demonstrated the power of expression of Eng¬ lish, and diverted him from his Latin, though he had to display his erudition in the title at least, is mainly of academic interest, a work of pedantry rather than of human nature, but.com- pleting our knowledge of the intellectual inter¬ ests of the time for that very reason by its contrast with Chaucer. The third English literary monument of this century is the (Vision of Piers Ploughman, > probably by William Langland (1 332 ?— 1 399 ?) , a clergyman in sympathy with the lower classes. It is a spirited satire against vice and abuses in gen¬ eral, not sparing the faults of the churchmen of that time, emphasized by the social conditions after the Black Death. France possesses one writer of cardinal importance in the period, Froissart, the historian who wrote in prose. England has her corresponding prose writer in the unknown translator of Sir John Mande ville's (Voyages,) the first to handle English prose as Chaucer did verse, with freedom and independence.

The 14th century presents an unexpected feature of history in the career of a woman writer, who finding herself a widow at the age of 25 with three children to support, proceeded to make a living for them with her pen. This was Christine de Pisan, born in Italy but brought up in France and writing French bal¬ lades, rondeaux and other poems as well as an immense amount of hack work prose, transla¬ tions and compilations of all kinds, so that, as she herself says, «in the short space of six years (1397-1403) I wrote 15 important books, without mentioning minor essays which com¬

piled, made 70 large copy-books.® It is indeed illuminating for the time to find the career of this kind in it, and it can scarcely help but revolutionize many commonly accepted notions with regard to mediaeval lack of interest in such things and utter denial of opportunities for a successful intellectual life for women who possessed the necessary talent and initia¬ tive.

A very interesting development in the litera¬ ture of this time is that of the mystical writers who in Italy, France, Germany and England wrote works which have continued to live be¬ cause of the depth of their meaning but mainly for their literary quality. Piers Ploughman in England and Wyclif's work belong to this class. Wyclif's translation of the Bible deeply influenced

all subsequent English writers. Gasquet has disputed the genuineness of the versions of Scriptures attributed to Wyclif, and there is now no doubt that the Bible was familiar to laymen before this and that trans¬ lations of the New Testament in English were common before Wyclif. Two 14th century works in Italian, the (Fioretti) of Saint Francis and the letters and (Dialogues > of Saint Cathe¬ rine of Siena are now attracting wide attention, 500 years later. The ˆiorettip which breathes the charm of Saint Francis better than any¬ thing ever written about him, has had a strik¬ ing revival. The development of feminism has brought with it a renewal of attention to Catherine of Siena (1347-80). Though she did not learn to read until she was 25 nor to write until she was 30 (and she died at 33), her ((work has survived the wreck of time be¬ cause she wrote with a passionate tenderness, intense and always present, which her deep feeling transmutes into eloquence.® (Snell, (Periods of Literature, Fourteenth Century)• She is the classic of Sienese, the other mode of Tuscan, besides the Florentine. These two equally influenced modern Italian. Saint Catherine, who was that curious composite being, ((a mystic, a poet, a politician and a saint,® deeply impressed her time. Her life was full of visions, yet she was a great practical social worker who led in the correc¬ tion of many abuses and the consolation of many sufferings and-whose influence became so great that she was the peacemaker of the troubled time, not only between individuals but also cities and states. To her influence more than to any other single factor is due the re¬ turn of the Popes from Avignon to Rome. In France, Jean Gerson (1363-1429), the chan¬ cellor of the University of Paris, deeply moved his own and succeeding generations by his preaching and writing, and the authorship of the (Imitation of Christ* was for long at¬ tributed to him. It was in Germany, however, that mysticism in our modern sense of the word flourished at this time. Master Eckert .with John Tauler and Heinrich Seuse, his disciples, created a mode of literature that was to have its culmination in the immortal Umitatio Christi* by a Kempis.*

Painting had a wonderful period of develop¬ ment during the century. Cimabue at Florence and Duccio at Perugia had made great begin¬ nings in the 13th century, and Giotto in the 14th continued their traditions and brought decorative art to one of its highest points of achievement. His pictures of the life of Saint

Francis at Assisi and his decorations for the Chapel of the Arena at Padua are still the sub¬ ject of loving study by painters, not only out of reverence for the past but particularly for the fine points of technique which they

illustrate for all time. <(As compositions in color and as wall decorations with certain architectural effects they have almost never been excelled. As serious and faithful efforts to realize the inner meaning and significance of the Bible stories and of the Franciscan incidents, they are quite as admirable.® (Goodyear). Giotto was one of the first to make portrait studies and he has all the qualities of a great portrait painter. He was never surpassed in solemnity and seriousness, in religious feeling and in original power. The work of his students in the Campo Santo Pisa has always attracted loving atten¬ tion. In Pisa the sculpture of the 14th cen¬ tury flourished, though this had reached a cul¬ mination in the preceding century. Giovanni Pisano directed the sculptural effects on the fagade of the Cathedral of Orvieto at this time. In this earlier Renaissance, the painter was often a sculptor also, as Giotto's fine plaques for the Campanile at Florence illustrate, and Orcagna's work on the tabernacle of the Oratory of Or San Michele. Pisan sculptors worked throughout Central Italy, and the bronze doors by Andrea of Pisa on the Florence bap¬ tistery show how well. Architecture flourished quite as luxuriantly as painting and sculpture, though some signs of decadence are to be seen. The secular buildings of Italian Gothic of this period and especially the great town halls and civic palaces are admirable. Many of these buildings were literally town fortresses to withstand the stormy outbreaks and civic convulsions in which the overflowing vigor of these municipalities found vent, but their mas¬ sive simplicity adds impressive dignity to their fine lines. Siena, Perugia, Florence, Piacenza contain some beautiful palaces from this time, and above all, Venice is the place to study the development of beautiful palaces of private citizens. There were fountains and other monu¬ ments also erected which show that Italy at this time had fully reached the idea of the city beautiful. The interior decorations of these buildings were done by the best painters of the time, and they are still models of artistic taste and charm. Particularly hospitals were the subject of loving attention in this way, as is very well illustrated by the hospital built after her death in honor of Saint Catherine of Siena. It was felt that the ailing poor should have something to occupy their minds during the time while they were confined to the hos¬ pital. The city built its public buildings for its citizens and nothing was too good for them and then had them decorated fittingly. At times, the decorations or portions of them were done by artists who had been cared for by the hospital and who wished to leave a substantial memorial of their gratitude. Instead of being deterrent, then, hospitals became some of the most attractive of municipal structures. The museum as such was unknown but the various public buildings, cathedral, town hall, hospital, took its place, and the pictures made for them were thus exhibited in a suitable environment.

The severe shock to humanity caused by the immense mortality of the

serious disturbance of social life due to its ravages made the people of the end of the cen¬ tury incline to hysteria. It is very probable that not a little of this was due to the fact that the bravei souls among men had nearly all perished and the race for a time was being propagated to a large extent by those who had escaped death by cowardly flight during the epidemic. The movement known as the Flagel¬ lants was in its origin probably only a real penitential impulse' on the part of men and women who felt that the sins of mankind had brought down the awful scourge of disease and who hoped to allay the storm of Divine vengeance by due acknowledgment in self-inflicted punishment. After a time, it came to be an hysterical epidemic associated with many abuses and productive of serious evil. Other hysterical manifestations as for instance the Dancing Mania spread throughout Europe and deeply affected the populations of a great many countries. Hecker, the medical historian of the Black Death, has treated these manifestations also, and suggests that after all they represent only a certain exaggeration of reaction to the religious emotions that are common at many times in history. Various curious sects still existing are the testimony to the fact that human nature is not changed and is still quite capable of going to these excesses.

The Black Death produced one other result that was of far-reaching importance. By mak¬ ing labor scarce, it raised laborers' wages and gave an opportunity to secure rights hitherto denied them. Toward the end of the century, Wat Tyler, that is Walter the tiler, led an in¬ surrection in Kent, while Jack Straw led a similar movement in Essex. John Ball, a priest, had been preaching in the open air, the churches being denied to him, against the luxury of the rich and their oppression of the poor, and had produced wide discontent. Wat Tyler led his men to London and London Bridge was shut against them, but they threatened to burn the city and were admitted. Tyler met the young king, Richard II, then only 15 years of age, with a retinue of only some 60 horsemen, and made his demands, one of which was that the king should cut off the heads of all the lawyers in England. When Tyler became insulting, he was struck down by Sir William Walworth, the Mayor of London, and the young king with out¬ stretched hands rode toward the mob of 30,000 who were just preparing to send a flight of arrows, and said, <(Tyler was a traitor, I am your King. I will be your Captain.® And thus ended the dangerous riot. The leaders of the mob were punished, John Ball was put to death, but the movement which they had set on foot continued to make itself felt and by the end of another century, many of the worst abuses they complained of had been corrected. It takes blood to bring about social changes of any importance; the first martyrs to the cause, or even their generation reap none of the benefits.

The political history of the 14th century is if possible even more full of turmoil than usual. The emperors chosen were usually of no special significance, until it came to be realized that the empire itself had lost prestige and that the man elected to the office must have considerable dominions of his own.

Charles IV, the king of Bohemia, made a good king but a poor emperor, and is remembered for his Golden Bull by which the election of the emperor was regulated but which lessened the imperial powers in favor of the Princes. The English and French became deeply occu¬ pied with the Hundred Years' War, not of ac¬ tual fighting but without lasting peace. The English took Calais and won the battles of Crecy (1346) and Pointiers (1356). King John of Bohemia was killed at Crecy; King John of France was taken prisoner at Poitiers, and became the companion in captivity of David, King of the Scots, the son of Robert Bruce, taken prisoner in 1346. King Edward of Eng¬ land took the title of King of France borne by all the kings of England down to 1800.

The century is famous as the scene of many national legends and heroes whose names have been famous at least among their own people ever since, though modern historians have sadly diminished the authenticity of their exploits. William Wallace, the Scottish chief, was be¬ headed in 1303, but his brave effort against his country's enemies probably encouraged Bruce in the great enterprise of freeing Scotland. About the same time William Tell inspired the Swiss with a renewal of that love of freedom which has ever since kept their little country independent in the midst of warring Europe. Arnold Winkelried may not have gathered all the Austrian spears into his single devoted breast at the battle of Sempach (1385), but his story has proved a real source of courage. Rienzi, the <(Last of the Tribunes,® (1347) at¬ tempted to restore the Roman Republic while Artevelde (died 1382) led the revolt of the Flemings for freedom. Apart from these, glo¬ rious if sometimes mythical deeds, political history of the time is a dreary period of wars an destruction, political jealousy, dynastic ri¬ valry and corrupt practices. Dante wrote his great poem in exile, and Italy was rent by the struggle of the Guelphs and Ghibellines, though somehow in spite of the disturbances, men found not only the time but the freedom of spirit for the pursuit of great literature and fine scholarship. The Popes left Rome be¬ cause of political disturbances and transferred their See to Avignon in France. For 70 years, sometimes called the ((modern Babylonian Cap¬ tivity,® the Popes were out of Rome, and it was given over to violent political dissensior An earlhquake occurred to further disturb the city, and

at one time of this century it is said that Rome contained scarcely 10,000 inhab¬ itants.

The end of the century saw the rise of a great conqueror in the East, Tamerlane, who from Tartary set out to conquer the world. He invaded Persia, took Ispahan, and made a pyramid of human skulls of his victims, de¬ feated the Russians and sacked Moscow, in¬ vaded India successfully and took Bajazet the Sultan of the Turks prisoner after a great bat¬ tle just as the next century opened (1402) .

The 14th century witnessed the serious division of Christianity known as the Great Schism. This developed after the return of Pope Gregory XI to Rome from Avignon and his death, when Avignon and Rome had claim¬ ants to the Papacy. Urban VI was elected at Rome and Robert of Geneva who took the

name of Clement VII, elected at Naples, by disaffected Cardinals was driven from there and took up his residence at Avignon. Even the saints of the time were divided in their ad¬ hesion. Saint Catherine of Siena and Cathe¬ rine of Sweden, as well as Blessed Peter of Aragon and Gerard de Groote, the great founder of the Brethren of the Common Life, acknowledged Urban as Pope, while Saint Vin¬ cent Ferrar and Saint Collette recognized Clement. Rome and Avignon Popes continued to be elected regularly until the end of the cen¬ tury. A third claimant to the Papacy was elected in Pisa, and it was not until the Coun¬ cil of Constance (1415) deposed one pope, re¬ ceived the abdication of another, and dismissed a third, that the Schism was ended bv the elec¬ tion of Pope Martin V. There are church the¬ ologians who argue that none of the claimants of this period were really popes, and that there was a long inter-regnum such as occurs for brief intervals at the death of every pope.

The social sense of the time is very well illustrated by the career of the famous Dick Whittington, as he is so well known from the children's stories with regard to him. He was born just after the middle of the century, shortly before the death of his father, Sir Richard Whittington, who had been declared an outlaw. The boy had to make his way for himself and the old legends depict him as going up to London to seek his fortune in the com¬ pany of a cat to whom he is kind and the ani¬ mal repays him by helping him to make his fortune. The part played by the cat has now been all whittled away by the rationalizing folklorists who have pointed out that a similar story is a commonplace in many languages. It is suggested that Dick made his fortune by achat or acat, that is, commerce or trade, and that in the course of time, the meaning of the word was transferred under the influence of folklore. There is no doubt about his having made his fortune however, and in 1392 he be¬ came an alderman and sheriff at

London and was chosen mayor in 1397 and several times later. He had no children of his own, and the principal interest of his career is not that he made his fortune, which is the part of the nur¬ sery tale emphasized for children, but the noble disposition which he made of it, a portion of his story that has unfortunately not been told to children. It is for this latter reason that he is spoken of as <(the model merchant of the Middle Ages.® He rebuilt Saint Bartholo¬ mew's Hospital, which had been founded in the 13th century and still continues its good work. He built an almshouse for the aged poor where old married folk might live together till the end of their days, as well as a college and an addition to Saint Thomas' Hospital, South¬ wark. He made arrangements for a maternity where young women ((that hadde done amysse® might be cared for with absolute privacy ((in truste of a good mendement® so as to have a chance for reform. Most of this he did before his death, but he left still more generous ben¬ efactions in his will, and all of them with the purpose of preventing poverty and suffering rather than merely providing temporary as¬ sistance. No wonder that he is known as the <(Father of the Poor® and that he is one of the well-known characters of the end of the

Middle Ages. The records of London chari¬ ties show many like him at this time.

James J. Walsh,

Author of iThe Thirteenth the Greatest of Centuries T etc.

PRINCIPAL EVENTS OF THE FOURTEENTH CENTURY.

1301-08. Founding of important European universities.

1302. Battle of Courtrai. Flemish democracy's victory over the French.

1303. Edward I of England invades Scotland.

1304. Birth of Petrarch.

1305. First Assembly of the States-General in France. Election of bishops. Regal power made independent of Papal influence. Wallace, the Scottish chief, beheaded in London.

1306. Robert Bruce becomes king and liberator of Scotland.

1307. William Tell appears as the liberator of Switzerland. Coal first used as fuel in England.

1311. Suppression of Knights Templar.

1314. Battle of Bannockburn. The Scots defeat the English under Edward II.

1315. Swiss defeat the Austrians at Morgarten, 15 November. 1321. Civil war in England. Death of Dante.

1326. King Edward II of England dethroned.

1327. Edward III of England commences his reign.

1328. Philip VI of France founds the Valois dynasty. Edward III of England assumes title of King of France.

1331. The art of weaving cloth introduced into England by Flemish artisans.

1338. Froissart, French chronicler and historian, born.

1339. English invade France and the Hundred Year's War begins.

1342. Factions of the Guelphs and Ghibellines in Italy. Rule of the Medici.

1344. Parliament of Paris. Madeira discovered by Portu¬ guese navigators.

1345. Canary Islands discovered.

1346. Battle of Crecy, 26 August. The French defeated by Edward III of England.

1347. Rienzi, the " last of the Roman tribunes," assumes power " in . the name of liberty, peace and justice." English capture Calais. Admiralty and Law Courts instituted in England.

1348-51. The Black Plague ravages the world.

1349. English king institutes the moral order of the Knights of the Garter.

1350. Dauphiny gives title to the King of France's heir. 1353. Boccaccio's literary fame commences.

1356. Battle of Poitiers, 19 September. King John of France made prisoner by the English.

1360. Calais ceded to England.

1362. Use of French language abandoned in English law courts for the native tongue. Langland writes his ‘ Vision of Piers Plowman.’

1368. Revolution in China. Yue-chang or Hong-wu founds the Ming or “ Bright ” dynasty. Makes Nankin his capital. Receives ambassadors from Persia and Con¬ stantinople.

1371. The Stuart dynasty founded in Scotland.

1377. Wickliffe’s doctrine condemned in England. Richard II becomes king of England.

1378. Schism begins in the Catholic Church and lasts \o 1417. 1381. Tyler's insurrection in England. Bills of exchange

first used in England.

1383. Cannon first used by the English governor of Calais.

1384. Wycliffe completes translation of Bible into English. The first English navigation act excludes all exports or imports in foreign vessels.

1386. Swiss defeat the Austrians at Sempach through Winkel- ried's courage.

1387. The first Lord High Admiral of the English navy appointed.

1388. Scotch invade England and are victorious at Otterburn. 1391. The Pope's power and authority abolished in England

by the Parliament.

1396. Chrysoloras appointed professor of Greek at Florence, vitalizes scholarship.

1397. Whittington the ' father of the poor " becomes mayor of London.*

1399. Rebellion in Ireland.

FOURTH CENTURY. The end of the

3d century saw the revivification of the Roman Empire under Diocletian. He was one of those strong sons of the poor who exemplify so often in history the fact that it is the man himself and not his heredity that counts. His mother was surely a slave, his father a carpenter, and the future emperor was born at Dioclea in Dalmatia, to which he owes his name. He was chosen emperor by the troops and slew with his own hands the Prefect of the Praetorians,

the murderer of Numerianus, his predecessor. Diocletian owed his position as emperor to his military talents, but it was his genius as an administrator that has given him a lasting place in history. His reign .was most favorable to the prosperity of the empire, and he re¬ formed legal procedure, reorganized the finances, and made himself a patron of litera¬ ture and the arts and sciences, but just at the beginning of the 4th century he permitted the tenth persecution of the Christians. He is not entirely responsible for this, urged to it by Galerius, whom he had chosen as Caesar, and he feared the growing power of Christianity over the people as lessening the reverence

for the emperor. Eusebius, the Christian historian, tells how much the peaceful early years of Diocletian's reign meant for Christianity and for the vast multitudes that flocked to the religion of Christ, and of the spacious and splendid churches erected to replace the very humble structures with which the Christians had been satisfied before. Eusebius notes that their prosperity had brought with it a falling off in fervor among the Christians, but the bitter persecution braced them up, and un¬ doubtedly did much to put the Christian Church in that condition of fervor which so impressed Constantine a little later.

Diocletian at the age of 59, presented to humanity the unusual spectacle of a man giv¬ ing up the highest position in the world and having resigned the Imperial dignity in 305 re¬ tired to live in- peace and obscurity for some eight years near his birthplace. Diocletian had chosen three others, Maximian, who received the title of Augustus, and Constantius Chlorus and Galerius with the titles of Caesars, to share his sovereignty of the Roman world, some 10 years before his retirement. As might have been expected with all these rivals for the empire, Diocletian's abdication was followed by a period of confusion, during which there were sometimes six emperors and almost continuous warfare. Out of this confusion, Constantine, the son of Constantius Chlorus, who on the death of his father (306) was proclaimed Caesar by his troops at York, England, emerged as the future emperor of Rome. His first five years as Caesar were spent in defending his province against the Germans, and then he found himself compelled to defend his rights and those of the empire against Maxentius who claimed sole authority. Constantine led an army of surely less than 100,000 men into Italy, though Maxentius had at least 200,000, and after annihilating a powerful host at Turin, laid siege to Verona, defeated a force coming to the relief of the city, and compelled its sur¬ render. Then with an army reduced to 20,000 men, Constantine, undaunted, marched on Rome. On the way he had his famous vision of the Cross in the heavens with the words around it, <(In hoc signo vinces — <(In this sign thou shalt conquer.ˆ_ By his instructions his soldiers, all now bearing this emblem upon their shields, though the majority of them were not Christians, went forward with a new courage. They met the army of Maxentius, nearly five times their number, at the Milvian Bridge over the Tiber and defeated them, Maxentius losing his life in the river (312).

From this event dates the absolute freedom of Christianity. Early in 313, by Constantine's

Edict of Milan, Christianity was formally recognized as a religion that his subjects might follow without molestation. He met his col¬ league, Augustus Licinius, and secured his pro¬ tection for the Christians in the East. Licinius married Constantine's sister and the peace of the world and the continuance of favorable con¬ ditions for Christianity seemed assured, but 10 years later Licinius was tempted into further persecutions of the Christians. Constantine took up their defense, and gained a victory by land at Adrianople and by sea at Chalcedon, and then a little later, defeated his rival's land army at Nicomedia, where Licinius was exe¬ cuted. In 325, Constantine, now the master of the Roman Empire, founded a new capital at Byzantium, which he called New Rome, but which came to be called Constantinople after him. The site for the new capital was chosen with great judgment, on an unrivaled harbor in the Golden Horn, at a spot where the commerce of the East and West naturally meet, united with and yet divided from the Mediterranean by the Bosphorus and from the Black Sea by the Propontus. It was an eminently defensible location which afforded splendid opportunity for the erection of a magnificent city. The solemn inauguration of the new capital did not take place until May 330, when the court and govern¬ ment settled permanently there. The choice of the site for this capital is a significant testimony to the practical genius of Constantine. He im¬ mediately proceeded to make the capital as far as possible a rival of old Rome. New public buildings including a senate house, a capitol, forums, circuses, a number of wonderful Christian churches, particularly that of the Holy Apostles, destined to be the burial place of the emperor, were erected, and some of the most beautiful pieces of antique statuary gathered from various parts of the empire, until Constantinople was considered to surpass all the other cities of the time. It was one of the centres of greatest interest in history for the next thousand years and more and has never lost its prestige.

Constantine did not spend much time in his new capital, partly because of his wars on the confines of the empire, but mainly because of his deep interest in making his government stable, his people happier, and to prevent by his presence the abuses which had been so common during the preceding century. Many of his laws show the influence of Christianity. He was the first to prohibit stringently the abduc¬ tion of girls, to encourage the emancipation of slaves, and he enacted that manumission in the Church should have the same force as before state officials or by will. Constantine was ex¬ tremely generous in almsgiving and for the adornment of Christian churches. He had a private chapel in his palace in which as Eusebius, a contemporary, tells us, ((every day at a fixed hour, he shut himself up as if to assist at the sacred mysteries and commune with God alone, ardently beseeching Him on bended knees for his necessities.® He did not become a Christian until the end of his life, remaining a catechumen himself,

although he brought up his children as Christians. This de- lav in baptism was not an unusual thing among adults, and Constantine retained something of the earlier Roman spirit exemplified so strongly in Diocletian that the emperor should be looked

up to almost with worship, and seems to have hesitated about permitting himself to be seen worshipping with others. At the end of his life, however, Constantine, feeling the approach of death, asked for baptism, declaring that fol¬ lowing Christ's example, he had desired to receive that sacrament in the waters of the Jordan, but that God had ordained otherwise, and he would no longer delay. In the true spirit of Christian humility, he laid aside the imperial purple to await in the white robe of a neophyte peacefully for the end. The story of Constantine's life is the best contradiction of the assertion that he became a Christian from political motives.

Constantine made it a favorite task to build handsome Christian churches and no less than three in Rome come from him. These are the magnificent basilica of Constantine in the Forum which was to influence so deeply Chris¬ tian architecture just then coming into prominence, Saint John Lateran and Saint Peter's. The Lateran was for many centuries the home of the Popes until they moved out to the Vatican. This latter was built in connec¬ tion with the great church of Saint Peter on the site of Nero's Forum where, according to tradi¬ tion, Saint Peter was put to death. Santa Maria Maggiore, or in English the Church of Saint Mary Major, was built shortly after Con¬ stantine's time and is still nearly in the same condition so far as to columns and walls as it was some fifteen hundred years ago in the time of Saint Jerome and Saint Augustine. The ceiling is Renaissance but the church itself gives an excellent idea of how from the time of Constantine magnificent church edifices were erected.

In spite of the unfortunate results which had followed the custom established by Dio¬ cletian of nominating a number of rulers, Con¬ stantine partitioned the empire among his three sons. Constantinus ruled the West; Con- stantius the East with Thrace in Europe, and Constans Italy, Africa and Western Illyria. As might have been expected hostilities broke out, in the midst of which two of the brothers perished, and in 353 Constantius was the sole ruling emperor. Attacked by the Persians in the East and the Allemani and the Franks in the West, he led the eastern armv himself, but without success; while Julian, his cousin, who had married Helena, the daughter of Constantine the Great, defeated the German tribes in the West. Jealous of this success, the emperor ordered most of Julian's troops to join him in the East against the Persians, but they re¬ fused, and proclaimed Julian emperor. Con¬ stantius at once set out to put an end to this encroachment upon his power, but died at Tarsus in Silesia.

Julian succeeded to the empire as sole ruler, and felt that the only hope of securing the allegiance of his people was to put an end to Christianity, to reintroduce the old religion, and above all, reinstate the worship of the emperor as divine. Proclaiming himself Pontifex Maximus, he set himself up as supreme in religion as well as the State. Hence his title in history of Julian the Apostate. He did not directly persecute the Christians, though in the course of restoring pagan temples, he injured many churchs. He met at once with firm op¬ position in Antioch when he attempted to

bring back the worship of Apollo to the Laurel Grove of Daphne, turning out of it the buried bones of Christian martyrs. He felt that it was only by grafting on the old Paganism many of the main features of Christianity to which people had grown used, that there could be any success for his campaign. Above all, he saw very clearly that unless the poor were cared for as heartily as by the Christians, and unless pagan sensualism could be repressed and Christian self-control secured, his proposed change of religion would be helpless. Humility and poverty were two Christian virtues that he despised. He said bitter, scornful things of the Galilean and the 12 poor fishermen whom He had selected to convert the world. Julian's anti-Christian program was interrupted by death after only two years of ruling. The Persians, encouraged by their defeat of Con- stantius, threatened his Eastern frontiers. He led an army against them as far as Ctesiphon, but was forced to retreat and was pursued by mounted enemies with the Parthian habit of attacking the rear guard but retreating as soon as it turned to face them. Julian fought bravely, but having laid aside his breastplate one day because of the heat of the country, an arrow pierced his breast. Realizing that his wound was fatal, he gathered some of the blood in his hand, it is told, and threw it toward heaven with the words : <(Thou hast conquered, Galilean.®. His successor, Jovian, who reigned less than a year, restored Christianity to its former position in the empire. He preferred to make peace with the Persians, giving them the whole of Mesopotamia as a peace offering. Jovian was succeeded by Valentinian after Sallustius had refused to accept the perilous post. Valentinian was a rough soldier but of sound practical wisdom, who associated with him in the empire Valens, to whom he en¬ trusted the rule of the East, fixing his own capital at Milan. Valens became an Arian, that is a Christian who refused to recognize Christ as God. He persecuted the Christians, and especially Athanasius, Bishop of Alexandria, numbered among the Fathers of the Church, who had to flee from his diocese. Gratian, the son of Valentinian, had the good sense to call Theodosius, the son of a great general of the same name who had well defended the empire in Britain, to

be commander-in-chief of the army, and made him Augustus. The empire was gradually being shaken to pieces by bar¬ barian invaders. The Goths had defeated Valens near Adrianople and internal dissensions made it impossible to resist properly. Pre¬ tenders to the empire, governors of provinces, set themselves up as tyrants, especially in Gaul and Britain, but under Theodosius, a stable government was secured once more. He well deserves the name of Great accorded him. He was the last emperor who reigned over the whole empire. He left two sons of whom Honorius reigned in the West and Arcadius in the East, after their father's death in 395.

Theodosius is probably better known because of his place in religious history than for his success as a ruler, great as that was. The most memorable incident of his reign is his accept¬ ance of a severe public penance from Saint Ambrose, who refused to allow him to enter the church at Milan because of his having or¬ dered a massacre of some seven thousand citi¬

zens of Thessalonica in punishment for a tu¬ mult in the city (April 390). He continued dur¬ ing all his life to be on terms of the most in¬ timate relationship with Saint Ambrose, and it is not surprising to find that his laws put an end to the old Olympian religion, so far at least as any open practice of it was concerned. His persecution of it was justified, for it was now being used as a rallying point for the dis¬ affected against his government and by those who hoped to continue to their own advantage the disturbances which had marked preceding reigns. His last victory over paganism organ¬ ized against him was at Aquilea in September 394. Theodosius entered Rome after this de¬ cree, sole master of what had now become a Christian Empire.

The greatest spiritual force of the century was Saint Ambrose, Bishop of Milan, who so deeply influenced the Emperor Theodosius. Through his personality in his immediate en¬ vironment and through the emperor for the civilized world of the time he helped more than any other factor to give Christianity the supreme place it now came to occupy. With Saint Augustine, Saint John Chrysostom and Saint Athanasius, Ambrose makes the four great Fathers of the Church. Ambrose's life is a touchstone of the social and educational in¬ fluences of the century. He was born about 340, whether at Treves, Arles or Rheims is not quite sure. His father was Prefect of Gaul, moving from place to place, but died when Am¬ brose was a boy, so that the future Father of the Church, like Saint Augustine, felt that he owed much to his mother. He was brought up in Rome, studied law and was appointed governor of Liguria and Aemilia with a residence at Milan. He came to be so much respected for his unswerving justice as an official that on the death of the Bishop, much against his own will, he was called by popular acclamation to the episcopal dignity. Only after his election did

he receive baptism, and at the age of 35 began his ecclesiastical career. He fulfilled his epis¬ copal duties with fine administrative ability which meant much for the Church and was noted for his tact, yet consistent firmness as is illustrated by his treatment of the Emperor Theodosius. His writings are only his Homilies or sermons as delivered to his people. For them, he has received the title of Father of the Church and they remain a recognized source of the traditional teachings of Christianity.

Another great Churchman of the century, whose name and fame are enduring, was Atha¬ nasius (296-373), Bishop of Alexandria. His writings on the Incarnation earned him the title of <(Father of Orthodoxy,® and he con¬ tinues to be the special source of argument and tradition with regard to the divine character of Christ. His relations with Constantine have made him a great historical figure at the time when Christianity was becoming the religion of the Roman Empire, while his persecution by Julian the Apostate and his years of exile give his life a romantic interest. He spent some time at Rome in the house of Marcella and he seems to have had a deep influence on the Roman society of the period. He was the long-suffering witness to the Trinitarian formulas which had been defined at Nicea, and which contain the substance of the Faith of the Chris¬ tian churches. The Athanasian Creed has con-

tinued to be ever since this time the symbol of his teaching. It has been the subject of as much contention as Athanasius himself met with during his lifetime. It may not have been writ¬ ten by him, but came to be accepted as the sum¬ mary of his position.

This century saw a climax of that form of monasticism in which men live in solitude and usually in some desert spot that secures them from intrusion. The greatest of the Fathers of the Desert, as they are called, was Saint An¬ thony, who died about the middle of the 4th century and whose life has been preserved for us by Saint Athanasius. There is scarcely a dis¬ tinguished Christian writer and thinker of this and the next century who did not spend some time at least in solitude. Jerome, Basil, Greg¬ ory Nazianzen, Augustine are examples. Be¬ sides Anthony, the names of Paul the first her¬ mit, Pacohmeus and Macharius are very well known in Christian literature. Some women are counted among these solitaries, though they are usually penitents, imitating Mary Mag¬ dalene's life of penance. Their stories have often been the subject of dramatic and fictional treatment so that their names are not unfamil¬ iar. Thais, Pelagia and Mary of Egypt are the best known. All these solitary lives had a strong

influence on their own time and on many subsequent generations.

The rival of Saint Ambrose in religious in¬ fluence in this century (for though he lived on until 420, 60 years of his life are in the 4th century), is Saint Jerome. His long journeys undertaken for his own education throw an in¬ teresting sidelight on the intellectual life of the time. Born in Dalmatia, he went to Rome for his early education, and becoming deeply inter¬ ested in religious studies, proceeded to Treves, then famous for its theological school. Later, he journeyed to Aquilea because of the educa¬ tional repute of the city, and then to Antioch to attend the lectures of Appollinaris of Lao- dicea who had the fame of being the finest exe- getical scholar of his time. Then, Jerome, like Basil, seems to have learned the lesson that all is vanity, and went to live as a hermit in the desert not far from Antioch. He was attracted there by the reputation of Saint Gregory Na¬ zianzen, whose intimate friendship he gained in Constantinople. His reputation as a scholar led to his invitation to Rome to act as the coun¬ sellor of Pope Damasus. At the death of the Pope wearied by the bitter discussions and personal enmities of the time, Jerome made his way to Bethlehem where he lived for nearly 40 years as a hermit doing the writing that has made him famous ever since. His version of the Scripture into Latin, known as the Vulgate, is still the basis of most Biblical translations. His philological inquiries regarding the text of Genesis Qucestiones Hcbraicce in Genesim show very clearly what he might have accomplished in what was then an absolutely new field of study, only that he was much more interested in finding the meaning of the Scriptures rather than writing treatises in textual criticism.

Jerome's name is connected with one of the most interesting chapters in the history of the 4th century because of the fact that under his influence a group of women came into promi¬ nence whose names have been famous ever since, for the broadening of woman's sphere in life which they brought about. Three women

particularly, Eustochium, Paula and Fabiola, under Jerome's directions, devoted themselves to work that up to this time had been unknown for women. Fabiola represents the social in¬ terests, and Eustochium and Paula the intellec¬ tual interests of the Christian women of the time. Fabiola, after a rather scandalous experi¬ ence in which she obtained a divorce according to the Roman law, had married again and thus cut herself off from the Church. After the death of her second husband, she did heroic public penance, and then, under the influence of Saint Jerome, devoted her immense wealth and her personal service to the sick poor, erecting a hospital and consecrating herself particularly to the care of those whose maladies made them avoided by others. No wonder that her funeral (400) was an enthusiastic tribute of the rever¬ ence and veneration with

which she came to be regarded by the Roman people. Paula and Eustochium, mother and daughter, of a Roman house, related on one side to the Julian gens and on the other to the Scipios and the Gracchi, had welcomed Saint Jerome when he came to Rome. On his return to Palestine, they fol¬ lowed him there, and erected monasteries and a hospice near where Christ was born. Three of the buildings were occupied by nuns under the supervision of Paula, all of them meeting every day in the common oratory for prayer. Mean¬ time Eustochium and Paula, and especially the first named, who knew Latin and Greek and Hebrew very well, helped Saint Jerome in a number of ways. Many of Saint Jerome's com¬ mentaries we owe to Eustochium's influence and Saint Jerome acknowledged this by dedicating to her his Commentaries on the Prophets. This was the first organization of women for intel¬ lectual work, and is therefore noteworthy. About the same time Hypatia attracted atten¬ tion at Alexandria for her learning, but unfor¬ tunately fell under the fanatical hatred of a Christian mob, and was brutally murdered. Some letters of Synesius, afterward Bishop of Ptolemais, show his admiration for her, and as he consulted her about the construction of an astrolabe, mathematics and astronomy seem to have been her special studies. Very little is known about her and above all her relations with the Prefect Orestes and the influence which that had in bringing down upon her the mob is not well understood. About the same time, there seems to have lived at Alexandria a Chris¬ tian maiden, Saint Catherine, whose deep learn¬ ing exercised great influence. She was made the patroness of Christian students, who were ac¬ customed to invoke her before studying, writ¬ ing or preaching. She was a favorite patroness of Bossuet, and the senior classes of Catholic universities still keep her day, 25 November, as their feastday.

Christianity afforded an opportunity for the exercise of feminine influence in the intellectual and social life which had not been possible be¬ fore. A whole group of Roman women owed a fine opportunity for the development of what was best in their personalities to Christianity. Eustochium and Paula, already mentioned, left Rome but not because there was not a congenial atmosphere there. Marcella, who is sometimes spoken of as the foundress of the first convent, belonged to one of the noblest families in Rome, whose mother, Albina, had entertained Athana¬ sius many years before when he had been com-

pelled to flee from Alexandria. Marcella having lost her husband a few months after marriage, returned to the seclusion of a country villa and gave herself to ascetic practice. When her grief had moderated somewhat, she

opened her palace on the Aventine again and made it a centre for the Christian women of Rome. The picture of the influence exerted socially, especially for the ailing poor and for the intellectual interests of Christianity in this palatial retreat on the Aventine not far from the present Santa Sabina, shows what Christianity could accomplish when allowed to exert its influence untrammeled.

Just as soon as the Christians were no longer the subject of persecution and could with con¬ fidence devote themselves to public expressions of their religious feelings, what is now called social service came to be a feature of public life. From earliest Christianity special care of the poor and the ailing had been provided. Deacons and deaconesses had visited the sick, and rooms in the bishop's house had been set aside for the homeless or for those in special need. In the Eastern cities, where there was less disturbance than in the West, public hos¬ pitals and refuges began to make their appear¬ ance and special buildings were provided for them. A letter of Julian the Apostate reveals his conviction that Christianity could not be displaced, unless the religion of the state would provide like facilities for the charitable care of the poor and needy to those which had sprung up under Christianity (361). The extent of the development of this Christian social service will be best understood from the foundation made by Saint Basil in his diocesan city of Caesarea in Cappadocia. Basil took very seriously the epis¬ copal obligation of caring for the poor and afflicted. He built a house in the suburbs which gradually became a group of houses, until it came to be called ((New Town.® Here there was provision for foundlings in what was called the Brephotrophium ; for homeless strangers in a Xenodochium ; for the ailing in a Nosoco- mium ; a Gerontrophium for the aged ; an Or- phanotrophium for orphans and other build¬ ings for physicians and nurses as well as work¬ shops and industrial schools. Basil even had provided an employment bureau where those out of work might meet those who needed labor and there seems even to have been a definite anticipation of what we now call reconstruction work in the training of cripples to special labor which would enable them to support themselves.

Basil's (Homilies) are full of insistence on the duty of the rich to spend their wealth in a Christian spirit. Indeed, the social obligations of the wealthy were so plainly and forcibly preached bv Saint Basil that modern socialists have sometimes claimed him as an early social¬ ist. He was only an expounder of the principles of Christian ethics as to the relations of rich and poor, and his words form the background of Pope Leo XI II's great Encyclical on the relations of Capital and Labor at the end of the 19th century.

Basil himself is a striking type of what Christianity was doing for the intellectual man at this time. Though he had the advantages of a university

education at Athens, where one of his teachers was probably Libanius, the best known Sophist of the 4th century, and where among his fellow students were, besides his dear

friend Gregory of Nazianzen and Julian, after¬ ward the emperor, known as the Apostate Basil after his graduation had insisted on living a life of prayer and poverty, even founding a religious community on the family estate at Ammesi. His father, known as Saint Basil the Elder, had spent several years as a hermit and his children, no less than three of whom, Macrina, Basil and Gregory, were afterward honored as saints, three of his sons having become bishops, were all known for their practical piety. Basil attributed some of the highest influences of his life to his sister Macrina. He refused the bishopric at first and after he was made bishop, insisted on living in the most absolute sim¬ plicity of life, cultivating, indeed, even in his episcopal home, the austerities which had made him remarkable just after his graduation from Athens when Saint Gregory Nazianzen declared that he was equipped ((with all the learning ob¬ tainable by the nature of man.®

A very interesting survival from the 4th century is the little independent republic of San Marino in north central Italy. They suc¬ ceeded in maintaining their independence all during the Middle Ages though not without a hard struggle and were one of the Allied gov¬ ernments, the smallest, in the war with the Cen¬ tral Powers. They still maintain some of the very old customs and have lived in more peace and happiness than the citizens of any state in Europe. Their founder, San Marino, was a Christian missionary, and he left them as their most precious heritage their land ˆindependent of everyone® which he hoped they would not increase. The papal authorities always fostered the little republic, and Pope Pius II (Hiinius Silvius Piccolomini) granted them special privi¬ leges. This little democracy with its long heritage of tradition finds itself just abreast of the new spirit of democracy in our time.

As Roman power declined toward the end of the 4th century, the outlying provinces were invaded by neighboring barbarians and the first invasion of England took place from the old low Dutch lands by the Elbe and the Weser Rivers. The first tribes who came were Saxons and suc¬ ceeding invaders from the same locality were called Saxons by the Britons whom they dis¬ placed and by the Irish and the Scotch, though after a while the Angles and the Jutes from the same region made their way to England and gained a foothold. The name by which the invaders called themselves was Angles or Eng¬ lish, hence the name England. The old Germans called everybody whose language they could not understand Walsch, a word still used in German for foreigners. This was the name they gave the Britons whom they displaced, who were pushed over into Wales where their

descendants still remain, though the Welsh call themselves Cymri. The first English (Anglian) kingdom was that of Kent, founded in 449, and in the next hundred years ((the greater part of that land which had been the Roman and Christian province of Britain became the heathen land of the Angles and Saxons.® (Freedman).

In the effort of the Britons to repel these invaders, great fighting was done under one or a series of leaders which formed the basis for the stories of King Arthur so often treated in English literature since. It is more than dubious whether a real character with the traits of the legendary king of that name ever lived but these

poetic stories with regard to him have kindled the valor of many generations since.

James J. Walsh,

Author of (Tlie Thirteenth the Greatest of Centuries P etc.

PRINCIPAL EVENTS OF THE FOURTH CENTURY.

301. Tenth persecution of the Christians.

305. Abdication of Diocletian, Roman emperor. Six emperors reign.

312. Constantine defeats Maxentius at the Milvian bridge and becomes western Roman emperor.

313. Edict of Milan proclaims full rights to Christians.

323. Constantine's brother-in-law Licinius, emperor of the East, persecutes Christians, is attacked by Constantine, defeated and executed at Nicomedia.

325. Constantine, master of the united empire, founds New Rome, now called after him, Constantinople, and con¬ vokes the great Council of Nice.

330. Constantinople made the capital of the empire and Christianity the state religion.

335. The Germans cross the Rhine and drive the Romans out of Spain, France and Portugal.

353. Constantius becomes emperor and is unsuccessful against the Franks. His cousin Julian defeats the German tribes in the west.

360. The Goths, originally from southern Russia, branching into eastern (Ostrogoths) on the Black Sea, and western (Visigoths) in Dacia and Podolia, extend their conquests.

361. Julian the Apostate becomes Roman emperor.

363. The Persian war. Julian killed.

364. The Roman Empire divided between Valentian and Valens.

370. The Saxons invade Gaul and England.

375. The Ostrogoths who had conquered the Vandals of Silesia and Bohemia are expelled by the Huns and Alani, and dislodge the Visigoths, who cross the Danube and settle in Thrace under Roman protection. The Alani inhabiting the Caucasus are partly subdued by the Huns, Asiatic nomads who, driven out of Mongolia by the Chinese, cross the Volga and Don unite with the Alani.

376. The Vandals are driven westward by the Alani.

378. The Visigoths, oppressed by the Roman governors, revolt, defeat the Roman army and kill Emperor Valens.

379. Theodosius the Great Teigns.

390. The massacre at Thessalonica.

394. Theodosius reunites the Roman Empire after his victory over paganism at Aquilea.

395. The great migration of nations continues. The Visi¬ goths under Alaric ravage the Peloponnesus. The Roman Empire redivides into Eastern and Western, with Rome and Constantinople as respective capitals.

FOURTH DIMENSION. See Geometry.

FOURTH DISEASE, or DUKE'S DIS¬ EASE, an eruptive fever closely akin to measles, German measles or scarlet fever. It was first described as a separate disease by Duke in 1900. Many consider it merely an atypical form of German measles, its incuba¬ tion period and general symptoms being iden¬ tical.

FOURTH NERVE, one of the pair of cranial nerves, and the chief motor

nerve of the superior oblique muscle of the eye. It originates in a group of cells in the floor of the medulla and runs outward over the superior elevator muscle of the eyelid, and is distributed to the orbital surface of the supe¬ rior oblique.

FOURTH STATE OF MATTER. See

Electron ; Matter ; Radium.

FOUSSA. See Fossa.

FOVILLE, Alfred de, French political

economist: b. Paris 1842; d. 1913. He was educated at the Ecole Polytechnique, Paris, be¬ came successively auditor to the Council of State, chief of the Bureau of Statistics, and pro¬ fessor of the school of political science. After 1877 he edited the Bulletin de statistique et de legislation comparee. He published (Memoire sur les variations des prix au XIX erne siecle) (1872) ; (La transformation des moyens de vol. 11 — 36

transport et ses consequences economiques et sociales) (1880) ; (Atlas de statistique finan¬ cier (1889) ; (La richesse en France et a 1'etrangeD (1893) ; (L'industrie des transports dans le passe et dans le present (1893) ; (Les conditions de l'habitation en France* (1899) ; (La monnaie) (1907). Consult bibliographical notice by Faure in Revue politique et parlemen- taire (Vol. LXXVIII, Paris 1913).*

FOWEY, England, seaport town in Corn¬ wall, on the Fowey, 21 miles west of Plymouth. It is situated in a place noted for its scenic beauty and is a favorite retreat for artists. It has a good harbor and was an important sea¬ port in ancient times. The pilchard fishery is the principal industry and there is a good ex¬ port trade in iron ore, which is mined nearby. Pop. 2,276.

FOWKE (originally SMITH). Gerard,

American archaeologist : b. Maysville, Ky., 25 June 1855. In 1885-88 and 1891-93 he was con¬ nected with the United States Bureau of Eth¬ nology in surveys and explorations of aborig¬ inal remains in the eastern part of the country. Further research by him includes explorations for the American Museum of Natural History, New York, on the lower portion of the Amur River, Siberia, and on Vancouver's Island, British Columbia; and excavations of the sup¬ posed Norse remains in the vicinity of Boston, Mass. Subsequently he explored and investi¬ gated the glacial remains and deposits in the valley of the Ohio and since 1911 has been en¬ gaged by the Missouri Historical Society. His published writings comprise essays on

archaeo¬ logical subjects in the bulletins and reports of the Bureau of Ethnology and elsewhere ; also (Archaeological History of Ohio) (1902) ; and (Montezuma Mounds) (1905).

FOWL. See Poultry.

FOWL CHOLERA. See Poultry, Dis¬ eases.

FOWLER, Charles Henry, American Methodist clergyman : b. Burford, Ontario, Canada, 11 Aug. 1837 ; d. New York, 20 March 1908. He was graduated at Genesee College in 1859 and at the Garrett Biblical Institute in 1861; studied law; was pastor for 11 years in Chicago, Ill.; president of the Northwestern University in 1872-76; and corresponding sec¬ retary of the Missionary Society in 1880. He was elected a bishop of the Methodist Episcopal Church in 1884; visited Japan, Korea, and China in 1888; organized the Peking and Nan¬ king universities and organized the first Metho¬ dist Episcopal Church in Petrograd, Russia. He was stationed for eight years on the Pacific Coast; founded the Maclay College of Theology in Southern California, and assisted in found¬ ing Wesleyan University in Lincoln, Neb. He was sent as a fraternal delegate to the Wes¬ leyan Conference in Great Britain in 1898. He wrote (Colenso's Fallacies) (1864) ; (Missions and World Movements) (1903) ; (Missionary Addresses) (1906) ; (Addresses on Notable Oc- casions) (1908) ; (Patriotic Orations) (1910).

FOWLER, Frank, American artist: b. Brooklyn, N. Y., 12 July 1852; d. 18 Aug. 1910. He studied at Florence, at Paris with Carolus Duran and in the Beaux-Arts, established a studio at New York in 1880, and became known as a portrait painter. His subjects include

S. J. Tilden, Archbishop Corrigan, C. A. Dana, W. D. Howells and other notabilities. He was elected a National Academician, and has pub¬ lished manuals of art: (Oil Painting5; draw¬ ing in Charcoal and Crayon-' ; 'Portrait and Figure Painting.5

FOWLER, Harold North, American author: b. Westfield, Mass., 25 Feb. 1859. In 1880 he was graduated at Harvard University and later studied at the universities of Berlin and Bonn. In 1892-93 he was professor of Greek at the University of Texas, and after 1893 held a similar chair in the College for Women at Western Reserve University. After 1906 he was editor-in-chief of the American Journal of Archeology. He was president of the American Philological Association in 1912. He published (History of

Ancient Greek Liter- ature) (1902) ; 'Handbook of Greek Archaeol¬ ogy, 5 with J. R. Wheeler (1909) and editions of Thucydides Book V. Plautus' 'Mensechmi,5 Plato in Loeb Classical Library, etc.

FOWLER, Sir John, English civil engi¬ neer: b. near Sheffield 1817; d. London, 20 Nov. 1898. In 1844 he was appointed to superintend the construction of the Manchester, Sheffield, and Lincolnshire system, a connected group of railways, and other works of vast extent and complexity. He subsequently was employed on many civil engineering works both in England and elsewhere ; but the work with which his name will probably be most lastingly connected is the great bridge across the Forth, of which he was chief engineer, having as his colleague Sir Benjamin Baker. (See Bridge). On its completion in 1890 he was made a baronet.

*FOWLER, Orson Squire, American phren¬ ologist : b. Cohocton, Steuben County, N. Y., 11 Oct. 1809; d. Sharon, Conn., 18 Aug. 1887. He was graduated at Amherst College in 1834, and opened a phrenological office in New York in 1835. In 1836 he and his brother Lorenzo wrote and published (Phrenology Proved, Illus¬ trated and Applied, 5 an*d in 1838 issued the first number of the American Phrenological Jour¬ nal. Subsequently he lectured on his specialty and allied subjects in the United States and Canada, and wrote and published numerous books, including 'Self-Culture and Perfection of Character5 ; (The Self Instructor in Phren¬ ologyˆ ; 'Human Science) ; etc.*

FOWLER, Thomas, English philosopher: b. Burton-Stather, Lincolnshire, 1 Sept. 1832; d. 1904. He was educated at Merton College, Oxford, and from 1873 to 1889 was professor of logic in the university. Since 1881 he has been president of Corpus Christi College. His published works include 'Elements of Deduc¬ tive Logic) (1867; 10th ed. 1892); 'Elements of Inductive Logic) (1870; 6th ed. 1892) ; an edition of Bacon's 'Novum Organum,5 with introduction and notes (1878 ; 2d ed. 1889); a little work on 'Locke5 (1880) ; an edition of Locke's 'Essay on the Conduct of the Under¬ standing5 (1881; 3d ed. 1890); 'Francis Bacon5 (1881) ; 'Shaftesbury5 (1882) ; 'Hutch¬ eson5 (1882) ; 'Progressive Morality: an Essay in Ethics5 (1884; 2d ed. 1895) ; 'History of Corpus Christi College, Oxford5 (1893) ; 'Prin¬ cipals of Morals5 (Part I, introduction written with J. M. Wilson, 1885 ; Part II, the body of the work, by Professor Fowler alone, 1887 ;

both in one volume, revised 1894) ; and 'Pop¬ ular History of Corpus Christi College5 (1898).

FOWLER, William Warde, English orni¬ thologist : b. Somerset 1847. He was educated at Marlborough College and Oxford, and was sub-rector of

Lincoln College, Oxford, from 1881-1904. He has published 'A Year With the Birds5 (1886) ; 'Tales of the Birds5 (1888); 'Life of Julius Caesar5 (1892); 'The City-State of the Greeks and Romans5 (1893) ; 'Summer Studies of Birds and Books5 (1895) ; 'The Roman Festivals of the Republican Pe¬ riod5 (1899) ; 'More Tales of the Birds5 (1902) ; 'Social Life at Rome in the Age of Cicero5 (1909) ; 'The Religious Experience of the Roman People5 (1911).

FOWLER'S SOLUTION. See Arsenic.

FOWLING. See Hunting.

FOX, Charles James, English statesman: b. London, 24 Jan. 1749; d. Chiswick, Surrey, 13 Sept. 1806. He was the son of Henry, 1st Lord Holland, and was educated at Eton and Hertford College, Oxford. His father pro¬ cured him a seat for the borough of Midhurst in 1768 before he was of legal age, and in 1770 the same interest procured him the office of one of the lords of the admiralty, which post he resigned in 1772, and was appointed a com¬ missioner of the treasury.

After being a supporter of the administra¬ tion for six years, Fox was ejected owing to a quarrel with Lord North, and was thrown into the ranks of the Opposition. The adoption of the disastrous measures which terminated in the independence of the American colonies en¬ abled him to take this part without opposing any of the policy which he had previously sup¬ ported. During the whole of this eventful con¬ test he spoke and voted in direct opposition to the ministerial S3rstem, and, in conjunction with Burke, Barre, Dunning and other eminent par¬ liamentary leaders, displayed the highest talents both as a statesman and orator. On the final defeat of the administration of Lord North and the accession of that of the Marquis of Rock¬ ingham, Fox obtained the office of Secretary of State for Foreign Affairs. But the death of the Marquis of Rockingham suddenly divided the party, and on the Earle of Shelburne becoming first Lord of the Treasury Fox retired and soon after a union took place between his friends and those of Lord North, under the name of the coalition. The temporary success of this party movement served only to render popular disgust the more general ; and the dismissal of the coalition excited general satisfactiQn. Though in the new Parliament Pitt had a de¬ cided majority, Fox headed a very strong oppo¬ sition, and political questions were for some years contested with a display of talent on both sides which the House of Commons had sel¬ dom previously exhibited.

In 1790 and 1791 Fox regained a share of popularity by his opposition to war with Spain and Russia, and also by his libel bill, regulating the rights of juries in criminal cases and ren¬ dering them judges both of the law and

the fact. On the breaking out of the French Revo¬ lution he was disposed to regard it as likely to prove extremely beneficial. The contrary views of Burke, and the extraordinary manner in which that ardent politician on that account

publicly renounced his friendship, is one of the most striking incidents in parliamentary history.

The opinions formed of this eminent leader as a practical and theoretical statesman have been as various as the shades of party differ¬ ence. That he was a sincere friend to all the broad and generous principles on the due de¬ velopment of which rest the freedom and best interests of mankind, is not to be doubted, and that they were alloyed by great latitude on the subject of party and political expediency is equally clear. As a powerful and purely argu¬ mentative orator he was of the very first class ; though as to eloquence and brilliancy he per¬ haps yielded to Pitt, Burke and Sheridan ; nor were his voice and manner prepossessing, though highly forcible. Of his amiability in private life, after making allowance for a dis¬ sipated youth, all accounts agree. Friends and foes equally testify to his ingenuous and benign character. As an author, besides some Latin poetry and a Greek dialogue, by which he highly distinguished himself at Eton, and a few num¬ bers of a paper, entitled (The Englishman,5 he published nothing during his lifetime but (A Letter to the Electors of Westminster (1793). To his nephew. Lord Holland, the world is indebted for his posthumous publication, enti¬ tled (The History of the Early Part of the Reign of James IIP It is written with unpre¬ tending simplicity, but disappointed expecta¬ tion, and has never been popular. Lord John Russell, (Life and Times of C. J. Fox) (1859— 66) ; Wakeman, (Life of Charles James Fox5 (1890) ; Trevelyan, (Early History of Charles James Fox5 (1881).

FOX, George, English religionist, founder of the Society of Friends: b. Drayton, Leices¬ tershire, England, July 1624; d. London, 13 Jan. 1690. He was the son of a weaver in good cir¬ cumstances. While yet a boy he was distin¬ guished by his gravity and exemplary conduct. When in the 20th year of his age, and for some two or three years afterward, Fox describes himself as having been in a distressed state of mind, but from this condition he was at length delivered by that which he regarded as the voice of God in his soul, directing him to Christ as alone able <(to speak to his condition.® Very soon after this he commenced his public minis¬ trations at Dukinfied, Manchester and the neighborhood. In 1646 he ceased to

attend church. From the first his preaching seems to have made many converts, mainly from the lower middle class, and excited much opposi¬ tion. Fox's first imprisonment took place in the year 1649, in consequence of his opposing the preacher in <(the great steeple-house at Notting¬ ham,® on a point of doctrine. In 1650 he was imprisoned at Derby under a false charge of blasphemy. One of the committing justices, Bennet, acted with great violence on this occa¬ sion, and it was he who on Fox's bidding him (

death for crimes affecting property only, and he exerted himself to save the life of a poor woman then in jail for theft. Within 10 years of Fox's appearance as a preacher, meetings of the Friends were established in most parts of England. At the same time, so actively were they persecuted, that for many years there were seldom less than 1,000 of them in prison. Cromwell, though himself favorable to liberty of conscience, and before whom Fox appeared in 1655, seems to have been unable to curb the excesses of popular hostility launched in all quarters against a sect which denounced all state interference with religion and maintained that the gospel should be preached without fee or reward. His doctrine of (

About a month after the restoration of Charles II, Fox was committed to Lancaster Castle, (

years of his life were tranquil as regards per¬ sonal molestation, but he continued to be ac¬ tively engaged in various ways in promoting the welfare of his brethren. Their persecutions continued throughout the reign of Charles II. In the first year of William and Mary was passed the bill which nullified the Conventicle Acts, and allowed the Friends to make a solemn declaration in lieu of taking the oaths, and Fox had the gratification of seeing the public wor¬ ship of the Society legally recognized before his death. Fox was a mystic and visionary; but there was another side of character; his mind was one of singular penetration, and his journal5 is one of the world's most famous books, rich in spiritual insight, in noble sim¬ plicity and in moral fibre. In his schemes for the relief of the poor and the education of the people he was far in advance of his age. He typified in his generation that manifestation of the love of God which has been so singularly exemplified in the history of Society of Friends in practical and unostentatious service to the well-being of their fellowmen. (See Friends, Society of). His works were issued in three volumes 1694-1700. The best edition was that published in Philadelphia (8 vols.) in 1831. Consult Sewell, (History of the Quakers5; Lives by Marsh (1848);

Janney (1853) ; Watson (1860) ; Hodgkin (1897) ; Wood (1912); Tallack, (George Fox, the Friends and the Early Baptists) (1868) ; Bickley, (George Fox and the Early Quakers5

(1884).

FOX, George L., American actor: b. Bos¬ ton, Mass., 3 July 1825; d. 24 Oct. 1877. He first appeared at the Tremont Street Theatre in the 'Hunter of the Alps) ; became known as a low comedian at the National Theatre, New York; was a lieutenant in the Union army at Bull Run, and later became manager of the New Bowery Theatre. Here he gained for him¬ self a distinct position by his burlesque imita¬ tions of favorite tragedians of the time, and his pantomimes, the best of which was (Humpty Dumpty,5 in which from 1867 to his retirement in 1876 he appeared as the clown.

FOX, Gustavus Vasa, American naval offi¬ cer: b. Saugus, Mass., 13 June 1821; d. New York, 29 Oct. 1883. He was appointed to the United States navy in 1838, in which he served till 1856, when he resigned with the rank of lieutenant. He was subsequently appointed as¬ sistant secretary of the navy, and held this post till the end of the Civil War. He planned a number of operations for the navy, including the capture of New Orleans; and was sent by the government on the monitor Maintonomoh to convey the congratulations of Congress to Alexander II on his escape from assassination. His visit to Russia materially aided the acquisi¬ tion of Alaska by the United States, and was the longest voyage then made in a monitor.

FOX, Henry Edward, English soldier, brother of Charles James Fox: b. 1755; d. 1811. He was educated at Westminster School and entered the King's Dragoons in 1770. In 1773 he was in command of the Thirty-eighth at Boston. He took part in the battles of Con¬ cord, Bunker Hill, Long Island, White Plains, Brandywine and Philadelphia and in 1778 be¬ came lieutenant colonel of the 49th Regiment

stationed in the West Indies. He returned to England in 1783 and was appointed aide-de-camp to the king. He was commissioned major-gen¬ eral in 1793 and commanded brigades at Rou- baix, Mouveaux and Pont-a-Chin. From 1801 to 1803 he was stationed at Minorca, and in the latter year was made commander of the forces in Ireland, where he had to deal with the uprising headed by Robert Emmet. In 1804 he became lieutenant-governor of Gibraltar and in 1806 became ambassador to Naples and commander of the British forces in Sicily. He failed in his mission there and was recalled in 1807, became general in 1808, and in 1811 was appointed governor of Portsmouth.

*FOX, John William, American novelist : b. Bourbon County, Ky., 1863; d. 8 July 1919. Graduated from Harvard in *1883, began life as a journalist, later traveled extensively in the South and Southwest and for some time was engaged in mercantile affairs at Cumberland Gap. He published 'A Cumberland Ven¬ detta5 (1896) ; (Hell fer Sartain and Other Stories5 (1897) ; (A Mountain Europa> (1899) ; 'The Kentuckians5 (1898); 'Crittenden5 (1900) ; 'Blue Grass and Rhododendron5 (1901) ; (Christmas Eve on Lonesome5 (1902) ; (The Little Shepherd of Kingdom Come5 (1903) ; following the Sun Flag5 (1906) ; 'Knight of the Cumberland5 (1906) ; (Trail of the Lonesome Pine5 (1908) ; (The Heart of the Hills5 (1913); (In Happy Valley5 (1917).*

FOX, Luke, English navigator: b. Hull, 1586; d. 1635. At an early age he went to sea and rose in due time to the rank of commander. On 30 April 1631 he set out from London to search for a northwest passage to the Orient. He explored the western shore of what we now know as Baffin Land, discovered Cum¬ berland Island and named several headlands along Hudson Strait; northern channel is named in his honor. The account of his explorations, together with a map of the regions, is em¬ bodied in the work entitled (Northwest Fox; or, Fox from the Northwest Passage5 (1635; also in publications of the Hakluyt Society with notes by Christy, London 1894).

FOX, Sir William, New Zealand states¬ man: b. Westoe, Durham, England, 1812; d. 1893. In 1832 he was graduated at W-adham College, Oxford, went to New Zealand in 1842 as agent of the New Zealand Company. He returned to England in 1850 and there pre¬ sented the claims of the New Zealanders for self-government. Although at first unsuccess¬ ful, he persisted and at length secured autonomy for the far-distant colonies. He was prime minister of the colony several times — in 1856, 1861, 1863, 1869-72 and 1873. He secured a lasting peace with the aborigines. His pub¬ lished works include (The Six Colonies of New Zealand5 (1851) ; (The War in New Zealand5 (1860) ; (How New Zealand Got Its Consti¬ tution5 (1890).

FOX, William Johnson, English orator and political writer: b. near Wrenthaum, England, 1786; d. London, 3 June 1864. A weaver's son, he early showed signs of ability and was picked out to be educated for the Independent minis¬ try. Once ordained, his rationalistic opinions cut him off from all the denominations. He be¬ came a radical active in politics, and spoke and

RED FOX

/

wrote with persistent vehemence against the Common Laws. He was elected to Parliament in 1847, but was twice defeated at subsequent elections. His vigorous pen and eloquent voice aided the cause of popular social and political progress in England at a critical time in her history.

FOX, Williams Carlton, American diplo¬ matist: b. Saint Louis, Mo., 20 May 1855. He first came into prominence as United States consul at Brunswick, Germany (1876-88). Subsequently he was United States vice-consul- general at Teheran, Persia. He organized the American Missionary Hospital during the cholera epidemic there in 1892, and established and edited the only strictly diplomatic and con¬ sular journal ever attempted in the United States. He was chief clerk of the Bureau of American Republics 1898-1905, and its director 1905-07. He was appointed Envoy Extraor¬ dinary to Ecuador in 1907, remaining in this relation until 1911, when he retired. He was arbitrator in the controversy between the gov¬ ernment of Ecuador and the Guayaquil and Quito Railway Company in 1907.

FOX, one of a group of small, long-eared, bushy-tailed animals of the dog-tribe (Canidce) , mostly included in the genus Vulpes ; specifi¬ cally, in literary usage, the red fox (V. vul¬ garis), called renard by the French and reinicke fuchs by the Germans. Foxes differ from wolves and jackals in being smaller, having shorter legs, longer, more furry and pointed ears, a more slender elongated muzzle, and a longer and more bushy tail ; and they incline to that yellowish red color called ((foxy.)) But these distinctions are difficult of limitation (see Fennec; Foxdog), and some naturalists refuse to recognize a separate genus for them. One fixed character is found in the pupil of the eye, which when contracted becomes elliptical in the foxes but remains round in other dogs. All the typical foxes are inhabitants of north¬ erly latitudes, and well represented by the common red fox, which may be regarded as distributed throughout the whole northern hemisphere, though variously named in differ¬ ent countries, where local diversities exhibit themselves ; thus the American variety is called V. pennsylvanicus, but it is not essentially dif¬ ferent from those of the Old World. Its vari¬ ations are as great here as in Europe and Asia, especially among those of the Far North, where certain color-phases have superior value in the fur-trade. Thus a fox marked with a dark line along the spine and another over the shoulders, is called a cross fox, and

fine specimens are worth an extra price. Wholly black ones are uncommon ; but the rarest and most valuable pelt is that of a ˆsilver® fox, that is, a black one in which so many hairs are white-tipped that a hoary or silvered ap¬ pearance is given to the skin. The red fox is fostered for the sport of fox-hunting (q.v.) in Great Britain, and in some parts of Eastern America, but in most countries he is regarded merely as a fur-bearer, or a poultry thief or worse, and is trapped, shot and poisoned continuously. Nevertheless, the animal sur¬ vives and multiplies in the midst of civilization, by virtue of its power of comprehension of and adaptation to new conditions ; so that he has ac¬ quired, very justly, a reputation for alertness,

wit and cunning in contrivance for food and safety. In America this species is constantly extending its range southward at the expense of the gray fox. Another species yielding a valuable fur is the Arctic or blue fox (V . lagopus), which is found on all Arctic coasts, and although brownish in summer, becomes in winter pure white; but the under fur is always bluish, and in those of Alaska this color pre¬ vails over brown in summer. Certain of the Aleutian Islands have lately been devoted by local fur companies to rearing these foxes in semi-captivity, where they are cared for, and a selected number annually sacrificed to trade. North America has two other well-marked species. One is the swift or kit fox (V . velox) of the plains, which is only 20 inches long, ex¬ ceedingly swift of foot, expert in digging and cunning at concealment. It has reddish-yellow fur in summer, but becomes dull gray in win¬ ter, with black patches each side of the nose. The other species is the gray fox, which was once generally distributed over the United States but has become extinct in the north¬ eastern part since the general clearing and set¬ tlement of the country. It is a woodland animal, still numerous in the South and West. Its hair is stiffer and duller in color than that of the red fox and it is so peculiar in struc¬ tural respects (among others in having a con¬ cealed mane of stiff hairs on the top of the tail) that it has been classified in a separate genus as Urocyon argenteus. Several well- known species dwell in Asia, the best-known of which is the familiar fox of northern India (V . bengalensis) .*

Foxes everywhere are burrowing animals or else adapt to family needs holes in rocks, hol¬ lows of old stumps and similar conveniences. They hide by day and go abroad at night in search of small prey, stalking and catching birds on their nests, or at roost on the ground, ground-squirrels, mice, frogs and insects, and also eating largely of certain roots, fruits and other vegetable food. They are hardy, hunt all winter and climb mountain peaks. They never hunt in packs, as do wolves ; and their voice is nearer a bark than a howl. They do not readily submit to domestication, and seem to have contributed little if anything to the composition of domestic breeds of dogs.

Consult for information on Old World foxes, the writings of Bell, Brehm, Blanford, Mivart and Beddard, well-summed up in Lydek- ker's (Royal Natural History) (Vol. I). For American foxes, read Richardson, Hearne, Au¬ dubon, Merriam, the writings of Nelson, Turner and Murdoch on the natural history of Alaska, and the general remarks in Cram and Stone's (American Animals) (1902).

FOX, or MUSKWAKE INDIANS. See

Sac and Fox Indians.

FOX BATS. See Flying-fox.

FOX CHANNEL, in the Hudson Bay, Canada, named after Luke Fox, who explored the region in 1631. The channel lies between Southampton Island and Baffin Land.

FOX-DOG, a name given by certain natural¬ ists to the wild dogs of South America, because of their fox-like appearance. Among these are the crab-eating dog (C . cancrivorous) ; the zono, or Azara's dog (C . azarce) , of which the (

a local variety; the small-eared Brazilian dog (C . microtis, of Mivart), and two other aber¬ rant Brazilian dogs (C . urostictus, and C. par-videns) for which a separate genus (Notho – cyon) has been proposed by Wortman. All these animals have a striking external resem¬ blance in color and form to the foxes, and con¬ nect them with the typical dogs. They are not well known, however. Consult Mivart in the (Proceedings) of the Zoological Society of Lon¬ don (1890) ; Beddard, Mammalia5 (1902), and writers upon the zoology of South America. See Bush-dog.

FOX-HOUND, a breed of hounds, concern¬ ing whose origin practically nothing is known, save that they were probably first bred in Great Britain. This, perhaps the handsomest and most perfect of all hounds, is essentially a field dog, presenting an eminently powerful, well- built appearance, with his clean-cut, compact body, and giving evidence of muscular strength and endurance in the hunt. The head is full, with a broad brow, a long, wide muzzle, and open nostrils. The ears are set low and lie close to the cheek. The eyes are soft and brown. The chest is broad, and the ribs are. deep, so as to afford plenty of breathing space. The mus¬ cular body is set on legs as straight as a post, and very strong; and the feet are round and cat-like. The color varies from black to tan and white, and the coat is hard, smooth

and glossy. The American breed is lighter and finer in lines than the English fox-hound, has longer, thin¬ ner and more pendant ears ; a slightly narrower chest, and a rougher coat. He is used in fox¬ hunting as is the English fox-hound ; but is also employed in hunting the moose, and other large game, especially in the Canadian forests. See Dog.

FOX-HUNTING, the chase of the fox with horses and hounds, as a recreation. This sport arose in England with the Restoration, when changes in customs and agricultural con¬ ditions caused the disappearance of falconry, and has become surrounded by codes of social usage and of legal enactments. It flourished most in the south-central counties of England, and in Ireland, and some of the principal organ¬ izations or ((hunts)) as the Belvoir, Quorn, Pytchley and Cottesmore, were founded early in the 17th century. A <(hunt® is an association for the promotion and regular practice of the sport in a certain district. It acquires a pack or several packs of fox-hounds (q.v.), kennels and perhaps a club-house, is directed by a ((mas- ter of foxhounds,® and served by paid em¬ ployees, the principal of whom are the <(hunts- man® who arranges and leads the sport for the day, and the ((whippers-in,® who see that the dogs work properly. These officials, and the sportsmen themselves wear <(pink® (that is scar¬ let) coats when in the field. The expenses arc- paid theoretically by annual subscriptions, eked out by casual subscriptions for temporary privi¬ leges, but usually they must be supplemented by a patron, — probably the ((M. F. H.,® who has inherited the dignity and its responsibilities from ancestors who founded the hunt. Any¬ one may join in the chase, and at Melton Mow¬ bray and other famous ((meets® large numbers of outsiders are often present. In these dis¬ tricts foxes are carefully preserved, and the abode and habits of each family of them are

studied with reference to the autumnal and win¬ ter sport. At the appointed time the hunters, men and women, mounted and accompanied by a pack of from 25 to 40 hounds, are led by the huntsman toward the place where he expects to ((find® a fox. There the dogs are loosed, and range about searching for the scent-traces in the air or on the ground left by the recent passage of the animal. When one finds a trail he gives tongue, the others come to his aid and the pack dash away following the scent. With a bugle-signal or cry of ((Gone away !® the hunt follows as straight and fast as possible, keep¬ ing to roads, lanes and gates where possible, but jumping fence and riding over grain-fields and meadows where needful, the hunt paying such damages as follow. This requires a horse of great speed and leaping power, and has de¬ veloped the English thoroughbred hunter. When anyone catches sight of the fox he shouts ((View ! halloa!®; and the ambition of all riders is to keep close to the racing animals and be on the spot, or <(in at the death,® when the fox is seized. It is then the duty of the huntsman, or the nearest rider, to save the body of the fox from the

dogs, cut off its <(brush® (tail), <(pads® (feet), and ((mask® (head) to be given as trophies to the foremost riders. The re¬ mainder of the fox is cut up and given to the dogs on the spot. Instead of running ˆstraight away® and leading a long chase the fox will often take refuge in a drain or other hole, un¬ less it has been (

Fox-hunting has been carried wherever Eng¬ lishmen have settled, but has found few parts of the world favorable to it. In some countries as on the North American prairies, in Califor¬ nia, and also in Argentina, similar methods are adapted to the chase of other animals, as wolves or kangaroos. In the southern and eastern United States, however, where foxes abound, true fox-hunting has flourished ever since colonial days, when each man brought his own hound or hounds to the assembly; and is still pursued by several established clubs in Virginia, Maryland and southern Pennsylvania, where the nature of the country and the agri¬ cultural habits of the people favor it. These clubs employ a modified form of hound better adapted to the faster and rougher work re¬ quired of it than would be the English breed. A special strain, the Magnes hound, has been fostered by the Maryland clubs, the foremost of which is the Elkridge. More nearly conform¬ ing to the English models is the establishment and hunting of the Meadowbrook Hunt, on Long Island, N. Y., where, in a level open coun¬ try, largely occupied by extensive estates and within easy reach of New York, the sport has flourished since about 1876, and is likely to be long maintained. The serious conditions of the great world war, and development of the feel¬ ing that it is not altogether manly for a crowd of human beings to chase to the death one small timid animal, have led to a decline in the <(sport.®

, An extensive literature has grown up about this subject, and many thousands of titles would be required for its bibliography. A good gen¬ eral view may be obtained by reading the vol¬ umes devoted to the sport in the English (Bad-

FOXES

1 Cape Fox or Lalande's Dog 2 Arctic Fox 3 Side-striped Jackal or Quaha 4 Silver Fox

*r**

minton Library > and in the American sports¬ man s Library. 5 Consult also (Encyclopaedia of Sport' (1897).

FOX ISLANDS. See Aleutian Islands.

FOX RIVER, (1) a river of Wisconsin, called by the Indians Neenah. It rises in Mar¬ quette County, near the centre of the State, and after a course of about 260 miles passes through Lake Winnebago; it enters the head of Green Bay. A canal has been cut from Fox River to the Wisconsin, which is a navigable affluent of the Mississippi, and the channel of the river below Lake Winnebago has been cleared to admit steamboats from Lake Michigan and Green Bay. A grant of land was made by Con¬ gress to assist the work. (2) A river in north¬ eastern Illinois, 100 miles in length, which joins the Illinois River at Ottawa.

FOX SHARK, or SEA-FOX. See

Thresher.

FOX-SNAKE, a large harmless snake (Caluber vulpinus) of the northern Mississippi Valley, light brown in color, marked on the back with small chocolate spots bordered by black, and with a series of smaller spots along the sides and on the yellowish abdomen. It reaches a length of three feet, is irritable and pugnacious, and feeds upon small mammals, especially gophers, mice and other pests of agri¬ culture.

FOX-SPARROW, a large American spar¬ row (Passer ella iliaca), notable for its foxy red plumage, and gay song. It is a spring-and fall migrant in the United States, breeding only north of the Saint Lawrence. See Sparrow.

FOX-SQUIRREL, the largest of the true squirrels (Sciuriss niger). These rusty-coated squirrels are denizens of woods. They live in hollow trees or high among the branches, in nests of dry grass, and feed upon fruits, berries, mushrooms and seeds of various trees. They have been hunted until they have become some¬ what scarce in the woods north of Virginia ; but southward, they are far more numerous. The flesh is esteemed as food — especially in Florida. Though safe from the depredations of preying birds, because of their size and strength, fox- squirrels are attacked by the foxes and wild¬ cats, which kill and eat them.

FOX-TERRIER, a small terrier dog modi¬ fied from the old-fashioned English white ter¬ rier of uncertain origin. It has a dense smooth coat white, with black or black-and-tan mark¬ ings ; and a small black nose ; and it generally weighs between 15 and 20 pounds, when in good condition. The fox-terrier has a narrow, ta¬ pering face, and small, deep-set eyes, usually gentle, but capable of an expression of keen animation; the jaws are strong and well-shaped; and the V-shaped ears droop forward close to the cheek. The compact little body is set on straight, supple legs,

and the tail, usually docked, is carried in a rather jaunty fashion. The dog's appearance is one of alertness ; and, though originally bred to run the fox to earth, fox-terriers have, latterly, become popular not only as vermin-destroyers about stables, but as house-dogs, — their cleanly, sprightly and affec¬ tionate ways rendering them extremely amiable and entertaining as companions. One variety, the Svire-haired,® has a rather long coat,— of rather shaggy appearance. In all other points

this is like the smooth-coated variety. See Dog.

FOXBOROUGH, Mass., town in Norfolk County, 25 miles southwest of Boston, on the Neponset River, and on the New York, New Haven and Hartford Railroad. It contains the Boyden Public Library, straw-hat manufac¬ tories, tire factories, steam-gauge and auto¬ mobile accessories works, etc. The town owns and operates the water supply system. Pop.

(1920) 4,136.

FOXE, John, English martyrologist : b Boston, Lincolnshire, 1516; d. London, April 1587. In 1543 he was elected a fellow of Mag¬ dalen College, Oxford. Applying himself to theology with great assiduity, he secretlv be¬ came a convert to the principles of the Reforma¬ tion. This tendency being suspected, a charge of heresy followed, and by the judgment of his college he was, in 1545, expelled. In the reign of Mary he went abroad, and gained a livelihood by correcting the press for an eminent printer at Basel, where he laid the first plan of his (Acts and Monuments of the Church.' On the acces¬ sion of Elizabeth he returned to his native coun¬ try, and was received in the most friendly man¬ ner by his former pupil, the Duke of Norfolk, who maintained him as long as he lived, and settled a pension on him at his death. Cecil also obtained for him a prebend in the Church of Salisbury. His principal work is the his¬ tory of the Acts and Monuments of the Church' commonly called (Foxe's Book of Martyrs,5 first printed in 1563, in 1 volume folio ; re¬ printed in 1632 and 1641 in 3 volumes folio. In 1684 it had reached the ninth edition.

FOXGLOVE, a genus (Digitalis) compris¬ ing about 20 species of herbaceous biennials of the natural order Scrophulariacece. All are char¬ acterized by erect stems which support large leaves near the base and terminate in bell¬ shaped flowers of various colors. They are much used for flower borders.

FOXTAIL GRASS. See Grasses.

FOY, James Joseph, Canadian jurist and statesman: b. Toronto, 22 Feb. 1847. He was educated at Saint Michael's College, Toronto, and at Ushaw,

England, studied law on his re¬ turn to Canada and was called to the bar in 1871. In 1883 he became King's counsel. His sympathies with the Irish Home Rule movement brought about his appointment as delegate to the Irish Nationalist Convention of 1896. Two years later he was elected as a Conservative to the Ontario Legislature, was re-elected in 1902, 1905, 1908 and 1911. In 1905 he became com¬ missioner of crown lands and later in the same year became attorney-general of Ontario. He was delegate to the Federal Conference on Education at London in 1907, to the Ottawa In¬ terprovincial Conferences of 1906, 1910 and

1913.

FOY, fwa, Maximilien Sebastien, French military officer: b. Ham, Fran'ce, 3 Feb. 1775; d. Paris, 28 Nov. 1825. He entered the army at 15, and made his first campaign under Dumou- riez in 1792. He received his 15th wound on the field of Waterloo, but refused to quit his post till the close of the engagement. He was after¬ ward employed as inspector-general of infan¬ try; and in 1819 was elected a member of the Chamber of Deputies, where he distinguished

himself as an orator, and was a great public

favorite.

FOYER, in places of amusement, a room for the informal social gathering of the spec¬ tators at intermissions. In some establish¬ ments there are separate foyers for the several classes of patrons and one for the performers. The Paris Opera House affords the best ex¬ amples of all genres. In America, the term usually denotes a lobby at the head of the main stairway, and is also applied in domestic archi¬ tecture to a kind of entrance hall.

FOYLE, Lough, Ireland, an inlet of the Atlantic Ocean between Donegal and Derry, 16 miles long, one mile wide at the entrance and widening to nine miles further inland. The west side is navigable for vessels of 600 tons which ascend the River Foyle to Derry. Trans¬ atlantic steamers call at Moville on the Done¬ gal side, whence their merchandise and passen¬ gers are brought to Derry on light draught vessels.

FRA ANGELICO, an-gel :e-k6>, the com¬ mon ˆappellation of Fra Giovanni da Fiesole, one of the most celebrated of the early Italian painters: b. Vecchio, 1387; d. Rome, 18 March 1455. He entered the

Dominican order in 1407, and was employed by Cosimo de Medici in painting the monastery of Saint Mark and the Church of Saint Annunziata with frescoes. These gained him so much celebrity that Nich¬ olas V invited him to Rome to ornament his private chapel in the Vatican, and offered him the archbishopric of Florence, which was de¬ clined. His works were considered unrivaled in finish and in sweetness and harmony of color, and were made the models for religious painters of his own and succeeding generations. Consult Cartwright, (The Painters of Florence)

(1901).

FRA DIAVOLO, fra de-a'voHo, real name MICHELE PEZZA, Neapolitan brigand: b. Itri, Calabria, 1760; d. 1806. He became a monk, but was expelled on account of mis¬ conduct. He then became leader of a troop of brigands. The government set a price upon his head; but when Cardinal Ruffo undertook to compel the French to evacuate Naples, Fra Diavolo was pardoned, was employed by the cardinal, and received a colonel's commission. At the head of his band he harassed the French, took refuge in Calabria after the conquest of Naples by Bonaparte, and incited the people against the French. He fell into their hands at San Severino in 1806, and was executed. His fame has been extended by the opera by Auber of that name.

FRA DIAVOLO, fra de-a'vo-lo, opera comique in three acts by Daniel Francois Esprit Auber (libretto by Scribe) first produced at the Opera Comique in Paris 28 Jan. 1830. The story, which is replete with incidents and cleverly put together, tells of the adventures of the famous and chivalrous bandit, which ends in his final capture and death, but not before he has spread consternation and almost tragedy through the little village group to which the audience is introduced. Auber was the last great representative of opera comique and his artistic alliance with Scribe, probably the most skilful librettist of modern times, contributed

to the great success of his career. (Fra Dia- volo) is typical of the composer's work at its best — • full of melodic ease, piquancy and finish. There is also a sureness of dramatic touch and technique that add not a little to the hearer's pleasure. The most familiar numbers are Zerline's romanza ((On yonder rock reclining," and the barcarolle of the first act, Fra Diavolo' s serenade ((Young Agnes® of the second and his rondeau, (

FRA LIPPO LIPPI. This dramatic monologue by Browning is like his (Andrea del Sarto, at once a revelation of character and a statement of a theory of aesthetics with special application to painting. It consists of about 400 lines of easy, flexible blank-verse, highly colloquial in style. It was written at Rome during the winter of 1853-54 and was published in 1855*

*in the volume entitled (Men and Women. * The monologue is supposed to be spoken by the painter-friar himself as he re¬ turns in the dawn of a spring day from one of his amorous adventures in Florence. Taken by the police, he tells his name and pauses for a friendly chat with the captain. How he came to be just what he is, both libertine and painter of the world as he sees it; how as a street gamin he learned to read men's faces ; how he was taken into the convent, given leave to paint, painted men and women as they really were, to the confusion and scandal of the friars ; how he escaped into a freer atmosphere, and now, as the protege of the great Cosimo de Medici, paints as he likes, still following the flesh and often in pursuit of a pretty girl — all this bub¬ bles from him as he faces a friendly listener. The character is complete; for all that Lippo is an old libertine, Browning likes him and the reader likes him. The poet took his facts from Vasari's * Life, J but if one wishes to see the difference between poetry and prose he need only compare the two accounts. Lippo's ideas about his art Browning has drawn less from Vasari than from a study of the painter's works. Lippo believes in (*

Or say there's beauty with no soul at all —

(I never saw it — put the case the same —)

If you get simple beauty and naught else.

You'll get about the best thing God invents, —

That's somewhat. And you'll find the soul you have missed,

Within yourself when you return him thanks.

In its dramatic revelation of character, its swift, graphic suggestions of setting, and its in¬ direct building-up of a theory of art at once characteristic of the speaker and sound in it¬ self, (Fra Lippo Lippi is altogether a master¬ piece. It should be read in connection with the same poet's (Andrea del Sarto) (q.v.) ; the joy in life, the rollicking good humor, and the spring-time of the one are in striking contrast with the weary acquiescence of the other. Con¬ sult Mrs. Orr, (Handbook to Browning) ; and Cooke, (Guide Book to Browning. * which*

prints Vasari's life of Lippo, with explanatory notes on the poem.

Marion Tucker.

FRACASTORIO, Girolamo, je-ro-'la-mo f ra-kas-toTe-o, Italian poet and physician: b. Verona 1483; d. Tacassi, 6 Aug. 1553. He was patronized by Cardinal Bembo, to whom he ad¬ dressed the most celebrated of his works, a Latin poem entitled (Syphilidis.ˆ In the latter part of his life he wrote a poem on the adven¬ ts es of the patriarch Joseph, but his poetic fire seems then to have been exhausted, and the virtues of the hero were less happily celebrated than the horrors of the disease. Among the moderns who have exercised their talents in the composition of Latin verse, few have obtained higher reputation than Fracastorio.

FRACKLETON, Susan Stuart Goodrich,

American artist: b. Milwaukee, Wis., 5 June 1848. She received a private education and be¬ came prominent as a ceramic artist. She has won many prizes in American, European, Cana¬ dian and Mexican competition ; invented a gas- kiln for firing decorated china and glass; and was the founder and first president of the Na¬ tional League of Mineral Painters. In 1901 she received a medal at the Paris Exposition for her exhibit of pottery. She published (Tried by FireP a work on china decoration (1885).

FRACKVILLE, Pa., borough in Schuylkill County, 50 miles northeast of Harrisburg, on the Pennsylvania and on the Philadelphia and Reading railroads. Coal mining is the principal occupation of its inhabitants. Pop. (1920) 5,590.

FRACTION, a part of any integer (whole number), or unit. For example, (

arithmetic, or — in algebra, the figure 1, or b

a, is the numerator, and 3, or b, is the de¬ nominator; and they represent that, if a whole number is divided into three or b parts, only

1 or a part is taken. In the addition of

fractions, the fractions must be brought down to the same denominator and their numerators (as expressed in the value of their new de¬ nominator) must then be added, when we have one whole fraction. Thus, if we want to add Yz and %, we must find the least common mul¬ tiple of 3 and 5, which is found to be 15;

then, as 3 goes 5 times into 15, and 5 goes 3

times into the same number, we multiply the numerators of the different fractions by these respective quotients and then add the two quantities together. Thus, Yz added to % will

be equal to — + — — • The true definition

of a fraction may be thus summed up: It is the division of its numerator by its denomina¬ tor; as seven-eighths are equivalent to the whole number 7 divided by 8 — whence a frac¬ tion is obtained. Decimal fractions simplify calculations greatly, as they are constructed on the principle of having one common denomina¬ tor — a multiple of 10; and thus fractions can be added, subtracted and divided without re¬ peating over and over the tedious process of bringing them down to a common denominator.

The familiar form of numeral fraction is

termed a "vulgar® fraction and where the num¬ erator is smaller than the denominator, as in Y, it is a proper fraction, but if the numerator

is the larger, as it is an improper fraction.

Fractions of fractions are termed compound fractions and where either numerator or de¬ nominator is itself a fraction, it is a complex fraction. For decimal fractions, see Decimals. See also Arithmetic.

FRACTIONAL CRYSTALLIZATION.

The crystals deposited at different periods during the evaporation or cooling of a liquid complex are not alike in composition, the order in which the different components crystallize being de¬ pendent not only on relative solubility but upon the proportions present. That is, while there is a certain so-called "eutectic® mixture from which the components will crystallize simul¬ taneously, all other proportions on continued evaporation or cooling form only crystals of the compound which is present in excess of the eutectic proportions. Thus a solution of more than 23.5 per cent of common salt in water if gradually cooled deposits only crystals of salt, but if the percentage of salt is less than 23.5 the solution deposits only crystals of ice and in each case when the residual liquid contains just 23.5 per cent of salt, the water and salt solidify together. With three or more compounds sim¬ ilar but more complex relations exist.

When the compounds in the liquid are closely similar in crystalline form and have similar chemical formulae "mixed crystals® form (see Chemical Crystallography) which con¬ tain molecules of the different compounds built into the same crystal. In such a case, at suc¬ cessive stage of crystallization the proportion of the more soluble compound is found to in¬ crease and advantage of this is taken to concen¬ trate radium and to separate the rare earths of the didymium group. The processes are ex¬ tremely laborious and may involve hundreds and even thousands of recrystallizations and may be briefly described as follows, the num¬ bers

representing the evaporating vessels.

After obtaining the mixed material in solu¬ tion in the desired solvent this solution is evap¬ orated in vessel one until a crop of crystals of sufficient size has formed. The crystals are fil¬ tered from one and placed in two and dissolved ; the mother liquor is placed in three ; both by evaporation yield new crystals differing in com¬ position from those first obtained.

The contents of two and three are now fil¬ tered and the crystals and mother liquor and placed in new vessels. Vessel four, crystals from two; vessel five, mother liquor from two and crystals from three ; vessel six, mother liquor from three. These three are made to yield three new crops of crystals, and so on, the number of fractions steadily increasing and the end members of each series differing most.

Fractional crystallization has long been used as a means of purifying compounds and was formerly much used for extracting silver from lead under the name of the Pattinson process, in which the silver-bearing lead is melted, cooled slowly and crystals of lead lower in sil¬ ver obtained and transferred to another kettle where they are remelted and recrystallized. The mother liquor from the first lot of crystals is higher in silver than the original lead and is

again cooled for another crop of crystals. In this way there can be obtained, with a series of crystallizations, essentially pure lead at one end and rich lead carrying $400 to $500 of sil¬ ver per ton at the other.

It is recognized by the geologists that frac¬ tional crystallization is the most general cause of the great differences between rocks formed from the same fused magma and fractional crystallization undoubtedly also explains nu¬ merous concentrated deposits of oxides and sulphides in these rocks. The great chemical sediments, common salt, gypsum, anhydrite and, sometimes, salts of potash and magnesium occur in essentially separate beds rather than inter¬ mixed because of fractional crystallization dur¬ ing the evaporation of some ancient sea.

Alfred J. Moses,

Professor of Mineralogy, Columbia University.

FRACTIONAL DISTILLATION OF PETROLEUM. See Petroleum.

FRACTURE, a broken bone. Inasmuch as the greatest variety in the nature, extent and complications may be observed, a certain classi¬ fication of fractures is desirable. Modern sur¬ geons classify them into about seven different categories or groups. Group 1. According to the degree of the fracture they are complete or incomplete or partial. Partial fractures are known as green stick fractures or they may consist of simple bony depressions, as in the bones of the skull, for instance, or simply by crushing of a bone or the separation of a splinter or of an epiphysis at the end of the bones. Group 2. Fractures are described ac¬ cording to the direction taken in the break, as longitudinal, transverse, oblique, crushed or comminuted, impacted fractures, where a part of the bone is jammed into another part. Group 3. The fracture may be classified in terms of its location — shaft, head, upper or lower third, or it may be named in terms of the contiguous structure. Supracondylar, Submal- leolar, etc. Group 4. In term of the cause of the fracture. Traumatic, as from a fall, blow or other injury. As in warfare from bullet wounds, smashing from explosions, etc. Mus¬ cular violence may cause a fracture at times. In certain pathological states of the nervous system, such as in syphilis (tabes) or in cer¬ tain chronic diseases of the spinal cord (sy¬ ringomyelia, chronic poliomyelitis, etc.), spon¬ taneous fractures are known to occur. Group 5. Fractures may be open, when the skin is cut, or they may be closed when there is no external wound. These fractures were usually termed compound or simple fractures respectively, but the terms open and closed are really more descriptive. Group 6. Fractures are still fur¬ ther divided into complicated and uncompli¬ cated. Group 7. Single or mutiple fractures according to the number of fragments.

Thus a fracture may come to be described in a number of terms. A tabetic who may happen to slip while walking may thus have a trophic, traumatic fracture from the fall or from the muscular exertion to right himself. This frac¬ ture might be open or closed, single or multiple, comminuted, complicated, transverse and com¬ plete. The most diverse and frightful bone injuries arise from the shrapnel wounds of war¬ fare. Inasmuch as there are so many techni¬ calities connected with fractures they call for

the most technical management. In a lay art¬ icle such as this only the simpler type of de¬ scription will be given, dealing only with such fractures which may call for first aid. A frac¬ ture may usually be recognized by the pres¬ ence of great pain, swelling and loss of func¬ tion of the part following an accident or injury such as usually may result in breaking a bone. By careful handling of the affected parts, or by the patient himself making movements of the parts, a sort of grating of the broken mds can be felt. This rubbing or crepitus is a valuable sign and when present always indi¬ cates the break in the bony structures. Thus pain, swelling or deformity and crepitus are the chief signs of a fracture. A fracture may

result, however, without there being evident crepitus. Therefore in all doubtful cases and, in fact in all suspected cases, an X-ray examina¬ tion should be made a routine procedure. By the incoming of the X-ray technique, the knowledge of fractures has increased enor¬ mously. First aid of closed, uncomplicated fractures consists in giving some support to the part until the physician can be summoned. When the wound is open, however, first aid may be of great service in limiting the possibilities of infection. Open fractures are complicated by the cutting of the skin or of the muscular parts. If there is much bleeding, this must be controlled by a tight compress. This can con¬ sist of a folded towel which has been placed in boiling water a few moments, or if time is an element, a clean towel can be applied directly to the wound. Blood is one of the best anti¬ septics until the doctor comes, and it is better to let the blood be on a complicated open fracture than to attempt poor minor surgery by washing. Complicated open fractures should be even more securely supported and prevented from cutting the tissues more during removal by careful bandages and supports.

The individual symptoms are subject to con¬ siderable variation so a short description may be of service in further aiding the first aid diagnosis. The pain is apt to be immediate. It is apt to be quite sharp and severe and acute and is distinctly aggravated by the movement of the parts involved. Unless the part is ban¬ daged there is a tendency on the part of the patient to involuntarily move the fragments which causes a certain amount of movement, hence the continuance of the pain. While the pain is usually closely localized, it may follow the course of a nerve trunk which may have been injured by the fragments. There is usu¬ ally marked local tenderness. A widely-used surgical rule is as follows : When pressure is put on the sides of a bone at some distance from the point of localized tenderness, and it gives rise to pain at the site of tenderness, there usually is a broken bone. Such pressure may be lateral or along the long axis of the bone. Broken bones usually show a deformity of the parts. Careful looking at the affected regions is enough to make a diagnosis in cer¬ tain localities ; thus there is the characteristic silver fork appearance of a broken wrist, and other localities have their characteristic defor¬ mities. Crepitation and X-ray examination have been discussed sufficiently. With the widespread facility for X-ray examinations there is no excuse for faulty diagnosis and

*treatment. Every fracture should be X-rayed. No doctor should feel satisfied without the valu¬ able information which this can give, and thus be of use to the patient. Every patient should insist upon it. Consult Keen, ˆ Surgery * ; Stimson, (Fractures* ; Bryant, < Surgery* ; Sted- man, (Reference*

*Handbook, Medical Sciences.**

Smith Ely Jelliffe.

FRADENBURGH, Jason Nelson, Ameri¬ can Methodist clergyman : b. Gouverneur, N. Y., 4 March 1843. He was graduated from Genesee College, was professor of mathematics in the Genesee Wesleyan Seminary (1868-69), of ancient languages in the Fredonia Normal School (1869-73) and principal of the Mans¬ field (Pa.) Normal School (1873-75). After pastorates at Cleveland, Ohio, and elsewhere, he was settled in 1896 at Clarion, Pa. He has published (Witnesses from the Dust (1885) ; (Beauty Crowned* (1887) ; (Living Religions* (1888); (Departed Gods* (1891); (Fire from Strange Altars* (1891) ; (Light from Egypt* (1897) ; (Life's Springtime* (1900); (History of Erie Conference* (1907); (In Memoriam, Henry Harrison Cummings* (1913).*

•FRAENKEL, fren'kel, Karl, German bac¬ teriologist: b. Charlottenburg, 1861. He re¬ ceived his education at the universities of Ber¬ lin, Heidelberg, Leipzig and Freiburg. In 1885 he was appointed assistant at the Berlin Insti¬ tute of Hygiene, becoming privatdozent in 1888. Two years later he was made professor at Konigsberg, removed to Marburg in 1891 and to Halle four years later. In conjunction with Brieger he demonstrated the proteid char¬ acter of extra cellular toxins. He succeeded in isolating the Pneumococcus and the Diplococ- cus lanceolatns in meningitis. Pie published (Grundriss der Bakterienkunde (1886; rev. ed., 1895) ; (Diphtheriebazillen* (1893) ; (Menin- gokokkus auf der Conjunctiva* (1899) ; (Spiril- len des Zeckenfiebers* (1907).*

FRAGA, fra'ga, Spain, town in the Province of Huesca, on the Cinca, 15 miles southwest of Lerida. It contains an ancient town hall and an interesting church which was formerly a mosque. Figs and pomegranates are exported in large quantities. Agriculture generally is in a prosperous condition in the neighborhood. In 1149 it was taken from the Moors, who had made it a separate emirate. Pop. 7,418.

FRAGMENTA VATICANA, a roll of

legal documents, dating from the 3d century a.d. and preserved in the Vatican Library, Rome.

FRAGONARD, fra-go-nar', Alexandre Evariste, French artist and sculptor: b. Grasse 1780; d. Paris 1850. He was the son of Jean Honore Fragonard and studied with his father and also with David whose historical style he followed. His most notable painting is the < Entry of Joan of Arc into Orleans, now in the museum at Orleans ; a bas-relief in the Palais*

Bourdon, Paris, is representative of his sculpture. Other paintings, lithographic illus¬ trations and designs by him are in the Louvre.

FRAGONARD, Jean Honore, French artist: b. Grasse 1732; d. Paris 1806. He was the son of a glover and was destined for a notary's career in Paris, but at 18 his artistic talent was so marked that Boucher suggested technical study with Chardin, later taking him

*into his own studio to make reproductions from his original paintings. Fragonard won the <(Prix de Rome** in 1752 with a painting of (Jeroboam sacrificing to the idols,* although he was not a student of the Academy. From 1752-55 he studied with Van Loo; in 1754 painting (Christ washing the feet of the Apos¬ tles* now in Grasse cathedral; and then from 1755-59 availing himself of his prize opportu¬ nity for residence and study at the French Academy in Rome under Natoire, his succes¬ sive masters broadening the scope of his tech¬ nic. With the abbe of Saint Non he spent a summer vacation at the Villa d'Este, and Fra¬ gonard's studies of the beautifully laid out grounds with their art decorations of terraces, temples, grottoes and foundations, were en¬ graved by the abbe for his descriptive works. They laid the foundation of that style of painting which has made Fragonard famous. Before returning to Paris in 1761 he went to Venice where he was greatly im¬ pressed by the works of Tiepolo. His (Coresus et Callirhoe,* eulogized by Diderot, bought by the king, and reproduced by the Gobelins tap¬ estry works, gained his admission to the Acad¬ emy in 1765. Abandoning religious and classical topics, henceforth Fragonard, a joyous spirit and social favorite, devoted himself to those suggestive pictures of high life which de¬ pict the pleasure, sentiment, passion and licen¬ tiousness of the court of Louis XV in that period of luxury, extravagance and profligacv which culminated in the French Revolution. Their worth is due to the beauty of their setting, their refined technic and delicate coloring. During the Revolution, Fragonard sought refuge with his friend Maubert at Grasse, whose house he decorated with the Toman d'amour de la jeunesse* (Romance of love and youth), a series of panels originally in¬ tended for the villa of Madame du Barry at Louveciennes They were sold by M. Maubert's heirs in 1898 for $250,000 ; they were bought by Pierpont Morgan in 1914 and exhibited in New York; in 1915 they became the property of H. C. Frick. Other fine speci¬ mens of Fragonard's works are owned by the Rothschild family of London and Paris, notably the small (Billet Doux) canvas bought in Paris in 1905 for $95,000 which gives an idea of the present worth of ((Fragonards.** In the Wal¬ lace Collection, London, are (The Fountain of Love,* (The Fair-haired Child,* (The Schoolmistress,* and (Le Chiffre d'amour* (The Symbol of Love) ; among 15 in the Louvre, Paris, are (Coresus* ; (The Bathers* ; (La Chemise enlevee* (The Stolen Chemise) ; (The Sleeping Bacchante* ; (The Shepherd's Hour,* and (Inspiration* ; other works,*

fer¬ ment d'amour (Pledge of Love) ; (Le Verrou* (The Bolt) ; (La Culbute* (The Tumble) ; etc., are in different museums throughout France. One of the best known by reproduction (The Swing,* and (Blind Man's Buff,* are in the Groult Collection, Paris. In 1769 he married Marie Anne Gerard, his pupil, a talented minia¬ ture painter of Grasse, his own native town, and his happy union resulted in beautiful sub¬ jects of domestic life, (The Happy Mother,* (The Cradle,* etc. After the Revolution he returned to Paris where he died in neglect and oblivion, appreciation of his work reviving 80 years after his death. Consult the biographies*

by De Nolhac (Paris 1906); and by Portalis (Paris 1883) ; also De Goncourt, (L'Art du XVIIIe siecle5 (Paris 1874) ; Josz, Fragon¬ ards, Moenrs du XVIIIe siecle5 (Paris 1901).

FRAMINGHAM, Mass., town in Middle¬ sex County, on the Sudbury River, and on the New York, New Haven and Hartford, and the Boston and Albany railroads, about 20 miles west of Boston. It comprises the villages of Framingham, South Framingham, Saxonville and Nobscot. The chief centre of commerce and industry is South Framingham which has manufactures of straw braids and hats, boots, shoes and rubber goods, paper boxes, tags, crepe paper, leather board, gummed labels, boilers and carriage wheels; while in Saxon¬ ville blankets, wool and worked yarn and cloth are manufactured; farming implements, heaters, sugar and coffee machinery are also produced. The United States Census of Manufactures for 1914 showed within the town limits 49 indus¬ trial establishments of factory grade, employ¬ ing 5,150 persons; 3,982 being wage-earners re¬ ceiving annually a total of $2,257,000 in wages. The capital invested aggregated $9,285,000, and the year's output was valued at $8,727,000; of this, $5,280,000 was the value added by manu¬ facture. Framingham was early known as an educational centre. Framingham Academy, es¬ tablished in 1792, was incorporated in its public school system in 1851. The first State normal school established in the United States is here, removed from Newton in 1853, its first location having been Lexington from 1839-44. At Sher- born adjoining South Framingham is the State reformatory for women. Framingham also contains hospitals, almshouse, Home for the Aged, a public library and its historical and natural history society has notable collections. Municipal waterworks are operated and the ad¬ ministration is by town meetings. Known as Danforth's plantation, the property of Governor Thomas Danforth from 1640, on the Boston to Worcester turnpike, the <(old Connecticut path,® and named Framingham from his Eng¬ lish home, its incorporation as a township

dates from 1700. Pop. 17,033. Consult Temple, J. H., (History of Framingham5 (Framingham

1887).

FRAMPTON, Sir George James, English sculptor : b. 1860. He studied under W. S. Frith and entered the Royal Academy schools in 1881, was awarded a gold medal and travel¬ ing studentship in 1887, since when he has re¬ ceived many honors in France, German}'-, Bel¬ gium, Spain and America, including Medaille d'Honneur at the Paris Exposition of 1900. He has executed many memorials and statues, in¬ cluding those of Queen Victoria at Calcutta, Southport, St. Helens, Winnipeg and Leeds. He designed the terra-cotta decoration on the Constitutional Club, the sculpture on the Glas¬ gow Art Galleries, the whole of the sculpture on the exterior of Lloyd's Register, London, the entrance to Electra House, London, spandrels at entrance of the Victoria and Albert Museum, figures on the spire of Saint Mary's, Oxford, saints on the shrine of William of Wykeham, Winchester Cathedral, lions at the entrance to the new exterior of the British Museum, statues of Queen Mary for Victoria Memorial Hall, Calcutta, and Government House, Delhi, portrait busts of George V and Queen Mary for the Guildhall. He has de¬

signed and executed works in ivory, silver, enamels, etc. He was knighted in 1908.

FRANC, a French silver coin, containing 10 decimes and 100 centimes. Value in Ameri¬ can money 20 cents.

FRANC, frank, Martin Le, French author: b. Normandy 1410; d. 1461. As secretary to the Duke of Savoy who became Pope Felix V he secured several prominent appointments, notably that of secretary to Nicholas V. His chief works, (L'estrif de fortune et de vertu5 (1519), in prose, and his lengthy poem, (Le champion des dames5 (1530), although tedious and burdened with detail, throw valuable light on contemporary manners and customs.

FRANQAIS, Count Antoine, French poli¬ tician and author: b. Beaurepaire, Isere, 1756; d. Paris, 7 March 1836. He was elected as representative for the Department of Loire- Inferieure to the Legislative Assembly in 1791, and became notorious for his violent attacks on the priesthood and the farmers-general but did not gain re-election to the Convention. As a Girondist, he fled for safety to the mountains during the Reign of Terror. He was a member and one of the secretaries of the Council of Five Hundred in 1798; became prefect of Charente-Inferieure ; member of the Council of State; in 1804 Director-General of Indirect Taxes ; was

created count and grand officer of the Legion of Honor, and finally peer of France. His published works include (Le manuscrit de feu M. Jerome5 (1825) ; (Jiidaises compose sur la montagne) (1826) ; (La vallee des originaux5 (1828) ; (La vie rurale, ou l'agriculture enseig- nee d'une maniere dramatique5 (1829).

FRANQAIS, fran-sa, Frangois Louis,

French painter: b. Plombieres, department of Vosges, 17 Nov. 1814; d. 1897. He was a pupil of Corot and Gigoux at the Beaux Arts, first exhibited at the Salon in 1837, obtained a medal of the first class at the Salon of 1848, and was admitted a member of the Institute in 1890. He became best known as a landscapist, par¬ ticularly for his views of the Paris environs and glimpses of the Seine. His finest work, (Daphnis and Chloe,5 is in the Luxembourg, together with three other canvases, (Evening, y Orpheus5 and (The End of Winter.5 His style is peculiarly individual in its combination of realism and idealism.

FRANCAVILLA (fran'ka-ve'ya) FON¬ TANA, Italy, city in the province of Lecce, be¬ tween Brindisi and Taranto. It has manufac¬ tures of leather and cloth and an active trade in oil and wine. Pop. 21,527.

FRANCE, f rans, Anatole. See Thibault,

Jacques Anatole.

FRANCE, Joseph, French publicist: b. Lorraine 1787 ; d. 1869. Having entered the French army in 1815, he had become a colonel in 1834, and in 1836-46 was commander of military police in the island of Martinique, West Indies. The publication of his (La verite et des f aits 5 (1841), a work descriptive of the ill-treatment of negro slaves in the island, caused his removal from his post and trial for sedition. He was deprived of his commission, but subsequent to the abolition of slavery in the French colonies (1848) was elected from Martinique to the Constituent As¬ sembly, and from 1852 was a member of the council of the island His publications include

(Les corsaires frangais dans les Antilles) (1857) ; (Questions coloniales> (I860); (1861)

FRANCE, the ancient Gallia or Gaul, is the most westerly country of central Europe and the largest republic of that continent. One of the most important of the Latin nations it possesses a history second to none, while

its art, literature, and social customs have made

foremost nations. Its history are here treated under the

it the peer of the and development following heads :

1. Geography, Topography, etc.

History, b.c. 58 to a.d.

1796.

History from the Revolu¬ tion to the Establish¬ ment of the Empire,

1796-1804.

The Empire.

History since 1815.

The French Government. French Law and Juris¬ prudence.

French Socialism. Socialism in France dur¬ ing the War.

French Church and State.

The Separation of Church and State.

French Education.

French Language.

2.

3.

4.

5.

6.

7.

8. 9.

10.

11.

12.

13.

14.

15.

16.

17.

18.

19.

20. 21. 22.

23.

24.

25.

26.

27.

28. 29.

French Literature from the 11th to the 19th Century.

French Literature, 19th Century.

French Dramatic Art.

French Music.

French Art.

French Civilization.

French Journalism.

French Industries.

Commercial and Banking System.

French Railways.

French Merchant Fleet.

French Army.

French Navy.

French Colonies.

France and the War.

France, Diplomatic Re¬ lations of the United States with.

1. GEOGRAPHY, TOPOGRAPHY, POLITICAL DIVISIONS, ETC. France is situated between lat. 42° 20′ and 51°

5′ N. ; and long. 4° 52′ W. and 7° 39′ E. (Green¬ wich). According to the meridian of Paris, the longitude is 7° 7′ 56″ W. and 4° 51′ 46″ E. France is bounded on the north and northwest by the Straits of Dover and the English Chan¬ nel (La Manche) ; on the west by the Atlantic, more especially that part of it called the Bay of Biscay; on the south by Spain and the Mediter¬ ranean Sea; on the east by Italy, Switzerland and Germany and northeast by Germany, Luxemburg and Belgium. The total land frontier of France is about 1,600 miles, of which about 285 miles faces Belgium, 25 miles Luxemburg, 230 miles on Germany, 260 miles on Switzerland, 350 miles facing on Spain and 250 miles on Italy. The restoration of Alsace and Lorraine as a result of the Euro¬ pean War 1914-18, renewed the ancient boundary line of the Rhine. About 1,872 miles of coast line is distributed as follows : English Channel, 672 miles; Atlantic, 831 miles, Mediterranean, 369 miles. The length of the country from north to south is about 600 miles, and greatest breadth from east to west about 400 miles; to Cape Saint Mathieu, 530 miles. The superficial area of France does not seem to have been defi¬ nitely determined. The French ˆofficial® area is 528,876 square kilometers; the French Ministry of War maps record 536,408 square kilometers ; General Strelbitsky, who made a careful survey of the land, arrived at 533,479 square kilometers ; while another authority, Dr. von Januschek, made the total 536,464 square kilometers, an estimate that most closely approaches that of the French geographer, Prof. E. Levasseur, who gives 536,460 square kilometers. It must be remembered that the island or ˆdepartment® of Corsica is included in each calculation.

Geographically, so far as regards peaceful communications, France is mope

favorably situated than any other country in Europe,

since none other has the same easy access from its own coasts to the North Sea, the Atlantic and also the Mediterranean. Her railroads communicate with every country in central and eastern Europe, and all railway traffic to Spain and Portugal must pass through France. Strategically, her position is weak, for, in addi¬ tion to her three exposed coast lines, France can be attacked on land by five different coun¬ tries adjoining her borders.

Topography. — Though protected by great natural barriers at most parts where the coun¬ try is connected with the Continent, France is not enclosed by them. More than half her frontiers face the open seas, and the eastern mountain girdle is open at the gap of the Rhone between the Alps and the Jura; the opening at Belfort; in lower Alsace; and the gorges of the Moselle and Meuse. Her harbors on three shores secure to France a large share in sea¬ borne trade, especially in that most important of all inland seas, the Mediterranean. France is traversed from southwest to northeast by several chains of mountains forming the general watershed of the country. This watershed has two slopes, the one toward the west and north, carrying its waters to the Bay of Biscay, the Atlantic Ocean, the English Channel and the German Ocean; the other toward the east and south, carrying its waters to the Mediterranean. The ranges of mountains and hills forming this watershed include the western and central Pyr¬ enees, the western Corbieres in the department of Aude, the Cevennes, the mountains of Vi-varais, Lyonnais, Beaujolais and Charollais, the Cote d'Or, the Plateau de Langres, the Faucilles Mountains and the Vosges. This general water¬ shed is met toward the northeast by the eastern mountain ranges of France, namely, the Jura Range and various Alpine ranges, one of the peaks of which is Mont Blanc, which may be regarded as the culminating point of the Euro¬ pean mountains, although not absolutely the highest mountain in Europe. Near the centre of France, and separate from the great water¬ shed of the country, are several groups of volcanic mountains knoˆwn by the general name of the mountains of Auvergne, the chief peaks of which are the Plomb du Cantal in the southernmost group, the Puy de Sancy in the central group and the Puy de Dome in the northernmost group. The spurs thrown off by the great watershed divide France into six principal basins, five of which are on the north¬ western slope and one on the southeastern.

Geology. — France possesses all the geo¬ logical formations in a greater or less degree of development. The mountains generally have a nucleus of granite, which accordingly forms a prevailing rock in the Alps, on the east fron¬ tier, and their branches south to the shores of the Mediterranean, in the Pyrenees, the Ceven¬ nes and the elevated plateau of Langres. In the Vosges it is more sparingly developed, its place being often occupied by

porphyry; and in the Jura, where limestone occurs in such enormous masses as to have given its name to a peculiar formation. The other crystalline rocks, consisting chiefly of trachytes and basalts, have received a magnificent development in Auvergne, where whole mountains are com¬ posed of them, and where the effects of remote volcanic agency are still presented to the eye in extinct craters and laya streams. The gram

ite is overlaid by primitive stratified rocks of gneiss, and of micaceous and argillaceous slates, succeeded, particularly in the Pyrenees, by mountain limestone. The secondary forma¬ tion, commencing with this limestone and con¬ tinued in ascending series up to the chalk, al¬ ways possesses peculiar interest, because within it valuable mines of lead and iron, and all the workable means of coal, are included. It is largely developed in many parts of France, and furnishes a considerable number of coal and mineral fields. The Tertiary formation, includ¬ ing all the limestones, sands and clays, above the chalk, occurs continuously in two great divisions, and partially in a number of isolated spots, and covers a vast extent of surface. The larger continuous division is in the south¬ west, where it commences at the foot of the Pyrenees, and occupies a very large portion of the basins of the Garonne and of the Adour. The lesser but better known division takes the name of the Paris Basin, and has been made familiar to the scientific world by the labors of Cuvier and other distinguished naturalists.

Rivers and Lakes. — The great rivers of France are the Seine, Garonne, Loire, Char- ente, Adour, Meuse and the Rhone. In the basin of the Garonne are its affluents, the Ariege, Tarn, Lot and Dordogne on the right bank, and the Gers on the left bank. To the north of the basin of the Garonne is that of the Loire and its tributaries, the Nievre and the Maine on the right bank, and the Allier, Loiret, Cher, Indre, Vienne and Sevre Nantaise on the left. To this basin also belong the sec¬ ondary basins of the Vilaine and the Blavet. In the basin of the Seine are its tributaries, the Aude, Marne and Oise on the right bank, and the Yonne, Loing, Eure and Rille on the left bank. The secondary basins are that of the Somme in the north and those of the Orne and Oise in the south. In the basin of the Meuse are its tributaries, the Sambre on its left bank, to which is added the secondary basin of the Escaut or Schelde. The basin of the Rhone occupies the whole of the territory of France which lies to the southeast of the great watershed. The tributaries of the Rhone are the Ain, the Saone, the Ardeche and the Gard upon the right bank and the Isere, Drome and Durance on the left. The secondary basins are those of the Var, Argens and Arc on the east and those of the Tet, Aube and Herault on the west. France has in all more than 212 navigable streams, with a total navigation of

5,700 miles. The lakes are few in number, and individually limited in extent. The largest, Grand-Lieu, in the department of Loire- Inferieure, covers an area of only 27 square miles, and is altogether devoid of interest. The next largest, Saint Point, in the Jura, does not cover three square miles. Others of still less dimensions become more interesting from -their localities in the lofty regions of the Pyrenees, or in the deep hollows of ancient craters in Auvergne.

Climate. — The climate of France is greatly diversified, and cannot be described accurately without dividing it into different regions. With a very limited exception, it lies wholly within the more moderate portion of the temperate zone. France may be divided into four climatic regions according to the different vegetable products which different districts are able to

mature. Within the first, and warmest, the olive is successfully cultivated. It forms the southeast part of France, and is chiefly con¬ fined to the departments which border on the Mediterranean. The second region is character¬ ized by the general cultivation of maize or Indian corn. The third region reaches north to the extreme limit of the profitable culture of the vine, and may be considered as deter¬ mined by a line stretching between the mouth of the Loire and the town of Mezieres, in the department of Ardennes. All the country be¬ yond this line is included in the fourth region. In the northwest the prevalence of winds from that direction often produces a superfluity of moisture, which manifests itself in mists or in frequent and heavy showers of rain. At the opposite extremity, the southeast, a contrary effect is produced, and a sultry, stifling wind wrinkles up the skin and? not infrequently spreads fever in its most malignant form. But it is only to a few exceptional districts that these remarks apply. After allowing for them, more than four-fifths of the surface remains, under an atmosphere remarkable, more espe¬ cially in its central districts, for salubrity, serenity and brightness.

Fauna and Flora. — The fauna of France does not differ materially from that of central, southern and western Europe, the only differ¬ ence being that more cattle and sheep are found in the north of France, while the stock of horses is rather deficient. Owing to the lack of extensive forest-lands or mountain masses, the range of wild animals is growing smaller. The wolf and wild boar have not yet been extirpated ; for the most part they are artificially protected for sport, especially the wolf of Brittany. In the south the silkworm is extensively reared, as also are bees producing the famous Narbonne honey. Fish is taken around the coasts in great abundance, including the tunny, sardines and herrings.

The flora is rich and extensive owing to the great differences of climate. The highland flora of the Alps and Pyrenees is identical with that of the

other Alpine lands. The garden of the country is Provence, in the southeastern corner, where eucalyptus, introduced from Australia, thrives as on native soil, besides olive and mulberry. The produce of the soil is naturally in accordance with the diversity of climatic and physical conditions. Between the weather-beaten flats of the north and the azure coast of the south, almost tropical in vegetation; from the vineyards of the Medoc to the Alpine woods and pastures below the per¬ petual snows; from the blooming grasses of Normandy to the wild and desolate plateaux of the Causses every type of vegetation or cultivation is represented. The forests yield oak, beech, lime, elm, pine, fir and various types of maple.

Political Divisions — Before the Revolution of 1789 France was divided into general gov¬ ernments, the number of which has varied at different epochs. Under Francis I, by whom they were instituted, there were nine. Under Henry III there were 12. Under Louis XIV the number was fixed at 32, to which a 33d was added by the acquisition of Corsica, under Louis XV. In 1789, when the love of change became paramount, the provinces were not per¬ mitted to escape; and it was then determined

ˆ 4« B C 20 D E go F G 2° H I 4© J K go L M g< > N

Longitude East from Greenwich.

The Hague/®

Rotte)

Rhine

Tilburj

Vlissing/n

Ghenti

Maastricht

SOUTHAMB-TOf

*“t*s)*

' fYj clAjˆrescMsei; Klerqfˆ F gL cWKA° J

lognfrf _ _ U- Gp11#,

Mer XryjT Haiebr.-Uˆ#"

, t^rea MSpUfe

16 ^i^EUples Kxx*M~ B, r^VJVrJntreuil 'w-rf" ^ Tc_ ^Nl Brl#° , V *3q, v_, JieidinH, — «<• Lem

i\\ o"?> • Nr^-#tr Hoi-.

tastings

| Aachen

(Verifiers.

L of Wight

Portland Bill

^Natnurn

IMons'

Le Catena]

Alberti

nt/ S?\ 'Rumign|fMontherH| / Sal i. / /°V.Ui

0refT*scP^:

Blangy

^"•©Dieppe T 6 o Longueville a»Scufchltd\

M»n™_

Oisemo L All] VAumal

£,reca,

- Pte. de Barflour p ^ott pBarfleur **>

(urg £ai*

Hontteur-t/p^

^St Clair oBalleroy_"x'

I i> /

Torign i r3fr-^~^~' /jMez 1‘

\ „me r\‘‘£*aJ Bopage

!Vn^*“L JBJ£' psonSh.

J a v„n;tey^>^r>

^) 0— n ^_ / Briouze V ' ?

PoQtAMon Mflrtaln—^^oqt _ Seeaiv'*

- Jf8*^ ✓'

'ChaulnesfjT

8t Pierre

Luxembourg »£)

L BeaumoSt (fcherbff

• jA&L Pierre J . C oLea Pleux>\

v • •(CJ ,8x«a l.'^^Valdta.,

.ANDS BarneyilleV. Ca?^ \o S1^.

t i L«aajev~ ^.

Jbksey I,^du Pult8> \

st.) L

!•• M.KQin»RS ..«! Cm,“V

CJrac

[Gournaj

ou tiers'

Keane!

pTois ^ 'Vereone* , 0 Charni

i^ur-Ao.lklle/ iClermofl JiGieor^ f V Les AjBelys Merj? /

"^S^vPontotoeJ^^lii 'P0\Oil»'lte8ijK Ada

egney “

jfVmer,.Coti;

,/VMenehould. Y

>a Chulous* Tj1 vsur-JIiirue i£. XN? Kevigr^y

luiuiurtin

ipourtvW

l$ar-le^\3l T->.Due . Commercy'S _S. ^Voidf

Livarot1

j'Gonde'-en.-Brie f Jousrre i/Ectt stMontmirii'l loc C(

sojnTSt. Germain^^d^v. “r ■ u r\V ersai II

loudanQ^^Y ')

^_^cRambouillet ;s

' An»)o«j7?8t

J A\jTC]hi

l) 'jTraibutS

^c^I)amville .

-Merlerault^

1>oMortagae^

ToCrnau.o.

bgorbeU-^

y Dreux V

E per non'

^^^ahcoideurs^NY (“ (Unevlfie^sJ^ GondreoourtˆColoV;b^\ d V«^eUse

Mlreoqurt ˆmˆrvillers

c C) i a'- o noi pai re

urmontl Epinalˆvˆ Gen Lamarcbe — 86/n«niirec

Nangia

° 8sihJref0US”ˆ\J f

Montfort ASbidˆErnee'/1

Laval

Meru

euc-Seitie ys u \ Estisaac i x

V 1 ■. 1 i – ! ' ' '

[ue!goat0

*\ |C*fbai£|*

aherbes?1ˆ. Uutarv llle)

_/PithlvTi ih'imII. Alt W 1

W Courville'ˆˆtl

Nogent-le-Rotrou V Brou, \Vove»J

Neufd

iˆsigny AnB! \ ur-Aubjpfˆ S*KS*

-

| ˆ Bar sur-Sieme S8 ® Cltnuiuot 5Chaource_S \cbateau-VUaiQ/

gdf Vbitiudwv

° VTTˆ\ N

0 A Lnigˆesˆˆi vAnˆ-le-FrancGtˆ>

Montbard Seloiˆeyˆj

ifiillonVˆ Ie-eur-Tille / Atttr

V 0St. Selne\

rSemur ˆ \

"j\ Vitteaux

Nemoi

J/janvllle

ViUeu*ufeˆ>nr-YooB»

Neu\-ille auV Bob

mdun

>urtenay a\

.W| _ vShˆI

Montargiˆˆ ArCharny fch'onnerre _Cbate»u i J? Auxerrcˆ'Chablia SˆsXGien 0«»wV-ˆ8rl

- Ul/„ v\Verm«

-bt-Fargeauˆ

fcangea-surV/ \

ˆeumy

ˆLa Ferty Jussey VRreˆAmaBˆ®

•oc'tn&f ■ | 7n ■ y 1 Piˆnalcg, /|*,n N

S“" M,aI«tro/,"**i2!**>F«™4a| 5ˆ«.iab«t WWtoHSTT

J \de Redon / /

VaUˆ~- LB,al”l/581J‘

C . A5ont;Chat«au /

L A.

St- t“,i A7k

^ bE NoiRMotrriERYt /M-Retx Dvtroit & fromentin?/ /cSuaw /.

8t- Gllles-sur-Vie? 8-t4 > " La Mothe Achard ^" ',a Lea Sables d'Olonne-o Talmont*

Brulon

•Mealay

■/ Monaounieau ' „6\

Calais / ^

AVendome ,• P/\ a . , S XBeai

Amand \Y

irtr/sur ^

\C bateau ^l/i;|0js ch itHLm-wir^olre*

avra^C^ "J Sallais^Mj

_-yJ,nboiM°C""t"— I

Romornntln

-

ueil f Issoudum

»ge BuznncaisyyyL LS V fi hateaurou x/Vb 6

Ardentes

u ch

"T A . ^V'^brgenton-sur-CreuaeA'"

lion I'Ajb Eguzom) *

^_o Montnjorillon J '

.uss'ni-les Cbatcrui

IsleJouidsln • cj

jBellacK^_^> ^ ifolens^Bessl^y

7 v Luxeull

ˆ BUu'»t>Ksˆ

Hippolyta >

,Be»an<;on # /

I a o sen

jngeau1

Eoommoy a FlWhe

Qulberonv

Chateau ’ la Vallierc 0||».'ˆc

ˆSeichˆs

Angtf

Belle-Ile1 -K.v Mer .

y Cosndl C

\sancerre jtU)onzy' .y\Ue . \pPoui yevreˆL

Aˆ7lˆL.CU,iuˆ,p£

V/BourgoTNˆ V\J

’hwoet la Guercheyˆ Tˆ > V o Levet Jir\ res St Pierre-le->y5utlar\

Mirebeau0′ v(a)na

s>u.i

.Chiooo NuitS7 "Pjho&

8t. Jean de lxwne/ / A/0

, ˆ•ioXBeaune/*' Seuxre?* < i/ V S

V" 7ˆ\£Chauai

(cha*?JTˆpVeWSii»t-»»l

-o-v Chalon-surJ- , *5.

ˆo.iˆriy,

nevBKues v . , T°/X Senneceyd) j1

ˆMoulIn3ˆBourhn Lˆcy ii0rand\ l

~ˆv> — ˆTJV. r»L«tn/ rTournusdl—

X St. Cliud«3,

Pm»j-U-MooUI ˆ v'ˆdv. V ˆ

cr J jrflY /Lei Glaˆetwyˆ XˆMontrevXˆf\-ˆˆ

. j \Mareign5f /Y| Rourg i> 1 vˆNantu? A

A*yiLV V7 cˆ=ii

Gennes /ˆDˆe«/S

L,oire0ˆBourrfell

?annay y <>■ i 1 Corblgny

MorteaUj

hguea O- Nevera

‘ontorlicr

rMontjeyjl-BJfian — ‘Tbouars?ˆ

Ire8suire'\y \

FribourgJ

, -JPcloitrex

-r , >r JStTpttp

! \Mazieres/ ttltlm?

V9* yˆMarans \ /W — o-Cellesˆj

ˆ Chef- Cfllvl * jdˆou ton De*5 •Ohorenlel dSt Jeaj

Lausannev

iLouh&nBˆ [jCuUery / >

oevEi

i ty / y / ? h on on • Q ylJ Douv oine Yf'\

ˆCtNtVl /y

NBonnevlUeV

' JuUenVˆ|~>\ 5*T\ˆ AnnvcjT Chamonix 0 V

Jls de Re,

St. Martin de

_ frtui*

StTˆierre d'OlerˆtJ Ilk i) OleronS

»V .1 . , Le C ha teat

Fcrtuia (U A/-

Bousaac'

'enevent

•Auzance»

Amberled

\\Uefrancbe

aneufj

, /St Claud/ . .vaOˆ4 t.itAe'

Amankˆ jCˆ42 v . 'Jlt?deBoixe SˆAue?- 5 Roc&foftiird 'ˆAug„uln„echalu»

0 La Falette J f

ˆ.V ˆ-CyAontrOD /<-;

r/Chalairf Montagrlerˆ%oy- krˆnTKib.r..fˆ>ˆ|er1gne(yt

r,..‘,fwr7p» St- Astlen?^

toufw/l l _ p' \TerrasaotF

~S~ ± x M U3»i dan » r \ 4 , <

s, ““aptii,

Bergerac LyprJea ^ Sarh la QKnd« [jurilogn6 —

bBourgi

onard

! 'V«umu83on Y1’ La Tremblad£p\ de la CoubreL-^/^.

Royals

le Verdon^

Stt Vivlmv

l*esj»arre'

kl _ .Clejm'o ut

kjr oe . ooum I

^m\o R ei taolrel

EUrRoe SAHtW?^ „ \ L JiBorf 1'Jutneaux'

Blanzac

pj,‘,nn?„ ri»»

[a Roussillon Vsegsi^ea-'TuUins

Arlanc

A,\ Jonzac

A lb i n be

V

= (t\f"J 2s

jollgnac-sur-Loire/ ,

’auillacuV

fl) .BlaJJj

leˆMedoo o~"K /Blanquefort ’

Ys3iugoa'ux jG'fc TournonA Tence -v . j f U/ˆIastreˆ: '

*Le *Eb&J'nr*

foVlztHe Laˆtonetler catier de Clertnbnt > ˆ I olaMureˆ

JorpT

Castelnai

: Romans V alenctt

t0Chabeull

aatni

-tsCrsbn

"“L’Areehtlere-

V d ' «» |l\£y/GuUle«tw

*R< * ssin I d' A rcachoJL Arcachon u Etang de Casa fa*

Etang de Parenti

I Parentis1

Etang d’Aureilhai

o 'Xs.

*Irandneu Vn Langogne**

L- Labrrde ˆ U'linV Pbdenaacv, Villandraut

St. Symphorlen- jJPJbsob ja

-~-i\'illerenl° f

ˆSeyches

Maraande

N Villoi.ouv«-«ar- jNgX Loi/ˆ*sLypA * UODneinsy}/ t CU. b. Cl/ LnM

vˆSe- Wa«

SˆrfˆBarcclonnetteˆf Tallard tA\

■ o La Motte du Calrt

Lfron U .c/uvii»:

'la Canourgue1

FldraOi v j jJ Bar re ?

Zl. 'oV

ˆen-Born-

LuXeJˆ ' iM im i zanT\ Sabres Morodnxrˆ Roquefort

Ambroix

K X Bagnols o 1 'ˆxTRoquemaure A y

le Mont] Vloissac

ˆi5‘> *

ra8j Peyruia oˆleaMees _ ˆ

Forwqutw E'

ICastcllaneo xPertuTˆi/ˆ-ˆ 1

Orange

VUUrs y \ Levensj

Anduze

Castvel-Sarrasi m.

' Gabarrey . –

Mont de JIursun

illenouvo

iioutauban

,1 Leqfoure W

Remoulins

*it. Auban^*

Vence

lemur

. y^-^GaillacI- Rabasjens /'• /l^rx^Lautrec,' J Cavaur\J n

,a«

^Castanet \ | / ' o\. Vill«jjAphe-d|

Grisolles.

Tartas/'

Valence Xogm S3 . IRIid. ?P Audi// \ Irande^jjj] d^aubourguet^b

Comp o G]*

Salerno^0" — ^_

Brignoiea 8 pr,;lUH*

^Nlwesi

A'auvert

j Tara .."i.

lontostruc

t y PeyrolleS^C^ ^&aion /Rians

y^VTreX

fGhnont

y*-^«rTeu?i V

'i^ina Roujan^f^il

*'& '/C.oatelnaudary >^^0. ✓IBelpcch]/.^ Alzonne/uT^V— vC u rats son ner^/^' 1

\Ma:gnc 9 Lezignan –

v >nirYfX f Limtu*UalreSlg««a^

FoU fpo.im.u

/oLea/Caliannes i ogt, pnul

Ax'b VI yde Fenouillet 6,

/ ^uerigut^V^* ? 0_ . – -/

lild _p‘ \ i’radea^ ' Mills* \ ^^SontjLouU ^ (>„, .. Z

Airthcz Garlini Lem bey e.,

JJidache0 g, A L' star its

Bilbao

Sauretferr

"i 12 –

) Maul eon

if Stet. Manet

Mouths of t*1*

CawTsan a Varbonne y'Etang de r Gruieean C. Leucate

o-Oloron

yBagneres de Bigorre An«*u^

itoria.

Pai iplona

Miranda de Ebro/

iertefltte.

/Orinesson

AGennevillier^ ;/olow»bes /; L Asniere6

Murillo

G. (ie .Rosas

Sefti. oDtiucJS-

Till i?r ABobl553S j]

ertu. X^ JiondyJ f=9TaulTii__<^l

< 9 ¥ ii NoisA-le-Set x.Cles Lilas 1 \Roan' Gl'Nv ©Bagnolet 0 ”v ^.iSj ©Montre nil iTVf sous Bois ^oJJnreiMH-s,' St Monde' \No\i vrOfh ^ parc fa, . ®\Nof 2si de / y, rrrr.Ti.r- vxi>'iN*

\'\V © MaieonB- Alfori

Gerona

Monzon

///Se uij

(//. Bols 5

BtiwnepVf //de B.i/

Neuillv- ur- Mum

Man res. a)

Lerida

le-Oibnd

Champignj

»>VERSAII/lE5 — r^fllont rouge/ /©

/^r^K..Tit.0M'ud<“Ch.l„,on7«ot he^Cflaj C1™art,> % oE.y®vrc“e*

*A , 0 Foutenay*o-Roece -Vˆfllcjulf*

j /Vellay Sceaux ° B/urg-la-l*

-sˆjouy-en- Chatonay 0 /Che»illy0 xt ,e oˆˆsˆdpsas 3jˆvre8 Antony Av Freanes

ˆvTS. V errleros ° .Rue

1.IU,

vufort ˆ ˆ JO — W Issoub Satiny ° ' VauhSuiSiv/ SI aa»y ov'"»"“" Baf|® . / FaJaUBeau

af -r'ˆX V" Lo-tm-aau

*eyOiui#s*on*

am

Tarragona

Tfoiseau 7 0 8ucy ABola»y St. Legor Marulles o

Tortosa!

I Limcil

C. de Tortosa

Brando

Rocˆse

Florent

Corte

Piana . oVlct

renaco

42fG.de Sagom

tocognanj

lastelical

Oluieto

G. de Valinco

Sad

0. de Par Vecchio

*Bonifacto^^*

STRAITVDE BOJilFA CIO

Longitude West from Greenwich.

FRANCE

SCALES

Statute Stiles, 70= 1 Inch.

*40 _ 60 _ 80 100 *120*

Kilometres, 100 = 1 Inch.

100 iso

Rand, McNally & Co. 'a New 11 X 14 Map of France.

Copyright. by'RaiurMoNally A Co.i

™°b;

at- a.thi'i _

*2m Gould d A J Cf0**

**: d4 Eouar*

- y>t 4udL

DEPARTMENTS

1 Ain

45 Iodre

2 Ai?no

4G Indre-et-LoUe

3 Abler

47 I sere

4 Alpee-Mari times

48 Jura

j 5 A r dec he

49 Landes

G Ardennes

50 Loire

7 Aricgo

51 Loir-et-Cher

j 8 Aube

52 Loire- lufericure

1 9 Aude

53 Loiret

| 10 Aveyron

54 I-ot

*11 Ba**«sa-Alpe9*

55 Lot-et-Garonne

12 Ba?.ae£ -Pyrenees

56 Lozcre I

13 Belfort (Tcrrltoire de)

57 Malne-et-Lolre

i 14 Bouohes-du-Rhone

58 Mancha

15 Calvados

59 Marne

i 1G Cantal

GO Mayenne

1 17 Charonte

G1 Meurthe-et-Moselle

18 CSarente-Inferleure

G2 Meuse

19 Cher

63 Morbibaa

20 Correse

G4 Nicvra

21 Corse (Corsica)

G5 Nord

22 Cote d'Or

GG Oise

67 Orae

24 C reuse

68 Pas-de-Catals

i 25 Deux-Sevres

G9 Puy-de-Dome

2G Dordogne

70 Pvreuees-Orientales

71 Rhone

| 28 Drome

72 Saone et- Loire

29 Euro

73 Sarthe

1 30 Eure-et-Lolr

74 Savoie

75 Seine

1 32 Gard

7G Seine -lnfericuro

33 Gera

77 Seine-et-. Marne

34 Gironde

78 Seinc-et-O'ise

1 35 ilaute8- Alpes

79 Somme

3G Haute-Qaronno

80 Tarn

37 Haute-Loire

81 Tarn-et-Garonne

38 Haute-Marue

82 Var

llautes- Pyrenees

83 Vauduse

4 < ˆlaute-&ttone

84 Vendee

41 l%ute-Savoie

85 Vienne

> 1 H%te- Vienne

80 Vosges

& 'dV — .

87 Yonne

, —

S ˆ

JWCrbj

_ Qn(*«pefS

PU a ˆP°atl'A

• fle Ponmarthi

pLttrXif ,.

iieiˆHDe T). Port LotUs'

I1- Oi QroixCq

'GR/JL*

Sv d® Muur.ntiej-no,-

Durneˆb \ ˆ

'(ireitobf^^^Oˆ// "

ˆ ■R/t0'ie vT°V< NV" ˆ

L/0*5 ° > > tˆVNO

r> .'V

/Le Luc/ ˆ ˆ V I,

St. Itap«A

V , 5»'.

CORSICA

(Same Scale as Main Map)

I'lslc

C. Corse

Bastia

San

Nicolao

Asinaba I,

REKA I.

338

/

\

that the whole of France, including the island of Corsica, should be parceled out into depart¬ ments, and each department subdivided suc¬ cessively into arrondissements, cantons and communes, an arrangement which was actually carried out in 1790. This division has since maintained its ground, each department being named after the most important physical feature which it contains. The number of departments was originally 83, but it has been at different times increased and decreased. There are now 89 departments and the "territory of Belfort,* a remnant of the department of Haut-Rhin. As the old provinces, though now no longer recognized in legal and other formal docu¬ ments, continue so familiar to the French them¬ selves and are so frequently mentioned, not only by earlier writers,

but in the geographical, historical and statistical works of the present day, a list is here given exhibiting those old provinces and the departments now most nearly corresponding to them, with their respective capitals or "prefectures. The names of the modern departments are nearly all borrowed from the physical geography of the country, above all from the water courses. A knowledge of French geography will readily enable one to locate easily the relative position of the departments.*

Area, Popu-

Provinces

Savoie .

Comtat- V enaissin Provence .

Arrond. de Nice .

Corse .

Languedoc .

Roussillon .

2,457 432,126

Comte de Foix . . Guyenne et Gas¬ cogne .

B6arn .

Angoumois .

Aunis et Saint-

Depaitments and

square

lation,

onge .

Provinces

capitals

miles,

1911.

Poitou .

Flandre .

. . Nord (Lille) .

2,228

1,961,780

Artois .

. . Pas-de- Calais (Arras) . . .

2,606

1,068,155

U

Picardie .

. . Somme (Amiens) .

2,443

520,161

a

il

. . Seine- Inferieure (Rouen)

2,448

877,383

Touraine .

u

. . Eure (Evreux) .

2,330

323,763

Orl6anais .

Normandie. . . .

. . Calvados (Caen) .

2,197

396,318

U

u

. . Orne (Alengon) .

2,371

307,433

u

u

. . Manche (Saint-L6) .

2,475

476,119

Berry .

Bretagne .

U

. . Ille-et-Vilaine (Rennes)..

. . C6tes-du-Nord (Saint)

2,697

608 , 098

U

Marche .

Brieuc)

. Finistere (Quimper) .

. Morbihan (Vannes) .

“ . Loire-Inferieure (Nantes)

Anjou . Maine-et-Loire (Angers) .

“ . Mayenne (Laval) .

Maine . Sarthe (Le Mans) .....

Isle-de-France . . . Seine-et-Oise (Versailles)

. . . Seine (Paris) .

... Seine-et- Marne (Melun) .

“ ... Oise (Beauvais) .

. . . Aisne (Laon) . .

Champagne . Ardennes (M6zieres) ....

“ . Marne (CMlons) .

“ . Aube (Troyes) .

“ . Haute-Marne (Chau-

mont) .

Lorraine . Meuse (Bar-le-Duc) ....*

. Meurthe-et- Moselle

(Nancy) . .

“ . Vosges (Epinal) .

Alsacef . Territoire de Belfort

(Belfort) .

Franche-Comt6 . . Haute-Saone (Vesoul) . . .

. . Doubs (Besangon) .

“ . . Jura (Lons-le-Saulnier) . .

Bourgogne . Ain (Bourg) .

. Saone-et-Loire (M&con) .

. C6te-d’Or (Dijon) .

. Yonne (Auxerre) .

Lyonnais . Loire (Saint Etienne) . . .

. Rh6ne (Lyon) .

Dauphinˆ . Isere (Grenoble) .

“ . Drdme (Valence) .

“ . Hautes-Alpes (Gap) ....

Savoie. ..." . Savoie (Chamb6ry) .

2,786 2,729 2,738 2,693 2,811 1 ,986 2,410 2,184 185 2,275 2,272 2,866 2,027 3,167 2,326

2,420

2,408

2 , 036 2,303

235

2,074

2,052

1,951

2,248

3,330

3,391

2,892

1,852

1,104

3.178 2,532

2.178 2,388

605,523

809,771

578,400

669,920

508,149

297,732

419,370

817,617

4,154,042

363,561

411,028

530,226

318,896

436,310

240,755

214,765

277,955

564,730

433,914

101,386

257,606

299,935

252,713

342,482

604,446

350,044

303.889 640,549 915,581 555,911 290,894 105,083

247.890

Limousin .

U

Auvergne .

Bourbonnais . Nivernais. . .

Area, Popu- Departments and square lation, capitals miles 1911

Haute-Savoie (Annecy).. 1,774 255,137

Vaucluse (Avignon) . 1,381 238,656

Bouches-du-Rh6ne

(Marseille) . '. . 2,025 805,532

Var (Draguignan) . 2,333 330,755

Basses-Alpes (Digne) 2,697 107,231

Alpes-Maritimes (Nice). 1,443 356,338

Corse (Ajaccio) . 3 , 367 288 , 820

Haute-Loire (Le Puy) . . . 1,930 303,838

Ardeche (Privas) . 2,144 331,801

Lozere (Mende) . 1,996 122,738

Gard (Nimes) . 2,270 413,458

Herault (Montpellier) ... 2 , 402 480 , 484

Aude (Carcassonne) 2,448 300,537

Tarn (Albi) . 2,231 324,090

Haute-Garonne (Tou¬ louse) .

Pyr6nees-Orientales

(Perpignan) . 1,598 212,986

Ariege (Foix) . 1,892 198,725

Hautes-Pyren6es

(Tarbes) . 1,750 206,105

Gers (Auch) . 2,428 221,994

Tarn-et-Garonne (Mont-

auban) . 1,440 182,537

Aveyron (Rodez) . 3,385 369,448

Lot (Cahors) . 2,017 205,769

Dordogne (P6rigueux) .. . 3,550 437,432

Lot-et-Garonne (Agen) . . 2,078 268,083

Gironde (Bordeaux) 4,140 829,095

Landes (Mont-de-Mar-

san) . 3,604 288,902

Basses-Pyren6es (Pau) . . 2,977 433,318

Charente (Angouleme) . . 2,305 347,061

Charente- Inferieure (La

Rochelle) .

Vendee (La Roche-sur-

Yon) . 2,690 438,520

Deux-Sevres (Niort) 2,337 337,627

Vienne (Poitiers) . 2,711 332,276

Indre-et-Loire (Tours) .. . 2,377 341,205

Loir-et-Cher (Blois) . 2,478 271,231

Eure-et-Loir (Chartres). 2,291 272,255

Loiret (Orleans) . 2,629 364,061

Cher (Bourges) . 2,819 337,810

Indre (Ch&teauroux) .... 2 , 664 287,673

Creuse (Gu6ret) . 2,163 266,188

Haute-Vienne (Limoges) 2,119 384,736

Correze (Tulle) . 2,272 309,646

Cantal (Aurillac) . 2,229 223,361

Puy-de-Dome (Cler¬ mont-Ferrand) . 3,090 525,916

Allier (Moulins) . 2,848 406,291

Nievre (Nevers) . 2,658 299,312

2,791 450,871

*Totals . * 207,054 39,601,509*

**fAs a result of the Franco-Prussian War (q.v.) of 1870- 71, 3,202 square miles in the departments of Moselle, Meurthe and Vosges, from the ancient provinces of Lorraine, and 2,403 square miles from the former province. of Alsace, com¬ prising the departments of Bas-Rhin (capital Strassburg) and Haut-Rhin (capital Colmar), were ceded to Germany. The European War of 1914-18 restored the lost territory to France, readjusted its area to a total of 212,659 square miles, and its population by 1,874.014 (Alsace-Lorraine) to*

41,475.523-

The following territories have been acquired since 1790:

Territories Departments

Afc °f V»cta. .

Nice . Alpes-Maritimes

Savoie . Savoie, Haute-Savoie

2. FRENCH HISTORY B.C. 58 TO A.D. 1796. The quadrilateral of Gaul has possessed a geographical and political unity from pre¬ historic times and the inhabitants of that quad¬ rilateral have inherited and transmitted certain political, rather than racial, qualities uninter¬ ruptedly throughout the historical period. But the first state in which we find them, when the great mass of them were but barbarians, exte¬ rior to the civilization of the Mediterranean Basin, was, of course, far different from that strictly organized and disciplined unity which 2,000 years ago and again to-day is associ¬ ated with the territory in question.

The Gallic tribes were a set of loosely or¬ ganized clans dependent one upon the other in a sort of semi-feudal organization. It would seem that no one clan ever rose to a complete hegemony over the rest and again that any small or dwindling clan, long before it per-

mitted itself to be absorbed, would seek de¬ fense by recommending itself to some superior neighboring clan. The classic instance of such a dependence is the association of the Parisii, who inhabited the neighborhood of Paris, with the large and powerful neighboring clan of Senones, whose capital was Sens on the Yonne higher up the Seine Valley. It is curious to note that ecclesiastical arrangements, always the most conservative of institutions, preserved a relic of this relation as late as the early 17th century, for until the see of Paris was raised to an archbishopric in 1622 the bishops of Paris were suffragan to the archbishops of Sens.

The languages spoken by these clans we know little of. We know that the civilized observers of antiquity regarded Gaul as pre¬ senting three very clearly marked divisions, which the Romans called (going from east to west), Belgic, Celtic and Aquitanian Gaul. It has been conjectured that the tribes of the first spoke a variety of Teutonic dialects. It may be asserted without fear of error that those of the second spoke a variety of Celtic. As to the Aquitanian or southwestern portions, some will have it that the Basque language once extended throughout its territory; others that its original language was Celtic like that of the central portion. On all this nothing can be certainly known. As to the origins of this stock we are again in complete ignorance and it would be idle to linger upon the many con¬ jectures of migrations on an ((Aryan race® (the very existence of which is but an hypothesis) or of a ˆMediterranean race,® a piece of pedan¬ try converse to and only one degree less futile than the last.

The inhabitants of Gaul have in common from the earliest times a national

character and a religion which, though they may have sprung from 20 different remote racial sources, gave them a common aspect. This character, which is dealt with under French Civilization, may chiefly be defined as military. In the earli¬ est, as in the latest, of European history, the Gaul appears marching eastward in quest of military adventure. The religion professed by these people is a more precise matter. It was of a definite and highly organized kind, although its mysteries specifically forebade its propagation by anything but oral tradition. It had for its organs a hierarchy of priests known as druids, and professed, as Gaul has always professed in a manner which seems a necessity to her people, specific dogmas the adherence to which was guaranteed by penalty and the expression of which was exclusively confined to the priestly caste. Among these dogmas the im¬ mortality of the soul, the necessity for sacri¬ fice and, we may presume, a universal God, were prominent. A sacrament of bread and wine distinguished this cult and a ritual holiness attached to certain objects and shrines, as the mistletoe among vegetables and the Grotto of Chartres among places.

The reader must here note the surprising continuity of French institutions, a continuity the like of which is not to be discovered in any other part of the Western world. Indeed it would seem as though the prodigious revolu¬ tions in philosophy which in ancient times made Gaul Christian, and in modern times have moved her to a great though perilous experi¬

ment in democracy, did little but recolor the substantial framework of the nation, and that under every regime national unity, a priestly caste, affirmed dogma and the sanctity of special shrines distinguished the nature of this people.

From very early times the shore where the Gallic quadrilateral touches the Mediterranean had been colonized by the merchants of the East Greek and Semitic ; and indeed the aspect of this fringe, its climate and produce, apart from its exceptionally political history, differ¬ entiated it from the rest of the country. Again, the Gallic hordes had overflowed the Alps and largely occupied the valley of the Po. Again, there were presumably spots (as the Plain of Alsace) where the quadrilateral was intercepted by invaders of another stock. But as we have seen in the preliminary essay, the quadrilateral of Gaul is the permanent habitation of the population with the history of which these notes deal, and that population first attains historical importance with the invasion and con¬ quest of Julius Caesar. This conquest occupied eight years, from 58 to 50 b.c. It was marked by many vicissitudes, the climax of which was the great revolt of Vercingetorix, which was finally crushed at Alesia. Had Caesar failed in this attempt one cannot say that the Roman power would have been diminished or that of the Gauls extended; it was fundamentally never more

than a struggle between civilization and barbarism, corresponding to the struggle undertaken later less thoroughly and with less success by Charlemagne against the Germanic tribes.

As it was, the conquest of Gaul affords such a field for the extension of civilization as has never before or since been afforded to its ex¬ tension in the history of the Western world. For, first, the ˆHinterland® thus acquired was in every way suited to the extension of civilizing power, with a perfect climhte, a very fertile soil, a numerous and highly intelligent popu¬ lation ; secondly, by an accident without which the Roman Empire could never have come into existence, the Gaul was not only suited to the reception of Roman civilization, but avid of it. Within three generations of Caesar's great ex¬ periment, the whole vast territory was Roman, and more thoroughly penetrated by Roman laws, tongue, feelings and manner than any alien territory has been before or since, with the habits of the conqueror.

Indeed there are but two examples in all history of a success of this kind : that of the Spaniards in the New World, and this of the Romans in Gaul. But the Spanish success, remarkable as it is, does not compare with the Romanization of France. It has achieved a less complete civilization ; it was effected at too great a distance from the metropolis.

Other military adventures of this sort have either spread a language or veneered a district with a governing class, without fundamentally changing its daily customs. Such was the Hel¬ lenic conquest of the Near East and such was the Roman conquest of northern Africa, in neither of which were the local dialects extin¬ guished or the local religions uprooted. As for the commercial empires, the Carthaginian, the Venetian or the English, it is not in their genius to impose their will upon subject peo¬ ples or to transform these into something after their own image; nor have they commonly

l.iade the error of attempting a task so uncon¬ genial to their forces.

This Romanization of Gaul, the most com¬ plete, and, in a manner, the most miraculous of historical revolutions, endures in its effect plainly to the present day, and upon it more than upon any other one historical phenomenon, the pattern of western Europe has been based: its bishoprics, its ritual, its law, its philosophy and its social organization. The municipality, with its elected council, European kingship, the legal class, the village with its lord and its praedial serfs — all these proceed from the

Romanized town and the Roman agricultural estate, not so much as they appear in their original Italian, but rather as they appear in their later Gallic form.

Some 200 years after the Roman pacification was complete, the preaching of the Christian religion in Gaul began to achieve its remark¬ able success. Legend, and even to some extent recorded history, shows us the leaven of this new philosophy at work much earlier; thus the famous martyrdom at Lyons took place as early as the middle of the 2d century, and the saints who there suffered were, through Irenaeus their priest, in touch with the apostolic period, for Irenaeus was the disciple of Polycarp, and Polycarp of Saint John. But it was from the middle of the 3d to the middle of the 4th cen¬ tury that the true revolution in Gallic thought as distinguished from these sporadic origins was effected. And from the middle of the 4th century Gaul becomes, as it has since remained, the chief scene of the struggle between the Faith and its opponents.

The Monastic Institution, Eastern in origin, was then established by the efforts of Saint Martin in the West, to produce, after centuries, the university upon one hand and upon the other the representative system. Again, it was then in the middle of the 4th century that the municipalities identical with the sees of the bishops begin to take on a social importance which has made them ever since pivots upon which French development has turned. And it is significant that about the same time the old tribal names of districts reappear, attached to these municipalities. By far the greater part of French towns to-day bear, not their Roman, but their second tribal name.

Coincident with the conversion of Gaul and its organization as a complex and highly effi¬ cient clerical hierarchy (which beginning in the 4th century, became within a hundred years the framework of the whole community and the only structure capable of outlasting the dissolution of the Roman world) came the phenomenon loosely and accurately called (

There was in fact but one true invasion, and that, to the honor of Europe, was utterly defeated. It was the Mongolian invasion under Attila. Even this was provoked by the use of Mongolian soldiers in the Roman armies. He penetrated with his enormous host to within sight of the walls of Orleans, fell back to the great dusty plains north and east of Chalons — probably much where the camp now stands. He had with him and was joined by every ele¬ ment of disorder and of chaos : German tribes, and, we may presume, the fugitive, the criminal and the broken men of that declining period. Opposed to them were all the forces of order vol. n — 37

and they were victorious. But it was the last organized effort of Rome, and

within 50 years a local chieftain was to assume power in northern Gaul without so much as assuming the titles of Roman officialdom.

The wealthier and the more self-conscious the Roman Empire grew, the more defined its social opportunities, the more ancient and fixed its customs and the more beneficent the religion which its civilization had to offer, the more did it attract the perpetual infiltration of bar¬ barians from beyond the pale. The process may be compared to the increase of potential which is created by the storing up of a head of water, or any other contrast of positive with negative in physical forces. With every succeeding gen¬ eration there was less and less temptation or need for the Roman to seek adventure outside the Roman pale. The towns were growing in magnitude, the Roman order had existed so long and with such splendid success as to be apparently eternal. Conversely, there was not a barbarian within a month's march of the border who was not by an irrestible gravita¬ tion drawn toward the enjoyment of such privileges. Some small proportion of the more abject savages were attracted by the mere opportunity to loot. These were easily defeated, though a watch against them was a constant care and harassment. They included the few pirates of the North Sea and the cannibal in¬ habitants of Scotland. The vast majority of the barbarians were not of this kind. They were men thoroughly acquainted with the advantages of Roman citizenship, men many of whom (in the case of some groups the majority of whom) had served in the Roman armies and who desired the privilege of being Roman rather than the fruits of destroying the only civili¬ zation they could conceive. Moreover, the total number was small, and especially small were the numbers of those who achieved political success. First of these in the history of Gaul come the Salian tribe of whose confederation was that limited and fairly definite race which still inhabits the district immediately to the north and west of the Waloon belt of French and Belgian Flanders. The social and even the military organization of northern Gaul was in dissolution when in 481 a lad whom history calls Clovis and whose actual name may have been spelled in any one of 20 barbaric fashions inherited the leadership of this little clan. Five years later as a boy of 20 he led them across the border, defeated another body of barbarians, organized as Roman soldiery, and through the organization of the Church, — notably of the great see of Rheims, was per¬ mitted to occupy executive rank. It must not be imagined that this, more than any other of the- numerous small incursions of the time, violently struck the imagination of contempo¬ raries, still less that it affected the general life of the people. Writs were issued, taxes col¬ lected, civil and religious ceremonies performed in the same way, whether the man nominally at the head of the executive in a province or a district happened to have been born within or without the Roman pale. For quite two cen¬ turies this distinction had been of little import¬ ance. The new features

accompanying the end of the 5th and the beginning of the 6th cen¬ turies were, merely, first, the advent of a certain though small number of independent warriors

who could not be fitted into any known part of the Roman organization (and who were not technically legionaries nor technically Roman officials), and, secondly, the breakdown of the provincial system. City, in the lack of a cen¬ tral power, stood apart from city, each looking to its own affairs. And any petty chieftain, such as Clovis was, would claim to gather taxes, issue writs, enjoy the luxury of the palace, not as the governor of one definite traditional dis¬ trict, but of just so many municipalities as he had troops under him to occupy. It goes with¬ out saying that these newcomers at once ac¬ cepted the religion of the civilization they found as they did every other of its habits. There was however, one feature, which seems to us of supreme importance, and which the Roman civ¬ ilization of that date seems to have regarded with indifference : this was the feature of popu¬ lar language. Semitic dialects lingered unmo¬ lested in northern Africa at this time. And it was a matter of regret to no one or even of curiosity to the learned, whether such a man as Clovis or Theodoric could or could not express himself in Latin. Latin was the only possible tongue for the work of government, for the law courts and for literature. A thousand dialects, Celtic in Britain, Iberian in the Pyr¬ enees, Teutonic in the Rhine Valley, Punic in Africa, which diversified popular speech, played no greater part in the life of the time than private tastes in reading or in cooking do to¬ day. Yet the existence of such dialects has warped and distorted the history, especially of Gaul, in that many historians of imperfect information, reading every sentiment of their own time into the past, have seen in language the test of a society and as we shall discover in a moment, have even made of such a figure as Charlemagne a sort of modern German nobleman.

In this Gaul then, which remained as purely Roman as before, with no perceptible admix¬ ture of new blood and with no change in the methods of government save a gradual weak¬ ening and coarsening of them, Clovis estab¬ lished himself in executive power over the municipalities of the north and east; having, that is, the right to issue writs in his name, to gather the dwindling taxes and to reserve for his part the luxuries and the honors tradi¬ tionally incident to the position of a Roman official. For more than a century, till the ad¬ vent in 628 of Dagobert, the great-great-grand¬ son of Clovis, this local executive power is as vague and changeable as can be. It depends upon personal prowess in battle. Now the petty kinglet

in the north stretching his nomi¬ nal power almost to the Pyrenees ; now the whole territory is divided among brothers ; now there is an alliance with other Teutonic chieftains of the Burgundian or Visigoths in other parts of the territory; now for a moment the whole is united again in one hand. Save as concerned landmarks, the lives of these kings are unimportant. The social fact under¬ lying the whole business is the dissolution of one portion of the Roman organization and the survival of another. The portion which dissolved .and whose instruments of power be¬ came first nominal, then merely legendary, was the central authority and the army upon which it had reposed. The portion which survived and which even increased in strength as the

darkness of the time deepened was the munic¬ ipality and above all the clerical organization based upon the municipalitv.

Meanwhile, like any great body that has gone through a sharp readjustment of condi¬ tions, the western districts of the Roman Em¬ pire by the 7th century began to organize a new and a debased but yet a stable life. The conditions were these : Britain had oeen for more than a hundred years quite cut off from the Roman world and the Eastern half of it nearly ruined by pirates. Africa had been over¬ run by every sort of wastrel, escaped slaves, nomads of the desert, starving peasants and criminals, gathered round a small nucleus of wandering Teutonic barbarians called Vandals. It had been temporarily regained by the Im¬ perial power, but was never again the orderly and civilized province which it had been for 700 years and was destined in the next century to be permanently effaced by the Arab inva¬ sion. In Spain and in Gaul the Roman munici¬ pality endured and little bands of Teutonic raiders had established their chieftains as nom¬ inal heads of the executive power. Men had settled down to this conception of the world as to the obliteration of the old central author¬ ity; they were long used to seeing upon their parchments the curious names of Germanic ori¬ gin which had replaced those of the emperors. Letters and arts had so declined that the past had become a fixed standard of excellence, the attainment of which was despaired, when the ruins of the old Roman order began to group themselves again into something of a stable (though of a coarsened and much lowered) civilization which is generally called that of the Dark Ages. And by an historic accident this civilization was nowhere fully preserved save in Gaul.

This accident was the successful Moham¬ medan invasion of Spain, a catastrophe which left Gaul the only intact Christian unit, and therefore the only seed plot in which the tradi¬ tion of civilization could hold its own and be preserved.

Britain was hardly yet rechristianized and civilization had but just begun to

strike its new roots. Theodore had but just organized the Church in that island and it was still a mass of little warring districts, when Taric landed upon the shore 'which still retains his name under the Rock of Gibraltar, in 711. In two years the Mohammedans were at the foot of the Pyrenees, and the whole intervening plateau with its Roman municipalities, its organized hierarchy, its European traditions of 900 years, was subject to the Asiatic.

The consequences of this disaster were enormous. The western Mediterranean, the common highway by which Roman influence has welded all Western Christianity together, was henceforward Mohammedan. Its islands were open to perpetual invasion, many of them to regular occupation (the Balearics were not re¬ covered by Christendom for over 500 years!) ; every seaport which had escaped actual conquest was open to perpetual insult ; Italy, already a mass of independent localities, now lay, as to its southern half, open to influences the most antagonistic to those of Rome; Rome itself might henceforward almost be called a fron¬ tier town; the balance of the great provincial system was destroyed and a general observer

of history who should not be acquainted with what was to follow might imagine that after this blow Christian civilization and all the tra¬ ditions of Rome and the West could not but perish. As a fact, by a process with which this paper has not to deal, the indomitable energy of the Spaniard reconquered the Iberian province and slowly re-established the civiliza¬ tion which we now enjoy. The debt we owe to the crusading spirit of Spain is not calculable; but for it there would not to-day be what we call Europe ; its learning and its religion would have perished. As it was, for many hundred years, with Britain hardly civilized, Spain lost and Italy distracted, Gaul remained to the close of the Dark Ages the one intact remnant of Europe.

Meanwhile there had been proceeding in Gaul itself a transformation in the nature of political authority which was destined to have very wide-reaching effects. The spirit of the municipalities, organized and aided by the bishops, had restored a conception of national unity, and the Frankish kings were at the head of that unity, the nominal centres from which a political power, debased but still Roman, pro¬ ceeded. These kings were manifestly unequal even to the moderate task of governing the decline of civilization. The great landowners who formed by this time an intimate mixture of Roman and German families grew more and more important as communications became more difficult. Chief among these land-owning families was one

which had acquired an heredi¬ tary position of predominance in the palace. This family had originated in a Roman noble of the territory of Narbonne, nearly 300 years before, but as was the case with nearly every other great Roman territorial family of Gaul, there had been continual intermarriage with families of German-stock, and prior to the Mohammedan invasion of Spain this family is found having its principal seat in that one of its many estates which lay in the eastern part of Gaul in the boundary of German-speaking ter¬ ritory. It was therefore, in the language of the time, an Austrasian family, for the French monarchy was roughly divided into Neustrian or Western and Austrasian or Eastern, though these divisions did not correspond to anything in race or language, but were convenient categories in which to reckon the topography of the scattered estates. This family was al¬ ready virtually ruling in the place of the king when the great head of it, Charles, led the combined Gallic forces against the Moham¬ medan invaders who had passed the Pyrenees in 732. This horde of Asiatics, crossing various parts of the chain of mountains but proceeding mainly by the middle road of the Imus Pyrae- naeus, sacked the cities of southern Gaul, were turned northward by the resistance of Tou¬ louse, passed through Poitiers and were march¬ ing upon Tours and the north when Charles Martel (Charles the Hammer) met them on the plateau of Dissay about half-way between the two towns. Their force was completely de¬ stroyed and Europe was saved. The son of Charles, Pepin, was still more patently the head of the state, though for several years he refused to accept the crown ; and it is under him that Gaul appears as the protector of the Papacy, an institution which French military power was to support continuously for the

next 500 years. It was only at the call of the Gallic municipalities and the hierarchy, but also by the direct sanction of the Pope that Pepin in 7 52 accepted the crown. He died in 768, leaving, as was so constantly the barbaric custom of the time, political authority divided between his two sons Charles and Carloman; the latter died in 771, and Charles, now 29 years old, became the sole ruler of the great territory which was now the only un¬ broken piece of the ancient empire and the only one subject to any sort of central au¬ thority; around it upon all sides, in Britain, in the German Marches, in the southern valleys of the Pyrenees and of the Asturias, in north¬ ern and central Italy, was a confused mass of petty lordships and beyond that again the ex¬ ternal belt of enemies of the Christian faith and Christian civilization, the savages of Scandinavia and of central Germany, the Mohammedan power of the South. The great Charles, therefore, whose title in history is Charlemagne, stood upon the defensive, as it were, throughout his long and glorious life, holding an island of Christendom against the pressure of these external forces. His de¬ fense was successful and that long respite per¬ mitted Christendom to

accumulate just so much strength as was sufficient in the next century to repel, though hardly to expel, the final as¬ sault of the anti-Christian power.

The reign of Charlemagne extends over 46 years, 43 of which he enjoyed as sole sovereign after the death of his brother, and during the last 14 of which he had mounted to that mirac¬ ulous position which earned him the title of emperor of the West and has caused him to fill not only the legends of Europe, but also, as with an original light, all the beginnings of modern European history. His period, there¬ fore, is one of the many of which we can say that the uninterrupted presence of one man at the head of a state for a long period gives that period a peculiar unity and significance. This is often true when the man is merely a symbol ; it is particularly true in a semi-barbaric con¬ dition of society, when the man happens also to be of military virtue and a successful war¬ rior. That the personal character of Charle¬ magne determined this wonderful episode in French history it would be an exaggeration to say, but that personal character made the epi¬ sode possible; these 40 years and more are full of his individual effort and they have some¬ thing personal and epic about them, like the eras which lie behind recorded history at the origin of every civilization.

He was 26 when his father died. Before he was 30 he had determined to extend civiliza¬ tion into the Saxon forests and he had begun to do so. In his 32d year he crossed the Alps ; in his 33d (in 774) he destroyed the power of the Lombards in Italy, and for the second time confirmed, as his father had confirmed, the tem¬ poral power of the papacy. The next year he was back again in North Germany, and the next year, he returned again to Italy; the year after that, for the third time, he was conquering among pagans of Saxony, and this time received at least the oath of their reluctant allegiance. The next year he was off again over the Pyre¬ nees, negotiating with, pressing back, harassed by, but checking, the Mohammedans. The Sax¬ ons rose behind him ; he hurried north again.

In 781 lie is yet again in Italy. He was not 40, and these first 14 years of his had been as full of violent and successful war as were the first 14 years of Napoleon. This elegy of rapidity and success, backed by a sort of renaissance of the Gallic spirit, so powerfully struck the imagination of the time as to make him, even in that period of rapid decay or transformation, the necessary leader of a united Christendom. It is from these swarming campaigns that the first new songs, or rather epics, of our modern Christian civilization drew their inspiration, notably from that check or defeat of his

rear guard in the pass of the Imus Pyraenseus as he was retreating from Spain, a disaster in which his nephew Roland died and from whose mem¬ ory sprang the noblest of Christian poems, the (Song of Roland. } On Christmas Day of the year 800 the culmination of these campaigns saw him crowned in Rome Emperor of the West by the Pope. The old title thus revived was but a symbolic name. He himself could exercise central and imperial power in a man¬ ner only distantly resembling the old Roman model upon which his title was based; and in the century that succeeded him that title be¬ came little more than a name. But it can be said with regard to the title itself and to his individual occupation of it, that it revived, just before the memory of such an institution would have decayed, the tradition of an Europe united under- a military head. That tradition has never wholly disappeared, and, fantastic as such a question may seem to-day, shall the future see it revived?

The remaining years of his life, though all around the frontiers of his empire the last effort of anti-Christian forces was ready to be made, were full of a sort of tranquillity and splendor which the insufficient knowledge of the time might vaguely compare to the ancient authority of Rome. He died 28 Jan. 814, at the beginning of his 72d year, and was buried ex¬ actly upon the confines of the two languages which he spoke, upon the limits of the civiliza¬ tion which he had preserved, in the old Roman watering-place of Aquae, called since his time Aix-la-Chapelle, his favorite residence. There, in a church long since rebuilt, under the in¬ fluence of mediaeval French architecture, he still lies, surrounded by modern architecture more appalling than most that is to be dis¬ covered even in the rapid industrial develop¬ ment of North Germany in our time.

The experiment to which Charlemagne had devoted such energy and in which he had achieved such success, turned out both at the time and in the judgment of long future gen¬ erations for more than he or his coadjutors had intended. The vigorous and united symbol of Christian and civilized government which his reign had afforded served as a bridge. It pre¬ vented Christendom from, too often forgetting (though it necessarily largely forgot and blurred) its Roman origins and it afforded also a halting place to which the trials and the new youth of Europe could look back in succeeding centuries. The reign of Charlemagne is like a holiday, or like a light in the night. It breaks the continuity of the Dark Ages and largely through his intellectual vigor enables us to un¬ derstand the transformation of Europe from the antique to the modern.

In spite of these qualities in the time, the

vital forces of Gallic civilization were still declining. Men built less well and thought less well from year to year, and when the omnip¬ otent chief of

this military episode had died in 814, there broke, upon what was left of civilization, the heaviest storm it had hitherto endured. In that storm Europe, and therefore its surviving centre in Gaul, was nearly over¬ whelmed.

The pagan tribes of Scandinavia, a fresh horde of Mongols, a renewed splendor in Islam, all fought together against the Christian name. It was a far stricter ordeal than were the bar¬ barian invasions of the 5th century; indeed, there was but little relation between these in¬ filtrations of that period and the savage attack of this. The numbers were far larger, the op¬ posing forces of civilization were far weaker, knowledge and discipline by which alone civ¬ ilized men can resist barbarians were at their lowest ebb.

The issue had already been joined in the British Islands by the beginning of what are known as the (

Two points of western Europe determine the struggle in favor of our tradition and of Europe. There are the southwest of England, Somersetshire and Berkshire, in which Alfred outlasted the savage invader and finally de¬ feated him; and Paris, where, just before, the local forces had beaten back the same enemies in a memorable siege in 885.

The second alone concerns these lines.

To understand the city of Paris is essential to anyone who would understand the history of France. The town has played for a thousand years the same part in the government of that country that the English governing class or plu¬ tocracy have played in Britain since the Reformation. Thence have orders proceeded; thither has intelligence flowed, and there has been fixed that specialized organ of administra¬ tion, round which all national development gath¬ ers, and which, though it has many names in many polities, is a necessary nucleus to every great nation.

Paris had risen to its great position through the waterways of northern France. In the breakdown of Roman order the disuse of the roads and the collapse of the posting system had increased the importance of the rivers in a

nexus of which the city found itself and from the last Roman emperors it had maintained a sort of special place, not as a capital (for there was no such thing), but as a chief town — the town of Clovis and of the early

kings, the town in which the early Carlovingians came to die and in whose shrine they were buried.

The local chief — who stood the siege of 885 — was by name Odo. Of the ancestry of his father, Robert, we are not overcertain, but from that father and his descendants sprang that line of men who symbolized the rejuven¬ escence of Gaul when the struggle was over, and in whom centred that which was at once the symbol and the organ of the new nation : the monarchy.

Robert the Second, the brother of Odo, was, like Odo, elected to a rough kingship, in the contempt which all felt for the decaying idea of the Carlovingian empire, and the grandson of this second Robert, Hugh, was formally crowned at Noyon, and the separation of French government from the mass of Europe was complete.

From that moment, for exactly 800 years, to the assembly of the nobles under Louis XVI, the monarchy, retained in one house, perpetu¬ ally increasing its power, is synonymous with and develops the consciousness of the nation. This date, 987, stand as the second landmark in the history of France, and our first business before entering the story of that great develop¬ ment is to consider how Gaul looked when the first of its nominal chiefs was crowned.

Beneath the various episodes which have been described beneath the great names of Clovis, of Dagobert, of Charles Martel, of Pepin, of Charlemagne, of the Robertian House of Paris, whose principal descendant, Hugh, we have just seen crowned, a slow but complete molecular change in society had taken place. The old Roman order had not only decayed, it had also been internally transformed in the 500 years which intervene between the invasion of Clovis and the crowning of the first French king. The slaves of the old Roman landed estates, though still legally slaves, werfe no longer bought and sold; they had become Chris¬ tian freemen; the old Roman landed estate had become Christian village and parish; in the breakdown of communications and of learning, agriculture had become, as it were, the sole in¬ dustry of men. This agriculture had grown to be neither an individual nor a servile, nor what we should call to-day a capitalistic industry, but a co-operative one. The old Roman land¬ lord was now no longer the possessor of the whole territory of a village; only a portion was reserved to himself and the village population beneath him had grown by centuries of custom and of cohesion to security of tenure and to fixed and customary payments of labor in the place of that surrender of all their energies which their former servile condition had im¬ plied. The vast mass of the population, there¬ fore, lived as perpetual holders of land at a fixed and customary due of labor or what-not paid to a local superior; they

cultivated the fields together, but apportioned the result in proportion to their respective holdings. The lord with his much larger holding, as he was the richest among them, was also their pro¬ tector, and, in a modified way, controlled by tradition and by the assessment of his own

tenants, their judge. The village so organized was a microcosm of the whole of society. For centuries the noble class, the men descended from the old Gallo-Roman owners of land and of slaves, had tended more and more to re¬ gard themselves also as tenants whose absolute ownership, though absolute, was part of a social system involving superiority, social and execu¬ tive, in some greater man among their number. They had coalesced in groups, usually under the largest landowner of the district, during the pressure of the barbarians wars ; the man owning but one or two villages would ((recom- mend himself® to some local man owning 10 or more, and he in turn to some very wealthy personage of the countryside who had accumu¬ lated by marriage or inheritance the dues and the lord's portion of, let us say, a hundred vil¬ lages. And long before the Carlovingian line was extinguished or the new Capetian line was acknowledged, society had become a compli¬ cated territorial system with the tenants of the village dependent upon but secure under the village lord, and with the village lords forming indeed one noble class, but arranged in a hier¬ archy of dependence from the small man, who was but lord of one village, through the big local man of the countryside, up to the over- lord of a whole province. What determined the size of these provinces it would be im¬ possible to say; some, like Normandy, were but old Roman divisions which had maintained its boundaries ; others, like the March, in the centre of France, were vague to a degree, built up of intricate local traditions and customs, and in dispute with their neighbors for all ex¬ cept the very centre of their dominion. Some were quite small, little more or less than a bishopric in extent ; others were virtually in¬ dependent kingdoms, like Brittany; but of all it was true that they formed the true sub¬ units in the general national unity. The par¬ ticular house which had been given the sym¬ bolical and nominal headship of the nation un¬ der the title of king were the dukes or local overlords of the Isle de France, a territory of which Paris is the centre (they were the lords of Paris, as we have seen), and which extends, roughly speaking, for three days' march round the city. To this house, once the head of it was crowned, the other great houses swore fealty, thus completing the hierarchy system which in its complete later and legal form was called feudal. It must not be imagined that the system was as yet symmetrical, even in theory. Not all the efforts of the lawyers during the next three centuries, the 11th, 12th and 13th, while it was still quite vigorous, could make a thing of such obscure and natural origin sym¬ metrical. But the general arrangement of so¬ ciety, the small farmer secure on his holding under his lord, that lord under a wealthier man of the same

countryside, he again under a duke or count of the whole province, and he again swearing fealty to the king, who was the sym¬ bol of the national unity, is the great social fact we must keep in view if we are to appre¬ ciate the development of modem France out of the Dark into the Middle Ages.

This family, the overlords of the Parisian centre who had been crowned king, for a cen¬ tury did nothing but accumulate in their hands more and more manors and cultivate by an in¬ stinct those remaining forces of civilization, the

municipalities and the Church, which every¬ where unconsciously strove to reproduce the old Roman order which had so nearly disappeared in the Dark Ages. To Hugh, in 996, succeeded his son Robert; to Robert again, in 1031 his son Henry; to Henry, in 1060, his son Philip, and to Philip, at the opening of the 12th century, succeeded, first in actual and next in theoretical kingship as well, his son Louis, (

Thus four men, each in direct succession, each crowned coadjutor during his father's life¬ time, each arriving at the throne in the vigor of his manhood, for well over a hundred years secured the continuity of the new experiment. None save Hugh was remarkable for domina¬ tion; Robert rather for piety; Henry for a quiet tenacity, Philip for debauch ; but all, to some extent in spite of themselves, were accu¬ mulators of territorial wealth and influence and every social influence of the neW time worked upon their side. That time, the 11th century, was one in which the energies of Christendom suddenly awoke. No new forms were discovered for it, the old architecture continued, the old customs were observed ; but everything from the Rhine to the Atlantic and from the Tagus to the Channel was boiling with a vigorous and novel life destined to bring forth the Middle Ages. The advance from the Pyrenees against the Mohammedan begins in the generation just after Hugh Capet's crowning, and the entry of the Christians into Toledo is effected within that hundred years. It is the time w7hen the curious phenomenon of cross¬ breeding, the vigorous, unique but ephemeral ˆNorman® race comes into being, spreads civilization through England, conquers, unites, administers and forever attaches to Europe and separates from Oriental influence the south of Italy and Sicily. It is the time when con¬ sonant to the necessities of such new vigors and such new light, the Christian Church re¬ defines its unity, cleanses and organizes all its machinery and imposes a working discipline under the advice and, at last, the papacy, of Gregory VII.

Many new phenomena advance in parallel, all connected with the general advance of the time, but each following its own path. Architecture does not change, but is everywhere pursued with magnitude and vigor; men are still igno¬ rant of the world outside the Western Christian unity, but although definite learning has not yet been organized, curiosity is wide-awake ; and the municipalities which had remained so long anomalies in the agricultural system, osseous relics, as it were, of the old Roman structure, begin again to live everywhere by an inde¬ pendent life. The new roads are not yet built; men still march along the old decayed Roman highways, or make use of the river systems or of the sea ; land is not yet bought and sold ; no universities are yet in existence; no Gothic arch has yet been built ; vernacular speech is but a tentative beginning unknown in England, very local and disparate in France, in the Span¬ ish kingdoms and in northern Italy; no repre¬ sentative system has yet met (save among the clergy), but all these things, the representative system, the Gothic architecture, the universities, vernacular literature, are in seed and are gemi¬

nating during the 11th century. The outcome of these various energies, their climax and at the same time the events by which they were to be made fruitful, was the Crusade. The long example of the fighting in Spain, coupled with the unrest of the multitude and with the criti¬ cal condition of the Eastern pilgrimage, had kindled a flame, and there poured out in suc¬ cessive hordes, mainly from Gallic territory, a host on the march for Jerusalem, the latter and organized portion of which must have been as numerous as that with which Napoleon invaded Russia, the unorganized forerunners of which may have numbered a million souls. Estab¬ lished by the papal sermon of Urban II in 1095, equipped in the next year in the summer, they trailed out in a prodigious raid of over 2,000 miles, and three years later, 15 July 1099, the remnant that had survived or persevered stormed Jerusalem and established for close upon a century the curious French experiment of a Christian outpost against Asia, established in French castles, defended (in such a climate!) by French armor mounted upon French horses, in the isolated belt of Palestine and of the Le¬ vantine coast.

The effect of that march was overwhelming; the sudden expansion of experience, the awak¬ ening of the mind, which accompanied it, pro¬ duced the Middle Ages. And when from 1100 to 1115 such lords as had not established them¬ selves in the East returned to Gaul, they dis¬ covered the monarchy renewed, and the na¬ tional movement in full strength under the vig¬ orous personality of Louis, who, though the first of that name in the Capetian line, called himself, in memory of the Carlovingians and of the Merovingians, <(the Sixths The towns, the hierarchy, the populace, everywhere seconded this refounder of the monarchy, and when he died, in 1137, his son Louis succeeded, heir to an executive power which was no

longer founded upon territorial possession nor merely the nominal feudal bond between the great over- lords, but possessed a military power of in¬ numerable garrisoned fortresses, of a legal cor¬ poration actively allied to the Crown, and of market-towns and great cities which throughout the territory of Gaul were prepared increasingly to insist with every new generation upon the power of the king of Paris in whom they saw the living figure of the nation.

Now, at the end of the first third of the 12th century, France and Europe were fully awake. A whole generation had grown up accustomed to territorial expansion (it was a generation since the Christians had entered Toledo and a generation since the first Christian king of Hungary had died ; a generation since civiliza¬ tion had re-entered England and a generation since the first Crusade had brought the West into touch again with the East and had begun again to teach the Christians of the Mediterra¬ nean the uses of the sea. It was a generation since the papacy had become a free and self- organized thing, elected from within the hier¬ archy, and a generation since unity of disci¬ pline had been established throughout the West by the powerful will of Gregory VII).

The first effect of the new life was the awak¬ ening of intellectual discussion, and of this dis¬ cussion France, and Paris in particular, were the seat. It turned upon the fundamental prob-

lem of all philosophy, the reality of ideas. It had for protagonist Saint Bernard upon the or¬ thodox side, and, in a manner which pretended to compromise but which was really opposing, the brilliant genius of Abelard upon the side that would have led to schisms and perhaps at last to the negation of God. That debate con¬ sciously or unconsciously is still in progress; the affections and sympathies of the two parties are to-day much the same. Out of it arose as its first fruit the University. Paris began to found those colleges and to group them into that united organism which soon became the great European model for the collegiate uni¬ versity. Parallel with the growth of a new curiosity came in the same place and from the same people the marvelous symbol of Gothic architecture. Suger, the abbot of Saint Denis, the friend and counsellor of King Louis VI, and in a sense the guardian of his son, was the first to light the flame. The south tower of his facade is the first bit of true Gothic in Europe. The same masons who had built it in their youth might have lived in their late manhood to see the beginning of Notre Dame; and with Notre Dame, the first great Gothic building of northwestern Europe, the style was fixed.

All this movement and advance corresponded to the reign of Louis VII, the son of Louis VI, and to that middle period of the preceding century which is marked by <(the Second Cru¬ sade,® and in which it was increasingly felt that the French hold on Palestine was doubtful and precarious. This reign was of great length ; it stretched from 1137 to 1180; its central episode, the Crusade, was undertaken upon the news of the fall of the frontier fortress of Edessa; it occupied the two years from 1147 to 1149, consisted in a futile attempt to take Damascus, and did little other than weaken the prestige of the Christian name in the East. '

*As has already been pointed out, not only the Crusades but the new movement and ex¬ pansion of Europe, the reflowering of civiliza¬ tion had necessarily helped the growth of the power of the Crown; that power, apart from the ceaseless support of the clergy, the lawyers and the towns, reposed upon two territorial bases, the king's political position as superior * over the great provincial lords, and the king's economic position as private lord over a num¬ ber of manors and countrysides. In the first of these he could grow only by the growth of an idea, but in the second he could grow in a material and actual manner. Already the cru¬ sading movement had led in Louis Vi's time to the Crown's becoming direct lord of the province of Berri, and thus obtaining direct possession of a district south of the Loire, and in a vast number of minor cases, only a certain propor¬ tion of which even are recorded, the commercial and military movement of the time was letting isolated manors and lordships fall by escheat, by confiscation, by disputed possession, and in general by the active presence and effort of the lawyers, into the king's hands ; and with every new step in the power of the kingship, the con¬ sciousness and unity of the nation increased also.*

An accident coming immediately after the second Crusade, an accident which for the mo¬ ment seemed to check the rise of the Capetian house, proved within half a century the main

factor of its definite establishment. The heiress of the crown of England, Matilda, the grand¬ daughter of the Conqueror, and widow of the German emperor, had married the lord of the great province of Anjou. Her son, Henry, landed as a boy in defense of his mother's rights against Stephen of Boulogne who had contested the English succession and was acknowledged heir. In 1154, therefore, by various relation¬ ships Brittany, Anjou and other lordships were in the hands of a young and vigorous soldier who also became king of England and Duke of Normandy. Or, to put it as the French law¬ yers saw it, the dukes of Brittany and Nor¬ mandy, the Count of Anjou, etc., were all merged in one person, and that person was the powerful king of England. Nor was this all: The vast territories of Aquitaine, a feudal over¬ lordship which, roughly speaking, comprised all the southwest of France, had ended in the hands of an heiress, Eleanor; the

male succes¬ sion had failed. Eleanor had first been mar¬ ried to Louis VII of France, and had accom¬ panied him on his crusade ; her desperate char¬ acter had led to a divorce, and immediately upon its pronouncement at Rome, Aquitaine, after its momentary union with the crown of Paris, fell into the hands of this same young claimant to the crown of England, for the divorced woman married him. The position, therefore, on Henry II's accession was this: That the feudal lordships of all Gallic territory west of a line drawn roughly from the centre of the Pyrenees to the neighborhood of the mouth of the Somme were in the hands of one man, and that man the king of England. In pure theory the French Crown stood as it had stood before: it was still overlord of the whole, and Henry of England had to do homage sep¬ arately for each province ; but in practice three things gravely modified this theory. First, the united control of territories which in the aggre¬ gate formed two-thirds of French territory; secondly, the fact that these two-thirds included the maritime and commercial portion of every single great French river (Rouen, Nantes, Bor¬ deaux, were all within Henry's boundaries) and thirdly, the complication by which these mari¬ time provinces were in the hands of an island king. There is little doubt that if the relation¬ ship had endured for a couple of generations, its theoretical side would have weakened to such a degree that the Capetian power would have dwindled to a shadow and very soon a Plantagenet would have ruled in Paris. It did not endure. When Louis VII died in 1180 he was succeeded by his son Philip Augustus, a man in whom the energies and the clear judg¬ ment of this new birth of civilization seemed to centre. It is evident that from the begin¬ ning of his reign Philip Augustus' great object was to destroy the overwhelming position of the house of Anjou. Fissures were opened in the great fabric by the perpetual revolts of Henry's sons under the impulse of their mother, a curse to her second, as she had been to her first, husband. The fall of Jerusalem in 1187 led to a third crusade. The old king Henry died;- his son, Richard I of England, still nom¬ inally the lord of all these territories, went to the rescue of the Holy Land as did Philip Au¬ gustus himself. Richard was imprisoned on his return; the French king intrigued to prolong

that imprisonment, and though he failed, for¬ tune was on his side when Richard I died at the siege of a castle in 1199, leaving England and all the French lordships to his brother John. The opportunity afforded by John's character was exceptional ; his premature regency, his license, the envy aroused by his cultivation and his prowess, united against him the feudal aris¬ tocracy of England. The claims of Arthur, his nephew, the heir to Brittany, and in strict right his senior in succession to all the territories,

coupled with complaints due to his marriage with the betrothed of the Count of la Marche, and the rising of Poitou, gave Philip Augustus a pretext for summoning John as feudal in¬ ferior to clear himself before a court of his peers. He failed to do so ; his land was declared forfeit; the claims of Arthur were pressed. This was in 1202. In the war that followed young Arthur was captured and shortly after¬ ward disappeared. John was accused of the murder, and the powerful armies of Philip were supported by the general indignation of Europe. By the end of 1205 only a few towns near the seacoast remained in the hands of the English king. Though the physical conquest of the Angevin territories was thus achieved, the vic¬ tory was not really ratified till 1214. In that year John, the best diplomatist of his age, ral¬ lied against Philip Augustus all the forces which it was possible to bring, moral and material, into the field. The Count of Flanders, against whom Philip Augustus had resolutely set the Roman municipalities of that district, the Ger¬ man emperor, and the sympathy of the papacy were marshalled in this critical month of July against the French Crown. Philip Augustus won a decisive victory. It was not only a de¬ cisive victory for the French Crown at that moment, it was one of the very few battles in which history may be said definitely to have marked the success or failure of a great his¬ torical cause, and it affirms for 600 years the power of the French monarchy and for a much longer and indefinite period the unity and exist¬ ence of the French nation. It had also its re¬ action upon England, for the aristocratic in¬ surrection against John was emboldened by this defeat of his to press on to the consumma¬ tion of Magna Charta.

Meanwhile yet another factor had entered into the rapidly growing consolidation of the Capetian hegemony. The Albigensian Crusade had been undertaken and had succeeded.

Contact with the East has invariably pro¬ duced upon Western Europeans an effect which may be compared with the effect of a spell, and usually of a maleficent spell. Its effects may be clearly observed in those modern nations which have the misfortune to be intimately mixed (especially if their governing class is intimately mixed) with the Asiatic. Oriental customs and vices and Oriental weakening of European health enter in with too much knowl¬ edge of the East. The Crusades, now a century old, had cast such a spell over the highly civil¬ ized townships of the south of France, and a confused mass of Oriental customs whose origins or nucleus had in the town of Albi overspread the county of Toulouse and its surrounding territory. The danger grew with startling rapidity; the Pope called against it the military power of the overlord, the north¬

ern barons especially answered the call ; the fight began in 1208, and the re-establishment oi Christian unity and civilization was effected within four years. This campaign, which in the eyes of contemporaries was mainly a

cam¬ paign for the unity of the health of Christen¬ dom, has for these notes the particular im¬ portance that it converted what was already a nominal into a real supremacy of the power of Paris over the southern portions of Gaul. The date 1215 may be taken as the term of all this development. England was now pledged to an aristocratic policy which would weaken the growth of a great civilized state. The Lateran Council had affirmed, in its most determined form, the framework of mediaeval Catholicism, the Capetian crown had triumphed over all its enemies at Bouvines, the south was definitely in the grip of the monarchy; and on the south¬ ern frontiers of Spain the great and successful fight of Navas de Tolosas had extinguished forever the threat of the Mohammedan. Henceforward Islam dwelt only upon sufferance between the extreme boundaries of Andalusia. In Paris, the Louvre, the symbol of the estab¬ lished monarchy was built, and round the city the great new wall, built at civic expense, was the symbol of that new mediaeval civilization which was in a way the resurrection of the Roman municipality. The university was char¬ tered and active; the epoch of the 13th century, the climax of the French race and certainly the climax of European development between the Dark Ages and the Renaissance, had come to flower. Philip Augustus died in 1223. The three short years of his son Louis VIII were mainly distinguished for a triumphant march through the south, and in 1226 the personality who stands most for the 13th century in Europe and in France, that of Saint Louis, the grandson of Philip Augustus, was seated upon the throne.

He was but a child, under the tutelage of his mother, Blanche of Castille, but even during the period of her guardianship, which was troubled by civil war, as such minorities invariably were, the power of the Crown was but the more con¬ firmed; and from the time when the king was of age until he undertook in 1248 his first cru-, sade, there was established by example and by vigorous action so absolute a strength in the monarchy that all the defeats and vicissitudes of the next 200 years were unable to shake it. It had acquired a sanctity that was almost leg¬ endary and an actual force which made it co¬ incident with the National life. The crusade of Saint Louis was directed against Egypt, for Pal¬ estine was now a dependency of Cairo and the recovery of the Holy Land could only be ac¬ complished by the reduction of the Mohamme¬ dan power upon the Nile. The five or six years during which the effort lasted were, upon the whole, unsuccessful. Saint Louis returned in 1254 with a vastly increased reputation, by far the chief figure in Europe, but there remained of the old French garrisons in the Levant noth¬ ing but few port towns at the mercy of oc¬ casional sieges, and doomed to ultimate capture. The 16 years that followed were years of quiet and successful administration, during which the most interesting experiment was that in which Saint Louis, after defeating Henry III, the

Eng¬ lish king, in the south, granted him a narrow

territory in that region as the price of what was imagined to be a lasting peace. The king, though long past his 50 years, was moved in 1270 to another crusade. The attempt this time was made against Tunis, but at its very incep¬ tion Saint Louis died on the spot that is now marked by his chapel at Carthage. It is possi¬ ble that the expedition to Tunis was suggested by the position of his brother, Charles of Anjou, in the south of Italy, for Charles, who 25 years before had married the heiress of Provence (thereby still further increasing the power of the house of Paris) had been called in by the Pope to combat the last efforts of the German Empire in Italy, and held for the moment, but only for the moment, the sovereignty of Sicily and of the kingdom of Naples. The massacre of the French in Sicily in 1282 put an end to his power, but it did not afford any opportunity for the interference of the Empire with the papacy or with the affairs of the Italian Penin¬ sula. .With the fall of the last Hohenstauffen, the mixture of the Germans in Italian affairs comes to an end and henceforth the anarchic welter and ill-organized conception, which had called itself for the last 300 years the Empire, meant nothing more in politics than a loose con¬ federation of shifting Teutonic lordships. The valley of the Rhone, over which a German exec¬ utive power had nominally existed for so long, though not yet technically subject to the French king, was now virtually within the orbit of which Paris was the centre. The reign of Philip III, son of Saint Louis, from 1270 to 1285, contains little of moment. His son Philip the Fair, who came to the throne in this latter year, marks, despite evident signs of internal decay, the summit of the material power of this first un¬ broken Capetian line. His mother, the heiress of Navarre, brought to the Crown that kingdom or province. His long struggle with the papacy ended in the capture of that institution, the election at Lyons in 1305 of Clement V, and the presence at Avignon of French popes for 70 years. He had the strength to destroy the gross and highly dangerous power of the Templars, a military order which had grown to be an im¬ mensely wealthy secret society upon which the just execration of the European populace fell from every side. When he died in 1314 it seemed as though no further advance could be made in the strength of the French sovereigns. Yet. it is from that date, or shortly after, that the chief peril of the nation and of the house itself must be counted. For Philip the Fair left three sons; and, by a catastrophe hitherto unknown in all the three centuries which had seen the rise of this great family, a direct male heir to the suc¬ cession failed. These three sons, Louis .X, Philip V and Charles IV, each enjoyed a brief reign, and each failed to leave a son who would succeed him. The whole course

of the three reigns covers no more than 12 years, and the only chance of a direct succession lay in a man- child, John, who died within a week of his birth. Charles IV did indeed leave a daughter, but the tradition which had strengthened for so long and whose example had been so glori¬ ous, by which a male heir alone could succeed, led through a curious legendary fiction or mem¬ ory, embodied at last in definite constitutional terms and called by the name of ((the Salic Law,® to the rule that only a man should suc¬ ceed to the throne. The nearest male heir,

therefore, if this baby daughter of Charles IV were to be set aside, was the first cousin of Charles IV, Philip of Valois. Philip the Fair's brother Charles had been granted the title and position of Valois. It was his son who now laid claim to and immediately mounted the throne in the year 1328, 14 years after the death of his uncle. The Capetian house had pro¬ ceeded without check from father to son in the virtual control of the town of Paris and the duchy of France for more than 400 years. For 340 it had held that position with increasing magnificence, the son regularly succeeding the father, and crowned in the father's lifetime. It had at last come to be the strong ruler of a great and united nation, a nation which was the centre and core of mediaeval civilization. It was impossible that so great a change, though it were but the accession of a near collateral, should pass unchallenged, and the challenge came from Edward III of England. There was no claim worth calling a. claim upon his part to the French throne, nor is it absolutely certain that at first he put forward the plea of blood. To inherit at all he would have to inherit through women, and even so he did not stand first in the succession. The policy of the French king of Flanders, his harassing of the great English trade with the ports of the Low Coun¬ tries, afforded a pretext in 1336. In 1337 hos¬ tilities broke out; in 1339 the English king, Ed¬ ward III, quartered upon his shield the lilies of France, which were not finally abandoned until the middle of the 18th century. And from that year may be said to date, in legal and her¬ aldic theory at least, the struggle of the Hun¬ dred Years' War.

The epoch or trial upon which the French next entered, that of the Hundred Years' War, falls into two very distinct parts : In the first part, which corresponds roughly to the second half of Edward Ill's reign in England, success¬ ful and brilliant raids terminate in startling vic¬ tories, and the French Crown consents to abdi¬ cate a portion of its territory. During this first part of the wars, the armies proceeding from Britain were commanded by French-speaking nobles and a French-speaking king, and though the English language was in process of forma¬ tion, and an English national spirit was already apparent, the whole thing was a chivalric ad¬ venture based upon the Gallic model. Then there was a lull, corresponding roughly to the reign of Richard II in England,' during which again the English lose ground.

At the end of Richard II's reign in England the cadets of the royal line, the house of Lan¬ caster, usurped the throne. The usurpation was downright and even cynical — it was, of course, hateful to the morals of that time, nor could the Lancastrians maintain themselves in power save by a sort of reign of terror, coupled with a strict alliance with the wealthy and official class. Of all the elements which had gone to build up the English oligarchy, with the exception of the Reformation, none has been so powerful as this Lancastrian usurpation. The experiment rap¬ idly led, as all such experiments have in all countries, to a foreign diversion. The war with France was renewed, but in a very different manner. The English king now claimed a real power. He was an English-speaking king, a sol¬ dier of extraordinary capacity, and very soon became, especially after his first great victory,

Agincourt, a national hero. The old mad king of France in Paris was compelled to marry his daughter to Henry V of England, and the rightful heir of France, the Dauphin, was thrust out, to the advantage of the issue of that marriage, who became the English king, Henry VI. What followed is common knowledge. Henry V of England died ; a vague national sentiment rose throughout French territory, and was embodied in the person of Joan of Arc. After one of those desperate and foot to foot struggles which are characteristic of French military history, the Capetian house gradually recovered all the territory which had been lost. The final expulsion of the last English garrison coincides, roughly speaking, with the close of the Middle Ages. This great struggle was ac¬ complished within a few years of the develop¬ ment of printing and within a generation of the discovery of America.

A recapitulation of the main dates of the Hundred Years' War will not be without value to the reader.

Philip of Valois had his first engagement with Edward III upon the fall of Cressy in 1346. The English, though a far smaller force, gained a complete victory. Immediately after¬ ward the town of Calais fell to Edward III. This did not lead to any immediate disintegra¬ tion of the power of the French Crown, though that power was gravely shaken. The next years were occupied with the great plague, the Black Death, which, though its effects have been so greatly exaggerated, especially bv English historians, does form so deep a division across the history of Europe. These years indeed, though suffering from the English attack, saw an extension of the power of the king of Paris, for Philip bought the town of Montpellier in the south and

acquired in full right a province which had now for 100 years been within the French orbit, the Dauphine.

Philip died in 1350. His son, John, was 30 years old on ascending the throne. The truce which had been established between the two countries had come to an end. The king of England again took advantage of the disturbed state of France (characterized by the convoca¬ tion of the Northern States-general in 1355) to push the attack. In 1356 the Prince of Wales, now a young man and an excellent cavalry leader (Edward the Black Prince), was ad¬ vancing from the South while his father had sent a powerful army into Normandy. It was again a small cavalry raid supported by bow men that decided the issue. The terms offered to the French king by the Black Prince were re¬ fused, a battle was engaged near Poitiers, and not only resulted in an overwhelming victory of the small English forces, but in the capture of the French king. The result of this dramatic victory was the temporary dismemberment of the kingdom. The wealthy merchants and some part of the commonalty attempted a government under Etienne Marciel at Paris in the absence of the king, and convoked the National Parlia¬ ment.

In 1360 John in his captivity consented to cede the southwest in absolute sovereignty to England, and for the first time in its history a portion of the territory of Gaul was separated though temporarilv, from the national sover¬ eignty. John returned and died in 1364. In the same year his son, Charles V, not quite 30,

that is much of the same age as his father on ascending the throne, took over the government. He had already been the virtual head of the government for several years. Under him du Guesclin, against the spirit of the treaty signed with England, but with great courage and capacity, attempted the reconquest of French territory. A long Fabian series of skirmishes followed. The Spaniards defeated the English fleet at La Rochelle and permitted du Guesclin to recover Poitou from the English. Brittany, after the long doubt of the whole generation, began to support the French cause; Edward of England in his old age landed again, but his army was exhausted by perpetual dilatory tac¬ tics on the part of the enemy, it was virtually de¬ stroyed as a fighting force by disease and fatigue and ill-organization, and the old king of England died, after signing a disgraceful truce, in 1370. Charles V of France held the throne till 1380. The country was impoverished, al¬ though the ancient power of the Crown had re¬ vived, and the new king, Charles VI, suffered on his accession from double disability. He came to the throne as a. minor and he had mad¬ ness in his blood. His very long reign (he Was upon the throne for 42 years) led to nothing but disaster. The weakness of his character led to a struggle between two rival factions, known by the names of their leaders as the

Armagnacs and the Burgundians. The Duke of Burgundy died in 1404, but his successor, John the Fearless, continued the struggle, seized the heirs to the throne and virtually governed Paris.

The Armagnac faction, now deriving its name from a marriage of the heir of the Duke of Orleans with the heiress of that family, be¬ gan to press upon the Burgundian power and was undoubtedly favored by the people in gen¬ eral, and secretly by the poor king. The Gas¬ cons, the chief military element on the Ar¬ magnac side, were marching on Paris ; a civil war of the most desolating kind broke out ; when the moment appeared propitious for a new descent on the part of the English king.

In 1415 he landed in Normandy. It was originally, like the earlier wars, a mere raid, but it was far more successful than former raids had been. Normandy was completely conquered, after the utter breakdown of the French army at Agincourt, and finally on 21 May 1420, the Treaty of Troyes was signed, whereby Henry V married Catherine, the daughter of Charles VI, and was declared heir in remainder to the Crown, with his descendants. The Dauphin was legally outlawed, and the position seemed secure for Henry, when in 1422 he died, followed im¬ mediately afterward by Charles VI after a reign of 42 years. There immediately began the struggle for the recapture of the territory, and that struggle was successful. Although a son had been born to Henry V before his death, and had been solemnly crowned on his father's death, as Henry VI of France and England, at the age of barely 12 months, the armies of the Dauphin began the reconquest. The chief ele¬ ments in this were the defection of Burgundy, and the appearance of Joan of Arc. When the struggle had continued with doubtful success for seven years, this child of 19, confident of a supernatural mission, approached the court of the exiled Dauphin — Chinon, recognized there by some supernatural power both the king and various historic relics presented to her, re-

lieved Orleans, had the Dauphin crowned in Rheims after a successful march across country, and in general roused in the army and the popu¬ lace a confidence of success. She was taken prisoner in the second year of this marvelous career, outside Compiegne, after being wounded in her failure to capture Paris. She was sold to the English and burnt alive at Rouen. Never¬ theless the English garrisons perpetually re¬ treated or surrendered, and in 1435 the Duke of Burgundy himself abandoned the English Alli¬ ance, and with that act, of course, after the de¬ fection of so many of his supporters, all further English successes became hopeless. A

few garri¬ sons still held out, notablv the Saint Michael in Normandy, but Paris was taken the next year and Rouen in 1453; and when Charles VII died, in 1461, the French territory was clear. He was succeeded by a son who had rebelled against him, a man approaching 40 years of age, of a character dark, intelligent, very powerful and tenacious, deeply religious, and a little mad, known to history as Louis XI.

Louis XI, who next succeeded to the throne, had to meet a combination, common enough at the close of any great epoch, coming as he did at the close of the Middle Ages ; that is, a com¬ bination of forces which depended upon the rit¬ ual service still paid to old names and old ideas, but which only survived as clumsy anachronisms. In this case the forces with which he had to contend were the last forces of feudalism. Feu¬ dalism had long lost its vitality, and instead of having to meet a rebellion of local lords numer¬ ous and well founded in their localities, he had to meet a combination of very great men most of them of blood royal but depending upon feudal theories and technicalities for their rebel¬ lion against him. His brother, Charles of France, the Duke of Brittany, and the heir to the duchy of Burgundy, banded themselves under the name of ((The League of the Public Good,10 won the battle of Montlhery and proceeded as they thought to a complete success. It was here that for the first time Louis XI's powerful if not quite sane character appeared. He imme¬ diately gave way, where a weaker man would vainly have resisted, granted Normandy to his brother, made Saint Pol a Constable, and in general did all that could be done with the mouth and the pen. But it is a rule throughout French history that periods in which the French execu¬ tive acts in this fashion are those which accom¬ pany an increase of force for such an executive, and for the nation. Within three years of the defeat he summoned his Parliament at Tours. The nation as a whole was now, as always, in support of the Crown against the wealthier mer¬ chants and the aristocracy. Louis received the strongest popular support, he incited the com¬ mercial towns of the Lowlands to rise against his enemy of Burgundy, he organized the mili¬ tary force of Paris, and though Charles of Bur¬ gundy, who had now succeeded to that throne and who is known to history as Charles the Bold, was still far stronger than the French king, compelled him to attend the sack of Liege and even to sign the Treaty of Perronne in which Louis granted Burgundy complete inde¬ pendence, the Capetian could not but win. On his return to France he summoned an assembly of the notables, they denounced the Treaty of Perronne, and Charles of Burgundy's invasion of France which immediately followed was

checked by the resistance of Beauvais. Every¬ where in the Lowlands, in the heart of France, in his Parliament and in the small provincial towns, it was the Commons who sustained Louis XI. And the Commons in France were begin¬ ning to be that which they had long ceased to be in England,

peasants and small tradespeople. For in France the end of the Middle Ages tend¬ ed to be democratic : in England aristocratic.

The end of Louis XI's reign emphasized at once his curious character and his successful policy. The extravagance of his religion and the cruelty of his revenge were never more ap¬ parent than in the last years of his seclusion; and yet it was during these last years that the death of Charles of Burgundy in battle against the Swiss gave him that province. When he died on 30 Aug. 1483, with all the provinces he had reunited to the Crown he governed almost automatically by far the greater part of the ter¬ ritory of modern France. Brittany alone was quasi-independent.

His son Charles was only 13 at his father's death, and the kingdom was under the guardian¬ ship of his elder sister Anne. She was well served. A second revolt of the great men in the kingdom was crushed at the battle of Saint Aubin du Cormier, and five years later Charles VIII, having now freed himself from his sis¬ ter's power, married the heiress of Brittany and united that province to the Crown. He next in¬ vaded Italy in pursuance to a claim to the throne of Naples. The military result was small, but the moral results large. First, and by far the most important, the military temper of the nation was given an opportunity to exercise after the long and successful diplomacy of his father. Such foreign wars have always been of the ut¬ most stimulant effect upon Gaul. And the sec¬ ond result was the introduction into France of the Italian Renaissance. When Charles VIII died, still quite a young man, in 1498, he was succeeded by the Duke of Orleans, a distant cousin of his, the great grandson of Charles V, who was the nearest male heir, and who had led the great insurrection of 12 years before. This prince, among the most sagacious and tem¬ perate of all European kings, insisted as a mat¬ ter of policy upon renewing the Breton mar¬ riage, though the experiment was perilously near incest, continued the Italian invasions, effected an alliance with Henri VIII, marrying Mary, a sister of that king, and died on the first day of 1515 with power more complete, a territory more united and the military organization of the kingdom more thorough, than any of these factors in French history had hitherto been.

This date, the opening of the year 1515, is of such moment for France and for all European civilization, that a short digression is necessary in order to appreciate the change we are about to witness.

The change which fell upon Europe in these first years of the 16th century is not one to which precise causes can be ascribed : it was rather one of those whirlwinds which appear to blow from without the field of material ob¬ servation and of material causation, though it is indeed true that the mind of Europe had been stirring uneasily and with increasing force for

three generations past. The movement which was to be of such prodigious consequence, and to which we owe the modern world, took two forms; the first of which was evidently of

vast moment, the second of which at first ap¬ peared to be a particular and local phenomenon. The first was an extension of human knowledge and a rediscovery of the past. The second was the revival of those interminable theological discussions which had been wearily familiar in Europe for more than a century past. The revival of learning, the discovery of antiquity, the expansion of the known world and so forth, for a hundred years occupied the chief energies of men, but side by side with that great wave of change went with expanding force the theological discussions of the time, until their united effect was such as to split asunder the unity of Europe ; that unity has not yet been regained, though it very nearly was under Napoleon, and though the trend of things to-day is to achieve it at the expense of bitter conflicts. When this enormous result of petti¬ fogging theological discussions was apparent, even educated men woke up to the importance of what had hitherto been a by-product in the general intellectual movement of the time.

This waking up, so to speak, to the import¬ ance of the religious quarrel took place in the middle and toward the end of the 16th century, but it was not until the 17th century had opened that the schism was irredeemably fixed or that the division of Europe into two camps of op¬ posed thought and morals was reluctantly ac¬ cepted. This period of ferment is covered in French history by six reigns. That of Francis I, from 1515 to 1547, very nearly contemporary with the reign of Henry VIII in England, was occupied with the glories of the Renaissance. It also corresponds to the reign of the great Em¬ peror Charles V, and covers the first stage of the theological discussions already alluded to.

The first 10 years of Francis I's reign were occupied with foreign ambitions, and were closed by his defeat at the battle of Pavia in 1525. He was defeated, and only obtained his liberty with difficulty. The remainder of the reign is concerned with the transformation of architectural and every form of plastic art under the inspiration of his court, and quite late — in 1535 — it was occupied with the be¬ ginning of the persecutions, an attitude which is retained during the remaining 12 years of the reign. Meanwhile, however, as the middle of the century approached, and as the principles of the Reformation obtained hold in Germany, the French kings saw the opportunity for maintaining the independence and increasing the greatness

of France, against the overwhelm¬ ing power of the Hapsburg house which sur¬ rounded them on every side, in Spain as upon the Rhine, and in the Low Countries. This opportunity was afforded by the Reformation which was supported in Germany as every¬ where by the squires and the great merchants, and all those who desired to break from the cen¬ tral authority of the Crown. From this period, for full 200 years, it was the constant policy, now more, now less active, of the French mon- archs, to support the petty Protestant com¬ munities against the general authority of the Empire.

The next reign, that of Henry II, was im¬ bued with this idea, although the repression of the Protestant movement at home was con¬ tinued.

Charles V, who had survived Francis, en¬ gaged in war against that policy, but was

checked by the defense of Metz. At the end of the reign, in 1559, Henry II had done little to check the growth of Protestant feeling in France itself, had powerfully aided it in Ger¬ many and had secured for the French monarchy the district of the three bishoprics. The wife of Henry and the mother of the next three kings was a Medici — Catherine, a woman of singular courage, probably corrupt in temper and certainly in physique. The first two of her sons to succeed, Francis II and Charles IX, were not quite sane and were even more un¬ certain in bodily health than in mental. The theory of monarchical government, which was increasing in power daily in the French mind, was weakened in practice by the spectacle of these two debilitated men. The country was in active quarrel between those great families who sided with the Reformers and those who maintained the defense of Catholicism, while the Crown was at times nothing but a pawn in the hands of either. It must not be supposed that the division really lay along philosophical lines. Nothing was commoner than for a man to appear first upon one side and then upon the other; but the progress of the Reformation was producing such an effect throughout Europe that its principles made a convenient line of division for warring factions. Meanwhile the populace, whom these factions of the upper class confused, were very strongly in favor of the national tradition and consequently in¬ creasingly hostile to the Reformers. The feeL ing became acute in the town of Paris, where the adherents of the Reformation were very wealthy and powerful and into which were already beginning to crowd those who ex¬ pected a political or diplomatic career. The natural jealousy of wealth, coupled with the indignation against the new theories (which were openly placarded in the street, often in the form of violent insults to the popular religion) led to the explosion known to his¬ tory as the Massacre of Saint Bartholomew, a piece of bloodshed which, though it was less in extent than many, must rank in history as one of the great Parisian days of violence and takes its place beside the attack upon the Com¬ mune and the

Massacres of September. (See Bartholomew, Massacre of). How far the queen mother took advantage of the popular exasperation against the Huguenots, it is quite impossible to say. The legend that the king fired a shot by way of signal has been exploded, but it is probable that the sympathies of the court in favor of suppressing one or other of the factions were sufficiently strong to have led to active intrigue and it is equally probable that the popular feeling was let loose by the Crown.

Whatever the causes — and they will never be fully determined — the effect of the Massacre of Saint Bartholomew was to make Protestant¬ ism impossible as the national religion of the French.

But some years later the death of the re¬ maining son of Catherine de Medici, brother and heir to Henry III, who since 1574 had been on the throne, left no male descendant of the Capetain house save Henry of Bourbon, the son of the king of Navarre, to whom he imme¬ diately succeeded. Now the house of Navarre had, through the influence of Henry of Bour¬ bon's mother, supported the Reformation: not

in its moral aspect but as a piece of protest against the central authorities of Europe. Henry of Navarre had no great attachment to the sys¬ tem on .its political side, none on its theological, and an active dislike of it in its moral aspect. He was for his friends a hearty liver, for his enemies a libertine and above all a highly suc¬ cessful soldier. The town of Paris under the influence of the family of Guise went so far in its hatred of the Reformation as to refuse the quite unchallengeable claim of Henry to the throne, because his name was connected with ihe Protestant side and because in the recent civil wars those who were now the members of his army had in the main been fighting for the Reformation. Under the authority of what was called wthe League, w Paris refused to accept Henry of Navarre's heirship to the throne and when in 1588 Henry III, the reigning king, had procured the death of the Cardinal Guise, and, being excommunicated for that act, joined Henry of Navarre and took refuge in his camp, Paris declared not only against the succession of Henry of Navarre, but also against the reigning and legitimate king.

In August 1589, that king was stabbed and killed by Jacques Clement. Henry IV, as Henry of Navarre must henceforth be called, was successful in the field, but was unable to take the capital ; and his final admission within its walls must not be ascribed to purely military success. It was rather his personal character which gave him popularity in every circle that he led,

whether military or civil, his tenacity and the growing absurdity of the attempt to put a subject upon the throne, as well as the adhe¬ sion of the remainder of the country, that slowly converted Parisian opinion. Henry IV was ready to meet this process of conversion halfway. Within four years of Henry Ill's death (in July 1593), he abjured heresy at Saint Denis just outside the walls of the capital and next year was secretly admitted by night. The Pope accepted his reconciliation with the Church ; he became immediately popular with the town of Paris and from this date begins his true reign over the French people.

The first and most turbulent period of the religious quarrel in France ends with the Edict of Nantes, signed by this monarch in 1598. It is a document of capital importance, the first of the three great steps by which modern religion has been affected in France. These three steps are: The Edict of Nantes, its revocation less than a century after it was promulgated; and the virtual secularization of the state by the French Revolution. This last, or the third step, in its turn has been followed by a reaction toward Catholicism.

The Edict of Nantes was remarkable in sev¬ eral ways : It was the first and almost the only document to grant religious toleration in its time. For three generations during which it was death to say mass in Protestant England, a Protestant in Catholic France enjoyed all the facilities of a citizen and many special privileges as well. The principle was recognized that if a religion alien to the body of citizens was toler¬ ated at all, it must be tolerated as a privileged and exceptional thing. The Huguenot body, which was then somewhat more numerous than it is to-day and may have amounted to 5 per cent of the population, was not only permitted to hold any office but was allowed to organize

its family life, to hold gatherings at regular intervals ; to decide upon the altitude which it should maintain toward the rest of the State ; and even to possess special towns as its places of refuge. The settlement was not wholly suc¬ cessful, as will be seen by what follows ; but though it worked under an increasing strain, it was not definitely put aside until the reign of Louis XIV ; and the two other generations dur¬ ing which it was in vigor nourished, the small but wealthy Huguenot body, permitted it to strike deep roots and to become what it still is, though it has dwindled in numbers — a powerful distinct element in the midst of the French state.

With this date, 1598, and with the signing of the Edict of Nantes, much more than with the end of the reign, the next period of French history may be said to begin.

After the settlement effected by the Edict of Nantes the energies of Henry IV were given up, as his temperament demanded, to aggran¬ dizement, for it

is remarkable that all those who acquire power over the French are tempted in a short time after that acquisition to theories of military expansion, finding in their hands the best material in Europe for such a purpose. The plan of Henry IV was clear enough and though it has been termed immoral was none the less patriotic. He proposed a destruction of the only strong and centralized power op¬ posed to his own, that of the house of Haps-burg, and he would have accomplished this at one stroke by the use of a powerful army, after which it is just possible that he intended to assume the headship of Europe and to impose peace. In this task or ambition he was aided by the great Sully, a man avaricious in temper¬ ament, orderly, careless of divine things, but tmdoubtedly courageous. The plan of the war was to help the petty German principalities in their attack upon the central power of the emperor. The greater part of these petty prin¬ cipalities were naturally Protestant, for Prot¬ estantism had been for them the religious aspect of their political claim. Germany 'was there¬ fore supporting them against their traditional authority, whether civil or religious. All was ready for the expedition, when on 14 March 1610 Henry was stabbed by Ravaillac on his way to visit Sully at the Arsenal. Many prog¬ nostications and omens had foretold this mur¬ der, the motive of which was the popular ex¬ aggeration that Henry's plot involved a war against the Pope himself and the Catholic Church. Henry was succeeded by his son Louis, the 13th of that name, then in his minority. The queen mother, Marie of Medicis, was regent. She ruled with great individual power and singular energy, but per¬ haps with insufficient judgment. And the point was of importance because all Europe was then in the great settlement of the quarrel which the Renaissance and the Reformation had aroused. In England itself a great civil war was about to break out, primarily oligarchic in its origin, that is, having for its motive the determination of the squires and the big shop¬ keepers and merchants to govern the common people and to oust the king. But France re¬ mained the arena. The Protestants were im¬ mensely powerful ; they had cities of their own, forming as it were a state within a state ; they were still very numerous (forming perhaps a quarter, perhaps a third of the well-to-do

classes), and the generation which could re¬ member, whether in France or elsewhere, the old unity of Europe in philosophy and gov¬ ernment was dead. The force of Protestantism in France lay of course upon the side that Prot¬ estantism took all over Europe, against central monarchy, in favor of oligarchic theories, and of the independence of the great landowners and of the great merchants. Had the first years of Louis XIII's minority been under the hands of some one strong man, France might at once have become the one thing or the other. As it was sufficient interval was allowed for the Huguenot theories of independence to take root. It was not until 1617 that Louis XIII, now in his 17th year, began to act upon his own initiative. Much at the same moment there appears in French politics the great personality of Richelieu (q.v.). He was of the squires family, by name du Plessis. He had been trained to the Church, was poor, but had sufficient in¬ fluence to be made bishop at the age of 22. The meeting of the French Parliament or States- General in 1614 (when he was not yet 30) had brought him into some prominence, for he was a member of the House of the Clergy. Two years later, in 1616, the queen mother, with her keen Italian eye, picked him out for the min¬ istry. From that moment he is the principal figure in France. A quarrel which Louis XIII engaged in against his mother eclipsed Riche¬ lieu for a moment, but when that quarrel was appeased she used her influence to have him made cardinal (in 1622), and in 1624 he entered the Council of the King, never to leave it, and to direct it during the remaining 16 years of his life with despotic power.

Richelieu, like all men who count in history, had a very simple plan, if it may be called a plan at all. He was determined to aggrandize the material power of the nation. He had, as have also all great men in history, not a simple but a highly complex and subtle appreciation of the medium in which he lived. To him is due that <(rediscovefly of the national soul,5) which in France is only satisfied by unity and rapid cen¬ tralized measures. He made short work of the Huguenot pretension to maintain within the state a body of rich men defying the authority of the state. He took, after a most gallant and savage defense the Protestant stronghold of La Rochelle, in spite of the active aid of foreign enemies, whom the Huguenots had at once summoned to their aid, and by the Peace of Alais in 1629 he destroyed their conspiracy. He left them, however, complete liberty of con¬ science, a stroke of statesmanship as wise as it seemed (at that moment) enormous and para¬ doxical. At that moment and for long years afterward it was death to say mass in England and no Englishman could have understood the ideas of toleration at all. Neither did any

Frenchman understand it as an idea, and Richelieu probably thought it illogical himself, but he forced it on the French in spite of civil war, as a measure of statesmanship.

He was not content to destroy the root of rebellion ; he was also determined to destroy what was left of the ambition of the squires, apart from any religious or philosophical atti¬ tude their class might have adopted. He took the occasion of an excess in the practice of duelling to execute more than one great Catholic noble who persisted in flouting his

decree against that habit ; in a word, before the outbreak of the civil war in England, he had made of France one united country in which the power of government was observed by all, and in which all tendencies to oligarchy had been utterly destroyed.

Abroad his policy was naturally the very opposite. As he had desired to strengthen France, so he desired to weaken her rivals. With this object he ardently supported all tendencies to division beyond her frontiers, and notably the claim of the German Protestants against what had a hundred years ago been the common civilization of Europe. There had broken out in Germany in 1618 the war known as the Thirty Years' War (q.v.) in which the small Protestant parcels, notably those whose conversion to Christianity was recent and whose foothold in European civilization was still in¬ secure, had determined to break off from that tradition by the sword. Their cause was hope¬ less in Germany itself, but Richelieu threw the whole weight of French influence upon their side. In about 1635 the empire and the old traditions of unity were completely successful, and in the same year France declared war against the empire. The Spaniards invaded and were with difficulty repelled, but in the next few years the French armies occupied the Rous¬ sillon (which is now the Department of the Pyrenees Orientales), and when Richelieu died in 1642 and, some months after him, the king, Louis XIII, a definite French success was ap¬ proaching. The young, brave, eccentric and somewhat taciturn prince of the blood, Conde, then Duke of Enghien, delivered the fortress of Rocroy on 19 May 1643, and five years later in company with the great Turenne, he accom¬ plished for his country after the most striking military successes, the Peace of Westphalia, by which, in 1648, the Protestant principalities, — and notably,. the sandy wastes whence has sprung the kingdom of Prussia, — were created independent units, and the power of the Aus¬ trian Empire and of the old traditional central authority in Germany finally wiped out.

The centre of the 17th century, like the close of the 16th and like the year 1515, is a date upon which all historical students should re¬ pose. Another stage in the great quarrel was accomplished and the schism of Western Chris¬ tendom was signed and sealed. Within a few months Charles I was

to lose his head and the English were to lose forever the conception of monarchy and, perhaps forever, the sentiment of civic equality. Germany, though destined per¬ haps ultimately to be reunited, was for 300 years left torn between the old Roman civiliza¬ tion and the barbarism of the north. France, the agent of this vast Protestant establishment, had, so far as domestic politics were con¬ cerned, welded her unity, re-established her own traditions and crystallized into the highly def¬ inite modern form, which she not only pre¬ serves. to this day, but seems destined to pre¬ serve indefinitely. . There was not yet a code of laws,, the old gimcrack pretensions of the nobility were still strong, but the whole spirit of the people and of their literature had be¬ come again egalitarian and Roman, and the destinv of the next century and a half might be predicted from the Peace of Westphalia.

Meanwhile Louis XIII was dead, a little child six years old, another Louis, his son, was

upon the throne. The regency was again in the hands of a woman and when this great develop¬ ment before mentioned was in process, the gov¬ ernment was in the hands of Anne of Austria, the queen, and of her favorite, an Italian of great subtlety and low birth, known to the French as Mazarin (q.v.).

Mazarin was not onlv lowly born and subtle ; he was also extremely fond of money. But he had all the Italian conception of what is au¬ gust ; he had inherited the tradition of Richelieu ; he maintained it, not nobly but by successful intrigue. He managed to wear down the tend¬ encies of revolt on the part of the nobles which still remained (the greatest French generals, Conde and Turenne himself mixed in that re¬ volt) and when he came to die he left to the boy, Louis XIV, then but 23 years of age, a complete inheritance of a thoroughly success¬ ful foreign policy (the Peace of Westphalia was 13 years old) ; an altogether independent personal despotism in the hands of the king, and a nation so organized in literature, in self¬ appreciation and in common morals as to form a completely homogeneous body in the Europe of its time. With that year (1661) in which Mazarin died, corresponding within a few months to the restoration of the impoverished, undignified and salaried monarchy made in England, begins in actuality the peculiar and (in the eyes of contemporaries) the glorious reign of Louis XIV. A boy of 23, as has been said, on his virtual accession, he reigned until 1715, a period of 54 years, and from the habits of the generation formed in that space of time, descend the 18th century

and the Revo¬ lution in France, and, in a sense, modern Europe.

The reign may be conveniently regarded in three periods. The first, of 17 years, covering Louis' active manhood and taking one to his 40th year, was principally composed of success¬ ful warfare. And the Peace of Nimeguen in 1678 terminated a successful and advancing struggle against what had become a coalition of the smaller powers against his throne. From that period till close upon the end of the cen¬ tury, the very rapid perfecting of French life which was setting, as it were, into a clear classical form, tempted him to that great sin of every French leader, which is ambition. With such armies and with such an intelligence as his allies, he began to dream. There was even for a moment a danger of the French Church becoming national and! losing the spirit of Catholicism. The combination against him continued to exist, and in the midst of this period the final victory of the English aristocracy over the Stuarts threw a heavy weight into the scale against Louis XIV. He was a man of strict honor, and his policy as well bade him support the claim of James II and of James II's son. He had against him, therefore, from 1688 onward, the whole force of the governing power in England as he had already had against him for 20 years the whole force of the governing power of Holland. To this period also belongs (in 1685) the. most disputed act of the whole reign because it was the one which most nearly touched the inter¬ ests of those opposed to the French people, the interests of their philosophy that is, and by philosophy alone do communities live. This act was the revocation of the Edict of Nantes.

From that- date it has been a fixed article of French policy that the state shall be one, and that no power within the state shall be per¬ mitted to exist. There was a vast outcry against the victims of this determination for unity; logic demands that a similar outcry should be raised against the persecution of the priests under the Revolution, of royalists under Napoleon, of the religious orders in modern France, and of countless other instances of minorities which this cardinal principle has caused to suffer. It was not of course a per¬ sonal act of Louis XIV, it was but one further stage in the maturing of that principle of abso¬ lute unity, which had been growing in the French mind since the opening of the Middle Ages, and which had acquired such open sym¬ bols upon the accession of Henry IV.

In the third period of his reign, as an old man, Louis XIV engaged upon the last great struggle of his life. The king of Spain, Charles II, had left the crown of that country by will to the young grandson of Louis, Philip, Duke of Anjou. This was in 1700. It was debatable whether Louis XIV should accept this onerous honor or not; he determined to accept it.

It must be remembered that until within living memory monarchy was a

real political principle. Those who now exercise the func¬ tion make us forget what a very real thing a reigning family was up to the moment when the French Revolution had worked out its full effect. For members of one family to rule over France and Spain at the same time had something of the same effect on contemporary imagination as would have to-day the declara¬ tion by one great power that it was determined to annex the territory of another. War flamed at once throughout Europe. It was one of those contests in which the French nature was in real peril and in which defeat seemed cer¬ tain ; one of those contests of which the two other historic examples are the invasion of Henry V and' the German war of 1870-71. Upon this occasion, however, there was toward the end of the struggle a rally which prevented the consequences that followed upon the earlier and upon the later occasion, and when the Treaty of Utrecht was signed (as well as those of Restadt and Baden) in 1714, the honor of the country and of the monarchy was saved. All that was lost by France was colonial terri¬ tory. The next year the old king died, leaving for successor a little child, his great grandson, who is known to history as Louis XV.

During the minority of this child France was in the hands of the Duke of Orleans, act¬ ing as regent. The regent had many quali¬ ties that we admire in man, especially that of courage. He was a gentleman, and thoroughly generous ; but he was a libertine, and this weakness of sensuality marred both the dignity of his position and the efficacy of his govern¬ ment. His counsel, the Cardinal Dubois, was probably most unworthy, but one must be care¬ ful not to exaggerate one's impression of him, for the attack upon authority was already be¬ ginning, and the fact that Dubois was in orders was quite enough to make the intellect of his time emphasize his vices. After a period of violent speculation and of great though per¬ haps exaggerated public distress, the regent died, having held his authority for eight years.

From that moment (1723) Louis XV began to reign.

*Nothing is more difficult than to estimate the character of this man. It cannot be denied that upon this character the history of France during the next 70 years largely depended. For the monarchy was *still real and absolute and the method in which it was conducted was the chief factor of the national destiny.*

T.he writer of these lines has minutely ex¬ amined the acts, the portraits and the hand¬ writing of Louis XV and in relation to a mono¬ graph

concerned with that period has made himself thoroughly acquainted with the person¬ ality of the man ; and yet he finds it very diffi¬ cult to give a true judgment. He was pro¬ foundly Christian, with a fervor of religion that verged upon superstition ; he was un¬ doubtedly courageous, somewhat sensual, in old age excessively so. On the other hand he suffered from an impediment of the will. To say that his will was weak would be to con¬ vey a very erroneous impression. But there were a certain number of things he could not bring himself to do and chief of these was the exercise of authority face to face. He hated and avoided all interviews and all scenes. In his character of gentleman this was well enough, but in his character of king it was fatal. The first war of his reign was upon the whole glorious. And the Treaty of Vienna, signed in 1738, gave France the reversion of Lorraine. But two years later the principal quarrel of the century and the most important event, in its effects between the English Revolu¬ tion and the French, took place. This was the death of Charles VI, the emperor of Germany, who left as heir his daughter Maria Theresa. The German anarchy was at once aroused. The attempt to destroy the empire virtually was begun by the Protestant princes, and notably by the rising power of Prussia. At this moment a clear error, one of the very few with which French diplomacy can be re¬ proached, was committed. Two centuries of tradition proved too strong for the French in¬ tellect, and the French armies were allied with those of the petty prince and of Prussia against Austria. The origin of the war was marked by the first of those scandalous acts which have brought European civilization into such peril during our own time. Frederick II of Prussia, a man subject to every vice, with the exception of cowardice, seized Austrian terri¬ tory without title and without any declaration of hostilities. It was the act rather of an Asiatic than of an European. But the French monarchy, whose whole history had been a protest against such a perversion of public morals, found itself in alliance with this de¬ testable soldier. The alliance was not unsuc¬ cessful, and the war which followed will be forever famous in French annals from the great victory of Fontenoy on- 11 May 1745, a victory largely due to the Irish exiles who fought under the French flag. The Peace of Aix-la-Chapelle sign d in. 1748 did not show the fruit of so much military valor and suc¬ cess; it left France very much as it found her. But the struggle with its false issues and its vanity had luckily converted the French diplo¬ mats, and henceforward France wisely asso¬ ciated herself with Austria, with the especial purpose of meeting the rising power of Eng¬

land. Had the French forces been confined to the struggle with England, their success, which was already great at sea, would probably have been final, and the strange spectacle would have been presented in our own time of a France weighted with eccentric, un-European colonies, and probably deprived of its whole national spirit and tradition. The reason that we have

no such spectacle to enjoy or deplore is that the government of Louis XV, not con¬ tent with fighting England abroad and at sea, undertook a continental campaign, and fought side by side with Austria in what is known as the Seven Years' War (q.v.). At the very be¬ ginning, in 1757, Frederick of Prussia inflicted a crushing defeat upon the French at Rosbach, a defeat entirely due to the ineptitude of the French command. Meanwhile in the colonies the French lost and the English won. And in 1763 the Treaty of Paris was signed, which for a century destroyed all French effort oversea, left Canada to the English, abandoned India, and, what was graver in the history of Euro¬ pean morals, permitted Frederick of Prussia to retain Silesia, thereby acknowledging in a pub¬ lic instrument for the first time since the foundation of Christendom that lawful suc¬ cession and inheritance might be waived in presence of force. From this grave crime Europe still suffers. It was the precedent of all the international anarchy which our gen¬ eration has almost become accustomed to.

The remaining 11 years of the reign were passed in peace, but in dishonor. The nation was profoundly troubled in its pride as in its economic circumstances. The heir to the throne was a lanky, very stupid boy, the grand¬ son of the old king, and men saw nothing in the immediate future for their relief, though the death of Louis was looked forward to as to an event for public rejoicing. He passed, after a few senile years of debauchery, in 1774, and his grandson, Louis XVI, who had been married as a boy (four years before) to the youngest daughter of Maria Theresa, Marie Antoinette, ascended the throne. On the same day the Boston Harbor Act was proclaimed in the American colonies. It is quite impossible in a few short notes such as these to prepare the reader for the enormous convulsion through which France and all civilization was now about to pass. It is enough to say that the mind of that generation was by this time securely .fixed in a clear and intense conviction: that lucid, mechanical and direct methods ca¬ pable of reasonable analysis were in all depart¬ ments of human energy the only ones which man as a moral being could entertain. It fol¬ lowed that all merely organic things were in peril, the old and merely traditional constitu¬ tions of the country, and of course religion. The Catholic faith had never been at so low an ebb since Constantine; its power has been returning for a- century, and it is difficult for our generation to understand how completely the faith had disappeared just before the French Revolution broke out. The first years of Louis XVI were occupied with a renewed struggle against England, which struggle was successful beyond the dreams even of those who most ardently supported the policy of attack. French guns had been supplied to the army which conquered at Saratoga shortly after a French fleet rendered possible the sur-

render of Yorktown; and it was imagined both in England and upon the Continent (such is the impossibility of foreseeing the future) that the power of Great Britain was finally extinguished. Meanwhile, the American colonies and their ideal republic furnished an object lesson, as it were, to the rationalism of the time. And the public mind was moving very rapidly indeed toward a reconstruction of society. The moral equilibrium was utterly unstable. It needed but some material cause for that equilibrium to be upset, and for a new society to arise. This cause was presented by the condition of national finance. France was a very wealthy country and like all the rest of soci.ety at that moment was rapidly increasing in' wealth. But the methods of taxation were grossly imperfect, the burden fell upon the wrong people and was imposed in the wrong way. So that France could with difficulty furnish a sum equivalent to no more than $5 per head of its population, where recently it furnishes with the utmost ease close upon and often exceeding $20 a head. An assembly of the notables of the kingdom was summoned in 1787 and did nothing. And finally in 1789 was con¬ voked the first great democratic parliament ever seen in Europe since the Middle Ages had declined. The experiment was watched with alarm, especially in England where the concep¬ tion of popular government was mistrusted and disliked, not only by the ruling oligarchy but by the people themselves. When the as¬ sembly had met, which was in the May of that year, the commons proceeded to claim in prac¬ tice complete power in the state. They had for their ally the city of Paris, without whose energy and courage their rhetoric would in¬ deed have been vain. The mobs of the capital proved incapable of withstanding regu¬ lar troops. That was the chief and least understood aspect of the Revolution. Nor can any unacquainted with the military temper of the French people comprehend the movement. It was, for instance, Carlyle's principal error that he imagined a display of public force suffi¬ cient to check the Revolution. Public force was used to the utmost, and failed because the people were in a mood of indifference to suf¬ fering and to death, a phenomenon so rare that, save in Ireland, the modern world has seen no example of it. It is possible that a democracy would have been established and that the names at least of certain great tradi¬ tional functions in the state would have been preserved, and that the Revolution would have ended in a compromise, had there been no for¬ eign war. As it was, the attack made upon the organization of religion, and the attempt to withdraw the Catholic priesthood from their normal organization and to make of them a civil service, coupled with the perpetual indignities offered to the king and queen, and added to the ceaseless effects of violence, moved Europe to interfere. The method of this interference was cautious and long debated, but the threat of it was enough to goad the French people. In June 1791

Louis XVI and his wife and chil¬ dren fled to the frontier and were recaptured. Two months later Austria and Prussia publicly agreed upon a policy of intervention, though even at this late stage the agreement was con¬ ditional, and so far as we can judge by the private letters exchanged in that autumn, the VOL. ll — 38

idea was rather to overawe the French democ¬ racy by a display of invincible force, than to proceed to actual invasion. In the winter, largely through the action of Marie Antoinette, Austria, ruled by her brother, proceeded to impose minor but direct commands upon the French policy. In the spring war was declared. The allied armies did not cross the frontier until the height of summer, but it appeared cer¬ tain that they would be in Paris by the end of August, for the disorganization of the French army was complete and it was quite incapable of making a stand. The invasion was accom¬ panied by a manifesto drawn up by advice of Marie Antoinette (who was probably the author of its principal threat) and this manifesto de¬ voted the town of Paris to military execution, if the persons of the royal family were not left inviolate. The answer of Paris to this docu¬ ment was to storm the palace on 10 August. The building was well defended by a powerful force of 6,000 men, and it was the opinion of Napoleon Bonaparte, who seems to have been an eye witness, and who was certainly an excel¬ lent judge of military affairs, that the military chances were in favor of the Crown. The mob fought with the utmost courage, losing men in numbers variously estimated at 150 and 3,000, — the latter is the nearer computation, for though the losses were heavier of course upon the de¬ feated side, the services of numerous carts and carriers were required for the whole day and the succeeding night in removing the dead. At any rate the populace were completely success¬ ful. The royal family was imprisoned and a committee of extreme democracy, the chief of whom was the learned but impetuous Danton, took over the management of the country in the face of the enemy. That enemy proceeded without obstacle, forced the three passes of the Argonne, and met such forces as the French had scraped together on much the same ground as had seen the struggle against Attila, the great plain now occupied by what is called ((the Camp of Chalons." The centre of the French position was the windmill of Valmy. What followed is a singular lesson in strategics. There was, properly speaking, no battle. A distant cannonade and an abortive charge made up the whole action. But precisely because the Duke of Brunswick did not press his power home Valmy had all the effects of a thorough defeat. A retreat was negotiated, and from that day, the equinox of '92, the Revolution took on its final phase. The republic was de¬ clared, the trial of the king was prepared, the army though still undisciplined and unmilitarv gained the haphazard victory at Jemappes, and poured over the frontier into Belgium. On 21 Jan. 1793 the king was executed; within a fortnight

Holland, England and Spain, one may say the whole of Europe, was at war with France. The volunteers and other hotch-potch under Dumouriez in Belgium were defeated ; at Neerwinden, Dumouriez betrayed the coun¬ try and ultimately accepted a large salary from England, whose strategy he advised and over¬ looked, and the French Revolution, for the sec¬ ond time in peril, established martial law. A strict military despotism in the hands of a small committee, known as <(The Committee of Public Safety," governed France with ruthless severity for 16 months, defeated the enemies of the country and began that marvelous series

of victories which within a generation trans¬ formed the world. During those 16 months the committee was changed; but its principal names give it unity from first to last, and in its latter stages the name most upon public lips was that of Robespierre (q.v.). Robespierre did not command the committee. They were at first jealous of him and toward the end of the period he hardly attended their meetings. He was a man of many virtues, of a high political idealism, and of conspicuous sincerity and can¬ dor, but he suffered from the vice of ambition. He loved the popular idolatry that surrounded him, and used it as a lever against the com¬ mittee. This committee, therefore (in which he had but two friends), being essentially mili¬ tary in its nature, and occupied principally in the military problem of repelling the foreigner, determined to be rid of him. They planned his destruction, and Robespierre was outlawed and guillotined on 28 July 1794.

*It so happened that the period of his great popularity had coincided with the height of the revolutionary delirium. Three-fourths of the country was in revolt. Savage acts of repres¬ sion had followed the crushing of the rebellions and <(the Terror,** as it was called, had come, very falsely, to be associated with Robespierre's name. When he fell, therefore, the committee found to their astonishment, that his fall was taken as a signal for the relaxation of their military power. From that date (called in the new revolutionary calendar ((the Tenth Ther- midor**) the active portion of the Revolution ends. It had succeeded in finally establishing the theory of democracy.*

In the next year it achieved its most diplo¬ matic success, and imposed peace upon its ene¬ mies at Basel in a treaty which considerably enlarged French territory, and shortly after¬ ward the public assembly which had accom¬ plished this great result was dissolved. England and Austria alone remained at war. Against the second was dispatched into the Plains of

Lombardy a young Corsican who had but lately been given his brigade, and who was but 27 years of age. This man was Napoleon, and from that date, 1796, the history of France be¬ gins to be a record of his exploits.

See Clovis; Charlemagne; Charles Mar¬ tel; Pepin; Paris; Crusades; Hundred Years' War; Joan of Arc; Henry of Navarre; Guise; Edict of Nantes; Henry IV; Sully; Louis XIII, XIV, XV, XVI; Richelieu; Thirty Years' War; Conde; Turenne; Mazarin; Maria Theresa; Seven Years' War; Freder¬ ick II of Prussia; Marie Antoinette; Mira- beau ; Danton ; Robespierre ; Marat ; Giron¬ dist; Reign of Terror; Napoleon; France — Church and State; Great Britain' — French Wars of the 18th Century; United States — The Revolution; Italy — Modern History; Germany — Political History; Austria, and the various personages and events mentioned in this article See also French Revolution.

Bibliography. — The literature relating to the history of France is extensive. For details con¬ cerning detached periods and events and for the careers of the great Frenchmen of this period the reader may consult the above men¬ tioned articles, where will be found the most important works relating to each. For a gen¬ eral history of France consult Bourgeois, (France under Louis XIV) (1889) ; Duruy,

*(Histoire de France * (trans. by Carey, New York 1889) ; Fleury, cHistoire de France > (1891); Guizot, cHistoire de France) (Pans 1870) ; Kitchin, (History of France to 1 793 > (Oxford 1881-82) ; Martin, (Histoire de France) (Paris 1855-60) ; White, (History of France) (1890) ; Anquetil, (Histoire de France depuis les Gaulois jusati'a la mort de Louis XVI * (15 vols., Paris 1820) ; Bonnechose, (History of France from the Invasion of the Franks under Clovis to the Accession of Louis Philippe* (trans. by Robson, London 1862) ; Daniel, (His- toire de France* (17 vols., Paris 1755) ; Ge- noude, (Histoire de France* (16 vols., Paris 1844-47); Lavallee,. (Histoire des Frangais de¬ puis le temps des Gaulois jusqui' en 1830* (4 vols., Paris 1856) ; Michelet, (Histoire de France* (16 vols.); Hotman, (Franco-Gallia ; or an Account of the Ancient Free State of France* (1574, Eng. tr. by Viscount Moles- worth, London 1711) ; Laveaux, (Histoire des premiers peuples fibres qui ont habite la France* (3 vols., Paris 1798) ; Picot, (Histoire des Gaulois, etc.* (3 vols., Geneva 1804) ; Thierry, (Histoire de la Gaule* (3 vols., Paris 1840-47) ; Bloch, (Les origines la Gaule inde- pendante et la Gaule romaine* (Paris 1900) ; various editions of Caesar's Commentaries on the Gallic War* ; Segur, (Histoire de France* (11 vols., 1834-35) ; Royon, (Histoire de France* (Paris 1819) ; Hugo, (Histoire generale de France* (5 vols., Paris 1836) ; Leroux, (Les conffits entre la Fratice & l'Empire pendant le moyen age* (Paris 1902) ; Duruy, VII — Philipp Auguste — Louis VIII 1137-1226* (Paris 1902) ; Lussan, (Histoire du regne de Charles VI* (9 vols., Paris*

1753) ; Val- let, (Histoire de Charles VII (3 vols., Paris 1862-65) ; Beaucourt, (Histoire de Charles VII* (6 vols., Paris 1881—91) ; Poullin, XIV La Cour et le Regent* (1789) ; Jobez, 'La France sous Louis XI 1715-74* (6 vols., Paris 1864-73), and 'La France sous Louis XVI* (2 vols., Paris 1877-81) ; Tocqueville, 'Histoire Philosophique du regne de Louis XV* (2 vols.). On the Revolution the number of works is too great to be enumerated separately but the fol¬ lowing books are representative and authorita¬ tive ; Aulard, 'L'eloquence parlementaire pen-*

dant la Revolution frangaise' (3 vols., Paris 1882-86) ; Aulard, (Histoire politique de la Revolution frangaise, 1 789— 1804) (Paris 1901); Bourgoing, (Histoire diplomatique de l'Europe pendant la Revolution frangaise' (3 vols., Paris 1865-71) ; Carlyle, (French Revolution (Lon¬ don 1837) ; Chassin, (La preparation de la guerre de Vendee' (3 vols., Paris 1892), (La Vendee patriote) (4 vols., 1893-95) ; Goncourt, (Histoire de la societe frangaise pendant la Revolution (Paris 1854) ; Jomini, (Histoire critique et militaire des campagnes de la Revo¬ lution de 1792 a 1801' (3d ed., 15 vols., Paris 1819-24); Jung, (L'Armee et la Revolution: Dubois-Cranee' (2 vols., Paris 1884) ; Michelet, (Histoire de la Revolution frangaise' (1st ed., Paris 1847-53) ; Mignet, (Histoire de la Revo¬ lution frangaise' (1st ed., Paris 1824) ; Morse- Stephens, (History of the French Revolution (New York and London 1886) ; Mortimer- Ternaux, (Histoire de la Terreur) (8 vols., Paris 1862-81) ; Quinet, (La Revolution) (1st ed., Paris 1885) ; Sciout, (Le Directoire) (2 vols., Paris 1895) ; Sorel, (L'Europe et la Revo¬ lution frangaise' (4 vols., Paris 1885-92) ; Von Sybel, (Geschichte der Revolutionszeit von 1789 bis 1800' (5 vols., Diisseldorf 1853-57; Eng. tr. to 1795, London 1867-69) ; Thiers, (His- toire de la Revolution frangaise' (Paris 1823— 27) ; Taine, (ib. 1884) ; Anderson, Constitutions and Other Select Documents Illustrative of the History of France, 1789-1907' (Minneapolis 1908) ; Lev- rault, (L'Histoire de France' (Paris 1905) ; Guerard, (French Civilization in the Nineteenth Century) (ib. 1914) ; Headlam,

Hilaire Belloc,

Author of (Danton ,' (Robespierre,' etc.

3. FRENCH HISTORY FROM THE REVOLUTION TO THE ESTABLISH¬ MENT OF THE EMPIRE, 1796-1804. This period is one of the most important in the his¬ tory of France, and from beginning to end its every event centres about one man, Napoleon Bonaparte. From the outset Napoleon was greatly hampered. There was much popular unrest, for the

people had but recently emerged from a bloody revolution and were clamoring for they knew not what. The main foundations of democracy had been laid, but the funda¬ mental principles of civil and religious liberty cherished by the French people, equality of rights and the sovereignty of the will of the people seemed as yet insecure; petty jealousies, conspiracies, plots and counterplots dominated politics. The government was internally weak and engaged in a struggle for its very exist¬ ence; the directors, honest men enough, never were in harmony; suspicion and distrust of everybody and everything pervaded the atmos¬ phere ; the finances were in a disgraceful con¬ dition. The nation, weary of internecine war¬

fare, sick of bloodshed, longed for permanent peace and a renewal of industrial and economic activities. But industry and commerce seemed dead, or at least in a hopeless state of stagna¬ tion. Bankruptcy overwhelmed the bourgeoisie ; the laws were unsatisfactory and, poor as they were, remained unenforced ; the army, though re-enforced, following the Revolution, was in a very bad condition, ill-fed, poorly clad and lack¬ ing a controlling hand ; and relations with for¬ eign nations were strained to such an extent that war threatened on every side. The ag¬ gressive policy of an unstable government bade . fair to lose to France the glory of her recent conquests. War seemed now to be the only means of replenishing an empty treasury and confirming the glory of the nation through the work of her military commanders. The first significant step in Napoleon's path toward power was the placing of the armies of France under his command and at his disposal. Thus the opportunity was within his grasp and the means provided whereby he could carry out his personal ambitions and, at the same time, promote the progress and wel¬ fare of the entire nation. Possessed of great wealth, acquired by plunder, Napoleon was en¬ abled to supply the directory with much needed funds and to bend the will of that body to his own ambitious ends. Peace-loving Frenchmen grew to place fullest confidence in this irre¬ sistible chief of the army. That this revivified military force and its ambitious commander should ever become a menace to the designs of the directory and of the citizens of France was not contemplated. Whether or not his love for the country or his commiseration for the pathetic state in which he found her were secondary in his mind to his personal aggran¬ dizement matters little. It is certain that from that time the destiny of France was indissolubly linked with his rise and fall. Upon his success or failure depended the continuance of the French entity. His plans formed the institu¬ tions of the country; his wars made French history and changed the face of the land. Aware that upon the applause of the nation rested largely the success of his ambitious projects, Napoleon endeavored to obtain the good will of the public and to then conform it to his wishes. Loving liberty, the French people yet gave enthusiastic support to a com¬ mander who detested liberty for any but him¬ self. Crying out

for equality and fraternity they yet upheld a leader whose predominant thought was to impose his absolute will upon all others through every means at his command, and whose vision was that 'of absolute power. France and her conquests he used to further his own project. Yet he was not insensible to the ideals of the Convention and of the di¬ rectory; on the contrary he was greatly in¬ fluenced by them. His lust for conquest may partly be attributed, no doubt, to his desire for the glory of the republic and the success of her ideals. These invigorating ideals of nationality and democracy he carried with him into Italy, breathing life and purpose into the beginnings of that wonderful movement which culminated in the events of 1870 and the birth of the Italian nation. From that time his master mind and subtle genius and mighty hand were the most potent factors in raising France from the pit of

anarchy and degradation to the heights of pride as the most powerful nation of the world; from that time his history was French history — Na¬ poleon was France.

The French Revolution has been character¬ ized as ((The most important event in the life of modern Europe® ; it has been compared to the Reformation and to the rise of Christianity, because, as in both of these great movements, it set forces in motion which changed the thought and life of men and permanently af¬ fected human civilization. The sovereignty of the people, personal liberty, a new idea of nationality were three principles that were awakened in the minds of men. The blood¬ shed and treasure spent and the unrest of Europe were but the prelude of a brighter day when order should come out of chaos, peace be restored to the nations, feudalism destroyed, social equality advanced and great national movements made possible.

The life and work of Napoleon in the Restoration, whatever may be our judgment of his motives and his purposes, have always been a subject of profound study for the student, for there is scarcely any department of human activity that he did not touch and influence. History, religion, politics, education, law, gov¬ ernment, political and industrial economy and social reforms were all subjects for his wonder¬ ful energy. One of the most versatile char¬ acters of history, his reorganization of France was one of his greatest achievements.

In order to understand the conditions exist¬ ing at this time and to follow the steps by which Napoleon attained his remarkable posi¬ tion we must go back into the reign of Louis XVI and study the events which resulted in the

Reign of Terror, the Revolution and the establishment of democracy.

Louis XVI, son of the Dauphin and grand¬ son of Louis XV, ascended the throne on the death of the latter, 10 May 1774. Hardly had he been crowned when war broke out with Eng¬ land, in consequence of the support afforded by France to the revolted American colonies of Great Britain. A treaty of commerce and alli¬ ance with the United States was signed 6 Feb. 1778, and was followed by an immediate decla¬ ration of war by England. The war was suc¬ cessful in its immediate object and was termi¬ nated by the Treaty of Versailles, 3 Sept. 1783. Three years afterward a commercial treaty was concluded with England. The first difficulty of Louis' government, however, and the rock upon which it split was the hopeless and unmanage¬ able condition of the public finances. Maurepas, Turgot, Malesherbes, Clugny de Nuis, Necker, Joly de Fleury, d'Ormesson, Charles- Alexandre de Calonne, Lomenie de Brienne and others signally failed to ward off impending disaster and resigned or were dismissed. Finally the king was forced to convoke the States-General (q.v.) at Versailles 5 May 1789. Owing to dis¬ putes between the three parties represented — the nobility, the clergy and the Third Estate — the attempt to solve the difficulties was abortive. The king assumed a hostile attitude and com¬ mitted several acts which angered the public, the chief of which was the dismissal of Necker, who a second time had been called to the finan¬ cial portfolio; and in June 1789 it became neces¬ sary to bring foreign troops to Paris to overawe

the assembly. The people demanded arms and the Hotel de Ville at Paris supplied them; blood was shed there on 12 July; and on the 14th the Bastile was captured and destroyed. The garde bourgeoise , formed by the munich pality, was now transformed into the national guard with Lafayette as commander. The spirit of insurrection in the meantime had, since the beginning of 1789, been spreading in the prov¬ inces ; sections of the country were swept by a panic called the ((Great Fear,® and the urgency of affairs induced the assembly, on 4 August, to take a decisive step. On the basis of a future compensation all privileges were abolished. A banquet given to the foreign troops at Ver¬ sailles, at a time when the populace was threat¬ ened with famine, excited another insurrection. Versailles was attacked by the mob and the king brought a prisoner to Paris (5 and 6 Oct.

1789).

In December 1790 the king began to cor¬ respond secretly with foreign powers and a secret convention had been made with Austria, Prussia, Piedmont, Spain and Switzerland to advance their troops to the frontiers with a view to a simultaneous occupation of the terri¬ tory. Louis made his escape from Paris (20 June 1791) and endeavored to reach Mont- medy;

but he was recognized on the road, ar¬ rested at Varennes and brought back to Paris escorted by the commissaries of the assembly. A demonstration in the Champ de Mars in favor of his deposition (17 July) was put down by force by Lafayette and Bailly under order of the assembly.

On 30 Sept. 1791 the assembly brought its work to a finish. The constitution was sworn to by the king on 14 September, after which he was reinstated in his functions. The constitu¬ tion embraced all those civil reforms which, afterward incorporated in the code of Napoleon, survived the political changes of the Revolu¬ tion. It deprived the king of arbitrary powers and voted him a civil list ; it provided liberty of worship, freedom of the press, of commerce, of industry; the laws of primogeniture and entail were abolished and equal division of property among children made compulsory; confiscation of property for offenses was abolished and per¬ sonal punishment substituted ; titles were abolished ; the clergy were reduced to public functionaries, salaried by the state; the terri¬ tory of France was declared free through all its extent and a redivision of it was effected (15 Jan. 1790) in 83 departments. This division afterward proved an admirable instrument of centralization and in repeated emergencies en¬ abled Napoleon at once to lay his hand with ease upon all the military resources of France. One of the measures already mentioned in par¬ ticular demands further details, as it was the means of meeting the financial difficulty and at the same time of arming the enemies of the Revolution, at whose expense it was effected. On 2 Dec. 1789 the domains of the Church were, in the euphemism of the assembly, put at the disposition of the nation. The minister was au¬ thorized to sell these estates to the extent of 400,000,000 livres. Until the sale was effected he was authorized, on the security of these na¬ tional domains, to issue a paper money having a forced circulation and a preference in the purchase of them. In 1792 the estates of the

emigres were confiscated in like manner. Thus was created that seemingly inexhaustible treasury of assignats which brought France so speedily into a financial anarchy worse than any she had yet experienced. Among other re¬ forms was the reorganization of the adminstra- tion of justice. The parliaments were dissolved by indefinite prorogation and judicial functions were separated from the administrative; district courts were created and judges appointed for 10 years. The assembly closed with an attempt to recall the emigres and it prohibited the re- election of its members. Mirabeau, the greatest orator of the assembly and one of the boldest leaders of the Revolution, had died prematurely 2 April 1791 from the

excesses of his life. The constituent assembly was, according to the con¬ stitution, immediately followed by the legislative assembly, which began its sittings on 1 October ; but before the period assigned by the constitu¬ tion it gave place to the convention. In the legislative assembly there were two parties of political importance, the Girondists, who led it, and the'Montagnards, who subsequently became all-powerful in the convention. The royalists were already powerless. The assembly was compelled at once to take a decisive course. By the declaration of Pilnitz the emperor of Germany and the king of Prussia threatened an armed intervention to restore Louis to his rights. The king was compelled in March to accept a Girondist ministry, and on 20 April 1792 war was declared against the empire. The first attempts to assume the offensive were un¬ successful and the French armies were not even able to prevent the enemy from invading home territory. To make matters worse the king maintained a treasonable correspondence with the allies and refused to sanction the decrees of the assembly. Paris grew restless as the enemy advanced; unscrupulous politicians urged the mobs to violence and on 20 June the people invaded the assembly and the Tuileries and summoned, the king to sign the decrees. He refused, but satisfied them for the moment by allowing himself to be crowned with a red bonnet. On 26 July the Duke of Brunswick issued his celebrated and impolitic manifesto, threatening, if the king were insulted, to deliver Paris to a military execution. The sections of Paris retorted by signing a petition demanding the deposition of the king before the close of the day (9 August). At midnight the tocsin sounded. The Tuileries, after a sanguinary combat, was taken and sacked. The king took refuge with his family in the assembly, which was invaded and compelled to submit to the dictation of the victors by assenting to the suspension of the king and the convocation of a national convention. The convention was an extraordinary assembly, summoned for an emergency, and thus recognized the fact that France was again without a constitution. The war now assumed a more favorable aspect. The victory of Valmy, 20 Sept. 1792, caused the Germans to fall back discomfited. The siege of Thionville was abandoned and France was freed of her invaders. Savoy, Nice and Villa-franca were seized and occupied by the French; the army of Alsace under Custine took Speier (30 Sept. 1792), Worms (5 October) and Mainz (21 October). Frankfort capitulated to Houchard; and the victory of Dumouriez over

the Austrians at Jemappes, 6 Nov. 1792, led to the occupation of Belgium.

The first act of the new assembly, 21 Sept.

1792, was to proclaim the republic. Thus the Year I of the republic began. On 3 December the king was cited to appear before the assem¬ bly. On 20 Jan. 1793, he was, by four succes¬ sive votes, sentenced to death within

24 hours, and on the 21st the sentence was executed. This violent inauguration of the republic shocked public opinion throughout Europe, and armed the neutral states against France. Eng¬ land, Holland, Spain and the empire joined the coalition. A levy of 300,000 men was ordered. It was necessary to send some of these new levies to suppress the Chouan insurrection in Mainz, Anjou and Brittany. Nearly all the officers of rank had emigrated, and Dumouriez, feeling that hostility was rising against him in Paris, resolved to regain his prestige by a bold stroke— the conquest of Holland. He was de¬ feated in the attempt, however, by the Prince of Coburg who administered a crushing defeat at Neerwinden, 18 March 1793. Dumouriez then secretly agreed to evacuate Belgium and turning against the convention deserted to the allies on 4 April. Mainz was also lost by Cus¬ tine. At home the army lost confidence in its heads and became disorganized. Mutual suspi¬ cion and distrust reigned in the convention itself. The convention took measures suited to the gloomy aspect of affairs. A revolutionary tribunal was appointed to try offenses against the state; a committee of public safety, with sovereign authority, was appointed (6 April), and the convention renounced the inviolability of its members. The period thus inaugurated is known in history as the Reign of Terror. The struggle between the Girondists and the Mon- tagnards became violent. The latter, defeated in the convention, armed the sections of Paris. The convention, under pressure, ordered the arrest of 31 Girondists (2 June). Some of them escaped and excited insurrection in the provinces. A new constitution was adopted by the convention 23 June, called the Constitution of the Year I, and the Republican calendar was adopted on 5 Oct. 1793. The energy of the dominant party had risen to the danger, but it was accompanied by a ferocity without example. The revolutionary tribunal had already filled the prisons with victims. On 10 Oct 1793 the constitution was suspended and the government declared revolutionary, a term which included unlimited power. Both in Paris and the prov¬ inces executions and massacres followeid each other daily, and as new parties succeeded each other in the convention the leaders of the de¬ feated parties were added to the usual list of suspected royalists or reactionaries. Thousands of paid committees were formed throughout France. The queen was executed on 16 Oct.

1793, the Girondists (against whom public anger had been more deeply aroused by the assassination of Marat on 13 July by Charlotte Corday) on 31 October (10th Brumaire), the Hebertists on 24 March 1794, the Dantonists on 5 April. Robespierre had a new law passed on 22 Prairial (10 June) to facilitate these execu¬ tions, and from this date to 27 July about 1,400 persons are supposed to have perished. At length the Reign of Terror came to an end by the revolution of the 9th Thermidor and by the

execution of Robespierre and his associates on 27 and 28 July 1794.

In the meantime the majority of the south¬ ern towns declared against the convention. French territory was invaded both on the north and south and to all these dangers was added famine. Conde was taken by the allies 12 July 1793; Mainz surrendered 23 July; and Coburg took Valenciennes on the 28th. The convention fixed a maximum price for the sale of pro¬ visions. A decree was passed excluding English manufactures from France. A levy was ordered of 1,200,000 men, and Carnot organized 14 armies. The revolted provinces were speedily reduced. At this time Napoleon first became prominent in France. In September 1793 he was commissioned lieutenant-colonel of artillery and sent to Toulon to assist in the reduction of that city which was then in the hands of the English. By his strategy this was accomplished on 19 December, and Jourdan, in the north, was en¬ abled to give his undivided attention to driv¬ ing the principal forces of the coalition from the country. During the balance of 1793 and in 1794 the campaigns resulted favorably to the French arms. Jourdan" defeated the Prince of Coburg at Wattignies 15 and 16 Oct. 1793. Hoche, after losing the three-day battle of Kaislerlautern (28 Nov.-l Dec.) and winning the battle of Wissenberg (26 December), wintered in the Palatinate. In Italy and Spain the French had also been able to carry the war beyond their own frontiers. In the spring of 1794 the French armies took the offensive. An attack on Lille by Coburg's forces was repulsed with great loss on 18 May. Jourdan crowned a series of victories by the capture of Charleroi in June; and by the victory of Fleurus (26 June 1794) recovered Belgium; and Pichegru, by the beginning of 1/95, had completed the con¬ quest of Holland. A treaty of peace was signed 16 May. Holland, under French influence, con¬ stituted itself the Batavian Republic. Tus¬ cany concluded peace with France 9 February. By the successes of Jourdan the allies were driven across the Rhine, and Spain was invaded. These successes induced Prussia and Spain to lay down their arms. By the treaties of Basel (q.v.) signed by the former on 5 April, by the latter on 12 July (ratified 22) 1795, and by Hesse-Cassel on 28 August, these countries acknowledged the French Republic. (See Peace Treaties). The English during this time had been successful at sea and had made extensive captures among the French colonies. Mean¬ while (in February 1794) Napoleon had been promoted to the rank of brigadier-general of artillery and later in the same year was sent to Genoa to study its defenses and the political disposition of its inhabitants.

In 1795 the convention gave the republic a new constitution called the ˆConstitution of the Year III®; a chamber of Five Hundred to propose the laws ; a chamber of Ancients to ap¬ prove them ; an executive of five

members, one elected annually, called the directory. This tame bequest of that once terrible assembly marked the progress of a strong reaction. The royalists conceived sanguine hopes of a restora¬ tion. Pichegru was gained, a royalist insurrec¬ tion organized, and 30,000 men marched on the Tuileries, where the convention sat. Barras en¬ trusted the defense to Napoleon who had lately returned. He with 5,000 men and his artillery,

though he had only a single night in which to prepare, not only repulsed the insurgents but poured such murderous discharges of grape into their ranks that within an hour after actual fighting began he had secured victory for the convention. This event is called the affair of the 13th Vendemiaire (5 Oct. 1795). In recog¬ nition of his services Napoleon was now ap¬ pointed by the convention to the command of the army of the interior. The convention was dissolved on 26 October.

With the suppression of the revolution at Paris by Napoleon, the subjugation of the Ven- deans and Bretons by Hoche, the crushing of the ((Conspiracy of Babeuf,® and the pacification of the other sections of the country came a dis¬ tinct lull in political passion. For the first time in many years the armies of France were idle and so the directory planned further foreign conquests. Carnot, the <(organizer of victory,® who was one of the five members of the direc¬ tory, was depended upon for the military suc¬ cess of the campaigns. He planned an attack on Austria and resolved to strike from three separate points. In 1796 he sent out three armies which were to hem in the Austrians on all sides and descend upon Vienna simulta¬ neously. Two of these armies, each 70,000 to 80,000 strong, were to enter Germany to reach the valley of the Danube, one under Jourdan (the army of the Sambre and Meuse) by way of the valley of the Main, the other under Moreau (the army of the Rhine and Moselle) by way of the valley of the Neckar. Both were then to descend upon Austria. Napoleon with the third army (the army of Italy) 40,000 strong, was to menace Italy. Let us follow this last army.

One object of the campaign was to make the armies live on foreign territories. Bonaparte's lieutenants in Italy were already experienced generals. He assembled them and unfolded his plans, which silenced the jealousy naturally caused by his appointment. To the soldiers he issued the first of his rousing proclamations : ((You are ill-fed,® he said, ((and almost naked; the government owes you much, and can give you nothing. I am about to lead you to the most fertile plains in the world, and to opulent cities where you will find honor, glory and riches.® During four years the army had been struggling against the Sardinian and Austrian troops, without decisive success, on the southern slopes of the Alps and Apennines. The Sardin¬ ians stretched from the Bormida to the Stura, with an entrenched camp at Ceva. The Aus¬ trians were cantoned in the

neighborhood of Alessandria and Tortona, commanding the roads to Genoa and Milan. Napoleon threat¬ ened an attack on Genoa by Voltri, but made his real advance through the valley of the Bormida. Toward the end of March 1796 he set out from Nice and after defeating the allies at Montenotte (11 April) seized that town and thus placed himself in thir centre. Having first repulsed the Austrians he pursued the Sardinian army, beat it at Millesimo (13—14 April) and at Mondovi (22 April), and drove them before him to Cherasco, where an armis¬ tice was concluded (28 April), which was con¬ verted, on 15 May, into a definite treaty, by which Sardinia renounced the coalition and ceded Savoy and Nice to France. In the interim Napoleon sent Massena and La Harpe against

the Austrian army and they defeated it at Dego, 14—15 April. Napoleon then, by forced marches to Piacenza, compelled Beaulieu to re¬ treat toward the Tyrol. He crossed the Po at Piacenza, stormed the Bridge of Lodi (10 May) which was held by the Austrians to cover their retreat, and entered Milan on 15 May. Brescia was entered on th.e 28th; the passage of the Mincio forced at Borghetto on the 30th; and the Austrians, after garrisoning Mantua, retired into the Tyrol. The English were dis¬ lodged from Leghorn and Corsica; and Venice, Genoa and Piedmont gave in.

Napoleon followed up his successes by ne¬ gotiations with the Italian princes and the Pope, upon whom he levied contributions. The king of Naples signed an armistice on 5 June. Besides money, so much wanted by the direct¬ ory, Napoleon provided a pleasing tribute to French vanity by stipulating for the surrender of pictures, manuscripts and works of art. On Lombardy he levied a contribution of $400,- 000,000; the Pope promised $420,000,000. He sent $200,000,00 to the directory, which had not been able to defray the expenses of his 'cam¬ paign. While he besieged Mantua, a fresh army of Austrians under Wurmser advanced against him in three divisions. Here Napoleon's ability to grasp a situation quickly and to discover the critical point in a campaign were remark¬ ably displayed and served him well. He raised the siege of Mantua, beat one division under Quosdanovich at Salo and Lonato, 3 Aug. 1796, and another under Wurmser at Castiglione, on the 5th. Wurmser, reinforced to 50,000 men, again attempted to relieve Mantua. Napoleon, who had entered the Tyrol and had reached Trent on his way to Innsbruck, after defeating 25,000 Austrians under Davidovich at Roveredo, on 4 September and winning the battle of Cal- liano, descended the valley of the Brenta after Wurmser, defeated him at Bassano (8 Septem¬ ber), at La Favorita and at Saint George and about the middle of that month shut him into Mantua.

On the other hand the same success had not attended the armies of the north. The Arch¬ duke Charles had defeated Jourdan, and forced Moreau, who had penetrated into Bavaria, to retreat by the Black Forest to Alsace which he reached in October. Thus any relief for Na¬ poleon was checked. At this time also a great expedition to Ireland under Hoche failed and that general was recalled to France to serve with one of the other armies. These events enabled the Austrians, to send a fresh army after Napoleon, consisting of 50,000 men, under Alvinczy and Davidovich. In vain, however. After sustaining repulses at Rivoli and Caldiero, he outmanoeuvred Alvinczy and defeated him at Areola 15-17 November. In January 1797 Alvinczy, with large reinforcements, again ad¬ vanced from Roveredo to the relief of Mantua. The French were driven in at La Carona but Napoleon defeated Alvinczy on the 14th at Rivoli, and on 2 February received the surren¬ der of Mantua from Wurmser. . On the same day he put an end to his armistice with the Pope and invaded the States of the Church, de¬ feating the papal troops at Senio, and in rapid succession capturing Faenza, Ancona, Loretto and Tolentino. A speedy understanding was reached by the Treaty of Tolentino (19 Feb. 1797). The Pope surrendered Avignon, Bo¬

logna, Ferrara and the Romagna to France. These were added to the provinces of Modena and Reggio, taken from the Duke, and formed the Cispadane Republic, as, after the battle of Lodi, Lombardy had been proclaimed the Transpadane Republic.

The Austrians, however, were preparing for another invasion of Italy under the Archduke Charles, and Napoleon resolved to anticipate them before they should receive their reinforce¬ ments from the armies on the Rhine. He there¬ fore entered the Tyrol, driving the Archduke before him, and, crossing the Noric Alps and penetrating as far as Leoben in Styria, he had reached Judenburg, a few days' march from Vienna, when an armistice was accepted (7 April 1797) and preliminaries were signed at Leoben on the 18th, ceding the Austrian Netherlands and Lombardy to France, and in¬ demnifying Austria with Venetia. These pre¬ liminaries were confirmed by the Treaty of Campo Formio, signed 17 October. While Na¬ poleon was carrying on these stupendous oper¬ ations, Hoche and Moreau had conducted equally glorious but less successful campaigns against the Austrians in southern Germany and had pushed them back into the Black Forest when they received the news from Leoben of armistice and suspended active operations.

In the meantime the condition of affairs at home was becoming worse. The Reign of Terror had been followed by an excessive dis- • solution of' manners. Brigandage prevailed in the provinces. Barras, a member of the direc¬ tory, and other high officials had been guilty of malversation and

private jobbing in the .public funds. The returned royalists were intriguing for a counter-revolution. The reactionary party had triumphed in the elections of May 1797, and had succeeded in electing Pichegru president of the Five Hundred, and Barbe Marbois, another royalist, president of the Ancients, and had re¬ placed Letournerre in the directory by Barthe- lemy. The majority of the directory, relying on the support of Bonaparte, resolved to anticipate them. Hoche had been recalled with his army from the Rhine and from Italy Napoleon sent Augereau, his trustworthy aide, and with these the directory carried out the coup d'etat of the 18th Fructidor (4 Sept. 1797). On that night Augereau introduced 12,000 men into Paris, sur¬ rounded the halls of the councils and arrested the leaders of the reactionary party. The minorities of the two councils, assembled on the invitation of the directors, condemned 53 depu¬ ties to transportation ; annulled the elections in 48 departments, and repealed the laws which had been passed in favor of priests and emi¬ grants ; and other violent measures were also taken. Moreau, who had betrayed the intrigues of Pichegru, was himself suspected, and de¬ prived of his command ; and Hoche in conse¬ quence received command of the two armies of the Rhine. Soon afterward, however, he was taken suddenly ill (some say he was poisoned) and died.

It seems to have been the purpose of the directory at this time to invade England and with this object in view a large army had been gathered together. Napoleon was placed in command of it and though at first he professed to favor the design, he readily saw its impracti¬ cability and finally persuaded the directory to abandon the project. As an alternative he pro-

posed to ruin the English Indian Empire by the conquest of Egypt. His plan was approved; an army consisting of 36,000 men was equipped; and in a fleet commanded by Brueis the ex¬ pedition embarked at Toulon on 19 May 1798. In passing they took Malta from the Knights 9—10 June. The fleet, a few days later set sail for Egypt and reached Alexandria 1 July. Na¬ poleon sent Kleber forward to take that city and then advanced on Cairo but before he reached his destination he encountered a large force of Mamelukes. A long and bloody strug¬ gle ensued known as the battle of the Pyramids, but on 21 July Napoleon emerged victorious. He then entered Cairo in triumph. Napoleon thinking himself secure set about reorganizing the civil and military government of the coun¬ try, among other things establishing on 22 Au¬ gust the Institute of Egypt. But before he had accomplished much in that direction fortune de¬ livered him a terrible blow. While he was thus occupied in the interior, Nelson, in

command of the English fleet, had pursued the French fleet, found it moored in the Bay of Abukir, defeated and nearly destroyed it at the battle of the Nile, 1-2 Aug. 1798. The French were thus cut off from escape. To make matters worse the sultan declared war against Na¬ poleon. In October the people in Cairo revolted and then occurred the fearful massacres when 2,000 people were put to deattn Napoleon, how- . ever, instead of attempting to return to France resolved to conquer Syria. Early in February 1799 he started with 13,000 men to cross the desert. El-Arish, Gaza and Jaffa quickly suc¬ cumbed and he then laid siege to the city of Acre which was defended by a Turkish garrison under Djezzar Pasha, assisted by the English commodore, Sir Sydney Smith. It was probably at this time that he heard of the disorders in France and the disasters to French armies. This fact combined with his inability to capture the city undoubtedly influenced his decision to return to France. He therefore on 20-21 May, after a 60-day siege, relinquished the attempt to capture the place and returned to Egypt, laying waste the country by fire and having lost over 4,000 men in the expedition. Napoleon re-entered Cairo on 14 June but not a month had passed before it was announced that a Turkish expedition of 10,000 men was marching against him. On 25 July Napoleon attacked and almost annihilated this force, which the sultan had landed at Abukir. On 22 Aug. 1799 he transferred the command of the Egyptian army to Kleber and embarking in a frigate landed at Frejus 9 October after several narrow escapes from capture by the English Mediter¬ ranean cruisers.

While Napoleon was conducting these opera¬ tions in Egypt a second coalition, in violation of the Treaty of Campo Formo, had been formed against France, embracing England, Russia, Austria and other German states, Naples, Portugal and Turkey. To meet this danger the councils passed the law of the con¬ scription (5 Sept. 1798), and ordered a levy of 200,000 men. The campaign of 1799 was dis¬ astrous to the French. Jourdan, who had crossed the Black Forest, was defeated by the Archduke Charles at Stockbach in Swabia on 25 March, and forced to retire beyond the Rhine. Sherer, who was entrusted with the command of the army of Italy, was defeated at

Magnano on 5 April. Moreau, who superseded him, sustained further reverses; and Mac¬ donald, who came to his assistance with the army of Naples, was totally defeated in the battle of the Trebbia, 17-19 June. Turin, Ales¬ sandria and Mantua were captured. Joubert, who succeeded Moreau, was defeated and killed at Novi 15 August. On the other hand, the Anglo-Russian campaign in Holland failed; and Massena, after a brilliant campaign in Switzerland, defeated the Russians and Aus¬ trians at Zurich on 25 September. This in¬ duced the Emperor Paul I to make peace.

Napoleon, on his return, found the govern¬ ment in great embarrassment. Its credit was wholly gone. It was obliged to fund the in¬ terest of its debts or pay it in worthless paper money. It was ill-obeyed by its generals. A revolution had taken place in the government (18 June), but the new directors were as in¬ competent as the old. In these circumstances was accomplished the revolution of the 18th and 19th Brumaire (9-10 Nov. 1799) by which the directory was abolished. The councils be¬ ing alarmed by rumors of a Jacobin plot, the Ancients gave orders that both bodies of the legislature should be transferred to Saint Cloud under the conduct of Bonaparte, who was entrusted with the command of the troops. Bonaparte had already secured the co-operation of Moreau and the other generals present in Paris. . On the 10th Napoleon entered the Council of the Ancients assembled at Saint Cloud, and insisted on the necessity of a new constitution. On proceeding to the Council of the Five Hundred he was received with cries of a bas le dictateur. General Leclerc, by his orders, entered and dispersed the assembly. The members of the two councils who were favorable to Bonaparte then appointed a pro¬ visional government of three consuls — Bona¬ parte, Si-eyes and Roger Ducos, and a com¬ mittee consisting of 25 members of each coun¬ cil to draw up a new constitution. This was proclaimed on 15 December, and called the Constitution of the Year III.® The three con¬ suls were appointed for 10 years, and re-eligible. The first had all the executive powers, the others only a consultative voice. This consti¬ tution was submitted to the approbation of the people, and accepted by 3,011,107 suffrages against 1,567. The departments were put under prefects directly responsible to the Minister of the Interior. The prefects, subprefects and maires of communes had their councils, which were merely consultative, the whole executive power being in the hands of the officer respon¬ sible to government.

Bonaparte chose Cambaceres and Lebrun as second and third consuls. He then under¬ took the task of reforming civil affairs. He recruited the national treasury, repealed many of the more violent laws that had been promul¬ gated during the Revolution, and reopened the churches. He wrote letters to the king of Eng¬ land and the emperor urging, in theatrical terms, the restoration of peace, but these overtures were refused, and his next business was to pre¬ pare for war. He gave Moreau the command of the army of the Rhine, and determined him¬ self to proceed to Italy. Massena with the remains of the French army was shut up in Genoa. On 13 May 1800 he began his memor¬ able march across the Alps and on 2 June to the

surprise and consternation of the allies entered Milan. After several

unimportant skirmishes he attacked and decisively defeated the Austrians at Marengo on 14 June 1800. He thus for a second time secured to the French possession of all the Piedmontese fortresses. By the Con¬ vention of Alessandria, signed on the 16th, Melas abandoned all Piedmont and Lombardy to the Oglio. Napoleon then committed the command to Massena and returned to Paris. Meanwhile Moreau defeated the Austrians in several engagements during May, and forced them to take refuge in Ulm. For a while Napoleon's time was divided between campaign¬ ing and negotiating. The English, however, finally persuaded the Austrians to continue the struggle and late in the year hostilities once more began in the valley of the upper Danube. Moreau again defeated the Austrians under the Archduke John on 3 December in the import¬ ant battle of Hohenlinden ; and after a series of brilliant combats drove the Austrians back till Vienna was in terror. Brune, who suc¬ ceeded Massena, extended the Italian conquests in Tuscany and Venetia. Negotiations were then entered on by Austria, and the Peace of Luneville concluded 9 Feb. 1801. The Rhine was recognized as the boundary between France and Germany. The Adige was to be the bound¬ ary of Austria and Italy. The independence of the Batavian, Helvetian, Cisalpine and Ligurian republics was guaranteed. A treaty was. also concluded with Spain at Madrid on 21 March ; and by the Treaty of Florence 28 March, Naples agreed to renounce the coalition, and re¬ ceived French garrisons. Treaties were also signed with the Pope, Bavaria, Portugal, Russia and Turkey. Russia, Prussia, Denmark and Sweden then formed an armed neutrality in opposition to the naval privileges claimed by England, which now maintained the war single-handed. This led to a brief war between Eng¬ land and the northern powers except Prussia, which was terminated by the death of Paul I, and the battle of Copenhagen.

During all this time, the French army in Egypt, thought greatly weakened, was unsub¬ dued. On 8 March 1801 an English fleet under Abercrombie debarked 18,000 troops at Abukir; on 13 March this force attacked and defeated the French. On the 17th Sir Sydney Smith re¬ duced the forts at Abukir; and on the 20th 15,000 English again attacked 9,000 French and forced them back to Alexandria and Cairo. General Kleber had been assassinated and on 30 August General Menou, by a capitulation with the English, agreed to evacuate Egypt. Both England and France were now anxious for peace. Preliminaries were signed on 1 October and the Peace of Amiens was concluded 27 March 1802. France retained her continental conquests. Cevlon was ceded to England by Holland, and Trinidad by Spain. All the other conquests of Great Britain were restored. Malta, which had been taken by the English, was to be restored to the Knights of Saint Tohn. This lull in active warfare allowed Napoleon time to crush an insurrection of the blacks in Santo Domingo. .

Napoleon exhibited his wonted vigor in home administration. By means of the Senate he silenced the opposition of the tribunate and the corps legislatif. He assembled the most noted lawyers in France under the presidency

of Cambaceres to draw up a new code of civil laws now known as the ((Code Napoleon.)} (See Code). He entered into a concordat with Car¬ dinal Consalvi for the re-establishment of the Catholic religion. He undertook public works, constructed roads and bridges, encouraged industry and commerce. On 2 Aug. 1802, Napoleon and his colleagues were made con¬ suls for life.

The external policy of Napoleon was not calculated to conciliaˆ the jealousies caused by the extension of French dominion. The inde¬ pendence of the new republics was merely nominal. The island of Elba was occupied and incorporated with France in August 1802, Pied¬ mont 11 September and Parma in October; while in the same year Piacenza was united to France and an armed intervention changed the government of Switzerland. Holland was also treated as a part of France and received a constitution from Paris. By the Treaty of Luneville the German princes dispossessed by the advance of the French boundarv were to be indemnified beyond the Rhine. The process of compensation was not carried out with suffi¬ cient promptitude for Napoleon. By his inter¬ ference, in conjunction with that of the em¬ peror of Russia, the indemnification was effected by the extinction of the two electorates of Cologne and Treves, and the secularization of the ecclesiastical estates. Napoleon on 30 April 1803 sold Louisiana to the United States for $15,000,000.

The discontent excited in England by this aggressive policy made it evident that the peace could not be maintained, and the govern¬ ment refused to evacuate Malta. On 16 May 1803, two days before the declaration of war, an embargo was laid on all French and Dutch vessels in English harbors. Napoleon retali¬ ated for this lawless proceeding by seizing as hostages all English travelers in France and Holland, and General Mortier took military possession of Hanover. Russia and Prussia attempted to intervene, but on terms unac¬ ceptable to France. Spain and Portugal had to purchase their neutrality from France; but as this purchased neutrality placed the former at the disposal of France, England declared war with Spain. Naples was occupied by French troops, and vast preparations were made osten¬ sibly for the invasion of England. While these events were occurring a conspiracy for the overthrow of Bonaparte and the restoration of the Bourbons was discovered in 1804. In this the British government was implicated. The most distinguished of the conspirators were Cadoudal, Pichegru and Moreau, Cadoudal was executed, Pichegru destroyed himself in prison, Moreau was pardoned and retired to the United States.

The legislative bodies were now completely subservient to Napoleon, and the conspiracy of Cadoudal was made a pretext for offering him the title of emperor. The senatus-consultum for the regulation of the empire, drawn up bv Napoleon himself, was passed 18 May 1804. The empire was confirmed by a popular vote of 3,572,329 against 2,569. The coronation took place at Notre Dame on 2 Dec. 1804, and the empire was established.

Bibliography. — Broglie, Due de, (Memoirs of the Prince TallyramP (New York 1891); Browning, O., (Wars and Military Develop-

ment) (Vol. XVII, The Nineteenth Century, London and Toronto, 1902) ; Carey, M., (A His¬ tory of France} (A translation of Duruy's (Histoire de France, } New York 1896) ; Crowe, (History of France) (London 1858) ; Emerson, E., (A History of the Nineteenth Century Year by Year) (New York 1901) ; Fleury, Histoire de France } (1891) ; Fournier, A., (Napoleon the First) (New York 1903) ; Guizot, (Histoire de France) (Paris 1870) ; Hazen, (The French Revolution and NapoleorP (New York 1917) ; Kitchen, G. W., (History of France) (Oxford, 1906) ; Lenz, M., (Napoleon > (New York 1907) ; Mackenzie, (The Nineteenth Century) (Lon¬ don 1882) ; Masson, F., (Napoleon } (New York 1894) ; Rose, J. H., (Life of Napoleon P (New York 1901) ; Taine, (Modern Regime (New York 1894, Durand's translation) ; Thornton, (Continental Rulers* (Vol. VI, The Nine¬ teenth Century, London 1902) ; Yonge, (Three Centuries of Modern History) (London 1872) ; White, (History of France) (1890). Also con¬ sult Vols. VIII and IX of the (Cambridge Modern History,* in which a long list of works covering this period is given.*

George Edwin Rines.

*4. THE EMPIRE. As the fear of social¬ ism helped to found the consulate in 1799, so the royalist plot of 1804 precipitated the foun¬ dation of the empire. Much as France ab¬ horred the execution of the Due d'Enghein, she was still more aghast at the prospect of the turmoils which would ensue, should Napoleon be suddenly removed from the head of affairs. <(The need of repose and stability, ** says Miot de Melito, <(was so pressing, the future so dis¬ quieting, the fear of terrorism so great, the re¬ turn of the Bourbons so formidable that people quickly grabbed at any expedient which might save them from those dangers.** Seven days after the Duke's murder, Fouche appealed to the Senate to establish hereditary government. The idea was taken up on every side. Carnot alone opposed it in the tribunate ; the Senate, the council of state, reported on its favor and*

after a brief period of affected hesitation Na¬ poleon complied with the general desire. On 18 May 1804, a constitution which had been elaborated by Fouche and Talleyrand was adopted in the Senate with three dissentent voices. It decreed to Napoleon the title of emperor of the French and settled the succes¬ sion to the throne on his direct male issue, natural and legitimate. It enabled a childless emperor to adopt the children or grandchildren of his brothers, and designated Joseph and Louis Bonaparte (Napoleon's brothers) to the succession, in case the emperor should die with¬ out natural or adopted children. The civil list was fixed at 25,000,000 francs, a sum estab¬ lished in the constitution of 1791 ; and other provisions were added with the design of add¬ ing brilliance and authority to the throne. Six grand dignitaries of the empire, irresponsible, irremovable, enjoying the status and preroga¬ tives of princes, were to support the new em¬ peror. Cambaceres was made archchancellor, Lebrun, archtreasurer. The office of grand- elector — a title borrowed from the nomencla¬ ture of the Holy Roman Empire — was conferred on Napoleon's elder brother Joseph; the office of constable was given to the younger brother Louis. The remaining two dignities were ulti-

"mately conferred upon connections by marriage, and while Napoleon's stepson, Eugene Beau- harnais, became archchancellor of state, his brother-in-law, Murat, was given the rank of high admiral. Another provision in the Senate's constitution of 18 May 1804 was designed to conciliate the army. There were to be 16 mar¬ shals of the empire, and the marshal's baton henceforward became the chief prize of mili¬ tary ambition. At the same time the court was furnished with decorative officials, with a grand almoner (Cardinal Fesch), a grand marshal of the palace (Duroc), a grand chamberlain (Talleyrand), a grand equerry (Caulaincoiirt) , a grand master of ceremonies (De Segur), and with numerous prefects and ladies of the pal¬ ace. The changes made in the mechanism of the government were even more significant of absolutist tendencies. The restriction placed upon the numbers of senators was removed and their nomination conferred upon the emperor. The tribunate was divided into three sections, dealing respectively with legislation, home af¬ fairs and finance, a measure which effectually destroyed its potency as an organ of protest ; and though the legislative body was given the power of discussing measures in a general com¬ mittee, the discussions, unless invited by the council, were neither to be published nor printed. As a matter of fact both tribunate and legislative ceased to be working parts of the -machinery. As the powers of the tribunes expired, no fresh nominations were made, and so the body vanished from the constitution. A more expeditious method of legislation was dis¬ covered. The emperor governed by means of Senatus Consulta or decrees of the council of state.

The French people acclaimed the constitu¬ tional revolution by more than

*three and a half million votes; that is to say, by a larger major¬ ity than was given for the consulate or the consulate for life. Of the opponents, Carnot was the most conspicuous ; and it is noticeable that almost all the barristers of Paris were against the establishment of monarchy ; but the army was flattered by the elevation of its leader, and the peasantry saw in the change a fresh guarantee for the stability of revolu¬ tionary land settlement. That he might reassure the Catholics, and win the royalists, Napoleon summoned the Pope to preside over the coro¬ nation. Pius VII undertook the journey, but was destined to receive a lesson upon the re¬ lations of the spiritual to the temporal power. After he had anointed the emperor and empress with the holy oil and as he was proceeding to perform the act of coronation, Napoleon seized the crown and placed it on his head with his * own hands. The sword and insignia of Charle¬ magne were brought from Aix to give signifi¬ cance to the occasion, as if the ceremony of Notre Dame betokened nothing less than a revival of the great Frankish empire.*

Meanwhile war had broken out with Eng¬ land. The vigilance of the English fleet pre¬ vented that concentration of the French navy in the Channel which was essential to the escort of the Boulogne flotilla, but Napoleon had paved the way for a war with Austria, in case it should prove impossible to strike at London. On the pretext that an emperor could not also be president of a republic, it was determined

to convert the Italian republic into a monarchy. The Italian crown was offered first to Joseph, then to Louis, but the brothers were too am¬ bitious to renounce their claims on the imperial succession, and Napoleon finally decided to as¬ sume the crown himself and to appoint Eugene Beauharnais his viceroy. Italian deputies were summoned to Paris to vote the crown and in May 1805 Napoleon went to Italy to receive it. In the cathedral of Milan on 26 May he placed the old iron circle of the Lombard kings upon his brow, and though the French senate and the rulers of Europe were assured that the Italian kingdom and the French empire would be kept strictly separate, no one was deceived. The an¬ nexation pf Genoa to France was a proof that Napoleon's ambition was insatiable, and adver¬ tised to the powers that war was the only rem¬ edy. By July 1805 Russia had determined to break off relations with Napoleon; on 9 August Austria gave her secret adhesion to the Russo- British alliance, by the middle of September an Austrian army under General Mack was at Ulm. The speed and genius of Napoleon disconcerted all the calculations of his enemies. The army of England (rechristened 29 August the grand army) was swung

round, and rapidly pushed through Germany into the valley of the Danube. On 20 October Mack, surprised, surrounded, and overwhelmed, capitulated at Ulm ; and on 2 December (the anniversary of the coronation) the Austrians and Russians were defeated with huge loss at Austerlitz. Francis withdrew from the war and on 20 Dec. 1805 signed the treaty of Pressburg with France.

The most obvious political result of the cam¬ paign was that the influence of the French em¬ pire was substituted for that of Austria in Italy and Germany. The Hapsburgs were compelled to recognize the Italian kingdom and the an¬ nexation of Genoa, and to cede Venetia, Istria, and Dalmatia to the victor. The Neapolitan Bourbons had received an Anglo-Russian force into their capital, and for this violation of neutrality they were condemned to expulsion. Accordingly no sooner had peace been struck at Pressburg than Napoleon sent Saint Cyr (q.v.) and Massena (q.v.) to expel ((the guilty woman® who had so flagrantly <(violated all that is sacred among men.® In this mission they were successful. On 13 Jan. 1806, Ferdinand and Caroline fled to Sicily, where they were secured by the protection of the English fleet. The kingdom of the two Sicilies was given to Joseph. Elise Bacciocchi, a sister of Napoleon, became princess of Lucca and Piombino, while another sister, the beautiful Pauline Borghese, received the principality of Guastalla. Thus the whole of the Italian peninsula, save the Papal States, came under French control.

The results of Austerlitz were no less im¬ pressive in Germany. Before the war Na¬ poleon had solicited and obtained the alliance of the South German dynasties and after the victory he proceeded to reward his allies. Ba¬ varia and Wurtemburg were raised to the dig¬ nity of kingdoms ; Baden became a grand duchy, while marriages were arranged between Eugene and Princess Augusta of Bavaria, Je¬ rome and Princess Caroline of Wurtemburg and Stephanie de Beauharnais and the Crown Prince of Baden. By recognizing the independ¬ ent authority of the three ˆ South German princes Napoleon had practically eliminated

Austrian influence from South Germany, but so long as the shadow of the Holy Roman Empire remained, the Hapsburgs still retained a right of intervention in German affairs. This right Napoleon determined to abolish. On 1 Aug.

1806, the Diet of Ratisbon was informed that the Holy Roman Empire was at an end. In place of this ancient and picturesque institution a confederation of the Rhine was formed under the protectorate of Napoleon, a ((new Carolin gian code® as it was called in Paris, where it was drafted under the direction of Talleyrand. The 16 princes who joined the confederation were bound by a close offensive and defensive alliance to

France and compelled to furnish contingents to the grand army. As the price of their subservience to the Protector of the League, they were encouraged to be autocratic in their own dominions.

As Austerlitz gave Napoleon control of Southern Germany, so Jena and Friedland made him master of the north. The Prussian court, roused by the occupation of Hanover in 1803, the murder of the Due d'Enghein in 1804, and the violation of Prussian neutrality by Ber- nadotte's corps in 1805, determined (October 1805) to present an ultimatum to Napoleon and in the event of his refusal to cast in her lot with the allies. But the battle of Austerlitz intervened, and Haugwitz, the bearer of the Prussian ultimatum, was compelled to sign the humiliating treaty of Schonbrunn (15 Dec. 1805), the main object of which was to involve Prussia in war with England by forcing her to accept Hanover. But the war spirit was now high in Berlin, and everything in Napoleon's conduct during the ensuing months — the for¬ mation of the Confederation of the Rhine, the obstacles placed in the way of a counterbalanc¬ ing confederation of the North — was calcu¬ lated to raise it. Finally Prussia learned that Napoleon was offering Hanover to England, and rushed into war. Napoleon, swiftly march¬ ing through the depths of Thuringia, beat the Prussians at Jena and Auerstadt, 14 Oct. 1806, occupied Berlin, compelled the Saxons to enter the confederation of the Rhine, and finally, after the bloody and indecisive battle of Eylau, 6 Feb. 1807, won a crowning victory at Fried land, 14 June, which led Alexander of Russia to decide for peace. The three sovereigns met at Tilsit, and then a peace was signed 7 July

1807. Prussia was not only compelled to pay a heavy war indemnity, and to support a French army of occupation, but was stripped both of her eastern and western provinces. The prov¬ inces (save the circle of Bialystock) acquired by the second and third partition of Poland, were formed into a grand duchy of Warsaw, which was attached to the Saxon kingdom, and consequently included in the Rhenish confede¬ ration. On the western frontier, the Westpha¬ lian province, including the important fortress of Magdeburg were, together with the Duchy of Brunswick, parts of Hanover and the elec¬ torate of Hesse-Cassel, formed into a kingdom of Westphalia for Prince Jerome, the youngest brother of the emperor, likewise included in the Rhenish confederation. The Baltic littoral passed under French control, for, though Dan¬ zig was proclaimed a free city, it was to be governed by a French force, and though the Duchies of Oldenburg and Mecklenburg- Schwerin were restored to their respective

dukes, they were to sustain a French army of occupation until the general peace. Meanwhile, on 21 Nov. 1806, Napoleon had issued the fa¬ mous Berlin decree (q.v.), the object of which was to ruin England by excluding her goods from the continent, and by declaring the British isles to be in a state of blockade. But to make the continental blockade completely effective it was necessary to control all the littoral of con¬ tinental Europe ; and this, accordingly, became the primary aim of imperial policy. The Bata¬ vian Republic was converted into a kingdom of Holland, and placed under the control of Louis in 1806, while the refusal of the Pope to accede to the blockade led to the gradual absorption of the Papal States, and to their final incorpo¬ ration in the French Empire in 1809. This, too, was the primary motive for Napoleon's in¬ tervention in the affairs of the Iberian penin¬ sula. While returning from Tilsit, Napoleon commanded Talleyrand to inform the Portu¬ guese that unless they closed their forts to the British by 1 Sept. 1807, he would declare war upon the Prince Regent. As Portugal did not acquiesce, a secret convention was signed at Fontainebleau, 27 Oct. 1807, between France and Spain, providing for the joint conquest and partition of the Portuguese kingdom. The con¬ quest was rapidly effected, and as Junot (q.v.) with 1,500 famished grenadiers struggled into Lisbon, 30 Nov. 1807, the Prince Regent and the -royal family fled to South America. But meanwhile Napoleon was preparing to over¬ throw the Bourbon house in Spain. The court of Madrid had secret grudges against the French Empire, and in a moment of infatuation during the summer of 1806, the Spanish army had been mobilized, with a view of rejecting the treaty of Ildefonzo, which had been the source of the destruction of the Spanish navy. But Jena upset the calculation of Godoy, the miserable favorite, who held the reins of Span¬ ish policy. He explained away his action, pro¬ tested friendship, showed himself in the treaty of Fontainebleau, prepared to connive at the destruction of the house of Braganza, and did not for a moment deceive Napoleon. The Portuguese campaign, and the dissensions be¬ tween Charles IV and his son Ferdinand, gave to Napoleon the pretext for interference. French troops were sent across the Pyrennees, nominally for the purpose of supporting the army of Portugal, really in order to effect the subjugation of the country. Finally the royal family was enticed to Bayonne, and father and son compelled, 5 May 1808, to renounce their claims to the throne. Joseph was sent to gov¬ ern in Madrid, while Murat, the grand duke of Berg, took his place in Naples. By the middle of May the whole Iberian peninsula had nomi¬ nally become an annex of the French Empire. In reality the gravest mistake had been com¬ mitted. An English army under Sir Arthur Wellesley (q.v.) defeated Junot at Vimievo 21 Aug. 1805, and forced the French to evacuate Portugal, while the Spanish people, passionately loyal to the fallen dynasty, hating the French revolution, and impervious to the charms of a scientific administration, everywhere rose in re¬ volt. On 22

July 1808, a large French force under Dupont (q.v.) capitulated at Bavle'n. It was the first serious military reverse which the French Empire had sustained.

The Austrian war of 1809 was the natural

sequel to the insurrection of the Spanish people. Germany was smarting under the hardships in¬ volved by the French military occupation and the continental blockade ; and the deepest re¬ sentment was caused by a decree issued by Na¬ poleon, commanding the banishment of Stein (q.v.), the great reform minister from Prussia. Every German who hoped for better things looked to Austria as the destined liberator; but again the genius of Napoleon overcame all ob¬ stacles. Five brilliant battles (1 9—23 April) drove the Archduke Charles out of Bavaria. On 13 May Vienna surrendered to Napoleon. On 6 July he won the hard fought field of Wagram. The English diversion at Walcheren was as ineffective as the gallant raid of Colonel Schill or the march of the Duke of Bruns¬ wick's black legion through northern Germany. On 14 Oct. 1809, Francis of Austria accepted the treaty of Schonbrunn, and abandoned the Tyrol, Trieste and the Illyrian littoral to the conqueror. The Tyrolese, who, under the leadership of Andreas Hofer (q.v.), an inn¬ keeper, had made a gallant resistance to the French, were now easily overcome, and while their leader was shot, to the eternal disgrace of Napoleon, their territory was divided between the kingdoms of Italy, Bavaria and the Illyrian provinces of the French Empire. Nor was this the last affront to Austrian pride. Divorcing Josephine, Napoleon demanded and obtained the hand of Marie Louise, the daughter of Francis. The French Empire had now reached its zenith, though some further rearrangements of territory were effected, mainly for the pur¬ pose of improving the mechanism of the block¬ ade. Thus Louis, who was considered to be too lenient to the Dutch, was compelled to ab¬ dicate, and the kingdom of Holland was an¬ nexed to the Empire on 9 July 1810; while at the end of the year (December 1810) the north¬ western portion of the Westphalian kingdom, and all the northwest littoral of Germany, in¬ cluding Bremen, Hamburg, Liibeck were simi¬ larly incorporated and organized as French de¬ partments. The rigor of the blockade now reached its height. Heavy duties were placed upon all colonial imports by the Trianon tariff, 5 Aug. 1810. The Fontainebleau decrees (18 and 25 October) ordered that all British manu¬ factured goods found in the Napoleonic states should be seized and publicly burnt, while 51 tribunals were established for the purpose of trying persons accused of contraband. So eager was Napoleon to complete the system that in January 1811, he dethroned the Duke of Oldenburg, the uncle of the Tsar.

The French Empire by this time consisted of 130 departments, stretching from the Ebro to the Trave, and from the Tiber to the Chan¬ nel, and girt

with a circle of vassal kingdoms and principalities. Throughout this vast area the valuable principles of social equality, reli¬ gious toleration, and promotion by merit were enforced. Though the codes of the Empire were more perfunctory, more observant of older legal traditions and less liberal than the civil code, which was the work of the consulate, yet they preserved two valuable conquests of the Revolution, the petty jury and public trial. If the essence of democracy was, as Napoleon contended, «a career open to talent," then the French Empire was democratic; but in every other respect it violated the principles of lib-

erty. Special courts were created with sum¬ mary jurisdiction in the disturbed districts. 1 he censorship of the press (aggravated by the decree of 5 Feb. 1810) annihilated political criticism. Holding that there could be no po¬ litical stability without ((a teaching body actu¬ ated by fixed principles,® Napoleon created 17 March 1808, a University of France, which was intended to include all the educational agencies in the Empire, and to form citizens <(attached to their religion, their prince, their country, and their family.® No one could open a school or teach in public without being a graduate of the university, which was to create and administer the public and to authorize and supervise the private schools. The university was divided into 16 academies, one in Paris and 15 in the provinces, and governed by a grand-master, whose appointment and dismissal lay in the hands of the Emperor. The aim of the whole institution was to inculcate habits of military discipline and blind subservience, and to secure complete educational uniformity throughout his empire. An imperial catechism, drawn up by Napoleon himself and inculcating obedience to his person, was intended to give a similar di¬ rection to the public mind. To fortify the dynasty, Napoleon saw that it was necessary to create an hereditary nobility, but the opposi¬ tion which had been made to the Legion of Honor in the name of equality warned him to proceed with caution. In the first instance he began by distributing foreign fiefs and titles, carving no less than 17 duchies out of the Venetian states; then (August 1806) license was given to exchange grand ducal fiefs for estates within the territory of the empire, and to transfer to estates so acquired the privilege attaching to noble tenure. Finally, on 1 March 1809, a new nobility was created, the titles to be hereditary and the noble lands to be en¬ tailed. In all, 31 dukes, 388 counts, 1,090 barons and about 1,500 knights were created under the first empire; but Napoleon was un¬ easily conscious that aristocracies were the product of time, and that the nobility of the ancient regime deposed the upstart dignitaries of the empire. ((I have made princes and dukes,® he said at Saint Helena, <(but I could not make real

nobles.®

In France the burden of the empire was great ; but it was still more crushing in the dependencies. It was part of Napoleon's sys¬ tem to reserve half the domains in every vassal state to serve as endowments to generals or favorites, or to help to replenish his imperial treasury. In addition to this, the dependencies were subjected to the conscription and the blockade, compelled to support the French troops who might, from time to time, be quartered on them, and to maintain war estab¬ lishments quite out of proportion to their financial resources. Thus the benefits secured by the introduction of the French legal codes were largely neutralized; and the French rule became detested all over Germany and Italy. The conscription was everywhere abhorrent, while the blockade inflicted great injury where-ever, as in Holland or the Grand Duchy of Berg, commerce or industry had been active. If the Italian, Dutch and German merchan¬ dise had been permitted a free entry into the French markets the lot of the mercantile and industrial community might have been allevi¬

ated; but in this, as in other respects, Napoleon sacrificed the interests of the French depend¬ encies to those of France herself.

The reconciliation with the Papacy, which had been one of the principal achievements of the consulate, was broken under the empire. The Papal States were annexed to France, 17 May 1809, by a decree recalling the donation of Constantine, and Rome was declared to be a free imperial town. Pius VII retaliated by excommunicating the despoilers of the Church, and the bull was secretly circulated through the empire. For this act of temerity he was seized 5-6 July 1809, and carried off to Savona, where he was kept a prisoner. Difficulties, however, soon arose. The Pope refused to in¬ stitute the bishops named by Napoleon; and Napoleon failed to coerce him. The cardinals and generals of the orders were convoked to Paris, and the archives of the Roman adminis¬ tration were similarly transferred to the capital of the empire. By a decree of 17 Feb. 1810, the Pope was guaranteed a salary of 2,500,000 francs, given a palace in Paris, while at the same time it was ordained that all future popes should at their enthronement swear to observe the Gallican articles of 1682, which were de¬ clared common to all the churches of the empire. This bold and revolutionary measure aroused great protests. Thirteen cardinals re¬ fused to attend the emperor's marriage with Marie Louise, and were in consequence ban¬ ished to provincial towns and prohibited from wearing the purple. A national council (17 June to 5 July 1819) gave Napoleon no satis¬ faction, but at last a mutilated remnant of the assembly was induced to declare that the right of institution to vacant sees lapsed to the metropolitan in case the Pope failed to grant institution within six months after the see fell vacant. The Pope ' signed a brief accepting this conclusion,

but in a form which was dis¬ tasteful to Napoleon, and the sore remained open. At last, after the Russian disaster, Napo¬ leon was induced (concordat of Fontainebleau 25 Jan. 1813) to renounce his claim to the Catholicity of the Gallican articles, while the Pope on his side confirmed the conciliar .decree on the institution of bishoprics. But good feel¬ ing was never restored, and the alienation of the Catholic Church was one of the greatest errors of the Napoleonic Empire.

The downfall of the empire was the nat¬ ural result of Napoleon's ambition. The Penin¬ sula War drained France of her finest troops, relieved the pressure on Prussia and prevented Napoleon from carrying out the designs on the Balkan peninsula, which had been part of the secret arrangement at Tilsit. Other causes con¬ tributed to weaken the Franco-Russian alliance, — Napoleon's encouragement of the Poles, the continent blockade, the Austrian marriage, the annexation of Oldenburg. War broke out in 1812, and Napoleon led a huge army to Mos¬ cow. He retreated among the rigors of a Russian autumn (October-December), lost a quarter of a million men, and shattered his prestige. First Russia, then Austria, ranged themselves on the side of the allies. A crush¬ ing defeat at Leipzig (16-19 October 1813) compelled the evacuation of Germany, and brought about an invasion of France. Though Napoleon fought a brilliant campaign in the valleys of the Marne and the Seine against the

Prussian and Austrian armies, the allies eventu¬ ally pressed on to Paris. On 30 March 1814, the defense of the capital was surrendered by Marmont, and on 6 April Napoleon signed an act of abdication at Fontainebleau, and was allowed to retire to Elba. His dynasty was prescribed. On the advice of Talleyrand, Alexander of Russia, who had entered Paris at the head of the allied armies, resolved to recall the Bourbons. So perished the empire in a blaze of military glory, which France will never forget.

On his return from Elba in 1815, Napoleon, realizing the growth of liberalism, made a pre¬ tense of liberalizing the imperial institutions, and Benjamin Constant, who had led the op¬ position to Louis XVIII, was summoned to draw up a constitution. The defeat of Water¬ loo supervened before any serious trial had been made of the Additional Act, which estab¬ lished an hereditary Chamber of Peers, an elected chamber of representatives, and at the same time guaranteed the freedom of the press; but it cannot be doubted . that had Napoleon succeeded in re-establishing his powers, he would have made short work of liberals and of liberalism.

At Saint Helena, however, he pro¬ fessed that the despotism of the empire had been a . transitional expedient, and that the future of liberalism and nationality in Europe were bound up with the fortunes of his house ; and this was the creed of the Bonapartist party, and the pretext and apology for the second empire.

Bibliography. — The best short biographies of Napoleon are those by F. R. Seeley (London 1836) ; J. H. Rose (2 vols., London 1902) ; A. Fournier (3 vols., Vienna 1886-89; French tr. Paris 1892). The (Cambridge Modern His- tory) (Vol. IX, Cambridge 1906) gives a more extended treatment, and a very full bibliography. Lavisse et Rambaud's (Histoire Generale) (Vol. IX, Paris 1897), is a valuable work of the same type, but slightly less elaborate. H. A. Taine's (Le Regime Moderne) (2 vols., Paris 1891-94), gives a striking criticism of the in¬ stitutions. For the empire in Germany, H. A. L. Fisher's (Studies in Napoleonic Statesmanship: Germany } (Oxford 1903) ; for the empire in Italy, J. F. Driault's (Napoleon en Italie) (Paris 1906), and R. M. Johnston's (The Napo¬ leonic Empire in Southern Italy (2 vols., Lon¬ don 1904), may be usefully consulted. An elaborate work by F. Masson, (Napoleon et sa famille) (7 vols., Paris 1897), is the best authority on the domestic history of the em¬ peror. For his statesmanship there are few works so illuminating as (Pelet de la Lozere Opinions de Napoleon I au Conseil d'Etat* (Paris 1833, English tr., London 1837). The text of the most important constitutional docu¬ ments may be consulted in Helie (Les Consti¬ tutions de la France * (Vol. II). The principal original authority for the period is the corre¬ spondence of the emperor himself, which was published in 32 volumes (1858-70) ; to which great collection must be added some few vol¬ umes of supplementary gleanings, (Lettres inedites ed. Lecestre* (2 vols., Paris 1897) ; (Lettres inedites ed. L. de Brotonne) (Paris 1898) ; and (Dernieres lettres inedites ed. L de Brotonne) (Paris 1903). A handy bibliography has been published by F. Kircheisen (London*

1902) but it is distinctly inferior to the bibliog¬ raphy in the Cambridge Modern History. }

Herbert Albert Laurens Fisher, Author of < Studies in Napoleonic Statesman¬ ships (The Mediaeval Empire , etc.*

5. FRENCH HISTORY SINCE 1815.

With the year 1815 (fall of Napoleon, Restora¬ tion of the Old Monarchy), opens a new era in the history of France. It may be said that from that date up to 1870 all important events, in spite of their inevitable reaction, led gradually to the final destruction of the monarchy, the establishment of the republic upon a solid basis and the triumph of

democratic principles. Be¬ fore proceeding further, and for the sake of easy reference, it may be convenient to mention the heads of the state in their order of suc¬ cession :

Louis XVIII, King, 1815-24.

Charles X, King, 1824-30.

Louis Philippe, King, 1830-48.

Louis Napoleon Bonaparte, President of the Republic,

1848-52.

Napoleon III, Emperor, 1852-70.

General Trochu, President of the Gouvernement de la Defense Nationale, 1870-71.

Adolphe Thiers, President of the Republic, 1871-73.

Marlchal de Mac-Mahon, President of the Republic, –

1873-79.

Jules Grevy, President of the Republic, 1879-87.

Sadi-Carnot, President of the Republic, 1887-94.

Casimir Perier, President of the Republic, 1894-95.

Felix Faure, President of the Republic, 1895-99.

Emile Loubet, President of the Republic, 1899-06.

Armand Fallieres, President of the Republic, 1906-13.

Raymond Poincare, President of the Republic, 1913-

Louis XVIII, brother of Louis XVI, was a liberal king, not by temperament but by cau¬ tiousness, and not only tried to preserve peace which wras earnestly desired by the French people, but to act according to the spirit of the charter of 1814 which gave almost entire ratification to the chief reforms achieved by the revolution : equality of rights, political liber¬ ties, a Parliament elected by the nation. Un¬ fortunately the king's own brother, Comte d'Artois, at the head of a powerful party known as ((Ultra-Royalists,® checked in some measure that liberal policy. He wanted to

restore the former regime of absolute monarchy and used to say that, for himself, he would rather be a simple joiner than be a king in the same capacity as a king of England. The Ultra-Royalists were responsible for what is known as ((la Ter- reur Blanche® (the White Terror), — in oppo¬ sition to the ((Red Terror® of the Convention, — that is to say for the plunders and murders of the Bonapartists and Republicans (especially in the south of France), by their supporters who were more or less encouraged by the local authorities.

It is true, nevertheless, to say that under the reign of Louis XVIII, were adopted, for the first time in the history of France, those measures which are the necessary adjuncts of a constitutional and representative government : periodical election, annual vote of the budget, liberty of discussion in the chamber, and liberty of the press. In order to be an elector it was necessary to pay taxes to the amount of 500 francs, and only those who paid taxes to the amount of 1,000 francs had the right to be elected. It must be remembered that the wealth in France is distributed into manv hands, and especially at that time the men who paid 500 or 1,000 francs in taxes were relatively very

rich; only a minority of the French people was represented in the Chambers.

Nevertheless, the liberal aspirations of the na¬ tion were encouraged because it was the begin¬ ning of a really liberal government. But it was only a beginning and the Ultra-Royalists who wanted to restore all the former privileges of the old aristocracy succeeded in stopping it, — but of course only for a time as nothing can stop the progress of true liberalism, once the movement is started.

The ((Ultras® were in fact strongly sup¬ ported by the aristocratic governments of Europe: Prussia, Austria and Russia, that had pledged themselves to stifle all revolutionary movements and manifestations in any country. For that purpose, these nations who had formed the Holy Alliance (q.v.), had proclaimed that they had a right of intervention wherever and whenever the public institutions were threatened by a revolt of the people. In fact the Holy Alliance was growing anxious at the manifesta¬ tions of liberalism in France, and at the Con¬ gress of Aix-la-Chapelle (1819), they took occasion to impress strongly upon the French ambassador that if the French wanted to take care of themselves they should accept the pro¬ gram of the ˆUltras.® At about the same time (1820), the Due de Berri, nephew

of the king, was murdered by a lunatic named Louvel. The Liberals were held responsible for this murder on the ground that their moderation weakened the power and encouraged the criminals, and the Ultra-Royalists, supported by the Holy Alliance abroad, again came into power, which they retained till the revolution of 1830, under the direction of the Comte de Villele (1820-27) and the Prince de Polignac (1829-30). These two ministers wanted to re-establish the preroga¬ tives of the ancient nobility, that is of the great landlords and the authority of the Church.

That policy was embodied in the following legislative measures: (1) the Emigres (the members of the nobility who had left France during the revolution) were to receive a billion francs (indemnite du Milliard) as a compensation for the sale of their estates which had been sold for the benefit of the state. (2) Certain crimes of a religious character (the stealing of sacred church vessels), were to be punished bv death. (3) Abroad, supported by the policy of the Holy Alliance, France under¬ took the Spanish expedition in order to over¬ come the revolt of the Spaniards against the absolutism and despotism of their king and to restore the latter to his full power.

In spite of the conquest of Algiers (1830) the Ultras who had not yet realized that their policy was contrary to the new French spirit sealed their doom when, in July 1830, they allowed Charles X (who had succeeded his brother in 1824) to sign the famous Ordon- nances de Juillet as follows: (1) Dissolution of the Chamber of Deputies, newly elected, be¬ cause it had liberal aspirations. (2) Suppres¬ sion of the liberty of the press. (3) Altera¬ tion of the electoral laws in favor of the rich citizens. (4) New election to take place in the following September.

It was really a coup d'etat , a violation of the constitutional charter, which was imme¬ diately answered by a revolution in Paris. After three days' fighting, Charles X, an obstinate unintelligent king who had not understood in

the least the spirit of the French people, had to leave not only his throne but his country, and seek refuge in England.

This short revolution did not end in the establishment of the republic, but it strength¬ ened forever the sovereignty of the nation through a constitutional government. Another dynasty, that of the Orleans, who were cousins of the former king, was called to the throne, and Louis Philippe, when ascending the throne, was made to pledge himself to respect the new amended constitutional charter.

He was not the king of France, as the former kings were, but the king of the

*French, which meant that he had been freely elected by the French people, and that there was no divine * right attached to the throne. Louis Philippe was a kind of liberal Bourgeois; he leaned entire. y upon the middle-classes, thereby alienating both the aristocratic party and the lower classes. As regards the foreign policy under his reign, he made, an alliance with England, to ensure peace on a durable basis ; the Entente Cordiale dates from Louis Philippe; his Prime Minister Guizot, the famous French historian, being the main supporter of that policy. As regards the manufacturing industries the reign of Louis Philippe was marked by an unprecedented de¬ velopment which created or rather expanded immensely the proletariat and the power of the poorer classes.*

In fact, the latter started that socialistic movement which was extraordinarily intensi¬ fied during the third republic and whose loud and sometimes brutal protests ended suddenly, — 'Only for a time, — on the very eve of the great European War, when Taures was murdered by a lunatic. The socialistic theories, preached mostly by Saint-Simon, Fourier, Proudhon and Louis Blanc, were however strongly opposed by the Guizot cabinet. Once more the re¬ publicans, allied to the socialists, brought about a revolution in Paris and dethroned the king who — history repeats itself — had to seek refuge in England (1848).

A republican government was established for the second time in the history of France. It was, however, a government of short dura¬ tion, and before a really democratic govern¬ ment, i.e., the third and present Republic, was established. France was to suffer such a catas¬ trophe and to be taught such a lesson as are likely never to be forgotten.

A nephew of Napoleon, Prince Louis Na¬ poleon, was elected President of the Republic: This choice may appear to be preposterous ; the reason was that there was a reactionary move¬ ment of the Monarchists and of the Bona- partists against the Republicans themselves.

The fear of a fresh revolution was directed against the republican government (which for a few weeks was only a Gouvernement Pro- visoire, consisting of the famous French poet Lamartine, and Garnier-Pages, Arago, Ledru- Rollin). The Socialists and the working classes were very exacting. Many riots broke out in Paris. Monarchists and Bonapartists hoping that Louis Napoleon might serve their own pur¬ poses elected him President of the republic for a period which according to the new constitu¬ tion was to last four years.

Louis Napoleon, however, served only his own purpose. As he had not the right to be elected at the expiration of four years, he

asked the Legislative Assembly to change the constitution so that he might be re-elected. The Assembly, however, did not accept this amendment, and that is the reason why it was dissolved by the coup d'etat of 2 Dec. 1851 ; about 100 deputies were exiled, a new consti¬ tution was drawn up admitting universal suf¬ frage, and Louis Napoleon, appealing through a plebiscite to the people, succeeded in having himself proclaimed emperor of the French people under the name of Napoleon III. He reigned until 1870.

From 1852 to 1860 the second empire was a highly despotic government, strict censorship, drastic control of the elections by the govern¬ ment, no right of initiative, of amendment, of interpellation for the Chamber, no public sit¬ tings and no reports of the latter, etc. From 1860 to the end, the empire was, on the con¬ trary, very liberal.

Napoleon III was obliged to alter his policy on account of the growing opposition of- his people as a consequence of the Crimean War (1855), of the Italian War (against the Aus¬ trians 1859), who held a portion of Italy. The Catholics especially were strongly opposed to the emperor in consequence of his policy toward the Pope, when he allowed the Italian king, Vittorio Emmanuele, to seize the Pontifical States, thereby suppressing the temporal power of the Pope. Napoleon had to form a new majority from the ranks of the Liberals; the press was freed from former restraints, the elections were no longer controlled, meetings were allowed unconditionally. Nevertheless the emperor was steadily becoming unpopular; the ((Roman Quˆstionˆ became so entangled that all parties were dissatisfied; the Mexican War had a lamentable conclusion; toward Prussia, who was growing aggressive, Napoleon did not adopt any definite policy; weakness of character, indecision of mind were not what might have been expected from a Napoleon; the very name of the great conqueror had acted upon the public mind as a sort of magic; but presently, for the second time within less than a century, the name of Napoleon was to be identified with a national catastrophe.

It is only fair, however, to say that in spite of many political blunders in his foreign policy, the districts of Nice and Savoie were given to France by Italy in exchange for the help of the French armies in the war against the Austrians which resulted finally in the unifi¬ cation of Italy.

This is no place to relate in details the sad tale of the Franco-Prussian War in 1870-71 ; the world knows that France was defeated, that Alsace-Lorraine was wrested from the mother country and that an indemnity of

five milliards francs had to be paid to Prussia.

After the capitulation of Sedan (2 Sept.

1870) , the Corps legislatif assembled in Paris, deposed the emperor, and Republic was pro¬ claimed by Gambetta, Jules Favre and Jules Ferry (4 Sept. 1870). A Gouvernement Pro- visoire was established until the end of the war. Gambetta was the most prominent member of that government ; he did wonders in organizing the Defense Nationale, 'raised new armies and wanted, in the teeth of insuperable difficulties, to continue the war.

After the capitulation of Paris (28 Jan.

1871) , however, there was no hope left — the

preliminaries of peace were signed, but they were to be ratified by the French people through their representatives. An Assembly (L' Assem¬ ble Nationale), was elected in most exceptional circumstances ; the republican candidates who had Gambetta at their head wanted the continu¬ ation of the war, whilst the large majority of the nation was in favor of peace. The electors voted for the royalist candidates, and the ma¬ jority in the Assembly was composed of. 375 Monarchists out of 700 members. The treaty of Francfort was signed with Prussia (10 May 1871) ; the Commune de Paris (insurrection of the Parisians against the new government) was finally repressed and the way was cleared for a comparatively long period of peace, prosperity, democratic reforms and consolidations, the solidification of public and personal rights so much desired by the French people.

The Assemblee Nationale was composed of a majority of Monarchists, but they were di¬ vided into two parties, the Legitimists and the Orleanists.

The former supported the Comte de Cham- bord, a nephew of Charles X, that is to say of the Bourbons ; the latter supported the Comte de Paris, a descendant of Louis-Philippe who belonged to the dynasty of the d'Orleans. Each of these two parties wanted the restoration to the throne of their respective candidates. In the meantime, Adolphe Thiers was entrusted with the executive power and received officially the title of President of the Republic (General Trochu had been the President of the Govern¬ ment de la Defense Nationale). The Monarch¬ ists however did not feel bound to accept the Republic as the definite form of the French government: Legitimists and Orleanists hoped that they might sooner or later come to an arrangement between themselves, but Thiers re¬ fused to be a party to any restoration. Before the hostility of the Chamber, he had to resign his office and Marshal de MacMahon was elected in his place (1873). On the other hand the Comte de Chambord made himself very un¬ popular by insisting that the national emblem should be the white flag (symbol of absolute monarchy) ; not only was he unpopular with the Republicans, which was a

matter of course, but with all Monarchists as well, Orleanists and Bonapartists. The republican party was gain¬ ing ground every day ; in 1875 the constitutional laws of the present Republic were voted by the National Assembly, wh-ich broke up and was replaced by two constitutional Chambers : the Chamber of Deputies and the Senate.

The government of the country was hence¬ forth to be that of a parliamentary Republic based on universal suffrage. The victory of the Republicans however was not complete. A coup d'etat was soon to be attempted : fortu¬ nately it failed in its results.

MacMahon, as well as the Senate, belonged to the Conservative party. 'On 16 May 1876 the President, with the sanction of the Senate, dissolved the Chamber of Deputies. This was really a coup d'etat, as there was no proper reason for a dissolution except that the repub¬ lican minority was becoming more and more powerful.

MacMahon and the Senate were, however, frustrated in their designs: the elections sent to the Chamber a greater number of Repub¬ licans whose policy was to apply in a strict

manner the Constitutional Laws of 1875. Be¬ fore the opposition of the new Chamber, Mac- Mahon had to retire from the Presidency and was succeeded by a politician belonging to a modest family, a cautious, clever lawyer who had no intention to resign his post in favor of any king or emperor, being only too glad to keep it for himself. Jules Grevy was Presi¬ dent of the Republic from 1879 to 1887.

No serious attempt was made from that time to disturb the internal peace of the country and France could after many revolutions and changes of governments devote herself to the

The two internal incidents of real import¬ ance and the results of which might have been disastrous had they not been checked in time, were the agitation of the B oulangisme and the Dreyfus affair.

General Boulanger was very popular in the army and among the French people as a whole. Monarchists, Bonapartists and a fraction of the Republican party persuaded him to take ad¬ vantage of his popularity in order to overthrow the Republic and to restore something like the Empire or the Monarchy under the name of a

GENEALOGICAL TREE OF THE BOURBON FAMILY

Henri IV (1589-1610). Louis XIII (1610-1643)

Louis XIV (1643-1715). Philippe, due d'Orleans.

Louis, died in 1711. Philippe d'Orleans, le Regent.

Louis, due de Bourgogne, died in 1712.

I

Louis XV (1715-1774).

i

. 1

Louis, died in 1765.

Louis XVI

(1774-1793).

Louis XVIII Charles X

(1815-1824). (1824-1830).

Louis-Philippe Ier

(1830-1848).

Louis XVII. died in 1795 (did not reign) .

1

Louis, due de An- gouleme, died in

1844.

1

1

Charles, due de Berry, died in

1820.

„ • L

Ferdinand, due d’Or¬ leans, died in

1842.

1

Due de Nemours, died in

1896.

Prince

de

Join- yille, died in

1900

1

Due d'Au- male, died in

1897

Due de Montpen- sier, died in

1890.

Henri , due de Bordeaux, comte de Chambord

(1820-1883).

Louis-Philippe, comte de Paris

(1838-1894).

Due d’Orleans.

Due de Chartres.

j

Philippe d’ Anjou, Louis d 'Orleans.

King of Spain.

Louis-Philippe d'Orleans. Louis-Philippe- Egalite.

GENEALOGICAL TABLE OF THE IMPERIAL FAMILY

Charles Bonaparte

1

Joseph, King of Naples, and

King of Spain.

Napoleon Ier> emperor

(1804-1815).

Napoleon II {le roi de Rome) , due de Reichstadt, died in Vienna

(1832).

(Did not reign)

Lucien. Louis, King of

Holland.

1

Napoleon III, emperor

(1852-1870).

Louis -Eugene Napoleon

{le Prince imperial),

Caroline, married to Joachim Murat,

King of Naples.

Jerome,

King of Westphalie.

1

Jerome Napoleon (le prince Napoleon), died in 1891.

•

born in 1856

- *died in 1879.*

victor Napoleon, born in 1862.

Louis

Napoleon.

development of her trade, her industries and her democratic institutions. All political liber¬ ties as regards press, meetings, associations, universal suffrage, etc., have been absolutely confirmed.

As regards the Church, the Republic has very much reduced its power, by disestablishing it and confiscating all the private estates which belonged to it. (See articles on Church and State). Social legislation has been passed which authorizes strikes, trade-unions, regulates the work of women and children in the fac¬ tories, limits the working hours, obliges the em¬ ployers to insure their staff against accidents, etc. vol. ll — 39

<(Plebiscitary Republic.® At that time (1887- 89) the plurinominal ballot made it possible for the candidates to stand in all the voting districts at one and the same time. For General Bou¬ langer, who was extremely popular throughout France, this amounted to trying a plebiscite. The general had an immense success, but he be¬ longed to a class of romantic visional ies who lack the qualities essential for any man of ac¬ tion : energy and quick decision of mind. The national hero did not take the tide at its flood ; he hesitated and lost his venture. On the other hand the government checked the movement by restoring the Uninominal ballot, by which

no candidate could stand for more than one constituency at a time, thereby frustrating all further attempts to a plebiscite ; finally the leaders of the Boulangisme were tried for high treason before the Senate. Boulanger himself died in exile at Brussels where he shot himself through the head.

The Dreyfus affair had very important political consequences. Alfred Dreyfus was an artillery officer accused and convicted of high treason. He was sentenced to perpetual trans¬ portation by a military tribunal. A new trial reduced the punishment to 10 years. Finally the Cour de Cassation released him entirely. The question whether Dreyfus was or was not guilty

was most passionately discussed in the press, in public and private meetings ; and it is literally true to say that for a certain period of time there was no possible gathering of three or four people without a passionate discussion on the ˆaffaire.® By degrees however the per¬ sonality of Dreyfus disappeared and the point whether he was or was not guiltv was totally forgotten as soon as the contending parties were able to divide themselves into two opposite groups: the Nationalists — recruited from

among the Monarchists, the Anti-Semites (Dreyfus was a Jew), and some Republicans, very moderate, called the Progressives, rely¬ ing for their support on the conservative and reactionary forces of the nation : army, capital, religion. On the other side, the Radicals, Socialists and Republicans of more aggressive temper united into a multifarious party, which was called the bloc, in opposition to the con¬ servative forces, and claiming to fight for in¬ dividual right and justice. The political life of the country was greatly intensified.

Political leagues ((Les Droits de l'Homme,® <(La Patrie Frangaise,® were created as a conse¬ quence of the internal struggle which had been raging throughout France, and which to a certain extent had drawn the attention of the whole world. The reactionary spirit of the Nationalists (a term which has been discredited by the party itself) was finally checked and overcome by such governments as those of Waldeck-Rousseau, Combes, Rouvier, Sarrien, Clemenceau and Briand. Since the Dreyfus affair the policy of France has aimed to secure a complete separation of Church and State. One of the precepts of the French Re¬ public has been that the teaching in public schools should be neutral : the teaching must be objective, the facts must speak for them¬ selves, especially when the Church and re¬ ligious questions are involved. See articles on Church and State in this series.

From 1905 to 1914 the whole history of France was dominated by the desire to main¬ tain peace which was first seriously threatened by the Emperor of Germany at Tangiers in 1905, provoking at the same time France and Great Britain. At the Algeciras Conference, the Moroccan question was apparently settled, but in 1907, 1909, 1911 Germany reopened it in spite of all previous concessions made by France and of further agreements signed by both parties after the Algeciras Conference. In 1911 when the German Kaiser sent a battle¬ ship before Agadir war with Germany was once more avoided by the conciliatory spirit of France which Germany mistook for weakness.

From that time up to 1914 Germany intense fied her war preparations in the most ex¬ traordinary manner. The French army had therefore to be increased in order to be ready to face the German menace and under the government of Louis Barthou the three-year military service law was

passed. According to that law every French citizen was to remain in training with the colors for three years. The law had been in existence a few weeks only when war broke out in August 1914. For tfhe history of the Great War which terminated so gloriously for France and the Allied Nations in 1918 see War, European.

Marc de V alette,

Chef d Etudes Economiques de la Banque de France.*

6. THE FRENCH GOVERNMENT. I. Constitutional Laws. — Strictly speaking, the political regime of France cannot be defined as a constitution but as three separate laws, called constitutional or organic, voted in 1875 and amended by two other laws, one in 1879 and the other in 1884. Strange as it may seem, these laws which make up the political mechanism of the third republic were prepared and accepted by an assembly in which monarchists consti¬ tuted the majority. In fact, of the 750 mem¬ bers composing the National Assembly elected by universal suffrage in February 1871, abo-ut 420 were monarchists, the peasants having voted for the monarchists who favored peace rather than for the republicans who wanted war. However, in spite of their majority, the monarchists were powerless to restore royalty in France, and that for two reasons: (1) the views held by French citizens were so mani¬ festly hostile that M. Thiers, minister to King Louis-Philippe and a strong Orleanist, chosen as ((chief of the executive power® and pro¬ visional president of the new government by the monarchists, who counted on using him to bring about a restoration, openly declared him¬ self for the Republic, thereby causing his downfall in 1875, when he was replaced by Marshal MacMahon ; (2) the monarchists were divided into two rival factions, each of which supported a different candidate for the throne, the Legitimists being the partisans of the Count of Chambord' a descendant of King Charles X, dethroned in 1830, and the Orleanists, adherents of the Count of Paris, a descendant of King Louis-Philippe, dethroned in 1848. At one time harmony or fusion, as it was then called, seemed about to be realized be¬ tween the two parties, as the Count of Paris had acknowledged the anterior and superior claims of the Count of Chambord, who, on his side, had legitimatized the dynasty of Orleans by accepting as successor the Count of Paris. But the Count of Chambord forfeited every¬ thing by obstinately rejecting the tricolored flag, symbol of the new revolutionary France, and favoring the white flag, symbol of the France of the old regime and of the divinely authorized monarchy. Therefore, Orleanists and Legitimists resumed their former positions and resigned themselves to a parliamentary re¬ public which put them temporarily on terms of agreement by eliminating the two rival claim¬ ants. According to an amendment to the law on the organization of executive power, known as the Wallon amendment it was decided in

the name of the new government, to confer upon the chief of the executive power the title of President of the Republic, and in memory of this amendment, M. Wallon was jocosely called <(Father of the Constitution.®

These circumstances explain the absence of a declaration of rights and a co-ordinated con¬ stitution, such as exists in the United States of America and existed in France from the constitution of ’91 to that of 1848.

The following are the three constitutional laws :

1. The Law of 24 Feh. 1875, relating to the organization of the Senate. It regulates the number of senators, the conditions of eligi¬ bility, the mode of election and renewal and the power of the assembly.

2. The Law of 25 Feb. 1875, concerning the organisation of public power. It defines the exercise of legislative power, the mode of dissolving the Chamber, the ministerial respon¬ sibility, the method of amendment, and fixes the seat of government and of the Chamber of Versailles.

3. The Law of 16 July 1875, treating of the relations of public power. It deals with the meetings of the Chambers, their preroga¬ tives and the connection of the executive power with the Chambers.

The laws of amendment are as follows :

1. The Law of June 1879, suppressing the constitutional residence at Versailles and trans¬ ferring it to Paris.

2. The Law of 14 Aug. 1884, excluding from the presidency members of ancient dy¬ nasties and forbidding the republican form of government to be called into question and sup¬ pressing irremovable senators and public prayers.

Of these five constitutional laws one has now almost completely disappeared, that is the law concerning the Senate. Of the four others, exclusively relative to political organization, only the following facts are constitutionally established :

1. The existence of a legislative power divided into two assemblies, the Senate and the Chamber of Deputies, concerning the organiza¬ tion of which the Constitution mentions only the functions, the interior

organization, the privileges of members and the election of dep¬ uties by universal suffrage.

2. The existence of a President of the Re¬ public, the complete enumeration of his functions and prerogatives and directions in regard to the mode of election and the dura¬ tion of power.

3. The reciprocal powers of the President and the Chambers either in regard to each other or to common questions, such as the con¬ vocation of the Chambers, length of sessions, form of dissolution, general procedure of amendments, forms of presidential and minis¬ terial responsibility, method of promulgating laws and concluding international conventions.

Everything outside of these matters depends upon legislative action ; the electoral system, ministerial organization, communal, depart¬ mental, judiciary, military and financial admin¬ istration, etc. However one question remain¬ ing outside of both constitution and legislation is the form of government. Contrary to pre¬ ceding constitutions, these constitutional laws give the greatest scope to legislative action and

tend to confound the legislative and constitu¬ tional authority.

II. The Principle of the Separation of Powers. — (a) Formation and evolution of that principle before the Third Republic.

Under the Ancien Regime, the king, by the use of his sovereignty and the abuse of extreme penalties, absorbed in his own hands an abso¬ lute power. The right of making regulations and by-laws on all sorts of matters was exer¬ cised by the king's agents, that is to say by the <(intendants® (Provincial Governors), the Provincial Assemblies and the Provincial States. In fact, such agents were entirely de¬ pendent on their master's omnipotence, and the legislative power could play only an auxiliary part. Such principles were thoroughly upset by the Great Revolution of 1789. The repre¬ sentative system was finally adopted in spite of inevitable reactions with the results that the French Parliament has now a predominant in¬ fluence and the separation of powers is as nearly complete as it may be. The initial con¬ ception of the National Assembly was ex¬ pressed in the following manner: ((The leg¬ islative Power alone, has the right of interpret¬ ing or completing the laws which have been passed. To entrust such a dual function to the executive power would create a confusion of two Powers which public interest requires to be distinct.®

The Assembly, however, objected to such wording, the character of which appeared too absolute, and adopted the following resolution, which became

article 6, title III, chapter IV, section 1 of the Constitution of 1791 : <(The executive power cannot make any law, even of temporary character; it can only make proc¬ lamations whch are consistent with the laws, for the purpose of ordering their execution or calling attention to their observance.® From that moment, the right to make regulations and by-laws concerning all the matters, was en¬ trusted by the Constitution to the exclusive care of the Assembly, and was withdrawn from the king. Such was also the case for all mat¬ ters upon which the Assembly itself had passed a law. The Legislative Assembly which suc¬ ceeded the Assemblee Constituante, adopted the same principle when it defined the attributes of the executive power. The same tradition was also followed by the Convention, the Con¬ stitution Jacobine and the Constitution Giron- dine of 1793. The latter conferred to the Conseil Executif a power which was limited to the execution of the laws and decrees of the Corps Legislatif (article 65). All matters which could be dealt only by laws were enumer¬ ated in articles 54 and 55. The Constitution of the year III (1795) made the attributes of the executive power more extensive by suppressing the list of matters which were considered as being of an exclusive legislative character. The laws became less elaborate in their details, allowing the executive power, i.e., the Direc- toire, not only to enforce them, but to provide regulations intended to complete them. The Directoire did not even limit its activities to such regulations as were required by the laws, it took the initiative of providing many others which were not connected with any existing law and which concerned chiefly the police, the theatres, the exchanges, or military or naval matters.

613

FRANCE— THE FRENCH GOVERNMENT (6)

The executive power was made much stronger than the legislative by the Constitution of the year VIII (1800). In the latter there is no mention of the principle of the separation of powers; there is no definition of the law; the government proposed the laws the wording of which was prepared by the Conseil d'Etat and the executive power was entrusted with the care of providing practical regulations, especially in the form of reglements d' administration pub¬ lique. Under the First Empire, Napoleon took completely in his own hands the legislative and the executive powers. A great number of his decrees encroached upon the field proper to the legislative power, especially after the Senatus of the 28th Floreal An XII, which is consid¬ ered as the first law decree.

The Charter of 1814 conferred upon the king the right of making regulations and orders concerning the execution of the laws and the safety of the state (article 14). It was only under the Restoration that the

principle of the separation of powers was reasserted, under that regime the parliamentary and constitutional practices were made more definite than ever before. The executive power developed more and more its attributes by making such regu¬ lations as were sometimes more or less required by the laws, and sometimes were not required at all.

The Charter of 1830 (article 13) curtailed the prerogatives of the sovereign by providing that ((the king can no longer suspend the ef¬ fects of the laws themselves nor their enforce¬ ment.® But the practice which had been es¬ tablished since the Charter of 1814 continued nevertheless to be followed. The form to be assumed in the regulations of public adminis¬ tration was determined by order of 18 Sept. 1839, article 6, which requires a discussion of the matter first in committee, then in a gen¬ eral assembly of the Council of State. The advice of the Council of State, in the regula¬ tions of public administration, was made legally necessary by a law passed on 19 July 1845. The Provisional Government of 1848 kept in its own hands all the attributes of full sovereignty; its regulations are consequently considered as law-decrees.

The Separation of Powers was proclaimed once more by the Constitution of 1848. The President of the Republic was only to super¬ vise and to procure the execution of the laws, but no mention was made that he had the right of drawing up regulations, however the practice established by the Directoire and adopted by the kings since the Charter of 1815, quickly reasserted itself and the President took the initiative of drawing up regulations.

The coup d'etat of 2 Dec. 1851 once more modified the conditions under which the Separa¬ tion of Powers used to be made effective. Up to 25 March 1852 the President disposed of the legislative and executive powers. During his reign, Napoleon III adopted the same system as Napoleon I, without however encroaching so radically upon the legislative power.

After the revolution of 4 Sept. 1870, the two owers were once more concentrated in the ands of the government of National Defense which wielded absolute power until 12 Feb.

1871.

(b) Separation of the Powers under the Third Republic. — The first law which organized

the public powers was passed by the National Assembly on 17 Feb. 1871. Monsieur Thiers was made head of the executive power which he was to exercise under the supervision of the Assembly. Another law of 31 Aug.

1871, (Con¬ stitution Rivet), gave to M. Thiers the title of President of the Republic. A third law of 13 March 1873, (Provisional Constitution) took away from the President of the Republic the right of addressing himself to the Assembly; it also modified the prerogatives of the Presi¬ dent which allowed him to suspend the official publication of the laws for a certain period. A law passed 20 Nov. 1873, (Loi du Septen- nat), decided that MacMahon who had suc¬ ceeded M. Thiers in May 1873 should hold the presidency for a term of seven years. It was only in January 1875 that the constitutional laws began to be discussed. The powers of the President of the Republic were defined by article 3 of the law of 25 Feb. 1875, in the fol¬ lowing terms: (VIII (1800) concerning the executive power, the framers of the new Constitution have always held that the fundamental rule to be applied was the principle formulated by Montesquieu on the separation of the three powers: (1) Estab¬ lishing the laws; (2) Enforcing them; (3) Deciding on offenses or individual conflicts.

The Constitution of 1875 must be considered as being rather similar to that of the year VIII (1800) as regards the separation of powers; the legislative power is completely and exclu¬ sively entrusted to the state, but there is no doubt that the President and his ministers have the right to make by-laws and regulations under the form of regulations of public administra¬ tion, and decrees %in Council of State or minis¬ terial decrees.

The tendency of the legislative power is more and more to leave it to the executive power to devise the means of enforcing in a practical way the laws which have been passed. That delegation of power is the more necessary be- cause. in many instances the enforcing of the laws is conditional upon the previous establish¬ ment of practical and detailed regulations or decrees which under the form of <(Rdglement d' administration Publique ® always require the advice, that is to say the sanction, of the Coun¬ cil of State in general session, and have the same character as the law itself. The other decrees (which do not assume the form of C(Reglement d' administration Publique ®) may be rendered without a special delegation of the legislative power. The point is to know whether such decrees, rendered on the initiative of the Ministers of State, may or may not refer to such matters as have already been dealt with by legislation. As regards the constitutional laws, the negative is absolute. As regards the other laws, the tradition admits the eventual interference of the executive power, but in a very limited way, mostly in matters of a purely administrative character, rarely in civil or commercial legislation, and in that case merely for the purpose of settling points of de¬ tail in the light of the fundamental principles.

FRANCE— THE FRENCH GOVERNMENT (6)

In fact, the growing activities of the legisla¬ tive power form the best regulating factor of the separation of powers.

III. The Legislative Power.— The two powers established by the constitutional laws have been accurately stated and defined by a combination of laws forming the real constitu¬ tion.

1. The Election of Representatives, (a) The Chamber of Deputies. — The application of universal suffrage was regulated by the laws of 20 Nov. 1875 and 13 Feb. 1889, both of which bear upon a great many points in the laws of 31 May 1850, and of 2 Feb. 1852. Electors. — Any citizen over 21 years of age enjoying civil and political rights, domiciled for six months in a district and enrolled on the electoral lists, is entitled to vote, which right is, however, withheld from all military men actively engaged either on land or sea. Eligibility.— Any citizen fulfilling the aforesaid conditions is eligible except in the cases pro¬ hibited by law, i.e., where one is a member of an old dynasty or holds a government office within his own province. Moreover, numerous incompatibilities prevent the cumulation of a public office and a legislative mandate. Ex¬ ceptions are made in favor of ministers, prefects of the Seine and of police, chief magistrates of the high courts of Paris and professors of the University. All candidates must declare their candidacy at least five days before the voting so as to prevent one individual presenting him¬ self as a candidate in more than one constitu¬ ency, such plural candidates being forbidden by the law of 1889. The voting is by ballot, one deputy being named for each arrondisse ment ; however, when an arrondissement has more than 100,000 inhabitants, it is divided into electoral districts. The law of 27 March 1914, has made some changes in the composition of the electoral districts so that the number of deputies for the whole of France and her colonies is now 602. (The vote is by secret ballot on a white paper — ˆbulletin® — folded and deposited in the ballot-box by the chair¬ man of the voting bureau, who is always a municipal magistrate, assisted by four assessors, appointed by the electors at the opening of the poll ; the hours of voting are from eight o'clock in the morning to six in the evening. A rough count by a committee of the electors themselves follows immediately on the close of the poll, before the official recount. This rough count consists in the exercise of the right of such a committee to open all the voting papers). The law prescribes two ballots at an interval of 15 days; to be elected on the first ballot, a candidate must have an absolute majority (half the votes plus one) ; on the second ballot, called ballotage, and brought into play only if the first ballot is inconclusive, a majority of votes cast suffices. Deputies are elected for four years, the full number of the chambers being elected on one and the same day

(b) The Senate is composed of 300 mem¬ bers, the number determined by the constitu¬ tion. Since the amendment of 1884 all senators are elected to office, the 75 life-senators ap¬ pointed by the Senate and created by the con¬ stitution, having been then suppressed. Sena¬ tors are elected from each department, their number varying from 2 to 10 according to the population. The suffrage is called limited, the

electoral body is formed of it: (1) the depart¬ mental representatives (senators, deputies, gen¬ eral councillors) ; (2) senatorial delegates

elected from among the voting citizens of each township by the municipal council and varying from 1 to 24 according to the popu¬ lation. These senatorial electors constitute a college that meets at departmental headquarters under the presidency of a civil magistrate. The election must end on the day of the third bal¬ lot, the first two being cast to find, if possible, an absolute and the third failing an absolute majority for a majority of votes cast. Sena¬ tors are elected for nine years some of their number being renewed every three years. Hence, the Chamber of Deputies represents the people as a whole and the Senate local bodies. Gambetta called the Senate the Great Council of the Communes of France

2. Prerogatives. — (a) The members of both Chambers enjoy the same personal prerogatives, inviolability from arrest and a fixed salary. A law dated 23 Nov. 1906, raised from 9,000 francs to 15,000 ($3,000), the fixed annual salary of each member of both Houses from 1 Jan. 1907. (b) They exercise the same legislative

privileges ; adopt their own rules and elect their own committees. Their essential privi¬ lege consists, as in all other Parliaments, in introducing and voting laws. In this regard the only difference between the Senate and the Chamber of Deputies is that all finance laws must first be voted by the Deputies. All laws must be voted by each Chamber separately. Only the laws of amendment to the constitu¬ tion are voted on in another fashion; for these both Chambers combine and form a congress held at Versailles. (c) Both Chambers as¬ sembled in congress at Versailles exercise an electoral privilege also, that of electing the President of the Republic, (d) The Senate alone enjoys the judiciary privilege and con¬ stitutes itself a High Court to judge the Presi¬ dent of the Republic and ministers arraigned by the Chamber of Deputies as also individuals accused of conspiring against the security of the state (the Boulanger affair in 1889 and the Deroulede in 1899). (e) Finally, each Cham¬

ber exercises a similar power over the minis¬ try through the right of question and inter¬ pellation. The latter is especially important in¬ asmuch as the minister summoned is obliged to respond and the interpellation is

followed by a vote, after which, unless he receive a ma¬ jority, he must retire. Interpellation is the practical mechanism through which the min¬ isterial responsibility is exercised. Either Cham¬ ber may further control the government by naming a commission of parliamentary in¬ quiry (the Panama and Boulanger affairs, the condition of the navy, etc.). The Chambers, especially that of Deputies, exert a really dom¬ inant influence over the French Government IV. The Executive Power. — The executive power is exercised by the President and his ministers. (1) The President is elected by Congress (Deputies and Senate combined) for seven years, being chosen from among its own members. His power is very extensive, as he can introduce, promulgate and execute laws, make appointments to all civil and military offices dispose of the armed forces and nego¬ tiate and sign treaties. But since he can exercise it only through the medium of his ministers,

this extensive power is practically reduced to that of appointing his ministers. Being polit¬ ically irresponsible, he can only be summoned before the High Court for felony. He resides in the Palais de l'Elysee in Paris and receives a regular salary of 600,000 francs ($120,000), with as much more for expenses incidental to official entertaining. List of Presidents of the Republic: Thiers, 1871-73; MacMahon, 1873- 79; J. Grevy, 1879-88 (the only one re-elected) ; Carnot, 1888-94; Casimir Perier, 1894-95 (the only one who resigned); F. Faure, 1895-99; E. Loubet, 1899-1906: A. Fallieres, 1906-13; R. Poincare,- 1913-20. (2) The Ministers form

a jointly responsible Cabinet under the direc¬ tion of the President of the Council. The lat¬ ter is appointed by the President of the Repub¬ lic and is free to choose his colleagues : 12 ministers — Justice, the Interior, Foreign Af¬ fairs, War, Navy, Colonies, Public Instruction, Commerce, Agriculture, Public Works, Finance, Labor — the last created in 1907. There was no change made in that list till 1915 when M. Briand became Prime Minister for the fifth time. Five Ministers of State were added to the list, without special portfolios. Under the sixth Briand Ministry the number of State Ministers was reduced to 10. The various de¬ partments were the following: Foreign Affairs, Justice, Public Instruction and Fine Arts, In¬ terior, Finances, War, Navy, Public Works, Transportation and Supplies, Commerce, In¬ dustry, Agriculture, Labor, Postoffice and Tele¬ graph, Colonies, Armaments and War Supplies. Ten under-secretaries of state were at the same time appointed, one to each ministry, They are the President's deputies, who in his stead sign or veto all executive documents.

Their es¬ sential character is their political responsibility. They are responsible for their acts to both Chambers, whose members, thanks to the right of interpellation, already defined, can put their actions to a vote which, if it place one or more in a majority, will entail his or their resigna¬ tion. Such a consequence is not explicitly de¬ clared in the constitution, but it follows in the logical order and from the practice of the government. In fact, in case of conflict be¬ tween a minister and the majority, two solu¬ tions may be resorted to; either the minister's resignation or the dissolution of the Chamber, which must be voted by the Senate. Through¬ out the history of the Third Republic there is but one record of a like dissolution, which was that of 16 May 1876. President MacMahon had formed the conservative ministry of the Due de Broglie in opposition to the liberal Chamber, which, by a majority of 353, refused to enter into relations with him. The Chamber was dissolved, the elections resulted in a ma¬ jority of liberal votes, in face of which the conservative ministry had to submit and re¬ sign. Since then, all ministers in the minority on a matter of confidence have tendered their resignations. During the first 20 years of the Republic ministerial instability was a veritable government defect, being due to the disintegra¬ tion of parties and the impossibility of consti¬ tuting lasting majorities. There were, however, ministries that lasted two and even three years as, for instance, the second Ferry ministry and the Meline ministry. But within the last 10 years this instability has disappeared in con¬ sequence of the Dreyfus affair and of the new

division of the parties into two blocs, the radi¬ cal-socialist and the conservative. The Wal- deck-Rousseau and Combes ministries each lasted three years, the incumbents retiring vol¬ untarily, Rouvier lasted two years. After the retirement of M. Clemenceau the following cabinets were formed without causing any marked change in the composition of political parties: 1st Briand cabinet, 24 July 1909; 2d Briand cabinet, 3 Nov. 1910; Monis, 2d March 1911; Caillaux, 27 June 1911; Poincare, 14 Jan. 1912; 3d Briand cabinet, 18 Feb. 1913; Barthou, 22 March 1913; Doumergue, 9 Dec. 1913; Ribot, 9 June 1914; 1st Viviani cabinet, 13 June 1914; 2d Viviani cabinet, 26 Aug. 1914; 5th Briand cabinet, 29 Oct. 1915; 6th Briand cabinet, 12 Dec. 1916; Ribot, 20 March 1917; 2d Clemenceau cabinet, November 1917.

National sovereignty, acquired through uni¬ versal suffrage and political liberties, such as those of the press, of meeting and of asso¬ ciation, and a parliamentary regime, that is to say, the supremacy of Parliament over the ministry, have become the groundwork of the constitution and of the political government of France.

Amendments to the Constitution and Mod¬ ifications Proposed Since the German Inva¬ sion of 1914. — (a) Government Proposal. — When M.

Briand formed his sixth ministry (14 Dec. 1916), he brought in a bill authorizing the government for the duration of the war, to take all steps and emergency measures which might be necessitated for the purpose of national de¬ fense, under the form of law decrees, with penalties. The committee which was appointed to make inquiries on the subject reported un¬ favorably on 29 Dec. 1916. <(As a matter of principle,® said the report, <(it is obvious that sovereignty cannot be delegated; it is inalien¬ able. Universal suffrage invests us with the legislation Power in order that we may exer¬ cise the latter at our own risks and under our own responsibility. Our constituents have given us no right to delegate such power.® In fact, the government proposal concerned a change in the Constitution, and both Chambers of Parliament should therefore have been ap¬ plied to by the President of the Republic. The proposal was therefore abandoned ; indirectly, however, it resulted in a simplification of pro¬ cedure concerning the discussions of bills, the passing of which was considered as extremely urgent.

(b) Proposed Amendment to the Constitution. The following proposal concerning a change in the constitutional laws, limited to the period of hostilities, were made by various members of Parliament: (1) That the two Houses of Par¬ liament sit in one general assembly so that the bills should be discussed and passed as if Par¬ liament consisted only of one house; (2) That the right of the President to dissolve the Cham¬ ber of Deputies should be suspended; (3) That Parliament should sanction all treaties signed between the Entente Allies, even before the war, whilst the Constitution of 1875 limits the powers of the two Chambers to the sanction of treaties of peace and of commerce ; (4) That the parliamentary supervisions of the na¬ tional defense and military operations should be exercised through a parliamentary com¬ mittee consisting of 80 deputies and 40 sena¬ tors elected by each House respectively.

G15

FRANCE — – FRENCH LAW AND JURISPRUDENCE (7)

Bibliography.— Block, 'Dictionnaire de 1 Admimstration Frangaise (1898); Boutmy, Etudes de droit constitutionnel* (Eng. trans. 1891) ; Lanessan, (La Republique democratique, la politique interieure; exterieure, coloniale de f ranee > (1897); Monteil,*

Henry-Emile Barrault, Formerly of the Faculty of Law, University of Paris.

7. FRENCH LAW AND JURISPRU¬ DENCE. Origin of French Law. — French law had its origin in Roman institutions, in Ger¬ manic customs, and to a certain extent in the canon law, the latter, however, having had

rather a parallel than a posterior existence dur¬ ing the formative period.

Roman Origin.

*Personal Status. — Under Roman institutions as they existed in Gaul during the 3d and 4th centuries of the Christian era, modern notions of liberty and equality in personal status were unknown. Slavery everywhere was rampant and even free men were not all treated on the same footing. A sort of nobility was conferred upon those who exercised a public function ; in certain cases this nobility was hereditary, while in others it was merely personal. This aristoc¬ racy, with a strict hierarchy, very much re¬ sembled what we know to-day as the "tchin** in modern Russia. It possessed certain privi¬ leges, especially in regard to criminal law, but special taxes were levied on its members apart from the usual dues. On a different footing to these "honestiores** were the large body of "humiliores** comprising artisans, tradespeople, workmen and peasants. Many professions, by their very utility, were obligatory hereditary and subject to stringent regulations. The peasant formed part and parcel, as it were, of the soil, and he and his issue being inseparable from the land they cultivated, their condition was really more that of a serf than a free man.*

*Property. — The Roman law governing prop¬ erty, as applied to Gaul, maintained a strictly individual character. The landowner held ab¬ solute sway over his property exactly like the landowner of our day. The principle under which the Roman state exercised a right of " dominium eminens ** over conquered territories had become purely theoretical. The landowner, however, was not the most envious of mortals. Excessive taxation often led him to depreciate the value of his property (cutting down vines and fruit trees for instance) in order to lighten*

his fiscal obligations. At times even he aban¬ doned his land to escape the punishment of tor¬ ture which was a means the authorities resorted to in dealing with refractory taxpayers. More¬ over, it not unfrequently happened that the large and powerful landowners took possession of the small-holders' property without being in any way molested by the law — as harsh on the poor as it was lenient on the rich — or they would compel the small owners to sell their land. The owners thus deprived of their prop¬ erty were obliged to eke out a precarious liveli¬ hood as a farmer in the employ of their self- appointed lord and master if they wished to re¬ tain use of that land over, which they once had absolute control.

Judicial 'Organization. — The judicial organ¬ ization made one with the administrative or¬ ganization. The governors of provinces or counties were judges of common law and the municipal magistrates exercised a right of juris¬ diction over the city and its suburbs in so far as litigation on a small

scale was concerned.

*In view of difficulties of communication and the large area covered by the provinces, and also by virtue of an old tradition, the prefects organized circuits for the dispensation of jus¬ tice. They were competent to judge appeals against decisions made by municipal magis¬ trates, their own rulings could be appealed against before the Pretorian prefect whose de¬ cision was final if heard in the diocese where the latter exercised the functions of "vicarius,** or before the "vicarius** and from his decision to the emperor if in other dioceses.*

Germanic Origin.

During the 5th century the barbarians founded in France three kingdoms : The Francs, Wisigoths and Burgonds, and it is in¬ cumbent to note what modifications were made in the institutions of Romano-Empiric origin. To understand the subject clearly it is first of all necessary to know the essential traits of this new law, that is to say its Germanic customs resulting from the tacit consent of the people perpetuated by the ancients and not defined by written texts, as the art of writing was unknown to the barbarians.

*Personal Status. — Like all ancient peoples, the Germanic tribe was made up of slaves and free men, the latter, so some authors have told us, being divided into two categories : "Inge¬ nus** (free men) and nobles. From among the latter were chosen the kings, princes and knights, but the existence of such nobles is contested by some authors who believe that the only class opposed to the slaves were the free men — possessing no hereditary privileges, and the "lites** or semi-slaves, similar to the afore¬ mentioned farmer employees or "colons** of the Gallo-Romanic institutions of which mention is made by Tacitus.*

It would appear that the latter formed them¬ selves into two groups, the serf-farmers who were kept in the country and who do not seem to have been ill-treated, and the slaves proper, such as the inveterate gamblers and debtors who were considered as so much merchandise and sold abroad.

Property. — Contrary to Roman law under which property was individual and absolute, the Germanic custom was all for collective property. Each family in the tribe received

periodical allotments of land for cultivation — forests and pastures being

common to all. In¬ dividual property only existed for heads of families, consisting of the ground site and land surrounding it and for certain estates which be¬ longed to the family who had hitherto culti¬ vated them and which remained untransferable and hereditary.

Co-existence of Roman Law and Germanic Customs. — It is still a matter of controversy whether at the time of the German invasion the Roman law would supersede the Germanic customs or vice versa. It seems that an inter¬ mediate opinion should prevail, in other words, the Gallo-Romans administered their laws in the three kingdoms founded by them as far as was compatible with a spirit of conquest. This solution, moreover, is quite in conformity with the tenets of history in so far that when two races are encountered in one country, the one relatively civilized, the other in a barbarian stage, each preserves in principle its public and private institutions so long as any real fusion is inextant. This is actually the case nowadays in Algeria, India, Indo-China, etc., and it is the principle on which all laws governing per¬ sonal status are based. But in actual practice this principle led to such complications subject to litigation that gradually the two laws were incorporated into one. Thus was brought about a body of regulations composed of certain rules of Roman laws — on account of their utility — and certain rules of German law because of their simplicity.

Canon Law. — As regards Canon law, both customary and written, derived from the Testa¬ ments, the writings of the Apostles and the cus¬ toms of the Catholic Church, and from prelate and papal decrees with texts borrowed by the Church from secular institutions, it left no mark of any importance on the first phases of French law. It merely followed its own course, and reference to it will be made here¬ after.

The Frank Monarchy.

Origin of Law. — The origin of law at this period can be traced to two sources: (1) The laws along their general lines, and (2) other data showing how the laws were applied.

There existed as many laws as peoples and they were divided into Roman law and Barba¬ rian law, the customs of the Barbarians have ing been made the subject of law from the Sth century. As regards the Roman law this con¬ sisted of a collection or adaptation of Roman texts compiled by order of the king for his Roman subjects.

In addition to these particular laws which only applied to a particular race, there existed the ordinances of the Frank kings, called "Ca- pitulaires® which could be applied to the entire population, and which, consequently, constituted elements for the fusion of the two laws. The most important of

these “Capitulaires® were due to Charlemagne, and show the remarkable activity displayed by this great emperor.

The documents which show the manner in which the laws were applied under the Frank monarchy consist inter alia of a series of forms intended for the use of practising lawyers which served as models for the drawing up of deeds and other legal instruments ; “cartu- laires,® or registers, in which administrators of churches and convents recorded the rights of

ownership of the different property in these es¬ tablishments ; and- “polyptyques,® wherein were registered in detail all the property belonging to the large landowners.

Personal Status. — From the point of view of personal status, the Frank period showed great diversity, the cause lying in the co-exist¬ ence and fusion of the two Roman laws and the German law. It is true that the people were still composed of free men, semi-slaves and slaves proper, but the quasi-servile popu¬ lation comprised a number of different classes.

As regards the free men, the nobility proper gradually disappeared, but a new aristocracy sprang up. The Roman nobility was replaced by the “Seniorat,® which was a class composed of influential property-holders and important state officials.

The quasi-servile population was made up of the “colons® of the Roman customs ; the “lites® of the Germanic institutions — a large number of enfranchised men over whom the Church exercised a patronage and a right of jurisdiction, and finally those people who had been driven by misery, hunger and debts to forego a part of their liberty. By degrees the various elements composing this semi-servile population developed into serfdom proper, a feature which will be dealt with later.

Under the influence and protection of the Church, the position of the slaves became bet¬ tered in some respects. Although they pos¬ sessed no personal status from a judicial stand¬ point, they were able to contract legitimate marriages and their masters were no longer able to confiscate the meagre savings of their toil. It even came to pass that the slaves were placed on the same footing as the “colons,® which greatly enhanced their hitherto precari¬ ous position.

Marriage, the cornerstone of family, was in those days quite a different institution from that understood in modern times. Sold by her father to her husband, the German woman had no other choice than to bow to the inevitable, she being in no way consulted in the matter. As regards the Roman woman, although her consent was necessary so also was her

father's, with the result that a trace of barter and sale still survived. Similar formalities applied to only sons.

In the Sth century any marriage contracted without the father's consent was not valid. It was at the beginning of the 9th century only that the idea of mutual consent was seriously mooted — to the advantage of both husband and wife. As regards divorce, which existed under both Roman and German law, the Church endeavored to suppress it, and so far succeeded as to substitute for it a judicial separation. "Capitulaires® of the 9th century were very strongly opposed to divorce, but ' its complete disappearance never resulted.

Judicial Organization.— Justice was dis¬ pensed in the provinces by the "Count® who was also invested with administrative and financial functions. The count went from canton to canton dispensing both civil and criminal jus¬ tice. He was assisted by "rachimbourgs® or*

- *" Rachimbourgs " were officials attached to the " Count " when the latter dispensed justice. They were not empowered to pronounce a sentence, but merely to see that the law was properly applied, and especially to satisfy themselves that cases were duly proven.*

officials appointed by him which Charlemagne replaced by ((echevins® (municipal magis¬ trates) who differed from the former by their permanent character. Furthermore, all cases were heard in public, anyone had the right to attend, and, as Gregoire de Tours has shown us in an interesting chapter in one of his works, the public manifested audibly their approval or disapproval of judgments rendered. This was an old remnant of popular justice as practised under German customs.

The king, assisted by a council, personally dispensed justice wherever he went. In princi¬ ple he was not a judge of appeals, but he could be referred to in a case of' ((deni de justice® (refusal of justice). He was, moreover, the supreme judge as it were, and had power to pronounce judgment in all cases pleaded before him, even in first instance. It has been said that his tribunal played the role of a school of equity, amending certain hard and fast texts of the legal code.

Transition between the Frank and Feudal

Periods.

Vassalage. — From an individual point of view it was the institution of vassalage which served as transition between the Frank and Feudal periods. From the 8th century onward documents and legal texts make mention of persons called Seni&res, who exercised a legal authority over other men qualified as vassals. Anybody from the king to the humblest sub¬ ject could be a Senior. The vassal himself could have vassals which the capitulates desig¬ nated by the name of vassal's vassals or va- vasseurs. The vassal was under the obligation of serving his senior all his life : Certain du¬ ties are mentioned in texts (accompanying the senior when traveling, guarding his house, lend¬ ing him armed assistance, etc.), but the enu¬ merations were not specific. On the other hand the senior was the vassal's attorney so to speak, and if a third party made any claim against the vassal it had to be addressed to the senior who saw that justice was done. In 847 Charles le Chauve ordered all his subjects to choose a senior; but his orders were not everywhere carried out; some of the free men refused to submit to this edict, with the result that their property became what was afterward called allodial or freehold.

Land Concessions. — The concentration of land property constituted a second aspect of the transition from the Frank to the Feudal period. The small landowners were generally ill looked upon by the counts who employed all kinds of devices to force them to sell their property. On the other hand, the large landowners often con¬ ceded part of their land for life with a view to developing their political and social influence vis-a-vis their tenants, and these concessions, which at first were leased on a life basis, ended by becoming hereditary — at least in fact. Thus it came about that Charles Martel conceded gratuitously to the lords of the realm, as a gift, i.e., without compensation, property which he had wrested from the Church. Any land concession created a link of vassality be¬ tween the two contracting parties. From this link arose from the Frank period a new judicial organization, the expansion of which will be witnessed during the Feudal period.

Feudal System.

Personal Status. — Leaving aside the clergy and the bourgeois, the feudal society was di¬ vided into three main classes : the nobles, the commoners and the serfs.

Feudal nobility was hereditary. As a gen¬ eral rule the free man or the commoner was made a noble if land was conceded to him, in other words becoming a vassal ; as also any person knighted for military prowess. Later on nobility was more sparingly conferred, and only the king was entitled to grant it, for which he made it the occasion to levy a tax on such appointment.

The commoners did not enjoy the same privi¬ leges as the nobles, but they were not handi¬ capped to the same degree as the serfs ; they were able to acquire property called commoners' tenures and were always free to choose their domicile.

The serfs were the descendants of the slaves, colons, lites, and even of certain free men of the Frank period. They differed from the slaves proper in that they had a judicial status and were able to enjoy a patrimony and raise a family. They differed from the colons in that they were not bound to the soil, that is, to a certain specified piece of land; some of them were, as a matter of fact, attached to the personal service of their lord and master : In this way arose a real servitude and a personal servitude. The serf owed many arbitrary du¬ ties to his lord, such as talliage, capitation tax and manual labor. If he desired to marry out¬ side the servile population he was obliged to obtain the consent of his lord; children born of a serf and a free woman were free in prin¬ ciple, at least such was the case in many dis¬ tricts.

While free to acquire and sell servile ten¬ ures and sometimes commoners' tenures, the serf could not, at the outset of the feudal pe¬ riod, bequeath them, although on payment to the lord of a fee such property might be left to the next of kin. As time went on this rule became less strict and in certain districts the serf was allowed to bequeath his property to a certain extent.

A free man became a serf if, for instance, he was unable to repay a theft or if his father, on his deathbed, made it over to the Church ; on the other hand the lord had the privilege of enfranchising his serf, but if the lord him¬ self was a vassal the consent of his directly su¬ perior lord was necessary.

Property. — The land was divided into allodial tenures and feudal tenures, these in turn being subdivided into three groups : fiefs or noble tenures, fee-lands or common¬ ers' tenures and servile tenures. Note <(en pas¬ sant® that a tenure is a parcel of land which is split up into two parts, the reversionary interest (dominium eminens) belonging to the as¬ signor, and the enjoyment of the property (do¬ minium utile) to the assignee.

At first the fief was untransferable and car¬ ried only a life interest, which, however, gradu¬ ally became hereditary and transferable. Ip order to inherit from his father, the son had to swear act of fealty to his lord and pay him a tax on the inheritance equal to one year's in- come. The birthright was a rule strictly ap¬ plied although certain customs admitted the*

concession of a part of the fief to the male children other than the eldest son; in collateral line the right of masculinity had the effect of making the younger brother the heir to the detriment of the elder sister. The object of these measures was to prevent the estate from being parceled out indefinitely. Contempo¬ rary legislation at the commencement of the present century was not favorably impressed with this system. When the fief was sold by the vassal the lord reserved for himself one-fifth of the price ; the fief could be reacquired by reimbursement of the purchase price.

The commoners' tenure entitled the lord to taxes in kind and to an annual quit-rent in cash, both specified in the lease contract. As regards taxes due under servile tenures it is known that these were left to the decision — often arbi¬ trary — of the lord.

By ˆalleu® or <(franc alleu® (allodial-free¬ hold) is meant free land, i.e., that over which the owner had an absolute right, there being no question of lord or tenant. In provinces where customs prevailed infeudation was pre¬ sumed, while in provinces governed by writ¬ ten laws allodiality was taken for granted. However, by an edict of 1576 the king pro¬ claimed himself sovereign fieffeux® through¬ out the kingdom, which resulted in all allodial tenures being placed under his suzerainty. The famous King of Yvetot — of legendap history — was merely the owner of an allodial tenure of very little consequence.

Judicial Organization. — During the feudal period the idea of justice was vastly different from our modern and Unitarian conception of it. A distinction had to be made between mu¬ nicipal, ecclesiastical, feudal and royal justice.

Municipal justice existed in certain urban communes which also enjoyed some other privi¬ leges, such as the suppression of serfdom and arbitrary taxes, immunity from unwarranted arrest, etc. Any proceedings instigated against the ˆbourgeois® were as a rule brought before the municipal magistrates, aldermen, jury, etc. However, even in the communes enjoying the greatest liberty the lords still retained certain judicial powers. Note that the modern French tribunals of commerce have a precedent in the (

Ecclesiastical justice, already extant under the Frank monarchy, reached the zenith of its power during the feudal epoch. It was founded on the diminution of civil power and the ob¬ scuration of the notion of state. Its character¬ istics were a practice of Roman and Canon law, numerous

degrees of appeals and relative guarantees for litigants, which rendered it more flexible and equitable than other jurisdictions. It was not executory on either persons or prop¬ erty, but assured the application of its sen¬ tences by threatening refractory lawbreakers with excommunication.

The lord had a right of justice, both civil and criminal, over all his subjects whether serfs or commoners. What was called God's Judgment was often resorted to in an endeavor to obtain proof of culpability which consisted in the accuser and accused being thrown into a reservoir of water, hands and feet tied, and whoever floated was deemed to be the guilty

party and convicted. Saint Louis, at the insti¬ gation of the Church, subsequently suppressed this barbarous custom. The lords themselves were tried by their peers, who met in the Feudal Court of their common Liege and under his presidency.

In the sixth part of this work we will ex¬ amine the principles of royal justice, it not being possible here to establish — or only facti¬ tiously so — the limit between the feudal and royal periods.

Law of Customs and Roman Law under the Old Monarchy.

Here again it would be imprudent to draw a hard and fast line between the feudal and royal periods. The subject is one, moreover, of sufficient importance to justify a special chapter being devoted to its study.

Under the Frank Monarchy, law was of a personal character ; Germanic customs had been made the subject of written legal texts, and the old capitulaires were henceforth but a memory of the Moyen Age. Custom alone was the or¬ der of the day from the 10th to the beginning of the 12th century, a period moreover in which chaos reigned supreme. A renaissance of Roman law appeared aside the Custom law, either co¬ existing with it or resisting it and sometimes even replacing it. Furthermore, from the 14th century onward, kings began to make laws by means of royal ordinances. Canon law was improved on and became more completive, ex¬ ercising over the other Roman and Royal Cus¬ tomary laws a reactionary effect of an often satisfactory nature.

Customary Law. — In principle, customary law was applied to the northern and central provinces (Alsace excepted) and Roman law to the southern provinces. But where in the north and centre custom was mute, recourse was had to Roman law to settle controversial disputes. Although the countries placed under Roman law were considered as being governed by written laws, it should not be concluded that in matters of custom oral traditions prevailed up to the time of the Great Revolution. These customs,

which had been strongly influenced by Germanic law, were first made the subject of written legal documents, compiled privately by legal institutions — such as the Etablissements de Saint Louis — and afterward officially recog¬ nized by decree of Charles VII at Montil-les- Tours in 1453. Gradually the divers customs were all incorporated into written texts, and Louis XIV in 1679 ordained that they be taught, like the Roman law, in all the univer¬ sities throughout the kingdom.

The customs were territorial, contrary to the laws and customs of the Frank Monarchy, which were of a personal character. They were moreover numerous. Some of them were widely disseminated, extending for instance to a whole province: Brittany, Normandy, Berry. There were some 60 of these general customs. Besides these there existed the minor customs called local customs applicable to particular cases, by derogation to a general custom, and governing only a small district, sometimes merely a single town or village. Their number was about 300.

Of all the customs those of Paris rapidly acquired preponderance, and ended by being

considered as representing the common law of the kingdom, applicable in case of muteness for other customs. This privileged situation arose from the following causes : Paris was the capital of the kingdom, its parliament, whose resorts were vast, exercised a great influence over the jurisprudence of the provinces, and was, more¬ over, the principal centre of the legal profession.

Roman Law. — During the feudal period and the absolute monarch period Roman law was studied, not out of idle curiosity from an historical point of view or as a legal education, but because it was law actually in force (like to a certain extent in Greece at the present time).

Up to the 16th century, Roman law was but little known; there only existed the texts com¬ prised in the leges ronianorum of the French monarch. But toward 1150 Irnerius, professor at the Bologna University, discovered at Pisa the works of Justinies and included them in the curriculum of his students. This was a filip so to speak. In the south of France where the population was really governed by Roman law, Roman doctrines were even more brought to the fore and their principles adopted. In the provinces where written laws prevailed, the <(Digeste,® the (

Despite its power, Roman law was nowhere the only

one applied in the south of France; in provinces governed by customs, Roman law was applied if the customs were mute, while in provinces where written law prevailed cus¬ toms settled all points not provided for by Roman law. These customs, moreover, were local ones except, however, those pertaining to Bordeaux or covered by the Provincial Statutes.

Royal Decrees. — From the 16th century onward the kings undertook the task of unify¬ ing the law throughout the country; this was done with the object of facilitating the admin¬ istration of justice, hampered by the multi¬ formity of the Customs and the judicial con¬ fusion resulting from their coexistence with the Roman texts. Its further aim was to con¬ ciliate the (

The Decrees covered a multiplicity of sub¬ jects: administration, civil procedure, criminal procedure, etc. Many of these Decrees bore the signature of Frangois I, Charles IX, Henri III and Louis XIII.

Special mention should be made of the Code Michau, a decree compiled in 1629 by Chance- lier Michel de Marillac from the records of <(Etats Generaux® of 1614 and the Assemblies succeeding it. It was a considerable work for the epoch, comprising as it did 461 articles. But this initial trial at codification, despite undoubted and useful reforms, encountered parliamentary resistance which accepted these innovations with a bad will, modified them in every possible manner, and in some cases even ignoring them.

Under Louis XIV, and particularly due to the untiring efforts of Colbert, the unification and codification of French law made great strides. The most important matters covered were publicity of mortgages, land and water,

civil procedure, criminal procedure, trade regu¬ lations, etc. Many of the articles of the pres¬ ent day French code have their origin in these decrees. Colbert's work was carried on under Louis XV by the Chancelier d'Aguesseau to whom we are indebted,

inter alia, for two very important texts regarding deeds of gift and legacies.

Canon Law. — Canon law held the fore¬ most place in the universities, and every seri¬ ous barrister made it a point of honor to become a doctor in ntroque jure of both Roman and Canon law.

The latter alone was applied by the Ecclesi¬ astical Tribunals, unless modified by Royal de¬ cree, as for instance from 1667 to 1670 the two decrees covering civil and criminal procedure were substituted in the aforesaid Tribunals for Canon law which had previously prevailed.

Canon law also played a role in the secular tribunals, account being taken concerning those institutions under the protection of the Church, or interests involving the salvation of souls (((salut des ames®). To the Influence of Canon law was due the prohibition of the rate of in¬ terest which was maintained in principle up to the Great Revolution, various rules govern¬ ing legacies and numerous other forms of pro¬ cedure such as matrimonial legislation, etc., all incorporated in the Decrees of Louis XIV.

The Absolute Monarchy.

Personal Status. — The tripartite division of the people into nobles, commoners and serfs was maintained in the Absolute Monarchy as during the feudal period. However, notions of equality made progress and the commoners' class endeavored to establish more and more firmly a regime of common law.

Nobility was no longer dependent upon the ownership of a fief, but was a purely personal quality. Privileges which resulted in a state of private law and its procedure largely disap¬ peared. The noble was nothing more than a subject of the king. He did, however, retain certain privileges, such as fiscal exemptions, sweets of office, immunity, in case of conviction, from flogging or the gallows, etc.

Nobility was bestowed by royal favor; it was forfeit if in¬ famous condemnations were incurred, or if certain professions were exercised, such as mechanics arts (except glass making), laborer's work, trade (except on the sea), etc.

As regards serfdom, this became a state more and more exceptional, whereas during the feudal period it constituted the condition of the great majority of the workmen of the towns and the agricultural population. The lords had, in fact, proceeded with enfranchisements on a large scale, either out of a feeling of piety or for remuneration; certain enfranchisements were even collective, as is illustrated by the charters of numerous towns. Furthermore the tribunals searching proof of a state of serfdom with the result that serfs became fewer and fewer. Finally, the customs, by their very nature, brought about the disappearance of serfdom by abolishing those laws that had fallen into disuetude characteristic of the ser¬ vile condition. The old slave had become a serf, now the serf had become a commoner.

Property. — Three kinds of feudal tenures existed during the latter centuries of the old

regime, i.e., the noble, commoners' and servile tenures. They were maintained despite the fact as regards the latter that serfdom was less and less prevalent. In respect to the feudal tenures these became a form of landed prop¬ erty: the liens between the lord and the vassal were relaxed, the obligation of fealty to which the latter was held in respect to the former being now merely of a platonic character. Pecuniary taxes — really rather heavy — alone remained, that is, those dues on the fief to the profit of the lord.

Besides these feudal tenures which the Revo¬ lution abolished without indemnity, there existed during

the Absolute Monarchy land-owned tenures, consisting either in the detinue of a parcel of land by virtue of a perpetual lease or long term lease, or in the ownership of land from which permanent income was derived. The most common land-owned tenures were the emphyteuses and the income-bearing leased property. Modern French law admits these modalities of ownership and detinue but their economic importance to-day is very small.

We may dismiss the ((alleu® or freehold tenure which was legally abolished and practi¬ cally inextant on the eve of the Revolution, and add that the feudal form of ownership of land was maintained until 1789 considerably im¬ peding the circulation of property.

Commerce and Industry. — Commerce and industry, which had played but an unimportant role in the feudal period, developed on a large scale during the latter centuries of the old regime.

In fairly important towns the trades were subject to a strict set of rules, to which the <(Assemblee Constituante® attributed in 1789 the maximum of liberty. Artisans and merchants were grouped into corporations ; each corpora¬ tion had its own exacting rules fixing the con¬ ditions of manufacture, quality, products, etc. In order to become an artisan or merchant quite a long apprenticeship had to be served, a professional examination passed and heavy fees paid. This system resulted in the realiza¬ tion of large prpfits and high wages by curtail¬ ing competition and guaranteeing the quality of the goods manufactured and sold. But ex¬ aggeration resulted : formalities and regulations succeeded each other to such an extent that various economists, known by the name of Physiocrates, repeatedly demanded liberty in trade and manual arts. In 1776, at the insti¬ gation of Turgot, the king issued an edict by the terms of which corporations were sup¬ pressed, but this met with such disapproval from the Paris parliaments and public opinion that it was repealed.

Industry proper, which in France dates from the time

of de Sully and de Colbert, was subject to another regime, that of monopoly. The king alone could authorize the establish¬ ment of a factory; he granted the exclusive right of manufacture, for a specified district, and often fixed the condition of fabrication and sale as well as the prices.

Monopolies and corporations alike were, however, doomed to disappear by dint of the great revolutionary crisis and cede their place to a more equitable system, the basis for which existed, moreover, and was to be found under the old regime, to the undoubted benefit of

the tradespeople and artisans of communes with a limited population.

Judicial Organization. — The latter cen¬ turies of the old regime witnessed the progress¬ ive diminution of the power of the lords, the clergy and the municipal authorities and the gradual development of Royal justice. To the multiplicity of existing jurisdictions a tendency arose to substitute a system of unity — a status definitely realized moreover by the Revolution. Royal efforts were directed mainly on two prin¬ cipal points : submit to its tribunals those cases previously submitted to seignorial courts and subordinate the latter in every instance to the control of the former, notably withdrawing from them the right to pronounce judgment in a final appeal.

Royal justice had been dispensed since the Capetians by provosts, or officials who besides rendering justice recruited soldiers for the army and collected taxes. Philippe Auguste made them subordinate to <(baillis® (bailiffs) in the north of France, and to ((sinechaux® (sen¬ eschals) in the south; bailiffs and seneschals fulfilled a triple function, judicial, financial and military. Gradually the provosts confined their role to that of magistrates, and the bailiffs, whose duties were less and less arduous, ceded their judicial functions to their two assistants, one civil and the other criminal.

The king in his quality of supreme suzerain presided over a feudal court called Curia Regis. At first the great vassals of the Crown were members of this court, but they soon wearied of its sittings especially when written proofs were substituted for the traditional judicial passage of arms.

They were replaced by Juris- consults and the Curia Regis became the parliament which was subsequently to decide the appeals against the decisions of the bailiffs and afterward those of the Court of Judicature at a time when the intermediary tribunals were intercalated under Henri II between the bailiffs and parliament.

Parliament consisted of four Houses or Chambers : the (

Thirteen other parliaments were established in the provinces. Justice also comprised special tribunals such as consular tribunals instructed to settle points in litigation connected with commercial legislation, and admiralty tribunals whose function consisted in applying maritime law.

• Many public functions, and particularly the judicial ones, constituted offices bought from the king from which he derived quite a sub¬ stantial revenue. These payments subsequent^ became hereditary on payment of a tax. How¬ ever, the mercenary manner in which these offices were granted and their hereditary nature gave rise to such abuse that the Revolution suppressed them altogether.

As the compensation allowed was very small,

the magistrates accepted from suitors what were called court-fees, consisting really in the gift of various articles and especially cash. Racine's play (Les Plaideurs) throws an inter¬ esting light on this old custom.

Ihe judges and counsellors-at-law naturally dispensed judgment in the name of the king, the latter reserving to himself the right to call before his own council any action pending before any tribunal. This prerogative was a relic of the old system of justice dispensed directly by the king, such, for instance, as that rendered by Saint Louis under his oak tree. It was also the King's Council, or at least one of its sections the, ((Conseil des Parties,® which judged cases of appeals.

Legislative Power. — The legislative power, like the judiciary power and the executive power, belonged alone to the king. It is true the (

Contrary to the (

The Royal Decrees were, however, only ex¬ ecutory after having been registered by Parlia¬ ment. The latter took advantage of this to address remonstrances to the sovereign, who nevertheless could ignore them and force Parliament to register the decree by means of the ceremonial known as ((lit de justice.® On many occasions Parliament endeavored to un¬ dermine the autocratic power of the king: the conflict was particularly bitter under Louis XV who banished the Paris Parliament and annulled the Provincial parliaments. Louis XVI was merely able to restore order temporarily and eventually he prorogued Parliament and sum¬ moned the (

Parliament also participated in the legisla¬ tive power by means of decretal decisions ; when that one of its rulings was likely to cover frequently arising questions, it was formulated in general terms and such formula was deemed to be law. This method of fixing jurisprudence, has been removed from French legislation since the Revolution as being contrary to the prin¬ ciple of the separation of powers.

Intermediary Law.

General Summary of the Work of the Revolutionary Assemblies. — The legislative work of the Revolution

has been qualified as intermediary law as it formed the transition between the old French law and the new, the law covered by the Napoleonic codes.

The intermediary period is by far the shortest with which we will deal in this treatise. It extended from the re-establishment of the (

It is characterized above all by the abolition of what remained of the feudal period, of the laws and customs existing between private par¬

ties, of privileges which had been inaugurated to the profit of certain lands and certain per¬ sons few in number.

We will cite the principal judicial reforms accomplished during this troublous period; never has the legislator been so active or accomplished more in any country at any time. And yet war abroad in addition to civil war did not render his task any the easier.

Personal Status. — Among the many in¬ stances of progress realized by the Revolution¬ ary Assemblies the foremost place is held by the protection to individual liberty and the establishment of equality for all. The year 1789 witnessed the extinction of caste and rank in France — henceforth everyone is citizen.

Of the measures concerning personal status the mo^t interesting were suppression of pa¬ ternal authority over majors, institution of divorce, which had been forbidden by the Catholic Church about the middle of the Moyen Age, and the organization of a social state, or rather its secularisation, as the clergy hitherto instructed to look after this very often carried out their task in a manner which left much to be desired.

Property. — Here again it is necessary to give prominence to the extraordinary transfor¬ mations to which French law was subject dur¬ ing the next 15 years. The French Revolution carried on actively the

enfranchisement of the land and the reorganization of property. Property once more became free and absolute; the owner had the absolute right of sway over his property. The numerous taxes to which the land was subjected during the feudal period were entirely suppressed ; the distinction be¬ tween dominium eminens and dominium utile disappeared ; all those vexatious dispositions, both arbitrary and traditional, which hampered the sale or transfer of property were abolished.

For the privileges of birthright and mascu¬ linity existing under the feudal period, the Revolutionary law substituted the principle of equality in regard to inheritance, a principle by the way still opposed at the present time by the conservative party.

, The privilege of contracting loans bearing interest, contrary to the precepts • of the fathers of the Church and the scholastics, was proclaimed, to the great advantage of the economical and commercial development of France. In 1795 a mortgage law was promul¬ gated establishing the system of mortgage cedules, an idea, moreover, which was adopted many years later by Australia (Act Torrens). In regard to alienations of property the method of transcription was adopted with the object of giving them publicity. Very numerous other reforms have left their trace on French law as practised to-day.

Judicial Organization. — The Constituent Assembly abolished the old magistracy and created in its place local tribunals which sub¬ sequently developed into civil tribunals for all districts, which is the jurisdiction prevailing at the present day for common law. It insti¬ tuted the court of cassation as well the estab¬ lishment of a jury for criminal cases.

For the state of anarchy and confusion extant under the old regime the Constituent Assembly substituted the system of separation of powers, being inspired in this direction from

Montesquieu and the principles applied in Eng¬ land. The judicial functions were hereafter separate from administrative functions.

Assuredly one of the most democratic and much debated reforms of the Constituent As¬ sembly was election to the office of magistrate, but this measure was rescinded and substituted by government nomination.

Contemporary French Law.

Civil Code. — It is from the Civil Code that contemporary French law really dates. Its ap¬ plication was of an international character in¬ asmuch as the example set by France was fol¬ lowed in principle by many other countries, and in Belgium to-day the Bonaparte Code forms the basis of its legislation.

The legislator of the Revolutionary ' period had proposed to codify the civil laws. In 1793 Cambaceres presented two projects to the Con¬ vention followed by a third to the Conseil des Cinq Cents. An impetus was given. That which neither the old Monarchy nor the Revo¬ lution — a prey to civil and national war — had not been able to accomplish, despite repeated efforts by eminent jurists, Napoleon realized, and in so doing gained for himself everlasting fame and the admiration of the entire legal profession.

The Civil Code, which contains 2,281 articles, was definitely promulgated by virtue of the law of 21 March 1804. Its principal authors were Portalis and Tronchet who, with their col¬ laborators, took inspiration from the old Cus¬ toms, especially those of Paris, from the Roman law, the Royal Decrees and the laws of the Revolutionary period, as well as in a lesser degree from the jurisprudence of the Parlia¬ ments and Canon law.

From the old Customs law arose in principle rules

governing inheritances, community of property between husband and wife; from Roman law the regime of property, general regulations covering obligations and contracts, the dowry system; from the Royal Decrees laws governing legacies and wills; from the Revolu¬ tion the fixing of the majority, the marriage laws and the disposition regulating mortgages.

It is generally admitted that the Civil Code presents great qualities of unity, method, pre¬ cision and clearness, but at the present day it is reproached, despite the numerous amendments made to it, with being somewhat old fashioned and not capable of solving satisfactorily the numerous problems which have arisen since its promulgation, and to its not having developed sufficiently to conform to the economical life of the country. Among the subjects it did deal with and which to-day are of primary im¬ portance are those questions of insurance, per¬ sonal property and moralist controversies.

Other Codes. — Napoleon doted France with four other codes besides the Civil Code, al¬ though of much less value. These were the Civil Procedure Code, Commercial Code, Crimi¬ nal Instruction Code and Penal Code; the first mentioned was instituted in 1807, the second in 1808 and the two latter in 1811.

The Civil Code owed its great qualities to the fact that it represented the accrued work of several generations ; the compilers of the other four codes were handicapped to the ex¬

tent that they did not possess any model — in¬ complete or otherwise — on which to form a basis adequate to contemporary needs. Their elaboration was less skilful and their authors less competent. Of the four the Commercial Code is the least satisfactory, representing as it does far too many ancient texts, such as the decree of 1673 regarding trade and that of 1681 on the marine. Colbert's legislation, of more than two centuries date, forms even to¬ day the basis of the Commercial Code,

whereas trade has developed with a remarkable rapidity and undergone most varied and unforeseen transformations.

Mention should also be made that French law has become enriched since Napoleon with four other codes : the Military Code, the Forest Law Code, the Rural Code and the code govern¬ ing employment, the two latter are not yet com¬ plete, only certain articles up to the present having been voted. And yet the first article of the Rural Code is dated 20 Aug. 1881.

Legislation since the Civil Code. — The five codes instituted by. Napoleon are in opera¬ tion at the present time and form the basis of contemporary French law. Many of their articles have been suppressed, improved upon or completed, while on the other hand many other laws, civil, commercial, etc., have been voted which supplement the Civil Code.

We have not here the pretension to outline the complete list of the legislative texts drawn up during this period covering more than a century. It will suffice to indicate the most important modifications and reforms.

The question of divorce had been settled in the affirmative by the Civil Code. For religious reasons the Restoration had abolished it, but the Third Republic reinstated it in 1884, due largely to the energetic efforts of the late Alfred Naquet.

The industrial revolution of the first half of the 19th century exercised over French legis¬ lation a powerful influence ; it contributed to the formidable development of incorporeal per¬ sonal property, the rise in the value of urban real estate with the consequent crisis in rural property, and finally the growing importance of the working classes.

The legislator had to ameliorate the system of land ownership by the following methods : the creation of mortgage loan societies, pub¬ licity of transfer of

real estate and improvement in regard to mortgages generally. Concerning personal property mention should be made of the various laws relating to corporations and particularly to joint stock companies, measures respecting lost or stolen securities, safekeeping of securities belonging to persons unqualified to guard them or in wardship, etc. The working class finally benefited by the recognition of trades union and the facilitation of their right to acquire property.

Other provisions were made with a view to improving the lot of illegitimate children to facilitate marriage (marriage by procuration exists since the war), to increase the list of professions open to women, and to extend cases of indistrainability, etc.

The Civil Code as well as the other imperial codes need to be entirely revised with a view to the incorporation in them of new dispositions

having a civil, commercial or personal charac¬ ter. At the beginning of the 20th century it was expected that these reforms would soon be effected; a commission was appointed in 1904 on the centenary of the Civil Code, to prepare such revisal. However, no results were forth¬ coming from this effort, but it is to be hoped that after the war France will make it a point of honor to have as complete and perfect as possible codes commensurate with actual eco¬ nomical developments.

Customs. — 1 he Customs which played such a large part under the old regime ceded the place to written law. In principle they could no longer be considered as constituting a source of legislation. However,, in certain cases the legislator took into account existing customs (urban servitudes, vicinity relations, lease rents) ; on the other hand commercial usages not having been abolished by the

Commercial Code remain in force provided always that they are not con¬ trary to a legal text. But in many respects the dispositions contained in the codes are so insufficient that the French Tribunals are often obliged to have recourse to the old texts which constitute an important stock of customary rules which enrich, consequently, the legislative system of France, such as the "action pau- lienne® (right of creditors to revoke fraudulent acts of their debtors) and the dotal system.

Jurisprudence. — By jurisprudence is meant the manner in which the laws (and the Cus¬ toms) are interpreted by the Tribunals. It is a rule of modern French law that no one court decision can bind either the same court or an¬ other (even of higher degree). The result of this is a great variety in the decisions and judg¬ ments rendered.

However, a certain unity of jurisprudence has been established by the institution of an unique Cour de Cassation which considers legal texts from a purely legal point of view without regard to fact. On the one hand the judges do not care to pronounce a judgment contrary to former findings of the Cour de Cassation in an identical case, on the other hand the Cour de Cassation may, at a sitting of all the Cham¬ bers, impose its point of view and decision on a Court. This is by virtue of the law of 1 April 1837 by the terms of which if the deci¬ sion rendered on a returned appeal after a premier cassation is similar to such decision the case is heard again before the court whose finding, rendered in solemn audience, binds the new appeal.

French jurisprudence cannot modify legis¬ lation, but in numerous cases it can often make it more elastic and adapt it to modern condi¬ tions without violating legal texts.

Judicial Organization. — In France the common tribunal is the District Court which decides civil litigation. Under the name of (

by district courts. There cannot be two suc¬ cessive appeals, the aim of the legislator being to do away with exaggerated delay necessitating extremely heavy costs.

Besides the civil tribunals and appeal courts there is the Public Ministry whose duty it is to watch over the interest of the public. These magistrates, unlike the regular sitting judges and counselors, are liable to dismissal, the judge or counselor alone being independent of execu¬ tive power in order to respect the principle of separation of powers.

The highest degree in the judicial organiza¬ tion is the Cour de Cassation which, as we have seen, unifies jurisprudence to a certain extent. Its members show great impartiality and are thoroughly versed in law.

In France, as in several other countries, commercial causes are not always brought be¬ fore the civil courts but are decided by special tribunals, commercial tribunals, a precedent of which is to be found under the Monarchy period. These tribunals are composed of mer¬ chants elected by their fellows. The election system which also exists for the nomination of workmen and masters to the "Conseils de Prud' hommes® (Trade Councils) whose task it is to settle controversies between employers and em¬ ployees, is not followed for civil magistrates who are appointed by the President of the Re¬ public.

Trade councils and commercial tribunals only exist in the large commercial and indus¬ trial centres; in other districts they are replaced respectively by justices of the peace and dis¬ trict courts.

Matters of an administrative nature are also decided by special courts, "Conseil de Prefec¬ ture® and "Conseil d'Etat,® which fulfil roles of first instance, appeal and cassation courts.

The penal law is applied, as we have seen, by a judge of simple police (minor offenses) and the

Correctional Tribunal (delinquencies so called). More serious affairs (crime) are dealt with by the Assize Court, composed of magistrates and a jury of 12, the nomination of the latter being a fairly complicated operation.

Legislative Power, Laws and Decrees. — In conclusion we will devote a few lines to the organization of the legislative power in France as it exists to-day. Two kinds of law exist: constitutional laws, voted by the two Chambers sitting conjointly in National Assembly, and ordinary laws voted by the Chambre des De¬ putes and ratified by the Senat.

Initiative for laws belongs to the President of the Republic and members of the Chambre des Deputes and Senat.

Laws regularly voted are only enforced once they have been duly promulgated and published by executive officials who are responsible for their application.

The decrees of the President of the Repub¬ lic are often criticized as being practically the same as laws. This, however, is not the case, as the laws alone are the law, whereas a decree defines the details for the application of the law; furthermore a French law is always pre¬ sumed to be constitutional, and this presumption is incumbent on the judicial authorities; being the contrary of American law, according to which the courts can refuse to take into con¬ sideration an unconstitutional decree.

Bibliography. — Bertauld, introduction a l'etude des sources du droit Frangais* ; Bris¬ saud, (An History of French Private Law> (The Continental Legal History Series, Boston 1912) ; Brissaud, (An History of French Public Law (meine collection 1915) ; Dareste, (Etudes d'histoire du droit* ; Esmein,*

(Cours elemen- taire d'histoire du droit frangais*; Gautier, ^Precis de l'histoire du droit frangais* ; Ginoul- hac, (Cours elementaire d'histoire generale du droit frangais*; Giraud, (Essai sur l'his¬ toire du droit frangais au Moyen-Age* ; Glas- son, (Precis elementaire de l'histoire du droit frangais) ; Guetat, cHistoire elementaire du droit frangais) ; Tardif, (Histoire des sources du droit frangais) (origines romaines) ; Violet, (Histoire du droit civil frangais) (Ouvrages de droit frangais contemporain) ; Berthelemy, (Traite elementaire de droit administrate* ; Esmein, (Elements de droit constitutionnel frangais et compare* ; Garraud, (Precis de droit criinineP ; Glasson, (Precis de procedure civile* ; Lyon-Caen et Renault, (Manuel de droit commerciaP ; Pic, (Traite elementaire de legislation industrielle) ; Planiol, (Traite ele¬ mentaire de droit civil. >

Charles F. Beach,

International Lawyer practicing in Paris.

8. FRENCH SOCIALISM. Socialism is an international theory. The same doctrine, the same conception of property, that is, is laid down by socialists in all countries. But every nation has produced its own form in the devel¬ opment of this doctrine, and these forms have been determined both by historical traditions and by the economic medium in which they have appeared.

Two traits have distinguished French Social¬ ism from the rest. The first is that its character is strongly political, by which is meant that it is perpetually attempting to arrive at the gov¬ ernment of the state, the second that it is con¬ tinually animated by an active hope of im¬ mediate success in that effort. The French proletariat has (since the French Revolution) been mixed up with most of the decisive polit¬ ical struggles. It was the proletariat which dominated the Commune of Paris in 1793, and thus indirectly dominated the Convention. The French proletariat had, therefore, at the be¬ ginning of the modern period, already put its hand

upon the central lever of the Revolution¬ ary power. Somewhat later when the energies of the Revolution began to sink, it was among the populace, among the working people (who were already filled with the communistic spirit) that the vital forces of the Revolution were maintained; and the hopes which the proletariat entertained at that moment were of the most vigorous sort. The program at the close of the 18th century is summed up in the name of Babeuf. Babeuf did not look upon himself as the head of a mere party' — it was in his character rather to depise party, be¬ cause party always looks for its success to some chance hazard on the political field : it was rather his object to take up again the whole effort of democracy at the point where Robes¬ pierre (q.v.) had left it, and to widen it beyond the limits which Robespierre had assigned to it. It was his object to free those energies of the

- All these works except the translations of Brissaud are edited in Paris.

Revolution which had been captive since Ther- midor. Babeuf believed the proletariat ready to assume and capable of assuming the respon¬ sibility of governing France, and had his con¬ spiracy succeeded he would have changed the destiny of the country. The present writer has been told by a friend of Gembetta's that in his youth, when that leader had just come to Paris, he said freely <(If Babeuf had won, the world would have been saved." It would in¬ deed have been saved from the counter revolu¬ tion, from militarism and from the Napoleonic dictatorship, and a democracy which should have been based upon egalitarianism and alive with enthusiasm would have proceeded in peace to the organization of labor.

The note of all this is that at the very be¬ ginning of modern history the French proleta¬ riat had ceased to be ^underground" as it were in the state. It thought itself strong enough for the highest tasks and it is this hope and this power of action which are continued obscurely or brilliantly in France throughout the whole of the 19th century. The

proletariat recovered these hopes of theirs and put them forward again in a lively manner during the <(Days of February" in 1848, on which occasion it was a socialistic inspiration which, for a moment at least, was the driving force of the second revolution. Even the terrible reprisals of June did not destroy the historical pride of the French proletariat. The day after the disaster it restated its leading idea and regathered its strength. Proudhon, in the book which he dated from the prison of the Conciergerie in July 1851 defied the reaction to proceed to its logical end. aThe Revolution he says, ccis at the present moment so thoroughly consummated in the national thought that to pass from thought to action is but a matter for executive energy. It is too late to avoid its power. The Revolution wills to be, and for her to will to be is to will to reign? The Bonapartist coup d'etat was the object of this peculiarly auda¬ cious expression, and it had the effect of raising the proletariat once more to a conquering height in politics. The same hope, the same ambition permeated the days which elapsed just before the fall of the second empire. Through¬ out 1868 and 1869 public meetings were the medium where the communist or the mutualist put forward the socialist doctrine with the ut¬ most strength. The middle classes, especially the middle classes of the republican stamp, held aloof and affected to despite such programs as ((utopias," but in the midst of their dis¬ dain the revolutionary working men were planning to lay a hand upon the new regime which was so soon to appear. Among Blanqui's papers, notes have been found upon the role which the proletariat would presumably play in the Revolution which he saw to be imminent. Had not the war of 1870 cut into these plans and had not the empire fallen under the par¬ ticular blow it would, without the slightest doubt, have fallen a few years later under the blows of a Revolution in which Socialism would have had a very large part. The at¬ tempts which were made during the siege of Paris by the Blanquistes on the 31 October, and which later developed into the Commune, would have dominated the new government or

at least would have been very largely represented

in it. There was even a moment when the re¬ publican part of France hesitated between the Commune and Versailles, and once again at that moment the French proletariat might have thought itself upon the eve of obtaining power.

It is evident that a working class with tra¬ ditions of this sort and with an education of this sort is essentially political. It is evident that such a class will be acutely sensitive to political events, will be ready to watch them upon all occasions, and to seize every chance of penetrating into the very heart of the state and of there establishing its sovereignty.

Nevertheless a man might have asked him¬ self after the Commune whether the socialist idea had not been buried. Superficial observ¬ ers believed it to be dead, or at least laid for a long time. M. Taine expressed that thought clearly, standing with some friends before the wall where the prisoners had been shot in Pere la Chaise: he said, <(We are rid of Socialism for half a century,® and M. Thiers in his electoral manifesto of 1877, during the great struggle of the Republic against reaction which is known as the (

It must not be imagined on this account that the French proletariat, which had refused to give up hope or to cease a moment from its effort after the days of June 1848, had lost its ideal after 1871.

What had happened was that the working people of the country were now absorbed by another battle which though it was not fought in the streets was not less tragic than a civil war. This battle was the struggle between monarchy and republicanism. The French proletariat at this moment had the foresight to perceive that before it could raise the

socialistic flag again the republican battle must be won, and therefore, under the appearance of a mere constitutional struggle, a class war arose which lasted until 1877. The point of the struggle was to determine whether France should be governed by an oligarchy drawn from the re¬ mains of the old regime, an oligarchy of which the Orleanist and clericalized middle class were the nucleus, or on the contrary by an artisan democracy. But this class war, embroiled and intricate as it was, did not suffice for the social¬ istic idea once it was thoroughly awake, and the proletariat was but waiting for the defeat of the counter revolution to bring forward the social question and to force it upon the vic¬ torious republican party. Just after the Re¬ publican elections in which the country replied in October 1877 to the challenge of the re¬ actionaries, Guesde and his friends began their revolutionary and collectivist campaign in their newspaper L'Egalite. The moment marks a decisive date in French socialism.

The first number of this journal appeared on 1 Nov. 1877. The very greatest difficulty confronted the leaders of the movement. In the first place the resistance of Marshal Mac- Mahon and of the survivors of the coup d'etat VOL. 11 — 40

had not yet ceased and the socialist party had to defend itself against the accusation which the Republicans brought against it of creating a di¬ version in the midst of the struggle. L'Egalite replied to these calumnies and to the treacher¬ ous insinuations which accompanied them by exactly defining its republicanism. It used the following words :

(

(

<(The only men who have the right to at¬ tack us in the matter of our publication are the working men, whose organ we desire to be, and upon that side we are quite at our ease. The working class have too clear a conception of their interest not to understand that the moment just before a battle is the very moment when it is the most essential not to leave the liberal middle classes in any doubt as to the nature of the help which we are willing to give them against a common enemy. The moment before the battle is also the moment for pro¬ claiming in the strongest manner that it is not the business of the working classes to be per¬ petually pulling the chestnuts out of the fire for professional politicians, but rather to clear the only ground upon which their claims can be successfully established. And that ground, of course, can only be a republican republic.®

Another formidable problem arose before the organizers of socialism at this time — that is 1877. What should be their attitude toward universal suffrage? Should they despise it or should they use it? Up to that date universal suffrage in France had always appeared as an instrument of reaction. It was under the heavy weight of the peasantry that the empire had crushed the republican and socialist thought of the towns. Hardly had that thought been relieved somewhat by the revolutionary forces of September and the fall of the empire than France was again given up by universal suffrage to the reaction, to the country squires and to the fanatical clericals of the assembly at Ver¬ sailles. But universal suffrage was destined bit by bit to be enlightened and to emancipate itself. The republican idea alone had had the strength to liberate the country from the as¬ sembly at Versailles. Universal suffrage had (again through the republican idea) found the strength to break the counter revolutionary at¬ tempt on the 16 May 1877. To despise uni- versl suffrage and not to take advantage of it

would be to remain outside the national life. To have done so would have been to reduce the socialist to an anarchic and powerless sect. Guesde and his friends accomplished a de¬ cisive act and rendered the French proletariat a vast service when they decided to rely upon universal suffrage, for by this decision the proletariat entered into the main current of the national life. They did not expect democracy would of itself achieve the socialization of property. They believed that only revolution¬ ary violence would succeed and that the prole¬ tarian revolution would have to be accom¬ plished by force, as every other revolution had been accomplished, and as more recently in the United States had been accomplished the abolition of slavery. But by relying upon uni¬ versal suffrage they changed the nature of the class struggle, they took it out of the workshop and brought it into the large world of politics. It was decided that the proletariat should choose men who would represent their class when they should send into Parliament men who had no idea of needing a majority there, but who could without ceasing act upon and render anxious the capitalist regime.

The plan was to cast upon that regime so implacable a light that in its exasperation and bewilderment a social revolution far more sys¬ tematic and far more thought-out than the Commune should at last push capitalism to its last entrenchments and make it deliver a de¬ cisive battle. The resources of universal suf¬ frage were for Guesde and his friends only the prelude to an active revolution. What might be called the historical ambition and the historical habit of mind of the French prol¬ etariat was awake. It thought itself now as ever on the eve of a final assault and be¬ lieved that it might enter into the government of the state by some unguarded door, and in its turn become master where the other classes had reigned. From 1877 to 1893 this was the at¬ titude of mind of the French socialists whether they were the friends of Guesde or Blanquists, whose leader Vaillant had been brought back from exile by

the recent amnesty. In the same tone of thought were journalists who, like Allemane, represented the Parisian proletariat. The great electoral successes of 1893 which suddenly introduced into the Parliament a body of 40 socialists, brought this excitement to a head, and the more enthusiastic of the party were justified in believing that the proletariat had at last reached the goal of their effort. The Republican and the middle class parties, worn out by the long and continual struggles between the opportunists and the radicals and broken by the Panama scandals, seemed con¬ demned to impotence. Guesde believed their regime to be in its death throes, and he thought that the moment had come to turn democracy away from what was now no more than a corpse. The socialistic minority needed nothing more than ability and courage in his opinion to become the leading majority, and universal suffrage would vote socialist if only an active and wide propaganda could be inaugurated among the peasantry and the smaller trades¬ men, to prove to them that their personal in¬ terests lay in an alliance with the industrial proletariat.

It was at this moment that Guesde addressed to the bourgeois parties in the Chamber, the

phrase : <(We need Use no weapon against you but those which you have provided for us in your own legal forms.®

It will be seen that by this time the tactics founded in 1877 had changed. But the same hopes and the same courageous spirit of action permeated the socialist proletariat. These hopes undoubtedly contained an element of illusion, but they were not all illusion. The political efficacity of socialism was rapidly growing and although the results had not given the socialist proletariat the full victory for which it had hoped, it nevertheless kept the activity of the party and its general spirit alive. Even when, after 1898, the socialist party had to give up the hope of an immediate and final success, it none the less retained the knowledge that it had become an historical force of the first order and

one capable of playing a de¬ cisive part in the national life. It is this result which, when one eliminates the details of the struggle, remains the chief fact in the par¬ ticipation of socialists in the defense of the Re¬ public under the Waldeck-Rousseau ministry, and the participation which the party also took in the work of laical emancipation under the Combes ministry. The traditional thread which unites the action of the French proletariat is perpetually showing itself in new forms which arise for the momentary necessities of the Re¬ publican democracy and the Parliamentary regime. At the present moment the <(parti socialiste uni® is withdrawing itself from the parliamentary system of groups and especially from those which aim at the forming of a ministry, but it is not so withdrawing itself in a sort of contemplative solitude, neither is it so withdrawing itself because it has given up hope of some ultimate decisive action. It is with¬ drawing itself because its leaders have discov¬ ered that the moment had come to rally to itself the general conscience of the whole work¬ ing class and it could not do so without further propaganda. When that propaganda shall be completed, it will be able to throw all its forces into the general movement of politics without in the least abandoning its ideal. In the first great crisis whether interior or exterior that may shake the troubled modern life of France the Socialist party will throw itself into the centre of the struggle and it will be driven for¬ ward by the indomitable and compelling hope which its history has taught it,

So true is this that even those of the French proletariat who imagine themselves to be di¬ vorced from political action are, if their methods be closely watched, only seeking some new form of action which shall be more polit¬ ical. What is known in France as <(La Synda- cahsme,® that is the Trade Union movement which pretends to stand aside and to be able to despise electoral and parliamentary action, is at bottom an essentially political thing,' When the leaders of this movement put it forward that a general revolutionary strike

may compel the world to a communistic form of produc¬ tion— to put forward such a theory is to in¬ augurate an action that is, at bottom, definitely political. It would be an error therefore to think that the newer movements in French socialism are an abandonment of the chief political method or a delaying of it, They are rather an emphatic assertion of it, an exalta¬ tion of that certitude in the .political future

which we have called the defining character of socialism in France.

This note of hope, however, which has been so frequently mentioned in this article would be but a sort of madness if French socialism were to count upon the industrial worker alone. For the industrial development of France, though in the last 50 years it has been acceler¬ ated, is relatively far less than that of England, Germany or the United States. France is still largely an agricultural country, and if social¬ ism were to retain as enemies against itself the 19,000,000 of peasants, nay more, if it did not draw them in the wake of its ideas, it would break itself against an insurmountable obstacle. It is on this account that the party has attacked the problem of converting the peasant. The French socialists know very well that the millions of peasant proprietors will never allow themselves to be expropriated by law. The party has put forth all its efforts to persuade the small proprietors that no such agrarian communism is in view. The theo¬ retical formulae which have here arrested the development of German socialism have not weighed upon the French party. It is the opin¬ ion of the leaders of that party that the peasant proprietor will bit by bit enter voluntarily into a state organized upon the socialistic basis and this is the future that far-seeing men like Blanqui believed to be nearer than the event actually proved to be. It is this process of gradual and voluntary acceptation

of the col¬ lectivist state by the peasant proprietors which Guesde foresaw in 1877 and put forward in his newspaper. ((The French peasantry, » he wrote, «may rest assured that expropriation of their land would remain necessarily outside any pro¬ gramme for a collectivist organization of the great industries or of large landed property .® Blanqui also had laid it down as a doctrine of tactics in the admirable notes which he drew up at the end of the empire. He pointed out that the peasants of the country were perme¬ ated by revolutionary memories, that the peasants like the rest of the. country had a tradition of hearty political initiative, that the peasants had given battle to the nobles and to the priests, and that the peasant had no love for the ((fat bourgeois® who had taken the best of the lands. And socialism he thought based upon these traditions and these memories would end by attaching the peasant to its movement. In a word, one does not find in France any ineradicable conservative force nor any . per¬ manent trend of affairs which can oppose itself to the action of socialism.

It remains to add that French socialism, though perpetually attaching itself to party forms, can never permanently attach itself to such forms. It looks to a revolutionary and decisive achievement and bases itself upon a sort of national habit of revolutionary action. It is not to be imagined that this formula, how¬ ever true, means that French socialism can in the future detach itself from the universal suffrage which governs the country, nor must it be imagined that it can develop its. nature apart from the creed of democracy, which is part and parcel of the French people. But when one says that its character will remain essentially revolutionary and attached to the traditions of rapid political action one means that the French Socialist party will, like its

predecessors, be perpetually and rapidly choos¬ ing from the mass of political events such a congeries as may be used for producing the maximum effect at the critical moment of a struggle, and that, like every other French party of the past, it will

continue to reject com¬ promise and to attempt nothing less than the full success of its clear and definite enterprise.

Bibliography. — Bertrand. (La vraie revolu¬ tion; solution pratique de la question sociale) (1891) ; Cerfbeu, (Le mouvement social et in- tellectuel en France depuis 1 789) (1902) ; Eble, (Les ecoles catholiques d'economie, politique et sociale en France > (1905) ; Ensbr, (The Revo¬ lutionary and Reformist Controversy of the French Socialist Party > (1904) ; Guthrie,

Socialism before the French Revolution (1907) ; Le Bon, Psychology of Socialism> (1899) ; Nitti, (Catholic Socialism.)

Jean Leon Jaures,

Late Deputy for the Tarn; Formerly l7ice- President of the Chamber of Deputies.

9. SOCIALISM IN FRANCE DURING THE WAR. When the Great War broke out, the general elections had just taken place in France. The Organized Socialists obtained 1,200,- 000 votes (132 per 1,000), and sent 106 Deputies to the Chamber. The Republican Socialists had 23, the Independent Socialists about a dozen, the Radical Socialists about 150 De¬ puties, besides those groups dependent to a greater or lesser degree on Socialism, a cer¬ tain number of Radicals, of Social Catholics even, amongst whom the most noteworthy was M. de Mun, accepted some of its claims. The Chambre de Deputes, a majority of which ad¬ mitted the intervention of the state in economic matters, had on this subject a very different opinion from that of the Senate where the doc¬ trine of ^Laissez-faire® predominated.

Among the different parties we must make a distinction between mere Reformers and the declared Radicals. Two only of these parties upheld the class struggle as a principle and called for a social revolution ; the abolition of the salary and capitalist systems. These were the Organized party

or French Socialist party, a section of the Workmen's International party, and the Syndicalist party, making up the (

The Organized party labored chiefly in the political, the Syndicalist party in the economic, field. Seeking the same end but with very dif¬ ferent men and means, they had maintained for several years rather strained relations which sometimes degenerated into open quarrels. The former aimed at the acquisition of. power through electoral and parliamentary action ; the latter meant to attain the same, end by means of strikes and direct action and its keenest fol¬ lowers carried the policy of anti-militarism to the pitch of antipatriotism.

The Socialists were divided into groups, each member of which received yearly a card delivered to him upon payment of a subscrip¬ tion. The different groups of a same borough (commune) or, in Paris, of a same district (arrondissement) formed a section ; and the different sections of a county (department) formed a federation directed by a federal com¬ mittee. The legislative power of the party was constituted by a yearly national congress,

which met at different cities every year and whose members were chosen by the federation in the ratio of one member per 100 subscribers. The executive power devolved on a National Council, composed of delegates of the federa¬ tion, of the parliamentary Socialist group and of the Permanent Administrative Commission, comprising 22 members, nominated by ballot at the Congress. The journal Humanite was the party organ and the Socialiste its official bulletin.

In France, in 1913, of 7,700,000 workmen and employees, there were only about 1,000,000 men and 100,000 women unionized, agricultural, mixed and

employers' syndicates being de¬ ducted. They were grouped as follows : 5,046 local unions, 20 7 corporative federations of these, and 143 labor exchanges (Bourses du Travail). The legislative power of the con¬ federation, which did not include all these or¬ ganizations, was an annual congress held in dif¬ ferent towns every year, and at which an execu¬ tive committee was elected whose office it was to administer the affairs of the Confederation, with its seat in Paris and to name a secretary. The official organ of the Confederation was La V oix du Pen fie and its newspaper La Bataille Syndicalists. The two radical parties had ties with similar parties in foreign countries. In¬ ternational congresses discussed pressing ques¬ tions of the moment and a permanent central organization furthered communications between the several national sections : The International Socialist Bureau had its seat at Brussels, its president was Mr. Vandervelde, its secretary- general, Mr. Huysmans; the International Syn¬ dicalist secretary's office had its seat in Berlin and its secretary was Mr. Legien.

The Effect of the War upon the Differ¬ ent Factions of French Socialism. — In every country, war in so far as it obliges the citizens to concentrate their forces in order to defend themselves is opposed to the policy of <(Laissez- faire,® and, as it arouses the solidarity between members of a same nation, it demands that the general interest prevail over particular in¬ terest. It thus creates a semi-socialistic atmos¬ phere; and it may be remarked that, in France, very many measures brought on by events were more or less tinged with socialism ; thus the buying, selling and distributing of certain arti¬ cles of food by the state or municipalities; requisition and taxation of other goods ; grants of relief to the unemployed; proclamation of the principle that the reparation of the damages borne by the few is a social debt to be repaid by all; agricultural work performed jointly by all the inhabitants of the same village ; collec¬ tive tilling of neglected lands if the proprietor be

defaulting; legal establishment of minimum salaries in munition factories and for home workers in the clothing trade ; progressive in¬ come tax ; the creation of employment bureaus and of mixed commissions in which employers and employees meet on an equal footing; and compulsory professional training, etc.

It happened also that numerous ministerial posts have been held by men who in their youth were influential members of the Socialist party, such as MM. Briand, Viviani, Millerand and Breton; or else who belonged to a group of Socialist reformers, such as MM. Augag- neur, Painleve, Godart and Metin. Doubtless Socialists who become ministers are not always

Socialist ministers; nevertheless their presence in the Cabinet calmed to a great degree the fear and aversion which the middle-classes {la bour¬ geoisie) felt at the very name of Socialism.

But what it behooves us to follow is the life of the two radical parties which are the most active or the most strongly organized of all. To the very last, the Organized Socialists and Organized Radicals did all they could to prevent the huge catastrophe threatening the whole world. The former used all their influ¬ ence with the government to maintain peace, the latter invited their foreign comrades to join them in the same cause. But their manifests, their appeals, their meetings woke no echo on the other side of the Rhine. Jaures fell murdered, on 31 July 1914, after having taken steps for the maintenance of peace and having lost all hope of success. At his funeral, Organ¬ ized Socialists and Organized Radicals, disap¬ pointed by the listlessness of the German So¬ cial Democracy, disgusted by the brutal vio¬ lation of the neutrality of Belgium and Luxem¬ burg, realizing that for France and the right of nations this was a question of life and death, proclaimed themselves ready to give their uttermost co-operation to the defense of the nation. They accepted the (

preached war to excess in his organ La Guerre Socials (later La Victoire).

On 28 Aug. 1914, in defiance of the policy which forbade members of the party to partici¬ pate in a ^bourgeois® ministry, MM. Guesde and Sembat were appointed to the Ministry of National Defense, in order, it was said, to pre¬ pare the general levy and to make certain that the country be told the truth. The former was named minister without portfolio, the latter Minister of Public Works; later on Mr. Albert Thomas was allowed to accept the undersecre¬ taryship of Artillery and Munitions, which be¬ came in time the Ministry of Munitions. Soon a new organism arose; this was the Executive Committee (Comite d'action) constituted on 6 September, and comprised the Permanent Ad¬ ministrative Commission, the Socialists in Par¬ liament, the directors and managers of Human¬ ite, the delegates of the Federation of the Seine, representatives of the Confederation and of the Workmen's Co-operative Societies. It strove to impose a single directive head on the entire working class of France.

It has been active in relieving the wounded, the prisoners, the refugees, the soldiers belong¬ ing to the laboring class, in sending them news¬ papers, food, clothes, in finding work for the unemployed, in assisting the families of soldiers, getting information about the dead and the missing, in protecting them against the in¬ creased cost of living. It had spent, by the end of 1915, 82,840 francs ($16,568) ; by the end of 1916, 210,000 francs ($42,000).*

In the meantime, the Socialist deputies urged the government to put a stop to the re¬ actionary and clerical campaign and advocated bold fiscal policy in accordance with the needs

of the times; they presented counter-projects on rents and taxes, asked that the monopolies of alcohol, insurance and hydraulic power should belong to the state, the abolition of the censor¬ ship, punishment for the speculations of the army contractors, etc. In the departmental and communal councils the Socialists elected ad¬ vised the municipalization of public utilities; in the Mixed Departmental Commissions, in the Women's Labor Committee, the representatives of the workmen's syndicates discussed with the representatives of the employers' associations those problems created by the war or the solu¬ tion of which was rendered urgent by it, as the organization of the labor market, alien workers, apprenticeship, terms offered to the men and women employed in the war factories.

All this may be called the outer life of both parties ; their inner life was more com¬ plicated. It is a law of human nature, that in every group, however small, there should be a Right Centre (moderate conservatives), and a Left Centre (liberals). Unanimity is but an exception, a case of unstable equilibrium. Di¬ vergences of opinions and nature often aggra¬ vated by personal dislikes and jealousies soon make havoc of it. It is therefore not to be wondered at, if the war lasting beyond all fore¬ casts, fissures showed and increased in the bloc constituted primarily by the political and eco¬ nomical labor groups. They still agree not to break up the International Congress a second time, that the right of peoples to dispose of themselves and to choose their nationality be one of the bases of the future peace, on the suppression of secret diplomacy, on the limita¬ tion of armaments, on compulsory arbitration to settle international conflicts, on the restora¬ tion of the independence of Belgium, Poland and of any country annexed by a larger state against its own free will. Let us add that no one has advised sabotage in the factories, nor desertion from the army, no one even proposed to carry to the trenches the discussions at home. But, apart from these, there are numerous points provoking dissension, many, of them common to both

the Organized Socialists and the Organized Radicals. Let us begin by these : (1) Who bears the responsibility of beginning the war? The majority agree that it rests with the Austro-German aggression. The minority, without denying this undeniable fact, are of opinion that the responsibility rests with all governments and capitalists who are always eager to conquer and annex. (2) The. question of Alsace-Lorraine, ever the stumbling-block to a good understanding between France and Germany, appears to the majority as capable of solution only by the restitution to France of the territories wrenched from her by main force. Liebknecht and Bebel, in 1871, protested against this act of violence, say the majority; they do not say what the lot of the immigrants is to be ; the minority think that the inhabitants should be consulted, but say nothing of those who left the country in order to escape German domina¬ tion ; a tribunal by arbitration, the composition of which is not made known, is to solve the question. (3) Is the common danger to put a temporary stop to the class struggle? Doubt¬ less the necessity of defending the fatherland has for a time cast into the background this class struggle, which is one of the very founda¬ tions of the Marxist doctrine. It is evident, too,

that in many minds a reaction has taken place, setting up the humanitarian and fraternal prin¬ ciples which were those of the French Socialists in 1848, the ideal of justice which Proudhon as well as Louis Blanc strove to realize and which Benoit Molon, Fourniere and the Revue Socialiste have never ceased to defend. It is natural enough that M. Longuet, Marx's grand¬ son, should be one of the chiefs of the minority whose Left Centre proclaims that the class struggle is "irreducible,® that sacred union is but a delusion, that it is high time to denounce it as it has never been properly observed by the reactionary parties. The majority, though con¬ fessing that it ought to be better applied, cry out: ((France first! Let us begin by saving our invaded country. The strife between capi¬

tal and labor can be taken up when the Germans are no more at Noyon.® Logically, the minor¬ ity have asked the (

president of the executive commission, had seen his country too much plundered, laid waste and outraged to be in any hurry to reach out his hand to former comrades who had perhaps been among the despoilers of Belgium and who, in any case, had raised no protest against the ferocious treatment inflicted upon his com¬ patriots. Against these demands for a full session, the majority urged meetings to which only the Socialists of the Allied and neutral countries should be invited. At the meeting held in London (14 Feb. 1915) only delegates from Great Britain, Belgium, France and Rus¬ sia were present and they decided unanimously to see the war through to complete victory. Then the Italian Marxist Socialists, who had remained obstinately hostile to the intervention of their country in the war, arranged with the Socialists of a neutral country, Switzerland, to call forth at Zimmerwald (5 Sept. 1915) another meeting to which the official parties of France and Germany were not invited. There were 35 delegates, among whom Mr. Merheim of the Metal Federation and M. Bour- deron of the Cask Federation (Federation dn Tonneau), a member also of the 12th section of the Socialist Federation of the Seine. There they met German delegates and signed with them a manifest and a declaration warning the groups against the ((so-called national defense® and nationalist socialism. The meeting ap¬ pointed an international socialist committee to meet at Berne and take up the work which the bureau at The Hague had declined to do. At the Confederation meeting of 15 Aug. 1915, M. Bourderon's motion : (

A new meeting, organized again by Italian and Swiss Socialists, was held at Kienthal (24- 30 April 1916) and 28 organizations were rep¬ resented. There were 40 delegates, five on the German side (two women) ;

on the French side, three members of the Chamber of Depu¬ ties, MM. Brizon, Alexandre Blanc and Ruffin-Dugens were present, without an official man¬ date and solely of their own volition. A new manifest was issued similar to that of Zim¬

merwald but its terms were more violent. It said in so many words that for the rich slackers the war meant but the death of others and that the <(will of social revenges® should take the place of the struggle between the nations. The Socialist deputies were asked to vote against all military credits and taxes.

The National Council (Conseil National) meeting in Paris in August 1915 disavowed the (

The party agreed also on the future eco¬ nomic reorganization of France. But on the renewal of international intercourse which the minority wanted first and immediate, on minis¬ terial collaboration in national defense, on the vote of credits, the discussion was animated and the difference between the two opposed factions was only from 200 to 300 votes. In the permanent administrative commissions in which both factions are proportionally repre¬ sented, the majority has 13 members, the minority 11. As for the majority, its last mani¬ festation up to the moment of writing has been that of the Socialist group of the Chamber of Deputies, joyfully greeting Mr. Wilson's mes¬ sage to the American Senate (27 Jan. 1917), not because the President of the United States expresses therein the hope of <(a peace without a victory,® but because he opposes all imperial¬ ist ambitions, wherever they come from, and wishes to see, as the Socialists do, the estab¬ lishment of a fraternal society of nations.

At the meeting of the Confederation, which took place in December 1916, in spite of the very vivid criticisms of the minority against the majority, all

agreed on a very general dec¬ laration stating that in the future peace must respect the independence, the territorial integ¬ rity, the political and economic freedom of all nations, small or great, and on an invitation to the government similar to that voted by the Socialists.

This having been said on the intestine strifes among the Socialists as well as among the trades-unions, a few words will suffice to indicate the questions peculiar to each of the groups.

The Confederation in its meeting of 1 May 1916, at which 94 organizations were repre¬ sented, asked that the International Secretary's office be transferred from Berlin to a neutral country, to Geneva for instance, and approved the American Federation of Labor's initiative, proposing that an Inter-Syndicalist Conference should be held at the same time and in the same country as the future peace conference. It decided also to call a Conference of the Workers of the Allied countries, which met at Leeds in July 1916. There a temporary office for correspondence was created, to be located at Paris, M. Jouhaux becoming its secretary. There, also, was discussed the question of alien workers and of the means of organizing them in the different countries so that the interests of the workers (immigrants ar.d native) might be equally respected. The meeting adopted also resolutions relative to the laboring classes to be inserted in the treatises of peace, includ¬ ing especially guarantees relating to the right of syndication, to migration, to social insurance, to the hours, hygiene and security of labor, to the control which international organizations can and must exercise over the working of agreements concluded to that effect by the different governments. If we examine the syndical activity in France, we see it was marked by numerous interventions in favor of workmen and workwomen, interventions which, in the beginning especially, were mostly conciliatory; for the strikes, being for the greater part actuated by a demand for an in¬ crease in salary, were comparatively not numer¬ ous (107 in 1915 concerning 7,281 persons against 1,073

in 1913 concerning 220,428 per¬ sons). In 1916 there were a greater number of conflicts, but for the most part they were easily settled.

The war diminished or put an end to certain unions. Others, however, increased and there was noticeable a certain merging going on

among them. Thus, the railwav _ employees

and workmen who formed several rival organ¬ izations became united into one vast and power¬ ful federation.

It only remains to tell of the inevitable fall¬ ing off of membership in the Socialist party, which took place primarily in the number of its members, 60 per cent of whom are mobilized :

Mobilization Cards stamps

July, 1914 . 93,218 . 574,184

November, 1915 . 24,638 137,019

November, 1916 . 24,854 176,032

For the former it means an increase of 200 over the year 1915, for the latter an increase of 39,013, and the treasurer of the party states

that the increase continued in 1917. In short, among Socialists and union workers an acute crisis of internationalism threatened the unity of the organized party and to a lesser degree that of the Confederation. But we can repeat the words of Mr. Charles Gide at the Confer¬ ence of the Allied Co-operatives in September 1916: (cWe read daily in the press that interna¬ tionalism is dying away. This is not true. Neither capitalist nor intellectual nor co-operative in¬ ternationalism is dying off . . . .}> And we can add: ^Neither is that of the working class . . . .}> It seems only as if Germany is to lose the direc¬ tion of the movement which is thus to take a new character.

In the intellectual, political and economic life of France, there is a very obvious penetra¬ tion of ideas and dispositions of Socialist in¬ spiration, in the wider meaning of the word, which shall not be entirely temporary.

Bibliography. — General: Guillaume, James. ^'Internationale,* published under the direc¬ tion of Jean Jaures; (Encyclopedie socialiste, syndicaliste et co-operative de l'lnternationale Ouvriere* ; (Histoire des partis socialistes en France,* a series of essays. Historical: Paul-Louis,' (Histoire du Socialisme frangais*; Renard, Georges, (Syndicats, trade-unions et corporations) ; (Histoire du mouvement syndi¬ cal en France) ; Weill, Georges, (Histoire du mouvement social en France.* Theoretical: Deslinieres, Lucien, (L'application du systeme collectiviste) ; Guesde, Jules, (Collectivisme et revolution* ; Leroy, Maxime, (La Coutume Ouvriere* ; Jaures, Jean, (L'Armee Nouvelle) ; Maton, Benoit, (Le Socialisme integral*; Renard, Georges, (Le regime socialiste.) Practical: Millerand, A., (Le socialisme reformiste* ; Renard, Georges, et alii, (Le Soci¬ alisme a l'oeuvre) ; Levasseur, E., (Questions ouvrieres et industrielles en France sous la Troisieme Republique.* Critical: Bourguin, (Les systemes socialistes et revolution eco- nomique) ; Leroy-Beaulieu, Paul, (Le Collec- tivisme.*

Georges Renard,

College of France, Author of cLe regime socialiste, y etc.

10. CHURCH AND STATE IN FRANCE. At the outbreak of the Revolu¬ tion of 1789, the Apostolic and Roman Catholic religion was the religion of the state, and, since the Revocation of the Edict of Nantes, no other religious sect, Christian or non-Christian, had had (except in Alsace) any legal existence in France. Nevertheless, a royal decree two years before had granted a sort of tolerance and legal status to the Protestants. The king had likewise allowed the Jews to live in certain cities in the

kingdom, and there to carry on their worship in private : a regime of tolerance, not of freedom of conscience. The relations between the king and the Pope were deter¬ mined by the concordat concluded in 1516 be¬ tween Francis I and Leo X.

The men of the Revolution had no intention at first of secularizing the state or of sepa¬ rating it from the Church, nor even of estab¬ lishing any real liberty of conscience. The Dec¬ laration of Rights of 1789 granted, in fact, only tolerance, and it was not until the 27 Sept. 1791 that the Constituent Assembly placed the Jews on a similar footing with other dti-

zens. While it confiscated the possessions of the Church, it nevertheless tightened the bonds of Church and State by means of the law entitled the ((Civil Constitution of the Clergy (12 July 1790). This gave to the clergy a salary from the state, by which the parish priests especially profited, and this first budget of the religions rose to about 100,000,000 francs. As a consequence and climax of the Gallican policy of the kings, the Civil Constitution of the clergy tended to make the Catholic religion national. Thenceforth the bishops and the priests were elected by the people ; the bishops no longer received from the Pope their canonical institution; it was given them by another bishop. The newly elected clergyman could not address to the Pope any request for confirmation; he had to confine himself to writing to him, as visible head of the universal Church, in testimony of unity of faith and communion. Thus without any diplomatic notification, the concordat of 1516 came to an end.*

But the Catholic religion continued to be the religion of the state, and no salary was allotted to the ministers of other creeds ; it was thought that enough was done for them in leaving them undisturbed. Such were the events which, little by

little, led the Revolu¬ tionaries to loosen the bonds which united Church and State. The Pope, after much hesi¬ tation, condemned the Civil Constitution, and the clergy divided into two factions whose numerical proportions are not well known. Those who accepted the Civil Constitution and took the oath it demanded were called Constitu¬ tionals, or Assermentes ; those who in obedi¬ ence to the Pope refused the oath were called Refractories.

There were thus a Papal Catholic clergy and a non-Papal Catholic clergy whose par¬ tisans quarreled for the possession of the churches almost to the point of civil war. The inclinations of both parties alike were adverse to the liberty of sects; but most violent objec¬ tion to such liberty was made by the Papal clergy, who had become an opposing minority. The Constituent Assembly with very ill grace finished by granting the principle of it by the law of 7 May 1791, which authorized the Papal party to carry on their worship in the churches in concurrence with the non-Papal party with reservations and irksome restrictions. This was to some extent a recognition and consecration of the existence of the schism, but the people, attached to the idea of religious unity, had no wish for any schism. Consequently, in one part of the country the Papal clergy, in another the non-Papals were harassed; and continual religious disturbances took place during the years 1791-92. It was the recognition of this situation which inclined many enlightened Frenchmen to the then very unpopular idea of the separation of Church and State and the secularization of the state.

Even the National Convention, which passes in history as an assembly of atheists, put aside at first, in November 1792, a project of separa¬ tion, and formally maintained the Civil Con¬ stitution, limiting itself to making laws against refractory priests. But soon, when the Re¬ public had replaced the Monarchy, all the Catholic clergy became unpopular. The patriots accused the Papal clergy of conspiring with out¬

side enemies and with the emigres, and also of fomenting the civil war in the province of la Vendee. They accused the non-Papal clergy of having taken part in the Civil War of the Republic with the Girondins against the party of the Mountain. It seemed to the people that all the priests, Constitutionals and Refractories, were conspiring against the Revolution, and that they were a permanent danger to the Re¬ public. Although the people had not become philosophers, they had the feeling that to put it out of the power of the priests to harm the country, they would have to tear down their altars ; and it was thus, much less by philoso¬ phy than by patriotism, much less by anti-religious fanaticism than as an expedient of national defense; it was thus that there arose these popular disturbances which finished by taking the form of an attempt at the de- christianization of France. There was first the cult of Reason, with which the convention was associated only to a limited extent, principally in permitting the communes to renounce their worship. Through its Committee of Public Safety it strove to prevent violence against persons ; it proclaimed the principle of liberty of conscience. But passions were stronger than the laws or the government. One after another most of the churches were closed and the observance of religious worship was pretty generally suspended in 1794.

A new attempt at a state religion was made the same year by the efforts of Robespierre, who was then the true head of the French government; this was the worship of the Supreme Being, a sort of philosophical religion or purified Christianity, which disappeared en¬ tirely, or almost so, when Robespierre died.

Then, when the victories of the French had put an end to the terror which the coalition of priests and foreigners had inspired, the Catholic religion spontaneously reappeared. Then at last, enlightened by experience, waiving all idea of a state religion, the National Con¬ vention established the secular regime of sepa¬ ration, which lasted from the end of

1794 to the spring of 1803. Under this regime the state paid no further salaries to any sect, and all the sects, equal before the law, worshipped freely, with the provisional restrictions and the police precautions rendered necessary by the state of foreign and even civil war in which France still labored. A number of the churches were restored to purposes of worship, on condition that the priests who should enjoy the privilege should submit to the laws. Nevertheless, there remained a shadow, a trace, of a state religion ; this was the (lculte Decadaire * or "Ten-Days* religion, a sort of official religion of patriotism, which disappeared little by little under public indifference, when the country was no longer in danger. On the other hand a new religion arose, a kind of unofficial continuation of the cult of the Supreme Being; this was Theo- philanthropism.

Papal Catholics, non-Papal Catholics, Jews, Protestants, Theophilanthropists, adepts of the ten-day cult; all these sects acted as counter¬ poise to .each other in a state of liberty, and although the vicissitudes of foreign and civi»l war brought on acts of intolerance, it may be said that the regime of separation of Church and State became a part of the life of France at the time of the Consulate, that it was at

least endurable tor all sects and that there was a rich development of religious life.

If Napoleon Bonaparte suppressed this regime of liberty, at which he had himself pre¬ sided with as much success as talent; if he came at last to desire and to effect the reunion with Rome, to conclude a new concordat, it was not at all from piety but from personal ambition, his purpose being to command, through the Pope, the consciences of men, to realize through the Pope his dreams of power and of universal empire.

When the victory of Marengo had made him sufficiently popular to believe that all things were permitted to him, in the enforced silence of public opinion and the press, he entered upon negotiations with the Pope, and on 15 July 1801, at Paris, an act was signed which, since none dare call it a concordat, was called a Convention, but which was really an agree¬ ment analogous to that which Francis I had concluded with Leo X. In it Catholicism was not declared the religion of the state, but the fact was recognized that it was the faith of the great majority of the French people. The Pope was to demand or force the resignation of all the bishops then acting, and after a new cir¬ cumscription of dioceses had been determined on, the First Consul was to make nominations to these bishoprics or archbishoprics and the Pope was to confer on the persons thus nomi¬ nated canonical ordination according to the forms of the earlier concordat. The bishops should nominate the priests, but subject to the approval of the government. The Pope prom¬ ised that the purchasers of property formerly belonging to the clergv should not be disturbed ; and a suitable salary was to be given the bishops and priests by the government. On the other hand, the First Consul instituted some regulations of policy, called the Organic Arti¬ cles, by which he received security from the churches, in conformity with the ancient Gal- lican policy. The Convention and the Organic Articles became law on the 18 Germinal, year 10 of the Republic (March 1802) and the new concordat was in force from the end of the following April.

The greatest advantage that accrued to the Pope from this document did not appear in writing: this was the suppression of schism. Bonaparte abolished the heretofore constitu¬ tional church. He abolished also Theophilan- thropy and whatever remained of the ((Ten- days® worship. Protestants and Jews were recognized and protected by the state, but not with the same degree of honor and influence. The Concordat promised salaries only to the district priests. When Bonaparte became em¬ peror, he allowed

a salary of other priests or curates to the number of more than 30,000. The budget of Religions swelled little by little. At the time of the rupture of the Concordat, in 1905, it was about 50,000,000 francs.

Pope Pius VII, who had signed the Concor¬ dat, came to Paris in person to consecrate the new emperor, but Napoleon did not find in him the docile tool he was counting upon. Not being able to bend him to every whim of his despotic will, he used force, had him carried off from Rome and kept him a prisoner at Fontainebleau, thus provoking the wrath of the Catholics and bringing upon himself the hatred of all religious persons.

It was in hatred of Napoleon, likewise, that Louis XVIII planned to make a new concordat more favorable to the Church. This concordat was, indeed, drawn up in 1817, but it was not carried out, and it was the Concordat of 1801 which governed the relations of the Catholic Church and the state up to the beginning of the 20th century. The charter of 1814, while guar¬ anteeing the freedom of conscience, declared Catholicism as the state religion. This declara¬ tion was from the charter in 1830, and the p-ov- ernment acted from 1815 to 1905 in the direction of a real liberty of the sects, at least of those recognized by the state: for no legal guarantee was granted to the founding of new sects. On the whole, although some of the liberal party from the time of Louis Philippe demanded a return to the regime of the separation, the regu¬ lations of the Concordat acted without encum¬ brance and seemed to suit the state of public opinion in France up to the end of the 19th century.

After the promulgation of the dogma of Infallibility, the Catholic Church, now an en¬ tirely absolute monarchy, appeared a menace to civil society; especially when the suppression of his temporal power had made the Pope invul¬ nerable. On the other hand, since the loss of Alsace-Lorraine separated from France a large number of Lutherans, Catholicism had no longer any rivals but the Jews, who do no proselytiz¬ ing, and the Calvinists, who

do very little. In the years which followed the Franco-Prussian War, the Catholic clergy showed a desire to gov¬ ern France and even to plunge her, all shattered as she was, into the perils of a war for the restoration of the Pope's temporal power. The same clergy favored the two attempts at politi¬ cal reaction by Marshal MacMahon. Thus the priesthood lost its popularity. Soon the pri¬ mary schools, now a lay institution, enfeebled religious faith in France, and free-thought made great strides. Every year in the Chamber of: Deputies, lively opposition was made on the vote on the budget of Religions, and the sepa¬ ration of Church and State was demanded in a considerable number of electoral programs ; but there was, nevertheless, no strong popular movement in this direction. Even the Chamber elected in 1902 seemed determined to maintain the Concordat.

An unlooked-for incident changed the situa¬ tion. In the spring of the year 1904 the Presi¬ dent of the French Republic returned the visit which he had received from the King of Italy, and moreover returned it at Rome. The Pope, who still claims the sovereignty of his ancient states, declared himself insulted by this pro¬ ceeding and addressed to all the Catholic Pow¬ ers a document in which he complained of the offense committed b^ the French against his rights and his dignity. This memorandum, when made known, deeply wounded the na¬ tional sentiment of the French. The govern¬ ment of the Republic recalled its Ambassador from Rome and returned to the Papal nuncio his passports. There was a complete rupture of diplomatic relations between France and the Pope, and on 10 Feb. 1905, the Chamber of Deputies, by a majority of 386 votes against 111, declared ((that the attitude of the Vatican rendered necessary the separation of Church and State.®

The writer of the project of a law of sepa-

ration was M. Aristide Briand, Socialist Collec¬ tivist, a man of character more moderate than his opinions. He strove, by skilful combina¬ tions, to prepare a regime that would be ac¬ ceptable to the Church, but there were no nego¬ tiations, official or direct, with the Pope him¬ self. The Briand plan received, in the course of debate, but few amendments.

The whole bill was passed in the Chamber of Deputies on 3 July 1905, by 341 votes against 233, and in the Senate, on 6 Dec. 1905, by 179 votes against 103. The law was declared 9 Dec. 1905. It forms to-day the politico-religious sys¬ tem of France.

The particulars of the law are these : the republic assures liberty of conscience and guarantees the free observance of religious worship ; it does not recognize nor pay nor subsidize any sect. All public religious estab¬ lishments are suppressed, revenues, factories, councils of elders, consistories and the like. The property of these establishments will be trans¬ ferred to associations called <(cultuelles® to pro¬ vide for the expenses, the maintenance and the public observance of a sect and composed of a minimum of 7, 15 or 25 persons, according to the population of the community. The church buildings which belong to the nation (and this means the greater number) will be left free of charge at the disposition of the religious socie¬ ties, who will be held responsible for repairs of all sorts. Life pensions are granted to ministers of religion of more than 60 years of age and actually in service; those less than 60 years old will receive an allowance for four years. As to the police regulations of the sects, the meetings are public, but take place under the surveillance of the authorities in the interest of public order. Penalties are enacted against such ministers of religion as shall make in the churches any ex¬ treme political opposition to the Republic.

The Protestant and Jewish congregations submitted without difficulty to this law, but such was not the case with the Catholic Church, or rather with the

head of this Church. The ma¬ jority of French bishops, in assembly at Paris, agreed to accept the law, after a formal protest, and to organize, under the name of Canonical Associations, societies analogous to those the law recommended. There even seemed to be a sort of agreement established between the clergy and M. Briand, who had become Minister of Public Instruction and Religion, and who had charge in this capacity of the administra¬ tion of the Law of Separation. Moreover, the most eminent of the Catholic laity, the Catholic ^Intellectuals,® had publicly advised the Pope to accept the law. The Pope preferred to fol¬ low the advice of the Jesuits, who urged him to an uncompromising resistance. He believed that the formation of religious societies would bring democracy into the Catholic Church in France, and from that the destruction of the monarchi¬ cal hierarchy of the Church would some day result. Not only did he condemn the law but he forbade the formation of the religious societies or anything that resembled them. The French bishops were dismayed, but they obeyed the Pope.

There seemed reason to fear a religious civil war. Already at the beginning of the adminis¬ tration of the law, when the government wished to make an inventory of articles of furniture kept in the churches, the Catholics had forcibly

opposed the officials in more than one place, and in some conflicts blood was shed.

This time the government pushed prudence to the point of negative passiveness. It allowed the Catholic priests to continue their services in the churches of which they already had posses¬ sion, and to this day they keep this possession under provisional title with no legal right nor guarantee. There has not been any religious disturbance in any part of France since the Pope rejected the law. Some of the Catholic laity tried by a sort of schism to form religious associations in defiance of the Pope's orders; their attempt fell flat, in the face of public in¬ difference.

But the decision of Pius X deprived the Catholics of property whose transmission to the religious societies was assured by law, that is to say, the property of the former establish¬ ments of the sect, whose sum total is reckoned at about 300,000,000 francs. The Catholics thus saw themselves defrauded of the re¬ sources they would have found in the assess¬ ments, collections and contributions of the re¬ ligious associations. It was difficult for them to pay their clergy and difficult to recruit them. Furthermore, the Pope had the ad¬ vantage of being able to name the bishops without the permission of the French govern¬ ment, a privilege which gave him the oppor¬ tunity to strengthen his absolute power.

The Great War in which France has been engaged since August 1914 has resulted in a truce being called to religious controversies and has almost completely obliterated their remembrance. Clericalism and anti-clericalism are words now scarcely ever spoken. On the various committees formed in aid of the national defense, free-thinkers and bishops sit side by side. There has not been in France any anti-papal movement. The war occupied all parties, and to-day all are united in a <(Sacred Union.® See Church and State.

A. Aulard,

Professor of Revolutionary History, in the University of Paris.

11. THE SEPARATION OF CHURCH AND STATE IN FRANCE. The Facts and the Law. — Without entering into an abstract discussion of right and wrong, we may admit as a fact that the whole world is now moving, more or less slowly, from the region where civil and religious power is lodged most fully in the same hands to the region where these two powers are completely separate ; and to American minds, in the habit of taking prac¬ tical views of things nothing must seem more natural and more profitable to the state as well as to the Church. How did it happen that, in France the same phenomenon could not be effected without great difficulties which nearly led

the faithful to revolt and the state to per¬ secution? A first cause of it is to be deducted indeed from the general centralization, from the moral impossibility of any great social force having a normal life outside of government con¬ trol in a land where the state intervenes as mas¬ ter or guide in the most trivial details of the citizen's private life. But, in order to understand it fully, we have also to remember that for many hundred years Church and State had lived in union, and held their interests in common. After their intimate (though not always happy)

relations during the Middle Ages, they had been united since the 16th century by the close bonds of a Concordat made between Francis I and the Holy See.

The French revolutionists did not at first seek to disestablish the Church, and if it is true that the Assemblee Constituante began by transferring to the nation all the property of the clergy, it was by agreement with the latter and under a formal pledge to provide for their support in an annual budget. So far from considering the Church and the State as sepa¬ rate and independent, the Assembly voted a so-called Civil Constitution for the clergy and intended to organize it in such a way that it would depend much more on the popular elec¬ tions than on the authority of the bishops and of the Pope. It is well known that they achieved exactly the contrary of what they in¬ tended, and, instead of becoming thereby more closely united, the civil and religious powers were thrown into a violent conflict which led to their first separation. The Pope having pro¬ nounced the Constitution Civil du Clerge in¬ compatible with the principles of Catholicism and the majority of bishops and priests having refused to sever with Rome, the Assembly pro¬ claimed them rebellious (Refractaires) and en¬ deavored to replace them by more docile minis¬ ters (pretres assermentes), whom most of the faithful refused to

follow.

Irritated by this failure, the government took more and more drastic measures against the Refractaires ; and under the Convention, went as far as condemning many of them to exile and even to death. Such strained conditions could not and did not last ; but the ameliora¬ tion which followed covered a feeling of un¬ easiness and uncertainty equally detrimental to religion and public welfare. Therefore when, in 1801, a Concordat was signed between Napo^ leon and the Pope, giving the Church a legal status and regulating its relations with the state, France welcomed it with sincere comfort and satisfaction.

Despite its imperfections, the chief of which was the narrow-minded confusion of temporal and spiritual power, one must render the Con¬ cordat this justice, that it granted France al¬ most a whole century of religious tranquillity. The conflicts, more or less grave, which sprang up from time to time between the state and the Church were as a rule only verbal recrimina¬ tions, and always ended without serious con¬ sequences. At least such was the case under the Monarchy and the Empire, but under the third Republic after a few years of < nerfect harmony, feuds arose, little by little, which ever became more serious and finally brought about the very unfriendly rupture.

Our aim is to expose the events and laws of this last period with the errors or the faults which, perhaps from each side, have led up to the separation.

1. From its origin in 1871 up to 1876 the Republic showed itself extremely favorable to religion. The National Assembly, elected after the war, asked for the re-establishment in the Church service of the official prayers for the state, which had been temporarily suppressed, and for the restoration of the military chap¬ lains. It admitted ministers of religion into the boards of Public Instruction and Public Charity. It increased by $800,000 the parlia¬

mentary appropriation for public worship. Finally in 1875 it gave private citizens the right, previously reserved to the state, to undertake higher education, a right of which the Church availed herself to found five universities. Need I recall that on the other hand, it healed up the wounds of the stricken fatherland with a rapidity which was the wonder of the world, and replaced France in a very short time in the position of dignity and honor from which the cruel disasters of the Franco-German War had for the moment displaced her? One of the most clear-sighted citizens of America, Father Hecker (q.v.), founder of the Paulists, who lived much in France at that time, declared the Republic of that day one of the best govern¬ ments that any people had ever known.

Unfortunately the foresight of the men who composed this government was not equal to their honesty, and their ability to serve well the interests of the country at the time was the measure of their inability to follow its political and social evolution. The majority of them did not suspect that France, con¬ sciously or unconsciously, had entered the age of democracy; and when, after vain efforts to agree upon the choice of a king or of an em¬ peror, they finally adopted, in 1875, a Republican form of government, because it was the only possible one, they lost the benefit of that act of wisdom in letting it be seen that they had done as they did in spite of themselves, and in setting themselves immediately to work to destroy what they had built up.

Those senseless tactics constituted at once the joy and the success of their adversaries, but I am frank in saying that France suffered griev¬ ously from it all. Men, if not gifted with the most profound foresight, at least possessed of honesty and disinterestedness, have been placed in a powerless opposition to the government, and from the special point of view which now concerns us this has been most disastrous for the cause of religion. The Conservatives, be it said to their praise, were in general the best friends of the Church, whilst by an

unhappy coincidence the most active and advanced Re¬ publicans were at the same time enemies of the Christian faith. From this there resulted an inevitable solidarity, which on the one hand cast the lot of the Church with that of the Conservative party, and on the other hand iden¬ tified the Republic with the cause of irreligion.

Little by little, however, a new generation grew up, and among the members of the Church were many who discerned the signs of the time and the political evolution of the majority of their countrymen. The liberal language of Pope Leo XIII and of Cardinal Lavigerie, ad¬ vising Catholics to sincerely accept the repub¬ lican constitution even when it was a duty to oppose some tendencies of the party in power, found enthusiastic echo in the hearts of many young priests and young laymen as well ; and they did their best to destroy the old prejudice that Catholic faith was incompatible with re¬ publicanism, one of their chief arguments to prove that freedom and religion can find their highest expression under a republican form of government being America herself and the satisfaction with which American prelates view the conditions of the Church in their country.

Unfortunately this movement, called in France Ralliement, was not universal, at least

before the Great War, and there remained some people simple enough to keep on believing that the acts of the government were an unavoid¬ able fruit of republicanism, and that the only thing to do was to try to overthrow it. That little coterie of blind men of the extreme Right did not exert a real influence on public opinion, nor on the life of the country; but in their speeches and in their newspapers they gave a perpetual pretext to the Anti-clericals of the extreme Left to unceasingly assume the role of saviors of the Republic and to

proclaim that, outside of themselves, there were no sincere Republicans in France. The Radicals, only too glad of such an opportunity, repudiated and misrepresented the attitude of the Catholics who were sincerelv adhering to Republicanism and did their utmost to perpetuate the animosity between the Church and the state and to pre¬ vent a reconciliation which would have hin¬ dered them from monopolizing the benefits of power.

Hence the Radicals' perpetual hostility and their destructive measures against every reli¬ gious institution, which we have now to speak about as impartially as we have pointed out the political mistakes of the Conservatives.

They declared war on the Church and that officially, when Gambetta put forth in 1876 his famous phrase (

As soon as they were assured of victory over the Conservatives, about 1879, they entered upon an active campaign against the Church and, having thus provoked her legitimate pro¬ test, pretended to see in this protest an attempt at revolt, and justified themselves in taking other steps more and more drastic against her, ending in laws of expulsion and confiscation which it is no exaggeration to regard as perse¬ cution.

At first they excluded the clergy from the Boards of Public Instruction where they had seats ; they sought to degrade the higher edu¬ cation of the Church by taking away from the Catholic faculties the name of ^Universities.® Then Jules Ferry, Minister of Public Instruc¬ tion, proposed a law, article 7 of which pro¬ hibited all teaching by members of unauthorized congregations. This article, which passed the Chamber of Deputies, was rejected by the Senate, thanks especially to the energetic op¬ position of that liberal philosopher, Jules Simon. The Cabinet however did not regard itself beaten, and lacking a new law such as they sought, they pretended to find support for what they proposed in some laws of the old monarchy. By the decrees of 29 March 1880, it was decided (1) that

the Jesuits must vacate their dwelling- houses within three months, and their school houses within five months ; (2) that all unau¬ thorized congregations must procure an authori¬ zation within three months. The Jesuits re¬ mained passive and were violently expelled by armed forces on 30 June 1880; the remaining unauthorized congregations decided to take their stand with the Jesuits and did not ask for au¬ thorization. Notwithstanding that, the govern¬ ment did not dare to strike them all and it dispersed at that time only 216 religious com¬ munities. In spite of some eloquent protests and manifestations, the people were indifferent, and at the legislative elections of the following year (1881) the Left gained 50 additional seats.

Encouraged by that success, the Anti-cleri¬ cals enacted in 1882 what they called the law neutralizing primary instruction, concealing un¬ der that apparently innocent formula sundry designs which since then have manifested them¬ selves more and more clearly. Every religious idea has been excluded from the schools with the same care as contagious diseases. The authorities do not admit either as books for study or as prizes any works in which the name of God is found. They even exclude all poems which contain it. They blot it out in sentences from classic authors which they are obliged to retain in the curriculum. Still, we should be fortunate if all the teachers confined themselves to this system of silence, bad enough though it be ; but many of them have spoken openly against God and railed at the doctrines of Chris¬ tianity before their pupils. There are no reli¬ gious schools in some places, and even where there are, all parents who have any connection direct or indirect with the government (and that means pretty nearly half the people) are obliged to send their children to these atheistic schools. In 1886 it was enacted that all public school teachers should be laymen, and later Catholics were forbidden to employ any mem¬ bers of the religious orders even in the schools entirely supported by themselves.

These measures for driving religious ideas out of

the common schools are usually referred to as laicisation ; but under the same name, many similar steps were taken in all the spheres of national life. For instance in 1880, military chaplains were dispensed with in time of peace, and in 1882 the chaplains at the normal schools met the same fate ; in that year also the name of God was removed from the judicial oath; in 1883 administration of diocesan property, during the vacancy of a see, was confided to civil commissioners ; in 1886 was suppressed, in the Budget of the Church, everything that had been added to it, even the most necessary things, since the Concordat ; and it was decided that theological students and priests should perform military service. Add to this that almost all functionaries who were practical Catholics have been driven out of public office and that the remaining representatives of public power studiously affect to totally ignore religion, so that not once in 40 years has the name of God been found in any public document, in any dis¬ course or any letter of either the President or the ministers or any other official.

A certain lull prevailed, however, during the last 10 years of the 19th century. Doubt¬ less the anti-religious laws and decrees of which we spoke above were still being enforced, and a law was added to them in 1892, which obliged the vestries or parish boards of trustees to submit their accounts to be audited by the state, and another one in 1895 which imposed upon the religious congregations a special and exceptional tax, obliging them to . pay on what was claimed by the government to be inherit¬ ances from their deceased members. But what¬ ever malevolence inspired these two measures, they did not constitute any serious evil, and it may be said in general that this period saw the polemics become rather milder, the appeals for reconciliation more numerous and more elo¬ quent. And to the voice of Pope Leo XIII, who was in favor of the acceptance of the Republic, was added, on the side of the govern-

ment, the voice of Spuller, Minister of Public Worship, proclaiming the necessity of a new spirit; and even a Prime Minister, Jules Melines, declared (

That was, alas, only a little rift in the clouds, a momentary clearing up in a stormy sky; and instead of a new spirit in place of the spirit of peace, there sprang up almost suddenly a tempest more violent than ever. All the world is aware of the occasion or the pretext for it, namely, the Dreyfus case. Evert if people ques¬ tion the innocence of Captain Dreyfus, they can¬ not question the illegalities of his trial, and the great number of honest men in France who, blinded by party spirit, opposed for a long time the necessary revision of his sentence, com¬ promised greatly the sacred cause of patriotism and religion of which they held themselves up as defenders. But the injustice of which one person was the victim and which has finally been atoned for to the honor of our national conscience does not at all render legitimate the acts of injustice which since then have been committed, under pretext of vengeance, against thousands of other persons, members of the religious orders and especially of the orders of women of whom the majority knew nothing whatever of the <(affair® or of politics of any kind.

Let me add that there had been always a certain number of eminent Catholics who fought earnestly in favor of Dreyfus, and notorious enemies of the Church who were his adversaries to the end. Moreover it is right and of the first importance to point out that, if many Catholics were mistaken in that affair, as were so many other Frenchmen, they acted as indi¬ viduals and in their personal capacity; nobody •can point to a single act, a single word, of any ecclesiastical authority advising them to take the unhappy steps they did. But whatever one may think of the <(Affaire Dreyfus® there can be no doubt that it inflamed passions, political, social and religious, to an unprecedented degree, and that it has been the direct cause of the difficulties or

rather hostilities which we have now to narrate.

I will not enlarge upon the action of the Prime Minister Waldeck Rousseau in conse¬ quence of which the courts, in January 1900, dissolved the Order of the Assumptionists against which, as against the Jesuits, the friends of Dreyfus were especially irritated. That par¬ ticular measure was soon lost sieht of in a general act which reached in its effects almost all the religious orders of men and women in France; the law which the same minister had passed against them in 1901.

According to this law, religious associations cannot be formed <(without authorization given by a law determining the conditions under which they operate,® and supposing that they have ob¬ tained such authorization, they cannot found any new establishment except by virtue of a decree given in the Council of State. But there is something more. These establishments, after all those authorizations, are always at the mercy of the Executive.

*The text of the law here merits attention. *The dissolution of a congregation, or the closing of any establishment, may be pronounced by decree given in the Council of Ministers.®*

And this suppression, or the refusal of authori¬ zation, is very effective : every member of an illegal association is liable to a fine of upwards of 5,000 francs and to be sent to prison for a period of one year.

The same penalties may be exacted from any person who lets a room, a hall or a work¬ shop to any member of a congregation; and these penalties may be doubled in the case of a founder or director.

But what steps must a congregation take in order to obtain proper authorization? It must previously submit to and even afterward hold at the disposal of public officers an exact ac¬ count of its income and expenses, an exact statement of the value of all its

property, whether personal or real, the name, age, oc¬ cupation, past and present, of each ot its mem¬ bers, with a complete record of his history. If notwithstanding this, authorization is refused, then they are (

Now, the text of this law, severe enough in itself, was enforced by the Combes cabinet with so much rigor, and I may say so much illegality, that its principal author, M. Waldeck Rousseau himself, was obliged, on two oc¬ casions, in June and in November 1903, to declare in the Senate that the law had been completely warped by his successor ; he gave battle to the Combes ministry exactly on this point and was defeated by a majority of 11 votes. The authorization was refused en masse to all congregations except five small ones whose destiny remained undecided, and this without any examination and in such fashion that the names of the greater number of them were not even mentioned in the single debate on the subject. Some congregations, notably the Jesuits and Assumptionists and others like them, seeing that the government was setting a trap for them, had preferred to disband of their own will, and so escaped, to a great extent, from administrative vexations and confiscations. The other congregations which, on the advice of the Pope, of the majority of the bishops and of the most liberal laymen, had submitted to the law, now de¬ clared their membership and their possessions to be in a far worse predicament than those who did not submit, for they were unable to save a single one of their houses or property of any kind, or even to preserve the individ¬ ual freedom of their members, whose names had been given voluntarily in the request for authorization. One single provision of the law remains in abeyance : that which reserved to the members of orders pensions on their proper¬ ties. This property was sold by the govern¬ ment at ridiculously low prices, because honorable men would not buy it, and the money realized on the sale has been swallowed up by the expenses, which had to be supplemented by advances from the government. The pretended billion of francs of the congregations

has, therefore, melted away in legal expenses ; and the members of the congregations were left to die of hunger, or to emigrate to free countries.

As a matter of fact most of them went into exile and remained there until 1914. When the war broke out, all those who were of military age returned to France ready to defend their country.

When one of two contracting parties thus treats the other, a rupture is morally certain and a trifle will suffice to precipitate it. But something remains to be said of three incidents which aggravated the situation and served as a pretext for the inevitable conclusion of these quarrels, namely, the divorce of the ill-mated union which the Church in France and the state had formed.

According to Article 5 of the Concordat <(the nomination to the bishoprics should rest with the Chief Council and canonical institu¬ tion should be administered by the Holy See.®

It appears as if this article, properly inter¬ preted, safeguarded the rights of the two powers. The government presented candidates to the Pope; their qualifications were considered and discussed, if there was occasion to do so ; and when an agreement was reached be¬ tween the two powers, their names appeared in the official journal of France. Afterward the Pope conferred spiritual authority upon the candidates, who were so nominated. Nothing on the face of it could be simpler than this. Some difficulties having arisen about the Latin translation of the word nomination in the offi¬ cial letter instituting the bishops, Pope Pius X yielded and altered the letters according to the requirements of M. Combes. But the Minister was not content with that victory. He de¬ clared that in future the candidates chosen as bishops by the government would be nominated in the

official journal without waiting to in¬ quire whether the Holy See would accept them or not. The consequence was that priests worthy of the honor refused to be nominated under these conditions, which were without doubt contrary to the spirit of the Concordat, and it came to pass that 15 dioceses were de¬ prived of bishops.

The second incident was of a quite dif¬ ferent order. Even if the Holy See itself ap¬ pears to regard as impossible the restora¬ tion of the temporal power, it does not wish to recognize by any formal act of renunciation the spoliation which it suffered in 1870, and it requires that the heads of Catholic countries do not come officiallv to Rome and thus ap¬ parently condone such spoliation. All Catholic sovereigns have thus far conformed to that desire. The French government did not deem it its duty to conform to the demand ; and hav¬ ing received in Paris in October 1903, a visit from the Italian sovereigns, it was thought that courtesy and the interests of France demanded that the President return that visit in Rome, and M. Loubet was sent there for that purpose in April 1904. At the end of the same month a confidential protest was sent by Cardinal Merry del Val, Papal Secretary of State, to all the powers with which he was in diplomatic relations, to the effect that the official coming of the French President to Rome was a grave offense against the right and dignity of the Holy See.

As long as the protest remained secret, nothing resulted from this platonic document; but about a month after its issue, a Socialist newspaper published a copy of it, and the storm burst. The newspapers friendly to the government declared that France had been grossly insulted, and the Cabinet of M. Combes ordered the immediate recall of the French Ambassador at the Vatican.

The Papal nuncio, however, still remained in Paris, and a secretary was left in the French embassy at Rome. The relations were not therefore entirely broken. The affair of the bishops of Dijon and Laval served to cut the last remaining knot. Those two

prelates had long before been denounced to Rome as utterly unfit to govern dioceses. It is very difficult to know the truth of the matter, for political passions were much excited against them. At any rate, the important question was not that of knowing whether they were in¬ nocent or guilty, but whether the Pope could, according to the Concordat, compel their res¬ ignation without prior agreement with the French government. The Cabinet maintained that the bishops, having been nominated by mutual consent, could only be deposed by mutual consent. Pius X did not directly op¬ pose this principle, since he requested their resignation instead of issuing an order for their deposition. While they were trying to escape a decision, he ordered them to come to Rome under penalty of suspension from their spiritual powers. The Minister, on his side, forbade them to leave France and sent an ultimatum to Rome to require the withdrawal of its last orders and threats. Cardinal Merry del Val replied by conciliatory explanations, but main¬ tained, in principle, the right of the Pope to deprive unworthy bishops of spiritual power. Without any more discussion, the Minister tele¬ graphed to the French charge-d'affaires to notify the Vatican that (

II

The French government which had only pushed matters to this extremity in order to bring about the suppression of the Concordat did not wait long before it sought to have this carried into effect.

The diplomatic rupture took place at the end of July 1904; at the next session of Parliament, in the autumn of the same year, M. Combes proposed to the Chamber of Deputies a proj¬ ect of law on the separation of Church and State. A commission was immediately nomi¬ nated with M. Buisson as president and M. Briand as secretary, and the discussion com¬ menced in the spring of 1905. On 3 July 1905, the Chamber passed the law ; the Senate con¬ tinued the discussion at its autumn session and passed it also, without changing a single word. On 11 Dec. 1905, it was promulgated and declared to be in force after

one year.

Before commenting rapidly upon this law, a remark of historical order is quite necessary, namely, that the law which had passed, what¬ ever may be thought of it, is on the whole less evil than the plans at first submitted to Parlia¬ ment. For this reason and owing to the cir¬ cumstances which had brought it about in a real spirit of hostility to the Church and to the comments of the Anti-clerical press which looked upon it as as a herald of the approach-

ing suppression of all religion to the Catholics, it appeared generally even more belligerent than it was, and they were disposed to con¬ demn it more severely than it deserved.

To judge it impartially with its characteris¬ tic good and bad and to put some sort of order in our examination, let us seek to understand, on the one hand, what the Church itself may consider advantageous in it and, on the other, what has given rise to her complaints.

There are effectively in the separation law several regrettable proposals, which we will ex¬ plain later ; but it affords one advantage and that advantage is so great that it appears to many people a compensation in itself for all its defects and dangers.

That advantage is the full liberty which is given fo the Church to nominate her ministers without interference on the part of the state — a freedom of which she was deprived in France for more than four centuries. Un¬ doubtedly the canonical institution of bishops was left to the Sovereign Pontiff, because that is considered in the Catholic Church an es¬ sential principle, an inalienable right ; but their nomination, both under the Concordat of Francis I and under that of Na-poleon, was left to

the head of the state. And this was, be¬ tween the two powers, a constant source of difficulty.

Whenever for one reason or another, they were on bad terms, they did not agree on candidates and numerous dioceses were left vacant. Let me add that this independence of the Church in the selection of bishops has its complement in the liberty permitted to them by the new law to assemble whenever they like, whereas the Concordat prohibited them from meeting and acting together even by letter in any collection, action or declaration.

The separation law interferes no more in the choice of parish priests than in that of bishops. The Concordat was not so liberal : <(The bishops shall have the appointment of the parish priests,® said Article 10 of the Con¬ cordat. But it added immediately ((Their choice shall not fall but on persons approved by the government.® One can realize the serious nature of such a restriction, and what conditions had to be fulfilled, for example, during the last 20 years in order to be agreeable to a Radical Cabinet. In most cases, to tell the truth, it was morally impossible for bishops to nominate for important functions the priests whom they considered best able to ful¬ fil them. The satisfaction which they now feel in governing their dioceses freely is so great in spite of the enormous material difficul¬ ties that it enables them to bear the injustice and the vexation which 'the law of 1905 im¬ poses and which we have now to consider, looking at the other side of the picture.

The first injustice which afflicted the Vati¬ can and which had not been sufficiently em¬ phasized, but which perhaps wounded it more than all the rest, was that the government abrogated, without consulting it, a bilateral con¬ tract in which its signature was, after all, on the same footing as that of the other party. The Concordat was a treaty between the Head of the French state and the Head of the Church. That the former, because it is the stronger, should abrogate it without informing the other party of the abrogation because it is

the weaker is a sort of procedure not recog¬ nized by international law.

The state, moreover, took no more notice of the Church in establishing the new order of things than in doing away with the old.

It affected to ignore the Church and legis¬ lated without at all concerning itself with her, exposing itself, in consequence, to that which happened, namely, to have the Church reject the work which the government had done, and destroy it entirely by pronouncing calmly its non possumus. But did the state, whilst dis¬ posing alone of Church rights and property, act with justice and equity? Here in effect is what the law purposes :

First the budget of worship is suppressed (Article 2). Now the budget was not entirely a favor dependent on the Concordat. It was morally, if not legally, bound by the obligation recognized by France in 1790, when the Church freely ceded all its property to the nation on the condition, solemnly accepted by the latter, that out of the revenues of that property a suitable compensation should be granted to the clergy. It is to the honor of the Church that she did not insist upon that point in the discus¬ sion, but there was, in fact, an injustice, an offensive repudiation of a national debt.

But the state not merely gives nothing to the Church, it takes away from it, by Article 5, even the pious foundations anterior to the Concordat. It takes away from it, by Article 7, (

Can you conceive of the Church being pro¬ hibited to engage in works of charity and education? Isn't that sort of thing the natural sequence of religious action? Can you imagine that the intentions of the donors should be absolutely ignored?

Article 12 denies to the Church any right of property in church buildings : <(Building which serve for purpose of public worship or for the

residence of ministers (cathedrals, churches, chapels, temples, synagogues, houses of archbishops and bishops, presbyteries, seminaries) with the outbuildings, pertain¬ ing to them, and the furniture and ob¬ jects therein contained at the time the said edifices were reconveyed for religious use, are and remain the property of the state, of the Department and of the Communes.® It is true that by Article 13 ((buildings used for purposes of public worship with their furni¬ ture and equipment shall be put free of charge at the disposal of public religious establish¬ ments and thereafter to the associations sum¬ moned to succeed them,® but by the same article : <(the cessation of this right of use and, if occasion arises, its transfer shall be pro¬ nounced by decree, without right of appeal, by the Council of State in its judicial capacity.® Notice also in the last words of Article 13, that, in spite of this precarious enjoyment of the mere use of property, the Associations <(shall be held responsible for repairs of all kinds as

well as for the cost of insurance and other charges pertaining to the buildings and to the furniture and equipment.® For other buildings, it is even simpler. According to Article 14 : houses of archbishops and bishops, presbyteries, and their appurtenances, the Catholic theologi¬ cal seminaries, and faculties of Protestant theology were to be all confiscated in any case after five years.

It is necessary to consider also that there was a possible confiscation threatening the Church in the future and which appeared to her authorities still less acceptable than the rest. Even if the Church had formed the re¬ ligious associations to receive such church property as the law left to her, the title to that property could always be contested by a rival association usurping the same name, and, in case of a contest, the civil power in the per¬ son of the Council of State, was alone to de¬ cide, which of the two contestants was the legitimate heir of the property. The Liberals tried in vain to

introduce by amendment of the Article one clear and assuring word, but they did not succeed in securing recognition of the bishops as in the Mexican law, nor of any governing body as is usual in the practical de¬ cision of the American courts. From the Catholic point of view, in which the hierarchy holds the first place, this fact made the law very difficult to accept, because, as M. Clemen- ceau himself wrote in his newspaper L'Aurore, (

Thus the law involved the spoliation of half the Church property and the insecure posses¬ sion of the other half. There must be added to all this a number of annoying provisions, which perhaps do not really amount to much but which are scarcely compatible with a real separation. Thus Articles 5 and 22 oblige the Church to invest its funds in state securities which would be very susceptible of attachment. This referred especially to the proceeds of any property the Church might sell. Articles 22 and 21 limit narrowly the disposable re¬ sources of the Church and provide for a de¬ tailed audit of its receipts, of its expenses, and of all its accounts by financial agents of the state. Articles 34 and 35 deprive priests of the right of recourse to the ordinary courts of justice and subject them, exceptionally, to judges named by the state, in cases where other citizens have the benefit of trial by jury. Finally, Article 36 makes the entire associa¬ tion responsible for any fine imposed upon its priest, even though he spoke or acted without their knowledge or consent.

Are these the fair conditions of an honest separation and have not we a right to see in them only the semblance of separation, a com¬ plete wiping out of every obligation of the state toward the Church, a perpetuation and in many cases an increase of the burdens and responsibilities of the Church toward the state?

Never was there seen a more perfect ex¬ emplification of M. Clemenceau's very original rendering of that text in the Gospel which says : "Render unto Caesar the things that are Caesar's . .

. and everything is Caesar's.®

After all that and especially if we had the time to go into the details of the threats which the Radicals made at the time, especially in the

annual Masonic convention, not to limit them¬ selves to the measures provided for by the law of 1905, but to go on and do worse, to continue their war on the Church until they should abolish it, it would perhaps seem less difficult to explain the conduct of the Pope and the Catholics who refused to recognize the law in any way, than to explain the conduct of those (a majority of the bishops, a minority of the priests and of the laymen) who before the decision of Rome wrote and spoke in favor of conciliation, that is to say, practically advised forming associations cultuelles. It would be a great mistake, however, to suppose that they approved the law and thought it good in itself. Such was not their opinion; far from it. They merely thought that it was better at first to submit to that law and then to work energeti¬ cally for its amelioration. They anticipated that, if it were rejected, they would, in any case, be compelled to organize upon some legal basis; and so they preferred to suffer the in¬ conveniences of this law rather than expose themselves to greater ones which would occur from some existing law or from one which might be passed; they believed that the crea¬ tion of associations cultuelles, containing in their provisions, as they were proposed by the assembly of the bishops, the most scrupulously minute precautions in favor of the hierarchy in order to obviate the danger of schism which the new law contained, represented a lesser evil, and that we ought not to sacrifice the part of the Church property which ^vas left to us in that event. It seemed to theffi that thus we should have the advantages of the law along with its disadvantages, whilst otherwise we should have only the disadvantages of it ; and above all, they were afraid of a threatening state of things, in which it would be impossible to organize the material life of

the Church upon any legal basis.

Their view did not prevail and it was "re- sistance® that carried the day. The first phase of it was the solemn condemnation of the law by the Pope, almost immediately, in his encyc¬ lical "Vehement er No: r.® Therein he reproached the state with great energy for having "violated its sworn promise, and abrogated by its sole authority the solemn pact it had signed, a bi¬ lateral contract binding on both parties,® and that without any notification to the Holy See, "without the courtesy which is never omitted in dealing with the smallest states.® Then fol¬ lowed a detailed criticism of the law in its principles and provisions and, at the end, an absolute condemnation. Moreover the Pope announced that he would send at the proper time definite instructions.

That encyclical was received with an extraor¬ dinary enthusiasm by an immense majority of the clergy and the laity. Language so energetic was a solace to hearts and consciences borne down by a long series of oppressions supported in silence. When the government, according to Article 16 of the law, sent its agents into the churches to take the inventories of the build¬ ings and of the furniture, they met a quite un¬ expected resistance in many places, especially in Paris, in the north and centre of France and in Brittany. They were very often obliged to come with armed force, and the soldiers were employed in a service which was very painful to them and to their officers, some ot

whom resigned and sacrificed their careers to their religious convictions.

The final decision of the Pope was looked for with great anxiety. It came on 10 Aug.

1906, and was read on the 15th of the same month in

all the cathedrals of France. It de¬ clared definitely that no association cultuelle of any sort could be organized, ((as long as there was not given by the government a positive legal guarantee that in these associations the constitution, the rights, the hierarchy and the property of the Church would be perfectly pro¬ tected and secured.®

The bishops, assembled in Paris, wrote to the Pope a letter of absolute submission and decided to maintain provisionally the statu quo, that is, the continuation of public worship in churches as long as the agents of the govern¬ ment would not attempt to expel the worship¬ pers by force.

The government paid no attention to the decision of the Pope and of the bishops. As the Church had to create associations cultuelles before the 11th of December under penalty of losing everything, all the properties of the dioceses and of the parishes, down to her last cent and her last candlestick, the little states¬ men who took her simply for a political ma¬ chine awaited with confidence the momentous date, thinking that, if by chance the Pope did not understand the situation, priests and laity would understand and act accordingly. The month of December approached, the 11th of December came, and no associations were formed.

That discipline and disinterestedness struck the foes of the Church with amazement. But surprise was not the only sentiment of the mem¬ bers of the government. According to their own admission, they had foreseen everything except what happened, and they did not know what to do. They drew back for a time ; they accorded to the Church a year of delay, a year of grace, one might say, during which she might have a chance to reflect upon her best interests, and during which also the ministry might be changed.

Nevertheless they did not wish to appear to yield entirely and to allow the Catholics to make use of the churches just as if the Con¬ cordat were still in force. They took the law of 1881 on public

meetings, modified it by a simple ministerial decree, so as to make it applicable to religious services, and declared that they might be celebrated in the churches upon a mere annual declaration made before the mayor or the prefect. But they were care¬ ful to add that the officiating priest would be nothing more in his Church than an occupant without legal title. He would have no right to act as a proprietor; still less could he make any disposition of the property. The ministerial circular further declared that he ((should have no right to charge or collect any sum for the use of the Church and of the objects which it contains.® In other words, the priest had in the Church the same rights that a traveler has in the public streets.

As the Pope said in his encyclical of 6 Jan.

1907, the annual declaration might have been tolerated, although it did not offer any legal security. But the situation thus created for the priest in his church was so humiliating and precarious that it could not be put up with.

vol 11 — 41

Pius X, consulted by several prelates, tele¬ graphed to the archbishop of Paris: "Continue worship in the churches. Refrain from any declarations.® As soon as this response was communicated to the bishops by Cardinal Richard, the Cabinet decided with feverish haste measures which otherwise would have been carried into execution only after a period of from one to five years. Within a few weeks all the archbishops and bishops were driven out of their homes, all the pupils in the theo¬ logical seminaries of every grade were turned out ; all the personal property, all the religious houses belonging to the dioceses or to the parishes, were confiscated without the slightest exception, even in cases where the state had contributed nothing either to their acquisition or construction.

To complete the picture, it would be neces¬ sary to show thousands of priests and several bishops

dragged into civil courts for having said mass, for having dared to pray to God in the churches without having made the previous declaration required by the Briand circular, and acquitted or condemned (as were about half of them) according to the interpretation of the judge before whom they happened to be brought, because, if it was a crime according to the ministrial circular, it was not an offense according to the law invoked. This sort of thing appeared so ridiculous and so odious to public opinion that the government gave it up soon after and got up a new law to regulate in some manner the conduct of worship. This law ratifies and approves of all the confisca¬ tions and spoliations of which we have been speaking. That is the only point in which it is clear. For the rest it only organizes anar¬ chy and enacts arbitrary will. For instance, by a very peculiar application of its idea of separation, it turns the churches with their property over to the town councils ; and we have seen those bodies in certain cities trying to interfere in such matters as the length of time children shall receive religious instruction, the date of the first communion and other reli¬ gious functions.

In reality the men of the government do not know any way out of the difficulty. They feel themselves to be in a very embarrassing posi¬ tion. Everything in the law was arranged as adapted for the so-called associations cultuelles which were the only authorized and legal or¬ ganizations for public worship, and now, by the prohibition of the Holy See, which the government was so proud to ignore, there are no such associations for worship. So they will be obliged to propose laws according to each circumstance, which will never end the matter definitely, so long as they deny to Catholics the right of organizing the practice of their religion in conformity with the principles of their discipline and their hierarchy as it is done in America.

The Church on her side suffers extremely from this situation, especially in country par¬ ishes and in poor dioceses. But what worries her the most is not

the loss of all her former properties, which have all been taken by the government without exception ; it is the abso¬ lute impossibility of acquiring new ones, and of organizing anything at all. The Church, be¬ cause she would not organize in the form of associations cultuelles, such as provided by the

new law, has no legal right to exist. That is to say, practically nobody or nothing can rep¬ resent a diocese or a parish in the eyes of the law. In America parishes and dioceses are represented sometimes by an incorporated board of trustees, sometimes by the bishops as a corporation sole or in fee simple. But in France now there are no bishops and no rec¬ tors of parishes as such, no trustees, no vestry¬ men of any kind. The little wealth which the Church may happen to acquire and which the faithful may give to the bishops or the priest by hand will help them to live from day to day, but it belongs to the recipient, as an indi¬ vidual, and if he dies, neither the diocese nor the parish, but only his personal heir, have a rig'ht to his property.

The bishops and priests, even as individuals, have no legal right to the churches nor to any furniture in the churches. And still they continue to use them, because the government does not dare to close the churches, knowing perfectly well that Frenchmen, however indif¬ ferent many of them may be on other points, want to have their churches open for baptisms, marriages, burials and first communions. Man¬ ners and customs of a people, imbued with Catholic faith and ideals for so many centuries, defeat the law hastily established by a mere political party which does not at all represent the truest and deepest feelings of the people. In reality, the present situation cannot remain as it is. Reason and justice will repair in the near future the ills from which the religious portion of the nation is suffering; and this, all the more certainly because through trials and bitter

experience this portion will have learned not to exact unreasonable conditions, but will content itself with freedom. The Catholics of France ask for liberty as it is in Brazil and other countries which have recently made the separation between Church and State, and which have done well with it. There is a lib¬ erty for which they do not ask, so far does it surpass their hopes. It is that liberty which exists in the United States. It would be too complete for our customs, impregnated as they are with the habits of Csesarism and of abso¬ lute monarchism. Who knows, perhaps, but that such a salutary example after all will exer¬ cise a healthy influence upon us by helping us to enlarge our own freedom and acquire a spirit of mutual concord, by showing us that the greatest republic and the greatest democracy that history has known since the beginning of the world is at the same time able to be the most tolerant and the most respectful toward the rights of conscience and the rights of God.

Abbe Felix Klein,

Professeur honoraire d VUniversite Catholique de Paris.

12. EDUCATION AND THE EDUCA¬ TIONAL SYSTEM OF FRANCE. The De¬ velopment of Education. — The organization of education in France as a public service is of comparatively recent date. Before the Revolu¬ tion of 1 789, teaching was considered as essen¬ tially a matter of private enterprise, and little, if anything, had been done to regulate and con¬ trol it. Naturally enough it was the Church that first understood the importance of instruc¬ tion and the first masters were members of the clergy. As far back as the 10th century

there were monastic and cathedral schools scat¬ tered all over the kingdom, which possessed a large population of scholars and attracted stu¬ dents from the most remote parts of Europe. At the end of the 12th century some of these schools had already developed into universities. The University of Montpellier, the most ancient of all, was

established about 1125; that of Paris about 1150, and others followed rapidly; Orleans 1200, Angers 1220, Toulouse 1230, Grenoble 1339, etc. In their turn the universi¬ ties gave birth to a number of colleges, and after the great revival of learning at the Renaissance the latter multiplied so that in Paris alone there were more than 50 of them. As to the universities, they, too, steadily in¬ creased, and when the Revolution broke out in 1789 there were no fewer than 25 in France, Paris being the most important with 6,000 un¬ dergraduates. But so far, little had been done for the education" of the people at large, and learning had remained the portion of an <(elite'.® Primary instruction was given in small uncomfortable schools by masters not often qualified for their task: teaching the rudiments was looked upon as a trade, and the customers were few, because few were able or willing to pay. Yet a universal feeling prevailed through¬ out the kingdom that this state of things was to be remedied, and when the (XVI assembled in Ver¬ sailles in 1789 there was a loud cry from the third Estate (Tiers-Etat) and the clergy for better schools and a wider diffusion of instruc¬ tion among the people. They distinctly asked for a national education of all classes, by means of national schools. But the expense entailed in the execution of such a vast scheme was ob¬ viously too much for the public treasury, ex¬ hausted as it was by continuous war. ((The Constituante® adopted the principle, but two years later when the members of the legis¬ lative® were asked by Condorcet for 24,000,000 francs as a first outlay, they were obliged to reduce the estimate to a paltry 200,000 (29 May 1792). In spite of repeated discussions in the assembly concerning the opportunity of making education compulsory, and of several decrees trying to enforce its decisions, nothing really effective could be done for the time being. The first practical measure was taken by Lakanal and the ''Convention® (27th Brumaire year three) when they granted a subsidy to the pri¬ mary schools then extant, and created training schools to recruit masters. This was but a very imperfect solution, and

one that only par¬ tially met the wishes of the people, but it was the greatest effort made by the Revolution to solve the problem of a national primary educa¬ tion. More was attempted in favor of secondary education, which received a common program of studies combining scientific with classical training, and for which the act of the 7th Ventose year three established the so-called "central schools.® A new plan of secondary education, drawn up by Napoleon, then first consul, with the help of Fourcroy and adopted by Parliament (1 May 1802) brought up to 36 the number of the central schools, which took the name of "lycees® and which were provided with the necessary staff of masters and an ef¬ fectual budget. And it was only the beginning of a vaster scheme, for in 1808, when he had

become emperor, Napoleon, with a view to forming a young generation devoted to the Imperial regime, founded the Imperial Univer¬ sity, "exclusively entrusted with the mission of teaching and giving education in the whole Empire.® It was a complete organization of education in three degrees, elementary, second¬ ary and superior, placed in the hands of a privileged corporation, which, in the intention at least of its founder, was destined to abolish private education everywhere and in all its forms. This total abolition, of course, was as yet impossible ; so private colleges were toler¬ ated, but only under the control of the omnipo¬ tent University and with the main object of recruiting pupils for it afterward. Moreover, of the national primary schools that were so badly wanted, few, if any, were created; Napo¬ leon's University merely adopted and, so to speak, legitimated those which existed already. Guizot in 1833 for the first time seriously took in hand the interests of popular education ; under his influence the primary schools in¬ creased in the proportion of nearly 900 a year (24,000 in 1847, against 9,000 in 1830).

However, it belonged to the Third Republic to

achieve the task conceived by the Revolu¬ tionaries of 1789, unsuccessfully attempted by their successors and only begun by Guizot him¬ self. In 1882 Parliament adopted Jules Ferry's famous education bill that rendered primary instruction compulsory and gratuitous. Nor was its interest limited to the more elementary and democratic form of knowledge, all the de¬ partments of education were infused with a new life: 800,000,000 francs ($160,000,000) were spent on new buildings including Faculties and Lycees as well as schools, and the annual edu¬ cational budget was raised within 30 years from 44,000,000 francs to 225,000,000 francs.

These figures, of course, must be understood to represent the share of the state only, not the total of the expenses connected with education; besides the national schools and faculties, there exist a very large number of private institu¬ tions, of which further mention will be made.

Organization of National Education. — The modern "University of France® is still to some extent organized as was Napoleon's "Im¬ perial University® ; only it is no longer, as it was then, an independent corporation. Since the creation of the Ministry of Public Instruc¬ tion by Charles X (26 Aug. 1824) it has been administered directly by the state, as the other great public services. The supreme authority is officially in the hands of the Minister of Public Instruction, who, however, is helped in his decisions by the directors of the three de¬ partments of superior, secondary and primary education, and more effectually still by several deliberating assemblies of professors and offi¬ cials, the most important of which are the Uni¬ versity Council and the Committee of Public Instruction. As direct representatives of the central power, 15 rectors residing in the 15 university towns has the supervision and man¬ agement of all educational matters in their academy (or academic district). Each academy possesses also an assembly of professors elected by their colleagues, the Academic Council, in which are treated pedagogical and administra¬ tive questions

interesting the academic district. Under the rector are placed Academy Inspectors,

who have the care of secondary and primary instruction, and under them again Primary Inspectors who superintend the primary schools.

Thus the three different branches of educa¬ tion are grouped into one vast administrative organism, insuring their homogeneity and the necessary unity of direction. Each of them, however, being destined to meet distinct and separate wants and consequently being managed on a distinct and separate plan, it is necessary to view them each by itself.

Primary Education is compulsory for all children from 6 to 13 ; those who do not attend the government schools (where it is gratuitous), are obliged to prove that they receive proper tuition either in a private school or at home. The matters taught are reading and writing, orthography, composition, arithmetic, the ele¬ ments of natural history and natural philos¬ ophy, history, geography, drawing and singing and also gymnastics for boys and needlework for girls. At the end of their regular course of studies, those of the pupils who want a more substantial and wider instruction, and yet do not choose to go to a lycee or a college, may get it in one of the 350 "superior primary schools® created within the last 25 years, or attend the so-called "complementary lectures® where superior schools have not yet been es¬ tablished. This "superior primary education,® which in some points is like a sort of cheap secondary education, has, however, a more prac¬ tical and positive object than the latter and is better suited to the wants of the working and commercial classes. For such of the young men or girls who cannot spare the time to complete their studies in superior primary schools, there exist in all towns and in most villages evening classes, which, it is true, are due to the masters' own initiative, but which at the same time are officially recognized and encouraged by the academic authorities.

Everyone possessing the necessary diplomas may apply for a post of master or mistress in a primary school ; but the government, under¬ standing that good teaching can only be given by well-trained teachers, has provided in each of the 83 districts called "departments® two training schools, E coles Normales Primaires, one for girls and one for young men, in which the future masters and mistresses are kept and educated for three years at the expense of the state. Schoolmasters and mistresses are ap¬ pointed and promoted, not by the minister, as is the case for the professors of the other two degrees of education, but by the prefect in each department, with approbation of the Academy Inspector.

Secondary Education is given to the boys in 112 lycees and 231 colleges. A lycee is properly a public school, being the property of the state, kept and administered by the state ; whereas a college is a municipal institution. In both the professors are appointed by, and placed under the authority of, the Minister of Public Instruction ; in both also the matters taught are the same ; yet there is a difference between them as regards their respective importance, the aver¬ age number of boys in a lycee being 500 to some 200 in a college ; and instruction in the former being generally recognized as of a higher standard. In the lycee the masters are divided into two classes : the "agreges de l'Uni-

versite® (i.e., fellows) who hold a regular pro¬ fessorship, and the licencies (m.a.) who are simply <(charges de cours® or lecturers. In a college the professors are only licencies.

Within the last 25 years the secondary cur¬ riculum has been repeatedly modified ; originally it comprised only two parallel courses of study, of which one was chiefly classical and the other chiefly scientific. It has now become more complex : the division in two sections is kept through the lower forms up to the third, after which the boys

have to choose between four sections according to the ^specialties® they think will be most useful to them in after life. These specialties, which are part of the staple or secondary education, are coupled into four groups: (1) Latin and Greek; (2) Latin and Modern Languages; (3) Latin and Sciences; (4) Sciences and Modern Languages. At the end of the first form, generally at the age of 17, the boys undergo one of the four examina¬ tions corresponding to the section to which they belong, and then spend one year more in the study of philosophy or of the more advanced mathematics, after which another examination (the second of the (

Up to 1881 the state had provided no regu¬ lar system of education for girls. In spite of a not very successful attempt of Duruy in 1867 to organize lectures for them with the help of professors from the boys' lycees and colleges, it may be said that the girls had really no choice but between education at home or in private schools, chiefly in convents. Within six years (1881-87) 35 lycees and colleges for girls were founded in as many towns, and the number has since rapidly increased. In these the lessons are now given everywhere by lady teachers qualified after studying in the universities or in the special training college of Sevres. There was at first a strong prejudice against these establish¬ ments among the families that were accustomed to another sort of feminine education, but it is gradually dying out, though it cannot be de¬ nied that, even at the present time, the great majority of girls are still educated in private and congregational schools. There are 54 lycees for girls (20,339 pupils) and 84 municipal colleges (12,943 pupils).

Superior Education. — Of the 25 universities that existed in France before the Revolution, 13 were suppressed in 1793 and have not been re¬ opened since ; four new ones have been created, bringing the total to 16. Here they are in the order of their foundation: Montpellier (1125), Paris (1150), Toulouse (1230), Grenoble (1339), Aix-Marseilles (1409), Caen (1431), Poitiers (1431), Bordeaux

(1441), Besanqon (1485), Nancy (1572), Dijon (1722), Rennes (1735), Lyon (1808), Lille (1808), Clermont (1808) and Algers (1849).

A university consists of four Faculties : Let¬ ters, Sciences, Medicine and Law. At the head of each Faculty is a dean elected by the pro¬ fessors and placed immediately under the rector of the university, who, it must be remembered, is the head of the academic district of which

the university is the centre. The lectures in each Faculty are given by ^professors® who must be doctors, and ((maitres de conferences® (tutors or lecturers) who are agreges (fel¬ lows). These lectures are open to all under¬ graduates that have duly matriculated, i.e., who, being in possession of the necessary diploma of (

Two degrees may be taken at a university: The first is the ((licence® (the old licentia do- cendi) for letters, sciences and law, and the second the degree of doctor which is the reward of at least one scientific work (thesis) presented and publicly discussed by the candidate that must already be (

To the universities proper that have been enumerated above should be added the Superior medical schools of Amiens, Angers, Limoges, Nantes, Rheims, Rouen and Tours. As regards the University of Paris, one would have a very incomplete idea of it if one limited it to the four Faculties that have the Sorbonne for their centre. It includes a large number of establish¬ ments' of which the College de France, Lcole des Chartes, Museum, £cole des Hautes Etudes, Lcole des Langues Orientales are only the prin¬ cipal. More or less directly connected with it, though not all placed within the authority of the Minister of Public Instruction, are also the Lcole du Louvre, Lcole des Beaux Arts, £cole des Arts Decoratifs, Conservatoire, Ecole Su- perieure des Mines, Lcole des Hautes Etudes Commerciales, ficole des Sciences Politiques. Even if one leaves these schools aside, and only takes into account the former, that are the natural complement of the four

Faculties, the University of Paris appears as something unique in the world. To give an idea of its im¬ portance it suffices to say that of the 21,033,778 francs annually spent on superior education, 9,952,191 francs, i.e., almost one half, are ab¬ sorbed by the University of Paris alone, and that the number of its undergraduates exceeds

19,800.

Whether this affluence in Paris is a good thing may be and has often been discussed ; it is a fact that it takes from the provincial uni¬ versities their best teachers and a large propor¬ tion of their students, but at the same time it is undeniable that this very density of the scholastic population of Paris is a strong stimu¬ lus to intense intellectual labor: there is no place in the world so replete with illustrious names or so productive of remarkable achieve¬ ments, both literary and scientific.

Private Education. — The monopoly of teaching which Napoleon had given to the Im-

perial University, and which the Royal Univer¬ sity retained after it, was abolished, practically in 1830, and officially in 1850 by the Falloux Bill. This bill, though recently modified in many of its clauses, has not been recalled as regards the liberty of teaching.

The development of the public schools was everywhere attended by a parallel increase of the private ones. It is worth remarking, how¬ ever, that this regime of liberty chiefly served the interests of the Catholics who, opposite the State University of France, built up, as it were, a university of their own, including establish¬ ments of the three degrees, primary, secondary and superior. Indeed, so preponderant is their influence in the so-called ((enseignement libre,® that a private school is

generally understood to mean a Catholic school.

The private establishment being as exact a copy as possible of those which belong to the state, there is no necessity to insist much on the subject. Yet a comparison of their re¬ spective importance cannot be dispensed with. With regard to primary education, the state es¬ tablishments are far ahead of the others, with 69,633 schools, 122,607 teachers and 4,661,000 pupils, against 13,462 private schools kept by 37,375 private teachers and receiving 1,067,200 pupils. It was chiefly in secondary education that the competition of private industry was successful, for the French middle and well-to-do classes are to a large extent favorable to Catholicism. The number of boys is not so high in private colleges as in the state lycees and colleges : 72,000 for the former against 100,203 for the latter. The competition is more successful still as regards the education of girls ; the state colleges, it has been said before, at¬ tract but a comparatively small number of them. Here the Catholics have an undeniable advantage, but they are far behind with their universities. They gave the utmost of their ef¬ fort in 1875 when they founded three Catholic universities in Angers, Lille and Lyons, and a Catholic Institute in Paris. For these they are wholly dependent upon charitable foundations (superior education being gratuitous and the matriculation fees being received by the state) ; so, far from being able to increase them, they experience great difficulty in maintaining what they have created. On the whole, therefore, the superiority of the state establishments is ob¬ vious and assuredly sufficient to reward the pecuniary sacrifices of the nation.

A law passed on 1 July 1901, amended and completed in 1904, ordered that all the schools under the management of religious orders (congreganistes), should be closed within 10 years. Private schools have therefore become less and less numerous, as most of them (espe¬ cially secondary schools) were managed by congreganistes (Jesuit es, Maristes, etc.).

Professional and Technical Instruction. — Among the schools and institutions of tech¬ nical instruction we must mention the follow¬ ing military schools : £cole Polytechnique, which is perhaps the most famous of the kind for the training of artillery officers; ficole de Saint-Cyr, ficole de Cavalerie at Saumur, ficole Superieure de Guerre (Paris). The Naval School of Brest forms naval officers. The following institutions deserve also special mention: ficole des Arts et Metiers (Paris);

ficole Centrale des Arts et Manufactures (Paris) ; ficole des Hautes fitudes Commer- ciales, Paris; ficole des Mines (Paris and Saint Etienne) ; ficole des Ponts et Chaussees (Paris) ; ficole des Beaux-Arts (Paris) ; ficole Nationale des Arts decoratifs (Paris), and also numerous practical schools of commerce and agriculture in the provinces.

CONDITION OF PRIMARY INSTRUCTION.

France and Algeria

Description of Schools Infant schools .

Public{aeyricai ::::::::::

Schools

2,749

Teachers

7,079

Pupils

506,544

Pnvatej^U-f; ;;;;;;;;

1,162

65

1,530

129

91,234

10,537

Total .

3,976

8,738

608,315

Primary and Higher Schools:

Public | anb • • 69 , 633

57,633

64,974

8,397

28,978

2,474,498 2,127,497 367,407 699 , 849

n ■ *. (Boys' and mixed. .

Private j Gi/ls> .

13,462

Total .

83,095

159,982

5,669,251

The cost of public primary instruction was:

1870 .

1875 .

1880 .

1885 .

1890 .

1895 .

1900 .

1905 .

1914. . over

Francs

61,640,000 77,687,000 108,185,000 170,604,000 177,142,000 207,333,000 217,878,000 280,917,000 300 . 000 , 000

CONDITION OF SECONDARY INSTRUCTION.

Public Institutions

Lyc6es (for boys) .

Communal Colleges (for

boys) . . .

Lyc6es (for girls) .

Communal Colleges (for

girls) . .

Secondary Courses .

1912 1913

Num-

Num-

■* — - ■,

ber

Pupils

ber

Pupils

112

62 , 092

112

62,879

230

36,796

231

37,324

53

19,898

54

20,339

79

11,882

84

12,943

57

5,565

55

5,076

CONDITION OF HIGHER INSTRUCTION.

(State Universities.)

The number of universities is 16. The most important of all is the University of Paris. The number of university students was as fol¬ lows in January 1914:

	French	Foreigners	Together
Paris University . .	15,186	4,319	19,505
All French Universities .. .	38,396	7,895	46,291

Among the French students, the total num¬ ber of men was 35,849 ; women, 2,547. Among the students of foreign nationality the number of men was 6,188; women, 1,707. The follow¬ ing table shows, the distribution of the total number of students by faculties in France:

Students of Law . .	16,614
Students of Medicine and Pharmacy .	12,794
Students of Sciences	7,976
Students of Letters	8 , 907
Total .	46,291

Charles Petit,

Agrege de VU niversite ; Professor at the Henri IV Lycee, Paris. Revised by Marc de Valette.

13. FRENCH LANGUAGE, in a general sense the language of France, more especially of the langue d'oui country, and of those re¬ gions outside France speaking the same tongue as that of the French people. In a more re¬ stricted sense it is applied to the literary lan¬ guage of the country. In speaking of the French language it is customary to exclude the Provengal and kindred dialects of the

langue d'oc country. Most reviewers of French litera¬ ture state that the French language is divided into two great dialects, the langue d'oui and the langue d'oc, each having its own separate litera¬ ture. But the reviewer usually contents him¬ self with passing in review the activities of the langue d'oui, to the complete exclusion of those of the langue d'oc. Behind this attitude of the reviewers of French literature lies the influence of centuries constantly exerted, both consciously and unconsciously, to denationalize the Proven- gal and native tongues of southern France.

Origin. — French is essentially a Latin lan¬ guage, to which has been added a considerable admixture of Celtic, German, Greek and dia¬ lectic Latin, with a very much smaller number of words borrowed from English, Italian and other languages. Not only does it belong rad¬ ically to the great Indo-European family of lan¬ guages, but its borrowings and admixtures have been almost exclusively from sister languages all members of the same family. The Tuscan and Greek elements in French (exclusive of scientific terms) have come into the language almost exclusively through Latin. The Celtic elements are the survival of vocabularies from the languages and dialects spoken over a con¬ siderable portion of Gaul before its occupation by the Romans. The German elements were introduced by the invading Germanic races who overran the country on the decline of the Roman Empire. Caesar is the authority for the statement that, even in his day, Celtic, Iberian (Basque), German and Latin were spoken in different parts of Gaul. Of these tongues the most important, at this period, was the Celtic, which extended over the greater part of the country. Considerable German was spoken in the north of Gaul, especially in the Seine and Marne districts; while Iberian was the tongue of Aquitaine, Garonne and the Pyrenees re¬ gions. A dialect of Latin was spoken in the Narbonnaise district. All of these had their influence on the changes undergone by the Latin language in its slow centuries of transforma¬ tion into modern French and the various dia¬ lects spoken

in France to-day.

The Roman conquest of Gaul was partially a feat of arms; but it was much more a triumph of Roman diplomacy and genius for colonial government. Roman power in Gaul was cen¬ tred in the larger cities and in their strongly fortified camps. There the laws and decrees of Rome were promulgated and the tribute of the conquered tribes received. There, too, the law courts were held and justice administered. Rome bent her efforts to the Latinizing of her newly-acquired possessions. Gradually she forced the inhabitants of the larger cities to use the Latin tongue. But this forcing was done in a most diplomatic though effective manner. Even in the days of Caesar, Latin was made the only medium for the administration of the law, the promulgation of decrees, the exer¬

cise of the functions of government, the admin¬ istration of justice and the performing of the offices of religion. It was the only medium of commerce and trade with the Romans ; of litera¬ ture and art, of the theatre and of social rela¬ tions. Above all, it was the only road to office under the Roman government and to political preferment. The Roman officials in Gaul en¬ couraged and rewarded the mastery of the Latin tongue and the acquirement of Roman culture, customs and manners. Thanks to this well-defined policy of the Roman government, native Gauls were found in important offices even in Csesar's time. The number of these Gallo-Roman offices increased rapidly, and their influence was steadily exercised in favor of the acquirement, by the natives, of the Latin lan¬ guage. A greater inducement still was held out to the Gauls to acquire the ways and culture of their conquerors. This was the prospect of employment or political preference and honors in the imperial city of Rome itself. Under this pressure so diplomatically applied, the study of the Latin language, grammar, literature and oratory became a passion throughout the cities of Gaul, which were full of Roman merchants, traders, teachers, philosophers, lawyers, artists, sculptors and seekers for political and

other offices. Latin was the symbol of success in every avenue of life. Native Gauls became noted merchant princes, lawyers, soldiers, local potentates at home and favorites of powerful political personages in Rome, and even in the colonies outside Gaul. Natives of Gaul, too, reached the highest offices in the land, becom¬ ing even members of the Senate ; and later on, a native Gaul became one of the most noted of the Roman emperors. The political policy of Rome made the imposition of the Latin lan¬ guage upon the cities of Gaul a comparatively easy matter, requiring only time to assure its accomplishment. Everywhere, throughout the populous cities of Gaul, there sprang up schools that rivaled, in their efficacy and reputation, the most famous institutions of Rome. Rich Romans sent their sons to these schools because of their excellence and the added advantage that they could acquire there a first-hand knowl¬ edge of the life and customs of the natives, whom they might be called upon, in the future, to govern, or to have political or other rela¬ tions with. Thus all urban Gaul traveled Rome- ward — <(all roads led to Rome.®

Native Languages — The influence of Ro¬ man culture extended itself much more slowly over the rural districts, the inhabitants of which, in addition to being much more con¬ servative and passionately attached to their native institutions and language, lacked the in¬ centive of ambition and of commercial and trade necessity. A powerful Druidical priesthood held the rural Celts together and set their faces against Roman culture and religion. But even in the rural districts Latin made its way slowly and in a mangled form ; yet none the less surely. This was accomplished almost entirely through the natural pressure from without exercised by the growing power of the Latin tongue, which had greatly increased during the reign of the Emperor Claudius (41-54 a.d.). Claudius, who was born in Lyon and educated in Gaul, opened to the Gauls all the employments and dignities of the Empire. In the construction of the

many extensive public works he employed many inhabitants of Gaul in positions requiring faith¬ fulness, honesty and skill. These, in their turn, frequently drew laborers from the rural dis¬ tricts of Gaul. These latter, during their resi¬ dence in Rome or other Italian cities, or in the populous centres of Gaul, acquired some knowl¬ edge of Latin. Thus, in time, through these and other agencies, a sort of lingua franca sprang up throughout the rural districts of Gaul and served as a medium of communication be¬ tween the Celtic-speaking population and the inhabitants of the cities and towns. This con¬ sisted of a frame of Latin words stripped of most of their inflections and subjected to word- contractions and other modifications. Into this frame were fitted many native words which had already become the property of trade and com¬ merce and the other activities of life in the city, town and country. Thus, as the influence of Latin became stronger in the cities, it con¬ tinued to exercise greater pressure on the rural districts. This pressure soon began to react upon the centres of Latin culture. The unedu¬ cated classes of Gaul everywhere, even in the cities, spoke very imperfect Latin, the genius of which is so different from that of the native tongues of Gaul. But while the cities afforded some correction for this universal tendency among the masses to corrupt the Latin lan¬ guage, the life of the rural districts, where the native tongues were still universally spoken, made the disintegration of the highly-inflected Roman speech unavoidable. As the masses in the city and country became more Latinized, at the expense of their native tongues, the cor¬ rupted Latin spoken over immense districts of the country tended to pass current as the speech of the populace and to crowd out classi¬ cal or school Latin. As this corrupted local Latin varied greatly in different parts of the country, due to linguistic and other influences, there resulted numerous Roman dialects throughout Gaul, many of which are still in existence.

New Influences. — The introduction of Christianity

gave additional impulse to the study of Latin which soon became the official language of the Christian Church; and it was taught everywhere by the priests to the middle and upper classes ; and they also encouraged the masses to learn it. It seemed as if this was destined to maintain the prestige of Latin as the official language of the country. But in reality it hastened its downfall, by making it more and more the language of the illiterate masses. Soon the rural districts furnished priests who spoke their own Roman tongue ; and the struggle to rehabilitate the literary Latin among the masses was abandoned. The numerous French dialects of Latin had already begun to assume shape when the decline of the Roman Empire brought the Germanic tribes down upon Gaul and introduced a new element into the Romanic speech, which had already worked its will upon the tongue of the Caesars. Under its influence the loose Latin construction disappeared; articles and prepositions took the place of the inflectiona] terminations brought to a high state of artificial perfection in Latin; and the wholesale suppression of unaccented syllables had so contracted the Latin words that they were often scarcely recognizable. The modification of vowel sounds increased the

efficacy of the disguise assumed by Latin words masquerading in the Romanic dialects through¬ out Gaul ; and the Celtic and other native words in current use to designate the interests and occupations of the masses helped to differentiate the popular speech from the classical Latin. Already Celtic, as a spoken tongue, had almost entirely disappeared from the cities ; and even in the rural districts it had fallen into a cer¬ tain amount of neglect, as the lingua franca of the first centuries of Roman occupation, reach¬ ing out in every direction, became the ever- increasing popular speech.

Germanic Influence. — The strongest proof that the rustic Latin had become the speech of the masses of Gaul is found in the fact that the Germans, in the course of two centuries, were able to have very little basic influence over it. Had Celtic been

still generally spoken, the over¬ throw of the Roman power and the introduc¬ tion of German rule must either have imposed the German language upon Gaul or allowed the ancient Celtic to assert itself once more. What did happen was that the conquerors, having to do for the most part with the masses, found that they could do this most conveniently through the medium of the Romanic dialects. The general business of the people of Gaul seems to have suffered but comparatively small inconvenience and derangement on account of the Germanic conquest, as the invaders never came in sufficient numbers to dispossess the original inhabitants who were much more civil¬ ized than their masters. The conquerors seem to have soon accommodated themselves to the life of the Gaulish people, the majority of whom were still largely of Celtic blood. One of the immediate effects of the Germanic con¬ quest was to hasten the downfall of the Celtic tongue even in those parts of the country where it still maintained its ascendency, and to drive out Latin as the speech of the ruling classes. The latter, thus dethroned, still remained, how¬ ever, the official language of the Christian Church. But even by the ecclesiastics it was spoken and written with much less of its liter¬ ary elegance, and tended to become more and more an artificial speech, since even with the priests, after a century of German occupation of Gaul, it was always an acquired tongue. A century later, we are told, ((Classical Latin was understood in Gaul by only a very few, but rustic Latin was understood by everybody.® In the 8th century, so thoroughly had the Romanic tongue become the property of the masses of the people that Charlemagne required sermons to be preached in that tongue, into which the homilies of the Church councils had been al¬ ready translated for some considerable time.

Fortunatus states that, in the 6th century. Celtic was still extensively used in the rural districts of Gaul. It was spoken among the natives while the Roman tongue served to com¬ municate with the cities and towns where it had already become the common

speech of the masses and the classes alike. The dethrone¬ ment of classical Latin as the court tongue and the substitution of German in its place gave the Roman language still greater importance as the one means of communication between the dwell¬ ers in the cities and towns and those of the rural districts. Naturally so long as the German con¬ quest continued and the hold of the Franks and other Germanic; tribes was not secure on the

greater part of the territory of Gaul, the court language of the new masters was German. It was also the tongue of the German officials in office and in private life. The Driadical reli¬ gion, which had, even before the fall of Rome, retreated to the mountains and other inaccess¬ ible parts of the country, seems to have made a final effort to establish Celtic as the language of the masses. But this influence proved altogether local; for the Druidical priests were too far from the centre of activity of the na¬ tion and from the spirit of the age. The Ro¬ mance tongue, therefore, standing midway be¬ tween the reactionary religio-Celtic element and the court, drew both toward it by the mere force of its general extension and commanding central position It has been customary to say that the German invaders lost their language in France because they were an uncultured race placed as masters over a cultured. But this is only half a truth. The Germans conquered Gaul and garrisoned it ; but they never popu¬ lated it in the sense of dispossessing the Gaulo- Romanic inhabitants. There is every reason to believe that the invading German host was so comparatively small that it was, in the course of time, easily absorbed by the solidarity of the vast native population rather than by its cul¬ tural superiority. In the course of nearly five centuries the boasted Latin civilization, with all its genius for organization and for imposing itself on conquered races, had succeeded only in forcing upon the people of Gaul, or a part thereof, the most distorted and battered sem¬ blance of its own noble tongue. And at the end of this long period of time the daughter had so grown away from the mother speech that they stood apart as strangers who could not understand one another. It was quite natural, therefore, that the German invaders, compara¬ tively few in numbers, should have succumbed in the course of time to this powerful young speech, just as the Norman invaders of Eng¬ land, in the course of two centuries, lost their native tongue — this same powerful Romanic speech — to the overpowering strength of the Saxons and the virility of the

English tongue.

But though the German language gave way before the Romanic, it dealt a deadly blow to the Latin, the Celtic and the other pre-Roman languages of Gaul. This left the field open, as early as the 6th century, for the development of the Romanic dialects, which had thus risen to supreme importance by becoming the one sure and general means of communication of the whole population of the country, stretching out to the Celtic hilly country on the one hand and invading the palaces of the Germanic princes and kings and the halls of the nobles on the other and driving the German language it¬ self across the Belgian frontier, just as the Provengal had already done in the south of France. The surest outward sign of the vic¬ tory of Roman over all the other linguistic ele¬ ments in northern France is the fact that it dis¬ carded its old name and became known as French, that is, the language of the Franks, at the time that it had succeeded in becoming the common speech alike of Romans, Celts and Germans. The victorious language was neither Latin nor Celt nor German but a curious min¬ gling of the three with the popular speech of the Roman soldier and colonist in Gaul, a

strangely vigorous hybrid born to a new life and destined to a glorious future.

Celtic Elements in French. — On no sub¬ ject connected with the origin of the French tongue do philologists differ more widely than the question as to the percentage of Celtic words that enter into its composition. Some champions of Celtic have seen real or fancied resemblances to a vast number of Celtic words in modern French, while others would limit Celtic roots in it to about 50. The philological field is still divided into two opposing camps neither of which appears to be fighting the bat¬ tle along truly scientific lines. The pro-Celtic party is inclined to list all French words for which there can be found a Celtic equivalent or root as Celtic in origin ; while the pro-Latin party would exclude from the right to

claim Celtic parentage all French words for which there is a Romanic word, whether classical or popular Latin. Common sense indicates that both extremists are wrong. While the Romans conquered Gaul and occupied all or parts of it for nearly 500 years, they never dispossessed the original inhabitants ; and the Latin tongue was imposed on the Celts and other Gaulish people very slowly and unevenly. As we have seen, Latin itself suffered very severely in the proc¬ ess of absorption by the Gauls. We have the testimony of many Latin writers that the Ro¬ manic tongue contained many native Gaulish words. Numbers of these words were adopted by the Latin writers and found their way into the writings of Latin authors and the utterances of public speakers, especially those educated in the schools of Gaul. It is, therefore, unsafe to conclude, because a word is found in the Latin of the writers following the conquest of Gaul, that it is of true Latin origin; and it is still much unsafer to argue that because a word is found in popular Latin, though not in the classical tongue, that it cannot be Celtic in origin. The fact seems to be that Latin and Celtic acted and reacted upon one another for 500 vears before the Romanic dialects gained the ascendency. As Celtic and Latin are sister tongues, it frequently happens that both con¬ tain the same root in almost the same form. In this case it is not impossible that both lan¬ guages influenced the Romanic derivative. It will, therefore, probably never be positively known to what extent modern French is in¬ debted to Celtic and the other Gaulish tongues.

As the Roman language was a sort of lin¬ gua franca bridging the way between the Ro¬ mans and the Gauls who spoke only their na¬ tive tongue, it contained, in the 4th century, very many words relating to the daily occupations and interests of the natives of Gaul. These in¬ cluded mining, agriculture, laboring occupations and trades. Many of these words are still in the French tongue. We are told that arpent, for instance, is derived from the Latin arapen- nis, but the root ar, ploughing, is common to all the

Celtic tongues. Bttle, a piece of wood, is also claimed to be of Latin origin because billci is the Low Latin for a tree trunk ; but the Irish bile is also a tree. Another writer claims that bouleau (balai , a broom) is from Latin; but bexth , in Irish, is birch, from which the original twig brooms were made just as they still are in Spain and most of the Latin-Amer- ican countries from branches or twigs ; and bal js the Welsh for bundle, the form in which

the brooms were tied, either by themselves or around a handle. Cep, the stock of a plant, may be from the Latin tip pus, but is more likely from Celtic, for Gaelic contains caep, a trunk. Combe, valley, has the Welsh equivalent cwm, with numerous derivatives from the same root. Dime, hill, has the Welsh ducho, above, and the Irish and Welsh dun, hill; yet certain philolo¬ gists claim that it is derived from a Low Latin word which is itself evidently from some Celtic form similar to the Irish diminutive dundn, a little hill. Fagot is asserted positively to be de¬ rived from the Latin fagus; yet the Welsh con¬ tains ffagod and the Irish fagoid, and the root word faic, a small part or bit of anything. The foregoing examples are sufficient to demon¬ strate the confusion that has reigned in the field of early French philology and the unscien¬ tific methods of many of the workers therein. The trouble is that many of the most strenuous champions on both sides of the question have had no adequate scientific training for their work and have fixed their attention on word resemblances between Celtic and Latin or Latin and French instead of investigating thoroughly the wide field of comparative Celtic language study and that of classical Latin and its rela¬ tion to the various dialects of Italy in the days of Roman rule. The wide extension of this field and the difficulty of the work therein, to¬ gether with the imperfect knowledge of the Celtic tongues, until recent years have con¬ tributed largely to

this confusion and to the encouragement of unscientific methods.

Among other modern French agricultural terms or words related thereto which are claimed to be of Celtic origin are gaule (post, or pole, English, goal-post, where the Celtic or French word and the English compounded have the same meaning), glui (thatch, coarse straw, or bundles thereof), gres (grit sand¬ stone), greve (beach, sandy shore), groseille (currant, gooseberry), gueret (field, fallow ground), guirlande (garland, wreath), if (yew- tree), marne (chalk, clay), motte (turf, peat, clod), pioche (pick-axe), platre (plaster), rigole (trench, gutter), roc (rock), ruche (swarm beehive), soc (sock, ploughshare), verne (alder).

Among the names of common animals are numerous words in French that are either from Celtic or have a similar root form in that tongue. These include alouette (lark), cochon (pig), coq (cock), etalon (stallion), furet (ferret), geai (jay), jars (gander), loche (groundling, fish) matin (mastiff), mouton (sheep), truie (sow), turbot. These are accom¬ panied with terms relating to animals, as dia (get up, go on, gee!), clavelee (scab), gour- mette (curb), gourme (glanders).

The human body, its impressions, tastes and relationships have naturally preserved some Celtic words in French, among which are: barguigner (bargain), danse (dance), dorloter (fondle), gober (gulp), grignoter (nibble), morguer (to bully, defy), rabacher (repeat), trimer (to go fast), troler (to stroll), brusque (rude), dru (brisk), sale (dirty), tajent, gour¬ mand, moquerie, rogue, souhait (wish). The Celtic language has also contributed to the French language its share of names of utensils, tools and arms including balai (broom), baril, baton, broche, echeveau (skein), gobelet, hart (halter, band), lance, mortaise (mortise), pavois

(large shield), treteau (trestle), treuil (axis, contained in the English compound word axle- tree,

both parts of which have the same mean- ing). Among the French words of Celtic origin expressing clothing and parts thereof are : botte (boot), braie (breeches, clout), casaque (great coat, cassock), toque (cap), trousseau, bouton (button). Barque (hut),brique (brick), cabane, geole (jail), platre (plaster) and rue (street) are all Celtic words relating to dwelling. The French word boudin (pudding), which looks like a corruption of the English word, finds its equivalent in the Welsh word poten. Literally it means the round thing. It is probably con¬ nected with the pot in which it is boiled, which is, in Irish, poitin. This is related to the Irish pott, a pit or hole (a round thing). In a similar manner many of the Celtic words in French can be traced through the various Celtic languages. French contains other interesting words of Cel¬ tic origin relating to foods, among them being: crepe (pancake), gateau (cake), cervoise (beer), leche (thin slice), lie (dregs), tripe, tourte (tart). Celtic derivatives express other rela¬ tionships of the life of the masses ; but the fore¬ going are sufficient to show the field in which the French words of Celtic are still preserved.

Teutonic Elements in French. — The arrival of the Germanic tribes in Gaul had considerable influence upon the Romanic speech in addition to those already mentioned. It undoubtedly crowded out numerous words of Celtic origin relating to the activities of life and displaced others of classical Latin. During the first cen¬ tury of German occupation of Gaul many Ger¬ manic words were introduced into the popular speech. Among these were words relating to war, navigation, legislation, agriculture, hunting, fishing, handling of horses and animals, music, fairy lore, the feelings and passions, colors, necessities, actions and directions. As the masses who spoke Celtic and German, at this time, were ignorant of arts, sciences and letters and all related thereto, the words introduced by the German conquerors and their immediate descendants never enter this higher sphere of life. The joy of living they have well repre¬ sented in biere (beer),

echanson (cup-bearer), gaufre (waffle), goinfre (glutton), malt, soupe, trinquer (tipple, drink). All the German words introduced into the Romanic languages at this period are expressive of the most active and intimate life of the people, with this restriction, they cover a comparatively wide range of sub¬ jects and interests. Thus the warlike and bois¬ terous life of the Germanic invaders finds its expression in the modern French words of Ger¬ manic origin: bagarre (to brawl, quarrel), brandir (brandish, flourish), butin (booty), dard (dart), escrime (fencing), fleche (arrow), guerre (war), hardi (bold), haubert, marechal, rapiere, saque (pillage), barque (boat), bouclier (shield), bateau (boat), bord (ship), fregate (frigat), houle (swell of the sea), mat (mast), pilote. The life of the ruling class is expressed in the words: baron, eschevin (alderman), fief, frais (expense), franc (true, free), gage (pledge), marquis, riche, senechal, saisir (seize), harpe, lai (lay), luth, rime; while the interests of the agriculturists finds expression in such words as ble (wheat), bois (wood), cresson (cress), framboise (raspberry), grappe (grapes), touffe (bunch), haie (hedge), gerbe (sheaf), jardin (garden), marais (marsh), s eve (sap),

tige (stem), troupeau (flock, herd). The horse¬ man is represented by bride (bridle), croupe, eperon (spur), galop, harnais, marechal (far¬ rier), train, trot. The life of the hunter and the forest appears in biche (hind), elan (elk), chou- ette (screech-owl), garenne (warren), hase (doe-rabbit), mesange (tomtit), moineau (spar¬ row), mouette (gull), trappe, gans (goose), heron. The interests of the house and the family appear in banc (bench), bande, bassin, boucle (buckle), buee (lye washing), canf (knife), coussin (cushion) , fauteuil (armchair), havresac (knapsac), malle (trunk), tonneau (cask), torche. The fisherman has given carpe, esturgeon, lamproie (eel), marquereau, nacre and perle. Among

other words expressive of residence are bourg, hameau (hamlet), hangar, hutte, seuil (threshold) ; while dress and per¬ sonal ornament are represented by bague (ring), bagage, chemise, coiffe, etoffe (cloth), feutre (felt), froc, gant (glove), jupe (petticoat), pantoufle (slipper), poche (pocket). The pas¬ sions and feelings are expressed in effroi (fright), etourdi (blundering), frayeur (ter¬ ror), cri (cry), hair (hate), honte (shame), cauchemar (nightmare), reve (dream). Large as the foregoing list is it is far from exhaus¬ tive of the Germanic elements in active use in the French tongue to-day.

Langue d'oc, the southern French tongue, owing to the fact that the south of France was not so much overrun and for such a continued period of time by the German invaders as the northern half of the country, developed its literary life faster and earlier became a centre of culture and of literary influence. This con¬ dition of affairs acted and reacted upon the whole south, upon the neighboring parts of Spain and Italy and upon the more slowly de¬ veloping north of France. It naturally remained more Latin and consequently more like the lan¬ guages of Spain and Italy. For almost two centuries it set the literary style for the sur¬ rounding countries and did much to awake to a higher life the northern French provinces. At one time it seemed as if Provencal, the lan¬ guage of the langue d'oc dukedoms, was likely to become the dominant tongue of France. But fate was against it. Troubadour poetry and Provencal literature generally had penetrated to the northern courts of France, as Gaul began to be called after the Germanic occupation, and the princes of France were proud to imitate the literary princes of the Provengal countries. The culture of the north grew, as it came more and more under the influence of the south. The Norman, the Picard and the Bourgignon aspirant for literary honors imitated the writers of the brilliant courts of the langue d'oc country, Pro¬ vencal, Languedocien, . Dauphinois, Lyonnais, Gascon, Auvergnat, Limousin ; and the best singers of the south country were frequently seen at the palaces of

the Frankish kings. But political influences were destined to be more powerful than literary throughout all of France. The French kings, allied with the Christian Church, both received additional strength which finally made them a power in the affairs of Europe. Out of this union sprang a new litera¬ ture which had its rise in the north of France. The northern kings received a wider vision which inspired an ambition to extend their dominions. This resulted in the gradual sub¬ jection of the langue d'oc country to the north.

From this time on the southern tongue was dis¬ couraged, and the Provencal literature, which had owed its rise to the encouragement given it by the southern dukes, rapidly declined. Soon southern writers set the fashion of writing in French. From this time southern literature practically ceased to exist so far as any influence outside its own country was concerned ; and the north country became the centre of literarv activity in France. This had been the result of a slow growth from the 8th century to the time of Charlemagne.

French Dialects. — The three principal dia¬ lects of northern France were the Norman, Bourguignon and Picard. The latter being the language of the capital and the court gradually acquired preponderating influence which enabled it to submit to its customs and ways of think¬ ing the other northern dialects. This was the more easily accomplished because of the fact that the country was still divided into local centres and interests, each of which had its own local dialect, the total of which embraced al¬ most two-thirds of France. The coming to the throne of the dukes of France gave it great strength, for the new rulers showed special ability for organization. They made their court the centre of the knightly culture of the age ; and their dialect the diplomatic tongue of all France. Soon it became the language of all ambitious of acquiring courtly honors and favors. The Picard tongue became the model of courtly speech and manners ; and by its own weight and influence gradually im¬ posed itself upon all the other dialects of northern France. By the

12th century the only road open for favors at the court of France was conformity to the polite manners and customs of the court, one of whose inexor¬ able laws was that all courtiers should speak correctly the Picard tongue. In the 16th cen¬ tury the latter became, by royal decree, the court language and the official tongue of all France. But long before this, as early even as the 13th century, French, as the official tongue had already begun to be called, had commenced to spread rapidly and to acquire an influence which was destined to reach to all the courts of Europe, so that it ultimately became the diplomatic language of Christendom. It be¬ came fashionable everywhere to speak French, which formed a part of the studies of all higher schools and universities throughout Europe ; for France had succeeded in what Rome and the Christian Church had failed. She had become the diplomatic centre of Europe of which her language and literature had become the admiration and the one modern tongue worthy of imitation. French language, manners and culture, therefore, exercised a world-wide influ¬ ence, the force of which, though diminished, has not yet spent itself. For the influence of French on English see English Literature. See Norman French ; German Literature ; Provenqal Literature; Catalan Literature; France — French Literature; French Phi¬ lology and Morphology.

Bibliography. — Armstrong, < Syntax of the French Verb* (New York 1909) ; Berthon and Starkey, (Synoptiques de phonologie de l'ancien frangais^ (Oxford 1908) ; Bourciez, (Elements de linguistique romane) (Paris 1910) ; Brunot, (Hi§toire cle la langue franqaise) (Paris 1905-

11) ; Cledat, (Nouvelle grammaire historique du frangais* (Paris 1908); Constans, (Chres- tomathie de l'ancien frangais* (Paris 1906) ; Etienne, Henri, (La precedence du langage frangois* (Paris 1896) ; Foerster, (Altfranzo- sisches Uebungsbuch) (Leipzig

1911) ; Geddes and Rivard, (Bibliograhie du parler frangaisau Canada) (Paris 1906) ; Gillieron and Edmont, (Atlas linguistique de la France) (Paris 1912) ; La Grasserie, (Etude scientifique sur l'argot et le parler populaire* (Paris 1907); Littre, (His- toire de la langue frangaise* (Paris 1886) ; Lu- quiens, introduction to Old French Phonology and Morphology* (New Haven 1909) ; Meyer-Lubke, (Historische Grammatik de franzo- sischen Sprache* (Heidelberg 1908); Nyrop, Grammaire historique de la langue frangaise* (Copenhagen 1913) ; Rivarol, (De Tuniversalite de la langue frangaise* (Paris 1784) ; Rudmose- Brown, (Etude comparee de la versification frangaise et la versification anglaise) (Grenoble 1905) ; Schwan-Berens, Grammaire de l'ancien frangais) (Leipzig 1913) ; Sudre, (Chresto- mathie du moyen age* (Paris 1906) ; Tobler, (Vermischte Beitrage zur franzosischen Gram- matik) (Leipzig 1908) ; Vaugelas, (Remarques sur la langue frangaise) (Paris 1813) ; Vo- retzsch, (Ein £iihrung in das Studium der alt- franzosischen Sprache) (Halle 1911). See also Bibliography under French Literature.

John Hubert Cornyn, National University of Mexico.

14. FRENCH LITERATURE FROM THE 11TH TO THE 19TH CENTURY.

The first written monuments o£ the French language, viz., the humble Prose of Saint Eulalia and the Life of Saint Leger, a poem of some 250 verses, both written in the 10th century, belong to philology rather than to literature; and we must come to the (Chansons de Geste) to find the first real manifestations of a literary genius which nearly 10 centuries of intense production have not yet exhausted.

The Middle Ages.

Epic Poetry. — If the number of those (Chansons de Geste) were the only criterion by which to judge them, this section of French literature would surely give the lie to the oft- repeated saying: <(Les

Frangais n’ ont pas la tete epique.** But we must admit from the out¬ set that quality does not go hand in hand with quantity and that very few of these early poetic productions deserve more than a passing mention.

To proceed in an orderly manner, we shall adopt the customary division of the Epics of France into three ^Cycles,® the French, the Briton and the Antique Cycle. The French Cycle is in turn divided into the Royal and the Feudal Cycle, the former being dominated by the idealized figure of Charlemagne, the latter, on the contrary, breathing a strong spirit of opposition to the Frankish monarchy.

The (Chanson de Roland, * which belongs to the Royal Cycle, is the masterpiece of the French epic poetry. Its composition goes back to the second half of the 11th century and its author is unknown ; but it may be truly called the Iliad of France, although it does not, of course, compare in finished beauty with the work of Homer. The most remarkable feature of it is the strong spirit of patriotism which

those rude verses breathe forth. The name of <(France La Deuce® is often on the lips of those fiery knights and her honor is their supreme preoccupation. For her they fight, for her they die and their greatest sorrow at the hour of death is to think that she may be trampled down by her enemies. But that national feeling, so remarkable at such an early date of French history, is surpassed perhaps by the religious sentiment which pervades the whole poem. These valiant fighters are Crusaders in the true sense of the word, they realize that they are soldiers of Christ as well as soldiers of France, and their valor is intensified by the thought that they are fighting against the traditional enemies of Christianity, the Moslems.

The chief characters of the poem, Charle¬ magne, Roland, Olivier, Turpin, although drawn by the unskilled hand of a naive psychologist, are not lacking in grandeur and beauty, and their heroic deeds have more than once inspired the French youth

in the hour of a national crisis. Only the literary skill of a Racine or of a Victor Hugo is wanting to make the Chan¬ son de Roland) a true masterpiece of epic poetry. As it is, with all the defects of a tongue yet in its infancy, it did not deserve the oblivion in which it lay buried for centuries and from which it was happily rescued by modern erudition. Among the compositions of the Feudal Cycle three at most deserve a men¬ tion: (Renaud de Montauban, the (Geste des Lorrains) and (Raoul de Cambrai.* The first named represents Charlemagne as a 'feeble, irascible and cruel old man who con¬ trasts singularly with the ideal emperor and the noble champion of Christianity we admire in the (Chanson de Rolands The two other poems seem to ignore him completely and are content with relating the bloody rivalry of the feudal lords.*

Whatever may be the literary value of these first Chansons de Gesta, there is no denying that they were immensely popular even outside of France and that they were imitated all over Europe. The (Chanson de Roland) was trans¬ lated into German and English and many an old Spanish ballad testifies that the French national hero was well-known and honored on the other side of the Pyrenees Mountains. Italy showed how much it thought of Roland and Olivier by erecting their statues at the door of the cathedral in Verona and in the 15th century Ariosto imitated the (Chanson de Roland in his (Orlando Furioso.**

The Briton Cycle is thoroughly Celtic in its inspiration ; its chief hero is Arthur of Great Britain, the founder of the Order of the Round Table; around him are grouped Merlin the wizard, Lancelot du Lac, Percival the Gallois, the finder of the Holy Grail. We are moving in a supernatural atmosphere and find ourselves face to face with a new and rather mystic con¬ ception of love and chivalry which contrasts singularly with the rough manners depicted in the preceding cycle. As to the Antique Cycle, which deals with the heroes of Greece and Rome and disfigures them in the most amusing manner, it has hardly any literary value ; with the

possible exception of the (Roman d' Alex¬ andre, } the poems of this cycle are all monoto¬ nous and childish.

Lyric Poetry. — While epic poetry was flourishing in northern France, the south was

witnessing a remarkable outburst' of lyric sen¬ timent. But the works of the Provencal Trou¬ badours do not really belong to French liter¬ ature and we must address ourselves directly to their rivals of the north, the lyric <(Trou- veres.® The end of the 12th century and the beginning of the 13th saw a remarkable develop¬ ment of French lyrics, the most representative names being those of Renaud de Coucy, Conon de Bethune, Thibaut de Champagne, Gace Brule and Colin Muset ; the usual theme of their songs is love, and many of them combine sin¬ cerity of feelings with depth of emotion and elegance of form.

Satirical Poetry. — The satirical litera¬ ture of the Middle Ages marks a strong reac¬ tion against the tendencies embodied in the epic and lyric poetry which were essentially aris¬ tocratic in their inspiration. The Fabliau , the satire by excellence of the Middle Ages, springs from popular sources. It usually ridicules the ^bourgeois,® especially in his conjugal mis¬ fortunes, deals mercilessly with the members of the inferior clergy, but is more cautious in its portraits of the feudal lords, and shows rather sympathy for the <(vilains.® The success of the Fabliaux and their influence on subsequent liter¬ ature was immense: in France Rabelais, La Fontaine and Moliere are indebted to them ; outside of France they were widely imitated, especially by Boccacio and Chaucer.

The most popular representative of the mediaeval satirical spirit is Rutebeuf, who took part in all the quarrels of the age, attacked lather fiercely the religious orders, but, toward the end of his

life, turned to the composition of pious literature. Rough and harsh though he be, Rutebeuf pleases by his frankness, and moreover he is a real artist, a worthy forerun¬ ner of Villon.

The (Roman du Renart, a composite and collective poem of uncertain origin, is the long¬ est satirical production of the period. It is an allegory in which animals play the part of men, the principal personages being Renart, the Fox, who is the living incarnation of cunning, Ysengrin the Wolf who represents brute force, Noble the Lion and Chantecler the Cock. The 'Roman du Renart) has been called the <(epic of the poor people,® but its satirical intentions are only too evident, and its aim is to ridicule not only brutal force, but the aristocratic so¬ ciety of the Middle Ages in general.*

Didactic Poetry. — Dante places French moral poetry on the same level with the best (Chansons de Geste) and proclaims unhesitat¬ ingly the superiority of the French tongue for this kind of literary productions. Leaving aside the didactic poems dealing with natural sciences and the 'Fables of Marie de France, we come to the most celebrated moral poem of the period, the 'Roman de la Rose.* It is the work of two different authors, Guillaume de Lorris (fl. 1230) and Jean de Meung, who, 60 years later, composed the second and by far the longest part of the poem. The contrast between the two is striking, and while Guillaume de Lorris intended to compose a sort of 'Ars amandi,* full of graceful symbols and of some¬ what effete galanterie, his successor gives us a rather rude shock by his aggressive and satirical tone. He openly preaches the most subversive doctrines which smack very much of the ex¬ treme theories of modern socialism. Whether*

it was the amiable allegories of the first sec¬ tion or the bold tirades of the second which appealed to the minds of the contemporaries, the fact remains that the 'Roman de la Rose) was considered, up to the time of Marot, as the most important production

of French poetical genius.

History. — We have to come to the 12th century to find in the vernacular the first samples of a genre in which the French have excelled ever since — history written in clear-cut, graphic prose. Geoffroy de Villehardouin, who took an active part in the 4th Crusade (1202) has recorded its events in the 500 short chapters of his

Born three-quarters of a century later, in 1224, Joinville the faithful friend and confi¬ dant of that model king, Saint Louis, has left us in his (Memoirs> a detailed picture of the domestic life of his master, and a candid nar¬ rative of the last Crusade. His candor is pre¬ cisely what pleases us most and we thank him not only for the evident sympathy with which he draws the portrait of the king, but also for the many curious anecdotes scattered through¬ out his book.

Froissart (b. 1337) is probably the best historian of the Middle Ages, and his 'Chron- iques) cover the history of the principal nations of Europe for 75 years. This <(Knight-errant of History,® as he has been justly called, is noted for his insatiable curiosity, his love of the picturesque, and in him the gallant deeds of the "One Hundred Years' War® found a most sympathetic and brilliant annalist : as a battle and tournament painter he is unsurpassed. On the other hand, the historian of Louis XI, Commynes (1447-1511) gives us no longer picturesque descriptions, but an attempt at a philosophical explanation of political events. ((The Breviary of Statesmen,® such is the name deservedly given to the in which he has recorded the end of the feudal struggles and the beginning of modern conflicts.

The 14th century is a barren period in French literature, just as it is about the saddest period of French political history. In poetry, two names only deserve a passing mention, that of Eustache Deschamps, whose verses, although not of a true poet, are not lacking in strength and originality, and that of Christine de Pisan, who left a poem in

honor of Joan of Arc, which betrays a sincere emotion, and a number of short ballads, graceful and tender.

In prose we have already mentioned Frois¬ sart, the only writer of mark during the cen¬ tury; but a word must be said of pulpit elo¬ quence in the vernacular. John Gerson (b. 1363), one of the greatest figures of the period, is also the greatest pulpit orator of the Middle Ages. However, in the sermons he preached before the Court, he did not escape the contagion of the prevailing bad taste and pedantic erudition; but in his homilies to his parishioners he makes an earnest endeavor to come down to their level, and his tender sym-

pathy for the sufferings of the poor people re¬ veals the heart of the true apostle.

The 15th century is almost as sterile as its predecessor. The literary output is indeed abundant, but mediocrity prevails and outside of the historian Commynes (see above), we find only one truly great writer, the poet Villon. However, it would be an injustice not to re¬ member Charles d'Orleans, who during the en¬ forced leisure of his 25 years' captivity com¬ posed a number of short poems remarkable at least for their artistic elegance. But he is left far behind by Frangois Villon (b. 1430), whose checkered career is really that of a rogue, but who has been justly hailed as the (

Renaissance.

Two capital facts dominate the French literature of the 16th century : a renewed and deeper acquaintance with classical an¬ tiquity together with the discovery of the artistic treasures of Italy: and this we call Renaissance ; and the introduction of the Prot¬ estant Reformation into France; and this be¬ gins the reign of individualism and of free

thought. In the first half of the century two names stand in almost violent contrast, Rabelais, the baffling author of Gargantua, and the austere, sombre Calvin.

In his prodigious, extravagant book, Rabelais (1495 ?— 1553) has left us a gallery of unfor¬ gettable personages, the best or rather worst known of whom is Panurge, worthy precursor of Gil Bias and Figaro. Has Rabelais a philos¬ ophy of his own? If so, it is no easy task to discover it under the huge mass of buffooneries which fill the book. His doctrine, if he has one, could be summed up in the following words: <(Moderation and- tolerance, hatred of fanaticism and pedantry, confidence in the natu¬ ral goodness of man.® As to his style, it is characterized by an astounding luxuriance of imagination, a wonderful gift of verbal inven¬ tion and a decided preference for popular terms, qualities which are too often marred by a dis¬ gusting display of indecency.

Calvin (1509-64) whose work, ^'Institu¬ tion chretienne> was originally written in Latin, is the very antithesis of Rabelais. He repudiates all tolerance, and history tells us with what piti¬ less severity he applied his theory of the repres¬ sion of heresy. Before everything else he is a moralist, a theologian and a rigorous one at that. As a writer, he deserves a place alongside of Descartes for the gravity and the precision of his style.

The third prose master of the 16th century and surely the greatest, is Michel de Montaigne (1533-1592) the author of the famous (Essais) which will forever remain one of the standard works in the French language. Do not, how¬ ever, look for any methodical composition: it is a series of loose talks on an immense variety of subjects, from <(Liars® to ((Heredity.® But,

in the midst of all these ramblings, it is visible that Montaigne's subject is <(Man® and his one purpose to draw a practical philosophy of life. The lessons he gives are not, by any means, of the

generous or heroic kind, but we cannot help loving his smiling wisdom, his keen insight into the complexity of human na¬ ture, his sense of measure and moderation. As to his style, Montaigne is truly a creator, an exquisite artist, and Montesquieu hardly ex¬ aggerates when he calls him (

The celebrated friend of Montaigne, E. de la Boetie, left a rather virulent (Discours de la servitude volontaire) which, perhaps, is hardly more than an exercise of rhetoric on a political subject, but the vigorous tone of which leads us to lament the premature death of the author.

The true political writers of the period, however, were Jean Bodin, author of the ^Republique, Michel de l'Hospital, an eloquent advocate of tolerance, and the authors of the (Satire MenippeeP This was the joint work of farsighted Frenchmen who strenuously op¬ posed the ((Ligue® and brought about the abjuration of Henry IV and thereby his acces¬ sion to the throne. The capital passage of the book is the harangue of Claude d'Aubray which draws, in elevated and pathetic language, a very gloomy picture of the state of misery to which France had been reduced by civil war; it is one of the most eloquent pages in the French tongue and as such deserves to remain a classic.*

Love of antiquity has led the authors of the 16th century to multiply translations. The Bishop of Auxerre, J. Amyot (1513-1593) has left us adaptations rather than translations of various masterpieces of Greek literature, the best known of which is the (Vie des Hommes Illustres, of Plutarch. Montaigne professed the greatest admiration for the old Bishop, whom he praised not only for his erudition but for the clearness and harmonious simplicity of his style.*

Among the historians and memoir writers it would be an injustice to ignore D'Aubigne, full of life and color in his (Histoire Univer- selle) which, however, lacks order and clear¬ ness; La Noue, who in his (Discours politiques and militaires) shows

himself a brave soldier and a concise, energetic writer; Blaise de Montluc, whose

The Queen of Navarre, Marguerite d'An- gouleme, ought perhaps to have been mentioned after her jovial contemporary, Rabelais, al¬ though she was not exactly guilty of Rabelai¬ sian literature. Her ^eptameron,* to tell the truth, is by no means an edifying book; but tha't kind of love stories did not scandalize anyone in the 16th century and we may freely praise the author, if not for the choice of her sub¬ jects, at least for the easy and graceful garment she threw over those erotic episodes.

In the beginning of the 16th century there is nothing to indicate the coming renaissance of French poetry. Clement Marot (1496-1544) is a very talented versifier rather than a true poet, and yet he was always held in high esteem

by his successors in the field of poesy. We hardly need mention his

Du Bellay, the author of the (Defense et Illustration de la Langue Frangaise,* which contains the program of the new school, was also a poet of no mean talent. His (Regrets) are full of melancholy sincerity, and his (Jeux Rustiques) prove what an attractive theme the most familiar objects may furnish to a man who is in daily contact with nature. An hon¬ orable mention at least is due to Remy Belleau, whose delightful (Chanson d'AvriP is a gem of exquisite beauty. With the 17th century we reach the golden age of French literature.

The 17th Century.

The century is usually divided into three sections: (1) From 1600 to 1660 we have a period of preparation which witnessed the slow birth of the classical spirit. (2) The true classical period is rather short, extending only from 1660 to 1688:

masterpieces follow one another in close succession and make these 28 years the most wonderful perhaps in the his¬ tory of any literature. (3) The third period, which leads us well into the 18th century (1688-1715), is a period of transition: while the classical spirit is still fully alive, it is clear that a new literary world is in the making.

First Period. — The name of Malherbe (1555— 1628) dominates this period. His part was chiefly that of a reformer who fought success¬ fully against the bad taste prevailing toward the end of the 16th century. Reason is Mal¬ herbe's predominant faculty. The rules he for¬ mulated to bring style and versification up to the standard of classical perfection may appear exaggerated at times, but they made possible the masterpieces of the century. His works, odes and religious poesies are few in number and rather artificial in tone, but for rhythmical harmony and purity of style they have seldom been surpassed.

Mathurin Regnier (1573-1613) represents a reaction against the school of Malherbe and is a staunch defender of the tradition of the 16th century. His

tion of the burlesque, though Scarron belongs rather to the next period, since he was born only three years before Regnier's death.

Alongside with the influence of Malherbe we must not fail to point out the part played by the "Salons® and by the foundation of the French Academy in the formation of the classi¬ cal ideals. The Hotel de Rambouillet and the Salons, by bringing together the members of the French nobility and the literary men of the day contributed to purify the language and to introduce that taste for subtle psychological analysis which has been one of the character¬ istics of French literature ever since. The Academie Frangaise, officially established by Richelieu in 1635, represents the principle of authority in the world of belles-lettres, watches over the purity of the French tongue and is the constituted guardian of the best French literary traditions.

What Malherbe had done for poetry, Jean L. de Balzac (1594-1654) did for prose. He is a pompous rhetorician whose perpetual striving for eloquence becomes tiresome, but we must give him credit for introducing into French prose that well-balanced harmony and regu¬ larity which became a perfect instrument in the hands of Bossuet and Fenelon.

Voiture (1598-1648) is a charming, witty letter-writer who intermingles fancy with real¬ ity and whose elegant badinage embodies the best spirit of the Salons. In strong contrast with him stands his contemporary Descartes (1596-1650) whose (Discours de la Methode) marks one of the turning points in the history of philosophy. As a writer Descartes is truly the creator of the philosophical tongue, and his exactness, precision and vigor leave little to be desired.

Second Period. — They were also philoso¬ phers, those two men so radically different and whose sole point of contact seems to be their common pessimism: Pascal and La Rochefou¬ cauld.

Blaise Pascal (1623-1662), the greatest rep¬ resentative of the Jansenistic school, was first of all a scholar and a scientist. Religious con¬ troversies brought him before the public in 1656: his ^rovinciales, which constitute a de¬ fense of Jansenism and a bitter and not always fair attack on the moral system of the Jesuits, created a sensation. They deserve their repu¬ tation, not indeed for any depth of theological learning, but for their wit, for their subtle irony and, at times, their almost pathetic eloquence. But the real title of Pascal to our admiration is that unfinished apology for religion which the world knows under the name of (Les PenseesP The contradictions of human nature constitute a psychological problem which re¬ ligion alone can solve; such is the theme de¬ veloped throughout with a vigor of thought, a naturalness and, at times, a sublime boldness and dramatic power of expression which ex¬ plain the extraordinary esteem in which the little book has been held by the foremost French literary critics of*

the 19th century.

La Rochefoucauld (1613-80) is an aristo¬ crat and his

nigh perfect and many of his sayings are struck like medals.

The (Memoirs played an important part in the life of the 1 7 th century and here again we meet with the name of La Rochefoucauld to¬ gether with those of Mme. de Motteville and Mile, de Montpensier. But the first place be¬ longs undoubtedly to Cardinal de Retz (1614- 79), whose*

Letters are a more familiar form of Me¬ moirs which faithfully mirror the society of the 17th century. Of course everybody knows that Mme. de Sevigne (1626-%) is unique in this regard, and her correspondence is for nearly 30 years (1669-96) the most reliable picture of Court life. The personal charm of the incomparable "Marquise,® her passionate love for her daughter, her unassailable moral character, her truly Christian kindness, a style which for vivacity and piquancy belongs to the purest French traditions, all these qualities com¬ bined have made the reading of her letters a pure delight ever since they were written. The letters of Mme. de Maintenon (1635-1719) are far from exhibiting the brilliancy which capti¬ vates us in Mme. de Sevigne's. But as she was a first-class educator, we find in her cor¬ respondence the qualities of her teaching, pre¬ cision and seriousness.

Novel writing, that branch of literature which is so overwhelmingly preponderant now- a-days, was not without its representatives in the 17th century. In his

But the greatest representatives of French prose in the 17th century were probably the pulpit orators.

Among the precursors must be mentioned the amiable Saint Francis de Sales, better known as the author of the v Introduction a la Vie Devote, which has the rare merit of making religion smiling and piety accessible to all. Bossuet (1627-1704) holds by common con¬ sent the very first rank among the pulpit orators of the classical era. It would be a mistake, however, to ignore the other aspects of Bos- suet's genius. As a matter of fact, the (His- toire des Variations des fLglises Protestantes* is looked upon as his masterpiece. In the (Dis¬ cours sur l'Histoire Universelle) he shows him¬ self not only a real scholar and an able apolo¬ gist of religion, but a deep philosopher as well. He may be looked upon as the creator of what we call now-a-days the philosophy of history. Although a little pompous at times, his funeral orations always contain profound and sublime lessons conveyed in noble language. But his sermons, which remained so long unappreci¬ ated, are now considered as his most genuine title to the universal fame he enjoys; and it is they principally which earned for him the en¬*

viable name of "the demigod of French prose,® bestowed upon him by modern critics.

Bourdaloue (1632-1704), who during his life was placed above Bossuet, is far from having the energy, the imagination and the vividness of style of his illustrious rival. Logic is his main quality and he appeals to reason rather than to sensibility.

Massillon (1663-1742), the last representa¬ tive of pulpit eloquence during the period, is a marvelous rhetorician who carried to perfection the art of oratorical development and delighted his audiences with his harmonious diction.

Flechier (1632-1710), bishop of Lavaur and then of Nimes, the only pulpit orator of the 17th century who had his sermons printed, was more a "literateur® than a preacher, and the over-wrought elegance of his sermons betrayed an exaggerated desire to please. His funeral oration of Turenne, however, is deservedly famous, and he has left us also curious

memoirs which contain many interesting descriptions of provincial life in his day.

Since the subject of tragic poetry is treated in the article on French Dramatic Art, in this section, the treatment of French poetry in the 17th century will perforce be brief and con¬ fined to two names, La Fontaine and Boileau.

La Fontaine (1621-95) is a unique character and his (Fables* a unique book in French his¬ tory. He is really the creator of that new genre in which he has far surpassed yEsop, Phaedrus and others. Each fable is a little drama in which men of his time and men of all times are depicted under the guise of animals and draw for us the lessons of experience. As to the style, it is almost inimitable ; "perfection in naturalness,® such is the verdict of all those who peruse the tiny little book which contains so many masterpieces.

Boileau (1636-1711), the lawgiver of the classical world, is not himself a great poet: he lacks the two indispensable qualities, imagina¬ tion and sensibility. He is essentially a critic, and the relentless war he waged against every form of bad taste in literature, together with his constant appeal to reason as the leading faculty in man, have been productive of lasting results. If his

Third Period. — The three names which illus¬ trate this period, Fenelon, La Bruyere and Saint-Simon, will lead us to the threshold of the 18th century.

Fenelon (1651-1715) successively tutor to the Duke of Burgundy and Archbishop of Cam- brai, is one of the most attractive characters of the whole period, although his life was not free from intrigues nor his mind from utopian ideas. His treatise on girls' education is a model of delicate psychology, his (Telemaque* is a poeti¬ cal novel with personages borrowed from Greek antiquity, but with more or less direct allusions to the political questions of the day ; his (Dialogues sur l'Eloquence* and his (Lettre a l'Academie* contain the author's literary

theories, and his (Traite de l'existence de Dieu) is a brilliant development of the argument of final causes. Few men have written French more fluently and more gracefully than Fene-

Ion: he is a Frenchman of the 17th century fed on the best marrow of Greek antiquity.

La Bruyere (1645-96) owes his reputation exclusively to his famous ^aracteres,* a collec¬ tion of moral reflections and portraits, the suc¬ cess of which was immediate and enormous. The most interesting part of the book is the one in which he depicts the manners and eccen¬ tricities of his day in a gallery of life-like pic¬ tures which are original, piquant, unforgettable. La Bruyere is moreover a master in the art of composing, and his style combines rare quali¬ ties of perspicuity, cleverness and wit.

The Duke of Saint-Simon (1685-1755), a proud aristocrat, overbearing, narrow and al¬ ways dissatisfied with his lot in life, has writ¬ ten curious

The 18th Century.

The 17th century had witnessed the triumph of the principle of authority in literature as well as in politics; the 18th, on the contrary, breaks loose from it, thus renewing the tradition of the 16th. For con¬ venience sake we may also divide it into three periods: 1715-50, 1750-89, 1789-1800.

First Period. — Fontenelle and Bayle are the precursors of the new spirit. The former (1657-1757) seems to have had no heart, no feelings and to have been an intellectual in the full and not always pleasant sense of the word. His chief work, (Entretiens sur la Pluralite des Mondes,* written with a facile pen, is the first example of the popular treatment of a scientific question. The latter, Bayle (1647-1706), is a precursor of

Voltaire and of the encyclopedists and his (Dictionnaire Historique et Critique is an arsenal of rather antiquated weapons against religion.*

The first real great writer of the century is Montesquieu (1689-1755). His (Lettres Persanes. are a sort of licentious and satirical romance in which many a portrait reminds us of La Bruyere and which contains the germ of his subsequent work,*

Buffon (1707-88) spent his whole life in composing his (Histoire Naturelle, an impos¬ ing monument in which he is said to have equalled the majesty of nature. Of course some of his theories could not stand the test of con¬ temporary science and Buffon is perhaps a poet rather than a scientist, and a poet often writing in too solemn a style. But some of his magnificent descriptions will live for ever and he had the rare merit of introducing natural history into literature.*

In Voltaire (1694-1778) we meet the most representative man of the century, and although historical truth forces us to admit that in many respects Frangois Marie Arouet (his real

name) was nothing less than a villain (witness his vile attacks on religion and his foul poem on Joan of Arc), there is no denying that his influence was universal and his talents extraor¬ dinary. History, tragedy, epic and lyric poetry, philosophy, satire, short stories, his ver¬ satile pen touched all subjects in turn. His tragedies are mediocre, his epic poem {La Henriade) is justly forgotten, but in his his¬ torical essays (Charles XII, (Le Siecle de Louis XIV, * (Essai sur les Moeurs,* Voltaire has truly been the precursor of Thierry and Guizot, although the last-named work betrays the shallowness of his mind and his anti-re¬ ligious bias. But it is in his immense corre¬ spondence (more than 12,000 letters) that we find the true Voltaire, with his feverish activity, with his curiosity always on the alert, with his brilliant, biting and inexhaustible wit, and his style as clear as spring water and as sparkling as champagne. This is why Voltaire's*

letters are by far the best part of his works and would suffice to secure for him perhaps the first place among French prose writers.

Second Period. — Diderot (1713-84) the originator of that huge war machine against tradition and religion which he called (L'Ency- clopedie,* is comparable to Voltaire only as far as versatility and anti-religious prejudices are concerned. A prolific but unequal writer in his novels, dramas, Salons, philosophical dialogues, he is chiefly an interesting conversationalist who wrote a few pages which their cleverness will save from oblivion.

J. J. Rousseau (1712-78) is known especially for his (Confessions,* in which he makes a mot- bid display of all his weaknesses, for his para¬ doxical

His disciple, Bernardin de Saint-Pierre (1737-1814), wrote the (Etudes de la Nature, * beautiful and eloquent, but in which there is more imagination than science, and a pastoral novel, (Paul et Virginie,* in which a rather maudlin sentimentality is corrected by a rare magnificence of descriptions.

Other novel writers are Lesage (1668-1747), who borrowed from Spanish literature the sub¬ ject of his (Diable Boiteux) and his famous < Gil Bias.* For his simplicity and natural grace he deserves to be called ^the last of the classics.® Marivaux (1688-1763), who in (Mari- anne) and (Le Paysan Parvenu) depicts the bourgeois and the common people with sincere realism and deep psychological analysis ; and the Abbe Prevost (1697-1763) whose (Manon Les- caut' is a glorification of love.

Third Period. — As we reach the end of the century and listen to the rumblings of the com¬ ing storm, we witness a sudden revival of lyric poetry which amply makes up for the cold and artificial compositions of J. B. Rousseau, of the Abbe DeliHe

or of the Academician Thomas. Andre Chenier (1762-94), whose career was cut short by the guillotine, was born in Con¬ stantinople, and that may explain the qualities of his poetical temper. Most of his pieces, eclogues, elegies, odes, iambes, are unfinished, but they are enough to make us regret that a premature and violent death should have de¬ prived France of many a masterpiece. Deli¬ cate harmony, sincerity of emotion, seriousness, and, toward the end, fiery indignation, such are the qualities which more than suffice to give Chenier a place of honor in the front ranks of French lyric poets.

After 1789 the upheaval which upset the governmental machinery of France gave rise to a new ^genre,® viz., political eloquence. To tell the truth, such men as Mounier, Maury, Sieyes, Vergniaud, Robespierre belong to history rather than to literature. But an exception must be made for Mirabeau (1749-91), not a very honor¬ able character, but surely a most powerful speaker who had perfected by study his natural gifts as an orator. His 150 discourses make a deep impression even now and we cannot help being carried away by that impetuous torrent, and under the spell of that mighty voice we forget the many defects which a methodical analysis would reveal.

And now the stage is set for the most ex¬ traordinary drama of modern times ; a new spirit is slowly born, or rather it is an alto¬ gether new world that comes into being, and with it new modes of thought, which will com¬ pletely renovate French literature. For bibli¬ ography see following article.

F. Drouet, C.M.,

Professor of Ecclesiastical History, Niagara

U niversity.

15. FRENCH LITERATURE. 19th Cen¬ tury and Contemporary Period. — Life is rhythm and movement.

It advances in waves. The centuries dash to a flood-climax with ebb and flow. Human thought, as expressed in literature, follows this law. The year 1800, from this point of view, represents a climax achieved ; a new departure. Aristocracy no longer existed. Henceforth the people were the dominant factor. Their voice commenced to be heard, their grievances were championed in the press. But in such an innovation entail¬ ing a proper preparation and a certain culture the masses were as yet but amateurs translat¬ ing their thoughts into phrases lightly copied from the works of the orators of the old Roman epoch. It was the beginning of a jour¬ nalism emanating from a gossip loving public and disseminated through the medium of pam¬ phlets of a semi-serious and trivial character. They monopolized the power of the old aris¬ tocracy and substituted the judgment of the people for that of the elite. Accordingly, in 1800, Bonaparte having pacified the intellec¬ tuals, dissipated and defined the revolutionary formulae, one awaited for a new style to be launched from the residue of so much chaos. Now from out the soil of France is perceived

the growth of a mighty tree the roots of which deeply embedded bloom fcrth into powerful branches rising majestically as an emblem in the land. In this way is pictured the intellec¬ tual vitality of the country. At the root of this tree is seen a genius serving both as a solid fink to tradition and a bold forerunner of the future. That genius is Chateaubriand.

Chateaubriand was to dominate the century. His mind stimulated it. Through him sprang up all those currents of ideas, all those modifi¬ cations of rhythms. His satellites whatever their qualifications merely followed in his foot¬ steps. He was born at Saint Malo at a time when the old regime was toppling, but not too late for him to comprehend it. He was of noble birth and of refined upbringing. The aristocratic blood in his veins was the basis of his genius, entirely dominating his

mind. Born by the seaside in country adjacent to wild land his infancy was spent in solitary roaming, re¬ turning timidly to the famous Chateau de Com- bourg where the figure of a maniacal father was apt to create a mysterious and gloomy atmosphere. His education corrected and com¬ pleted his birth, his was a domineering mind as it was imaginative. For these two reasons he found himself solitary and realized that the only remedy was escape and travel. He en¬ larged his mind by voyages to America, visit¬ ing Niagara and Florida, returning from these countries with ineffaceable memories. Through intimate contact with the growing republic of the United States his political conceptions be¬ came modified. The life led by the savages of Ohio showed him a simplified humanity. He quite understood the events which recalled him to France. He took side with those of his caste as a matter of Hionor® ; though his sym¬ pathies were with the newcomers. He could feel that the cause for which he was fighting was a forlorn one. The day of Royalty was past. With the fall of the Bourbons he read the sign of the times resulting in the probable downfall of all the thrones of Europe. This idea obsessed him, making him highly melan¬ choly, and consumed with a feverish curiosity. He has revealed to us this dual sentiment, with which is intermingled a superior scepticism and an irony which shield him. He was solitary, egoistic, independent — a lover of self. He was devoted but knew that his devotion was sterile, and practised it merely in an ornamen¬ tal way. He was an observer of people and allowed himself to be observed. His memoirs teem with portraits resembling in a remarkable degree those of Saint Simon. He judged events and did more than merely understand them by admitting them ; he concealed his conclusions — we five them in the present times — he was unquestionably a man of the moment, gifted with foresight, to which much of his success was due. He transferred Christianity from an active domain to an artistic realm, realizing that it was the only means of safeguarding and reviving it. He revered antiquity but did not forget to portray for us other beauties; he was the discoverer

of artistic America and all other countries came under his spell. In Chateau¬ briand we have a belated classicist, a budding romanticist, a symbolicist in embryo and even the sophistry of a decadent school. To him is due the nostalgia of foreign words of which

we are not yet cured: Onondagas, Musco- gulyve, — all the nostalgia of unfamiliar rhythms; in his description of the dance of the sup¬ pliants he has reduced to a state of lassi¬ tude the style which Chrysostom calls Athumia or <(manque d'ame.® He has said of himself, <(Je suis un penible songe)) ((

Next to Chateaubriand a name predominates, less great assuredly, but one nevertheless of surprising brilliancy : Madame de Stael. Like him she was an aristocrat by birth and repub¬ lican by temperament. The French of the Revolutionary period were cosmopolitan in theory while she was in practice. Madame de Stael possessed the European mind and to her we owe the denationalization of our intellects, the curiosity for penetrating beyond our front¬ iers. Born of Swiss parents she inherited this inclination to cosmopolitism. As an exile she lived at Coppet where she received people from all countries. Expelled from this refuge she traveled throughout Europe, understood it and did her best to make it understood. Like Chateaubriand she extended the boundaries of our comprehension. But she was not an artist, her sphere was intelligence. She described but did not suggest. Her book on Germany, great and beautiful, acquainted us with her intellect, her inner mind, her morals. As she progressed she created romantic criticism. Her mind was critical rather than national. She read every¬ thing, wrote of everything, argued on every¬ thing. A highly strung and elated being she was a clear and ingenious, not a great writer. Connected with her name was one both dear and fatal — Benjamin Constant. Their quar¬ rels, which made diverting

reading in their days, only interest us by reason of the works which they bequeathed. Their passion was beauteous inasmuch as it was creative. Ben¬ jamin Constant was an orator, but words after all are mere flights of speech and a political career is an ever changing regime. He was his own executioner as well as that of his be¬ loved ; one work alone lives, a book of knowl¬ edge and deep thought (Adolphe^ It was a masterpiece of acute analysis, of melancholic irony, of clear composition. This little ro¬ mance made its appearance at the very begin¬ ning of the period of Romanticism like a de¬ fiant note or a wager, which moreover it won inasmuch as the book lives to-day whereas so many other dull and heavy works of the time have sunk into oblivion. Before touching upon the Romantic period we should not over¬ look a few litterateurs, a portion of whose works, aside from party polemics, speak more than volumes. Let us cite Joseph de Maistre, stoical and poor, cornerstone as it were of a structure swept by the sea. He disowned all that the 18th century created. He combated the new ideas already tried and proved suc¬ cessful. The passion of unity animates him,

he hates whatever separates and dissociates. To his somewhat puerile vehemences scanty thought would be paid were it not for their almost perfect conception. His (Nights of Saint Petersburg) charm us provided that we discard all reference to the political aspect. In Paul Louis Courrier we have a democrat of a strange turn of mind; a rugged artist, liberal, Voltarian. He also dabbled in politics, but his great talents as a writer mark with im¬ mortal beauty the temporary passion which agitated him. His writings live despite their now antiquated subjects. His dialogues con¬ jure up the picture of a wealthy Roman liv¬ ing in his villa enamored of his library and landscape. Lamennais became embroiled in other quarrels : episcopal contests and a bitter fight with deism and Christianity. What re¬ mained to him? Time aiding we see the tri¬ umph of something which our ancestors be¬ lieved to have killed forever. Art alone is immortal. In his 'Paroles d'un croyantP a

work of an apocalyptical order in versicle form, by turns violent and tender, gloomy and serene, no doctrine is formulated but we have evidence of a large and generous mind, one tender, re¬ bellious, graphic, poetical. The work is soberly and powerfully written. Lamennais will live as he was essentially a creator of symbols. J. P. Proudhon also, will live, not so much on ac¬ count of the vehemence of his democratic dia¬ tribes but as a writer of nature ; for instance, when bearing in mind that part of his boy¬ hood spent as a shepherd he narrates in fresh and vigorous terms his first emotions. Royer- Collard Guizot, Thiers, retain our attention although they touch too deeply on politics to allow of an exclusive literary study.

Compared to them Victor Cousin is more eclectic. A philosopher of the bourgeois class, guardian of propriety, of religion, of property, he wrote voluptuous pages on the women of the Fronde period which endear him to us. It was he who discovered the precious text of the (Pensees de Pascal. •*

Romanticism. — We have now reached the great evolution of the century — the advent of Romanticism. The change was not a sudden movement ; it had been prepared, its nature de¬ fined and its introduction duly announced. It might be said that it existed in embryo and had even taken shape in the works of the past masters, but certain it is that humankind as portrayed by literature is ever the same. The same potentials exist ready to be exercised as circumstances permit. A high order of genius always leads the way for others to follow. We witness the birth of a new school called Ro¬ manticism, an intellectual crisis following closely on the Revolutionary crisis. Chateau¬ briand was its leader and foreign influences aided its development. The great Breton bor¬ rowed ideas from the foremost English classics: Byron, Walter Scott and Wordsworth; Ma¬ dame de Stael introduced the German school with Schiller and the Italian with Manzoni. What after all is meant by Romanticism? It is giving the reins, so to speak, to lyricism, the expression of integral individuality. By dwell¬ ing on its more

pathetic side and exaggerating it to a veritable paroxysm, the poet voices human thought. Disdaining method and logic it follows instinct without restraint. Disdaining

a limited style the poem becomes a dis¬ course, the theatre a witness box and history a poem. The traditions of the past are severed, but only the traditions, as the substance matter remains. In Racine was inherent all the de¬ generacy of the! Romantic writers. Phedre closely resembles Rene. But Phedre's manner of expression is different to that of Rene: The mode is the expression which varies its color to renovate our sensations. At this time appear the first works of the romantic style : (Les Messeniennes) by Casimir Delavigne,

Romantic Poetry. — Victor Hugo played the leading role in this symbolical romanticism, the origin of which can be traced to Chateau¬ briand. To practically the whole world Victor Hugo is the poet par excellence. As a matter of fact he was the outstanding figure of the century which he fascinated with his vocabu¬ lary. Is his life's work a wonderful example of French genius or a mere construction of propositions? Both, but in distinct parts. Hugo was proud, adroit, not particularly sensi¬ tive, and wished to occupy the foremost place while encroaching on all branches of literature. Living a secluded and bourgeois life his aim was to be the master thought of a perturbed century. He discussed the pros and cons of the great problems of the day and rubbed shoulders with the leading journalists. In the role of a prophet he was apt to exaggerate and distort. That which Chateaubriand had indi¬ cated he approved, overlooking the fact that a verity ceases to be such once it is an open secret. He was dazzling and disconcerting but he molded new ideas. He exploited every¬ thing: his sufferings, his pleasures, his exile. He was not exactly tender although he knew the language of tenderness. He was

not brave but liked to strike heroic attitudes. He was a humanitarian because he saw in it the great vogue of the century. He had the mind of a showman, possessed little witty intellect and no sense whatever of moderation. He was quite serenely extravagant, ridiculously vain, merely

mediocre — in a word, small. Such was Victor Hugo, but such also is the power of words that this strangely composed mind was able to manipulate them in a wonderfully dexterous manner. Open at random any of his volumes in verse: (Les ChatimentsP (Les Feuilles d'Automne,* (Les Contemplations) and one cannot but be enthralled by the majestic tone of such wildly passionate rhythms.

Lamartine was a great and sympathetic figure who inherited from Chateaubriand an infinite tenderness, an entrancing melodious¬ ness. Of gentle birth, he had a happy boyhood and knew an ephemeral love cut short by premature death. We have an insight of his life and character in his (Meditations. } The title itself is an index to his nature. He was vague, uncertain, rhythmical. The soul of this poet beautiful and compassionate is compar¬ able to the nerveless somnolence of a light hearted child. No fixed picture, no precise fact. Read

of an infinite sadness which leave a deep impression on the reader. Mention should also be made of Beranger with his rather vulgar sentimentality; his works, though catching the fancy of the average reader, are only of medi¬ ocre quality. These are the principal names which have survived the times.

Romantic Theatre. — The romantic theatre possessed the qualities and defects common to the epoch. Neither rules nor limits were ob¬ served. In order to understand it thoroughly it is necessary to determine what it actually was and what it desired to be. It was melo¬ drama in verse. It was a crisis

and not a conflict. It was more a prodigal use of words than the analysis of an evil. It pretended to be symbolical and to comprise in a single type the character of a caste, of an epoch. Philo¬ sophical abstraction, a definition of morality, degradation of the races, servitude personifying fatality, sovereignty personifying Providence. No psychology, an excessive simplification swelled by false erudition and local color, one gigantic salmagundi where we are shown man, reality, fiction, nature, the king, the pauper, the buffoon. Such was Hugo's theatre in its numerous and tumultuous dramas, alone saved by its wonderfully lofty tone. He formu¬ lated his curious ideal in the preface to 'Marie Tudor.) The theatre was to consist of laugh¬ ter, tears, the good and the bad, the high and the low, fatality, Providence, genius, chance, society, the world nature, life. Casimir Dela- vigne, who followed this style but with infin¬ itely less genius, exposed all the defects of the innovation while making no allowance for its qualities. Ponsard in prose followed in a similar strain. A saving clause existed for Alexandre Dumas the elder by virtue of his prodigious imagination. His 25 volumes de¬ voted to the theatre are an orgy of local color wherein we witness the play of bourgeois pas¬ sions, personal ambition and vested interests. Here are exposed necromancy, imprecations, acrobatics, duelling — it was just one multiplic¬ ity of drawn swords, not however without its amusing side. Alfred de Vigny bestowed on his theatre the charming qualities of his poems ; while conserving the romantic spirit he pos¬ sessed a sobriety of style and means which saved him. He was primarily a student of souls and not situations as is borne out in his masterpiece 'Chatterton.5 Musset displays in his theatre an impressive and elaborate imagina¬ tion. His was the art of creating a plot with a sad or joyous note in which personality alone is expressed. Besides its tragedies, Romanti¬ cism possessed its comedies, of which Scribe was the ideal author. During 50 years he supplied the pleasure-loving public with that for which it clamored. His plays were well constructed, clear, and above all had a happy ending; they might

be likened to puppets with¬ out a soul, as witness his masterpiece 'Bataille de dames.)

The Romantic Novel. — A curious con¬ dition during this feverish period was, that men tried their skill at the divers branches of literary art without confining themselves to a single effort. Literature was not parceled out or apportioned. As has been seen, quite a number of poets were dramatists, and we shall further see that many were novelists. Victor

Hugo who at first was an apostle and reformer gave in (Les Miserables, 'Travailleurs de la mer, 5 'Han d'Islande,* and others, a formidable example of his humanitarian declamations and violent antitheses. But here again as in his other works brilliant pages stand out, discon¬ certing and enchanting. Vigny gave us*

Rouge et le Noir is a character study of am¬ bition on a grandiloquent scale. The genius of Merimee pales beside that of Stendhal. He was studious, composed, intelligent, classical, concise and simple. He possessed one really great gift : writing chapters with material which served his contemporaries for books. A great lesson to be learnt! Next to these two cold personalities we have Honore de Balzac of a highly complex character. An undisputed artist, if coarse, heavy and indifferent. His works are powerful, inflated, commonplace. That which is, becomes diminished by what he believes it to be. Like Hugo and the elder Dumas he aimed at being a reformer, a great thinker. His real sphere lay in the portrayal of characters drawn from the bourgeois and laboring class. He sketched his characters from life, depicting them with remarkable dexterity. He had a particular penchant for mania, especially that mania which upsets and divides families. We have avarice in Grandet, debauch in Hulot, jealousy in cousin Betty. His great skill lay*

in holding the attention of the reader without relying solely on the love episode to retain it. He took advantage of all the tricks of the trade of his profession when weaving his plots. He was a bibliopolist and as such analyzed the habits and customs of the people. He is romantic in his portrayal of life and a realist by the wealth of detail with which he depicts it. If we compare his commonplace and precocious works to those of Barbey d'Aurevilly we shall better appreciate the latter. He was complex and belated, a mixture of mysticism and eccentricity. He was, however, a talented writer and his (Diaboli- ques,* (Chevalier des Touches) and (Double Maitresse) rank among the finest of the roman¬ tic works. On the threshold of militant ro¬ manticism appear the two touching figures of Maurice and Eugenie de Guerin. They belong to their epoch by reason of their dolorous life to which, moreover, too much prominence has been given. Maurice only lived to write two masterpieces — (Le Centaure) and (La Bac- chante) — before meeting a premature death. It was sufficient, however, to immortalize his name. The question arises had he been spared would he have written more, would he have done better? More undoubtedly, better no. These two poems in prose attain an unpre¬ cedented beauty by their construction and sym¬ bolization. Eugenie was more tumultuous than her brother and we find in her work the beating of a heart covetous and deceitful, the raptures of a soul enamored with nature and grandeur. Mention should also be made of Gerard de Nerval — so unaffectedly French in his modern idyls. To terminate the list we have Saint-Beuve of a restless and pleasing disposition. Not a particularly good poet and only a medium novelist as is proved by his*

mysterious forces of the period. A great thinker and a spirited writer it cannot be denied that he made his influence felt on the epoch. He has bequeathed to us delightful characters and dramatic episodes depicted with a genius peculiarly his own. This called for a historical and religious style of which the au¬ thor of (Volupte) alone was capable.

Romantic Historians. — Of the Romantic historians the reputations of three have lived to our days : Augustin Thierry, whose Mero¬ vingian tales resemble an epic poem, Guizot who collected and condensed the efforts of his pre¬ decessors, and Michelet, the great evocator of the past, the enchanter of revolutionized times. Michelet introduced science into his poesy to the advantage of the latter. He showed us a France personified struggling to be herself, in other words, a nation free and generous, a champion of civilization and justice. He was of the people, of a fanciful dreamy disposition. He set up a standard which overwhelms us by its grandeur. No one understood better than he the occult forces of life and the certain emancipation of a struggling humanity.

The Parnassians. — After so much ex¬ uberant clamor it was only to be expected that a new generation would arise diametrically opposed to the preceding one, denying what the other had affirmed and searching new formulae: the Parnassians and the Naturalists. They were a class of impressionists and pessi¬ mists, of great probity of style, a scorn for the oratory element and an unique preoccupation for the plastic in the hope of its complete realization. Their aim was to discern and to discern -clearly, dispel mystery and venture on the unsightly with the idea of discovering, alas ! the general law of life. All honor to the Parnassian poets. Their master was Lecomte de Lisle, a splendid figure — distinterested and lonely. From all his sorrows were hidden, none will ever know his passions. He vested them with pompous names borrowed from the legends of the Indian, Biblical, Polynesian, Scandinavian, Celtic, German and Christian nations. He was an erudite, a thinker, a nihilist, a despairing voice crying in the wilder¬ ness. A portrayer greater than Theophile Gautier he was a virtuoso of lyricism on a par with Victor Hugo. His work is beautiful, com¬ parable to the porch of a tabernacle resplendent with transient rays. Sully-Prudhomme in com¬ parison to him is more gentle, tender. His note rang false when he introduced science and declamatory effects into his

poesy. His sad¬ ness alone plays on our emotion, while we re¬ spect his unembittered resignation. Frangois Coppee had a liking for the humble. But more than the humble did he love the afflicted. By afflicted is meant in this sense those frail be¬ ings more miserable than unfortunate by force of circumstances. His style is limited and replete with artifice. His work is prosaic. Theodore de Banville is the acrobat of the group. Uncommonly skilful he manipulated rhythm as a juggler plays his puppets. He was. more of a versifier than a poet proper but was gifted with great talents and possessed a keen mind. Jose Maria de Heredia is by excellence the maker of sonnets, H;is

tain a wealth of detail which creates the at¬ mosphere, a precision of tone which denounces the soul — an exact composition of impeccable architecture. The merit of Catulle Mendes lay more in his literary proselytism than in the university of his gifts which impoverished them. A contributor to reviews, poet, dramatist and novelist, he employed in his works the tone of the different people he admired. His reflections are of a remarkably high order. Jean Richepin was verbose after the style of Hugo. In his (Chanson des Gueux) he wanted us to believe that he was of an independent school which was, however, far from the case. Charles Morice has summed up in a few well-chosen words Richepin's undoubted but limited talent: ((Vous faites l'ecole normale buisson- niere . . . normale tout de meme.® (You play the truant normal school, , . . normal

just the same).

In naming Charles Baudelaire next it must not be supposed that he ranked after the others, on the contrary he merits a place apart. As a matter of fact Baudelaire would appear to rank as the most important author of the group. His genius was

exclusive, and its influence and brilliancy increased with time. An artist power¬ ful and severe his exaggerated sensibility vi¬ brated through everything he touched. He expressed himself in nuances and half tones with a precision as bold as it was disturbing. His (Fleurs du MaP will ever remain immortal as the eternal chant of a body preparing for death. His evocatory prose is one of the most powerful of which we know ; his criticism of a calculated and intelligent frigidity. He discon¬ certed his contemporaries but we to-day know him better — he is part of to-morrow — of all time. Let us conclude with Leon Merat and Dierx whose

Naturalism. — It will be remembered when speaking of the advent of Parnassianism that mention was also made of Naturalism. A new order of things was to prevail. Scientific posi¬ tivism was to domineer Faith ; material inter¬ ests, moral interests. The leaders were Louis Veuillot, journalist (Catholic notwithstanding), who was vehement and impassionate ; Prevost- Paradol, a haughty ironist; Jules Favre Thiers, Gambetta, and above all Hippolyte Taine, whose influence determined the movement. He was the theorist of naturalism. He reduced the mind to a stream and group of sensations and impulsions, of nervous vibrations. His science was the choice of small important facts, sig¬ nificative, minutely chronicled and dexterously arranged. He restored idea to practice and practice to sensation. For him sensation and movement were the conception of the physical universe. Before his time it was Antoine de la Salle, a friend of Heraut de Seychelles who said (

imagination. With him, dominating the move¬ ment although taking no active part, but sympa¬ thizing with it, was Renan, who applied the same relentless methods to the exegesis, the analysis, the criticism of religion. Nevertheless his charm, grace and imagination beguile us. He was an acrobat of the mind with a smiling philosophy and a sweet inflexibility. His dual culture, laic and religious, aptly fitted him to discourse on incredulity. Desiring the truth in religion, persuaded he could

no longer believe in its modern presentation, he outlined its numerous phases, but claimed for his conclu¬ sions only a relative certitude. A represen¬ tative artist, he is a symbolical figure after the manner of Socrates.

Romanciers of the Naturalist School. —

Succeeding these leaders we have the younger school : Edmond About, an epicurean whose works, mirthful but not hilarious, artfully con¬ ceal much of the scepticism they contain. Fromentin was of a double personality. Painter and traveler, he has left us in his (Maitres d'autrefois> precious pen pictures of the artists of the North. Novelist at times, he has given us in (Dominique) one of the finest romances of the century. It was an auto¬ biography like

Esseintes, his heroes, his minute analysis of architectural structures, and especially cathedral windows, his horrifying description of the suf¬ ferings of Lydwine, all go to affirm a powerful and rugged mind eminently evocative. Remote from party strife and quarrels lived Gustave Flaubert, the least literary of the group, but a noble and upright figure. How masterfully he showed up the shallowness and hypocrisy of the period and the disgust with which they in¬ spired him. This accomplished he turned his attention to the eternal topic — the real intellec¬ tual drama — that which makes man struggle with the sentiment of the infinite. . . . Hero- dias has the intuition of it before the weak vo- ciferator Antoine in the desert ; Bovary, in love. Flaubert's prose is sumptuous and sober, lyrical and comprehensive. His pupil and only dis¬ ciple was Guy de Maupassant, and he deviated from the principle. His art is direct but he applies it to develop everyday occurrences to suit dramatic situations without intellectual ele¬ vation. Sho.uld mention be made in this cate¬ gory of Jules Verne, the friend of youth, the amazing and profuse storyteller who*

was so imaginative and prophetical? We witness to¬ day the realization of his vivid imagination. His genius consisted in gripping the reader's attention and of skilfully handling entangled situations. Octave Feuillet, aristocrat and ro- mancier, created conventional types, non-exist¬ ent to-day, but which like Balzac's characters present a documentary interest.

The Naturalist Theatre. — It is a matter of discussion as to who instituted the Natural¬ ist theatre. The works are no longer poetical melodramas, but according to Emile Augier and Dumas, the younger, consist in a minute and merciless study of the bourgeois class strug¬ gling against the prejudices and barriers formed by caste. It is the aristocrat unmasked, the rehabilitation of the courtesan, the effervescence of the under world. It is a theatre somewhat poor inasmuch as it depicts uniquely an epoch and not humanity. It contains, however, many cleverly devised scenes and carefully handled situations. Sardou was likewise an adept in creating theatrical sensations, while his really clever historical adaptations amuse without greatly affecting us. He was the popular en¬ tertainer of the day, and we are grateful to him as well as to Scribe, who provided the century with mirthful comedies always acceptable.

The Parnassian Theatre. — The Parnas¬ sians had two great representatives for their theatre: Henri de Bornier, with (Fille de Ro¬ land,) and Edmond Rostand, an imitator of Hugo on a less pretentious scale and of de Ban- ville with less taste. He wrote the word finis to the romanticism-parnassian school, his enor¬ mous success, (Cyrano de Bergerac, J supplying the Hast rocket of the great firework display^ of the century. Miguel Zamacois and Rene Fauchois, Jacques Richepin, Andre Rivoire, Francis de Croinet follow and gather here and there a few sheaves dropped by these two gleaners.

Neo-Realists. — We are now fast approach¬ ing our own davs. Many of the writers cited hereafter are still alive playing an active part in literature,

while others have but recently died. The tree has grown and its branches have ramified, losing their vigor. The schools

are less determined, the parties less opposed. Effort has been made to classify them with as much clearness as possible by making the most representative names stand out from the long list at our disposal. Let us begin with the Neo- Realists, direct followers of the Naturalists. Arriving on the scene at a time when the latter were beginning to lose their novelty, they modi¬ fied their formulae. We find amongst this group Octave Mirbeau, passionately fond of art like the de Goncourts ; he is the celebrated author of (Journal d'une femme de chambre) and (Jardin des sup¬ plies, } which allies him to Huysmans — misan¬ throp and terse — a really remarkable writer. Next is Rosny with prehistoric evocation, both romantic and scientific — a very interesting figure. Edouard Rodzuise of a loyal mind, bourgeois instinct and strongly dogmatical ideas was a clever novelist. Paul Marguerite was less original but more representative of his epoch. He was bold enough to write (Le De- sastre, a minute and circumstantial description of defeat, which, with Zola's (Debacle^ make the most humiliating confession of French national faults and their ransom. As a relief from these gloomy forebodings it is a pleasure to turn to Abel Hermant, the large-minded Parisian, with a sense of keen observation and a bantering disposition. Rightly and soundly does he tear the mask from that cosmopolitan pedantism and all those Hsms® tending to inflate bom¬ bastically society in general. His is the true French mind, his language the language of the Gauls. Franc-Nohain, more eccentric, more chimerical, is also agreeable to us for similar reasons of bantering and jesting, if at times he is a little spiteful. Assuredly less easily read but of wider scope is Paul Adam. Aristocrat, with an exuberant mind, learned and laborious, he possesses a style eminently personal and evocative. His elliptical turns, powerful epi¬ tomes and delightful choice of words all com¬ bine to make a descriptive*

whole of the highest quality. He handles the crowd and raises above it self-willed figures of a moral and lofty mind pregnant with high ideals and of comforting solace. He wanted to comprise the entire earth in his works : he has shown us the Byzan¬ tine world, the American world, the African world, the Napoleonic epopee. But he reduces with justness all things to the unity of that thought and sentiment which guides humanity in its perpetual transition. His works are sub¬ lime, containing some of the finest passages of literature of our epoch. Paul Adam is the chronicler of the modern worlds, Maurice Maindron the episodic historian of the ancient. His preference is for the 16th century. (Saint Cendre) and (Blancador> are imperishablq types of intrepid adventurers who move in surround¬ ings which only a connoisseur and consummate artist could choose.

The Psychological School. — The authors of this school display a realism active in a superior domain : that of the soul. The fore¬ most place is held by Anatole France. Posses¬ sor of a refined mind, an erudite, a charmer, an ardent if discreet bibliophile, we wander with him from Alexandria to the Rue Saint Jacques, from Paris to Florence. He 'believes in nothing and takes umbrage at everything, but pleasingly

so. He carries on, so to speak, the work of Voltaire, Montaigne and Renan. Jules Le- maitre in his criticisms displays a similar state of mind, not forgetting that he was once a poet. His sharp raillery, keen sense of justice and consummate tact make of him a discreet judge who leads us gently into the confines of the soul. Paul Hervieu has drunk at the same source. An analyst of abstract problems, a mor¬ bid intellectual, he possesses qualities of pene¬ tration and finesse which temper the portrayal of the elegances of Parisian society. Amiel alone is recognized by us as a man of letters ; his unique book is his (Journal,) a monumental and

analytical work redoubtable in its confes¬ sion of daily impotence. Nothing makes more poignant reading than this, nothing more in¬ vigorating by reaction. In addition to this he possessed a sure and incisive style which tend to render even more precious the psycho¬ logical discoveries practised on his own mind. Maurice Barres is our great living writer. Moral artist, man of action, he combines two distinct minds. Far from deploring this he re¬ joices in it, using it to his advantage. Ironical, he was the witness of our anarchy, irritable and intriguing, he endeavors above all to improve his mind. Is he an egoist? Rather an egotist. The egoist's dictum is self, its primary and sole aim. The egotist's dictum is also self, but as a field of experience. It is the sounding of one's nature until one has discovered the inexhausti¬ ble well for sustenance. Barres is a disciple of Chateaubriand, inheriting from him the mania of frequenting exclusive circles for the better playing of an active part in great events. He has inherited also his indeterminate reveries, his pointed pungency as a portrait painter, his sense of religion, which is more esthetic than moral. The charm of his style may lie in the fact that it is slightly more vigorous than Chateaubriand's and brisker. He is like unto music. To him we are indebted for an awaken¬ ing of energy and action. He inspires multi¬ tudes with a spirit of activity, to accomplish something, to assert self. His style is the antithesis of that of Madame de Stael. She opened the doors to foreign influence — he closed them. To him we owe those long unsel¬ fish poems, (Du sang, de la volupte, de la mortC where in harmonious stanzas he analyzes the fragrance of the Lombardian gardens, the autumnal seasons of Parme, Grenada, Venice. Let us retain his advice, so rich in thought, (Chacun doit cultiver son souvenir.) Charles Maurras is his political parent. Writer on a less grandiose scale he likewise invited his disciples to a revival of tradition, of energy and high spiritedness. His role was immense and we can appreciate to-day at its value the debt we owe him. Leon Daudet is his Seid. He is painfully realistic in some of his works dealing with the

moral evils of the day, but loves also to plunge headlong into political proselytism. Paul Bourget is less conspicuous and more bourgeois. He is the woman's novelist, whom he endeavors to flatter in the matter of gossip. He interests himself in lost causes. He seeks, and what is more strange discovers, a set of rules governing life for the use of the countess and marchioness. He is extraordinarily popular with a certain class of readers. Of a similar style is Marcel Prevost, who specializes in the study of the eternal feminine. Of a lighter

vein, however, and with no pretense at brag¬ ging, he alleviates the science of the heart by ingenious intrigues which are highly captivating. Andre Beaunier, a pupil of the normal school, the impression of which he has not been able to shake off, possesses none the less a curious mind, coupled with an incisive style, infinitely pleasing if tortuous. Romain-Rolland is the author of (Jean Christopher He has set the reader a heavy task; the style is heavy and it becomes quite an undertaking to distinguish the ridiculous from the sublime. Lucien Muehfeld died prematurely. His mind was full of prom¬ ise and his style subtle and refined.

Colette Yver and Marcelle Tinayre have left their mark on the psychological novel. The first mentioned has recorded the sentimental deviations caused by the social obligations of the woman. It is permissible to reproach her with a narrow-mindedness of ideas the more culpable at the present time when the question of feminism is not one of discussion but of organization. Charles Henry Hirsch is a satel¬ lite of Zola and an original character. He paid perhaps too much attention to the feuilleton and his books are too long. He is a vigorous and honest writer who has not said his last word. Henri Duvernois is perfect in his light ro¬ mances, resembling those of Hermant. Claude Farrere is our story teller. He commenced with material obtained from opium dreaming and ended by attaining the precision of a Mau¬ passant. This is a pity. His interior vision is more captivating than his

observations. This, however, is purely a personal opinion. His un¬ doubted talent is beyond dispute. Leon Frapie is the friend of the children. Jerome and Jean Tharaud are the most promising writers of the coming generation. Their work, at the present moment, is of a noble, determined, independent, sure style, approaching that of Flaubert.

One of the greatest of contemporary names has been reserved for the last — Jules Renard. He is classical, psychological, realist, a poet in the noblest sense of the word. He chooses with subtle and sure art and defines with the preci¬ sion of a mathematician. The sonority of his words is such that they sink into our mind and enthral us more than poems. His characters, Poil de Carotte — distressed youth — Ragotte — old age resigned — are imperishable types of touching humanity depicted with terrible reality. Renard is a lonely soul, a misanthrope, pos¬ sessing a style of his own. Charles Louis Philippe relates in an all too brief work the story of his unhappy life. Jules Dolent, realist, haughty, younger brother of Renard, is like him, pitilessly ironical. Wrongly understood, he will in time affirm himself, and his works will play a preponderating role. Aurel is a dis¬ ciple of Dolent. His complicated style is preju¬ dicial to the harmony of his train of thought. But his mind is so original that it is able to make and even to sustain the effort.

Psychological Critics.— These are four in number, of unequal merit but all strongly im¬ pregnated with the psychological mind. Sarcey may perhaps be considered a little too super¬ ficial ; Brunetiere too heavy; Emile Faguet and Rene Doumic are <(tres universitaireT

Artists. — Another school arose out of Naturalism and more directly from the de Gon- courts: this was styled the Artists. A primary homage is due to Peladan whose archaic science

and sense of the mysterious has not been suffi¬ ciently recognized. Esthetic artist, erudite, a perfect stylist, his criticisms and novels are of the finest quality. Jean Lorrain possessed the dilatory methods and broad mind of a great man of letters. He wrote with delightful har¬ mony (Princesse d'Ivoire et d'lvresse.5 He showed himself perverse in (Monsieur de Phocas5 and terribly realist in his tales. He embellished by the color and rhythm of his style the most impenetrable secrets of our heart.

Pierre Loti has played a large part in litera¬ ture. He has taken but a small note from the magnificent orchestra of Chateaubriand, a note forever monotonous, modulated endlessly on the eternal theme of the tomb. He gives the impression of an ever-swaying mind, or meta¬ phorically speaking as a sailor on the ship of life tossed perpetually on the rough sea. A great and . enchanting poet. Pierre Louys is a favorite with the public, a cultured and finished artist. A Greek and Latin scholar in addition to an admirable French litterateur his works are valuable and will assuredly live. For a better understanding those writers have been grouped who have specialized in the description of the sites of France and to whom we are grateful for giving us an insight into such de¬ lightful nooks. They are named in the order of ancient to modern: Ferdinand Fabre has given us delightful pictures of the southern Cevennes ; Emile Pavilion has depicted the land¬ scape of Languedoc ; Andre Theuriet has por¬ trayed for us — in somewhat puerile fashion — the Champagne and Touraine country; Rene Bazin, Angoumois and Poitou. Anatole Le Braz was a lover of Brittany. We must cer¬ tainly not overlook Jean de Bonnefon, a great artist but unfortunately somewhat bitter in the use of a mind which does not lack quality. There is finally Colette (Colette Willy), per¬ versely sentimental in her

Realistic and Psychological Theatre. — These playwrights have been grouped like the writers in

order to be better able to distinguish the ideas separating them. As continuation of Emile Augier and Dumas we will cite Emile Fabre, the animator of the proletarian masses, and Brieux with his risky subjects, medical or social, somewhat tardy but vigorous. Alfred Capus, Maurice Donnay, Paul Hervieu, Henri Becque and above all Porto-Riche are merely haunted by the amorous and the sentimental. Francois de Curel complicates his works by a predilection for individualism. He, however, is responsible for quite original characters which give an interest to his theatre and raise it to a higher level. Henri Bernstein is still more fearless. He attacks, like Fabre but more forcibly so, the terrible scourge of the hour : Money. He presents this scourge in all phases and gives us a terribly realistic vision of incon¬ testable grandeur. The psychological theatre is endowed with two famous names, Courteline and Tristan Bernard. Their keen and un¬ erring spirit of observation, coupled with a sense of the humerous not devoid of gall, have made them writers as well as dramatists, their works classics as well as modern. Their crea¬ tions, drawn to life, are on a level with an Alceste or a Tartuffe and rank perhaps as authoritative. Sacha Guitry follows in their footsteps while limiting the scope of. his obser¬

vations to the shallow and make believe which were so deplorably prevalent before we were all tried in the fire by the present world crisis. Henri Bataille's theatre is a compromise be¬ tween pure art and worldliness in general. He is at times superbly brilliant while at others he lapses into quite incomprehensible triviality not to mention commonplace.

Realist and Psychological Historians. — Following the order of our preceding classifi¬ cation we will now name the historians of the two foregoing groups. Fustel de Coulanges with his (Cite Antique5 and his curious political papers so opportunately republished at the present time ; Ernest Lavisse with his remark¬ ably clear (History of France5 ; Frederic Mas¬ son, a specialist of the Napoleonic

period; Gas¬ ton Boissier, the evocator of the ancient times ; Gerard Lenotre, anecdotal, not always truthful but highly captivating in hitherto unpublished episodes of history; Pierre Nolhac enamored with Versailles and its queen, and Madelin and Andre Fribourg the youngest and already au¬ thorized specialists of the Revolution.

.Symbolism. — We have now reached the last current which has shaken modern sensibil¬ ity; its apparition however was not immediate. Like all modes of emotion and expression it is self-will that dominates mind and sensibility and conditions were not yet favorable for such a complete state. After all symbolism is merely the sign of a synthetic evolution of the race. Poesy is reminded that it once was song. Chateaubriand had announced it, Lamartine had proved it ; it became necessary to formulate its rules. This musicality in the Symbolists was but a tentative construction, a literary process, destined, in their mind, to break the traditional monotony of the French verse; and to register physical sensations rather than to express in¬ telligible ideas. Hence their obscurity. They are impressed by Wagner, governed by Hegel. They are also influenced by the English pre- Raphaelites Burne-Jones, Watts and the poets Swinburne, Meredith and Tennyson. They looked for predecessors in the past masters, as for instance from the charming Maurice Sceve of the 16th century (the symbolists is unquestionably Villiers de l'lsle Adam. He has recreated, for a time, the mind of the elite. His mind tempered with science touches on the abstract. Tourist and poet, he is the author of (Axel,5 (Tribunat Bonhom- met,5 (Akedisseil5 and (L'Eve future,5 all writ¬ ten with the magnificent and sure pen of the master. He has created a type of woman both voluptuous and intellectual preceding those of his epoch and which lay the foundation of a superior feminism. Stephane Mallarme pos¬ sesses an equally noble mind but is less brilliant in execution. He analyzes, punctuates and gives a facet to all his words. He likes them for their possible sense rather than their true sense. Verlaine, in the mask of a

Socrates, is one of the greatest of modern poets. He is an artist by pure instinct. His unexpected brutalities and his grace, his ironical gaiety, his tenderness ex¬ tending to vice— a vice terminating in remorse, are evidences ol an unusual mind. No one has

pleaded more eloquently for the relief of maimed humanity downtrodden by carnal lust. Albert Samain is original and charming, gentle, suave, sincere, the poet of the fair sex. Jean Moreas, Violle Griffen and, above all, Verhaeren, are the enchanting songstresses of restless nature. Henri de Regnier is grand and sad. Paul Claudel disappointing but genial. Andre Gide disquieting and uneasy. Charles Peguy an ardent adherent to the land. Francis Jammes, the monk, and Paul Fort, the trouba¬ dour. Leon Bloy, the theological and Ra- belesian poet ; above all, Remy de Gourmont, whose considerable work and enlightened intel¬ lect apply to all systems ; an admirable writer whose works will surely develop. Andre Suares, an obviously great mind ; Comtesse Mathieu de Noaille, vibrant and thrilling, of an exuberant lyricism greatly captivating; Lucie Delarue Mardrus, more classical, more moderate, less genial; Jeanne d'Orliac, with her multiple and curious essays on the affirmation of a creative and commanding will; Marguerite Bornat Pro- vins, of an amorous lyricism, whose (Livre pour top is the model of a task accomplished. Finally, Charles Demaye and Henri Franck, whose early demise is ever to be regretted. They have both left masterpieces ; the former, (Le Livre du Desir> ; the latter, (La Danse devant 1' Arche. >

Symbolist Theatre. — Claudel is the great

pontiff. His (Annonce faite a Marie, 5 a play in a mysterious vein, is, in its archaic form, a disturbing vision. (L'Otage, } a deeper work, less aesthetic, more closely resembles a superior piece

of realism. Maurice Maeterlinck has en¬ dowed the theatre with that engrossing and always disturbing theme consisting in the por¬ trayal of the mysterious sides and moods of man ; masterpieces indeed are his chaste and profound dramas in which every word tells. Henri Gheon is responsible for (Le Pain, a powerfully-composed work ; and H. R. Lenor- mant writes desponding and disconcerting plays. J. d'Orliac, with 'Pulcinella* and (le Chiffon- nier,* affirms the right of the picturesque and irony in tragedy.*

The Future. — What will be the literary future of France? With the war a generation has died while another is springing up. We have followed the sinuous line of French thought from 1800 to the present time. Born directly after the Revolution it is like that animated with an inspiration of gaiety and is powerful. It feels it has a mission to ac¬ complish, i.e., to bring to humanity — liberty, deliverance. Romanticism clamored for liberty; political errors deceived it, difficulties arose in 1848 continuing to 1870. The war, defeat, humiliation are accepted. A generation then arose, the naturalists, seeing only the gloomier aspect of life, ceding the place later to the symbolists. A reaction finally sets in. Two schools rise in opposition to each other ; on the one hand is Charles Maurras and his followers of the Action Frangaise championing the cause of the royalists, on the other the young school of the Rappel and Foi et Vie favoring the revo¬ lutionary tradition, both ardent and enthusiastic. The present world crisis arrives and unites them in a common ideal, that of showing to the world at large the real role of France which is to save civilization. This is the basis for a new school. Gaston Riou in his magnificent

work (aux ecoutes de la France qui vient> has already formulated it.

Bibliography. — As all the prominent figures in French literature have separate articles de¬ voted to them in these volumes, with bibliogra¬ phies

*appended to each, the reader should refer to these. An excellent ((Systematic Bibliogra- phy** may be found in Wright's, C. H. C., his¬ tory of French Literature) (Oxford and New York 1912). Of special value are the (His- toire de la langue et de la litterature fran¬ gaise* edited by Petit de Julleville (8 vols., Paris 1896-99) ; Lanson's (Histoire de la lit¬ terature frangaise* (ib. 1912) and Lintilhac's (Litterature frangaise* (2 vols.), also his re¬ vision of Merlet's (Etudes litteraires sur les Classiques frangais* (2 vols.). Less accessible is the great (Histoire litteraire de la France> (33 vols., 1733-1898). Brunetiere's valuable (Manual* has been translated into English. Faguet's studies on the writers of the 16th, 17th, 18th and 19th centuries are illuminating. Monographs on a larger scale will be found in the series (Grands ecrivains frangais* and the (Classiques populaires.* The works of Le- maitre, Scherer and Anatole France are es¬ pecially valuable on 19th century literature, while Flint's (The Philosophy of History) (London 1893) is one of the best studies of French historical literature. Of older histories the most scholarly is the (Histoire de la lit¬ terature frangaise* by Desire Nisard (4 vols., Brussels 1879). Dowden, E., (History of French Literature) (London 1911) is instruc¬ tive and contains a bibliography arranged in periods. Among the best works in the English language are also Kastner and Atkins, (Short History of French Literature) (Cambridge 1901) ; Saintsbury, G. E. B., (Short History of French Literature) (London 1889) and War¬ ren, Primer of French Literature) (Boston 1889). See French Dramatic Art.*

Jeanne d'Orliac,

Poet and Dramatic Author; Author of iGrand Blessed

16. FRENCH DRAMATIC ART. Dra¬ matic art occupies one of the foremost places, probably even the first place, in French litera¬ ture.

Evolutions of the French Theatre. — There

are six principal periods in the evolution of the French theatre:

1. The Middle Age. — This was the tentative . and experimental period. Dramatic art was

rudimentary, allegorical and coarsely realistic in general. Despite the number and diversity of its productions it has left no remarkable work of a durable nature.

2. The Renaissance. — From the end of the 15th century to the beginning of the 17th Greco- Latin culture became more widely disseminated and the knowledge of ancient Greek and Roman literature engendered a taste for the classics. We were still in the experimental period, but poetical expression improved and tragedy made its appearance.

3. The Classical Era. — This marked the zenith of dramatic art in France. In it was discovered the mode of expression best harmon¬ izing with the genius of the nation, which ap¬ proached perfection in the great tragedies of Racine and Corneille, and in the foremost comedies of all times, those of Moliere.

4. The Eighteenth Century. — This represent- ed for the theatre, as it did for political and social life, a transitory era. The literary output was poor, tragedy became inextant, comedy was transformed and diversified, and drama first made its appearance.

5. The Romantic Period. — This marked a renaissance in dramatic art which was decidedly brilliant but ephemeral. The theatre became epical, lyrical, even philosophical. The attempt had been a bold one but ended in failure.

6. The Realistic Period. — This dates from the end of the last century and still predomi¬ nates in the

French theatre. The period was characterized by a return to nature, and to the portrayal of contemporary life and customs.

I. The Middle Age.

The French theatre originated from two dis¬ tinct sources and from its inception has been developed in two different directions. 'On the one hand, the religious theatre, with its mirar cles and mysteries, was a natural development of the simple religious ceremonies; while the profane or secular theatre, of more humble origip, found its setting in the farcical exhibi¬ tions at fairs and the vernacular of strolling players.

The Religious Theatre. Origin (from the 5th to 14th Century). — The Church may be re¬ garded as the first theatre. It was the only exhibition offered to the public during the early centuries. In order to attract the people the priests introduced variety into their services. They began by adding to the liturgies certain developments known as tropes (or metaphors). These were followed by religious chants, by psalms, as solos, and then the choir. Finally, for the celebration of religious festivals, sim¬ ple dramas were composed, with a rough stag¬ ing: for instance, at Christmas, the Manger, the Virgin and the Child, the Ass and the Ox, the Three Wise Men of the East; at Easter, the Holy Women at the Tomb of Christ. Emo¬ tion was aroused both of a religious and theat¬ rical nature, by striking the imagination and appealing to the visual as well as the auricular senses.

Up to the 12th century drama was played in churches only, at which time it left them. Devout laymen, organized into a brotherhood, erected a sort of stage on the spaces round the churches, and on the public highway. Compli¬ cated scenery represented at one and the same time Heaven, Earth and Hell. Everything was confused. In the production of (Adam > there parade, in turn, God in a long white cloak, Adam in a red tunic, Eve in a white robe. Then we have Satan and the demons and the prophets of

Israel. In the 13th century, Jean Bodel produced at Arras the (Jeu de Saint Nicolas,* wherein a crusade is presented. We are transported successively from a Turkish palace to a Picardy tavern, from a battlefield in Palestine to a common prison. No distinc¬ tion is made either in epochs or customs. Tragedy intermingles with comedy, and the purse-snatchers of the Rue Vide Gousset rub shoulders with the Mohammedan.

These crude plays were followed in the 14th century by the ^MiracleP This was a complete and lengthy drama which owed its title to the fact that the denouement always lay in the

miraculous intervention either on the part of a Saint, of God, or more particularly, the Holy Virgin, the latter appealing to popular imagi¬ nation. There was much scenery, the plot was complicated and called for a large number of executants.

There exist 40 (Miracles de Notre Dame.* They are complete plays, fairly well arranged and containing not more than 1,000 to 3,000 verses. They ignore both unity of time and unity of place, but they do observe unity of action. The dramatic interest is generally sus¬ tained.

Les Misteres.* (15th and 16th Century). — The same thing cannot be said of mysteres, or more correctly misteres (from ministerium, sig¬ nifying action, drama, and not musterion, a mysterious thing). These are works of exag¬ gerated length, many parts of which have little apparent relation to the whole. (Le Mistere du Vieil Testament* contains 60,000 verses, (le Mistere de la Passion,* by Greban, 35,000, and 4es Actes des Apotres) more than 50,000. Their performance lasted several days, some¬ times weeks.

The subject is almost exclusively taken from the Scripture. There exist, however, a few secular misteres, such as de Mistere de Troie) (1463), de Mistere du Siege d'Orleans* (1439). But even these

*are religiously inspired and were performed <(in honor of God for the in¬ struction of the poor.**

The entire population participated in the preparation and organization of a mistere. There were no professional actors to play these numerous roles, sometimes as many as 100, 200 or even 500, in addition to a host of other figurants. The corporations and the brother¬ hoods supervised the enterprise. The most celebrated brotherhood was the Confrerie de la Passion, organized in Paris at the end of the 14th century, which had the monopoly for mis- tires as regards the capital, and continued in existence for 250 years. The actors, nearly all giving their services free, were recruited from every class of society : artisans, commoners and even priests ; the role of Christ was always chosen from among them. Women only played mute roles, at any rate at first, the female char¬ acters being impersonated by young men. Per¬ formances were announced several weeks in advance by means of a cry, i.e., a solemn proc¬ lamation. An imposing procession, preceded by trumpeters and including the actors, arrayed in gorgeous costumes, paraded the town collecting alms and recruiting the figurants or parties playing secondary roles. The stage, which was very large, with a width of from 30 to 50 meters, showed several scenes in juxtaposition: a house, a church, a forest, a cavern. Paradise was represented by a loggia erected at the back of the stage, and Hell by a sort of cavity ar¬ ranged in the place which is now occupied by the prompter's box, from which the demons rushed out on to the stage.

Everything was arranged with a view to striking the imagination; flames escaped from the jaws of Hell, drums were beaten and claps of thunder were heard. By mechanical means, angels were shown descending from Heaven,

♦Name given in the Middle Ages to plays dealing with religious subjects wherein are found the intervention of God, the saints, the angels and devils.

and the "damned® disappeared through trap¬ doors. Scenes were shown of torture, cruci¬ fixion and decapitation. It was a highly realis¬ tic performance and as bold as it was simple.

These plays on a prodigious scale were abso¬ lutely incoherent, they took the form of a re¬ view of the acts of men, saints and demons. Comedy continually intermingled with tragedy. The devil was usually represented as a kind of buffoon or big booby, flouted and beaten to the great delight of the spectators. It must be borne in mind that these simple-minded people had to be supplied with plays suited to their particular mentality. Their emotions required variety. They would weep at the sufferings of Christ, but shake with laughter at a coarse farce or a drunken brawl in a disreputable gaming house. After a mystical oration they expected, and often demanded, licentious and even obscene entertainment.

Performed with the object of pleasing the populace, the misteres possessed all those de¬ fects inherent to pieces created for popular con¬ sumption, eventually descending to the level of common melodrama or farce. They were al¬ most altogether devoid of artistic merit and the rare poetical passages they contained could not save them from well-deserved oblivion. These dramatic poems, quite inferior to the Miracles of the 14th century, contain practi¬ cally nothing of interest to the modern reader. They had an enormous success at the time and they retained their popularity until about the middle of the 16th century, but their coarse humor, which approached the sacrilegious, ulti¬ mately alarmed the Church, and by a decree of the Paris Parliament, voted in 1548, they were suppressed in the capital. They survived a few years longer in the provinces but finally disap¬ peared. Public taste, which had been influenced by the Renaissance, demanded art of a more refined character.

The Secular Theatre. Origin (from the 11th to the 14th Century). — The secular theatre — wrongly styled the comedy theatre inasmuch as all subjects are treated by it except those which fell into the category of the miracle or mist ere — is of very humble origin. It orig¬ inated more particularly from those strolling players who peddled their wares from town to town in the shape of tales, monologues, dis¬ putes and debates. Traces can also be found of the influence of the ancient Greek and Roman theatre, known vaguely to the univer¬ sity scholars. The first works with which we are acquainted are (le Jeu de la Feuillee,5 and (le Jeu de Robin et de Marion^ both by Adam de la Halle, the former produced in 1262 and the latter about 1285. The first play repro¬ duces with a fair amount of spirit the adven¬ tures and misfortunes of the author's life. The second, of quite a different character, is a pastoral play, a kind of comedy-ballet inter¬ spersed with songs wherein is related the sim¬ ple story of a shepherdess who prefers her shepherd-lover to her Seigneur. This play, as has been rightly stated, is the first of our comic operas.

No comedy has been handed down to us from the 14th century, but we find a play with the title (Histoire de Griselidis, a sentimental story of a wife unjustly condemned and de¬ serted by her husband but to whom justice is finally rendered. It contains some passages of*

exquisite tenderness, as, for instance, that in which the forsaken wife begs her husband to treat his second wife less harshly than he dealt her: more frail and more <(delicately nur¬ tured® she cannot <(suffer as I have suffered.®

Merrymakers Clubs (Les Societes Joy- euses). — In the 15th century considerable in¬ terest in comedy was revealed in plays of a satirical, moral and farcical nature. Numerous amateur clubs supplied the actors, the most important being (la Basoche) and (les Enfants sans souciP The Basochians were clerks to the attorneys attached to the Paris Parliament. They formed an important corporation which elected

its king, and every year, in spring and July, played farces and moralities at the Palais de Justice. The En¬ fants sans souci, or Sots, were young men of good family, having literary and artistic tastes. They were arrayed in green and yellow like the Court Jesters. At their head was the Prince of Sots, assisted by Mother Sot. They played what were called Soties, a kind of satirical comedy or revue with a contemporary tendency.

The Moralities. — The morality play was less a comedy than a drama, or rather a melo¬ drama. Its characters were allegorical : Hope, Faith, Pity, Wealth, Poverty, the Prodigal Son, the Ungrateful Child. Like all self- respecting melodramas, these morality plays always punished vice and rewarded virtue; as for instance the greedy son who offers his father a piece of coarse bread while reserving for himself a succulent pie, but this pie when opened contains a toad which jumps out, strik¬ ing the boy in the face. Or again, in the (Condamnation de Banquet, Banquet, in the person of Gluttony, is condemned to be hanged by Diet.*

The Soties. — Tf the morality plays were pedantic and morose, the Soties were alert and realistic and the dialogue satirical. The plot, based on a feint, permitted great liberty of treatment; the characters were all represented as being mad, the dialogue was free and easy. The Prince of Sots took the role of King Louis XII, mad, Mother Sot impersonated the Holy Mother of the Church, mad. The community was also represented as mad, or Sotte Com¬ mune, the soldier, Sot Glorieux, the merchant, Sot Corrompu, the woman, Sotte Folle.

All the eccentricities and abuses of the epoch were criticized. The voluminous works handed down to us by the Sotie plays furnish us to-day with the record of a period when journalism did not exist.

The Farces. — The morality and sotie plays quickly disappeared but the farce remained. We find it in all our later day comedies, es¬ pecially those of Moliere. It expresses the French, or rather Gallic,

temperament and finds its embodiment in that hearty laugh so dear to Rabelais ((pour ce que rire est le propre de l'homme® ("laughter belongs to man®). Nothing escapes it, everyone and everything is subjected to its raillery and wit : commoners, soldiers, the clergy, tradesmen. But its ani¬ mated spirit and biting humor, which never fear to employ the right word, coarse or not, are above all reserved for matrimonial affairs and domestic wranglings. In these farces we are shown the husband, flouted, beaten, de¬ ceived by his wicked wife . . . against whom

he takes revenge. In the (Farce du Cuvier, the husband is little more than a slave; his wife has drawn up a list of tasks he is to perform : sweep, draw water, buy the provisions, look after the brat of a boy and a host of other things. But one day it so happens that our good wife falls into a tank and to her supplica¬ tions for help the husband merely replies <(That isn't on my list.**

We are indebted to the farce plays for a really artistic piece: (Patelin. Here we are shown the biter bit. A crafty lawyer wins a suit for his client, the shepherd Agnelet, who, before the jury, pretends to be an idiot and whose replies consist in the one word <(Be.** When the lawyer comes to collect his fee, Agnelet merely keeps on repeating his ((Be** and the man of law is obliged to depart without a sou. The plot is amusing and the characters, cleverly played, make it a forerunner of true comedy.*

But (Patelin is an exception only, and, on the whole, the prolific output of the Middle Age is condemned to sink into oblivion. This un¬ refined public clamored for amusing actors and not real artistes. Chance did not bring -to light among all these anonymous authors the man of genius, the Shakespeare or the Lope de Vega who would have*

developed dramatic art in France in the same way they did for the English and Spanish theatre. The change did take place but by a return to antiquity. The French spirit ever seeking lucidity and method could only reach its true goal and only produce works of art by taking a leaf out of the literary perfections of the Romans and especially the Greeks.

II. The Renaissance.

After the prolific but sterile productions of the Middle Age, we now enter a rather short transitory period not extending beyond three- quarters of a century, i.e., the second half of the 16th and the first years of the 17th. Nothing re¬ markable stands out in this period and it did not produce any masterpiece, but it is of great importance, marking as it does a real revolu¬ tion in dramatic art. Thanks to the humanists, whose minds had been elevated by a closer acquaintance with Homer and Virgil, dramatic art was of a more refined character, the lan¬ guage richer, and the colored but confused realism of the Middle Age was succeeded by classicism, undoubtedly poorer but certainly of a more finished quality, the real perfection of which moreover was not to be attained until a later period which was felt to be imminent. The 16th century was creating the instrument with which the 17th century would write mas¬ terpieces. We here witness the birth of tragedy, which has no precedent in France, being di¬ rectly inspired from the ancient literature, while comedy for a time is eclipsed. In the 16th century we find the founders and pioneers of dramatic art.

Tragedy. Origin. — The populace always took delight in the old sotie, farce, morality and mistere plays, but literary men had already conceived a form of art of a higher tone. Emulating the Italians, the humanists of the colleges composed Latin tragedies, played by the pupils before their professors and fellow students.

tragedies, such as (Sophonisbe* by Trissino, adapted by Mellin de Saint-Gelais, were also translated and

played under the same condi¬ tions. To these should be added translations of some of the ancient works, such at (Electre and (Hecube* by Lazare de Baif, (Iphigenie a Aulis* by Thomas Sibilet. These were not, however, original works in the French lan¬ guage. The first French tragedy was (Cleo- patre* by Jodelle, played in 1552 at the Hotel de Reims before Henri II. This is a date to be remembered as it marks the appearance of a new style.*

It was undoubtedly tragedy in the true meaning of the word, the study of a moral crisis, treated just prior to its close and cul¬ minating in the death of the hero. The work was clumsy and confused but this is not of great importance. We are shown Cleopatra, after the death of Antony, discussing with Octavius, deliberating with her confidants, hesitating before taking a decision, finally de¬ ciding and then killing herself. This was the commencement of a psychological development of a character in a tragic situation, in fact a domestic drama transported to the stage. It was tragedy itself.

Among the successors of Jodelle, two really talented authors should be mentioned: Robert Gamier and Antoine de Montchrestien. The masterpiece of the first named was (Les Juives (1580), a spirited work which paved the way for Racine's T'Athalie.* Gamier, al¬ though a fine orator, was too verbose. He lacked taste but his style was vigorous. Quite different was Montchrestien. Elegiac and gentle, the real poet with a melancholy tend¬ ency. In sensitiveness he resembled Racine and sometimes even Lamartine. His works in¬ clude T'Ecossaise* (1605) where we meet the unfortunate Marie Stuart.*

*Tragedy of the 16th century like that of the 17th obeys ((the three unities.*** But it was dull and declamatory, and contained lyrical parts and choruses which, however, disappeared later. More pathetic than dramatic, it left its mark on poetry rather than the theatre. The first years of the 17th century mark a step backward rather than forward. Once again the different styles become confused. The best- known author was Alexandre Hardy, the of¬***

ficially appointed playwright to the <(Grands Comediens de l'Hotel de Bourgogne. *He was indefatigable, turning out pieces by the hun¬ dred : comedies, tragedies, romantic dramas, popular pieces and pastoral plays. He under¬ stood the theatre and knew how to create a dramatic situation, but never troubled about art, merely aiming at making money. (Ber- geries* by Racan, might also be mentioned which was a very delicate pastoral play; Py¬ rame et Thisbe* by Theophile de Viau, a mas¬ terpiece of bad taste, which has become im¬ mortalized by the two ridiculous lines :*

"Le voild ce poignard qui, du sang de son maitre S'est souille l&chement; ll en rougit le traitre! "

("See this dagger, basely stained with the blood of its master; it blushes, the traitor!")

and (Sophonisbe by Mairet where, for the first time, the Aristotelian rules were strictly observed. A man of genius only was missing,*

- *Note by translator — the three unities in the Drama*

are: time, place and action.

and he will be revealed to us later in (Le Cid)

(1636).

Comedy. — The transformation was less marked than for tragedy. There was evolu¬ tion rather than creation, properly speaking. Farce combined with Morality, and we wit¬ nessed, under Italian influence, the comedy of intrigue with its artificial and complicated im¬ broglios, its conventional and stereotyped figures of wily valets, dishonest servants, bullying assassins and innocent and coquettish maidens. At the beginning we find a few poetical works, (Eugene } by Jodelle, played in

1552 after his ^leopatre,* (la Tresoriere® and (Les Es- bahis) by Jacques Grevin. These were merely farces, amusing in a coarse and rough sense. Pierre Larivey, a direct descendant by his father of the Giunti, the famous printers of Venice, introduced into France the Italian comedy. Everything was of foreign extraction, the plot, dialogue and the different characters. The style alone was original, the language spirited and colored. It will be seen later that Moliere borrowed quite a lot of ideas from this theatre, notably in where Harpagon losing his cash-box appears to be inspired by the miser who, in Larivey's piece (les Esprits,> has been robbed of ((sa chere bourse.® This is not much, but it is practically all that is worth mentioning. Toward the end of the 16th cen¬ tury, tragic-comedy and pastoral plays replaced comedy proper. The latter was not revived until 1629 with (Melite) by Corneille.

III. The Classical Era.

We have now arrived at a glorious period in French dramatic art, in which it reaches its zenith. It is incarnated in three great names : Corneille, Racine and Moliere. The two first mentioned have immortalized tragedy. The latter is the undisputed master of comedy not only in France but throughout the world. Moliere did for comedy what Shakespeare did for drama. In order to understand this period it is not sufficient to study the works only, it is above all necessary to understand the nature of this classicism and the part it plays in French dramatic art.

Classicism in the French Theatre. Char¬ acter of Classical Art. — The classical mind, de¬ fined by Malherbe and confirmed by Boileau, possesses a certain number of essential traits which have a direct bearing on dramatic art, and more especially in regard to tragedy.

Classical literature emulates the ancient au¬ thors. But this does not mean a mere servile copying of the works. Masters are looked for rather than models ;

these ancient works furnish themes which can be developed and subjects which are capable of expansion. For example, the Roman historians, Tite-Live and Tacite, the epical poets, Homer and Virgil, the great trag¬ edy writers Sophocles, Euripides and even Se- neque, afforded inspiration to Corneille and Racine in most of their tragedies.

Classical literature is governed by reason. In this it admirably suits French genius with its lucid and enlightened mind. This faculty of reasoning power restrains and disciplines the imagination and sensibility without in any way suppressing them.

Classical literature follows nature. There¬ fore it avoids allegorical subjects, abstract ideas and symbols so inherent to the theatre of the

Middle Age, and which we shall find in the works of the romantic writers. Classical liter¬ ature portrays individuals and humanity in the supreme moments of passion or self-assertive¬ ness. It is psychological, devoted to the an¬ alysis of the intellectual and moral faculties, to the observation and development of the de¬ cisions they provoke. It is not descriptive and does not concern itself, to any great extent, with local color ; neither physical nature nor the customs of society interest it. It only recognizes concrete, man, resolute and active. It is not pathetic and does not endeavor to excite emotion without appealing to intelligence.

As classical literature obeys the laws of reason and nature it therefore follows that it respects the rule of the three-unities: (1) Unity of Place. — It is not in the nature of things that a drama which is limited as to time should lead the actors and spectators to the four cor¬ ners- of the world. (2) Unity of Time. — It is unnatural that a violent crisis occasioning a tension of the entire being should last years, months or even days ; it must be confined to a few hours. (3) Unity of Action. — Above all it is absolutely unnatural for the interest to be scattered over a multiplicity of disconnected episodes ; it must be concentrated on a

single action. In this connection we cannot do better than quote Boileau's famous precept :

" Qu'en un lieu, qu'en un jour un seul fait accompli, Tienne jusqu'a la fin le theatre rempli."

(" That but one accomplished fact in a place or a day, Holds the theatre filled unto the end ")

It will be seen that it is the exact opposite of the diversified and confused art of the Middle Age, which, in its interminable plays, paid no attention to time, place or action.

Finally, classical literature required a dis¬ tinction to be made in the different styles : trag¬ edy, a noble style, and comedy, a popular style, thus forming two distinct spheres separated by an impassable barrier. This is yet another difference distinguishing it both from the art of the Middle Age and that of the Romantic period. It now remains to be seen how, on such lines France was able to produce in the 17th century such perfect, if not the most vig¬ orous, works in dramatic art of modern times.

The Classical Tragedy. — The date 1636 is unique in the annals of the French theatre. The appearance of (Le Cid) by Corneille marks the birth of a new dramatic art. This young poet, born at Rouen in 1606, had already made himself known by a few pleasant comedies which will be referred to later, and by a trag¬ edy, ^edee, gloomy and confused but which, nevertheless, was not devoid of beauty. Noth¬ ing however, in his first works could lead any¬ one to suppose that this was the author whose genius , would be revealed later in (Le CidP The piece had a phenomenal success. (*

actors predominates. The characters create the situation represented and the latter is sub¬ ordinate to the former. Interest is fixed on the

heroes for the simple reason that they are the living embodiment of the role they play and we are able thus to follow them feelingly through¬ out the whole piece. The psychological theatre was created.

What do we find in (Le Cid) ? A conflict between love and duty in the souls of Rodrigue and Chimene. To avenge his honor, Rodrigue kills the father of his beloved and Chimene ((to uphold his glory,® demands the death of her adored one. We suffer with them because we act and feel with them. Masterpiece after mas¬ terpiece follow. They are always in the nature of moral conflicts wherein mind triumphs over difficulties. In

Numerous other tragedies followed, too nu¬ merous in fact to immortalize the poet's glory. They marked a falling off in quality and finally the decline of his genius. There are, however, many beautiful passages in

The most striking thing which appeals to us in Corneille is the role he attributes to Mind and Reason, which invariably triumph over passion. All his heroes by a superhuman ef¬ fort take upon themselves the accomplishment of a duty which breaks their career and ruins their hopes. A thousand obstacles stand in their way and a thousand times they are sur¬ mounted. All, before accomplishing a painful task, are ready to say like Pauline in (Po-lyeucte) :

"11 dechire mon tine et ne I'ebranle pas."

(" It may shatter my soul, but not shake it.")

All, after having accomplished it are ready to repeat with Rodrigue :

"Je le ferai-s encor si j'avais a le faire."

("I should do it again if I had it to do.")

Love never has the ascendancy over virtue in this theatre, which La Bruyere and Voltaire unanimously qualify as sublime. It has been said rightly of

Corneille's theatre, ((qu'il etait une ecole de grandeur d'ame,® (<(It was a school of high ideals®), and it is not difficult to understand the words used by Napoleon, who if anyone understood human nature: ((La France doit a Corneille une partie de ses belles actions® ((

Of quite another school was ((Racine the tender.® La Bruyere draws a comparison of the two in these terms: "Racine portrays humanity as it exists, that is to say, real ; whereas Corneille depicts man in his concep¬ tion of all that to which man should attain, i.e., an idealistic state of humanity.®

The difference may be explained by circum¬ stances. From 1636, date of the first perform¬ ance of XIII to whom honor was the salt of their life? Who would recognize them

in the insipid and powdered marquesses of the court of Louis XIV? The noble ideals in¬ spired by Corneille no longer sat well on the shoulders of these spoilt and sickly puppets. Love with all its weaknesses seduces them much more than the exaltation of will dominating passion. Racine, so well versed in the knowl¬ edge of human nature, supplies their demands. Born in 1639 he was educated by the Jansen- istes of Port Royal and he was indebted to the early training he received there for the refined culture to which he attained ; he read both Latin and Greek in the original. He learned from his masters the doctrine of predestination, and that without the aid of Providence humanity can¬ not hope to triumph over passion. His heroes, and above all his heroines, are the unconscious and innocent victims of a fatality against which their will revolts in vain.

After two of his earlier works, brilliant but somewhat empty, (la Thebaide) (1664) and (Alexandre le Grand (1665), Racine asserted his personality in his first masterpiece (Andro- maque* (1667). In this piece we meet love which is stronger than death, fidelity lasting be¬ yond the tomb, conjugal love stronger than ma¬ ternal love, the child almost*

sacrificed to the memory of its father. And next to this ex¬ quisite figure <(Andromaque aux bras blancs® we have the tortured, jealous, desperate love of a Hermione or an Oreste. In (Britannicus) (1669) we are shown the ambition of an Agrip- pine struggling against the tyranny of a Nero. But Racine quickly reverted to his favorite theme, as witness (Berenice* (1670), a delight¬ ful elegy, a study of unrequited love; ^ajazet* (1672), a drama of the harem with all its vo¬ luptuousness; (Mithridate) (1673), the story of the jealous love of an old man and the chaste love of his young and sorrowful fiancee ; Hphigenie* (1673) deals with the innocent love of the maiden; and in (Phedre) (1677) we have the culpable, incestuous love which is passion in all its fury.

At this time, Racine, in the zenith of his glory, forsook the theatre at the age of 37. He married, reverted to the Christian religion, and this great passionate master became trans¬ formed into the best of husbands and fathers. It was fated, however, that he should bequeath two more works to the theatre, though after an absence of 12 years and under very different conditions. At the request of Madame de Maintenon he composed for the young ladies of Saint-Cyr two religious tragedies with choirs,

As we have pointed out, Racine was the very antithesis of Corneille. He portrayed to us the mind wandering at random, abandoning itself to its destiny, the latter being to love and die for love. All his heroes might .repeat with Oreste: "Je me livre en aveugle au destin qui m'entraine® (((I yield blindly to the fate that impels me®), and all his heroines echo with Phedre : (

Racine's art is unrivalled. His poesy is as sweet and melodious as music and colored as a painting. His imagination, of a marvelous rich¬ ness, evokes the splendors of a fete in Imperial

Rome, or the horrors of : <(. . . . cette nuit cruelle qui fut pour tout un peuple une nuit eternelle® (((. . . . that cruel night which

was an eternal night for a whole nation®).

If it is borne in mind that he used the sim¬ plest methods, that his tragedies contained as little matter as possible, and that he excelled in creating ((something out of nothing,® it is not difficult to understand Voltaire's unstinted praise and his preference for ((the perfect trag¬ edies of Racine® to the <(sublime scenes of Cor¬ neille.® Voltaire has employed the right epi¬ thet : In Racine we find perfection.

Besides these two illustrious names all others pale. We might, however, cite Thomas Cor¬ neille, 20 years his brother's junior, who possessed a vapid and romantic talent, and above all, Rotrou, of an original imagination with occasional flashes of genius. His (Saint Genest) is a weird Christian tragedy, wherein the hero, a comedian, becomes a martyr. Pra- don is known only by his

Classical Comedy, — In the 17th century it may be said that comedy is incarnated in one name, but what a name : Moliere ! The great¬ est name in dramatic art after Shakespeare. It would, however, be unjust to overlook certain other authors among his predecessors, con¬ temporaries or successors.

In the first place, we have Corneille. He made his debut with the three following light comedies (Melite* (1629), (La Place Royale* (1634) and (L'Illusion Comique) (1636). In 1643 (Le Menteur> appeared, whidh was the first character comedy given in France before Mo¬ liere's plays, and in 1644 we have (La Suite du Menteur.* Scarron, with his burlesque com¬ edy (Don Japhet d'Armenie* (1644), and Cy¬ rano de Bergerac, with (Le Pedant Joue* (1654), furnished certain elements from which our great comedian gleaned a few ideas, for he never made a secret of the fact that he <(adopted ideas wherever he found them.® Furthermore, the Italian

comedies played in Paris supplied him with ready-made material for plots and topics on which he could exercise his genius.

Jean Baptiste Poquelin, called Moliere, a native Parisian, was born in 1622 in the shop of an upholsterer to the king, situated under the columns of a densely populated middle- class quarter of Paris. He rubbed shoulders from his childhood with those who were later on to figure in his works. When still very young he founded, with a few friends, the Theatre Illustre; the troupe led a precarious ex¬ istence in Paris and drifted to the provinces. Moliere was the guiding spirit, manager, actor and author. At the beginning he merely com¬ posed a few farces, crude sketches on the lines of the Italian theatre in which the actors suited the gests and words to their own fancy. He returned to Paris in 1658 and thereafter led an exceedingly strenuous life. His literary output was prodigious and he composed his works, even his masterpieces, in feverish haste, often

on the order of the king who commanded his troupe to play at Versailles. In the meantime, he married one of his actresses, Madeleine Bejart, pretty, coauette and 20 years his junior, on whose account he experienced great suffer¬ ing. Finally, worn out and broken by the in¬ tense life he led, he died on the stage while playing in his piece (Le Malade Imaginaire)

(1673).

Moliere possessed extraordinary activity, writing, producing and playing more than 20 works of varying length and unequal value. The most important were (Les Precieuses Ridi- cules) (1659), a satirical comedy of the man¬ ners of the day; (L'£cole des Maris) (1669) and (L'ficole des Femmes (1662), a biting criticism of the badly matched husband and wife; (Tartufe* (1664), wherein he attacks re¬ ligious hypocrisy; (Don Juan* (1665), a work of a curious and exciting nature; (Le Misan¬ throp* (1666), wherein Alceste's uprightness makes him the*

victim of the perversities of Celimene the Coquette; (Le Bourgeois Gentil- homme (1676), a portrait of the parvenu; (Les Femmes Savantes* (1672), an outspoken attack on pedantry.*

Moliere's theatre is a world in itself. Al¬ though his output is smaller than that of Shakespeare, he introduces us to all classes of society: nobility, the masses, country yokels, people of all ages and conditions. And all are handled with consummate skill. A Jourdain, a Tartufe or a Celimene are types that are im¬ perishable. What then was Moliere's secret? Quite a simple one, consisting merely in <(paint- ing after Nature.® And painting what? <(The people of his day.® Action and plot count for little. He devoted himself primarily to life and character. In the portrayal of his charac¬ ters, Moliere followed the psychological style of Corneille and Racine, and in portraying life or customs, while retaining the scene and satire of his epoch, he showed a predilection for the social side of life. Moliere was gifted with a remarkable talent for observation, which earned for him from his contemporaries the nickname of <(the Contemplator.® The ridiculous, the ec¬ centric or the vicious, nothing escaped him. His characters are life-like because they have been drawn from actual life. Who has not met his Tartufe: <(Gros et gras, le teint frais et la bouche vermeille® (<(Big and fat, fresh complexion and red mouth®), or the good-na¬ tured and easy-going Chrysale who: <(Aime fort . le repos, la paix et la douceur,® to say nothing of Jourdain, suffering from that mania for wild extravagance ((

After all, comedy is merely a cloak to mask the seamy side of human nature. All these comedies are in reality dramas. It is life, and life is sad and hard for the virtuous, while fac¬ ile for the unscrupulous. Take Tartufe, a re¬ ligious hypocrite pretending to be righteous, who divides and upsets a happy and respectable family ; or Alceste, the very type of honor and

loyalty, who is deceived by his friends and be¬ trayed by his mistress. Again, Harpagon, the avaricious father of a prodigal son and a frivo¬ lous daughter who forsakes him. A Trissotin, of intellectual disposition in quest of a large marriage portion, dangling before the eyes of the narrow-minded mother his social status and profiting by the moral cowardice of the father, to marry a charming girl only to make her the most unhappy of women. If, to respect tradi¬ tions and in order not to trick the spectators, Moliere had furnished his pieces with their logical denouement, they would all have had an unhappy ending; honest folk would have been ruined by clever rogues, households di¬ vided and every home in misery. Musset right¬ ly summed up Moliere's style in the following words.

" Cette m&le gaiet6 si triste ct si profonde

Que lorsqu'on vient d'en rire on en devrait pleurer."

(" This manly gaiety, so sad and so deep,

That when one laughs at it, one should weep").

And yet despite all this, Moliere remained optimistic, and if he made war on all these abuses, eccentricities and vices it was because he honestly believed it was possible to remedy them. He desired to bring man back to na¬ ture and common sense.

In those two expressions, nature and com¬ mon sense, we have the whole of Moliere's character, and in his way of thinking one was the logical sequence of the other. To follow one's common sense was to refrain from affec¬ tation, or, in other words, effect a return to sim¬ ple nature. Right-minded people, according to Moliere, were those who waged war on affec¬ tation in the name of nature and common sense. This is embodied in Alceste when he reproaches certain epigrammatic thoughts and insipidities in Orente's sonnet, for ((ce n'est

point ainsi que parle la nature® (<(Nature does not speak that way®). We also see it embodied in Clitandre <(the honest,® so frank in his manner, so care¬ ful in passing a judgment, exposing the pedan¬ tic nonsense of a Trissotin. It is even shown in Chrysale, thick-skulled as he was, when he is made to say : (

After Moliere whom shall we name? Ex¬ cept Racine, with his pleasing comedy (Les Plai- deurs,} an imitation of (Guepes) by Aristo¬ phanes, dealing in a satirical manner with the procedure of law courts, we find no one. We are forced to let a generation go by before finding anyone approaching the genius of Mo-

vol. 11—43

Here, until we eventually discover two names, those of Regnard and Dancourt. Regnard, the next in merit to the master, was brilliant but superficial. His

Dancourt wrote more especially plays in prose dealing with passing events. Two of them, the (Chevalier a la Mode) (1687), and (Les Bourgeoises de Qualite) (1700), evoke the realistic theatre by showing on the stage pleas¬ ure-seekers and parvenus.

The classical epoch is unique in history, not only for the French theatre but for modern dramatic art. With it, dramatic art reaches the same degree of perfection it attained with the Greeks. The century of Louis XIV can only be compared to the century of Pericles. Racine recalls Sophocles and surpasses Euripides. Moliere is an Aristophanes, with less fanciful imagination but of deeper thought. After such masters there can only be a decline or a revo¬ lution in dramatic art.

IV. The Eighteenth Century.

In literature, as in politics, the 18th century marked a transitory era. This had its reper¬ cussion on the theatre. We find no great dramatic genius and

only a few works of any originality. Classical art became distorted and we see the preparation of romantic art. We witness tragedy bordering on a state of collapse and its final demise, while comedy undergoes a profound transformation, and a new style ap¬ pears — the drama.

Tragedy. — Tragedy is about to disappear and finally does disappear despite all efforts to save it. The framework is apparently retained but in reality there is nothing of that inner spirit which inspired it. It is like a body with¬ out a soul.

Crebillon was the first to endeavor to revive it. To him is attributed the expression ((Cor- neille appropriated Earth, Racine Heaven, to me there remains Hell.® He aimed at pro¬ ducing an impression of terror on the audience by a succession of horrors. In (Atree et Thy- este} (1707), if the father does not actually eat the bodies of his children he nevertheless drinks a cup of their blood. In (Rhadamiste et Zenobie) (1711), which was his greatest suc¬ cess, brutality, murder and horror succeed each other — it is nothing more nor less than blood¬ thirsty melodrama. In these plays, moreover, we find no attempt at character or sentimental study. It is all outward show with its incog¬ nitos, inconceivable situations and theatrical sensations. In a word, we witness all those ingenious expedients which reduce comedy to the level of vaudeville, and tragedy to melo¬ drama.

Voltaire alone in this century understood tragedy. But even he treated it in a superficial manner. His real genius, moreover, was not in the theatre. He composed his numerous works with a facility and celerity to be de¬ plored. His two most interesting plays were

♦

(Zaire> (1732) and (Merope> (1743). In the first we are shown an episode of the Crusades, and the love of a Christian for an infidel ; in the second, and more classical piece, we learn the tragic story of a mother who, quite un¬ knowingly, is on the point of killing her own son. But what should be particularly remarked in Voltaire's theatre (in reality rather weak), are the innovations he made. They were not always of a happy inspiration. Like Cre- billon, he used and abused sensational features, especially in the matter of legitimizations. Me- rope avowed her child, Zaire is acknowledged by her father thanks to ((la croix de ma mere,® which we shall find taken up again in the later melodramas. The characters are not studied with sufficient care. Why? Because (Zaire,) his masterpiece, was written in 17 days, while another of his plays, <01ympie,) was the work of six days. According to Voltaire, it suffices to place the heroes in touching situations to be certain of exciting the emotion of the spec¬ tators.

Moreover, Voltaire sought to renovate trag¬ edy. Timidly emulating Shakespeare, he learned enough from the latter to appreciate unity of action, but he deemed as languid <(those long soliloquies® delivered by an actor semi-hidden in the side scenes. He modified the scenery, paying great attention to the set¬ ting of the stage and the accessories. He varied the choice of his subjects, borrowing from every country and every period: Amer¬ ica, Turkey, even China ((L'Orphelin de la Chine)) are represented in his works. What is more important he did not hesitate to take subjects from the history of his own country, for instance, the Crusades inspired him to write (Zaire,) and the Hundred Years' War supplied the material for (Adelaide du Guesclin.)

For Voltaire, the theatre became in short one vast rostrum from which he expounded his philosophical and political ideas. In

- *Les pretres ne sont pas ce qu'un vain peuple pense Notre credulite fait toute leur science."*

(''Priests are not what foolish people think Our credulity makes all their science.")

(Brutus) and (La Mort de Cesar) were pre¬ texts for making an apology of civic duty and republican virtues.

After Voltaire we find no one worth men¬ tioning except Ducis, known for his adaptations of Shakespearean dramas: (1792). But there only remained a shadow of Shakespeare in these insipid and colorless adaptations, from which all the power and vitality of the original model had disappeared. They were not, properly speaking, either tragedies or dramas, which is a manifest proof that the first no longer existed and the second had not yet made its appearance.

Comedy. — Regnard and Dancourt carried over the period between the 17th to the 18th cen¬ tury. After them comedy was transformed and took several new styles. However, a few classical authors still remain to be mentioned, the most important of whom are Piron and Gresset. The first mentioned, a Burgundyman, a spirited writer, gave us in his

(1738) a satirical portrait of the impenitent rhymster who (

Gresset, in (Le MechanC (1747), treated us to a comedy of everyday life. He portrayed in forcible style that type of slanderer who injures others for the pleasure of doing so without any other profit than mere delight in causing pain. Wherever he passes he sows dis¬ content, makes mischief between friends and separates husband and wife. It may be argued that perhaps the author lacks piquancy in this portrayal.

The two great comedy authors of the cen¬ tury, both innovators of totally different styles, were Marivaux and Beaumarchais. Mari¬ vaux is to comedy what Racine is to tragedy. The principal, or rather the unique, topic of his pieces is love. But it was

not the passion¬ ate, vehement love culminating in suicide or crime; it was love of a delicate, refined, tender and gallant character, the sincere and profound love of the 18th century. Born in Paris in 1688, Marivaux, through his social rank and position, had access to the aristocratic salons. There he became acquainted with those exqui¬ site, witty, cultured and sentimental women of the days of Louis XV. It was here that he met the woman of ((dangerous liaisons,® for whom love was the unique preoccupation. This love the author was able to study at first hand at a period of his life when he was still unaware of his own talents although uncon¬ sciously revealing them. In (La Surprise de 1' Amour) (1722), the (Jeu de l'Amour et du hasard) (1734) and (Les Fausses Confidences) (1737), Marivaux showed himself to be a promising painter of true love. All his hero¬ ines might repeat with Silvia: ((Ah ! je vois clair dans mon cceur® ((

Beaumarchais presented a singular contrast to Marivaux. Like him he was a Parisian, but a Parisian of the people, of an intriguing and unscrupulous nature. He became mixed up in numerous court intrigues and was associated with many financial enterprises of a more or less shady character. He lived during those stirring times of riotous living which preceded the Revolution. As a matter of fact, his mas¬ terpiece, (Le Mariage de Figaro) (1784) was produced on the eve of the Revolution of '89. Beaumarchais created in Figaro a never-to-be-forgotten type, which, moreover, is no other than his own portrait. The character was first seen in the (Barbier de Seville) (1775), the amusing and eternal story of the old guard¬ ian duped by his young and pretty ward who elopes under his very nose. Figaro, who naturally is the very soul of the piece, is a study of Moliere's valet on a bolder scale; the Mascarille or Scapin, not content with merely serving his master but having personal ambitions and seeking his own fortune. Shrewd, venturesome and enterprising he knew how to get on in the world. Figaro becomes quite an important person. He is the type of plebeian, disappointed and

despised, but tena¬ cious and with an ardent desire to enjoy to the full the pleasures of life which up to the present have been meted out to him in such meagre

quantities. We have a picture of him in (Le Mariage5 when he faces his lord and master, Count Almaviva, who wishes to steal his wife from him. Well he knows how to handle the situation, how to reply! how to proceed! Fi¬ garo is the type of individual we shall see in the revolutions of 1789, 1830, 1848 and 1870, overthrowing the old despotic regimes and in¬ stalling republics. Meanwhile, he is not afraid to speak a few home truths to the nobility : ((Parce que vous etes un grand seigneur, vous vous croyez un grand genie; vous vous etes donne la peine de naitre, rien de plus, tandis que moi, morbleu!® (<(You think yourself a great genius because you are a grand lord, but you only took the trouble to be born, nothing else, whereas I, by Jove!®).

In short, Figaro is Beaumarchais. The author is incarnated in his work, in which we have a foretaste of romanticism. His ideas, theories and expressions of hatred were ap¬ plauded. His sympathies and feelings are ours. It should be added that the piece is admirably arranged and written in an acerb and sarcas¬ tic strain in which every word tells. It shows a thorough understanding of dramatic art. Beaumarchais, at any rate in his best plays, displayed a master hand in comedy, and ranks without question next only to Moliere.

Finally, (Le Turcaret5 by Le Sage, should be cited. This piece was produced at the begin¬ ning of the century, in 1709, to be precise, and was remarkable for its attack on financiers, those jobbers and unscrupulous bankers who speculated on the credulity of the public and shamelessly ruined the simple but honest folk who had confided in them. It was the first play of this nature to be put on the stage,

and it is the first example we have of realistic art in the French theatre.

Drama. — The great novelty of the 18th century from a dramatic art point of view was the appearance of a new style, the drama, or in other words, the fusion of tragedy and comedy, so severely discountenanced by the classical writers. The first effort was made by Destouches, whose idea was to compose a com¬ edy-character piece, in serious strain, and from which laughter was to be banned. All he suc¬ ceeded in achieving, however, was a play in bad taste, consisting really of a series of lay sermons intended for general edification. Only one of his plays, (Le Glorieux) (1732), is at all worthy of remark, and that because the author cleverly instilled into it a large measure of pathos and sentimentality.

La Chaussee had a tendency to exaggerate this innovation. He created pathetic comedy which merely consisted in a rough and ready handling of commonplace situations, thereby appealing to the spectators' sentiments. The new element he introduced was that, instead of interesting the public in the misfortunes of royalty and aristocracy, he chose his characters from amongst the people themselves and de¬ picted domestic misfortunes of private families. In his piece

Finally Diderot, in (Le Fils natureP (1757), and created the popular drama, which was, however, neither more nor

less than pathetic comedy written in prose. Beaumarchais imitated it in his (Mere Cou- pable) (1792). These works, however, of a tamtam and empty style, merely interest us as an indication of the new era then imminent. Sedaine alone treated this style with any degree of ability in his (Philosophe sans le savoir) (1765), wherein is a life-like portrayal of the great merchants of the 18th century, and also a charming and touching love episode of two young people.

Apart from the works themselves, which are poor, the theory of the popular drama should be examined. It was formulated by Diderot who sought to infuse between too con¬ ventional tragedy and comedy bordering largely on caricature a really genuine style which would represent a new ideal of humanity in the different spheres of life, for example : a father, a judge, a merchant. It was an interesting idea and one capable of considerable develop¬ ment but unfortunately it was incomplete. Of what good is a state of existence without char¬ acter? It is an abstract idea without life, a symbol without reality. A father, in his ca¬ pacity as such, a judge, in his capacity as such, as a mere state of being, do not exist. Who, therefore, can be expected to take an interest in them? We must unite the two conceptions, show character exerting its influence on a state of existence, or modified by it. In this manner alone shall we have the complete human being. Balzac's romance, (La Comedie humaine, 5 shows us such a state. These endeavors to transform drama were likewise premature. They were unsuccessful, and toward the end of the century comedy was revived which was traditional, unpretentious but mirthful. Vol¬ taire distinguished himself by a few light works such as (L'Enfant prodigue5 (1736) and Can¬ ine5 (1749).

The period can be summed up as follows : failure of tragedy, great modification in com¬ edy, a tendency of the two styles to fuse and reunite into drama. It marks the end of one epoch and predicts the dawn of another.

V. The Romantic Period.

The 19th century, following on the political revolution, was also to be marked by a revolu¬ tion in French literary art. Romanticism was especially in open revolt against classicism. It clamored for liberty in art, rebelling against those rules to which it was bound by classicism and which did not give free scope for its gen¬ ius. In future, the poet would compose his works without being impeded by hard and fast rules. The principal lines this new

art would follow would be: free scope in imagination, sensibility provoked to its highest pitch and hypertrophy of personality. It would be lyr¬ ical rather than dramatical.

We accordingly find ourselves in the pres¬ ence of an original conception which has no precedent in the past literature of France. It has produced masterpieces of . incomparable vigor and brilliancy. But this victory of sen¬ timent over reason, of liberty over control, had certain dangers and weaknesses which are felt in the theatre even more than elsewhere.

The Theory. — In order to understand the dramatic art of the epoch it is necessary to examine the theory under which it was in¬ spired. In this way it is possible to make a

comparison between what it was desired to do and what has been accomplished. A brilliant example of the conception of romantic drama will be found in Victor Hugo's (Preface de Cromwell, > and a more simple, if perhaps more forcible, one in Vigny's (Letters. } (La Preface de Cromwell y was one of the earliest works of Victor Hugo, who in 1827 was only 25, which accounts for the boldness of his concep¬ tions. According to his theory drama should aim at the truth, the whole truth and nothing but the truth. On this basis it must conse¬ quently include everything : comedy, tragedy, the grotesque and the sublime. This was, also, Shakespeare's dictum : <(Shakespeare, c'est le drame, le drame qui fond sous un meme souffle . . . le terrible et le bouffon, la tragedie et la comedie. La poesie complet est dans l'harmonie des deux contraires® (<(Shakespeare is the drama, the drama which melts together under the same inspiration . . . the terrible and the comical, tragedy and comedy. Perfect poetry lies in the harmony of the two contrarieties^)

Therefore, according to this formula drama comprises everything. It does not choose. Se¬ lection was the greatest mistake made by the classical authors; to choose is to mutilate a reality which is whole and indivisible. In Vic¬ tor Hugo's works, Hernani, the vagabond, rubs shoulders with Charles Quint the Emperor; Didier, the foundling, jostles King Louis XIII.

Drama is spread over time and place. Unity of place disappears — from the Louvre of Frangois Premier we are transported to a pros¬ titute's den, from

*Valladolid in Spain to Aix- la-Chapelle in Germany. Unity of time like¬ wise disappears — * days, months, sometimes years, elapse between the opening scenes of the piece and its denouement. The action is no longer confined to the four walls of a room and the 24 hours of a day.*

Unity of action, however, is respected, to which is added unity of impression. Interest must be sustained and the play proceed along its appointed lines. Terror and pity must be kept up to the end, and we no longer have, as in the fifth act of melodrama, a happy ending belying at the last minute the normal and tragic action of the piece. Romantic drama must wind up in misfortune and therefore be true to life.

When compared with melodrama it presents still another essential difference : the style is maintained and verse is employed in preference to prose. These verses contain the classical 12 syllables of the alexandrin, but they tend to im¬ prove in versatility and color. Lines are cut up to suit a new cadence of verses, the pause displaced and encroachment on the next verse to complete the phrase are risked. We all re¬ member the great outcry which saluted the first verse of (Hernani) — a daring innovation of the poet:

" . . . On vient par l'escalier d4rob6."

(" . . . Coming down the secret stairway.")

Finally, no hesitation is made in using the right word, the familiar or trivial one if neces¬ sary. Instead of the noble style we have:

" Un vers libre, franc, loyal, osant tout dire sans puderie, tout exposer sans recherche."

(" A free verse, frank and loyal, daring to tell everything, without prudery, expose everything without reserve ").

Vigny sums up in a still clearer manner the conditions of this new style. According to him

drama is modern tragedy. Consequently: (1) In its conception we must take a broad out¬ look on life and not the narrow-minded one resulting from common intrigue. We must not be satisfied with a hastily worked up crisis, but show a study of life extending over long periods and experience. He prefers Shakespeare's style to Racine's.

(2) In its composition we should draw char¬ acters, not roles ; we would represent peaceful scenes, without drama, in which would be sprinkled an element of tragedy and comedy. No longer would we have a Rodrigue or a Phedre acting a scene of ephemeral duration in a person's life, but a Hamlet or a Lady Macbeth who maintain their character through¬ out their whole existence. Assuredly the dramatic and artificial tone would be lacking but in its place we should have, as in actual life, our calm, happy or our sad moments.

(3) In its execution it would have a free and easy style — ■ comic, tragic, sometimes even epic. The characters would not all speak the same pretentious language. The grandiloquence of kings and the passionate words of great heroes would be mingled with the simple say¬ ings of the people and the merry quips of jesters. It is, in short, altogether the reverse of classical literature ; real life replaces conven¬ tion. It is a very large and revolutionary pro¬ gram. An examination of the works will enable us to see whether it has been carried out, or whether it is even possible of execu¬ tion.

The Works. — Romanticism made its ap¬ pearance on the stage in 1829 with (Henri III et sa cour) by Alexandre Dumas, and (Othello > by Vigny, and in 1830 with (Her- nani) by Victor Hugo. The struggle was keen between the old and the new schools. It re¬ sulted, however, in the defeat of the old school and the triumph of the new.

We are indebted to Alexandre Dumas pere for the historic dramas (Henri III, } (Chris- tine) (1830) and (Charles VII chez ses vassaux) (1831). His psychology was rough and ready and his characters

were rather in the nature of puppets. But he was undoubtedly imbued with dramatic instincts and understood the importance of action in a play. There was life in his pieces and he knew how to maintain in¬ terest and keep the audience in hand right up to the denouement. But he was too apt to rely on easy sensational features and very quickly drifted into pure melodrama. His (Tour de Nesle) (1832) is an example of this.

The art of Alfred de Vigny, a great poet and thinker, was of a more sober order, but in temperament he was a poor dramatist. His adaptations of Shakespeare, (Othello } and (Shylock, > and his historical drama (La Mare- chale d'Ancre, were unemotional, not particu¬ larly scenical and indifferently composed. His (Chatterton) (1835), however, was of a much higher order and is the masterpiece of the Ro¬ mantic theatre. Here we have quite an intimate drama, the action not extending beyond a few hours. It is the story of a man who has writ¬ ten a letter in the morning and who waits for the reply until evening; when it at last arrives it kills him. In*

society had treated with contempt and con¬ demned to suicide. This was the inert part of the work. But the chaste love, which never dares to declare itself, of Kitty Bell and Chat- terton, that exquisite tenderness of two frail, pure beings, victims of the conditions of life, and which is only revealed in death, is a pene¬ trating and poignant piece of drama which makes this work incomparable. No work, not even the masterpieces of Victor Hugo, attain such a degree of sincerity and perfection.

It should be noted that, by a strange coin¬ cidence, this unique work is classical in many respects : unity of place, unity of time and a crisis which is passionate, violent and short. But it remains romantic in one point : Chatter- ton is not an

individual but a symbol, merely a name. His soul is the soul of the poet.

Victor Hugo is the master of Romantic drama. He began his career with (CromwelP (1827), a piece unsuitable for theatrical repre¬ sentation, and which, like his is more valuable from the point of view of a public declaration. These were followed by several other works, most of them in verse but some (the poorest ones) in prose. The most important were and (Ruy Bias, of incomparable harmony, are an enchantment to the ear. Witness his duo between Hernani and Dona Sol, between Ruy Bias and the Queen, between Marion Delorme and Didier, or let us say between the Lover and the Be¬ loved, the eternal lovers of romance with their melting and voluptuous language, whose words sink into the soul and transport us into a realm of dreams. Sometimes he uses the lash of satire, manipulated by the inflamed accents of Ruy Bias to stigmatize extortioners, those priests and courtiers of Spain; or the epical language of a Ruy Gomez de Silva in the por¬ trait scene QHernanP), or even the truculent and superb comedy of Don Cesar, that tatter¬ demalion so proudly arrayed in his ragged raiment. Hugo, the wonderful virtuoso, touches every string of the lyre with a master hand. But his characters have no living counter¬ part, they do not belong to this world. They speak at great length and magnificently, but emptily. They speak for their own satisfac¬ tion and not for others, not merely to make themselves heard but to portray their own character. And what definition they make! Eloquent, but how puerile! Hernani is:*

. . Une force qui va

Une Ame de malheur faite avec des t£nebres f "

(". . . A force that goes

An unfortunate soul conceived in gloom ! ’’)

Ruy Bias, the lackey enamored of a Queen :

" Un ver de terre amoureux d'une 6toile,"

(" An earthworm enamored of a star "),

and Don Cesar, the great Seigneur, who, ruined, associates with the ruffians of Madrid :

" Un pauvre grelot vide oti manque ce qui sonne."

(** A poor, empty rattle, lacking that which sounds").

In reality they are not individuals but mere symbols. Ruy Bias represents the People ; the Queen, the eternal Woman. In (Angelo:; Catherina is the woman of society and Tisbc is the woman whom society scorns, but both are types of the weaker sex, both stand for Womanhood.

In these large generalizations and empty syntheses reality is motionless and senseless. There are no really life-like characters, only puppets, magnificently presented it is true, but without a trace of psychology or the least sign of individual life.

What matter ! Strictly speaking it is not real 'dramatic art but it is undoubtedly a dazzling stage picture. We are irresistibly carried away by the effusion and spirit of the poet. Of drama in the real meaning of the word we find practically nothing. The plots are childish and the situations often descend to the level of common vaudeville ; for in¬ stance, we have a king hiding in a cupboard, an emperor disguised as a beggar, a cabinet minister answering the door or performing other menial offices like any properly trained domestic servant. If we stopped to think we could not refrain from smiling, but we are not given time for reflection, overwhelmed as we are by Victor Hugo's hardy conceptions, bril¬ liant metaphors and striking contrasts. The poet makes up in richness of language for the poor dramatic quality of his works with their weak psychology and elementary scenic effects.

Alfred de Musset did not write with a view to his

works being staged, the result being that dramatic art was enriched to a greater degree than might otherwise have been the case. Being absolutely free from theatrical considera¬ tions, his imagination took wings and gently flying from flower to flower, so to speak, he composed rare and beautiful bouquets. In his (Comedies et Proverbes) we see Musset at all stages and conditions of his life. We see his personality in Fortunio, that Cherubin of Beau¬ marchais' creation, but more poetical, sacri¬ ficing his life for a smile from his adored one; and we meet him again in Uncle Van Buck, whom 50 years of life has rendered wise and only gently chiding. But we find a more life¬ like portrait of Musset in Perdican or Octave, Valentin or Fantasio, the gentle hero, voluptu¬ ous yet sensitive, jesting yet sincere, _ sceptical yet passionate. He frolicked with love, laughed and mocked at love, but he was in turn tricked and fooled by love. He sought to trifle too much with love but <(on ne badine pas avec l'amour.®

In this we have an explanation of his works, which, while light, were at the same time pro¬ found, those Hnarivaudages® (works of a highly affected style) but infinitely more sad and more dramatic, nearly always ending in melancholy and suffering, sometimes even in death. He roamed in a world^ of dreams, in almost unreal surroundings, calling to rnind the fairy scenes of Shakespeare. His imagination, left to itself, wandered at random. It was pure lyricism without the slightest philosophical or other pretension. These proses of Musset have furnished the French theatre with its purest poetical productions.

Classical Reaction. — The Romantic theatre was doomed to disappear. Its success had been brilliant but ephemeral. It should not be for-

gotten that dramatic art lives essentially on

action, and romanticism which is the expression of mind in its most personal conception does not respond to this fundamental condition. The reaction was not long in taking place. (Louis XI > (1832), and (Les Enfants d'EdouarcP

(1833), the pseudo-classical works of Casimir Delavigne, were frantically applauded, less for their intrinsic worth, which was poor, than be¬ cause they were against Victor Hugo's style. Ponsard, the author of (Lucrece> (1843), and ^Charlotte Corday) (1850), was more eloquent, if not more dramatic, and his prosaicism was not quite so flat.

Toward the end of the 19th century, Henri de Bornier wrote, just after the war of 1870, (La Fille de Roland (1875), the plot of which was fairly well arranged, evoking the national glory of France, and obtaining an immense suc¬ cess. Frangois Coppee, with (Severo TorellP and (Pour la Couronne,* and Jean Richepin with

But public taste soon tired of this brilliant but rather artificial art. It calls for truth and reality which is found lacking in the extrava¬ gances of romantic drama. This feeling brought comedy once more into favor, which hereafter was destined to become more and more realistic and contemporary. We were to descend, so to say, from the clouds to mother earth and substitute actualities for the historical past.

VI. The Realistic Period.

Classical Comedy and Vaudeville. — The

years which followed on the great develop¬ ment of Romantic drama were a period of re¬ lief. A movement of reaction toward Natural¬ ism began to make itself felt and more simple forms of art came into favor again. Comedy relegated drama to a secondary place. As a matter of fact comedy had never completely lost its hold on the public, but during the first half of the 19th century its more sordid side only appealed

to spectators. We witnessed the triumph of vaudeville with Picard and espe¬ cially Scribe. This latter name is an incarna¬ tion of the epoch and at the same time forms a judgment thereof. Scribe was the exact an¬ tithesis of an artist. In his works no trace is found of poetry or stvle. He was, however, an adept in stagecraft, excelled in the con¬ struction of a plot and was a pastmaster in the preparation of theatrical situations. His char¬ acters had to be manipulated like puppets, which in fact they really were ; they appeared, disappeared, met unexpectedly, lost one another only to meet again at the opportune moment. In his best pieces, i.e., those most cleverly ar¬ ranged, (Bertrand et Raton, } (La Camaraderie) and (Bataille des Dames, y he handled compli¬ cated situations with a master hand.

Victorien Sardou followed in his footsteps. He, also, replaced art by artificiality and grasped in a remarkable manner all the tricks of the trade. He was able to machinate ad¬ mirably an intrigue whether in the nature of

vaudeville like (Pattes de Mouche or when dealing with a historical question as in*

There was more sincerity and realism in the astonishing vaudevilles of Labiche. A grain of common sense always sobered his coarsest farces. (Monsieur Perrichon was as unemotional toward him who helped him as he was ardent in befriending others. His remark <(Vous me devez tout . . . je ne l'oublierai jamais® ((*

The operettas of Offenbach, written with the collaboration of Meilhac and Halevy, were masterpieces of satire concealed beneath a con¬ siderable amount of buffoonery, particularly (Orphee aux Enfers) and (La Belle Helene. >

Popular Comedy. — Real comedy, i.e., com¬ edy of life and comedy of character, was repre¬ sented by these two authors, Emile Augier and Alexandre Dumas fils, with a disposition for the pathetic comedy of

La Chaussee and the popular drama of Diderot. Augier was that type of the middle-class man, having all his sterling qualities but also his narrow-minded ideas. His ideal was sound but prejudiced. He desired more than anything else to maintain and fortify home life. He waged war to the knife on everything pertaining to the romantic, because fantastic romantic ideas are capable of up¬ setting the most respectable women: in (Ga¬ brieli we see a woman about to desert her husband and child because she is mentally up¬ set and thinks she has poetical aspirations. In the (Mariage d'Olympe, Augier attacked the artificial sentimentality of those who consid¬ ered the rehabilitation of fallen woman as possi¬ ble and desirable; in (Les Lionnes pauvres> and (Les FourchambaulD he depicted the havoc wrought by a life of luxury and pleasure, and in (Ceinture doree5 he made a violent attack against the custom of giving dowries and financially arranged marriages in general. His loyal, upright mind and aversion for innova¬ tion made him the champion of the traditions and the morals of the people.*

Himself a commoner in the true meaning of the word, he created certain types of the middle class which will ever survive : Mon¬ sieur Poirier, the counterpart of the Monsieur Jourdain of Louis Philippe's reign, the parvenu with his mania for greatness sacrificing his daughter to his ambition by marrying her to a ruined nobleman who in addition to deceiving her despises his father-in-law; or Maitre Guerin, the unscrupulous notary, with his dis¬ honest associates, whose whole character is summed up in his sublime but wily expression : <(Je tourne la loi, done je la respecte.® (<(I twist the law, yet I respect it®).

Moreover Augier thoroughly understood the intricacies of the theatre. His pieces were ad¬ mirably planned, and he had the gift of being able to develop a character in all dramatic situ¬ ations. Dumas fils exercised his talent on a higher plane and followed a more generous ideal. He wrote pieces that were problem plays, carefully arranged, but the principal object of which was to moralize.

His ideas were certainly bold for the period in which he lived. He advocated the rights of illegitimate children, and in (Denise, 5 those of the unwedded mother. He even made himself the champion of the woman who has erred, and in

Among the less known authors of the end of the 19th century, we must not overlook Pailleron. His (Monde ou Ton s'ennuie) was a witty, if somewhat puerile, criticism of the literary salons. Henri Becque, talented in a bitter and harsh style, should also be mentioned. His realism is of a pessimistic nature. In his piece (Les Corbeaux) we are shown a pack of avaricious and unscrupulous creditors eager for their booty, reducing a family to misery after the death of the father. His

The Free Theatre. — Toward the end of the century, an interesting experiment was made by Monsieur Antoine. Under the influence of na¬ turalism inspired by Zola and the Goncourts, he founded the Free Theatre. He sought to pro¬ test against the artificial character of contem¬ porary dramatic art, and depict on the stage an exact picture of actual life. At first he em¬ ployed his energies in criticising to excess pass¬ ing events and personalities in a spiteful but witty manner, and, under the cloak of realism, he took pleasure in describing, with exaggera¬ tion, the defects and turpitudes of humanity. But it must not be forgotten that he kept (

Present Tendencies. — This evolution of realism in the theatre is not yet completed. Possibly it is counteracted by other tendencies more or less undefined. The dramatic produc¬ tion in France is more abundant than ever but it would seem that it is still feeling its way. Spontaneous comedy, pure and simple, is a thing of the past. We have above all pieces of an ill-defined and composite style embodying both comedy of every-day life, character-

com¬ edy and drama. Many eminent authors such as Capus, Donnay, Lavedan, Romain Coolus, Bataille, Bernstein, know how to combine wit with emotion. On the other hand a higher

ideal is sought and social problems are dis¬ cussed on the stage. Monsieur Brieux attacks our whole legal system in (La Robe Rouged and poses difficult questions concerning sexual morality in (Les Avaries5 and (Avortement) ; Monsieur Hervieu in (Les Tenailles) and (La Loi de l'homme) espouses the cause of fem¬ inism ; Monsieur Emile Fabre evokeo and con¬ demns in (Les Ventres dores5 the big financial scandals which have recently been the subject of a large press campaign. Monsieur de Curel, one of the most talented dramatic authors of our day, deals with touching and difficult cases of conscience in (La Nouvelle Idole.5 Has a famous physician the right to sacrifice the life of a patient in the interests of science, or jeopardize an existence to save thousands of other human beings? In the (Repas du Lion) we are asked to solve the problem of whether great intelligence and highly refined ideals should concentrate themselves to the welfare of the ignorant masses who would destroy them.

Thus we find many talented and promising writers but no particular name which stands in relief and no style clearly dominating an¬ other. Such is the present state of dramatic art in France, and as such it holds its own throughout the world, giving stimulus to other peoples. As far as it can be permitted to prophesy in such matters, it would seem likely that the theatre of the future would have a tendency to take up political and social ques¬ tions. But what has the future in store for us? Who knows if as the outcome of the Great War which is scourging Europe a new world will not be born which will create a formula of art as yet unknown? In any case, France, which up to now has been the special cradle of dra¬ matic art, will certainly not be the last to dis¬ cover its proper trend and perhaps indicate it to others.

Bibliography. — I. General: Lintilhac, (His- toire generale du theatre en France® ; Brune- tiere, (Les epoques du theatre frangais5 ; Saint- Marc Girardin, (Cours de litterature drama- tique.5

II. Special: (a) The Middle Age. — Petit de Julleville, (Les mysteres — la Comedie et les moeurs en France au moyen-age) ; Ed. Fournier, (Le Theatre frangais avant la Renais¬ sance.5 (b) The Renaissance. — Ed. Fournier, (Theatre frangais au XVIeme siecle5 ; Em. Faguet, (La tragedie frangaise au XVIeme siecle.5 (c) The Classical Era. — G. Lanson,

The Romantic Period. — P. et V. Glachant, (Es- sai critique sur le theatre de Victor Hugo5 ; Lafoscade, (Le» theatre d' Alfred de Musset5 ; Ern. Dupuy, (Alfred de Vigny.5 (/) The Realistic Period. — Em. Faguet, (Notes sur le theatre5 ; J. Lemaitre, Umpressions de theatre5 ; R. Doumic, (Essais sur le theatre contemporain.5

Gustave Rodrigues,

Docteur h Lettres, Professeur agrege de Phi- losphie, Laureat de ITnstitut de France.

17. FRENCH MUSIC. Animated by an intense new life, the French School among all schools of music stands out rich and flourish¬ ing. Retaining all that is best in the past, it looks fearlessly toward the future, and repre¬ sents a harmonious classical epoch.

French music displays with profound truth¬ fulness the countless national sensations of the present day. With some composers it expresses a religious sentiment, with others it has become pagan, a noble and sound pagan¬ ism which surrenders itself wholly to the beauty of its surroundings, in hymns of pan¬ theism, in which all the voices of the universe and of mankind are blended. The history of music since

the <(dechant® of the Middle Ages, from the first (

Of primitive Gallic music we are able to recognize traces in the old songs of Brittany. For Brittany is faithfully traditional as much by her relative remoteness as by the well- known stubbornness of her people. Barzas- Breis, H. de la Villemarque and the collection of popular melodies copied by Bourgault-Ducoudray contain admirable examples. As in some Scottish or Welsh airs, the Celtic soul lives again. The reverie, face to face with wide horizons, serene and tender piety, some¬ times even a real gladness, are blended in those accents, the character of which, well defined, remains as striking as in former times. One hears in them those antique modes which were equally those of the earlier Greeks. The Dorian, whose virile energy and nobly har¬ monious gravity belonged also to that of the Doric order; the Phrygian, wholly in contem¬ plative ecstacy before the divine scenes of nature; the Lydian, descended from Asia Minor, brilliant with light and of a singular charm. It is probable that these modes were discovered by the people of Brittany, entirely on their part, without having been derived from the Greeks by the intermediary of the Gallo-Roman conquest. Modern composers, grouped under the name of ((Celtic School,® consider that Brittany owes nothing to the Latin genius. Their influence on our music is undeniable and fruitful.

The Middle Ages saw an extremely ap¬ preciated art. Our Merovingian kings loved music; later, in their heroic poems, the trouveres, the troubadours (as formerly the aged Homer) related the glory of the heroes. More profane, some popular refrains translate wonderfully the ironical gaiety of a people who, according to all appearance, were sensi¬ tive to the beauty of sound. Let us call to mind the amusing (Prose of the Ass,5 wittily taken up by G. Pierne in his <(Scherzo® of the (Year one thousand.5

It belongs to comic art, so distinctive in its style, of which certain sculpture in cathedrals has left us grotesque proofs. On the other hand, sacred music reaches to serene heights of collective

expression in the Gregorian chants. It has sometimes been thought that these melodies are none other than the themes of ancient Greece, baptized as Christians for the occasion, as the churches of Rome made use

of columns from heathen temples. Thus, legend attributes the Te Deum to the inspira¬ tion of Sophocles. This hypothesis would not appear to be absurd. The oldest of the Gregorian chants are very simple, syllabic, e.g., the Dies Irce. In the course of time, a freer melody soars higher toward the skies, similar to the expansion of the Gothic cathedrals with their ^flamboyant® ogives. Plain chant, the expression of which has no individuality, might seem at first cold, but its pure meditative line, joyful even in the Sanctus and the Alleluia is full of stirring sentiment. To the Gregorian chant, the art of the contrapuntists of the Renaissance owes its birth. It acquired a sure style and masterly skill with the musicians of the 16th century; their vocal counterpoint was an accomplished science. The descriptive tendency to which our artists often ceded in the course of time asserted itself in the (Battle of Marignan> and the (Awakening of the birds,5 by Ch. Jannekin. This name, like those of Claude le Jeune, Guill. de Costeley, Cl. de Scrimzy, are familiar with us to-day. As to the sacred art of this period, its beauties were brought to light by the chanters of Saint Gervais. In every respect it harmonizes with the architecture and to the proper atmosphere of the cathedrals. The reign of Louis XIV saw the ancient gamut gradually abandoned, retaining only the ordinary major and minor. On the other hand, whilst the 16th century re¬ served, in general, the same importance in all its parts, the melody of the 17th asserted itself, isolated and preponderant in juxtaposition to the accompaniment. But it did not burst forth with the boldness or the fulness that it has at¬ tained since in modern music. In spite of the excellent writing of our authors, the vocal line retains a sort of timidity in the expression. The art of sound is the slave of the public. It aims to please, to amuse. The language of the personal*

sentiments of the musician and especially his complainings would scarcely be allowed. Instrumental works and pieces for the organ are concise but charming, sober, full of good humor and of a real nobility of thought. At the opera, poetry is the great ruler and the composer dares not yet translate into music the sentiments which it describes. Tulli, the most illustrious, although Italian by birth, submitted entirely to this aesthetic style. In spite of the restrictions which resulted from it, our school was very flourishing; there were organists, harpsichord-players of infinite talent, such as L. Marchand, W. de Grigny, Cleram- bault, Cai, d'Herlevoix, Couperin and espe¬ cially J. P. L. Rameau. This great master to whom we owe so many delightful, even really vigorous works, receives to-day the just homage of the Debussy, Dukas, Ravel. Our modern artists have recognized the link with the past. Moreover, without imitating it, or losing any new acquisitions, many are happily inspired by ancient music: its measure, its purity of style, its lucid discernment. Yet, in spite of a real independence, and however thoroughly a musi¬ cian Rameau may be, one cannot say that either

♦Thanks to the preformance of the Society of the Con¬ servatoire, the Society Guillot de Sainbris, with J. Griset, of the Schola Cantorum with Ch. Bordes and d'lndy as well as several excellent vocal quartets.

tThe most celebrated of these composers are R. de Lassus, Josquin dec Pres, and Goudimel.

the qualities or the national soul are to be found entirely in him. Modern music by its expansiveness and its discoveries has turned to the light, the face of that soul, left in the shade by the masters of former times. The latter, polished, worldly, traditional, do not reveal the highly exalted and lofty imagina¬ tion of France. Our professors of

rhetoric often insist on the order that characterizes the art of our country; and it is quite true, but it is not everything.

It was romanticism which at first appeared to widen our horizon. It commenced with the encyclopedists and J. J. Rousseau. These phi¬ losophers foresaw how our art would become greater one day, by the action of a free voice and a spirit entirely human. It was that period, forerunner of the Revolution of 1789, in which the ideal of those thinkers, charmed with solidity, gave, at last, to the cry of man¬ kind, the right to live. And that cry, with on the other hand the energy of a resumption of hope, leading to hymns of serene and en¬ thusiastic joy, is almost the whole of our music of the present day.

After the celebrated (Quarrel of the Buf- fons) in which the Italians triumphed, the works of Gluck, in harmony with the principles of the encyclopedists, had a considerable in¬ fluence. But our musicians did not grasp the true lesson. These works seem to have made them forget those of Rameau. It was not a question for them to curtail their accompani¬ ments. Indeed Rousseau wronglv judged that a more expressive art demanded a simplification of accords and counterpoint ; but modern music and already that of J. S. Bach proves that this is absurd. A noble harmony more often only accentuates the beauty of the melody. It ought to have been understood that the admi¬ rable technic of Rameau was necessary to our school and further that, that kind of wider ex¬ pansion in singing sufficed, coming as it were, to animate a dense and rich material. Unfor¬ tunately, it is easier to impoverish an art, and the principles of Rousseau, followed too strictly to the letter, had that effect. Then, doubtless, there was a desire to render music popular. It was not wanting in interest, how¬ ever, in the revolutionary epoch, especially with the famous (Song of the Departure, also in the (Song of the 25th Messidor,* triple choruses by Mehul, and above all with the matchless (Marseillaise* of Rouget de l'lsle a unique work, born of exceptional circumstances. It has never been reproduced; besides nothing is more rare than a*

noble heroic song. Finally, let us call to mind the charm and intelligence of Gretry, the real beauty of Joseph de Mehul, the works of Lesueur, full of noble and ex¬ cellent intentions. But a solid musical structure, vivified with songs of particular harmony and rhythm, new and audacious — such was the appanage of Berlioz. An extraordinary phenomenon, this really genial musician had been obliged to invent nearly all his resources (when still at the Conservatoire, he wrote the (Overture to the Free Judges, he ignored the German masters with the exception of a few of Gluck's works). Let us remark that Hector Berlioz is essentially French. It was not under the German influence that he wrote works of such ample dimensions and vigorous so¬ norousness, (he, however, none the less appre¬*

ciated the subtle delicacy of the orchestra). It was a natural taste. That taste for the grand (and not the colossal in the wrong sense of the word, for with Berlioz there is neither bombast nor tediousness), is necessary to his romantic enthusiasm, as otherwise is to Ra¬ belais, a close, serried style with copious (Litanies. Moreover, if romanticism were en¬ tirely in the right in not disowning the art of foreigners, neither that of our Gothic past (so distinctly our own), this movement of free, even revolutionary sensibility, was national — caused by the same state of the mind. One should also notice that Berlioz possessed that very French sense of measure (and measure may be kept in great works for it concerns only harmonious proportions) ; lastly his romanticism was balanced by his classical ten¬ dencies. his Virgilian education (the traces of which is revealed in the (Trojans* and in the pure (Childhood of Christ*). His power is never embarrassed by a dull heaviness, his de¬ velopment is, at once, wide and concise ; his idea, neither diffuse nor diluted, remains clear and striking. Berlioz is our near ancestor, be¬ cause without him the modern world is already established. The Unvocation to Nature,* (The Fisher's Lament,* some pages of (Romeo and Juliet,* the (Septuor of the Trojans* reveal the emotion displayed before the*

mystery of things that the 19th century taught us to love: the sea, the mountains, the night, the breeze in the offing, the distant voyages. And he is the creator of the symphonic poem and his or¬ chestra has remained young. The technic of his art is almost ours too : liberty of harmony, rhythm and development.

*Very distinct from Berlioz, often wrongly understood in his simplicity and still also our ancestor was Charles Gounod, the exquisite and grand musician who immortalized the act of the ((Garden Scene** in (Faust.* This act was disdained by the critics, ((There is nothing in it.** Accustomed to the violent and superfi¬ cial operas of Meyerbeer, all inner action could not exist for them. Now, this inner action so conformable with the idea even of Monteverdi, Gluck, Wagner, and all of those who have made the ((theatre of the soul** of profound sentiment (to begin with yEschylus in Prometheus*), that is decidedly the ideal aim of French lyrical drama. That in con¬ sequence of the Wagnerian allurements Gounod might have seemed antiquated to cer¬ tain ears it matters little. In general, our best musicians have never ceased to appreciate him, from Faure* to Ravel. And we know what our modern school owes to him. Indeed, like Mozart, like Faure and like Debussy, Gounod was music itself. If there are some irregu¬ larities in his work (for he does not free him¬ self entirely from the tedious musical aesthet¬ icism of his epoch), they will not prevent us from loving that which has been preserved from the ravages of time ; particularly that extreme charm of which the strong and benef¬ icent perfume has not evaporated.* With Gounod there is something of the pagan in the ingenuity with which he surrenders him¬ self, an instinctive and luminous ease, the softness of the phrase and of the harmony.*

The 16th century saw, with the classical

- *For instance, read again the admirable melodies of Venice,*

an astonishing and complete synthesis.

spirit of the Greeks and Latins, the triumph of simplicity, an admirable order and well estab- listed rules ; the Revolution, food for heroism in the cult of the great men of Plutarch. To¬ day, the art of the ancient Hellenes shows us the perfect equilibrium ; and with the cult of the harmonious lines of the human body, the natural and sincere love of the beautiful; in the same way, as that which concerns music, Gounod seems our precursor. He was also a believer, a mystic, but without the least as¬ ceticism. Yet his art does not express any¬ thing of sensuality. Quite the reverse, it is essentially sentiment and one might make the same remark of those that, after him, were great by the charm of their compositions, Faure and Debussy. Apart from Berlioz and Gounod, French music, until about 1860, had somewhat slumbered. The composers, over whom the influence of Meyerbeer triumphed, often only succeeded in producing superficial operas, full of affectation, the transient reputa¬ tion of which could not mislead. As to the comic opera, although, since Gretry, at times delightful with Boieldieu (The Woman in White) and Herold (The Clerks' Meadow, y it eventually quite degenerated; the same is to be remarked of Auber, Ad. Adams, V. Masse. It has been brilliantly revived in our day. Moreover this style, qualified as eminently na¬ tional, only represents a very small portion of French music.

The generation immediately following that of Berlioz and Gounod, fostered by vigorous and classical studies, finally comprehended all the beauty of the symphony. Since then, this favorable movement was no longer to be stopped. It will be but right to state here, that the ancient German masters pointed out the way to a more closely serried technic. The example of Beethoven, also that of Mozart were precious, but still more that of J. S. Bach. In art, we have never approved of,, nor prac¬ tised, absolute protectionism, esteeming on the contrary

that interchange is beneficial, pro¬ vided it is not prejudicial to the natural gifts of the race. Now, French music has not been without submitting to several foreign influences, but by a harmonious fusion, they have only helped to maintain its national originality; it is thus, that rich natures borrow of one an¬ other. Our school is no less great nor French, for having found in J. S. Bach the real tradi¬ tional style of polyphonetics. This style of Bach's directly linked to that of Purcell, Buxtehude, H. Schutz and more anciently, of Gondimel, and the Franco-Flemish masters of the 16th century, Gounod understood how to discover its beauty (as his commentaries on the chants of the grand cantor testify), at about the same time as Lalo, Saint-Saens and Caesar Franck. The latter, the first with Berlioz, sees far and wide. But the admirable hidden life of Franck is nothing more than an effort toward the best, and this great master medi¬ tated long in silence, seeking his own calling, the right direction of his thoughts ; it was only much later he ^realized® that he had reached his aim.*

Even before 1870 tendencies, at the same time very serious and purely symphonic, were affirmed. Already the first compositions of

♦Three trios, op. 1 (1841).

Saint-Saens (this delightful trio in F dates from 1865) testify to those gifts which were bestowed on him, if one may say, from the cradle : an exceptional surety in writing and scoring, which characterizes the (Deluge } and the (Symphony for the organ. There is also manifested in it, that which Berlioz calls (*

All this musical progress was not checked by the tragical events of 1870, quite the con¬ trary. The admirable score of the (Beatitudes } is known to have been completed by Caesar Franck during the siege of Paris. In the face of so much misery and sadness the soul of the great musician sought refuge

in the word of the Gospel, and found there the accents of divine consolation. His first disciples had already comprehended the beauty of his lessons and example. Alexis de Castillon, dying too young, before he had been understood by the public, left an incomplete work, no doubt, but in which there is to be found great nobility, sustained by a pure musical taste, as that of a very sure calling. More distinctly still H. Duparc was a precursor. It is not to be denied that, at times, one meets with signs of genius in his works. Are we astonished to see this word attributed to simple <(melodies,® to short and unpretentious compositions? The absolute scale has nothing to do with the matter; cer¬ tain Japanese engravings would always be of more worth than a large but common-place ^historical picture.® The profound and mysteri¬ ous beauty of the Unvitation to traveP escapes in the analysis. It is made up of well-known accords, the line is of the most simple, but thanks to the intuition of a great master, for the first time the nostalgia of Bandelaire enters into our art.

By Lalo, de Castillon, Caesar Franck, Saint- Saens, H. Duparc and a few musicians of the theatre, to whom I shall subsequently refer, the impetus was given to the French school. The National Society of Music, founded in 1873, and which greatly favored the scope of our chamber music, seemed at its dawn to be the fraternal union of all the composers. Chimaera, on account of the free and manifold character of our school. The diversity of

- *He had filled the modest part of alto in the Armengaud quartet.*

tastes led to several resignations, among them that of Saint-Saens. Later on, the schism of the I. M. S. (Independent Musical Society) was equally the resulting logic of analogous causes. Like the heresies which marked the most flourishing epochs,

these rivalries and strifes were inseparable from a rich and pro¬ ductive art.

At the time of its foundation the National Society numbered several musicians, the careers of which have since been principally theatrical. With their colleague symphonists they were then the <(young® who were hopefully march¬ ing toward the future. And the public showed them that distrust, so often directed to new works, with which the author has succeeded in forcing an entrance into the Temple of Fame. It was thus that Reyer appeared too modern. His early works, (The Selam,* (The Statue,* displayed that love of the Orient, so natural with us. From the (Persian Night) of Saint-Saens to the (Marouf) of Rabaud, the French musicians have always been attracted by the charm and the distinction of the art of Islam. They did not compete with that (other¬ wise so captivating) manner of Rimsky-Korsakoff or of Balakireff, but adorned with discreet colors that which they showed to be essentially civilized (consult the translation of the (Arabian Nights) by Galland).

Preceding Reyer, Felicien David had an hour of fame ; a musician of disproportionate talent, carried away by a nostalgic remembrance of the desert and of whom Auber so wittily remarked : (

alights from his camel.® Let us not forget either the celebrated melody of Berlioz, the (Captive, J impregnated with the romanticism of the (Orientals } of Victor Hugo, and also call to mind that Bizet took part in this move¬ ment, (The Pearl Fishers, *

years old. () is terminated this rapid review of the French opera and comic opera, before the Wagnerian influence and the kind of revolution which it caused. Truly speaking, the revolu¬ tion was not so sudden, for the use of persist¬ ing themes had already been^found in (Sam¬ son^

At the other musical pole were camped, at the National Society, a group of composers clustered round the professor Caesar Franck. The latter (all

his life one might say, if not ignored, at least unacknowledged by more au¬ thorized artists, and particularly by the musi¬ cians of the theatre) was of a modest disposi¬ tion, humbly earning his living, far from all <(arrivism,® desiring only to realize his sonorous dream ; an enterprising spirit also whose link¬ ing of accords and personal style were little appreciated by his colleagues, with the exception of his pupils and a few other juniors. At the present time everyone renders homage to the angelical purity of his melodies as well as to the fulness of his noble, thought. Goodness predominates in it, a naive, goodness with a serene smile, which, without ignoring suffering, contemplates the world through the hope of his beautiful vision. Moreover, neither humanity nor passion are strangers to him, but he knows nothing of the bitterness of hatred. His art is inspired by the classical symphony, with, however, this very decided principle that the same idea begets the development and the form. By this independence, as also by the boldness of his harmony, so naturally free from all pedantry, Caesar Franck remains one of the fathers of our modern school. Certain accents of divine consolation in the ^Beatitudes* seem to belong to all Christian humanity, more, to

- A kind of exaggeration in the trait and in the sonorous¬ ness, in view of obeying the laws of vrhat he held to be "Stage illusions".

all suffering humanity. His example shows the beauty of the simple chamber music, and was a precious encouragement. But a curious thing which remains clearly defined, is the Northern origin* of Franck; this is particularly noticeable in the way his disciples understood his lessons. His amplitude of style, his calm but vigorous thought, as organist, are not with¬ out a certain heaviness in the realization ; they, however, agree even with the idea. The full accords, the development which is

displayed without fear of levying too great a stress, all these things do not displease us in Franck. It is not always the same with certain pupils ; their noble intention (

The fashion for sombre, motionless and gloomy music yielded, most fortunately, to a reaction, instinctive to the race.. Some fought against pessimism by the vitality of rhythm, others by the charm and the light. . It would seem that, to-day, our younger musicians bene¬ fit by these two victories at once ; and it speaks well for the splendid vigor of our contempo¬ raneous art. The musicians of the Franckist school, f the first who took part in this re¬ action, are Oh. Bordes, A. Magnard, d'lndy, Paul Dukas. The characteristic of d'lndy's disposition is to consider energy, which in his works is quite clearly stamped by the force of the rhythm. Whence the best of his influ¬ ence. Moreover, he often seems sustained by the rhythm, the principal subject of his music. And those of his compositions which testify to these qualities the. most ((Symphonie with piano5; (Wallenstein5) are also those which reunite the highest expressions of admiration. The name of Ch. Bordes, too little known, mer¬ its to be joined to that of his friend and asso¬ ciate of the Schola Cantorum. It is known what devotion and what portion of his too brief life he consecrated to the work of the (Chanters of Saint Gervais,5 reviving the vocal art of the 16th century. But one ignores,

- *Caesar Franck was born at Liege (Belgium Wailon) became a naturalized Frenchman and lived almost always in Paris.*

fl mean by this term, not only the direct pupils of this master, but those who frankly submitted to his influence.

in general, that he was a composer of delightful ideas, naive, fresh and sincere, occasionally pic¬ turesque and always exempt from pomposity. Paul Dukas is connected with this Franckist group, although he came from the Conserva¬ toire. His

works, in the main, so traditionally written denote an accomplished science, a mani¬ fest will in the writing, an orchestral perfec¬ tion often to be compared to that of Saint- Saens. Flis musical personality may seem made up of divers elements, otherwise solidly united. But his most dominant feature is doubtless that vigor of rhythm and development which is ad¬ mired in the finale in his Variations5 on a theme of Rameau, as well as in certain pages of (Ariadne5 and (Blue Beard.5

At the time of the German invasion in Sep¬ tember 1914, Alberic Magnard was killed under tragical circumstances. Of a sincere mind, strong and sensitive, above all a lover of truth — a noble-hearted man, his music bears witness to his qualities. In my opinion his true per¬ sonality is found outside the traces of the teach¬ ing of the Franckist and the d'Indyist groups. Magnard's style is somewhat that of a classic; it is quite anterior to that of our young school. A priori, he distrusted the harmony (yet, some¬ times so pleasing) of Debussy and his success¬ ors. His resources are those of Beethoven, Wagner and Csesar Franck. He declared in his preface to (Berenice5 : <(My score is writ¬ ten in the Wagnerian style.55 He feared the presumption of appearing to create a new style, and kept as models the primitive masters of former times, good, naive artists who cared only to resemble their master. Most fortu¬ nately, however, and in defiance of them, when the instinctive personality commanded, they in¬ fringed on the discipline of strict imitation. Magnard did the same. In spite of the out¬ wardly Wagnerian form, his music, in general, is that of ours. He had the love and the pro¬ found spirit of. his native land that impelled the resistance in which he found his death. And this love discloses itself in the most per¬ sonal of his pages, the best. The rustic enjoy¬ ment, the mirth somewhat rough of the dances which formed his (Scherzo 5 ; the familiar beauty of the French landscape when evening draws near, and the blue smoke rises from the old thatched cottage into the calm air, and the pure, limpid sensitiveness of

a noble and tender soul, those were the accents of an abso¬ lutely original emotion which he interpreted. Verily, Magnard is one of our first and best symphonists.

Outside the school of Franck, the rhythmic reaction had several promoters. To-day ap¬ pears to us the grandeur of the work of an un¬ pretending artist to whom we must give a proper rank as historian and composer : Bour- gault-Ducondray. His lyrical drama of

- *Which are also, we have remarked, those of the art of the Gregorian Chants.*

years, seem to have been remembered by our French music, in order to realize certain ar- chaical or naive coloring (for instance in (The Childhood of Christ) by Berlioz). But gradu¬ ally the ear again began to understand and love them, realizing all the beauty to which they might be the support. Caesar Franck and above all, Chabrier, Faure, Debussy came at times, to think naturally by means of these gamuts. They are written to-day in as fluent and instinct¬ ive a manner as the classical major and minor. Our art inherits a priceless antique treasure, the language of contemplation and mystery. And the old Celtic groundwork of our soul finds again, in song, the modes of Brittany of ancient times. At the same time (and to begin with Chopin who was the first to proclaim the splendor of the starry night of which the classics thought so little, and which is adored by modern music) was revealed the grandeur of the Slavonic dream, the vast domain of which extends from the popular airs purely Russian, to the chromatic melopoeias of the Musselman world. The Andantes, so exceed¬ ingly nostalgical of Borodine, the dancing choruses of (Prince Ygop so pro¬ found in his imperishable melodies from which the true nobleness (to the contrary of hypocriti¬ cal common prejudice) of the

soul of Verlaine is released and lastly Debussy, whose (Prelude to the Afternoon of a Faun) came like a thun¬ der-bolt, in 1892. The first of modern musicians, these three masters revealed to us a clear and measured art, really ^Mediterranean,® thor¬ oughly French.

Emanuel Chabrier, so truly original and to whom our school owes so much, offers the ex¬ ample of a very free artistic nature, very naive, — superior on the whole : to have the down¬ right courage to affirm and to write whatever one likes, no matter the subject and the char¬ acter. His natural good nature, rich in enthusi¬ asm and tenderness illuminated the music with happy joyous rays. Its greatest charm is, not only the pleasing sonorousness, but especially a simple mindedness, just and good. Some critics only grant him the genius of the comic art : a very narrow judgment. Without doubt Cha¬ brier was a wonderful author of parody ((The

Star, and, (The King in Spite of Himself,) are in a way master-pieces) but he was also a refined artist, a lover of musical beauty and of the picturesque. He showed, if one may say so, an entire lack of pedantry. Coming from the operetta, one discerns in this unassuming artist a charming resignation to be only what he is. In other respects, by his melodious liveliness, his discoveries in harmony and the charm of his personality, he seems to me greater than one would imagine. If he were free with regard to subject, no one more than he was more submissive to the reasonable claims of the ear. But while satisfying, for his own pleasure, the secret instinct of that ear, he justly respected the true rules of art, those hidden, mysterious principles, moreover in¬ finitely varying with the works, and which the intuition of the artist alone knows how to obey. In this way Chabrier acquits himself of the first duty of every musician, as our young French school understands it to-day.*

Very different from Chabrier, the same cult of the

sonorous beauty, the same very frank, decided will to write whatever he likes, also characterizes G. Faure. His most uncommon gifts which have sometimes made us say (as of Gounod) that he is ((music itself, ® com¬ bined with such exquisite taste and prophetic imagination, G. Faure is one of our greatest masters. His art is like that of the ancient Hellenes, of an entire purity, discretion and harmony, not excluding, however, depth and penetrating charm. The construction of his phrase is really inimitable. In order to de¬ fine these words <(Faure's way® you might as well crush the marvelous wings of a butterfly between your benumbed fingers. One cannot explain the great and delicate mystery of the and there is a magic in this music, so mysteriously, so entirely musical. Besides, it did not require much to make Faure's song heard with still greater force. He seized the opportunity and conquered. His Prome¬ theus^ at once simple and concise, shows splen¬ did vigor. His Penelope^ of a wonderfully Greek art, interprets the eternal humanity of the old Homeric legend.

This style scarcely offers anything else but known accords, linked, however, mostly by <(ex- ceptional resolutions® very new and altogether characteristic. Debussy, likewise, makes use of many new Sinkings.® But let it be distinctly affirmed that he possesses all the fine qualities of a French classic. If he be essentially of our epoch (in order to give a more just expression to contemporaneous appreciation, no one ever appeared so precisely at the right moment) if, by this happy concordance Pelleas and Melis- ande> (in spite of so much that is surprising

in the style) called forth numerous and sincere commendations, it is none the less a perfect classical work. At the present time^ we dis¬ cern in it that good sense which knows how to reserve its means; one enjoys the soberness of the writing and scoring.

It is false to say that (Iberia. > You will be convinced that it is not a question of "sonorous dashes® set down by chance. It is the freshness of a sketch in front of the landscape combined with the quality of the pictures of finished composition. Lastly, like Chabrier and Faure, Debussy has never looked upon the charm of music as a faulty thing. And the neopaganism of this tendency has only that which elevates it. It is none the less opposed to the materialism of the theatre veritist than to the scholasticism of misunderstood tradition. A pantheist, he adored, as divine, the beauty of the material, or if one prefers, he decks it with all that is divine in man, that is the exact opposite to commonplace art.

In France, at first, and for a few years in foreign countries the repercussion of this music has been considerable.

(The Pavan for a deceased Infant, > by Ravel, at first appeared confusing; it strikes us to-day by its classical and regular beauty.

After

pansion, these are many of the reasons which are at the origin of the means of expression of Debussy, as of Ravel. The charming (Elegy } of Raymond Bonheur may remind us of some expressions in the (Chosen Damsel y ; it would be absurd to see a "copy® in it. (The real copy does not exist in music and plagiarism only ends in tame repetitions). One hears also in the earlier works of Erik Satie (especially in the (Son of a Star}) some curious <(parallel movements® which it is possible Debussy and Ravel kept in mind. Moreover, every artist must possess some genuine originality in order to be inspired with success by the chance dis¬ coveries of a colleague. Thus Wagner ac¬ quired certain harmonies from Liszt; Debussy does not ignore some pages of Monssorgski. But the result of it was beauty and of quite a personal kind. If young musicians, in their turn, have walked in the footsteps of Debussy (continuing in case of need to venture into the

pathways, the starting point of which he has pointed out) it would be foolish and wrong to quarrel with them. The whole history of art is composed of rich and fruitful influences, terminating in original works; and we have only to judge by the results.

The history of the Debussyst revolution is then only a natural episode of the onward march of our musical art. The origin of this progress dates from more than 20 years, and this lapse of time permits us to measure the fulness of its effects. We now perceive much better, that a refined harmonious ele¬ gance does not exclude, either a sound musical condition or even force an intense expression (quite the reverse), or the simplicity of the whole which includes many more mysterious reasons. And this irresistible thrust was the last assault against the fortress of ((false dog¬ mas.® We can thus make the enumeration.*

1. Rules of harmony prohibitiner certain linking of accords ; certain arrangements of suc¬ cessive seconds, fifths, sevenths or ninths ; false connections, appogiaturas or retarda¬ tions heard with the true note, irregular resolutions, etc. Contemporaneous scoring has definitely acquired liberty; but it is easy to find many a derivation from these rules in Pales¬ trina, Monteverdi, Bach, Mozart, Beethoven, Chopin, Caesar Franck, Gounod, Bizet, Saint- Saens, Bruneau, Chabrin, Moussorgski, Boro- dine and more recently Faure, Debussy, Ravel, Schmitt, etc. The right to these liberties is then ancient classical and just. They have formed the subject (with some examples taken from the French school) of a remarkable book by Rene Lenormand (Study of Modern Harmony. > But this is only a small portion of the license, so necessary, taken by our music which, from all sides, breaks through the too narrow restric¬ tions. Let us note also :

2. New views on the tonality and on the modulation. The ancient Greek modes serving as the natural expression of the phrase; the modulations written with great independence: some pieces exist which have no longer the unity of tone of past times, but

keep a con¬ tinuation, a cohesion, an incontestable musical logic (moreover, we must call attention to the importance accorded to the unity of sentiment of our day).

- Let us remember here the exceedingly interesting work of our colleague John Hure, ' Musical Dogmas.'

3. Liberty of rhythm and of melodies. Dis¬ appearance of the prejudice of the <(width® sometimes even of the bar of measure. Rhythms varied and animated as in those of blank verse.

4. Liberty of the symphonic style which may adapt itself to anything else than to the scholastic development, called (

5. Finally, the very accurate idea, that the magnitude of a work is not measured by its material duration , or its sonorousness, neither to the more or less forcible hold of the rhythm, but to the beauty, the elevation of the idea, and to the harmony of its develop¬ ment ; the whole being only a matter of pro¬ portions.

The history of the French symphony has made us temporarily abandon that of the theatre. But at the present day our best musicians make no absolute distinction between these two acts. The theatre adapts itself very easily to a symphonic style, as a proof, that of Mozart. In every instance, good music is necessary and no exigency of scenic action would excuse bad music.

In what might be called the ((theatre of the soul,® the first example was given to us in the < Dreamt by Alfred Bruneau, the music of which, so sincere and faithful, interprets the emotions of the heart in a language which is not out of date. Under the influence of Zola, Bruneau has since reverted toward a broader style of art, of great force in

(Yola> and the (Habanera, of vivacious and characteristic character.*

In this history of our modern art the comic theatre merits a place apart, none the less from the value of the works than the tendencies which they announce : the conception of purely musical laughter. The operetta and the former comic opera aimed still more at agreeable music, amusing, gay, superficial on some oc¬ casions; and the laughter sprang from the text, from the performance of the actors, more than from the musical style of interpreting the inner sentiment of the character; scoffing, bantering, or ridiculous. And that is quite a new notion for the public. (The Star of Chabrier, had no success : an admirable parody, the comic of which was not discerned (yet, intense, and so evident to cultivated ears). Besides, this pecu¬ liar language of music, from which the smile is born and out of which springs laughter, some examples are already met with in certain pages of the <(King in spite of himself,® in (Carmen,* in the ((King has said it,® by Leo Delibes, in (Phryne' of Saint-Saens, even in (Madame Angot's Daughter * by Charles Lecocq. What¬ ever may be the cause, musical comedy is not yet completely realized, in which the composer closely follows a poem from real life (as the author of the (Dream* and of (Pelleas) have done in the domain of tragedy). But these last few years have seen two very interesting attempts due to musicians of the highest order, (The Spanish Hour,* by Ravel, and (Marouf,* by Rabaud. The music of Ravel is the exact interpretation of the parodic and fantastical humor of the poet Franc-Nohain. The serious¬ ness of an inperturable dry-jester, the precision of a highly lucid mind, a historiographer of puppets, an insinuating style of an irreproach¬ able appearance; all these form an entire as¬ semblage of the most characteristic and novel kind. The inimitable (Stories from Nature> (prose by Julius Renard), already asserted that sense of the comic in Ravel, of an imagination, so apart, and which to be appreciated at its true value, demands a real musical culture. In (Marouf,* Rabaud superbly*

revives the comic opera, transfigured, thanks to a masterly. sym¬ phonic style. The real musical comic is re¬ vealed more than once, the talent beyond com¬ parison of the principal interpreter, G. Perier, completes the whole. The ampleness of style is not prejudicial here to the equilibrium of the proportions, nor to the gaiety; and the oriental coloring, never monopolizing or artificial, is harmoniously blended with the. music itself. It goes without saying that in this gen¬ eral review and considering the richness of our school, a great number of our talented composers cannot be studied here. Let us not omit, however, a few of the prede¬ cessors of Rabaud, notably Messager, with his amusing, and concise (Basoche, and G. Pierne in his (Tabarin's daughter,* as well as in his witty songs, or still more so his ((Scherzo® of the (Year one Thousand) in which his disposi¬ tion is happily exhibited. Midway between the drama and the comic opera,*

the testifies a profound love of his native land; Ladmirault, Duhamel, Paul Le Flem who transcribed some popular songs or were happily inspired by the moor and the forest of Brittany. And we can connect with these John Hure, a fervent admirer of the Geogorian chant, and the ancient modes. A few French provinces have their own lan¬ guages. We have mentioned the Basque airs of C. Bordes ; the same comer of French soil is evoked in the of Ravel. D. de Severac is faithful to his Languedoc; Paul Lacombe (of the generation of Saint-Saens) is inspired by the radiancy and the happy philosophy of the South. The familiar muse of F. Berthet, sensi¬ tive as much as restrained, retains the beloved memory of the friendly slopes of the Beau- jolais; that of Dupin shows that he has been brought up under the misty skies of the North, in the atmosphere of country fairs: a "popular® musician in the best sense of the word. The soul of the humble, of those whose lives are hard, resounds in his*

voice, resigned and digni¬ fied, wherein mutters a great spent force, break¬ ing out into violent explosions, sometimes into gaiety and enthusiasm. Fanelli precursor, in many respects, and whose (Pastoral Impressions) contain some real beauty, cannot either be classed in a very definite manner. Lastly, a few composers — more often organists — at¬ tracted by preference to sacred music, also re¬ main in a way isolated — as Tournemire whose forcible and high class work (note particularly his VI Symphony) are not of those that will pass away. There were often strifes between such groups. It would be wrong to deplore them; they show the free vitality of our art; as a tree of vigorous sap branches out naturally. Likewise, one remarks with us some logical schisms which are inevitable. The National Society after a first breach (departure of Bizet, Massenet and Saint-Saens) saw also the detach¬ ment of the Independent Musical Society, "I. M. S.» at the same time in which the National Society seemed to assemble and to play, espe¬ cially, the 'works of the pupils of the Schola Cantorium, where the principles of teaching were applied by d'Indy. The I. M. S. in¬ voked rather the general ideas of Moussorgski and of Debussy, their style being equally di¬ rected toward the music of Chabrier or of Faure in preference to that of Dukas or of d'Indy. They thus comprised the greatest num¬ ber of composers who had been enthusiastic

- *It is thus manifested in his exceedingly beautiful inter¬ pretation of a nostalgic popular Song of the Sailors of Brit¬ tany.*

over the conquests of the "Debussyst movement.® The rivalry of these two groups did not occur without exciting their energy; a great number of interesting works were heard (temporarily put on one side by the committees of the grand concerts Colonne and Lamoureux, always more timid in their choice) ; notably, at the orchestral recital of the I. M. S. the superb of A. Roussel, a sensitive and profound musician; (Margaret's Garden) by Roger Ducasse ; and the Hasselmans concerts, the (Heliogabale by D. Severac. And a com¬ plete pleiades of musical*

directors, active, re¬ markable musicians, confident in the art of the future, such as, Ingelbrecht, Rhene Baton, P. Montense, Robert Schmitz, gave ample proof in the most brilliant manner. Aided by these societies (and by others which have sprung up since the war), the impetus of our present chamber music requires that we stop there. The characteristic of these recent works seems above all, vitality.

In conclusion, ancient Greece, far back in the ages, remains our imperishable model. But we perceive that at the present time, even the gamuts of her music have become familiar to our understanding, and that we are also pene¬ trated afresh by the beauty of the Gregorian chant. Therefore, we may hope for a return to a higher sacred music, less theatrical and as it was formerly, more collective. The art which will resound in this manner, whether it be in the church, or in laical hvmns at National ceremonies, will, moreover, have benefited by all these discoveries of the expression of a subjective and personal art; and the latter will none the less continue its vitality, whether in the theatre or in the symphony, also as in that which we call "melody® for piano and singing (with us so distinct from the German "lied®), or again in compositions of the same kind, but more developed, in which whole pages of prose would be interpreted in a familiar action, a "musical novel.® One sees the variety of ways in which our music may be handled with fresh resources. The present is a guarantee for the future. And this present is linked to the past, it continues and completes it.

Charles Koechlin,

Composer, Music Critic of the Gazette des Beaux Arts, Paris.

18. FRENCH ART. The Sources of the Renaissance.— Art in France, as in all Euro¬ pean countries, emanated — in its two essential forms, sculpture and painting — from architec¬ ture. Frescoes and statues, exclusively of sa¬ cred legends, served to decorate the churches and palaces. It was but gradually — during the last five centuries only — that French

paint¬ ing especially, has been divided into historical painting, landscape painting, genre and still life, and that sculpture has, according to Spencer (who explains the evolution of the history of

art by the law of differentiation), become "heterogeneous" through the variety of sub¬ jects, both realistic and ideal, of which it treats.

Mosaics play a prominent role in the dec¬ oration of basilicas, and later of Christian churches ; Byzantine influence extended to icon¬ ography and to the miniatures in missals. The development of art, from the Roman churches of the 11th century to the Gothic cathedrals of the 13th century, attained unpre¬ cedented perfection. The sculpture of the cathe¬ drals of Chartres, Amiens, Rheims and Paris — by their simple and exquisitely naturalistic forms — realized the highest ideals. The dec¬ oration of the fagades and the portals, like a living encyclopedia, fully reflects the faith and the aspirations of an age of earnest religious belief. All the industrial arts, ornamental sculpture, cabinet-work, church windows, mis¬ sals and goldsmiths' work, were in unison in the Middle Ages in France. The director of the work was, at the same time, sculptor and painter as well as architect. In the 13th cen¬ tury, French decorators turned aside from By¬ zantine rigidity and archaism (Sainte Chapelle de Paris, and Donjon of Coucy, the latter de¬ stroyed in 1917 by German vandalism). Then the workmen were employed in decorating the dwellings of the nobles. Charles V and the Due de Berry exercised a great influence over the French school. The court of the Due de Bourgogne vied with that of France in the magnificence of its arts; calling itself the great Bourguignonne school. The Chartreuse de Champniol near Dijon, is the most significant example. On the other hand the works or¬ dered by the popes during their sojourn in Avignon were not without their

influence on French decorators, bringing them in contact with Italian artists.

Jean Fouquet, a portrait painter, limner and fresco painter, connected with the court of Louis XI, made this progress still more appar¬ ent. Jacques de Litemont decorated the chapel of the house of Jacques Cceur in Bourges. The sojourn of the court on the banks of the Loire brought a great many artists to Tour- aine and those from Italy brought with them the new lessons they had learned from antique art.

Jean Bourdichon of Tours and Jean Perreal, brought back by Charles VIII when he re¬ turned from his expedition to Naples, rivaled the ultramontane artists.

With Francis I Italian decoration and style reached their zenith : at Fontainebleau, the king placed a great many painters and artists skilled in stucco under the direction of Primatice, which resulted in the beautiful gallery of Francis I — one of the most perfect "ensem¬ bles" that the Renaissance has produced. Un¬ der Henri II and Catherine de Medici the school of Fontainebleau followed their lead. While French architects and builders attached to the kings of France erected the Chateaux of Gallon, Blois, Vendome, Chenonceaux, Fon¬ tainebleau, Ecouen, Anet, Chambord and lastly the Louvre and the Tuile'ries, which have made the names of Pierre Lescot, Philbert Delorme and Jean Goujon illustrious, their wonderful tombs and fountains are to be seen everywhere. Conspicuous in French sculpture are the names of Michel Colombe and of Ligier Richier, and later, in the reign of Francis I, that of Jean vol. 11 — 44

Goujon (who was the first in France to do bas- relief), and of German Pilon.

The 17th Century. — During the great ex¬ pansion of the Renaissance, wherever the influ¬ ence of the Clouets (portrait painters of psychi¬ cal insight) predominated, French art main¬ tained the greatest

independence, notwithstand¬ ing the official pressure brought to bear in favor of Italian art. At the end of the 17th century, art had but one head — the king; and he ex¬ pressed but one idea: absolute power. French art became monarchical, reflecting the absolute majesty of the sovereign, and his servile flat¬ terers, who could and did say of the state : "It is I." It was now necessary to have a dwelling proportionate to these excessive pre¬ tensions. Architecture, painting and sculpture basked in the sunshine of royalty. It is not quite natural for people to submit to such rigid rules. Even the gardens became monarchical in style, everything was imperial, theatrically pompous; then followed the portraits of a Ri- gaud, a Nateuil, and even the pompous divinities in the garden of Versailles. The methodical minister, Colbert, formed a comprehensive plan for the protection of art. Frangois Mansard, who built the palace of Mazarin, was imitated by Claude Perrault who constructed the splen¬ did colonnade of the Louvre; and above all by Hardoin Mansard, his nephew, who designed the palace of Versailles, and the chapel and the dome of "Les Invalides."

Sculpture, in its turn, was held in leading strings. Girardon Coysevox, Nicolas Coustou and Lemoyne designed great works along these lines. It was only the genial Pierre Puget whose ardent and passionate temperament would not yield to discipline. Thus he lost the favor of the public, who leaned toward the style of LeBrun in his great decorative enter¬ prises. It was these artists who peopled with marble Versailles, Trainon, Marly and Saint- Cloud.

In painting there was the same love of display, except in the works of the Le Nain brothers, who portrayed the peasant. Simon Vouet, in the reign of Louis XIII, ushered in LeBrun. Nicholas Poussin, whose style in historical landscape is unsurpassed, lived in re¬ tirement in Rome, where he formed the style of Claude Lorrain — a wonderful analyzer of light, — aside from this movement in which even the austere Philippe de Champagne and the suave Le Sueur took but little part, LeBrun is the artistic spirit

of the 18th century in France. The position of Director of the Academy having been created for him, he grouped the artists as he wished. To him is due the stately gallery of Apollo in the Louvre, and his artists Lemoyne, Monnoyer, Audron, Berain, Bourdon, Coypel, la Hire, Jouvenet, Van der Meulen, Regaud and Largilliere painted por¬ traits in a wonderful dashing style. Decorative art reached its apogee in the Gobelins manu¬ factory of tapestries supported by the govern¬ ment, and in the cabinet work of the Boule family.

Exceptionally original talent was now seen in engraving — that of Jacques Callot.

The 18th Century — A very natural re¬ action from the pompousness of the 17th cen¬ tury resulted in the piquant grace and the sen¬ suality of the 18th. Caprice and subtle deli¬ cacy took the place of dull etiquette. "Pretti-

ness® replaced "the Beautiful.® Art declined. The "Rocaille® and "Folies® styles succeeded. Nevertheless Gabriel, the architect, did not as yet abandon the deep-rooted traditions of his predecessors which he embodied in the fagades of the Palace de la Concorde. Soufflot, in the reign of Louis XVI, inspired by antiquity, built the Sorbonne in that style. But architectural style now aimed rather at "comfort.®

Sculpture was flourishing, after the style of Jean Baptiste Lemoyne. Two eminent sculp¬ tors, Pigalle and Houdon, partially escaped this craze, especially Houdon who made such a powerful bust of Voltaire. But the idol of the boudoirs was the voluptuous Clodion, whose very worldly creations seem to be caressed by the hand of Love itself.

Painting was in every way typical of the taste of French society in the 18th century. The pastorals of

Franc Boucher; the fasci¬ nating "Fetes galantes® of Watteau ; the charm¬ ing nudes of Fragonard, sounding the praises of woman; the great Chardin, a man of the middle class, who escaped the false manner of his time, which engulfed Joseph Vernet, Hu¬ bert Robert, Oudry, Lancret and Pater, paint¬ ers of marines, of landscape, of the chase and of gallantries; the sentimentality of Greuze and the archness of Madame Vigee Le Brun are offset by the keen penetration of the por¬ trait painter Quintin Latour, a capricious pastel artist.

The 19th Century. — Another reaction took place. David revived the ancient Greco-Ro- mano, and his horror of the license taken by Boucher led him to adopt a very severe style of art. His influence on his time was great. The David school, which had its origin in the painting of (The Crowning of Napoleon I,* includes the names of Drouais, Girodet, Gros, Guerin, Gerard, Leopold Robert and also In- gres.

Jean Dominique Ingres detached himself completely from the heroic style of his master. He was a forcible and skilful draughtsman, psychological, intense, a sensual "feministe,® and excelled the fascinating founder of French Classicism, but like him he confined himself to an setheticism which sprang from his "esprit® which was inferior to his temperament. The gentle and pure Prudhon was inspired, as well as David, by antiquity, but from a different point of view, that of vague dreaminess. Ro¬ manticism made its appearance with Gericault, the spirited and bold colorist of (The Ship¬ wreck of the Medusa. > Romanticism, there¬ fore, burst forth with a flourish of trumpets. Delacroix made his appearance, — lyrical, agi¬ tated, masterly and ever restless, an excellent colorist and a dramatic pessimist : he is Byronic, reminds one of Berlioz, ranks with Shakes¬ peare and anticipates Wagner. Songeur Ful¬ gurant is the embodiment of lyric art separated from schools and epochs. Almost at the begin¬ ning of the century Delacroix foretold the end. He was ignorant of the broken tones, which had been slightly discerned by Andrea del Sarto and Watteau, — the theory of complementaries as applied

to pictures. This resulted in Dela¬ croix being (1830) fully imbued with the Im¬ pressionist revolution which developed toward the year 1865. The feverish earnestness of his great spirit enabled him to surpass Ingres, pro¬ duce a contrary current throughout the entire

country, — a stiff breeze of independence. He repudiated codes and dogmas, and taught that the law of art is the scrupulous cultivation of individual expansion.

The struggle between Classicism and Roman¬ ticism was violent, and it soon gave place to another enemy — Realism. Romanticism spon¬ taneously engendered from the soil an admir¬ able school of Romantic landscape — Theodore Rousseau, who set his skies aflame as with pre¬ cious stones and blood; Daubigny, self-con¬ tained and affected; Troyon, an animal painter as vigorous as a Dutchman ; and Dias, florid, the votary of a muse too studiedly grounded. These landscape painters, followers of Ruys- dael and of Claude Lorrain, possessed — besides the qualities of these masters — great keenness of perception, and the new theory of the vi¬ bration of color absorbing the contour with¬ out losing the form ; and laying less stress on the drawing of the trees and hills than on the feeling for open air values.

And now comes the line of Romantic Real¬ ists instituted by Decamps, the Orientalist ; these will continue in Marilhat and the dainty Fro- mentin, one of the most limited in range of any of the artists of the Romantic school, and also Daumier, a superb worker in black and white, who, in addition to his celebrated lithographs, did innumerable small panels which are very expressive, thrillingly tragic, and of a grand and sombre spirit. The Romantic realist Courbet — the grandson of the bitter Gericault — fol¬ lowed; then came Edouard Manet. Camille Corot, however, the follower of Poussin, bathed his scenes from Virgil in a diffuse, angelic and superb light. The damp, chilly charm of the morning, the veiled mysteries of the evening, are the themes he chose.

Corot is a unique master in French art. He has a very fasci¬ nating, delicate and consummate charm. An¬ other man standing alone is Jean Frangois Millet, known as being the interpreter of the sad figures of peasants in the fields. Both be¬ longed to the Barbizon school (q.v.).

Courbet modified the trend of Romantic art ; he took the lead in realism, and was an artless, vehement and capable leader, forming his views directly from life, of excellent health and in the first rank of historical painters. His style was degraded owing to the influence of the followers of Ingres, and he was fully imbued with the spirit of Flandrin — the con¬ ventional and insipid painter of the nude, — and by Manet, — the Franz Hals of French soil. Round him are grouped Ribot and Bonvin.

At first under the influence of Velasquez, Goya and Franz Hals, Manet tried his skill and found the bent of his genius. He eliminated all bitumen from the palette, which left only the infinite combinations of the seven prismatic colors. He transformed Romantic Realism into a vision of modern life and was noted for representing the manners and customs of the second empire. He is not understood. The well-known and conscientious critic, le Caf ouent, paid him tribute 20 years after his death. His <01ympia) has at last been placed in the Louvre. Manet broke off all connection with the Im¬ pressionists, but before taking this important and reactionary step he restored to their rank two illustrious men who, in the midst of Real¬ ism, mark the return toward mystic dreami¬ ness : one of them is Gustave Moreau who

carried out the heroic and legendary ideals of Eugene Delacroix in the dreamy magnificence of the Hindoo palaces, in the luxurious hier- atisms of Hebraic royalty and in the fabu¬ lous Hellas. He was a visionary idealist. The other one is Puvis de

Chavannes, so long mis¬ understood, who is the greatest fresco painter of the 19th century, the author of Sainte Gene¬ vieve of the Pantheon, of the celebrated mural decorations of the Sorbonne and in the United States of the Boston Public Library. He was not only a great painter, but a great poet. Impressionism now became noted. This style, however, was followed by neither Fantin- Latour — devoted to Wagner and Virgil and an earnest and serene portrait painter — nor by Carriere — happily inspired to paint his Ma¬ ternities in monochrome. To explain better the spirit of these designs let me say that Car¬ riere did not permit himself the use of color.

Impressionism is a special study of light. Claude Monet, a fellow-worker with Manet, came into notice about 1867 ; he encouraged landscape painting founded on the vibratility of ambient light. The Impressionist school took its name from a picture by Monet, modestly entitled UmpressionP which was ridiculed. The name of this work so ridiculed became a rally¬ ing point. Luminous effects predominate in the vibrating marines of Claude Monet. His pictures (a series of cliffs, of mill-stones, of poplars and of cathedrals), copied at every hour of the day, all from the same angle, are different aspects of the same theme under the effects of the sun's rays. Monet employs the method of separating the tones ; under his brush inanimate objects volatilize into irides¬ cent and versicolored phantoms.

Near Claude Monet struggled Sisley, Renoir and Camille Pissarro, who immediately fell under the spell of the ((Petits Maitres,® fore¬ runners of the Impressionists, Boudin and Lepecie.

If Monet affiliated with Claude Lorrain and Watteau, Renoir followed the 18th century and Boucher, but a Boucher of a different power. Exceedingly appreciative of female beauty he embodied it in creatures charmingly natural and glad to be alive and he thus expanded only beautiful flowers of flesh under the rays of light, that they seemed to drink in at every pore. He was the great painter of the (Moulin de la GaletteP the gem of the Caillebotte

Gallery, Luxembourg Museum. Berthe Morisot left a series of water-colors, exquisite, spirited and of refined taste, painted in a style between that of Manet and Renoir.

Alfred Sisley was like Claude Monet, with the exception that he laid much less stress on the experimental demonstration of a theory of art. His subjects, the environs of Paris, are noted for the quick and accurate perception and the light touch with which they are treated. Camille Pissarro sang, in a generous and frank spirit, of shepherds, market-gardens and Nor¬ man villages.

To these names let us add that of M. Degas, one of the most keen and least charitable ob¬ servers of the life of to-day, a careful student of jockeys, an unkind humorist and a wonderful draughtsman ; and also those of M. Raffaelli, the late Monticelli, Lebourg and Guilla.

The teachings of Impressionism, even though denied by the corrupt followers of Ingres, Cab-

inel and Bouguereau, who was greatly Ital¬ ianized, and by Meissonier and Gerome, (

Before mentioning the names of the young generation it would be well to note those of the traditionalists® who defend — and some¬ times with great ability — the academic tradi¬ tions. They are the pure and Giorgionesque Henner, a painter of nymphs with ivory bodies ; the classical Delaunay; the severe Jean Paul Laurens, portrayer of a civilization that has van¬ ished ; the melancholic Cazin with his fine fancy; the vigorous Roll; the delicate and nerv¬ ous Henry Levy; in fact all the members of the Institute; Benjamin Constant; Bonnat, a pronouncedly pedantic painter, director of the <(£cole des Beaux Arts® ; M. Detaille who rep¬ resents military painting, cold and panoramic, never painting a graceful detail ; M. Carolus Duran, an elegant virtuoso ; MM. Flameng, Jacques Blanche, and Antonio de la Gandora, a skilful poser of female figures.

All these exhibit in the salons, either in the <(Societe des Artistes Francais® — in which the most noted names are those of MM. Jules Adler and Hanicotte — or in the ((Societe Na¬ tional® where MM. Cottet, Lucien Simon, Aman Jean, Rene Menard and George Des- valliere compete with them.

This digression ended, we must — in order to describe those who fell heir to Impressionism — single out two men who stand apart, whose talent though incomplete is not without great merit ; Paul Ganquin, the painter of Polynesian scenery and luxuriant vegetation in decorative pages, and Cezanne. From them proceed the rising masters of to- morrow who win distinc¬ tion in the ((Salon d'Automne® and the <(Inde- pendents® : MM. Vuillard, Signac Bennard, Maurice Denis, George D'Espagnat, Dufrenoy and Marquet. All enthusiastic young painters of exuberant vigor, working very hard and taking pleasure in it and who, notwithstanding their exaggerated colorists, do not despair of attaining renown in the true and liberal French school.

The limits of this brief study compel us to name, only, the illustrious draughtsmen, whimsi¬ cal painters or humorists, engravers, water¬ colorists and lithographers, who recall Dau¬ mier, Constantin Guys, Gustave Dore, Avarni and Toulouse-Lautree, who bear witness to the originality and fertility of French imagination and humor; they are Bracquemond, Lepere, Cheret, Willette, Odilon, Redon, Forain and Louis Legrand.

What are the leading tendencies, the main currents which govern French pictural art to¬ day? Impressionism henceforth is to take its place in history. It was always recognized that this was not an isolated manifestation, a contradiction to the traditions of the veritable school, but on the contrary a logical return to

such traditions which had been tainted by a degenerate Italianism. As a matter of fact it is academicism and not impressionism which is really international. Impressionism may be de¬ fined as a reactionary movement against the Greco-Latin spirit and the scholastic organiza¬ tion of painting such as had been imposed on it after the Second Renaissance, by the School of Fontainebleau, Louis XIV's century, the School of Rome and the consular and imperial style. It is also a no less normal reaction against the dark and bituminous style of the degenerate inheritors of Romanticism. In 1850 the sun, which shone alike for all, did not ap¬ parently cast its rays on the students' work¬ shops. The impressionists, however, by dili¬ gent travail, sub jove crudo were able to rectify this omission. It was Turner's ex¬ ample which determined Claude Monet and Pissarro in 1871 to modify entirely their pal¬ ette. These two masters, at that time young, were struck with admiration by Turner's land¬ scapes in the National Gallery of London. They perceived on studying his pictures that the white effects of the snow were obtained by polychromes and realized that the proper tech¬ nic to be established was that of the division of tone. They accordingly eliminated the earths and the blacks from their palettes. Im¬ pressionism was therefore especially a technical movement, a revolution in the art of preparing and composing the palette, in a word, a method, a means, a tool, thanks to which artists suc¬ ceeding them were able to make a great devel¬ opment in decorative art. The impressionists knew that color does not exist by itself, that the coloring of objects is merely pure illusion, the creative source of the colors being the solar light which reveals and diversifies the objects according to the hours of the day and the state of the atmosphere. Drawing and color exist together in nature ; without light there is neither color nor form. It is by light alone that we conceive that a drawing is the limitation of color and its contour. That is why, basing their theory on this, — justified moreover by the works of Chevreul and Helmoltz, — these in¬ novators decided to employ only the seven primitive

tones of the solar spectrum, thus fol¬ lowing light itself. In this way they brought about the suppression of the local tone with a view to bathing their landscapes in an atmos¬ phere of a continually diversified character. They consequently sounded the death knell of the old academic conception of (

science. Impressionism has rendered immense service to contemporary painting, renovating it, invigorating it and rejuvenating it. It is one of the most beautiful artistic movements in the history of art. It has brought a gust of pure air, a caressing touch to a superior nature. The work of the masters of this school is one of light and a feast for the eye. A landscape by Monet stimulates the imagination ; we look at a canvas of Berthe Morisot and for the time we live in a delightful park. The influence of French impressionism on foreign painting was equally felt; in Germany, Max Lieberman, Felix Borchardt, Gothardt Knehl, Karl Koep- ling, abandoned, in order to follow this new movement the symbolic romanticism of Boek- lin and the academic traditions of Stuck; in Norway, Thanlon, Carl Larson, Skredsvig, Dereks ; in Denmark, Kroyer ; in Belgium, Claus, Verheyden, Theo Van Ryselberghe; in Spain, Anglade, Dario de Regnoyos, Sorolla ; in Italy, de Sezantine ; in America, Lewis- Brown, who followed de Mault and Degas, and those brilliant virtuosos Morris, Miller, Frieseke. The direct followers of impression¬ ism were the ((Pointillistes.® They brought the ((broken touch® method to a greater degree of perfection, but instead of combining the ^primary® or pure colors on the palette they represented them by dots of unmixed pigment laid side by side on the canvas in order to con¬ fer a high pitch of vivacity and an increase of luminosity to their works. The Pointil- listes were too often scholars and theorists who made a profound study of the laws of solar analysis. They were criticized in a bantering manner and their work compared to a display of so much confetti; indeed it could be objected, not without reason, that their theories of a cold mathematical precision left no place for that spirit of inspiration and creative

imagina¬ tion sought for in masters. They left nothing to chance, there were no effects at virtuosity, no liberties taken with the palette. It is not surprising therefore that* we prefer their aquarelles to their more pretentious works, as they are more spontaneous, more directly ap¬ pealing and quite often exquisite. Impression¬ ism and Pointillism are really so much technic or methods employed to obtain the maximum of luminous saturation on a canvas.

Now a fact quite understood and appre¬ ciated by painters is that a painting should not confine itself to an undue influence of light, and paint anything provided ((it is clear.® Compose, construct, plan large decorative sur¬ faces, balance beautiful quantities, reduce to a proper sense of proportion, thought and sen¬ timent, even a dream, a poem, a symbol, such was the program the followers of the mas¬ ters of 1874 to 1880 outlined. In this eminent role is one of the most famous painters, so misunderstood to-day — Paul Cezanne. Cezanne felt that after such prodigious labor of analysis it was essential to establish a synthesis and re¬ compose after having dissociated. In the quietude of his little home at Aix-en-Provence, Cezanne worked incessantly; according to him impressionism was only a means toward an end — composition and style were his aim, his ultimate goal. This was what he taught to the younger school and it earned for him the repu¬ tation of being a ((primitive® artist so different were his pictures to the easy and anecdotic

art then prevalent in the salons. Gauguin vul¬ garized the Cezanian composition and contrib¬ uted, like his master, to the substitution in the minds of their followers of the sense of the actual for that of the ephemeral. Similarly a curious and refined creator, Gustave Moreau, formed quite an elite of colorists : Desvallieres, Piot, Rouault, Flandrin,

Evenepoel, Matisse, Lehmann, Marquet, Braut, Guerin, Manguen, Milcendeau, Bussy, in whom he inculcated a taste for culture and a love for the masters of the museum. The influence of the myste¬ rious harmonist Odilon Redon should likewise not be overlooked. Thus, briefly summed up, we have the influences which manifested them¬ selves in France on the colorists who exhibited at the Independent Salon and the Salon d'Au- tomne, while at the official salons the deplorable academic traditions prevailed.

Excesses, incoherences and exaggerations took place ; we witnessed the <(fauves® who de¬ veloped to the point of absurdity the theory of their masters. We also saw the celebrated cubists who likewise carried to the extreme the conceptions of Cezanne. The general princi¬ ples underlying cubism are quite acceptable and even laudable — it is the result which shocks us. The cubist's conception — and it is his right — is to react against ephemeralism, against phenomenalism, against form diluted in the air, against volatilized volumes. Thev desire a return to the constructive school but their error lay in the fact that their constructions were too schematic, based too much on cones and cylindrical cubes. On the other hand tired of the subjects treated on the canvasses displayed in the salons they tried to make of the subjective such a role as to cause it to be preponderating. The greatest mistake these young artists made consisted — by a quite understandable horror of the literal reproduction of an object — in resolutely turning their back on nature. Now it cannot be too often repeated that an artist can produce nothing of worth without invoking nature. It is not a question of servile copying, of making a <(double,® but of interpretation through the prism of sensibility. Once an artist endeavors to alienate himself from nature, from which he derives an inexhaustible source, an infinite repertoire of forms, rhythms, volumes and colors, he risks becoming en¬ tangled in the phantasms of the abstract, that is to say of the misshapen and the void. What after all are the real theories of the cubists? Our object, they say, is to

paint things not as they appear to the eye but as they are seen in the mind, not as one would like them to be but as one knows them to exist. Now how does one know what an object is? By its reality, by its synthesis of volume, under several angles at a time, by its cubic form. Therefore, in order to render decipherable this synthetic form, necessarily complex, it is incumbent to simplify it, reduce it to its principal elements, and in this way arrive at a geometrical figure which presents the aspect of a sketch by a care¬ ful student of the £cole des Beaux Arts — while pretending it to be a synthesis of a part of creation. The cubists desire that the. paint¬ ing shall not reproduce the flat, superficial and literal reality, shall no longer be a repetition of the monotonous exhibits in the world's gal¬ leries, but suggest, by simplifications of simul¬

taneous imbroglios, the voluminous objectivity of beings and things. The extraordinary part of this doctrine is that, promulgated by young en¬ thusiastic artists who preferably employ the language of the philosophers, follow the tenets of mathematicians and juggle with Euclid, Descartes and Bergson, the sum total of their striving results in the production of works com¬ parable to a schoolboy's efforts. Octave Mir- beau once compared them to a manufacturer of modern furniture who in his endeavor to make something really striking in the way of complete ornamentation finished by producing

— quite unconsciously — a piece of furniture of a Louis XVI simplicity. The cubist, like a beginner or a schoolboy, draws a tree or a human being in a pentagon, a hexagon, a cube or a square.

Is this laughable? Not particularly. These innovative .artists are sincere. That a few (

Let us take another characteristic example

— the cubist portrait painter will paint that part of the head, for instance, which is not seen — the back part. And we say to him : (

ing the sensitive mind which alone is the exist¬ ing link between the painter and the spectator. Now of these two characters, the painter and the spectator, if the former is not imbued with the same thought as the latter, how it is possible for them ever to understand each other? To accept the cubist postulate is to gainsay painting, which must forcibly take the objective as the starting point of all syntheses. To proceed otherwise is to steer headlong for the void by sheer sense of an insane pride. It is extremely foolish to desire to be placed on a self-centred pedestal. One should be content with those usages and languages which the rest of the world understand and employ, merely disposing of them whenever possible in a nobler and more beautiful style. The world, the sun, the tree, the flower, the sky, the mountain, the valley are living things worthy of being addressed and portrayed. To substitute the reality of conception for reality of vision is, as we have already stated, equivalent to saying ((No® to nature. It should always be borne in mind that nothing can be constructive or imag¬ inative without the aid of nature. The most daring inventions of The Fable, the centaur, the sphinx, the Chimera are all combined with natural elements. <(L'Art,® has said Nicolas Poussin, <(n'est pas chose differente de la Nature et ne peut sortir de ses limites.® ((Art does not differ from Nature and cannot go outside of its limitations.®

That cubists, by weird and inacceptable de¬ ductions should endeavor to constitute them¬ selves the ancestors of Paolo Nicello, Breughel le Vieux, Watteau is nothing more or less than the fanciful dream of a humorist's mind. Cubinism then is a topical demonstration of the danger of theorizing to excess, of losing oneself in the research for the absolute. The duty of a critic is to impress on artists ((Never allow a reason alone to prevail over feeling and taste; take a just sense of proportion

and balance the faculties. The masters of the museums are famous for the very reason that they knew how to co-ordinate the essential qual¬ ities which are necessary to any esthetic crea¬ tion.®

From this forced movement of cubism, with its rigid sense of discipline and (

Sculpture. — From Rude to Rodin, including Carpeaux — ithe three geniuses who represent the entire French sculpture of the 19th cen¬ tury — much vigorous and delicate talent has been seen. Rude raised the standard of sculp¬ ture, which was very low at the beginning of this century. Rude was the unique artistic expression of the Napoleonic spirit, so unfa¬ vorable to every kind of art. His hauts-reliefs on the Arc de Triomphe de l'Etoile are im¬ mortal. Besides Rude, Barye — a powerful .animal sculptor — the classicists David d' An¬ gers, Etex and Pradier are conspicuous under the Second Empire, Carpeaux, the sculptor of

the group called (The Danced on the portico of the Opera House and the bas-relief of (Flora in the Flora pavilion of the Louvre and of a hundred charming ((maquettes,® of masterly execution and refined taste, achieved grandeur through grace, style through fancy. A brilliant constellation of sculptors was seen in the Third Republic ; Falguiere, delicately expressive ; Dalou, severe and profound; Paul Dubois, sub¬ tle; Mercie and Trijalbert, who although de¬ clamatory in style are each gifted; and Fremiet, a pupil and nephew of Frangois Rude. All these names and those of the ((Rodinisants® and the original genius Camille Claudel, Emile Bourdelle, Desbois and Maillol, were over¬ shadowed by the formidable genius of Auguste Rodin. Rodin (whose recent death we have to deplore) is the third term of this trilogy relat¬ ing to Rude and Carpeaux. At first he was discussed, ridiculed and disowned by the In¬ stitute because he purposely distorted his models so as to better display the intensity of am¬ bient light; he conceived and executed his principal works which are (The Age of Brass,* (The Bourgeois of Calais, * (Saint Jean Bap¬*

tiste, J 20 busts and a hundred groups in marble and in bronze, illustrating the sad poems of love, of nervousness and of revery. He over¬ turned all preconceived rules, going for his inspiration as far away as Assyria and Egypt and the Middle Ages; his Victor Hugo and his Balzac are statues which caused in the artistic world a sensation not as yet defined.

Architecture and Decorative Art. — The French Revolution that revived all the institu¬ tions of the ancient regime only apparently influenced the teachings of the arts. At first French architecture was under the yoke of the Greeks and the Romans. Deep study of the chief works of antiquity always inspires earnest artists, such as Percier and Fontaine ; Vignon, who built the Madeleine, and Brongniart, who built the Bourse.

*Duban, Labrouste and Vaudoyer revolution¬ ized architecture. Viollet le Due is charged with restoring Notre Dame (1837). With Lassus, who restored Sainte Chapelle, he strug¬ gled romantically against the <(Academie des Beaux Arts.® Labrouste was the first to util¬ ize iron, which may be seen in the (Biblio- theque Sainte Genevieve) ; Ballard was a bold innovator, who built the (Halles Centrales.**

The wonderful inspiration of Charles Gar- nier, architect of the Opera House, is typical of the period of the Second Empire. Still not¬ withstanding the modern spirit set forth in the teachings of Viollet le Due, architecture is not yet emancipated; the ideas of Vignole and of Palladio, who imitated the antique, will dis¬ appear but slowly — with M. Mogue de Baudot and Vaudremer. After all the rationalistic modernism of MM. Plumet, Chedanne, Gen- noys, Binet, Bonnier, Perret-Frere, Dervaus, Jaussely, Tony and Gamier has erected monu¬ ments and dwellings commensurate to our needs and to the ideas and customs of our time. See French Architecture.

The revolution in applied art corresponds to that of

architecture. The followers of Riesener, Gouthiers and Jacob will be the <(furnishers,® such as Galle of Nancy — a cabinet-maker and glass painter, who most always found his mo¬ tives in floral naturalism ; carvers and gold¬ smiths with exquisite taste, such as MM. Dampt

and Lalique, and lastly the makers of ceramics Carriers and Chaplet, who rediscovered the art of the wonderful Japanese pottery.

French ornament workers during the last 12 years or so have fortunately increased in number and quality. Such artists as Jallot, Gaillard, Follot, Ruhlmann de Fleure, Lucet, Louis Sue, Gustave Jaulmens, have renovated the interior architecture of French homes and excellently counter-balanced the dangerous in¬ fluence of Munich decorative art; brilliant ceramic artists, Delaherche, Decoeur, Le Noble, Methy, Dammouse, Roux-Champion ; gold¬ smiths, carvers, ironworkers, Robert, Nocq, Rivaud, Mangeant, Monot, Herzen; divers ornamental masters such as the lace worker Mezzara, the embroiderers Ory-Robin, Desval-lieres, Marie le Meilleur, have likewise con¬ tributed to this renaissance of French applied arts. In addition there is the interesting ex¬ periment in tapestry manufacture, the ex¬ ponents of which, Boileau, Gustave Jaulmes, Ottmann and Deltombe, have contributed to the revival of an ancient French handicraft adapting it to the needs of contemporary taste.

In the foregoing is given a very short sum¬ mary of the principles of French art. The 19th century was one of such great fecundity that under normal influences art should take its part in all events, in the great struggle and in the great hopes that agitate humanity in the present day. Le-t us say in conclusion that art can now, less than ever, be said to be separated from life. French art is no longer, and does not wish to be, a thing apart from or aside

from life. It is in itself the expression of life, not only in vague generalities, but in the most contingent phenomena.

Bibliography. — Benoit,' (L'art frangais) (1897) ; Brownell, (French Art (classic and contemporary, 1901) ; Hamerton, (Etat actuel des Beaux-Arts en France) (1892) ; Toudouze, (Tradition frangaise et musees d'art) (1903).*

Louis Vauxcelles,

Member of the Committee of the Autumn

Salon; Art Critic of the Pays.

19. FRENCH CIVILIZATION. Nation¬ ality does not consist in a race, still less in the use of a common language, but in the possession of a corporate tradition. A nation is a body of men distinguished from other bodies around it by the possession of an organic tradition which so molds the habits of life of those subjected to it as to define them clearly from their neighbors.

The territory the larger part of which is now called France, and the ancient name of which was Gallia, has since the beginning of recorded history been inhabited by many mil¬ lion men possessed of and influenced by such a corporate tradition as has given unity to their commonwealth even in its most anarchic or barbaric periods, and which permits us therefore to speak of the French people as of a permanent historical phenomenon in western Europe. Compared with this solid and recog¬ nizable • truth, guesswork upon complicated racial origins and still vainer guesswork upon the evidence of language are negligible.

The characteristics which the Gauls have developed in this national tradition of theirs and in which in turn their national tradition has imposed upon them and confirmed them in are

easily recognized by the modern traveler or by the student of the detailed history of the last 300

years. This tradition comports energy working at a very high potential, a potential so high as sometimes to fuse its communications, and so high as to suggest to those unused to it a necessary absence of volume. It comports in philosophy a combination, somewhat paradoxi¬ cal in character, by which material and tangible things are chiefly regarded and yet treated by the methods of pure thought. Thus no nation has expressed political theory in terms more general than the French, yet none have had less inclination for metaphysics.

In the political sphere the national tradition of which I speak is essentially military, and in the various forms of its expression has never ceased to be so, — by which is not meant that the French are perpetually under arms, or chiefly concerned with making war, but that their conception of the organization of a state is always a military conception ; and that as the art of war changes and develops, now tribal, now municipal, now based on castles and at last national, so has Gaul been a loose hierarchy of tribes, a web of Roman municipalities and gar¬ risons, a tangle of feudal relations, or a highly centralized and bureaucratic body. The whole trend and determination of the French mind in civics may be expressed in the formula <(With- out authority there is no life.® It is on this account that throughout French history prompt¬ itude and power are demanded from govern¬ ment, and that among a people to whom the Oriental ideal of collectivism is highly repug¬ nant, so much is demanded from the state and so many of a citizen's actions are considered only in the light of his relation to the state, as though the duties which he owes to the state were in some way more sacred than the rights which the state should guarantee to himself.

The minor and more superficial character¬ istics that go with this general picture are a vivacity and often an excellence in oratory, an exact and somewhat excessive precision in daily life, accompanied by an excessive neglect of such details as are considered unimportant, which neglect is

repulsive to those who carry a less precise order more generally over the whole of life ; a considerable artistic faculty, waning and waxing with various periods, but fairly constant in dramatic art and in architecture ; a lack of appetite for individual adventure (a trait in which the Frenchman contrasts very sharply with the Scandinavian and the Islander of the North, whether Irish, Highland, English or Dane) ; and finally, a curious power of common action often suddenly inflamed and always extreme, in which the Frenchman con¬ trasts not only with the Scandinavian spirit upon the north of him, but also with the various Germanies, the Spaniards and Italians of his frontiers, and indeed with every other European community. It is to this trait that France owes the many popular risings and massacres to be discovered in her history, the extreme rapidity with which a leader is chosen and again rejected, the lack of judgment in foreign affairs which cannot but accompany the confused action of a great number of men, and the startling military successes which that com¬ mon action often produces. Of these of course the main historic examples are the g^eat east-

ward march of the Gauls in the 3d century be¬ fore our Lord, which led them to the sack of Rome and of Delphi, and to a permanent colony in Asia Minor; the march of the Crusades, and the wars of the French Revolution. But beside these enormous swarmings of the French, in¬ numerable minor phases of the same type are to be discovered in the 2,000 years of Gallic history. It is to be noted also that just as the French are unique in expeditions of this kind, so are they unique in the multitude of their civil wars.

The good or evil of these characteristics I do not propose to examine, nor can they I think be determined ; for they will vary ac¬ cording to the very various ethical systems which abound in the

modern world, and every reader will determine for himself whether he approves or disapproves of the Gallic temper. It is such as I have described it.

It will next be remarked that the French, such as they are, have had since the fall of the Roman Empire a very large and dispro¬ portionate influence upon the mind of Europe. This truth is so generally appreciated that it needs no expansion here, but a few examples will make it evident to all. French has been the language of a governing class from the river Tyne to the river Euphrates, and from the Atlas Mountains to the mouths of the Rhine.

Feudalism and the whole structure of me¬ diaeval society were Gallic in origin. The Gothic architecture is a Gallic invention, as is the collegiate university. The systems of mili¬ tary fortification in the 12th, in the 16th, the 17th and the latter 19th centuries, are French; the French framed the first code of laws since the fall of Rome — it became at once the basis for every code throughout Europe. The French road is the model of the German and the Italian road, and to-day the weights and meas¬ ures of European civilization are French; while, to mention a detail of no great importance, the French language becomes, with every year, more and more the medium of international communication and especially the medium in which is expressed the general result of Euro¬ pean thought.

This permanent and, as it would seem, un¬ due preponderance of the French mind, is in part no doubt due to the mixture of excessive energy with excessive precision which is the vice, or virtue, of the French. But a very large part, and the more easily ascertainable part of this influence, must be laid to causes of another kind — causes more material and dependent upon the sequence of history out¬ side the frontiers of Gaul, and the geographical position of the quadrilateral which the French inhabit ; as also to some extent to the influence of soil and climate.

In order to appreciate these measurable causes of

French preponderance, let us exam¬ ine the boundaries of that quadrilateral, and estimate its physical qualities and its historical position.

The French, as I have said above, inhabit nearly all the territory anciently known- as Gaul, and the boundary which may be set to the Gallic temper runs as follows :

Taking first a point upon the shores of the Bay of Biscay some 20 miles north of the

Spanish frontier, the Atlantic coast is the boundary until the Bay of Quiberon is reached; from that point upon the coast of Brittany the line drawn vaguely north and south to the coasts of the channel, excluding to the east the highly different Armorican type which, if place names and folklore are any guide, has probably lain permanently beyond this boundary since a period prior to the Roman invasion. From the point upon the channel so determined, the boundary proceeds eastward and northward along the coast (including the Channel Islands and their dependencies) to a point about half way between Calais and Dunquerque. Thence it strikes inland, including such places as Tournai, Mons, Charleroi, Namur, Liege, but a few miles east of the latter town and some¬ what west of the old castle of Limburg the boundary turns sharply to the south and in a somewhat undulating form, after striking the Belgian frontier at Gouvy, runs a trifle west of that line, passes a mile or two east of Arlon, about half way between that town and the frontier, and so reaches the point where France, Luxemburg and Belgium meet, a point in which artificial and political boundaries curi¬ ously correspond with real divisions of men.

The limit of which I am speaking next fol¬ lows the short Luxemburg boundary, and cuts in a line less defined than most parts of its course from the top corner of Lorraine to within a march or so of the Rhine.

This section is difficult to define, from the fact

that the population #is not possessed of sharply marked characteristics. Between the Gallic belt of Belgium and the non-Gallic, a boundary as sharp as that made by a river or a wall can be discovered by the most super¬ ficial observer. There is more difference be¬ tween Liege and Maestricht than there is be¬ tween, let us say, an Irish and an English town. But in Lorraine no such sharp differentiation of architecture, manners and general way of life is to be discovered. Language is no guide here, the habits and aspect of a German-speak¬ ing village are the same as those of a French- speaking village, and one can only speak of a gradual transformation from the purely French town of Metz to the purely German belt which extends, as I have said, to within about one day's march of the Rhine. The belt between can only be described as mixed.

An exact boundary begins again in the neighborhood of Saverne, and follows the crest of the Vosges Mountains, the valleys and Alsatian plain to the east of which seem never to have, been impressed with the Gallic type .of culture ; but whether under the dominion of the government at Paris, or autonomous, or under the dominion of the government of Berlin, or of foreign or of native lords and bishops, to have been other than Gallic in tem¬ per, and resembling in historic times any one of the minor subdivisions of tribal Germany.

Across the gap of Belfort the line runs just barely including that fortress a few hundred yards to the east of whose town boundaries everything, from the aspect of agriculture to the gait- of the peasants, ceases to be French. '

The line next proceeds to the peculiar iso¬ lated peak known as the Mont Terrible, runs down the middle of the Jura valleys, and from the end of that range of mountains can again

with difficulty be determined ; the great mass of mountains which lies between the gap of Geneva and the Mediterranean may justly be regarded as less French in character than the Italian valleys upon the farther sides. French influence and culture and the march of French armies have more deeply affected the Val d'Aoste, for instance, than such remote villages of Savoy as Lagrave. But one may say in general that it is safe to exclude Geneva and to include most of the mountain mass lying south of that town until the Mediterranean is reached. The shores of that sea continue the boundary so far as the neighborhood of Perpignan, and though the Catalan language and the Provencal, the highly differentiated climate and the long Roman tradition of this belt make it a thing somewhat apart in France, yet we must recog¬ nize the sea as the boundary of Gaul with the exception of a still remaining foreign influence in the town of Marseilles.

In the neighborhood of Perpignan as I have said, and a little before the Pyrenees are reached, the limit which we are defining turns westward and follows the northern base of the hills. So thorough has been the work of French governments since the Revolution, that the val¬ leys running up from that base to the crest of the Pyrenees are, with one exception, now completely transformed in their superficial aspect and seem as French as any other part of the country; but no one well acquainted as is the present writer with the Pyrenean chain can question the identity of the inhabitants upon either slope. Beneath the surface of the modern French system, the manner and culti¬ vation of these valleys is a foreign thing. And the line which we are following may be said, for instance, to include the Canigou and Mont Louis, but not the French Cerdagne; Aix, but not the sources of the Aiege ; Bagnieres but nothing beyond it; Tarbes, and perhaps Lourdes but nothing south of Lourdes, and so on all along the chain until, a few miles after the passage of the Adour, the total separate Basque country is reached, where the line strikes north¬ east and reaches the point upon the Bay of

Biscay from which we began to trace it.

It will thus be seen that the political bound¬ aries of France do not exactly correspond to the territory which we are considering, and which as a whole represents the physical basis of the French nation. That territory overflows the political boundaries toward Belgium and Germany, and is within those boundaries in much of its southern and southeastern part as also in the Armorican Peninsula. And this lack of identity between the political and the real boundaries of Gaul has existed throughout recorded history. Thus the Romans took the convenient line of the Rhine upon the east, although the German tribal customs, dialect and general traditions have always existed in a wide belt upon the left bank of that river; and again the nominal suzerainty of the king of Paris (though that is hardly a test) for long excluded Bar-lerDuc, which is as French as Canterbury is English.

When the student sees upon the map of Europe the position occupied by this quadri¬ lateral, he may wonder how that position can be called in any way preponderant. It is ap¬ parently but a fraction of the great European

area, a fraction thrust far to the west, and occupying no central radiating position. The modern map, uninterpreted by history, and by the known effect of climate, leaves inexplicable the material cause of French preponderance. But an examination of these historical and climatic conditions goes far to explain it, and of the two the historical, which is the more important, should be taken first.

European civilization is not a material spread out evenly from the Ural Mountains to the Atlantic and from the Frozen Sea to the Mediterranean ; it is an influence whose gen¬ eral expression is Roman, whose permanent seat is within the old boundaries of the Roman Empire, and which while it has radiated east¬ ward and northward of those boundaries through the influence of the Christian mission¬ aries, loses its intensity as a general rule the further it proceeds

from its original seat.

This Roman unity was broken by the Adri¬ atic into two halves, originally widely differing and as the centuries proceeded differing yet more widely. In the eastern half (the Balkan Peninsula, Egypt and the Levant and Asia Minor) old and stable civilizations had ac¬ cepted the hegemony of Rome. The language of the generality of men was Greek, their in¬ terests were those of a very aged and per¬ haps a somewhat exhausted civilization, whose origins went back to the remotest eras, and whose high art and exquisite literature was already in perfection in epochs long anterior to the furtherest records of history.

In the West, Latin was the general tongue, though for long the educated and wealthier classes were bi-lingual. And there the Roman genius taught and produced a new civilization common to the Iberian, the Gaul and the Briton, to the Kabyle of the Atlas Mountains, and to the German of the Rhine Valley, intro¬ ducing to all these people a common art, a common tongue and law, and a common hap¬ piness. The boundaries of this Latin unity are very clearly determined : A line drawn from Glasgow to Edinburgh including both those cities shows us what part of the British Islands enjoyed this benefit, Wales, the Lowlands and England. The Netherlands, south of the Rhine delta, all the lower left bank of the Rhine and in its upper reaches both banks — all the valley of the upper Danube and the mountains of the Tyrol. All North Africa, from the Bight of Tunis to Tangiers ; all Spain and all Gaul — had in common the vine, the mass, the arch, the column, the municipium, the military way, and were one thing.

Now if this boundary be drawn upon the map it will at once be perceived that Gaul was the centre of gravity, so far as mere area was concerned, of the whole system. And to this mere material fact, important though it was, there was soon added a series of historical ac¬ cidents which very greatly emphasized this cen¬ tral position.

In the same period which saw the flowering of Roman thought into a definitely Catholic civilization, the long transformation of the Ro¬ man army was accomplished. It had become an hereditary and a mercenary thing, drawn largely from those populations which did not enjoy the full civilization of Rome and which were therefore ready to accept a wage more

easily than would the free citizen of the em¬ pire. Through the agency of these armies, in a most confused manner, the barbarian pressed more and more upon the civilized area, and he pressed upon it, though never in large numbers yet always with an energy that varied from an infiltration like that of the Franks or the Bur¬ gundians to a savage incursion like that of the pirates who overran the eastern part of Britain.

A little later than the first series of these catastrophes the Mohammedan religion sud¬ denly united the non-Roman desert tribes to the south and these destroyed the civilization of northern Africa which had already been weakened by an anarchy of wandering Ger¬ mans, revolted slaves and what not, and, finally, by the 8th century the principal islands of the western Mediterranean, nearly all the Iberian and the ports of southern Italy were occupied by the Saracens.

The test of Roman, that is of civilized, con¬ tinuity, is the authority of the town, with its bishop as the successor (he had once been the coadjutor) of the civil authority. And side by side with this test is a secondary one, namely, the authority of the Palatine Writ: of the Writ issued in Latin from the palace (a word borrowed from the Palatine Hill at Rome) wherein resided the centre of government. Now if we take a map of western Europe as de¬ fined within the old Roman limits, and shade with a pencil those Roman municipal areas which lost

such a continuity of episcopal gov¬ ernment and Palatine, Latin, authority, we shall find that this shading will leave us nothing but northern Italy and Gaul ; and indeed, but for the exception which northern Italy pre¬ sents, the vast area of Gaul may properly be regarded as the only survival of Roman civili¬ zation in the West. From this survival, as from an unsubmerged rock in a flood, a plat¬ form could be made upon which the damaged conditions of civilization might be rebuilt and from which the influence of civilization could again radiate.

The transformation of Roman society when the recivilization of western Europe began had made it what is called ^feudal.® The slaves had become serfs organized in co-opera¬ tive agricultural communities ; the great Roman landlords had become fighting nobles; from this type of society in all its changes, onward until the Revolution, and through the Revolu¬ tion to our own day, Gaul through every vicis¬ situde has remained the pivot upon which the mind of western Europe has turned. And if at the present moment French armor plating, French road making, the French system of fortification, the French organization of local government, French weights and measures, French field artillery, French submarines, French motor cars, French historians, and the dual polarity of French philosophy, Catholic and anti-Catholic, have imposed themselves upon Europe, this modern accident is but in the general and normal tradition of an his¬ torical condition necessary to western Europe.

Apart from these human and therefore most important factors, certain merely material, lim¬ iting and therefore inferior factors must be considered. These will be discovered no less than those to conspire in favor of this perma¬ nent position of France.

Of material influences in Europe the two most considerable contrasts are the contrast between the northern and the southern type of climate, and the contrast between the tidal ocean and the non-tidal Mediterranean.

A vast number of characteristics, may be connected with either of these physical con¬ trasts, and with either portion of each. That materialism which was the dominating note of the last generation and which is but slowly passing regarded climate and such material considerations as we' are now discussing as the principal cause of all the differences that could be discovered by the historian. No man would now lend himself to such crudities. The tribal system does indeed roughly contrast with the municipal, in the same way that north does against south, and those who use such terms as (

It is evident also that with difference of climate a different architecture, a different agriculture and different social habits will arise; and my point is that the contrast between the two zones in Europe is normally a sharp com. trast. Nowhere does one feel it more strongly than in the passage from Switzerland of the German sort over or through the Saint Gothard to Airolo. Between the two points which are but nine or ten miles apart, the whole of life appears to change.

Now Gaul affords the obvious link between these halves of civilization, and, typically enough, Paris, the capital, is in its aspect now a Northern and now a Southern town. It was southern under the Roman occupation, grad¬ ually grew northern again during the Dark Ages, and during the Middle Ages was purely Gothic without a vestige of the South about it. (except that it was just on the limit of the wine-drinking country). Then again with Renaissance it became again gradually the Southern thing which it is to-day.

Again, on a modern battleship, if it be Ger¬ man or English, you will have only the North¬ ern type of man, accustomed as a rule to the tidal sea. with all the quality of seamanship developed under those conditions, while on an Italian battleship you will have men brought up as boys with the latine sail, the absence of tidal currents, the steeper seas, the sudden gust and the long calms of the Mediterranean. On

a French battleship you will have both types of men.

Consider again climate not by meaningless scientific terms of measurement, but as it is expressed in the common experience of life. In the South frost is rare, snow is rare; the long months of cold which render life difficult are not known save in the mountains. The south of Gaul is in this condition. It builds with a flat roof, it knows nothing of skating nor of the preservation of plants through the winter, nor of the isolation which cold else¬ where has produced in the past through long periods of the year. In the North all those conditions are as common a part of life as they are in Holland or in England.

In Northern Europe the sun is the grateful climate ; in Southern Europe shade and cool¬ ness. In Southern Europe a low relief was sufficient for plastic art; in Northern Europe a high relief. You find them joined in the art of Mediaeval France.

Again, consider food. Wheaten bread is the staple of Roman civilization. To the north of it, oats, rye and other poorer cereals ; to the east, rice; and, normally, France grows more wheat than any other of the western European states. France grows more wheat than Italy, England and Spain combined. She grows more than half of Europe, outside Russia. Next to wheat the vine has been the staple of French civilization in the matter of food, but the vine is not easily grown north¬ ward of a certain limit (though in the Middle Ages that limit extended far into Britain). Gaul, though mainly wine-drinking, includes a northeastern belt which has the custom of East¬ ern Britain and the German tribes, and drinks beer, while it has a larger* northwestern belt which follows the custom of Western Britain and drinks cider.

The northern use of butter, the southern use of

olive oil meet in Gaul. The use of and the partial abstinence of flesh — which is largely a matter of climate — depend upon zones which also meet in that territory. Meat cannot be kept in a southern summer; a northern winter cannot healthfully be passed without it.

The list of such contrasts could be drawn out indefinitely by any man of average travel and reading; and in nearly every one of them he would find that French territory was a com¬ mon ground upon which either type met.

It is in the light of the foregoing general considerations that we must regard the history and character of the French people. They will continue to influence the future as they have influenced the past, and they are the major constants in every far-reaching problem of European importance. But a few closing words upon the immediate conditions of the French will perhaps enable the reader better to appreci¬ ate the articles that follow.

In general, those immediate conditions con¬ sist in this, that upon the general material of a people welded into their unity by ancient customs, and by a method of thought which they are incapable of abandoning, two consid¬ erable discussions are at work. Neither can ultimately affect the profound mass and struc¬ ture of Gaul, but the victory of one of the two parties in either of these discussions will con¬ siderably affect the form or mold into which that mass shall be thrown, and therefore in¬

evitably will affect the general structure of surrounding Europe.

These two discussions are, the discussion upon the purely democratic state, and the dis¬ cussion upon the authority of the Christian religion.

They are often confused, and nowhere more so than in France itself. But the connection between them is quite accidental, and no accu¬ rate conception of the position can be arrived at until each is

regarded quite separately from the other.

The modern French experiment in democ¬ racy is, in the main, a reversion to the ideal of the old civilization of the Mediterranean. It contains no part of that anarchic ideal of in¬ dividual liberty common in more rudimentary states : an ideal that inevitably ends in oligarchy and usually in plutocracy. The French experi¬ ment in republicanism is an experiment which presupposes a highly organized, a highly cen¬ tralized and a powerful state, capable of crush¬ ing by a common effort all sporadic and par¬ ticular energies which may be antagonistic to or even separate from the common life. And the experiment is an experiment and not an achieved one, because the machinery for such a state is so difficult to construct. The experi¬ ment has never been tried before and it may well fail. Democracies have existed in small city states usually dependent upon slave labor ; they have endured indefinitely in small isolated agricultural states ; they have never permanently existed in large states under conditions of high civilization. So long as the French ex¬ periment endures, so long the conception of democracy at least, and, to some extent, its forms and ideals, will be observed in Western Europe. And it is a matter of intense interest to watch the succeeding phases of the experi¬ ment, the moments when it seems nearly ap¬ proaching success and the moments when the whole conception seems too unworkable for the complexity of the modern world. I repeat, the issue is by no means decided.

The religious question is a more profound and a more vital one. The whole fabric of French life and tradition is so closely inter¬ woven with the Catholic Church that men who put no credence in the divine origin of that Church find their easiest temporal explanation for its existence in the action and nature of the French people. Its high centralization, its military defense throughout a thousand years, its rigid conception of dogma, its deductive philosophy, are Gallic, not Italian.

Wherever this conception of religion exists, its counterpiece and converse is rationalism. Rationalism had completely dominated the thinking part of the nation and the leaders of its action in the 18th century; indeed it is only since the middle of the 19th that the arguments against that position have gathered strength among the more cultivated classes of the coun¬ try. Coincident with the maximum of this rationalistic wave, the French Revolution quar¬ reled in its first year with the political organi¬ zation of the clergy; next the Revolution be¬ came identified with all the patriotism and all the energies of the people in the course of a long war, and by the time of the Restoration, a great body of French thought and French energy was definitely cut off from and antago¬ nistic to the national religion. The quarrel be-

tween the two still endures. The attitude of many a French statesman toward the Catholic Church in France is not one of neutrality, but one of active enmity proceeding from a con¬ viction that the Catholic Church is not only the permanent enemy of human happiness and liberty, but also of the particular state which it is his function to guide. Conversely, more than one cleric, though of French extraction, has learned to regard the liberal institutions of his country as the necessary and permanent enemies of religion. There is no logical con¬ nection between the two ideas : there is but a chance historic association, but that association has acquired great strength with the passage of time and with the succession of some five generations of men who have seen the quarrel continually growing, and no perceptible end to it approaching.

Such are the main combatants in this strug¬ gle. But two other factors of importance are present, the Jew and the Huguenot. Neither of these bodies are numerous, but they happen each of them to be

extremely wealthy, and this wealth with all that it connotes, of education and of power in the press, is thrown into the scale against Catholicism. It is impossible at this moment to say what the end of the strug¬ gle will be. It is only certain that if Catholi¬ cism is grievously wounded in France, it will have received a blow far more serious than that which it received in the 17th century. And conversely, if upon the whole the influence of the Church should henceforward grow among the French people, it will be difficult for the forces adverse to Catholicism to prevent the continued increase in political power, both of those populations which are ardently and those that are only nominally Catholic, from Ireland to the Desert. See "Church and State in France (articles 10 and 11).

Hilaire Belloc.

20. JOURNALISM IN FRANCE (1631- 1918). Without exaggeration it may be said of France that all the ((real® in the political, social, economic and artististic life of that country has been reflected in the formidable museum of public prints which opened in the 17th century with the first Gazette of Theophraste Renaudot, and which, in the ages to come, will never cease to be enriched with new acquisitions. For the French, indeed, and especially since the Revolution, the newspaper has become not only the mirror of the daily events, but also a fighting weapon, one of Freedom's tools, a polit¬ ical force, a tribune for the orators of all parties, but also a real battlefield in moments of stress, when blows were exchanged and men killed. After having been an instrument wielded by Power, the newspaper in France averred itself the spokesman of all great popu¬ lar enthusiasms, of all popular explosions, of the wrath of the lowly against the great. It became the clarion of all free ideals, of all generous or mad utopias. It spoke for the multitude with the voice of the multitude. It became a soldier and an insurgent. And like seeds, it cast on its path the coming ideas.' It was one of the feverish workmen who' threw down the Bastiles. The legislators' decisions were dictated, provoked and

compelled by it. Carried away by its enthusiasm, it became a poet with Chenier, a despot with Marat, an

idealogue with Babeuf and a dreamer of too magnificent visions with Desmoulins.

An iron hand that wanted to put a stop to it did not even check it on its passionate way. For years, like a subject liable to suspicion, like a dangerous citizen, it was thrown into prison by the rigor of the law. But on an evening in 1814 its prison-gates were shattered. Captivity had not injured its spring. Greater, stronger, firmer, French journalism stepped out of the prison cells of the First Empire. It was to show, in the course of the century, that it had remained the organ and means of all living ideas, the forerunner of progress, the rallying-point of all those who in that country, where spiritual forces are inexhaustible, fight for the Good and the Better, and are willing, in ad¬ vance, to suffer for this noble cause. The history of French journalism during the 19th century assumes for the historians the aspect of a long and bitter fight. There certainly were papers which flattered the authorities, who followed the taste of the day, and which pre¬ ferred the art of pleasing with accepted ideas to the talent of fighting for ideas considered subversive. But, on the whole, the part played by the French press was a warrior's part, whether preparing for 1830 or 1848 or trying to fight against 1851 and the Second Empire, or upholding the young Republic of 1871 against the perils which encompassed it on every side. This characteristic of the newspaper in France does credit to it. In this indefatigable stride the best qualities of the French temperament found their true vent. The warmest initiative, the most beautiful aspirations toward human happiness, all the sparkles of wit, all the re¬ sources of satire and pamphlet, the finest out¬ bursts of fraternal and humanitarian eloquence, the fiercest addresses against injustice; nay, even the deepest errors of opinion, but the more excusable because of their thorough disinter¬ estedness; all that adorns the French soul with a fine, warm flame, with an endless idealism, with a

bright imagination, with a courage some¬ times inconsiderate, but always spontaneous ; all the splendid virtues and the generous de¬ fects of the race, thronged in the columns of the newspaper in one continuous meeting — the voice of a nation that was ever a lover of progress and justice. Indeed, to know the best part of France one has only to glance through several collections of its big and small news¬ papers ; the wise work of time has without more ado separated the tares from the wheat. Whatever excessive passion, violent anger or impracticable dreams may be found therein, they have given way to the luminous outburst of the tenacious will of the French (even and above all in the fever of momentous crises) to remain the apostles and if need be the martyrs, of a free civilization ever on the way to new conquests by the weapons of mind and heart alone.

The newspaper did not exist anywhere in the beginning of the 17th century. Those rudimen¬ tary periodicals that were irregularly published in Holland, England and Germany cannot be' considered as newspapers. They were for the most part circulated secretly, were chiefly of a licentious nature, and went under the name of <(nouvelles a la main® (news to hand). They related mainly the scandalous news of the court

or the town, and the writers thereof not infre¬ quently expiated their indiscretions in prison. On, 30 May 1631 a Parisian doctor named Theophraste Renaudot (b. London 1586), who was also the founder of pawnbroking estab¬ lishments, conceived the idea of selling a real newspaper of four pages every Saturday, which he called the Gazette, from <(Gazetta,® a Venetian coin. This enterprise, which under his care was to last till his death, had its vicis¬ situdes. The novel idea pleased Louis XIII and Cardinal Richelieu, who, almost at once, assisted by Father Joseph, ((His gray Eminence,®

wanted to make use of it to answer the enemies of the Court. But Renaudot's success aroused jealousies. His receiving a pension of 800 livres provoked irritation. The word <(gazeteer® be¬ came an insult. The first of all journalists an¬ swered the envious in 1632 in his paper. His articles were printed next to those of the king himself, who nevertheless did not sign, and to those of Richelieu. The paper had a great suc¬ cess, and was sold by little newsboys at about six centimes. From 1649 it became necessary to print supplements and extra numbers. The first number bore this device : ((On one point alone, shall I yield to no one : the research of truth, which, nevertheless, I will not vouch for, as out of 500 pieces of news, sent post haste from one country to another, many a one from our own correspondents may have to be cor¬ rected by Father Time.® Louis XIII, delighted with his own first contributions, continued to write, and besides articles on general politics he related his quarrels with his wife about affairs concerning the welfare of the kingdom. Much later, under Louis XIV, the Gazette printed the following avowal : <(Every one knows that the late king not only read my gazettes, but that he sent me, almost daily, matter to be in¬ serted.® Thus, from year to year, until the very last (1792), the newspaper of daring Renaudot (he had died poor and miserable) came to make up a huge collection of 163 quarto volumes. During the lifetime of its <(inventor® it had known many competitors who, for the greater part, were satisfied with copying it servilely, word for word. By a strange proscription, several states bordering upon France had forbidden the Gazette to pass their frontiers.

From 1651 to 1659 the Muse Historique was published. A man named Loret related the week's occurrences in very bad verse ; during the eight years he wrote some 400,000 lines. The readers enjoyed these lucubrations, each number of which ended with something like <(Written, in April, on the 28th, before my supper was ready-cooked." The Journal des Savants appeared in 1665 and treated of litera¬ ture

and new books. Next appeared the Mer- cure Galant in 1672, published by Donneau de Vize, which became the Mercure de France in 1724. It contained chronicles, letters, feuille- tons or serials and dramas, notices of mar¬ riages and deaths, stories of intrigues, religious, academical and judicial news, riddles, ^ songs, etc. The Journal de Trevoux appeared in 1701 under the direction of the Jesuits and in op¬ position to the Journal des Savants. This new¬ comer was profoundly religious and bore the brunt of Voltaire's irony. Many new papers sprang up almost at once, the best known being the Annie Litteraire of Freron. It was pub¬

lished every 10 days on 72 sheets ; it fought the encyclopedists, continuously abused Voltaire, and lasted from 1754 to 1776. Besides the Four et le Contre of the Abbe Prevost and the Ob- servateur Litteraire of Marmontel there ap¬ peared the Journal de Geneve, printed in Paris, an entirely political paper; the Annales poli- tiques et Litteraires, a great success, in which can be found a foretaste of the virulence that became customary during the Revolution. In 1776 the Anglo-French paper, the Courrier de r Europe (issued twice weekly in London), had its share in awakening the enthusiasm for the American War. It sowed the political passions in the minds and prepared for its own part the great events of 1789. In 1788 were read in addition the Journal General (on science and art), the Journal de Paris and the Correspond- ance Secrete (Strassburg).

Then came the Revolution, which gave birth to the freedom of the press. In the Tableau de Paris a few years before Mercier had shown (

The press enjoyed unlimited freedom from 1789 till 12 Aug. 1792, when the royalist papers were suppressed. Marat, ever fierce, had issued the Courrier de Provence and Desmoulins his Vieux Cordelier, an antagonist of the rude Pere Duchesne of Hebert. Young Camille, in seven numbers, drew up a passionate list of accusations against the men of the guillotine, overwhelming them with brands

borrowed from Tacitus. Then Marat struck harder, creating the Ami du Peuple, in which he clamored suc¬ cessively for 600, 10,000, 20,000 and 270,000 heads. Maximilien Robespierre upheld the Defenseur de la Constitution and Babeuf fought in the Tribun du Peuple. The very exe¬ cutioners had their organ ; it was the Bulletin du Tribunal Revolutionnaire, with the follow¬ ing device borrowed from the

Racine: <(Celui que met un frein a la fureur des dots, sait aussi des mediants arreter les complots55 (He who can bridle the raging waves knows also how to check the plots of the wicked). Meanwhile, public fury rose ever higher. On 10 March 1793 the printing presses of the Girondin papers were smashed by the mob; Robespierre suffered with the Jacobins of the Montague. Long ago they had silenced the Journal des Halles , which upheld the kingship in the coarsest "Billingsgate.55 On 25 July 1794 Chenier died for his papers on the scaffold, and three days later the head of Robespierre fell. Opposition sheets now sprang into existence; royalist papers revived : L'Agonie du Jacobin, L' Alleluia des Honnetes Gens and La France Sauvee. The Directoire fought for its life. The law of 23 Germinal Anno IV was a first step toward the great reactions. On 18 Fruc- tidor Anno V a decree suppressed 42 papers ; seven more were stopped on 17 Frucditor Anno VII. The press remained fettered for a long period after the downfall of the Directoire.

Bonaparte, when consul, was no more dis¬ armed by the Antiterroriste than by the Jour¬ nal de Bonaparte et des Hommes Vertueux. On 18 Brumaire the suppression of all political papers was decided, save that of 13 sheets which should appear under the supervision of the police and be ruled with ever- increasing rigor. Sixty papers died thus at one stroke (27 Nivose Anno VIII). Among the sheets that were spared were Le Moniteur Universel, Le Jour¬ nal des Debats, Le Journal de Paris, Le Publi- ciste,

L'Ami des Lois, which for a few months was suppressed for having mocked the Insti¬ tute; La Cle du Cabinet des Souverains, Le Citoyen Frangais (which became the Courrier Frangais in 1804) ; the Gazette de France, the Decade Philo so phique and the Journal des De- fenseurs de la Patrie. Neither the Constitu¬ tion of Anno VII nor the organic Senatus Con- suite of Anno X made the slightest allusion to the freedom of the press. Bonaparte had said what he as Emperor Napoleon was to repeat: "If I give full scope to the press, I shall not keep the power three months.5 The times were approaching when a well-known sentence of Chateaubriand on the "silence of the abjection55 was to rouse the ire of the master and to be the prelude to new rigors.*

On 18 May 1804 the first consul became emperor. In 1805 he gave the following warn¬ ing to the Minister of Justice: "Have good articles inserted in the papers. Let the con¬ tributors to the Debats and the Publiciste clearly understand that when I perceive them to be no longer useful I shall suppress them with all the others and shall keep on but one paper.55 A censor's office was created. The Debats became the Journal de V Empire . The em¬ peror laid hands on the income of the news¬ papers. In fact, during the empire,, the only real paper was the Moniteur with its official sheet. Soon nothing could be said but what the Master willed, a circumstance which ex¬ plained the little help he found in the press when he was a prey to adversity. In 1808 two bills on the organization of the printing presses and the booktrade were laid before the Conseil d'Etat ; thev were to end in the famous decree of 5 Feb. 1810. Napoleon wanted firstly to create a censor's office entrusted to magis¬

trates who were to prevent the manifestation of any ideas capable of disturbing the peace and good order of the state. He took the following dispositions : limitation of the number of the printers, unceasing watch over the press to be exercised by the police agents and 22 censors, the right of the Director-General to break printing presses, seize reports, make confiscations, impose fines, imprisonments,

etc. This state of things existed till the last day of the Empire for the Parisian and Provin¬ cial press ; the latter, reduced to a single politi¬ cal paper per "departement55 and severely con¬ trolled, threatened in vain. No opposition was possible any longer.

On 6 April 1814, the Senate restored the liberty of the press. Napoleon, overthrown, was trampled under foot. The 23d clause of the Senatus-Consulte proclaimed that "the free¬ dom of the press is full save for the legal repression of such offenses as might result from an abuse of this freedom.55 On 5 July 1814 the government of Louis XVIII brought in a bill which was to become the Law of 21 October. The censorship was restored. But Napoleon left Elba. Tardily he gave the papers back their freedom. Eight days before Waterloo he wanted to restrain their excesses. The Journal du Lys and the Journal Universel (newly issued) compared the beaten man of 18 June to Cain, the brother-killer. Louis XVIII came back to France. The press con¬ tinued under the system of previous authori¬ zation but enjoyed a great tolerance which it misused by dealing blows at random. On 8 August, a Commission of Censors was created and the law was to be very hard on writers. In truth, the royalist press alone was to be allowed to speak. The papers were to be sub¬ mitted to authorization of the king, who had the right of suspension or of suppression. Tribune and press took to arms. Benjamin Constant, Chateaubriand and Royer Collard pronounced the most splendid speeches. Never had the press such spokesmen. The great mem¬ bers of the press were at that time Lamennais, Barante, Cousin, Guizot, Villemain, Mignet, Thiers, Sacy, Saint-Marc-Girardin, Augustin Thierry. The laws given on 17 and 26 May and on 9 June 1819 seem to be a success won by the liberated press. They were but a slight progress. They allowed every citizen to publish his thought upon his own responsibility. They granted certain rights to the press and the power of self-defense to the state.

The murder of the Duke of Berry in 1820 suddenly renewed the harsh measures. The minister Richelieu

had the bills of exception passed. The, censorship was revived. In 1821, the poet Beranger was brought before the judges on account of his songs. The law passed in 1822 authorized the Parliament to judge and punish directly all offenses against itself. Chateaubriand wrote a terrible pamphlet against censorship. Many famous writers were condemned. The ministry tried to buy the newspapers. The war of ideas raged for two years. In 1824, the governmental papers had 14,344 subscribers, the opposition papers, 41,330. In 1825 the former had 12.580, the latter 44,000.

A return to the freedom of the press was believed in under Charles X. It was but a slight respite. The government haled before

the judges the Constitutionnel and the Courrier Frangais which had made attacks on the Jesuits. They were acquitted. The Ministry Villele, in 1827, brought in a bill of violent repression, ironically called the ((Law of Justice and Love.® The public anger was aroused and the bill was withdrawn ; Paris illuminated ; the Ministry fell. A new bill was passed freeing the press from the trammels of the censorship. It was the glorious hour of the pamphleteer Paul- Louis Courrier. «Let people talk,® said he ; ((let them blame, condemn, imprison you, but publish your thoughts. This is not a right but a duty, a strict obligation on whoever has a thought, to publish and proclaim it for the common good, for, if your thought be good, it helps others, and if it be bad, it gets corrected and it still helps others along. But the abuse? Nonsense! Those who have invented this word of abuse are those who really abuse the press by printing what they wish and by deceiving, slandering or preventing the others from answering.®

Thenceforward a mortal strife between the press and the power took place. The Con¬ stitutionnel, the

Courrier Frangais, the Temps (the first Temps), the National, the Figaro (the first Figaro) and the Globe struck daily at the Ministry. On the eve of 1830, a protest by Thiers, signed by 44 journalists, the glory of the French press, proclaimed : ((In the situa¬ tion we are placed, obedience ceases to be a duty.® The regulations of July 1830 abolished the freedom of the press. The newspapers raised a protest against this <(coup d'etat .® The police intervened and smashed up the print¬ ing presses of two of the papers ; riots threat¬ ened, and three days later the legitimate monarchy fell. The press now believed itself to be free. The monarchy of July, born of a revolt, achieved in the name of the rights of the press, showed no thankfulness toward the journalists. A new era began. In November 1830, the Draconian Law of 1825 was abolished. For the papers this foreboded freedom. The Tribune of Raspail, the Bon Sens of Cauchois Lemaire and Louis Blanc, the Monde of Lamen- nais, the Constituionnel and the Globe saw a hope of better days. However, in three years the victors had no less than 400 trials. The government had guaranteed the faculty of printing all opinions within the bonds of the. laws. The censor's scissors had been sup¬ pressed. Made eager by its successes, full of confidence in the future, the press multiplied. Within a short lapse of time there were no less than 20 large papers in Paris. The Con¬ stitutionnel, whose yearly subscription amounted to 80 francs, boasted of 23,000 subscribers, a very large number for the times. All these papers, with more or less reserve or passion, made attacks on authority. It was the fight of the legitimists against the authority of Louis- Philippe. They were also the first manifesta¬ tions of the young Republican party.

Caricature made its start, helped on by the discovery of lithography (1830-31). The il¬ lustrated comic papers, such as the daily Charivari, the weekly Caricature, mocked the king and his Ministers. The public liked and clamored for the gay drawings of Granville, Daumier, Raffet, Charlet, Descamps, Bellange and Charles Philippon, who was

prosecuted for having represented Louis-Philippe dressed

as a mason busy erasing the promises of July 1830. The king's head was often represented in the shape of a pear. The government began to chastise: From July 1830 to October 1832, 281 papers were seized. In 1835, the Tribune proudly announced its 114th lawsuit and its 199,000 franc paid in fines. The Revue des Deux-Mondes alone, founded in 1829, all the contributors of which were well known, was not shaken by the tempest. Every opportunity was seized to attack the king. Thus, when the United States claimed an indemnity for the American merchantmen confiscated in French ports during the Empire, the papers accused Louis-Philippe of having bought up at a lu¬ dicrous price the debts he wanted France to pay. The press was called the fourth power in the state.

The law of September 1835 at length claimed a bond of 48,000 to 100,000 francs ($9,600 to $20,000) from all political papers; every offense against the king was considered a crime ; it was forbidden to proclaim one's self a Republican or to express the hope in a change of govern¬ ment. There was also a censorship for the drawings.

But a great journalistic event was about to take place : The Presse of Emile Girardin ap¬ peared on 1 July 1836 at the low subscription of 40 francs. Girardin had already created the V oleur (1828) and the Mode (1829) in which Balzac, Eugene Sue and George Sand had pub¬ lished their first articles ; the Journal des Con- naissances Utiles (1831), which had found 232,000 subscribers in the space of a year. The Presse was his masterpiece. With <(feuilletons® by Alexandre Dumas and Frederic Soulie, and diversity of matter, his paper was admirably edited. In three months, he had no less than 10,000 subscribers. Two years later he had advertisements for 150,000 francs. His con¬ tributors were Balzac, Dumas, Delphine Gay, Gautier, Leon Gozlan, Sue and Victor Hugo ; Balzac published therein his ^aysans, Dumas his (Joseph Balsamo) at*

the rate of 1 franc, 50 centimes per line (30 cents). A gifted jour¬ nalist, Armand Carrel, stormed against the paper as (

Among the ((opinion® papers, we find L'Uni- vers of Louis and Eugene Veuillot, a Catholic organ founded in 1833 by the Abbe Migne. It aims at freedom for teaching and quarrels with the bishops. Lamennais, in 1830, had founded the Avenir, a sign that the believers forgotten since the Revolution had stepped forth again. Lacordaire and Montalembert contributed to it during its 13 months' ex¬ istence. In it appeared, on 18 Oct. 1830, the sensational article <(On the separation of the Church from the State,® which invited the Catholics to turn toward the legitimate king and to break with the new rule of the Orleans.

But in 1840 the French ((bourgeois® had become a Voltairian, with a taste for anti- religious papers, for the writings of Michelet, Quinet, Cousin and Villemain. The authorities were molested hy the smaller and Larger papers

alike: the Guepes of Alphonse Karr, soon the Reforme of Ledru-Rollin (1843) and the Journal dn Peuple of Godefroy Cavaignac. In 1845 judicial questions began to be discussed in the papers. In the following year the Paris papers had a total of 200,000 subscribers for 24 sheets. An ever-increasing influence re¬ sulted: in 1848, the Temporary government was organized by the press. At first it showed moderation and preached ((Concord,® then claimed new liberties for itself. Within four months 200 papers sprang up. From 1848 to 1851, there appeared 400 new literary papers and 789 political publications, among which were Cause du Peuple , by George Sand, and the Peuple, by Proudhon. U Avant-Garde offered to its subscribers a retiring pension after 30 years' subscription, the cost of a third-class funeral and 100 francs ($20) to the widow. The

Republique des Femmes wanted to free the earth from its tyrants : all the men. Then sprang up the Journal pour Rire, with Nadar, Daumier, Grevin, Cham and Gustave Dore; the Trompette du Pere Belle-Rose, the Croque-Mort de la Presse, the Lunettes du Pere Duchesne , the Drapeau des Sans-Culottes, the Pilon and the Tocsin des Travailleurs. The Liberte informs that it had just made <(the acquisition of Alex¬ andre Dumas and of new printing-presses.® Victor Hugo, on 1 Aug. 1848, published the Evenement, and wrote: <(We shall give the foremost place to the event of the day, what¬ ever it be, whatever region of the soul it come from. ... If among these unheard of days, came an ordinary day, which would be the most extraordinary of all ; if, against all pos¬ sibility, the event came one day to be lacking, that day we would unite in one sheet like a dazzling constellation all the glorious names that stud our staff, and on that day our paper should become its own event.® To uphold the social movement, Fournier had created the Phalanstere, and Victor Considerant the Demo crate Pacifique. There were then 90,000 Socialists in Paris ; they read the Repub¬ lique Rouge and the Salut Social. Lamartine, more moderate, wrote in his own paper Le Bien Public.

The Revolution soon produced a reaction. The <(holy rights® of the press lost their sponsors. Emile de Girardin was thrown into prison. General Cavaignac suppressed seven papers and ordere — something new — that henceforth all articles be signed. Rochefort and Paul de Cassagnac prove that they are great controvertists. Ledru-Rollin, in 1849, helped the press to defend its rights. The coup d'etat of Louis Napoleon surprised L' Union (conservative), the Opinion Publique (moderate conservative), tin which Barbey d'Aurevilly published his <(Prophets of the Past® and to which the staff contributed without any salary, for the sake of proselytism ; the Patrie, founded in 1841; the Ordre (Orleanist) ; the Pays (conservative), adhering to the republic. The printing presses of the most passionate of these papers were seized. The Debats, Presse and Univers appeared then under con¬ trol of the censorship and

the Moniteur be- * came the official organ. The censorship made use of brutality: fines, suspension, prison. It was forbidden to mention the suits brought for press offenses. A newspaper could be sus¬ pended by ministerial decision after a first

warning. Victor Hugo in his Napoleon-le- Petit branded the new laws on the press.

Villemessant's Figaro appeared sprightly and charming in 1854. Weekly at first, then appearing daily, its directors were in turn Magnard, Perivier, de Rodays, Calmette and Capus. Napoleon III said of it: <(I believe the Figaro owes its success to its way of pro¬ ceeding by short, varied, numerous articles, each offering some new idea.® It was the mirror of Parisian life. Every morning it brought a spark of gaiety; it collected all the witty sayings of the Boulevards. In the Patrie, which had become a Bonapartist organ, Cuche- val-Clarigny published every week excellent articles on English and American politics. The best contributor to the Debats was then Prevos- Paradol, who died at Washington, 20 July 1870, as Ambassador of Napoleon III. The Chronicle had a great development. It was fashionable to improvise a witty dialogue on the anecdote of the day. Laughter was the order of the day and French wit sparkled on every side. Aurelien Scholl published the Nain Jaune, and he was not the worst joker. But there were also serious newspapers, the Courrier du Dimanche (republican), the Opinion Nationale (1859), the Temps (1861), to which contributed at its foundation Louis Blanc, Jules Ferry, Henri Brisson and Charles Floquet. This paper was to have a deep liberal influence over the ((bourgeoisie.® Jules Valles published the Rue. The Petit Journal came out in 1863, with the daily writings of Thimothee Trimm, ((which became the vogue, a real fanaticism.® In 1868 came out the Gaulois, a rival of the Figaro and the official organ of the af'ter-war imperialism, nowadays following the legitimists under the guidance of a Jew converted to Catholicism, Mr. Arthur Meyer. Henri Rochefort started his Lanterne ; the Eclipse of Gill ; the Corsaire, to which Jules Claretie was

a contributor, were fore¬ runners of the coming storm. Rochefort had said, aFrance contains 36 millions of subjects for discontent.® The fall of the empire was drawing close. An article of Pascal Grousset in the Marseillaise . brought on the murder of Victor Noir by Prince Bonaparte. The affair Hohenzollern-Spain burst out and then came the war. <(The press is gagged by the Law of Silence,® said the Figaro on 29 July, after the battle of Wissembourg. In October the press is accused of giving information to the enemy by publishing too many details, and on 23 Dec. 1870, the Patrie was suppressed for having published a relation of war operations. On 4 September the Empire fell, and on that day appeared the Patrie en Danger of Blanqui, the Peuple Soiuverain, the V erite of Portalis. the Tribun du Peuple, the Vengeur of Felix Pyat, the Mot d'Ordre of Rochefort, the Cri du Peu¬ ple, and sundry other journals. The Combat opened a one-cent subscription to offer a gun of honor to the soldiers who should kill the king of Prussia. As a joke, to keep up the good spirits during the siege of Paris, the Trac appeared — the papers of the cowards. All these papers, paper being lacking, appeared in small sheets, often no bigger than note-paper. They were sent into the provinces by balloon. When the Prussians entered the capital the papers stopped appearing of their own accord. The commune began on 18 March 1871 only to

create others, amongst them the Drapeau Rouge. All • those revolutionary sheets were far from being on good terms with one another, disagreeing either on principles, on persons or on the means of action. After those tragic events a regular and less unusual France was reorganized. The Journal des Debats, which had once been liberal-royalist, became in 1872 a moderate Republican. This centenary organ was then read by the liberal and cultured public. A huge press-movement set in. In the provinces big papers started and developed; such were the Phare de la

*Loire, the Gironde, the Petite Gironde, the Journal de Rouen, the Depeche de Toulouse, the Progres de Lyon and the Petit Marseillais. On 2 July 1871 Gambetta founded in Paris the parliamentary group of the ((Union Republicaine** and its organ the Republique Francaise. In the same year also appeared the XIX° Siecle. In April 1872 came out the first Matin, declaring in an editorial, <(Go ahead . . . said the pioneers of the New World. Let this powerful watchword become that of Republican France. . . . Like the Americans, we have but one aim : progress.** Magnier in 1872 created the Evenement, reviv¬ ing the old title Victor Flugo had chosen in 1848. The Soleil of Edouard Herve (Orleanist), shone in 1873; Petit Parisien appeared in 1876 under Jules Roche. Two years later Aurelien Scholl started the Voltaire, in which Mr. Ray¬ mond Poincare, future President of the re¬ public, wrote the judicial chronicle. In 1880 Georges Clemenceau, Camille Pelletan, Stephen Pichon and Millerand founded Justice, and Rochefort published the Intransigeant. For a year there had appeared Gil Bias, a gay, light and very fast gazette. The Fathers of the Assumption took a hold on the Catholic readers through Croix (1880).*

*At that time the press could boast of its. freedom and proclaim its titles on the Boulevards, a right lost during the period of Boulangism, to find later and to lose again. The fever for more and more information grew from year to year. Information was soon to be the very characteristic of the press. The journalists began to adopt the system of titles and subtitles, reforming the material as¬ pect of the papers and employing the head¬ ing** of the American papers. On 29 July 1881 a law on the press, corrected by the law of 2 Aug. 1882, bridled the licentiousness of the drawings and — very justly — reminded a certain number of illustrated papers of the reverence due to morality.*

The Radical dates from 1881 ; the Nation from 1883; the Echo de Paris from 1884. Created by a Jew, Valentin Simon, it became in 1898 the organ of the Ligue de la Patne Frangaise. During die Great War,

*an Academi¬ cian, the president of the Ligue des Patriotes, Maurice Barres, wrote daily in it and by his patriotic zeal deserved the surname of lit¬ terateur du territoire.** The Matin (the second) dates from 1883. It was created to give exact news on foreign affairs. As early as 1886 Paul de Cassagnac fought in his Autorite against the republican institutions. In 1887 the Cocarde, followed by all monarchist and bonapartist papers, fought the cause of Gen¬ eral Boulanger. The Eclair shone in 1888. From 1881 to 1890 the provincial press in¬ creased considerably. In 1893 it comprised*

5,726 papers. The department of the Gironde had 148 to itself, i.e., one paper per 5,242 in¬ habitants. The department of the Finistere had but one paper per 39.323 inhabitants.

One of the greatest improvements is to be found in the illustrations. Another happy find was the special wire for the papers printed out¬ side the capital. In 1892 there was still in Paris an Imperialist press. The Patrie gave up the game and became an afternoon information sheet, together with the Presse, the Intransi¬ geant, the Liberte and later, during the war, with the Bonnet Rouge and the Heure. The Journal started its .brilliant career in 1892. Its first number brought an article by a valiant woman-fighter, Mme. Severine. Epic strife took place with the Matin, followed by recon¬ ciliations and new quarrels, provoking the mirth of Parisian readers. At the same moment as the Journal, and for a very special reason, the Libre Parole was created by the rabid antisemit Edouard Drumont. As passionate as the Libre Parole, but in a very different order of ideas, was the Aurore of E. Vaughan, which ap¬ peared in 1897, to prove the innocence of Cap¬ tain Dreyfus, accused of high treason. In that paper Zola published his celebrated (

The universal exhibition of 1900 gave birth to numerous papers, mostly illustrated, and which died

*when the exhibition shut its doors. A collection of them remains as a valuable document of the history of this manifestation of the world's activity. Ever since, quantities of papers — we cannot give the list — have been born and have died. Each of them had its momentary success. Many fell, but many rose on their ruins. The most noteworthy among the latter are L' Homme Libre of Mr. Clemenceau, which he baptized L'Homme Enchaine the day the war censors proved too severe for the magnificent articles of the great writer. The Humanite was the ringing tribune of the powerful socialist speaker Jean Taures, and wrhich, since his murder on 1 Aug. 1914, has been directed by the Deputy Renaudel and upholds the ideal of the French Labor party; the Gtierre Sociale, whose career is of the strangest, upheld the most advanced ideas by Gustave Herve, a violent anti-militarist, who therein planted ((the flag in the dung** and wrho now, an illumined convert restored to less ex¬ cessive feelings, has called his paper La Vic- toire. The Oeuvre is inspired and directed by Gustave Thery, a militant journalist and a very bitter and often just censor of the censor¬ ship of the administration, of morals and men ; Paris-Midi is sold at noon to justify its title, and L' Information , once a financial paper, is transformed into a great daily, austere and very wrell informed. Excelsior was founded in 1811 by Pierre Laffitte, a great newspaper starter, the creator of Jc sais tout and Fernina; Excelsior is a daily paper with many pictures. Since 1917 such papers as the Trait d' Union, a Franco-Italian paper, the Journal du Peuple, a militant socialist, have appeared, and since 1915 Le Bulletin des Armees de la Republique and in¬ numerable soldiers' papers, written and printed at the front. Meantime, the foreign papers*

enjoyed a great success in Paris, for they gave the enemies' war-bulletins ; the Journal de Geneve, the Gazette de Lausanne, the Suisse and also the

Italian, Spanish and English papers; the London Daily Mail (Paris edition) ; the German paper Pariser Zeitung vanished on the first day of the war. The New York Herald, true to its traditions of publishing the news both in English and in French, saw an increase of the just sympathies of the numerous readers of its Parisian edition.

The illustrated papers, Illustration, Monde Illustre, the great magazines, the older and more recent ones, Revue . dcs Deux-Mondes, Revue de Paris, Correspondant, the Revue of Mr. Finot, whose writings are often translated in America ; the Revue Hebdomadaire, and thousands of magazines and papers of the technical press, amongst which the Auto, were in 1917 completed by new organs having as object the stimulating of French energy. The Explorateur, the France au Travail, the Usine, etc., aim at the practical preparation for the difficult after-war days. The artistic press was taking a rest; the Gazette des Beaux Arts and the Revue des Arts Decoratifs, however, were preparing for their reappearance. The Art de France was busily organizing numerous lec¬ tures, preparing the national revival in what concerned art.

But the vast family of French journalism was not so deeply absorbed by its work as not to think of foresight and fraternity. In 1875 the press for the first time elected a syndicate to which it entrusted its rights. Later, other groups grew active : the <(syndicat special de la presse republicaine parisienne,® in which after a scission with the conservative press, the latter founded the Reunion libre des journaux de Paris. The assocation syndicale profes- sionnelle des journalistes republicans frangais dates from 1880, the Association des journal¬ istes parisiens from 1890. More associations have sprung up since.

Thus, through the multiplication of all sorts of papers, the words of Alfred de Vigny (d. 1863) were realized in 1918: <(The bourgeois of Paris is a king to whom, every morning, a flatterer tells 20 stories. He is not obliged to invite him to lunch ;

he silences him and allows him to talk when he pleases. This faithful friend pleases him all the more that he is the mirror of his soul and tells him daily his own opinions in choicer terms than he could find himself. Take that friend away, and it will seem as if the world stopped. This friend, this oracle, this very cheap parasite is — his paper 1®

In 1917 there were in Paris 3,170 papers classified as follows: financial, 251; medical, 269; political, 168; fashion, 130; 192 literary, political and scientific magazines and 129 sport magazines. The total for the provinces was about 3,973, whereof 685 were republican (

Bibliography. — Avenel, H., (Le monde des Journeaux en 1895 } (Paris 1895) ; Belisle, A., (Histoire de la Presse Franco- Americaine) (Worcester, Mass.) ; Bock, J. de, (Le Journal a travers les ages* (Brussels 1907) ; Bourgeois, A., (Le General Bonaparte et la Presse de son Epoque) (Paris 1906) ; Carre, H., (Quelques

mots de la Presse clandestine a la fin de l'ancien regime* (Paris 1893) ; Cremieux, A., (La Censure en 1820-21 : Etude sur la Presse politique et la resistance liberale* (Paris 1912) ; d'Aurevilly, J. B., (Journalistes et polemistes, chroniqueurs et pamphletaires* (Paris 1895) ; Des Granges, Ch., (La Presse litteraire sous la Restauration) (Paris 1907) ; Grouchy, Vicomte de, (La Presse sous le Premier Em¬ pire* (Paris 1896); Guillemine, E., (Etude sur le Journalisme depuis son origine jusqu'a l'epoque actuelle) (Bone 1890) ; Jasuen, J., (Les specialistes de la Presse) (Paris 1901) ; Lajeune-Vilar, A., (Les coulisses de la Presse) (Paris 1895) ; Maze-Sencier, G., (Le role social et moral de la Presse) (Paris 1911) ; Paccaud, A., (Du regime de la Presse en Europe et aux Etats-Unis : Etude de droit com¬ pare* (Lausanne 1887) ; Poittevin, G. le, (La Liberte de la Presse depuis la Revolution * (Paris 1901) ; Pottier, P., (Les Journalistes) (Reims 1907) ; Price, G., (Petite Histoire des grands journaux J (Paris 1889) ; Quidam, (La Presse et les Correspondances Privees pen¬ dant la Guerre de

1870-71* (Paris 1903) ; Roure, H. du, (La Presse d'aujourd'hui' et le Presse de Demain) (Paris 1908) ; Saint- Vine- bault, G., (La Presse sous l'Assemblee Con- stituante) (Paris 1905) ; Soderhjelm, A., (La Regime de la Presse pendant la Revolution Franqaise* (Helsingfors 1900) ; Soleilhac, P., (Le Grand Levier) (Paris 1906) ; Tavernier, E., (Du Journalisme, son histoire, son role poli¬ tique et religieux) (Paris 1902) ; Von Schoor, (La Presse sous la Revolution Franqaise* (Brussels 1908) ; Willox, A., (Le Journalism en Province* (Paris 1883).

Pascal Forthuny,

Art Critic of the Matin (Paris); Literary Critic of Excelsior (Paris).

21. FRENCH INDUSTRIES. In order

to study French industries methodically we shall divide them into four classes: (1) Great industries; (2) small industries; (3) agricul¬ tural industries.

Great Industries.

Textiles. — In the first rank of great indus¬ tries stand the textile industries, which really include cotton, wool, worsted, flax, hemp and jute, and also a certain number of secondary industries, each one of which consists of two principal branches : spinning and weaving. To avoid mistakes we shall examine them sepa¬ rately.

The cotton industry consists of spinnine— mills containing 6,200,000 spindles and 110,000 power looms. Spinning-mills are confined to three centres : Normandy, where they are in the vicinity of Rouen; Nord, where the centres of Lille and Roubaix stand out prominently; and Vosges, including the department of the same name, Meurthe-et-Moselle and the Territoire de Belfort. Weaving, on the other hand, is much more extended, and can be divided according to specialties into 15 districts: (1) Amiens, ribbed velvets; (2) Conde sur Noireau, striped cotton; (3) Le Ferte Mace, coutils of various designs; (4) Flers in Orne, stripes and ox¬ fords; (5) Evreux, corsets and bed linen; (6) Mayenne, specially for what is called Laval;

(7) le Nord. flannels, bedquilts and sateens;

(8) Normandy, shirtings and long-cloth; (9)

Paris, napkins and Turkish toweling; (10) Roanne, blue cotton goods; (11) Tarare, mus¬ lins and hand

embroideries; (12) Thizy, cre¬ tonnes and peruviennes; (13) Saint Quentin, mousselines and gauzes for furnishing; (14) Vosges, cotton-cloth and satinet; and (15) Troyes, cotton hosiery.

The wool industry uses 1,600 heckling machines of different styles; 2,000,000 spindles in combing mills; 390,000 spindles in the spin¬ ning mills of carding, and 55,000 power-looms. A certain number of these looms are used by turns for cotton and for wool. The wool- carding mills are most important and form a separate industry. They are situated in Roubaix and in Rheims, and the shoddy mills are in Elbeuf and Vienne. The spinning mills are at Roubaix, Fourmies, Rheims, Vienne and Belfort. As for weaving mills they have 15 different centres: (1) Amiens, noted for serges called du Barry; (2) Saint Quentin and Bohain, cashmeres and light novelties ; (3) Beauvais, tapestries; (4) Tours, blankets; (5) Elbeuf, cloth; (6) Fourmies, colored and mixed weaves; (7) Lisieux, printcloth ; (8) Louviers, novelty goods; (9) Mazamet, curried fustians and military cloth; (10) Paris, double-milled goods and sateens for uniforms; (11) Rheims, merinos; (12) Roubaix and Tourco- ing, novelties for dresses; (13) Sedan, cloth for clothing; (14) Vienne, novelties for ready¬ made suits; (15) Vosges, articles for footwear. The value of imports and exports of woolens were just before the European War: Imports (yarn and cloth): 59,000,000 francs; exports (yarn and cloth), 322,000,000 francs.

The silk industry consists of 13,000 bassines for separating the thread from the cocoons; 35,000 power-looms for weaving, and 35,000 hand-looms. The silk mills are situated in Cevennes and Gard ; silk is made both by machine and by hand in Rhone and the neigh¬ boring departments, and the principal centre for selling is at Lyons; for ribbons, the chief centre is Saint Etienne ; and for galoons, laces for shoes, etc., and braids, Saint Chamond and Izieux. A new industry (artificial silk) was first made in 1889 by Chardonnet, its chief centre being Besanqon. The value of imports and exports of silks were just before the European War: Imports (tissues),

49,386,000 francs ($9,877,200) ; exports (tissues), 385,774,- 000 francs ($77,154,800) .

Flax and hemp, together with jute, contain, in all their factories, 500,000 spindles ; and in weaving, 22,000 power-looms and 20,000 hand- looms. The flax mills are chiefly situated in Nord; the manufacture of thread called ((sec® (dry) is in many respects like that called ((mouille® (wet). Sewing thread of flax is also made in the same section of the country. As for woven goods, strictly speaking, their manufacture is divided into a certain number of groups, that can be classed as follows : (1) the factories of the Nord, the chief centres of which are Armentieres, Lille and Bailleul, where smooth goods, colored or white, are made in every width; Dunkirk, Beauval and Flixecourt manufacture jute goods, and several places in Somme, awnings and damasks; (2) Normandy is celebrated for shirtings, pillow¬ cases and table covers; (3) Brittany and Anjou for handkerchiefs, canvas, etc.; (4) Vosges for table and bedroom linen; (5) South for

coarse cloth. We may add that in all these sections <(ramie® silk is manufactered.

It is estimated that the textile industries, properly speaking, employ 851,000 workmen in France, furnishing occupation to 1,093,000 workers on suits and other garments. They also feed as many cotton as silk mills, more than 2,000 tulle looms are working in Caudry, Calais, Saint Pierre and Lyons. This is the official account of the hosiery business in flax and in wool in Somme, Nord and Vosges; in cotton in Roanne and Troyes; and in silk in Herault, Gard and Hautes-Pyrenees. Hand¬ made lace forms one of the most artistic in¬ dustries of Puy, Bailleul, Bayeux, Mirecourt, etc. Besides these there are innumerable em¬ broidery factories in successful operation in Saint Quentin, Angers, Tarare and Nancy, and of passementeries in Lyons, Nimes and Paris.

The following table gives the number of persons employed in the various industries :

Persons

Nature of Industry employed

Cotton (textile) . 167,200

Wool (textile) . 171,349

Silk (textile) . 123,599

Flax, hemp, jute (textile) . 47,513

Hosiery (textile) . 56,682

Lace, etc. (textile) . 156,554

Ribbons (textile) . 48,371

Clothing of all kinds . 938 , 905

Linen garments . 212,716

Mineral Industries. — After the textiles, the industry which employs the most men in France is the mining of coal. The coal mines are divided geographically into five districts :

(1) the coal miles of the North, covering a surface area of about 109,000 hectares (269,337 acres), distributed in the departments of Nord and Bas-de-Calais, in about 40 grants, the chief of which are those of Anzin, Vicoigne, Noeux, Bethune, Lens, Aniche, Marly, etc.;

(2) the coal mines of the East, principally near the Moselle, to which are joined the mountainous districts in Savoie where anthra¬ cite coal is found; (3) the coal mines of the Oise, which include the basins of Basse-Loire, Vendee, etc.; (4) the coal mines of the centre, the most important after those of the North, which include the basins of Saone et Loire (Autun, Creuzot, Blanzy, Montceaux, Mont- chain, 875 hectares, 2,161 acres) ; those of Al- lier and Auvergue (Ahim, 2,200 hectares, 7,462 acres) ; Commentry (2,480 hectares, 5 244 acres) ; those of Loire (Saint Etienne, Saint Chamond, Rive-

de-Gier, Firminy), with a sur¬ face area of 25,000 hectares (61,775 acres) ; those of Savoie and Loire, 42,972 hectares (106,- 182 acres) ; of Nievre, 8,000 hectares (19,768 acres) ; of Allier, 7,367 hectares (18,208 acres) ; of Correze, 5,432 (13,342 acres), etc.; (5) the coal mines of the South, situated in the depart¬ ments of Lot, Herault, Gard, which contain several basins, two of which are exceedingly important, that of Aveyron, 12,000 hectares (29,652 acres), and Gard, 26,888 (66,437 acres), (Grand Combe, Besseges, Alais, etc.).

Besides these, there are in Herault the small basins of Neffiez, Ronjan, Graissesac, 8,800 hec¬ tares (19,768 acres), and Bousquet d' Orb, 15,- 129 hectares (37,384 acres), and in Tarn, the basin of Carmeaux, 8,800 hectares (21,744 acres). To coal mining there is always at¬ tached the secondary industry, the manufacture of coke and agglomerates.

PRINCIPAL RESULTS OF THE MINING INDUSTRY IN FRANCE

FROM 1891 TO 1915

Year	Average French consummation. Millions of tons	Production. Millions of tons	number of miners. Thousands of miners
1891 .	36,573	26,025	131.8
1895 .	38,640	28,020	137.3
1900 .	48,803	33,404	162.0
1905 .	48,600	35,928	175.1
1910 .	56,530	38,350	196.7

1911 . 59,530 39,229 200.2

1912 . 60,677 41,145 202.3

1913 . 40,813 from

1914 . 29,786 40.0

1915 . 19,750 to 50.0

As already expained, the coal mines of the North District cover a surface area of 109,000 hectares (269,339 acres) ; that is to say they are a very important proportion of the whole mining area in France. During the European War that district has been occupied by the enemy; on the other hand the scarcity of labor has been extreme during that same period. Such abnormal situation is sufficient to explain the decrease of output in 1914 and 1915.*

The great mineral industries of France are naturally near the coal deposits. The only way they can be divided geographically is under the same divisions as the coal mines. But the chief centres can be especially noticed as fol¬ lows : in Besseges (in Gard) where there are iron mines, blast furnaces, foundries, machine- shops, turning-plate factories, smelting works, etc. Commentry-Fourchambault has blast fur¬ naces, forges, foundries, wire-mills; there are machine shops for the manufacture of steel at Montlugon and at several points where these manufactures are exported, extending through Cher, Allier and the Nievre ; at Creusot there is one of the most important metallurgic estab¬ lishments in the world, Schneider & Co., which is situated in the centre of France. Henriche- ment is joined to the railway of Bourgogne and Bourbonnais and connected with the Canal du Centre by a private railroad. Decazeville is the most important metallurgic centre in the South ; here are made rails, various iron mer¬ chandise, cast-iron pipes for conduits, boilers, etc.

Manufactures. — There are factories in Fives-Lilles (Nord) and Givors (Rhone), chiefly making machinery

used in the manufac¬ ture of silk and plush, steam-engines, locomo¬ tives, materials for constructing railroads, pig iron, and heavy metal work, etc. Indre, in the department of the Loire, makes a specialty of marine constructions, torpedoes, large pieces of cast-iron boilers, etc. In Maubeuge (Nord) are the most important metal works and there are others in Longwy (Meurthe-et-Moselle), both near Belgium ; and in Montataire, which contains other factories besides the one of that name; then comes Creil, celebrated for its parquet flooring, and the remelting of old iron, extensively used in the manufacture of tin ; and then again the factories of Frouard, near Nancy, Bagugson in Meuse, and Outreau (near Boulogne-sur-Mer) ; Rive-de-Gier is an im¬ portant centre for foundries, the manufacture of steel, steam-engines, wheels and material for building railroads; Saint Chamond, espe¬ cially, is celebrated for the rolling of iron and steel ; and lastly comes Terrenoire, where the pig iron of Ardeche is made into iron.

The glass industry is brilliantly represented in France. Besides the manufacture of bottles carried on in the glass works of Blanzy, Rive- de-Gier, Givors, Saint-Galmier, Vauxhot, Reims, Epernay, Fourmies, Valenciennes, and some localities in the Jura, mention may be made of the celebrated factories for making plate glass in Aniche (Nord), Chauny and Saint Gobain (Aisne), and those for making cut glass in Baccarat (Meurthe-et-Moselle), where the in¬ dustry has reached great artistic excellence, in consequence of which a considerable amount is exported.

Mention should also be made of the chem¬ ical works for the manufacture of sulphuric acid and soda. These have warranted the erec¬ tion of large buildings ; for instance, the chem¬ ical works in the North, the works in Saint Gobain Maletra, etc. At all these places there are mineral deposits. Other industries of a chemical character can be included in this group, like that of coloring matter, the most representative of which are Saint Denis and Rhone ; fecula and amidine works, which

are all in Nord; white lead, made in Nord and in the vicinity of Paris ; tallow candles, chiefly made in the departments of the Seine, Rhone, Herault, and Bouches-du-Rhone ; dyeworks al¬ ways located near textile factories.

Ceramics are among the great industries of France. The manufacture of porcelain is espe¬ cially centred in Limoges ; square tiles in Mau¬ beuge, faience in Choisy-le-Roy, Gien, etc. In this group can be classed the manufacture of cements in Boulogne-sur-Mer, and in the out¬ skirts of Grenoble ; and the mining of asphal- tum principally found in Savoie.

We can also count among the great indus¬ tries of France the manufacture of machine- made boots and shoes in Blois, Fougeres, etc.; writing pens and pencils in Boulogne-sur-Mer; clocks in Besangon ; marble-cutting in Cousolre ; cutlery_ in Chatellerault ; perfumery in Paris and in Grasse ; gloves in Grenoble and its en¬ virons; soap in Marseilles and in the North; hats in Tours, Epinal and Paris, etc. ; the picture trade in Tours, Epinal and Paris; the most celebrated manufactures of automobiles in the suburbs of Paris, etc. There are a great many tobacco and match factories. Arms are manufactured in Saint Etienne, cannons in Bourges, and tapestries (Gobelins) in Paris.

It must be said that all the information above refers to normal conditions in France before the European War. The great manu¬ facturing and industrial districts of France be¬ ing situated in the North and the Northeast, a great number of plants have been either de¬ stroyed or entirely removed to Germany with all their machinery. No doubt all these fac¬ tories will be rebuilt. Already in the Vosges and Alpine districts many factories have been created, mostly for the production of muni¬ tions, which hereafter will be turned into in¬ dustrial factories; the Alpine and Vosges dis¬ tricts have been selected on account of the waterfalls, thanks to which electric power may be created without coal which has been so scarce and so expensive in France during the war. It may be added

that all the machinery used in these new factories is of the most up-to-date type and comes mainly from the United States of America.

FRANCE— FRENCH INDUSTRIES (21)

709

SMALL INDUSTRIES.

The principal small industries for which the French are especially noted, on account of the taste they have shown for this kind of manu¬ facture, are "Articles de Paris® — so called be¬ cause manufactured in that city or its suburbs. They can be divided into 13 groups: (1) the toy trade-dolls, dressed and undressed, me¬ chanical toys, various games, all kinds of play¬ things, heads for modistes, cotillon favors, masks, etc. (2) The manufacture of buttons in horn, bone, vegetable-ivory, papier verni, hardwood, etc. (3) Pasteboard articles, such as bonbon boxes, and all decorative pasteboard articles. (4) False hair and hair work, the demand for which has greatly increased owing to the present style of coiffure worn by women. (5) Fans, certain kinds of which are manufac¬ tured in the vicinity of Beauvais. (6) Artifi¬ cial flowers, many of which are exported. (7) The sheath trade, which includes the manufac¬ ture of knife boxes, cases for spoon, fork and knife, cases for surgical instruments, pipes, cigars, opera glasses, cases of white manna-ash, and especially jewelry cases. (8) The manu¬ facture of workboxes, which includes certain small articles used by children as playthings ; (9) Umbrellas, parasols and horsewhips. (10) Combs in horn, buffalo-horn, real and imitation tortoise shell with hinges, gilt backs carved, in¬ laid, etc. (11) Feathers, which are chiefly worn on women's hats. (12) Portfolios and morocco leather work, which is an industry distinct from sheath-making. (13) Fancy arti¬ cles, such as billiard balls, crucifixes and other religious objects, in ivory or in wood, mount¬ ings for canes, lunettes, opera glasses, lorg¬ nettes, knife handles, games of dominoes, toilet articles and articles used by

smokers, etc.

Let us mention, as essentially French, the industries that owe their existence to fashion, in which Paris reigns supreme, the term (

The goldsmith trade also takes a high rank in France, especially in Paris, not only on ac¬ count of the large goldsmith shops that make only large pieces (all silverware used to orna¬ ment the table and buffets), but also the small goldsmith's shops that make a specialty of knives and forks for fish, mugs, sauce-pans, knives and various kinds of utensils, and also religious goldsmith work, such as brass and pewter plates. To this industry can be added that of argentry, for which certain Parisian firms have acquired quite a reputation.

DOMESTIC INDUSTRIES.

Although domestic industries are very promi¬ nent in France, it is difficult to locate them be¬ cause in so many places they are annexed to the great industries. For example, in the tex¬ tile industries a certain number of localities, such as the environs of Lille and the manufac¬ turing town of Cambrai, flax linen has its

home ; the workmen use all their skill to get suitable thread from their employers, and then, after weighing it, they take it home; so also in Saint Etienne the manufacture of silk ribbon is made in great part in the homes of the work¬ men, whose looms work by electricity controlled from a central factory from which the power is distributed; the same is the case in the entire lingerie industry, concentrated in Saint Omer and in Vosges, the work being taken home under the direction of forewomen and con¬ tractors, as is almost all the lace manufactured in Bailleul, le Puy and other localities ; and much of the labor of the 1,000 mousseline de coton factories in Tarare.

The large stores where ready-made clothing is sold have in their employ many men and women who do the

work at home. In the small industries, as well as in the large, part of the work can be done in the homes of the work¬ men. For instance, all varieties of <(Articles de Paris® are usually made away from the factories.

Besides these branches of the chief centres there are other industries that may be con¬ sidered as family industries in the sense that the manufacturer needs only one, two or three workmen at most on each article, like real or imitation jewelry, the manufacture of effer- vescents, pharmaceutical specialties, many of which are exported; dyeing and scouring, etc., and numerous others.

AGRICULTURAL INDUSTRIES.

The most important of French agricultural industries is the manufacture of wines, for which France has a world-wide reputation. The departments of Gironde, Cote d'Or, Marne, Drome, Savoie and Loire yield the most noted vintages, as well as the most abundant; but fine grapes are also grown in the departments of Herault, Gard, Aude, Gers, Pyrenees- Orientales, Charente, etc.

They can, broadly speaking, be divided into three great classes: Bordeaux, Bourgogne and Heaujolais. Especially noteworthy are the Burgundy wines and the matchless champagne. Next in importance after wines come distilled liquors. There are two kinds of brandy, bet- terave (beet), manufactured only in the North and consumed there, and wine brandy exported all over the world — a sufficient guarantee of its worth. This last can be divided into three varieties: (1) cognac brandies, which are called (after the places where they are made), Fine Champagne, Borderies, Bois ordinaires and Deuxieme Bois; (2) Armagnac brandies, which are known by the names of Bas-Armagnac, Tenareze and Haut-Armagnac ; (3) Montpellier brandies. The first are made exclusively in the departments of Charente and Charente- Inferieure ; the second in Gers, Landes, Lot et Garonne, and the third in Herault. Besides the above-mentioned kinds, in all these wine

districts Marc brandy is made of the residue of the pressed grapes; and in the department of Indre another brand of local brandies, which goes by the name of Calvados, has gained a cer¬ tain reputation.

Next in importance to brandies is beer. This is not exported, but a greater quantity has been brewed in the last few years. A great many departments in France situated near the

German frontier have brewed beer after the German fashion so successfully that its general consumption has exceeded that of Munich and Vienna.

The manufacture of granulated sugar is one of the great agricultural industries of France. This gives rise to three different industries: (1) the cultivation of beets for the sugar contained in them, with nurseries for the scientific culti¬ vation of seeds, which are exchanged between France and Germany. These extend over the millions of hectares in the North. (2) The manufacture of beet sugar in Nord, Aisne, Somme and many northern departments that have refineries annexed. (3) The refineries of colonial sugar, which is imported and made into sugar in the ports. Before the European War there were 213 sugar works, employing 31,774 men, 1,614 women and 936 children. The yield of sugar (in metric tons [2,204 pounds] of re¬ fined sugar) was in 1909—10, 733,902 tons; 1912-13, 877,656 tons; 1914-15, 302,961 tons.

Besides these great manufactures, which form the basis of French agricultural industries, we might mention a great many more that are developing rapidly, as the preparation of chick- ory in Nord, successfully used with coffee and sometimes as a substitute for coffee ; the dig¬ ging of peat in Somme, used instead of coal ; the manufacture of olive oil in all the southern departments; that of wax and honey, which has been greatly extended in the eastern portion of France; butter, which has

necessitated the erec¬ tion of large factories in the district of Avesnes (Nord) ; the manufacture of biscuits at Mar¬ seilles, Nantes, Bordeaux and Suresnes, etc.; chocolate manufacture; glue manufacture, etc.

The manufacture of agricultural machinery is an important industry and, notwithstanding the competition of American machines, the making of heavy implements like threshing ma¬ chines is carried on on a large scale, especially in Liancourt, Fumay, Vierzon, Dourdan and Algeria.

AGRICULTURAL PRODUCTS IN THE YEARS 1913,

1914, 1915.

Produce in thousands of metric tons (2,204 lbs.)

Crop ' 1913 1914 1915

Wheat . 8,692 7,870 6,472

Rye . 1,271 1,138 993

Barley . 1,044 1,004 786

Oats . 5,183 4,665 3,746

M 0170 S43

potatoes::::::::::::::: 13,586 11:993 '9:057

Beetroot (sugar) . 5,930 3,751 1,508

Tobacco . 26 24 15

In 1915, the harvests for the principal fruits were as follows (in thousands of metric tons) : Cider apples, 4,482; table apples, 206,000; table pears, 66; chestnuts, 147; walnuts, 49; olives, 39; peaches, 13; cherries, 39; plums, 26; prunes, 16; strawberries, 9.

The production of the wines (Bordeaux, Bour¬ gogne, Champagne) ranges between 25,000,000 (660,500,000 U. S. gallons) and 78,000,000 hec¬ tolitres

(2,060,760,000 gallons) . The average for the last 10 years was 47,000,000 hectolitres (1,241,740,000 U. S. gallons).

Number of farm animals in 1915: Horses, 2,227,000; mules, 152,000; asses, 332.000; cattle, 12,287,000; sheep and lambs, 13,483,000; pigs, 5,491,000; goats, 469,000.

In reading the statistics for 1915 it should be remembered that the Germans occupied dur¬ ing that year a portion of the French territory while on the other hand there was a great scarcity of labor.

Bibliography. — (Official publications) ; Al¬ bum de Statistique Graphique du Ministere des Travaux Publics (Paris) ; Bulletin Officiel du Ministere de l'lnterieur; Rapports des Tn- specteurs divisionnaires du travail ; Statistique de l'lndustrie Minerale et des appareils a vapeurs (annual) ; Statistique agricole an- nuelle ; Statistique agricole decennale ; Cornpte des depenses du Ministere de rAgriculturc ; Bulletin de Statistique agricole et Commerciale (published by the Institut International d' Agri¬ culture, Rome) ; Almanach national ; Journal Officiel ; Annuaire Statistique ; Statistique Gen¬ erate de la France (annual) ; Bulletin de la Statistique Generate de la France (quarterly).

Alfred Renouard, Editor of <(Z/ Industrie Textile?''

Revised by Marc de Valette, Attache aux Etudes Economiques de la Ban quo de France.

22. FRENCH COMMERCIAL AND BANKING SYSTEM. The history of French commerce and industry, like the history of France itself, naturally falls under two heads: the old regime and modern times.

Previous to modern times, the development of French industry was limited by the guild- system on the one hand, and on the other by the numerous obstacles, inherited from feudal times, which lay in the way of exchanges from one province to another. Many of

those ob¬ stacles were still in existence on the eve of the Revolution. However, a progressive ele¬ ment was to be found, ever since Colbert's days, in the royal manufactures. They did not belong to the king, but were protected against the guilds' monopolies by privileges conferred by the Crown. We may mention among them the tapestry manufactures of the Gobelins and of Beauvais and the porcelain factories of Sevres. The private factories of Aubusson (tapestry) ; Rouen, Marseilles, Lune- ville (earthenware) ; Lyons (silk), and the glassworks in the Vosges — where glassworkers were long styled gentilshommes verriers — also deserve notice.

Foreign commerce was effected principally through the French ports: Marseilles, where the tradition of commercial navigation is as old as the town itself ; Dieppe, the birthplace of the famous Angot, and the harbors of the Atlantic, which sent our ships to the New World; the old French colonies in the West Indies, Louisiana, Canada and the Indian Ocean are witnesses to their activity. The establish¬ ment of the Compagnie des Indes (1664) shows us the metropolis taking an interest — unfortu¬ nately one too weak and too fugitive — in com¬ mercial matters. The reader may also be re¬ minded that the commerce between England and France which, if circumstances had been different, might have developed under the treaty of 1786, was at stake throughout the long duel fought by the first consul and the emperor against the English people.

The home commerce was necessarily purely local ; the means of communication being strictly limited to the rivers, the few canals

and fewer good roads; the towns were com¬ pelled to be self-supporting and the country people had to depend both for their food and their clothes on the produce of their labor and on the housewives' industry.

Before the middle of the 19th century the new canal and road systems and the railway and telegraph lines had given an incalculable power to the latent forces of the country, bring¬ ing about a complete transformation of industry and commerce. We may here notice that the impulsion thus given to commerce and industry never equaled in France that which made itself felt in England and in America about the same time.

Among the principal characteristics of the commercial revival of the 19th century we must mention the specialization of goods, the indefinite extension of the fields open to manu¬ factures, a considerable increase in the cash balances and clearing-house statistics, an ever¬ growing demand for capital and its tendency' to concentration and association. Henceforth we see, more and more frequently, societies taking the place of individuals, and joint-stock companies substituting themselves to the ordi¬ nary copartnerships (those among the latter which have sleeping partners bear the name of societes en commandite) . The co-operation just mentioned was in France as elsewhere of more frequent occurrence among manufacturers than among tradespeople, and there exists in France in the towns and in the villages a large class of small retailers which have the political strength to destroy any great combination that might attempt to drive it out of the market.

As early as the beginning of the modern period, the government had encouraged industry and commerce and given them the institutions they wanted. The Code de commerce was is¬ sued in 1807. In order to entrust its applica¬ tion to fully competent magistrates the French produced a unique and admirable system of commercial courts. The judges of these are returned by an electoral body exclusively com¬ posed of those subject to their jurisdiction. The jurisdiction of Prud'hommes was organized on the same lines, finally the Chambers of Com¬ merce, to be elected very much in the same way as the courts, were instituted (1803), their functions being to look after the general in¬ terests of trade, to advise the public

powers when requested and to lay before them the desiderata of the trading classes. Important rights were conferred upon these Chambers of Commerce, including that of raising certain taxes. One of the most useful works under¬ taken by the Chambers of Commerce has been their contribution to the organization of com¬ mercial education in France. So far that edu¬ cation was practically nonexistent ; at the pres¬ ent time it is still comparatively little spread. It is only given in special schools where pupils are admitted after completing their general education.

The interference of the government makes itself felt in another way, more prejudicial than favorable to the expansion of trade, namely by the manifold regulations which are constantly claimed by the working class. The government also has to regulate the system of customs which is largely based on the principle of pro¬ tection, in France as elsewhere favorable to

some producers and a source of grave difficul¬ ties to others.

It is practically impossible to give a numeri¬ cal estimate of the amount of business trans¬ acted in France. Mr. Maurice Block put it at 1,000 francs ($200) per inhabitant in 1875. It would certainly be more now, even without in¬ cluding the business carried on at the Stock Exchange ; to give an example of the latter it was estimated in 1888 by Mr. Neymarck that the stock negotiated on the Paris Exchange alone reached a yearly total of from 30 to 35 billion francs or 6 to 7 billion dollars.

As to importation and exportation, the fol¬ lowing statistics will give an idea of the com¬ mercial movement in France. We first extract a few figures from the tables drawn under Louis XVI by Arnould, chef du bureau de la balance du commerce.

Exportation from France to Holland

1658 .

72,000,000 francs 31,000,000 "

46,000,000 "

1716 .

1787 .

Import from England into France

Export from France into England

Total

1686 .

18,000,000 f.

23,300,000 f.

41,300,000 f.

1716 .

13,900,000

8,000,000

21,900,000

1787 .

58,600,000

37,600,000

96,200,000

We may add that the total importation of France in 1787 seems to have reached from 400,000,000 to 500,000,000 francs as against somewhat less than 100,000,000 in 1716, and the total exportation at the same date from 50,- 000,000 to 500,000,000 francs as against a little over 100,000,000 francs in 1716. The imperial policy considerably reduced our exchanges with foreign countries, especially with England, with the effect that even under the

ultra-protectionist government of the Restoration the figures rep¬ resenting our imports and exports hardly equaled those reached during the last years of the old regime.

In the following columns we give the aver¬ age reached by the commerce general and the

Commerce general

Commerce special

Import

Export

Import

Export

/

1827 .

667

698

480

521

1837 .

1,088

1 ,024

776

713

1847 .

1 , 503

1,672

1,077

1,224

1857 .

2,987

3 , 293

2,200

2,430

1867 .

4,262

4,202

3,408

3,307

1877 .

4,570

4,371

3,670

3 , 436

1887 .

4,943

4,238

4,026

3,246

1897 .

5,137

4,803

4,000

3,676

1907 .

7,874

7,256

6,222

5 , 596

1908 .

7,180

6,620

5,640

5 , 050

1909 .

7,856

7,482

6,246

5,718

1910 .

9,102

8,104

7,173

6,233

1911 .

1912 .

9,809

10,293

8,012

8,823

8,065

8,230

6,076

6,712

1913 .

10,724

9,260

8,508

6,875

Franc = 19 cents in U. S. currency.

In 1909 the imports were valued at $1,152,715,000 and exports, $1,063,746,000; in 1908, imports $1,088,619,000, and exports, $974,785,000.

commerce special respectively during ten-years' periods from 1827 to 1907, and the yearly aver¬ ages from 1907 to 1913. (The commerce general includes all imports and exports of any sort, coins excluded ; the commerce special only in¬ cludes among imports foreign goods meant to be consumed in France and among exports goods wholly or partly manufactured in France and sent to foreign countries. The sums given represent millions of francs).

The revival of the French commerce and industry after the Revolution and in the course of the 19th century was bound to have its effect on the working of the banks which, being the organs of the public credit, are the natural auxiliaries of exchange. The financial system of the state has also been subjected to a com¬ plete reorganization ; public works of all kinds, military expenses, etc., have brought about a considerable demand for capital ; all the finan¬ cial markets have come to share in the greater operations of credit and an ever closer solidarity has been established between the various finan¬ cial markets themselves. The function of bankers, formerly mere money-lenders to the sovereigns, has thus evolved, being placed by circumstances on a broader basis. Hence it is true to say that, although some banking firms can proudly trace their origin several centuries back, the constitution of the banking system in France was the work of the 19th century.

The French banks are divided as follows: (1) The two official institutions, viz., the Banque de France and the Credit Foncier; (2) the so-called (

1. The Banque de France was founded in 1799 by the first consul and finally organized by him, as emperor, in 1806. Its constitution was inspired by that of the Bank of England, but not made similar to it ; it belongs to the system which, with some variants, now prevails in most European countries, and is entirely different from that of the United States. The Banque de France has, to begin with, an official function, viz., the issue of bank notes, which it owes to a privilege conferred upon it by law as early as 1803 and renewed ever since, the last renewal having taken place on 19 Nov. 1897, when it was stipulated that it would last for 15 or 23 years more and expire on 31 Dec. 1920. A fresh renewal is already under consideration and cannot fail to be voted for an important period, as it is the wish of the majority of business people. The currency of bank-notes is balanced partly in metal and partly in dis¬ counted bills. Something of this system can be recognized in the new principles,

recently introduced in the United States by the Federal Reserve Act, The sum total in gold and silver

amounted in July 1914 to about 4,500,000,000 francs ($900,000,000) in gold and between 300,000,000 and 400,000,000 francs ($60,000,000 to $80,000,000) in silver. Since the outbreak of the war, the gold stock has been gradu¬ ally increased to 5,000,000,000 francs ($1,000,- 000,000 .at the beginning of December 1916), although several consignments of gold have been sent to England and to the United States. The amount in bills discounted is constantly varying under the direct influence of the economic activity of the country; dur¬ ing the last 20 years it has oscillated between 500,000,000 francs ($100,000,000) and 1,500,- 000,000 francs ($300,000,000). The limit of the currency of bank-notes has been raised a number of times, and amounted before the war to 6,800,000,000 francs ($1,360,000,000). It must be observed that cheques are used on such a limited scale in France that a high number of notes are a necessity of the ordinary course of business and life. Bank-notes were recog¬ nized before the war as legal currency. The limit has now been raised (by a ^decree® of 15 March 1916) to 18,000,000,000 francs ($3,600,- 000,000) in accordance with the necessities of the war, the enforced currency of bank-notes being decreed at the same time; the limit had been successively put at 12,000,000,000 francs ($2,400,000,000) 5 Aug. 1914, and 15,000,000,000 francs ($3,000,000,000) 15 May 1915.

The Banque de France has, on the other hand, a commercial function, consisting in the discounting of commercial bills on condition that they bear three signatures, represent a minimum value of five francs and can produce a minimum interest of 0 franc, 10 centimes The rate at which the commercial bills are dis¬ counted varies according to the circumstances of the money and financial markets, but the right enjoyed by the Banque de France to reim¬ burse its notes in silver enables it to keep that rate considerably more even than is the case in

countries in which gold is the only recognized standard. During many years before the war the discount rate could be maintained prac¬ tically at 3 per cent. On 29 Jan. 1914, in con¬ sequence of the economic crisis, it was raised to 3y2 per cent ; it was fixed at 4 per cent on 30 July 1914, at 6 per cent on 1 August, at 5 per cent on 20 Aug. 1914, and has not varied since.

The capital of the Banque de France, origi¬ nally 30,000,000 francs ($6,000,000), has been raised successively to 45,000.000. later on to 90,000,000, and finally to 182,500,000 francs ($36,500,000) 9 June 1857, in 182,500 shares of 1,000 francs each. They are worth to-day about 5,125 francs. The banque is administered by a committee of 15 regents, five of whom are to belong to the commercial or manufacturing class and three are to be taken among the tresoriers payeurs generaux (the representatives of the French Exchequer in the various departments) . It has a governor and two subgovernors ap¬ pointed by the government. The banque has a total of 445 branches in the country.

Under the conditions which have prevailed during the last 10 years this privilege has been reinforced, the market of the coulissiers keep¬ ing the designation of ((marche fibre® and em¬ bracing all the stocks for which admission to the official quotation has not been obtained.

The Credit Foncier, the governor of which is also appointed by the government, has an organization very similar to that of the Banque de France. Its special function consists in granting first mortgage loans to persons, vil¬ lages, towns and departements. The Credit Foncier appeals to the public for the .funds necessary to its operations by issuing bonds called obligations foncier es or communales. It has a capital of 200,000,000 francs ($40,000,000).

The following statistics will give an idea of the rate at which bills have been discounted at the banque during the last 50 years :

Maximum

rate

Minimum

rate

Average

rate

1854 .

Per cent

5

Per cent

4

Per cent

4.30

1864 .

8

41

6.50

1874 .

5

4

4.30

1884 .

3

3

3

1894 .

21

21

2.50

1904 .

3

3

3

1914 .

6

3

4.15

2. The firms which compose the Haute Ban que are often older than the Banque de France itself. We find them at the origin of all great modern enterprises ; their heads were the founders of the Banque de France and of the great railway and insurance companies and their successors still have seats in the councils of both. The government of Napoleon I re¬ warded their efforts at the time by creating among them the barons de la finance. Most of them have kept up the tradition and occupy an important place in the management of the financial market. The loans and other greater financial operations which they used to claim as their own are now partly in the hands of the financial societies which differ from the credit establishments in the receiving of money de¬ posits; the discounting of bills is but a second¬ ary part of their functions.

3. The discounting banks are organized on the three-signature principle and work in con¬ nection with the Banque de France. The ma¬ jority of tradesmen use them and they in their turn apply to the banque where they get their bills discounted. They are of varied import¬ ance. Their number, which used to be very great in the provinces, tends to decrease owing to the constant development of the credit establishments.

There are of that kind in France, viz., three of the first class, the Credit Lyonnais, the Comptoir National d'Escompte de Paris and the Societe Generale, which have their statutory or head offices in Paris, and the Societe Mar¬ seillaise, the Societe Nanceienne, the Credit du Nord, the leaders of the financial decentraliza¬ tion, the head offices of which are established in Marseilles, Nancy and Lille respectively. They occupy an intermediate position between the English joint-stock banks and the greater German societies. The credit establishments appeal to the public for funds, which they keep as deposits, they have created among a large part of the population the habit of having their money deposited in banks, and the parallel habit for bankers of relying for their operations upon the public's deposits as much as, if not more than, upon their own capitals. The credit es¬

tablishments, like the joint-stock banks, use the greater part of their deposits for discounting purposes, they also devote a certain amount of them to investments and even to loans, although their extreme parsimony in granting the latter somewhat justifies the saying that in France ((the credit establishments give no credit.® At all events they never subscribe to an issue of commercial or industrial shares except in a very cautious manner and they are no more anxious to make issues of capital themselves than to invest in the ventures of others. It is true that beside the credit establishments are to be men¬ tioned the (

One result of the outbreak of the European War was

the establishment of a moratorium in France as in England and all the countries en¬ gaged in the conflict (although the Germans have eluded the name of moratorium). The disappointment and dissatisfaction of many owners of deposits in credit establishments gave rise to the opinion that disaffection would follow. It can hardly be asserted that this was more than a superficial and passing feel¬ ing and that the standing of the establishments was seriously injured. It is right to say that, though the moratorium is still in force, the credit establishments, as well as all the banks of deposits, ceased to take advantage of it and resumed the habit of payments in full on 1 Jan.

1915.

To complete the description of the organs of credit in France we have still to mention: (1) the popular and co-operative banks, as yet but little developed;. (2) the land and estate banks (banques foncieres) , the operations of which are carried on in connection with those of the Credit Foncier; (3) the postal transactions; (4) the savings banks, viz., the Caisse d'epargne and the Caisse d'epargne postale, both of which are official institutions; (5) the land credit estab¬ lishments, recently created, whose action is still uncertain ; (6) the magasins generaux where goods can be warranted; and last but not least the colonial banks, which are constituted under special laws and have a half-official existence. The two more important ones are the Banque de l'Algerie and the Banque de lTndo-Chine.

The French banks are but scantily repre¬ sented outside of France; there are only a few branches of the credit establishments in Eng¬ land, Belgium, Switzerland, Spain and in Con¬ stantinople. Inversely each year previous to the war saw the establishment in Paris of new branches of the foreign banks, a consequence of the abundance of capital which had made France the money-lender to the whole world.

It is impossible to give an estimate of the banking operations carried on in France. By the side of the joint-stock-companies whose statistics are made known to the public, there exists a large number of private firms whose joint capital certainly exceeds that of the said companies and whose balance-sheets, statistics and other results remain unknown. There is, it is true, a clearing-house (chambre de com¬ pensation) in Paris, but it is only composed of a dozen members (they were 12 including the representative of the Banque de France, until

April 1906, when their number was raised to 13), and the amount of business settled there is far from representing even the totality of operations transacted in Paris alone. We can, however, subjoin the following statistics, while warning the reader that under the conditions of secrecy prevalent in French private banking the returns are given below the full total. They are taken from the tables of the <(Chambre de Compensation^ from August 1913 to July 1916.

	Francs
August	2,423,490,843.78
September	2,999,790, 068 . 40
October	3,277,729,349.86
November	2,824,160,673.50
December	3,591,772,534.84
January	3 , 241 , 348, 903. 72
February	3 , 147 , 938, 228. 10
March	3,530,566,899.14
April	3,338,716,504.44

May . 3,398,238,125.16

June . 3,492,674,442.76

July . 3,370,915,077.96

The average per day during the same months was given as follows :

Francs

August . 100,978,785.15

September . 115,376,541.09

October . 121 , 397 , 383 . 32

November . 117,673,361.39

December . 138,145,097.49

January . 124,667,265.52

February . 131,164,092.83

March . 135,791,034.58

April . 133,548,660. 17

May . 135,929,525.

June . 139,706,977.71

July . 134,936,603.11

It is to be observed that the figures of the last named month are not normal figures, part of the sums which fell due on 31 July not hav¬ ing been paid.

Of the three great credit establishments of the state we have of course full statistics which we here append :

Francs

Cash, etc .

Loans and reports. . . Discounted bills …. Stocks,

shares, bonds

Check accounts .

Creditor accounts . . . Undue bills .

939 , 002 , 402 668,153,014 2 , 465 , 433 , 640
88,668,720 1,555,068,738 2,676,918,460 72,113,895

to which we may add a few more figures :

Francs

Capital .

Reserve funds .

Net profit .

Dividend .

See France, Bank of.

700,000,000 290,580,775 39,824,299 25 , 000 , 000

J. Delcourt,

Professor of English , University of Montpellier.

23. FRENCH RAILWAYS. Historical, 1823-59. — The principles underlying the pres¬ ent system of railways in France will perhaps be made clearer by a brief account of the several phases that have preceded it.

The earliest experiment in railroading on French soil was a line between Andrezieux and Saint Etienne, intended solely for coal and freight and operated by horse traction. The grant for it was made in 1823 by a simple royal ordinance. It was a grant in perpetuity, with¬ out subsidy or guarantee. About the same time grants were made on the same conditions for several other small lines.

In 1832 the first locomotive mad^ its anpear- ance. This was on the fine from Saint Etienne to Lyons, and thenceforward passenger service was added to

freight traffic.

The government, divining the future im¬ portance of the new mode of transportation, worked out a general scheme of trunk lines and submitted it to Parliament. The first debate brought out two contrary principles which were destined to clash frequently thereafter. Ac¬ cording to the one principle the state ought to construct and operate the railways ; the other principle was that of private enterprise. After some fruitless discussions several grants were made, but a financial crisis which followed forced the recipient companies to ask for a re¬ vision of their contracts. The state had to assist them, and in 1840 it guaranteed to the Paris-Orleans Company, for 47 years, 4 per cent interest on a maximum capital of 40,000,- 000 francs. This was the beginning of an ar¬ rangement which afterward became general.

The law of 1842 decided on the creation of the trunk lines radiating from Paris to, respec¬ tively, Lille and Belgium; Nancy and Strass- burg; Lyons and Marseilles; the centre of France, Bourges and Toulouse; Tours, Bor¬ deaux and Bayonne; Nantes; Rouen and Havre; and lastly from Bordeaux to Marseilles by Tou¬ louse, and from Mulhouse to Lyons by Dijon.

The state undertook the acquisition of a part of the lands, the departments being re¬ sponsible for the remainder. The state built at its own expense the embankments and other artificial works and the substructures of the stations. The companies had to furnish the permanent way and the working stock, which at the expiration of the grant were to be bought by the state at an expert valuation. The work was begun and pushed forward energetically, but in a short time a financial crisis precipitated by speculation endangered the existence of the companies. The Republican government of 1848 proposed repurchase, which was not ac¬ cepted.

The empire from the first favored an amal¬ gamation of the various companies, the large number of which

was a cause of weakness and of inconvenience to the public. By a series of decrees it constituted the great corporations, unifying the conditions of their contracts and extending the duration of their grants to 99 years. In this way were founded the principal French systems, whose grants expire as fol¬ lows: That of the Northern Company in 1950; of the Orleans in 1956; of the Southern in 1960; of the Eastern in 1954; of the Western in 1956; and of the Paris-Lyons-Mediterranean in 1958.

Feeling their position strengthened, the com¬ panies accepted grants for secondary lines, to serve as feeders to the main lines, and from 1852 to 1857 more than 2.000,000,000 francs ($400,000,000) were expended, when a fresh financial crisis supervened.

At the end of 1858 the situation was as follows :

LENGTH OF LINES

In operation . 8,700 kilometers (5,448 miles)

Granted . 16,174 kilometers (10,050 miles)

EXPENDITURE

Million

francs

By the state and sundry . 780 ($156,000,000)

By the companies . 3,334 ($666,800,000)

1859-75.— The situation of the companies having become critical, the government, on 11 June 1859, induced Parliament to ratify agree-

mcnts between the state and the companies of the following nature :

In order to restore the companies to the situation they had enjoyed before the grants of secondary lines, the system of each was divided into two sections, called the old and the new systems. The capital appropriated to the new system received a guarantee of 4.65 per cent interest for 50 years, beginning with 1865. Working expenses were included in a single account. Beyond a certain sum, repre¬ senting the dividend guaranteed to the old system and the redemption of its capital, the excess of the net profits had to be expended on the new system, so as to cover partly, at least, the revenue guaranteed by the state, which was advancing the difference. This scheme has been named the ((Overfall)) (dever-soir). The sums advanced by the state for the guarantee were regarded as loans, the com¬ panies paying interest on them at 4 per cent.

On the other hand it was specially agreed t-hat after 1872 the companies should share with the state such portion of their revenue as exceeded a certain fixed figure, called the <(partition point.® This figure was determined so as to allow the old system a higher dividend than at first, and to ensure to the new system, over and above the redemption charges, a revenue of 6 per cent.

If at the expiration of the grant the com¬ panies should prove to be debtors to the state, their working plant was to be assigned for the repayment of the sums due. Moreover, the

state might redeem the grant at the end of 15 years by paying for the remainder of the time an annuity determined according to the revenue of the preceding seven years. The working plant was to be bought in at an expert valua¬ tion.

Such were the chief clauses of these agree¬ ments which enabled the companies to place their finances op a firm basis and to add about 700 kilometers yearly to their lines in oper¬

ation.

At the close 1875, in spite of the loss of 800 kilometers (497 miles) with Alsace-Lorraine the system ((of general interest,® that is, the man system, showed the following develop¬ ment :

LENGTH OF LINES

In operation . 19,744 kilometers

Granted . 26 , 423 kilometers

EXPENDITURE

Francs

By the state and sundry . 1,412 000,000

By the companies . 7,991 ,000 , 000

To facilitate the economical construction of lines, a law dated 12 July 1865, had authorized the departments and communes to create sec¬ ondary lines for themselves in their neighbor¬ hood. These railways, which were called <(lines of local interest,® attained, in 1875, to an extension of 1,500 kilometers, representing an expenditure of 41,000,000 francs ($8,200,000).

1875-83. — During the preceding period, alongside of the great companies, a number of minor companies had sprung up, such as that of the Charentes, that of the Vendee, of Dombes, of the North and East, etc.; but their position had become very much embarrassed. Several of these lines — of ^general® as well as of (

of the Charentes, one of the most important among the minor organizations, showed an annual deficit of from 4,000,000 to 5,000,000 francs ($800,000 to $1,000,000). The govern¬ ment submitted to Parliament for its ratifica¬ tion an agreement whereby the Orleans Com¬ pany was authorized to buy up the Charentes Company, and other secondary lines, taking over their indebtedness under certain guaran¬ tees. At this particular time there was a great deal of ill-will toward the companies in Parlia¬ ment and

the agreement was thrown out, gov¬ ernment being invited to introduce a repur¬ chase bill, which was voted in 1878. The state thus acquired the Charentes Company, and several others, which formed the original nucleus of the state system. The cost was 500,000,000 francs, and it was covered by the issue of the 3 per cent redeemable.

Since 1876 government had been preparing a scheme for completing the railway system. Several commissions were at work on it, and in 1879 M. de Freycinet, Minister of Public Works, procured their consent to a scheme which provided for the construction of 8,700 kilometers (5,391 miles) of new lines, and 8,300 kilometers (5,157 miles) of lines granted but not yet operated, or a total of 17,000 kilometers (10,548 miles), within a period of 10 years.

The cost per kilometer was estimated at 200,000 francs ($40,000), making a total sum of 3,400,000,000 francs ($680,000,000), or an an¬ nual outlay of 340,000,000 francs ($68,000,000) a very reasonable figure compared with the out¬ lay for the companies during the period 1855— 65, when it averaged 430,000,000 francs ($86,- 000,000) a year. The Freycinet scheme, as it has since been called, refers to the whole of these new lines, together with considerable works to be carried out in the ports.

The agreements of 1879 began to be carried out at once, but the operation of the first lines showed a deficit, which, added to the cost of constructing the new lines, considerably in¬ creased the burden on the state. It became necessary, therefore, either to proceed more slowly with the work, or else to have recourse to a financial operation to ensure the comple¬ tion of the proposed lines.

Owing to a financial crisis it did not seem feasible to make a loan. The state accordingly fell back on the credit of the companies, and the government, in spite of lively opposition, succeeded in 1883 in carrying through Parlia¬ ment a fresh set of

agreements which regulate the French railway situation to-day.

The main features of these agreements may be summarized thus: (1) The companies ac¬ cept the grant of about 1,200 kilometers of new lines. They undertake to supply, in addition to the working stock and plant for these lines, a sum of 25,000 francs per kilometer, the rest of the cost falling on the state. The companies agree to carry out the works according to plans approved by government and to advance the necessary funds which shall be repaid by annui¬ ties. (2) In regard to guarantee the previous distinction between the old and the new systems is done away with. There is only one account for working expenses. The net proceeds from this account are assigned by each company to the service of its debt and to the payment of a guaranteed minimum dividend. If there is a deficiency, the state gives its guarantee. If

there is a surplus, it is used for the repayment of the advances made by the state as guarantee, and after the extinction of that debt it goes to the shareholders until the dividend touches a figure known as the "reserved® dividend, after which the profits are divided in the proportion of two-thirds for the state and one-third for the company. (3) With a view to reducing the amount of the annuities guaranteeing the interest, the companies are authorized to carry over till a fixed time the deficits on new lines to a special account, called <(Account of Partial Operation,® where the deficit is covered each year by an issue of bonds. (4) A settlement was carried out in respect of the ((Initial Out¬ lay® account of the old systems, and also of the value of the stocks, on 31 Oct. 1882. However, the companies may still, by obtaining a simple ministerial authorization, execute supplement¬ ary works and charge them to Initial Outlay. (5) The companies which had used the guar¬*

antee of interest under the agreements of 1850 liquidated their debt by constructing works up to an amount agreed upon. (6) The state re¬ serves the right of repurchase at any time. Lines which have not completed 15 years' exist¬ ence are to be valued according to the actual expenditure on them, and the same rule holds good for supplementary works. In regard to the other lines, an annuity is to be paid, de¬ termined, as under the agreements of 1859, by the net profits of the last seven years, the guar¬ antee of interest being included. (7) Finally, the companies agreed to a considerable reduc¬ tion of the passenger rates, and further promised to revise and unify the slow freight tariffs.

The brilliant situation of the companies in 1883 had raised the hope that the burden of the guarantee would not weigh too heavily on the budget. But a period of depression followed the prosperous years, and it was necessary, in order to reduce the expenditure, to proceed more slowly with the works. Accordingly the completion of the proposed lines seems de¬ ferred to 1908 or 1910. Subsequently the re¬ ceipts gradually rose, and in the last few years the calls on the state guarantee have been de¬ creasing; some companies have even begun re¬ payment. However, it is to be feared that the fresh outlays imposed on the companies may defer to a still distant date their entire libera¬ tion from indebtedness to the state.

State Purchase of the "Ouest® Railway. — After lengthy parliamentary debates the pur¬ chase by the state of the railway system of the Compagnie de 1'Ouest was decided and au¬ thorized by law on 13 July 1908. It was sub¬ sequently decided that the system should be operated in the same manner as the existing state railway, but with a special budget. The "Ouest® Railway was officially taken over on 1 Jan. 1909, and the purchase conditions were arranged by a friendly agreement in conformity with the law voted 21 Dec. 1909. Under this agreement, the state pays the old Compagnie de l'Ouest an annual sum equivalent to the dividend guaranteed to the shareholders, plus the amount necessary to meet the

coupons of the bonds. The company retains its private property and cedes to the state all its assets in real estate and working plant. Later, the organization of the administration of the two state railways was established under the law of

13 July 1911, with a joint management, but two distinct budgets.

Situation of French Railways of General Interest

in 1912

In operation . 40,750 kilometers (25,320 miles)

Concessions . 43,000 kilometers (26,719 miles)

Million

Preliminary expenditure francs

By the State or localities . 8,038 $1,607,600,000

By the companies . 11,682 2,336,400,000

19,720 $3,944,000,000

Characteristics of the Present System of French Railways. — We have seen that the railway system which has prevailed in France is rather due to circumstances than to the reali¬ zation of theoretical ideas.

It is a mixed system, which, while respect¬ ing the supreme rights of the state and accord¬ ing it a very extensive control over the com¬ panies, leaves the latter as much independence and initiative as are necessary for the proper management of their business.

The companies enjoy a monopoly and oper¬ ate the lines, while the state continues to own them, and only concedes them for a limited period. Entrusted with a public service the rights and duties of the companies depend on contracts made with the state, which exercises over their management a threefold

control — financial, technical and commercial, in virtue of the threefold character of the railway system. The exercise of this control comes under the powers of the Minister of Public Works, who is assisted by various commissions, according to the nature of the questions at issue. The most important of these commissions is the Advisory Railway Board, whose functions are chiefly commercial.

Financial System. — 'The financial system of the companies is regulated by agreements, viz. : Those of 1883, which are actually in force, and of which the details have been given above. The state, having refused to divest it¬ self of its proprietary rights over the railways, and on the other hand having compelled the companies to construct costly lines, has been led not only to undertake a part of the initial out¬ lay but also to guarantee a minimum interest on the capital invested. Consequently, the state must satisfy itself as to the correctness of the companies' accounts in respect of initial outlay and working expenses, since these determine the amount of the guarantee of interest, and also of the annuity to be paid the companies in reimbursement of their advances. The state also controls the financial situation of the com¬ panies. It sees that the issues of bonds are sufficiently guaranteed, and that a right propor¬ tion is observed between the shares and the bonds. Lastly, the law of 27 Dec. 1890, places the statutes of the companies' pension funds under ministerial control.

Technical System. — The state, intervenes also in technical questions. When the com¬ panies are constructing new lines, the plans and estimates must be submitted to the minis¬ ter, who has the draught verified, and sees that all the works are planned in accordance with scientific requirements and satisfy the terms of the accepted estimates. Moreover, he causes the execution of the works to be supervised. When the companies wish to improve existing lines or to increase the working stock, they*

must likewise submit their plans and estimates to the minister's approval. There is govern¬ ment control also over all regulations touching the working of the lines, over the speed of the trains, the limitation of hours of labor, and various internal matters. The railway police is regulated by the law of 1845 and the ordinance of 1846, modified in 1901.

Commercial System. — Railway tariffs affect public wealth too deeply to have escaped gov¬ ernment control. To begin with, in the terms of contract appended to the grants, maximum tariffs were laid down for passenger and freight services ; these cannot be exceeded by the com¬ panies though they may reduce them as much as they please. However, such reductions can¬ not come into force till they have been con¬ firmed or approved by the minister, who has the right to withhold confirmation or only to accord it subject to certain modifications. This gives the government a means of exercising • pressure on the companies in such direction as it may desire.

An elaborate method enables the minister to get information as to the reasonableness of the proposed change, and constant shifting of rates, which is so harmful to the public, is care¬ fully guarded against. In some cases, e.g., of export tariffs or transit tariffs, the ordinary regulations are modified so as to enable the companies to meet foreign competition.

Tariffs. — The terms of contract fix the max¬ imum amount of the taxes which the railway companies are allowed to collect. That is the legal tariff. But the companies have exercised their right of introducing lower tariffs. When freight is conveyed with all the guarantees and under all the conditions laid down in the terms of contract, the general tariff is enforced. But when the public consents to some modifications of those conditions, then special lower tariffs are applied. The tariffs are based on

the rate paid per kilometer or per unit of transportation. This base may be constant, and then the rate is proportionate to the distance traversed, as hap¬ pens in the passenger service. Or it may vary with the length of the journey, so as to stand, for instance, at 8 centimes for transits below 100 kilometers (62.14 miles) ; 5 centimes for those below 300 kilometers (186.3 miles), and 4 centimes for those beyond 300 kilometers. Coal and mineral products were treated thus after 1863. It was a drawback of the system, however, that the rates came higher for jour¬ neys of just less than 100 kilometers (62.14 miles), than for journeys of just more than 100 kilometers, and this was true also about journeys in the neighborhood of 300 kilometers. To remove this anomaly, it was specified that in no case should the rate in one section ex¬ ceed the minimum rate in the section follow¬ ing. This rule, however, produced an intermit¬ tent scale (bareme a paliers), the rate not changing for a number of kilometers.

To get rid of this defect in turn it was de¬ cided to adopt the Belgian tariff, so-called be¬ cause it first came into general use in that country. Here the base varies only when you pass from one section into another. Thus, to return to our previous figures, the first 100 kilo¬ meters (62.14 miles) are reckoned on the base of 8 centimes, the next 200 kilometers on the base of 5 centimes, and those beyond on the base of 4 centimes. So that we get a diminish¬

ing base. The Belgian system is commonly used in France to-day both for rapid and for slow freight ; but such has not always been the case.

At first the tariff had a fixed base, but in order to encourage this and that special traffic the companies introduced for certain freights and between certain stations fixed rates called ((steady rates®. (prix fermes), lower than those called for by the general tariff. The number of these ((steady rates® increased so rapidly, how¬ ever, that the handling of the tariffs was much complicated.

Moreover the principle involved in the ((steady rates® was much attacked. Ac¬ cordingly, after the agreements of 1883 the companies proceeded to recast their tariffs. They were simplified and partly unified ; freights were divided into six series ; the diminishing base of the Belgian system was adopted; and a slight reduction of rates has been the general result.

However, the (

Economic and Financial Results of the Agreements. — Under the agreements of 1883 the railways of France have attained to a de¬ velopment which seems not far removed from the limits imposed by the nature of the soil and by existing economic conditions, and be¬ yond which they could not perhaps be profitably worked.

For each thousand inhabitants in France there is 1.26 kilometers (5.78 miles) of railroad, while England has only 0.86 kilometer, Germany 0.94, Belgium 0.97, and the United States 0.41. Thus France has the lead in this respect. In pro¬ portion to area France has 9.2 kilometers of road for each square myriameter (=6 miles 1 fur¬ long 28^4 poles); England, 11.5; Germany, 10.0; Belgium, 22.7; and the United States, 4.3. Here, even setting Belgium aside, the order is reversed.

It must be remembered that, owing to the very variety of the regions traversed by them, the several lines of the French system show marked differences in the importance of their traffic. To become convinced of this one only has to glance at a map on which the thickness of the lines is proportioned to the gross receipts by kilometer. There one will quickly perceive a number of great arteries standing out clearly. These constitute the nuclei, as it were, of the great companies, and they are connected to¬ gether by a network of other lines mostly slender, and with meshes which are larger or smaller according to the nature of the districts they cover. If the creation of the lines had been left entirely to the initiative of the companies, it

is certain that the principal arteries would long have remained the only routes opened up, while their ramifications would have been con¬ structed but slowly. It was the influence of the agreements which enabled the less productive lines to be opened and operated.

From the financial point of view the most important result of the agreements has been the consolidation of the companies' credit. In some instances it has made it possible for them to borrow at lower rates than the state itself could have done. But as the increase of their capital made their indebtedness more burdensome, and on the other hand the operation, of new lines caused a deficit, they were obliged to call on

the guarantee of interest for sums which before the conventions of 1883 amounted to 545,000,000 francs ($109,000,000), and between 1883 and 1903 rose to 951,000,000 francs ($190,200,000).

But it must be borne in mind that the amounts paid over as guarantee of interest and which figure in the budget as expenditure con¬ stitute in reality an investment for the state at 4 per cent secured by the rolling stock, which is of a much higher value.

Moreover, if during the years subsequent to the agreements of 1883, the annual amounts called for by the companies from the state reached 93,000,000 francs ($18,600,000) in 1893, they fell to 4,000,000 ($800,000) in 1900. The companies began to reimburse more and more, and the accounts for 1910 showed a bal¬ ance in favor of the treasury of 5,500,000 ($1,100,000). In 1912 it only amounted to 775,000 francs ($155,000), but it must be noted that during that year the Compagnie de l'Est had also refunded to the state under a special agreement 159,000,000 francs ($31,800,000) of the capital amount of its guarantee debt. The debt of the <(P. L. M.® has been

settled since 1897 in conformity with special agreements, and the Compagnie du Nord has never had recourse to a state guarantee.

The accounts of guarantee of interest for the year 1912 for the principal railways are briefly as follows :

Companies

Payments made to the treas¬ ury for

1911

Guarantee debt to

31 Dec. 1912

Capital

Interest

Nord .

**Francs,*

millions

**Francs,*

millions

**Francs,*

millions

Est .

9 6

10

Orleans .

P. L. M .

—9.2

169

94

Midi .

0.4

209

121

The sign — indicates a call on the guarantee.

- 1 franc = 19 cents United States currency.

It will be noticed that the Compagnie de l'Ouest does not appear in this table, having been since 1909 under the management of the state, as well as the old line. The latter showed, in 1912, net proceeds of 6,000,000 francs ($1,200,000) while the accounts of the new line show a deficit in the earnings of 96,000,000 francs ($19,200,000).

In addition to the lines of the more import¬ ant companies, the French railway system com¬ prises a number of small railways which also receive a state guarantee.

On the other hand, the railway companies are a source of revenue to the state by way of taxes on transportation, on their securities, and economy on the transportation of soldiers and sailors, as well as on postal and telegraphic transit ; the budget for 1912 therefore shows : expenditure, 361,000,000 francs ($72,200,000) ; receipts, 358,000,000 francs ($71,600,000). These accounts are thus, so to speak, balanced.

To get an idea of the management of the different companies, it is not sufficient to take into account the amount of their gross receipts, we must compare it with the amount of ex¬ penditure, which gives the figure of working coefficient, i.e., the ratio of expenditure as compared with the receipts. We now see that this coefficient, which, in 1880, was 50

per cent, has gradually increased, reaching 60.3 per cent

in 1912. This figure, although lower than that of the majority of foreign companies, never¬ theless goes to show that for various reasons the operation of railways has become more and more onerous, whereas the transportation tariff both for passengers and goods has de¬ creased since 1880 by about 30 per cent.

On the other hand, during the last few years, the railway companies have considerably in¬ creased their initial capital, with the especial object of making the improvements which the heavy traffic had rendered necessary and to in¬ crease the efficiency of the rolling-stock ; the result, however, has been to greatly increase their financial obligations, entailing a corre¬ sponding reduction in the remuneration of the capital invested, which was only 3.72 per cent in 1912.

This is certainly a point to be considered, as in view of the limited duration of the conces¬ sions, the period of amortization of the new bonds necessarily becomes shorter.

Military Organization of Railways.* * — The regulations governing the military organization of railways were laid down and determined by the laws of 1873, 1877, 1888 and by various decrees.

By virtue of these laws, a special depart¬ ment was organized at the War Office to exam¬ ine the operation of railways in times of peace and to take over such operation in war time. This department is called the <(4eme Bureau® and is in charge of a lieutenant-colonel, who, in turn, acts under the orders of the Chief of the Staff-office.

The management of each railway system com¬ prises a commission called <(Commission de Reseau® (Railway Commission), composed of two members, a technical adviser (generally the manager of the line) and a military officer (a superior staff officer). This

commission takes charge of the management of the line and acts as intermediary between the military au¬ thorities and the railway under its management. It is assisted in its work by sub-commissions, which likewise comprise a military officer and a technical adviser, and by the station commissions consisting of an officer and a technical agent.

The staff of the companies subject to mili¬ tary obligations is mobilized and go to form sections of field railways, officered by their proper chiefs. Each section constitutes an in¬ dependent unit, comprising three departments : permanent way, traction and operation.

Moreover, each section comprises an active section to be placed at the disposal of the com¬ mander-in-chief of the armies, and home sub¬ divisions to be at the order of the War Office.

On the first day of mobilization, the mili¬ tary authorities take over the management of the railways : the lines are controlled by the railway commissions and the employees are militarized in their respective duties. The ter¬ ritory is divided into two zones: (1) the in¬ terior zone which is itnder the control of the War Office, and (2) the army zone under the authoritv of the commander-in-chief.

Mobilization; Commencement of Hos¬ tilities. — As soon as the order for mobilization is given, the ordinary train service is sus¬ pended and mobilization trains are run, the timetable for which is drawn up before hand.

- *Consult Le Journal des Transports. La Revue Politique et Farlementaire, October 1915.*

FRANCE— FRENCH RAILWAYS (23)

719

On the declaration of war in 1914, the trans¬ porting of the troops which had been mobilized commenced in the night of 1-2 August, after

midnight. The covering troops had already been concentrated near the frontier. This con¬ centration, which was commenced on 31 July at 9 o'clock in the evening, was completed at noon on 2 August. The transporting of these forces on the ((Est)} railway system required 600 trains.

The order of mobilization required each mobilized man to be transported to his regi¬ ment centre and, afterward, the concentration of the regiments so formed into army corps near the front. Now, the transporting of an army corps requires over 100 trains, without taking into account some 30 trains of equip¬ ment, etc. The trains comprise an average of 50 wagons.

The transporting of the mobilized forces was completed on 19 August — it had taken 18 days. The ((Estw line alone ran more than 4,000 troop trains during these 18 days, and the traffic at certain moments was exceptionally heavy. On three particular days nearly 1,200 military trains were run on the ((Est)) line, 3,000 on the Paris-Lyon-Mediterranee, and 1,500 on the Paris-Orleans. Three hundred trains were dispatched from some stations in a day. It is worthy of remark that, even dur¬ ing the heaviest days of the traffic, the trans¬ porting of the forces was effected with the greatest punctuality and that what delays oc¬ curred were insignificant.

The railways had, however, to cope with many other difficulties. The requirements for the concentration of troops were much greater than had been anticipated. About the middle of August, over 400 trains were required for transporting the English army from -the Channel ports and the ocean on their way to Belgium, and, later on, 400 trains transported in three days the Indian troops from the south of France to Orleans.

The German attack on France having been directed by way of Belgium necessitated a modification of the original plan of concentra¬ tion so that it extended from Longwy right up to Fourmies.

Meanwhile, the railways not only had to transport the food and munitions required for the army, but also that necessary for the en¬ trenched camp of Paris. Hundreds of thou¬ sands of head of cattle and as many tons of provisions passed over the rails during the month of August.

This traffic formed so to speak a series of uninterrupted streams throughout the whole of France, flowing toward the north and north- C3. S t .

After the battle of Charleroi, it became necessary to look after the evacuation of the population of these regions fleeing before the invaders and also remove the Belgian and other locomotives and railway material in the north and east of France, whilst at the same time numerous trains followed the retreating armies, taking to the rear supplies, food, muni¬ tions and a part of the artillery, to be central¬ ized at points fixed by the commander-in-chief where the armies were to be reformed prior to the battle of the Marne.

In the meantime, the government and the most important state administrations were

hurriedly transported to Bordeaux. Objects of value from the museums were sent to the provinces, and as the enemy advanced toward Paris, thousands of Parisians, women and children mostly, quitted the capital. It has been estimated that some 50,000 people left Paris 3 September by the Orleans station alone.

During the battle of the Marne, an entire army corps was transported in less than a week by 180 trains from the borders of the Meuse to the east of Paris, thus reinforcing our left wing just at the moment when it was commencing to shake the German army.

Finally, after the battle of the Marne, when the enemy was being pursued and was attempt¬ ing to outflank us to the north, over 6,000 trains were employed to transport 70 divisions, in many cases

for long distances, and again the rapidity of transportation was a factor of success.

During these first weeks of the war, the railway personnel not only showed their abso¬ lute devotion to duty, but gave striking evi¬ dences of their endurance and energy, winning the highest praise alike of the government and the public.

Resumption of Commercial Traffic. — At

the commencement of mobilization, all com¬ mercial traffic was interrupted; it was resumed by degrees when the concentration of the forces was completed; at first the trains were few and far between, but their number was gradu¬ ally increased as military transportation per¬ mitted. When the war of movements gave place to a war of positions, and a fixed front was established, the consequent decrease in the displacement of troops left more facilities for commercial traffic, and with the resumption of business and the development of war industries, an increasing traffic was re-established.

But as France was deprived of a part of its rich agricultural and industrial provinces in the north and east, it lost the greater portion of its iron and steel production, its coal out¬ put and sugar produce, and also the centre of its woolen industry, to mention only the prin¬ cipal industries affected. On the other hand, the requirements of the army attained unpre¬ cedented proportions. It became necessary not only to seek raw material abroad but also manufactured goods.

Gradually the movement of shipping con¬ siderably increased ; the monthly tonnage which, before the war, amounted to 2,800,000 tons, reached 5,019,000 tons in July 1916, or almost double. The increase made itself felt partic¬ ularly toward the end of 1916; it was more marked for the northern and Channel ports, due to the presence of the British army in the north of France, and to the important centres of Havre and Rouen which supply Paris, but it was general throughout France.

This resulted in a so-called ((Transport- crisis.^ In a speech in the Chambre des Deputes in reply to certain criticisms ad¬ dressed to railway managers, Colonel Gassouin gave the following figures : A comparison of the present kilometric traffic with that of times of peace gives 140 per cent for the ((Etat® lines, as against the pre-war figure, 149 per cent for the (

FRANCE— FRENCH RAILWAYS (23)

Consequences of the War. — It may seem premature to endeavor as yet to outline the effects of the war on railway companies. Still, if we take into account its results up to date, we are warranted in saying that there was an increase in traffic rates in France after the war. This was the opinion of a number of competent men and was backed up by the financial results of operation even before the end of the war.

Already in 1913, the railway systems taken as a whole showed an excess of expenditure over and above the earnings of over 42,000,- 000 francs, resulting especially from the opera¬ tion of the <(Etat,® (

It is also to be expected that as a result of the war, the opposition, in England to the Chan¬ nel tunnel scheme will disappear. It is not too much to hope that the union of the two countries, after having been cemented on the fields of battle, will continue after the war and will manifest itself particularly by an economi¬ cal entente and closer commercial contact, which the construction of the tunnel would greatly facilitate. We can already get some idea of the services it would have rendered during the recent war in transporting troops and munitions : the running capacity of the tunnel being estimated at 120 trains a day of 500 tons, i.e., 6 trains an hour, during 20 hours, it would thus have been possible to ensure the safe transportation of 30,000 men and 30,000 tons of goods a day. The great conflict has sufficed to convert several British

military au¬ thorities to the idea of the tunnel, and all the big shipowners by the mouth of their princi¬ pal periodical, The Shipping World, now ac¬ knowledge the utility of the tunnel. Work on a tunnel had been started both from the French and English coasts in 1875 after an English corporation known as The Channel Tunnel Company obtained an act authorizing it to un¬ dertake preliminary works, and The French

Submarine Railway Company in the same year had obtained a concession obligating it to ex¬ pend at least 2,000,000 francs ($400,000) in in¬ vestigation work. The French company made over 7,000 soundings, took over 3,000 samples from the sea-bottom in the Strait of Dover, sank a shaft and started a heading from San¬ gatte. The English company met with con¬ siderable opposition and interruptions and sev¬ eral rival projects were mooted. In 1882 when the British government suspended the work then in progress, a shaft 164 feet deep in the chalk at Shakespeare's Cliff, Dover, had been sunk, whence at an inclination of 1 in 72 a driftway seven feet in diameter projected 2,300 yards eastward under the sea. British officials deemed it ^inexpedient for a submarine com¬ munication to exist between England and France,® and despite the persistent efforts of a prominent supporter, Sir Edward Watkins, who presented bill after bill, all appeals to be al¬ lowed to continue the work were futile. As soon, however, as the British Parliament de¬ cides in favor of the tunnel, the work can be speedily pushed to a successful conclusion.

Statistics. — The development of the lines and the paid-up capital by decades and in 1912 was as follows :

Years

Length of the lines in operation up to 31 December

Corre¬ sponding capital of initial outlay.

1830 .

In

kilometers

38

435

3,010

9,439

17,440

23,738

33,550

38,122

40,300

40,707

In million francs

6*

146

1,363

4,726

8,168

11,065

14,271

16,442

18,874

19,720

1840 .

1850 .

1860 .

1870 .

1880 .

1890 .

1900 .

1910 .

1912 .

Kilometer = 0.621 miles. Franc =19 cents in United States currency.

The division among the several companies in 1912 was as follows:

Average

length

Capital enlisted

Company

opera¬

tion

during

the

year

Ex-'

pended

by

the

com¬

panies

Sub¬

sidies

Shares and bonds issued by the companies

Nord …. Est .

Kilo¬

meters

3,785

4,962

7,787

9,666

4,056

Millions (francs)

1,945 1 , 755 2,209 4,263 1,151

Millions

(francs)

103.4

850.5 1,126.6 1,231.4

630

Shares

525,000 584,000 600,000 800,000 250 , 000 300 , 000

Bonds

5,181,605 6,552,894 7,481,744 14,569,833 4,348,576
6,066, 536 600,000 183,202

416,410

Orleans . . P. L. M. . Midi …. Ouest ….

Etat .

9,028

2,746

104

1,173

36

Ceinture .

128

Cies sec- ondaires

1,564

256

141.7

213,517

Total. .

40,717

14,427

5,293

3,272,517

45,400,800

19,720

Kilometer — 0.621 miles. Franc = 19 cents in United States currency.

FRANCE — FRENCH MERCHANT FLEET (24)

RECEIPTS, EXPENDITURES AND NET PROFITS.

Years

Gross

receipts

with

tax

taken off

Work¬

ing

expenses

Net

profit

Coeffi¬

cient

of

opera¬

tion

Rates

of

remu¬

neration

capital

Millions

Millions

Millions

Per

Per

(francs)

(francs)

(francs)

cent

cent

1841. .

13

8.3

4.7

64

1850. .

96

45

51

47

3.75

I860..

418

188

230

45

4.67

1870. .

634

313

321

48

3.95

1880. .

1,061

539

523

50

4.75

1890. .

1,154

607

548

51

3.85

1900. .

1,517

824

693

54

4. 10

1910..

1,828

1,099

729

60

3.86

1912.,

1,997

1,264

733

63.3

3.72

Franc = 19 cents in United States currency.

The division for 1912 among the different companies was as follows :

Company

Gross

receipts

with

tax

taken off

Work¬

ing

expenses

Net

profit

Coeffi¬

cient

of

opera¬

tion

Millions

Millions

Millions

Per

(francs)

(francs)

(francs)

cent

Nord .

325

199

126

61.27

Est .

291

175

119

60.35

Orleans .

302

169

133

55.03

P. L. M .

588

332

256

56.62

Midi .

143

76

67

52.88

A. R .

69

63

6

91.4

Etat .

242

216

26

89.4

Ceintures .

20

21

1

113.2

Petits reseaux . . .

16

10

6

60.5

Total .

1,997

1,264

733

63.3

Franc ==19 cents United States currency.

(In these two tables the coefficient of opera¬ tion is the relation of working expenses to gross profit. The rate of remuneration on capital has been determined by comparing the net profits with the capital of establishment. The liquidation charges on the capital are not taken into account.

Traffic. — The progressive development of traffic and lowering of rates from 1841 to 1904 was as follows:

Total distance covered

Mean tariff per kilometer

Mean receipts per kilo¬ meter

Years

Passen¬

gers

Freight

Passen¬

gers

Freight

•

Millions of kilo¬ meters passen¬ gers

Millions of kilo- metric tons

Cen¬

times

Cen¬

times

Francs

1841. .

112

38

7.00

12.00

26,000

1850.

797

462

6.66

7.7

32,700

1860.

2,921

120

5.64

6.92

45 , 600

1870. .

4,272

5,057

4.95

6. 14

40,800

1880. .

5 , 863

10.500

5.04

5.95

46 , 000

1890. .

7,943

11,759

4.40

5.46

35 , 000

1900. .

14,063

16,557

3.67

4.69

39 , 800

1910. .

16,907

21,984

3.51

4.27

45 , 400

4912. .

18,178

24,878

3.48

4.20

48 , 880

Franc = 100 centimes = 19 cents in United States currency. Kilometer = 0.621 miles. Metric ton = 2 , 205 lbs. avoir¬

dupois.

Division among the companies of the traffic for 1912 was as follows :

Company

Total distance covered

Mean tariff per kilometer

Mean receipts per kilo¬ meter

Passen¬

gers

Freight

Passen¬

gers

Freight

Millions of kilo¬ meters passen¬ gers

Kilo-

metric

tons

millions

Cen¬

times

Cen¬

times

Francs

Nord .

2,933

5,085

3.455

3.721

84,662

Est .

2,477

4,640

3.17

4. 18

58,428

Orleans ….

2,900

3,266

3.41

7.43

38,730

P. L. M… .

4,646

7,323

3.87

8.47

60 , 960

A. R .

707

651

2.92

4.66

22,809

Etat .

2,924

1,892

3.21

4.74

41,051

Midi .

1,380

1,708

3.48

5.96

35,714

Ceintures. . .

108

203

2.42

6.68

Petits re-

seaux ….

102

109

3.87

8.58

11,114

Total. . . .

18,178

24,878

3.44

4.20

48 , 880

1 franc = 100 centimes = 19 cents in United States currency. 1 kilometer = 0.621 miles. Metric ton = 2, 20 ■> lbs. avoirdupois. The number of kilometric passengers or tons is the sum of kilometers covered by each passenger or by each ton of freight.

M. de Saint Amand, Engineer to the Chemin de Fer du Nurd.

24. FRENCH MERCHANT FLEET. If

a study is made of the French merchant fleet covering a period of more than a century and its importance compared with the maritime traffic in France, one cannot help being struck by the fact that the commercial fleet sailing under the French flag has never been in proper proportion to the maritime traffic of the differ¬ ent French ports.

The present situation as disclosed bv the figures leaves no doubt in this respect. If the last pre-war year (1913) be taken as an example, it will be seen that the maritime trade holds, as regards French

exterior trade, a prepon¬ derating place, no matter under what aspect it is considered. Merchandise forming the ex¬ terior trade of France in 1913 weighed no less than 78,800,000 tons. Of this, trade by sea ac¬ counted for 40,000,000 tons, or 54 per cent. From the point of view of weight of merchan¬ dise, maritime trade therefore accounted for more than half of France's exterior trade. If the value of the goods is considered, and not their weight, the result is even more striking. The general exterior trade of France in 1913 represented 20 milliard of francs ($4,000,000,000). Of this sum maritime trade accounted for 13 milliard of francs ($2,600,000,000), or 65 per cent. As regards the value of the goods making up this exterior trade, sea traffic represented two-thirds of the total. Before the war, con¬ sequently, despite the considerable development of our commercial relations with Belgium, Ger¬ many and Switzerland, France carried on a vast sea trade with foreign countries. It is nevertheless a fact that the part played by France in sea trade was relatively small when compared with that of other countries. Im¬ ports amounted in 1913 to 22.56 per cent as regards weight and 38.8 per cent value. The

exports were 56.95 per cent weight and 57.1 per cent value. The result of this situation is that France paid in 1913 to foreign vessels an amount of 414,000,000 francs ($82,800,000) in freight charges.

History. — The most serious point is the disproportion which is continually increasing between the importance of the French maritime traffic and its merchant fleet. This can easily be realized by quoting a few figures from old statistics. Up to the end of the 19th century the statistics of the French Customs Adminis¬ tration gave the value of imports and exports,

distinguishing between traffic by land and sea; but without indicating weights. We are, there¬ fore, obliged to base our comparisons on the value of the merchandise carried at a fairly remote period which gives a less exact idea of the problem under consideration. As a matter of fact, the important thing to be con¬ sidered when studying the maritime transport industry is more the weight of the goods trans¬ ported than their value. However, useful con¬ clusions can be drawn from the figures appear¬ ing in the statistics. In 1822 ships flying the French flag carrying transports of French origin and destination represented 61 per cent. In 1835 it fell to 48 per cent. This percentage was maintained during the reign of Louis Philippe, reaching 48.9 per cent in 1850. In 1866, on the eve of new legislation (law of 19 May 1866) establishing equal treatment for all ships in French ports, the percentage fell to 43 per cent. From this time onward, it continued to decline rapidly owing to competition with foreign ships, and in 1880, before any new legis¬ lation was made to protect it, it only represented 37 per cent. These fluctuations are shown in the following table :

VALUES EXPRESSED IN MILLIONS OF FRANCS.

YEARS

Value of imports and exports carried by- French ships

Value of imports and

exports carried by foreign ships

Total

Percent¬ age of French ships in this total

1822 .

316

197

513

61

1835 .

532

560

1,092

48

1850 .

976

1,017

1,993

48.9

1866 .

2,500

3,196

5,696

43

1880 .

2,727

4,458

7,185

37

More precise information is available for recent years. We know, for instance, that in 1900, ships flying the French flag accounted for 26.18 per cent of imports, while exports amounted to 50.82 per

cent. If a comparison is made of the figures quoted for 1913 and 1900 it will be seen that there was an improvement in exports but a diminution for imports. As regards the freight charges paid by France to foreign countries, this amounted in 1900 to a little more than 300,000,000 francs ($60,000,000) or an increase of $22,800,000 in 13 years.

In presence of the declining role played by the French merchant fleet in the national mari¬ time traffic it is permissible to enquire into the general causes which have brought about such a state of affairs.

Causes of the Inferiority of the French Merchant Fleet. — It should first of all be re¬ membered that up to 1866 the French flag had been protected by adequate measures, such as reserving certain traffic for French ships and giving them an advantageous differential treat¬ ment for other traffic. A very close interest, therefore, united the exterior maritime trade with the national flag, as was the case, more¬ over, in foreign countries. In 1860 the English were the first to renounce this system of privi¬ leges and protection which had been followed by all the merchant fleets of the maritime countries of Europe during the 1 7th and 18th centuries. There was every advantage to the English in taking this stefi as their trade did not fear rivals at that time. France was dragged into the movement, and by the com¬ mercial treaties of 1860 suppressed the greater part of the customs dues which protected its markets, and established by law of 19 May 1866 complete equality for all ships entering its ports. It was, however, found that the French com¬ mercial fleet was unable to support the com¬ petition to which it was suddenly subjected. Despite the general increase of commercial ac¬ tivity, the French merchant fleet only made slow progress and was outstripped by those countries she had formerly rivaled.

As far back as 1869 public opinion became uneasy regarding this situation and an in¬ vestigation was ordered with a view to placing the French merchant

*fleet on a better footing. The tragic events of 1870 prevented the pro¬ posed program from being carried out, and it was in 1881 only that a law was promulgated protecting the merchant fleet. In 1893 a new system was inaugurated, which was replaced later in 1902 and once more modified in 1906. The main lines of this new legislation were the establishment of certain premiums and com¬ pensations for equipment of French ships, the conditions varying with each new law. At times sailing vessels were favored, while at others they were harshly treated. Sometimes navigation premiums were paid according to the distance covered and sometimes compensa¬ tion for equipment was granted corresponding to the number of days taken up in the adminis¬ trative equipment of the ship. At other times ships constructed in France alone profited by these laws while at other periods vessels built abroad were placed on the same level as the former. The same criticism can be applied to all these legal texts, i.e., that instead of en¬ couraging French shipbuilding they established a certain policy which had to be strictly fol¬ lowed and which did not tend to improve the shipping industry. However, the law of 1*9 April 1906 — the most recent one — instituted a system which has been in vogue for the last eight years before the war and which has given interesting results. The gross tonnage of the French commercial fleet in 1906 was 2,047,952, and 2,498,285.92 in 1914.*

The abnormal situation in which the French merchant fleet was placed on account of the return to a protection tariff greatly favoring agriculture and various categories of industries should also be noted. It is a fact that mari¬ time transports do not trade throughout France to their full capacity. Customs protection can-

not therefore be extended to them. On the other hand it can do them a lot of harm indi¬ rectly because it

impedes international trade dependent on maritime transports. It was to parry this abnormal state of affairs that the system (an artificial one) of allowing premiums and compensation for equipment was estab¬ lished; or in other words privileges were granted, theoretically, with a view to counter¬ balancing the serious situation outlined above. But other causes of a geographical and economi¬ cal order, independent naturally of customs legislation, explain why the French commercial fleet is not on the basis it should be with re¬ spect to the exterior trade of France.

Let us commence by examining the geo¬ graphical causes. It has frequently been con¬ sidered that France derived great advantage from the fact that she is bordered by three dif¬ ferent oceans, with an important number of ports. This was, of course, of undoubted ad¬ vantage when ships were of small dimensions and when land transports did not concentrate on a certain number of ports. To this system of dispersion, modern conditions of maritime transportation and transportation by railway have substituted a system of concentration. The large ports of to-day are the cross-roads of sea routes and land routes serving as junc¬ tions for distant destinations. Secondary ports of course play a lesser role. On the other hand it is in the national interest that every effort be made to confine activities to limited numbers of ports, of modern construction and equipped with adequate machinery to deal rapidly with the loading and unloading of large tonnage ships. Whereas in some countries, Germany for instance, a choice of ports is limited — Bremen and Hamburg — a certain indecision was maintained in France, due to local jeal¬ ousy, with the result that competition has been keen between quite a number of French mari¬ time ports. In other words, if there are numerous French ports able to harbor ships of an average tonnage, none of them are as well equipped as Antwerp, Hamburg or Liverpool. This naturally makes its repercussion felt on the French commercial fleet which is practically dependent on national traffic.

Another very serious result of a geographi¬ cal order is the transfer of the European mari¬ time trade from the Mediterranean, which was the great traffic centre at the end of the 18th century, to the North Sea, where to-day most of the merchandise is handled. English, Ger¬ man, Dutch and Scandinavian vessels are ac¬ cordingly near the source of the large freight traffic of Europe, and when making long dis¬ tance voyages they have access to French ports, thereby being in a position to complete their cargoes on the outward journey or unloading part of their goods on the return trip. French ships on the contrary only have at their disposal French freight or freight from. the Mediter¬ ranean. If French ships desire to secure a part of the large freight traffic of the North Sea they are obliged to make a trip to northern waters, thus increasing their operating expenses. On first thought it might be objected that the French commercial fleet does not suffer from lack of freight, for, according to the figures previously quoted, France has insufficient ships to transport the mass of goods making up her

whole maritime traffic. But it should be re¬ membered that in freight matters it is not only quantity which counts, the nature of the mer¬ chandise also plays an important role. As re¬ gards France, the goods making up the exports are rarely of a very heavy character.

France does not produce a sufficient quantity of coal to satisfy her needs (40,000,000 tons as against 60,000,000 consumed) ; she cannot there¬ fore follow the example of England who is able to assure freight in coal exports. Again, France does not export vast quantities of metal¬ lurgical products like Germany (potash salts for instance) ; neither is she in a position to ex¬ port a large amount of coal like Germany, who, although exporting a quantity greatly inferior to England, is nevertheless able to supply its ships with a not to be despised cargo of this combustible. Finally, France does not possess, like the United States, the enormous export freight constituted by its grains,*

meat, cotton and petroleum. Exports from France generally consist of light materials which is much ap¬ preciated by ships from the North anchoring in our ports as same serves to complete their cargoes. It will, therefore, be seen that French goods are more adaptable as cargo for foreign ships touching our shores than to French ves¬ sels attached to their respective ports.

To these geographical and economical causes must be added reasons of an administrative nature. The regulations covering the merchant fleet are more onerous and complicated in France than in any other maritime country of Europe. The recent law of 17 April 1917 re¬ garding the security of navigation and regulat¬ ing the work aboard merchant ships has added to the already heavy burden laid down by former laws. Furthermore, the discipline of the crew is less well assured in France than it is in other European countries possessing a merchant fleet. For instance, the Decree of 24 March 1852 covering discipline, although modified on several occasions, is still con¬ sidered as inadequate to meet modern condi¬ tions and its revision was decided upon. This task was confided to the Conseil Superieur de la Navigation Maritime which, after a long and minute examination by a special commission, in which all interests were represented, has drawn up a draft defining the respective rights and duties of shipbuilders, captains and crew. Unfortunately the government responsible for the draft in question did not insist on a Parlia¬ mentary debate, with the consequent result that uncertainty exists regarding questions of dis¬ cipline as the texts of the old law are severely criticised and liberties taken with them while the text of the draft has not yet been made law.

The foregoing show the difficulties handi¬ capping the French merchant fleet at the out¬ break of war.

But a wrong idea might be formed of the situation if account is not taken of the urgent necessity of providing cargo boats to meet the needs of French maritime traffic.

- In 1913 England exported 76,000,000 tons of coal without taking into account the 21,000,000 tons of bunker coal taken by ships landing at English ports, thus making up a total of 97,000,000 tons.

— Some large countries carrying on extensive exportation trade by sea present the curious contrast that their sea trade has developed while their own shipbuilding declined. This was especially the case with the United States during the period extending from 1865, i.e., at the end of the Civil War, to recent years. In 1860 American ships accounted for two-thirds, to be precise 66.5 per cent of the maritime transportation between the United States and foreign countries. In 1914 it only amounted to 8.6 per cent. During this time the exterior commerce of the United States increased from 4 milliard to 21 milliard francs ($800,000,000 to $4,200,000,000). This anomaly is explained by the fact that of the 11 milliard francs, ($2,200,000,000) representing almost the whole of the American merchandise exported in 1912, about 5 milliard ($1,000,000,000) of these goods enjoyed a sort of monopoly, that is to say, that this merchandise was unable to be produced in any quantity in the countries sending their ships to America to procure it. The goods were :

450,000,000 francs — cereals and by-products

835,000,000 " — fresh or preserved meat

2,830,000,000 " — cotton

530,000,000 " — petroleum

France is naturally not in a similar position. She has neither the abundant resources of new countries

possessing an excess of agricultural products and supplying them to densely popu¬ lated countries, nor any of these products of which a capricious nature has given a sort of monopoly in certain regions. Consequently, most of the goods exported by France are similar to those exported by other countries whose ships accordingly compete with our own in home ports, particularly England and Germany.

The French exportation amounts to a total annual sum of about 7 milliard francs ($1,400,- 000,000) compared to 6 milliard 880 millions ($1,376,000,000) in 1913. Of this total, about 60 per cent is represented by manufactured articles, that is to say, goods able to be produced in other countries, and especially in those compet¬ ing on a large scale with the French merchant fleet. It is therefore no exaggeration to say that France leaves to her competitors the care of transporting much of the merchandise making up her export trade.

But the subject should not be dismissed by the bald statement that the reason for the infe¬ riority of the French merchant fleet is because France practically confines her exports to manu¬ factured goods. A more thorough investigation should be made and an analysis taken of the products exported. Most of them consist of articles of luxury, which recommend themselves by the elegant manner in which they are pre¬ sented and the hall mark establishing their quality. Very few exporters seek a cheap mar¬ ket for these goods. Now it should be borne in mind that buyers are judges of the price of goods, while on the contrary they are often un¬ able to distinguish between the finely finished article and that of the cheap and crudely made substitute. This is a thing one has to be edu¬ cated up to. In this category of goods are the following : nearly all textile products, clothes, articles of fashion (ladies' dresses, lingerie, hats, etc.). This group represents about one-

third of the value of all French exportations. The following are some of the figures:

Silk, floss silk, silk tissues . 588 millions.

Cotton and cotton fabrics . 511

Wool and woolen fabrics . 632

Flax and hemp . 69

Clothes and lingerie . 252

Hats, artificial flowers and feathers . 136

2,188

There is no doubt that some of our large dressmakers and fashion houses escape the danger of delivering their wares through the intermediary of foreigners on account of the frequency of the personal business relations of their overseas clientele with them. Strangers residing a short while in Paris or passing through the city undoubtedly create a strong link between these producers and themselves which greatly adds to the development of this branch of our exportations. But this clientele, although constantly renewed by several visits to France, is as constantly curtailed by the fact that once the clients return to their home coun¬ try they are obliged to have recourse to an intermediary for the reception of any further goods. The Germans, especially, make great efforts in distant European countries to substi¬ tute the Berlin fashion for the Paris fashion and whatever prestige the latter still retains, the good taste of people must not be too blindly relied on to allow us to overlook the danger with which we are threatened.

Even in the matter of non-manufactured products there are certain articles of export which it is necessary to have presented to cli¬ ents by an intermediary who is more or less a connoisseur of their specialty. For instance, wines and liqueurs, which represent an annual exportation of 265,000,000 francs, should not be delivered to distant clients through English or German shipping agencies, as they run the risk of being supplanted by such substitutes as Australian claret, Australian burgundy, Moselle

or Rhine wines and even <(Deutsches Kognac® manufactured in the open port of Hamburg. In addition, it should be noted that in the list of French exports not classed in the statistics figure 566,000,000 francs of parcels post and 656,000,000 francs of undenominated goods, or a total of over a milliard francs, in which manufactured articles and (

*The greater part of French industries, there¬ fore, need to be exported by a properly organ¬ ized national service which would avoid the use of intermediaries in whom one encounters dan¬ gerous rivals. Thanks to their merchant fleet the Germans have been able during the last 30 years to place on all the markets of the world German goods which before that period were practically unknown. Undoubtedly the perse¬ vering efforts of the German traders have ac¬ counted for much to achieve this result, but the transportation *by German ships and the delivery of the goods by German intermediaries result¬ ing therefrom were a necessary condition of success. Let it be further remembered that the German product, being nearly always cheaper than that of its competitors, has less need of recommendation to prospective purchasers than the better and more elegant — but generally dearer — article of French fabrication.*

Under these conditions any improvement of the merchant marine in France is dependent not only upon efforts displayed by the govern¬ ment and shipbuilders but also by the whole¬ hearted support of shippers in general. Ship¬ pers should be made to realize the importance of the eventual destination of their merchan¬ dise, and not become more or less disinterested in its fate once the goods have been dispatched and an invoice sent. It is indispensable for them to follow up the shipment to the very door of the client, and the intermediary naturally designated for such a task is unquestionably the

agent of a regular French navigation com¬ pany. It is not too much to say that owing to the very nature of the French export trade, a close union of the shipbuilding industries and this export trade is an essential condition of success for the one as for the other.

The Critical Situation Created by the War. — On 1 Jan. 1914 the French commercial fleet comprised 2,498,285 raw tonnage. To 1 Jan. 1917 the tonnage of French merchant fleet sunk through acts of war (mines, submarines, etc.) amounted to 311,271 tons. As very few ships were added to the French merchant fleet after the outbreak of hostilities, the tonnage at the commencement of 1917 was reduced to 2,265,000 tons. These figures sufficiently prove the serious character of the situation.

This situation was not due entirely to sub¬ marine losses. It was greatly aggravated by the almost unsurmountable obstacles encountered during the first three years of war by the French constructors to make good the losses. These obstacles were of two kinds: (a) impos¬ sibility of constructing ships in France; (b) impossibility of procuring them from abroad. The impossibility of construction in France is easily explained by the fact that raw material (sheet iron, angle-iron, profiles) indispensable for naval construction could no longer be fur¬ nished by the French metallurgical manufacto¬ ries as most of them were located in the invaded districts of northeastern France. To under¬ stand this it is merely sufficient to state that in 1913 the departments of Meurthe and Moselle alone produced 19,798,000 tons of iron ore of the 21,714,000 tons extracted throughout France. Furthermore, the steels which it was possible to procure, either from neutral or allied countries, were all exclusively reserved for direct war purposes. The naval shipbuild¬ ing yards were themselves, at the request of the government, transformed into munition factories for the making of shells. Moreover, these shipbuilding yards had the greatest diffi¬ culty to finish the ships in an advanced stage of construction but which were still on their stocks.

There was no question, therefore, of undertaking new naval construction, which scarcity of labor, moreover, would have made difficult of realization.

Finally, as the submarine warfare became more intense, each maritime country awoke to the necessity of jealously reserving its own ships for its own needs. England, at first, quickly followed by the Scandinavian countries, the United States (1916) and lastly Japan in September 1917, successively forbade the transfer of their national flag. Under these circumstances not only was it impossible, to re¬ place lost merchant vessels by new units but

the exploitation of foreign ships under the French flag was also out of the question. It was only when matters reached an acute crisis that the proper authorities took steps to obtain supplies of steel from France's reserve stock necessary to construct some 20 small vessels (1,400 tons) for delivery in the spring of 1918.

The need of reconstituting the French mer¬ chant fleet was still further accentuated by the fact that apart from loss of tonnage mentioned, the bulk of merchandise to be handled in the French ports during the war was following an ever upward tendency. This is easily ex¬ plained by the fact that before the war France's exterior commerce by land was principally transacted with Germany and Belgium. Thus, owing to the war, these two land routes were closed to her. Again, if French exports by sea have declined since 1914, importations on the other hand have increased in such proportions that the total mass of maritime commerce has reached a much higher figure.

We quote a few figures taken from statis¬ tics compiled at the ports. By taking the total figures affecting merchandise disembarked and embarked in the 40 principal ports of France we find the following:

1913 . 42,296,665 tons.

1914 . 35,005,498 "

1915 . . 42,265,903 "

1916 . 56,673,098 "

But if only goods disembarked in the same ports are considered the proportion in the in¬ crease is much greater, as will be seen from the following figures :

1913….. . 31 ,884,516 tons.

1914 . 27,223,519 "

1915 . 40,155,884 "

1916 . 51,502,755 *

These figures do not furnish any indication from the point of view of importance of the French maritime traffic after the war. They do possess, however, a permanent interest because they show the receptive capacity of the French ports which have been able to handle in 1916, under particularly difficult circumstances, 20,000,- 000 tons more imports than in 1913. An idea can thus be formed of the future possibilities of the maritime trade in the ports of France.

The les'son to be learned, therefore, from the critical situation caused by the war is the absolute need of a powerful French merchant fleet ; such a fleet did not exist in peace times, and the need for the same was imperative in the two cases. Serious obstacles will have to be surmounted before this fleet can be properly developed. However, the teachings of the late war prove in an irrefutable manner the necessity for manufacturers to preoccupy them¬ selves with means of maritime transportation which forms such a link between them and their foreign clientele. Moreover, with the war ter¬ minated it is possible not only for French shipbuilders, but also for all those other in¬ dustries which suffered so cruelly during the years 1914-18, to procure either abroad or in the French

market that machinery indispensable for naval construction.

It is only fair to state that certain of the obstacles cited above regarding tfie develop¬ ment of the French merchant fleet in normal times are gradually being overcome and some are on the point of being entirely eliminated. As a case in point we might mention the large

source of heavy freight which French maritime enterprises might derive from the operation of the iron mines of Normandy and Brittany. As recent as 1913 1,000,000 tons of iron ore was. embarked at Caen or Saint Nazaire. The con¬ siderable development of the metallurgical in¬ dustry in the west of France during the years 1914-18 leads one to suppose that this figure will increase in large proportions in the future.

To sum up, the crisis which the French mer¬ chant fleet is suffering from is a serious though not an irremediable one. It can be overcome because, on the one hand, the general interest of the nation is to remedy the present situation, and on the other, the combined efforts of the transportation enterprises as well as the manu¬ facturers or producers interested in the exterior commerce of France are capable of finding a solution to the problem.

Prepared and contributed by the Comite Central Des Armateurs De France.

25. THE FRENCH ARMY. On the eve

of the great war, the French army was in an evolutionary period. The recruiting of the troops, their organization, the classification of the grades, armament, etc., were all being modified along new processes and many meas¬ ures in course of practice produced no other result than causing that temporary confusion so inherent to every

transformation.

Before the War.

Recruiting, General Effectives, Budget. —

The law of 7 Aug. 1913, called ®the three years service bilP ratified the principle of obligatory and equal service for all French citizens. Serv¬ ice is contracted for 28 years, viz., three years with the active army (this time is all passed under the colors), 11 years in the Active Army Reserve, comprising two periods of training; the first of 23 days and the second of 17 days; seven years in the Territorial Army with one period of training of nine days, and seven years in the Territorial Army reserve, the men in this category taking part in reviews and eventually in sentry work on lines of com¬ munication. The ^classes® are divided into parts : men fit for active service and men only apt for auxiliary service. Voluntary enlist¬ ments can be contracted by youths attaining their 18th year. Up to a figure fixed by the War Office young men possessing a certificate for military aptitude granted to them for efficiency may contract a three years' enlistment which will enable them to be discharged sooner from active service. Enlistments may be made, moreover, for four and five years, and, in case of war, for the duration of hostilities. Men undergoing their military training period may re-enlist for a total duration of 15 years. In the Gendar¬ merie and in certain special services re-enlist¬ ments may be contracted beyond this period. The age limits are 55 years for the Gendar¬ merie and 60 years for special services. The ad¬ vantages derived by the men contracting re¬ enlistments consist in better pay, premiums and pensions. The pension is granted after 25 years' service. A proportional pension is allowed after 15 years.*

The Colonial troops are formed of young men demanding such service, voluntary enlist¬ ments, re-enlisted men and young men residing in the colonies. Special privileges are granted

to the enlisted and re-enlisted men in this cate¬ gory. The Algerian native troops are recruited by enlistments and re-enlistments and by means of classes (calls to the colors) wherein the prin¬ ciple of replacement is allowed.

The black troops of West Africa are also recruited by enlistments and re-enlistments and by properly authorized calls according to the local customs. The census taken in 1911 for France showed a population of 39,601,509. The figure for the colonies, for the same period, was about 60,000.000. In 1912 there were 314,369 conscripts, from which had to be de¬ ducted a number of men unfit for service, men previously rejected and men who had already contracted enlistments, which reduced the num¬ ber to 240,502. The number of troops for 1914, not including colonial troops, was 28,519 officers, 762,450 men and 187,317 horses. The war cred¬ its for France in 1913 amounted to 4,738,603,534 francs ($947,720,707). Of this sum military expenses accounted for 983,224,376 francs ($196,644,875) for the army and an amount of 488,941,062 francs ($97,788,212) for the navy.

High Command and Central Administra¬ tion. — The constitutional laws of France pro¬ vide that the army be placed under the nomi¬ nal command of the President of the republic. The War Minister is the acting chief. A Superior Board of the National Defense (de¬ cree of 14 June 1913) examines all questions regarding the co-operation of the various min¬ istries. The Superior War Council studies all questions relating to the preparation of war. It is composed of the Minister for War, his general staff and 10 generals selected by the high command in case of war. The general staff of the army (decree 14 May 1912) is di¬ vided into two groups. The first group is con¬ cerned with the preparation of war plans, the second looks after current affairs. The chief of the general staff is assisted by two Superior officers. The first of these, who is at the head of the first group, holds the rank of major- general in time of war, the other at the head of the second group, remains at the ministry once the mobilization

order is issued. The Under-Secretary of War (decree of 16 Feb. 1914) is in charge of administrative affairs.

The directing bodies are divided up as fol¬ lows : The Board of Control prepares the bud¬ get, centralizes the accounts, has an administra¬ tive control over the infantry, cavalry, artillery, engineers, quartermaster, munitions and sani¬ tary services, over the Colonial troops and all questions dealing with the various arms and services. The Technical Board, acting under the direct authority of the War Minister, is re¬ sponsible for unity of direction and fulfils any technical missions that may be confided to it. The principal missions are: Inspection of cav¬ alry, . unmounted artillery, coast batteries, engi¬ neering service, schools, aeronautics, automo¬ biles, reserves, military preparation, etc. Tech¬ nical committees and permanent or temporary commissions study those questions of a more important technical, order. The territory is di¬ vided into 21 regions as follows: 1, Lille; 2, Amiens; 3, Rouen; 4, Le Mans; 5, Orleans; 6, Chalons ; 7, Besanqon ; 8, Bourges ; 9, Tours ; 10, Rennes; 11, Nantes; 12, Limoges; 13, Cler¬ mont-Ferrand; 14, Lyons; 15, Marseilles; 16, Montpellier; 17, Toulouse; 18, Bordeaux; 19, Algiers; 20, Nancy; 21, Epinal.

Each region is itself divided into several subdivisions possessing one or more recruiting offices. The two large centres of Paris and Lyons possess a military government, headed by a governor.

Ranks.— T he military hierarchy comprises the following grades: Private, corporal, ser¬ geant, sergeant-major, candidate for commis¬ sion, adjutant, adjutant-chief. After this classi¬ fication the officers follow in the order here¬ after indicated : . Second lieutenant, lieutenant, captain, major, lieutenant-colonel, colonel, brig¬

adier-general, general, marshal. The title of fourrier bestowed on a private indicates em¬ ployment as a clerk. In the cavalry the rank of brigadier corresponds to that of corporal in the infantry, while sergeants and sergeant- majors are called <(marechal de logisi® and <(marechal des-logis-chef .® The title of major added to that of captain or commander indi¬ cates an administrative function. The title of adjutant-major added to the rank of officer in¬ dictates a function of assistant to battalion or regimental chiefs.

Generals of division, called upon to com¬ mand army corps in peace time, and armies and groups of armies in war time, are invested with authority placing them on the same level as regards rank. Non-commissioned officers con¬ sist mostly of men who, on conclusion of their service, have reached the necessary standard to be enrolled in their respective rank at mobili¬ zation. Professional non-commissioned officers are constituted by means of re-enlistments. These re-enlistments carry with them certain privileges such as higher pay, bonuses, pensions and civilian employment reserved for them once their service is concluded.

The recruiting for officers who make a career of the army is undertaken in three different ways: (1) The large Military Schools. — The famous military school of Saint Cyr, where pu¬ pils are received after passing the mathematical class A secondary examination, furnishes officers to the infantry and cavalry after two years' training. The Polytechnic School — pupils ad¬ mitted after passing special mathematical exam¬ inations — furnish officers to the artillery and engineers after a two-year course of training. Some of the pupils on the termination of their studies set up in practice as civil engineers. In such a case their status in the army is that of reserve officer. The pupils of these schools spend two months with a corps troop at the end of each year's studies, the first time as a private soldier and the second time as a non-commis¬ sioned officer (law of 7 May 1913). (2) The

schools for non-commissioned officers and can¬ didates for commission are military schools to which are sent non-commissioned officers who have completed two years' service in this grade and have satisfied while so serving the standard of capacity and have passed the examinations set corresponding to the superior primary test. (3) The adjutants or sergeant-majors having served at least 10 years as noncommissioned officers are appointed by decree of the President of the republic — on recommendation of their superior officers in a proportion not exceeding 1.5 per cent of the vacancies to be filled. In addition to these three categories, the law of April 1913 provided for the recruiting of a certain number of officers in the active army by the admission of reserve officers on their

fulfilling certain conditions. The declaration of war interrupted this experiment before appre¬ ciable results could be obtained. The prepara¬ tory schools receive the sons of soldiers with the object of preparing them for an army career. The Prytanee Militaire de la Fleche receives sons of officers and sons of state offi¬ cials, gives them a complete secondary training and prepares them for admission to the military schools. Most of the pupils are admitted free of charge. The Ecoles preparatoires d'Enfants de Troupe receive sons of non-commissioned of¬ ficers. They receive a primary instruction with a view to preparing them for the grade of non¬ commissioned officer and subsequently officer. Board and training are free on condition that the pupils contract a five-year enlistment on leaving the school.

There are four schools for the infantry, one for the cavalry and one for the artillery. L'Orphelinat Heriot receives the orphans of non-commissioned officers and officers.

The recruiting for complementary officers is undertaken by the following means: (1) Spe¬ cial Reserve Officers. — Officers of the active army may, at their request, be placed on the ^special reserve® list, in determined proportions. These officers are

replaced in the active army, placed on the list of reserves and called up in case of mobilization. They are obliged to un¬ dergo a period of training of five weeks every two years. They draw a pension and receive special privileges. (2) Pensioned Officers. — Officers in receipt of a pension are called upon to serve five years as complementary officers after they have ceased to belong to the active branches of the army. They may, however, at their request, be maintained in the reserves after this period of five years has elapsed. The officers pensioned off before the completion of their 25 years' service still belong to the army until the expiration of such period. (3) Officers Resigning Their Commission. — Officers of the active army may be called upon to serve in the reserves in their respective grades. (4) Pupils of the Large Schools. — The pupils of the Polytechnic School, designated for employment in state civilian services or resigning when leav¬ ing the school, the pupils of the ficole Forestiere, ficole Normale Superieure, ficole Nationale des Mines de Saint Etienne, ficole Centrale des Arts et Manufactures, ficole des Ponts et Chaussees, are liable to serve as re¬ serve officers. By the terms of the law of 1905 these young men complete one year's training in a corps troop, under ordinary conditions, and follow during this period a course of studies preparing them for the grade of officer. The law of 1913 modified these arrangements by substituting for the one year's service a mili¬ tary training carried out in the schools them¬ selves with an annual period of two months in a troop corps during the course of the studies. These arrangements, which only applied to the ficole Normale Superieure, the ficole Forestiere and the ficole Polytechnique, up to the present have operated but very little. (5) Non-Com¬ missioned Officers of the Active Army. — The discharged non-commissioned officers who have received a diploma for aptitude on the recom¬ mendation of their chiefs and who possess the necessary training and social status may be nominated reserve officers. They can, while not actually ranking as an officer, hold a position of

chief of section. (6) Young Men Called up for Sendee with the Colors. — By the terms of the law of 1905 the young men undergoing their two (or three) years' service may be admitted to the regional schools after one year's service provided they have satisfied military require¬ ments as to aptitude. The course of studies lasts six months. On leaving these schools they may be called upon to undergo a period of six months' training in a troop corps in the grade of non-commissioned officer. The law of 1913 granted these young men permission to enter the military schools, admission being allowed after one year's service. The studies last one year. The men accomplish their third year's service, first as candidates and finally as non¬ commissioned officers, during the last six months. These dispositions are not yet in force. The officers of the territorial army are recruited from among the reserve officers.

Promotion. — Promotion in the active army is gained partly through seniority, partly through choice. Second lieutenants are pro¬ moted first lieutenants automatically after two years' service. For the other grades up to and including battalion chief promotion is granted according to seniority. But every year the Minister of War, on recommendation from the proper officials, draws up for each branch of the service a ^promotion® schedule promoting specially chosen officers. The promotion of offi¬ cers so chosen is one-third for captains and one-half for battalion chiefs. From the rank of lieutenant-colonel all promotion is by choice. In the reserve and territorial armies second lieutenants are promoted first lieutenants after four years' service, the other grades being by choice. The minimum period of seniority to rise from one grade to another is two years for a lieutenant, four for a captain, three for a major, two for a lieutenant-colonel and for grades above that three years. This period is just one-half in war time.

Promotion in the ranks is entirely by choice with a minimum of seniority. The private soldier should reckon on serving six months before being promoted to corporal, etc.

General Staff. — In peace time besides the Army General Staff there exist staffs for army corps, divisions and brigades. Their personnel is composed of gazetted staff officers and ad¬ ministrative officers of the General Staff, the latter being more particularly concerned with carrying out orders emanating from the cabinet or government. The recruiting of gazetted staff officers is undertaken at the Superior Mili¬ tary School. Officers fulfilling requirements as to age, seniority of rank and command may participate in the annual examination on recom¬ mendation of their superior officers. This ex¬ amination or competition is drawn up by the Minister of War. The pupils admitted follow during two years the course of studies at the Paris school. They are gazetted staff officers on termination of their studies provided they have satisfied the necessary tests. The grade of staff officer can be attained by superior officers and captains not having followed the course of studies at the military school but having satis¬ factorily passed the tests equivalent to those required by candidates belonging to the school. Such cases are, however, exceptional. Gazetted officers on leaving the school are attached for two years to general staff officers to complete

their training. After this period they must serve in the branch of their service as com¬ mander for two years. They have served a cer¬ tain length of time previous to their admission to the General Staff in other branches of the service than that originally chosen by them.

The principal branches of the army are: The Control, charged with safeguarding the in¬ terests of the Paymaster's Department and, in the administrative services, with supervising the proper application of decrees and laws.

The controllers form a special corps with its own governing body. The Artillery Service at¬ tends to the general direction of the branches of this service and its proper working by means of a special General Staff. The Munitions Serv¬ ice is confided to military engineers with its own governing body. The Engineers Service looks after this branch of the service and as¬ sures its proper running in the schools for engineers. There follow the Aeronautic Serv¬ ice, the Sanitary Service, the Veterinary Service, the Military Justice and Penitentiary Service, the Recruiting Service, the Paymaster Service, the Post and Telegraph Service, the Railway Service, the Automobile Service, etc.

Troops. — 'The law of 15 April 1914 pro¬ vided for the following organization, the pro¬ gram of which was not entirely realized at the time of mobilization :

The infantry comprises 173 regiments of 3 battalions of 4 companies, 31 battalions of <(chasseurs® of which 12 are specially designated to serve in the Alps, 6 regiments of <(zouaves,® 12 regiments of Algerian sharpshooters, 2 regi¬ ments of the Foreign Legion, a variable number of Saharian companies, the Paris regiment of sapper-firemen, and special disciplinary sections. The officer-personnel of an infantry regiment comprises, besides the normal units, a comple¬ mentary body destined for the needs of mobili¬ zation. It comprises one lieutenant-colonel (in addition to the one seconding the colonel), two battalion chiefs, six captains, three adjutant chiefs and three adjutants. Each company has one captain, two lieutenants and one adjutant. Ten cyclist groups, one attached to each cavalry division, are formed by certain battalions of ^chasseurs.® Commanded by a captain, each one of them is divided into two platoons. The platoon, commanded by a lieutenant, contains seven non-commissioned officers and 100 <(chas- seurs.®

The cavalry comprises 93 regiments, as fol¬ lows : 12 cuirassiers, 32 dragoons, 23 ((chasseurs a cheval,® 14 hussars, six African <(chasseurs,® six

Algerian ((spahis.® There are, moreover, four Algerian-Tunisian remount companies and 17 cavalry remount groups in France. The cav¬ alry regiments are composed of four active squadrons and one depot squadron. The num¬ ber of squadrons in Africa may be modified by ministerial decree. Brigades of cavalry are pro¬ vided with wheeled-machine-gun sections.

The field artillery comprises 62 regiments in three or four groups of batteries and eight autonomous groups of field and mountain artil¬ lery in Algeria-Tunisia and Morocco. Thirty batteries of horse artillery are divided over the field artillery regiments. In all there are 618 batteries mounted in France and 17 outside of France. The heavy artillery forms five regi¬ ments, in all 34 batteries. The mountain ar¬ tillery forms two regiments, 14 batteries in

France and eight outside France, including the autonomous groups. The foot artillery forms nine regiments in France. In all 89 batteries, of which 30 are coastal and 59 land — two autonomous groups in Algeria-Tunisia of four batteries each.

The engineers are composed of nine regi¬ ments of sapper-miners of 25 battalions. Be¬ sides two battalions forming a corps, one regi¬ ment of sapper telegraphers of four battalions and two battalions forming a corps in Algeria- Tunisia unite all the units of this arm of the service without distinction of specialty. The troops of the Aeronautic Service comprise : (1) Seven companies; (2) Sections, the num¬ ber of which is determined by ministerial de¬ cree; (3) One company of conductors. These units are formed into groups making one corps.

The ((Train des Equipages® (Supply Train) forms 21 squadrons of three companies, in which are included a few companies from Al¬ geria. The troops of the administrative and sanitary service make up sections of secretaries to the staff officers and recruiting officers, sec¬ tions of clerks and laborers and sections of hospital attendants, orderlies, etc., forming a corps. The Departmental Gendarmerie (Con¬ stabulary) form 27 legions, 25 of which for France, one for Algeria-Tunisia and one for Paris. The legion is subdivided into depart¬ mental companies and the company plus a cer¬ tain number of mounted or unmounted brigades are spread over different regions according to the needs of the service. The Colonial Gen¬ darmerie forms a few detachments. The Re¬ publican Guard of Paris consists of three bat¬ talions and four squadrons. The (

Mobilization. — The active army corps are completed by means of reservists from the

youngest classes. They also form new corps called reserve corps, by means of reservists and complementary cadres from the active corps completed by the reserve cadres. Under these conditions each active regiment forms a re¬ serve regiment and each battalion forming a corps a battalion. Similar dispositions were taken for the mobilization of artillery, cavalry and other corps and services.

The Territorial Army when mobilized com¬ prises 145 regiments (one per subdivision), seven battalions of

(

The large units when mobilized are divided up as follows : Divisions of infantry, compris¬ ing one staff group, two or three infantry brigades, one squadron, one artillery regiment, one company of engineers, one ambulance, one administrative convoy, etc. The army corps comprise : One staff group, two or three divi¬ sions of infantry, one brigade of cavalry, one regiment of artillery, one company of sappers, one company of pontoon workers, one park company, etc. Armies and groups of armies, formed only in war time, the composition of which is unknown.

Equipment. Armament. — The infantry is armed with a rifle, 1886 model, modified in 1893, of an eight-millimeter bore with magazine containing eight cartridges, of a weight with¬ out bayonet and unloaded, of 4 k. 240 (about eight and one-half pounds). Two types of machine guns ; the field machine gun, Puteaux model, and the fortress machine gun, Hotch¬ kiss model.

The cavalry is armed with a carabine of the same system as the rifle but with three cart¬ ridges ; a sword and a lance for certain regi¬ ments. Machine gun on wheels of the same model as that of the infantry. The field artillery consists of a gun of 75-millimeter bore, 1897 model with recoil on gun carriage, hy¬ draulic brake and independent line of sight. The heavy artillery includes several models : 120-millimeter short, in steel, hydraulic brake, pneumatic recuperator; 155-millimeter short, 120-millimeter long, 155-millimeter long, 220-millimeter mortar, 220-millimeter gun. The in¬ fantry soldier is supplied with 120 cartridges, the wagon attached to each company supplies 65 per man, and the ammunition sections of columns 110; in all 501.

Automobiles. — The needs of the army on mobilization are covered by requisition. The government grants premiums to owners of motor trucks and tractors.

The Aviation section included several hun¬ dred types of machines of different models. Dirigibles only existed in the form of a few trial models.

Uniform. — In 1914 the French army had not adopted for its uniform colors of little visibility. The question was under considera¬ tion. The greater part of the troops, partic¬ ularly the infantry, were provided with red

trousers and a red kepi. The <(chasseurs a pied® wore deep blue trousers with jonquil borders and kepi of the same color. The kepi for the Alpine "chasseurs® was replaced by a beret. The African troops wore a red cheohia with the voluminous trousers common to the natives, red for the zouaves, blue for the Algerian sharpshooters. The cavalry was pro¬ vided with a steel helmet with an elevated crest for the dragoons and the cuirassiers. The light cavalry had just adopted a similar helmet, but shorter and lighter. The cuirassiers retained the steel breastplate. The artillerymen wore a black uniform with red stripes on the trousers. The engineers wore the same colors as the ar¬ tillery with the same capot as the infantry in field service uniform. A blue or khaki cov¬ ering placed on the helmets and kepis, when in field dress, made the uniforms less visible.

Rewards and Distinctions. — The rewards and distinctions destined to maintain the morale of the army are: The Order of the Legion of Honor including grades of chevalier, officer, commander, great officer, great cross. These various grades are awarded to officers, and, exceptionally, to the rank and file ; for seniority of service or particularly distinguished services the order is also conferred on civilians by the state. The military medal is awarded to the rank and file. It is exclusively awarded to soldiers and sailors. If it is awarded to an officer it constitutes a supreme recompense,

ranking even higher than the Order of the Legion of Honor.

Various commemorative medals of certain campaigns and orders existing in countries under French suzerainty reward services ren¬ dered to the colonies.

After 2 Aug. 1914.

On the declaration of war, the opinion of all military experts was to the effect that hostilities would be of short duration, which opinion coin¬ cided with that of the most eminent economists of the day. A few months, a few weeks even, would probably witness the exhaustion of the material and financial resources of the various belligerents however well prepared or rich they might be. The military preparation of France, as well as other contemporary military powers, had been based on this conviction. Such sup¬ position, however, was quickly contradicted by actual events which necessitated a complete transformation during the war of the resources of the nations, the principal lines of which we will outline in this article.

We have no intention of indicating in this treatise the nature of all the transformations made during the course of the war. Not only are the statistics unavailable but the secret nature of their character does not permit of their being divulged even if it were possible to compile them.

For the present we must be content with generalities from which, however, the reader will be able to glean a few ideas of the trans¬ formations which have taken place since mobili¬ zation was decreed.

Recruiting, General Effectives— The mobi¬ lization order decreed 1 Aug. 1914 quite realised the objects aimed at by legislation. But the necessity of creating new units to meet fresh demands and keep up to standard at the same time the mobilized troops raised a problem, a

few weeks after mobilization, presenting many difficulties which naturally increased with the duration of hostilities. The government was able to obtain some of its needs by calling to the colors young men fit for service who had not yet attained their 20th year. Thus the classes 1915, 1916 and 1917 were successively called up by decrees of 2 Sept. 1914, 3 Dec. 1914 and 6 April 1915 respectively. Other dispositions facilitated voluntary enlistments. The Alsace-Lorrains were admitted to the French army (law of 5 Aug. 1914). Enlist¬ ments for the duration of the war were allowed to be contracted from the age of 17 (15 Aug. 1914). A larger use was made of the native colonial troops. Long- service native troops from North Africa in receipt of a pension were recalled. (Decree of 26 Jan. 1915). The num¬ ber of battalions of Senegalese sharpshooters was increased. West Indian troops were called to service in France (April 1915). Enlistments for the duration of the war were open to natives of the North African colonies and pro¬ tectorates.

The army is not, of course, made up entirely of combatants. Manifold are the tasks re¬ quired to be performed at the rear on the lines of communication, as well as in the interior of the country for the proper administration of the army and to satisfy its ever-growing needs. As far as possible only those men un¬ fitted to serve as combatants are employed in these services. This matter was covered, moreover, by a law fixing the conditions for auxiliary service. It should further be noted that successive laws have been the means of (

As early as September 1914 the government took steps to have men in the auxiliary service medically re-examined with a view to their eventual transfer to the active army. By law of 17 Aug. 1915, called the ((Dalbiez Law® after its author, Deputy Dalbiez, the military situ¬ ation and fitness of each man was minutely in¬ vestigated with the idea of <(combing out® fit men at the rear serving in munition factories, driving automobiles, etc., and sending them to the front. This law was still further

reinforced by the "Mourier Law® providing for a better utilization of the mobilized forces, regulating the age limit, family situation and fitness of officers and men for obligatory service in the zone of the armies. Furthermore, the Minister of War drew up schedules covering the em¬ ployment of civilians in the manifold services of the interior and replaced mobilized men by

women at regular scales of pay. It was, how¬ ever, only to be expected that the economical life of the country must necessarily suffer by this calling up in mass of all able-bodied men — a situation naturally aggravating with the prolongation of hostilities. The problem was still further complicated by the necessity of assuring the maximum output of war material and of carrying out those works indispensable for the proper upkeep of the country and the victualling of the population. This was pro¬ vided for, at first, by mobilizing on the spot certain specialists indispensable for the proper running of factories and workshops. Steps were taken to regulate throughout the country men thus mobilized and check any abuses. A call was made on foreign labor recruited amongst neutrals or allies. Natives from Africa and Asia were brought to France to work as dockers, laborers, etc. A system of leave from the army was inaugurated allowing farmers to return to their homes for periods of 20 days renewable during the year as far as military exigencies permitted. In the surroundings of the barracks and in the zone of the armies, troops assisted in agricultural labor, gangs of men being placed temporarily at the disposal of the departmental prefects. Finally, special arrangements were made so that men in the auxiliary service were employed, as far as possible, near their domicile and left alone to pursue their usual occupations outside of service hours with the idea of their partic¬ ipating in the economical life of the country.

Command, Central Administration— The general mobilization order was immediately followed by a ministerial decree (2 Aug. 1914) fixing the boundaries of the army zone. From that time onward all the territory comprised in such zone was administered by .the com- mander-in-chief of the North Eastern Armies, while the Minister of War was in supreme charge of the interior zone. The general staff, divided into two bodies, constituted the general headquarters. The mobilized army corps were grouped together to constitute armies, which latter are afterward formed into groups of armies. In the interior, the military com¬ mander of the territory remained constituted as in peace time. However, the first and sec¬ ond regions were grouped into one.

The services at the war office underwent some modifications, necessitated by new mili¬ tary and political considerations. The most important were : the creation of Under-Secre¬ tary of State for artillery and munitions (de¬ cree of 18 July 1915) was transformed into Minister of Armament and War Equipment. An Under-Secretary of State for Food was created at the same time as the appointment of munitions minister. He was later replaced by an Under-Secretary for General Administra¬ tion, an office invested with a wider scope. On the same day, also, 18 July 1915, an Under¬ secretary of the Health (military) Service was appointed to replace the old health service. Finally, an Under-Secretary of Aeronautics was appointed. A system of inspections organized to supervise the proper execution of the gov¬ ernment's decrees and the strict observation of the law underwent certain . transformations. On 15 Nov. 1915 the War Minister established six ^inspection® districts, at the head of each being a general assisted by a staff officer, the

object being to see that the Dalbiez Law of 17 Aug. 1915 was strictly applied. Later on these inspections were suppressed and replaced by a commission appointed to watch over the better utilization of the military resources of the country, several members of Parliament serv¬ ing on

this commission in collaboration with the military authorities. Apart from the in¬ spections the object of which was to bring about a better utilization of the military re¬ sources, technical inspectors were appointed for all branches of the army.

Officers. — The preconceived idea of a short, violent conflict of great battles, or (

Arrangements were also made to use as officers, after a special preparation, young men admitted after examination into the state mili¬ tary schools (ficole Polytechnique, Ecole Nor-

male Superieure, etc.). Examination for en¬ trance to Saint Cyr was re-established. How¬ ever, candidates seeking commission who re¬ ceived their instruction at the training centres are only appointed officers after having served a certain time at the front. The losses sus¬ tained in officers commanding the infantry be¬ ing greatly superior to those in other branches of the army, a call was made on the cavalry to counterbalance this void. Successive drafts were made on this latter arm and amply justi¬ fied the decree of 4 March 1916 in this respect. Finally, the continuation of hostilities served to provide both professional and amateur of¬ ficers with a wider experience and resulted in progressively expunging certain natural prej¬ udices existing amongst them, particularly as regards such vexed questions as rights of superior officers and rules governing promotion.

Troops, Armament, Material. — The time is not yet ripe to give precise details regarding the transformations made during the war in the armament and equipment of the troops. Suf¬ fice it to say that such transformations are the result of carefully studied plans based on the most up-to-date principles. Open warfare having ceded the place to trench warfare it became imperative to increase in

large propor¬ tions the output of heavy artillery. To the old light field gun, whose number was daily increasing, new weapons of greater power and range were added. Moreover, trench warfare necessitated a large use of grenades and trench mortars of an approved new design. The un¬ precedented use of machine guns was also a tremendous factor to be reckoned with in modern warfare. In addition to the foregoing weapons, the quick-firing rifle and bomb-throw¬ ing apparatus were invented and had to be manufactured on a large scale, while it should not be forgotten that sapping and mining was carried on daily along the whole of the vast front. These radical modifications of new fighting conditions necessitated a correspond¬ ingly radical reorganization of the troops. The two or three machine gun sections per infantry regiment at the commencement of the war were soon transformed into numerous companies. The infantry company itself was obliged to model itself to suit new conditions. Hence¬ forth it was composed of grenadiers (grenade or bomb throwers) and fusiliers (soldiers manipulating the new quick-firing rifles), while the infantryman proper with rifle and bayonet was divided up into the four sections of the company in such a way that each section was composed of two half sections, one of which included the specialists (grenadiers or fusiliers) and the other the ordinary rifleman. The bat¬ talion transformed its fourth company into a machine gun company, fighting in ternary order. Certain of the cavalry units were sup¬ pressed and among those retained some were formed into foot regiments.

The artillery also underwent no less drastic transformations, the first step being a large in¬ crease in the output of guns. Pre-war opin¬ ions as to the material and projectile were dis¬ sipated almost on the first shot being fired and the French artillery of 1917 possessed a variety of models from the small trench weapon to the latest long range heavy howitzer. The Decree of 18 Oct. 1915 gives authority to the Minister of War to fix, for the duration of hostilities,

the number of officers and men forming native colonial troops deemed necessary to be dis¬ patched to France from the colonies of Algeria and Tunisia.

Distinctions and Rewards. — The very exist¬ ence of the army depending to a great extent on the morale of the fighters, the government used every means in its power to keep it up to the highest possible level. Among the meas¬ ures adopted, the honorific distinctions confer¬ ring a manifest and public proof of the military value of the troops occupied a foremost place.

A law promulgated 8 April 1915 provided for the striking of a medal called the ((croix de guerre)} (war cross) intended to commemorate individual ^citations® (mentioned in dispatches) for acts of valor by the army and navy, army corps, brigades and regiments. This cross is in Florentine bronze of a diameter of 37 centimeters, of four branches, and between each branch are two crossed swords. In the centre is a head of the Republic. The cross is sus¬ pended from a green ribbon with a red border at each edge and with five red bands. This is a replica of the ribbon from which the medal of Saint Helena was suspended which Napoleon bequeathed to his comrades in exile with <(sa derniere pen-see P The ^citations® are distin¬ guished in the following manner: Army:

palm in bronze in the form of a laurel placed on the ribbon; Army Corps: a star in vermeil; Division: a star in silver; Brigade and Regi¬ ment : a star in bronze.

Several ^citations® obtained for various deeds of valor are distinguished by as many stars corresponding to their degree, or of palms. By circular of 21 April 1916 a special decoration was created destined to commemo¬ rate in a permanent manner the deeds of valor of certain corps mentioned in dispatches. This insignia consists of a plaited ^fourragere® with the same colors as the war cross. It forms part of the equipment of the regiment and is worn by all the soldiers of such regiment. They

are allowed to wear it even if no longer belonging to the corps, on the understanding, however, that they participated in the action for which the decoration was awarded. The ((fourragere® is given to a corps after two army ^citations.® A new decoration was insti¬ tuted in July 1917 for corps mentioned in dis¬ patches four times. This consists of a ((four- ragere® with the colors of the Military Medal. The same circular stipulated the wearing of stripes or (

Colonel Eychene,

Sous-Chef d'Etat-Mafor du Gouvernement Miii- . taire et des Armees de Paris; Ex-Command¬ ant du 4 erne Zouaves aux Armees; Ex- Instructeur en Chef d VEcole Normale Su¬ perieure; Ex Commandant du Xll° Group e Alpin; Officier de la Legion d'Honneur, de- core de la Croix de Guerre, du Merite dis¬ tingue d'Angleterre ; Commandeur de I'Or- dre de Danilo du Montenegro, etc.

26. THE FRENCH NAVY. Brief His¬ tory. — During the last few years, the French navy has undergone some rather important modifications, both before the war and after¬ ward. In order to make the nature of these transformations clearly understood, it would perhaps not be out of place to give a short resume of the role played by the Navy, at least during the last century, and more particularly since the Franco-Prussian War of 1870. It is admitted that at the conclusion of the American War of Independence the French fleet could be con¬ sidered as almost equal to the English fleet. Although it did not possess quite as many vessels and frigates, it was better organized than its rival, and its chiefs, officers and men had on several occasions shown their worth. The French Revolution resulted in the disband¬ ing of the General Naval Staff, disorder broke out amongst the men and the material was al¬ lowed to deteriorate. The efforts made by Napoleon

to regain the ground lost were almost a complete failure. This organizing genius was unable to understand — among other essen¬ tial things — that squadrons are not formed by mere exercises while at anchor, but that to be able to fight well at sea, it is first of all necessary to know how to navigate without suffering too much damage. After Napoleon, the Restoration period (1814-15), which al¬ though it inherited a large number of vessels and small ships in good condition, very nearly lost everything and was on the verge of <(liqui- dating}> the entire navy, being unable to under¬ stand the importance — for France — of a fleet. The conquest of Algiers (1830) proved, how¬ ever, that what remained of the French fleet could still be usefully and gloriously employed.

*The July government (Louis-Philippe I) sought to reconstitute a navy worthy of France, and was able, during its last years of office, to take advantage of new inventions, i.e., steam, the screw-propeller and steel construction. It was, however, during the reign of Napoleon III, in the 19th century, that the French Navy reached its zenith. The boldness with which its chiefs, aided by a great engineer, Deputy de Lome, took advantage of the new fields opened up to them through the progress made in ar¬ tillery and especially in defensive weapons, gave for a time a marked superiority to the French fleet, of which, however, Imperial politics did not take full advantage. It can be stated that from about 1862 to 1868 the armor-plated French squadron had no rival, Great Britain merely following the movement with hesitation and tardiness. Unfortunately this fine fleet had one drawback which made itself seriously felt in 1870 when it became a question of at¬ tacking the German coast. Many of the float¬ ing batteries of 1855-60 were useless; neither the Onondaga, the Rochambeau * nor the spur- ships of 18(54 (of a rather low water displace¬ ment) had any weapons capable of opening curved fire. Nearly everything concerning coast warfare — in which connection mines al¬ ready played an important part — had been neglected. An ineffective blockade was*

the result. The weakening of France after the Treaty of Frankfort had a serious repercussion on maritime organization. It has, in fact,

- *Bought in 1869 from America and recast in France.*

*been stated with reason that the state of this organization gives a precise and exact idea of the power of a nation. Not only the fleet of the Republic definitely lost the first place it had attained for some years in rivalry with the Eng¬ lish fleet, but, little by little, it declined to the third rank, then to the fourth, while the Ger¬ man, American, Japanese, Italian, even Aus¬ trian, fleets rapidly sprang into importance.**

For 12 years, however, great efforts were made to recover the ground lost. Programs for naval construction were drawn up, with perhaps more zeal than judgment. It was necessary, moreover, to overcome certain prej¬ udices, technical controversies, deep-rooted dif¬ ferences of doctrine and competitive influences between the various staffs of the Navy. There was a period when the Heads of Corps, of the ships' officers (fleet officers so to speak) were systematically looked upon with suspicion and when the Command might be considered as de¬ prived of its essential prerogatives. This state of affairs, however, gradually improved, but not to such an extent as not to leave serious traces in the organization of the services at the Ministry and in those of the arsenals. At the Ministry, absolute authority was not given to the chief of the General Staff over the direc¬ tors of the service, resulting in serious difficul¬ ties! in the preparation and conduct of war. In the arsenals, autonomy in the management of the works caused continual obstacles to be placed in the executive authority of the mari¬ time prefects, misnamed Commander-in-chief. Moreover, erroneous doctrines penetrated into the governing spheres of the Navy and were embodied in the higfi technical school training. It was proclaimed that the only thing to be considered was the war of squadrons and

big battles fought on the high seas by large units, equipped with a unique weapon, powerful guns with a more and more extended range. The possibilities of a war of cruisers and all ques¬ tions of an economic order connected therewith, however important in such a vital matter, were disregarded. Coastal warfare did not exist for these new theories of naval warfare on a large scale, and finally, to the amazement of those who knew that France possessed the first submarines, as well as the first seaplanes, submarine and aerial warfare was almost en¬ tirely ignored. It was under these conditions — and other nations were in the same predica¬ ment — that France faced the formidable con¬ flict of 1914, the immediate, lessons of which were to relegate to their proper place so many erroneous ideas. Scarcely a year had elapsed before the large dreadnought fleets took refuge in their protected waters and the sea was pa¬ trolled by smaller ships, whilst in its depths submarines slyly navigated, laying mines and ready to discharge torpedoes, these submarines being eagerly sought for by seaplanes.

Composition of the French Fleet. — It is not the purpose of this article to give the present composition of the French fleet. We con¬ fine ourselves to stating what it was in July 1914, and what ships were under construction at that time.

- *No mention is made of the Russian fleet as this was weak¬ ened by being obliged to split itself up between three mari¬ time stations situated far from each other.*

t This point will be taken up again toward the end of the article.

(1) Ironclad Squadron. — 25, armored or launched and in course of construction (4 dreadnaughts) ; 3 dreadnaughts in the stocks and in an advanced stage of construction ; 4 in the primary stage of

construction. Characteristics of the latter: 25,250 tons; 21 knots; 12 guns of 34 centimeters, 24 of 14 centimeters, 4 of 47 millimeters and 6 torpedo tubes; armor belt plate of 320 millimeters; turbine engines; 1,000 to 2,700 tons of coal.

(2) Battle Cruisers or Rapid Dreadnoughts. — Nil.

(3) Armored Cruisers. — 22 (5 of which

are of a very old type and of small displace¬ ment, the others varying between 10,000 and 14,000 tons).

(4) Armored Coast Defense Cruisers .-*-3 (one of which is a <(gunboat® of 1,800 tons, the two others of 7,000 and 9,000 tons).

(5) Protected Cruisers or Light Cruisers. — 10, all old types.

(6) Destroyers or Torpedo Boats. — 90, types vary from 310 to 850 tons; characteristics of the latter: 31 knots, turbine engines, 2 guns of 100 millimeters, 4 of 65 millimeters, 4 tor¬ pedo tubes.

(7) Torpedo Boats. — About 150*, from 80 to 185 tons, 21 to 30 knots, usually 2 tubes and 2 or 3 light guns.

(8) Submersible Boats and Submarines. — 53 in service and 18 under construction (plus 6 under study), varying with a marked differ¬ ence of types from 155 to 215 tons to 833 to 1,100 (Dup>uy de Lome, Sani, Gustave Zide, etc.).

(9) Auxiliary Boats. — 1 transport for tor¬ pedoes and mines ; supplementary naval work¬ shops; 2 mine layers, 2 mine sweepers (4 under construction); 2 petroleum reservoir tenders; 8 transports ; 3 gunboats ; 3 river boats, etc.

(10) Steamships Liable to be Requisitioned and Armed. — About 40 (La France 23,700 tons; 24 knots; 7 or 8 guns of 14 centimeters).

Theoretically the warships of the fleet from the

ironclads to the submarines ought to have been distributed for eventual disposal both as to personnel and material over various <(posi- tions® fixed by the regulations ; complete arma¬ ment, armament for trials; reserve (1st and 2d category) ; disarmament. As a matter of fact, as regards the material there was a tendency for complete armament, the state of disarma¬ ment being nearly always assimilated to that of the ships to be condemned. Concerning the personnel, the Minister himself determines the composition of the men in each particular case and for each of the positions to be taken up by the ship.

Disposition of the Naval Forces. — A fleet

composed of two squadrons of ironclads of recent type, one division of armored cruisers and several flotillas of small ships — including a group of submersibles — was maintained, fully armed, in the Mediterranean. A squad¬ ron of old-type ironclads, of reduced effec¬ tives, and specially used as training ships, formed a solid reserve for this fleet. In the Atlantic and the Channel there only existed a strong division of armored cruisers, compara¬ tively ancient, supported by flotillas of de-

- *Most of them dismantled and proposed to be con¬ demned, as well as many other vessels which have, however, rendered great service in the war*

stroyers and submarines. In Morocco, a small division consisting of a cruiser and some small boats or transports patroled the coast. In the extreme Orient there was a naval division con¬ sisting of an armored cruiser, two or three light cruisers, some river gunboats, a few tor¬ pedo boats and some submarines of a small type. The field of action for this division was very extended, covering the whole of the Paci¬ fic and the Indian Ocean. Finally, in the dif¬ ferent colonies, the Antilles, Senegal, Madagas¬ car, Indo-China, Pacific Settlements, there were small ships fulfilling the*

role of police scouting.

Bases for Operations. — In European waters and northern Africa, the following six mari¬ time ports form the bases for operations : Cher¬ bourg, Brest, Lorient, Rochefort, Toulon and Bizerta (north of Tunis). However, the har¬ bor at Dunkirk, with that of Calais, would also be considered as secondary bases in the North Sea, and especially the first, being splendidly defended both by natural and artificial means (the shoals of Flanders). Bizerta was not quite completed, but was able to render good service which, in fact, it did. In the above mentioned six fortified maritime centres, the supreme command of the entire military organ¬ ization, under the orders of the Minister of War, was in the hands of the Vice-Admiral Maritime Prefect. This superior officer was of course also responsible for the fixed and mobile maritime organizations (mines, tor¬ pedoes, barrages, projectors, torpedo-boats, sub¬ marines, etc.). In short, he was, and still is, general director of the arsenal, central head¬ quarters of the maritime bases.

There were four naval bases abroad which were organized for the supplying and protec¬ tion of divisions of battleships: Fort de

France (Martinique); Dakar (Senegal); Diego-Suarez (Madagascar) ; Saigon (Cochin- China). In addition, Papeati (Tahiti), Haip¬ hong (Tonkin), Libreville (Gabon) and Saint Louis (Senegal) could if required be made use of.

Finally it should be noted that Algiers and Oran, dependencies of Bizerta, possessed, like Bizerta itself, mobile maritime defenses, con¬ sisting of small squadrons of torpedo boats. The same remark applies to Ajaccio in Corsica, a dependency of Toulon.

Organization of the Personnel. (a) Officers. — Before the war, there were 2,050 naval officers; 340 skilled mechanic officers; 160 naval engineer

officers (constructors) ; 250 naval commissioners ; 400 doctors and chemists ; 27 hydrographical engineers.! Each of these corps was normally recruited from the dif¬ ferent schools or by means of special organiza¬ tions. However, the marine officers' corps, re¬ cruited principally from among pupils who have been graduated at the Naval School of Brest, admitted, under certain conditions as regards capacity, pupils from the Polytechnic School, the first mates (masters) of the men composing the fleet, the long distance captains (merchant fleet) having previously passed the position of auxiliary ensign. The different ranks in this marine corps were midshipman

- A division of reserve cruisers was organized but was far removed from the complete armament.

t Besides this there existed 400 reserve officers.

(on training ships only), ensign first and second class (corresponding to lieutenant and second lieutenant in the army), lieutenant (captain in the army), frigate captain (lieutenant-colonel in the army), captain (colonel in the army), rear-admiral (brigadier-general in the army), vice-admiral (general of a division in the army).

During the present war a new rank has been created, that of corvette captain (major in the army), which comes between ensign and frigate captain. Furthermore, the age limit has been lowered for the higher ranks, with a view to rejuvenating the corps. General superior officers are henceforth pensioned off at the age of 62 for vice-admirals and at 60 for rear- admirals.

(6) Men. — The men serving in the navy are recruited from among the professional sailors and fishermen, all belonging to an old institution called the ^Inscription Maritime,® partly by means of voluntary

engagements, or in default of this, young men conscripted in the ordinary way for the army are drafted into the navy. The corps are composed of non-professional sailors having no special profession and those having some specialty, the latter being divided up into seven categories corresponding to the various and manifold services of a warship: gabion-sailors and helmsmen, gunners, riflemen, torpedo service, electricians, mechanics and stokers, carpenter-caulkers, quartermasters, store and supply keepers. The military guard and policing of the ship is undertaken by the marine riflemen. They form, moreover, the first ele¬ ment for the landing companies. At the com¬ mencement of the war they also furnished a naval brigade which so gloriously distinguished itself on the Yser. In the naval war ports there exists a special sedentary marine corps which is in exclusive charge of all matters of a nautical nature at the arsenal and its de¬ pendencies (towing, mooring of ships, guard and upkeep of dismantled ships), as well as fire service and the looking after of the fixed defenses.

Each of the corps specialties has its own professional school and its special conditions for promotion. The hierarchy for the different rank is, however, with a few exceptions the same as for all specialties ; the duly qualified sailor becomes a quartermaster (corporal in the army), second mate (sergeant), mate (sergeant major) and first mate (adjutant). Finally, there exists a special corps «crew officers® and (

Organization of the Ministry of Marine. — The Ministry of Marine is composed essen¬ tially of two principal organizations : High Gen¬ eral Staff and Central Administration. The High General Staff is in charge of everything regard¬ ing preparation for naval warfare, and in war¬ time has charge of the carrying out of active operations. This organization has also control over the Officers' Training Schools, at least from the point of view of teaching and methods of training. The Superior School of the Navy, an academy for high naval studies, is more

particularly under its direction. The Central Administration is more specially an organiza¬ tion for the study and execution of ministerial decisions concerning the personnel, material, arms, construction, supplies of all nature, gen¬ eral accountancy and the Budget. These vari¬ ous services are split up into two large depart¬ ments, in charge of vice-admirals, that of the armed fleet (personnel and supplies) and material (construction and arming) ; the ac¬ counts and the budget being handled more par¬ ticularly at the Minister's cabinet.

Councils, or large consultative commissions, sit also at the Ministry, as well as the general inspectors of each of the officers' corps. The particular functions of these organizations are to advise the Minister on all questions concern¬ ing the proper working of the departments and the strict maintenance of the military or pro¬ fessional aptitude of the officers and men. Finally, the Minister is assisted by a staff of administrative and financial comptrollers, work¬ ing exclusively under his orders, and responsi¬ ble for the supervision of the material interests of the department and for the strict application of the regulations laid down to guarantee such interests. When the Minister is a political man, a member of Parliament, new, at any rate at first, to naval matters, it is necessary that, in conformity with his general views, which are really those of the government itself, a naval official should manage effectively the services of the Central Administration and co-ordinate its efforts. The vice-admiral placed at the head of the High General Staff is evidently best suited to be placed in charge, being better ac¬ quainted than anyone with the requirements of the naval forces and the means by which this force can best fulfil its duties. But two con¬ ditions stand out if full benefit is to be derived from such organization. In the first place it is necessary that the general officer in question possess the personal confidence, one might even say friendship, of the chief of the depart¬ ment. In the second place this official must have full authority

over all the directors of the services of the Central Administration. How¬ ever strange it may appear, it is nevertheless a fact that the problem of which these two con¬ ditions form the essential factors has not yet been completely and definitely solved. More¬ over, the civil ministers rather resent being kept under what they consider as a sort of guardianship, even temporary. Again, the chiefs of services, especially those of a purely technical nature, have done everything possible to avoid a subordination which affects their personal dignity. This is one of the chief reasons for the comparatively slow progress made in the French Navy during the last 20 years. In addition to this, the credits granted up to about 1908-09 were inadequate, and mat¬ ters took a false route about the same period as a result of erroneous conceptions concern¬ ing naval warfare, as we have explained in the commencement of this section. It is never¬ theless true that, thanks to the high qualities of the personnel, the French Navy rendered to the Allied cause in the late war services, the full value of which are now better understood when, after hostilities, they can be freely and openly discussed.

Admiral Degouy,

27. FRENCH COLONIES. General His¬ tory. — Colonization is one of the most char¬ acteristic forms of human activity. It was only logical that France, one of the foremost coun¬ tries imbued with a sense of initiative and enterprise, many of its citizens having a love of adventure, and combining harmoniously in their desire to ^live® a prediliction for what is real with a love of the dreamy or ideal side of life, should become a great colonial nation. As a result, once navigators found themselves in possession of the necessary means, they started out to explore the world. In 1365, some Dieppe sailors settled on various parts of the

Senegal and Guinea coasts, and in 1404, Jean de Bethencourt, a Norman, settled in the Canary Islands. From 1535 to 1550, Jacques Cartier made a series of voyages and expedi¬ tions in Canada. He was succeeded by Cham¬ plain who took possession of Acadia. About the same time (1625) Saint Louis du Senegal was founded and the French settled at Saint Dominica in the Antilles (1632). The colonies of Cape Breton, Canada .and Acadia, attacked by the English under the lead of French Huguenots, were restored to France by the Treaty of Saint Germain. From 1664 to 1783 (Treaty of Versailles) the French were very active but had to contend with many vicissitudes and take part in numerous continental wars.

The English, from the moment of the de¬ struction of the Invincible Armada (1588).. awoke to a knowledge of their power. The India Company, of London and Plymouth, was founded, Barbados occupied, the enceinte of Madras traced, the Navigation Act passed (1651) and Jamaica conquered (1655). From this time onward, that is, from the middle of the 1 7th century, English and French coloniza¬ tion made rapid strides, and great rivalry ex¬ isted between the two countries which often resulted in war followed by the launching of great commercial enterprises. The history of this rivalry can be better understood by an examination of the different treaties arising out of the various conflicts and wars. The treaties of Nimegue and Ryswick were the out¬ come of the struggle of Holland and France. The latter had Pondicherry restored to her in 1687, where Caron and Martin had done much useful colonization work. In 1713, by the Treaty of Utrecht, France allowed England to destroy the Dunkirk fortifications, a sure sign of its diminished force, and ceded the Hudson Bay and Dependencies, Acadia, Saint Chris¬ topher and Newfoundland and adjacent islands, with the exception of Saint Pierre and Mique¬ lon. The Iroquois were recognized as English subjects. In 1748 by the Treaty of Aix-la- Chapelle, Cape Breton was restored to France in exchange for Madras. The

Treaty of Godeheu in 1754 was an evidence of the with¬ drawal of the India Company and its object was the restoration of the territory conquered by the French in Deccan. Meanwhile Mauritius was occupied and New Orleans founded as a result of the brilliant campaigns of Cavelier de la Salle in Louisiana. Dumas, la Bour- donnais and Dupleix, by armed force and clever diplomacy — which must always work to¬ gether — brought French influence and power to its zenith in the Indian Ocean (1752). Vain efforts. A weaker power vanquished by a

superior one. Quebec was lost. Clive and Coote took Pondicherry and Chandernagor. The Treaty of Paris (1763) severely condemned these set-backs. Canada was turned over to England by France, thus losing all the fruit of the heroism displayed by Montcalm and his lieutenants. Ohio, Louisiana to the east of the Mississippi, except New Orleans, was given to Spain in compensation for Florida and Senegal, except Goree, Saint Vincent, Dominica, Tobago, Granada and the Granadian isles.

On the other hand, France recovered her Indian establishments, but dismantled and with¬ out territory, Saint Pierre and Miquelon, Belle- Ile in compensation for Minorca, Guadeloupe, Martinique and Saint Lucie. The Treaty of Versailles (1783) restored Senegal to France. The English colonies now became emancipated. We have now reached the period of the Great Revolution, followed by the magnificent cam¬ paigns of the empire and the fall of Napoleon. For a while, France was all powerful and the emperor could be pardoned if he conceived a wonderful plan : that of taking India from the English and the conquest of Asia. But this dream met the fate of all similar schemes which, overriding the reasonable bounds of human desires, seek to dominate the world. It came to an end in the icy steppes of Russia. The Congress of Vienna in 1815 resulted in consecrating English power which was increased by the possession of Heligoland, Malta, the Ionian Isles, Cape Colony, taken from Holland, Mauritius, Saint Lucie and Tobago. The colonial situation of France in 1815 was the following: she had lost a large part of her

empire. Saint Dominica was torn from her in 1803. Louisiana was sold. She retained Martinique, Guadeloupe, Cayenne, Saint Pierre and Miquelon, a part of Senegal, the Reunion and a few markets in India, all that remained of the immense domain controlled by the India Company, which in Dupleix's time possessed 17 boats, 25 frigates and 750 vessels of various types. During the 19th century new efforts were made for the conquest of distant territory: Caille Sylvain, Roux and Gourbeyre explored Africa. Algeria was conquered under Louis Philippe, in despite of the colonial entente. The Marquesas, Tahiti, Wallis Islands and Gambier were occupied (,1841^-7). The second empire witnessed the development of French West Africa: war with the Moors, expansion in Guinea, on the Ivory Coast, in Dahomey and the Gaboon. Treaties were made in Madagas¬ car. Cochin-China was occupied, agreements were reached with Cambodja and Siam; Me¬ kong and the Tonkin were explored. Finally, New Caledonia was conquered and Tahiti organized.

After the tragic events of 1870-71, the Third Republic resumed the work of expansion, thus proving that France possessed remarkable vi¬ tality. Protectorate of Tunisia, progressive occupation of Senegal, of the Soudan, of the Niger and of che Guinea coast, of Kongo and Tchad, such were the new possessions to be added to France. The Somali coast became French at the very time when the Italian cam¬ paign failed at Adua. Madagascar was occu¬ pied in 1895. Indo-China was conquered from Chantaboun to Hainan. The appalling conflict of 1914 breaks out. The French Colonial

troops occupy the greater part of the Came- roons and the half of Togoland in co-opera¬ tion with their British allies.

This brief historical sketch shows the im¬ portance of the colonization work carried out by France since

the 16th century. Comment is almost superfluous. It would, however, be in¬ exact and imprudent to consider the successive conquests of ’France as a natural evolution of its expansion or as having been accomplished without trouble and difficulty. A famous French economist, Christian Schefer, in his re¬ markable work (La France moderne et le prob- leme colonial > endeavors to show, and not with¬ out success, ((how the recent ardour for distant campaigns was not the result of a mere whim nor merely of circumstances ; to show, in fact, how the enterprises successfully carried out in the Second Empire and Third Republic were in many cases only the realization of long and carefully studied schemes, how, in a word, de¬ spite the revolutions which break up our his¬ tory, racial traditions have been maintained, and it is owing to such traditions that opposing governments have collaborated in a fraternal spirit in a common task.®

In this conception there is an optimism which undoubtedly will tend to assure the main lines of a very remarkable doctrine, but an examination of the historical facts render some modifications necessary. The truth is that in France, the colonial effort has from all time encountered a few zealous disciples, but often too stubborn opponents. At the very time when a Henri IV, or a Richelieu, foresaw that the future of the country depended on the exploita¬ tion of distant possessions of countless wealth, at the moment when pioneers dreamed of a mythical and fabulous Eldorado — a false con¬ ception perhaps but an excellent incentive to activity nevertheless — Colbert elaborates a Colonial Pact and draws a conception of the economical relations of the colonies and the motherland which still greatly hinders the de¬ velopment of the French possessions. This conception was too narrow and lost sight of the great evolutions to be realized in the cen¬ turies to come. Following this we have the deplorable events of Louis XVth’s reign re¬ sulting in the great work accomplished . by Martin and Dupleix being thwarted and re¬ duced to nothing by a spiritual and

sceptical king, by incompetent officials and all kinds of underhand intrigues and dishonest practices which brought about the ruin of the India Com¬ pany at the very time when Montcalm, inad- quately protected against the prevaricator Bigot, and left to his fate in Canada, appeals vainly for support from his king and country. After the Seven Years' War we lost North America and Hindustan. We still possessed Louisiana but Napoleon I was shortly to sell it. After Voltaire's vaunting in his letter to Chardon re¬ garding the cession of Canada's "acres of snow,® Bernardin of Saint Pierre declared, «I shall be convinced that I have rendered service to my country if I prevent a single man from leaving the country and if I can persuade him to cultivate an acre of neglected land at home.® On 13 May 1791, Robespierre, finely emulating Rousseau, said ((Let the Colo¬ nies perish, if they mean the loss of your wel¬ fare, your glory, your liberty! Perish the

Colonies, if colonists are to make us, by threats, decree laws for their own especial benefit !®

On the other hand, Barrere, on 21 Sept. 1793, did not hesitate to write that ((without a fleet you can possess no colonies, and without colonies there can be no commercial pros¬ perity.® The Convention period, as regards colonial regime, made a highly important reso¬ lution by decreeing the complete assimilation of the colonies and the mother country. Article 6 of chapter I of the Decree of Year III states : ((The Colonies form an integral part of the Republic and are subject to the same constitutional laws. They are divided into Departments.® The Directoire government was hostile to over-sea expansion. Delacroix, Minister of Foreign Affairs, clearly stated: <(I would much prefer that France possessed four more villages on the frontiers of the Re¬ public than the richest of the Antille Islands and I should even be sorry to see Pondicherry or Chandernagor again belong to France.® However, it should be borne in mind that about the same time, Talleyrand read to the Institute on the 25th

Messidor, Year V, his paper concerning the advantages to be gained by the possession of new colonies in the pres¬ ent circumstances.

Bonaparte appeared, at first, to be the man who would favor colonization on a large scale. On this subject, Mr. Paul Gaffarel has writ¬ ten : <(The ephemeral conquest of Egypt and Syria, the taking of the Ionian Islands, the occupation of Louisiana, and the Saint Do¬ minica campaign, indicate that one of France's great ambitions was to increase and develop its maritime and colonial policy. However, during the last years of the Consulate and particularly when he became emperor, Napoleon had only disgust for the fleet; for him colonies were a negligible quantity and he lost several oppor¬ tunities of re-establishing our over-sea prestige.®*

The dogma founded on assimilation was brought to nought : article 91 of the Constitu¬ tion of Year VII decreed that "the colonial regime shall be determined by special laws.® Decrees of the 19 April and 16 June 1902 re¬ organized the old regime as regards Guade¬ loupe and it is expressly stated (

In 1822 and 1828 General Foy and General Sebastiani once more attacked the colonial situation. In 1829, Deputy Bessieres again states that "for what the colonies are worth and cost us, we should be much better off if we did not possess them. A colonial system, even if advantageous, is no longer practicable. I maintain that it has ceased to be necessary.® However, the Restoration government did not

- *Paul Gaffarel, 'La Politique Coloniale en France de 1789 a 1830.'*

abandon all its colonies : the famous (III and the Third Republic each time that, activated by a sort of instinctive fatalism, France proceeded to new

colonial con¬ quests, the same opposition was encountered, supported by the same weak arguments which had prevailed in Colbert's Colonial Pact. After more than 100 years had elapsed, the excessive conceptions of the Revolution were found again in the minds of certain militant socialists who persisted in seeing in the colonial policy merely an occasion for the exploitation of distant peoples, and refused to recognize the indis¬ pensable role which colonies play in the economical evolution of a great country like France. The few facts we have indicated — to which could be added many more of no less a significative character — sufficiently prove that France's colonial policy has always encountered difficulties and that, at all times in its history, it has had to overcome the strongest hostility. But the war which is scourging Europe and which has caused so many bereavements and so much ruin will at least result in making all Frenchmen perceive the necessity for closely following all colonial matters and reaping that harvest from their over-sea possessions which they should legitimately expect. As a matter of fact, while not pretending to be versed in witchcraft, it would truly seem that France, much more so than ferocious Germany, had received a high mission from Civilization to fulfil, which it had always carried out to its honor despite every difficulty encountered. Fortunately men of energy have always been found in France at the critical moment ready to defend and maintain those principles which a weak-kneed government failed, or seemed disinclined, to uphold. Looked at from this point of view, French colonization appears as

a kind of mission above the level of French people's desires, and beyond the hesitating will of its leaders; it is undoubtedly an admirable mission which, even during its most sombre history, has always found a champion to fight for its cause, either among the professional politicians or from among the people in distant lands, ever ready to set the example, to <(mili- tate® and to sacrifice himself. In the 18th century, it was Montcalm who wished to keep Canada, despite Louis XV. In the 19th

century it was, as regards Africa, the Bingers and the Marchands, the Gentils and the de Brazzas who, supported in the mother country by noble- minded and intelligent men, enriched France by assuring it vast territories and large spheres of influence. As compensation for the action of governments who have not always drawn up with sufficient care the principles of a colonial policy based on practical observation and solid doctrines, we find disinterested and noble indi¬ viduals whose one desire is to make France richer and greater, and to renovate it continu¬ ally by fresh additions of lands and peoples. The events of the World War, the precious and generous aid given by the colonies to the mother country prove in a striking manner the debt which every Frenchman owes his colonies. This individual character of colonial work does, moreover, great honor to the French race. Certain people discussing the episodes of the battle of the Marne and the heroic resistance at Verdun have dared to speak of a miracle. It is sheer blasphemy to pretend that the re¬ sults obtained are to be attributed to some vague occult, and more or less divine protec¬ tion. The truth is that throughout their his¬ tory the French of to-day, as in the past, owe their success to their magnificent and sublime individual qualities which makes up for absence of direction just as it does for lack of preparation and the incoherence of methods.

TABLE OF THE GENERAL SITUATION OF THE FRENCH COLONIES.

Trade Statistics for Year 1913

(Last normal year)

Colonies

Area in square miles

Population

Importations

Exportations

Total

Francs*

Francs*

Francs*

A. North Africa

I. Algeria .

343,500

5,492,569

729,111,000

562,917,000

1,292,028,000

II. Tunisia .

50,193

1,850,000

144,254,678

178,663,360

322,918,038

III. Morocco .

231,660

4,550,000

149,774,979

30,865,639

180,640,618

B. African Colonies

I. French West Africa .

1,544,400

9,811,849

151,574,300

126,143,852

277,718,152

II. French Equatorial Africa. . . .

849,420

6,137,000

21,181,768

36,865,938

57,846,805

III. Madagascar .

225,868

2,701,081

46,747,456

56,054,377

102,801,833

IV. Reunion .

965

177,677

24,934,943

16,592,290

41,527,237

V. French Somaliland .

46,332

208,061

33,916,843

47,704,148

81,620,991

C. Asiatic Colonies

I. French Indian Establishments

198

277,723

10,837,115

43,720,095

54,557,210

II. French Indo-China .

310,059

16,315,063

306,238,068

345,259,253

651,697,321

D. American Colonies

I. Saint Pierre and Miquelon. . .

92

6,483

4,356,745

6,201,998

10,558,543

II. Guadeloupe .

686

190,275

20,174,930

18,287,489

38,462,419

III. Martinique .

IV. French Guiana .

382

182,024

22,144,315

28.896,814

51,041,129

30,980

39,117

12,494,765

12,222,537

24,717,302

E. Oceanic Colonies

I. New Caledonia .

7,201

55,886

17,707,916

15,838,405

33,546,321

II. French Oceanic Estabmts _

1,182

30,563

9,030,474

11,554,507

20,584,981

1,704,530,495

1,360,916,248

3,243,067,096

- Franc — $0.19 United States currency.

In an excellent work entitled (Un demi- siecle de civilization frangaise 1870—1915, } Mr. Raphael Georges Levy rightly states that 'Trance has founded a colonial empire which is second only to that of Great Britain. Over the entire length of its African and Asiatic possessions, Justice reigns: France has civilized in the noblest sense of the word.®

M. Marcel Dubois, a Sorbonne professor, in his book (Systemes coloniaux et peuples colonisateurs,* protests with vehemence against the common belief that the French do not possess a genius for colonizing and that France has no need of colonies. ((These opinions,® he says, (

Colonial Editor of the (Mercure de France P

28. FRANCE AND THE WAR. Several prominent historians who have written on the origins of the European War are virtually unanimous in attributing a considerable share of the responsibility for that conflict to ' the result of the Franco-German War of 1870-71. One of the keenest American exponents of European politics, Mr. W. Morton Fullerton, declared that ((Bismarck, who presided at Ver¬ sailles over the conferences that resulted in the dismemberment of France, failed to perceive the logical consequences of his own vast designs, a Franco-Russian alliance and a Triple Entente resolutely directed toward giving a more reason¬ able modern form to the perspicacious provi¬ sions embodied by Napoleon in the Treaty of Tilsit.® On that occasion (1807) Napoleon had said to the king of Prussia, (

Europe has suffered ever since. To it must be attributed all the subsequent bitterness between the combatant nations and the fact that for half a century not merely Germany and France but all Europe has been converted into an armed camp.® Holt and Chilton (American military historians) declare that on Bismarck's part <(every effort was made to soothe Austria: every effort was made to irritate France. The success was complete, for within a few years Austria was joined in close alliance to her former enemy [of 1866], and in France there was apparent that growing hatred which at last culminated in the horror of 1914.® By the

Peace of Westphalia in 1648 a powerful France wrested Alsace from a sundered and weakened German Empire, to which it had belonged for 600 years ; yet even when two and a quarter centuries had passed the sore was not healed. The war of 1870 gave to Germany, now re¬ united, the chance for which she had so long waited of reincorporating the severed territory, and she took it. From that time France had lived in the shadow of defeat, exhausting her strength in armaments, immobilizing her youth in barrack life and plunged in a sad patriotism which almost lacked confidence in itself. France might

never have forgiven defeat, but she would not have fought simply to restore her lost pres¬ tige, still less for the return of the indemnity. It was the loss of Alsace-Lorraine that incited the passion for revenge, that made possible the alliance with Russia ardently desired by Thiers and later French statesmen, foreseen and dreaded by Bismarck long before he ceased to be Chancellor, and consummated soon after his retirement, thus placing France for the first time in a position so strong that she was able, as Gambetta said, to think but never speak of the great act of restitution, but to regard it as a serious promise of the future. In a letter addressed to Prof. Hans Delbriick on the role of Bismarck, Emile Ollivier, the French states¬ man, prophetically declared that Apolitical facts are not to be judged by their immediate con¬ sequences. There are distant consequences which convert into calamities what had seemed to be good fortune, and which turn into bitter¬ ness victories that had been received with re¬ joicing. ... A state of reciprocal distrust be¬ tween France and Germany is a permanent cause of tumult in Europe® (Figaro , 14 May 1908). Gambetta showed himself a seer when he wrote (1871) in his Bordeaux Declaration, ((Peace at the price of cession of territory will be only a ruinous truce, and not a definitive peace.® Napoleon III was no less prophetic. In a private letter written after the peace treaty, he said that ^instead of re-establishing peace, it [the treaty] sow for the future hatred and distrust.® These gloomy prognostications were confirmed during 40 years of growing arma¬ ments and their ultimate employment in 1914. Writing to the Empress Eugenie in October 1870, King William of Prussia, grandfather of the ex-kaiser, explained that he was obliged <(to insist upon a cession of territories that has no other object than to throw back to the start¬ ing-point the French armies which in the future will come to attack us.®

Within less than two and a half years after the close of the Franco-German War, France had paid the final instalment of the imposed war indemnity

(September 1873), and the last German troops were withdrawn from her soil. In 1875 France, whose rapid recovery from the effects of the war had .excited general admi¬ ration and surprise, began to exhibit especial activity in the reorganization of her army. This energy on her part had not escaped the notice of the military party in Germany, who were dread¬ ing the day when France would be strong enough to think of revenge. That party de¬ cided on Von Moltke's phrase that ((from every point of view, military, political, philosophical and even Christian, an immediate war with France was a necessity.® The Republic was becoming too strong; therefore a fresh invasion

was to be carried out ; Paris was to be reoccu¬ pied ; for 20 years Germany was to be paid a tribute of $100,000,000 per annum, the security for which was to be taken in the permanent occupation of French cities by German garri¬ sons; the French army was to be compulsorily limited. Rumors of such a scheme had reached various European foreign offices, but in the absence of direct evidence no one was willing to incur the odium of interfering or even of mentioning the subject. Europe lived in the dread of a crisis. Such was the strained con¬ dition of affairs when the Due Decazes, the French Foreign Minister, determined on a novel mode of clearing the air and averting the danger which he believed to exist. He sent for Blowitz (q.v.), the famous Paris correspondent of the London Times, explained the situation and told him frankly that there was only one way of preventing a catastrophe, and that was by having the whole situation exposed in The Times. On being asked for proof, the duke handed the correspondent a confidential de¬ spatch just received from the French Ambas¬ sador in Berlin, giving a detailed account of the designs of Moltke and the military party. Blowitz, promising not to reveal the source of his information during the duke's lifetime, wrote a remarkable article which

appeared in The Times of 6 May 1875, headed (

As president at the Berlin Congress (q.v.) in 1878 Bismarck stood out against Russia and conciliated Austria — which country he had crushed and humiliated only 12 years before at Sadowa — by handing her Bosnia-Herzegovina. Russia's Balkan policy, at that time her main preoccupation, brought her into friction with Austria. Vienna and Saint Petersburg drifted apart and Bismarck felt that he must choose between them. From the treaty of 7 Oct. 1879 the German and Austro-Hungarian empires became allies — a combination aimed directly at Russia and obliquely at France. With the

accession of Italy in 1882, Bismarck had com¬ pleted the Triple Alliance — an effective military barrier between France and Russia, extending from the Baltic and the North Sea to the Mediterranean — and established the German hegemony of Europe. Germany stood but¬ tressed against France by the Italian alliance and against Russia by that with Austria. In addition Bismarck effected a Reinsurance policy® in the shape of a secret understanding with Russia providing for a benevolent neutrality if either should be attacked by a third power. France was left isolated and impotent, as Bis¬ marck intended ; he accepted the fact that, so long as Alsace-Lorraine remained an open wound, France could never be reconciled. By keeping her isolated she would be powerless for offense. The only powers she could con¬ ceivably look to for support were Great Britain and Russia. But Bismarck made it the cardinal point of his policy not to quarrel with either of these two. Thus he persistently set his face against extravagant schemes of naval or colo¬ nial expansion, which might jeopardize Anglo- German relations, while his Reinsurance policy® with Russia kept that country, at least passively, on his side. Furthermore, the long-standing differences between France and Great Britain, especially after the latter's occupation of Egypt, seemed likely to keep those two apart, while the still more remote contingency of any close co¬ operation between Russia and Great Britain seemed to be entirely

excluded owing to the Asiatic rivalries between those two powers. Already in 1881 Gambetta had said, <(Leaning on Russia and England, we shall be unattack- able.® The first step was taken by France in 1888 in issuing a Russian loan of $100,000,000 in Paris ; several other loans followed, and France became Russia's creditor. Economic interests broadened into friendship, and on 22 Aug. 1891 a diplomatic agreement was signed between France and Russia which culminated in a defensive alliance in 1892.

Kaiser William II came to the throne in 1888. His early repudiation of Bismarck's reinsurance treaty with Russia only served to tighten the bonds between that country and France. When Great Britain nearly fell out with France in 1893 over Siam, the kaiser proffered German aid to England, which was declined by Lord Rosebery. With the acces¬ sion of the new tsar, Nicholas II, in 1894, the pacific character of the Franco-Russian Alliance was so emphasized that its political raison d'etre, from the point of view of European balance of power, was stultified. The tsar fell under the influence of the kaiser and a new movement began in Europe. Vast schemes were broached in favor of an ac¬ tive entente composed of France, Germany and Russia, having for object the isolation of England. After the Chino- Japanese War (1894— 95) the strange alliance compelled Japan to re¬ linquish the fruits of her victory, an act which Japan avenged at Mukden and Kiao-Chau re¬ spectively 10 and 20 years later. Italy, insti¬ gated to enter upon colonial enterprises wher¬ ever she might risk colliding with England or with France, met disaster in Abyssinia (1896). France, encouraged to continue her African adventure, was being gradually driven along the fatal path leading to a war with England.

She awoke in 1898 to the dramatic moment of Fashoda, when Kitchener and Marchand stood suddenly face to face in the desert.

By the close of the 19th century the inter¬ national situation presented a curious tangle. German diplomacy, while maintaining intact the alliance with Austria and Italy, had almost paralyzed the Dual Alliance, infuriated Italy against France, and had nearly brought about an Anglo-French war. French hopes had been dashed to the ground by the tsar's Peace Mani¬ festo of 1898 and the abortive Hague Confer¬ ence. France had suffered much foreign criti¬ cism over the Dreyfus case, which created a great domestic uproar in 1899. The Spanish- American War had produced the Manila Bay episode and the proposed scheme for European intervention. Great Britain had the South African War on her hands; a fierce storm of Anglophobia raged in France and Germany.

The first decade of the 20th century wit¬ nessed a remarkable regrouping of the powers. The Anglo-Japanese alliance came in 1902. The rapprochement between England and France in 1904, followed by the Anglo-Russian Agree¬ ment of 1907, is related under Triple En¬ tente (q.v.).

It appeared as if the new entente had a prosperous voyage before it, but the inter¬ national sky was quickly overcast by the first of the diplomatic crises which shook Europe to its foundations during the decade preceding the outbreak of the great war. (See Morocco). It was the first of Germany's attempts to de¬ tach France from Russia and England. The temporary military eclipse of Russia after the war with Japan is commonly given as the reason why German diplomacy seized the oppor¬ tunity of striking a blow at the Entente. .(See War, European: Historical Introduction).

The events immediately preceding the out¬ break of hostilities in 1914 are described under War, European: Diplomatic History (q.v.). On Friday, 31 July 1914, Germany suddenly despatched an ultimatum to Russia demanding cessation of mobilization within 12 hours. A declaration of war from Berlin followed next day. On 2 August German troops violated French territory at Ciry and near Longwy, and the following

day the German Ambassador in Paris made allegations of hostile acts by the French military authorities on German and Belgian soil — charges which have since been disproved from German sources. M. Viviani, the French premier, at once described them as <(a pure invention.® Though French mo¬ bilization had been ordered on the 1st, the troops left a zone of 10 kilometers between them and the frontier, as proving a desire to abstain from any provocative act. Germany declared war on France on the 3d.

There, was at the time a widespread opinion in Europe — and especially in Great Britain — that France should have abandoned Russia as Italy had abandoned her partners in the Triple Alliance. A fundamental difference, however, lay between the two cases. Whereas the pub¬ lished diplomatic correspondence- shows that Italy was throughout never consulted by her then allies, Russia, on the other hand, con¬ sulted France from the earliest stages of the crisis and satisfied her that she (Russia) had done what could reasonably be expected to avert war. Italy, having co-operated with

France and Great Britain for a pacific solution, considered herself released from all obligations toward her partners, to whom she was bound only in the case of an unprovoked attack upon them. In short, the casus foederis arose for France in regard to Russia out of precisely the same reasons which made the casus foederis inoperative for Italy in regard to Germany and Austria-Hungary.

In a proclamation dated 1 Aug. 1914 order¬ ing the mobilization of the French army and navy, the President and Cabinet thus expressed the situation: <(The States of Europe have been considerably disturbed for some days, and, despite the efforts of diplomacy, the horizon has grown darker. Most of the nations have at the present hour mobilized their forces. Even those countries protected by neutrality conventions have regarded it as their duty to take similar precautionary measures.

<(The powers whose constitutional or mili¬ tary

legislation differs from ours have begun and are carrying on preparations which are in reality equivalent to mobilization, without any decree to that effect having been issued, yet clearly in anticipation of that step.

(

<(But our legislation does not permit the completion of these preparations without a de¬ cree of mobilization. Conscious of its high responsibility, and feeling that it would fail in its sacred duty if it did not take this measure, the government has signed the decree.

<(Mobilization is not war. In the present circumstances, to the contrary, it would appear to be the best means of assuring peace with honor.

<(Strong in its ardent desire of reaching a peaceful solution of this crisis, the government under cover of these essential precautions will continue its diplomatic efforts, and still hopes to succeed. It counts upon the calmness of the people not to yield themselves .to unjustified emotion. It relies upon the patriotism of every Frenchman, and it knows that there is not a single one who is not prepared to do his duty at this hour.

(

On 4 August Premier Viviani presented the case for France in an address to the Senate and House of Deputies. He announced that the German Ambassador had left Paris and that France was obliged to defend her frontier against an attack of premeditated suddenness. «This attack, entirely inexcusable and begun before any declaration of war notified us of it, is the last act in a plan whose origin and aim I intend to lay bare before our republic and before civilized public opinion.® The Premier reviewed the crisis from the Serajevo assassina¬ tions to the Austrian ultimatum, declaring that the advice transmitted to Serbia by France, Russia and Great Britain had not been with-

out effect, as Serbia had submitted to the severe terms ((almost without a reservation of any sort.® During the three preceding weeks the Austro-Hungarian government had repeat¬ edly given assurances to the Triple Entente that its demands upon Serbia would be <(extremely moderate.® The actual terms, when presented, had astonished the cabinets of Paris, Saint Petersburg and London. <(This astonishment was rendered greater by the fact that, on Tues¬ day, the 21st [July; two days before the ulti¬ matum had been launched], the German Am¬ bassador had visited the French Minister of Foreign Affairs for the purpose of reading to him a note to the effect that the Austro-Serbian dispute should be localized and not made the subject of intervention by the great powers . . . Nevertheless, passing over the abnormal character of the German action, we, in con¬ junction with our allies and friends, imme¬ diately instituted measures of conciliation and invited Germany to take part in them.

((From the very first we were chagrined to find that our efforts found no echo at Berlin. Not only did Germany seem unwilling to give Austria-Hungary the amicable advice which her situation authorized her to give, but, from that very time and even more in the ensuing days, she seemed to place herself between the Vienna cabinet and the propositions of a com¬ promise emanating from the other powers.® After dealing with the Austrian declaration of war and the futile efforts of the Entente for a pacific solution, M. Viviani continued that (

((Since then, acts of aggression have been repeated, multiplied and accentuated. Our fron¬ tier has been crossed at more than 15 places.

. . . The German Ambassador did not deny them, nor even express regret. On the con¬ trary, he came to me yesterday evening to ask for his passport and notify us of the existence of a state of war,

alleging without justification hostile acts committed by French aviators on German territory in the Eiffel region.® After reading the Ambassador's note, M. Viviani de¬ clared: ((Never at any time has any French aviator gone into Belgium; no French aviator has committed an act of hostility either in Bavaria or any other part of Germany. Euro¬ pean public opinion has already done justice to these miserable inventions.®

The Premier concluded his speech by giving (

times the desire of renewing the blows which they had dealt us. In 1875 the war for finishing vanquished France was prevented only by the intervention of the two powers destined to be united to us later by the ties of alliance and friendship — by the intervention of Russia and Great Britain.

<(Since then the French Republic, by the restoration of its strength and the making of diplomatic agreements, invariably observed, has succeeded in freeing itself from the yoke which Bismarck had been able to impose upon Europe even in days of peace. . . . Germany can re¬ proach us with nothing. We have made an unprecedented sacrifice to peace by bearing in silence for half a century the wound inflicted by Germany. . . . Nobody can believe in good faith that we [and our allies] are the aggress¬ ors ; in vain the sacred principles of law and liberty, which rule nations as well as individ¬ uals, are assailed. . . .

((What is being attacked, I repeat, is that independence, dignity and security which the Triple Entente has restored to the balance of power in the service of peace. What is being attacked are the liberties of Europe, whose de¬ fenders France, her Allies, and her friends are proud to be. We shall defend these liberties, for it is they which are in peril ; all else is merely a pretext. France, unjustly provoked, did not desire war. She has done everything to prevent it ... an armed nation fighting for its own life and for the independence of Europe. ... We are without reproach. We shall be

without fear. . . .®

President Poincare gave the following ad¬ dress to the French Parliament on 4 Aug. 1914: (

Within three days there were eight belliger¬ ent nations in the field, Austria-Hungary, Bel¬ gium, France, Germany, Great Britain, Monte¬ negro, Russia and Serbia.

On 1 March 1918 M. Stephen Pichon (q.v.) revealed a document dated 31 July 1914 and signed by Dr. Von Bethmann-Hollweg, then Imperial German Chancellor, containing instruc¬ tions telegraphed to the German Ambassador in Paris, ending with these words: (

Bibliography. — Adkins, F. J., historical Backgrounds of the Great War5 (1915) ; Albin, P., (Le Coup d'Agadir) and (Kiel et Tangier) (Paris) ; Barclay, Sir T., 'Thirty Years of Anglo-French Reminiscences> (Boston 1914) ; Bourdon, G., 'The German Enigma5 (trans. from the French by B. Marshall: Paris and

k°n(i?n l^4) ; Bracq J C., France under the Republic > (New York 1910); Cestre, C,

i?KniOK)EtIrani! ,and Eur°Pean Democracy, [215-191 5 > (English trans. by L. M. Turner

New York 1918) ; 'Diplomatic Correspondence respecting the War> (French 'Yellow Book > published by the French government, Paris /r Do.cumentary History of the War>

(London Times, 1917) ; Durkheim and Denis, (^U1 a voulu la Guerre?) (Paris 1915); Gooch and Masterman, 'A Century of British Foreign Policy) (London 1917) ; Mevil, A., 'De la Paix de brancfort a la Conference d'Algesiras> (Paris); Morris, C., 'One Hundred Years of Conflict between the Nations of Europe) (New York 1914) ; 'Current History) (New

York limes, Vols. I and XVIII); Pilant, P., 'Le Peril Allemand : Pourquoi l'Allemagne a voulu la Guerre) (Paris 1914) ; Rose, J. H., 'Origins of the War) (1914) ; Saintyves, P., 'Les Re- sponsibilites de l'Allemagne dans la Guerre) (Paris 1914-15) ; Tardieu, A., 'France and the Alliances) (New York 1908).

Henri F. Klein, Editorial Staff of The Americana.

29. FRANCE, DIPLOMATIC RELA¬ TIONS OF THE UNITED STATES WITH. Before 1763, France had plans of oc¬ cupation which "held North America by its two ends® and threatened to restrict the English colonists in America who actively participated in the struggle^ for the Ohio Valley and for Canada.^ In 1763, when France relinquished the Ohio Northwest and Canada to England and Louisiana to Spain, French leaders fore¬ saw the revolt of the English colonies and rec¬ ognized French interest to promote their in¬ dependence.

American success in the Revolution was largely due to French aid. The result was largely influenced by the sympathy of the French people expressed both in outward acts of indi¬ viduals and of the French government to which the Continental Congress first directed its diplo¬ matic efforts to obtain recognition in the fam¬ ily of nations. In the first year of the war, French secret aid was sent to keep the strug¬ gle alive; and, after American success at Sara¬ toga, negotiations with France through Frank¬ lin resulted (6 Feb. 1778) in a treaty of amity and commerce and a treaty of alliance. By the latter the United States, in order to secure French aid, guaranteed the pos¬ sessions of France in America and agreed to receive her prizes in American ports. These treaties, due largely to the French desire to avenge her late humiliations by Eng¬ land, were of momentous consequence in deter¬ mining American independence. Later, in April 1781, when Washington, viewing the critical state of affairs, urged that France must act quickly for American deliverance, the formi¬ dable squadron (28 ships) of Admiral de Grasse set sail from the West Indies for Hampton

Roads, promptly brought invincible deliverance from the tenacious Cornwallis, and placed the United States under a debt of gratitude which, never forgotten, was partially repaid over a century and a third later by large American armies dispatched to France to push back the

long premediated German invasion of French territory. In the peace negotiations of 1782, however, France was inclined to favor the Spanish proposal to limit the United States on the west to the Appalachians.

In July 1784, Franklin negotiated with France a consular convention which proved unaccept¬ able because it did not follow instructions based on the plan adopted by Congress in January 1782. On 14 Nov. 1788 Jefferson signed a new consular convention which, adhering to the plan of Congress and receiving the unanimous consent of the Senate, was made effective by act of Congress on 14 April 1792.

Meantime the French government unsuccess¬ fully attempted by decrees to prevent the tend¬ ency of American commerce to revert to its old channels — a tendency which had produced dis¬ satisfaction in France. Late in 1790 it also com¬ plained that certain acts of the American Con¬ gress in regard to duties were an infraction of the treaty of 1778, and soon proceeded to adopt measures of retaliation. In 1792, following in¬ structions of Secretary Jefferson who desired to secure a new commercial convention, Gou- verneur Morris, appointed Minister to France, began negotiations which were quickly and radically changed by new revolutionary pro¬ ceedings.

The American people hailed with enthusiasm the outbreak of the French Revolution but by 1793 there was a strong reaction led by the more conservative element and influenced by the increasing violence of the Revolu¬ tion and the Genet incident, and marked by the President's firm stand on neutrality. At the opening of the war between France and England in 1793, Franco- American re¬ lations became involved

by embarrassing controversies and discussions concerning the construction and enforcement of the old treaties. For her aid in the American Revolu¬ tion, France made demands on the United States which threatened to embroil the new re¬ public in a ruinous war with Europe. Under the treaty of 1778, she claimed the right to take prizes into American ports and under the con¬ sular convention of 1788 claimed a jurisdiction for her consuls which was very embarrassing to a neutral. The American government denied these claims, asserting that, by the circumstances of the war, it was released from its treaty obli¬ gations.

In the interest of national salvation, Wash¬ ington in a proclamation of 22 April 1793 de¬ clared a policy of neutrality for which the American government struggled for 20 years to secure proper respect. Genet, who arrived at Charleston in June 1793 to use American terri¬ tory as a base of operations to recover Louisi¬ ana territory which France had ceded to Spain in 1762, impertinently claimed privileges even beyond those granted by treaty. In defiance of Washington's proclamation of neutrality, he pro¬ ceeded to fit out French privateers in American ports with a demand that they should be per¬ mitted to return with captures free of duty and to sell them. The American government ob¬ jected, demanded the return of British prizes seized in American waters and maintained that American courts instead of French consular

courts should determine whether captures had been made in American waters. In August 1793, it requested the recall of the offensive Genet. Meantime, in May 1793, the French National Convention threatened American commerce by directing the capture of vessels carrying pro¬ visions and merchandise belonging to the enemy or bound for the enemy's port. Later it placed an embargo on American vessels at Bordeaux and captured American ships and

goods. At the same time, in opposition to rules asserted by England, it opened to neutral vessels a lucra¬ tive trade with the French West Indies which had been closed to foreign vessels before the beginning of the war with England.

Meantime, Gouverneur Morris had been un¬ acceptable to the Revolutionary party, and on request of the French executive council was re¬ called in May 1794 by President Washington. His successor, James Monroe, was promptly ap¬ pointed to protest against illegal seizures and violations of treaties by France, to remove French suspicions concerning the Jay mission and seek French aid in obtaining from Spain the free navigation of the Mississippi. To him, al¬ though he was cordially received, the French Directory complained that the American gov¬ ernment was violating both the treaty of 1778, and the consular convention of 1788 and was discriminating against France by a clause of the Jay treaty relating to contraband. After his re¬ call, and the recall of Adet from Philadelphia (leaving no French Minister in the United States until 1800), the Directory refused to rec¬ ognize or receive an American Minister until the American government should make repara¬ tion for its acts and proceeded to issue new de¬ crees (of 4 Jan. 1795, 2 July 1796 and 2 March 1797 and 18 Jan. 1798) prefigur¬ ing the later Berlin and Milan decrees and aiming at the destruction of Ameri¬ can commerce. C. C. Pinckney, who had been appointed to succeed Monroe, was compelled to retire to Amsterdam and in the fall of 1797 re¬ turned to Paris with John Marshall and El- bridge Gerry, whom President Adams had ap¬ pointed to join him in the French mission. These commissioners were unable to open direct negotiations with Talleyrand, who resorted to preliminary clandestine communication through secret agents demanding a national loan and in¬ dividual bribes. Later (18 March 1798) Talley¬ rand was disposed to treat with Gerry alone who, although he remained after the departure of his colleagues, declined to accept the invita¬ tion to enter into formal negotiations.

The return of Marshall and Gerry with the news of their treatment caused Congress to sus¬ pend commercial intercourse with France and her dependencies, to make preparations for war (28 May and 22 June) and to declare (7 July) the abrogation of treaties with France, result¬ ing in actual hostilities at sea in several in¬ stances, but George Logan of Philadelphia who, with no passport except letters of introduction from Jefferson and Governor McKean, under¬ took a self-constituted mission to Paris and re¬ turned with verbal assurances that France was ready to treat on a proper basis.

Later assurances made to William Vans Murray, American Minister at The Hague, that France desired to treat through a suitable envoy, resulted in the appointment by President Adams (without consultation of his Cabinet) of a new

temporary commission — - Murray, Judge Oliver Ellsworth (of Connecticut) and Gov. W. R. Davie (of North Carolina), with instructions to assume that previous treaties of France had been revoked by Congress, to demand spoliation indemnity for damages inflicted on American commerce before 7 July 1798 (the date of the abrogation of the treaties by Congress), and to make a treaty (for not more than 12 years) free from the previous provisions as to guar¬ anty, alliance and consular judicial jurisdiction, and establishing a claims commission. Then followed a series of tedious negotiations with the First Consul, who insisted that previous treaties were still in force and offered the alter¬ native of acknowledgment of abrogation of treaties and no indemnity or continuance of treaties with claim for indemnity. The American commission finally abandoned instructions by sacrificing the French spoliation claims but se¬ cured a temporary convention (of 30 Sept. 1800) which (after amendment by the Senate and Napoleon) released the United States from the treaty obligations of 1778 and France from re¬ sponsibility for all damages.

This peaceful adjustment of serious difficul¬ ties

delivered the United States from the perils of war, and three years later made possible the peaceful acquisition of Louisiana from France by the negotiations of Livingston and Monroe — an achievement which constituting a new his¬ torical tie of friendship between the two nations concerned, opened the road for westward ex¬ pansion and prevented a long struggle of the United States for supremacy in the Southwest against a strong rival nationality which threat¬ ened to erect a barrier to American destiny.

The Louisiana treaty was followed by diplo¬ matic correspondence relating to the disputed boundaries of the territory acquired and later by efforts to get the co-operation of France in the negotiations with Spain. — until the later de¬ crees of Napoleon and reprisals on neutral com¬ merce, opposed by the vigorous but unsuccess¬ ful protests of General Armstrong, the Amer¬ ican Minister at Paris, gave a new turn to dip¬ lomatic relations.

Against the Berlin and Milan decrees of Na¬ poleon which subjected to seizure every Amer¬ ican vessel bound for ports of Great Britain or her colonies, American diplomatic representa¬ tions were unavailing; and the sacrificial em¬ bargo was doomed to disappointment. Protests against the later Rambouillet decree of March 1809 were equally unsuccessful. Finally, after the passage of the American Non-Intercourse Act, Napoleon, in order to increase American activity against England, promised that his de¬ crees would cease and induced the American government to issue a proclamation (of 2 Nov. 1810) to restore intercourse with France, but he continued to seize American vessels under vari¬ ous pretexts.

For a quarter century after Napoleon's over¬ throw and the restoration of the Bourbons, Franco-American relations were comparatively unimportant. The chief questions arising for discussion were commerce, spoliation claims, the American acquisition of Florida from Spain, the French measures against liberal government in Spain,

followed by the declaration of the Monroe Doctrine and policy relating to the des¬ tiny of Cuba.

The American government endeavored to

secure from France a commercial convention which, on the basis of the Anglo-American commercial treaty of 1815, wTould place Ameri¬ can vessels on an equality with the French in carrying American products to France, but the French government which, by an extra duty on cotton imported in American ships, had greatly increased the tonnage of French vessels engaged in the trans- Atlantic trade, was not anxious to surrender these benefits. Finally, after Congress passed a law imposing a tonnage tax upon French vessels, thereby depriving them of their immense advantages and profit, France speedily agreed to a convention provid¬ ing for the equal interchange of products in the. ships of both countries — an arrangement which immediately increased the American ton¬ nage employed in the French trade. An ob¬ stacle to the adjustment of difficulties arose from the interpretation of the eighth article of the Louisiana treaty which provided that after the expiration of 12 years the ships of France were to be treated upon the same foot¬ ing of those of the ((most favored nation.® After long argument the matter was adjusted by a treaty of 24 June 1822.

Apparently in 1823 the French government hoped to expand in the West Indies and re¬ garded the American recognition of the inde¬ pendence of Latin-American states as an attempt to arrest French development. The United States was especially anxious in regard to the destiny of Cuba and in regard to European designs in connection therewith. After France, in 1825, refused to accept the British proposal to bind herself not to seek the acquisition of Cuba, the American government informed the French government that it would not permit France the

occupation of either Cuba or Porto Rico either with or without the consent of Spain.

The most important diplomatic question re¬ maining for adjustment with France was the tiresome wrangle concerning the French Spolia¬ tion claims. These claims for injury to Ameri¬ can commerce after 1803, especially by the Berlin decrees and subsequent decrees of Napo¬ leon, which had been awaiting the establish¬ ment of a more stable government in France, began to be pressed by Secretary Adams in 1819. At the same time France claimed dam¬ ages for alleged violation of the ((favored na¬ tion® clause of the treaty of 1803. On these subjects Adams and DeNeuville could reach no agreement. Although in 1822 they negotiated a convention of navigation and commerce greatly reducing discriminating duties, yet the spoliation claims and the <(favored nation® clause both remained unsettled until by the Rives-Sebastiani treaty of 4 July 1831, France agreed to pay 25,000,000 francs ($5,000,000) for American claims and abandoned French claims under the old favored- nation clause, and the United States agreed to pay 1,500,000 francs ($300,000) in satisfaction of certain French claims. The delays of the French Chamber of Deputies, and the refusal in April 1834 to appropriate the money neces¬ sary to pay the claims, resulted in 1836 in the recall of Mr. Livingston from Paris, followed by the recall of Pageot from Washington. Al¬ though diplomatic relations were suspended for over a year, the French government, partly through the mediation of Great Britain, soon

took steps toward their restoration by providing for the payment of its obligations.

A few years later, new treaties were sub¬ jects of correspondence. In 1841, Lewis Cass, the American Minister at Paris, protested against the Quintuple treaty (to which the United States refused to become a party) on the ground that its object was to show the Ameri¬ can government in a bad light. A treaty of extradition was signed 9 Nov. 1843. A consular convention concluded 10 years later (23 Feb. 1853)

contained a provision (protecting con¬ suls against compulsory appearance as witnesses before the courts), the violation of which in 1854 at San Francisco was the occasion of a serious complication which, however, was happily adjusted.

Meantime relations in Central America, in the Pacific and in the West Indies became sub¬ jects of discussion. It appears that France was expected to join in the guaranty established by the treaty of 1846 for the transit route across the Isthmus of Panama and by the Clayton- Bulwer Treaty of 1850 for the canal across Cen¬ tral America. In 1851, on invitation of the Dominican Republic, the American government sent a special agent to co-operate with repre¬ sentatives of France and England in a remon¬ strance to stop the Haytian war against San Domingo and with a view to possible joint inter¬ vention if needed, but in 1852 it declined to accede to the proposed tripartite arrangement for guaranty of Cuba to Spain. The Hawaiian Islands, valuable because of their harbor facili¬ ties in connection with the development of trade interests in the Pacific, were a source of con¬ tention between France and the United States for nearly two decades. In 1843, following the French seizure of the Marquesis Islands, and the demands of France on the Hawaiian authori¬ ties, the American government made a declara¬ tion against any attempt by any power to take possession of the Hawaiian Islands either by conquest or by colonization. This declaration doubtless influenced both France and England to recognize Hawaiian independence in 1845 and to agree never to take possession even un¬ der a protectorate. In 1849-50, following a punitive blockade of the Hawaiian harbor by a French frigate, the American government re¬ newed its declaration in stronger terms and contemplated joint action with England to pre¬ vent French occupation. France, checked in her plans, finally withdrew her extravagant demands and disclaimed any intention of improper inter¬ ference, but continued jealously watchful of increasing American influence which in 1854 finally found expression in a draft treaty of

annexation — a treaty whose execution was pre¬ vented partly as a result of French protests.

After 1852 the United States was apprehen¬ sive of French policy under Napoleon III. American diplomatic correspondence from the accession of Napoleon III to the throne of France until the opening of the Civil War shows increasing apprehension of French diplomacy in Spanish-America, and especially in Mexico which, beginning with French designs in the mining region of Sonora in 1852, seemed to contemplate a European protectorate. It also shows apprehension of concerted action of France and England in a policy relating to Cuba and in the political adjustment of the Americas.

Franco-American relations during the Ameri-

can Civil War, often severely strained, were largely determined by Napoleon's policy in Mexico. They were particularly affected by the determined and persistent watchfulness and firm determination of the American govern¬ ment to prevent the European recognition of the Confederate insurgents, or European inter¬ vention in American domestic concerns through the concerted action of European powers under the influence of Napoleon, and by the continued expression of admonishing opposition to Napo¬ leon's Mexican expedition which (in spite of his friendly assurances) was regarded as a deliberate attempt to establish a Latin- American barrier in order to restrict the dominating in¬ fluence of the United States on the continent. After the establishment of the Franco-Maxi- milian empire which was regarded as a blow at the Monroe Doctrine and whose immediate bearing upon the future politics of the Ameri¬ can continent became a subject of much specu¬ lation and concern, relations were affected by the American apprehension of possible plans for a Franco-Confederate alliance as a counter¬ poise to the strength of the United States, and as a

strategic step in the extension of French dominion southward from Mexico to the gate of the isthmus. After the failure of the Con¬ federate attempt to destroy the integrity of the Union, American diplomacy successfully cen¬ tred its efforts on urging the withdrawal of French troops by which Maximilian had been sustained.

During the Franco-Prussian War of 1870 American diplomatic relations at Paris assumed a position of unusual prominence. The Ameri¬ can Minister while maintaining friendly rela¬ tions with the French rendered important serv¬ ices to foreign residents of Paris and to the Prussian government.

Among the subjects affecting diplomatic re¬ lations after 1870, the most important, aside from questions incident to immigration, naturali¬ zation and citizenship, were the formation (in 1881) of the French company for the construc¬ tion of the canal across the Isthmus of Panama (over which the United States had guaranteed neutrality of transit by treaty with New Gren¬ ada in 1846), and French restrictions on the importation of American pork products after 1880 on alleged sanitary grounds.

In 1884-85 when the French canal company began work on the canal the American govern¬ ment insisted that the United States would exer¬ cise her right to take all needful precautions against the possibility of offensive use of the isthmian transit against American interests on land or sea. In 1884, acting on a report that Hayti contemplated a cession of naval bases to France, the American government promptly in¬ structed its Minister at Paris to state that such acquisition would conflict with the Monroe Doc¬ trine. In 1888, while discrediting the rumor of French plans to declare a protectorate over Hayti or to annex it, Secretary Bayard, in view of the possibility that the French government might be asked to complete the Panama Canal, instructed the American Minister again to take opportunity by explicit language to express the consistent American policy, to leave the smaller independent republics of Latin-America free to develop their own

resources, free from foreign dictation or interference.

The French act of exclusion of American

pork, resulting in threats to prohibit the impor¬ tation of French wines, was a theme of continu¬ ous diplomatic correspondence until its repeal was secured in 1891. The situation was com¬ plicated by the McKinley administrative bill which by a tariff on French wine attempted to accomplish indirectly what the French prohibi¬ tion of American pork accomplished directly. Finally, after Congress enacted legislation pro¬ viding for thorough inspection of all meats in¬ tended for exportation, a repeal of the French restriction was obtained through Whitelaw Reid, the American Minister to France.

In the decade after 1882, French colonial expansion in Africa was a subject of American diplomatic correspondence. In 1884, the Ameri¬ can government, through Secretary Frelinghuy- sen, warned France again aggressions on Liberia. Again in 1892-93 it interposed its remonstrances against the danger of French spoliation of the weak republic.

Meantime a claims convention with France, concluded in 1880, was supplemented by conven¬ tions of 1882 and 1883. By the convention of 1880 a board or mixed commission was created to adjust the claims resulting from the Ameri¬ can Civil War, the Mexican troubles of 1863-67 and the Franco-German War. It sat at Wash¬ ington 1880-84 and completed its work in 1884, awarding $612,000 to France. A reciprocity arrangement of 28 May 1898 was followed by the negotiation of a reciprocity convention (of 24 July 1899) which, however, was not ratified. The arrangement of 1898 was amended and supplemented on 20 Aug. 1902.

Although French sympathy for Spain early in the Spanish-American War was noticeable, the French government was irreproachable in its conduct and the French Minister at Wash¬ ington tactfully performed

the delicate task of opening negotiations for peace. Subsequent signs of illwill caused by the American policy in the Far East — especially by the American opposition to the designs of Russia which had been an ally of France — were soon succeeded by a better understanding shown in the French appreciation of President Roosevelt's initiative in the peace negotiations following the Russo- Japanese War, and the friendly attitude of the Washington government during the Morocco dispute. With the elimination of the last real danger from conflicting interests by the Ameri¬ can purchase of the property of the bankrupt French Panama Canal Company, Franco-Ameri- can relations were placed on a more satisfactory basis than they had been for a century. The Monroe Doctrine, which has sometimes been opposed by French writers through misappre¬ hension that its extension will result in American aggression against the French West India Is¬ lands, recently has been regarded more as a safeguard against the transfer of her West India colonial territory to any other European power seeking colonies at French expense.

An arbitrary convention, suggested by The Hague Convention of 1899, was concluded in 1907. A more comprehensive arbitration treaty was signed on 2 Aug. 1911, but was emasculated by the Senate March 1912 and finally aban¬ doned. A general treaty of arbitration to facilitate the settlement of disputes and to further the advancement of the cause of gen¬ eral peace was negotiated in September 1914 and proclaimed in January 1915.

In the World War, begun by the invasion of France by Germany, the American government at first maintained a strict neutrality, but, finally, instigated by brutal German attacks upon Amer¬ ican rights on the sea, decided to co-operate with France and England in a determined effort t? arrest the German menace to the peace and civilization of the world. Although the United States has not been directly affected by

French political institutions, and until recently has not been bound to France by close ties in foreign affairs, Americans have been greatly influenced by French thought and cannot remain indiffer¬ ent to what happens to France.

Bibliography.— Bancroft, F.,

J. M. Callahan,

Professor of History and Political Science, West

V i rginia U niversi ty.

FRANCE, The Bank of. Before the Bank of France was established all attempts which had been made to create a fiduciary circulation had ended in ruinous failures. The last and most disastrous experience had been the creation of assignats in 1789 by the Assemblee Constituante. The assignats were government currency notes issued on the security of the Biens Nationaux (estates of the clergy), pending the sale of the latter. The assignats were to be canceled when returning to the coffers of the treasury; in fact they were left in circulation, multiplied without any control, until one day their value was measured only by their weight of paper. When that financial catastrophe occurred the disasters that attended Law's plans (under the reign of Louis XV in 1716), were still alive in the minds of the people. It is, therefore, easy to understand that the very name of bank¬ ing was discredited when, in 1800, Bonaparte, being at that time First Consul, decided to es¬ tablish a great issuing bank to serve the inter¬ ests of the state and of trade as well. A com¬ pany was created under the name of Banque de France just as an ordinary joint-stock company with an original capital of 30,000,000 francs. The capital was increased to 45,000,000 francs in 1803, when the bank first began to enjoy the exclusive privilege of issuing national bank notes; then to 91,000,000 francs in 1848 and finally to 182,500,000 francs in 1857. The capital has not been increased since that time. The shares are of a nominal value of 1,000 francs and they were quoted

on the Paris Bourse at over 5,000 francs (in January 1917).

Although all the shares are nominative (the French capitalists having a marked preference

for bear shares and bonds), and in spite ol the fact that their price increases in a constant and steady manner, the shareholders have never ceased to grow in number. For the same amount of shares there were in 1860, 13,767 holders; in 1880, 27,136 holders; in 1909, 31,249 holders; in 1915, 33,453 holders.

In order to understand how popular are these shares with the general public it must be kept in mind that one-third of the holders do not possess more than one share each and that 50 per cent have no more than two shares each. The Bank of France was given a charter at first for only 15 years. Before that period expired, the privilege was renewed for another period of 25 years and has always been renewed be¬ fore expiration. The last renewal of the charter was granted by the state in 1897 ; it is to expire on 31 Dec. 1920, but it will of course be prolonged for another period.

Internal Organization. — At the beginning the bank was governed by 200 of the largest shareholders (each of them having only one vote), who elected the Conseil General, that is to say, the board of directors entrusted with the management. This Conseil General con¬ sisted of 18 members, 15 of them being regents (directors) and the three other Censeurs (su¬ pervisors). A committee of three regents was then selected by the Conseil General to act as managing directors. In 1806 Napoleon (he had then become emperor), decided that the real management of the bank should be invested in a nominee of the government. He accord¬ ingly selected the three members form¬ ing the Committee of Managing Directors, that is to say, the governor and the two deputy- governors. That organization has lasted till to-day. The governor and the two deputy-governors are always appointed by the govern¬ ment. The latter is also a national bank, inas¬ much as it

has no branch whatever in foreign countries, not even in the French colonies which have their own and independent banks of issue. At the beginning it was to be only a Parisian- bank, but the area of its operations was by de¬ grees extended to the whole of France where there are now 143 succursales (branches) in the principal towns. Besides, 75 sub-offices (bureaux auxiliaires) have been established in minor centres, whilst in 365 other localities (villes rattachees) , selected among the most im¬ portant, all drafts and bills, payable in these localities, are collected by the bank at par. (Altogether 583 banking places).

The Bank of France is not only a national institution by the exclusive location in France of its chief offices and branches, but it will not discount any bills unless the latter are created in France or, at least, endorsed by two French signatures ; all collateral loans must be guaran¬ teed by French securities which are themselves guaranteed by the state ; its bank notes are circulated only within French territory (not in the French colonies). Finally all the members who make up the general assembly of the shareholders as well as the governor, the two sub-governors and all the employees, who number more than 7,000, must be of French nationality. If, for in¬ stance, a French young lady in the service of the bank marries a foreigner, whatever may be his nationality, she acquires the nationality of her husband and therefore cannot continue

in the service of the bank. For all its national characteristics the Bank of France is a private joint-stock company and not an establishment of the state; that is the reason why it had been able during the Franco-German War of 1870— 71 to keep entirely safe its real property, its metallic reserve and all its securities as being strictly private. (tAccording to its statutory articles,®

writes Frederick William in one doc¬ ument, (

Regulation of Note Issue. — It is an inter¬ esting point to know how the state has regu¬ lated the issue of banknotes. First of all it must be said that there is no necessary relation between the amount of metallic reserve and the circulation of banknotes. The emission of the latter is regulated by what has been termed the ((banking principle.® The bank can issue its notes freely and create, for its own use, a new capital ; but the latter can be used only for two banking operations, viz., dis¬ counting commercial bills and advancing money upon approved securities, whence the term of <(banking principle.® Of course, there is a limit fixed by the state to the issuing of notes; but whenever it becomes necessary, that is to say, whenever the discounts and loans are in increased demand, owing to expansion in trade, the state modifies the maximum of emission and allows a new margin. The value of the banknotes is therefore always fully represented first by commercial bills discounted, of very short maturity (at most 91 days), second, by loans upon approved securities, with a consider¬ able margin, and last, not least, by its metallic reserve of gold and silver.

Although the bank is not required to keep a minimum gold reserve, its policy has always been to accumulate as much yellow metal as possible. It is true that the bank has also the right to pay its notes in silver coin; for practi¬ cal purposes, however, gold is the only metallic reserve that really counts and the bank has never made any great effort to increase its silver reserve. In 1916 the bank held 5,076,600,000 francs in gold and 299,100,000 francs in silver in reserve, and had in circulation notes to the value of 16,500,700,000 francs.

Relations with the State. — The state is en¬ titled to a portion of the net profits of the bank over and above stamp duties and ordinary taxes which the Bank of France is bound to pay just as any other joint-stock institution of the same kind. First of all

there is a special stamp duty on all bank notes ; in the year 1908 the amount of money paid to the state on that account was no less than 1,400,000 francs for an average circulation of 4,800,000,000 francs. In 1897 when the privilege was renewed the state stipulated from the bank that it should pay to the treasury an annual royalty consist¬ ing of the eighth part of the average rate of

discount multiplied by the amount of the Cir¬ culation productive,® that is to say, by the amount of collateral loans and discounted bills. The taxes which the bank has to pay, on all accounts, in exchange for its privilege, reach about the fourth part of its net profits. Besides, the bank must grant to the state a permanent ad¬ vance of 200,000,000 francs without charging any interest. The bank is moreover the cashier and treasurer of the state, it keeps an account with all sub-treasuries which deposit their funds and withdraw them without being charged any commission. Whenever there is a national loan, the bank receives all applications without charg¬ ing any commission to the Minister of Finances ; it pays all dividends on government bonds, dis¬ tributes funds to all public offices, etc., always at its own expense. In exceptional circum¬ stances, however, the bank may be allowed to lend nearly any amount of money to the state ; during the Franco-German War of 1870-71, the loans granted to the French government reached 1,600,000,000 francs which were paid off within eight years. Up to the present time during the Great War. the Bank of France has lent more than 10,000,000,000 francs to the government. In 1915 the bank paid to the state on account of royalty, taxes, etc., 23,009,649 francs.

Banking Operations. — The most important transaction of the Central Establishment con¬ sists in the discount of commercial bills. The latter must be payable within 91 days, none of longer maturity being, eligible for discount ; they must bear three approved signatures. Since the last renewal of the privilege (1897), the very smallest denominations down to five francs are accepted for discount by the

bank ; this makes the establishment as popular as possible and the accounts of all sorts which in 1897 numbered only 27,304 amounted in 1908 to 91,- 458 and in 1914 to 147,800. In the latter year 21,953,000 bills, amounting to 18,802,000,000 francs, were discounted.

The rate of discount is of course a matter of very great importance for the commercial community. In France, money is never very dear and there is much more stability in the rates of discount at the Bank of France than at either the Bank of England or the Imperial Bank of Germany. Between 1898 and 1913, for instance, the official rate of discount was changed 62 times in Germany and 79 times in England whilst it was changed only 14 times at the Bank of France.

Even during the Great War the Bank of France did not raise the rate of discount to the excessive level which was reached by some of the foreign issuing banks. Only for about 20 days in August 1914 the rate was as high as 6 per cent and has been now for over two years and a half reduced to 5 per cent, whilst the Bank of England had (for a very short period) to charge 10 per cent. Next to dis¬ counts the most important banking transac¬ tions of the Central Establishment consist in collateral loans. All the money which is ad¬ vanced to its customers must be guaranteed by French Rentes and other national and colonial bonds which enjoy the guarantee of the govern¬ ment.

The rate of interest upon such loans is al¬ ways 1 per cent or one-half per cent higher than the rate of discount. The reason is that dis¬ counts are always necessarily useful to trade

and industrial or agricultural activity, whilst this is not always necessarily the case with loans upon securities. The following table shows the average amounts of the bank collateral loans from 1897 to 1915:

COLLATERAL LOANS OF THE BANK OF FRANCE.

(Yearly averages in millions of francs).

YEARS

Amounts

YEARS

Amounts

1897 .

358.0

1907 .

547.6

1898 .

361.6

1908 .

503.6

1899 .

403.8

1909 .

487.2

1900 .

451.2

1910 .

505.8

1901 .

472.0

1911 .

590.6

1902 .

415.3

1912 .

645.5

1903 .

428.6

1913 .

693.0

1904 .

477.9

1914 .

697.4

1905 .

459.8

1915 .

562.0

1906 .

473.7

The bank receives deposits of money which may be withdrawn by cheques or transfers, but no interest

whatever is paid on these moneys. The deposits, however, are always very import¬ ant for two reasons. The first is an absolute confidence of the depositors, the second is that the bank is the clearing-house of France. All the persons who have a deposit or current ac¬ count at the bank can transfer credits or liqui¬ date their balances by virements, that is to say, by an order of transfer of credit from ac¬ count given to the bank and at the same time by giving notice to the payee that his own ac¬ count has been credited. Such transfers are made free of charge from any banking place to any other (there are 583 banking places). It is a method of settlement which is very much of the same character as that of a central clearing-house.

Finally the bank undertakes many opera¬ tions of minor importance from which no great profit is derived, and for the main reason that they are of great convenience for its customers; the bank, for instance, takes orders for sales or purchases of securities on the stock exchange, that is to say, it transmits such orders to the Agents de Change (stockbrokers) who have

DIVIDENDS OF THE BANK OF FRANCE.

(Period from 1898 to 1915).

YEARS

Profits alloted to shareholders

Divi¬

dend

per

share

Average price of the shares

Propor tions of dividends to average price of the year

1898 .

Francs

20,075,000

Francs

110

Francs

3,685

Per cent

2.98

1899 .

23,725,000

130

4,070

3. 19

1900 .

26,462,500

145

4,035

3.59

1901 .

21,900,000

120

3,770

3.18

1902 .

21 ,900,000

120

3,797

3.16

1903 .

23,725,000

130

3,812

3.41

1904 .

23,725,000

130

3,830

3.39

1905 .

23,725,000

130

3,805

3.41

1906 .

27,375,000

150

3,939

3.81

1907 .

31,937,500

175

4,067

4.30

1908 .

29,200,000

160

4,185

3.82

1909 .

25,550,000

140

4,270

3.28

1910 .

25,550,000

140

4,277

3.27

1911 .

25,550,000

140

4,088

3.42

1912 .

29,200,000

160

4,380

3.65

1913 .

36,500,000

200

4,650

4.30

1914 .

34,675,000

190

4,275

4.44

1915 .

36,500,000

200

4,582

4 36

Totals. . . .

487,275,000

2,670

73,517

Averages. .

27,070,800

148

4,084

3.62

a monopoly as regards all transactions at the Bourse.

It keeps securities on deposit, and lets safes in its vaults, not only in Paris, but in 156 branches (sue cur sales) and sub-offices (bureaux auxiliaires) as well. The preceding table shows the dividends of the Bank of France from 1898 to 1915.

The Bank of France During the Great War. — In November 1911 the bank agreed to lend to the government in case of mobilization 2,900,000,000 francs. This amount was raised to 6,000,000,000 francs in September 1914, to 9,000,000,000 in May 1915 and to 12,000,000,000 in 1917. Such advances are granted to the state at a rate of interest of 1A. of 1 per cent. The limit of 9,000,000,000 would have been exceeded in 1916 if the government had not repaid part of its debt to the bank (about 4,000,000,000 francs), out of the proceeds of the two first national loans. Besides these advances granted direct to the French government, the bank, with¬ out being obliged to do so, had lent up to Feb¬ ruary 1917, over 2,000,000,000 francs in discount¬ ing French treasury bills the proceeds of which have been lent mainly to the Russian govern¬ ment. When the French National Loans were issued the bank received the applications of sub¬ scribers throughout France without charging any commission to the government : For the first War Loan the bank received, from 300,798 subscribers, nearly 3,000,000,000 francs. For the second War Loan the

bank received from 828,- 652 subscribers nearly 4,000,000,000 francs. Be¬ sides these long-term loans, the bank sells daily over its counters French treasury bills in de¬ nominations which may suit any investor since the lowest of them is 100 francs. Whenever such bills come to maturity within three months, they may be discounted at the bank; and when they have more than three months to run be¬ fore maturity, they are accepted by the bank to the extent of 80 per cent as collateral for loans. In 1915 the sales of these Bons du Tresor through the Bank of France and its branches reached the amount of 1,902,000,000 francs; in 1916 3,575,000,000 francs. From the beginning of the war to the end of December 1916, 1,057,- 483,000 francs in gold were sent abroad by the bank in order to maintain the foreign exchanges. Nearly the whole of that huge quantity of gold (about 900,000,000 francs) was sent to the Bank of England as a consequence of agreements signed by the British and French governments. In exchange of gold, France obtained in London a certain amount of credit which exceeded of course the amount of the shipments of gold. In spite of these exports of the precious metal the reserve at the Central Bank has always been verv large. A great quantity of the gold in circulation (2,000,000,000 francs up to February 1917) was in fact brought by the French people to the central reserve where it was exchanged for notes always at par, the notes of the Bank of France having never lost any portion of their full face value. In 1915, a credit of $20,- 000,000 was obtained, under the auspices of the Bank of France, from a group of banks and trust companies of New York (headed by Messrs. Brown Brothers) ; these credits were renewed in 1916; arrangements were also made with the National City Bank of New York for the establishment of dollar credits in that city where French payments have always been exten-

sive during the war. From 27 July to 1 Aug. 1914, the discounts of the Bank of France were raised from 1,500,000,000 francs to 3,041,000,000; two months later the discounts reached nearly 4,500,000,000 francs. The private banks had to unload their own discounts to the Central Bank, just as we understand here that the mem¬ ber banks of any Federal reserve bank in the United States would rediscount their commercial paper at their own reserve bank, if they wanted to liquidate their assets in case of a run of their depositors. In fact that possibility of re¬ discount, thanks to the elasticity of the issuing system of banknotes for commercial purposes, saved France from a financial catastrophe. Not one private bank failed in spite of the rapidity with which the war was declared. These dis¬ counts at the bank had been reduced gradually and steadily, week after week, to 1,838,000,000 francs at the end of 1915, and to 1,341,000,000 at the end of 1916 in spite of the moratorium. It is an unmistakable sign of the vitality of France, of its economic and staying power and of the soundness of its finances.

The Bank of France is a living organism, very much respectful of the traditions of the past, but always alive to the economic changes of the present and the possibilities of the future. The great European War is bound to create new developments and great changes ; conse¬ quently dangers, such as an inflation of notes. But the bank, since its foundation, has weathered many storms, witnessed many changes, political, social, economical, a great national reverse in 1871 ; now it may be compared to an old lady who has got much experience and deserved the confidence of the world for more than 100 years, and there is no Frenchman doubting that she will weather the greatest storm which might well have swept away not only a very respect¬ able institution but civilization as well.

Marc de Valette,

Attache aux Etudes Economiques de la Banque de France.

FRANCE, Institute of. See Institute of

France.

FRANCE, Isle of. See Mauritius.

FRANCE, Reformed Church of. See

Huguenots.

FRANCESCA, Piero della, also called

Piero Borghese, Italian painter and writer : b. at Borgo-San-Sepolcro, about 1401 ; d. between 1494 and 1509. He came of a family of some note, and was given a good education, for his time. He studied mathematics and painting, and was the first to make use of geometry in his art, thus winning the right to be called ((the father of perspective in painting.® He also studied the cause and effects of light and suc¬ ceeded in producing excellent light effects. It is said that, becoming blind at the age of 60, he continued his interest in his work by gather¬ ing about him the young and ambitious painters to whom he gave lectures on their art and whom he invited to consult him with regard to their difficulties and problems. As a painter he belonged to the Florentine school. He had much of the vivacity of his mother who was French and who seems to have inspired him with French ideals. At any rate it was out of regard for her that he called himself <(Fran- cesca® (son of France), instead of Borghese,

which was properly his family name. There does not seem to be any certainty as to who were his teachers ; but the probabilities are that he was largely self-taught. He studied the ac¬ tions of the human body, the workings of the muscles and the effects of different kinds, grades and colors of cloth subject to different light effects ; and he made little figures which he dressed with care for those and other ar¬ tistic experiments. He thus set an example of care in his work, of the use of models and of careful study in the production of artistic ef¬ fects that bore good fruit in the followers of his

school, in his pupils and in his brilliant suc¬ cessors. Early in his career Francesca painted small-sized pictures for Guido Antonio Monte- Feltro, Count of Urbino, who seems to have extended him his protection. In the public gallery of Florence are pictures by Francesca of members of this family, Federico de Monte- Feltro and his wife, Bantista Esforcia. He also painted frescoes in the Vatican at Rome, and in churches in Milan, Ancona, Borgo-San- Sepolcro, Pesaro and Arezzo. The church of San Francisco in Rimini had a series of fres¬ coes painted by Francesca in 1451, in which he depicted Sigismondo Malatesta, Lord of Rimini, kneeling before the saint of his own name. His most distinctive work was the (Story of the Cross, } a series of remarkable frescoes in the church of San Francisco at Arezzo. Among his other paintings are a (Ma- donna} (Brera) ; (Flagellation of ChrisU (Urbino Cathedral) ; (Saint Louis of Toulouse) (town hall, Borgo-San-Sepolcro) ; (Resurrec- tion) (town hall, Borgo-San-Sepolcro) ; (Her- cules' (Gardner Collection, Boston) ; (Magda- lena) (Arezzo Cathedral) ; (Baptism of Christ (National Gallery, London) ; (Annunciation* (Perugia Gallery) ; (Nativity* (National Gal¬ lery, London) ; (Triumph of Chivalry* (New York Historical Society) ; (Saint Thomas Aqui¬ nas* (Poldo Pezzoli Collection, Milan). All these pictures show the hand of the careful, conscientious artist. They mark a great ad¬ vance in Italian painting. Their drawing is superior to that of most of Francesca's con¬ temporaries and predecessors ; their manage¬ ment of light and color is an advance on any¬ thing heretofore accomplished in Spain; and so thoroughly realistic are the scenes that they easily claim for their author the honor of being the greatest realist in painting of his century. As a writer on scientific subjects Francesca is also worthy of remembrances for his origi¬ nal investigations in perspective and geometry, respectively treated in the following works : (Prospettiva pingendP and (De quinque Cor- poribus.* Consult Calcagni, (Memorie isto- riche di RecanatiP; Mariolli. (Lettre Perugine*; Ricci, (Memorie storiche dell' arte e degli artisti della*

Marca d’Ancona) ; Walters, (Life of Francesca) (London).

FRANCESCA DA RIMINI, fran-ches'ka da re' me-ne'. This tragedy in five acts, in blank verse, or rather vers lihres, by Gabriele d’Annun- zio, was acted for the first time at the Costanzi Theatre, Rome, bv Eleonora Duse (to whom the play is dedicated) and her company, 9 Dec. 1901, making one of those memorable first nights in theatrical annals, suggestive of (Hernani* and H’Aiglon.* The play lasted five hours, portions of it being performed amid

much confusion and noise. The tragedy has since been materially shortened, and has been played successfully in Italy, England and America. The subject is that first treated sympathetically by Dante in the fifth canto of the (Inferno 5 and one which became a favorite theme of poets. Upon this frame¬ work d’Annunzio has woven the first of his plays to attract popular favor. It is, however, more than a love tragedy ; it is a study of one of the most sanguinary epochs in Italian his¬ tory, the 13th century. He himself defines it as a poem of ((blood and lust,® and in this it differs markedly from Dante’s poem, made all of pity, tenderness and love. D’Annunzio’s tragedy has more dramatic action than is found in his previous plays and is not lacking in energy, bringing vividly to mind the his¬ torical and literary pictures the student of that barbarous age is used to look upon. Yet while the action does move onward, nevertheless the deviations from the straight course are so numerous, and in many cases so long and winding as to make the work rather a series of highly polished lyric poems abounding in beau¬ tiful description, in which realms the author is invariably at his best, than a dramatic pro¬ duction in the ordinary sense. It is a ffd’Annunzio55 drama. Among the 20 or more dramatis persona, not including archers, men- at-arms and the

like personnel, four focus and hold the attention throughout the play, Fran¬ cesca, Paolo, Gianciotto and Malatestino, Gianciotto's brother. The women who make up Francesca's attendants are suggestive, es¬ pecially by their singing of the Greek chorus, contributing to the understanding of the period and to the events which occur in the play, as do also the slave, the merchant, the doctor, the court jester, the astrologer and other super¬ numeraries, all of these accessories differentiat¬ ing notably this version of the play from the literary treatment of the subject by other au¬ thors. Despite the fact that the blackest crimes known to humanity constitute the material of the play, there are throughout the tragedy pas¬ sages in a lighter vein admirable in their way, girlish jesting and chattering, scenes of bright foolery between the jester, the voluble mer¬ chant, the astrologer and the damsels, reveal¬ ing the hand of a poet remarkably gifted. D'Annunzio's vocabulary is extraordinary, for he has drawn freely on the most fitting words of old and modern Italian, and in a man¬ ner likely to enrich permanently the Italian language. Arthur Symons has translated (Francesca da Rimini5 (New York 1902), re¬ producing both the spirit of the play and the form of the verse with unusual accuracy. The wonderful power and charm of d'Annunzio, however, defies translation, for they lie largely in his use of words, bringing out the pos¬ sibilities of the Italian language as never before by any modern writer. Consult Gargiulo, Al¬ fredo, (G. d'Annunzio5 (pp. 298-316, Naples 1912) ; Zaldumbide, G., (La evolucion de G. d'Annunzio5 (pp. 241-268, Paris 1909) ; Huneker, James, (Iconoclasts 5 (pp. 333-338, New York 1905).

FRANCESCO DI PAULA, or SAINT FRANCIS OF PAOLA, Italian monk: b. Paula or Paola, Calabria, 1416; d. Plessis-les- Tours, 2 April 1507. At the age of 13 he was

the inmate of a Franciscan convent; and at 19 retired to a cave where he inflicted on him¬ self every species of self-mortification. The fame of his piety having attracted to his cell several emulators

of his austere life, he ob¬ tained permission to erect a convent, and the new community received from Pope Sixtus IV the title of the Hermits of Saint Francis of Assisi ; but the title was changed by Alexander VI to Minim-Hermits of Saint Francis of Paola. The founder established numerous com¬ munities in Italy, Sicily, France, Spain and Germany, but the Minims were never settled in Great Britain or Ireland. To the usual con¬ ventual vows, Francesco added one of the most rigorous abstinence — flesh, eggs, cheese and milk being strictly forbidden the entire year, except in illness. In Spain they were called the Brothers of Victory, in commemoration of the deliverance of Malaga from the Moors. Twelve years after his death he was canonized by Leo X, and the Roman Catholic Church celebrates his festival on 2 April.

FRANCHE-COMT£, fransh-kom'ti, a province of Old France, now formed into the departments of Doubs, Haute-Saone, Jura and part of Ain. It was the homeland of the ancient Sequani. It had a chequered history throughout the entire period of the Middle Ages, passing from one robber-baron to an¬ other, until it passed to Louis XIV by the Treaty of Nimeguen in 1678. Cuvier and Victor Hugo are among its famous sons. Besanqon, the ancient Vesontio, was the capi¬ tal of the province. See France — History.

FRANCHETTI, fran-chet'te, Baron Al¬ berto, Italian composer: b. Turin, 1860. He was a pupil in Coccon and Magi, studied at Dresden and Munich, and in 1888 produced his most successful opera (Asraele.5

FRANCHEVILLE, fransh've', or FRAN- QUEVILLE, Pierre, .French sculptor: b. Cam- brai, 1548; d. about 1618. Against his parents' wishes he went to Paris to study art, and be¬ cause of further opposition left France and went to Germany and Austria. He studied for *a time also in Florence, where he assisted Giovanni da Bologna in many of his works. In 1585 he went to Genoa, and there executed the figures of Jupiter and Janus in the Grimaldi Palace, and the Evangelists, Saint Ambrose and Saint Stephen, groups for the cathedral. In the Nicolini Chapel, Florence,

are his figures of Humility, Chastity and Wisdom. He modeled the doors of Pisa Cathedral and soon after became court sculptor to Henry IV of France. The Louvre contains his (David5 ; (The Conquered Nations5 and (Orpheus5 and in the garden of the Tuileries are the groups of (Time and Truth5 and (Saturn and Cybele.5

FRANCHISE, in law, originally a right belonging to a subject of exercising a branch of the sovereign or government prerogative, either in virtue of a grant conferring such right, or by prescription, which always pre¬ supposes such a grant. In modern usage, a special privilege granted by a governing body, to an individual or corporation to perform some work or function that is withheld from others. A special privilege of minor import¬ ance, which usually can be had by any one paying the fee, is termed a license. It is

now generally conceded that the State legis¬ latures and governing bodies of cities in the United States have been far too liberal in the granting of franchises, so that public utilities have largely passed out of the control of the people, and are exploited for private or cor¬ porate gain. The right to vote is also popu¬ larly termed a franchise, doubtless because it was at first conceded as a privilege by royalty. See United States — Suffrage in the.

FRANCHISE, Electoral. See Electoral Qualifications; Woman Suffrage; Elec¬ tions; Aliens; Naturalization; Vote, Vot¬ ers, Voting; United States — Suffrage in the.

FRANCHISE TAX, a tax on public serv¬ ice and private corporations for the purposes of governmental revenue and indirectly to effect a sharing of profits with the public. In its widest application it includes patents, copy¬ rights, inheritance,

etc., besides those franchises and rights conferred by government for con¬ ducting an occupation in a particular way, or accompanied with particular privileges. Its application to public service corporations was justified as a payment for the right to use streets, highways and public places for special purposes. Between a domestic corporation with its state franchise and a corporation in a state with a foreign charter, a distinction exists. A state can impose a tax only on privileges which it grants; it, however, taxes foreign corpora¬ tions as to the amount of their business, thus adding to state revenue.

The sharp distinction between a corporate franchise and a corporate charter must be recognized. A franchise is the permission given a private corporation to use public property in the public interest, to occupy a particular street or highway with its tracks, wires, pipes, etc. A charter is the state grant to an associ¬ ation of individuals to do business as a cor¬ poration. The development of the franchise tax arose chiefly on account of the difficulties in collecting the general property tax. The general method employed to determine the value of the franchise in regard to public service corporations which have monopolistic privileges is to subtract the value of the real estate and other physical property from the value of the securities and to consider the difference as the value of the franchise. This process is usually called the corporate excess. In Massachusetts the corporation pays the tax directly to the state. The receipts are distributed to the towns and cities in proportion to the number of shares owned, or in the case of street railways, ac¬ cording to the miles of street railway owned in each town. With deductions made for real estate and other items locally taxed, shares are assessed at their market value. Plehn classifies four different methods of obtaining revenue from the franchise of a public service corporation: (1) to consider the privilege as property and to include this in the valuation of taxable property ; this valuation may be arrived at in one of two ways: (a)

by valuing the tangible property and then adding an amount equal to the difference between that and the value of the stock, including bonds ; this is the ^corporate excess® previouslv re¬ ferred to, so termed in Illinois, or the <(value of the franchise,® as in California, or <(the

value of the tangible property,® as used in other States; (b) by ascertaining the earnings and capitalizing them ; and then proceeding as in the first plan to obtain the corporate excess; (2) to tax the net earnings; (3) to tax the gross earnings; (4) to levy special annual license taxes. Objections, however, can be raised against any of these methods. The cor¬ poration annual license fee in some States is called a franchise tax. In New Jersey, for in¬ stance, the tax is one-tenth of 1 per cent on capital up to $3,000,000 with decreasing rates for larger amounts. Consult Seligman, E. R. A., (Essays on Taxation) (New York 1898) ; Plehn, C. C., introduction to Public Finance) (New York, 3d ed., 1909).

FRANCHISES, in the most general sense, rights or privileges conferred by the govern¬ ment upon particular persons not otherwise possessed by them by common right; more spe¬ cifically, the grants by which governmental au¬ thorities confer the right to use the streets of a municipality upon those who supply the com¬ munity with services or commodities which are in the nature of public utilities. This right to use the streets is set forth in a document which is itself called a franchise. Franchises must be secured by those who furnish to cities their water, electricity, gas, telephone and tele¬ graph services and street car facilities.

Legal Nature of Franchises.— In its legal nature a franchise is a binding contract be¬ tween those granting it and those receiving it. As such it is protected by the clause of the Federal Constitution which forbids the States to make any law impairing the obligation of contracts. Accordingly when a State or city has granted a franchise it cannot revoke nor change its terms without the consent of

the grantee unless the right to do so has been spe¬ cifically reserved to it by the terms of the fran¬ chise itself. This has been held t-rue even in cases where franchises were secured by bribery or fraud. Such revocation or alteration may, however, be accomplished by mutual agreement. The violation of the terms of the franchise by those who hold it may result in its forfeiture, just as the breach of any contract by one party relieves the other of obligation. The public, furthermore, can take the rights and privileges so granted by eminent domain proceedings pro¬ vided just compensation is paid for the prop¬ erty rights thus destroyed. Like all other contracts or grants by which the State or city binds itself, a franchise is subject to the reason¬ able exercise of the police power of the State in the interests of public health, safety, morals, good order and general welfare. As a result of this rule a street railway company, for ex¬ ample, may be subjected to control in the matter of speed of cars, place of stopping them, water¬ ing of tracks or the installation of safety devices, when the public welfare demands such control, even, though it be operating under a franchise which is silent upon those points, or which purports in express terms to free the company from such control. The courts have applied to franchises the rule of strict construction, and any doubt as to whether a right or privilege has been given by a franchise is resolved against the grantee and in favor of the public on the theory that the city or State can be presumed to have granted nothing not

set forth in express terms. Accordingly the rights given by a franchise will be held not to be exclusive unless their exclusive character is specifically declared.

The Granting of Franchises. — The grant¬ ing of a franchise is an exercise of legislative power. When not restrained by constitutional prohibitions the

State legislature may grant them directly even over the protest of the municipality concerned. The first period in the history of franchise grants in the United States was that in which State legislatures con¬ ferred franchises by special laws upon corpora¬ tions usually created by special laws. There is no blacker page in American political history than this. Franchises were secured by the most brazen dishonesty and bribery, and reputable political leaders openly bartered them for party campaign funds. The terms of most of these early franchises were naturally in gross viola¬ tion of the public interest. Many of the grants were perpetual. In return for the almost in¬ valuable rights with which the State parted it received as a rule nothing. It received no money and it retained no adequate power of regulation over the grantee in the matter of service, rates or extensions. It reserved no power to prevent gross over-capitalization. Many cities are still suffering from the cor¬ rupt and improvident franchise grants made during this period. The second era of fran¬ chise history began in the latter part of the 19th century with the movement to forbid the crea¬ tion of corporations or the granting of privi¬ leges by special law. Municipalities, acting under delegated authority as agents of the State, took over the power to grant franchises. This system did not prove to be a very substantial improvement. At the present time a .third policy, that of vigorous control over franchise grants, is in force in most parts of the United States. Three types of restrictions are com¬ monly found. First, no franchises may be granted by special act of the State legislature. Second, the people of the municipality con¬ cerned may be given the right to approve or disapprove the franchise by voting on it. Third, public utility commissions may be created either with very limited authority or with a high de¬ gree of power over the terms and conditions upon which the franchises shall be issued as well as over the grantee thereafter.

Taxing of Franchises. — Franchises are sub¬ ject to taxation unless, they are specifically ex¬ empt

therefrom by their own terms. In the first place they may be taxed as property at their fair value, either separately or as part of the assets of the corporation holding the franchise. In the second place, since franchises are special privileges which the State is not obliged to grant, it may stipulate the payment of heavy special taxes as a condition of granting the franchise, or as the price of not revoking it when once granted. Most students of the franchise question believe that it is contrary to public policy to place special taxes upon franchises, at least those hereafter to be granted. Such taxes are ultimately shifted to the con¬ suming public in the form of increased prices for the services supplied. It is urged that the grantee of a franchise should be subjected to so many obligations and duties in return for the special privilege enjoyed that the money value of the franchise itself would be very vol. 11 — 48

small. It should then be taxed in common with other property at its fair value.

By what governments franchises are taxable in the United States is a problem of some com¬ plexity. This is especially true if the term franchise is used in a broad enough sense to in¬ clude the right of a corporation to carry on business under the terms of its charter, a meaning frequently given to the word. It is well established that a franchise granted directly by the Federal government cannot be taxed by a State or any subdivision thereof. Otherwise a State, by heavy taxation, could destroy en¬ tirely the privilege or right thus granted by the national government. This rule, however, does not prevent a State from taxing such property of a corporation holding a Federal franchise as may lie within its jurisdiction. It would be equally true that franchises granted by the States are free from na¬ tional taxation were it not for the fact that the Federal government frequently assumes jurisdiction over such franchises by reason of its power to regulate interstate commerce. A further limitation upon the power of the State to tax franchises is found in the rule that no State can

tax or burden the right to engage in interstate commerce. Whether the franchise to engage in such commerce is granted by the Federal or the State government it is equally free from State taxation. Nor can a State tax as such the franchise of a corporation chartered by another State since that franchise is re- garded as property only in the State which grants it. No corporation, however, has a right to carry on business not interstate in character in any State except that of its creation without obtaining special consent. As the price of this privilege a State may demand practically any¬ thing it sees fit. Thus while a State may not tax the franchise of a foreign corporation as such it may require it to pay as the privilege of doing business within its borders a tax measured by the entire capital stock of the corporation, a sum which includes the value of the franchise which it may not tax directly. Many students of the problem advocate the Federal incorporation of corporations engaged in interstate commerce in order, among other things, to secure relief from the injustices and inconveniences arising from the existing system of franchise taxation.

Provisions of Franchises. — The provisions of franchises differ widely according to the date of issuance, the municipality or other au¬ thority granting them and the purposes for which they are given. Any adequate franchise at the present time deals with the following points: (1) Tenure. Three policies may be

followed in fixing the tenure of a franchise. First, it may be perpetual, although in many States this is now expressly forbidden. Second, it may be for a fixed term of years, as 20 or 25. Third, it may be indeterminate in duration, allowing the municipality to revoke it at will after a plan which protects the rights of the grantee. (2) Compensation. It is common at present to secure to the State or city something in return for the valuable rights given in a public utility franchise. This may be done in a number of ways; (a) a lump sum may be required as a fee; (b) payment may be re¬ quired in kind, as when

a water company sup¬ plies a city without charge with water for fire

protection; (c) other services may be required of the grantee, such as paving or watering of the streets occupied; (d) a certain percentage of the earnings of the corporation may be taken annually as a tax. (3) Rates, service and ex¬ tensions. Provision may be made to have these matters handled by a periodic revision of the terms of the franchise by the municipal au¬ thorities or by a permanent public utility com¬ mission. Most franchises contain elaborate pro¬ visions relating to all these matters. (4) Laborers and strikes. Continuity of service is vital in the case of a public utility and inter¬ ruptions due to labor disputes may be sought to be avoided either by fixing the conditions of labor in a satisfactory manner in the franchise itself or by requiring the arbitration of such disputes. (5) Capitalization. So many evils have arisen from the overcapitalization of pub¬ lic utility companies that it is wise to regulate this matter closely by definite restrictions and by requirements of publicity regarding the financial operations of the grantee. (6) Re¬ version to the city. Some modern franchises contain stipulations of the conditions under which the rights granted will revert once more to the city together with the properties acquired by the public utility corporation. The transi¬ tion to a system of municipal ownership is made possible in this way. The provisions now found in many franchises afford a reasonably adequate protection to the public interests in¬ volved in the important services rendered to the community by public service corporations. Consult Beard, C. A., (American City Govern¬ ment (New York 1912) ; Joyce, (Treatise on Franchises) (ib. 1909) ; King, Regula¬ tion of Public Utilities J (ib. 1912) ; Munro, (Bibliography of Municipal Government) (1915); Pond, (Public Utilities J (1913) ; Whinery, (Municipal

Public Works) (New York 1903) ; Wilcox, (Municipal Franchises5 (1910).

Robert Eugene Cushman, Associate in Political Science, University of Illinois.

FRANCIA, fran'cha, easel name of Fran¬ cesco di Marco di Giacomo Raibolini, Italian painter: b. Bologna, 1456; d. there, 5 Jan. 1517. He assumed his name of Francia from that of the goldsmith under whom he began his art studies. He was a pupil in painting of the Ferrarese, Lorenzo Costa, and shows the influ¬ ence of his master's style. He painted por¬ traits and history, his greatest work being the Bentivoglis altarpiece, in the church of San Giacomo Maggiore, Bologna.

FRANCIA, fran'se-a, Jose Gaspar Tomas Rodriguez da, Paraguayan dictator: b. Asun- gion, about 1756; d. there, 20 Sept. 1840. He was sent to the University of Cordova, with a view to entering the Church ; but his plans underwent a change, and on his return to his native town with the degree of doctor of laws, he began his public career as a barrister. His high repu¬ tation for learning, but still more for honesty and independence, procured him an extensive practice ; and he devoted himself to legal pur¬ suits for 30 years. In 1811, when Paraguay threw off the Spanish yoke, he became secre¬ tary of the junta appointed by Congress. In 1814 he was appointed dictator for three years, and in 1817 he was continued in authority for life. No sooner had he reached the goal for

which he had been striving than he began to display the utmost tyranny in his administra¬ tion. He was kindly disposed toward for¬ eigners, till they excited his jealousy by the culture of Paraguay tea, of which he made a state monopoly. After everything had been placed completely at his beck he seemed, in 1824, disposed to return to milder courses, but a new attack of his constitutional malady led him again to a renewal of his tyrannical pro¬ ceedings ; but as Paraguay had improved under his government, and the inhabitants had be¬ come reconciled to his

tyranny, he was able to continue his system till his death.

FRANCIABIGIO, fran-cha-be'jo (the easel name of Francesco di Cristofano Bigi), Italian painter : b. Florence, 1482 ; d. there, 24 Jan. 1525. He was a pupil of Albertinelli, where he met and made a freind of Andrea del Sarto. The two artists painted in collaboration the frescoes in the Santa Annunziata Church at Florence. In these paintings the influence of del Sarto is very apparent, as well as in the (Last Supper,) which Franciabigio painted in the refectory of San Giovanni, and the oil painting at Dresden, (David and Bathsheba.5 He has left many excellent portraits, one of which is in the Berlin Museum.

FRANCILLON, Robert Edward, English novelist: b. Gloucester, England, 25 March 1841. He was educated at Trinity Hall, Cambridge. He was admitted to the bar in 1864 and was on the staff of the London Globe 1872-94. His novels are (Earl's Dene) ; Rearl and Emer- ald) (1872) ; Olympia-* ; (Strange Waters) ; (Zelda's Fortune5 ; (A Real Queen) ; (Queen Cophetua> (1880); (Under Slieve-Ban) (1881) ; Ring or Knave5 (1888) ; (A Dog and his Shadow) ; (Jack Doyle's Daughter5 ; Ropes of Sand5 ;

FRANCIS I, king of France: b. Cognac, France, 12 Sept. 1494; d. Rambouillet, 31 March 1547. He succeeded to the throne in 1515, on the death of Louis XII, who died without male issue. As grandson of Valentino of Milan, he put himself at the head of an army to assert his right over the Milanese. The Swiss, who opposed him in his entry into the duchy, were defeated at Marignano (or Melegnano), and Milan fell immediately after this victory. After a short war with England, the famous inter¬ view between Henry VIII and Francis took place, in 1520, in Flankers, which, from the magnificence displayed on the occasion, was called The Field of the Cloth of Gold (q.v.). In the same year, Charles V of Spain having inherited the empire after the death of Maxi¬ milian Francis laid claim to the imperial dignity and declared war against his rival. In this

struggle, however, he met with nothing but reverses. After the defeat of Marshal Lautrec at Bicoca, in 1522, the retreat of Bon- nivet, and Bayard's death, Francis was himself, in 1525, beaten at Pavia, and taken prisoner. The fight had been a fierce one, and the king wrote to his mother, <(All is lost, except honor.55 Led captive into Spain, he recovered his liberty only at the cost of an onerous treaty, signed at Madrid in 1526; but which Francis subsequently declared null and void. He immediately recommenced war in Italy, met with fresh de¬ feats. and concluded a second treaty at Cambrai in 1529. He once more invaded Italy, in 1536,

and, after various successes, consented to a definite arrangement at Crespi, in 1544, by which the French were excluded from Italy, though Milan was given to the Duke of Orleans, the second son of Francis. Francis was a friend to arts and literature, which flourished during his reign; and he was called the ((Father of Letters.® Justice, also, began to be better administered in his reign. He founded the Royal College of France, the Royal Library and built several palaces. He was succeeded by his son, Henry II.

FRANCIS II, king of France, son of Henry

11 and Catharine of Medici: b. Fontainebleau, 19 Jan. 1544; d. Orleans, 5 Dec. 1560. He ascended the throne on the death of his father 10 July 1559. The year previous he had married Mary Stuart, only child of James V, king of Scotland. During his short reign of 17 months were sown the seeds of those evils which afterward desolated France. The uncles of his wife, Francis, Duke of Guise, and the Cardinal of Lorraine,' held the reins of govern¬ ment. The latter stood at the head of the clergy, and had charge of the finances. The former had the direction of military affairs ; and both used their power solely as a means of gratifying their pride and

avarice. Antony of Bourbon, king of Navarre, and his brother Louis, Prince of Conde, provoked that two strangers should govern the kingdom while the princes of the blood were removed from the administration, united with the Calvinists to overthrow the power of the Guises, the pro¬ tectors of the Catholics. Ambition was the cause of the quarrel, religion the pretext, and the conspiracy of Amboise formed among the French nobility, especially the Calvinists, with the object of removing the king from the in¬ fluence of the Guises, the first symptom of the civil war. The war broke out in March 1560. In December of the same year Francis died, leaving the kingdom loaded with debt, and a prey to all the miseries of civil war.

FRANCIS I, Holy Roman Emperor: b. 8 Dec. 1708; d. Innsbruck, 18 Aug. 1765. He was the son of Leopold, Duke of Lorraine. He in¬ herited this duchy from his father in 1729, and six years afterward exchanged it for that of Tuscany, which the death of the last of the Medicis had rendered vacant. In 1736 he mar¬ ried Maria Theresa, the daughter of the Em¬ peror Charles VI. On the death of the latter, he disputed the imperial dignity with the Elector of Bavaria, whom France supported, and who took the name of Charles VII ; he was, however, defeated, and Francis became Roman emperor in 1745, as co-regent. He reigned peaceably for 20 years. He had 16 children, among whom were Joseph II, who succeeded him, and the unfortunate Marie Antoinette. See Maria Theresa.

FRANCIS II, Holy Roman Emperor and as Francis I of Austria: b. Florence, Italy,

12 Feb. 1768; d. Vienna, 2 March 1835. He suc¬ ceeded his father, Leopold II, in 1792, as Holy Roman Emperor, King of Bohemia, Hungary, etc. At the very commencement of his reign, he had to sustain a war against France, in which he was defeated, and was, in 1797, obliged to sign the treaty of Campo Formio, which de¬ prived him of the Netherlands and Lombardy. Another war taking place with the same power,

he was not more fortunate than in the first, and was beaten at Marengo, and lost, by the Treaty of Luneville, in 1801, all his possessions on the Rhine. In a third campaign, undertaken in 1805, the French were victorious over his armies at Elchingen, Ulm and Austerlitz ; and the Treaty of Presburg still further diminished his terri¬ tory. Renouncing now the title of Holy Ro¬ man Emperor, loudly styled Emperor of Ger¬ many, he took the title of Emperor of Austria, under the name of Francis I. He tried again the fate of battles in 1809; but the defeats of Eckmiihl and Wagram led to the Peace of Schonbrunn, to cement which more strongly his daughter Maria Louisa was, in 1810, given to Napoleon I. Notwithstanding this alliance, however, he, in 1813, joined the coalition against his son-in-law and contributed consid¬ erably to his overthrow. The treaties of 1815 put him again in possession of the greater por¬ tion of his territory, and he reigned peaceably till his death.

FRANCIS I, king of the Two Sicilies, son of Ferdinand I: b. Naples, 19 Aug. 1777; d. there, 8 Dec. 1830. Twice during the lifetime of his father he carried on the government of the kingdom under the name of viceroy ; first in 1812, when a constitution 'was granted to Sicily; and afterward in 1820, during the troubles which broke out in Naples and Pa¬ lermo. He mounted the throne in 1825, and died 1830, without having achieved anything re¬ markable. He was succeeded by Ferdinand II.

FRANCIS II (Francesco d'Assisi Maria Leopold), king of the Two Sicilies: b. Naples, 31 Jan. 1836; d. 27 Dec. 1894. He succeeded his father, Ferdinand II in 1859, and attempted to carry out the monarch's policy. His do¬ minions were invaded by Garibaldi in 1860 and Gaeta, his last stronghold, fell in 1861. Subse¬ quently the deposed ruler lived in France in retirement, occasionally organizing abortive ex¬ peditions against the Italian kingdom.

FRANCIS JOSEPH I, emperor of Aus¬ tria and king of Hungary: b. Vienna, 18 Aug. 1830; d. Schoenbrunn Castle, 21 Nov. 1916. He was the eldest son of

Archduke Francis Charles and nephew of Ferdinand I, who reigned from 1835 to 1848. On the abdication of the latter and the renunciation of the crown by his father, Francis Joseph was proclaimed emperor on 2 Dec. 1848. He was then 18 years old, was the unanimous choice of the Austrian court and it was believed that his popularity would help har¬ monize the various conflicting interests. He had been educated very carefully under the super¬ vision of his grandfather, the father-in-law of Napoleon I. He had mastered not only the classical and modern languages but nearly all the dialects of his polyglot fatherland. He had studied Roman, civil and canon law, chemistry and mechanics. He served in the field under Radetzky in Italy in 1848 and officers of high rank had taught him tactics, strategy and the art of making plans. He was fond of sport and exercise and won the first prize in a shoot¬ ing competition with expert Tyrolese marksmen, who made him one of their guild.

At home he was opposed by Kossuth in Hun¬ gary, by Count Cavour in Italy and later by Bismarck in Prussia.

He made little or no effort to propitiate Kossuth or his followers, and in April 1849,

four months after his coronation, Hungary was declared a republic. Simultaneously Francis Joseph proclaimed a new constitution which abolished all the ancient rights of the nation.

The Hungarian General Georgei defeated the emperor's troops in successive engagements and the emperor was forced to seek help from Tsar Nicholas. The latter responded promptly with 80,000 troops, which turned the tide of the war, and in August 1849 Kossuth was in flight and the Hungarian forces in complete subjec¬ tion, Georgei having surrendered with a rem¬ nant of 5,000 men from his army.

In Italy the emperor's General Radetzky quelled the uprising speedily and Francis Joseph followed the dual victory by promulgating a new constitution. This totally failed to work, and two years later Austria became again an absolute despotism. The emperor took <(Viribus Unitis® for his motto and let it be known that the state was to be as highly centralized as France under Louis XIV. Hungary and all the other provinces were governed from Vienna.

In 1855 a concordat was concluded with the Pope by which extraordinary privileges were conferred on the Roman Catholic Church in Austria. In 1859 the diplomacy of Cavour, the great Minister of Victor Emmanuel of Sar¬ dinia, and Louis Napoleon's zeal for military renown forced upon Austria the war with France and most of the Italian states. At Magenta and Solferino, Francis Joseph himself fighting in the latter battle and displaying con¬ spicuous bravery, the Austrians were decisively defeated by the French army under Marshal MacMahon. The war resulted in the loss of Lombardy to Austria and only the intercession of Bismarck, watchful of Louis Napoleon's prestige, saved Venetia.

In 1866 Bismarck forced Francis Joseph into the disastrous Seven Weeks War, the pretext of which was a dispute with Prussia over the succession in Schleswig-Holstein. The Austrian emperor had the satisfaction of humiliating Italy, which took sides with Prussia, by decisive victories on land and sea, but this was small recompense for the crushing defeat sustained at the hands of the Prussians at Sandowa, or Koeniggratz. This one battle brought Francis Joseph to a treaty which solidified both Ger¬ many and Italy at his expense. . To Italy, despite his victories there, he was forced to cede Venice through Napoleon III of France as intermedi¬ ary; to Prussia he lost the last trace of the ancient Hapsburg hegemony over the German states and the ghost of the Holy Roman Empire was laid forever.

The immense loss of prestige following the war was accompanied by serious disaffection at home. The emperor and his ministers forth¬ with abandoned

their policy of absolutism and promulgated a constitution for the Austro- Hungarian monarchy. Under it the emperor was crowned King of Hungary at Budapest in 1867. The form of monarchy adopted then re¬ mains in force to-day, and generally the method of governing the dual monarchy is the same. There has been bitter strife since then, with in¬ cessant demands for reforms and continual dis¬ turbances in the legislative assemblies, but the influences and strength of purpose of the em¬ peror have served to keep the empire together and even to retrieve much of the prestige lost in the Seven Weeks War. In }878 the congress

of Berlin gave Austria the former Turkish provinces of Bosnia and Herzegovina, so that the emperor, notwithstanding his losses of ter¬ ritory in Italy, concluded his life as ruler of a territory more extensive than that he possessed in the beginning.

The emperor sustained as severe blows in his family relations as in war. His brother, the ill-fated Maximilian, was shot after the success¬ ful revolution against him as Emperor of Mexico. His wife, a beautiful but eccentric woman, was the Princess Elizabeth Amalie Eu¬ genie, ((Duc.hess of Bavaria® and daughter of Duke Maximilian-Joseph. They were married in 1854, but had become estranged long before her death. She was assassinated in Geneva, 10 Sept. 1898.

The only son of the imperial couple, the Crown Prince Rudolph, died mysteriously by violence in 1899 at his hunting lodge of Meyer- ling in company with the young Baroness Vet- sera. His daughter, the Princess Elizabeth, after making a love match with Prince Otto of Windischgratz, quarreled with him and shot his mistress, an actress whom she found in his rooms at Prague. The emperor's daughter Gisela is the wife of Leopold, second son of Prince Luitpold, the late regent of Bavaria.

Three attempts were made to assassinate the emperor himself, but from all of them he es¬ caped unscathed. The first was in 1853, when a Hungarian

tried to cut his throat. Bystanders seized the man and he was hanged the next day. The second attempt took place 13 years later. The emperor attended a performance in the Bohemian Theatre in Prague. As he was enter¬ ing a carriage after the performance a Bo¬ hemian in the crowd drew a revolver, but was struck down by a bystander before he could shoot. Every effort was made to hush up the attempt and no one was ever prosecuted for it. The third and last attempt upon the emperor's life was made in September 1882, when an ef¬ fort was made to blow up the ruler with bombs at Trieste. A man named Overdank, the head of the conspiracy, was tried and executed for his share in it.

The emperor's last years, in addition to the dread of assassination and family troubles, were perplexed by dissensions in his empire growing out of its inchoate components and complicated system of government.

To his faculty as a linguist the emperor owed part of the great personal popularity that was his throughout the empire. Once when as a mere boy he had occasion to address a meet¬ ing of Hungarian nobles he won all their hearts by speaking to them in their own tongue, the Magyar.

The emperor's generosity had as much to do with his popularity as his ability as a linguist, and his gifts to charity were lavish. It has been estimated that his civil list was worth perhaps something approaching $5,500,000 a year, but the demands upon it were not infrequently greater still.

His golden jubilee was celebrated with great acclaim in 1908, the Kaiser and 11 German kings and reigning princes visiting Schoenbrunn Cas¬ tle to congratulate the aged monarch. During the celebration an imperial rescript annexing Bosnia and Herzegovina was issued and ac¬ quiesced in by the powers. There were gala performances at the opera and the theatre and

FRANCIS —FRANCIS OF ASSISI

the time was one of popular rejoicing. Sav¬ age race riots occurred during the period in Bohemia and gave rise to the epigram that the longer the emperor lives the more his peoples love and hate each other.

To the end the emperor continued to live the life of simple habits formed in his youth. He rose early, went to bed early and dieted like the poorest of his peasants. To the end he continued to meet his people and to hear their grievances.

The last tragedy came when the heir ap¬ parent, Archduke Francis Ferdinand, was killed at Sarajevo, Bosnia, on 28 June 1914 by an as¬ sassin, and his wife, the Duchess of Hohenberg, was shot to death in the same attack. This caused the break between Austria and Serbia which precipitated the great European War of

1914.

Francis Joseph lived in turmoil, a leading figure in the wars of three generations ; he left the field when the world is in the throes of the greatest conflict of history. He was succeeded by his grand-nephew Charles Francis Joseph (q.v.), son of the Archduke Otto, the younger brother of the slain Francis Ferdinand. Con¬ sult Emmar, J., (Kaiser Franz Joseph5 (2 vols., Vienna 1898) ; Gribble, F., (Life of the Emperor of Austria) (New York 1913) ; Mahaffy, R. P., (Francis Joseph, His Life and Times) (London 1908) ; Schnitzer, J., (Franz Joseph I und Seine Zeit) (2 vols., Vienna 1899) ; Weindel, H. de, (Frangois Joseph and His Time) (Paris 1905).

FRANCIS, Charles, eminent printer : b. London, 16 Feb. 1848. He learned the print¬ ing trade in Tasmania, returned to London as a young man, but later came to the United States and entered business in Chicago, Little Rock, Louisville, etc., and about 1890 came to New York city, where he founded one of the larger printing plants in America. In 1906 he founded the Printers' League, which later ex¬ tended

to nine leading cities and became the Printers' League of America. The organiza¬ tion, under Mr. Francis' leadership, developed the principles of <(consultation, conciliation and arbitration® between employers and employed in the printing trade, and was extremely influ¬ ential in doing away with the ((strike® evil. In recognition of his services in stopping trade war, Mr. Francis was presented with a bronze bust by about 1,000 of his admirers in 1918, on the occasion of his 70th birthday anniversary, being the third American printer (after Ben¬ jamin Franklin and Theodore Low De Vinne) to be thus honored. He is the author of (Printing for Profit5 (1918).

FRANCIS, Convers, American Unitarian clergyman and writer : b. West Cambridge, Mass., 1795; d. 1863. In 1815 he was graduated at Harvard College and entered the LTnitarian ministry at Watertown. In 1842 he was ap¬ pointed to the chair of pulpit eloquence at Har¬ vard. His published works include (History

of Watertown5 (1830); (Life of Rev. John Eliot, the Apostle to the Indians5 (1836);

(Life of Sebastian Rale5 (1848). Consult

Newell, (Memoir of Convers Francis5 (in Massachusetts Historical Society's Proceedings

1864-65).

FRANCIS, David Rowland, American politician : b. Richmond, Kv., 1 Oct. 1850. He was graduated from Washington University,

Saint Louis, 1870, entered business and in 1877 established the firm of Francis Brothers, grain merchants, Saint Louis. He was mayor of Saint Louis 1885-89, governor of Missouri 1889— 93, Secretary of the Interior under President Cleveland 1896-97, and became president of the Louisiana Purchase, Centennial Exposition in

1901.

FRANCIS, James Bichens, American hy¬ draulic engineer: b. Southleigh, England, 1815; d. 1892. At 14 he was engaged on harbor work for a railway company. In 1831 he was em¬ ployed on the Grand Western Canal, England; two years later he came to America and was at once engaged on the Boston and Providerfce Railroad under G. W. Whistler. With the lat¬ ter he was engaged in 1834 in water-power de¬ velopment at Lowell and in 1837 succeeded Whistler as chief engineer for the proprietors of locks and canals on the Merrimac. From 1845 to 1884 he also served as agent and after 1884 was consulting engineer. In addition to the regular routine of building dams, conduits, locks, etc., he made vast experiments in hy¬ draulic work, known as the ((Lowell hydraulic experiments.55 In 1855 appeared an account of these experiments. He wrote (Strength of Cast Iron Columns5 (1865) and (Lowell Hy¬ draulic Experiments5 (later ed., 1883).

FRANCIS, Joseph, American inventor: b. Boston, Mass., 12 March 1801 ; d. Cooperstown, N. Y., 10 May 1893. He was the inventor of a number of life-boats and life-cars which came into general use and by means of which 200 persons were saved when the British ship Ayr¬ shire was wrecked on the New Jersey coast in 1850. It is estimated that in four years as many as 2,150 lives were saved.

FRANCIS, M. E. See Blundell, Mrs. Francis.

FRANCIS, Sir Philip, British statesman: b. Dublin, 22 Oct. 1740; d. London, 23 Dec. 1818. He is the best accredited of the candidates for authorship of the (Jumus> letters. He entered the civil service, and was rapidly advanced, owing partly to his abilities and partly to per¬ sonal influence curiously accordant with par¬ tialities shown in the (Letters.5 Suddenly raised to the lofty position of one of the resi¬ dent India council appointed by Parliament to control those affairs, he went out to India; spent his time there in a furious contest for su¬ premacy with Warren Hastings; was finally vanquished, but achieved a terrible revenge after his return to England, by inciting Has¬ tings'

impeachment and coaching Burke; en¬ tered Parliament, prepared many pamphlets and made many speeches of much ability and un¬ failing acrimony. The (Letters5 — savage as¬ saults on the heads of the party in power, up to George III himself — appeared in the Pub¬ lic Advertiser of London from 1767 to 1772; ceasing with the dispersion of the party faction most liked by Francis, and a year before his great promotion and his departure, from Eng¬ land. The case for his authorship is effectively put in Macaulay's (Essay on Warren Hastings.5 See Junius.

FRANCIS OF ASSISI, as-se-ze, Saint, Italian founder of religious order: b. Assisi, Umbria, Italy, 1182;. d.. Assisi. 4 Oct. 1226. Saint Francis of Assisi is the founder of the

Friars Minor, who are usually styled Francis¬ cans (q.v.). His family name was Bernardone. At baptism he was called John. Whether it was because his father, who was a merchant, was at the time largely engaged in French trade, or because of the saint's own familiarity with the French language, the name Francis eventually superseded that of John. As a youth he was remarkable for his ardent piety and the spotless purity of his life, but is re¬ proached with a worldly vanity in dress which his wealth enabled him to indulge In. A change of heart came over him in consequence of a year's confinement as a prisoner of war; a se- fious illness helping the transformation. He began to dispose of his property for the pur¬ pose of repairing dilapidated churches. Irri¬ tated by his extravagance his f ather treated him with the greatest cruelty; the trouble ending by the saint's abandonment of everything, even his worldly apparel, and he assumed the dress of a common laborer. His zeal for Church restoration grew in intensity, and being no longer able to devote his own patrimony to the work he obtained the necessary means by beg¬ ging; he himself laboring at the

buildings with his own hands. His affection was lavished also on the poor and especially upon lepers. He lived in the extremest poverty, practised the greatest austerities and for a time was looked upon as a madman. Distinguished and learned men, however, began to associate with him and follow his way of life. Though not a priest (and he never became one) he began to preach everywhere on the necessity of penance. As those were the days in which Barbarossa was raging against the Church, both religion and morality needed reformation and the preacher was eagerly listened to by all classes. When the number of his followers increased, the de¬ sire to institute a new religious order developed, and for that purpose he betook himself to Rome, but Innocent III, then sovereign pontiff, treated the proposal with indignation. Francis persevered, and the request was granted. The new community, known first as the Preachers of Penance, increased with astonishing rapidity, and at the first general chapter more than 5,000 friars assembled; some from the humble classes of life, others already famous in Church and State. The foundation of the order coincided with the great Lateran Council, the spirit of wThich was against the formation of any new religious order. In spite of this, however, there seemed to be a tacit consent to allow the new movement to proceed. It was when Pope Honorius finally gave the necessary authoriza¬ tion that Francis met the Spanish canon Domi¬ nic, who was in Rome to found his own Order of Preachers, commonly known as Dominicans (q.v.). The two saints met in church and in¬ stinctively recognized each other, becoming immediately most devoted friends. The visions and miracles reported of Francis are bewilder¬ ing in their number and character. In the hope of martyrdom he made several attempts to preach the gospel to the Mohammedans. His prayer and austerities were continued, his ec¬ stasies frequent, and while on Mount Alverno he received on his person what are known as the stigmata, namely, bleeding wounds on the hands, feet and side, corresponding to the marks on the crucified body of the Saviour. Wherever he went he was honored as a

saint;

and his preaching was irresistible in its pathetic and stirring appeals to repentance. The rule of life he laid down for his followers was based on the strictest poverty, that is, no property, and dependence on the alms of the faithful. This extreme rigor almost immediately brought dissension in the order. Parties were formed, and the Friar General Elias, who had been appointed by Francis, was its bitterest oppo¬ nent, going so far as to leave the order and to side with Barbarossa, who was then in open warfare with the Church. Nevertheless, the friars continued to increase in number and to spread everywhere, preaching the gospel and carrying the faith into distant countries. Be¬ sides his order for men, he established another for women, commonly known as the Poor Clares, so called from Saint Clare, the first su¬ perior. There is still another section called the Third Order of Saint Francis, for men and women living in the world, who follow a miti¬ gated and adapted form of the rule of the friars. All three have given a vast number of saints and scholars to the Church. Francis died at the age of 45, 19 years after the estab¬ lishment of his order. The extreme beauty, simplicity and amiability, and perhaps the poetry, of the saint's character, but especially his love of created nature, have had the effect in our own days of developing a singular cult for him on the part of many outside the Cath¬ olic Church. The movement was started by Paul Sabatier, a French Calvinist minister, and Franciscan societies for the study of the life of the saint and of everything connected with him have been established in several countries of Europe.

Bibliography. — Segur, (Popular Life of Saint Francis) ; Saint Bonaventure, (Life of Saint Francis> ; Thomas de Celano, (Life of Saint Francis) ; (Franciscan AnnalsP

Thomas J. Campbell, S.J.

FRANCIS DE SALES, salz, Fr. sal, Saint, French

prelate, founder of the Order of Visita¬ tion : b. of a noble Savoyard family, in the cha¬ teau of Sales, near Geneva, 21 Aug. 1567 ; d. Lyons, 28 Dec. 1622. He was educated by the Jesuits at Paris, studied law at Padua, and hav¬ ing a strong bent to theology and a religious life, entered the Church. Earnest and success¬ ful as a preacher, he was sent in 1594 with his kinsman, Louis de Sales, to preach in the duchy of Chablais, and bring back, if possible, to the Roman Catholic Church the followers of Cal¬ vin. He had a large measure of success. His conferences with Theodore de Beza, Calvin's successor, at Geneva, were, however, without result. He went to Paris in 1602, preached there with great . success and steadily refused the offers of dignities made by the French king. The same year he was appointed bishop of Geneva, and taking Saint Charles Borromeo as his model, applied himself zealously to the re¬ form of the diocese and its monasteries. He was disinterested and free from worldly ambi¬ tion, and declined the offer of a cardinal's hat and the renewed invitations of the king of France. In 1610 he founded the Order of the Visitation, of which the first directress was his friend, Madame de Chantal. His best-known works are the (Introductions to a Devout Life,* which has been translated into many languages, and

God.* He was canonized by Pope Alexander VII in 1065. Consult (Life; by Camus.

FRANCIS XAVIER, zav'i-er, Fr. ksav-e-a, Saint, Spanish Jesuit missionary: b. Castle of Xavier, Navarre, 7 April 1506; d. Island of Sancian, 2 Dec. 1552. Saint Francis Xavier was born in Spain, of one of the noblest families of the kingdom of Navarre. After the usual collegiate studies in his own country, he went to Paris for a course of philosophy in the university. In spite of his extreme youth, his extraordinary ability secured for him a professorship in the affiliated College of Beau¬

vais. It was in Paris that he met the man who shaped his destinies, Ignatius of Loyola (q.v.). Abandoning his professorship, he took up the study of theology, practised the rudest austerities, bound himself to a life of evangeli¬ cal poverty, chastity and obedience, and with Ignatius and five other companions estab¬ lished what is known as the Society of Jesus.

The original purpose of this organization was to evangelize Christians living in the Mo¬ hammedan countries of the East. Failing in that, they offered themselves to the Pope and were employed by him in most responsible trusts in various parts of Europe, which, how¬ ever, they combined with labor in pest houses, prisons and among the abandoned poor. A demand coming from John III of Portugal for 10 missionaries to evangelize the new Portu¬ guese possessions in India, Francis Xavier was chosen, but went alone, invested with the dig¬ nity of Apostolic Nuncio, a dignity which he sedulously kept out of sight.

The day after the command was given, he left Rome for Lisbon, making the journey on foot, preaching and teaching on the way. In Portugal his influence was so instantaneous and so great that the king purposed to keep him in his dominions. But Xavier set sail for the East, 7 April 1541, having refused even to see his own relatives before leaving. The journey meant more than a year of great suf¬ fering, and he reached Goa only on 6 May 1542. The ignorance and immorality which prevailed there were deplorable and a complete and immediate revolution in conditions fol¬ lowed his arrival.

Then began his series of amazing apostolic journeys. They can only be appreciated by re¬ calling the methods of travel of those days ; the perilous character of the seas through which he continually sailed, and the savage or barbarous nature of the people he had to evangelize. From Goa he went around Cape Comorin and Ceylon, then back to Goa, then through every principality of Hindustan, off through the scat¬ tered islands of the coasts, until he

reached the distant Moluccas ; establishing missions every¬ where, and managing all the complicated and multiplied works which necessarily resulted. The story of his life is simply a series of sur¬ prising evangelical conquests, bringing thou¬ sands to Christianity by the efficacy of his preaching, the prodigies he wrought and the extraordinary sanctity of his life.

On 15 Aug. 1549 he reached Japan. He re¬ mained there only two years and four months, but succeeded in penetrating almost all the little kingdoms into which the country was then di¬ vided ; breaking down the opposition of the Bonzes who were the chief enemies of the Gos¬ pel, winning vast numbers to the faith, and

establishing his followers in the favor of both rulers and people. The sway which he exerted over the Japanese mind may be inferred from the reverence with which he is still regarded there. The thoroughness with which he and his successors taught Christianity is evidenced by the fact that 25,000 Catholics were found in Japan after three centuries of persecution. They had handed down the faith from father to son without any ecclesiastical ministrations.

To obtain laborers for this new field he re¬ turned to Goa in 1551. We then find him ven¬ turing on a new project, attempting to win China to Christianity. Its conversion he thought essential for the maintenance of the faith both of India and Japan; for the corrupt¬ ing influences in both those places he consid¬ ered to be largely due to their relationship with China. He never reached that country but died on the Island of Sancian, about six leagues from Canton, being only 46 years of age. This last fatal voyage had lasted nine months.

His entire apostolate in the East extended only 10 years, but he is said to have planted the faith in 52 kingdoms, preached the Gospel through 9,000 miles of territory and baptized more than 1,000,000 persons. Fifty years after his death Pope Paul V by

a bull, dated 25 Oct. 1605, declared him blessed, and, 16 years subse¬ quently, Gregory XV canonized him, but on account of the pontiff's death, which occurred just at that time, the bull of canonization was issued by Urban VIII on 6 Aug. 1623. He is honored in the Church on 3 December and is usually styled ((the Apostle of the Indies? The devotion to him is universal and countless churches are erected under his invocation. His relics are still preserved in Goa, and in 1859 the body was found to be incorrupt.

Bibliography.— Bartoli, (Life of Saint Francis Xavier* ; Bouhours, (Life of Saint Francis Xavier*; Coleridge, (Life and Letters* ; B. N., (History of the Society of Jesus* ; Cretineau-Joly, (History of the Society of Jesus.*

Thomas J. Campbell, S.J.

FRANCISCANS, the designation borne by the members of the three great religious orders founded in the 13th century by Saint Francis of Assisi. The first of these orders is that of the Friars Minor, known as the Greyfriars, and in France as the Cordeliers. The second order is that of the Poor Clares, called in Italian Povere Donne (Poor Ladies), and in France the Clarisses. The third order is that of Pen¬ ance, or Tertiaries.

Saint Francis, keenly alive to the evils which in his day seemed to threaten the very existence of the Church and society, strove to counteract their baneful influence by establishing an order, the members of which were to observe the most absolute poverty, and to be devoted to the serv¬ ice of the Church. The goal which he aimed at was to reproduce the ideal of the divine life on earth, therefore neither he nor his were to possess anything temporal, but were to go about doing good and preaching to all the world the kingdom of heaven. A little band of disciples to the number of seven, aglow with enthusiasm, gathered around the saint, and the little chapel of Sta. Maria degli Angeli, near Assisi, which he called Portiuncula, ((the

little portion, or in¬ heritance,** was the place where the order was first planned. It was truly a humble origin, an

insignificant beginning, but Francis had a pre¬ sentment of the future world-wide extension of his order. In 1210 he obtained from Inno¬ cent III a verbal approbation of the rule he had drawn up for it. Forthwith it appeared how accurately he had gauged the wants of his age, for his order sprang at a bound into popular favor. So rapid was its growth that 10 years afterward, at a chapter held near Assisi, more than 5,000 of his religious assem¬ bled, and not half a century had elapsed when they counted missionaries in every known coun¬ try, as may be learned from a bull of Alex¬ ander IV in 1258. In 1260, when a chapter presided over by Saint Bonaventure was held at Narbonne, the order had 1,400 houses. At the dissolution of the monasteries in England there were 65 houses of Franciscans and even in 1680, in spite of severe losses in Protestant countries, the order numbered 100,000 members. The order is ruled by a general minister, who, with his council or definitorium, resides in Rome. It is divided into provinces to govern which provincials are elected. Each province is composed of a certain number of houses or convents, whose superiors are termed guard¬ ians.

Owing to the absolute nature of the poverty prescribed by the second rule drawn up for the first order and approved by Honorius III in 1223, some of Saint Francis' immediate fol¬ lowers showed tendencies inimical to it even in the saint's lifetime. After his death these tendencies became more marked, and were covertly connived at and effectively encouraged by the second minister-general, Elias of Cor¬ tona. This was the rift in the lute which widened as time went on. Some zealous up¬ holders of the purity of the rule, such as Saint Anthony of Padua, Adam de Marisco, Caesar of Spires,

protested against all innovations, and labored strenuously to maintain intact their sacred inheritance, receiving the distinctive name of Cesarines, but eventually returning to the body of the order in 1256. Other reforms were initiated, such as that of Peter of Mace- rata, 1294; that of Philip of Majorca, 1308; that of John of Vallees, 1336; and others. They met with varying success, until in 1415 a final split took place, one section of the order adopt¬ ing the mitigations which had been introduced in the matter of poverty, this being the bone of contention all through. They became known as the Conventuals, while the members of the other section were called Observants, as ob¬ serving faithfully the Franciscan traditions. These latter still adhere strictly to the original austerity of their rule. Saint Bernardine of Sienna, Saint John Capistran and Saint James de la Marcha were mainly instrumental in pro¬ moting the interests of the Observance. In 1517 Leo X issued his famous bull, Ite et vos in vine am meant, decreeing that a general minister of the whole order was to be chosen from among the Observants, and that the Con¬ ventuals were to elect a master-general. The Observants, however, did not satisfy the zeal of some, and thus we find certain groups, such as the Reformati, originating in Italy; the Alcantarines, or those who follow the reform of Saint Peter of Alcantara, in Spain; and the Recollects.

There were now the two great families of the first order, the Observants and the Con¬

ventuals, these latter being governed, as said above, by a master-general, and notwithstanding their dispensations in regard to poverty, they have always rendered important services to the Church. The great Pope Sixtus V was himself a Conventual. In 1525 there arose a third family, known as the Capuchins (q.v.).

The Franciscans did not devote themselves exclusively to the apostolic life. From the first they took an active and leading part in the study of Holy Scripture and in all the branches of sacred and

secular learning. They have filled with honor the first chairs in the most celebrated universities. Such great names occur among them as Alexander of Hales, Saint Bonaven¬ ture ((were Fran¬ ciscans. Nuncios, legates, archbishops, many cardinals and several popes have been chosen from among the Franciscans.

The relations of the Franciscans with Amer¬ ica began with its very discovery. Father Juan Perez, guardian of the Franciscan monastery at La Rabida, the adviser and personal friend of Columbus, with several companions, accom¬ panied the discoverer in 1493. The first con¬ vent was erected for them at what is now the city of Santo Domingo, on Haiti ; another arose at La Vega, on the same island. Connected with these convents were the first schools in the western hemisphere.

Owing to the enthusiasm among the re¬ ligious in Spain, and to the docility of the Indians, the order spread so rapidly in the West Indies that King Ferdinand found it advisable to issue a decree forbidding the erection of a new convent except at a di- tance of at least five leagues from one already existing. In 1505, only 13 years after the dis¬ covery, there was a sufficient number of convents to form a province, under the name of Holy Cross. The first diocese to be erected was Santo Domingo, in 1504; its first bishop was Father Juan de Padilla, a Franciscan.

After the Spaniards had set foot on the mainland, the king, ever anxious for the spirit¬ ual welfare of the aborigines, sent over a great number of friars under the leadership of Father Juan de Quevedo, who was appointed bishop of Darien, the first bishop on the American conti¬ nent. The Franciscans entered Venezuela in 1508, Brazil in 1519; in 1535 they were able to form a province in Peru, whence were founded the missions farther south in the Andes and Pampas. Saint Francis Solanus, called the A.postle of Peru on account of his extraor¬ dinary missionary labors, evangelized these regions ; he died at Lima in 1610.

In 1521, if not before, the first Franciscans came to Mexico. Together with 12 friars known as the Twelve Apostles of Mexico, there labored here from 1533 to 1572 the famous Brother Gante. He wrote a catechism in the

Aztec language, erected over 100 churches and with one companion frequently baptized 8,000 Indians in one day. Many schools were erected, in which often as many as 600 and 800 boys received an elementary education. Owing to their stainless lives, abstinences and contempt for gold, the friars obtained marvelous results among the natives. In 1535 the 70 convents in Mexico were organized into a province. At the end of the 16th century there were three provinces ; others have been formed since then, besides several missionary colleges, whence zealous missionaries set out to convert the natives to the north, notably in Florida, New Mexico, Arizona, Texas and California.

Florida was the first of the States that be¬ held the Franciscan garb. Five friars came with Narvaez in 1528; their superior, Father Juan Suarez, was the first bishop in the United States. In the course of time the missionaries succeeded, though not without heavy sacrifices of life and labor, in establishing flourishing missions all along the coast and in the interior as far west as Mississippi and as far north as Georgia. In 1634 there were 34 friars, who maintained 44 mission stations, where they at¬ tended to about 30,000 converts. These mis¬ sions suffered greatly by invasions from Caro¬ lina and Georgia, and when Florida was ceded to the English in 1763 they ceased to exist

Arizona and New Mexico were first visited by Franciscans in 1539; in the course of time a great many missions and churches were es¬ tablished, to most of which were attached schools for boys, as we learn from an official report of 1632. Beginning

with 1689, about 160 friars labored in Texas up to the time of the Mexican independence, when the missions were ruined.

The Franciscans came to California in 1768 under the renowned Father Junipero Serra. The first mission founded was San Diego. Up to 1823, 21 missions were organized, forming a chain which extended a distance of over 700 miles. At the height of mission prosperity 30,000 Indians lived under the paternal guidance of the friars ; they were fed, clothed and edu¬ cated, with no expense to the government, the missions supporting themselves by agriculture and stock-raising ; everything was manufactured at these establishments by the Indians. In 1834 the Mexican government began to con¬ fiscate the missions and took them from the control of the friars; this work was finished by 1846 and brought about the complete destruc¬ tion of the once so flourishing missions.

While the Spanish Franciscans were thus extending their labors in the south from the Atlantic to the Pacific, other bands of Friars Minor were emulating their example in the north. Champlain induced the French Francis¬ cans, formerly called Recollects, to come to Canada as early as 1615. Thence they pene¬ trated into Maine, New York, Pennsylvania, Michigan, Illinois, Minnesota and Wisconsin. The best known of these missionaries is Father Louis Hennepin. He accompanied La Salle on his expeditions, and was the first to publish a description of the Niagara Falls. While a cap¬ tive among the Sioux he saw and named the Falls of Saint Anthony. About this time we find the English Franciscans laboring in Mary¬ land and adjoining colonies for full half a cen¬ tury. In the beginning of the 19th century the

Rt. Rev. Michael Egan, a Franciscan and first bishop of Philadelphia, intended establishing a province of his order in Pennsylvania, but he died before accomplishing his design. In 1845 Franciscans from the Tyrol came to Cincinnati; in 1854 Italian friars formed a community in western New York, and in 1858 German friars settled in Illinois. The ^Kulturkampf® was the cause of many more coming to the United

States.

At present there are in the States about 1,- 200 Franciscans, who are distributed through¬ out the country. Most of these friars are en¬ gaged in regular parish work; some preach missions throughout the States ; others are on the Indian missions in Michigan, Wisconsin, California, Arizona and New Mexico. They also conduct one seminary (Allegany, N. Y.) and six colleges (Allegany, N. Y., Cincinnati, Ohio, Teutopolis, Ill., Quincy, Ill., Pulaski, Wis., Santa Barbara, Cal.).

The Conventual Friars Minor came to the United States in 1851, and at present form a province in New York and New Jersey num¬ bering about 125 members. Besides these there are in the States 134 Franciscan Brothers and some 7,800 Sisters, all belonging to the third Order of Saint Francis. In 1897 the four above-mentioned groups, namely, Observants, Reformati, Alcantarines and Recollects, who had always been under the same minister-gen¬ eral, dropped their distinctive traits and are now known simply as Friars Minor or Francis¬ cans. They number at present about 17,000.

Consult Shea, (Catholic Church in the United States) ; Hammer, (The Franciscans in America) ; Engelhardt, (Franciscans in Califor- nia) ; (Franciscans in Arizona. >

Rev. P. Hugoline Storff, O.F.M.

FRANCK, Adolphe, French philosopher: b. Liocourt, department of the Meurthe, 9 Oct. 1809; d. Paris, 11 April 1893. Finding his proper field in philosophy after attempts in other directions, in 1832 he taught in various colleges and in 1840 at Paris, beginning in the same year a course of public lectures at the Sorbonne. In 1842 he became assistant curator of the Bibliotheque Royale, and soon after be¬ gan his chief work, (Dictionnaire des Sciences Philosophiques.* In recognition of his (Esquisse d’une Histoire de la Logique) and his book on the Cabala (translated into Ger¬ man in 1844 by

Adolf Jellinek), he was elected in 1844 member of the Institute de France. In 1847 he started at the Sorbonne a course in social philosophy, and in 1856 became professor of natural and civil law, holding the position for 30 years. He founded Paix Sociale, the organ of the Anti-Atheist League, and was president of the Societe des Etudes Tuives in 1888. Among his best-known works, in addi¬ tion to those already mentioned, are (Etudes Orientales) (1861) ; (Reformateurs et Publi- cistes de l'Europe) (1863-93) ; (La Philosophic Mystique en France au XVIII Siecle) (1866); (1871) ; (La Religion et la

Science dans le Judaisme) (1883) ; (Essais de Critique Philosophique) (1885) ; (Nouveaux Essais> (1890).

FRANCK, Cesar Auguste Jean Guillaume Hubert, sa'zar o-giist zhoii ge-yom iibar, frank, French composer: b. Liege 1822; d. Paris 1890. He studied in the conservatory of his

native town and at Paris, and in 1872 succeeded his master, Benoist, as teacher in the Metropol¬ itan Conservatory. His talent as a composer was for a long time unrecognized, and in 1846 his oratorio

FRANCK, or FRANK, Sebastian, German humanist and reformer : b. Donauworth, c. 1499 ; d. Basel, c. 1543. He was educated for the Catholic priesthood, studying at the universities of Ingoldstadt and Heidelberg. Ordained in 1524, he held a curacy near Augsburg, but the following year joined the Reformation party at Nuremberg and became Protestant preacher at Gustenfelden. In 1518 he had attended the Augsburg Conference, and had met Luther, Bucer and Frecht, who were to exercise a considerable influence on his writings. Besides translations and editorial work, he published in 1528 a treatise against drunkenness which gained considerable popularity. He signed him¬ self Frank von Word after

his native city, Donauworth. His liberal religious ideas, how¬ ever, antagonized the authorities, and he re¬ moved from Nuremberg to Strassburg in 1529 where two years later he published his chief work, (Chronica, Zeitbuch und GeschichtsbibeP (1531). Freedom of thought, broad tolerance in connection with a universal but invisible spiritual Church, ideas far in advance of his age, expressed in clear, forcible, direct lan¬ guage, again brought him official condemnation, Luther even describing him as a <(devil's mouth." His life henceforth witnessed a series of polem¬ ical vicissitudes, with removals to Esslingen, Ulm, and finally Basel. (Weltbuch) (Tubingen 1534) supplemented the (Chronica) ; the same year appeared (Augsburg

1538) ; (Germaniae Chronicon) ; (Frankfort

1539) ; (Kriegbuchlein des Friedens) (pseudony¬ mous, 1539) ; (Schrifftliche und ganz griindliche Auslegung des 64 Psalms) (1539) ; (Das ver- biitschierle mit sieben Siegeln verschlossene Buch) (1539); (Spruchworter) (1542; new ed. by Guttenstein 1831). Consult Hase, C. A., (Sebastian Franck von Word) (1869) ; Tausch, E., (Sebastian Franck von Donauworth und seine Lehrer) (1893).

FRANCKE, fran'ke, August Hermann,

German Lutheran clergyman and philanthropist: b. Liibeck, 22 March 1663; d. Halle, 8 June 1727. In 1692 he obtained the professorship of Orien¬ tal languages at Halle, which in 1698 he ex¬ changed for that of theology. A pupil of Spener and the teacher of Zinzendorf, Francke belonged to the ranks of those who carried for¬ ward the pietistic movement; his activity, how¬ ever, took the practical direction of founding, endowing and organizing various educational institutions at Halle. Among these were a school for the poor, a pedagogium, a burgher school, a Latin school and a seminary for train¬ ing teachers for these establishments, all founded in one year, 1695; and with them was associated an orphanage, which became in the course of time the most important of all Francke's

institutions. At the time of his

death his schools were frequented by more than 2,300 pupils. Francke's principal aim was religious instruction, but he founded also a printing-office, and an apothecary's shop, and taught natural science and physical exercises and manual trades.

FRANCKE, Kuno, German-American ed¬ ucator and author : b. Kiel, Germany, 27 Sept. 1855. His life work became associated with Harvard University, where he was instructor from 1884-87 ; assistant professor of German 1887-92, and of German literature 1892-96 ; pro¬ fessor of history and of German kultur from 1896; and curator of the Germanic Museum from 1902. He received his early education at Kiel gymnasium, graduating in 1873, and at the Uni¬ versity of Munich, attaining his Ph.D. in 1878. He received the degrees of LL.D. University of Wisconsin 1904, and Litt.D. Harvard Uni¬ versity 1912, and from the German imperial government the title of Chevalier Royal Prus¬ sian Order Red Eagle and Order of the Crown. His early works published in Germany include : (Zur Geschichte der Schulpoesie des 12 Jahr- hunderts> (1878) ; (De Hymno in Cererem Ho- merico) (1880) ; (Libelli de Lite Imperatorum et PontificunP (1892). After settling in the United States he published (Social Forces in German Literature) (1896) ; (Glimpses of Mod¬ ern German Culture) (1898) ; (History of Ger¬ man Literature) (1901) ; (Handbook of the Germanic Museum > (1906) ; (German Ideals of To-day) (1907) ; (Die Kulturwerte der deutschen Literatur des Mittelalters) (1910) ; (A German- American's Confession of Faith (1915) ; Per¬ sonality in German Literature before Luther) (1916) ; (The German Spirit* (1916) ; editor- in- chief (The German Classics) (1914).*

FRANCKEN, Frans, frans frank'en (called The Younger), Flemish painter: b. Antwerp, May 1581 ; d. there, 6 May 1642. After a trip to Italy he was received into the Guild of Saint Luke at Antwerp, where he worked at first in the brilliant colors of the old masters and later in the realistic style of Rubens.

FRANCKEN, Frans (called The Third), Flemish painter : b. Antwerp 1607 ; d. there, 2 Sept. 1667. He was admitted to the Guild of Saint Luke in 1639. His works, patterned after Rubens, are unsigned and therefore difficult of identification. Specimens of his religious sub¬ jects are to be seen at Augsburg ((Moses Strik¬ ing Water from the Rock) and Vienna. He was the last of the Francken family of 11 Ant¬ werp painters whose works date from the 16th and 17th centuries. He was the son of Frans Francken (The Second), b. 1581; d. 1642; among whose paintings are (Christ Washing the Apostles' Feet,* in the Berlin museum; was the altarpiece of Ant¬ werp Cathedral. The latter's elder brother, Hieronymus Francken, b. 1540; d. 1610; became court painter to King Henry III of France and decorated the palace of Fontainebleau; he is represented in the Dresden museum by (The Beheading of John the Baptist. 5*

'

'

•

■

■

• •–«

•

.

.

• \ caHc<

.

.

•

'

.

? ••

■

■

V

N

I

Vol. 12, FRANCO TO GOETHALS

Americana

ˆt

|

I

I

i

I

1

5

1

1

i

i

I

I

1

I

j

I

I

ri

THE

ENCYCLOPEDIA

AMERICANA

JT

UjitVEHSAL

Knowledge,

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK. CHICAGO

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN I® t922

J5”>.!.A654317

I

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XII

ANGELL, JAMES ROWLAND, Litt.D.

President of Yale University

FUNCTIONALISM

AYRES, SAMUEL G., B.D.

’Librarian, Garrett Biblical Institute

GENERAL CONFERENCE OF THE METHODIST EPISCOPAL CHURCH

ASHE, SYDNEY W.

Educational Department, General Electric Com¬ pany, Pittsfield, Mass.

GENERATORS

BENNETT, CHARLES E., Litt.D.

Late Professor of Latin, Cornell University

GALLIC WAR, .OESAR'S COMMEN¬ TARIES ON THE GERMANIA

BERTLING, K. O., Ph.D.

Amerika Institut, Berlin, Department of Educa¬ tion

GERMANY — GERMAN SCHOOLS

BESSEY, ERNEST A., Ph.D.

Professor of Botany, Michigan Agricultural College

FUNGI

BIGELOW, JOHN, LL.D.

Author of "The Complete Works of Benjamin Franklin," etc.

'franklin, benjamin

BOTHNE, GISLE, A.B.

Professor of Scandinavian Languages and Literature, University of Minnesota

FRITH JOF'S SAGA

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

GERMANY — DIPLOMATIC RELA¬ TIONS OF THE UNITED STATES WITH

CANFIELD, ARTHUR G., Ph.D.

Professor of Romance Languages, University of Michigan

FROISSART'S CHRONICLES

CARLTON, WILLIAM N. C., M.A., L.H.D.

Librarian, Newberry Library, Chicago

GARFIELD, JAMES ABRAM

CARROLL, HENRY K., LL.D.

Author of "Religious Forces in the United States," etc.

GERMAN BAPTIST BRETHREN

CASTLE, WILLIAM ERNEST, Ph.D.

r Professor of Biology, Harvard University

GENETICS

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

GAMETOPHYTE

CHANDLER, FRANK W., Ph.D,

Professor of English and Comparative Literature, University of Cincinnati

GIL BLAS

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

FRENCH REVOLUTION, THE

COUMBE, CLEMENT W.

Technical Art Expert

FRESCO PAINTING FURNITURE, HISTORY OF ANCIENT FURNITURE, MEDIAEVAL GAUNTLETS

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

FRANKENSTEIN

DAKE, CHARLES LAURENCE, A.M.

Professor of Geology, School of Mines and Metal¬ lurgy, Univesity of Missouri

GEOLOGY

DARTON, NELSON H.

United States Geological Survey

GASES IN MINES AND COAL GEOMORPHOLOGY

DERRY, JOSEPH T.

Author of “History of Georgia ”

GEORGIA, STATE OF

DOLE, NATHAN HASKELL, A.B.

Author, Editor and Translator

FRUITS OF CULTURE GANGHOFER

DOUGLAS, D. S.

Editorial Staff of The Americana

GEORGE, DAVID LLOYD GLADSTONE, WILLIAM EWART

EGGERT, CARL E., Ph.D.

Assistant Professor of German, University of Michigan

GEORGE, STEFAN

EISELEN, FREDERICK CARL, Ph.D., D.D.

Professor of Old Testament Interpretation, Garrett Biblical Institute

GENESIS, BOOK OF

ELROD, MORTON J., Ph.D.

Director of Biological Station, University of Montana

GLACIER NATIONAL PARK

EMERSON, OLIVER FARRAR, Ph.D., Litt.D.

Professor of English, Western Reserve University

GIBBON, EDWARD

Contributors to Volume XII — Continued

EMERTON, EPHRAIM, Ph.D.

Winn Professor of Ecclesiastical History, Harvard University

GERMANY — HISTORY OF GERMAN RELIGION

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

GAS

GLUCOSE

GAY, WILLIAM H.

President of Berkey & Gay Furniture Co., Grand Rapids

FURNITURE INDUSTRY IN AMERICA, THE

GENTHE, KARL WILHELM, Ph.D.

Formerly Assistant Professor of Natural History, Trinity College

GENTHE, MARTHA KRUG, Ph.D.

GERMANY — PHYSIOGRAPHY

GLASSON, EDWIN J.

United States Department of Agriculture

FRUIT GROWING

GOEBEL, JULIUS, Ph.D.

Professor of Germanic Languages in the University of Illinois

GERMANY — HISTORY OF – LITERA¬ TURE

HAMLIN, A. D. F., A.M., L.H.D.

Professor of Architecture, Columbia University

FRENCH ARCHITECTURE

HAUHART, WILLIAM F., Ph.D.

Assistant Professor of German, University of Michigan

FRENSSEN, GUSTAV FREYTAG, GUSTAV FULDA

HENDERSON, ERNEST F., Ph.D.

Author of “Short History of Germany”; “Bliicher and the Uprising of Prussia against Napoleon,” etc.

GERMANY — POLITICAL HISTORY TO 1871

INGERSOLL, ERNEST

Zoologist, Editor and Author

FUR-BEARING ANIMALS

FUR TRADE

FURS

GAME BREEDING GLYPTODONT

ISAACS, LEWIS M., Ph.B., LL.B.

Music Critic and Composer

FREISCHUTZ, DER

JAGEMANN, HANS CARL G. VON, Ph.D.

Professor of German Philology, Harvard University

GERMANY — HISTORY OF THE GERMAN LANGUAGE

JELLIFFE, SMITH ELY, M.D., Ph.D.

Formerly Professor of Pharmacognosy, Columbia University

FREUDIANISM, MEDICAL ASPECTS OF

GENERAL PARESIS

KAINS, M. G., B.S., B.S.A., M.S.A.

Lecturer on Horticulture, Columbia University

FRUIT

FRUIT INDUSTRY

KALLEN, HORACE M., Ph.D.

Instructor in Philosophy, University of Wisconsin

FREUDIANISM

KASNER, EDWARD, Ph.D.

Professor of Mathematics, Columbia University

GEOMETRY, ELEMENTARY

KEYSER, CASSIUS J., Ph.D.

Adrian Professor of Mathematics, Columbia University

GEOMETRY, CARTESIAN GEOMETRY, LINE-, AND ALLIED THEORIES

GEOMETRY, MODERN ANALYTICAL

KLEIN, HENRI F.

Editorial Staff of The Americana

GEDDES, SIR ERIC CAMPBELL GEORGE V

KOESTER, FRANK, C.E.

Consulting Engineer, New York City

GERMANY — ECONOMIC ORGANIZA¬ TION

GERMANY — NATIONAL WEALTH GERMANY — INDUSTRIES GERMANY — TRAFFIC AND TRANS¬ PORTATION

GERMANY — THE ARMY GERMANY — THE NAVY

KRUGER, FRITZ-KONRAD, Ph.D.

Author of “Government and Politics of the German Empire”

GERMANY — PARTIES AND PARTY POLITICS

GERMANY — THE GOVERNMENT GERMANY — THE JUDICIARY

KUNZ, GEORGE F., Ph.D., Sc.D.

Gem Expert, Tiffany & Co., New York City

GEMS, ENGRAVING OF

LENNOX, PATRICK J., B.A., Litt.D.

Professor of English Language and Literature, The Catholic University of America

GAELIC LEAGUE, THE

LICHTENBERG, BENJ.

Of J. Adler & Co., New York

GLOVE MANUFACTURE IN AMERICA

LUFFT, H.

Writer on German Economics and Finance

GERMANY — COMMERCE GERMANY — MONEY, BANKING, EX¬ CHANGE

Contributors to Volume XII — Concluded

MacMECHAN, ARCHIBALD, Ph.D.

Professor of English Literature, Dalhousie College, Halifax, N. S.

FREDERICK THE GREAT FRENCH REVOLUTION, THE

MACH, EDMUND VON, Ph.D.

Author of “Outlines of the History of Painting” “The Art of Painting in the Nineteenth Century”

GERMANY — PAINTING GERMANY — SCULPTURE GERMANY — ARCHITECTURE

MASON, SIDNEY

President, Welsbach Company

GAS ILLUMINATION

MORE, PAUL ELMER, LL.D., Litt.D.

Author of “Life of Benjamin Franklin,” etc.

FREEDOM OF THE WILL

MUNROE, CHARLES E., S.B., Ph.D.

George Washington University, Washington, D. C.

FUSE

MUNSTERBERG, HUGO, Ph.D., LL.D.

Late Professor of Psychology, Harvard University

GERMANY — HISTORY OF SCIENCE AND PHILOSOPHY

GERMANY — THE GERMAN UNIVER¬ SITY SYSTEM

NASON, ARTHUR H., Ph.D.

Professor of English, New York University

GODWIN, MRS. MARY WOLLSTONE- CRAFT

GODWIN, PARKE

NOURSE, EDWARD E., D.D.

Professor Biblical Theology, Hartford Theological Seminary

GALATIANS, EPISTLE OF PAUL TO THE

PALMER, WALTER B.

Former Special Agent, Bureau of Foreign and Domestic Commerce

GLASS MANUFACTURING IN AMERICA

PANARONI, ALFRED G., B.S.

Instructor in Romance Languages, College of the City of New York

GIACOSA, GIUSEPPE

GINGILLINO

GIUSTI

RINES, IRVING E.

Editor of “History of the United States”

GALLATIN, ABRAHAM ALFONSE .ALBERT

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers In¬ surance Company, Hartford, Conn.

GASES

SCHEVILL, FERDINAND, Ph.D.

Professor of Modern History, University of Chicago

GERMANY AND THE WAR

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Author of “Germany: the Welding of a World Power,” etc.

GERMANY — POLITICAL HISTORY,

1871-1918

GERMANY — AGRICULTURE

SERVICE, JOHN A.

Authority on European Glass Manufacture, Toronto, Canada

GLASS, DEFINITION AND HISTORY OF GLASS, CHEMICAL

PROPERTIES OF GLASS-MAKING

SHOREY, PAUL, Ph.D., LL.D.

Head of Greek Department, University of Chicago

FROGS, THE

SHOWERMAN, GRANT, Ph.D.

Professor of Latin Literature, University of Wis¬ consin

FRERE'S TRANSLATION OF ARISTO¬ PHANES

GEORGICS OF VIRGIL, THE

SMITH, DAVID EUGENE, Ph.D., LL.D.

Professor of Mathematics, Teachers College, Colum¬ bia University, New York

GEOMETRY, HISTORY OF THE ELE¬ MENTS OF

SOUTHALL, JAMES P. C., B.A., M.A.

Associate Professor of Physics, Columbia University

GEOMETRICAL OPTICS

SPALDING, WALTER RAYMOND, A.M.

Assistant Professor of Music, Harvard University

GERMANY — HISTORY OF GERMAN MUSIC

TAAFFE, THOMAS GAFFNEY, A.M.

Professor of English, Fordham University

FULDA, ABBEY OF GAELIC LITERATURE GALL, ABBEY OF SAINT

THOMPSON, GEORGE FAYETTE

Bureau of Animal Industry, Washington, D. C.

GOAT, THE

VAN DOREN, CARL, Ph.D.

Associate in English, Columbia University

FRANKLIN'S AUTOBIOGRAPHY

WELLS, BENJAMIN W., Ph.D.

Author of "Modern French Literature"

GARGANTUA AND PANTAGRUEL GENIUS OF CHRISTIANITY, THE

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

GEOMETRY, NON-EUCLIDEAN

WILSON, EDWIN BID WELL

Professor of Mathematical Physics, Massachusetts Institute of Technology

GEOMETRY, PURE PROJECTIVE

YERKES, ROBERT M., Ph.D.

Professor of Psychology, University of Minnesota

GENETIC PSYCHOLOGY

- Deceased

KEY TO PRONUNCIATION

a

a or a

a

a

A

a

ch

e or e

e

e

e

ff

far, father fate, hate at, fat air, care ado, sofa all, fall choose, church eel, we bed, end

her, over: also Fr. e, as in de; eu, as in neuf; and oeu, as in boeuf, coeur; Ger. d (or oe), as in okonomie.

befall, elope

agent, trident

off, trough

n

g gas, get

gw anguish, guava h hat, hot

Ji or h Ger. ch, as in nicht , wacht hw what

I file, ice

i or 1 him, it

i between e and i, mostly in

Oriental final syllables, as, Ferid-ud-din

j gem, genius

kw quaint, quite

n Fr. nasal m or n, as in embon¬

point, Jean, temps

ng

9

nk

Span, h, as in canon (can’yon), pin on (pen’yon)

mingle, singing

bank, ink

no, open

o or o not, on

01

corn, nor atom, symbol book, look

oil, soil ; also Ger. eu, as in beutel

6 or oo fool, rule ou or ow allow, bowsprit

s

sh

th

fh

u

satisfy, sauce show, sure thick, thin father, thither mute, use

uoru but, us pull, put

u

ii between u and e, as in Fr. sur,

Ger. Milllcr

of, very

(consonantal) yes, young

zh

pleasant, rose azure, pleasure

‘(prime) ,” (secondary) accents, to indicate syllabic stress

FRANCO, fran’ko, Giovanni Battista,

Italian painter and etcher, called II Semolei : b. Udine, 1510; d. Venice, 1580. He visited Rome, where his Venetian manner was much influenced by that of Michelangelo. His best work was done in decorative lines. Upon the victorious entry of Charles V of Spain into Rome in 1536 he embellished the triumphal arch with scenes de¬ scriptive of the city’s history. His principal canvas is a (Baptism of Christ) in the Venetian Church of San Francesco della Vigna. His etchings, including such plates as (The Adora¬ tion of the Shepherds) and (The Scourging of Christ) (after Titian), are by many preferred to his paintings, which are criticized for defects of color.

FRANCO-GERMAN or FRANCO- PRUSSIAN WAR, the stupendous conflict be¬ tween France and Germany in 1870-71, which resulted in the total defeat of the French, the overthrow of the Napoleonic dynasty, the es¬ tablishment of the Third Republic in France and the consolidation of Germany into an em¬ pire under the leadership of Prussia.

The remote causes of this war are to be sought in the jealousy which had long existed between France and Prussia, and which was strengthened on the side of France by the Prus¬ sian defeat of Austria in 1866, which secured to her rival the unquestioned leadership in Ger¬ many. The immediate occasion of the war oc¬ curred in Tune 1870, when General Prim, com¬ manding in Spain after the deposition and abdi¬ cation of Queen Isabella, offered the crown of that country to Leopold of Hohenzollern, a prince belonging to the reigning house of Prus¬ sia. It was thought in France that the accept¬ ance of this offer would endanger the balance of power in Europe, and more particularly would threaten the safety of France, by putting Prussia in a position to attack it both in the east and in the south. Accordingly, the govern¬ ment of Napoleon III demanded of the King of Prussia that he should forbid the candidature of the prince. The prince voluntarily retired from his candidature, but the French ambassa¬ dor offensively insisted that this renunciation should be formally made by the king and a guarantee given that the candidature would not be revived. See Ems Dispatch. This demand was refused and a formal declaration of war by France against Prussia was received by Count Bismarck, the chancellor of the North German Confederation, on the 19th of July.

The war was welcomed by both sides with equal enthusiasm. While

the French were the first in getting their troops to the frontier it soon became manifest that instead of being in a complete state of readiness, as the Minister of War had declared, the army was defective in almost everything essential to its equipment.

In contrast to this the arrangements for mobilizing the German army, which had previ¬ ously been tested in Prussia in 1864 and 1866, were again found to work admirably. Each section of the army was completely organized in the headquarters of the district which it occu¬ pied in time of peace and was only sent to the frontiers after being furnished with everything it required. In addition to this, Prussia, against which country alone the war had been declared, was not only joined according to treaty by all the states of the North German Confederation but also by those of the south, upon whose neu¬ trality, perhaps even upon whose alliance, Na¬ poleon and the French had counted. The whole of Germany north and south was thus in arms and was able to muster forces far outnumber¬ ing those of the French. While the whole French army brought into the field at the com¬ mencement of the war numbered no more than 310,000 men, the troops of the Germans in the field amounted in all to 477,000, to which must be added strong reserves ready, with the ex¬ ception of such as were necessary to protect the interior and to resist a threatened landing on the north coast by the French fleet, to be brought to the scene of war at any time, giving a total strength on the side of the Germans of more than 1,000,000 men.

The German forces were divided into three armies ; the First Army had its headquarters at Treves under General Steinmetz ; the Second Army occupied the Bavarian Palatinate under Prince Frederick Charles; while the _ Third Army, under the crown prince of Prussia, was stationed in northern Baden. The cavalry of each army, instead of being attached in separate divisions to each of the corps d'armee compos¬ ing the army, were in this way massed together into one body, and in this formation rendered very important services during the war. The commander-in-chief of the whole forces was King William of Prussia, who was supported by a staff of general officers, with Von Moltke at their head. The French army, under Napoleon himself, had its headquarters at Metz, and two advanced divisions were stationed on the bor¬ ders of France and Germany, the one in the

north on the Saar, under General Frossard, the other farther south at Weissenburg, under Gen¬ eral Douay. The first overt act of war took place on 2 August, in which a part of the north¬ ern division of the French army, in the pres¬ ence of Napoleon and the prince imperial, com¬ pelled a few Prussian troops belonging to the First Army, after some hours' firing, to evacu¬ ate Saarbriicken. After this Von Moltke as¬ sumed the offensive. His plan was to unite the three armies in the line of the Moselle in' order to attack the enemy's centre with the view of obtaining the shortest line of operations in the direction of Paris, and in this he was completely successful. On 4 August the army under the crown prince defeated the advanced southern division of the French army at Weissenburg, and on 6 August MacMahon's army at Worth ; on the latter date also the first and second German armies had routed the northern division of the French army at Forbach, with terrible loss on both sides. In two separate armies, com¬ manded respectively by Marshal Bazaine and Marshal MacMahon, the French retreated. To prevent their union Steinmetz and Frederick Charles pursued Bazaine, defeated him at Cour- celles on 14 August, at Mars-la-Tour on the 16th, at Gravelotte with awful slaughter on the 18th, and shut him up in Metz. The crown prince and his army following MacMahon ad¬ vanced to Nancy; there reinforced by a newly formed army under the crown price of Saxony, they advanced on Chalons, where MacMahon's army had been reorganized and strengthened, and was expected to retreat on Paris. Follow- ing instructions, however, MacMahon moved northward to make a descent upon Metz and relieve Bazaine. He was overtaken near Beau¬ mont, and on 27 August and on the days im¬ mediately succeeding a number of engagements

ning of November war in the open field had been resumed at various points : in the north, in the southeast and on the Loire in the neighbor¬ hood of Orleans. The army of the Loire, under Gen. Aurelle de Paladines, compelled the Ger¬ mans to evacuate Orleans on 7 November, but was unable to follow up this temporary suc¬ cess, and on 4 December and on 12 January was severely defeated by Prince Frederick Charles. The army of the north, under General Faidherbe, which had been hastily formed to attempt the relief of Paris, after many gallant attempts which were checked by the first Ger¬ man army under General Manteuffel, was finally defeated at Saint Quentin on 19 January. In the east and southeast the results were equally dis¬ astrous to the French. General Werder defeated the French troops under Cambriels in the Vosges, the irregular forces under Garibaldi in Burgundy, and at Hericourt on the Lisaine on 15, 16 and 17 January kept in check the army of Bourbaki until the approach of Manteuffel

compelled Bourbaki and 84,000 troops to escape into Switzerland, where they were disarmed and remained till the conclusion of the war.

Meanwhile Paris had held out f®r a much longer period than even the most sanguine on the side of the French had expected. Desperate sallies were frequently made, but not in suffi¬ cient strength to have any decisive effect. On the failure of the last sally, on 19 January, Gen¬ eral Trochu resigned and was succeeded by Leflo as head of the government of defense, and by General Vinoy as commander of the troops of Paris. But by this time the city was at the point of starvation, and after a three weeks' bombardment was in such a desperate condition that the government could no longer help seeing that a capitulation was inevitable. The terms were settled on 28 January, the chief

and strategic movements resulted in Mac-_^ being that all the forts around Paris 'should be

M Q hntl C Qrrmr hoitirr cnrromiHnd 4- 1 . ^ J _ i. . 1 1 1 i i

Mahon's army being surrounded at Sedan on 1 September by a force of overwhelming num¬ bers. On the following day both army and fortress were forced to capitulate. Forty gen¬ erals, 4,000 officers of all grades and 84,000 sol¬ diers became prisoners of war. Among the prisoners was Napoleon III, who was unexpect¬ edly found to have been present with the army of MacMahon. On the day after the battle he had a personal interview with King William of Prussia, who assigned to him Wilhelmshohe, near Cassel, as a place of residence during his captivity.

At the news of this disastrous defeat the., Parisians in an outburst of rage demanded the dethronement of the Napoleon dynasty, and on 4 September a republic was proclaimed. A gov¬ ernment of national defense presided over by General Trochu, military governor of Paris, was formed, but before any effective measures could be adopted Paris was invested by the Ger¬ mans on 19 September. A day or two before a delegation from the central government had es¬ caped from Paris and established themselves at Tours, where they were joined on 9 October by Gambetta, who escaped from Paris by balloon. It was some time before the French were able to organize a new army, and in the meantime, 27 September, Strassburg fell into German hands, and on 28 October Metz, which had been in¬ vested by the second German army under Prince Frederick Charles, capitulated. By the begin-

immediately handed over to the Germans, and that the city should pay a contribution of 200,000,000 francs ($40,000,000). An armistice of three weeks was at the same time concluded, to allow of the election and assembling of a National assembly to decide upon war and peace. This armistice, however, was not to ex¬ tend to the scene of war in the southeast until a separate arrangement had been made regard¬ ing it. Here the fortress of Belfort still held out, but at last, on 16 February, it agreed to capitulate. The garrison, on account of its gal- lant defense, was allowed to march out with full military honors. On the same day the ‘■armistice became general. The fortress of Bitsch in the department of Moselle, did not surrender till after the conclusion of the pre¬ liminaries of peace.

The elections for the assembly had taken place on the 8th; it met at Bordeaux, and on the 17th appointed M. Thiers head of the ex- »

1 fills’

cede to Germany one-fifth part of Lorraine, including Metz, together with the whole of Alsace except Belfort and the surrounding dis¬ trict. (2) That France should pay to Germany a war indemnity of 5,000,000,000 francs ($1,000,- 000,000). (3) That certain departments of

France should remain in the occupation of the Germans and should not be fully evacuated until after the payment of the whole indemnity. The definite treaty of peace, which was signed at Frankfort on 10 May and ratified on the 21st, confirmed in all essential particulars the preliminaries of Versailles. The last instalment of the war indemnity was paid on 5 Sept. 1873, and France was completely evacuated by the Germans on the 13th of the same month.

Bibliography. — Consult the French official account, (La Guerre de 1870-7P (Paris 1902) ; tne German official account, (Der deutsch-franzosische Krieg, 1870-7P (Berlin 1874—81) ; Von Moltke, (The Franco-Prussian War, 1870- 71, } translated by Forbes (London 1893) Chuquet, (La Guerre de 1870-7P (Paris 1895) ; Flerstlet, (The Map of Europe by Treaty* (Vol. Ill, London 1891) ; F. B. Maurice’s contribu¬ tion in Vol. XI of the (Cambridge Modern His¬ tory, } with its exhaustive bibliography; Sohel, (Iiistoire diplomatique de la guerre franco- allemande) (Paris 1875) ; Valfrey, (Histoire du traite de

FrancforP (Paris 1874-75) ; and the work of the United States ambassador, Recol¬ lections of a Minister to France) (New York

1887).

FRANQOIS, fran-swa, Kurt von, German explorer: b. Luxemburg, 1852. After active service in the Franco-Prussian War, he joined, with the rank of lieutenant, the Wiss- mann expedition to explore the river Kassai, a tributary of the Kongo, and subsequently pub¬ lished

FRANQOIS, Louise von, German novelist: b. Herzburg, Saxony, 27 June 1817; d. Weis- senfels, 24 Sept. 1893. Her first important story, cThe Last Reckenburgerin* . (1871), was very warmly praised by the critics for its power in character delineation; it was followed by (Frau Erdmuthen's Twin Boys-* (1872) ; (Climacteric Years of a Lucky Fellow) (1877) ; (Judith the Housekeeper* (1878), a peasant counterpart to (The Last Reckenburgerin,* and next after that her best story. She wrote a (Popular History of the Prussian War of Liberation, 1813— 15) ; and a comedy, (Woman's Station * (1882).

FRANQOIS DE NEUFCHATEAU, nef- cha-to', Nicolas Louis Frangois, Count; French poet and statesman: b. Lorraine, 1750; d. Paris, 1828. He was educated at the Jesuit College of Neuf chateau, and received this name in 1765 when a volume of poetry published by him attained considerable vogue. In 1770 he

was appointed professor of rhetoric at Toul, and in 1783-88 he was procureur general in San Domingo. Later he was deputy to the National assembly and to the legislative assem¬ bly, of which he became secretary and was for a time its president. He published, in 1793, a comedy entitled (Pamela, ou la vertu recom¬ pense which led to his imprisonment. In 1797 under the Directory he was Minister of the Interior, and during his tenure did much for inland navigation and for industrial exhibi¬ tions. He was president of the Senate in 1804-06, and after 1815 retired from politics. Other volumes by him are (Fables et contes en vers) (1814); and Res trois nuits d'un goutteux) (1819). He wrote also many articles on agri¬ culture and miscellaneous subjects and transla¬ tions. Consult Lamoureux, (Nicolas Louis Frangois de Neufchateau* (Paris 1843), and Simian, (Frangois de Neuf chateau et les ex¬ positions* (ib. 1889).

FRANCOLIN, a kind of small partridge belonging to the genus Francolinus of the family Phasianidae of Africa and southern Asia, much resembling the American bobwhite in behavior. One species (Francolinus vul¬ garis) used to be common in the south of Europe, but

has been exterminated.

FRANCONIA, Germany, a district lying to the east of the Rhine, and traversed by the Main. After the dismemberment of the Car- lovingian empire this district became attached to the German division, and ultimately formed one of the grand-duchies of Germany. Be¬ tween 1024 and 1125 it furnished a series of emperors to Germany. (See Germany, His¬ tory). It was one of the 10 circles into which the empire was divided by Maximilian I in 1512. Its capital was Nuremberg. In 1806 it was partitioned among Wurttemberg, Baden, Hesse-Cassel, the Saxon duchies and Bavaria. The last received the largest share, and still re¬ tains the name in the three circles of Upper, Middle and Lower Franconia. (1) Upper Franconia has an area of 2,702 square miles and pop. 661,126. Bayreuth is the capital. (2) Middle Franconia has an area of 2,925 square miles and pop. 929,985. The capital is Anspach. (3) Lower Franconia has an area of 3,243 square miles and pop. 709,832, Wurzburg is the capi¬ tal. The name of Franconia has been rendered familiar to the traveler and the geologist by its picturesque scenery, which has procured for part of it the name of Franconian Switzerland, and by its caverns, filled with fossil bones, among the most remarkable of which is Konig Ludwig's Hohle (King Louis' Cave), between Bayreuth and Muggendorf.

FRANCONIA MOUNTAINS. See

White Mountains.

FRANCS-TIREURS, fran'-te'rer' (Fr., free shooters; "snipers**), name given to bands of French soldiers whose exploits came into general notice during the Franco-German War of 1870-71. They originated in 1867-70 when military societies sprang up in northern France. They were not well organized at first, and waged an irregular warfare against small enemy detachments, lines of communica¬ tion, etc. The Germans refused to recognize them as belligerents of military standing, and when captured they were summarily executed.

In November 1870, they were incorporated with the regular army, became better organized, and co-operated in the movements of the regu¬ lar army. They continued to wage a guerilla warfare for some time after the main bodies of French troops had been defeated and cap¬ tured. The most spectacular exploit of this corps was the

destruction of the Moselle Rail¬ way Bridge on 21 Jan. 1871. Consult Saint Etienne, (Les chasseurs des Vosges) (Toul 1906). See France; Army.

FRANCUCCI, fran-koo'-che, Innocenzo.

See Imola, Innocenza da.

FRANEKER, fra'ne-ker, a town in Fries¬ land, Netherlands, once the residence of the Frisian nobles, whose castles were numerous. Here lived and died the Belgian mystic An¬ toinette Bourignon: b. 13 Jan. 1616; d. 30 Oct. 1680, whose writings excited theologians in Europe for over a century, and with whom William Penn was in correspondence. She was a follower of Jean de Labadie. The plantarium, in the town hall, made by Eise Elsinga (1774-1881) shows the movements of the heavenly bodies. Here are the botanical specimens, from the famous university founded in 1585, which was suppressed by Napoleon in 1811, for its ultra-democratic proclivities. The same building contains portraits of several British scholars who came later to America, one of them being that of Amesius (Prof! William Ames, 1576-1633), whose (Marrow of Theology > is still read in Holland and Scot¬ land. (

. FRANGIPANI, fran'je-pa'ne, (1) illus¬ trious Roman family, founded in 1014 by Leo Frangipani and which reached the zenith of its power in the 11th and 12th centuries. Its castles and fortresses were in the neighbor¬ hood of the Arch of Titus and the Coliseum. The family was a rival of the powerful house of the Pierleoni, and their differences caused repeated troubles to both the State and the Church. The Frangipani were for long parti¬ sans of the emperor but later espoused the papal cause. (2) A noble family of Croatia, distinguished for its services in the struggle against the Turks. The most celebrated mem¬ bers of this family were John Frangipani, who in 1390 was Ban of Croatia, Dalmatia and Slavonia, andˆ Christopher Frangipani who fought. at Mohacs in 1526. Francis Frangipani joined in a conspiracy against Leopold I in 1670 with the object of restricting Germanic in¬ fluence in Hungary and of spreading that of the Magyar. The conspiracy being detected Francis paid the penalty with his life in 1671. Consult Gregorovius, Tome in the Middle Ages > (London 1896-97).

FRANGULA, the bark of Rhamnus Fran- gula, used in medicine as a purgative.

FRANGULIN (C21H30O9), a dyestuff ex¬ tracted from the root, bark,

fruit and seed of the alder buckthorn (Rhamnus frangula) . It is a bright yellow silky, crystalline mass, with¬ out taste or smell, which fuses on heating, and can be sublimed in golden needles. It is not soluble in water, and though soluble in hot alcohol separates very completely on cooling. It dissolves in alkalies with a purple color, and is decomposed by sulphuric acid with a succes¬ sion of colors. It forms lakes with metallic hydrates, and dyes silk, wool and cotton. In its chemical constitution it is a glucoside, and it is probably the same as cciscara sagrada.

FRANK, frank, Jacob (properly Lebo- wicz), Jewish pseudo-Messiah: b. Galicia, 1720; d. 10 Dec. 1791. The name Frank was obtained during travel in the east from the Turks, who employed the word as a generic term for an European. Originally a distiller, he settled, after his eastern journey, in Podolia, where he professed himself a second Messiah, basing his teachings, in opposition to the Tal¬ mud, on the Sohar, the source of . the Cabbala. An outcome of the Messianic mysticism of Sab- betai Zebi, in the middle of the 18th century, he started the movement, in behalf of spiritual freedom, so he claimed, but the moral laxity which followed alarmed the rabbinical authori¬ ties, who were unable to suppress the agitation. He was imprisoned by the Poles for a number of years, but was set free by the Russians after, their invasion of Poland. He then re¬ moved to Offenbach, a small city near Frank- fort-on-Main, where he lived regally on the gifts of adherents and finally became a Roman Catholic. His death by apoplexy broke down popular belief in his immortality, but for a number, of years his daughter succeeded in continuing the existence of the Frankist be¬ liefs. The sect of Frankists persisted for some time in Poland, Turkey and Moldavia, its tenets being a Judaized form of the Roman Catholic faith. Consult Gratz, H., (Frank und die Frankisten) (Breslau 1868) ; id., ‘History of the Jews) (Vol. V, Philadelphia 1895) ; Kraushaar, A., (Frank i Frankisci Polsky) (2 vols., Cracow 1895) ; Morfill, W. R., < Frank and the Polish Frankists) (in Academy, Vol. XLIX, p. 73, London 1895) ; Przyborowski, W. ‘Historya Franka i Frankistow> (Cracow

1893) .

FRANK, J°ˆann Peter, German physician : b. Rothalben, Bavaria, 1745; d. 1821. He studied medicine at the universities of Heidel¬ berg and Strassburg, was professor at Pavia 1785-95, when he was made director of the Vienna General Hospital, where he remained until 1804. Afterward he was for a short time professor of medicine at Vilna, Russia, and was physician in ordinary to Tsar Alexander I. He returned to Vienna in 1808. He exerted a wide influence upon the

development of medi¬ cal practice in Lombardy, Austria and Russia. He made great improvements in public sanita¬ tion methods, wrote much on this subject and has been called the founder of modern sanita- tion. A good deal of the legislation on this subject is based on his recommendations. His principal works are (System einer vollstandigen medizinschen Polizeri (6 vols., 1779-1819; sup- Fono16ˆ 3 vols., 1812-27; trans. into Italian i8U8-30) ; De Curˆncjis Hominum Mqrbis

Epitome (6 vols., 1792-1821; German tra.is., 3d ed., 1840-41) ; (System der landwirschaft- P°hze5) (1789-91) ;

FRANKALMOIGNE, frank'al-moin', form of feudal tenure whereby lands were held by religious houses or persons for charitable pur¬ poses. By the ancient common law of Eng¬ land, a man could not alienate lands which came to him by descent without the consent of his heir, but he might give a part to God in free alms. It was an old Saxon tenure and was con¬ tinued under Norman rule. This is the tenure by which almost all the ancient monasteries and religious houses held their lands, and by which the parochial clergy and very many ecclesiastical foundations hold them at this day in England. See Feudalism ; Tenure.

FRANKAU, frank'ow, Mrs. Julia. See

Danby, Frank.

FRANKEL, Zacharias, German Jewish theologian: b. Prague, 1 Oct. 1801; d. Breslau, 13 Feb. 1875. He was eminent for his work in rabbinical jurisprudence; as magazine editor (1844-46, 1851-68) promoting the study of Jewish history and Semitic lore, and as director of the Breslau Seminary (1854—74), which he made the most famous in his day. He was the leader of what was termed the positive historical school, and exerted a power¬ ful influence against obscurantism and radical¬ ism. His works include (The Jewish Oath, in its Theological and Historical Relations5 (1840~47); (Studies on the Septuagint5 (1841); { Introduction to the Mishnah5 (in

Hebrew, 1860), and (Introduction to the Palestinian Talmud5 (1870).

FRANKENBERG, Germany, town of Saxony, 32 miles so.uthwest of Dresden, an important industrial centre. It manufac¬ tures cottons,

woolens, carpets, silks, dyes, furniture, castings, machinery, cigars and draperies, and has the largest calico-printing works in Saxony. It contains a gymnasium, trade school, textile school and a teachers' seminary. In the neighborhood are many ruined castles and churches, at one of which is a memorial iron cross to the poet Korner. Pop. 13,576.

FRANKENHAUSEN, frank'en-how'sen, Germany, town of the State of Schwarz- burg-Rudolstadt, 27 miles northwest of Wei¬ mar, on the Wipper. There is a gymnasium, a technical institute, and a teachers' seminary. It manufactures cigars, sugar and articles of mother-of-pearl and contains productive salt springs. Its baths are famed for curing scro¬ fula. There are mines of lignite, and sand¬ stone quarries in the neighborhood. Nearby also is the Barbarossa cave, discovered in 1865. Here on 15 May 1525 the Brunswick, Hessian and Saxon forces defeated the insurrection of the peasants led by Miinzer. Pop. 6,600.

FRANKENSTEIN, frank'en-stin. The famous romance of Frankenstein5 was begun by Mrs. Shelley in the summer of 1816, while she was staying with her husband the poet, Lord Byron and another friend in Switzerland by Lake Geneva ; it was completed at Marlow, in England, the next year and published in 1818. On wet evenings the little Swiss party of four used to read German ghost stories; and at the

suggestion of Byron, they entered into a half- serious compact that each should write one for the amusement of the company. Only Mrs. Shelley quite fulfilled the engagement. The outline of her story came to her in a dream — that is, in a horrible nightmare — one night after she had been greatly excited by a con¬ versation between Byron and her husband over the possibility of creating and endowing a being with life. This problem Frankenstein, a young student in chemistry and anatomy, succeeds in solving. But the creature whom he builds up in his laboratory and infuses with life turns out to be a huge male monster eight feet in height, with long ragged hair,- and roll¬ ing, blood-shot eyes, and yellow features so distorted and loathsome that no one can look upon them an instant without a scream of terror. Cut off from all association with man¬ kind, the hideous giant resolves upon war against the whole human species and above all others against the man who had formed him and sent him forth to unsupportable misery. One by one he slays, or brings to death from grief, all the members of Frankenstein's family and all his dearest friends including his bride. At last, Frankenstein, unable to overtake and kill the being fashioned by his hands, dies of exhaustion and remorse ; and the monster, repentant for his crimes, disappears in the darkness of the northern seas.

In this romance, Mrs. Shelley reached the goal for which she set out — which was to write as horrible a tale as she had ever read. In her own words : (

Wilbur L. Cross.

FRANKENTHAL, frank'en-tal, Germany, a manufacturing city of the Bavarian Pala¬ tinate, 10 miles northwest of Mannheim near the Rhine. It has machine shops, iron foundries and sugar refineries, manufactories of dynamos, machinery, boilers, cooperage works, corks, toys, soap, bells and cement works. A canal con¬ nects it with the Rhine. The town dates from the 8th century. Its abbey church, dating from 1119, is the chief object of interest. The town erected a monument to those who took part in the war against Napoleon I. Pop. 18,779.

FRANKFORT, Ind., city and county-seat of Clinton County; on the Chicago, Indianapo¬ lis and Louisville (Monon), Lake Erie and Western, Toledo, Saint Louis and Western (Clover Leaf), and the Pennsylvania railroads (including a new double-track road, Indianapo¬ lis to Frankfort), and the Terre Haute, Indian¬ apolis and Eastern and Kokomo, Marion and Western traction lines; 47 miles northwest of Indianapolis and 91 miles southwest of Fort Wayne. It is situated in an agricultural sec¬ tion and its chief manufactures are flour, butterˆ

e

canned goods, lumber, cigars, plumbers' brass goods, tool handles, kitchen cabinets, stoves and furnaces. The trade is chiefly in the manufac¬ tured articles and grain, fruits and vegetables. The city has a fine public library and a well or¬ ganized system of public schools. There are five grain elevators (22 in the county). The electric light plant is owned by the city. Pop.

(1920) 11,585.

FRANKFORT, Ky., city, capital of the State of Kentucky, county-seat of Franklin County; on the Kentucky River, the Chesapeake and Ohio, Frankfort and Cincinnati and the Louisville and Nashville railroads; 55 miles by rail east of Louisville and 65 miles southwest of Cincinnati. The city, was founded by Gen. James Wilkinson (q.v.) in 1786, and for a time it was made the seat of his intrigues when he was trying to detach Kentucky from the Union and affiliate it with Spain. When

Kentucky was admitted as a State in 1792 Frankfort was made the capital. During the Civil War it was for a time the headquarters of the Confederate forces under Braxton Bragg (q.v.). On 4 Oct. 1862 Richard Hawes was inaugurated here as the Confederate governor of Kentucky. In 1900 there was great excitement in Frankfort as to who was elected governor of the State. It was decided that William Goebel was the governor- elect. In the midst of the agitation Goebel was assassinated. Frankfort owes much of its present prosperity to its location in the ((Blue Grass® section of the State. Its chief manufactures are flour, lumber, carriages, twine, shoes and furniture. The United States census of manufactures for 1914 showed within the city limits 31 industrial establish¬ ments of factory grade, employing 878 persons ; 546 being wage-earners receiving annually a total of $271,000 in wages. The capital invested aggregated $4,094,000 and the year's output was valued at $4,755,000 : of this, $1,996,000 was the value added by manufacture. The city is the trade centre for an extensive region; the river is navigable and by artificial means it is made to furnish a large amount of water power. The city contains the State arsenal, a State home for feeble-minded children, a State peniten¬ tiary, the State Normal School for colored pu¬ pils and Saint Joseph's Academy. The State government buildings and the State library with over 100,000 volumes add to the interests of the city. Franklin cemetery contains the grave of Daniel Boone (q.v.) and otherjioted men con¬ nected with the history of Kentucky. Pop.

(1920) 9,805.

FRANKFORT, N. Y., village in Herkimer

County, 10 miles from Utica, on the West Shore Railroad and on the Barge Canal. Its industrial establishments include agricultural implement works, and road-making machinery factories, and the Gates match factory, one of the first in the country. The village has a public library. The village owns its waterworks and electric¬ lighting plant. Pop. 4,213.

FRANKFORT, Council of, the assembly convened at Frankfort-on-the-Main by Charles the Great in 794. It was attended by all the bishops of the Frankish kingdom, together with many ecclesiastics, and also by the bishops of Italy and Aquitania and by some ecclesiastics from England. It condemned the doctrine of Adoptianism as propounded by Elipandus and

Felix. It also condemned the rendering of Latreia (worship due to God alone) to images. Its canons also touch upon many matters of

discipline and doctrine. Consult Hefele, (Con- ciliengeschichte) (Freiburg 1874) • Migne, (Pa- trologia Latina, > xcvii ; and Mombert, (Charles the Great) (New York 1888).

FRANKFORT LAND COMPANY, 1686. Francis Daniel Pastorius (q.v.), an able young German lawyer, had joined the sect of Pietists (q.v.), and to escape from the atmosphere of Lutheranism concerted with his coreligionists an emigration to America. A number of wealthy and distinguished Germans and Dutch¬ men were induced to join; but they soon gave up the idea of emigrating themselves, and wished Pastorius instead to head a colony of German and Dutch Mennonites and Quakers to a land where they need not be harried. Pas¬ torius had made Penn's acquaintance in Eng¬ land, had become a Quaker, and wished to be near Penn; some Frankfort and Crefeld mer¬ chants bought from Penn 15,000 acres near Philadelphia, and had formed a land company, calling it the German Society. They were all friends of Pastorius, who himself was one of the original purchasers. He was appointed fac¬ tor of the company and in 1683 conducted a colony thither, and at once laid out Germantown (q.v.). In 1686 the land company was reorgan¬ ized as the Frankfort Land Company, after its holdings had been increased to 25,000 acres. Consult Learned, M. D., < Francis Daniel Pas- torius> (in German American Annals, Vols. IX and X [U. S. Vols. V and VI], Philadelphia

1907-08).

FRANKFORT-ON-THE-MAIN, man,

Prussia, the capital of a district of same name, on both banks of the navigable river Main, 24 miles above its confluence with the Rhine. It is divided by the river into two unequal parts ; the one on the north bank, called Frankfort proper, being considerably larger than the other, which is called Sachsenhausen ; and the two communi¬ cate by several bridges. Frankfort was for¬ merly fortified; but most of its outworks are now . converged into gardens and promenades, and it is entered by nine gates. The principal streets are wide ; there are also many squares and a number of large buildings, among which may be named the Rcemerberg, or old palace, in which the emperors of Germany were elected, and place of the assembling of the Diet; the Taxis palace, a place of residence of the em¬ perors; the Sallhof, a modern imperial palace; an academy of painting, and the Senkenberg Museum. Its manufactures include carpets, table-covers, oilcloths, cotton and silk fabrics' woolen stuffs, jewelry, tobacco and printer's black. It has also large printing, lithographic and stereotyping establishments. Charlemagne, who had a palace in this city,

summoned a coun¬ cil in 794, and it was surrounded with walls by Louis I in 838. It was the capital of the Eastern Franks from 843 to 889, when Ratisbon was se¬ lected. Frederick I was elected at Frankfort in 1152. From that time it became the place of election of the German kings and emperors. Frankfort was made a free city in 1245. Fred¬ erick of Prussia signed a treaty known as the Union of Frankfort, with the empire, France and Sweden, at this city, 13 May 1744. The French captured it 2 Jan. 1750, and again in

i.792;i5S thTe Prussians wrested it from them 2 Uec. 1/92. It was bombarded by the French 12 July, and surrendered 19 July 1796. It formed part of the Confederation of the Rhine in 1806. ioin° tl ˆ erected Frankfort into a duchy in lolU. ˆ 1 he Declaration of the Allied Powers was issued at Frankfort 1 Dec. 1813. By the Congress of Vienna, in 1815, it was made one of fhe four free cities of Germany, and in 1816 the seat of the Germanic Diet. It was made a free port in 1831. The constituent assembly, elected in 1848, held its sittings at Frankfort. It was occupied by the Prussians 16 July 1866, and is nowr incorporated with Prussia. At the end of the Franco-Prussian War the treaty of peace was signed at Frankfort on 10 May 1871. Its university, founded in 1914, had 618 students in the winter semester of 1914-15. Pop. 414,600.

FRANKFORT-ON-THE-ODER, Prus¬ sia, the capital of a district of the same name, province of Brandenburg, 50 miles by rail east- southeast of Berlin. Its university, founded in 1506, was in 1811 transferred to Breslau. Man¬ ufactures are woolens, silks, leather, earthen¬ ware, machinery, boilers, glass articles, musical instruments, chocolate, sugar products, paper, chemicals etc. Near it is Kunersdorf, the scene of the victory of the Austrians and Russians over Frederick the Great (q.v.) in 1759. The Oder River is navigable, and canals connect the city with the Vistula and Elbe rivers. Pop 68,300. P

FRANKFORTER, George Bell, Amer¬ ican chemist: b. Potter, Ohio, 22 April 1860. He was graduated at the University of Ne¬ braska in 1886, and studied also at the Univer¬ sity of Berlin, where he received the degree of D.Ph. in 1893. In 1893-94 he was professor of chemistry at the University of Nebraska, and from 1894 to 1917 was dean of the School of Chemistry and director of the Chemical Labor¬ atory at the University of Minnesota. He was commissioner of the United States mint in 1900. He is Fellow of the American Association for the Advancement of Science, of which he was vice-president in 1910. He is the author of numerous papers on chemical subjects.

FRANKINCENSE, frank'm -sens (O. F. franc encens; Mod. Lat. francum incensum) , a name given to various oleo-resinous substances. The frankincense employed in religious cere¬ monies (called also incense and olibanum) is a gum resin obtained from Boswellia thurifera (or serrata), a tree somewhat resembling the sumach, belonging to the Amyridacece, and in¬ habiting the mountains of India. The frankin¬ cense so highly prized by the Greeks, Romans and Jews was probably chiefly of this variety. Substances derived from other trees, such as croton and protium, are frequently employed as substitutes for olibanum. American turpen¬ tine, from which Burgundy pitch is obtained by melting and straining through a cloth, is fre¬ quently called frankincense. The frankincense familiar to pharmacy is procured from the Eu¬ ropean silver fir.

FRANKING PRIVILEGE, that of send¬ ing postal matter gratis. In England peers and members of the House of Commons had it till 1840, and till 1837 could also frank their friends' letters wholesale, and even leave franks with them to use at will. In the United States

it was first accorded to Revolutionary soldiers in actual service ; then to the executive body, chiefs of departments and bureaus, and some special clerks ; and all public documents were franked. Senators and Congressmen, postmas¬ ters for official correspondence, also had it; likewise newspaper exchanges and petitions to Congress ; and later, exchanges of the Smith¬ sonian institutions, and medals and testimonials to soldiers. The first four presidents had it for life, and it has been granted to the widows of ex-presidents. It was totally abolished from 30 June 1873, an allowance of stamps being made to the departments; but restored a few years later. At present officers of the United States government may send and receive through the mails all public documents without payment of postage, the name and office of the sender being written thereon. The privilege does not extend to those officers who are au¬ thorized to make requisitions upon the Post¬ master-General for official postage stamps. Agricultural reports, seeds, etc., may be mailed free by the Commissioner of Agriculture and by members of Congress. There is no penalty attached to improper use of the frank but it is being urged that Congress impose one. Many public officers are empowered to send their offi¬ cial communications in unstamped envelopes marked ˆofficial business® and the unlawful use of such an envelope by one not entitled to the frank is punishable by a penalty of $300.

FRANKL, frankl, Ludwig August, Chev¬ alier von Hochwart, Austrian poet : b. Chrast, Bohemia,. 3 Feb. 1810; d. Vienna, 14 March 1894. He was a Jew by birth, studied medicine at the University of Vienna, but

soon aban¬ doned it for literary work. He founded a school at Jerusalem in 1856. His literary debut was made with (A Lay of Haps,burg > (1832), a series of historical ballads, followed (1836) by the romantic epic (Christopher Columbus } ; a poem, (The University } (1848), the first pub¬ lication in Austria not subjected to the official censorship; (Don John of Austria, > a heroic poem (1846); (Lyric Poems,) and (Epic and Lyric Poetry. > His (Nach Jerusalem* (1858) (Aus Aegypten) (1860) deal with the East. (RacheP (7th ed., 1880), (Der Primator (1864) and the historical work (Zur Geschichte der Juden in Wien* (1853) deal with the Jewish question. He was also active in public affairs and in charitable work at Vienna. A collected edition of his works, with the exception of the satires, appeared in 1880.

FRANKLAND, Sir Edward, English chemist : b. Churchtown, near Lancaster, 18 Jan. 1825; d. Norway, 9 Aug. 1899. He made the discovery of the union of organic radicles with metals, announcing in 1850 the preparation of compounds of zinc with methyl and ethyl. From this he deduced the conclusion that an atom of the metal could only attach itself to a definite number of the atoms of other elements, which discovery led to the theory of ((equiva- lents.** He was appointed professor of chemis¬ try at Owens College, Manchester, in 1851, and there developed the process of making water gas. Becoming professor of chemistry in the Royal School of Mines in 1865, he turned his attention to water analysis, the purification of sewage and the means of preventing pollution. Subsequently he proved that compressed gases

are capable of giving out a flame of constant spectrum, from which he concluded that the photosphere of the sun was atmospheric. He also investigated the chemistry of foods. He published Experimental Researches in Pure, Applied and Physical Chemistry 5 (1877) ; and with Japp, (Inorganic Chemistry5 (1884). He was created K.C.B. in 1894.

FRANKLAND, Percy Faraday, English chemist : b. London, 3 Oct. 1858. He is a son of Sir E. Frankland (q.v.). He has held profes¬ sorships of chemistry at University College, Dundee, 1888-94; at Mason College, Birming¬ ham, 1894-1900; and since 1900 in the Univer¬ sity of Birmingham. His published works, which deal mostly with micro-chemistry, the chemistry of fermentation and bacteriology,

include Agricultural Chemical Analysis5 (1883) ; (Our Secret Friends and Foes5 (1894, on micro-organisms) ; (Micro-organisms in

Water5 (1894) ; (Life of Pasteur5 (1897) ; and many lectures and papers in the transactions of various societies. In several of his works he has been assisted by his wife, the sister of the philanthropist Arnold Toynbee (q.v.).

FRANKLIN, Benjamin, American states¬ man and philosopher: b. Boston, Mass., 17 Jan. 1706; d. Philadelphia, Pa., 17 April 1790. The youngest son (15th child) of the 17 children of Josiah Franklin, a Boston tallow-chandler, was born a subject of Queen Anne of England, and on the same day received the baptismal name of Benjamin at the Old South Church in that city. He continued for more than 70 of the 84 years of his life a subject of four successive British monarchs. During that period, neither Anne nor either of the three Georges who succeeded her had a subject of whom they had more reason to be proud, nor one whom at his death their people generally supposed they had more reason to detest. No Englishman of his gen¬ eration can now be said to have established a more enduring fame, in any way, than Frank¬ lin established in many ways. As a printer, as a journalist, as a diplomatist, as a statesman, as a philosopher, he was easily first among his peers.

On the other hand, it is no disparagement of the services of any of his contemporaries on either side of the Atlantic, to say that no one of his generation contributed more effectually to the dissolution of the bonds which united the principal British- American colonies to the mother country, and toward conferring upon them independence and a popular government.

As a practical printer Franklin was reported to have had no superiors; as a journalist he exerted an influence not only unrivaled in his day, but more potent, on this continent at least, than either of his sovereigns or their parlia¬ ments. The organization of a police, and later of the militia, for Philadelphia; of companies for extinguishing fires ; making the sweeping and paving of the streets a municipal function ; the formation of the first public library for Philadelphia, and the establishment of an acad¬ emy which has matured into the now famous University of Pennsylvania, were among the conspicuous reforms which he planted and watered in the columns of the Pennsylvania Gazette. This Philadelphia journal he founded; upon the earnings of it he mainly subsisted during a long life, and any sheet of it to-day

would bring a larger price in the open market, probably, than a single sheet of any other periodical ever published.

Franklin's Almanack, his crowning work in the sphere of journalism, published under the pseudonym of ((Richard Saunders,55 — better known since as Poor Richard, — is still one of the marvels of modern literature. Under one or another of many titles the contents of this publication, exclusive of its calendars, have been translated into every tongue having any pretensions to a literature; and have had more readers, probably, than any other publication in the English or indeed in any other lan¬ guage, with the single exception of the Bible. It was the first issue from an American press that found a popular welcome in foreign lands, and it still enjoys the special distinction of being the only almanac ever published that owed its extraordinary popularity entirely to its lit¬ erary merit.

What adds to the surprise with which we contemplate the fame and fortunes of this un¬ pretentious publication is the fact that its repu¬ tation was established by its first number, and when its author was only 26 years of age. For a period of 26 years, and until Franklin ceased to edit it, this annual was looked forward to by a larger portion of the colonial population and with more impatience than now awaits a President's annual message to Congress.

Franklin graduated from journalism into di¬ plomacy as naturally as winter glides into spring. This was simply because he was by common acclaim the fittest man for any kind of public service the colony possessed, and es¬ pecially for any duty requiring talents for per¬ suasion, in which he proved himself to be un¬ questionably past master among the diplomatists of his time. See Flag, United States.

The question of taxing the Penn proprietary estates in Pennsylvania, for the defense of the province from the French and Indians, had assumed such an acute stage in 1757 that the Assembly decided to petition the king upon the subject; and selected Franklin, then in the 41st year of his age, to visit London and pre¬ sent their petition. The next 41 years of his life were practically all spent in the diplomatic service.ˆ He was five years absent on this his first mission. Every interest in London was against him. He finally surmounted all ob¬ stacles by a compromise, which pledged the Assembly to pass an act exempting from taxa¬ tion the unsurveyed lands of the Penn estate — the surveyed waste lands, however, to be as¬ sessed at the usual rate. For his success the Penns and their partisans never forgave him, and his fellow colonists never forgot him.

Franklin returned to Philadelphia in 1762, but npt to remain. The question of taxing the colonies without representation was soon thrust upon them in the shape of a stamp duty, and Franklin was sent out again to urge its repeal. He reached London in November 1764, where he remained the next 11 years and until it be¬ came apparent that the surrender of the right to arbitrarily tax the colonies would never be made by England during the life of the reign¬ ing sovereign, George III. Satisfied that his usefulness in England was at an end, he sailed for Philadelphia 21 March 1775; and on the morning of his arrival was elected by the As-

•

sembly of Pennsylvania a delegate to the Con¬ tinental Congress which consolidated the armies of the colonies, placed Gen. George Washington in command of them, issued the first Continental currency, and assumed the responsibility of re¬ sisting the imperial government ; his last hope of maintaining the integrity of the empire hav¬ ing been dissipated by recent collisions between the people and the royalist troops at Concord and Lexington. Franklin served on 10 commit¬ tees in this Congress. He was one of the five who drew up the Declaration of Independence in July 1776, and in September following was chosen unanimously as one of the three com¬ missioners to be sent out to solicit for the infant republic the aid of France and the sym¬ pathies of continental Europe. In this mission, the importance of which to his country can hardly be exaggerated, he was greatly favored by the reputation which had preceded him as a man of science. While yet a journalist he had made some experiments in electricity, which established its identity with lightning. The pub¬ lication by an English correspondent of the let¬ ters in which he gave an account of these ex¬ periments secured his election as an honorary member of the Royal Society of London and undisputed rank among the most eminent nat¬ ural philosophers of his time. When he ar¬ rived in Paris, therefore, he was already a member of every important learned society in Europe, one of the managers of the Royal So¬ ciety of London, and one of the eight foreign members of the Royal Academy in Paris, where three editions of his scientific writings had already been printed. To these advantages must be added another of even greater weight : his errand there was to assist in dismembering the British Empire, than which nothing of a political nature was at this time much nearer every Frenchman's heart. See Great Seal of the

United States.

The history of this mission, and how Frank¬ lin succeeded in procuring from the French king financial aid to the amount of 26,000,000 francs, at times when the very existence of the republic depended upon them, and finally a treaty of peace more favorable to his country than either England or France wished to con¬ cede, has been often told; and there is no chapter in the chronicles of this republic with which the world is more familiar.

Franklin's reputation grew with his success. (

A few weeks after signing the definite treaty of peace in 1783, Franklin renewed an appli¬ cation which he had previously made just after signing the preliminary treaty, to be relieved of his mission, but it was not until 7 March 1785 that Congress adopted a resolution permitting ((the Honorable Benjamin Franklin to return to America as soon as convenient.® Three days later, Thomas Jefferson was appointed to suc¬ ceed him. On 13 Sept. 1785, and after a so-

journ of nearly nine years in the French capi¬ tal, first in the capacity of commissioner and subsequently of minister plenipotentiary, Frank¬ lin once more landed in Philadelphia, on the same wharf on which, 62 years before, he had stepped, a friendless and practically penniless runaway apprentice of 17. Though now in his 79th year, and a prey to infirmities not the neces¬ sary incidents of old age, he had scarcely un¬ packed his trunks after his return when he was chosen a member of the municipal council of Philadelphia, and its chairman. Shortly after, he was elected president of Pennsylvania, his own vote only lacking to make the vote unan¬ imous. <(I have not firmness,® he wrote to a friend, <(to resist the unanimous desire of my country folks ; I find myself harnessed again into their service another year. They engrossed the prime of my life ; they have eaten my flesh, and seem resolved now to pick my bones.®

He was unanimously re-elected to this dig¬ nity for the two succeeding years, and while holding that office was chosen a member of the convention which met in May 1787 to frame the Constitution under which the people of the United States are still living. With the adoption of that instrument, to which he probably contributed as much as any other individual, he retired from official life; though not from the service of the public, to which for the remaining years of his stay on earth his genius and his talents were faithfully consecrated.

Among the fruits of that unfamiliar leisure, always to be remembered among the noblest achievements of his illustrious career, wa6 the part he had in organizing the first anti-slavery society in the world; and as its president, writing and signing the first remonstrance against slavery ever ad¬ dressed to the Congress of the United States.

In surveying the life of Dr. Franklin as a whole, the thing that most impresses one is his constant study and singleness of purpose to promote the welfare of human society. It was his daily theme as a journalist, and his yearly theme as an almanac-maker. It is that which first occurs to us when we recall his career as a member of the Colonial assembly; as an agent of the provinces in England; as a diplo¬ matist in France; and as a member of the con¬ ventions which crowned the consistent labors of his long life. Nor are there any now so bold as to affirm that there was any other per¬ son who could have been depended upon to accomplish for his country or the world what Franklin did in any of the several stages of his versatile career.

Though holding office for more than half of his life, the office always sought Franklin, not Franklin the office. When sent to England as the agent of the colony, he withdrew from business with a modest competence judiciously invested mostly in real estate. He never seems to have given a thought to its increase. Frugal in his habits, simple in his tastes, wise in his indulgences, he died with a fortune neither too large nor too small for his fame as a citizen ora patriot. For teaching frugality and economy to the colonists, when frugality and economy were indispensable to the conservation of their inde¬ pendence and manhood, he has been sneered at as the teacher of a ((candle-end-saving philoso¬ phy,® and his (Poor Richard5 as a ((collection of receipts for laying up treasures on earth

rather than in heaven.® Franklin never taught, cither by precept or example, to lay up treas¬ ures on earth. He taught the virtues of in¬ dustry, thrift and economy as the virtues su¬ premely important in his time, to keep people out of debt and to provide the means of edu¬ cating and dignifying society. He never coun¬ tenanced the accumulation of wealth for its own sake, but for its uses, — its prompt con¬ vertibility into social comforts and refinements. It would be difficult to name another man of any age to whom an ambition to accumulate wealth as an end could be imputed with less propriety. Though probably the most inventive genius of his age, and thus

indirectly the founder of many fortunes, he never asked a patent for any of his inventions or discoveries. Though one of the best writers of the English language that his country has yet produced, he never wrote a line for money after he withdrew from the calling by which he made a modest provision for his family.

For the remaining half of his life both at home and abroad, though constantly operating upon public opinion by his pen, he never availed himself of a copyright or received a penny from any publisher or patron for any of these labors. In none of the public positions which he held, even when minister plenipotentiary, did his pay equal his expenditures. He was three years president of Pennsylvania after his return from France, and for his services declined to appro¬ priate to his own use anything beyond his neces¬ sary expenditures for stationery, postage and transportation. It is not by such methods that men justly incur the implied reproach of ((laying up treasures on earth,® or of teaching a candle- end-saving philosophy.

Franklin courted fame no more than for¬ tune. The best of his writings, after his re¬ tirement from journalism, he never gave to the press at all ; not even his incomparable autobi¬ ography, which is still republished more fre¬ quently than any of the writings of Dickens or of Thackeray. He always wrote for a larger purpose than mere personal gratification of any kind. Even his bagatelles and jeux d'esprit read in the salons of Paris, though apparently intended for the eyes of a small circle, were inspired by a desire to make friends and create respect for the struggling people and the great cause he represented. Few if any of them got into print until many years after his decease. Franklin was from his youth up a leader, a lion in whatever circle he entered, whether in the printing-house, the provincial assemblies, as agent in England, or as a courtier in France. There was no one too eminent in science or literature, on either side of the Atlantic, not to esteem his acquaintance a privilege. He was an honorary member of every important scientific association in the world, and in friendly correspondence with most of those who con¬ ferred upon those bodies any distinction ; and all this by force of a personal, not to say planetary, attraction that no one brought within his sphere could long resist.

Pretty much all of importance that we know of Franklin we gather from his private cor¬ respondence. His contemporaries wrote or at least printed very little about him; scarcely one of the multitude whose names he embalmed in his (Autobiography } ever printed a line about him. All that we know of the later half of

his life not covered by his autobiography, we owe almost exclusively to his private and offi¬ cial correspondence. Though reckoning among his warm friends and correspondents such men as David Hume, Dr. Joseph Priestly, Dr. Price, Lord Karnes, Lord Chatham, Dr. Fothergill, Peter Collinson, Edmund Burke, the bishop of Saint Asaph and his gifted daughters, Voltaire, the habitues of the Helvetius salon, the Mar¬ quis de Segus, the Count de Vergennes, his near neighbors De Chaumont and Le Veillard the moire of Passy, — all that we learn of his achievements, of his conversation, of his daily life, from these or many other associates of only less prominence in the Old World, might be written on a single foolscap sheet. Nor are we under much greater obligations to his American friends. It is to his own letters (and except his c Autobiography, > he can hardly be said to have written anything in any other than the epistolary form ; and that was written in the form of a letter to his son William, and most of it only began to be published a quarter of a century after his death), that we must turn to learn how full of interest and importance to mankind was this last half-century of his life. Beyond keeping copies of his correspondence, which his official character made a duty as well as a necessity, he appears to have taken no precautions to insure the posthumous fame to which his correspondence during that period was destined to contribute so much. Hence, all the biographies — and they are numberless — owe almost their entire interest and value to his own pen. All, so far as they are biographies, are autobiographies ; and for that reason it may be fairly said that all of them are interesting.

It is, also quite remarkable that though Franklin's life was a continuous warfare, he had no personal enemies. His extraordinary and even intimate experience of every phase of hu¬ man life, from the very lowest to the very high¬ est, had made him so tolerant that he regarded differences of opinions and of habits much as he regarded the changes of the weather, — as good or bad for his purposes, but which, though he might sometimes deplore, he had no right to quarrel with or assume personal responsibility for. Hence he never said or did things per¬ sonally offensive. The causes that he repre¬ sented had enemies, for he was all his life a reformer. All men who are good for anything have such enemies. ((I have, as you observe,® wrote Franklin to John Jay the year that he retired from the French mission, «some enemies in England, but they are my enemies as an American ; I have also two or three in America who are my enemies as a minister; but I thank God there are not in the whole world any who are my enemies as a man ; for by His grace, through a long life. I have been enabled so to conduct myself that there does not exist a human being who can justly say, (Ben Frank¬ lin has wronged me.) This, my friend,

is in old age a comfortable reflection. You, too, have or may have your enemies ; but let not that ren¬ der y°U unhaPPy- ˆ y°u make a right use of them, they will do you more good than harm. They point out to us our faults ; they put us upon our guard and help us to live more cor¬ rectly.®

Franklin's place in literature as a writer has not been generally appreciated, probably be¬ cause with him writing was only a means, never

an end, and his ends always dwarfed his means, however effective. He wrote to persuade others, never to parade his literary skill. He never wrote a dull line, and was never nimious. The longest production of his pen was his autobiog¬ raphy, written during the closing years of his life. Nearly all that he wrote besides was in the form of letters, which would hardly average three octavo pages in length. And yet what¬ ever the subject he touched upon, he never left the impression of incompleteness or of in¬ conclusiveness. Of him may be said, perhaps with as much propriety as of any other man, that he never said a word too soon, nor a word too late, nor a word too much.

The Doric simplicity of his style ; his incom¬ parable facility of condensing a great principle into an apologue or an anecdote, many of which, as he applied them, have become the folk-lore of all nations ; his habitual moderation of state¬ ment, his aversion to exaggeration, his inflexible logic, and his perfect truthfulness, — made him one of the most persuasive men of his time, and his writings a model which no one can study without profit. A judicious selection from Franklin's writings should constitute a part of the curriculum of every college and high school that aspires to cultivate in its pupils a pure style and correct literary taste.

There was one incident in Franklin's life, which though more frequently referred to in terms of reproach than any other, will probably count for more in his favor in the Great Assize than any other of his whole life. While yet in his teens he became a father before he was a husband. He never did what men of the loft¬ iest moral pretensions not unfrequently do, — shirk as far as possible any personal responsi¬ bility for his indiscretion. On the contrary, he took the fruit of it to his home; gave him the best education the schools of the country then afforded. When he went abroad, this son

accompanied him, was presented as his son wherever he went, was presented in all the great houses in which he himself was received; he entered him at the Inns of Court, and in due time had him admitted to the English bar; made him his private secretary, and at an earlv age caused him to be appointed by the Crown governor of New Jersey. The father not only did everything to repair the wrong he had done his son, but at a time when he was at the zenith of his fame and official importance, pub¬ licly proclaimed it as one of the great errors of his life. The world has always abounded with bastards, but with the exception of crowned heads claiming to hold their sceptres by divine right, and therefore beyond the reach of popular criticism or reproach, it would be difficult to name another parent of his generation of any¬ thing like corresponding eminence with Frank¬ lin, who had the courage and the magnanimity to expiate such a wrong to his offspring so fully and effectively.

Franklin was not a member of the visible church, nor did he ever become the adherent of any sect. With the Unitarian creed Dr. Frank¬ lin had more in common than with any other, though he was much too wise a man to sup¬ pose that there was but one gate of admission to the Holy City.

Franklin made a somewhat more definite statement of his views on the subject of reli¬ gion, in reply to an inquiry from President

Styles of Yale College, who expressed a desire to know his opinion of Jesus of Nazareth. Franklin's reply was written the last year of his life, and in the 84th of his age:

<(You desire to know something of my reli¬ gion. It is the first time I have been questioned upon it. But I cannot take your curiosity amiss, and shall endeavor in a few words to gratify it. Here is my creed. I believe in one God, the creator of the universe. That He governs it by His providence. That He ought to be wor¬ shipped. That the most acceptable service we render to Him is doing good to His other chil¬ dren. That the soul of man is immortal and will be treated with justice in another life re¬ specting its conduct in this. These I take to be the fundamental points in all sound religion, and I regard them as you do in whatever sect I meet with them.

(

((I shall only add, respecting myself, that, having experienced the goodness of that Being in conducting me prosperously through a long life, I have no doubt of its continuance in the next, though without the

smallest conceit of meriting such goodness. My sentiments on this head you will see in the copy of an old letter enclosed, which I wrote in answer to one from an old religionist whom I had relieved in a paralytic case by electricity, and who, being afraid I should grow proud upon it, sent me his serious though rather impertinent caution.11 See Franklin's Autobiography.

Bibliography. — A list of works by or re¬ lating to Benjamin Franklin appeared in the Bulletin of the New York Public Library for January 1906; Ford, W. C., cList of the Benja¬ min Franklin Papers in the Library of Con- gress) (Washington 1905) ; Ford, P. L., cFranklin Bibliography: a List of Books writ¬ ten by or relating to Benjamin Franklin 1 (Brooklyn 1889) ; (Autobiography } (edited by John Bigelow, Philadelphia 1868) ; (Life of Benjamin Franklin, written by Himself 1 (edited by Bigelow, rev. ed., ib., 1888) ; (Complete works) (10 vols., edited by Bigelow, New York 1887-88) ; Mignet, F. A. M., (Vie de Franklin1 (Paris 1848) ; Parton, J., (Life and Times of Benjamin Franklin1 (New York 1867) ; Mc- Master, J. B., (Benjamin Franklin, as a Man of Letters1 (Boston 1887) ; Hale, E. E. and E. E., Jr., (Franklin in France1 (ib. 1887-88) ; Morse, J. T., (Benjamin Franklin1 (ib. 1889) ; Ford, P. L. (edited), (Sayings of Poor Rich¬ ard1 (New York 1890) ; Ford, P. L., (The

Many-Sided Franklin) (ib. 1899) ; Fisher, S. G., (The True Benjamin Franklin* (Philadelphia 1899) ; More, P. E., (Benjamin Franklin*

(Boston 1900) ; Oswald, S. C., 'Benjamin Franklin, Printer* (1918).
JoHN Bigelow

FRANKLIN, Christine Ladd, American scientist : b. Windsor, Conn., 1 Dec. 1847. She was graduated at Vassar College in 1869; studied at the University of Johns Hopkins 1878-82 under Sylvester and others and later at Gottingen and Berlin. In 1882 she was mar¬ ried to Fabian Franklin. Her theory of color- vision, which she published in 1892, attracted wide attention in America and Europe. Until 1909 she had charge of the department of physiological optics in the Psychological Re¬ view. In 1901-02 she was an associate editor of Baldwin's dictionary of Philosophy and Psychology) and lectured in logic and psy¬ chology at Johns Hopkins during 1904-09, and since 1910 at Columbia University. From her pen have come many contributions to mathe¬ matical, philosophical and psychological

jour¬ nals, and editorials and other articles to the Nation, etc. In 1887 Vassar College conferred upon her the degree of LL.D.

FRANKLIN, Edward Curtis, American chemist : b. Geary City, Kan., 1 March 1862. He was graduated at the University of Kansas in 1888, and also studied at the University of Berlin and at Johns Hopkins. He was assist¬ ant in chemistry 1888-93, associate professor 1893-99, and professor of physical chemistry 1899-1903 at the University of Kansas. In 1903 he was appointed associate and in 1906 profes¬ sor of organic chemistry at Leland Stanford Junior University. From 1911 to 1913 he was connected with the United States Public Health Service as professor of chemistry and chief of its department of chemistry. He was a member of the United States Assay Commission in 1906. JHe is Fellow of the American Associa¬ tion for the Advancement of Science, and has published papers on the electrolytic action of ammonia, and various salts and solvents.

FRANKLIN, Fabian, American mathema¬ tician and editor: b. Eger, Hungary, 18 Jan. 1853. After his graduation from Columbian (now the George Washington) University, Washington, in 1869, he engaged in civil engi¬ neering and surveying. In 1877 he became a Fellow at Johns Hopkins University, and his advance to the associate and then full profes¬ sorship of mathematics quickly followed. Dur¬ ing his connection with Johns Hopkins, which lasted until 1895, he was a frequent contributor to mathematical and other journals. In 1895 he became editor of the Baltimore News ; and on 1 Oct. 1909 associate editor of the New York Evening Post. Among his works are People and Problems) (1908) ; 'Cost of Liv¬ ing* (1915), and contributions to mathematical publications and The Nation.

FRANKLIN, Sir John, English navigator : b. Spilsby, Lincolnshire, 16 April 1786; d. Lancaster Sound, 11 June 1847. When only a boy he went to sea, and later entered the Eng¬ lish navy. In 1806 he was present at the battle of Trafalgar, in 1814 at that of New Orleans, and in 1819 was appointed to head an over¬ land expedition from Hudson Bay to the Arctic Ocean. After suffering many hardships and

being frequently on the verge of death from hunger and fatigue, he reached home in 1822, In the following year he married a Miss Pur-den (died 1825), the daughter of an architect, and the author of several poetical effusions. In 1825 he submitted to Lord Bathurst a plan ((for an expedition overland to the mouth of the Mackenzie River, and thence by sea to the northwest extremity of America, with the com¬ bined object also of surveying the coast be¬ tween the Mackenzie and Coppermine rivers? This proposition was accepted, and six days after he left Liverpool, in the same year, his wife died. In 1827 Captain Franklin arrived at Liverpool, where he married as his second wife, Miss Griffen. In 1829 the honor of knighthood was conferred upon him. He com¬ manded the Rainbow frigate in the Mediter¬ ranean 1830-33; and was lieutenant-governor of Van Diemen's Land 1837-43. In 1845 Sir John set out on a third expedition with two ships, called the Erebus and Terror, and his ships were last seen by a Scottish whaler on 26th July of that year. Lie spent his first winter in a cove between Cape Riley and Beechey Island. After that period many ex¬ peditions were dispatched, both from England and America, in search of Sir John, of whom there were no tidings, and not till 1854 did the intelligence reach England that the navigator and his companions had, in all probability, perished in the winter of 1850-51. This in¬ telligence, however, wanted confirmation, and Lady Franklin, who deserves all praise for the intelligent persistency of her efforts, resolved to have the mystery cleared up. Accordingly a last

expedition was fitted out, and the news was, in 1859, at length confirmed by the re¬ turn of Captain McClintock, in the yacht Fox, after a persevering search for the lost adven¬ turers. This officer brought with him indis¬ putable proofs of the death of Sir John and the loss of his crew. Several articles belonging to the unfortunate explorers were found at Ross Cairn and Point Victory. At the latter place a record was discovered, wherein it was stated that Sir John Franklin had died 11 June 1847. Other traces, were found on the west coast of King William's Island, as the various survivors of the expedition had strayed from each other, perhaps in search of food, or the means of escaping from their dreary and desolate situations. C. F. Hall, the emi¬ nent Arctic explorer, returned in September 1869 from a five-years' search for the remains of Sir John Franklin's companions, and brought back about 150 relics of the expedition, pur¬ chased from the natives of King William's Land. It remained, however, for Lieutenant Schwatka to find the bodies of the Franklin party in his expedition of 1879-80. Franklin was the author of 'Narrative of a Journey to the Shores of the Polar Sea in the Years 1819-22* (1823) ; 'Narrative of a Second Ex¬ pedition to the Shores of the Polar Sea in 1825-27 * (1828). Consult McClintock, Nar¬ rative of the Fate of Sir John Franklin) (1860) ; Osborn, 'Career, Last Voyage and Fate of Sir John Franklin* (1860) ; Beesly, 'Sir John Franklin) (1881) ; Markham, 'Life of Sir John Franklin and the Northwest Pas¬ sage* (1891) ; Traill, 'Life of Sir John Franklin > (1896).

FRANKLIN

13

FRANKLIN, William, American colonial governor: b. Philadelphia, 1729 or 1730; d. Eng¬ land, 17 Nov. 1813. He was a natural son of Benjamin Franklin (q.v.), in whose household he was brought up. He served with the Penn¬ sylvania forces on the Canada frontier, ob¬ tained a captain's commission before 1750, in 1754-56 was comptroller of the general post- office during part of his father's administration as Postmaster-General, and during a portion of that time clerk of the provincial assembly. In 1757 he went to England with his father, studied law in London and was admitted to the English bar in 1758. In 1762 he was ap¬ pointed governor of New Jersey. During the Revolution he was a Loyalist, and kept under guard by the patriots from January 1776. In June 1776 he called a meeting of the Colonial Assembly, then abrogated, for which he was kept prisoner in Connecticut till 1778, when he was exchanged, and later went to England. It was for this son of his that Benjamin Franklin wrote his autobiography. As a re¬ sult of his stand against the

Revolution, an estrangement arose between father and son, which, however, disappeared before the latter's death. Consult Bigelow, J., ed., (The Life of Benjamin Franklin, etcP (3 vols., Philadel¬ phia 1879) ; Bruce, W. C., (Benjamin Franklin, etcP (New York 1917) ; Fischer, E. J., (New Jersey as a Royal Province, 1738— 76 > (in Co¬ lumbia University, (Studies in History, Eco¬ nomics and Public Law,* Vol. XLI, New York 1911) ; Hart, C. H., (Who was the Mother of Franklin's Son) (in Pennsylvania Magazine of History and Biography, Vol. XXXV, p. 308, Philadelphia 1911) ; Ford, P. L., (Who Was the Mother of Franklin's Son > (Brooklyn 1889) ; Franklin, W., (Letters from W. Frank¬ lin to W. Strahan) (Philadelphia 1911) ; Lee, F. B., (New Jersey as a Colony and a State* (4 vols.. New York 1902) ; (Minutes of the Provincial Congress and the Council of Safety of the State of New Jersey* (Trenton 1879) ; Parton, J., (Life and Times of Benjamin Franklin) (2 vols., New York 1865) ; Ricord, F. W., ed., (Archives of the 'State of New Jersey) (Series I, Vols. IX, X, XVII, XVIII, XXV-XXIX ; Series II, Vols. I-V; Trenton 1885-1917) ; Sabine, L., (Biographical Sketches of Loyalists of the American Revolution (2 vols., Boston 1864) ; Whitehead, W. A., Con¬ tributions to the Earlv History of Perth Am¬ boy, etc.* (New York 1856).

FRANKLIN, William Buel, American military officer: b. York, Pa., 27 Feb. 1823; d. Hartford, Conn., 8 March 1903. He was grad¬ uated at the United States Military Academy in 1843 at the head of his class, one of his classmates being U. S. Grant. In the Mexican War he served on the staff of General Taylor as a topographical engineer, and carried Tay¬ lor's orders at the battle of Buena Vista. After the Mexican War he served in the Engineer Corps of the army and gradually reached the rank of colonel. At the outbreak of the Civil War he was assigned to the command of a brigade in Heintzelman's division. He took part in the battle of Bull Run, served with dis¬ tinction in the Peninsular campaign and was promoted major-general of volunteers in 1862. Subsequently he served under McClellan in Maryland and under Burnside at Fredericks¬

burg (q.v.) where he commanded the left wing, was adversely criticized for his part in this bat¬ tle and resigned his command. However, he re¬ turned to the army in July 1863 and was assigned to the department of the Gulf under Banks. A severe wound received in the battle of Sabine Cross Roads, 8 April 1864, incapacitated him for almost a year. In July 1864 he was captured by the Confederates, but escaped the same night. In March 1865 he was brevetted major-general in the regular army, but resigned a year later to engage in manufacturing, becoming vice- president of Colt's Automatic Firearms Manu¬ facturing Company. He represented Connecti¬ cut as State

Commissioner at the Centennial Exposition (1876), was adjutant-general of his State 1877-78, and for many years president of the board of managers of the National Home for Disabled Soldiers. He was appointed United States Commissioner-General to the Paris Exposition in 1900 and was made a grand officer of the Legion of Honor. His various reports covering his commands and operations during the Civil War may be found in United States War Department, (War of the Rebellion. Official Records) (Series I, II and III, Wash¬ ington). Consult Franklin, W. B., (A Reply to the Report of the Joint Committee of Con¬ gress on the Conduct of the War* (New York 1863) ; Greene, J. L., (General W. B. Franklin and the Operations of the Left Wing at the Battle of Fredericksburg) (Hartford 1900) ; Johnson, R. U., and Buel, C. C., editors, (Battles and Leaders of the Civil War* (4 vols., New York 1884-88).

FRANKLIN, William Suddards, Amer¬ ican educator, physicist and electrical engineer : b. Geary City, Kan., 27 Oct. 1863. He was graduated from the University of Kansas in 1887, and the same year was appointed assist¬ ant professor of physics there. After studying at Harvard and Cornell and the University of Berlin, Germany, he was appointed in 1892 to the chair of physics and electrical engineering in Iowa State College, remaining there till 1897, when he received his appointment to the same chair in Lehigh University. He is author and joint author of about 80 scientific papers and of 22 books on mathematics, physics and elec¬ trical engineering. In 1912 he published a volume of essays entitled (Bill's School and Mine.*

FRANKLIN, a title bestowed upon the English landholders previous to the Norman conquest, who held their lands of the Crown free from any feudal servitude. In later years they lost their power and dignity, which was usurped by the Normans and became simply wealthy yeomen.

FRANKLIN, Canada, former district, and since 1905 merged into the Northwest Terri¬ tories. It was formed in 1895, and comprised several islands to the north of the main land mass. The principal islands are Banks, Prince Albert, King William, Baffin Land, Prince of Wales, Melville, North Devon and Bathurst. The area is about 500,000 square miles. Being mostly within the Arctic circle it is nearly des¬ titute of animal and vegetable life. A few Eskimos dwell on Baffin Land.

FRANKLIN, Ind., city, county-seat of Johnson County; on the Pennsylvania Railroad,

Louisville Division, about 75 miles east of Terre Haute, and 20 miles south of Indianapolis. It is in an agricultural section and its chief manu¬ factures are agricultural implements, flour and lumber. The value of taxable property is given as $2,000,000; industries, besides those men¬ tioned, canning and light and power; resources of the four banks approximately $1,721,000. It is the seat of Franklin College, founded in 1834 by the Baptist Church, and has also one high and two graded schools. Pop. 4,502.

FRANKLIN, Ky., city, county-seat of Simpson County; on the Louisville and Nash¬ ville Railroad ; about 145 miles southwest of Lexington, and five miles from the boundary line between Kentucky and Tennessee. The manufactures are woolen goods, flour, bricks and lumber. The trade is in the agricultural products of the surrounding country, and the manufactures of the town. It is the seat of the Southern Kentucky Sanatorium and the Frank¬ lin Female College. Pop. 3,063.

FRANKLIN, La., a town and parish-seat of Saint Mary Parish, 101 miles by rail south¬ west of New Orleans and 30 miles west of Morgan City, on Teche Bayou, and on the Southern Pacific Railroad. It is the centre of a very fertile district, and as the bayou is navigable for steamers, the town has a con¬ siderable trade in cotton, sugar, fruits, etc. There are also several saw-mills and sugar refineries located in the town. Pop. 3,857.

FRANKLIN, Mass., town in Norfolk County, 28 miles southwest of Boston, on the New York, New Haven and Hartford Railroad. The town also includes the village of Union- ville. Dean Academy, an endowed co-educa- tional school, is located here, and the town also has an almshouse, a public library and six churches. There are manufactories of pianos, straw, woolen, felt and cotton goods, printing presses, etc. It was originally a part of Wren- tham, but in 1778 was separated and incor¬ porated as a separate township. The affairs of the community are administered by town meet¬ ings. Pop. 6,440.

FRANKLIN, N. H,, a city in Merrimac County, situated at the junction of the Pemi- gewasset and Winnepesauke rivers, which here unite to form the Merrimac, and on the Boston and Maine Railroad, 95 miles northwest of Boston. Owing to the abundant water power, numerous mills are located here, among which are paper and pulp mills, machine shops, wood¬ working shops, hosiery and knitting machine mills, woolen mills and one of the largest needle factories in the

world. It is famous as the birthplace of Daniel Webster, and on the farm once owned by him now stands the New Hampshire Orphans' Home. The city owns and operates its waterworks. It was incorporated as a town in 1828 and as a city in 1895. A mayor and council administer public affairs. Pop. 6,132.

FRANKLIN, Ohio, village in Warren County, on the Cincinnati Northern Railroad; Cleveland, Cincinnati, Chicago and Saint Louis ; Ohio Electric; the Big Miami River, and the Miami and Erie Canal, 40 miles northeast of Cincinnati. There are several churches, schools, paper mills, wood pulp mills and large tobacco

warehouses. It was founded by Gen. William Schenck in 1796. Pop. (1920) 3,071.

FRANKLIN, Pa., a city and county-seat of Venango County, 123 miles north of Pitts¬ burgh, on the Alleghany River, at the mouth of French Creek, and on the Erie, the Pennsyl¬ vania, the New York Central and the Franklin and Clarion railroads. The chief business is in oil, as the city is in the heart of a great oil region. There are large oil refineries, oilwell supplies and railway equipment shops and manufactures of asbestos goods, air compress¬ ors, boring machines and drills, carbon papers and office blanks and books, etc. The United States census of manufacturers for 1914 showed within the city limits 45 industrial establish¬ ments of factory grade, employing 2,002 per¬ sons; 1,479 being wage-earners receiving an¬ nually a total of $955,000 in wages. The capital invested aggregated $13,516,000, and the year's output was valued at $10,608,000: of this, $4,- 999,000 was the value added by manufacture. The city has beautiful parks and a public library, four banks, one high school, one union and five ward schools, one Catholic school ; a State armory, city hall, courthouse, etc; the streets are provided with sewers and paved with brick. Franklin was first settled in 1753, and was incorporated in 1795. The government is of the commission form, the mayor and com¬ missioners being elected annually. The value of the taxable property is given as $5,650,000 at about 60 per cent assessment. Pop. 10,250.

FRANKLIN, Tenn., town and county-seat of Williamson County, 20 miles south of Nash¬ ville, on the Harpeth River, and on the Louis¬ ville and Nashville and Middle Tennessee rail¬ roads. The Tennessee Female College, which was established in 1856, and the Battleground Academy are located here, and there are also several public schools and a Masonic Temple. It has flour mills, a furniture factory and a planing mill, several steam cotton gins and carriage manufactories. It was the scene of two battles during the Civil War, the first on 10 April

1863, between the Federal forces under General Granger and the Confederate forces under General Van Dorn, the latter being de¬ feated; the second on 30 Nov. 1864, between the forces of General Hood and those of General Schofield, and which is famous as the Battle of Franklin (q.v.). Pop. (1920) 3,123.

FRANKLIN, Battle of. On 12 Nov. 1864 General Sherman turned back from his pursuit of Hood to begin his march from Atlanta to the sea, leaving General Thomas to act on the de¬ fensive in Tennessee or to take the offensive in Alabama. Hood was at Florence and Tuscum- bia, on the Tennessee River, threatening Nash¬ ville, with an army of 44,000 men. Thomas' command, much smaller, was widely distributed from Chattanooga to Nashville. General Scho¬ field was at Pulaski, Tenn., 80 miles south of Nashville. With the Fourth corps under Gen¬ eral Stanley, a part of the 23d corps, under General Cox, and a division of cavalry, Thomas instructed Schofield to delay Hood, should he advance, until the army could be concentrated and Nashville reinforced. On the 21st Hood moved on Schofield's right. Schofield withdrew from Pulaski on the 22d, reached Columbia on the 24th, and remained there until the 27th,

.

.

.

‘

■

when Hood forced him to withdraw to the north bank of the river. On the 28th Scho¬ field learned that Forrest's Confederate cavalry- threatened his line of withdrawal through Spring Hill, 11 miles in his rear, and early on the morning of the 29th all his trains and three divisions of infantry were put in motion for Spring Hill. Stanley led, and arrived at Spring Hill just as Forrest reached it. Stanley checked Forrest and took defensive positions. Hood fol¬ lowed Forrest, and during the night Schofield's entire army passed through Spring Hill, in sight of Hood's bivouac fires, for Franklin, 12 miles distant, which the advance reached before day¬ light of the 30th. Being unable at once to cross to the north bank of the Harpeth River, Scho¬ field, who was

closely followed by Hood, had to fight to save his trains, with a river at his back. He threw up a line of entrenchments, and a division of the Fourth corps under Stanley crossed to the north bank of the river, all those remaining in the works south of it being under command of General Cox. By noon the trains were in, and most of them crossed to the north bank. Not anticipating a general attack, Schofield gave orders for the withdrawal of the troops at sunset. He was mistaken as to the intention of Hood, who had closely fol¬ lowed his rear with Forrest's cavalry, and when Wagner's division, acting as Schofield's rear¬ guard, had halted and thrown up barricades about 280 yards beyond the main line, Hood rapidly advanced his infantry and ordered a desperate assault to drive the Union forces into the river. Two of Wagner's brigades were on either side of the Columbia road; Op-dycke's brigade had come into the main line and was massed 200 yards in rear of the entrench¬ ments. Wagner's orders were (

tended to the right and left, involving all of the 23d corps and the left brigade of Kimball's division. The Confederates reached the works in many places, but were unable to carry them. On both sides the fighting was most gallant. At midnight the Union army crossed to the north bank of the river and marched to Nashville.

The Union army engaged at Franklin, not including cavalry, numbered about 23,000 men, of whom 189 were killed, 1,033 wounded and 1,104 missing. Of this loss 1,241 were in Wag¬ ner's division. The Confederates engaged num¬ bered about 22,000. There are no complete of¬ ficial reports of Hood's losses; as far as figures are available it appears that the Confederates lost 534 in killed, 1,744 wounded and 417 in miss¬ ing; but Schofield reports that 1,750 were buried on the field, 3,800 were disabled and placed in hospitals and 702 captured, an aggregate of 6,252, to which must be added the slightly wounded, probably 2,000. A controversy arose regarding the responsibility for the heavy losses of the Union forces which was followed by an investigation, resulting in the censure of Gen¬ eral Wagner's actions and in his removal from his command at his own request. On the Confederate side General Hood was blamed by many for his severe losses, and, although his superiors held him blameless, he too was re¬ lieved at his own request. Franklin, Tenn., was also the scene of various other actions, engage¬ ments and skirmishes fought on 9, 12, 26, 27 Dec. 1862; 1 Feb.; 4, 31 March; 9, 10 April; 4 June 1863; 17 Dec. 1864. Consult Cox, J. D.,

(Campaigns of the Civil War: The March to the Sea, Franklin and Nashville) (New York 1882) ; id., (The Battle of Franklin, Tenn.* (New York 1897) ; Hood, J. B., (Advance and Retreat, etc.* (New Orleans

1880) ; Johnson, R. U., and Buel, C. C., editors, (Battles and Leaders of the Civil War* (4 vols., New York 1884-88) ; Johnston, J. E., (Narrative of Mili¬ tary Operations, etc.* (New York 1874) ; Shellenberger, J. K., (The Battle of Franklin, Tenn., etc.-* (Cleveland 1916) ; Speed, T., (From Columbia to Franklin* (in Southern Bivoiiac, Vol. Ill, No. 9, p. 399, Louisville 1885) ; United States War Department, 'War of the Rebellion. Official Records) (Series I, Vol. XLV, pt. 1; Series III, Vol. V; Atlas; Washington 1891— 95) ; VanHorne, T. B., (History of the Army of the Cumberland) (2 vols., Cincinnati 1875) ; id., (Life of General G. H. Thomas) (New York 1882).

E. A. Carman.

FRANKLIN, State of, now Tennessee (q.v.). Twelve years after the Watauga Asso¬ ciation was formed (1772), and when four counties west of the present North Carolina had been organized, with some 10,000 people, that State on request of Congress ceded the district to the United States, giving it two years to accept. The inhabitants, already ag¬ grieved at having no Supreme Court or militia protection, and being left to fight the Indians and keep public order without help, and now, feeling abandoned to at least two years' an¬ archy, decided to revolt, set up a State, and ask Congress for admission. On 23 Aug. 1784 deputies from three counties met at Jonesboro, resolved on measures and issued an address to the people. Each county chose five representa-

tives, which met in convention at Jonesboro in November, but were unable to agree, and ad¬ journed to 14 December. Meantime the alarmed North Carolina legislature established a Supreme Court and proper officers, and formed the Watauga militia into a brigade, commanded by the leader of the revolt, John Sevier. He advised the convention to accept this redress of their grievances; they refused and made him president of their meeting, drew up a constitu¬ tion to be ratified by another convention the following November, and named the new State perhaps at first Frankland; if so, they soon changed it to Franklin, after the philosopher. A governor — Sevier — and a legislature were elected; courts established, sheriffs and jus¬ tices appointed, etc. For the next three years there were two conflicting governments, each levying taxes, disallowing each other's official acts and making war on each other. The North Carolina militia invaded the

Franklin courthouse at Jonesboro, seized the papers and turned the judge and counsel outdoors; a Franklin mob did the same service to a North Carolina court; the North Carolina commander took the papers by force from Sevier's house, and Sevier gathered a force and recaptured them from his opponent's house. At last, in 1788, the North Carolina party prevailed and put an end to Franklin; Sevier was carried off to Morganton, N. C., put into jail and later tried for high treason. While his trial was going on about a dozen of his followers entered the courtroom. Remaining unrecog¬ nized they succeeded in attracting Sevier's at¬ tention apd, while one of them interrupted the proceedings by addressing the presiding judge, Sevier made good his escape. Finally the North Carolina legislature sensibly passed an act of oblivion and made Sevier a senator, and in 1790 the lands were ceded to the United States. From 1790-96 they were known as the Terri¬ tory South of the Ohio. In 1796 they became the State of Tennessee with John Sevier as the first governor. (See United States — West¬ ward Movement). Consult Fitch, W. E., (The Origin, Rise and Downfall of the State of Franklin, etc.5 (in Order of the Founders and Patriots of America , New York Society, Pub¬ lication No. 25, New York 1910) ; Gilmore, J. R., (The Rear-Guard of the Revolution5 (New York 1886) ; id., (John Sevier as a Com¬ monwealth-Builder5 (New York 1887) ; Turner, F. M., (Life of General John Sevier5 (New York 1910).

FRANKLIN COLLEGE, a non -sectarian institution founded in 1834 at Franklin, Ind., by the Baptist Church. Its faculty numbers 18; the average annual attendance of students is 260. The tuition fees are $175; living expenses $225; productive funds $333,000; income, includ¬ ing tuition and incidental charges, $53,100. The library contains over 30,000 volumes ; the col¬ lege colors are gold and blue. The number of graduates since organization is 748.

FRANKLIN INSTITUTE, The, of the

State of Pennsylvania for the Promotion of the Mechanic Arts, institution founded in Phila¬ delphia in 1824 for the dissemination of knowl¬ edge of the arts and sciences. The work of the society is carried on by means of lectures and reports, exhibitions, class instruction, a journal and a reference library. At first the lectures

gave systematic courses of instruction, but are now limited to a presentation of the latest dis¬ coveries in the arts and sciences. The lectures may be divided into two classes — popular lec¬ tures and strictly technical discussions confined to the special divisions of the institute. A committee was formed in 1834 to report on new inventions and discoveries ; it consists of 60 members, and its work

has greatly enhanced the standing of the institute. The found¬ ing of a journal in 1826, by opening the way to the establishment of exchange relations with other societies, proved an invaluable help in promoting its growth. It is issued monthly, gives a record of the institute's work and pub¬ lishes articles on the advance of science. The institute maintains a library of scientific litera¬ ture, in some branches unique, and embracing the publications of the principal scientific and technical societies of the world, and the lead¬ ing periodicals devoted to science and the arts. At the present time the collection consists of about 68,492 volumes and 29,716 pamphlets. Several of the foreign governments have de¬ posited with the library complete sets of their patent-office publications. It contains records of the patent office of Great Britain since 1617, of France since 1791, of Switzerland since 1888, of the United States since 1790. Abstracts of the patents granted by Germany, Russia, Hun¬ gary and Austria can also be consulted. The institute has held 29 exhibitions of American manufactures, the most notable being that of 1884, which was the first exhibition in America devoted exclusively to the electrical arts. Medals and premiums are awarded for notable inventions. It maintains a school of architec¬ tural and mechanical drawing and night schools of machine designs and naval architecture. Any one interested in the purposes and objects of the institute and expressing a willingness to further the same may become a member when proposed by a member in good standing and elected by the board of managers. The insti¬ tute fills the need felt by inventors and discov¬ erers of some competent, trustworthy and im¬ partial body, to whom they may safely appeal for advice, and on whose judgment they may confidently rely for an opinion as to the useful¬ ness of their inventions and discoveries. Con¬ sult Wahl, W. H., (Franklin Institute: A Sketch of Its Organization and History5 (Phila¬ delphia 1895).

FRANKLIN AND MARSHALL COL¬ LEGE, located at Lancaster, Pa., was formed in 1852 by the consolidation of Franklin Col¬ lege, founded at Lancaster in 1787, and Marshall College, founded at Mercersburg, Pa., in 1836. Franklin College was organized with a view to meet the needs of higher education in the inter¬ ior of the State, especially among the Germans, who formed so large a part of the population. Dr. Benjamin Franklin, after whom the college was named, took a deep interest in its welfare, contributed liberally to its endowment and in his old age made the journey from Philadelphia to Lancaster to be present at its formal opening. Although the college had in its faculty men like Henry E. Muhlenberg, the distinguished bota¬ nist, and Frederick V. Melsheimer, the entomol¬ ogist, and on its board of trustees some of the most prominent men of the

Commonwealth, its work was that of a first class high school.

FRANKLINISM

FRANKMARRIAGE

1?

Marshall College was founded by the Re¬ formed Church in the United States, when its theological seminary was removed from New York to Mercersburg, to meet the educational requirements of her own communion, and with limited resources accomplished a wonderful work. Among the eminent men in its faculty were its first presidents, Drs. Frederick Au¬ gustus Rauch and John Williamson Nevin, and later on Dr. Philip Schaff, all of whom took high rank as philosophers and theologians. The college had a brilliant career, but declined for lack of endowment and pecuniary resources.

When the two colleges were united, James Buchanan became president of the new board of trustees, and the institution entered upon a prosperous career, although it had to make its way in the face of many obstacles and limita¬ tions. Its growth was checked by the Civil War, from the effects of which it but slowly recovered. During the last 15 or 20 years, however, its growth has been rapid, and it now compares favorably in point of equipment, grade of scholarship and number of students with its sister colleges in the State of Pennsyl¬ vania.

Franklin and Marshall College makes no pretense to be a university. It lays stress upon the college course as a means of liberal edu¬ cation, with sufficient elasticity in the way of electives to make first class preparation for technical or professional study. It confers the degrees of A.B. and B.S. for undergraduate work, and A.M. and M.'S. for graduate work, after the completion of the prescribed courses and satisfactory examinations.

The site of the college is exceptionally fine. The principal buildings are the main building, the halls of the literary societies, the Daniel Scholl Observatory, the gymnasium, two Acad¬ emy buildings, the De Peyster Library and the new Science building, with admirable equip¬ ment for physics, chemistry and biology. The libraries contain altogether about 48,000 vol¬ umes. The students in the college proper and the academy number 510, and the faculty 27. This account does not include the Theological Seminary of the Reformed Church, which, al¬ though in close proximity to the college, is a separate institution.

FRANKLINISM. See Electricity.

FRANKLINITE, a native oxide of zinc, manganese and iron, containing these metals in rather widely varying proportions. It crystal¬ lizes in the isometric system with octahedral habit, and also occurs in massive and granular forms. It is opaque, slightly magnetic and iron-black in color, commonly with a metallic lustre. Its hardness varies from 5.5 to 6.5, and its specific gravity from 5.07 to 5.22. In the United States its occurs in considerable quan¬ tity in the neighborhood of Franklin Furnace, N. J., taking its name from the locality, where it is mined as an ore of zinc, its manganese md iron being melted into spiegeleisen, an alloy used in the manufacture of Bessemer steel.

FRANKLIN'S AUTOBIOGRAPHY.

Franklin began his autobiography while he was visiting the bishop of Saint Asaph at- Twyford in 1771. This first instalment carried the ac¬ count from 1706, the date of Franklin's birth,

VOL. 12 — 2

to 1731. It was intended solely for his own posterity, and contains what he called <(several little family anecdotes of no importance to others, }) but the manuscript proved so interest¬ ing to some of his friends that he was per¬ suaded, when the Revolution had ended and he again found a little leisure, to continue his task for the sake of the public. At Passy in 1784 he wrote the engaging pages which tell of his early religious speculations and his pursuit of moral perfection. In 1788, once more at home in Philadelphia, he brought his history from 1731 to 1757, and the next year, the year of his death, added a brief section which breaks off, however, without going beyond his initial trials as agent of the Pennsylvania as¬ sembly. Part I was issued in French in 1791 ; Part XI, in French in 1798; Part III, in English in 1817 (with I and II) ; Part IV, in French in 1828. The whole book, as Franklin wrote it, was first published in 1868 by John Bigelow, whose text and notes are indispensable.

Franklin was already a cosmopolite, a great diplomat and statesman, and an honored citizen of the world, when he thus related his small beginnings, but he assumed no posture in pre¬ senting himself as he had been when he was only a printer and provincial politician. Nothing- can exceed the candor with which he tells of his struggles for a livelihood unless it be the lack of modesty with which he recounts his successes. He is, though he makes no claim to be heroic, actually the hero, in the (Autobi¬ ography, > of one of the few universally

interest¬ ing plots — that in which a man wins his way unaided. There is something essentially dra¬ matic in Franklin's steady progress to wealth and influence; he had the golden touch which turns every material thing to some human ad¬ vantage. And yet the book has no romantic coloring. The (is not only one of the greatest of autobiographies; it is one of the most truly republican books ever written.

Carl Van Doren.

FRANKMARRIAGE, a species of estate entail once obtaining in England under the com¬ mon law, but now obsolete. It existed when a man gave land, which he held in fee simple, to his daughter on her marriage, upon which the married couple become donees in frankmarriage, and the land could pass only to their issue of the fourth generation. This estate came into use under Henry II and was a favorite form of dowry until the reign of Elizabeth.

FRANKPLEDGE, the old English custom by which 10 inhabitants of a district made them¬ selves responsible for any crime or injury com¬ mitted by one of their number. At first only freemen could undertake the frankpledge, but later villains were admitted. When a crime was committed by a member the other nine compelled his appearance or held him to repara¬ tion. In case he absconded, they themselves were held to make reparation by the sheriff, who held court for this purpose. See Criminal Law.

FRANKS, Sir Augustus Wollaston, Eng¬ lish archgeologist: b. Geneva, Switzerland, 1826; d. London, 22 May 1897. He was graduated at Cambridge University in 1849; became an as¬ sistant in the British Museum in 1851 ; and served as keeper of the Department of British and Mediaeval Antiquities for many years. He was knighted in 1888; and was president of the Society of Antiquities from 1892 till his death. His publications include (Recent Excavations and Discoveries on the Site of Ancient Car- thage) (I860) ; (Guide to the Christy Collection of Prehistoric Antiquities and Ethnography) (1868) ; Catalogue of a Collection of Oriental Porcelain and Pottery } (1876), etc.

FRANKS (ˆSpearmen®), The. In the 3d century a.d. (the name first appears in 240, under the Emperor Gordian) the scattered Teu¬ tonic

tribes north and east of the middle and lower Rhine, in the present Westphalia, Hesse, Gelderland, etc., united in a loose confederacy; very probably compacted by the ancestor of the Meroving family, to whom the Franks clung so loyally and even stupidly for centuries. The tribes themselves were known from the early empire : Ampsivarii, Attuarii, Batavi, Bructeri, Chamavii or Gambrivii, Chatti, Cherusci, Sali, Sigambri, Usipetes, etc. In 253 under Valerian they raided Belgic Gaul, and half a century later had permanently settled south of the lower Meuse in Brabant. They are early distinguished as Salian and Ripuarian Franks: the former (from their chief tribe, perhaps originally on the Isala or Yssel) on the lower Rhine; the latter (ripa , bank) on both banks of the middle Rhine. The Salians, after heavy defeats by the Romans, became their allies and wardens of the marches; but when the pretender Constantine withdrew the Roman garrisons in 406 for his attempt on Italy, they overran central Belgium, and Colonia Agrippina (Cologne) shortly fell into their hands. By 450 they had reached the Moselle and the Somme, or Luxemburg and northwest France; but still acknowledged Roman sovereignty. They sent forces to help the Romans against Attila at Chalons ; but when the Huns had retreated from the fortresses whence they had expelled the Romans, — Trier, Mainz, Metz, etc. — the Franks occupied them and the lands on the Rhine and Moselle instead of the Romans. The Salians now held the ter¬ ritory from the Scheldt to the Somme and Meuse, or most of Belgium and a little of France; the Ripuarians from the Meuse to the Rhine, and the lands along that river from the Lippe to the Lahn. They were still pagans ; backward in the arts of war ; had no political union or common head, though their chiefs all claimed Meroving descent ; and were accused of being treacherous and perfidious even beyond

barbarian wont, which their history makes probable.

When the Western Empire fell, the Rhone and Saone valleys were occupied by a Burgun¬ dian kingdom; central and northern France by a Roman province in a condition of anarchy; below which was the great Visigothic kingdom of Enric, taking in South France and nearly all the Spanish Peninsula. Five years later (481) a Salian prince of the upper Scheldt named Chlodovech (Latinized Clovis) acceded, and in 485 fell on the Roman province in al¬ liance with other princelings. In three years he had conquered it, making Gaul to the Loire and Brittany a Frankish possession; refusing to share the spoil with his allies, he attacked and subjugated all the Ripuarians, slaying every Merovingian prince he could seize, in order to exterminate all rivals. In 492 he mar¬ ried Clotilda, the Catholic niece of the Bur¬ gundian king. In 496 he subdued the Ale- manni, and Frankish settlers founded

Fran¬ conia. On returning from his campaign he was baptized a Christian and subscribed to the Athanasian creed; and in a single generation the entire Frankish body, now consolidated into one, renounced paganism. He then conquered nearly all Visigothic Gaul. But Burgundy was too strong for him. He died in 511. The chance of Chlodovech becoming an Athanasian instead of an Arian had the most important consequences : alone of all the barbarian con¬ querors of Rome, his subjects were in religious sympathy with him, and his work endured, while the Arian kingdoms crumbled to pieces. This also began the career of the Frankish mon¬ archy, which for centuries, as the champion of the Church, helped it and was helped by it.

Chlodovech began the practice of dividing the kingdom among his sons, which his suc¬ cessors followed; again and again death or the strong hand united the realms, again a legacy would divide them ; and the records of the ferocious, half decrepit, perfidious Merovingians are the blackest in all European history for unredeemed wickedness and anarchy. Scarce one of them for a century lived to be 40, and scarce one showed any gleam of statesmanship to justify his atrocities or his even worse weak¬ ness. At last in 613 the dominions — which had generally followed the fourfold divisions of Austrasia, Neustria, Burgundy and Aquitaine- — were united apparently finally, but the Merov¬ ingian kings ceased to have any but a nominal sovereignty. The great provincial governors, in the period of anarchy, had made their offices hereditary; the officers of state likewise — chamberlain, keeper of the seal, etc. Of these the mayors of the palace became the de facto rulers ; keeping the kings as puppets, but mak¬ ing them live as country gentlemen, only attend¬ ing court functions annually, in a farm-cart and with long hair. This mayoralty. in Aus¬ trasia fell into the hands of one of the most wonderful families of the world, the Karlings or Carlovingians, who held possession of it for a century, till one of them became king; and later the mightiest of them, Charlemagne, be¬ came emperor of the Romans in a revived em¬ pire. Pepin, or Pippin of Landen, ((the Elder,® was the first, dying 639 ; then his son Grimwald, murdered 656; the latter's sister married the son of Arnulf, bishop of Metz; and their son

was Pepin the Younger or Pepin of Heristal, who, after 30 years of anarchy and partition and reunion following Grimwald's death, finally and forever reunited the Frankish realms by a crushing defeat of the allied forces of Neustria and Burgundy at the battle of Testry, 687. His

son, Charles Martel (Hammer), who held power 717-41, carried civilization at the sword's point among the Germans, and in 732 routed a great Saracen army at Poitiers, saving France from the Mussulman. His son Pepin the Short, after 10 years of mayoralty, deposed the last driveling Meroving and ascended the- throne. Pepin's son Charles (Carolus Magnus, Charle¬ magne, perhaps with a confusion of the title with the name Carloman), acceded in 768. As warrior, statesman and lawgiver, he stands among the foremost of all time. The Frankish realm as such attained by far its greatest ex¬ tension under him — though it is incorrect to say, as is usual, that his work perished with him, for the territorial divisions of his realm never went back to their old anarchy. He ruled a vast congerie of races, from North Spain to North Germany, and from the Hungarian plains to the English Channel ; and he brought them all under the reign of law and Christianity, in¬ heritors of the memories and civilization of Rome. In 800 he crowned the career of the Franks begun by Clovis, becoming secular head of a Holy Roman Empire, of which the Pope was the spiritual head. Whether it was well judged or beneficial to the world, historians are still divided. The history of Charlemagne's successors is not the history of the Franks: after this they became merged in a wider aggre¬ gation. *

The Frankish dominion was the conduit through which the treasures of Rome, political, social and ecclesiastical, were given to the world. Roman law, Roman literature and the Christian religion were forced on the barbarians through the Franks: their impress, deep and strong, was laid in the foundations of European civilization. The best modern compendium is Oman's (History of the Dark Ages) (London 1901). Consult also Emerton, (Introduction to the Study of the Middle Ages> (Boston 1895) ; Hodgkin, (Italy and Her Invaders > (8 vols., Oxford 1890-99) ; Sergeant, (The Franks) (New York 1898).

FRANSECKY, frans'ke, Eduard Friedrich von, German general : b. Gedern, Hesse, 1807 ; d. 1890. In 1825 he entered the Prussian army and became a member of the general staff in 1843. He distinguished himself in the war with Denmark in 1848, and by his resistance against seemingly overwhelming odds won a decisive engagement at Miinchengratz in the Austro-Prussian War of 1866. He was also prominent in the battle of Sadowa. In 1870-71 in the war against France he commanded the Second Army Corps, and by a forced march reached the battlefield of Gravelotte where he threw the First army against the Pont-du-Jour Heights. Late in the year while commanding the army between the Marne and the Seine he repulsed the great effort of Ducrot's forces to break this line. He was transferred to the East and assisted in the operations which obliged Bourbaki's army to

retreat and be interned in Switzerland. He was decorated with the Order of the Black Eagle and received 450,000 marks

in recognition of his distinguished services. In 1879 he became governor of Berlin. He re¬ signed this post in 1882. Consult Von Bremen,

(Memoirs of Friedrich von Fransecky* (Biele¬ feld 1901).

FRANTZ, Konstantin, German publicist: b. Halberstadt, 1817; d. 1891. He was educated at the universities of Halle and Berlin. For some time he studied and wrote on mathematics and philosophy, and also acted as private sec¬ retary in the Berlin Foreign Office. He entered the consular service and spent the years 1853- 56 in this service in Spain. His work is in¬ teresting in view of subsequent events. Russia he believed to be the greatest menace to his country and Europe and after Russia the United States, with its free institutions, and its utter disregard for rockbound political theories. The central idea in his works, therefore, is the necessity of establishing a confederation of central European powers directed against the United States and Russia this confederation to be built around Austria and Germany. His chief works are (Der Foderelismus als das leitende Princip fiir die soziale, staatliche und international Organization (1879) ; (Die Weltpolitik) (1882-83) ; and part of Schuch- ardt's (Die dcutsche Politik der ZukunfP (1899). Consult Schuchardt, (Frantz, Deutsch- lands wahrer RealpolitikeU (Melsungen 1896).

FRANZ, Robert, German composer : b. Halle, 28 June 1815; d. Berlin, 24 Oct. 1892. The family name originally Knauth, was legally changed to Franz in 1847. He began the study of music at an early age and in opposi¬ tion to his parents. At the age of 20 he went to Dessau where he studied under Schneider 1835-37. Upon his return to Halle he studied the great masters, paying special attention to Bach, Handel and Schubert, and in 1843 pub¬ lished his first set of 12 songs, which won the warm praises of Schumann, Mendelssohn, Liszt and other masters. From then till 1868 he held various appointments at Halle. In that year owing to ill health and deafness, he was obliged to give up his positions, and was soon reduced to poverty. . A series of benefits were organized by his friends in America and Ger¬ many and alleviated his dependency. His ar¬ rangements of some of Bach's and Handel's works are standard, but it is as a song writer that he is best known and his .fame, assured. He published over 250 songs with pianoforte accompaniments, a Kyrie and several chorales and four-part songs/ besides arrangements of the vocal masterpieces of Bach and Handel. Franz's best songs rank with those of Schubert and

Schumann. Consult Prochaska, (Robert Franz1* (Leipzig 1894).

FRANZ, Shepherd Ivory, American psy¬ chologist : b. Jersey City, N. J., 27 May. 1874. He was graduated at Columbia University in 1894, and later studied at the University of Leipzig. In 1897-99 he was assistant in psy¬ chology at Columbia, was assistant in physi¬ ology at Harvard 1899-1901, instructor in physiology at Dartmouth Medical School 1901— 04, pathological psychologist at the McLean Hospital, Waverley, Mass., 1904-06. In 1906 he became professor of experimental psychology and physiology at George Washington Univer¬ sity, in 1907 psychologist and in 1910 scientific director in the same institution. He is a Fellow

FRASER, James, English prelate: b. Prest- bury, Gloucestershire, 18 Aug. 1818; d. Man¬ chester, 22 Oct. 1885. He was educated at Lin¬ coln College, Oxford, took orders in the English Church and was rector at Cholderton, Wilt¬ shire, 1847-60; and of Upton Nervet, Berk¬ shire, 1860-70. He was made assistant commis¬ sioner of education in 1858 and in the following year rendered a memorable report on his di¬ vision. In 1870, soon after his refusal of the bishopric of Calcutta, he became bishop of Manchester, in which position he gained the approbation of churchmen and non-conformists alike, as also other religious denominations, which earned him the sobriquet of <(bishop of all denominations.55 Under his administration the diocese made a most remarkable advance. He opposed the Tractarian movement and be¬ longed to the old High Church school of theol¬ ogy. Bishop Fraser was greatly interested in educational matters and visited the United States and Canada in 1865 as a commis¬ sioner of education, subsequently publishing a (Report on the Common School System of the United States and of Upper and Lower Canada5 (1866). A bronze statue of Bishop Fraser stands in the square before the town hall of Manchester, and in the Fraser Chapel of the cathedral of Manchester is a recumbent statue in marble of the much-be¬ loved prelate. He published some addresses and sermons and various reports as commis¬ sioner of education. Consult Bryce, (Studies in Contemporary Biography) (New York 1903) ; Diggle,

mons of Bishop Fraser5 (1887-88) ; and Mem¬ oir of Bishop Fraser5 (1887).

FRASER, Mary (Mrs. Hugh Fraser), English novelist: b. Rome. She is a

sister of F. M. Crawford (q.v.), the novelist, and was married to Hugh Fraser, English Minister to Japan, who died in 1894. She traveled with her husband in America and the Orient and in 1884 embraced the Roman Catholic faith. In her works she seeks to interpret the spirit of the new Japan. She is the author of (The Brown Ambassador5 (1895) ; (Palladia) (1896) ; (A Chapter of Accidents) (1897) ; (The Looms of Time) (1898) ; (A Diplomatist's Wife in Ja¬ pan5 (1899; new ed., 1911) ; (The Custom of the Country; or Tales of New Japan5 (1899) ; (The Splendid Porsenna) (1899), a story of modern Roman society. She published also (Letters from Japan5 (1904) ; (A Diplomat's Wife in Many Lands5 (1910) ; (Further Re¬ miniscences5 (1912) ; (The Honor of the House,5 with J. J. Stahlman (1913) ; (Italian Yesterdays5 (1914) ; (The Bale Fire5 (1914) ; (Captain Corbeau's Adventure5 (1914) ; (Seven Years on the Pacific Slope5 (1915).

FRASER, Simon. See Lovat, Twelfth Lord.

FRASER, Sir Thomas Richard, English physician : b. Calcutta, 5 Feb. 1841. He was educated at Edinburgh University in 1862 and was assistant physician to the Royal Infirmary 1869-74. He became examiner in materia medi- ca 1870-75, and in public health 1876-79 in the University of London. In 1877 he was a mem¬ ber of the Admiralty committee on Sir George Nares' Arctic Expedition 1877, in which year he became professor of materia medica at

Edinburgh and of clinical medicine in the; following year. He was dean of medicine at Edinburgh from 1880 to 1900, was president of the Indian Plague Commission 1898-1901, presi¬ dent of the Royal College of Physicians of Edin¬ burgh 1900-02. In 1902 he was knighted. He is well known as an authority on poisons and has published (An Investigation into Some Pre¬ viously Undescribed Tetanic Symptoms Pro¬ duced in Cold-blooded Animals5 (1867-68) ; (An Experimental Research on the Antagonism be¬ tween the Action of Physostigma and Atropia5 (1870) ;

FRASER, William Alexander, Canadian author : b. Pictou County, N. S., 24 March 1859. He traveled widely and became a mining engi¬ neer, but subsequently turned his attention to waiting. He has contributed much to English and American magazines and has achieved dis¬ tinction as a writer of short stories. (The Eye of a God and Other Stories5 first attracted attention (1892) ; and he published in 1900 an interesting collection of animal stories, (Mooswa and Others of the Boundaries.5 Other works are (The Outcasts5 (1901); 'Thoroughbreds5 (1902) ; (Brave Hearts5 (1904) ; 'Sa'zada Tales5 (1906) ; (The Lone Furrow5 (1907).

FRASER RIVER, the principal river in British Columbia. The larger fork of the Fraser rises in lakes in lat. 55° N. and long. 124° W. After flowing southeast for about 160 miles it joins the lesser fork, w*hich has a length of 200 miles from its source in the Rockies to the junction. The main stream flows through the province from north to south for 725 miles and enters the Gulf of Georgia a little north of the United States boundary line. The Fraser receives the waters of the Stuart, Quesnelle, Blackwater, Thom¬ son, Chilcotin and of many lesser streams. It is navigable for 100 miles in its lower course and in a part of the upper course between Fort George Canon and Soda Creek vessels of light draft navigate the stream. It is subject to floods from April to August, often rising 60 feet above normal high water in the narrow reaches and covering about 200,000 acres in the valleys lower down. Gold was discovered in its bed in 1857 and for some years the rush thither rivalled those of California and Aus¬ tralia. Its lower watershed is densely forested. Great quantities of timber are floated down the river and its tributaries. The salmon, of which there are five species, are world famous, and the fishing and canning industries are of some importance. The river was named after Simon Fraser, who explored it in 1808.

FRASER RIVER SALMON and others of the genus Oncorhynchus nerka, the blue- back, redfish, which are common in the Fraser River and other streams of British Columbia.

FRASERBURGH, Scotland, seaport in Aberdeenshire, 42 miles north of Aberdeen. It contains a handsome cross, town hall, large custom-house ; the streets are wide and clean. In the neighborhood to the north is the Prom- ontorium Tcexalium of Ptolemy, now Kinnaird Head, on which stands Fraser's ancient castle, utilized as a lighthouse, with its mysterious

wine tower and cave. Fraserburgh is the chief centre of the Scottish herring fishery, and in addition to cured herrings and cod, exports barley, meal, oats and potatoes. It has three tidal harbors, and its shipping includes 14 sail¬ ing vessels, 8 steam vessels and a fleet of 700 fishing boats. The herring trade is valued at $1,000,000 annually. Pop. 11,151. There is a large increase in the number of inhabitants dur¬ ing the fishing season (July and August).

FRASERVILLE, or RIVIERE DU LOUP, re-vyar' dii loo, Canada, a town

and county-seat of Temiscouata County, Quebec, on the south shore of the Saint Lawrence at the confluence of the Riviere du Loup, 116 miles below Quebec. It is on the Intercolonial Railway and is the terminus of the Temis¬ couata Railway. Its permanent population is almost entirely French Canadian. It has rail¬ way workshops, and manufactories of pulp, leather, lumber, furniture, iron products, butter and flour. It is a popular summer resort. Pop.

6,774.

FRATERNAL INSURANCE. See In¬

surance, Fraternal.

FRATERNAL SOCIETIES IN AMER¬ ICA. A fraternal society is defined as a cor¬ poration or voluntary association organized and carried on for the sole benefit of its mem¬ bers and their beneficiaries. It has no capital stock and is not operated for profit. Every such society must have a representative form of government, and is supposed to operate on the lodge system, with a ritualistic form of work for the meetings of the lodges or other des¬ ignated subordinate bodies. It has power to adopt its own constitution, by-laws, rules and regulations for the orderly conduct of its af¬ fairs, and in general terms may manage its internal interests as it may deem best. Al¬ though the American fraternities have the same basis as the friendly societies (q.v.) of England and Scotland, they are a purely Amer¬ ican institution, organized without reference to, and at the outset of their career, in entire ignorance of the fact that the same system was in successful operation elsewhere. At the present time the laws governing the frater¬ nal system are in a state of transition, and as the fraternal societies are the creatures of, and governed by the laws of, the different States, any change in those laws will necessarily change or modify the system as at present operated.

There are two representative bodies, claim¬ ing to act for, and represent a large constitu¬ ency among the fraternal associations. The National Fraternal Congress, organized in 1886, represents the larger number of leading soci¬ eties. From its official reports it appears to aim at eventually securing the adoption of a uniform law throughout the United States and Canada, defining as fraternal society, as above expressed, with the addition, that every soci¬ ety shall pay a death benefit on the death of a member, and may pay disability payments, re¬ sulting from accident, disease or old age. Dur¬ ing the years 1900 and 1901 the Congress made a vigorous effort to secure the passage of a uni¬ form bill in the legislatures in all the leading States, restricting

the benefits, coupled with a provision requiring all the newer organizations to charge adequate rates, but allowing the older

societies to continue their low rate assessment system. This action was bitterly opposed by the minority of the Congress and by a still larger number of other associations that were not affiliated with the Congress. The result of this opposition was the defeat of the proposed law in every State where a contest was made.

The outside societies that participated in this contest, feeling the need of a union for mutual protection thereafter, immediately after the contest was ended met together and in March 1901 organized the Associated Frater¬ nities of America, with the avowed object of opposing any further changes in the laws of the different States until public sentiment was ripe for the adoption of a uniform law on the basis of the largest liberty to each society in the matter of benefits, provided adequate rates are charged therefor. This dissension among the fraternal societies induced the convention of the insurance commissioners of the differ¬ ent States to formulate a proposed law for the government of fraternal societies, containing many new and startling features.

All the early fraternal associations collected their contributions from their members bv means of assessments, the rate of which, except in two instances, was graded according to age at entry, and each member was required to pay such a number of assessments each month as might be needed to meet the death losses. As these older organizations, advanced in years, their death losses necessarily increased in num¬ ber, and with increased death losses the num¬ ber of assessments each month also increased. During this period many new societies were organized on the same system and while young naturally had a low death rate and a low mortality cost per member. Being much cheaper they naturally attracted members from their predecessors until they were displaced in popular favor by other new creations on the same plan. Whatever differences of opinion may now exist among fraternalists as to the need of the sys¬ tems at the present time, they all agree that the old assessment system has been a failure, and should be superseded by rates based on the rec¬ ognized mortality tables. The newer organi¬ zations profited by the experience of the older societies, and generally started with higher rates, and this fact has made it. much easier for them to provide for their deficiencies. A large num¬ ber of the younger organizations are, and for some years have been, charging adequate rates, and the protection they furnish is as safe as the insurance supplied by any insurance company.

The real basis of the fraternal system in America is the fraternal bond of union, uniting the members together in a common cause fof mutual beneficial and protective purposes. The lodge system requires meetings of the members at least once a month, and therefore directly tends to draw the members closer together. Every member thus participates in the work of the organization and the emulations aroused among the different lodges naturally produces the best results at the least outlay. Bread cast upon the waters will return, and it is the act of casting that produces that wonderful change in the human heart, which constitutes the re¬ turn. A mother is fonder of her offspring than the father, and both parents love a crippled child more than the sturdy members of the flock, and the reason is the same. The mother suffers

more and bears more than the father, and both do more for the cripple than for the healthy child. No one ever did a good deed, or thought to do a good act without feeling the better for it, and thus no person ever did or can partici¬ pate in the good work that the various lodges of the fraternities are engaged in without grow¬ ing to love the work and the organization which does the work. This ennobling influence upon the membership is not by any means the least of the many blessings conferred upon the American people by the fraternal system. This same influence naturally impels the members to labor without compensation for the growth and prosperity of the organization and thus' at a low cost produce results beyond the dreams of avarice to the insurance companies.

Every society is required to have a repre¬ sentative form of government and is governed by its constitution and laws, as enacted, or from time to time amended by the constituted author¬ ities. Its constitution and laws therefore con¬ stitute the contract between the members in their relations to the society. The protection furnished by such societies is not insurance in the ordinary sense in which that word is un¬ derstood and used. No society can issue a certificate in favor of a creditor of the member and the benefits furnished under the certificate cannot be attached for the debt of the member. The beneficiaries are limited to husband or wife, affianced husband, or affianced wife, or some heir, blood relative or dependent of the member. In insurance anyone having an in¬ surable interest in the life of the policy holder may be named as beneficiary while under a fraternal certificate the beneficiary is limited by the bonds of affection

and duty. In the one case a beneficiary has a vested interest in the policy and it cannot be changed without her consent, while in the other the beneficiary has no vested rights whatever until the claim matures; and the member may have his certifi¬ cate changed in favor of another beneficiary without her knowledge or consent.

There are numerous other societies con¬ ducted on the same principle. According to the reports of the supreme bodies of these or¬ ganizations for 1916 the membership of the principal fraternal organizations in the United States and Canada was as follows, beginning with the largest:

Freemasons . 1,760,277

Odd Fellows . . 1 .622,100

Modern Woodmen of America . 921 ,899

Eastern Star, Order of . . . 800,000

Woodmen of the World . 732,385

Knight of Pythias . 729,053

Rechabites, Independent Order of . 701 ,040

Good Templars, International Order . 620,000

Loyal Order of Moose . 620 , 000

Improved Order of Redmen . 479,033

Benevolent and Protective Order of Elks . 442,658

Royal Arch Masons. . . 422,359

Order of Eagles . . 400,000

Ancient Order of United Workmen . 350,000

Knights of Columbus 346,560

Order of Owls . 346 , 754

The Maccabees . 331,756

Ancient Order of Hibernians . 250,000

Royal Arcanum . 244,722

Knights Templar . . . . . 237 , 368

Independent Order of Foresters . 218,074

Junior Order of United American Mechanics. . . 230,000

Nobles of the Mystic Shrine . 220,000

Foresters of America . . . 205 , 756

B'rith Abraham Order . 194,490

Brotherhood of American Yeomen . 196,478

Woman's Benefit Association of the Maccabees. . 179.176

Knights and Ladies of Security. 155,399

Ladies' Catholic Benevolent Association . 155,080

Loyal Orange Institution . 150,000

Tribe of Ben Hur 101,011

Orioles, Order of . 98,781

Sons and Daughters of Liberty . 90 , 265

Protected Home Circle . 88,252

Fraternal Aid Union . 80,000

Mystic Workers of the World . 83,538

Knights of the Golden Eagle . 78,112

Court of Honor . 75,786

United Commercial Travelers of America . 72,964

Order of Gleaners . 71,070

Daughters of America . . . 68 , 000

Improved Order of Heptasophs . 65,604

Knights and Ladies of Honor . 65,855

Catholic Mutual Benefit Association . 64,615

National Union . 62,028

New England Order of Protection . 53,619

Hermann's Sons . . . 42 , 000

Ladies of the Modern Maccabees . 50,088

Independent Order of B'nai B'rith . 40,083

Knights of Malta . 40,000

United Order of American Mechanics . 36,316

Patriotic and Protective Order of Stags . 34,827

Veiled Prophets of the Enchanted Realm . 34,000

Fraternal Brotherhood . 26,495

Royal League . 32,756

Sons of Saint George . . 32 , 000

Order of United Ancient Druids . 30,968

Smaller organizations . . 236,841

Total . 16,118,931

All the older associations operate on what is known as grand jurisdictions consisting of rep¬ resentatives ejected by the subordinate lodges within the limits of the grand jurisdiction. It in turn sends delegates to the supreme body, which is the highest authority in the organization. As a general rule the supreme body assumes all lia¬ bility for death or disability payments that are permanent in their nature, and the subordinate lodges assume and pav the sick or other tem¬ porary disability benefits. Each member pays his share of all benefits through the local lodge, of which he is a member, the dues going to the supreme office, being remitted direct, and not through the grand jurisdiction. As a rule the grand jurisdiction covers a State, and has su¬ pervision over the growth and general manage¬ ment of all the lodges within its territory. Of late years the tendency has been

to do away with the plan of grand jurisdictions and have the supreme body composed of delegates elected either directly by the lodges or by districts com¬ posed of a number of lodges. The officers are usually elected by the supreme body, but in some cases are elected by a direct vote of the mem¬ bers.

To sum up in a word: a fraternal society is a brotherhood of members, bound together by its fraternal bond of union. It is organized and carried on for the sole benefit of its members and their beneficiaries. It operates on the lodge system, and uses a ritual in the meetings of its lodges and the initiation of its new members. It has a representative form of government, in which the management is responsible to the members for the faithful performance of their duties. It is governed by a constitution and laws enacted by the representatives of its mem¬ bers, and it furnishes its members, in all the States, with protection in case of death, and in many of the States with protection in case of disability resulting from illness, accident and old age after the expectancy of life, and in some of the States with still more liberal benefits. See Insurance, Fraternal, and the articles on the different fraternal organizations.

FRATERNITIES, religious societies for pious practices and benevolent objects. They were often formed during the Middle Ages,

from a desire of imitating the holv orders. From the 12th to the 15th century nothing was con¬ sidered more meritorious than to form and be¬ long to such orders. The laity, who did not wish to pronounce the monastic vows, entered into associations in order to gain some of the advantages of the religious even in their worldly life. These societies were at first formed with¬ out any ecclesiastical interference, and on this account many of them, which did not obtain or did not seek the acknowledgment of the Church, had the appearance of separatists, which sub¬ jected them to the charge of heresy. The pious fraternities which were formed under the direc¬ tion of the Church or were acknowledged by it were either required by their rules to afford assistance to travelers, to the unfortunate, the distressed, the sick and the deserted, on ac¬ count of the inefficiency of the police, and the want of institutions for the poor, or to perform certain acts of penitence and devotion. Of this description were the Fratres Pontifices, a brotherhood that originated in Tuscany in the 12th century, where they maintained estab¬ lishments on the banks of the

Arno, to enable travelers to cross the river and to succor them in case of distress. A similar society was af¬ terward formed in France, where they built bridges and hospitals, maintained ferries, kept the roads in repair, and provided for the security of the highways. A bridge of 18 arches over the Rhone at Avignon, built by Saint Benezet in 1177 and another of 22 arches over the same river at Pont. Saint Esprit, built between 1265 and 1309, were among their great¬ est achievement in bridge-building. They grad¬ ually amassed great wealth by alms and gifts. In 1519 they were secularized on account of the abuses that had crept into the order.

Similar to these were the Knights and Com¬ panions of the Santa Hermandad in Spain ; the Familiars and Cross-bearers in the service of the Spanish Inquisition; the Calendar Brothers in Germany; the Alexians in Germany, Poland and the Netherlands, etc. The professed ob¬ ject of the Alexians was to visit the sick and imprisoned; to collect alms for distribution; to console criminals, and accompany them to the place, of execution ; to bury the dead, and to cause masses to be said for those who had been executed, or for persons found dead. They derived their names from Alexius, their patron saint, and were at first principally com¬ posed of persons from the lower classes of the people in the Netherlands. They were after¬ ward increased by the addition of the female branch, the Black Sisters. Although lay brothers they had houses, and formed their order into two provinces under an ecclesiastical government. They still exist, in the societies for burying dead bodies, in Antwerp, Utrecht and Cologne. The Brothers of- Death, of the order of Saint Paul, were dressed in black, like the Alexians, and were distinguished by a death's head on their scapulary. They were suppressed by Pope Urban VIII.

There were also Gray Penitents (an old fraternity of an order existing as early as 1264 in Rome, and introduced into France under Henry III), the black fraternities of Mercy and of Death ; the Red, the Blue, the Green and the Violet Penitents, so called from the color of their cowl; the divisions of each were known by the colors of the girdle or mantle. The fra¬

ternity of the Holy Trinity was founded at Rome in 1548 by Philip de' Neri for the relief of pilgrims and the cured dismissed from the hospitals. The Brothers of the Christian Schools are a fraternity founded near the end of the 17th century, the statutes of which were approved by Benedict XIII. Their labors have been of great service in the cause of elemen¬ tary and secondary education in France, though their work is not confined to France but ex¬ tends over a large part of the world, including Belgium, North and South America and Eng¬

land. They take religious vows, wear a suit of clerical dress and always work in pairs. In Ireland there is a body of Christian Brothers modeled on the French one, the first of its schools having been opened at Waterford in 1804. Their schools have spread over Ireland, and their system of education has received the approval of various royal commissions.

The Brothers of Common Life, founded at Deventer in Holland by the celebrated theolo¬ gian, Gerald Groot, toward the end of the 14th century, and formally approved by Gregory XI in 1376, were a fraternity which performed great services to learning, especially theological learning. From Holland they spread rapidly over Germany, and increased so greatly in num¬ bers that 500 houses belonged to the order in 1460. The Roman Catholic Church is indebted to it for a text of the Latin version of the Bible by Saint Jerome; most carefully prepared by a collation of the most ancient manuscripts. This text was consulted as an authority by the ed¬ itors of the Bible prepared at the command of Sixtus V. The same order prepared some texts of the Christian fathers.

The Brothers of Charity are another fra¬ ternity whose hospitals are found in the princi¬ pal cities. It was founded by Saint John de Dieu in Spain in 1540. Much better known in Great Britain are the Sisters of Charity (called also Gray Sisters, Daughters of Charity, Sisters of Saint Vincent de Paul), a Roman Catholic order founded in 1634 at Paris by Saint Vin¬ cent de Paul for the purpose of nursing the sick in hospitals. The sisters take vows of poverty, chastity and obedience, besides a vow binding themselves to serve the sick. Besides conducting hospitals and nursing, they some¬ times undertake the management of poor schools. They attend the sick of every nation and religion. There is also a body of Irish Sisters of Charity, separate from the one just mentioned. See Greek-Letter Societies or College Fraternities and Orders, Religious.

FRATERNITIES, College. See Greek- Letter Societies.

FRATICELLI, frat-i-sel-i or cheLe, a name applied to several heretic sects in the Middle Ages, more especially to those members of the order of Saint Francis who, in an en¬ deavor to live up to the strict rule of their founder, created a split between the Spirituals and the Conventuals of the Franciscans (q.v.). They were generally opposed to existing eccle¬ siastical and social order and were similar to the Brethren of the Free Spirit, Beghards and other sects. They had no fixed place of resi¬ dence. In the 14th and 15th centuries the Fra-ticelli made considerable progress and attracted more or less attention

in northern Italy, from where they spread to a certain extent to south-

ern France, Flanders and South Germany. They declared the existing Church as in a state of apostasy and looked upon poverty as an absolutely essential condition. Some of the popes persecuted them with great severity as heretics and many of them suffered greatly from the Inquisition. Consult Dollinger, J. J. I. von, 'Beitrage zur Sektengeschichte) (Munich 1890) ; Ehrle, F., in Archiv fur Litteratur und Kirchengeschichte des Mittelalters (Vols. I- IV, Berlin 1885-88) ; Lea, H. C., (History of the Inquisition of the Middle Ages) (3 vols., New York 1888).

FRATICELLANS. See Fraticelli.

FRATRES ARVALES. See Arval

Brothers.

FRATTAMAGGIORE, fra'ta-ma-jo ra, Italy, city in the province of Naples, eight miles north of the city of Naples. It contains a fine church and has manufactories of silk and ropes. There are also many country homes of wealthy Neapolitans. Pop. 13,720.

FRAUD, in law , all deceitful practices in defrauding or endeavoring to defraud another of his known right, by means of some artful de¬ vice, contrary to the plain rules of common hon¬ esty. It is condemned by the common law, and punishable according to the offense. All frauds and deceits for which there is no remedy by the ordinary course of law are properly cog¬ nizable in equity. Where a fraud can be clearly established, courts of law exercise a concurrent jurisdiction with courts of equity. Wherever fraud or surprise can be imputed to, or collected from, the circumstances, equity will interpose and grant relief against it. Where a person is party to a fraud, all that followed by reason of that fraud shall be said to be done by him. A party prejudiced by a fraud may file a bill in equity for a discovery of all its circumstances. Mere inadequacy of price alone is not a ground for a court to annul an agreement; but if there be such inadequacy as to show that the person did not understand the bargain he made, or was so oppressed that he was glad to make it, knowing its inadequacy, it will show a com¬ mand over him which may amount to a fraud. If a person be fraudulently prevented from do¬ ing an act, equity will consider the act as done ; and equity also relieves against bargains

made under misconception of rights. In treaties, con¬ cealment of a material fact by one of the par¬ ties, in order to keep the other in ignorance, whereby to profit, is a gross fraud, and the con¬ tract will be set aside in equity. Constructive or legal fraud is applied to such acts or con¬ tracts as, though not originating in an actual evil design or contrivance to perpetrate a posi¬ tive fraud or injury upon other persons, yet by their tendency to deceive or mislead other per¬ sons, or to violate public or private confidence, or to impair or injure the public interest, are deemed equally reprehensible with actual fraud, and are prohibited by law, as within the same reason and mischief as acts and contracts done malo animo. Gross criminal frauds are punish¬ able by way of indictment or information. Frauds are not indictable at common law unless they be such as affect the public — as vending unwholesome provisions, or using false weights or measures; or by the way of conspiracy; pr unless they affect the crown or the adminis-

tration of justice. (See Frauds, Statute of; Fraudulent Conveyances). Consult Bigelow, (The Law of Fraud on its Civil Side' (Boston 1888) ; Browne, Construction of the Statute of Frauds } (1895) ; Kerr, 'Treatise on the Law of Fraud and Mistake} (4th ed., London 1910).

FRAUD, Prevention of, an exercise of po¬ lice power to stop deception, or to render its commission more difficult, or to facilitate its detection. The principal field for legislation for the prevention of fraud is found in the busi¬ ness of brokers, agents and depositories — warehouse and commission men, auctioneers, etc., — and in the sale of commodities, espe¬ cially of substitutes, imitations and adultera¬ tions, bankrupt and fire sales, and sales by peddlers or other itinerant dealers. Fraud is legally dealt with either criminally, — generally in cases specified by statute, — or civilly by granting or withholding remedies, or by pre¬ ventive measures.

Congress can legislate for the prevention of fraud so far as interstate and foreign com¬ merce is concerned. The Pure Food Law of 1906 serves partly for that purpose. A city ordinance will usually cover protection against fraudulent practices, particularly in the retail sale of merchandise and in the services of hotel-keepers, cab and taxicab-drivers, for which a stranger is likely to call. A State may exer¬ cise its power for the prevention of fraud, even though interstate commerce is thereby in¬ directly affected ; as example the sale of oleo¬ margarine colored in imitation of butter was largely prohibited, though imported from other States and sought to be sold in original pack¬ ages. As a

useful article of commerce, how¬ ever, the policy of prohibition of oleomargarine has been abandoned in all the States, the legis¬ lation against it showing evidences of a desire to use the power of fraud prevention so as to suppress competition.

Governmental regulations to prevent fraud include the requirement of licenses, of reports, of notices, labels and marks indicating the char¬ acter and quality or- quantity of merchandise ; the fixing of standards of weights and meas¬ ures and sometimes of the form of packages, and inspection by public officials.

FRAUD ORDERS, Postal, powers con¬ ferred on the Postmaster-General by act of Congress 19 Sept. 1890, to prohibit the use of the mails by persons believed to be conducting a fraudulent business. The necessity for the act was demonstrated by the fact that as the work of investigation proceeded, schemes for swindling through the mails were disclosed much more numerous and extensive than had been supposed. Many of the fraudulent enter¬ prises proved to be as far-reaching in their ramifications as the postal service itself. Not only were thousands of credulous people swindled out of money foolishly invested, but confidence in legitimate enterprises was under¬ mined. It was estimated that in 80 important cases early brought under the operation of the act, the American public in less than a decade had been swindled to the extent of a hundred million dollars. The arrest, conviction and im¬ prisonment of the swindlers has proved effec¬ tive in abating the fraudulent abuse of the mails. The constitutional question raised as to the authority of Congress to delegate power

to the Postmaster-General to act in specific cases was definitely affirmed by the Supreme Court of the United States. The action of the Postmaster-General was thus made conclusive, no provision being made for a judicial review.

FRAUDS, Electoral. See Electoral Frauds and Safeguards against; Corrupt Practices Acts; Electoral Commission; Uni¬ ted States — Disputed Presidential Elec¬ tions.

FRAUDS, Statute of. Perhaps one of the

most important statutes ever enacted in Engr land or the United States was the Statute of Frauds (29 Charles II, chap. 3). It was passed in the year 1673. Its object is stated to be the “prevention Gf frauds and

perjuries,® and its effect is to make writing essential to the validity of many contracts or transactions. The most important sections are those relating to con¬ tracts; namely, the 4th and the 17th, almost every word of which has been the subject of numerous decisions. It is provided by the 4th section that no action shall be brought on the contracts therein mentioned unless the agreement or some note or memorandum thereof shall be in writing and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorized. The contracts referred to are the following: (1) Any special promise by an executor or ad¬ ministrator to answer damages out of his own estate; (2) any special promise to answer for the debt, default or miscarriage of another person; (3) any agreement made upon consid¬ eration of marriage ; (4) any contract or sale of lands, tenements and hereditaments, or any interest in or concerning them; and (5) any agreement that is not to be performed within the space of one year from the making thereof. This section, however, does not make the con¬ tract null and void, but only unactionable. The 17th section has reference to sales of goods for the price (or value) of £10, and upward, which are “not allowed to be good® unless some memorandum of the bargain has been made in writing, or unless the buyer shall accept part of the goods so sold, and actually receive the same, or give something in earnest to bind the bargain, or in part payment. In the statutes of the American States the principal alteration made in these terms is by the specification of a different sum of money. The sum usually established is $50, but in some of the States it is $30 or $40. Generally the statute has been construed not to render compliance with’ its provisions essential to the validity of the enu¬ merated contracts, but only necessary to the proof of such contracts against the party who sets up the statute as a defense. The import¬ ance of this statute has been so fully recog¬ nized in this country that it has been substan¬ tially re-enacted in every State in the Union, and in some of them its provisions have been made still more comprehensive and stringent. The 1 7th section, however, has been discarded in 16 of the States : Alabama, Arizona. Dela¬ ware, Illinois, Kansas, Kentucky, Louisiana, New Mexico, North Carolina, Ohio, Pennsyl¬ vania, Rhode Island, Tennessee, Texas, Vir¬ ginia and West Virginia. Consult ˆCyclopedia of the Laws of England, } (Vol. V) ; Browne, (Treatise on the Construction of the Statute of Frauds* (5th ed., Boston 1895) ; Smith,

(Treatise on the Law of Frauds and the Stat¬ ute of Frauds* (Indianapolis 1907). See Con¬ tract; Fraud; Lease.

FRAUDULENT CONVEYANCES, in

law, a fraudulent conveyance is a conveyance the object, tendency or effect of which is to defraud another not a party to such a conveyance, or the intent of which is to avoid some debt or duty due by or incumbent on the party making it. Conveyances of this character are declared in¬ valid by two celebrated English statutes which have been substantially re-enacted throughout the United States with the same provisions. The first of these statutes was passed in the 13th year of the reign of Queen Elizabeth (1571), and commonly referred to as the stat¬ ute 13 Eliz. chap. 5, and by it all fraudulent con¬ veyances, gifts or alienations of lands or goods whereby creditors might be in anywise dis¬ turbed, hindered, delayed or defrauded of their just rights are rendered utterly void; but the statute does not extend to any estate or interest in lands on good consideration, and bona-fide conveyed to any person not having notice of such fraud. The second statute against fraud¬ ulent conveyances is the statute 27 Eliz. chap. 4, which was passed in 1585. It provides that the conveyance of any interest in lands for the intent and purpose to defraud and deceive sub¬ sequent bona-fide purchasers of the lands for a good and sufficient consideration shall be utterly void. This statute differs from the one first mentioned in applying solely to lands, and in protecting the interests of purchasers instead of creditors; but it contains similar provisions declaring the validity of any previous convey¬ ance if it be upon valuable consideration and to a bona-fide purchaser. It has been held in England, in the interpretation of this statute, that if the previous conveyance be voluntary it is void as to a subsequent purchaser, even if he had notice before he received his deed that such a conveyance had been made. This doc¬ trine has been generally rejected by the courts throughout the United States as unjust, and the principle adopted that the receipt of notice gives a person intending to purchase sufficient op¬ portunity to protect his own interests, and if he is guilty of imprudence in accepting the con¬ veyance he should receive no assistance from the courts. This appears to be the more un¬ objectionable doctrine. Voluntary conveyances are never set aside under either statute, as between the immediate parties, but only in favor of purchasers or creditors. Consult Bigelow, (The Law of Fraudulent Conveyances* (Bos¬ ton 1911) ; Hunt, (The Law Relating to Fraudulent Conveyances> (London 1897) ; Moore, (Treatise on Fraudulent Conveyances> (2 vols., Albany 1908). See Fraud.

FRAUENBURG, frow'en-boorH, Germany, town in the district of Konigsberg, Prussia, on the Frisches Haff, 41 miles southwest of Konigsberg. The chief products are garden truck, flour and cereals. A forest school is situated here. Copernicus was canon of the cathedral and died here in 1543. His tomb is in the Gothic cathedral erected in

1329. Pop.

2,522.

FRAUENFELD, frow'en-felt, Switzer¬ land, capital of the canton of Thurgau, 25 miles northeast of Zurich, on the Murg. It is situated in a beautiful and fertile district, and

is of importance as the centre of trade for the fruit, wine and agricultural products of the dis¬ trict. It is a well-built town and contains a church which was built in 1286 and an ancient castle, the government building, which contains the archives of the canton and a library, the town hall and military barracks. It is the seat of a technical school with historical and scien¬ tific collections, and has manufactories of gloves, cotton and iron goods, machinery, leather and guns. Pop. 8,105.

FRAUENLOB, frow'en-lob, the assumed name of Heinrich von Meissen, German minne¬ singer : b. 1250; d. 1318. For several years he wandered as a minstrel and then established the first school of the meistersingers at Mainz. The ladies of Mainz are said to have carried his bier to the cathedral in appreciation of his life-long chivalrous devotion to their sex. His tomb was restored in 1783 by ladies during the Werther period of German literature, and the ladies of Mainz erected a beautiful monu¬ ment to his memory near his tomb in 1842. Ettmiiller published an edition of his poems in 1843. They are bombastic and artificial m style. One of his works, the (Cantica CanticorumP has appeared in English.

FRAUNCES' TAVERN, an ancient build¬ ing at the southeast corner of Broad and Pearl streets, New York. It was originally built by the Delancey family and long occupied as a mansion. Afterward it was transformed into a tavern. After the British evacuation of New York it was for a time the headquarters of Gen. George Washington, who here on 4 Dec. 1783 delivered his farewell address to his of¬ ficers. In 1768 the New York Chamber of Com¬ merce was founded here, and in 1902 it was purchased and restored by the Sons of the Revolution, who have thus preserved for pos¬ terity one of the famous landmarks of Revolu¬ tionary days. The tavern is still maintained.

FRAUNHOFER, frownho-fer, Joseph von, German mathematician : b. Straubing, Ba¬ varia, 6 March 1787 ; d. Munich, 7 June 1826. In 1799

he was placed with a looking-glass maker and glass-grinder at Munich. After various vicissitudes he received an appointment as optician in the mathematical and mechanical institute of Reichenbach and Utzschneider at Benedictbeuren, and in 1809 the mechanical part of the optical institute was chiefly under his direction. In the same year he became one of the members of the firm under which the busi¬ ness was conducted, and in 1818 its director. In 1823, after it was moved to Munich, Fraun¬ hofer became a member of the Academy of Science, its conservator of physics and was made a member of the nobility in 1824. One of the most difficult operations of practical optics was to polish the spherical surfaces of large object-glasses accurately. Fraunhofer in¬ vented a machine which obviated this difficulty, and rendered the surface more accurate than it was left bv the grinding. He invented also other grinding and polishing machines, and introduced many improvements into the manu¬ facture of the different kinds of glass used for optical instruments, and which he found to be always injured by flaws and irregularities of various sorts. In 1811 he constructed a new kind of furnace, and on the second occasion when he melted a large quantity found that he

could produce flint-glass, which, taken from the bottom of a vessel containing two hundred¬ weight of glass, had the same refractive power as glass taken from the surface. He found that the English crown-glass and the German table- glass both contained defects occasioning irregu¬ lar refraction. In the thicker and larger glasses there would be more of such defects, so that in larger telescopes this kind of glass would not be fit for object-glasses. Fraunhofer there¬ fore made his own crown-glass. The cause which had hitherto prevented the accurate de¬ termination of the power of a given medium to refract the rays of light and separate the different colors which they contain was chiefly the circumstance that the colors of the spectrum have no precise limits, and that the transition from one to another is gradual and not im¬ mediate; hence, the angle of refraction cannot in the case of large spectra be measured within 10 feet or 15 feet. To obviate this, Fraunhofer made a series of experiments for the purpose of producing homogeneous light artificially, and unable to effect his object in a direct way, he did so by means of lamps and prisms. In the course of these experiments he discovered that bright fixed line which appears in the orange color of the spectrum when it is produced by the light of fire. This line enabled him after¬ ward to determine the absolute power of refrac¬ tion in different substances. Experiments to ascertain whether the solar spectrum contains the same bright line in the orange as that pro¬ duced by the light of fire led him to the dis¬ covery of the innumerable dark fixed lines in the

solar spectrum, consisting of perfectly homogeneous colors and now bearing his name. The importance of this discovery can scarcely be overestimated. It led to the invention and use of the spectroscope (q.v.), to the science of spectroscopy (q.v.), and to all our present knowledge of solar and stellar chemistry. Fraunhofer also made a variety of other im¬ portant discoveries and inventions. He made the great refracting telescope for Dorpat. His writings were edited by Lommel as (Gesam- melte SchrifterC (Munich 1888). Some of his writings were translated into English by J. S. Ames and published as the second volume of (Harper's Scientific Memoirs) under the title (Prismatic and Diffraction Spectra) (New York 1898). Consult, (Life of Fraunhofer) (in American Journal of Science and Art, Vol. XVI, p. 304, New Haven, 1829) ; Voit, 'Joseph Fraunhofer* (Munich 1887).

FRAUNHOFER LINES. See Spec¬ troscopy.

FRAU SORGE, f row'sor'ge (Dame Care). 'Frau Sorge,* the first of Herman Suder- mann's complete novels (1887) and the work which brought him his fame as a writer of fiction, as (Die Ehre,* his first play,- placed him in the front rank among contemporary dramat¬ ists, stands out in the long list of his novels and plays in two ways ; as an art-work it is the most perfect, and it is the one which shows least the wear and tear of a generation of social change. Those may be merely two ways of saying the same thing; namely, that in a writer who combines, as Sudermann does, the qualities of a noet and a realist, the more highly imaginative works have a more per¬ manent value than the controversial ones. Into

this grim tale of East Prussian peasant life, with its hint of autobiography in the spirit and the scene, if not in the story, Sudermann has infused something of the spirit of the epic, the narrative of the toiler battling against the forces of nature. The legend of Frau Sorge (Dame Care) with which the story ends and around which it is conceived is a fine bit of imaginative writing. -It is the story of a mother so poor and lonely that she had no one to act as godmother for her son except Dame Care, who offers to see that the boy grows up to be a good man who shall never go hungry if his mother will give the boy's soul, with his youth and his hope of happiness, as a hostage to Dame Care. The rending of the charm by the power of a woman's love and the solemn, but never tragic, quality of the story, are dis¬ tinguishing characteristics of Sudermann's work.

Edith J. R. Isaacs.

FRAXINELLA. See Dittany.

FRAY BENTOS. See Independencia.

FRAY GERUNDIO. See La Fuente, Modesto.

FRAYSSINOUS, fra'se-noos', Denis An¬ toine Luc, Count de, French prelate and statesman: b. Curieres, Aveyron, 1765; d. 1841. He entered the ministry ana attained fame by his conferences at l'Eglise de Saint Sulpice in 1803-09. In the latter year they were prohi¬ bited by Napoleon. In 1816- he was made court preacher and almoner of Louis XVIII, and became Minister of Public Worship in 1824-28. He was made a peer of France and the Jesuits were readmitted to France during his term as minister. In 1822 he was elected to the Academy. The Revolution compelled him to leave France and he sojourned for a time at Rome and at Prague. His (Defense du chris- tianisme) (3 vols., 1825) had a great vogue in his day and went through several editions. Consult his life by Henrion (2 vols., Paris

1844).

FRAZER, Sir James George, English an¬ thropologist : b. Glasgow, Scotland, 1854. He became a Fellow of Trinity College, Cambridge, and was appointed professor of social anthro¬ pology at the University of Liverpool in 1907. His works are of the greatest importance in the study of anthropology, and particularly of religion and myth. He is a Fellow of the British Academy, honorary Fellow of the Royal Society of Edinburgh and corresponding mem¬ ber of the Royal Prussian Academy of Science. He has published a revised edition of (Long's Sallust5 (1884) ; 'Totemism5 (1887) ; (The Golden Bough5 (1890; 2d ed,, 1900) ; Passages of the Bible chosen for their Literary Beauty and Interest5 (1895; 2d ed., 1909) ; 'Pausanias's Description of Greece,5 translated with a com¬ mentary (1898; 2d ed., 1913) ; (Pausanias and Other Greek Sketches5 (1900) ; (Lectures on the Early History of the Kingship5 (1905) ; 'Adonis, Attis, Osiris, Studies in the History of Oriental Religion5 (1906; 2d ed., 1907; 3d ed., 1914) ; 'Questions on the Customs. Beliefs, and Languages of Savages5 (1907) ; (The Scope of Social Anthropology5 (1908); 'Psyche's Task, a Discourse concerning the Influence of Super¬ stition on the Growth of Institutions5 (1909;

2d ed. 1913) ; 'Totemism and Exogamy5 (1910) ; 'The Magic Art and the Evolution of Kings5 (1911) ; 'Taboo and the Perils of the Soul5

(1911) ; ‘The Dying God5 (1911) ; ‘Letters of William Cowper,5 chosen and edited with a memoir and a few notes (1912) ; (Spirits of the Corn and of the Wild5 (1912) ; ‘The Belief in Immortality and the Worship of the Dead5 (Vol. I, 1913) ; ‘The Scapegoat5 (1913) ; bal¬ der the Beautiful5 (1913) ; ‘Essays of Joseph Addison,5 chosen and edited with a preface and a few notes (1915) ; ‘The Golden Bough5 (Vol. XII, Bibliography and Index, 1915).

FRAZER, John Fries, American scientist : b. Philadelphia, 8 July 1812; d. there, 12 Oct. 1872. He was a grandson of Lieut-Col. Persi- for Frazer of the Revolution. Graduated with highest honors at the University of Pennsyl¬ vania in 1829, he afterward completed a course in law, was admitted to the bar, but soon gave up the practice of this profession in favor of the natural sciences. With Prof. A. D. Bache he made the first researches on magnetics in the United States. In 1836 he became one of the two assistants on the First Geological Sur¬ vey of Pennsylvania. After filling for some time a professorship in the Philadelphia High School, in 1844 he succeeded Professor Bache as professor of natural philosophy and chem¬ istry in the University of Pennsylvania, serving until his death; and from 1855-68 also as vice¬ provost. In 1857 he received the degree of LL.D. from Harvard. He was an active mem¬ ber of the American Philosophical Society (its vice-president in 1855), the Academy of Natural Sciences, and the Franklin Institute (the editor of its journal from 1850 to 1866), and one of the charter members of the National Academy of Sciences. Consult Le Conte, T. L., (Memoir of J. F. Frazer5 (in National Academy of Sciences, Biographical Memoirs, Vol. I, p. 245, Washington 1877):

FRAZER, Persifor, American geologist, son of preceding: b. Philadelphia, 24 July 1844; d. 1909. After graduation (1862) from the University of Pennsylvania, served during Civil War in the Mississippi squadron (1863-65) ; was mineralogist and metallurgist to the United States Geological Survey (1869-70), professor of chemistry in the University .of Pennsylvania (1870-74), assistant geologist Second Geological Survey of Pennsylvania (1874-82). He was the first foreigner to receive the degree of Docteur- es-Sciences Naturelles from France, which also gave him the decoration of the golden palms of the Academy. He served as vice-president, rep¬ resenting the United States in the International Geological Congress of 1888 (London), and of 1897 (Saint Petersburg). _ The John Scott medal was awarded to him in 1905. He wrote extensively for scientific periodicals, published five volumes of Reports of the Geological Sur¬ vey of Pennsylvania; ‘Tables for the Deter¬ mination of Minerals5 (1874); and (Bibliotics or the Study of Documents5 (1894).

FRAZIERS FARM, Battle of. See Glen¬ dale, Battle of.

FREAR Walter Francis, American jurist: b. Grass Valley, Cal., 29 Oct. 1863. He was graduated at Yale University in 1885, and at the Yale Law School in 1890; and received the degree of LL.D. from Yale University in 1910;

was made second judge of the First Circuit Court of Hawaii, in January 1893, associate jus¬ tice of the Supreme Court of Hawaii in March 1893. He was a member of the commission to recommend to Congress legislation for Hawaii, in August 1898; was appointed chairman of the Hawaiian Code Commission in 1903 ; became chief justice of the Supreme Court of Hawaii in July 1900 and governor 1907-13. He was chairman of the Hawaiian delegation to the National Republican Convention in 1912. He is the author of (Evolution of the Hawaiian Judi¬ ciary, } etc.

FREAR, William, American agricultural chemist : b. Reading, Pa., 24 March 1860. He was graduated at Lewisburg (now Bucknell) University in 1881, and was assistant in sciences there in 1881-83, when he became assistant chemist of the United States Department of Agriculture. In 1885-1907 he was professor of agricultural chemistry, and after 1907 of experi¬ mental agricultural chemistry at the Pennsyl¬ vania State College of Agriculture. Mean¬ while he held various important posts in State agricultural work. Since 1900 he has been special agent of the United States Department of Agriculture and is also chief chemist of the Pennsylvania Dairy and Food Bureau. He edited Agricultural Science in 1892-94 and is a member of many scientific societies. His writing is confined exclusively to communica¬ tions to scientific periodicals and experiment station and State reports.

FRECHETTE, fra-shet, Louis Honore,

French-Canadian poet; b. Levis, Quebec, 16 Nov. 1839; d. 31 May 1908. He edited several French-Canadian journals and in 1889 became clerk of the legislative council of Quebec. His lyrics were much admired both for their form and sincerity of passion. He published (Mes loisirs-* (1863); (La voix d'un exile* (1869); (Pele Mele) (1877) ; (Les fleurs bor- eales,* crowned by the French Academy (1879) ; (Les oiseaux de Niege* (1879) ; (La legende d'un peuple) (1887) ; (Les Feuilles Volonte* (1891); (VeronicaP a drama; and in prose (Letters a

Bastile) (1872); (Histoire critique des rois de France) (1881); (1893); (La Noel au Canada* (1900).

FRECKLES, brownish-yellow spots of a circular form on the human skin. They are due to excess of pigmentary matter in the cells of the cuticle, immediately above the true skin, and only appear on those exposed surfaces, as the neck, face, hands and arms. They are some¬ times congregated in thick clusters which give to the features an unsightly appearance. Some¬ times freckles are hereditary, appearing soon after birth and continuing * through life, or subsiding or vanishing altogether. This affec- tion. is most common as well as most persist¬ ent in persons of fair complexion and hair, and especially so in those with red hair. There can be no doubt that exposure to the sun increases the disfigurement One of the milder treat¬ ments for removing freckles is a solution of 15 to 30 grains of hyposulphite of soda, or of chloride of ammonium, 15 grains to one ounce of water. A beneficial remedy, to be used as a .wash at night and in the morning, is a mixture of bichloride of mercury, dilute acetic acid, borax and rose water.

F R E D E G A R, o.r FREDEGARIUS SCHOLASTICUS, chronicler of the Franks, who flourished in the 7th century and was one of the three compilers of the celebrated (His- toria Francorum,* a history of the Franks down to 642 a.d. It is invaluable as a source book for the history of France during the first half of the 7th century. It is written in corrupt Latin, and was continued in the 8th century in the work known as (Gesta Francorum.* Frede- gar traced the Franks in direct line from the Trojans. Consult Krusch, (Fredegarii et Aliorum Chronica* (Hanover 1888).

FREDERIC, Harold, American novelist: b. Utica, N. Y., 19 Aug. 1856; d. Hornby, England, 19 Oct. 1898. After receiving an edu¬ cation in the schools of his native city, he en¬ tered the profession of journalism there, work¬ ing later on papers in Albany and New York. In 1884 he was appointed London correspondent of the New York Times, retaining this position until his death. His best works were his nov¬ els, of which the two greatest are (In the Val¬ ley } (1890), a historical novel of upper New York, and (The Damnation of Theron Ware-* (1896), a searching analysis of the life of the American bourgeoisie. Among his other novels are:

Lawton Girl* (1890) ; (The Return of O'Maho- ney) (1892) ; (The New ExodusP a story of Jewish life, written after his visit to Russia (1892) ; (The Copperhead) (1894), a Civil War story, dramatized and produced with consider¬ able success in 1917; (Marsena) (1.895), hu¬ morous

tales; (March Hares * (1896); (Gloria MundP (1898) ; (In the Market Place* (1899). See In the Valley.

FREDERICIA, fred-e-rish'e-a, Denmark, seaport, on the coast of Jutland. It was at one time well fortified, but the forts have not been kept in repair. The chief exports are eggs, meat, fish, cheese and butter; the chief imports are cotton and woolen goods, fruit, salt and petroleum. Pop. 14,228.

FREDERICK (Friedrich Maria Albrecht Wilhelm Karl), Archduke of Austria : b. Gross- Seelowitz, near Briinn, 1856. His training was almost exclusively military. In 1905 he was made general of infantry and army inspector, and in 1907 commander of the Landwehr. Upon the death of Prince Francis Ferdinand in 1914 he became practically chief commander of the Austro-Hungarian army. The Albertina collec¬ tion of engravings and drawings is housed in his palace at Vienna.

FREDERICK I, First Elector of Branden¬ burg, of the house of Hohenzollern : b. 1371 ; d. 1440. In 1398 he succeeded his father, Frederick V, Burgrave of Nuremberg. He served in the army of Hungary, and at the bat¬ tle of Nicopolis in 1396 effected the rescue of King Sigismund. He supported the . candidacy of Sigismund for the imperial crown and in recognition of his services was made Elector of Brandenburg in 1417, after he had been ad¬ ministrator for seven years. He thus became the founder of the roval Prussian dynasty. He quarreled with Sigismund in 1423 and in 1427 sold his rights as Burgrave of Nuremberg to the city. He was a candidate for the throne of Germany in 1438. Consult Brandenburg. (Konig Sigmund und ICurf first Friedrich I> (Berlin

1891).

FREDERICK III, Elector of Brandenburg. See Frederick I of Prussia.

FREDERICK I, king of Denmark and Nor¬ way: b. 3 Sept. 1471; d. 10 April 1533. While joint ruler of Schleswig-Holstein, he suc¬ ceeded his nephew Christiern (or Christian) II, on the deposition of the latter, in 1523, and en¬ tered into an alliance with Gustavus I, king of Sweden. After taking Copenhagen, he gained over all the nobility, to whom he granted privileges at the expense of the throne, and in¬ troduced Lutheranism into his dominions.

FREDERICK II, king of Denmark and Norway, the son and successor of Christian III : b. 1534; d. 1588. He ascended the throne in 1559. He subdued the Ditmarshers of West Holstein in 1559, suppressed piracy in the Baltic and North Sea, founded the fortress of Kronborg, and waged a successful war against Sweden (1563-70). He was a friend of learning, was served well by his counselors and was beloved by his people.

FREDERICK III, king of Denmark and Norway: b. Hadersleben, Schleswig, 18 March 1609; d. Copenhagen, 6 Feb. 1670. He suc¬ ceeded his father Christian IV, in 1648. The most remarkable event of his reign was his changing of the constitution from an elective to an hereditary monarchy.

FREDERICK IV, king of Denmark: b. Copenhagen, 11 Oct. 1671; d. there, 12 Oct. 1730. He ascended the throne on the death of Chris¬ tian V in 1699. He leagued against Charles XII of Sweden, who forced him to make peace ; but when Charles fled to Turkey, Frederick drove the Swedes out of Norway, and con¬ cluded a favorable neace, retaining possession of the duchy of Schleswig.

FREDERICK V, king of Denmark and Norway: b. Copenhagen, 31 March 1723; d. 14 Jan. 1766. He came to the throne in 1746. The character of his reign may be in¬ ferred from the following remark, which, on his deathbed, he made to his successor, Chris¬ tian VII : ((It is a great consolation to me, my son, that I have not injured any person and that my hands are not stained with one drop of blood.

FREDERICK VI, king of Denmark and Norway: b. Copenhagen, 28 Jan. 1768; d. there, 3 Dec. 1839. He became regent in 1784, fol¬ lowing on the mental eclipse of his father. Having joined the Armed Neutrality of the North against England in 1800, all Danish ships in English harbors were seized and the Danish fleet destroyed at

Copenhagen (21 April 1801). The regent thereupon withdrew from the alliance. Having again allied himself with Napoleon, Copenhagen was bombarded by the British (25 Sept. 1807). On his accession in 1808, he had waged a war with the Swedes, who attempted to possess themselves of Nor¬ way. He succeeded in defeating them and peace was signed in 1809. Norway was taken by the Allies in 1814 and handed over to Sweden ; Pomerania and the isle of Riigen falling to Denmark. His country emerged from the Napoleonic wars in a bankrupt and pros¬ trate condition ; but under the able guidance of the chief minister, Bernstorff, great progressive measures were carried through, among them peasant emancipation, freedom of the press,

prison reform and Jewish emancipation; sav¬ ings banks were established, education en¬ couraged and a representative system of gov¬ ernment set up.

FREDERICK VII, king of Denmark: b. Copenhagen, 6 Oct. 1808; d. Gliicksburg, 15 Nov. 1863. He ascended the throne in 1848. The principal events of his reign were the re¬ volution in Schleswig and Holstein, and the dis¬ pute over the succession to Denmark and the duchies, the king himself and his uncle, the heir-presumptive, being childless.

FREDERICK VIII, king of Denmark: b. 1843 ; d. Hamburg, 14 May 1912. He was the eldest son of Christian IX and of Queen Louisa of Hesse-Cassel. He received his education at a grammar school and fought against Germany in 1864. He also studied at Oxford and traveled abroad. In 1869 he married Princess Louisa of Sweden, niece of Oscar II. He succeeded his father on 29 Jan. 1906. In 1905 his second son, Charles, became king of Norway, under the title of Haakon VII. He was a brother of Queen Alexandra of England and of King George I of Greece. He died suddenly at Hamburg, and for several hours his body was not identified.

FREDERICK III («The Fair»), German king and Duke of Austria: b. 1286; d. Guten- stein, 13 Jan. 1330. On the death of his father, Albert I, he failed to gain the throne, which went to Henry VII. On the death of the latter a few of the electors favored Frederick, chose him as king, and he was crowned by the Archbishop of Cologne in 1314. The majority of the electors, however, chose his cousin, Louis IV, Duke of Upper Bavaria, and war was carried on until the capture of Frederick at Miihldorf in 1322. Frederick was imprisoned for three years, when he was released for a short time, returning to captivity in accordance with an agreement between him and Louis, and remaining in captivity until his death.

FREDERICK I, surnamed Barbarossa or Red Beard, emperor of the Holy Roman Em¬ pire, son of Frederick, Duke of Suabia: b. 1123; d. June 1190. He was chosen to succeed his uncle, Conrad III, in 1152. He was crowned at Aix-la-Chapelle a few days after his election. His great ambition was to secure the independence of the empire and, above all, to be master of Italy. His first expedition to Italy was made in 1154, when, after subduing several towns in Lombardy, he went to Rome, and after some delays, had himself crowned emperor by Adrian IV (18 June 1155). He marched again into Italy in 1158, took Brescia and Milan, and at the celebrated Diet at Roncaglia assumed the sovereignty of the towns and received the homage of the lords. On his return to Germany he triumphed over Bohemia, and made Poland tributary to the empire. After the death of Pope Adrian, Frederick had three anti-popes in succession elected in opposition to Alexander III, who excommunicated him and his pope, Victor. The same year, 1160, he be¬ sieged and took Crema, after a most courage¬ ous defense. In 1162 he conquered Milan, and had many of the public buildings destroyed, as well as parts of the fortifications ; after which the other towns of Lombardy submitted to him. In 1166, he traversed the Romagna, levied con¬ tributions on the towns, besieged Ancona and had himself crowned a second time at Rome by

the anti-pope, Pascal, but pestilence broke out in his army and he was forced to return to Germany. In 1174 he besieged unsuccessfully the newly founded town of Alessandria, and in 1176 was totally defeated by the Milanese at Como. This reverse was not lost on him, for it changed his policy of repression. In 1183 he made peace with the Pope and the towns of Lombardy. In 1188 he assumed the cross, set out in the following year on the third crusade, was opposed on the march by the Greek em¬ peror and the sultan, arrived in Asia, and was drowned while crossing a river.

Frederick was great, not only as a soldier, but as a ruler. His administration was marked by justice, his subordinate officers were chosen for their capacity and probity, he was himself an educated man and promoted education and literature. His politic measures held in check the power of the nobles of Germany by the granting of municipal privileges to the cities. His memory is still cherished among the peas¬ ants of Germany, who dream of the return of Fritz Redbeard, as the Welsh did of King Ar¬ thur. Consult Prutz, (Kaiser Friedrich P (1871-73) ; Fischer, (Kreuzzug Friedrich P

(1870).

FREDERICK II, emperor of the Holy Ro¬ man Empire: b. Jesi, near Ancona, Italy, 26 Dec. 1194; d. Fiorentino, 13 Dec. 1250. He was elected king of the Romans in 1196, again after the death of his father, Henry VI, and a third time on the excommunication of Otho IV, in 1211. He was already king of Sicily and duke of Suabia, under the joint regency of his mother and Pope Innocent II. He made a league with Philip Augustus, king of France, and after the defeat of Otho by the latter at the battle of Bouvines, was crowned at Aix-la-Chapelle in 1215. He received the imperial crown at Rome in 1220, on which occasion he had to renew a vow previously extorted from him to take the cross. In 1225 he married as his second wife, Yolande, daughter of John of Brienne, king of Jerusalem, and in 1227 em¬ barked for the Holy Land. Illness compelled him in a few days to abandon the enterprise, and for this he was excommunicated by Pope Gregory IX. He set out again in 1228, and the Pope exciting opposition to him and invading his hereditary states, he at once concluded a truce with Kameel, the sultan of Egypt, by which he became master of Jerusalem. He entered the city, crowned himself (no priest daring to do it), and returned to Europe. He recovered his states, made peace with the Pope and suppressed the revolt of his son Henry, who was then imprisoned for life. In 1235 Frederick began the war with the cities of Lombardy, having for his ally Eccelino, tyrant of Verona. After his victory of Corten- uova, he took Ravenna, Faenza and Benevento ; and in 1241 his fleet defeated that of the Genoese, and captured the cardinals and bishops who were on their way to attend a council against him. Frederick promoted the election of Innocent IV, who had been his friend and made a treaty with him, but soon found In¬ nocent a most determined enemy. A new anathema and sentence of deposition and re¬ lease of his subjects from their allegiance to him was published in 1245. The mediation of Saint Louis utterly failed to bend the Pope to reconciliation. Rival emperors were set up, the

war in Italy continued, Parma was lost in 1248, his, Frederick's, son, Enzio, was defeated and made prisoner in the following year. Fred¬ erick was the most accomplished sovereign of the Middle Ages ; but his strong sympathies with his Italian motherland and his unremitting endeavors to establish a compact and all- supreme empire in Italy, were the causes not only of his own misfortune but of the miseries which he brought on the German em¬ pire by embroiling it in costly wars abroad and leading him to neglect the welfare and to sacrifice the interests of his German subjects.

FREDERICK III («The Pacific"), em¬ peror of the Holy Roman Empire:

b. Innsbruck, 21 Sept. 1415 ; d. Linz, 19 Aug. 1493. He was elected emperor in 1440, and reigned for 53 years, the longest German reign. He was of a slow, phlegmatic temper and in his hands the imperial authority declined. The Concordat of Vienna in 1448 put an end to the nationaliza¬ tion of the Church in Germany which had been attained at the Council of Constance. Frederick failed in his claim to the crown of Hungary, but in his reign the Hungarians were expelled from Vienna. He showed foresight in his alliances : the Swabian League, formed in 1487 to maintain the authority of the empire, led to the peaceful annexation of the Tyrol. He effected a stroke of diplomancy by the marriage of his son, Maximilian, to Mary, daughter and heir of Charles the Bold of Burgundy, to whom he surrendered the king¬ dom of the Romans in 1486.

FREDERICK I (((the Victorious"), elector- palatine : b. 1425 ; d. 1476. In 1439 he received a portion of the Palatinate on the death of his father. This he ceded some time later to his brother, Louis. After the latter's death he be¬ came guardian of his infant nephew, Philip, and administered the government. He was made elector for life in 1451 owing to the ex¬ ternal troubles which threatened the Palatinate, but renounced the succession of his children in favor of his nephew. He opposed Frederick III, and had to defend himself against the defection of his allies. In 1462 he won the brilliant victory of Seckenheim, and thereby increased the territory of the Palatinate and secured undisturbed possession of the elector¬ ship for his lifetime. Consult Feeser, Fried¬ rich der Siegreiche) (Neuburg 1880), and the biography by Menzel (Munich 1861).

FREDERICK II (((the Wise"), elector- palatine: b. 1482; d. 1556. He ascended the throne in 1544, succeeding his brother, Louis. He was in command of the imperial army in 1529 when the Sultan Solyman appeared before Vienna. He came under the influence of Melanchthon, and joined the Schmalkald League. Consult Rott, Friedrich II von der Pfalz und die Reformation (Heidelberg 1904).

FREDERICK III (<(the Pious"), elector- palatine: b. 1515; d. 1576. He became elector- palatine in 1559 upon the extinction of the elder Palatine line. He had become a Lutheran in _ 1546, and by his embracing the Calvinistic faith in 1561 alienated the Lutheran princes. He aided the French reformers and also those of the Netherlands. His supervision of the drawing up of the Heidelberg catechism in 1563 placed Calvinism on a systematic founda-

tion. Consult Kluckhohn, A., (Friedrich der Fromme) (Nordlingen 1877-79).

FREDERICK IV (*(the Upright®), elector- palatine: b. 1574; d. 1710. Son of elector Louis VI. His father died during his infancy, and his uncle, John Casimir, was his guardian until he assumed the crown in 1592. The Prot¬ estant Union was formed in 1608, chiefly through his influence, and his whole reign is noted for his firm adherence to the Protestant cause. Consult Hausser, L., (Geschichte der rheinischen Pfalz) (Heidelberg 1856).

FREDERICK V, elector-palatine and king, of Bohemia: b. Amberg, 1596; d. Mainz, Ger¬ many, 29 Nov. 1632. He succeeded his father, Frederick IV, in 1610. In 1613 he married the Princess Elizabeth, daughter of James I, of England. In 1619, on the death of the Em¬ peror Matthias, he accepted the crown of Bo¬ hemia in opposition to the Hapsburg claimant. He made a triumphal entry into Prague, which was followed in 1620 by his total defeat by the Imperial forces at the battle of Prague, and the loss of his kingdom and hereditary states. He then took refuge in Holland. He was succeeded by his cousin, Maximilian of Bavaria, the head of the Catholic League. Two of his sons, Prince Rupert and Prince Maurice, were cele¬ brated in the Civil Wars in England. His daughter, Sophia, who was married to Ernest Augustus, afterward Elector of Hanover, be¬ came the mother of George I of England.

FREDERICK I, first king of Prussia (Frederick III, as elector of Brandenburg) : b. Konigsberg, 11 July 1657 ; d. Berlin, 25 Feb. 1713. He succeeded his father in 1688, entered into the alliance against France, supported William of Orange in his English expedition, and seized Bonn and other towns, sent auxiliaries to the emperor against the Turks, and, after a dispute of some years, -sold to the emperor the circle Schwiebus, which the Great Elector had acquired in exchange for the principalities of Liegnitz, Brieg and Wohlau. He supported the emperor in the war of the Spanish Succes¬ sion, and in 1701 obtained from him the title of king, which he had long coveted. Frederick gratified his love of pomp in the ceremony of his coronation at Konigsberg, the cost of which exhausted his treasury for a time. He placed the crown on his head with his own hands. In 1694 he founded the. University of Halle; two years later the Berlin Academy of Paint¬ ing; and, in 1707, he established the Academy of Sciences, Berlin, and made Leibnitz first president.

FREDERICK II, best known as FRED¬ ERICK THE GREAT, king of Prussia: b. 24 Jan. 1712; d. Sans Souci, 17 Aug. 1786. He was the son of Frederick William I and the Princess Sophia Dorothea of Hanover. Though by the direction of his father, he was instructed only in the details of military exercises and service, his taste for poetry and music was early developed by the influence of his first instructress, Madame de Rocoules, and his early teacher, Duhan, who, countenanced by the queen, formed a secret opposition to his father's system of education. The prince's in¬ clination led him to adopt entirely the views of his mother. This gave rise to a coolness be¬ tween him and his father. Indignant at the oppression and hatred which he experienced

from his father, Frederick determined to flee to the court of George II, king of England, his mother's brother. His sister Frederica and his friends, Lieutenants Katt and Keith, were the only persons entrusted with the secret of his flight. He was, however, overtaken, was barbarously treated by his father, and obliged to be an eye-witness of the execution of his friend Katt.

While the prince remained in the closest confinement in Kustrin, the king sent him a proposal to renounce the succession in favor of his younger brother Augustus William, on con¬ dition that he should have the liberty of pur¬ suing his own inclinations in regard to his stud¬ ies, traveling, etc. ((I accept the proposal,® said the prince, <(if my father declares that I am not really his son.® On this answer the king, who looked on conjugal fidelity with re¬ ligious respect, relinquished his design. That the king was inclined to sentence his son to death is certain. But the provosts Reinbeck and Seckendorf, who had before intrigued against the prince, now saved his life ; the latter, in particular, by availing himself of the interfer¬ ence of the emperor.

The prince was not admitted to court till on the occasion of the nuptials of his sister Frederica, and was obliged by his father in 1733 to marry the Princess Elizabeth Christina, daughter of Ferdinand Albert, Duke of Bruns- wick-Bevern. Frederick William gave the castle of Schonhausen to her, and to the prince the county of Ruppin, and in 1734 the town of Rheinsberg, where he lived devoted to study till he ascended the throne. Among his daily visitors were literati, musicians and painters. He corresponded with foreign scholars, particu¬ larly with Voltaire, whom he greatly admired. Several of his writings, in particular his (Anti- MachiavelC had their origin in the rural tran¬ quillity of Rheinsberg.

The death of his father raised him to the throne 31 May 1740. Frederick on his succes¬ sion found in his states a population of only 2,240,000. At his decease the number had risen to 6,000,000. He raised Prussia to a pitch of greatness by his talents as a legislator and general, assisted in the field and in the cabinet during a reign of 46 years by many distin¬ guished men. Frederick, who had already ex¬ cited great expectations, retained for the most part the institutions and laws of his father, but gave to the latter more extent and vigor. The death of the Emperor Charles VI was a favorable moment, of which Frederick II took advantage, to revive the claims of the house of Brandenburg with regard to the Silesian prin¬ cipalities, so far as to ask from the queen Maria Theresa, the duchies of Glogau and Sagan, in return for which he promised her assistance against all her enemies, his vote for the election of her husband as emperor, and 2 000,000 Prussian dollars. These proposals being rejected, he occupied Lower Silesia in De¬ cember 1740, and defeated the Austrians 10 April 1741, near Molwitz. This victory, which was almost decisive of the fateˆ of Silesia, raised new enemies against Austria. France and Bavaria united with Prussia, and the war of the Austrian Succession commenced. The only ally of the queen of Hungary and Bohemia, George II of England, advised her to make peace with Prussia because Frederick II was

her most active and formidable enemy. After the victory of Czaslau (Chotusitz), gained by Frederick, 17 May 1742, the first Silesian War was terminated by preliminaries signed at Bres¬ lau under British mediation (11 June), and by the peace signed at Berlin, 28 July 1742. Fred¬ erick obtained Lower and Upper Silesia, and the larger part of the county of Glatz, with full sovereignty. On the other hand he re¬ nounced all claims to the other Austrian terri¬ tories, assumed a debt of 1,700,000 Prussian dollars charged on Silesia, and promised to re¬ spect the rights of the Catholics in Silesia. Saxony acceded to this peace, of which England and Russia were the guarantors.

Frederick II seized the opportunity of a peace to introduce useful institutions into the conquered territories, and to render his army more formidable. In 1743, on the death of the last count of East Friesland, he took possession of that county, the reversion of which had been granted to his family in 1644 by the emperor. The war of the Austrian Succession continued; the Emperor Charles VII was driven from his hereditary estates of Bavaria, and the Aus¬ trians were everywhere victorious. Frederick, apprehensive that an attempt would

be made to recover Silesia, entered into a secret alliance with France (April 1744), and with the em¬ peror, the palatinate, and Hesse-Cassel, in Frankfort (22 May 1744). He promised to support the cause of the emperor by the in¬ vasion of Bohemia, on condition that he should receive the circle of Koniggratz. He entered Bohemia suddenly, 10 Aug. 1744, and captured Prague; but the Austrians and Saxons com¬ pelled him to evacuate Bohemia before the close of the year. The death of the emperor (18 Jan. 1745), and the defeat of the Bavarians at Pfaffenhofen, obliged Maximilian Joseph, the young elector of Bavaria, to conclude the Peace of Fuessen with Maria Theresa, and occasioned the dissolution of the Alliance of Frankfort, after Hesse-Cassel had already declared itself neutral. The victory of the Prussians over the Saxons at Kesselsdorf, 15 Dec. 1745, led to the Peace of Dresden (25 December). Fred¬ erick retained Silesia, acknowledged the hus¬ band of Maria Theresa, Francis I, as emperor, and Saxony promised to pay 1,000,000 Saxon dollars to Prussia.

During the 11 following years of peace Frederick devoted himself with the greatest activity to the domestic administration, to the improvement of the army, and at the same time to the Muses. It was at this time that he wrote his (Memoires pour servir a 1'Histoire de BrandenbourgP his poem, (L'Art de la Guerre,5 and other works in prose and verse. He en¬ couraged agriculture, the arts, manufactures, and commerce, reformed the laws, increased the revenues of the state, perfected the organiza¬ tion of his army which was increased to 160,000 men, and thus improved the condition of the state.

Secret information of an alliance between Austria, Russia and Saxony gave him reason to fear an attack and the loss of Silesia. He hastened to anticipate his enemies by the in¬ vasion of Saxony, with which the Seven Years' War, or third Silesian War, commenced. The Peace of Hubertsuburg (15 Feb. 1763), termi¬ nated this war without foreign interference, on the principle that the contracting parties

should remain in statu quo. Frederick came out of the Seven Years' War with a reputation which promised him in the future a decisive influence in the affairs of Germany and Europe. His next care was the relief of his kingdom, drained and exhausted by the contests. He opened his magazines to furnish his subjects com for food and for sowing. To the peasants he distributed horses for plowing, rebuilt at his own expense the houses destroyed by fire, established new settlements, built manufac¬ tories, and laid out canals. In 1764 Frederick founded the Bank of Berlin, with a capital of 8,000,000 Prussian dollars.

A treaty was concluded with Russia (31 March 1764), in consequence of which Fred¬ erick supported the election of the new king of Poland, Stanislaus Poniatowski, and the cause of the oppressed Dissidents in Poland. For the purpose of connecting Prussia with Pomerania and the Mark, and of enlarging and consolidat¬ ing his territories, Frederick consented to the first partition. of Poland proposed at Saint Petersburg and concluded 5 Aug. 1772. Fred¬ erick received the whole of Polish Prussia (which had been ceded to Poland by the Teu¬ tonic Order in 1466), with the part of Great Poland to the river Netz, excepting Dantzic and Thorn. From this time the kingdom of Prussia was divided into East and West Prus¬ sia. He declared against the possession of a large part of Bavaria by Austria in 1778, after the death of Maximilian Joseph, elector of Bavaria, without issue, but Austria was not to be diverted from her designs by negotiations. Saxony, therefore, formed an alliance with Prussia, and Frederick invaded Bohemia with two armies (July 1778). The Emperor Joseph, in a strongly fortified camp behind the Elbe, could not be induced to give battle. The aged Empress Maria Theresa wished for peace. But Catherine II having declared her intention of assisting Prussia with 60,000 men, this war of the Bavarian Succession was terminated with¬ out a battle by the Peace of Teschen (13 May 1779). Austria consented to the union of the principalities of Franconia with Prussia, and renounced the feudal claims of Bohemia to those countries. In the evening of his active life Frederick concluded, in connection with Saxony and Hanover, the confederation of the German princes, 23 July 1785.

Frederick left to his nephew, Frederick Wil¬ liam II, a kingdom increased by 29,000 square miles, more than 70,000,000 Prussian dollars in the treasury, an army of 200,000 men, great credit with all the European powers, and a state distinguished for population, industry, wealth and science. Tested and strengthened by seveie experience before he ascended the throne, and possessed of rare talents, Frederick shook the prevailing political system of Europe when he conceived and established, in accordance with the wants of his time, the confederation of princes, the master-work of his policy. One of his great merits is that in the most difficult cir¬ cumstances he contracted no public debts, but ori the contrary, though he distributed a con¬ siderable part of his revenues in different ways among his subjects, . he had a richer treasury than any monarch in Europe ever possessed. His contempt for ecclesiastical establishments, which was considered by his contemporaries as a contempt of religion, has been censured, and

his writings show that his heart was a stranger to the highest sentiments of piety. Entirely unacquainted with the literature and mental cul¬ tivation of Germany, which began in his later years, he underrated it and contributed nothing to its improvement, and was even prejudiced against the use of the language.

Some of Frederick's writings were published during his lifetime, but most of them appeared first in the (CEuvres Posthumes) (1788-89). In 1846-57 the Berlin Academy published a critical edition of the whole, together with his literary and private correspondence, under the title (CEuvres de Frederic le Grand) (31 vols.). See Frederick the Great.

Bibliography. — Loryman, Frederick the Great and the Seven Years' War) (1881) ; Car¬ lyle, (History of Frederick IP (1858-65) ; Tut¬ tle, (History of Prussia under Frederick the , GreaP (1888) ; Lavisse, (La jeunesse du grand Frederic5 (1891) ; Lavisse, (Le grand Frederic avant l'evenement5 (1893) ; Koser, (Friedrich der Grosse als Kronprinz) (1901) ; and (Gesch- ichte Friedrichs des Grossen) (4 vols., 1912-14) ; Daniels, E., in Vol. VI of (Cambridge Modern History 5 ; Reddenay, (Frederick the Great and the Rise of Prussia) (1904).

FREDERICK III, king of Prussia, second emperor of modern Germany: b. Potsdam, 18 Oct. 1831 ; d. 15 June 1888. He married in 1858 the Princess Royal of England, the eldest daughter of Queen Victoria. When Prussia declared war against Austria in 1866 the crown prince, as he was called, became commander of the army of the Oder. By a series of rapid marches from Silesia through the Sudetic mountain passes into Bohemia his army arrived just in time to aid Prince Frederick Charles and snatched the decisive victory of Sadowa. At the outbreak of the Franco-German War he commanded the third German army, which num¬ bered 200,000 men, and with these he advanced to attack the French under MacMahon. The first assault was made at Weissenburg (4 Au¬ gust), and two days later he successfully turned the French defense at Woerth, causing the dis¬ orderly retreat of MacMahon's army. He pressed northward closely after MacMahon, and the passage of the Meuse by the Germans under his command greatly contributed to the success¬ ful turning of the French advance and the final surrender at Sedan. This accomplished, he pushed on to Paris, and after surrounding the city established his headquarters at Versailles, where he remained until the capitulation in January 1871. In 1887 he was attacked by can¬ cer, and while undergoing treatment for this his father died, and he became emperor in March 1888. The announcement of his. own death three months later was received with

wide re¬ gret, for his renown as a military commander, his liberal views, his large-heartedness and his resignation under suffering, had touched his personality with the rarest heroic qualities.

FREDERICK I («the Warlike®), elector and Duke of Saxony: b. 1369; d. 1428. His father was Frederick the Stern of Meissen. In 1381 on the death of his father he with his two brothers and two uncles succeeded to the inheritance. He became a distinguished soldier in the campaigns against the Hussites, and in recognition of his services was made elector and Duke of Saxe-Wittenberg in 1423 by the

Emperor Sigismund. The Hussites inflicted a defeat upon him at Aussig in 1426. With his brother he founded the University of Leipzig. The House of Guelph, once rulers of England, were his direct descendants. Consult Bottiger and Flatte, (Geschichte des Kurstaates und Konigreichs Sachsen) (3 vols., Hamburg 1830-

73).

FREDERICK I, elector ˆnd first king of Saxony: b. 1750; d. 1827. He was the son of Elector Frederick Christian and succeeded his father in 1763 as elector with the title of Fred¬ erick Augustus III. During his minority his uncle Prince Xavier was his guardian. With Frederick the Great he fought against Austria in 1778-79 and joined the League of German Princes. He declined the crown of Poland which was offered him in 1791. He kept his state neutral during the Franco-Austrian war of 1805, but in 1806 joined Prussia against France. The rout at Jena obliged him to form a treaty of alliance with Napoleon in the same year, and by it he was permitted to assume the title of royalty. He obtained the duchy of Warsaw in 1807 from Napoleon, and during the remainder of the latter's career remained his faithful ally. He was made a prisoner by the allies at Leipzig 19 Oct. 1813, and at the Congress of Vienna was obliged to cede about one-half of his kingdom to Prussia. He de¬ voted his remaining years to perfecting the internal administration of his kingdom and de¬ veloping its agricultural and commercial re¬ sources. Consult, Bonnefois, A., (Un Allie de Napoleon, Frederic Auguste premier roi de Saxe5 (Paris 1902).

FREDERICK II (((the Mild55), elector and Duke of Saxony: b. 1411; d. 14ˆ. Son of Frederick I, he shared the family lands with his three brothers, defended Saxony from the Hussites, and became Burgrave of Meissen. His brother William disputed his partition of the lands of Frederick the Peaceful and the struggle went on from 1446 to 1450. An at¬ tempt to abduct his two sons was made in 1455 ; this is the event known to German history as the (

FREDERICK III («the Wise55), elector of Saxony: b. Torgau, 17 Jan. 1463; d. 5 May 1525. He succeeded his father, Ernest, and is known chiefly as founder of the University of Witten¬ berg (1502), and as the friend and protector of Luther, one of the first professors of the new university. He refused to put into execu¬ tion the papal bull which ordered Luther's writ¬ ings to be burnt, and declined to put the re¬ former under restraint or be sent to Rome. It was by his arrangement that Luther, after the Diet of Worms, was seized and carried off to Wartburg. He did not, however, establish the reformed faith in his dominions. He became administrator of the empire in 1 519, and was offered the imperial crown, but declined it.

FREDERICK III, king of Sicily: b. 1272; d. 1337. He was a son of King Peter of Sicily and Aragon. When his elder brother James succeeded as king of Aragon, Frederick became regent of Sicily. Soon afterward James sur¬ rendered Sicily to the Church in trust for Charles II of Aragon which caused a revolt of the Sicilians who chose Frederick as their king in 1296. Frederick was compelled to fight to hold his throne and in 1302 made a treaty

with Charles II. With Henry VII he made war again on the House of Anjou in 1313 and the struggle was continued with short intervals to the end of his reign. During his reign the Sicilians became a united people, and were thenceforth to be reckoned with in the affairs of the peninsula.

FREDERICK I, William Charles, duke

(1797-1803), elector (1803-06), and king (1806-16) of Wiirtemberg: b. Treptow, Pomera¬ nia, 6 Nov. 1754; d. 30 Oct. 1816. He was a son of Sophia Dorothea, niece of Frederick the Great. In 1797 he became duke. His title of king, with a large accession of territory, he gained through an alliance with Napoleon. In 1806 he joined the Confederation of the Rhine; in 1809, 1812 and 1813 fought for Napoleon, but in 1813 took side with the allies.

FREDERICK, Christian August, duke of

Schleswig – Holstein – Sonderburg – Augusten- burg: b. Castle Aueustenburg, island of Alsen, 6 July 1829; d. Wiesbaden, 14 Jan. 1880. He was banished from Denmark in 1851, after having, while an officer of the general staff, taken part in the insurrection. Upon the

conclusion of the war between Denmark and Germany in 1864, however, he was proclaimed duke by a popular assembly at Elmshorn and received allegiance at Kiel. But he was not destined to rule. The duchy by the terms of the Treaty of Vienna, fell to Austria and Prussia for disposal, and Prussia, through Bismarck, imposed upon Fred¬ erick conditions which he rejected. After the war with Austria, his domains were incorporated with Prussia. He took part in the Franco-Ger¬ man war as a Bavarian general on the general staff of the Prussian crown prince. His daugh¬ ter, Augusta Victoria, was married to Prince William of Prussia, later William II, emperor of Germany.

FREDERICK AUGUSTUS II, king of Saxony: b. 1797; d. Tyrol, 9 Aug. 1854. He was the eldest son of Prince Maximilian of Saxony. He was made joint regent of Saxony with King Anthony in 1830 and succeeded the latter in 1836. With the aid of Prussian troops he quelled an insurrection which broke out in Dresden in 1849 in alarming proportions. The remainder of his reign was tranquil. His death resulted from a fall while traveling in the Tyrol. Consult Forster, F., (Friedrich August ID (Leipzig 1910).

FREDERICK AUGUSTUS III, king of Saxony : b. 25 May 1865. He was educated at Leipzig and Strassburg, entered the army in 1883. He was made general of infantry in the Prussian army in 1902, and succeeded his father on 15 Oct. 1904. In 1902 the Princess Louise of Tuscany, whom he had married in 1891, eloped with Andre Giron, a tutor in his palace. She was divorced by him in 1903.

FREDERICK CHARLES, Prince of Prus¬ sia, popularly known as the <(Red Princeˆ : b. Berlin, 20 March 1828; d. Castle of Klein-Glienicke, near Potsdam, 15 June 1885. He was a son of Frederick Charles Alexander and nephew of William I. He was in command of the first Prussian army which made so vigorous a resistance, and, aided by the second army, which arrived opportunely, finally defeated the Austrians at the battle of Sadowa (Koniggratz) . In the Franco-German War he commanded the second army, fought at Vionville and Saint

Privet, directed the siege-operations against Metz, and 28 Nov. 1870 defeated the army of the Loire. He married Marie Anna of Anhalt. One of his daughters, Louise Margareta (1860- 1917) was married to Arthur, Duke of Con¬ naught.

FREDERICK FRANCIS II, grand duke of Mecklenburg-Schwerin : b. 1823 ; d. 1883. He was the son of grand duke Paul Frederick and received his education at the University of Bonn. He succeeded to the

grand duchy in 1842 and became a general in the Prussian army, distinguishing himself in the war with Austria in 1866. In 1870 he commanded the 13th armv corps and laid siege to Toul, which he took 23 Sept. 1870, and later in the campaign he was prominent in the operations on the Loire and at the siege of Paris. There is a fine monument to him at Schwerin erected in 1893. Consult Von Hirschfeld, ˆFriedrich Franz D (Leipzig 1891).

FREDERICK HENRY, Prince of Orange: b. Delft, 1584; d. 1647. He was a son of William the Silent and succeeded his brother Maurice in 1625. The latter had given him his military training. He attained fame as a military leader by the capture of several cities including Hertogenbosch in 1629, Maastricht in 1632, Breda in 1637, and Sas van Ghent in 1644. He made a successful treaty with Spain securing for the Dutch every point for which they had long struggled. In his time the Dutch Republic reached its greatest power and influence. Con¬ sult (Memoires de Frederic Henri > (Amster¬ dam 1743).

FREDERICK LOUIS, Prince of Wales : b. Hanover, Germany, 20 Jan. 1707; d. Leicester House, London, 20 March 1751. He was the eldest son of George II, with whom he was on terms of enmity. He became the leader of the Opposition, which was strongly against Walpole and styled itself the Patriot party. In the con¬ test between Handel and Buononcini he was a partisan of the latter. At the outbreak of the rebellion of 1745 he sought, but did not obtain, the command of the army. He married Augusta, daughter of Frederick II, duke of Saxe-Gotha, and his eldest son became King George III.

FREDERICK VHLLIAM, elector of Brandenburg, called the Great Elector: b. 16 Feb. 1620; d. Potsdam, 9 May 1688. He suc¬ ceeded his father when the unhappy Thirty ˆ ears War was still raging in Germany, and his conduct toward the contestants was marked by great prudence. In 1641 he concluded a treaty of neutrality with Sweden, notwith¬ standing the earnest remonstrances of Austria. In 1644 he concluded an armistice with Hesse- Cassel, by which Cleves and the county of Mark were restored to him, and by the peace of Westphalia in 1648 received Magdeburg, Halberstadt and Kammin In the war between Poland and Sweden (in 1655) he supported both parties in turn and obtained an acknowl¬ edgment of the independence of the duchy of Prussia from Poland, upon whom it was for¬ merly dependent. In 1672 he concluded a treaty with the Dutch Republic when his state was threatened by Louis XIV. On 6 June 1673, he concluded a treaty with France at Vossem, by which France promised to evacuate West¬ phalia and to nay 800,000 livres to the elector, who in return broke off his treaty with Holland

and promised not to render any aid to the ene¬ mies of France. In 1674 the German states de¬ clared war against France. In the following December a Swedish army, at the instigation of France, entered Pomerania and the Mark. The elector defeated them, 18 June 1675, at Fehrbel- lin. In 1678 he concluded a separate peace with France, at Nimwegen, as did also Holland and Spain. France demanded the restoration of all the conquered territories to Sweden. The elector, having refused compliance, formed an alliance with Denmark and waged a new war * against Sweden, but was obliged to submit, by * the Peace of Saint Germain-en-Laye, 29 June 1679. Louis XIV having occupied several circles of Alsace by his famous chambres de reunion, Frederick William effected (1684) an armistice of 20 years between France and Ger¬ many. But when he renewed (1685) his treaty with Holland and received into his dominions about 14,000 Protestant refugees from France, driven forth by the revocation of the edict of Nantes, new difficulties arose between him and France, which brought him into a closer con¬ nection with Austria. He received the circle of Schwiebus in 1686, and in the same year sent 8,000 men to assist the Austrians against Turkey. A wise and tolerant ruler, equally skilful in the fields of diplomacy and ad¬ ministration, Frederick William set himself to repair the ravages wrought by the Thirty Years' War. He paid great attention to agri¬ culture, promoted canal works, was a dis¬ criminating patron of education,, founded the University of Dinsburg and reorganized those of Frankfort on the Oder and Konigsberg, and also established the Royal Library of Berlin.

A colossal statue of Frederick William in bronze was cast by Jacobi in 1700 and is still one of the greatest ornaments of the city of Berlin. Consult Hitl, (Der grosse Kurfiirst und seine Zeit) (1893) ; Philippson, (Der grosse Kur- f first J (1897-1902), and W. Ward's contribu¬ tion in Vol. V of the Cambridge Modern His- tory) (1908).

FREDERICK WILLIAM, duke of Bruns¬ wick: b. Brunswick, 9 Oct. 1771 ; d. at Quatre- Bras, 16 June 1815. He entered the Prussian military service in 1788, and in 1800 was com¬ missioned major-general. With a Bohemian volunteer corps he invaded Saxony, and with Austrian reinforcements took Dresden and Leipzig. After the armistice of Znaim, he de¬ feated Reubel's corps, 6,000 strong, at Oelger, near Brunswick, finally arrived at Elsfleth and Brake, seized all available shipping and em¬ barked for England, where he was received with demonstrations of enthusiasm. He partic¬ ipated in the

Peninsular War, and returned only after the battle of Leipzig (1813). He fell while leading an attack at Quatre-Bras.

FREDERICK WILLIAM I, last elector of Hesse: b. Philippsruhe, 20 Aug. 1802; d. Prague, 6 Jan. 1875. He succeeded to the throne in 1847. His reign was disturbed by conflicts with his people due to his efforts to disregard the constitution of 1831 and to limit popular liberties. In 1866 he took sides with Austria in the war with Prussia, was deposed, and for a time imprisoned. In the same year Hesse was annexed to Prussia, the larger por¬ tion of it now being incorporated with the province of Hesse-Nassau.

FREDERICK WILLIAM I, king of Prus¬ sia: b. Berlin, 15 Aug. 1688; d. Potsdam, 31 May 1740. He married the daughter of the elector of Hanover, afterward George I of Eng¬ land, and began to reign in 1713. In 1715 he de¬ clared war against Charles XII of Sweden, and in conjunction with Denmark took Stralsund; but on the death of Charles, in 1718, he made peace. Thereafter he introduced internal re¬ forms in his kingdom and worked out an ad¬ mirable system of financial administration. His habits were entirely military and he labored un- weariedly to promote the discipline of his troops. One of his strongest peculiarities was an extraordinary love for tall soldiers ; and in order to procure them had agents employed in all parts of Europe, who even went the length of kidnapping men for his service. He held science and literature in profound contempt ; but money he worshipped; he was frugal in ex¬ penditures ; and men of a military character after his own ideal he respected and en¬ couraged. The consequence was that he left an abundant treasury and a well-appointed army of 83,000 men. He was succeeded by his son, Frederick the Great. Consult Carlyle's pic¬ turesque account of this sovereign in his Frederick the Great> ; and Tuttle's (History of Prussia) (Boston 1884).

FREDERICK WILLIAM II, king of Prussia: b. 25 Sept. 1744; d. 16 Nov. 1797. He was the eldest son of Prince August William, brother of Frederick the Great, and ruled from 1786 to 1797. Of an easy, pleasure-loving dis¬ position in his youth, much under .the control of his mistress, the Countess Lichtenau, and devoted to a blind obscurantism and Rosicrucian mysteries in his riper years, in his feeble hands the army declined and the power of Prussia waned. As the result of an interview at Pil- nitz in 1791, he arranged with the emperor of Austria to interfere in aid of Louis XVI of France. The ensuing campaign was an inglori¬ ous one, concluded by a retreat to the Rhine in the autumn of 1792. The war was ended in 1795, and Frederick William ceded to France Prussian territory west of the

Rhine. From the second (1793) and third (1795) partitions of Poland his kingdom obtained large acces¬ sions of territory. Consult Stanhope, (A Mystic on the Prussian Throne) (London

1912).

FREDERICK WILLIAM III, king of Prussia: b. 3 Aug. 1770; d. 7 Tune 1840. He commenced his reign in 1797 by maintaining a strict neutrality in the various alliances with and against France which resulted from the ambitions designs of Napoleon I. In 1805, however, he yielded to the solicitations of Rus¬ sia, and allied himself with the tsar against the French emperor. The rapid campaign of 1806, and the defeat of the Prussians at Jena, opened the gates of Berlin to the enemy, in whose hands it remained till 1809. In 1807 the battle of Friedland led to the humiliating peace of Tilsit. Restored to his capital, the king diligently endeavored to repair the evils of war; but new disasters overtook him, and his kingdom suffered greatly during the struggle from 1812 to 1814. He subsequently joined his troops with those of Russia. The allies having triumphed over the French at Leipzig, Frederick William in 1814 entered Paris with

Tsar Alexander. On the return of Napoleon from Elba, he once more joined the allies. After the victory of Waterloo, in which the Prussians, under Bliicher (q.v.), played an im¬ portant part, Prussia, once more at peace, gradually recovered from the losses she had sustained, under the wise and paternal sway of Frederick, whose moderation contributed greatly to the maintenance of peace. Through¬ out his life, he was a warm defender of the Protestant religion, and a patron of education. He never redeemed his promise, however, to bestow a representative constitution on his people, and the Revolution of 1830 only strengthened his determination to withhold it. The establishment of the provincial estates only affected his slightly absolute power. It may finally be said of him, that, a waverer between the Absolutist party and the Liberal party, he secured, as is the lot of most undecided men, the respect and adherence of neither.

FREDERICK WILLIAM IV, king of Prussia: b. 15 Oct. 1795; d. near Potsdam, 2 Jan. 1861. On the death of his father, Freder¬ ick William III, he succeeded to the throne in 1840. He evinced, at an early period, a love for the arts, which he preserved throughout his career. During the first years of his reign his subjects anxiously demanded the reform

of the government, requiring the liberal consti¬ tution which had been promised them in 1815 in return for the great sacrifices they had made during the continental war. In 1847, at a general diet of the Prussian states, some of these reforms were granted. In March 1848, however, the king was obliged to change the ministry, to issue a general amnesty and com¬ mence a war in favor of Schleswig against Denmark. In the war between the western powers and Russia, the king preserved a strict neutrality, though earnestly solicited by each party to espouse its side in the conflict. In the complication relative to the Danubian prin¬ cipalities, Prussia followed the lead of France and Russia as opposed to England and Austria. Toward the end of 1857, a severe illness, result¬ ing in the loss of some of his faculties, caused his brother William to be nominated regent, who succeeded him as king.

FREDERICK, Md., city and county- seat of Frederick County, one of the richest agricultural counties in the United States. Sit¬ uated near the Monocacy River, on the Balti¬ more and Ohio and the Pennsylvania railroads ; also the centre of the Hagerstown and Fred¬ erick Railroad, an extensive trolley system, 60 miles northwest of Baltimore and 58 miles north of Washington, D. C. Here are Hood College and Hood Seminary for Women and the Maryland School for the Deaf, a State institution. Frederick's manufacturing in¬ terests embrace leather, hosiery, brick, fibre brushes, flour, iron specialties, corn canning and lime products. The city has an assessed property valuation of $6,500,000, pure mountain water and good State roads. During the Civil War it was twice occupied by the Confederates, the second time in 1864 by Gen. Jubal Early, who compelled the citizens to pay a ransom of $200,000. Federal troops under General McClel¬ lan occupied the city in 1862. Frederick has monuments to Francis Scott Key, the author of the (Star Spangled Banner, > and to Bar¬

bara Frietchie, the heroine of Whittier's famous war-time poem, which bears her name. Both were residents of Frederick and their remains are buried there. It was also the birthplace of Admiral Winfield Scott Schley, the hero of Santiago. Pop. (1920) 11,066.

FREDERICK, Okla., city and county-seat of Tillman County, 150 miles southeast of Oklahoma City, on the Saint Louis and San Francisco and the Wichita Falls and North¬ western railroads. Owing to its position as the centre of a productive agricultural region, it has extensive interests in cotton, cottonseed oil and cake, alfalfa, wheat and poultry. The city owns its waterworks. Pop. (1920) 3,822.

FREDERICK THE GREAT. «A tyrant of extraordinary military and

political talents, of industry more extraordinary still, without fear, without faith, without mercy** is Macaulay's esti¬ mate of the greatest of all the Hohenzollerns. In the light of the Great War, - Macaulay's essay reads like prophecy, while Carlyle's glorifica¬ tion of unscrupulous force as embodied in Frederick seems like courting the destruction which burst upon the world in August 1914. All that Macaulay wrote about Frederick's great crime of violating his plighted faith, of robbing the ally whom he was bound to defend, and of plunging all Europe into (

Carlyle himself called his greatest work, his (Thirteen Years War* with Frederick. # In 1852 he made his first trip to Germany to gather material, visiting the scenes of his hero's bat¬ tles and noting their topography with unerring accuracy. The first two volumes appeared in 1858 and the last two in 1865.

Emerson considered it ˆInfinitely the wittiest book that was ever written.** Lowell criticized it with discrimination. While pointing out its obvious faults, he wrote : <(The figures of most historians seem like dolls stuffed with bran, whose whole substance runs out through any

hole that criticism may tear in them ; but Car¬ lyle's are so real in comparison, that, if you prick them, they bleed.®

So true are Carlyle's narratives of Freder¬ ick's battles, that his work was studied as a textbook in the military academies of Germany. For biography see Frederick II.

Archibald MacMeachan.

FREDERICKSBURG, Tex., town, county- seat of Gillespie County; on the San Antonio and Arkansas Pass Railroad ; 80 miles west of Austin. It was founded by a German colony in 1846. Chief industries, farming and stock- ' raising. Pop. (1920) 1,800.

FREDERICKSBURG, Va„ city in Spottsyl- vania County; on the Rappahannock River, and the Richmond, Fredericksburg and Piedmont, and the Potomac, Fredericksburg and Potomac railroads ; 61 miles north of Richmond. It has good water power and manufactures silk, woolen goods, flour, shoes, carriages, tanned

leather, excelsior, etc., and an assessed prop¬ erty valuation of more than $2,000,000. It was the scene of several battles during the Civil War. (See Fredericksburg, Battle of). Noteworthy are the Stonewall and National cemeteries, Fredericksburg College, State Nor¬ mal School, public libraries, an attractive park, etc. Pop. 5,874.

FREDERICKSBURG, Battle of. At the

beginning of December 1862 the Army of the Potomac, under command of General Burnside, held the north bank of the Rappahannock River at Falmouth, Va., while the Confederate Army, under General Lee, held the south bank at and below Fredericksburg. The Army of the Poto¬ mac ((present and equipped for duty® numbered 120,281 men, with 312 guns. General Lee's army, strongly entrenched on a broken range of hills back of Fredericksburg, numbered (10 Decem¬ ber) ((present for duty® 78,513 men, with 270

guns. .

The Army of the Potomac was organized into three grand divisions : The right, under General Sumner, consisted of the Second corps, General Couch, the Ninth corps, General Will- cox, and Pleasonton's cavalry division ; the cen¬ tre, under General Hooker, of the Third corps, General Stoneman, Fifth corps, General Butter¬ field and General Averell's cavalry division ; the left, under General Franklin, of the First corps, General Reynolds, Sixth corps, General Smith, and General Bayard's cavalry brigade. General Lee's army was divided into two wings, General Longstreet commanding the left and General Jackson the right.

Burnside concluded to cross the river at and below Fredericksburg by pontoon-bridges. Un¬ der great difficulties, with annoyance from the enemy, the bridges were completed 11 December, troops rushed over, and by night of the 12th Sumner and Franklin had crossed and taken position. Franklin, who was to open the battle by an attack upon the Confederate right, rein¬ forced by Birney's and Sickles' divisions of the Third corps, and Burns' of the Ninth, had about 60,000 men. At 7:30 a.m. on the 13th, Burnside gave him orders to seize the heights at Hamil¬ ton's crossing. One of Franklin's smallest divi¬ sions, Meade's, led the attack, moving out at 9 o'clock ; but owing to flank attacks and lack of immediate support, it was 1:15 p.m. before Meade drove the Confederates from the Rich¬

mond Railroad and, crossing it, charged up a ridge and into the woods, piqrcing the centre of A. P. Hill's first line ; but when he had

crossed the road that ran in rear of the crest he was attacked, front and flank, by Hill's second line and the reserves, and was driven back with a loss of over 40 per cent in killed, wounded and captured. Gibbon, who had been thrown for¬ ward to support Meade's right, shared the same fate, being forced back, with a loss of 1,267 men. The Confederates then advanced beyond the railroad but were checked. Franklin made no further attempt to carry the ridge, but directed his attention to protecting his left, which he thought was seriously threatened. At 2 :30 p.m., when Sumner was heavily engaged in front of Marye's Heights, Franklin received Burnside's order to attack with his whole force, but the

order was not carried out. Franklin put but a small part of his command into the fight.

Sumner was held in position until after 11 a.m. in the expectation that Franklin _ would make such an impression upon Lee's right as would enable him to carry the line near the Telegraph and Plank roads. Feeling the import¬ ance of haste, Burnside now directed Sumner to begin his movement. In rear of the town, and between it and the heights that Sumner was to carry, was a broken plain, traversed about mid¬ way by a canal or ditch, running from right to left. Two roads cut the plain nearly at right angles with the canal ; the Plank road on the right, the Telegraph road on the left, leading to Richmond. The advance was to be made on and between these two roads, over ground com¬ pletely covered by artillery on the heights. McLaws' division held the heights to be as-

saulted, Cobb's and Kershaw's brigades being placed in the sunken Telegraph road, that ran at the base of the hill. On the side of the road next to the town was a stone wall, shoulder high, behind which Cobb's and Kershaw's men were well protected. The Second corps led in the attack. French's division moved out of the town by parallel streets, and at noon, under a severe artillerv and musketry fire, had driven in the Confederate skirmishers and gained a rise of ground, within about 120 yards of the stone wall, from which and the top of the hill it re¬ ceived a most deadly fire. Hancock's division followed in support. At 1 p.m. Couch ordered French and Hancock to carry Marye's Heights. French sent in his three brigades in succession, but they were bloodily

repulsed by the deadly fire from behind the stone wall. Hancock now ordered in Zook's brigade. It sprang forward, was joined by some shattered regiments of French's division, and when within 25 paces of the stone wall was repulsed with great loss. The Irish brigade and Caldwell's followed in succession, but failed to carry the position and, after losing one-half, fell back, and both French and Hancock continued, with parts of their com¬ mands, to hold the rise of ground near the stone wall. While Hancock's men were falling by hundreds, Howard was ordered to move his division to the right of the Telegraph road and turn the Confederate left, but as French and Hancock needed help, Howard was recalled_and ordered in on the Telegraph road, and two divisions of the Ninth corps went in on Couch's left. All fought gallantly, but made no impres¬ sion upon the Confederate line. French's loss was 1,160; Hancock's 2,032; Howard's 914; Sturgis' division of the Ninth corps lost 1,007 and Getty's division 296.

It was 2 p.m. when Hooker, riding in advance of the Fifth corps, came on the ground. After an examination of the position and conference with Couch and other general officers, he con¬ cluded that it would be useless waste of life to make a further attempt and sent an aide to Burnside, giving his opinion. Burnside ordered him to attack. Hooker then rode to Burnside, across the river, and sought to inipress upon him the hopelessness of the attempt, but Burn¬ side reiterated the order to attack. Every avail¬ able battery opened fire upon the Confederate position, and near sunset Humphreys led his division of the Fifth corps against Marye's Heights, Sykes' division moving on his right. Twice Humphreys led his men forward; some of them were killed within 20 yards of the stone wall; but he was repulsed with a loss of 1,000 men. Sykes, on his right, lost over 200, while Griffin's division, on the left, supporting the Ninth corps, lost over 800 men. Night came with the Union army everywhere repulsed. Burnside directed preparations for a renewal of the battle on the morning of the 14th, when he proposed to lead the Ninth corps, his old command, in an assault where the 2d and 5th corps had failed, but he was dissuaded from the attempt. From the night of the 13th until the night of the 15th the two armies confronted each other, engaged in artillery-firing and angry skir¬ mishing. On the night of the 15th the Army of the Potomac recrossed the river, after one of its most bloody and humiliating defeats. Its loss was 1,284 killed, 9,600 wounded, and 1,769

missing, an aggregate of 12,653. The Confed¬ erate loss was 595 killed, 4,061 wounded, and 653 missing, an aggregate of 5,309. The loss of the Confederate troops defending Marye's Heights was less than 1,000; that of the attack¬ ing and supporting Union troops was over

7,300. As a result of the large Federal losses both General Franklin and General Burnside were much criticized especially after the Joint Committee of Congress on the Conduct of the War had made a report unfavorable to both. General Franklin resigned, though he main¬ tained that the fault was not his, but the result of Burnside's inadequate orders. A considerable controversy arose regarding this question, but the preponderance of evidence seems to place the blame on Burnside's shoulders. General Burnside soon after the battle of Fredericks¬ burg was relieved by General Hooker. A number of other engagements and military operations of varying extent took place at or near Fredericksburg on April 17-19, 1862, Aug. 4-8, 1862; Nov. 9, 1862; April 29-May 4, 1863 ; March 5-8, 1865 ; by some authorities the fighting on May 3-4, 1863, is called the second battle of Fredericksburg, but it is usually known as the battle of Marye's Heights, being part of the Chancellorsville campaign (q.v.). Consult Alexander, E. P., (The Battle of Fredericks- burg) (in Southern Historical Society Papers, Vol. X, pp. 382 and 445, Richmond 1882) ; Allan, W., (The Army of Northern Virginia in

1862) (Boston 1892) ; Chamberlain, J. L., (The Passing of the Armies, etcP (New York 1915) ; Confederate States of America, War Depart¬ ment, (Reports of the Operations of the Army of Northern Virginia, 1862-63* (2 vols., Rich¬ mond 1864) ; Conway, M. D., (Fredericksburg, First and Last) (in Magazine of American His¬ tory, Vol. XVII, pp. 185 and 449, New York 1887) ; French, S. L., Rhe Army of the Po¬ tomac from 1861-63 * (New York 1906) ; Gough, J. E., (Fredericksburg and Chancellorsville) (London 1913) ; Greene, J. L., (Gen. W. B. Franklin and the Operations of the Left Wing at the Battle of Fredericksburg* (Hartford 1900) ; Henderson, G. F. R., (New York 1893) ; Powell W. H., (History of the Fifth Army Corps, etc.* (New York 1896) ; Redway, G. W., (Fredericks- burg> (London 1906) ; Ropes, J. C., (The Story of the Civil War* (Part II, New York 1898) ; Stine, J. H„ (History of the Army of the Po¬ tomac* (Washington 1893) ; Swinton, W., c Campaigns of the Army of the Potomac) (New York 1866); United States, Conduct of the War, Joint Committee on the, Report on the Battle of Fredericksburg> (37th Congress, 3d Session, Senate Reports, No. 71, Washington

1863) ; United States, War Department, (Series I Vols. XXI, XXV, LI; Series II, Vol. V* Series IV, Vol. II; Atlas, Washington 1888- 1900) ; Walker, F. A., (History of the Second Army Corps in the Army of the PotomacP

(New York 1891) ; Wise, G., (Campaigns and Battles of the Army of Northern Virginia) (New York 1916).

FREDERICKTOWN, Mo., city and county- seat of Madison County, 104 miles south of Saint Louis, on the Saint Louis, Iron Mountain and Southern Railroad. Marvin College is situ¬ ated here. There is a lead mine known as La Motte located nearby. It has been worked con¬ tinuously for over 200 years. Cobalt, lead, nickel and copper mining are carried on -and railroad ties are manufactured. The city owns its electric-lighting plant. Pop. (1920) 3,124.

FREDERICTON, Canada, county-seat of York County and capital of New Brunswick, is beautifully situated on the west side of the river Saint John, 60 miles north-northwest of Saint John. It is on the Canadian Pacific and Intercolonial railways, and is the terminus of the Fredericton Railway. It is a port of entry and the seat of a United States consular agent. It has handsome public buildings and is the seat of parliament buildings, New Brunswick University and of the provincial normal school. It is the seat of an Anglican bishopric. Fred¬ ericton has manufactories of iron castings, machinery, leather, boots and shoes, but its chief trade is in lumber and timber products. The city was first called Saint Ann's, and on its being selected as the site of the provincial capital by Col. Thomas Carleton, the first lieutenant-governor, the name was changed (1785) to Fredericton, in honor of the Duke of York. Pop. 7,208.

FREDERIKSBERG, Denmark, formerly a suburban municipality of Copenhagen, situated to the west of the latter. It is a handsome residential section and contains several beautiful parks and a zoological garden and art museum. It contains also a palace built by Frederick IV in the 18th century. It is in the Italian style and is now used as a military training college. The Royal Porcelain Works, a faience factory and several breweries are located also in this section. Since 1910 it forms a part of Greater Copenhagen. Pop. 97,237.

FREDERIKSBORG, frad'er-iks-borg, cele¬ brated castle of Denmark, situated on islands in Frederiksborg Lake in Zealand, 22 miles northwest of Copenhagen. It was constructed in 1600-20 by Christian IV and is in the style of the Danish Renaissance. The kings of Den¬ mark were fomerly crowned in its chapel, which contains a king's oratory and several re¬ ligious paintings executed by Bloch. The mural decorations of the castle are by Ovens, and De Vries and Sweis executed most of the sculpture. The castle was partly destroyed by fire

in 1859 and has since been made into a national his¬ torical museum.

FREDERIKSHALD, frad'er-lks-hal', Nor¬ way, fortified seaport, on the Idefjord, at the embouchure of the Tistedalselo, 85 miles south¬ east of Christiania. It has a good harbor which is protected by the fortresses of Frederiksten and Glydenlove. There is a monument to Char¬ les XII who fell while besieging the town in 1718. It was besieged by the Swedes for two years in 1658-60. It is of importance as a cen¬ tre for the lumber trade of East Norway and exports large quantities of woodenware. Pop.

11,992.

FREDERIKSHAVN, fra'der-iks-ha'v'n, Denmark, seaport town of Jutland, on the Catte- gat, 52 miles north of Aalborg. The harbor is excellent, admits vessels of 20-feet draught and is free from ice throughout the year. There is regular steamer communication with Copen¬ hagen and with several points in England and Sweden. It exports large quantities of dairy products, beef, fish, oysters, pork and eggs, and imports coal, iron, cotton goods, grain, yarn and wood. It was incorporated as a town in 1818. Pop. 7,916. '

FREDERIKSTAD, fra'der-iks-stat, Nor¬ way, seaport town at the mouth of the Glom- men, 58 miles southeast of Christiania. It dates from 1570 and was for a long time very strongly fortified. Its industries are important, consist¬ ing of manufactories of bricks, boilers, engines, chemicals, cotton and woolen goods, lumber and ships. The lumber trade with France, Ger¬ many and Holland is extensive. In the neigh¬ borhood is Hanko, one of Norway's most popu¬ lar bathing resorts. Pop. 15,597.

FREDMAN, The. See Bellman, Karl Mikael.

FRED ONI A, Kan., city and county-seat of Wilson County, on the Atchison, Topeka and Santa Fe and the Missouri Pacific railroads, on the Fall River, 90 miles southeast of Wichita. It is situated in an agricultural and stock-raising district and natural gas and oil are found nearby. The chief industries are manufactories of brick and cement, window-glass and ice, linseed-oil and founding. The waterworks are owned municipally. The commission form of government obtains here. Pop. (1920) 3,954.

FREDONIA, N. Y., visage in Chautauqua County, on the Dunkirk, Allegheny Valley and Pittsurgh Railroad, about four miles south of Dunkirk and about 45 miles southwest of Buffalo. It was settled in

1803 and incorpo¬ rated as a village in 1829. It was early noted for its good schools, including its free academy. It is a residential village situated in an agricultural region, in the Lake Erie grape section, and has large wine cellars, nurseries, canning establishments, etc. Some of • the in¬ dustrial products are grape baskets and boxes, dried fruits, patent medicines and grape juice. Natural gas was discovered here in the early part of the 19th century and was in use for lighting the village in 1821. The trade is chiefly in fruits, wine and patent medicines. It has the D. R. Barker free library and one of the State Normal schools. It was for some years the home of William Barker Cushing (q.v.). The village owns and operates the waterworks and electric-light plant. Pop. (1920) 6,051.

FREDRO, fra'dro, Count Alexander,

Polish dramatist, called "the Moliere of Po¬ land® : b. Suchorow, Galicia 1793 ; d. Lemberg, 15 July 1876. He served in the army for many years and came to Paris in 1814 to study French drama. He was the founder of Polish comedy, those who preceded him having worked oyer French plays. He produced 18 comedies, which had considerable success. He is praised for his presentation of comic types, and for the national spirit which pervades his work. His plays appeared in a collected edition in 1877. (Mr. Moneybags } (his first piece, 1821); (Ladies and Hussars* ; (Man and Wife*; and

(Revengc\ arc his principal titles. The scenes are taken from real life.

FREE BANKING SYSTEM, the prede¬ cessor of and essentially the same as our present national banking system, and on the same prin¬ ciples as the general railroad and corporation laws. Up to 1838 all banks required special charters, with the attendant evils of collusive "blanket® powers, corruption, and an insecurity which was not only a private evil, but seriously affected the State credit and finance. In that year New York State passed a "free® or open banking law, under which anyone could start a bank by depositing with the State an amount of securities equal to its circulating notes. The other States soon followed the precedent.

FREE CHURCH, the term applied by Brit¬ ish non-conformists to the Christian denomina¬ tions throughout the British Empire, free from state patronage and control.

FREE CHURCH ASSOCIATION,

founded in 1866, in English ecclesiology, is a society which has for its main object the abolishment in the Established Church of pew rents and pew ownership, maintaining the equal right of all parishioners to the free and unre¬ stricted use of seats in churches. See Institu¬ tional Church.

FREE CHURCH OF ENGLAND, a dis¬ tinct evangelical Protestant denomination which originated in the creation of “free churches® in the west of England as a protest against the Tractarian (q.v.) movement of 1832. The Shore controversy (1843-49), and the Gorham case (1849-50), accentuated the movement. The Church had in 1916 two bishops, 24 ministers and 1,352 members. This Church may be re¬ garded as the English counterpart of the Re¬ formed Episcopal Church in the United States (q.v.).

FREE CHURCH OF SCOTLAND. This was the name assumed by the large body of ministers and their adherents who gave up their livings and separated from the Established Church of Scotland at the Disruption (q.v.) on 18 May 1843. They seceded in vindication of the “Headship of Christ,® that is, to gain liberty to obey what they deemed the will of their Divine Lord in all church arrangements (includ¬ ing the election of ministers to charges) free from the control or interference of the civil power. No new article of faith was adopted, all the forms and rights of the national Church being retained in their integrity. The Church prospered in the face of formidable financial difficulties which were largely overcome by the institution of a sustenation fund, and by the excellent arrangements made for its distribution and employment. After 1867 there was a move¬ ment for an incorporating union with the United Presbyterian Church, which represented the voluntary principle in Scottish non-con¬ formity. That union was formally compelled by the constitution at Edinburgh, on 31 Oct. 1900, of the first general assembly of the United Free Church of Scotland, which represented 1,149 ministers and 296,089 communicants be¬ longing to the Free Church, and 637 ministers and 199,089 belonging to the United Presby¬ terian Church. A protesting minority, consist¬ ing of 27 ministers and 500 elders, who claimed to represent a total strength of 50,000 members

and adherents, refused to join the union. The union of the Free Church with a voluntary body appeared to them to be a surrender of the principle of national religion and of the Con¬ fession of Faith, subscription to which had been already qualified by two declaratory acts. They were also opposed to the toleration in the Church of the

higher criticism, and to the use of organs and human hymns. They were ex¬ truded from the use of the buildings and funds of* the Church; the parties went to law; and after the protesting minority had been non¬ suited in the Scottish courts, the case was taken on appeal to the House of Lords, which by a majority judgment, given in August 1904, re¬ versed the decision of the Scottish courts. The effect of the judgment was that the whole of the funds and property of the Free Church became vested in the non-uniting minority, or “Wee Frees,® as they were popularly called. Lord Halsburg, who gave the leading judgment, decided that the Free Church had “lost its iden¬ tity® in its incorporation with the United Presby¬ terian Church, a voluntary body. The decision was received with dismay and indignation in Scotland. It was at once perceived that the “legal® Free Church, whose stronghold was in the Gaelic-speaking Highlands and Islands, and was almost totally unrepresented alike in the rural districts throughout the country and in the great urban centres, was in no position to administer the trust that had been imposed upon it. Relief had to be sought in legislation ; a royal commission was appointed and follow¬ ing on its report an act of Parliament was passed in 1905, under which an executive commission was set up to allocate the property as between the two churches. The Free Church had in 1916 5 synods, 12 presbyteries, 97 ministers and 178 congregations. See Presbyterianism, United Free Church.

FREE CITIES, the name applied to vari¬ ous cities of Germany which in the 12th century assisted the emperors in repressing the arro¬ gance of the nobles, and, in return for their services or contributions, received various privi¬ leges and immunities and became imperial cities. Free cities existed in Germany from the time of the Romans ; they had little in common with the free cities of later times, and in the beginning of the 16th century lost their most essential privi¬ leges, and even the name of free cities, through the ignorance and carelessness of their magis¬ trates. The most important of those privileges, as shown in the case of Ratisbon, were that they should enjoy an independent government; should never swear allegiance to any emperor or king, nor be obliged either to engage in any expedition against the Romans, or to pay for the privilege of exemption ; nor to pay any contribu¬ tions whatsoever to the empire; nor be in any way reckoned among the cities of the empire. Virtually they were independent republics. Commerce and manufactures gradually in¬ creased the importance of the imperial cities and they often ventured to resist their masters, the emperors, and could not be reduced to obe¬ dience without great difficulty. In the middle of the 13th century two important confederacies were established for

common objects — the Hanseatic League (q.v.) (1241), comprising the cities of Frankfort-on-the-Main, Hamburg, Bremen and Liibeck, and the league of the

Rhenish cities (1246), comprising Cologne, Worms, Mainz, Strassburg, Basel and Spires, which are now incorporated in their respective political divisions. The powerful Hanseatic League lasted nearly four centuries, until its dissolution was effected by several causes in 1630. The remnant of this league and of the former collegium of cities, which had its repre¬ sentatives in the German Diet — namely the free cities of Hamburg, Bremen and Lubeck — was incorporated with the French Empire in 1810. As these cities co-operated vigorously in the re¬ covery of German independence, they were ac¬ knowledged, together with Frankfort-on-the- Main, as free cities by the Congress of Vienna (1814—15). They joined the German Con¬ federacy and obtained the right of a vote each in the Diet, and one among the four in the narrower council. In conformity with the 12th article of the constitution of the German Con¬ federacy, they established a common Supreme Court of Appeal in 1830. Frankfort in 1866 was annexed to Prussia. The only free cities now existing are Hamburg, Lubeck and Bremen, each sending a member to the Reichsrat, and Hamburg three deputies to the Reichstag, the others one each.

FREE CONGREGATIONS (Ger. Freie Gemeinden) , sometimes called ((Protestant Friends, 55 a sect of German Rationalists, who at first professed to be Christians, but now reject the doctrines of miraculous revelation and a personal deity. They possessed considerable influence between 1840-50. From 1855 on, they had a difficult time as a result of determined oppression on the part of the governmental au¬ thorities of most of the German states. In more recent times they again increased their influence, gained official acknowledgment in a number of states, and gradually extended the number of their adherents. In 1859 a national society of free congregation was formed. A number of weekly and monthly journals are published, representing their views. There are upwards of 120 congregations of them in Germany, and a few in the United States. Consult Kampe, F., (Geschichte der Religiosen Bewegung der neueren Zeit> (4 vols., Leipzig 1852-60) ; Nippold, F., (Handbuch der neuesten Kirchen- geschichte5 (Heidelberg 1867) ; Tschirm, G.,‘ (Zur 60 jahrigen Geschichte der Freireligiosen Bewegung5 (Bamberg 1904).

FREE ENQUIRERS, a body of reformers interested in the improvement of labor con¬ ditions and associated with the establishment of New Harmony, Ind., in 1825. The originator of the movement was Robert Owen (q.v.), and among others associated with him was Robert Dale Owen (q.v.) who with Fanny Wright at New York in 1827, established The Free Enquirer, a socialistic and agnostic pub¬ lication. See New Harmony; Harmonists; D'Arusmont, Madame Frances (Fanny Wright) ; Rapp, Johann George.

FREE NEGROES, in the United States. At the formation of the Union these numbered about 60,000, nearly half of them in the South ; but while there were few slaves in New Eng¬ land, and those dwindling, and less than 50 per cent more than the free colored population north of Maryland, the South had more than 20 times as many slaves as freedmen, and the sys¬ tem was extending. Hence this section began

early to dread the free negroes, as an element always making their slaves discontented, and possibly stirring them to revolt ; a sentiment deepened into terror after the Santo Domingo massacres. State laws and constitutions were framed or amended to drive them from the States or re-enslave them ; one method being to forbid emancipation by will, and provide that free negroes must choose masters or leave the State ; and another to punish all penitentiary offenses of negroes with reduction to slavery. The Colonization Society derived its first im¬ petus from this feeling, till it was seen to be a mere reinforcement of slavery. The laws for refusing to allow negro merchant sailors to land, or even imprisoning them if they did, also caused much bad blood with the North. The ((Black Laws® reached their acme just be¬ fore the War, as did the personal-liberty laws in the free States. When the United States Constitution was formed free negroes could be¬ come voters in every one of the original 13 states except South Carolina and Georgia. By 1860 they had lost this privilege in all but five New England States and New York. This re¬ mained so until the passing of the 13th, 14th and 15th amendments to the Constitution. At the beginning of the Civil War there were 487,970 free negroes to 3,953,760 slaves. (See Negro). Consult Alexander, W. T., (History of the Colored Race in America5 (New Orleans 1887) ; Brawley, B. G., (A Short History of the American Negro> (New York 1913) ; Russell, T. H., (The Free Negro in Virginia, 1619—1865 > (in Johns Hopkins University (Studies in His¬ torical and Political Science,5 Series XXXI, No. 3, Baltimore 1913) ; Williams, G. W., (History of the Negro Race in America5 (New York

1883).

FREE PORT, a harbor where ships of all nations may enter and load or unload on pay¬ ment of harbor dues or charges for accommo¬ dation. Goods may be stored at free ports, and may then be either reshipped for export, or they may be admitted for home consumption on payment of the usual full customs of the country. The bonded warehouse system effects the same end as free ports. It is gradually spreading. England never had any free ports. There are none to-day in the United States and France. Only Hamburg and Bremen in Germany and Copenhagen in Denmark are still partially free ports. There were, how¬ ever, many free ports in earlier times when the large number of small states with differing custom regulations made them .of importance. Consult Bellet, D., (La Question des Zones et Ports Francs5 (in Revue d' Economic Politique, Vol. XXXI, p. 197, Paris 1917) ; Howe, F. C., (The Free Port an Agency for the Develop¬ ment of American Commerce5 (in American Academy of Political and Social Science, Vol. LIX, p. 236, Philadelphia 1915).

FREE PRESS. See Press, Freedom of the.

FREE SHIPS, FREE GOODS. That is, that in time of war, belligerents shall have no right to inquire into anything regarding a ves¬ sel and her cargo but whether the former be¬ longs to a neutral, and if so, her cargo must be as free as herself ; unless the cargo is agreed contraband of war. This is the doctrine of international law which the countries of pre-

dominantly industrial interests have always struggled to have accepted ; while those by nature constantly or frequently at war have refused to admit it. In the great wars of France with England, in the Revolutionary and Napoleonic era, the United States was the great champion of this doctrine, while England refused to admit it, claiming the right to con¬ fiscate her enemy's goods wherever she found them, and search every neutral for them. The War of 1812 arose partly from this, and did nothing toward settling it; but the close of the war period left it of little practical im¬ portance for many years. The Declaration of Paris (q.v.) went farther than this, and proclaimed neutral goods safe even in an enemy's vessels.

FREE AND SLAVE LABOR. See Labor.

FREE-SOIL PARTY (1848-55). This was the old Liberty party (q.v.) of

direct abolition (Birney, Chase, etc.), plus the (

nominated Hale and Julian; with a platform denouncing the Compromise of 1850 (q.v.), both the great parties for accepting it, and slavery as ((a sin against God and a crime against man,® and demanding the repeal of the fugitive-slave law. They polled 156,149 votes, of which 25,329 were in New York. They maintained their organization in Congress till the Kansas-Nebraska Bill (q.v.) had created the Republican party, which adopted its policy, and into which they were at once fused. It had served as a school of experience for some of the most distinguished Republican leaders, and played a part out of all proportion to its voting strength. Consult Wilson, H., (Fall of the Slave Power* (New York 1874) ; and Smith, T. C., (Liberty and Free-soil Parties in the NorthwesD (New York 1897).

FREE SONS OF ISRAEL, Independent Order of, a Jewish fraternal and benevolent society founded 10 Jan. 1849. It has 3 grand lodges and 89 subordinate lodges in the United States. In 1914 it had a total membership of 8,745, and up to that time had paid $6,559,355 to its beneficiaries.

FREE SPIRIT, Brethren of the, a sect of heretics with strong leanings toward quietistic and pantheistic mysticism, which originated in Alsace in the 13th and 14th centuries, and quickly became disseminated over Italy, France and Germany. They claimed ((3 vols., Leipzig 1874-93).

FREE STONE, the name applied to build¬ ing stones, especially sandstones, that can be most conveniently worked on account of their freedom from stratification planes, layers of heterogeneous material or different structure, etc. Limestones that can be freely cut in all directions, owing to exceptional homogeneity of structure, may also be called free stone. See Building Material.

FREE TRADE, in current use restricted to mean the interchange of commodities between countries politically independent, without ob¬ stacles specifically intended to restrict the trade. All taxes on imports, which form a large part of the revenue of most civilized governments to that extent impede the freedom of trade ; but the essence of the free-trade system is, that they shall not be arranged to <(protect® the cor¬ respondent home production, or, as free-traders would put it, to divert capital into otherwise unprofitable channels at the expense of the con¬ sumer. This is accomplished by selecting arti¬ cles not possible to produce at home (as tropi¬ cal products in a temperate country) ; by for¬ bidding their production at home (as tobacco in

England), foregoing certain new home in¬ dustries for the sake of sparing existent ones; or by laying corresponding internal taxes.

That free trade was never even formulated as a theory till a few generations ago, nor adopted as a policy till within two generations, that it is even now practised in its fulness by

only one country, and nearly so by only two more, and that the former, its chief exponent, is at this moment rent by a fierce struggle to re¬ sume its old protective system, indicates some¬ thing more back of this question than the mere state of economic enlightenment. The truth is, free trade is a matter of business, and all states have prior interests which business only subserves, and to which it is sometimes par¬ tially antagonistic. National existence always comes first, national prestige usually, national rivalry and jealousy frequently. In the Middle Ages war was the normal condition of most countries and the constant liability of the rest ; hence everything had to be subordinated to di¬ versified resources in war, whence a nation's supplies might be suddenly shut off. As the age of neutrality and the localization of wars has supervened, this danger has practically passed ; but masses of capital and of labor in each country, which its rulers cannot politically disregard, can still be injured by the hostile tariffs which are the modern substitutes for fleets and armies of conquest. The problem at issue is, whether these injure the target as much as the marksman; free-traders have one answer, protectionists another. But the pro¬ tectionist interest is always much more concen¬ trated and effective than the free-trade: it is that of masses of capital embarked in certain enterprises and fighting for life, with all the masses of people behind it whom it maintains, and who would be temporarily injured by a readjustment. Protection is led by those who are interested in terms of millions,- free trade mostly by those who are interested relatively in terms of pennies. The contest is so unequal that it is only wonderful that any circumstances have ever given the latter even a temporary victory.

In Europe till the 17th century, and in most parts of that till the 18th, the only way the bounds of free trade were extended was by conquest ; and even that did not always effect it, old provinces and feudalities retaining their rights to separate custom-houses — primarily an octroi, but used for "protection.® Most coun¬ tries were cut up by dozens of these vexatious boundary lines, crippling all internal trade, and

making each little district a special and self- subsistent world. Under Louis XIV Colbert (1665-83) swept away many of these old pro¬ vincial barriers, to the enormous development of French industry and trade, and consequently revenue ; but he could not touch the chief portion. Already in 1623 De la Croix had pro¬ pounded the theory of free trade ; and in Eng¬ land it was urged in 1696 by Nicholas Barbon, one of the founders of the life-insurance sys¬ tem. But about the middle of the 18th century it sprung into life at once in two quarters, the lesser influence at the time having been vastly more potent in the end: with the French "Phys¬ iocrats® and Adam Smith. The theory of the former — whose founder was Cantillon and the chief heads Quesnay and De Gournay — was enthusiastically taken up by a group of able thinkers and men of affairs, and in 1774 put partially in practice by Turgot, in free trade for grain throughout France. Their method of ap¬ proach was curious : they held that as com¬ merce does nothing but transfer from hand to hand wealth already existing, without creating new, the gains of the trading class are at the

expense of the only real wealth, the products of the earth; it is therefore to the community's interest that they should be as small as possible, and to this end commerce should take the shortest and most natural channels, as this leaves the "net product® of society the highest. Meantime in 1752-63, Adam Smith, a professor of moral philosophy at the University of Glas¬ gow, had been working out a theory of the social progress of nations ; and, as one branch of it, he investigated the causes of their material well-being. He was anything but a man of business, but he had a Scotch intellect which reasoned truly, and his society included many keen and able merchants and importers of the day. From them and his own mind he pro¬ duced and fortified the theory that dams in a stream could never create water, but only force it into other channels. He visited France and met the Physiocrat leaders, and received doubt¬ less new arguments and fresh facts. In 1775 he published his (Wealth of Nations, } perhaps the most epoch-making single book of all time ; for it created political economy as a science and free trade as a practical system. He took separately each kind of protective duty in use or advocated, and proved that each did harm in the very line it was supposed to do good. But he saw no hope of free trade ever coming about in England, so dominating was the influence of invested capital and of "furious and disappointed monopolists.® But a curious change in indus¬ trial affairs inverted the position of his friends and enemies. His views had been favored by the landed interest and disfavored by the manu¬ facturers; but the course of business made the agriculturists eager to keep up the duties on

grain, which gave them immense profits ; while the manufacturers began to be irked by the duties on raw material, which checked their coming dominance of the textile market under the splendid English inventions. The ablest statesmen were on the same side : Shelburne and the younger Pitt were convinced free-traders, and the latter tried to put Irish free trade into the act of Union in 1800. Two decades later the adherents were numerous: Ricardo's '^Politi¬ cal Economy) had reinforced Smith's, with greater weight because he was a successful Jewish banker; and London merchants were petitioning to have the shackles taken off trade. The first great success was making William Huskisson president of the board of trade in 1823; he was ignominiously driven from the Cabinet by the Duke of Wellington, _ but had induced Parliament to free some articles and lighten the duty on others. Thrust aside by more pressing politics, the reform stood still till 1836, when a failure of crops made it once more a burning question. Never was an issue so sharply marked out : the people were sacking the towns for bread while grain was taxed to enrich the landlords. Meantime manufacturers, increasingly the chief reliance of the national revenues, were kept out of foreign markets by having to pay higher for raw materials and more for wages. Local Anti-Corn-Law Asso¬ ciations from 1837 on were fused into the Na¬ tional Anti-Corn League in 1839; at its head were Richard Cobden and John Bright, both partners in Manchester calico-printing works; whence the term "Manchester School® for sup¬ posed believers in various doctrines mistakenly attributed to Cobden. The struggle convulsed

England, and almost broke the bonds of social order ; but the final blow to the old system was the Irish potato famine in 1845-47. This short¬ age made food still higher; and Sir Robert Peel, who had taken office expressly to resist the repeal of the Corn Laws, remained in it to re¬ peal them himself, 26 June 1846 — most of the duty at once, the rest by a sliding scale within three years.

The full free-trade policy was not intro¬ duced for many years, however : it was Mr. Gladstone in 1869 who framed the present sys¬ tem of absolute freedom from protection, though as Palmerston's chancellor of the ex¬ chequer in 1861 he had taken a long step to¬ ward it. In 1841 more than 1,000 articles were on the customs list, over half of them large staples; in 1849 they were reduced to 515, and in 1855 to 414, but still 153 main articles of con¬ sumption ; while in 1861 they were reduced at a blow to 142, of which only 19 were of

great importance, and in 1876 to 42, of which 10 were important. They have since been reduced to 12 altogether, in as few classes as possible • — seven kinds of drinks, three of sweets, one narcotic and one food; namely, spirits, wine and beer; tea, coffee, chicory, and cocoa ; sugar, molasses, and glucose; tobacco; and dried fruits.

It may be said here that in the last 30 years of protection, the total increase of British im¬ ports and exports was $340,000,000; in the first 30 of free trade it was $2,400,000,000, between seven and eight times as much. In 1816-40 the total increase in British shipping was 80,000 tons; from 1848 to 1858 it was 1,257,000, and thence to 1880 1,917,000 more. The experience of Belgium was even more striking. Under Napoleon prohibitory duties were imposed, and the country became largely depopulated; with the return of the Dutch and low duties, great manufactures at once sprang up ; with their expulsion in 1830 high protective duties were again imposed, and in 1851 the prime minister declared that if they were not removed all domestic industry would be ruined ; the whole system was swept away in 1855, and Belgium rapidly became, size for size, the foremost in¬ dustrial and commercial state of the world, the richest per capita, and the manufactory of Europe. Only a few per cent of its revenue is from imports, the rest being from internal duties.

The arguments for free trade cannot be stated without those against protection, being the same. They are not alone industrial, but political and social. Broadly, it is asserted that protection cannot increase the total industrial product to be divided up, and can only enable one class of the community to force the re¬ mainder to buy one costly article instead of two cheap ones, thus lessening the volume of trade and production ; that its claim, to re¬ distribute the amount in wages is false, as but for the system the same capital would have been employed in other industries and paid as much wages, with lower prices to the consumers ; that its claim to ultimately reduce prices is false, because as soon as that object has been achieved, it applies to the government on that very ground to save it from ruin by increasing the duty; that its claim to found industries is false by demonstration ; and that it narrows instead of diversifying them; that it extorts high prices from home consumers by squeezing

the market of which it is given a monopoly, and then sells its surplus to foreigners at a low price — which Adam Smith sets down as inevitable with a protective system ; that it pro¬ duces trusts, to prevent competition through which the public might secure its alleged bene¬ fits ; that it produces alternate <(feast or famine,ˆ inflation and panic, instead of equable business ; that it makes orderly public

finance impossible, by creating huge random revenues to be spent at random, in place of a calculable budget; that it corrupts politics deeply and hopelessly, by making masses of capital dependent on legisla¬ tion for its profit, and consequently influencing that legislation for its own ends, stripping the treasury to prevent repeal of duties, inventing extravagant schemes to spend an unnecessary revenue, and buying votes in its favor by enor¬ mous permanent burdens on the people, through pensions, etc., is mainly due to this money power created by legislation. For the opposite side, see Protection. See also Economics ; Tariff.

Bibliography. — Smith, Adam, (The Wealth of Nations) (1776) ; Ricardo,

1912) ; Higginson, (Tariffs at Work > (London

1913) ; Matthews, (Taxation and the Distribu¬ tion of Wealtn (New York 1914).

FREE WILL. This question is properly di¬ vided into two sections, that of the metaphys¬ ical basis and the doctrinal application ; but the latter has so deeply affected the reasonings on the former, that it is almost impossible to sepa¬ rate them.

The metaphysical problem is unique, from its presenting at the outset an irreconcilable contradiction between the phenomena of con¬ sciousness and the operations of reason. In this respect it is different from the insoluble problems of time and space, where the conflict is. between opposing conclusions of the reason with regard to the materials furnished by con¬ sciousness ; here there is a denial, by reason, of the validity of those materials. Consciousness appears to show us at every moment that we can dictate our actions mostly and our thoughts very largely; reason tells us that each follows on. other phenomena, from whose invariable re¬ lation of precedence we characterize them as cause and the former as effect. Consciousness tells us that our will is the active agent in pro¬ ducing the phenomena which immediately suc¬ ceed it ; reason tells us that this fancied agency is an illusion and itself a part of the chain of sequences, and that the apparent relation is be¬ cause,, as Hobbes says, the so-called will is the last wish of the mind before determining. But what causes the determination? This involves the problem of the nature of the will as before,

as well as of the ((coupling-pin® by which, if a reality, it acts on matter; if not a reality, the reason why a mental resolve is invariably fol¬ lowed by a physical movement or mental con¬ ception. Of the coupling-pin no acceptable theory has ever been framed; the best expla¬ nation of the association of will and act, sup¬ posing the former an illusion, is still Spinoza's, that they are twin phases of the same ultimate reality, and of necessity change coincidently. But this leaves it still unexplained why our consciousness makes the will not coincident with the act, but invariably its predecessor : we do not will and act simultaneously, but in suc¬ cession. The overwhelming weight of reason, however, for 2,500 years, from the Greek pre¬ decessors of Aristotle to Jonathan Edwards, has won reluctant acceptance to the doctrine of uni¬ versal determinism, or in theological phrase, of necessitarianism : a chain of causation extend¬ ing to all things and back to infinity, since no uncaused first act or idea can be fancied except as part of the First Cause of the universe. It is of course never claimed that all acts are volitional or all volitions deliberate, but only that the mind at will can interject uncaused determinations among the caused. It is evident, however, that to assume the possibility of un¬ caused acts is to consign the universe to chaos and abolish the reign of law ; that only on the theory of strict and unbroken causation (or ˆinvariable sequence®) can we reason at all concerning phenomena ; that the mind must fol¬ low the same law as other entities, and has no power, nor could even be endowed with such by omnipotence, of willing without motive ■ — that is, without a cause itself the resultant of an endless series of other causes. Indeed, as Professor Huxley puts it, for the mind to cause itself implies that it has anteceded itself, which is absurd ; the first mental action must have been part of the chain of causation, which sur¬ renders the whole case, as there is no spot where it can be imagined that it was able to throw down the ladder by which it had climbed, and cut loose from causes into a region of caprice.

To avoid this conclusion, a curious dilemma — usually known as ((Buridan's Ass,® though Buridan did not devise it — was invented by the mediaeval schoolmen. Suppose an ass between two bundles of hay, exactly alike, and with no motive for choosing which to bite first : it is absurd to suppose he would starve in the midst of food, and he must therefore act from free will. To this, however, it was answered that if motiveless he would so starve ; and the ques¬ tion remained as before.

Involved with this is the question of God's foreknowledge. It is

obvious that this involves his pre-determination of events, as otherwise he would foreknow what was never to happen, or was to happen outside his will ; and there can be no change in the predestined order, since any change in a sequence must itself be part of the predestination and foreknowledge.

Alone of all metaphysical questions not in¬ cident to the claims of religious founders, this has always been a fierce battle-ground, the dividing line of great religious sects. The rea¬ son is that the possibility of sanctions for moral law, and consequently of a decent basis for human society, is believed to depend upon it. Determinism seems to cut the roots of moral

obligation, by removing the possibility- of obedi¬ ence to it. If we are without will except as a consciousness of preference resulting from causes outside our control, we are automata; and preaching obligation of any sort to us seems as irrational as preaching it to a doll, for our action will not be influenced by it, nor are we responsible for disobedience. In this ex¬ treme form, the fallacy is easily apparent. The will, as Edwards has put it, always follows the greatest seeming good : but its estimate of good is not an unvarying thing, but constantly changing with experience and reason. Now moral rules, apprehended and accepted by the mind, form a part of this good, and therefore become new causes which determine the will : and whatever may have been the causation which has determined the evolving and enforc¬ ing of the moral law, it is nevertheless a por¬ tion of the environment which acts on the mind. As to responsibility, the question is irrelevant. An automaton which runs into a fire or the sea perishes none the less than if the act were a conscious volition. Punishment waits not on responsibility, but on violation of the laws of its being, and blame and excuse are alike imperti¬ nent to the result. We do not blame a child who burns its fingers, but the fingers are in the same condition as if we did.

Back of this, however, lies a contradiction of fact. So far from determinism making moral law impossible, free will makes it impos¬ sible. If volition can perpetually nullify the action of motive, there is a fatal breach in the continuity of cause and effect ; there can be no calculable sequence of action and therefore no law. The most perverse defiance of natural order is no more independent of cause than the steadiest obedience, for that perversity is itself due to causes precedent. Whence then come the invariable consciousness of freedom to act, its universal recognition, its embodiment into the framework of society, the obvious fact that there can be no society except on this basis? Why, here again, do consciousness and practice oppose

themselves unalterably to invincible ar¬ gument ? Edwards explains that though we have not liberty of willing, we have liberty of action ; which taken literally would imply that the will has no necessary connection with the act, and that we may voluntarily do a thing we have involuntarily willed not to do. Of course Edwards does not in fact maintain this, but only that God has given a choice of action by fur¬ nishing experience and reason and illumination by which to frame correct determinations. Waiving discussion of the difference between these determinations and will, the real explana¬ tion probably lies in the confusion between the abstract and concrete will, between its de¬ pendence on causes and, as above said, our own power to determine or change those causes. In¬ struction, example, appeals to self-interest or fear, or vanity, or affection, or honor, etc., pro¬ duce an environment and modify the view taken by each of the supreme immediate good, cal- culably enough to base coherent society upon; where their effect is grossly miscalculated the society goes to pieces. Metaphysics and the general consciousness are both right, each in its own sphere : the will must have motives, but those motives are furnished in great measure externally. Furthermore, subject to the inex¬ orable limitation, it can furnish by its own ac-

tion motives to change itself ; and constantly does so, attributing to its independent action what is really due to the influence of the new causes it has made to operate in altering its estimate of relative good. For the purposes of human life, volition is absolute and there is no injustice in enforcing responsibility.

Consult Edwards, Jonathan, (Freedom of the WilP (London 1754) ; Bennett, W., (The Religion of FreewilP (Oxford 1913) ; James, W., (The Will to Believe> (New York 1897) ; and Principles of Psychology) (New York 1899) ; Levy, P. E., (The Rational Education of the MindP (Boston 1914) ; Martineau, J., (A Study of Religion1* (2 vols., Oxford, 1888) ; Mill, J. S., (Logic> (London 1856) ; Rashdall, H., (Theories of Good and EviP (Oxford 1907) ; Stewart, D., (Moral Philosophy) (Edin¬ burgh 1854) ; Ward, J., (The Realm of Ends) (Cambridge 1911).

FREEDEN, fraMen, Wilhelm Ihno Adolf,

German mathematician and navigation expert : b. Norden, Hanover, 1822; d. 1894. He re¬ ceived his education at the universities of Bonn

and Gottingen. For a number of years he was head of the school of navigation at Elsfleth, and in 1867 founded the German Naval Ob¬ servatory at Hamburg, of which he was in charge until 1875. This observatory was de¬ signed to facilitate maritime intercourse, and consists of the departments of marine meteor¬ ology, of coast meteorology, of signal service, chronometer testing and bureaus -of nautical, meteorological and magnetic instruments. He was in the Reichstag in 1871-76 and until 1891 was editor of the Hansa, Zeitschrift fur See- wesen, which he had founded together with H. Tecklenborg-Bremen.

FREEDMAN. See Freeman.

FREEDMEN'S BUREAU, 1865-69. The supervision, temporary maintenance and em¬ ployment of the mass of homeless, penniless and untaught freedmen created by emancipa¬ tion was an obvious duty of the government, urged upon it at once after the proclamation of 1 Jan. 1863; and in 1863-64 officials were ap¬ pointed to lease abandoned lands to them for terms not exceeding a year. The military offi¬ cers left much of the care and provision for freedmen in their hands; but a more compre¬ hensive plan was needed, and after various abortive efforts at an acceptable measure, a "Bureau of Refugees, Freedmen and Aban¬ doned Lands® was established in the War De¬ partment, 3 March 1865, to continue for a year after the war. It was to be headed by a commissioner, with assistant commissioners in all the seceded States ; to issue supplies to destitute freedmen, have charge of abandoned lands to lease and ultimately sell in 40-acre plots, and have <(control of all subjects relating to refugees and freedmen® — an elastic pro¬ vision construed in the most elastic way. Its commissioners — the head being Gen. O. O. Howard (q.v.), a noble-minded and laborious philanthropist — acted as courts of law where there were none, or where negroes were not recognized as free; established the institution of marriage, and kept records ; assured the freedmen the right to choose employers, and made fair contracts for them. The "abandoned lands® disappeared under the amnesty acts ; but the bureau did excellent work by inaugurating

free schools on a large scale. On 6 Feb. 1866 Congress passed a bill to enlarge its powers and make it permanent; Johnson successfully vetoed it, but on 16 July another was passed over his veto, extending the bureau to July 1868, later extended a year in unreconstructed States. Under this its sweeping powers made it largely the government of the South under Reconstruction, especially as the department military commanders were usually made assist¬ ant commissioners ;

and the demoralizing and disastrous struggle of the North to secure negro independence and of the South to re¬ assert white mastery, is a history of part of the bureau's action — through executive and legislative powers scarcely pretended to be constitutional, and to transfer which to the regular courts the Fifteenth Amendment was passed. The bureau was regarded with detes¬ tation in the South; a large number of its offi¬ cers secured office through negro support; and its influence was exercised in organizing the blacks politically against the whites. Better features of its work were the foundation of the free public schools in the South, and of Fisk, Howard and Atlantic universities, and Hamp¬ ton Institute ; of the system of negro peasant proprietorship; and the winning of equal rights for all men in the courts. That it failed in its larger hopes, and that its harmful results were so great that many hold them far in excess of its benefits, are facts attributed by the fairest judges to the inevitable conditions of the prob¬ lem. (Consult the lucid and singularly just summary by W. E. B. DuBois — colored — in the Atlantic Monthly, Vol. LXXXVII, p. 354). The bureau ended its main work in 1869; its educational work continued till 1872, and bounty payments some years longer. It had about 900 agents in 1868; and expended in all some $20,000,000, over $10,000,000 on objects unconnected with soldiers' bounties. General Howard published a report of its work in the House Executive Documents, 41st Congress, 2d session. Consult Pierce, (The Freedmen's Bureau) (Iowa City 1904).

FREEDMEN'S SAVINGS AND TRUST CO., usually called FREEDMAN'S BANK, a

savings bank chartered by Congress in the District of Columbia by an act approved 3 March 1865, at the special instance of Charles Sumner and Charles R. Buckalew, as a means of encouraging thrift among the newly emanicipated negroes. It was in fact intended as part of the Freedmen's Bureau work, and had among its corporators General Howard, the chief commissioner, and a host of the most eminent and upright public men and philan¬ thropists; and its investments were restricted to government securities. It started branches in some 30 Southern cities, with doubtful legality, but covered by the elastic aegis of the bureau's power and everyone's good will, the South's most of all ; and did a large business. But the corporators appointed successors much less disinterested; the restriction on invest¬ ments was removed in 1870, ostensiblv to bene¬ fit depositors by a higher rate of interest, against the protest of Simon Cameron in the Senate ; the securities were rapidly replaced by "wildcat® stocks, all speculative and mostly worthless, and by mortgages on valueless prop¬ erty; and in 1874 the bank was pronounced in¬ solvent, with practically no assets. At that

time there were 61,131 depositors with a total of $2,939,925 deposits. As a result of bank¬ ruptcy proceedings about 62 per cent or $1,822,-753 of this indebtedness has been paid off. The blow to incipient negro thrift was very great; and the scandal discredited the entire system of which the bank was an outcome, and was one cause of the political overturn in 1874. Consult Anon., (The Story of the Freedman's Bank) (in Nation, Vol. XX, p. 253, New York 1875) ; United States; Banking and Cur¬ rency Committee, (Freedman's Savings and Trust Co.* (Washington 1910) ; United States, (Acts and Resolutions) (38th Congress, 2d Session, Washington 1865).

FREEDOM, Pa., borough in Beaver County, 25 miles northwest of Pittsburgh, on the Pitts¬ burgh, Fort Wayne and Chicago Railroad, and on the Ohio River. There are manufactures of caskets, monuments and oil. Pop. 3,060.

FREEDOM, Personal, the liberty of the individual to determine the course of his own actions, subject only to restrictions the same for all and as few and liberal as the public safety permits. It is characteristic of a social condition where the individual is the funda¬ mental unit, rather than subordinate communi¬ ties such as the family or the clan. Accord¬ ingly, the gradual eclipse of the family by the individual characteristic of European social history has led to the removal of such ob¬ structions to personal liberty as the Roman right of the father. The disappearance of slavery and of serfdom is likewise a natural consequence of the supersession in their role of political units of the household and the es¬ tate by the individual. In the modern demo¬ cratic state, personal liberty exists as a recog¬ nition of the right of each individual, within limits, to do what he pleases without the con¬ straint of his fellows to go where he pleases, to work at whatever trade he pleases and to own whatever property he can purchase. All these rights are strictly limited in the case of minors, and even among adults, the welfare of the State has necessitated such restrictions as pun¬ ishments, quarantines, special professional qualifications and taxes. In times of emergency the right of the State to dispose of even the lives of its constituent individuals for the com¬ mon good is universally recognized. That the restriction on the individual by the State shall not be more oppressive than necessity demands is secured by various clauses in the constitu¬ tions of the several nations of the world. In English-speaking countries, one of the most trusted weapons against the abuse of the powers of the State is a constitutional pro¬

vision concerning writs of habeas corpus (q.v.).

FREEDOM OF CITY. The custom of

granting to a distinguished visitor the <(privi- leges connected with municipal citizenship,® which is known as conferring ((the freedom of the city® obtains in both American and Euro¬ pean cities. The practice is to enter the names of such <(honorary citizens® upon the register of municipal electors, but they are not actually entitled to exercise the franchise or to become members of the city's governing bodies. The custom amounts nowadays to little more than a public expression of esteem, but its history goes back to the mediaeval days when it was a notable and valuable gift. When the custom vol 12 — 4

originated there was no general recognition of the right of freedom of domicile, and cities were more like private corporations with restricted membership than our modern cities. Such mem¬ bership — municipal citizenship — was usually obtained only after a long period of apprentice¬ ship to one of the recognized guilds, followed by examination, and enrolment as a ((master workman.® In such circumstances, the immedi¬ ate and unencumbered gift of ((the freedom of the city® by the vote of the magistrates was a considerable favor, and it was only granted to persons whose wealth or renown made their citizenship substantially desirable to the other burghers.

FREEDOM OF THE SEAS. See Inter¬ national Law.

FREEDOM OF SPEECH AND OF THE PRESS. By this is understood the essential right embodied in liberty of speaking and publishing the truth with good motives and for justifiable ends, in regard to the actions of the government, of officials, or individuals. The different bills of rights in State constitutions contain provisions along the same lines as those contained in the First Amendment of the Federal Constitution that no law shall be made ˆabridging the free¬ dom of speech or of the press.® This preserves an important feature of personal liberty long recognized in the constitution of England and maintained in the United States where in fact liberty in speaking and publishing one's opinions is subject to even fewer restrictions than in England. These constitutional provisions, how¬ ever, do not imply that liberty of speech and publication shall be free from responsibility and not subject to regulation. Improper speech and publication can incur both civil and criminal liability as determined by general law in the protection of property, person and reputation. These regulations and restrictions comprise :

(1) Civil liability to damages for injuries caused by slander, that is, the speaking of false and malicious words concerning another re¬ sulting in injury to his business or reputation;

(2) both civil and criminal liability for libel, which is the publication by writing or printing of matter calculated to injure the business of another or his character by bringing him into ridicule, hatred or contempt, under circum¬ stances rendering such publication unjustifiable and without lawful excuse; (3) criminal pun¬ ishment for the speaking or publishing of blasphemous, obscene, indecent or scandalous matter. Damages may be recovered in a civil suit for libelous statements made maliciously or without proper occasion to the injury of an¬ other. The truth of the statements may be pleaded as justification for a complete defense; but unless their truth is established, defamatory words spoken or written are presumed to be false, and they are also presumed to be malicious unless the occasion of their being spoken or published is such as to render them privileged.

FREEDOM OF THE WILL, a work by Jonathan Edwards. It is an amazing fact that this treatise, undoubtedly the greatest contribu¬ tion of America to metaphysical thought, was written within a period of four months, while the author was a missionary to the Indians in a frontier settlement. But the work is amaz¬ ing for other reasons also. Its power of close

argumentation was reckoned by so able a critic as Sir James Mackintosh as <(perhaps un¬ matched, certainly unsurpassed.® The reputa¬ tion of its awful audacity still haunts the minds of men who know no metaphysics and recite no creeds. Properly to understand the book, how'ever, it is necessary to go back to Edwards' youth, and to read his romantic outpourings on the beauty of holiness, the serene delights of the gardens of faith, and the fragrance of the love of God. These things still underlie the terrible logic of the later treatise, though con¬ cealed from superficial gaze by the unfortunate results of his reforming zeal and by his long- developed habit of controversy. To Edwards the Arminian theology of the day — which held that man is free to choose between good and evil and owes his salvation to his own choice as well as to the grace of God — was a manner of trifling with the tremendous issues of sin and of slighting the supreme prerogative of Deity. It is to make a mockery of sin, he argued, to

suppose that men would deliberately and knowingly choose evil and pain in place of good and happiness; man's freedom is confined to his ability to carry out his inclinations, but his so-called will is nothing more than his inevitable inclination toward that which at the moment of action seems to him best. In the same way it is to derogate from God's majesty to look for any cause in the world outside of His om¬ nipotent will. Hence the inclinations of men, as they must have a cause, are traced back to their source in God, whom Edwards does not hesitate to call <(the author of sin,® though, as he insists, ((for wise, holy and most excellent ends.® It is of course a manifest injustice to reduce Edwards' vast argument, a veritable megalotherium of metaphysics, to so puny a compass. More than that, any prospective reader should be warned that the spirit and intention of Edwards cannot be judged from this treatise alone, but must be gathered from the whole range of his works.

Paul Elmer More.

FREEDOM OF WORSHIP. See Wor¬ ship, Freedom of.

FREEHOLD, N. J., town, county-seat of Monmouth County, on the Central Railroad of New Jersey, and the Pennsylvania Railroad; about 32 miles southwest of Jersey City. It was settled in 1734, and for some time it was called Monmouth Court House, because the county court was held in the village. In 1869 it was incorporated, and the commission form of government has been adopted. It is the trade centre for a large agricultural section. Its chief manufactures are bicycles, foundry and machine-shop products, underwear and shirts. There is also a large canning factory. One of the attractions of the town is the granite monu¬ ment in memory of the battle of Monmouth (q.v.) which took place here 28 June 1778. Pop. (1920) 4,768.

FREEHOLD, in English and American law, an estate or real property held in fee simple in America, or in England either in fee simple or fee tail ; the tenure by which such an estate is held. (See Fee.) Anciently it was one of the two chief tenures known as tenure in free socage, and was the only free method for lay¬ men to hold property. A freehold estate must

possess immobility, in other words, must con¬ sist either of land or of some interest arising out of land annexed to it. Secondly, it must be of indeterminate duration. Consult Digby, K. E., (An Introduction to the History of the Law of Real Property5 (Oxford 1875) ; Pol¬ lock, Sir F., and Maitland, F. W., history of English Law Before the Time of Edward I' (2 vols., Cambridge 1895).

FREELAND, Pa., borough in Luzerne County, on the Lehigh Valley and Central Rail¬ road of New Jersey, about 30 miles southwest of Scranton. It is situated in the anthracite coal region, but is surrounded by a large sec¬ tion of good farming land. The chief indus¬ trial establishments are two silk mills, an over¬ all factory, two coal mining companies, etc. There are two banks with aggregate resources of about $1,150,000. The value of taxable prop¬ erty (1916) was given as $2,028,273. Educa¬ tional institutions are the Mining and Mechani¬ cal Institute, public and parochial schools. Re¬ ceipts of government (council of 12 members) $21,629 and expenses $20,465, as reported in 1916. Pop. (1920) 6,666.

FREEMAN, Alice Elvira. See Palmer,

Alice Freeman.

FREEMAN, Edward Augustus, English

historian : b. Harborne, near Birmingham, 1823 ; d. Alicante, Spain, 16 March 1892. He was educated at Trinity College, Oxford, where he obtained a scholarship in 1841, and after his marriage in 1847 he retired to a small estate at Somerleaze, in Somerset, where he devoted himself to literature. His first publication 0849) was a (History of Architecture, 5 a sub¬ ject in which he maintained interest throughout his life. This work was more especially devoted to Gothic architecture. His architectural re¬ searches helped to turn his attention to history, but his earliest historical works were the prod¬ uct of his interest in contemporary burning questions. His history and Conquests of the Saracens5 (1856) was partly due to the Crimean War; and the American Civil War brought forth his history of Federal Government (1863), which, however, remained a fragment in one volume. Between 1867 and 1879 appeared his magnum opus, the (History of the Norman Conquest of England,5 in six volumes, followed in 1882 by two supplementary volumes dealing with (The Reign of William Rufus and the Accession of Henry IP In 1884 he was ap¬ pointed regius professor of modern history at Oxford, and this post he occupied till his death. His last great work was a (History of Sicily, 5 which he left unfinished, though three volumes of the work were published. He died in Spain, where he was traveling for the purposes of recreation and research. Other works of his beside those mentioned were (Essay on Window Tracery ; ; (The Architecture of Llandaff Ca- thedraP ; history of Wells CathedraP (1870) ; (01d English History for Children5 (1869) ; (Growth of the English Constitution5 (1872); historical Essays5 (three series, 1871-79) ; (The Ottoman Power in Europe5 (1877) ; his¬ torical Geography of Europe5 (1881) ; (Subject and Neighbor Lands

of Venice5 (1881) ; (Lec- tures to American Audiences5 (1882) ; (English Towns and Districts5 (1883) ;

(1887) ; (Methods of Historical Study * (1886) ; (The Chief Periods of European History) (1887) ; (William the Conqueror1* (1888) ;

(Studies of TraveP (edited by Miss F. Freeman, 3 vols., 1893, 1897). He was a man of strong partisan feeling, which sometimes interfered with a judicial weighing of evidence. But he took great pains to verify his facts, indeed was devoted to truth, and had a wide and deep knowledge of history. The charge of prolixity made against him is not without foundation, but when in the mood he displayed remarkable powers of compression. He had a marked pref¬ erence for the use of words of purely English origin. In spite of his pugnacity and the obstinacy with which he maintained his side in a controversy he was a man of generous and kindly nature. Consult (Life and Letters,* by Stephens (1895).

FREEMAN, James, American Unitarian clergyman, the first in the United States to as¬ sume the name Unitarian : b. Charlestown, Mass., 22 April 1759; d. Newton, Mass., 14 Nov. 1835. He was graduated at Harvard Col¬ lege in 1777, in 1782 became lay-reader in King's Chapel, Boston, later proclaimed him¬ self a Unitarian, and, supported by his congre¬ gation, secured corresponding changes in the prayer-book. In 1787, his bishop having re¬ fused him ordination, he was ordained by his wardens and congregation. Until his death he was sole minister of the chapel. He received the degree of D.D. from Harvard in 1811; he was a liberal and accomplished scholar. He published (Sermons and Charges* (1832).

FREEMAN, James Midwinter, American Methodist clergyman: b. New York, 29 Jan. 1827 ; d. Morristown, N. J., 27 Feb. 1900. He was educated at Wesleyan University, ordained in the Methodist Episcopal Church in 1850 and held pastorates of various prominent New Jer¬ sey churches for 22 years. From 1872 until his death he was assistant editor and corre¬ sponding secretary of the Sunday School Union and of the Tract Society of the Methodist Episcopal Church. He also acted as secretary of the board of trustees of the Centenary Col¬ legiate Institute and of that of Drew Theolog¬ ical Seminary, as well as secretary of the Meth¬ odist Historical Society of New York City.

FREEMAN, Mary Eleanor Wilkins, American novelist : b. Randolph, Mass., 1862. She was educated at Mount Holyoke Seminary and after some years spent in Brattleboro, Vt., returned in 1883 to Randolph, which remained her home till her marriage to Charles Freeman in January 1902, when she removed to his home in Metuchen, N. J. She came first into notice about 1886 by her extremely faithful delinea¬ tions of certain phases of New England life in her short stories contributed to the magazines ; then attempted more sustained work, and pub¬ lished several novels, displaying the same char¬ acteristics. Her work steadily gained in popu¬ larity and has been admired by English as well as American critics. A fondness for very short sentences gives it almost a staccato character at times, and while the accuracy of her studies of New England village existence cannot be called into question, her insistence upon the bareness of the life to the exclusion, or almost entire subordination of its happier phases, con¬ veys a not wholly correct impression of the life

in its entirety. Her published works include (The Adventures of Ann) (1886) ; (A Humble Romance and Other Stories* (1887) ; (A New England Nun, and Other Stories* (1891) ;

(Young Lucretia* (1892) ; (Giles Corey, Yeo¬ man,* a drama (1893) ; (Jane Field,* her first novel (1893) ; (Pembroke* (1894) ; (The Long Arm,* with J. E. Chamberlin (1895) ; (Jerome> a Poor Man* ; (Silence and Other Stories* ; (The People of Our Neighborhood* ; Under¬ studies* ; (Madelon* ; (The Love of Parson Lord* ; (Evelina's Garden* ; (The Wind in the Rose-Bush*; (The Givers* (1904); (Doc Gor¬ don* (1906) ; (By the Light of the Soul* (1907) ; (Shoulders of Atlas* (1908) ; (Win¬ ning Lady* (1909) ; (Green Door* (1910) ; (Butterfly House* and (Yates Pride* (1912) ; (Copy Cat and Other Stories* (1914) ; (The Jamesons, and People of Our Neighborhood* (serially, 1914).

FREEMAN, Nathaniel, American jurist: b. Dennis, Mass., 8 April 1741 ; d. Sandwich, Mass., 20 Sept. 1827. After studying law and medicine he moved to Sandwich in 1763. He fought in the Revolution, and was brigadier- general of militia forces in 1781-91. In 1795— 99 he was a member of the United States Con¬ gress, sat in the Massachusetts legislature, and was for many years judge of probate and of the court of common pleas. He was also a medical practitioner, and an orator of some dis¬ tinction.

FREEMAN, or FREEDMAN, is one who

has inherited the full privileges and immuni¬ ties of citizenship; one

who has been delivered from the restraints of bondage, but who, usu¬ ally, is not placed in a position of full social or even political equality with him who was born free. In old Rome, the equivalent for freeman comprehended all classes of those who were not slaves. As the organization of Ro¬ man society survived the convulsions of the Middle Ages to a far greater extent in the towns than in the landward districts, where the institutions of feudalism (q.v.) almost entirely superseded it, it is in the borough and other municipal corporations of Europe that we still find freemen, or persons inheriting or acquiring by adoption, purchase or apprenticeship the rights of citizenship. In the United States the term freemen was used of the colored people emancipated by the Civil War. The duty of caring for those people, finding them work, and preparing them for the privileges of freedom was thrown on the War Department; and in 1865 an act of Congress created in that depart¬ ment the bureau commonly known as the «Freedmen's Bureau** (q.v.) whose duties prac¬ tically ceased in 1870. The founding of several institutions for colored persons, such as How¬ ard University and Fisk University (q.v.), was a permanent result of its work, out of which have grown other educational achievements of great importance in the advancement of the col¬ ored people. Consult Green, (The Making of England* (London, 1883).

FREEMAN'S FARM or STILLWATER, Battle of. See Saratoga. Battles of.

FREEMASONRY. See Masonic Fra¬ ternity.

FREEMASONS. See Masonic Fraternity.

FREEPORT, Ill., city and county-seat of Stephenson County, on the Pecatonica River, the Illinois Central, the Chicago and Northern, and the Chicago, Milwaukee and Saint Paul railroads, about 113 miles northwest of Chicago, and 55 miles southeast of Dubuque. Freeport's chief manufactures are wind-mills, automobiles, organs, gas engines, hardware, pianos, agricultural implements, drugs and chemicals, garments and toys. The United States census of manufactures for 1914 showed within the city limits 63 industrial establish¬ ments of factory grade, employing 3,013 per¬ sons ; 2,566 being wage-earners receiving annu¬ ally a total of $1,661,000 in wages. The capital invested aggregated $11,227,000, and the year's output was valued at $7,447,000 : of this, $3,537,- 000 was the value added b'y manufacture. It has a free library, three hospitals, a good system of

public and parish schoqls, and several fine public buildings and public parks. Freeport was settled in 1835 and received its charter in 1855. The <(Freeport heresy,** a political doctrine much discussed before the Civil War, was that, regardless of the Dred Scott Case (q.v.), any territory had the right to reject the slave system by the means of police laws which would be <(unfriendly,** and would in time stamp out the existence of slav¬ ery. This ((doctrine** or (

FREEPORT, N. Y., village of Nassau County, on Long Island, on the Long Island Railroad, 20 miles east of New York. It is mainly a residential town, contains a high school and two clubhouses. Fishing is the only local industry. It owns the electric-lighting and water supply plants. Pop. (1920) 8,599.

FREER, Charles Lang, American capital¬ ist: b. Kingston, N. Y., 1856; d. 25 Sept. 1919. He was educated in the public schools of Ulster County, N. Y., and for many years was engaged in railway service and manufacturing in Detroit. He was well known as a connoisseur in art. He presented his own art collection to the Smith¬ sonian Institution at Washington, and donated $1,000,000 to the building fund of this institu¬ tion. He received the honorary degree of A.M. from the University of Michigan.

FREESIA, a genus of plants of the iris family, including two or three species, natives of southern Africa. They have narrow, grass¬ like leaves and showy clusters of fragrant white or pale yellow flowers terminating the slender stems. They are popular with florists and for window gardens, and are of very easy culture.

FREETHINKER, a name assumed by those who, disbelieving in revelation, feel themselves free to adopt any opinion in religious or other matters which may result from their own inde¬ pendent thinking. The name was specially claimed by those who in the 17th century took part on the anti-Christian side in the deistic controversy. Voltaire (q.v.) was a well-known French freethinker.

FREETOWN, Africa, a seaport of West Africa, capital of the British colony of Sierra Leone (q.v.) on the south side of the river of Sierra Leone, in 80° 29′ N., 13° 10′ W. Its

principal streets are broad and straight, and have, more especially in the part occupied by Europeans, a very attractive appearance, the houses being generally detached and surrounded by trees. Freetown is a strongly fortified im¬ perial coaling-station. A railway runs from Freetown some distance into the interior. Its climate is very unhealthy, although in recent years sanitary conditions have been improved considerably and the death rate has gradually been reduced. A new residential suburb has been developed on one of the nearby hills (900 feet high) and has been connected with the town proper by a light railway. Freetown was made a municipality in 1893 with a mayor and 12 elected and 3 appointed councillors, being the first city in West Africa to enjoy this privilege. It is a port of call for all West African steamers and of ever-growing com¬ mercial importance. There are the usual official buildings of a small colonial capital ; governor's palace, barracks, courts, schools, churches, in¬ cluding a cathedral, botanic gardens, etc., show the result of many years' labor. There are no horses, manual labor taking their place. In 1916 the total revenue was $48,452 and the expenditures $57,175. The net debt slightly

more than $130,000. The town was founded in 1792. In September 1794 it was practically destroyed by a French squadron, but recovered in a short time. According to the census of 1911 there is a population of 34,090 of which 558 are Europeans, 169 Asiatics and 33,363 Africans of more than 15 different tribes. Con¬ sult (The Freetown Municipality Consolidation Ordinance, 1908) (London 1908) ; (Handbook of Sierra Leone> (Sierra Leone 1916) ; Burton, Sir R., (Wanderings in West Africa, etc.* (Vol.

I, chapter V, p. 193, London 1863) ; Crooks,

J. J., (A History of the Colony of Sierra Leone, West Africa) (Dublin 1903) ; D'Lspagna.t, P., (Jours de Guinee* (p. 277, Paris 1899) ; George, C., (Rise of British West Africa, etc.* (Lon¬ don 1902) ; Sibthorpe, A. B. C., (History of Sierra Leone* (London 1906) ; Sierra Leone Government, (Blue Book* (Freetown 1917) ; Trevelyan, Sir G. O., (Life and Letters of Lord Macaulay* (Vol. I, p. 29, London 1909) ; Villelume, Baron de, (Au Cceur de l'Afrique* (Paris 1910).

FREEZING, CONGELATION, or SO¬ LIDIFICATION, the transformation of a liquid into a solid under the influence of cold. Each pure liquid always solidifies at the same temperature, which is called its freezing point (q.v.), and the solid also melts again at the same temperature. Thus the freezing point and the melting point, or point of fusion, are the same, and the point is always the same for the same substance. The freezing point of water, or the melting point of ice (32° F.), is taken for one of the fixed points in ther¬ mometry. The freezing point of mercury is 39° below zero, of sulphuric ether 46° below zero, of alcohol 203° below zero F. • It has been shown that the increase of pressure on water, and on all substances which expand in freezing, will lower the freezing point; and that such substances as wax, spermaceti, sulphur and paraffin, which contract in freezing, have the freezing point raised by pressure. See Melting- point.

FREEZING-MIXTURE, a mixture for the production of artificial cold by absorption of heat. For this purpose two substances are mixed, of which one is usually solid, and which tend to form a liquid mixture. In liquefying any solid a certain amount of heat is made latent, and owing to this the temperature of the mixture at the end of the liquefaction is often very low. Thus on mixing snow and salt to¬ gether the salt converts the snow into water, or rather tends to form

brine ; but snow cannot melt without withdrawing from something a quantity of heat. It may withdraw this heat from the salt, or partly from surroundings. Hence the temperature of the brine which is the result of the mixture is very much below that of either the salt or snow. The fact is that salt and water mixed cannot be in the solid condition, except at a temperature very much below that of ordinary snow. The table gives a list of freezing-mixtures, and of the lowering temperature obtained by means of them. See Ice, Artificial; Refrigeration and Refrigerating Machines.

Substances and parts by weight

Reduction of temperature, F.

Total

temper¬

ature

reduc¬

tion,

F.

From

To

Snow 2, sodium chloride 1 .

+32

— 5

37

“ 2, calcium chloride 2\ .

+32

—40

72

” 2, calcium chloride crystals 3 .

+32

—50

82

“ 12, sodium chloride 5, ammo-

—25

57

nium nitrate 4 .

+32

“ 3, dilute sulphuric acid 2S. . . .

+32

—23

55

“ 3, hydrochloric acid 5 . . .

+32

— 27

59

“ 3, potassium 4 .

+32

— 51

83

Sodium nitrate 3, dilute nitric acid 2 .

+s0

— 3

53

“ phosphate 9, dilute nitric

+50

—12

62

acid 4 .

“ sulphate 6, ammonium

nitrate 5, dilute nitric

—40

90

acid 3 .

+50

FREEZING POINT, the degree of cold at which a liquid freezes. It may be stated as accurately as the degree of heat at which a liquid congeals, since everything above absolute zero represents some degree of heat. In the case of water the freezing point is 32 F. or 0° C. The fusing or melting point of a metal is also its freezing point, the point where it changes from the liquid to the solid condition if the temperature is going down, or from solid to liquid if it is going up. But as the melting points of metals are regarded as hot, we use the word fuse, except in the case of mercury or quicksilver. The freezing or fusing points of familiar substances are:

Hydrogen .....

Mercury .

Bromine . .

Water .

Olive oil .

Phosphorus

Potassium .

Sodium .

—328° F. Sulphur . . . 235° F.

—38 Tin . 551

— 20 Bismuth . 517

0 Zinc . . 811

50 Lead _ , 850

112 Gold . 1913 .

144.5 Iron.’ . 2912

204 I.’.* .

Sea water freezes at a lower point than fresh water, owing to the solution of salt and other minerals. Changes of pressure affect the freezing point as well as the boiling point. This

is illustrated by the melting of glaciers from the bottom, which is the cause of their move¬ ment of flow. This melting at the bottom is due to the great weight of ice, creating pres¬ sure, which brings about melting though the temperature may be many degrees below 32° F.

To determine the molecular weights of sub¬ stances, it is important to know the freezing point. To ascertain this the common method is to make a solution of the substance. The freezing point of the solution is usually lower than that of the solvent, the difference being proportional to the amounts not only of volume but of weight. The curves obtained appear to be similar to those found by tests of the boil¬ ing point to determine molecular weight. Beck¬ man’s apparatus for determining the freezing point of solutions consists of a jar containing a liquid, which can be maintained at a tempera¬ ture slightly below that of the solution, and a glass tube made double, that is, with inner and outer tube, the inner tube for the solvent and the outer for air space. A thermometer scale is marked on the inner test tube. With this apparatus the freezing point of the pure solvent can be found with a close approach to accuracy. Next a definite proportion of the substance to be dissolved is added to the solvent, through a side aperture provided in the tube, and the temperature of the solution is observed. The difference between the freezing point of the solvent and the solution is then apparent. Be¬ cause of different results obtained by different experimenters with different apparatus it was learned that

several conditions minutely affected the final temperature recorded. The size and shape of the vessel containing the cold mixture that accomplished the freezing, and the regular or irregular stirring of the contents, and the diameter of the test tube were all found to affect the ultimate temperature, as well as the temperature of the outside of the jar, due to the temperature of the room. To check such experiment therefore a boiling test and some¬ times other tests are' made for molecular: weight, the average result being accepted. See Melting Point; Solutions.

FREIBERG, fri'berg, Saxony, a mining town 25 miles southwest of Dresden. It is the capital of the mining district of Saxony, and contains a mining academy founded in 1765, with 13 professors, fine scientific collections, among which is the celebrated collection of precious stones amassed by W erner, and a large library. There is a fine relic called the Golden Portal belonging to an ancient Church that stood on the site of the Gothic cathedral. It is an ancient imperial city, and is still surrounded by the old walls and ditch. The town owes its origin to the discovery of silver mines in its vicinity in the 12th century. Here, on 29 Oct. 1762, Prince Henry of Prussia defeated the allied Austrian and Saxon army. Pop. 36,237.

FREIBURG, frl-boorg, or FREYBURG, or FREIBURG IM BREISGAU, Baden, a town in the circle of the upper Rhine, in the valley of the Dreisam, and on the railway from Carlsruhe, in one of the most beautiful and fertile districts of south Germany, at the west foot of the Black Forest. It consists of the town proper, the fortifications of which have been converted into pleasure-grounds, and of

FREEPORT, Ill., city and county-seat of Stephenson County, on the Pecatonica River, the Illinois Central, the Chicago and Northern, and the Chicago, Milwaukee and Saint Paul railroads, about 113 miles northwest of Chicago, and 55 miles southeast of Dubuque. Freeport's chief manufactures are wind-mills, automobiles, organs, gas engines, hardware, pianos, agricultural implements, drugs and chemicals, garments and toys. The United States census of manufactures for 1914 showed within the city limits 63 industrial establish¬ ments of factory grade, employing 3,013 per¬ sons; 2,566 being wage-earners receiving annu¬ ally a total of $1,661,000 in wages. The capital invested

aggregated $11,227,000, and the year's output was valued at $7,447,000 : of this, $3,537,- 000 was the value added by manufacture. It has a free library, three hospitals, a good system of public and parish schools, and several fine public buildings and public parks. Freeport was settled in 1835 and received its charter in 1855. The <(Freeport heresy,® a political doctrine much discussed before the Civil War, was that, regardless of the Dred Scott Case (q.v.), any territory had the right to reject the slave system by the means of police laws which would be ˆunfriendly,® and would in time stamp out the existence of slav¬ ery. This ˆdoctrine® or <(heresy® was ad¬ vanced by Douglas in the famous debate with Lincoln which took place in Freeport in 1858. Pop. 20,000.

FREEPORT, N. Y., village of Nassau County, on Long Island, on the Long Island Railroad, 20 miles east of New York. It is mainly a residential town, contains a high school and two clubhouses. Fishing is the only local industry. It owns the electric-lighting and water supply plants. Pop. (1920) 8,599.

FREER, Charles Lang, American capital¬ ist: b. Kingston, N. Y., 1856; d. 25 Sept. 1919. He was educated in the public schools of Ulster County, N. Y., and for many years was engaged in railway service and manufacturing in Detroit. He was well known as a connoisseur in art. He presented his own art collection to the Smith¬ sonian Institution at Washington, and donated $1,000,000 to the building fund of this institu¬ tion. He received the honorary degree of A.M. from the University of Michigan.

FREESIA, a genus of plants of the iris family, including two or three species, natives of southern Africa. They have narrow, grass¬ like leaves and showy clusters of fragrant white or pale yellow flowers terminating the slender stems. They are popular with florists and for window gardens, and are of very easy culture.

FREETHINKER, a name assumed by those who, disbelieving in revelation, feel themselves free to adopt any opinion in religious or other matters which may result from their own inde¬ pendent thinking. The name was specially claimed by those who in the 17th century took part on the anti-Christian side in the deistic controversy. Voltaire (q.v.) was a well-known French freethinker.

FREETOWN, Africa, a seaport of West Africa, capital of the British colony of Sierra Leone (q.v.) on the south side of the river of Sierra Leone, in 80° 29′ N., 13° 10′ W. Its

principal streets are broad and straight, and have, more especially in the part occupied by Europeans, a very attractive appearance, the houses being generally detached and surrounded by trees. Freetown is a strongly fortified im¬ perial coaling-station. A railway runs from Freetown some distance into the interior. Its climate is very unhealthy, although in recent years sanitary conditions have been improved considerably and the death rate has gradually been reduced. A new residential suburb has been developed on one of the nearby hills (900 feet high) and has been connected with the town proper by a light railway. Freetown was made a municipality in 1893 with a mayor and 12 elected and 3 appointed councillors, being the first city in West Africa to enjoy this privilege. It is a port of call for all West African steamers and of ever-growing com¬ mercial importance. There are the usual official buildings of a small colonial capital ; governor's palace, barracks, courts, schools, churches, in¬ cluding a cathedral, botanic gardens, etc., show the result of many years' labor. There are no horses, manual labor taking their place. In 1916 the total revenue was $48,452 and the expenditures $57,175. The net debt slightly more than $130,000. The town was founded in 1792. In September 1794 it was practically destroyed by a French squadron, but recovered in a short time. According to the census of 1911 there is a population of 34,090 of which 558 are Europeans, 169 Asiatics and 33,363 Africans of more than 15 different tribes. Con¬ sult (The Freetown Municipality Consolidation Ordinance, 1908) (London 1908) ; (Handbook of Sierra Leone) (Sierra Leone 1916) ; Burton, Sir R., (Wanderings in West Africa, etc. 5 (Vol.

I, chapter V, p. 193, London 1863) ; Crooks,

J. J., (A History of the Colony of Sierra Leone, West Africa5 (Dublin 1903) ; D'fispagnat, P., (Jours de Guinee5 (p. 277, Paris 1899) ; George, C., (Rise of British West Africa, etc.5 (Lon¬ don 1902) ; Sibthorpe, A. B. C., 'History of Sierra Leone5 (London 1906) ; Sierra Leone Government, (Blue Book5 (Freetown 1917) ; Trevelyan, Sir G. O., 'Life and Letters of Lord Macaulay5 (Vol. I, p. 29, London 1909) ; Villelume, Baron de, 'Au Coeur de l'Afrique5 (Paris 1910).

FREEZING, CONGELATION, or SO¬ LIDIFICATION, the transformation of a liquid into a solid under the influence of cold. Each pure liquid always solidifies at the same temperature, which is called its freezing point (q.v.), and the solid also melts again at the same temperature. Thus the freezing point and the melting point, or point of fusion, are the same, and the point is always the same for the same substance. The freezing point of water, or the melting point of ice (32° F.), is taken for one of the fixed points in ther¬ mometry. The freezing point

of mercury is 39° below zero, of sulphuric ether 46° below zero, of alcohol 203° below zero F. • It has been shown that the increase of pressure on water, and on all substances which expand in freezing, will lower the freezing point; and that such substances as wax, spermaceti, sulphur and paraffin, which contract in freezing, have the freezing point raised by pressure. See Melting- point.

FREEZING-MIXTURE, a mixture for the production of artificial cold by absorption of heat. For this purpose two substances are mixed, of which one is usually solid, and which tend to form a liquid mixture. In liquefying any solid a certain amount of heat is made latent, and owing to this the temperature of the mixture at the end of the liquefaction is often very low. Thus on mixing snow and salt to¬ gether the salt converts the snow into water, or rather tends to form brine ; but snow cannot melt without withdrawing from something a quantity of heat. It may withdraw this heat from the salt, or partly from surroundings. Hence the temperature of the brine which is the result of the mixture is very much below that of either the salt or snow. The fact is that salt and water mixed cannot be in the solid condition, except at a temperature very much below that of ordinary snow. The table gives a list of freezing-mixtures, and of the lowering temperature obtained by means of them. See Ice, Artificial; Refrigeration and Refrigerating Machines.

Substances and parts by weight

Reduction of temperature, F.

Total

temper¬

ature

reduc¬

tion,

F.

From

To

Snow 2, sodium chloride 1 .

+32

— 5

37

“ 2, calcium chloride 2$.

+32

— 40

72

“ 2, calcium chloride crystals 3 .

+32

—50

82

“ 12, sodium chloride 5, ammo-

—25

57

nium nitrate 4 . •

+32

“ 3, dilute sulphuric acid 2 .

+32

—23

55

“ 3, hydrochloric acid 5 . . .

+32

—27

59

“ 3, potassium 4 .

+32

— 51

83

Sodium nitrate 3, dilute nitric acid 2 .

+•ˆ0

— 3

53

“ phosphate 9, dilute nitric

acid 4 .

+50

—12

62

“ sulphate 6, ammonium

nitrate 5, dilute nitric

90

acid 3 .

+50

—40

FREEZING POINT, the degree of cold at which a liquid freezes. It may be stated as accurately as the degree of heat at which a liquid congeals, since everything above absolute zero represents some degree of heat. ˆIn the case of water the freezing point is 32° F. or 0° C. The fusing or melting point of a metal is also its freezing point, the point where it changes from the liquid to the solid condition if the

temperature is going down, or from solid to liquid if it is going up. But as the melting points of metals are regarded as hot, we use the word fuse, except in the case of mercury or quicksilver. The freezing or fusing points of familiar substances are;

Hydrogen .....

Mercury . .

Bromine. .

Water .

Olive oil . – .

Phosphorus

Potassium .

Sodium .

— 328° F. Sulphur . . . 235° F.

—38 Tin . 551

— 20 Bismuth . 517

0 Zinc. 811

50 Lead – - 850

112 Gold . 1913.

144.5 Iron.' . 2912

204 '

Sea water freezes at a lower point than fresh water, owing to the solution of salt and other minerals. Changes of pressure affect the freezing point as well as the boiling point. This

is illustrated by the melting of glaciers from the bottom, which is the cause of their move¬ ment of flow. This melting at the bottom is due to the great weight of ice, creating pres¬ sure, which brings about melting though the temperature may be many degrees below 32° F.

To determine the molecular weights of sub¬ stances, it is important to

know the freezing point. To ascertain this the common method is to make a solution of the substance. The freezing point of the solution is usually lower than that of the solvent, the difference being proportional to the amounts not only of volume but of weight. The curves obtained appear to be similar to those found by tests of the boil¬ ing point to determine molecular weight. Beck¬ man's apparatus for determining the freezing point of solutions consists of a jar containing a liquid, which can be maintained at a tempera¬ ture slightly below that of the solution, and a glass tube made double, that is, with inner and outer tube, the inner tube for the solvent and the outer for air space. A thermometer scale is marked on the inner test tube. With this apparatus the freezing point of the pure solvent can be found with a close approach to accuracy. Next a definite proportion of the substance to be dissolved is added to the solvent, through a side aperture provided in the tube, and the temperature of the solution is observed. The difference between the freezing point of the solvent and the solution is then apparent. Be¬ cause of different results obtained by different experimenters with different apparatus it was learned that several conditions minutely affected the final temperature recorded. The size and shape of the vessel containing the cold mixture that accomplished the freezing, and the regular or irregular stirring of the contents, and the diameter of the test tube were all found to affect the ultimate temperature, as well as the temperature of the outside of the jar, due to the temperature of the room. To check such experiment therefore a boiling test and some¬ times other tests are made for molecular weight, the average result being accepted. See Melting Point; Solutions.

FREIBERG, fri'berg, Saxony, a mining town 25 miles southwest of Dresden. It is the capital of the mining district of Saxony, and contains a mining academy founded in 1765, with 13 professors, fine scientific collections, among which is the celebrated collection of precious stones amassed by Werner, and a large library. There is a fine relic called the Golden Portal belonging to an ancient Church that stood on the site of the Gothic cathedral. It is an ancient imperial city, and is still surrounded by the old walls and ditch. The town owes its origin to the discovery of silver mines in its vicinity in the 12th century. Here, on 29 Oct. 1762, Prince Henry of Prussia defeated the allied Austrian and Saxon army. Pop. 36,237.

FREIBURG, fri-boorg, or FREYBURG, or FREIBURG IM BREISGAU, Baden, a town in the circle of the upper Rhine, in the valley of the Dreisam, and on the railway from Carlsruhe, in one of the most beautiful and fertile districts of south Germany, at the west foot of the Black Forest. It consists of the town proper, the fortifications of which

have been converted into pleasure-grounds, and -of

two suburbs, and is the seat of a superior civil and criminal court, and of several public offices. The buildings most deserving of notice are the minister or cathedral, a large and beautiful Gothic structure built of red sandstone, ad¬ mired for its delicate symmetry, with a magnifi¬ cent portal richly sculptured, and surmounted by a tower, partly of exquisite open work, 380 feet high; the university, founded in 1457, the merchant house, now the chief tax office, a quaint Gothic structure, resting on pointed arches, and decorated externally with fresco portraits of the Emperor Maximilian, his son Philip I, Charles V and Ferdinand I ; and the grand-ducal palace and government buildings. Freiburg is the see of an archbishop, and the seat of the courts and offices for the circle of the upper Rhine. Pop. 83,324; pop. of the entire District of Freiburg being 564,580 and area 1,830 square miles. Its university had, in the winter semester 1914-15: professors and teachers, 151; students, 2,237 (theology 250, jurisprudence 469, medicine 960, philosophy 301, and the remainder students of the faculties of mathematics and natural science). The faculty of theology in the University of Freiburg, as in the universities of Munich, Munster and Wurzburg, is Roman Catholic.

FREIBURG. See Fribourg.

FREIFELD, George, American judge: b. New York city, 1856; d. 17 Nov. 1917. Of German extraction, his father served in the Civil War. Freifeld was elected a municipal court justice in 1909, and was re-elected to the second district municipal court of Brooklyn in 1917 for a term of 10 years. For over a quar¬ ter of a century Freifeld was a prominent figure in Freemasonry; he was district deputy of the third district in 1906, and in 1914-15 was grand master of the Grand Lodge of Masons in the State of New York. He served 12 years as a member of the board of education, was a life member of the Brooklyn Institute of Arts and Sciences, and vice-president of the Manufacturers' Trust Company.

FREIGHT. This term was originally syn¬ onymous with cargo, being applied to miscella¬ neous articles shipped for transportation by water. When the railways began to do a gen¬ eral transportation business in America the word freight was extended in meaning to cover all miscellaneous merchandise transported by train, other than

baggage, mail and express matter paying a higher rate for quick transporation. In Great Britain, however, the word freight was not so extended in general meaning, the word “goods* being employed for miscellaneous shipments by railway, so that in England they say goods-van and goods-train with a meaning similar to freight-car and freight-train in the Western hemisphere.

The tremendous development of the United States railways, and the enormous freights they handle, have overshadowed the much smaller volume of ocean freight shipped in and out of this country, hence freight is largely considered from the railway point of view. The freedom of trade between the States, and the unprecedented development o? railways has evolved a freight traffic in this country which is the marvel of modern civilization. Manu¬ facturers no longer confine their trade to a

neighborhood, but seek trade hundreds and thousands of miles away, because low freight charges enable them to compete.

Early in the history of American railways there was developed the policy of charging for freight <(what the traffic would bear.* Obvi¬ ously a carload of shoes, worth several hun¬ dred times as much as a carload of brick, could afford to pay a cent a pound or $20 a ton more without any danger of driving away the traffic, whereas the brick would not be shipped at all if it was assessed a rate of $20 a ton, being more than its intrinsic value. So the railroads stiffened the prices on valuable goods and took other articles at cost or less than cost, arguing that as they had to run trains both ways, they might be hauling empties if they did not accept cheap <(fillers.)) They were fur¬ ther urged on by the continual threat of com¬ petition by canal, river or coast vessels. The railway interests thought it good policy to keep these out of existence, because water transportation is cheaper than railway, although slower. So they underbid for freight on stone, brick, lumber, coal, grain, etc., to hold the trade and keep down canal and river competition, believing that if these got a good start they would make a bid for the higher class freight that could pay a profitable price. Under such conditions the railways of America have built up a freight traffic that far excels the passen¬ ger and express traffic. There are more than 40 times as many freight cars in use on Amer¬ ican railways as there are passenger, mail and express cars combined.

Freight rates, originally based on market conditions, next had to meet competitive con¬ ditions, to points where other railways led, or where there was water communication. For many years the railways

competed for freight, and cut-rate wars between the roads were com¬ mon in the last century. Then it developed that very large shippers who could dictate to railways demanded and secured rebates, thus getting an advantage over small competitors; also that certain cities had been discriminated against, and that the railways actually carried freight to some centres, say 500 miles for less than they charged intervening cities at a dis¬ tance of 300 or 400 miles. Under such condi¬ tions freight rates had become so much mixed and complicated as to be unintelligible to the mass of people, seemingly senseless, and often grossly unfair to those who considered the charges from the basis of equity. Complaints were so numerous and so well founded that the Interstate Commerce Commission (q.v.) was established to secure equitable rates and rul¬ ings, and the famous regulation was established that a railway must not charge more for a short haul than for a long haul.

Conditions tended toward centralization of and consolidation of railway interests, and for years promoters and capitalists were kept busy consolidating competing lines of railway until the present great trunk lines were established, and 88 railway systems virtually control the transportation of the country, while 13 of them, an annual freight business of from $50000,000 to $150,000,000, control more than half the lines and dominate the situation. Com¬ petition has given way to consultation, and through interlocking directorates the great rail-

way systems move largely in unison, with com¬ mon interests, the protection of the shipping public lying in the dictation of the Interstate Commerce Commission.

The average haul for freight in the United States is about 140 miles, and it follows that much of the freight has to be transferred to some other railway system, and sometimes to several systems before reaching its destination. Where shipments are large, shippers hire entire cars, and the goods are loaded and go in that car to the destination, no matter how many lines it travels over. The railways charge each other for the use of such cars when detained under certain conditions. The smaller freight is subject to transfer and handling when going to other systems.

Freight Handling. — Shipments of freight may be divided into four classes: (1) Bulk articles, which subdivide into (a) free-flowing

articles, as oil, grain, sand, coal, ore and broken stone, that can be run through a chute or pipe, or handled by dumping; and (b) articles re¬ quiring mechanical handling, as coke, brick, pig iron, lumber, steel beams, etc. (2) Live stock, requiring special cars, food and attendance. (3) Package freight, including boxes, barrels, crates, wrapped goods and machinery. (4) Perishable freight, as meats, vegetables, fruit, etc., much of which requires refrigeration. These classes of freight require for economical handling different methods and different cars for transportation. For handling grain, the elevator, with spout delivering right into the cars or vessel, has been highly developed. For oil transportation by rail the tank-car was de¬ vised and proves both safe and cheap. For sand, coal, ore, etc., the gondola and various types of dump-cars have been developed, han¬ dling this class of freight by the simple process of having it slid on by gravity and dumped out by the same force.

At terminals or points where railway and water traffic meet, a variety of freight-handling machinery is always to be found, suited to the local conditions. Great steel bridges, for con¬ veying overhead cars and lifting heavy freight bodily back and forth between the cars on the railway tracks and the vessels at the docks, are common. In many of them a man rides with the car and conducts its operations. Others are operated on the principle of cableways, and still others are essentially cranes or gantries. The Hulett unloaders have achieved great popu¬ larity at terminals on the Great Lakes. The old method of handling a lot of freight between car and vessel by crews of men with wheel¬ barrows is abandoned wherever possible. Ma¬ chinery has caused a vast reduction in freight¬ handling costs. Figuring roughly, it used to cost $2 to $3 a ton to shift a miscellaneous cargo ; now it is usually accomplished at a cost of less than 25 cents a ton. A record of costs at a large freight terminal, where all sorts of freight are continually transferred from cars to steamships and from ships to cars, showed these figures : Hand trucking 200 feet, 8 cents a ton ; loading on box cars, 12 cents a ton ; un¬ loading from box cars, 11 cents a ton; loading off-shore ships with package freight, 23 cents a ton; unloading or discharging same, 20 cents a ton. In a modern terminal the vessels run into slips alongside great piers that parallel the en¬

tire length, giving close access to every hatch¬ way. There are cranes on the ship and on the pier for hoisting and shifting the cargo. On the piers are lines of bins for separating the freight or for brief storage, while nearby are large storage warehouses for freight that has to wait. Every up-to-date mechanism that makes for easy transshipment is at hand. Portable con¬ veyors are supplied for running bags and pack¬ ages aboard or off board with a minimum of handling. Electric trucks

are becoming as com¬ mon as hand trucks. The heaviest articles are handled with ease, large machines being shipped all put together in one crate. Every sort of mechanical assistance for freight handling seems to have been thought of and provided, just as in a modern factory.

Statistics. — There are 2,400,000 freight cars employed on United States railways, double the number in 1894, and of three times the total capacity; in other words the cars are one-half larger than they used to be. The average haul of a consignment of freight is 140 miles — less in the Eastern but more in the Western States. The annual mileage of these freight cars is 20,000,000,000, or the equivalent of more than a hundred round trips to the sun, or 40,000 tours around the earth. The ton mileage, that is the number of tons carried one mile, is 264,000,- 000,000, or the equivalent of 1,400 trips to the sun and back. The average receipts per ton- mile are three-fourths of a cent. A horse will draw a ton a mile in 15 minutes, at a cost of 50 cents for hauling and another 50 cents for loading and unloading; a man can carry a ton in 50-pound parcels a mile in 20 working hours, or two and a half days, yet the railway handles this freight for three-fourths of a cent. As the railway's average haul is about 140 miles, it is apparent that its average charge for a ton of freight is $1. Valuable freight, however, commands much higher figures.

The Interstate Commerce Commission re¬ ports the freight movement for the year ending 30 June 1914, in tons, as : Products of agri¬ culture, 98,825,133; animal products, 26,352,289; products of mines, 574,000,013 ; forest products, 91,093,595; manufacturing products, 142,015,332; merchandise, 40,239,497; miscellaneous freight, 35,934,471 ; total of United States freight move¬ ment in one year, 1,008,460,330 tons. More than half this total is mine products and more than a fourth is soft coal; bituminous and an¬ thracite coal and coke constitute 38 per cent of the total; ores, 9 per cent; stone, sand, etc., 8.5 per cent ; lumber, 6.2 per cent ; grain, 4.5 per cent ; and cement, brick and lime together, 3.8 per cent. No other class of freight is over 2 per cent of the total.

The last census reports the railways as spending $95,000,000 annually for new cars and $437,000,000 for repairing cars. At least 95 per cent of this must be for freight cars, and the great excess of the repair item is evidence that very many cars are rebuilt so much that they might better be classed as new, and that from this point of view it requires about 200,000 new freight cars annually to handle the freight — 100,000 to replace those that wear out and 100,000 to take care of increased freight move¬ ment. Since the railway mileage of the United

States is about 35 per cent of the entire world mileage, it is reasonable to infer that the above

statistics represent about a third of the world's freight movement by rail.

Ocean Freight. — This was originally carried by sailing vessels, and while such transporta¬ tion is very cheap, it has given way to steam navigation, nearly all the carrying trade being in the hands of regular lines plying between the important ports of the world. The tonnage going out of New York, which is now the world's greatest port, is about 15,000,000 tons annually. In time of peace London and Ham¬ burg each clear about 14,000,000 tons, Liverpool 12,000,000 each, Hongkong 11 – 000,000, Shanghai 9,000,000, Rio Jamero 8,500,000, and Marseilles, Singapore, Colombo and Cardiff each 7,000,000 to 8,000,000 tons. The steam¬ ship lines follow the same practice as the rail¬ ways in making rates, putting the price on the valuable freight, and carrying bulk cargo, which is sometimes needed as ballast, at low rates. There are a considerable number of coasters that do a freight business all along the Atlantic seaboard and handle cargoes at rates much less than the railways charge, but railway interests have sought to discourage such traffic by re¬ fusing such vessels terminal facilities at the docks. There seems to be an economic loss here, for it is well known that a schooner with a gasoline engine can tow a half dozen large barges between ports on the coast and make money at rates away below what the railways charge ; but there is risk in the business and occasionally a string of barges is wrecked by a sudden storm.

The total ocean freight of the world is ap¬ proximated by the commerce reports. The imports of 31 leading countries in 1912, the best year for comparison, were of $19,000,000,000 value, and the cost of transportation was about $350,000,000. The tonnage is believed to be about 1,000,000,000, of which about 20 per cent now originates in the _ United States. It thus appears that America is far ahead of all other countries in freight movement, the internal movement here by rail being equal to the entire water movement of the world, and one-fifth of the^ ocean freight being American though little of it is carried under the American flag.

Charles H. Cochrane, Author of (Modern Industrial Progress d

FREILIGRATH, fri'lig-rat, Ferdinand,

German poet: b. Detmold. 17 Tune 1810; d. Cannstadt, Wurttemberg, 17 March 1876. His father was a teacher. Though apprenticed to a grocer at 15, he continuedˆ his studies and published verses in local journals. In 1831-36 he was a banker's clerk in Amsterdam. In 1836-38 he published a literary journal Rhein- isches Ode on, became a bookkeper at Berman, but continued writing lyrics, one volume of which he published at Mainz in 1838, and as it proved successful he determined to devote him¬ self entirely to literature. In 1842 he received a small pension from the King of Prussia; but this he retained for only two years, for having embraced views in politics of an advanced liberal stamp which placed him in opposition to the government, he felt bound to resign the benefits of royal favor. At the same time (1844) he published a poem entitled a Confes¬ sion of Faith > (Glaubensbekenntnis), in which he became the champion of the political creed he. had adopted. In 1848 three other political

poems by him: (Die Revolution*; (Februark- lange' ; and (Die Todten an die Lebenden,* saw the light; and the last of these led to his being put on trial for treason. This trial, in which he was acquitted, is memorable for an¬ other reason, being the first jury trial ever held in Prussia. From 1851 till 1867 Freiligrath resided in England as manager of the London branch of a Swiss banking establishment. On the failure of the bank a national subscription was got up in his behalf in Germany, and the proceeds of it enabled him to return to private life. The general amnesty of 1868 brought him back to Germany and he celebrated the triumph of 1870 with the very popular (Hurrah Ger- mania) and (Die Trompete von Vionville.* The early poems of Freiligrath are distinguished by a wealth of glowing and highly-colored im- agery, and by the prevalence of Oriental scenes and subjects. His political poems are too full of the tones of party warfare to live as poetry; but many of his lyrics seem destined to hold an abiding place in German literature. Germany is also indebted to him for many admirable translations from foreign languages, as from Burns, Tannahill, Moore, Hemans, Shake¬ speare, Longfellow and Victor Hugo. His works were collected in eight volumes and pub¬ lished at Stuttgart (1870-71). There is a volume of English translations of his select poems edited by his daughter, Mrs. Kroeker (Leipzig 1871). Consult Buchner, (ib. 1899).

FREIRE, fra're, Ramon, Chilean general: b. Santiago, 29 Nov. 1787; d. there, 9 Dec. 1851. He was a grandson of Freire de Andrada (q.v.). He fought in the patriot army in the war for independence (1811-20), and defeated Benevides at Concepcion, 27 Nov. 1820. He became the

leader of the Liberals, and upon the deposition of O'Higgins in 1823, supreme director, with dictatorial powers. In 1826 he ended Spanish rule in Chile by expelling the remaining Spanish forces from Chiloe. He was re-elected supreme director in 1827, but resigned not long after. The Conservatives having gained control, he led an insurrection against them, was defeated at Lircai (1830) and banished to Peru. In 1836, he attempted to invade Chile with two ships, but had to sur¬ render, was again exiled to Peru and was not permitted to return until 1842. After his death a bronze statue was erected to his memory by public subscription in Santiago de Chile. Consult Elliot, G. F. S., (Chile* (Lon¬ don 1907) ; Mehegan, J. J., < O'Higgins of Chile, etc. > (London 1913) ; Torrente, M., (Historia de la revolucion de Chile, 1810-28* (in Col- l e cion de kistoriadores i de documentos rela- tivos a la Independencia de Chile. Vol. Ill Santiago de Chile 1900).

FREIRE DE ANDRADA, fra're da an- dra'da, Gomes, Portuguese colonial administra¬ tor : b. Coimbra 1684; d. Rio de Janeiro, 3 Jan. 1763. He served in the Portuguese army, and became governorˆ and captain-general of Rio de Janeiro in 1733, his authority extending over most of southern Brazil. His adminis¬ tration of almost 30 years was the most suc¬ cessful and prosperous, as well as the longest,

in the colonial annals of Brazil. The gold mines were effectively worked, and colonization was greatly furthered. The war over the boundaries of Brazil and Paraguay was fought during his administration (1754-56). Freire de Andrada was made Count of Bobadilla in 1758. His exploits form the subject of the epic poem entitled (picos Brasileiros) or (0 Ura- guay) (1811), by Jose Basilio da Gama.

freischUtz, fri'shuts, (in German ((free shooter®) a legendary marksman who makes a covenant with the devil that six balls from his gun shall follow his own will, while the seventh is directed bv the devil. The idea was universal about the 1 5th century, and may be found in the literature of the time and even later. Con¬ sult Apel,

FREISCHUTZ, Der, romantic opera in three acts by Carl Maria von Weber (libretto by Friedrich Kind) first produced at Berlin, 18 June 1821. Founded upon a popular fairy story, the plot has an. atmosphere of mediaeval romanticism heightened many degrees by its musical investiture. Max, a skilful marksman, is betrothed to Agatha, daughter

of the head ranger of the Prince of Bohemia. Caspar, who has sold himself to the demon Zamiel, is also in love with Agatha and plots to ruin Max and deliver him over to the Evil One in sub¬ stitution for himself. He persuades Max to accept his aid to procure magic bullets to win him success in the coming trial upon which his future rests. At the Wolf's Glen, Max joins Caspar and receives from Zamiel seven silver bullets, six for himself and one to be at the demon's disposal. On the eventful day, Max fires his six successful shots. At the Prince's command, he fires the seventh, Zamiel's bullet, at a passing dove. It appears to him as Agatha ; but . her bridal wreath protects her and Zamiel directs the bullet to Caspar's heart. No opera has a history of greater popular suc¬ cess and none is nearer to the German heart than (Der Frieschiitz) with its folk-spirit and thoroughly national emotional expression. It was the foundation stone of a new school of opera that has vitally influenced the trend of the art even to the present day. The sug¬ gestive and descriptive power of the music, the intimate connection between the orchestra and the stage, the rich hues of the instrumental color and the telling and novel orchestral effects, notably in the melodramatic scene of the casting of the magic bullets, form a land¬ mark in the history of the development of music. Wagner's debt to Weber, readily ac¬ knowledged by him, was immense. Berlioz, too, learned much from his use of the orchestral instruments. The opera is full of ingratiating melody of a popular nature, much of it pure folk-music (for example, the "Peasants' March® and the "Waltz® in the first act) and all of it expressive of what has come to be known as German romanticism in music. The overture is a model of orchestral scoring, rich, effective and spontaneous. Agatha's great scene and aria "Wie nahte mir der Schlummer® is the musical high-water mark of the opera and in its great variety of moods and rhythms, closely welded, is a clear presage of the continuous music of a later day. The chorus of bridesmaids and the huntsman's

chorus in the third act are sung at least wherever German is spoken ; and there are many other numbers scarcely less close to the hearts of the people.

Lewis M. Isaacs.

FREISING, Otho of. See Otho of Frei¬ sing.

FREISING, fri'zing, Bavaria, town 22 miles northeast of Munich, on the Isar. It contains a cathedral, dating from the 12th century, and a former episcopal palace now transformed into a seminary. There are also a gymnasium, a preparatory school and teacher's training school, and a number of orphanages, homes and other benevolent institutions.

Agricultural machinery, stained glass and pottery are the chief articles here manufactured. Freising is of Roman origin and from 724 was the see of a bishop. In 1803 the see was merged with that of Munich. Pop. 14,946.

FREJES, fra'hes, Francisco, Mexican his¬ torian: b. Guadalajara, Mexico; d. 1845. He was trained for priestly and monastic life, be¬ came known as a Franciscan of remarkable eloquence, but retired from publicity in 1838, and eventually became superior of the mon¬ astery of Guadaloupe, near Zacatecas, Mexico. His object in his retirement was the prosecution of historical study, and his works, especially the 'Historia Breve de la Conquista de los Estados Independientes del Imperio Mejicana,* have both value and interest.

FREJUS, fre-zhii', France, town in the de¬ partment of Var, 15 miles southeast of Draguig- nan. It was founded by Roman colonists from Massilia (Marseilles), and was again colonized by Julius Caesar, after whom it was named Forum Julii. Its Roman remains are interest¬ ing; there is a pharos, a circus, a viaduct and walls. In the time of Augustus the harbor be¬ came the principal naval station in Gaul, but is now entirely silted up. It was the birth¬ place of Agricola, Roscius and Gallus, and at a later day of l'Abbe Sieyes. Pop. 4,022.

FREKI. See Geri and Freki.

FRELINGHUYSEN, fre'lmg-hi-zen, Fred¬ erick, American lawyer: b. Somerset County, N. J, 13 April 1753; d. 13 April 1804. He was graduated at the College of New Jersey (now Princeton) in 1770; studied law, and was ad¬ mitted to the bar in 1773. Two years later he was chosen a member of the Provincial Con¬ gress of New Jersey. He was a member of the Continental Congress much of the time dur¬ ing the Revolutionary War; served as a captain in the army; participated in the battle of Tren¬ ton, in 1777 he became colonel of the New York militia and took part in all the military opera¬ tions of Washington's army in that year and in the battle of Monmouth in 1778. From 1783 to 1793 he practised his profession, and attained reat eminence; in 1793 he became United tates senator serving until 1796. . He led an expedition against the Western Indians in 1790.

FRELINGHUYSEN, Frederick Theodore,

American statesman : b. Millstone, N. J., 4 Aug. 1817; d. Newark, N. J., 20 May 1885. He was a nephew and adopted son of T. Frelinghuysen (q.v.). He was graduated at Rutgers College in 1836, and studied law in the office of his

uncle and adopted father and succeeded to the latter's large practice in 1839. He was city attorney for Newark in 1849, and was widely known as counsel of many large corporations, among them the Central Railroad of New Jer¬ sey and the Morris and Essex Canal Company. He was one of the founders of the Republican party in New Jersey. He became attorney- general of New Jersey in 1861, serving until 1866, when he was appointed United States senator. He remained in the Senate till 1869, and was regarded as an able debater. In 1870 he was appointed Minister to Germany, but de¬ clined the appointment. He returned to the Senate in 1871. He was a member of the Elec¬ toral Commission of 1876-77. He succeeded James G. Blaine as Secretary of State under President Arthur in 1881. He was president of the American Bible Society and a trustee of Rutgers College.

FRELINGHUYSEN, Theodore, Amer¬ ican lawyer : b. Millstone, N. J., 28 March 1787 ; d. New Brunswick, N. J., 12 April 1862. He was a son of F. Frelinghuysen (q.v.). He was graduated at the College of New Jersey (now Princeton) in 1804; and admitted to the bar in 1808. In the War of 1812 he commanded a company of volunteers, and in 1817 became at¬ torney-general of New Jersey, which office he held till 1829 when elected United States Sena¬ tor. In the Senate he was prominent on the Whig side, and was active in the discussions relating to the rechartering of the United States Bank and the withdrawing of the government deposits therefrom, and relating to the tariff. He failed of re-election in 1835 and resumed his practice at Newark, of which city he was mayor in 1837-38. He was chosen chancellor of the University of New York in 1838; was nominated for Vice-President of the United States in 1844 on the ticket with Henry Clay; and in 1850 became president of Rutgers Col¬ lege where he remained until his death.

FREMANTLE, William Henry, English clergyman : b. Swansboro, Buckinghamshire, 12 Dec. 1831 ; d. 24 Dec. 1916; graduated at Balliol College Oxford, 1853; Fellow of All Souls, Oxford, 1854-63; Fellow and tutor of Balliol College, 1888-94; curate of Middle Claydon, 1855-57 ; vicar of Lawknor, Oxfordshire, 1857— 65; rector of Saint Mary's, Bryanston Square, London, 1865-83 ; canon of Canterbury, 1882-95. Since then dean of Ripon. He has occupied prominent lectureships and a chaplaincy. He was the author of fully a dozen volumes and editor and translator of the work of others. His most important works are

FREMANTLE, Australia, the chief sea¬ port of Western Australia, at the mouth of the Swan River, 12 miles from Perth. The manu¬ factures include aerated waters, boots, soap, furniture, confectionery, etc. In 1914-15 the vessels entering the port of Fremantle showed aggregate tonnage surpassed only, among Aus¬ tralian ports, by that of Sydney, Melbourne, Brisbane and Adelaide, its total being 1,659,-697 tons. Pop. of town and suburbs about

22,200.

FREMIET, fra'mi-a, Emmanuel, French sculptor: b. Paris, 1824; d. 1910. His early artistic education was received from his uncle Rude. He became lithographer in the Museum of Natural History and official painter of the Morgue. His (Gazelle' brought him consid¬ erable fame in 1843 and he was awarded medals for his animal groups (The Mother Cat' and (A Hunting Dog.' (The Wounded Hound' (1850) created a furore, and is now in the Luxembourg. In 1855 he was commissioned by the emperor to model a series of military statuettes; many of these are now in the Fre- miet Barbedienne collection. He was appointed professor of drawing and modeling at the Jardin des Plantes in 1875, and in 1887 received the medal of honor for the celebrated (Gorilla Carrying off a Woman', which had been re¬ jected at the Salon in 1859. Among other nota¬ ble groups and statues by him are the (Jeanne d'Arc' in the Place des Pyramides, Paris; with copies at Nancy and in Fairmount Park, Philadelphia; (The Faun' in the Luxembourg; his statues of Napoleon I at Grenoble, the Duke of Orleans at Pierrefonds, the Prince de Conde, the elephant of the Trocadero Foun¬ tain, Paris; statues of De Lesseps at Suez, of Colonel Howard in Baltimore. He was awarded the Grand Prix at the Paris Exposition of 1900. At the Saint Louis Exposition of 1904 he ex¬ hibited a statue of Saint George, the (Gorilla of Gabun,' and (Race Horses.) He was a grand officer of the Legion of Honor, a mem¬ ber of many art societies and of the Institut de France.

FREMONT, Jessie Benton, American au¬ thor: b. near Lexington, Va., 31 May 1824; d. Los Angeles, Cal., 27 Dec. 1902. She was a daughter of Thomas H. Benton (q.v.), and married John C. Fremont (q.v.) in 1841. She published (Story of the Guard: a Chronicle of the War,' with a German translation (Boston 1863) ; (A Year of American TraveP (New York 1878) ; (Far West Sketches) (Boston 1890) ; a sketch of her father prefixed to her husband's memoirs (Chicago 1886) ; < Souvenirs of My Time' (Boston 1887) ; (The Will and the Way Stories' (Boston 1890). Consult Fre¬ mont, J. C., (Memoirs of My Life' (Chicago 1886) ; Peacock, V. T., (Famous American

Belles of the 19th Century' (Philadelphia 1901).

FREMONT, John Charles, American ex¬ plorer and soldier: b. Savannah, Ga., 31 Jan. 1813; d. New York, 13 July 1890. His father was a Frenchman and his mother came of the distinguished Virginia family of the Whitings. He attended Charleston College, but was ex¬ pelled from there for insubordination before completing his course.. In 1833 he was appointed teacher of mathematics on board the United States sloop of war Natchez, with which he proceeded on a cruise to South America. On his return he gave his attention to civil engineer¬ ing and in 1836 was one of a company sent out to survey , a railway route. He was still engaged in railway surveying in 1837, and at the end of that year was engaged in the survey of the Cherokee lands in Georgia, North Caro¬ ling and 1 ennessee. In 1838-39 he undertook the exploration of the country between the Mis¬ souri River and the British frontier in the present States of Iowa, Minnesota, the Dakotas and Nebraska, In 1838 he became a second

lieutenant in the United States Topographical Corps. In 1841, in Washington, he eloped with Jessie Benton, daughter of Senator Benton. About this time Fremont proposed to the gov¬ ernment to undertake the exploration of the Rocky Mountains — at that day a terra incognita. His plan being approved through the influence of his father-in-law, Senator Benton, he, in 1842, started with a handful of picked men on the first of a series of explorations of what is now the western part of continental United States. Great Britain at that time laid claim to Oregon, and the Southwest was under the domain of Mexico. Fremont reached and explored the South Pas? Not only did he fix the locality of that great defile, but he defined the astron¬ omy, geography, botany, geology and meteorology of that region, described the route since fol¬ lowed, and designated the- points upon which a line of United States forts were subsequently erected. He proceeded on a second expedition in 1843 intending to extend his previous work to the westward and join it with the survey done on the Pacific Coast by Captain Wilkes, of the United States navy. He had just reached Westport (Kansas City), from Saint Louis, when an order commanding his return reached the latter city. The assigned reason for the order was that he was taking with him a 12- pounder howitzer without authority. His wife received the order and, instead of forwarding it, sent him a message telling him to get away to the wilds as soon as possible and ask no ques¬ tions. This time he reached South Pass by

another route and from there journeyed to Great Salt Lake, reaching the island now known by his name. He pushed investigations right and left of his entire course, went up the Snake River and journeyed along the Columbia, finally reaching Fort Vancouver where he connected his survey with that of Wilkes' exploring expe¬ dition. Later in the winter, without adequate supplies, or a guide, he traversed the wilder¬ ness to the Rocky Mountains. In this daring expedition he crossed 3,500 miles of country in sight of eternal snows, discovering the grand features of Alta California, its great basin, the Sierra Nevada, the valleys of San Joaquin and Sacramento and determined the geographical position of the west portion of the North Amer¬ ican continent. He came east via Utah Lake, the Uinta River and Brown's Park, reached the North Platte, turned south through Colo¬ rado, reached the Arkansas River, which he followed eastward, and arrived in Saint Louis, 6 Aug. 1844. His report created a sensation and 10,000 copies were printed and distributed by Congress and many thousands of copies were issued and sold by private publishers. He was made captain in 1844. His third expedition was quickly organized in 1845 and directed to Cali¬ fornia in the acquisition of which by the United States it played a prominent part. On this trip he had a force of 60 expert marksmen ; he pro¬ ceeded from Bent's Fort along the Arkansas, the Grand and the Uinta to the Wasatch Moun¬ tains, across these to Utah and Salt Lake, thence down to the Sierra Nevada, crossed by the Donner Pass, to Sutter's Fort. The Mexican War was now looming up ; Fremont had secured permission of the Mexican officials at Monterey to explore California and New Mexico. This permission was withdrawn within a short time and he was ordered to leave Mexican territory.

This order, however, he did not obey but, on 5 March 1846, fortified himself on Gavilan Peak, thus opening the first phase of the war in California. Without being attacked he retreated toward Oregon. In May while on this journey through Lieutenant Gillespie he received special instructions from Washington and returned at once to the Sacramento Valley country. Fre¬ mont here found the American settlers in open revolt against Mexico. They had proclaimed the (< Republic of California® at Sonoma, and had adopted a white flag with one red stripe at bottom and bearing a star and bear for em¬ blems, hence this is often called <(the Bear Flag Revolt.® Fremont took command, and this move created an American military occupation. The naval forces under Stockton and Sloat now entered the fray, raising the flag at Monterey. The United States flag was raised soon after in San Francisco, Sutter's Fort and Sonoma. Stockton made Fremont major of the land forces.

General Kearny arrived soon after the cap¬ ture of Los Angeles, and co-operated with Fre¬ mont and Stockton. Fremont sided with Stockton in the latter's differences with Kearny on the question of senior authority. At this time Fremont was commissioned lieutenant-colonel and soon after was promoted by Stockton mili¬ tary commandant and civil governor of the Territory of California, and in this capacity in 1847 concluded the articles of capitulation by which Mexico ceded exclusive possession of that territory to the United States. In the autumn of 1847 Fremont was tried by court- martial in Washington on several charges aris¬ ing out of the conflict of authority between him and General Kearny. Fremont was found guilty and sentenced to dismissal from the service. President Polk did not confirm all the charges, and remitted the sentence. Smarting under a sense of having been greatly wronged, Fremont quit the service on 15 March 1848. Later in this same year he organized another expedition to survey a railway route to the Pacific. After enduring terrible hardships and losing 11 of his party he finally arrived in California. He had purchased a large tract of land in 1847 and gold having been discovered on his tract, on his return to California proceeded to develop it. Considerable litigation followed over the title and Fremont finally lost the lands altogether. In 1850 he was one of the first senators sent from California to Washington. In 1853 he undertook his last expedition across the continent, made new discoveries and after many hardships reached California. In 1856 he was the first candidate of the new Republican party for the presidency.

His opposition to slavery cost him the votes of the South and he received but 114 electoral votes while Buchanan received 174. On the outbreak of the Civil War in 1861, Fremont was appointed a major-general of volunteers. He then, as commander of the Western Federal Army, marched into Missouri seeking an en¬ counter with General Price's Confederate force. An unfortunate dispute with a subordinate offi¬ cer caused the War Department to relieve him of his command. A few months later he was placed in charge of the Mountain Department of Virginia, Tennessee and Kentucky. His divi¬ sion was finally consolidated under Pope, wffio was Fremont's junior, and the latter declined

to serve under him and resigned in 1864. He became involved in the railroad building boom of the late 60's and early 70's and met financial disaster in the panic of 1873. He was governor of Arizona in

1878-81, and in 1890 by act of Congress was made a major-general and placed on the retired list. In July of the same year he died in New York of ptomaine poisoning. In 1906 the Slate of New York erected a monu¬ ment at his grave in Rockland Cemetery, Pier- mont, N. Y. He wrote (Report of the Explor¬ ing Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in 1843-445 (Washington 1845) ; (Memoirs of My Life) (Chicago 1887) ; (Souvenirs of My Time5 (Boston 1887) ; (A Year of American Travel5 (New York 1878) ; (The Story of the Guard) (1863). Consult Bigelow, John, (Memoir of the Life and Public Services of John Charles Fremont5 (New York 1856) ; Carvalho, S. N., Hncidents of Travel and Ad¬ venture in the Far West with Colonel Fremont's Last Expedition (ib. 1857) ; Curtis, (The Re¬ publican Party5 (ib. 1904) ; Dellenbaugh, F. S., (Fremont and '49) (New York 1914) ; Fremont, E. B., (Recollections) (ib. 1912) ; Richman, I, B., California under Spain and Mexico) (ib. 1911) ; Royce, (California } (Boston 1888) ; Up- ham, (Life of Fremont5 (Boston 1856).

FREMONT, Neb., a city and county-seat of Dodge County, in the central eastern part of the State, on the Chicago and Northwestern, the Union Pacific and the Chicago, Burlington and Quincy railroads, 37 miles northwest of Omaha. The town was settled in 1857 and was incorporated in 1871 ; it has a telephone system, gas works and a municipal water supply and electric-lighting plant. It is an important market for horses, cattle, sheep and swine and has pork-packing establishments, flouring mills, planing mills, machine shops, etc. The edu¬ cational institutions include a normal school and a business college. There is a Carnegie library; noteworthy also are the courthouse, Lutheran Orphan's Home and high school buildings. Pop. 9,345.

FREMONT, Ohio, city and county-seat of Sandusky County, on the Sandusky River, at the head of navigation, 30 miles southeast of Toledo. In a productive farming, oil and nat¬ ural gas region, its transit facilities include the Lake Erie and Western, the Lake Shore and Michigan Southern, the Wheeling and Lake Erie railroads, and the Fremont and Fostoria and the Lake Shore electric routes. It is a busy manufacturing centre with extensive water power and produces boilers, engines, cutlery, farming implements, stoves, ranges, electro¬ carbons, flour, beet sugar, paper, underwear, furniture, etc. The United States census of manufactures for 1914 showed within the city limits 65 industrial establishments of factory grade, employing 2,402 persons, 2,065 being wage earners receiving annually a total of $1,097,000 in wages. The capital invested aggre¬ gated $4,086,000 and the year's output was valued at $4,780,000: of this, $2,484,000 was the value added by manufacture. The prin¬ cipal civic features are the State Historical building, the Birchland public library (1873) and parks, chiefly gifts of Sardis Birchard, uncle of ex-President Hayes, the Hayes Memo¬ rial Hospital, Y. M. C. A. building, the armory,

technical school, the Hayes Memorial Library and Museum in Spiegel Grove State Park, pre¬ sented to the Ohio Archaeological and Histori¬ cal Society by Col. Webb C. Hayes; the Sol¬ diers' monument, the tomb of Major Croghan in Fort Stephenson Park and the monument on Cemetery Knoll over the graves of President and Mrs. Rutherford B. Hayes. The site of a former Indian village and of a trading post from 1785, Fort Stevenson was built here early in 1812 and was the scene of Maj. George Croghan's defeat of the English and Indian forces 2 Aug. 1813. Known as Lower San¬ dusky until 1849, the name was then changed in honor of J. C. Fremont; it received a city charter in 1867. Pop. 12,000.

FREMONT PEAK, Wyo., mountain in the granite centre of Wind River Mountains in the west central part of the State, with an elevation of 13,730 feet above sea-level. It was named from General Fremont and was supposed to be the highest peak in the State until Gannett Peak, six miles north-northwest, was found to be 55 feet higher and the re¬ measurement of Grand Teton gave 13,747 feet for that summit in Teton Range. There is another Fremont Peak in San Benito County, Cal.

FREMSTAD, Olive, American operatic soprano : b. Stockholm, Sweden. At the age of 10 she came with her parents to America and settled in Minneapolis. She taught music in Minneapolis, Duluth, Chicago and New York and went to Germany in 1892 where she studied under Lilli Lehmann. In 1898 she made her debut as Azucena in (I1 Trovatore5 at the Cologne Opera House. She was subsequently engaged at the Royal Opera House, Munich; sang two seasons at Covent Garden, London; and in 1903 was engaged for the Metropolitan Opera Company of New York. Her success was immediate and overwhelming. She sings in all the principal Wagnerian roles and also many in French and Italian. She created the part of Salome in Strauss' opera both in New York and Paris. Her best-known roles are Isolde in (Tristan and Isolde5 ; Briinnhilde in (The Ring5 ; Kundry in (Parsifal5 ; Venus, Tosca, Armide and Salome. She also ranks as one of the world's greatest lieder singers. She has received two decorations from the French government in appreciation of her remarkable achievements.

FREMYOT, frem'yo-, J. F., Baroness de.

See Chantal.

FRENCH, Alice, American novelist, better known as Octave Thanet: b. Andover, Mass., 19 March 1850. In. 1878 she began writing on economics and sociology and similar themes but in a. short time. chose the short story as her special literary vehicle. Her residence in Iowa and Arkansas gave her practically a new field of experience of which she availed herself to the utmost. Her principal works are (The Bishop's Vagabond5 (1884) ;

She also edited (The Best Letters of Mary Wortley Montague.5

FRENCH— FRENCH ALLIANCE

01

FRENCH, Anne Warner. See Warner.

FRENCH, Daniel Chester, sculptor: b. Exeter, N. H., 20 April 1850. He was the son of the Hon. Henry Flagg French, judge and ex-assistant Secretary of the United States Treasury, who in 1867 moved to Concord, Mass., whence his son attended the Massachusetts In¬ stitute of Technology and Dr. Rummer's lec¬ tures on anatomy in Boston and received some slight tuition in sculpture from John Q. A. Ward. After a year spent in Florence, Italy, with Thomas Ball, he completed a commission from the town of Concord for the well-known statue of (The Minute Man,* which was un¬ veiled on the centenary of the battle of Con¬ cord, 19 April 1875. From 1876-78 his studio was located in Washington; from 1878-87 in Boston and Concord and after 1887 in New York. His principal works besides (The Minute Man> of Concord are statues of General Cass, Rufus Choate, John Harvard and Thomas Starr King; (Dr. Gallaudet and His First Deaf Mute Pupil) ; Statue of the Republic; and the Milmore Memorial. Also (Bust of Phillips Brooks, > Trinity Church, Boston; (Gen. Wm. F. Bartlett, > Boston; Public Library bronze doors, Boston; (Francis Parkman Memorialˆ Boston; four Custom House groups, New York; statue of Senator Hoar, Worcester; Melvin Memorial and Emerson statue, Concord, Mass. ;

(Alice Freeman Palmer Memorial, } Wellesley; Governor Oglethorpe, > Savannah, Ga. ; Mar¬ shall Field Memorial,* Chicago, Ill.; statue of Lincoln in Lincoln, Neb.; equestrian statue, 'General Draper,) Milford, Mass. ; Longfel¬ low Memorial,* Cambridge, Mass.; (Spencer Trask Memorial,* Saratoga, N. Y. ; in collab¬ oration with E. C. Potter, equestrian statue of Washington in Paris, France, and of Gen¬ eral Grant, Philadelphia, Pa. He received numerous distinctions, being elected a member of the National Academy of Design, of the American Academy of Arts and Letters and of the Accademia di San Luca, Rome, and honor¬ ary president of the National Sculpture So¬ ciety. Consult Caffin, 'American Masters of Sculpture) (New York 1903) ; Taft, (History of American Sculpture) (ib. 1903).

FRENCH, Henry Willard, American jour¬ nalist and author: b. Hartford, Conn., 1854. He is known as a war correspondent and lecturer and among his writings may be mentioned 'Nuna, The Brahmin GirP ; (Desmonde, M.D.* ; 'Art and Artists) ; 'Our Boys in China) ; 'Our Boys in India* ; (Our Boys in Ireland.*

FRENCH, Sir John Denton Pinkstone,

1st viscount, English soldier: b. Ripple, Kent, England, 28 Sept. 1852. He served in the navy 1866-70, entered the army 1874 and fought in the Sudan campaign of 1884 — 85. In the Boer War in South Africa

(1900) he commanded the cavalry division, directed the operations about Colesberg from 10 Nov. 1899 to 31 Jan. 1900, and commanded the cavalry in the move¬ ments that led to the relief of Kimberly in February 1900, and the capture of Bloemfon¬ tein and Pretoria. For his services he was ap¬ pointed to be lieutenant-general. He was made a general in 1907 and field-marshal 1913; was inspector-general of the forces, 1907-11, 1914; and chief of the general staff, 1911-14. As he was one of the signatories to a memorandum

to General Gough giving guarantees that army officers would not be called upon to fight the Ulster Unionists — which memorandum was repudiated by the Asquith government — he re¬ signed in March 1914, but on the outbreak of the European War was appointed to command the British expeditionary forces in Belgium and France. After holding that post for a period of 16 months — during which the retreat from Mons took place, and the battles of the Marne, Ypres and Neuve Chapelle were fought — he resigned, was appointed as commander-in-chief of the forces in the United Kingdom, and for his services created a viscount (December 1915). He became Lord Lieutenant of Ireland in May 1918 and served until April 1921.

FRENCH, Mansfield, American educator : b. Manchester, Vt., 1810: d. 1876. He was edu¬ cated at Kenyon College, Ohio, and from 1845 to 1848 was president of the Female College, Xenia, Ohio. He was active in the founding of Wilberforce University, the first college for the colored race, as he had been one of the found¬ ers of Marietta College. An ardent abolitionist he laid before President Lincoln his plans for the education of the negroes as preliminary to their emancipation. The National Freedman's Relief Association was the realization of his views, as he had stated them at a mass meeting held in Cooper Union, New York, February 1862. He became the agent of this association and did valuable work for the liberated negroes of the South at Port Royal, S. C.

FRENCH, William Henry, American sol¬ dier: b. Baltimore, Md., 13 Jan. 1815; d. there, 20 May 1881. He was graduated from West Point in 1837 and served with distinction in the Seminole and Mexican wars. In 1861 he was commissioned brigadier-general of volunteers. He fought in the battles of Fair Oaks, Gaines' Mills, Peach Orchard, Malvern Hill, Antietam, Fredericksburg and Chancellorsville. In 1862 he became major-general of volunteers, and was mustered out of the volunteer service in 1864 after having for a time commanded the Third Army corps. He commanded the Second Ar¬ tillery 1865-76, first on the Pacific Coast and then at Fort McHenry, Md., and was retired with rank of colonel in 1880. He commanded the forces which

suppressed the Baltimore and Ohio Railroad riots (1877).

FRENCH, William Merchant Richardson,

American art director : b. Exeter, N. H., 1 Oct. 1843; d. Chicago, Ill., 3 June 1914. He was graduated at Harvard in 1864, and for over 10 years devoted himself to civil engineering and landscape gardening. In 1874, having become greatly interested in art, he was much sought after as a lecturer on art subjects and did some writing on art for various periodicals, and in 1877 began his connection with the School and Museum of Art in Chicago, becoming director in 1879 when it was renamed the Art Institute. He helped organize and build up this institution from small beginnings to its present size and prominence, and was connected with it until his death. He was president of the American Association of Museums.

FRENCH ALLIANCE, The, in Amer¬ ican history, an alliance, offensive and de¬ fensive, between France and the American

colonies, signed in 1778. Three American com¬ missioners, Benjamin Franklin, Silas Deane and Arthur Lee, sent to the court of France at Versailles, obtained recognition of the independ¬ ence of the United States, and effected an alliance between the greatest European rival of Great Britain and her revolting colonies in America. The treaty stipulated that should war ensue between France and England it should be made a common cause, that neither France nor America would make peace with¬ out the consent of the other, nor should either lay down its arms until the independence of the colonies should be established. The news of the alliance provoked great enthusiasm in the American colonies. See United States — American Revolution.

FRENCH ARCHITECTURE. Whileln any extended discussion of the architecture of what is France to-day it would be necessary to divide the subject according to the various provinces which were later united under the French monarchy, it seems wiser in so brief an article as this must be to take a more com¬ prehensive survey, referring to provincial dif¬ ferences only when necessary to make clear the more general view. Leaving aside, as not strictly architectural, the rude stone monuments of prehistoric France, especially numerous in Brittany (Carnac, Lochmariaker, etc.), we may best follow the customary division of the sub¬ ject into the six periods called the

Gallo- Roman, Carlovingian, Romanesque, Gothic, Renaissance and Modern periods, each marked by well-defined style characteristics.

I. Gallo-Roman. — With the conquest of Gaul by Caesar (51 b.c.) the Romans began extensive works of public utility. These were especially numerous in Languedoc and Provence, where a large population of Greek colonists had long maintained a high civilization. Here the Romans built roads and bridges (e.g., the Pont du Gard near Nimes and the bridge of Saint Chamas across the Touloubre), theatres and amphitheatres, city gates, baths, temples and triumphal arches, all of cut stone and admirably executed. Nimes is especially rich in Roman monuments, including two gates, an amphi¬ theatre, baths and one of the loveliest and best-preserved of all Roman temples, the so- called Maison Carree (4 a.d.). Arles, with its amphitheatre; Orange, with its superb theatre; Cavaillon and Carpentras, with their triumphal arches; testify to the splendor of this Greco- Gallo-Roman civilization. Further north are other interesting Roman monuments : at Autun two well-preserved city gates, at Lillebonne, fine remains of a theatre; at Rheims, a splendid arch of triumph ; at Paris, remains of the palace and baths of Julian (4th century) and of an amphitheatre (the arenes de Lutece). Tombs and memorial columns at Saint Remy, Cussy, Vienne, etc. ; mosaic floors and foundations of villas, city walls, forts, gates, aqueducts and bridges, are widely scattered through France.

II. Carlovingian.— From the chaos of the Merovingian era which intervened between the Roman and the Carlovingian dominations, al¬ most nothing remains of architectural work. Possibly the crypt of Touarre and the much- restored baptistery of Saint Jean near Poitiers belong to this period. It was Charlemagne who began the restoration of civilization and

art in France during the early part of the 9th century. Little, however, survives of this period in France: the oldest parts of the church of Saint Generoux in Poitou is of this time, but Charlemagne’s greatest works were in the Rhine Valley. The octagonal church at Aix- la-Chapelle is his most important monument ; built by Byzantine artificers in imitation of San Vitale at Ravenna, it has been much altered and restored in later centuries. Whatever else has survived is in fragments incorporated into later structures, as in the crypt of Saint Denis, the church of Saint Martin at Angers, in two churches at Vienne and the lower part of the tower of Saint Germain-des-Pres, Paris. The Norman invasions destroyed much of what was standing before 1000 a.d.

III. Romanesque.— With the establishment of the Normans in

possession of western France (911 a.d.), and the accession of the Capetian dynasty to the French throne (987), there began a new era for France. Out of the social and political chaos were emerging the feudal system, an established monarchy, and the monastic orders (q.v.). It was these or¬ ders that revived architecture, for during the 10th and 11th centuries they were the chief refuge of the arts, and the chief builders of churches, about which they grouped also many other buildings — cloisters, dormitories, refec¬ tories, hospitals, etc., in and upon which they developed the arts of carving, sculpture and painting. Lacking marble and antique columns, but retaining the traditional elements of the basilican church-plan, they were forced to build at first rudely, later with greater elegance, out of coarse stone vaulted churches with mas¬ sive piers, heavy round arches, small windows and thick walls, in which decoration was re¬ duced at first to its lowest terms. This general style, called the Romanesque, varied greatly in detail in different provinces. Thus in south¬ ern France the Roman remains strongly in¬ fluenced the detail and execution of churches usually of moderate size but fine workmanship (Arles, Aix, Cavaillon, Thor, Vaison, etc.) ; in parts of south central France domical churches were built, showing Byzantine influ¬ ence as at Perigueux, Fontevrault, Solignac, Cahors , in Normandy, where development was early and rapid, at first timber roofs, later scientific cross-vaulting appeared, and central towers or lanterns at the crossings (Vignory, Caen, Mont-Saint Michel) ; while in Burgundy and under Cluniac influence another develop¬ ment of vaulted architecture took place as at Vezelay ; and in the Royal Domain and in Auvergne other variations of the general type. Lack of space forbids specifying these provin¬ cial variations; what is common in varying degree to all these “schools” is their solid, mas¬ sive construction, controlled by a clear scientific logic, the absence of applied ornament, the rich¬ ness of the deep portals with their shafted jambs and carving, the increasing use of sym¬ bolic sculpture and grotesques, the use of stepped arches, and in the later 11th and the 12th centuries, the great size of churches like oaint Sernm at Toulouse, Vezelay, the churches

a-Vu jn’ etC-’ an<ˆ tˆie'r increasing loftiness, with ribbed cross-vaults and elementary buttresses.

IV. Gothic. — With the consolidation of the royal authority under Philip Augustus in the

late 12th and Louis IX (Saint Louis) in the 13th century, and with the growth of the power of the bishops as opposed to the pretensions of the abbots, there began an activity in the build¬ ing of cathedrals, — that is, of bishops' churches, — which endowed France with its most splendid monuments in that marvelous style called the Gothic. (See Gothic Architecture). In this style, which was a logical outgrowth from the preceding Romanesque, a rigid structural logic blended with a vivid artistic imagination, cloth¬ ing the structural elements of clustered piers, molded arches, ribbed vaults, flying buttresses, pinnacles and traceried windows, in forms of great decorative beauty, enhanced by figure- sculpture, carved foliage, stained glass and a limited amount of painting, and dignified by imposing dimensions and especially by great loftiness. The vault of Notre Dame, Paris, reaches a height of 108 feet; that of Amiens, 136 feet; that of Beauvais, 142 feet. Towers with or without spires, — in some cases it was planned to have seven — added to the majesty of the noble exteriors. The earliest completely Gothic cathedral was Notre Dame at Paris (1163-1235) ; but the abbey of Saint Denis as first erected (begun 1140), and the cathedrals of Senlis, Noyon, Auxerre and Laon show early and incomplete realizations of the style whose culmination is seen in the cathedrals of Chartres, Rheims and of Amiens, next to which may be named, among others, those of Bourges, Rouen and Tours. These were all practically completed in the 13th century and are all in the northern half of France. During the 14th century building was mostly confined to parish churches, chapels and partial rebuildings of earlier churches, the cathedral of Albi being the only large cathedral of this century. The style became more ornate, less majestic, passing in the 15th century into the highly ornate phase called the ˆFlamboyant® from its flame-like traceries, as in the exquisite churches of Saint Malou at Rouen and of Saint Pierre at Lou- viers and the fagade of Rouen Cathedral. Dur¬ ing this century civil and domestic architecture developed rapidly (Palais de Justice, Rouen; houses of Jacques Coeur at Bourges, of Cluny at Paris) ; and finally expired in a corruscation of brilliant, overwrought beauty in minor works, as the Renaissance came in.

V. Renaissance. — The Renaissance (q.v.) movement had been potent in Italian art for a hundred years before it strongly affected French architecture. Minor works by Italian artists during the closing decades of the 1 5th century had been executed in France, but it was not until the military expeditions of three succes¬ sive kings into Italy — Charles VIII, in 1489, Louis XII in 1499, Francis I between 1515 and 1527 — that the new style began to make its way in France. Italy was at that time far in advance of France in the refinements of civil¬ ized

life and art and Italian arists were im¬ ported as well as Italian works of art by all these three monarchs to domesticate the for¬ eign style on French soil. Here began a long contest between the national French taste and the Italian, and fo 400 years it has con¬ tinued with oscillations between the Latin and the Gallic tendencies in design. Surviving fragments of the chateau de Gaillon (1499, demolished in 1793) and the east wing of the

chateau of Blois built by Louis XIT show a mixture of Gothic with Italian details ; and while in the tremendous building activity , of Francis I and his court in palaces, rural castles along the Loire Valley and churches a large number of Italian artists collaborated with French master-masons, composition and construction long followed Gothic traditions, though the decorative detail approximated Italian models. Thus the church of Saint Eustache (1532) at Paris is purely Gothic in conception but with not a Gothic detail ; shafts, capitals, entablatures, arches all following Italian precedent. Even Fontainebleau, of which part (Cour Ovale) was built under Italian direction (Serlio, Primaticcio), and in more striking degree the chateaux of Chambord, Azay-le-Rideau and Chenonceaux, retain the high roofs, dormers, pinnacles and chimneys of the French feudal chateau, while the superb open staircase-tower of the north wing of Blois is a _ purely Gothic structure with exquisite Renaissance arabesques. The Renaissance forms are a superficial dress, and while under the Bourbon Henrys (II, III and IV) the Ital¬ ian influence increased and architectural forms followed classic precedent more closely (chateaux of Ancy-le-Franc, Anet, Pailly, the Tuileries), and Gothic forms disappeared, the French were slow to abandon their preference for the older French ways. The earliest part of the Louvre (1546-59) by Lescot, did more than any other monument to fix the type of French Renaissance architecture for a long period.

Under Louis XIII and especially XIV, the Latin or classic ideals increasingly prevailed (1610-1710), and externally the great domed churches (Sorbonne, Val-de-Grace, Invalides) and palaces and chateaux like the completed Louvre with its magnificent east colonnade, the enlarged Tuileries and above all the colossal palace of Versailles, displayed a style of great stateliness and classical dignity, being admirably composed, but often frigid in their formal regularity. The picturesquely irregular mass¬ ing of the times of the Henrys and of the earlier part of Louis XIII's reign disappeared entirely. Internally palaces were decorated in a style which, though increasingly capricious, was absolutely French and often displayed great refinement and originality. (See Interior Decoration). But this freedom degenerated into extravagance and a reaction set in during the second

half of the 18th century, culminating under Louis XVI (1784-89), toward greater simplicity and purity within and without. The most notable monuments of this reaction are the colonnaded fagades on the Place de la Concorde, the imposing fagade of the church of Saint Sulpice and the coldly classical but impressive Pantheon, with its fine dome and very Roman exterior. To this period also belong the Grand Theatre at Bordeaux, the Palace of the Legion of Honor (Paris) and the Petit Trianon at Versailles. Under Napoleon this formal classicism developed into the Em¬ pire style and produced such monuments as the Madeleine, the Corps Legislatif (Chamber of Deputies) and the Arch of the Carrousel, all in imitation of Roman types, and the superb Arc de l'Etoile, surpassing in grandeur all Roman arches of triumph but copying none.

VI. Modern. — The 19th century began amid both political and industrial revolutions and architecture sank to a low estate in Europe for a long period. In France, however, it maintained still some artistic life, thanks in part to the ficole des Beaux-Arts, in part to the vitality of the French taste. From 1830 to 1850 it was marked by a sincere effort after Greek refinement without copying of Greek models; the Library of Saint Genevieve, the Column of the Bastille and new wings of the Palais de Justice and Ecole des Beaux-Arts exhibit this tendency, called by some the Neo- Grec. It was less a distinct style than a tend¬ ency which affected architecture beneficially long after its particular forms had been given up. When, under Louis Napoleon (the Second Empire) the completion of the union of the Louvre and Tuileries and the building of a new opera house were undertaken, French architecture rapidly advanced to a high degree of artistic excellence, drawing inspiration largely from the Louvre and the style of Henry II. Especially notable was the revival of French decorative sculpture applied to build¬ ings, while the great international exhibitions of 1867, 1878, 1889 and 1900 and the building of new railway terminals greatly stimulated the development of the artistic use of iron and steel construction for roofing over very wide spans and introduced wholly novel types of architectural design. The eccentricities and the forced affectation of originality of the so- called <(Art Nouveau® or secessionist move¬ ment, though it originated in France, never led to the extravagant monstrosities to which it gave birth in Germany, Austria and Belgium.

Ever since the time of Louis XIV the French have led the world in the

creation and adornment of squares and monumental centres in cities, as in the Places Vendome and de la Concorde in Paris, the Grande Place of Bor¬ deaux, the Place Stanislas at Nancy, the Long- champs at Marseilles, etc. In no other country in recent times have the arts of decorative sculpture and painting as auxiliary to archi¬ tecture been carried to so high a development or practised with such success as in France. While tradition and the unifying influence of the national Fcole des Beaux-Arts have to some extent hampered the free development of new ideas in architecture, on the other hand they have preserved it from anarchy and extrava¬ gance, while the sound good taste and artistic sense of the French people have been manifest through all periods of its history.

Bibliography. — The literature of French architecture, in French, is enormous; only a few titles can be given : Berty, A.,

de Tarchitecture franqaise5 (Paris 1876). In English: Adams. H., (Mont Saint Michel and Chartres5 (Washington 1914) ; Blomfield, R., (History of French Architecture 1494 to 1661 5 (London 1911) ; Cram, R. A., (The Substance of Gothic5 (Boston 1917) ; Moore, C. H., (Gothic Architecture5 (New York 1899) ; Mathews, C. T., (The Renaissance under the Valois Kings5 (New York n. d.) ; Ward, W. H., (French Renaissance Architec¬ ture5 (London 1911).

A. D. F. Hamlin,

Professor of Architecture, Columbia Univer¬ sity.

FRENCH BROAD RIVER, a river of North Carolina and Tennessee, rising in Tran¬ sylvania County, of the former State, near the foot of the Blue Ridge, flowing northwest into Tennessee, and discharging into Holston River, four miles above Knoxville. It is about 250 miles long. From Asheville to the Tennessee line it is remarkable for its beautiful scenery, flowing through deep mountain gorges, or over¬ hung by high cliffs. In Buncombe County, N. C., are precipices known as the Chimneys and the Painted Rocks. The latter, which are be¬ tween 200 and 300 feet high, derive their name from some Indian pictures still to be seen on them. Consult Kirke, E., (On the French Broad5 (in Lippincott's Magazine, Vol. XXXIV, pp. 425 and 529, Philadelphia 1884).

FRENCH CHALK, a variety of steatite

or talc (q.v.) occurring in fine-granular or scaly masses of milky-white color and pearly lustre. It is extensively used by tailors as a crayon for

marking cloth, also as an absorbent in removing grease spots and, in powdered form, inside of new gloves and shoes to produce a smooth surface and make it easier to slip them on.

FRENCH CLASSICAL SCHOOL OF POLITICAL ECONOMY. See Economics.

FRENCH EAST INDIA COMPANY.

See East India Companies.

FRENCH EQUATORIAL AFRICA.

French Kongo — which in 1908 became the Gen¬ eral Government of French Equatorial Africa — is a colony of a special nature. Its boundaries were fixed diplomatically before the country was penetrated, as the result of some brilliant exploring expeditions. The conquest was under¬ taken progressively and pacifically without France being called upon to support those heavy burdens and bloodshed which the establishment of other colonies have sometimes entailed.

We are indebted to those intrepid explorers who started out to unravel the equatorial mystery and who paid the price of their ad- venturious spirit in loss of health and life in order to add a new page to the colonial history of France. In turn, Commanders Bouet- Wuillaumez and Paul du Chaillu, Ensigns Bravouzec and Genoyer, Aymes, Marche and Compiegne, established from 1840 to 1872 the general lines of definite bases in the hinterland of Gaboon. Shortly afterward, Savorgnan de Brazza, by patience coupled with skill, trans¬ formed in the course of three successive mis¬ sions from 1875 to 1885, the small possession of Gaboon into a very large colony, joining up in a pacific manner that Kongolese depression which constitutes the enormous basin of the Kongo to our Gaboonese possession. Posses-

sion had only just been taken when the diplo¬ matic status of the Kongo was settled by an international conference, the outcome of which was the General Act of the Berlin Conference of 26 Feb. 1885, and a series of agreements fixing the frontier boundaries for Germany, established in the Cameroons, for Spain, mis¬ tress of the Rio Mouni region, for Portugal, installed in the enclosed territory of Cabinda, and for the Kongo Free State, which afterward became Belgian Kongo.

However, a new field of activity was opened up for explorers consisting in the gigantic scheme of presenting France with an empire which would be linked up by way of the Tchad, the banks of the Oubangui River, to the Algerian oases, and by way of the upper Nile region and the ports of Gaboon to the Red Sea stations. In 1890 Crampel marched on Tchad, but the sly hostility of the Sultan Rabah prevented him from reaching it. Dy- bowski, Maistre and Clozel followed in his wake, and their repeated efforts gradually en¬ larged the sphere of France's activity in Kongo- land. Shortly afterward as the result of a clever junction-movement carried out by the Foureau-Lamy mission coming from Algeria, Joalland-Meynier from Senegal and Gentil as¬ cending the Kongo, France became definitely in¬ stalled in Tchad in 1900 and Baguirmi, Kanem, Chari and Ouadai were not long before suc¬ cumbing to its influence. These results were further completed by the Marchand mission, which crossed French Kongo from one to the other, making the junction between the basin of the Kongo and the Bahr-el-Ghazal, and which, following on the Fashoda incident, found its epilogue in the Declaration of 21 March 1899. The pacific conquest of the country was. hereafter assured. At Tchad, however, where France encountered the hostility of the well-organized Senoussans and Ouadians and found herself in the presence of troops used to fighting in open country, trained by chiefs like the Sultan Rabah for long periods of warfare, the occupa¬ tion could not be carried out under the same conditions and took the form of a veritable cam¬ paign, of which the battles of Abeche, Bir- Taouil and Dorote and the military operations of Massalit and Borkou were the most glorious episodes. In 1911 French Equatorial Africa allowed France to emerge from the situation wherein she found herself after the Agadir in¬ cident, and it was she who, by a mutilation ac¬ cepted with dignity, finally supported the cost of the operations of 4 Nov. 1911 of which France was to reap honor and profit in Morocco. But although having to accept the inevitable in the scheme of world politics, Equatorial Africa was soon after to have her share of glory, and in the World War, thanks to the valor displayed by the Franco-Britannic troops under Generals Aymerich and Dobell, she has not only recov¬ ered the territories taken from her but she now exercises her administrative action in the old Cameroon territory.

French Equatorial Africa is an immense re¬ gion which extends from the mouth of the Kongo to Tripolitana and from the Atlantic to Egypt, covering an area of 2,200,000 square kilometers (849,420 square miles) or almost four times that of France. Situated between lat. 19° N. and lat. 5° S., its climate

is very varied, alternating with the dry and healthy climate of the

Saharean countries to

that encountered in the wooded forests of the equatorial zone. The inhabitants, numbering some 6,137,000, are no less diversified, from the nomads of the north to the savages living in the forests. Some have a pretense to civil¬ ization — at least Islamic — others are still bar¬ barous and in the first stage of human evolu¬ tion; the former are priests of tribes and tur¬ bulent, the latter still ferocious but more docile and more apt for agricultural work. This col¬ ony, so rich naturally as regards its soil, so well favored by the variety of its climate and its populations, possesses moreover the most magnificent navigable system imaginable, with the immense Kongo and its great tributaries, the smallest of which are large in comparison with our rivers in France, with the vast Tchad which receives the waters from the Chari and Logone, with the Ogooue increased by the Ivindo, the N'Gounie and the Fernan Vaz. Such a situation is unique in Africa and for Equatorial Africa it is indeed fortunate as not only does this system water and fertilize the greater part of its territory but it constitutes the most remarkable means of penetration, of communication and transport between the dif¬ ferent regions.

From a physical point of view, the division of French Equatorial Africa into natural regions gives four large distinct zones : the mountain¬ ous zone of the coast basins ; the large equato¬ rial depressions of the African plateau; trans- equatorial Kongo of the upper country; and the basin of the Tchad.

The coastal basins each comprise four banks rising one above the other; beyond the mari¬ time bank, the banks of the virgin forests at the top of the first falls, limited at the east by the N'Gounie, the Nyanga and the mid-Niari, then the banks of the grassy plateaux having an altitude of 400 to 700 metres (1,311 to 2,295 feet) and the bank of sandy prairies of the upper plateaux of a height varying from 700 to 800 metres (2,295 to 2,622 feet) and extending as far as the watershed of the Kongo Basin. The principal rivers are the Ogooue (1,200 km., 745 miles), the Kouilou, called the Niari in its upper course; a part of the Kongo (about 600 km., 373 miles, of its length of 4,000 km., 2,485 miles). The Kongo possesses in French territory a certain number of tributaries among which are the Alima, the Likouala, the Sangha (itself swelled by the N'Goko), the Oubangui forming the boundary between French Kongo and Belgian Kongo and itself swelled by the Ibenga, the Lobayem, the Kouango, the Kotto, etc. The Chari River has no outlet to the sea ; it finishes in the lake Tchad after having re¬ ceived on its right bank the waters from Bahr Salamat, and on its left those of Bahr-Sara and Logone, of which the

confluence is at Fort-Lamy. From an administrative point of view, the decree of 15 Feb. 1910 provided for the definite creation of the general government of French Equatorial Africa, as stipulated by the decree of 26 June 1908. The general govern¬ ment is constituted to govern the following groups of colonies : the Gaboon colony, capital Libreville; the Middle Kongo, capital Brazza¬ ville; the Oubangui-Chari-Tchad colony, capital Bangui, including the military territory of Tchad.

At the head of the colony is a governor-gen¬ eral invested with mandatory powers from the

French Republic and residing at Brazzaville. The colonies composing the group have admin¬ istrative and financial autonomy; they are ad¬ ministered, under the superior authority of the governor-general, by governors of colonies hav¬ ing the title of lieutenant-governors. The mili¬ tary territory of Tchad was administered by a commander of the territory of Tchad, acting under the direct orders of the lieutenant-gov¬ ernor of Oubangui-Chari-Tchad. The decree of 14 May 1915 specified that the military ter¬ ritory of Tchad should hereafter, under the name of ((Tchad Territory,)} be administered either by a civil official or by the officer com¬ manding the troops stationed there, such func¬ tionary to take the title of administrator or commander of the Tchad territory. Decree of 12 April 1916 specified that the chief of the Tchad territory would hereafter be under the orders of the governor-general of French West Africa. A decree of 7 April 1916 — modified by decree of 5 Sept. 1916 — fixed the conditions under which the Cameroon territories would be administered. The governor-general of French Equatorial Africa administers, as commissioner of the French Republic, the Cameroon territories which previously formed part of Equatorial Africa and which had been relinquished by virtue of the treaty of 4 Nov. 1911. Moreover, a governor of colonies is appointed as commis¬ sioner of the Republic in the old Cameroon ter¬ ritories.

From an economical point of view, French Equatorial Africa has, during the last 10 years, undergone an important evolution and its pros¬ pects are excellent.

The trade returns for the colony in 1892 were francs 5,500,000 ($1,100,000) ; it rose to a yearly average of about francs 11,450,000

($2,- 290,000) for the following period of 10 years, and amounting in 1908, when the general gov¬ ernment was formed, to francs 27,000,000 ($5,- 400,000) and reaching in 1913 francs 57,846,805 ($11,569,361). The trade for the year 1913 — taken as an average year — is divided up as fol¬ lows: Francs 21,181,768 ($4.236 353) for im¬ portations and francs 36,865,038 ($7,373,007) for exportations. Foreign, trade played a con¬ siderable part in exportations, in fact almost half. The French markets received in 1913 francs 14,389,717 ($2,877,943) of products from French West. Africa, while the export figure for other countries was francs 5,728.194 ($1,145,- 638) for Belgium; francs 3,96 7,377 ($793,475) for England; francs 3,860,549 ($772,109) for Germany and francs 1,242,031 ($248,406) for Holland. These figures explain why the eco¬ nomical life of Equatorial Africa has slackened since the outbreak of hostilities. Trade fell in 1914 to 28,000,000 and to 22,000,000 in 1915, while there was a slight increase in 1916, the figure being francs 30,533,038 ($6,106,607). The products exported consist of minerals, animal and vegetable products, both of a superior qual¬ ity. The mineral products of the colony which are found particularly in the Niari and Djoue basins are principally copper (of an exception¬ ally high grade), zinc and lead. For many years the natives have carried on the extraction of these products, and recently Europeans have systematically exploited same, the exportations amounting to 8 tons in 1910, 1,271 tons in 1913 and 1,451 tons in 1914.

French Equatorial Africa is rich in big

game. Elephants are especially sought after on account of the value of their ivory. The ex¬ portation of the latter has remained stationary during recent years, varying between 130 and 150 tons, and eight-tenths of the ivory ex¬ ported was sold before the war, on the Ant¬ werp market. The exportation of whale oil represents a new and interesting factor, amounting to 10,603 tons in 1913, which, how¬ ever, fell to 6,771 tons in 1914. Of all the French colonies, French Equatorial Africa is the richest from a forest point of view, possessing as it does a considerable choice of woods suit¬ able for various uses. Mahogany is found in different grades, such as okoume which forms an excellent counter-veneer wood much used in Germany for the manufacture of cigar boxes ; semi-hard wood such as kambala, walnut from Gaboon, billinga, hard woods like crail, moabi and mowingui, soft wood like fromager, gombo-gombo and tulip tree wood. The area of these compact forests is some 140,000 square kilometers (54,054 square miles). It should be noted, moreover, that three-quarters of the present forest production of Gaboon was con¬ sumed in Germany and Holland. During the year 1916 it was proposed to use wood from

Gaboon for the needs of the army and for reconstruction work in the devastated regions of North and East France. Wood exports which scarcely amounted in 1898 to 2,886 tons reached 10 years later nearly 70,000 tons and in 1913 amounted to 150,688 tons, representing a value of francs 8,319,239 ($1,663,847). This result, obtained in so short a time, is most encourag¬ ing for the future of this industry.

Rubber is also found in French Equatorial Africa but the proper cultivation of this prod¬ uct has not yet been undertaken in these colonies. The recent world wide rubber boom was felt in French Kongo as elsewhere but this was only of temporary duration and should not interfere permanently with the normal de¬ velopment of this industry. The exportation for 1912 and 1913 was 1,901 tons and 1,600 tons respectively; in 1914 it dropped to 600 tons, increasing in 1915 to 1,413 tons. There is an abundance of palm oil in French Equatorial Africa but it is only exploited in a rudimentary way by the natives. Several large European establishments have been founded for the operation of this industry and its future would appear to be very promising. The exportation of palm oil only amounted to 76 tons in 1912 and 77 tons in 1913; there were 359 tons of palm almonds exported in 1912 as against 208 in 1896, 595 in 1913 and 971 in 1914, thus show¬ ing an upward tendency which reached, in 1915, 1,135 tons. Gum copal of various quali¬ ties is found in French Equatorial Africa but its exportation is insignificant (1,490 kg. [3,278 lbs.] in 1913). Raphia is also exported in small quantities, as well as fibres called ((pias- sawa® which are used in the brush trade and the exportation of which amounted in 1915 to the interesting figure of 490 tons which is promising for the future of this industry. Among the principal cultures, the foremost are coffee and cocoa. The coffee tree grows in a wild state in many parts of Equatorial Africa, especially in the Kongo islands, the Sangha and the Oubangui ; the. local coffee is much ap¬ preciated by connoisseurs but no great traffic has yet been undertaken in this product. Its

exportation merely amounted to 33,593 kg. (73,- 904 lbs.) in 1913. The climate and the soil of Gaboon, similar to that of the San Thome Island, are suited to the cultivation of cocoa and many experiments have been made in this direction within the last 20 years. The ex¬ portation of cocoa exceeded in 1913 158 tons; in 1914 it amounted to 142 tons and in 1915 actually reached 203 tons despite the difficul¬ ties of transportation. Finally, food producing plants are found in

French Equatorial Africa such as the banana, tapioca, rice, etc., as well as medicinal plants (castor oil, kola, etc.) ; pepper, spice, etc., are also grown.

From the foregoing it will be seen that French Equatorial Africa is characterized by the variety and abundance of its products. Its great ivory reserves, its rubber trees, superior and more abundant to those of West Africa, the richness of its soil which is suited for all tropical cultures, its splendid palm forests and precious wood, the immense variety of its ordinary wood, its large herd of cattle in the north, the minerals found in its soil, its copper mines situated at less than 300 kilo¬ meters from the coast, all furnish a sure guar¬ antee of the future prosoerity of French Equa¬ torial Africa which will quickly be on a par with French West Africa and Madagascar and from which France will derive* great advantage. The colony must, however, be liberated from those impediments which at present hinder its full development. From a territorial point of view Equatorial Africa is the only one of the French colonies where the regime of granting large land concessions was put in practice in 1899 and which since 1910 has proved of much benefit to the colony. From a fiscal point of view the colony has suffered from a duality of the customs regime which is still further ag¬ gravated by the fact that a large part of the colony is subject to the international stipulations laid down in the Berlin Agreement bv which it is deprived of the liberty of its tariffs.

FRENCH ESTABLISHMENTS IN INDIA, the five colonies of Pondichery, Kari- kal, Chandernagar, Mahe and Yanaon. The total area is 196 square miles. These colonies are divided into five dependances and 17 com¬ munes, having municipal institutions. There is also an elective general council. The governor of the colonies resides at Pondichery. The colonies are represented in the Parliament at Paris by one senator and one deputy. The principal crops are paddy, ground nut and ragi. Pondichery has five cotton mills and there is a jute mill at Chandernagar. The cotton mills employ 7,335 persons. There are also in oper¬ ation two oil factories and a few oil presses for ground nuts, two ice factories and a cocoatine factory. Oil seeds form the chief export from Pondichery. At the ports of Pondichery, Kari- kal and Mahe in 1914 the imports amounted to $1,509,126 and the exports to $6,860,702; 292 vessels of 555,561 tons entered and 288 of 568,- 666 tons cleared from these three ports in the same year. Forty-three miles of railroad are in operation, Pondichery to Villapuram, and Peralam to Kar.ikal. Pondichery, the chief French possession, was founded by the French in 1674, taken by the Dutch in 1693, and re¬ stored in 1699. The English took it in 1761, restored it in 1765, retook it in 1778, restored it

a second time in 1785, retook it a third time in 1793, and restored it in 1814. The population in 1914 was estimated at 273,000.

FRENCH ESTABLISHMENTS IN OCEANIA, islands scattered over a wide area in the eastern Pacific. They are administered by a governor with an administrative council consisting of certain officials, the maire of Papeete, and the presidents of the chambers of commerce and agriculture. The establishments consist of the Society Islands, the most im¬ portant of which are Tahiti and Moorea, the former with an area of 600 square miles and 11,691 inhabitants, the latter with an area of 50 square miles and 1,564 inhabitants. Other groups are the Marquesas Islands , with a total area of 480 square miles and 3,424 inhabitants, the two largest islands being Nukahiva and Hivaoa; the Tuamotu group, consisting of two parallel ranges of islands from King George's Island on the north to Gloucester Island in the south, their total population being 3,828; the Leeward Islands (lies sous le Vent), of which the more important are Huahine, with a popu¬ lation of 1,230, Raiatea and Tohaa, population 3,347, and Bora-Bora-Maupiti, population 1,295; the Gambler, Tubuai and Rapa islands; the Gambier group, of which Mangareva is the principal, has six square miles of area and 1,533 inhabitants; the Tubuai (or southern) Islands, of which Rurutu is the largest, Raivavae, Rima- tara and Rapa, have a combined area of 115 square miles and about 2,550 inhabitants. The total area of the establishments is estimated at 1,520 square miles, and their population in 1911 at 31,477, of whom 26,219 were natives and 975 Chinese. In 1903 it was decreed that separate islands or groups should no longer be regarded as distinct establishments, but that all should be united to form a homogeneous colony.

The most important of the islands is Tahiti, whose chief town is Papeete with 3,617 inhab¬ itants, of whom 1,909 are French. Pearl and mother-o'-pearl are important products. The island is mountainous and picturesque with a fertile coastland bearing coconut, banana and orange trees, sugar-cane, vanilla and other trop¬ ical fruits, besides vegetables of temperate climes. Cotton, coffee and tobacco are now little cultivated. The chief industries are the preparation of copra, sugar and rum. The im¬ ports in 1913 were valued at $1,685,390 and the exports at $1,703,590. The chief imports are tissues, wheat, flour, metal work, and the chief exports are copra, mother-o'-pearl, vanilla, coconuts and oranges.. There is a monthly steamer service connecting San Francisco, New Zealand and Australia with Papeete, the Tua¬ motu Islands, the Marquezas and the Leeward Islands. Shipping between the islands is car¬ ried on by sailing boats.

Consult Haurigot, G.,

FRENCH FURNITURE. See Furniture, Medieval.

FRENCH GUIANA, French colony situ¬ ated on the northeast coast of South America, in 4° 56′ 20″ N. lat. and 54° 41′ W. long.

French Guiana has an area about the third of France. Three chains of mountains run through the country parallel to the coast: the Tumuc-Humas ranges (1,250 to 2,500 feet), the central chain (650 to 1,300 feet) and the coastal chain (200 to 950 feet). A large number of water courses intersect the country. They flow from south to north, throwing their waters into the Atlantic Ocean after being swelled by several tributaries or creeks. The more important of these rivers are the Maroni, Mana, Sinnamary, Kourou, Cayenne, Conte, Mahury and Oyapoc.

Climate. — The temperature is not as hot as is generally supposed; it varies between 25° and 30° C., but it has a weakening and de¬

pressing effect on account of the humidity of the atmosphere, the hygrometric degree exceed¬ ing 90 per cent. The dry season lasts from June to November, the wet season during the other seven months of the year. The capital of the island is Cayenne, at the mouth of the river of that name, and the port can accommodate ships of 500 tons.

History. — Guiana was discovered by Chris¬ topher Columbus in 1498 but it was not until 1500 that Vincent Pingon first explored the coasts. During the 17th century numerous European expeditions were carried out in Guiana. In 1604 Rivardiere landed on the bor¬ ders of the Mahury, in 1643 Poncet de Bretigny made an expedition to the Cap du Nord; in 1652 Equinoctial France was explored. In 1654 the Dutch took the budding colony and kept it for 10 years, but de la Barre expelled them in 1664 and took possession in the name of the Grande Compagnie des Indes Occidentales. In 1667 the English made a surprise attack on Cayenne, devastated the country, and withdrew. In 1676 it was again occupied by the Dutch who were, however, expelled by the fleet of Admiral d'Estrees.

Numerous attempts to colonize the place were unsuccessful on account of poor means of organization, the Kourou expedition being the most disastrous and ending in a veritable fiasco which contributed

in gaining for Guiana an un¬ merited reputation which has seriously handi¬ capped its development. However, thanks to the efforts displayed by men like Melouet, Guizan and Touat, better results were obtained and the country was in a flourishing condition for several years. When the Second Republic — to its eternal honor — abolished slavery on 27 April 1848, the negroes excited with their new liberty refused to work and the problem of labor became the crucial question in Guiana as in the West Indies for the development of the rich natural resources of the country. Since 1854 the discovery of gold mines resulted in a general exodus to the great forests where the ((placers® are ; the plantations which had sur¬ vived so many vicissitudes were abandoned and serious efforts were necessary to place agricul¬ tural development on a proper basis again. Moreover, memories of the unfortunate Kourou expedition had a disastrous effect on the colony and was still further aggravated by the dispatch later on of exiles to Cayenne and Sinnamary as the outcome of the Fructidor incidents in September 1797. Since that time Guiana has been considered the dumping ground (

Government. — At the head of the local ad¬

ministration is a governor, assisted by a privy council. Guiana is represented in the Chamber of Deputies but not in the Senate. From an administrative point of view, the colony is divided into communes each of which is admin¬ istered by a mayor assisted by a municipal board.

Commerce, Trade, etc. — The trade of the colony for 1913 amounted to 24,717,302 francs, made up of 12,494,765 francs, imports, and 12,-222,537 francs, exports. Its business has not been much affected by the war, amounting to 20,989,045 francs in 1914 and 21,543,502 francs in 1915. (Franc — 19 cents United States cur¬ rency; for general purposes of comparison, 5 francs = $l).

Gold mining is the principal industry of Guiana, the amount of gold dust exported rep¬ resenting a sum of 10,149,115 francs in 1913. The gold is exported almost exclusively to France and Switzerland — 2,388 kilograms of a total of 3,758 kilograms, Switzerland receiving 1,362 kilograms. Martinique received the re¬ maining 9 kilograms of precious metal (kilo- gram = 2.20 lbs.).

Agricultural products do not enter much into the commerce of Guiana. Cocoa in ber¬ ries is exported to an amount of 15,241 kilo¬ grams (34,000 pounds), and coffee beans 720 kilograms (17,000 pounds), valued at 2,521 francs ($504.20). ˆCayenne® pepper, which is now

merely a trade term for this condiment, could be much more remuneratively exploited. Bananas, manioc, food producing plants, pota¬ toes, yams and maize give good results nearly everywhere in the colony.

The forests, very rich in valuable wood, are as yet but little exploited. Rosewood was ex¬ ported in 1913 to an amount of 44,676 kilograms of a value of 1,116,900 francs. Exotic woods were exported to an amount of 244 steres, rep¬ resenting a sum of 36,616 francs ; most of the wood found in Guiana is superior to the Eu¬ ropean woods both as regards hardness and rupture resistance ; the wacapou is used in the construction of railroad ties, the wapa is em¬ ployed in France as props for the growing of vines. Apart from the wood other products are found in the forests, some of which are quite valuable, such as oily products, aromatic products, dye products, gum and resinous prod¬ ucts, textiles and medical products. Balata gum is exported to an amount of 217,982 kilo¬ grams, representing a value of 653,946 francs. A fairly good trade is also done in raw hide, 35,040 francs, raw feathers, 2,760 francs, air bladders, 10,095 francs, and rich phosphates, 127,720 francs.

With the exception of gold prospecting, Guiana is only partially exploited, the extraction of gold having caused other industries to be almost entirely neglected, or at least relegating to a secondary place other rich minerals or vegetables which could be developed to the profit of the colony. It is, moreover, believed that silver exists in Guiana, as well as copper, lead, iron, tin, mercury and numerous precious stones such as topazes, chalcedones, grenats, amethysts, etc.

From every point of view, whether as re¬ gards mineral exploitation or rich forestral or agricultural products, Guiana is in a position to satisfy all demands made on it for colonization. The colony should accordingly show much im-

provement in a not too distant future, espe¬ cially when the gold seekers will be joined by workers on the land. It should not indeed be forgotten that in a country so well endowed as Guiana, pasturage and tilling are the very es¬ sence of its existence and future prosperity.

FRENCH GUINEA, gin'i, colony com¬ prised in the government-general of French West Africa. It is situated on the coast be¬ tween

Portuguese Guinea and the British col¬ ony of Sierra Leone, and extends inland so as to include the territories of Dinguiray, Siguiri, Kouroussa, Kankan, Kissidugo and Beyla. The area is about 95,000 square miles and the popu¬ lation (1914) 1,810,059, including 1,166 Eu¬ ropeans. It is a rich colony, exporting not only cattle, peanuts, gum, hides, beeswax and rubber, but also palm kernels and palm oil. There is an experimental garden near Konakry, the capital, where the culture of bananas, pine apples, rubber trees atid other plants is being tried. Futa Jallon contains cattle in abundance. Gold is found in the river Tinkisso and in the Boure and Siecke districts. The French Guinea Railroad runs from Konakry to the Niger and thence to Kankan, a distance of 412 miles. At Konakry there is a new breakwater 1,066 feet long. In the colony there are 2,225 miles of telegraph and 48 miles of telephone line, with 6 miles of submarine line. The chief port is Konakry, where ocean-going vessels discharge their cargoes at the wharves. In 1915, 408 ves¬ sels, of 338,420 tons, entered the ports of the colony. Its imports in the same year were val¬ ued at $1,870,033, and its exports at $3,134,414. A regular system of government schools has been introduced here as in the rest of French West Africa. Konakry has regular communi¬ cations with Europe through two French, one English, and one German line. The 1916 budget of the colony amounted to $1,365,480. Consult Aspe-Fleurimont, (La Guinee Fran- gaise} (Paris 1900).

FRENCH AND INDIAN WAR. See

Colonial Wars in America.

FRENCH INDO-CHINA. History.—

France lost India in the 18th century. In the 19th century she conquered eastern Indo-China. Although the territory is much smaller and less peopled than that of Hindustan, it is in no sense a compensation to be disdained. A colony which is half as large again as the area of France, with a population estimated at 16,000,- 000, of which 30,000 are French, which is situated at the very door of China — that in¬ comparable market with a population of 400,- 000,000 — is a colony of very great value and justifies, despite its infancy, all the hopes which have been lavished on it. As has been quite rightly stated, it was not a war of 100 years but a slow penetration of Frenchmen into Indo-China extending over a century./ However, the real conquest is of quite recent date. In 1870, Cochin-China and Cambodia alone belonged to France. Tonkin, Annam and Laos were acquired under the Republic. Here again a fortunate coincidence obliged France to take action : its ministers, with the exception of

Jules Ferry, who had a clear in¬ sight into the future, followed not without un¬ easiness the rulines of fate. The real pioneer of the French in Indo-China was Pigneau de Behaine, a vicar in Cochin-China and bishop of

Adran, who persuaded the emperor of Annam, Gialong, to have recourse to Louis XIV's aid against the Chinese. This premier interven¬ tion resulted in the signing of the Treaty of Versailles between Louis X.IV and the son of Gialong in 1687, and by which France received the Bay of Tourane and the island of Paulo- Condore. The French officers, appointed to the court of Hue, formed a disciplined army which defended Annam against the English during the Revolution and the Empire. Chaigneau, the last survivor, died in 1822, having received the title of consul of Hue which was conferred on him by the Duke of Richelieu. Later on, however, a changed and hostile attitude was adopted toward the French and this spirit of persecution became extremely violent on the accession of Tu-Duc who deemed the French to be the implacable enemies of his country, describing them as ((people who bark like dogs and run away like goats.® Tu-Duc in fact be¬ came so menacing and defiant that the two European powers most directly concerned, France and Spain, decided to dispatch a small squadron, under Admiral Rigault de Genouilly, in 1847. A further intervention took place at Tourane in 1852, under the reign of Tu-Duc, as a result of the murder of several mission¬ aries ; this was followed in 1858 by the dispatch of a Franco-Spanish expeditionary force which took possession of Tourane, and later of Saigon, in 1859. But the wars in which the French Empire was engaged in Italy and China diverted momentarily the attention of France. Tourane was taken and Saigon blockaded. In 1861, Admiral Charner, at the head of a properly equipped expedition, which included but few Spaniards, conquered a part of Cochin- China. On 5 June 1862 Admiral Bonard signed at the ((Camp des Lettres® a treaty by the terms of which the three oriental provinces of the Mekong Delta, Saigon, Mytho and Bien Hoa, were ceded to France. A few years later (1867), Admiral Grandiere completed the con¬ quest of Cochin-China by seizing all the im¬ portant places and the Emperor Tu-Duc sur¬ rendered at the Temple of Plumg-Tien, repent¬ ing and declaring himself guilty of ((having neglected to perform my duties and having been incapable of preserving the patrimony of my forefathers intact.® Thus the six provinces of the Mekong Delta were definitely occupied and Cochin-China became a French possession. Already, in April 1863, King Norodom, in order to be freed from the harsh vassalage of Sian and Annam — anxious to exploit the Cambodia country — had signed a protectorate treaty with Admiral Grandiere. But larger schemes were

conceived and at the time when the English were seeking a trade route to China via Irawaddy or the Salouen, the French wondered if the Mekong, by the verv length of its course, would not open up a still easier way. The Doudard de Lagree mission soon found out, however, that this large river was not particularly practicable for penetrating into the Chinese Empire. It was a French merchant named Jean Dupuis who discovered a shorter route, the Red River, which led directly to the province of Yunnan, one of the richest and most densely populated of southern China. However, Jean Dupuis was molested by the Tonkin mandarins and Lieut. Francis Gamier was dispatched to Tonkin with 80 men to settle the

incident, with the help of a high official of the Court of Hue. As a result of the bad faith of the mandarins he decided, despite the small forces at his disposal, to attack the citadel of Hanoi, which he took on 20 Nov. 1873 after a brilliant battle. In 20 days he was master of the whole of the Red River Delta ; but the Annamites were not long in reacting, all the more so as they had the superiority in num¬ bers ; Francis Gamier was lured to his death on 21 Dec. 1873. Hostilities ceased at the begin¬ ning of 1874 on the arrival of Lieut, de Vaisseau Philastre who signed a disastrous treaty with the court of Hue by which France lost Tonkin, merely retaining a few commercial and diplomatic rights in Annam. The signing of this treaty assured relative tranquillity for a few years. But little by little the hostility of the Annamite mandarins to the French grew to alarming proportions and the emperor of China declared that he would not recognize the treaty of 1874. Commandant Riviere, who was appointed to bring them once more to reason, committed the same sublime stupidity of his predecessor, Francis Gamier, only to meet the latter's fate at Nam Dinh where he was en¬ deavoring to repel the multitudes who were besieging it. The prestige of France had re¬ ceived a serious set-back. By unanimous de¬ cision the Chamber of Deputies decided <(to avenge the glorious servitors of France® and the necessary credits were voted. But the campaign, carried out on the system of "small drafts,® was long and costly and the country understood but little the importance of colonial expansion. It required all the eloquence and civic courage of a Jules Ferry, backed by the dauntlessness of the army and navy, to secure this flourishing colonial empire for France.

Events succeeded each other in rapid succes¬ sion; General Bouet installed himself at Hai- Duong, Admiral Courbet took the important

town of Hue, and France's old enemy Tu-Duc recognized by the convention of 25 Aug. 1883 a French protectorate over Annam and Tonkin. However, Chinese pirates, or the <(Black Flag,® were not alone in infesting Tonkin, for in ad¬ dition there appeared the band of the ((Yellow Flag® or Chinese regulars. It was against China itself that France was called upon to fight. General Millot, in charge of the Ton¬ kin expeditionary forces, took Bac-Ninh, Hung-Hoa and Tuyen-Quang in 1884. Courbet conducting a campaign in the river passes of the Min, eventually took up quarters in Formosa and in the islands of Pescadores, and by a process of starvation forced China to treat for terms (1884-85) at the very time when General Briere de l'Isle delivered Tuven- Quang and repulsed the Chinese to the north as far as the Kwang-Si district, after two months severe fighting. It is to be regretted that his right-hand man, General de Negrier, was wounded at Langsan and his successor, Colonel Herbinger, ordered a too hasty re¬ treat which became a rout. This regretable incident although unimportant in itself supplied theˆ long sought after excuse for the adver¬ saries of Jules Ferry for demanding his resig¬ nation from office (30 March 1885). As a matter of fact the ((Grand Tonkinois® could easily have revealed the terms of the forth¬ coming peace negotiations, but he preferred to lose his office rather than commit a diplomatic

indiscretion. Negotiations, already begun by Commandant Fournier, were carried on by the representative of France, M. Patenotre, result¬ ing on 9 June 1885 in the signing of the final Treaty of Tien-Tsin by which China recognized the French protectorate over Tonkin, thereby opening up to French trade the rich Chinese provinces of the south : Yunnan and Kwang-Si. This treaty caused serious riots at Hue and necessitated the intervention of General de Courcy in Annam. The young rebel king was only subdued after a long campaign, being finally captured in 1888. Since that period France has had to assert its authority by undertaking numerous campaigns against the Annamite and Chinese rebels, who alone prof¬ ited by a state of war. Operations were long and laborious, culminating in 1889 by the sub¬ mission of the principal rebel chiefs. In 1904 the success of the Japanese in the Manchurian campaign naturally had . its repercussion in the Asiatic world, although the immediate effect on Indo-China was not very great. Up to 1913 order reigned, with only slight local troubles, and at the end of 1913 the death of De Tham, who lived a secluded life in the mountains and forests of the Upper Tonkin regions, liable to fall at any moment into the hands of the militia, marked the close of the period of banditry with which France had had to contend ever since the conquest of this country. The adversaries of French domina¬ tion

in Indo-China from that time onward seem to have had recourse to the more scientific and violent weapons of modern revolutions. But the rapidity with which the plots were dis¬ covered and repressed, the manner in which justice was meted out by the “Criminal Com¬ mission® and the calm dignity displayed by the French population, made a profound and last¬ ing impression upon the minds of the An¬ namites. In the last 12 years French Indo- China has become enriched by the inclusion of two more important territories, increasing its population by almost 1,000,000 inhabitants: the Kwang-Tchu-Wan territory, leased to France for a period of 99 years by the Franco-Chinese agreement of 10 April 1898, and the long dis¬ puted provinces of Battanbang, Siem-Reap and Sisophon, restored to Camboda by the Franco- Siamese agreement of 23 March 1907. In this manner was realized the progressive expansion of France in Indo-China, an exceptionally in¬ tricate and difficult enterprise if it is borne in mind that France was called upon to subdue and equitably govern a large and homogeneous population having a racial affinity with neighbor- ing peoples not particularly well disposed to¬ ward France, i.e., Chinese, Siamese, etc. She had, moreover, to parry the great danger to its ideas of expansion arising from the contact of the people in the peninsula with an adjacent empire of several hundreds of million souls where the frontiers are not protected by any mountains of importance.

Area. — The total area of Indo-China ex¬ ceeds 800,000 square kilometers (308,880 square miles) ; it is geographically bordered by the Annamite mountain chain, on its two sides, west and east, and by the lower valleys and deltas of the two rivers which form boundaries: The Red River and the Mekong River.

Topography. — Indo-China is crossed from south to north by a long range of mountains

which join and form a cluster in the Tibet region, branching out fanwise from the north to the south, dividing the country into two large valleys which constitute the basins of the Mekong and the Red River. This mountain range entirely covers the Laos and spreads over the Tonkin as far as the Red River in high plateaux of an average height of 1,200 to 1,500 metres. From this block a long chain extends toward the south, the Annamite Cordiliere, the spurs of which cut Annam up into a series of small valleys, the communications between

which are difficult. Toward the southwest and the south, the Cordiliere spreads into large plateaux a few of which extend to the boundaries of the Cambodia and Siam. The abundant rain from the monsoons in Indo-China has resulted in numerous water courses being formed which, except in the Annam centre, have their low and high seasons in winter and summer respectively. The rain is so frequent in this latter season that floods occur which are often of a disastrous character. The two large rivers of Indo-China, the Mekong and the Song-Coi or Red River, collect the waters and their alluvions form the deltas where the economical life of the colony is centred. The Mekong, an important river, has a length of 2,400 kilometers (1,460 miles) of which lake Tonle-Sap, at the top of Pnom¬ penh, forms a natural regulator. The Song- Coi is swelled by the Claire River and the Moire River whose vast delta encompasses the richest provinces of the colony.

The coasts of Indo-China have the form of an S and extend over a length of 2,500 kilo¬ meters (1,508 miles) ; they are rocky where the mountains are near the sea, low and flat by the side of the deltas. They afford good ports but the harbors are either too shallow or insufficiently sheltered.

Climate. — The climate of Indo-China is hot and damp; there are two seasons: summer, which is very rainy, and winter much less so. This difference is due to the monsoons or pe- iiodical winds which are prevalent during sum¬ mer, blowing either from the southwest to the northeast (Cambodia, Cochin-China, Laos) or from the southeast to the northwest (coasts of Annam and Tonkin), and during winter from the northeast to the southwest. The climate, moreover, greatly varies according to the dis¬ tricts. In reality no Indo-Chinese, properly speaking, climate exists, but Indo-Chinese cli¬ mates according to whether it is a question of Cochin-China, Cambodia, Annam or Tonkin.

Population. — The Indo-Chinese population is of great variety. Peopled during many cen¬ turies, Indo-China has witnessed numerous invasions or migrations resulting in a great cosmopolitan race having sprung up. The Annamites constitute at least five-sixths of the total population, being estimated at about 12,- 000,000. Then come the Cambodians, numbering about 1,300,000, or representing 7 to 8 per cent of the total population. The Thais or Lactians from Upper Tonkin form a total of 600,000 to 700,000 individuals, and the Khas district con¬ tains a large number of peoples spread over the Annamite mountain country. There also exist in Indo-China some other peoples who were probably the first to inhabit the country, but they were not

strong enough to resist the Anna¬ mite invaders, the Cambodians or the Thais, and

were obliged to seek refuge in the mountainous regions of the west and southwest. They are classed together under the general name of ((the savage population® or Mois. The Chinese are very numerous in Indo-China and their import¬ ance is still more considerable than their number would appear to warrant. Finally, the number of Europeans taking up residence in Indo- China increases yearly.

Government. — At the present time the po¬ litical organization of Indo-China is that of an adult colony. The decrees of October 1887 and 31 July 1898 created the Indo-Chinese union, centralising in the hands of a general governor the superior administration of the colony of Cochin-China and the protectorate of Cambodia, Annam and Tonkin. Nowadays the general government of Indo-China comprises five distinct regions : Cochin-China, capital Saigon, over which France exercises direct au¬ thority; Annam, capital Hue; Tonkin, capital Hanoi; Cambodia, capital Pnom-Penh; the three latter are protectorate countries where the rights of the sovereigns and the authority of the native officials appointed by them are respected; Laos, which can be considered as French terri¬ tory despite the presence at Luang-Prabang and in other parts of this country of native princes or chiefs who continue to exercise over the population, with the consent of France and under its control, certain vestiges of suzerainty.

The territory of Kwang-Tchu-Wan pos¬ sesses its own administration. The powers of the governor-general are set forth in the decree of 20 Oct. 1911; he holds mandatory authority from the French Republic for the whole of French Indo-China and is assisted by a general secretary and a government board. The various countries comprising the general govern¬ ment of Indo-China possess their administra¬ tive autonomy with certain reservations ; they are each administered under the superior au¬ thority of the governor-general by a lieutenant- governor in Cochin-China, by superior residents in Tonkin, Annam, Cambodia and Laos, and by an administrator in the territory of Kouang- Tchu-\Van. Apart from privy and protector¬ ate councils operating in Cochin-China, Tonkin, Annam, Cambodia and Laos, other deliberating or consultative assemblies exist in the various countries of Indo-China ; such as the colonial board of Cochin-China (an emulation of the (

been given new powers by the local decree of 19 March 1913; Cambodia also possesses its native consultative assembly and in the Laos dis¬ trict the government commissioners have as as¬ sistants “Mandarins, ˆ if not like the other countries of the union, native chiefs who by their situation and authority are most useful auxiliaries.

No French colony is more densely populated than Indo-China, none possesses a richer soil, so suitable for the most varied products or more abundant and intelligent labor. Its re¬ sources are immense. A European can, if he takes proper hygienic precautions, easily live in the country which is not too close to the swampy regions of the coast, or the forests of the interior. These conditions explain the rapid development made by Indo-China from an eco¬ nomical and commercial point of view since French occupation.

Live Stock. — The distance of Indo-China from France does not allow of the exportation of live stock and for the present the prepara¬ tion of preserved meat is the only form in which Europe has benefited from its cattle breeding industry. According to the latest esti¬ mates drawn up in 1916, the Indo-Chinese live¬ stock amouxited to no less than 634,525 head of oxen, 523,553 cows, 289,939 calves, 618,939 buffaloes, 631,709 female buffaloes, 334,024 buffalo-calves, 2,662,534 pigs. The skins and horns of the oxen and buffaloes give rise to a certain amount of exportation (3,000 tons of raw hide in 1913). Silk is exported to an amount of about 100,000 kilos (220,000 lbs.), but a large quantity of the silk produced is em¬ ployed for local uses. The “stock-laque,ˆ an insect product, may later on give rise to a good business.

Fisheries.— Indo-China, with its 2,500 kilometers (9,650 miles) of coast, its large rivers, its numerous arroyos and especially the great lakes in the Cambodia region, is essen¬ tially a country suitable for the fishery indus¬ try on a large scale. Deep sea and river fishing permits of the exportation of a large quantity of dried and salted fish, of by-products and of fish oil. The government grants concessions of fishing rights from which it derived a revenue estimated at 500,000 piastres for 1915. The value of the fish exported from Indo-China gives 12,000,000 for Cambodia, 3,000,000 for Annam and 200,000 to 300,000 for Tonkin; the totality of fishing products exported for 1913 amounted to 18,000,000 francs ($3,600,000). Another local industry allied to the fishing trade is the preparation of different fish sauces, the most noted of which is the nuoc- mam.

Other Products.— Among the vegetable products, fatty matters hold a prominent place. The exportation of copra fluctuates between 6,000

and 8,000 tons. Arachide is cultivated in Annam where, however, it is mostly consumed locally. Castor oil, the exportation of which has increased from 42 tons to 600 tons, is principally shipped to China. Cotton oil is also cultivated locally. Rice is the principal crop of Indo-China and is consequently exported in large quantities. Indo-China is second only to Birmania as regards rice exports, being more important than Siam. Laons and Annam do not export rice and Cambodia only in small quan¬

tities (about 150,000 tons), but Tonkin ex¬ ported in 1915 250,000 tons and the figures for Cochin-China — the principal exporter — were 1,295,000 tons in 1914 and 1,085,000 tons in 1915. Rice is treated at Cholon, the big Chinese town near Saigon. Maize was first exported in 1904 and from that time its culti¬ vation has considerably increased, being classed at the present time third in the list of exporta¬ tions, accounting for nearly 16,000,000 in 1913. Arrowroot, manioc and soja are cultivated for local consumption.

Sacchariferous plants, such as the sugar cane, are grown throughout Indo-China, and es¬ pecially in Annam. The sugar palm is highly interesting, its sweet juices being estimated at 200,000 hectoliters (5,200,000 United States gal¬ lons) a year.

Textile raw materials are abundant. Cotton is cultivated nearly all over Indo-China for the local use of the inhabitants. The cotton from Cambodia is greatly valued by the spinners but practically the whole of the exportation — some 5,000 tons — is dispatched to Japan. Kapok is found in ‘Cambodia in the proximity of the native habitations. Jute is not much cultivated in Indo-China; the local production is used by the natives for manufacturing mats. Ramia is not extensively cultivated and the Annamites use it for making fishing nets. Bambous are treated for paper pulp. Cane is abundant and Indo-China exports from 2,000 to 3,000 tons to Singapore. Mats from Tonkin — the manufacture of which is exclusively car¬ ried on by the Chinese — represents an ex¬ portation exceeding 800,000 tons.

Spices and condiments are found in Indo- China. The exportation of pepper for 1915 amounted to 4,007 tons, spices to 800,000 tons in 1913, while cinnamon amounted to 1,500,000 tons for the same year.

The rubber crop has fallen off during recent years, the natives having imprudently cut all the creepers. Hevea Bresiliensis has been much developed in Cochin-China; this is also found in southern Annam and in Cambodia, the area planted amounting to some 14,179 hectares (35,000 acres) representing 4,626,000 trees and the exportation

reaching 914 tons in 1913, or a value of 962,708 francs ($192,541). The Indo-Chinese rubber plantations have a brilliant future before them. Coffee is prin¬ cipally exported from Tonkin, showing an aver¬ age for the five years 1910 to 1914 of 1,815 hun¬ dred-weight. The average annual exportation of tea is 900 hundred-weight. Tobacco is cul¬ tivated all over Indo-China for local consump¬ tion, but the French Regie — which imports nearly 30,000,000 of tobacco from abroad — did not forget Indo-China which exported to France in 1913 tobacco, in various forms, amounting to 865,000 francs ($173,000). The principal commercial aromatic plant is the aniseed tree, the fruit of which is used mostly in the manu¬ facture of the liquors known as “Anisette® and “Absinthe.® The exportation of this product amounted to 230 tons in 1913, of a value of 2,500,000 francs ($500,000). The gen¬ eral resources of the country in vegetation comprise medicinal plants, such as cocoa, dye- producing plants such as indigo, and fruits, such as bananas, pineapple, lemons, papaws, etc.

Forest Products. — The forest resources of Indo-China are of an infinite variety. Teak is abundant and is exploited in Luang-Prabang. The exportation of wood to Europe — which will certainly increase when Indo-China woods are better known, is already considerable for teak, Him® and ˆcho.® The figure for 1913 was 3,875 tons, of a value of 798,000 francs.

The geological exploration of Indo-China has been begun methodically, but is far from being complete. The mines at present worked are the following: fuel in Tonquin and Annam, zinc in the Tuyen-Quan Lang-Hit Chodian region, tin in the Pia-Ouac district, antimony in Vinh and gold at Bong-Nieu. The value of the mineral output in 1915 was 15,980,000 francs ($3,196,000) and was exported to an amount of 12,632,000 francs ($2,526,000).

Since the war, Japan is the principal market for coal. The production, which was 371,000 tons in 1913, reached 540,000 tons in 1915. The output of the zinc mines for the same year amounted to 34,300 tons, exceeding the last five-yearly average, which was 29,000 tons. The production of tin amounted to 425 tons. Antimony from Vinh shows an exportation of 413 tons, representing a value of 95,000 francs ($19,000), and gold was exported from the mines of Bong-Nieu to an amount of 344,000 francs ($68,800) or 98 kilogrammes. Indo- China, which in the past relied on its agricul¬ tural industry for prosperity,

possesses in. its soil inexhaustible resources for a brilliant future.

Commerce and Trade. — The general trade returns for Indo-China for the year 1913 amounted to 651,697,321 francs ($130,339,464) or 306,238,068 francs ($61,247,613) for imports and 345,259,253 francs ($69,051,850) for exports. If the import statistics are analysed, i.e., those relating principally to cotton tissues, cotton threads, silk tissues, petrol, jute, beaten gold, porcelain, tea and flour, the figures show that France accounted for 107,086,468 francs ($21,- 417,293) and other countries for 194,931,643 francs ($38,986,328). Exportations to France amounted to 77,631,581 francs ($15,526,316) and 261,935,838 francs ($52,387,167) to other coun¬ tries. The principal products exported are rice, tin, maize, cotton thread, dried, fish, raw skin, pit-coal, leather, pepper and zinc. The trade movement in Indo-China showed a con¬ siderable upward tendency from 1904 to 1913, and despite the present conditions prevailing in Europe, Indo-China continues to prosper, as evidence of which we quote the figures for 1915—16 : Imports, 334,955,000 francs ($66,- 991,000) and 390,981,000 francs ($78,196,200) exports, or a total of 725,936,000 francs ($145,- 187,200). After the war, therefore, great hopes may be founded on Indo-China, which, being a long way from the theatre of the war, has suffered somewhat in its imports — which is but natural — has nevertheless been able to continue to produce and satisfy her clients in the Extreme Orient, as well as those situated in other parts of the globe.

FRENCH KONGO. See French Equa¬ torial Africa.

FRENCH LACQUERWORK. See Lac¬

quers AND LACQUERWORK.

FRENCH LANGUAGE. See France.

FRENCH LAW. See France — Law AND Jurisprudence.

FRENCH LITERATURE. See France.

FRENCH OCEANIC COLONIES. See

Gambier Islands; Marquesas Islands; New Caledonia and Dependencies; New Hebrides; Society Islands; Tahiti.

FRENCH PAWNSHOPS, Government.

See Government Pawnshops in France.

FRENCH POLISHING, a process, gen¬ erally employed for giving a smooth surface¬ coating to furniture and cabinet-work. The surface of the wood being finished off with glass-paper and placed opposite the light, the rubber (a ball of wool covered with rag), dipped in the varnish (or polish), is passed quickly and lightly over the surface in the direction of the grain of the wood, and rubbed till dry. This operation must be repeated sev¬ eral times. The most common of the varnishes known under the name of French polish are prepared as follows : Pale shellac, 5j4 ounces ; finest wood-naphtha, 1 pint; dissolve. Before applying any of these varnishes the rubber must be first slightly moistened with raw linseed oil. See Varnish.

FRENCH PROPHETS, the English name for a group of Camisards, who arrived in England from France in 1706. Their leaders were Cavalier, Durand-Fage and Marion. The group laid claim to several extraordinary gifts, including that of prophecy, of tongues and of working miracles. They preached communistic doctrines, gained several converts for a time, and declined gradually. Consult Vesson, (Les prophetes Camisards a Londres) (Paris 1893).

FRENCH REVOLUTION, The. There are several revolutionary periods and events in French history which stand out prominently from the national records; but the Revolution of 1789 is, by common consent, known as The Revolution. This is because it marks, for the French people, the parting of the ways and forms the most prominent landmark along their pathway of progress. Behind the Revolution is autocratic France with its cynical abuses, profligacy, immorality and disregard for the rights of all but the governing class. On this side of the Revolution is modern France, force¬ ful, imaginative, ever hopeful, working out her own political and social future along demo¬ cratic lines which her far-seeing public and literary men laid down more or less clearly fully a century and a half ago, principles which served as a beacon light to the strug¬ gling American colonies in their fight for free¬ dom, and unified the New World provinces of Spain against the incompetency and non-pro- gressiveness of autocratic Spanish rule. Wher¬ ever democracy has made any true advances since 1789 it has been in the name of the prin¬ ciples of the French Revolution. This is why France is still to-day looked upon with peculiar affection by all the republics and democratic nations of the earth, why she was, from the beginning of the European War, the central figure in the immense drama played upon the stage of the world. France has been rightly called the mother of republics and of democ¬ racy, though the outbreak of the Revolution took’ place 13 years after the declaration of American independence. This is due to the

iact that intellectually the Revolution had been going on in France for years before the fall of the Bastile, an event which symbolizes the high tide of public resentment against the auto¬ cratic and unjust acts of the irresponsible rulers of France during the pre-Revolutionary period. Ihe growth of the principles announced by the Revolution is, in fact, the history of the rise and fall of the autocratic power of the French sovereigns; and it is the symbol of the revolt of the nation against the accumulated griev¬ ances of two centuries.

Pre-Revolution France.— After the break¬ ing up of the Roman Empire, Europe became split up into many principalities and a few larger powers. All these political bodies were frequently at war with one another; and the country suffered from the unsettled condition of the age and the lack of anything like unity of aim. The whole of Europe was overrun with robbers and military, many of whom were not much better than robbers. Little by little the kings of France, whose power, in the beginning was very shadowy, succeeded in con¬ quering the different principalities now in¬ cluded within modern France, and consolidating the government of the whole country under one royal head. But though this had been done the government of the sovereigns of France was still far from arbitrary; for the nobility retained very extensive power, and throughout the rural districts the communities practically governed themselves without the in¬ terference of the central authorities. The peasants had preserved the memory of their freedom and local autonomy under later Roman rule. This spirit was shown in 997 when the peasants of Normandy conspired against the oppression of their masters, proclaiming the equality of man. In 1224 the peasants of Brit¬ tany, under very similar conditions, revolted; and a most desperate and bloody war ensued before the nobility got the upper hand. Some cities had actually preserved their independence s*nce j e ˆays the Romans ; others had pur¬ chased freedom from needy nobles; while others had boldly fought for and won independence in local government. This spirit of independ¬ ence grew as the wealth of the country in¬ creased. But there was no unity in all these concessions or different forms of local govern¬ ment, each of which thought only of securing its own advantages and liberties. So when the French sovereigns had finally broken the power of the great barons and established the sover¬ eignty and power of the Crown over all France, they turned their attention to the communes, as these local governments were called. Louis XIV consolidated all this power in his own person and became

virtually autocratic ruler of France. The consolidation of the power of the nobles in that of the sovereign was beneficial for the country as it tended to make it a united nation, which it in no sense was previous to this extension of the sovereign power over the whole country. This concentration of power enabled the sovereign to do away with many abuses from which the peasantry and the mid¬ dle classes, suffered at the hands of the nobles. But all this was not done without a long and interesting battle. The independent princes and barons having been subdued by playing one off against another, the (

sal laws were made instead of local observances. Francis I (1515-59) largely increased the royal power. He refrained from calling together the States-General ; and he proceeded to divest them of power by taking each separate entity by itself; and he forbade the Parliament of Paris to (III that he was forced to side with them. Thus the struggle went on, sometimes quietly, some¬ times openly, until Louis XIV proclaimed the doctrine of absolutism ((I am the State,® and succeeded in as nearly making good his boast in this direction as any other sovereign of Europe. He not only believed in it himself, but he made France believe in it and he suc¬ ceeded in getting the Church to teach it. Dur¬ ing his long reign (1643-1715) the States-Gen¬ eral were never called together. He did away with state and municipal liberties; and by an edict passed in 1683, the financial management of the cities of France was placed in the hands of the royal intendants. Under Louis XIV municipal life became a thing of the past. Thus every attempt was made, unfortunately for the royal family itself, to incapacitate the French people for democratic ideas or self-government. The king himself became the centre of all life., whether court or municipal. He destroyed the independence of everything but himself. To please his own vanity he patronized the brilliant literary men, philosophers and thinkers of his day, who all shone -in his reflected glory. These very men, practically all of whom belonged to the middle classes, represented the rise of that class which Louis further encouraged by ad¬ vancing them in industry and commerce as well as literature. Boileau, Racine, Moliere, and the other brilliant thinkers of the age, were digging the grave for the autocracy that their ™yal master was so sedulously upbuilding.

J-u 1?ldc*le class was also advanced in the Church. All these factors were with the sover¬ eign ; but the very fact that they were indicated a breaking away from the old policy of the value of blue blood and long ancestry. The king even raised illegitimate children of princes and nobles to power. Brilliancy, debauchery and profligacy distinguished the court, while the peasantry remained in ignorance, wretchedness and poverty.. The long and costly wars of the reign of

Louis XIV and the extravagance of the court, coupled with the vast scale on which royal palaces and other edifices were con¬ structed, had already, toward the end of the reign of the king, placed the country deeply in debt. Monopolies, trade and commerce re- sanctions and the quartering of soldiers on the populace increased this misery of the peas¬ antry and the middle classes ; and the constant plundering of the unpaid military made life unbearable. In many districts the peasantry had become almost savages. But the king was set against all reform. Fenelon, exiled to Greece for suggesting the improvement of the condition of the masses, from there proclaimed that governments are made for the governed,®

one of the first signs of the coming revolution. This excessively angered the king, who did not know that he was himself playing the prin¬ cipal part in the greatest tragedy of the age (though he thought it a royal drama) when he was fostering the brilliant lights of poetry, drama, history, art, philosophy and science; for they embodied the idea of liberty of thought which was destined to ultimately destroy the doctrine of autocracy and the divine right of kings.

The very power that the king was putting into the hands of the middle class to. serve as a foil against the ambitions of the princes and nobles, while it served his day, built up a re¬ sistance on the part of the masses against which royal autocracy was pitiably powerless when the great test came in 1789; for the mid¬ dle classes had got rich and ambitious and were strongly imbued with the idea of protecting themselves and their own interests and property from exactions on the part of the nobles and the sovereign. The sum of the national intelligence had risen enormously during the reign of Louis XIV and with it the power of national resist¬ ance had increased proportionately. The very organization that the king had given to liter¬ ature, with Colbert as Minister,, in order to control it, gave it a dignity and influence that it had never before possessed and enabled it to reach the great and growing middle class. The boldness of the writers and thinkers of the age presaged the coming revolution. Moliere, Boileau, La Fontaine, Voltaire were names that were on every one’s tongue. They attacked the vices and follies of their age and respected only what their royal patron wished respected. Thus, in the reign of the most absolute of all French monarchs, the leaven of democracy was industriously working; and the. independence of thought shown by the great writers of the court was interpreted by

each community and each separate interest in its own way and from its own point of view ; so that, when the climax of the great drama came, the French intelli¬ gence had been quickened to a point perhaps greater than that of any other nation in Europe. This explains the sudden and ceaseless activity of the French people following the fall, of the Bastile and the brilliant organization, innova¬ tions in government and sociology and masterly strategy in war with which they . astonished the whole civilized world. All this was the legitimate result of that spirit of inquiry which began early in the reign of Louis XIV and continued with increasing impetus throughout the reigns of his successors. It was during this long period that was born the eager, earnest, venturesome, serious, witty, sympathetic France such as we know her to-day; for the autocratic sovereigns of the French people were working better than they knew or suspected.

The Struggle with Autocracy. — The death of Louis XIV left as heir to the French throne a boy of only five years of age, and the regen¬ cies and ministers of his minority worked to¬ gether unconsciously to discredit the system of autocracy which the late sovereign had built up during his long reign. The dignity and regal splendor of the court gradually disap¬ peared and cynicism, debauchery, frivolity and reckless extravagance took their place. Pleas¬ ure of the worst kind became the great god

of the French court and of the nobility; and this evil permeated the body of the ever-increas¬ ing wealthy middle class. The debt of the court and the nation increased by bounds. The autocratic judicial system which Louis XIV had attempted to force upon the nation had worked as all artificial systems are apt to work ; but in this case the effects were especially bad be¬ cause the system was disorganized, disjointed and ineffective owing to a bewildering diversity of laws and customs which still held sway over France. In fact autocracy in the administra¬ tion of the law was only a name in so far as any intelligent sovereign direction or adminis¬ tration was concerned. None of the officers of the law were paid by the sovereign and they were forced to help themselves as best they could. The French courts, as a result, became known as the <(halls of robbery.® Over 300 different customs or series of local law codes were in use in France at this time. Hence the whole nation, with the exception of the sovereign and the nobility, groaned under this burden of legal injustice and oppression, which had made the securing of justice the most ex¬ pensive thing in France. Corruption became so great in every branch of the royal and court service that only a comparatively small part of the money extorted from the public in the way of taxes, fees and fines ever reached the royal treasury, though the odium of the system

rested upon the Crown which had farmed out the collection of its revenue. The revenue farm¬ ers got their concessions through favorite cour¬ tiers and powerful nobles. Thus courtiers, nobles and revenue farmers grew rich at the expense of the taxpayers, who consisted of the middle class, since the lower class was too poor to pay anything and the nobility and the clergy found means to avoid contributing to the purse of the nation and the court.

The Church itself was in a position which tended to divide it against itself ; for the upper clergy alone profited by the exemption from taxes, the control of a large part of the land of the country and special privileges extended to the Church by the court. The lower clergy were miserably poor, all the lucrative and hon¬ orable offices in the Church being almost alto¬ gether in the hands of the nobility or sons of rich middle class families who had wealth enough to pay for special privileges and digni¬ ties. Thus, on the eve of the Revolution, France was in reality divided into two nations which had nothing in common with one an¬ other, the possessors and the dispossessed. So great had become the gulf dividing these two classes ; so heavy the burden and so grievous the condition of the dispossessed, that it was only a question of time when the slumbering fires that burned in the subterranean depths of the nation should burst forth into volcanic passion. This discontent of the masses, was increased on account of the burdens and inter¬ ference under which industry and commerce groaned and the restrictions placed upon the right to work at whatever trade or occupation one wished to. The possession of nearly all the land of the country by the Crown, the nobles and the clergy and the excessive taxes on all rented land had led to the rapid de¬ cline of agriculture and to the consequently increased poverty of the agricultural popula-

tion and the control of agricultural products by a few unprincipled jobbers working in the interests of a handful of nobles with special privileges from the court, ruined the peasant farmers and frequently brought on want in a land of plenty. This general misery of the masses and exploitation of the industrious middle classes soon began to have its influence upon the court and the government which were unable to obtain money enough to meet the growing expenses of the administration of the affairs of the nation and the increasing robbery of the public treasury. Finally, in 1787, the court, to avoid calling together the States- General, through which alone the national purse

could be reached, finally compromised matters by calling an Assembly of the Notables, who were more inclined to look after their own interests than to help the court out of its financial troubles. Brienne, the Minister of the Crown, won over the Parliament to his ends by promising to call together the States-Genera'l (1788) ; and this was actually done the follow¬ ing year by his successor, Necker, because of the financial troubles of the government. But, in the meantime, the whole interest of the nation had become centred in the meeting of this the only representative body of the whole French people. The States-General met in 1789, under very different conditions from what it had assembled in the past; for now the Third Estate, as the representative body of the non¬ nobles was called, had become the representative of a rich and powerful section of the country which had been paying the bills of the nation for many years. The interest of the masses in their representatives, as the members of the Third Estate were called, increased from hour to hour. Clubs of many kinds were formed in Paris and all the more important towns of the country to further the interests of the middle classes. These were the forerunners of the democratic and revolutionary clubs that became so notable after the fall of the Bastile. The public unrest found a leader in Mirabeau, a brilliant orator and man of initiative, force of will and character, who was trusted by the people, notwithstanding his noble birth, because of the determined stand he had taken in their behalf. Fie went about the country stirring the people, by his fervid eloquence, to action in defense of their rights.

The States-General opened at Versailles on 5 May 1789; and they soon proved that they were in no mood to play the role the Crown had set apart for them. After considerable wrangling between the three orders which com¬ posed it, the clergy, the nobility and the Third Estate, the deputies of the latter declared them¬ selves a ((National Constituent Assembly® (17 June 1789). This was done in protest against the action of the other two orders in refusing to act with them in any measure or in any way, holding themselves above the representa¬ tives of the people. This action was equivalent to a declaration of war in the sense that it meant that the commons had decided to main¬ tain their rights . at all costs and against all opposition. Their attitude coupled with the evident joy with which it was welcomed by the populace of Paris and the surrounding c:ties and country aroused the court and the nobility to their own danger; and they met in secret

session, locking the doors against the Third Estate. The latter at once met in a tennis court, where all the members solemnly swore not to disband until they had secured a constitu¬ tion for France. This was the signal for the lower clergy, who formed the great majority of the

priests, to join the commons and to throw open the church of Saint Louis to them. There the assembly, though warned by the king to disperse, declared the inviolability of its members and defied the sovereign. Louis XVI realizing the danger of the situation, persuaded the other two orders to yield to the Third Estate; and a truce was patched up. The commons had won out. But the contest was not over. The court threw troops around the city. The following day all Paris showed that it was with the Third Estate in no half¬ hearted way; and the electors of the city con¬ stituted themselves an administrative body (13 July). They formed a guard of the citizens which, in a few hours, reached 80,000 armed men. . In fear, the king withdrew the troops.. Again the commons had won out. The following morning the excitement of the popu¬ lace, which already realized its power, reached fever heat. The mob attacked the Bastile, the emblem of autocratic power and oppression, and captured it; murdered the provost and several others, and putting their heads on pikes marched in parade about the city. The Revolu¬ tion was in full swing; and the court and the nobility were powerless to withstand it, for arbitrary government had long ago deprived the upper classes of all organization and power of resistance.

The news of the fall of the Bastile spread rapidly over the whole country. In fear the nobles hastened to relinquish all their privileges, seigniorial, ecclesiastical and jurisdictional; and their ancient rights were restored to the mu¬ nicipalities. The day might have been saved for the royalists had they known how to handle the situation. But they thought only of regain¬ ing their lost privileges by force of arms; and to this end they plotted in secret. This came to the ears of the people and they hastened to \ ersailles and forced the king to accompany them to Paris, and with h m went the queen ?nd the assembly. All three found themselves in the hands of the revolutionists (6 October), who. from this time on, with justice, continued suspicious of the good faith of the king and the court. On the anniversary of the taking of the Bastile an immense crowd assembled in the Champs de Mars took the oath of fidelity to the. new Constitution; and among them were the king and Lafayette, commander of the National Guards of the kingdom. The excesses of the ultra-revolutionists increased from day to day and the plottings of the nobility and the court kept pace with it. Thus the two extremes of French society drew rapidly apart.

I he queen, Marie Antoinette, urged the king to assert his rights. The populace replied with the establishment of all kinds of clubs which be¬ came more revolutionary from hour to hour. Finally the royal pair decided to escape from rrance and to appeal to the sovereigns of Europe to help them restore the kingly power m France (20 June

1791). They had already had the promise of large bodies of troops from Austria, Spain, Prussia, Switzerland and Pied-

mont. The royal household were stopped in their flight, at Varenne, and sent back to Paris under guard. As a result of this attempted escape, the king was deprived of all power and placed under guard (17 July 1791) ; but on his accepting the new Constitution and solemnly swearing to strictly observe it, he was restored to power (14 Sept. 1791). There is no reason to believe that the king did not mean to keep his word. But he was not a strong enough character to force the nobles to keep faith with the Revolution.

The Terror. — The demands of the Con¬ stituent Assembly and the Constitution of 1791 were moderate and wise; France might have been saved the terrible days that followed had some strong leader arisen among the nobility; but the curse of absolutism long continued had rendered them powerless and inert and in¬ capable of clear thinking and leadership. So all the activity and genius for leadership re¬ mained with the masses. This was unfortunate, for it assured the throwing to the winds eventu¬ ally of all moderation. The new Constitution formed a basis upon which all parties might have easily agreed and worked for the restora¬ tion of order throughout the nation. It provided that there should be but one legislative assem¬ bly to hold office for two years, after a general election. In it were vested the sole right to make all laws and to carry on the war. The Constitution also provided for universal suf¬ frage. These were very moderate provisions ; but they were looked upon with great d.sfavor by the foreign governments of Europe which were still strongly royalistic. This gave en¬ couragement to the plotting nobles at home and to the non-juring priests and emigres abroad who stirred up the growing feeling against France in the foreign courts. A coalit.on of foreign kings was formed against France and their troops crossed the French frontier. In vain Louis appealed to them to withdraw the troops; they refused, and war began, a war that was to last 23 years, to engulf all Europe and to change the very nature of the French government and people. France, on her part, declared war against Austria on 20 April 1792. The king, while pretending to side with the French people, was secretly treating with the ‘ coalition. The Duke of Brunswick, command¬ ing the Prussian army, issued a proclamation to the effect that he was coming to restore the king of France to his ancient power and d gnity; and threatened dire punishment on all

who dared oppose him (26 July 1792). The mob rose in Paris, and marching upon the Tuileries forced the deposition of the king and his imprisonment. This placed the ultra¬ revolutionary Commune of Paris, with Danton at its head, in control of the affairs of the nation. The report of the success of the Prus¬ sians in the north of France was the signal for the first outburst of ferocity on the part of the Commune, which proceeded to massacre wholesale prisoners of all classes, to the cry of ((first get rid of the enemy at homeˆ (2-6 September). This was followed by the procla¬ mation of the republic by the Convention (20 September). Louis XVI was tried by the Con¬ vention for conspiracy aga'nst the nation, con¬ victed and executed (21 Jan. 1793). This act brought England and the Netherlands into the

coalition against France, and it created among the political parties in France itself an un¬ limited distrust of one another. Th.s resulted in the most frightful atrocities perpetrated in the name of the safety of the republic. The guillotine became the best-known public office in France; untold victims were fed to it in all the cities, among them being Marie Antoinette, the queen (16 Oct. 1793). After the death of the king, the Convention became divided against itself ; and the two dominant parties in it, the Girondists and the Montagnards, contended for supremacy and for different political aims, the former seeking to restra n the excesses of the Revolution, the latter seeking to push them to the extreme. The whole south of France rose against the Convention, which replied by sup¬ pressing liberty of trade,, commerce and action and by throwing into prison over 300,000 sus¬ pects. The Girondists having gained the upper hand in Paris and the greater part of the country began to quarrel among themselves; one party wishing to make the Terror the gov¬ ernment of all France and the other wishing to restrain the ferocity of their own followers. The Terrorists gained the upper hand, and Danton, Herbet and their followers were ar¬ rested and executed at the instigation of Robespierre and his followers. The Terror be¬ came madness, and over 1,200 people were executed in one month. Robespierre became alarmed at the tempest he had h'mself stirred up and attempted to restrain it, with the result that the Commune ordered his arrest and execu¬ tion together with that of many of his followers (27-2 8 July 1794). This final excess was fol¬ lowed by a reaction and the Convention sup¬ planted the Commune. The prisons were opened ; the Terror began appreciably to dimin¬ ish ; and the principal authors of the massacres were punished or exiled. The government of the Convention obtained notable military suc¬ cesses against the allies and the French rebels in the south everywhere except on sea. One of its first acts had been to abolish the Constitution of 1793 and to vest

the execu¬ tive power in the Council of the Ancients ; and the Council of Five Hundred, the duty of the latter being to propose the new laws, and that of the former to pass upon them and to accept or reject them (1795). In the meantime, royalist plots were thickening and the result of one of these was to incite the National Guard to attack the Tuileries where the Con¬ vention was in session. Napoleon Bonaparte, then a lieutenant, defended the place, and put the Guard to rout. This feat and his previous services won him the command of the Army of the Interior and shortly afterward that of Italy. The government of the Directory continued to grow weaker and more incapable, and its in¬ competency had already plunged the countiy in debt, the emigres who had in great num¬ bers plotted almost openly for the overthrow of the revolutionary government returned in large numbers. The armies of the republic, which were republican to the core, had been almost universally successful. At this important moment Napoleon concluded a very advanta¬ geous peace, and thus became the hero of the

hour (17 Oct. 1797). .

Napoleon on the Scene. — The mcompe- tency of the Directory resulted in another com-

lunation of European powers against it, includ¬ ing England, Russia, Austria, Germany, Tur¬ key, Naples, Piedmont and the Barbary States; and the French government was forced to resort to conscription to obtain an army with which to meet the threatened danger. The wonderful successes of the comparatively weak forces of France against this strong coalition managed to keep alive the Directory but did not in any way help it to mend its ways, which had long ago become hopeless. The return of Napoleon to France in 1799 turned all eyes toward him as the coming savior of the nation. On 9 Nov. 1799, the Council of the Ancients ordered the removal of the two consuls, confiding the task to Bonaparte ; and on the following day he cleared the Hall of the 500 who protested against his action ; and from that moment he was dictator of France.

Bibliography. — Aulard, (Histoire politique de la Revolution Frangaise* (Paris 1901) ; (15 vols., Paris 1809-24); Kropotkin, P. A., (La Grande Republique* (Paris 1909) ; Mahan,

(Influence of Sea Power upon the French Re¬ public and Empire* (2

vols., Boston 1892) ; Marty, (La demiere annee de Marie Antoinette* (Paris 1907) ; Michelet,

(History of the French Revolution* (2 vols., New York 1886) ; Quinet, (La Revolution* (Paris 1878-85) ; Rose, Revolutionary and Napoleonic Era* (New York 1897) ; Sorrell, (L'Europe de la Revolution Frangaise* (8 vols Paris 1885-92) ; Sarolea,

John Hubert Cornyn, Editorial Staff of The Americana.

FRENCH REVOLUTION, The. Every¬ one knows the story how the manuscript of the first book of Carlyle's masterpiece,

everyone does not know how Carlyle took the loss. Mill and Mrs. Taylor went together to tell him the news. It was a long and painful interview, for Mill most injudiciously stayed talking for three hours. All through the ordeal, Carlyle's whole endeavor was to relieve Mill's distress at having caused such an irreparable loss. His own distress came later when the visitor was gone. The «ill-bred Scotch collie-dog,** as he had been called, played the part of a very chivalrous gentleman. No Chesterfield could have done more. Then, consoled by his admirable wife, he sat down and rewrote the whole book, a marvelous feat of memory and determination.

The completed work has been called drama rather than history; and the usual advice to the tiro is to read some plain forthright nar¬ rative of the events of the Revolution before attacking Carlyle's version; but a very bare outline will suffice. If the reader but surrender himself to the poet-historian's dramatic method and rouse his mind to co-operate, he will come to know this period as he can know no other; for Carlyle will make him live in the heart of it. This most artistic of all Carlyle's works is cast on the lines of a great tragedy with a definite beginning, middle and end. The cur¬ tain rises on the room where Louis the Well- beloved is dying of smallpox, and falls on the streets of Paris cleared of the Revolution by Napoleon's «whiff of grape-shot.** The cen¬ tral catastrophe is the violent death of the false, effete, bankrupt ancien regime. Carlyle real¬ izes the events himself so strongly that he almost persuades the reader he is a living wit¬ ness of the scenes portrayed. Urged by hunger, the women of Paris stream out in long pro¬ cession to Versailles and bring the royal family back with them, «the baker, the baker's wife, and the baker s. little boy,** as they call them ; for the people still have faith in their king's, power to relieve their distress. At the time, it seems no more than another bread-riot. The reader is not conscious of the implications or consequences of this act, just like any ob¬ servant

Parisian of the time. But events march swiftly on; the net of fate tightens around the luckless king and queen ; they become prisoners; they must stand trial; they must set their heads under the axe of the guillotine. Equally vivid is his portraiture of the actors in the great drama, Mirabeau, Danton, Robespierre, Marat, for Carlyle pos¬ sessed what his friend Emerson called «por- portrait-painting eyes,** which were as effective in dealing with the past as with the actually visible present.

Carlyle's own account of its composition is the best criticism. «It all stands pretty fair in my head, nor do I mean to investigate much more about it, but to splash down what I know in large masses of colours, that it may look like a smoke-and-flame conflagration in the distance, which it is.** When he had completed the manuscript in January 1837 he wrote to Sterling: (

tunities, political and religious views, even when he does not try to make history fit a theory. Other histories of the Revolution, such as Taine's, are stronger in analysis of the origins and causes of this cataclysm ; but Carlyle succeeds in giving back the actual im¬ pression the Revolution made upon the world at the time, the impression of storm and earth¬ quake, volcano and eclipse. Nor must it be inferred that his work was superficial. It was based on (

"This book gave Carlyle at a single step his unique position as a man of letters, w says Carlyle's friend and biographer. It established his reputation as a man of extraordinary gifts among the greatest of the time. Dickens car¬ ried a copy of it with him wherever he went. From it he derived the inspiration for (A Tale of Two Cities. > Southey read and reread it six different times. Thackeray welcomed it in an enthusiastic review. Even Jeffrey, an out¬ spoken critic of the old school, admitted its success in the teeth of all the rules and precedents.

Dr. J. Holland Rose, the learned authority on Napoleon, has produced an annotated edi¬ tion of (The French Revolution ; but per¬ haps the most illuminating aid to the under¬ standing of this masterpiece is Mr. Edmund J. Sullivan's graphic interpretation of the text in a remarkable series of symbolic designs for the two-volume edition of Chapman and Hall, 1910. The genius of Carlyle is matched by the art of this master of black and white.

Archibald MacMechan, Professor of English Literature, Dalhousie College, Halifax, N. S.

FRENCH RIVER, Canada, stream in On¬ tario. It drains Lake Nipissing and empties into the Georgian Bay of Lake Huron after a course of 55 miles. For 150 years it was the regular route to the upper lakes, and is noted for its magnificent scenery.

FRENCH SCHOOL OF FORTIFICA¬ TIONS. See Fortifications.

FRENCH SHORE. See Newfoundland.

FRENCH SOMALILAND. French So¬ maliland is situated on the east coast of Africa to the north and the south of the Bab-el-Man- deb straits; it is bounded at the north by the Ras-Doumeirah, which separates it from the Italian possessions, at the south by a line run¬ ning from the Haadou wells to Gueldeissa, which separates it from British Somaliland, and on the west by Abyssinia. The French first set¬ tled in Obock in 1858, following a voyage under¬ taken by M. Henri Lambert, French consular agent at Aden, to Zeilah and the Bay of Tad- jourah to purchase a port at the entrance to the Red Sea in anticipation of the opening of the Suez Canal. Ibrahim Abou-Becker, one of the principal chiefs of the country, whom he rescued from the Sultan Hodeidhah's prison during this voyage, offered, as a recompense for this service, to cede to France the terri¬

tories of Obock. Unfortunately M. Henri Lam¬ bert was murdered near the Mushah Isles on 4 June 1859, and his work was only taken up again two years later by Capt. Fleuriot de Langle. This officer entered into negotiations with Ibrahim Abou Becker, punished the mur¬ derers of Henri Lambert, and drew up the treaty of 11 March 1862 which gave France the port of Obock and the territory situated be¬ tween Ras Doumeirah and Res Ali in consider¬ ation for a sum of 10,000 thalers. The early stages of the colonies were extremely modest, comprising a police station, a few native huts and an improvised jetty — this was during the first year of occupation in 1883. But little by little, thanks to the merchants, shopkeepers, na¬ tive traders and the inhabitants of Obock who all helped in the effort to develop the country, there sprang up on this hitherto uncultivated and desert plateau, a little, city, peopled by 4,000 to 5,000 souls, active and enthusiastic, and this city was full of vitality in 1895. It soon be¬ came evident that Djibouti, on account of its port, was best suited for navigation and was capable of linking up business relations with Abyssinia. Djibouti was accordingly officially made the capital in 1896.

Topography. — The coast is flat, dry, mo¬ notonous, formed of hardened sand cliffs with waterless rivers. In the centre is the Bay of Tadjourah with the port of Obock which is merely a hamlet of a few hundred inhabitants ; the small station of Tadjourah, the watering stations of Amabo and Sagallo to the north of the bay, and Djibouti at the south. In the interior, up to a line parallel to the coast and distant about 90 kilometers (61 miles), where the French hinterland finishes, small plateaux are found, and. farther on is an undulating country with hills leading to the heights of Harrar and between which is the Aouache.

Climate.— The climate is of an extreme dryness (not however unhealthful) ; sunstroke only is to be feared, but it is easy to take pre¬ cautions against it. Thanks to the railway, it is possible to go from Djibouti to Dire-Daoua in eight hours, thus enabling the inhabitants to get a breath of fresh air and take a few days rest at Dire-Daoua or Harrar, which really con¬ stitute for the inland a natural sanatorium.

The inhabitants belong to two distinct races : the red African race (Danakils or Somalis) and the white Ethiopian race (Gallas). Somali¬ land will never be an agricultural producing country as vegetation is practically nil with the exception of a few European vegetables, some date and coconut plantations and fruit trees; it is merely a trading centre and the natural route for transportation from southern Abys¬ sinia. A few industries have been established in Djibouti, but it is trade alone which must make the fortune of this French colony on the Red Sea. The most important product is coffee which grows in a wild state in Abyssinia and Moka, these being but a short distance from the Arabian coast. After coffee there is the ivory trade, civet, sheepskin, goatskin, ox¬ hide, raw animal wax and gold dust. Trade on the Somaliland coast, that is at Djibouti which has practically the monopoly, amounted . in 1913 to 81,620,991 francs ($16,324,198), of which 33,916,843 francs ($6,783,368) were imports and 47,704,148 francs ($9,540,809) exports. The

figures for 1916 were 80,864,011 francs ($16,- 172,802) being made up of 39,238,856 francs (87,847,771) for imports and 41,625,155 francs ($8,325,031) exports. It is the trade done in Abyssinia which alone keeps business going in Somaliland. Products from abroad or destined for abroad account for three-fourths. Four-fifths of this trade is however carried on under the French flag, because on the one hand

the large French ships alone touch at Djibouti and on the other hand coasting between Aden and Djibouti is carried on exclusively by the French.

The territory of Cheil-Said should also be mentioned. Here merchants from Marseilles established a coal depot in 1868. The position, which has an area of 150,000 hectares (446,000 acres), is a good one from a maritime point of view as it dominates the Strait of Bab-el- Mandeb.

FRENCH SPOLIATION CLAIMS.

During the great European wars from 1793 on, French privateers assailed neutral commerce, of which the American was chief, under various pretexts or without any; one was that the United States had violated the treaty of 1778. In the virtual French- American war of 1798-99, their privateers about the West Indies and elsewhere made prize of a great quantity of American shipping, for which our commission¬ ers vainly endeavored to obtain indemnification. Finally, in the treaty of 30 Sept. 1800, as there was no hope of getting the money from Napo¬ leon, the United States for other considerations waived the claim. From then on, even though the cases were referred in 1885 to the Court of Claims, nearly every year saw a bill before Con¬ gress to pay these claims, and at various times a vote for it was obtained, which was vetoed by the President in each case — Polk, Pierce and Cleveland. The court finally adjudicated sev¬ eral thousand claims, and awarded some $4,800,- 000. Consult Carnegie Endowment for Inter¬ national Peace, Division of International Law, Pamphlet No. 25, (Opinions of the Attorneys- General and Judgments of the Supreme Court and Court of Claims of the United States Re¬ lating to the Controversy Over Neutral Rights between the United States and France > (Wash¬ ington 1917) ; id., Pamphlet No. 24, ‘Documents Relating to the Controversy over Neutral Rights between the United States and France 1 797— 1 800 } (Washington 1917) ; United States, Senate, Claims Committee, ‘French Spoliations etcP (Washington 1912) ; United States, War Claims Committee (House), ‘Veto Messages of J. K Polk, F. Pierce and G. Cleveland of brench Spoliation Claims* (Washington 1912).

FRENCH SUDAN, Africa, the name for¬ merly given to a large tract of country in the western Sudan, including the upper basin of the Senegal and the countries watered by the Upper and Middle Niger ; bounded on the west by Senegal, on the south partly by the French territory of Rivieres du Slid, and on the east by independent tribes and by British territory. Officially it was divided into “annexed terri¬ tories, ** mostly in the western part, and pro¬ tectorates. The entire

region now forms a part of the Government General of French West Africa.

FRENCH TAPESTRY. See Tapestries.

FRENCH WEST AFRICA. A French government-general comprising the colonies of Senegal, French Guinea, the Ivory Coast, Da¬ homey, Upper Senegal-Niger. From the Rio de Oro to English Nigeria, the West African colonies are scattered over the west coast of Africa, separated from each other by various foreign colonies. For instance, Casamanca is separated from Senegal by English Gambia, and between Casamanca and French Guinea we find Portuguese Guinea. Then there is Sierra Leone and Liberia between French Guinea and the Ivory Coast which itself is separated from Dahomey by the Gold Coast and Togo. Yet although the French colonies from the Rio de Oro to Nigeria do not form an uninterrupted territory, they none the less possess an advan¬ tage over certain other foreign possessions which are completely enclosed, in that every one is within the loop formed by the Niger and has access to the common hinterland where all meet. It was at the commencement of the 14th century that the west coast of Africa began to be explored and colonized by the French. In 1365 some Dieppe sailors settled on the Senegal and Sierra Leone coasts ; the first establish¬ ments, founded at great expense, soon disap¬ peared with the exception of Senegal. Riche¬ lieu by forming colonization companies, gave a new development to these possessions and such companies administered Senegal, under different names, until 1758, when the colony fell into the hands of the English.

Retaken in 1779 by the Duke of Lauzun, Senegal was thereafter governed by agents ap¬ pointed by the king. The capitulation of 14 July 1809 again placed the colony under English control, but it was restored to France in 1817. Up to 1855, however, France merely occupied different points on the coast. After the dis¬ astrous Franco-Prussian War of 1870-71, French public opinion was not properly in¬ formed as to the value of French West Africa, and, consequently, was not particularly imbued with the idea of expansion in these latitudes. Colonel Faidherbe's exploits and the progress made by French domination in the Saharean Oasis regions, gave food for reflection as to the advantages to be gained, from a political and commercial aspect, by reaching the Niger, despite the bad impression caused through the unfortunate expeditions of Mungo-Park and Lander. Faidherbe, moreover, was popular on account of the services he had rendered in the country's defense and his victories in Africa. But whilst the time was ripe for French ex¬ plorations and conquests in Africa, the objec¬ tive changed on several occasions. At first, the only

desire was to extend beyond the Valley of Senegal into the Valley of the Niger; then came the feverish attraction of the wonderful Sudan which, conquered during the early cam¬ paigns in its northern part and henceforth illustrious with the names of Gallieni and Borgms-Desbordes, excited no less public en¬ thusiasm despite some crying disappointments 1 hen the view from the valley of the Niger and the more meridional regions, better watered better cultivated and peopled, modified first im¬ pressions and took attention away from the tracts of land nearest to Upper Senegal. Finally the riches of Guinea, Fouta-Djallon, the Ivory Coast and Dahomey, became known, and the

spiiit of conquest and civilization could now speculate on these countries so varied and dif¬ ferent in aspect.

Shortly afterward, Captain Binger showed up the empty hypotheses concerning the Kong Heights and, removing the prejudice which gave to the Ivory Coast colonies and Dahomey the petty importance of coaling stations without distant relations with the hinterland, proved in 1887-89 that there were as many <(doors to the Sudan® as France possessed territory on the West African coast, from the mouths of the Senegal to those of the Niger; and the abso¬ lute necessity of joining up the whole of the Sudan, the Senegal and the Niger, the rivers at the south and the Guinea coast became ob¬ vious. From 1890 to 1901 (a period fertile in good results) a logical plan for colonial ex¬ pansion was methodically carried out. In Senegal, Guinea, the Ivory Coast, and later in Dahomey, successful efforts were also made for territorial expansion, similar care being taken to draw the rich products of the hinterland toward the ports. Hereafter no doubt could remain concerning the economical future of the re¬ cently acquired colonies. The future of the Ivory Coast hinterland was no longer uncer¬ tain since the capture of Samory by Captain Gouraud on 29 Sept. 1898, following on the cam¬ paigns of Colonel Archinard. Since the two expeditions resulting in the defeat of Behanzin (1892-94) and since the settlement of the latent conflict between Great Britain and France re¬ garding the borders of Lower Nigeria and Da¬ homey, the commercial future of the old king¬ dom of Dahomey could be unreservedly con¬ sidered. The Brosselard-Faidherbe, Madrolle and Paroisse missions had proved as regards the Fouta-Djallon the importance of a com¬ mercial route terminating at Conakry. Certain missions excellently carried out across the Sahara resulted in the

linking up of extreme South Algeria with the Kongo on the one side and French Sudan on the other.

While explorers traveled over the new re¬ gions, signing treaties with the native chiefs, and officers occupied (sometimes peaceably, sometimes by force of arms) territory which later on was to form French West Africa, French diplomacy did not remain passive, but turned these efforts to account to get the European Powers to recognize the countries placed under French influence. The Franco English treaties of 10 Aug. 1889, 5 Aug. 1890, 25 Jan. 1895, 14 June 1898 and 8 April 1904, were completed by fixing frontier boundaries in agreement with Spain (27 June 1900), Germany (24 Dec. 1885 and 23 July 1897), Portugal (12 May 1886) and Liberia (8 Dec. 1892 and 18 Sept. 1907). Hereafter from the south of Morocco and Algeria to the Tchad (

fighting. But whatever might be the extent of these disturbances and however painful the un¬ foreseen consequences sometimes are, regional troubles are always bound to arise, which, how¬ ever, by their very nature are easy to localize, if not so easy to repress, and it is not neces¬ sary to have recourse to those punitive expedi¬ tions of which Continental France, moreover, has never had the monopoly. From a geo¬ graphical point of view, the aspect of the coasts of French West Africa is very varied: the coasts are bordered with sand banks against which the waves break from Cape Blanc to the estuary of the Casamanca ; rocky and much cut up in Guinea; bordered with lagoons on the Ivory Coast and at Dahomey. French West Africa is relatively flat; the mountainous re¬ gion is situated in Guinea and extends from the Fouta-Djallon to the Kong country: this is the most salubrious part of the colony. West Africa is divided into two quite distinct river basins : the Senegal and the Niger, both of which have their source in the Fouta-Djallon and follow for some distance the same direction, the former toward Cape Vert where it flows into the sea after joining the Faleme and the Baoule and watering Kayes, Bakel, Matam, Salde, Podor and Dagana, — the Niger flows toward the end of the Gulf of Guinea which it reaches after describing a wide curve on which are situated Toulimandio, Koulikoro, Segousi- koro, Sansanding, Mopte and Kabara, one of the three ports of Timbuktoo.

The ethnography of West Africa is as yet difficult to determine in a scientific manner ; the type of white man we find there comprise the Berbers, who live in the desert zone and are called Touareg in the Sahara; there is a red African type composed mostly of Feulhs or

Foullenes from Senegambia, distant cousins of the Egyptian ((fellahs,® which is a mixture of the African negro type and the Berbers; finally, there is the black type of infinite variety from the Ouolofs, from Lower Senegambia, which represent the negro type in all its purity, the Sonikes, nomads, the Mandingues, intelligent but warlike and given to pillage, to the Achantis of the Ivory Coast, Dahomenians and Haoussas of Upper Dahomey.

In organizing the immense territorities which the valor of her explorers and the efforts of her politicians had assured for France, it seems evident that the fascination of empty words and the superstition of formulae were not al¬ lowed to prevail ; it would have been regrettable not to have resisted any such temptation when dealing with populations so greatly dissimilar as those of West Africa. When, in 1899, it was proposed to establish an embryonic or¬ ganization in what was later to be known as The Guinea, The Ivory Coast and Dahomey, it appeared necessary to separate them adminis¬ tratively from The Senegal to which they had been hitherto connected under the name of ((Southern Rivers and Dependencies.® But very shortly the mutual interests of the local governments became evident and a decree of 16 June 1895, wffich created the General Gov¬ ernment of French West Africa, instituted a supreme authority which could, by reaching a decisive opinion on the spot, make the general interest override any particular tendencies of such and such a colony of the group. But the transformation was insufficient, as was also

that effected later by decree of October 1902. It seemed an opportune moment to make a further step toward a more rational and profitable organization of the vast French West African possessions, and by a decree of 18 Oct. 1904, making the general government the instrument for the permanent direction and control of French West Africa by placing at its disposal, through the creation of a general budget, the necessary financial aid for its expenses in the common interest and to represent the civic dignity of West Africa, it was hoped that the general government would be able to develop the possessions in a normal manner.

The decree of 18 Oct. 1904 regulates the present organization of the general government. The immense territories to be controlled by the government have an extent of 3,913,250 square kilometers (1,510,795 square miles), comprising five colonies and a civil territory: —

1. Senegal, capital Saint Louis

2. Upper Senegal and Niger

3. Guinea, capital Koncary

4. Ivory Coast, capital Bingerville

5. Dahomey, capital Porto-Novo

6. Civil territory of Mauretania

The governor-general holds mandatory powers from the French Republic and his resi¬ dence is at Dakar. He is assisted by a council. The colonies forming the group enjoy admin¬ istrative and financial autonomy; each one is administered, under the superior authority of the governor-general, by a governor of the colonies whose title is lieutenant-governor and assisted by a secretary-general. The civil ter¬ ritory of Mauretania is administered by a com¬ missioner of the governor-general of French West Africa. In the organization of West Africa, the question of improving the moral and general situation of the natives has re¬ ceived the constant attention of the administra¬ tion. Evidence of this is found in the con¬ tracts passed between natives, in the improve¬ ment of the situation of natives, the organiza¬ tion of public education, the development of public hygiene and the medical aid rendered to the natives. West Africa is above all an agri¬ cultural country; it is therefore not surprising that agriculture has reached quite an advanced stage among these people so primitive in some respects. The produce of the land may be classed in two categories : agricultural prod¬ ucts and food products, or in other words, those which are cultivated with more or less care; and the products of the forests. First among the agricultural products figure the arachide, or peanut, which has so enriched Senegal and the cultivation of which even ex¬ tends to the Sudan. Practically the entire ex¬ portations of fruits and grains from Senegal to the Sudan consists of this product. If it is borne in mind that it was only about the year 1840 that this culture was started, its rapid development is seen by the export figures for the year 1913, which show, for Senegal, 229,961,605 kilogrammes (231,500 tons), for Upper Senegal and Niger, 8,577,135 kilo¬ grammes (9,175 tons), and for Guinea 3,541,106 kilogrammes (3,714 tons).

The climate of French West Africa is suit¬ able for producing cotton, the type of which has not yet been improved all-round, but which nevertheless can be used in the metropolitan workshops. From the

results already obtained

great hopes may be placed in the future of this cultivation. Upper Senegal and Niger, the Ivory Coast and Dahomey have, moreover, commenced to export a certain quantity of cot¬ ton. Dahomey exported in 1913, 171,173 kilo¬ grammes (376,580 pounds) of cotton wool and 37,740 kilogrammes (83,028 pounds) of unseeded cotton ; the Ivory Coast exported 18,221 kilo¬ grammes (40,086 pounds) of cotton wool and Guinea 60,517 kilogrammes (133,137 pounds) of unseeded cotton. Kapok exported about 33,000 kilogrammes (72,600 pounds). The da grows wild in the Sudan and produces beautiful fibres. The growing of agave has several times been seriously attempted by the Europeans in Sene¬ gal.

Sorgho or large millet has been greatly cul¬ tivated in the West African colonies; it has been said, not without truth, that ((millet is to Africa what rice is to Asia.® Another variety of millet is also found, the little millet or sania, or ((mil chandelle® (wax millet). There is also a fairly considerable local trade in rice, culti¬ vated more particularly in Upper Guinea, in Casamanca and in the inundated countries of the Middle Niger; there were 11,584 kilo¬ grammes (25,485 pounds) of rice exported from Guinea in 1913. Manioc is more especially cul¬ tivated in Dahomey, the Ivory Coast and in Guinea; at the present time it is only used for local consumption, but when seriously taken up as a commercial proposition it will give con¬ siderable traffic to the railways. Sweet potatoes are found everywhere. Maize is cultivated particularly in Dahomey and locally serves as a food, but its cultivation for exportation is only carried on by the natives and therefore -merits attention; the exports from Dahomey alone reached 13,256,193 kilogrammes (14,582 tons) in the year 1913.

Bananas form the principal food for the in¬ habitants of the Ivory Coast. Copra is ex¬ ported from the Ivory Coast and Dahomey. Coffee is a product of Guinea where the ((Rio Nunez,® with its rather small beans, of a dirty yellow with brilliant pellicles, is much appre¬ ciated on account of its special aroma, and on the Ivory Coast, where its export reached a figure of 10,637 kilogrammes (23,401 pounds) for 1913. The cultivation of cocoa, attempted with much success by the natives in the Eng¬ lish colonies of the Gold Coast and Nigeria, has been developed in Dahomey and above all on the Ivory Coast which respectively exported in 1913, 10,651 kilogrammes (23,432 pounds), and 47,190 kilogrammes (103,818 pounds).

Among the principal products derived from the forests, rubber holds

one of the foremost places, the territories producing it being Guinea, the Ivory Coast, the Sudan region and Casa¬ manca. No definite choice has yet been reached as to which rubber trees should be cultivated but it would seem that the Funtumia will give good results, and accordingly the administration has taken steps, principally on the Ivory Coast, to protect this tree against a too extensive ex¬ ploitation. The French markets of Bordeaux and Havre, new to this commerce, receive a fairly large quantity of African rubber, but Liverpool also receives an important supply. The exports for the year 1913 were the follow¬ ing: Guinea, 1,455,450 kilogrammes (3,210,990 pounds) ; Ivory Coast, 4,684,095 kilogrammes (10,305,009 pounds) ; Upper Senegal and Niger,

83,300 kilogrammes (183,260 pounds) ; Senegal, 90,421 kilogrammes (198,926 pounds) ; Dahomey, 5,105 kilogrammes (11,231 pounds).

The Ivory Coast and Dahomey are the colonies which export the greatest quantity of palmetto ; this is abundant in the coastal region which is not dominated by the large forests. During the year 1913, Dahomey ex¬ ported 7,971,220 kilogrammes (17,536,684 pounds) of palm oil, the Ivory Coast 6,014,460 kilogrammes (13,231,812 pounds), and Guinea 164,221 kilogrammes (361,286 pounds) ; for the same period Dahomey exported 26,371,438 kilo¬ grammes (58,017,163 pounds) of palm almonds, the Ivory Coast 6,949,206 kilogrammes (15,288,- 253 pounds), Guinea 5,172,165 kilogrammes (1 1,378,763 pounds), Senegal 1,901,024 kilo¬ grammes (4,182,252 pounds). Palm oil and palmetto are used principally in the manu¬ facture of soap and stearine and are dispatched to Marseilles and England; a considerable quantity of these products was also sent to Germany. Ivory Coast is the richest as regards forest lands. The forests in this colony only have been most carefully explored by M. Au¬ guste Chevalier, Directeur du Laboratoire d'Agromomie Colonial au Musee de Paris, who has made a thorough botanical classification of the different kinds of wood, and who estimates the wooded area at over 120,000 square kilo¬ meters (46,332 square miles). This area is very rich and valuable woods, the only ones which have been cultivated for many years, foremost among which is mahogany suitable for diagonal grained work and for decorative panels. Since then, many other samples have been experimented with and it now appears certain that commerce in general and the cabi¬ net-making trade in particular will find on the Ivory Coast, the former, woods supplanting oak and teak

which are lacking and of lengths and widths to which they have not been accustomed ; the latter, new woods of beautiful shades which will enable satisfaction to be given to all cus¬ tomers' tastes. Wood exports from the Ivory Coast amounted in 1913 to 52,700 tons, repre¬ senting a value of 5,000,000 francs ($1,000,000).

The kola business has been developed con¬ siderably by the natives and every day sees a more and more extensive use of it since the con¬ sumption of alcohol is no longer permitted on account of the growing prevalence of Islamitic beliefs. It is exported to Europe in ever-increas¬ ing quantities, as fresh fruit, to be consumed mostly in the form of extracts or wine tonics. In the year 1913 Dahomey exported 21,808 kilo¬ grammes (47,977 pounds), and the Ivory Coast 24,090 kilogrammes (52,998 pounds).

Karite is found practically all over the West African possessions but principally in Upper Senegal and Niger, which, by the Kayes Railway and the river Senegal, makes large exportations of this fatty matter extracted on the spot by the natives. The exportation of karete butter reached, in 1913, for Dahomey 169,841 kilogrammes (373,650 pounds), for Upper Senegal and Niger 27,565 kilogrammes (60,643 pounds), for the Ivory Coast 8,787 kilogrammes (19,331 pounds), and for Guinea 3,899 kilogrammes (19,331 pounds'). The ex¬ portation of karite almonds from Upper Senegal and Niger, exclusively reached 474,624 kilo¬ grammes (1,044,172 pounds).

Finally, gums, exuded by different trees of

the acacia genus, are concentrated at, and dis¬ patched from, one place, i.e., Saint Louis, from whence it is all shipped to France, the port of destination being Bordeaux. The exportation for 1913, for Senegal, amounted to 2,943,379 kilogrammes (3,238 tons), and for Upper Sene¬ gal and Niger 532,157 kilogrammes (585 tons).

Cattle breeding plays an important role, and is destined to play even a greater one, in the prosperity of the West African colonies. It is therefore necessary to encourage this in¬ dustry in countries where ˆhor i scarce, and with a view of procuring on the spot the neces¬ sary cattle for food for the European and the native. The principal centres are Senegal, the Sudan, Guinea and Dahomey, where horses, asses and bovidae are found. The bovidae are found more especially in Mauretania and Sudan Sahara. The raw skins of oxen, sheep and goat form an important exportation ; in the year 1913 exports amounted to 1,010,743 kilo¬ grammes (2,223,034 pounds) for Guinea, 802,- 931 kilogrammes (1,766,448 pounds) for Sene¬ gal, 211,405 kilogrammes (465,091 pounds) for Upper Senegal and Niger, and 50,333 kilo¬ grammes (110,732 pounds) for the Ivory Coast. The trade in wool from Macina (Upper Senegal-Niger) is relatively recent, but it is beginning, however, to be put on a proper com¬ mercial basis, and its exportation amounts to 250,000 kilogrammes (550,000 pounds).

Certain wild, birds (ostriches, herons, marabouts) furnish valuable feathers. Wax is prepared in Gambia, Casamanca, Boubdou and the sur¬ roundings of Thies and its exportation ex¬ ceeded 180,000 kilogrammes (396,000 pounds) in. 1913. The foregoing enumeration of the principal agricultural, forestral and animal products of French West Africa will give an idea of the variety of cultivation in the West African colonies, but although confidence can be placed in the future agricultural develop¬ ment of the colonies it must be recognized that no industry at present exists there in the real meaning of the word.

The West African colonies are far from being known from the point of view of geology and mineralogy, despite the highly scientific work of M. Hubert. The raw materials prin¬ cipally exploited are gold and salt. Goil is found in Upper Senegal where its production is estimated at approximately 800,000 francs ($160,000) yearly, and in Upper Guinea and the Bambouk region where gold from Faleme and Galam has been exploited since 1858 by the government. In 1913 the exportation of gold for this group of colonies amounted to 255,635 francs ($51,127). Salt is of two kinds: sea salt from the coast where the Gandiole salines constitute a fairly important output for Senegal ; rock salt from the interior to the north of the town of Timbuktoo. Each year there enters into Upper Senegal-Niger, emanating from the Sahel and Sahara, an average of 80,000 bars of salt. The mining industries of this group of colonies have been the object of special legislation both as regards prospecting and operation of mines.

The fishing industry ranks next to the min¬ eral industry. Fishing is at present practised over the entire west coast, but more particularly in Senegal and Dahomey. The coasts of Sene¬ gal and Mauretania have long ago been recog¬ nized for their ichthyological richness; the re-

suits of the efforts made to develop the fishing industry at the Levrier Bay are now an ac¬ complished fact; French fishermen are in¬ terested in fresh fish and the Crustacea to send to France, and the dry fish for African con¬ sumption. The exportation of dry fish, salted or smoked, reached 575,384 kilogrammes (1,265,778 pounds) in 1913. But it is not merely sufficient for West Africa to be abundantly provided from an agricultural point of view and for its soil to be stocked with riches. If the commercial movement of the colony has made rapid progress and if the financial situa¬ tion of French West Africa has constantly im¬ proved of late years, the cause should be

looked for in the persevering efforts made by the local administration to furnish this group of colonies with the necessary economical equip¬ ment for their proper development. The ports have been improved, the railways from Daker to Saint Louis, from Thies to Kayes, from Kayes to the Niger, have been constructed as well as the railways in Guinea, the Ivory Coast and Dahomey. It will therefore be seen that the dominating idea of the governor-general has been to open up lines of communication and to practise the policy of penetration by rail¬ ways. The results have been excellent inas¬ much as the general commerce, which in 1895, i.e., at the time the general government was created, amounted to 78,777,356 francs ($15,- 755,471), reached 10 years later 155,592*303 francs ($31,118,460). In 1913, the last normal year, the figure amounted to 277,718,152 francs ($55,543,636), made up as follows: 151,574,300 francs ($30,314,800), in importations, and 126,- 143,852 francs ($25,228,770) exportations. The figure fell in 1914 to 233,928,780 francs ($46,785,756) and in 1915 to 225,484,917 francs ($45,096,983). For 1916 a total of 300,013,474 francs ($60,002,694) is estimated, made up as 172,137,615 francs ($34,427,523) for importa tions and 127,875,859 francs ($25,575,171) for exportations.

FRENCH WEST INDIES. The French West Indies form part of that stretch of vol¬ canic islands which seem to connect North and South America. France possesses from the north to the south: the northern part of the island of Saint Martin, Saint Barthelemy, Guadeloupe and its dependencies, Desirade, Marie Galante, the Saintes Isles and Martinique. Martinique and Guadeloupe • — the two sister islands — hold the foremost place among the French Antilles.

Guadeloupe. — Guadeloupe was discovered by Christopher Columbus who, while making a second exploring expedition in the Atlantic, perceived on 4 Nov. 1493 an island which he named after the monks of the convent of Notre Dame de Guadeloupe in Estremadura. The island remained Spanish until .1635 when Du- plessis and Olive took possession of it in the name of <(la Compagnie de.s lies d'Amerique.® In March 1674 the colonization companies being in straightened circumstances the islands were made part of the royal domain, but the admin¬ istration of the king was interrupted from 27 April 1759 to 4 July 1763 by a first occupation by the English under the command of Admiral Moore and General Barington. On 21 .April 1794, during the Revolutionary period, the island was retaken by the English, only to be recovered on 2 June following by the delegates of the

National Convention, Victor Hugues and Chre¬ tien. A third and last

British occupation took place during the Wars of the Empire lasting from 1810 to 1816 when Guadeloupe was definitely restored to France.

Area and Topography, etc. — Guadeloupe, which has an area of 1,780 kilometers (583 square miles), is divided into two islands in¬ dependent of each other: Guadeloupe proper or Basse Terre and Grande Terre, separated by a stretch of sea about six miles in length and of a width varying from 90 to 300 feet. Basse Terre has the form of an irregular ellipse; it possesses many signs of its original volcanic state, there being still some active vplcanoes, like the Soufriere. Grande Terre is in the form of a triangle and the principal ports of the colony are found there: Pointe a Pitre, Moule, Saint Franqois, Sainte Anne and Port Louis. There are three districts in the island : Basse Terre, Pointe a Pitre and Marie Galante. Dur¬ ing winter, Guadeloupe is subject to severe atmospheric perturbations and is frequently dis¬ turbed by cyclones in August and September.

Commerce. — In order to form a correct idea of the traffic movements in the principal products exported, we must take the figures for a normal year and not one which has suffered from the war (the 1914 and 1915 returns amounted to 43,728,540 francs ($8,745,708) and 46,323,164 francs ($9,264,6 32) respectively). Moreover, it is not fair to take a year like 1913 when atmospheric conditions were very un¬ favorable — 38,462,419 francs ($7,692,483). We will therefore take the year 1912 which may be considered as normal ; the commercial move¬ ment amounted to 45,608,418 francs ($9,121,683), made up of 19,524,116 francs ($3,904,823) im¬ ports and 26,084,30 2 francs ($5,216,860) exports. Sugar-cane products hold the foremost place. The production of cane sugar has reached 39,000 tons, representing a value of 16,660,000 francs ($3,332,000 annually) ; the planters at present concentrate their efforts on better varie¬ ties and pay more attention to the extracting processes. The molasses exported in 1912 amounted to 714,000 litres (188,638 United States gallons) of a value of 103,000 francs ($20,600). Rum is exported to an amount of 9,697,000 litres (2,162,740 gallons) representing a value of 4,155,000 francs ($81,000). Coffee is grown more particularly in the middle region, having an altitude of over 600 feet ; the kind cultivated is the Arabian coffee or ((Le Liberia, w which at the best is used for grafting. The colony ex¬ ported 1,108 tons of coffee of a value of 2,605,- 000 francs ($521,000) in 1912. The cultivation of cocoa has been continually on the increase during the last 20 years, the export figure for 1912 being 925 tons valued at 1,400,000 francs ($280,000). Vanilla and vanilla products, cultivated more especially in Basse Terre, varies from one year to another; in 1912, 25 tons valued at

396,000 francs ($79,200), in 1913, 20 tons, in 1914, 11 tons, representing a value of 220,000 francs ($44,000). The fruit trade is mak¬ ing progress, although this ‘ still leaves some¬ thing to be desired; the principal fruits ex¬ ported are bananas (12,800 kgs., 28,160 lbs.), pineapples (156,077 kgs., 343,369 lbs.), coconuts (26,000 kgs., 57,200 lbs.). Commerce in dye- producing plants is declining. Rocou is ex¬ ported to an amount of 43 tons representing a value of 17,290 francs ($3,458) as against 88

tons in 1910 of a value of 63,000 francs ($12,600). Wood for cabinet making is ex¬ ported to an amount of 24 tons valued at 5,500 francs ($1,100).

Bulky foods (yams, potatoes, carribee cab¬ bages, etc.) are practically all used for local consumption. The administration has decided to encourage new cultures, principally the growth of coconuts and lemons, as much to provide against inconveniences caused by de¬ pendence on a single crop as to develop the resources of the colony. In normal times France receives nine-tenths of the production of the lands of the colony.

ˆ The dependencies of Guadeloupe include : Desirade, a rock of little productive capacity; Marie Galante with Grand Bourg, a fairly safe anchoring ground ; the Saintes Archipelago, a mass of rocks which have been given the name of ((The Gibraltar of the West Indies® on ac¬ count of their high strategical importance ; Saint Barthelemy and Saint Martin, of which France possesses two-thirds: Saint Franqois, Sainte Anne and Port Louis.

Martinique. — Martinique was discov¬ ered by Christopher Columbus on Saint Mar¬ tin’s Day. The Spaniards did not settle there and the natives remained in possession of the island until 1625. At this time Pierre Belain of Esnambuc, while returning from a cruise in the Gulf of Mexico, obtained from Cardinal de Richelieu authority to constitute the <(Com- pagnie des lies d’Amerique; on his return to Saint Christopher he endeavored to colonize the neighboring islands and landed at Martinique on 1 Sept. 1635. In 1650 the Compagnie des lies d’Amerique sold its islands for £60,000 to Duparquet who became their lord and master. On his death, war broke out be¬ tween the French and the Caribs, which ended in the extermination of the latter. In 1664 the Crown purchased the islands from the heirs of Duparquet

and ceded its rights to the Com¬ pagnie des Indes Occidentales. During the suc¬ ceeding years, Martinique was attacked by the English and the Dutch, which resulted in the dissolution of the Compagnie and the return of the islands to. the Crown. Cultivation was un¬ dertaken but very soon Martinique had other serious preoccupations and for more than a cen¬ tury was obliged to defend herself against the furious onslaughts of her enemies. In 1762 the island fell into the hands of the English who restored it to France one year later on the sign¬ ing of the Treaty of Paris, but at the price of the loss of Canada. In 1793 the Royalist party surrendered the island to the English who kept it until the Peace of Amiens was signed. The English reoccupied it during the Empire Wars of 1808-14 and finally during the (

Martinique which has an area of 987 square kilometers (385 square miles), the greatest length of which is 70 kilometers (44 miles) and the average width 31 kilometers (20 miles), is divided into two parts — two peninsulas united by the isthmus which is situated between the <(cul de sac® of Franqois and the (

of Fort-de-France. Its mountain range really consists of two high peaks, one in the north and one in the south, connected by a small chain of mountains much less in height. All these mountains, which bear the name of (

From a political point of view, Martinique is divided into two districts, the capitals of which were until 1902 Fort-de-France and Saint Pierre.

Commerce, Trade, etc. — Exportations amounted in 1913 to 28,896,814 francs ($5,779,- 362) out of a total trade of 51,041,129 francs ($10,208,225). In this total products from the land figure to an amount of 25,900,000 francs ($5,180,000). Suga r-cane is the principal crop of the island, the exportation for 1913 amounting to 40,000 tons, which is slightly higher than that of 1912. The exportation of rum, which occu¬ pies the second place in the trade of the island, amounted in value to about 7,000,000 francs ($1,400,000) in 1912, rising in 1913 to 12,000.000 francs ($2,400,000) for 18,823,000 litres (4,973, 026 United States gallons). Next in importance is the cultivation of cocoa which is exported in berries to an amount of 524 tons of a value of 1,071,000 francs ($214,200). Coffee beans are ex¬ ported to the amount of 9,587 kilogrammes (21,091 pounds), valued at 23,932 francs ($4,786). Vanilla hgu res for an exportation of 3,259 kilogrammes (7,169 pounds), repre¬ senting . 76,373 francs ($15,274) ; cinnamon 1,875 kilogrammes (4,125 pounds), valued at 1,234 francs. ($246). The fresh-fruit trade has not

yet attained that importance of which it is capable (40,675 francs, $8,135) ; the principal fruits exported being bananas (10,000 francs, $2,000); pineapples (15,000 francs, $3,000) and oranges (1,400 francs, $280). Oil from Indian wood is a fairly active industry, the results for 1913 being 2,649 kilos (5,827 pounds), represent¬ ing a value of 23,495 francs ($4,699). In the category of farinaceous products, fecula and potatoes show exportations of 11 and 77 tons, respectively. The manufacture of citrate of lime is no longer in the experimental stage and the results obtained are highly satisfactory, the exportation amounting to 2,000 kilogrammes (4,400 pounds). All the citrate is shipped to England.

France accounted for 51.4 per cent of the trade movement in Martinique in importations, and 93 per cent in exportations ; business with other countries amounts to 46.08 per cent and 3.78 per cent of the importations and of the exportations, respectively.

FRENCHMAN'S BAY, Maine, an ocean inlet in Hancock County, extending northward about 30 miles with a width of about five miles. It contains a number of islands, among them Mount Desert, . whereon is situated Bar Har¬ bor (q.v.).

FRENCHTOWN, Md., in the War of 1812. As part of the British operations on Chesa¬ peake Bay in 1813, Sir George Cockburn was sent to close its head. Establishing himself first

at the mouth of the Susquehanna, then on Elk River, on 28 April he sent 150 marines to de¬ stroy the stores at French town, a small village much used in the land transport between Balti¬ more and Philadelphia since the closure of the bay. They drove off the Americans and burned the stores and five vessels lying near.

FRENCHTOWN, Mich., Battle of, in the

War of 1812. Hull's surrender of Detroit threw the American frontier back to the line of the Wabash and the Maumee. The Maumee was defended by Fort Wayne, about 20 miles from the Ohio border, and the Wabash by Fort Harrison, a block-house standing near the site of the present city of Terre Haute, near the Illinois border. In September 1812, after the departure of Sir Isaac Brock (q.v.) for Niag¬ ara, these forts were attacked simultaneously by the Indians, but Zachary Taylor saved Fort Stephenson and Fort Wayne held out until re¬

inforcements arrived on 12 September under Gen. W. H. Harrison. The latter then divided his troops into three bodies to march by differ¬ ent routes to the Maumee Rapids, one of which forces, under Gen. James Winchester, after ex¬ periencing great hardships, reached the rapids 10 Jan. 1813, and there began to encamp. Two Frenchmen came to beg protection for French- town, Mich., a little village on the Raisin River, about 30 miles to the north and 22 miles south¬ west of Detroit. Winchester sent half his troops who, on 18 January, with small loss, drove the British and Indians from the town, which success so elated the troops left behind at the Maumee that Winchester led them to the town, encamping there on 20 January but fail¬ ing to take the usual military defensive measures. On the 21st the British commander, Gen. Henry Proctor, started toward the town with a force of 600 militia and 500 Indians under Round Head, making the assault on the American posi¬ tion the next day. Most of the American troops were in the open field and quickly succumbed, Winchester being among the captured. But a small body of Americans stoutly resisted be¬ hind a picket defense until Winchester, under Proctor's threat of burning the village and an Indian massacre, ordered them to surrender. The unwounded prisoners were sent to Malden but the wounded were left at Frenchtown un¬ der Proctor's promise of adequate protection. But Proctor failed to furnish protection and after his departure the Indians plundered the village, mutilated and scalped the dead, strip¬ ped the inhabitants of clothing and valuables and fired the houses, consuming the injured and the dead. The American loss was 934 killed, captured and massacred; the British loss was 24 killed and 158 wounded.

Had Proctor advanced to the Maumee Rap¬ ids he might have captured Harrison with his 900 troops and their artillery and stores. But Harrison burned the post and retreated to the Portage or Carrying River, about 18 miles to the rear, where on 1 Feb. 1813 he began the con¬ struction of Fort Meigs, before which on 28 April Proctor appeared with 983 regulars and militia and 1,200 Indians under Tecumseh (q.v.). On 1 May the British began the bom¬ bardment which lasted several days, but on 5 May were attacked on the north side of the river by a force under Brig.-Gen. Green Clay (q.v.) who had come to Harrison's relief. This force was almost annihilated by the British, but

Harrison made a successful sortie on the south side. The siege was continued for several days but Proctor's army was weakened by death and sickness and by the desertion of the Indians, and on 9 May he retreated to Malden unmolested by Harrison. On 20 July Proctor again at¬ tacked the fort but after vainly trying to draw Clay into ambush

decided to attack Harrison at Seneca on the Upper Sandusky, whither the latter had moved his magazine. Between Har¬ rison's troops and the British was a stockade called Fort Stephenson, defended by one can¬ non and 160 troops under Maj. George Cro- ghan (q.v.). Harrison ordered the evacuation of the fort but Croghan refused, and when the British attacked on 1-2 August not only re¬ pulsed them but inflicted such a decisive defeat that Proctor retreated to Malden. The British loss was 26 killed, 41 wounded and 30 missing, while Croghan lost only one killed and seven wounded. Soon afterward Tecumseh raised the siege of Fort Meigs and followed Proctor to Detroit. Harrison remained at Seneca until September, when he began the march that brought about, the battle of the Thames (q.v.). Consult Wiley and Rines, (The United States) (Vol. V, pp. 361-372, giving extensive bibliog¬ raphy) ; Adams, Henry, Administrations of Jefferson and Madison) (Vol. VII, pp. 72-115) ; histories of the war by Brackenridge, Lossing, Armstrong, McAfee, Richardson, Auchinleck, Perkins, etc.; Edwards, (History of Illinois5 and (Life and Times of Ninian Edwards-* ; Montgomery, Henry, (Life of Harrison5 ; Slo¬ cum, (The Ohio Country } ; Shaler, N. S., (Ken¬ tucky 5 ; Brown, S. R., Campaigns of the Northwestern Army5 ; Dawson, Moses, (Life of Harrison5 ; Brannan, (Official Letters5 ; McMul¬ len, (History of Canada5 ; James, William, (Military Occurrences5 ; Fay, H. A., (Official Accounts5 ; Knapp, (The Maumee Valley5 ; Williams, Samuel, 'Two Western Campaigns in the War of 18125 ; Dawson, (Battles of the United States5 ; Cooley, T. M., (Michigan5 ; Everett, (History of Sandusky County5 ; Howe, historical Collections of Ohio5; Atwater, Caleb, history of Ohio.5

FREND, William, English reformer: b. Canterbury, 1757; d. 1841. He was educated at Saint Omer, France, and at Cambridge Univer¬ sity. In 1781 he was chosen Fellow and became rector of Madingley in 1783. He was converted to Unitarianism in 1787, when he issued his Address to the Inhabitants of Cambridge to turn from the False Worship of Three Persons to the Worship of the One True God5 (1788). About 1790 he traveled abroad and on his re¬ turn published the radical pamphlet (Peace and Union Recommended to the Associated Bodies of Republicans and Anti-Republicans,5 which led to his trial and conviction for breaking the Statute De Concionibus. He was banished from Cambridge but remained a Fellow of the uni¬ versity until his marriage in 1808. From 1806 to 1826 he was connected with the Rock Life Assurance Company. He was active in every radical and popular movement of his time. He wrote, in addition to those mentioned above, thoughts on Religious Texts5 (1789); An Account of the Proceedings in the University of Cambridge against

William Frend5 (1793); (Scarcity of Bread5 (1795); A Letter to the Vice-Chancellor of Cambridge5 (1798) ; Prin¬ ciples of Taxation5 (1799) ; (The Effect of

FRENEAU

FRENSSEN

©Y

Paper Money on the Price of Provisionsˆ (1801) ; (Letter on the Slave Trade> (1817).

FRENEAU, fre'no-, Philip, American poet: b. New York, 2 Jan. 1752; d. near Freehold, N. J., 18 Dec. 1832. Graduated from Princeton in 1771, he was captured in 1780, during a voy¬ age to the West Indies, by an English cruiser, and his experiences while under detention he later recorded in (The British Prison-Ship.1* Having regained his liberty, he wrote much for the Freeman's Journal of Philadelphia. In 1790 he became editor of the Daily Advertiser (New York), and in 1791 of the National Ga¬ zette (Philadelphia). After an interval at sea he permanently settled in New Jersey. Freneau was the first national poet of America and a lyrist of real though uneven gifts. His elegy, (The Battle of Eutaw Springs, > was praised by Scott, who called it <(as fine a thing of the kind as there is in the language.® During the Revo¬ lution he was active in satirical verse. His work attests his extensive culture ; and though it conforms in the main to the conventions of the 18th century, it does not lack distinction. He wrote also several volumes of prose, pub¬ lished under the pseudonym ((Robert Slender® and of small merit. Until recently his poetry has been strangely neglected; but in 1901 ap¬ peared a biography by Austin, and in 1903 an edition of the poems, with a ˆifeP prepared by F. L. Pattee. During Freneau's life there were editions in 1786, 1788, 1809 and 1815. There were reprints of the 1786 edition in 1861 and 1865. Consult further, De Lancey, E. F., (Philip Freneau; the Huguenot Patriot Poet of the Revolution (New York 1891) ; Forman, S. E., (Political Activities of Philip Freneau) (Baltimore 1902) ; More, P. E., (Shelburne Es- says) (New York 1908) ; Paltsits, bibliog¬ raphy of the Works of Freneau1* (ib. 1903) ; Tyler, (Literary History of the American Revo¬ lution (1897) ; and Wendell, (Literary History of America* (1900).

FRENSSEN, Gustav, German novelist: b. in Barit, in Ditmarschen, a district on the western coast of Holstein, 19 Oct. 1863. He received his early education in the volksschule at Barit and later attended the

gymnasium at Meldorf and Husum, not far from his birth¬ place. From 1886 to 1890 he studied theology at the universities of Tubingen, Berlin and Kiel. In 1890 he became pastor in the village of Hemme in Ditmarschen. In 1902, after the phenomenal success of (Jcirn Uhl,* he resigned his position as pastor in order to devote himself entirely to literary labors. For a time he then resided in Meldorf, but eventually he moved to Blankenese on the Elbe, a suburb of Ham¬ burg, where he at present resides. Frenssen's power lies in his ability to describe nature and the life of his home community. The fate of the families and the individuals of his neigh¬ borhood had interested him from his boyhood days. He knows the seas, the forests and the moors of his native Ditmarschen and de¬ scribes them in a realistic way. In reading his novels one soon finds himself deeply interested in the characters that are being portrayed. One lives and feels with them, sympathizes with their sorrows and grows with them in the development of their ideals.

His first novel, (Die Sandgrafin* (1896), shows as yet no originality. Frenssen is still

working in the ordinary novelist's fashion. An improvement may be seen in (Die drei Get- reuen* (1898). We find here an attractive picture of the author's home community and its people. The causes of the social disturb¬ ances and the large emigration to America are treated. (Jbm Uhl,* the book which made Frenssen's reputation, appeared in 1901. It* gives a vivid description of the struggles of a peasant in his attempts to lift himself above the drudgery and misery of his environment and to realize his higher, better self. In spite of his misfortunes the hero is not discouraged and eventually emerges into a happier existence as an engineer. The average reader feels that it would have been more appropriate if Jorn would have been permitted to work out his salvation as a peasant, but he is carried away by the descriptive power of the author and all his doubts vanish. More than 250,000 copies of this novel have been sold, a success almost without precedent on the German book market. In (Hilligenlei> ((Holy Land,* 1905) Frenssen wishes to show why the people have been unable to grasp the teachings of the man of Galilee. The book attempts to bring about a rebirth of religion in spirit and in truth. It is doubtful, however, whether the literary field should be made the arena for agitation and reform. The artistic elements in literature are likely to suffer in this way and in (Hilli- genlei* the difficult problems are not solved, nor are they elevated into the field of the purely artistic. The characters are true to life and are sketched in an attractive fashion, but the conclusion to this novel is even more unsatis¬ factory than in (J6rn Uhl.*

In (Peter Moors Fahrt nach Siidwest* (1907) Frenssen gives a patriotic appreciation of German valor in a far-distant African col¬ ony. The story, which is based upon the re¬ ports of a military campaign, is told in a simple and artistic way. The author has freed him¬ self in this book from his tendency to inter¬ pose reflections on life and there are no episodes to detract from the unity of action. In (Klaus Hinrich Baas1* (1909) Frenssen describes the career of a country lad who left his home and worked out a commercial career in the city of Hamburg. Klaus is without culture but is practical and worldly-wise and fights his way against opposition until he is known as a suc¬ cessful business man. While Jorn Uhl was an idealist and stargazer, Klaus, is a coolly calcu¬ lating man who depends entirely upon himself in attaining his ends. (Der Untergang der Anna Hollman1* pictures the tragedy of lust for wealth. The hero, Jan Guldt, an ardent youth, is temporarily overcome but eventually emerges strengthened in character and insistently de¬ mands justice. Frenssen has also published three small volumes of (Dorfpredigten* (1889), village sermons, and two dramas, (Das Heimats- fest) and (Sonke Erichson.1* In 1915 he wrote a (Bismarck-Epos* in hexameters which, how¬ ever, after much discussion, was withdrawn from the bookmarket, as it apparently failed to meet the ideas of the great chancellor held by most Germans.

Frenssen's writings show the influence of Storm, Raabe and Dickens. His novels have been widely read, not only in Germany, but also in translations in England and America. At

times his writings have episodes which detract somewhat from the main theme, but they fas¬ cinate the reader and he would be loath to have them omitted. Occasionally one feels the preacher transcending the artist in Frenssen's desire to reform society, but we cannot help but admire his moral earnestness. He feels it his duty to speak the truth about life as he understands it. One of the admirers of Frens- sen says that Ehrlichkeit is at the foundation of his great success. See Jorn Uhl. Consult (Gustav Frenssen,5 by Hans Martin Elster (1910) ; Bierwirth, H. C., in (German Classics,5 (Vol. XVII, New York 1914). Also the his¬ tories of German literature by R. M. Meyer and Alfred Biese.

William F. Hauhart,

Assistant Professor of German, University of Michigan.

FRENZEL, Karl Wilhelm, German jour¬ nalist and novelist : b. Berlin, 1827 ; d. 1913. He received his education in his native city and after 1861 was dramatic and literary critic of the National-Zeitung. He wrote very many historical novels dealing with French and Ger¬ man life. Among his works are (Charlotte Corday) (1864) ; (Watteau) (1864) ; (La Pu- celle) (1871) ; (Lucifer, Ein Roman aus der Napoleonischen Zeit) (1873) ; (Frau Venus) (2 vols., 1880) ; (Schonheit5 (1887) ; (Warheit5 (1889) ; (Berliner Dramaturgie) (1882), a valu¬ able contribution to the history of modern Ger¬ man drama.

FRERE, frar, Charles Theodore, French painter : b. Paris, 24 June 1815 ; d. there, 25 March 1888. He was a pupil of Cogniet and Roquelan, and made his first exhibit in 1834. He was present at the fall of Constantine, Al¬ geria, in 1837, and from that time chose scenes from Eastern life. His pictures illustrating Constantine (1840-48) are among the best he painted. In 1869 he accompanied the Empress Eugenie in her voyage up the Nile, and made a sketchbook of aquarelles at her request. He painted some military pieces but scenes of East¬ ern life formed most of his subjects. The Metropolitan Museum, New York, has three of his canvases, (Cairo Evening,5 (View of Jeru¬ salem5 and (Departure from Jerusalem for Jaffa. >

FRERE, frer, Sir Henry Bartle Edward,

English statesman and administrator : b. Cly- dach, Brecknockshire, Wales, 29 March 1815; d. Wimbledon, Surrey, 29 May 1884. He was educated at Haileybury College ; entered the East India Company's civil service in 1834; introduced improvements into the system of tax collection, and distinguished himself as an ad¬ ministrator. At the outbreak of the mutiny in 1857 he promptly seized the fortress of Mul¬ tan, retained command over his own province, and was enabled to assist the neighboring pro¬ vinces. From 1862-67 he was governor of Bombay. In 1859 he was created K. C. B., and in 1867 G. C. S. I. In 1872, as British com¬ missioner, he negotiated a treaty with the sul¬ tan of Zanzibar abolishing the traffic in slaves. In 1877 he was appointed governor of the Cape, and high commissioner in South Africa, but the war which he provoked with the Zulus gave so much dissatisfaction to the Conservative government then in office that he was censured, and on the accession of the Liberals to power in

1880 he was recalled. He was the author of the (Life of Hookham Frere5 (1871), and his own by Martineau was published in 1895.

FRERE, John Hookham, English poet, translator and diplomatist : b. London, 21 May 1769; d. Malta, 7 Jan. 1846. After a career in the diplomatic service, he produced his original (Prospectus and Specimen of an Intended Na¬ tional Work . . . Relating to King Arthur

and His Round Table5 (1817), better known as (The Monks and the Giants5 ; a literary bur¬ lesque, full of charming verse and of excellent character-drawing. It naturalized in English the ottava rima afterward used by Byron in

(1871).

FRfiRE, Pierre Edouard, brother of Charles Theodore Frere (q.v.), French painter: b. Paris, 10 Jan. 1819; d. Econen, May 1886. He studied under Paul Delaroche, and chose sentimental genre as his specialty; many of his delineations of home- and child-life are full of true and simple feeling and have been frequent¬ ly reproduced. In technique he was remarkable as a colorist, and his (Little Gourmand5; Cu¬ riosity5 ; (Repose5 ; (The Little Cook5 ; (First Steps5 ; (Going to School5 have long been favorites in the print-shop windows. He ex¬ hibited in the Salon from 1842 to 1886, received a number of medals and was made a chevalier of the Legion of Honor in 1855. He also ex¬ hibited 28 times at the Royal Academy, London, between 1868 and 1885. Pictures by him are in museums at Bernay, Chartres, Cardiff, Glasgow, Hamburg, Melbourne, Sheffield. Consult Ba¬ con, H., (Edouard Frere5 (in Art Journal, Vol. XXXVIII, p. 321, London 1886).

FRERE-ORBAN, frar'or'ban', Hubert Jo¬ seph Walther, Belgian statesman: b. Liege, 1812 ; d. 1896. He was educated at Liege and at Paris, and entered on the practice of law in the former city. His early leanings toward the Liberal party led to his controversy with the Catholic clergy. He was an advocate of free trade and of the priority of state over church authority and of secular public instruc¬ tion. He was elected to the Belgian Chamber in 1847, and became Minister of Public Works ; in 1848-52 he was Minister of Finance. He founded the National Bank of Belgium, and reduced postal rates. In 1857 on the return to power of the Liberals he became again Minister of Finance, and was made Prime Minister in 1868. He retired with his party in 1870 but returned in 1878 and was again Prime Minister until 1884. For the succeeding 10 years he was leader of the opposition, and lost' his seat in 1894. He published (La mainmorte et la charite5 (1854) ; and

(1874).

FRERE'S TRANSLATION OF ARIS¬ TOPHANES. Born in 1769, graduate of Cam¬ bridge in 1792, occupying various positions con¬ nected with the Foreign Office from 1799 to 1808, intimate friend of Canning, John Hook¬ ham Frere is among England's many remark¬ able examples of public men in letters. In spite of interpretations and views sometimes at

variance with recent exact scholarship; in spite of — perhaps because of — an old-fashioned freedom, his version of (The Acharnians^ (The Knights, > (The Birds* and (The Frogs* of Aristophanes, made at intervals beginning as early as 1820 for his own gratification and the diversion of his friends, and published in 1839 and 1840 (best read now in the (World's Classics,* with introduction by W. W. Merry), remains the English rendering that most per¬ fectly reflects the substance and spirit of the great Greek comedian.

Certain principles of translation formulated by Frere in a review of Mitchell's Aristophanes (Quarterly Review, July 1820) help to account for the qualities of his work. They may be restated briefly as follows : The language of translation should never attract attention to itself ; expressions remarkable in themselves should as far as possible be avoided. The forms of language should be translated ac¬ cording to the intention .with which they are employed. In his representation of the vast mass of feeling, passion, interest, action and habit always and everywhere common to man¬ kind, the translator should make use of the phrase in his own language to which habit and custom have assigned a conventional im¬ port similar to that of the corresponding an¬ cient phrases, taking care, however, to avoid those which, from their form or other cir¬ cumstances, are connected with associations belonging exclusively to modern manners. The translator should omit all local peculiarities which, however interesting as matters of curi¬ osity to the antiquary, would have no other effect than that of distracting the attention, or diverting it from the broad general expres¬ sion of character and humor which is evidently the primary object of the poet. The text of the original is not necessarily the original itself. The tone and the intended impression of the original must first be ascertained, and the trans¬ lator may then expand his own sentences to a dimension capable of bearing a distinct and intelligible impress of character. Or, he may contract; for example, the well-known coarse¬ ness of Aristophanes, which was a sop Jo the vulgar crowd, should be represented in the modern version, which is

addressed to an audi¬ ence of greater refinement, in greatly modified lorm. Again, just as Aristophanes compen¬ sated for extravagance of plot and situation with reality of speech, so the translator should employ truthfulness of language; remembering, however, to give intentional unrealities, such as burlesque, their corresponding form. Finally, the successful translation should be free from any of those peculiarities, unintelligible to an English reader, which belong to antiquity but are in no wise characteristic of it, and which would distract the attention without affording employment for the imagination ; and yet should so perfectly maintain the tone and character of antiquity, and the general spirit of the original author, as to make it impossible for any one to feel sure, without special acquaintance with the text, that a deviation from the original had taken place.

The difficulties confronting the translator of Aristophanes, who, it must be kept in mind, rep¬ resents the comedy of personal satire, and is therefore honeycombed with localisms, “are

enormous — in the words of’ George Cornewall Lewis, an exacting critic who wrote in 1844, there are ((the endless variety of his style and metres, the exuberance of his witty imagination, the richness and flexibility of the Attic lan¬ guage in which he wrote, and the perpetual by¬ play of allusions (often intimated merely by a pun, a metaphor, or a strange new compound) to the statesmen, poets, political events and institutions, manners and domestic history of his times.® Without claiming everything either as to ability or consistency, it may be said that Frere has met these difficulties with extraordi¬ nary success, and that his success has been due to more or less faithful observance of his own principles. He is not always literally accurate, and he sometimes admits the localisms and modernisms he condemns ; but he reproduces with great vividness the spirit of audacious extravagance and droll absurdity, the rippling, sparkling variety, the dash and rapidity, the brilliant flights of poetic fancy, which are the essential traits of Aristophanes. Frere is a case of genius translating genius.

Grant Showerman.

FRfiRON, fra’ron’, Elie Catherine, French critic: b. Paris 1719; d. there, 10 March 1776. He was educated by the Jesuits and became professor at the College Louis-le-Grand at the age of 20. In 1739 he became a contributor to literary periodicals and was a strenuous op¬ ponent of the encyclopaedic movement and of Voltaire, one of its leading lights. His work called forth retorts from Voltaire, among which (Le pauvre

diable) ; (L'Ecossaise* and (L'Ave litteraire* are the most remarkable. Consult Nisard, (Les ennemis de Voltaire) Paris (1853) ; Trevedy, J., (Notes sur Freron et ses cousins Royons) (ib. 1902).

FRESCO (Buono). See Painting, Technique of.

FRESCO PAINTING. The word «fresco® is Italian and means fresh. The term ((fresco painting® means, technically, painting on a freshly laid wet surface of plaster. The method is employed in the decoration of spaces on walls and ceilings. The pigments used are water- colors. By extension the term has been used to include other systems of painting on plaster and has, at last, become, to some extent,. accepted in popular parlance as synonymous with mural decoration in general. Some of the most, noted paintings of the early great masters are in this medium.

Technique. — As an absorbent surface is needed on which to lay the plaster background, in cases where the wall structure is of hard, impervious stone, it becomes necessary to add a lining of brick. Over this is spread a three- quarter-inch layer of mortar consisting of lime (at least a year old), well-washed river sand and an admixture of ox-hair or other durable fibre. This coating is combed over coarsely to produce a roughened surface and is left to dry thoroughly (preferably a year) before further manipulation. Next comes the second coating (termed the intonaco), on which the painting is done. The aim here is to get this last plaster as absolutely homogeneously mixed as pos¬ sible, as any imperfections or irregularities in the density of the plaster will cause lack of uniformity in the coating pigments when ap-

•

plied and unequally absorbed. To this end the finest quicklime is slaked and strained through a close-meshed sieve, then even¬ grained river sand is added till the mixture becomes, on cooling, a (

glass® process, or the later innovation known as the Reims process. Among other schemes for increasing the usable range of pigments is ˆspirit fresco® done by grinding the colors in wax, then thinning with spirits of turpentine or oil of spike. The so-called (

Historical. — The origin of mural painting on plaster reaches back into very primitive times. Without being hypercritical as to the exact

processes used by the ancients, we know, from the excavations by Dr. Schliemann of the pre-Hellenic palaces of Mycenae and Tiryns (1500 b.c) , that the plastered walls and ceilings were decorated in colors. The ancient Egyp¬ tian tombs and mummy-cases were decorated with painting on stucco white ground in tempera (distemper). The Greeks would ap¬ pear to have used the fresco process in the period of their prime, although it would seem that their most noted painter, Polygnotos, worked in tempera technique. But nothing is extant to afford visual proof. From the Roman period, however, we have fine examples of mural decoration in the ruins of Pompeii, Her¬ culaneum, Stabia, Boscoreale, etc. Besides, Pliny and Vitruvius have left us descriptions of the Greco-Roman technique. Next we come to the fresco painting of the primitive Chris¬ tians in the Catacombs of Rome and Naples. Then the art appears to have declined and we learn of only isolated examples till we come to the 13th and 14th centuries, when the proc¬ ess again began to flourish. And the art took on greatly advanced and talented execution in the persons of Cimabue, Giotto and other Italian artists. From Florence the pupils of these masters soon spread a knowledge and practice of the art of fresco painting through¬ out all Italy, some examples of which we will enumerate later. Mural decoration in fresco next became popular in Germany in this period and we find examples in Brunswick Cathedral,, in Saint Gereon's, Saint Ursula and Saint Hum¬ bert's churches at Cologne. We find them nu¬ merous in the cloisters and castles ; the (

and the princely nobles. Wonderful genius in fresco work is displayed by Masaccio, Fra Lippi, Ghirlandajo and others. And their successes brought forth the enthusiasm of the 16th cen¬ tury that produced the schools of Florence, Milan and Rome, and created the highest work and most flourishing period in fresco painting. To this period belong the greatest of fresco painters : Perugino, del Sarto, Pinturicchio, Leonardo da Vinci, Luini, Correggio, Raphael, Michelangelo, etc., all great masters in this art. But too soon after the zenith of the fresco painting art followed the decadence with its baroque period of rapid execution running to fantastic perspectives and tours de force. Standing boldly out from such extravagances we have, however, such names as Annibale Carracci with his superlative work in the gallery of the Farnese Palace and Guido Reni has left us fine frescoes in the (Dawn) or salon in the Imperial Palace is' another noteworthy work.

Noted Frescoes. — Giotto's (1276-1336)

< Birth of the Virgin,1 etc., are in the Bardi Chapel, his (Scenes in the Life of Saint Fran¬ cis of Assisi,1 others in Santa Croce, Church of Santa Maria Novella ((Birth of the Virgin,) etc.) are best examples. By Beato Fra Angel¬ ico (1387-1455) the best extant works are 'Crucifixion,1 (Annunciation,) etc., in Saint Mark's monastery, where are also some of those of his less talented brother Fra Bene¬ detto. Massaccio (1401-28) is well represented by his grand work in the Brancacci Chapel of Santa Maria del Carmine ((Tribute Money,) etc.). Benozzo Gozzoli (1420-97) creations are found in the Riccardi Palace, consisting of many portraits (the Medicis), the (Journey of the Magi,1 etc. All these are by Florentine artists and in Florence. The Gozollo series of paintings at Pisa in the Campo Santo are

noted. Pietro Vannuchi, called "Perugino® (1446-1524), was teacher of Raphael and is represented by such work as the 'Crucifixion1 in Santa Maria Maddalena de'Pazzi, Florence; the (Baptism of Christ1 in the Vatican, etc. Bernadino di Betti, called "Pinturicchio® (1454—1513), has left us (Saint Catherine before Emperor Maximianus,1 in the Vatican and scenes from the life of Saint Bernard of Siena in Santa Maria Araceli, Rome ; others in the Sistine Chapel. Domenico Bigordi, called "Ghirlandajo® (1449-98), is represented by his 'Calling of Saints Peter and Andrew-* in the Sistine Chapel and other works in Santa Maria Novella and Saint Trinita, in Florence. Andrea Vannuchi, called ((del Sarto® (1488-1530), has extant his (Death of Saint Filippo) and other works in Florence. The wonderful frescoes of Raphael (1483-1520), (The School of Ath¬ ens, 1 'Jurisprudence,1 Parnassus5 and 'Theol- ogy) in the Vatican are peerless. Michelangelo Buonarroti's (1475-1564) great fresco 'The Last Judgment1 is on a wall in the Sistine Chapel (Rome), together with his ceiling deco¬ ration 'Story of Genesis,1 etc. Luini, pupil of da Vinci, did fine fresco work as is proven by his (Virgin and Child1 and 'Saint John1 at Lugano. Da Vinci (1452-1519) did his world- renowned wall painting 'Last Supper,1 in oil- colors and the great work is rapidly decaying by scaling off ; no fresco-bueno work of his is known.

Bibliography. — Gruner, L., 'Fresco Deco¬ rations and Stuccos of Churches and Palaces in Italy during the 1 5th and 16th centuries1 (London 1854) ; Merrifield, Mrs. M., (The Art of Fresco Painting as practised by the Old Italian and Spanish Masters1 (London 1846) ; Merimee, J. F. L., 'The Art of Painting in Oil and Fresco1 (London 1839) ; Ward, J., 'Fresco Painting; Its Art and Technique1 (London 1909).

Clement W. Coumbe, Technical Art Expert.

FRESCO-SECCO. See Painting, Tech¬ nique of.

FRESCOBALDI, fres'ko-bal'de, Girolamo, Italian organist and composer: b. Ferrara, 1 583 ; d. 1644. He studied with Luzzaschi at Ferrara and later removed to Belgium. About 1614 he became organist of Saint Peter's, Rome, and remained in this position until his death, with the exception of an interval, 1628- 33, when he was court organist at Florence. He is equally famous as a composer and organ¬ ist. His compositions include canzones, motets, hymns and madrigals. Consult Haberl, F. X., 'Frescobaldi1 (Leipzig 1887).

FRESCOS, Boscoreale. See Art, Metro¬ politan Museum of.

FRESH-AIR WORK, a form of benevo¬ lence or helpfulness; in this particular the taking of poor children from the tenements and slums of large cities to the country or seashore for # recreation. It is said to have originated in* 1849, when Rev. William A. Muhlenberg of New York sent a large number of poor children and invalids from his parish to the country for short vacations. In 1872 the New York Times inaugurated a system of free excursions and its example was followed in other parts of the country. The first general

fresh-air societies were organized in 1874, and since then a number of newspapers have in¬ augurated fresh-air funds. There are now nearly 100 societies and 14 fresh-air organiza¬ tions in New York. General agencies, church organizations and private funds provide for between 2,500,000 and 3,000,000 days' outing for poor children of the cities. The beneficiaries are for the most part children from 6 to 12 years old. A few adult women usually ac¬ company them. They are sent away from the city_ for periods varying from a few hours to a fortnight spent in the so-called country homes, or as the guests or boarders of private families. In Europe, Switzerland was the first to take upˆ the movement in 1876. In 1895 there were 73 fresh-air colonies in that country. Nearly all European countries and Argentina in South America have taken up the work. It is also common in Germany and Denmark for the artisan classes in the city and country to make a temporary exchange of children during a part of the summer. Consult (Fresh Air Charity in the United States) (1897) ; Del- perier, (Les colonies de vacances) (Paris 1908) ; Allen, (Sea Air Treatment for New

York's Bedridden Children) (in Review of Reviews, Vol. XXXII, New York 1905).

FRESH-WATER INSECTS. Insects are essentially creatures of the air and the land; yet a considerable number pass the whole or the greater part of their lives in rivers, lakes and ponds. Among insects aquatic in all stages we can distinguish between those which glide or skate over the surface of the water, diving not at all, or only exceptionally, and those which habitually dive and swim through the water after the manner of fishes. The most typical of the surface-dwellers are the bugs of the family Hydrometridae. See Pond-skaters.

Among the Coleoptera the whirligig beetles (Gyrinidce) frequent the surface of ponds and brooks where they may be seen in small com¬ panies, performing a whirling, mazy dance over the surface-film. These insects, when they dive, carry down with them a small air-bubble en¬ closed in a film between the tip of the wing- covers to the hinder end of the abdomen. They – are not, like the pond-skaters, completely envel¬ oped in air while under water. The beetles of a nearly related family (Dyticidce), well called •ˆdiving-beetles,® belong to the group of insects which live habitually submerged. Their con¬ tours are admirably adapted for motion through the water, but there is no dense hairy covering to ensure the formation of an air-bubble and the breathing is provided for in quite another way. The abdominal spiracles open on the upper surface of the segments, which are com¬ pletely covered by the _ wing-cases when the wings are shut. The wing-cases being convex and the upper surface of the abdomen de¬ pressed, a considerable amount of air is en¬ closed, allowing the insect to remain submerged for some time.

Another mode of adaptation to life in the water is shown by the water-scorpions (Nepi- dce). They are provided with a pair of long- grooved appendages at the tail-end of the body; these can be closely pressed together and form a tube, the tip of which pierces the surface-film and conveys a supply of air to the spiracles. These insects, like the allied <(water-boatmen®

(Notonectidce) , have well-developed wings, and make excursions by night to new watery dwell¬ ing-places.

Many insects lead an aquatic life only dur¬ ing their larval stage. Naturally enough, howr- ever, such insects when adult are to be found flying chiefly in the neighborhood of water in which they will lay their eggs — the May-flies and midges for example. The contrast between the conditions of the larval and the imaginal life in such

cases is most striking, and can only have been brought about by slow degrees. A certain amount of moisture in the earth is necessary to the well-being of many burrowing larvae, while some are found in semi-liquid mud, in decaying refuse, or in animal excre¬ ment. In such surroundings breathing through the lateral spiracles becomes impossible, and we find that access to the air-tubes takes place only by one or two pairs of spiracles near the head or tail-end of the body, sometimes open¬ ing through ˆrespiratory trumpets® whose ex¬ panded mouths can be thrust out of the clog¬ ging surroundings of the mud or refuse into the fresh air, while the grub remains concealed and continues to feed. A similar suppression of most of the spiracles, with the development of a tubular process at the tail end of the body in connection with the tracheal system, is the adaptation by which many aquatic larvae breathe — for example, the grub of the mosquito. The families of insects nearly related to these have larvae which live in mud and damp earth, and this suggests that it was from the shores that the waters were invaded by these insect-hosts.

But there is another division of aquatic larvae still more perfectly adapted to life in the water. The grub of the gnat or the drone-fly needs to rise to the surface at intervals and pierce the film with its air-tube in order to get a fresh supply of oxygen. But the pupa of the sand-midge, with its tubular gill-filaments, or the larva of a May-fly with its tracheal gill- plates, can remain in the water throughout its life, drawing, as do the fishes, sufficient oxygen from the dissolved air. It is interesting to notice that within the limits of a single and restricted order — the dragon-flies — we find some larvae breathing by means of tracheal gill- plates, and others taking supplies of water into the hind-gut over whose walls run branching air-tubes; while in the final nymph stage the thoracic spiracles are open, and the insect rais¬ ing the front part of its body above the sur¬ face, breathes through them after the manner of an imago. These various adaptations to an aquatic life within a single group indicate clearly that the habit of living in water is not primitive among insects, but that it has become acquired by different races at different times in the course of the development. It may be presumed that larvae with the more perfect adaptations for breathing when submerged — leaf-like or thread-like gills — are older inhab¬ itants of the water than those which have to rise periodically to the surface to take in a supply of air.

FRESH-WATER MUSSELS, bivalved mollusks that dwell in lakes and rivers ; river- mussels, or river-clams. They belong to the family Unionidce, allied to the cockles, which has a large and thick foot, no byssus, siphon short (when present), and a parasitic em-

bryonic growth. The shells are equivalve, varying according from thin and smooth to very thick, rugose and knobbed ; the hinge variable (in Anodonta having no hinge-teeth) ; and the interior always thickly nacreous, mak¬ ing it useful in the arts as ((mother of pearl,® and often producing fine pearls. The family is world-wide in its distribution and includes about a dozen genera, two of which (Unio and Anodonta) occur in most parts of the world. These mollusks dwell in rivers and ponds, and vary greatly according to the character of their home, whereby a great number of supposed species have been named that are now known to be merely varieties of the same stock result¬ ing from different environment. They stand upright in the sand on the blades of the shell, so that the heavy hinge margin receives any blow from drifting stones, or other harm; and slowly move about, sucking in the minute ani¬ mal and vegetable organisms upon which they feed. (See Pelecypoda). The development of their young is most unusual. The eggs when ejected from the ovaries are caught in the gills of the mother and are sustained by a nutritiye mucus-like secretion, until they reach a certain degree of age, when they become (

They then have a larval shell, provided with strong hooks, and possess a long filament. After a period they are expelled through, the exhalent siphon into the water, and this ejection may be timed to the passing of a small fish, to whose body if they touch it the glochidia at once cling by means of the hooks. Should they miss striking against a fish when thrown out the embryos sink and lie upon the bottom with their shells gaping and the filament floating upward. There they remain until a (

Mussels abound in all the rivers of the United States and were extremely numerous and varied in those of the Mississippi ; and they entered very largely into the fare of the native red men, as is attested by the large refuse- heaps of their shells to be found in all the river courses. It was long ago discovered, however, that these shells yielded pearls of great beauty and price (see Pearl), while the mother-of-pearl of many species was market¬ able for the manufacture of buttons and similar articles. The result has been a serious deple¬ tion of the mussels of many parts of the Middle West, and nearly an extinction of some species. Consult Lefevre and Curtis, (Studies in the Production and Artificial Propagation of Fresh- Water Mussels) in the United States Fisheries Bureau Bulletin (Vol. XXX, Washington 1912), and other publications of the department.

FRESNEL, fra'-nel, Augustin Jean, French physicist: b. Broglie, France, 10 May 1788; d. Ville d'Avray, near Paris, 14 July 1827. Fie was educated at the ficole Polytechnique and.

the Lcole des Ponts et Chaussees, and early devoted himself to the practice of civil en¬ gineering. He served as government engineer in La Vendee and subsequently in Drome. During the Hundred Days he was persona non grata to Napoleon, but after Waterloo he re¬ turned to Paris to his former occupation of engineer. In 1815 he became distinguished as the discoverer of the polarization of light, and in 1823 was elected a member of the Acad¬ emy. He made important researches respecting the wave theory of light, and proved Newton's theory wrong so ably that Arago, long an op¬ ponent, was converted to the new hypothesis. The result of his great discovery is shown in the system of lens lighting apparatus, which has changed the mode of lighthouse illumina¬ tion over the whole world and is universally known as the ((Boston 1859) ; Moon, R., (Fresnel and His Followers) (Cam¬ bridge, England, 1849).

FRESNEL'S SURFACE. See Light.

FRESNILLO, fres-nel'yd', Mexico, a city in the state of Zacatecas, on the Mexican Central Railway. It has a spacious square, with a fountain in the centre, and contains several large churches. In its vicinity are the celebrated mines of Fresnillo. Elevation nearly 6,900 feet above sea-lev 1. Pop. about 6,500.

FRESNO, Cal., city and county-seat of Fresno County, situated on the San Francisco and San Joaquin Valley, the Southern Pacific and Atchison, Topeka and Santa Fe railroads. The city is an important fruit-growing centre, the raisin trade alone being valued at $5,000,000 annually. Other important industries are the cultivation and exporting of oranges, grapes and olives, besides a large livestock trade. The United States census of manufactures for 1914 showed within the city limits 117 industrial es¬ tablishments of factory grade, employing 3,330 persons, 2,903 being wage earners receiving annually a total of $1,511,000 in wages. The capital invested aggregated $7,375,000, and the year's output was valued at $16,520,000: of this, $4,349,000 was the value added by manu¬ facture. Fresno was settled in 1872, became the county-seat in 1874 and received a charter as a city in 1885. The government is controlled by a mayor, chosen every four years, a municipal council and other administrative officials. The assessed property valuation is about $22,000,- 000. Pop. (1920) 44,616.

FRETUM GALLICUM. See Bonifacio.

FREUD, froid, Sigmund, Austrian psychi¬ atrist: b. Freiburg, Moravia, 6 May 1856. He studied medicine at Vienna ; was appointed demonstrator at the physiological institute, and subsequently assistant at the Vienna General Hospital, where he also lectured on diseases of the nerves. At Paris he studied for a year under Charcot in 1885-86 and in 1902 was ap¬ pointed associate professor of neuropathology at Vienna. In 1909 he came to the United States. Freud's reputation is international owing to his psychoanalytical treatment of hysteria and especially to his theory of dreams. He published (Zur Auffassung der Aphasie) (1891); (Studien ueber Hysterie) (1895; Eng-

lish translation by Jelliffe and White 1913) ; (Traumdeutung> (1900; 3d ed., 1911; trans. by Brill, interpretation of Dreams, J 1913) ;; (Ueber den Traum) (1901; 2d ed., 1911); Psycho- pathologic des Alltagslebens) (1904; English trans. 1914) ; Per Witz und seine Beziehung zum UnbewussteiF (1905; 2d ed., 1912); (Drei Abhandlungen zur Sexualtheorie) (1905) ; (Sammlung kleiner Schriften zur Neurosen- lehre) (1906; 2d ed., 1911) ; (Zweite Folge) (1909 ; 3d ed., 1913); (Ueber Psychoanalyse) (1910; 2d ed., 1,912); (Totem und Tabu) (1913). He edited Jahrbuch fur psychoanaly- tische und psychopethologische Forschungen; Internationale Zeitschrift fur drztliche Psycho¬ analyse ; Imago; and Schriften zur angwand- ten Seelenkunde. See Freudianism ; Dreams.

FREUDENTHAL, froid'en-tal, Jacob, German philosopher: b. Bodenfelde, Prussia, 20 June 1839; d. Breslau, 1 June 1907. Twenty years teacher in the Rabbinical Seminary of Breslau (1864-88), he was successively lec¬ turer, assistant professor and professor in philosophy at the University of Breslau (1875- 88), dean of its philosophical faculty (1898- 99). He was sent to England (1888) by the Prussian Academy of Science to study Eng¬ lish philosophy, and to the Netherlands (1898) for research work on the life of Spinoza — the results being his Contribution to English Philosophy, > in the Archio fiir Geschichte des Phil. (IV, 400 et seq., V, 1 et seq.) and his (Die Lebensgeschichte Spinoza's* (Leipzig 1899). In the field of Greek and Hellenistic studies, he wrote, besides various essays, (Hellenistic Studies) (1875-79) ; (On the Theology of

Xenophanes* (1886) ; in addition to a treatise on Aristotle's

conception of Phantasia (1863) ; and another on Josephs' assumed work on the rule of reason (1869). His son Berthold (1872) is professor of law at the Academy of Social and Industrial Sciences at Frankfort- on-the-Main.

FREUDIANISM. The name applied to the views of the most modern school of psy¬ chology and philosophy, of which Sigmund Freud (q.v.) is the central figure. The gov¬ erning conceptions of contemporary scientific psychology fall into three classes. One class regards mind and body as coordinate and parallel functions of one another. It does not assume any causal connection between two men¬ tal states. In the laboratory it aims to check up introspection by the control of its conditions, and it is content to record the structure of these states as introspection, so controlled, re¬ veals them. Another class regards conscious¬ ness or mental states as such as non-existent. What is normally called consciousness it describes as behavior (q.v.). In the laboratory it replaces introspection by rigidly controlled observations of the reaction of sentient beings to stimuli. This reaction, which is to its last detail physiological, is considered with its stimu¬ lus, as the mental unit of behavior. Hence, for the first group, consciousness runs parallel to the interaction of the body, or of a state of the body, with its environment. It is a third and later entity, which appears after the other two already exist, while for the second group con¬ sciousness is the response or behavior of the organism toward its environment. For the

first group psychology is purely a descriptive science ; for the second group psychology is an explanatory science which differs, however, from physiology in that it takes into account not the organism alone, but the organism to¬ gether with the environment to which it re¬ sponds. The third class falls between the other two. It believes in the reality of conscious¬ ness with the parallelists, and with the be- haviorists it believes in its functional character. From the point of view of functional psy¬ chology consciousness modifies both the organ¬ ism and its environment and is reciprocally modified by them.

All three of these conceptions are alike in that they have not succeeded in formulating any precise law of the rise, operation and sub¬ sidence of ideas. The so-called Haw of associa¬ tion** is nearest to such a law ; but that is rather a formulation of the conditions under which ideas appear together than a state¬ ment of their dynamic relationships and bases. It does not, nor does any other of the current hypotheses, unify the various processes of will¬ ing, feeling and thinking under a single causal concept.

Such a unification is, however, precisely what Freud effects. Psychologists have, on the whole, paid little and unflattering attention to Freud, but Freud has been the first to express the process of consciousness in a single causal pattern which can utter and coordinate in gene¬ tic terms all the phases of consciousness, in all degrees of normality and abnormality. The pattern may be designated as follows : Mind, like body, consists of distinct units of action, which Freud calls ˆcomplexes® or wishes. These are normally integrated and fused. The essen¬ tial conditions of life are, however, such that not all can be realized or satisfied at one and the same time. Some can never be realized. Life, consequently, consists of constant choices between conflicting alternatives, of which many must be repressed if the course of life is to go on at all. The repression may be complete or partial. When it is effected, it does not destroy the wish; it renders the wish subconscious. The subconscious wish may then be completely dissociated from the conscious life and alternate with it, or it may emerge against the repres¬ sive factor, with a resultant in feeling, attitude and ideas that constitutes the overt state of consciousness and behavior. Every phase of a state of mind may be accounted for in these terms, which are ultimately reducible to the action of the primary instincts of self-preserva¬ tion, sex, hunger and gregariousness.

Mind thus becomes an interplay and re¬ sultant of separate conational units, whose operation can be graphed as the physicist graphs the operation of lines of force. So stated, the view contains nothing novel. It is the same which Spinoza has worked out in detail in his (Ethica* and which William James expressed in so many places in his (Psychology.) Freud, however, adduces a wealth of empirical evi¬ dence, in which the schema of the causal proc¬ ess stands out clearly, and the movement from conflict to repression, dissociation, cen¬ sure and emergence, in rationalization, symbol and fantasy is actually seen in the coming and going of states of mind. Freud's contributions fit in best with the concept of functional psv-

chology. The behaviorists have, however, been the most hospitable to his ideas. In (The Freudian Wish) Mr. Edwin Holt has very cleverly reduced the ((complex® to the responsive mechanism of the reflex arc and its object. The whole of mind is there stated as the conflicts and integration of the varieties of this mechanism ; ((complex® consciousness and subconsciousness become superfluous and the Freudian system becomes one aspect of the larger system of behavior of living organisms.

Philosophy as such has as yet paid little or no attention to Freudianism. But Freudians and others have paid a good deal of attention to philosophy and philosophers. In this connec¬ tion the analysis of systems and system-builders brings additional confirmation of William James' description of the non-logical motives in system-building. Hans Sachs and Otto Rank have divided philosophies into three types according to the instinctive motives in play : (1) that of the intuitive spectator or artistic metaphysician like Plato; (2) that of the syn¬ thetic thinkers like Comte, Spencer and Locke ; (3) that of the analytical thinker like Kant, Spinoza, Hume. Their classification and ex¬ amples are not convincing, but the line of in¬ vestigation is promising.

To the persistent problems of philosophy the Freudian hypothesis contributes another confirmation of determinism in the controversy over the freedom of the will, and perhaps a mitigation and even an abolition of the prob¬ lems by exhibiting the perennial wishes and conflicts that make persistent such difficulties as <(the many and the one,® ((the immortality of the soul,® <(the existence of God,® <(the free¬ dom of the will,® ((eternity and time.® Whether it can add anything positive to metaphysics is extremely doubtful. Because of its conception of memory, forgetting and the subconscious, it has been claimed in confirma¬ tion of the Bergsonian philosophy (q.v.), but its treatment of these facts is diametrically op¬ posed to that of Bergson. So far it has been most fruitful and original in the social sciences — in ethics and its derivatives. E. B. Holt's (The Freudian Wish) is an essay in this field, in which a rapprochement is established be¬ tween Freud and Aristotle. The ethical and social conclusions derive from the clear and distinct apprehension of the causal pattern of mental life, of the importance of conflict, of the constant oppositions of such fundamental in¬ stincts as that of sex and gregariousness, self- preservation and the groupings of individuals according to class, family, nation and so on. Once the detail of causal pattern of conscious life is fixed, it is bound to be a clarifying con¬ ception in education, ethics and religion rather more than in the purely technical philosophic disciplines like logic and metaphysics.

Bibliography. — Hart, (A Philosophy of Psychiatry) (Journal of Mental Science , July 1908) ; Rank, Otto, and Sachs, Hans, (The Significance of Psychoanalysis for the Mental Sciences) (The Psychoanalytic Review, Oc¬ tober 1915, January, April, July 1916) ; Jung, Psychology of the Unconscious) (New York 1916) ; Kallen, H. M.,

H. M. Kallen.

FREUDIANISM, Medical. The medical or therapeutical aspect of Freudianism claims priority in point of time over its distinctively psychological and philosophical application, since psychoanalysis developed out of therapeu¬ tic experience and primarily as a method of investigation and treatment of nervous disease. Still the very fact of its rapid development in these other spheres emphasizes its broader and its profoundly fundamental service in estab¬ lishing a comprehensive genetic basis for therapeutic knowledge and practice. Under its conception neurotic disturbances together with the far-reaching physical phenomena dependent upon them are concerned with the patient's en¬ tire attitude toward reality, his attempt at self-expression in regard to it which involves his success or failure of adaptation toward it. Therefore it presupposes a psychological and philosophical attitude on the part of the physi¬ cian in order to comprehend the patient's prob¬ lem as well as to guide him to a normal ad¬ justment to life as a whole.

Psychoanalytic investigation has thus of necessity led into a pragmatic psychology and philosophy whose scope is all-embracing and whose foundation is laid in the genetic develop¬ ment and dynamic potentiality of human life. The therapeutic side is inseparably bound with such implications of the psychoanalytic method for a new comprehension and control of both individual and general medical problems. In this way it has enlarged the conception of medi¬ cine and quickened it by this introduction and use of the dynamic genetic element.

It was while Freud was working as a pupil of Charcot in 1885-86 that he was led to his method of investigation of hysteria. Both Char¬ cot and Janet discovered through hypnosis something of the hitherto unknown mechanisms of hysteria as the results of ideas which have temporarily gained mastery of the patient's mental apparatus. Freud followed up their observations together with Breuer, who had been able to demonstrate through hypnosis the psychic traumatic experience which was the cause of the hysteria and to discover the fact that the symptoms disappeared when the memory of the traumatic event was brought to clear consciousness and the emotion or effect originally accompanying it could be thus dis¬ charged. Freud then applied this cathartic method to a number of cases and with Breuer conceived of the hysterical symptoms as the manifestations of such mental traumas con¬ verted into bodily symptoms. This involved an elaboration and a much farther reaching ex¬ tension of the original concept to account for the elaborate mechanisms which were gradually discovered at work. Freud carried this work forward into all forms of the psychoneuroses and discovered in all the same

fundamental etiological factors as in hysteria.

Briefly considered his significant recasting of the etiological conception of neurotic dis¬ turbances includes the following features. Be¬ hind certain definite traumatic experiences first discovered in certain cases of hysteria there ap¬ peared to lie still earlier experiences reaching back into the forgotten infantile period. Mean¬ while also the theory of a definite traumatic experience proved itself by no means always valid and this was gradually given up for a more comprehensive background of psychic

predisposition in which infantile experiences phantasied as much as actual were stored up to contribute at a later period of psychic stress their accumulated effect toward a psychic dis¬ turbance. A working hypothesis was necessary to fit the facts revealed by psychoanalytic therapy which discovered these stored up memories and effects, and for this Freud adopted the concept of the unconscious, a men¬ tal sphere in which the past is conserved un¬ recognized but not inactive. Into this uncon¬ scious are relegated all those experiences and phantasies which belong to infantile years and to infantile modes of expression but which are not compatible with an adult position in a social, cultural environment. Nevertheless these experiences and phantasies represent the strongest instinctive forces and desires of man¬ kind, his deepest wishes. Hence they can be banished only by the force of ˆrepressions These infantile instinctive desires are common to normal and neurotic alike, but in the former case the repression is successful as the effect associated with the infantile manifestation of the desire or the infantile experience is ade¬ quately discharged at the time or finds a suf¬ ficient substitution channel and is thus ˆsublimated.® In many cases, however, such a sublimation is not found and the effect undis¬ charged is repressed together with the experi¬ ence which it accompanies.

It is the special nature of these instinctive impulses which causes the strength of the re¬ pression, for they lie in the sexual sphere. It was here that Freud performed a striking service in opening up the nature of infantile sexuality. His investigations have proved the existence of the sexual impulse from the earliest years but in its ˆpolymorphous,® undif¬ ferentiated manifestation, when it is not as yet converged into the central sexual aim but is diffused throughout the many forms which are essential as contributory in the course of normal

development to the primary aim. They afford also, as in the history of the race, op¬ portunities of desexualization and diversion of the primeval energy or libido from the strictly sexual into the various paths of sublimation which have built up civilization and are neces¬ sary for individual as for racial advance. They offer also in those constitutionally disposed to disturbance occasions for over emphasis of one or another of these polymorphous components. This causes fixation of infantile interest upon it with arrest in so far of normal psychic de¬ velopment, or according to Freud in conception later worked out by the Zurich school, path¬ ways ready to receive a retrogression of the energy or libido when in later life some obstacle in its course drives it back to reanimate these pathways at the expense of the adult form of reaction.

Whether occupied with actual traumatic oc¬ currences or _ with phantastic formations of childhood, primitive and infantile ways of thought and reaction fixed through life or re¬ vived through repression find themselves in¬ compatible with cultural demands. The early content of experience or of phantasy is of a forbidden nature and therefore repressed but its affect continues to seek adequate expression. Hence arises an unbearable conflict. The only escape from this is through some form of com¬ promise formation which will satisfy the un¬

conscious wish and at the same time accord with the ethical demands of conscious life. The result, therefore, is the protean symbolism of hysteria, conversion into bodily symptoms, the compulsive idea, the compulsive act, the obsession, the whole train of phobias, and passing on to the realm of the actual psychoses or mental derangements, the whole range of symbolic acts which serve as nature's attempt to heal the breach between conscious and un¬ conscious and substitute for the conflict this imperfect and a social but individually more bearable compromise.

The therapy of psychoanalysis consists then in the discovery of the hidden source of the conflict, bringing the original wish impulse to clear consciousness and thus discharging the affect bound with it. The ultimate goal always before the physician is the freeing of the re¬ gressed and diverted libido and directing it into oaths of sublimation which will desexual- ize it for useful, active work and substitute such a form of satisfaction for the wasteful energy discharge of a futile round of self-per¬ petuating and distressing symptoms. For the libido as conceived by Freud and particularly defined and developed by Jung of the Zurich school, is the sum of creative energy originally designed for the reproduction and perpetuation of the race but in the course of

development and expansion necessarily demanded along the countless pathways of sublimation. The force of the original impulse has not found even its biological reproductive outlet or has failed in satisfaction there probably because of the in¬ fantile fixations and the readiness of the regres¬ sive pathways to receive the libido at the first serious obstacle presented by external circum¬ stances. The substitute symptom formations then take the place of the sublimations which naturally follow the normal healthful develop¬ ment of the love life. The aim and effort of clinical psychoanalysis is thus to release the libido from its regressive occupation with the ego wishes and direct it along the path of racial, that is social and cultural progress in order thus to attain also the satisfaction of the indi¬ vidual creative impulse.

This is the general principle of investiga¬ tion into the sources of disturbance and of the method of treatment. It has been adapted to the understanding and treatment of the hysterias, compulsions and the like which dis¬ tinctly have their origin in the infantile period, and also to those more acute forms of dis¬ turbance which Freud has called the true neurasthenias and anxiety neuroses, the origin of which lie in present conditions. The essen¬ tial disturbance and treatment are the same in the latter forms of neurosis, and at the same time there is frequently a background of the same infantile condition and mode of reaction as in the former cases. Psychoanalysis has thrown much illumination upon the understand¬ ing of the psychotic or profound mental dis¬ turbances, particularly those of purely func¬ tional nature as well as upon the symptomatic manifestations of those of organic and toxic origin. Its therapeutical value has also been demonstrated here in so far as such patients are accessible Jo the co-operation with the work of the physician which is an indispensable part of the psychoanalytic procedure. The application of psychoanalysis to the psychoses, particularly

dementia precox, has been largely the work of the Zurich school.

The method of psychoanalytic therapy re¬ quires a highly specialized technique in order to penetrate, correlate and readjust this wealth of plastic human material. This specialized technique was the result of Freud's careful and detailed research based upon his experience with hysteria and its subsequent development. His masterly insight and critique discovered and elaborated the ((royal way® into the uncon¬ scious storehouse of affective experience and phantasy through the

interpretation of the dream. This revealed not only the extensive symbolism under which the unconscious con¬ tent concealed itself and obtained partial escape in a way acceptable to conscious thought, but also threw illumination upon the various mechanisms utilized in system formation as in dream work, technically known as condensa¬ tion, substitution, distortion, manifestation through the opposite and the like, all of which have to be understood in order for the physi¬ cian to guide the patient into the source of the disturbance and out through a revaluation and readjustment in an adequate discharge.

He discovered also the fundamental factor in the success of the treatment and with char¬ acteristic fearlessness and clarity of presenta¬ tion has led his followers to an appreciation of its importance and a recognized utilization of it as an indispensable aid. This is that phenomenon to which Freud has given the name of the ˆtransference.® It represents an essential element wThich enters into all human relationships but into none more conspicuously than into the success of medical treatment, mental or physiological. Yet it has been un¬ recognized in its real significance. Its share in the treatment has been either undervalued or because it was not properly understood it has sometimes interfered with treatment to a very serious extent. Its potentiality for service as its capacity for interference lies in its essen¬ tially dynamic character. Briefly defined it is that psychic ability on the part of the patient to bring over to the physician the whole burden of his psychic life and find in him the sense of power and security which the infantile neurotic character seeks in a heightened degree. It represents an aim of all human desire and thus enters into every relationship, particularly of the patient who feels his sense of weakness aggravated by any disease, but it plays a particularly large role in the infantile character of the mental and neurotic disturbances. On the basis of this Freud and his followers have shown it to be the psychoneurotic attempt to revive the infantile parent images and the supreme security which they afforded the in¬ fantile period. Through this then the physician gains the complete confidence necessary for the intimate and complex investigation of profound individual problems, while on the other hand he. must utilize the confidence and affection gained to stimulate the patient to participate ac¬ tively on his own part in the analysis and the accomplishment of the final aim, the freeing of the patient from a condition of infantile de¬ pendence, which without keen watchfulness would become intensified about this very factor so essential for successful treatment. The nature of the transference as Freud has under¬ stood it furnishes one of the clearest evidences

of the nature of the unconscious mental con¬ flict.

It is here that Freudianism shows its de¬ parture from the more partial therapy of hyp¬ nosis. The earliest psychoanalytic discoveries arose out of experience in hypnotic treatment and Freud at first employed this earlier method of approach to the unconscious. He soon, however, surpassed its inherent limitations and realized the advantage of the conscious co¬ operation of the patient in the detailed investi¬ gation. of the unconscious and its minute analysis. Hypnotic success was recognized as a special example of the working of the trans¬ ference phenomenon whereby the physician, by adopting a role which in reality represented the original parental attitude, created the con¬ dition of supreme dependence and received the unconscious revelations of the patient who through hypnosis had entered into the infantile world. In this condition of things there was a fruitful field for suggestion and its effect. Freud nevertheless soon discarded suggestion as he left hypnosis behind, for he perceived that a complete and permanent result was assured rather by the patient's co-operation and by the gradual realization on the part of the patient of the meaning of his conflict and the way out of it, than by the acceptance of suggestion which was conditioned by an infantile attitude of de¬ pendence.

Psychoanalytic therapy has hardly as yet passed beyond the stage of its infancy. But it arose out of experience and has been unfolded through its application to a large class of suf¬ ferers who were finding effective relief in no other manner. It is for this reason a method that deals with vital human problems and re¬ veals a way of understanding them hitherto un¬ known. It. claims to be only a pragmatic tool in the making, but one which carving into the pressing . realities of modern existence must either evince its utter worthlessness or be per¬ fected and enlarged in the process of applica¬ tion. Its results are already attested by signal success in many cases where a life condemned to a useless round of meaningless ceremonies, of profitless ineffectual effort, or of painful never solved struggle has given place to a clear self-understanding and a control of forces toward productive work and purposeful adjust¬ ments. It has moreover brought an illumina¬ tion into the dark problems of mental disease suggestive of great promise for the future and likewise thrown much light in the direction of a clearer understanding of physical symptoms as avenues for psychical expression and thus of the relationship of mind and body. The clinical and therapeutic advance which this sig¬ nifies has scarcely as yet made an entrance into general medical comprehension and apprecia- • tion, but through the results of their application psychoanalytic principles are steadily gaining ground.

Bibliography. — Hitschmann, (Freud's Theo¬ ries of the Neuroses) (New York 1913) ; Freud, (Three Contributions to the Theory of Sex> (New York 1916) ; Jung, Psychology of the Unconscious) (New York 1916) ; Jelliffe,

(Technique of Psychoanalysis y (Nervous and Mental Disease Monograph Series No. 25). Articles on transference, Freud, (Bemerkunjen ueber die Uebertragungsliebe) (Internationale Zeitschrift fiir Aerztliche Psychoanalyse, III,

1) ; Ferenczi, Untrojektion und Uebertragung) ((Psychoanalytischen Jahrbuch,) 1909).

Smith Ely Jelliffe.

FREUND, froint, Herman Ernst, Danish sculptor: b. Uthlede, Hanover, 15 Oct. 1786; d. Copenhagen, 30 June 1840. At first a black¬ smith, he studied at the Copenhagen Academy of Fine Arts, won the academy's large gold medal with allowance for foreign study, and re¬ sided in Rome from 1817 to 1828, where he was greatly assisted in artistic progress by Thor- waldsen and executed his (Mercury) and

FREUND, Wilhelm, German classical scholar: b. Kempen, Posen, 1806; d. 1894. He was of Jewish parentage, was educated at Ber¬ lin, Breslau and Halle, was professor at Breslau 1828-29, Hirschberg 1848-51, at Gleiwitz 1855- 70, and at Breslau- after 1870. His greatest work is the (Worterbuch der lateinischen Sprache) (1834-45), based on Forcellini's lexi¬ con. Other important works were the (Gesamt-worterbuch der lateinischen Sprache) (1844— 45) ; and (Lateinisch-deutsches und deutsch lateinisch-griechisches Schulworterbuch) (1855) ; (Wie Studirt man Philologie ?) (6th ed., Stuttgart 1903) ; (Tafeln der Litteratur- geschichte) (1877) ; (Triennium Philologicum) (3d ed., 1906 et seq.) ; the series of (Prepara- tionen zu den griechischen und romischen Klas- sikern) (1859 et seq.) ; (Wanderungen auf Klassischem Boden) (1889-92). Andrews, Lewis and Short, Riddle and White, and Dr. Smith based their Latin-English dictionaries on Freund's work.

FREY, or FREYR, frar, the son of Njord, of the dynasty of the Vanagods. He is the god of fruitfulness and peace, patron of marriage and had his chief temple at Llpsala. He was greatly venerated in Sweden, Norway and Ice¬ land. For a full account of his genealogy,

his exploits and the worship rendered him, consult Paul, (Grundriss der germanischen Philologie) (Vol. Ill, Strassburg 1900).

FREY, fri, Emil, Swiss statesman : b. Arles- Keim, near Basel, 24 Oct. 1838. While in the United States in 1861 he enlisted as a sergeant in the Federal army, was taken captive at Gettysburg and confined in Libby Prison. He returned to Switzerland in 1865, there becoming prominent as a journalist, and was Minister from Switzerland to the United States 1882-87. In the Nationalrat he was a leader of the Left in 1872-82 and president in 1875-76. He was elected President of the Swiss Confederation 14 Dec. 1893. He is a noted advocate of. educa¬ tional progress and reform and has been prom¬ inent in the furtherance of public works and

of army improvement. Frey was one of the most prominent supporters of the Saint Gott- hard tunnel project and of other great enter¬ prises to facilitate communication. Other pro¬ jects dear to him were a greater and better army, an improved and extended system of frontier fortifications and a change in the forestry conservation system. He was ap¬ pointed director of the International Telegraph Bureau at Bern in 1897, and 1906 presided at the first conference for the International Pro¬ tection of Wage Earners.

FREY, Friedrich Hermann. See Greif,

Martin.

FREY, Heinrich, German anatomist and zoologist: b. Frankfort-on-the-Main, 15 June 1822; d. Zurich, 17 Jan. 1890. He began his studies at Bonn in 1840, and continued them up to 1845 at Berlin and Gottingen, when he took the degree of doctor in medicine and at the last-named university became assistant pro¬ fessor of physiology. In 1848 he was ap¬ pointed professor of histology and comparative anatomy at Zurich, and professor of zoology at the Polytechnic Institute there. He wrote sev¬ eral volumes on histology and microscopy which are among the leaders in their special field. They include (Histologie und Histochemie des MenschenJ (5th ed., 1876; English trans. 1874) ; (Das Mikroskop und die mikroskopische Technik) (8th ed., 1886; English trans. 1874); (Grundziige der Histologie) (3d ed., 1885). He was considered one of the first micro-lepidopterologists of Germany. He wrote a (Text-Book of Zootomy) (1847) ; (An Intro¬ duction to the Study of Invertebrates) (1847) ; and an elaborate account of the lepidoptera of Switzerland.

FREY, Joseph Samuel Christian Fred¬ erick, American clergyman: b.

Mainstockheim, Bavaria, 1773; d. Pontiac, Mich., 1850. He was of Jewish parentage, and at an early age began the study of Hebrew theology, and became a reader in the synagogue in 1794. He was con¬ verted to Christianity in 1798, went to England and from 1800 to 1807 was a missionary of the London Missionary Society among the Jews of England. He came to America in 1816 and two years later became pastor of the Mulberry Street Congregational Church, New York. He established the American Society for Improving the Condition of the Jews in 1820. In 1827 he joined the Baptist ministry, and during the next 10 years held several pastorates in that Church. From 1837 to 1840 he labored in Europe for the American Society for the Conversion of the Jews, and met with little success. He returned to America in 1840 and settled at Pontiac, Mich., where he became instructor in Hebrew in the University of Michigan. He published 'My Life) (1809) ; (Judah and Israel) (1837) ; 'Hebrew- English Dictionary) (1839) ; 'Hebrew Grammar) (1840); (Joseph and Benjamin: A Series of Letters on the Controversy between Jews and Christians) (2 vols., 1842).

FREYBURG. See Freiburg.

FREYCINET, fra-se-na, Charles Louis de Saulces de, French statesman: b. Foix (Ariege), 14 Nov. 1828. He was trained as an engineer, and held several important appoint¬ ments, and rendered notable service when asso-

cjfted with Gambetta in the War Department in 1871. He was elected to the Senate in 1876, and became Minister of Public Works in the following year. He was Minister of Foreign Affairs and president of the Council 1879-80, and these posts he held on several subsequent occa¬ sions. In 1888 he became Minister for War, and continued to hold that office for five years, during two of which (1890-92) he was also Premier. In 1893 he had to resign owing to the Panama scandals. As head of the War Depart¬ ment he did much to strengthen and develop the French army. In 1898-99 he again held the post of Minister of War. He is the author of several important works on engineering and sanitation, and of (La Guerre en Province pendant le Siege de Paris) (1872) ; (Essais sur la philosophic des Sciences) (1895) ; (La Ques¬ tion d'Egypte) (1905). In 1914 he published two volumes of memoirs. In 1890 he was elected to the French Academy.

FREYCINET, Louis Claude Desaulses de,

French naval officer and navigator: b. Monte- limart, Drome, 7 Aug. 1779; d. 1842. He en¬ tered the navy in 1793, and saw service against the English and Spanish in 1795. With his brother Louis Henri he joined Baudin's ex¬ pedition in 1800 for the exploration of the south and southwest coasts of i\ustralia in the Naturaliste and Geographe. This expedition traversed much of the ground explored by Flinders. He returned to Paris in 1805 and re¬ ceived an appointment in the Department of Marine Maps and Charts, with the assignment to make maps of the territory he had covered with the Baudin expedition. He went to Rio • de Janeiro in 1817 in command of the Uranie to take a 'series of pendulum measurements. He was accompanied by Arago, and his ex¬ pedition was in reality part of a general plan of investigations in ethnology, geography, astron¬ omy, meteorology, terrestrial magnetism and for collecting natural history specimens. On this voyage Freycinet visited Australia, Marianne, Hawaii, other Pacific islands, and South America, The Uranie was lost but nevertheless Freycinet returned to France with several splendid col¬ lections. He published (Voyages de decouverte aux terres australes pendant les annees 1800-04) (2d ed., 1825) ; and (Voyage autour du monde entrepris par ordre du roi> (13 vols., 1824-44). He also published some scientific memoirs and was. one of the founders of the Geographical Society of Paris.

FREYLINGHAUSEN, fri'ling-how'zen, Johann Anastasius, German theologian and religious poet: b. Gandersheim, 1670; d: 1739. He was educated at Jena, where he studied the¬ ology. In 1695 he removed to Halle where he was assistant to Francke, and later became pastor and director of the Pedagogical Institute. He published several important works of the¬ ology, but his fame rests chiefly on the many hymns he composed and edited. His Com¬ pendium. der christlichen Lehre> appeared in English in 1804 under the title (Abstract of the Whole Doctrine of the Christian Religion.) The (Grundlegung der Theologie) (14th ed., 1744) long remained a very popular work. Of his hymns the principal may be found in the collections Ceistreiches Gesangbuch) (1714), containing 683 hymns, and ˆNeues geistreiches Gesangbuch) (1718), containing 798 hymns.

His hymns were very popular in Protestant Germany and have been republished many times.

FREYTAG, fri'tag, Gustav, German novel¬ ist, journalist and critic: b. Kreuzburg in Silesia, 13 July 1816; d. 30 April 1895. Heˆ was a son of the physician and burgomaster, Gottlob berdinand Frey tag, a man of

much dignity and reserve. His mother was cheerful, sympathetic and helpful. Seiler, one of his biographers, compares breytag's home life with that of the young Goethe. It is certain that he never suf¬ fered any privations and had all possible assist¬ ance in obtaining a good education. At the age of 13 he entered the gymnasium at Oels. Here he developed a taste for wide reading. Of foreign authors he became interested chiefly in Walter Scott and James Fenimore Cooper. He himself has given testimony to the influence these writers had upon him during the forma¬ tive period of his life.

In 1835 he left the gymnasium to enter the University of Breslau with the intention of devoting himself to the study of the classics. He came in touch here with Hoffman von Fallersleben who introduced him to the wonder¬ land of Germanic antiquities. In the fall of 1836 he went to the University of Berlin where he attended the lectures of Karl Lachmann. According to Freytag' s own account Lachmann was an inspiring teacher, and his lectures on the (Nibelungenlied) and the history of the literature of the Middle Ages became the basis of Freytag's later studies in this field. In 1838 Freytag was granted the degree doctor of phi¬ losophy by the University of Berlin. In 1839 he established himself as lecturer (Privatdozent) in the German language and literature- at the University of Breslau, but resigned the position after only a few years, to devote himself entirely to liter¬ ary studies. In 1848 he moved to Leipzig, hav¬ ing purchased in company with Julian Schmidt, the literary historian, the political and literary journal known as the Grenzboten. They an¬ nounced their editorial policy as liberal in poli¬ tics and also in literature, but opposed to the strongly radical and revolutionary ideas of <(Young . Germany.® Freytag was connected with this journal almost during the entire period from 1848-70. All his important writ¬ ings, except (Die AhneiP and (Erinnerungen aus meinem Leben,* were published in this period. In 1870 he was summoned by the Crown Prince, later Emperor Frederick III, to his headquarters in the Franco-Prussian War as correspondent. The 10 years following he devoted to the writing of the series of historical novels, (Die AhnenP The latter part of his life was spent in Wiesbaden and Siebeleben. After 1880 he took little interest in political and literary matters.

As a journalist he wrote many articles of more than passing value, but as a literary man his fame rests chiefly on four works: (Die JournalisterP (1853), (Soll und Haben) (1855), (Bilder aus der Deutschen VergangenheiP (5 vols., 1859-67) and (Die AhnerP (1872-80). (Die JournalisterP is one of the most interest¬ ing of German comedies and is keenly enjoyed even to-day when it is well performed. The most successful character of the play is Konrad Bolz, a

cheerful journalist, who feels the dis¬ cords of his time, but whose genial nature

makes the best of all situations. The acting qualities of the play are largely due to a brilliant dialogue. (Soll und Habeffi was an epochmak¬ ing novel in which Freytag ennobled the routine and toil of daily life. He conceived it to be the duty of writers in those trying times of polit¬ ical turmoil and social unrest to hold up be¬ fore the people an example of their ability for efficient work. In its genial humor this novel shows the influence of Dickens. Its suc¬ cess was phenomenal, 64 editions having ap¬ peared up to 1906. The present-day reader, however, usually finds it somewhat tedious. (Bilder aus der Deutschen VergangenheiD is a series of descriptions of German life from its beginnings to recent times. In its clear style this work is a masterpiece of German prose. Freytag sketches the life in castle and cloister, the exploits of the knights of the Middle Ages, the intellectual ferment of the Reformation, the degradation of the Thirty Years' War, the rise of the Prussian state, and finally the wars of liberation of 1813-15. (Die AhneiP is a cycle of eight novels in which Freytag made a poetical transcription of his (Bilder aus der Deutschen VergangenheitP The artistic value of these writings varies, but upon the whole the series is attractive and has the distinction with the Wilder5 of setting forth the unity and continuity of German life. Another of his novels, (Die Verlorene Hand- schrifP (1864), is not quite on the same plane as (Soll und HabenP The characters are somewhat artificial ; they have not developed from life itself, but show the hand of the con¬ scious imitator of real art. The humor, too, is at times forced and the language is not always spontaneous and free from mannerisms. Frey- tag's theoretical work, (Die Technik des Dramas> (1863), indifferently translated by McEwanr Chicago 1894, is based upon the classical German drama. It is instructive and stimulating and states the fundamental dramatic laws clearly, but it should not be misused by trying to derive from it absolute rules that must invariably be followed. Other works of lesser importance are the dramas (Die Braut- fahrt, oder Kunz von der Rosen) (1841) ; (Die Valentine* (1847); (1850); and

At his death in 1895 Freytag was enjoying great popularity and his popularity has not waned up to the present day. He was not a genius,

unless we define genius as <(an infinite capacity for taking pains.® He himself early recognized that he lacked the divine spark, but undaunted he made the most of the talent he possessed. ((German poetry, German scholar¬ ship and German patriotism,® as Erich Schmidt says, <(were in Freytag fused into an indissolu¬ ble unity.® (See Debit and Credit ; Journalists, The). Consult Collected Works, 22 vols., 1886- 88; Lindau, Hans, (Gustav Freytag* (Leipzig 1907) ; also Seiler, Friedrich, (Gustav Freytag) (Leipzig 1898), and Schmidt, Erich, (Dem An- denken Gustav Freytags* (in (Deutsche Rund- schau) (Vol. 83. pp. 453-464) ; republished in ˆharakteristiken,* 2d series, Berlin 1901).

William F. Hauhart,

Assistant Professor of German, University of Michigan.

FRIAR, from the French frtre, Latin frater, signifying brother, is a name common to the male members of any religious order. Thus the Capuchins were originally called Friars Hermits Minor, and the Observants, Friars. Observants. The term, however, is more exclusively applied to those of the mendicant orders ; of which the four chief were the Dominicans (Black Friars), Franciscans (Gray), Carmelites (White), and Augustinians. The most important lesser orders of friars are the Minims; the Third Order Regular of Saint Francis; the Capuchins; the Discalced Carmelites; the Discalced Trini¬ tarians; the Order of Pennance or Scalzetti. Consult Creighton, M., historical Lectures * (1904) ; Heimbucher, N., (Die.Orden und Kon- gregationen* (Paderborn 1907) ; Helijot, P., (Histoire des Orders Monastiques religieux, etc.* (8 vols., Paris 1714-19) ; Monahan, W. B., (Monks and Friars> (in Associated Architec¬ tural Societies, Reports and Papers, Vol. XXVII, p. 419, Lincoln 1904) ; Wietz, F. . K., (Abbildungen Samtlicher Geistlicher Orden, etc.* (2 vols.. Prague 1821).

FRIAR BACON, popular title of Roger Bacon. It is employed in a play of 1594 by Robert Greene under the title (The Honorable History of Friar Bacon and Friar Bungay.* Thoms' (Early English Prose Romances) (Lorn don 1828) contains the reprint of a prose work of 1627, entitled (The History of Friar Bacon.*

FRIAR-BIRD, a familiar woodland bird of Australia, of moderate size, with brownish- drab plumage, head and neck bare of feathers and a cowl-like neck-ruff. They frequent tree- tops, possess considerable strength and bold¬ ness, and, when injured, have been known to inflict severe wounds with their strong claws and beaks. It is an

aberrant form of honey- eater (Meliphagidce) ; some 16 species, all of the Malayan and Australian regions, are grouped in the genus Philemon, of which the present species is named P. corniculatus, in reference to a horny excrescence upon the base of the cul- men of the beak. Its loud cries and other pecu¬ liarities have given it many local names, such as ((monk,® <(leatherhead,® <(poor soldier,® <(pim- lico® and <(four o'clock.® Consult Gould. T.. (The Birds of Australia> (7 vols., London 1848) ; Le Souef, W. H. D.,

FRIAR'S BALSAM, popular term for the compound tincture of benzoin. It is often ap¬ plied to a similar preparation, balsamum trau- maticum. Friar's balsam is extensively used as a dressing for wounds and ulcers, having the properties both of a stimulant and of an anti¬ septic.

FRIAS, fre 'as, Tomas, distinguished Bo¬ livian statesman : b. Potosi 1805 ; d. 1884. He was. Secretary of State during several adminis¬ trations, and' in 1872, on the death of Morales, was chosen provisional President. He was elected . to the vice-presidency in 1873 and in the following year succeeded to the presidency on the death of President Ballivian. His ad¬ ministration passed quietly, undisturbed by in¬ ternal dissension, and was marked bv many progressive measures. His term of office ex¬ pired in 1877 and in 1879 he became Minister to France. Because of his progressiveness and integrity he is regarded as one of the greatest statesmen of South America.

FRIBOURG, frl'boorg, or FREIBURG,

Switzerland, canton in the western portion of the country, bounded on the north and east by the canton of Bern, and on the south and west by Vaud, on the northwest by Lake Neuchatel. Its area is 646 square miles. The southern and eastern portions of the canton are elevated and the northwestern portion forms part of the basin of Lake Neuchatel. The Broye and the Saane are the principal rivers. Wood for ex¬ port is obtained in the mountain forests, which yield also quantities of limestone, gypsum and pitch coal. Grain, potatoes, tobacco, fruit and grapes are the general crops grown on the productive area, which is 88 per cent of the total. Dairy products, black cattle and draft horses form considerable export items. The manufactures include watches, cigars, tobacco, paper, glass and woolens. Straw plaiting and tanning form the leading industries.

French is the official language, but legislative measures are published in German also, since the canton is on the dividing line between the French and German-speaking populations of Switzerland. Roman Catholicism is the prevailing religion. Educational facilities are many, comprising the University of Fribourg, a seminary, college, in¬ dustrial schools and many secondary and ele¬ mentary schools. The ancient inhabitants were the Helvetii, who were in time displaced by the Alemanni and the Burgundians. The Franks took hold of the country in the 6th century, and in 1032 it became a part of the Holy Ro¬ man Empire. At the time of the Reformation Protestantism was not allowed to spread here. The French conquered the land in 1798 and held it until 1814. The canton is the most con¬ servative in Switzerland, and popular rights are still rather restricted. The government is ad¬ ministered by a Grand Council, chosen by popular vote, and seven representatives are chosen for the National Council. Pop. 139,200. Consult Berchtold, (Histoire du canton de Fribourg) (Fribourg 1841-45) ; and Marrot, (Chronique du canton de Fribourg* (ib.

1878).

FRICK, Henry Clay, American manufac¬ turer : b. West Overton, Pa., 19 Dec. 1849 ; d. 2 Dec. 1919. He began as a clerk for his grand¬ father, a flour merchant and distiller, and later embarked in a small way in the coke business. He was president and after 1897 served as chairman of the board of directors of the H. C. Frick Coke Company, now the largest pro¬ ducer of coke in the world, operating nearly 40,000 acres of coal and 12,000 coke ovens, with a daily capacity of 25,000 tons. He came into public notice by his vigorous management dur¬ ing the famous strike at Homestead, Pa., in 1892, when he was several times shot and stabbed by one of the strikers. In 1889-92 he was chairman of the board of the firm of Carnegie Brothers, and later chairman of the board of managers of the Carnegie Steel Com¬ pany. He was a director of. the Pennsylvania Railroad Company, the Atchison, Topeka and Sante Fe, the Chicago and Northwestern rail¬ ways, the United States Steel Corporation, the Norfolk and Western Railroad Company, etc.

FRICTION, in mechanics, is the adhesion or degree of adhesion of contacting surfaces ; the resistance which opposes the slipping or sliding of two bodies in contact. In an active

sense, it is the rubbing together of things; in a passive sense, it is the tendency to adhere or stick, presented by bodies in contact, whether moving or at rest. Gritty substances and sticky substances between

surfaces tend to in¬ crease friction ; oils, fluids and gases inter¬ posed tend to reduce friction. The degree of friction between surfaces is determined by: (1) the weight or pressure with which they contact; (2) the extent or surface of area in contact; (3) the degree of roughness or smoothness of the contacting surfaces; (4) the speed at which the surfaces move; (5) the extent or kind of lubrication employed. The angle of friction is the maximum slope at which one body will rest on another without the upper one sliding off by gravity. Efforts have been made to tabularize the angle of fric¬ tion of different contacting surfaces, but so many conditions are involved that in practice such tables are worthless. It is generally true, however, that at 45 degrees almost all straight surfaces will slip and smooth lubricated surfaces can be depended upon to slip at half that angle. A block placed on a flat, smooth sur¬ face can be moved by a force equaling two- fifths of its weight.

When friction is considered with reference to two bodies at rest, it is called static friction. Instances of static friction in machinery are noticeable in friction couplings or friction discs, consisting of two discs placed close together, just out of contact, one of which rotates while the other is stationary, but when both discs are tightly pressed together by the action of a lever, they rotate together, as if they were one. Friction between bodies in motion is called kinetic friction. This exists in the journal or bearing of an axle, on the working surface of cams, etc., in machinery; and machine designers as well as operators of machines should keep down such friction all they can, as it uses power to no good end.

Static friction is measured by the force that is required to just cause one body to move upon the other, when the two are pressed together by a certain definite pressure; and the ratio of this force to the pressure with which the bodies are held in contact is called the ((co-efficient of statical friction.® Kinetic friction is measured by the force that is required to maintain one of the bodies that are in contact, in a state of uniform motion with respect to the other one ; and the ratio of this force to the force with which the bodies are pressed to¬ gether is called the ˆcoefficient of kinetic fric¬ tion.® The coefficient of static friction between two given substances may be determined by causing a weight composed of one of the sub¬ stances to rest upon a smooth plane composed of the other substance. If the plane is nearly horizontal, the weight will not slip upon it; but by increasing the angle of inclination, a position will be found for the plane, such that the weight is just on the point of sliding. The angle that the plane then makes with the hori¬ zontal is called the (

Rolling friction presents different char-

acteristics from rubbing or static friction. It arises from the contact between a stationary surface and a rolling wheel, sphere or cylinder, or between two rotating surfaces. The tractive effort required to draw a cart on a smooth level road is about one-thirtieth of the weight of cart and load. A carriage wheel running on the ground is an instance .of rolling friction, while the friction in the axle box is rubbing friction if the bearing be a plain one, or rolling friction if ball-bearings or roller-bearings are em¬ ployed. Some have thought there was no fric¬ tion between the steel balls and the raceway of a ball-bearing, but it is obvious that the weight or pressure produces static friction and that the imperfections of the surfaces, even though very minute, must always exist and there is al¬ most sure to be some dust or grit in such bear¬ ings at some time, hence rolling friction has to be figured on by machine designers, even in the best bearings, though it may be trifling, as in the ball-bearings of a typewriter. Sliding fric¬ tion is a term used as opposed to rolling fric¬ tion and is identical with kinetic or rubbing friction, except that it suggests surfaces de¬ signed to slide easily.

To reduce friction in the moving parts of machinery, the. parts contacting are made smooth, and their area or surface is kept small, as in roller-bearings and ball-bearings. (See Bearings). Provision is also made for some form of lubrication, the common plan being to bore small holes leading to the bearing or other point of friction and supply such holes with oil occasionally. In large bearings grooves are often cut diagonally in the surface of shafts, to carry the oil to the entire surface. The principle of lubrication is the placing of a film of slippery substance between rubbing sur¬ faces not so slippery. Oil is the most common lubricant and thin oil is used on light-running machinery and heavy, thick oil or grease on heavy machinery where the weight might tend to drive out or use up the light oil quickly. Water is sometimes employed, being cheaper. Graphite is an efficient lubricant, employed in cases where it is difficult to retain oil, as on a bicycle chain. In kinetic friction between surfaces that are smooth and well lubricated, the results depend far more upon the nature of the lubricant than they do upon the nature of the rubbing surfaces; and they are also greatly dependent upon the method by which the lubricant is applied. When a journal is lubricated by means of an oily pad placed underneath it, the friction may be more than six times as great as when the same journal

is run in a bath of oil. Speed also has a great influence upon the amount of friction developed.

Early books on mechanics and engineering contained assumed laws of friction which were quite erroneous and are now disregarded. There is no method of determining in advance the actual friction in a mechanism, because all the conditions are never certainly known, and some of them are subject to change daily or hourly. In a cotton-spinning frame, for in¬ stance, the cotton bands that drive the spindles tighten up through shrinkage on a damp day, causing undue pressure on the bearings and often doubling the friction of the machine. The most nearly frictionless machine ever con¬ structed is doubtless the Emery testing ma¬ chine, which is employed for testing great bars

of steel, as by pulling them apart. Large sizes of this machine will exert a pull of 500,000 pounds and, of course, this involves tremendous strain on the parts of the machine, and when the piece tested is pulled apart and broken and the strain is thus suddenly released, the reac¬ tion of the parts strained is equal to the break¬ ing strain and would rack the machine terribly were not almost frictionless devices introduced. These are the ((weighing-heads,® constructed on the principle of hydraulic weighing machines. The blpw of reaction is received by a plunger bearing against a body of water, and the shock is absorbed by the water without injury to the machine. It would appear that nature makes frictionless machinery, for the earth and planets revolve in a medium in space so tenuous that no evidence of friction is observable. Were friction present, it would show itself in retarda¬ tion of rotation as well as as orbital revolution. For the internal friction of liquids see Vis¬ cosity.

Charles H. Cochrane.

FRIDA, fre'da, Emil Bohusch, Czech

poet and dramatist: b. Laun, Bohemia, 1853; d. 1912. He received his education at Prague, and in 1893 became professor of literary his¬ tory at the Czech university of that city. He became a member of the Austrian House of Peers in 1901. He wrote comedies, tragedies, epics, several novels and made many transla¬ tions from the best Continental writers. He has been likened by some to Victor Hugo. Much of his work has been translated into German, and in English his one-act play (At the Chasm) appeared in Poet Lore (Vol XXIV, 1913).

FRIDAY, a savage in Defoe's (Robinson Crusoe.' Crusoe saved his life

on a Friday, named him after the day and was faithfully served by him.

FRIDAY, the sixth day of the week, so named from the Anglo-Saxon Frigedag, the day of Friga, the wife of Odin and the Teutonic goddess of love. The Anglo-Saxon corresponds to the Lat. Dies Veneris, day of Venus, whence the French V endredi, Friday. Its religious associations are varied. According to the Mo¬ hammedans it was the day when Adam was created, entered Paradise, was expelled there¬ from, the day of his repentance, of his death and is to be the day of resurrection. It is the Moslem «day of assembly® or sabbath. As the day of Christ's crucifixion it is generally ob¬ served in the Greek, Latin and other Christian episcopal churches as a fast day, except when Christmas falls on a Friday, and is especially observed on Good Friday (q.v.). From the same cause, also, it is regarded among the superstitious as an unlucky day, and was long associated in the public mind with the execu¬ tion of criminals sentenced to .death, which usually took place on Friday and was com¬ monly called hangman's day.

FRIDAY CLUB, The, a social club founded by Sir Walter Scott in 1803. Its ren¬ dezvous was at Fortune's Tavern. For list of its members see Lockhart's (Life of Scott' (Vol. II, Edinburgh 1850).

. FRIDOLIN, or FRIDOLD, Saint, Chris¬ tian missionary of the 6th century, known as wThe Apostle of Allemania.® Our knowledge

of him is contained in the life by Balther, writ¬ ten in the 10th century. He labored in Ireland, where he was born, in Poitiers and in the island of Sackingen in the Rhine. He is the patron saint of Glarus, Switzerland, and is represented on its coat of arms. He is commemorated in the ecclesiastical calendar on 6 March. Con¬ sult the life by Balcher in Mone's (Quellen- sammlung der badischen Landesgeschichte5 (Vol. I, Carlsruhe 1845) ; Heber, (Die vorkaro- lingischen Glaubenshelden5 (Gottingen 1867) ; Heer, (Sankt Fridolin, der Apostel Alemanniens) (Zurich 1888).

FRIED, fred, Alfred Hermann, German peace advocate : b. Vienna 1864. He removed to Berlin in 1883, where he established a book¬ store. After 1891 he devoted himself to the peace movement, founded the German Peace Society in 1892 and edited the Friedenswarte. He was joint-winner of the Nobel Peace prize in 1911. He has published

(Friedenskatechismus) (1895) ; (Tagebuch eines zumTode Verurteilter5 (1898; Eng. trans., 1899) ; (Lasten des bewaff- neten Friedens und des Zukunftskrieg5 (1902) ; (Handbuch der Friedensbewegung) (1905; 2d ed., 1911) ; (Die moderne Friedensbewegung) (1906) ; (Pan-Amerika5 (1910) ; (Der kranke Krieg5 (1910) ; (Der Kaiser und der Weltfrie- den5 (1910; Eng. trans., 1912).

FRIED Oskar, German composer: b. Ber¬ lin, 10 Aug. 1871. His early musical education was scanty, and was obtained at intervals ; he played meanwhile in obscure orchestras. Hum¬ perdinck noticed him at Frankfort and from him Fried received his first systematic instruc¬ tion in composition. Later he studied counter¬ point at Berlin under Scharwenka. Hus first success was (Das trunkene Lied,5 which ap¬ peared in 1904. From 1907 to 1910 he con¬ ducted the Sternscher Gesangverein of Berlin, and in the latter year established a symphony orchestra. He is famed as a successful choral and orchestral leader. He has written a pre¬ lude and double fugue for string orchestra, two choral works, andante and scherzo for wind instruments, and several songs. Consult Bek- ker, P., (Oskar Fried: Sein Werden und Schaf- fen5 (Berlin 1907) ; Leichentritt, H., (Oskar Fried) (Leipzig 1906).

FRIEDEL, fre'del, Charles, French chem¬ ist : b. Strassburg 1832 ; d. 1899. He studied under Pasteur in his native town and continued his scientific education at Paris, entering the laboratory of Wurtz. In 1869 he was gradu¬ ated with two remarkable theses, one in organic chemistry and one in mineralogy which at once brought him to the notice of men of science. He was made instructor at the Ecole Normale in 1871, and in 1876 became professor of min¬ eralogy in the Sorbonne. In 1878 he became member of the Institute in succession to Reg- nault. He eventually succeeded Wurtz (1884) as professor of organic chemistry and director of the research laboratory in the Sorbonne, a position he maintained till his death. The Ecole de Chemie, in connection with the University of Paris, was organized by . Friedel in 1892. His contributions to synthetic mineralogy and to industrial chemistry have been of the greatest and most far-reaching importance. His re¬ searches are recorded, by him in 254 original memoirs and entitle him to a place among the foremost scientific men of the 19th century.

His name is especially connected in association with James Mason Crafts (q.v.) with the syn¬ thetic method known as the Friedel and Crafts reaction (q.v.). He published, in addi¬ tion to textbooks on mineralogy and crystallog¬ raphy, (Cours de chimie organique prof esse a la faculte des sciences de Paris) (1887).

FRIEDEL AND CRAFT'S REACTION,

in chemistry, a synthetic method discovered by the French chemist, Charles Friedel, in conjunc¬ tion with James Mason Craft. This discovery revealed the action of various chlorinated com¬ pounds on hydrocarbons in the presence of aluminum chloride. A vast number of varying organic compounds may thus be produced in any ordinary quantity, for example, triphenyl methane is a commercial compound, necessary to the production of valuable dyes; by Friedel and Craft's Reaction process it can be produced rapidly and cheaply in any quantity required.

FRIEDELITE (H;(MnCl) MmShCU), an acid silicate of manganese, containing some chlorine, and crystallizing in the rhombohedral system, but also occurring massive. It is rose- red in color, transparent or translucent and is found in a manganese mine at Adervielle, France. It was named after the French chemist and mineralogist Charles Friedel (q.v.).

FRIEDENTHAL, fred'en-tal, Karl Rudolf,

German statesman: b. Breslau 1827; d. 1890. He received his education at Breslau, Berlin and Heidelberg. He was elected to the Reich¬ stag in 1867 and aided in founding the Free Conservative party. He was present as a member at the Versailles conference during the Franco-Prussian War at which the constitution of the German Empire was framed. In 1875- 80 he held the portfolio of Minister of Agri¬ culture and afterward was elevated to the House of Lords. He laid the foundations for the economic development of modern Germany.

FRIEDENWALD, Herbert, American au¬ thor and editor : b. Baltimore, Md., 20 Sept. 1870. He was educated at Johns Hopkins Uni¬ versity where he was graduated in 1890, and at the University of Pennsylvania from which he received the degree of D.Ph. in 1894. He was chief of the division of manuscripts of the Library of Congress from 1897 to 1900; edited the American Jewish Year Book from 1908 to 1913; was secretary of the American Jewish Committee from 1906 to 1913, and is an officer of the American Jewish Historical Society. He has written (The Continental Congress5 ; (The Journal and Papers of the Continental Con- gress) ; (Material for the History of the Jews in the British West Indies55 (1897).; (Some Newspaper Advertisements, of the Eighteenth Century5 (1897) ; historical Manuscripts in the Library of Congress5 (1898) ; (A Calendar of Washington Manuscripts in the Library of Congress5 (1901) ; (The

Declaration of Inde¬ pendence5 (1904) ; (Preparedness,5 a play (1915); (Upheaval,5 a play (1915).

FRIEDERICIA, fre-da-re'se-a, Julius Al¬ bert, Danish historian : b. Copenhagen 1849. He was appointed assistant librarian of the library of the University of Copenhagen in .1.891. He is the author of (Danmarks ydre politiske His¬ toric i Tiden fra Freden i Lybek til Freden i Bromsebro5 (1876—81) (Adelsvoeldens sidste Dage Danmarks Historic fra Christians TV's

Dod til Enevoeldens Indforelse) (1894) ; (Revo- lutionen og Napoleon I 1789—1815 J (1903) ; and (Christian IV's egenhaendige Breve, > in collabo¬ ration with Bricka (1878-1901).

FRIEDHEIM, fred'him, Arthur, German pianist : b. Petrograd 1859. At an early age he showed signs of musical ability. He received the ordinary education of a German youth of the upper classes in the gymnasium and uni¬ versity. He studied under Liszt at Rome in 1880-82, acted as conductor in various theatres for several years and again studied with Liszt at Weimar. He visited the United States in 1890 and there made his debut as a pianist. He obtained recognition very slowly owing to his lack of moderation. His execution was so spirited that it rendered his playing colorless, and obscured many other excellent qualities. Through extensive tours in Europe he gradu¬ ally came to be recognized as the greatest of the Liszt players, and on his return to the United States in 1910 his conquest was immedi¬ ate. After 1908 he continued to live in Munich. He has written an opera, (Die Tanzerin,* which was produced at Cologne in 1905, and a con¬ certo in B flat for piano and orchestra.

FRIEDLAND, fred'lant, Valentin, Ger¬ man educator: b. Trotzendorf, Upper Lusatia, 14 Feb. 1490; d. Goldberg, Silesia, # 26 April 1556. He was educated at the University of Leipzig, was instructor at the Gorlitz School for a time, but was obliged to resign in 1518 because of his sympathy with the doctrines of Luther and Melanchthon. He was appointed rector of the Goldberg gymnasium in 1523 but remained only for a short time; he returned in 1531 and ren¬ dered the school one of the most famous in Europe. Its organization was unique for the period, being modeled on that of the Roman Republic, the students having a voice in the administration. Latin became the official lan¬ guage of the school. The buildings were de¬ stroyed by fire in 1554

and the school was tem¬ porarily installed at Liegnitz pending the erec¬ tion of a new school building at Goldberg. Friedland died while the building was under construction. Consult the lives by Loschke (Breslau 1856) and Pinzger (Hirschberg 1825).

FRIEDLAND, Prussia, small town 28 miles southeast of Konigsberg, in East Prussia, on the river Alle. The Russians under Benningsen were here defeated on 14 June 1807 by the French under Napoleon (q.v.). Pop. 3,029.

FRIEDLAND, Sagan and Mecklenburg,

Duke of. See Wallenstein.

FRIEDLANDER, C. Gottfried Immanuel,

German geologist: b. Berlin 1871. He was edu¬ cated in Berlin, in the Kiel University and the Zurich School of Technology. He traveled extensively in North America, Hawaii and Samoa in 1893-94. In 1896 he visited the Canary Islands, in 1897 Madeira, in 1906 he came to Mexico, revisited Samoa in 1907, traveled in Japan in 1908-09 and in 1912 in the Cape Verde Islands. He made a special study of volcanoes and all his travels were for the purpose of gathering data in regard to this subject. After 1901 he resided in Naples in order to study Mount Vesuvius. He built a volcanological institute there in 1913 and founded the Zeitschrift filr Vulkanologie. He has written many papers on the relation be¬

tween the production of diamonds and other precious stones to volcanic action. In 1910 he was a member of the International Geological Congress at Stockholm, where he proposed the establishment of a volcanological institute at Naples.

FRIEDLANDER, Ludwig, German classi¬ cal scholar: b. Konigsberg, Prussia, 24 July 1824; d. 1909. He received his education at the Konigsberg gymnasium and at Leipzig and Berlin. In 1847 he was appointed privatdozent at the University of Konigsberg and in 1858 be¬ came full professor there. He retired in 1892 and removed to Strassburg. During his active life he paid considerable attention to Roman archaeology and Homeric literature. His most representative work is (Typical Studies in the History of Roman Manners and Morals* (8th ed., 1910), written in popular style. (The Re¬ mains of Nicanor's Emendations of the Punctu¬ ations of the Iliad } (1850) ; (Die homerische Kritik von Wolf bis Grote* (1853) ; (Analecta Homerica) (1859), constitute him an authority in Homeric criticism.

Other works are (Ueber den Kunstsinn der Romer in der Kaiserzeit* (1852) ; (Darstellungen aus der Sittengeschichte Roms, etc.* (8th ed., 1910) ; the works of Mar¬ tial (1886) ; Petronius' (Cena Trimalchionis) (2d ed., 1906) : Tuvenal's works (1895).

FRIEDLANDER, Max, German musical scholar: b. Brieg, Silesia, 1852. In early life he engaged in commercial pursuits, finally gave up this career, studied singing under Garcia in London and later under Stockhausen at Frank¬ fort. _ He made his debut as a singer at Lon¬ don in 1880, but did not continue long in this field, having become interested in the history of music. He settled in Berlin in 1883, where he came under the influence of Spitta, which led him to pursue original researches in the history of music. The University of Rostock conferred on him the degree of D.Ph. in 1887. He was appointed instructor in the science of music at Berlin University in 1894, becoming professor in 1903. He set about writing an exhaustive biography of Schubert and in pur¬ suing this task discovered over 100 lost songs of the latter and many old folksongs. In 1912 he lectured in the United States. He has pub¬ lished (Goethe's Gedichte in der Musik* ; (Gedichte von Goethe in den Kompositionen seiper Zeitgenossen,* and

FRIEDMAN, Isaac Kahn, American au¬ thor: b. Chicago, Ill., 3 Nov. 1870. He was graduated at the University of Michigan 1893. Later he took part of post graduate course in philosophy and English in the University of Chicago. He spent three years in the florist business with his brother, since when he has been special writer on Chicago newspapers and for various magazines. In 1908 he traveled through Japan, China, Korea for the Chicago Daily News, contributing articles on sociological and economic topics. He has written (The Lucky Number) (1896); (1901); (Autobiographv of a Beggar* (1903);

FRIEDMANN, Alfred, German poet and novelist: b. Frankfort-on-the-Main, Prussia, 26 Oct. 1845. He received his education at the universities of Heidelberg and Zurich. In 1886

he removed to Berlin and there devoted him- selt to literary work, producing many novels and works of verse. Among his poems are

Merlm Orpheus) (1874); two ballads;

Biblical Stars) (1875), comprising three idylls; ‘Love s Fire Test, Angioletta* ; ‘Lays of the Heart (1888). He is the authQr of many novels, including ‘Two Marriages* ; ‘Suddenly Rich > (1891); ‘The Wild Rose) (1893); ‘Inez de Castro* (1898); ‘Tantalus) (1901); ‘Die ICrZte Hand* (1902) ; ‘Vier Liebhaber der Marquise* (1905).

FRIEDRICH, fred’rm, Johannes, Ger¬ man Old Catholic theologian : b. Poxdorf, Bavaria, 5 Mav 1836. After studying at the universities of Bamberg and Munich he entered the Roman Catholic priesthood in 1859. In 1865 he became professor of theology in the University of Munich. At the Vatican Council, 1869-70, he united with his colleague Dollinger (q.v.) in opposing the dogma of papal in¬ fallibility, and when acceptance of the dogma was demanded by the archbishop of Munich of the faculty of the Munich University, he with Dollinger declined and was excommunicated. In 1882, however, he was given another pro¬ fessorship, being transferred by request to the philosophical faculty. He opened in 1874 the Old-Catholic theological faculty at the Univer¬ sity of Bern and lectured there for a year. He was one of the leaders in founding the Old Catholic Church, but withdrew from active leadership in 1878 when the Old Catholic Synod voted to allow its priests to marry. Among his many writings are ‘Tagebuch wahrend des vati- canishen Concils* (1871); ‘Documenta ad Illustrandum Concilium Vaticanum) (1871) ; ‘Zur Verteidigung meines Tagebuchs* (1872) ; ‘Beitrage zur Geschichte des Jesuitenordens* (1881) ; ‘Geschichte des Vaticanischen Concils) (1877-87), and ‘Life of Dollinger* (1899-

1901).

FRIEDRICH, John, American violin- maker : b. Cassel, Germany, 1858. Having studied violin making under Oswald Mockel, he came to the United States in 1883, and shortly took prominent rank in his calling. In 1893 he obtained the highest award for violins, violas and yiolon- cellos at the World’s Columbian Ex¬ position. He has also made bows of very ex¬ cellent workmanship, and came to be recognized as an expert in identifying and appraising rare specimens. Four of the choicest specimens of his violins are in the possession of Dr. Frank Waldo of Cambridge, Mass.

FRIEDRICH, Kaspar David, German painter: b. Greifswald, 5 Sept. 1774; d. Dres¬ den, 7 May 1840. He obtained his training under Ruistoop at Greifswald and under Eckersberg at the Copenhagen Acadamy of Fine Arts. In 1795 he settled at Dresden, where he became member and professor of the Academy. He drew his inspiration from scenes on the Baltic, at Riigen and in the mountains of Germany. Of the Romantic school he ex¬ celled in depicting nature as seen through the psychologic medium of transitory human moods. Favorite motifs are the gloom of the forest, night scenes with moonlight or storms at sea. Notable among his works are the fol¬ lowing: ‘Abbey in an Oak Forest on a Winter’s Evening) ; ‘Pilgrim on the Shore, * both in the Castle of Berlin; ‘View in the Hartz Moun¬

tains } ; ‘Moonrise by the Sea, 5 in the National Gallery, Berlin; ‘Rest at Harvest Time,* in the Dresden Museum; ‘Grave of Hermann (Armimus)* in Hamburg; and ‘The Pine Forest, at Rugen. In 1906 his works drew general attention at the German Centenary Celebration at Berlin.

FRIEDRICH, Woldemar, German painter: b. Gnadau, Saxony, 20 Aug. 1846; d. 1910. He studied in Berlin under Steffeck, and in Wei¬ mar under Plockhorst, Ramberg and Verlat. He accompanied the German troops in the Franco-German War, and thence gained ma¬ terial for his illustrations in Daheim and in Hiltl s < Der franzosische Krieg von 1870-7P (6th ed., 1891). In 1881 he became professor m the art school at Weimar and in 1885 in the Berlin A.cademy. He executed decorative paintings in Castle Hummelshain, Weimar; the Weimar gymnasium. Among several other decorative works on a large scale are to be especially noticed 'The Diet of Worms* (1892) in the aula of the gymnasium at Wittenberg, and the two mural paintings, 'Art and Science* and 'Book-trade and Printing* in the Book¬ sellers’ Exchange at Leipzig. He also painted a series of aquarelles and numerous genre-works in oils.

FRIENDLY ISLANDS. See Tonga

Islands.

FRIENDLY SOCIETIES IN AMER¬ ICA. See Fraternal Societies in America.

FRIENDLY SOCIETY, the general name for English benefit associations, usually founded by the working classes for purposes of self-help, which have become mostly mutual insurance societies. They originated with the mediaeval guilds and for a long time maintained

no benefit funds but made grants to numbers in distress. The benefits are generally for sickness and funeral expenses. Some maintain superannu¬ ation funds, others offer endowments, insurance for shipwrecks, loss of working appliances or tools, convalescent homes, widows' and orphans' funds, homes for the aged, and relief for the unemployed. The local societies with their social features are giving way to strongly cen¬ tralized bodies, with no social union, on a purely business basis, the dues being paid through agents or by mail. The affiliated* orders, including the temperance societies, con¬ stitute an important portion of the friendly societies ; they are democratic social centres, many are of an educational character, and in¬ clude the pick of the English working classes and many from the lower strata of the middle class. Of the societies for women the United Sisters' Friendly Society is perhaps the most important. Considerable reforms have been effected by legislation providing a legal status and supervision. In 1910 there were 31,469 soci¬ eties registered under the Friendly Societies Act of 1896 (amended 1908) and of these 29,425 submitted reports giving a membership of 14,- 507,000 and funds aggregating $314,330,000. The Hearts of Oak Benefit Society and the Rational Aid and Burial Association are the largest centralized societies. Among the lead¬ ing affiliated are the Ancient Order of Foresters and the Independent Order of Foresters.

These societies have had a very beneficial effect on the English working man, but they did not reach the very poor and helpless, who have

been provided for to a degree under the Na¬ tional Insurance Act. (See Old-Age Pensions). Consult Baernreither, (English Associations of Working MeiP (London 1893) ; Fuller, (The Law Relating to Friendly Societies) (3d ed., ib. 1910) ; Wilkinson, (The Friendly Society Move¬ ment (ib. 1886) ; id., 'Mutual Thrift) (ib. 1891) ; the Nineteenth Century, No. 45,891.

FRIENDS, The Religious Society of.

The Religious Society of Friends, commonly called Quakers, had its origin in England about the middle of the 1 7 th century, and was largely the result of the ministry of George Fox, who is often called its founder.

Early History. — George Fox, the son of a weaver, was born at Drayton, in Leicestershire, 1624, and began his public preaching about the year 1648. His spiritual views and practical application of Christian doctrines met a ready response in many pious persons (both Church¬ men and Dissenters), and bitter opposition from others whose practices they condemned. His followers increased rapidly, and were known as ((Children of Light,® ((Children of Truth,® and ((Friends of Truth®; finally adopting the name ((Religious Society of Friends.® Among them were many itinerant preachers ; Fox in his journal (1654) says, above 60 in number. From the first imprisonment of Fox in 1649 to 1687 Friends were the objects of almost continuous persecution. In 1656 Fox computed there were seldom less than 1,000. in prison. Between the years 1661 and 1697, over 13,000 Friends were imprisoned in England, 198 were transported as slaves and 338 died in prison or of wounds received in assaults while attending meetings. These persecutions were upon various pretexts, as, the refusal to pay tithes, to swear or to remove the hat; for preaching in public places; as disturbers of public worship, for speaking in “churches® (a practice then not uncommon) ; and as Sabbath breakers, for traveling to their meetings on the day called the Sabbath. Many were apprehended for keeping an unlawful as¬ sembly under the Conventicle Act. Scotland, Ireland, the Continent and America were early visited by their ministers.

The first to arrive in New England were two women, Ann Austin and Mary Fisher, who came to Massachusetts from Barbados in 1656. After five weeks’ imprisonment and much cruel treat¬ ment they were sent back. Stringent laws were promptly enacted by that colony to prevent others from coming and owners of vessels from bringing them. Regardless of the cruel pen¬ alties of these laws, the Quakers continued to arrive and suffer their infliction. In numerous instances delicate women were “stripped naked from the middle up, tied to a cart’s tail and whipped through the town® and thence through other towns. Four — one a woman’ — were hanged on Boston Common. Nevertheless they increased in numbers and spread to adjoining colonies.

The first Friends in New Jersey settled along the Raritan River in 1663. In 1677 over 200 came to this province and founded Burlington. William Penn joined the society in 1667. In 1681 he and several other Friends purchased East New Jersey, and in the same year Penn obtained from the Crown the grant of Penn¬ sylvania. A few Friends were in the province before Penn acquired it, and two shiploads came in the fall of 1681. The next year Penn

himself came with others, and in less than three years the colony had a population of 7,000. bor a period of 70 years, and so long as the influ¬ ence of Friends predominated, there were no conflicts with the Indians. At an early date the society cleared itself of human slavery. Friends began to protest against it as early as 1688, and for nearly 100 years the agitation was continued, until (

Organization and Discipline. — Fox and his co-laborers did not have an outward organiza¬ tion as an object. The organization and dis¬ cipline were progressively developed. The first disciplinary meetings established were held monthly and were in a sense congregational. Some were held as early as 1656, but the prac¬ tice does not appear to have become general before 1666. The first yearly meeting appears to have been held in 1656, the first in London in 1668, but it was not held there regularly until 1672. The first yearly meeting in America was held in Rhode Island in 1661. Monthly, quar¬ terly and yearly meetings have geographical boundaries ; and monthly meetings are subordi¬ nate to quarterly, and these to the yearlv meet¬ ing, which is the source of discipline, and final judge of all questions. At stated periods monthly meetings appoint a few of their num¬ ber as <(Overseers,® whose duty it is to have a loving oversight of the members. Men and women hold separate meetings for business, al¬ though some subjects are jointly considered. Of late years the practice of separate meetings has largely been discontinued. Elders are men and women chosen out of the body as “Friends of solid judgment, prudence and experience,® to sit with the ministers and to advise, encour¬ age or caution them as seems needful. Per¬ sons — men or women — who speak and pray in public to the satisfaction of the members are, in due time, publicly acknowledged as ministers, or those in whom the body recognizes the ((true gift.® Such recognition does not confer upon them any new powers or authority. All mem¬ bers are embraced in a set of “Queries® which are answered, some quarterly — others annually, by meetings for discipline. These have refer¬ ence to love and unity ; attendance upon meet¬ ings ; consistency in speech, behavior and ap¬ parel; oaths, military service and fraudulent business ; moderation in trade and living, and just payment of debts; encouragement of a stated or paid ministry; care of the poor and education of children ; and keeping records of births, deaths and marriages. (The answering of “Queries® has been discontinued in many meetings). Meetings have no presiding officer. In those for business a clerk is appointed, whose duty is to gather and record the sense or judg¬ ment of the meeting as expressed. No question is settled by a majority and no vote is taken. Christ is recognized as ((the head over all things to the church.®

Distinguishing Views. — In the essential doc¬ trines of the Christian religion Friends were in accord with their fellow Christians. The prin¬ cipal points in which they differed were :

1. Immediate Divine Revelation. Barclay (

than immediate divine revelation ; insomuch that once to lay claim to it is matter of re¬ proach.ˆ Again, t(He that affirms himself so led (by the spirit of God) is, by the pretended orthodox of this age, presently proclaimed an heretic.® Fox (Journal) says: ((I saw that Christ had died for all men, and had enlight¬ ened all men and women with his divine and saving light. I was commanded to turn people to that inward light, spirit and grace, by which all might know their salvation and their way to God.® Friends believed that this inward saving light of Christ was universal and came to both heathen and Christian.

2. Worship and Ministry. Barclay (Apol¬ ogy says: (

3. Sacraments. Sacraments require the serv¬ ices of a priest or minister. Friends denied this necessity, rejecting all types and outward ordinances. They taught that the only saving baptism was that of the Holy Spirit, and that the true communion was not partaking of bread and wine, but the spiritual ((eating of the flesh and drinking of the blood®- of Christ. They held that marriage was the Lord's joining of man and woman, and, therefore, was not per¬ formed by man — men were but witnesses.

4. War, Oaths, etc. Friends have always • maintained that war and oaths were incon¬ sistent with Christianity, being forbidden by Christ and his apostles in the New Testament. Consistent members refuse to perform military service or partake in war-like preparations. They refuse oaths in civil courts or elsewhere as forbidden by Christ's language, ((Swear not at all.® In their early history they suffered much on this account. They decline the use of complimentary titles and language, believing they proceed from pride and tend to foster it. They refuse the complimentary use of the plural pronoun to a single person, although the <(thou® and ((thee® to judges and magistrates has often resulted in suffering. They use the numerical language of Scripture instead of the names of months and days in honor of heathen deities. Their plainness of dress is a testimony against

pride, and any uniformity the result of a refusal to change its style at

the dictates o’f fashion.

.Present Condition and Membership. —

W lm some unimportant exceptions the society maintained a practical unity until the year 1827. At that time a separation occurred in Phila¬ delphia Yearly Meeting and later in others. Since then two district bodies have claimed the title. “Religious Society of Friends,® commonly distinguished by the names <(Hicksite® and (< Orthodox,® although not recognized or offi¬ cially used by either body. The name ((Hicksite» came from Elias Hicks, a talented and popular minister of Long Island, whose ministry was the immediate cause of the schism. The Ortho¬ dox party hold that unsound doctrines caused the separations. The followers of Hicks, ad¬ mitting differences in doctrines, contend' that the real cause was not so much these differ¬ ences, as an arbitrary exercise of authority by the Orthodox party. Quotations from Hicks establish the contention that the divinity of Jesus Christ, the doctrine of atonement, and the inspiration and authority of the Bible were denied or questioned. There were probably some grounds for the charge of an arbitrary spirit on the part of the Orthodox. In the separations, two-thirds of Philadelphia and New York yearly Meetings were of the ((Hicksite® party, and in Baltimore four-fifths; in Ohio they were about evenly divided, while in In¬ diana Hicks had comparatively few sympathiz¬ ers. ˆ No separations occurred in New England or North Carolina meetings, they continuing to be identified with the Orthodox bodies, which were officially recognized by London Yearly Meeting.

There are seven yearly meetings of the “Hicksite® Friends: Philadelphia, Baltimore, New York, Genesee (Canada), Ohio, Indiana and Illinois, numbering about 17,800 members. They are connected by epistolary correspond¬ ence. Their principal schools are Swarthmore College, and the George School in Pennsyl¬ vania, Friends Central in Philadelphia and sim¬ ilar schools in New York and Baltimore. The Friend’s Intelligencer, an ably conducted weekly paper, is published in Philadelphia.

Several of the Orthodox yearly meetings have experienced separations. Joseph John Gurney of England, a wealthy and educated minister and voluminous writer, expressed views which many. in England and America re¬ garded. as subversive of some always held by the society. Prominent among those in America who opposed his views was John Wilbur, a minister in New England. This resulted in a division in that Yearly Meeting in 1845, which was followed by one in Ohio in 1854. These, and. later separations in others, resulted in two

distinct bodies of Orthodox Friends within the limits of six yearly meetings, including Canada. They have been distinguished by the respective names, <(Gurney® and <(Wilbur,® and the terms “Progressive® and “Conservative.® In Ohio the “Conservative® body was the larger, ’and in each of the others the smaller. London gave its official recognition to the “Progressive® bodies. There are now 13 of these, connected with each other and with London and Dublin Yearly Meetings by correspondence: New Eng¬ land, New York, Canada, Baltimore, North Carolina, Ohio, Wilmington (Ohio), Western,

Indiana, Iowa, Kansas, Oregon and California. Total membership in America about 75,000.

The six ˆConservative® yearly meetings are : New England, Ohio, Canada, Western (Ind.), Iowa and Kansas. These annually exchange epistles. Their membership is about 4,000.

Philadelphia occupies a unique position, not being connected with either of these groups of related yearly meetings. That its sympathies were with Wilbur against the views of Gurney was shown by the recognition of the <(Wilbur® Friends in Ohio. Later, in the interest of peace, Philadelphia ceased correspondence with all yearly meetings, and has never regularly re¬ sumed it. The membership is about 4,000. Within most ˆProgressive® yearly meetings paid pastors, prescribed services, singing, instru¬ mental music and revival methods have been introduced ; until, in many localities, the so- called ((Friends Churches® more nearly resemble (

Statistics. — The total membership in 1918 was given as about 142,000, the distribution be¬ ing as follows: <(Orthodox® in America, 97,514; in Great Britain, Ireland and Australia, 22,350. The <(Hicksite® membership was about 17,806; that of the ((Wilburites® 4,000; that of the <(Primitive® branch 171. The Continental mem¬ bership (Norway, Denmark, Germany, France, Turkey) was given a few years ago as 247.

Bibliography. — Brailsford, M. R., Crom¬ well’s Quaker Soldiers1* (Contemporary Review, New York 1915) ; Braithwaite, W. C., (The Be¬ ginnings of Quakerism1 (London 1912) ; Clarke, M. E., (The Friends in France1* (Corn – hVl Magazine, London 1916) ; Cunningham, Y., (The Quakers from their Origin Till the Present Time1 (London 1897)

; (Early Quaker¬ ism in Ireland) (Friends' Historical Society Journal, London 1910) ; Fox, G., (The Ameri¬ can Journey of George Fox, 1671— 73) (Friends' Historical Society Journal, London 1912) ; Holder, C. F., (The Quakers in Great Britain and America> (New York 1913) ; Jones, R. M., (The Quakers in the American Colonies1* (London 1911) ; Penn, W., (A Brief Account of the Rise and Progress of the People called Quakers) (London 1695) and (The Select Works of William Penn1 (London 1825) ; Speakman, T. H., (Divisions in the Society of Friends) (Philadelphia 1893) ; Woodman, C. M., (The Present Day Message of Quakerism1 (Boston 1915).

Edwin P. Sellew,

Publisher of The Friend, Philadelphia.

FRIENDS OF GOD, a body of religious reformers of the 14th century. They were

mystics and labored for the reformation of society and the Church. The brotherhood in¬ cluded many members of religious orders, es¬ pecially Dominicans. It appears to have flour¬ ished more especially in Basel, Cologne and Strassburg. Consult Jones, (Studies in Mysti¬ cal Religion1* (New York 1909) ; Jundt, (Les amis de Dieu au quatorzieme siecle1 (Paris 1879) ; Rieder, (Der Gottesfreund vom Ober- land1 (Innsbruck 1905).

FRIENDS OF THE PEOPLE, society founded in 1792 by Sheridan and Grey with the object of bringing about parliamentary reform. Fox and Pitt were opponents of its program. Grey introduced reform bills in 1792, 1793 and in 1797, but the time was not ripe for such changes because the nation was engaged in a long struggle on the Continent. It was not until after the downfall of Napoleon that the nation could turn to home reforms. The move¬ ment finally achieved its triumph in the Re¬ form Bill of 1832.

FRIENDS OF THE TEMPLE, a Ger¬ man sect, called also the Temple Society and Hoffmannites, founded by the Rev. Christopher Hoffman at Wiirttemberg about 1850. The Scriptures are accepted in their entirety, all the biblical prophecies are to be fulfilled and the members are bound to labor to accomplish this end. In order to do so the people of God are to be gathered in Palestine. Temples are in¬ stituted in different countries in order to fa¬ cilitate this object. The sect established a colony at Jaffa in 1868, and others subsequently at Haifa, Sarona, Jerusalem and other points in Palestine. Hoffman died in 1885 and the religious side of the movement has since de¬ clined;

at present the movement is important on its economic side and because of its further¬ ance of German interests in the East. Outside of Palestine there are communities in Wurttem- berg, .Alexandria, Egypt and one of 350 mem¬ bers. in the United States. The Eastern com¬ munities have a total membership of about 1,500. Consult Hoffmann, (Occident und Orient1 (Stuttgart 1875) ; id, (Mein Weg nach Jerusa- lem) (ib. 1881-85) ; Kalb, (Kirchen und Sekten der Gegenwart1* (1907).

FRIENDS UNIVERSITY, an institution of higher learning founded at Wichita, Kansas, by the Society of Friends in 1898. The faculty numbers 20 ; the average annual attendance of students is 300. The tuition fees are $50; the total productive funds $210,000 ; total annual in¬ come $22,600. The library contains over 8,000 volumes. . The total number of graduates since organization is 275.

FRIES, fres, Elias Magnus, Swedish bot¬ anist : b. Smaland, Sweden, 15 Aug. 1794 ; d. Upsala, 8 Feb. 1878. He was educated at Lund and in 1828 was appointed demonstrator in botany there. In 1834 he was called to the chair of practical economics at Upsala, with which in 1851 that of botany was conjoined. His botanical investigations deal with the field of systematic botany,. but his work is especially valuable in its additions to our knowledge of lichens, mosses, fungi, etc. Fries introduced into Sweden the morphological theory in his (Systems of the Vegetable World1 (1825). His work on Mycology1 (1820-32) was long the standard work on the classification of

fungi, of which he gave a relatively complete catalogue in c Scandinavian Flora > (1846-49). He wrote a series of useful books on the Hymenomycetce, on lichens, and on the flora of Scandinavia, more particularly of Sweden. Among his monographs is one on the (Hieracieai) (1848). In 1851 Fries was ap¬ pointed director of the botanical museum and garden at Upsala, and in 1853 rector of the university.

FRIES, Jakob Friedrich, German philoso¬ pher : b. Barby, Saxony, 23 Aug. 1773 ; d. Wartburg, Germany, 10 Aug. 1843. He re¬ ceived his education at Leipzig and Jena and in 1801 was appointed lecturer in philosophy at the latter university. He was professor of philosophy and elementary mathematics at Heidelberg 1806-16, after which he held the chair of theoretical philosophy at Jena. He is a link between

Kant's system and the so-called historical school. According to his theory philosophy is founded in the last analysis in subjective knowledge and it is propounded thoroughly only by means of psychological analysis. (The New or Anthropological Critique of Reason5 (1807) is his most im¬ portant book. He wrote also (Handbook to Psychical Anthropology 5 (1820) ; (System of Metaphysics 5 (1824), etc.

FRIES, John, American insurgent: b. 1764; d. 1825. He had a varied career, becoming in succession a cooper, soldier and auctioneer. His career of soldier was undertaken in the so-called Whisky Insurrection. When in July 1798, Congress voted a direct tax of $2,000,000 the Federal officers who were sent to Pennsyl¬ vania to collect the State quota of $237,000, were resisted by a party of opposition which Fries had rallied from among the Germans of Montgomery, Lehigh, Bucks and Berks coun¬ ties. At Bethlehem, 7 March 1799, the United States marshal was compelled by this party to release 30 prisoners who had been arrested for refusing to obey the law. The ˆrebellion® was at length put down by the militia which Presi¬ dent Adams ordered out, and among those captured was Fries, who was subsequently twice tried and on each occasion sentenced to death. In April 1800 he was pardoned by President Adams, who at the same time pro¬ claimed an amnesty to all concerned in the ˆrebellion.® Removing to Philadelphia he en¬ gaged in the tinware business in which he be¬ came comparatively wealthy. Consult Davis, (The Fries Rebellion) (Doylestown, Pa., 1899) ; McMaster, (History of the People of the United States) (Vol. II, New York 1907) ; and, for an account of the trials, (Das erste und zweite Verhor von John Fries) (Allentown

1839).

FRIESE, fre 'ze, Richard, German painter: b. Gumbinnen, East Prussia, 15 Dec. 1854. He studied at Berlin, and traveled in the East, as well as northward within the Arctic Circle. He is now considered one of the best of Ger¬ man animal painters, and is equally successful in depicting the lion in the desert and the deer in a German forest. In 1886 he was awarded a gold medal by the Berlin Academy, of which body he was elected a member in 1892. His most famous works are (Lions Surprising a Sleeping Caravan* (1884). in the Dresden Gal¬ lery; (On the Bredszell Moor) (1895), in the

Konigsberg Museum; (Elks on Field of Battle) (1890), in the National Gallery, Berlin; (A Twenty-pronged Stag under Way,5 owned by Emperor William II.

FRIESEKE, Frederick Carl, American artist : b. Owosso, Mich., 7 April 1874. He re¬ ceived his art education at the Chicago Art Institute, the Art Students' League, New York, the Julien Academy and the Whistler School, Paris. After 1900 he lived mostly in France; he is of the Impressionist school, and his work shows the influence of Renoir. He has painted many beautiful female figures and has done con¬ siderable work in the nude. 'Before the Mir¬ rorˆ hangs in the Luxembourg Gallery; his (The Toilet) in the Metropolitan Museum, New York; 'The Open Windows5 in the Art Insti¬ tute, Chicago. Mural decorations by him may be seen in the Hotel Shelbourne, Atlantic City, and in the Wanamaker Auditorium, New York. There are also pictures by him in the Gallerie- Modern, Venice; the Modern Gallery, Odessa, Russia; the Telfair Gallery, Savannah, Ga. ; the Minneapolis Art Institute; and the Syra¬ cuse Museum of Art. He has received several awards, including gold medal, Munich in 1904, silver medal at Saint Louis 1904, prize at the Corcoran Exhibition, Washington 1908, and grand prize for painting at the Panama-Pacific Exposition 1915. He was elected to the Na¬ tional Academy in 1914, and is a member of the National Portrait Society, London ; of the Societe Nationale des Beaux-Arts, the Inter¬ national Society of Painters and Sculptors and the Society of American Painters, Paris.

FRIESIAN, or HOLSTEIN-FRIESIAN, CATTLE. See Dairy Breeds, under Cattle.

FRIESIAN ISLANDS. See Terschelling; Texel.

FRIESLAND, frez'land, or VRIESLAND,

fres'lant, a province in the Netherlands, bounded by the provinces of Groningen, Overyssel and Drenthe, and by the North Sea and the Zuyder Zee. It is generally flat, and parts of it are below sea-level, being protected by dykes. Excellent horses, the best in Hol¬ land, cattle and sheep are reared, and cattle and other pastoral and agricultural produce are the principal exports. It is sometimes called West Friesland, to distinguish it from East Friesland, now the district of Aurich in Han¬ over. It is divided into three districts — Leeu-warden, containing the capital of same name, Sneek and Heerenveen. Area, 1,281 square miles. Pop. 366,305. See Netherlands.

FRIETCHIE, Barbara. See Barbara Frietchie.

FRIEZE, Henry Simmons, American edu¬ cator: b. Boston, 15 Sept. 1817; d. Ann Arbor, Mich., 7 Dec. 1889. He was graduated from Brown University in 1841, was instructor there from 1841-45,

conducted the grammar-school connected with the university 1845-54, and from 1854 until his death wasprofessor of the Latin language and literature in the University of Michigan, of which in 1869-71, 1880-82 and 1887-88 he was the acting president. He was a pioneer in the teaching of Latin on more ad¬ vanced lines, laying more stress on the inter¬ pretation of Latin texts as literature than as illustrations of grammatical rules. He was also an advocate of the elective in place of the

compulsory system, and the originator of the system by which graduates of preparatory schools approved by the university are admitted on the strength of their diploma without ex¬ amination, a system which has been copied by almost all the important universities in this country. In every direction he did much to promote the interests of the university, being chiefly responsible for the establishment of its school of political science and its school and museum, of art; also obtaining for it a State appropriation of $75,000 and an important library in political science. He published an edition (1860) of the <,Eneid,> and (1867) of the (Ars Rhetorical; and 'Giovanni Dupre* (London 1886). Consult Angell, J. B., 'A Memorial Discourse on the Life and Services of H. S. Frieze) (Ann Arbor 1890) ; Butter¬ field, C. W., 'H. S. Frieze) (in Magazine of Western History, Vol. V, p. 254, Cleveland 1886) ; Kelsey, F. W., 'H. S. Frieze* (in Nation, Vol. L, p. 8, New York 1890).

FRIEZE, (1) the architectural term for the central part of an entablature between archi¬ trave and cornice or any similar position, in a work of structural decoration. It is often en¬ riched with figures of animals, etc., in relief, and in the Doric order (q.v.) of architecture is divided by triglyphs into metopes. One of the best-known examples is the Panathenaic frieze around the cella of the Parthenon, (q.v.) part of which is now in the British Museum. It was used especially in classic and neo-classic architecture. Consult Bone, H. A., 'Frieze and its Origin* (in Art Journal, Vol. LI II, p. 149, London 1901)- See Architecture. (2) The name of a thick woolen stuff or cloth with a nap on one side, in use since the 14th century for heavy outer garments. Frieze is largely made in Ireland, whence considerable quanti¬ ties are exported.

FRIGATE, the designation in the days of wooden war vessels of a full-rigged ship with two decks, and so distinguished from a ship of the

line which had three. In time frigates were, designed to ensure speed and ease in working them, while they remained of moderate size. After 1600, the frigate type became more or less fixed although a rigid adherence to a single form was not demanded until about 1750, after which frigates were classified as forty-fours, thirty-eights, thirty-sixes, thirty- twos, twenty-eights and twenty-fours; this classification being made on the basis of the number of guns aboard. In the British navy the tonnage of frigates was from 500 to 1,200, while m the early days of the United States navy, vessels over 1,200 tons were at times classed as frigates.. Frigates were usually fast sailers, mounted with 28 to 60 guns, and were employed as scouts and. as cruisers, to convoy merchant¬ men, etc. With the introduction of armor-clad war vessels the term frigate has been super¬ seded by that of cruiser, but a large full-rigged merchantman is still sometimes so called. The name originally was used in the Mediterranean to designate a long, swift vessel propelled by oars, and sails. Consult Chatterton, E. K., 'Ships and Ways of Other Days:* "Philadel¬ phia 1913) ; Holmes, G. C. V,, 'Ancient and Modern Ships> (2 vols., London 1906).

FRIGATE-BIRD, or FRIGATE PELI¬ CAN. See Man-of-war Hawk.

FRILL-LIZARD, a large Australian lizard * (q*v.) (Cklamydosaurus kingi) of the family Agamidae, so called in allusion to the erectile collar or ruff about its neck. This broad mem-, brane is supported on each side of the neck by slender rods from the hyoid bone which extend to its margin like the sticks of a fan; and like a fan it may be folded close against the should¬ ers or spread until it stands up all around the back part of the head ; but this erection can be accomplished only by opening the mouth widely, and always accompanies a stretching apart of the jaws. The exterior of the frill is of the general grayish-brown of the animal's body, but its interior or front is scarlet; and when it is suddenly spread, in the face of an enemy behind the open hissing mouth, it is calculated to astonish and frighten the attacker in no small degree, as seems to be the pur¬ pose of the structure. These lizards are six to eight inches long plus a long, lashlike tail. They spend their time on trees and logs, searching for the beetles which constitute their principal food; and have an extraordinary manner, when in haste, of rising and running upon their hind legs alone. Consult Kent, W. Saville, 'The Naturalist in Australia* (London 1897).

FRIMAIRE, fre'mar' (Fr. sleety), the third month of the French Republican Calendar of 1793. It began on 21 November in years 1 1— I II, and V-VII; on 22 November in years IV, VIII-XI, XIII, XIV, and on 23 November in the year XII.

FRINGE-TREE {Chionanthus virginica) , a beautiful tree of 10 or 20 feet in height, with oval, smooth, entire leaves, white narrow- petaled flowers in drooping racemes, and oval, purple drupes. Its blossoms are not only sug¬ gestive of its English name, but of the generic title of Chionanthus, “blossoms of the snow? IHs found in the United States from latitude 39° to the Gulf of Mexico, and forms an at¬ tractive feature in. garden shrubbery. In the Southern States it is known as old-man’s-beard.

FRINGES, (1) in optics, the bands of light and drak due to the interference of light waves, produced when a beam of light passes the sharp edge of a screen, or passes through a narrow slit or biprism. (See Diffraction of Light; Optics; Interference; Light). (2) In the English Bible, the translation of the Hebrew gedilim in Deut. xxii, 12, and of sisith m Numbers xv, 38. Consult Benzinger ‘ Hebraische Archaologie* (2d ed., Tubingen 1907) ; Nowack, ‘Hebraische Archaologie* (Freiburg 1894) ; and Robertson-Smith, ‘Re¬ ligion of the Semites* (London 1894).

FRINGILLIDiE, frin-jil’i-de, the finch and sparrow family, an extensive group of oscine birds., regarded as the most highly organized of all birds, the old name Fringilla, applied by Linnaeus to the whole group, is retained only for the typical genus, represented by the chaf¬ finch (q.v.). All the fringillines are small, compact and active, without eccentricity of form or plumage, and with organs adapted to an omnivorous diet, although seeds form the principal part of the fare. The bill is usually stout and cone-shaped, varying from a greatly swollen size in some of the grosbeaks to the slenderness of that of the goldfinch. The legs are short, and scutellate; the feet strong; and

the wings and tail do not vary much from normal, but the wing has a minute outer primary. The plumage is varied, and in many genera the sexes are unlike. These birds mainly frequent fields, roadsides and wood¬ lands; and build their nests (often elaborate structures) in trees, in bushes or on the ground — never in burrows, or tree-holes, or com¬ posed of mud. Their eggs are usually five in number, and usually are spotted. The family includes extremely good singers, and furnishes us not only the canary but many other of the most popular cage-birds; also many whose flesh is considered a delicacy. The group is d vided into scores of genera and contains hun¬ dreds of species, which predominate in the northern latitudes of the Old World, where

many are resident throughout the year ; but they also abound in all other parts of the world except Australia. Consult Coues, E., (Key to North American Birds' (5th ed., 2 vols., Bos¬ ton 1903) ; Evans, A. H., (Birds) (London 1899) ; Ridgway, R., (Birds of North and Middle America' (Part I, Washington 1901) ; Sharpe, R. B., (Catalogue of the Passeri¬

formes or Perching Birds in the Collection of the British Museum' (London 1888). See Bunting, Finch, Grosbeak, Linnet, Redpoll, Sparrow, and names of various species.

FRISBY, Edgar, American astronomer : b. Great Easton, Leicestershire, England, 22 May 1837. He received his education at the Uni¬ versity of Toronto where he was graduated in 1863. For the ensuing four years he taught in Canada, afterward becoming acting pro¬ fessor of mathematics at Northwestern Uni¬ versity. Later he became assistant astronomer at the United States Naval Observatory, Wash¬ ington, and professor of mathematics in the United States navy. He was retired on 22 May 1899, and now holds the relative rank of commander. For the government he observed several eclipses and made a noteworthy com- putat'on of the – orbit of the comet of 1882. Until his retirement he was in charge of the government's 12-inch equatorial telescope.

FRISCHES HAFF (L .G., Fresh-water Bay), Germany, a lagoon on the north of Prussia, south of the Gulf of Danzig. It is about 57 miles long, with a breadth varying from 2 to 18 miles, and an area of 330 square miles. Its depth varies from 10 to 18 feet. Until 1510 it was entirely cut off from the Gulf of Danzig by the Frische Nehrung; in that year the waters broke over the Frische Neh¬ rung at its northeastern extremity, forming the passage called the Gatt. This passage was originally from 10 to 15 feet in depth, but has been dredged to a depth of 22 feet. Ves¬ sels of greater draft than this load and unload at Pillan, which is located at the mouth of the Gatt. Cargoes are thence conveyed by lighters to and from the ports on the Frisches Haff. The Nogat, Frisching, Pregal, the Passage and part of all the waters of the Vistula flow info the Frisches Haff.

FRISCHMANN, David, Hebrew author: b. Lodz 1863. He removed to Warsaw in early life, began to write at 13, and came into public notice by his endeavor to overthrow the archaic traditions of Hebrew literature, which through¬ out his life he has earnestly sought to pattern

after European models. He has translated Bernstein's

(Naturwissenschaftliche Volks- biicher' ; Byron's (Cain' ; Nietsche's (Thus Spake Zarathustra' and other works. He has written much both in prose and verse. He works have been published in 17 volumes at Warsaw.

FRISCO, a popular abbreviation of the name San Francisco.

FRISIANS, a people of Teutonic stock, who at the beginning of the Christian era occupied the coast lands stretching from the mouth of the Scheldt to that of the Ems. They were closely related by speech and blood to the Angles and Saxons, and the other Low German tribes, who lived in Schleswig-Holstein and to the east of the Ems. The first notice of this people is found in the (Annals' of Tacitus. They became tributaries of Rome under Drusus, and lived for some time on friendly terms with their conquerors, but were driven to hostilities by oppression. They submitted again in 47 a.d., and in 58 attempted to extend their ter¬ ritory between the Rhine and Yssel; in 70 they rebelled again with the Batavians in the campaign of Claudius Civilis. From this time on their history is obscure for several cen¬ turies. They appear to have been confused with their neighbors, the Saxons and Batavians. It is very probable that great numbers of Frisians joined with the Angles and Saxons in their sea-roving expeditions, and assisted them in their invasions and conquest of Eng¬ land and the Scottish lowlands. About the end of the 7th century, the Frisians in the south¬ west were subdued by the Franks under Pepin d'Heristal, who compelled them to accept Christianity. A century later the eastern branch of the tribe was conquered and chris¬ tianized by Charlemagne. Their country was divided into three districts, two of which were annexed on the division of the Carlovingian Empire to the possessions of Louis the Ger¬ man, and the other to Charles the Bald. The latter part was called West Frisia (West Friesland), and the two former East Frisia (East Friesland). The distinctive national features were gradually lost by assimilation with their neighbors, and their modern history is chiefly connected with Holland and Hanover.

Bibliography. — (Gesta regum Francorum' ; Emmius, Ubbo, (Rerum Frisicarum historia' (Leyden 1616) ; Winsemius, P., (Chronique van Vriesland' (Franoker 1822) ; Klopp, O., (Ge- schichte Ostfrieslands) (3 vols., 1854-58) ; Hooft van Iddekinge, (Friesland en de Friezen in de Middeleeuwen' (Leyden 1881) ; Blok, P. J., (Friesland im Mittelalter' (Leer 1891).

Language and Literature. — A Low German dialect, formerly spoken along the North Sea coast from the Scheldt to the Ems, where dwelt the Frisians, from whom it takes its name. It is now much more

restricted in territory, and is confined almost entirely to the peasantry. It is closely akin to Anglo- Saxon, and has many points in common with Dutch, Danish and Icelandic. As now spoken it is divided into numerous dialects, some of which differ widely one from the other. The general dialectic divisions are East, West and North Fris:an. The East Frisian is again divided into the Ems and Weser dialects. It has been supplanted by Plattdeutsch, and is

now spoken by but a few hundred people in the Saterland of Oldenburg and on the island of Wangeroog. The name East Frisian, how¬ ever, is popularly given to the dialect of Platt- deutsch which has supplanted the older tongue. The North Frisian is subdivided into about 10 dialects, many of which are but admixtures of Low German, Danish or West Saxon. Of the pure North Frisian there is scarcely any record. West Frisian has extensive literary re¬ mains, however, and modern West Frisian is ihe vehicle of all modern Frisian literature. It is subdivided into six dialects, which do not diverge greatly. The morphology of the lan¬ guage is essentially of the German type and its syntax is of the type of the older German dialects.

Old Frisian literature is very scanty, con¬ sisting mainly of collections of laws, a few epic poems and sagas. The Asegabuch (1200) was a series of laws valid for all Friesland. An almost complete collection of those laws is to be found in Richthofen's (Friesische Recht- squellen) (1840). Most of the poetry is a mixture of dialects which renders it useless for the study of the language; (Thet freske Rijm,1* a collection made in 1671, is a good example. The most important work in North Frisian is (Di Gidtshals of di Sol'ring Pid'ersdeP of Hansen, a comedy published at Flensburg in 1809, and which appeared in a second edition together with (Di leddelk Stjiiurman,1* a story and some poems at Sonderburg in 1833. In West Frisian has appeared nearly all modern Frisian literature of any consequence. Its pe¬ riod began in 1609 with the comic dialogue enti¬ tled (Een tramensprekinghe van twee boersche Personem, Wouter en LialleP West Frisian poetry received considerable impetus from the work of Gijsbert Japiks and Jan Althuysen in the 17th and 18th centuries, respectively. Since then there has been no great name in Frisian poetry, and comedy portrayals of peasant life form alike the best and bulk of modern Frisian literature. The most famous of these comedies are Meindert's (It libben fen Aagtje Ijsbrants, of dy frieske boerinne) (1779) ; (De tankbre boerezoon) (1778) ; (De reijs fen Maicke Jakkelis1* (1778) ;

and (Het jonge lienes booskP Other names of more recent date are Eeltje (1797-1858), Salverda, Rinse. Van Blom, Van der Wey-Rutgers, van der Veen, W. Dijkstra and Pieter Troelstra.

Bibliography. — Bendsen, (Die nordfriesiche Sprache nach der Mohringer MunderC (Ley¬ den 1860) ; Colmjon, (Beknopte friesche Spraakkunst vor den tegenwoordigen Tijd) (Joure 1889) ; Cummins, (Grammar of the Old Frisian Language* (London 1887) ; Dijkstra and Hettema, (Friesch Woordenboek) (4 vols., Leeuwarden 1896-1903) ; Grimm, (Deutsche Grammatik) ; Helten, (Zum altfriesichen Vo- kalismus) (Strassburg 1906) ; Hewett, (Frisian Language and Literature* ; Hettema, (Oude friesche Wetted (Leeuwarden 1845-51) ; Hen- ser, (Altfriesisches Lesebuch mit Grammatik und Glossar > (Heidelberg 1903) ; Jaekel, <(Die alt friesische Verse vom hute des abba® (in Zeitschrift fur deutsche Philologie, Vol. XXXI, Halle 1907) ; Johansen, (Die nordfriesische Sprache1* (Kiel 1862) ; Kock, ((Vokal- balance im Alt friesichen® (in (Beetrage zur Gesc.hichte der deutschen Sprache und Litteratur,* Halle,

1904) ; Richthofen, (Altfriesisches Worter- buch* (Gottingen 1840) ; id., friesische Recht- squellen* (Berlin 1840) ; Siebs, ((Geschichte der friesischen Sprache® (in (Grundriss der german- ischen Philologie) von Paul, Vol. II, Strassburg 1901-09) ; id., (Geschichte der friesischen Lit- leratur,* Vol. Ill (ib. 1900) ; id., (Sylter Lust- spiele* (Griefswald 1898) ; id., (Zur Geschichte der Englisch-friesisch Sprache) (Halle 1889) ; Sipma, (Phonology and Grammar of Modern West Frisian) (Oxford 1913) ; Sturenburg, (Ost-friesisches Worterbuch* (Aurich 1862) ; Ten Doornkaat Kooman, (Worterbuch der Ost- friesischen Sprache, etymologisch bearbeitet* (3 vols., Norden 1879-84) ; Van Helten, (A1- tosttriesische Grammatik1* (Leeuwarden 1890) ; Walter, (Der Wortschatz des Altfriesischen) (Naumburg 1911) ; Winkler, Algemeen neder- duitschen en friesch Dialecticon) (The Hague

1874).

FRIT. See Glass.

FRITH, John, English Protestant martyr: b. Westerham, Kent, 1503; d. Smithfield, 4 July 1533. He was educated at Eton and at Cam¬ bridge, where he was graduated in 1525, and in the same year on the advice of Wolsey removed to Cardinal (now Christ Church) College, Ox¬ ford. Here he assisted Tyndal in his transla¬ tion of the New Testament. Because of his leanings toward the Reformers he was for a time imprisoned at Oxford but Wolsey pro¬ cured his release and he went to the Continent, where he was associated with Tyndal at the

Protestant University of Marburg. He re¬ turned to England in 1532 and warrants were issued for his arrest without delay. He evaded arrest for several months but was at last taken at Milton Shore, Essex, when about to depart to Flanders. After the manner of the time his imprisonment in the Tower was rigorous, miti¬ gated a trifle under the chancellorship of Sir Thomas Audley. Just at a time when Cranmer and Cromwell were disposed to be lenient in his regard, Frith's enemies circulated a manuscript (Lytle Treatise on the Sacraments,1* which he had written for the information of a friend and with no view to publication. He was charged with denying the necessity as articles of faith of the doctrines of purgatory and transsubstan¬ tiation. He was found guilty, was turned over to the secular power 23 June 1533, and 11 days later was burned at Smithfield, London. Frith's works include a translation of Patrick Hamil¬ ton's Places1*; (A Pistle to the Christen Reader,* under the pseudonym of Richard Brightwell; Antithesis wherein are compared togeder Christes Actes and our Holye Father the Popes) (1529) ; (Disputacyon of Purgatorye) (1531) directed against Rastell, Sir T. More and Fisher of Rochester. During his captivity he wrote several letters, a reply to More and some tracts. Frith is important in ecclesiastical history as having been the first to maintain the doctrine concerning the sacrament of Christ's body and blood, which ultimately was incor¬ porated in the communion office of the Church of England. Later Cranmer, one of Frith's judges, was sent to the stake for the same be¬ lief and three years after the latter's death it became the professed faith of the English Church. Frith's works were published by Foxe (London 1573) and again in 1631. Consult Burnet, G., (History of the Reformation of the

Church of England (1865); Richmond, L., c The Fathers of the English Church) (1807); (Life and Martyrdom of John Frith) (London 1824) ; Alcock, Deborah,

FRITH, William Powell, English painter: b. Studley, near Ripon, 9 Jan. 1819; d. 2 Nov. 1909. Since 1840, when he exhibited (Malvolio before Olivia) at the Royal Academy, he pro¬ duced a great number of scenes from Shakes¬ peare, Moliere, Dickens, Sterne, Goldsmith, etc., besides his immensely popular pictures, dom¬ ing of Age) (1849) ; (Life at the Sea-Side) (1854);

FRITHJOF'S (frit'yo'f) SAGA. This lyrical epic in 24 cantos by Esaias Tegner was completed in 1825. This is the most famous literary work

produced in Sweden, and for many years has been very popular throughout Europe. It is based on the romantic story, (Frithjof's Saga,) written by an unknown au¬ thor in Iceland about 1300. We find in the original saga, for the first time in the early Norwegian-Icelandic literature, resignation praised as a virtue of real manhood; also, for the first time, a love story with a happy ending. According to Tegner's Explanatory Letter,) CEhlenschlseger's (Helge) gave him the idea of Frithjof, but the treatment is different. The Swedish author has modified the original saga and made many additions, drawn from other Icelandic sagas and from the (Edda.) <(My object was to represent a poetical image of the old Northern hero age. The heroine Ingeborg says of Frithjof : How glad, how daring, how inspired with hope

"Against the breast of Norn [Fate] he sets the point

Of his good sword, commanding: * Thou shalt yield.' "

These lines contain the key to Frithjof 's char¬ acter. All that may be offensive to the modern way of thinking in the conduct of a hero and warrior of old has been left out or smoothed over. The poem presents itself in conformity with the literary views and taste of the author's own age. As works of consummate art may be mentioned such cantos as (Frithjof's Court¬ ship,) (Ingeborg's Lamentation,) (The Viking Code,)

Gisle Bothne.

FRITILLARY, in botany, a plant of the genus Fritillaria, of the lily family, found in the North Temperate and Arctic zones. The plants are herbaceous, the leaves simple, alter- vol. 12 — 8

nate, though sometimes appearing opposite or verticilate; the flowers terminal and pendent; the perianth campanulate, of six petals ; the sta¬ mens six; the style trifid. About a dozen spe¬ cies are known, several of which are cultivated in gardens, being hardy and highly ornamental plants. The F. imperialis, or crown imperial, supposed to be a native of Persia, has large orange or yellow flowers nodding beneath a ter¬ minal tuft of leaves. The bulb is poisonous, as is that of F. ?nelcagris, though in a less degree.

In entomology, a butterfly of the nympha- line genus Argynnis, containing some 50 species widely distributed in North America and others in the Old World. They are of medium or large size, usually red-brown with black mark¬ ings in wavy transverse lines and

rounded spots near the outer margin of the wings. Several species are among our most common and best- known butterflies. The name is also given to species of the related genera Dione, Euptoeta and Brenthis, the last of small size and darker hue.

FRITSCH, Gustav Theodor, German scientist : b. Kottbus, Brandenburg, 1838. He was educated at Berlin, Breslau and Heidel¬ berg, went on a scientific exoedition to South Africa in 1863-66 and was appointed an as¬ sistant in the Berlin Anatomical Institute in 1867. In the following year he journeyed with an expedition to Aden to observe a total eclipse of the sun and in 1874 he accompanied another expedition to Ispahan, Persia, to observe the transit of Venus. In 1874 also he was made professor of comparative anatomy at the Uni¬ versity of Berlin, and later was appointed to the chair of physiology also. The Berlin Royal Academy of Sciences sent him to the Mediterranean countries in 1882 to study elec¬ tric fishes. He has published (Drei Jahre in Siidafrika) (1868) ;

FRITZ, Der alte, (Ger., Old Fritz), nick¬ name given to Frederick the Great by his soldiers.

FRITZ, John, American iron and steel ex¬ pert : b. Londonderry, Pa., 21 Aug. 1822 ; d. 13 Feb. 1913. He was at first a machinist in shops at Parkersburg and Norristown, and subsequently was a constructor of rolling-mills, acquiring in the latter capacity an authoritative knowledge of iron and steel manufacture. He equipped the Bethlehem iron and steel works, and was for many years manager of that well-known establishment. Many methods of manu¬ facture now in general use wˆere employed by Fritz among the first in this country, including the Bessemer process. Several manufacturers and scientists established in 1902 the award of the Fritz medal to be given for discovery in the fields of science. In 1910 the Franklin In¬ stitute awarded him the Elliott. Cresson medal. He was president of the American Institute of Mining Engineers in 1894 and of the Society of Mechanical Engineers in 1896.

FRITZ, Samuel, German missionary : b. Bohemia 1656; d. Quito, South America, 1728. He joined the Jesuit Order in 1673, and in the following year was sent to Cartagena. He

completed his studies at Quito and went as missionary to the upper

Amazon region in 1686. His health failed and he removed to Para at the mouth of the river, where he suffered imprison¬ ment as a spy at the hands of the Portu¬ guese governor of Para. He was released in 1691, but returned to his former mis¬ sionary field in 1693. Here he founded the Omaguas missions during his 42 years of labor among the aborigines, being since known to his brother Jesuits as <(the Apostle of the Oma¬ guas.® He prepared a map of the upper Ama¬ zon region and published it in 1707 at Quito. It reappeared in the (Lettres edifiantes* (Vol. XII, 1717). It was long the recognized au¬ thority on the upper river system.

FRITZ, Unser (Ger., Our Fritz), popular German name bestowed on Frederick William (1831-1888), Crown Prince of Prussia, after¬ ward Emperor Frederick III, and father of Em¬ peror William II, who abdicated 9 Nov. 1918.

FRITZNER, Johan, Norwegian clergyman and lexicographer : b. Asko 1812 ; d. 1893. He received his education at Christiania and for many years labored in several pastorates. He later devoted himself to literary work. His greatest work is his excellent dictionary of Old Norse, (Ordbog over det gamle norske Sprog) (1861-67; 2d ed., 1883-96).

FRITZSCHE, Franz Volkmar, German classical scholar : b. Steinbach, Saxony, 1806 ; d. Rostock 1887. He was educated at the Uni¬ versity of Leipzig, where he studied under Beck and Hermann. From 1828 until his death he held the chair of eloquence and poetry at Ros¬ tock. He wrote much on the Greek drama¬ tists, especially Aristophanes. His best known works are (Quaestiones Lucianeae* (1826) ; an edition of Lucian's (Dialogi DeorunP (1829) ; editions with commentary, of Aristophanes' (1845) ; a critical edition of Lucian's complete works (1860-74) and (Recension des Buches Aeschylos Eumeniden von K. O. Muller* (1834), a defense of his former master, Her¬ mann.

FRIULI, fre'oo-le, Italy, formerly inde¬ pendent duchy, consisting, in its widest extent, of the modern Italian province of Udine, the Austrian County of Gorz and Gradiska, and the circle of Idria. It derived its name from that of its chief town, Forum Julii, which was said to have been founded by Julius Caesar. It was one of the most important duchies of the Lon- gobard Kingdom, and after the overthrow of that monarchy by Charlemagne, and even up to the 15th century, when it was conquered by Venice and its territories dismembered, it re¬ tained a considerable degree of independence. The inhabitants, called Furlani, are Italian for the most part, but speak a peculiar dialect, into which a strong Celtic element has been intro¬

duced. The area of the district is about 3,300 square miles ; its population about 700,000. Con- sulf Manzano, (Annali del Friuli* (Udine 1858- 79) ; and Fracassetti, (La Statistica etnografica

del Friuli*- (ib. 1903).

• •

FROBEL, Julius, German editor and poli¬ tician, nephew of Friedrich Froebel (q.v.): b. 1805 ; d. 1893. He pursued his studies at Mu¬ nich, Weimar and Berlin, and in 1833 was ap¬

pointed professor of mineralogy in the indus¬ trial schools of Zurich, Switzerland, and was also editor of Der schweizerische Republikaner. He gave up his professorship after 11 years and engaged in publishing scientific works and po¬ litical tracts at Zurich. He removed to Dresden in 1846, and in 1848 was one of the Democratic leaders and a member of the Frankfort Main National Assembly. During this troubled year he visited Vienna in th.e company of Robert Blum. He was arrested and condemned to death, but because of his great talents he re¬ ceived a pardon from Windischgratz. He came to the United States in 1849 and edited a Ger¬ man journal in New York until 1850, when he went to Nicaragua, and was later engaged in commercial expeditions in Mexico. In 1855 he was editor of a San Francisco paper and re¬ turned to Germany in 1857. In 1862-73 he was editor of newspapers in Munich and Vienna In the latter year he was appointed German Consul at Smyrna, was transferred to Algiers in 1876 and retired in 1890. He published (Aus Amerika) (1857), translated (1859) by himself and issued under the title (Seven Years' Travel in Central America, Northern Mexico and the Far West) ;

FROBEN, or FROBENIUS, Joannes,

German scholar and printer : b. Hammelburg about 1460; d. 1527. He received his education at the University of Basel. In 1491 he set up a printing press at Basel, which became noted for its excellence. He published editions of Saint Jerome, Saint Cyprian, Tertullian, Hilary of Poitiers and Saint Ambrose. He also pub¬ lished the works of Erasmus, of whom he was an intimate friend. His Greek Testament, edited by Erasmus, was used by Luther for his translation. Froben projected an edition of the Greek Fathers, which was issued after his death by his son Jerome and his son-in-law, Nikolaus Episcopius. Many texts of Froben's were il¬ luminated by Holbein.

FROBISHER, Sir Martin, English navi¬ gator: b. Altofts, Yorkshire,

about 1530 or 1540; d. Plymouth, 22 Nov. 1594. He was sent to school in London and in 1544 was placed on board a ship sailing to Guinea. He was later in the public service at sea off the coast of Ire¬ land. About 1560 he formed a resolution to undertake a voyage in search of a northwest passage to India, and by his efforts he gave the enterprise a national character. Finally he was put in charge of an expedition, consisting of two barks of 20 and 25 tons, and a pinnace of 10 tons, and an aggregate crew of 35. He set sail on 7 June 1576 by way of the Shetland Islands. _ Stormy weather resulted in the loss of the pinnace, and soon after one of the ves¬ sels, the Michael, deserted. Frobisher continued the voyage alone in the Gabriel and on 28 July sighted the coast of Labrador in latitude 62° 2′ N. Some days afterward he reached the mouth of Frobisher Bay, which he deemed to be a strait. He explored the coast and Butcher's Island until 18 August, and then he returned homewards, reaching London by 9 October. He brought back, with him some <(black earth® and a rumor soon got abroad that this was really a lump of gold ore. The story aroused great enthusiasm and in the following year ?

much more important expedition was fitted out, with Frobisher in command. He sailed in May 1577, with three ships and 120 men and reached Hall's Island at the mouth of Frobisher Bay on 17 July. Several weeks were spent in pros¬ pecting for gold, but little was done in the way of discovery beyond going over the ground vis¬ ited on the occasion of the first voyage. A third expedition of 15 vessels was sent out in 1578 and this time Frobisher sailed up a new strait, afterward explored by Henry Hudson (Hudson Strait). In 1580 he became a captain of one of the queen's ships and in 1585 was vice-admiral under Drake in his expedition to the West Indies. He was knighted for his dis¬ tinguished services in the dispersal of the Span¬ ish Armada in 1588. He continued to cruise in the Channel until 1590, when he was sent in command of a small fleet to Spain. In 1592 Sir 'Walter Raleigh sent him with a squadron against the Spanish coast, from which he re¬ turned with a rich prize. In 1594 he was en¬ gaged in the siege and relief of Brest, when he received the wound from which he died later at Plymouth. He was one of the ablest seamen of his time and ranks among the greatest of England's naval heroes. Consult Corbett, Julian, (Drake and the Tudor Navy* (London 1898) ; Jones, F., (Life of Frobisher* (ib. 1878) ; Hakluyt's (Voyages,* and the Hakluyt Societies (Three Voyages of Frobisher) (1867).

FROBISHER BAY, an Arctic inlet, lo¬ cated approximately between 62° and 64° N. and between 65° and 69° W., and opening west¬ ward near the mouth of Davis Strait, between Cumberland Sound and Hudson Strait, at the southern end of Baffin Land in the Northwest Territory of Canada. It is about 240 miles long by above 20 wide, with rugged mountain¬ ous shores. It was discovered by Sir Martin Frobisher (q.v.), the English navigator, in 1576 and named after him. It was till Hall's voyage called Frobisher Strait, being erroneously re¬ garded as a passage into Hudson Bay. Consult Collinson, R., ed., (The Three Voyages of Fro- bisher) (in Hakluyt Society Publications, Vol. XXXV, London 1867) ; Hall, C. F., 'Arctic Re¬ searches, etc., 1860-62) (New York 1865) ; Por¬ ter, R. W., 'Frobisher Bay Revisited> (in American Geographical Society of New York, Journal, Vol. XXX, p. 97, New York 1898).

FROEBEL, fro'bel, Friedrich Wilhelm August, German educationist : b. Oberweissbach, Thuringia, 21 April 1782; d. Marienthal, 21 June 1852. It was Froebel who said, "The clearer the thread that runs through our lives backward to our childhood, the clearer will be our onward glance to the goal® ; and in the fragment of autobiography he has left us, he illustrates forcibly the truth of his own saying. The motherless baby who plays alone in the village pastor's quiet house ; the dreamy child who wanders solitary in the high-walled gar¬ den ; the thoughtful lad, neglected, misunder¬ stood, who forgets the harsh realities of life in pondering the mysteries of the flowers, the con¬ tradictions of existence, and the dogmas of orthodox theology; who decides in early boy¬ hood that the pleasures of the senses are with¬ out enduring influence and therefore on no ac¬ count to be eagerly pursued ; — these present¬ ments of himself, which he summons up for us from the past, show the vividness of his early

recollections and indicate the course which the stream of his life is to run.

The coldness and injustice of the new mother who assumed control of the household when he was four years old, his isolation from other chil¬ dren, the merely casual notice he received from the busy father absorbed in his parish work, all tended to turn inward the tide of his mental and spiritual life. He studied himself, not only be¬ cause it was the bent of his nature, but because he lacked outside objects of interest; and to this early habit of introspection we owe many of the valuable features of his educational philosophy. Whoever has learned thoroughly to understand one child, has conquered a spot of firm ground on which to rest while he studies the world of children ; and because the great teacher realized this truth, because he longed to

give to others the means of development denied him, he turns for us the heart-leaves of his boyhood.

It would appear that Froebel's characteristics were strongly marked and unusual from the beginning. Called by every one (

At 10 years old the sensitive boy was for¬ tunately removed from the uncongenial atmos¬ phere of the parental household; and in his uncle's home at Ilm he spent five free and happy years, being apprenticed at the end of this time to a forester in his native Thuringian woods. Then followed a year's course in the University of Jena, and four years spent in the study of farming, in clerical work of various kinds, and in land-surveying. All these em¬ ployments, however, Froebel himself felt to be merely provisional ; for like the hazel wand in the diviner's hand, his instinct was blindly seek¬ ing through these many restless years the well- spring of his life.

In Frankfort, where he had gone intending to study architecture, Destiny touched him on the shoulder, and he turned and knew her. Through a curious combination of circum¬ stances he gained employment in Herr Gruner's Model School, and it was found at once that he was what the Germans love to call ((a teacher by the grace of God.® The first time he met his class of boys he tells us that he felt inexpressibly happy; the hazel wand had found the waters and was fixed at last. From this time on, all the events of his life were connected with his experience as a teacher. Impelled as soon as he had begun his work by a desire for more effect¬ ive methods, he visited Yverdon, then the cen¬ tre of educational thought, and studied with Pestalozzi. He went again in 1808, accompanied by three pupils, and spent two years there, alter¬ nately studying and teaching.

There was a year of lectures at Gottingen after this, and one at the University of Berlin, accompanied by unceasing study and research both in literary and scientific lines ; but in the fateful year 1813 this quiet student life was broken in upon, for impelled by strong moral conviction, Froebel joined Baron von Liitzow's famous volunteer corps, formed to harass the French by constant skirmishes and to encourage the smaller German States to rise against Napo¬ leon.

No thirst for glory prompted this action, but a lofty conception of the office of the educator. How could any young man capable of bearing

arms, Froebel says, become a teacher of chil¬ dren whose Fatherland he had refused to de¬ fend? how could he in after years incite his pupils to do something noble, something calling for sacrifice and unselfishness, without expos¬ ing himself to their derision and contempt? The reasoning was perfect and he made prac¬ tice follow upon the heels of theory as closely as he had always done since he became master of his fate.

After the Peace of Paris he settled down for a time to a quiet life in the mineralogical museum at the University of Berlin, his duties being the care, arrangement and investigation of crystals. Surrounded thus by the exquisite formations whose development according to law is so perfect, whose obedience to the prompt¬ ings of an inward ideal so complete, he could not but learn from their unconscious ethics to look into the depths of his own nature, and there recognize more clearly the purpose it was intended to work out.

In 1816 he quietly gave up his position, and taking as pupils five of his nephews, three of whom were fatherless, he entered upon his life work, the first step in which was the carrying out of his plan for a ((Universal German Educa¬ tional Institute? He was without money, of course, as he had always been and always would be, — his hands were made for giving not for getting; he slept in a barn on a wisp of straw while arranging for his first school at Gries- heim ; but outward things were so little real to him in comparison with the life of the spirit, that bodily privations seemed scarcely worth considering. The school at Keilhau, to which he soon removed, the institutions later estab¬ lished in Wartensee and Willisau, the orphan¬ age in Burgdorf, all were most successful edu¬ cationally, but, it is hardly necessary to say, were never a source of profit to their head and founder.

Through the 20 succeeding years, busy as he was in teaching, in lecturing, in writing, he was constantly shadowed by dissatisfaction with the foundation upon which he was build¬ ing. A nebulous idea for the betterment of things was floating before him; but it was not until 1836 that it appeared to his eyes as a ˆdefinite truth? This definite truth, the discov¬ ery of his old age, was of course the kinder¬ garten; and from this time until the end, all other work was laid aside, and his entire strength given to the consummate flower of his educational thought.

The first kindergarten was opened in 1837 at Blankenburg (where a memorial school is now conducted), and in 1850 the institution at Marienthal for the training of kinder-

gartners was founded, Froebel remaining at its head until his death two years after.

With the exception of that remarkable book (The Education of Man) (1826), his most im¬ portant literary work was done after 1836; (Pedagogics of the Kindergarten? the first great European contribution to the subject of child-study, appearing from 1837 to 1840 in the form of separate essays, and the (Mutter-und- Kose Lieder) (Mother-Play) in 1843. Many of his educational aphorisms and occasional speeches were preserved by his great disciple the Baroness von Marenholtz-Biilow in her (Reminiscences of Froebel } ; and though two most interesting volumes of his correspondence have been published, there remain a number of letters, as well as essays and educational sketches, not yet rendered into English.

Froebel's literary style is often stiff and in¬ volved, its phrases somewhat labored, and its substance exceedingly difficult to translate with spirit and fidelity; yet after all, his mannerisms are of a kind to which one easily becomes accus¬ tomed, and the kernel of his thought when reached is found well worth the trouble of re¬ moving a layer of husk. He had always an infinitude of things to say, and they were all things of purpose and of meaning ; but in writ¬ ing, as well as in formal speaking, the lan¬ guage to clothe the thought came to him slowly and with difficulty. Yet it appears that in friendly private intercourse he spoke fluently, and one of his students reports that in his classes he was often (

Froebel's educational creed cannot here be cited at length, but some of its fundamental articles are :

The education of the child should begin with its birth, and should be threefold, addressing the mental, spiritual and physical natures.

It should be continued as it has begun, by appealing to the heart and the emotions as the starting-point of the human soul.

There should be sequence, orderly progres¬ sion, and one continuous purpose throughout the entire scheme of education, from kinder¬ garten to university.

Education should be conducted according to nature, and should be a free, spontaneous growth,— a development from within, never a prescription from without.

The training of the child should be con¬ ducted by means of the activities, needs, desires and delights, which are the common heritage

of childhood.

The child should be led from the beginning to feel that one life thrills through every mani¬ festation of the universe, and that he is a part of all that is.

The object of education is the development of the human being in the totality of his powers as a child of nature, a child of . man, and a child of God.

These principles of Froebel's, many of them the products of. his own mind, others the pure gold of educational currency upon which he has but stamped his own image, are so true and so far-reaching that they have already begun to modify all education and are destined to work greater magic in the future. The great teach¬ er's place in history may be determined, by-

and-by, more by the wonderful uplift and im¬ petus he gave to the whole educational world, than by the particular system of child-culture in connection with which he is best known to¬ day.

Judged by ordinary worldly standards, his life was an unsuccessful one, full of trials and privations, and emptv of reward. His death¬ blow was doubtless struck by the prohibition of kindergartens in Prussia in 1851, an edict which remained nine years in force. His strength had been too sorely tried to resist this final crushing misfortune, and he passed away the following year. His body was borne to the grave through a heavy storm of wind and rain that seemed to symbolize the vicissitudes of his earthly days, while as a forecast of the future the sun shone out at the last moment, and the train of mourners looked back to see the low mound irradiated with glory.

In Thuringia, where the great child-lover was born, the kindergartens, his best memorials, cluster thickly now ; and on the face of the cliffs that overhang the bridle-path across the Glockner Mountain may be seen in great letters the single word Froebel, hewn deep into the solid rock. Consult von Marenholtz-Biilow, (Reminiscences of Friedrich FroebeP (trans¬ lated by Mrs. Horace Mann, Boston 1887) ; Barnard, (Papers on Froebel's Kindergarten (1881) ; Fletcher and Welton, (Froebel's Chief Writings on Education Rendered into English' (New York 1912) ; Hauschmann, (Froebel's Kindergarten System) (1874) ;

Bowen, (Froe- beP (1897) ; Quick, (Educational Reformers' (New York 1896).

Nora Archibald Smith.

FROG, Nicholas, or Nic, national nick¬ name of the Hollanders, first appearing in (Law is a Bottomless Pit,' by Arbuthnot (1712).

FROG. This familiar animal is the type of the anurous Amphibia (order Anura). The family Ranidcz, to which it belongs, is char¬ acterized by having the skin smooth, the hind legs long, and the feet usually completely webbed; teeth are present in the upper jaw and palate, seldom in the lower jaw. The tympanic membrane is situated behind the eyes, and is not concealed. The nostrils are placed at the extremity of the rounded muzzle just above its margin, and open directly into the mouth. When the mouth is filled with air the nostrils are closed, and the animal swallows the bolus of air into the sacculate lungs, there being, in the absence of ribs, no provision for such re¬ spiratory movements as take place in the chest of mammals. Frogs are thus air breathers, but they are capable of remaining for a consider¬ able time under water. They swim with great vigor, and on land progress by a series of vio¬ lent leaps, the long hind limbs being powerful levers. Their food is chiefly insects, which they capture by means of the tongue : this organ is covered with a viscid secretion and is attached in front, its free border being behind; it is rapidly projected from the mouth, the insect adheres to it, and is at once swallowed. The frog does not drink, but its soft skin absorbs fluids rapidly, and thus has a double function both of nutrition and as an aid to respiration. As the frog grows the old outer skin cracks from time to time, and is pulled off and swal¬ lowed. The animal retires in winter to the

bottom of ponds, from which clusters of frogs may be drawn buried in mud. This hibernation, which is associated with low vital energy, ends in February; in March the spawn is deposited in gelatinous masses of many hundreds of eggs, the males riding for a long period at that season on the backs of the females, and fertilizing the eggs as fast as they are extruded. The eggs soon manifest change, and after a time the young escapes as a ((tadpole," a larval animal with short body, circular suctorial mouth, and long tail, compressed from side to side. Gills project on either side of the head from a cleft which answers in position to the gill opening of fishes. The hind limbs first appear as buds, later the fore limbs project, the gills disappear, .the lungs becoming more fully developed; the tail gradually shrinks and disappears, and the animal, which was at first fish-like, then closely resembled a newt (or urodele amphibian), finally assumes the adult or

anurous form. This is a true process of metamorphosis as com¬ plete as that of the butterfly ; since there is a .change not merely of form and proportion, but also of internal organs. The frog is highest among Amphibia, and the successive stages of its development resemble each the adult form of a lower group in its line of ancestry.

Frogs, themselves useful in clearing gardens of slugs and insects, are in turn the prey of birds, especially herons and aquatic birds, of serpents, and fish, the latter destroying large quantities of the spawn. Though exposed to droughts, they can bury themselves in the moist soil and thus live after the ponds are dried up. Though thus tenacious of life, the stories of frogs being found in stone and in trees are for the most part founded on imperfectly noted facts, though it is possible that a frog may now and then get closed into a cavity for which, after entering, it had grown too large ; but an aperture must always be present by which water can get access to them. Their fossil his¬ tory goes back to the early Tertiary days, and probably will be found to extend farther, as Eocene examples differ little from modern forms.

It is by no means easy to define the word <(frog" in classification, as distinguished from <(toad" (q.v.), and the safest method here will be to deal only with the aquatic family Ranidce, already defined, except as the most highly de¬ veloped of amphibians. It contains about 280 species and is represented in every part of the world not too cold except southern South America and Australia, where all the so-called frogs belong to a related family, the Cysiig- nathidaz, whose members, especially of the sub¬ family Cystignathincz, may be said to represent the Ranidcz in Notogaea. ((Some of them," says Gadow, C(can be distinguished from the true, typical frogs solely by the arciferous type of the shoulder-girdle and sternum."

The type-genus Rana contains more than half the known species, and is scattered all over the northern hemisphere, but is absent from the southern. It is to this genus that the common frogs of Europe and the United States be¬ long— the bull-frog, spring-frog, European grass-frog, etc. The American bull-frog (R. catesbiana) is the largest of the whole tribe, occasionally reaching a length of eight inches ; and its muffled grunting cry may be heard a mile or more over the water. It is greenish

bright upon the head and mottled elsewhere, while the legs are

distinctly blotched. This species abounds in all sluggish waters from Kansas eastward, laying its eggs in long strings, and its tadpoles require two years to reach maturity. It is bold and voracious, catching fish, salamanders, other frogs and even duck¬ lings. Its size and the chicken-like daintiness of the flesh in its hind legs, or “saddle,® make it the favorite frog for market, and great quantities are eaten in all parts of the country. In the springs, swamps and ditches lives the green frog (R. clamata), not half as big, but very similar in color except that it is yellowish or white below. Another green aquatic frog, still smaller, is the leopard frog (R . virescens) , whose bright coat is marked with irregular blotches of black edged with whitish, in two rows along the back, and the legs are barred. This species is numerous everywhere as far west as the Sierra Nevada. Another checkered frog, confined to the Eastern States, is the pickerel frog (R. palustris), which is light- brown with two rows of large oblong square, blotches of dark brown on the back, and one or two on the sides. The head is short, and a dark line extends from the nostril to the eye, while the upper jaw is white, spotted with black spots. Another well-known little kind is the wood-frog (R. sylvatica), which goes to the water to breed in early spring, but during most of the year lives in the dry woods. It is a variable reddish brown, with the side of the head marked with a dark-brown band. Several other less conspicuous species of frog inhabit North America, including a few representatives of another family (Engystomidce) , besides the tree-frogs, elsewhere described.

For frogs generally consult Gadow’s Am¬ phibia and Reptiles* (1901) ; for those of the United States the writings of Holbrook, C. C. Abbott, O. P. Hap, A. W. Butler, and especially (North American Batrachia,* by E. D. Cope; Dickerson, (The Frog Book) (New York 1906) ; Mivart, (The Common Frog* (London 1874) ; Marshall, (The Frog) (11th ed., New York 1912). See also Amphibia; Metachrosis.

FROG. See Railway Construction, Frogs and Switches.

FROG, Flying. See Flying Frog.

FROG-SHELL, a small mollusk of the Triton family (genus Ranella), so called be¬ cause of its shape and mottled colors.

FROGBIT, in botany, the popular name for a small floating water plant belonging to the order Hydrocharidece. See Hydrochari- deˆ:; Vallisneria.

FROGFISH, any of several sea-fishes of low organization, toad-like forms and carniv¬ orous habits, constituting the family Anten-

nariidce, and related to the goosefish (q.v.), itself sometimes called “fishing frog.®

FROGHOPPERS, or FROTH-FLIES,

minute plant-feeding homopterous bugs of the family Cercopidce, which dwell upon plants and may, when very numerous, seriously damage grass crops. The eggs are laid on the stems of plants in the autumn, and survive in the winter. When the embryos hatch (and these resemble the parents, but are wingless) they exude a viscid liquid which is whipped into froth, called in England “cuckoo-spit,® by the

thrashing of the “tail,® an anal appendage, probably respiratory in function. The “spittle® is supposed to be a protective disguise, never¬ theless the immature insects are preyed upon by wasps, etc. These bugs are called “frog- hoppers® in double allusion to the froth about their eggs and to their great leaping powers.

FROGMORE, a mansion within the roval demesne of Windsor, Berkshire, England. It was occupied by Charlotte, queen of George III, and later by the mother of Queen Victoria, who died here in 1861. In the grounds are the mausoleum of the Duchess of Kent and the royal mausoleum, a cruciform building with a central octagonal lantern, where lie the remains of the Prince Consort and Queen Victoria.

FROGMOUTH, one of a group of birds, the subfamily Podargince of the family Capri- mulgidae. They are indigenous to parts of India and to Australia. They have a very wide mouth, a soft plumage and are nocturnal. They have two large powder-down patches on each side of the rump, and have no oil gland.

FROGS, The (Aristophanes’ (Frogs*), is the wittiest comedy in the world and the best index of the intelligence of the audience that could appreciate it. It was produced in 405 b.c. in the brief interval of respite and hope between the victory of Arginusae and the fatal defeat of .TEgospotami. The allusions to political conditions and the war are few. The main theme, the descent into hell, had a long history before Aristophanes, running back to the 11th book of the Odyssey; and from Aristophanes to Dante, and from Dante to (The Houseboat on the Styx,* it has served as the. vehicle of contemporary satire. It supplies Aristophanes with abundant motives of comic relief and farce. And the whole is enlivened by the grotesque costumes and the brek-ke-ke-ke coax refrain of the chorus of frogs,, whose original habitat was the precinct of Dionysus in the marshes. But informing and transcending

all this is the serious comedy of ideas — the criticism of the style, temper, thought and ethics of the new poetry. Sopho¬ cles and Euripides (as who should say Tenny¬ son and Browning) are dead and there are none to fill their shoes, but very minor bards.

“ And idly tuneful, the loquacious throng

Flutter and twitter, prodigal of time.

And little masters make a toy of song,

Till grave men weary of the sound of rhyme. ”

These words of William Watson are almost an echo of the complaints of Dionysus, god of drama, poetry and music. Since there are no good poets left on earth, he is resolved to fetch one from Hades. In this quixotic role he appears with a Sancho Panza, the slave Xanthias, who plays up to him in the funny business. He takes counsel of Heracles, who had made the journey and who vainly tries to daunt him. He crosses Charon’s ferry to the chant of the frogs and is rejoined by Xanthias, who had to walk around the lake because Charon drew the color line on his boat. In the darkness they at first cannot see the male¬ factors and cutthroats there — but taking a good look, at the audience, they discern them. After various comic alarms they fall in with a second chorus, composed of the blest initiates, to whose lovely songs they listen and from whom they inquire “where — in hell — they

are.® Knocking at Pluto’s door, Dionysus, who wears the garb of Heracles, is received with an appalling outburst of PEschylean vitu¬ peration from the servant Hiacus, who remem¬ bers Heracles’ former thefts. Dionysus faints, and changes roles with Xanthias, but insists on resuming his divinity when a message from Persephone invites them to a feast, and cajoles Xanthias into changing yet again upon the eruption of two furious housewives, who recall the misdeeds of Heracles. ZEacus returns prepared to execute judgment on the supposed Heracles. But Xanthias, in that role, denies his guilt, and in accordance with Attic law, offers in evidence the testimony of his slave (Dionysus) to be taken under torture. Diony¬ sus warns all and sundry that he is an immortal god. Xanthias proposes to test that by seeing which can stand the hardest buffets. The re¬ sulting farce is redeemed by the witty device of converting Dionysus’ ejaculations of

pain into unfinished familiar quotations. ((0, mighty Caesar,® he yells — but instantly adds com¬ pleting the verse, ((dost thou lie so low?® A reference to the masters, Pluto and Persephone, clears up the misunderstanding, and after a choric song the two slaves are left outside talking servants' hall gossip. They hear a tremendous uproar within, and Aeacus explains to Xanthias that it is the contest between Aeschylus and Euripides for the tragic throne. Dionysus has been appointed judge, and the contest is transferred to the open stage, where it is accompanied by the comments of the chorus and the ribald interpolations of Diony¬ sus. Beginning with a regular slanging match, the two rival poets analyze one another's drama¬ tic construction and style, parody the blank verse and the lyrics, balance in the scales the weightiness of their meters and criticism of life, and censure the tendencies of their moral and political teaching. No literal version can con¬ vey any adequate idea of the wit and subtlety of this penetrating literary criticism. But

The tongue has sworn — the mind remains unsworn.

Ihe tongue has sworn — but /Eschylus's my man.

The justice of Aristophanes' travesty of Euripides C(new poetry for a new age® is still under controversy. Recent criticism from Browning's (Aristophanes' Apology* to the in¬ troduction of Professor Murray's translation leans to the side of Euripides. The best brief temperate summary of the older and saner view is to be found in Jebb's (Lectures on Classical Greek Poetry* (p. 203 ff, 1892).

Paul Shorey,

Head of Greek Department , University of Chicago.

FROHLICH, fre'liH, Abraham Emanuel,

Swiss poet: b. Brugg 1796; d. Aaran 1865. After 1835 until his death he held the pastorate of Aarau. He wrote many poems and fables which have become very popular, and have attained a high rank among their kind. His best known works are (Fabeln* (1825) ; (Das Evangelium Sankt Johannis in Liedern* (1830) ; (Elegien an Wieg' und Sarg) (1835) ;

(Ulrich Zwingli* (1840) ; (Ulrich von Hutten* (1845); and (Johann Calvin) (1864).

FROHMAN, Charles, American theatrical manager: b. Sandusky, Ohio, 1858; d. at sea,

7 May 1915. Having managed several road companies, he took charge of the Empire Theatre, New York, in 1893, and in 1895-96 organized the syndicate which exercises so large a monopoly in American theatrical affairs. Maude Adams, Julia Marlowe, John Drew and other prominent performers were managed by him and he starred them in various roles. He managed E. H. Sothern and Julia Marlowe in Shakespearean productions in the season of 1905-06. He opened playhouses in London and was one of the first managers to produce American successes on the London stage. He lost his life on the Lusitania. Con¬ sult Marcosson, J. F., and Frohman, D., (Charles Frohman Manager and Man* (New York 1918).

FROHMAN, Daniel, American theatrical manager : b. Sandusky, Ohio, 1853. He became office boy in the New York Tribune office in 1866 and remained five years in the newspaper business. Subsequently he was manager of traveling theatrical companies and later man¬ ager of the Madison Square Theatre (1879-85). New York, the Fifth Avenue Theatre and the old Lyceum Theatre, New York. He was also manager of Daly's Theatre, New York, with the Daniel Frohman Stock Company. He also managed English and American stars and theatrical companies. He has allied himself closely with the so-called Theatrical Trust, formed by his brother Charles Frohman. At present he is proprietor of the (new) Lyceum Theatre, New York, and- vice-president of the Famous Players' Film Company, and president of the Actors' Fund of America.

FROHSCHAMMER, Jakob, German theo¬ logian and philosopher: b. Illkofen, 6 Jan. 1821 ; d. Bad Kreuth, Bavaria, 14 June 1893. He studied theology at Munich, and was destined by his parents for the Roman Catholic priesthood, which he entered in 1847. From 1855 until his death he was professor of philosophy at the University of Munich. He was specially attracted to philosophy and the history of dogma. In 1850 he published his (Beitrage zur Kirchengeschichte,* which was placed on the Index Expurgatorius, and led to his resignation as preacher at the university. His (t)ber den Ursprung der menschlichen* (1854) and (Menschenseele und Physiologie* (1855) gave great offense to his ecclesiastical superiors. In most of his writings he main¬ tained the independence of science, whose goal was truth, against authority. He was de¬ nounced by the pope in an apostolic brief of 11 Dec. 1862, and students of theology were forbidden to attend his lectures. He refused to associate himself with the Old Catholic movement, and founded in 1862 the Athendum as the organ of Liberal Catholicism. For this he wrote the first adequate account in German of Darwin's theory of natural selection, for which he was warmly commended by Darwin himself. He was

excommunicated in 1871, and in reply wrote three pamphlets which were widely popular— (Der Fels Petri in Rom) (1873) ; (Der Primat Petri und des Papstes* (1875) and (Das Christenthum Christi und

das Christenthum des Papstes) (1876). He also vigorously opposed the materialism of Strauss and the doctrine of papal infallibility. In his later years he wrote several philosophical works, which include (Die Phantasie als Grundprincip des Weltprocesses) (1877) ; (t)ber die Genesis der Menschheit und deren geistige Entwicklung in Religion, Sittlichkeit und Sprache) (1883), and (Ueber die Organiza¬ tion und Cultur der menschlichen GesellschafC (1885). Consult Attensperger, A., (Jakob

Frohschammer's philosophisches System im Grundriss) (1899); Friedrich, J., < Jakob

Frohschammer) (1896), id., (Systematische und kritische Darstellung der Psychologie J. Froh- schammers) (1899) ; Hinrichsen's, A., (Deutsche Denker) (1888).

FROHSDORF, or FROSCHDORF, Aus¬ tria, village situated 30 miles south of Vienna, on the Leitha. After 1844 it was the residence of the Duchess of Angouleme and later of the Count de Chambord. It subsequently became the headquarters of the elder Bourbons. Pop. about 700.

FROISSART, Jean, zhon frwa-sar or froi'- sart, French chronicler: b. Valenciennes, Hainault, 1333 or 1338; d. Chimay about 1419. He was well educated with the view of entering the church, but he soon abandoned this object and took great delight in tales, adventures of chivalry and narratives of travel. His passion for travel brought him to Avignon and sub¬ sequently to England. In 1361 we find him in London, where he was appointed secretary of Queen Philippa. He visited Scotland in 1365 and in the following year left Britain with the Black Prince. Two years afterward he was in Italy. From 1370 to 1380 he lived more or less in seclusion, engaged on his Chronicles. About 1384 he was made chaplain to Guy de Chatillon, count of Blois. There¬ after for many years he made several journeys to examine the theatre of the events he was about to relate. In 1394 he was again in Eng¬ land and thereafter his movements became ob¬ scure. His 'Chronicle* (as the title is usually abbreviated) covering the years

1326-1400, is of capital importance for its period. To a collection of the verses of Wenceslaus of Brabant, Froissart added some of his own, and gave to the whole the title ‘Meliador, or the Knight of the Golden Sun.* All of his extant poems were published at Brussels (1870-72). (See Froissart’s Chronicles). Consult Dar- mesteter, ‘Froissart* (1894) ; Molinier, (Les sources de l’histoire de France) (Vol. IV, Paris 1904).

FROISSART’S CHRONICLES. The

‘Chronicles* (Chroniques) of Froissart deserve in many respects to hold the first place among historical compositions of their kind. They purposed to be a record of all that was memor¬ able in the long struggle between France and England that filled the last three-quarters of the 14th century, so far as it could be dis¬ covered by a man with a prodigious curiosity and thirst for information and very fortunately placed for securing it. For their author en¬ joyed the protection of Philippa of Hainaut, queen of Edward III, from his arrival in Eng¬ land in 1361 till her death, and later had suc¬ cessively as patrons, Duke Wenceslaus of Lux¬

embourg and Count Guy of Blois; he lived in the company of great lords and ladies ; he trav¬ eled much in England, Scotland, France and Italy; he followed the Black Prince to Aqui- tania in 1367 and the Duke of Clarence to Milan in 1368. Born in the 19th century Froissart would have been the prince of reporters and interviewers. He had a very keen scent for a “story,® and a sharp eye for the color and move¬ ment of the life of camps and of courts, which he knew thoroughly and loved passionately. He shared unquestioningly the rather hollow ideals of knighthood of that troubled, post- chivalric age, bequeathed by the generations that had created the romances of chivalry but gone to seed and emptied of their first inspira¬ tion. The interest of life appears in the Chron¬ icles, as in those romances, to centre in adven¬ ture. Personal exploits, feats of arms, jousts, tournaments, pageants, the glitter of armor and the clash of lance and sword and spear fill their pages and are reported with such spirit, zest and relish that they live again with vivid and colorful reality. And in equal measure the persons led in endless procession before us are made alive and real. The portraits, sketched in bold, firm, rapid, telling lines, distinct both in outward form and spiritual features, are almost the most solid and admirable part of the work. But the Chronicles are no true his¬ tory. Froissart, though sincerely anxious to present the truth, was quite without critical sense, and we must not look in his pages for exact facts of date and place, which are not infrequently sadly distorted. He was equally without historical vision, and his narration wholly lacks perspective and illuminating glimpses

into the meaning of the events of which he was the spectator. Chameleon-like, he takes on the color of the opinions that surround him, now English and Burgundian (in the first book of the Chronicles, inspired by Philippa of Hainaut and composed mainly in England), now French (in the three other books, and in a later redaction of the first, undertaken when his patron was French). Living in the society of the nobility he has their attitude and point of view; he has no more interest in the un¬ privileged people than if they did not exist, and the Chronicles have little or no information for us as to the life and condition of the great masses or the role they were playing more and more. But with all their short¬ comings and omissions the Chronicles are a faithful mirror of the later 14th century and a most precious source of knowledge about it.

The manuscripts that we possess of the Chronicles represent several redactions, for Froissart was continually gathering new mate¬ rials. For the first book he drew largely upon the Chronicles of Jean Lebel, even transcribing whole passages. For the expedition of the Black Prince in Aquitania he consulted the nar¬ rative of Chandos. The standard edition is that of Kervyn de Lettenhove (29 vols., Brus¬ sels, 1870-77). The Chronicles have long been accessible to English readers in translation.

Arthur G. Canfield,

Professor of Romance Languages, University

of Michigan.

FROLIC, The. See Wasp and Frolic.

FROLICH, Lorentz, Danish artist: b. Copenhagen, 1820; d. 1908. He studied in his

FROLLO

FRONDE

native city under Eckersberg, in Dresden and in Paris under Coutoure. He spent much time in Rome and Paris and exhibited regularly at the salons. After 1877 he was professor at the Copenhagen Academy. His best known pictures are

FROLLO, Roman knight and governor of France, who was killed by

King Arthur, ac¬ cording to an Arthurian legend of the 15th century.

FROME, England, town on the Frome, in Somersetshire, about 12 miles southeast of Bath. There are manufactures of woolen goods, broadcloth, silks, hats, dyestuffs, ales, cutlery and ironware. It is also an important central market for agricultural produce. Sel- wood Forest, a part of which is still in exist¬ ence, was in the neighborhood. The town con¬ tains an art school and a museum and owns its water system. Pop. 10,901.

FROMENTIN, fro-mon-tan, Eugene, French painter: b. La Rochelle, 24 Oct. 1820; d. Saint Maurice, near La Rochelle, 27 Aug. 1876. He began life as a law student, but early turned his attention to landscape painting, working in the studio of Louis Sabat. In 1842 he traveled in Algeria, and it was after this journey that under the guidance of Marilhat, the painter of Oriental scenes, he resolved to work a new vein in the same department by painting the North African deserts. In 1847 he exhibited at the Salon for the first time and visited Algeria twice (1848-52). The fruits of these wanderings were not only numerous pic¬ tures, but also two literary works descriptive of his travels. These were (A Summer in the Sahara5 (1856), and (A Year in the SaheP (1858), works distinguished by powerful and richly colored style and poetic imagination. As a painter his aim was to depict the light and atmosphere of the desert with truth and deli¬ cacy, yet imparting to it his own subjective interpretation, and he showed a marked taste for studies in gray and violet. The masterly analysis of ancient painting, which appears in his (Masters of a Former Day) (1876), em¬ bodies the results of his travels in Holland and Belgium (1875), where he made a careful study of the Dutch and Flemish masters. His paintings are remarkable for their brightness and harmony of color, excellent draftsmanship and execution. The most noted are (A La Rochelle FarnP (1847) ; (The Gazelle Hunt5 (1857)*; (A Street in El-Aghouat5 (1859) ; (An Arab Bivouac5 ; fThe Falcon Hunt5 (1863); and (An Arab Camp,5 his last picture, in the Louvre. He is represented in the Walters col¬ lection, Baltimore, and in the Vanderbilt collec¬ tion and the Metropolitan Museum, New York. Consult Blanchon, (Biography and Letters of Eugene Fromentin5 (1909) ; Claretie, <(Eugene Fromentin55 (in (Peintres et sculpteurs contem-

porainsP Paris 1882) ; Gouse, (Eugene Fro¬ mentin, peintre et ecrivain> (ib. 1881) ; Huthor, (Modern Painting) (New York 1907) ; Jouin, ((Fromentin)5 (in (Maitres contemporains,5 Paris 1887).

FROMMANN, Georg Karl, German phi¬ lologist: b. Coburg 1814; d.

1887. He was editor of Die deutsche Mundarten and was also librarian of the Germanic Museum. In 1865 he was one of a Committee of Eleven theolo¬ gians, which undertook the revision of Luther's translation of the New Testament. Later, at the request of the Protestant conference, the Old Testament was included and the revised edition of the whole Bible was published in 1892. Consult memoir by Vogt (Nuremberg

1888) .

FROMMEL, fro-'mel, Emil, German theolo¬ gian and author: b. Karlsruhe, 5 Jan. 1828; d. 1896. He was educated at Halle, Erlangen and Heidelberg. He held several pastorates suc¬ cessively, was army chaplain during the strug¬ gle with France in 1870-71 and after the war became court preacher at Berlin and pastor of the garrison there. He wrote several volumes of theology including (Die zehn Gebote Gottes in Predigten5 (6th ed., 1898) ; (In drei Stufen,5 an anthology, (8th ed., 1890) ; (Festflammen5 (6th ed., 1896) ; (Das Gebet des Herrn in Predigten> (4th ed., 1893). (Tales For the People5 (1873-86), and similar collections of humorous and realistic compositions, will more surely form his memorials in the future.

FROMMEL, Karl Ludwig, German painter and engraver: b. Birkenfeld, Oldenburg, 1789; d. 1863. He studied at Karlsruhe where his masters were F. J. Becker and Haldenwang. He afterward visited France and Italy. He returned to Germany in 1817, and became pro¬ fessor at Karlsruhe, where he founded the So¬ ciety of Art and Industry. He visited London in 1824 with the object of studying the tech¬ nique of steel engraving, and later he estab¬ lished a studio in this branch at Karlsruhe. He was director of the picture gallery from 1830 to 1858 and his able administration placed it in a flourishing condition. His most notable works (engravings) are (Arricia near Rome5 ; (View of Tivoli5 ; (Mount ˆEtna5 ; and (Mount Vesuvius.5 Many of his landscapes are pre¬ served in the Karlsruhe gallery.

FROMMEL-LINDEMANN, Karl August.

See Lindemann-Frommel.

FROND, in botany, a term applied to a plant in which stem and leaves are not differ¬ entiated. It has been generally applied to fern leaves by older botanists who thought that ferns represented a combination of stem and leaf. The duckweed is the best illustration of the frond type.

FRONDE, frond, the name of a political faction which played a

conspicuous part in French history during the minority of Louis XIV, and gave rise to the insurrectionary movement known historically as the War of the Fronde. The members of this party obtained the contemptuous name of Frondeurs (slingers), being compared to boys throwing stones from slings, owing to' the pertinacious lampoon war¬ fare which they waged against the powerful minister of that day, Cardinal Mazarin, and the Queen Regent, Anne of Austria. Mazarin, as a

foreigner and a parvenu, was detested by the French people — both patrician and proletarian — and especially had incurred the opposition of the Parliament of Paris to his measures. In 1648 Mazarin ventured on the bold step of ar¬ resting two of the most popular members of the latter body, and on the next day, 27 August (la journee des barricades) the Parisians rose in arms, dispersed some of the royal troops sent out against them, and barricaded the approaches to the Louvre, compelling the court party to re¬ tire to Saint Germain, thus leaving Paris in the hands of the insurgents. Upon the Prince de Conde advancing to besiege the capital, the par¬ liament called the citizens to arms, when the Prince de Conti, the Due de Beaufort (<(Le Roi des Halles,® and son of Henry IV), and numerous others of the great nobles of the kingdom came forward to head the insurrection. The famous Cardinal de Retz and the Duchesses de Longueville and de Montbazon also joined the popular cause. The Prince de Conde, too, changed sides and went over to the malcontents, with whom the court party shortly afterward patched up a treaty of peace of but brief dura¬ tion. Fresh contentions arose, and Mazarin caused the arrest of Conde and Conti. This step excited a revolt in the provinces, and Mar¬ shal Turenne hastened to the rescue of the Frondeur princes, but was routed in the battle of Rethel (1650). The cardinal, however, en¬ joyed but a temporary supremacy; the parlia¬ ment again agitated against him, and procured his banishment from France, leaving the Prince de Conde master of the situation. Subse¬ quently, the contest degenerated into a war of intrigue and is regarded as one of the most useless conflicts ever waged. The court finally agreeing to dismiss Mazarin a general amnesty was proclaimed. Conde attempted to continue the struggle, but was proscribed, and entered the service of Spain, while Mazarin, after a time, returned to Paris, and again obtained the reins of government. It was not until 1653 that the last

signs of revolt in the provinces were suppressed. The defeat of the movement helped to render the monarchy absolute. Con¬ sult Barante, (Le parlement de Paris et vie de M. Mole) (Paris 1859) ; Gordon, (The Fronde) (Oxford 1905) ; id., (Lettres du Cardinal Mazarin5 (Paris 1878-1906) ; Pardoe, (Louis XIV and the Court of France, etc.* (London 1888) ; id., (Memoirs of Cardinal de Retz) (ib. 1896) ; Perkins, ˆFrance under Richelieu and Mazarin* (New York 1888).

FRONSPERG. See Frundsberg, Georg von.

FRONSPERGER, Leonhard, German mil¬ itary writer: b. Ulm 1520; d. 1575. He applied himself to the study of military science at an early age. His most famous work is the (Kriegsbuch kaiserlicher Kriegsgerechte und Ordnungen vom Geschiitz) (1573; new ed., by F. W. A. Bohm 1819), in which is displayed a remarkable knowledge of military science in all its ramifications. It stamped Fronsperger at once as the foremost German military writer of his century.

FRONT ROYAL, Engagement at. Front Royal, Va., is 12 miles east of Strasburg, and is the key to Luray Valley. On 23 May 1862 it was held by Colonel Kenly with nine com¬ panies of the 1st Maryland infantry, two com¬

panies of the 29th Pennsylvania, a company of the 28th New York, and a section of Knap’s battery, under command of Lieutenant Atwell, in all about 900 men. Soon after noon of the 23d (

FRONTAL BONE. See Skull.

FRONTAL MORAINE. See Moraine.

FRONTAURA, fron-ta-oo'ra, Vasquez Carlos, Spanish dramatist and journalist: b. Madrid, Spain, 4 Sept. 1835. He was one of the most voluminous writers of Spain in the 19th century and contributed to practically all the well-known newspapers and magazines of Madrid. He founded the Cascabel, which he used in behalf of the restoration to the throne of Spain of Alfonso XII, in which he was finally successful. He became president of the Council of Ministers, and for six years he was governor of various provinces, editor-in-chief of the Gaceta de Madrid and finally head of the section of public charities in the Depart¬ ment of the Interior, a position he held for many years. He wrote many dramas and musical comedies, several of which were very popular and are still played wherever Spanish is spoken. Two of his zarzuelas,

toms contributed to La Ilustracion Es panola 3) Americana show a real insight into the life of certain classes of Spain. He has also written several books for children which became very popular. Many of his works of all kinds have been translated into Portuguese, French, Ger¬ man and Italian.

FRONTENAC, Louis de Buade, loo-e de boo-ad f ront'nak. Comte de, French colonial officer: b. France, 1620; d. Quebec, 28 Nov. 1698. He entered the army in 1635 and at an early age became brigadier. In 1672 he was appointed governor of the French possessions in North America. Of an imperious nature, the new governor was nevertheless most energetic and aimed at an orderly, well-directed administra¬ tion of the colony, which he believed would her¬ ald an era of great prosperity. To this end he inaugurated a city administration in Quebec and convened the clergy, nobles and commons. Frontenac's reforms met with little favor from his sovereign and he was shorn of much of his power. Quarrels with the Jesuits, the new in- tendant and the governor of Montreal divided the colony, and the news spreading to France Frontenac was recalled in 1682. In spite of his violent temper he gained the confidence of the settlers and the respect of the Indians, and in 1689, when to the horror of constant attacks from the Iroquois

the misery of a war with England was added, he was again sent out by the king, as the only man who could rouse the colonists to hope and action. During the next nine years he loosed his savage allies on the de¬ fenseless villages of New England, repulsed a British attack on Quebec and so broke the power of the Iroquois that they were never again a terror to the colony. Consult Le Sueur, (Count Frontenac) (Toronto 1906) ; Parkman, (Fronte- nac and New France Under Louis XIV) (1877) ; Winsor, (Cartier to Frontenac) (1894).

FRONTENAC, Kans., city of Crawford' County, on the Atchison, Topeka and Santa Fe, the Kansas City Southern and other railroads, 100 miles south of Kansas City. It is the cen¬ tre of an important coal mining region. The waterworks are the property of the municipal¬ ity. Pop. 3,396.

FRONTERA, Mexico, a seaport in the State of Tabasco on the Gulf of Campeachy, 225 miles southeast of Vera Cruz. It has a good harbor and its annual exports exceed $2,000,000, consisting chiefly of coffee, cocoa, hides, rubber and dyewoods. Its imports con¬ sist chiefly of iron, steel, machinery and cotton goods and are valued at about $1,000,000 annu¬ ally. It is the port of Juan Bautista, the capital of the State of Tabasco. A United States con¬ sul is stationed here. Pop. 5,760.

FRONTIER, Military, the outermost lim¬ its of the lines of national defense of a country. By agreement between countries with a common land frontier the military frontier is placed at some distance back of the actual dividing line between them. The term was formerly applied to a narrow strip along the Turkish frontier in Hungary, which had a special military govern¬ ment. Modern land frontiers are usually de¬ fended by a chain of forts.

FRONTINUS, fron-ti'nus, Sextus Julius,

Roman writer of the latter part of the 1st cen¬ tury after Christ. He was thrice consul and

commanded with reputation in Britain under Vespasian. He was appointed by Nerva to su¬ perintend the aqueducts of Rome and left an extant work on the subject, (De Aquis Urbis RomaeP as well as one dealing with the art of war, (Stratagemata.} His death took place about the year 105 a.d. The (De Aquis Urbis Romae) is an important work in that it contains complete descriptions of the aqueducts and water supply of the city. Consult Herschel, (Two Books on the Water Supply of the City of Rome,* which contains an edition of (De Aquis, }

with translations, notes and commen¬ tary (Boston 1899; 2d ed., London 1913) and (Stratagemata,> edited by Gunderman (Leip¬ zig 1888).

FRONTO, Marcus Cornelius, Roman ora¬ tor and rhetorician: b. Cirta, a Roman colony in Numidia, about 100 a.d. ; d. about 175. He went to Rome during thie reign of Hadrian, soon acquired great fame as a speaker and teacher of rhetoric and was in consequence selected as tutor to M. Annius Verus and L. Commodus, afterward emperors under the names of Marcus Aurelius and Lucius Verus. He became a mem¬ ber of the senate and was a consul in 143 a.d. Till 1814 the only extant writings of Fronto were a worthless tract, (De Differentiis Vocabu- lorunP and some fragments; but in that year Angelo Mai recovered many of Fronto's letters from a palimpsest in the Ambrosian library at Milan. These were part of the orator's corre¬ spondence with Antoninus Pius, Marcus Aure¬ lius, Lucius Verus and other distinguished friends and were published under Mai's editor¬ ship in 1815. In 1823 Mai published a new edi¬ tion of the letters, containing many others which he had discovered in the Vatican library. While not of great importance the letters show that the Emperor Marcus Aurelius was as highly esteemed by his contemporaries as by the moderns. Consult edition of the letters by Naber (Leipzig 1867) ; Brock, < Studies in Fronto and his Age* (Cambridge 1911) ; Ellis, (The ˆ Correspondence of Fronto and Marcus Aurelius* (Oxford 1904) ; Teuffel, (Geschichte der romischen Litteratur* (6th ed., Leipzig

1913).

FROSCHDORF. See Frohsdorf.

FROSINONE, fro'sT-no'ne, Italy (the an¬ cient Frusino), city in the province of Rome, 53 miles southeast of Rome, on the Cosa River. Wine is produced in the neighborhood and mar¬ keted here. The ruins of the ancient Volscian town, form its principal attraction. Pop. (com¬ mune) 11,646.

FROSSARD, Charles Auguste, French military officer : b. Versailles, 1807 ; d. Chateau- Villain, Haute Marne, 25 Aug. 1875. He was educated at the military school of Metz and gained distinction in the engineers' corps. He was present at the siege of Rome in 1849, was commander of the Second Corps of Engineers in the Crimea, and was made a brigadier-gen¬ eral in 1855. He served as chief of the engi¬ neering department in Italy in 1859 and in 1867 received the appointment of chief of the mili¬ tary household and governor to the prince im¬ perial. He commanded the Second Corps of the Army of

the Rhine in the Franco-Prussian War, driving the Prussians from Saarbriicken on 2 Aug. 1870. On 6 Aug. 1870 he was de¬ feated at Forbach. He gave the order for the

charge of the Imperial Guard cavalry in an ef¬ fort to stem the retreat at Metz on 16 August, and was involved with his corps in the sur¬ render of Bazaine's army, remaining a prisoner until the close of the war. General Frossard published a (Rapport sur les operations du 2e corps de l'armee du Rhin dans la campagne de 1870> (Paris 1872).

FROST, Arthur Burdett, American illus¬ trator and author: b. Philadelphia, 19 Jan. 1851. He studied under Thomas Eakins in the Acad¬ emy of Fine Arts, Philadelphia, and coming to New York secured employment on the Graphic, and later entered the studio of Harper and Brothers, where his associates were Abbey, Reinhart and Alexander. In 1877 he went to England, and in 1900 he exhibited at the Paris Exposition. His early work was full of inter¬ est and attracted much .attention and his later work showed the spirit of the true artist. His illustrations of (Out of the Hurly-Burly 5 (1872), first attracted general attention. Good examples of his style are his illustrations of Stockton, (Rudder Grange) (1879) ; Thanet, (Stories of a Western Town5 (1893) ; and Bunner, (Story of a New York House5 (1887). He has published (Stuff and Nonsense5 (1888) ; (Bull Calf and Other Tales5 (1892) ; (Sports and Games in the Open5 (1899) ; (Golfers' Alphabet5; (Book of Drawings5 (1905); (Carlo5 (1913).

FROST, Edwin Brant, American astrono¬ mer: b. Brattleboro, Vt., 14 July 1866. He was graduated at Dartmouth in 1886 and afterward studied physics and astronomy at Princeton, Strassburg and at the Royal Astrophysical Ob¬ servatory at Potsdam, Germany. In 1887-90, he was instructor in physics and astronomy, 1892- 95, assistant professor and director of the ob¬ servatory, 1895-98, professor of astronomy, and from 1898 to 1902 non-resident instructor at Dartmouth College. In 1898 he was appointed professor of astrophysics and in 1905 director at the Yerkes Observatory of the University of Chicago. From 1896 to 1902 he was assistant editor and after 1902, editor of the Astrophysical Journal . He has made an especial study of stel¬ lar velocities, stellar spectroscopy, sun spots and solar thermal radiation. He is a member of the National Academy of Sciences, the Roval Astronomical Society, the Societa degli Spet-troscopisti Italiani and of many other learned bodies. _ He translated,

revised and enlarged J. Scheiner's (Treatise on Astronomical Spec¬ troscopy5 (1894), and has made many contribu¬ tions to astronomical and other periodicals.

FROST, George Henry, American pub¬ lisher: b. Ontario, Canada, 9 July 1838; d. 15 March 1917. Educated at McGill University, Montreal as civil engineer in 1860. He was a land surveyor and railway engineer in Chicago before establishing himself in New York in 1878. In 1874 he established the Engineering News and published it until August 1911, when it was sold. He was president of the Courier-News Pub¬ lishing Company of Plainfield, N. J., and was a member of many engineering societies.

FROST, John, American educator and writer : b. Kennebunk, Me., 1800 ; d. 1859. He was educated at Bowdoin and at Harvard, being graduated at the latter in 1822. He taught in Boston and from 1828 to 1838 conducted a girls'

school in Philadelphia. He was later connected with the Central High School until 1845. He compiled many school books and biographical and historical works, including his very popular (Pictorial History of the United States5 (2 vols., 1844) ; (Pictorial History of the World5 ; cLives of American Generals5 ; (American Naval Bi¬ ography,5 etc.

FROST, William Edward, English painter : b. Wandsworth, near London, September 1810; d. 4 June 1877. About 1825 he was sent to a drawing school in Bloomsbury where he studied for several years. He also studied in the British Museum and in 1829 was admitted as a student in the Royal Academy schools. He maintained himself all those years by portrait¬ painting, executing over 300 portraits. In 1839 he was awarded the gold medal of the Royal Academy for his (Prometheus Bound.5 In 1843 he was awarded a third-class prize for his cartoon (Una alarmed by Fauns and Satyrs.5 His best-known works are (Christ crowned with Thorns5 (1843) ; (Nymphs dancing5

(1844, now in the Dublin Museum) ; (Sabrina5 (1845) ; (Diana and Actaeon5 (1846) ; (Nymph disarming Cupid5 (1847) ; *Una and the Wood- Nymphs5 (1847) ; (Chastity5 (1854) ; (I1 Pen- seroso5 (1855) ; (The Graces and Loves5 (1863) ; (Hylas and the Nymphs5 (1867). In 1846 he was elected an associate of the Royal Academy, and to full membership in 1871. Frost was deficient in power of design and while many of his works have grace and charm they are entirely without mastery. Many of his pic¬ tures were frequently engraved.

FROST, William Goodell, American edu¬ cator: b. Le Roy, N. Y., 2

July 1854. He was graduated at Oberlin College in 1876, and after¬ ward studied at the universities of Wooster, Harvard and Gottingen, Germany. From 1877 to 1879 he was instructor in Greek, and from 1879 to 1892 professor of Greek at Oberlin, being chosen president of Berea College in the latter year. He has done much in the promotion of higher education in Kentucky and in adapting educational methods to conditions in the South¬ ern mountains. He published (Greek Primer5 (1887); Unductive Studies in Oratory5 (1890), and contributions to magazines.

FROST, the moisture in the atmosphere crystallized or congealed by the cold, upon the earth's surface, or upon various objects and surfaces situated or existing upon it, as grasses, shrubs, trees, window panes, etc. The various phenomena of hoar frost, window frost, etc., grouped under this head, occur over a large portion of the land surface of the earth. In the United States, hoar frosts often occur during the spring and autumn months, over the whole northern portion of the country, and more rarely also in the Southern States, sometimes causing much damage by freezing and injuring the young corn sprouts and early fruits and vegetables. Frosts occur only during calm, cold nights when the temperature falls below 32° F. In the United States the meteorological condi¬ tions usually preceding the formation of frosts are northerly winds, accompanied by high ba¬ rometer, and especially the coincidence of these conditions with the near approach, or passing, of a storm from the west or southwest. The for¬ mation of hoar frost depends in some degree upon surface topography and local causes, oc-

WINDOW AND HOAR FROST

1 Columnar window frost

2 The same, cup-like

3, 4, 5, 7 Crystalline window frost

6 Branching hoar frost

8* 9 Membranous window frost, highly magnified

/

curring much more frequently within the deep valleys leading down from mountain heights, than in broader valleys or level regions. In the former, during calm cold nights, the cold air of the hill and mountain tops, by virtue of its greater specific gravity, flows down and mixes with, or flows underneath and replaces, the warmer, lighter air of the valleys, thus furnish¬ ing the conditions favorable to frost formation. The cooling of objects by radiation of heat, and by the evaporation of moisture from them, greatly facilitates the formation of frost. Frost crystallizations exhibit a wonderful variety, both of form and structure. The formation of each of the various types seems to depend upon a great number of meteorological and other condi¬ tions, some of them obscure. The temperature of the air, its electric condition, humidity, etc., and also the nature of the substances upon which they form, each seem to exert an influence in determining and modifying their form and structure. Two principal types of hoar frost occur, — the columnar and the tabular. Com¬ monly, both varieties do not occur simul¬ taneously, but on a given night one or the other type will greatly predominate and form the bulk of the crystals. Frost crystallizations in general greatly resemble those of snow, but be¬ cause their development is usually restricted in one or more directions by the objects or surfaces upon which they form, the resemblance is seg¬ mentary, rather than complete. In general, columnar forms vary from similar snow crystal¬ lizations, by virtue of their hollow cylindrical, or cup-like character, and by often attaining to much greater dimensions. Sometimes, during extreme cold, such forms attain a length of many Inches. Tabular forms rarely attain perfect sym¬ metry, but exhibit w.ithin them air tubes and inclusions, assume crystal forms possessing both close and open structure, and develop upon the same extremely thin plane as do similar snow crystals. As commonly deposited in spring or autumn, they do not usually greatly exceed .in size similar snow forms, but during intense and prolonged cold, as in winter, they attain much greater dimensions. A very beautiful effect is sometimes produced by the deposition upon the trees, shrubs, etc., of a heavy coat of hoar frost. Each limb and leaf and delicate twig is trans¬ formed and beautified, and presents a white ap¬ pearance, as though frosted with silver. During zero weather, large and delicately formed branch¬ ing tabular crystals, and long, icy needles, form in beautiful pendent clusters upon, and depend from, the rafters and timbers of barns, etc., close to where domestic animals are kept ; and also upon ferns and similar plants overhanging icy terraces or ice-covered pools. Similar forms also form directly upon or project from icy surfaces. Even the clouds furnish their quota of frost crystallizations. When low-lying clouds enshroud mountain tops covered by forests, they often deposit a portion of their moisture

upon the branches of the trees, commonly in the form of long, granular or fibrous needle-shaped crys¬ tals. Fogs, when they occur during hoar frost formation, usually deposit moisture upon the forming crystals in granular form. The most beautiful and varied frost crystallizations are those that form upon the window panes of dwelling houses, etc., in arctic or temperate zones. These fairy-like creations, seemingly in imitation of leaves, feathers, ferns, trees, starry

firmaments, tropical forest effects, etc., occur as three distinct entities : the granular, the crys¬ talline, and the membraneous. The latter va¬ riety forms only in heated rooms, upon window panes covered with an uncongealed film of water, as a dew-like condensation of moisture. It oc¬ curs most frequently in the form of long, curv¬ ing, feather-like forms, or as an exceedingly delicate membranaceous-like network of diverg¬ ing and coalescing lines. It is due to a process of crystallization that takes place during the conversion of a film of water into ice. The crys¬ talline variety of window frost forms only upon window panes that are free from water in liquid form. Crystals of this class assume branching, star-like forms (often as four- or six-pointed branching stars), curving filaments, fibrous crys¬ tallizations, and those resembling sea-moss, long serrated lines, etc. Many of these are very beau¬ tiful and interesting. Some of them develop within minute striations in the surface of the glass and will reappear in the same identical posi¬ tions upon a given pane, with each renewal. When identical meteorological and other condi¬ tions recur again and again, the types of frost coexistent with each will, in general, recur simultaneously with them. During zero weather, if conditions are favorable, the formation and growth of these beautiful frost creations takes place very rapidly. A beautiful and absorbingly interesting experiment consists in melting a heavy coat of window frost off a portion of a window pane (by placing an oil lamp close to it). Only the central portion of the pane should be cleared of all moisture ; around this a film of water should be left upon the glass. Soon after the lamp is removed the feather-like mem¬ braneous frost will form around the outer edges of the film of water, and quickly radiate in beau¬ tiful curves toward the centre of the pane. They stop instantly when they reach the clear glass. Soon minute and delicate serrated crys¬ tal lines, or tiny crystal stars, appear upon the clear glass space, and slowly develop, and usually coexistent with them a thin film of granular texture will be laid down upon portions of the clear glass. The latter is not usually deposited in slow progressive order, but in intermittent ! order. Large spaces of the clear glass are often covered simultaneously, by a succession of auro¬ ral-like flashes ; each flash, in the twinkling of an eye, spreading a thin granular film upon un¬

occupied portions of the glass. Singularly enough, the granular deposit does not form near where the true crystalline frost is; the latter repels the former and prevents its forma¬ tion upon the spaces immediately surrounding it.

The phenomena included under the title frost, as commonly accepted, are understood to include both the processes of freezing and the mechanical effects produced thereby. Con¬ sidered under this broad definition, frost plays an important part in the economy of nature, both beneficent and otherwise. It enters the crevices and minute cracks in the rocks and rends the rocks apart ; and is thus an important agent in aiding and hastening their disintegra¬ tion, and in converting them and the solid materials of the earth into soil. Its beneficent action in loosening and pulverizing the soil, by entering it and forcing the particles of com¬ pacted soil and clods apart through its expan¬ sive action upon the particles of moisture dis-

seminated therein, is well known, and is of inestimable value to agriculture and to human¬ ity. The damage sometimes done to vegetation, trees, etc., through the frosts entering them, and rending their fibres, cells, etc., apart, is often very great, and partial failures of crops such as corn, vegetables, fruits, etc., are due to this cause. As any considerable motion of air, the presence of clouds covering the sky, or the placing of a light covering, as of cloth or similar material, over the objects to be protected, greatly reduces or prevents the formation of frost upon them and of injury thereby, artificial preventives are often resorted to. Sometimes smoke-producing fires are built around or within enclosures or fields containing plants, fruits, or vegetables, and light, tent-like coverings are placed over small fruit trees, shrubs, etc., and other tender vegetable or plant growths, and thus the damage by frosts is prevented, or minimized. In France an instrument has been devised for the predic¬ tion of frost. It consists of a wet bulb and dry bulb thermometer, mounted on a board on which is also a scale of lines corresponding to the degrees of the dry bulb, and a pointer travers¬ ing a scale graduated according to degrees of the wet bulb. Observations are taken shortly before sunset. By means of the pointer and scale, the point may be found at which, the line of the dry bulb reading meets the pointer set to the reading of the wet bulb. The scale is colored so that the point may fall in one of three zones, indicating certain frost, probable frost or no probability of frost. See also Snow.

Air Drainage is a term generally applied to a type of air circulation which plays an import¬ ant part in the distribution of frosts, more par¬ ticularly in hill and valley districts. The cold heavy air of the higher slopes flows down and fills the valley, forcing upwards the warm and lighter air of the latter, and forming in the valley a lake of cold air. Thus there are heavy frost in the valleys while the higher slopes escape. The condition is understood by gar¬ deners and others who use upper slopes for their gardens, orchards, etc.

Bibliography. — Andrews, (Famous Frosts and Frost-Fairs in Great Britain5 (London 1887) ; Beals, forecasting Frost in the North Pacific States5 (Weather Bulletin 41, Wash¬ ington 1912) ; Cox, frost and Temperature Conditions in the Cranberry Marshes of Wis¬ consin' (ib. 1910) ; Day, frost Data of the United States and Length of the Crop-Growing Season) (ib. 1911) ; Garriott, E. B., fold Waves and Frost in the United States) (Weather Bulletin P, Washington 1906) ; (Canada's Fertile Northland) (Department of the Interior, Ot¬ tawa 1907) ; Hann, (Zum Klima Manitoba) in Meteorologische Zeitschrift (Vienna 1894), and Monthly Weather Review.

FROST-BIRD, or FROST-SNIPE, a stilt sandpiper (q.v.).

FROST-BITE, form of mortification due to the action of cold in withdrawing the supply of blood from ears, fingers, nose, toes, cheeks, etc. In its milder forms it is known as ((chaps5) or ˆchilblains.® In frostbite the affected parts are always in danger of gangrene. The remedy is an immediate application of snow or a spray of ice-water to restore the circulation ; this cold application is effective in all cases where the mortification is slight and not of long dura¬

tion, but if it has gone too far the circulation cannot be restored, the part is lost and surgical treatment of the latter is necessary to prevent a spread of gangrene. See Chilblain ; Cold.

FROST-FISH, a name given to various fishes, because they appear at the time of early frost, as does the tomcod (q.v.) so called in New England. The frost-fish of New Zealand is one of the scabbard-fishes (q.v.).

FROSTBURG, Md., town in Allegany County, 80 miles southeast of Pittsburgh ; on the Pennsylvania, the Western Maryland and the Cumberland railroads. Its situation is picturesque at an elevation of 2,200 feet above sea-level, and it has a reputation as a summer resort. A State normal school and a miners' hospital are located here. Coal mining is the chief industry, but there are also fire-brick and tile

works, planing-mills, foundries and hosiery mills. It is governed by a mayor, elected for one year, and a council elected at large. The waterworks are the property of the municipality. Pop. 6,028.

FROTH-FLY, or FROTH-HOPPER. See

Froghopper.

FROTHINGHAM, Arthur Lincoln,

American archaeologist : b. Boston, Mass., 21 June 1859. He was educated in Rome, Italy, and at Leipzig; lectured on archaeology at Johns Hopkins University in 1882-86 ; and became pro¬ fessor of archaeology and the history of art at Princeton University in 1887, and in 1898-1906 was professor of archaeology and ancient his¬ tory. He founded the American Journal of Archceology in 1885; and was associate director of the American School of Classical Studies, Rome, in 1895-96. He is a member of many learned societies. His publications include (A History of Sculpture) ; (Mediaeval Art Inven¬ tories of the Vatican5 ; (Stephen Bar Sudaili, the Syrian Mystic and the Book of Hierotheos5 (1886) ; with Marquand, A., (A Textbook of the History of Sculpture5 (1896) ; (Monuments of Christian Rome5 (1908) ; (Roman Cities in Italy and Dalmatia5 (1910); (A History of Architecture5 (1911), and various monographs on Syria.

FROTHINGHAM, Nathaniel Langdon,

American Unitarian clergyman and religious writer: b. Boston, Mass., 23 July 1793; d. there, 4 April 1870. He was graduated from Harvard in 1812 and entering the ministry was pastor of the First Church in Boston 1815-50. He was author of (Deism or Christianity5 ;

(Sermons in the Order of a Twelvemonth5 (1852) ; and (Metrical Pieces5 (1855-70). He was one of the earliest American students of German. His writings are marked by grace and refinement.

FROTHINGHAM, Octavius Brooks,

American clergyman : b. Boston, Mass., 26 Nov. 1822; d. there, 27 Nov. 1895. He was a son of N. L. Frothingham (q.v.), and was graduated from Harvard in 1843, and from the Cambridge Divinity School in 1846. His radical views led to the resignation of his pastorate in the North Unitarian Church, Salem, Mass. He was pastor in Jersey City 1855-59; he then organized the Third Unitarian Church in New York, where he preached very radical and advanced views till his resignation in 1879. The remainder of his life was devoted to

travel and literary pur-

suits, his home being in Boston. His works were . Stories from the Lips of the Teacher) ; ‘Stones from the Old Testament*. ; ‘The Re¬ ligion of Humanity*; ‘The Cradle of the Christ*; ‘Memoir of W. H. Channing* ; ‘The Safest Creed* ; ‘Beliefs of the Unbelievers* ; ‘Creed and Conduct* ; ‘The Spirit of the New Faith*; ‘The Rising and the Setting Faith*; ‘Lives of Gerrit Smith, George Ripley, Theo¬ dore Parker* ; ‘Transcendentalism in New England* ; ‘Recollections and Impressions* ; etc.

FROTHINGHAM, Richard, American journalist and historian: b. Charlestown, Mass., 31 Jan. 1812; d. 1880. He was at various times a member of the State legislature, was mayor of Charlestown 1851-53, and managing editor of the Boston Post 1852-65. He published ‘History of Charlestown* (1848) ; ‘History of the Siege of Boston* (1849) ; ‘Life and Times of Gen. Joseph Warren* (1865) ; ‘The Rise of the Republic of the United States* (1871),

FROUDE, frood, James Anthony, Eng¬ lish historian : b. Dartington, Devonshire, Eng¬ land, 23 April 1818; d. Salcombe, Devonshire, 20 Oct. 1894. He was the youngest son of Archdeacon R. H. Froude, rector of Dartington, and was educated at Westminster and Oxford. His brother, Hurrell Froude, was one of the leaders in the “Oxford Movement** and both were influenced by Newman, the earliest work of the younger Froude being a contribution to the ‘Lives of the Saints,* edited by Newman. He soon emerged from Tractarian influence, however, and for the rest of his life remained indifferent to the Church in which he had been reared. The first two volumes of his history of England appeared in 1856 and at once attracted marked attention, both favorable and adverse, on account of the brilliant style and the audacity of the writer’s opinions. The book flatly reversed many historical judgments, and interpreted mo¬ tives in a manner more common now than then, but very startling to readers in the middle of the 19th century. His attempted vindication, of Henry VIII must be accounted a failure, bril¬ liant and able as it is, and although it is a most striking portrait of Henry that he has painted, it cannot be called a faithful likeness. His treat¬ ment of Mary of Scotland is frankly hostile, and has been met with severe criticism. His judgment of Elizabeth, though far from im¬ partial, is more nearly accurate than that of either of the other two personages. He excelled in vigorous, dramatic presentation of men and events, and in the judgment of sober critics appears to have cared much more for pictur¬ esque

narrative than for absolute historical ac¬ curacy. As a historian, he will long continue to be read and admired, but his apparent in¬ difference to historical truth at times will not permit of his inclusion in the first rank of historians. He visited the United States in 1872 on a lecture tour, his lectures being after¬ ward published with the title of ‘English Mis¬ rule in Ireland.* In 1874 he visited South Africa, his impressions being later given to the world in lectures at Edinburgh, and in 1882 made an extended tour through Australia, the West Indies and the United States, the liter¬ ary outcome of which were ‘Oceana* and ‘The English in the West Indies.* He was the friend of Carlyle, whose literary executor

he became, and his life of the Sage of Chelsea, his ‘Reminiscences of Carlyle* and ‘Letters and Memorials of Jane Carlyle* have excited a vast amount of controversy. In 1892 Froude succeeded the historian Freeman as regius professor of history at Oxford, his lectures in that capacity afterward constituting his volume on Erasmus. It may be said that Froude was more distinctly a man of letters than a historian. He is always readable even when one is forced to dissent from him most strongly, but he touched on too many themes to give to the writing of history the devotion toward it so characteristic of such men as the late Samuel Rawson Gardner, Professor Freeman or John Richard Green, and he was temperamentally indifferent to the claims of entire truthfulness. He may not have consciously distorted facts, but his selection of certain details and suppres¬ sion of others for the apparent sake of making the particular hero in question brighter, or the particular villain darker, does not commend itself to the lover of truth for its own sake. His important works include ‘Shadows of the Clouds,* published under the pseudonym “Zeta** (1847) ; ‘The Nemesis of Faith* (1849) ; ‘The Book of Job* (1851); ‘The History of England from the Fall of Wolsey to the Death of Elizabeth* (1856-70) ; ‘Short Studies on Great Subjectsˆ (1867); ‘Inaugural Address Delivered to the University of St. Andrews* (1869) ; ‘The Cat’s Pilgrimage* (1870) ; ‘Short Studies: Second Series* (1871); Calvinism* (1871) ; ‘The English in Ireland in the 18th Century* (1872-74) ; ‘Short Studies: Third Series* (1877); ‘Life and Times of Thomas hecket* (1878); ‘Caesar: a Sketch* (1879); ‘Banyan* (1880); ‘Two Lectures on South Africa* (1880) ; ‘Reminiscences of the High Church Revival* (1881); ‘Short Studies: Fourth Series* (1882) ; ‘Reminiscences of Thomas Carlyle* (edited 1881); ‘Thomas Car¬ lyle: History of the First Forty Years of His Life* (1882) ; ‘Letters and Memorials of Jane Welsh Carlyle* (edited 1883) ; ‘Thomas Car¬ lyle; History of His Life in London 1831-81*

(1884) ; ‘Life of Lord Beaconsfield* (1890); ‘The Divorce of Catharine of Aragon* (1891) ; ‘Life and Letters of Erasmus* (1894). The first two volumes named above he attempted to suppress in later life, and succeeded with ‘The Shadow of the Clouds.* Consult ‘Life,* by Herbert Paul (1905).

FROUFROU, comedy in five acts, pro¬ duced at the Gymnase in 1869 and the greatest work of Meilhac and Halevy.

FROZEN STRAIT, the passage which con¬ nects Repulse Bay and Fox Channel, and sepa¬ rates Melville Peninsula and Southampton Islands. It is from 10 to 20 miles wide and in lat..65° N. This strait is frozen, as its name indicates, nearly all the year, although some bodies of water farther north are free from ice from two to five months each year.

FROZEN WELLS, wells occurring in which ice is found throughout the year. In most wells of this kind the temperature is seldom above 32° F. The low. temperature is due to the entrance of cold air into the interior of the earth in cold winter months. Kimball studied conditions in some abandoned iron mines at Westport, N. Y., and thus obtained a clue to the method of ice formation in wells and

oaves. It was formerly believed that the presence of ice was due to the fact that the well pierced a stratum of glacier drift in which ice still survived. A famous frozen well is that at Brandon, Vt., which long showed ice at 14 feet below the surface in summer time.

FRUCTIDOR, friik’te-dor, the 12th month of the French Republican Calendar. From the year I to VII it ran from 18 August to 16 September, and in the years VIII-XIII from 19 August to 17 September. It was followed by five supplementary days — the sansculottides — which completed the year. The 18th Fructidor, year V (4 Sept. 1797) is memorable for the coup d’etat by Barras, Le Revelliere and Rew-bell in expelling Barthelemy and Carnot. See French Revolution.

FRUGONI, Carlo Innocenzio Maria, Ital¬ ian poet: b. Genoa, 21 Nov. 1692; d. Parma, 20 Dec. 1768. He was originallv destined for the Church and was even induced to take monastic vows. He gained a great reputation as an elegant writer of Latin and Italian prose and verse and from 1716 to 1724 he was pro¬ fessor of rhetoric successively at Brescia, Rome, Genoa, Bologna and Modena, where he at¬ tracted a great number of students. He finally settled down at

Parma, where the Duke Antonio Farnese appointed him poet laureate. After the duke's death he returned to Genoa. Later he returned to Parma and devoted his remaining years to poetical composition. As a poet, Fru- goni is* regarded as one of the best of the Arcadian school. Consult his (Opere poetiche) (10 vols., Parma 1779s) ; (Poesie) (15 vols., Lucca 1780) ; Carducci, °Poeti erotici del sec XVIIP (Florence 1878) ; (Lettere inedite,> edited by Bertoldi (Forli 1891) ; the biography in (Fabroni Vitae> (Vol. I, 1778-1805) ; Torelli, (Paesaggi e profilP (Florence 1861) ; Bertana, E., Hntorno al FrugonP in Giornale storico della letteratura italiana (Vol. XXIV, Torino 1883 et seq.).

FRUIN, Robert, Dutch historian: b. Rot¬ terdam 1823 ; d. 1899. He received his edu¬ cation at Leyden and after 1860 was professor of the history of the Netherlands there. He edited Nijhoff's (Bij-dragen voor Vaderlandsche Geschiedenis) and contributed frequently to De Gids and other periodicals. Jle was the great¬ est authority on Dutch history in his time. He published (Tien jaren uit den tachtigjarigen oorlog) (4th ed., 1889) ; (Reply to Sir Bartle Frere-1 and (Appeal to the People of England) (1881), dealing with the Transvaal question caused considerable comment at the time ; (Geschiedenis der staatsinstellingen in Neder¬ land tot den val der republicˆ (1901) ; (Ver- spreide Geschriften) (8 vols., 1900-03),

FRUIT, that part of a plant in which the seed or other reproductive element is perfected ; in ordinary plants the matured ovary with its pericarp and other parts. Strictly speaking the term is confined to the true, seed plants (sper- matophytes). This botanical definition is largely extended in popular usage to include the sporangia of mosses and the sori of ferns and still more loosely and erroneously to any plant part useful to man..

Within the limits of the definition fruit structures show exceedingly wide variation. Typically the fruit is a mature ovary which con¬ tains seeds, but in some cases, as in the straw¬

berry, the seeds are practically outside the ˆfruit,® being embedded in the pulp. Because of the difficulty of making a satisfactory and all-inclusive general classification on any other than that of evolutionary development the fol¬ lowing sketch is given.

Dry Fruits. — Starting with those simplest flowers in which all the carpels (simple pistils or one of the elements of a compound pistil) are separate, we find the stigma and style usu¬ ally withering back as no longer of service, and the ovary enlarging, as the fertilized ovules

grow up into seeds. But in many simple flowers more ovules are produced than are fertilized, and generally also more fertilized than can be developed up to maturity; hence the reduction of the ovules is exceedingly common, as is sim¬ ply exemplified in the horse chestnut.

A second principle of fruit-making is reached through keeping in mind the origin of the ovary from one or more carpellary leaves, of which the individual development has been so greatly checked that they remain closed upon the ovules, and frequently even coalesce with each other from the base upward, so forming a many-celled ovary. Yet the tendency to their individual expansion is not lost; in many mon¬ strosities, and normally in a few types, such as the common mignonette, the carpellary leaves early begin to expand, so opening the ovary and exposing the seeds long before ripeness. Far more frequently, however, this final develop¬ ment of the carpellary leaves is delayed until the growth-processes of the seed and fruit have ended, and it is, therefore, accompanied, or even preceded, by their death; the separation often indicating the lines at once of leaf-margin and leaf-fail.

In the best-developed carpellary leaves, such as those of the more floral Ranunculacece, we naturally find the ovary opening along the. line of its united ovule-bearing margins. This is what is termed a follicle.

Since, however, the ovules are on the. united margins, the midrib tends to interpose little or no resistance to a tendency to split or tear along .its fold. Such ((dehiscence by both dorsal and ventral suture® gives us the legume or pod. Another type is the siliqua (or when shortened and broadened the silicula) of Crucifercu. Here the placental edges of two united carpels de¬ velop a transverse septum which divides the fruit; and this is left when the lobes split away, as so familiarly in honesty.

Among united ovaries which readily split open at the united margins (septicidal) is that of gentian (q.v.), while the more familiar three-

Fig. 1. — /, follicle; e, legume; d, silicula; c, capsule of hem bane; b, of violet; a, of poppy.

celled ovary of violet, with its parietal placen- tation, gives a characteristic example of dehis¬ cence along the midribs of the united carpels,

so opening the loculi (loculiciddl) . In the iive-celled capsule of the geranium (q.v.) the carpellary leaves separate not only at the sides but also at the base, so curling inwards and projecting the seed. Where, however, the placentae remain more or less completely upon a

a p*

Fig. 2. — e, /, achenes of buttercup; c, d, caryopsis of oat; a, b, achenes with pappus; g, “ lomentum ”; i, h, nut¬ lets and ovary of borage; l, k, umbelliferous type of schizocarp.

central column from which the valves are de¬ tached, the dehiscence is said to be septifragal.

In henbane (Anagallis), etc., the dehiscence is circular (circumscissle) . Many-celled cap¬ sules are numerous in which the leaf-opening or dehiscence is greatly reduced from complete¬ ness ; witness the valvular and porous dehiscence of the Lychnis and of the poppy respectively. Such cases clearly point us to those of carpels which do not open at all. Such indehiscent fruits, produced from carpels so persistently embryonic, are usually short, few or one-ovuled, and, for the most part, little specialized. Thus the follicle of the Ranuncuiacece of more spe¬ cialized floral character becomes shortened into the one-seeded indehiscent achene of the ane¬ mone and the buttercup. In the achene of the grasses (which similarly represents the capsule of the ancestral lilies) the thin dry pericarp becomes inseparable from the seed-coat (hence the term caryopsis) ; in many trees (for exam¬ ple, hazel) it becomes hardened and thickened as a nut. In composites, too, the achene is practically a nutlet, although often (on account of its being inferior) superfluously termed a cypsela. Less extremely reduced representa¬ tives of the various multicellular ovaries to which such fruits correspond are afforded us by borages or mints in which the two-celled ovary of the primitive solanaceous type be¬ comes, as in thorn-apple, etc., subsequently divided into four parts. In Umbelliferce we have another characteristic form of schizocarp, as all such fruits are termed which split up without truly carpellary dehiscence, although the tendency to this can be seen still to have some influence. Here the separate portions (or mericarps), each resembling an achene or nut, are two in number, and when ripe swing off upon the ends of a forked carpophore.

Fleshy Fruits. — So far all our fruits have been dry; but a different physiological principle of fruit formation is necessary to comprehend

those in which the pericarp is succulent. For, just as the effect of fertilization is seen in many animals to extend beyond the mere ovum to the parent organism, and also in many of the lowest

plants, so it is in the case before us. Even in fruits which are dry on ripening we have seen that the ovaries or loculi, on which no demand is made for the growth of fertilized ovules, be¬ come reduced or disappear. Sometimes it may be merely the coats of the seed (as in the pome¬ granate) which undergo the complex histologi¬ cal and chemical changes which we sum up as those of succulence and ripening; at other times largely their placentas, as in gooseberry and currant. Yet, as in these, the innermost tissue of the ovary may become succulent as well. In the orange also the seeds are imbedded in the familiar succulent tissue of the enlarged loculi or “cells® of the endocarp ; the grape, too, gives a characteristic example of soft endocarp. These may all be classed as berries or baccate fruits, for the distinction of the succulent product of an inferior ovary as a berry, from that of a supe¬ rior one, as a uva or grape, need hardly be al¬ lowed to increase our nomenclature. A pepo is merely a berry in which the epicarp is thick and tough (for example, a melon, with which the orange and the pomegranate may be reck¬ oned). Where the succulent change, instead of primarily affecting the deeper tissues of the fruit, and so producing a berry, leaves the endo¬ carp hard, we have the drupaceous or stone- fruit. The endocarp here forms a more or less complete “stone® or “pit® around the kernel or seed, the difference from an ordinary nut being due to the succulence of an outer layer (meso- carp), with a more or less leathery outer skin, the epicarp. The plum, peach and cherry are the most obvious examples ; but, since we may have many carpels thus transformed and more or less united as in the raspberry, we may have an aggregate fruit or syncarp of tiny drupes. The walnut and even the coconut are hence not true nuts. (See Nuts). The immature succu¬ lent mesocarp of the former is familiar in pickled walnuts, the ripe walnut we crack being merely the stony endocarp (which is exceptionally spe¬ cialized in being set free by the bursting of the mesocarp on ripening). Coconut fibre is the fibro-vascular tissue of the mesocarp, the fruit being thus broadly comparable to a peach which has wizened while still young and stringy. But, as in the kindred grass, the coats of the ovule further unite to the endocarp.

Fig. 3. — a, drupe: b, orange; c, a single drupelet of bramble;

d, pome; e, strawberry;/, hip of rose; g, capitulum of Dorstenia; h, fig.

The numerous carpels of the strawberry, al¬ though, of course, corresponding to those of the allied raspberry, remain mere nuts ; here, how¬ ever, the subjacent portion of the floral axis or receptacle becomes succulent. In the perigy- nous and epigynous Rosacece the same change

may take place ; hence the rose-hip is a succu¬ lent axis, enclosing a multitude of nuts. The apple or ®pome>:> is more akin to the drupe, since the carpels, here deeply sunk in the upgrown floral axis, develop a hard endocarp correspond¬ ing to the stone of a drupe.

Fertilization may even be followed by suc¬ culent or other thickening of the floral enve¬ lopes, or of the floral axis with subjacent bracts — the various cupules, as of acorn, beech, hazel¬ nut, etc., being of this nature. Or we may have a spurious fruit developed at the expense of an entire inflorescence, as in the pineapple, Dor- stenia and fig.

In the plantain and the banana the fruit is fleshy but when normally ripened it dehisces by the splitting of the pericarp into valves somewhat after the order of a bean pod. Another anomaly is the almond in which the construction is precisely the same as in the peach except that in the former the pericarp is fibrous, in the latter fleshy.

Chemical Composition of Fruits. — Our knowledge of the chemistry of fruit may be dated from the analyses of Fresenius (1857). But because of the innumerable varieties of almost every cultivated fruit, the effects of different soils and climates upon these, and still more of the fluctuation due to better or worse seasons, the results of any one chemical analysis would tend to convey an idea of undue precision. Thus — for example, while the ratio of sugar to free acid in certain grapes of an ordinary wine-year was found to be 16 to 1, in a very bad year it sank to 12, and in a very good year rose to 24. Hence a broad outline may be of more general use than the statistics of any one analysis.

The percentage of water may be taken as varying from 78 to 80 in the grape and cherry, as from 82 to 85 in plums, peaches, apples and pears, as 82 to 87 in brambles, currants, etc., and as much as 95 in the watermelon. The proportion of insoluble residue — skin and cel¬ lulose, stone and seed — obviously also varies greatlv with succulence and ripeness, but may be taken, one fruit with another, at not less

than from 4 to 6 per cent. Unripe fruits may contain a notable proportion of starch, but this is fermented on ripening into glucose and other sugars, fruit-sugar, grape-sugar, cane-sugar or (in S orbits) sorbin. The only fruits which re¬ tain starch in important quantity arje those of the banana, breadfruit-tree and.baoDab; hence the exceptional nutritive value of these. The olive alone yields a notable proportion of oil. The proportion of sugars varies exceedingly, dates, dry figs (48 per cent) and raisins (56 per cent), again very important foods, heading the list. Grapes, of course, stand high, from 12 to 18, indeed sometimes as much as 26 per cent, cherries from 8 to 13, apples 6 to 8, pears 7 to 8, plums 6, red currants 4.75, greengage plum 3.5, peach and apricot only 1.5. The pro¬ portion of pectin bodies is, however, exceed¬ ingly notable, especially in fruits such as the three last named. In unripe fruits (as also in roots) we find pectose, a body apparently re¬ lated to cellulose, but easily transmuted by a natural ferment or by boiling with dilute acid into pectin, CiHeCh, and its allies. These are all more or less soluble in water, with which they readily form a jelly (whence the peculiar consistency of our fruit-preserves). The pro¬

portion of soluble pectin and gum varies con¬ siderably and is of great importance to the blandness and agreeableness of fruit, the harder and more common apples having con¬ siderably less than 3 per cent and the best reinetts nearly 8. The red currant, indeed, like berries in general, has exceedingly little (0.25 per cent) ; while the apricot has as much as 9, the greengage plum 12 and the peach 16 — a circumstance which explains the peculiarly melting quality of these fruits, especially the last-named. The free acid also varies greatly, from 2.4 per cent in the red currant, 1.4 in the raspberry, and nearly as much in the sourest cherries, to 0.5 in sweet cherries and a minimum of 0.1 or less in the sweetest pears. That of apples and of grapes, of course, varies greatly, but both may generally be taken at from 0.75 to 1, while the apricot and peach stand at 0.3 or 0.4. The a

The quantity of albuminoids is of course small, in fact, inadequate to render most fruits staple food. Yet it is by no means inappre¬ ciable, ranging from nearly .5 per cent in the majority of fruits to .7 or .8 in the grape (2.7 in raisins), and above 1 in the melon and the tomato. Hence to acquire albuminoids equal to those of one egg we must eat \Y/i pounds of grapes, 2 pounds strawberries, 2*4 pounds apples or 4 pounds pears. To replace 1 pound starch =5l4 pounds potatoes, we need 5.4 pounds grapes, 6.7 of cherries or apples, or 12.3 of strawberries.

The quality of fruits depends largely upon the proportion of sugar,

gum and pectin to free acid, largely also upon the proportion of soluble to insoluble matters, but in very great measure also upon the aroma. This quality is due to the presence of characteristic ethers, often accompanied by essential oils, although not of course in ponderable percentage. Culti¬ vation and selection operate strongly on all three factors.

Keeping of Fruit. — Many of the finest fruits undergo very speedy decomposition, which, as distinguished from the intrinsic proc¬ esses of ripening, is due to the attacks of bacteria, molds or yeasts ; so the problem of their preservation is therefore primarily one of preventing these. In damp and stagnant air, especially with considerable or frequent changes of temperature, these fungous pests multiply with special readiness; hence a fruit-room must be cool and shady, yet dry and airy, and the fruit carefully gathered rather before full ripeness, handled so as to avoid in any way bruising or tearing the skin, and laid out and occasionally looked over so that rottenness in one may not affect the rest. Under these con¬ ditions apples especially may be kept for many months ; indeed many varieties of fruit — for example, winter-pears — require these condi¬ tions for satisfactory ripening. On antiseptic principles we see how it is that the dense¬ skinned and wax-coated grape can be so largely imported in sawdust, or how unripe gooseber¬ ries and even very perishable pears can be kept for months similarly packed in well-sealed jars in a cool place. The process of preserving with sugar in jars promptly covered up is similarly an antiseptic one ; but in the systema¬ tic application of antiseptic princples we may

still look for considerable progress in the pres¬ ervation and transport of fresh fruit upon a large scale. The method of drying fruit has also been in use from remote times, especially with dates, figs and raisins. (See Cider; Fruit Growing; Fruit Industry; Fruits, Cold Storage of ; Garden ; and articles on the various fruits, as Apple, Cherry, Peach, etc.). Consult works on fruit-culture by Bailey, Burbidge, Cheal, Downing, Du Breuil, Fish, Fuller, Hogg, Roe, Thomson, Wood, Paddock and Whipple, Sears, Barry, Warder, Thomas, Beach, Hedrick, Kains, Hume, Coit, Waugh, Wilkinson, Husman, Budd and Hansen, Card, Wickson, Webb, White, Popenoe, Munson, Chorlton, Fletcher, Maynard, Green and Meech.

M. G. Kains.

FRUIT-BATS, the bats of the family Pteropodidce , called also fox-bats or flying- foxes, because of their fox-like heads and faces. They compose one of the two grand subdivisions of bats, the Megachiroptera (see Bat), con¬ fined to the tropical parts of the Old World. These are the largest of all bats, and differ from the other bats in that they are entirely frugivorous. There are several genera, the most important being the genus Pteropus. The best-known species is the Indian fox-bat (P . medius), common in India, Ceylon and neigh¬ boring islands. As evening falls these bats fly out of the branches, where they have hung, like great black fruits, all day, and start on their nocturnal depredations, which they con¬ tinue until dawn, when they return to their homes, — thousands sometimes forming a single colony, wrangling and jostling one another for the most desirable places on the limbs. Once settled they hang, head down, until day is over. They are so numerous and so destructive to crops in certain localities that they are hunted vigorously ; but even when they are shot by thousands, the numbers do not seem to be ma¬ terially decreased. There are certain species that sometimes feed on flowers as well as fruit; but this is not generally the case. The Indian fruit- bat, Lyddeker says, will greedily drink palm- juice from the pots hung on the trees to col¬ lect it, and at times, individuals have been found at the foot of the trees quite helpless from intoxication.

The spread of wing is from four to five feet in the Indian and Malay species; smaller than these are the ugly-faced Harpyias, so named because of the supposition that they were the ˆharpies® of the old mythology.

FRUIT-CROWS, the somewhat crow-like birds of that section of the South American family Cotingidce called Gyrnnoderince. This section contains a number of most unusually ornamented birds, such as the bill-bird, and um¬ brella-bird, and most of them have bare spaces, or wattles, about the head. They are woodland birds whose habits are little known, but they feed mainly on seeds and berries, and make large nests in trees and bushes.

FRUIT-FLY, any of the flies of the family Trypetidce, whose eggs are laid and maggots are bred in fruit, for example, the apple-mag¬ got (q.v., under Apple), or in plant stems. The Mexican orange-worm (see Orange In¬ sect-pests) is another well-known species, while the galls so frequently observable upon the golden-rod are the work of a third (Try-

peta solidaginis) . The maggots remain within the fruit or gall during the winter, then, if not already thrown down, creep out, drop to the

ground and transform into pupa and imago. They vary in color from buff to brownish-black, and are frequently beautifully banded or spotted. See also Pomace-fly.

FRUIT GROWING. Fruit growing is the art and practice of producing fruits for human consumption. Fruit growing is also highly developed as a profession ; followed by many experts, teachers and investigators. In recent years there has been a tendency to develop the scientific aspects of fruit growing, and, al¬ though little progress has been made in the solution of fundamental laws, much knowledge of real value to the professional and practical fruit grower has been accumulated. The term pomology is frequently applied to the classified knowledge of fruit growing, but the two terms are really synonymous. The fruit grower's con¬ ception of the term fruit is much more re¬ stricted than that of the botanist's. In this country it is generally confined to the product of trees, bushes and woody vines, such as the apple, currant and grape. Important exceptions are the fruits of such herbaceous perennials as . the strawberry and pineapple. The products of annual plants, such as watermelons, cantaloups, tomatoes, etc., are classed as vegetables. It is common practice to classify the fruits of North America into four general groups: (1) Orchard fruits, including the temperate zone tree fruits such as the apple, peach, apricot, plum, cherry, etc.; (2) grapes, the only important vine fruit; (3) small fruits, including the raspberry, black¬ berry, currant, gooseberry, blueberry, cranberry and strawberry; and (4) citrus fruits, includ¬ ing the orange, lemon, grapefruit and allied forms. To provide for such fruits as the pine¬ apple, fig, olive and other fruits grown in milder regions of the country, the awkward but comprehensive heading tropical and sub¬ tropical fruits other than citrus, is frequently used.

A survey of the cultivated fruits of North America reveals the fact that native fruits have been of minor importance in developing the great fruit industries of the country. Of the more or less important fruits, the following are of foreign origin : the commercial apples, the pear, peach, apricot, quince, cherry, Euro¬ pean plum, Japanese plum, Japanese persimmon, European grape, currant, certain gooseberries and most of the strawberries, all of the citrus fruits, pineapple, olive, fig and date. The native fruits have contributed several plums, a few apples, the grapes of eastern North America, the blackberry, dewberry, raspberry, loganberry, many gooseberries, some of the strawberries, cranberry and blueberry. The improvement of fruits, especially tree fruits, by breeding methods is a slow process and rather uncertain in its results. Practically all of the improved native fruits listed above are of chance origin. Many of the foreign introduc¬ tions have been so altered in the course of time by the influence of

environment, selec¬ tion, and, to a small extent, by breeding, as to be now considered distinct American forms. Fruit growing in this country has been de¬ veloped along amateur, local and commercial lines. There are varieties of fruit adapted for

the home, the local market and the long dis¬ tance market. The present-day improvement of varieties is largely with the commercial idea in view. Edible quality has been sacrificed to some extent; whereas appearance and shipping and keeping qualities have improved. Compe¬ tition is becoming keener and the commercial fruit of the future must be of high quality in order to find a ready sale.

Commerce in fruits and fruit products dur¬ ing the early years of the 19th century was insignificant. It consisted in a small trade in fresh and dried apples, apple cider, apple brandy and vinegar, peach brandy, and in some localities, wine from native grapes. The in¬ creasing demand for cider led to the planting of many seedling apple orchards in the North¬ east, and the culture of orchard and small fruits in general was gradually established in the vicinity of the larger towns. By the middle of the century the railroads began to penetrate the interior of the country, opening fertile regions adapted to fruit culture and broader commercial possibilities of fruit growing came to be more fully recognized. During the period from 1850 to about 1880 many large orchards, vineyards and small fruit plantations were established at long distance from their pros¬ pective markets, and plantings were increased in the vicinity of the large markets. The knowledge of fruit transportation and storage was limited. Nearby fruits frequently glutted the markets during the few days or weeks in which they were harvested and long-distance fruits could not reach these markets when local fruit was scarce. Such was the condition existing about 1890, when mechanical cold storage plants were adapted to storing apples over long periods and the more perishable fruits over temporary market gluts. Success¬ ful refrigerator car systems for conveying fruits long distances were developed about the same time. With the perfection of storage and transportation methods, fruit growing has be¬ come an important and highly specialized branch of North American agriculture. But few sections of the country are without some commercially important fruit industry.

Production. — The first attempt to obtain definite reports on the value of fruits produced in the United States was made by the 12th census in

1899. The total value of all classes of fruits produced in that year was $131,423,000. By 1909, the total value had increased to $218,-000,000 which was equivalent to about one-third of the value of the wheat crop of 1909. The value of all deciduous tree fruits in 1909 amounted to $140,867,000; small fruits, $29,- 974,000; citrus fruits, $22,7 11,000; grapes, $22,- 027,000; subtropical and tropical fruits other than citrus, $1,995,000. Nearly four-fifths of the total value was contributed by apples, 38.3 per cent; peaches, 13.2 per cent; grapes, 10.1 per cent ; strawberries, 8.2 per cent ; and oranges, 8.1 per cent. Since 1909, the produc¬ tion of most fruits has gradually increased and competition has become keener. At the same time fruit values have conformed to the gen¬ eral upward trend in price of all commodities. As far as the commercial crop is concerned, the apple, the most important fruit grown in the United States, has been declining in pro¬ duction for the past 20 years. The bulk of the

apple crop was formerly grown in the general farm orchards in the Northeast. Many of these orchards have passed the prime of life, produce inferior fruit and are dying. Thus far, the large crops they formerly bore have not been replaced by the many young orchards planted in other sections.

The principal orchard fruits of Canada ˆare the apple, peach, plum, pear and cherry. The leading small fruits are the grape, strawberry, currant and gooseberry. As in the United States, the apple is the most important fruit grown. The production of all orchard fruits in Canada in 1910 amounted to 12,565,000 bushels of which 10,618,000 bushels were apples. Ontario is the leading province in the produc¬ tion of fruits, although apple orcharding has assumed some importance in Nova Scotia and British Columbia.

The geographical distribution of the im¬ portant fruits is considered in articles dealing with these fruits (see Apple, etc.). From the standpoint of commercial production the lead¬ ing apple States are New York, Pennsylvania, Washington, Virginia, West Virginia, Missouri and Michigan; peaches, California, Georgia, Texas, New York, Alabama, Michigan and Pennsylvania; pears, California, New York and Michigan ; plums, California, Oregon and Washington; cherries, New York, Washington, Wisconsin and Michigan; grapes, California, New York and Michigan; strawberries, Mary¬ land, Delaware, Tennessee, Louisiana and Ar¬ kansas. Raspberries are widely grown through¬ out the northern half of the country. Limited commercial districts occur near large cities. New York and Michigan produce large quan¬ tities of raspberries for canning and drying. The loganberry, a blackberry-raspberry hybrid, originating in California, is now cultivated

extensively in that State and Oregon for canning and drying. The principal citrus fruits grown in the United States are oranges, lemons and grapefruit. The cultivation of these fruits is largely confined to California and Florida. Limited quantities of oranges are grown in Arizona and in the Gulf Coast States. California produces about two-thirds of the oranges and practically all of the lemons. Florida produces about one-third of the oranges and most of the grapefruit. Of the smaller subtropical industries, pineapple growing is con¬ fined to Florida, and the production of dried figs and olives to California. It is practically impossible to secure complete and comparable statistics on the fruit industries of the country as a whole, but from data largely obtained from the United States Bureau of Markets, it is conservatively estimated that it required 200,000 cars to move all classes of fresh fruits in 1917. Nowhere in the United States are all branches of commercial fruit growing centered to such an intensive degree as in California. This great region has a multitude of local climates, much variety of soil and rainfall, and physical conditions which strongly differentiate it from the remainder of the United States. With one or two exceptions, such as the grape¬ fruit and pineapple industries of Florida, every commercial fruit industry in the country as a whole has been duplicated in California and many industries, such as lemon, Smyrna fig, olive and European grape growing have been al-

FRUIT GROWING

1 Napoleon Cherry Trees in California

2 A West Virginia Peach Orchard

FRUIT GROWING

1 Dewberry Field in Maryland

2 Gathering Peaches in Georgia

FRUIT GROWING

1 Birdseye View of a Well-cultivated Peach Orchard

2 Strawberry Growing in Wisconsin

FRUIT GROWING

most localized there. If we except dried apples nearly all of the cured

fruits are produced in California and about two-thirds of the canned fruits. In 1917, California shipped from the State 24,340 cars of fresh grapes, peaches, pears, plums, etc. The commercial citrus crop of California for the shipping season ended 1 Oct. 1917, was oranges, 46,44-7 carloads, and lemons, 7,914 carloads. The estimated production of dried fruits, including apples, apricots, figs, peaches, prunes, raisins and others was 341,100 tons, of which more than two-thirds were prunes and raisins. California packed over 7,000,000 cases of canned fruit in 1917. In recent years the citrus and pineapple industries in Porto Rico and the pineapple in¬ dustry in Hawaii have developed rapidly. About $6,000,000 worth of canned pineapples were shipped from Hawaii to the United States in 1915. The same year Porto Rico shipped about $3,000,000 worth of pineapples, grapefruit and oranges to the United States.

Export Trade. — During the past 15 or 20 years ihe United States has developed a big business in fruits with other countries. The exports consist of dried and canned fruits as well as fresh apples, oranges and pears. Ex¬ ports of all fruits during the year ended 30 June 1900, amounted to $11,486,000. By the year ended 30 June 1914, fruit exports had increased in value to $31,030,000 and for the year ended 30 June 1917, to $37,652,000. The fruit imports for the same years are : 1900,

$16,284,000; 1914, $33,638,000; 1917, $25,315,000,

Bananas and lemons comprise more than half of the imports. The balance is made up of dried currants, grapes, raisins, figs, olives, pineapples, dates and other fruits. The war has created an active demand for exports of canned and dried fruits, but has curtailed im¬ ports of fruits of all kinds. The principal fruit exported from Canada is apples. An average of 1,242,000 barrels annually, valued at $3,626,000, was exported during the five years ended 31 March 1913. During this same period, Canada's annual fruit imports amounted in value to about $10,000,000.

Cultural Practices. — In the early days when fruit had no financial standing as a crop, the farm orchard or plantation was given indiffer¬ ent care at the best. With the rise of com¬ mercial fruit growing this condition has rapidly changed. Cultural practices, specially adapted to large area planting, have been evolved. The extent to which these practices are em¬ ployed in certain regions varies largely with the relative importance of fruit growing and other agricultural pursuits. Men who make fruit growing their main pursuit have been quick to adopt methods that enhance the pros¬ pects of a good annual crop.

Modern practice calls for just as thorough a preparation of the soil before planting fruit trees as is given other farm crops. The soil should be stirred deeper, because the main roots are to establish them¬ selves some distance below the surface. The best planting conditions are secured when the land is occupied by a fertilized and cultivated crop the year before the trees are planted. As a rule solid plantings of the same kind of fruit are more easily managed and will be more successful than mixed plantings of differ¬ ent fruits. On the other hand it is safer to

include several commercial varieties of the same fruit in a planting because most varieties yield better when pollinated by another variety than when self-pollinated. In most situations fruits will thrive best when tilled or cultivated than when grown in sod. There is rarely enough moisture for both trees and grass. For this reason grain crops should not be grown between the rows. In order to reduce the cost of developing an orchard, cultivated crops may be grown for a few years, provided they are well fertilized and neither the crop nor the necessary preparation of the land interferes with the ever-extending tree roots. Frequent light tillage from early spring until midseason conserves moisture and assists in making plant food available to the tree roots. Tillage pro¬ longed throughout the whole season, however, will eventually destroy the physical texture of the soil, promote soil erosion and puddling; and may stimulate the trees into a late immature growth subject to winterkilling. To prevent this, the orchard is seeded down with a cover crop such as rye or clover as soon as the trees have ceased making rapid growth. This crop is turned under in the spring, thus supplying humus for loosening the soil. If clover or other legumes are used as cover crops, an im¬ portant amount of nitrogen is added to the soil. In the West much of the fruit is grown under irrigation, and the tendency has been to till the land throughout the season in order to conserve as much moisture as possible. The detrimental effect of continued clean tillage on soil texture is so evident that the use of cover crops in that region is becoming more common. It is generally recognized that fruit crops ex¬ haust. the fertility of the land in much the same manner as other farm crops, and the best fruit growers use fertilizers in some form or other. Soils vary so much even over short distances that the fertilizer question must largely be solved by the individual grower. In lieu of more specific knowledge on the subject, the fertilizer practice of successful growers in any section is apt to give the best results.

Spraying fruits for the control of insects and diseases is a well established and generally necessary practice. Spraying equipment has been perfected for large and for small planta¬ tions and spraying

formulas have been worked out to meet the needs of different sections of the country. Sprays are usually applied in liquid form. Quite recently some progress has been made in the perfection of dusting ma¬ chines for orchard use. The fumigation of young fruit trees in nursery establishments for the control of scale insects is a common prac¬ tice and is required by law in many sections. (See Insecticides; Fungicides). Most fruit growers practice pruning to some extent. The best practice calls for a light annual pruning rather than intermittent heavy pruning. Prun¬ ing is apt to be neglected over too long inter¬ vals because it requires more knowledge and experience than other orchard work and skilled labor is not always available. The subject is discussed under Pruning (q.v.). Fruit trees often set more fruit than can be matured to marketable size. An excessive crop usually means small and often poorly colored fruit. The overloading breaks down the limbs of the tree ; thus favoring the development of disease,

and, at the same time, reducing the chance for a good crop the succeeding year. These conditions can be corrected by thinning the fruit. Thinning is an established practice with peaches and other summer fruits. Such fruits show remarkable increase in size from thinning. When a market for high quality fruit is as¬ sured, it is often profitable to remove as much as two-thirds of the immature fruit. There is an increasing demand for high quality apples, and thinning is more common in the best com¬ mercial districts. Varieties that naturally grow large should not be thinned beyond the point of reducing excessive strain on the tree. In the citrus regions the fruits require several pickings and each of these pickings might be called a thinning operation. The usual time to thin is just after the so-called June drop, when the tree sheds much fruit that failed to pollinate and when growth is still active. The amount to thin varies with the kind of fruit and the variety. Rarely will it pay to thin un¬ less the remaining fruits are well sprayed.

Very frequently young trees are attacked by rabbits, mice, woodchucks and the like and serious damage is done. If the trees are still vigorous and the wounds are not too extensive, the trees may be saved by bridge grafting. When young trees are set in districts where such rodents are numerous, it is a good plan to use some form of a tree protector. These pro¬ tectors may be of wood veneer, wire netting, lath or tar paper. They should be set into the earth several inches and surround the trunk up to the base of the lower limbs. In

milder sections of the South and West, heavy spring frosts sometimes do much damage to the young fruit buds and newly set fruits. In the West particularly, many large commercial orchards are equipped with fuel pots for burn¬ ing crude oil, distillate and coal, while others use wood. Orchard heating devices are quite common in the citrus regions. The present orchard heating devices are far from perfect and much more must be learned about the range of effectiveness and the limitations of orchard heating before the practice becomes general. They have been more successful when em¬ ployed over a large contiguous area and with fruits bringing high prices than when employed by individual growers and with fruits bringing low prices.

Generally speaking, cultural practices are more highly developed in those regions that are de¬ voted almost entirely to fruit growing and are dependent on long distance markets. The same is true of methods of picking, grading, packing and marketing fruits. It has been thoroughly demonstrated that careful handling in preparing the fruit for market means a minimum of de¬ cay or deterioration in transit, on the market, or in storage. Also the prompt precooling of carefully handled fruits has a marked influence on their carrying and holding qualities. Compe¬ tition in the fruit trade is keen ; hence, fruit that is well grown and given every attention in getting it to the market in good shape must be put up in an attractive manner in order to se¬ cure remunerative prices. The present practice is to put up choice fruits in packages small enough to induce customers to buy by the pack¬ age. This has resulted in so many different sized packages that it has made marketing more

or less difficult, both for the dealer and the consumer. Recent legislation by the Federal gov¬ ernment and by several of the States provides for standard sizes in fruit packages, whether they be large or small. Fruit grades, especially for apples, have also been established in several States.

The country-wide development of fruit grow¬ ing has been favored by climate, soil and eco¬ nomic conditions. This growth has also been fostered by governmental, State and provincial agencies. The Federal and Dominion Depart¬ ments of Agriculture and the various State and provincial agricultural colleges and experi¬ ment stations have contributed largely to the knowledge underlying the principles of commer¬ cial fruit growing. Cultivated fruits have been introduced from foreign countries, varieties have been tested, and cultural problems worked out in experimental orchards. Successful prac¬ tice has been studied in the field with the view of determining the reason for success and many investigations are conducted in commercial fruit

districts in order that the results may have an immediate practical value. Until very re¬ cently, the cultural phases of fruit growing re¬ ceived most attention. The ever increasing com¬ petition between different sections of the coun¬ try has caused the governmental agencies to take up many marketing problems, both tech¬ nical and economic in nature. Many improved practices have resulted from studies in the handling, precooling, transportation and stor¬ age of fruits. The question of distribution is now receiving attention. The Bureau of Markets of the United States Department of Agriculture has an inspection service in most of the large markets for the purpose of investi¬ gating and certifying to shippers the condition and soundness of fruits when received at the market. Information on daily carload move¬ ments of fruit is now available to fruit growers in the commercial areas. See also the articles on the particular fruits.

Bibliography. — The Department of Agri¬ culture of the United States and of Canada as well as the State agricultural colleges and experiment stations have issued numerous bulle¬ tins and reports on the practical, technical and scientific phases of fruit growing. The agricul¬ tural and general press and private writers have also contributed largely to the literature of fruit growing. Some of the general works on the subject are Bailey, L. H., (The New Stand¬ ard Cyclopedia of Horticulture) (6 vols., New York 1914—17) ; id., Principles of Fruit Grow- ing> (New York 1915) ; id., (The Pruning Manual* (New York 1916) ; Sears, F. C., Pro¬ ductive Orcharding* (Philadelphia 1914) ; Moore, S. W., Practical Orcharding on Rough Lands * (Akron, Ohio 1911) ; Paddock and Whipple, < Fruit Growing in the Arid Regions* (New York 1910) ; Wickson, E. J., (New York 1917) ; Brown, B. S., (Modern Fruit Marketing) (New York 1916).

Edwin J. Glasson,

United States Department of Agriculture.

FRUIT INDUSTRY. While fruits have been grown since earliest times to supply homes and comparatively local needs, fruit growing

has become worthy of the status of an industry only within the past century. Prior to this period commerce in fruits was limited almost wholly to dried fruits such as dates, figs, prunes, raisins and nuts, though oranges, lemons, coconuts, apples and a few other fresh fruits

were successfully transported short distances and sold during the few weeks or months that they could be kept by the crude storage methods of those days. The main limiting factors of the fruit industry then were slow transporta¬ tion, defective storage methods and the gen¬ erally sufficient local supplies to meet the re¬ stricted demand.

These conditions applied not alone to America, where they, however, were most strik¬ ingly evident, but to the whole world. Not until sailing vessels gave place to steam and canals to railways did progress begin to be rapid. With the development of these im¬ proved methods of transportation came count¬ less other improvements, not alone in speed but in storage and marketing, canning and drying. By their reaction these factors have stimulated production until the fruit industry now plays a highly important role in the world s com¬ merce. Whereas in the United States half a century ago the area devoted to fruits and the value of the fruit products were small fractions of the total area and .value of all crops grown, the increase has been such that in 1909 when the last census was taken they were about 2 and 4 per cent respectively of the gross totals and values of all farm crops. Develop¬ ment from that time forward continued to be rapid until the Great War placed a temporary check upon certain phases of planting, trans¬ portation and manufacture. Lest the percent¬ ages mentioned above should appear insignifi¬ cant let it be noted that the area devoted to fruit growing in 1909 was upward of 10,000,000 acres and the value of the fresh fruits at point of production more than $215,000,000. Since that date millions of trees not then in bearing have added their quotas to the output, so both per¬ centage and total value have been augmented.

Perhaps the most far-reaching effects of the improved transportation and storage have been the education of public taste and the consequent demand for fresh fruits in regions remote from points of production. Refrigerator cars, steam¬ ships and cold-storage warehouses have made it possible for growers a thousand to several thousand miles from market to grow fruits at living and often highly profitable prices, at the same time lengthening the season during which consumers may enjoy fruit. Steamship lines whose main business is the transportation of tropical fruits have been established between Mexican, Central American, West Indian and Mediterranean ports and those in the North, so the northern regions now secure abundance of these products. Similarly trainloads of fruits are shipped from the Pacific Coast States in refrigerator cars and forwarded on almost ex¬ press schedule east of the Rocky Mountains. Still more striking is the instance of the straw¬ berry which instead of being confined to the local period of production — about three weeks

_ may now be obtained in northern markets

during six months, the earliest coming from Florida and Louisiana during January, the latest from northern New York during June. This period has recently been still further ex¬

tended by the so-called ((ever bearingˆ varieties which continue the local season in the North from July until October and even November. These varieties, however, have as yet scarcely attained commercial importance.

Again, thanks to the improved methods men¬ tioned, the variety of products obtainable at any given season in the markets not only of the large cities but the small towns is no longer confined to the species locally produced before these methods came into play, but has been increased by countless kinds from distant points of produc¬ tion. It is nowadays no unusual thing to be

able to choose among 25 or more fresh

fruits offered for sale at one time in such large city markets as New York, Boston, Chi¬ cago or San Francisco. Dried, canned and

preserved fruits and manufactured fruit prod¬ ucts such as wine, cider, vinegar and juices have during the period in question become

staple commercial commodities obtainable the year around. The net effect of these improved methods is such that the number of cultivated and even of the important wild fruits suited to human consumption not found in the world's markets in either the fresh or the manu¬ factured state is steadily decreasing.

Among leading fruit producing countries of the world and the principal products the fol¬ lowing may be taken as typical examples sug¬ gestive of the industry as a whole. The Ameri¬ can tropics export enormous quantities of bananas, pineapples and coconuts to northern markets. The United States, Canada and Aus¬ tralia ship apples to Europe, where commercial plantings are too small to supply continental demand. Reciprocal shipments from Europe to America consist largely of dried fruits, such as figs, prunes, raisins, currants and oranges, lemons and grapes. The quantities of all these fruits imported are lessening as American growers gain knowledge of how to grow equally good supplies. In each continent there is similar reciprocal shipment, the tropical and subtropical fruits moving north and the tem¬ perate climate ones going south but to a less extent. In North America the movement of fruit is far more extensive than in any

other continent. In addition to southern shipments northward and western ones eastward, there is a considerable movement from east to west and from north to south. California and Florida annually ship trainloads of oranges, lemons and grape fruit beyond their borders. The former also exports fresh, dried and canned plums, cherries, peaches, pears, grapes, apricots; the latter sends pineapples, strawberries, peaches and to a small extent subtropical fruits.

The opening years of the present century have seen a still more striking development of the fruit industry in the enormous and increas¬ ing plantations of cool climate fruits, notably apples, pears, plums and cherries in Oregon, Washington, Idaho and other northwestern States. These are being grown not merely for home consumption in those and adjacent dis¬ tricts, nor even for shipment to Atlantic and other eastern States, but to Europe and South America. Besides the factors of refrigerator car transportation and cold-storage warehousing the recently opened Panama Canal bids fair to have a marked influence; for bv its means the cost of shipment to Europe may be lessened

and markets on the eastern coast of South America reached more expeditiously and less expensively than when the route includes rail transportation from the orchards to Atlantic ports, transfer to steamer there, ocean voyage to Liverpool or other British port, a second transfer to other steamers and a second voy¬ age to or through the tropics to some port in eastern South America. Developments were being made toward the more direct route sug¬ gested when brought to a halt by the Great War.

The principles upon which the fruit industry of these Northwestern States has been able to develop in spite of competition from older and more firmly established Eastern fruit-producing regions are so thoroughly sound in themselves that they are slowly but steadily revolutionizing the fruit business everywhere. First, by means of cultural methods adapted to the region the fruit is given a finish not usually found in the older producing districts where nearness to market permits the sale of all grades of fruit. Second, careful sizing and grading are insisted upon by organizations of growers who realize that in order to make sales at all and the more important repeat sales they must maintain a higher standard of product. Third, the adoption and perfection of the box rather than some other package in which to

ship and sell fruit. Fourth, uniformity and attractiveness of packing in these boxes. Results have justified the care exercised; for buyers and final consumers have been taught through experience with these goods that they do not need to open the packages but can depend upon the statements printed on the labels as to the contents. Herein perhaps lies the answer to the question as to what factor is now destined to exercise most importance in the further development of the fruit industry.

As to what fruits are of relatively most economic importance, doubtless among fruits consumed in the fresh state the orange leads since it is grown in the warm parts of all the continents though it enters important commercial channels mainly from southern Europe, the West Indies and the semi-tropical parts of the United States. It is also of importance as a source of cider, juice, marmalade and peel. Probably the apple ranks next, with the mild parts of North America and Australasia in the lead. It finds the widest use of all fruits — fresh, evaporated, butter, marmalade, jelly, cider, vinegar, wine, champagne, brandy and countless culinary dishes. Then follows the grape which is grown on all continents from the tropics almost to the limits of agricultural endeavor, for consumption in the fresh state and as raisins, “currants,® wine, juice, vinegar, jelly and argols (a by-product of wine making used as a source of baking powder). The plum used fresh, preserved and as prunes comes next. Olives as a source of oil and a condi¬ ment; lemons candied and raw; bananas fresh and as flour; peaches fresh, canned and dried; pears, dates, figs, strawberries, pineapples and cherries take commercial rank in about the order named.

Judged by commercial standards, quantity and variety of products, prompt adaptation of scientific principles and business sagacity to fruit production and disposal, the United States

and adjacent Canada rank first among the countries of the world. This is particularly evi¬ dent in the development of many branches of the industry. While fruit growing in America has scarcely deserved the title “industry® for as long as a century, several branches have been developed from the original wild species in scarcely more than half that time. One notable instance is the American grape, the leading variety of which, the Concord, first bore fruit in 1849, yet in the 70 years since then it has extended to practically every State and prov¬ ince. It is now grown upon tens of thousands of acres and profitably employs thousands of people. Its latest development, the manufac¬ ture of juice, is a purely 20th century industry which now involves several million dollars in buildings and equipment. The European

straw¬ berry, like the European grape, having failed in America, native species were developed so that now trainloads of berries daily go to market from individual shipping stations. Similar re¬ marks, though in less degrees, are true also of raspberries, blackberries and cranberries. All of these have been developed from strictly American species and all since the middle of the last century.

The fruit industry and its sponsors have not alone profited by its development. With it have been developed many other lines of business which directly or indirectly depend upon fruit growing. A partial list includes the following: The nursery business, the manufacture of prun¬ ing tools, spraying apparatus, insecticides, fun¬ gicides, fertilizers, tillage implements (many of these specially designed for work in fruit plantations), harvesting equipment, grading machinery , marketing receptacles and many others. Then there is the reflex action of fruit growing upon the development of cold- storage, refrigerator car building, railway freight traffic and commercial practices. Added to these are the subsidiary industries such as canning, evaporating, wine, juice and vinegar making, each in itself involving enormous capi¬ tal and employing great numbers of workmen.

M. G. Kains.

FRUIT-PIGEONS, a group (Trevonince) of pigeons of very brilliant and often curious plumage, and frequently of large size, which are scattered from India to the South Sea Is¬ lands. They spend their lives in the tops of the forest trees and feed wholly upon fruits, which are swallowed whole. There are about 180 species, chiefly of the genera Carpophaga and P til op us.

FRUITS, Cold-Storage of, the preservation of fruits, by keeping them in a refrigerator or ice-box of such a temperature as will neither freeze them nor permit the process of ripening to advance. The problem of cold-storage has at length been solved by experiments successfully made by the government expert, W. H. Ragan of the Department of Agriculture, at Washing¬ ton. It had been generally supposed that cold- storage fruit quickly rotted, on exposure to the ordinary atmosphere of the dwelling-house in summer or winter. It has, however, been dis¬ covered that when fruit is put up in a proper condition and kept subject to a proper tempera¬ ture, it remains uninjured by storage for some time. Thirty-two degrees is considered suitable temperature for the cold-storage of fruit.

FRUITS, TROPICAL

Peaches of good color, yet still hard, if fresh from the tree, have been kept in cold-storage for four weeks and found at the conclusion of that period in fairly marketable condition. They have maintained this condition for at least four days. It is only when they are in bad condition, imperfect and poorly colored, that they spoil on exposure, after resting in cold- storage.

In order to obtain good results the tempera¬ ture of a cold-storage warehouse should be kept uniform throughout. Freshly plucked fruit is alone suitable for storage, for a delay of a few days, even of a few hours, will result in serious loss. While pears must be gathered as soon as they reach their full size on the tree, apples may best be stored when well matured and highly colored, though still hard. The storing should be made in small packages, cer¬ tainly of not over 50 pounds; this is especially the case with regard to quickly fermenting fruits, such as pears and peaches. The careful ventilation of the cases, barrels or boxes, which enclose the fruit, is absolutely indispensable. Nothing is more likely to prolong the preserva¬ tion of fruit in cold-storage than wrapping them individually. Double-wrappings are even better than single. The inner paper should be porous, like blank newspaper tissue, the outer may be paraffin paper.

FRUITS, Tropical. Many tropical fruits are well known in the colder zones. Some of them are even cultivated in subtropical climates, in northern greenhouses, or as annuals where- ever summer-heat is sufficiently torrid; as, for instance, okra, tomatoes, melons, egg-plants, peppers and peanuts. Others, like the pome¬ granate, lime, orange and related citrus fruits, banana, pineapple, fig, date, coconut, alligator- pear, litchi, coffee- and cocoa-beans and vari¬ ous familiar nuts, as Brazilnuts, are imported in a fresh or dried condition. Cooled ships are arranged for their transportation, especially for that of the fast-ripening banana. But most of the soft fruits of the tropics either will not survive long journeys, or will not pay for the trouble.

They form, however, an important part of the food of the natives in the Equatorial Zone who raise them in tiny scattered orchards or in their dooryards, or pluck them from wild groves. Many of these fruits, like the coconut and tamarind, have been carried from port to port and have been cultivated and even natural¬ ized in so many tropical countries that their place of origin is a matter of dispute. Some of them are used as vegetables as in the case of the familiar tomato, egg-plant and okra. In the Philippines sequidillas (Psophocarpus tetra-gonolobus) are the tender angular pods of a leguminous vine, which

are boiled, having an asparagus-like flavor. The pear-shaped fruits of a cucurbitous vine which is trained on arbors and is white or green, rugged of rind and single-stoned, is known as the chayote, or cho-cho (Sechium edule), and is boiled, stuffed and baked like squash, which it much resembles in taste and consistency. Africa contributes the akee (Blighia sapida), a brilliant vermilion- hued fruit, within which are shining black seeds perched on cream-colored fleshy arils which are cooked, generally with salt fish, and have the appearance and taste of scrambled egg-

yolks. If eaten before the fruit has opened of itself, however, Jamaicans claim, the akee is a swift and deadly poison. The heavy, round compound breadfruit (Artocarpus incisa), too, is baked, or boiled, or even dried and converted into flour. It is an utterly tasteless vegetable, and for this reason can be used as frequently as a potato. Its seeds are also boiled for food. The sweeping from the trees of this dooryard fruit is one of the tragic results of a West Indian hurricane, since it destroys thus one of the food staples of the peasantry, having been brought to them from the Asiatic Archipelago. Its close relative, the jack-fruit (Artocarpus mtegrifolia) , is larger, and so heavy that it is borne on trunk and limbs of the trees instead of at the tips of the branches. Green bananas, or plantains (Musa sp.)> are also served as a vegetable, often being sliced and fried, and having a pleasant subacid taste.

Among the most prized tropical fruits are the thick-skinned mangosteen (Garcinia Man- gostana) ; the little, round, brown sapodillas (Achras Sapota), in the West Indies called naseberries, evidently a contraction of an earlier title ˆNispera.® They are cut into hemispheres, so that the soft interior, not unlike a baked pear in flavor, may be scooped out. The East Indian durian (Durio Zibethinus) , whose oval fruit is defended by spines which have been said to flay a man's face if struck by the fall¬ ing fruit, and by a very offensive odor, is a favorite dessert with those who can forget the smell of the otherwise delicious pulp.

Other pulpy fruits are the little fragrant rose-apple good for jellies and dessert (Eugenia Jambos) ; and its relative, the Malay apple {Eugenia malaccensis) ; fruits borne on small anonaceous trees, which include the sweetsop (Anona squamosa) that remotely resembles a young pine-cone when ripe having greenish polygonal knobs rising from the ivory-tinted rind. It is readily torn apart in the hands dis¬ closing slender black seeds enveloped in sugary pulp. The soursop (Anona muricata) is a curious shapeless green bag armed with weak prickles, enclosing crowded carpels, the seeds immersed in envelopes much like

cotton wadding to the tongue, but filled with juicy pulp. Rather musky and tart in flavor, it is a favorite cool dessert served as a custard with cream, or as a sherbet. The cherimoyer (Anona Cherimolia) and custard apple, the latter also known as bullock's heart from its shape and size (Anona reticulata) ; belong to the same family and are not dissimilar.

The papaw (Anona triloba) of the Southern States is another member of this family, but the papaw of the tropics (Carica Papaya) is a dif¬ ferent affair. It rises above the garden patches like a palm, but is really a sort of tall herba¬ ceous plant, very slender, with a tuft of huge cut leaves at the top, beneath which hang dozens of canteloupe-like fruits that when cut dis¬ close a hollow centre lined with small, black mucilaginous seeds. Its juice is said to render meat tender, it is the source of a drug and is itself prescribed for digestive troubles.

Avocados, or alligator pears (Persea gratis- sima), were at one time called ((Midshipman's butter,® the smooth rich flesh having been spread on bread, but they are now more gen¬ erally used as a salad — or dessert — fruit.

They grow on a rather large tree. The star apple (Chry sophy llum Cainito) is also a large tree which changes color continually as the wind turns up either the green upper-surfaces or the satiny brown under-surfaces of the foliage. <(You are just as deceitful as a star apple® is a West Indian comment supplemented by an¬ other, ((he sticks like a star apple,® for this fruit, a little larger than an orange, smooth, purplish or green in color, hangs persistently on its long stem. When cut transversely, the severed tops of the seeds radiating from the centre form a star embedded in gelatinous flesh stained with color from the rind, from which gummy juices exude and cling to spoon and lips. The mammee apple (Mammea Ameri¬ cana) and the Otaheite apple (Spondias dulcis) are also grown for their fruit. Passion-flowers yield fruit rather like that of the (

It is said that a species of jujube was the ((Lotus® of ancient history, but the small fruits of Jujube Zizyphus do not seem surpassingly tempting ; they are generally dried and used as a refreshing acid dessert in winter, and formerly were an ingredient in <(jujube paste.® A famous Mexican fruit is the <(tuna,® produced by sev¬ eral varieties of cactus, especially by Opuntia Ficus-Indica and O.

Tuna. An Opuntia plant appears on the coat-of-arms of Mexico. It is also called prickly pear from its shape and armament, or Indian fig on account of the many small seeds embedded in its somewhat acid pulp ; it has been carried to the Mediterranean shores, thriving on their arid, hot sands and has become a veritable pest in Queensland. Some of the <(tunas® are prickly, and an old traveler says that Spanish dons played a trick on new¬ comers by rubbing several <(tunas® in a napkin, thus fastening the infinitesimal spines in the fabric <(wherewith a man wiping his mouth to drink, those little prickles stick in his lips so that they seem to sew them up together, and make him for a while falter in his speech.® The cashew (Anacardium occidental) has peculiar kidney-shaped fruits or nuts poised on the tips of swollen, pear-shaped, fleshy stalks that, al¬ though astringent, are eaten as ((cashew apples® and furnish a wine. The shelled nuts are usually roasted and eaten with salt, and are said to be better than almonds. The tropical almond (Terminalia Catappa), a handsome street tree, also bears edible almond-like nuts. Tamarinds are the fruit of a huge leguminous timber-tree (Tamarindus indica), which is cov¬ ered by the buffy pods, fragile-shelled, very like ripe bean-pods, but filled with a dark-brown acid pulp which is utilized for cooling drinks and also for tart preserves. There are also small fruits known as <(plums® that are used for preserves, and the small, tough, puckerv, pink-hearted yellow guava (Psidium guava) is famous for the sweet paste and jelly made from it.

Mangoes (Mangifera indica), however, are among the most valuable of tropical fruits. Unripe they are preserved and pickled and

when ripe are eaten from the hand. The mango is so important a food that Jamaican bakers do not expect to sell as much bread as usual when this fruit is ripe. There are many which are cultivated in the tropical belt and have become naturalized therein ; the inferior sorts are fibrous and have a turpentiny taste, but the better kinds are softer and more luscious. At the best the mango requires skill in manipulation ; the tough fibres surrounding the husk of the seed radiating through the flesh. Golden loquats (Eriobotrya Japonica) and the fruits of many palms are among the minor fruits of tropical regions. Oily Sesame seeds (Sesamuna orientate) are cultivated for food and oil.

Although not eaten directly, the pencil¬ shaped pods of an orchid (Vanilla officinalis) are cured for flavoring purposes, becoming the vanilla of commerce. They are the fruits of a cultivated vine which creeps up tree-trunks. Annatto, or achiote seeds, are also gathered from the little tree, Bixa orellana, for the sake of their arils, which

yield an orange-red dye applied to dairy products, and formerly used as a skin paint by South American aborigines. The dried fruit of pimento (Pimenta officinalis) becomes the allspice of commerce, while the seed and arils of Myristica fragrans are known as nutmeg and mace. Consult Candolle, Al¬ phonse de, (Origin of Cultivated Plants y (New York 1902) ; Cook, O. F., and Collins, G. N., (Economic Plants of Porto Rico) (Contribution United States National Herbarium, Vol. VIII, pt. 2, Washington 1903) ; Philippine Commis¬ sion, (Report) (Part 3, United States War De¬ partment, Washington 1907).

Helen Ingersoll.

FRUITS OF CULTURE, The (Plodui Prosivyeshcheniya). Count Tolstoi recognized in the drama an immense power for driving home his ethical teachings. His second play, (The Fruits of Culture) (or (The Fruits of Enlightenment,* 1889), is a satirical comedy with a triple purpose — to show up the ab¬ surdity of superstition, whether manifested by people of culture or by simple-minded peasants ; to discredit the medical profession; and to con¬ trast the frivolity of the so-called educated and wealthy classes with the simplicity and dignity of the sons of the soil. Spiritualism is the principal target. The scene is laid in the Mos¬ cow mansion of Leonid Svedintsef, a landed proprietor and an ardent spiritualist. He is ad¬ dressed by three peasants from the province of Kursk who are commissioned by their commune to buy land from him and to pay for it by instalments. Svedintsef insists that the whole amount be paid at once. The peasants have friends among the servants, and are promised that the master shall sign the paper that they desire. So Tanya the chambermaid and Sem¬ yon the kitchen-boy arrange a spiritualistic seance, in which the latter appears as a medium, and which the master attends with enthusiasm. His credulity rises to the occasion, and, when directed by the medium, he of course signs the paper granting the peasants their request.

Much of the fun of the play arises from fre¬ quent and unexpected encounters between the peasants and the lady of the house, who has a horror of disease germs and who is convinced that in the garments of these creatures lurk the

FRUITS, TROPICAL

1 Tamarind fruit

2 Jack fruit

3 Mangoes

y

.

FRUMENTIUS

FRYATT CASE

139

germs of various dreadful diseases. The sub¬ plot concerns the fortunes of Tanya and Sem¬ yon, who are to be married, and who agree that the only real life is life in the country, where they propose to live. The list of characters include doctors, princes and other nobles, cooks and other servants, all of whom are differ¬ entiated with Tolstoi's masterly skill. It is all capital comedy and capital satire, has often been presented on the European stage, in Russian, in French and in German. It was first translated into English (from the French) by George S. Schumm in 1891, and is also included in the works of Tolstoi as translated by Nathan Haskell Dole, by Louise and Aylmer Maude, by Leo Wiener and by Mrs. Constance Garnett.

Nathan Haskell Dole.

FRUMENTIUS, Saint, founder of the Abyssinian Church: b. about 300; d. about 360. He was a native of Phoenicia, and, according to Rufinus, when a young man set out for India with his brother Edesius and their uncle Mero- pius on a commercial voyage. # The party fell into the hands of the Ethiopians on the shore of the Red Sea. All were put to death, with the exception of Frumentius and Edesius, who became slaves of the king. They were well treated, gained their freedom in time and rose to great influence in the land. After the death of the king, Frumentius became instructor to the young Prince Aizanes. He formed a Chris¬ tian congregation with the help of visiting Christian merchants. Edesius returned to Tyre and became a presbyter. Frumentius went to Alexandria and was consecrated bishop of Axum in 328 by Athanasiusj who in his (Epis- tola ad Constantinum' mentions the consecra¬ tion and gives some details of Frumentius' mission. Frumentius' day is celebrated on 27 October by the Latin, and on 18 December by the Abyssinian Church.

FRUNDSBERG, or FRONSPERG, Georg von, German soldier : b. Mindelheim, Swabia, 1473 ; d. 1528. In his youth he served in the campaign of the Hapsburgs against Switzer¬ land and in Italy in the

struggle between Cam¬ bria and Venice. In 1519 he became com¬ mander of the infantry of the Swabian League. He fought at Pavia in 1525. Through his serv¬ ices to Maximilian in organizing the pikemen he became known as ((the Father of the German Landsknechte ” (pikemen). Consult Barthold, (Georg yon Frundsberg) (Hamburg 1833), and the life in Latin by Adam Reissner (Frankfort 1568; German trans. 1572).

FRY, Sir Edward, English jurist: b. Bristol, 4 Nov. 1827; d. Failand House, near Bristol, 19 Oct. 1918. He was educated at Bristol Col¬ lege and at University College, London. He became a barrister in 1854, and Queen’s coun¬ sellor and bencher of Lincoln’s Inn 1869. He presided over the Royal Commission on the Irish Land Acts 1897-98; acted as conciliator in the South Wales colliery dispute 1898. He was legal assessor to the International Commission on the North Sea incident 1904-435; arbitrator between the United States and Mexico in the Pious Funds case 1902, and between France and Germany on the Casa Blanca incident 1909, and in many other local and international cases. From 1900 to 1912 he was a member of the Permanent Court of Arbitration at The Hague, and in 1907 was the first British plenipotentiary

jp The Hague Peace Conference. His pub¬ lished works include (Essays on the Accord- ance of Christianity with the Nature of Man) (1857) ; (The Doctrine of Election, an Essay’ (1864); (A Treatise on the Specific Perform¬ ance of Contracts’ (1858; 5th ed., 1911); ˆBritish Mosses’ (2d ed., 1908) ;

FRY, Elizabeth Gurney, English philan- thropist and prison reformer*, b. Norwich, Eng- land, 21 May 1780; d. Ramsgate, Kent, 12 Oct. 1845. Brought up a Quaker by her family she did not adapt her mode of life to that pre¬ scribed by the more rigid and orthodox of the sect, till 1798, being then induced to do so by the preaching of William Savery, an American Friend traveling in England on a religious mis¬ sion. This change was consummated by her marriage in 1800 with Joseph Fry, himself a ((plain Friend.” In 1810 Mrs. Fry became an occasional preacher and thenceforward devoted herself to offices of the purest benevolence and piety. Owing to her unwearied exertions, im¬ portant reforms were effected in the prison sys¬ tems, not only of Great Britain, but also in those of France and Germany. Consult (Memoirs’ by Thompson (1846) ; Corter

(1853).

FRY, James Barnet, American military of¬ ficer: b. Carrollton, Green

County, Ill., 22 Feb. 1827; d. Newport, R. I., 11 July 1894. He was graduated at the United States Military Acad¬ emy in 1847, and after serving as assistant in¬ structor at West Point, he was assigned to the 3d Artillery, then in Mexico, where he remained till the close of the war. In 1863 he was ap¬ pointed provost marshal-general of the United States, with headquarters at Washington, D. C. ; and in 1864 was promoted brigadier-general. He was brevetted major-general in the regular army, 13. March 1865, for “faithful, meritorious, and distinguished services,” and after the war served, in the divisions of the Pacific, the South, the Missouri and the Atlantic, till 1881, when he was retired. He was the author of (The His¬ tory of Brevets’ ; (The Army under Buell.’

FRY, William Henry, American composer and journalist: b. Philadelphia, August 1815; d. Santa Cruz, W. I., 21 Dec. 1864. He early showed a singular aptitude for music, and in 1835 produced four overtures which were per¬ formed by the Philharmonic Society of Philadel¬ phia, who presented the composer with an hon¬ orary medal. He next wrote the operas of (Aurelia’ and the (Bridal of Dunure.’ In 1845 he brought out his opera of (Leonora,’ an Italian version of which was performed in 1858 in New York. In 1846 Fry visited Europe as the cor¬ respondent of several American newspapers, and after his return in 1852 gave his attention to music, producing several symphonies of merit. In 1855 appeared his next work, a (Stabat Mater,’ brought out at the New York Academy of Music. He subsequently became attached to the editorial staff of the New York Tribune, and attained much popularity as a public lec¬ turer.

FRYATT CASE. On 20 March 1915 Capt. Charles Fryatt, commanding a British vessel, was attacked by the German submarine, U-33, off the coast of Holland and called upon to

surrender. Instead, Fryatt turned his ship and attempted to ram the submarine, which escaped by quickly diving. Both Fryatt and his chief officer were each rewarded with a gold watch by the British Admiralty for bring¬ ing the vessel safely through. In the following year Fryatt was in command of the British steamer Brussels when he was captured by German torpedo boats on 27 July 1916. Taken to Antwerp, he was brought before a German court-martial at Ghent and charged with il le¬ gally^ — as a civilian — attacking a submarine. Fryatt confessed

that he had acted under gov¬ ernment instructions. He was found guilty and summarily shot as a franc-tireur. The ex¬ ecution aroused intense indignation in England and was regarded as on a level with that of Nurse Cavell (q.v.). The ensuing controversy between the British and German governments was carried on through the medium of the American Ambassador, Mr. Gerard.

FRYE, Alexis Everett, American educator : b. North Haven, Me., 2 Nov. 1859. He was graduated at the Cook County Normal School, Chicago, 1885, and from Harvard Law School in 1890. In 1883-86 he was teacher of methods and practice at the Chicago Normal School and from 1886 to 1890 lectured on educational topics. He was admitted to the Massachusetts bar in 1890 and in 1891-93 was superintendent of schools at San Bernardino, Cal. He was ap¬ pointed superintendent of schools in Cuba by the Secretary of War in 1899. He organized the public-school system of the island in 1899— 1901 and conducted the Cuban teachers' ex¬ pedition, bringing 1,284 native teachers to the United States in 1900. He was captain in the Harvard University Battalion in the Spanish- American War. He has published (Child and Nature) (1888) ; Crooks and Brook Basins) (1891); (Mind Charts — Psychology* (1891) and a number of school geographies.

FRYE, William Pierce, American lawyer, legislator and statesman : b. Lewiston, Me., 2 Sept. 1831; d. Lewiston, 8 Aug. 1911; son of Col. John M. and Alice M. Frye. He was grad¬ uated at Bowdoin College in 1850 and after studying law in the office of William Pitt Fes¬ senden, he began practice at Rockland, and later at Lewiston. He was elected to the State legisla¬ ture from the latter city in 1861, 1862 and 1867. In 1864 he was a presidential elector on the Lin¬ coln ticket. After serving a term as mayor of Lewiston, he was elected attorney-general of the State, on the Republican ticket, holding the office from 1868 to 1870. He_ was elected to Congress from his home district in 1871, and was re-elected no less than five times.

In 1881 he resigned his seat in the House of Representatives to accept the nomination to the United States Senate, filling the vacancy caused by the resignation of James G. Blaine, who en¬ tered Garfield's Cabinet as Secretary of State. Senator Frye was re-elected to the Senate in 1889, 1895, 1901 and 1907 ; was elected presi¬ dent pro tern, of the Senate in 1896, and has twice acted as permanent presiding officer of that body — after the death of Vice-President Hobart in 1899, and after the elevation of Vice-President Roosevelt to the Presidency in 1901. After the close of the Spanish-American War Senator Frye was a member of the Peace Commission in Paris. He was chairman of the Commerce Com¬

mittee in the Senate and has exerted a great influence on national legislation. He was looked upon as one of the great leaders of the Repub¬ lican party, and had much to do with framing legislation on the tariff and as regards American shipping. During the exciting days of the Spanish-American War he acted as chairman of the Senate Committee on Foreign Relations. Senator Frye was given the degree of LL.D. by Bowdoin College in 1889, and also by Bates College in 1881.

FRYER, John, American Orientalist: b. Hythe, Kent, England, 6 Aug. 1839. He was graduated at Highbury College, London, in 1860 ; (LL.D. Alfred University, N. Y.). He was principal of Saint Paul's College, Hongkong, 1861-63; and professor of English at Tung-Wen College, Peking, China, 1863-65 ; and head-mas¬ ter of the Anglo-Chinese School, Shanghai, China, 1865-67; head of department for trans¬ lation into Chinese of foreign scientific books at Imperial Government Arsenal, Shanghai, 1867-96; general editor and other offices of Educational Association of China 1887 to 1896; founder and proprietor of Chinese Scientific Book Depot, Shanghai, 1874; Viceroy's Exam¬ iner at Imperial Naval College, Nanking, 1894- 95 ; traveling secretary to Chinese Ambassador, Kwo-Sung-Tao, 1878. Editor of Chinese news¬ paper, Shanghai Sinpao, 1866-67. Honorary member Northern China Branch Royal Asiatic Society in 1867 ; Agassiz professor of Oriental languages and literature, 1895-1915; professor emeritus, 1915; president Oriental Institute of California since 1904. Founder of the Insti¬ tution for the Chinese Blind, Shanghai, China, 1912; editor and proprietor of Chinese Scien¬ tific and Industrial Magazine , Shanghai, 1876— 84; Third degree of Chinese brevet civil rank, 1872 ; First Rank of Third Degree, Imperial Order of the Double Dragon, 1878. He is author or translator of upwards of 100 books in the Chinese language published at Shanghai, as well as articles, essays, reports, etc., in Eng¬ lish; and the first Educational Directory for China) (1896) ; various vocabularies of scien¬ tific terms in English and Chinese, etc.

FRYKEN, fri'ken, a series of small lakes north of Lake Wenern, Sweden. They are connected by narrow channels and drain south¬ ward into Lake Wenern. They are famed for their scenic attractions.

FRYXELL, Anders, Swedish historian : b. Hesselskog, Dalsland, 7 Feb. 1795; d. Stock¬ holm, 21 March 1881. He was educated at Up- sala, took holy orders in 1820, became instruc¬ tor at the Djurgardskole, Stockholm, in 1819, and at the Maria-Skole in 1822. He was rec¬ tor of the latter in 1828-36. In 1823 he began his great work (Stories from Swedish His- tory) ; the work occupied much of his time for 56 years and was issued in 46 volumes. His style is picturesque and his

popularity among all classes is due to his faculty of awakening a national sense in his readers. He published a (Swedish Grammar) in 1824, which long re¬ mained a standard. He was made pastor at Sunne in 1835 and was elected to the Swedish Academy in 1840. In 1847 he received permis¬ sion to devote himself exclusively to historical research. His other works include Charac¬ teristics of Sweden between 1592 and 1600) (1830) ; (Origins of the Inaccuracy with which

the History of Sweden in Catholic Times has been Treated* (1847); Contributions to the Literary History of Sweden > (1862) ; (The Role of the Aristocracy in Swedish History > (1850); (Studies in Swedish History* (1843). In 1884 his daughter, Eva Fryxell, published from his manuscripts an autobiography, his¬ tory of My History.* It is now recognized that Fryxell's labors were rather of a popular than of a scientific order and threaten to be¬ come obsolete despite their great popularity.

FTELEY, Alphonse, American civil engi¬ neer : b. Paris, France, April 1837; d. Yonkers, N. Y., 6 Aug. 1903. He was educated at the Ecole Polytechnique, Paris, and came to the United States in 1865. He was resident engi¬ neer of the waterworks bureau of Boston (1873-80) ; chief assistant city engineer of Bos¬ ton (1880-84), and subsequently consulting en¬ gineer. He was also chief engineer of the New York Aqueduct Commission (1888-1900). In the last-named capacity he planned the Croton dam in 1891, and the Jerome Park reservoir in 1894. At various times he acted as consulting engineer on municipal waterworks and exten¬ sions in Brooklyn, Newark, Hoboken and on the Passaic Sewerage District, the Hoosac tun¬ nel and the rapid transit systems of Boston and New York. He was a member of the American Society of Civil Engineers, its presi¬ dent in 1898 and a contributor to its (Trans¬ actions. >

FU-HI, or FO-HI, Chinese legendary hero, whose reign began about 2852 b.c. He was the first of the Wu-Ti, or <(Five Rulers,** and is affectionately regarded as the founder of the Chinese nation. He is reputed to have brought the people from a barbarous state to a com¬ paratively high degree of civilization. He was renowned as a law-giver, having instituted mar¬ riage and divided the people into 100 clans and forbidding intermarriage within the clan. Much of myth and legend surround his birth, his alleged discovery of writing, etc. He

died in 2738 b.c. (See China, History). Consult La Conperie, (Western Origin of the Early Chin¬ ese Civilization* (London 1894) ; Hirth, < An¬ cient History of China* (New York 1908) ; Mayers, (Chinese Readers' Manual* (Shanghai

1875).

FU-SHAN, foo-shan', FATSHAN or FA- CHAN, China, a manufacturing town in the province of Kwang-Tung, 16 miles southwest of Canton, on one of the branches of the delta of the Si-Kiang. It has manufactures of silk, iron and steel, etc., is a busy commercial centre and is called the Chinese (

FUA-FUSINATO, foo-a foo-se-na'to1, Erminia, Italian poet: b. Rovigo, 5 Oct: 1834; d. Rome, 27 Sept. 1876. She was married to the poet Arnaldo Fusinato (q.v.) in 1856. Her spirited appeals to national sentiment in 1848 brought her widely into notice. In 1852 was published her (Verses and Flowers.* She wrote a series of (Stornelli,* advocating Flor¬ ence as the national capital instead of Rome. Her complete poetical works, (Versi,* were published in 1879; her ˆLiterary Writings* in

1883.

FUAD PASHA, Turkish statesman: b. Con¬ stantinople, 1814; d. Nice, 1869. He was the son of the distinguished poet Kecheji-zade Izzet Molla, was educated at Galata-Serai and was at first an army surgeon. In 1836 he forsook medicine and entered the civil service as an official of the foreign ministry. In 1840 he came to London as secretary of the embassy and later was employed on special missions in the principalities and to Petrograd. In 1851 he was sent to Egypt as special commissioner. Later in the same year he became Minister for Foreign Affairs, a post to which he was subse¬ quently appointed four times and which he held at the time of his death. He was in command of the troops on the Greek frontier during- the Crimean War and was distinguished for his bravery. He was Turkish delegate at the Paris conference of 1856; was on a mission to 'Syria in 1860; grand vizier in 1860-61 and later Min¬ ister of War. He accompanied the Sultan Abd-ul-Aziz to Europe and was presented with the freedom of the city of London. He was one of the original members of the Turkish Academy of Science and Belles-Lettres and published a Turkish grammar in 1852, which was held in great esteem by Turkish scholars. As Foreign Minister he rendered invaluable services to his government at more than one critical period.

FUCA, Juan de, hoo-an' da foo'ka (origi¬ nally Apostolos Valerianos), Greek navigator: b. Cephalonia; d. Zante 1602. He was for many years in the Spanish naval service. In 1592, when he discovered the sea-passage sepa¬ rating Vancouver Island from Washington and connecting the Pacific Ocean with the Gulf of Georgia and with Admiralty Inlet and Puget Sound, he thought he had chanced upon a con¬ nection between the Atlantic and Pacific oceans. This strait has been called after his name. In 1596 he told an Englishman, Michael Lok, that he had made this discovery and the story found its way to (Purchas, His Pilgrimes* (1625) and led to renewed efforts in search of a passage between the Atlantic and Pacific oceans. For a criticism of Juan de Fuca's claims consult Bancroft, (History of the Northwest Coast* (Vol. I, 1884).

FUCA, Strait of. See Juan de Fuca, Strait of.

FUCHOW. See Foochow.

FUCHS, fooks, Ernst, German ophthal¬ mologist: b. Vienna, 1851. He was educated in Vienna, was professor at the University of Liege in 1881-86 and in the latter year became professor of ophthalmology at the University of Vienna. He has written several important works, including (Das Sarcom des Uvealtrac- tus* (1882) ; (Die Ursachen und

die Ver- hfitung der Blindheit* (1885) ; (Lehrbuch der Augenheilkunde* (11th ed., 1907; Eng. trans. by Alexander Duane entitled (Text-Book of Opthalmology,* 4th ed., 1911).

FUCHS, Immanuel Lazarus, German mathematician: b. Moschin, Posen, 1833; d. 1902. He was appointed professor extraor¬ dinary at Berlin in 1866 and became full professor of mathematics at Greifswald in 1869; removed to Gottingen in 1874, to Heidel¬ berg the year following and to Berlin in 1884. He wrote considerable on the theory of func-

tions and on linear differential equations. In 1891 he was made editor of the Journal fiir die reine und angewandte Mathematik. Consult

FUCHS, or FUCHSIUS, Leonhard, Ger¬ man botanist: b. Membdingen, Bavaria, 17 Jan. 1501 ; d. Tubingen, 10 May 1566. He studied the classics under Reuchlin at Ingolstadt and was graduated doctor of medicine in 1524. He afterward turned his attention to botany, of which science he must be looked upon as one of the fathers. In his (De Historia Stirpium Commentarii Insignes) (1542), he gave a clever description of domestic plants, alpha¬ betically arranged, and laid the foundation of a permanent bontanical nomenclature. The fuchsia (q.v.) was named after him.

FUCHSIA, fu'shi-a or fook'si-a, a genus of plants, the type of the tribe Fuchsiece, family Onagracece, named after the botanist, Leonhard Fuchs. The genus contains more than 70 known species, chiefly natives of Mexico, Peru and Chile. Some have been found in New Zea¬ land. The plants are shrubby or arborescent, sometimes climbing; the flowers are pendent, large and fine, with brilliant and delicate color¬ ing — purple, rose and white; the calyx is four- cleft, the corolla four-petaled, the fruit four- celled. The leaves are opposite and verticillate. The flowers are both axillary and terminal, usu¬ ally one flower springing from the axil, more rarely in racemes at the top of the branches. Fuchsias are much cultivated in conservatories, and are favorite house-plants throughout the United States. They are propagated with great facility from cuttings.

FUCHSINE, fook'sin, an aniline dye pre¬ pared by the action of arsenic acid, nitroben¬ zene or other oxidizing agents upon a mixture of aniline and its homologue toluidine, which yields a mass with a

bronze or coppery lustre, called rosaniline. This dissolved in water, pre¬ cipitated with common salt and the precipitate washed and crystallized from water, forms fuchsine, which in commerce receives various fancy names, as magenta, aniline or new red, roseine, rubine, etc. It is a derivative of triphenylmethane and has the formula

. CH — CH ’ ” ’

/ XCH-C

/ ch3

/ * CH = CH v

c = cc ;c = NH,0

XCH = CH/

.CH — CH.

c (; cnh2

x CH — CHX

It is largely used for dyeing purposes and wines and even confectionery are sometimes colored with it. It was first prepared by Natanson in 1856, by heating aniline with ethylene chloride.

FUCHSIUS. See Fuchs.

FUCHS’ SOLUBLE GLASS. See Water Glass.

FUDGE FAMILY IN PARIS. A satire written by Thomas Moore in 1818, the under¬ bred English in foreign countries being the subject.

FUEGIAN. See Ona; Yahgan.

FUEGO (fwa’gd) ISLAND. See Fogo.

FUEL, Comparative Heating Values of.

The effective and economical utilization of the inherent heat energy of fuel in the production of light and power is perhaps the most import¬ ant industrial question of the times. It is one that plays such a necessary part of modern life and the cost of the fuel used oftentimes is so great a factor in the conduct of an industrial enterprise on an

economical basis, that con¬ stant efforts are being directed to improve the present methods of fuel utilization and ap¬ proach more nearly the possibilities of theoreti¬ cal efficiency.

Kinds of Fuel. — Nature furnishes a great variety of fuel in three general forms — the solid, such as wood and coal ; the liquid, such as petroleum ; and the gaseous, such as natural gas. The solid forms of fuel are the most common ; the liquid contain the largest propor¬ tion of heat energy; and the gaseous are the most convenient for use and economical of labor. The fact that any kind of gaseous fuel is the most convenient and, in a great many cases, the most effective for use, has been demonstrated principally through the utiliza¬ tion of natural gas ; but as the supply of natural gas is gradually failing and the cost of oil-firing is much higher, the tendency of the times is to perfect methods for the conversion of solid and liquid fuel into gaseous form. These conditions render the methods of firing employed very important.

Methods of Firing. — In general, the eco¬ nomical and effective utilization of a fuel de¬ pends upon the completeness of the combustion thereof. In the combustion of solid facts by ordinary grate or ((direct firing® methods the greater part of the heat liberated is lost in the form of gases which are not combustible at the temperatures attained in grate-fired fur¬ naces. On the other hand, when solid fuel is first converted into gas and the gas thus ob¬ tained utilized by ((gas firing® methods, the re¬ sults accomplished more than compensate the 15 or 20 per cent loss of heat energy sustained by the process of conversion. As generally applied, gas firing results in more complete combustion and the attainment of higher com¬ bustion temperature and thereby make possible metallurgical operations which are impracti¬ cable with direct firing. There is also less loss of heat through the waste products of com¬ bustion and greater efficiency in transfer of heat. Furthermore, by suitable methods, the heat from the hot waste gases can be recovered and returned to the combustion chamber in preheated air, so that the gas and air supply, and therefore the combustion of the fuel, are placed under easy and complete control.

In practice, the theoretical amount of air necessary for complete combustion is always exceeded. Direct firing requires at least twice the theoretical amount to even approximate complete combustion, especially in the use of soft coals. With the progress of combustion, the fuel bed becomes more compact, so that with a given draught the amount of air pene¬ trating into the bed decreases with the increase of the depth and compactness of the fuel. Under these conditions, a

fresh charge of coal requires a greater amount of air to consume

its volatile components and demands it at a time when its passage is most retarded and the combustion rendered more incomplete by the reduction of temperature accompanying volatiliri zation. As the final result is an irregular air demand, the grates have to be arranged to ad¬ mit the greater excess of air at all times, otherwise large heat losses will occur from the . escape of unconsumed gases. M

On the other hand, in gas firing, the air sup¬ ply is always under control and therefore can be made to approximate closely the theoretical amount, thus reducing the bulk of the prod¬ ucts of combustion and ensuring more com¬ plete combustion. The greater amount of heat then liberated is concentrated in smaller volume, and raises the temperature of combustion, so that the oxygen of the air combines more read¬ ily with the combustible constituents of the gas. Furthermore, the smaller the excess of air the less the dilution of the gaseous mixture by nitrogen and other inert gases which retard combustion.

The products of combustion being of a higher temperature transmit their heat more readily, and being smaller in quantity carry off less heat by way of the chimney. By suitable arrangements, these products may be inter¬ cepted and forced to impart a large amount of their heat to the air supply going to the com¬ bustion chamber, thus returning a certain amount of heat to the system, which represents a saving in fuel equivalent to the amount of heat so returned.

Therefore, in considering any fuel the pri¬ mary question does not relate to the calorific value of the fuel so much as to what percentage of the heat energy represented by its calorific value is actually available for conversion into mechanical energy according to the manner of its utilization.

The latest experience shows, that in the case of a modern steam plant, burning coal by direct firing, the economy lies behind the stop valve, rather than in reducing the consumption of steam.

According to the best authorities, the mechanical arrangements and conditions most favorable for the most economical utilization of solid fuel are as follows : the height of the chimney should not be less than 120 feet, nor more than 180 feet, giving a natural draught ranging

from 0.50 to 0.83 inches of water, with an average temperature of 300° F. For Lan¬ cashire boilers (full size) the chimney area should equal six square feet per boiler up to a total of four boilers and five square feet per boiler for every additional boiler. The area of the chimney entrance should be 10 per cent in excess of this amount and the flue should enter the chimney with a rising slope of not less than 45 degrees. The area through the economizer should be 20 per cent greater than the flue area and the economizer walls should be at least 14 inches thick and exceptionally well built and the combined area of the boiler side flues should not be less than twice that of the main flue.

As the price of fuel is influenced to a great extent by the convenience with which it can be burned, the general tendency is to use a higher priced fuel even though it may have a lower heating value than a cheaper grade. This

tendency can be readily overcome and a large reduction made in the fuel bill by the use of high-class mechanical stokers which will burn coal almost impossible to fire by hand.

General Descriptions of Fuel. — For vari¬ ous reasons coal is the most important of all fuels and in many localities constitutes the only one available ; but in some places wood, oil and gas are abundant and take the place of coal. In certain industrial and manufacturing plants, their waste products, such as straw, tanbark, sawdust and bagasse are used as fuel more eco¬ nomically than coal, owing to their availability. For general purposes, however, coal is the chief fuel and the available heating value of all other kinds of fuel are invariably expressed in terms of that of coal.

Solid Fuels.

Varieties of Coal. — The five most important varieties of coal are anthracite, dry bituminous, caking bituminous, cannel and lignite.

Anthracite coal is found principally in the Alleghany Mountains and in the Rocky Moun¬ tain region in Colorado. It is a hard, lustrous variety and breaks up easily at a high tempera¬ ture. It consists of 93 to 95 per cent carbon and 2 to 4 per cent hydrogen and burns with very little flame and smoke, unless containing an excess of moisture and gives an intense heat. There is a variety known as semi-anthra¬ cite which contains 90 to 93 per cent carbon and 4 to 5 per cent hydrogen, but it is not as hard as true anthracite and burns with a short flame. _ Owing to its great brittleness, a large part of anthracite gets broken

into small pieces; therefore, in order to obtain the best results it should be fired on grates having small air spaces. The various commercial names and sizes of anthacite coal used in industrial fur¬ naces are as follows:

(

Bituminous coal contains less carbon and more hydrogen than is found in anthracite. The dry variety is found in Maryland and Vir¬ ginia and the caking variety chiefly in the Mis¬ sissippi Valley. Dry bituminous coal contains 84 to 89 per cent carbon and 5 to 6 per cent

hydrogen and burns freely, without caking and with very little smoke. The caking coals be¬ come pasty or swell and cake when burning. Caking bituminous coals contain from 80 to 85 per cent carbon and 5 to 6 per cent hydrogen and are largely used for making illuminating gas.

Cannel coal, also known as long-flaming bituminous, contains from 65 to 85 per cent carbon and 5 to 8 per cent hydrogen. It is found in Pennsylvania, Indiana and Missouri. All varieties of cannel coal have a strong tendency to smoke and some of them cake when heated.

Lignite, also known as brown coal, contains from 55 to 75 per cent carbon and 5 to 6 per cent hydrogen. It is found in the Dakotas, Colorado, Texas, Washington and Alaska. It is a substance intermediate between peat and coal and contains some moisture and mineral matter. The poorer varieties have a low fuel value.

Peat consists of decayed roots and foliage consolidated into earthy matter. It is cut out of bogs and swamps and then dried, usually by being stacked in the air. If it is sufficiently compact it is burned without being previously compressed; otherwise, it is pulverized and com¬ pressed into briquettes, and sold as an arti¬ ficial fuel. The amount of ash varies from 5 to 12 per cent. Recent experiments in the carbonizing of peat have greatly increased its value as an effective fuel. It is transformed into peat charcoal by the process used in making wood charcoal and into peat coke or semi-coke in special apparatus. In powdered £orm peat has been used successively as a locomotive fuel on the Swedish national railways, the powder being blown into the fire with an air-blast. A small percentage of powdered bituminous coal is added to the peat powder. In the semi¬ coke

process the peat is pulverized in water, carbonized and then pressed into briquettes. Peat charcoal has a calorific value of about 12,500 B. T. U. per pound and peat coke a calor¬ ific value of 14,500 B.T.U. per pound.

The value of a fuel is indicated by the num¬ ber of heat units it contains. This heating value is expressed in British thermal units (generally abbreviated to B. T. U.). This unit is the amount of heat required to raise one pound of water one degree Fahrenheit from a starting point of 60°.

Coke is an artificial fuel obtained from bituminous or semi-bituminous coals by driv¬ ing off their hydro-carbon constituents by means of heat. As the by-products of gas re¬ torts, commercially known as gas-house coke, it has a low fuel value under direct firing methods ; but it will make a very hot fire under forced draught. It contains about 60 per cent carbon and 1 to 2 per cent hydrogen.

Briquettes are made by pressing into blocks of varying shapes and sizes fine coal and coal dust mixed with tar, asphalt, pitch, molasses residues and similar materials as binders. At first prohibitory on account of manufacturing cost they have come more and more into favor as coal has advanced in price. In the United States alone, in 1917, there were 13 plants en¬ gaged in making briquettes. They used 402,336 tons of fuel material which otherwise would have been valueless, and turned out 406,856

tons of briquetted fuel, valued at $2,233,888 — an average value of $5.48 per ton. The calorific value of briquettes is from 13,700 to 14,600 British thermal units per pound.

Thermal Units. — The number of British thermal units (B.T.U.) per pound of fuel in some of the more common kinds of coal arc as follows: Pennsylvania anthracite, 13,100 to 14,200; Pennsylvania Connellsville coal, 13,640; Pennsylvania semi-bituminous and cannel coal, 13,150; Pennsylvania brown coal or lignite, 12,300; Kentucky bituminous, 14,400; Kentucky cannel, 15,200; Kentucky lignite, 9,300; Indiana bituminous, 14,160; Indiana cannel, 13,100; Vir¬ ginia bituminous, 13,100; Virginia Pocahontas, 14,800; West Virginia bituminous, 13,740; southwestern Illinois, 12,800; Missouri bitu¬ minous, 13,550; Ohio bituminous, 12,300; Mary¬ land Cumberland, 12,200; Arkansas lignite, 9,200; Colorado lignite, 13,560; Texas lignite, 13,000; Washington lignite, 11,550; peat* air- dried, 7,400; peat, kiln-dried, 10,200 to 12,200; coke (average), 14,700. Many other examples are given in Bulletin 23 of the United States Bureau of

Mines. Coals which have a high moisture content or a high percentage of ash develop their best fuel results when used in a gas producer. The calorific value of any sample of coal may be roughly determined by the

formula 14,600 C + 56,000 (H— 3) + 4,000 S.

O

where the letters stand for the molecular weights of those elements — the result being in British thermal units per pound.

Wood, considered as fuel, is divided into two classes — hard wood and soft wood. The heating value of different kinds of wood for a given weight is practically the same ; or, in other words, one pound of hickory is not worth any more as fuel than one pound of pine, as the chemical composition of different kinds of wood is nearly the same. Wood, however, is usually purchased by the cord, and the hard woods are very much heavier per cord than the soft woods. Hickory and hard maple weigh about 4,500 pounds per cord, equal to 1,800 pounds of coal; white oak weighs 3,850 pounds, equal to 1,540 pounds of coal ; birch and the red and black oaks weigh 3,250 pounds, equal to 1,300 pounds of coal ; poplar, chestnut and elm weigh about 2,350 pounds per cord, equal to 940 pounds of coal ; pine weighs about 2,000 pounds per cord, equal to 800 pounds of coal. The average chemical composition of air-dried wood shows 37.5 per cent of carbon ; 4.5 per cent of hydrogen; 30.75 per cent of oxygen; and 1.5 per cent of ash, with a moisture content ranging from 15 to 25 per cent. Its fuel value is about 5,800 British thermal units per pound. For some purposes wood is kiln-dried, increas¬ ing its fuel value to 7,800 British thermal units per pound ; but such wood, if kept for any length of time, absorbs from the air the moisture driven out, and falls again into the class of ordinary air-dried wood. Selected resinous wood, such as pine knots, give as high a fuel value as 10,800 British thermal units per pound. In estimating relative fuel values it is customary to reckon one pound of coal as equivalent to two and one-half pounds of wood.

Spent tan-bark is commonly used in the furnaces of tanneries and yields about 4,500 British thermal units per pound. Straw is

sometimes burned as fuel under boilers and yields about 5,500 British thermal units per pound.

Charcoal is made by evaporating the vola¬ tile constituents of wood, either by partial com¬ bustion or by heating in retorts. By partial combustion as in a common charcoal kiln, 100 pounds of wood will yield 20 pounds of char¬ coal, and by heating in a retort about 30 pounds. A cord of wood generally yields about 50 bushels of charcoal. Since the non-combustible constituents of the wood are driven off in the process of making charcoal, the latter has a high calorific value, ranging from 11,000 to 13,500 British thermal units per pound.

On account of the large per cent of moisture in peat, wood, sawdust apd tan-bark, these sub¬ stances as well as coke and charcoal, are rarely used for steaming or power-producing purposes, but all of them are available as fuel in gas producers, by the use of which the moisture is readily removed from the constituent gases, which can then be used for power-producing purposes by means of internal combustion engines, or be burned directly m furnaces where high temperatures are required, such as those of steel works, rolling mills, smelting furnaces, glass works and chemical v/orks.

Liquid Fuels. Among liquid fuels the oils derived from petroleum occupy practically the whole division. In application they are used in two ways : in external combustion and much more extensively in internal combustion en¬ gines. While the so-called heavy oils are gen¬ erally devoted to the external oil-firing and the lighter oils to the internal combustion type of motor, there is actually no distinct division as to availability, if there is a suitable adaptation of burners. Closely allied to the lighter petro¬ leum oils is benzol, a by-product of the manu¬ facture of coke. Tars derived from gas works, coke ovens and blast furnaces are much used in engines of the Diesel type. The only other liquid fuel which approaches industrial im¬ portance is alcohol.

Fuel Oils.— The various kinds of fuel oils are all derived from petroleum, varying in com¬ position as follows: Carbon, 82 to 87 per cent; hydrogen, 11 to 15 per cent; oxygen, x/2 to 6 per cent. The theoretical average calori¬ fic value is about 20,860 B. T. U. per pound, corresponding to a theoretical evaporation of 21 pounds of water from and at 212° Fahr.

American crude petroleum carries more of the lighter oils than the European, Mexican or Peruvian, from which a residuum or fuel oil, consisting largely of the heavy oils, is obtained by distillation. To be effective fuel oils must be vaporized and thoroughly mixed with the proper proportion of air. In this work steam atomizers give better results than the air spray, the steam required to atomize being about 4

per cent of the water evaporated.

<(Astatki,® <(Mazoot,® ˆdistillate,® <(petroleum refuse,® ((reduced oil,® etc., are some of the commercial terms used to designate the various kinds of fuel oil.

Approximately, one pound of fuel oil is equal to 1.45 pounds of coal. A test at the Minneapolis waterworks showed that for the same duty 224 gallons of oil, weighing 6.875 pounds per gallon, equaled one ton (2,240 lbs.) of Youghiogheny coal.

Fuel oils have both advantages and disad-

vantages. The heating value of a fuel oil is nearly twice its weight of coal. Its use is not as injurious to the furnace as the use of coal, on account of the smaller percentage of sul¬ phur. With oil, the fire can be controlled by means of a single valve and when once regu¬ lated to produce a certain heat, it can be main¬ tained at that point with very little trouble. There is a much lower temperature in the fire- room, particularly noticeable on shipboard. The fire can be started easily and extinguished instantly. The combustion is complete and smokeless, thus making economy and cleanliness important advantages in its use. And there is a very considerable saving in labor, one man with oil taking the place of eight men with coal.

The most important disadvantages are the comparatively high price, danger from explo¬ sion, loss by evaporation and unpleasant odor.

The barrel of crude petroleum of commerce is 42 gallons, weighing six and one-half pounds per gallon, and it is customarv to consider roughly that three and three-quarters barrels are equivalent to one ton of coal.

The requirements of a desirable fuel oil are : high calorific value — at least 18,000 B. T. U. ; specific gravity within 0.85 to 0.97 at 60° F. ; high flash point — not lower than 150°; and if for shipboard use, not lower than 175°, and 200° preferred; viscosity, low enough to remain liquid at 32° and to flow freely with one foot head in a four-inch pipe; freedom from water (2 per cent highest exception) ; freedom from sulphur (1 per cent highest exception) ; free¬ dom from dirt; and freedom from acid (one- twentieth of 1 per cent highest exception).

Tar Fuels.— Tar fuels are of two classes: the high temperature tars and the low tempera¬ ture tars. The former are products of the horizonal

gas retorts, are quite viscid and con¬ tain a high percentage of the objectionable naphthalene, and about 19 per cent of free car¬ bon. Low temperature tars are the products of vertical gas retorts and blast furnaces manu¬ facturing coalite and coke. The latter produce tars which are quite fluid, contain but small percentages of napthalene and anthracene and almost no free carbon. The tar from the verti¬ cal gas retorts is of the same general character, but has a larger proportion of naphthalene and about 3 per cent of free carbon. In some cases the tars are first distilled to secure their benzol content.

As fuel, tar is much less desirable than the oils because of its content of oxygen com¬ pounds (carbolic acid, cresylic acid, etc.), which not only reduce its calorific value but evolve noi¬ some fumes. The average composition of tar is about as follows : carbon, 78 per cent ; hydro¬ gen, 6 per cent; sulphur, 1 per cent; nitro¬ gen, 1 per cent; oxygen, 14 per cent. Its calorific value is about 15,800 B. T. U. per pound. The flash point of tar varies from 100° to 115° F. for vertical retort tar to 160° to 190° for horizontal retort tar.

Benzol. — Benzol appears upon the market in two grades — 90 per cent benzol and 50 per cent benzol ; also in mixtures of the two. The 90 per cent grade is the onlv one used to any ex¬ tent as a fuel and this use is confined almost whollv to internal combustion motors, where it very successfully takes the place of the higher priced gasoline and yields about 12 per

cent more heat gallon for gallon — and with¬ out any change in the motor. The calorific value of benzol is 17,500 B. T. U. per pound (156,700 B. T. U. per gallon).

Alcohol. — It has been truly said of alcohol that, in the present state of the world's knowl¬ edge, it is the only fuel which man is able to manufacture in unlimited quantities and within a reasonable time, without drawitig upon the reserves of natural fuels ; and this is especially important as to those parts of the earth where there are no natural fuel deposits. Alcohol is easily produced from any form of vegetable growth containing sugar or fermentable starch and at a cost of about 21 cents per gallon from such relatively costly material as the sugar cane and the sugar beet — which may be grown in four months. The so-called gasoline motors run readily on 84 per cent alcohol (a higher degree has been found of no advantage) with¬ out material

change in the mechanism. The only difficulties to be overcome are those of starting from the cold, and the necessity of a more abundant supply of fuel than with gasoline. The calorific value of fuel alcohol is about 11,500 B. T. U. per pound (91,100 B. T. U. per gallon). With alcohol, internal combustion motors show a somewhat higher efficiency than with gasoline and run with much less noise.

Gaseous Fuels.

The principal kinds of gaseous fuel which are in use at the present time for power- producing purposes are natural gas and pro¬ ducer gas. A certain kind of uncarburetted water gas, made by the decomposition of steam in the presence of incandescent-carbon, is also used to a limited extent, but this gas can never play a very important part as a power producer, on account of the large consumption of energy in its production.

The composition, weight and heat value of 1,000 cubic feet of the four types of gases used for power producing and illuminating purposes are as follows :

Natural Gas. — Marsh gas, 92.6 per cent; ni¬ trogen, 3.61 per cent; hydrogen, 2.18 per cent; carbon monoxide, 0.50 per cent; oxygen, 0.34 per cent; olefiant gas, 0.31 per cent; carbon dioxide, 0.26 per cent. Natural gas weighs about 45.6 pounds per 1,000 cubic feet. Its calorific value is 1,100,000 B. T. U. per 1,000 cubic feet.

Coal Gas, or Illuminating Gas. — Hydro¬ gen, 46.0 per cent ; marsh gas, 40.0 per cent ; carbon monoxide, 6.0 per cent ; olefiant gas, 4.0 per cent; nitrogen, 1.5 per cent; oxygen, 0.5 per cent; carbon dioxide, 0.5 per cent. Coal gas weighs about 32 pounds per 1,000 cubic feet. Its calorific value is 735,000 B. T. U. per 1,000 cubic feet.

Water Gas. — Hydrogen, 45.0 per cent ; car¬ bon monoxide, 45.0 per cent; carbon dioxide, 4.0 per cent; marsh gas, 2.0 per cent; nitrogen, 2.0 per cent; oxygen, 0.5 per cent. Water gas weighs about 45.6 pounds per 1,000 cubic feet. Its calorific value is 322,000 B. T. U. per 1,000 cubic feet.

Producer Gas (from bituminous coal). — nitrogen, 55.3 per cent ; carbon monoxide, 27.0 per cent ; hydrogen, 12 per cent ; marsh gas, 2.5 per cent ; carbon dioxide, 2.5 per cent ; olefiant gas, 0.4 per cent; oxygen, 0.3 per cent; Producer gas weighs about 65.9 pounds per

1,000 cubic feet. Its calorific value is 156,900 B. T. U. per 1,000 cubic feet.

This exhibit shows natural gas to be the highest in the order of heat energy, its calor¬ ific power being 50 per cent greater than that of coal gas. This is due to the high percentage of marsh gas given to natural gas by a natural process which cannot be duplicated artificially. Producer gas has the lowest heat value, yet it is the cheapest artificial fuel gas per unit of heat, as the oxygen for burning the carbon to carbon monoxide is derived principally from the air. It has only one-fifth the heat energy of good illuminating gas per cubic foot, and it is most successfully applied in operations where a con¬ siderable body of gas is burned rather than in small operations where illuminating gas can be used to superior advantage. .

Comparison of Gases on a Coal Basis. — The theoretical heat value of average anthracite coal is about 14,200 B. T. U.'s per pound, or the power to evaporate about 14.7 pounds of water per pound of coal burned. This theoretical evaporation is never attained in practice, how¬ ever, owing to heat losses sustained in various ways — by improper design of boilers, by radia¬ tion, by improper firing, etc., so that a boiler rarely gives an efficiency equivalent to the evap¬ oration of 12 pounds of water per pound of coal, or the utilization of 80 per cent of the theoretical heat energy of the fuel. The effi¬ ciency usually attained is about 10 pounds of water, or about 67 per cent of the theoretical energy, so that only about 9,500 of the 14,200 heat units in a pound of coal are utilized by the average boiler.

As determined by satisfactory experiments, seven and one-half cubic feet of natural gas burned will evaporate 10 pounds of water; or in other words, about 8,000 heat units in the form of natural gas are equivalent to a pound of good coal burned. Other authorities give the heat value of 1,000 cubic feet of natural gas as equivalent to that of an amount of coal rang¬ ing from 80 to 130 pounds.

Comparison of Illuminating Gas and Pro¬ ducer Gas. — First-class coal gas, or carburetted water gas, made with four and one-half gallons of Lima oil per 1,000 feet of gas, contains be¬ tween 730 and 735 heat units per cubic foot, which gives an equivalency of 19 cubic feet of gas to one pound of anthracite coal, or 1,000 cubic feet equal to 59 pounds of coal.

One pound of anthracite coal, composed of carbon 85 per cent, hydro-carbons 5 per cent, and ash 10 per cent, will make 90 cubic feet of producer gas of the following composition: hydrogen 12 per cent, carbon monoxide 27 per cent, marsh gas 1.2 per cent, carbon dioxide 2.5 per cent, and nitrogen 57 per cent, having a heat value of 137 heat units per cubic foot. This gives an equivalency of about 104 cubic

feet of gas to one pound of anthracite coal, or 1,000 cubic feet to about 9.5 pounds of coal.

Comparison of Anthracite Gas and Bitumi¬ nous Gas. — One hundred pounds of anthracite coal converted into gas in a gas producer yields 186.66 pounds of carbonic oxide, equivalent to 807,304 B. T. U. ; 5 pounds of marsh gas, equiva¬ lent to 117,500 B. T. U. ; and 3.75 pounds of hy¬ drogen, equivalent to 232,500 B. T. U. ; — a total of 1,157,304 B. T. U. The total energy per pound of gas is 2,248 B. T. U. Since the total energy in 100 pounds of anthracite is 1,349,000

B. T. U.t its conversion into gas shows an efficiency of 86 per cent.

One hundred pounds of bituminous coal con¬ verted into gas in a gas producer yields 116.66 pounds of carbonic oxide, equivalent to 504,554 B. T. U. ; 32 pounds of volatile hydrocarbons, equivalent to 640,000 B. T. U. ; and 2.5 pounds of hydrogen, equivalent to 155,000 B. T. U.— a total of 1.299,554 B. T. U. The total energy per pound of gas is 3,484 B. T. U. As the total energy in 100 pounds of bituminous coal is 1,437,- 500 B. T. U., its conversion into gas shows an efficiency of 90 per cent.

In view of the facts that the supply of natural gas is gradually failing, and that the most satisfactory method of using the heat from other fuels is to first convert it into gas, it is interesting to note that in the gasification of fuels having a high percentage of moisture, high percentages of carbonic acid and hydro¬ gen occur in the gas. This is probably due to the fact that at a temperature of about 1100° F., water vapor oxidizes carbonic oxide to car¬ bonic acid. Therefore, coke and charcoal, which have a low value as a direct-firing fuel, work more favorably in a gas producer, and yield more gas per pound than any other material. The approximate yield of gas per pound of different materials is as follows : coke or char¬ coal, 104 cubic feet ; anthracite, 85 cubic feet ; bituminous coal, 75 cubic feet ; lignite or brown coal, 55 cubic feet; peat, 45 cubic feet; wood 35 cubic feet.

Tests on Fuel. — The most important con¬ clusions of the tests on fuel made by the gov¬ ernment and by the laboratories of some of the principal universities are as follows :

1. Samples of coal from 17 States, tested in steam boiler plants, indicate that the high steaming quality of many of the American coals

may be improved by washing.

2. Most of the American coals and lignites constitute an available source of power by util¬ ization in gas producer plants.

3. Comparative tests made by the govern¬ ment on 14 bituminous coals from nine States, indicate that when these coals are used in a gas producer plant, their power efficiency is two and one-half times greater than when they are directly fired in a steam boiler plant.

4. Some of the lignites found in undeveloped but extensive deposits in the Dakotas and Texas, show very high power producing qualities when gasified in the gas producer and used in the gas engine.

5. Some of the American coals, and the stock produced in mining them can be briquetted on a commercial basis.

6. Under these conditions of attainable fuel economy, it is merely a question of time when the gas engine will supersede any possible type of steam motor.

For relevant information consult articles un¬ der the title Gas; Gas Engine; Gases, Laws of; and Gas Producer.

Bibliography.— Bjorling, P. R.,

and Gaseous Fuels) (London 1907) ; Poole, H., (The Calorific Power of Fuels) (New York 1907) ; White, A. H., (Technical Gas and Fuel Analysis> (New York 1913); United States Bureau of Mines Bulletin 23, (Steaming Tests of Coal> (Washington 1908).

FUEL VALUE OF FOOD. See Nutri¬ tion of Man.

FUELS. See Internal Combustion Engine.

FUELS FOR LOCOMOTIVES, Com¬ parative Value of. See Locomotive.

FUENTEOVEJUNA, foo-en”ta-6,ve’hoo na, Spain, town in the province of Cordoba, 45 miles northwest of the city of the same name. It is an important agricultural centre and has manufactories of bricks, flour, leather, soap, el \ Lead, calcite and building stone are obtained in the neighborhood. The town has a consid¬ erable trade, in wine, fruit and ordinary agri¬ cultural produce. Pop. 13,470.

FUENTERRABIA, foo -en”-ter-ra’be-a, Spain, town in the province of Guipuzcoa, on the French frontier and on the Bidassoa River. It has a

mediaeval aspect but in recent years a new town for summer visitors has sprung up without the walls of the old. The town has an ancient castle, a town hall, and is noted for its old gabled houses. Its principal industries are the manufacture of rope, nets, flour, lumber a.nd paper.. It had the usual fortune of a fron¬ tier town in the Middle Ages, being repeatedly attacked and sacked. Pop. 4,976.

FUENTES DE ONORO, foo-en-tes de on-yo'ro, Spain, village on the Portuguese bor¬ der, 15 miles west of Ciudad Rodrigo. On 3 May 1811, it was the scene of a sharp engage¬ ment between the English forces of Wellington and the French under Massena and Bessieres. The French were debarred from their project of invading Portugal. Pop. 1,200.

FUERO, foo-ar'o, Joaquin, Mexican sol¬ dier: b. Guadalupe Hidalgo, 1814; d. 1867. He received his education at the Military School of Segovia and became professor and vice-presi¬ dent of that institution. He suppressed the insurrection of 1840 and three years later was made chief of staff of the Tamaulipas army division. He fought against the Americans in 1846-47 and was seriously wounded in one en¬ gagement. He wrote (Manual del militar, 6 tratado completo de instruccion en la ordenanza) (1842), and a translation of McKenna, Mili¬ tary Tactics.)

FUERO (from the Latin forum), a Spanish word signifying jurisdiction, law, privilege. It is applied to the various written, codes and char¬ acters of particular districts, towns, etc., and signifies generally those laws, privileges and immunities founded on usage and sanctioned by the suzerain or supreme authority. Fueros are both civil and ecclesiastical. The earliest, as well as the most universal, is the fuero fuzgo. This name (a corruption of the Latin forum judicum) is given to a 13th century translation of a code of the 17th century. It contains the Gothic laws which, up till this time, gradually superseded the Roman. Each law receives the name of the Gothic sovereign by whom it was promulgated. This code has formed the foun¬ dation of Spanish law down even to modern times. The fueros of Leon, known by the name

of fueros bonos, contain a complete constitution, civil and ecclesiastical, recognize the rights of self-taxation, and of the nobility of all subjects by birth. The constitution of free towns under these

fueros is essentially republican, the king having only a right to name the corregidor, who must be confirmed by the junta of the province, an assembly elected by a very liberal suffrage. As the various monarchies became consolidated under a single head, the kings became anxious to evade or withdraw privileges which interfered with the organization of their kingdom, and after 1592 when Philip II entered Aragon with an army, hanged the grand-justiciary, whose office it was to administer the oath, and abol¬ ished the constitution, the fueros as a political institution ceased to exist, although some local and municipal privileges continued to be called by that name. In 1833 a civil war broke out in the Basque provinces, in assertion of the fueros, which were formally recognized in 1844. In 1876, however, the fueros of these northern provinces were superseded by the general laws of the kingdom. Consult Arias, M., (Fueros observancias, actosde Cortes de Aragon } (Saragossa 1907) ; San Martin, ed. (Los co¬ digas espanoles) (Madrid 1872-73).

FUERTE VENTURA, fwar'ta ven-too'ra, one of the Canary Islands, belonging to Spain. It is situated between the Grand Canary and Lanzarote. In general the soil is not produc¬ tive and the rainfall is slight. Fishing and the raising of goats are the principal industries. Among the products of the island are figs, olives, almonds, gypsum and chalk. It has an area of 650 square miles and numerous e-xtinct volcanoes. Its principal harbor is Cabras on the east coast. Pop. about 13,000. See Canary Islands.

FUERTES, Estevan Antonio, American civil engineer: b. San Juan, Porto Rico, 1838; d. 1903. He received his education at Salamanca, Spain, and at the Rensselaer Polytechnic In¬ stitute, Troy, N. Y. In 1861-63 he was assist¬ ant engineer in the Department of Public Works, Porto Rico, and subsequently served as director of public works for the western dis¬ trict of that island. Coming to the . United States in 1864 he was successively assistant en¬ gineer and engineer to the Croton Aqueduct Board, and in 1870-71 was chief engineer of the American Isthmian Canal expeditions to Tehu¬ antepec and Nicaragua to investigate and re- 'port on the practicability of a ship canal con¬ necting the Caribbean and the Pacific. In 1873 he was appointed dean of the civil engineering department of Cornell, _ and in 1890-1902 directed the college of civil engineering there and brought the equipment of that department up to modern standard. In 1902 he became professor of astronomy at Cornell and super¬ vised the construction of the Barnes Observa¬ tory. He olanned a drainage system for Santos, Brazil. He was a member of many scientific societies, American and foreign.

FUERTES, foo-ar’tes. James Hillhouse,

American civil and sanitary engineer: b. Ponce, Porto Rico, 10 Aug. 1863. He was graduated from Cornell University in 1883. He has con¬ structed works for the sewerage, , drainage and water supply of various cities in the United States, Canada and Brazil, and served as con¬ sulting engineer of various corporations and

municipalities, and is a non-resident lecturer at Cornell. He has published (Water and Public Health) (1897) ; (Water Filtration Works*

(1901); (European Sanitary Engineering

Series* in the Engineering Record , and numer¬ ous monographs on engineering and sanitary subjects, etc.

FUERTES, Louis Agassiz, American painter of birds : b. Ithaca, N. Y., 7 Feb. 1874. He was graduated from Cornell University in 1897. His habitat bird groups in the American Museum of Natural History are one of the most attractive features of the institution. He made 25 decorative panels for F. F. Brewster of New Haven, Conn. He has illustrated (Birding on a Broncho) (1896) ; (Citizen Bird* (1897) ; (Song Birds and Water FowP (1897) ; (Bird Craft) (1897) ; (The Woodpeckers) (1901); (Second Book of Birds* (1901);

(Birds of the Rockies> (1902) ; (Handbook of Birds of Western North America) (1902) ; (Coues’ Key to North American Birds * ; the plates for the

FUGA, Ferdinando, Italian architect: b. Florence 1699; d. 1784. He spent most of his active life in Rome, where there are many ex¬ amples of his work, including the Corsini Palace, and the exterior of the Church of Santa Maria Maggiore. He removed to Palermo toward the end of his life and died there while employed in the reconstruction of the cathedral of that city.

FUGER, Heinrich, German artist: b. Heil- bronn, Wiirtemberg, 1751; d. 1818. At Stuttgart he studied under Guibal and under Oeser at Leipzig. He toured Italy and studied brief periods at Rome and Naples. He was made court painter at Vienna, was appointed professor and assistant director at the Academy of that city, and became director of the Belvedere in 1806. His best works are the. portraits of Joseph II, the Grand Duchess Elizabeth, Queen Caroline and Nelson (in the National Gallery, London), and the historical paintings (Farewell of Coriolanus,* Allegory of Peace, * (Bathsheba* and other examples in

the Vienna collections.

FUGGER, fook'er, or fug'ger, the name of a wealthy and illustrious German family of Suabia, descended from a weaver, who origin¬ ally lived in the environs of Augsburg, about 1300. They were at first successful in selling clothes, but afterward extended their dealings and became merchants, accumulating an im¬ mense fortune. Reaching the height of their affluence at the commencement of the 16th cen¬ tury, they rendered considerable services to the Emperors Charles V and Maximilian, by mak¬ ing them large advances. These princes be¬ stowed titles of nobility on the Fugger family, and they soon became connected with the best blood of Germany. Promoted to the highest dignities of the empire, they did not any the more neglect the pursuits of commerce. Their

riches were always forthcoming for the im¬ provement of their birthplace, Augsburg, where they erected some handsome monuments and founded philanthropical institutions. The best known of them are the three brothers, Ulric, James and George; and afterward Raymond and Antony, both sons of George. Ulric re¬ ceived for his loans to Maximilian the court¬ ship of Kirchberg, and the seigniory of Weis- senhorn, which afterward remained in the pos¬ session of his family. He was a great en- courager of learning. Antony and Raymond bore, to a great extent, the expenses of the ex¬ pedition of Charles V against Algeria, obtain¬ ing from him the permission to coin money. One day, at an interview with the emperor, Antony, as a mark of his regard and esteem, threw into the fire all the title-deeds and securities which Charles had deposited with him. Toward the close of the 18th century the family withdrew altogether from trade, confining themselves to the management of their landed estates. Count Anselm Maria of Babenhausen, of the Wellenberg line (b. 1776; d. 1821), was raised by the Emperor Francis II to the dignity of a prince of the empire. The principality of Babenhausen was annexed to Bavaria in 1806, and Leopold Fugger Baben¬ hausen (1827-85), grandson of the first prince, was a hereditary Imperial councilor, and lord high-chancellor of Bavaria. He was succeeded by his brother Karl Ludwig Maria Fugger (b. 1829), who in 1891-93 was president of the Bavarian Reichsrat. Consult Jansen, (Studien zur Fugger-geschichte) (Leipzig 1907), and Stauber, (Das Haus Fugger von seinen Antan- gen bis zur GegenwarD (Augsburg 1900).

FUGGERS Bank of the. The foundation of this great banking house was laid in Augs¬ burg, Bavaria, about the middle of the 15th century. (Rabelais, (Letters from RomeJ 1536). As its active career extended to the middle of the 17th century it embraced a period of some 200 years during which interval it was accounted the richest banking house in northern Europe, commercially the most ex¬ tensive and politically the most important in its financial operations. The fortunes of the Fugger family grew originally out of the woolens trade, in which a great rivalry arose between the growers and merchants of wool in England, Germany and Spain, and the dyers and finishers of Italy. The political im¬ portance of the Fuggers coincided with the reign of Charles V, whose youth, 1500-1516, was passed in * Ghent (Flanders), where he was born. The expenditures of the young prince exceeding his income, he had recourse for assistance to the Fuggers of Augsburg, one of whom (probably Antony), resided and con¬ ducted an agency of the house in Flanders. In 1548, after Charles had successively as¬ cended the thrones of Spain and Germany, he reformed the government of Augsburg, mark¬ ing the occasion by elevating the Fuggers to the dignity of senators and conferring the title of baron upon Raymond and Anthony. In the European wars which engaged the emperor, as well in the administration of his affairs in Spain and America, the Fuggers often shared his confidence and frequently responded to his demands for financial assistance. Among the minor, though now most interesting of the projects which were undertaken in the earlier

portion of the great emperor's career one which was financed by the Fuggers, was a sur¬ vey by Flemish engineers of the Isthmus of Darien, with a view to the construction of a Panama Canal, about 1526 (Rev. Peter Hey- lin s (Microcosmos,) 1631, p. 788), a design whose grandeur had yet to await for its fulfil¬ ment another 400 years. The bank of the Fug¬ gers, with agencies in the principal cities of Europe, was a depository for the funds of numerous commercial houses and trading com¬ panies, whose paper it discounted and whose plans it often promoted. It issued and cashed bills of exchange, bought coins and bullion, and advanced money upon bills of lading and con¬ signments of merchandise ; it even acquired the extraordinary privilege, in at least three places, of minting its own coins, some specimens of which are preserved in the great continental cabinets. Consult Hazlitt, (European Coinage; mints of Augsburg, Fugger and WeissenhornP For the history of other ancient European banks see Barcelona, Bank of; Byzantium, Bank of; Genoa, Bank of; Medici, Bank of the; Tyre, Bank of; Venice, Bank of.

Alexander Del Mar.

FUGIO. See Cent.

FUGITIVE, in law, is a term applied to persons who having violated the laws of a State escape into a foreign territory. As one State cannot pursue criminals into the territo¬ ries of another, the practice prevails among the more enlightened nations of mutually surren¬ dering such fugitives to the justice of the in¬ jured State. This practice is founded on national comity and convenience, or on express compact. The United States recognize the obligation only when it is created by express agreements. (See Extradition). As between the States of the American Union, extradition is made compulsory by the Federal Constitu¬ tion, Article IV, Section 2, which provides that ((a person charged in any State with treason, felony or other crime, who shall flee from justice and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime. ˆ In the several States there are statutory provisions or established usages regu¬ lating the procedure in such cases.

FUGITIVE-SLAVE LAWS. In the colo¬ nies and under the Confederation, fugitive slaves could be reclaimed only through inter¬ colonial or interstate comity, and in framing the Constitution, one of the chief inducements for the South to join was a fugitive-slave clause. The mandate to deliver them up, how¬ ever, was only to the States, which could not be punished for refusing to comply; and as the free States, recognized no obligation of comity on this point, the general government passed the first fugitive-slave law, signed by Washing¬ ton, 12 Feb. 1793. The oral testimony of the alleged owner was all the evidence required, and on this any magistrate, even a town justice, was ordered to surrender the alleged fugitive; $500 fine was imposed for rescue, concealment or obstruction of arrest. This made kidnap¬ ping free blacks a pastime, and it was exten¬ sively carried on in the Border States ; motions to amend the law and require more evidence were voted down. On the other hand, the

Border States complained of increasing escapes, and Congress promptly passed an amendment (30 Jan. 1818), enabling a claimant to make his proof before a judge of his own State and abolishing the habeas corpus in such cases. The Northern magistrates, however, revolted against the obligation ; Pennsylvania passed a law contravening the national act and provid¬ ing its own methods of

reclamation, and made them incumbent on her own magistrates; a Maryland slave-seeker thereupon carried off an alleged slave by force, and on his indictment the Supreme Court decided (Prigg v. Pennsyl¬ vania) that the execution of Federal laws could not be imposed on State officials. Taney dis¬ sented; and on this doubt the Northern States began to pass (

(1906). See also United States, Slavery in the; Underground Railway.

FUGIWARA, a noble family of Japan, emi¬ nent in civil affairs. It was founded by Kama- tari, regent of the empire, in 645ˆ49 a.d. It has given many statesmen, historians, scholars, poete, artists, etc., to Japan and was long the most powerful family in the empire. The em¬ press of Japan is of this family, being of the 40th generation in descent from Kamatari. Consult Mentchikov, (Empire du Japon' (Geneva 1881).

FUGUE, fug, a musical term, derived from the Latin word fuga, — a flight, and signifying a polyphonic composition constructed on one or more short subjects or themes, which are har¬ monized according to the laws of counterpoint (q.v.), and introduced from time to time with various contrapuntal devices. The interest in these frequently heard themes is sustained by diminishing the interval of time at which they follow each other, and monotony is avoided by the occasional use of episodes, or passages open to free treatment. The chief elements of a fugue are: (1) the subject; (2) the counter¬ subject, or contrapuntal harmonization of the answer by the part which has finished the enun¬ ciation of the subject; (3) the answer; (4) episodes; (5) the stretto; and (6) the pedal point. There are three kinds of fugue, the simple, containing one subject; the double, con¬ sisting of two subjects, occasionally intermin¬ gled and moving together, and the counter fugue, in which the subjects move in a direction contrary to each other. In all fugues the parts fly, as it were, after each other, whence the name. The great masters of fugal form are Johann Sebastian Bach and Handel.

FUHCHOW. See Foochow.

0 0

FUHRICH, Joseph von, Austrian painter and engraver: b. Kratzau, Bohemia, 9 Feb. 1800; d. Vienna, 12 March 1876. He studied at Prague under Bergler and in 1824 designed plates for Tieck's (Genovera.' In 1827 he re¬ moved to Rome, there joined the German Naza- renes, and collaborated in the fresco work of the Villa Massimi.

He returned to Prague in 1829, went to Vienna five years later, and in 1841 received the appointment of professor at the Academy there. He painted a series of frescoes in the Church of Saint John Nepomu- cene in 1844-46, and a large fresco in the Alt- lerchenfeld in 1854-61. For the latter he was ennobled and made a member of the order of the Iron Crown. His paintings include (The Mourning Jews' (Prague) ; (Christ going to the Mount of Olives' ; (Peter's Draught of Fishes' ; and (Mary's Journey over the Moun¬ tain' (in the Vienna gallery). His best en¬ gravings are series illustrating the Psalter, the Imitation of Christ, and the Prodigal Son. Con¬ sult Muther, ˆHistory of Modern Painting' (London 1907) and Worndle, {Joseph Fiihrichs Werke' (Vienna 1914).

FUJI-NO-YAMA. See Fujiyama.

FUJI-SAN. See Fujiyama.

FUJITA, foo-zhe'ta, Sadusake (real name, Honda Teiken), Japanese mathematician: b. 1734; d. 1807. He was a native of the Province of Mushashi and attained eminence in his chosen field, being the leading Japanese mathe¬ matician of his century. He wrote the cele-

bratcd ˆSeiyo Sampo) (1779), mostly devoted to algebra, and many other works.

FUJIYAMA, FUJI-NO-YAMA, or FUJI¬ SAN, the sacred mountain of Japan, situated in the Province of Suruga, 60 miles west of lokio, and having an elevation of 12,395 feet. It is a volcano, having a crater 2ˆ4 miles in cir¬ cumference and 500 feet in depth. The last eruption took place in November 1707-January 1708. Many pilgrims visit it annually from all parts oj the empire and on its sides are numer¬ ous shrines and temples. Consult Griffis, (The Mikado's Empire) (11th ed., 2 vols., New York 1906) and Satow and Hawes (Handbook for Travelers in Central and Northern Japan) (Yokohama 1881).

FUKIEN, or FOKIEN, China, a maritime province of the republic, bounded north by Chekiang, west and northwest by Kiangsi, south by Kuangtung and east by Formosa Channel. It has an area of 46,300 square miles and a population of 22,000,000. The surface is broken by low mountain ranges running from south¬ west to northeast and having densely wooded slopes. The soil is very fertile and is under intensive cultivation. Wheat, barley, rice, tea, sugar and indigo are

produced in large quanti¬ ties. Timber cutting is an important industry but manufacturing is at a low ebb. Porcelain of great value is produced and has long been unexcelled in quality. Foochow and Amay are the treaty ports of the province. See China.

FUKUDA, Tokuso, Japanese educator: b. Tokio, 2 Dec. 1874. He was graduated at the Higher Commercial School of Tokio in 1894, afterward went abroad and studied economics and the history of political economy at Leipzig University. Subsequently he studied at the University of Munich and also at Paris and Genoa. Upon his return home in 1901 he was appointed professor at the Higher Commercial School, in 1906 he removed to the University of Tokio and subsequentlv was appointed pro¬ fessor at Keio University. He has published (National Economy* and (Labor and Economy. *

FUKUI, Japan, capital of the province of Echizen, on the Ashiwa River, five miles from its mouth. It is well built and is noted for its cleanliness. It has a long and honorable his¬ tory and is a great Buddhist centre. There are also many Christian missions. The city manu¬ factures annually about $10,000,000 worth of a white silk known as habutai. There are many smaller places of this name throughout the empire. Consult Griffin, (The Japanese Nation in Evolution* (New York 1911). Pop. 53,000.

FUKUOKA, Japan, a prefectural town, 150 miles from Kokura, on the northern coast of Kiushiu. It contains an ancient castle, a public garden and has many splendid streets. There is also a permanent garrison stationed at the castle. Pop. 97,303.

FUKUSHIMA, Japan, town in the province of Iwashiro, 170 miles from Tokio and 50 from Sendai. It is the seat of a prefect and has a large trade in cocoons and raw silk. Pop.

33,500.

FUKUYAMA, Japan, seaport situated at the southern end of the Island of Yezo, 60 miles from Hakodate. Before the abolition of feudalism it was of great commercial impor¬ tance, being the main outlet for the products of

the entire island. In modern times Hakodate has usurped its place in the commercial world. The city has numerous temples and many re¬ mains of its former splendor. Pop. 15,000.

FUKUZAWA, Yukichi, foo-koo-zah-wah you-kee-chi, Japanese educator and author: b. Buzen, 1834; d. 1901. In the last generation,

he was the intellectual father of one-half of the young men in civil government service in Japan, and the teacher of a large number of those who to-day direct the affairs of the empire. He mastered early the Dutch language and later the English. After traveling with the Japanese Embassy in America in 1860, on his return he refused all offers of honor or emolument under the government and devoted himself to educa¬ tion, authorship and journalism in champion¬ ship of western civilization, especially in its American form. His books, 50 or more, treat¬ ing of what were then novel themes, reached a sale of 4,000,000 copies. He founded the Keio University which has continued in whole¬ some rivalry with the Imperial University. No other individual did so much by pen and voice to mold the mind of the nation in favor of Oc¬ cidental civilization. His two sons were edu¬ cated at Yale University. Consult Chamber- lain, (Things Japanese) (1890) ; Morris, (Makers of Japan * (1906).

FULAH, a Hamite-Negro people dwelling on the upper Senegal and from Senegambia to Darfur. They resemble the Berber peoples of North Africa, are negroid in speech and frizzled hair. Their color is light brown or copper and they are of good stature. They are divided into four great branches : The Baa, the Jel, the Beri and the So, these in turn are subdivided into many tribes. Consult Meyer, Hans, (Das deutsche Kolonialreich) (Vol. I, Leipzig 1909).

FULBERT, French bishop and writer: b. about 960; d. 1028. At the Rheims school con¬ ducted by Gerbert, Fulbert was a charity student. Later he became connected with the diocese of Chartres. He became a teacher at Chartres and under his direction the academy there became renowned as a seat of learning. He was made bishop of Chartres in 1006, re¬ built the cathedral during his episcopate and took an active part in the political world of his day. He wrote letters, hymns and dis¬ courses ; the first-named are useful as a history of his period. His literary remains are to be found in Migne, (Patrologia Latina) (Vol. CXLI). Consult Pfister, (De Fulberti Carno- tensis Episcopi Vita et Operibus) (Nancy 1886).

FULDA, fol'da, Ludwig, German dram¬ atist: b. Frankfort, 15 July 1862, of Jewish ancestry. After finishing the schools of his native city, he attended several German uni¬ versities, finally taking the degree Doctor of Philosophy, from the University of Heidelberg in 1883. He had devoted himself largely to German literature and presented a thesis on Christian Weise, a German dramatist of the 17th century. From 1884 to 1888 he lived in Munich where he came in touch with Paul Heyse to whom he is indebted for help in striv¬ ing for grace of form and perfection of finish. Since 1888 he has lived in Berlin. Here

he came under the influence of the naturalistic movement. This affected him only temporarily,

however, as he was not of a serious turn of mind and soon he gave most of his time to satire and light comedy. In 1906 and in 1913— 14 he made lecture tours in the United States. Upon returning home from his first trip he published a volume entitled (Amerikanische Eindriicke> which records in a rather easy superficial manner his impressions of America.

After beginning his literary career Fulda produced a succession of plays, most of which gained a fair degree of popularity upon the stage. He understands dramatic technique and his plays as a rule act well. They are bright, witty and sparkling in dialogue, though they lack originality and are not profound. They are amusing, but have no seriousness of purpose. It has been argued that his plays belong to the history of the theatre rather than to the history of literature. His dramas may be divided into three classes : Comedies, serious social plays and allegorical and symbolistic dramas. Ex¬ amples under the first head are (Unter vier Augen) (1886), and (Der DummkopP (1907) which is perhaps his best stage play. Of his serious social plays (Das Verlorene Paradies> (1890), (Die Sklavin) (1891) and

William F. Hauhart,

Assistant Professor of German, University of

Michigan.

FULDA, Prussia, the capital of a district in the province of Hesse-Nassau, on the river Fulda, 70 miles northeast of Frankfort. Its cathedral is a replica on a lesser scale of Saint Peter's, Rome, and contains the remains of Saint Boniface. It contains also the 9th century church of Saint Michael, the old episcopal palace, a Benedictine convent, and large bar¬ racks, a Catholic gymnasium, with a library of 40,000 volumes, a teacher's training school and a school of military music. It has a large cattle market and manufactures textiles, leather, metal goods, agricultural implements, chemicals, soap, vinegar, etc. It was once the seat of a university and was ceded to Prussia in 1866. Pop. 22,500.

FULDA, Abbey of. A Benedictine abbey in Prussia, which is also the

seat of a bishopric. The abbey was founded in 744 under the direc¬ tion of Saint Boniface, who made it an episco¬ pal see as a part of his plan for evangelizing Germany. The rule of the community was modeled on that of Monte Cassino, and" abso¬ lute autonomy was secured to it by Pope Zachary in 751. The authenticity of the docu¬ ment granting this privilege has been questioned, but it is now generally accepted as genuine. The monks at Fulda devoted themselves particularly to the development of agriculture, and estab¬ lished many smaller monasteries in Thuringia, Saxony, Hesse, Bavaria, Lorraine, Swabia and

other parts of Germany, these subordinate houses becoming centres of thriving agricul¬ tural communities. Art and literature were also assiduously cultivated at Fulda. A splendid church, erected in the 9th century on the site of the original structure, was famous through¬ out Europe, and exercised for centuries an in¬ fluence on ecclesiastical architecture. The monastic school, established by Saint Sturmius, the first abbot, began to flourish during the time of Charlemagne, and became celebrated throughout Europe. Abbot Rabanus Maurus (822-42) assembled a great library, which was further enriched during the following centuries by the labors of the monks. By the end of the 10th century the abbey had achieved a very important position in the German Empire. From 968 the abbot was primate of all the Benedictine abbeys in Germany and Gaul, and from the 12th century, he was a prince of the empire. The abbey grew so rich in lands, tithes and other sources of revenue that the monastic discipline was much relaxed. The importance of the school declined perceptibly. At a comparatively early date the teachings of the Reformation affected the chapter, but late in the 16th century discipline was re-established and the Catholic faith restored. The foundation of a Jesuit college there in 1571 revived the scholastic spirit, which had almost ceased to exist. In 1584 a papal seminary was established and also placed under the direction of the Jesuits. Dur¬ ing the Thirty Years' War the abbey suffered, but afterward it enjoyed a period of peace and prosperity, and in 1732 the Jesuit and the Bene¬ dictine schools were united and converted into a university. In 1802 the abbey, which then embraced a territory of about 40 square miles, with a population of 100,000, was secularized. In 1809, under Napoleon it was ceded to the Grand Duchy of Frankfort; in 1815 to Hesse- Cassel, with which it passed in 1866 to Prussia. The university was closed under the law of secularization, and the papal seminary was con¬ verted into an episcopal seminary.

Thomas Gaffney Taaffe.

FULFORD, Francis, Canadian bishop: b. Sidmouth, England, 30 June 1803; d. 9 Sept. 1868. He was a graduate of Exeter College, Oxford; was ordained to the priesthood in 1826; consecrated first Anglican bishop of Montreal, 25 July 1850 and elected metropolitan 1860.

FULGENTIUS, Fabius Planciades, Afri¬ can grammarian: b. about 480; d. about 550 a.d. Of his life we know nothing beyond what may be gleaned from internal evidence. He wrote (Liber de Ficticiis PoetarunP ; (Liber Physio- logus* ; IIP ;

FULGENTIUS, Saint, Bishop of Ruspe: b Telepte, North Africa, 468; d. 533. He was of senatorial rank by birth, was well educated and became procurator of the province. The wars and troubles of the period caused him to seek refuge in a monastery near Telepte. Be¬ ing persecuted by the Arian rulers, the monks were driven out and Fulgentius went to Rome in the year 500. He returned to Africa, founded a monastery and in 508 became bishop of Ruspe,

Two years later he was banished and again in 515. He suffered other indignities at the hands of the vandal king lhrasimund. On the latter's death in 523 Fulgentius returned to his see and spent his remaining years in peace. He was a rigorous ascetic and a champion of monasticism. He is honored on 1 January in the Catholic Church. Consult Migne, (Patrologia Latina) (\ ols. LXV and LXVII) ; Bordenhewer, (Saint Louis 1908); and Mally, Das Leben des heiligen Fulgentius) (Vienna

1885) .

FULGURITE. On mountain summits, it has been noticed occasionally that the-surface of the rock shows in places a glassy film, and that fine depressions may be present, or small droplets of vitrified rock. It has been rea¬ sonably inferred that these are due to the fusion of the rock materials by lightning. On sand hills in many places curious natural tubes have Ireen found projecting above the surface, and these, when examined under the microscope, are found to consist of a thin film of glass en¬ closing sand grains. They descend through the sand to depths of several feet, often branching in their course. These also are the product of lightning and are also known as fulgurites.

FULHAM, England, a metropolitan and parliamentary borough of London, six miles south of Saint Paul's opposite Putney. Area, 1,703

acres. It contains the residental districts of West Kensington and Walham Green. Here is the palace or manor house of the bishop of London, surrounded by a moat. The oldest part of the building dates from the beginning of the 16th century. The parish church of Saint Ann's contains some fine monuments pre¬ served from the older building. The Queen's Club grounds are celebrated for their athletic meetings. The borough returns one member to Parliament. Pop. 153,284. Consult Feret, (Fulham, Old and New> (1900).

FULKE, William, English Puritan: b. Lon¬ don 1538; d. 1589. He was educated at the LJniversity of Cambridge, began his studies for the bar, but soon abandoned this field for that of theology. In 1564 he was made a Fellow of Saint John's College and five years later rector of Warley and Dennington. In 1578 he became master of Pembroke Hall. He was an ardent Puritan of the extremist type and took an ungodly delight in the religious squabbles of his time. He wrote (Defense of the Sincere and True Translation of the Holie Scriptures into the English Tong against the Cavils of Gregory Martin) (1583) ; (Stapleton's Fortress Overthrown* (1580); (Rejoinder to Marshall's Reply against the Answer of Martin CalfhilP (1580) ; (Discovery of the Dangerous Rock of the Popish Church) (1582). An edition of these works appeared at Cambridge (1843-48).

FULLAM, William Freeland, American naval officer : b. Monroe County, N. Y., 20 Oct. 1855. In 1877 he was graduated at the United States Naval Academy at the head of his class; attained the rank of commander in 1905, and that of captain in 1909. In 1883-1904 he was engaged as instructor at the Naval Academy, in various departments, and lastly as chief of the department of ordnance. In the Spanish- American War he served on the New Orleans. In 1907-09 he was commandant of the training station at Newport, R. I., and commanded the

Mississippi in 1910. Two years later he had charge of naval training on the Great Lakes, and in 1914 became superintendent of the United States Naval Academy. In 1915 he be¬ came commander of the Pacific Reserve fleet. He published c Handbook of Infantry and Ar¬ tillery, United States Navy* (1899) ; (Textbook of Ordnance and Gunnery) (new ed., 1905) ; and (The Recruits' Handy Book.*

FULLER, Andrew, an English Baptist clergyman and theologian: b. Wicken, Cam¬ bridgeshire, 6 Feb. 1754; d. Kettering, 7 May 1815. He was largely self-educated. He began preaching in 1774 and the next year became pastor at Soham. In 1782 he removed to Ket¬ tering where he labored for the rest of his life. Out of his ((Monthly

Concert,® a meeting for prayer for the conversion of the world, came the Baptist Missionary Society which sent forth. William Carey. Mr. Fuller was secretary of the Society from its beginning until his death. He was the author of several theological works. The principal ones are (The Catholic and So- cinian Systems Compared) (1793) ; (The Gos¬ pel: Its Own Witness) (1800); (Strictures on Sandemanianism* (1809) ; (Letters on Com¬ munion (1815). His works were published in 5 vols., London 1831, and a more complete edi¬ tion in 3 vols., Philadelphia.

FULLER, Arthur Buckminster, American Unitarian clergyman : b. Cambridgeport, Mass., 1822; d. at the battle of Fredericksburg, Va., 13 Dec. 1862. He was graduated from Harvard in 1843, studied in the Harvard Divinity School, and held pastorates in Manchester, N. H., and Boston and Watertown, Mass. In the Civil War he was chaplain to a Massachusetts regi¬ ment. He edited several works of his sister, Sarah Margaret Fuller (q.v.). Consult Fuller, R. F., (Chaplain Fuller) (Boston 1863) and Higginson (in (Harvard Memorial Biogra- phi es,* Vol. I, Cambridge, Mass., 1866).

FULLER, George, American artist : b. Deerfield, Mass., 1822; d. Brookline, Mass., 21 March 1884. He went to Illinois in 1836, and, having developed a taste for painting, studied in 1842 under Henry Kirke Brown, at Albany, N. Y. After working in Boston for a few years, he went to New York, where in 1857 his portrait of his former teacher, Mr. Brown, the first of his works to attract notice, gained him an election as associate of the National Academy. He spent eight months in European study and travel in 1859 and then retired to his farm at Deerfield, using his art only for recrea¬ tion, till financial reverses in 1873 forced him to take it up again as a profession. About 1876 his pictures began to be noticed for their peculiar handling, richness of tone and a dreaminess of conception which, when admired at all, was admired very thoroughly. A memorial exhibition of his works was held at the Boston Museum of the Fine Arts in 1884. His contributions to the National Academy ex¬ hibitions include (The Turkey-Pasture, Ken- tucky) (1878) ; (The Dandelion GirP ; (The Romany GirP (1879) ; ‘The Quadroon) (1880). To the exhibitions of the Society of- American Artists he sent (Priscilla Fauntleroy) (1882) ; (1861); (At the Bars* (1865); Shearing the Donkey* (1879) ; (And She was a Witch1

(1879) ; ‘The Gatherer of Simples) (1880) ; (Winifred Dysart* (1881) ;

FULLER, Henry Blake, American author : b. Chicago, Ill., 9 Jan. 1857. He entered litera¬ ture with ‘The Chevalier of Pensieri-Vani* (1891), and ‘The Chatelaine of La Trinite* (1892). He next wrote ‘The Cliff-Dwellers* (1893), and ‘With the Procession* (1895), novels of Chicago life; ‘The Puppet-Booth* (1896), dramatic sketches; ‘From the Other Side* (1898), short stories; ‘The Last Refuge* (1900) ; ‘Under the Skylights* (1901) ; ‘Waldo Trench and Others* (1908).

FULLER, Lucia Fairchild, American art¬ ist : b. Boston, 6 Dec. 1872. She was educated at Shaw’s Private School, the Cowles Art School under Dennis M. Bunker, and at the Art Students’ League, New York, under William M. Chase and H. Siddons Mowbray. Since 1889 she has been engaged professionally as a painter, chiefly of miniatures. She was mar¬ ried in 1893 to Henry Brown Fuller. She was awarded a bronze medal at the Paris Exposi¬ tion of 1900, a silver medal at Buffalo in 1901 and a gold medal at the Saint Louis Exposition of 1904. In 1906 she became associate of the National Academy and in 1913 was president of the Society of Miniature Painters. She is also a member of the New York Water Color Club.

FULLER, Melville Weston, eminent Amer¬ ican jurist and one of the chief justices of the Supreme Court of the United States. He was borne in Augusta, Me., 11 Feb. 1833; d. Sor¬ rento, Me., 4 July 1910. He was graduated at Rowdoin College (A.M.) in 1853, and attended a course of lectures at the Harvard Law School (LL.*D.), and wˆas admitted to the bar in his native city in 1855. He began the practice of law, meanwhile becoming the associate editor of the Age, a Democratic newspaper. In 1856 he was elected city attorney and president of the common council. He resigned these offices and removed to Chicago, where he established an extensive law practice.

In 1862 he became a member of the Illinois State Constitutional Convention, and in the following year was elected from Cook County to the lower house of the State legislature. He rose rapidly in State and national politics, and from 1864 to 1880 was regularly a delegate from Illinois to the Democratic national conventions. In 1876 he placed Thomas A. Hendricks .in nomination and was himself seriously consid¬ ered as a candidate for presidential nomination in 1880. The same year he practically retired from politics, but gained additional fame as a lawyer during the next few years. In the fa¬ mous lake-front case in Chicago he was counsel for the municipality, and in the Cheney ecclesi¬ astical case, he defended Rev. C. E. Cheney, a Protestant Episcopal clergyman, rector of Christ Church, Chicago,

against an action brought by an ecclesiastic council.

In April 1888 President Cleveland appointed him chief justice of the United States Supreme

Court to succeed R. M. Waite (q.v.), deceased. He was confirmed 20 July 1888, taking the oath of office 8 October. About this time Bowdoin, Harvard College and the Northwestern University conferred degrees upon him. In the Supreme Court he soon became a prominent figure, and he was largely responsible for the expansion of Federal power, by means of the decision asserting the implied authority of the executive to protect the Federal judge on occasion when there is just reason to believe that, while in the exercise of official duties, he is exposed to personal danger. This was especially applicable to the case of one Nagle, an Arizona cowboy, who was made a United States marshal to protect the person of Chief Justice Field, and who while performing this duty shot and killed Judge Terry, of California. In December 1889, he delivered before the two Houses of Congress an address commemorating the inauguration of President Washington.

In 1899 Justice Fuller was a member of the Arbitration Commission convened at Paris for the adjustment of the Venezuela boundary question. In 1904—05 he was chosen ,by Great Britain as arbitrator at The Hague in the case of the French flag at Muscat. Consult an article by Reeder in University of Pennsylvania Law Review (October 1910), for a summary of his work in the Supreme Court.

FULLER, Richard, American Baptist cler¬ gyman : b. Beaufort, S. C., 22 April 1804; d. Baltimore, Md., 20 Oct. 1876. In 1820 he en¬ tered Harvard University, but was obliged, on account of feeble health, to leave during his junior year. He then studied law in Beaufort, was admitted to the bar and soon rose to emi¬ nence in his profession. During a period of great religious interest in Beaufort he felt it his duty to abandon the law and devote him¬ self to the Christian ministry. .\t the same time he was constrained to leave ;e Protestant Episcopal Church in which he had been brought up. Pie was at once ordained, and called to the pastorate of the Baptist church at Beaufort. His reputation as a preacher soon became national and his services were widely sought in promoting religious revivals. During his resi¬ dence in Beaufort he was engaged in two memorable controversies — one with Bishop England of Charleston, on the claims of the Roman Catholic Church, and the other with President Wayland, of Brown University on the subject of slavery. In 1836 he traveled in Europe for the benefit of his health and in 1846, became pastor of a Bap'tist church in Baltimore, Md., where he spent the remainder of his life. He

was more than once president of the Southern Baptist convention. In addi¬ tion to pamphlets and various sermons published separately, he was the author of volumes of ‘Sermons* and ‘Letters* ; ‘Argument on Baptist, and Close Communion* (1849) ; ‘Psalmist.* Consult the memoir by his nephew, James H. Cuthbert (New York 1879).

FULLER, Sarah Margaret (Marchioness Ossoli). American author: b. Cambridgeport, Mass., 23 May 1810; d. off Fire Island Beach, 16 July 1850. She derived her first teaching from her father, studied Latin at the age of six and injured her health by over- application. At 13 she was a pupil at the famous school of Dr. Park, in Boston, where she began the study

■N

of Greek Thence she went to a school at Groton. On the sudden death of her father she vowed that she would do her whole duty toward her brothers and sisters, and she faith¬ fully kept the vow, teaching school in Boston and I rovidence, and afterward taking private pupils. During the transcendental period she knew intimately the leading minds of the time — ■ Emerson, Hawthorne, Ripley, Channing, Clarke,

ana m the company of such was very brilliant, meeting them as equals. She first met Emerson in 1835, and the next year visited nm at Concord. She went occasionally to Brook Farm, though never fully believing in the success of that experiment, and never liv¬ ing there She held conversations in Boston, conducted the Dial, translated from the Ger¬ man projected works and wrote (A Summer on the Lakes, the record of a season spent in trave! in 843. In December 1844 she went to New York as literary critic of the Tribune,

wlVndeVThe rtlanagement of Horace Greeley. While in New York she visited the prisons, penitentiaries, asylums, theatres, opera-houses, and lecture-rooms, writing about everything in the Tribune and doing much to move the level of thought on philanthropic, literary and ar¬ tistic matters. She pursued this task unre¬ mittingly for about 20 months, after which,

•aVion|Salˆ a money» she went to Europe m 1846. There she met the foremost people in , , erary’ SO(aal) political and reformatory world,

spent the summer and autumn in travel, established herself for a time at Rome early in 1847, visited Switzerland and northern Italy and returned to Rome in the autumn. In December 1847 she was married to Giovanni Angelo, Marquis Ossoli, and entered with zeal the Italian struggle for independence in 1849. Her conduct during the siege of the city by the French was of the most heroic, disin¬ terested, humane and tender kind. She was a friend of Mazzini. On the capture of Rome in June 1849ˆ she and her husband took refuge in Rieti, in the mountains of the Abruzzi, and after some months removed to Florence, which they later left for Leghorn, whence passage for America was taken on the Elizabeth that sailed 17 May 1850. The voyage ended in disaster; the vessel being driven ashore off Fire Island on 16 July 1850. The body of the child was borne ashore lifeless and neither father nor mother was heard of more. She wrote a good deal for magazines during her active literary period. Her collected works was edited by her brother, Rev. Arthur B. Fuller (Boston 1855). There are lives by Emerson, Clarke and Channing. There is also a memoir by Julia Ward Howe (in the Emi¬ nent Women Series,* Boston 1883) and one by Thomas W. Higginson (in < American Men of Letters Series, > ib. 1884). Consult also Braun,

F. A., (Margaret Fuller and Goethe) (New York 1910) ; Dali, Mrs. C. H., (ed.) (Margaret and Her Friends* (Boston 1895) ; Goddard,

H. C., Studies in New England Transcenden¬ talism* (New York 1908) ; Macphail, A., (Essays in Puritanism* (Boston 1905).

curate of Saint Benet's parish, Cambridge, and became very popular as a preacher. In 1631 he became prebend in the cathedral of Salisbury. The same year he published a poem entitled

Davids hainous Sin, heartie Repentance, and heavie Punishment. * He gave up his Cambridge curacy in 1633, and next year became rector of Broadwindsor, Dorsetshire. His (History of the Holy Warre* appeared 1639, soon after the publication of which he removed to London and was chosen lecturer at the Savoy church in the Strand. In 1642 he published his (Holy ?nu ˆofane, State* (folio). In 1650 he pub¬ lished (Pisgah Sight of Palestine and the Con¬ fines thereof, with the History of the Old and New Testament acted thereon> (folio), and in 1650 appeared his (Abel Redivivus* consisting of ˆ lives of religious reformers, martyrs, divines, etc. In 1655 he published the (Church History of Britain, from the Birth of Jesus Christ to the Year 1648ˆ \ to which was sub- joined the (History of the University of Cam- bridge since the Conquest,* and the (History of Waltham Abbey.* The year after his death was published his principal literary work, the Worthies

of England*— a production valuable alike for the solid information it affords rela¬ tive to the provincial history of the country and for the profusion of biographical anecdote and acute observation on men and manners. Con¬ sult (Life* by Bailey (1874).

FULLER, Thomas, Canadian architect: b. Bath, England, 1823 ; d. 1899. He studied at Bath and London; went to the West Indies, where he erected a cathedral at Antigua. In 1857 he went to Toronto, established his practice there and two years later, with his partner, Chilion Jones, was awarded first prize for designs for the Parliament buildings to be erected at Ottawa. He removed to Ottawa and remained there until 1867, in which year he entered the competition for the New York State Capitol at Albany, N. Y. His design was one of three to wrhich were awarded equal premiums. In the second competition, with Laver, his design was adopted, and the capitol built from it. The same architects were also successful at this time in their design for a city hall and court buildings at San Francisco. Fuller resided in Albany until 1881, when he returned to Ottawa and was appointed' chief architect of the Department of Public Works. He retired in 1897.

FULLER-MAITLAND, John Alexander,

English musical critic: b. 1856. He graduated from Trinity College, Cambridge, in 1879, and in 1889 became musical critic of the London Times. He contributed to Grove's dictionary of Music and Musicians,* the appendix to which he edited; translated (with C. Bell 1884) Spetta's (Johann Sebastian Bach,* wrote a standard (Life of Robert Schumann* (1884); c Masters of German Music* (1894);

FULLER, Thomas, Anglican churchman and historian : b. Aldwinkle, Northamptonshire, June 1608; d. London, 16 Aug. 1661. He was graduated from Queen's College, Cambridge. In 1630 took orders and was appointed perpetual

FULLERS' EARTH, a substance of in¬ definite composition, consisting essentially of clay, mixed with sufficient finely divided silicious matter to destroy its plasticity. Ful¬ ler's earth has a specific gravity varying from

1.8 to 2.5, and also varies in color. It is of very fine grain and received its name from the fact that for centuries its sole use was in cleansing

(“fulling®) grease and oil from cloth and wool. In modern times its field of usefulness has been greatly extended. It is now an important agent in oil-refining, especially cottonseed and lubri¬ cating oils. The muddy oil is filtered through the earth and emerges clear. England was long the only large source of supply, the Cretaceous beds there furnishing great quantities. Cimo- lite, found in Greece is a variety of fuller’s earth and has been used in similar fashion from the earliest times.

With the constantly rising prices for im¬ ported fullers’ earth — due to the scarcity of ocean tonnage from 1914 on — the domestic production increased to the largest figure on record, reaching 67,822 short tons in 1916. The value of this output amounted to $706,951, an average of $10.42 per ton. The imports for the year amounted to only 16,801 short tons, of a value of $139,664, an average of $8.31 per ton. The relative ton price is informing as to the superior quality of the domestic product. Fully 80 per cent of the domestic product comes from the State of Florida. The other produc¬ ing States are Georgia, Texas, California, Mas¬ sachusetts and Arkansas. Large deposits have been located in Texas and California, but only one mine in each State was active commercially in 1916. The domestic product is nearly all used for clarifying and filtering fats, greases and oils, on which the earth exerts a bleaching effect. Only the imported earth is used for fulling cloth. (See Mineral Production of the United States). Consult Ries, (Clays, Occur¬ ence, Properties and Uses) (New York 1910) and Parsons, (Bureau of Mines, Bulletin 7 P

(1913).

FULLERTON, George Stuart, American professor of philosophy: b. Fathegarh, India, 18 Aug. 1859. He was graduated from the Uni¬ versity of Pennsylvania and in 1887 he was ap¬ pointed professor of philosophy in the same institution. He was dean 1 894—96, and vice-president 1894—98. Since 1904 he has been pro¬ fessor of philosophy in Columbia University. In 1913-14 he served as first American exchange professor to Vienna and other Austrian uni¬ versities. In 1914 Emperor Francis Joseph appointed him honorary professor in the Uni¬ versity of Vienna. He is the author of Pre¬ liminary Report of Seybert Commission on Spiritualism (1887) ; (The Conception of the Infinite) (1887) ; (A Plain Argument for God) (1889) ; (The Philosophy of Spinoza) (1894) ; (On Spinozistic Immortality > (1899) ; (A

System of Metaphysics) (1904) ; (An Intro¬ duction to Philosophy > (1906) ; (The World we Live In> (1912); (The American Univer-

sities) (published in German 1914) ; (Germany of To-day) (1915).

FULLERTON, Lady Georgiana Charlotte Gower, English novelist : b. Tixall Hall, Staf¬ fordshire, England, 23 Sept. 1812 ; d. Bourne¬ mouth, Hampshire, 19 Jan. 1885. She was mar¬ ried to Alexander George Fullerton in 1833 and followed him into the Roman Catholic Church in 1846. Her first novel, (Ellen Middleton) (1884), was followed by (Grantley Manor) (1847). Her later stories, after her conversion to the Catholic faith, are in a mild way “stories

with a purpose,® the purpose being to develop the influence of religious belief on life and char¬ acter; among them are (Lady Bird) (1852) ; (Too Strange Not to be True) (1864); (Mrs. Gerald’s Niece) (1869) ; (A Will and a Way* (1881). She wrote also (The Gold-Digger, and Other Verses) (1872). Consult Craven, (Life of Lady Georgiana Fullerton,* translated from the French by H. J. Coleridge (1888).

FULLING, the act of cleansing, scouring and pressing woven woolen goods, etc., to render them stronger, firmer and closer; called also milling, because these cloths are usually scoured by a water-mill. The principal parts of a fulling-mill are the wheel, with its trundle, which gives motion to the tree or spindle, whose teeth communicate that motion to the pestles or stampers, which fall into troughs, wherein the cloth is put, with fullers’ earth, to be scoured and thickened by this process of beating it. The operation takes from 48 to 65 hours, and re¬ sults usually in considerable shrinkage in length and width ; it obviates the tendency to unravel and renders the threads of the cloth so firm and close as to be almost imperceptible.

FULMAR, ful’mar, a name applied to sev¬ eral species of petrels, of which the most com¬ mon is the Arctic petrel (Fulmarus glacialis). This bird breeds on rocky coasts of the north Atlantic in enormous colonies, and goes south¬ ward in winter, some individuals as far south as New Jersey. It is about the size of a large duck. The head and neck are pure white ; the back and long wings of a bluish or smoky gray; breast, belly and under surface white ; bill large, strong and yellow or brownish; legs and toes brownish. The young are brownish gray. In the Hebrides, and especially in Saint Kilda, where these birds reside in incredible numbers, they are of great value to the people, not only for their eggs but also as a source of oil. The birds, when seized, vomit a quantity of clear amber-colored oil of a disagreeable odor which is one of the most valuable products of Saint Kilda. The old birds feed the very young with it. The fulmars breed on the faces of the high¬ est precipices, on which every grassy shelf over a few inches in extent is covered with their nests, which are slightly excavated in

the turf and lined with dry grass and withered tufts of sea- pink. One egg is deposited at a time, which the cliffmen obtain by descending with ropes from the summit of the cliffs. The fulmar feeds on animal substances, preferably fat. It flies buoyantly and swiftly, and withstands heavy gales, skimming the surface of the water. When a whale is caught, though few of the fulmars should be present, they assemble in thousands as soon as the cutting up is com¬ menced ; hence the whalers call them “whale- birds® or “mollymauks.® They follow in the greasy track of a whaling ship, doming within a few yards of the men engaged in cutting, and devour the morsels of fat voraciously and in great quantity, becoming quite tame. Other petrels which are classed as fulmars are the Giant Fulmar (Ossifraga gigantca), or “Cape Hen,® a bird 30 to 36 inches in length, and with a wing-spread of six to. seven feet, common in the Indian and Antarctic oceans. This bird is exceedingly gluttonous, gorging itself until it can scarcely walk. Its favorite feast is car¬ rion, and it has the filthy habit of vomiting its

partly digested food when pursued. Rodgers’ Fulmar (Fulmar Rodgersii) inhabits Bering Sea and adjacent waters as far south as the Bay of Monterey, California. The Pacific Ful-

t r!a’r-nˆˆ’ , is found along the north

Pacific Coast as far south as Mexico. It is fearless of man, often disputing the catch with fishermen, and is easily captured.

FULMINATES, ful’mi-nats, compounds of fulmimc acid (C:NOH), all of which are violently explosive. The most important of these is mercuric fulminate, which is formed bv dissolving 10 parts by weight of mercury in 120 parts of nitric acid of the specific gravity 1.34 and, when cooled, pouring this solution into 110 parts of 95 per cent grain alcohol. At the normal temperature a reaction sets in which becomes quite turbulent, dense white fumes be¬ ing given off and then red fumes, and after this the mercuric fulminate separates out as a gray, crystalline powder. It has the formula of Hg02N2C2, and belongs to the class of chemical substances known as oximes. Its specific gravity is 4.42. When moist it may be handled without danger, but when dry, mercuric fulminate explodes violently if struck or com¬ pressed or rubbed between hard surfaces ; when heated to 367° F. ; when touched with strong sulphuric or nitric acids; or when in contact with sparks from flint and steel or electric sparks. In all these cases the body undergoes a detonating explosion ; and its principal use is to produce detonation in high explosives, though it is used also in percussion caps and primers to ignite gunpowder and other low explosives. Mercuric fulminate should be stored and transported only in the moist con¬ dition, yet even in this condition it can be ex¬ ploded by the explosion of dry fulminate in contact with it. Certain amines like fulminat¬ ing silver, gold, mercury and copper are fre¬ quently confounded with the fulminates because they also are explosive. The best known of these is Berthollet’s fulminating silver, which was used in the bomb which killed Tzar Alex¬ ander II. This substance is produced only by the energetic oxidation of alcohol by nitric acid, in the presence of silver nitrate, the operation being performed in capacious vessels. It separates out as a black, crystalline mass, which explodes on the slightest concussion when dry and may even be exploded by rubbing between hard substances when moist, so that it requires the greatest caution in handling. It has been repeatedly formed accidentally in the am- moniacal silver solutions used in silvering mir¬ rors and in the silver baths used in the wet processes of photography and has given rise to serious explosions. See Explosives.

FULMI NATION, a term used in chemistry to denote the violent decomposition of a sub¬ stance, usually by heat or percussion, and ac¬ companied by a flash of flame and a loud re¬ port, .and differs therefore but little from de¬ tonation ; except that the latter refers

more to the sound, and the former to the flash. See Detonation ; Explosives ; Fulminates.

FULMINIC ACID. See Fulminates.

FULTON, Frederick John, Canadian states¬ man : b. Bedlington, England, 8 Dec. 1862. He received his education at Magdalene College, Cambridge, and after his arrival in Canada, began the practice of law at Victoria, B. C.

He was elected to the British Columbia legis¬ lature as a Conservative in 1900 and three years later became president of the Council in the McBride Cabinet. Afterward he was suc¬ cessively Provincial Secretary, Minister of Education, Attorney-General and Commissioner oi Lands. He was a member of the Irrigation Convention of 1907 and two years later served as chairman of the Timber and Forestry Com¬ mission. He did much for legislation on irri- gation and forestry interests. He retired from public life in 1909.

T . FULTON, Robert, American inventor: b. Little Britain (now Fulton), Lancaster County, Pa 1765; d. New York, 24 Feb. 1815. His father came from Kilkenny, Ireland, early in the 18th century, and settled in Little Britain. At the age of 13 Robert constructed paddle- wheels, which he applied with success to a fishing-boat. The years 1782—85 were spent in painting miniature portraits and landscapes, mechanical and architectural drawing, and whatever came in his way in the line of artistic work, at Philadelphia, where he numbered Benjamin Franklin among his friends. In 1786 Fulton went to London, and was received into the family of Benjamin West, under whose instruction he studied for several years. After¬ ward he practised his art in Devonshire, under the patronage of wealthv persons, among whom were the Duke of Bridgewater and Earl Stan¬ hope. With his _ acquaintanceship with these persons begins his experiments in mechanics. Francis Egerton Bridgewater, last duke of that name, had become famous by the construction of a navigable canal from Worsley to Man¬ chester, and Charles, Earl Stanhope, was the inventor of the Stanhope printing-press, and a student of mechanics and engineering. In 1793 Fulton actively engaged in a project for the improvement of canal navigation, and in the following year obtained from the British government a patent for a double-inclined plane for raising or lowering boats from one level to another on a system of small canals. In 1794 he patented a mill for sawing marble. Some time in 1796 he made plans for the con¬ struction of cast-iron aqueducts, and a great work of this kind was built for crossing the river Dee. A bridge built from his plans was erected at Wandsworth, and others at several

points in Surrey. He also patented in England a machine for spinning flax, a dredging machine, a market or passage-boat, a dispatch boat, and a trader for use on canals. In 1796 he published his (Treatise on the Improvement of Canal Navigation,) having previously pub¬ lished some articles on the subject in the Lon¬ don Morning Star, advocating small canals. Copies were sent by the author to the President of the United States and other officials, each accompanied by a letter emphasizing the ad¬ vantages to be derived by the United States from canal navigation. In 1794 he became a member of the family of Joel Barlow, author of the ˆolumbiadp in Paris. Here he painted a panorama, the first ever shown in the French capital. In December 1797, Fulton made an experiment on the Seine with a boat for sub¬ marine navigation, to be used in torpedo war¬ fare. In 1801 he conducted some experiments at Brest with his submarine or plunging boat, under the auspices of the French government, which, however, on Fulton's failure to blow up

the British ships that sailed along the coast, became disaffected with the undertaking. At the instigation of Lord Stanhope, the govern¬ ment of England determined to secure Fulton's services for that country, and accordingly he went to London in May 1804, after a short so¬ journ in Holland. The submarine boat was finally reported by the British commission to be impracticable, but the torpedo they thought of some value, and Fulton was taken out with an expedition to try it against the French fleet at Boulogne, where the torpedoes burst harm¬ lessly beside the French ships. An experiment in October 1805, with an improved apparatus, on a brig of 200 tons, provided for the purpose by the government, resulted in the destruction of the ship. In 1806 Fulton had returned to the United States, and renewed his experiments with torpedoes. His system was never adopted, though in 1810 Congress appropriated $5,000 for testing the torpedoes and submarine ex¬ plosions. . About this time Fulton invented a machine to cut the cables of ships at anchor. In 1813 he took out a patent for ((Several Im¬ provements in Maritime Warfare, and means for Injuring ships and vessels of war by Ignit¬ ing Gunpowder under Water." Fulton began to turn his attention to the subject of steam navigation as early as 1793, as is. shown in a letter to Lord Stanhope, written in. that year. In 1803, having the financial assistance of Chancellor Livingston, Fulton launched a steam¬ boat on the Seine, which, owing to faulty con¬ struction of the frame, immediately sank. Another boat was soon built, with the old machinery, and a trial trip

was made but no great speed was attained. Encouraged with this partial success Fulton shortly afterward ordered an engine of Watt and Boulton to be sent to the United States. Early in the spring of 1807 the boat that was to navigate the Hud¬ son and establish the system of steam naviga¬ tion was completed at a ship-yard on the East River. The engine was put in later and on 11 Aug. 1807, the Clermont steamed up the Hud¬ son to Albany, the voyage occupying 32 hours. During the autumn of 1807 the Clermont was run as a packet between New York and Albany. The success of Fulton's enterprise excited much jealousy and rivalry, and a number. of persons disputed his claim to originality. Litigation and competition threatened to rob him of all profit from his invention. Fulton's first patent for improvements in navigation by steam was taken out 11 Feb. 1809, and another, with fuller provisions, on 9 Feb. 1811. What¬ ever may have been Fulton's honors as to the invention, he undoubtedly deserves the credit of first bringing into practical use the steamboat as a conveyance for passengers and freight,, all earlier undertakings having been inefficient practically. The success of the Clermont was followed by the rapid multiplication of steam¬ boats. A list of those built under Fulton's superintendence comprises the Car of Nep-' tune , the Paragon, the Fire-Fly, the Richmond, the Washington, Vesuvius, Olive Branch, Em¬ peror of Russia, the Chancellor Livingston, and many ferry-boats. He described his first ferry¬ boat in an article published in the American Medical and Philosophical Register for Octo¬ ber 1812. In 1814, Fulton submitted to the coast and harbor defense committee plans for a steam warship to carry 44 guns, and in October

of that year a boat of this description, called the Demologos (subsequently known as Fulton the First), was launched. The War of 1812 terminated before the effectiveness of the Ful¬ ton as a war vessel could be tested, and she afterward became a receiving ship. The last subject to which Fulton's energies were devoted was a modification of his submarine boat the Nautilus, but only the hull of the projected craft was completed before his death. Ex¬ posure in crossing the Hudson, after testifying in New Jersey in a steamboat case, laid the foundation of Fulton's last illness. He left a widow (daughter of Walter Livingston) and one son and three daughters. In 1909 the cen¬ tennial anniversary of the Clermont was cele¬ brated in conjunction with the tercentennial of the discovery of the Hudson by the navigator of that name. A replica of the Clermont was constructed and proceeded under its own steam up the river as its prototype had done exactly 100 years before. The literature of the steam¬ boat controversy is extensive. The fullest list on the subject is afforded by Preble's (History of Steam Navigation. > Fulton's published works

are (Treatise on the Improvement of Canal Navigation (1796; French trans., 1799) ; (Letters on Submarine Navigation (1806); (1810) ; (Report on the Prac¬ ticability of Navigating with Steamboats on the Southern Waters of the United States) (1813) ;

(Memorials of Robert Fulton and Edward P. Livingston in regard to Steamboats) (1814) ; Advantages of the Proposed Canal from Lake Erie to the Hudson River) (1814). Consult Colden, (Life of Robert Fulton (New York 1817) ; Dickinson, (Robert Fulton, Engineer and Artist; His Life and Works > (ib. 1913); Knox, (Fulton and Steam Navigation (ib. 1886) ; Sutcliffe, (Robert Fulton and the Cler¬ mont* (ib. 1909).

FULTON, Ill., city in Whiteside County, on the Mississippi River and Lincoln Highway, and on the Chicago, Milwaukee and Saint Paul, the Chicago, Burlington and Quincy, and the Chi¬ cago and Northwestern railroads, 36 miles northeast of Rock Island. The new high school building erected in 1914 at an expense of $40,000 and the Carnegie library are noteworthy. There are two banks, with resources aggregating over $1,000,000. The streets are paved, there is a good water system, and connection is made with Clinton, Iowa, by a high bridge over the Mississippi River. Pop. 2,174.

FULTON, Kv., city in Fulton County, 50 miles south of Paducah, on the Illinois Central. It is the seat of Tennessee College, a high school and Carr Institute and has machine shops, foundries, flouring mills, tobacco ware¬ houses, lumber mills and harness works. The municipality owns the waterworks. Pop. 3,415.

FULTON, Mo., city and county-seat of Cal¬ laway County, on the Chicago and Alton Rail¬ road, near the centre of the county, on Stenson Creek. Here are located the State School for the Deaf, Westminster College (Presbyterian), founded 1852; the Woods College, the Synodical College and State Hospital No. 1 for the In¬ sane. Fulton is noted for its fire-brick and pottery works, and has a flouring mill, etc. The town was settled in 1821, and was incorporated as a city in 1859. There are three banks. The

value of taxable property in 1915 was $1,849,-

ii ” It mayor an<ˆ council are elected annu¬ ally. 1 he city owns and operates its electric- light and water plants. Pop. 6,000.

i -^^^TON, N. \ city in Oswego County, on me Oswego River and the Oswego Canal, and

°VhmNew York Central> New York, Ontario and Western and Delaware and Lackawanna i ailroads, 25 miles northwest of Syracuse. It has a public library, city hall, opera-house and other public buildings. It is the centre of the cheese trade of northern New York, and there are manufactures here of paper, woolen goods, flour, fire-arms, tools, water-motors, cutlery, paper-mill machinery, condensed milk, canned goods, knit goods, chocolate, infant’s foods, macaroni, spark plugs, etc. The United States census of manufactures for 1914 showed within the city limits 51 industrial establish¬ ments of factory grade, employing 3,292 per¬ sons ; 3,042 being wage earners receiving annu¬ ally a total of $1,736,000 in wages. The capital invested aggregated $12,168,000, and the year’s output was valued at $9,572,000: of this, $3,632,- 000 was the value added by manufacture. Ful¬ ton was settled in 1791 and was originally in¬ corporated as a village in 1835. The villages of Fulton and Oswego Falls, with an aggregate population of 8,206, were consolidated and char¬ tered as a city in April 1902. A mayor and common council govern the city, being elected every two years bv popular vote. The munici¬ pality owns and operates the waterworks. Poo

(1920) 13,043.

FULVIA, ful’vi-a, Roman matron : b. about 40 b.c. After being twice married she became . the wife of Mark Antony. Antony divorced her to marry Cleopatra, upon which she attempted to persuade Augustus to take up arms against her husband. When this scheme did not succeed she retired into the East, where Antony received her with great coldness. This broke her heart and she soon after died.

FUMARIC ACID. See Stereochemistry.

FUMAROLE, fu’ma-rol, a volcanic vent, usually on the side of the main cone, from which gases issue.. Due to the difficulty of approaching the main crater during an eruption, most of our information about volcanic gases is obtained from fumaroles. See Volcanoes, and the section on V olcanism in the article on Geology.

FUMIGATION, an attempt at disinfection by gaseous agents. The term is also used to describe the application of the fumes of medic¬ inal substances to the respiratory tract. Fumi¬ gation is probably, in its primary sense, a very unsatisfactory mode of bringing about disinfec¬ tion. The agents that are used most effectively are chlorine gas, sulphur dioxide and formalde¬ hyde.. It has been distinctly demonstrated that chlorine gas as a disinfecting agent is untrust¬ worthy, and that its application is attended with many disadvantages.. Sulphur dioxide, in the absence of moisture, gives practically no re¬ sults, and even when aqueous vapor is generated in a room previous to the use of the gas its bactericidal action is very slight. Moreover, sulphur dioxide in the presence of moisture in the air tarnishes brass and silver, gilt frames, etc., and corrodes fabrics and other stuffs. It

is not a satisfactory disinfectant. Formalde¬ hyde gas has been used since 1800 for fumiga¬ tion. The vapor is extremely pungent, and it has a strong affinity for all organic substances. Its practical value as a disinfectant has been demonstrated to be above that of any other gaseous substance. It cannot, however, be said to give absolute results, and although its power of penetration is greater than in that of any of the others mentioned it is still only a surface disinfectant. The interior of a heap of cloth- nig, for instance, if exposed to the gas, is not affected at all by it. Formaldehyde gas as a fumigant is not sufficiently strong to kill many household pests. This casts suspicion on its value as. a room disinfectant. Moreover, it is very costly. In general it may be gathered that gaseous disinfection by fumigants is somewhat of a farce; and although formaldehyde gas ap¬ proaches more closely the requirements of the ideal, it is far from being perfect. The best disinfectant for rooms is unquestionably sun¬ light. Short of this, thorough cleansing, rub¬ bing down, the walls, etc., should be carried out. As noted in the article on disinfection, it is the effort of hygienists to particularize on the type of disease agents which they desire to eradicate. The general modes of disinfection heretofore much in vogue were largely founded on a lack of knowledge of what the infecting agents have been. See Bactericide; Disinfectants.

FUMITORY (((smoke of the eartlU), a name commonly given to species of the genus Fnmaria. It is a native European weed of deli¬ cate and beautiful appearance, which has been naturalized in America. The climbing fumitory or mountain-fringe of the United States grows well under cultivation. To the family Fuma- rmcecu belongs the genus Corydalis, found throughout most of the north temperate zone. Fumitory leaves have a bitter saline taste, and as a tonic and diaphoretic are used in provin¬ cial France as a blood-purifying remedy for scorbutic affections, chronic eruptions, etc.

FUNCHAL, foon-shal, Madeira, the capital and seaport of the island in the centre of a large bay on the south coast of Madeira. It is irregularly built; the streets are narrow, wind¬ ing, ill-paved and dirty. An old castle, which commands the roads, stands on the top of a steep, black rock, called Loo Rock, surrounded by the sea at high water. The entire produce of the. island, consisting mostly of wine and fruit, is exported from Funchal. Pop. about 19,600, among whom are many English, French, Portuguese and mulatto and negro freedmen. See Madeira.

FUNCK-BRENTANO, funk bron-ta-no, Theophile, French philosophical and critical writer: b. Luxemburg, 20 Aug. 1830; d. 1906. He became professor at the School of Political Sciences in Paris in 1873. His thorough studies in law and medicine have imparted to his philo¬ sophical writings an exactitude of thought and inspired a special stress on method, very ap¬ parent in such works of his as (New Thoughts and Maxim s> (1858) ; (Exact Thought in Phi- losophy) (1869) ; {Greek Sonbists and Contem¬ porary English SoUiists) (1879) ; (La civiliza¬ tion et ses lois) (187(f) ; (La politique> (1892) ; (L'Homme et sa destinee> (1895) ; (La science sociale, morale, politique) (1897) ;

phistes frangais5 (1905), and others. As a critic he is esteemed for the happy presentation and careful elaboration of his thought.

FUNCTION. (1) In biology, the action proper to tissues, organs or groups of organs in plant and animal life. The function of respira¬ tion is the joint action of lungs and skin; diges¬ tion is a very compound function, to which organs and groups of organs contribute. The actions are capable of being grouped in subordi¬ nation to three leading phenomena of every liv¬ ing thing — namely, sustentation, reproduction and relation. To the first belong digestion and all the other functions which contribute to the vegetative life; the processes of the second are, as examples of cell transformation, so far iden¬ tical with those of the other two, but the results are different ; the cell changes of the nervous system which regulates the relations of living things, are again identical with those of the other two sets of phenomena. Functional dis¬ eases are those due to organs perfect in struc¬ ture but not performing their functions prop¬ erly; as opposed to organic or structural dis¬ eases, due to defect of structure.

Organs often have more than one function — a primary, or that for which it is principally intended, and a secondary, some subsidiary pur¬ pose which it performs. It sometimes happens that important changes take place in the course of the evolution of a type, or the development of an individual, whereby the primary function disappears and some secondary use becomes pre-eminent or exclusive. Thus <(a brilliant speculation,® says Carpenter, ((has indicated pairs of tracheal gills on the meso- and meta¬ thorax as the possible origin of insect wings. The primeval insects forsook, so it is thought, the water for the land; and the plates, becom¬ ing useless for breathing, were enlarged and finally changed into organs of flight.® Another strong and familiar example is the case so often presented among crustaceans where the mouth parts are largely structures (((foot-jaws) orig¬ inally ambulatory, but now entirely devoted to the seizing and mastication of food. Change of function results in change of structure. Con¬ sult Darwin, < Origin of Species) (6th ed., Lon¬ don 1882) ; Dohrn, A., (Der Ursprung der Wir- belthiere und das Princip des Functionwechsels5 (Leipzig 1875) ; Marshall, A. M., (Biological Lectures and Addresses5 (London 1894) ; Saint George Mivart, (Genesis of Species5 (New York 1871). See also Functionalism.

(2) In mathematics, one quantity is said to be a function of another, or of several others, when its value depends on those of the latter. Thus the area of a triangle is a function of its three sides, and y = aJrbx + cx2 is a function of a, b, c, and x. Functions receive distinctive names according to the nature of the depend¬ ence above referred to. Thus the . function above written is said to be an algebraical func¬ tion of x, since y is obtainable from ˆ by the performance of a limited and definite number of algebraical operations. Log x, sin x, ax, on the other hand, are said to be transcendental func¬ tions of and for obvious reasons receive the distinctive names of logarithmic, trigonomet¬ rical and exponential functions. The term function in its mathematical sense was due to Leibnitz (1692), but in its present sense was first defined by Johann Bernoulli (1718). La¬

grange first used the term “theory of functions® in his ‘Theorie des functions analytiques5 (Paris 1797). The object of the theory is the study of functions of one or more variables, in which either the variables or the coefficients, or both, are complex numbers. Lagrange (1772, 1797, 1806) may be said to have been the real founder of this general theory but others before him — Newton, Leibnitz, Bernoulli, Clairaut (1734), D’Alembert (1747), and Euler (1753) — had already worked in its ˆ direction. Landen (1775) is usually credited with found¬ ing the theory of elliptic functions, though this theory had been suggested by Jakob Bernoulli (1691) ; Maclaurin (1742), and

D’Alembert (1746). The real development of the theory, however, is due to Legendre, who after great labor produced his ‘Traite des fonctions ellip- tiques et des integrales Euleriennes5 (1825-28). Abel, Jacobi and Cayley also contributed much to this theory. The present form of the gen¬ eral theory of functions is based largely on the works of Cauchy, Riemann and Weierstrass. For a list of the special functions consult Muller, ‘Mathematische Terminologie,5 in bib¬ liotheca Mathematica5 (Leipzig 1901), a work in which are given about 200 functions. Brill and Noether, in (Die Entwickelung der Theorie der algebraischen Functionen in alterer und neuerer Zeit,5 in (Jahresbericht der deutschen Mathematiker Vereingung5 (Vol. II, Berlin 1894), gave a valuable history of the develop¬ ment of functions. Consult also Forsyth, ‘Theory of Functions5 (Cambridge 1893) ; Harkness and Morley, ‘Theory of Functions5 (New York 1893) ; and Merriman and Wood¬ ward, ‘Higher Mathematics5 (New York 1896), in all of which will be found the historical de¬ velopment, bibliography and full discussion of the theory of functions. See also articles in this encyclopedia: Complex Variable Theory of the Functions of a; Real Variable, The¬ ory of the Functions of a ; Mathematics ; Trigonometry ; etc., to which extended bibliog¬ raphies are appended.

FUNCTIONALISM (in psychology and philosophy). Functionalism is a term em¬ ployed by modern writers both in philosophy and psychology. It occurs more commonly in psychological writers and it will be convenient to designate first the meaning which they assign to it. Functional psychology can be considered as dealing with three fairly distinct problems which we may discuss separately.

First: One of the fundamental problems which psychologists undertake to solve consists in the determination of the number and char¬ acter of the various materials sensory, idea¬ tional, etc., which the mind employs, e.g., the varieties of color, tone, taste, etc. Their effort is directed to analyzing and describing both the elementary and the complex contents of con¬ sciousness. This field of endeavor is ordinarily entitled structural psychology. As contrasted with this, functional psychology undertakes to discern and portray the typical operations of the mind with especial reference to the actual life conditions under which consciousness, occurs. In describing sensation, for example, it. would find its sphere of interest in determining the character of the various sense activities like vision and hearing, as differing in their modus operandi from one another and from other

Mcnuil pioccsses such as thinking and willing.

I his branch of functional psychology is tound in all important psychological writers irom Aristotle to the present day. It is not however, until the present generation that any essential distinction has been recognized in this regard between structural and functional psy¬ chology. Indeed, as compared with the remain- mg forms of functional psychology, the distinc¬ tion is relatively unimportant. It represents nevertheless a difference in emphasis which is significant. The functionalist is peculiarly reso¬ lute in his purpose to describe mental life as it is in the moment of experience. The analyses offered by the structuralist are perhaps apt to dwell too impartially upon details which may be evident to later introspective examination with¬ out having constituted noticeable features of the conscious state itself when it was in progress.

. Substantially identical with this first concep¬ tion of functional psychology, but phrasing it¬ self somewhat differently, is the view which regards the functional problem as concerned with discovering how and why conscious processes are what they are. The structuralist is sup¬ posed to be occupied with the problem of deter¬ mining what the conscious elements are and how they are combined. In general it will be seen that functionalism as thus described is roughly analogous to a physiology of mind, whereas structuralism is analogous to a mental anatomy.

Second: A broader conception of functional psychology and one more frequently character¬ istic of contemporary writers takes its rise from the prevailing interest in the larger formula; of biology and particularly the evolutionary hy¬ potheses within whose majestic sweep is now¬ adays included the history of the whole stellar universe. From this point of view functional psychology finds its peculiar problem in mental activity as part of a larger stream of biological forces. The psychologist of this stripe is wont to take his cue from the basal conception of the evolutionary movement, i.e., that for the most part organic life possesses its present character¬ istics by virtue of the efficiency with which they serve to meet the conditions laid down by the environment. With this conception before him he attempts . to gain some understanding of the manner in which the psychical contributes to the furtherance of organic activities — not alone the psychical in its entirety, but much more the psychical in its particularities, mind as feeling, mind as judging, as willing, etc. He seeks to discover the exact nature of the ac- commodatory service

represented by the various great modes of conscious expression.

Animal psychology affords a concrete ex¬ ample of the effort to discover these particular¬ istic features of the adaptive service rendered by consciousness to organisms. Modern in¬ vestigations in this field have thrown a flood of light upon such problems as the mechanism of instincts, the methods of animal topographical orientation, the scope and character of the several sense processes, etc. In a similar man¬ ner the studies of human genetic psychology, particularly that branch entitled child study, have contributed to our knowledge of the serv¬ ice rendered to the growing mind by its several different functions, such, for example, as the

vaiious sensations, the emotions, etc. Patholog¬ ical psychology has also contributed in no small measure to our knowledge of the part played by particular portions of our consciousness in the development and organization of our mental life as a whole.

In this connection it is interesting to remark that not a few modern writers hold the view that every accommodation by an organism to a novel situation requires and involves conscious¬ ness. Such a view rests on the conviction that consciousness is not only of service from time to time in assisting organic adaptation to envi- hut also that it is the absolute pre¬ condition of accommodation to situations which are new.

This broad biological ideal of functional psychology may be considered as issuing in the attempt to discover the fundamental utilities of consciousness. The problem from this point of view has not as yet been satisiactorily solved. It is possible to regard the three great familiar divisions of mental life, i.e., knowing, feeling, and willing, as constituting these basal utilities! There are, however, many subordinate catego¬ ries which are equally significant; e.g., attend¬ ing and judging. Moreover, from the strictly utilitarian standpoint it may be urged as practi¬ cable to reduce all these manifestations of utility to the basal one, selective accommoda¬ tion ; that is to say, it is because consciousness by its selective action leads to movements which result in the attaining of certain ends, that mind possesses value.

Third: It is sometimes asserted that func¬ tional psychology is in reality a form of psy¬ chophysics. This means that it finds its major interest in determining the relations to one an¬ other of the physical

and mental portions of the organism. To be sure all psychology must necessarily entertain some doctrine regarding these relations, but functional psychology is oc¬ casionally identified with a peculiar attitude to¬ ward this problem which may be described as follows :

The distinction between the mind and the body is not regarded as founded primarily on a difference between two kinds of existence, one physical and the other mental. The two are rather thought of as different modes in which organic life expresses itself, now the one and now the other being more in evidence. Con¬ scious processes are thought of as present whenever novel situations are to be dealt with and the fundamental business of consciousness is conceived to be that of building up efficient habits, or co-ordinations, to meet the necessities of these situations. The purely physical or physiological processes . are on the other hand regarded as finding their peculiar sphere of ac¬ tion wherever old and well-formed habits are capable of meeting the requirements of the tem¬ porary environment. From this point of view mind and body are not so much two distinct entities as they are stages or aspects of the gen¬ eral process of vital accommodation to environ¬ ment.

These three conceptions of functional psy¬ chology which have been described are obvi¬ ously supplementary to one another. It is clearly impracticable to carry out a functional psychology which should deal with the problem of mind conceived as engaged in mediating be¬ tween the environment and the needs of the

organism without having some doctrine to offer concerning the connection of the mind and the body, for by common agreement consciousness makes itself effective through the muscular movements to which it leads. Some notion, therefore., of this connection must be involved. Moreover, it is equally certain that no effort to handle either of these problems can go far with¬ out some theory as to the basal character of the various mental operations themselves. The three positions must accordingly be regarded as complementary to one another. Their apparent divergence arises chiefly from emphasizing dif¬ ferent aspects of a common problem.

The term functionalism, as has been already intimated, is less frequent in philosophy than in psychology. When used, however, it is gener¬ ally employed as substantially identical with such terms as

pragmatism and humanism. It does not represent a definite group of opinions and beliefs, but rather a certain attitude toward philosophical problems. This attitude, may be illustrated by the comments in an earlier para¬ graph upon functional psychology conceived as concerned with the mind-body problem. In general, philosophical functionalism undertakes to discern the exact circumstances out of which the various problems of philosophy have grown, not only in the historical sense in which these problems are connected with the systems of particular movements or philosophers, but in the much more genetic sense in which they may be shown to come to light in the reflective processes of any human being. In a way, there¬ fore, it might be designated a genetic philos¬ ophy.

In its purposes at least a philosophy of this kind is peculiarly vital, for it attempts to see the practical living significance of philosophical problems and it finds its solutions in the actual outcome in human life of the multifold factors with which metaphysical speculation finds itself confronted.

Bibliography. — Angell, (The Province of Functional Psychology) (Psychological Review, 1907, p. 61) ; (The Relation of Structural and Functional Psychology to Philosophy) (Philo¬ sophical Review, 1903, p. 203) ; Titchener, (The Postulates of a Structural Psychology* (Phil¬ osophical Review, 1898, p. 449) ; Warren, (The Fundamental Functions of Consciousness> (Psy¬ chological Bulletin, 1906, p. 217) ; Bawden, functional View of the Relation between the Psychical and the PhysicaP (Philosophical Re¬ view, 1902, p. 474) ; James, foes Conscious¬ ness Exist?* (Journal of Philosophy, Psy¬ chology, and Scientific Methods, 1904, p. 477) ; Baldwin, J. M., fictionary of Philosophy.*

James Rowland Angell, President of Yale University.

FUNDAMENTAL CONSTITUTIONS.

See Colonial Government, Proprietary.

FUNDAMENTAL NOTE, TONE, or BASS. (1) The lowest or deepest tone that a string or pipe sounds in generating a series of harmonics. The fundamental note of a stretched string is sounded when the string vibrates as a whole. The fundamental note of an open organ-pipe is sounded when there is one node at the middle of the pipe. In a closed organ-pipe the closed end or stopper acts as the node when sounding the fundamental note.

(2) The fundamental note also signifies the root of a chord, irrespective of the inversions of the chord; thus in the common chord of C, C E G, C is the fundamental note and remains so in the inversions E G C, G C E, E and G being called the bass notes.

FUNDAMENTAL ORDERS OF CON¬ NECTICUT, a body of laws based on the Foundation Principles of Thomas Hooker (q.v.) and adopted in 1639 for the government of the Connecticut Commonwealth, settled by seceders from Massachusetts, who were dissatisfied with the latter's autocratic government. Although the preamble presumed the union of church and State, a distinctive feature was the absence of a religious test for citizenship, while the au¬ thority and even the existence of a sovereign or proprietor were ignored. Otherwise there was no great divergence from the legislation con¬ trolling Massachusetts. The governing au¬ thority was vested in the presiding officer of a court of magistrates and town deputies, elected at a court session by the town freemen. There was no separation of the executive, legislative and judicial functions. The general court in 1659 imposed a property qualification of $150 for suffrage. Some authorities state that this was the first written constitution known to history that created a government, and it con¬ tinued in existence without material alteration for nearly two centuries. Consult Fiske, J., beginnings of New England ((pp. 127-128; Boston 1889) ; Rines, I. E., (The United States) (Vol. I, pp. 263-269; New York 1916).

FUNDAMENTALS, or BODY OF LIB¬ ERTIES, a colonial collection of laws pre¬ pared in 1641 by a convention of New England freemen who resented the arbitrary, undefined powers and prerogatives of the magistrates. A preliminary draft prepared by the council was first submitted to the local magistrates and elders, and was then sent broadcast to the free¬ men for consideration, suggestion and improve¬ ment. After considerable revision, about 100 laws were formally adopted, with the provision that after three years' trial they were to be re¬ vised and then become finally established. Church members were vested with the supreme power, but the supreme council possessed the power of veto. Every citizen was granted a certain share in the business of any public meeting, although universal suffrage was not conceded. The liberties of women, children and servants were defined in a more benovelent spirit, in harmony with the Mosaic code. A certain degree of liberty was granted to private churches and assemblies of different Christians, but the council had power to suppress arbi¬ trarily any proceedings which they deemed dan¬ gerous or heterodox and to punish or expel their authors. Strangers and refugees who pro¬ fessed the true Christian religion were to be received and sheltered. Injurious monopolies were not to

be allowed. Slavery, villainage or captivity was abolished, except in the case of lawful captives taken in war, or any case where slaves might be sold by others or should sell themselves. All torture was abolished, except whipping, ear-cropping and the pillory which were retained as necessary and wholesome, but death was the punishment for idolatry, witch¬ craft and blasphemy, or for the wilful dis-

tuning of the established order of the State. Consult Palfrey, J . G., (History of New Eng- land> (Vol. I, pp. 229-282; 4 vols. 1873).

FUNDED DEBT. See Debt, National.

i /1\UI4DI, or FUNDUNGI, a kind of grain

obtained tiom a grass, Paspalum exile, allied to the millets, which is cultivated to a considerable extent in the western part of Africa. It is \vholesome and nutritious and is much used by the natives of western Africa as a food.

FUNDING, in finance, the conversion of noating debt into an interest-bearing obligation with a definite period, on which bonds can be issued. One such operation is of special interest in United States history, as part of the opera¬ tions by which Hamilton, as leader of the Fed¬ eralists (q.v), and then secretary of the treas¬ ury, succeeded in setting the government on a firm foundation. The Act of 4 Aug. 1790 founded not only the foreign and domestic debt in full, but the State debts incurred in carrying on the Revolutionary War; the bonds were at 6 per cent, but those for the domestic debt did not bear interest till 1800.

FUNDS, Public. See Debts, Public.

FUNDY, Bay of, a huge arm of the At¬ lantic Ocean extending into the land between New Brunswick and Nova Scotia, and the State of Maine, and terminating in two smaller bays, Chignecto Bay and the Basin of Minas. Its length up to Chignecto Bay is 140 miles, and its extreme breadth 45 miles. It is noted for its high tides, which are influenced by the Gulf Stream, and rise about 30 feet at Saint John and 60 feet at the head of Chignecto Bay, rush¬ ing into the latter with remarkable force. At Bay Verte, 14 miles distant, the tide rises little more than four or five feet. Along its northwest side the Bay of Fundy receives the Saint John, the largest river in New Brunswick,

and also the Saint Croix. The tides in the Fundy are perilous to navigation and produce dangerous bores, especially in the upper reaches of the Bay. At low tide there is a long expanse of mud flats, at times over two miles in length, and the inreaching estuaries are completely drained. At the entrance to the Bay of Fundy are the Grand Manan and other islands. See Tides.

FUNEN, Denmark, an island of the Danish archipelago, separated from Jutland by the strait called Little Belt; area 1,133 square miles; pop. about 252,288. Its shores are deeply in¬ dented ; its interior is undulating, and there are numerous lakes, streams and marshes. The largest stream is the Odense, 36 miles long. The soil is extraordinarily fertile and well watered. Grain is produced and considerable amounts are exported. Stock farming is also extensively carried on. It trades principally with Sweden and Norway. It forms with other islands a province of Denmark (q.v.). Chief towns : Odense, Svendborg and Nyborg.

FUNERAL RITES, the last religious and ceremonial tribute of friendship and love paid to the remains of the dead. Funeral rites have developed from the belief that the dead are not really dead and the desire to propitiate or alleviate the departed spirit. Among the Hindus the corpse is perfumed and adorned with flowers; it is then burned; after many cere¬ monies the bones are deposited in a casket and buried, but afterward disinterred and thrown

into the Ganges. A second series of obsequies commences after the period of mourning has expired, and this is followed by commemorative rˆeS‘ voluntary immolation (suttee) of

the widow of the deceased, now abolished, was F1?8* remarkable part of the ceremony. 1 he Mohammedans bury their dead. The in¬ terment takes place as soon as possible, in ,len

Make haste to bury the dead, that, if he have done well, he may go forthwith into blessedness ; if evil, into hell-fire.ˆ No signs of excessive grief, . no tears nor lamentations, are allowed, as it is the duty of a good Mussulman to ac¬ quiesce without a murmur in the will of God On arriving at the burial place the body is com¬ mitted to the earth with the face turned toward Mecca. Monuments are forbidden by the law, but they are constantly erected. The Egyp¬ tians embalmed their dead. Among the Jews the next of kin closed the eyes of the deceased ; the corpse was then washed, and, in the case of persons of some consequence at any rate, laid for a time in spices or anointed with spices, swathed in linen bandages, and deposited in the tomb. The

mourning customs of the Jews may be collected from various passages of the Scriptures. They went bareheaded and bare¬ foot, covered their mouths and kept silence, put on sackcloth, and sat in ashes ; funeral songs were sung by persons hired for the purpose; splendid monuments were sometimes hewn out of the solid rock, with numerous niches; as each niche was filled, its entrance was stopped up by a large stone rolled against it. In the re¬ ligious creed of the Greeks and Romans sepul¬ ture was an act of piety to the dead; without it the spirit had to wander 100 years on the banks of the gloomy Styx. The last breath was generally caught by a near relative, who opened his mouth to receive it ; the body was washed and crowned with flowers, a cake of flour and honey placed in the hand, as a bribe for Cer¬ berus, and an obolus in the mouth, as a fee for Charon. Interment and burning were practised indifferently. In interment the body was placed with the face upward and the head to¬ ward the west. In burning the pile varied in form and material ; it was lighted by the nearest relative; perfumes and wine were poured on it, and the richest clothes of the dead were burned with him. The ashes were then collected and deposited in an urn. This description relates to both Greeks and Romans, whose rites were nearly identical.

In the Roman Catholic Church the body is washed immediately after death, a crucifix is placed in the hands, and a vessel of holy-water at the feet, with which the visitants sprinkle it. The Ritual prescribes that the corpse be borne in procession from the house in which it lies to the church, attended by the parish priest with acolytes and servitors all in cassock and sur¬ plice, and one of them bearing the processional cross in the van. Before the procession moves, the priest first sprinkles the coffin with holy- water and recites the De profundis and the Miserere while the procession is in movement. Taken into the church, the coffin is laid on trestles in the middle of the nave, the feet to the east or the sanctuary, if the deceased was a layman, the head to the sanctuary if he was a priest; lighted candles surround the coffin. Then follows the Office for the Dead, and after

that the Mass for the Dead. After the Mass the priest, attended by the acolytes, pronounces the Absolution and certain prayers, meanwhile sprinkling the coffin with holy-water and fumi¬ gating it with frankincense. The procession is now re-formed and the body borne to the place of burial. There the Benedictus is sung or re¬ cited, followed by an Antiphon, Ego sum resur- rectio et vita (I am the resurrection

and the life) ; the corpse is again sprinkled, a final prayer is pronounced, and the body is laid in the grave or tomb. In the funerals of chil¬ dren, the vestments of the clergy are white in¬ stead of black, joyous psalms are chanted or recited, there are antiphons of praise and thanksgiving instead of petitions for mercy and forgiveness; and the church bell is not tolled.

In the Greek Church there are distinct serv¬ ices for laymen, monks and priests severally. The officiant holds a short service at the house of the defunct ; service is held at the church, to which the body has been brought, and then at the grave, where the priest takes a shovel and sprinkles dust cross-wise on the body. Finally, before the grave is closed, he casts wax or ashes from his censer upon the coffin.

The English Church, followed very closely by the Protestant Episcopal Church in the United States, uses the order for the Burial of the Dead in the Book of Common Prayer. It is a stately and somewhat elaborate service, which is frequently used in part by other Prot¬ estant bodies. The first section of the service is recited in church, to which the body has been brought, or at the house of the defunct. It consists of anthem, psalms and a lesson. The second section, sometimes called the committal, is recited at the grave, where dust is scattered on the coffin as it has been lowered. Consult Yarrow, H. C., introduction to the Study of Mortuary Customs among the North American Indians> (Washington 1880) ; Jevons, F. B.., introduction to the History of Religion> (Lon¬ don 1896) ; Frazer, J. G., (The Golden Bough) (ib. 1900) ; Tylor, E. B., (Primitive Culture) (ib. 1903).

FUNFKIRCHEN, or PfiCS, Hungary, capital of the county of Baranya, 110 miles southwest of Budapest. The name is derived from five Turkish mosques, three of which are now in ruins and two in use as churches. There is a fine 12th century cathedral in Romanesque style. It contains a gymnasium, seminary, mili¬ tary school, vocational school, a library and museum. Church organs, leather, cloth and pottery are manufactured and there is a brisk trade in coal, wine, fruit and tobacco. From 1543 to 1686 the town was in the hands of the Turks. It is probably the Roman Colonia Serbinum. Pop. 50,000.

FUNG-HUANG, the Chinese phoenix, re¬ garded as a harbinger of prosperity; also as an emblem of good luck. For the mythological lore concerning it, Consult Griffis, (China's Story in Myth, Legend, Art and Annals1* (New York 1911) ; Macgowan, ˆChinese Folk Lore Tales) (London 1910) ; Mayers, (Chinese Reader's Manual) (Shanghai 1875).

FUNGI, fun'ji (singular Fungus, Latin name for mushroom), the

general name ap¬ plied to a multitude of lower plants of quite diverse structure, but which agree in not con¬ taining chlorophyll, the green coloring matter

of the vegetable kingdom. Formerly the fungi were regarded as constituting a natural group (class or order), but are now . recognized by modern botanists as belonging to many natural groups of plants.

The peculiarities of fungi are physiological ; they result from their food habits, and are not primarily structural and of profound signifi¬ cance. When we enumerate the physiological changes involved in the change of a plant from an independent life to one of parasitism or saprophytism, we have considered all of the essential differences between the fungi and the green plants from which they have been de¬ rived. We may say then, that a fungus is a lower plant which has suffered certain physio¬ logical changes on account of the fact that it has become parasitic or saprophytic.

Before going farther it is necessary to de¬ fine certain terms which must be used in any discussion of the fungi. A plant is a parasite when it lives upon or in another living plant, absorbing food from it, and living at its ex¬ pense. The mere fact of growing upon an¬ other plant does not make the first parasitic, for there are many small plants which merely find lodgment upon larger species, not, how¬ ever, absorbing anything from the plants on which they are lodged. When it is necessary to distinguish such plants, they are called epi¬ phytes. In the case of parasites the plant or animal upon which they live is spoken of as the host. When a plant lives upon an organism which is no longer living or upon its products it is called a saprophyte. Thus the toadstools which grow so freely on manure and other de¬ caying vegetable matter are saprophytes. It is sometimes necessary to have a term to apply to plants which are neither parasitic nor sapro¬ phytic, and then we use the word holophyte. Thus all common green plants are holophytes. When it is desired to contrast holophytes with both parasites and saprophytes, we can use the term hysterophyte for the parasitic and sapro¬ phytic plants.

Applying the terms we have now defined, we may say that all fungi are hysterophytes, some living parasitically upon their hosts, others liv¬ ing saprophytically.

All holophytes are green in color, although in many this is concealed by other pigments and the significance of this is purely physiolog¬ ical. Green plants absorb the gas carbon di¬ oxide, and in green cells this is combined with some of the elements in the ever-present mois¬

ture of the plant into a chemical compound allied to starch and sugar, and characterized by consisting of nearly equal amounts of carbon and oxygen, combined with nearly double the amount of hydrogen.

Such compounds are known as carbohydrates and they are made by all holophytes, and then used in the processes of assimilation and growth. It has been demonstrated that plants which are not green cannot make the carbo¬ hydrates, and since all plants need these com¬ pounds for building up their tissues, it follows that colorless plants must obtain them by tak¬ ing them from living or dead green plants Last, it should be borne in mind that even green plants cannot make the carbohydrates in darkness. For this work they need light and in fact the greatest importance of light to a plant is in connection with this process of making

EDIBLE FUNGI

G

>

G

73

.2

fH

/*“N

*£

G

C/3

G

G

Gh

P >

Jh

G

r2

o

73

U

a

73

O

c/3

rl

G

C/3

4-»

G

be

a;

rj

o

G

3

G

pq

<-w

Jh

‘w ‘

c/3

G

rG

Jh

G

G

O

u

H

‘w’

be

G

d

£

•— > *-tH

jd

E

i >

d

13

G

Jh

o

4- >

be

“H.

E

M

Xt

c

u

o

E.£

O Jh

o ■*-» jh S G w

tS a

3 s

n g

cfl

. > bo

r-» w

U

^ VO 0\ N

t/3

.5

’C

03 O

4* rG G

3

o

C/3

u

V

ˆ n

2 £

G

C/3

J3

3

Jh _» 03

J3 t3

. — I H- >

(U g

rG

o

Jh

o

s

Jh

/*“N G G CJ

a

c/3

c/3

G

-*-»

03

3

pq

o

PQ

S c

U

-M

rG

C/3

G

13

Jh

o

pq

S

73

o

-4-»

I/)

G

be

G

G

d

Jh

43

G

CJ

2

Ph

o

pq

73

s

rG

be

G

O

«

CN to 00

S

G

c/3

.2

/•“N

G

H-»

3 S 73 jE a 3

o

G

3 S

u

& g

73

3

o

u &

.2

c/3

V

S «

*C

G

3 .3

G

d • — «

■4— >

o

r H

”3 &

G

a;

4_»

P

K 3

S— ✓

13

v_/ O

3 H, W

Jh

G

■4-*

u

G

P

V)

G

O

V

P

c/3

G

be

G

G

P

a;

S > s

o

o

Sh

J3

t/J

3

73 73

3 kh — •

MEPh

r-l Tf t >. O

-

FUNGI

cai bohydrates. Accordingly plants which are not green, and which as a consequence do not make carbohydrates, often grow in darkness or in teeble light. This is quite characteristic of the fungi, great numbers of which grow as well in darkness as in light, or in some cases grow even much better in the darkness than they do in the light.

The fungi are very numerous, some recent estimates placing the number of species as high as 250,000, of which not more than one-third have as yet been described. They occur wher¬ ever there is organic matter of any kind upon which they can subsist. Wherever there are living plants or animals there are fungi which obtain food either from the living cells of their hosts, or the dead and cast-off cells and tissues. Some species occur in the lower layers of the air, in all exposed waters and in the soil. They are the most numerous of living things when we consider individuals alone. They range in size from extremely small to many centimeters in length. The smallest are far too minute to be seen by the naked eye, some being visible only by the aid of the most powerful micro¬ scopes. Of some of the smallest species it would require 25,000 to 30,000 placed side by side to measure one inch. On the other hand there are toadstools a foot or so in height and diameter, and puff-balls two to three feet in diameter have been recorded.

The fungi as thus described are found in four of the grand divisions (phyla) of the vegetable kingdom.

Phylum, Myxophyceae. The Slime Algae.

— Here are gathered a thousand or so species of microscopic aquatic plants in which the cells have a very low organization. No distinct nucleus is present, and the coloring matter in the typical plants pervades the whole cell, and is of a bluish or brownish-green color instead of a bright green as in higher plants. They re¬ produce by simple fission, and by the produc¬ tion of spores. There is no hint of any sexual reproductive process. They occur in ponds, pools and streams, to which they give a green¬ ish color by their great numbers. In decaying they usually give off a fetid odor.

While the typical Slime Algae are greenish — and are known as green slimes- — many have become parasitic or saprophytic, and have lost their green color. These colorless species are known as Bacteria, and are the lowest of the fungi.

Bacteria (Fig. 1) are then to be regarded as colorless green slimes, their lack of color

A B 0 0

Fig. 1. — Bacteria. A, Streptococcus pyogenes; B, Micro¬ coccus tetragenus; C D, Sarcina lutea. All highly mag¬ nified.

being due to their parasitic or saprophytic habits. Some species are minute rounded cells of remarkable minuteness. To these the generic name Micrococcus has been given, and many species have been recognized by botanists. Other genera with spherical cells are Strepto¬

coccus, Staphylococcus, Sarcina, etc. Other bacteria consist of cylindrical cells which tend to adhere end to end in filaments or rods. In the genera Bacillus and Bacterium the rods are straight or little curved, and short or of mod¬ erate length, while in V ibrio and Spirillum the rods are more or less spirally curved. In still other genera, as Crenothrix , Leptothrix , etc., the rods are elongated. The study of Bacteria

in relation to diseases of man and other ani¬ mals and of plants, and to soils, etc., has de¬ veloped into the science of Bacteriology (q.v.). Many botanists now, on that account, do not include Bacteria among the Fungi. See Bac¬ teria.

Phylum Chlorophyceae and Phylum Si- phonophycese.— These plants, of which there are probably nearly 2,500 species, may very properly be called sea-weeds, since they are typically aquatic, living in the salt and fresh waters of the earth. Typically they are bright green, and the cells of which they are com¬ posed have well-formed nuclei. However, the chlorophyll is confined to definite portions of the protoplasm, and is not diffused throughout the cell. Some of the lower species are spher¬ ical, rounded cells, but for the most part they consist of filaments of cylindrical cells, or in some_ instances they are masses of cells con¬ stituting leafy-stemmed plants. They repro¬ duce by fission as in the Slime Algae, but in addition all, or nearly all, Slime Algae repro¬ duce sexually also. In the simplest cases of sexuality, two equal and similar cells detached from older plants fuse into a new and larger cell, and then this new cell grows into a new plant. Sometimes the new cell becomes covered with a thick wall, and for a time ceases activity as a ((resting spore, before it develops into a new plant.

While most of the plants of these two phyla are green plants, several hundred species have become parasitic or saprophytic in habit (Figs. 2

to 10) and have therefore lost their color, and become fungi. Among these are the following families, namely :

Gall Fungi (Synchytriacece) are beyond reasonable doubt to be regarded as hystero- phytic forms of the one-celled class (class Protococcoidece) of the first of these two phyla. These fungi consist of single cells which enter the cells of their living host plants and there enlarge, feeding on the host cells and causing an irritation of the tissues which often causes swellings which may be minute or in some cases very large (e.g., wart disease of potato tubers caused by Synchytrium endobioticum) . The fungus cell eventually breaks up internally into numerous minute zoospores which escape

in various ways and infect new host cells. (Fig. 2). The family Chytridiaceco (Fig. 3) which are mostly parasitic in aquatic algae and fungi are probably closely related to these or to the next forms.

Water Molds (Saprolegniacece) which are minute filamentous, colorless plants living in the water on living and dead plants and ani¬ mals. (Fig. 4). Each plant is a more or less branched thread, some portion of which pene¬ trates the host and thus obtains food, while the other part is external and bears the repro¬ ductive organs. The filaments are cylindrical, and are peculiar in having no cross partitions in the vegetative portions. They are to be re¬ garded as composed of many cells which have

Fig. 3. — Rhizidiomyces apophysatus, another of the lower fungi (Chytridiacea); the root-like organs are parasitic in a cell of a water mold. Highly magnified.

Fig. 4.— Saprolegnia thureti; A, fly with reproductive fila¬ ments; B, end of a filament forming zoospores. C, zoospores escaping. A, natural size; B and C, highly magnified.

not separated themselves by partitions. The nuclei are numerous, and very small.

The more common mode of reproduction is as follows : A terminal portion of a branch forms a partition at some distance from the extremity and the protoplasm in this segment becomes denser, and a little later divides into a great number of small cells, each of which re¬ mains naked (that is, no cell wall is formed around it), and soon

escapes by a rupture of the end of the segment. (Fig. 4). These escaped cells are known as zoospores, since they have a very active swimming motion, very like that of some of the lower microscopic, animals. The similarity to the lower animals is shown still more by the identity in their locomotive organs, which consists of one or two slender

protoplasmic whips (flagella) by whose rapid lashing the zoospores are propelled. After a short period of activity they come to rest, when they cover themselves with a cell wall, and begin to elongate into a filament like that of the

Fig. 5. — Achlya racemosa, showing antherids and oogones.

Highly magnified.

plant from which they came. Reproduction by means of zoospores is very rapid, since they are formed in such great numbers when conditions are favorable.

The sexual organs, which are rather rarely formed, consist first of an enlarged and rounded end segment in which the protoplasm is quite dense. From the sides of the branch below the end segment (or from elsewhere on the body of the plant) slender branches grow up and in turn their ends become cut off by cross partitions. (Fig. 5). The first end segments (the rounded ones) are oogones, or in plainer words they are egg-organs, and in them one or more eggs are produced. The second seg¬ ments (slender) are male organs called an¬ therids, and the protoplasm they contain has the function of the spermatozoids of many plants (and animals). At the proper time the an¬ therids puncture the egg-organs, and by the in¬ flow of the contents of the former the eggs are fertilized. Later these eggs may germinate and produce new plants like those on which they were borne.

Downy Mildews (Peronosporacea) are much like the water molds, but instead of be¬ ing aquatic, they live in the tissues of land plants. Like the water molds they are com¬ posed of branching, non-septate filaments. The main body of the plant usually grows in the intercellular spaces of the host, where there is nearly as much moisture as under aquatic con¬ ditions. In a few species, however, including the organism of the Late Blight of the potato (Phytophthora infestans), the filaments grow directly through the cells of the host, killing them in advance by a poisonous secretion sent out by the fungus. (Fig. 6). From this inter –

Fig. 6. — Portion of a filament of Albugo Candida, witli its haustoria

penetrating host cells. Highly magnified.

nal part of the fungus short branches grow out into the air, and these become swollen ter¬ minally into rounded segments, which are in fact short zoosporangia. Instead of forming zoospores at once, they first fall off and then

those that fall into water develop zoospores, much as in the water molds. As these struc¬ tures are very minute, a droplet on a leaf is large enough for the germination of hundreds of the detached zoosporangia. Here again, the zoospores, after coming to rest, develop into new plants, which at once penetrate the host. In some species the zoosporangia grow at once into a filament, without forming zoospores.

The sexual organs of downy mildews are much like those of water molds, the differ¬ ences being quite immaterial for the present discussion. (Fig. 7).

It is evident from a comparison of the struc¬ ture and reproductive organs of water molds and downy mildews, that the latter are derived from the former. Just as the water molds have been derived from the green plants of the Green Felt family (Vaucheriacea ?) by the adop¬ tion of parasitic and saprophytic habits, so by the change from strictly aquatic conditions to those found in the intercellular spaces of land plants, water molds have been changed to downy mildews. Every difference between the two families may be accounted for by this dif¬ ference in the environment of the plants.

Black Molds (Mucoracece) show an addi¬ tional modification of the water mold type. They are non-aquatic, mostly saprophytes, a few only being parasites. They live for the most part on dead organic matter, animal or vege¬ table, which is still moist, and but few species can live in the water. The commonest species live on the starchy and sugary substances in pantries, cellars and other places where these substances are found in the presence of suffi¬ cient moisture. Organic substances which are dry are not attacked by black molds.

Each black mold plant is a branching tubu¬ lar filament, which has few cross partitions. One part of the plant usually grows in the sub¬ stance of the organic matter, and another grows

Fig. 7 Fig. 8

Fig. 7. — PeronosPora alsinearum, showing antherid pene¬ trating the egg-cell. Highly magnified.

Fig. 8. — Mucor stolonifer. Highly magnified.

upward into the air. (Fig. 8). The former ab¬ sorbs food matter, while the latter bears re¬ productive organs, as in the water molds. The ends of the aerial branches enlarge as in the two preceding families, but instead of forming zoospores, the protoplasm in the terminal seg¬ ments forms many small spores, each covered with a cell wall. These spores are the homo- logues of the zoospores in previous families, but as the plants are not aquatic, these zoo¬

spores have ceased to be aquatic also. With a good cell wall to protect their protoplasm, they may be blown about in the air without drying up. It is in this way, in fact, that black molds are propagated, the air currents carrying the spores sometimes for long distances, and when they fall upon organic matter under

Fig. 9. — Mucor fusiger; A, young sexual organs; B, after fertilization. Highly magnified.

favorable conditions they quickly give rise to a new crop of mold plants. On the filaments which penetrate the nutrient substance, or grow over its surface, are to be found (rarely, how¬ ever, in the common species) sexual organs somewhat resembling those of the two preced¬ ing families. (Fig. 9).

Insect Fungi (Entomoplithoracecp) are somewhat similar to black molds, but are parasitic in the body tissues of insects, and ac¬ cordingly show considerable structural modi¬ fications. (Fig. 10). ‘

Phylum Carpomyceteae. The Higher Fungi. — This immense phylum, containing over 60,000 recognized species and probably twice as many, if not more, not yet studied, seems to have arisen from chlorophyll-bearing plants of the phylum Rhodophyceae, the Red Sea¬ weeds. These are mostly marine, although many fresh-water species are known. They re¬ produce sexually by the union of a non-motile sperm with the elongation of the oogone, termed trichogyne. The male nucleus passes down this to the egg nucleus with which it unites. The fusion nucleus thus produced di¬ vides very freely and the daughter nuclei pass out into many branching threads whose ter¬ minal cells (carpospores) are the reproductive cells of the plant. The whole structure of oogone, branching threads and carpospores is a <(spore-fruit® and may or may not be sur¬ rounded by a protective structure

of vegetative cells. In the Higher Fungi we find similarly a spore-fruit arising as a result of the sexual process. The ultimate cells are of three kinds, depending upon which one of the three classes is under consideration. (See Vegetable King¬ dom and Plants, Morphological Evolution of) . These classes are the Ascomyceteae, Basidiomy- ceteae and Teliosporeae. Beside these there is a large group of fungi, certainly belonging to this phylum but which in the lack of knowledge as to their sexual reproduction cannot with certainty be assigned to any one of these classes. These are the Imperfect Fungi. All the plants of this phylum possess branching threads with numerous cross walls (septa) and usually one or two nuclei to a cell. Asexually they pro¬ duce by conidia, cells cut off from the ends of

unmodified or specially modified threads. The cells so produced possess walls and are dis¬ tributed by the wind, rain, insects, etc.

Sac Fungi (class Ascomycetea).— The distinguishing mark of the plants of this class

Fig- tt1.0:T_ Empusa musca; filaments from body of fly. Highly magnified.

FlG‘ } 1 T A> several spore-sacs (asci) in different stages of development; B, a mature spore-sac. Highly magnified.

is that the spores which occur in their fruits de- velop in certain end cells and remain enclosed within the cell wall until matured. (Fig. 11). These spore-containing cells have been aptly likened to sacs (Latin asci’ singular, ascus) and from this we derive the name of the class.

There are more species of sac fungi than of all other kinds. Their fruits range in size from very minute to many inches in extent. They include some of the most harmfully parasitic plants as well as many which live saprophy- tically upon refuse organic matter. Among the many families (more than 100) in this class, the following may be noticed:

.Fig. 12. — Sexual organs of Erysiphe and formation of fruit.

.Highly magnified.

Powdery Mildews (Erysiphacea ?) are the ■cause of many serious diseases of wild and cultivated plants ; e.g., rose, apple, cherry,

goose¬ berry. ash, etc. The plant body consists of branching filaments which creep over the sur¬

faces of their hosts, from which they obtain food by means of root-like absorbing organs, which penetrate the host cells. Certain branches form spores by the simple process of separating their terminal cells in succession and this is done so abundantly that the spores form pow¬ dery masses on the surface of the hosts. These spores float away on wind currents, and those that germinate on similar hosts give rise to new plants.

The sexual organs (egg-cells and antherids) occur on the creeping filaments, and are short lateral branches, the former somewhat thicker than the slender antherids. (Fig. 12). The two come in contact with each other, and the protoplasmic contents of the antherid pass into the egg-cell fertilizing it. As a result the egg- cell sends out one or more branches, the end cells of which develop into asci , while from below the egg-cell there grows up a cellular, globular covering, constituting the outer wall of the fruit, and enclosing the asci. The spores in the asci, when set free by the rupture of fruit and ascus walls, germinate and on similar hosts give rise to new plants. These fruits are usually blackish and may be seen by the naked eye as globular bodies on the mass of filaments (Fig. 13).

Truffles (Tuberacece) are eagerly sought for as table delicacies, their large subterranean frrnts bemg highly favored by epicures. Their life history is not well known. They are sap¬ rophytic, living on the decaying organic matter in me soil in forests. Little is known as to their early life, and the formation of their non-sexual spores, but these are thought to be somewhat like those of the powdery mildews.

Fig. 13.— Mature fruit of powdery mildew, with escaping spore-sac. Highly magnified.

Their fruits are formed under ground. The sexual organs, which possibly precede the de¬ velopment of the fruits, have not yet been dis¬ covered. The fruits of the common truffles of Europe are from one to two inches in diameter and warty and dark colored externally. (Fig! 14). Internally they consist of a soft, whitish tissue, in which are numerous cavities, each containing several asci. Practically nothing is known as to their propagation. A few little known species occur in America, but in Europe they are common. See Truffle.

i ˆ (Sphceriacece and numerous

related families) are typically parasites which grow in the tissues of higher plants, and whose smafl black fruits are formed on the surface of the host. Here again we are evidently . ealing with plants ..related to the powdery mil-

dews, but with an increased parasitism Thev are known to form non-sexual spores much as in the powdery mildews. Their fruits ˆlso re

probiblv re uktSf°f the ?owˆ ˆ

?a° the ‘ f 0m ,a fert.lization, but thus

ar the sexual organs have evaded discovery

princbutdlv W ‘° ‘he fore«oi”S differing LhvPn Lft, Possessing a bright color and

the Fami Iv • ‘ tructure Aare the members of F y Nectriacece. Asexual and sexual

Fig. 14

Jf’— Tniffly; fruit, natural size. riG. 15. Nectna\ ctnnabarina; A, bark with enlarged fruits-

B. spore-sacs. Highly magnified. ’

reproduction are similar to the same phenom- ena in the Sp handles. Several species of Nec- tna (Pig. 15) cause serious cankers on apple t \igs, etc. Ergot of grains (Spermcedia or

familyˆ S° be ongs in a cI°sely related

Cup Fungi (Pezizacea and related families) are typically saprophytes (Figs. 16 and 17) growing in the tissues of decaying plants, as rotten logs, sticks, etc. In these fungi the plant is filamentous and grows through the decaying tissues as slender white, branching threads Non-sexual spores resembling those of the pow¬ dery mildews are known for some species. Sex¬ ual organs consisting of a globular egg-cell and a slender anthenid are found on the creep¬ ing filaments. (Fig. 19). Fertilization takes

hm ˆb*g’ ˆ) are globular when young,

bulas tbey mature they open out into cup- ape structures (Fig. 17), in the concave sur-

FlG' r 7 ' Htimaria rutilans; A, three fruits, natuial size- B, vertical sections of fruits of different ages

face of which are found many asci (Fig. 18). It will readily be seen that were these cup- fruits to remain closed, their structure would be closely similar to that of the fruits of the powdery mildews or black fungi. However

s?drrfnh1ltS °f ˆ CU-P fURgi ˆ °ften °f con¬ siderable size,_ sometimes being as large as five

or six inches in diameter.

Lichens (see article Lichens) are now re¬ garded as nearly related to the cup fungi and black fungi. (Fig. 20). In the essential! they agree with those fungi, but they are usually treated separately because their parasitism on various small algae leads to the production of

Fig. 18

Fig. 19

Fig. 16. Diagrammatic vertical section of a cup fungus.

place as in powdery mildews, with a similar result the fruits, however, being at length cup¬ shaped instead of globular. In many species

F,°' th rM

FlG' magih ffedg~CellS antherids of a CUP fungus. Highly

peculiar vegetative structures, the study of which for a long time led botanists to neglect their evident relationship to fungi which were not parasitic on algae. There are several fam¬ ilies of the lichen-forming fungi, aggregating between 2,500 and 3,000 species. ˆ to

. Yeasts (Saccharomvcetacea) are here briefly referred to in order to call attention to the excessive degradation which they have suf¬ fered. Although they consist of single cells or

short chains, they are now regarded as greatly reduced sac fungi. They grow on sugars, starches and other carbohydrates, and one re¬ sult of their activity is the formation of alcohol,

while at the same time carbon dioxide is set free. It is for the alcohol that yeasts are used in breweries and distilleries, and it is for the escaping carbon dioxide gas that they are used in the making of bread. See Yeast.

Phylum Teliosporeae. — The fungi of this phylum consist entirely of parasites upon higher plants. They are often exceedingly destructive. The characteristic distinction from the preceding phylum is the formation of a thick-walled telio- spore. This is formed as the ultimate product of a sexual union. From this teliospore there arises sooner or later a short thread (Bromy – celinm) upon which are produced four (some¬ times more) small sporidia which give rise to the new fungus when they fall upon the right host. In this phylum we find parasitism brought to its highest development. The fungus has so adapted itself to the host that it continues to live within the host tissues for a long time without causing much inconvenience, only prov¬ ing destructive when it enters upon its fruiting stage. The two chief groups (orders) are the rusts and smuts.

Rusts (order Uredinales) are minute plants, parasitic in the tissues of higher plants. (Fig. 21). They consist of branching filaments which grow through and live upon the host tissues. Certain branches cluster together and form rows of spores by terminal abstriction, each row being initiated by a sexual union of the terminal

Fig. 21. — Puccinia caricis, a common rust on sedges.

or subterminal cells of two adjacent filaments. (ceciospores) (Fig. 22 A). The fungus arising from the germination of these spores forms at first large numbers of red or orange colored single terminal spores (urediniospores) (Fig. 22 B), and still later, the one- to several-celled thick-walled, usually dark colored teliospores. (Fig. 22 B). These all begin within the host tissues, but they eventually break through the epidermis into the air. Lastly, when the telio¬

spores germinate each produces a short fila¬ ment (promycelium) on which four minute spores (sporidia) develop. There are thus four kinds of spores in a typical rust plant, and these have been taken to characterize as many stages in the plant's life history, namely: (1) Cluster-cup stage (ceciospores) ; (2) Red Rust (urediniospores) ; (3) Black Rust (telio¬ spores) ; (4) Promycelium (sporidia). In many rusts

these stages occur on the same host in the order given, but in some the first stage occurs on one host, and the remaining stages on an¬ other. The latter is the case with the stem rust of wheat, in which the cluster-cups occur on barberry leaves, and the seciospores then ger¬ minate upon and infect the leaves of the wheat, on which the red rust, black rust and promy¬ celium then follow in succession.

Smuts (order Ustilaginales) are still more parasitic than the rusts, and as a consequence have suffered still greater degeneration (Fig. 23). They grow wholly within their hosts, and do not even bring their spores to the surface. They consist of branching filaments which pene¬ trate the tissues of their hosts, and at last form spores homologous with the teliospores of the rusts. The latter in germinating produce sporidia. Comparing the rusts with the smuts we note that while there are four stages in the

Fig. 22. — Puccinia graminis, a common rust of wheat. A, Cluster-cup stag on Barberry leaf; B, three uredini¬ ospores and one teliospore from a leaf of wheat. Magnified.

former, there are but two in the latter, the first and second having apparently disappeared.

Imperfect Fungi. — At this point should be mentioned the so-called imperfect fungi, an im-

TiTnnn aggregat'?n °* manY thousand species (16,000 or more) of which we know but one

stage (apparently the first) and so are unable to assign them to their proper place in the system. They are minute and mostly parasitic plants, occurring in the tissues of higher plants, and sendmg their spore-bearing branches out into the air. borne plants formerly placed here have been found to be early stages of certain sac .ngi (black fungi, or their relatives) and it is suspected that most, if not all, of them will eventually be so disposed. At present they are grouped under three general kinds, as follows :

Spot Fungi (Splicer opsidacece), which pro¬ duce whitish or discolored spots, and later de¬ velop closed, spheroidal cases, containing free spores. S eptoria and Phyllosticta are common genera.

Fig. 24. — Basidia in different stages of development; A, when very young; B, with the spore-branches beginning to form at the summit; C, showing the spore-branches with nearly mature spores at their ends. All highly magnified.

Black-dot Fungi (Melanconiaceoe) are like the spot fungi, but there are no spore cases, the spores developing in masses beneath the epidermis which they eventually rupture. Glccosporium is a common genus.

Molds (Moniliacece and related families) produce their spores on branches which grow out through the stomata of the host. Here we find the parasitic species of Ramularia Cer- cospora, e tc., and the mostly saprophytic species of Monilia, Botrytis, etc.

Basidium Fungi (class Basidiomyc decs') . — The distinguishing mark of this class is that the spores are produced externally upon club-shaped or rounded terminal cells. (Fig. 24). These club-shaped, spore-bearing cells are tech¬ nically known as basidia (singular, basidium), whence the scientific name of the class. The basidia of this class are regarded in this dis¬ cussion as the homologues of the spore-sacs (asci) of the preceding class.

About 14,000 species of fungi of this class are known. Many attain to considerable di¬ mensions, especially their fruits. They are typically saprophytic, but it is now known that many of them are more or less parasitic, also, when the opportunity offers.

About HO families are commonly recognized, OUp °ff k hˆh' °nly, will be noticed here.

.Putt-balls {Ly coper dace ce) are saprophytes whose branching filaments penetrate decaying

wood or earth rich in organic matter, and finally produce globular fruits which rise above the surface. (Fig. 25), These fruits are filled with tortuous canals whose walls are studded with basidia on which the spores are produced. At maturity the interior tissues of the fruits del¬ iquesce, setting free the spores, which escape into the air a little later as a dusty cloud, by the rupture of the fruit wall. From these spores new plants are produced, but we do not know the whole life history of these common fungi Although the sexual organs should pre¬ cede the formation of the fruits, they have not yet been observed.

Stink-horns (Phallacece) are closely related to the puff-balls, which they closely resemble in all stages excepting the last. Here the spore¬

bearing portion of the globular fruit is confined to a veitical, circular layer of tissue about mid¬ way between the centre and the circumference At maturity the spore-bearing tissues deliquesce and at the same time the tissues below rapidly elongate, bursting the fruit-wall and carrying up the spores into the air. (Fig. 26). These fruits have very bad odors, which attract insects, and it is thought that these help to distribute the

Fig. 26. — A, a stink-horn (Phallus impudicus) after the rupture of the volva; B, highly magnified section of the spore-bearing layer.

spores. Stink-horns are from an inch or two to six or more inches in height, and grow com¬ monly in lawns and pastures, where their presence is indicated by their intolerable odor.

Toadstools, or Mushrooms (Agaricaceae) are fungi of the puff-ball kind, consisting of white, branching filaments which creep through the nutriment substance or the host tissues.

Fig. 27. — Development of a toadstool (Amanita muscaria) shown in vertical section. A, very young stage; B and C, later stages; D, after the bursting of the volva.

Most species are saprophytes, but some are parasites. When the fruits are young they resemble those of puff-balls, but as they grow older a circular layer of spore-bearing tissue develops, and this, by the rapid growth of lower lying tissues, is carried up on a stalk, very much as is done in the stink-horns. (Fig. 27). Here, however, the stalk is formed earlier, and the spores are usually developed after the rupture of the fruit-wall.

A typical toadstool fruit has the following structure : There is first at the bottom the cup¬ shaped remnant of the original fruit-wall (technically, the volva) ; from this rises the cylindrical stem (stipe), terminating in an ex¬ panded cap (pileus). The stem and cap to¬ gether resemble an expanded umbrella, or a one-legged stool (Figs. 28 and 29), from which latter fact the common name ˆtoadstool® was doubtless suggested. The lower surface of the cap is folded into many vertical radiating plates, called gills (lamellae), and these are studded with the basidia, bearing the spores. This gill portion corresponds to the circular spore-bearing layer of the stink-horns, and the gills themselves are to be regarded as devices for increasing the number of

spores, by an en- enlargement of the surface studded with basidia.

While in typical toadstools the cap is rounded and centrally attached to the stem, in

Fig. 28. — Two fruits of Armillaria mellea attached to the filamentous plant; several young fruits at the left. Considerably reduced.

some species its growth is not uniform, and the stalk is excentric, or even lateral. Lastly, let h be remembered that the toadstool which we

see is not the plant itself (that is below the surface) but it is the fruit of the plant which develops in order that it may produce spores, Pore Fungi (Polyporacece) are so named because the spore-bearing structure on the under side of the cap of the fruit consists of a mass of small vertical pores, instead of plates, and by this character they may be readily recognized. In typical pore fungi the general structure and development are sinrlar to those of the toadstools, the change from gills to pores being the only important difference. Here, however, many of the species instead of grow¬ ing into regular umbrella-shaped fruits have the stalk more or less laterally placed. In others, again, the lateral stalk is very short, and from this the step is a very short one to its complete suppression, when the cap is sessile marginally, as in the bracket fungi, which are

Fig. 29. — Agaricus campeslris, the cultivated mushroom,

showing several stages of development.

so common on decaying logs and other forms of timber.

Some pore fungi are fleshy, but for the most part they are hard and tough, often resisting decay for many years. Some of the species are perennial, adding successive layers of pore tissue to their fruits for some years.

ECONOMIC RELATIONS OF FUNGI.

The economic relations of the fungi are of great importance. Some are edible and furnish wholesome food to man and other animals, some are used in the arts, some yield medicines, some are the cause of disease in man and other animals, and some again attack and destroy other plants, including many of the cultivated plants of our farms and gardens.

Edible Fungi. — Here perhaps we should include those bacteria which

have to do with the flavor of butter and cheese, and those molds whose presence in cheese adds to its edibility. Of far greater importance, however, are those species which are eaten for the nutriment which they contain. Truffles are collected in Europe, and sold in the markets. Dogs and pigs are trained to search for them, the attendant bagging the truffle when found by the keen scent of the animal. The Morels are sac fungi

POISONOUS FUNGI

-

S*s n *y f

■fim S

fr’ :*t

BSeT*. r 5Vz *J$Sm

M&gfV*,. – n *^5WB

wjj

jw,, “*k!2j

oT ” • ‘**2**.- “irs?ula2

U*;

rt ^

« s

3 o

rt

CO «

o 3 O TJ • !2 ‘£ > 3

J3

03

r-|

o3

u

3

“a

G

C/3

u

4-J

C/3

oJ

o

G

4-»

03

O

Pi

G

u

PQ

‘w’

o3

>»-✓

s

w

c r

G

4-*

G

C/3

C/3

<

G

U)

G

a;

G

a

G

o

«

3

u

Pti

PQ

_ ‘ G

fl 3 D 13 U -w « .2

O Q < j

^ ‘O C\ M

6

4-1

G

ctJ

u

G

o3

o3

s

Ih

X3

O

u

o

c/3

aJ

o3

c/3 u. 03 o3 G '_J 03 G

4-» O

03 *3

1/5 £

03

Vh

o3

03

40

S3

G

v

G

#g

15

c/3

"G

u

d

►n

G

■*-* ,

O 2! 2

rt o c gJ cq J2 o

•g H

2 §

G

43

a

ffi

u

03

4-!

2 S

tn .,

3 £

3

O G

C 4° 3

O 3 -5

(fl o3 &

‘3 3

Ph Ph C/3 C/3

oq io oo

c/3

G

o

03

G

oJ

u

G ^ 03 o3 o

w *n

G

}h

ctf

43

Vh

c 3

G [/) 03 Cfl

43 3

o cm

u O

be •«

r-j ■*”*

G

± * s

O W

C/3

3

a

£.3

O G

03 03

a o

cn

tn 5

3 6

03

a ”3

r°? c/3

U 3 w «

o .t; pq g

o3

6

1,5 * < <

3 <

03

O fa pq o

U

r&

C/3

vG 3

4i §

o

43 GP

H Pg

Tt- ˆ O

FUNGICIDES

173

related closely to the cup fungi ; each Morel (truit) is a hollow-stalked body two to five inches high, with a crinkled and pitted conical cap in a\ hose surface are embedded the spore- sacs. They grow in fields and in thickets, and WiiCIj ‘ 1 esfl are wholesome. Morels are often called mushrooms, although this name should be restricted to the next group.

Mushrooms (Fig. 29) are of the toadstool Kind and popularly but incorrectly any species which is edible is called a mushroom, while those which are poisonous are called toad¬ stools. Many species are collected from the torests and fields by experts who have learned to distinguish them from the poisonous ones, but by far the most commonly used species is the common mushroom (Agaricus compestris) which is cultivated by gardeners for this pur¬ pose. See Mushrooms.

Poisonous Fungi.— Although the vast ma¬ jority of the toadstools and other fleshy fruited fungi are edible or innocuous there are a num¬ ber that are extremely poisonous and many others that, while not deadly, yet are likely to cause gi eat discomfort or nausea. The most dangerous are the Death-cup (Amanita phal- loides) and the Fly Mushroom (Amanita muscaria) . The Emetic Russula (Russula eme- {ica) is a common fungus that is poisonous, but its emetic nature prevents any serious in¬ jury. The occurrence of poisonous species of mushrooms makes great caution necessary on the part of those who otherwise would have in the great supply of mushrooms in the late sum¬ mer and fall a source of food to be had for the picking. The only safe rule is to avoid any mushroom unless it is known to be harmless.

Medicinal Fungi. — The most important species is the Ergot (

Spermoedia clavus), one of the sac fungi, which is parasitic in the heads of rye.

Pathogenic Fungi (on Animals). — Many bacteria are the direct cause of diseases of ani¬ mals, including man. See Bacteria.

Some of the water molds cause a serious disease of fishes, especially of young fishes in “hatcheries.® Occasionally an epidemic, known as the. “Salmon Disease,® has been known to occur in the streams of Great Britain. Investi¬ gation has shown it to be due to a certain species of water mold.

The insect fungi (Entomophtlioracece) annu¬ ally destroy immense numbers of flies, locusts, caterpillar larvae, etc. The common house fly is attacked by Entomo phthova muscce in sum¬ mer and autumn. Every infected insect fastens itself by means of its tongue- to some object, and soon perishes miserably, its body walls being pierced by innumerable spore-bearing branches. In the autumn myriads of locusts (“grasshoppers®) are destroyed by Entomo ph- thora grylli. When attacked by the fungus the locust climbs a grass or weed stem around which it finally clasps its legs and dies firmly attached. Many other insects, including mos¬ quitoes, are destroyed by these beneficial fungi. Thus far all attempts to artificially apply these fungi in combating insects have been unsuccess¬ ful.

Several species of Aspergillus and other genera bring about a serious disease of the ear passages in man.

Pathogenic Fungi (on Plants) See

Plants, Diseases of. See also Vegetable Kingdom.

T Charles E. Bessey,

lro[essor °f Botany, The University of

Nebraska. Revised by Ernest A. Bessey,

Professor of Botany, Michigan Agricultural

College.

FUNGICIDES, fun’ji-sld, any agent used to prevent the growth of fungi or their spores. 1 he most important uses of fungicides are in agricultui e and horticulture for controlling the fungi that attack crops. 1 hese may be divided into two general classes: (1) Fungi which

burrow among the tissues of the host plants and expose little more than their fruiting organs to the air. (2) Fungi which expose almost all of their vegetative parts to the air, only the holdfast, absorbing organs (liaustoria) entering the tissues of the host. From the nature of their growth it is easily seen that members of the second group may be attacked at any time, but that since the vegetative parts of members of the first group are protected by the tissues of the host they cannot be reached effectively by any fungicide without injuring the host. Controlling agencies in such cases must therefore be preventive.

. For the control of the exposed fungi the chief agent is sulphur in out-door practice, ap¬ plied as a powder, which is dusted upon the foliage, preferably with a powder gun. In the greenhouse it is more frequently evaporated, by strewing powdered sulphur upon the heating pipes or upon burlap suspended in warm parts of the greenhouse. This is a slow way, and is mainly preventive. When a considerable quan¬ tity must be evaporated in a short time the sulphur is gently heated over an oil stove. It is imperative that the sulphur be kept from igniting, because the fumes are destructive to host as well as fungus. For cleansing a green¬ house of objectionable fungi when the plants are out, the sulphur may be burned and all reachable parts sprayed liberally with Bordeaux mixture.

Various compounds of copper are used as preventives of the attacks of internal feeding fungi and as remedies for the exposed. Chief of these salts is copper sulphate, which may be applied in a pure solution only to dormant wood, walls, etc. It is used at the rate of one pound to the gallon, and will, at this strength, destroy lichens and algse as well as fungi. For use upon foliage and other actively growing parts it must be mixed with some substance which will counteract its causticity. Lime is most frequently used, and the compound is called Bordeaux mixture from the French city where its usefulness was accidentally dis¬ covered about 1882. It is made as follows:

A known number of pounds of copper sulphate are dissolved in an equal number of gallons of water, contained in a wooden tank or barrel, the salt being suspended at the surface of the water to ensure quick solution. In another receptacle a known number of pounds of lime, as free from magnesium as possible, are slaked with a little water, and when slaking is com¬ plete, enough more water is added to make the proportion one pound of lime to a gallon of water. When needed for use five gallons of the copper sulphate solution and five of the lime solution are separately diluted with enough water to make a combined total of 50 gallons.

The two diluted solutions are then thoroughly mixed, and afterward tested with ferrocyanide of potash to make sure that there is no un¬ combined copper sulphate. A brownish dis¬ coloration indicates that more lime must be added to neutralize the free copper salt. The mixture is then ready for general use, but for peaches, plums, cherries and some other plants, another 25 gallons of water must be added be¬ cause of the susceptibility of the foliage to in¬ jury. The stock solution of copper may be kept for weeks, but the lime solution should stand for only a few days and the completed mixture for only a few hours, because the particles tend to flocculate and settle, a process which impairs the usefulness of the mixture.

Copper sulphate is often used as eau celeste, a solution of one pound of the salt to two gal¬ lons of water, plus three half-pints of standard ammonia, and then diluted with water to make 25 gallons. Since the strength of the ammonia varies, this solution often burns the foliage, there being insufficient ammonia to neutralize the free copper sulphate. This fungicide and ammoniacal solution of copper carbonate are used when a non-staining solution is needed, as in spraying ornamental plants and fruit which is nearing maturity. The latter solution is made by dissolving one ounce of copper car¬ bonate in one pint of ammonia and mixing with 10 gallons of water.

The seeds of various cereals are often dipped in hot water formalin solution and copper sul¬ phate solution to destroy fungous spores, and hot water is also used to some extent for destroying exposed fungi, spores, etc.

All solutions must be applied as a mist-like spray, to ensure which a nozzle with a small aperture is essential. The first application to fruit trees should be before the buds begin to swell. This may be a stronger solution than those used after growth starts. The second should be given when the buds begin to swell, the third when the blossoms have fallen. No spray should be given during the blossoming period. A favorite fungicide for ripening fruits is the ammoniacal copper carbonate solu¬ tion, made by dissolving one ounce of copper carbonate in a pint of ammonia, to which are added 10 gallons of water. Lime-sulphur solution is also an efficient fungicide. It is made by boiling fresh lime and sulphur to¬ gether, or by slaking lime in contact with sul¬ phur. It is also used as an insecticide. Sulphur is a favorite remedy for various mildews. It is dusted in the foliage with a

blower, but in greenhouses is evaporated. The usual apparatus for applying fungicides to plant foliage consists of a tank or container which can be made air¬ tight, a hose with special nozzle which pro¬ duces a mist-like spray and an air pump. By means of the pump air is forced into the tank containing the liquid, which then issues under pressure at the nozzle and is converted by the latter into a spray. All types of sprayer com¬ bine the above features in one form or an¬ other. (See Fungi; Bacteria). Consult Lode- man, (The Spraying of Plants) (New York 1902) ; Prillieu, (Maladie des plantes agricoles) (18.95) ; Massee, (Text-book of Plant Diseases) (New York 1899) ; Duggar, (Fungous Diseases of Plants) (New York 1909) ; Stevens and Hall, (Diseases of Economic Plants) (ib. 1910) ; various bulletins of the United States

Department of Agriculture and of many of the State Agricultural Experiment Stations.

FUNGUS, fun'gus. See Fungi.

FUNGUS-EATERS. The fungi enter largely into the food of the lower animals, and somewhat into the fare of the higher forms. The molds, slimes and various aquatic forms are devoured by echinoderms and mollusks, both bivalves and univalves, who take in the minute floating forms, or their spores, or eat the fixed growths from stones and other rest¬ ing places, and by vegetable-eating fishes and Crustacea. Pond-snails will keep the glass sides of an aquarium clean of vegetable growths, a large part of which is fungoid. Worms, slugs and insects in great variety feed upon the vast array of fungi not aquatic. Beetles are especially fond of the larger forms — the toad¬ stools and tree-borne polypores. A large Javan beetle, known from its shape as the ((fiddle-beetle® (Mormolyce phylloides) , spends its life within and about certain fungi growing on tree-trunks. A whole family of small flies (Mycetophilidce) breed in fungi, including the cultivated mushroom, beds of which are often largely damaged by the work of their maggots bred there; hence the group is termed ((fungus- gnats* In the United States the woodland toadstools are eagerly fed upon when ripe in August and September, not only by great num¬ bers of insects, slugs and snails, but by sala¬ manders, tortoises (especially) and by all sorts of squirrels ; but they seem to be rarely, if ever, eaten by birds. For the edibility of fungi by man, see Mushroom.

FUNGUS-GNAT. See Fungus-eaters; Gnats.

FUNK, Franz Xaver von, German Catholic theologian: b. Abts-Gmiind, Wiirttemberg, 1840; d. 1907. He received his education at Tubingen

and at the Rottenburg Seminary, and also at Paris, where he paid special attention to economics. He became professor of theology at the University of Tubingen in 1870 and in 1876 became a member of the editorial staff of the Theologische Quart als chrift there. He pub¬ lished (Opera Patrum Apostolicorum) (1878; 2d ed., 1901) ; (Lehrbuch der kirchenge- schichte) (1886; 4th ed., 1902);

(1899).

FUNK, funk, Isaac Kauffman, American publisher: b. Clifton, Ohio, 10 Sept. 1839; d. 1912. He was graduated at Wittenberg College, Ohio, and after several pastorates, the last of which was in Brooklyn, N. Y., began a publish¬ ing business in 1872 ; founded and published the Metropolitan Pulpit (now the Homiletic Review) in 1876, and the Literary Digest in 1890. He has published also the Standard Dictionary > of which he was editor-in-chief (1890-94). He was an earnest Prohibitionist, and in 1884 founded the Voice, a prohibition journal, and was the Prohibition candidate for mayor of New York. In 1901 he began the publication of the im¬ portant (Jewish Encyclopedia.*

FUNK, Wilhelm Heinrich, American artist : b. Hanover, Germany, 14 Jan. 1866. He was educated in the public schools of his native land, and came to the United States after his father's death in 1885. He first attracted at-

tention by a pen-portrait of Edwin Booth, the actor. He studied at the Art Students' League, i\ew York, and was pen and ink artist on staff of the New York Herald 1891-96, also contrib¬ uting to Scribner s, Century , Harper's, Judge, l ruth and other magazines of the day. During this period he went to Europe every year and studied in the galleries of Holland, Spain, Ger- many' Italy and France, especially the masters of the 16th century. He now devotes attention to portrait painting, and has painted portraits of several members of the royal families of Ger¬ many and England, and many well-known men and women in the United States and in France. He is an especial member of the Munich Acad¬ emy of Fine Arts.

FUNNEL-MARKS, painted designs on the funnels of ocean steamships to designate the ownership of the vessel. American line steam¬ ships are thus designated by a black funnel, white band, with black top ; Cunard line, red funnel, with black rings and black top ; French lme, red funnel with black top; White Star line, buff funnel with black top; North German Lloyd line, cream funnel; Hamburg-American line, buff

for express steamers, black for regu¬ lar. steamers; Holland-America line, green, white, and green.

FUNSTON, Frederick, American soldier: b. New Carlisle, Ohio, 9 Nov. 1865; d. San Antonio, Tex., 19 Feb. 1917. He was educated at the State University, Kansas, and was a commissioner of the Department of Agriculture to explore Alaska 1893-94. He served in the insurgent army in Cuba in 1896-97, and was made lieutenant-colonel. Suffering from wounds and illness he attempted to reach the United States, but was taken by the Spaniards and sentenced to death. At length he was liberated and on the outbreak of the war with Spain he was commissioned as colonel of the Twentieth Kansas Volunteers. He was sent to the Philippines and in 1899 became brigadier- general of volunteers. In March 1901, he com¬ manded an expedition which succeeded in capturing the Filipino leader, Aguinaldo, and was appointed brigadier-general in the United States army in the same month. He became commander of the department of California in 1905 and, during the earthquake and fire of April 1906, placed the city under martial law and brought order out of chaos. From De¬ cember 1907 to March 1908 he was in charge of troops at the Goldfield mining centre during the great strike of that year. In May 1914, Funston was sent with troops to Vera Cruz, Mexico ; he brought sanitary and hygienic per¬ fection out of disease-breeding uncleanliness and chaos, greatly improving the healthfulness of that tropical city. In November 1914 he was made a major-general. He was appointed com- mander-in-chief of the army mobilized on the Mexican border in March 1916, and also of movements of United States troops in Mexico, in pursuit of the bandit, Francisco (“Pancho8) Villa.

FUR-BEARING ANIMALS. Those ani¬ mals whose pelts are utilized as fur garments or ornaments; specifically, animals of the carnivorous familv Mustelidce. See Mustelidˆ:.

FUR-BEARING ANIMALS, Cultivation of, or FUR FARMING, is a new and promis¬ ing industry in North America, which has been

begun in view of the alarming decrease of these animals in their wild state. It will relieve the pressure on the wild stock, and will make it possible not only to supply the market with the pelts of captive stock, better on the average than wild skins, but also will enable the persons engaged to supply themselves with excellent furs at a comparatively small cost. As most of the animals to be utilized are natives of cold regions the industry can be successful, accord¬ ing to present information, only in the colder Northern States and in Canada, as in warmer regions good long fur will not be produced ; but the beaver,

skunk, muskrat and raccoon may be cultivated almost anywhere when local circumstances are favorable. Farmers are most advantageously situated to carry on this indus¬ try as a side-line,, so that it has come to be called “fur-farming.8 Much of the food re¬ quired, which is mainly such as is fed to dogs and cats, involves little expense, and the labor of attendance is light, except, perhaps, in the case of black foxes. This special line requires a considerable investment and an expensive up¬ keep if entered upon systematically.

The earliest serious attempts were made in Oneida County, N. Y., where minks were reared in 1866 by H. Resseque, and by others later, with profitable returns ; but were not long con¬ tinued. Latterly mink culture has been resumed in Canada by many persons, one company in Quebec having embarked about $50,000 in the enterprise. Minks require access to water, and the yard in which they are confined should in¬ clude a small space of pond or of a running stream. They are fed on bread, corn-meal mush and the like, with fish or meat twice a week. The results thus far are highly en¬ couraging.

The Canadian pine-marten and the larger pekan (see Marten) have been bred in captiv¬ ity, and several serious efforts are now in progress in Canada toward their cultivation; but the difficulties of success with these animals are great. The same is true of the otter, ex¬ periments with which are being made, with good promise of success. The fur of all three is very costly, and successful cultivation would be very profitable. The raccoon is far more easily reared, and this is now done in hun¬ dreds of farm-yards, where the space required and the food supply can be furnished with almost no expense, and the returns are gratify¬ ing; but wild stock is still too abundant to make the culture of this animal very important as yet. The same may be said of the skunk. Two kinds of skunks exist in North America — the common black-and-white northern skunk, and the smaller variegated or “striped8 skunk of the southwestern border and Mexico. Both pro¬ duce fur that is in constant demand at good prices, the pelts of the northern skunk being now worth about $3. The skunk breeders in this country now exceed in number that of all other animals combined. This animal tames quickly and is easily managed and cheaply fed ; and it offers the great advantage that it remains asleep in its den during cold weather, when other animals need the most costly attention. Any farmer or villager may easily rear a few; and there is much inducement to engage in skunk-breeding as a regular business on a large scale. In undertaking to rear these or any other animals the principle of action must be to ar-

range food and a manner of life for the captives as nearly as possible like that to which they are accustomed when wild.

The cultivation for its fur of the fox in captivity is the most important and extensive venture in this direction yet made. American foxes, from the point of view of the furrier, are of four kinds: (1) The gray fox of the southern United States; (2) the small swift or kit fox of the western plains; (3) the red or “common® fox, and (4) the white arctic fox. The first two have not yet been cultivated, nor do their pelts enter largely into trade. The arctic fox is yet too abundant to attract capital to its culture ; but a small proportion of the species, perhaps 10 per cent, are not white even in winter, but slate-blue in color all the year round, and are known as ftbhie® foxes. These have been held in captivity and reared for their fur for many years at places along the shores of Alaska, and on certain islands in Bering Sea; but in most places they are able to pick up their own food (largely fish), or need be fed only a part of the year, and are caught late in the fall by trapping. Several expensive ex¬ periments have been made in establishing breed¬ ing establishments for these blue foxes in east¬ ern Canada, and they promise well, but definite results are not at hand.

Fox-farming. — The red fox, which, in its normal fulvous condition, contributes thousands of beautiful pelts to the furriers annually, has a strong tendency toward black in its pelage. When one shows a line of black along the spine and across the withers it is called a <(cross-fox® ; when the dark coloring is more irregular it is a ((patch-fox® ; when black all over, with the tips of the hairs white, it is a <(silver fox.® This last is the most valuable variety, and one which varies from grizzly to almost pure black; finally, some may be pure black. To rear in captivity the ordinary red type would not be worth the cost ; but to cultivate by selective breeding the high-priced silver and black furs promised wealth. Attempts to do this began in eastern Canada more than 50 years ago, but no considerable success was reached until two in¬ dependent fox-breeders in Prince Edward Island united their knowledge and stock in 1894, and began to produce black and silver foxes the sale of which, as breeding pairs, brought them great wealth, and aroused a furor of ex¬ citement and an army of more or less specula¬ tive fox-farmers. The success of these orig¬ inators was

owing not only to the acquired knowledge and experience of many years, but to what is now known to be a most favorable situation, and to the availability of wire-mesh for fencing. To make a fox-proof fence had been, until the invention of woven wire, a practical impossibility.

Messrs. Oulton and Dalton, operating with great secrecy, continually bred from darker and darker animals until finally they achieved sil¬ ver and black strains that bred true ; but it was not until 1910 that they felt justified in ap¬ pearing in the market. The first 25 silver skins sent to London sold at auction for an average of $1,386 apiece. This created a furor of specu¬ lation. <(People who formerly had known some¬ thing of the business,® says Osgood, ((were now eager to engage in it. . . . How rapidly prices for breeding-stock advanced is well illustrated

by the experiences of one ranchman who sold his first pair of cubs for $750, and other pairs successively for $3,000, $12,000, $13,000 and $14,- 000.® The maintenance of this prodigious in¬ flation of prices was due mainly to stock com¬ panies which sprang up like mushrooms and were capitalized so recklessly that in May 1913, when the value of the foxes on Prince Edward Island was estimated officially at $15,000,000, the combined capitalization of 196 registered companies was $29,305,700, and in December 1914 was $31,500,000. In addition to this fox ˆranches® were established all over Canada, and in almost every one of our northern tier of States. Then the monopoly was broken. Wild stock was searched for and found in increased amount, the war came on, and the inflation collapsed. Ranch-bred silver foxes could soon be bought for $1,500 to $2,000, or often much less, and pelts fell in price to the level of 10 years ago. ((Now, with a comparatively large number of silver foxes in domestication, with a clearer understanding of their successful man¬ agement, and with a return of moderate prices for breeders, a steady, healthy and general de¬ velopment of silver-fox farming may be ex¬ pected.®

Karakul. — A very different kind of domesti¬ cation of animals for the production of fur is that of the Central-Asian sheep, known as karakul (Black Lake), whose lambs at birth are clothed in a coat of closely curled black hair, formerly designated astrakan or Persian lamb. Some of these sheep (known as Arabi, Krim- mer, broadtail, etc.) were imported, at great trouble and expense, in 1908 and their progeny, crossed with other breeds, is now producing these valuable lamb-skins here and in Canada. The industry is experimental as yet, but seems likely to prove a very valuable success. Consult Ingersoll, E., (Animal Competitors) (New York 1911) ; Jones, J. W., (Fur Farming in

Canada* (Montreal 1913) ; Circular on Karakul Sheep (Department of Agriculture, Washington 1913); Dearborn, Ned, (The Domesticated Silver Fox) (Department of Agriculture, Farmers' Bul¬ letin 795, Washington 1917, which summarizes ■Farmers' Bulletins 301 and 328 previously issued).

Ernest Ingersoll.

FUR SEAL, the fur-bear or northern fur- seal (Otaria ursina), whose pelts form the seal¬ skins of commerce. (See Fur Trade). There is also a southern fur-seal (O. nigresceus) , dwelling along the southern coast of South America. See Seal.

FUR TRADE, The. The history of the fur trade is so closely interwoven with the early history of America that it is extremely difficult to narrate one without reference to the other. Among all the industries that helped to make this country one of the great commercial nations of the world none exerted such an important influence upon the early prosperity of the col¬ onies as that represented by those who took the pelts of animals and prepared them for manu¬ facture into various articles for the use of man¬ kind. The rich peltries of North America at¬ tracted hardy French and British adventurers to the shores of the New World, and to obtain furs they journeyed into the most dis¬ tant and inaccessible parts of the land ; and that

SEA LION

LYNX

ART 1C FOX

ERMINE

WOLF

RABBIT

BADGER

OTTER

IARTEN

SKUNK

BEAVER

MUSKRAT

SABLE

POLAR BEAR

■“‘V~

COPYRIGHT, 1913, BY F. li. WRIGHT

they might have havens of safety in which to store their pelts, and, incidentally, rest secure 1 rom the attack of a savage foe, they estab¬ lished small settlements, so many of which have since grown into prosperous communities. It was the fur trader, therefore, who was the real pioneer in North America. Always in advance of civilization, his labors in leading the way for the settlement of the country provided a means of advancement that would have been much delayed if it had not been for these preparatory efforts. The Canadian provinces, for example, owed practically all their primary prosperity to their fur trade, for in Canada, as throughout the English colonies farther south the native Indians were so ignorant of the value of the pelts which they gathered that they were willing to dispose of them upon terms that per¬ mitted an enormous profit to the successful trader.

Era of Great Fur Companies.— The con¬ ditions under which the fur trade with the na¬ tives was conducted soon became such a serious scandal that the licensing system was introduced, but this too soon became subject to abuse.

It was during these early days that the feuds between the British merchants of New York and the Canadian (French) traders became a serious factor in the industry. There can be little doubt that the former set out deliberately to encroach upon the fur interests of Canada, and the infringement of territorial rights had become serious when the Hudson’s Bay Com¬ pany was formed in 1670. This British com¬ pany, which was chartered by Charles II, had the exclusive privilege of planting trading sta¬ tions on the shores of Hudson Bay and all its tributaries, and when, about a century later, France lost possession of her Canadian colonies, the Britons assumed almost exclusive control over the great fur trade of America. Prior to the beginning of the 19th

century this trade was chiefly monopolized by the powerful trading companies.

First in the field, of course, was the Dutch West India Company, with its prosperous trad¬ ing-posts at New Amsterdam (now New York), Beaverwyck (now Albany), and at several points on the Delaware. Next came the exten¬ sive Hudson's Bay Company, which practically monopolized the trade in furs for 200 years, or until the Northwest Company entered the field and established a somewhat successful rivalry, although its efforts were confined almost en¬ tirely to the Pacific coast. This was an organ¬ ization of French-Canadian merchants, and was formed -in 1784 under the name <(Compagnie du Nord-Ouest.®

It was in 1808 that John Jacob Astor formed the American Fur Company, establishing a line of trading-posts that extended across the con¬ tinent, with a depot for furs at the mouth of the Columbia River, from which point he in¬ tended to ship direct to China and India. The name of the concern was afterward changed to the Pacific Fur Company and Mr. Astor saw his enterprise on the high road to success, when, in 1813, he was treacherously sold out to the Northwest Company by his resident partner, the latter claiming that, as the United States was then at war with Great Britain, the British sol¬ diers would have taken the establishment by force if he had not made other disposition of it. After this incident, Mr. Astor confined his op- vol. 12—12

erations to the district east of the Rocky Moun¬ tains, where he, writh his partner and successor, Ramsay Crooks, transacted a profitable business m furs for many years. The Russian- American ˆ ur Company, which had its main trading-post at ˆtka Alaska, with many subordinate posts on the Yukon, carried on an immense traffic in such lines until 1867, when all its rights and properties were transferred to the United States with the purchase of Alaska.

Astor s Enterprises. — It was somewhat prior to 1809 that John Jacob Astor conceived ms great project to make the American fur trade independent of the Hudson's Bay Com¬ pany. As his scheme was partly based upon the tact that such an enterprise would have a strong tendency to spread the civilization of the Fast into the far western country, he asked the a Congress **n carrying it into execution. .Mi\ Astor s idea was to establish a connected chain of trading-posts from the Great Lakes to the Pacific Ocean, with a central depot for packing and shipment at the mouth of the Co¬ lumbia River; to acquire one of the Sandwich Islands as a provision station and**

to establish a line of vessels to sail from the west coast of North America to the most important ports in India and China. Washington Irving, in his (Astoria, presents a graphic description of this gigantic enterprise which met with such a strange disaster when Astoria, the town founded at the mouth of the Columbia River in 1811, was so unnecessarily abandoned during the War of 1812. The remainder of Mr. Astor's career, however, was quite as remarkable. Year after year his fur business was extended until its operations surpassed those of any house that had hitherto been established. In addition to its immense American business a gigantic ex¬ port trade was carried on with many countries, and, when the founder of the company died, he left a fortune that was estimated at $20,000,000. William Backhouse Astor, his son, was inter¬ ested with him in the fur trade, and when, in 1827, the house of John Jacob Astor & Son was merged in the American Fur Company, he became its president.

Later Developments.— The first great estab¬ lishment founded in Saint Louis — one of the principal depots of the fur trade from the mid¬ dle of the 18th century until 1859 — was that of Laclede, Maxon & Company, in 1763. In the early days of this house the brothers Auguste and Pierre Chouteau were connected with it, and the establishment, which was extremely suc¬ cessful, employed a large number of trappers and voyageurs. In 1808, the Chouteau brothers and a number of their associates in the older firm withdrew to form the Missouri Fur Com¬ pany. This prospered until about 1813, when, because of the war with Great Britain, it was dissolved. During the next few years several of its members transacted business independ¬ ently, but, in 1827, the Rocky Mountain Fur Company of Saint Louis was formed to send trappers to the Pacific coast. At this time the perils of the work were so great that fully 40 out of every 100 persons employed in it perished, and yet the life of adventure offered so many fascinations that there was no lack of hardy men eager to take the places of the slain. After several years of varying success the company was dissolved. In 1834, however, Pierre Chou¬ teau, Jr., who had been educated in the fur

trade by his father, organized the house of Pierre Chouteau, Jr. & Company, a firm name which was a household word among hunters and trappers during the next 25 years. In 1859, the business was sold to Martin Bates and Francis Bates of Saint Louis and New York.

The table that follows is designed to present a list of the principal fur-bearers of the world,

their habitat and their average yield during the 30 years previous to the opening of the Euro¬ pean War which wrought far-reaching disturb¬ ance in this trade, but perhaps benefited the ani¬ mals, especially in Russia. The authority is the fur statistician, Emil Brass, of Leipzig.

The year 1859 saw the American fur trade more widely diffused than ever before. The

Name of Animal

Badger .

Bear, black. . Bear, brown .

Bear, grizzly . . Bear, white . . . Cat, domestic.

Cat, wild. . Civet-cat . . Chinchilla . Coney . . . . Ermine

Fisher or Pekan.

Fitchew .

Fox, black .

Fox, blue .

Fox, cross .

Fox, gray .

Fox, Japan .

Fox, karganer. . .

Fox, kit .

Fox, pampas. . . .

Fox, silver .

Fox, white .

Fur seal . .

Hamster .....

Hare, polar .

Karakul .

Kolinsky .

Lambskins . Lynx .

Marmot .

Marten .

Marten, Hudson Bay. Mink .

Mole. . . . Muskrat . Nutria. . . Opossum . Opossum . Ocelot . . . Otter. . . .

Polecat . Rabbit.

Raccoon .

Raccoon-Dog . Sable .

Skunk. . . Squirrels .

Weasel. . Wildcat.

Wolf, gray.

Wolf, prairie. Wolverine. . .

Explanations

Several species .

Ursus americanus . Several species . . .

Ursus horribilis .

Polar bear (U. maritimus) . Common house cats . .

Various species, not lynx .

Cacomistle (Bassarisius astutus) . .

Three related rodents .

See Rabbit.

Any weasel in white winter coat.

Black cat.

The polecat: strictly, its fur .

Variety of red fox .

Blue variety of white fox. . .

Variety of red fox .

Uracyon cinereo-argenteus .

Raccoon-dog (Nyctereules procyonides) .

Small species of open plains .

Several Patagonian fox-wolves .

Variety of red fox . i

Arctic fox (Vulpes lagopus) .

Otaria ursina . . . . .

Cricetus frumentarius .

Several northern, winter-white species . See Lambskins.

Siberian polecat; also similar skins. . . .

Newly-born lambs of Asiatic sheep. American and Old World lynxes. . .

Woodchucks and other ground-squirrels Three Old World species, except saLle. .

Pine marten (Mustela Americana) .

Putorius vison, and other species .

Old World species .

Musquash (Fiber zibethicus) .

(Myopotamus coypu), Coypu; Otter. American (Didelphys virginiana)

Australian, several marsupials .

Leopard cat (F elis pardalis) .

Lutra canadensis .

Putorius fcetidus: Fitch .

The European Coney (Lepus cumiculus)

Procyon lotor. . . . See Fox, Japan. Mustela zibellina.

Mephitis mephitica .

Several Old World species .

Total (1909).

See Ermine; Kolinsky (Chinese). Common European Wildcat, and others.

Several species .

Coyote .

Glutton; carcajon.

Habitat — Source of raw fur

N. America, 30,000; Europe and Asia,

130,000 .

North America .

N. America, 2,000; Asia and Europe,

12,000. . . .

North America .

Polar regions .

N. America, 80,000; Europe, chiefly Holland and Russia, 770,000; Asia,

150,000 .

See Wild Cat.

S. W. United States; Mexico .

Peru, Chile, Bolivia .

N. America, 400,000; Siberia, 700,000; Europe, 10,000 .

European .

Rare and extremely costly .

Polar regions, especially Alaska .

North America .

North America .

China, Japan, Korea .

Central Asia .

N. America, 4,000; Central Asia, 60,000.

Argentina . . .

North America, 4,000; Siberia, 300. . . .

Alaska and polar regions .

Bering sea .

Germany, 2,000,000; Austria, 250,000. . N. America, 200,000; Siberia, 5,000,000.

Siberia, etc., 200,000; China, 500,000;

Japan, 200,000 . . .

Persia, Turkestan, southern Russia …. N. America, 90,000; Europe and Asia,

40,000 .

N. America, 30,000; Asia, 4,550,000. . . .

Europe, 530,000; N. Asia, 60,000 .

North America .

North America, 600,000; North Asia,

60,000 .

EurQpe and Asia .

North America .

Northern South America .

Southern United States .

Australia and New Guinea .

(Included in Wildcat) .

North America, 30,000; Asia and Europe

86,000 . . .

Europe and Siberia .

France and Belgium, 50,000,000; Ger¬ many and Russia, 1,000,000; Aus¬ tralia, 20,000,000 .

North America .

Siberia, 70,000; China, 20,000; Japan,

5,000 .

North America, 1,500,000; South

America, 5,000 .

Siberia, 15, 00*0,000; China, 500,000. . . . (Also 75 tons of squirrel-tails).

Asia and Europe, 50,000; South America,

10,000. . . .

North America, 8,000; Russia and Asia,

22,000 .

North America .

North America, 3,000; Europe and Asia, 5,000 . .

Average

annual

supply,

1900-1913

150,000

20,000

14,000

1,200

1,000

1,000,000

100,000

40,600

1,110,000

11,000

15,000

50,000

260.000

150,000

64,000

15,000

4,300

105,000

68,000

2,250,000

5,200,000

900,000

2,860,000

130,000

4,580,000

590,000

120,000

660,000

1,000,000

8,000,000

5,000

1,000,000

4,000,000

116,000

290,000

71,000,000

600,000

95,000

1,505, 000 15,500,000

60,000

30.000

40,000

8,000

*123,213,100

- There is good reason to estimate that by June of 1914 this total had been increased to 130,000,000 skins. Only those are counted that pass through the world's auction markets, where the total cash value realized by the sellers of this raw material is probably not less than $100,000,000 annually.

passage of the industry into the hands of in¬ dividuals had commenced to be apparent as early as 1821, and while, by the middle of the century, the aggregate amount collected each year was much greater than it had been 40 years previously, the opportunities for making great f˚r/.llnes, ln the trade had gone. A writer in oil limans Journal (1834) gives an interesting description of the situation of the fur trade at that time. He says :

(

. A.s ?arly as 1834 those who were interested in this industry began to fear that the American fur trade had commenced to decline and, even at that time, it was quite freely predicted that its downfall would be rapid. By this period there were practically no new lands to be ex¬ plored. The hunters and trappers in the employ of the great fur-trading companies had gone everywhere and had slaughtered so indiscrimi¬ nately that it seemed almost impossible that the fur-bearing animals should not be exterminated. It is true that now the buffalo and large deer, the bears and the puma and the otter, beaver and pekan are gone or become rare so far as their interest to the trade is concerned, but the smaller, and on the whole, more important fur-bearers, are about as numerous as ever, sev¬ eral kinds maintaining their numbers in the very midst of civilization, as does the muskrat, mink and skunk. As a matter of fact the yield of American pelts in early times was far less a year than recently. Take the muskrat, for example. The average number of skins sold on the London market between 1800 and 1850 was about 411,000; from 1850 to 1900 it was more than 2,500,000. In recent years the London sales were: 1911, 5,197,530; 1912, 5,014,921; 1913, 6,876,417; 1914, 10,488,647. In addition to this an enormous number of skins was used from year to

year in the Lhiited States and Canada. The average sales of skunks increased in the same way. In 1858 London disposed of 18,255 skins; in 1878. 285,103; in 1898, 482,130; in 1908,

1,˚37641: in 1909, 1,115,910; in 1910, 1,282,000;

iVork 2’ 1912’ 1.821,485; in 1913, l,Ojy,//o. I he persistence of these two, and other animals, against such a warfare is largely due to the laws that now protect them except during the breeding-season. Nevertheless the finest fur-bearers, such as the sable, marten, sea-otter and silver fox have rapidly decreased in the present century.

Consult files of the Fur Trade Review, Fur hews Magazine and the publications of the United States Department of Commerce and Labor, especially the consular and trade reports ;

also of the Canadian Commission of Conserva¬ tion.

Ernest Ingersoll.

FURBRINGER, fiir’bring-er, Max Karl, German anatomist: b. Wittenberg 1846. He re¬ ceived his education at the universities of Jena and Berlin; was appointed professor at the for¬ mer institution in 1888 and at the University of Heidelberg in 1901. His works have been note¬ worthy contributions in their special field ; they include (Die Knochen und Muckeln der Ex- tremitaten bei den schlangenahnlichen Saurien> (1870) ; (Zur vergleichenden Anatomie der Schultermuskeln und des Brustschulter appa¬ ratus* (5 parts, 1872-1902) ; (Zur Entwicklung der Amphibienniere* (1877) ; (Untersuchungen zur Morphologie und Systematik der Vogel* (1888); (Morphologische Streitfragen* (1902)- (Abstammung der Saugetiere* (1905).

FURETlERE, fu-re-tyar, Antoine, French lexicographer and litterateur: b. Paris 1619; d. there 1688. He studied law at first, followed the profession of advocate and became fiscal procurator of the Abbaye de Saint-Germain. Later he became abbe of Chalivay and prior of Pruines. In 1655 he published a volume of Poesias diverses*; in 1658 the

FURIES, EUMENIDES, or ERINYES,

called by the Romans Furl£ and Dirˆe, were Greek mythological divinities, the avengers of murder, perjury and filial ingratitude. They sprang from the drops of blood which fell from Uranus when he was mutilated by his son Kro- nos or Saturn.’ Others make them the daughters

of Acheron and Night, and of Pluto and Pro¬ serpine. Later mythologists reckon three of them and call them Alecto the unresting, Me- gaera the jealous, and Tisiphone the avenger. They were supposed to be the ministers of the gods and to execute their irrevocable decrees; their sphere of action consequently was both in the infernal regions, to punish condemned souls, and on the earth to rack the guilty conscience and chastise by mental torments. JEschylus, in the celebrated tragedy of the Eumenides, intro¬ duced 50 furies, and with them Horror, Terror, Paleness, Rage and Death upon the stage. These terrible beings were described as clothed in black robes, with serpents instead of hair, with fingers like claws, a whip of scorpions in one hand and a burning torch in the other, an out¬ stretched tongue and eyes dripping with gore. They were suckers of the blood of men; when they were enraged, a venom oozed from them that spread like a leprosy-spot wherever it fell and made the ground barren. They were re¬ garded with great dread and the Athenians hardly dared to speak their names, but called them the venerable goddesses, by a similar eu¬ phemism the name Eumenides, signifying the soothed or well-pleased goddesses, being intro¬ duced. They dwelt in the cave called after them, at the northeast corner of the Areopagus at Athens, below the seats of the judges. Eri¬ nyes, the more ancient name, signifies the hunt¬ ers or persecutors of the criminal, or the angry goddesses. The sculptors represented them as beautiful hunting nymphs, whose character was indicated only by the sternness of their expres¬ sion, by the torch, dagger and other similar em¬ blems.

FURIUS, Marcus Furius Bibaculus, Ro¬ man poet : b. Cremona 103 b.c. ; date of death unknown. He is classed by Quintilian along with Catullus and Horace as one of the most distinguished of the Roman satiric iambogra- phers. From the scanty and unimportant speci¬ mens of his works transmitted to modern times, we are scarcely in a condition to form any estimate of his powers. A single senarian is quoted by Suetonius, containing an- allusion to the loss of memory sustained in old age by the famous Orbilius Pupillus; and the same author has preserved two short epigrams, not remarkable for good taste or good feeling, in which Furius sneers at the poverty to which his friend, Valerius Cato, had been reduced at the close of life, as contrasted with the splendor of the villa which he had once possessed. It seems certain that he published a poem on the Gallic wars, entitled

(Pragmatia Belli Gallici. 5 This is known to us only from a metaphor parodied by Horace, who ridicules the obesity which distinguished Furius. Consult Bahrens, (Fragmenta Poetarum RomanorunP (Leipzig 1886) ; Schang, (Geschichte der Romischen Lit- teratur) (3d ed., Munich 1907) ; Weichert, (Poetarum Latinorum Fragmenta) ; id., (Dis- sertatio de Turgido Alpino S. M. F. Bibaculo) (Meissen 1882).

FURLOUGH, the absence, with leave, of enlisted men. In the United States army the post or regimental commander may grant fur¬ loughs not to exceed one month in duration, the brigade commander for two months, the division or department commanders for three months, and the Secretary of War for longer

periods, in case of necessity. Not to exceed 5 per cent of any command may be absent on furlough at any one time. Soldiers on fur¬ lough are entitled to pay, and to commutation of rations at the rate of 25 cents per diem. Consult latest edition of (United States Army Regulations.)

FURMAN, Richard, American Baptist clergyman: b. Esopus, N. Y., 1755; d. Charles¬ ton, S. C., August 1825. While he was an in¬ fant his father removed to Sumter district, S. C. His education, though obtained irregu¬ larly, became considerable, including a knowl¬ edge of Latin, Greek and Hebrew. He was converted at an early age, and soon began to preach, and at 19 was ordained pastor of the High Hills Baptist Church. On one occasion he was not allowed by the sheriff to preach in the courthouse at Camden because he was not a member of the established (Episcopal) church. At the beginning of the Revolution he actively promoted measures for removing the disabilities under which the Dissenters la¬ bored. During that struggle he became so con¬ spicuous as a patriot that Lord Cornwallis of¬ fered a reward for his apprehension, and after a while he retired to Virginia, where Patrick Henry was a regular attendant on his ministry. In 1787 he became pastor of the First Baptist Church in Charleston, S. C., in which relation he continued for 37 years. He was a member of the convention that framed the first consti¬ tution of South Carolina, and vigorously op¬ posed in that body the provision which ex¬ cluded ministers from certain offices. In 1814 he was elected first president of the Triennial Convention of Baptists, and for several years was president of the South Carolina Baptist Convention. He published several sermons and addresses, including one commemorative of George Washington. Furman University at Greenville, S. C., was named in his honor. Consult Sommer, (Memoir of John Stanford) (New York 1835).

FURMAN UNIVERSITY, a coeducational institution in Greenville, S.

C., founded in 1854 under the ausipces of the Baptist Church. Re¬ ported in 1916: Professors and instructors, 16; students, 276; volumes in the library, 8,000.

FURNACE, an apparatus wherein a vehe¬ ment fire and heat may be made and maintained, as for melting glass, ores or metals, heating the boiler of a steam-engine, warming a house, firing pottery or baking bread and other such purposes. Furnaces are constructed in a great variety of ways, according to the different pur¬ poses to which they are applied. In planning furnaces the following objects are kept in view:

(1) To obtain the greatest quantity of heat from a given quantity of fuel. (See Fuel).

(2) To prevent the dissipation of the heat after it is produced. (3) To concentrate the heat and direct it as much as possible to the sub¬ stances to be acted on. . (4) To be able to regulate at pleasure the necessary degree of heat (see Heat) and have it wholly under the operator's management.

The materials of which a furnace is con¬ structed must be able to endure wide varia¬ tions of temperature as well as the highest degree to which it may be subjected, without losing their physical or chemical constitution. Such materials are called ˆrefractories® (q.v.).

jjˆjlrˆaces are hand-fired when the fuel is added from time to time by hand. There are two types of mechanical stokers — underfeed and overfeed. The former employs a steam ram which forces the fuel up from below, and is used generally in connection with forced draught : the overfeed type employs a grate which moves horizontally from the front of the furnace toward the rear, the fuel being fed from a hopper on to the front end, and the ashes and cinders passing off at the rear. The grate resembles an endless chain. The Murphy furnace has a V-shaped cross-section, with feeders along each side, at the top of the V, the grates forming the sides of the V. At the bottom is a shaft which may be revolved to remove the ashes.

In all furnace construction the effort is made to secure smokeless combustion, and many smoke-consuming devices have been in¬ vented. Most of these have been unsatisfac¬ tory, and in any event the formation of smoke in the first place shows that the problems of

economical combustion have not been solved. One of the improvements has been the admis¬ sion of air above the fire through the fire-door, which supplies oxygen for the consumption of the unburned gas. Steam jˆts have been tried for the same purpose, but their disadvantages overbalance the gains. The indirect-fired fur¬ nace, which has a separate chamber for the fire, obviates the smoke difficulty to a large extent, and, by using the chimney gases to heat the air admitted to the fire chamber, a higher de¬ gree of working heat is secured.

An air furnace is one in which the flames are urged only by the natural draught of the chimney; a blast furnace, one in which the heat is intensified by the injection of a strong current of air by artificial means; a reverber¬ atory furnace, one in which the flames in pass¬ ing to the chimney are thrown down by a low- arched roof on the objects which it is intended to expose to their action. A gas furnace is one in which gas is used for fuel.

The gas to be consumed and the air to be used in the combustion are introduced into the combustion-chamber by separate pipes or open¬ ings, preferably in parallel streams near to each other, or in opposite directions along one chan¬ nel so as to mingle before entering the chamber. The fuel may be either natural gas, or what is called (

1915) ; Peebles, J. C., (Furnace Efficiency' (Chicago 1914).

FURNACES, Electric. See Electric Fur¬ naces.

FURNACES, Metallurgical. See Metal¬ lurgy.

FURNEAUX, fur-no', Tobias, English navigator: b. Swilly, Plymouth, 21 Aug. 1735; d. there, 19 Sept. 1781. Entering the royal navy he saw active service in the latter part of the Seven Years' War, 1760-63. In 1766-68 he was second lieutenant to Captain Wallis of the Dolphin in a voyage around the globe. He commanded the Adventure which accompanied Captain Cook in his second voyage of dis¬ covery. On this voyage from February to May 1773 he was separated from Cook and again from October 1773 to July 1774. He pursued the objects of the expedition, however, and made the first British chart of the coasts of Tasmania where much of the nomenclature given by him survives. Cook named the islands in Bank Straits after Furneaux, also a group now known as the Low Archipelago. In 1775 Furneaux became a captain and on 28 June 1776 commanded the Syren in the attack on Charleston, S. C. Consult the life bv Rev. Henry Furneaux (in dictionary of Natural Biography').

FURNEAUX ISLANDS, a group in the South Pacific off Tasmania, to which col¬ ony they belong. The total area is about 1,050 square miles. The principal islands are Flinders, Cape Barren and Clarke. The inhab¬ itants number about 700, and earn their liveli¬ hood by seal-fishing, the capture of sea-fowl, etc. The islands were discovered in 1733 by Tobias Furneaux (q.v.).

FURNESS, Sir Christopher, English ship builder and ship owner, 1st Baron: b. West Hartlepool, 23 April 1852; d. Ripon, 10 Nov. 1912. The son of a farm laborer who became a corn merchant, he achieved his first suc¬ cess for the firm by shipping flour from Sweden during the Franco-German War.. In 1874 he founded the ((Furness" line of steam¬ ships, which now owns nearly 100 steamers, with a total tonnage of close on 300,000 tons. He also established the great ship-building firm of Furness, Withy and Company, Hartle¬ pool, in connection with which in 1909 he set on foot a profit-sharing scheme, which, how¬ ever, was abandoned two years later at the re¬ quest of the unskilled workers. He represented Hartlepool in the Liberal interest 1891-95 and 1900-10. He was knighted in 1895, and raised to the peerage in 1910.

FURNESS, Horace Howard, American Shakespearian scholar and editor; son of Wil¬ liam Henry Furness (1802-96) (q.v.) : b. Phila¬ delphia, 2 Nov. 1833; d. 13 Aug. 1912. He was graduated at Harvard in 1854; studied law, and was admitted to the bar in 1859. The honorary degree of Ph.D. was conferred on him by the University of Gottingen in recognition of his services to Shakespearian literature. He is the editor of the exhaustive (New Variorum Edi¬ tion' of Shakespeare, the successive volumes of which appearing since 1871 include (Romeo and Tuliet' (1871); 'Macbeth' (1873); (Hamlet> (2 vols., 1877); 'Lear' (1880); (Othello> (1886) ; 'Merchant of Venice' (1888) ; 'As

You Like It5 (1890) ; (Tempest5 (1892) ; Mid¬ summer Night's Dream5 (1895) ; (Winter's

Tale) (1898) ; (Twelfth Night5 (1901) ;(Love's Labor Lost5 (1904) ; (Antony and Cleopatra5 (1907), and ˆymbeline5 (1913). He was aided in his editorial work by his wife and his son. He received honorary degrees from Co¬ lumbia, Harvard and Yale, and was a member of the American Academy of Arts and Letters. The Wariorum Edition5 is most exhaustive, being practically the last work on the text of Shakespeare. Consult Appreciations of Hor¬ ace Howard Furness5 (1912).

FURNESS, William Henry, American clergyman and author: b. Boston, Mass., 20 April 1802; d. Philadelphia, 30 Jan. 1896. He was educated

at Harvard; studied theology at Cambridge, Mass., and was pastor of the First Unitarian Church in Philadelphia in 1825-75. He was an earnest supporter of the anti-slav¬ ery movement and was a German scholar of eminence, translating much from the German in both prose and verse. He was radical in his religious views but made a life study of the character of Jesus, which forms the theme of several of his works. Among his numerous works are (Remarks on the Four Gospels5 (1836) ; (Jesus and His Biographers5 (1839) ; A History of Jesus5 (1850) ; (Thoughts on the Life and Character of Jesus of Nazareth5 (1859); (The Veil Partly Lifted5 (1864); (Jesus5 (1871) ; (Verses and Translations from the German Poets5 (1886) ; (Pastoral Offices5

(1893).

FURNESS, William Henry, American artist, son of the preceding: b. Philadelphia, Pa., 21 May 1828; d. Cambridge, Mass., 4 March 1867. He very early made a reputation by the excellence of his crayon portraits, and having earned from the sale of these the means for foreign travel, studied art in Europe for two years. On his return to America he established himself as a portrait painter in Philadelphia, and subsequently in Boston, and at the time of his . death was one of the foremost portrait painters in the country. Among noted portraits by him are those of his father, Dr. Furness; Charles Sumner and Lucretia Mott.

FURNESS, William Henry, American ethnologist : b. Wallingford, Pa., 18 Aug. 1866. He is a son of Horace H. Furness (q.v.), and in 1888 was graduated at Harvard University, subsequently graduating at the medical school of the University of Pennsylvania. He made scientific tours in South America and elsewhere, the results of which are embodied in several volumes from his pen. In 1904 he became sec¬ retary and curator of the Free Museum of Sci¬ ence and Arts of the University of Pennsyl¬ vania. He is a fellow of the Royal Geogra¬ phical Society. His works include (Folklore in Borneo5 (1899) ; (Life in the Fuchu Islands5 (1899) ; (Home Life of the Borneo Head Hun¬ ters, its Festivals and Folklore5 (1902) ; (Uap, the Island of Stone Money5 (1910), also sev¬ eral monographs to the American Philosophical Society. In April 1917 he was commissioned captain in the Medical Reserve Corps.

FURNI (foor'ne) ISLANDS, a group of the Grecian Archipelago, situated between Samos and Nikaria. Furni is the largest and gives its name to the group. Its area is about

10 square miles and it is the only inhabited is¬ land. Its inhabitants

are almost cut off from intercourse with the outer world.

FURNISHING GOODS. See Clothing and Furnishing Trade.

FURNISS, Harry, English illustrator and caricaturist: b. Ireland 1854. From 1880 to 1894 he served on the staff of Punch, produc¬ ing many humorous cartoons on social and po¬ litical life. He started two comic journals on his own account, but the venture proved a finan¬ cial failure. His numerous artistic contribu¬ tions to the wide series of British and Amer¬ ican illustrated journalism brought him inter¬ national fame. As a humorous lecturer with (

(Royal Academy Antics5 (1890) ; (P. and O. Sketches5 (1898); America in a Hurry5 (1900) ; (Confessions of a Caricaturist5 (2 vols. 1901) ; (Poverty Bay5 (1905) ; (How to Draw in Pen and Ink5 (1905); (Our Lady Cinema5 (1914) ; Political Sale Catalogue5 (1914). He also illustrated complete editions of Thack¬ eray and Dickens, besides other works. In later years he wrote and acted for moving pictures.

FURNITURE, formerly all the various movable appliances or articles in the interior of a house, now more commonly applied to arti¬ cles of wood or metal. The ancient Egyptians aimed to variety rather than symmetry in the arrangement of their houses. They had chairs made of the finest woods in great variety of design, covered with rich cloths or skins, and inlaid with gold or ivory. They also used fold¬ ing stools, sofas, couches and carpets or rugs. Their tables were of variety of shapes and con¬ structions. Bedsteads were made of wicker¬ work and sometimes of bronze. The forms of household articles of furniture found in or represented on Assyrian monuments and re¬ mains show great artistic elaboration and a profusion of highly wrought ornament. The Assyrians were especially skilful in the chas¬ ing of metals, and they delighted in reproducing natural objects on their ornaments. The Greeks had couches covered with skins or drapery, on which several persons might lie with their bodies half raised ; these were used at meal times by the men only, women and children sitting on seats; they had large armchairs with footstools, portable small chairs without arms and stools with carved legs made to fold up.

• Among the Romans, Greek art gained a predominant influence, and the conquerors of the world were at all times glad to employ natives of Greece to design and execute the works intended to display the opulence of their masters. On the ornaments of the triclinia or couches on which they repose, immense sums were bestowed. They were often inlaid with precious materials, such as ivory, tortoise shell, gold and silver and had ivory or metal feet. They consisted of a framework

which was strung with girths, on which rested a mat¬ tress stuffed with straw, wool or feathers, and covered with rich drapery. The lectus cubicula- ris, or bed, was higher than the couch, but not unlike it. The tables were generally of costly foreign wood, resting on frames of carved marble or an ivory column. The curule chairs, or seats of state of the patricians and magis-

FURNITURE

CHARACTERISTIC CHIPPENDALE CHAIR-DESIGNS Thomas Chippendale flourished about 1750-1760. His “ Design Book ” was published in 1752

FURNXTUR3

HEPPELWHITE SIDEBOARD OR SIDE-TABLE

CHARACTERISTIC HEPPELWHITE FURNITURE

Messrs. A. Heppelwhite & Co., Chippendale’s successors, oublished their “ Design Book ” in 1789. The Hepple-

whites were designers rather than manufacturers

FURNITURE

CHARACTERISTIC SHERATON FURNITURE

Thomas Sheraton (1751-1806) was the last of the famous cabinet-makers of the 18th century. In 1790 he published his first collection of “ Designs for Furniture,” and this was followed by numerous other publications of a similar class

FURNITURE

Permission of the Metropolitan Museum of Art, New York

English Corner Cabinet 1725-30; black lacquer with Chinese scenes in gilt

FURNITURE

trates, were wrought in ivory; and to form an estimate from the number of beautiful utensils m marble and bronze richly chased and inlaid with silver, that have been found in the ruins of a

comparatively insignificant city, Pompeii, the wealth ot the Romans in movable property rl ˆ1S rl?ˆure must have been very great. The library first appears as a separate apartment in a Roman house; that discovered at Her¬ culaneum was small, and lined with presses about the height of a man, in which the rolls of papyrus and parchment were kept. Still, according to modern ideas, the Roman rooms would seem rather bare of furniture. They had no writing tables or cabinets; couches, chairs, tables and candelabra comprised the whole of the furniture with the exception now and then of a water clock, or a chafing dish.

Among European states from 500 a.d. to 1500, the ecclesiastical style prevailed in furni¬ ture as in every other species of art, attaining its greatest eminence in the decorated Gothic of the 14th century. Articles of furniture pre¬ vious to 1500 are very rare. For three centuries after the Conquest domestic furniture was very scanty. The hall was furnished with tables and benches, the furniture of a bedroom consisted of little more than a bed and a chest. Chairs were large and cumbrous, and were usually fix¬ tures; wooden forms, sometimes with back rails, being placed against the walls. The fur¬ niture of the dining-room was very limited. Boards on trestles were in general use as tables. In the 14th and 15th centuries remarkable prog¬ ress was made and a considerable degree of splendor in furniture was attained. Defense began to be not the only object studied in the construction of buildings. The Gothic panel¬ ing of the carved bedsteads, chairs, screens, etc., was dazzling with scarlet, blue and gold, and costly embroidered hangings and curtains heavy with heraldic symbolism, cabinets, reading-desks, prie-dieus, ivory and enameled coffers, fire dogs or andirons elaborately chased and gilded, be¬ gan to appear.

The progress of this decorative style was suddenly arrested by the ˆRenaissance,® or re¬ vival of ancient classical art and literature, of which Italy was the earliest seat, and from whence the impulse was given that communi¬ cated itself speedily to the rest of Europe. A genuine and self-evolved style instantly went out of fashion, and was discarded for an imi¬ tation and counterfeit one based on the copy¬ ing of understood classic models which were applied without consideration to the most incon¬ gruous objects. The classical temple was the dominant idea in the manufacture of furniture as well as in the construction of a palace or a cathedral, and columns were considered as necessary in one species of art as in the other. All the architectural details of Roman buildings were then applied to furniture; the lions, griffins, chimeras, etc., of the temple frieze encumbered the stately pillars of the Italian palaces, and caryatides

and Roman trophies replaced the patron saint and the crucifix. With all its ab¬ surdities, it must be noted that this style was in the hands of great men, and their produc¬ tions display a boldness and vigor of line, and a mastery over human and animal forms that give dignity to a licentious freedom of design in which all appropriateness is forgotten. Speci¬ mens of the Renaissance are still met with,

though daily increasing in value. Gothic art never recovered its lost ground.

•With various modifications the Renaissance style continued dominant for nearly two cen¬ turies. In England it degenerated into positive ugliness, the furniture of the time of Elizabeth and James I having very little to recommend it in tasteful design. It is distinguished by a mixture of overwrought heavy molding, com¬ bined with thin spindly columns, twisted legs, and other inelegant characteristics. Magnifi¬ cence is sometimes attempted in the value of the material, as in the famous set of chamber fur¬ niture in chased silver executed for a royal visit at Knowle Park, the seat of the dukes of Dorset in Kent. It was succeeded by the style named after the French monarch, its patron and encourager, Louis XIV.

The modern predominance of France in the construction of furniture is owing to the minis¬ ter Colbert. He it was who brought together the best workmen of Europe, and by an edict of the year 1667 established the French royal manufactory of furniture. The new style which the productions of this establishment assumed appears to have been worked out undesignedly, and, like every such successful phase of art, was the genuine product of circumstances. Nov¬ elty and magnificence seem to have been the great features aimed at; these were sought by varied treatment of surface in cabinet furni¬ ture (as inlays of metals, ivory, enamels, por¬ celain tablets, tortoise shell, etc.), and bv an incrustation of broken scroll panel work, which hid the real constructive forms and frittered away the graceful outlines of the Renaissance into a confused and unsymmetrical mass. Un¬ der Louis XV the same school of art contin¬ ued, and it received new elaboration under the successors of Boule, Riesner and Gouthier; their works are known to connoisseurs as arti¬ cles of vertu by the respective styles of each master, and fine specimens bring almost fabulous prices. Probably more of this class of furni¬ ture is to be found in Great Britain than in all the rest of Europe, a great change of own¬ ers having been brought about by the French Revolution. While the splendid extravagances of Louis XIV were holding sway in France, the prevailing taste in England seems rather to have been modified by the fashion introduced from Holland by William III. The native woods,

oak or wainscot, chestnut, etc., were about this time superseded for furniture by the dark and heavy West India mahogany, the in¬ variable material of the ill-designed and awk¬ ward furniture familiar to us in the immortal designs of Hogarth. A better style based on that of France was introduced by Chippendale, but a severer and more artistic taste was dis¬ played by the designs of Heppelwhite and Shera¬ ton. In the latter part of the reign of Louis XVI another change is apparent in French furniture. Greece and Rome were looked up to as standards of correctness in furniture as well as in politics. But instead of impressing their own genius on designs inspired by ancient models as did the great artists of the Renais¬ sance, the authors of this revival were too often content with frigid imitation. The classi¬ cal style did not long hold sway, and since that time the practice of both France and England (and with them the rest of Europe) has been purely eclectic. At present designs after the

best work of the older makers are much in favor in both Europe and America. See Fur¬ niture Industry in America, The.

FURNITURE, Colonial. When the. colo¬ nists first landed, and during their early strug¬ gle for existence, little if any attempt was made to import furniture, and we have nothing now which could be rightfully claimed to have been brought over from Europe before the coming of the Mayflower (1620). The New Englanders were the first to make furniture, copying the designs of the original pieces, which were of heavy oak with severe lines and flat carvings. Their puritanical minds apparently abhorred anything of an ecclesiastical cast. As early as 1650 the Southern planters imported fine pieces from England, of oak, richly carved and inlaid, the designs being influenced by the Renaissance just dawning in France, and the Elizabethan and Jacobean periods in England. The authorities in the South tried to prevent trade with Holland and New England, so a comparison of the English furniture, prior to the Revolutionary War, with that of Maryland and Virginia, shows that the English life of that time was planted there as far as it was possible. Since we find so few of these original pieces, we can only think that the planters, be¬ coming wealthy so rapidly, and wishing to keep up to the ((prevailing English style,® must have discarded the old for the new, as their invoices show large importations of furniture up to the Revolutionary War.

There was a marked difference between the houses of New York and

of New England. The Dutch built theirs of brick, while those in New England were mostly of timber, and a striking feature in the living-room of the former was the chimney-piece, which among the wealthy was elaborately carved and tiled and held vessels of brass repousse and Delft- ware. The fire-place with its colored tiles con¬ tinued to be a decorative feature, even after coal succeeded wood as fuel and grates took the place of andirons. The floor of the average house was sanded, and rooms had no special character. The ideas which the Dutch brought from the Orient influenced the designs not only around New York but in New England as well, and fast grew into favor. Strange shapes from the East, introducing marqueterie in exotic woods, were eclipsing the old chests of drawers, cupboards, etc., and actual products of the Far East filled many of the Dutch houses. The cabriole legs superseded the severer lines. Other woods beside oak, such as walnut, pine, red cedar, maple, etc., were introduced ; ebony was scarce, so the <(black egg ornament® was often of white wood stained black.

In the first half of the 18th century New York was an important place, and inventories show that fashions in New York compared favorably with those of London and Amster¬ dam. The bed was disappearing from the hall; carpets were introduced, and in 1750 they had flowered carpets and <(painted floor cloths.® The walls, of houses of the better class, were pa¬ pered before the middle of the 18th century, and for 50 years we have an interesting wall¬ paper period ; their chief designs were large illustrating panels, such as «The Lady of the Lake,® <(The Four Seasons,® etc. Fire-places were growing smaller as wood was harder to

obtain, and in 1745 Franklin invented what is now known as the ((Franklin stove.® Uphol¬ stery was taken up and there were many cab¬ inet-makers in New York, Boston and Phila¬ delphia ; skilled workmanship was in demand, and ((choice timber and metal furnishings for cabinets® were advertised. Then came the period when mahogany was the favorite wood, and, just as in England, all designs had a tendency toward greater lightness and grace of line, and showed the Chinese influence strongly. In 1776 the home of a wealthy Amer¬ ican compared favorably with that of an Eng¬ lishman in similar circumstances. ((Chippen- dale® was the rage, both imported and domestic. There was a marked difference between the North and South — the Northerners lived more simply, but with a certain amount of fashion and elegance ; in the South everything was ease and luxury, and many houses were noted for their costly furnishings. Around Charles¬ ton, S. C., at the present time are some ex¬ cellent examples of typical Southern homes of the 18th century, containing

many of the orig¬ inal pieces of furniture. The classic or Greek style adopted by Adam in England found its way here, and was seen in architecture and interior woodwork, noticeably in mantels and built-in cupboards, but was little used in ar¬ ticles of furniture.

Mount Vernon — now a museum of relics — is the most interesting colonial house, on account of its associations. It was inherited by George Washington in 1751 from his half-brother, Law¬ rence Washington. Soon after it was almost entirely refurnished, and though by no means palatial was extremely comfortable. There were few of the original Washington pieces left there, as Mrs. Washington bequeathed the furni¬ ture to four grandchildren, but now many articles are gradually finding their way back, either through gift, or through purchase by the Mount Vernon Ladies' Association of the Union. There are many Washington pieces, used by him while in Philadelphia, now in possession of the Historical Society of Pennsylvania. Second in interest is Monticello, the home of Thomas Jefferson. Its architecture and decorations are delightful, and it still contains proofs of the owner's good taste and love of art.

((Colonial designs,® as termed in the vocabu¬ lary of the dealer of to-day, were not known until the colonies had become States. They are traced in America first through the Dutch, who had taken many points from Spain and the Orient, namely, the ball and claw pattern. Chippendale adapted them with more lightness and grace of line, but the French Empire style which came in at that time changed it into the massive mahogany, and gave the rope-carved pillars and lion-claw feet. American makers omitted the elaborate brass and ormolu trim¬ mings used by the French, and depended upon the beautiful grain of the wood, often veneer¬ ing to obtain handsome effects. The superior¬ ity of the old furniture is due to its construc¬ tion ; the old makers worked solidly, dove-tail¬ ing and blocking all drawers, and to-day the age of the wood has greatly added to its value; the stained mahogany loses the beautiful golden shafts of light. The polish was attained by constant rubbing, while to-day most pieces are simply varnished.

Mahogany was brought into England by Sir

COLONIAL FURNITURE

1-5 Handles 8 Windsor chair

6 Dressing table — Constitution mirror 9 Four-post bed

7 High-boy

Walter Raleigh, but was not in general use until about 1725. In New England it was ex¬ tensively used a little later, being imported from the West Indies. The Honduras and Mexican varieties most commonly used to-day do not materially improve with age, and are much lighter in weight than the West Indian, thereiore a really old piece may often be told by its heaviness. The date of a bureau, chest or drawers, etc., may frequently be ascertained from its handles.

Handles. — The oldest handles, chiefly brass, rarely pewter, were drop-handles, formed like an earring, backed by a small plate. Next in order was a larger plate, usually engraved, with a bail large enough to insert two fingers, ihe next was a larger plain plate similar to a neur-de-lis in shape, the bail being much larger, and from now on held into the drawer by brass nuts instead of wires as formerly, but in reproductions iron nuts are nearly always used. It: gradually developed into a thin oval plate embossed with moldings, sometimes with centre design, and the bail, fitted into posts, falls out-

c-fi i e Pˆa*-e> preserving the same curve, otill later came the knob and empire rosette handles, sometimes with ring, usually of brass but also of glass or plain wood.

Chests. — No matter how meagre an inven¬ tory, it always included a box, chest or case. First the ordinary ship s chest of pine with iron handles, which was appraised very low. There are several good examples of these in State historical societies, including one brought over in the Mayflower. Few of these were made after 1725. The oldest carved chests were in low relief with often the date and name of the person for whom it was made; they were after¬ ward made with one drawer, having panel or turned ornaments. This developed into the “chest of drawers,® made of oak and more elab¬ orately decorated, which in turn developed into the ((chest upon chest,® sometimes having as many as nine drawers, and the three-tier “steps® for displaying china was sometimes placed upon these. The ((high-boy)) is not men¬ tioned until the chest of drawers was placed upon a frame about three feet high, having one or more drawers; it had six legs, and later the part where the centre legs were omitted was finished with “drops.® This, in the latter part of the 18th century, became a very handsome article of furniture, with carved top, usually “shell® or

“sun® pattern, decorated with gilt torches or balls and cabriole legs and carved feet.

The Dressing-Table, or “low-boy,® came from England in 1716. At first it had but one drawer, afterward it was the same as the frame for the “high-boy,® only about three inches lower. The “high-boy® and “low-boy® were often made to match. The Chippendale and Sheraton designs were usually furnished with dressing-boxes and mirror.

The Settle was an evolution of the chest. Handsome examples are rarely found in this country, although there are many varieties of the “fire-side® settle in painted pine and oak found in New England, with a shelf to hold a candle. The settles which appeared in the latter part of the 18th century, following the Chippendale, Sheraton and Heppelwhite designs, might better be termed sofas, which later took on the Empire designs, with “claw-qnd-ball® and

ˆwings-and-claw® feet, and t(cornucopia® and “swan-neck® ends.

Beds were among the first and most fre¬ quently mentioned articles of furniture in wills, being highly prized. In the 17th centufy the Southern planters owned elaborate European bedsteads, usually of oak. In New England they were very simple affairs, while among the Hutch the bed, at first, was only a sort of bunk, ihe tour-poster soon supplanted all, first of oak, but later oi mahogany. Some were most elabo- rate, with rope-carved, or pineapple and acan¬ thus-leal posts, and ball-and-claw feet, with tester drapery valance, curtains and coverlet to match, ot white or bright-colored materials, chiefly drugget, linsey-woolsey or dimity though later chintz was popular. In the South’ mosquito canopies were prevalent, sometimes colored to match the color scheme of the room heather beds were universally used, resting on ropes or sacking pulled taut, and owing to their height, bed steps® were necessary. We also find mention of turkey feathers and cat-tails being used as fillings, and early in the 18th cen¬ tury hair mattresses appeared.

Cupboards were usually built into the wall, and whether called “livery.® “court,® “stand- mg® or “press,® were all fitted with light mov¬ able shelves to hold linen and display china and glass, ihere are few of these open cupboards to-day First the upper part was enclosed with doors (later ones show glass doors with lattice work), afterward a drawer was added, then the lower part was enclosed, and when fitted with lock and key was highly prized as an article of ˆUnni/Uref These partly opened cupboards were au e<7 meaufait,® afterward contracted to boufet.® Closed-in cupboards show German as well as

Dutch origin, and the finest examples were found among the Dutch, usually spoken

rl . sse> carefully carved and painted.

Chairs are scarcely mentioned before 1650 forms or benches being used almost entirely' the chair being considered the seat of honor but toward the end of the century there was a marked increase in the numbers mentioned in the inventories. They were made of oak, pine and walnut, turned or paneled, simply carved and with high backs, the seats either rush or cane. About the 17th century we notice leather and "turkey-work® seats with brass nail-heads. The "ball-and-claw® foot, introduced by the Dutch, appeared at the close of the 17th cen¬ tury and remained in favor for nearly a hun¬ dred years. Chairs made of wicker and cane were known as early as 1711, and in 1720 came the painted chairs from Holland, usually black, often decorated, with rush or cane seats. The Windsor chair, first made and used in Philadel¬ phia in 1725, was the most popular style up to the 19th century. It was usually of hickory or ash and had a wooden seat, the back was high and either "spindled® or "fan-shaped,® some¬ times having an extra headpiece. The style known as Chippendale appeared in 1720, the development being apparent before Chippendale worked. Its chief characteristics were the traceried splat, bow-shaped back and cabriole legs, also the "plate-backed,® which was a solid splat, usually jar-shaped, and hoof feet. The all-upholstered "wing® chair seemed to be in general use before 1750. Mahogany was now easily procurable and the tendency was toward greater lightness, and most of the designs, from

now on, follow the English cabinet-makers ; Chippendale* with a strong Chinese influence, then Sheraton and Heppelwhite, some being beautifully decorated with hand-paintings, Carvings and inlay. In 1770 we have another style, modeled after the old "splat-back,® but with the splats crosswise. About 1800 the style commonly known as "empire® began to be felt, and gave us the "lion® and (

Tables. — What has been said of the develop¬ ment of chairs may be applied to tables, as almost every form of chair had its correspond¬ ing table. First we had the "table-borde,® a board, often 12 feet long by 2 wide, resting on a cross-legged trestle. It gradually became cus¬ tomary to leave the "horde® on the trestle in¬ stead of removing it

after each meal, and it was then known as a table. Marble and slate-topped tables appeared about 1693, and were considered “the latest thing.® Before the 18th century we had imported “chair-top® tables, “drop-leaf® and the “100 legged,® which was the first ex¬ tension table, all with turned posts. About 1735 the Dutch influence was strong, and to-day we have some excellent examples, dating from 1750, of mahogany “pie-crust,® “dish-top,® etc. The “centre-pillar® table came in with the Em¬ pire period. Tea tables were found in every parlor of the 18th century, always ready with complete tea-service, spirit-lamp, kettle, tea-box, tongs, strainer, etc. Among the Dutch the table was frequently of rare or japanned woods, many with adjustable tops. Card tables, of which there were many, usually had a plain surface, though some were covered with green cloth; they had folding tops and corner shal¬ lows for counters. Work tables were mostly of Sheraton design, the top lifting up, disclosing compartments for sewing materials. Candle tables were of various heights, with a top only large enough to hold a candlestick.

Desks. — A desk was originally a wooden box with slanting lid, the writing materials, and frequently the Bible, were kept inside under lock and key, and the top served the double purpose of reading and writing desk. The large desk or “secretary® appeared about 1660 and seems to have been another development of the “chest of drawers,® usually having two or more drawers in the lower half. The lid on the upper part was either let down on chains or rested on two wooden slides. The interior was fitted with many drawers and pigeon-holes, and they had often secret compartments. Later, a cabinet was placed on top and developed into the “cabinet-top® desk, made in one piece and reaching almost to the ceiling. The “table- topped® desk belonged to a later period, a good example being the one used by Washington while in New York in 1789, now in the city hall. There are some good specimens of Sheraton and Heppelwhite desks in this country belong¬ ing to their respective periods. The later em¬

pire or “Colonial® pieces were large and heavy, mostly “bureau-fronts.®

Clocks.— There is slight mention of house¬ hold clocks prior to 1700, but in the 18th cen¬ tury clock-making was quite an art ; the Wil¬ lard brothers of Massachusetts were the first to become famous. Around New York were found some “Frisian® wall clocks from Hol¬ land, run by weights, with elaborate designs of gilded and painted mermaids, cherubs, etc. The English “lantern® clock was on the same order, being of brass with heraldic metal work. This developed into the “bracket® clock, through hav¬ ing a wooden hood placed over it

for protec¬ tion; it was very popular about 1700. The first mention of a tall clock is in the latter part of the 17th century, when long pendulums, also moving figures upon the dial, became fashion¬ able. It was spoken of as “clock and case,® and was very plain, of oak or walnut but later of mahogany. Many of them were destroyed during the Revolution, the works being hidden and the cases, in some instances, used for shipping bayonets. Few tall clocks were made after 1815. After the Revolution cheaper time¬ pieces were in demand, and to meet it, clocks having white enamel dials and wooden works were invented. From then on there were many styles of cheap clocks for walls and mantels, including the “banjo® clock patented by Willard in 1802 ; the “lyre® clock and many “Colonial® designs in wood, some with painted glass cover¬ ing the pendulum.

Looking-Glasses. — The first record is in an inventory in Maryland 1639. They were rare at that time even in England, being imported from Venice. The frames were of olive-wood, black or gilt, and when the glass exceeded four feet were made of small pieces joined by mold¬ ings. Later the frames were heavily carved and inlaid, but always retained the Italian appear¬ ance. We find mention of a parlor in a Mary¬ land house in 1732, “set off with pier glasses.® In New England it hung over the mantel-piece and was known as the “chimney-glass,® usually ornamented at either side with candle sconces. At the end of the 18th century the shield and oval glasses appeared, showing the influence of the English cabinet-makers, followed by the Empire, with rope-carved pillars, acanthus-leaf and lyre carvings, sometimes having the top partitioned off for paintings. What is known as the “Constitution® mirror did not appear until after 1800; most of them bore the eagle at the top.

Mirrors, during the 17th and 18th centuries, were either of convex or concave glass with elaborate frames, and were frequently used for decoration.

Sideboards came into fashion about 1780, taking the place of cupboards and side tables. They were nearly always of mahogany. First after Sheraton, with inlay, noticeably the “bell¬ flower® design down the slender legs ; later “Colonial® of heavy mahogany with the cup¬ boards extending nearly to the floor, ball-and- claw feet and rounded pillars, similar to the bed-posts.

Washstands. — First called a “bason-frame.® Few good examples before the later part of the 18th century, which were influenced by the Eng¬ lish cabinet-makers, and later by the Empire. Warming-Pans were a necessity, especially

in New England. The pan was usually of brass with cover, 14 inches in diameter, with a long wooden handle fastened to the pan by an iron

r«KKC!i w* coa V vver,e Placed in it, and when

ubbed between the sheets warmed the beds.

ey were often decorated with open-work carvings and were quite ornamental hanging beside the fire-place.

Screens were used to protect the face from the heat of the fire, were small, made of embroidery or painted wood, with round or square frame, fastened on a post which could be raised or lowered.

i * r . . We find frequent en-

tnes of articles of furniture for children. Gradies, the first one brought over in 1620 ; high-chairs, also “fenders,® to keep the children away from the fires.

There were several miscellaneous article’s of furniture _ mentioned after 1750, including dumb-waiters,® now called “butler’s trays® * wine-coolers, » «knife-boxes,» «sewing-boxes,» “clothes-trees,® etc.

Collections. Some of the many permanent collections of Colonial furniture may be found in the Connecticut Historical Society, Hart¬ ford, Conn.; the Pilgrim’s Society, Plvmouth, Mass.; the Essex Institute, Salem, Mass.; Van Courtlandt Mansion, Van Courtlandt Park, N. Y. , American Antiquarian Society, Worces-

t^l’i ^jass‘ ’• Historical Society of Pennsylvania, Philadelphia; Washington’s Headquarters, Mor¬ ristown, N. J. ; Independence Hall, Philadelphia, Pa. ; and Mount Vernon, Va.

Bibliography.— Singleton, (Furniture of Our Forefather ; Lockwood, ‘Colonial Furni¬ ture in America* ; Morse, (Furniture of the Olden Times* ; Wallace, ‘Colonial Interiors> ; Chandler, ‘Colonial Interiors*; Corner and Sodeholtz, ‘Colonial Interiors and Exteriors* ; and The House Beautiful (monthly).

Louise Cowperth waite,

Of George C. Flint Company, New York.

FURNITURE, History of Ancient. In the

Far East, in ancient times, little if any furni¬ ture of wood or metal appears to have been used in the household, even the palace dwellers contenting themselves with cushions, rugs, cur¬ tains and other hangings. Of the furniture used by the ancient Jews little is known, though their long residence in Egypt would lead one to suppose they must have learned the art of woodworking, in which Egyptians were so adept. Even the little knowledge we have of the Babylonian and Assyrian furniture is derived, mostly, from sculptured remains; atmospheric influence long since destroyed such pieces of workmanship. Layard and Smith found that Nineveh furniture was ornamented with heads of lions, bulls, rams, etc. One noticeable feature of Assyrian chairs or thrones was the use of human figures as supports of arms, etc. These are conjectured as representing captives. The carved forms of bulls were also used as supports. The tables and couches were of wood and metal encrusted with ivory. Gold, silver and bronze were also used. The luxuriousness of the Assyrian despotic monarchy is fully proved. A Greek author mentions 100 tables and 100 beds, all of gold, piled on the funeral pyre of Sardanapalus. Herodotus tells of al¬ tars, tables and statues of gold in the temple of Baal. The thrones had footstools.

Egyptian. The absence of humidity in Egypt s atmosphere has been the cause of preservation of numerous pieces of ancient native furniture, as well as the vivid depictions of the living habits of its citizens as displayed on the many stone monuments, tombs, sarcoph- agi, etc. Many furniture specimens extant date back 3,000 years or more. The oldest known piece of furniture in the world is the

rone of the Egyptian Queen Hetshepsu, in the British Museum. We find chairs with X legs like our campstools, with heads of geese carved on the lower extremities of the legs. Some egs and chair-rails appear to have been turned on the lathe; they used mortise and tenon joints and their strength of construction is shown in the fact that 18th dynasty pieces hold hrm yet. Seats were of leather, linen cords or plaited rushes. Other pieces extant are foot¬ stools with three legs, ebony settees, tables, armchairs, bedsteads, coffers on legs, flower stands, cushions of woven cloth, mattresses, etc. .Besides animals, human figures frequently act as supports, as found on Assyrian furniture, a.nch I*e the latter, probably represent “cap¬ tives* or prisoners. Chair-legs show delicate curved forms and clawed feet as in modern furniture, with «tie-pieces» and diagonals to brace the slender framework. Furniture has decorations (besides carving) in gilding, inlays of colored stones, glazes, ivory (both of the elephant and

hippopotamus) and different woods. Woods used are acacia, ebony, cedar, sycamore, etc.

Greek.— Concerning the furniture of the ancient Greeks we are far more clearly in¬ formed. The early styles are not of complex construction nor are they subjected to much decoration. A common piece was the four¬ legged stool (diphros), first heavily built, then becoming more slender and inlaid' with ivory and pieces of metal plate. Some had straight legs, others outwardly bent. The tripous was a three-legged stool as its name implies. The folding X legged folding stool (similar to our camp-stool) was in favor from the earliest Greek days and was in two styles, one with curved legs, the other straight, the first being in more common use. In early days these legs actually folded but later, while keeping the same form, they were fixed. The feet' were generally carved to represent the claws of lions or tigers, sometimes the hoofs of stags or goats. These claws often turned inwards. Rarely these chair-legs took on architectural forms. The kathedra was a chair style used chiefly by women and guests. Its form continued, with slight modifications, throughout antiquity. It consisted of four light legs gracefully curved outwards and had a horizontally curved back- board, about shoulder high, fastened to the seat by strong curved supports. Arms are ab¬ sent. The most beautiful curved forms appear to have been made about the 5th century of our era. No decoration is found on such pieces. The thronos or armchair was a show chair for the reception room. In ordinary civil life it was the seat of the master of the house, in official life it was the seat of dignitaries, in the temples the seat of the gods. In pictures, there¬ fore, of ordinary day life we rarely meet the thronos. It was furnished with a back and two arms. The throne seat of honor at public

functions differed from that of the ordinary household in being so high as to need a foot¬ stool to climb into it. In the later styles we find the back straight and so high as to reach above the head of the sitter. The elbow-pieces of the throne seat often terminated in a seg¬ ment of a sphere, later to become an animal's head, usually of a ram. Another early type had massive posts as legs, the heaviness being broken by two palmettes joined together by a stem, the legs being cut into the small size of the stem; such archaic style throne seats have the back rests very low and terminating in a human or animal figure, this decoration appearing at times on each corner of the seat. Another form of leg decoration has volutes where the joints of the front and

back legs meet the seat. Still a.nother throne leg style is the turned <(baluster.ˆ Lastly, there was the massive stone-built thronos used by dignitaries in theatres, for judges, princes, and acting as seats of the gods in temples; some are quite plainly built, others have all kinds of pictorial representation as the Sphinx, griffins and other animals. The Greek bedstead (kliny) closely resembles the Roman lectus in the main and answered for two kinds of furniture of the modern house — the bed and the sofa. But the antique sofa was not made, like the modern, for seating several persons, but was for one person to recline on; in this the dining couches were an exception as they were so large that several persons reclined alongside of each other. Originally the kliny was intended as a sleeping couch and only when the old custom of Homer's day of sitting at meal times went into disuse and one reclined at meals did the kliny find any use except for sleeping. Reclining then became the custom also for writing, studying, etc., and the more diverse the uses for this piece of furniture became the more they ad¬ vanced in art handwork, in alteration of con¬ struction, according to the use they were to be put to, this without changing the fundamental form at all. This main form answers, in gen¬ eral, to the modern chaise longue, having only a raised projection at the head end. They have occasionally head, foot and back pieces, like the modern sofa. The difference, which main¬ tains the bedstead character of the piece, is the absence of fixed upholstering and use of bolsters and cushions. The bedstead {kliny) is made of wood or bronze and consists of an oblong framework mortised to four corner posts and resting on four feet. Over this is stretched webwork or straps (tonoi): This is all that is found in the more primitive pieces. There is usually, however, a raised head-piece and, less frequently, one at the foot that is not as high as that at the head. The Greek bedstead was often so high as to need a stool to reach it. Ancient Greek tables were of two kinds: the tables off which they ate and those used as a dresser. In Homer's time people ate their meals seated at table ; later they ate in a reclining posture. We read of each person, at times, having the meal at his separate table; these must have been small tables with round or square tops. And this fact is further proved by statements that these tables were used as shields in cases of murder. Again we read of a number of persons eating in common at one table. This larger dining table was displaced

by small tables for the drinks when the symposium followed the meal. These tables were oblong and were furnished with three legs, one only at the foot end of the reclining guest at whose couch (kliny) it stood beside. A shelf was sometimes placed below the table- top upon which to rest the utensils after use. The use of only three legs would make

the table more steady considering the unevenness of the unboarded floor. The dresser or display table (abax) was divided into separate com¬ partments in which wine cups were placed; it was a species of cupboard or early credence on which to array gold and silver vessels.

Roman. — As might be supposed, the Roman and Greek furniture are very closely similar, and the earlier Greek civilization afforded the models. The common stool (sedile) was like the Greek dithros; the bench was termed scamnum or subsellium ; their settle was called sella, while the magistrate's stool was known as sella curulis. A special wide seat, without back or side rests, was the bisellium. The Roman cathedra was a magistrate's chair but also designated the comfortable, cushioned armchair of the women. The thronus or solium was the elevated chair dedicated to the gods, kings and other illustrious personages. The Roman bedsteads (lecti) formed several functions, like those of the Greeks, and were called, ac¬ cording to the purposes for which they were intended: Lectus cubicularis was for sleeping purposes and was generally open on all sides (spondus), some had a backboard (p lute us) ; lectus lucubratorius, for study, often had an attachment on which to write; lectus : tricliniaris was used to recline on at meal-times. The Romans favored a rather large round table, for convivial purposes, with one leg (mono¬ podium), a style not found among the Greeks. They were very costly, and had legs of ivory, silver, etc., and the much-prized African thya wood in beautiful grains formed the tops. On such tables were used marble, gold, silver, bronze, engraved and damascened work ; they were even enriched with precious stones. In¬ conceivable prices were paid for such pieces of furniture and we are told that Cicero's table cost a million sestertiae (over $45,000) and that of King Juba fetched over $50,000 at auction. Such tables were not used with the three rectangular couches (tricliniaria) but with a semi-circular sofa (sigma). When the Romans gradually became conquerors of the entire known world their excessive luxuriousness de¬ manded elaborate carving as well as inlays of box-wood, ebony, cherry, holly, terebinth, ivory, tortoise-shell, stained horn, etc. Beautiful veneering was done to bring out artistic designs of the fanciful grains. In furniture construc¬ tion they used cedar, pine, elm, olive, ash, beech, bird's-eye maple, ilex, etc. Bronze tripods of most exquisite designs were a much favored form of stand with the Romans as we know from the numerous examples excavated from ruins.

Byzantine. — The art product of Byzantium or Constantinople was the outcome of the cen¬ turies of war, which ended in the dissolution of the Roman Empire besides destroying all vestiges above ground of the costly furniture of the period. True Byzantine art lasted till about

1202, when the city was taken by the

L,atinV \ differed from the Classic art in absmbmg Oriental motifs and combining them with Creek in a manner that has ever since had world admiration. With centuries of luxury and piolific ait production nothing remains of her furniture except several chairs or ((thrones ˆ supposed to be of Byzantine origin. The Icono¬ clasts did more to destroy the city's art work han all the devastation of the passing cen¬ turies. The so-called ((chair of Saint Peter** in the basilica of that saint in Rome belongs probably to a date between the 4th and 6th centuries. Its arcaded back and other details show mixed styles of Classic Greek, Asiatic G#eek and Persian. Another supposed Byzan¬ tine chair is in San Marco, Venice. In the later days of Byzantium furniture became lux¬ urious and was ornamented with gold, silver and precious stones. There is a seat ' in the British Museum with a high back which may be of Byzantine make. The so-called Saint Maximiman's chair, at Ravenna, of this period, is of wood overlaid with plaques of ivory carved with scenes from the life of Joseph, but some of the workmanship, at least, is certainly of later -date.. From manuscripts we learn that beds of this period were of old Roman form. The former custom of reclining at meals ceased and guests sat at table.

Romanesque.— 1 his style is sometimes termed <(Romano-Byzantine** and (

Bibliography— Baumeister, A., (Denkmaler des klassischen Altertums* (Leipzig 1888) ; id.,

Clement W. Coumbe.

FURNITURE, Mediaeval. Much of the few pieces of furniture used by the nations not reached by Byzantine or Romanesque in¬ fluences was without decoration and consisted of bare boards fastened together. But under Gothic influence the pieces of utility began, in the northern countries, to receive some artistic attention. The wealthy alone owned anything outside of chests and settles. The bahut (chest) of the nobility was used as a piece of furniture when not traveling. It acted as a seat, a bed, and often as a table, and when change of place was at hand the bedding, hang¬ ings of leather or arras were packed into the bahut. The chest was also known as a huche, and the chestmakers or carpenters were called huchiers. Continuous warfare subjected Eu¬

ropeans to very frequent and hurried change of abode and the court and nobles had little use for the comforts afforded by much furni¬ ture. In early mediaeval times the Church alone, with its altars, choir-stalls and patriarchal chairs, possessed permanent, substantial fur¬

niture. In « the absence of actual specimens

aˆcc aVG jt0i on illuminations in old

Mbb. and the inventories attached to old wills, for information as to the household equip- menl- Ty the 11th century we find dressoirs, cup bordes (on trestles) ; and the armoire takes an early place with the faldestool. The bed¬ stead was built into the wall. Even the lux-uriousness of the French was one more of show than of comfort right into the 15th cen¬ tury. And, while we read of beautifully carved wainscoting and ceilings, these rooms held but eV. chairs, mostly hassocks (carreaux) or cushions carved bench, perhaps, while the mag¬ nificent bahuts, . architecturally constructed and decorated, hold immense services of the precious metals to be displayed on state occasions (their silver and gold services representing their only realizable wealth). When a medium of ex¬ change was needed this precious metal was melted down for payment.

European Furniture.

Italian Furniture. — The Gothic style never gmned a full hoJd in Italy, for, as Dr. Semper says: Already by the 12th century the Renais¬ sance era was opened in furniture, especially in Italy. Most of these Gothic pieces are found m the church furnishings, as closets, with Gothic faqades, and were used in chapels, choirs, sacristies, etc. For a short period in the 14th century Gothic architectural motifs were used in structural parts as niches, pillars, balus¬ trades, etc. When (1453) Mohammedans captured Constantinople, the Greek artists, fleeing to the west, brought back the grand Classic traditions and the Renaissance blos¬ somed forth. A favored method of decoration was painting and the craftsmen’s guild of Saint Luke, in Florence (1349), admitted artists as members. Woodcarving advanced in artistic merit, but the greater fondness in the 15th cen¬ tury was still for painted panels for the great wall cupboards (credences) and coffers (cas – soni), and even chairs and bedsteads. The tendency was toward depictions of Biblical sub¬ jects, history or fable. The Florentine artist, Dello, did much fine painting on woodwork! Along with this fondness for painted furniture there was an increasing fondness for the mar¬ quetry work (called intarsia), which, starting with geometric inlays, of black and white woods, had advanced, by the 15th century, to

historical and landscape representations in stained woods with_ very realistic effects. Giovanni da Verona is said to have invented the staining of half-tones with oils and acids. Giulio Majano and Benedetto da Majano, Guido Servellmo, Domenico di Marietto, Baccio Cel¬ lini, Girolamo della Cecca were noted in that period. In the 16th century great Italian mar¬ quetry artists were the family of Bartolommeo de Pola, and the ecclesiastics Giovanni, Raf- faello and Damiano. Venice became the most active centre and her marquetry work was in demand all over Europe. The trecento, quat¬ trocento and cinquecento styles of decoration were each well represented in their periods by the furniture makers of Italy. The credence or _ dresser developed into a true sideboard, losing its open shelves. The cabinet grew out of the press or closet. Tables were soon most ornately carved. Bureaus of drawers came into being in the Renaissance. The heavy

Gothic bedstead became a light frame with slender posts (columns) supporting a canopy tapestry or brocade, and the high head- board showed magnificently carved designs such as the owner's heraldic bearings. Lovely screens were in use in stamped leather or with painted decoration. The cassone (marriage chest) became more and more ornate, receiving beautiful decoration in gesso relief, gilding, intarsia and wood carving. An artist noted for such work was Andrea di Cosimo. The 17th century saw the development of book¬ cases and writing desks as part of the furniture of the wealthy. These were formerly only seen in the great libraries or used by Church digni¬ taries.ˆ The true couch belongs to this period — a piece of furniture for day comfort entirely apart from the bed.

French Furniture. — The Gothic style ruled supreme in the designs of French furniture up to the 16th century; that is to say Gothic archi¬ tectural motifs and outlines formed the con¬ structive parts. In the 16th century Italian in¬ fluence sets in and we find Venetian marquetry arabesques adorning the furniture. Francis I, through his campaign in Italy, brought the Renaissance style to France and we find great carved work in caryatids, grotesques and sculptured human heads protruding from medallions in miniature garrets, heavy garlands of fruits. Mythological and allegorical sub¬ jects appear on the marquetry panels. Archi¬ tectural pediments crown the furniture, the <XIII all decora¬ tion as well as the furniture itself is character¬ istically heavy, including the columns, car- touches, garlands,

balustrades, furniture feet. The motifs are Renaissance but the light¬ some and open work is gone, all is opaque and sombre. . Panels are sometimes octagonal. The cabinetwork begins to show the influence of the Flemish ebenist (cabinet-maker), for the king had sent artisans to the Netherlands and they had brought back the Flemish Renaissance technique. The queen was_ Spanish and she introduced Moorish traditions (mosaic in¬ crustations of mother-of-pearl, ivory, etc.). The chaise a vertugadin was armless to allow ladies to sit with their immense spreading far¬ thingales. Chairs had often straight medallion- backs; armchairs were of wood entirely; set- tles, generally bare, had leather or cane seats. The Louis XIII cabinet is typically heavy; it succeeded the dresser and had channeled pil¬ asters to break the front surface; statues in niches were in the upper tier, the swinging doors were paneled. The queen's Spanish goldsmiths made some furniture pieces of solid silver.

Louis XIV Style. — The pompousness of the ((Grand Monarch" is reflected in the furniture as a prevailing feature till toward the end of his long reign, _ when the Berain style of minute¬ ness and delicacy arrived. With Colbert as Controller-General, ruling the decorative arts with his genius and enthusiasm, with the Lou¬ vre and Gobelins factories, aided by the Aubus- son and Beauvaix furniture tapestries, France produced furniture that astonished the world and was able to discard Italian and Flemish styles for new conceptions. To this reign be¬ long the art products of the genius of such artists as the sculptors Caffieri, Tuby, Anguier;

the engravers Le Clerc, Audran, Rousellet; the cabinet-workers Boulle, Cucci, Oppenord, Poi¬ tou, Varin; and designers LePautre and Be¬ rain. The heavy first phase in the Louis Qua- torze period is heroic or Roman decorative treatment (trophies of Roman arms, allegorical and mythological figures, cornucopias, car- touches with bulging fields). In the late phase of the period the minute detail decoration of ˆchinoiseries" by Berain commence, to continue into the Regence period. Pieces of furniture are broad, heavy, stiff armchairs with capacious backs and massive arms and legs ; the couch (lit de duchesse) was introduced, also the screen and fire screen of lacquer. Some pieces of furniture are of solid silver. Rosewood ve¬ neer appears late in this reign. Bedsteads have plumes (panaches) at the four corners of the canopies. Stiff, heavy, capacious, but grand, is the type of furniture of <(le Roi Soleil."

Regency Style. — The King Louis XV was five years old on the death of Louis XIV, and Louis Philippe of Orleans was made regent. The

light, graceful arabesques of Berain, the drawings of Oppenord, the “singeries” (ape- groups) of Gillot were inherited in fresh, form from the later years of the former reign. Charles Cressent gave life and exquisite beauty to furniture pieces with his talented sculpture work ornament, in bronze, brass and or-moulu, his delicate tortoise-shell marquetry, inlays of colored woods, etc. Financiers, merchants and the wealthy bourgeoisie were taking promi¬ nence in luxurious surroundings. Meissonnier and Thomas Germain brought their genius into this period. In decorative motifs we find the shell (coquille), used often in the Louis Qua- torze period, is pierced and more or less con¬ ventionalized. Multiplied opposing curves and volutes frame panels and mirrors. It is the be¬ ginning of the «rococo» decoration. Chiseled copper and bronze gilt are profusely used in ornamentation of wardrobes, bureaus, chiffon¬ iers and sidetables. Corners of furniture dis¬ play high relief busts of women. Legs bend to ˆcabriole” curves; tie-pieces are discarded leaving the legs free. Vernis-Martin (see Lac¬ quers and Lacquerwork) furniture is in vogue. Chairbacks are of rounded outline and concave ; chests of drawers acquire styles «a la Reeence » (

Louis XV Style. — The fashions in furnish¬ ing changed considerably in this reign on ac¬ count of arranging the dwellings (formerly im¬ mense rooms) into small apartments of cozy dimensions. With the arrival of these small comfortable suites of rooms, the furniture be¬ comes of reduced size and takes on bolder curves and “bombe” fronts. The “rococo” style with its opposed C’s and fantastic shell- work was in full vogue till 1750, when Ma¬ dame Pompadour converted the court to favor a return to Classic models (first termed d la reine). Cressen s genius was now rivaled by Oeben and, later, by Riesener. Other great cabinet-makers were Duplessis, Hervieux, Ber¬ nard, Boudin, Olivier, Joubert, etc. Jacques and Philippe Caffieri (sons of the noted Caf¬ fieri of the last reign) did lovely furniture dec¬ oration. Gladbach came from Cologne and Gouthiere did master work in metal adornment on Riesener and other creations. Boucher painted entrancing cupids. The “Duchesse”

FURNITURE

Permission of Metropolitan Museum of Art, New York

1 American Serpentine-front Desk; Mahogany, 1765 1800 2 English Arm Chair. Chippendale style

FURNITURE

Permission of the Metropolitan Museum or Art, New York

2 Mahogany Table. Irish Chippendale style 1730-50

1 English Table; Spruce, gilt lacquered

FURNITURE, EUROPEAN

1 Louis XIV Room, Metropolitan Museum, New York

2 Gothic Room, Metropolitan Museum, New York

FURNITURE

long chair often was divided by partitions: ecoxnqons (corner pieces) or encoignures ad¬ mirably adapted themselves to these small rooms. Hand-made Aubusson and Beauvais tapestries were coverings for chef s-d' oeuvres, besmes satin, velvet-plush, embossed taffeta, chenille, silk brocatelle, etc., in soft-toned

*?ie chair seats were caned, some gilded. Marquetry grew into still greater tavor. irophy motifs are now tied with rib¬ bons and contain bouquets of flowers, groups of musical instruments, quivers (carquois), torches, doves, cupids and other Love emblems, io the comfortable «bergeres» are added «mar- quises,') ˆvH-a-vis® and sofas. Fire screens and folding screens continue greatly in favor. Imitation Chinese lacquers are the rage (vernis Martin), with decorations of pagodas, pastoral scenes, groups of gallants, etc. Lacquer artists ot note are Watin, Lequay, Girardin. The harpsichord (clavegin) became a favored piece of furniture. Bedsteads remained as in the Regency, those d la duchesse having no posts. Large chiffoniers had sliding-doors. Writing tables often had flat tops, fluted legs, chased bronze decorations. Cylinder bureaus were in use. "Coquilliers,® or shell cabinets came into vogue, for conchology was a popular fad. These and other cabinets, toilet tables, gueri- dons, etc., have as decoration cartouches and escutcheons set always oblique (it is rococo). Armchairs had their arms set halfway- back on the seat to allow room for the ladies' hoops of the crinolines in fashion.

Louis X VI. — With the advance in the exca¬ vation of the beautiful furnishings of Pompeii and Herculaneum, the Classical style came into full power in the decorative arts. Furniture was built on more rigid lines, but light and portable, even slender, not on the Louis Qua- torze massive scale; the former contorted panels now become rectangles

with plain lines. A list of tables must include work tables, toilette tables, gueridons (small round tables), (

makers were Roentgen, Beneman, Saunier, Schwerdleger, Avril, Carlin, Lavasseur. Rie- sener continued his successes. Noted carvers were Gouthiere, Clodion, etc. Thomire was a talented bronze worker.

Empire.— War had done its work. Art talent and inspiration were dead. Caesarism produced mediocre copies of the Roman models in the coldest form. We find curule chairs, re¬ ferring to the Consulate; candelabra (lampa – daires) ; there are ((Neptune® beds, ((trophy» beds. Tables are mostly round, and consoles, pier-tables, etc., have frequently marble tops. There are bookcases, cabinets, secretaires, dress¬ ing tables, all in the sombre, heavy, exaggerated ((Roman® lines. Desks often have a hinged flap that lets down. There is an excess of veneer¬ ing. Mahogany is in its fullest vogue, but does not lend itself well to the chisel ; it best dis¬ plays itself in architectural molding and turned work. Its mottled and veined beauties show best, in flat, polished surfaces. The decorative motifs are the sphinx, war trophies in Roman style (helmets, glaives, etc.); the consular fasces with projecting axe refer to the con¬ sulate of Napoleon; swan-necks are frequent as supports ; rams' and lions' heads are common, also the anthemion. The initial N surrounded by a laurel wreath is ubiquitous. The imperial eagle perches everywhere; Liberty (Phrygian) caps and <(winged Victories® abound. The Jacob brothers were leading cabinet-makers; Thomire did fine bronze decoration. Architect Perrier devoted time to decorative furniture de¬ signs, Fontaine also.

German Furniture. — Germany was in utter pagan barbarism until the English monk Win- frid (about 718) with his missionaries preached the Gospel there. He was murdered there in 755 and canonized (as Saint Boniface) later. In the course of his activities he built Catholic churches and monasteries at Saint Galle, Fulda, Reichenau, Saint Emeran, etc., and in these establishments his followers trained native arti¬ sans in woodwork and metalwork. They formed schools and centres for all the arts. They became, by this means, participators in the Carlovingian epoch. But till the 13th cen¬ tury the arts were almost entirely devoted to the Church. Secular furniture remained mostly roughly carpentered pieces, such as trestles and boards for tables, benches of wood for table seats, benches of stone or brick built into the walls for the retainers. The earliest pieces in the decorative arts show Byzantine tendency, then Byzantine-Gothic. With the 13th century the Gothic style of architecture arrived and, of course, the decorative work on furniture was on strictly architectural lines. Gradual advance¬ ment in civilization and wealth brought to the

middle classes the pieces of home furniture conducive to comfort in civil life. Augsburg, Nuremberg, Ulm, Ratisbon, Luneville became industrial centres with artistically furnished homes. Artist decorators produced fine carving and elaborate furniture construction, and en¬ gravers and artists aided with clever designs for the artisans. These latter so-called ˆLittle Masters® had among them such talented genius as is found in the work of J. Collaert, Theodor and Johann de Bry, of Frankfort, Virgil Solis of Nuremberg Dieterlin, etc. And as produc¬ tions of these talents we get the most interesting

art effects in woodcarving. The German cab¬ inet-makers made beautiful pieces of furniture rich in architectonic design enriched with grotesques, grimacing human faces, etc., boldly yet minutely carved. The German bureau (Kunstschrank) with its architectural facade, its multitude of incrustations, and its cleverly hidden secret drawers, was so popularly useful as to have a great demand for over a hundred years. But German woodcarvings are the great inspiration the world over, rivaling the Italian though differing so entirely with the Teutonic love for the feudal and Gothic treatment. Noted workers of the 16th century were Krug, Flotner, Teschler, etc. Peter Vischer, Korne- mann and others brought the Italian Renaissance to Germany, and the great advances and pro¬ lific work of the second half of the 16th cen¬ tury were continued into the next century. Marquetry and encrusted panels, also ((pietra dura® or Florentine mosaic (inlays of colored pebbles), ivory and mother-of-pearl inlays were beautifully carried out on bureaus as in Italy. Nuremberg and Augsburg were the centres for such cabinet furniture. Ulrich Baumgarten, maker of the renowned ((pommerscher Kunst¬ schrank® (now in the Berlin Museum), was of Augsburg. This art object was built for Phillip II of Pommerania and took 25 years to deco¬ rate. Phillip Hainhofer was his partner. Lorenz Zick of Nuremberg did wonderful open¬ work in ivory. Locksmithing was a German art carried to great perfection in that century with its picturesque metal artistry in chiseled and beaten iron in great and elaborate designs. War in Germany in the 18th century destroyed all chance of notable advancement in the decora¬ tive arts ; and in the latter part of that century the Louis Quinze style was saturating all artistic endeavor throughout Europe. In the 19th century the great evolutions in furniture brought about by the English cabinet-makers carried everything in the way of opposition before it.

English Furniture. — From its insular posi¬ tion England’s progress in

the furniture and cabinet-making art has been, at different per¬ iods, a tardy copying of Continental styles when traveling experts visited her shores, of develop¬ ing entirely original conceptions of construction or decoration, or of blending foreign and native methods and motifs. Its earliest, crude work is as its neighbors.

Tudor Period (1485-1558). — Pollen says: <(The Tudor style denotes that particular modi¬ fication of Renaissance mingling with Gothic art, which arose in England under the first four sovereigns of the House of Tudor® (Henry VII, Henry VIII, Edward VI and Mary), ((but more especially under Henry VIII.® The development of this style under Elizabeth is called Elizabethan. Henry VIII greatly en¬ couraged the arts and, as patron, invited for¬ eign talent to his court. Artists and artisans alike found profitable patronage. It has been termed the "English Renaissance,® Carving done by native hands is crude flat work, but inlay work shows advance. The "linen fold® pattern carving for panels was in use by the end of the 15th century. Gothic ornamental decoration prevailed till Henry VIII severed relations with the Catholic Church, when Renaissance treatment commenced. Tudor

tables were narrow (evolved from the narrow trestle board) ; they had heavy stretchers sev¬ eral inches from the ground to keep the feet off the cold, damp, rush-strewn stone floor. The credence table or dresser held the foods served at table, and some had enclosed closets below to hold broken food, and shelves above to dis¬ play plate. Chairs (a rare piece of furniture till Henry VIII) during the first half of the 16th century were similar to the French; the currule X-legged chair came into favor about 1530 with curved decoration in front, and the curve at the back had projections above and leather bands stretching across the back to lean against. The "thrown® (turned) spindle chair was for bedrooms and stayed till the end of the 1 7th century. "Joined® or "joint® stools were in later days called <(coffin® stools, being supposed to have been used to support coffins in churches, but were really for private residences. Those extant are mostly Jacobean. Benches and forms were the retainers' seats. Tudor settles were boxed in below and used for storage purposes as well as seats ; panels were often carved. The high backs were to keep off draughts, and they were placed at right angles to the fireplace. Monks' bench- settles had backs that could be let down to form a table resting on the arms. In the 15th and 16th centuries the coffer (called often huche and bahut) was the principal piece of furniture, serving as bed at night and seat by day; it held the textiles used for comfort and adornment. The highly decorated Gothic ones, seen in museums, are mostly muniment chests and held church furnishings. Tudor beds had "testers® supported on four posts.

Elizabethan Period (1558-1603). — The anom¬ aly of Elizabethan furniture is that the earlier pieces are far superior to the later. The Ital¬ ian, French and Flemish artisans brought over by Henry VIII continued their fine work at almost princely pay. The native makers, al¬ ready lacking in skill and genius, under the •competition, had to produce the cheaper pieces for common use only and, consequently, de¬ pended on the quick action of the lathe and rapidly but poorly executed carving. Chairs in this period are more in number but not in common use. They are heavy ceremonial furni¬ ture with large seats (hoop petticoats are still worn), and have high, carved, paneled backs, heavy stretchers. Alongside these we see the native spindle (turned), rush-bottomed uncouth pieces. A parlor was added to the living rooms necessitating more decorative furniture. The “withdrawing® table with its “melon-bulb® sup¬ ports originated with the Italian Renaissance artisans ; its legs had carved acanthus and grape-bunch decoration. Its name was de¬ rived from the two slabs that could be with¬ drawn on runners so that the table could be -extended by dropping a centre slab in the opened space. The <(court cupboard® came into use. “Day-beds® were in use, for Shakespeare mentions them ; those extant, however, are Carolean or Jacobean. Headposts are not used because the “tester® is supported by the high head-paneling. We find “nail-head® ornament often on furniture. ((Elizabethan strap-work® is a species of intreccio or interlacing flat band-work.

Jacobean Period (1603-1689). — This includes

the reigns of James I, Charles I, the Common¬ wealth or Cromwellian period, Charles II or the Restoration and James II. It has also been termed the Stuart Period. The reigns of the two. Charles have been termed the Carolean Period. Woodcarving, descendant of Eliza- oethan days, is now in its lowest stages. It consists of “scratch carving® largely; this is done by the primitive method of drawing an outline of the design, then excising these lines. Another style is done by chiseling and goug¬ ing out a little of the surface and leaving the motif or design in the original flat surface.

Split balustre® was a favored decoration, also pendants on corners of cornices. In panel work the Jacobean Period holds a high posi¬ tion ; typical is the “rising® panel built up with moldings so as to project beyond the surface of the carcase. Lozenge-shaped bosses are often

found on panels. Chairs became so com¬ mon in the 17th century that even children and servants used them. The upholstered chair usually had straight legs and straight back ; there was an open space at the bottom of the back as the upholstering did not start at the seat. Until the Cromwellian time upholstering in finer material had a tasseled border, but in the Commonwealth period, leather (chiefly pig¬ skin) was mostly used and the edges fastened with brass-headed nails. The front brace dis¬ appears as better flooring made a foot-rest un¬ necessary. Cromwellian legs were either turned or rectangular, always straight. Side tables with round tops in two pieces, one of which could be let down or “dropped® by turning a pivoted leg, belong to this day. All Puritan pieces are very sober, simple and strong. Some leather chairbacks were quite low. With the return of Charles II from French exile (Res¬ toration) the style became ornate and French. Stuart furniture legs are typically spiral turned, on chairs, tables, drawers, cupboards. Inlays continue in bone, mother-of-pearl, ivory, tor¬ toise-shell. Walnut, solid and veneered, takes the place of oak. In the fashionable marquetry work we find apple, pine, plum, lignum vitae, pear, yew, box, holly; some is burned or stained to get the desired color. Engraving is sometimes found in the inlay. The so-called “oyster-veneer® is produced with cross sections of walnut branches. The number of drawers in furniture increases as clothing becomes more plentiful. “Court-cupboards® and “bread-and- cheese® cupboards are in most households. Jacobean coffers lose architectural design and take on decoration of acorns, drops as pend¬ ants, lathe-turned beads, split-spindles, etc. Geometrical designs prevail. They stand on globular or egg-shaped feet. Small tables are in vogue as tea-drinking came into fashion; the “gate-leg® was a favorite table (it is fre¬ quently termed “thousand® or “hundred® legged) because it could be reduced to almost the space of its balustres. The Elizabethan ((melon-bulb® protuberance on furniture sup¬ ports had dwindled to balustre knobs, but now grew into a big ball, half-way down the leg. Cane and open work appear in chairbacks, dis¬ placing leather, in late transition pieces. Day- beds are now of walnut.

Queen Anne Period. — In the short reign of William and. Mary the only change was in the form of imported pieces. The Queen

Anne style continued all through the reign of George I, but only arrived rather late in the queen s reign. Seats had been largely cane-bottomed till now and loose cushions were used on them. The upholsterer in this style did the chief work in the production of furni¬ ture to sit on. The stiff, angular wooden seat and back of chairs were

no longer common usage. -Chairs were built to the shape of the human form and softly padded, seat and back. The same with couches and settees. Seat frames are rounded in front, arms are scroll form and set half-way back to allow for the spreading crinoline. The double chair became a favorite and is called also a “love-seat.® “Turned® (spindle) chairs with high backs, called ((Windsors,® came into use. The “wing- ear® or “grandfather® chair was perfected as an evader of draughts. The cabriole leg came into general use now, but was seen also in William and Mary’s time. In decoration we see the scallop-shell; and the ((claw-and-ball» feet are on fine pieces. Splats appear in fur¬ niture-backs. Tables of Jacobean style persist in early walnut examples and the “inverted bowl® appears on balustred legs. Stretchers are carved and “tied® (X form). Inlays are frequent and show great perfection. Early examples of bureaus have an overhanging upper story, but, in general, they are in present-day form by 1710. Chests of drawers show brass drop handles, mostly pear-shaped, and the brass escutcheons are usually openwork. These had three or more drawers on a stand which had or had not drawers. Now from one to five drawers are in the stand. The “high boy® or “tall boy® came into being with 8 to 12 drawers. Cabinets for curios belong to this time in which collectors displayed behind glass doors their bric-a-brac, for Chinese porcelain collecting was a craze.

Georgian Period (1727-1820). — The styles of furniture in use during the reign of George I were those passed over by Queen Anne; this furniture has been styled by some “Early Georgian.® To it belongs the “Hogarth® chair and the gilt pieces that stayed in vogue. The period, so full of furniture talent (1735 to 1805), with the achievements of Chippen¬ dale, Adam Brothers, Heppelwhite, Shearer and Sheraton has been called “Mid-Georgian.® The following period marked by decadence and depraved fashions has been termed “Late- Georgian.® William Kent, the architect, in¬ cluded furniture in his work when he returned from his studies of antiques at Rome, but he included the prevailing French styles in Classic work, till his death in 1748. With the brothers Adam decoration conformed rigidly to the Greco-Roman and their styles in furniture were immensely popular from the middle to the end of the century. The Chippendale and Heppel¬ white creations were adapted to the Louis XV interiors then so popular. Heppelwhite, Shearer and Sheraton worked to fill interiors in Louis XVI style, in fashion at the end of the century. In the early 19th century Sir William Chambers gained some popularity with his Chinese motifs in , furniture. This is the age of mahogany.

Bibliography.— Ba jot, E., ‘Encyclopedic du meuble du 15e siecle jusqu’a nos jours> (Paris 1900-09) ; Bayard, E.,

styles/ (Paris 1913); Benn, R. D., (Style in Furniture5 (London 1904) ; Binstead, H. E., (The Furniture Styles5 (Chicago 1909) ; Blake, J. P., and Reveirs-Hopkins, A. E., (Little Books About Old Furniture5 (New York 1912) ; Burgess, F. W. /Antique Furniture) (New York 1915) ; Candee, H. C., 'Jacobean Furniture) (New York 1916) ; Champeaux, A. de, 'Le Meuble5 (Paris 1885) ; Clouston, j R. S„ (English Furniture of Furniture Makers of the 18th Century5 (London 1906) ; Fenn, F., and Wyllie, B., (Qld English Furniture) (Lon¬ don 1909) ; Foley, E., (The Book of Decorative Furniture) (New York 1911) ; Graul, R., 'Das XVIIIte Jahrhundert Decoration und Mobiliar) (Berlin 1905) ; Guerin, J., 'La Chinoiserie en Europe au 18e siecle5 (Paris 1911); Havard, H., 'L'Art dans la maison) (Paris 1884) ; id., 'Histoire et philosophic des styles, (Paris 1899-1900) ; id., 'Dictionnaire de l'ameuble- ment) (Paris n. d.) ; Jacquemart, A., 'A History of Furniture) (London 1878) ; Hay¬ den, A., (Chats on Old Furniture> (London 1905) ; Labarte, J., 'Handbook of the Arts of the Middle Ages and Renaissance) (London 1855) ; Lambert, A., and Stahl, E., (Das MobeP (Stuttgart n. d.) ; Leixner, O. von, 'Einfiihrung in die Geschichte des Mobiliars und die Mobelstile5 (Leipzig 1909) ; Litchfield, F., 'Il¬ lustrated History of Furniture) (London 1907) ; Macquoid, P., 'A History of English Furniture5 (London 1904-08) ; Molinier, E., (Les meubles du moyen age et de la Renais¬ sance5 (Paris 1897) ; id., (Le Mobilier au 17e et au 18e siecle5 (Paris 1898) ; Moore, N. H., 'The Old Furniture Book5 (New York 1903) ; Morse, F. C., 'Furniture of the Olden Time5 (New York 1913) ; Pollen, J. H., 'An¬ cient and Modern Furniture and Woodwork5 (London 1908) ; Robie, V., 'Historic Styles in Furniture5 (Boston 1916) ; Ris-Paquot, O. E., 'Le mobilier et objets qui s'y rattachent5 (Paris 1893) ; Singleton, E., 'Furniture' (New York 1911) ; id., 'The Furniture of Our Forefathers5 (New York 1901); Timms, W. H., and Webb, G., 'The 35 Styles of Furniture5 (London 1904) ; Wheeler, G. O., 'Old English Furniture of the 17th and 18th Centuries5 (London 1907).

Clement W. Coumbel

FURNITURE INDUSTRY IN AMER¬ ICA, The. The early cabinet-shops of America were like the second-hand repair-shops to be seen to-day in New York, Boston, Philadelphia, and other large cities. A great many cabinet¬ makers made furniture until late in the 1st cen¬ tury of commercial independence on simple Chippendale lines. Gradually the Empire fashions, which were making themselves felt all over

Europe, spread to America, and shapes became heavier and more pretentious, mahogany being used almost exclusively. Heads of ani¬ mals were also used, and claw-feet became a general feature. Common furniture was heavy and unattractive. The general condition of things at this time was unfavorable to the de¬ velopment of art industries. Little thought was given to progress in the manufacture of furni¬ ture and for some years there was a decline. Upon a revival of commerce cabinet-makers changed their style, and began producing a de¬ based rococo style, which did not have the elegance or character of the Louis XV, but was

covered with a florid ornamentation in which the only consideration was display. The ex¬ travagance of curves and lavish ornamentation brought about a reaction, and toward 1830, fol¬ lowing the fashion in England and France, an attempt was made to construct furniture in the Gothic style, but with very unsatisfactory re¬ sults. The lack of artistic training of the man¬ ufacturers who were, as a rule, cabinet-makers or carvers by trade, made it very difficult for them to handle a method of decoration and construction so little appropriate in itself to the requirements of home comfort. This Gothic style of furniture, monumental in ap¬ pearance, was made to a limited extent only, although its influence is to be noticed on other furniture placed on the market at this time and later. The making of rococo furniture was kept up by a large number of cabinet-makers, the cheaper furniture being for many years made in this style. It was also during this period that steam, applied to cabinet-makers' machinery for the first time in 1815, occasioned a revolution in the manufacture of furniture, bringing labor- saving devices into more general use, and enabling the cabinet-maker to supply the rapidly increasing demand for his product. In 1825, Richardson, of Philadelphia, introduced the cir¬ cular saw, and Taylor, Rich & Company erected the first mahogany-mill in America, a number of these saws being used there. Ordinary furni¬ ture, which until now had been very plain, was covered with endless scroll-work and moldings, produced so easily by the new machines. The manufacturers indulged for a time without re¬ straint in this ornamentation. The use of ma¬ chinery in shops, and the increased facilities for transportation, wrought a wonderful improve¬ ment in the furniture trade; and the cabinet- shop, which had until this time been of small importance and partially engaged in making ar¬ ticles kindred to furniture, suddenly assumed large proportions, and confined itself to furni¬ ture only, using in the making of it the new devices which were constantly being brought forth by ingenious inventors. The value of the furniture product in the year 1850 mav be esti¬ mated at about $15,000,000, and the industry gave employment

to 37,000 people, out of a pop¬ ulation of a little over 23,000,000. For a long time a great number of hand-shops survived, making to order special high-grade work and they succeeded in impressing their patrons with the idea of the inferiority of machine-made furniture, which at this early stage in the in¬ troduction of machinery was not entirely with¬ out foundation. The extensive use of machinery in shops had the immediate effect of again changing the style of furniture. Manufacturers looked for a fashion in which they could use their facilities to the best advantage, and at the same time retain the attractiveness of their earlier work. This they found in . the Renais¬ sance, which for a number of years superseded all other styles in the best class of furniture.

Up to this time the furniture industry had been confined to the Eastern States, principally in and around Boston; but a number of fac¬ tories were now started in the West, where sit¬ uated in proximity to large forests and regions where population and wealth were rapidly in¬ creasing, they soon became important factors in the production of furniture in the United States. These factories, equipped with new

machinery and using native timber, produced at hrst a low grade of furniture in which art seems to have been very little considered. Those \ 10 wanted more artistic furniture purchased it from the East. The art revival which had taken place in Boston and New York was fos- tered by increased travel . in Europe, where exhibitions were taking place at short intervals in London arid Paris. Moreover, the considera¬ tion that old furniture was beginning to receive brought forcibly to the people the inferiority of that then made, and manufacturers gave more attention and study to its appearance than be¬ fore Trade kept increasing with the general

SecaJnA aaa d, in i1860 the Pro(luction reached 8ˆa,aUU,U00 ; but the number of workingmen em¬ ployed in this industry, owing to the improve¬ ments in machinery, had fallen to 28,000, al- n P0Pulaˆon had then reached almost

Industries in general were now to receive another blow, on account of the War of the Rebellion. As soon as this conflict was over, the extraordinary activity which had prevailed in military circles was transferred to the in¬ dustrial field, and from this time on it is by leaps and bounds that improvements can be noted. The furniture trade was in the hands of two classes of manufacturers, one class of whom, having taken the place of the old-hand- shop workers made high-class

work to order, continuing the old traditions, but now using machinery extensively. The other class of man¬ ufacturers studied the wants of the people, and produced suitable articles at prices which were within the reach of the masses. It is to them that we are indebted for the gigantic develop¬ ment of the industry, as they placed within the reach of all, strong, ornamental and practical furniture. _We have seen that men of taste had recognized for some time that our furni¬ ture was inferior to that made at the end of the last century, and had begun to study not only the styles of that period, but also those of the English and French prevailing in the past. As a result we find that a great variety of styles were employed in the productions of the leading firms, who were always striving for novel effects.

A work published in London, England, in 1868, entitled (Hints on Household Taste, } by C. Eastlake, waged war on modern work, advo¬ cated returning to the primitive principles of Gothic construction; and gave positive instruc¬ tions as to what was right or wrong, not only in the line of furniture, but in draperies, car¬ pets, and other household decoration, as pre¬ cisely as if the art had been a science. This book was looked upon as a sort of gospel treatise on furnishing, and however much we may at this time ridicule some of the ideas con¬ veyed, it directed the public mind in its search for more artistic surroundings at home. From that time other styles were discarded, and de¬ signs in accordance with the newly developed taste took their places. The movement in favor of more perfect construction and the use of straight lines exclusively became general, the stiff appearance being relieved by an abundant use of arches, spindles, turnings, etc. This style allowed the manufacturers to do the greater part of the work by machinery, for which it seemed specially adapted. The in¬ creased interest that the public took in furniture

developed the trade in an unprecedented man¬ ner, the production for 1870 being $68,500,000, or nearly two and one-half times that for 1860. The number of men employed at this time shows a similar increase, being 55,800, out of a popu¬ lation of 38,500,000 people. The Centennial Exhibition in Philadelphia (1876) had a far- reaching influence, especially on western manu¬ facturers, who until this time had not had oc- casion to compare their products with those of the best manufacturers of America and Eu¬ rope. This exhibition marks the highest point that the Eastlake or early English was to at¬ tain. A number of the most prominent manu¬ facturers of this country had their exhibits made in this particular style. It was quickly taken up by the manufacturers of cheaper fur¬ niture, who until then had given very little at¬ tention to artistic form, and they are respon¬ sible for the enormous quantity of furniture in imitation of this description that

can yet be seen in the auction-rooms of large cities. The strife for originality, which was soon to be one of the characteristics of western manufac¬ turers, had now begun to show itself ; but an in¬ sufficient knowledge of art subjects rendered many of their designs more strange than beau¬ tiful, and more noticeably so when they were working on the lines of any given style; but through diligent efforts their designs were stead¬ ily improved, and this, in connection with their superior facilities, has secured to them a large part of the eastern trade. The volume of busi¬ ness showed a substantial increase during this decade, although not as large as during the preceding period. The value of the output of furniture for 1880 was $77,845,000 — an increase of 13.5 per cent in value, but a decrease from $1.77 to $1.55 per capita of the population. The wonderful changes which occurred in archi¬ tecture in the next decade, especially the Romanesque revival due to H. H. Richardson, had a distinct effect on furniture. Richardson himself designed some Romanesque furniture. Furniture manufacturers eagerly welcomed this departure, for the ceaseless demand for new things, as strong then as it is now, obliged them to change their patterns very frequently. Unfortunately, by passing through the hands of manufacturers of cheap furniture, it lost all of its original beauty. During this decade great improvements were made in woodworking ma¬ chinery, and a large number of new devices were invented. Among them was the carving machine, which enabled manufacturers to orna¬ ment even the cheapest kind of furniture. The amount of business done in 1890, large as it was, did not keep up with the increase of popula¬ tion. The value of the product in 1890 was $86,362,685, an increase of 11 per cent over that of 1880, but the amount per capita of population dropped to $1.38 as compared with $1.55 in 1880, and $1.77 in 1870. The International Paris Ex¬ position of 1889 revived a taste for the 18th century furniture, especially of the Louis XV style, which was quickly taken up by the people of the United States. In spite of the seeming difficulty of using machinery in making such work, American manufacturers made and are still making a large quantity of furniture, in that dainty mode, which certainly equals that of the same class made in Europe, and is gen¬ erally better constructed. All the 18th century styles, French or English, have been and to a

certain extent are now used by American man¬ ufacturers Louis XV, Chippendale, Louis XVI, Sheraton, Hepplewhite, Empire and the Flemish Renaissance.

Since the decline of the Empire style in the first half of the last century manufacturers have been satisfied to copy the styles of the past, with such, modifications as conformed to commercial requirements. The public demand for repro¬ ductions of old furniture increased to such an extent as to leave little room for originality in their production. Within recent years a strong feeling has developed that the old styles are not in keeping with present ideals and new styles should be evolved to emphasize simplicity of construction, grace of style, beauty of propor¬ tion and harmony of color. The Mission style, at first heavy and shapeless, is acquiring more subtle and refined lines, thereby increasing in public favor. The novelty of the last century is a free natural style called Art Noveau. Its introduction to this country from France a few years ago was attended by failure. The market was flooded with goods of inferior make in which the vagaries of this style were mistaken for its distinctive features. The meaningless curves and coarse ornaments of the beginning are being discarded and a refined elegance is now taking their place. The extensive adoption of this style in other art industries warrants the belief that it soon will be a distinctive feature in furniture.

Many of the numerous articles of furniture manufactured are distinctly American. The bureau, the rocking-chair, the folding-bed, the chiffonier, as now made with toilet, and in general most of the combination pieces of furni¬ ture made with a view of economizing space in apartments in large cities, are of this class. The American bureau is a combination of the old chest of drawers and the dressing-table, having the drawer-room of the one and the swinging mirror and table-top of the other. This has been imitated in Europe to a limited extent, in the production of what is known as the English dressing-table. As made in this country, the bureau is one of the most practical pieces of furniture used. The rocking-chair, almost en¬ tirely unknown in Europe, is found in every home in this country, yet it is difficult to ascer¬ tain when it was first put in use. We do not find any mention of it in the descriptions of ar¬ ticles of furniture in the 18th century. The first patent issued for improvements in rocking- chairs is dated as far back as 1830. The fold¬ ing-bed, in the shape of a sofa, with a box-seat for bedding, has been used in Europe for over a hundred years, but America claims the folding-bed in other forms, such as the ward¬ robe, the cabinet, the mantel, and the combina¬ tion; some of these were made as early as 1847. The demand for folding-beds, which reached its climax a few years ago, is now showing a material decline.

The woods used in the manufacture of furni¬ ture are varied, and subject to frequent changes. Early in the century, mahogany, maple and black walnut were in favor; then cherry and ash became

fashionable; toward 1880, oak, so long forgotten, took a prominent place. At the present time black walnut is almost entirely out of use. Oak has kept its popularity for the hall, the library, and the dining-room. Mahogany, curly birch, and maple are still ex¬

tensively used; all of them for the bedroom, and mahogany for the dining-room and the drawing-room in the better grades of furniture. The changes in furniture covering have been more frequent and radical than those of the woods. Haircloth and other coverings in use 30 years ago have fieen superseded by materials more varied in texture and coloring. Their variety is almost endless, and they show, per¬ haps as much as anything else, the advance that art as applied to furniture has made in this country. The present centres of the furniture industry are, with one exception (Grand Rapids, Mich.), the largest cities, which, with their densely populated suburbs and surroundings, offer large markets. The cities whose produc¬ tions amount to more than $2,000,000 per annum, in the order of their importance, are: New York, Chicago, Grand Rapids, Philadelphia, Cincinnati, Saint Louis, Boston.

During the past 10 or 15 years there has been a very steady progress towards more re¬ fined furniture and to-day the manufacturers of the better grade furniture are producing ar¬ ticles in quantities that a few years ago could only be found at shops making furniture to order by the single piece. The manufacturers of medium and lower grade goods are placing upon the market designs with feeling following the thoughts of some of the earlier masters of the Flemish and English schools, therefore our furniture stores are full of many simple and good pieces which the consumer can buy at very moderate prices. One can furnish a home today which will bear close inspection by the artists at a cost which is within the reach of the more modest incomes. There is to be found some very ugly furniture which is still pro¬ duced for certain trade, but the desire for this kind of furniture is fast disappearing. The manufacturers all over the country are eager to secure artists and draughtsmen who can lead them forward to better production and choicer class of wares.

During the last 10 years there has been published many readable books and monthly .publications which picture the better homes and home furnishings. They have done much to help the people to understand better furniture. We are seeing the demand come very fast for more refined furnishings in all branches of the industry. The day is not far distant when fur¬ niture will have the same thought given to its selection as we give to other objects of art that we expect will live and adorn our homes. Fur¬ niture should grow in favor as the years

pass by.

The manufacturers of to-day have endeavored Ito keep well abreast of the demand and the keen competition which has always existed has been the means of producing more new things in the past few years than has ever been produced in a like period. In many instances too much has been produced for the sake of getting some¬ thing new rather than of confining our efforts to reallv good pieces that prove their worth by age. The semi-annual furniture sales of the manufacturer have been continued up to the present time. The points most prominent for such exhibitions are New York City, Chicago, Ill., Grand Rapids, Mich., and Jamestown, N. Y., the latter coming into prominence within the last five years. This was brought about by the large number of factories located there

combining their efforts in erecting a large ex¬ hibition building which is open to the dealers during the months of May and November of each year. The selling dates of July and Janu- ary are maintained at the other points men- tioned. Dealers from all over the country as¬ semble ˆ at these sales to purchase their six months requirements. Both the New York and Chicago exhibition buildings show many lines of the cheaper grades of furniture. Both of these cities, however, have many manufacturers of the better grade who exhibit in their local factories. Grand Rapids has for many years stood out very prominently with its lines of bedroom, dining-room and living-room furni¬ ture. No market in recent years has shown more marked progress. This market, like New York and Chicago, has many exhibitors whose factories are located in various sections of the country. Six large buildings have been erected for the convenience of these manufacturers to show their product, there being about three hundred who exhibit at these semi-annual sales in Grand Rapids. To-day many kindred lines are shown and one can find in this market al¬ most anything that is required in the furnishing of a home or public building. The quantity of furniture manufactured has greatly increased until the total output in this country averages about $300,000,000.

The manufacture of furniture is so easily undertaken that there are a large number of small companies and but few whose volume ex¬ ceeds a million dollars per annum. The same method of starting these companies is true to¬ day where cabinet-makers rally about them a few men and organize a small company. Fur¬ niture factories are

located in practically all of the States of the Union, excepting the prairie and mountain districts. The manufacturers of furniture are fast reaching efficiency methods in both manufacturing and selling. Much has been accomplished along this line in the past few years where costs have been reduced and the production is better. The commercial prod¬ uct of to-day consists of furniture largely made of mahogany, American walnut, oak and other woods that can be enameled in various colors and also decorated according to require¬ ments. Other woods are used in some instances and in the better grades the choicest of woods can be found.

The working conditions have been greatly improved, and labor is receiving a much larger compensation than in the past. The majority of furniture factories in the country are work¬ ing on the 10-hour a day basis. This is true especially with the factories located in the smaller towns. Some, however, have adopted the nine-hour a day basis, Grand Rapids being one of the most prominent centres working on this basis.

The exporting of furniture is still very limited, although certain grades of chairs and office desks have been exported for some years. Just before the World War our South American markets were making purchases from manu¬ facturers of the better quality furniture and from reports received our furniture has proved quite satisfactory in South America. Manu¬ facturers are in a fair way to do much more business there when the shipping conditions between the two countries become more favor¬ able.

During 10 years (1907-17) there developed quite a departure in office and public building furniture, such as desks, tables, chairs, filing cabinets, wardrobes, etc. All of these articles being also made of steels, painted or finished to imitate mahogany. Metal furniture, how¬ ever, has not come into favor for the home ex¬ cepting the brass and iron beds, which have been made for many years and continue to be made. lhese articles, however, have been changed to more refined lines and proportions. Articles for the kitchen and bath-room are also made in metal and are growing in favor.

We are fast becoming lovers of outdoor life and cmr homes are being built with large porches both open and closed. This calls for a different class of furniture. The demand is supplied quite largely by reed, rattan and fibre¬ seating furniture, trimmed with bright colors of chintz or cretonne. This character of furniture has increased in demand very materially. The breakfast room is much more common in our modern homes and therefore a bit of color or fancy wood is very

appropriate for such fur¬ nishings, thereby calling for changes in design to meet new needs.

This industry was affected to a considerable extent by the World War. The furniture business is commonly considered as one of the non-essential industries on account of the in¬ ability of the government to supply orders for more than 10 per cent of the output of the woodworking factories of the country. Every manufacturer hoped, however, that his organ¬ ization could be held together by older men and the women who were fast filling furniture factories. For the duration of the war the manufacturers entered into an agreement with the Conservation Division of the" War In¬ dustries Board at Washington, to produce no new pieces of furniture and to discontinue spe¬ cial sales seasons of July and January, Novem¬ ber and May, and established one sale season a year during the month of May, this sale being held at the various points at the same time. Many other economies were inaugurated. Knock-down construction whenever possible was demanded to save shipping space. Metals and glass were largely conserved owing to the great shortage of the raw product. To conserve capital, the variety of de¬ signs was reduced 50 per cent. This con¬ servation program caused some manufac¬ turers to take up other lines of work more essential to winning the war. It also created quite a change in the present method of doing business, and especially after the war. Some factories were unable to stand the strain, and all of the war casualties were not found in Europe.

Wm. H. Gay.

FURNIVALL, Frederick James, English scholar and editor: b. Egham, Surrey, 4 Feb. 1825 ; d. 2 July 1910. He was a graduate of Trinity College, Cambridge, and was called to the bar in 1849. He devoted his life chiefly to the study of early and middle English litera¬ ture ; and he was mainly instrumental in estab¬ lishing the Early English Text Society, the Chaucer Society, the New Shakespeare Society, the Browning Society, the Wickliffe Society and the Shelley Society. The societies named have given a powerful impulse to English scholarship

by their publications, and this was in no small measure due to Dr. Furnivall. For them and for the Roxburghe Club and the Rolls Series he edited numerous works, notably the Six-Text edition of Chaucer's Canterbury Tales > (1868— 75). Other works of his are

FURNIVAL'S INN, an ancient inn of chancery and appanage of Lincoln's Inn. It is named after Sir William Furnival, whose fam¬ ily became extinct in the 14th century. It stood in Holborn and gradually falling into disuse finally ended its history in the 18th century. Consult Pearce, R. R., (Guide to the Inns of Court and Chancery' (London 1855), and Headlam, Cecil, (The Inns of Court) (New York 1909).

FURRER, fur'er, Jonas, Swiss statesman : b. Winterthur 1805; d. 1861. After studying at Zurich, Heidelberg and Gottingen he be¬ came president of the Grand Council of Switzerland in .1839, a position which he again occupied in 1844. In 1845 he received his ap¬ pointment as president of the Cantonal Diet, and when the new federal constitution went into effect he was elected President of the Swiss Confederation and was thrice re-elected. He wrote (Das Erbrecht der Stadt Winterthur'

(1832).

FURS, fors, FORS, or FURANI, Moslem negroes, whose habitat is in Darfur in eastern Sudan. They are very black, tall and have wooly hair. They have been classed with the Nigritians, the race which once covered the Egyptian Sudan. Their modern history is a continuous record of wars and insurrections.

FURS are articles made from the skins of fur-bearing animals prepared with the hair left on. A fur-bearer, in the language and prac¬ tice of the fur-trade, is an animal that has a short, fine, soft coat through which grow longer hairs. (For a list of fur-bearing animals and their residence, see Fur-Trade). This over¬ hair is straight, smooth, somewhat stiff and serves as a protection against cold and wet. The beauty of such pelts as those of foxes and the weasel tribe is due largely to this long overhair, and when it is at its best, in prepara¬ tion for winter, the animal is said to be "prime." In some, however, as the otter, beaver and sometimes the skunk the pelt is improved for use by pulling or "plucking" out these long hairs. Conversely, long hairs are sometimes in¬ serted, or "pointed," into manufactured skins, as in making a fraudulent silver-fox.

The underfur, or "fur® proper, consists of soft, silky, curly filaments. It is usually short and thick, and toward the skin it grows lighter in color. It is barbed lengthwise and hence is capable of felting — whence the value of rab¬ bit-fur in hat-molding. "In a prime pelt,® says Jones, "the underfur is hardly discernible unless the overhair is blown apart. Then the light color of the underfur appears. If it were generally known that the undyed skin is whitish, and that the

underfur close to the skin is a light

drab, or pale blue color, it would not be so easy to sell dyed skins as (natural.' ®

Two methods are used in taking the pelt off the animal's body and saving it for market. The larger animals, as bear, wolf, wolverine, beaver and others, are regularly skinned and the hides are scraped clean of flesh, stretched on a flat surface and dried in a cool place. Small skins are opened by slitting inside the hind legs, the bones of which are removed, clipping and taking out the tail-bones and then stripping the skin from the body. The pelt, then wrong side out, is stretched by means of hoops or wedged boards fitted to each kind, cleaned and permitted to dry in this stretched form. This is called "casing.® Much of the value of the pelt depends on the care of this original preparation and the subsequent packing for shipment. Sealskins are packed with salt in barrels as soon as flayed.

Dressing and Dyeing.— – Until the modern introduction of machinery, the dressing of the "raw® pelt began with the placing of them in a bath of lye. "When the £elt has become soft,® it was prescribed, "the skins are tubbed and then shaved, by passing them over a large knife, and placed in an upright position; they are next buttered, and put in a large tub of sawdust by men half naked, who tread on them for some time . . . rendering the leather soft and supple; they are then beaten out and fin¬ ished.® The complicated operations of the art, varying with different pelts, are now performed mainly in great factories, and by special ma¬ chinery. The process in general is as follows : The skins are first dampened on the flesh side and left all night to soften. In the morning they are placed, perhaps 2,000 at once, in a tramping-machine and kneaded for 8 or 10 hours, then taken out and left to soak over night in a mixture of brine and sawdust. The next morning they are fleshed by hand, then stretched and hung up to dry. When thoroughly dry they are again moistened with salt water and left over night. Brushed on the leather side with some animal oil or fat, they are then laid together in pairs, hair side out, and the next day are kneaded again in a tramping machine until perfectly soft and supple, after which they are stretched in every direction.

The next process is cleaning, 300 or 400 skins being placed in revolving drums exposed to steam heat, with sawdust which in time absorbs all their grease. The skins are next incased in a beating-drum, where they are revolved and hammered for two or three hours. On removal they are beaten by hand with rattans, and finally the hair is combed.

Well-dressed furs as clothing furnish a maximum of warmth with a minimum of weight, due to the air entangled among the hairs, excelling any practicable garment of cloth of the same shape. Their durability varies greatly, however. Jones gives a long table ex¬ hibiting the comparative value of most furs in this respect. The otters, both land and sea, are the most durable, and are reckoned at 100 per cent. Others follow: Beaver, .90; seal .75; raccoon, .70; skunk, .70; Persian lamb, .65; martens and sable, .60 to .40; fox, .40; muskrat and opossum, .37; nutria, .27; and others from .25 down to hare or rabbit only .5. These facts

fIjrst

should be borne in mind in purchasing any article made of fur.

The dyeing of furs is a distinct branch of the industry which heretofore has been almost wholly in German hands, except that until re¬ cently all seal-skins were dyed and otherwise dressed in England. Now, however, much of this preparation is done in Canada and the United States. The Bureau of Manufactures recorded that the value of the seal-skins pre¬ pared in this country in 1916 was $74,530.

Almost every sort of fur, raw as well as manufactured, has quadrupled in price during the last 30 years, although with many fluctua¬ tions. Coincidently, the demand for, and utilization of, furs in garments, and as trim¬ mings, has enormously increased since the be¬ ginning of the present century. Political dis¬ turbances in Europe, and especially religious persecution, caused the emigration to western Europe, and to North America, of great num¬ bers of workmen skilled in the preparation and sewing of skins and furs. This influx of com¬ paratively cheap, yet competent labor, and other influences, led the capitalists of the trade, in concert with the controllers of fashion, to stimulate, and then to cope with, an unprece¬ dented expansion in the use of ornamental furs — even in summer. This was followed by the setting up, almost wholly, as is natural, by Russian and Polish Jews, of thousands of small factories in every large town, Mean¬ while the decreasing supply of first-class skins, competition resulting from the wide diffusion of business and much doubtful responsibility, and the great demand for showy appearance at a cheap rate, have led to a sad disguising and counterfeiting of materials by means of dye¬ ing, manipulation and the invention of trade- names.

The deceptive misnaming of furs is en¬ couraged by the ignorance of

buyers, most of whom are willing to believe it when told by an unscrupulous salesman that a cape or muff offered at a ridiculously small price is true sable or seal or other rare and ex¬ pensive article. It will be interesting and use¬ ful to mention some of the frauds constantly perpetrated — though less so than formerly. Take, for instance, sable. Precisely, it is the pelt of the Siberian marten, of which only about 75,000 skins were received annually previous to 1914, worth wholesale perhaps a million dollars. The price of even a small cape of Russian sables must be reckoned in three or four figures. But experts tell us that most ((sables® in the fur-shops are made of dyed skins of the Canadian or pine marten, or of polecat, or mink, or plucked skunk (((Alaska sable®), muskrat, marmot, hare or even rabbit. Genuine sealskin now has a price far beyond the reach of ordinary purses ; but when the fur-dressers produced a clipped and dyed musk¬ rat pelt that resembled sealskin almost per¬ fectly it could be sold far cheaper — not, how¬ ever, under its own name. Consequently this popular, and even now, high-priced product is sold as ((Hudson Bay seal® (no true fur-seals live or ever did live in Hudson Bay; and the seals that do live there are not used). The fur of the common wild rabbit of Europe and elsewhere is the raw material of ((electric seal,® ((clipped seal® and <(Baltic seal.® The

rabbit and hare indeed may become almost any¬ thing in the hands of fur-dressers and sales¬ men. When white it may masquerade as coney, ermine, white fox, ((foxaline,® (

The United States is not only a large pro¬ ducer, but the greatest consumer of furs. Our export of skins in 1916 were valued at $9,288,786, and our imports of furs and fur- manufactures at $16,891,699.

Ernest Ingersoll.

FUR.ST, Julius, German scholar : b. Zer- kowo, Posen (Prussian Poland), 12 May 1805; d. Leipzig, 9 Feb. 1873. He was of Jewish parentage, and at an early age he had a remark¬ able knowledge of Hebrew literature, Old Testa¬ ment Scriptures and Oriental languages. In 1825, after having studied at Berlin, he took a course in Jewish theology at Posen. In 1829, after having abandoned his Jewish orthodoxy, he went to Breslau, and in 1831 to Halle, where he completed his studies in Oriental languages and theology. In 1833 he entered journalism in Leipzig, later securing a position as tutor and lecturer in the university there, from which position he was promoted in 1864 to the chair of Oriental languages and literature, a post he filled with great distinction until his death. His works, especially those

pn the Semitic lan¬ guages, are of great value, and among the most important may be mentioned (Lehrgebaude der aramaischen Idiome) (1835) ; (Concordantice librorum Sacrorum veteris Testamenti Hebraicae et Chaldaicae) (1837-40) ; (Bibliotheca Judaica> (1849-63); (Hebraisches und Chaldaisches Handworterbuch) (1851-61) ; (Geschichte des Karaerthums) (1862-65) ; (Geschichte der biblischen Litteratur und des jiidisch-hellenis- tischen Schrifttums) (1867-70). From 1840-51 he edited Der Orient. He compiled (Bibliotheca Judaica) (1849-63).

FURST, William, American composer and conductor: b. Baltimore, Md., 25 March 1852. He studied music in his native town and was a church organist at the age of 14. His comic opera (Electric Light) was produced and con¬ ducted by him in 1878 and for the five seasons following he received engagements as con¬ ductor of opera. He became musical director of the Tivoli Theatre, San Francisco, in 1884. His opera

was produced for two seasons in New York. His chief productions are < Theodora > (1888); < The Isle of Champagne) (1891); (Honey-mooners> (1893); (Princess Nicotine> (1893); 'The Little Trooper) (1894); (1894) ; *The Merry World) (1895).

FURSTENBERG, Prince Maximilian Egon zu, German nobleman: b. 1863. He bears a number of territorial titles but is popularly known as Prince Max of Baden. He was friend and advisor of the former Emperor of Ger¬ many, William II, and owns a magnificent estate at Donaueschingen, near the source of the Danube. On 2 Oct. 1918, Prince Max, a Liberal m politics, . was appointed German chan¬ cellor and immediately began negotiations for an armistice which would end the European War. His appeal was made to President Wilson through the Swiss government. On 9 Nov. 1918 Prince Max announced the .abdication of the Kaiser and the next day turned the chancellor¬ ship office to Friedrich Ebert.

FURSTENBERG, a mediaeval principality, now comprised in Baden, Hohenzollern and Wurttemberg. The name is perpetuated by the princely house of Fiirstenberg of Austria, by the landgraves of Fiirstenberg of Lower Austria and by the counts of Fiirstenberg in Rhenish Prussia and Westphalia. * Consult Tumbfilt, G., (Das Fiirstentum Fiirstenberg:* (Freiberg 1908).

FURSTENWALDE, ffir'sten-val'de, Prus¬ sia, town in the province of Brandenburg, on the Spree, 30 miles southeast of Berlin. It con¬ tains several churches, a gymnasium and many public monuments. It owns a neighboring forest 20 square miles in extent. Its industries include woolen manufactories, machinery, bricks, glass, alcohol and electric supplies. The town obtained municipal privileges as early as 1285. Pop. 23,000.

FURTADO, foor-ta'do, Francisco Jose,

Brazilian statesman: b. Oeiras (Piauhy), 13 Aug. 1818; d. Rio de Janeiro, 23 June 1870. After graduating from the Academy of Law at Caxias and serving for some time as judge, he entered politics and rose to be leader of the Liberals. In 1847 he was elected deputy and re¬ elected several times. In 1856 he was elected president of the new province of Amazonas remaining such uitfil 1859, when he was made Minister of Justice. In 1864 he was elected senator, but held that position for a few months only, and in August 1864 was made Premier and Minister of State, in which position he did much toward the establishment of a good monetary system. During his term of office .as Minister of State the dispute with Uruguay was settled and war between Brazil and Paraguay was de¬ clared. In 1870 he was again a member of the Senate and as such, being an opponent of slavery, exerted all his influence in behalf of legislation looking toward its final abolition.

FURTH, Bavaria, town situated at the con¬ fluence of the Pegnitz and the Regnitz, five miles northwest of Nuremberg, and 950 feet above sea-level. It has broad streets and is entirely modern in appearance, has many fine churches, a synagogue and a modern Rathaus. It manufactures mirrors, mirror-frames, bronze and gold leaf, toys, haberdashery, optical in¬ struments, pencils, silver work, machinery,

leather goods, etc. It has a large trade in these and in hops, wool and coal. A large annual fair is held here in October. Fiirth was a Vogtei for some time under the burgravate of Nuremberg; in 1314 it passed to the bishops of Bamberg; it was besieged by Gustavus Adolphus in 1632, and two years later it was pil¬ laged and burned by the .Croats. It extended tolerance to the Jews and in great part owes its commercial prosperity to them. It passed to Bavaria in 1806 and was chartered in 1818. Pop. 66,500.

FURTWANGLER, Adolf, German archae¬ ologist : b. Freiburg, 1853 ; d. 1907. He re¬ ceived his education at Freiburg, Leipzig and Munich ; took part in the excavations at Olym¬ pia in 1878-79, and in 1884

was made professor of archaeology at the University of Berlin. After 10 years in Berlin he removed to Munich. At 2Egina he conducted excavations in 1901 and two years later similar operations at Orchomenos. He was universally recognized as an expert on vases and ornaments of antiquity. He published (Plinius und seine Quellen fiber die bildenden Kfinste) (1877); (Meisterwerke

?oen,f ieiis?en ?astik> 0893; English trans. 1894) ; (Ueber Statuenkopien im Alltertum) (1896); (Die antiken Gemmen* (1900)* 'Griechische VasenmalereP (1900-04), with Reichold ; the catalogue, . (Beschreibung der /innmˆe,k Kdnig Ludwig I zu Mfinchen) (1900); (Ein hundert Tafeln nach der Bild- ™ der konigliche Glyptothek zu Mfinchen> (1903) ; abridged edition of (Meisterwerke der gnechischen Plastik) (1908; translated into English by Taylor, London 1914).

FURY AND HECLA STRAIT, in the

Arctic region, lat. 70° N., separates Melville Peninsula from Cockburn Island, and connects Fox Channel with the Gulf of Boothia. It was discovered by Parry (q.v.) in 1822 and named after his ships.

FURZE, ferz, Anglo-Saxon fyrs Ulex, a genus of very branched and thorny shrubs with linear sharply pointed leaves, solitary flowers and two-lipped calyx, belonging to the order Leguniinoscz, sub-order Papilionacece.

I he common furze (U . europceus), also called whin and gorse, is abundant in many parts of southern Europe and in Great Britain, al¬ though not reaching any considerable elevation and often suffering from the frost of severe winters. It affords a wholesome fodder, es-Pˆlywhenyoung, or when the thorns are artificially bruised, and is grown often on dry and barren hillsides not fitted for other forage crops. A double flowering variety is grown in gardens. Furze is sometimes used as a sand binder and it frequently acts in this capacity of its own accord.

FUSAGASUGA, foo'sa-ga-soo-ga', Colom¬ bia, town in the department of Cundinamarca,

25 miles distant from Bogota, the Capital, in a southwesterly direction. It has extensive coffee interests and is a favorite summer resort of the !wv?kˆants Bogota, elevation of nearly 6,000 feet making it most salubrious. Pop.

FUSAN, foo-san', or PUSAN, Korea, sea¬ port on the south shore,

about five miles from the embouchure of the Nak-Tong, at the south¬ ern end of the Seoul Railroad, 285 miles south

1876 a treaty was concluded with

m the nnrtC '!?e JaPan«e to trade

in the port. It consists of two towns old and

new Fusan ; the older portion being the native

h°abi?edWIth abT°Ut 5'°°0 ?he new £

habited by Japanese. Under the Japanese

regime great improvements have been made!

waterworks, lighting systems, roads, streets'

harbor, etc constructed or improved. It has

a good harbor protected by several islands It

nas steamer communication with Nagasaki and

other ports in Japan, also with Shanghai, Port

Arthur and Vladivostok. The ruling authority

c ' i prˆ,ect aPpomted by the governor at

beoul. There are now about 20,000 Japanese

at Fusan. Hides beans, fish, whale meat and

oil and rice are the chief exports, and cotton

petroleum and Japanese manufactured goods

$6??nmnbU k of11the lmPorts, which total about *0,250,000 annually, and are double the value ot the exports.

tb/USAR° ,LAKE> Italy, lake in

the province of Naples, in ancient Campania,

one-half mi e west of Baia, and about one mile south of the acropolis of Cumae. It is the Acherusia Palus of the ancients and is con¬ nected with the sea by two canals. It mav have been the harbor of Cumae at an early period. Along its shores are the remains of numerous villas. Oyster cultivation is carried on extensively Consult Beloch, J., (2d ed., Breslau 1890).

FUSE, a device employed for firing explo¬ sives. In mining, quarrying and in military and naval mining operations there is used the “Bick¬ ford, safety running® or “tape® fuse which con¬ sists ot a tubular cord of cotton or hemp that has been rendered slowly combustible, the cav¬ ity in the centre of the cord being filled with a slow-burning gunpowder composition. To make the fuse firm and hard, so as to prevent its being cut by the sharp edges of the rock during tamping, the outside of the cord is served with a covering of strong twine, which is wound about it at nearly right angles to the direction of the twist of the cord by the process called countering. To protect the powder from moisture, the wrapped fuse is immersed in a bath of heated varnish composed of glue, soap and Whiting. Finally, to prevent the surfaces of the fuse from sticking together when coiled they are coated with dry whiting, bran or pow¬ dered soapstone. The fuse described is known as “single fuse® and, as the varnish used is not waterproof, this fuse is only suitable for use in dry ground. In wet ground, a fuse is used which is made by coating the countered cord with tar or resin varnish and then, before the varnish is quite set, countering it with tape and again coating it with varnish. This is known as “taped fuse? When the fuse is to be sub¬ jected to especially severe treatment, it is pro¬ vided with a double coat of twine or thread and is known as “double fuse.® The varieties in use are “common hemp fuse®; “common cotton fuse®; “white fuse®; “superior mining fuse® ; “single-taped fuse® ; “double-taped fuse® ; “triple-taped fuse® ; “small gutta-percha® • “large gutta-percha® ; “small gutta-percha taped® and “large gutta-percha taped.® Run¬ ning fuse comes in lengths of about 50 feet, and, when properly made, is so uniform in quality that it can be depended upon to burn at

the rate of three feet per minute. This is im¬ portant, as it is necessary for the safety of the operator. The fuse should be stored in a dry place so that the powder core may not become damp; and, if so treated, it will retain its efficiency until the varnish has lost all its essen¬ tial oils and become dusty. Care must be taken not to touch the tape with any oily or greasy matter, as this penetrates through the varnish to the powder core and affects the rate of burning. The fuse should not be

roughly handled, as pinching and squeezing alter the rate at which the powder burns. Care should be exercised in opening out a coil which has become stiff through age or exposure to cold weather, for the fuse is then brittle, and if the covering is cracked by sudden and violent un¬ rolling the fuse becomes unfit for use. If there be any doubt as to the behavior of a coil of fuse a piece one foot, long should be taken and its rate of burning timed.

Although in firing single charges, safety luse answers admirably, where several charges are to be fired simultaneously, the safety fuses are connected together by “instantaneous fuses.® hese consist of a strand of quickmatch en¬ closed in hemp or flax and several layers of gutta-percha and tape, or of a core of gun¬ cotton enclosed in a leaden tube. Besides these nitroglycerine compositions have been proposed by vjuentin and Nobel, and one containing mer¬ curic fulminate by Philip Hess. Within recent years it has become the practice to enclose tri¬ nitrotoluene (T. N. T.) in leaden tubes for use as a fuse to be exploded by a detonator. Such fuse is now put upon the market under the name of “cordeau detonant,® and is meeting with much favor in blasting with “high® ex¬ plosives.

. I*J naval and military operations, and for simultaneous blasts in mining and quarrying electric fuses® are preferred to running fuses 1 hese are gunpowder “igniters® or fulminate detonators,® that are fired by electricity. They are classified as “low tension fuses,® designed for use with strong currents of low potential, from primary, or secondary batteries, or from dynamo-electric machines ; “medium tension fuses, for use with magneto-electric machines which generate, currents of medium potential and “high tension fuses,® for use with con¬ densed sparks capable of traversing a sensible air space. The use of the word tension is not warranted by the present condition of electrical science, but it has become technical in this art. To-day, only low tension electric fuses are em¬ ployed and they are described under Detona¬ tors (q.v.).

. Fuses are employed in ordnance for explod¬ ing shell and they may consist of a compressed core of gunpowder enclosed in a tube of wood or metal, or of a fulminating composition or of both. They are known as “nose fuses® when put in the front end or “nose® of the conical pointed shell, or “base fuses® when inserted in the lower end or base of the shell. They are known as “time fuses,® when they are planned to burn a certain length of time after they have become ignited,, before they set fire to the ex¬ plosive charge in the shell; “percussion fuses® when they are set in operation by the impact of the shell against an object after it has been projected from the gun. They may

act in¬ stantaneously in firing the charge in the shell

or there may be a column of compressed powder interposed between the charge of explosive in the shell and the fulminating composition which is fired by impact. As sometimes a second or more intervenes between the striking and the bursting of the shell, these are styled ((delayed action fuses.® They may be used with armor piercing shells designed to penetrate armor and burst within the ship. In time fuses, used with spherical shell, the powder in the fuse used to be ignited from the flame of the burning charge with which the shell was propelled from the gun. In modern time fuses there is a metal cylinder which serves as a hammer placed within the fuse case and held in place by brittle pegs of metal, or by a number of small balls. When the shell containing such fuses is fired, the inertia causes the hammer to strip from the pegs and set back toward the base of the shell, or, if it be a shell from a rifled gun, the centrif¬ ugal force causes the balls to fly outward and release the hammer. When the shell strikes, and is arrested in its flight, the hammer moves forward, strikes a percussion cap and fires the charge.

<(Chemical fuses® have been used in firing gunpowder mines and torpedoes. As an exam¬ ple of these we cite the mixture of cane sugar and potassium chlorate used in the Harvey tor¬ pedo. Above a column of this mixture was placed a small glass bulb filled with concen¬ trated sulphuric acid, the whole being enclosed by a soft copper cover projecting from the torpedo. When this cap was struck, it collapsed and broke the glass bulb, and, as the sulphuric acid came in contact with the mixture of sugar and chlorate, the latter burst into flame and ignited the powder in the torpedo. Such fuses have been used by anarchists in infernal ma¬ chines and they have ascertained the rate at which the acid would eat through sheets of bibulous paper so that by interposing a suffi¬ cient number of sheets of paper they could set the train in operation and get safely out of the way before the machine exploded. Fuses, con¬ sisting of columns of compressed gunpowder composition, are used in pyrotechny by which to ignite the charges in rockets, bombs, roman candles and other devices. By their use the operator is enabled to get to a safe distance after igniting the device before it functions fully.

Fuses are used in <(electrical installations,® but these are of an entirely different character from the above. They consist of strips of

metal of low fusibility which are interposed, in elec¬ tric lighting and other circuits, between the gen¬ erator and the lamp, or other device, to prevent damage to the device by an excess of current. When the load is greater than is desired the current heats the fuse to its fusion point, when it melts and cuts out the circuit. See Gun¬ powder; Explosives.

Chas. E. Monroe,

George Washington University , Washington, D. C.

FUSED QUARTZ. See Electrochemical Industries.

FUSEE, fu-ze', in clock and watch making, is the conical pulley used in connection with the main spring, to equalize the power of the latter, so that the watch may run regularly. The spring coiled within the barrel, when fully

wound up and at its greatest tension, draws on the part of the chain wound on the smaller portion of the fusee. The first wheel of the watch or clock is attached to the fusee, and as the latter unwinds by the gearing motion in the watch, the spring also uncoils and loses a part of its tension ; as this proceeds, the chain draws on a larger portion of the fusee, and attains an increased leverage on the latter to counterbal¬ ance the decreased power of the spring.

FUSEL OIL, an injurious and exceedingly objectionable constituent of improperly prepared distilled liquors (q.v.), consisting of an in¬ definite and variable mixture of the amyl al¬ cohols (see Amyl) with certain other alcohols and ethers, and certain organic acids and their esters. Fusel oil usually contains butyl and propyl alcohols. It comes over in the later parts of the distillate, and may be separated from ethyl alcohol (in large measure at least) by resort to fractional distillation.

FUSHIMI, foo-she'me, Japan, seaport town in the province of Kioto, southern coast of Hondo, on the right bank of the river Uji- gawa, which serves as a trade outlet and depot for Kioto, Otsu and Nara, and is connected by steam service with Osaka. It is noted as the place where a battle occurred between the Im¬ perialists and the adherents of the Shogun in January 1868. Pop. about 22,000.

FUSIBLE METAL, or FUSIBLE AL¬ LOY, any alloy, or metallic mixture, which melts at a comparatively low temperature, that is, below the melting point of tin (442° F.). (See Alloy; Amalgam; Bismuth; Cadmium). Fusible metals are either binary, ternary or quarternary

alloys of lead, tin, bismuth and cadmium. These metals, constituting what is known as ((the fusible group,® form simple al¬ loys, which consist of practically pure metals and eutectics. As eutectics have a lower melt¬ ing point than either of their components, we may, by combining these components in the pro¬ portion necessary to form the eutectic, obtain alloys whose melting point is much lower than any of the combined metals. The eutectic of three metals melts at a lower point than that of two metals, and the eutectic of four metals lower than that of three.

The alloy known as Wood's Metal, or Wood's Alloy melts at the lowest temperature of all the fusible alloys — 145° F. Its com¬ position is: tin, 4 parts ; lead, 4 parts; bismuth, 8 parts ; and ((a little® cadmium. Other fusible alloys melting at very low temperatures are constituted as follows: (1) lead, 25 per cent; tin, 12.5 per cent ; bismuth, 50 per cent ; cad¬ mium, 12.5 per cent — melting at 150° F. ; (2) lead, 26.7 per cent; tin, 13.3 per cent; bis¬ muth, 50 per cent; cadmium. 10 per cent — melting at 153° F. ; (3) lead, 26.7 per cent; tin, 14.8 per cent; bismuth, 52,2 per cent; cadmium, 7 per cent — melting at 156° F. (See Bismuth). Fusible metals are used in the arts for many purposes. Automatic sprinklers, for example, are capped with alloys of this sort, which are chosen so as to have melting points that are higher than any temperature that would nor¬ mally occur in the room that is to be pro¬ tected. If a fire breaks out, however, the ab¬ normal rise of temperature so produced causes them to melt, the water in the sprinkler pipes being thereby released and the fire extinguished.

Fusible metals have also been used quite gen¬ erally in the manufacture of < fusible plugs, > for the protection of steam boilers ; such plugs being screwed into the boiler at the height which is considered to be the lowest limit to which the water level in the boiler can be allowed to descend with safety. So long as the inner end of the plug is covered with water, the plug itself is thereby kept too cool to melt under the influence of the furnace gases; but when the protecting action of the water is removed by e water level descending below the safety ru the hot furnace gases melt the material of the plug and the steam in the boiler escapes. Fusible plugs are excellent appliances and in tact they are required by law in some of the Mates. There is no advantage in filling them viith an alloy, however, because in anv event the ahoy must have a melting point higher than °fjTe steam that the boiler is to generate (JOb F., for a gauge pressure of 150 pounds

per square inch), and pure tin, with a melting point of 442° F., is entirely satisfactory for the purpose. Indeed, tin is far superior to any alloy for this purpose, because its melting point remains sensibly constant for an indefinite time (so long as oxidation is prevented), while the melting points of alloys that are continuously exposed to heat for considerable periods become quite uncertain and are often found to be far higher than when the alloy is freshly prepared. The eutectic alloy of lead, tin and bismuth ex¬ pands at the moment of solidification. It is therefore of value in making metallic casts of substances which will not endure the heat of molten single metals.

FUSIBLE PLUG. See Fusible Metal.

FUSIDZE, fu'si-de, a family of gastropod mollusks, by some conchologists regarded as only a genus (Fusus) of the family Fascio-lariidce. In either case it is a world-marked group allied to the turban-shells and volutes in structure, but having a long, more or less spindle-shaped, comparatively thin shell, with a very long canal. The animal is closely similar in its soft parts to a whelk or a murex. The family contains the genera Fasciolaria, Clavella, Latirus, etc., but interest centres chiefly on the genus Fusus, of which many species are known in various parts of the world and which goes back to Cretaceous time in geological history. North American species are inconspicuous, but some of the several kinds found upon the coast of Great Britain are highly valued by collectors of shells and constantly sought for by fishermen who bring them up in their dredges from time to time. The ˆred-whelk® or ((roaring buckie® of Scotland is a species (F . antiquus) made famous in folklore and by Wordsworth's poem ; it is extensively eaten in various parts of Great Britain and along the continental coast. In Zetland its shell was formerly used by the peasantry as an oil lamp. F. proboscidialis is one of the largest of mollusks.

FUSING POINT. See Freezing Point; Melting Point.

FUST, or FAUST, Johann, German pio¬ neer printer and associate of Gutenberg: date of birth unknown; d. about 1466. He appears to have been a money-lender or banker; was shrewd enough to see the possibilities of gain in Gutenberg's printing apparatus. He financed

the latter s undertaking but when Gutenberg was unable to make repayments, he sued him and seized enough of the printing outfit to cover the mortgage. With his son-in-law, Peter Schoifer, he carried on printing at Mainz; the first publication was a (Psalter> (14 Aug. 1457), a folio of 350 pages, the first printed book with complete data

and with initials printed in red and blue from two-piece types. At the capture and sack of Mainz in 1462, the printers were dispersed and their secret became common property. See Gutenberg; Printing.

. FUSTEL DE COULANGES, fos'tel de koo-lanzh Numas Denis, French historian': b. Pans 1830; d. Massy 1889. He was edu¬ cated at the Lcole Normale and at the French School at Athens. After his return to France he became professor of. history at Amiens and later at Paris. He received the degree of doc- tor m 1858, and soon after became professor at Strassburg.. After the war of 1870 he re¬ turned to Paris, where he taught at the Lcole Normale; became in 1875 member of the Acad¬ emy of Moral Sciences; succeeded Geffroy in the faculty of letters at Paris, and in 1878 be¬ came professor of mediaeval history there. From 1880 to 1883 he was director of the ficole Nor¬ male ; returned to the Sorbonne in 1884 and re¬ mained until 1888. He published

(1875—89) ; (Recherches sur quelques problemes d'histoire* (1885). Consult Guirand, (Fustel de Coulanges) (Paris 1897).

FUSTIAN, named after Fustat, a suburb of Cairo, wTere the material originated, (1) a species of cotton cloth similar to velvet, having, in addition to the warp and weft, a species of pile consisting of other threads doubled to¬ gether, which are thrown up in ridges and con¬ ceal the groundwork of the fabric. When in the loom, this pile presents the appearance of a set of loops. These are cut in two and sheared down, and when polished and finished, present an evenly ribbed surface on the exterior. The best fustians are known as cotton-velvet and velveteen ; besides these there are moleskin, corduroy, and several other kinds. (See Weav¬ ing). (2) In literature, fustian signifies a forced, bombastic style of writing, abounding with metaphors or other rhetorical figures. Consult Passelt, technology of Textile De¬ sign } (Philadelphia 1895).

FUSTIC, name of certain kinds of dye- wood, which yield a yellow color, capable of being chemically changed to other hues, as brown, green, etc. One variety (Chlorophora tinctoria) is a handsome tree of the West In¬ dies, Central and South America; is sometimes used as a cabinet vˆood, but principally as a dyewood because of its large content of yellow. Another variet3r is the Rhus cotinus, known in commerce as ((young fustic.®

FUTA-JALLON, foo'ta zha-lon', West Africa, a region in central French Guinea, ex¬ tremely mountainous, and remarkable for the romantic beauty of its scenery; and the source of the rivers Senegal, Gambia,

Niger, etc. Large herds and flocks are pastured, and the

soil produces in abundance bananas and other fruits, besides coffee, maize, rice, cotton and numerous palm trees, which furnish dates, wine and oil. The region has an area of about 42,500 square miles and since 1902 has been subdivided into four districts for administrative purposes. The native princes are called almamys, and rule each for two years, subject to the edicts of a council of nobles. The French protectorate dates from 1893. Pop. 700,000. Consult De Sanderval, (La conquete du Fouta-Djallon) (Paris 1899) and Machat, (Les rivieres du sud et le Fouta-Djallon) (ib. 1906).

FUTA-TORO, foot'a to'ro, West Africa, a territory in the northern part of French Sene¬ gal. It has a population estimated at 125,000, chiefly Fulahs. The soil is fertile and much of the country is covered with tamarind forests. Iron is mined in considerable quantities.

FUTHARK, foo'thork, the Runic alphabet which derives its name from the first six letters, f, u, th, a, r, k, and is applied to all the systems of phonetic signs of the Teutonic stock, for the same reason as those of classical derivation are called ˆalphabet® or <(abecedarium.® They occur in the same order in Old German, Gothic, Anglo-Saxon and Northern Runes, with a nomenclature in all of them borrowed from trees and other familiar natural objects, sug¬ gestive of the derivation of the series of phonetic symbols from a primitive system of pictorial writing. See Alphabet; Runic Characters.

FUTURE ESTATE, a landed estate of which a person is to become possessed at some future time. In England under the common law the number of such estates was very limited until the reign of Henry VIII, when, in 1535, new classes of future estate were rendered pos¬ sible by legislation. In England many legal distinctions still remain, such as executory de¬ vise, springing use, shifting use, etc., but in very many of the United States all future estates are placed on the same basis so that future estates of all kinds may be created di¬ rectly by deed as well as by last will and testa¬ ment. It is also possible to create future estates or interests in personal property as well as in real. All future estates of a contingent char¬ acter are subject to the rule against perpetuities, which makes void any interest which is not to vest within

a lifetime, and 21 years after the creation of the future estate.

FUTURE LIFE. The purpose of this ar¬ ticle is not to discuss the varying conceptions of a future life which have been believed and taught through the many generations of human existence. It is not an attempt to trace the history or development of the doctrine of a future life. It is no part of the plan to prove or disprove the matter of continued existence after death or any particular theory thereof, nor to disclose the ground on which this belief has been built. All that is attempted is to present, as fully as space will allow, a summary of this belief as held and expressed by fairly representative minds in all generations. To record every shade of difference, or to quote from authorities in each of the different reli¬ gious movements is impossible on account of the length to which this article would run. By a series of carefully selected quotations it is hoped to enable the reader to get a hint of

what men in different nations and periods of human history have thought on this unceasingly important matter.

Prehistoric. — In the prehistoric period of human life there is in the nature of things no written record of man's belief concerning the future or anything else. The evidence dug up from the burial places of very ancient man is such as to convince any one that in the remote periods of human existence man believed that death of the body was not the end of life. It was believed that the spirit of man lived on; that it often returned to the place of its earthly existence ; that it knew those who still lived on earth. It is not at all certain that all primitive races had this belief.

Pre-Christian. — The earliest records known in which man has tried to express his ideas of the future are not easy to understand. It is far from easy to select sentences that express the idea with any clearness.

ASSYRIA.

The future was frequently spoken of as ®The land from which there is no return,ˆ and in the Uzdubar legends,* we read, <(Formerly Pir-napistim was of human nature, now Pir- naptistim and his wife must be like the gods.®

EGYPT.

The tombs of Egypt have yielded considerable material on this subject; a 26th century b.c. in¬ scription on a tomb reads :

((Now I caused that I should be buried in the same tomb with this Zau (His father's name) in order that I might be with him in the same place ; not, however, because I was not in a position to make a second tomb ; but I did this in order that I might see this Zau every day, in order that I might be with him in the same place.®

During the Osirian period the Egyptian dead are identified with Osiris, which explains the following from Pyramid Texts:

" As surely as Osiris lives, so shall he live also ;

As surely as Osiris did not die, so shall he not die.

As surely as Osiris is not annihilated, so shall he too not be annihilated."

<(When thou hast triumphed over thy present, Re and Horus will provide a ladder for thee; one of them shall stand on this side and one on that, and thou shalt mount up to heaven. The gate of heaven will open to thee, and the great bolts will draw back for thee. There thou findest Re stationed ... he takes thee by the hand and leads thee into the sanct¬ uary of heaven, and sets thee upon the throne of Osiris® ;

From the (Book of the Dead^ :

<(The blessed dead has his place in the Hall be¬ fore the great god and he knows every great god . He goes out into the field of Earu. There is given to him cakes and bread and fields of barley and spelt seven cubits high. The servants of Horus gather in the harvest, and he eats of this barley and this spelt.®

On Egyptian Tombs (2,000 b.c.) we find:

(

the eyes of the Great God. They dwell in the abodes of glory where the heavenly life is led. The bodies which they have abandoned will

repose forever in their tombs, while they will enjoy the presence of the Great God »

It was believed that the dead go to the lower world and occupy vast caverns thro ' which the sun passed during his night absence:

((The departed, who are in their halls, in their caverns, praise the sun ; their eyes are opened, their heart is full of felicity when they behold the sun ; they shout for joy when his body is over them.®

PERSIAN.

We read in the < Prayer to the Angels' (Yasa – tas) recited in last death rites:

<(0 victorious and holy Srosh, we have re- m

• • 0» Srosh, Mihr, and Rashn the Just,

we have delivered him (her) into your keeping; take his (her) hand and lead him (her) to the abode of our forefathers and the righteous and the pure. So be it in accordance with the will of the Angels and Archangels; so be it, so, verily let it be?

In the (Zendavesta (589 b.c.) is found:

®The man who has constantly contended against evil, morally and physically, outwardly and inwardly, may fearlessly meet .death; well assured that radiant Sprits will lead him across the luminous bridge into a paradise of eternal happiness, . . . Souls rise from the graves

will know each other, and say, That is my father, or my brother, my wife, or my sister?

((What is the world? It is simply a halting place with two gates. By the one ye enter; by the other ye depart.®

From Airyama Prayer:

In the earth shall Ahriman hide.

In the earth the demons hide.

Up the dead again shall rise,

And within their lifeless bodies Incorporate life shall be restored.”

The Pahlavi Texts have:

((In that assembly (the risen dead) every one sees his own good deeds and his own evil deeds ; and then, in that assembly, a wicked man becomes as conspicuous as a white sheep among those which are black.® The heavenly work being completed <(all men become of

one voice and administer praise to . . . the merciful Lord,

who makes the final retribution, and who will at the end deliver the wicked from hell and restore the whole creation in purity?

HINDU.

The < Ancient Vedas' (c. 1500 b.c.) state that:

((The God of the Dead waits enthroned in immortal light to welcome the good into his kingdom of joy: to the homes he had gone to prepare for them, where the One Being dwells beyond the stars.®

•

The Bhagavadgita (c. II), The deity said:

> ((You have grieved for those who deserve no grief, and you speak words of wisdom. Learned men grieve not for the living nor the dead. Never did I not exist, nor you, nor these rulers of men: nor will any of us ever hereafter

cease to be. . . . For the one that is born

death is certain ; and to one that dies, birth is certain.®

Dhammapada (Buddhist) :

... ˆhe evil-doer mourns in this world, and he will mourn in the next world: in both worlds has he sorrow.

(The virtuous man rejoices in this world, and he wd! rejoice in another world: in both worlds hath he joy.

As kindred, friends, and dear ones salute him who hath travelled far and returned home sate, so will good deeds welcome him who goes from this world and enters another.®

The Satapatha-Brahamana (Pt. IV, Third

Brahmana) :

, Henceforward no one shall be immortal with the body : only when thou shalt have taken that (body) as thy share, he who is to become immortal either through knowledge, or through holy work, shall become immortal after sepa¬ rating from the body. Now when they said, either through knowledge or through holy work> it is this fire-

altar that is the knowledge, 2-11(1 this fire-altar that is the holy work.

((And they who so know this, or they who do this holy work, come to life again when they nave died, and, coming to life, they come to life. . But they who do not know this, or

n°^ work, come to life again

when they die, and they become the food of him (Death) time after time?

Buddhist Suit as:

(

CHINESE.

Buddhist Scriptures :

ˆMan never dies. The soul inhabits the body for a time, and leaves it again. The soul is myself : the body is only my dwelling place. Birth is not birth : there is a soul already exist¬ ent when the body comes to it. Death is not death : the soul merely departs, and the body falls. It is because men see only their bodies that they love life and hate death.®

The writings of Kwang-tze (Book XVIII, 4):

((When Kwang-tze went to Khu, he saw an empty skull, bleached indeed, but still retaining its shape. Tapping it with his horse-switch, he asked it, saying, (Did you, Sir, in your greed of life, fail in the lessons of reason and come to this? Or did you do so, in the service of a perishing state, by the punishment of the axe? Or was it through your evil conduct, reflect¬ ing disgrace on your parents, and on your wife and children? Or was it through your hard endurances of cold and hunger? Or was it that you had completed your term of life?) ®

((Having given expression to these questions, he took up the skull and made a pillow of it when he went to sleep. At midnight the skull appeared to him in a dream, and said, (What you said to me was after the fashion of an orator. All your words were about the entangle¬ ments of men in this life-time. There are none of those things after death. Would you like

to hear me, Sir, tell you about death ?> (I should, 5 said Kwang-tze, and the skull resumed: Hn death there are not (the distinctions of) ruler above and minister below. There are none of the phenomena of the four seasons. Tran¬ quil and at ease, our years are those of heaven and earth. No king in his court has greater enjoyment than we have.* Kwang-tze did not believe it, and said, (If I could get the Ruler of our Destiny to restore your body to life with its bones and flesh and skin, and to give you back your father and mother, your wife and children, and all your village acquaintances, would you wish me to do so?} The skull stared fixedly at him, knitted its brows, and said, (How should I cast away the enjoyment of my royal court and undertake again the toils of life among mankind ?) ®

SIAM.

Buddhist Scriptures :

<(The effect of water poured on the root of a tree is seen aloft in the branches and fruit; so in the next world are seen the effects of good deeds performed here.®

CEYLON.

Buddhist Scriptures:

(

JAPANESE.

From letter of old Japanese Buddhist woman quoted by Reischauer in (Studies in Japan¬ ese Buddhism) (1917) :

((I am old and I am a woman, and it is not to be expected that a woman will know much of such subjects, but I will tell you what thoughts I have. I am weak and sinful, and have no hope in myself ; my hope is all in Amida Buddha. I believe him to be the Supreme Being. Because of the wickedness of man, and because of human sorrow, Amida Buddha became in¬ carnate and came to the earth to deliver man ; and my hope and the world's hope is to be found only in his suffering love. He has entered humanity to save it; and he alone can save. He constantly watches over and helps all who trust in him. I am not in a hurry to die, but I am ready when the time comes ; and I trust through the gracious love of Amida Buddha,

I shall enter the future life which I believe to be a state of conscious existence, and where I shall be free from sorrow.®

From a letter written by Japanese Amidaist on death bed (ibid.) :

((Should my sickness change for the worse,

I shall never see you again in this life. But I shall, of a certainty, see once more, in the pure Land, all those who are partakers with me in the faith that I have in Amida.®

PHOENICIAN.

Inscription of Eschmun (Azar'> :

((Let there be no resting-place among the Rephaim for the man, even if he be of royal lineage, who ventures to open this chamber of repose, or remove the sarcophagus in which I am at rest.®

Hebrew.

Old Testament:

"For there is hope of a tree, if it be cut down, that it will sprout again, and that the tender branch thereof will not cease. Though the root thereof wax old in the earth, and the stock thereof die in the ground; yet through the scent of water it will bud, and put forth boughs like a plant. But man dieth, and is laid low: Yea, man giveth up the ghost, and where is he?" — Job xiv, 7-10.

"If a man die, shall he live again? All the days of my warfare would I wait, till my re¬ lease should come. Thou wouldest call, and I would answer thee : thou wouldest have a desire to the work of thy hands. — Job. xiv,

13-1.1.

" But I know that my Avenger liveth, and that at the last He will appear above (my) grave : and after my skin hath been thus de¬ stroyed, with out my body shall I see God : and whom I shall see for myself, and mine desire to the work of thy hands.® — Job. xiv,

25-27.

" For thou dost not commit me to Sheol,

Nor sufEerest thy faithful ones to see the pit.

Thou teachest me the pathway of life;

In thy presence is fulness of joys,

Fair gifts in thy right hand forever."

Psalm xvi, 10-11 (transl. by H. H. Furness).

" Like sheep they sink into Sheol Death rules them, terrors affright them;

They go down straight into the grave Sheol is their mansion forever."

Psalm xlix, 14— 15 (transl. by Dr. Cheyne).

"And many of them that sleep in the land of dust shall awake, some to everlasting life, and some to shame and everlasting contempt." — Daniel xii, 2.

((For God created man to be immortal, and made him to be an image of his own eternity.

The souls of the righteous are in the hand of God and there shall no torment touch them. In the sight of the unwise they seemed to die: and their departure is taken for misery, and their going from us to be utter destruction : but they are in peace. For though they be punished in the sight of men, yet is their hope full of immortality. And having been a little chastised, they shall be greatly rewarded : for God proved them, and found them worthy for himself. As gold in the furnace hath he tried them, and received them as a burnt offering."— Wisdom of Solomon ii, 23 — iii, 1-6.

2 Baruch li , 7-10, 12 (quoted from R. H.

Charles in his Eschatology) :

Those who have been saved by their works, and to whom the law has been now a hope, and understanding and expectation, and wis¬ dom a confidence, to them wonders will appear in their time. For they will behold the world which is now invisible to them, and they will behold the time which is now hidden from therm And again, time will not age them. For in the heights of that world shall they dwell, and they shall be made like unto the angels, and be made equal to the stars, and they shall be changed into every form they desire, from beauty into loveliness, and from light into the splendor of glory. . . . More¬

over there will then be excellency in the righteous surpassing that in the angels."

Book of Enoch xxii (quoted from R H Charles) :

tt thence I went to another place, and

Uriel showed me in the West another great and high mountain of hard rock. And there were foui hollow places in it, deep and very smooth : three of them were dark and one bright, and there was a fountain of water in its midst. And I said : How smooth are these hollow places, and deep and dark to view. Then Raphael answered one of the holy angels who was with me, and said unto me: These hollow places have been created for this very purpose, that the spirits of the souls of the dead should assemble therein, yea that all the souls of the children of men should assemble here. And these places have been made to receive them till the day of their judgment and till their appointed period, till the great judgment (comes) upon them. I saw the spirit of a dead man making suit, and his voice went forth to heaven and made suit. And I asked Raphael, the angel who was with me, and I said unto him : This spirit which maketh suit, whose is it, whose voice goeth forth and maketh suit to heaven ? And he answered me saying: This is the spirit which went forth from Abel whom his brother Cain slew, and he makes his suit against him till his seed is de¬ stroyed from the face of the earth, and his seed is annihilated from amongst the seed of men. Then I asked regarding all the hollow places, why is one separated from the other? And he answered me saying: These three have been made that the spirits of the dead might be separated. And this division has been made for the spirits of the righteous, in which there is the bright spring of water. And this has been made for sinners when they die and are buried in the earth and judgment has been executed upon them in their lifetime. Here their spirits will be set apart in this great pain, till the great day of judgment, scourgings and torments of the accursed forever, so that (there may be) retribution for their spirits. There shall He bind them forever. And this division has been made for the spirits of those who make their suit, who make disclosures concerning their destruction, when they were slain in the days of the sinners. And this has been made for the spirits of men who shall not h,e righteous but sinfiers, who are godless, and they of the lawless shall be companions: but their spirits shall not be punished on the day of judgment, nor shall they be raised from thence.®

GREECE.

In Homeric times the destiny awaiting man after death is one of totally unrelieved gloom. One passage in the cOdyssey) gives a glimpse of something different in store for Men elans:

“ To thee it shall not come

In the horse-kind land of Argos to meet thy death and doom. But unto the fields Elysian and the wide world’s utmost end, Where dwells tawny Rhadamanthus, the Deathless thee shall send.

Wherein are the softest life-days that men may ever gain;

No snow and no ill weather, nor any drift of rain;

But Ocean ever wafteth the wind of the shrilly west,

On menfolk ever breathing, to give them night and rest.”

From early Orphic poems:

((They who are pious in their life beneath the rays of the sun enjoy a gentler lot when

they have died, in the beautiful meadow around deep-howmg Acheron.®

(

Pythagoras (589 b.c.):

When thou shalt have laid aside thy body, thou shalt rise, freed from mortality, and be¬ come a god of the kindly skies.®

Heraclitus 500 (b.c.):

« My body must descend to the place or¬ dained, but my soul will not descend: being a thing immortal, it will ascend on high, where it will enter a heavenly abode.®

From the second Olympian- Pindar :

<(The guilty souls of the dead straightway pay the penalty here on earth; and the sins committed in this kingdom of Zeus are judged by One beneath the ground, hateful Necessity enforcing the doom he speaks. But ever through nights and ever through days the same, the good receive an unlaborious life be¬ neath the sunshine. They vex not with might of hand the earth or the waters of the sea for food that satisfieth not, but among the

honored Gods, such as had pleasure in keeping of oaths enjoy a tearless life; but the others have pain too fearful to behold. Howbeit they who thrice on either side of death have stood fast and wholly refrained their souls from deeds unjust, journey on the road to Zeus to the tower of Cronus, where the ocean-breezes blow around the island of the blest, and flowers gleam bright with gold, some on trees of glory on the land, while others the water feeds ; with wreathes whereof they entwine their arms and crown their heads.®

FEschylus:

“ There thou shalt see in durance drear,

’Gainst god or guest or parents dear,

Like thee who sinned, receiving their due meed.

For Hades, ruler of the nether sphere,

Exactest auditor of human kind,

Graved on the tablet of his mind Doth every trespass read.” .

Sophocles:

“ But a good hope I cherish, that, come there.

My father’s love will greet me, yea and thine,

My mother — and thy welcome, brother dear.”

Socrates in the (Apology’> :

(

be wise, and is not. . . . Besides being hap¬ pier in that world than in this, they will be im¬ mortal, if what is said is true.®

(

Xenophon introduces dying Cyrus to his chil¬ dren :

<(By the paternal gods, my sons, respect one another, if you care to

please me. For you surely do not imagine that you know clearly that I shall be nothing, when I have finished with my human life. For even now you never saw my soul, but you knew its existence from what it did. And have you not seen, what terrors the souls of those who have suffered injustice bring upon the criminals; what aveng¬ ing spirits they send to the evil doers? And do you believe that the honors paid to the dead would continue, if their souls had no longer any power? I, indeed, O sons, have never be¬ lieved that the soul while it is in a mortal body lives, and is dead when it is free from it : for I see that even these mortal bodies live only so long as the soul is in them. Nor can I believe that the soul will be without reason, after it has been separated from this unreason¬ ing body; but when the mind has been sepa¬ rated, unmixed and pure from the body, then it is likely that it will be most rational. . . . Consider also that nothing is nearer to human death than sleep, and that the soul of man seems then most divine, and sees then some¬ thing of the future, because it is then most free. If then these things are as I believe, and the soul leaves the body, do what I ask from reverence for my soul. But if it is not so, and the soul remains in the body and dies, even then do not do or think anything impious or unholy for fear of the eternal, the omniscient, the omnipotent gods, who hold together this order of all things, flawless, unfading, unfail¬ ing and inconceivable by its greatness and by its beauty.®

Euripides:

((Let now the dead bodies be covered by the earth, and each go away whence it came into the body; the breath to the aether, the body to the earth.®

Plato CPhcedo)):

<(Those who have been pre-eminent for holi¬ ness of life are released from this earthly prison, and go to their pure home which is above, and dwell in the purer earth ; and those who have duly purified themselves with philos¬ ophy, live henceforth altogether without the body, in mansions fairer far than these, which may not be described, and of which the time would fail me to tell.®

<(The soul of each of us is an immortal Spirit and goes to other immortals to give an account of its actions. Those who have lived a holy life, when they are freed from this earth and set at large, will arrive at a pure abode above, and live through all future time. They will arrive at habitations more beautiful than it is easy to describe.®

Popular verses on Harmodius and Aristogiton:

Dearest Harmodius, thou art surely not dead,

Thou dwellest, they say, in the isles of the blest,

Where the swift-footed Achilles,

Where the son of Tydeus, the brave Diomedes, dwells.

Greek inscription on a daughter:

((Mother, leave thy grief, remembering the soul which Zeus has rendered immortal and undecaying to me for all time, and has now carried into the starry sky.®

Epitaph (trans . by Hon. Lionel A. Tollemache) :

“ Dying, thou art not dead! — thou art gone to a happier country,

And in the aisles of the blest thou rejoicest in weal and abundance,

There, Prote, is thy home in the peace of Elysian meadows, Meadows with Asphodel strewn, and peace unblighted with sorrow.

Winter molests thee no longer, nor heat nor disease; and thou shalt not

Hunger or thirst any more; but, unholpen of man and unheedful.

Spotless and fearless of sin, thou exultest in view of Olympus;

Yea, and thy gods are thy light, and their glory is ever upon thee.”

ROMAN.

Cato (quoted by Cicero, 200 b.c.) :

(<0 glorious day, when I shall remove from this confused crowd to join the divine assem¬ bly of souls ! For I shall go not only to meet great men, but also my own son. His spirit, looking back upon me, departed to that place whither he knew that I should soon come; and. he has never deserted me. If I have borne his loss with courage, it is because I consoled myself with the thought that our separation would not be for long.®

Seneca:

<(This life is only a prelude to eternity, where we are to expect another state of things. We have no prospect of Heaven here, but at a distance : let us, therefore, expect our last hour with courage. The last I say to our

bodies, not to our minds. The day which we fear as our last is but the birthday of eternity. . . .

This we presume, either we shall pass out of this life into a better one, where we shall live in diviner mansions, or else return to our first principles, free from any sense of incon¬ venience. . . . It is the care of a wise and

good man to look to his manners and actions ; and rather how well he lives than how long. To die sooner or later is not the business, but to die well or ill; for death brings us to im¬ mortality.®

CHRISTIAN ERA.

Paul (Cor. XV, trans. by Dr. James Moffatt) :

((Someone will ask, (How do the dead rise? What kind of body have they when they come?' Foolish man! What you sow never comes to life unless it dies. And what you sow is not the body that is to be; it is a mere grain of wheat, for example, or some other seed. God gives it a body as he pleases, gives

FUTURE LIFE

20©

each kind of seed a body of its own . . .

here are heavenly bodies and also earthly

odies, but the splendor of the heavenly is one t ling and the splendor of the earthly is an- other. There is a splendor of the sun and a splendor of the moon and a splendor of the stars tor one star differs from another star in splendor. So with the resurrection of the dead : what is sown is mortal, what rises is immortal; sown inglorious, it rises in glory; sown in weakness, it rises in power ; sown an animate body, it rises a spiritual body. As there is an animate body, so there is a spiritual , • , I teˆ y?u this, my brothers, nesh and blood cannot inherit the Realm of God nor can the perishing inherit the im-. perishable. Here is a secret truth for you : not all of 11s are to die, but all of us are to be changed — changed in a moment, in the twinkling of an eye, at the last trumpet-call. The trumpet will sound, the dead will rise imperishable, and we shall be changed. For this perishing body must be invested with the imperishable, and this mortal body invested with immortality; and when this mortal body has been invested with immortality, then the saying of Scripture will be realized. Death is swallowed up in victory.®

1 Thessalonians, iv:

<(We would like you, brothers, to understand about those who are asleep in death. You must not grieve for them, like the rest of men who have no hope. Since we believe that Jesus died and rose again, then it follows that by means of Jesus God will bring with him those who have fallen asleep. For we tell you, as the Lord has told us, that we the living, who survive till the Lord comes, are by no means to take precedence of those who have fallen asleep. The Lord himself will descend from heaven with a loud summons when the archangel calls and the trumpet of God sounds ; the dead in Christ will rise first ; then we the living, who survive, will be caught up along with them in the clouds to meet the Lord in the air, and so we will be with the Lord forever.®

Revelations xx and xxi (trans . by Dr. Moffatt) :

((Then I saw a great white throne, and One who was seated thereon; from his presence earth and sky fled, no more to be found. And I saw the dead, high and low, standing before the throne, and books were opened — also another book, the book of Life, was opened — and the dead were judged by what was written in these books, by what they had done ... I heard a loud voice out of the throne, crying, (Lo, God's dwelling place is with men, with men will he dwell; they will be his people and God himself will be with them ; he will wipe every tear from their eyes, and death shall be no more — no more wailing or crying or pain.} ®

NON-CHRISTIAN.

Marcus Aurelius Antoninus:

«

<(If souls survive, how has ethereal space made room for them all from eternity? How has the earth found room for all the bodies buried in it? The solution of the latter prob¬ lem will solve the former. The corpse turns to dust and makes space for another: so the

VOL. 12 — 14

spirit, let loose in the air, after a while dis¬ solves, and is either renewed into another soul or absorbed into the universe.®

early church.

The Clementina Homilies:

'For there is every necessity, that he who says that God who is by His nature righteous, should believe also that the souls of men are immortal; for where would be His justice, when some having lived piously, have been evil treated, and sometimes violently cut off, while others who have been impious, and have in¬ dulged in luxurious living, have died the com¬ mon death of men? Since therefore, without all contradiction, God who is good is also just, He shall not otherwise be known to be just' unless the soul after the separation from the body be immortal, so that the wicked man, being in hell, as having here received of his good things, may there be punished for his sins ; and the good man, who has been punished here for his sins, may there, as in the bosom of the righteous, be constituted as heir of good things. Since therefore God is righteous, it is fully evident to us that there is a judgment, and that souls are immortal.®

Gregory of Nyssa (394 a.d.):

(

*Council of Florence (1439 a.d.).**

(

POST REFORMATION.

Martin Luther:

«The Scriptures say that the holy and just go into the unseen world, and there enjoy the most pleasant peace and sweetest rest. As in this life they were wont to fall asleep in the guard and keeping of God and of the dear angels, without fear of harm, though the devils might prowl about them — so, after this life, they repose in the hand of God. When my soul departs, I

know that highest kings and princes are appointed to attend me ; namely, the dear angels themselves who will receive me and guard me on the way.®

Heidelberg Catechism (a.d. 1563) :

((Not only my soul after this life shall be immediately taken up to Christ, its head, but also this body, raised by the power of Christ, shall be again united with my soul and made like unto the glorious body of Christ.®

Westminster Confession (xxxiii, 1);

(

*dust, and see corruption ; but their souls (which neither die nor sleep), having an im¬ mortal substance, immediately return to God who gave them. The souls of the righteous, being then made perfect in holiness, are re¬ ceived into the highest heavens, where they behold the face of God in light and glory, waiting for the full redemption of their bodies: and the souls of the wicked are cast into hell, where they remain in torments and utter dark¬ ness, reserved to the judgment of the great day. Besides these two places for souls separated from their bodies, the Scripture acknowledgeth none.**

Episcopal Prayer Book:

((Almighty God, with whom do live the spirits of those who depart hence in the Lord, and with whom the souls of the faithful, after they are delivered from the burden of the flesh, are in joy and felicity.®

John Wesley ((Letters'1) :

Catholic Encyclopaedia:

<(The blessed dead (after the resurrection with glorified bodies) enjoy, in the company of Christ and the angels, the immediate vision of God face to face, being supernaturally elevated by the light of glory so as to be capable of such a vision. There are infinite degrees of glory corresponding to degrees of merit, but all are unspeakably happy in the eternal possession of God.»

CLERGYMEN AND THEOLOGIANS I RECENT.

Charles H. Spurgeon:

((I believe that heaven is a fellowship of the saints, and that we shall know one another there. I have often thought I should love to see Isaiah. ... I am sure I should want to find out good George Whitefield. . . . We shall have a choice company in heaven when we get there.®

Henry Ward Beecher:

(

Charles Kingsley:

((brother, said the abbot, (make ready for me the divine elements, that I may conse¬ crate them.* And he asking the reason there¬ for, the saint replied, (That I may partake thereof with all my brethren before I depart*

*hence. For know assuredly that within the seventh day I shall migrate to the celestial mansions. For this night stood by me in a dream those two women whom I love, and for whom I pray, the one clothed in a white, the other in a ruby-colored garment, and hold¬ ing each other by the hand, who said to me that life after death is not such a one as you fancy: come, therefore, and behold what it is like. * »*

Robert Collyer:

<(If the Higher Powers should say to me, (We have nothing else for you here or here¬ after, } I think I should answer: (I make no claim. I would love to see those I have lost once more; but if it is not to be so, I am still debtor for the untold blessings of my many years. ®*

Cardinal Newman:

<(It would be presumption to attempt to de¬ termine the employments of that eternal life which good men are to pass to in God's pres¬ ence, or to deny that that state which eye hath not seen, nor ear heard, nor mind conceived, may comprise an infinite variety of pursuits and occupations. Still so far we ire distinctly told, that the future life, will be spent in God's presence, in a sense which does not apply to our present life.®

James Martineau:

<(Were it the will of the Creator to change his arrangements for mankind, and to deter¬ mine that they should henceforth live in this world ten or a hundred times as long as they do at present, no one would feel that new souls would be required for the execution of the design. And in the mere

conception of un¬ limited existence there is nothing more amaz¬ ing than in that of unlimited non-existence ; there is no more mystery in the mind living for ever in the future, than in its having been kept out of life through an eternity in the past.

. . . It is far more incredible that from not having been, we are, than that from actual being, we shall continue to be .®

Phillips Brooks:

((If we could only know, somewhat as John must have known after his vision, the presence of God into which our friend enters on the other side, the higher standards, the larger fellowship with all his race and the new as¬ surance of immortality in God; if we could know all this how all else would give way to something almost like a burst of triumph as the soul which we loved went forth to such enlargement, to such glorious consummation of life.®

*C. C. Everett ((Immortality and Other Es¬ says *) :*

(

St-U?gluS11after the rMht and good . . . that spirit shall mount up into the realms of blessed¬ ness and peace ; while those whose love has been downwards, and not up, shall fall . . . .»

Mgr. Vaughan (cMan or Ape'):

<(As to the past we are creatures of yester-

Borden P. Bourne (in North American Re¬ view, 1910) :

(

Prof. H. A. Youtz (in Biblical World, 1912):

((The Christian doctrine of a future life has for its core and center the affirmation of the permanence of the spiritual order. . . . The spiritual universe can be trusted and all spirit¬ ual achievement is secure. . . . Goodness and love and courage and the spirit of service — we cannot believe that these can perish in a spiritual world. . . . They will survive in any spiritual world that is continuous with the life we know. And since character and love are not abstract ideals but concrete facts — ex¬

pressions of personality — their continuance point to the persistence of personal identity.®

NON-CHURCHMEN.

Thomas Paine:

((I trouble not myself about the manner of future > existence. I content myself with believing, even to positive conviction, that the^ Power which gave me existence is able to continue it in any form and manner he pleases, either with or without this body; and it appears more probable to me that I shall continue to exist hereafter, than that I should have existence as I now have, before that ex¬ istence began.® . . . «I hope for happiness be¬ yond this life.®

Robert G. Ingersoll:

(

SCIENTISTS, POETS, LITERATI.

Kant:

. After death the soul possesses self-con- sciousness, otherwise it would be the subject of spiritual death, which has already been dis¬ proved. With this self-consciousness neces¬ sarily remains personality and the conscious¬ ness ot personal identity.®

Benjamin Franklin:

<(Life is a state of embryo, life. A man is not completely passed through death.®

a preparation for born until he has

Charles Darwin (cLife and Letters'):

"Believing as I do that man in the distant tuture will be a far more perfect creature than he now is, it is an intolerable thought that he and all other sentient beings are doomed to complete annihilation after such long-con¬ tinued slow progress.®

John Stuart Mill (c Essay on Theism'):

All the probabilities in the case of a future life are that such as we have been made or have made ourselves before the change, such we shall enter into- the life hereafter; and that the fact of death will make no sudden

break in our spiritual life. If there be a future life, it will be at least as good as the present, and will not be wanting in the best features of the present life, improvability by our own efforts.®

Thomas Carlyle:

«Man endures but for an hour, and is crushed before the moth. Yet in the being and m the working of a faithful man is there al¬ ready (as all faith from the beginning, gives assurance) a something that pertains not to this wild death-element of Time, but that which triumphs over Time, and is, and will be, when I ime shall be no more.®

Ralph Waldo Emerson:

Of what import this vacant sky, these pufhng elements, these insignificant lives, full of selfish loves, quarrels and ennui? Every- thing is prospective, and man is to live here¬ after. ... All the comfort I have found teaches me to confide that I shall not have less in times and places that I do not yet know. • • ••■All I have seen teaches me to trust the Creator for all I have not seen. Whatever it be which the great Providence prepares for us, it must be something large and generous, and in the great style of his works.®

George Eliot:

L – . " This is life to come

Which martyred men have made more glorious For us to strive to follow. May I reach That purest heaven; be to other souls The cup of strength in some great agony; Enkindle generous ardor; feed pure love;

Beget the smiles that have no cruelty;

Be the sweet presence of a good diffused,

And in diffusion ever more intense."

John Fiske ((Through Nature to God'):

((So far as our knowledge of Nature goes the whole momentum of it carries us onward to the conclusion that the Unseen World, as the ob¬ jective term in a relation of fundamental im¬ portance that has co-existed with the whole career of mankind, has a real existence.

The lesson of evolution is that through all these weary ages the human soul has not been cherishing in religion a delusive phantom, but

in spite of seemingly endless groping and stumbling it has been rising to the recognition of its essential kinship with the ever-living God.®

Mark Twain ((A Biography, 5 by Albert Bigelow Paine) :

<(I have never seen what to me seemed an atom of proof that there is a future life. And yet — I am strongly inclined to expect one.®

Richard Watson Gilder (on the death of Alice Freeman Palmer) :

“ When fell to-day the word that she had gone,

Not this my thought: Here a bright journey ends Here rests a soul unresting; here, at last,

Here ends the earnest struggle, that generous life —

For all her life was giving. Rather this,

JI said (after the first swift, sorrowing pang)

Radiant with love, and love’s unending power Hence, on a new quest, starts an eager spirit . .

Hugo Munsterb erg ((The Eternal Life ,5 1905):

<(Who dares to speak the word Uncom¬ pleted5 ? Are the influences of our will con¬ fined to those impulses which directly and with our knowledge act on the nearest circle of our neighbors? Will not our friend, who left us in the best energy of his manhood, influence you and me and so many others throughout our lives, and what we gained from his noble mind — will it not work through us further and further, and may it not thus complete much of that which seemed broken off and uncom¬ pleted ?®

Sir Oliver J. Lodge:

<(Nor is it so with intellect and conscious¬ ness and will, nor with memory and love and adoration, nor all the manifold activities which at present strangely interact with matter and appeal to our bodily senses and terrestrial knowledge ; they are not nothing, nor shall they ever vanish into nothingness or cease to be. They did not arise with us : they never ’did spring into being; they are as eternal as the Godhead itself, and in the eternal Being they shall endure for ever.'®

Edward Roland Sill:

“ What can we bear beyond the unknown portal?

No gold, no gains

Of all our toiling: in the life immortal

No hoarded wealth remains.

Nor gilds, nor stains.

“ Naked from out that far abyss behind us

We entered here: #

No word came with our coming, to remind us What wondrous world was near,

No hope, no fear.

” Into the silent, starless night before us,

Naked we glide:

No hand has mapped the constellations o’er us,

No comrade at our side.

No chart, no guide.

“ Yet fearless toward that midnight, black and hollow, Our footsteps fare:

The beckoning of a Father’s hand we follow —

His love alone is there,

No curse, no care.”

Charles Graves.

FUTURE LIFE IN MYTHOLOGY.

See Mythology; Nature Worship.

FUTURISM, the word applied in 1911 by five Italian painters to a new theory of art which they claimed their own works exempli¬ fied. They themselves characterized their art as ˆviolently revolutionary,® and exhibited paintings at that time (in the “first exposition of futurist paintings in Paris®) which added zest to their declaration that “all truths taught

in schools and ateliers are abolished.® Their guiding principles were sought in individual intuition and they declined to lean for sup¬ port upon the example of the Greeks and the old masters, their frankly expressed purpose being the establishment of wholly new laws which should rescue modern painting from in¬ certitude. Thus, Futurism is a movement away from old ideals and toward new ones, differ¬ entiated somewhat in this respect (and more obviously in methods of expression) from the nearly synchronous cubism.

FYFFE, fif, Charles Alan, English his¬ torian : b. Blackheath, Kent, England, December 1845; d. 19 Feb. 1892. He was graduated at Oxford in 1868; and called to the bar in 1876, but never practised. As correspondent of the Daily News during the Franco-Prussian War he is said to have sent to that journal the first account of the battle of Sedan that appeared in print. His historical works are distin¬ guished by accuracy and a pleasing, perspic¬ uous style. They include (History of Greece) (1875), in a series of (History Primers5; and the well-known (History of Modern Europe) (1880, 1886, 1890), , covering the period from 1792 to 1878.

FYLES, Franklin, American dramatic critic and author. In 1886 he became dramatic critic of the New York Sun. He wrote several suc¬ cessful plays, including the military dramas Cumberland '61 > and (The Girl I Left Behind Me} and some works in book form, among them (The Theatre and Its People5 (New York 1900), a popular account of the profession; (A Ward of France5 ; (Drusa Wayne,5 etc.

FYNE LOCH, Scotland, an inlet of the sea extending northeast from Bute Sound in Argyll. It is abo _t 44 miles in length and its width varies from three to eight miles; the average depth being from 50 to 70 fathoms. The rivers Fyne, Aray and Shira flow into it. Great quantities of herrings are caught in its waters, and it is a favorite summer resort for hundreds of city dwellers.

FYT, fit, or FEYDT, John, Flemish painter: b. Antwerp, 1611; d. there, 1661. He studied under Van den Birch, and at 20 was received into the Guild of Saint Luke. He spent a long time in Italy, as the numerous works executed there by him abundantly attest. His subjects embrace almost all living animals and reveal a deep knowledge of form. He was associated with Jordaens, Willeborts, etc. Among the works which they executed to¬ gether may be mentioned the (Repose of Diana5 (1650), in the Vienna Museum. He is represented in all the principal collections of the world; the Metropolitan Museum of New York has three fine specimens of dead game pieces. He also executed some gravures.

FYZABAD, fiz'o'-bad, British India, a divL sion of Oudh, in -the United

*Provinces. Its area is 12,000 square miles, with a 'population of 6,646,362. Agriculture is in a prosperous state ; wheat, rice and other cereals being grown extensively. Other crops. are cotton, tobacco * and indigo. The capital is Fyzabad, near the river. Gogra, 75 miles east of Lucknow. It is rich in ancient remains and is a holy city of the Hindus. It has sugar factories and trades in the agricultural products of the region. A Brit¬ ish commissioner resides in Fyzabad. Pop. 54,600.*

G

G seventh letter of the English alphabet and of other alphabets derived from the Latin. In very early Latin, G stood for the proper g-sound (g hard, as in go) and also for the k-sound of C, as in cup; afterward the k-sound was represented by K, while G continued to represent the sound of G hard; but K did not remain long in the Latin alphabet, being superseded by C (always hard and equiv¬ alent to K). Both in Greek and Latin the gamma (T. G) was always the hard guttural in whatever situation, and hence geographia was pronounced gheographia, genus ghenus, etc. The softening of g-hard to j when g pre¬ cedes e, i or y, began to prevail in the 6th century of our era, and it persists in the modern languages derived from Latin and in our own. In languages having words derived independently by each from some common stock, for example, the Indo-European lan¬ guages, the interchange of c-hard, g-hard, k, and the aspirate gutturals ch, gh, is very common; examples : Eng. kin, Lat. genus, Gr. genos; Gr. chen, Ger. gans, Eng. goose; Gr. gnonai, archaic Lat. gnosco, Ger. kennen, Eng. ken ; Lat. hester- nus, Gr. chthes, Ger. gestern, Eng. yester: the same equivalence of g and y is seen in Ger. gelb, Eng. yellow; Ger. gdhnen, Eng. yawn; Ger. garn, Eng. yarn. In French words of Teutonic origin an original w is often repre¬ sented by gu (equal to g-hard), thus Wilhelm becomes Guillaume ; Ger. weise, Fr. guise; Teu¬ ton werra, Eng. war, Fr. guerre.

GAAl, gal, Jozsef, Hungarian writer: b. Nagy Karoly, 1811; d. 1866. He was educated at the University of Pesth, and soon after en¬ tered the employment of the Hungarian Coun¬ cil of Lieutenancy. He took a conspicuous part in the troubles of the revolutionary year of 1848. He contributed much to periodicals, especially sketches of country life. His works include (Szirmay Ilona) (1836) ; (Peleskei Notarius5 (1838) ; a four-act comedy ; (Szvatop- Juk,) a tragedy; (Pusztai KalancP ; Tengeri Kalandaz Alfoldon ; Hortobagyi ejszakaP In 1837 he became a member of the Hungarian Academy. An edition of his novels was issued by Badics (Budapest 1880-82).*

QABBATHA, a word occurring only in John xix, 18, It occurs in connection with the Judgment by Pilate where he sat on a place called the Pavement, but in Hebrew, Gabbatha. Josephus does not mention this word,

nor can it be found in other writings outside of the New ‘ Testament. Various attempts at identification with well-known sites have been made but with¬ out success. The introduction of the word has also made a philological puzzle which has brought forth many guesses as to the origin and

form of the word. It was a place undoubtedly outside the Praetorium. One conjecture is that it was a local name for the outer court of the temple.

GABBRO, gab’ro-, a general name for a large group of evenly crystalline igneous rocks, composed, typically, of plagioclase and pyroxene, and having granitic texture. Gabbros show by analysis much the same composition as basalts; the silica ranging from 46 to 59 per cent. They may be regarded as plutonic equivalents of basalts, basaltic magmas which have cooled at great depths. Under the general term gabbro are included anorthosites, abundant in Canada and the Adirondacks, high in silica and com¬ posed almost wholly of crystalline labradorite; true gabbros ; norites, composed of plagioclase and orthorhombic pyroxene. With decreasing pyroxene and increasing olivine gabbros grade into peridotitles. Gabbros are heavy, dark- colored, usually greenish, rocks. They occur in the Adirondacks, in the neighborhood of Balti¬ more, Md., and particularly in the highlands along the north shore of Lake Superior, from Duluth to the international boundary. The gabbro near Duluth has this composition : Si02 49.15 ; AhO, 21.90.; Fi2O36.60; Fe04.54; CaO 8.22 ; MgO 3.03 ; Na20 3.83 ; K20 1.61. See Basalt.

GABELENTZ, ga’be-lents, Hans Conon von der, German philologist : b. Altenburg, 1807 ; d. 1874. He received his education at the universities of Leipzig and Gottingen; secured employment from the government of Saxe-Al- tenburg and in 1848 became chief minister. He studied many foreign and little known languages. He published (Elements de la grammaire mand- choue) (1833) ; (Grundziige der syrjanischen Grammatik) (1841) ; (Ueber der PassivunrP (1860), which has examples from over 200 languages. He also published an edition of Ulfilas’ Bible with Latin translation and Gothic glossary and grammar, and wrote (Ueber die melanesischen Sprachen5 (2 vols., 1860; 1873). He aided in founding Zeitschrift fur die Kunde des Morgenlandes.

GABELLE, a term originally applied to all imposts ; came in time to designate in particular the impost or tax on salt. This tax, one of the most crushing under the old monarchy, is al¬ ready mentioned in an edict of Louis IX in 1246. At first levied only temporarily after a time it was made a permanent tax. In 1340 salt was declared a state monopoly and every household was obliged to buy a certain amount. The price was strictly regulated but was not the same in all provinces. Some provinces were

exempt from the tax, having paid a special price for such exemption; others paid one-fourth the regular tax. The monopoly was

fc.

always unpopular and was the cause of much rioting and disaffection. It persisted, however, as late as 1790 when it was finally suppressed. Consult Gasquet, A., (Precis des institutions politiques de l'ancienne France) (2 vols., Paris

1885).

GABELSBERGER, ga'bels-ber'ger, Franz Xaver, German pioneer in stenography: b. Mu¬ nich, 1789; d. 1849. He was educated in his native city ; secured the position of private secretary to the Ministry of the Interior there, and published texts and charts for schools. He finally became interested in stenography, gave public exhibitions of his system, and at length received the approval of the Academy of Sci¬ ences for his work in the new field. His system achieved a wide popularity in Germany and was adapted also to other European languages. A monument to Gabelsberger was erected at Mu¬ nich in 1890. He published (Anleitung zur deutschen RedezeichenkunsC (1834; Eng. trans. by Richter 1899) ; (Neue Vervollkommnungen in der deutschen RedeschreibekunsC (1849); (Stenographische Lesebibliothek) (1838).

GABES, ga bes, or CABES, Tunisia, capi¬ tal and seaport of the province of Arad, at the head of the gulf of the same name, 70 miles southwest of Sfax. It is on the site of the Roman Tacape, has European and Arab quarters and a large trade in dates, skins, wool and oil. It is the seat of the provincial governor and has a garrison of French troops. Pop.

20,000.

GAB II, ga'be'i, city of Latium in ancient Italy, 13 miles east of Rome. It occupies a prominent part in early Roman history; was captured by Tarquinius Superbus, and gradu¬ ally fell into decay. Subsequently it was granted municipal rights and in the reign of Tiberius again, prospered owing to its sulphur springs bringing numbers of Romans. Thereafter for about three centuries it enjoyed renewed pros¬ perity, but again sank into decay, and little is heard of it beyond that it continued to be the seat of a bishop until the 9th century. There are many interesting ruins, especially those of a temple of Juno. Excavations have brought to light many works of

art, now scattered in the museums of Europe. Statues and busts have been turned up in great numbers and include Agrippa, Tiberius, Hadrian, Germanicus, Calig¬ ula, Nero, Trajan, M. Aurelius, Geta and others. Consult Visconti, E. Q., (Monumenti Gabini della Villa Pinciana) (Milan 1835).

GABINIUS, Aulus, Roman statesman : d. 48 or beginning of 47 b.c. When tribune of the people in 67 b.c., he brought forward the lex Gabinia, by which Pompey was granted the command of the war against the pirates, and absolute control over the Mediterranean and its coasts for 50 miles inland. Gabinius was praetor in 61 b.c., and provided public games on a scale of great splendor. In 58 he became consul and during his term helped Clodius to bring about the exile of Cicero. In 57 Gabinius went to Syria as proconsul ; he reinstated Hyr- canus as high-priest at Jerusalem, suppressed various revolts and, at the request of Pompey, and without the consent of the Senate, went into Egypt and restored Ptolemy Auletes to his kingdom. While absent in Egypt, his province of Syria was overrun by robbers and free¬ booters, resulting in serious loss of revenue to

the Equites, who farmed the taxes. On his re¬ turn to Rome he was brought to trial on three charges, was acquitted of treason, but convicted of extortion and sent into exile. He was re¬ called by Caesar in 49, and by him was sent to Illyricum. He defended himself bravely against Marcus Octavius, the Pompeian commander, but died of illness after a few months. Con¬ sult Stocchi, G., {Aulo Gabinio e i suoi processP (Torino 1892).

GABION, a cylindrical basket without bot¬ tom used for various purposes in military engi¬ neering. When placed in position it is filled with earth or sand and is usually woven from brush cut nearby. See Fortifications.

GABLE, the triangular or quadrangular end of a house or other building, from the cornice or eaves to the top, and distinguished from a pediment by this, among other things, that it has no cornices, while a pediment has three. The word is also applied to the highly decorated canopy or screen which in Gothic church architecture rises over some doors or windows. The wall of a house which is sur¬ mounted by a gable is called the gable-end. In modern towns the gable-ends of houses are usually at right angles to the line of the street, but in the Middle Ages the reverse was usually the case, the gable ends being turned toward the street. Many old towns in France, Belgium and Germany are still to be seen with this peculiarity, and some even in Britain. In Scotland, a wall separating two houses, and common to both, is called a mutual gable, and according to Scotch law such a gable is the property of the builder, who can therefore prevent the owner of an ad¬ joining property from using the support of his gable, unless he pays half the cost of erecting it.

GABLONZ, ga'blonts (Czech, Jablonec), Bohemia, town on the Neisse, 95 miles north¬ east of Prague. It contains a gymnasium and several trade and professional schools. It is the chief seat of the glass and imitation jewelry manufacture. It has also woolen and cotton factories, hardware, papier mache and other paper goods factories. Pop. 29,600.

GABORIAU, ga-bo'-re-o, Emile, French writer of detective stories: b. Saujon, Charente- Inferieure, France, 9 Nov. 1835; d. Paris, 28 bept. 1873. His early years were a succession of vicissitudes; the army, the law, and even the Church, were in turn the objects of his incon¬ stant attentions till at last when he had already contributed to some of the smaller Parisian papers, # he leaped into fame at a single bound with his story

9iroSf\ d'?rcival> , (1868); (Monsieur Lecoq) (1869) ; Les Esclaves de Paris) (1869) • (La

7^1 nf?Trna1^ (187°); (La Clique Doree> (1871) ; (La Corde au Cou> (1873) ;

(1876)UtreS> (1874)' and

j ga-bre-ak, Paul Joseph de Ca-

dome, Marquis df., French diplomatist: b Hei¬ delberg, Baden, 1 March 1792; d. Paris, 12 June a was- consul-general in New York in 14 ; ,aPP °lnted Minister to Stockholm in 1823 ; and Minister to Brazil in 1826. While in Brazil he induced all the other states in South America to adopt the French maritime law. He was created a peer in 1841, and made a life

senator in 1853. His publications include (The Question of Brazil) (1829) ;

r> i? ' / King Pedro I, Notes and Personal Recollections 5 (1854).

GABRIEL (Heb. ((hero. or man, or cham¬ pion of God55), among the post-exilic Jews, • e seve.n archangels (q.v.). In the book of Daniel and in the third gospel he is the mes¬ senger and interpreter of God. The rabbins represented him as the angel of death to the Israelites, as Azrael was to the Mohammedans. According to the teaching of the Koran he is one of the four angels, of which the other three are Michael, Uriel and Raphael, most highly favored by God. The Gnos¬ tics held that Gabriel was one of the creators of the universe; and Paul warns the Colossians against errors of

this kind (Col. ii, 18). They also held that Gabriel was one of the celestial law givers ; and oratories were erected to him in Asia Minor, where he was worshipped as a god. One of the old con¬ ceptions of Gabriel was that he was the great culture hero who rid the earth of giants and evil spirits of all kinds; and in the book of Enoch the Creator is represented as command¬ ing: ((Go Gabriel, against the giants, the

spurious ones, the sons of fornication, and de¬ stroy the sons of the watchers from among the sons of men.)) The old belief that Gabriel was the messenger of death is still preserved in the north of England in the popular superstition of ((Gabriel's hounds,® a spectral pack thought to foretell death by their howling at night. They are believed to be the souls of unbaptized chil¬ dren doomed to wander through the air until the day of Judgment. According to the rab¬ bins Gabriel had distinctly the offices of an ancient culture god. He was the prince of fire; he presided over the ripening of fruit; he taught Joseph the 70 languages spoken at the dispersion of Babel ; he helped Michael destroy the host of Sennacherib; he set fire to the temple at Jerusalem and he was the only one of the angels who understood Chaldee and Syriac. According to the Mohammedans he is the great judge destined to weigh men's actions on the last day; and the Koran calls him the Holy Spirit, The Spirit of Truth. He it was who gave the Koran, the book of knowledge, to Mohammed. His characteristics, as thus out¬ lined, correspond to those of Thoth, the Egyp¬ tian culture god and judge of the dead, the giver of all knowledge and the special patron of learning. It is interesting to note that Gabriel's characteristics become strongly marked after the exile of the Jews to Egypt.

GABRIEL, The Congregation of the Brothers of, a religious order in the Roman Catholic Church, founded in 1705, by Grignon de Montfort, to educate the young and to look after orphans and deaf, dumb and blind. Abbe Deshayes established the order firmly in France in the 19th century. In this work he acted in concert with the Abbe de Lamennais. The latter subsequently left the institution and organized the Brothers of Christian Instruction ; and the original ˆCongregation® in 1835 took its present name. In 1858 the Congregation had 73 establishments and over 400 members. On the suppression of the order in France in 1905 the headquarters were transferred from Saint-

Laurent-sur-Sevre (La Vendee) to Peruwelz, Belgium. In the following year 170 schools, 12 homes for deaf, dumb and blind, and others for orphans were conducted by the (

_ GABRIELS, Henry, American Roman Catholic prelate : b. Wannegem-Lede, Belgium, J838, d. 30 April 1921. He studied classics in the colleges of Audenarde and Saint Fiicholas, and theology in the Seminary of Ghent,

where he was ordained priest, 21 Sept. 1861. He continued his studies at the University of Louvain, from which institution he received the degree of S.T.L. in 1864 and the honorary degree of doctor of theology in 1882. When the Theological Seminary of Troy, N. Y., was founded, Dr. Gabriels was one of the four priests sent from Belgium to manage it. He was diocesan examiner for New York and Albany, vicar-general of Ogdensburg and Burlington and one of the secretaries of the Third Plenary Council of Baltimore, the decrees of which he assisted in formulating. For 20 years Dr. Gabriels was rector of Troy Seminary and for nearly 30 years its professor of dogmatic theology, Church history and Hebrew. On 21 Dec. 1891, Pope Leo XIII appointed him bishop of Ogdensburg and he was consecrated at Albany, N. Y., 5 May 1892.

GABRIEL'S INSURRECTION, an at¬ tempted slave rising near Richmond, Va., in 1800, headed by a slave named Gabriel, called also ˆGeneral Gabriel® and «Jack Bowler.® He belonged to a planter named Thomas Prosser, and was about 24; tall, powerful and noted as a fighter. He drew about a thousand negroes into a plot to attack Richmond by night, massacre the inhabitants, seize the arsenal and arming themselves effectively, rouse a general insurrection. One August night he collected his forces, armed them with scythe blades and marched toward the city. Meanwhile a negro had disclosed the plot; James Monroe, then governor, had ordered out the militia; a creek in Gabriel's way proved to be unfordable, and hearing that the citizens were in arms, the whole force dispersed to the swamps and woods. They were hunted out, and many hanged, including Gabriel.

GABRILOVITCH, Ossip, Russian pianist: b. Saint Petersburg, 7 Feb. 1878. He was edu¬ cated at the Saint Petersburg Conservatory of Music, was a pupil of Tolstoff and Rubinstein. In 1894 he won the Rubinstein prize and later studied with Leschetizkv and Navratil, Vienna. In 1896 he made his debut in Berlin, and sub¬ sequently went on a concert tour of Russia, England, Sweden, Austria and America. He has made many successful tours in the United States since his first appearance there in 1900. He married Clara Clemens, daughter of Mark Twain, in 1909.

GAD, the Tribe. Gad, the son of the Patri¬ arch, was descended from Jacob and the slave- girl Zilpah. The position of the tribe on the march to the Promised Land was on the south side of the tabernacle. The leader of the tribe on the march from Sinai was Eliasaph, son of Deul or Reul. On the division of the land of

Canaan, their portion was east of the central part of the river Jordan. They numbered 40,- 500 which was 5,150 less than when they left Egypt. They bravely took their share in the subjugation of the country and thus complied with the conditions made by Moses. They were a tribe of shepherds and cattle men and asked for the allotment which they received because of its suitability as a grazing country. Ihey were also a fierce and warlike people. When the kingdom was divided, Gad adhered to the northern section. Gad was taken into captivity by Tiglath-Pileser. Her cities in the time of Jeremiah were occupied by the Am¬ monites, and the tribe never returned to its homeland. At one time Gilead and Gad were synonymous terms.

GADARA, Palestine. It is not mentioned in the Bible, but the country of the Gadarenes is, which probably amounts to the same thing. It was the scene of the casting out of the de¬ mons by Jesus and their entry into the swine. Gadara was a Greek city of importance, east of the Jordan, mentioned by Josephus, Polyb¬ ius, Epiphanius, Pliny and Eusebius. It was a strongly fortified city. According to the Nishna it was fortified by Joshua. The first mention it receives in history was its capture along with other cities by Antiochus the Great in 218 b.c. About 20 years later it capitulated to Alexander Jannseus after a siege of 10 months. It was in the hands of the Jews for some time but was destroyed during the civil wars. Demetrius, a Gadarene, was a freeman of Pompey and to please him the city was re¬ built and the citizens given complete freedom under Gabinius, the proconsul. Judea was divided into five districts, Gadara was made the executive centre of one of them (b.c. 57- 55). Under the reign of Herod the Great it was under his dominion, having been presented to him by Augustus Csesar. After Herod's death it again became part of the province of Syria. When the Jews revolted in 70 a.d. the city was captured by Vespasian. Later its im¬ portance continued and it was the seat of an episcopal see. Its bishops were members of the councils of Nice and Ephesus. It is also mentioned in the Talmud. After the Mo¬ hammedan conquest the city went to ruin and has been deserted for centuries. Its ruins have been identified at a site now called Umm Keis. The ruins prove the city to have been very rich and beautiful. They occupy a space of about two miles in circumference. Near the city were some baths known as the Thermise Heliae and said to be inferior only to the baths of Baiae. Epiphanius states that a yearly festival was held at the baths. He also intimates that some of the inhabitants dwelt in the caverns later used for tombs. For some years the Christians of Nazareth held an annual festival at Umm Keis, but Bedouin raids have put a stop to their observance.

GADDI, the name of four painters of the early Florentine period. (1) Gaddo Gaddi, b. about 1260; d. 1333. He began his career as both painter and mosaicist. The mosaic near the portal of the cathedral at Florence is

at¬ tributed to him, as also those in the portico of the basilica of S. Maria Maggiore. Other mosaics by him were in old Saint Peter's, Rome, and in S. Maria Novella, Florence, but these

have long since perished. No picture from his hand is now extant. (2) His son, Taddeo Gaddi, b. about 1300; d. 1366, is said to have been Giotto's assistant for almost a quarter of a century. His works include (The Virgin and Child with the Phophets,1 in the Giugni chapel, at S. Croce, Florence; (Virgin and Child, 1 in the Berlin Museum; other subjects in the Naples Museum; (Scenes from Life of St. Lorenzo1 in the Brooklyn Museum; frescoes in S. Maria Novella, Florence, and mosaics in the Florentine baptistry. He planned the Ponte Vecchio, and was architect of the Companile after the death of Giotto. (3) Agnolo Gaddi, son of Taddeo, b. about 1350; d. October 1396. His works include (Resurrection of Lazarus1 in S. Jacobo tra' Fossi, Florence; frescoes in the Pieve di Prato and in Santa Croce. (4) Giovanni Gaddi, brother of the preceding, d. 1383. He was also a painter and gave promise of genius which was cut short by his early death. Consult Crowe and Cavalcaselle, his¬ tory of Painting in Italy1 (Vol. I, London 1903), and Vasari, (Lives of the Most Eminent Painters, Sculptors and Architects1 (10 vols., New York 1912).

GADE, Niels Wilhelm, nels vil'helm ga'de, Danish composer: b. Copenhagen, 22 Feb. 1817; d. there, 21 Dec. 1890. In 1841, by his over¬ ture entitled (Echoes of Ossian, 1 he gained in Copenhagen the prize of the Musical Union. He was supported during his studies abroad by a royal stipend, and in 1844 was appointed to succeed Mendelssohn in the direction of the Gewandhaus concerts at Leipzig. In 1850 he was appointed musical director to the king of Denmark, and in 1876 received a life pension. His works, which are Mendelssohnian in char¬ acter, include seven symphonies, several over¬ tures, sonatas, quintets, etc.; a lyrical drama,

GADFLY. See Horsefly.

GADIDiE, gad'i-de, a family of fishes, the cods, sub-order anacanthini (spineless fishes), with ventral fins attached to the breast or throat. The body is rather long, a little compressed and covered with small, soft scales; the teeth are in several rows; the gill covers, which are large, have seven rays; the median fins are generally very large, and divided into several portions. They are voracious fishes. They are found chiefly in the depths of the colder seas, and are largely used for the food of man. Fossil remains are rare, but scattered bones have been found as far back as the Eocene. See Cod; Haddock; Ling; etc.

. GADOLIN, ga'do'len, John, Finnish chem¬ ist : b. Abo, Finland, 5 June

1760; d. Wirmo, Finland, 15 Aug. 1852. He studied chemistry under Bergman and in 1797 was appointed pro¬ fessor of chemistry in Abo — an office which he held till 1822. He devoted himself to in¬ vestigations on mineral and metallurgic sub¬ jects. But the research for which he is specially remembered was upon a black mineral found in the porcelain feldspar quarry at Ytterby, near Stockholm, by Arhenius, of which an account had been published in 1788. In 1794 he read a paper to the Academy of Sciences, and showed that it contained a new kind of earth. This discovery was subsequently confirmed by Eke berg, who called the earth yttria, and the min-

eral gadolinite, after its first yttria was afterward shown several earths.

investigator. The to be a mixture of

S^dow, Hans Friedrich, Ger- man-Enghsh naturalist : b. Pomerania, 8 March

,nrf' f ft, WaS ?duaKed at Frankfort-on-Oder, u-j a,t the universities of Berlin, Jena and Heidelberg. In 1880-82 he was employed in the natural history department of the British Museum and in 1884 was made Strickland curator and lecturer on zoology at the University ot Cambridge. His publications are

nscm ' ("[h^Last Link by E. HaeckeP

6V through Southern Mexico (1908) • Aves .f On Brown's (Animal Kingdom*); Amphibm and Reptiles> (in Cambridge Natural History*); 'The Wanderings of Animals, and papers in Royal Society trans¬ actions and other scientific periodicals.*

, GADSDEN, Christopher, American pa-

A10t : ,LrChaTrTleston- S- C- 1724 '• d- 'here, 28

*Aug. Io05. He was educated in England * re¬ turned to the United States in 1741 and later engaged in business in Philadelphia; was a member of the first Colonial Congress which convened in New York in October 1765, and was also a member of the first Continental Congress which assembled in Philadelphia in 1774. He joined the American army as colonel at the beginning of the Revolution, and was promoted brigadier-general in 1776.*

i GADSDEN, James, American diplomatist: U Charleston, S. C., 15 May 1788; d. there, 25 Dec. 1858. He was graduated at Yale College in 1806 ; served with distinction in the War of 1812 He was aide-de-camp to General Jackson in 1818 and took part in the campaign against the Seminole Indians. He became military in¬ spector of the South Division in 1820 and had the principal part in the removal of the Semi- noles to southern Florida in 1820. He was ap¬ pointed Minister to Mexico in 1853, and on 30 December of that year negotiated the Gadsden Purchase (q.v.), which fixed a new boundary between Mexico and the United States.

GADSDEN, Ala., city and county-seat of Etowah County, on the Chattanooga Southern, the Louisville and Nashville, the Southern and the Nashville, Chattanooga and Saint Louis railroads, 56 miles northeast of Birmingham. It is dominated by Lookout Mountain, on the north bank of the Coosa River which gives its name to the rich coal and iron mines in the vicinity. There are several steam-mills which manufacture considerable quantities of yellow- pine lumber. Further industries include steel and wire-nail mills, cotton mills, a pipe works, a car and foundry establishment, a pressed-brick plant, a cotton-seed-oil mill and ginnery, and manufactories of wagons, doors, blinds, handles, etc. There are 15 churches, a national and a State bank, and two newspapers, a daily and a semi-weekly. Pop. 14,642.

GADSDEN PURCHASE, The, a tract of territory, embracing 45,535 square miles, which was > purchased by the United States from Mexico in 1854. This region, which is bounded on the north by the Gila River, on the east by the Rio Grande, and on the west by the Colo¬ rado, was acquired by treaty and the payment of $10,000,000, and is now included in the south-

*xt*1 Territ°ries of Arizona and*

ew Mexico. It is called the Gadsden Pur-

cla?e James Gadsden (q.v.), United

States Minister to Mexico in 1853, by whom, in December of that year, the treaty of sale vvas negotiated with Santa Anna (q.v.). ssues growing out of the execution of the treaty ot Guadalupe-Hidalgo (q.v.) made this negotiation a matter of great importance, as well as a business of much difficulty. Disputes had arisen concerning the boundary line be¬ tween Chihuahua and New Mexico, involving the possession of the Mesilla Valley, of which, though claimed by the United States, the Mexi¬ cans took armed possession. The 11th article of the treaty, imposing upon the United States the obligation to restrain the Indian marauders on the Mexican frontier, had been neglected, and the reclamations in consequence amounted to

between $15,000,000 and $30,000,000. By Gadsden s treaty that article was abrogated and a new boundary was agreed upon, while Mexico also agreed to forego all claims against the United States for damages on account of Indian depredations between the years 1848-53. The settlement of the boundary dispute was considered in this country to be of greater moment than the requisition of the land, which waˆ. thought to be of little or no value for cultivation , and it was in the minds of enter- prising Americans that through this region the Southern Pacific Railroad, already projected, might find an advantageous route, as in fact it did. In Mexico the transaction was vigor¬ ously opposed, and on account of his part in the sale Santa Anna, in 1855, was banished

u01?t • country as a traitor. On the part of the United States, the Senate made some modi¬ fications in the original treaty and then ratified it. On 30 June 1854 it was finally proclaimed. Consult Haswell, (Treaties and Conventions- (Washington 1889).*

GADSDEN TREATY. See Annexation; Boundaries of the United States; Gadsden Purchase.

GADSHILL, England, a hill near Roch¬ ester, on the road from London to Gravesend. It is commemorated in Shakespeare's play, 'Henry IV, as the place where Falstaff had his encounter with the robbers, and an inn at the place is called Falstaff's Inn. It is inter¬ esting in modern times for Gadshill Place, opposite the hill, which was long the residence of Charles Dickens and was the home in which he died.*

GADSKI, gadz'ke, Johanna, German opera singer: b. Anclam, Prussia, 1871. 'She re¬ ceived her musical training in Stettin, made her debut in opera in Berlin in 1889, and six years afterward, as one of the Damrosch German company in New York, appeared as Briinhilde and in numerous other Wagnerian parts. She made a concert tour in America in 1898-99; married an Austrian, T. Tauscher,. in 1892; has excelled in the interpretation of heroines of Wagner's operas.

GADWALL, or GRAY DUCK, a migra¬ tory wild duck (Chaulelasmus streperus) found on all the four continents. It is less in size than the mallard and mainly black, brown and white in color. It frequents western marshes in small flocks, but is rare east of the Alle-

ghany Mountains. As a table delicacy it is highly prized.

GiEA, ge'a, or GE, ge, in Greek mythology, the goddess of the earth. She appears in Hesiod as the first-born of Chaos and the mother of Uranus and Pontus. She also bore the Titans, Cyclops, Erinyes, Giants, etc, As the Vapors which were supposed to produce di- Viile inspiration rose from the earth, Gaea came to be regarded as an oracular divinity ; the oracles at Delphi aud Olympia were believed to have once belonged to her. Her worship ex¬ tended over all Greece, black female lambs being offered on her altars. She was also the goddess of marriage, and again of death and the lower world. At Rome Gsea was wor¬ shipped as Tellus.

GAEDERTZ, ged'erts, Karl Theodor, Ger¬ man poet: b. Lubeck, 8 Jan. 1855; d. 1911. In 1880 he obtained a post in the Royal Library of Berlin and he was appointed chief librarian at Greifswald in 1903. His poems in Low Ger¬ man include Uulklapp5 (3d ed., 1899) and "Eine Komodie) (2d ed., 1881). He also wrote valuable monographs on German poets and on the history of German drama, his chief works in this field being (Goethe's Mincheffi (2d ed., 1888) ; (Aus Fritz Reuters jungen und alten Tagen) (3d ed., 1899); (Emanuel Geibel : Ein deutsches Dichterleben) (1897) ; (Bismarck und Reuter} (1898) ; (Bei Goethe zu Gaste) (1900), and (Im Reiche Reuters } (1905).

GAEL, gal, the name of a branch of the Celts inhabiting the Highlands of Scotland, Ireland and the Isle of Man. Gadhel, or Gael, is the only name by which those who speak the Gaelic language are known to themselves. By way of distinction the Highlanders of Scotland call themselves Gael Albinnich (Gaels of Albin) and the Celtic population of Ireland call them¬ selves Gael Erinnich (Gaels of Erin). See Celts.

GAELIC LANGUAGE. See Celtic Lan¬ guage.

GAELIC LEAGUE, The. From the pass¬ ing of the Statute of Kilkenny in 1367, the policy of the English governors of Ireland was to discourage the use of the Irish language, and even to root it out entirely; and from time to time other laws, with various pains and penalties attached in case of non-observance, were enacted with the same end in view. It was a vain attempt. The people clung with singular tenacity to their own language, and many of the English settlers adopted it, so that in the early part of the 19th century, out of a total population of 7,000,000, at least 4,000,000 spoke Irish as their native tongue. A more insidious method than penal legislation was then adopted. Under the primary school system, conducted by the Board of National Education established in 1831, the Irish language was both banished from the curriculum and forbidden as a medium of instruction, the motive of course being to establish, in process of time, the universal use of the English language in Ireland, to the exclusion of the native speech. This method of killing a language by degrees was so effective that, before

the end of the century, Irish had practically disappeared from Ireland as a written language, and survived as a spoken one only in a few districts of the

south, west; and northwest. The figures show¬ ing its decline in 66 years are startling; a drop from 4,000,000 Irish speakers in 1835 to 1,524,- 286 in 1851, and to 641,142 in 1901, tells its own tale. Worse perhaps than the actual de¬ cline here disclosed was the neglectful or even contemptuous attitude adopted toward their own language by great numbers of the Irish people.

In the meantime, however, the great Celtic Renaissance (q.v.), which had accomplished so much in other fields, had begun to produce its effects on the moribund Irish language — slowly, indeed, at first, for the political and social unrest in Ireland from 1878 onward was an insuperable barrier to the widespread suc¬ cess of any mere linguistic or literary move¬ ment. The Society for the Preservation of the Irish language and the Gaelic Union did some¬ thing to stem the tide ; but the more ardent spirits of the latter body, dissatisfied with the progress made, and believing that, in order to achieve their purpose, a great popular move¬ ment was necessary, decided to establish an¬ other organization. To this new body was given the title of The Gaelic League (Cu- mann na Gaedhilge).

The Gaelic League was founded on 31 July 1893, at 9 Lower O'Connell street, Dublin. The number present on that historic occasion was small, seven perhaps or nine at most; but many of them were young men of great force of character and with a clear concept of what they intended to do and of the difficulties which they had to face. At the outset the three recog¬ nized leaders were John MacNeill, Rev. Eugene O'Growney, and Douglas Hyde. By using the native language as their basis of operation, they contemplated the deanglicization of Ire¬ land and the restoration of that distinctive Irish culture which they regarded as then well- nigh lost : the re-establishment, in fact, of what came afterward to be called an Irish Ire¬ land. The program of the League, as an¬ nounced, was :

1. The preservation of Irish as the national language of Ireland and the extension of its use as a spoken tongue.

2. The study and publication of existing Irish literature and the cultivation of a modern literature in Irish.

Although conceived on strictly non-political and non-sectarian lines, the League made but slow progress at first. It had to encounter suspicion and even secret and open opposition, it had to endure the mock and the jeer of the scoffer and the scorner, and, worst of all, it had before it the herculean

task of overcoming the apathy of the great majority of the people. The heads of the League, however, set about their work with courage and high hope and with a dogged perseverance, which in the long run produced results. Taking over and con¬ tinuing the monthly Irisleabhar na Gaedhilge (The Gaelic Journal), which had been begun in 1882 by the Gaelic Union, the Gaelic League also started a weekly of its own, Fainne an Lae (The Ring of Day, The Dawn), which was subsequently replaced by Claidheamh Solids (The Sword of Light). In time, its propaganda attracted men of all classes and all creeds, various daily and weekly newspapers helped on the movement, and a national sentiment was

namnhW By ■ ?995 thousands of books and pamphlets printed entirely in Irish were pro¬ duced annually, and, exclusive of prayer manu- l °Ath.er ˆll&ous. works, more books were

Jrbnn?08cV i'81,4 lntermediate, or secondary ciool students presented themselves for ex-

aminatmn in Irish. By 1906 close on 100,000 c lldren were learning the Irish language in the natmna1 or primary schools, and the ban on Jho teaching °f I nsh history in those institutions had been lifted. A new literature in modern nsh was also in process of formation, and an nsn 1 exts Society was busily engaged in rescuing from oblivion the ancient Irish clas¬ sics and the works of the 17th and 18th cen- tury Lish poets, like Geoffrey O'Donoghue,

nEVldu 2BrT?adair' Egan O'Rahilly, John Claragh MacDonnell, and Owen Roe O'Sullivan.

Among the people the principles of the Gaelic League flourished apace. Branches to the number of about 1,000 were formed not only in Ireland but also among people of Irish birth or descent in England, the United States o America, Canada, South America, and Australasia. A long-continued struggle resulted in the admission to the mails of letters, postal cards, newspapers, and parcels addressed in the

u1S i chara?ter» and in forcing banks to accept checks similarly signed, all of which meant that postal clerks and bank clerks with a read¬ ing knowledge of Irish had to be employed, and that Irish had to be introduced as a sub¬ ject into the competitive examinations by which such officials are selected in Ireland. One week in the year was set aside as ((1912-13), were from time to time brought out. Sermons were preached and pub¬ lic

prayers were recited in Irish. A national drama in the national tongue sprang into exist¬ ence and was presented by capable actors to understanding and appreciative audiences. The industrial revival in peculiarly Irish arts was due in no small degree to the spirit evoked by the Gaelic League. Its influence was also largely felt in that wonderful efflorescence of Irish literature in English which is known, par excellence, as the Irish Literary Revival (q.v.).

When the National University of Ireland was founded by act of Parliament in 1908 and came into being in 1909, the success of the efforts of the League was plainly discerned.

In University College, Dublin, one of the Con¬ stituent Colleges of the University, there were established professorships in Celtic Archaeology, in Early and Mediaeval Irish History, in Early

and ibf tbl M VInSˆ EanSuage and Literature, Uw, b National Economics of Ireland, and lectureships in Modern Irish History and in

La"guage; ln University College, Cork, Constltuent College, a professorship of shinNˆ£Pj?ge an4 Literature and a lecture- TTn? Modern Irish were provided; and in y ofleSe» Galway, the third Constitu fn Af i ege,T heireTWere founded professorships

n CDtt'pJrf Language and Literature and in Celtic Philology. Furthermore, a great agi¬ tation arose to have a knowledge of Irish made compulsory on students entering the university and up to a certain point in their undergraduate courses. A compromise on this question was

lnally arnv.ed at> rby which it was arranged that a knowledge of Irish was not to be essen- tial for the first three years, but was to be obligatory thereafter. This controversy was made memorable by the declaration of the Standing Committee of the Irish Catholic bish¬ ops, who while thinking that for the time being Irish ought to be an optional subject y/7 w£nt °n record as expressing the hope that the day might come when Irish would be not only compulsory but would also be the recognized medium of instruction in the university.

Since then the Gaelic League has pursued its course, not quite so demonstratively per¬ haps, but none the less perseveringly. Political events, like the bitter struggle over the Home Rule bill from 1912 to 1914, the threatened revolt in Ulster in 1912, and the counter-move¬ ment of the Irish Volunteers in 1913 and 1914, as well as the advent of the great World War in the latter year and the developments to which it has led in Ireland, have tended in great measure to curtail the activities of the League.

. It has not yet by any means suc¬ ceeded in deanglicizing Ireland, nor has it made, substantial progress in extending the use of Irish as a spoken tongue. Whether it will succeed in those objects depends largely on the status of Ireland after the war. It is certain however, that the rebellion of Easter week, 1916, and the spirit generated by its aftermath! as plainly shown in the trend of events since, are likely, when peace is restored, to give the Gaelic League a new lease of life and a fresh and stronger hold on the Irish people

Bibliography.— Dunn, J., (Washington 1905) ; Paul-Dubo's, L.,

L Irlande contemporaine) (Paris 1907) • D'Alton, E. A., (History of Ireland) (Half- Volume VI, 1879-1908, London 1910) ; Lennox,

P. J., (The National University of Ireland (Washington 1910) ; Dunn and Lennox,*

P. J. Lennox,

Professor of English Language and Literature, Catholic University of America.

GAELIC LITERATURE. Although the

oldest existing MSS. in Gaelic are of no earlier date than the 7th century, there is ample evi¬ dence that the literature of the Gaels, not only the traditional but the written literature, is of much greater antiquity. The internal evidence furnished by the ancient sagas, songs and chron-

icles preserved in mediaeval manuscripts indi¬ cates a regular development extending from a period antedating by many centuries the be¬ ginning of the Christian era, down to a time well within the compass of authentic history. And both the internal and external evidence point to the existence of a written as well as a traditional literature long before the Gael came into close contact with the civilization of the other nations of western Europe.

The Gaelic, or Gaedhealg, language is an Indo-European tongue, highly inflected, and rich in beautiful forms and euphonious combi¬ nations. It is spoken in Ireland, the Highlands of Scotland and the Isle of Man. Being a Celtic tongue it is akin to the Brythonic group of languages, the Welsh, Cornish and Breton, and to the tongues, now extinct, spoken by the Celtic

peoples who occupied central Europe before the extension of the Roman power. The isolation of Ireland ensured the development of the language along lines peculiarly its own, unaffected by outside influences. This is true not only of those centuries before the dawn of history, when the language was in the making, but is true also of the later period when mo¬ mentous changes were stirring the rest of Eu¬ rope and the modern nations were springing into being out of the fragments of the shattered Roman Empire. This isolation made for the development of a unique language and litera¬ ture and it resulted, too, in the preservation and development of those peculiar social condi¬ tions, the record of which is now shedding light on a period which would otherwise be shrouded in darkness. The development of the language is usually assigned by scholars to three periods : Old Gaelic, from the earliest time to about the end of the 10th century, a.d. ; Middle Gaelic, from the 11th to the 17th cen¬ tury; and Modern Gaelic, from the 17th cen¬ tury to the present day.

Though much of the old Gaelic literature came down to mediaeval times in the form of oral tradition it must not be supposed that it is on that alone that its history is based. The fact that the earliest writing extant can be traced no further back than the 7th century is far from proving that previous to that time writing was unknown in Ireland. During the 8th, 9th and 10th centuries Ireland, like the other nations of Europe, suffered from the in¬ cursions of the Danes and Northmen. These marauders landed on the coast, established themselves in seaport towns, set up their own government and raided the interior. Monas¬ teries were sacked and burned and, as in Eng¬ land, almost every existing book and manu¬ script was burned at their hands. That such manuscripts and books existed before that time, however, is amply proved. Ireland had at that time been long in touch with the rest of Europe, and her schools had supplied teach¬ ers and missionaries to the western world for centuries. During the Dark Ages, when con¬ tinental Europe was plunged in almost univer¬ sal war, Ireland was the home of the monastic schools, where the learning of the ages was preserved and the arts of writing and illumi¬ nating were generously fostered.

The present alphabet, which is a modifica¬ tion of the Roman, was introduced, it is be¬ lieved, by Saint Patrick when he came in the 5th century to preach Christianity. But the

art of writing was known before that. Many inscriptions have been found, especially in the southern counties, in Ogam, a system of writ¬ ing which was peculiar to the early Irish. This script consisted of a series of short lines, drawn either above, below or through a stem¬ line. Each group of short lines represented a letter, the letter being indicated by the number and position, some being at right angles and some being at acute angles with the

stem-line. This stem-line was generally the angle between two sides of a long upright rectangular stone. The vowels were indicated by very small cuts on the angle of the stone, but much larger than points. The use of Ogam was not confined to monumental inscriptions, for some small metal articles have been found inscribed with it, and the old sagas and chronicles contain many allusions to Ogam writings on poets' staves, the shields of warriors and other arti¬ cles. With the introduction of the modified Roman alphabet the use of Ogam was practi¬ cally discontinued, although instances of its occasional use have been discovered. In a Saint Gall manuscript of the 9th century eight Ogam sentences were discovered, and others as late have been commented on by Zeuss, Nigra and others. How Ogam was invented is still a pro¬ found mystery, but it is certain that it is pe¬ culiar to the Irish Gael and only found where he settled.

The literary form in which the primitive Gaelic genius chiefly found expression was the sgeul, or ursgeul — the saga or song-story — partly in prose, partly in verse, which recited the deeds of gods and demi-gods and heroes in spirited and dramatic fashion. Of drama, strange to say, no trace can be found in ancient Ireland; there is not a record of even a mys¬ tery or a miracle play in the early Christian days. But the romance began early and reached a very advanced stage of development, probably long before the art of writing was^ known. It took the form of prose narrative, interspersed with flights of spirited and highly imaginative poetry. The (Book of Leinster, a MS. of the 12th century, enumerates 187 of these romances and the names of many more are given in the 10th or 12th century tales of Mac Coise. Many of these tales show evidence of accretions dur¬ ing subsequent periods. Some of palpably pa¬ gan origin bear traces of Christian additions, such as the legend of Niul, the ancestor of the Milesians, meeting Moses and the Israelites fleeing from Pharaoh, with the miraculous heal¬ ing of Niul's infant son by the Hebrew law¬ giver ; and the tale of the children of Lir, whose enchantment was to be ended by the ringing of the first mass-bell in Ireland. But in every in¬ stance it is an easy matter to separate the ac¬ cretions from the original tale and so recon¬ struct the story in its primitive form.*

The value to the antiquarian and student of history of the material thus obtained is incal¬ culable. For these old hero-tales give a vivid picture of 'the social life of the primitive Celts, a history of the early stages of Celtic civiliza¬ tion, that it is impossible to find elsewhere. For although the entire of central Europe, as well as the British Isles, was peopled by Celtic tribes, the records of their civilization have been oblit¬ erated everywhere except in Ireland. The Romans, wherever they planted their standards, introduced their own civilization, wiping out of

existence whatever antedated their coming, and their historians writing of the Roman con¬ quests measured everything by a Roman stand¬ ard and found nothing worthy of record in the culture of the barbarian. Hence, practically all record of the continental Celt prior to his sub¬ jugation by the Roman has been lost. But the Roman legions never secured a foothold in Ire¬ land, and the Gaelic Celt worked out his own estiny without interference. The record of this development is found in his traditional lit¬ erature and is proving a mine of invaluable material for the investigator of conditions in ancient Celtic Europe. The most important of these sagas resolve themselves into three dis¬ tinct groups, representing three periods of the history of the race: The Mythological Cycle; the Heroic, or Red Branch Cycle; and the Fenian or Ossianic Cycle.

The Mythological Cycle.— In the oldest sa??s \he confusion of gods and men is battling. So thoroughly have the ancient deities been euhemerized that later generations came ^°ok upon them simply as earlier races of inhabitants. These romances tell the story of successive settlements of Ireland. They tell of Partholan and his followers who were the earli¬ est settlers; of Nemedh, who followed and pos¬ sessed himself of the land; of the Fomorians, who conquered the Nemedians and drove them out; of the return some centuries later of the descendants of a part of the Nemedian force, now known as Firbolgs, to dispute with their former conquerors, and the subsequent return of the descendants of another division of the Nemedians, the Tuatha de Danaans, who in turn became masters of the land, holding it until the coming of the conquering Scots, or Gaels, or Milesians as they are variously called. The saga of the (Battle of North Moytura> tells of the fight between the Tuatha de Dan¬ aans and the Firbolgs, which resulted in the utter defeat of the latter, who were driven into the smaller islands. This story and the story of the (BattIe of South Moytura* between the Tuatha de Danaans and the Fomorians, abound in descriptions of the marvelous achievements of the heroes and ends in the complete defeat of Fomorians. To this period belongs also the pathetic tale of the (Death of the Children of Tuireann,* included by Hyde in (The Three Sorrows of Story-Telling. >

The Red Branch, or Heroic Cycle. — This group of tales deals with the history of the Milesians, the warlike race which finally con¬ quered the island and held it until the coming of the English. Unlike the earlier tales, which palpably treat of a fabulous age and purely mythical persons and events, these romances deal with a world which has an apparent basis of reality, despite the legendary character of many of the events there recorded, and of the heroes, who participate in them. The people of this cycle, Cuchulain, Conall Cearnach, Deirdre, Naoise, Meve, Conor mac

Nessa, Fer¬ gus mac Roigh, though of heroic stature, are yet human; their deeds, and the motives for those deeds, are human ; and though the mar¬ velous and the preternatural are found there in as marked a proportion as in the Uliad) and the

identified by the annalists with the birth of Christ and the beginning of the Christian era, is associated chiefly with the long war between Connaught and Ulster arising out of the mur¬ der of the children of Usnach. This incident is recorded in. one of the most beautiful and pathetic tales in the whole range of ancient story-telling, the tale of (Deirdre, or the Fate of the Children of Usnach. J Cuchulain, the Ultoman champion, is the great hero of this cycle. Conall Cearnach, Ferdiad and Meve, the warrior-queen, are figures hardly less heroic. The most important of the romances of this group is the (Tain Bo Cuailgne, or the Battle- Spoil of Cooley, > a tale that has proved a val¬ uable source of information for the antiquarian from the light it throws on early Celtic life and manners. The < Death of Conlaoch> is a curi¬ ous parallel of the story of Sohrab and Rustum.*

Fenian or Ossianic Period.— Though Cu¬ chulain is the great hero of the heroic age of the Gael, there is another of a later age who comes closer than he to the popular heart. Fionn, or Finn, mac Cumhail, if one may judge by the affectionate reverence with which his name and the records of his deeds are preserved in peasant lore, is without question the most popular of the traditional heroes. While the wonderful achievements of the elder hero are familiar to the scholar, those of Fionn are known to. every unlettered peasant and are em¬ balmed in folksongs and folktales without number. Moreover, the whole body of Fenian story is intimately bound up in the popular in¬ terest. Hyde points out that for a period of from 1,200 to 1,500 years these tales showed a most remarkable instance of continuous literary evolution. Century after century saw accre¬ tions in the form of stories and poems about Finn, and the Fenians, and there are to-day ex¬ tant, in Gaelic-speaking communities numberless stories that have never been reduced to writing in which Finn is the central figure. This was never, at any time, true of Cuchulain and the Red Branch Cycle. Finn is distinctively the popular hero, the hero who stands in the popu¬ lar imagination for all that is heroic and patriotic.

Like Cuchulain, he is the central figure of a cycle of romance, almost as important as the Red Branch Cycle. The Fenian Cycle, so- called from the fact that it deals largely with the Fianna, or Irish Militia; or the Ossianic Cycle, from Ossian, or more properly Oisin, the son of Finn, who is credited with the authorship of many of the poems, comes nearer than either of the other cycles to the limits of authentic history. These sagas treat of such historical personages, as Conn of the Hundred Battles, Ard-Ri (High-King), whom the an¬ nalists assign to the 2d century; his son, Art

the Lonely; his grandson, Cormac mac Art (a.d. 227, according to the <(Four Masters 213, according to Keating) ; and his great- grandson, Cairbre of the Liffey. Finn, himself, is generally accepted as an historical figure, though much of myth and romance has been woven into his history. The earliest, in point of the chronology of the romances of this pe¬ riod, is the tale of the (Battle of Cnucha,* in which Cumhail, the father of Finn, is killed by Conn of the Hundred Battles. Thence through a long cycle of romances the many adventures of Finn and his redoubtable band of warriors,

Oisin, his son, Oscar, his grandson, Caoilte, the poet, Diarmidh and many another, are related until in the (Battle of Gabhra,} which closes the series, is told how Cairbre of the Liffey broke the power of the Fenians forever.

The most fascinating, and when everything is considered, perhaps the most meritorious of the Fenian sagas is the (Pursuit of Diarmidh and GrainneP Like the story of

Miscellaneous Romances. — Besides the stories of the three main groups above enumer¬ ated, there is a considerable number of sagas, some as old as those of the Red Branch Cycle, and some more recent, which cannot well be in¬ cluded under any of these headings. The most important is the a Leinster tale of the Red Branch period; and others that fall under this same heading are (The Dream of Mac Conglinne,* a satire full of an irresistible humor; the (Voyage of Mael- duin) and the. (Battle of Moy Rath. 5

Early Christian Period. — With the coming of Christianity came a new phase of Gaelic lit¬ erature. Saint Patrick and his followers found a soil ready to receive the seed of Christianity. Theirs was a bloodless conquest, and although the Bardic Schools struggled long against the innovation of Christianity they at length suc¬ cumbed and the subsequent literature of Ireland is thoroughly Christian and largely devotional in tone. Saint Patrick himself was a man of works rather than a man of letters, and yet it is to him that the earliest literature of Chris¬ tian Ireland and, if we except the Ogam in¬ scriptions, the earliest authentic writings now in existence can be traced. Of the (Canon Phaidraig,> or Patrick's Testament,* a MS. copy of the late 8th or early 9th century is still in existence, and this, it has been demonstrated, was made from an older copy in the saint's handwriting. The authenticity of (Saint Pat¬ rick's Confession,* which, strictly

*speaking, is not a confession but an apology, has been ques¬ tioned, but it is vouched for by such eminent authorities as Stokes, Todd and Hyde. These two works, it is true, are in Latin and might be excluded * from a consideration of purely Gaelic literature, but as they are the first literary utterance of Christian Ireland, they are worthy of note, despite the alien tongue in which they are written. This objection, how¬ ever, does not apply to the < Epistle to Coroti- cus* and (The Cry of the Deer,* two com¬ positions in Gaelic which are also attributed to Saint Patrick. Seachnall, a nephew of the great apostle, is looked upon as the first Chris¬ tian poet in Ireland, although he, too, wrote in Latin.*

Biography, chronicle-history and genealogy make up a large part of the remains of Gaelic literature and, as might be expected from the fervor with which the Irish adopted Christianity, the literature of this period is rich in lives of the saints. It is appropriate, too, that among the earliest we should find

lives of Saint Patrick. The (Book of Armagh contains two very early biographies. There are many others, but the most important is the tripartite Life,* the MS. of which, written in ancient Gaelic, was discovered by O'Clery, one of the ((Four Masters,** early in the 17th cen¬ tury. This <(Life** might, perhaps, be more fittingly described as a group of three semi- historical homilies on the life of the saint. Saint Columcille (521-597), after Saint Patrick the most renowned of the early churchmen, contributed generously to the Gaelic literature of this period. His Gaelic poems voice an ardent patriotism, those written after his exile to Iona especially breathing a passionate love for the land of his birth. The same century that knew Saint Columcille boasts of another great churchman and writer, Saint Brendan the Navigator, founder of the famous abbey and school of Clonfert. Saint Brendan is the re¬ puted author of the (Navigatio Brendani,* a tale of marvelous romance, the influence of which was felt throughout Europe. MS. copies of it may be found in many monasteries on the Continent, and it has been edited and anno¬ tated in many tongues. Giraldus Cambrensis (1146?- 1220?) alludes to it as being well known in his time. The life of Saint Brendan in the (Book of Lismore* tells of his setting out in three vessels in search of an isle in the west which was to be a land of promise, probably the Moy Mell and Hy Brassil of the ancient pagan legends.*

But it must not be supposed that the making of literature in Ireland was confined to the churchmen. The arts of poetry and prose com¬ position flourished after, as before the coming of Christianity, and the race of bards did not die out for many centuries. Notable among those who flourished prior to the period of the Danish incursions was Eochaidh, better known as Dalian Forgaill, a contemporary of Saint Columcille. He was Chief Ollamh

of Ireland, a dignity which on his death devolved on his pupil, Senchan Torpeist. Others, equally as important, were Cernfaeladh (c. 678) and Angus Cede De, or the Culdee. The (Saltair na Rann, a collection of 162 poems in Early Middle Gaelic, giving a rather fanciful account of the creation of the world and the fall of Adam and Eve, was long attributed to Angus, but later research by Whitley. Stokes has shown*

*1000 ** C°U^ n0t ^ave keen written earlier than*

Danish Occupation to Norman Invasion.

— Despite the continual warfare and waste of life and property that marked the two or three centuries of Danish occupation of Ireland, liter¬ ature and learning flourished. Cormac mac Culinan (d. 908), king, and bishop of Cashel- statesman, ecclesiastic, poet and scholar, is the most eminent figure at this stage of Gaelic lit¬ erary development. (Cormac's Glossary > is the earliest attempt at a comparative vernacular dictionary made in any language of modern Europe. It is valuable not only as an example of early scholarly effort, but also for the light it throws on pagan customs, on law, historv and romance. The

deceive battle of Clontarf (1014) defeated the Danes and broke forever their power in Ire-

rrpditpHlaC-tt,Ll?i? — d Errard mac Coise are dt,W h,thec^mt authorship of the val- uaHe chromde,

wbir^L Nor,semen)» the accuracy of

fhas withstood some very remarkable

PnH °r\^0 the Book of Leinster > and the (Book of Hymns. > Iighearnach, abbot of Clonmacnois, the great annalist, and Flann, head-teacher of the school of Monasterboice, chronologist and poet, are the most eminent individual figures. Irish scholars traveled to the Continent and left the impress of their learning on many a Euro¬ pean school.

Arrest of Development and Subsequent Kevivals. With the Norman invasion in 1169 came the arrest of development. Hitherto wars, .whether between the septs or with for¬ eign invaders, did no lasting injury to the intellectual or aesthetic' development, of the race, but with the coming of the Normans be¬ gan a period of decay that lasted for four cen¬ turies. The tradition of

poetry was kept alive, but no great names illumine the record, and it is not until the beginning of the 17th century that we find a reawakening of the literary spirit. With this period came the last great outburst of classic Gaelic poetry. Teig mac Daire is looked upon as the last of the classic poets and the greatest of his time, although Lughaidh ua Clerigh, with whom he engaged in a notable controversy ((

This period, too, saw some of the earliest and most notable achievements in the field of antiquarian research and compilation of an¬ nals. Chronicle-history and genealogy had been favorite fields of literary effort for the Gael from the earliest time, but this period brought to the ancient labor the resources of mediaeval scholarship and the habit of study bred in the monastery. Among the chroniclers of the 17th century we find men of acknowl¬ edged learning and skilled in antiquarian re¬ search, such men as Brother Michael O'Clery, the learned Franciscan, who compiled the (((Book of Inva¬ sions®) ; and who, with O'Mulconry, O'Duige- nan and Peregrine O'Clery, compiled that great¬ est of all mediaeval Irish chronicles, the (Annals of the Four Masters. } This work, covering the whole field of Irish history, legendary and authentic, is the most comprehensive and exhaustive record of the kind in the language. Others equally eminent were Duald mac Firbis, the genealogist; and Geoffrey Keating, theolo¬ gian, poet and historian, whose (History of Ireland is a model of Gaelic prose. Keating, in one sense the greatest of these, was the first to depart from the dialect of the learned, the ancient bardic idiom, and write in a popular*

style. All his predecessors were learned men writing for the learned few ; he, a learned man, writing tor the many. His history was the most popular book ever written in Gaelic. In his poetry, as in his prose, he was an innovator

and was the first to depart from the ancient metres.

The metrical systems of the old bardic schools were intricate and elaborate and, tech¬ nically, had reached an advanced stage of de¬ velopment at an early period. The underlying pn?Clpi!e was not. alliteration as in Anglo-Saxon and other Teutonic verse; or'quantity as in the metres ot the Classic tongues, but a consonan¬ tal rime, based on a division of the consonants into groups, any consonant in a particular group riming with any other consonant in that group. The syllables, too, were reckoned, but without regard to stress. It was an intricate system, and ease of composition according to it could be acquired only after years of arduous labor over its technicalities. But with the breaking up of the bardic schools in the 17th century came the introduction of a new verse- form in which accent and not syllable was the measure and in which vowel rime took the place of*

consonantal. The change was al¬ most instantaneous, and with the introduction of the simpler form the whole nation seemed to burst into song. The new method was elab¬ orated and developed until the rime affected every accented syllable in the line, with a re¬ sult that was wonderfully melodious. (*

Eighteenth Century and After.— The 18th century was a period of persecution, and with the means of education and the opportunities for bettering themselves denied them, the Irish people found an outlet for their feeling only in song. The number of poets produced is al¬ most countless, but a few names, such as David O'Bruadar, John O'Neaghtan, Torlogh O'Caro- lan, Tadhg Gaoloch O'Sullivan, Donough Mac Conmara and Brian Mac Giolla Meidhre, are worthy of special mention. But with the 18th century the history of Gaelic literature practi¬ cally ends. Through the early years of the 19th century the struggle to preserve it was kept up, but the famine, coming as the climax of a long series of calamities, put an end to it. Such men as O'Curry, O'Donovan, Petrie and Todd; such societies as the Ossianic Society and the Society for the Preservation of the Gaelic Language, labored for the salvation of the tongue, but it was not until the great popu¬ lar movement of the last two decades of the century that any real progress was made. The Gaelic League during that time stirred the nation to a sense of its impending loss and as a result the study of the language has been taken up with enthusiasm not only in Ireland but in the United States, South America and Australia. Although this movement, which is purely popular and patriotic and has for its object the restoration of the language and the

literature, is distinct from the scholarly interest shown by such scholars as Zeuss, Zimmer, Kuno Meyer, Windisch, D'Arbois de Jubain- ville, Whitley Stokes, yet its indebtedness to the researches of these investigators is unquestion¬ able. That indebtedness is greater, however, to men like Dr. Douglas Hyde, Dr. Siger- son, Rev. Eugene O'Growney, Rev. P. J. Dineen, Rev. Peter O'Leary, Lady Gregory and others, who couple with thorough scholar¬ ship an enthusiasm that makes their efforts doubly effective. Dr. Hyde is a poet of un¬ doubted gifts, with a command of Gaelic and the intricacies of its metres as sure as is his command of English, and a prose writer of equal fluency in both languages. Father O'Growney's series of textbooks is the standard course in most of the classes, and the others have contributed generously to the product of the new school. See also Celtic Languages.

Bibliography. — Hyde, (A Literary History of Ireland) (3d ed., New York and London 1903) ; (Love Songs of Connaught (London 1895) ; (Religious Songs of Connaught* (Dub¬ lin 1906) ; Joyce, (Ancient Social Ireland) (2 vols., London and New York 1903) ; Stokes and Strachan, (Thesaurus Palaeonibernicus* ; Siger- son, (Bards of the Gael and Gall* (London 1907, 2d ed*) ; Stokes, (Irish Lives* and (Three Middle Irish Homilies) ; Thurneysen, (Mittel- irische Verslehren) ; Stokes and Windisch, Hrische Texte* (Leipzig 1881-1900) ; Anwyl, < Celtic Religion in pre-Christian Times* (1906) ; Strachan, (01d-Irish Paradigms and Selections from* Old-Irish Glosses) (1909); O'Grady, (Silva* Gadelica* (London 1892). Numerous texts can be found in the Revue Celtique, the Zeitschrift fur Celtische Philologie , the Anec- dota Oxoniensia, and the Irish Text Society, the Irish Archaeological Society, the Celtic So¬ ciety and the Royal Irish Academy.*

Thomas Gaffney Taaffe, Professor of English, Fordham University.

GAETA, ga-a'td, a city and seaport of Italy and one of the most strongly fortified maritime cities of the country, located in the province of Caserta on the Gulf of Gaeta, 74 miles by rail northwest of Naples. It is picturesquely situ¬ ated on an abrupt promontory projecting into the Mediterranean and connected with the main¬ land by a low' and narrow isthmus protected by solid walls. On the summit of the prom¬ ontory stands the circular tower D'Orlando, said to be the ancient mausoleum of Lucius Muna- tius Plancus, friend of Augustus. Many in¬ teresting classic remains have been found in Gaeta, including a fine marble vase by the Athenian sculptor Salpione, the ancient cam¬ panile of the cathedral of Saint Erasmus and the remains of a Roman theatre and a Roman amphitheatre.

The inhabitants of Gaeta derive their chief profits from the fisheries and their coasting- trade in oil, wine and fruit — principal produc¬ tions of the surrounding country. Cajeta, an¬ cient name of Gaeta, derived its origin, accord¬ ing to tradition, from its being the burial-place of Caieta, the nurse of ˆEneas. On the dis¬ memberment of the Roman Empire, Gaeta be¬ came a centre of civilization and commercial prosperity, and gained still more importance after the decadence of the Eastern Empire. It successively withstood the invasions of the bar¬

barians and the Lombards and Saracens. Both in ancient and modern times, Gaeta has sus¬ tained remarkable sieges, and recently it has been the theatre of several interesting events. In 1134 it fell before Roger II, and was an¬ nexed to the Norman kingdom of Sicily. In 1806 it was defended for six months by Prince Ludwig von Hessen-Philippsthal against the forces of Massena. From 1848-50 it was the refuge of Pope Pius IX, when the

revolution at Rome compelled him to retire. In 1860 after the defeat of the Neapolitans on the Volturno by the forces of Garibaldi, Gaeta was the last stronghold of the Bourbon dynasty of Naples, and after a protracted siege lasting from No¬ vember 1860 to 13 Feb. 1861 Francis II of Naples surrendered the city to General Cialdini. Pop. about 6,000.

GAFF, in a ship or boat, spar or a sort of boom to which the head of a fore-and-aft sail is bent, such sail having its foremost side made fast by rings to the mast, and its lower edge, in most instances, held straight by the boom proper. The thick end of the gaff is con¬ structed with <(jaws® to pass half round the mast, the other half being inclosed by a rope or wire ; this serves to keep it close when the sail is hoisted or lowered. The jaws are usually made by 'fastening two pieces of wood by means of bolts to the thick end of the gaff, the for¬ ward side of these pieces being hollowed out in the form of a semicircle so as to fit snug to the mast but sufficiently loose to allow of free play for the hoisting and shifting of the sail. Lately these jaws have been made entirely of metal, chiefly bronze. The after end of the gaff is called the ((peak,® because it is usually raised much higher than the jaws when the sail is set. The ropes used in hoisting and lower¬ ing the gaff are called (

GAFFAREL, gaf-fa-rel, Paul (Louis Jacques), French historian: b. Moulins 1843. He received his education at the Lcole Normal Superieure; was made professor of history at Besangon, removing afterward in a similar ca¬ pacity to Dijon and Marseilles. He has pub¬ lished many noteworthy works on colonial history; these include (Etude sur les rapports de l'Amerique et de l'ancien continent avant Christophe Colomb) (1869) ; (Histoire de la Floride frangaise (1875) ; (Histoire du Bresil frangais* (1878); (Les colonies frangaises) (1880); (L'Algerie: histoire, conquete et colonisation (1882) ; (Les explorations fran- gaises de 1870 a 1881 5 (1882) ; (Les campagnes de la premiere Republique* (1883).; (La con¬ quete de l'Algerie jusqu'a la prise de Constan- tine) (1887) ; (Les Frangais au dela des mers> (1888) ; (Campagnes du Consulat et de l'Em- pire) (1888) ; (Campagnes du premier Empire> (1890) ; (Le Senegal et le Soudan frangais (1890) ; (Histoire de la decouverte de l'Amer-*

FTaˆdriWfˆb'aW)!ˆ C°l0niale in

GAFFKY, Georg Theodor August, Ger-

StedPafSJ£ianTT h/ Ha.nover 1850- He was edu¬ cated at the University

of Berlin and in 1888

was appointed to the chair of hygiene at the

University of Geissen. In 1883ˆ4 he visHed

hgypt and India as member of an expedition

mnˆUdyiePLlemiCS of cholera- He gathered much valuable material which he published

t reiGQooari ater in collaboration with Dr. Koch. In 1892 during a cholera epidemic at Ham-

ion? he ™as advlser t0 the municipality and in 1897 again visited India to make further studies of cholera. He became director of the inniltUteTˆor Infecti°us Diseases at Berlin in a • , • , Publlshed works include (Zur

iqq/}? 0g?rv d?s Abdominaltyphus> (2 vols, 1884) ;< Die expenmentelle Hygiene in Dienst der orfentlichen Gesundheitspflege> (1895).*

GAFFNEY, S. C., city and county-seat of Cherokee County, 110 miles northwest of Co¬ lumbus, on the Southern Railway. Its indus¬ tries comprise cotton and cotton-seed-oil mills, fertilizer w'orks, lime, fibre works, tin and monazite mines, etc. It has extensive cotton¬ growing interests ; has a woman's college, a Carnegie library, several schools and churches, and owns and operates the electric-lighting plant and the water supply system. Pop. 5,010.

a seides of rules adopted 1826-44 by the House of Representatives, to prevent the reception of anti-slavery petitions and check the possibility of debate on the sub¬ ject. No other measure created more virulent debate. The Constitution forbids Congress to pass any law "abridging the right of the people to petition the government for a redress of grievances,ˆ and impliedly to refuse to receive petitions, as an unheard petition is a nullity. From 1831 on, the abolition societies rained pe¬ titions on Congress, urging the abolition of slavery in the District of Columbia, over which it had complete legislative power. They were referred to the Committee on the District, which at first reported adversely, then ceased to report at all, despite complaints. The 24th Congress, 1835-36, laid them on the table instead; but in both Houses there soon arose an outcry to bar them from congressional cognizance alto¬ gether. In the Senate, Calhoun on 7 Jan. 1836 moved not to receive two such petitions, on the ground that the South must in the end be worn out and degraded by having constantly to justify its _ institutions before a body which had no jurisdiction over them

anywhere; but after two months' debate, it was voted to receive them and they were immediately rejected, which re¬ mained the rule thereafter. In the House, on 8 February, Henry L. Pinckney of South Carolina moved that all the petitions be referred to a select committee, under instructions to report that Congress could not constitutionally inter¬ fere with slavery in the States, and ought not to do so in the District; on 18 May the com¬ mittee so reported, with another resolution that all petitions relating to slavery be laid on the table without action or reference. Under the previous question both resolutions were passed 25-26 May; the last 117 to 68, John Quincy Adams refusing to vote and denouncing them as a violation of the Constitution, the rules of the House and the rights of his constituents.

vol. 12 — 15

Adams' as. the champion of the 8 ,, Pe ˆlon» became involved for years in

Uneˆ«27StVtrU?ge ,against the «gag.» On 18 Jan. 1827 this struggle was renewed. The furi¬ ous scenes in which Mr. Adams was pitted » "earIy a11 Jhe rest of the House are

f™°ngnhe9imnSt Pˆturesque in American his¬ tory. On 21 Dec. 1837, John M. Patton of Vir- ginm moved and secured the passage (122 to 74) of a resolution to lay. on the table without debate, reference or action, all papers concern- mg sUvery in any State, "District or Territory» f/inH Un,lted States. Adams again denounced

«A?£dtref£Sed) >to vote 0n 11 Dec. 1838 the Atherton Gag» was moved by Charles J. Ather¬ ton of New Hampshire, and passed 126 to 73- it was the same in essence .as the others. On 21 Jan. 1840 the House adopted as its 21st Kule that no paper praying the abolition of slav- ery or the slave trade should in future be re¬ ceived by the House or entertained in any manner. But this only passed by 114 to 108 * the refusal of the right of petition was incensing the North, and forcing even Democratic repre¬ sentatives to protest. Thereafter at every ses¬ sion, in adopting the rules, Mr. Adams moved to strike out the 21st. The violence of the assaults on him increased, but the majorities • im decreased. At the special session of 1841 his motion was carried on a motion to adopt the rules only for 10 days, but recon¬ sidered and defeated. Finally, on 3 Dec. 1844 a motion to lay his motion on the table was lost by 104 to 81, and the 21st Rule was abolished by 108 to 80. Nothing of the kind was again attempted. Since 12 Dec. 1853 petitions are no longer presented in the House, but handed to the clerk Consult Adams, (Memoirs> (Phila¬ delphia 1874-77) ; Benson, Abridgment of the Debates of Congress 1789-18S6> (New York*

; , J,hirty Y?ars Yieˆw> (New York

1854—56) ; Wilson, (Boston 1872-77).

• pˆGARI'N, ga'-ga-ren, Alexander Ivano- vich, Russian soldier : d. 1857. He distinguished himself in the campaigns in the Caucasus es¬ pecially in the Dargo expedition, and in 1847 became military governor of Kutais; in 1853 he took command of the troops on the Turkish frontier, becoming aftcrˆrci commander of the 18th Infantry division. He was seriously wounded at Kars and «in 1857 returned to his duties at Kutais as governor-general. He was charged with the subjugation of Suanethea and ordered to bring the prince of that province to Tiflis. The latter, . Constantin Dadeschkalian, surprised Gagarin in his castle and inflicted on him wounds from which he died a few days afterward.

GAGARIN, Ivan Sergeyevich, Russian diplomat and churchman: b. 1814; d. 1882. He was a member of the princely house of Gagarin; entered the diplomatic service of his country and became secretary of embassy at Paris. He was converted to the Catholic faith in 1843, and subsequently entered the Jesuit order. He wrote

GAGARIN, Matthew Petrovich, Russian prince and statesman: d. 1721. In 1703 he was governor of Nertchinsk and four years later became president of the Siberian Chamber. He was named governor of Moscow in 1708, and

after 1711 was governor of Siberia. After ad¬ ministering this office for a few years he was charged with various offenses, especially with a project of separating Siberia from the empire and constituting it a separate and independent nation. He spent two years in prison, was tortured frequently and finally put to death by Peter the Great.

GAGE, Lyman Judson, American finan¬ cier : b. De Ruyter, N. Y., 28 June 1836. His family moved to Rome, N. Y., in 1848, and he was educated at the Rome Academy. He worked in the Oneida Central Bank 1853-55, when he went to Chicago, becoming a clerk, and later bookkeeper and cashier of a planing-mill company. In 1868 he became cashier and in 1891 president of the First National Bank of Chicago. He was the first president of the board of directors of the World's Columbian Exposition, and several times president of the American Bankers' Association and the Civic Federation of Chicago. On 5 March 1897 he was appointed Secretary of the Treasury, by President McKinley; in 1901 was reappointed; resigning in March 1902. He received the de¬ gree of LL.D. from the New York University, 4 June 1903. He was the originator of the

movement for civic reform which started in Chicago under his inspiration and became a national influence. He wrote the platform of the Economic Conferences, a unique feature of Chicago's social organization, where Republi¬ can and Democrat, rich and poor, conservative and anarchist, meet for debate and exchange facts and theories.

GAGE, Simon Henry, American embryol¬ ogist : b. Maryland, Otsego County, N. Y., 20 May 1851. In 1877 he was graduated at Cornell University and in 1878-81 was instructor, in 1881-89 assistant professor, and in 1889-93 as¬ sociate professor of physiology at Cornell. From 1893 to 1895 he was associate professor of anatomy, histology and embryology and in 1895-96 professor at the same institution. In 1906 he became professor of histology and em¬ bryology emeritus after 25 years' service to undertake special investigations, on an allow¬ ance from the Carnegie Foundation for the Advancement of Teaching. He is coeditor of the American Journal of Anatomy and is a member of many scientific societies, American and foreign. He is the 'author of 'The Micro¬ scope and Microscopic Methods> (12th ed., 1916) ; (Anatomical Technology, 5 with B. G. Wilder; (Optic Projection with the Magic Lantern and the Moving Picture Machine) (1913-14) ; also numerous papers on biological subjects; collaborator to Foster's Encyclopaedic Medical Dictionary5 ; Wood's 'Medical Diction¬ ary5 and Wood's 'Reference Hand Book of the Medical Sciences,5 etc.

GAGE, Thomas, English general : b. Firle, Sussex, 1721 ; d. 2 April 1787. He was son of first Viscount Gage and was educated for the army which he entered as lieutenant in 1741. He took part in the battle of Culloden and served in Flanders as aide-de-camp to Lord Albemarle. Appointed lieutenant-colonel of the Forty-fourth Foot in 1751, he came with it to America three years later with General Brad- dock. In 1755 he accompanied Braddock's ill- fated expedition as lieutenant-colonel. _ In 1758, while stationed at Oswego, he raised and

trained a regiment of provincial troops for Abercrombie's expedition against Ticonderoga. The following year he became brigadier-general with command at Niagara. He was appointed by General Amherst, in 1760, military governor of Montreal, and in 1763 commander-in-chief of the British forces in America. His inflexible character led the government to regard him as well fitted to end the disturbances in the Amer¬ ican colonies. In 1774 he was nominated gov¬ ernor of Massachusetts, a post of peculiar diffi¬ culty, and his enforcement of the rigorous de¬ crees of Parliament brought matters to a cli¬ max. On the night of 18 April 1775 he dis¬ patched an expedition to seize a quantity of arms which had been stored at Concord ; and next day took place the memorable encounter of Lexington, which announced that the Revolu¬ tion had begun. The battle

of Bunker Hill (q.v.) made him unpopular. For a short time he was commander-in-chief in America, a post he soon resigned to return to England.

GAGER, (Charles) Stuart, American bot¬ anist: b. Norwich, N. Y., 1872. In 1895 he was graduated at Syracuse University and later studied at Harvard and Cornell. In 1897-1905 he was professor of biological science and phys¬ iography at New York State Normal College; from 1906 to 1908 was director of the labora¬ tories of the New York Botanical Garden and in 1903-10 was professor of botany at the Uni¬ versity of Missouri. Since 1910 he has served as director of the Brooklyn Botanical Garden. His publications include 'Errors in Science Teaching5 (1901) ; 'Effects of the Rays of Radium on Plants5 (1908) ; 'Non-Technical Lectures5 (1913) ; English translation of De Vries, 'Intracellular Pangensis5 (1910).

GAGNON, gan'yon, Charles Alphonse Na¬ thanael, Canadian author: b. Port Joli, Quebec, 1851. He received his education in the public schools; entered journalism at Montreal and afterward moved to Quebec. He was re¬ porter in the courts there and afterward se¬ cured a position from the provincial government in the Department of Public Works. His tales, sketches, etc., include 'Douleurs et Joies5 (1876) ; 'Genevieve, Saint Jean, Port Joli5 (1876) ; 'Quelques considerations pour les temps actuels5 (1882) ; 'Les banques d'epargnes scolaires5 (1887) ; 'Etudes archaeologiques et varietes) (1894); 'L'Amerique precolombienne ; essai sur l'origine de sa civilisation5 (1908).

GAHNITE, ga'nlt, "zinc spinel55 (named after J. Gottlieb Gahn, a Swedish chemist and mining engineer), a zinc-aluminate, Zn AhCh. The variety automojite has this formula; in kreittonnite the zinc is in part replaced by fer¬ rous iron and magnesium, and the aluminum by ferric iron. The variety dysluite is similar except that manganese is present instead of magnesium. Gahnite usually occurs in octa¬ hedrons of a black, gray, dark green or brown color, with a hardness of 7.5 to 8. Its most important localities are in Sweden, Bavaria and Sussex County, N. J.

GAIL HAMILTON. See Dodge, Mary Abigail.

GAILLARD, gi'yar', Claude Ferdinand,

French painter and engraver: b. Paris, France, 7 Jan. 1834; d. there, 19 Jan. 1887. He was a pupil of Leon Cogniet and studied painting

Xfi Pgra.vinf at ficole des Beaux-Arts. In 1856 he gained the Pnx de Rome. Among his

/The Education of Hies?

K? /fo?,e/as,tlan' (1876>i 'Christ at omb (1877), besides several portraits lsomf c°P'es. °f old masters. His principal e graved portraits are 'Chateaubriand, ' Mon*

'Mo11/11' Bouv'er'' j

Sebastian, of one of Botticelli's 'Holy Fami¬ lies and of the 'Man With the Pink, of Van tyck, rank among the masterpieces of modern engraving. Gaillard gained three medals for engravmg and one for painting, and was deco*

fn 1S7fildVhe C,r°o °f,i-he Leg'0n of Honor , ,. • Consult Beraldi, H., 'Les graveurs

au aix-neuvieme siecle) (Paris 1885-92).

GAILLARD, gaPlerd, David Du Bose,

American soldier and engineer : b Summer Cou,nty. S. C 1859; d. 1913. In 1884 he was graduated at the West Point Military Academy and from 1891 to 1894 was a member of the International Boundary Commission of the United States and Mexico. In 1895-98 he superintended work on the Washington aque¬ duct and during the war with Spain was colonel oi a regiment of volunteer engineers. In 1909 he was made lieutenant-colonel in the regular an?y-. In 1907 he was appointed on the Isthmian Canal Commission and was made di-

ˆnno°u Lanama Railroad Company. In

was made engineer of the division of the Panama Canal from Gatun to Pedro Miguel. He wrote (Wave Action in Relation to Engineering Structures) (1904).

. GAILLARDET, gi-yar-da, Theodore Fred¬ eric, French dramatic author : b. Auxerre 7 April 1808; d. Plessis-Bouchard, 12 Aug. 1882. ■He practised law at Tonnerre. He sent a drama to the Porte Saint-Martin, which partly rewritten by Alexander Dumas, the elder, and signed by him, achieved an enormous success as (La Tour de Nesle,5 28 May 1832. This led to a duel with Duinas, Gaillardet afterward gaining a lawsuit which permitted him to place his name as one of the authors of the piece. He is the author of two other plays, (Struensee ou le Medecin de la Reine>

(1832) and Georges, ou le Criminel par Amour) (1833). He also wrote from private papers found at Tonnerre and the archives of foreign affairs the (Memoires du Chevalier d'Eon) (1836, new ed. 1866). Coming to New York in 1839 he founded the Courrier des Etats Unis, a French newspaper, which he edited until 1848 and which is still published. He returned to France later and served on the editorial staff of the Presse.

GAILLARDIA, a genus of plants of the family Asteracece, composed of about 20 spe¬ cies, natives of western North America. They are annuals or perennials with toothed leaves, bearing usually very showy heads, surrounded by yellow and red rays. Some of the species are common in cultivation.

GAILOR, Thomas Frank, American Prot¬ estant Episcopal bishop: b. Jackson, Miss., 17 Sept. 1856. He was graduated from Racine Col¬ lege, Wisconsin, in 1876, and from the General Theological Seminary, New York, in 1879. En¬ tering the ministry he was rector of the Church of the Messiah, Pulaski, Tenn., 1879-82; and

in 1882 became professor of ecclesiastical his- ory in the University of the South, Sewanee, ienn. In 1893 he was consecrated bishop- coadjutor of Tennessee, and in 1898, on the death of Bishop Quintard, became bishop of lennessee. Elected chancellor and president of board of trustees of the University of the

cS a'u ?ewanee' Tenn-> 1908. He delivered Bedell Lectures on the Christian Church and ducation (1908). His writings include (A Manual of Devotion5 ; ;

GAJNES, Edmund Pendleton, American arm\ \ Culpeper County, Va., 20

March 1777; d. New Orleans, 6 Tune 1849. He was appointed second lieutenant in the Sixth r?ˆm,ent» United States Infantry, in 1799; in ˆ05 became collector of customs of the port . ˆLjUle, Ala., and received the rank of cap¬ tain 1807. Serving through the War of 1812 he became brigadier-general in 1814, command¬ ing at Fort Erie, in August, until wounded. He afterward became brevet major-general ■ commanded the Southern Military District dur¬ ing the first war against the Seminoles 1817, the Western District 1821, being wounded in the second war with the Seminoles in 1837, and the Department of the Southwest when war was declared with Mexico.

GAINES, Myra Clark, American claimant: b. New Orleans 1805; d. 1885. She was a daughter of Daniel Clark, who emigrated from Ireland to New Orleans and inherited his uncle s property there in 1799. He was sup¬

posed to have lived a bachelor, but it was known that he was the father of two daughters by a French woman of great beauty. He died in 1813; his will gave his property to his mother. In 1830 letters were found detailing the circumstances of Myra's birth; in 1832 one that gave an account of a will made by her father in 1813, in which he acknowledged her as his legitimate daughter and bequeathed her all his property. She then began her remark¬ able litigation, first to establish her legitimacy, then to secure her father's estate. The Supreme Court of Louisiana pronounced her legitimate and his lawful heir in 1856. Subsequently, the United States Supreme Court decided that the facts of her father's secret marriage in Phila¬ delphia and her own legitimacy were fully es¬ tablished. Then began the struggle to secure possession of the estate. She filed a bill in equity in the United States Supreme Court in 1856, and a favorable decision was rendered in 1867. In 1861 the property in New Orleans was valued at $35,000,000, and previous to 1874 she obtained $6,000,000. Appeals and counter¬ suits were in progress at the time of her death in 1885. She married W. W. Whitney in 1832 and at his death, Gen. Edmund P. Gaines in

1839.

GAINES' MILL, Battle of. After the battle of Mechanicsville or Beaver Dam Creek,

26 June 1862, McCall's division was withdrawn from the field of its victory and Gen. Fitz John Porter, with it and the Fifth corps, took up a defensive position near Gaines' Mill, east of Powhite Creek, a small stream flowing into the Chickahominy. Porter's corps and McCall's di-

vision, numbering in all about 20,000 infantry and artillery and 2,500 cavalry, were the only Union troops north of the Chickahominy, the rest of McClellan's army being south of it. Porter's line was formed in the shape of a semi-circle, its left resting in the low ground near the Chickahominy, with its right bending around south of Old Cold Harbor. The line was naturally strong and was strengthened by rifle-pits, by felling trees in front of them and by piling rails and such other material as was at hand. The east bank of the creek was quite high and the slope to the creek was covered with brush and timber. The line covered sev¬ eral of the bridges over the Chickahominy and through the centre and right ran the roads from New Cold Harbor and Old Cold Harbor to Dispatch Station. Sykes' division of the Fifth corps was on the right and Morell's di¬ vision on the left, with

*McCall's .division in reserve. General Cooke, with three small cav¬ alry regiments, watched the left. The line was somewhat too extended for the number of troops Porter had at his disposal, but these were well posted and his artillery placed in good positions, sweeping the ground in front. On 27 June the Confederates advanced upon Porter's position, A. P. Hill and Longstreet from the west, Jackson and D. H. Hill from the northwest. A. P. Hill led the advance from Mechanicsville, and *on reaching Pow- hite Creek, near Gaines' Mill, at noon, Gregg's South Carolina brigade was so stoutly resisted by the Ninth Massachusetts, holding an ad¬ vanced position, that Hill was checked and Compelled to deploy a large force to push the Massachusetts men back, which consumed the time until 2 p.m. Meanwhile the other divisions had come up, Longstreet on A. P. Hill's right, Jackson, Ewell and D. H. Hill in the order named, on A. P. Hill's left. The main battle began a little after 2 o'clock with an impetuous assault by A. P. Hill on Porter's left division and resulted in the final repulse of Hill with great loss. Longstreet came to his support, Jackson and D. H. Hill closed in on Porter's right and for nearly two hours Porter's entire line was successively assailed and pressed at every point, but held firm, so firm that General Lee thought that <(the principal part of the Federal army was on the north side of the Chickahominy® and ˆapparently gaining ground.® McCall's division was placed in line. All fought well and were admirably handled ; but there were not enough of Porter's men long to withstand the energetic and continued pres¬ sure of 57,000 Confederates at all parts of the line. At about 4 p.m. Slocum's division of Franklin's corps came on the field from beyond the Chickahominy. Its three brigades were separated and disposed of in weak places on the line and the general attack was repulsed about 5 p.m. A few minutes later another attempt was repulsed, the Union line holding fast and not yielding a foot. The Confederate forces were now all up. Whiting's division had come to the relief of A. P. Hill ; and Stuart, with his cavalry and artillery, opened heavily on Por¬ ter's right. General Lee now ordered a general advance, which was responded to in a most gallant manner. Porter's lines were fiercely assaulted; parts remained firm, but other parts gave way and soon all gave back, losing 22*

guns and some 2,800 prisoners. Some of the commands fell back in much confusion; others retired in good order upon the brigades of French and Meagher, of Sumner's corps, which had crossed the Chickahominy, and now as¬ sisted in checking the Confederate pursuit. During the night the Union troops crossed to the south side of the Chickahominy, destroyed the bridges behind them and joined the rest of the army in its retreat to Harrison's Landing on James River. The entire number of Union troops engaged was about 34,000; the loss was 894 killed, 3,107 wounded and 2,836 missing, an aggregate of 6,837. The number of Confed¬ erate troops engaged was about 57,000, of whom 8,751 were killed and wounded.

Bibliography. — Alexander, (Military Mem¬ oirs of a Confederate) (New York 1907) ; Johnson and Buel, (The Battles and Leaders of the Civil WarJ (New York 1887) ; Nicolay and Hay, (Abraham Lincoln; A History } (New York 1890) ; (Official Records) (Vol. XI, Washington 1885) ; Ropes, (The Story of the Civil War> (Vol. II, New York 1894-98) ; Steele, (American Campaigns } (Washington 1909) ; Webb, (The Peninsula) (New York

1881).

*GAINESVILLE, Fla., city and county-seat of Alachua County, on the Seaboard Air Line, the Atlantic Coast Line and the Tampa and Jacksonville railroads, 70 miles * southwest of Jacksonville. Owing to its temperate climate it is a favorite winter resort. Its industrial in¬ terests are chiefly agricultural; fruit growing, is largely carried on, and we mention also the phosphate mining, the foundries and planing mills. Pop. (1920) 5,286.*

GAINESVILLE, Ga., city and county-seat of Hall County, on the Southern, the Gaines¬ ville Northwestern and the Gainesville Midland railroads, 53 miles northeast of Atlanta. From its situation at the summit of the Chattahoochee ridge, and owing to the numerous mineral springs in the vicinity, it is a much-frequented health resort. The educational establishments include Brenau College and Conservatory of Music, the Riverside Military Academy, etc. There are milling industries and manufactures of machinery and wagons, and the city owns its electric-lighting plant and waterworks. Pop.

(1920) 6,272.

GAINESVILLE, Tex., city and county-seat of Cooke County, on the Missouri, K. and T., and the Gulf, G. and S. F. railroads, 65 miles north of Fort Worth. This is the centre of an important agricultural and stock-raising dis¬ trict. It has large meat-packing establishments and manufactures of flour, foodstuffs, cotton¬ seed oil, carriage works, hide and leather fac¬ tories and pressed-brick works. The town was first settled in 1851, and was incorporated in 1873. It is governed under a charter of 1879 by a mayor and council elected by popular vote every two years. The post office, city hall, library and city park are noteworthy. Pop.

(1920) 8,648.

GAINSBOROUGH, ganz'bur-6, Thomas, English painter: b. Sudbury, Suffolk, May 1727; d. London, 2 Aug. 1788. He was the son of a wool manufacturer, and was educated under his uncle in the grammar-school of his native town.

His artistic gemus early displayed itself, and tor a time he studied art in London under the hrench engraver Gravelot, and afterward under hrank Hayman. He married at 19, set up as a portrait painter in Ipswich, and in 1758 took up. his residence in Bath, where he soon ac¬ quired a leading position as a portrait painter. He sent pictures to the exhibitions of the So¬ ciety of Artists from 1761 to 1768, and in the T?S e ecAted ,one of original mem- R5 s a iC R˚yaI Academy. He contributed to Academy exhibitions during the period l/oq /2, and again, after an interval of es-

777gtllie?7S^fr0mnSir- Toshlia Reynolds' Rom V r T . pictures shown during the

nrst of those periods comprised some land¬ scapes and numerous portraits, among them those of Garrick (two), the Duke of Argyll and Lord Nugent. Owing to a quarrel with'his friend and patron, Philip Thicknesse, he left Bath for London in 1774, and in the metropolis his fame rapidly increased. Among the pictures exhibited at the Academy after his arrival in London none is more celebrated than the (Blue Boy (1779), said to have been painted to refute a statement made by Sir Joshua Reynolds in one of his discourses. Among portraits painted during this period are those of the Duchess of Devonshire, Duchess of Cumberland, Duke of Argyll, General Conway, Sir Bate Dudley, George III and his queen, Bishop Hurd, the Prince of Wales, Colonel St. Leger, Lord Corn¬ wallis, the Princess Royal and other members ˚f tho royal family. Owing to a quarrel about the hanging of some pictures, he never ex¬ hibited at the Academy after 1784. Before his death he was reconciled to Sir Joshua Reynolds. Among his other works the following should be mentioned: portraits of Mrs. Siddons, Hon. Mrs. Graham, Pitt, Blackstone, Johnson, Sterne,. Richardson, Clive, Burke, Canning, Franklin, besides others; 'The Market Carp • also known as the (Stolen Duchess. > This was sold to Messrs. Agnew of London in 1876 for £10,605, and was immediately thereafter stolen, its fate remaining a mystery until it was returned in 1901 by the thieves from Chi¬ cago, because of their inability to dispose of it, when it was purchased by J. Pierpont Mor¬ gan. Consult 'Lives,* by Fulcher (1856); Brock-Arnold (1881); Bell (1897); Gower (1903); Fletcher (1904); Boulton (1905);

Wedmore, Studies in English Art,* first series (1878); Armstrong, 'Gainsborough and His Place in English Art> (1898); Chamberlain, 'Gainsborough* (1903).

GAINSBOROUGH, England, an ancient town in Lincolnshire, on the Trent

River, con- taining a timber-framed Old Moot Hall of the 15th century and other edifices of antiquarian mterest and modern use. In George Eliot's novel, 'The Mill on the Floss, > this town is called Saint Ogg s. The trade by water, river and canals is great. To Americans this place

iio?f.t!ntereSt because here gathered, before 1604, the congregation that became the Pilgrim

Fathers (q.v.) of New England, some of the fathers of the Baptists in America, and some also identified with the earliest historic litera- tui e of the Western world. The leaders were John Smythe and John Robinson (q.v) the former leading a party into the Dutch Repub¬ lic m 1606 and the latter in 1608. On 29 Tune

\ ,a J.V8? company of Americans, "New World Pilgrims to Old World Shrines,® with the United States Ambassador, T. F. Bayard who made the address of the day, visited Gains¬ borough to lay the cornerstone of the John Robinson Memorial Church and to celebrate the spiritual movement in Tudor times of ((men who beyond their dark age led the van of thought, which meant <(the emancipation of England from Norman domination.® The ch,urch edifice has been in use since 1897. Con- ˆbe Ro°k tbe Pilgrimage) (Boston

1896).

GAIRDNER, gard'ner, James, English his¬ torian : b. Edinburgh, 22 March 1828; d. 4 N°v. 1912. When 18 years old he entered the Eublic Record office in London as a clerk, and was assistant keeper from 1859 to 1893' He distinguished himself by the rare com¬ bination of. profound erudition, patient ac¬ curacy and judicial temper which he displayed in the editing of a long series of historical documents: 'Memorials of Henry VIP (1858) ; 'Letters and Papers Illustrative of the Reigns of . Richard III and Henry VII> (1861-63), in the Rolls series; 'Calendar of Letters, and Papers, Foreign and Domestic, of the Reign of Henry VHP (11 vols., 1880-96); and 'Historical Collections of a London Citi- zen) (1876), and 'Three Fifteenth-Century Chronicles (1880), for the Camden Society series; 'The English Church in the Sixteenth Century* (1902) ; 'Lollardy and the Reforma¬ tion in England* (1908, 1911). Equally valu¬ able are the books addressed to a wider audi¬ ence : an edition of the 'Paston Letters* in Arber's series (1872-75) ; 'The Houses of Lan¬ caster and York,.* in 'Epochs of Modern His¬ tory* (1874) ; 'Life and Reign of Richard IIP (1878); 'England* in 'Early Chroniclers of Europe* (1879) ; 'Studies in English History* (1881), written in conjunction with Spedding; and 'Henry VII,* 'Statesmen* series (1889).*

GAIRDNER, Sir William Tennant, Scot¬ tish pathologist: b. Edinburgh, 8 Nov. 1824; d.

28 June 1907. He was graduated M.D. at Edinburgh in 1845, and from 1862 until his re¬ tirement in 1890 occupied the chair of medicine in Glasgow University. Among his published books are 'Pathological Anatomv of Bronchitis and Diseases of the Lungs* (1850); 'Clinical Medicine* (1862); 'Public Health in Relation

to Air and Water5 (1862); (Insanity: Modern Views as to its Nature and Treatment5 0885) ; (The Physician as Naturalist5 (1889).

GAISERIC, gi'ser-ik. See Genseric.

GAISFORD, Thomas, English scholar and Greek philologist: b. at Ifort, Wiltshire, Eng¬ land, 22 Dec. 1779; d. 2 June 1855. He was educated at Christ Church, Oxford, took orders in the Church, and in 1811 was appointed regius professor of Greek in the University of Ox¬ ford. In 1831 he became dean of Christ Church, remaining such till his death, and in 1847 rector of Westwell and curator of the Bodleian Library. He was a prolific writer, his principal works being (Hephaestronis Enchi¬ ridion de Metres5 (Oxford 1810, Leipzig 1832) ; (Poetae Grseci Minores5 (1814-20, 4 vols.) ; (Stobsei Florilegium5 (1822, 4 vols.) ; (Herodoti Historise5 (1824); (Sophoclis Tragaedise5 (Ox¬ ford 1826, 2 vols.; Leipzig 1827, 8 vols.); (Suidae Lexicon5 (1834, 3 vols.); (Parsenuog-raphi Grseci5 (1836) ; (Scriptores Latini rei Metrics5 (1837) ; (Entymologicum Magnum5 (1848); and (Eusebii Demonstratio Evangelica5 (1852, 3 vols.). He was elected a member of the Institute of France, and in 1856 the Gais- ford prize, for Greek composition, was founded at Oxford in his memory.

GAIUS, ga'yus, the name of several persons mentioned in history: (1) A Roman general, the son of Marcus Agrippa and Julia, daughter of Augustus Caesar. He was adopted by Au¬ gustus and distinguished himself as a soldier during the 1st century b.c., having reduced Ar¬ menia and routed Tigranes. (2) A Roman jurist who lived 130 to 180 a.d. Before the re¬ vision of the Roman law and the reform of legal studies by Justinian, the (Institutes5 of Gaius, afterward the ground work of the (Insti¬ tutes5 of Justinian, were the received text¬ books of the schools of law. Almost com¬ pletely lost until 1816, their discovery at Verona by Niebuhr threw a flood of light on the his¬ tory of the early development of Roman law. (3)

A Christian controversialist of the 3d cen¬ tury. He regarded the Epistle of Saint Paul to the Hebrews as apocryphal, and was the first who wrote against Cerinthus and the Millenar- ians. (4) Gaius, Saint, bishop of Rome, 283 to 296; d. 22 April 296. A native of Dalmatia and nephew of Diocletian, he suffered many hardships during the first persecution of the Christians by the emperor.

GALABAT, ga-la-bat', or KALABAT,

Africa, a small district situated near the west¬ ern frontiers of Abyssinia contiguous with the Anglo-Egyptian Sudan. The people, some 20,- 000 in number, and fanatical Mohammedans, trade with Abyssinia in coffee, cotton, hides and beeswax. The district contains about 1,500 square miles. It was for a number of years within the Italian sphere of influence.

GALACTIC CIRCLE, the great circle of the heavens which coincides best with the course of the Galaxy or. Milky Way. Accord¬ ing to Sir John Herschel, the north pole of this great circle is situated approximately in right ascension 12 hours 47 minutes, and declination + 27°, the circle crossing the equator at the points whose right ascensions are about 6 hours 47 minutes and 18 hours 47 minutes. See Galaxy.

GALAGO, ga-la'go, a genus of African lemurs (q.v.), arboreal and nocturnal in habit, living on fruit and insects. They vary from the size of a rabbit to that of a rat, are covered with soft fawn-gray woolly fur, have somewhat bushy tails longer than the body, and hind legs longer and stronger than the arms, with two of the ankle bones (calcaneum and navicular) greatly elongated. The head is round like a cat's; the eyes are large with oval pupils con¬ tracting in daylight to vertical slits ; the ears are naked and very big, expanded during activity, but rolled together when the animal rests. The female is said to bear one young one at a birth, and often carries it about. Soft nests are also made in the branches. The Galago proper (G . senegalensis) seems to be distributed throughout tropical Africa, and is known in Senegal as <(the gum animal55 from its frequent habitat in mimosa or gum-acacia forests, and from its alleged habit of gum-chewing. It is said to be eaten there. The largest species (G . crassicaudatus) measures a foot in length, not including the bushy tail, which is 15 or 16 inches more. In Zanzibar the komba (G . agisymbanus) is said frequently to make itself intoxicated with palm-wine, so that it falls from the tree and gets caught. It is readily tamed and utilized to catch insects and mice in the houses. There are numerous species, and the Madagascar genera Chirogale, Microcebus and Opolemur are joined with it in the sub-family Galagincc. Consult Beddard, (Mammalia5 (London 1902).

GALAHAD, Sir, son of Launcelot and Elaine and the noblest of the Knights of the Round Table, of whom he alone was successful in the search for the Holy Grail. He was in¬ troduced into the Grail legend by Walter Map (q.v.). (See Grail; Round Table, Knights of). Consult Morley, (English Writers5 (Vol. Ill, London 1887-90).

GALANGAL, a dried rhizome obtained from different species of Alpinia growing in the East. What is known as the lesser galangal is brought from China. It occurs in small pieces, cylindrical and forked, striated and diversified with whitish rings; the outside is brown, the inside paler. It has an aromatic taste and odor, and is an agreeable substitute for ginger in dyspepsia. It yields an oil and a soft resin, but its chemical composition is not settled. The larger or Java galangal is coarser, and is not so strongly aromatic. The rhizome of Alpinia officinarum has been used in medicine as a stimulant aromatic.

GALANTHA, ga-lan'tha, Eszterhazy von,

Hungarian Magnates and, later, princes of the German empire. See Esterhazy von Ga-

LANTHA.

GALANTHUS. See Snowdrop.

GALAPAGOS, gal'-a-pa'gos, ARCHI¬ PELAGO, a group of volcanic islands in the Pacific Ocean, belonging to the Republic of Ecuador (q.v.). It consists of 15 larger islands and about 40 smaller, with a total area estimated at 2,400 to 3,000 square miles, and all included between lat. 0° 38′ N. and 1° 27′ S. and long. 89° 16′ 30″ W. and 91° 40′ 45″ W., except Cul¬ peper and Wenman which lie somewhat farther toward the North. The more important in area are Albemarle, Indefatigable, Marlborough,

Chatham, James and Charles — to give them

nnetpn?rf ,1" gCnera' USe; at the same time we note that the government of Ecuador in 1892

.'T'1,3'11 r 'he archipelago, rather inappropri- r Colon and invented novel designations for separate members of the group. The dis¬ tance frorn Chatham Island to Guayaquil is 620

™lles’ 9 oof an uma 840 miIes> and to San Fˆn- cisco 2,990 miles. Features of wholly excep¬ tional interest in the natural history of the archipelago were noted by Charles Darwin in his journa of the voyage of the Beagle , which iorms the basis of the present description. The constitution of the whole is volcanic; with the exception of some ejected fragments of granite ever> part consists of lava, or of sandstone re- ˆl ˆng from the attrition of such materials.

f \ nnn 1Gr (which attain an elevation

of 3,000 to 4,000 feet) generally have one or more principal craters toward their centre, and on their flanks smaller orifices. There are, in all the islands, at least 2,000 craters. Though the islands are placed directly under the equator, climate is not in all parts of them excess¬ ively hot ; a circumstance which is owing to the singularly low temperature of the surrounding ocean (compare the observations mentioned be¬ low). Very little rain falls, except during one short season, but the clouds generally hang low; therefore the summits, at an elevation of 1,000 feet or mope, possess a tolerably luxuriant vege¬ tation, while the lower parts of the islands are extremely arid. On a part of Chatham Island, black cones, the former chimneys of the subter¬ ranean heated fluids, are so numerous and in form so regular that they give the country a .<(workshop® appearance, which strongly re¬ minded Mr. Darwin of the great iron foundries of Staffordshire. All the craters on Chatham are extinct, but on the western islands «the vol¬ canic forces were in frequent activity.® Charles Island was frequented by buccaneers and whalers long before Ecuador established a small penal colony there. The soil of the elevated portions of that island is fertile black mud; the climate of the same regions is tempered by a cool south¬ erly tradewind; and wild pigs and goats are found in the woods, ((but the main article of animal food is derived from the tor¬ toises® — which sometimes weigh 200 pounds each. On both Albemarle and Marlborough islands, eruptions occasionally take place. Of the former, Mr. Darwin writes : ((I should

think it would be difficult to find in any other part of the world an island situated within the tropics, and of such considerable size (namely, 75 miles long), so sterile and incap¬ able of supporting life.® On James Island there is a lake from which salt is procured. The equatorial heat was observed in its effect upon the soil of the lower and sterile parts. There the thermometer placed in sand of a brown color immediately rose to 137°, and black sand was so much hotter that it was disagreeable to walk over, even in thick boots. An acacia, a cactus, and one of the euphorbiaceas — a bush with minute brown leaves — are common in some parts of these lowlands. Near the sum¬ mits the vegetation has a very different char¬ acter; ferns and coarse grasses are abundant; and the commonest tree is one of the Com-

positse. There are no members of the palm family. <(The natural history of this archipel¬ ago,® Mr. Darwin says, ((is very remarkable. It

seems To be- a little world within itself ; the greater number of its inhabitants, both vegeV table and animal, being found nowhere else.® •i.i again, ((In my collections from these 's. J nd ere are 26 different species of land birds. Wrth the exception of one, all probably are un¬ described kinds, which inhabit this archipelago and no other part of the world. ® The order of reptiles foims the most striking feature in the zoology of the islands, the species not being numerous, but the number of individuals of each kind extraordinarily great. There is one kind both of the turtle and tortoise; of lizards

A£Ur l °^. snakes about the same number. Of the tortoise (Testudo Indicus) some old males have been found so large that it required six or eight men to lift them from the ground Mr. Darwin says: «I frequently got on their backs, and then, upon giving a few raps on the hinder part of the shell, they would rise up and walk away; but I found it very difficult to keep my balance. The tortoise is very fond of water drinking large quantities, and wallowing in the mud. The larger islands alone possess springs, and these are always situated toward the cen¬ tral parts, and at a considerable elevation. The tortoises, therefore, which frequent the lower districts, when thirsty, are obliged to travel from a long distance. Hence broad and well- beaten paths radiate off from the wells even down to the seacoast. Near the springs it was a curious spectacle to behold many of these great monsters; one set eagerly traveling on¬ ward with outstretched necks, and another set returning, after having drunk their fill.® Mr. Darwin inclined to the opinion that the Galapa¬ gos islands are the original home of the Testudo Indicus, though it is now found in many parts of the world. Also characteristic of this archi¬ pelago are the lizards, individuals of the aquatic variety being three or four feet long. Many of the islands possess trees, plants and birds, which do not occur on the others. At the date of Mr. Darwin's visit the birds had not learned to fear man. He wrote: <(A gun is here al¬ most superfluous; for with the muzzle of one I pushed a hawk off the branch of a tree.® The Pan American Union Bulletin, Vol. XXXII (Jan.June 1911), pp. 222 seq., states that in 1814 and 1825 English skippers reported activity in the Galapagos craters, and as late as 1907 a new opening appeared on James Island from which a torrent of lava flowed to the sea. The Eucadorian government took possession of the group 12 Feb. 1832, and it seems that the act of occupation was suggested by a citizen of the State of Louisiana, Mr. Villamil, who obtained a concession from Ecuador and was governor of the islands at the time of Darwin's visit. The average temperature is about 72° F. The mitigating influence of the Humboldt current is mentioned in the article Latin America — climate. But remarkable differences of temper¬ ature are observed : for

example, on one side of Albemarle Island a foot below the surface the ocean's temperature was 80° F., while on the other side it was less than 60° F. The number of indigenous botanical species is now given at 190; and there are 58 distinct species of land birds.

Marrion Wilcox.

GALATA, ga'la-ta, a suburb of Constanti¬ nople (q.v.).

GALATEA, gal-a-te'a, (1) In Greek my¬ thology, daughter of Nereus and Doris. The Cyclops Polyphemus persecuted with his love this charming nymph, though he gained nothing but ridicule in return. The handsome shepherd Acis, of Sicily, enjoyed her affection, and suf¬ fered death on her account; for Polyphemus, finding them together, and mad with jealousy, hurled a rock at them, which dashed Acis in pieces, while Galatea escaped into the sea. Acis was transformed into a fountain, and hastened to meet his mistress in a safer region. Other legends have Galatea the mother of Galas by Polyphemus. Poets and sculptors both ancient and modern have derived much inspi¬ ration from the myth. In English literature it has been used by Gay (Acis and Galatea, by Proctor in (Death of Acis, 5 by Buchanan in (Polypheme's Passion) and by Austin Dobson in (Tale of Polypheme.* (2) A sheperdess in Virgil's (Third Eclogue* who throws an apple to her lover, and flees, taking care to be seen, hence a type of the coquette. (3) A statue en¬ dowed with life by Venus at the prayer of Pygmalion.*

*GALATIA, ga-la'shi-a, Asia Minor, the an¬ cient name of an extensive region, so called from its Gallic inhabitants, who were immi¬ grants from Europe. With the Gauls were intermingled a considerable proportion of Greeks; hence the inhabitants were often called Gallograeci, as well as Galatians. The Apostle Paul visited Galatia twice and addressed the (Epistle to the Galatians * to the churches of Antioch in Pisidia of Lystra and other places.*

GALATIANS, Epistle of Paul to the.

The Apostle Paul wrote this letter to the churches of Galatia (i, 2) in order to counter¬ act the influence of an extreme type of Judaistic Christianity which, he was convinced, was threatening to undermine faith in Christ alone as the fundamental principle of the Gospel and which appears to have gained a strong footing in those churches which he himself had founded. Apparently, the Judaizers had attacked not only Paul's doctrine

but also had insinuated that he was not really an apostle and therefore his teaching had no apostolic authority.

The news of the defection of his. Galatian churches came to Paul as a great surprise (i, 6) and filled him with grief and indignation. He wrote immediately and his letter is intense, even severe, written hastily perhaps, but not thought¬ lessly or carelessly.

He first sought to show that both his apostle- ship and the gospel he preached were of divine, not human authority. He had been called to his apostolic work directly by God and to no man did he owe his knowledge of the gospel (i, 6- 24). Nevertheless, both he and the gospel as he preached it had been fully recognized and ap¬ proved by the leaders of the mother church in Jerusalem (ii, 1-10), and on one occasion he had even rebuked Peter for inconsistency and disloyalty to the truth of the gospel when he weakly yielded to the Judaizing extremists (ii, 11-21). He then asked the Galatians to recall their own past experience as evidencing that <(faith,® and not <(Works of the Law,® is the condition of the Spirit's presence and power (iii, 1-6). He next showed that the principle of <(faith® antedated and is superior to that of the Law even in the Old Testament. The Law

is only of a secondary and temporary significance entailing bondage ; it was simply preparatory to the dispensation of faith which alone brings liberty and sonship (iii, 7-v, 12). After a few hints as to the true character of Christian con¬ duct (v, 13-vi, 10) the letter closes with a final warning against trusting to circumcision in preference to faith in the crucified One (vi,

11-16).

The purpose of the letter is thus perfectly clear from its contents and no reasonable doubt can exist as to its authorship by Paul. In im¬ portance Galatians is second to no other of Paul's epistles. Its biographical material in chaps, i and ii is invaluable, while in its state¬ ment and exposition of Paul's great doctrine of justification by faith this epistle, along with Romans, has been the great source from which theologians from Augustine to Luther and Cal¬ vin have drawn their arguments.

"The critical questions regarding Galatians are mainly two, as to its destination and date.

Who were the <(Galatians® (iii, 1) and where were <(the churches of Galatia® (i, 2) to whom Paul addressed this remarkable letter? The traditional view (now commonly called the North Galatian theory) is that

the Galatians addressed lived in old Galatia proper, a large district in the interior of Asia Minor, north of Lycaonia and east and northeast of Phrygia (the boundaries of which were rather vague). A more modern and widely accepted view is that by (

As to the date of the epistle it is evident from i, 18— ii, 1, that it was written after more than about 15—17 years had passed since Paul's conversion. And since about 33 a.d. is the ear¬ liest possible date for the latter event, Galatians could not have been written before 49 or 50 a.d. In other words, the visit to Jerusalem, men¬ tioned in ii, 1—10, which took place 3 + 14 years (= about 15—17 years) after Paul's conversion, must have been made about 49 or 50 a.d., and as the way Paul refers to it implies that it had transpired a considerable time before he wrote, the probable date of the epistle would be some years after 50 a.d. Incidentally, these consider¬ ations seem fatal to the identification of the

visit to Jerusalem of Gal. ii, 1-10 with that mentioned in Acts xi, 27-30 (advocated by many vvho adopt the South Galatian view) instead of the traditional identification of Gal. ii, 1-10 with Acts xv, since the former visit took place, ap¬ parently near the time of the death of Herod Agrippa, 44 a.d. (cf. Acts xii). In spite of differences between Acts xv and Galatians ii, u, these two must be interpreted as referring to the same occasion, and Luke's account must be adjusted to Paul's. The advocates of the oouth Galatian theory are not at all unanimous as to the date of the epistle. Some (e.g., Luke) would date it even before the council of uCt-rXV ' wˆe pthers would put it later. On the North Galatian view the epistle would be dated after the time of Acts xviii, 23, especially it the expression to tt pdrepov (Gal. iv, 13) is taken strictly as meaning the former (of two visits). On the whole a date in the latter part of the period covered by Paul's third journey either during the last months of his stay at Ephesus (54 a.d.) or while he was en route from Ephesus to Corinth (early in 55) seems most satisfactory. In this way the close resemblance between Galatians and Romans is best accounted for, the Galatian defection hav- mg brought forcibly to Paul's mind the danger to the Church in the Judaizing propaganda, and his hurried argument in the epistle to the Gala¬ tians being more deliberately worked out in Romans which was written soon after, while he was resting at Corinth (spring of 55 a d) Bibliography.— The literature on Galatians is extraordinarily voluminous, and for a full bibliography one may consult Moffatt, Untro- duction to the Literature of the New Testa¬ ment (New York 1915). Monographs of espe- cial value are Lagrange, M. J., (Les Judaisants de 1 Epitre aux Galatea > (in Revue

Biblinue, 1917, pp. 129-167) ; Lake, K., (The Earlier Epistles of PauP (London 1911); Lightfoot,

(Saint Paul's Epistle to the Galatians) (11th ed., 1892) ; Steinmann, (Abfassungszeit des Galaterbriefes> (Munster 1906), and (Ibid 1908) ; Watkins, C. H.,

Edward E. Nourse,

Prof essor Biblical Theology, Hartford Theolog¬ ical Seminary.

GALAX, a genus of plants of the family Galacacece, containing a single species, G. aphylla, occurring from Virginia to Georgia, chiefly in the mountains. The plant is a per¬ ennial, with a basal cluster of leaves and slender simple flowering stems terminating in slender spikes of small greenish flowers. The leaves are rounded, heart-shaped, somewhat leathery and shining. In autumn they assume a beauti¬ ful bronze color and then, as well as at other times, they are gathered in large quantities to be used for decorative purposes, especially for wreaths and for Christmas greens.

GALBA, Servius Sulpicius, Roman em¬ peror: b. 3 b.c. ; d. 15 Jan. 69 a.d. Caligula ap¬ pointed him general in Germany. He soon re¬ pulsed the Germans who had invaded Gaul, and restored the ancient military discipline. After the death of Caligula he caused his troops to swear allegiance to Claudius, who sent him in 45 a.d. as proconsul to Africa, where great confusion prevailed. In two years Galba re¬

stored order, obtained the honors of a triumph, and was received among the priests of Au- e?sg?. ■'N\ero appointed him in 61 a.d. governor or Hispama Tarraconensis, but soon after be¬ came so exasperated against him that he ordered him to be secretly assassinated. Galba then revolted, but when news arrived of the insur- rection among the praetorians at Rome, and of the death of Nero, 68 a.d., he himself was chosen emperor by the praetorian cohorts in Rome. Ambassadors from the senate made known to him his elevation. He chose a col¬ league in the government under the name of an adopted son, but instead of Otho, favored by the soldiery, he selected Piso Licinianus, hated by them on account of his rigid virtue. Utho, offended by this neglect, resolved to get possession of the throne by force of arms. The piastorian cohorts first declared themselves in his favor, and Galba, attempting in vain to re¬ store order, was attacked and slain.*

GALBANUM, a gum-resin obtained from ter ilia, galbaniflua and allied plants, used in medicine as a carminative and expectorant, and externally as an irritant.

GALBRAITH, John, Canadian engineer: b Montreal 1846; d. 1914. He received his education at the University of Toronto, studied engineering and surveying and was engaged on the construction of the Intercolonial Midland and Canadian Pacific railroads. He led an ex¬ ploring expedition in 1880 from Georgian Bay to Fort Churchill and Lake Mistassini. In 1878 he was appointed professor of civil engineering in. the newly-founded school of practical science at Toronto, and in 1889 was made di¬ rector of the institution. He was one of the original founders of the Canadian Society of Civil Engineers; was an associate of the Eng¬ lish Institute of Civil Engineers. In 1907 he was appointed on a royal commission to report on the causes of the collapse of the great rail¬ road bridge over the Saint Lawrence at Quebec.

GALD6S, Benito Perez, a noted Spanish writer born in 1845. See Perez Galdos, Benito.

GALE, Henry Gordon, American physicist : b. Aurora, Ill., 12 Sept. 1874. In 1896 he was graduated at the University of Chicago ; began his connection with the department of physics there in 1899, and in 1911 became associate professor. He was physicist of the Solar Ob¬ servatory at Mount Wilson, Cal., in 1906 and in 1909-11 was research associate there for the Carnegie Foundation. With R. A. Milliken he wrote (A First Course in Physics> (1906) ; (A Laboratory Course in Physics (1906); with Adam, W. S., (An Investigation of the Spectra of Iron and Titanium under Moderate Pres- sures) (1912).*

GALE, James S., American missionary, ed¬ itor and lexicographer in Korea, who has done more than any other writer to open the treas¬ ures of the language and literature of the Koreans. Commissioned by the Presbyterian Church, he arrived in the peninsula in 1889.

In collaboration with H. G. Appenzeller and H. G. Underwood, the noted pioneers, he worked for many years upon the translation of the holy scriptures. His great dictionary of the Korean language, published in 1898, supersedes all others. He is also the author of

Korea; (Korea in Transition5 (1909); and of a great variety of learned articles on Korean history, literature and antiquities and on life and manners published in The Korean Reposi¬ tory (1892-98) ; The Korean Review (1901-06) ; The Korean Magazine (1917). Consult Griffis, (A Modern Pioneer in Korea: H. G. Appen- zeller5 (1912).

GALE, Norman Rowland, English poet : b. Kew, Surrey, 1862. He received his educa¬ tion at Exeter College, Oxford. His (Country Muse5 appeared in 1892 and attracted general attention. A second series appeared within the same year. Other publications are (Orchard Songs5 (1893) ; (A June Pastoral5 (1894) ;

(Songs for Little People5 (1896); (Barty's Star5 (1903) ; /More Cricket Songs (1905) ; (Song in September5 (1912) ; (Solitude5 (1913); Collected Poems5 (1914).

GALE, Zona, American author : b. Portage, Wis., 26 Aug. 1874. In 1895 she was graduated at the University of Wisconsin; was employed on the staffs of Milwaukee journals until 1901 and from 1901 to 1904 was on the staff of the New York World and also contributed to other journals. She has published (Romance Island5 (1906) ; (The Love of Pelleas and Etarre5 (1907) ; friendship Village5 (1908) ; friend¬ ship Village Love Stories5 (1909) ; (Mothers to Men5 (1911) ; (Christmas5 (1912) ; (When I was a Little Girl5 (1913) ; Neighborhood Stories5 (1914) ; (Hearts' Kindred5 (1915) ; (A Daughter of Tomorrow5 (1917) ; and a one-act play, (The Neighbors.5

GALE, a tree. See Candleberry.

GALEN, or CLAUDIUS GALENUS,

Greek physician : b. Pergamus, Mysia, 131 a.d. ; d. Sicily, about 201 a.d. He began the study of medicine at Pergamus, and afterward studied at Smyrna, Corinth and Alexandria. On his return to his native city in 158 he was appointed physician to the school of gladiators. Six years later he went to Rome, where he stayed four years, and gained wide reputation. Scarcely had he returned to his native city when he re¬ ceived a summons from the emperors M. Aurelius and L. Verus to attend them in the Venetian territory, and shortly afterward he ac¬ companied them to Rome. There he remained several years, though how long is not known precisely, and about the end of the 2d century was employed by the Emperor Severus. Galen was a voluminous writer not only on medical, but also on philosophical subjects, such as logic, ethics and grammar. The works that are still extant under his name consist of 83 treatises, acknowledged to be genuine ; 19 whose genuine¬ ness ' has been questioned; 45 undoubtedly spurious; 19 fragments; and 15 commentaries on different works of Hippocrates. His most important anatomical and physiological works are: (Of Anatomical Administrations5 and (Of the Use of the Parts of the Human Body.5 As an anatomist, he combined with patient skill and sober observation as a practical dissector — of lower animals, not of the human body — accuracy of description and clearness of expo¬ sition as a writer. He gathered up all

the medical knowledge of his time and fixed it on such a firm foundation of truth that it con¬ tinued to be, as he left it, the authoritative ac¬ count of the science for centuries. His physiol¬

ogy does not, according to modern ideas, attain the same level of scientific excellence as his anatomy. He seems to place a more implicit faith in amulets than in medicine, and he is supposed by Cullen to be the originator cf the anodyne necklace which was so long famous in England. His practice was based on the two general principles: (1) that disease is contrary to nature and is to be overcome by something that is contrary to the disease itself; and (2) that nature is to be preserved by that which has relation to nature. In the 9th century Galen's works were translated into Arabic and were in great vogue for centuries throughout the East. The Greek text has been issued four times ; the Aldine (5 folio vols., 1525) was the first; the best and most complete modern edition is that by Kuhn (20 vols., 1821-33). Several minor works were issued by Helmrich and Muller (3 vols., Leipzig 1893) and there are several German and French translations of the more important treatises. Consult Daremberg, Exposition des connaissances de Galien sur l'anatomie5 (Paris 184) ; Kidd, transactions of the Provincial Medical Association5 (Vol. VI, London 1831) and Rhenisches Museum fur Philologie for the years 1889, 1892, 1896.

GALENA, Ill., city and county-seat of Jo Daviess County, a port of entry on the Galena River, and on the Illinois Central ; Chicago, Burlington and Quincy and the Chicago and Northwestern railroads, 17 miles from Du¬ buque. Galena is famous as the home of Gen. U. S. Grant from May 1860 until the opening of the Civil War, and the old Grant homestead still remains one of the attractions of the city. Grant Park, a fine statue of General Grant, a government building, a public library, an excel¬ lent school system and a number of fine churches are evidences of public interest. A fine white stone building, formerly the custom house, is now used as a post office. In an upper room of this building is the famous painting, by Thomas Nast, representing the surrender of Gen. Robert E. Lee to Gen. U. S. Grant at Appomattox. The city has an extensive trade by rail and river, and is the centre of large lead and zinc mining interests. There are also smelting works, shoe factories, brick yards, marble, granite, cement works, iron-bridge works, furniture and cigar factories. The town, which was named after the galena ore found in the vicinity, was settled in 1827 and incorporated as a city in 1839. The mayor and council are elected every two years. The city owns its electric-light plant which supplies power to industries and towns in the vicinity, and has an artesian water system. Pop. 4,742.

GALENA, Kan., a city in Cherokee County, on the Missouri, Kansas and Texas and the Saint Louis and San Francisco railroads; seven miles west of

Joplin, Mo. Like its namesake in Illinois, Galena is engaged largely in lead and zinc mining and smelting. The mining district, about four miles square, has 200 con¬ centrating mills, and gives employment to 3,000 men. Among the industrial establishments are lead smelters,, a large foundry, and a planing mill. There is a supply of natural gas in the neighborhood which furnishes heat and nower at very low cost. It has paved streets, electric lights and sewers, and is situated in a prosper¬ ous farming and dairying centre. Over

$2,000,000 in ore was mined in 1915. The mayor and council are elected every two years. The deputy marshal and police are appointed by the council. Galena was settled and incor¬ porated in 1877, and its population rapidly increased from 1,463 in 1880 to 4,712 in 1920.

GALENA, a sulphide of lead (PbS), con¬ taining when pure 86.6 per cent lead. It crystal¬ lizes in the isometric system, commonly in cubes or cubo-octahedrons, but is often found massive with a well-marked and characteristic cubic cleavage. It has a metallic lustre and lead-gray color. Its hardness is 2.5 and its specific gravity 7.5. Galena is the most important ore of lead, nearly all the world's supply of that metal being obtained from it. As it is always more or less argentiferous the mineral is frequently an im¬ portant silver ore, the amount of silver present sometimes amounting to over 1 per cent, but galena containing less than 1 per cent silver is often mined as a lead-silver ore. The mineral is widely distributed, frequently being associ¬ ated with the sulphides of iron, copper or zinc, and often with native gold. The principal mines working deposits of galena in the United States are in Missouri, Colorado, Idaho, Utah and Montana. See Lead; Silver.

GALENISTS, ga'len-Tsts, a religious sect founded by Galen or Galenus Abrahans de Haan. They were a branch of the Mennonites. Galen was a doctor of medicine and a minister among the Mennonites at Amsterdam. He taught freer doctrine in practice and belief than his co-religionists, declaring that the Chris¬ tian religion was not so much a body of truths to be believed as of principles to be obeyed. His enemies accused him of having Socinian proclivities, a charge from which the States- General acquitted him 14 Sept. 1663. See Mennonites.

The term was also in medical controversy during the Renaissance to mean a follower of Galen, whose authority as a physician they main¬ tained against the introduction of new chemical methods into the preparation of

medicinal drugs. The new school professed to extract essences, or quintessences, and, like modern homceopathists, gave doses small in bulk, but al¬ leged to be powerful in effect, as containing a concentrated preparation of the original drug. The Galenists adhered to the ancient tinctures and extracts, which, they maintained, possessed all the virtues necessary.

GALEOTO, The Great. See El Gran Galeoto.

GALERITES, gal-e-rl'tez, a genus of fossil sea-urchins, peculiar to and abundant in the Cretaceous system. The body in breadth is nearly circular or polygonal. The under sur¬ face is entirely flat, and has the mouth placed in its centre, with the vent near the margin. There are five avenues of pores reaching from the mouth to the summit of the conical dorsal surface. These fossils are often found silicified. G. albogalerus is one of the most abundant; it has received its specific name from its re¬ semblance to the white caps worn by the priests of Jupiter.

GALERIUS, ga-le'ri-us, or GALERIUS VALERIUS MAXIMIANUS, Roman em¬ peror: b. near Sardica, Dacia; d. 311 a.d. En¬ tering the imperial army, he rose rapidly to the

highest ranks. In 292 Diocletian conferred on him the title of Caesar, made him administrator of Gaul, Spain and Mauretania, and gave him his daughter in marriage. In 295 he was vic¬ torious over the Carpi and Bastarnae. In 297 and 298 he carried on an ultimately successful war against Persia. In 302 he urged Diocletian to suppress the increasing power of the Chris¬ tian hierarchy. On the abdication of Diocletian

(305) he and Constantius Chlorus became joint rulers of the Roman Empire, Galerius taking the east half. When Constantius died in York

(306) the troops in Britain and Gaul immedi¬ ately transferred their allegiance to his son, Constantine (afterward Constantine the Great), who was not recognized by Galerius till 308. Galerius, however, retained possession of the East till his death.

GALES, Joseph, American journalist: b. Eckington, England, 10 April 1786; d. Washing¬ ton, D. G, 21 July 1860. H.e came to the United States with his father in 1793, was educated at the University of North Carolina and learned the printer's trade of his father. In 1807 he was made assistant and later partner of Samuel Harrison Smith in the management of the Independent Gazetteer, which had been removed to Washington and its name changed to the National Intelligencer. He became sole editor of that paper in 1810, and took his brother-in- law, William Winston Seaton, into

partnership in 1812. Had it not been for the industry of Gales and Seaton an important part of the pro¬ ceedings of the Senate and House of Repre¬ sentatives, which they reported, would not have been preserved. Especially is this true of the great debate between Hayne and Webster.

GALESBURG, Ill., a city and county-seat of Knox County, on the Atchison, Topeka and Santa Fe ; the Chicago, Burlington and Quincy, and Chicago and Northwestern railroads, 43 miles northeast of Burlington, la. This is the seat of Knox College, founded in 1837, where took place the famous Lincoln-Douglass debate in 1859. Lombard University (Universalist) was established here in 1852, and the Saint Joseph Academy and the Ryder Divinity School are also located here. There is a public library containing 24,000 volumes. The Burlington rail¬ road shops give employment to many mechanics, and there are extensive stock-yards, brick-mak¬ ing plants, boiler and engine works, farm ma¬ chinery works and carriage factories. The census bureau's summary for 1914 is as follows : Number of industrial establishments, 60; per¬ sons engaged in manufactures, 1,709; proprietors and firm members, 47; salaried employees, 263; wage-earners, 1,399; primary horsepower, 1,984; capital, $2,488,000; services, $1,204,000; salaries, $263,000; wages, $941,000; materials, $1,5 1 5,000 ; value of products, $3,192,000. Under a general State law, passed in 1872, the mayor and city council are elected every two years, and the smaller offices are filled by appointments made by the mayor with consent of the council. The town was settled in 1837 by pioneers from New York State and named in honor of Rev. George W. Gale, who planned to establish a theological seminary here. During the Kansas-Nebraska struggle Galesburg was a rendezvous and rally¬ ing point for the free-soilers. The city was chartered in 1857. The municipality owns and operates its electric light and water plants. Pop.

(1910) 22,809; (1920) 23,834, according to the official United States census.

GALETON, Pa., borough of Potter County, on Pine Creek, the Buffalo and Susquehanna Railroad, 50 miles southeast of Bradford. Its industries are numerous and thriving ; they com¬ prise stave and wagon mills, a tannery, stove works, breweries, machine shops, railroad repair shops, knitting mills and lumber dressing mills. Pop. (1920) 2,969.

GALI, ga'le, Francisco, Spanish navigator: b. Seville 1539; d. Mexico City 1591. He sailed from Acapulco in 1585 with two vessels, under

commission of Pedro Moya de Contreras, pro¬ visional viceroy of New Spain, to look for a harbor on the coast of California where ships returning from the East Indies might be re¬ stocked with provisions. He visited the Philip¬ pines, Macao, the Lin-Kins, Japan and other islands, and on his return (1584) discovered what is now the Bay of San Francisco. The report of the voyage sent by him to the viceroy of the Indies was published by Linschot in a Dutch rendering in (Track Charts of the Indies) (1596), and an English translation appears in Hakluyt's (Voyages. } In the National Library, Mexico, are fragments of what is believed to have been a more extended narrative by Gali under the title of (Viaje, discurbrimientos y ob-servaciones de Acapulco a FilipinasP He was a skilful navigator and acute observer.

GALICIA, ga-lish'i-a, Poland, southern province of the Republic, composed of the for¬ mer kingdoms of Galicia and Lodomeria, the duchies of Auschwitz and Zator and the grand- duchy of 'Cracow, and formerly Bukowina. It is bounded on the north by the Polish districts of Kyeltse, Lublin and Volhynia, east by Ukrainia, southeast by Rumania, south by Czechoslovakia and west by Czechoslovakia and Silesia; area, 30,311 square miles; pop. 8,025,675 in 1910, and at the outbreak of the war about 8,200,000. The physical features of the country are determined by the Carpathians, which form a long and irregular curve on the south, the con¬ vexity being toward Galicia. Farther north the hills subside and merge into vast plains. The chief river in the northwest is the Vistula, which partly bounds the province. The Western Bug, a tributary of the Vistula, is partly in Galicia. The chief river is the Dniester. The only part of the surface belonging to the basin of the Danube is in the southeast. It is drained by the Pruth and is of limited extent. The climate is severe, particularly in the south, where more than one of the Carpathian summits are beyond the limit of perpetual snow. While Galicia is open to the cold north and east winds, these mountains intercept the warm winds from the south. The winters are long and rigorous and the summers very warm but comparatively short.

The soil is much diversified. In the more mountainous districts scanty pasture only is obtained, but in general, where the elevation is small, the ground, more especially where resting on a substratum of limestone, is of great fertil¬ ity, and yields abundant crops of wheat, rye, barley, oats and maize. Hemp, flax and tobacco are alco extensively grown, and the sugar beet is cultivated. The domestic animals include great numbers of horned cattle, generally of a superior description, and a fine, hardy breed of horses, well adapted for cavalry. Sheep are

neglected; but goats, swine and poultry abound. The rearing of bees yields great quantities of wax and honey and is a lucrative industry. Bears and wolves are frequently met with in the forests, and all the lesser kinds of game are in abundance. The minerals include marble, ala¬ baster, copper, lead, zinc, calamine, coal, iron and rock-salt. Only the last two are of much importance. Iron occurs in numerous parts of the central Carpathian chain and bog-iron ore is frequently met with in extensive seams on the plains. They are both worked to a considerable extent. Rock-salt is particularly abundant, stretching in continuous beds for nearly 250 miles along the base of the Carpathians, and of course beyond the limits of Galicia, into Buko¬ wina and Transylvania. The most important mines have their central locality at Wieliczka. Manufactures have not made much progress. The spinning and weaving of flax and hemp pre¬ vail to a considerable extent on the confines of Silesia. Distilleries exist in every quarter. To¬ bacco, sugar, leather, beer, agricultural ma¬ chinery, etc., are also manufactured. The prin¬ cipal exports are salt, wood, grain, coal, aniseed, linen and spirits. The population is generally of Slavonian origin and consists of two principal branches — Polish in the west and Russniak in the east. In religion they are divided among Roman Catholics, Greek Catholics and Armeni¬ ans. Under the Austro-Hungarian regime, the court of third instance for the country was the Superior Court at Vienna ; there were two courts of second instance, one at Lemberg and the other at Cracow ; and there were various district courts of first instance. The government has its headquarters at Lemberg. Educational establishments, both for superior and ordinary instruction, are numerous. At the head of the former stand the University of Cracow, with about 130 instructors and some 1,300 students, and the younger University of Lemberg, with 80. instructors and a similar attendance. The principal towns are Lemberg, the capital, Brody, Cracow, Stanislau, Tarnopol, Przemysl, Sambor, etc.

The nucleus of the modern kingdom of Gali¬ cia and Lodomeria was formed by the duchies of Halicz and Vladimir (the original forms of the present names), which were established about the beginning of the 12th century under two princes of the Russian dynasty of Rurik.

After being the field of continuous strife between Russians, Poles and Hungarians, Galicia continued a Polish dependency from 1382 till the first partition of Poland, in 1772, when it was acquired by Austria and became one of the Cis-Leithan provinces of the Austrian Empire, represented in the Reichsrat by 63 deputies, while the affairs peculiar to itself were delib¬ erated and determined on by its own Landtag or Diet. Under the peace treaties of 1919 Galicia became part, of the new Republic of Poland (q.v.). During the war in Europe, Galicia was for a long time an arena in which the Allies and the Central Powers struggled for supremacy. See War, European.

GALICIA, Sp. ga-le'the-a, Spain, an ancient kingdom and province, bounded north and west by the Atlantic, south by Portugal and east bv Leon and Asturias, with an area of 11,256 square miles. It has. been divided since 1833 into the minor provinces of Coruna, Lugo. Orense and Pontevedra, whose joint population

is about 2,109,000. The country is mountainous, jeing tiaversed by offsets of the Asturian chain, nsing in their highest peaks to about 6,500 feet. I he west spurs, Capes Ortegal and Finisterre, pioject into the Atlantic. The numerous short but rapid rivers form small estuaries which afford secure havens and roads. The principal river is the Minho, which, with its feeder, the Sil, is navigable for small vessels on its lower course. Galicia has a mild, damp cli¬ mate, favoring the development of a sturdy race devoted to agricultural pursuits; capital, however, is scarce, roads are bad and railways are few. Rich meadows and dense forests oc¬ cur everywhere, but the soil is more suited to the cultivation of garden produce than of corn. Mines of lead, tin, copper and iron pyrites are worked. The inhabitants, called Gallegos, are robust, vigorous, industrious and, in comparison with the Spaniards of the southern and central parts of the peninsula, heavy witted and un¬ polished. Great numbers of them annually visit central and southern Spain and Portugal, where they find employment as harvesters, water car¬ riers, porters, etc., and laboring men from this region seek employment in many parts of Latin America. Chief exports, live cattle, preserved meat, eggs, minerals, fish, fruits and grain; im¬ ports, coal, oil, hides, spirits, sugar and tobacco. The principal towns are Santiago di Compostella and the seaports Vigo, Coruna and Ferrol. Galicia was a kingdom under the Suevi from 411 to 585, and again for a few years after the death of Ferdinand the Great, in 1065, was an independent kingdom under his son Garcia for a few years. In the main, however, its fortunes were united with those of Castile.

GALILEAN, one of the followers of Judas the Gaulonite, who resisted the payment of the tax imposed by Quirinius, the Cyrenius of Saint Luke (Luke ii, 1), and gave the Romans trouble till the capture of Jerusalem by Titus in 70 a.d. Galilean is a name applied to Jesus and his disciples, from the intimate connection they had with Galilee (Matt, xxvi, 69; Mark xiv, 70) ; hence applied by pagans and Moham¬ medans as a term of reproach to Christians generally.*

GALILEE, Palestine, during the Roman period and at the commencement of the Chris¬ tian era a province comprehending the northern part of

Palestine west of the Jordan. In pre- Roman times it was referred to as a district inhabited' by the tribe of Naphtali.. Its name is derived from the Hebrew galil, signifying a circle or circuit. It now forms part of the pashalic of Damascus, in the Turkish province of Syria. Anciently it was divided into Upper and Low.er Galilee, and was a fertile region with many towns and villages, thickly inhabited by Syrians, Phoenicians, Arabs, Greeks and Jews. The Jewish inhabitants, on account of their ignorance, simplicity of manners and less rigid sentiments in regard to religion, were held in contempt by other Jews; but after the destruc¬ tion of Jerusalem despised Galilee became the refuge of the doctors of Jewish law, and the city of Tiberias the seat of Rabbinical learning. As the cradle of Christianity and the scene at Nazareth, Cana, Capernaum, the Lake of Gen- nesaret, Mount Tabor and other localities, of a great deal of Christ's ministry on earth, Galilee has world-wide interest. Consult Merrill,

'Galilee in the Time of Christ (New York 1885); id., (East of the Jordan* (ib. 1881); Smith, George Adam, (Historical Geography of to6 Land* (London 1894) ; Masterman,*

(Studies in Galilee (Chicago 1909).*

GALILEE, Sea of, in biblical history also called the Sea of Chinnereth or Cinneroth, Lake of Gennesaret and Sea of Tiberias, is a large pear-shaped lake in the north of ancient Galilee (q.v.), Palestine. It lies 682.5 feet be¬ low sea-level; is 13 miles long by 8 broad and 150 feet deep. It occupies the bottom of a great basin, and is of volcanic origin. The Jordan flows into it red and turbid from the north, and it is fed also by many warm and brackish springs, but its waters are cool, clear and sweet. Its shores on the east and north sides are bare and rocky; on the west gradually sloping. For half the year the hillsides are bare, but in spring a subtropical vegetation abounds. Fish are plentiful and are caught with nets by a guild of fishermen. Sudden changes in tem¬ perature often cause violent storms. Near the shores of the lake are numerous ruins and sites of ancient settlements ; the most notable of these are Talhoum (Capernaum), Kerazeh, the an¬ cient Chorazin, Tubariya, the ancient Tiberias or Rakkath and Mejdel, supposedly the ancient Magdala. Kerak, at the southern end of the lake, has been identified by some as the city of Taricheas. The identification of the ruins and sites on the east shore is less satisfactory. In ' modern Arabic the lake is called Bahr Tubariya, often translated <(Lake of Tiberias.®

GALILEI, Galileo, ga-le-la'o ga-le-la/e, Italian physicist and astronomer: b. Pisa, 14 Feb. 1564; d. Arcetri, 8 Jan. 1642. His father, Vincenzo Galilei, an impoverished nobleman of Florence, caused him to be instructed in Latin and Greek, drawing and music, and he very early showed a strong

inclination to mechanical labors. In 1581 Galileo entered the University of Pisa, to attend lectures on medicine and the Aristotelian philosophy. Here he became con¬ spicuous in refusing to accept without question the dogmatic statements of his teachers. That spirit of observation for which he was dis¬ tinguished was early developed. When he was only 19 the swinging of a lamp suspended from the ceiling of the cathedral in Pisa led him to discover the isochronism of the pendu¬ lum, which he was the first to apply as a measure of time. He studied mathematics under Ostilio Ricci, soon exhausted Euclid and Archimedes, and was led, by the works of the latter, in 1586, to the invention of the hydro¬ static balance, by which the specific gravity of solids might be ascertained with much accuracy.

He now devoted his attention exclusively to mathematics and natural science, and in 1589 was made professor of mathematics in the Uni¬ versity of Pisa. In the presence of numerous spectators he went through with his experi¬ ments, which he performed on the leaning tower of Pisa, to show that weight has no in¬ fluence on the velocity of falling bodies. By this means he excited the opposition of the adherents of Aristotle to such a degree, that after two years he was forced to resign his professorship. Through the influence of the Marchese Guidobaldo, the Senate of Venice, in 1592, appointed him professor of mathe¬ matics in Padua. Here he remained till 1610.

He lectured with unparalleled success. Scholars from the most distant regions of Europe crowded about him. In 1597 he in¬ vented the sector.

One of the most important mathematical dis¬ coveries which he made at a period subsequent to this is that the spaces through which a body falls, in equal times, increase as the numbers 1, 3, 5, 7; that is, if a body falls 16 feet in the first second, it will fall 48 in the next second, 80 in the third, and so on. Whether the thermom¬ eter was his invention it is difficult to determine; perhaps he only improved it. By means of a telescope, constructed by himself, he made a series of the most important discoveries. He found that the moon, like the earth, has an un¬ even surface ; and he taught his scholars to measure the height of its mountains by their shadow. A particular nebula he resolved into individual stars, and even conjectured that the whole Milky Way, with good instruments, might be resolved in the same manner. His most remarkable discovery was that of Jupiter's satellites, 7 Jan. 1610. He likewise observed Saturn's ring, though he had not a just idea with regard to it. He saw the sun's spots some¬ what later, and inferred, from their regular ad¬ vance from east to west, the rotation

of the sun, and the inclination of its axis to the plane of the ecliptic.

Galileo's name, meantime, had grown so celebrated that Cpsmo II, grand duke of Tus¬ cany, appointed him grand-ducal mathematician and philosopher, and invited him to become first instructor in mathematics at Pisa. Here he gained a decisive victory for the Copernican system by the discovery of the varying phases of Mercury, Venus and Mars; as the motion of these planets about the sun, and their de¬ pendence on it for light, were thus established beyond the possibility of doubt. He wrote a work afterward on the floating and sinking of solid bodies in water, and in this, as well as in all his other writings, scattered the seeds of many new doctrines.

While thus employed in enlarging the field of natural philosophy, a tremendous storm was gathering about his own head. He had de¬ clared himself in favor of the Copernican sys¬ tem, in his work on the sun's spots, and was therefore denounced as a heretic by his enemies. In 1611 he visited Rome for the first time, where he was honorably received, and where a favorable report was made on his writings by the mathematicians of the Collegio Romano at the instance of Cardinal Bellarmin. On his re¬ turn to Florence, however, he became more and more involved in controversy, which gradually took a theological turn, and in the course of which he declared the literal understanding of the utterances of Scripture with regard to physical phenomena to lead to absurdities. From Rome he received, in the name of the Cardinal Barberini (afterward Pope Urban VIII), the warning not to overstep the limits of mathematics and physics, but he paid no heed to the well-meant advice. The monks preached against him, and in 1616 he found himself again obliged to proceed to Rome, where he is said to have pledged himself to abstain for the future from promulgating his system either orally or otherwise.. The genuineness of the document on the basis of which this is asserted, has, however, been questioned in modern times,'

and the controversy regarding this matter is not yet finally settled.

In 1618 the appearance of three comets gave him an opportunity to communicate to his friends some general observations, on these bodies. His scholar, Mario Guiducci, wrote a work immediately after, in which he severely condemned the Jesuit Grassi. Supposing Galileo to be the author, Grassi attacked him. Galileo replied in his (Saggiatore,; a master¬ piece of eloquence, pronounced by Algarotti to be the finest controversial work Italy has ever produced, and, notwithstanding the errors con¬ tained in it, a work always worthy to be read.

About this time he completed his famous work, in which, without giving his own opinion, he introduces three persons in a dialogue ((Dialogue on the

Two Chief Systems of the World)), of whom the first defends the Copernican system, the second the Ptolemaic, while the third appears as a blind and unrea¬ soning supporter of the views of Aristotle. With this w'ork, in which the greatest elegance and accuracy of style is united with the clear¬ est and most concise statements, Galileo went to Rome in 1630, and succeeded in obtaining the privilege to print it. Having obtained the same permission in Florence, he published it there in 1632 — (Dialogo di Galileo Galilei, dove ne' Congressi di quattro Giornate si dis- corre de' due massimi Sistemi del Mondo, Tole- maico et CopernicanoP Scarcely had it ap¬ peared when it was attacked by the disciples of. Aristotle, and most violently of all by Scipione Chiaramonti, teacher of philosophy at Pisa. A congregation of cardinals, monks and mathematicians examined his work, con¬ demned it as highly dangerous, and summoned him before the tribunal of the Inquisition. The veteran philosopher was compelled to go to Rome, and in June 1633 was condemned to re¬ nounce, in presence of a great assembly, kneel¬ ing before them, with his hand upon the gos- pel, the. great truths he had maintained. <(Corde sincero et fide non ficta, abjuro maledico et detestor supradictos errores et hereses,® was the formula which he was compelled to pro¬ nounce. His famous whisper, «But neverthe¬ less it [the earth] does move,® is a fiction. He was sentenced to the dungeons of the Inquisi¬ tion for an indefinite time, and every week, for three years, was to repeat the seven peni¬ tential psalms of David. His

. employed his last years here principally in the study of mechanics and projectiles. The results are found in two important works on the laws of motion, the foundation of the pres¬ ent system of physics and astronomy. At the same time he tried to make use of Jupiter's satellites for the calculation of longitudes; and though he brought nothing to perfection in this branch, he was the first who reflected systemat¬ ically on such a method of fixing geographical longitude.. He was at this time afflicted with a disease in his eyes, one of which was wholly blind, and the other almost useless, when, in

1637 he discovered the libration of the moon.

indness, deafness, want of sleep and pain in his hmbs umted to embitter the last years of Galileo s life. He died in the year Newton was born, and his relics were ultimately deposited in the church of Santa Croce, at Florence, where a splendid monument was erected to him near thai of Michelangelo.

Galileo was of diminutive size, but strong and healthy. His countenance was agreeable ; his conversation lively. He loved music, draw¬ ing and poetry. . He knew Ariosto by heart • and in one of his works, first printed' in 1793' Considerazioni al Tasso, J the product of his leisure hours, he points out the superiority of Ariosto to Tasso, whom he criticizes very severely. His style is lively, natural and fluent. His collected works have been edited by Alben (16 vols., Florence 1842-56). Consult

ror,eiTteA. 'Maˆyrs Of Science> (London 1841); Chasles, (Galileo GalileP (Paris 1862)- PI- do (Les Pieces due proces de Galilee (1877), and (La question de Galilee) (1878); Fahie, J. J., 'Galileo: his Life and Work* (London 1903); Favaro, A., 'Galileo GahleP (Florence 1882) ; Gebler, K. von, 'Ga- hleo Galilei und die Romische Kurie) (1876) ; Wegg-Prosser, F. R., (Galileo and his Judges > (Eng. trans., London 1889).

GALIMBERTI, ga-lem-bar'te, Luigi, Ital¬ ian cardinal and diplomat: b. Rome 1838; d. 1896. He became professor of church history in the College of the Propaganda and of the¬ ology in the University of Rome, and was ap¬ pointed by Pius IX canon of the Lateran in 1868. From Leo XIII he received appointment as canon of Saint Peter's, archbishop of Nicaea, and secretary to the Congregation of Extraor¬ dinary Ecclesiastical Affairs. He was papal ar¬ biter in the award to Spain, as against Germany, of the Carolines, and in 1880 was sent as am¬ bassador to Germany, where he was successful in adjusting the difficulties of the "Kulturkampf® through the abrogation by the Crown of the so- called "May Laws.® In 1893 he was made a cardinal and prefect of the papal archives.

GALINfiE, gal-e-na, Rene de Brehant de,

Sulpician missionary: b. Brittany; d. 1678. He came to Canada in 1668, and in 1669-70, in com¬ pany with Dollier de Casson (q.v.), made a notable journey, in the course of which they explored Niagara, the north shore of Lake Erie and the east and north shores of Lake Huron, and took formal possession of the coun¬ try in name of Louis XIV. On their return to

Montreal Galinee made a map of their ex¬ plorations — the first map of the upper lakes made at first hand, and one which marked a notable advance in cartographical knowledge.

GALION, Ohio, a city in Crawford County, on the Erie and the Cleveland, Cincinnati, Chi¬ cago and Saint Louis railroads, 80 miles south¬ west of Cleveland. Galion is an important railroad town, being a connecting point and division terminal. There are railroad shops and round-houses here, brick and tile works, car¬ riage and wagon factories, wheel and gear works, iron foundries and lumber mills. The town was originally laid out in 1831, bv settlers from western Pennsylvania, and was chartered as a city in 1878. The city owns and operates its electric light and water plants. The gov¬ ernment is composed of a mayor, who holds

office for two years, and a common council, elected by popular vote. Pop. 7,214.

GALITZIN, gal-let'sen, or GOLITZIN,

the name of a noble Russian family, whose members have been equally prominent ift war and diplomacy from the 16th century down- Yar

GALL, Saint, Irish monk: b. Ireland about 550; d. Saint Gall, Switzerland, about 645. He accompanied Saint Columba to France about 585 and took part with him in all his missionary labors. . Banished from France, they went to¬ gether into the wilder regions of Switzerland, and near the Lake of Constance they founded the monastery which bore the name Saint Gall and gave name to the town and canton of Saint Gall. After a few years Columba retired to Italy, leaving his companion abbot of the new house. The monastery was burnt by Hungari¬ ans in the 10th century.

GALL, gal, Franz Joseph, German phrenol¬ ogist : b. Tiefenbronn, Baden, Germany, 9 March 1758; d. Montrouge, near Paris, 22 Aug. 1828. He studied medicine at Strassburg and Vienna, and settled in the latter city in 1785 as a physician. In 1796 he began to give courses of lectures on phrenology (q.v.) in Vienna; but these lectures were prohibited in 1802 by the Austrian government as being sub¬ versive of the accepted religion. With Spurz¬ heim, who became his associate in 1804, he quitted Vienna in 1805, and began a lecturing tour through Germany, Holland, Sweden and Switzerland. He reached the height of his fame when in 1807 he settled as a physician in Paris. On 14 March 1808 he and Spurzheim presented to the Institute of France a memoir of their discoveries, on which a committee of the mem¬ bers of that body (including Pinel, Portal and Cuvier) drew up an unfavorable report. There¬ upon Gall and Spurzheim published their memoir, Hntroduction to Physiology of the Brain U this was followed by

Researches on the Nervous System > (1809), and by (Anatomy and Physiology of the Nervous System } (1810— 19) with an atlas of 100 plates. In 1811, in answer to accusations of materialism and fatal¬ ism brought against his system, Gall published 'Of the Innate Inclinations of the Soul and

Spirit^ He continued to practise medicine and pursue his researches at Montrouge, near Paris, till his death. See Spurzheim, Kaspar.

GALL. See Bile.

GALL, Abbey of Saint. A Benedictine ab¬ bey in the canton Saint Gall, Switzerland. It was founded in the 7th century and placed under the patronage of Saint Gall, or Gallus, an Irish missionary and a disciple of Saint Columbanus. Saint Gall died in 646 and a chapel was erected on the site of his cell by Charles Martel. Under his patronage and that of his son, Pepin, a community of monks grew up there and the monastery was dedicated to Saint Gall. Under Othmar, the first abbot, a school was founded which soon acquired a great influence. The early years of the abbey were marked by frequent conflicts with the bishops of Constance, who refused to recog¬ nize the exemptions and other privileges of the community, but in the time of Louis the Pious its rights were confirmed and its independence secured. In the 9th century the library was considerably enlarged and a catalogue, pre¬ pared at that time and still in existence, shows the possession of manuscripts on a wide range of subjects. In the 13th century the import¬ ance of the abbey as a centre of religion and learning waned. This may have been due in part to the fact that at this time the town became an independent principality over which the abbots ruled as territorial sovereigns. After the Reformation the town threw off the rule of the abbots. At this time many of the most valuable books and manuscripts were car¬ ried away. In 1530, under Abbot Diethelm, the library and schools were restored and later in the century a printing press was established there which eventually became one of the most important in Switzerland. In 1712 the abbey was raided by the Swiss who carried away many books and manuscripts to Zurich, Berne and other cities. By a curious irony of for¬ tune the abbot was obliged at this time to place the abbey under the protection of the towns¬ people, who had once been the subjects of his predecessors. After this trouble a final attempt was made to restore the library and schools, but in 1798 the Swiss Directory suppressed the ecclesiastical principality and secularized the abbey. In 1846 Saint Gall was erected into a separate bishopric, with the abbey church as its

cathedral. A portion of the monastery was assigned as the bishop's residence and the rest used for the offices of the civil government and the remains of the library.

Thomas Gaffney Taaffe.

GALL-BLADDER, the reservoir for the bile, a pear-shaped membranous sac, about four inches long, one inch in breadth at its widest part and holds from an ounce to an ounce and a half, is lodged in a depression on the under surface of the right lobe of the liver. Its fundus or broad extremity is directed down¬ ward and forward and occasionally projects a little beyond the edge of the liver, almost touch¬ ing the abdominal wall about three inches from the middle line of the body, its body and neck extend upward and backward. The bile is conveyed to the small intestine by biliary ducts or canals about the s:ze of a quill except when distended. The cystic duct, the smallest,

and about an inch in length joins the neck of the gall bladder with the hepatic duct, about one inch and a half long, which issues from the liver and so is formed the common excretory duct of the liver and gall bladder, the largest of the biliary ducts and about three inches in length, which empties into the duodenum. Bile is not conveyed into the intestine until it is needed in the process of digestion, but as secreted in the liver passes into the gall-bladder through the hepatic and cystic ducts to be stored until needed.

Catarrhal cholangitis, acute or chronic, is an inflammation of the lining membrane of the ducts, causing swelling of them and obstruc¬ tion to the flow of bile. Usually it is an exten¬ sion of a gastritis or duodenitis, or may be due to the presence of gall stones, to stricture, to cancerous disease or pressure from enlarged or contracted liver, etc. Whenever there is an interference with the flow of bile from the liver there is usually jaundice more or less pro¬ nounced. Catarrhal jaundice is attended by few symptoms, no emaciation, some discolora¬ tion of skin, liver little larger than usual and tender to pressure — usually runs a course of about six weeks. Marked jaundice coming on gradually and attended by severe pain-points to gall stones or something worse. Biliousness, sallow complexion, depression of spirits, di¬ gestive disturbance is probably more often due largely to a deficient flow of bile rather than to an excessive amount, and may end in gall stones.

Cholecystitis,, inflammation of the gall¬ bladder due to infection by microbes from the intestines may be a mild catarrh, or suppuration may occur leading to perforation and peri¬ tonitis. If a severe attack there is violent pain, great tenderness and a high temperature. If persistent, and

especially if stones are believed to be present, an operation is necessary. Chole¬ lithiasis, the tendency to the formation of gall stones, occurs mostly among persons engaged in sedentary occupations who take but little if any exercise in the open air and who eat too much nitrogenous and fatty food. The bile becomes too thick and is retained, and stagnant, infec¬ tion occurs and gall-stones form chiefly from cholesterine, a normal constituent of the bile. The congestion of the biliary tracts may result from poisons taken into the body or manu¬ factured within the body, from interference with the circulation of the liver, and from dis¬ placements of the liver.

Gall-stones, even in large numbers (100 or more) may be formed and held in the gall¬ bladder for years without causing discomfort, but there is always the tendency to local inflam¬ mation of the gall-bladder or of one or more stones being forced into the cystic or common duct, damming back the bile, causing adhesions and intense pain. Getting rid of gall-stones by medicines is unsatisfactory. There is no known solvent. Operation for their removal in ob¬ stinate cases is necessary. Statistics show that only 1.4 per cent of operated cases die, under the care of experienced surgeons. The opera¬ tion is not so much in reality to get rid of the stones as to get rid of the bacteria causing infection, and of inflammation, irritating fluids etc.

Hepatic or gall-stone, colic, is the name given

to the intense cramp that accompanies the nas-

*atfemm * gall”s,tone thr°ugh the bile-ducts or an*

ex crucial n a pasf^e. There is a sudden

hod ^f iPain m the nght side at the free

tatndv tSP°,r ‘Ven overuthe whole abdomen; lequenlly the pain may shoQt h .

*osses Tnb “** ^u- The pa‘i“t rolls and ° agony with his face suffused with*

5° ,d pejSP’rat’on- Sometimes there is a chill foUowed by fever. The duration depends on

had in , f °f t,‘he St°ne,; frequently relief is . fevv hours, only soreness remaining.

Milter tectomy- surgical removal of the

forted to ' nOW'a_days 1uite frequently re-

gallCbhladden0'0my~SUrgiCal indsi°n of the Cholecystastomy — surgical creation of per-

"bdominaTwin5 in,° ga"b,add through the

GALL-FLY, one of the several minute gall¬ making insects, as the British ash-fly. See vxALLS AND GALL-MAKERS.

GALL-GNATS, a gall-making gnat of the genus C ecidomyia. See Galls and Gall- makers.

GALL-STONE. See Calculus.

GALLA. See Nut-galls.

GALLAIT, ga-la, Louis, Belgian historical painter : b Journal, Belgium, 10 May 1810; d. Brussels, 20 Nov. 1887. He studied in Tournai, Antwerp and Pans, where he acquired a name by his portraits as well as his genre and his¬ torical paintings. Among his earlier pictures

Sr S°It W,ere ; 'Montaigne Visit¬ ing Tasso in Prison ; Abdication of Charles V. Among his subsequent pictures are GL emptation of St. Anthony> ; ; Alva Signing Death War¬ rants >; and lastly (1882),*

GALLAND, ga-loii, Antoine, French Ori¬ entalist and archaeologist : b. Rollot, France 4 April 1646; d. Paris, 17 Feb. 1715. Attached in 1670 to the French embassy at Constanti¬ nople, he three years later accompanied the ambassador to Syria and the Levant. In 1676, and again in 1679, he made other visits to the East. , In 1701 he was made a member of the Academie des Inscriptions, and in 1709 pro¬ fessor of Arabic in the College de France. The greatest part of his writings relate to archaeological subjects, especially to the numis¬ matics of the East; but the work which has secured him the greatest reputation is his translation of the Arabian Nights Entertain-

ments) (1704-17), the first translat'on of these stories made into any language of Christendom. Among his other writings are (Remarkable hayings, Witticisms and Maxims of the Ori-

k mS 96o4,}' and 6 1 724) . See Arabian Nights, The. '

at GALLARDO, gal-lar'do, Aurelio Luis,

Mexican poet : b Leon, Guanajuato, Mexico,

3 ur u i831, ; d- Napa> Cal-> 27 Nov. 1869. He published three volumes of poems: (Dreams

and Visions * (Mexico 1856) ; < Clouds and

Stars (Guadalajara 1865) ; and < Legends and Romances (1868) ; also a collection of poems, Home Stories .* He wrote many comedies, ihe drama, Maria Antonieta of Lorena) is regarded as his best work.

DALLAS, gal laz, a Hamitic people inhabit-

1ˆgoAfncJa,approx,mately between lat. 9° N and 3 S and long. 34° and 44° E. Their language l?, a descendant of the ancient Geez of Abyssinia ihough they bear a perceptible strain of Negro blood they are the purest type of the Ethiopian branch of the Hamitic race. They are tall, with good, often European, features, strong, well- rnade limbs, skin of a light chocolate brown, hair frizzled but not woolly. Though cruel in waJ* they are frank and faithful to promises and obligations. They are distinguished for their energy, both physical and mental especially the southern tribes, which pursue pastoral voca¬ tions, notably the breeding of horses, asses, sheep cattle and camels, and those which live byhunt- ing, especially the elephant. These same tribes cue mostly still heathens, though Mohammedan¬ ism is rapidly making way among them. The more northerly tribes who dwell about Harar profess a crass form of Christianity, derived from Abysinnia, and for the most part raise cot¬ ton, durra, sugar and coffee. The total Galla populati°n, who call themselves Urn 'Orma (Sons of Men, or Sons of the Brave), is estimated at upward of 3,000,000. Politically they are divided into a great number of separate tribes, which are frequently at war with one another. But their inveterate foes are the Somali, who have gradu¬ ally driven back the Galla from the shores of the Red Sea and the. extremities of the Somali peninsula regions which were occupied by them in the 16th century, just as on the other side the Abyssinians and Shoans have beaten them back. The country they now inhabit is a plateau north¬ west of the Indian Ocean, with a hilly, well-timbered surface. Consult Keane, A." H., in Stanford's Africa) (Vol. I, London 1907) ; Salivac, P. M. de, (Les Galla) (Paris 1901); Smith, A. Donaldson, (Through Unknown African Couptries : First Expedition from Somaliland to Lake Lamu} (London 1897).

GALLATIN, Abraham Alfonse Albert,

generally known as Albert Gallatin, American statesman , and diplomat, and one of the fore¬ most public financiers of the United States : b. Geneva, Switzerland, 29 Jan. 1761; d. Astoria N. Y., 12 Aug. 1849. In 1773, both his parents having died a few years previously, the boy was sent to a boarding-school and in August 1775 to the Academy of Geneva, from which he gradu¬ ated in May 1779,. the first in his class in mathe¬ matics, natural philosophy and Latin translation.

In 1780, after refusing a commission as lieuten¬ ant-colonel of a regiment of mercenaries under the Landgrave of Hesse, he and a friend, Henri

Serre, secretly left Geneva for the United States and established themselves in business at Machias, Me., but in 1781 abandoned this un¬ successful enterprise, Gallatin going to Boston where he supported himself by teaching French. In July 1782 he received permission to teach French in Harvard College, in which occupation he remained for about a year. In July 1783 he left Boston and purchased several thousand acres of land on the south side of the Ohio be¬ tween the Monongahela and Kanawha rivers, in March 1784 establishing himself in a country store in Fayette County, Pa. In May 1789, against the wish of her mother, he married Sophie Allegre, but in the following October she died.

Gallatin had early evinced an intense interest in the political affairs of his adopted country and, after the adoption of the Constitution by the Federal Convention, joined the Anti-Fed¬ eralists (q.v.). In September 1788, after Penn¬ sylvania had ratified the Constitution, Gallatin represented Fayette County at a conference at Harrisburg for the purpose of suggesting amendments. In 1789-90 he was a delegate to a convention called to revise the constitution of Pennsylvania, and in October 1790, as also in the two following years, was elected to repre¬ sent Fayette County in the State legislature. In this body he was conspicuously active, being a member of 35 committees, preparing all their reports and drawing all their bills, his report prepared for the committee of ways and means of the session of 1790-91, laying the foundation of his reputation. He bitterly opposed the ex¬ cise laws, acting as secretary of meetings and drafting resolutions which, if not criminal, at least reached the utmost limit of indiscretion and expressed sentiments which he himself later acknowledged to be <(violent, intemperate, and reprehensible.® On 28 Feb. 1793 the Pennsyl¬ vania legislature elected Gallatin a United States Senator and on 2 December he took his seat, but on 28 Feb. 1794 the Senate refused his admission to that body because he had not ac¬ tually been a citizen for nine years as pre¬

scribed in the Constitution. On 11 Nov. 1793, prior to taking his seat in the Senate, he had married Hannah Nicholson, daughter of Com¬ modore James Nicholson, and for a few months was engaged in cultivating his lands, but in 1.794 again plunged into the vortex of public life in connection with the Whisky Insurrection (q.v.). In October 1794 he was elected both to the State legislature and to Congress ; his elec¬ tion to the legislature was declared void on 9 Jan. 1795, but he was immediately re-elected and sat from 14 February to 12 March, when he was granted leave of absence. In December 1795 he took his seat in the House of Representatives, joining the Republican party, became a member of the finance committee, and immediately ex¬ hibited his grasp of national affairs and his unique financial talents. He steadfastly opposed the Jay treaty (q.v.) and the increase of the army and navy, earnestly advocated the pro¬ tection of the frontier, favored direct taxes, criticized the operations of the Treasury De¬ partment, objected to the manner of handling relations with France, fought the passage of the Alien and Sedition laws (q.v.) and by 1801 had become a powerful influence in the councils of his party.

Gallatin's (Sketch of the Finances of the

United States > (1796) and his (Views of the Public Debt, Receipts and Expenditures of the United States) (1800) gained for him great re¬ nown as an economist and statistician, and to¬ gether with his known abilities as an adminis¬ trator of public finances brought him in 1801 the appointment as Secretary of the Treasury, which office he held continuously until 1813. He persistently urged and to a considerable degree effected a rigid economy in governmental finan¬ cial operations, improved the internal revenue and sinking fund systems, reduced the public debt, provided funds to carry on the war without disturbing the financial system of (he country, and devised a comprehensive plan for internal improvements. (See United States — Fi¬ nances of the, 1789-1816). He also ably but unsuccessfully urged the renewal of the charter of the Bank of the United States. Always a free-trade advocate, in 1831 he was the leading spirit in a free-trade convention at Philadel¬ phia, drafting a memorial on that subject for presentation to Congress. His views on finance and banking were eagerly sought, among his notable essays on these subjects being Consid¬ erations on the Currency and Banking System of the United States (1830) and Suggestions on the Banks and Currency of the United States) (1841).*

In 1813 Gallatin was sent to Saint Peters¬ burg as one of the commissioners to urge Rus¬ sian mediation between Great Britain and the United States, but as he had not resigned from the Treasury, the Senate in July 1813 withheld confirmation and in January 1814 he left Saint Petersburg. A few weeks later, however, he received a regular appointment

as one of the peace commissioners to settle the War of 1812 and materially influenced the shaping of the Treaty of Ghent (q.v.). In 1815, with Adams and Clay, he also negotiated a commercial conven¬ tion with Great Britain. On his return home he declined a nomination to Congress and a second appointment to the Treasury portfolio, prefer¬ ring diplomatic life instead, and from 1816 to 1823 rendered inestimable service as Minister to France. He aided Richard Rush at London in negotiating a new commercial convention with Great Britain and signed the compromise convention of 20 Oct. 1818. In 1824, after his return to New York, the Crawford Republicans nominated him for Vice-President but in Octo¬ ber he withdrew in favor of Clay. A year later he declined to represent the United States at the proposed Congress of American republics at Panama, but in the spring of 1826 accepted an appointment as Minister to Great Britain, prior to his return in 1827 negotiating several important conventions. With his return to New York Gallatin's diplomatic career terminated, but during the next two years he prepared a statement of facts regarding the northeastern boundary to be laid before the King of the Netherlands.. In 1846 he rendered his last dip¬ lomatic service when he published a pamphlet entitled (The Oregon Question.* He protested against the annexation of Texas and in 1847 published a pamphlet entitled (Peace with Mex¬ ico.)*

The last years of Gallatin's life were in a large measure devoted to scientific researches, since his position as president of the National Bank of New York, which he occupied for sev¬ eral years, allowed him ample time for study;

he declined to re-enter public life in 1843

porZioreHeent T/le5,'S 0ffe' of 'he Treasury porttolio. He ardently supported all educa-

nK New0 Yorl" nand assisted in fouS-

ing iNe w York University; but his chief inter-

noloo-yS ˆeˆad 1U ˆ fifld ˚f American eth-

studv of the / rpreviollsly made an extensive sumy oi the Indians and their languages oub-

lishmg several essays on the subjelt bm after

a‘SdeeoS-aTnnH settlemen.‘ at New York he made l«^^eepeL-aiud moJe scientihc investigation in

*TribesP w It Sy”°PcSis of ^ Indian *Tthm -the Umted States, East of the*

*^ankpo«e«ntainS’ canM in ‘he Br“*sh and Rus- sian Possessions of North American In 1842*

he founded in New York the American Eth¬ nological Society and three years later in the

‘Essav o!TetL0VtS • Published an • „ – , °2 the Semi-Civihzed Nations of Mex-

Notes donC?W-a rAmer‘Ca’ E™bradng Elaborate dars Numeration, Calen-

into ’th^ P k and Chronology, and an Inquiry don >h(/’ roba,y,e,0n8!n ° £ ‘heir Semi-Civiliza¬ tion. From 1843 until his death in 1849 Galla-

Sorief5 pr1s,dent. °f ‘he New York Historical f^ yand despite his age never lost interest historical, economic and scientific pur-

plff • 9 °n,Svl •, Ad,ai??* Henry,*

1879 ?ie2 ?aliati^ (3- vols” Philadelphia 1879) Bartlett, J R-, Reminiscences of Albert

Gallatin (in (New York Historical Society Proceedings) for 1849 pp. 281-98) ; Gallatin, Albert, ‘Autobiography) (in ‘Maine Historical bociety Collections,) Vol. VI, pp. 93-103, 1859) • Gallatin James, (A Great Peace Maker: the Diary of James Gallatin, Secretary of Albert Gallatin , U. S Envoy to France and Eng¬ land 1813-27 and Negotiator of the Treaty of Ghent,) edited by Count GaTlatin (London 1914) • Hde, E. E., (Memoir of Albert Gallatin) Jin 1 American Antiquarian Society Proceed¬ ings,) 23 Oct. 1849) ; Meany, Edward^.,

Irving E. Rines.

GALLATIN, Mo., city and county-seat of Daviess County, on the Wabash and the Chi¬ cago, Rock Island and Pacific railroads, and on the Grand River, 55 miles northeast of Saint Joseph. It is in a farming region, has lumber industries, municipal waterworks and an elec- tnc-light plant, and an academy. Pop. 1,825.

GALLATIN, Tenn., town and county-seat of Sumner County, on the Louisville and Nash¬ ville Railroad, 27 miles northeast of Nashville and

three miles from the Cumberland River. Its industrial and commercial activities are con¬ nected with stock-raising, agricultural products, lumbering, cotton and woolen manufactures, flour milling and foundry and machine prod¬ ucts. It contains a training school and the How¬ ard Female College. Pop. (1920) 2,757.

GALLAUDET, gal-a-det', Edward Miner,

American educator: b. Hartford, Conn., 5 Feb. 1837; d. 26 Sept. 1917; son of Thomas H. Gal- laudet (q.v.). He was graduated at Trinity Col¬ lege in 1856. He organized the Columbia In¬ stitute for the Deaf, Dumb and Blind in Wash- ington, D. C., in 1857, and from it developed the Gallaudet College for the Deaf, of which,

in 1864, he became president (May 1911

'Manual H'1 pTublications include

lvianual oi International Law) (1879) and

Life of Thomas Hopkins Gallaudet) (1888). GALLAUDET, Thomas, American Episco-

d3 27 Aug™ 902 b'i? art£ord' Co"". 3 June 1822; det In v 1 • hi He WaSJa son of T H- Gallau-

*leJe in'1'84? h "T 8Jad9ated at Trinity Col- lege in 1842, was teacher in the New York In¬ stitution for Deaf-Mutes 1843 ˆ8 yt„ dainpd in 1QCT1 . r ,s *043-38. He was or-*

SaimAnn'!8rn' f< ?unAded a?d became rector of in ifiW Church, New York, for deaf-mutes m 1852, was appointed general manager of the Protestant Episcopal Church Mission to Deaf- Mutes in 1872 ; and founded the Gallaudet Home for Deaf-Mutes, near Newburg, N. Y., in 1885

GALLAUDET, Thomas Hopkins, Ameri- gn educator: b. Philadelphia, 10 Dec 1787- d Hartford, Conn., 9 Sept. 1851. In 1817 he founded at Hartford, Conn., the first deaf-mute

same tinni830AmTerii'«'tsnn ˆ president of the me till 1830. In 18 38 he became chaplain of

the Insane Asylum at Middletown, Conn, where

of "uuTl 1111 hlf deanthA,He was the author °Th rluj?' t0Ues forthe Young) (1838), and The Childs Book of the Soul,) etc. Consult

MVeng«yˆHUi5nphreˆ (f1858)' and Gallaudet, E. M. (1888); Barnard, (Tnbute to Gallaudet.)

TfaPAˆLf'VRE?1, gal-H-v ra-ze, Giuseppe, Italian paleographer: b. Milan, 26 June 1879

He was educated in private schools, the Univer- sity of Genoa, and the Royal School of Paleog- raphy of Milan. Since 1905 he has been a trustee the Museum at Castello Sforzesco, Milan and since 1908 has been lecturer on modern istory at the Royal Academy in the same city. He has been very active in Catholic social work has served as general secretary of the Aid So- f% Ita ban Workmen Abroad, is member c6 -ˆoya Historical Commission of Italy the Society of Social Science. He is a knight!

°l +t?ie pCr0rT °r f taly and honorary attache of the Royal Italian Legation, Berne. He has written 'Nava Memoirs' (1902); 'Carteggio del Conte Fedengo Confalonieri) (1910) • Electoral Law of the Cisalpine Republic,5 etc! He is a contributor to (Nuova Antologia . Rassegna Nazionale,) 'Archivio storico ital- lano ; 'Archivio storico lombardo) ; 'Giornale storico della litteratura italiana) ; HI libro e la stampa) ; Correspondant, Revue des questions lustonques. Revue d'histoire diplomatique. Since 1910 he has been editor of Rassegna storica del Risorgvmento Italiana.

GALLE, gable, Johann Gottfried, German astronomer: b. in Pabsthaus, Prussia, 9 June 1812; d. Potsdam, 11 July 1910. He studied natural sciences and mathematics in Berlin 1830-33; discovered three comets in 1839-40; was the first to observe the planet Neptune (23 Sept. 1846) ; and in 1851 became director of the observatory in Breslau and professor of astronomy in Breslau University. In 1875 he advocated planetoid observations to determine the solar parallax. Among his published works are 'Grundziige der schlesischen Klima- tologie) (Breslau 1857) ; 'Ueber eine Verbesser- ung der Planetenelemente) (Breslau 1858) ; 'Neber eine Bestimmung der Sonnenparallaxe aus Korrospondierenden Beobachtungen der Flora im Oktober und November 1873) (Bres¬ lau 1875) ; (Mitteilungen der Breslauer Stern-

\varte> (Breslau 1879) ; (Verzeichnis der Ele- mente der bisher berechneten Kometenbahnen) (Leipzig 1894).

GALLEGO, ga-ya'gd, Juan Nicasio, Span¬ ish poet : b. Zamora, 14 Dec. 1777 ; d. Madrid, 9 Jan. 1853. He was possessed of great natural poetical talent; but he was careless and, in a sense, indolent so that his life's work does not correspond to his talents. Graduated from the University of Salamanca, he entered the Church and became Court chaplain in 1805. It was in Madrid- that he became acquainted with Quintana and Cienfuegos and other men of literary and other note. This friendship en¬ couraged him to literary exertions, which were broken by the entrance of the French into Mad¬ rid in 1808. On this occasion Gallego wrote (E1 dos de mayo, one of his best known poems. Losing his position on account of the political changes at this time, he soon became noted as one of the best poets of Spain. His burning patriotism and love of independence coupled with his fight for the freedom of Spain appealed to the nation; and his compositions were passed from hand to hand throughout the land and read in every household. On the re¬ turn of the French to Madrid, Gallego went to Seville and from there finally to Cadiz ; where he seems to have led a rather active existence until the return to power of the Spanish gov¬ ernment in 1814. In 1810 he was elected deputy from the Isle of Leon to the Cortes and he gave so much attention to his political duties that he had apparently little time left for literary work. On account of this political activity, he was imprisoned for 18 months on the return to the throne of Fernando VII, in a public prison, af¬ ter which he was sent to Cartuja de Jerez, where he was held until 1816, when, owing to his ill health, he was taken to La Luz Monas¬ tery at Moguer, and later to Loreto Convent in Seville, where he remained until he was freed by the revolution in 1820. Shortly afterward he was appointed Archdeacon of Valencia, a position he held until he was deposed by royal order, in opposition to the laws of the Church, and on account of his former political activities, and he was compelled to go to Barcelona, then held by the French; and from there he went to France on the retirement of the French. Later on he returned to Spain and was ap¬ pointed Canon of Seville.*

GALLEGOS, gal-ya'gos, Argentina, a river and city in the extreme southern part. The river rises in the Latorre Mountains .and emp¬ ties into the Atlantic Ocean ; length 160 miles. The city is near the mouth of the river in Santa Cruz Territory and has a population of about 5,000.

GALLEIN, gal'e-in (Pyrogallolphthalein), a coal-tar color used in dyeing. Formula, C20H10O7. Obtained by heating for some hours one part of phthalic anhydride with two parts of pyrogallol from 190° to 200°, then dissolving the fused mass in alcohol, precipitating with water, and recrystallizing from dilute hot alcohol.

GALLENGA, gal-len'ga, Antonio Carlo Napoleon, Italian publicist and historian : b. Parma, Italy, 4 Nov. 1810; d. Llandogo, Wales, 17 Dec.

1895. He left Italy in 1831 by reason of political disturbances in which he took a

part. He visited the United States and France. Returning to Italy he became more deeply in¬ volved in political intrigue. Finally he again became exiled because he could not agree with the policy of assassination held to by his party by which he had been selected to murder Char¬ les Albert, king of Sardinia. Going to London (1843) he was elected to the chair of Italian literature in University College. He took part in the insurrection in Italy in 1848; and he re¬ turned in 1854; and was a member of the Ital¬ ian Parliament 1858-64. He was long the Lon¬ don Times' special correspondent in Italy. His works, many of them* issued under the name of <(L. Mariotti,** include (Italy, Past and Present* (1841-49) ; (Castellamonte, an Autobiography* (1854) ; (Mariotti's Italian Grammarˆ which went through 12 editions; (History of Pied¬ mont * (1855—56) ; (The Pearl of the Antilles) (1873) ; and several books of travel.

GALLEON, a name formerly given to a very large kind of a vessel, with three masts and three or four decks, such as those used by the Spaniards in their commerce with South America, to transport the precious metals. They were large, clumsy, square-sterned ves¬ sels, having bulwarks three or four feet thick, all of which were so encumbered with topham- per and so overweighted in proportion to their draft of water, that they could bear very little canvas, even with smooth seas and light wind.

GALLERY, in architecture, any of various rooms, corridors, platforms, etc.: (1) A corri¬ dor or long, narrow room, sometimes serving as a means of access to other parts of a house ; especially, a covered space for walking, partly open at the side ; in English country houses, a main corridor having a continuous row of windows on one side. Galleries of this class include the low, paneled halls of the old cha¬ teaux and manor houses, particularly English houses of the 16th and 17th centuries; here were kept family portraits, arms and armor, trophies of the chase, banners, fine furniture, bric-a-brac, etc. (Compare (4) below). Be¬ longing to this class also are such galleries as the one connecting the Sainte Chapelle with the Palais de Justice at Paris and the one connect¬ ing the Palazzo Pitti with the Palazzo Vecchio at Florence. (2) A long, narrow platform, balcony or passage projecting from a wall and open at the outer side except as having a balus¬ trade or railing; especially, a passage either within the thickness of a wall, or supported on corbels, having its open side toward the in¬ terior of a building and serving both for orna¬ ment and as a means of communication. It is connected in some intimate way with the archi¬ tectural design of the building. To this class belong the triforium and external galleries of many Gothic churches. These galleries are of¬ ten filled with statuary, as the galerie des rois at the cathedrals of Paris and

Amiens and at the ruined cathedral of Rheims. (3) A platform, supported by columns, brackets, or the like and projecting from the interior wall of a building, as a church or theatre, usually to provide addi¬ tional room for an audience ; specifically in a theatre, the highest of such platforms, con¬ taining the cheapest seats. (4) A room, typic¬ ally long and narrow, or a building, for the ex¬ hibition of works of art. Famous galleries are

*encPL0ZrevVParis' *5«Uffizi and Pi«i at Flor-*

the Lm a"'J BorShese at Rome, and

ine JNational at London. Other galleries rnn

vSlef°VWned PaW!ngS °r ^ufpmres are at

Versailles Venice Milan, Petrograd, Madrid Dresden, Vienna, New York, etc (5) A place

*°Jr >us"*sf or Measure shaped like a galle^ or in some way analogous to it ; as a photo¬ graph gallery, a shooting gallery.*

As a nautical term, gallery means a plat-

o?Tt rSldC b°d? °f the ship' at the stern

or at the quarters. It was formerly common In mining, a working drift or level. In forti¬ fication any sunk or cut passageway that is covered both overhead and at the sides.

f ancient and mediaeval ship

ot the Mediterranean, propelled primarily by oars. I he Venetian galleys were about 160 feet iong above and 130 feet by the keel, 30 feet wide and 20 feet length of stern-post. They were furnished with three masts, and 30 banks ot oars, each bank containing two oars, and every oar being managed by six or seven slaves, who were usually chained to it. In the fore part, after the invention of cannon, they had three small batteries of cannon, namely, two 36-pounders, two 24-pounders and two 2-pound¬ ers. They had also three 18-pounders on each quarter, and carried from 1,000 to 1,200 men.

The term galley, as applied to the ships of the ancient Greeks and Romans, refers espe¬ cially to their warships, which were propelled chiefly by oars.

The Greek or Graeco-Etruscan vases show many illustrations of biremes, that is, galleys with two banks, or. longitudinal rows, of oars. The invention of this form of vessel was a very important advance in naval construction, for it permitted of a large increase in rowing-power, in proportion to the bulk and weight of the vessel. It was the trireme, however, which formed the chief warship of Greece during her prime. It had three banks of oars on each side. The seats for the rowers, which were remov¬ able, were placed between the sides of the vessel and a series of upright and inclined tim¬ bers supporting the main deck. The stem of the vessel was generally curved, and terminated in an ornamental figure-head, and the stern- post was also usually curved upward and finished off ornamentally. At the stern there was an elevated quarter-deck whence the helms¬ man and the trierarch or naval captain gave orders. The latter had full command of the ship; the former acted as navigating officer, having the oarsmen and sailors under his com¬ mand.. The trireme had regularly two masts — a mainmast with one large sail, and a very small foremast.

The rowers formed much the largest portion of the crew, while an Attic trireme carried also 10 marines, 17 sailors, a sort of paymaster, two men in charge of the lines of towers, besides two boatswains, one with a flute, to give the time to the rowers. The total crew would thus be about 220. The total length of a trireme was about 120 feet, of which about 100 was devoted to the rowers ; the breadth at the water¬ line was some 12 feet ; and the draught about 6 feet. A speed of 8 or 9 knots was probably about the highest obtainable.

The Romans did not become important as a maritime nation till the period of their struggle

vth Carthage They built large numbers of

p„?S;uChI • y ˚,f hl§her rates than the trireme.

ut the triumph of the bireme vessels, known as Liburman galleys, at Actium led the way for a reversion to lower-rated ships. Consult Par-

p • F1vts,of the WorId: The Galley

Period' (New York 1876) ; Chatterton, E. K ,

!cu-Shlps and their Story) (London 1900) ;

ˆidn-ShioiSˆndJˆays of 0ther Days' (Phila¬ delphia 1913) ; Holmes, G. C. V., 'Ancient and

Modern Ships > (2 vols., London 1906).

r PˆDLI, gal'i, the emasculated priests of Lybele, who was worshipped as symbolizing the procreative powers of nature. Cybele was the Great Mother and inspired the arts of agri¬ culture. The chief seat of this cult in historic times was Pessinus in Galatia, but it never ob¬ tained public recognition in Greece, where the excesses and mendicity of its priests exposed contempt. It was introduced into Rome 204 b.c., at the bidding of the Sibylline oracle, and for the purpose of expelling Hannibal from Italy. 1 he Galli were permitted to pass in a procession through the streets of the city, led by an Asiatic piiest and priestess, but Roman citizens were forbidden to participate in this service. The cult gained an increasing favor and popularity and in the 2d century a.d. other rites were added, such as baptism in the blood or bulls and rams, by which the devotee was supposed to be cleansed from pollution and re¬ generated. This baptism was undergone by the Emperor Julian, called the Apostate. The worship of Cybele was checked by Constantine and abolished by Theodosius.

ACID, CeH2(OH)3COOH, is an acid which exists in small quantity in gall-nuts, •in Yalpnia (the acorn-cup of Quercus cegilops), in dividivi (the pod of Ccesalpinia coriaria) , in sumach, and other vegetables. It is usually pre¬ pared from gall-nuts, which, in addition to gal¬ lic acid, contain a large proportion of tannin (tannic acid or gallo-tannic acid). When the gall-nuts are digested with water for some weeks, fermentation takes place, and the tannic acid is gradually converted into gallic acid. The same result is obtained more quickly if sulphuric acid be present. To obtain pure gallic acid the gall-nuts are boiled with water, and the hot liquor separated. On cooling gallic acid crystallizes out, and is further purified by solution in hot water and treatment with animal charcoal. It forms delicate, silky, acicular crystals, nearly colorless and having a sourish taste. It is soluble in three parts of boiling water, but only in 100 of cold water, and on this account it can be readily purified by re¬ crystallization. With solution of iron salts (ferric) it produces a blue-black color, and finally yields a black precipitate on exposure to the air. Hence it may be used in the produc¬ tion of ink, for which purpose it has some ad¬ vantages over tannin or gall-nuts. When the crystals are strongly heated pyrogallic acid (CePLfOHL) is produced and sublimes over. Gallic acid is a useful astringent. As it does not coagulate albumen it is readily absorbed into the blood, and in this way it is efficacious in Bright's disease. Where a decided local astringent effect is desired tannic acid is much more powerful. It has been used in excessive sweating and is useful for sweating feet and as a local spray and gargle in tonsilitis, pharyn-

gitis and similar affections of the nose and throat.

GALLIC WAR, Caesar's Commentaries on the. Caesar had filled the consulship in the year 59 b.c. Shortly after the end of his year of office, he had set out (early in 58 b.c.) for the province of trans-Alpine Gaul, to which he had been appointed for a period of five years. The situation in this province was most serious. Various wild tribes were becoming restless and were threatening the fringe of Roman cities scattered along the Mediterranean in southern Gaul. Appreciating the menace to Roman in¬ terests and Roman prestige, Caesar gathered troops to meet the immediate crisis. The Gal¬ lic tribes, suspicious of Caesar's first success, soon began organized resistance to his evident purposes of ambition, and in the attempt to maintain their freedom and realize their na¬ tional aspirations waged campaign after cam¬ paign against the Romans. Despite their gal¬ lant efforts they were finally crushed in the year 52 b.c., when with the surrender of Ver- cingetorix and the fall of Alesia, the last at¬ tempts at Gallic independence were proved futile.

Caesar's Commentaries on the Gallic War give an account of the events of his contest with the Gallic tribes. This account is con¬ tained in seven books, each book being devoted to the campaigns of a year. The struggle lasted from 58 to 52 b.c. The work seems to have been published in the winter of 52 to 51 b.c. Book I deals with the unsuccessful attempt of the Helvetians to invade southern Gaul ; also with the defeat of the Germans under Ariovis- tus, who had established a tyranny over the Sequani and Haedui in eastern Gaul and was now threatening Roman influence in this region. Book II is devoted to an account of the over¬ throw of the Belgian league. To forestall the establishment of Roman ascendancy in northern Gaul, the Belgian tribes had organized a strong confederacy. One of these tribes, the powerful and warlike Nervii, almost succeeded in inflict¬ ing a crushing defeat on Caesar's troops in a fierce engagement on the Sambre. Book III embraces a description of the successful mari¬ time war against the Veneti and their allies on the northwestern coast of Gaul, along with the account of scattered operations by Caesar's lieu¬ tenants in other quarters. Book IV deals first with the campaign against the Germans. This was waged partly to the west, partly to the east, of the Rhine. To cross the river, Caesar (in 10 days) constructed his famous bridge. He then penetrated far into the interior of the country. The remainder of Book IV describes Caesar's first invasion of Britain in the autumn of 55 b.c. Book V begins with the events connected with the second invasion of Britain and gives an in¬ teresting description (chapters 12-14) of the island and its inhabitants. The concluding por¬ tion of the book is devoted to an account of the overthrow of the new league of Gallic states against the Romans. Book VI describes a sec¬ ond expedition into Germany. In this connec¬ tion a somewhat lengthy account of German institutions and customs is

given and a contrast drawn between the Germans and the Gauls (chapters 11-28). The year 52 b.c. was signal¬ ized by a general revolt of all the Gallic tribes against the Roman rule. The leader in this

movement was the able, courageous and pat¬ riotic king of the Arverni, Vercingetorix. The struggle was futile. Alesia, Vercingetorix's stronghold, was captured, his forces crushed, and he himself taken as a prisoner to Rome. These operations are described in Book VII. An eighth book, detailing the Gallic operations of 51 b.c., has come down to us. It was written by Hirtius, one of Caesar's lieutenants.

The importance of the Commentaries lies partly in the subject matter, partly in the au¬ thorship. They are the composition of a great personality, dealing not merely with great events, but events of world-historic import of which he himself was the directing genius. Caesar's account in the main is authentic and trustworthy. By always speaking of himself in the third person, he aims to produce the impression of detachment and im¬ partiality. Yet at times he suppresses the truth, and at times colors his narrative in his own favor. Specific literary charm, as ordinarily understood, is totally lack¬ ing. Caesar's simplicity and directness have always appealed to his readers, but the com¬ position of the work was evidently hasty. Much of it may have even been the unrevised draft of notes made at the time of the events described.

Translation: T. Rice Holmes (London 1905). A scholarly discussion of the contents of the work may be found in the same writer's Cae¬ sar's Conquest of GauP (Oxford 1911).

, Charles E. Bennett,

Late Professor of Latin, Cornell University.

GALLICAN CHURCH. See Gallican-

ISM.

GALLICAN CONFESSION, The, or

French Confession of Faith, was prepared by John Calvin and his pupil De Chandieu and approved by the Synod of Paris in 1559. In 1561 it was delivered by Theodore' Beza to Charles IX at Poissy. In 1571 it was formally adopted by the Synod of La Rochelle, and due to that fact is sometimes called the Confession of Rochelle.® It was also sanctioned by Henry IV. It consists of an address to the king and 40 articles. The text of the articles may be found in (The Creeds of Christendom > by Philip Schaff (Vol. Ill, pp. 356-382, New York 1877). The arrangement is the

same as in Calvin's (Institutes > and the Geneva Catechism of 1540. In 1848 an attempt was made to sub¬ stitute a new confession but failed. In 1872, however, a second attempt proved successful but created a division in the Church.

GALLICANISM, the tendencies, principles, or action of those members of the Roman Cath¬ olic Church in France who, notably in 1682, sought to increase the power of the national church and to restrict in that country the au¬ thority of the Pope. By extension, the tend¬ ency to enlarge the prerogatives of any na¬ tional Church in restriction of the authority of the Roman See. This term takes its derivation from the controyersies between the French monarchy at various times and the Roman pontiffs in regard to ecclesiastical jurisdiction. It is a mistake to suppose that Gallicanism took its rise in France prior to the 13th century, or that the decrees of Louis IX, including the Pragmatic Sanction, were in any proper sense

an

attempt to restrict the authority of the Roman pontiffs. So far from this being true, their object was to assure the immunities and franchises .accorded to the clergy from the exac¬ tions of the royal officers and feudal lords. In his ordinance of April 1228, Louis IX, or rather his mother, Blanche of Castile, the regent, says not a word about the relations of the clergy or the laity with the Roman pontiff, and Pope Innocent IV in 1250, in a letter to the queen, thanks her for issuing it.

It was not until the time of Philip the Fair that Ga licamsm in any proper sense can be said to have manifested itself. That monarch in his contest with the papacy sowed the seeds oi the controversy as to the question of papal jurisdiction, which so long agitated the French Church. As a result of his contest with Boni¬ face VIII, and of the later declarations of the Councils of Constance and Basel, the principles began to be enunciated by the national party; one that the king of France was absolutely inde¬ pendent of the Pope in all temporal matters; the other, that the papal power was not abso¬ lute, must be exercised within the limits of the canons, and was inferior to that of a general council. By the Pragmatic Sanction passed at Bourges in 1438, the Gallican Church, in union with the king, adopted the decrees of the Coun¬ cil of Basel abolishing papal reservations and expectatives, and restricting appeals to Rome to the causes majores. Against this many popes protested, but it was not until the date of the concordat (1516) between Leo X and Francis I, that it was abolished.

During the 16th century there were many customs and privileges of more or less ancient date still extant, which the national party de¬ lighted to call ((Gallican liberties.® The crisis came in the 17th century, during the reign of Louis XIV, oyer the question of the royal right of regalia. Two bishops excommuni¬ cated the crown nominees to benefices in their dioceses. Their Metropolitans canceled their sentences ; whereupon they made appeal to Rome, and the Pope annulled the decisions of the Metropolitans. The Crown resented the Pope's decision as an intrusion upon its rights. Louis XIV called an assembly of French bishops (1682) to confirm his position. This assembly formulated the famous Four Articles setting forth the ((Gallican liberties.® The first declared that the jurisdiction of Peter's suc¬ cessor did not extend to civil and temporal affairs, that kings were subject to no ecclesias¬ tical power in temporals, and denied the depos¬ ing power of the popes.. The second ratifies the third and fourth sessions of the Council of Constance as regards the respective authority of the Pope and general councils, and denies that these sessions refer only to times of schism. The third asserts the validity of the laws, cus¬ toms and constitutions of the realm and of the Gallican Church. The fourth declares that al¬ though the Pope has the principal share in questions of faith, and that his decrees regard all and particular churches, still his judgment is not irreformable, unless the consent of the Church be added.

Afterward, at the command of the king, who subsequently realized the radical character of the Four Articles, the bishops who had signed them individually wrote to the Pope retracting

their Declaration. Later Louis himself wrote to Innocent XII, in 1693, stating that he had given the necessary orders to the effect that the contents of my edict of 22 March 1682, con¬ cerning the Declaration emitted by the clergy of France, be not observed.®

Nevertheless, the spirit of Gallicanism lin¬ gered on in France, finding fresh impetus in Jansenism. During the 18th century its strength rapidly waned, and by the time of the French Revolution (1789) it had ceased to have any vital significance. Consult Jervis, W H P (The Church of France > (2 vols., London

1872) and (The Gallican Church and the Revo- (jb- 1882) ; Le Roy, (Le Gallicanisme au XVIII siecle) (Paris 1892) ; Valois, P. N., (New

GALLICO, Paolo, American pianist: b Trieste, Austria, 1868. At the Vienna Con¬ servatory of Music he studied under Julius Ep¬ stein and there won two firsts for piano playing. Next he toured the principal countries of Europe, giving concerts in all the principal music centres. He visited the United States in 1892 and thereafter made his abode in New York, where

he became a noted teacher of piano. He has composed several songs and pieces for piano and has appeared frequently at recitals and as soloist with orchestras.

GALLIENI, gal-le-a'ne, Joseph Simon, French general and colonial administrator: b. Saint-Beat, Department of Haute-Garonne, 24 April 1849; d. Versailles, 27 May 1916. The son of an officer, he was educated at the mili¬ tary college of Saint Cyr and served as lieu¬ tenant in the Franco-German War. From 1877 to 1881 he served in West Africa in military, scientific and administrative capacities. With General Faidherbe, his chief, he was mainly in¬ strumental in founding French Equatorial Africa. Being sent on a mission to a savage chief, Ahmadou, in the interior, he was held prisoner for ten months and informed every morning that he was to die that day. Gallieni finally succeeded in concluding a treaty with his captor. He next served three years in Martinique and in 1886 became governor of Upper Senegal. He was sent to Indo-China (Tonquin) in 1893 and fought for two years against the Black Hand pirates. In 1896, when Madagascar (q.v.) became a French colony, he was appointed governor and commander-in¬ chief. His vigorous and determined policy made a great improvement in the condition of the island. He first crushed rebellion and brigandage, and then pursued a policy of en¬ lightened pacification. His efforts were so suc¬ cessful that the young women of Tananarivo were soon wearing Paris fashions and learning French dancing. When Gallieni laid down his office in 1905 he left a peaceful and prosperous colony. On his return to France he became military governor of Lyons, and in 1908 a mem¬ ber of the Supreme War Council. In the dark days of August 1914, when the German armies were pouring in like an irresistible avalanche upon Paris, that city was not in a position to defend itself. On the 26th Gallieni -was placed in command of the entrenched camp

of Paris. A new spirit of courage and energy entered with him. Great gangs of laborers left the city every morning in ˆsight-seeing® cars to throw up hasty trench defenses; the arrival of naval guns and numerous other indications showed that Gallieni was preparing to defend Paris inch by inch if necessary. But the de¬ cisive battle of the Marne saved the city. On 29th Oct. 1915 Gallieni became Minister for War in the newly-formed Briand Cabinet. In March 1916 his health broke down and he re¬ tired. He was replaced by Gen. Pierre Roques. An accomplished scholar and linguist, Gallieni was a member of various learned societies and published several volumes on the Sudan and Madagascar. See Madagascar.

GALLIENUS, gal-i-e'nus, Publius Licinius Valerianus, Roman emperor: d. 268 a.d. He received the title of Caesar from the senate at the same time with his father, Valerianus, and associated with the latter in the empire on his accession in 253 a.d. His father having been defeated and taken prisoner by Sapor, king of the Persians, in 260, Gallienus showed complete indifference, and continued to reign alone with¬ out making any attempt to deliver his father. With a like indifference he saw his empire dis¬ membered by numerous usurpers, and invaded in all parts by barbarians.

GALLIFFET, ga-le-fa, Gaston Alexandre Auguste, Marquis de (Prince de Martigues), French general: b. Paris, France, 23 Jan. 1830; d. there, 8 July 1909. He joined the army in 1848, serving in the Crimea, Mexico and Al¬ geria. He took part with the Army of the Rhine during the Franco-German War, being made prisoner at Sedan, after leading the mem¬ orable cavalry charge of the chasseurs d'Afrique. During the second siege of Paris he commanded a brigade of the Army of Ver¬ sailles, and was unenviably distinguished for his severity to the Communard prisoners. He was promoted general of division in 1875, and was placed in command of the Ninth Army Corps in 1879 and of the 12th Army Corps in 1872. He became Minister of War in June 1899; he resigned in May 1900 after strongly supporting the government in the crisis follow¬ ing the Dreyfus affair.

GALLINiE, a group of birds, styled galli¬ naceous or ˆgame-birds,® deriving its name Horn the Latin gallus, the domestic cock, which is a typical example. The group is non-classi- fied as a suborder Galli of the order Galli- formes, situated between the tinamous and the rails. The order embraces the singular mesites of .Madagascar ; the various partridges and quails of the Eastern Hemisphere Tumices; and the hoatzin . besides the typical gal¬ linaceous birds, which far outnumber the rest. All are ground-keeping, running birds, agreeing in the possession of a globular crop adapted to the digestion of the seeds and hard insects that form the greater part of their food, and in having the young hatched in such a state of advancement that they are clothed in a uniform coat of down-feather, and are able to run about and pick up food after a few hours. They are distributed throughout the world, but are most numerous and reach their highest perfection in the forested parts of the Orient. The group (Galli) includes the mound-birds or brush- turkeys, and other Megapodes of Australasia ;

the curassows and guans of tropical America; and all the pheasants, guinea-fowls, turkey, jungle-fowls (parents of our domestic fowls), tragopars, American quails and partridges, grouse, ptarmigan, and similar species of vari¬ ous parts of the world. Many have been suc¬ cessfully domesticated ; others are prized as ornaments, or for their plumage, and all

are good eating. Hence they have ever been the object of capture, and some of them afford the finest sport to be enjoyed with dog and shot¬ gun. Special articles described the most im¬ portant species under their popular names.

GA.LLINGER, Jacob H(arold)., American physician and Republican politician : b. Corn¬ wall, Ontario, Canada, 28 March 1837, being one of 12 children; d. Franklin, N. H., 18 Aug. 1918. He received a common-school and aca¬ demic education; was a printer in early life; studied medicine and was graduated in 1858; and followed the profession of medicine and surgery until he entered Congress. He was on the board of trustees of Columbia Hospital for Women, and a member of the board of visitors to Providence Hospital; was a member of the House of Representatives of New Hampshire in 1872, 1873 and 1891, and member of the con¬ stitutional convention in 1876; of the State Senate in 1878, 1879 and 1880, being president of that body the last two years. He was sur¬ geon-general of New Hampshire, with the rank of brigadier-general, in 1879-80; received the honorary degree of a.m. from Dartmouth Col¬ lege in 1885 ; served as trustee of George Wash¬ ington University for several years, and was chairman of the Republican State committee from 1882 to 1890, when he resigned the place, but was again elected to the position in 1898, and continued to serve until 1908, when he de¬ clined re-election; was chairman of the delega¬ tions from his State to the Republican national convention of 1888, 1900, 1904 -and 1908; was for a time a member of the Republican national committee ; was chairman of the Merchant Ma¬ rine Commission of 1904-05, composed of five senators and five representatives in Congress; was a member of the National Forest Reserva¬ tion Commission, and vice-chairman of the Na¬ tional Waterways Commission; served as presi¬ dent pro tempore of the Senate during a por¬ tion of the 42d Congress; was elected to the 49th and 50th Congresses, and declined renom- ination to the 5 1st Congress; was elected to the United. States Senate, to succeed Hon. Henry W. Blair, for the term beginning 4 March 1891, and successively re-elected by the legislature without opposition in 1897, 1903, 1909 ; was re¬ elected by popular vote 3 Nov. 1914 for a fifth term.

GALLINULE. See Mud-hen.

GALLIO, gal'i-6, Lucius Junius Annaeus,

Roman pro-consul of Achaia tinder Claudius when Saint Paul was at Corinth, 53 a.d. Born at Cordova, the son of the rhetorician Annaeus Seneca and elder brother of the famous phi¬ losopher and statesman, Lucius Annaeus Seneca, he procured his name by adoption into the family of Galho the rhetorician. The narrative in the (Acts of the Apostles tells*

how, with regard to the clamor of the Jews against Paul he was not minded to be a judge of these matters . and how <(Gallio cared for none of these things® ; hence his name has become a

synonym for a careless, easy-going, and indiffer¬ ent man who keeps himself free from trouble and responsibility. Gallio's behavior, however, rather shows the impartial attitude of Roman officials, at that time, toward provincial re¬ ligions.

GALLIPOLI, gal-lep'6-le, Thrace, a sea¬ port on the peninsula of the same name, in the vilayet of Edirneh, in lat. 40° 24′ N. and long. 26 39 E., 130 miles west of Constantiople.

The ancient Callipolis, of which some ruins remain, it was formerly the most important commercial town on the Hellespont, and still retains considerable trade. There are two har¬ bors, extensive bazaars, and some manufac¬ tures. The town was taken by the Turks in 1354, and formed their earliest European pos¬ session ; and here the allies disembarked during the Crimean War. Pop. about 30,000.

GALLIPOLI, Peninsula of, Thrace, a tongue of land separating the Hellespont from the .TEgean Sea and the Gulf of Saros, about 55 miles long, by a varying breadth of from 4 to 13 miles. Lat. between 40° 3′ and 40° 38′ N., long, between 26° 10′ and 27° E. Its chief city is also called Gallipoli (q.v.). The western portion of this peninsula was the scene of des¬ perate fighting in 1915. See War, European.

GALLIPOLI OIL, a coarse olive oil, used in Turkey-red dyeing and for other purposes, and prepared from oliyes grown in Calabria and Apulia, the latter being considered the best. The oil is conveyed in skins to Gallipoli, where it is clarified and shipped in casks.

GALLIPOLIS, gal-i'pc>-les, Ohio, city and county-seat of Gallia County; on the Ohio River, and on the Hocking Valley and Kana¬ wha and Michigan railroads. It contains a United States Marine Hospital, Gallia Academy, the State Hospital for Epileptics, Washington High School, a library and park. Industries are iron and wood manufactures, etc. First settled in 1790, Gallipolis was incorporated as a village in 1842 and chartered as a city in 1865. Pop. (1920) 6,070.

GALLITZIN, Demetrius Augustine,

Prince, American clergyman : b. The Hague, 22 Dec. 1770; d. Loretto, Pa., 6 May 1840. He was a son of Prince Dimitri Gallitzin, and be¬ came a Roman Catholic in his 17th year. He served with Austria against France in 1792. He was ordained a priest in the United States in 1795, and after preaching at Port Tobacco, Canewago and Baltimore, betook himself to a bleak region among the Alleghany Mountains in Pennsylvania, where he was known as <(Father Smith. Here he laid the foundation of a town called Loretto. He declined to return to Russia on his father's death, and as a Catholic priest, was adjudged to have lost his right of inheritance. He was for some years vicar-gen¬ eral of the diocese of Philadelphia. He was austere in his mode of life, but liberal in the highest degree to others, and an affectionate and indefatigable pastor. In 1809 he resumed his original name. He wrote various contro¬ versial works, including a (Defense of Catholic Principles) (1816) ; (Letter to a Protestant Friend> (1820), and (Appeal to the Protestant Public) (1834). Consult Heyden, (Baltimore 1869).

GALLIUM, a metallic element, symbol Ga, atomic weight 69.9. Gallium is a triad element. Specific heat 0.079. It was discovered by the French chemist, Lecoq de Boisbaudran, by means of the spectroscope ; but the Russian chemist Mendeleeff had shown in his periodic law (q.v.) that an element must exist having intermediate properties between aluminum and indium. He called his supposed element eka- luminum. The metal is obtained by dissolving the blende in sulphuric acid and placing in the solution plates of zinc. This precipitates anti¬ mony, arsenic, bismuth, copper, cadmium, etc., while gallium, aluminum, iron, zinc, etc., remain in solution, and after solution and precipitation basic salts of gallium are thrown down by zinc. The metal is then isolated by electrolysis. Gal¬ lium is a hard metal, very slightly malleable and leaves a bluish-gray trace on paper; when melted it adheres to glass; it does not tarnish in the air. Its specific gravity is 5.95. It melts at 30.15° C. It gives two brilliant violet lines in the spectrum. When heated in the air it oxidizes on the surface, and does not volatilize. It dissolves in hydrochloric acid with disen¬ gagement of hydrogen. It is scarcely attacked by nitric acid in the cold; when heated it dis¬ solves slowly with evolution of nitrous fumes.

At least one oxide, two chlorides, and iodide, a bromide, a nitrate, a sulphate, a double sul¬ phate with ammonium and probably a hydroxide are known. The chief means of detecting gal¬ lium is by its spectrum.

GALLIUM CHLORIDE, in chemistry, Ga Cl3. It is colorless, crystalline and deli¬ quescent.

GALLIUM SALTS, salts precipitated by ammonia. If redissolved by hydrochloric acia, and again precipitated by ammonia, the precipi¬ tate is soluble in excess. If zinc is present the gallium is precipitated along with the zinc. Po¬ tassium ferrocyanide gives a yellow precipitate with strongly acid solutions of gallium chloride.

GALLON. See Weights and Measures. GALLOTANNIC ACID. See Tannins.

GALLOWAY, Beverly Thomas, American horticulturist and plant pathologist : b. Millers- burg, Mo., 16 Oct. 1863. He was graduated from the University of Missouri, agricultural course, in 1884; was assistant in the horticul¬ tural department of the university in 1884-86, and chief of divisions in the United States De¬ partment of Agriculture, division of vegetable physiology and pathology, in 1887-88. In 1900 he became chief of the Bureau of Plant In¬ dustry and served in this capacity until 1913, when he was appointed assistant secretary of agriculture. In 1914 he was made dean of the College of Agriculture at Cornell University. His writings include works on plant diseases, botany, horticulture, rural education and allied subjects.

GALLOWAY, Charles Betts, American

bishop of the Methodist Episcopal Church, South : b. Kosciusko, Miss., 1 Sept. 1849 ; d. 12 May 1909. In 1868 he entered the Mississippi conference and for several years he was pastor of various churches in that State. From 1882 until 1886 he was editor of the New Orleans Christian Advocate , and in the latter year was made bishop. He was also elected president of the board of education of his church, and pub-

lished a (Life of Bishop Linus Parker ; hand¬ book of Prohibition ; (Open Letters on Pro¬ hibition,) written during his controversy with Jefferson Davis on prohibition, of which he was an earnest advocate; < Modern Missions: Their Evidential Value) ; and Christianity and the American Commonwealth. >*

GALLOWAY, Joseph, American lawyer: b. near West River, Md., about 1729; d. Hert¬ fordshire, England, 29 Aug. 1803. He was ad¬ mitted to the bar in Philadelphia, and was a member of the Pennsylvania Assembly 1757-74. He held a seat in the Congress of 1774, where he suggested a plan of government headed by a president-general to be appointed by the king and to hold office during the latter's pleasure, and a grand council elected every three years by the assemblies of the several colonies. Be¬ fore

the conclusion of the Revolutionary War he removed to England; and in 1788 was charged with high treason by the Assembly of Pennsylvania, which ordered his estates to be sold. He was the author of (A Candid Exam¬ ination of the Mutual Claims of Great Britain and the Colonies with a plan of Accommodation on Constitutional Principles) (1780); History and Political Reflections on the American Re¬ bellionˆ (1780) ; etc. Consult Balch (ed.),

(Examination of Joseph Galloway by a Com¬ mittee of the House of Commons) (1855) ; Tyler, (Literary History of the American Rev¬ olution (1897).*

GALLOWAY, an extensive district in the southwest of Scotland, once somewhat larger, but now comprised in the shires of Wigtown and Kirkcudbright. To-day, the designation is nothing but a name, having no political bearing. It enjoys a mild climate, and is famous as a pastoral district, its breeds of small horses and of large, hornless, black cattle being well known. Dairy-farming is now an important in¬ dustry. The old district or province is about 70 miles in length by 40 at its utmost breadth, and contains the greatest diversity of scenery mountain, lake and stream, as well as dreary waste and almost pathless moor. There is no mineral wealth and few industries. The prov¬ ince owes its name to the fact that the natives were called Gall-Gael, or Foreign Gaels, at first because of their falling under the foreign rule of the Anglians ; but as the Piets of Galloway they continued to be known so late as 1138. Their geographical position had shut them off from their northern kinsmen and they continued under their ancient names a distinct people till the 12th century, and preserved their language — a dialect of Gaelic — down to the 16th cen¬ tury, when it finally disappeared before the Reformation and the use of Lowland Scotch in the churches and schools, leaving only a rich crop of place names similar to those of Ireland and the Highlands of Scotland. The earliest inhabitants are styled by Ptolemy the N ovantcE and their towns are given as Luco- phibia, Perigonium, Corda and Carbantorigum. Tacitus tells us that Agricola concentrated a force in that part of Britain which looked on Ireland, and most authorities identify this with Galloway, and they are borne out bv discovery of Roman forts in Wigtown. Galloway was subdued by the Northumbrian Anglians of Bernicia in the 7th century, and governed by them for about 200 years, and it was to this

period apparently that the modern name is due. After about three centuries of more or less complete independence, interrupted only bv Norse ravages and at length by a period of Norse supremacy, it was recovered by Mal¬ colm Canmore, granted as an earldom in 1107, to his youngest son David, and on his accession to the throne in 1124, formally united with Scotland. Of the native lords of Galloway several rose in revolt in attempts to throw

off the Scottish yoke, even offering fealty to Eng¬ land. Finallly in 1455 the lordship of Gallo¬ way was attached to the Crown. Consult Briggs, (Angling and Art in Scotland) (New York 1908) ; Mackenzie, (History of Galloway (1841); M'Kerlie, Calloway in Ancient and Modern Times) (1891); Maxwell, (History of Dumfries and Galloway) (Edinburgh 1900) ; Skene, 'Celtic Scotland) (ib. 1876).*

GALLS AND GALL-MAKERS. Galls are unnatural plant-growths caused by various forms of parasitic animals or plants, more partic¬ ularly by the hymenopterous family of gall-flies (Cynipidcz) . Gall-gnats (Cecidomyiidcz) , — (minute two-winged midges or flies), many species of mites, certain aphids, nematode worms, some forms of caterpillars, and the larvae of weevils and other beetles also cause galls. Among plant gall parasites, the most important are bacteria, slime molds and certain algae. The formation of a gall is due to the puncturing of any portion of a plant, the surface of the leaf, stem, roots or bark and the deposition of an egg in the cavity formed, or by the presence of larvae subsequently hatched from it. Within

Fig. 1.— Bedeguar Gall of Wild Rose.

these excrescences the larvae feed and grow, and either eat their way out while still grubs or remain till the pupa stage is past and emerge as adolescent insects. A gall may contain a single egg and larvae or many, and both external form and internal structure vary widely. Each gall-fly has its favorite or exclusive host, and usually restricts its egg-laying to some special part of the plant. While most produce true galls, some members of the family utilize galls already formed.

The process of gall formation is but imper¬ fectly understood. It is not known whether the gall-forming stimulus is mechanical or chemical in nature, nor whether it consists in the oviposition of the female or the growth and movements of the larvae. The extreme complexity and specialization of the gall adds greatly to the difficulty of explanation. A cynipid oak gall may consist of an outer shell,

Whw1?h'wing/bT sllPP°rtinS a larval cham- ber with well developed food-layers, Not only

" t1Cf°IlSlderˆble-increase in the number

J pof S' but tbe,r S1fe ls aIso often immensely greater than normal. The

gall is often full

waste produets, such as resins and tannic acid — whence comes their commercial value in tanning and in the manufacture of ink. Galls

s/antrTff related. species may maintain a con¬ stant difference in structure. Many galls are

smooth°r Spmy' WhlIe the plant is naturally

The reproductive relations of gall-flies are very interesting. In many cases parthenogene¬ sis undoubtedly occur; in some species, for ex¬ ample, of Rhodites, no males have ever been round ; in other forms the males when they occur are very few in proportion to the females It must be emphasized that many gall-wasps

Fig. 2. a, oak gall produced by Cynips quercus-folii; D, section of gall; c, gall-insect (Cynips Quercus-folii).

distinguished by entomologists as separate species or even referred to different genera have turned out to be the parthenogenetic and the sexual forms of one species. A common life history is as follows: (a) Out of a sum¬ mer-gall male and female forms emerge; (b) the females lay their fertilized eggs and give origin to winter-galls in so doing; (c) from these winter-galls there arise parthenogenetic females which in their egg-laying produce the summer-galls from which we started.

Galls vary greatly in shape, and may be solid or spongy, and contain one or several cavities, in each of which a larvae is lodged. Though galls are very generally distributed, they occur in commerce chiefly as Levantine ar¬ ticles of trade. The Aleppo nut-galls are spher¬ ical. and tubercular ; blue, black and white varieties are recognized, the two former being picked before the escape of the larvae, the lat¬ ter after its exit. They are produced by a gall-fly (Cynips g all cetincto rice) on twigs of an oak (Quercus infectoria). The galls made on oak by the common British ˆash-fly® (C. quer- cifolia), or by the hundred or more American species of Cynips, might serve the purpose of ink making, tanning, etc., just as well; the 70 to. 80 per cent of tannin they contain is the principal element of value. Dead Sea Apples, or Mecca or Bussorah galls, or Apples of Sodom (mala insana, or C. q. infectoria in- sana), are varieties of this vegetable product. The artichoke or strobile galls consist of sev¬ eral pieces, and resemble the fruit (strobilus) of the hop. They, are exemplified by the gall produced on the willow by a Cecidomyia. The hairy galls, or bedeguars, or rose sponges, are chiefly found on Rosa rubiginosa ; they are produced by Rhodites rosce. A peculiar fact

about many galls is that they contain insects o er than those . which have caused them.

ese are called inquilines. They are often, out not always, closely related to true gall¬ forming insects. Consult Adler, H., (Alternat-

rfn GenSra'°"s = A Biological Study of Oak Galls and Gall Flies > (Oxford 1894) ; Beuten- muller The Insect-Galls of the Vicinity of v-eiV iur \rˆlty (American Museum Journal,

r °if York 1904> J Kuster, E„

Gallen der Pflanzen> (Leipzig 1911).

N' a c?ty on tlie Atchison, lopeka and Sante Fe Railroad; in McKinley County in the western part of the State. Sev¬ eral large coal mines are in the vicinity and also two brick works. . There is an auto road to Pueblo of Zum 3a miles south and to Ganado, Saint Michaels and Fort Defiance to northwest.

e city has extensive trade with Navajo In¬ dians who have a reservation not far north, ihere are large supplies of water from artesian wells. Pop. (1920) 3,920.

n GALLUS, sometimes mentioned as Saint

u' flIlan or Saint Gall: b. Ireland

about 560; d at the monastery of Saint Gall, Switzerland, 16 Oct. 646. He is known to have been a. disciple of Columban. With a few companions, he established the hermitage of Saint Gallus in 613 which later became a noted monastery. An account of his life appeared in the 8th century but is so filled with legends as to make it seem without authority. He is said to have seldom left his cell. The monastery had a continuous and eventful career until 1805 when it was suppressed. The buildings were used as a spinning factory from 1801-08. I he wonderful collection of manuscripts num¬ bering over 80,000 is still in the town.

GALLUS, Caius Cornelius, Roman poet : general and administrator: b. Forum Julii (modern Fre jus), in southeastern Gaul, about

i.B'CA ˆ B c- He was educated at Rome, where he became an intimate friend of Virgil, Varus and Asinius Pollio. After the assassina¬ tion of Julius Caesar, Gallus joined the party of Octavius (afterward Augustus), by whom he was appointed to assign lands in .northern Italy to army veterans. He commanded a division at Actium, and in Egypt defeated the forces of

Antonius and captured Cleopatra. When Cleo¬ patra died (30 b.c.), Gallus became the first governor of the Roman province of Egypt, which he administered with considerable suc¬ cess for. four years. Then charges against him were laid before Augustus, and, deprived of rank and estates and sentenced to banishment, he killed himself by falling on his sword. Gallus, who imitated the Greek Euphorion, is regarded as. the founder of the Roman eligy, and. by Ovid is given first place among the elegiac poets of Rome. He wrote four books of elegies chiefly on his mistress, a notorious actress named Cytheris, whom he called Lycoris. Little or nothing of his verse has survived. He is introduced in the well-known story of Roman domestic life, entitled (Gallus: Roman Scenes from the Time of Augustus, J by W. A. Becker (Eng. trans., London 1844; 9th ed., 1888). Consult Nicholas, A., (De la vie et des ouvrages de C. Gallus > (Paris 1851) ; Mackail, J. W., ((Virgil and Virgilianism® (in (Lectures on Poetry, J London 1911) ; Smith, K. F., (The Elegies of Albius Tibullus) (New York 1913).

GALOIS, gal 'wa', Evariste, French math¬ ematician: b. Bourg-la-Reine, 25 Oct. 1811; d. Paris, 31 May 1832. He obtained his early edu¬ cation in the College de Louis-le-Grand and en¬ tered the Ecole Normale in 1830, while there writing a theorem on the solubility of irre¬ ducible equations of prime degree by radicals, six articles on the theory of equations and theory of numbers, and with others founded the theories of groups and functions. His works were published in Paris under the auspices of Le Societe Mathematique de France (1897). See Equations, Galois Theory of.

GALOPARO, gal- o-pa'ro, an agitated body of water off Capo del Faro, the Charybdis (q.v.) of the ancients. It forms the whirlpool on the outside of the harbor of Messina, in the strait separating Italy from Sicily. Opposite, on the Italian coast, is the rock Scylla.*

GALSWORTHY, John, English author: b. 1867. His early works appeared under the nom-de-plume of ((John Senjohn55 and attracted little notice, being purely of a conventional type. 'Jocelyn5 (1898), (Villa Rubein5 (1900) and (A Man of Devon5 (1901), all belong to this period. His later novels and plays departed from the conventional and are more individual, more serious and vastly more interesting, be¬ cause of their dealing with acute social prob¬ lems of the 20th century. Such are 'The Is¬ land Pharisees5 (1904; 1908), a satire on Brit¬ ish insularity and provincialism; 'The Man of Property5 (1906), dealing with capitalism ; 'The Country House5 (1907), depicting English bourgeois types;

‘Fraternity5 (1909, German translation 1911), a study of class conscious¬ ness and solidarity; ‘The Patrician5 (1911); ‘Moods, Songs and Doggerels5 (1911); ‘The Inn of Tranquillity5 (1911); ‘The Dark Flower5 (1913); ‘The Little Man and Other Satires5 (1915); and ˆThe Freelands5 (1915). His plays present social problems even more strongly than his novels. Of these the most important are ‘The Silver Box5 (1906), show¬ ing the all too frequent legal differentiation between rich and poor; ‘Joy5 (1907) ; ‘Strife5 (1909), the story of a strike; ‘Justice5 (1910), a play of prison life; ‘The Little Dream5 (1911) ; ‘The Pigeon5 (1912, produced in New York in 1913), a problem in poverty; ‘The Eldest Son5 (1912); ‘The Fugitive5 (1913); ‘The Mob5 (1914); ‘The Foundation5 (1917); Beyond5 (1917). Galsworthy was included in the king’s New Years honors (1918) for a knighthood which he declined. (See Tustice) Consult Skemp, A. R., ‘Plays of John Gals¬ worthy,5 in ‘Essays and Studies by Members of the English Association5 (Vol. IV, London

1914).

GALT, gait, Sir Alexander Tilloch, Cana¬ dian statesman: b. London, England, 6 Sent. 1817; d. Montreal, 19 Sept. 1893. He was a son of John Galt (q.v.) and went to Canada while still a boy. He was closely identified with the Eastern Townships ; was first elected to the Canadian legislature in 1849; was Minis¬ ter of Finance 1858-62, 1864-66 and in 1867; and Canadian High Commissioner to England from 1880-83. He was the first to bring Confederation within the range of practical politics, and he stoutly claimed for Canada the right to determine her own fiscal policy. His budget of 1859, embodying as it did his policy

of incidental protection, was inconsistent with the treaty of reciprocity then subsisting between Canada and the United States, and helped to put a period to the agreement. He was created K. C. M. G. in 1869, and was one of the fish¬ eries compensation commissioners under the Washington Treaty of 1871.

GALT, John, Scottish novelist: b. Irvine, Ayrshire, 2 May 1779; d. Greenock, Scotland, 11 April 1839. In 1804 he went to London, and entered into a mercantile partnership, but the venture soon ended in bankruptcy. He then entered himself at Lincoln’s Inn, but made small progress in law, and quitted England in 1809. He made a tour of the south of Europe and the Levant, and on his return in 1812 published ‘Voyages and Travels in the Years 1809, 1810 and 1811, 5 and in 1813 ‘Letters from the Le¬ vant. 5 In 1812 he had published ‘Life of Car¬ dinal Wolsey,5 and also a volume of tragedies, which received a rough handling from the Quarterly Review. In 1820 and 1821 the ‘Ayr¬ shire Legatees,5 a series of letters descriptive of a supposed visit by a Scottish minister’s

family . to London, appeared in Blackwood' s Magazine, and attracted universal attention. Its success induced him to publish immediately afterward his 'Annals of the Parish,5 which was received with no less approbation. 'The Provost,5 'The Steamboat,5 'Sir Andrew Wyl- he5 and 'The Entail5 appeared in rapid suc¬ cession. These were all extremely popular, but his subsequent novels, 'Ringhan Gilhaize,5 'The Spaewife5 and 'Rothelan,5 did not sustain the reputation which fie had acquired. 'The Omen5 (1825), which was praised by Scott, was followed by 'The Last of the Lairds5 (J826). In 1826-29 he was superintendent to the Canada Company. While in Canada he founded the town of Guelph (1827). After his return to England he produced many works,

. including 'Lawrie Todd5 (1830), containing sketches of frontier life in America; 'Southen- nan ; 'Life of Lord Byron5 ; 'Autobiography of John Galt5 ; 'Literary Life and Miscellanies5 in three volumes. Collected editions of his works were published in London (4 vols., 1868 ;

8 vols., 1899) ; the novels were edited by Mel- drum (8 vols., London 1895-96).

*GALT, Canada, town of Waterloo County, Ontario, on the Grand River, the Canadian P. and the Grand T. railways, 25 miles northwest of Hamilton; named for John Galt, the Scottish novelist (q.v). The town is picturesquely situated on both sides of the river which is here crossed by several bridges. It is substan¬ tially built and. lighted by gas and electricity; an important jobbing centre; the seat of * a United States consular agent; and has manu¬ factories of flour, axes, paper, woolens, leather, foundry products, woodenware and paper. Be¬ tween 1900 and 1910 its manufactures increased by nearly 140 per cent. Lumber, limestone and sand are in the neighborhood. An electric railway gives connection with Kitchener, Paris and Brantford. Pop. 10,299.*

. GALTON,, gal'ton, Sir Francis, English scientist: b. Birmingham, 16 Feb. 1822; d. 17 Jan. 1911. He was a grandson of Erasmus Darwin and a cousin of Charles Darwin, the scientist. He. was educated at King Edward's School, Birmingham ; studied medicine at the Birmingham Hospital and King's College,

London; and graduated at Trinity College

1namNonlge'A1fn ■ >84\ Hav,inS in 1846 traveled ,tl,L 'iVfnCa' .he explored in 1850 lands hitherto unknown in South Africa, publishing

his experiences in his ‘Narrative of an Ex

?Ar,erˆfn’r‘r°Pli<;a/,So0rrlh A*™?’ (1853), and in m , Travel (1855). His investigations in

T7r\record?d in ‘Meteorographica*

, ‘a’lri. he specially devoted himself to the pioblem of heredity and anthropology. He

«eiSenirs> >edfnS ,founde^ of the science of hnman f desi8ned to improve the

human family by discouraging and checking the

propagation of the unfit and selective breeding among the fit, and he left his fortune to found a chair in that science in the University of Lon-

?ther,_ subject that attracted him was identification by means of fingerprints; he de¬ vised a directory for that purpose; and prac¬ tical application of his theories is now being made by the criminal authorities. Among his works are < Hereditary Genius: its Laws and Consequence^ (1869); ‘Experiments in Pan- genesis) (1871); ‘English Men of Science: their Nature and Nurture* (1874); ‘Life-His-

‘Natural Inheritance> (1889); ‘Finger Pnnts> (1893); ‘Fingerprint

; (Noteworthy Families)

(1906) ; ‘Memories of My Life> (1908) • ‘Essays m Eugenics^ (1909). He was knighted in 1909.

GALUPPI, ga-loo’pe, Baldassare, Italian composer: b. island of Burano, near Venice, 18 Oct. 1706; d. Venice, 3 Jan. 1785. He was sometimes called “II Buranello.» From 1722 he was an organist in Venetian churches, and he early wrote an opera, ‘Glianrci rivaliP After study of advanced composition as a pupil of Antonio Lotti, he again turned to writing, and achieved notable success with more than 70 comic operas, among them ‘II mondo della luna,> and ‘II mondo alia rovesciaP He has generally been considered the originator of comic opera (opera buffa) in Italy. From 1741 he was for some time resi¬ dent and active in London, in 1762 became maestro di capella at Saint Mark’s and director of the Conservatorio degli Incurabili, and in ,1765-68 was in Russia as court composer and director of music. Returning to Venice, he continued as director at the Incurabili. He wrote some sacred works, but none of his compositions are known to-day save a harpsi¬ chord sonata which finds place in Pauer’s ‘Alte

KlaviermusikP He is apostrophized by Brown- ing in 'A Toccata of Galuppi'sP Consult Wotquenne, A., 'Baldassare Galuppi, etude bibliographique sur ses oeuvres dramatiques) (Brussels 1901).

GALVANI, gal-va'ne, Luigi, Italian physi¬ ologist ; the discoverer of galvanism : b. Bo¬ logna, 9 Sept. 1737; d. there, 4 Dec. 1798. He studied medicine, and in 1762 entered on the practice of his profession. His favorite studies were anatomy and physiology. He soon re¬ ceived the appo:ntment of professor of anat¬ omy in the celebrated university of his native city and published a treatise on the urinary organs of birds. While engaged in these pur¬ suits he was fortuitously led to the discovery which has immortalized his name. It is related that his wife, the daughter of Galeazzi, a medi¬ cal professor under whom he had studied, and

a woman of superior intelligence, having ob¬ served that the contact of the inanimate body of a skinned frog with a scalpel lying on the table produced in the frog a series of remarkable muscular convulsions, the knife having been in contact with an electric machine, informed her husband of the fact, who instituted a series of experiments, and formed conclusions which led to a controversy with Volta. Galvani rightly ascribed the convulsive movements to electricity jut erroneously concluded that the electricity was generated by nerves and muscles. On a journey to Smigaglia and Rimini he was so tortunate as to trace the cause of the electric appearances which are observed in the torpedo and wrote a learned treatise on this subject! Ihe loss of his beloved wife in 1790 rendered him inconsolable Having refused to take the oaths to the Cisalpine Reoublic in 1797, he was deprived of his chair, and refused to resume it when the government, in consideration of his celebrity, offered to allow him to do so uncon¬ ditionally.

GALVANIC BATTERIES. See Primary Batteries.

GALVANISM. See Electricity; Galvan¬ ization, Treatment of Disease by.

GALVANIZATION, Treatment of Dis¬ ease by. Of the different forms of electricity used in medicine the galvanic or direct current is perhaps the most widely employed. This form of current is derived from a primary battery, a storage battery, or a direct current dynamo. . Its therapeutic use has a wide range: inv:goration of the muscles; stimulation of the nutritive processes and of the secretory organs • allaying, congestion ; equalizing the blood pres¬ sure, elimination of morbid substance from the tissues; repulsion of bacterial attack; and sedative effects upon the nervous system Gen¬ eral galvanism is sometimes applied before a surg eal operation to put the patient in a satis¬ factory state, and after the operation as a tonic measure, and also where the healing processes tend. to produce local deformities. It may be administered either locally or centrally; local

*galvanization is used especially for the relief of pain. It is applied to the brain, eye, ear, sympathetic nervous system, spinal cord, ure¬ thra, bladder and chest, either by what is ' known as "stabile** application, in which both electrodes are kept in a fixed position, or by "labile® application, in which one or both electrodes are slid over the surface, but not lifted from the skin. It is found that a greater sedative . influence is obtained if the galvanic current is not interrupted. Labile and stabile interrupted currents are generally preferred for the galvanization of muscles of the head, spinal cord and nerve-tracts. Stabile continu¬ ous currents, either uniform or increasing, give the best results. When the galvanic current is interrupted it causes, as is well known, pro¬ nounced muscular contraction. This is of service as a tonic to poorly nourished and atrophied muscles.*

By "central® galvanization is meant that mode of treatment by the galvanic current by which the entire central nervous system may be brought under the influence of the electrical fluid. In order to accomplish this, one electrode, usually the negative, is placed over

the solar plexus, at the pit of the stomach, while the other is firmly pressed to the top of the head and passed gradually over the back of the head and along the inner border of the strong muscle that pulls the neck to one side, the sternoclidomastoid. From here the electrode is passed down the spine. It is thought to in¬ crease the electrical excitability of the central nervous system, inducing sleep and relieving general tire. It is a method, however, that should be used with great caution, as it may do more harm than good. See Electro¬ therapeutics.

GALVANIZED IRON, sheets of iron coated with tin by a galvanic process, and with a second metal, zinc, which is effected by pre¬ paring a bath of fluid zinc covered with sal ammonia mixed with earthy matter. When the tin-coated sheet is plunged into this prepara¬ tion the zinc is precipitated with a crystal-like diaper upon the tin. The term is sometimes improperly applied to sheets of iron which have been coated with zinc without recourse to the use of galvanism. The iron, after being thoroughly cleaned from all trace of oxydiza- tion, by a dilution of sulphuric acid, is then plunged into a bath of melted zinc and other substances . such as sal ammoniac, or mercury and potassium.

GALVANOCAUTERY, the use of a

cautery knife, loop, point or blade heated by the passage of a galvanic

current. It is of value wherever a limited cautery action is de¬ sired, and particularly valuable in being easy to control. See Electrotherapeutics.

GALVANOMETER, an instrument for de¬ tecting and measuring the intensity, direction or length of duration of an electric current by means of the magnetic force it produces. The many types of indicating instruments such as voltmeters and ammeters, where the pointer is held at zero by some directive force, such as the earth's field, a spring or weight or a perma¬ nent magnet, come under this head. With very few exceptions, all galvanometers may be classed under two heads: (1) Those having a magnetized needle suspended so as to move freely in a horizontal plane, the needle being normally held at zero position by means of the earth's field or an external field produced by auxiliary magnets placed to accomplish this result. The needle is suspended on a pivot or a quartz fibre or fibre of silk or other appro¬ priate material. (2) Those having a coil of wire in place of the needle in the first class. This is the type usually called the d'Arsonnal type, and has the coil suspended by means of a fine wire, which provides a way 'for leading current to the coil, and has another wire under¬ neath the coil for conducting the current from it. The coil, with the conducting wires, is then suspended between the poles of a magnet, its axis being normally at right angles with the lines of the field. The second class of galvanom¬ eters, those having a moving coil, are to be preferred for most classes of work, all except those requiring the very greatest delicacy, for the following reasons : The readings are but very slightly affected by the presence of an ex¬ ternal field or by magnetic substances in vicinity of the instrument, and are practically independent of the variable influence of the

earth's field ; this form of instrument may easily be made dead-beat (that is, when the coil is deflected it goes at once to its position with¬ out long vibration), on account of the strong field in which the coil moves ; many forms are portable and much less affected by vibrations than those of the first class.

The figure of merit of a galvanometer may be expressed either as the current necessary to cause a deflection of one scale division, or as the resistance through which one volt will cause a deflection of one scale division when such resistance is inserted in the circuit. Such an expression of the delicacy of a galvanometer should be accompanied with the following data : The resistance of the instrument, the scale dis¬ tance and size of one division of the scale. The sensitiveness of a galvanometer is expressed as the difference of potential across the galvanom¬ eter terminals necessary to cause a deflection of one scale division; and to be exact, should be accompanied with the same data as for the figure of merit. Of the moving needle class of galvanometers the tangent galvanometer and the Thomson astatic galvanometers are prob¬ ably in most general use. The

tangent galva¬ nometer is constructed so that the inside diame¬ ter of the coil which surrounds the needle is at least 12 times the length of the needle. Under these conditions, the needle being held at zero by the earth's field, the current strength will vary, directly as the tangents of the angle of deflection ; hence the name of the instrument. Although at one time much used for the abso¬ lute determination of current strengths, it has of late been replaced by other types, on account of its many correction factors, some of which are of uncertain magnitude, a prolific cause of error being the necessity of knowing the exact value of the horizontal component of the earths .magnetism, which quantity is subject to continual change and is affected by large masses of iron or heavy electric currents in the vicinity. .The sine galvanometer is similar but the coil is moved so as to bring the needle back to zero. This makes the sine of the angle through which the coil is moved proportional to the deflecting current.

The Thomson Galvanometer. — This type was designed by Lord Kelvin, and to him we are indebted for the most sensitive instruments as yet made. The moving system consists of a slender quartz rod to the centre of which is fastened a small mirror of glass which reflects a ray of light to a graduated scale. Above and below the mirror at each end of the quartz rod is fastened a complex of carefully selected magnetized needles, minute in size, placed paral¬ lel to the -plane of the mirror. In the upper complex the north poles of the needles are all placed in one direction, and in the lower complex the north poles of the needles are placed in the opposite direction, the combina¬ tion forming an astatic system, on which the*

exerts a very slight directive force. Itus directive force exerted by the earth's field would be zero if the two complexes could be made exactly equal in magnetic strength. Each complex of needles is enclosed by two coils, thus making four coils in an instrument. These coils are provided with binding posts for series oi parallel connection, and are connected so that the current flowing through them will

caube the magnetized needles to be deflected in direction in each complex. An adjustable magnet mounted on top of the in¬ strument provides a directive action on the needles which may be modified to any extent, a weak directive force increasing the sensitive- ness greatly, and also increases the period of oscillation, so that in the best instruments the sensitiveness is limited largely to the patience °J observer Refinements of this type have

needles001 S an<ˆ eˆˆlt needles or groups of

Movmg Coil Galvanometers.— This type is most familiar in the d'Arsonnal galvanometers, and is to be preferred for most purposes within the limits of its sensitiveness. Its preference lies in the fact that it may easily be made dead¬ beat, and the readings are practically independ¬ ent of the earth's field or magnetic substances in its vicinity. The construction also adapts itself to a portable type of instrument, and it may be so constructed as to be very slightly affected by vibrations. The sensitiveness of this class of galvanometers may be further in¬ creased by substituting an electro-magnetic field f'r that produced by permanent magnets.

Among the. newer European galvanometers are the following: The Broca galvanometer is of the type having fixed coils and a moving magnetic system. Its distinctive feature is the form of this system, which consists of two steel wires hung vertically and close together. Each wire has like poles at its ends, making the system astatic. The Einthoven string gal¬ vanometer has a single fine wire or quartz fibre in the intense field of a powerful electro¬ magnet having a narrow air gap. When a cur¬ rent flows through the string, the latter moves across the field. The motion is observed with a microscope or is registered by projecting the image of the string on a screen. This galvan¬ ometer has an extremely short period, as low as one one-hundredths of a second. It is highly sensitive and is free from inductance and capac¬ ity. The Duddell thermo-galvanometer has sus¬ pended in the field of a permanent magnet a loop of silver wire which is closed at the bottom by a thermo-couple of bismuth and antimony. The current to be measured is caused to flow through a heating coil placed below the thermo-couple. The heat sets up a current in the loop and deflects it more or less according to its strength. This galvanometer works equally well with either direct or alternating currents. It can be used with the wireless cur¬ rents and for the telephone. Another type called the Duddell oscillograph is made for voltages up to 50,000 in either of two forms — with permanent magnet and with electromag¬ net. The former is preferred for the high- frequency currents and is more readily trans¬ ported when necessary.

J. E. Taylor,

Western Electric Company, Philadelphia.

GALVANOSCOPE. See Electrical Terms.

GALVESTON, Tex., city, port of entry and county-seat of Galveston County, located on the east end of Galveston Island which is 30 miles long and two miles from the main¬ land. Galveston Bay lies to the north and Gulf of Mexico on the south. The city is con¬ nected with the mainland by

the Galveston

Causeway, an arched reinforced concrete structuie, and used by electric interurban, steam railways, auto and vehicle traffic. It is 0n, bbc Southern Pacific, the Missouri, Kansas and lexas, the Gulf, Colorado and Santa Fe, the International and Great Northern, the Galves¬ ton, Houston and Henderson, and the Gulf and Inteistate railroads, and Galveston-Houston Electric Interurban. The city possesses a fine jeach automobile speedway, 25 miles long. Semi-tropical winters and balmy summer bieezes offer a delightful climate the entire

AooarW , e antlual average temperature is W . Galveston has a magnificent gulf front, irick paved, brilliantly illuminated boulevard and walk, four and a half miles long and 17 feet above sea-level. It has two splendid bathing Payilions, pleasure and fishing piers, city-owned gulf front public park with free band concerts boating, fishing and one of the finest and most up-to-date resort hotels in the country. Fish¬ ing is confined to no season. Tarpon, Jack fish, trout, Spanish mackerel, red fish, pompano and red snapper are freely caught at and near Gal¬ veston. The coast country in the vicinity of Galveston, during the fall and winter, is a hunter's paradise. The bays and creeks in this locahty abound with ducks, geese and snipe. Miles of oleanders and palms line the streets. It is a city of beautiful residences and many conventions and large gatherings have been held here.

Public Buildings.— Galveston has a mag¬ nificent fireproof city auditorium, seating 4,200 The finest public library in the State, endowed with a fund of $535,000. The finest and best equipped public hospital in the South. A large Roman Catholic hospital, Y. M. C. A. building, a Masonic temple and Scottish Rite cathedral' Elks, Ivn ghts of Columbus and Eagles build¬ ings. Galveston has 31 churches for white peo¬ ple and 12 churches for colored people, two or¬ phan asylums, a home for homeless children and a home for aged women ; the School of Medicine of the State University, 12 private or sectarian schools, a Roman Catholic Uni¬ versity, two Roman Catholic academies, a bus¬ iness college and public high school and seven graded schools for white children. One high and two graded schools for colored children.

Docks and Terminals. — The city possesses 30 piers and berth room for 100 ocean-going vessels, coal elevators and floating bunker plants, fuel oil stations, 245 miles of standard gauge terminal tracks and 3,000,000 feet of covered storage space on water front. The Galveston Wharf Company in which the city owns a one-third interest has an improved chan¬ nel frontage of 12,400 lineal feet and the Southern Pacific Terminal Company, 1,350 lineal feet. The city has 22,990 lineal feet of undeveloped channel frontage, a powerful wire¬ less telegraph station, termini of the Mexican

Telegraph Company, cable communication direct with Mexico and a United States quarantine station. There are commodious and modern immigration station and buildings. A United States revenue cutter is stationed at Galveston. The average yearly business passing over the Galveston docks is over $400,000,000. The ex¬ port cargo in 1917 reached approximately $275,000,000. The facilities at Galveston for the proper storage of cotton are unequaled, there being ample space to store on end 913,500

bales. Galveston has a 10,000-ton dry dock and several ship repair plants. It has taken the national government 41 years and has cost $11,000,000 to develop the port of Galveston. It has a very large and impressively beautiful and well-fortified harbor, a channel six miles in length from open sea to docks, more than 32 feet of water on the bar with 35 feet on the inside, magnificent up-to-date system of docks, warehouses, compressers, fine grain elevators, railroad terminals and facilities and is well lo¬ cated with respect to the Panama Canal. Cars are unloaded and released on an average within one and a half days after arrival. Grain ships are loaded in one day.

Trade and Commerce. — Galveston is the natural entry port for the great Southwest. Its trade, particularly in cotton, places it among the foremost cities of the world in the volume and value of its exports and imports, as the figures will indicate. Galveston has advanced from third to second place in its rank among ex¬ porting ports of the United States. The total value of foreign exports for the trade year of 1917 was $275,000,000 and for 1916, $198,298,736. These figures place Galveston the fourth city in the United States in the volume of its foreign commerce. Galveston has over 50 lines of steamships to foreign ports, besides two regular lines of coastwise vessels to New York and points in the Gulf of Mexico. The do¬ mestic exports are cotton, wool, hides, oil cake and oil meal, cottonseed oil, fish oil, cement and poultry. The domestic imports are drugs, boots and shoes, hats, dry goods, chemicals and like commodities. The foreign exports are cot¬ ton, cottonseed oil, oil cake and meal, wheat, corn, flour, copper and iron ores, cattle, lumber and timber and provisions. The foreign im¬ ports include fire brick, tiles, chemicals, cement, liquors, earthenware, prepared vegetables and fancy woods. There are four export grain elevators, with a storage capacity of 4,000,000 bushels, and one clearing and conditioning elevator.

Government, Public Utilities, etc — Gal¬ veston is governed by a mayor

and four com¬ missioners, known as the board of city com¬ missioners. The commission plan was in¬ augurated by the city of Galveston, 18 Sept. 1901 and has proved highly satisfactory. The city owns Pelican Island, immediately across the channel from the city and with a channel frontage of 15,000 feet. On this island are located the dry dock and ship-repairing plants. It is susceptible of development into docks, warehouses and an ideal location for ship¬ building plants. The city owns four public parks. The waterworks, fire department, sewer system and street electric-light plants are owned by the city. The waterworks is valued at $2,000,000. The supply of water comes from artesian wells on the mainland and is piped under the bay. The city also owns a one- third interest in the Galveston Wharf Com¬ pany and is represented on its board of nine directors by the mayor and two of the four city commissioners.

Finances and Industries. — The city has three State, four private and two national banks, 21 building, loan, abstract and real es¬ tate corporations. Two daily papers and six weekly papers are published here; 20 hotels, a large jobbing trade, brewery, cement and pipe

works, ice plants, cold storage plants, iron works, sash, door and blind manufactories, cot¬ ton presses, clothing, flour, meal, coffee, baking powder, spices, extracts, pickles, preserves, macaroni and mineral water manufactories and rice mills, book manufacturing, lithographing and printing establ.shments.

Taxes and Assessments. — The assessed val¬ uation of the city for 1918 was $43,000,000. The rate of taxation for the city on $100 valuation is $1.65, and for school purposes 25 cents addi¬ tional. The public debt is $5,655,525.30, includ¬ ing grade raising bond issue.

History. — About the year 1782, a Spanish fleet made an examination of the coast of the Gulf of Mexico west of the Mississippi River, and named Galveston Bay and Island in honor of Conde de Galvez, then governor of Louisi¬ ana. The explorers found on the island one white man who subsisted by hunting and fish¬ ing. Galvez was governor of Louisiana from 1780 to 1785. Until the year 1816 Galveston Island remained in its primaeval state, a low island formed in process of time by the sea throwing up sand and shells. The conjecture that La Salle visited Galveston Island during his brief stay in Texas is without reasonable foundation. The island was long a favorite hunting ground for the Caronkawas, the once powerful and warlike tribe which inhabited so much of the coast of Texas. Francisco Xavier Mina, a young Spanish soldier, resolved to lend the patriotic cause in Mexico his sword and aid the people of that country in their struggle for liberty. He determined to make Galveston Island his base of operations. He worked in co¬ operation with Don Luis Aury, a naval officer. His plan was

approved by Herrera, a com¬ missioner of the Mexican revolutionary or Morelos government to the United States. Her¬ rera, with Aury, landed on Galveston Island with an expedition in September 1816. A gov¬ ernment was organized, Aury was made civil and military governor of Texas and Galveston Island and took the oath of fealty to the Re¬ public of Mexico. In November 1816, Mina arrived at Galveston with a few small vessels and about 200 men. Mina and Aury abandoned the island in March 1817. Just about the time they left Galveston Island we have the first ac¬ count of Lafitte coming to the island. The pirate is supposed to have reached Galveston late in 1816. He held letters of marque from the revolutionary government of Venezuela au¬ thorizing him to prey upon the commerce of Spain. He had a number of vessels and quite a force of adventurers. He also assumed to be governor of Texas under the revolutionary gov¬ ernment of Mexico, probably having received some such authority from Herrera, the Mexi¬ can commissioner in New Orleans. Lafitte's purpose was to capture Spanish vessels sailing under the flag of the Mexican republic. By the close of the year 1817 the population of Galves¬ ton had increased to nearly 1,000. The United

cause for complaint against the pirates, but Spain feared the United States would claim the island if the pirates were dispersed by the American naval establishment and the United States did not feel called upon to takeˆ action, owing to the attitude assumed by Spain, consequently Lafitte was left undis¬ turbed. In 1820 an American vessel was taken by Lafitte s men. The United States govern-

ment then dispatched an armed vessel under Lieutenant Kearney to break up the establish- ment at Galveston. Lafitte left Galveston for good, but continued his depredations upon Spanish shipping until 1826. In 1820 Dr Tames Long visited Galveston Island to induce Lafitte n-aS ab°\lt: Ieavln? Galveston, to co-operate / Tr lm ,in Jˆle establishment of a government at Nacogdoches. Lafitte referred to the failure of all previous attempts to invade Texas and re¬ fused to join Long Before Long left Bolivar

a Fre"C,h sloop freighted with wine stranded on Galveston Island. Caronkawas to the number of 200 were encamped in the vicin- T' , 1 hˆy attacked and butchered the crew, plundered the sloop and engaged in a drunken jollification Long determined to chastise them, u te- "Lˆtfall with 30 men he passed over to the island in small boats. In the fight the Garonkawas outnumbered the whites seven to one. Long was compelled to retreat. Three of his men were killed; 32 Indians were left dead on the

field.

Little is heard of Galveston Island after Longs expedition until just previous to the battle of San Jacinto. The island was prac¬ tically abandoned from 1820 until along in the thirties, when the Mexican government estab¬ lished a custom-house on the island. On the occasion of the preliminary meeting at Brazoria to declare the independence of Texas in 1835 there was no representitive present from Gal¬ veston. The same is true of the more formal declaration of independence which was made •on 2 March 1836, at Washington on the Brazos. Just prior to the battle of San Jacinto the new Texas government retreated from Washington to Harrisburg. As Santa Anna and his army approached Harrisburg, President Burnet and his Cabinet sailed down to Galveston Island, narrowly escaping capture. The news of the victory at San Jacinto reached President Burnet on Galveston Island 26 April 1836. The pro¬ visional government of Texas under Governor Smith in 1835 had granted letters of marque and reprisal and had provided for the establish¬ ment of a small navy. The Liberty, one of the vessels of this navy, was at Galveston at the time of the battle of San Jacinto. Several prizes were taken by the Texas navy and brought into Galveston Bay. During the hostile period following the battle of San Jacinto the Mexican government proclaimed a blockade against the. ports of Texas and in attempting to enforce it interfered with vessels of the United States. In 1837 the Texas navy was increased and several vessels were stationed at Galveston. The Third Congress of the Texas republic as¬ sembled at Houston in November 1838. The county of Galveston was represented for the first time in the third House of Representatives by Moseley Baker. After the annexation of Texas and the outbreak of the Mexican War the first Texas regiment to join General Taylor was composed of six months' men raised and organized in Galveston, commanded by Albert Sydney Johnston. Galveston County was created 15 May 1838. 4 he battle of Galveston

during the Civil War occured 1 Jan. 1863. The first railroad begun in Texas was at Harrisburg in 1852. The Galveston, Houston and Henderson road was begun at Virginia Point in 1855. Trains were first run from Virginia Point to Houston in 1859 and in that

year a contract was let for the first Galveston -Bay bridge, which was completed and trains were run into Galveston in I860.

The jetties at Galveston were completed in 1836, since which time the water at the point where the bar existed has been slowly deepen¬ ing. (bee Galveston, Jetties at). Galveston wharves are only one hour from the deep

sea for a laden steamer. Galveston wharf and terminal facilities, as a system, have few equals

in the country, being excelled in no particular except size.

In December 1836, Col. Michael B. Men- ard purchased of the republic of Texas for the sum of $50,000 one league and labor of land on the east end of Galveston Island. He asso¬ ciated with him a number of persons and they formed a joint-stock company known as the Galveston City Company, which was incor¬ porated in 1841. This company is still in ex¬ istence, although its present holdings of real estate are not large. The city of Galveston \vas incorporated in 1839. The first mayor was John M. Allen.

Recent Civic Achievements. — The build¬ ing of the causeway, connecting Galveston Is¬ land with the mainland, the building of the sea¬ wall and extension thereof and the raising of the grade of a large part of the city are three great achievements. On 8 Sept. 1900 Galves- ton was visited by a West Indian hurricane which did much damage to property and caused great loss of life. To guard against any such disaster in the future the city government secured the services of an engineering board ˆrˆPosed of Gen. Henry M. Robert, Alfred Noble and H. C. Ripley, whose duty was to pre¬ pare plans looking to the protection of the city against storm damage. The county of Galves¬ ton assisted by the railroads constructed the great causeway. The county constructed the sea-wall and the United States extended same The wall is 17,593 feet long, 16 feet wide at base and 17 feet high. (See Galveston Sea- Wall). The raising of the city grade was financed and carried out by the city with aid extended by the State, under the direction of a grade raising board, composed of J. P. Alvey, chairman; John Sealy and E. R. Cheesborough, secretary, appointed by the governor, S. W. T. Lanham. The total cost of the sea-wall and grade raising was $4,783,138.54, not including the cost of raising 2,156 buildings and other im¬ provements aggregating $1,000,000 additional. The plan adopted in raising the grade of the city was not only remarkable in itself, but was one that called for great sacrifice on the part- of the people. A canal, two and one-half miles long, 300 feet wide and 20 feet deep, was excavated from Galveston Bay through the residence section of the city. The people, for the mere payment of taxes, leased their land to the city and improvements were moved to vacant lots. Five self-loading, self-propelling and self-discharging hopper dredges were em¬ ployed. Sand was sucked up from the bottom of the bay and brought in through the canal and discharged through pipe lines, the water draining back into the canal. The work completed, the canal was refilled and houses replaced. On 1 May 1918, actual construction started on the extension of the present sea-wall, looking to the protection of Fort San Jacinto, the eastern part of the channel of Galveston Bay

and that part of the city area lying east of Sixth street, at the joint expense of Galveston County and the United States government, at a cost of $2,741,000, which includes fill to grade for 200 feet back of the wall, a sidewalk and brick driveway. The total length of this ad¬ ditional sea-wall is 10,300 feet. The sea-wall and grade raising have rendered Galveston ab¬ solutely safe from serious damage from the most violent storm that could possibly occur. According to the United States census Galves¬ ton's population in 1920 was 44,255.

E. R. Cheesborough,

President of the Galveston Commerical Asso¬ ciation.

GALVESTON, Jetties at. The entrance to Galveston Harbor was originally obstructed by an inner bar upon which the depth of water was 9ˆ2 feet and an outer bar with a depth of

12 feet. The Federal government adopted the jetty system for improving the entrance to this harbor. Two jetties have been constructed of sandstone riprap and are covered with granite blocks weighing from 5 to 12 tons each. The south jetty is 35,603 feet in length and the north jetty 25,907 feet in length. They are built to a height of five feet above mean low tide and are from 12 to 15 feet in width at the top with a slope of about one and one-half feet to each vertical foot in depth. The distance between the shore ends of the jetties is about two miles; they converge until their sea ends are about 7,000 feet apart apart. The jetties, by confining the water, have increased the tidal scour and secured a depth of 30 feet at mean low tide on both bars. These works, damaged by the hur¬ ricane of 8 Sept. 1900, were repaired with granite blocks of 10 tons weight.

GALVESTON, Military and Naval Oper¬ ations at. In the summer of 1862 Farragut sent several light squadrons to cruise along the coast of Texas, and a blockade was maintained against Galveston, which was abandoned by the Confederate military forces, and 8 October sur¬ rendered by its civil authorities to Commander Renshaw of the United States navy. Six United States vessels lay in the bay, command¬ ing the city. Lieutenant Jouen, with two launches, captured and burned the privateer Royal Yacht, carrying one heavy gun, and took

13 prisoners, with a Union loss of two killed and seven wounded, 7 November. On 24 De¬ cember 260 men of the 42d Massachusetts regi¬ ment were landed and encamped on the city wharf. At daybreak, 1 Jan.

1863, General Ma- gruder, the Confederate commander in that de¬ partment, made a combined naval and land at¬ tack upon the Union fleet in the bay and the military in the city. He secured four steamers from the adjacent rivers, used cotton-bales for armor, mounted them with guns and filled them with sharpshooters, and attacked the six United States vessels. The Westfield was blown up and destroyed by her officers to prevent capture ; the Harriet Lane was boarded, and surrendered after her captain and executive officer had been killed. One of Magruder's boats went to the bottom in its encounter with the Harriet Lane: The land force was attacked by a largely supe¬ rior force and, after a stout resistance, in which it had 20 men killed and wounded, surrendered. Magruder reported his loss as 26 killed and 117 wounded. The other United States vessels then

abandoned the blockade, but Farragut quickly restored it. Soon afterward (11 January) a strange vessel was seen outside and the Hat- teras was sent to overhaul her. She proved to be the noted Alabama, and after a short and hot fight she sunk the Hatteras, saving her crew. Ten days later the Union gunboats Ve¬ locity and Morning Light, blockading Sabine Pass, were attacked by Confederate steamers, driven out to sea, and captured, with guns, prisoners and a large amount of stores. Gal¬ veston remained in Confederate possession until the close of the war. Consult (Official Records) (Vol. XV) ; Mahan, (The Gulf and Inland Waters > ; Maclay, 'History of the Navy> (Vol. II) ; Lossing, Wield Book of the Civil War> (Vol. II) ; the Century' Company's Wattles and Leaders of the Civil WaU (Vol. III).

GALVESTON BAY, an inlet of the Gulf of Mexico, extending northward from Galves¬ ton about 35 miles.

GALVESTON ISLAND, an island off the coast of Texas on the northeastern end of which is Galveston. Length, about 28 miles.

GALVESTON PLAN OF CITY GOV¬ ERNMENT. See Commission Form of Gov¬ ernment.

GALVESTON SEA-WALL. The date 8 Sept. 1900, in Galveston, Tex., will be referred to by its inhabitants for generations to come. The appalling loss of life and the destruction of property on that date, due to the terrific West Indian hurricane which drove the waters of the Gulf of Mexico over the oleander city, shocked the civilized world. Over 6,000 lives were sacrificed to satisfy the storm king's anger, and over $17,000,000 worth of property was completely destroyed. The city of Galveston is located on the east end of an island about 30 miles in length and from one to three miles in width. The entire south side of the island fronts on the Gulf of Mexico, while the north side fronts on Galveston Bay.*

Why the Wall Was Built. — In September 1875 a hurricane swept over the island, causing considerable damage to property. At this time the convention was in session which framed the present constitution of the State of Texas. The impression produced by this hurricane led to the insertion of sections 7 and 8, in Article XI of the constitution, granting all counties and cities bordering on the coast of Mexico the right to issue bonds and construct sea-walls, or breakwaters. Judge Wm. P. Ballinger, one of Galveston's most honored citizens and a lawyer of marked ability, was a member of this Con¬ stitutional Convention, and the author of the sections before named. On 28 Aug. 1886 Judge Ballinger addressed an open letter to the citi¬ zens of Galveston, calling to their attention this constitutional provision and warning them of the great necessity for the construction of a sea-wall as a means of protection. This letter was a strong appeal, and while it provoked much newspaper discussion, no active steps were taken to carry out the plan offered. When the people of Galveston awoke from their night of death in September 1900, Judge Ballinger's plan was again brought to light, and, although the author had long since passed away, it required no new appeal to spur the then thoroughly aroused people to the point of action.

• °n. 22c Nt°v- -1901' the Board oi Commis¬ sioners oi the city of Galveston appointed a

5!?™ °td£ uen&lneers, consisting of Brig.Gen. Aˆi'r ^°ˆiert' Bnited States army (retired), Alfred Noble and H. C. Ripley, engineers of na trnnal renown, to devise a plan for the protection of Galveston against destructive overflows. On ra Jan- this board submitted a plan call- mg tor the construction of a solid concrete sea¬ wall and the raising of the city's grade The raising of the grade was not only intended to turnish a solid backing for the sea-wall, but also to prevent the water from the Gulf, in the severest storms, from ever reaching a depth in the city dangerous to life or property. The plan for protection submitted by this engineer¬ ing board was accepted as the best that could possibly be devised. The county of Galveston, through the Commissioners Court, agreed to construct the granite concrete sea-wall, and pro¬ vide a 150-foot right of way and filling for the same, with the understanding that the city proper, with aid from the State of Texas, would undertake the task of raising the grade*

Construction of the Sea-Wall.— This wall is 16 feet at the base, 16 feet high and 5 feet wide at the top, curving from the top to the base. The concrete is composed of one part of cement, three parts of sand and six

parts of crushed granite. At intervals of three and one-half feet there is placed in the wall one and one-half inch square corru¬ gated steel reinforcing rods 10 feet long. The riprap on the Gulf side of the wall is 27 feet wide and from three to seven feet in thickness, and is composed of granite.

Raising the Grade. — In order to carry out the plan for raising the grade, the legislature of the State authorized the city to issue bonds to the amount of $2,000,000 at a rate not to exceed 5 per cent. In order to aid the city in caring for these bonds the State granted it $70,000 per annum for a period of 17 years. The manage¬ ment, control and direction of this work were entrusted to three commissioners appointed by the governor and known as the ((Grade Raising Board of the City of Galveston.®

GALWAY, Ireland, a municipal and parlia¬ mentary borough, a seaport and a county of itself at the mouth of the river Corrib, on the north shore of Galway Bay, 65 miles north¬ west of Limerick by road. The old town is poorly built and irregular. The new town con¬ sists -of well-planned and spacious streets, and is built on a rising ground which slopes gradu¬ ally toward the sea and the river. Galway is the see of a Roman Catholic bishop, but is in the Protestant Episcopal diocese of Tuam. The principal buildings are the cruciform church (Episcopal) of Saint Nicholas (1320) ; Saint Augustine's Roman Catholic church (1859), monasteries, nunneries, the county courthouse, barracks, prison, infirmary and University Col¬ lege (1849). Galway has flour-mills, a distillery, iron foundries, marble yards, extensive salmon and sea fishing, one of the best and safest har¬ bors on the Irish coast and a lighthouse. The exports consist mainly of agricultural produce, wool and black marble. It was taken by Rich¬ ard de Burgh in 1232. From the 13th till the middle of the 1 7th century it continued to rise in commercial importance. In 1652 it was taken by Sir Charles Coote, after a blockade of sev-

eial months; and in July 1691 it was compelled to surrender to General Ginkell. The borough returns one member to the House of Commons. Pop. 15,944.

?AJ' a large hay 011 the west

coast of Ireland, between County Galway on the north and County Clare on the south, about 3° miles in length and from 20 to 7 miles in breadth. Across its entrance lie the Aran islands and there are numerous small islands in the bay itself.

GAMA, ga ma, Antonio Leon de, a Mexi-

?nfSCSSthb- City of Mexico > 1735; d. 12 ˆept 1802. He was secretary to the Supreme

Court for a number of years, and subsequently was a professor at the School of Mines He is best known for his study of the celebrated Aztec calendar stone which was discovered in ms time.. He was one of the first students of the remains of the past civilizations of America to place the development of archaeology upon a scientific basis. For. this reason his name stands nign in Latin- American scientific circles

, GAMA, Jose Basilio da, Brazilian poet : r ,Sa?i?seXMlnas Geraes), 1740; d. Lisbon, 31 July 1/95. He was educated by the Jesuits and joined the. company; but on the expulsion of the order in 1795 he left Rio de Janeiro where he had been in a monastery and returned to the seminary of Sao Jose. Later on he went to Portugal , and from there he paid a visit to Rome, where he seems to have become closely identified with the prominent representatives of the Catholic faith. On his return to Rio de Janeiro, he was seized as a Jesuit and sent back to Lisbon. There he saved himself by re¬ nouncing the Jesuit order and allied himself to the strongly royalist interests. This, backed up by the powerful influence of statesmen, among them Pombal, and his poetical flatteries ad¬ dressed to the royal family, secured for him an important position in the Ministry of Foreign Affairs. Returning to Rio de Janeiro in 1777 he founded the Arcadia Ultramarina on the lines of that of Rome, and became himself a promi¬ nent literary figure in the life of the colony. Suspected of plotting treason, by the viceroy, Count Rasende, Gama returned to Lisbon where he spent the rest of his life. His epic poem, (0 Uraguayˆ which accused the Jesuits of at¬ tempting to form an independent papal nation of the Indians of Uruguay, attracted to Gama considerable notoriety. He was a fairly good poet and has left numerous lesser poems of con¬ siderable merit.

GAMA, Vasco da, vas'ko da, Portuguese navigator: b. Sines, Portugal, 1450; d. Cochin, India, 24 Dec. 1524. He was the first navigator who made the voyage to the East Indies by the Cape of Good Hope. Bartholomew Dias, a Portuguese explorer, having visited the cape, which he called Cabo Tormentoso, or stormy cape, brought back such interesting accounts of his discoveries that the Portuguese sovereign, Emanuel, following the policy of his prede¬ cessor, John II, determined to urge discovery beyond the point where Dias left it, and if possible to reach by sea the countries of the Indies. Accordingly an expedition was placed under the command of Vasco da Gama, a gen¬ tleman of the king's household and a skilful and experienced mariner. The fleet consisted of

the San Gabriel, flagship of 120 tons, the San Rafael of about 100 tons, a caravel of 50 Ions and a store-ship, with a total force of 160 men. On 8 July 1497 Gama's expedition departed from Lisbon for the Cape Verde Islands, whence it set sail on 3 August southward along the African coast. On 7 November they put into a bay called Saint Helena, and departed on the 16th. They then encountered a succession of tempests such as had gained for the southern promontory of Africa the name of the Cape of Storms. The courage of Gama's companions failed, and they besought him to put back, which he not only refused to do, but put the ringleaders of the movement in irons, and held on his course into the stormy sea. On Wed¬ nesday, 20 November, they doubled the Cape of Good Hope. On Christmas Day having sighted the coast, it was named Natal, in honor of the day. Further north they discovered Mozambique; the island of Aqoutado ; the island of Mombassa, and Melinda, where the king gave them a pilot to conduct them across the Indian Gulf. The Melindese pilot is reported to have been acquainted with the astrolabe, compass and quadrant. Under his guidance the voyagers steered 750 leagues across the open sea. In 23 days they arrived off the Malabar coast, and on 20 May 1498 they reached Calicut, the object of their search. Their mission was thus accom¬ plished, and a new route to the East established. Gama's relations with the ruler of Calicut were not cordial ; and, therefore, leaving the Indian coast on 15 October, Gama returned to Lisbon, calling at Melinda on the way to take on board an ambassador to Emanuel's court, and arriving in the Tagus September 1499, after an absence of two years and two months. He brought back one ship, a caravel which he had chartered at Cape Verde, and 55 men. The king received Gama most cordially.

Emanuel immediately fitted out a second fleet of 13 ships, with 1,200 men, under the com¬ mand of Pedro Alvarez Cabral, to establish trading posts ; but failing in its ends, another fleet of 20 ships was placed under command of Gama. This expedition, which was warlike in its character, sailed early in 1502. On reaching Calicut, Gama immediately bombarded the town, enacting deeds of inhumanity and savagery too horrible to detail. From Calicut he proceeded to Cochin, and, having made favorable trading terms with it and other towns on the coast, he returned to Lisbon in September 1503 with richly laden ships. He and his captains were welcomed with great rejoicing; Da Gama him¬ self having great privileges conferred on him, and being made admiral. Soon after his return Vasco retired to his residence in Evora, and for 20 years took no part in public affairs, either from pique at not obtaining, as is supposed by some, so high rewards as he expected, or be¬ cause he had in some way offended Emanuel. During this time the Portuguese conquests in¬ creased in the East, and were presided over by successive viceroys. The fifth of these was so unfortunate that

Gama was recalled from his seclusion by Emanuel's successor, Joao III, cre¬ ated count of Vidigueira, and nominated vice¬ roy of India, an honor which in April 1524 he left Lisbon to fill. Arriving at Cochin in Sep¬ tember of the same year, he immediately set himself to correct, with vigor and firmness, the many abuses and evil practices which had crept

in under the rule of his predecessors. He was not destined, however, to prosecute far the re¬ forms he had inaugurated, for on Christmas eve following his arrival he died, and was buried in the Franciscan monastery there. In 1538 his body was conveyed to Portugal and en¬ tombed in the town of Vidigueira, of which he was count. The important discoveries of Vasco da Gama had the result of enriching Portugal, and raising her to one of the fore¬ most places among the nations of Europe. Con¬ sult Correas, (The Three Voyages of Vasco da Gama} (Hakluyt Society 1869) ; the (Journal y of his first voyage, edited by Ravenstein (Hakluyt Society 1898); Jayne, (Vasco da Gama and His Successors 1460— 1568) (London

1910).

GAMALIEL (((God is a reward®). Two persons of this name are mentioned in Bible history. The first, Gamaliel, the son of Pedah- zur, in the book of Numbers, i, 10; ii, 20; vii, 54, 59; x, 23, as prince or head of the tribe of Manasseh. The other and better known Gama¬ liel is mentioned twice in the Acts of the Apostles. In both passages he appears as a learned doctor of the law of the sect of the Pharisees. From the one we learn that he was the preceptor of Saint Paul, who was brought up in Jerusalem, <(at the feet of Gamaliel.® In the other we find him advising the council of Sanhedrim in regard to their treatment of the apostles, and it is the advice given on this oc¬ casion which has rendered him famous. <(If this counsel or this work,® he said, ((be of men it will come to naught, but if it be of God ye cannot overthrow it, lest haply ye be found to fight even against God.® Ecclesiastical tradition makes Gamaliel become a Christian, and relates that he was baptized by Saint Peter and Saint Paul ; but the story does not appear to be sup¬ ported by any evidence. He has been identified by scholars with Gamaliel, the son of Simeon and grandson of Hillel, president of the Sanhe¬ drim under Tiberius, Caligula and Claudius.

GAMARRA, ga-mar'ra, Augustin, Peru¬ vian general: b. Cuzco, 27 Aug. 1785; d. Yngavi, 20 Nov. 1841. He fought in the Spanish army in 1809-21, attaining the rank of lieutenant-colonel. He went over to the revolutionists in 1821, became general and was made grand marshal. He marched into Bolivia (1827), and effected the Treaty of Pisagua (1828). From 1829 to 1833 he was President of Peru, and on the expiration of his term of office he tried to con¬ tinue to hold the presidency by military

force ; but was compelled to depart hurriedly into Bo¬ livia and later was variously identified with the political disturbances of the time. In 1837 he took a leading part in Chilean opposition to the Bolivia-Peru confederation; and upon the con¬ clusion of a successful campaign in which he commanded the Peruvian reserves, he became President of Peru (1839). He was killed in battle during an invasion of Bolivia.

GAMBA, a stringed instrument of the viol sort, called also viola da gamba, with six strings, weaker in tone and smaller in size than the vio¬ loncello, so called because it was held between the knees of the player, as distinguished from viola da braccia,, played on the arm. Also an organ stop, the pipes of which are, in continental organs, generally cylindrical, of small scale, and well cut up, but sometimes conical in shape.

Its tone is pungent, and not unlike that of a violin or violoncello.

. GAMBADO, or GAMBADE, a leather leg¬ ging for equestrians ; it is wrapped round the eS > reaching from the knee to the foot, and is fastened at the side by clasps. The term is also used for boots fixed to the saddle instead of stirrups.

GAMBESON (spelled also gambei son). A defensive body garment worn in the chain mail period. (See Chain Armor). Its description and nrUj^rVary at different times or at the hands of different contemporary writers, being termed also wambais, wambeys or wambeis and acketon or haketon. It was wadded with wool and quilted in parallel lines. In the 13th century it took the plate of the tunic under the coat- of-mail (see Hauberk) to break the force of blows in combat. It, at times, was long enough to reach the knees and shows up (in old illus¬ trations) for several inches below the shorter hauberk. The gambeson was worn also by foot-soldiers and knights often as the sole body defense; again, it appears to have been worn over the hauberk, sometimes with a superim¬ posed surcoat; or the surcoat has been termed gambeson when gambisoned (quilted) with cot¬ ton wool. A defensive coat of this same form but made of leather appears to have been termed gambeson.

GAMBETTA, gam-bet'ta, Leon Michel,

French statesman: b. £ahors, France, 3 April 1838; d. Sevres, France, 31 Dec. 1882. He was of Genoese extraction; was educated for the Church; but finally decided in favor of the law; and going to Paris became a member of the metropolitan bar in 1859. In November 1868 he gained the

leadership of the Republican party by his defense of Delescluze, a noted Re¬ publican. In 1869, having been elected by both Paris and Marseilles, he chose to represent the latter city ; and in the Chamber of Deputies showed himself an irreconcilable opponent of the empire and its measures, especially of the policy which led to the war with Prussia. On the downfall of the empire, after the surrender of Sedan in 1870, a government for national de¬ fense was formed, in which Gambetta was nominated Minister of the Interior. The Ger¬ mans having encircled Paris, he left that city in a balloon, and set up his headquarters at Tours, from which, with all the powers of a dictator, he for a short time organized a fierce but vain resistance against the invaders. In the capitulation of Paris, he resigned. After the close of the war he held office in several short¬ lived ministries, was president of the Cham¬ ber under Grevy, and the director of its policy; and in November 1881 accepted the premiership. The sweeping changes proposed by him and his colleagues speedily brought a majority against him, and after a six weeks' tenure of office he had to resign. The accidental discharge of a pistol led to his death, which was deeply mourned in France. He had remarkable ora¬ torical gifts, the faculty of command and showed consummate tact in uniting the extrem¬ ists of the Republican party with the centre, in opposition to all the reactionary elements in France. He founded La republique franqaise in 1871. Consult Reinach, (1892) ; Tournier, (Gambetta> (1893) ;

Gheusi, c Gambetta: Life and Letters (Eng¬ lish trans. 1910).*

GAMBIA, (1) a British colony in West Africa, occupying portions of territory at the mouth of the river Gambia, some of its islands, and . (including the adjacent territory under British protection) about six miles of land on either bank for a distance of 250 miles from the sea, and the navigable waters of the Vin- tang Creek. It thus forms a narrow strip run¬ ning through French territory; total area, about 4,500 square miles. The principal settlement is Bathurst, at the mouth of the river. There is comparatively little fertile land, and agriculture is primitive. Gambia differs very little from the other West African settlements in being unhealthful. The position of Bathurst, the seat of government, is very unhealthful in the rainy season. There are a number of Anglican, Roman Catholic and Wesleyan schools in the colony. Cotton cloth is manufactured to some extent by the natives, who also prepare palm- oil, build boats, etc. The principal exports are groundnuts, rubber, beeswax, ivory, hides, gold and palm-oil. The value of imports in 1912 was over $3,700,000 and the exports amounted to $3,600,000 and in 1915 $1,471,941 and $1,766,- 543 respectively. Gambia is a Crown colony under an administrator, who is assisted by an executive and a legislative council. The popu¬ lation of _ the entire region in 1911 was about 138,400, including about 200 whites, the re¬ mainder being chiefly negroes. (2) A river flowing through the

above colony and giving to the colony its name. Rising in the moun¬ tains of Senegal, after a course of about 700 miles it expands into a broad estuary and at Bathurst enters the Atlantic Ocean. For 170 miles it is navigable by seagoing vessels.

GAMBIER, gam'ber, James, Baron, Eng¬ lish naval officer: b. New Providence, Baha¬ mas, 13 Oct. 1756; d. near Uxbridge, England, 19 April 1833. He entered the navy and off Ushant fought with distinction as commander of the Defence under Lord Howe in 1794. In 1802 he was appointed governor of Newfound¬ land. As admiral he commanded the British fleet at the bombardment of Copenhagen in 1807 and was rewarded with a peerage. At the action in Basque Roads in 1809 he refused to act on the instructions of Cochrane, Lord Dundonald, was tried by friendly court-martial and acquitted. He was one of the commis¬ sioners who negotiated the Treaty of Ghent in 1814. Gambier attained the rank of admiral of the fleet in 1830.

GAMBIER, Ohio, village of Knox County, on the Cleveland, Akron and Columbus Rail¬ road, 50 miles north of Columbus. It is noted for its educational institutions, including Ken¬ yon Episcopal College (q.v.), Bexley Theolog¬ ical Seminary and the Harcourt Place School. Pop. 537.

GAMBIER ISLANDS, or ARCHIPEL¬ AGO, a group of small islands of the south Pacific about lat. 23° 8′ S. and long. 134° 55′ W. The total area of the group is about 10 square miles. The natives are a well-formed race and have made some progress in civilization. On Mangareva, the largest of the group, some French missionaries settled in 1834 and the

islands now belong to France. The total pop¬ ulation is about 500 or 550.

GAMBIR, or GAMBIER, called also Terra japonica, an astringent substance obtained from the Uncaria gambir, a tree of the family Cin-chonacece, cultivated in Sumatra and other islands of the Malay Archipelago. It is ob¬ tained from the leaves by boiling or infusing them in water, inspissating the resulting fecula and forming into cakes. The Chinese use it for chewing and in the Western world, princi¬ pally in Great Britain, it is employed in dyeing and tanning, also medicinally. It is mostly ex¬ ported from Singapore. It is often considered as one of the articles of catechu (q.v.).

GAMBLE, Francis Clark, Canadian civil engineer: b. Toronto, Ontario, 1848. He was educated at the College of Upper Canada ; in 1869 became

a civil engineer on the Intercolo¬ nial Railroad, in 1872 assistant engineer of the Great Western. He was later assistant engi¬ neer of the Canadian Pacific and in 1881 was made assistant engineer of the Department of Public Works of British Columbia, was resi¬ dent engineer and agent from 1887 to 1897 and from 1898 to 1911 was engineer of public works. In 1911 he became chief engineer and inspect¬ ing engineer of railways. He is a member of the Canadian Society of Civil Engineers and of the English Institute of Civil Engineers and the American Society of Civil Engineers.

GAMBLE, Hamilton Rowan, American statesman: b. Winchester, Va., 1798; d. 1864. He was admitted to the bar in Virginia, settling in Missouri 1818 and being elected secretary of state of that Commonwealth 1823. Practising law at Saint Louis he became judge of the Su¬ preme Court and was elected a member of the Constitutional Convention 1861 and appointed by it governor in place of C. F. Jackson, who had become a secessionist.

GAMBLING, or GAMING, the practice of

playing for a money stake, games depending solely on chance, like roulette, for instance, or those other games into which the element of skill enters, as in the cases of whist or billiards. Strictly speaking, gambling may be understood as gaming in its worst sense and as implying professional play for a money stake by men who are unscrupulous adepts at so-called games of chance. Gambling has been common among most nations, civilized and uncivilized. The practice of civilized communities in regard to these acts has been far from uniform. The odium of gambling has sometimes been attached to games perfectly innocent in themselves and these games have been prohibited to the mani¬ fest prejudice of the law, which has thus been brought into dishonor and contempt. At other times, governments, tempted by the facilities of sharing in the dishonest gain, have openly and . shamelessly encouraged gambling by li¬ censing gaming-houses, or instituting lotteries under their own authority. See Lottery.

Gambling in Europe. — In England gam¬ bling was early made the subject of penal enactments. Statutory restrictions upon games and gaming go back as far as Richard II. In France, public gaming-tables were suppressed from 1 Jan. 1838. Previous to the formation of the new German Empire gambling was en¬ couraged by official countenance in several of

the principalities of Germany. Baden-Baden, a watering-place in the grand-duchy of Baden, and Homburg, then in the landgravate of Hesse-Homburg, were until comparatively recent times the two most famous resorts in Europe of the frequenters of gaming-tables. Since the sup¬ pression of gambling in these places, after the formation of the Empire (31

Dec. 1872), the principally of Monaco in Italy has become the last public resort of this species of grambling in Europe.

*Repression of Gambling in the United States. — In the United States the keeping of a gambling-house is indictable at common law as injurious to morals; and most States and Terri¬ tories have passed laws against gambling, some of them severe and stringent. Yet till 1880 gambling was common and open in many parts of the United States; and it was left largely to societies for the suppression of vice, especially in New York, to stir up the authorities to put the laws in force. In 1881-84 prosecutions and convictions were very numerous ; in 1885 almost all the chief cities in the Union followed the example of New York and since that time the progress of legislation on this subject has been noteworthy, in many of the States. Always there is difficulty in legally defining gambling and distinguishing in judicial practice between acts which violate the gambling laws and those which, while presenting some questionable ap¬ pearances, are yet not obviously to be classed in the same category. * As in so many other matters of public policy, there is also a loss of power to the regulative sentiment of the people through want of uniformity or any consider¬ able degree of identity among the laws of various States and sections. Therefore it is scarcely strange that, in spite of all prohibitive legislation and repressive influences brought to bear by public opinion, gambling should, either through connivance of the authorities or by secrecy and evasion, continue to be practised in many of the large cities of the United States. As in all other matters of public interest, the moral sentiment of the community steadily seeks and no doubt gradually finds a control¬ ling expression through its official representa¬ tives in the legislative field and in local and general administration. Consult Coldridge and Hawksford, (The Law of Gambling, Civil and Criminal* (London 1913).*

GAMBOGE, gam-bdj' or booj,) a gum resin derived from Garcinia cambogia, a member of the order Guttiferc f. The gamboge tree it¬ self is a native of Siam, Cochin-China, Cam¬ bodia (which gives the drug its name), from which places the drug is imported to Europe and to the United States. Other forms of gamboge that are rarelv seen in the American market are found in India, China and the Asiatic Islands. The gum-resin is obtained by cutting or wounding the trunks of the trees causing a bright yellow juice to flow. This is collected, usually in bamboo joints, and hardens naturally, or is dried over a fire, until a solid mass results, which generally takes the shape o f the collecting vessel. In the drug market pipe gamboge, press gamboge and cake gamboge are recognized. Pipe gamboge is preferred be¬ cause it is usually clean. As a pigment for painting, gamboge has been known for cen¬ turies and as a purgative it has been used in

China as long as history gives any definite information.

The gum resin contains a large amount of gum, 15 to -0 per cent and 70 to 80 per cent of a yellow resin, gambogic acid, on which its purgative properties depend. The formula of gambogic acid is C40H23O. Taken into the body m doses of from two to five grains, it acts as a very active hydragogue cathartic, producing numerous watery stools, with much griping. It is principally valuable when combined with some other drug that tends to diminish the pain and it is one of the most important in¬ gredients in the compound cathartic pill of the Lnited States Pharmacopoeia, which contains one-quarter of a grain of the resin. Overdoses cause violent poisoning with intense prostration.

GAMBRINUS, gam-bri'nus, a mythical king of Flanders, inventor of beer, said, probably incorrectly, to have an original in Jan Primus (or Jan. I), Duke of Brabant. He is repre¬ sented in Germany as Saint Gambrinus, patron of drinking. His figure is familiar in German beer-cellars, often seated astride a cask, a foam¬ ing tankard in his hand.

GAME BREEDING signifies to most per¬ sons the rearing in captivity of gallinaceous birds for purposes of sport, as pheasants, grouse, quails and the like ; but it must be ex¬ tended to include the rearing of wild ducks and geese in confinement to be sold as food. The peacock, turkey and our domestic poultry (originally jungle fowls) are familiar examples of ancient success in this direction and local species of wild birds of this order are "pets® in all parts of the world. Great Britain rears annually, under personal care, millions of the common South-Russian pheasant (see Pheas¬ ant) for the sake of sport in the autumn; and great quantities of this game and of the red grouse preserved on the grouse-moors of Scot¬ land and elsewhere have been utilized as food in the scarcity of food resulting from the present war in Europe. The ring-necked pheas¬ ant of eastern China and Japan was long ago taken to Europe and has interbred with the Western pheasants until now it is difficult to find any of either kind there of pure blood. This ring-neck was introduced from semi- domesticated Japanese stock into Oregon about 1890 and in a few years had become a common wild bird throughout all that coast-region and still remains so, although no particular care has been given to it. This is owing to the simi¬ larity of the mild climate to that of their native lands. Some years later pairs of these and of the British pheasants were acclimated in the Eastern

States and did well. They are now reared on country estates and farms all over the United States for both pleasure and profit and in many places have been turned out as wild birds. They are described as light eaters, of good size and are very prolific; and both birds and eggs bring excellent prices. Several other species are reared, with more trouble, for ornamental purposes, principally the golden, silver, eared, Reeve's and Lady Am¬ herst's pheasants; but they are more costly and less hardy. Very full and trustworthy direc¬ tions for their care during the breeding season, the treatment of the young, feeding, etc., may be found in the books quoted below.

The wild turkey has been bred in some cases, but only where an extensive tract of enclosed wild woodland is available. It is possible to rear any of the grouse, but only the rutted grouse has been successfully produced and this is attended with many difficulties on account of the pugnacity of the male and other troublesome factors. Each pair requires a large, separate wire-enclosure, the cost of which 1S £° &reat grouse-culture will not be

profitable commercially until the wild supply « much diminished. The cultivation of bob- W- ite » (our American "quail,® called "par¬ tridge in the South, where the ruffled grouse is known as "pheasant®) has been undertaken on a large scale and with, considerable success on Long Island and in some other favorable places ; but each breeding-pair must have a small separate enclosure and the eggs must be incubated in almost every case by a bantam hen The increase is fast, but when the birds are strong the coveys are likely to stray out of bounds. The Mexican scaled quail, a very pretty and interesting bird, has been reared on several Northern estates as also has the California and other Western quails; but these are pets and ornaments only, as yet. The meth¬ ods of culture have been learned, however, and hereafter may be of much service in restocking depleted areas. The common European par¬ tridge was imported very largely a few years ago under the name Hungarian partridge and was bred easily in preserved tracts; but it disappointed the hope of sportsmen, has not multiplied and is no longer in favor. On the whole the breeding of game-birds, while a very delightful amusement, has not become of any practical importance.

The breeding of waterfowl has much the same history. The Canada and other wild geese have long been reared by themselves in confinement, or are mixed with tame flocks; so, also, has the mallard, from which, indeed, our domestic ducks are mainly derived. Black ducks are easily domesticated and these, with mallards, are produced for market in some places. Experiments show that with labor and much expense any of the fresh-water ducks may be reared; but thus far the matter is one of enjoyment rather than profit. Many exten¬ sive "game-farms,® devoted to

cultivating and selling breeding-stock of these various birds, exist in the Northern States; but the movement for general game-production in this way en¬ counters considerable popular opposition and does not receive the legal encouragement that it desires and perhaps needs, owing to popular prejudice against its apparent exclusiveness. Consult files of the Game Breeder magazine and the writings of its editor, Dwight Hunt¬ ington; Bulletins No. 1 and No. 2 of the Na¬ tional Association of Audubon Societies; Job, H. K., (The Propagation of Wild Birds) (New York 1915).

Ernest Ingersoll.

GAME-FOWLS. See Cockftghting ; Poultry.

GAME LAWS, legislative enactments adopted by nations and states to prohibit or regulate the killing of wild animals, birds and fishes. In Great Britain the game laws are a relic of the forest laws, which in the time of the Norman kings were so oppressive; it being

under the Conqueror as great a crime to kill one of the king's deer as to kill one of his subjects. A certain rank and standing, or the possession of a certain amount of property, were for a long time qualifications indispensably nec¬ essary to confer upon any one the right of pursuing and killing game. By the Game Act of William IV the game laws were greatly modified, the necessity for any qualification except the possession of a game certificate being then abolished and the right being given to any one to kill game on his own land, or on that of another with his permission. Every un¬ certificated person selling game is also required to take a yearly license. The animals designated as game by this act are hares, pheasants, par¬ tridges, grouse, heath-game or moor-game, black-game and bustards. These animals (with the exception of hares) are not allowed to be killed at all times, there being a certain season of the year — ■ the close season — during which all people are prohibited from killing game. By an act of 1880 every occupier of land has a right, as inseparable from and incident to the occupation of the land, to kill and take ground game (hares and rabbits) thereon, concurrently with any other duly authorized person, all agreements in contravention of this right being declared void. Game laws of greater or less strictness are in force in many other countries. In Canada the chief restrictions are in regard to killing wild animals during the breeding season.

Game Laws in the United States.— In the United States wild game whether

of forest, field or stream is perhaps better protected than in any other country in the world. Although there are certain general national laws, all States have passed game laws of their own and many States have organized societies for the protection and preservation of game. There are eight national organizations, the most im¬ portant being the League of American Sports¬ men. The others are the American Ornitho¬ logical Union; the National Sportsmen's Asso¬ ciation ; the National Bird, Game and Fish Pro¬ tective Association; Bird Protective Society of America; Boone and Crockett Club; Inter¬ national Forest, Fish and Game Association and North American Fish and Game Protective Society. Nearly every State in the Union has now a Game and Fish Commission and numer¬ ous game wardens.

The national game law, known as the Lacey Law, passed by Congress in 1900, gave to the Department of Agriculture certain powers, by which among other provisions no importation of wild animals, birds or fishes could be made without a permit from Secretary of Agricul¬ ture.

Many important additions and amendments to the Federal laws have been passed during the last 10 years, all tending to protect game and game birds in their natural state without interfering with the importation of birds, birds' eggs or animals for breeding purposes. Dur¬ ing 1910 there was an increase in these im¬ portations. Foreign mammals were imported to the number of 7,862, less than 600 of which could be classified as game animals, while the number of game birds imported was 49,989. Among the importation of the year were the valuable specimens obtained for the National Zoological Park at Washington through the

Roosevelt expedition and containing, among other mammals, several African antelopes and a lophiomys, a peculiar maned rodent rarely seen in zoological collections. Another ship¬ ment worthy of special mention was the six musk oxen brought from the Arctic regions for the New York Zoological Park by Paul J. Rainey, this being the largest number ever brought to the United States.

European Game Birds for American Cov- ®rs A great deal of interest has been mani¬ fested in the experimental stocking of American covers with European game birds. The Hun¬ garian partridge was the favorite prior to 1910, but since that time there has been a marked tendency to return to the pheasant. Thousands of pairs of partridges and English ringneck pheasants have been imported and distributed in Indiana, New Jersey, California, Colorado, Louisiana, Oklahoma, Iowa, Vermont, the Da¬ kotas and other States. Pheasant eggs have been imported for hatching and later liberation.*

I he experiments with other game birds has been so disappointing that practically nothing was done along these lines.

The movement toward securing uniform laws for the protection of song, insectivorous and other non-game birds has also made sub¬ stantial progress since 1900. The Shea plum¬ age bill, prohibiting the sale of aigrettes and other plumage, took effect 1 July 1911. Laws protecting non-game birds have been very gen¬ erally adopted in Canada.

Protectors, Seizures, Sportsmen's Asso¬ ciations, Close and Open Seasons. — New rork since 1902 raised the number of salaried protectors from 50 to 90 and New Jersey has given its wardens every power to make searches and seizures. The total number of authorized protectors in the 42 States reporting in ,was Of these 748 were salaried

officials, 1,167 were paid per diem and 7,439 performed their services without remuneration.

Under the Lacey Act numerous seizures were made of game shipped from the West and Southwest and proceedings were instituted in a number of cases in State and Federal courts. In some of the cases in Iowa and South Da¬ kota convictions were secured with penalties ranging from $150 to $200. The inspection of foreign birds at the port of New York was made more effective and special inspection serv¬ ice was established in Hawaii and extended in scope so as to prevent the introduction of nox¬ ious reptiles into the islands.

Even more important than the enactment of new game laws has been the work of game com¬ missions and voluntary organizations interested \n imnpr.actlcal protection of birds and game in 1910 important changes were made in the game commissions of several States and five

ait iame wardens were appointed in Alaska. Several sportsmen's game and fish

protective associations were added to the large number already existing and the Audubon So¬ ciety began a special campaign of bird protec¬ tion in the South. Nearly all the States now have Audubon societies, which are formed primarily for the protection of birds other than game. The committee of the American Ornithologists . Union on the protection of birds extended its work along the coast and now maintains supervision of all the breeding colo-

EastD00£rtSMeb,rfo ru the Uantic coast from nastport, Me, to Chesapeake Bay, as well as

at some points in Florida

Practically all the State game laws oassed 7 tkf various State legislatures prohibit the

cia^°nurrLf^me' °r fishinS for commer-

In aPfew huntlng h[S game with dogs.

i ,a.L\s dle netting of minnows for bait

•S ?hZLrohlhl ted- The killing of Tong birds is torbidden in most of the States but this law

bi°rd an^ EnSl7 1 t0 the hawk> °wl,' crow, black- in tbp nJi g iSvSf,arrOW- Hunting and fishing WfiM at ?naliYel ll°wstone Park is prohibited an,Wfihle the close and open season for hunting

thesis11 nn are We 1 defined in all the StateSg ere is no general statement that can cover

SO widpf 10nT thl ,seasons and conditions varying i i , Alabama, for instance, deer may

rann^vVT P,? m°nths °n'y (November to January), in Indiana at no time, and in Illinois

no deer can be shot until 15 June 1919. All conditions6 EWS ^ pectdiarly adapted to local

**GW Kr.eSulations on close seasons for mi- gratory kds were made public 22 Aug. 1916 by the United States Department of Agricul- ture, after its approval of recommendations by the Federal Advisory Committee on the Mi¬ gratory Bird Law. Spring shooting has been everywhere refused. It has been adopted as a fixed lule for the present that in nn na rt r\ f «*

present that in no part of the ^ntr/ .may ,ther? shooting after the game

as started for its breeding grounds in the iNortfi. I he committee recommended a maxi¬ mum shooting season of three and one-half months for any section of the country and tried to equalize opportunity as best it could

m ,nmAg th-at s^aso,n- Among the valuable .North American birds that the

committee said were "candidates for extinction® were the whooping crane, trumpeter swan, American flamingo, roseate spoonbill, scarlet ibis, long-billed curlew, upland plover, Hudsonian god- wit, red-breasted sandpiper, golden plover dowitcher, willet, pectoral sandpiper, black- capped petrel, American egret, snowy egret wood duck, band-tailed pigeon, heath hen, sage grouse, white-tailed kite, prairie sharptail, pin¬ nated grouse and woodcock. See Audubon Society ; Fishing ; Hunting.

GAME PRESERVES, or GAME PARKS,

are large reservations of land, usually includ¬ ing mountain and forest, set aside by the gov¬ ernment or individuals, for the propagation and preservation of game. Game preserves have been well known in Great Britain and on the Continent for upward of five centuries. Henry \ III established a royal deer park near Hamp¬ ton Palace in 1526, and the Duke of Suther¬ land at the present day owns the largest game preserve in the world. Game preservation in the United States, first attracted attention just pnor to . the Civil War and later when the rapidly increasing settlement of the States threatened the extinction of all kinds of wild game.

The United States government took up the question of game preservation almost as soon as the individual, and the establishment of the Yellowstone National Park in the Rocky Moun¬ tains and the Yosemite National Park in Cali¬ fornia had as much to do with the protection of big game as in the preservation of forests.

ranKcsehave,enH/eSen?ti0nS the government

rt s£ r ?«e S3 =‘

In 19(P Precirl animaL, including birds.

of KtLWs feT a hu,,tcr puru0 gtth ˆ z

had a total area ˆ{Um276, 4ˆ6 acresneWSi"ceeSI?

mtehemHsf oPresT1 addltlons ha'- been made low : reservations, some of which fol-

San Isabel, Colorado . Acres

Santa Rita, Arizona . 77,980

Niobrara, Nebraska. . . 337 , 300

Dismal River, Nebraska. . . 123,779

Santa Catalina Arizona. .. . 85, 123

N°unt Graham, Arizona 155,520

Lincoln, New Mexico . 118,600

Chiricahua, Arizona . 500,000

Madison, Montana. 169,600

Little Belt Mountains, Montana". . gm ‘ non

Alexander Archipelago, Alaska …. . 4

Absaroka, Montana . 4,506,240

Grand Canyofi, Arizona . .)

Afognak Forest, Alaska . 1 ’ • 930

Mount Olympus. Washington ! . ˆ,000

Montana National Bison Range . 6?o’ˆ9

Munkunyuweap, Utah 18,521

Colorado National Monument." Colorado . H ‘ 522

Billy Meadows Pasture, Oregon. . . .

\r d’ke.re 9re aLo numerous State preserves

s«yv°emofg’;7finnnVe’ mcIPng Teton State Pre¬ total o/ l7«in°° acres\ fennsylvania five, of a rr.il, r- 1’6C® acres; Montana has the Snow Vortk ˆfa“e ,Preserve of 57,600 acres; and New Park State haS tHe famous Adirondack State

thUUnfUSU Parks ln the United States, me first of record was that of Judge T D

Caton of Ottawa Ill., the author of < Deer 'and

lthedTn lSfiOhef Un’ted StatfS-’ This he estab- lisfied in 1860 for sport and study, bringing to-

fnimri°n hu argG 6State many varieties of game animals native to America. In 1889 Austin

Snbli? enc,Io:Td the area known as Blue Moun¬ tain F orest, situated near Newport, N H It

contains over 36,000 acres and is surrounded by

tnZ tr£nft ulgc' 1 fSet hiˆh- forming an ob- g t act 12 by 5 miles, and which is crossed

5 000 TTu}nu rar}fe' the Peaks of which are 3,000 feet high. Here are miles of wooded

slopes, dense forests and broad meadows, giv- ng oo and shelter to all kinds of game ani¬ mals from the buffalo, elk and moose to the smaller species. The experiment has been most successful, nearly all of the animals thriving c greasing rapidly in numbers. In 1870 K S. Giles laid out the Grove Park reservation' containing ! 7,000 acres and this experiment was followed by Dr. W. Seward Webb with a preserve of 9,000 acres at Nebasane, N. Y in the Adirondacks, Northern New York and another preserve at Shelburne, Vt. The Litrh

ACJd P?rl9 at TuPPer Lake, N. Y., in Vhe Adirondacks, was established in 1893, with 9 000 acres, and in 1900 hundreds of herds of large game were roaming the mountain forests within this tract In the same region the Adirondack limber Company has a park of over 30 000 acres, well stocked with animals. George ' W Vanderbilt at his Carolina estate of Biiimnrp has 80,000 acres, 6,000 acres of which are en-

closed and well stocked with game. A small army of men are engaged here as keepers. In many of the smaller parks particular attention has been paid to game birds, such as the Eng¬ lish pheasant, prairie chicken and wild turkey. A lover of birds imported large numbers of Japanese pheasants for his preserve in Oregon in 1893, the experiment proving a great success. E. C. Benedict of Greenwich, Conn., has estab¬ lished extensive fish preserves in Long Island Sound, which are the largest and most success¬ ful of their kind in this country. Near Platts- burg, N. Y., Paul Smith owns an immense pre¬ serve around Saint Regis Lake of 40,000 acres. Large numbers of elk were brought here from the West in 1903. William C. Whitney of New York has been active in stocking the Adirondack region with big game, and in conjunction with Pr. F. E. Kendall of Saranac Lake, has re¬ stocked the forests with elk and deer. At Delaware Water Gap, Pa., on the New Jersey side of the Delaware River, Barclay Warburton of Philadelphia established in 1902 an extensive deer park, which is one of the most successful in that section of the country. Dr. R. V. Pierce bought about 20 square miles for a

preserve at Saint Vincent Island, which was established in 1909 for the preservation of waterfowl. Marsh Island, La., was purchased by Mrs. Russell Sage in 1912, and set aside as a refuge for water- fowl. George Vanderbilt's Biltmore estate in North Carolina has been largely donated to the United States government as a game preserve.

In Canada there are several large game pre¬ serves, prominent among which is the Caughna- waga reservation on the Maquacippi River. The Roberval Club, which has a membership of 300 including both American and Canadian, owns a big game preserve containing 500 square miles, located in the Laurentian Mountains. Henri Menier occupies as a game park the whole of Anticosti Island, in the Gulf of Saint Law¬ rence.

GAME PROTECTOR LEGISLATION AND GAME LAWS, legislative enactments adopted by nations and states to govern the appointments of game officials, and formulating the rules and regulations to be observed in fishing and the hunting of game. See Game Laws.

GAMES, Gutierre Diez de, a Spanish chronicler and soldier of the first half of the 15th century, attached to the person of Pero Nino, Count de Buelna (1379-1453). His work which constitutes an interesting and faithful account of the life of Pero Nino from his early boyhood days is one of the most curious in any language. It is simple in form and lan¬ guage and direct in manner and aim. It is, therefore, of considerable value for the his¬ torical point of view. Of the life of Games himself nothing is known except what he him¬ self personally and incidentally reveals in the course of the (Chronicled He seems to have followed his master in all his wars and to have struck many a stout blow for him and his cause. So vivid and faithful are his pictures of his young master that they show how the young sons of noble families lived and acted in that age ; what their interests were and how they proceeded to satisfy them. Games boasts that he was Pero Nino's standard-bearer on many an occasion when the battle raged fiercely.

But he was never more truly his standard- bearer in the ardor of combat than in the in¬ timacy of his personal description of his pa¬ tron in his delightful and chatty (Chronicle > ((Cronica de Don Pero NinoU This work, which lay long in manuscript, appears to have been used by subsequent chroniclers and his¬ torians and to have been cited frequently from early times, as one of the most important docu¬ ments relating to the history of the reign of Henry III. It was finally edited and consider¬ ably abridged by Eugenio de Llaguno Amirola, appearing in print in Madrid in 1782. Under the title (Cancionero de Baena} a second edi¬ tion was published by P. J. Pidal (Madrid 1851), and a third by Fr. Michel (Leipzig 1860). Consult Cueto, L. A. de (Marquis de Valmar), Revue des Deux*

Mondes (15 May 1853) ; Menendez y Pelayo, M., (Antologia de poetas liricos, etcP ; Ticknor, (History of Spanish Literature (New York 1854).*

GAMES. Games are an expression of the play instinct, a distinct species or form of play. A study of them includes a definition of games as distinguished from play; and a considera¬ tion of games from historical, educational and recreative viewpoints. While the term play in¬ cludes games, so that we ((play games,® it is technically applied to informal play activities, such as playing horse, playing house and play¬ ing in the sand. In such play there are no fixed rules, no formal mode of procedure and generally no climax to be achieved. The vari¬ ous steps are spontaneous, not predetermined, and are subject to individual caprice. In games, on the contrary, as in blindman's buff, prisoner's base or football, there are prescribed acts, sub¬ ject to rules, generally penalties for the in¬ fringement of rules and the action proceeds in a formal evolution until it culminates in a given climax ; which generally consists of a victory of skill, speed or strength. This definition applies to games that require considerable bodily ac¬ tivity, such as those mentioned, and to so- called quiet games, as dominoes, cards, jack¬ straws, chess, checkers and other board games. Our concern in this article is chiefly with ac¬ tive games.

Among the simplest of active games are sing¬ ing games, in which the action is mainly a repetition of dance movements, or of some dramatic or descriptive motions, as when the farmer sows his seed or London bridge falls down upon its victim. More strenuous are the games of chase, such as tag, cat and rat, and Red Rover; or competitive games of skill, strength or speed, illustrated by relay races and athletic contests. Highest of all, both in their organization and their demands upon the varied powers of players, are team games, of which baseball and football are popular examples. Team games are peculiar to the Anglo-Saxon race; nearly all games of the other classes are of very ancient origin and of wide distribu¬ tion among the races and nations of men. In¬ deed, the games of children form a distinct branch of anthropology, ethnology and folk¬ lore and throw much light on early customs from which they are descended; for they come trooping out of the. past unconsciously bearing the relics of primitive civilizations, of old re¬ ligious rites and grim superstitions, of mar¬ riage and May-time festivals and "battles long

<-' P-eas' beans and barley grows® had us origin in a religious rite intended to

brite“ i?tehefnffll1y °f/he fieIds= London the hiiilHin tbc °ffeun? of a human sacrifice at he building of a bridge ; “Here we go round

the mulberry bush» is the survival of a custom

Strv aPndCt1Sed by §Te °f the EuroPean peasan- back as fJe? 1° have existed at least as far dav or • Y- Greeks- of celebrating May

flowers IZ g T WUh the §athering of nowers and marching in procession This

andgefromV?t eh am°ng the American colonists and iiom it have come our May basket and

May pole customs. Indeed, most of these

smgmg games and many other active parte?

? anT p ayed b? chlldren- s«ch asPstage

stead of ?heSdng “°i re™sa,em. were used in

Purita?/ e?a d ACe by T yOUng people of the ■ruritan era. Among the games of religious

IhtTT ;°US °,ngin Sh0uld be mentioned! which, m us e,arliest form of iron tag renre-

fnfluenrplgbt fr°m an evil spirit’ agains whose influence iron was a protection. The little*

kindergarten game, “I put my right hand in,®

is very ancient and with its chorus “Loobv loo®

gives evidence of having been part of a religious

rite to some deity In time it became a stately

court dance, which rank it held a century ago7

hr°imf Lhe suPerstltJous customs of divination by lot have come the doggerel “counting out® rhymes used by children the world over for choosing the principal players in games. Fami¬ liar are the stanzas of this kind beginning ((Ena mena, mina, mo® and “Onery, twoery, tickery,’ tee. Of similar derivation is the custom of assigning parts by “holders,® in which one child holds a pebble in the closed hand and another guesses which hand contains it. Courtship and marriage customs are perpetuated in “Round and round the village® and “Little Sallie Water. Still other games, for example, Unde Jchn is very sick,® come from the Daiiad days when a versified narrative was sung and acted at the same time ; — days when to sing a dance® and “dance a song® were interchangeable terms.*

Athletic games, or competitive trials of in¬ dividual strength, speed or skill under fixed rules are probably prehistoric. The mention i theP1 takes one’s thought at once to “the glory that was Greece and the grandeur that was Rome. The Greek games have been im¬ mortalized in literature and art; prominent ex¬ amples^ of which are the Iliad and Odyssey, Pindar s Odes of Victory) and, in sculpture, the discobolus or discus thrower and the wrestlers. These Greek games were played at four stated festivals, the greatest being the Olympic which became a national festival about 776 b.c., and recurred every four years at Olympia in Elis. The importance of the Olympic festival in Greek national life may be judged from the fact that time came to be reckoned in Olympiads. The Pythian games were celebrated in the third year of each Olympiad, the Nemean games in the

second and fourth years of each Olympiad, and the Isthmian games in the first and third years of each Olympiad. All were held in honor of some god. In Homeric times the events in athletic games were chariot, racing, boxing, wrestling, foot racing and javelin throwing. The Olympic contests, which came later, were probably confined at first to foot racing; to this

olhci crcnts were gradually added until the pentathlon came into existence, about the 18th Oympiad, and boxing and chariot racing were added in the 23d Olympiad. The pentathlon consisted of leaping, spear throwing, discus pitch-

"afl nwr®lng ˆ reltlin h thus called for aQ V; work, thereby preventing inharmoni-

fL d?veloPrnent by over-specialization. A competing athlete was obliged to enter for all \e contests and was considered a victor only npon winning , at least three of the five events

™°dT athIetlc ˆames embody these

For n f m whaL are ca!Ied contests.

Men's rtfw' m Athe P.en.tathl°n Of the Young Men s Christian Association, the 100-yard dash

jt0u the Gre.ek foot race; throwing the 12-pound hammer is equivalent to discus throwing the running high jump to leaping- pole vaulting for height is a substitute ior 3 the spear and the one-mile run for wrestling The prizes for the Greek games had no intrinsic value and were merely symbols ot honor, as wreaths or palm branches. The prestige and indirect advantages accruing to a victor, however, became in time so great that contestants spent all of their time training for the games. The entrance of this professional and commercial spirit led to the decadence of the games. A similar degeneration occurred much more quickly in Rome. In these latter days we have had the dramatic spectacle of the revival of the Greek games as international con-

i qqa thmeufirSt of tbese occurrmg in Athens in 1896. I he countries represented by the con¬ testants in these international games included Germany, England, Austria, France, Italy Switzerland, Sweden, Hungary, Denmark,' Greece, Australia and the United States. See Olympic Games.

No mention of the Greek games would be adequate that did not include the balanced rela¬ tion which they held to the intellectual, artistic and ethical interests of the time. The contest- ants were examples of balanced culture, and the festivals drew together the greatest poets, philosophers, orators and

artists whose achieve¬ ments were there displayed. The tournaments or jousting bouts of the age of chivalry may be cited as a further example of athletic contests u ·rea popularity in which the concern for physical prowess was blended with higher in¬ terests. It is notable that the modern organiza¬ tions which have made physical training most pcrpumr, the German Turnverein, the Young Mens Christian Association and the colleges, also combine these varied elements.

Ranking higher as games than individual contests, because more complicated in their or¬ ganization and demands, are team games in which opposing groups contest, each as a unit against the other. Each player on such a team has his assigned part or duties, differing from many of the others, but as an individual he is subordinate to the interests of his team. Games of this class are an expression of the fighting in¬ stinct and undoubtedly are a development f rom the simpler fighting games played by young boys, such as stealing sticks (Scots and Eng¬ lish), and prisoner's base, which in turn are supposed to have originated in border warfare. Between these simpler games and the highly developed team games there exists the same differences of organization as between prim¬ itive and modern warfare. The former was

merely a series of individual combats, the parts enacted by the various contestants being hom¬ ogeneous, and, the fight, once on, very largely a matter of individual initiative. In modern warfare there is greater differentation of duties, and the individual is subordinated to the organized whole. The team games most popular in the United States are baseball, foot¬ ball, basket ball, cricket and hockey. Baseball has been called the national game of the United States, as cricket and Rugby football are dis¬ tinctive of England, golf of Scotland and hand ball of Ireland. Basket ball bears the unique distinction of being the only game of wide and enduring popularity which was deliberately invented. Dr. James Naismith devised the game about 1892, as a result of studying the principles involved in successful games. Though invented for and played by men, it is the only team game that has become popular with women. Competitive adult games largely in vogue, which depend upon skill, rather than upon a combination of skill and organization, are tennis, golf and croquet.

The anthropological tenet, that in his de¬ velopment the child passes through the stages which the race has gone through before him, finds strong confirmation in children's plays and games. (

Intellectual pastime are quite as educative as the more active physical games. In the proc¬ ess of the evolutional development of the aver¬ age child there comes a time when mental play is a real necessity, and in later life games that employ the mind are usually preferred to those that call for physical exertion. Grandmother is often as fond of her backgammon as the college youth of his chess or the clerk of his proficiency at checkers. Backgammon, like most board games, is partly a game of chance, but there is considerable opportunity for the exercise of skill and experience. These same conditions make most of the fascination in¬ volved in games of cards. Chance determines what cards each player shall hold but he usually has choice as to what he shall play, and this affords opportunity for skill, judgment and application of the law of averages. Some games of cards, like whist, call for really scientific play to excel ; others, like draw-poker, call for quick judgment of human nature, cour¬ age and bluff. Card games in which there is bidding, like auction bridge, develop the trading qualities useful to the merchant.

The gambling game, which involves the staking of money, affords another sort of men¬ tal excitement of the sort that mature minds consider harmful, but which seems to have a part in the mental development of the average individual. Intellectual games of pure ability, experience and science are typified by checkers and chess. Checkers being easy to learn is widely played by those who enjoy this mimic warfare of the calculating powers of mind

against mind. Chess is far more complicated, and serves to amuse many of the highest intel¬ ligences. It is a common pastime with educated' men of a mathematical turn. Every good chess player can discuss enthusiastically the training of the mind involved in playing this game of games.

The training of the hand and eye, as well as judgment and skill, are evidenced in pool and billiards, which have their devotees of all ages and both, sexes, though mainly played by men, apparently because the equipment is not often conveniently within the reach of the woman or child. Pool compares with checkers, as the easy game to learn, played by the crowd, while the expert prefers billiards, and has much the same condescending air toward pool that the expert chessplayer exhibits toward the simpler game of checkers.

It thus appears that games, like the activities of .life, show an evolutionary progress. First the rattle, then the doll, then the kindergarten play, then athletic sport and team play, then the test of hand and eye as in billiards, then the evolution through games of chance to games of intelligent skill — all pastimes imitat¬ ing the more real and serious affairs of life. There is a game for every age and every taste ; there is development of body and of

mind ; there is distinguishable an element of social progress, in recognition of the rights of others and of superior ability. The power of co¬ operation is recognized; resourcefulness is de¬ veloped; the need of caution and value of courage are made apparent, and often the error of selfishness is thoroughly taught. The games common to an earlier age call for individual play, or the competitive element, or the homo¬ geneous social characteristics of the folk- games. The training of the will is another strong educational feature of games. The timid, hesitating child, who at first shrinks from exposed positions or an aggressive part, gains courage and self-reliance ; defeat be¬ comes, instead of a discouragement to all effort, a spur to greater; and the inhibitive control required to obey rules and regulations, es¬ pecially under strong excitement, touches an¬ other of the well springs of character. So, from the first, clumsy, timid efforts of the little child, to the skilful team work of the college athlete, at once aggressive and self-controlled, games afford a means of development and training for body, mind and character. Were any of these results objects of conscious en¬ deavor on the part of the players, the recreative element of games would be lost. But their unique power lies in the fact of this recreation — this objective interest which holds the at¬ tention involuntarily and renders the training incidental, unconscious and natural. Because of this psychological distinction, the expression ˆgymnastic games,® which is frequently heard, is a contradiction in terms and a misnomer. A mistake also is an occasional tendency to dis¬ card gymnastic exercise in favor of games, and vice-versa. While each is an important part of physical training, psychologically and physi¬ cally there are essential differences between the two forms of exercise. Gymnastics are taken for the purpose of bodily development, and the mind is continually in the unnatural attitude of consciously directing the automatic processes of muscular co-ordination ; games are played

GAMETOPHYTE

i°rT mil Jlr°],C °r ‘,he Atory- without subjective 01 utilitarian end. This psychological differ-

PhCvQi1SlieXaCt Y tha- between work and play.

13 s Rally, g}annastic exercise may be more

closely adapted to individual powers and needs than the exercise of games; it can afford more vigorous exercise m a brief time to large num¬ bers in limited space; and it is corrective of

rlS™ˆ~°L faulty neuro-muscular habits.

W, nf thc-°thfr hand' offer a more natural pnt ° , exercise, have a larger emotional con¬ tent and in their social and psychological train- mg are not approached by gymnastics.

f,,AhV?Crratlve- ?lement in games, the sheer un and trolic spirit, and the engrossing inter¬ est that springs from primitive instincts, can¬ not be too highly valued as a relief from the pressure which modern civilization brings to bear upon both children and adults. Especlallv under city conditions should this be fostered lhe paucity of childish play and normal youth¬ ful sport in cities, owing to lack of space, is not only pitiable, but tragic in view of all that it may mean for the healthful, balanced de¬ velopment and life of the individual. The growth of indoor games as basket ball and indoor baseball is admirable because making a virtue of necessity; but the movement to pro¬ vide playgrounds is still better, for gangs of >outhful criminals and depredators are found to melt away before them, and the play and games which they foster belong by inherent right to the open sky and the free air. See Baseball; Basket Ball; Cards; Checkers; Chess; Cricket; Football; Folklore; Golf- Hockey, etc.

Bibliography. — Berenson, etc., (Basket Ball for Women) (1893), Bigelow, etc., 'One Hun¬ dred and Fifty Gymnastic Games) (1902) • Bol¬ ton, (The Counting-Out Rhymes of Children) (1888); Chamberlain, 'The Child: A Study in the Evolution of Man> (1900); Champlin, Young Fojks Cyclopedia of Games and Sports J (1899) ; Fielde, 'A Corner of Cathay) (for games of Chinese children) (1894) ; Gomme 'Traditional Games,) 'Dictionary of British Folk Lore> (1894); 'The International Games of England, Scotland and Ireland, with Tunes, Singing Rhymes and Methods of Playingˆ (1894-98); Gross, 'The Plav of Animals) (1898); 'The Play of Man> (1901); Newell, 'Games and Songs of American Children) (1884) ; Plummer, 'Athletics and Games of the Ancient Greeks,) 'American Physical Educa¬ tion Review) (1898); Tsanoff, 'Educational Value of the Children's Playgrounds) (1897)

GAMETOPHYTE, ga-me'to-fit, Reduc¬ tion of. The gametophyte, as the name implies, is the gamete-bearing plant. In all plants which have reached the level of sexuality there is a gamete-bearing plant in the life history, alter¬ nating with another phase which may or may not bear spores. This other phase, in some algse and fungi and in all plants above these two groups, does bear spores and, consequently is called the sporophyte. The gametophyte pro¬ duces gametes, usually called sperms and eggs ; a sperm unites with an egg, and this fertilized egg is the first cell of the sporophyte. The sporophyte, at maturity, produces spores; a spore produces the gamete-bearing plant and so the gametophyte and sporophyte generations alternate. See Alternation of Generations.

n the liverworts, the gametophyte genera¬ tion is the conspicuous one, and the only one likely to be seen, except by the botanist, the sporophyte being comparatively small and para¬ sitic upon the gametophyte (Fig. 1, A).

GAMETOPHYTE.

FlG'—A series illustrating the reduction of the game tophyte. A, Marchantia, a liverwort; g, gametophyte; s. sporophyte, represented as a small black dot (one- nail natural size). B, a moss: g, gametophyte; 5, sporo¬ phyte; natural size. C, a young fern: g, gametophyte nearly rotted away; s, sporophyte; natural size. D, +v,eˆmˆ0irej0ˆ Selaginella containing female gametophyte; 77 6 T ac, r'ot' °> represents the egg; greatly magnified.

female gametophyte of Pine; the dotted lines indi¬ cate the surrounding tissue of the ovule: g, gameto- phyte; o, egg; greatly magnified. F, female gameto¬ phyte (embryo sac) of Sunflower, consisting of three antipodal cells, a; endosperm nucleus, e ; egg, o; two synergids, h; nucleus of egg, n; greatly magnified. G, female gametophyte (embryo sac) of Plumbaginella greatly magnified.

In mosses, the matted cushions, which every¬ one calls moss, are masses of gametophyte plants. The sporophytes are the capsules, often nodding on slender stalks, which are seen at¬ tached to. the gametophytes, upon which they are parasitic (B) . In the common ferns, the gametophyte — called the prothallium — is a small thin, prostrate plant, seldom as large as one's finger nail. It produces eggs and sperms, a sperm fertilizes an egg, which then grows into the familiar fern plant. As the fern plant — the sporophyte — develops roots and becomes independent, the gametophyte dies (C). While this gametophyte is small and evanescent, it is green and independent as long as it lives. In some of the fern allies — Selaginella, Isoetes and the water ferns — the sporophyte produces two kinds of spore cases containing two kinds of spores, small spores, called microspores, and large spores, called megaspores. The micro¬ spores develop microscopically small prothallia (male gametophytes) which produce a few sperms ; the large spores develop female game¬ tophytes which produces one or more eggs. Both male and female gametophytes are con¬ tained within the spore, so that they are ex-

posed only through cracks in the spore coats (D.) They are not green and

consequently, are practically parasitic. The male gametophyte dies as soon as it has discharged its sperms; the female gametophyte, with a larger supply of stored food material, not only matures its eggs, but nourishes the young embryo until it develops roots and leaves and thus becomes independent. 1 he gametophyte then dies. In the seed plants, which include the gymnosperms and angio- sperms, there are also two kinds of spores, microspores and megaspores, which develop parasitic gametophytes. The male gametophyte consists of the microspore and a long tube, the pollen tube, which contains two sperms. The female gametophyte is not only entirely in¬ cluded within the megaspore but the megaspore itself is entirely included within the sporangium (ovule) (E). This inclusion has resulted in a more and more pronounced dependence, ac¬ companied by reduction. In the gymnosperms, e.g., in the pine, the female gametophyte still bears considerable resemblance to that of some fern allies, but in the angiosperms, e.g., in the sunflower, the reduction has gone so far that a megaspore and female gametophyte are identi¬ fied only by the evidence of comparative mor¬ phology. In this case, which represents the majority of the flowering plants, the female gametophyte consists of only seven nuclei, or loosely organized cells, so specialized that they have received individual names. The egg with two accompanying cells occupies one end of the gametophyte while three antipodal cells occupy the other extremity. Between these two groups is the endosperm nucleus, formed by the fusion of two polar nuclei (F). The final stage of reduction is found in an unfamiliar plant, Plumbaginella, in which four megaspore nuclei form a female gametophyte of only four nuclei, one of which organizes the egg, two unite to form the endosperm nucleus, while the fourth disorganizes; thus, at the time of fertilization, the female gametophyte has only two nuclei, the egg to start the embryo and the endosperm nucleus to start the endosperm, or nutritive tissue which support the embryo until it de¬ velops root and leaves (G .)

Summarizing for the female gametophyte, it will be seen that in the lower plants, the game¬ tophyte is green and independent and is the phase which we recognize as the plant, the sporophyte being parasitic upon it. In the flowering plants, the sporophyte is the con¬ spicuous phase which we recognize as the plant, while the gametophyte has become en¬ tirely parasitic. A mean, between these two extremes, is illustrated by the mosses, in which both gametophyte and sporophyte are green, so that the sporophyte, although still attached to the gametophyte during its entire life, never¬ theless is partially independent. The reduc¬ tion, however, is very gradual and numerous intergrades could be cited to make the series complete. The reduction of the male gameto¬ phyte is similar, but there is less difference be¬ tween the extremes.

Bibliography. — Atkinson, G. F., (College

Botany ; Campbell, D. H.,*

Charles J. Chamberlain, Professor of Morphology and Cytology, Uni¬ versity of Chicago.

GAMEWELL, Francis Dunlap, American missionary: b. Camden, S. C., 31 Aug. 1857. He studied civil engineering at the Rensselaer Polytechnic Institute and at Cornell, was graduated at Dickinson College, Pa., in 1881. From 1881 to 1884 he was engaged in educa¬ tional work at Peking, China, from 1884 to 1887 was superintendent of the West China Mission and from 1889 to 1900 was professor of chemis¬ try and physics at Peking University. At the siege of Peking in 1900 he was chief of staff at the fortifications of the British embassy, was field secretary and executive secretary of the board of foreign missions of the Methodist Episcopal Church in New York from 1901 to 1908 and secretary of education for China since 1909. Since 1912 he has served also as general secretary of the China Christian Educational Association. He is editor of the Educational Review and member of the editorial board of the Chinese Recorder.

GAMING AND WAGERING. See Gam¬ bling.

GAMMER GURTON'S NEEDLE, a

*'Aomedie** by Bishop John Still, very popular during the 16th century, and supposed to have been the first play that was acted in the English tongue. In 1575, nine years after its appear¬ ance on the stage of the university mentioned below, it appeared in print under the quaint title, (A Ryght Pithy, Pleasaunt, and Merie Comedie; Intytuled Gammer Gurton's Needle; played on Ye Stage not long ago in Christes College in Cambridge; Made by Mr. S [till] , Master of Art.* Thomas Warton had been misled into believing that the first issue of the play from the press dated from 1551, and hav¬ ing so described it in his (History of Poetry,* he misled others, who on this account took it to be the very first English comedy. (Ralph Roister Doister,* and possibly even another comedy, had however, already appeared when Bishop Still's work was not yet in press. Readers of the present time who penetrate be¬ hind the quaint, uncouth language of this old play, will find in it an interesting picture of the 16th century village life. The plot, one of the simplest sort, turns on merely the loss of Gammer (((old wife**) Gurton's ((needle,** as she mends her man Hodge's <(breeches.** The action proceeds on the search for the needle — a search by the entire household — and the pranks of Diccon the Bedlam, a clown (the ftvice** of this play) who induces a quarrel be¬ tween Gurton and the neighbors ; and con¬ cludes, to the discomfiture of the wearer, in the finding of the needle in exactly the place on which Gammer Gurton's*

industry had been employed. Lord Morley, a high authority in these matters, in an attempt at a literary evalua¬ tion, found this play — to use his own words — ˆindelicate, but not indecent.® It was revived successfully by Stuart Walker and the Port¬ manteau players in 1917. Consult Morlev,

(English Writers (Vol. VIII, 1897) ; and Saintsbury, 'History of Elizabethan Literature.*

GAMMON THEOLOGICAL SEMI¬ NARY, school for the training of colored men for the ministry of the Methodist Episcopal Church located at South Atlanta, Ga. Rev. Elijah H. Gammon was a Maine man who came to Illinois in 1851 for the benefit of his health and actively labored in the Rock River Confer-

retLlc\ f ld \ri?Und- Chicago until 1858 when he letiied from the ministry at the age of 39. He

J "5red upon a business career and became l0£r: 1 o man' hfe founded Gammon Theo-

np?rl tiS®"llnaryi with gifts and bequests of tb12yoha f a milIlon dollars, besides contrib- in 1 ia? etluUS sums to other causes. He died

*Rev W P TP rSti/nn°f the seminary was Mptlio r } * T.hlrhield, D.D., now a bishop of the*

k>rd nn EpiSC5pal Church. Rev. W. H Craw- iord, D.D., president of Allegheny College was

a mem],eJ ?f lts £acupy. Bishop Thirkiefd was succeeded by J. W. E. Bowen 1899-1910. Rev.

in?c nan' was president 1910-13

Since 1915 Rev. Philip M. Watters, D.D., has 3een the president. At present it has a fac- ty °7nnS1X' average attendance of 80 and

. The buildinSs are valued

at $62,UUU with the present endowment of $481 –

0U0, and a library of more than 15,000 volumes.

GA.MP, Mrs Saircy, in Dickens' (Martin Chuzzlew.t* (1843-44) , a stout and elderly pro- Sessional nurse with a watery eye and a fond- ness tor spirits. She is loquacious and con¬ fidential and continually refers to the opinions ot a fabulous being, umy friend Mrs. Harris.® Her amorphous umbrella has furnished the name gamp for that type of impedimenta.

GAMTOOS (gam'tos) RIVER, Cape Coiony, South Africa, which rises in the plateau ot Great Karoo and empties into the Indian Ocean. In 1770 this river was officially declared the eastern boundary of Cape Colony. Consult Theals S. McC. (History and Ethnography of South Africa before 1 795 > (London 1910).

. GAMUT, gam fit, in music, a name applied m a three-fold manner:— (a) in its original sense, to the first or lowest note of the scale • (b) to the mediaeval «great scale® whereon the musical notes are disposed in their several orders; (c) to the whole range of a voice or instrument, in the modern sense of ((compass ® Gamut is derived from the Greek letter r y Wfj', pmma, which was combined in the' Middle Ages with the Latin adverb or conjunc¬ tion ut. Thus arose «gamma ut,® which was ater contracted into gamut. Ut is derived from the first syllable of the mediaeval Latin hymn, Sancte Johannes,® well-known in the history of musical development. The invention of the hexachord, the origin of which is bound up with that of the gamut, when understood to mean the great scale, is usually ascribed to Guido Aretino or d'Arezzo (q.v.) who (about a d. 1020) designated the notes of the hexa¬ chord by the first syllables of each line of the above mentioned hymn.

Guido d'Arezzo is commonly credited with many musical improvements, mutations, the hexachord and even gamut. But in the evolu¬ tion of musical notation out of the classical alphabetical system, the invention of the medi¬ aeval is more properly assigned to Huc- bald (a.d. 840-932). Hucbald used lines and the first letters of the Latin alphabet as a means of fixing the intervals of the scale, and thus may have been an important forerunner of Guido d'Arezzo. (Consult Hans Muller's (Huc- balds echte und unechte Schriften fiber MusikP Munich 1884). If by the invention of the gamut (taking the word in what was probably its original sense as employed in music), one is to understand the addition of the note ((G,® at

the bottom of the scale, it is quite certain that tins note was sung ages before the time of

riˆˆA „ „ˆnstides Quintilianus (fl.

c rca a.d. 110) tells us that whenever a note was wanted before the TrpochauBavouevos or proslambanomenos (added note) (A) of the

Hypodonan Mode, it was represented by the recumbent Omega (k). And S. Odo, writing in the 10th century, represents it exactly as . e|d1I0 did, by the Greek letter T y ‘ uf.° dˆiezzo himself speaks of gamma as in his time a recent addition. He writes : «In P3S ?.01Btuˆ r Graecum a modernis adjectum. It is thus certain that he was not the first to extend the scale downwards to <(r-ut.® Gamut in its second sense, as the name of a plan of the musical scale (from G to e) was early so understood, and the plan to which it was assigned persisted as long as the hexa- chords were recognized; that is. down to quite recent times They are alluded to in Shakes- peare The Greek letter, T, yt was used in this plan to denote the first note, or ut, of the lowest hexachord: the lowest note of the bass stave, where the first hexachord had its start¬ ing point The gamut (in this second sense) seems indeed to have been employed as a mne¬ monic system whenever it was desired to effect a change from hexachord to hexachord, ac¬ cording to the principles of mutation; and on this account the gamut may be regarded as the ancestor of the Tonic Sol-fa modulator In modulating with the Tonic Sol-fa system, for example, from the tonic to the dominant, the Su°P °n°ne bar becomes the «do» of the next which illustrates the survival of the very prin¬ ciple for which the gamut once existed. Some¬ times the scale is referred to as the harmonical hand, from Guido d’Arezzo’s having used the figure of the hand to demonstrate the progres¬ sion of his system of sounds. The understand¬ ing of the scene between Bianca and Hortensio in the (ii. I.) is possi¬ ble only when one in some measure understands the gamut. There the words ((one clef, two notes have,® refer to the fact that note «B» was expressed by a natural and a flat, being in the former case the third or «mi» of the hexachord beginning at «G,» and in the latter the fourth °L fa °f the hexachord beginning on <(F.®

I his small circumstance was the commence¬ ment of the system of accidentals, and thus opened the door for modern modulation.® Consult Fuller-Maitland, J. A., on the ‘Gamut.*

GANANOQUE, ga-na-nok’, Ontario, Can¬ ada a port of ˆentry of Leeds County, 18 miles northeast of Kingston, on the Saint Lawrence River, at the point where it flows from Lake Ontario. It is opposite the Thousand Islands, and has long been popular as a summer resort.

It has a fine insular public park, and manufac¬ tures machinery and farming implements Pop. 3.804.

GANDARA, gan’da-ra, Philippines, a pueblo of the island of Samar, situated in the western part of the island on the left bank of the Bac- hao Bangahon River. In 1900 it was almost entirely destroyed during an engagement with insurgents ; before that it had a large trade. A United

States military station and depot for stores is situated eight miles by river from Gandara. Pop. about 15,000.

GANDIA, gan'de-a, Spain, town of the province of V alencia, 45 miles southeast of the city of that name, on the Alcoy, about two miles distant from the coast. It contains many mediaeval remains, old walls surrounding the town, a ducal palace, a college, churches, etc. It has silk mills, tanneries and velvet manufactories and has a good trade in the grain, rice, fruit and oil of the district, which is very fertile. Consult Calvert, A. F., 'Valencia and Murcia> (New York 1911). Pop. 12,000.

GANDIER, gan'de-a, Alfred, Canadian preacher and educationist : b. Hastings County, Ontario, 29 Nov. 1861. He was educated at Queen's University, Kingston, where he grad¬ uated B.A. in 1884, and at Edinburgh Univer¬ sity, where he graduated B.D. in 1889. After holding charges at Brampton, Ontario (1889-93), and Fort Massey Church, Halifax, Nova Scotia (1893-1901), he was called to Saint James' Square Church, Toronto, where he labored until 1908. He was appointed lecturer on apol¬ ogetics at Knox College, Toronto, in 1902, and in 1908 was elected principal of the college.

GANDO, gan'do, Africa, a portion of the colonies of Nigeria, Dahomey and Upper Sene¬ gal and western Sudan, intersected by the Niger and inhabited chiefly by Hausas, Fulbes and Surhais. It is a most fertile district, the rain being plentiful. Mohammedanism is the prevalent ieligion. Pop. estimated at 5,500,000.

GANGES, gan'jez, one of the greatest rivers of Asia, and <(the sacred river of the Hindus, » rises in the Himalaya Mountains, in the prov¬ ince of Garhwal, northern India. It is formed by the junction of two head streams, respec¬ tively called the Bhagirathi and the Alaknanda, which unite at Deoprayag, 10 miles below Srinagar, 1,500 feet above the level of the sea. The Bhagirathi which flows from an ice cave in a snow field, 13,800 feet above sea-level, is usually considered the source of the Ganges from its being a sacred stream in Hindu mythol¬ ogy; but the material claims of the Alaknanda are preferable, as it flows farther and brings a larger volume of water to the junction. At Hardwar, about 30 miles below the junction of the head streams, and about 120 miles north- northeast of Delhi, the river is only 1,000 feet above sea-level. Here it enters the great valley- plain of Hindustan, and flows in a southeast by south direction until it discharges itself by numerous mouths into the Bay of Bengal, a dis¬ tance exclusive of

windings of fully 1,100 miles. Its length, with deviations, is calculated at about 1,500 miles. During its course it is joined by a number of large rivers, the principal of which are the Jumna and Son, joining on the right bank ; the Ramganga, Gumti, Gogra, Gan- dak and Kusi, on the left bank. Some of the principal cities on the Ganges and its branches, descending the stream, are Cawnpore, Allaha¬ bad, Benares, Patna, Behar, Murshidabad and Calcutta. The Ganges is navigable for boats of moderate size nearly 1,300 miles from its mouths. It is a great feeder of irrigation and navigation canals. (See Ganges Canal). Its utmost breadth is about three miles, with a maximum depth of about 30 feet in the dry sea¬ son, and 60 feet in the wet. Its descent is com¬ puted at four inches per mile ; its current in the dry season is less than three miles an hour; in the wet season five or six. The quantity' of

water discharged into the ocean is estimated at 500,000 cubic feet per second during the flood season, and 100,000 during the remaining eight months of the year. Its current brings down a great quantity of mud, which in the course of ages has contributed to form the wide delta which belongs to it in common with the Brah¬ maputra. The delta, intersected by numerous branches, extends from east to west from 80 to 200 miles, and commences about 200 miles, or 300 by the course of the river, from the sea. A part of it is an uninhabited region called the Sundarbans, overgrown by jungle, infested with tigers and crocodiles. The westernmost deltaic branch of the Ganges, called the Hugh, is the only branch commonly navigated by ships ; and vessels drawing 26 feet are safely piloted up to Calcutta. The construction of embankments, and continuous dredging, are necessary to keep a clear channel. The Ganges, as the Padna, continues eastward until it joins the Jamuna, the main branch of the Brahmaputra, which flows through the estuary of the Megna, the deltaic boundary on the east, into the Bay of Bengal. The periodical inundation of the Ganges commences about the end of April with the tropical rains. It rises gradually till it at¬ tains, near the commencement of the delta, a height of 32 feet above its ordinary level. By the end of July, the flat country of Bengal is overflowed to the extent of 100 miles in breadth, leaving visible little but tops of trees and vil¬ lages, which are often built on artificial mounds above flood mark. After the middle of August the water begins to recede, and decreases till the period of the next inundation.

That part of the Ganges which lies between Gangotri, the first temple and pilgrim resort on its banks, 10 miles from its source, and Saugor Island, below Calcutta, is held particularly sa¬ cred. Wherever the river runs from south to north contrary to its usual direction, and at the junction of its affluents, it acquires a more pecu¬ liar sanctity. Its junction with the Jumna at Allahabad (q.v.) forms the most venerated place of Hindu ablution. The Hindus believe that this river rises immediately from the feet

of Brahma, and that it possesses great and miraculous cleansing powers, on account of its divine origin. There is a scientific basis for this universal faith among Hindus, repeated and careful experiments showing that the river pos¬ sesses extraordinary but hitherto inexplicable antiseptic qualities.

It is an imperative duty of the Hindus to bathe in the Ganges, or at least to wash them¬ selves with its waters, and to distribute alms, on certain days. Whoever dies on its banks' having drank of its waters before his death, is thought to.be exempted from the necessity' of returning into this world and commencing a new life. Whenever, therefore, a sick person has been given over by the physicians, his relations, hasten to carry him to the bank of the Ganges, in order that he may drink of the holy water, or be immersed in the river. Such as live too far from the river to admit of this always preserve some of the precious water, as a sacred treasure, in a copper vessel, that it may be given them in the hour of death. This water is, therefore, a considerable article of cJ)mn]erce in India. It is also customary, after the dead have been burned, to preserve the remains of the bones and the ashes until au

GANGES

Bathing in the Ganges

I

.

■

■ .

GPan0esUnily °^ers Growing them into the

The name _ Ganges signifies merely the stream (Sanscrit Gangd). In Hindu mythology the rner, personified as the goddess Ganga, held a position equal in importance and interest to that which the stream (the stream par excel¬ lence) holds to-day.

GANGES CANAL, The, in India, an im¬ portant irrigation work and navigable channel, e oldei portion called the Upper Ganges Ganal, opened in 1854, and extending on the nght of the Ganges (q.v.) from Hardwar to

Fawnpore and Etawah, with a main canal 440 J™1®? Mg' navigable throughout: and with »ˆ~4 miles of distributaries. The Cawnpore and Etawah terminal lines are now absorbed in the Lower Ganges Canal, commenced in 1873 and completed in 1878, which continues in its main branch for 260 miles to Allahabad, draw¬ ing its supply from the river at Narora, in the Aligarh district. The weir and headworks at Narora include a solid wall, 3,800 feet long, with 42 weir sluices, founded on huge square blocks.

GANGHOFER, gang'hof-er, Ludwig, Ba¬ varian poet, dramatist, novelist and statesman : b 7 July 185c at Kaufbeuren ; d. Tegernsee, Ba- Y,ana> 26 July 1920. He was the son of August G. (1826-1900), who was the author of several useful books on forestry. As a youth he showed ability in mechanics and was trained in the technique of machinery. He studied philosophy, philology and the natural sciences at Wurzburg, Munich and Berlin. But after 1879, making his debut with a volume of lyrics, he devoted himself entirely to literary activities, taking up his residence in Leipzig. The fol¬ lowing year he issued his translation of De Musset's 'RolloC He continued pouring forth poems, collecting them from time to time under the titles (Bunte Zeit> (1883); (Heimkehrer> (1884); (Es War Einmal : Moderne Marchen) (1891) ; (Fliegender Sommer: kleine Erzahlun- gen) (1893) and (Die Siinde der Vater, (1886), the last reaching its seventh edition in 1902. He then turned his attention to dramatic writing and attained his first success with (1891); (Auf der Hohe) (1892). He also wrote the five-act drama (Wege des Herzens) and a one- act comedy, (Der Anfang vom EndeP Having an intimate knowledge of the Bavarian moun¬ tain-forests and the dialect of the people living there, he found among them an inexhaustible source of tales and romances. The best known of the (Tales of the Highlands> are (Der Jager vol. 12 — 18*

von Fall' (1882) ; (Aimer- und JagerleuD

0885); ,(Edelweiskonig> (1886); (1887); /Der Unfried) (1888); (Die Fackel- jungfrau) and and (Tarantella> (1898); (Das Kaser-MandP (1900). The titles of the longer romances, some of them in two volumes and illustrated with characteristic vignettes, are (1895) ; (Die Bacchantin) (1896) ; (Der lau- (1899) ; (Das Schweigen im Walde> (1899) ; (Der DorfaposteP (1900), and Das neue Wesen> (1902). The rather difficult dialect in which much of the dialogues in these dramatic and fascinating novels is cast is un- doubtedly the reason why they have never been translated into English, as they well deserve to be. Ludwig Ganghofer in late years was one of the most trusted counsellors in the entourage of former Kaiser Wilhelm, although in a strictly private capacity.

Nathan Haskell Dole.

GANGLION, connective tissue membranes enclosing small amounts of clear synovial fluids. They are usually found where tendons or mus¬ cles glide over bony parts, or where the skin, muscles or fascia are subjected to pressure or to friction. The number, size and location of these structures are subject to much individual variation. One of the commonest is found on the back of the hand, at the wrist, particularly in people who stretch their fingers widely, as piano players, or as librarians who handle many books, grasping several at a time. In this form is a firm and painless swelling, liable to be caused by any excessive exercise of the wrist, as in playing tennis, golf, etc. This swelling gives the impression that there is fluid beneath the skin, and grandmother's advice to break it with the family Bible or the dictionary is often followed, sometimes with serious results. This forceful method of reduction is foolish, as most of the swellings disappear with rest and the application of heat. If they persist, a surgeon should be consulted. Another very persistent variety of this trouble is found in the knee — causing housemaid's knee, or miner's knee. Obviously the breaking of these tumors by force is out of the question. There are many places in the body in which similar collections of fluid may accumulate, but these rarely cause much inconvenience unless they become infected through some knock or cut. In this event prompt surgical treatment is advisable, and aseptic surgery should be insisted on. A care¬ less and unclean surgeon may render a limb useless.

GANGOTRI, gan-go'tre, a square temple, about 20 feet high, erected on the right bank of the Ganges (q.v.), which here forms a small bay, about 10,319 feet above the level of the sea. This spot is regarded by pilgrims as the source of the holy stream, here called the Bhagirathi, which, however, rises eight miles higher up. The water here is peculiarly sacred, but few pilgrims come so far, and the only dwelling- house in the locality is occupied by the officiat¬ ing Brahmins, by whom flasks of the holy ele¬ ment are sealed for conveyance to the plains.

GANGRENE, gan'gren, the term applied to death of soft tissue in masses large enough to be seen. There are two forms, differing in

causation, appearance and progress. Dry or senile gangrene results from the gradual occlu¬ sion of arteries, the venous return being unim¬ paired.

For weeks or months the toes and feet, the parts most frequently affected, may feel cold or numb, or be actually painful, then gradually the skin becomes dry, then purple and black. The spread is usually very slow. It is particularly a disease of old age, due to the tendency at that period of life toward thickening and stiffening of the arterial walls. Moist gangrene results from sudden stoppage of the arteries, obstruction of veins, mechanical destruction of the tissues or from specific in¬ fection by germs. It is generally due to an in¬ jury which destroys a part of the living flesh, as in wounds, frostbite, burns by fire or cor¬ rosion by acids, etc. It also follows carbuncles and bedsores in some cases, and has occurred as the result of a tourniquet too vigorously ap¬ plied or left on too long. This form shows a soft,, boggy, bluish mass covered with blisters and emitting the odor of putrefaction. In both forms of gangrene there may be a zone of in¬ flammation between the dead and the living tis¬ sue, called the line of demarcation. The dead flesh may separate naturally leaving a scar on the healthy tissue, or the separation may have to be made by amputation of the diseased part.

Hospital gangrene was formerly very preva¬ lent in military hospitals; a wound becoming infected would quickly change to a gray slough, which in a few hours might involve the entire limb unless prompt removal of the tissue was undertaken. Aseptic surgery has made this fatal disease a thing of the past. Spreading gangrene is due to infection by a specific germ, the bacillus of malignant oedema, so called from the fact that it generates a gas that puffs up the tissue affected. The spread is rapid, and life is sometimes saved by amputation far above the wound. The treatment of gangrene is usually a matter of amputation, well beyond the affected part. Careful aseptic dressing is imperative, particularly where the condition of the patient is apt to contra-indicate radical cure.

GANGUE, gang (Ger. Gang, a vein), the matrix or veinstone of ores. These are always included in some stony matter, which forms the principal portion of the veins or beds which are worked for the sake of their metalliferous contents. Quartz is the most common vein¬ stone, and has been called the mother of ores. Calcareous spar, calcite, is also a frequent predominant material of veins. Sulphate of barytes or heavy spar, and fluor spar, are also often found as gangues.

GANISTER, a name originally given in England to a particular clay high in silica, used in the manufacture of fire-brick. In this coun¬ try the term is used more loosely and includes non-plastic rocks that are not clays at all but approach sandstones in character. Ganister may, therefore, be defined as highly silicious material used in the manufacture of fire-brick, more particularly what are known as silica- brick, for lining blast-furnaces, Bessemer con¬ verters, etc. The manufacture of such brick is an important

industry in western Pennsylvania. See Clay.

GANNAL, ga-nal, Jean Nicolas, French chemist: b. Saarlouis, Prussia, 28 July 1791; d. Paris, January 1852. He is noted for his in¬

vention of the method of embalming by injec¬ tion.

GANNETS, large sea-birds constituting the family Sulidce, of the order Steganopodes, char¬ acterized by having all the toes connected by webs, the absence of external nostrils and a very short tongue. They are closely related to the pelicans and cormorants, have large power¬ ful bills and feed upon fish, frequenting the sea-coasts of various parts of the world. The common gannet (Sula bassana), to which the name properly refers, is restricted in the breed¬ ing season to a few rocky islets on the coast of the British Isles and Iceland — notably the Saint Kilda group, and to Bird Rock in the Gulf of Saint Lawrence; and their numbers have been much diminished bv the fishermen who gather their eggs for food. They nest in colonies among the crevices and ledges of the rocks, and each bird lays a single large chalky white egg. When the young are on the wing they all leave together and scatter widely in search of food, extending their range on our coasts as far as the Gulf of Mexico. In the southern hemisphere are two closely related gannets. S. serrator of Austria and S. capensis of South Africa. Eight other some¬ what smaller species, called "boobies® (q.v.), breed on various tropical islands. The com¬ mon gannet is pure white with black outer wing-feathers and a buffy suffusion on the head. The young are mottled grayish brown. The other species are similar, many of them with red and blue coloring on the bare skin of the throat and around the eye.

GANNETT, Ezra Stiles, American Uni¬ tarian clergyman: b. Cambridge, Mass., 4 May 1801; d. near Boston, 25 June 1871. He was graduated from Harvard in 1820, in 1824 be¬ came assistant to W. E. Channing at the Federal Street Church, Boston, and later suc¬ ceeded to the pastorate. In the Unitarian con¬ troversies of 1825—35 he took a prominent though conservative part. He was the first secretary of the American Unitarian Associa¬ tion, its president 1847-51 and president of the Benevolent Fraternity of Churches 1857-62. He was also founder and editor of the Scrip¬ tural Interpreter, and an editor of the Christian Examiner and the Monthly Miscellany of Re¬ ligion and Letters.

GANNETT, Henry, American geographer: b. Bath, Me., 24 Aug. 1846; d. 5 Nov. 1914 He was _ graduated at the Lawrence Scientific School in 1869 ; became geographer of the United States Geological Survey in 1882; was geographer of the 10th, 11th and 12th censuses, and of those taken by the War Department in Cuba and Porto Rico in 1899. His publications include 'Manual of Topographic Surveying (1893) ; < Statistical Atlases, 10th*

and 11th Cen- suses) ; 'Dictionary of Altitudes (3d ed., 1899) ; (Commercial Geography* ; (The Build¬ ing of a Nation) (1895) ; "Gazetteer of Cuba> (1902); /Gazetteer of Texas* (1902); 'Origin ©ˆCertain Place Names in the United States >*

GANNETT, William Channing, American Unitarian clergyman: b. Boston, Mass., 1840. He is a son of E. S. Gannett (q.v.). He has held Unitarian pastorates at Saint Paul, Minn., and other places, and is now pastor emeritus at Rochester, N. Y. He is the author of

Year of Miracle (1881) ; 'Memoir of Ezra Stiles Gannett' (1875) ;

188ˆˆ Kina oems ((with F. L. Hosmer, ! ;S' , (/ 1 i l,K Faith that Makes Faith- ful (with J L . Jones, 1886);

Oneself Beautiful' (1899) ;

Jesus (1884), and other books.

*GANODONTA, a group of primitive mam¬ mals regarded as ancestral to the edentates, whose remains are found in the lowest Eocene formations of the western United States, inese remains are not numerous nor complete, but plainly exhibit a progressive relationship toward modern Edentata (q.v.). The earliest known is Hemxganus, from the Puerco beds of New Mexico, which was as big as a medium¬ sized dog. A later genus of similar size is Tk/r-*i tacotherfuin ; ' and a still later (Lower and Middle Eocene) is S tylxnodon. In reviewing the series, says Beddard, we see a gradual dimi¬ nution of the incisors, a gradual loss of enamel on the teeth generally and the production of hypsilodont teeth growing from persistent pulps, all of which are features of the later edentates.*

I he progression is gradual, but the forms seem to be a continuous series culminating in the ground-sloths. (See Paleontology). Consult Wortman, (The Ganodonta,) in Bulletin of the American Museum of Natural History (Vol. IX, New York 1897).

GANOID FISHES, an order of fishes founded by Agassiz on the character of the scales of certain fossil fishes, which are bony and lustrous, now regarded as a group-name for a rather heterogeneous series of low and chiefly extinct fishes. They are distinguished from the Clasmobranchs by their scales, their possession of true bone and of an air-bladder, and from the teleosts or true fishes by the pos¬ session of a spiral valve and a

contractile bul- bus arteriosus and the absence of decussation in the optic nerves. (See Ichthyology). The ganoids were, most numerous in Palaeozoic and early Mesozoic times, and few and diverse are the surviving forms, which include the paddle- fishes and sturgeons, the gar-pikes, the mud¬ fishes of the African rivers and a few others, all elsewhere described. In this group fall some of the most famous fossil fishes of palaeontology, described by Hugh Miller in his (01d Red Sandstone' and otherwise introduced long ago to the public. The berry-bone (Coc – costeus), the seraphim (Pterichthys) and the Asterolepis also had a bony shield, the flexible trunk having scales in Pterichthys, being naked in Coccosteus. The anterior limbs, or pectoral fins, of Pterichthys were long, covered with closely fitted plates and had a complex joint connecting them with the thorax. The gar-pikes of the American lake region are the modern representatives of the Lepidotus, TEchmodus, etc., of Mesozoic strata and of the Carbon¬ iferous Palceoniscus. Polypterus, the type of this group, is confined to the Nile and a few other African rivers. The group is most abun¬ dant in the Palaeozoic strata, Dipterus, Osteo- lepis, Holoptychius, Phaneropleuron, being Old Red Sandstone genera ; Rhizodus, Megalichthys with rhomboidal scales, Strepsodus with cycloid scales, Carboniferous. The ccelacanths range from the Carboniferous to the Chalk forma¬ tions, and are the only members of the order in which the tail is homocercal.

rp, Ganoids are not a homogeneous group.

ne C > ossoptcrygii, whose sole extant repre¬ sentatives are Polypterus (see Bichir) and C alamoichthys from equatorial Africa, stand close to the common origin of the other Ganoid stocks, the teleosts, or ordinary bony fishes, and the dipnoi. The Chandrostei, in¬ cluding the sturgeons and spoon-bills, stand later palaeontologically and in their degree of specialization, but show some interesting re¬ semblances to the sharks and rays. Still later in their degree of development 'and definitely on the track of teleost evolution are the tiolostex, of which the bow-fin and gar-pike survive.

GANONG, William Francis, Canadian his¬ torian and botanist: b. Saint John, New Bruns¬ wick, 19. Feb. 1864. He was educated at the universities of New Brunswick, Harvard and Munich. He was assistant professor of botany at Harvard 1887-89; instructor 1889-93; and since 1893 has been professor of botany and director of the botanical garden at Smith Col- R&c, ˆNorthampton, Mass. Among his works ˆce The Teaching Botanist' (1899) ; ˆLabora¬ tory Course in Plant Physiology' (1901) ; (The Living Plant' (1913). He has written a num¬ ber of monographs on the history of the Mari¬ time Provinces and has translated and edited for the Champlain Society Denys' (Natural History of Acadia' (1908); Le Clercq's (New Relation of Gaspesia' (1910).

GANSEVOORT, gan'se-vort, Johan Wes- sel, Dutch theologian and ancestor of American families: b. Groningen, Netherlands, 1420; d. 4 Oct 1489. Educated at Deventer in the school of the Brothers of the Common Life, he came also under the influence of Thomas a Kempis at Zwolle. As student or teacher, he spent some years in Cologne, Paris, Rome, Basel and Heidelberg, becoming versed in Hebrew, Greek and Latin, and in contact with many minds and the ablest men of his day. His fame as a re¬ nowned teacher of philosophy and theology was over all Europe. Eschewing strife and declin¬ ing ecclesiastical honors, he returned to Gron¬ ingen to spend the remainder of his life amid many disciples and as director of the cloister of the Spiritual Virgins. His theology was of the mystical and mediaeval type, yet' he is justly reckoned a (

GANSEVOORT, gans'voort, Peter, Ameri¬ can officer: b. Albany, 17 July 1749; d. there 2 July 1812. In 1775 he joined the army which under Montgomery invaded Canada, and in 1776 he was appointed to the command of Fort George. In 1777 he was placed in command of Fort Stanwix, which he gallantly defended

against a vigorous siege of 20 days by British and Indians under St. Leger, and received the thanks of Congress for having thereby pre¬ vented the co-operation of that general with Burgoyne, and contributed to the defeat of the latter. In 1781 the State of New York raised him to the rank of brigadier-general, which he held till the termination of the war. He after¬ ward filled various important offices under the Federal government. He was successively com¬ missioner of Indian affairs, commissioner for fortifying the frontiers and military agent. In 1809 he was appointed brigadier-general in the United States army.

GANSS, Henry George, American com¬ poser : b. Lancaster, Pa., 22 Feb. 1855; d. there, 25 Dec. 1912. He was educated at a parochial school in Lancaster, Saint Vincent's College, Latrobe, Pa. He was ordained to the Catholic priesthood in 1878 and from 1878 to 1881 was curate at Lykens, Pa. In 1881-86 he was rector at Milton and from 1890 to 1910 was rector of Saint Patrick's, Carlisle, and spiritual director of Catholic Indians in the Carlisle Indian School. In 1910-12 he was rector of Saint Mary's Church, Lancaster. He has been much interested in the Carlisle Indians and has done much to ameliorate their position. His musical compositions include (First Mass in D,5 with orchestra; (Second Mass in D,5 with orchestra; (Fourth Mass in C5 ; (Requiem in D Minor5 ; (The Banner of the Sea,5 hymn of the navy; (Long Live the Pope,5 hymn, trans¬ lations in 25 languages. He has published (Mariolatry: New Phases of an Old Fallacy5; (History of Saint Patrick's Church, Carlisle, Pa.5 ; pamphlets on the

Reformation, Anglican orders and on Indian questions. He was a con¬ tributor to (The Catholic Encyclopedia,5 The Messenger, the American Catholic Quarterly Review, the American Ecclesiastical Review, the Ave Maria, etc.

GANYMEDE (Gk. Tavv/uydr/c ; Lat. Gany- medes), in Greek mythology the son of Tros and of Callirrhoe, a daughter of the Scamander. Zeus sent his eagle from heaven, which carried him off from Mount Ida to the seat of the gods, where he discharged the office of cup¬ bearer to the immortals, Hebe having rendered herself unworthy of this office. This fiction has afforded, both to poets and artists, an inex¬ haustible supply of subjects. Numerous paint¬ ings, statues, cameos and intaglios, master¬ pieces of ancient art, have descended to us, upon which this youth, scarcely past the years of boyhood, is represented as of great beauty. The representations of Ganymede are to be recognized by the Phrygian cap and the eagle, which is either standing beside him or carrying him in his talons to Olympus. Ganymede was identified with the Nile god who presided over the source of the river, and seems to have been originally one of the water gods and the sender of water upon the earth. He was also identified with Aquarius (the water¬ man) among the stars and was said to have the honor of being the cup-bearer of the im¬ mortal gods.

GANZ, gants, Rudolf, Swiss composer : b. Zurich, 1877. He studied in his native city under Freund and Hegar, and appeared in pub¬ lic as a 'cellist at the age of 10. From 1893 to

1896 he paid especial attention to piano and composition, being instructed in the former by Eschmann-Dumur and in the latter by Blanchet. At Strassburg he prosecuted his studies under Blumer, and later removing to Berlin studied there under Busoni and Urban. In 1899 he made his debut in the German capital and soon afterward came to the United States, where he remained for 13 years, being chief of the piano department at the Chicago College of Music from 1900 to 1905 ; from the latter year he went on the concert stage, playing all over the country with the great symphony orchestras and meeting everywhere with the greatest suc¬ cess. He is the author of a symphony in E ; concertstuck for piano in B ; several male choruses; piano pieces, and about 150 songs. His concert numbers have avoided the beaten path, presenting as a rule little known but meritorious works, whether of old composers or of recent writers struggling for recognition.

GANZ, Wilhelm, eminent musician : b. Mainz, Germany, 6 Nov. 1833; d. London, 12 Sept. 1914. At the age of 15 he came to Lon¬ don with his

father, who was chorus master at Her Majesty's Theatre. In 1850 he defi¬ nitely settled in London as an accompanist, in which capacity he acted for Jenny Lind in England and Scotland. He was a church organist for some years and also played the violin in the New Philharmonic Orchestra in 1852, of which he became conductor in 1874. In 1884 Ganz turned his attention to the teach¬ ing of singing, and up to his death was a pro¬ fessor at the Guildhall School of Music. He had a jubilee concert at the Albert Hall in 1898 to celebrate the 50th anniversary of his first visit to England, and a diamond jubilee concert in 1908. A number of leading sopranos — including Patti — preferred his style of ac¬ companiment to that of more strenuous players.

GAP, France, capital of the department of Hautes-Alpes, on the Luye, 2,418 feet above sea-level, 50 miles from Briangon and 85 from Grenoble. It contains a fine cathedral, entirely reconstructed in 1866-1905, an episcopal palace, the tomb of the constable de Lesdiguieres, a lyceum, library, a prefecture containing scien¬ tific and archaeological collections. Gap has a few small manufactories, including those of hats, leather, cement, etc. The town was founded as Vapincum by Augustus in 14 b.c. It was long a part of Provenge but passed to the dauphins of Viennois in 1232. From the 5th century it was an episcopal see and its bishops for a time (1232-1512) ruled the dis¬ trict. In 1512 it was annexed to the Crown of France. It is the birthplace of Guillaume Farel, the reformer. Pop. 11,000. Consult Roman, J., (Histoire de la ville de Gap5 (Gap 1892).

gapAn, ga-pan', Philippines, a pueblo of the province of Nueva Ecija, Luzon, situated four miles east of San Isidro, the capital. It is at the junction of several roads, and is the largest town in the province. Pop. about 12,000.

GAPER, ga'- or ga'per, a name given to many animals who have great mouths, or in some other way suggest gaping. Thus it is one of the British names for the European soft clam (Mya truncata) in reference to the wide separation of the shells, as is characteristic of

deeply burrowing bivalves ; and it is applied to relatives on the Pacific Coast of the United states Among birds, the broadmouths (q v) are called gapers; and among fishes some of the sea bass, which open their mouths in dying to the widest extent. s

GAPES, a disease of young poultry, caused by a parasitic nematode worm

in the throat. See Poultry, Diseases of.

i ˆAPON, George, Russian revolutionist: b. Bihki Poltava, about 1870; d. 1906. He studied theology, entered the priesthood and worked as a missionary among the poor people ? , Saint Petersburg. He set about organizing labor unions and the better to further this end secuied the consent of the Russian secret police to the project. This was about 1903; m April of the following year the Industrial \ orkers Association of Saint Petersburg was formally launched and many branches were formed in the capital and suburbs. In Decem- b(T Gapon, who had come under the influence of the Zemstovs, began a systematic propaganda or a general strike as an aid to the reform movement which was then sweeping Russia. He secuied a large following and was a prominent figure in the troubled year of 1905. He escaped from Russia, reached London and there wrote an autobiography which was published in the strand Magazine. His subsequent activities are shrouded in mystery. On 11 April 1906 the body of a man, who had either been hanged or had committed suicide, was found in a villa near the capital and was identified as that of Father Gapon. About a month afterward the news¬ papers of the capital published a letter for¬ warded them from Berlin, in which it was alleged that Gapon had betrayed his associates by returning to Saint Petersburg and agreeing to reveal the activities of the revolutionaries to the authorities ; for this he was marked for death by the latter, who succeeded in carrying out the decree. Consult Gapon, (Story of My Life (London 1905).*

GAR, GARFISH, or GAR-PIKE, one of

two sorts of fish, both long and slender, with a prolonged spear-like snout filled with teeth, and hence bearing such local names as "bill-fish,® "needle-fish,® "bony-pike,® etc.; and "green- bone,)) because of the greenish tinge on the bones. The group originally called "gar® was that of the family Belonidce (or Esocidcu) , allied to the sauries and flying-fish, the type of which is the common European Belone belone. This is a swift, voracious fish which darts along the surface picking up little fishes, and especially playing havoc in shoals of young mackerel. It is usually about two feet in length, is often brought to the London market, and forms a wholesome dish, in flavor somewhat like mack¬ erel. The. young forms have at first jaws , of a normal size, but in growth the lower outstrips the upper. Very similar, but larger, are the "silver® gars, "agujas® or Needle-fish® of American tropical waters, which offer good sport by their speed and strength, but are hated by practical fishermen whose nets they fre¬ quently destroy or damage by their effort to get at imprisoned prey. There are several species, all of the genus Tylosurus.

Both these kinds, as well as their Oriental representatives, are often called

“gar-pikes® from their pike-like form and voracity; but in

the United States this term is suitably reserved fi°r niTur different kind of gar, not known in the Old World, and a relic of the ganoid tribe prevalent in the palaeozoic seas. This gar-pike repiesents the family Lepidosteidce (see Ich- ihyology), and has a long almost cylindrical >od> encased in an armor of white, bony, enam- cled rhomboid plates, which are imbricated in oblique rows running downward and backward, ine jaws are long, narrow and furnished with sharp teeth, each of which fits into a depression in the opposite jaw; and are covered with a granulated shagreen-like integument. They have the air-bladder subdivided and used in inspiration ; no spiracle; strong fins, a heterocer- cal tail ; swim well, and prey upon small fishes.

1 heir own flesh is not edible and they interfere with fishing, and therefore are destroyed freely they inhabit the rivers and lakes of North America, where the commonest species is the long-nosed gar (Lepidosteus ossens). Another more southerly, is the short-nosed gar (L. pla- tystomus) ; and a great and powerful sub¬ tropical species (L. tristocchns) , reaching 8 or 10 feet in length, and called “manjuari® in the Y\ est Indies is known as “alligator-gar® in the lower Mississippi district. Another species oc¬ curs on the west coast of Central America; and another in the rivers of China.*

All these gar-pikes frequent shallow, reedy or grassy places, basking in the sun like the pike, and devouring living prey with great voracity. The manner of seizing prey differs from that usually observed in fishes, and re¬ sembles that of reptiles; instead of taking their food at once with open mouth and swallowing it immediately, they approach it slyly and side¬ ways, and then, suddenly seizing the fish or other animal, hold it until by a series of move¬ ments it is placed in a proper position for being swallowed, in the manner of alligators and lizards , the ball of food is also seen to distend the body as it passes downward, as in snakes.

GAR-PIKE. See Gar.

GARABIT, ga-ra-be, France, in the de¬ partment of Lozere, is a picturesque locality on ˆ u railwaV ˆm Marvejols to Neussargues, where the line spans a gorge of the Truyere River, about 10 miles south of Saint Flour The viaduct planned by M. Eiffel is 1,85214 feet long, and is built partly of girders and partly of masonry. Where it crosses the river at a height of 401 feet, it is supported by an arch, with a span of 541 feet 4 inches. Consult Eiffel, (Le Viaduc de Garabit (1889).*

GARANCINE, gar’an-sin, is prepared from the ground root of Rubin tinctorum or madder (in French garance) by washing it with 8 or 10 times

its weight of water acidulated with sul¬ phuric acid, 1 part of acid being used for 100 parts of powder. After digesting for seven or eight hours the fluid is run off and the paste is boiled for two or three hours by steam with more acid, and then the mass is thrown into cold water contained in a large trough with a perforated bottom covered with cloth to act as a filter. Here it is washed till all the acid is got rid of, and the paste is afterward pressed, dried and ground to fine powder. It is used for dyeing, and has the advantage over madder (q.v.) of containing a large proportion of color¬ ing matter, It is preferable to madder for

mixing with other dyestuffs to produce chocolate and some other shades.

GARAY, ga-ri, Juan de, Spanish soldier: b._ Badajoz, 1541; d. South America, 1584. About 1565 he went to South America, where he be¬ came secretary to the governor of Paraguay, was sent on a voyage up the Parana, discovered a vast territory and founded near the river the town of Santa Fe de Vera Cruz. He defeated the Charruas Indians not far from the Uruguay, received the commission of lieutenant-general and was appointed (1576) governor of Asun¬ cion. In 1580 he refounded the city of Buenos Aires on its previous site, and subsequently did much to improve the condition of neighbor¬ ing native tribes. Having landed in an un¬ familiar region on a journey up the Parana to Asuncion, he was there killed by hostiles.

GARBAGE is kitchen refuse and table waste, offal or discarded material from the preparation and use of human food. Assembled, it is an ever-varying mixture of animal and vegetable food waste, the nitrogenous or pro- teids being largely in excess of the non-nitrog- enous properties. Garbage decomposes rapidly in the open air and becomes offensive, especially in warm weather. When thrown upon the ground and allowed to decompose, or when used as a fertilizer in a raw state, it may contaminate sources of water supply, and thus become a menace to public health ; but, contrary to the popular belief, the garbage heap does not gen¬ erate bacteria — they die when exposed on the garbage pile. In country districts and in most towns and small cities much garbage is used as food for domestic animals, and when fresh no more proper disposition of it can be made. When the material is allowed to become par¬ tially decomposed before feeding, and where caustic solutions are used for the cleansing of cooking utensils, etc., the mortality precludes its use. American cities

produce from one-half pound to one pound per day per capita. Euro¬ pean cities produce less than one-half of this amount. Anatysis of American city garbage shows moisture, 70 per cent to 80 per cent; grease, 2 per cent to 3 per cent; and solids' principally wood fibre, 18 per cent to 28 per cent. Garbage from European cities contains more of solids and less of moisture and grease.

Previous to 1900 the garbage problem was a serious trouble to officials and boards of health in American towns and cities. The thoughtless citizen throws it in the street, or leaves it in his back yard until his neighbors rebel, or he burns it in his range or furnace and has more trouble with his neighbors. He puts it with ashes and other refuse and it is dumped on a vacant lot, or a depression in the ground is filled with it, and injunction proceedings are brought by near-by residents; protests and complaints of every description are made to councilmen, heads of departments and boards of health! Newspapers take it up and everyone who can possibly be held accountable is abused. The first attempts at collection and disposal in a community are apt to be crude and imperfect. All kinds of household wastes are put together in boxes or barrels and teams are hired to cart it away. In some cases the city owns the horses and wagons required for the work. This lasts until there is no longer a dumping place within hauling distance. In a few instances it has

been taken to sea in scows and dumped in deep water. This is found objectionable, as the lighter portions float to shore. Total destruc¬ tion of the material is the next resort. In¬ ventors and promoters take advantage of the situation, and it is proposed to burn or utilize the material at huge profit. Corporations are formed, stock is sold and plants are built for final disposal. Then there are indignation meet¬ ings and injunction proceedings. No one wants a garbage-disposal plant near his property. Should it be completed and started, it is gen¬ erally closed within a year, either by injunction or owing to the lack of funds for its operation. The country is strewn with such wrecks.

It has been found that when garbage is mixed with ashes, paper and other household waste, final disposal is rendered very difficult, the mass being unfit for filling, fuel or fertilizer. Numerous American cities separate household waste into three parts, namely, <(food waste,® ˆcombustible waste® and ((non-combustible waste.® By this means final disposal is more readily effected, each class of waste having prop¬ erties of commercial value when kept separate from the others. Most European cities do not attempt a separation, excepting it be at the plant where final disposal is effected. In some cases the whole mass is passed through what are termed <(destructors,® burning the unconsumed carbon found in the ashes and the combustible portions of other household waste. This system

of final disposal has not been found satisfactory in American cities, and has been equally unsatis¬ factory in some European cities, particularly on the Continent, where, as in America, it is found that much additional fuel is required in order to maintain a proper temperature in the furnaces.

It would scarcely be possible to name in this connection all those who have contributed to the development of principles, systems and ap¬ paratus which go far toward the practical solu¬ tion of this difficult problem. Boston installed the first modern refuse-sorting plant, and the first reduction plant was at Buffalo. Much im¬ petus was given to effective practical develop¬ ment of the principle of utilization by the deter¬ mined efforts of the late Col. Geo. E. Waring, New York's indomitable commissioner of streets! After a most exhaustive investigation of the whole subject, and a thorough inspection and test of every system of disposal then in exist¬ ence, both in Europe and America, Colonel Waring became thoroughly convinced that utilization was right in principle and practice, and proceeded at once to have the garbage of the city of New York disposed of in this manner.

Prior to this time there were successful utilization plants in Philadelphia, Pa., Saint Louis, A/Io., and Detroit, A/Iich. The system adopted by Colonel Waring, and which is now in use m many of the principal cities of the United States, is first, thorough sterilization by subjecting the material to the action of live steam in enclosed vessels, condensing all vapors and. passing insoluble gas through flame. By this treatment the structure of the material is broken down, — even bones are disintegrated, — the liquids carrying the oils and greases being separated from the solids by mechanical means. The further preparation of the ingredients, by which they are put in commercial form or

finally disposed of, varies greatly in the different plants. In some cases the liquids are evaporated, in otheis they are allowed to run into sewers or water courses. In a number of the plants the solid portions are used for fuel ; in others they are acidulated or dried and prepared as a base for commercial fertilizers. The greases are sometimes extracted by the use of a solvent, and reclaimed by evaporation, the solvent vapors being condensed and also reclaimed to be used again. The principles involved are not new, having been applied for many years to the treat¬ ment of slaughter-house waste. In its applica¬ tion, howrever, to the greater subject of garbage disposal, much new apparatus has been invented, and the plants have been equipped to handle very promptly a vast amount of the material; the plant

which disposes of the entire garbage of the Greater New York having a daily capacity of more than 2,000 tons, and the plants lo¬ cated in Philadelphia, Pa., Boston, Mass., New¬ ark, N. J., Baltimore, Md., Washington, D. C., Detroit, Mich., Saint Louis, Mo., Cleveland, Ohio, Columbus, Ohio, and in some of the smaller cities, are of sufficient capacity to dispose of all the garbage produced within 12 hours of de-livery at the plant. It is this prompt and effect¬ ive disposal that has rendered the utilization systems so popular in the large American cities. Th £ entire work of collection and disposal is, in most cases, done by contract. The plants are owned by contractors, the cities in some cases collecting the garbage and delivering it upon the contractors' cars or boats for trans¬ portation to the place of final disposal.

Garbage collection is now common in all American cities and towns of 10,000 or more population, and is increasing in smaller places. It has been found that a collector making rounds once a week can serve 40 to 90 houses a day. Usually two men travel to a wagon, and the use of specially designed sheet-iron body wagons is increasing. It is common to ask house¬ holders to separate their garbage and ashes and refuse in separate cans, so that the collectors can conveniently dispose of them. The ashes can then be used for filling low land, which would be impracticable if mixed with garbage. Where there are incinerator plants there is a tendency to return to the old method of dumping all the garbage, ashes and refuse together, and taking it to the incinerating furnace. Here the unburned coal in the ashes and the wood in the refuse furnish fuel enough to consume all the moist garbage. Cities and districts are routed, and householders notified what days the collectors will come through their streets, and on such mornings they place their garbage cans on the sidewalks.

Incinerators or destruction plants are increas¬ ing in use. Seattle has five 60-ton destruction plants, distributed so as to reduce haulage, and pays $1.94 per ton for collecting the garbage. Incineration costs only seven and one-half cents a ton. Figuring in depreciation, interest and all costs, the total expense is about $3 per ton. One of the largest incinerator plants is in Columbus, Ohio; capacity 80 tons in 12 hours. The garbage is collected in steel wagons, 50 horses being employed in the hauling. Ashes are utilized to fill in low land; the garbage collectors deliver to railway garbage cars, of which there are four, built at a cost of $1,890 each. These cars deliver over the trolley line to a plant four

miles out, where the garbage is drained, the water being evaporated. The solid residue goes to digester tanks for treatment with hot steam at 60 to 70 pounds pressure for six hours. It is then pressed and the grease separated, as much as 400 tons a year being obtained and sold; the remainder of the solid product is pressed into cakes for fertilizer. This Colum¬ bus plant cost

the city about $200,000 and the collection system about $100,000. It disposes of the garbage and ashes at a total cost of about $3 per ton.

Many of the failures, both in incineration and utilization, are due to the improper location of plants. While it should be perfectly clear to everyone that such plants should be so located as to cause the least possible property loss or inconvenience to the people, yet it should be recognized that every city must have a place for final disposal of its waste and, once prop¬ erly located, it must be recognized as such. Though plants for final disposal, when properly designed and operated, have not proved a nuisance to near-by residents, nor a menace to public health, yet the assembling at one point of the material is objectionable and should be restricted to a section for such purposes. See Wastes, City, Disposal of.

*Much has been written on the subject by both European and American engineers, prin¬ cipally in the form of papers read before some of the engineering societies, and published in engineering journals. Valuable information can be obtained from the files of such journals. Very little of such material, however, has been put in book form. In a small volume published in 1897, entitled (Street Cleaning and Its Effects, > by Col. Geo. E. Waring, interesting and valuable data is assembled, a portion of wrhich bears directly on this subject. A most comprehensive treatise on the subject is (The Wastes of a Great City, > by John McGaw Woodbury, commissioner of street cleaning, New York, in Vol. XXIV, p. 387, Scribner's Magazine (1903). Consult also Venable, < Gar¬ bage Crematories in America > (1906); Morse; Collection and Disposal of Municipal Waste**

(1908).

GARBAGE DISPOSAL. See Sanitary Engineering.

GARBER, Daniel, American painter: b. North Manchester, Ind., 11 April 1880. He made his art studies at the Cincinnati Art Academy and the Pennsylvania Academy of the Fine Arts. Since 1909 he has been a mem¬ ber of the faculty of the latter institution. In 1902 he was awarded the first Toppan prize at the Pennsylvania Academy ; held the Cres- son scholarship in 1903-05 and in 1909 won the first Hallgarten prize at the National Academy of Design. He has received numerous other rewards, medals, etc. He is represented in the permanent collections of the Chicago Art Institute, the Cincinnati Museum, the Cor¬ coran Art Gallery, Washington, Mary Brown Memorial, Providence, R. I., the University of Missouri, the Saint Louis Museum, the Car¬ negie Institute, Pittsburg, and the Museum of History, Science and Art, Los Angeles. He was elected to the National Academy.

GARBORG, gar'borg, Arne, Norwegian novelist: b. island of Time, Jaederen, 25 Jan. 1851. He was educated at Christiania, pub-

lished anonymously in 1873 his essay, Ibsen's ((Emperor or Galilean,® and in 1877 founded the Fedraheimen, a liberal journal which he edited until 1882. Characteristic of this author's way of thinking is (The New Norwegian Language and the National Movementˆ (1887). His best-known work was done in his stories, originally written in the popular tongue and largely rendered into Swedish and Danish. They are of the realistic vein so common to Scan¬ dinavian writers and include

GARQAO, gar-sa'o, Pedro Antonio Correa,

Portuguese poet: b. Lisbon, 29 April 1724; d. there, 10 Nov. 1772. As a lyric poet he stands very high ; while his satires, odes and epistles — upon the models of Horace — are dainty and spiritual. He also wrote successful dramas. The Portuguese esteem him for the perfection with which he employed their language in his works. The (Hymn to Dido) is one of his most popular productions. He was arrested for a personal . satire, and died in prison after a long captivity. He is called, by his country¬ men, the (

GARCIA, Diego, de-a'go- gar-se'a, Portu¬ guese navigator : b. Lisbon 1471 ; d. Madrid 1529. In 1526 he sailed with three vessels from Cape Finisterre for South America, in the em¬ ploy of the company established at La Coruna for the spice trade. He explored the Uruguay (1827), and the Parana to 27° S., defeated the Indians who had besieged Sebastian Cabot on the latter river, and in 1528 left for Spain. About 1532 he is said to have made a voyage to the East Indies. His account of his Brazilian explorations appeared in Vol. XV of the (Re- vista do instituto historico e geografico do Brasil.5 The island of Diego Garcia is said to have been named after Gargao.

GARCIA, gar-the'a, Manuel, Spanish pro¬ fessor of singing in England : b. Madrid, Spain, 17 March 1805; d. London, England, 1 July 1906. He invented the laryngoscope (1855) and published (Memoire sur la Voix Humaine5 (1840) and (Traite complet du Chant5 (1847). One of his pupils was Jenny Lind. From 1850 to 1895 he was professor of singing at the Royal Academy of Music, London.

GARCIA, Manuel del Popolo Vicente,

Spanish tenor and composer : b. Seville, Spain, 22 Jan. 1775; d. Paris, 10

June 1832. After ac¬ quiring a considerable reputation as a tenor singer at Cadiz and Madrid, in 1808 he at¬ tained great success at the Italian opera in Paris, and afterward proceeded to Italy, where he was received with equal favor. From 1816 to 1824 he was constantly engaged as a singer, either in Paris or London. In 1825, with a select operatic company, composed in part of members of his own family, he crossed the At¬ lantic and visited New York, South America and Mexico. On the road between Mexico and Vera Cruz he was robbed of all his money; and after his return to Paris was compelled to open a class for singing, as his voice had become

greatly impaired by age and fatigue. Many of Garcia's pupils reached a high degree of ex¬ cellence, but none equaled his eldest daughter Maria, afterward Madame Malibran (q.v.). His son Manuel and another daughter, Pauline Viardot, also attained to considerable fame. He was a prolific composer of operas in Spanish, French and Italian, several of which were very popular in his day. Of his 43 compositions of this class the (Caliph of Bagdad) is probably the best known.

GARCIA Y INIGUEZ, gar-se'a e e-nye' gas, Calixto, Cuban patriot : b. Holguin, Cuba, 14 Oct. 1836; d. Washington, D. C., 11 Dec. 1898. In 1868, with Donato del Marmol and Carlos Manuel Cespedes, he organized the revo¬ lution known as the <(Ten Years' War.® In the early part of the struggle he won the battle of Santa Maria and recaptured Jiguani. In recog¬ nition of his services Garcia was appointed brigadier-general under Gomez (q.v.), and sub¬ sequently succeeded that officer as commander-in-chief of the Cuban army. In 1873 he was captured and carried as a prisoner to Spain. In 1879 he returned to Cuba to start (

GARCIA MORENO, gar-se'a m6-ra'no, Gabriel, Ecuadorean politician: b. Guayaquil. Ecuador, 1821 ; d. Quito, 6 Aug. 1875. He was educated at Quito and in Europe, became pro¬ fessor of chemistry in the University of Quito, and in 1857 its rector. In 1859, upon the over¬ throw of the Roble's government, he was chosen a member of the provisional government, and in 1861 President for a term of four years. He declared himself dictator in 1864 and subse¬ quently relinquished the title and office, though he maintained virtual control of affairs. In 1869 he led a revolution, became again dictator, and in 1875 was elected President for a six-years' term. Before his inauguration he was fatally wounded by assassins. Consult Berlichingen, Adolf von, (Gabriel Garcia Moreno) ; Cancio, A. Z. de, (Vida de Gabriel Garda Moreno) (Madrid 1889).*

GARCIA DE QUEVEDO, ka-va'do, Jose Heriberto, South American poet and dramatist : b. Coro, Venezuela, March 1819; d. Paris, June 1871. Educated in France and Spain, he settled in Paris, and was killed in the communard in¬ surrection of 1871. Among his poems are (To Columbus) ;

(To Liberty) ; (To Pius IX) ; frenzy ; 5 The Life to Come5 ; and (The Pro¬ script.5 His dramas were well received. He wrote the novels (The Love of a Girl5 and (Two Duels Eighteen Years Apart.5*

GARCILASO DE LA VEGA, gar-the¬ 'a so da la va'ga (properly Garcias Laso de la Vega), Spanish poet; b. Toledo, 6 Feb. 1503;

d. Nice, 14 Oct. 1536. His father was councillor oi state to berdinand and Isabel; and later Ambassador at the Court of Rome; and his mother belonged to the noble house of Guz- man. According to an account given in the

Historia de las Guerras Civiles, } the Garcilasos received their surname from their combats with Moonsh heroes, in the great valley of Granada, called La Vega. Garcilaso soon found his proper sphere. His genius was kindled by the study of the ancients, particularly of the Ro¬ mans. Boscan had already begun to trans- plant the versification of the Italians into Spanish poetry, Garcilaso followed his ex¬ ample, and succeeded so well that he is still ranked among the best Spanish poets. Most of the events of his life may be learned from his own works. He lived for a long time in Italy, and afterward traveled through part of Germany, in the service of Charles V. In 1529 he was engaged in the expedition against tollman, and in 1535 in that against Tunis. In the latter he received a wound in his arm, after which he remained some time in Naples. In 1536 he commanded 30 companies of in¬ fantry, and accompanied the imperial army against Marseilles. He was mortally wounded during an attack on the part of Muy and died three weeks later. Spanish poetry is highly indebted to him; for without his aid Boscan, (his bosom friend) a foreigner, would never have succeeded in his innovations, more particu¬ larly as he had a formidable adversary in Christoval de Castillejo. His writings consist of eclogues, epistles, odes, songs, sonnets (in which he imitated Petrarch) and some smaller poems. A volume of his poems first appeared at Barcelona in 1543. An edition of his works, with notes, appeared in 1765, and Herrera's commentary (1580), with notes by Azara (1765). Consult Fernandez de Navarrete, E., (Vida de Garcilaso de la Vega) ; Flamini, F., Hmitazion.i italiani in Garcilaso de la Vega) (Milan 1899).

GARCILASO (GARCIAS LASO) DE LA VEGA, surnamed the Inca, Spanish his¬ torian : b. Cuzco, Peru, 1540; d. Spain, 1616. He was a son of Garcilaso de la Vega, one of the conquerors of Peru, and a member of the il¬ lustrious de la Vega family and Elizabeth Palla, a princess of the race

of the Incas. His mother taught him the Peruvian language, and is said to have inspired him with the idea of writing the history of his ancestors. He went to Spain where he was well received at court and made much of, probably due to his good family con¬ nections. Later on he was imprisoned at Valla¬ dolid by order of Philip II. On his release he returned to Peru where he began his work of writing the history of ancient Peruvian civilization. His great work on the history of Peru is in two parts : the first bearing the title of (Historia de las Antiquedades y Con- quista de Piru; Primera Parte de los Com- entarios Reales que tratan del Origen de los Incas, etcP (1609) ; the second being the (His¬ toria general del Peru (1616). He wrote also (Historia de la Florida* (1609). His history is the greatest source of information concerning ancient Peru, its history, religion, civilization, myths, sociology and customs. It is somewhat highly colored; but the author had plenty of documentary evidence which he used in an in¬*

teresting and illuminating way. Consult Mark¬ ham, (The Incas of Peru (1910); Prescott, 'History of the Conquest of Peru.**

. . ^^RCINIA, so called after Laurent Garcin (d. 1752), a b ranco-Oriental traveler, is the botanical name for a genus of the family Guttiferce. It consists of opposite-leaved trees, with a yellow resinous juice, and generally uni¬ sexual flowers with four sepals, four petals, many stamens in from one to four bundles, and

3 u tOJi0'Cr1Ie-d ovary with a sin£le seed in each cell. 1 he fruit of G. mangostana is the highly- prized mangosteen of the East Indies. It is about the size and shape of an orange purple outside, divided within into segments like those of an orange. The flavor is be¬ tween that of a grape and a peach. The triuts of G. pedunculata, G. cornea and G. kydiana are also eaten, but are not greatly valued. G. kola of tropical Africa yields fruit and seeds similar in properties to the kola-nut. G. cambogia and other species of the genus furnish Gamboge (q.v.).

GARDA (gar'da) or BENACO LAKE,

the Italian Lago di Garda, and the Benacus Lacns of the Romans, is an extensive and beautiful lake in North Italy, 33 miles long from north to south, by 3 to 11 miles broad, and 213 feet above sea-level. It forms part of the bound¬ aries of the provinces of Verona, Mantua and Brescia, while its north extremity enters the Austrian territory of Trent, in the Tyrol. It receives the Sarca, almost its only affluent, at its north end, and is drained by the Mincio, which issues from its southeast end near the fortress of Peschiera, and conveys its waters to the Po. Storms are not infrequent, and are sometimes violent. It is well stocked with ex¬ cellent fish, including

salmon-trout, trout, eels and pike. Garda is the largest lake in Italy, and attains a depth of over 1,000 feet in many places. Its shores are covered with villas, and steamboats ply on it regularly between the ports of Riva, Desenzano and Peschiera, which with Gardone-Riviera, Garda, Malcesine Salo and the beautiful promontory of Sirmione are its most popular resorts.

GARDE, Thomas William, Danish ex¬ plorer: b. 1859. He made several tours of ex¬ ploration in southeast Greenland, starting from Cape Farewell. He discovered Norse remains at Lindenows Fjord, over 200 live glaciers, very many over a mile wide between Nanor- talik and Cape Farewell. In 1893 he explored the Greenland ice cap, which he found to ex¬ ceed 8,000 feet in height at certain places. He received the commission of commander in the Danish navy; subsequently was appointed to the chief of staff, and in 1908-11 was made assistant to the Minister of the Navy. The story of his explorations is contained in 'Meddelelser om Gronland) (Vols. IX and XVI).

GARDE NATIONALE, gard na-se-o-nal, a guard of armed citizens instituted in Paris 13 July 1789 for the purpose of preserving order and protecting liberty. At first it numbered 48,000 men, but was increased to 300,000 when it was organized throughout the whole country. Acting as a royalist and reactionary force, it was crushed by Napoleon in 1795. It was re¬ organized by the Directory and by Napoleon

and again under the Bourbons, to whom, how¬ ever, it was a source of such disquietude that it was dissolved by a royal ordinance in 1827. Under Louis Philippe it was resuscitated in its old form and contributed to his overthrow. In 1851 the national guard was again reorgan¬ ized, but in 1855 it was dissolved. In 1870 the national guard of Paris was again formed for the defense of the city against the Prussians. The resistance of a section of the guard to the decree of disarmament issued under M. Thiers led to the Communal War, at the close of which the guard was declared dissolved by the Na¬ tional Assembly (1871).

GARDEN, Alexander, Scottish scientist: b. Charleston, S. C., about 1730; d. London, 15 April 1791. He was graduated from Aberdeen; became a professor in King's College, New York (now Columbia University), and in 1755 established himself in medical practice at Charleston. From 1783 he was in London, where he became vice-president of the Royal Society. The botanical genus Gardenia (q.v.) was named in his honor by Linnaeus.

GARDEN, Alexander, American soldier: b. Charleston, S. C., 4 Dec. 1757; d. there, 29 Feb. 1829. He was for a time aide-de-camp to General Greene. He wrote < Anecdotes of the Revolutionary War in America, with Sketches of Character of Persons the most distinguished in the Southern States for Civil and Military Services } (1st series, Charleston, 1822; fol¬ lowed by a second series), which is one of the authorities for the history of the period, con¬ taining information hardly to be found else¬ where.

GARDEN. The earliest known gardens are those of Solomon, which are described as having been of quadrangular form, surrounded by high walls. They contained aviaries, wells and streams of water. The gardens of Cyrus and other Persian monarchs were of great ex¬ tent, and generally laid out in romantic situa¬ tions. They were also distinguished for the great diversity of their uses and products. The first allusion to terraces in gardens is to be found in the description of the celebrated hang¬ ing gardens of Babylon, anciently reckoned among the wonders of the world. Their con¬ struction is variously ascribed to Queen Semi- ramis and to Nebuchadnezzar. Diodorus and Strabo have given descriptions of them. They are said to have formed a square with an area of nearly four acres, and rose in terraces, sup¬ ported on masonry arches, to a height of 75 feet. They were irrigated from a reservoir built at the top, to which water was lifted from the Euphrates by a screw. Fountains and banqueting-rooms were distributed throughout the numerous terraces; groves and avenues of trees, as well as parterres of flowers, diversified the scene ; while the view of the city and neigh¬ borhood was extensive and magnificent. Most of the elements of a modern architectural garden are alluded to in connection with those of Babylon. The grove of Orontes, described by Strabo, must be regarded as a park or large garden in the picturesque style; it was nine miles in circumference.

In ancient Greece, gardening was rather a neglected art at first, but in process of time great advance was made. The vale of Temne, the Academus at Athens, and other public

gardens were extremely elegant and were orna¬ mented with temples, altars, tombs, statues, monuments and towers. The Greeks copied their gardening from the Persians; and the Romans, in their turn, copied that of the Greeks. Little is known of the early style of Roman gar¬ dening; the vast edifices projecting into the sea, and the immense artificial elevations, are appar¬ ently ridiculed by Cicero and Varro. About this time, however, began the cultivation of odoriferous trees and plants; and the planting of trees adjoining each other, whose odors as¬ similated, was then as much a study with the gardener as the harmonious blending of colors at the present day.

The early French and Dutch gardens were evidently adopted from the description of Pliny's garden. The use of glass in the con¬ struction of conservatories was early known to the Greeks and Romans; and the ((Gardens of Adonis, mentioned by some of their most eminent authors, were probably of this kind. Gardening, like all the other arts, languished during the Dark Ages, but with the revival of learning, the invention of printing, and the Reformation, it began again to flourish. The art was revived and patronized by the family of the Medici in Italy ; and their gardens, which were of the geometric and architectural style, long served as models for most of Europe. They continued to be imitated in France, Ger¬ many and Great Britain till the introduction of the English or natural style. In garden archi¬ tecture very little progress, as far as hothouses are concerned, has been made in southern Europe, the warmth of the climate rendering them all but useless. There are, however, plant houses in many places in Spain and Portugal. The French and Dutch gardens resemble each other closely; symmetry and profuse ornament are the characteristics of both. The Dutch style is eminently adapted to the nature of the country, where there are no inequalities of sur¬ face, as in England. The French style seems to have arisen about the middle of the 17th century, during the reign of Louis XIV. The most celebrated gardener of the period was Le Notre, who laid out the famous gardens of \ ersailles. Le Notre's style spread rapidly into other countries. The first erection of hot¬ houses in France took place toward the end of the reign of Louis XIV by M. Fagon, in the Jardm des Plantes. The first magnificent at¬ tempt at hothouse building was that of Francis I, of Austria, in 1/53. They were in five ranges extending altogether to the length of 1,290 feet' /bem being 30 feet high. From about 1700 landscape gardening, and the adoption of the English style, rapidly spread into France, Germany and Russia, where it still prevails. See City Planning; Floating Island; Flori¬ culture; Flowers; Garden Cities; Green¬ house; Horticulture; Cross-Fertilization; Plant Breeding, etc.*

GARDEN CITIES. The disassociation of the idea of home life with modern existence in the metropolitan centres is a matter of serious concern to the social economist. In the body politic the city is merely a commercial organ, a convenience in the nation's commerce, a clearing¬ house for domestic and inter-nation commodities

in a word, an artificial juxtaposition of ele¬ ments depending for their life or entertainment

GARDEN CITIES

T^‘t’hn^ ^f°Wer ,?/ Capital or social standing. ■. e wealth, or to the transient within

offe8rW ’aH ?P° “anrlife is an ideal existence, , ’f advantages of social life, human inter-

S’ ‘ f’J,te/al ture and Ihe thousand and one

othef han,ld ft,„and |,1ght,bri«g forth. On the and, the salaried man or the waee

earner, forced to live in inadequate, and often-

trnies unsamtery, quarters, lacking in opportu-

m y for recreation, leads a most undesirable

existence, tempered alone by the «hope eternal®

that springs up in every human breast.

children adWOnderrthfn that men and women and children dream of the green fields and running

brooks, and of the day when they may have

their own home — a real hearthstone — in the

country, where Nature in gladsome abundance

welcomes all mankind as her children ? Indeed

tended to become little if any larger. When additional demands spring up for quarters, a new garden city is formed elsewhere, and thus

°fi Vhe exlsting one is preserved indefinitely, and the residents, in the expectation of spending their whole lives in their own l T?’ oVe eveP’ mcentive to improve and em-

possible condition P gr°UndS “ the best

in |he.garcle^ city in plan should be laid out

lPrh TJmp e?’.yet? ,the most attractive, man-

p J’ciThfretbelIi1f thtt e. traffic of consequence, the streets should be laid out with that degree

ft irregularity that ensures charm. Some of the streets should be winding, while the straight ones should have suitable terminals. Each house should be provided with a spacious gar¬ den, as it is from such gardens that these cities

Great ground plan of Washington, D. C.

many do break the shackles of city life for rural retreats, but the vast majority dream on, exist- ing from pay day to pay day, with the same old hope eternal® burning in their breasts, but with constantly diminishing flame.

It is not possible for everyone to live in the country, but it is within the ability of many that are now housed in cramped quarters in the cˆty to own their own homes and live and rear then families in the free country life — cheaper, more healthful and with a maximum of per¬ sonal comfort and individual standing.

Among the plans that have been carried out abroad and in the United States to a rapidly increasing extent are those of garden cities workingmen's colonies and suburban garden¬ ing. Of these the garden city in its best form is a well-organized development, in which from 100 to 500 homes make up a unit, which is in-

denve their name. These gardens, though partially devoted to vegetable raising, should also be well laid out with flower beds, and the whole garden city should be subject to such regulations as will ensure sufficient attention to this feature to produce the intended appearance. Grass plots, trees, hedges, shrubbery and arbors should be provided in abundance, both in the front and in the rear of the houses. The neg¬ lect of the residents should not be allowed to mar the appearance of the city.

As to the houses, they may be quite simple and compact m design, but they should all be individual in character, and by no means the frightful rows of t boxes all exactly alike that are put up for workingmen's use in the usual rural or suburban places devoted to such pur¬ poses The economical design of the buildings and the small expenses for streets make the

housing cost small, so that the rents may be low, or the workingman may, within a reason¬ able length of time, become the owner of his own home.

Garden cities should be laid out within easy reach of transit facilities and

natural advan¬ tages of site should be availed of whenever pos¬ sible, to give individuality and charm to the plan.

The sanitary arrangements of garden cities should be carefully planned and carried out, and the details should be simple and at the same time the construction should be solid and as in¬ expensive as possible.

A garden city is principally a place of resi¬ dence and it should have as few stores as pos¬ sible, only those of the most necessary charac¬ ter being provided. A school may be the only building of a public character. However, in those garden cities of a larger size and which are located in more or less isolated places, the suburban character is lost and they become small cities, and should accordingly be provided with a greater number and variety of stores and public buildings. The city may have its own civic organization, with schools, a library, churches, theatres and the like, and be a com¬ plete civic unit.

Garden cities have met with greater success in England than elsewhere up to the present time, although a greater number and variety of them are now in process of formation in Germany. The principal English garden cities are Port Sunlight, near Liverpool, Bourneville, near Bir¬ mingham, and Letchworth, near London, while the leading German garden city is Hellerau, near Dresden. The numerous workingmen's colonies in Germany that first began to be founded about 1863 are earlier prototypes of the present garden cities, but on a less comprehen¬ sive scale and with less open ground.

Garden cities are organized on several dif¬ ferent plans. Port Sunlight is operated by a soap factory, the rents being based on a basis of depreciation and taxes only, without taking into account the value of the land and the cap¬ ital invested. The factory considers this in the nature of profit sharing with its employees, who, with their families, constitute the sole tenancy. The extent of Port Sunlight is 450 acres.

At Bourneville the situation is different. Although half of the tenants are employees of the concern under whose patronage the city is operated, any one is eligible to become a resi¬ dent. . The rents are higher but the city is an individual entity administered by an independ¬ ent corporation. There are some 5,000 inhab¬ itants in Bourneville, occupying 925 houses. The city covers 612 acres of land, and one- tenth of the land, in addition to that occupied by roads and gardens, is reserved for parks and recreation grounds. In no case is the building allowed to cover more than one-fourth of the plot belonging to it, and the number of houses is usually from 7 to 10 per acre.

1. *The large amount of ground left open per¬ mits of vegetable gardens, the produce of which materially reduces the cost of living of the householders. Under ordinary conditions land yields a return of about $25 'per aCre, but that portion utilized in Bourneville for raising produce returns a valuation of some $150 per acre, in addition to housing an average of 30*

persons per acre in the occupied portions of the city.

Hellerau, which is about three miles from Dresden and covers 325 acres, has a population of about 1,000, and the land is held by a corpo¬ ration which limits its dividends to 4 per cent. The village is occupied by the employees of a single concern, the Deutsche Werkstdten fur Handwerkkunst, the chief owner of which • — Karl Schmidt — is the leading spirit of the Hel¬ lerau improvement. The building is largely carried on by the Co-operative Building Asso¬ ciation of Hellerau, which secures its capital at low rates from the governmental insurance funds. These enormous funds are thus utilized in a twofold manner — the principal for improv¬ ing housing conditions and the income for the amelioration of the beneficiaries.

The garden city of Letchworth, some 35 miles from London, is a modern city of 7,500 inhabitants, with 49 industries. It is an inde¬ pendent entity, and is operated by a group of persons that has limited it? possible dividends

Great ground plan of Karlsruhe, Germany, an excep¬ tionally well-planned city, full of individuality and variety. The portion above the medium line of the great circle is a forest park. The building regulations of the city provide for 16 zones.

to 5 per cent, thus ensuring the best of condi¬ tions for the residents. The maximum number of houses permitted to the acre is 12, and two- thirds of the six square miles of the city are reserved for parks and similar uses.

Another interesting example will be found in Forest Hills Gardens, Long Island, New York, a town-planning enterprise in which cer¬ tain trust funds have been invested and which is conducted wholly on commercial lines in the expectation that a fair profit will be earned from the investment. As a real estate propo¬ sition it may not differ much from other first- class Long Island developments. It is not a garden city for workingmen, however, but is intended for persons of ampler means.

The main points in the general layout or great ground plan are the direct, ample, con¬ venient thoroughfares, the gently curved resi¬ dence streets, so laid out as to allow for deep front gardens; the interior parks for the private

use of the residents, and the large amount of land in proportion to the size of the develop¬ ment that is put aside for common use. Each block is considered as a unit and treated as such. This separate block planning gives a beauty and variety not possible with the ordi¬ nary rectangular block plan.

Unity of design is the special attraction of

the gardens, and this unity has been faithfully adhered to. The station, the inn, the stores the apartments, and the houses, large and small \vhile varying in treatment and material, are all harmonious in design. The whole place has an atmosphere that is homelike, refreshing and dis¬ tinguished with a real individuality. Like all •aˆr- j 1 1 ~class suburban developments, the individual or free standing house will predomi¬ nate, but an attractive feature of the building plan is the so-called "Group-Building? This plan makes it possible to buy a house of supe¬ rior construction and enduring value at a lower price, for the reason that the land may be used more economically when the houses are either semi-detached or one of a group of three, four, Six, eight or 10 houses set contiguously in a row! Ihese groups and rows add greatly to the charm and variety of the building scheme. Ihey have been planned so as to conform to the land and road contours, and are of different sizes and prices, with varying interior arrange¬ ment and architectural treatment. There is no subject upon which the developers of the gar¬ dens have laid more stress than upon the value of the common use of land as a factor in com¬ munity life.

When the plans of this company were first officially made public, disappointment was ex¬ pressed that the enterprise would not benefit the mechanic or day laborer, such as the Eng¬ lish development at Port Sunlight. This, how¬ ever, was impracticable owing to the location of the property, the initial cost of which would only permit the upbuilding of a high grade resi¬ dential suburb.

These examples indicate the scope of the garden city idea in its various applications, from the housing of the employees of a single factory to the establishment of an independent and thriving city.

The workingmen's colonies were the proto¬ types of the garden cities and had their origin in the workingmen's quarters established by the Krupp Company at Essen, beginning in 1855, with barracks affording lodging and board for

200 men to start with, continuing with the erec¬ tion m 1863 of a colony of 160 dwellings at "Alt West End? the first actual colony continuing with various additions to the present time until, with the colonies of Westend, Nordhof, Baum-

t

Plan of garden suburb, Dalhauser Heide, near Essen,

Germany.

hof, Schederhof, Cronenberg, Alfredshof, Friedrichshof, Magarethenhof, Dalhauser Heide, Emscher Lippe and Colony Gaarden and the miscellaneous quarters in Essen, the Krupp works house 12,800 men and their fami¬ lies, a total of 46,000 persons.

The colony Cronenberg, the largest and best known, was mainly erected during the years from 1872 to 1874. The buildings are partly set up in rows of three-storied houses containing 30 to 40 dwellings in each block, and partly of three-storied semi-detached houses with 12 dwellings, six of them accessible from each gable front. The buildings are constructed of brick or quarry-stone without ornaments, and are surrounded by gardens and lawns. Throughout, each staircase gives access to six dwellings, to two each on each floor from a small landing, through a private front door. The streets are lined with trees, and in the midst of the colony there is a spacious park, which in connection with the gardens surround¬ ing the houses gives to the whole a most agree¬ able aspect. Subsequent to 1891, 204 additional dwellings were erected, so that the entire colony now contains 1,454 workingmen's dwellings of from two to three rooms, and some of as many as six rooms.

From 1894 to 1899 the principal portions of Alfredshof and Friedrichshof were erected, and in the construction of these colonies aesthetic as well as practical and sanitary considerations were emphasized. The plans on which the streets were laid out, the varying positions of the buildings as regards the streets, the provision for spacious open grounds, the application of a handsome and varied architecture and the utili¬ zation of bright colorings in the roofs and

fagades lend to these colonies a most attractive aspect.

In fixing the ground plans of the several dwellings allowance was made for

the high

Type of half open block system found in England, Holland

and Germany.

standard of the workingman's life at present, and accommodations of two rooms, therefore, were altogether abandoned, and sets of three or more rooms only were admitted. Each one- family cottage was given a small garden and houses of two or more stories were provided with verandas and loggias, to afford their occu¬ pants a sitting place in the open air. Each kitchen was also provided with a larder.

The first lot of houses in Alfredshof was erected on the cottage system, in one, two, three and. four family cottages, in rows, each con¬ taining a small number of houses. To each family-lodging a small garden is attached. The dwellings in the semi-detached or double semi¬ detached cottages are also completely separated, each family having its own private entrance through its own garden. At the entrance of each dwelling is a veranda.

In 1899 construction work in Alfredshof came temporarily to an end. When it was re¬ sumed in 1907, the ground had in the meantime become so dear that it was deemed inadvisable to continue the system. Therefore, in order to utilize the building space more rationally, and m order to provide a sufficient number of dwell¬ ings in the neighborhood of the works, corre¬ sponding to the increased number of working¬ men, a more compact mode of building had to be adopted.

The question could only be solved by the multiple-storied house arranged in flats, which at the. same time afforded the possibility of har¬ monizing the. colony architecturally with the town houses in the vicinity. The houses were arranged, in blocks, an arrangement already adopted in the Friedrichshof. By an artistic grouping of the blocks, by leaving sufficient open ground, lawns and playgrounds between,

HI

ip

IP

If

IS

1

n

IP

n

n

n

HI

HI

i!

HI

n

Block with open ends as found in Mannheim and Posen.

and by carefully preserving existing trees, this new part of Alfredshof was made to answer all modern requirements as regards healthfulness and beauty.

The annual rents in these colonies are :

Three-room dwelling Four-room “

Five-room “

In One-Family House

$47 . 50 to $55 . 00

62.50

75 . 00 “ 96 . 00

In Multiple- Family House $42.50 to $52.50 55.00 “ 60.00

65.00 “ 70.00

In opposition to the Altenhof and the older part of the Alfredshof, this colony was from the very beginning erected on the- system of the two or more storied house on account of the valuable and rather limited building space. Six or four families enter the residence from one common entrance,,

and two or three families have one laundry in common. But apart from the street door each dwelling has its own pri¬ vate front door on the landing.

The three or two storied houses of this col¬ ony are united into more or less large blocks, which are grouped around squares and play-

Plan of garden suburb, Hempstead, England.

ˆV ’ ,L iresn air is abundant

i he trees and shrubs that grow in abundance a 91ˆ a verY pleasant and agreeable aspect, w j?e ri notabl(r German garden cities are Wandbeck and Altona, near Hamburg The former covers about 10 acres and has 150 houses, while the latter is still under construc¬ tion with municipal assistance. It will ulti¬ mately provide, for a population of 30,000 per¬ sons. In addition a large number of co-oper¬ ative associations have been formed in Germanv

f Estobk’„ PT,en- Ti,s!t’ Bo™. Chemnitz Aachen, Halle, Dortmund, Erfurt, etc., and a

considerable number of garden cities have been under construction or completed.

Industrial home towns is the usual term in the United States for what the British call

GARDEN OF THE GODS

Gateway to the Garden of the Gods, near Manitou, on the Denver and Rio Grande Railroad, Pike’s Peak in the distance

garden cities, and the Germans, “Workingman’s colonies. Ihe basic, principles are practically die same, the exception being that in British pi actice there are fewer houses per acre ■ — ibat is, more ground is allotted to gardens lawns, parks, playgrounds and streets. The Hempstead suburban garden has eight one- family houses per acre, exclusive of streets; Hempstead tenants, 10; Ilford, eight; Letch- worth Garden City, 12 one-family houses per net acre. American industrial home towns have

as many as 18, and even more, houses per net acre.

Notable among the industrial house towns of xj iL niˆ“ States are those of*

the Goodyear Heights Realty Company, Akron, Ohio; Keno¬ sha Home Association, Kenosha, Wis. ; Dela¬ ware and Lackawanna Railroad Company, Kist- ler, Pa ; the Improved Housing Association,

. ew Naven, Conn.; aside from those men¬ tioned, there are numerous other industrial home town developments now under way in various parts of the country.

. Frank Koester,

Author of (Modern City Planning and Mainte¬ nance?

GARDEN CITY, N. Y., a village on Long Island in Nassau County, on the Long Island Railroad, 20 miles east of New York. It was founded by Alexander T. Stewart as a residen¬ tial town. It is the seat of the Protestant Epis¬ copal bishop of Long Island, and contains the cathedral of the Incarnation. Here are also the cathedral schools, Saint Mary's and Saint Paul's, and the factory of a large publishing house. Pop. (1920) 2,420.

GARDEN OF THE GODS, a small region m Colorado, near Colorado Springs, in which are seen some of the most striking effects of erosion ever found upon the globe. The "Gar¬ den® covers an area of about 500 acres, within which are sandstone rocks, red and white, in forms of grotesque magnificence ■ — columns, "cathedral spires® and giant figures sometimes appearing almost as if made in human likeness. To many of these shapes have been given dis¬ tinctive names suggested by their various formations. The road into the "Garden® enters through the huge "Gateway® of red rock- masses 330 feet in height.

GARDEN SNAIL. See Snail.

GARDEN VILLAGES. See Village.

GARDEN WEBWORM. See Webworm.

GARDENER, Helen Hamilton. See

Smart, Helen Hamilton.

GARDENER BIRD. See Bower-birds.

GARDENIA, a genus of shrubs or small trees of the family Rubiacece, containing about 60 species in the subtropical regions of the Old World They have mostly glossy, entire leaves and showy, solitary or clustered, yellow or white flowers. G. Jasminoides, the Cape jas¬ mine, is a shrub

with waxy double flowers much cultivated for hedges from Virginia southward. It was formerly popular as a greenhouse plant but is little grown now.

GARDENING, Landscape. See Land¬ scape Architecture.

GARDINER, gard'ner, Asa Bird, Ameri¬ can lawyer: b. New York, 30 Sept. 1839; d. 28 May 1919; educated at the College of the City of

Nevv Yoik and New York University; during service in the Civil War attained the rank of captain and received a medal of honor for bravery; was professor of law in the United States Military Academy in 1874-78, and be¬ came district attorney of the county of New York in 1897. He held important posts in the ocie y of the Cincinnati and other organiza¬ tions. Author of (The Writ of Habeas

LkLL a

(1874) ' The Order of the Cincinnati in

France (1905), etc. Uncmnatl m*

„ . ' ■*rreaeric, American Protes-*

W iP8l5°PAal ,C]ˆman : b- Gardiner, Me., 11 Sept. 1822; d Middletown, Conn., 17 July 1889.

He was graduated from Bowdoin College in

1842, from the General Theological Seminary,

MpW 184d; waS rrector of Trinity, Sacb,

nˆs1ˆ-47ˆ [ect?r of churches at Bath •(1H and Lewiston, Me., (1855-56); and in 1865 became professor of the literature and [f/Pf'if011. °.f Scripture in the Gambier (Ohio) Theological Seminary. In 1867 he was appointed professor of the Old Testament lan- guage and literature in Berkeley Divinity School (Middletown, Conn.), and in 1883 of Lew lestament interpretation and literature in that institution. He founded (1880) the So- C1Ci!r Biblical Literature and Exegesis, and published The Island of Life) (1851) • 'DiatessarorP (1871); 'The Old and New testaments in their Mutual Relations) (1885).

GARDINER, Harry Norman, American educator: b. Norwich, England, 6 Nov. 1855. n 1874 he came to the United States; was graduated at Amherst in 1878, and subsequently studied at_ Union Theological

Seminarv (1879ˆ

iQ7i 7ˆ˚t!lngen' ,Le!Pzig and Heidelberg. In 1878-79 he taught in the Academy of Glens

Falls, N. Y. ; in 1891-92 was instructor in psychology in Amherst; was instructor (1884- 88) and subsequenffy professor of philosophy at Smith College after 1888. He is member of the American Psychological Association, the American Philosophical Association (presi- dent 1907) and of the American Association for the Advancement of Science. He has pub-

(˚utllI]es of Modern Philosophy> (1892) and edited 'Jonathan Edwards — A Retrospect > (1901) and 'Selected Sermons of Jonathan Edwards> (1904).

GARDINERˆ John, American lawyer: b.

i7o?t0?x 1/31 ' drowned ˚ff Cape Ann, "15 Oct. U/3. He was a son of Sylvester Gardiner (q.v.) i~ie studied law at the Inner Temple, London, and was admitted to practice at Westminster j ' formed an intimacy with Churchill and V\ likes, and was junior counsel of the latter at his trial in 1764, and also appeared for Beardmore and Meredith, who for writings in support of Wilkes had been imprisoned on a general warrant. In 1766 he procured the ap¬ pointment of attorney-general in the island of Saint Christopher, where he remained until after the American Revolution, when he re¬ turned to Boston. After residing there a few years, he removed to Pownalborough, Me., which place he represented in the Massachusetts legislature until his death. As a legislator he distinguished himself by his efforts in favor of law reform, particularly the abolition of special pleading, and the repeal of the statutes against theatrical entertainments. In connection with

the latter subject he published a dissertation on the Ancient Poetry of the Romans,) and an accompanying speech. The abolition of the law of primogeniture in Massachusetts was due to his efforts. He was one of the most influential of the early Unitarians of Boston, and partici¬ pated in the change of King's Chapel from an Episcopal into a Unitarian Congregational church.

GARDINER, John Sylvester, American Episcopal clergyman : b. Haverford West, South Wales, England, June 1775; d. Harrow- gate, England, 29

July 1830. He was a son of John Gardiner (1731-93) (q.v.) ; accompanied his father to the West Indies, and subsequently studied in Boston, and in England under the celebrated Dr. Parr. Returning to America, he became a candidate for orders in the Protestant Episcopal Church, and in 1797 was ordained. In 1805 he became rector of Trinity Church, the chief Episcopal parish in Boston, with which he remained connected until his death. He was an accomplished scholar and a forcible preacher. In the establishment of the Boston Anthology and Monthly Repository, for which he was a frequent writer, he contributed mate¬ rially to the dissemination of literary taste and culture in Boston. He was also one of the founders of the Boston Athenceum. He wrote the (Jacobiniad,) a satire in prose and verse directed against the liberal clubs of Bos¬ ton to which, being in politics a strong Federalist, he had an antipathy.

GARDINER, Lion, English settler in America: b. 1599; d. 1663. After service in the English army, he came to America in 1635 as the representative of a land company which had a patent of territory at the mouth of the Con¬ necticut. He built a fort to which he gave the name of Saybrook, compounded from the names of Lord Say and Sele and Lord Brook, two of the patentees, and remained in charge until 1639. He made on an island, called by him the Isle of Wight (now Gardiner's Island, township of Easthampton) , the first English settlement within the limits of what is now the State of New York, and there he lived in baronial style.

GARDINER, Samuel Rawson, English historian : b. Ropley, Hampshire, 4 March 1829; d. Sevenoaks, Kent, 23 Feb. 1902. He was educated at Christ Church, Oxford, studied also at Edinburgh and Gottingen; was pro¬ fessor of history at King's College, London, in 1877-85, historical lecturer for the University Extension Society in 1880-94, and examiner in the Oxford final history school in 1886-89. He was elected to a research fellowship bv All Souls, Oxford, in 1882, and to 'a similar fellow¬ ship by Merton, in 1894. On Froude's death (1894) he declined appointment to the Oxford regius professorship of modern history. It is for his work of research in the history of England from 1603 to 1660 that he is best known. The results were published in instal¬ ments later assembled in various collective edi¬ tions. In the course of his investigations he examined the minutest details with extraor¬ dinary care. He inspected the scene of most battles which he described ; he thoroughly familiarized himself with the state papers of the Record Office; and for the study of the state papers foreign and the contents of other

national archives learned six continental lan¬ guages. No source of information was left unexhausted. It is stated that he was the only one that ever read the entire collection of Thomasson tracts in the British Museum. Though himself a Liberal in politics, his writ¬ ing was wholly judicial and

impartial. Perhaps no other English historian ever labored more enthusiastically for historical truth and no one was more judicious in his treatment of sources. His style is clear and well-ordered, and in later volumes vigorous and often impressive. He was the first to describe in full the period of Commonwealth and Protectorate from an unprejudiced viewpoint, and he was also the first to explain satisfactorily the beginnings of the Cavalier party and the rise of the civil war. He was fortunately enabled to utilize many newly discovered sources. His work was not at first popular, but its worth was later fully recognized. In 1882 he received a civil- list pension of £150. The titles of the larger divisions of his great undertaking are (History of England from the Accession of James I to the Disgrace of Chief Justice Coke> (1863);

(History of England from the Accession of James I to the Outbreak of the Great Civil War} (1883-84) ; (History of the Great Civil War) (1886-91); and (History of the Com¬ monwealth and Protectorate) (1894-1901), in three volumes, a fourth to be completed by Firth. He wrote also (Cromwell's Place in History) (1897); (01iver CromwelP (1899); and other works, including (The Thirty-Years' War) (1874) ; (The First Two Stuarts, and the Puritan Revolution) (1876); Untroduction to the Study of English History) (with Mullin- ger, 1881) ; Constitutional Documents of the Puritan Revolution) (1889); 'Student's His¬ tory of England) (1890-92) ; (School Atlas of English History' (1891); (What the Gun¬ powder Plot Was) (1897).

GARDINER, Sylvester, American physi¬ cian: b. Kingston, R. I., 1717 ; d. Newrport, R. I., 8 Aug. 1786. He studied medicine in Lon¬ don and Paris, subsequently practised his pro¬ fession in Boston, and opened there a drug establishment, from which the New England colonies were chiefly supplied. He was one of the early promoters of inoculation for the smallpox, and a liberal contributor for the erection of King's Chapel, Boston. He be¬ came possessed of large tracts of land in Ken¬ nebec County, Me., and about the middle of the century was instrumental in establishing there the settlement of Pittston, a portion of which was subsequently set off into a separate town, under the name of Gardiner, where he built and endowed Christ Church. He retired from Boston on its evacuation by the British troops, but returned to the United States at the close of the Revolutionary War, and passed the rest of his life there.

GARDINER, Me., a city in Kennebec County, on the Kennebec River, and on the Maine Central Railroad, six miles from Augusta. Separated from Pittston and incor¬ porated as a town in 1803, it was chartered as a city in 1848. It has admirable water power, valuable manufacturing interests, and an as¬ sessed property valuation of more than $4,000,- 000. The ice-cutting industry employs 1,000 people, with an annual output valued at

$75,000.

i he commission form of government was adopted by the city, and became operative in 1912. Pop. 5,311.

GARDINER'S ISLAND, N. Y., an island in a bay of the same name at the northeastern extremity of Long Island. It is part of the township of East Hampton, Suffolk County, and has an area of 3,300 acres, mostly undulat¬ ing. pasture land. It was bought from the Indians by Lion Gardiner in 1639. Captain Kidd (q.v.) buried part of his treasures on the island in 1699, but they were recovered in the same year by the colonial authorities.

GARDNER, Augustus Peabody, Ameri- can congressman and soldier: b. Hamilton, Mass., 5 Nov. 1865; d. Camp Wheeler, Va., 16 Jan. 1918. He was graduated at Harvard in 1886; was a member of the Massachusetts State senate (1899-1901), and was elected to nine congresses, from the 57th to 65th inclusive. During the Spanish-American War, he served as captain and assistant adjutant-general on staff of Gen. J. Wilson In 1913 he was Repub¬ lican nominee for governor of Massachusetts. An earnest advocate of American participation in the European War, he entered the army in 1917 as colonel in the Officers Reserve Corps. He procured demotion to major, so that he might see active service sooner. . He died while in training at Camp Wheeler, and was interred at the national capital.

GARDNER, Edmund Garratt, English scholar in Italian : b. London, 12 May 1869. He was educated at Gonville and Caius College, Cambridge. Intended for the medical profes¬ sion, he soon abandoned it for the study of Italian literature and history, especially the study of Dante. He has devoted much time to research in Italian archives and libraries, and, more recently, to the investigation of mysticism and kindred subjects. He is Barlow lecturer on Dante at University College, Lon¬ don. His publications include (Dante's Ten Heavens) (1898); (A Dante Primer) (1900); (The Story of Florence5 (1900);

GARDNER, Ernest Arthur, English archaeologist: b. London 1862. He was edu¬ cated at Cambridge University, and was di¬ rector of the British School of Archaeology at Athens, 1887—95. From 1884 he has been en¬ gaged in archaeological researches in Egypt, Athens, Paphos in Cyprus, Megalopolis and elsewhere, and has lectured and written much upon Greek

art and archaeology.

GARDNER, Eugene C., American archi¬ tect: b. Ashfield, Mass., 28 March 1836; d. Springfield, Mass., 7 Feb. 1915. He was prin¬ cipal of the academy at Tallmadge, Ohio, 1852-62. He then removed to Northampton, Mass., where he resided 1863-68, engaged in architectural work, going to Springfield, Mass., in the latter year, editing The Builder 1885-87, and writing for the Springfield Republican. In 1901 he was elected a member of the Massa- voi.. 12 — 19

chusetts House of Representatives. Among his works are (Homes and How to Make Them5 ; Ullustrated Homes5 ; (Home Interiors5 ; (The House that Jill Built5 ; (Town and Country School Houses5 ; and (Common Sense in Church Building.5

GARDNER, Henry Brayton, American educator: b. Providence, R. I., 26 March 1863. He was graduated at Brown University in 1884 and from 1884 to 1888 studied at Johns Hopkins, where he received the degree of Ph.D. in 1890. In 1888-90 he was instructor in political economy ; in 1890-98, associate pro¬ fessor, and since 1898 professor at Brown Uni¬ versity. _ He is a member of the American Economic Association, of which he was vice- president in 1897-98, and has published Statis¬ tics of Municipal Finance5 (in publications of the American Statistical Association, New Ser., No. 6, 1889 and in publications of American Economic Association, New Ser., No 2

1899).

GARDNER, Percy, English archaeologist : b. Hackney, Middlesex, 24 Nov. 1846. He was educated at Cambridge University, was Disney professor of archaeology there in 1880 and has been professor of classical archaeology at Ox¬ ford since 1887. Among his publications are (Samos and Samian Coins5 (1882) ; (The Types of Greek Coins5 (1883) ; (New Chapters in Greek History5 (1892); 'Manual of Greek Antiquities,5 with Jevons (1895); Sculptured Tombs of Hellas5 (1896) ; 'Exploratio Evan- gelica5 (1899) ; (Historic View of the New Testament5 (1901) ; (A Grammar of Greek Art5 (1905) ; (The Growth of Christianity5 (1907) ;

(Religious Experience of Saint Paul5 (1911) ; Principles of Greek Art5 (1913).

GARDNER, Mass., a town in Worcester County, including the villages of Gardner Cen¬ tre, South Gardner and West Gardner. It is situated about 25 miles north of Worcester, on the Fitchburg division of the Boston and Maine Railroad, two branches of which pass through the town, intersecting

at the station in Gardner Centre. Gardner is the trade centre of an agri¬ cultural region and has a large chair-manu¬ facturing industry, with establishments employ¬ ing about 3,000 people. Almost every known kind of chair is made here, and the products of this manufacture are shipped to all parts of the United States and to many foreign countries. The number of industrial establishments in 1914 was given in the Census Bureau's sum¬ mary as 64; persons engaged in manufactures, 4,245; proprietors and firm members, 49; sal¬ aried employees, 232 ; wage earners, 3,964 ; primary horse power, 5,046; capital, $13,534,000; services, $2,447,000; salaries, $363,000; wages, $2,084,000; materials, $3,079,000; value of prod¬ ucts, $7,450,000; value added by manufacture, $4,371,000. The town has two good parks and an excellent public library. Pop. (1920) 16,971.

GAREFOWL. See Great Auk.

GARFIELD, Harry Augustus, American educator and public official : b. Hiram, Portage County, Ohio, 11 Oct. 1863. He is a son of James A. Garfield, 20th President of the United States ; was educated at Williams College, where he was graduated in 1885. In 1885-86 he taught Latin and Roman history at Saint

Paul's School, Concord, N. H., and practised law in Cleveland from 1888 to 1903. From 1891 to 1897 he was professor of contracts at the Law School of Western Reserve University; in 1903-08 was professor of politics at Princeton, and in the latter year was appointed president of Williams College. In 1898-99 he was presi¬ dent of the 'Cleveland Chamber of Commerce and in 1896 helped to organize the Cleveland Municipal Association, of which he was after¬ ward president. In 1917, soon after the en¬ trance of the. United States into the World War, President Wilson appointed Mr. Garfield fuel ad¬ ministrator. Because of the shortage of coal in the Northeastern States, especially New York City, and in Ohio, his administration of the office was severely criticized in the press, but Congressional investigation showed that the shortage was due to failure of the railroads to meet the extra demands upon them, and the situation cleared soon after Federal control of the roads was instituted, 28 Dec. 1917.

GARFIELD, James Abram, 20th Presi¬ dent of the United States : b. Orange, Cuyahoga County, Oh:o, 19 Nov. 1831; d. Elberon, N. J., 19 Sept. 1881. On his father's side he was of English Puritan descent; on his mother's, Hu¬ guenot. The father, a native of New York, settled in the

((Western Reserve® in 1830 and died in 1833, leaving his widow with four small children, James being the youngest. Garfield's boyhood was passed amid the harsh but by no means destitute conditions of frontier life. He worked hard on the farm, helped in the support of the . family, attended school three months each winter and read and reread every book which fell in his way. For a short time he was a driver and steersman on the Ohio Canal. Sup¬ porting himself chiefly by teaching, he studied successively at Geauga Seminary 1849, Eclectic Institute, Hiram, Oho (now Hiram College), 1851-54, and Williams College, Mass., entering the junior class in 1854 and graduating with high honors in 1856. Returning to Ohio, he taught the classics at Hiram Institute 1856-57, and became its president 1857-59. Coincident with his teaching he studied law, was admitted to the bar in 1859 and, resigning his presidency, was elected to the Ohio State senate. The Civil War breaking out, he threw himself enthusi¬ astically into the Northern cause, was commis¬ sioned lieutenant-colonel of the 42d Ohio and given command of a brigade, with orders to operate as an independent force in eastern Ken¬ tucky, December 1861. With a force of 1,100 men and no artillery he signally defeated 5,000 Confederates under the veteran general Hum¬ phrey Marshall, driving them from fortified positions of their own choosing, 10 Jan. 1862. For this exploit Lincoln promoted him briga¬ dier-general. Subsequently he took part in the battle of Shiloh, in the operations around Cor¬ inth, and served with distinction on several courts-martial at Washington, one being that of Gen. Fitz-John Porter (q.v.). Appointed chi.ef of staff to General Rosecrans, February 1863, his notable services at Chickamauga (see Chickamauga, Battle of) caused Lincoln to make him a major-general, 19 Sept. 1863. In 1862 his home district had elected him to Con¬ gress. Thus, within six years he had been president of a college, State senator, major-general and representative-elect, a combination

of honors without parallel in the national an¬ nals. Upon the advice of Lincoln and Stanton he resigned his major-general's commission 5 Dec. 1863 and took his seat as a representative on December 7. In this field his talents and genius found their true sphere. He stepped to the front at once, taking a prominent part in every debate of importance and becoming an authority on questions of finance, tariff, edu¬ cation and constitutional rights. Always the champion of sound money, his speech in March 1866 clearly outlined the policy which resulted in the resumption of specie payments 1 Jan. 1879. An eminent contemporary has well said of Garfield's speeches, that they are a compen¬ dium of the political history of the time and would give a connected history and complete defense of the important legislation of the 17 eventful years that comprised his legislative career. He was eight times re-elected to Con¬ gress, serving on such important committees as those on military affairs and on ways and means,

and was the first chairman of the Com¬ mittee on Banking and Currencv. In the Recon¬ struction period he steadily opposed the theories of President Johnson (see Johnson, Andrew) ; in 1876 he went to New Orleans at President Grant's request to watch the counting of the Louisiana vote, and in 1877 was chosen by acclamation one of the two members of the Elect'd Commission allotted to the House of Rep ▼'ntatives. In the 45th Congress Gar¬ field displayed masterly qualities as a leader of opposition. His speech at Faneuil Hall, Boston, in 1878 on the national finances was circulated by thousands as a campaign docu¬ ment On 13 Jan. 1880 the Ohio legislature unanimously elected him United States sen¬ ator to succeed Hon. Allen G. Thurman (q.v.), and his last speech in Congress was delivered 23 April 1880. At the Republican National Convention at Chicago, 2-8 June 1880, he headed the Ohio delegation, nominated John Sherman (q.v.) for the Presidency, opposed the nomination of General Grant for a third term and was himself nominated on the 36th ballot as a compromise candidate. Contrary to all precedent, Garfield himself took part in the campaign that followed, making some 70 speeches in all, chiefly extemporaneous. At the November election he received 214 electoral votes to 155 given his Democratic opponent, General Hancock. The first months of Gar¬ field's administration were disturbed by the opposition of the New York senators to certain of his appointments. Senators Conkling and Platt claimed the right to control the Presi¬ dential appointments in their State. This the President refused to concede. The senators resigned and appealed to their legislature to vind cate their attitude by a re-election, but failed to get it. On the morning of 2 July 1881, while in the Baltimore and Potomac sta¬ tion at Washington, on his way to New Eng¬ land, where he intended to deliver the com¬ mencement address at Williams College, Presi¬ dent Garfield was shot by Charles Jules Guiteau (q.v.), a disappointed office-seeker. For weeks he lingered between life and death, suffering the greatest agony but bearing it with a mag¬ nificent fortitude that won the admiration and sympathy of the civilized world. A removal to Elberon, N. J., in the hope that the sea air*

JAMES ABRAM GARFIELD

Twentieth President of the United States

-

'./

-

-

might benefit him was of no avail. Blood poisoning set in on 15 September and he died on the 19th at 10.30 p.m. In February 1882 an impressive memorial service was held in the House of Representatives, the Hon. James G. Blaine delivering a commemorative address, which for eloquence, dignity and truth has rarely been equaled on such occasions. Gar¬ field s body lies in a beautiful cemetery in Cleveland, Ohio, a stately monument marking the spot. His life was the fullest realization of the opportunities of American citizenship. Rising from nothing, by his own exertions he won high places in various spheres and filled them all adequately and with dignity. His (Works * have been edited by Prof. B. A. Hinsdale (Boston 1882-83).. Consult Hins¬ dale, (President Garfield and Education * (Bos¬ ton 1882).

W. N. C. Carlton, Librarian, Newberry Library, Chicago.

GARFIELD, James Rudolph, American government official, son of President James A. Garfield: b. Hiram, Ohio, 17 Oct. 1865. He was graduated at Williams College in 1885; studied at the Columbia Law School and in 1888 was admitted to the bar. In 1896-99 he was a member of the Ohio senate and in 1902- 03 was a member of the United States Civil Service Commission. From 1903 to 1907 he was commissioner of corporations of the United States Department of Commerce and Labor and in 1907 became Secretary of the Interior in President Roosevelt's Cabinet. He retired from this post on 4 March 1909; during his term of office, he effected a complete reorganization of the department and instituted many land-office reforms. Since 1909 he has been engaged in law practice at Cleveland ; in 1912 he was prom¬ inent in the councils of the new Progressive party.

GARFIELD, N. J., borough of Bergen County, opposite Passaic, on the Passaic River, and on the Erie Railroad, 10 miles northwest of New York. It contains machine shops, em¬ broidery works, knitting mills, woolen mills and stone works, and there are manufactures of wax paper, chemicals, rubber goods, paper boxes, perfumes and clothing. In 1914 there were in operation 39 establishments with an ag¬ gregate capital of $16,083,000 and employing 6,144 persons. Salaries and wages amounted to $3,113,000. The products were valued at $16,113,000, of which $4,748,000 was added by manufacture. Garfield was incorporated in 1898; the government is vested in a mayor and council. The water plant is municipally owned. Pop. (1920) 19,381.

GARFIELD MONUMENT, a monument erected as a memorial to President Garfield, in the Lakeview Cemetery at Cleveland, Ohio. See Cleveland.

*GARGANO, gar-ga'nd (ancient Garganus), a mountainous peninsula, the ˆspur** of Italy, in the province of Foggia, jutting «out into the Adriatic Sea, and attaining in Monte Calvo a height of nearly 4,000 feet. Bee-keeping is yet as generally engaged in as in the time of Horace. The district is visited mainly by pilgrims to a shrine of Saint Michael on Monte Saint Angelo. It is about 50 miles long and 27 miles broad.*

291

GARGANTUA AND PANTAGRUEL

*(La Vie trds horrifique du grand Gargantua and Pantagruel, roi des Dipsodes) is the literary monument of Francois Rabelais. The signifi¬ cance of the work for its time is likely to be misapprehended by readers grown more squeamish, even in speaking, than he was in writing or printing, of matters concerning the processes of engendure, gestation, nutrition, digestion and excretion, while they have become heedless, through long and wonted use, of those liberties in education and in the saner social, political and intellectual outlook for which our age is indebted most to Rabelais and to Eras¬ mus among the humanists of the 16th century. In the coarseness with which he expresses a lusty animalism, Rabelais had rivals but hardly an equal. Yet in the whole of his work there is not a prurient phrase. He likens (Bk. 1, Pro¬ logue) his work to a «silene,** i.e., to a little fancy box whose grotesquely ornamented lid hid some prized thing, a jewel perhaps, a spice, some healing salve. What is hidden is worth more than what appears. Let his readers (< break the bone and suck out the marrow."*

The dates and even the order of publica¬ tion of the five books that make up the current (Gargantua and PantagrueP are uncertain. Book 2, the first of (PantagrueP was certainly in print in 1533, as was the (Pantagrueline Prognostication, a parody of the current popu¬ lar almanacs. Book 1, (Gargantua,* is known first in an edition of 1535. A rather common¬ place chap-book, (The Grand and inestimable chronicles of the great and enormous giant Gargantua* is at least as early as 1532. Giant Gargantua was already a familiar figure in the folklore of France. Whether these Chronicles* are by Rabelais, or whether perhaps some other earlier (Gargantua* by him has left no trace, is uncertain. A new edition of Books 1 and 2 appeared in 1542, the very important Book 3 in 1546. A part of Book 4 appeared in 1547, while Rabelais was in exile, the whole of it after his restoration to royal favor in 1552. Meantime a version of the much disputed Book 5 had appeared in 1549. The current version of this Book was first printed in 1562 and not incor¬ porated with the other four till 1567. This latter version is at least sophisticated; possibly neither is genuine.*

The work changed in character as it pro¬ gressed. It began as a narrative of Brob- dingnagian folk-lore, with sallies of ebullient animal spirits and passages of shrewd obser¬ vation and deep wisdom regarding the errors and shortcomings of the time in education and in political, social and religious life. As the work proceeds these latter elements become more and more prominent, and with the develop¬ ment of the character of Panurge in Book 3, it grows clearer why Coleridge should speak of (

deeds of the redoubtable Friar John of the Fun¬ nels, better, ((of the Choppers® (Bk. 1; 27, 39- 45) and his abbey of Theleme (Bk. 1; 52-57) ; Gargantua's letter of counsel to Pantagruel (Bk. 2; 8) ; the latter's encounter with the Li¬ mousin pedant (Bk. 2; 6); and with Panurge (Bk. 2; 9); Panurge's praise of debt (Bk. 3; 3-5) and his famous search for light on the question of his marriage, which, with many digressions, is the binding thread for the rest of the work. The key-note is its militant faith in human nature and liberty, informed by free thinking and free teaching, joined to a Greek aversion to ascetic restraint. Never was there a more robust believer that life for its own sake could be made worth living.

Among many annotated editions of Rabe¬ lais may be noted those by Marty-Laveaux (1870-81), by Montaiglon and Lacour (1868— 72), by Moland (1881), by Clouzot (1912) and by Lefranc and others (unfinished, 1912-). The best-known translation was begun by Sir Thomas Urquhart and completed by Peter Le Motteux (1653-94). It has been often re¬ printed, notably with an introduction by Whib- ley (Tudor translations, 3 vols., 1900). W. F. Smith's annotated version (2 vols., 1893) is more accurate. Consult Tilley,

Benjamin W. Wells.

GARGOYLE (Late Latin gargula, Old French gargouille, throat), a carved or moulded ornamental figure projecting at the upper part of a building, either connected with a water spout or in general design resembling those satirical figures which originally decorated water spouts. Thus, in (La Scultura nel Duomo di Milano) (Milan 1908) we read that, contemporaneously with the locations of the first statues on parts of the exterior of Milan Cathedral, there began also the creation of those bizarre figures which enlivened the ex¬ ternal architectonic organism. The Milanese gargoyles, ˆoriginating in the simple necessity of making channels for rainwater, became one of the most vivid and characteristic orna¬ ments.® The important book devoted to this branch of art as exemplified at Rouen, Adeline's Sculptures Grotesques et Symboliques, em¬ ploying the word in its wider meaning, de¬ nominates both non-spouters and*

spouters gar- gouilles ; and useful definitions are those by Canon Auber in the Bulletin Monumental : (a) Symbolic monsters, emblems of the paganism conquered by religion at Rouen, and (b) imita¬ tions of those chimerical animals, to conduct water from roofs. The 1608 edition of Withal's Dictionary has : (

telamones, atlantes ; gargels of women's figures, cariatides.® Mr. G. L. Hunter, in his (Notes on Gargoyles, Grotesques and Chimeras (Archi¬ tectural Record, New York, February 1914) writes : <(Gargoyles are as fundamentally*

Gothic as grotesques are Renaissance and chi¬ meras are Classic.® Only by a perversion can the word grotesque be twisted from Renaissance to Gothic and substituted for gargoyle. <(Even

GARIBALDI

if gargoyle did mean the spouter only, the ex¬ tension of its meaning to include all the Gothic satirical figures that throng the roofs and towers of Gothic buildings would be in line with the normal and natural development of language. All the more reason, then, for hold¬ ing on to a meaning that is sanctioned by an¬ cient general usage.® In the United States the day of the gargoyle and the grotesque in church decoration has gone by; secular architecture, however, retains and finds new applications for such ((symbolic monsters.® Examples are seen at West Point, where one of the barracks is ornamented with quaint and humorous figures illustrating the development of war; at Prince¬ ton University, where (on a dormitory) are numerous interesting gargoyles designed by Mr. Borglum. One of the best modern ex¬ amples of the free use of gargoyles and gro¬ tesques is seen at the College of the City of New York, whose buildings the architect has en¬ riched with more than 600 figures, all different.

The highest-placed gargoyles in the world are those projecting from the 29th, 49th and 51st stories of the Woolworth Building in New York City. These, like other modern gargoyles, (

GARIBALDI, ga-re-bal'de, Giuseppe, Ital¬ ian patriot: b. Nice, France, 4 July 1807; d. island of Caprera, Italy, 2 June 1882. His father being a poor fisherman he received little education, and for a number of years was a sailor on various trading vessels. In 1834, being condemned to death for his share in the schemes of Mazzini, he escaped to Marseilles and finally went to South America. In the serv¬ ice of the Republic of Rio Grande against the Brazilians he became known as a brilliant leader, and with his famous Italian legion he subse¬ quently gave the Montevideans such effective aid against Buenos Aires as to earn the title of ahero of

Montevideo.® While in South Amer¬ ica, he married his first wife, Anita, who shared his dangers and privations. In 1848, on hear¬ ing of the rising against Austria, he returned to Italy, raised a band of volunteers and harassed the Austrians till the re-establishment of Aus¬ trian supremacy in Lombardy. In the spring of 1849 he proceeded to Rome to support Mazzini's republic. He was appointed to command the forces, but the odds were overwhelming, and after a. desperate defense of 30 days Gari¬ baldi escaped from Rome with 4,000 of his followers, and made a daring retreat through territory occupied by Austrian forces. Gari¬ baldi, accompanied by his wife, ultimately set sail for Venice; but being pursued by Austrian vessels, was forced to land, when his wife suc¬ cumbed and was buried in the sand. He

1 cached the United States, and was for several years in command of a merchant vessel. He then purchased a part of the small island of Caprera, off. the north coast of Sardinia, and made this his home for the rest of his life. Latterly the subscriptions of his admirers enabled him to become owner of the whole island.

In the war of 1859, Garibaldi and his Chas¬ seurs of the Alps did splendid service ; and on the revolt of the Sicilians in 1860 he crossed to the island, wrested it after a fierce struggle from the king of Naples, recrossed to the main¬ land and occupied Naples, where he was pro¬ claimed dictator of the Two Sicilies. He read¬ ily acquiesced in the annexation of the Two Sicilies to Italy, and declining all honors, re¬ tired to his island farm. In 1862 he endeavored to force the Roman question to a solution, and entered Calabria with a small following, but was taken prisoner at Aspromonte by the royal troops. He was soon released, however, and returned to Caprera. In 1864 he received an enthusiastic welcome in Great Britain. In 1866 he commanded a volunteer force against the Austrians in the Italian Tyrol, but failed to ac¬ complish anything of consequence. Next year he attempted the liberation of Rome, but near Mentana was defeated by the French and pon¬ tifical troops, and was again imprisoned by the Italian government, but soon pardoned and released. In 1870 he gave his services to the French republican government against the Ger¬ mans, and at the end of the war was elected a member of the French Assembly, but speedily resigned his seat and returned to Caprera. Rome now became the capital of united Italy, and here in January 1875, Garibaldi took his seat in the Italian Parliament. The latter part of his life was spent quietly at Caprera. His second wife was the Countess Raimondi, whom he married in 1860; but the union was an ill- assorted one; and his third wife was

Francesca, a peasant. After 1870 he wrote two or three novels of very mediocre quality. His autobiog¬ raphy was published in 1887, and translated into English with a supplementary biography in 1889..

Bibliography. — Dwight, (Life of Garibaldi; from his Private Papers) (new ed., New York 1903) ; Bent, (Life of GaribaldP (London 1881) ; Guerzoni, (Garibaldi) (2 vols., Flor¬ ence 1881) ; and G. N. Trevelyan's admirable works, (Garibaldi's Defence of the Roman Re¬ public (New York 1907) ; (Garibaldi and the Thousand) (New York 1909) ; and (Garibaldi and the Making of Italy) (New York 1911).

GARIBALDI (fish), a small, brilliantly colored, edible fish (Hypsypops rubicundus), scarlet when adult, which dwells in rocky pools along the coast of southern California, hiding and finding its food among the seaweeds.

GARIBALDI HYMN, the popular, though not. official, national anthem of Italy. The real national air is the ((Marcia Reale, » or Royal March. The other, known originally as the (

spirit, being mainly a parade march with a dash of operatic aria. The words are :

All' armi! all' armi!

Si scopron le tombe, si levano. i morti,

I martiri nostri son tutti risorti,

Le spade nel pugno, gli allori alle chiome,

La namma ed il nome d' Italia sul cor!

Corriamo, corriamo, su o giovani schiere!

Su al vento per tutto le nostre bandiere!

Su tutti col ferro ! su tutti col fuoco !

Su tutti col fuoco d' Italia nel cor.

Va fuori d'ltalia, va fuori ch'e l'ora,

Va fuori d'ltalia, va fuori o stranier!

All'armi! all'armi!

La terra dei fiori, dei suoni, dei carmi,

Ritorni qual era la terra dell'armi;

Di cento catene ci vinser la mano,

Ma ancor di Legnano sa i ferri brandir.

Bastone tedesco 1' Italia non doma,

Non crescono al gioco le stirpe di Roma;

Piu Italia non vuole stranieri e tiranni Gia troppo son gli anni che dura il servir.

Va fuori d'ltalia, va fuori che'e l'ora,

Va fuori d'ltalia, va fuori o stranier!

Le case d'ltalia son fatte per noi,

E lk sul Danubio la casa de tuoi.

Tu i campi ci gnasti, tu il pane c'involi,

I nostri figlinoli — per noi li vogliam.

Son l'Alpi e i due mari d'ltalia i confini,

Col carro di fuoco rompiam gli Appennini:

Distrutto ogni segno di vecchia frontiera,

La nostra bandiera per tutto inalziam.

Va fuori d'ltalia, etc.

The following translation, in blank verse, closely imitates the original, without attempt at rhyme :

To arms! The graves open, the dead arise,

Our martyrs all are resuscitated

With swords in hand, and laurels on their brow.

The flame and name of Italy in the heart.

Haste ! haste ! up, ye marshalled youth !

On every wind our banners fly !

Rise all with arms, all with fire!

Rise all with the fire of Italy in your hearts !

Depart from Italy, go, the hour has struck!

Out of Italy depart, Oh stranger!

To arms ! The land of flowers, melody and poets,

Once more be a land of arms;

A hundred chains here bind the hand.

But Legnano yet knows how to wield the sword! German cudgel-blows cannot Italy tame,*

The Roman stock was not raised to that game ;

No more foreign tyrants will Italy bear,

Too many years has the servitude endured.

Depart from Italy, etc.

The homes of Italy are built for us,

Your home is away on the Danube;

You ravage our fields, you steal our bread,

Our own sons we want ourselves.

The Alps and the two seas are Italy's borders;

With fire we break through the Appennines;

Destroyed every sign of the old frontier.

Our flag shall be raised over all.

Depart frqm Italy, etc.

GARIGLIANO, ga-rel-ya'no, a river in southern Italy, formed by the

junction of the Liri and Sacco near Pontecorvo. It flows southeast and southwest, and after a course of 40 miles falls into the Gulf of Gaeta.

GARLAND, Augustus Hill, American lawyer: b. near Covington, Tenn., 11 June 1832; d. Washington, D. C., 26 Jan. 1899. He op¬ posed secession as a policy, but was afterward elected to the Confederate Senate, which office he held till the close of the war. In 1874 he was elected governor under the new constitu¬ tion of Arkansas, and in 1885 became Attorney-General in the Cabinet of President Cleveland.

- *Legnano, an ancient " borgo " of Lombardy, cele¬ brated in history as the final scene of the great struggle for Italian liberty in 1176 against Barbarossa. The word " German " in the next line refers to the Austrians.*

GARLAND, Hamlin, American lecturer and novelist: b. near West Salem, Wis., 16 Sept. 1860. When about 16 he became a pupil at the Cedar Valley Seminary, Osage, Iowa, though working as usual on the farm during six months of the year. He was graduated in 1881 from this school and for a year tramped through the Eastern States. He farmed and taught in Illi¬ nois and Dakota, went to Boston in 1884, in¬ tending to further qualify himself for teaching. He became a pupil and later an instructor in the Boston School of Oratory. During 1885— 89 he taught classes in English and American literature and lectured on Browning, Shakes¬ peare, The Drama, etc. In 1893 he took up residence in his native village of West Salem. Here he has resided ever since. A part of each year, however, is spent by the author in moun¬ tain traveling. His first book was (Main-Trav¬ eled Roads) (1890), frankly realistic fiction. Somewhat similar in character are (A Spoil of Office) (1892) ; (Prairie Folks) (1893) ; (A Little Norsk) (1891) ; (Rose of Dutcher's Coolly > (1895). Other works are (Jason Ed¬ wards > (1891); CA Member of the Third House) (1892) ; (Wayside Courtships> (1897) ; cHer Mountain Lover) (1901). He has also written a volume of criticism entitled Crumb¬ ling Idols) (1894) ; (Prairie Songs) (1894), a volume of verse; (Ulysses Grant: His Life and Character (1898) ; (The Eagle's Heart) (1900) ; (The Captain of the Gray Horse Troop* (1902) ; (Hesper* (1903) ; (The Light of the Star* (1904) ; (The Tyranny of the Dark* (1905) ; (Victor Olnee's Discipline)*

(1911) ; (Forester's Daughter (1914). He is vice-president of the National Institute of Arts and Letters, a member of the Players' Club and the originator and first president of the Cliff Dwellers, the leading artistic and literary club of the West. He is a persistent advocate of national character in fiction and in music.*

GARLIC (Allium sativum), a species of onion long in cultivation. The leaves are grass-like, and differ from those of the com¬ mon onion in not being fistulous. The stem is about two feet high, terminated by a head composed principally of bulbs instead of flowers; the flowers are white; the root is a compound bulb, consisting of several smaller bulbs, commonly denominated cloves, enveloped by a common membrane. Garlic has a strong, penetrating odor and a pungent acrid taste. It differs from the onion only by being more pow¬ erful in its effects. In warm climates, where garlic is. considerably less acrid than in cold ones, it is much used both as a seasoning and as food. In the south of Europe, particularly in Spain, and among Italians in the United States, it enters into the composition of almost every dish, not only among the common people, but among the higher classes of society. At all times, however, while it has been prized by some nations it has been detested by others, as by the ancient Greeks. Its cultivation is easy, and it is reproduced by planting the radical or floral bulbs. Its medicinal virtues are cele¬ brated.

GARLIC, Oil of. When the leaves, seeds or bulbs of garlic and other allied plants are distilled with steam, about 0.2 per cent of a brown oil, with acrid taste and strong disagree¬ able odor, passes over. By purification it is ob¬

tained as a pale yellow oil having the odor of garlic, and it is then found to consist of the sulphide of allyl (CsHOaS. This oil is nearly related to the pungent oil of mustard, C3H5NCS, an isomer of the sulphocyanide of allyl, and is of much interest chemically, but it is of no importance from an industrial point of view.

GARMAN, Harrison, American naturalist : b. Lena, Ill., 27 Dec. 1858. Educated in the public schools and the State Normal Univer¬ sity; studied later at Johns Hopkins University. He has held many professional positions, among them, first assistant in the Illinois Lab¬ oratory of Natural History and associate pro¬ fessor of zoology in the University of Illinois and is now professor of entomology and zool¬ ogy of Kentucky State University. He has been State entomologist of Kentucky since 1897. He has written numerous articles on botany, zoology and entomology.

GARMAN, Samuel, American naturalist: b. Indiana County, Pa., 5 June

1846. He was graduated at the Illinois State Normal Univer¬ sity in 1870, and became assistant in herpetology and ichthyology in the Museum of Comparative Zoology, Cambridge, Mass., in 1873. His works include (Fishes and Reptiles from Lake Titi¬ caca > (in Bulletin Museum Comp. Zoology, Vol. Ill, 1871-76) and, as joint author, Explo¬ ration of Lake Titicaca) (same volume of that Bulletin).

GARNEAU, gar'no-, Frangois Xavier,

French-Canadian historian : b. Quebec, 1809; d. 1866. Educated in his native city, he became a notary in 1830, and devoted his leisure to mak¬ ing researches into the history of Canada. In 1831 he went to England and returned to Quebec in 1833. He afterward became trans¬ lator to the legislative assembly of Lower Can¬ ada and city clerk of Quebec. His (Histoire du Canada,- published in four volumes, recounts the story of all the French colonies in North America until 1763, and from that date deals with Canada only. Its publication gave a great impetus to literary productivity in French Canada.*

*GARNEAU, Hector, French Canadian essayist and historian: b. Ottawa, Ontario, 9 June 1872. He received his education at Ottawa University and at Laval University (Montreal), where he was graduated LL.B. with honors in 1895. In the same year he was called to 'the Quebec bar but soon afterward abandoned the law for a career in literature and journalism. Already in 1892 he had contributed weekly «Chroniques** under the title*

(Montreal 1906) ; a revised and annotated fifth edition of the (History of Canada) by F. X. Garneau, his grandfather (2 vols., Paris 1913- 19). He has lectured on Francois Xavier Gar- neau, His Life, and Work; is a member of the Champlain Society since 1905, of the American Historical Association; of La Societe de l'His- tmre des Colonies Francaises and of the Missis¬ sippi Valley Historical Association. He is Fellow of the Royal Society of Canada.

GARNER, James Wilford, American edu¬ cator: b. Pike County, Miss., 22 Nov. 1871. In 1892 he was graduated from the Mississippi Agricultural and Mechanical College ; subse¬ quently studied at the University of Chicago and at Columbia University. In 1902-03 he was lecturer in history at the latter institution; in 1903-04 served as instructor in political science at the University of Pennsylvania; and in 1904 was appointed to the chair of political science at the University of Illinois. Since 1903 he has been

collaborator for the French Revue Politique et Parlementaire. Professor Garner has con¬ tributed articles to various works of reference including The Americana, the (Cyclopedia of American Government, > and to the various re- views and periodicals. In 1910-11 he was edi¬ tor-in-chief of the American Journal of Crim¬ inal Paw and Criminology. He is the author of 'Reconstruction in Mississippi (1901) ; his¬ tory of the United States,' with Senator Henry Cabot Lodge (4 vols., 1906) ; Untroduction to Political Science) (1910) ; 'American Govern¬ ment (1911). Professor Garner edited < Es¬ says on Southern History and Politics> (1914) and translated from the French Brissaud's 'History of French Public Law.'

GARNER CASE, 1856, the most tragic of the fugitive-slave cases. Simon Garner, his wife, and his son Robert, slaves of John Mar¬ shall of Kentucky, and Robert's wife Margaret and their four children, slaves of A. R. Gaines, ran away, crossed the Ohio on the ice, and took refuge with a Cincinnati colored man. Gaines tracked them, secured a warrant, and with a deputy marshal and a band of assistants at¬ tacked the house. After a desperate fight the fugitives were overpowered, one of the posse being badly wounded; but Margaret, who had shared in the conflict, found time before her capture to murder one of the children, severely cut the throats of two others, and considerably bruised the baby, to keep them from returning to slavery.

GARNET, Henry Highland, Afro-Ameri¬ can clergyman: b. New Market, Md., 1815; d. 1882. He was born in slavery and at the age of 10 was brought to New York by his parents, who effected their escape from slavery. He re¬ ceived his education at Canaan Academy and at Oneida Institute. He was made pastor of a Presbyterian Church in Troy, N. Y. in 1842. He became prominent among the Abolitionists and for many years edited the Clarion, a weekly periodical advocating the abolition of slavery. He lectured on slavery in Great Britain in 1850— 53 and for the next two years was mis¬ sionary in Jamaica under the protection of the United Presbyterian Church of Scotland. From 1855 to 1865 and again from 1869 to 1881 he was pastor of Shiloh Presbyterian Church in New York. In 1865-69 he held a pastorate in Washington, D. C. In 1881 he was made Min¬

ister and Counsel-General to Liberia, and died within a few months after his arrival in that republic.

GARNET. See Gems; Mineral Produc¬ tion of the United States.

GARNETT, James Mercer, American ed- ucator: b Aldie, Va., 24 April 1840; d. Balti- more, Md., 18 Feb. 1916. He was graduated at th.e.Un)versity of Virginia in 1859. He served with the Confederate army

during the Civil

• aFin/A a caPtain of artillery. Dur¬

ing 1869-70 he studied in Berlin and Leipzig, and in 1870 was appointed president of Saint

• j f AnnaP°fis, which post he occu-

*SedTT- 10 years. Following this he taught at the University of Virginia and the Woman's College in Baltimore. He was a former presi¬ dent of the American Philological Association, and vice-president of the Modern Language Association. For many years he was a mem- heJ °1 fhe University Club of Baltimore. He edited 'Selections in English Prose> (1891) **

??QoopUi)LlshJed1ˆ!Tran.slation of Beowulf > (1882 ; 6th ed., 1900) ; a literal version in metre resembling the original; 'Elene and Other Anglo-Saxon Poems) (1889-1900) ; and a 'His¬ tory of the University of Virginia' (1901).

... GARNETT, Richard, English poet and iq« rijn : b. Lichfield, Staffordshire, 27 Feb. 1835; d. London, 13 April 1906. He was ap¬ pointed in 1851 assistant in the printed book department of the British Museum, became su¬ perintendent of the reading-room in 1875, but lesigned in 1884 to devote himself more ex¬ clusively to the printing of the 'Museum Cata¬ logue, of which he had had charge from its commencement. He published 'Primula: a Book of Lyrics' (1858); 'Io in Egypt and Other Poems' (1859) ; 'Poems from the Ger- ovjnn U862) ; . 'Relics of Shelley) (1862); Idylls and Epigrams } (1869); 'Selections of Shelleys Poems > (1880); 'Letters' (1882);

Garlyle (1887); 'Life of Emerson' V Twillffht of the Gods' (1888); 'Life

zioo^f1 t0?o (1890) ; 'Iphigenia in Delphi' (1891); 'Poems' (1893); 'William Blake: Pamter and Poet' (1895); 'The Age of Dry- den (1895) ; 'One Hundred and Twenty- four Sonnets from Dante, Petrarch and Camo- (1896) ; 'Richmond on the Thames'

/ 1 ono \ ' fir1 e Edward Gibson Wakefield' (1898) ; 'History of Italian Literature' (1898) ; Essays in Librarianship and Bibliography' (1899) ; 'The Queen and Other Poems' (1901) • 'Essays of an Ex-Librarian' (1901) ; and, with Edmund Gosse, 'English Literature' (1903-04).

GARNETT, Kan., city and county-seat of Anderson County, on the Pottawattomie River, and on the Missouri Pacific and the Atchison' Topeka

and Santa Fe railroads, 45 miles north¬ west of Fort Scott. It has good educational institutions, including a United Presbyterian college; large manufactures of furniture, flour, lumber and cheese. It adopted the commission form of government in 1913. Pop. 2,334.

GARNIER, Jean Louis Charles, French architect: b. Paris, 6 Nov. 1825; d. 4 Aug. 1898 He was a pupil of Leviel and Lebas at the Beaux-Arts, won the Prix de Rome in 1848 with his design for a conservatory of arts and industries, traveled in Italy, Turkey and Greece, and in 1861 won the competitive prize for plans of the new Paris Opera. In 1863-74

he superintended the construction of this costly and important work, whose chief feature is its grand staircase, but which is by some thought to be overladen with accessories of painting and sculpture. In addition to this, his principal achievement, he designed buildings, public and private, at Paris and elsewhere. He was the author of (Travers les Arts) (1869) ; ˆ'habi¬ tation humaineP with Ammann (1892); and editor (Le nouvel Opera de Paris) (1876-81).

GARNIER, Marie Joseph Frangois, com¬ monly known as Francis, French explorer: b. Saint-Etienne, 25 July 1839; d. Hanoi, Tong- king, China, 2 Dec. 1873. He entered the French navy, served in the war with China in 1860-62 and became a civil officer in the newly- established colony of Cochin-China. In 1866 he was appointed to assist Capt. Doudart de Lagree in an exploring expedition which set out from the coast of Cambodia and proceeded through Yunnan to Shanghai, the purpose being to open a highway of trade. Gamier explored the river Mekong, and, on the death of Doudart de Lagree, assumed command of the expedition, which he brought successfully along the Yang- tse-kiang to Shanghai. The geographical so¬ cieties of France and Great Britain bestowed numerous honors upon him. He took part in the defense of Paris in 1870-71, and again un¬ dertook explorations in China. The governor of Cochin-China empowered him to negotiate a treaty with the viceroy of Tongking. Upon the refusal of the viceroy to open negotiations, Gamier captured Hanoi, the capital, and achieved further victories with a force of but 120. He was finally killed in an ambush. His (Voyage d'Exploration en Indo-Chine pendant 1866-68) (1873) is a notable book.

GARNIERITE, a green, amorphous min¬ eral, one of the most important

ores of nickel. It is a hydrous silicate of nickel and magne¬ sium, the ratio of the two metals varying widely. It is soft and very brittle and has a specific gravity of 2.3 to 2.8. It is extensively mined in New Caledonia and also occurs in large quantities in Douglas County, Ore., and Jackson County, N. C. It was named after the French geologist, Gamier.

GARNISHMENT, in law, a process by which a third person, in whose possession the effects of the defendant are attached, is warned not to turn over such effects to the defendant, but to appear in court and give information. This process is controlled by statute in the States where it exists, and the demands of the statutes must be fully met by any plaintiff seeking to make use of the process. A cor¬ poration's debts may not be garnisheed ; neither may the process be invoked to inter¬ fere with a Federal court's judgment. The process is called in some States trustee process, in others factorizing, and in still others attach¬ ment, the more general title. The third party, who is known as the garnishee, is liable for only such property as is not encumbered by trusts and may be delivered by the officer serv¬ ing said process. Virtually, the process is a secondary suit brought by the suing creditor against the third party, or garnishee, the cred¬ itor claiming the rights of the defendant in the primary action. Consult Rood on Garnish¬ ment (1896). See Attachment; Replevin.

*GAROFALO, ga-ro'fa-ld, Benvenuto (orig¬ inally Benvenuto Tisi da Garofalo), Italian painter: b. Ferrara, 1481; d. there, 6 Sept. 1559. In this city and in Cremona he cultivated his talents for painting; but the masterpieces of art in Rome exercised the greatest influence upon him. In the year 1505 he is said to have returned to Rome, and to have formed a very close intimacy with Raphael, who often made use of his assistance. He afterward painted for Alfonso I, in his native city. Garofalo's works show the influence of all the schools, particularly of the Lombard, and still more so of Raphael's, whom he surpassed in coloring. Most of his works are at Rome. Several o*f them, however, are in the galleries of Vienna and Dresden.*

GAROFALO, Raffaele, Baron, Italian criminologist: b. Naples, 1852. He received his education at the University of Naples, became president of the Ferrara Civil Court, subse¬ quently served as justice of the Naples Court of Appeals and finally became professor of criminal procedure and law at the University of Naples. He also prepared and edited ma¬ terial for a new code of procedure. He pub¬ lished Griminologia : studio sul delitto e sulla teoria della repressione) (1885; Eng. trans., by Millar 1914), and (Riforma della procedura penale in Italia) (1889).

GARONNE (Lat. Garumna), a river of southwestern France, the chief one of that sec¬ tion, rising in the Pyrenees, at the foot of Mount Maladetta, in

the Val d'Aran, within the Spanish border. It enters France at a dis¬ tance of 26 miles from its mouth. The Garonne flows in a general northeasterly direction through the department of Haute-Garonne to Toulouse, whence it proceeds in a northwesterly course. Some 20 miles below Bordeaux it forms a junction with the Dordogne; it then takes the name Gironde, and enters the Atlantic Ocean by an estuary of 50 miles in length. The complete length of the river is about 400 miles. Ocean-going steamers may ascend to Bordeaux, and the river is navigable to Toulouse and be¬ yond. From Toulouse the Canal du Midi ex¬ tends to the Mediterranean. Several destruc¬ tive floods have taken place, that of 1875 hav¬ ing caused special damage. With its 32 tributaries the Garonne offers a system of waterways navigable for more than 1,400 miles, — a total exceeding that afforded by any other French stream. The total drainage area ap¬ proaches 38,000 square miles.

GARRARD, Kenner, American soldier : b. Cincinnati, Ohio, 1830; d. there, 15 May 1879. He was graduated from the United States Mil¬ itary Academy in 1851, was made brevet second lieutenant in the artillery, but in 1852 was trans¬ ferred to the dragoons, and after service, largely in the Northwest, was made captain of cavalry in 1861. During the early part of the Civil War he was in the commissary-general's office at Washington, and in 1861-62 commandant at West Point. In September 1862 he was com¬ missioned colonel of the 146th New York Vol¬ unteers, which he commanded at Fredericks¬ burg, Chancellorsville and Gettysburg. For services in the last-named battle he was bre- vetted lieutenant-colonel. In 1863 he was pro¬ moted brigadier-general of the United States

*olrniteei*5, and afterward he participated in the combat at Rappahannock Station and the Mine Run operations.. He took part, also, in the invasion of Georgia, was brevetted colonel tor services in the expedition against Coving¬ ton, Ga and from December 1864 to July 1865 commanded the second division of the 16th abfny corps. He distinguished himself by his efficiency in the battle before Nashville and in the opei ations against Mobile; led the storming*

iqacn111 w j finally captured Blakely (9 April 1865); and was in command of the district of Mobile in August-September 1865. Mustered out of the volunteer service in August 1865, he was assistant inspector-general of the Depart¬ ment of the Missouri in 1866, and in November 1866

resigned from the army, being at that time major, with the brevet of major-general for gallant and meritorious services in the field during the Rebellion.

GARRETT, Alexander Charles, American Protestant Episcopal bishop : b. Ballymot County Sligo, Ireland, 4 Nov. 1832. He was graduated from Trinity College, Dublin, in 1855; was oidained priest in 1857 ; held the curacy of East Worldham, Hampshire, in 1856-59; was a missionary in British Columbia in 1859-69; rector Saint James', San Francisco, in 1870-72' and dean of Trinity Cathedral, Omaha, 1872-74. In 1874 he became missionary bishop of north¬ ern Texas, and subsequently bishop of Dallas. His publications include

(1875) .

GARRETT, Edmund Henry, American artist and author: b. Albany, N. Y., 19 Oct. 1853. Pupil of Laurens, Boulanger and Le- febvre. He has exhibited at the principal ex¬ hibitions in America and the Paris Salon. Medal, Boston 1890; was member jury, Saint Louis Exposition. He has published Eliza¬ bethan Songs (1891) ; (Victorian Songs**

(1895); (Three Heroines of New England Romance (1894) ; (Romance and Reality of the Puritan Coast* (1897); (The Pilgrim Shore* (1900); translation of Merimee's Carmen* (1896); (Flowers of Fancy*; (Roses of Romance.* He has received recognition in Italy for services to the Latin tongue.*

GARRETT-ANDERSON, Mrs. Elizabeth,

*first English woman doctor: b. London, 1836; d. Aldeburgh, Suffolk, 17 Dec. 1917. She was one of the pioneers of that phase of the move¬ ment for the ˆemancipation** of women which aimed at throwing open to them the doors of the medical profession. Her attention was at¬ tracted to medicine by Miss Elizabeth Black- well (q.v.), an Englishwoman who after many fruitless attempts was permitted to graduate M.D. of the University of Geneva, Beaver Falls, Pa. Miss Garrett, however, was the first woman to secure an English diploma. She began her medical studies in 1860, despite the fact that there was no school (in Eng¬ land) where she could be received, and no ex¬ amining body willing to admit her to its ex¬ aminations.. The male students of Middlesex Hospital in London presented a memorial against the admission of women, and Miss Garrett was barred from that and other hos¬ pitals. Eventually the Society of Apothe¬ caries authorized her to get her education*

privately from teachers of recognized medical schools, and finally gave her

the desired quali¬ fication of L.S.A. in 1865, this being a genuine doctor s degree. She opened a dispensary for poor women and children in Marylebone, Lon¬ don, in 1866. Suddenly the Society of Apothe¬ caries adopted a new rule which refused recog- mtion of ceitificates granted for private studies, which made Miss Garrett's diploma void. She went to Paris, passed the examinations and

*ˆrneTd t?0'7nngiˆan(ˆ Wˆfi an M D. degree in 18/a In 1870 she became a candidate at the London school board election, and was re¬ turned at the head of the poll for Marylebone, where her dispensary developed into the «New Hospital for Women and Children** in Euston road She married in 1871. In 1874 she as- sisted m the establishment of the London School, of Medicine for Women, in conjunc¬ tion with her hospital of 26 beds. But the General Medical Council of England stipu¬ lated that only a general hospital of 150 beds could be recognized as adequate for teaching purposes. After three years of struggle and appeal, an alliance was formed between the Women's School of Medicine and the Royal Free Hospital in Gray's-in-road, which met the offidal requirements. The strenuous efforts of the devoted little band of women <(would-be doctors** were rewarded in 1876 by an act of Parliament enabling British examining bodies to include women. Until 1892 Mrs. Garrett- Anderson was the only female member of the British. Medical Association; in that year all restrictions were removed. Mrs. Garrett- An¬ derson was lecturer on medicine at the London School for Women for 23 years, and for over 24 years she was senior physician of the New Hospital for Women. In 1908 she was elected mayor of Aldeburgh, the first woman in Eng¬ land to receive that civic honor. Her son, Sir Alan Garrett-Anderson, succeeded Sir Eric Geddes as Controller of the Navy in August 1917 ; her daughter, also a doctor, was head of a military hospital in the European War.*

GARRETT BIBLICAL INSTITUTE,

the sec

18 editors and 120 missionaries. It has not only prepared men for the Methodist ministry, but its men are serving in the Congregational, Pres¬ byterian, Protestant Episcopal, Lutheran, Men- nonite and other churches. In 1912 the school was divided into a Graduate School primarily for college men; and the Diploma School for men with less than collegiate training. In 1915 the quarter system was adopted, September

being the only month when the seminary is not in session. In 1917 the first units of a new plant were erected which will ultimately cost a million dollars. The seminary owns con¬ siderable property in the city of Chicago. It has an endowment of over $948,000 and a library of 51,612 volumes.

GARRICK, David, English actor: b. Here¬ ford, England, 19 Feb. 1717; d. London, 20 Jan. 1779. His grandfather was a French refugee, his father a captain in the army. He was edu¬ cated at the grammar school at Lichfield. He gave an early proof of his dramatic tendency by inducing his school-fellows to act the (Recruit¬ ing Officer,) in which he himself took the part of Sergeant Kite, being then only 12 years of age. Later he was placed with a brother under Dr. Samuel Johnson. In 1741 he joined Gif-fard's company at Ipswich, where under the name of Lyddal he played with uniform suc¬ cess.

At this time the stages of the metropolis were but indifferently supplied with leading per¬ formers, so that when Giffard, who was man¬ ager of a threatre in Goodman's-fields, intro¬ duced his accomplished recruit there, 19 Oct. 1741, the effect was immediate and decisive. He judiciously chose the part of Richard III, which did not require that dignity of person in which he was deficient, while it gave him scope for all the strong marking of character and changes of passion in which his principal excellence consisted. He at the same time adopted a natural mode of recitation, which was a daring innovation on the part of a new performer before audiences accustomed to the artificial declamation of the school which preceded him. He afterward visited Dublin, where his success was even greater than in the metropolis, and in 1745 became joint manager with Sheridan of a theatre there. In 1746 he was engaged for the season at Covent Garden, and at its close purchased Drury Lane, and opened it 15 Sept. 1747, with the (Merchant of Venice,) to which Dr. Johnson wrote a pro¬ logue for the occasion. This period formed an era in the English stage, from which may be dated a comparative revival of Shakespeare, and a reform both in the conduct and license of the drama. In 1749 he married Eva Marie Violette (1724-1822), and his married life seems to have been happy. The next year (1750) he and Mrs. Bellamy were playing (Romeo and Juliet) at Drury Lane, while Barry and Mrs. Cibber were giving the same play at Covent Garden; but the Covent Garden opposition failed, and it has been truly said of Garrick that the remainder of his theatrical career was an uninterrupted series of successes that brought enduring prosperity. He had written, while an actor, his farces of (The Lying Valet) ; (Lethe, } and (Miss in Her Teens) ; and in 1766 he composed, jointly with Colman, the excellent comedy of (The Clandestine Marriage.) The year 1769 was signalized by the famous Strat¬ ford jubilee — a striking proof of his enthusiasm for Shakespeare. It occupied three days at Stratford, and its representation at the theatre lasted for 92 nights. The last part which he

performed was Don Felix in (The Wonder,) for the benefit of the theatrical fund (10 June 1776). At the conclusion of the play he ad¬ dressed a brief farewell to the audience.. The general feeling with which this was delivered

and received rendered it truly impressive. His remains were interred in Westminster Abbey, his funeral being attended by a numerous as¬ semblage of rank and talent. As an actor Gar¬ rick has rarely been equaled for truth, nature and variety and facility of expression, for which his countenance appears to have been admirably adapted. Expression and the language of pas¬ sion formed his great strength, as he was equaled by many of his contemporaries in the enunciation of calm sentimental and poetical declamation. His literary talents were re¬ spectable, but not eminent; besides the pieces already mentioned he wrote some epigrams, a great number of prologues and epilogues, and a few dramatic interludes, and made many and sometimes judicious alterations of old plays. A collection of his works was published in London (1768-98), and his correspondence 1831-32. Consult Knight, (Life of David Gar- rick) (London 1894) ; Parsons, (Garrick and his Circle) (Boston 1907).

GARRIGAN, Philip Joseph, American Ro¬ man Catholic prelate: b. Cavan, Ireland, 8 Sept. 1840; d. 14 Oct. 1919. When he was very young the family came to America and settled in Mas¬ sachusetts and in the schools of that State he received his elementary education. He after¬ ward studied at Saint Charles' College, Mary¬ land, later taking an ecclesiastical course at Saint Joseph's Seminary, Troy, N. Y., where on 10 June 1870 he was ordained priest. He was then appointed assistant in Saint John's Church, Worcester, Mass. In 1873 he became vice-president of the Troy Seminary and after three years was recalled to the diocese of Springfield. In 1888 he was chosen vice-rector of the Catholic University, Washington, D. C., and continued to hold the vice-rectorship until 21 March 1902, when Pope Leo XIII selected him for the newly-created episcopal see of Sioux City. He was consecrated bishop at Springfield, Mass., 25 May 1902.

GARRISON, George Pierce, American historical scholar : b. Carrollton, Ga., 19 Dec. 1853. He was educated at Sewanee College, Tennessee, and the universities of Edinburgh and Chicago ; became instructor in English and history in the University of Texas in 1884, assist¬ ant professor of history in 1888 and professor in 1897. He has published (The Civil Govern¬ ment of Texas> (1898), etc.

GARRISON, Lindley Miller, American lawyer and cabinet officer : b. Camden, N. J., 28 Nov. 1864. He was educated at the Protestant Episcopal Academy of Philadelphia, at Phillips Exeter Academy and at Harvard University. He studied law in the offices of Redding, Jones and Carson, Philadelphia, and was admitted to the Pennsylvania bar in 1886. In 1888

he was admitted to the New Jersey bar and practised at Camden, N. J., until December 1898, when he became member of the firm of Garrison, Mc¬ Manus and Enright of Jersey City. From 1904 to 1913 he was vice-chancellor of New Jersey. On 5 March 1913 he became Secretary of War in the cabinet of President Wilson. On 10 Feb. 1916 he resigned his cabinet post and has since been a member of the law firm of Hornblower, Miller, Garrison and Potter of New York.

GARRISON, William Lloyd, American re¬ former: b. in Newburyport, Mass., 12 Dec. 1805; d. New York, 24 May 1879. He was

appi enticed to a shoemaker, but eventually be¬ came a compositor on the Newburyport Herald, an occupation which suited his taste; he soon made himself master of the mechanical part of the business, and when only 16 or 17 began to write for the Herald. His contributions, which were anonymous, were favorably re¬ ceived, and he soon commenced to send articles to the Salem Gazette and other papers, drawing the attention of political circles by a series of articles under the signature Aristides, with the view of removing the almost universal apathy on the subject of slavery. In 1824 he became editor of the Herald, and some of Whit¬ tier s earliest poems were accepted by him, while their author was yet unknown to fame. In 1827 he became editor of the National Phi¬ lanthropist, the first American temperance journal, and afterward of a journal in sup¬ port Of the election of John Quincy Adams. With Mr. Lundy, a Quaker, he then started at Baltimore the paper called the Genius of Uni¬ versal Emancipation (1829). The vigorous ex¬ pression of his anti-slavery views in this last paper led to his imprisonment for libel, from which he was released by Mr. Tappan, a New York merchant, who paid his fine. He then prepared a series of emancipation lectures, sub¬ sequently delivered in New York and other places. He returned to Boston, and in 1831 started The Liberator, without capital or sub¬ scribers, a paper published weekly with the aid of one assistant and a negro boy, and with which his name is inseparably associated, and which he carried on for 35 years, until slavery was abolished in the United States. In 1832 appeared his (Thoughts on African Coloniza¬ tionˆ and in the same year he established the American Anti-Slavery Society. For several years the mail brought hundreds of letters to Garrison, threatening his assassination if he did not discontinue The Liberator; the legislature of Georgia offered a reward of $5,000 to any one who should prosecute and bring him to conviction in accordance with the

laws of that State ; in 1835 he was severely handled by a Boston mob, and the mayor of that city was constantly appealed to from the South to sup¬ press his paper. In spite of all, he successfully persevered. In 1833 he visited Great Britain. On his return the results of his conferences with English emancipators were seen, to a limited extent, in a platform for the American Anti-Slavery Society, founded in Philadelphia toward the close of that year. He went to England again, in the furtherance of his anti¬ slavery opinions, in 1846 and 1848. The di¬ verging views of the anti-slavery party, as to whether a political platform should be adopted, and as to the voting and speaking of women, rent the body for a time, but on 1 Jan. 1863 Lincoln's proclamation of freedom to the slaves as a military measure placed the civil struggle on an anti-slavery basis. In 1865, when Garrison's labors had been completely success¬ ful, and after the total abolition of slavery in the United States, his friends presented him with the sum of $30,000 as a memorial of his services.

A bronze statue has been erected to his mem¬ ory in Boston. Some (Sonnets and Other Poems by him were published in 1847, and Selections from Writings and Speeches) in 1852. Consult Johnson, William Lloyd Garri¬*

son ; (1882); (William Lloyd Garrison, the

°j Life, } by his children (1885—

An j .an(P°ems to his memory by both Whittier and Lowell. The reformer's charac¬ ter, as revealed in the accounts of his life, shows his great humanitarian schemes to have been the inevitable outcome of a sensitive con¬ science, a humane spirit and an overpowering sense of justice. Later biographies are those by Swift, L. (Philadelphia 1911), and Chap¬ man, I. J. (New York 1913).*

GARROD, Sir Alfred Baring, English physician: b. Ipswich, 1819; d. 1907. He was educated at University College and at the Uni¬ versity of London. In 1847 he became assist¬ ant physician at the hospital of University Col¬ lege, and four years later became physician and professor of therapeutics there. He be¬ came physician to King's College Hospital in 1863 and consulting physician there in 1874. In 1856 he became Fellow of the Royal College of Physicians and two years later of the Royal Society of Great Britain. In 1896 he was nom¬ inated physician extraordinary to Queen Vic- toria. He made original investigations on the pathology of gout and prescribed lithia as a remedy. His (Essentials of Materia Medica and Therapeutics, > which first appeared in 1885, went through very many editions and is in high favor as a textbook.

GARROTE, ' a mode of punishment m Spain by strangulation, the victim being placed on a stool with a post or stake (Spanish, garrote) behind, to which is affixed an iron collar with a screw ; this collar is made to clasp the neck of the criminal, and drawn tighter by means of the screw till life becomes extinct. This word, with the spelling garrotte, has of late years become naturalized in Great Britain and the United States as a term for a species of robbery effected by suddenly spring¬ ing upon and throttling the victim, and strip¬ ping him of his property. A law was passed in 1863 to do away with this practice; and it proved efficient. Consult Andrews, W., by¬ gone Punishments) (London 1899).

GARRUPA, ga-roo'pa, the Spanish name, in the West Indian region adopted as generic, and also corrupted into ˆgrouper® of the great black jewfish (Garrupa nigrita). See Jew- fish.

GARSHIN, gar'shen, Vsevolod Mikhailo¬ vich, Russian man of letters; b. Yekaterinoslav, 2 Feb. 1855, of an ancient noble family; d. 1888. His childhood was not at all joyous; he was surrounded by unhappiness, his earliest antici¬ pations of life were dark. This state of pes¬ simism in a child was aggravated by his un¬ usual precocity. At the age of seven he read Hugo's (Notre-Dame de Paris) and his youth¬ ful, soul was strangely impressed and his only desire was to perish in war. Therefore he tried to join the volunteer corps for Serbia (Serbo-Turkish War 1876), but, not being of mili¬ tary age, he was not allowed to go. When next year, however, Russia declared war on Turkey he threw his examination papers in a gym¬ nasium where he was studying and immediately joined Bolkousi's regiment. In a battle on 11 Aug. 1877 he distinguished himself for bravery, receiving a serious wound in the leg. After the war he studied philology at the University

of Saint Petersburg and wrote his war memo¬ ries under the title (Four Days, published in 1877 and attracting immediate attention. But his soul was growing darker and darker and it was difficult for the best psychi¬ atrists to establish in him where the high de¬ gree of his soul ended and where insanity began. After long wanderings he went to Yasnaya Polyana where Count Leo Tolstoi re¬ ceived him amiably and spent a whole night with him in a discussion as to ((how to make all mankind happy.® Partly Tolstoi's powerful logic and partly Garshin's happy marriage con¬ tributed to an improvement of the author's mental state, but in 1888 he jumped to death from the fourth floor of a building. The un¬ usually human views on life and the necessity for struggle against evil as expressed in his (Four*

Days) are in striking contrast to the author's mad wish for his own death. He con¬ siders the extermination of men by men in wars as most hopelessly vulgar and cruel, while he, himself, sought salvation in a war, justifying his action with his desire to free the brother- Serbians from the barbarian Turkish yoke. In his (Hodozhniki) (<(Artists®) he, as a very subtle critic and admirer of arts, demonstrates that a moral-sensitive man cannot peacefully abandon himself to the aesthetic enthusiasm of creation in art when he is so cruelly surrounded by the suffering of mankind. His ever-burning wish to exterminate all the evil from the earth and his poetic thoughts about the ideal life have found expression in his remarkable story (The Red Flower, which is in some measure the author's autobiography. However, in the depth of his heart and soul Garshin did not believe in the triumph of good over evil, nor that the very annihilation of evil could ever constitute man's complete happiness. His other works (From the Diary of the Private Ivanov,* At¬ tala Princeps,* (Nadezhda Nikolaevna,* Sig¬ nal, } (The Proud Aggei,* etc., show mani¬ festly the author's powerful talent and bring home to the reader his passionate humane feel¬ ing and the softness and sincerity of his soul.*

GARSTANG, John, English archaeologist: b. Blackburn, 1876. He was educated at Jesus College, Oxford, where he was graduated in 1899. Since 1897 he has been engaged in archaeological research ; conducted excavations on Roman sites in Britain at Ribchester, Melan- dra Castle, Richborough, etc. ; in Egypt at Abydos, Mahasna, Bet Khallaf, Beni-Hassan, Esna and elsewhere. He conducted an archaeological expedition in Asia Minor and North Syria in 1907, and excavations on the Hittite site of Sakje-Geuzi in Asia Minor in 1908 and 1911. He was engaged on the con¬ tinuous excavation of ancient Meroe from 1909 to 1914, and since February 1915 has been on special service in France. He published (Short History of Ancient Egypt ; (The Land of the Hittites) (1911) ; (On Lucian's De Dea Syria) (1913), and various reports.*

GARTER, Order of the, the highest order of knighthood in England. Two stories are told of its origin. The first is that Richard I at the siege of Acre caused some of his officers to tie leather thongs around their legs as a dis¬ tinction. The origin of the order is, however, generally attributed to Edward III, and the legend runs that the Countess of Salisbury hav¬

ing dropped her garter while dancing, the king restored it after putting it round his own leg, amid the jesting of courtiers, with the words, Honi soit qui mal y pense — <(Shame be to him who thinks evil of it.® The date of the founda¬ tion or restoration by Edward III of the order is not exactly determined; 1344 is given by Froissart, while other authorities, founding on the statutes of the order, assign it to 1350. In the former year it appears that a festival was held, and a society or company instituted, called the

Company of Saint George, with the design of furnishing soldiers of fortune to assist King Edward in asserting his claim to the crown of France, but it seems probable that the organiza¬ tion was completed as an order of chivalry in 1350. The order is said to have been founded in honor of the Holy Trinity, the Virgin Mary, Saint Edward the Confessor and Saint George of Cappadocia, the last being its special patron. Until the reign of Edward VI its common title was the Order of Saint George, which it still bears, beside that of the Garter. The original number of knights, 26, including the sovereign, its permanent head, is still retained, except that since 1786 princes of the blood are admitted as supernumerary members. The order is fre¬ quently conferred on foreign sovereigns. The vestures and insignia of the order are : The emblem of the order, the garter, a dark-blue ribbon edged with gold, bearing the motto, and with a buckle and pendant of gold richly chased ; worn on the left leg below the knee; the mantle of blue velvet, the length of the train distin¬ guishing the king ; the surcoat and hood of crimson velvet, the hat of black velvet, with plume of white ostrich feathers, having in the centre a tuft of black heron's feathers, and fas¬ tened to the hat with a band of diamonds ; the collar of gold consisting of 26 pieces, each in the form of a garter, with the badge of the order, called the George, pendent from it — a figure of Saint George on horse-back fighting the dragon — the lesser George being worn on a broad blue ribbon over the left shoulder. The star, formerly only a cross, is of silver, and consists of eight points, with the cross of Saint George in the centre, encircled by the garter. A star is worn by the knights on the left side when not in the dress of the order. The officers of the order are the prelate, the bishop of Win¬ chester; the chancellor, the bishop of Oxford; the registrar, dean of Windsor; the garter king-of-arms, and the usher of the black rod. There are a dean and 12 canons, and each knight has a knight-pensioner.

GARTER KING-OF-ARMS, the head of the heraldic establishment in England, consist¬ ing of three kings-of-arms — Garter, Claren- cieux and Norroy, and the herald of the mili¬ tary order of the Garter. The office of garter king-of-arms was instituted by Henry V in 1417. The duties of the garter king-of- arms are principally to grant heraldic sup¬ porters, to arrange funerals and to present the order of the Garter to foreign princes. The Garter is a member of the Heralds' College.

GARTER-SNAKE, or GRASS-SNAKE.

Names given in the United States to several small striped harmless serpents of the genus Eutcenia, especially E. sirtalis, which abounds in all temperate parts of the continent from Guate¬ mala to Canada, and is exceedingly variable.

Ihis species varies in color from light-green through olivaceous to black, marked by three stiipes but only the one along the spine is well denned, those on the sides being often obscure, broken or altogether absent. The spaces be¬ tween these may be spotted in double rows, or not at all ; and the belly, usually light greenish- blue, may be darker, almost to blackness. Some "varieties have a metallic lustre. The ordinary eastern specimens are olive-brown, with dull spots and stripes. It is everywhere abundant, frequenting grassy meadows, farm-fields, road¬ sides and gardens, where it searches for mice as the principal part of its food, but it eats in¬ sects, small toads and frogs, and the eggs and young of birds vvhose nests are on or near the ground, for it is not a bold climber. It is abroad by day as well as by night, and itself forms the prey of such larger snakes as the blacksnake and king-snake. In the West it eats all the young gophers and ground-squirrels it can get, and in these habits commends itself to the protection of agriculturists. These snakes are extremely active and swift, as they must be not only to capture their prey, but to avoid being caught by the larger blacksnakes, king-snakes and the like which pursue them. They swim well and hide clearly in water, and in many habits, as in structure, resemble the water-snakes (Natrix) ; and like them they are pugnacious, and quick to bite when handled, but their teeth are minute and the bite, of course, quite harmless. Their abundance is due to these qualities, not only, but even more to their great fecundity, 25 to 40 young in a season not being an uncommon product for one mother, and an instance of 80 is recorded. These are born alive, in early warm weather, and are able to care for themselves from the start, but the mother remains near them and protects them vigorously for some time. When cold weather approaches, these serpents seek under¬ ground retreats, such as old gopher-holes, and there often gather in large numbers which hibernate entwined together in a mass; mating takes place at this season. The skin is usually shed in the spring, by creeping through some crevice and scraping off the old hide, which peels backward from the head.

Of the score or more of species the greater number are Mexican and Central American ; and some are known by very few specimens. The beautiful slender ribbon-snake (E . saurita) of the Southern States is chocolate in color, with three narrow distinct stripes, and has highly aquatic habits. The common species of the plains region (E . radix) is peculiar in its fondness for fish, catching them constantly in the pools and seizing every dead one cast on shore. A similar fish-loving species is the sub¬ tropical E. macrostemma, which appears in the talons of the eagle in the coat of arms of Mexico. The common species of California is E.

elegans. In the southern part of that State occurs a rare form (E . inf emails), sometimes wholly black, save a yellowish throat. For the identification of the various species of this wholly American group the reader should con¬ sult Cope's

GARVEY, Eugene A., American Roman Catholic bishop : b. Carbondale, Pa., 6 Oct. 1845 ;

d. 22 Oct. 1920. He attended Saint Charles' College, Ellicott City, Md., and was graduated in theology from Saint Charles' Seminary, Phila¬ delphia, Pa. He was assistant pastor at Hawley, Pa, 1870; pastor at Athens, Pa, 1871; Wilhnmsport, Pa, 1871-99, and at Pittston, Pa, 1899-1901 ; when he was elected bishop of Al¬ toona, Pa, and was consecrated 8 Sept. 1901.

GARVIE, Alfred Ernest, British Congre¬ gational clergymen: b. Zyrardow, Russian Po¬ land, 1861. He was the son of a Scottish flax merchant, and received his education at George Watson's College, Edinburgh, Glasgow Univer¬ sity and Oxford. In 1893 he was called to Macduff Congregational Church, and later to Montrose Congregational Church. From 1903- 07 he was engaged in educational work as pro¬ fessor at Hackney and New colleges, and later as principal of the latter institution. He was elected president of the Congregational Union of Scotland in 1902. His publications include (1899) ; (The Gospel for To-day) (1904) ; (Religious Education (1906) ; (Studies in the Inner Life of Jesus> (1908) ; ˆHandbook of Christian Apologetics (1913). He also wrote commentaries on Romans and Saint Luke, and edited the (Westminster New Testament. >*

GARY, Elbert Henry, American financier: b. Wheaton, Ill, 8 Oct. 1846. He was graduated at the law school of Chicago University in 1867; admitted to the bar of the Illinois Su¬ preme Court the same year, and to that of the United States Supreme Court in 1882. After serving as first mayor of the city of Wheaton for three terms, and as county judge of Du¬ page County for two terms, he applied him¬ self to the practice of corporation law in Chicago, and became general counsel for a large number of railroad and industrial corpo¬ rations. It was largely through his legal work that his talents as an organizer of large indus¬ tries first came into recognition. He retired from law practice in 1898 to become president of the Federal Steel Company, which in 1901 was merged into the United States Steel Cor¬ poration, he then being chosen chairman of its finance committee, to which office was added that of chairman of the board of directors. The city of Gary, Ind, which the United States Steel . Corporation built at the foot of Lake Michigan, a few miles out of Chicago, was named after him.

GARY, Lake County, Ind, the seat of the largest steel industry in the United States, and the largest as well as youngest city in the northwestern part of the State, is situated at the extreme southern end of Lake Michigan, 10 miles east of the Indiana-Illinois State line, 26 miles southeast of the heart of Chicago and 163 miles northwest of Indianapolis. The city of Gary was founded in April 1906, when the site was an almost impenetrable wilderness of swamps and sand dunes. The population in 1910, according to the Federal census, was 16,802; in 1920, 56,378. The city limits em¬ brace a territory extending along the shore of Lake Michigan a d:stance of seven miles and extending inland a distance of five and three- fourths miles. The general elevation of the site occupied by the city is 30 feet above the lake, the entire site being covered with a layer

of fine sand to a depth of 80 feet, once form¬ ing the bed of Lake Michigan when that body of water extended four miles south of the present shore line. The site of the city is traversed from east to west by two rivers, the Grand and Little Calumet, both of them sus¬ ceptible of being converted into vast inner lake harbors, having 28 miles of water frontage. Gary has 70 miles of improved streets, 100 miles of cement sidewalks, 60 miles of main and lateral sewers, 34 miles of electric street railway tracks, two interurban railway lines passing through the city, two other inter¬ urban lines entering the city and making it their terminus, with a total of 455 miles of tracks, seven trunk lines of steam railroads and two belt and terminal lines connecting the city directly with the 32 trunk line railroads entering the Chicago-Gary region. In addition there is a splendid harbor accommodating the largest ore vessels on the Great Lakes, con¬ structed by the Indiana Steel Company — (a subsidiary of the United States Steel Corpo¬ ration) and used in conveying iron ores from the northern mines to the Gary furnaces and in carrying the steel and coke output of vast local industries to all parts of the United States and Canada reached by water trans¬ portation.

Equipment. — In 1916 the city of Gary pos¬ sessed seven banks with an aggregate capital of $575,000 ; surplus, $139,500 ; deposits, $4,- 230,000, 24 churches, three hospitals, a Young Men's Christian Association building costing $250,000, a public library building costing $65,- 000, two of the finest and largest public school buildings in the Middle West, aggregating in cost $475,000, three other schoolhouses cost¬ ing $150,000. Broadway, Fifth avenue and Washington street, the principal business streets of the city, are lined with handsome business blocks, Gary Theatre, banks, hotels and public build ngs, while the

residence streets and ave¬ nues are graced with hundreds of handsome homes and beautiful churches and schools, both public and parochial. The city is splendidly equipped with auto patrol and fire engines used by the metropolitan police force and the fire department of the city. Water for domestic purposes and drinking is drawn from Lake M'chigan in inexhaustible quantities, while all other public utilities, such as gas, electric lights and telephone service, are adequate for a city of 250,000 inhabitants.

Expenditures. — Gary was founded by the United States Steel Corporation, which, up to 31 Dec. 1916, had expended $85,000,000 in build¬ ing steel furnaces, coke ovens, rail mills, axle mills, merchant mills, sheet and tin plate plants, structural steel works, pumping stations, elec¬ trical power plants, benzol works, Portland cement works, ore docks, machine shops and foundries and a corporation hospital, which, when fully equipped, cost nearly half a mil¬ lion dollars. In addition to this expenditure, the corporation, through its subsidiary concerns, expended in five years the sum of $15,000,000 on the improvement of the city and in con¬ structing homes for its officials and employees. A further appropriation of $40,000,000 has been made by the steel corporation for extensions and improvements of its various local plants.

Industries of Gary. — In the year 1916 the various plants of the steel corporation and its

subsidiary companies are giving employment to 18,000 men. When fully completed, these plants are capable of giving employment to 40,000 men. The Gary Bolt and Screw Works, an independent industry, began operations in 1912, giving employment to 1,000 persons at the start and has since greatly extended its oper¬ ations. In the spring of 1912 the Baldwin Locomotive Company purchased a site adjacent to the city limits on the west. Other inde¬ pendent industries and fabricating plants are locating in Gary. During the first six years of its existence, the supply of houses in Gary for mill employees fell far short of the demand and thousands of the mill workers were forced to live in surrounding towns and cities. In 1911 nearly 1,000 homes were erected and more than

1.500 dwellings were planned for erection in 1912. The principal commercial artery of the city — Broadway — is 100 feet wide and five miles long. Fifth avenue, the principal east and west thoroughfare, is 80 feet wide and seven miles long. Both of these streets are improved their entire length. Within a radius of 10 miles from the intersection of Broadway and Fifth avenue there is a population of 120,000 people, largely supported by the manufacturing industries of the famous Calumet region, of which the city of Gary is the centre. The steel, cement, sheet and

tin¬ plate and coke oven industries of the city occupy seven miles of the lake front and also several miles of water front upon . the Grand Calumet River, which the Federal gov¬ ernment plans to convert into a great inner harbor, connecting with Lake Michigan at Gary, Indiana Harbor and South Chicago. The largest manufactory of Portland cement in the world, the Universal Portland Cement plant, with a daily capacity of 27,000 barrels and employing

2.500 men, is situated at Buffington, within the city limits of Gary, and is one of the subsidiary interests of the United States Steel Corporation. In the southern part of the city is located the Fairweight Scale plant, employing 500 men and covering nearly 20 acres of ground with its buildings and yards. The city hall, at the corner of Seventh avenue and Massachusetts street, would be a credit to a city of 250,000, while the new union station at Third avenue and Broadway, costing $250,000, is adequate to the comfort and needs of a city of 500,000 popu¬ lation. Although the city of Gary was only 10 years old in 1916 the assessed valuation of real estate aggregated a total of $28,000,000. The city of Gary through its park board has established a boulevard system. It will have a park on the lake front. The speeding-up of the steel and ancillary industries for war pur¬ poses brought about increased prosperity to Gary and added thousands to its population.

GARY PLAN IN EDUCATION. See

Education, Elementary.

GAS. See Critical Point; Gases, Kinetic Theory of; Gasometric Analysis; Liquefied Gases.

GAS, Natural. By recognized usage the term <(natural gasˆ has been restricted to the inflammable gases found accumulated in reser¬ voirs in the earth's crust — leaving the equally natural supplies of carbonic acid gas and of nitrogen to be given a more specific title. In

QAS

303

*j?5ˆPos*tion, various samples of natural gas diner very considerably, but its principal com¬ ponent is methane, or marsh gas (CH4), rang-*

*v*F • • Per cent ˆor Pennsylvania and*

\ est Virginia gas to 98 per cent in some of the gas produced in Oklahoma. In the Glenn nool (Oklahoma) gas, known as <(wet):> gas tiom its heavy

content of petroleum vapors, the components are methane, 39 per cent, and ethane, 61ˆ per cent. The gas at Dexter, Kan., has but lo per cent methane, and 83 per cent nitrogen. The combustion factor of the Pennsylvania and West Virginia gas is made up by 14 per cent of other hydrocarbons, chiefly ethane, and hydrogen. In add tion, natural gas contains from 2 to 5 per cent nitro¬ gen; up to 2 per cent of carbonic acid; up to ˆ of 1 per cent of carbonic oxide and up to 14 of 1 per cent of oxygen. Occasionally small quantities of helium are present; in one case 1.84 per cent. It has an average heating value of about 945 British thermal units per cubic foot at a pressure of four ounces per square foot, and a temperature of 60° F. At a greater pressure and at a higher temperature its heat¬ ing value is increased by about one unit for each higher degree of temperature, and two units for each added pound of pressure.

The accompanying table presents a com¬ parison of the principal types of natural gas with the other economic artificial illuminating and fuel gases.

ever there are hollows in which the pres¬ sure is less than its own, and only collects in considerable quantities where there is an im¬ permeable stratum of clay or rock to prevent further movement. In these hollows it ac¬ cumulates under varying pressures, depending upon their depth below the surface, the pres¬ sure haying a close relation to the weight per square inch of a column of water of the same eight , from which it is argued that the pres¬ sure found in natural gas reservoirs is derived from water forcing the gas out of a lower level. 1 he maximum pressures reported have been 1,700 pounds per square inch in Green County, Pa., and 1,260 pounds more recently at Midway, Cal.

Wells and Conditions of Strata.— There is a great variation in the depth of natural gas wells, owing to the diversity of the strata in which the product exists and the changing po¬ sition of the underlying rocks with reference to the general surface. Some natural vents have produced natural gas in considerable quantities and have proved the incentive for drilling down to the original reservoirs, from which the gaseous fluid was escaping. Other gas wells have been discovered in drilling wells for oil or salt brine. Some of the most im¬ portant gas fields have been located by expert geologists, who have traced out the summits of the anticlinals, or rock waves, for many miles from surface exposures of the strata.

Constituents

Average for Penna. and W. Virginia

Average for Ohio and Indiana

Average for New York

Average of Coal Gas

Average of Water Gas

Average of Producer Gas from Bit. Coal

Marsh gas (CH4) .

Other hydrocarbons .

Nitrogen .

Carbonic acid, CO2 .

Carbonic oxide, CO .

Hydrogen .

Hydrogen sulphide .

Oxygen .

Total .

Pounds in (a) 1,000 cubic ft .

Specific gravity, air being 1 .

B. T. U. per 1.000(b) cubic feet .

f

Per cent

80.85 14.00 4.60 .05 .40 .10 .00

Trace

Per cent

93.60 .30 3.60 .20 .50 1.50 .15 .15

Per cent

98.40 0.25 0.40 .00 0.95 .00 .00 .00

Per cent

40.00 4.00 2.05 .45 6.00 46.00 .00 1.50

Per cent

2.00 .00 2.00 4.00

45 . 50 45.00 .00 1.50

Per cent

2.05 .04 56.26 2.60 27.00 12.00 .00 .05

100.00

100.00

100.00

100 00

100.00

100.00

47.50

48.50

49. 10

33. 10

45.67

75.00

0.624

0.637

0.645

0.435

0.600

0.985

1,145,000

1,095,000

1,300,000

755,000

350,000

155,000

**'5°° cubic,fe£4 °f dry air at an atmospheric pressure of 14.7 pounds and at a temperature of 60° F. weighs 76.12 pounds and is a mechanical mixture of 23 parts of oxygen and 77 parts of nitrogen by weight.*

degree ˆ ˆ British thermal units, which indicate the heat necessary to raise 1 pound of pure water at 39° F. one

Natural gas is regarded as a form of bitu¬ men, closely related to petroleum, maltha and asphalt. It may be mentioned in passing that the asphalt which is continually rising on the lake at Trinidad is aerated by large bubbles of natural gas. Opinion is divided as to the origin of natural gas, but the majority favors the theory that it is the product of vegetable matter slowly decaying at a low temperature. As it is found only in sedimentary rocks, the theory prevails that it is the product of car¬ bonaceous matter deposited with those strata, although it is quite as likely to have been formed elsewhere, finding its way into those rocks because of their porous structure. Gas, because of its natural qualities, has a tend¬ ency to make its way for long distances wher-

The depth of weds varies from 250 to 3,000 feet, while their diameter varies from two inches up to eight inches ; their output, or open flow, varies from 500 cubic feet per day to 35,000,000 cubic feet per day; their shut in, or rock pressure, varies from 1 to 1,500 pounds to the square inch in extreme cases, while 300 to 400 pounds to the square inch and a volume of 1,000,000 cubic feet per day is considered a profitable commercial well. The greatest yield on record for any one well is 7,781,946,000 cubic feet in iy2 years, an average of 2,842.700 cubic feet per day for the entire period. This well is in Pennsylvania. It is down 3,000 feet tapping the Gordon sand. In 1915 it was still yielding 1,000',000 cubic feet per day. In many of the deeper wells, two or more reservoirs

of natural gas are often found. _ The cost varies from a few hundred dollars in the shal¬ low shale districts to $10,000 in the deep wells in West Virginia. All large wells are usually tubed and a packer set just above the gas sand; the top of the tubing is held by clamps attached to bolts that are anchored and a heavy gate valve attached, so that the well can be shut in and the gas held in the rock when not in use.

The reservoirs in which natural gas is usu¬ ally found stored when pierced by the drill are composed of porous sandstone or limestone. In some cases a limited quantity of the gas has been found in shales but this gas may be re¬ garded as having gradually accumulated from the underlying rock formation. Almost invari¬ ably the large reservoirs have been developed in the strata on or near the crests of the anti¬ clinal or rock waves, while petroleum has been generally collected on the lower horizon ; and frequently salt water is found at a still lower level. Sometimes, however, the gas fields are entirely isolated from the petroleum producing areas. There are three leading requisites neces¬ sary for the accumulation of natural gas in merchantable quantity. These are as follows :

1. An open or porous strata capable of stor¬ ing the gas under pressure, generally sand¬ stone or limestone.

2. A slate or shale covering of this porous strata to seal in the upper surface and the frac¬ tures of the strata saturated with natural gas.

3. A sufficient flexure or relief of the strata to enable the separation of the salt water and the petroleum from the natural gas, which is almost invariably found in the higher portion of the strata.

These gas reservoirs have been accumulating for ages the gas they contain.

Original Pressure. — The original pressure of natural gas reservoirs has been found in many cases equal to the hydrostatic balance, or, in other words, to the weight of a column of water equal to the vertical distance between the reservoir and the surface of the ground. Al¬ lowing 2.3 feet for each pound, or about 43 pounds to the 100 feet, a reservoir at a depth of 1,000 feet should show 430 pounds rock pressure per square inch. This hydrostatic pressure has been equalized to a certain extent by a large number of minute vents that have permitted the escape of the lighter hydrocar¬ bons to the surface. These vents are of com¬ mon occurrence throughout the Appalachian gas field from northwestern central New York to central Tennessee and along the great Cin¬ cinnati uplift from central Kentucky to north¬ ern Ontario.

These vents have during past ages allowed the gas to escape in immense quantities, amounting to unnumbered millions of cubic feet, so that the supplies from which we are now drawing are presumably but a small frac¬ tion of what has been produced in the earth.

Reserves of Natural Gas. — Many of the original natural gas fields have been practically exhausted and a large number of the produc¬ ing companies have had to seek new localities, where a fresh supply could be secured. This has been often accomplished by drilling deeper wells in more remote regions. The gas fields adjacent to Pittsburgh having been used up,

most of the supply for that city now comes from the deep natural gas sands of south¬ western Pennsylvania and West Virginia, dis¬ tant from 80 to 100 miles. The gas pressure in the original pool in northwestern Ohio is nearly exhausted. That of central Indiana has only about 15 per cent of the original pressure and volume remaining. The newly developed field in eastern central Ohio has recently sup¬ plied a large and increasing quantity to the in¬ habitants of that State. West Virginia has, during recent years, supplied a constantly in¬ creasing quantity of natural gas to Ohio and Pennsylvania. New York and Ohio have also been supplied by Pennsylvania. In all the natural gas fields it requires constant drilling of new wells and their connection with the main lines to keep up the supply, which is con¬ tinually being depleted. Owing to the decrease in pressure at the wells and the desire to de¬ liver large quantities of natural gas to distant consumers without increasing the size of the main lines, the companies have erected power¬ ful compressing plants in convenient localities. These plants are models of mechanical engi¬ neering skill. The compressors are, in many cases, operated by large internal combustion engines of from 500 to 1,500 horse power each. About nine cubic feet only of natural gas is required to develop one horse power ; and 1,000 cubic feet of natural gas at a pressure of 0 may be compressed to 270 pounds, by con¬ suming 33p3 cubic feet (or 3 l/s per cent), where very close to double this quantity is required if the natural gas be consumed under boilers and the steam used in condensing en¬ gines. The deep sand reservoirs in south¬ western and central Pennsylvania and those of West Virginia should keep up a fair supply for many years to come. The West Virginia field is estimated as good for 50 years at its present rate of utilization. What may result from the deeper drilling of wells in localities where structural conditions are favor¬ able is a problem for future determination. The Caddo field of Louisiana is regarded as the most extensive and prolific of all. Its utilization was begun only in 1913. The Cali¬ fornia field, developed in 1910, has not yet reached its maximum.

Occurrence, Geological Horizons, etc. —

In the United States the principal sources of natural gas are located on the west slope of the great Appalachian uplift, extending from New York through Pennsylvania and West Virginia to southern central Kentucky, with a considerable portion of southeastern Ohio, also along the northern portion of the great Cin¬ cinnati uplift in northwestern Ohio and cen¬ tral Indiana and southeastern Kansas. There has been recently developed an important nat¬ ural gas field in eastern central Ohio.

In California, Texas, Louisiana, Colorado, South Dakota and Alaska gas is found in geo¬ logically more recent rocks, but no attempt is here made to correlate the rocks of one field with those of another. In the Mississippi Val¬ ley to the eastward natural gas occurs almost universally in rocks of Palaeozoic Age, extend¬ ing from the highest Carboniferous down at least as far as the Trenton limestone, a distance of over 9,000 feet. The rocks vary greatly in thickness from place to place, so that no one

section can be regarded as typical of all parts the region. The 50 gas-bearing horizons known are composed of very different material, ranging from the coarser sandstones of the Upper Carboniferous and Catskill period to the finer sands of the Middle and Lower Devonian, he limy sands of the Silurian period, the crys- allme limestones of the Ordovician and the crystalline sands of the Cambrian period.

*So far as at present discovered there are five great gas fields in the United States, the Pennsylvania and West Virginia field; the Kansas field ; the Oklahoma field ; the Louisi- 'l*la an<^ tbe California field. During*

U15 two wells in Montana flowing 6,000,000 cubic feet per day were opened, and there bave j eei? promising developments in new grounds in Indiana, Kentucky, Oklahoma and Louisiana. There were, in 1915, 23 States m which some natural gas was produced, though the yield was notably large only in I9nC In all, the gas-yielding territory of the United States covers about 9,365 square miles of which some .10,600,000 acres are being ac¬ tively exploited by gas producers. The States that produce large quantities of natural gas, as Pennsylvania and West Virginia, distribute it to the adjoining States by a system of pipe lines, so that in some instances the natural gas consumed in a town or city is produced over

Pii i u es from Vhere i? is consumed. Thus Oklahoma and Kansas pipe gas into Missouri • Louisiana into Arkansas and Texas; Illinois into Indiana and Oklahoma into Arkansas.

In many localities the yield of gas is inci¬ dental to the production of petroleum, and the former has been frequently sacrificed for the more stable fuel. This is the case particularly in the Caddo field of Louisiana, where billions of feet of gas have been allowed to escape un¬ hindered. For some years open gas vents known as «roarers» were of interest only as a night spectacle when, having been ignited, their flames, a hundred feet in height, lighted up the surrounding country. It is a satisfaction to record that in most localities this waste has been checked. Another avenue of serious waste, when the totals are considered, is that which has occurred in boring for oil. This, too, has been overcome by sealing the gas sands with clayey mud, when they are encoun¬ tered in the search for oil.

Production of Natural Gas in the United States. — No other country enjoys the luxury of natural gas to the extent of the people of the United States. It is used in Canada and in a very limited way in England, Australia, Germany, Rumania, Galicia, Russia, Persia, In¬ dia, China and Japan, but all these countries combined use only 2 per cent of the known world's commercial production of this efficient and convenient fuel, leaving 98 per cent to be consumed by the people of the United States. The total value of the natural gas produced and sold since its introduction, commercially, in the United States, in 1872, up to the close of 1915 was $1,164,717,474. Assuming the average price of the last 25 years, 12 cents per 1,000 cubic feet, this value, should represent 9,705,978,950,- 000 cubic feet in amount. If it were possible to confine this immense quantity in a tank whose end was one square mile in area it would require to be 630 miles in length. Its

vol. 12 — 20

heating value would equal 945,000,000 tons of

coa{/ r?e as quantity seems, it is quite probable that it does not represent one-half of the actual quantity which has flowed from the earth s rocky reservoirs since the discovery of

j° 8um- The loss in developing petroleum helds has been so great that these figures, rep¬ resenting only that amount of gas which has been collected and sold on a commercial basis, give little idea of the actual evolution from the great gas reservoirs.

The volume of natural gas utilized in the United States in 1916 was greater by nearly 20 per cent than the record production of the pre¬ ceding year. Owing, however, to a reduction m the service price in some of the Western and Southern States, there was a slightly lower ratio (18.6 per cent) of increase in the value of the product. The yield amounted to 753,170,253

000 cubic feet (628,578,842,000 cubic feet in 1915) ?mdcxthe^lue t0 $120,227,468 ($101,312,381 in 1913) . 1 his sum may be better comprehended

in its true relation to the mineral wealth of the country, if it is recalled that it is $27,000,000 greater than the value of all the gold produced in the United States in the same year.

Among the several States, the largest pro¬ ducer was West Virginia, with 299,318,907,000 cubic feet ; followed in order by Pennsylvania

*^hr,L29'9,25'150'00(? cubic feet; Oklahoma, with *23,517,385,000 cubic feet; and Ohio, with 69,- 888,070,000 cubic feet. Louisiana, Kansas and fan for nia each recorded a production of about 32, 000,000,000 cubic feet. Nearly two-thirds of West Virginia's production was piped into other States for utilization; and Oklahoma disposed of one-third of its yield in the same way. Pennsylvania, Ohio and Kansas bought practi¬ cally all of this surplus, and New York bought a considerable share of Pennsylvania's output.*

The gas was produced by 7,697 operators, from 37,989 active wells; 3,889 new wells having been added during the year to the 36,546 in pro¬ duction at the beginning of 1916, and 2,446 hav¬ ing been abandoned as no longer profitable. The area under control of the natural-gas pro¬ ducers in 1916 totaled 12,899,781 acres; an in¬ crease of 2,252,239 acres in the year.

Consumption and Cost. — The natural gas output of 1915 was consumed by 7,939 manu¬ factories, 10,419 other industrial plants and 2,- 195,081 domestic consumers ; the latter class consuming about 35 per cent of the total. The price to the manufacturers averaged 10.35 cents per 1,000 cubic feet. To the industrial plants it averaged 8.32 per 1,000 cubic feet; and to the domestic consumer, 28.32 cents per 1,000 feet. The prices which are thus expressed in an average figure varied from limits of 8.47 cents per 1,000 feet in Louisiana to $1.00 per 1,000 feet in Iowa; and some industrial plants in West Virginia using large quantities were sup¬ plied at the price of 5.41 cents per 1,000 feet.

The above, separation of ^manufacturing" from other industrial plants depends upon whether the gas is burned directly as fuel, as in the latter, or is used to produce power (steam or elettric or gas engine), as in' the former. About two-thirds of the 65 per cent used industrially was burned directly as fuel.

As used in the home, natural gas in itseif is not dangerous to health. Tests

made with canary birds, most delicately sensitive to poi-

sonous gases, showed that they breathed as large a proportion as 34 per cent in the air of a room without showing the least disturbance. They became drowsy when the percentage reached 49 per cent, but did not collapse until it was as high as 66 per cent; and then quickly revived when taken to the outer air. The risk from fire is less than when wood and coal are used. There have been some cases of asphyxia¬ tion when a stove has been burned in a room without connection with the chimney flue, as it has been found that under these conditions the air in the room becomes more and more saturated with carbonic acid and the vapors of water and depleted of oxygen. When this vitiated air passes again into the stove the com¬ bustion is imperfect, the result being the forma¬ tion of poisonous carbon monoxide (CO). There is more or less danger also from explo¬ sion in the case of a mixture of natural gas with air from a leaky stove. A comparatively small percentage of gas makes an explosive mixture, the limits being 5 per cent (low) and 11.5 per cent (high).

Products of Combustion. — The products of complete combustion of natural gas are water and carbonic acid, slightly over two cubic feet of the former in the form of water vapor and about one foot of carbonic acid gas for each cubic foot of natural gas consumed ; both are invisible and nearly odorless. Somewhat more than two cubic feet of oxygen are neces¬ sary, but, owing to the air being composed of a larger percentage of nitrogen, a little over 10 cubic feet of air is required for thorough combustion.

It has been found that in a stove without a flue connection, especially if the air in the room becomes more or less saturated with carbonic acid and the vapor of water from lack of fresh air, there is a small percentage of carbon mon¬ oxide (q.v.) produced, which is a deadly and insidious poison, and if breathed by a man or an animal will soon cause death, even when a com¬ paratively small percentage is present. When a small stovepipe connecting with a flue is used, no carbon monoxide is formed in the room, the greater portion of the products of combus¬ tion being carried outside as the fresh air is drawn in to supply their place. On the other hand, where there is no flue connection or large opening for the free entrance of an abundance of fresh air, a number of fatal results and nar¬ row escapes from asphyxiation have occurred.

Carbon monoxide does not usually exist to such an extent in the natural gas produced in West Virginia or Pennsylvania as is found elsewhere.

Analysis shows its presence in the natural gas produced in the Lima-Indiana field to the average extent of about one-half of 1 per cent, and to the average extent of 1 per cent in the natural gas produced in Kansas. Formaldehyde is in some cases formed upon putting the cold surface of a teapot in contact with the gas flame of a stove, or when the flame impinges on the cold sheets of a steam boiler. Its presence in small quantities is made known by its pungent and irritating effect upon the nostrils and throat. The effect is danger¬ ous, yet there are no cases known in which death has resulted from this gas thus generated.

Illuminating Properties.— The illuminating properties of natural gas vary in different lo¬

calities, because of the difference in the per¬ centage of the heavier hydrocarbon, ethane (C2H8). All the natural gas found adjacent to petroleum fields has a larger proportion of ethane than the gas farther removed, and there¬ fore the candle power is considered greater. Ordinary natural gas, if consumed with a com¬ mon tip at the rate of 7 or 8 cubic feet per hour, will yield about 6 or 7 candle power. In an ordinary Argand burner with chimney, it will give about 12 candle power in consuming 5 to 6 cubic feet per hour. When natural gas is consumed. in contact with a mantle of alkaline earth (thoria, etc.), the result is the cheapest and best illuminant known.

Calorific Value. — The calorific or fuel value of natural gas varies in different locali¬ ties, as the amounts of carbon and hydrogen vary. Those natural gases which contain the highest percentage of carbon give the best re¬ sults. The standard used in measuring fuel values is called the British thermal unit, writ¬ ten B. T. U., and is the amount of heat neces¬ sary to raise the temperature of one pound of pure water 1° F. at or near 39° F., which is the temperature of the maximum density of water. As tested by this standard various sam¬ ples of natural gas showed heat values ranging from 740 to 1,312 B. T. U. per cubic foot. The quantity of air necessary for the perfect combustion of natural gas varies from 10.4 to 10.8 parts of air to 1 part of natural gas. A number of tests have fully demonstrated that when ordinary care is taken in burning natural gas under boilers in actual service, 1 cubic foot of natural gas will do work equivalent to the evaporation of 1 pound of water from and at 212° F. Since 20 cubic feet of ordinary natural gas weigh 1 pound, 1 pound of natural gas will evaporate 20 pounds of water, while, under similar conditions, 1 pound of petroleum will evaporate only 16 pounds of water, and 1 pound of good coal will evaporate but 10 pounds of water; therefore 10 cubic feet of natural gas or one-half a pound is equal to one pound of good coal. In fact in a number of tests with a Klein or a Kirkwood burner, .87 cubic foot of natural gas has evaporated 1 pound of water from and at 212° F., which will make

17,400 cubic feet equal to one ton of good coal. The actual heating effect of natural gas as a fuel approaches much nearer the theoretical result than can be attained with coal. The price paid by the domestic consumer for natural gas varies in localities, ranging from 13 to 27 cents per 1,000 cubic feet. The consumers near the supply pay less than those farther off. Manufacturers pay less, ranging from 6 to 18 cents per 1,300 cubic feet. About 20,000 cubic feet of natural gas will equal one ton of good bituminous or anthracite coal. If we assume the average price to the domestic consumer to be 22 cents per 1,000, then $4.40 worth of gas will produce the same heating effect as one ton of good coal delivered in the bins — to which must be added the expense of shoveling it into the furnace and the removal of the ashes, as well as the inconvenience of the necessary dust and dirt which invariably accompanies a coal fire.

The Natural Gas Engine. — Natural gas, as applied to the internal combustion engine, has caused a complete revolution in the methods of

securing power throughout the gas belt. It las 111 nearly all instances superseded any other source of power in pumping petroleum wells, n some instances this has been done by substi- utmg a gas cylinder for the steam cylinder, using the same engine bed. The economy in ic use of natural gas and the dispensing with ie costly and troublesome boiler, with its con¬ stant attendant, has brought it into great favor or all sources of power, from a 1 horse-power up to 1,500 horse-power engine.

The iollowing table gives the equivalents of natural gas and coal for both the gas and steam engine per indicated horse power per hour :

Type of Engine

Gas

Coal

Large natural-gas engine, highest type. . . Ordinary natural-gas engine.

Cubic

feet

9

13

16

20

40

SO

Pounds

0.9

Triple expansion condensing steam engine Double expansion condensing steam engine.

Single cylinder and cut-off steam engine _

Ordinary high pressure, without cut-off steam engine. . . .

x . o

1.6 2.0 4.0

q n

Ordinary oil well pumping steam engine. . .

130

o . u

13.0

Uses. Natural gas is used in domestic service principally as a source of heat and light, it is employed extensively in industrial estab¬ lishments for many purposes, notably in the generation of steam; in the manufacture of glass , puddling of iron ; in roasting ores ; in heating furnaces, for lacquering and japanning, annealing and reheating, case hardening, tool ten]1Pering' preheating castings in oxy-acetylene weldmg ; and for heating china kilns, water stills, fire expanders, etc. ; and in the manufac¬ ture of steel and pottery; it is also utilized as a source of power in the gas engine, used in drilling and operating oil and gas wells and in pumping oil, and as a general source of power for all purposes. The heat value stored in natural gas is greater than that caused by any artificial combination of carbon and hydro¬ gen, and it is a perfect fuel as it issues from its original rock-sealed*

reservoirs. No prepara¬ tion is necessary for its combustion and no residue is left. It is not affected by ordinary temperature, and it is easily distributed by pipes to points of consumption. It is a most economical source of light and power, and an ideal household fuel. Carbon black (q.v.) is the only commercial article that is made directly from natural gas.

Since 1911 a considerable industry has been built up in the production of gasoline from casing-head gas that is the gas which comes up between the casing and the tubing of an oil well, and collects in the casing head. This gas is known as ˆwet" gas, carrying a propor¬ tion of the vapor of petroleum. The process is also applied to gas from gas wells if it carries as much as six pints of gasoline vapor to the 1,000 cubic feet. For the wetter gases the principle of compression is employed, with subsequent condensation. For the dryer gases the process is to pass the gas through a tank of heavy oil which absorbs the gasoline vapor, and the gasoline is afterward distilled out. In 1915 there were in the United States 414 plants devoted to the production of gasoline from natural gas. The total recovery was 65,364,665

gal ons, nearly half of which was gained in Oklahoma. The highest percentage was se¬ cured from the gas of the Glenn Pool in Okla- homa, which yielded eight gallons of gasoline per 1,000 cubic feet.

r LlqUiu Natural Gas. — Natural gas may be lquefied by a pressure of 415 pounds at a tem-

°fTˆr F-» or a pressure of 506 pounds at 4o b. Fifty cubic feet of the gas condense to one gallon of the liquid gas. The internal pressure in a cylinder of this liquid gas at 133°

• j , P°unds per square inch — only one third the pressure of many liquefied gases. As an llluminant the vaporized liquid gas burns with a slightly yellower flame than the ordinary natural gas, and gives the best results with an inverted Welsbach mantle. It is en¬ tirely effective in heating if a plentiful supply of air is provided. With oxygen in a blow¬ pipe it gives a very hot flame. It has been used successfully to run an automobile, where provision is made to keep the valve warm ; the vaporing of the liquid gas produces a low tem¬ perature in which the unprotected valve quick¬ ly freezes up.

Early History —Natural gas has been known since the earliest records of the human race as a curiosity. Perhaps the first historical record of the use of natural gas is that of

1 nnnApo ° 9racle at DelPhi in Greece, about 1,000 years before the

Christian era. The

Chinese are credited with the earliest practical application of this fuel at the wells at Tz-Lin- Chmg, western China, in the evaporation of salt brine.

The fire worshippers on the shores and is¬ lands of the Caspian Sea, in the Baku region, Russia, and those of Punjab, India, have pre¬ served a continuous flame in their temples caused by a steady flow of natural gas for centuries. In after years it caused the deadly

explosions in the deep coal mines in Europe

and America, being known to the miners as

fire damp. Its existence in the United States

has been known since the first white men crossed the divide and explored the Ohio River watershed, as the Indians invariably conducted them to these natural vents, and, setting fire to them, viewed the effect with a semi-religious 'veneration. The discovery of vast reservoirs, sealed up in the porous rocks of the United States and Canada, is of recent years. The artesian driller, searching for salt brine, knew of its presence since the first wells were drilled on the western flank of the Appalachian up¬ lift; afterward the driller in search of petro¬ leum encountered it, but by both of these early prospectors it was considered a source of danger and annoyance. It frequently caught fire,. causing loss of life and destruction of the drilling outfit by a sudden outburst. It is on record that Washington in 1755 conveyed to the United States a small tract of land in Virginia containing a ((burning spring" fed by natural gas.

The earliest economic use of natural gas known, in the United States occurred in 1821, when it was used for the illumination of the village of. Fredonia, N. Y. A well one and one-half inches in diameter was drilled to a depth of 27 feet near a noted gas spring and for many years supplied the village with 30 street lights.

In 1838 a water well dug at Findlay, Ohio, encountered such quantities of a foul smelling gas that it was abandoned for the original ob¬ ject. It was subsequently covered up and the gas conveyed to a house near by and utilized for domestic fuel and lights for nearly 50 years.

About the year 1841, natural gas was found in a well near Charleston, W.

Va., which also supplied salt brine, from which it was separated and for many years used as a fuel for making salt.

More or less natural gas was developed in the rush to find petroleum in the valley of Oil Creek in the winter of 1859 and the year fol¬ lowing.

One of the first attempts to employ natural gas for fuel purposes was at a well drilled at Erie, Pa., in 1868, which was soon followed by many others ; these wells were only 600 feet in depth and supplied from one to three fam¬ ilies each. Titusville, Pa., enjoys the distinc¬ tion of installing the first modern equipped nat¬ ural gas plant, as well as the first well drilled for petroleum. This plant was constructed dur¬ ing 1872, 13 years after the first oil well was drilled by Colonel Drake.

During 1873 natural gas was introduced into many of the villages of Butler and Venango counties for light and fuel, being supplied from wells drilled not far distant in prospecting for petroleum. In the year 1875 the first long pipe line (17 miles in length) was built; the pipe used was six and a quarter inches in diameter, supplying the natural gas produced from the Harvey well at Larden Mills, in Butler County, Pa., to a large manufacturing plant known as the Etna Iron Company on the Allegheny River, a few miles above Pittsburgh. In the 10 years that followed slow progress was made in the actual use of the known gas wells; many were utterly ruined by pulling the casing and allow¬ ing the inflow of muddy water, which gradually sealed up the rock and prevented the flow ; this was after a struggle for years. The gas from other wells was allowed to escape into the air for years. There seemed to be an uncertainty in the minds of all, as to the lasting supply of this natural product.

In the year 1876 the large Haymaker well was drilled in at Murraysville, Pa., but was not utilized until the year 1883, when its prod¬ uct was piped to Pittsburgh. By the close of 1883 a number of pipe lines were supplying Pittsburgh and the Beaver Valley with natural gas from a number of good gas wells drilled in Washington, Beaver and Butler counties. Dur¬ ing May 1885, the first natural gas well from the deep Speechly sand was drilled, seven miles south of Oil City, Pa. > During the same year the remarkable reservoir of natural gas in the Grapeville pool, near Greensburg, Pa., was also found.

These numerous natural reservoirs at this period with their great initial pressure encour¬ aged the impression that it could be found in almost any locality and that the supply was practically inexhaustible.

In 1885 the large natural gas fields near Findlay, Ohio, became prominent and the year following large wells were also found in In¬ diana. These

latter developments gave addi¬ tional assurance of its unlimited supply.

In Pennsylvania, Ohio and Indiana immense

quantities of gas were consumed in the most wasteful manner and in the extravagant dis¬ play, which in numerous instances turned night into day. The effect upon witnessing mile after mile illuminated by the burning of escaping wells and torches produced an impression long to be remembered. This extravagance and waste were not realized until many of the then known fields began to show a serious decline in the rock pressure and, knowing the original pres¬ sure, it was a simple calculation to show that a large percentage of the quantity of natural gas originally contained in the natural reser¬ voirs had been withdrawn and that something must be done to stop the waste. Even then the reforms were slow and gradual and many companies became bankrupt. It was not until the general introduction of the gas meter in 1890 and 1891 that economy in its use by the consumer was inaugurated. Formerly the nat¬ ural gas was sold by month, according to the size of the orifice through which it was deliv¬ ered without regard to the manner of its com¬ bustion and use. The meter made it to the interest of the consumer to use this convenient fuel in an economical manner. It is estimated that under the meter system a saving of fully one-half the gas required to accomplish the same results was made. Another economical improvement introduced consists of shutting in the wells when their flow is not required ; their closing or opening being regulated by telephone from a central office. The wells are also more carefully watched and the salt water removed by pumps, instead of by blowing out as formerly. The pipe lines were thoroughly overhauled for leaks and the new pipe after¬ ward used was heavier and of larger diameter, being supplied with heavier thimbles or im¬ proved rubber-packed joints. In the cities and towns larger distributing mains are used and a greater number of regulators secured — thereby maintaining a more even pressure — through¬ out all the variations in consumption, due to changes in seasonal temperature. Consult Hager, D., Practical Oil Geology (New York 1916) ; Johnson, R. H., and Huntley, L. G., ˆPrinciples of Oil and Gas Production (New York 1916) ; Thompson, A. B., c Oil Field De¬ velopment and Petrol Mining) (London 1916) ; United States Mines Bureau, (Technical Paper No. 10) (Washington 1912) ; Westcott, H. P., (Handbook of Casing Head Gas) (Erie, Pa., 1916) ; and (Handbook of Natural Gas* (Erie, Pa., 1913).*

Richard Ferris.

GAS, Poison. See Poison Gas.

GAS-CARBONIZING PROCESS OF ARMOR PLATE. See Armor Plate.

GAS ENGINE. See Internal Combustion Engine.

GAS HOLDER. See Gasometer.

GAS ILLUMINATION, History of. The

development of gas lighting can properly be placed to the credit of the 19th century. Spirit of coal, produced by the distillation of coal, was known as far back as 1739, and the attention of Robert Boyle was called to this substance by Dr. Clayton, bishop of Cork. Its properties were studied and its inflammability and many of its general characteristics were known at this time, although an inflammable gas rising

l rom the surfaces of certain stagnant pools had been noted as far back as 1659. The first prac¬ tical application of gas for illuminating pur- poses was made in 1792. William Murdock, an English engineer, produced gas by the destruc¬ tive distillation of coal in iron retorts and con¬ ducted it for a distance of 70 feet through iron pipes and lighted and heated his house in Red¬ ruth, Cornwall. Lebon in 1801 illuminated his house and garden in Paris by gas produced 1 rom the destructive distillation of wood. This method of illumination proved a failure on ac¬ count of the poor illuminating power of the gas. In 1802 Mr. Murdock installed a plant for illuminating the foundry of Boulton, Watt & Co. (Watt being the inventor of the steam engine) near Birmingham, and a similar in¬ stallation was introduced in Manchester shortly after this time. Street lighting was introduced by F._A. Winzer (afterward changed to Win- sor) in 1807 in Pall Mall. Mr. Winsor pro¬ moted a company for general gas lighting in 1809, and was granted a charter by Parliament in 1810 for the establishment of the London Gas Light and Coke Company, generally known as the chartered gas company.

In America David Melville, of Newport, R. I., was attracted by the developments made along the lines of gas lighting in England, and installed in his house, and in the streets in front of his house, the first gas lights used in the United States. This installation was made in 1806, his apparatus, with improvements, was patented in 1813 and a general installation made in several cotton mills and lighthouses. Balti¬ more was the first city in the United States to install gas lighting, in the year 1817, and since that time the growth of the gas lighting indus¬ try has proceeded uninterruptedly, for its con¬ venience and economy have been impressed upon the public.

The original promoters of gas lighting en¬ countered many difficulties. At

the time of the installation of gas pipes in the House of Par¬ liament it was stipulated by this body that no pipes should be placed nearer than six inches to any woodwork. Numerous explosions and fatal asphyxiations caused by lack of experi¬ ence in handling the new substance are re¬ corded. The disagreeable and often injurious odor of the products of combustion of the gas greatly retarded its favor with the public. With the increasing experience of gas engineers, the dangers of explosions and accidental asphyxia¬ tions were eliminated. Considerable inventive genius was brought to bear to remove from the room the products of combustion, or to purify the gas for the removal of those constituents which gave the disagreeable products on burn¬ ing. Several means were proposed for accom¬ plishing these purposes. The most original im¬ provement, and one in use at the present time, was the invention of Clegg, who introduced the use of slaked lime for removing the sulphurous constituents of the gas before it entered the holders. A later development was that of Lanning, who used ferrous oxide mixed with sawdust or wood pulp to make it porous for the absorption of the sulphur constituents. These methods are to-day in general use. Many other methods, of more or less value, have been pro¬ posed.

The illuminating power of a flame is de¬ rived from the heating of solid particles to

incandescence, and the practice of gas illumina¬ tion can therefore be divided into two general principles: (1) Where the solid incandescent material is supplied by the decomposition of the gas in the process of combustion; (2) where the complete combustion of the gas is pro¬ duced by the Bunsen burner, and a permanent incandescing material is supplied as a part of the apparatus.

The latter method is what is generally known as the incandescent gas lighting system. The original developments in gas lighting were made on the first of these principles. The bat¬ swing or fishtail flame was produced by re¬ leasing the gas through a narrow slit, and its illumination was produced by the incandescence ˚t? j Solici ParticIes ˚f carbon derived from the decomposing gas in the flame. The Argand gas burner js a modification of the old Argand oil burner, and consists of a ring of small open¬ ings arranged near enough together so that the gas flame is in the form of a continuous cylinder, admitting air to the inside and out¬ side of the cylinder. The Siemens-Lungren system, known as the Regenerative system, con¬ sisted in applying to the burner gas and air which has been preheated. Professor Bunsen, professor of chemistry in Heidelberg, designed a burner to produce a non-luminous flame with complete combustion and to give the maximum heating effect of the gas. This was accom¬ plished by so constructing a burner that it will carry in and mix with the gas a limited

amount of air before it reaches the point of combustion. The additional air necessary to produce com¬ plete combustion is drawn from the atmosphere surrounding the flame. This type is known as the Bunsen burner.

The experiments of Henry Drummond in 1826, in which he placed a solid stick of lime in the oxy-hydrogen flame, was the first sys¬ tematic attempt at the development of what is now known as the incandescent gas lighting system. The Drummond, or lime-light, was until recently in general use for the production of very high power lights, especially in theatres and for stereopticon practice, etc. This system, however, was not applicable to the ordinary con¬ ditions of gas lighting. A modification of the Drummond light was made by Tessie du Motay, in which he substituted coal gas for the hydro¬ gen in the ordinary Drummond oxy-hydrogen flame. A burner exhibited at the Crystal Palace Electric and Gas Exposition in 1883, by Lewis, was constructed with a platinum mantle sus¬ pended over the flame, and designed to pro¬ duce a high incandescence. This mantle, how¬ ever, was unsuccessful, owing to the fact that it rapidly deteriorated by the reducing action of the gas. This burner was designed to operate with compressed air. Clamond about the same time introduced a burner similar to the Bunsen type, in which he placed a mantle made of threads of magnesia. He also introduced an in¬ verted pattern or burner in which a basket or mantle was made of magnesia threads held in a platinum basket. This burner, like the Lewis burner, was operated by compressed air, and was claimed to produce 4ˆ4 candles per foot of gas consumed, with a life of from 50 to 60 hours. Mantles in modification of the Clamond type were produced by C. B. Harris, in which he molded a refractory material into sheets, pressed into the proper shape and perforated in

any desired pattern. Attempts have also been made to make a mantle of asbestos or similar non-combustible material, and saturate this with a substance giving high incandescence.

The first commercially successful results ac¬ complished in the field of incandescent gas lighting were made by Dr. Carl Auer von Wels- bach of Vienna. Welsbach's work in this field began in 1880, in Bunsen's laboratory in Heidel¬ berg, where he was studying the rare earths from a standpoint of pure chemistry. His at¬ tention was centred on the oxide of erbium. To produce a continuous light for spectro¬ scopic study he satuated a cotton fabric with a solution of erbium, and after burning out the cotton suspended the residual ash in the flame. This produced an intense green light. The idea occurred to Welsbach to utilize this particular

method for producing an ash fabric of incan¬ descing material in the ordinary feunsen gas flame. When this plan was communicated to Bunsen he replied : (

The invention was now called to the atten¬ tion of the public, and Welsbach delivered numerous lectures before the press representa¬ tives. The invention was named the Incan¬ descent Gas Light by Mr. Seeps, editor of the Neue Wiener Tdgeblatter. The announcement of the Welsbach mantle was received with vari¬ ous comment, and many prominent engineers re¬ fused to take the matter seriously. Welsbach's confidence, however, was not shaken, and com¬ panies were formed for the development of the industry and the manufacture of the lighting fluid from the rare earths. The services of Dr. Ludwig Haitinger, an able chemical engi¬ neer, were added to those of Dr. Auer in the development of this work. The increased effi¬

ciency of this method of lighting, however, was not what had been expected, and the public re¬ fused to take it up. The mantle rapidly de¬ teriorated and required to be rejuvenated. At that time it must also be understood that these mantles were very fragile and in the early stages of the work they were delivered in the city of Vienna by a boy carrying one in each hand, as they would not bear the ordinary han¬ dling in transportation. The usual skepticism of the public in regard to new inventions pre¬ vailed, and the commercial failure of this enter¬ prise seemed imminent. The Vienna factory was closed and the plant and laboratory sold. The American factory, under the direction of Waldron Shapleigh, was still producing with some success the lanthanum-zirconium mantle. Welsbach, however, was not discouraged by these drawbacks, and devoted his entire atten¬ tion to the development and improvement of the mantle. In the early nineties he went before the public with an entirely new mantle, which was composed of 99 per cent thorium oxide and 1 per cent cerium oxide. This mantle gave 24 candles per cubic foot of gas consumed. The present system of manufacture of mantles is entirely in accordance with this last invention of Welsbach's, which consists in saturating cot¬ ton fabric with the proper mixture of the ni¬ trates of thorium and cerium, burning out the cotton fabric and tempering the mantle. It is then coated with collodion and packed for the market. Various improvements have been made in the Bunsen burner and a large number of designs are now on the market; but the general Bunsen principle is strictly adhered to and the present incandescent gas light is invariably pro¬ duced by applying the incandescing material to the colorless Bunsen burner flame.

The first incandescent gas mantles were of approximately conical form, suspended above the upwardly directed flame from an upright burner by means of a loop in the apex of the mantle. On account of the expansion of

the mantle under heat it was impracticable to secure the bottom or ((skirt" of the mantle to the burner-head, and the swaying of the skirt against the burner-head with every vibration of the lamp resulted in disintegration of the lower portion of the mantle. In 1907 the inverted mantle and burner were introduced. In this type a mantle of roughly hemispherical form was suspended below the downwardly directed flame of an inverted burner. The open end of the mantle was affixed to the burner-head and thus rigidly supported. Although the inverted mantle greatly exceeded the upright in durabil¬ ity, the arrangement of the burner parts was unsatisfactory in that the burner being below the supporting fixture discolored the latter by the strongly heated combustion products. In 1915 an upright burner bearing inverted mantles was introduced. In this lamp was combined the strength of the inverted mantle and the structural advantages of the upwardly project¬ ing lamp body — particularly desirable for at¬ taching to fixtures designed for the upright open flame tips. Up to this time the develop¬ ment of the gas lighting industry had been much restricted bv the above mentioned lim¬ itations and the lack of flexibility in the adapta¬ tion of gas lamps resulting from these limita¬ tions.

Almost coincidentally with the development

the upnght inverted mantle lamp it was dis- coveied that by conserving the kinetic energy oi the gas through proper design it was possible to control the gas and air mixture so com¬ pletely that practically any structural combina¬ tion imposed by the requirements of fixture de¬ sign or illumination requirements may be real¬ ized and the light yield much increased. Al¬ though the mantles are best suspended in an inverted position, the burner may be vertically upright or inverted, horizontal or angular. By the application of these principles, incandescent gas lamps ranging from 25 to 2,500 candle power have been successfully operated, and all of the various systems of illumination — direct, indi¬ rect and semi-indirect — successfully applied. In connection with other development, refine¬ ments in ignition and control have been so elaborated that any desired condition of opera¬ tion may be met.

Gas for lighting is usually distributed at a pressure of from two to three inches of water column. At these pressures the most recent incandescent gas lamps give from 28 to 30 candle power per cubic foot of gas consumed. For street and factory lighting, higher pressures are coming into use, and at a pressure of three pounds per square inch a yield of from 50 to 60 candle power per cubic foot is obtained.

The wonderful ability of Auer von Wels- bach as a chemist and inventor should also be noted, from the fact that the chemicals used in the production of the mantles were very rare and almost unknown, and that he was called upon to find the raw material for the produc¬ tion of these chemicals, and to invent proc¬ esses for their extraction in a sufficiently pure state for use. All of this work was accom¬ plished successfully after years of patient, pains¬ taking endeavor. Within the past decade the decorative side of gas lighting has been all- appealing. The primary idea of gas lighting was illumination, but with a desire for greater comforts and more luxuries in everyday life has come the desire for decorative effects. Globes, shades and domes are now made in many varieties. Color schemes of beauty are evolved, and artist and artisan combine to lend decorative worth to shape, color and treatment of the globe or shade, which is destined to add to the bare illumination of the gas jet or the incandescent mantle.

In 1917 the entrance of the United States into the Great War imposed radical changes upon the gas practice of the country. The entire production of benzol and toluol (the basis of the most efficient high explosives) from the by-product coke oven plants — the principal source — was under contract to the Entente Allies, and the United States government had recourse to the plants furnishing illuminating gas to obtain its own supply of these needed chemicals. Benzol and toluol are largely re¬ sponsible for the luminosity of the open-flame gas burner, and the necessity for removing these substances from illuminating gas made the incandescent mantle almost an universal necessity wherever gas was employed for light¬ ing. The mantle burners in use before this time were relatively expensive (when of good quality) and had been restricted to the more important uses, the open-flame burner being used for occasional and intermittent service. In many cities more than one-half of the

gas used for lighting was burned in open- flame tips.

In order to make the needed conversion of these less-frequently-used burners to mantle lamps without imposing undue burden upon the consumer, a small, relatively inexpensive mantle burner, of substantially the same light-giving power as the previous open-flame burner was developed, ffhis effects a saving of about two- thirds in gas consumption and permits all the toluol and benzol to be removed from the gas without impairing its light-giving power.

Table showing efficiency of various systems of gas lighting in use at the present time :

Candles per cubic foot of

System consumed

Welsbach Incandescent High Pressure (1915) ... . 50 to 60

Welsbach Incandescent Low Pressure (1915) ... . 28 to 30

Welsbach Incandescent thorium-cerium mantle

(1907) . 22 to 24

Welsbach Incandescent lanthanum-zirconium

mantle (1888) . 11 to 12

Siemens-Lungren burner . S to 6

Argand flame . W!; 3 to 4

Bray burner . 3 to 4

Fish-tail flame . . i| to 3

Sidney Mason, President Welsbach Company.

GAS LIGHTING, High Pressure. High pressure gas lighting represents the most effi¬ cient application of the energy in illuminating gas to the production of light, and is the highest development of the use of the Bunsen burner in connection with the Welsbach incandescent mantle. . The principle involved is simply the production of high flame temperature within or on a mantle of highly refractory and radio¬ active elements by the complete combustion of gas in a concentrated flame volume. This prin¬ ciple was first demonstrated before the Phila¬ delphia Chemical Society in 1801 by Dr. Robert Hare, by exhibiting the effect of concentrating the oxy-hydrogen flame on a refractory sub¬ stance. The term <(high pressure® is recognized as distinguishing it from ordinary incandes¬ cent gas lighting, because of the fact that the greatest number of lighting appliances coming within this class depend on the gas being sup¬ plied at higher pressures than are common in the ordinary distribution of illuminating gas from the works to the consumer. There are other types of. units, however, of equally high luminous efficiency which come within this class, but which use the gas at the ordinary pressures, complete and high temperature com¬ bustion of which is effected by supplying the air at pressures ranging from one to two pounds above the atmosphere. These types have not met with such general favor as the other, on account of requiring a double pipe line system, one to carry the gas and the other to carry the air under pressure, and also because of the greater amount of compression needed to sup¬ ply

the large quantities of air used.

The lamps of the first type mentioned use gas at two to three pounds pressure per square inch (54 to 81 inches wa'ter column). The ordinary pressures at which gas is dis¬ tributed range from one to four inches water column. These lamps use the energy of the gas under pressure flowing from a small orifice at high velocity to entrain from four to six volumes of air per volume of gas by simple

injector action into the Bunsen tube and be¬ fore being burned the gas and air are thor¬ oughly mixed and pre-heated in the extending chamber from the Bunsen tube. At first high pressure lamps were designed to use the up¬ right mantle, but later developments of the in¬ verted mantle recommend it particularly for this class of lighting, because of the fact that the best incandescent results are obtained by having the mantle conform as closely to the flame as is possible, in order to have all its fibres in the zone of the highest temperature. Inverted mantles for high pressure units are applied to the burners in a soft state, so that in burning off and hardening they assume the exact form of the flame on which they are used. This factor is one of the important elements in the luminous efficiency of high (pressure units. For low pressure lighting mantles are furnished which have been shaped and hardened in a pressure Bunsen furnace to a length approximating the size of a low pres¬ sure gas flame. It is impossible with gas at low or ordinary distribution pressure to com¬ pletely burn out and properly shape the mantle fabric.

The increase in efficiency of gas lighting by the use of high pressure gas can be seen from the following comparisons :

Burner	*Single unit*	*Candle power per foot of gas consumed*
Flat flame (coal gas) .	*12 to*	*16 c. p.*
	2 . 4 to 3 . 2	

Flat flame (water gas) .

Low pressure incandescent

18 to

22 c. p.

3.6 to 4.4

Welsbach burners .

60 to

100 c. p.

20 to 22

High pressure gas lamps . . .

250 to 1500 c. p.

50 to 60

The candle-power values of the limits given above are horizontal or maximum candle- power intensities. In the utilization of the heat energy in gas for the production of light, which is really the proper measure of efficiency and energy transferred, we have the following:

Flat flame burner, coal gas :

200 British thermal units per candle power. Flat flame burner, water gas :

. 150 British thermal units per candle power. Low pressure incandescent Welsbach burners:

35 to 30 British thermal units per candle power.

High pressure gas units :

15 to 10 British thermal units per candle power.

From this it is seen that with high pressure gas the ratio of energy input in the form of heat to light output measured as candle power is 20 times that of flat flame gas lighting and three times more efficient than Welsbach burn¬ ers using gas at low pressures.

High pressure lighting units are supplied with gas by pipe lines connected

with a com¬ pressor, which by automatic control delivers the gas at the pressure required, or they may be connected direct with mains carrying gas at considerably higher pressure, the pressure in the lines leading to the lamps being controlled by individual reducing governors. High pres¬

sure gas lighting has been extensively used abroad, for street and ornamental lighting wherever high power units are required. The principal streets of London, Paris, Vienna and Berlin are so lighted with units ranging from 250 to 4,500 candle power each. These lamps are supplied by special steel mains from central compressor stations and as they are independ¬ ent of the regular distribution gas mains, are lighted automatically from these central stations. A large section of the grounds of the Panama- Pacific Exposition in 1915 at San Francisco was lighted by over 300 1000-candle-power units of ornamental design. These units were equipped with automatic regulators, which de¬ livered the gas at three pounds pressure per square inch, taken from the main distribution system, which carried gas into the grounds for all purposes at 35 pounds per square inch. The general use of high pressure gas for light¬ ing and heating will necessarily be a gradual process on account of the conditions and legal regulations imposed upon the gas industry since its inception when gas was used only for lighting with the appliances then known. The Welsbach mantle was invented in 1886 and soon afterward came into general use, rapidly dis¬ placing the flat flame burners, as its superiority was appreciated and recognized. Notwith¬ standing this radical change in the use of gas for illumination, the old legal regulations re¬ stricting gas pressure and specifying the illu¬ minating power of the gas to meet the require¬ ments of an obsolete appliance still are en¬ forced, thereby seriously deterring the ad¬ vancement of the use of gas for lighting, as well as heating. The same principles which make gas valuable as an illuminating agent apply to its use for heating purposes. Many industrial establishments utilize the advantages of high pressure gas for fuel by installing in¬ dividual compressor outfits. High pressure lighting may be termed an advance of the art years ahead of the physical condition of the in¬ dustry. When the legal restrictions referred to are removed, gas will be supplied on the basis of its heating value and at pressures which will ensure the general enjoyment of its latent quali¬ ties as demonstrated by high pressure lighting.

F. V. Westermaier.

GAS POISONING, poisoning vapors of various substances when taken into the body through the air passages. Theoretically, a large number of substances used in the arts may cause gas poisoning; practically, there are only a few that seriously endanger health or life.

In general, gaseous substances must reach a certain percentage in a mixture with respir¬ able air before they become poisonous. This percentage varies with each gas. Forms of gas poisoning most commonly met are those in¬ cidental to certain of the industrial trades, arising from the inhalation of poisonous gases, or of the fumes of volatile liquids. It is not to be supposed that such poison gases and vapors are allowed to work harm to employees unopposed. On the contrary every effort is made to prevent danger from this cause, and the cases of industrial poisoning by inhalation are very few.

Following is a list of the vaporous poisons against which precautions have to be taken, and a note of the industrial occupations in which they are met with :

Acetaldehyde fumes — in the vinegar in¬ dustry. 7

Acrolein vapors — in fat-reducing establish¬ ments, oilcloth works, soap and candle factories.

Ammonia — around coke ovens ; in the man¬ ufacture of ammonia salts; in the making of dyes, varnishes and lacquers; about ice making and refrigerating plants.

Amyl acetate fumes — from Zapone lacquer in several industries; in jewelry manufacture; and in the oilcloth process.

Amyl alcohol fumes — in the manufacture of fruit essences, valeric acid, and in the making of aniline dyes.

Carbon dioxide — in mines ; in lime and brick kilns, tanneries and sugar mills ; and in breweries and mineral water bottling estab¬ lishments.

Carbon disulphide fumes — in the manu¬ facture of calcium sulphide; in imitation silk making; and in many industries where it is used as a solvent, as for rubber, resins, fats, oils, etc.

Carbon monoxide — leakage from defective flues in all industries; around coke ovens; in the exhaust and leakage from gas engines; in metal foundries, from drying molds; in char¬ coal burning; and about lime and brick kilns.

Chlorine — in laundries, bleacheries, paper mills and in the manufacture of organic chlorine products.

Cyanogen (prussic acid) — in the extracting of gold from ores; in silver and gold plating; in dye works; in the manufacture of celluloid; in certain photographic processes.

Diazomethane — in methylizing processes of all kinds.

Dimethyl sulphate — in the production of methyl ethers, methyl esters and methyl amines ; in the manufacture of artificial perfumes.

Formaldehyde — in disinfecting processes, and in the manufacture of coal-tar colors.

Hydrofluoric acid — in glass factories, glass etching works, potteries, dye works and fer¬ tilizer factories.

Methyl alcohol (wood alcohol) fumes — in the manufacture of varnishes, lacquers and pol¬ ishes ; in the making of perfumes; in furniture polishing; in the production of coal-tar colors; in calico printing.

Methylic bromide fumes — in aniline dye works.

Nitro-benzol fumes — in the making of per¬ fumes, fine soaps and pharmaceutical prepara¬ tions ; in making coal-tar colors; in the manu¬ facture of explosives.

Nitroglycerine fumes — in making explosives.

Nitrous gases — in numberless industries in which nitric acid comes in contact with deox¬ idizing substances; in chemical works; in the manufacture of celluloid, aniline colors, bleach¬ ing materials and dynamite ; in dyeing and calico printing.

Phosphuretted hydrogen — in the extraction of phosphorus; in the reduction of iron sili¬ cate ; in the production of acetylene.

Sulphur chloride fumes — in the rubber in¬ dustry, and wherever it is used as a solvent for rubber, resins and fats; in making solu¬ tions of sulphur.

Sulphur dioxide — in the reduction of sul¬ phurous ores ; in potteries and the ceramic in¬ dustry; in refining petroleum; and extensively in the bleaching of wax, silk and wool, dried

fruits, hops, straw hats and bristles; in the fuming of wine casks, etc.

Sulphuretted hydrogen — around blast fur- naces ; in ultramine works; in soda factories (Leblanc process); in extracting cellulose; in tanneries ; in making illuminating gas.

Sulphuric acid fumes — in hat factories; in petroleum refining; in fertilizer factories; in making and caring for storage batteries.

Turpentine oil fumes — in the making of lacquers, varnishes and cements ; in tapestry printing; in house painting.

Outside of industrial gas poisonings there has been a number of cases of poisoning by carbon monoxide (CO) both through the medium of illuminating gas, of which it is an important constituent, and also where old- fashioned gas stoves without flues are used, and where there is insufficient air to convert the CO to C02. See Carbon Monoxide.

Poisoning by illuminating gas is extremely common, occurring both by intent and acci¬ dentally. The character of the poisoning and its mode of treatment will vary with the com¬ position of the particular variety of illuminating gas that may be inhaled. The so-called <(water- gasˆ is particularly rich in CO. The leading symptoms of this form of poisoning are, in the beginning, headache, with sense of pressure in the temples, ringing in the ears, flashes before the eyes, beating of the temporal arteries, diz¬ ziness and perhaps unconsciousness. If the breathing of the gas continues, dangerous symp¬ toms develop. There is marked redness of the skin, with unconsciousness ; the blood is bright- red — a marked contrast to the dark blood with blueness of the skin seen in carbon-dioxide poisoning. Occasionally there are cramp-like convulsions. The pulse is at first full and strong; later it is thin and small. The breathing is slowed, and becomes a kind of snoring. Vomiting is common, and occasionally the vomit is drawn into the lungs and causes the additional symptoms of suffocation. The pa¬ tient may die in deep slumber. The diagnosis is not simple, but the chief signs are the red¬ dish face, the snoring breathing, the absence of alcoholic breath and perhaps the slight odor of gas in the room. The treatment should be energetic. The patient should be brought into fresh air at once, the clothing loosened and hot bottles applied to the extremities. Active rub¬ bing of the skin with coarse towels, mustard- water applications to the extremities and arti¬ ficial respiration should be instituted. The breathing of camphor vapor or well-diluted am¬ monia gas may stimulate the breathing. So long at the heart beats there are hopes of re¬ viving the patient. The injection into the rec¬ tum of large quantities (2 quarts) of hot salt solution (110°-118° F.), a teaspoonful of salt to a pint of water, is of great service. Small quantities of whisky (F2 ounce) may be added to this. The transfusion of salt solu¬ tion into the veins is sometimes necessary, but should be performed only by the medical prac¬ titioner.

Where the pulmotor (q.v.) is available it is used almost exclusively in the resuscitation of persons overcome by the inhalation of poison¬ ous gases, and has been successful in cases where the beating of the heart has been

sus¬ pended for five minutes. Persistence in the operation is required; two or even three hours

having been necessary in some cases. The difficulty of carrying it about on account of its weight led to the invention of the respirator (q.v.), similar to the pulmotor, but using or¬ dinary air instead of oxygen, which is not al¬ ways obtainable in an emergency. The record of the respirator is quite as satisfactory as that of the pulmotor.

In the European War poison gases have been used freely, first by the German army and later by their foes. The German gases were at first a mixture of chlorine and sulphur dioxide, which rolled along the ground to a height of about seven feet and filled the trenches. In one recorded instance the cloud of gas rose to a height of 40 feet, and this was maintained along a stretch of five miles for the space of four hours. The effect upon those not im¬ mediately killed by the inhalation of this mix¬ ture was to produce irritation and swelling in the bronchial tubes, with many of the symptoms of acute bronchitis. The inhalation of ammonia gas gave relief, but most cases became speedily worse on the third day, and succumbed. Nitrous acid gas has also been used alone and in mix¬ ture, both in the clouds of gas sent rolling over the ground, and in the gas shells dropped into trenches and gas bombs dropped from aero¬ planes. Bromine has also been used. To pro¬ tect the soldiers from these attacks gas masks were devised. They consist of a face piece in which is placed an absorbent filling containing a mixture of sodium thiosulphate, 72 per cent; and sodium bicarbonate, 28 per cent and 2 to 3 per cent of glycerine to keep them moist. These masks are effective for two and a half minutes in air containing 10 per cent of chlorine, and twice as long if the chlorine content is only 5 per cent. One part of chlorine in 1,000 parts of air is instantly fatal when inhaled. One part in 100,000 of air, if inhaled for any length of time, is highly injurious. The German treatment of their own gassed men is by hypo¬ dermic injection of atropine.

Consult Dion, S. A., (Tanks, Gas, Bombing, Liquid Fire) (New York 1917) ; Glaister, J., and Logan, D. D., (Gas Poisoning in Mines and Other Industries) (Edinburgh 1914) ; Roberts, A. A., (The Poison War5 (London 1915) ; United States Bureau of Labor Bulletin 100, (List of Industrial Poisons and Other Sub¬ stances Injurious to Health Found in Indus¬ trial Processes1 (Washington 1912), and Bulle¬ tin 179, (Industrial Poisons Used in the Rub¬ ber Industry5 (1915).*

GAS PRODUCER. The preliminary re¬ quirement in using any form of fuel is its con¬ version into a gas in order that it may com¬ bine more readily with the oxygen in the com¬ bustion process. Whether the gas thus ob¬ tained is combustible, i.e., whether it enters into combination with oxygen, with the production of heat, or otherwise, depends upon the nature of the fuel from which it is derived and upon the method of gasification employed.

In. most fuels, the chief combustible ele¬ ments are carbon (C) and hydrogen (H), which are present in a great variety of chemical com¬ binations with varying physical characteristics. When these fuels are completely burned, the products of combustion contain only carbonic acid (COO and water (H20), with nitrogen (N) and some of the oxygen (O) of the air

supplied for combustion, all of which are in¬ combustible. But when the fuel is incompletely or partially burned, the products of combustion will also contain varying quantities 6f carbon monoxide (CO), various forms of hydrocar¬ bons (CHn) , hydrogen, and sometimes tar and smoke as the products of distillation, all of which are combustible or have a heating value, which is wasted if not oxidized in the combus¬ tion processes.

Fuels may be burned by either direct firing on a grate or after conversion into gaseous foim. The ultimate object of direct firing is the at¬ tainment of complete combustion in close prox¬ imity to the fuel bed, by vaporizing, distilling, gasifying and completely burning the fuel ele¬ ments within the same chamber. It is well known, however, that the processes of vaporiza¬ tion and distillation do not produce heat but, on the contrary, absorb it, and, therefore, it is advantageous to separate them from the point at which the combustion of the gases takes place, and where high temperatures are devel¬ oped by the heat evolved, as is accomplished by the use of a gas producer or generator.

Generation of Producer Gas. — In the gas producer, the processes of vaporization, distilla¬ tion and gasification, result in the generation of combustible gas, which is led away to a sep¬ arate combustion chamber in which it is subse¬ quently burned under conditions more favorable to a full realization of the heat value of the fuel, and the high temperatures absolutely un¬ attainable by any other method of firing.

It should be clearly understood, however, that the use of a gas producer does not enable the generation of a greater quantity of heat than may be obtained by direct firing. Even when the producer is closely connected to the furnace so as to utilize the sensible heat of the gas, a loss of energy of from 15 to 20 per cent of the calorific value of the fuel is sustained ; but notwithstanding this loss, practical experience has demonstrated that the

gas producer accom¬ plishes, with much less fuel, practical results equal to those obtained by direct firing and has made possible metallurgical operations imprac¬ ticable by the latter method.

. The advantages of gas firing over direct fir¬ ing will be better understood by a brief discus¬ sion of the manner in which producer gas is generated.

As already stated, the products of the in¬ complete combustion of a fuel contain various combustible elements which are susceptible of being burned at a higher temperature than that of the original combustion, and producer gas is simply the product of an incomplete combustion or, more exactly, a distillation of a fuel in the generator.

The oxygen of the air admitted to the pro¬ ducer comes in contact with the incandescent carbon of the fuel and forms a certain amount of incombustible carbonic acid gas or carbon dioxide (CO,). The heat evolved by this re¬ action is absorbed by the CO2 thus formed and by the nitrogen of the air supplied. These gases aS^eil^ and their heat to the fuel above

and bring it to the point of incandescence, so that the CO2 first formed is brought in con¬ tact with this glowing carbon, and taking up an additional quantity of carbon is converted into the combustible carbon monoxide (CO). In a word, then, the primary object of the gas pro-

ducer is to convert carbonaceous fuel into car¬ bon monoxide gas.

If this gas is generated with dry air in con¬ tact with fuel free from impurities, it will still contain all the nitrogen of the air and will be composed approximately of carbon monoxide (CO), 34.7 per cent; nitrogen (N), 65.3 per cent by volume, and will possess a heating value of about 118 British thermal units per cubic foot.

In actual practice, however, it usually con¬ tains also a certain amount of carbon dioxide C02 and a little hydrogen (H), the H being de¬ rived from the fuel and the decomposition of the moisture in the air supply when it comes in contact with the glowing carbon.

When fuels such as soft coals are used, the products of distillation of the raw fuel in the upper zone of combustion, consisting chiefly of hydrogen and the hydrocarbons — marsh gas (CH4) and olefiant gas (C2H4) will become mixed with the products of gasification in the zone below.

Air when passed over incandescent carbon

maintain a given quality of gas with a minimum • percentage of CCb. Practically, however, the heat employed must not be so great as to de¬ stroy the producer, and the lower the exit tem¬ perature of the gases the better.

It is important to note that wet coals re¬ tard the development of high temperature in a gas producer, on account of the great heat ex¬ penditure required for the vaporization of such water ; and also, that for like reasons, carbon¬ ized fuels work at a higher temperature than uncarbonized fuels.

A condition which affects favorably the per¬ centage of combustibles in the gas is the pres¬ ence of steam in the air supply. Blowing with air alone introduces a large amount of inert nitrogen which dilutes the gas and reduces its calorific value. On the other hand, the use of steam increases the percentage of combustibles by adding hydrogen and supplying in its disso¬ ciation a quantity of oxygen which is not di¬ luted with nitrogen, thus increasing the calorific value of the gas, reducing its exit temperature and preventing clinkering.

Fig. 1. — Sectional Diagram, Siemens Gas Producer.

(C) gives minimum C02 at a temperature of 2000 F., therefore, the temperature of the pro¬ ducer should be kept above this point. Further¬ more, the formation of CO is greatly affected by the character of the fuel and the depth of the fuel bed, so that the greater the depth of the fuel bed and the more finely divided the fuel, provided it does not offer too much resistance to the passage of the air and gases, the greater will be the percentage of CO formed.

Other things being equal, the higher the tem¬ perature of the producer the greater will be the amount of fuel gasified per unit of time, but as this depends largely upon the air supply, an increased air supply signifies more rapid com¬ bustion, greater velocity of the gases through the fuel bed, briefer contact of the gases with the fuel, and, therefore, indicates that a greater depth of contact is required if it is desired to

The use of steam does not, however, result in the production of a greater amount of heat in the producer. The heat is simply transferred from the generator to the furnace by the higher potential heat value of H, instead of the less efficient, though greater sensible, heat in the gas itself. In practice it is found that not all of the water content of the air-blast is con¬ verted into hydrogen and oxygen. A small per¬ centage slips through unchanged, and in the combustion chamber of the furnace absorbs heat in its dissociation,

and, to that degree, reduces the temperature of the furnace. For this rea¬ son the amount of water supplied (as steam) must be carefully regulated according to the amount of moisture present in the fuel. When the fuel is dry and highly carbonized the equiva¬ lent of one pound of water may be injected with each 80 cubic feet of air at ordinary tern-

peratures. If the air-blast and steam are pre¬ heated, say to 1000° F., one pound of water may be injected with each 40 cubic feet of air. With fuel of the composition of bituminous coal one pound of water is supplied with each 85 feet of air.

It is apparent, therefore, that the composition of producer gas is likely to be very variable, owing in the first place to the lack of uniform¬ ity in the fuel, and secondarily to the varying adjustments of the air and steam supplies and the degree of heat at which the gas is produced. An analysis of producer gas made from Illinois bituminous coal showed, in combustible con- stitutents: Carbon monoxide, 15.12 per cent; hydrogen, 9.98 per cent; methane (marsh gas),

Fig. 2. — Vertical Cross-Section, Taylor Gas Producer.

6 per cent ; and of incombustible constituents : nitrogen, 59.06 per cent ; carbon dioxide, 9.72 per cent; and oxygen, 0.12 per cent. Where the gas is not used directly as it comes from the producer, but is cooled and the moisture content condensed, a larger quantity of water may be used during gasification, with the beneficial ef¬ fect of reducing the nitrogen content to or slightly below 50 per cent, and replacing the 9 or 10 per cent thus eliminated with hydrogen. The percentage of carbon dioxide will be larger in the case of fuels with a low melting slag, as in such cases the temperature of the producer must be kept so low that not all of the dioxide is transformed, into monoxide. A higher per¬ centage of dioxide than 4 or at most 5 per cent is objectionable and indicates that the pro¬ ducer is not working properly, or that its fuel is not suitable for making profitable producer gas.

Types of Gas Producer. — Gas producers

have been developed after two general types : (1) The Siemens gas producer, which operates without artificial blast and is typical of the older producers; and (2) the Taylor producer on the plan of the blast furnace, equipped with a rotative ash table and operating with a forced steam-blast, and representing the later develop¬ ments in this line.

Fig. 1 shows a vertical section through a Siemens gas producer and regenerator furnace. It consists of two essential parts — the gas pro¬ ducer proper in which the raw fuel is converted into a combustible gas and the furnace with its regenerators or chambers for storing the waste heat of the flame, given up to the incoming air and gas. As the air is drawn into the producer through the firebars A, a certain quantity of the water contained in the trough B is vaporized by the heat of the fire above, and mixing with the air is drawn with it into the fire. The necessary indraught of air, and the pressure re¬ quired to cause the gas generated in the pro¬ ducer to flow into the furnace, is obtained by means of the vertical uptake C, usually built of brick; the horizontal iron tube D, of rela¬ tively large diameter; and the vertical tube E, leading to the gas flue F of the furnace. By this arrangement, as the hot gas rises from the producer and passes through the tubes, it is considerably reduced in temperature, thus ren¬ dering its density much greater at the furnace end than at the producer, and thereby causing a suction and an indraught of air at the latter. This type is practically the one used in all plants making illuminating gas.

Fig. 2 shows a vertical cross-section of a Taylor producer charged with anthracite coal. The incandescent fuel is supported by the bed of ash put upon the rotative ash table A, before firing, and kept there constantly as an essential feature in the successful operation of the pro¬ ducer. The rotative ash table has a greater di¬ ameter than the bosh B, and is placed at such a distance below the latter that upon being re¬ volved, the descending ash forms its own slope at an angle of about 55°, and is discharged uni¬ formly by gravity over the periphery of the ash table into the sealed ash pit C.

When operated regularly, the line between the ash and the fuel is kept always about six inches above the cap D of the central air pipe E, thus allowing the fire to come in contact only with the brick lining, so that all the iron work is protected from the heat. The height of the fire line is maintained by grinding or revolving the ash table once every 6 or 24 hours, accord¬ ing to the rate at which the producer is worked.

The air blast is furnished, usually, by a steam jet blower, but a fan blower may be used if more convenient, and a pipe from some aux¬ iliary source of steam run into the vertical air pipe to supply the steam required for softening the clinkers and maintaining the proper tem¬ perature of the producer.

The producer as shown is equipped with a Bildt continuous automatic feed device F, con¬ sisting of a receiving hopper G, which sur¬ mounts the main storage magazine H, the com¬ munication between the two being regulated by a horizontal rotary register /, operated by a lever. The distributor plate K is suspended be¬ low the main magazine, and supported by a steel

shaft L, which passes upward through the storage cylinder. Both the hood of the distrib¬ utor plate and the inverted conical base of the magazine are water-cooled, the tendency of the cooling water and the location of the plate above the gaseous current tending to facilitate the discharge when using strongly caking coals. The receiving hopper is rotated by means of a worm wheel and worm-drive attached to the upper end of the shaft, and the distributor plate is rotated by means of the radical arms and hub of the receiving hopper, which are also keyed to the steel shaft. A hand-wheel nut upon the threaded end of the axis affords means for adjusting the distance between the distributor plate and the coal reservoir, and this adjust¬ ment, together with the variable speed secured by means of the stepped cone pulley M, permits of a ready control of the rate of coal dis¬ charge. Experience shows that the use of feed¬ ers equipped with distributing plates not only tends to reduce the amount of furnace wear, labor and repairs, but also results in a great reduction in the coal consumption.

of the producer gas into the cylinder of the engine, are effected by the suction or aspiration caused by the forward stroke of the piston.

Although the pressure system is composed, usually, of more cumbrous apparatus, and re¬ quires more space, it possesses greater elas¬ ticity than the suction system for meeting varia- tions in the quality of fuel and greater capa¬ bility for utilizing different kinds and cheaper grades of fuel. It is also the better for use with large power-producing units, or where several gas engines receive gas from the same pro¬ ducer plant.

On the other hand, for isolated plants of small , capacity, or where only a single gas en¬ gine is used intermittently, the application of the suction system not only simplifies the bulk and reduces the cost of the plant, but what is more important, it makes the demand of the engine for gas the controlling factor of its generation from solid fuel.

Pressure Gas Producer System.— Fig. 3 shows the general arrangement of a pressure gas producer system. Usually it consists of a

The following table gives the average anal¬ yses by volume of the gas produced by the two types of producers :

Siemens Taylor

Constituent Gas Gas

Carbon monoxide (CO) . 23.7 27 0

Hydrogen (H) . 8.0 12.0

Marsh gas (CHd . ‘ _ 2.2 2.5

Carbonic acid (CO2) . 4 .1 2 0

Nitrogen . 62.0 56.5

100.0 100.0

Gas Producer Systems. — Through the methods of operating gas producers of all types have sprung two general but well-defined sys¬ tems of gas production for power purposes — the pressure system and the suction system.

In the pressure system, the air required for combustion and for the generation of the gas is supplied to the gas producer under pressure, and the gas generated is delivered under pres¬ sure to the engine using it.

In the suction system, both the passage of the air through the producer, and the introduction

small steam boiler A , for making steam, or pro¬ ducing the necessary air pressure; a gas pro¬ ducer B, with a continuous-feed arrangement ; an economizer C, with superheater and wash- box ; a scrubber D ; a purifier E ; a gas holder F, consisting of a steel tank; and suitable drips and connections.

The details of the several organs may be modified to adapt them to varying conditions. For example, the boiler may be omitted where steam can be obtained from some other con¬ venient source of supply, and in some cases a separate steam generator is not absolutely neces¬ sary.

For smaller equipments, or those employed for operating engines up to 500 horse power, single producers are generally considered suf¬ ficient, but the larger equipments require two or more producers, which may be varied in de¬ sign and arrangement.

In the operation of a plant of this type, the gases generated in the producer enter the superheater and economizer. In the latter, the air blast of the producer travels in a direction

opposite to that of the blower, and the gas passing through the wash-box deposits a large portion of its extraneous matter. The econo¬ mizer also contains the seal arrangement against the gases stored in the holder and present in the other organs of the plant. From the wash- box the gas passes into the scrubber, the com¬ partments of which are filled with coke. Here the gas is showered by water sprays, and still further purified by the removal of any tar, sulphur or ammonia that may be present prior to its introduction into the purifier where the final purifying operations are performed. From the purifier the gas passes into the holder, which stores a supply sufficient to start and run the plant for several minutes, but the main function of the holder is to regulate the pressure, and care for variations in the consumption and mix¬ ture of the gases.

The drip pots and drainage pipes are very essential parts of the plant and are suitably

the tar is thus split up into its gaseous constitu¬ ents. The gas outlet for producers of this type is near the grate. Another device to accom¬ plish the same result conducts the tarry gases from the top of the producer by an outside pipe downward to the base of the producer whence they pass again through the fire. A still more successful type has two fire zones, one at the top of the fuel mass and the other at the bot¬ tom, the gas outlet being between the two. Doubling the producer is also effective, one of the two being fired with anthracite, and the gases from the low-grade fuel in the other be¬ ing passed through its fire.

The constitution of producer gases from various fuels as made in a pressure plant is as follows :

Coke — carbon monoxide, 27.6 per cent ; hydrogen, 7 per cent ; methane, 2 per cent ; carbon dioxide, 4.2 per cent; nitrogen, 58.6 per cent.

Fig. 4. — 'Suction Gas Producer System.

placed as shown, while the hot water issuing from the top of the producer is carried by suit¬ able pipes to the holder.

In the pressure systems all of the following named or similar materials may be used for fuel : Anthracite and bituminous coals, lignites, coke, charcoal, wood, peat and tanbark. Good anthracite coal is the best when convenience of operation is the primary consideration. When bituminous coals are used, preference should be given to those of the semi-bituminous class. According to general experience, soft-coal plants appear to be more expensive than those operated with hard coal, and when the price of anthracite does not exceed that of soft coal more than $1 per ton, it is advisable to em¬ ploy a

hard-coal plant. When coke is used it should be in small pieces of about one cubic inch ; as the tendency of large-size coke is to give a weak gas. When coke is used instead of anthracite, one-third more, by weight, of the former should be taken as the fuel consumption.

A variation of the pressure producer is the down-draught apparatus, used for lignite and similar low-grade fuels. The tarry gases are driven down through the incandescent fuel, and

Lignite — carbon monoxide, 18.90 per cent; hydrogen, 15.13 per cent; methane, 3.65 per cent; carbon dioxide, 9.43 per cent; nitrogen, 52.50 per cent.

Peat — carbon monoxide, 28.6 per cent; hydrogen, 8.5 per cent; methane, 2.2 per cent; carbon dioxide, 6.9 per cent; nitrogen, 53.8 per cent.

Wood — carbon monoxide, 9.86 per cent; hydrogen, 54.14 per cent; methane, 3.45 per cent; carbon dioxide, 21.30 per cent; nitrogen, 10.53 per cent.

Fuel oil — carbon monoxide, 11.40 per cent; hydrogen, 5.37 per cent ; methane, 5.87 per cent ; carbon dioxide, 4.10 per cent; nitrogen, 67 per cent.

The by-product gas producers used in the manufacture of illuminating gas separate and accumulate the tar, which is 38 per cent oil, and reclaim a large part of the nitrogen as ammonia. . The latter passed through a sul¬ phuric acid bath yields 80 to 90 pounds am¬ monia sulphate per ton of coal.

Suction Gas Producer System. — Fig. 4 shows the general arrangement of the several organs of a suction plant: A, represents the

producer ; B, the evaporator; C, the scrubber; and D, the receiver. The plant operates as follows :

The gases generated in the producer pass through the evaporator, which is simply a small multitubular boiler, and serves to utilize the sensible heat of the gases for evaporating the water used as steam in the producer. The vapor thus obtained is conducted through the pipe E, to the ash-pit of the producer, by the suction of the engine piston, while at the same time the gases pass from, the evaporator to the scrubber filled with coke. As these

gases rise through the interstices of the coke they come in contact with the descending washing water, which not only takes up and thus removes the dust brought over from the producer, but also purifies the gases of ammonia and any other impurities which water will absorb. From the scrubber, the purified gas passes into the re¬ ceiver. The diameter of the receiver is rela¬ tively large as compared with that of the suc¬ tion pipe of the engine, and thus prevents the pulsations which would otherwise be caused by the strokes of the engine piston, between the receiver and the producer.

Usually, in the smaller plants, the producer is provided with a charging hopper of sufficient capacity for holding enough fuel for several hours' operation, and permits the admission of coal to the combustion chamber without allow¬ ing air to enter it, during the charging opera¬ tion.

To operate the plant a fire is first kindled upon the grate of the producer; the fuel bed then built thereon, and the air necessary for starting combustion is supplied by means of a hand- or belt-driven fan. At first, the poor or lean gases produced at starting are allowed to escape into the open air through the vent- pipe G, until the test-cock shows that good gas of the desired quality is being generated. Then the vent-pipe is closed and the scrubber and receiver brought into the gas circuit. The engine is now brought into operation, and as the suction caused by the strokes of its piston thereafter performs the function of the fan, the latter is stopped.

In the suction systems only anthracite coal, and the so-called carbonized fuels such as gas- house coke and charcoal, have been satisfactor¬ ily used up to the present time. When anthra¬ cite is used it should not be less than <(pea® size, clean and of good quality. It is evident that the finer the size of the fuel and the greater its tendency to clinkering, the greater will be the amount of work required of the engine to draw the air current through the fuel bed. There¬ fore, if continuous action and easy operation are desired, the use of anthracite of the ordi¬ nary ((nut® size will give the most satisfactory results.

The following table shows average analyses of the gases produced by the two systems.

Per cent.

Pressure Suction

ELEMENT Plant Plant

Carbonic acid (CO2) . ' . 8.2 8.0

Oxygen (O) . .7

Carbon monoxide (CO) . 19.5 26.3

Hydrogen (HI . 16.5 18.2

Marsh gas (CH«) . 2.9 0.5

Nitrogen (N) . 52.2 47.0

100.0 100.0

In either case the gas produced is of good quality, when good fuel is used, the pressure- producer gas averaging about 125 B.T.U.'s per cubic foot, and the suction-producer gas about 145 B.l .U.'s per cubic foot, with variations ac¬ cording to the method of operation, and the proportion of hydrogen and carbon monoxide present.

In the power-plant operation, the fuel con¬ sumption will average one and one-half pounds of coal per brake horse-power hour for small powers, and decrease in relative amount with the increase in the size of the engine until a rate of one pound per brake horse-power hour is at¬ tained, thus giving a higher efficiency than that of the best marine steam engine or the largest steam pumping engine in the world.

Quality of Gas for Power Plants. — In con¬ sidering the quality of a gas suitable for the production of power or for use in gas engines it is necessary to inquire into the amount and quality of gas obtainable from various kinds of fuels.

The following table gives an approximate index to the difference of yield of gas for the different materials available for this purpose.

Yield per pound in cubic

MATERIAL feet

Coke or Charcoal . 104

Bituminous Coals . 75

Brown Coals . 55

Peat . 45

Wood . 35

The actual yield of gas varies, however, within wide limits, according to the composi¬ tion of the fuel, its general character and the method of classification, and in the care of coal, as already stated, according to the proportion of steam used in the producing operations. It may be assumed, however, that on the average, one ton of anthracite buckwheat coal will

yield about 170,000 cubic feet of gas, having a calorific value of 138,000 B.T.U.'s per 1,000 cubic feet; with an average composition as follows:

element Per cent.

Carbon monoxide (CO) . 22 . 0 to 30. 0

Hydrogen (H) . 15.0 " 7.0

Marsh gas (CH4) . 3.0 " 1.51

Carbonic acid (CO2) . 6.0 " 1.5

Nitrogen (N) . 54.0 " 60.0

Advantage of Using Producer Gas.— The

advantage to be derived from the use of pro¬ ducer gas may be briefly stated as follows :

The combined efficiency attainable in the best steam engines and boilers, operating under the most favorable conditions, is about 12 per cent of the intrinsic heat energy of the fuel used. On the other hand, the modern gas engine, even in small powers, will give an efficiency much higher, but if it be supplied, with illuminating gas for fuel, a large amount of the economy due to the higher efficiency is lost in the cost of the gas. Heat energy in the form of coal gas at a dollar per thousand feet, costs 13 times as much as an equiva¬ lent amount of energy in the form of coal at $3 per ton ; therefore, in order to utilize a gas engine to its full advantage, the gas used must be produced as economically as possible. This is exactly the function of the

gas producer, and by its use a good gas engine with a theoretical thermal efficiency of 75 or 80 per cent, or a practical thermal efficiency of 25 or 30 per cent, will readily convert into actual work, or available power, 25 per cent of the heat energy of the gas delivered to it. The gas producer of such a plant will transfer to the gas about 80 per cent of the intrinsic en¬ ergy of the coal, so that a gas-producer engine operating on an inferior grade of coal will show an efficiency of 20 per cent, as against the 12 per cent of a steam engine and boiler plant using the best steaming coal. Producer gas is used to great advantage in many industrial operations, among which may be mentioned the manufacture of high degree sulphuric

acid; the regeneration of bone black; in the enameling processes ; in making lime, cement, glass, brick, china and porcelain; in reverbatory furnaces, especially for small castings; in puddling fur¬ naces in the steel industry ; in reheating and annealing furnaces, etc.

Consult Askling, C. W., and Roesler, E., internal Combustion Engines and Gas Pro¬ duced (London 1912) ; Hirshfeld, C. F., and Barnard, W. N., (Elements of Heat-Power Engineering) (New York 1915) ; Jones, F. R., (The Gas Engine) (New York 1909) ; Miller, J. C., (Power Gas and the Gas Produced (Chicago 1910) ; Nagel, O., Producers Gas Fired Furnaces5 (New York 1909) ; Robson, P. W., (Power Gas Producers: their Design and Application (London 1908) ; United States Mines Bureau Technical Paper 20, (The Slag¬ ging Type of Gas Produced (Washington 1912) ; Wimperis, H. E., (Internal Combustion Engines5 (London 1915).

Revised by Richard Ferris.

GAS TAR. See Coal Tar.

GAS TURBINE. See Internal Combus¬ tion Engine.

GASES, Compressed. In general it may be stated that all gases are included under this head, all being compressible to a greater or less extent. Specifically, however, the term has come into use in the industries where it is used to designate those gases which by compression are reducible to liquids and in this state are more easily transported and adapted to indus¬ trial uses. The most characteristic feature of the gaseous state is the law or relation which obtains between the volume and tension of a mass or quantity of gas. When pressure is applied to such a mass its volume diminishes until its tension balances the pressure. Pro¬ vided the temperature is constant, the general principle will be observed that the tension is in inverse proportion to the volume — the greater the tension the less the volume, and vice-versa, when expansion is permitted, the tension de¬ creases in exact proportion to the increase of the volume. Here it is possible to state the general law that the product of the tension and the volume of a gas mass maintained at an invariable temperature remains a constant quan¬ tity under moderate pressures; thus, if T,T' represent the tensions at different pressures and V,V' the volumes. Since the tension and vol¬ ume are in inverse proportion, as above stated we have: T : V' : : T' : V, or TV 7= TV'. Boyle discovered and stated this law in 1662 and it was subsequently verified by Mariotte.

Under high pressures, however, the law does not hold, but here a modification has been sug¬ gested by Van der Waals. The law of Boyle indicates rather a typical condition of gaseous bodies and not a state which

is met with in practice. No known gas conforms exactly to the law. Generally the tension increases less rapidly than the law states, while in the case of hydrogen the tension increases more rap¬ idly than the volume diminishes. In practice, however, the deviations are negligible in the case of hydrogen, oxygen, nitrogen, the hydro¬ carbon gases, nitrous oxide, and a few others; while with other gases the deviations are very marked, and increase rapidly with the pressure. Through the means of pressure and cold all gases may be reduced to liquids when pressure is applied by means of a piston, to a mass of sulphur dioxide gas, for example, the volume is reduced and the tension increased. The latter, however, increases in a lessening ratio up to a certain value, upon attaining which, a further reduction in volume does not further increase the tension, but a part of the gas becomes a liquid, and with further pressure the remainder of the gas also assumes a liquid state.

The more important compressed gases used commercially and medicinally at the present time are the following: acetylene, anhydrous ammonia, argon, carbon acid gas, chlorine, hydrocarbon gases, hydrogen, nitrogen, nitrous oxide, oxygen, and sulphur dioxide. For the historic, scientific, commercial, and economic phases of these gases, also 'the manufacturing methods, accessories and appliances used in the industry and the distinctive legislation affecting it see Liquefied and Compressed Gases.

GASES, Joule's Law of; Boyle's or Mari- otte's Law of; Gay-Lussac's Law of; Regnault's Law of; Absolute Pressure; Ab¬ solute Temperatures; Adiabatic Expansion or Compression; Density of; Isothermal Ex¬ pansion and Compression; Specific Heat of. See Liquefied and Compressed Gases.

GASES, Kinetic Theory of. The theory

which regards gases as aggregates of discrete particles (or ˆmolecules55) of matter that are incessantly flying about and colliding with one another, the space in which they are moving being presumably absolutely vacuous, save for the omnipresent luminiferous ether. (See Ether). According to this theory, the mole¬ cules which are in the outer parts of a given mass of gas must beat incessantly upon the walls of the containing vessel, flying back again from these walls in the same way that they fly away from one another after collisions among themselves. This being the case, it is plain that the walls of the containing vessel are in the same condition as a target against which a furious storm of bullets is striking perpetually. Such a storm of bullets would tend to force the target in the direction in which the bullets were moving before collision ; and if the impacts were frequent • enough, they would have an effect upon the target which could not be distinguished from a continuous pressure. And if we pass, in thought, from target to retaining vessel, and from bullets to molecules, we shall have a

good conception of the kinetic theory of gaseous pres¬ sure. Before the behavior of molecular aggre¬ gates can be studied by mathematical methods,

it is necessary to make certain assumptions with regard to the nature of the molecules. Some of the received assumptions have been made on account of their apparent necessity, and others have been made for no reason whatever, except that they simplify the mathematical treatment of the problems that arise. Thus molecules are assumed to be perfectly elastic, because it has beep held to be evident that if they were not so, their incessant collisions must result in a grad¬ ual loss of velocity, which would not cease un¬ til they were all at rest. The assumption of per¬ fect elasticity is therefore commonly regarded as a logical necessity, since we do not observe any tendency toward rest among the molecules of gases ; that is, we do not perceive any tend¬ ency toward a fall of pressure, in a gas that is isolated, thermally and otherwise, from its environment. In the earlier mathematical in¬ vestigations of the properties of gases, from the standpoint of the kinetic theory, the mole¬ cules were assumed, furthermore, to be ex¬ ceedingly small (practically mere physical points), and they were considered to be hard, smooth and spherical and to exert no influence upon one another whep not in actual contact; these assumptions being made, not because it was considered to be in the least degree likely that molecules have such properties, but merely in order to lessen the mathematical difficulties involved in the subsequent analysis — difficul¬ ties that are serious enough, even when the problem is made as simple as possible. For example, they were assumed to be hard, in order that collisions might be considered as having no sensible duration. They were as¬ sumed to be exceedingly small, in proportion to the space in which they move, in order that the probability of a collision in which three or more molecules should come together at once might become vanishingly small in comparison with the probability of a collision in which the molecules come together in pairs, the discus¬ sion of the more complex collisions being thereby avoided. They were assumed to be spherical, because spheres can collide with each other in only one way; whereas other bodies (cubes, for example) can come together in the greatest variety of ways, according to their relative orientation at the moment of collision. They were assumed to be smooth, in order to avoid the necessity of taking account of the rotations that are produced when rough spheres glance against one another obliquely. The as¬ sumptions stated above were adopted in what may be called the Maxwellian period of the development of the kinetic theory and Max¬ well and other mathematicians made elaborate investigations of the

behavior of a practically in¬ finite number of molecules havinp- these prop¬ erties, when once set in motion in a finite space.

Following are a few of the results obtained by the mathematical study of such molecules as are defined above. It is evident, in the first place, that the velocities of the various mole¬ cules will not all be equal ; for even if such equality existed at any given instant, it would be quickly destroyed by the inter-molecular col¬ lisions. Maxwell investigated the distribution of velocities that must subsist in a gas com¬ posed of such molecules and gave a formula by which it is possible to calculate, at any given instant, the number of molecules that have velocities greater than, or less than, any assigned vol. 12 — 21

velocity. Thus if the total number of molecules present be taken as unity, the number having a velocity less than the average velocity is 0.533 ; the number having a velocity less than one-half the average velocity is 0.112; the num¬ ber having a velocity less than twice the average velocity is 0.9829; and the number having a velocity greater than four times the average velocity is 0.0000000074. It appears, therefore, that although any velocity whatever is theo¬ retically possible (so far as Maxwell's formula is concerned), the incessant collisions bring about a sort of averaging which is effective enough to ensure that an almost vanishingly small proportion of the whole number will be actually moving with a speed as great as four times, the average. The number having higher velocities falls off with still more remarkable rapidity; for example, the formula shows that less than one molecule in 1053 will be moving with a speed as great as 10 times the average. When two or more different kinds of molecules are simultaneously present, all the molecules in any one set being exactly alike and very numerous, and every molecule being hard smooth, small, spherical and perfectly elastic, Maxwell found that the different sets will mix with one another uniformly, and that the veloci¬ ties in each set will be distributed precisely as though the other sets were not present. The average velocity in each set will be different, however, from the average velocity in every other set, the set in which the molecules are heaviest having the smallest average velocity. In fact, the velocities, in such a case, will be such that the average kinetic energy of a molecule of one set will be precisely equal to the average kinetic energy of a molecule of any other set.

Some of the mathematical difficulties that appeared almost insuperable to Maxwell have been partially overcome by other mathemati¬ cians, and, largely owing to the labors of Boltz¬ mann, we now have a far more general form of the kinetic theory of gases. Before stating the nature of the generalizations that Boltz¬ mann effected, it is necessary to offer a short explanation of the expression ((degrees of free¬ dom.® A mathematical point is completely de¬ fined when its three co-ordinates are given ; it can

move by the variation of any one of these three co-ordinates, while the other two remain constant. Such a point is therefo‘e said to pos¬ sess three ((degrees of freedom.® A rigid body in space similarly has six degrees of freedom. Three co-ordinates must be given in order to fix the position of some one of its points — say its centre of gravity; and it may also have three independent rotations about three independent axes passing through the point so fixed. If the rigid body is not free to rotate, or if (as in the case of the smooth spherical molecules imag¬ ined by Maxwell) there is no force acting which tends to produce rotation, the number of de¬ grees of freedom may be considered as reduced to three, the three co-ordinates of the centre of gravity being then sufficient to define the state of the body completely. In particular, a mole¬ cule shaped like a dumb-bell may be considered to have but five degrees of freedom, if it is so smooth that collisions cannot set it in rotation about its axis of symmetry. The number of degrees of freedom of a rigid body is six, in. the most general case; but if two or more rigid bodies be joined together by hinges, or by any*

other analogous mode of connection that will allow of relative motion between the compo¬ nents, the number of degrees of freedom of the system so formed becomes greater than six. Thus a system composed of N straight rods, connected together by flexible joints at their ends, has (2N + 3) degrees of freedom.

Boltzmann’s form of the kinetic theory may now be stated as follows : Let there be a gas composed of any number of sets of molecules, such that the molecules belonging to each set are exactly like one another, though a molecule belonging to one set may be totally unlike a molecule belonging to another set. Let these molecules have any number of degrees of free¬ dom (which number of degrees may be dif¬ ferent in the different sets), and let them be acted upon by parallel forces (such as gravity), or by forces tending toward fixed centres, or by internal forces (that is, forces acting within the individual molecules, between their parts). Let all the molecules be very small in com¬ parison with the total space they occupy, so that the chance of their colliding three or more at a time is practically nothing. Moreover, let them be very numerous and let them be per¬ fectly elastic, and let them be smooth, so that when they collide the only force tending to make them rotate is that due to normal impact. Let them be set in motion among one another with any distribution of velocities ; and let them be hard, but not infinitely so — the force called into play during collision being very great, but not necessarily infinite (as it would be if the hardness were infinite) ; and let the duration of a collision be exceedingly short, yet

not neces¬ sarily zero. Then Boltzmann reaches the fol¬ lowing conclusions : (1) After a short time, the

law of distribution of positions and velocities in each set of the molecules will be precisely the same as it would be if all the other sets were absent; so that each set behaves as a vacuum to all the rest, so far as the distribution of ve¬ locities and the density of aggregation of the molecules in any given region are concerned. (2) The law of distribution of the velocities of translation in each set is the same as that de¬ duced by Maxwell for spherical molecules. (3) The average kinetic energy of translation of the molecules of any one set is equal to the average kinetic energy of translation of any other set. (4) The total kinetic energy of each set of molecules (including that due to translation, rotation, etc.)

is divided up equally among the different de¬ grees of freedom of that set. This last prop¬ osition is undoubtedly one of the most remark¬ able ever enunciated with regard to molecules and it appears not to have met with unqualified acceptance among; mathematicians, though there are many experimental facts which tend to show that it is at all events a good approxima¬ tion to the truth.

Although Maxwell and Boltzmann agree that the percentage of molecules that have velocities much larger than the average velocity is very small, it must be remembered that ac¬ cording to either form of the kinetic theory there is always a certain number of molecules that have velocities of any assigned magnitude whatever; and Stoney has pointed out that if this conclusion is really sound, one consequence of it is, that the earth must be continually losing molecules of its atmosphere by their

flight from the upper layers of the atmosphere, into space. A molecule of air escaping into space with a verticle velocity greater than about seven miles per second would possess sufficient momentum to carry it beyond the range of the earth's attraction forever. The loss of air that takes place in this manner is probably very gradual, but it is doubtless real, and in the course of ages it may result in the entire dis¬ sipation of the earth's atmosphere into the depths of space. It has been suggested that the absence of an atmosphere about the moon, and the apparent rarity of the atmosphere of Mars, may be due to this cause; the action having been more rapid in the cases of these two bodies, because their attractive power is smaller, and hence a larger proportion of at¬ mospheric molecules would have the critical speed necessary to enable them to pass off into space.

It has been stated, above, that Boltzmann found that in a gaseous mixture each set of molecules would assume the same distribution that it would have if it existed in the given space alone. This corresponds to the known

experimental fact that gases of different kinds will diffuse into one another, so as to eventu¬ ally form a homogeneous mixture. When a bottle of some strong-smelling gas, like am¬ monia, is opened in a room containing still air, we cannot perceive the odor at any considerable distance until quite a time has elapsed. The molecules of the ammonia vapor are indeed moving with high velocities, but they continu¬ ally strike against air molecules, rebounding from them in such a manner that in any given region there are almost as many of them re¬ turning toward the bottle as there are going away from it. They are forced to describe zigzag lines which are so very crooked that by the time an ammonia molecule has reached a point actually 10 feet distant from the bottle, it has in all probability traveled many miles. But eventually the ammonia molecules and the air molecules become thoroughly mixed, just as the kinetic theory predicts. Boltzmann's theory also teaches that in a gaseous mixture the distribution of velocities is the same in each set of molecules as it would be if that set ex¬ isted in the same space alone. If the explana¬ tion of gaseous pressure suggested at the be¬ ginning of this article is correct, it follows that each constituent of the gaseous mixture will contribute to the total pressure that the gas exerts against the vessel containing it, by an amount equal to the pressure that this con¬ stituent would exert if it existed in the same space by itself. This corresponds to the known law of Dalton with regard to gaseous mixtures, — 'the law which states that in a gaseous mix¬ ture the total pressure is equal to the sum of the partial pressures due to the several constit¬ uents separately.

It may be shown that the average kinetic energy of translation of the molecules of a given mass of gas is sensibly proportional to the absolute temperature of the gas. This being admitted, it is easy to understand the reason for Boyle's law. (See Liquefied and Com¬ pressed Gases). For so long as the temperature of the gas remains constant, the average veloc- ity. of translation of the molecules also re¬ mains constant, and therefore the average ef-

feet of the blow that a molecule strikes against the walls of the containing vessel is also con¬ stant. But the pressure, in this case, will vary in direct proportion to the number of blows that the molecules strike against a unit area of the walls in a given time, and this will also vary in direct proportion to the number of molecules that a cubic inch of the gas contains. We see, therefore, that if the temperature of a gas remains constant, the pressure that the gas exerts will vary directly with the density of the gas ; or, to state the same fact in another way, the pressure will be inversely

proportional to the volume of the gas, which is Boyle's law.

Avogadro's law may be derived in a some¬ what similar manner. Thus let P be the pres¬ sure that a gas exerts against a unit area of the containing vessel, let N be the number of molecules that it contains, per unit of volume, and let K be the average kinetic energy of translation of its molecules. Then the kinetic theory shows that the pressure of the gas can be expressed in the following manner: P = = 2/z NK. If two different kinds of gas are to be compared, we may conveniently dis¬ tinguish the values of P, N and K that relate to the separate gases by using the subscripts 1 and 2. Then for one gas we shall have Pi — 2A NiKi, and for the other Vi~2/z N2K2. If the pressure is the same in both gases, we have Pi=P3, and it is easily seen that this involves the equation NiKi = N2K2. Now, if the temperatures of the two gases are also equal, the average kinetic energy of transla¬ tion is likewise the same in both gases; that is, Ki = K2. Taking this into account, we see that it follows that Ni=N2; or, in other words, when two gases have the same temperature and the same pressure, they also contain the same number of molecules per unit of volume; and this is Avogadro's law.

Knowing the mass of a given volume of a gas, and the pressure that the gas exerts against the boundaries that confine it, we may cal¬ culate the average speed that the constituent molecules of the gas must have, in order to produce the observed pressure. The formula by which the calculation is effected need not be given here, but some of the results are of interest. Thus it is found that at 32° F. the molecules of the more familiar gases have the following average velocities, in feet per second : Hydrogen, 5,571; oxygen, 1,394; nitrogen, 1,488; carbon monoxide, 1,491; carbon dioxide, 1,189. At higher temperatures, the velocities are greater, being proportional, for any one gas, to the square root of the absolute temperature.

A very important application of the kinetic theory of gases relates to the ratio of the spe¬ cific heats of a gas. Boltzmann's theory shows that if the specific heat of a gas at constant pressure be divided by its specific heat at con¬ stant volume, then the quotient can be ex-

2

pressed in the form 1 + ~, provided the effects

of such forces as may exist between the differ¬ ent molecules of the gas are negligible, n being the number of degrees of freedom of the mole¬ cules of gas under consideration. This equa¬ tion, it will be seen, affords a means of ascer¬ taining the number of degrees of freedom of the molecule of a gas, by setting the foregoing expression equal to the observed value of the

ratio of the specific heats, and then solving the equation for n. By this method, it has been inferred that the molecules of hydrogen, nitro¬ gen, oxygen and carbon monoxide have each five degree of freedom; for the ratio of the specific heats of these gases approximates closely to 1.4, which is the value of the foregoing ex¬ pression for n = 5. If the molecules of a gas were really smooth spheres, — so smooth that they could not be set in rotation by their collisions, — then we should have n = 3, and hence the ratio of the specific heats would be 1.667, a value which is actually observed in the cases of argon, helium, mercury vapor, cad¬ mium vapor, and a few other substances. Hence it is inferred that argon and helium are ele¬ mentary bodies; because it is difficult to con¬ ceive of a compound body behaving, so far as collisions are concerned, as though its mole¬ cules were smooth spheres ; and if they had any other shape, it would be necessary to admit that they have at least five degrees of freedom (since it is impossible for any body in free space to have four degrees of freedom), and this would reduce the calculated value of the ratio of the specific heats to 1.400, a value which it is apparently impossible to reconcile with the results of direct observation.

Most of the results of the kinetic theory, as given above, involve the assumption that the effects of the mutual attractions that may exist between the individual molecules of a gas are small, on the whole. The forces, when they exist, may be great ; but we assume that under ordinary circumstances the radius of sensible action of these forces is small in comparison with the length of the average distance that the molecules travel, between successive collisions. When, by reason of the gas being greatly compressed, this assumption becomes of doubt¬ ful validity, the foregoing conclusions become correspondingly weakened. The average dis¬ tance that a molecule travels, between succes¬ sive collisions, is known as its (

The whole kinetic theory of gases is likely to be profoundly modified in the near future, when physicists have learned more about the ˆelectron® (q.v.), which is now commonly re¬ garded as the foundation unit in molecular architecture. For further details concerning the subjects touched in this article, consult Boltz¬ mann, ; Risteen, (Molecules and the Molecular Theory of Matter) ; Watson,

Kinetic Iheory of Gases } ; Tait, foundations of the Kinetic Theory of Gases. > See also Critical Point; Liquefied and Compressed Gases; Matter, Properties of; Molecular Theory; Thermodynamics.

Allan D. Risteen.

GASES, Liquefaction of. It has also been long known that most solids can be transformed into liquids by the application of heat, and that many liquids can also be transformed into vapor by a further addition of heat. Conversely, it was known that certain aeriform substances, such as steam, can be converted into liquids by the mere abstraction of heat. It was believed, however, that an essential difference exists be¬ tween gases and vapors, vapors being condensi¬ ble to the liquid form, while gases were believed to be permanently aeriform, and not conden¬ sible by any experimental means at our disposal. In the early part of the 19th century the validity of this distinction came to be doubted, and Faraday, at the suggestion of Davy, undertook the systematic study of the question. He suc¬ ceeded in reducing to the liquid form quite a number of gases that had previously resisted liquefaction. His general method consisted in generating the gas in large quantities in a lim¬ ited space, so as to produce a very high pres¬ sure, under the influence of which (when the experiment was successful) the gas passed into the liquid state. The most convenient way of carrying out this experiment is to make use of an inverted U-shaped glass tube, one of whose legs contains a chemical preparation suitable for the generation of the gas in question, while the other end dips into a freezing mixture; the tube being hermetically sealed. If cyanide of mer¬ cury be heated in one of the legs of a tube of this kind, for example, cyanogen gas is gener¬ ated in such quantities that the pressure causes a large part of it to condense in the chilled end of the tube. Chlorine was liquefied by Faraday in this manner in. 1823. Shortly afterward Thilorier succeeded in solidifying carbon dioxide by the combined application of intense cold and great pressure, and Cagniard de la Tour, Reg- nault, Natterer, and many other experimenters, improved the methods in use with the result that many of the gases that had been previously regarded as non-condensible were reduced to the liquid form. Oxygen, hydrogen, nitrogen and some few other gases still resisted all at¬ tempts at liquefaction, however, and these were still called «permanent gases,® although the con¬ viction had forced itself upon physicists that all gases could be conquered, if the necessary condi¬ tions of success could be discovered. The sub¬ ject was in this state when Andrews undertook his classical study of the phenomena of lique¬ faction of carbon dioxide. In 1863 he made the following announcement: <(On partially lique¬ fying carbonic acid by pressure alone, and grad¬ ually raising at the same time the temperature to 88° F. (31° C), the surface of demarcation between the liquid and gas became fainter, lost its curvature and at last disappeared. The space was then occupied by a homogeneous fluid, which exhibited, when the pressure was suddenly diminished or the temperature slightly low¬ ered, a peculiar appearance of moving or flicker¬ ing striae throughout its entire mass. At

tem¬ peratures above 88° F. no apparent liquefaction of carbonic acid, or separation into two dis¬

tinct forms of matter, could be effected, even when a pressure of 300 or 400 atmospheres was applied.® It appeared, therefore, that a certain temperature exists, above which carbon dioxide cannot be liquefied by any pressure whatever ; and this discovery was soon verified in the case of other gases. The temperature in question is known as the <(critical temperature® of the gas under experiment. (For its numerical values in the cases of the more important gases, see Critical Point). The reason that oxygen, ni¬ trogen and hydrogen resisted previous attempts at liquefaction, even when the pressure was pushed to 3,000 atmospheres, was that the criti¬ cal points of these gases are very low indeed, — far below any temperature at which the attempt at liquefaction had been made. The problem of liquefying the so-called ((permanent gases® was, therefore, resolved into the production of ex¬ ceedingly low temperatures. One means for the production of such temperatures was given by Thilorier, who showed that by mixing solid carbon dioxide with ordinary ether, a tempera¬ ture as low as 165° F. below zero may be at¬ tained. The cold produced by the expansion of the gases themselves has also been utilized for the production of the necessary degree of cold, and in the best modern forms of apparatus the gas, after being cooled by its own expansion, is furthermore caused to circulate about the pipes that are conducting fresh supplies of gas to the point at which the expansion takes place. In all cases, every care is taken to make use of any process or device which will lower the temperature of the gas ; and by the strictest at¬ tention to this general principle, it has been found possible to liquefy every known gas except possibly one or two of the rare gaseous elements recently discovered in the atmosphere. It is highly probable that these .will also succumb, when they can be obtained in sufficient quantity to be treated by the same methods that have yielded success in the case of so obdurate a gas as hydrogen. Hy¬ drogen was first liquefied, in quantity, by Dewar, in 1898. Consult Hardin, (Rise and Devel¬ opment of the Liquefaction of Gases. >

GASES IN MINES AND COAL. Gases of several kinds are given off by rocks and es¬ pecially by coal in mining. Some of these gases are poisonous and some are explosive so that fresh air has to be forced through most under¬ ground workings to ventilate them. More or less oxygen is also consumed and carbonic oxide is produced by men and animals in the mine, the decay of timbers, explosives, oxida¬ tion of coal, etc. Ordinarilv the principal gas that emanates from freshly cut coal is methane, CH_4, popularly known as marsh gas, which when mixed with air is the highly explosive .fire damp.® The following is a list of the prin¬ cipal mine gases, their composition and specific gravity.

Principal Mine Gases.

XT Compo- Specific

Methane . NAME . sig? Gravity

Carbon dioxide . • . op, < ' - ->

Carbon monoxide . . pr> a 7

Olefiant (Ethene) . ..!!!!!! !!.'.'" " C2H< ! 98

Hydrogen sulphide . !.!!.!!!!!."!!' H2S 119

Nitrogen . . '12

Hydrogen . !!..!![image] . 97

325

GASES IN MINES AND COAL

Oxygen and nitrogen in mines are mostly trom air, but considerable oxygen is absorbed by the coal, lowering the oxygen ratio from its normal one (approximately 79 per cent nitrogen and 21 per cent oxygen). Carbon dioxide occms in moderate amounts in most mines, but in some cases and locally it is present in large \olume. Carbon monoxide is rarely an ingre¬ dient of the gases in coal and when present in mines it is generally a product of incomplete combustion, whether that of explosives, coal or wood, or explosion of gas or coal dust. It is a colorless, odorless gas slightly lighter than air, strongly explosive and extremely poisonous.

All coal contains in its pores and crevices some of the inflammable gas methane, which is given off when the coal is in the ground, during mining and in diminished volume for a long time after mining. The amount in the coal varies greatly in different beds and localities, and in some mines the amount is so small that they are classed as <(non-gaseous.® In some such cases most of the original gas has been lost, especially in the shallower workings. In the anthracite region of Pennsylvania there are several mines giving off 2,000 cubic feet of meth¬ ane a minute, or nearly 3,000,000 cubic feet a day, which is brought to the surface by the ventilating system. This would be sufficient to supply heat and illumination for a city of 100,000 inhabitants. It is estimated that the total out¬ flow of the gas in the Northern Anthracite Basin alone is 31,000 cubic feet a minute 43,640,000 cubic feet or 1,000 tons a day.

At ordinary temperatures most coal yields at least an equal volume, of gas or 20 cubic feet to the ton. Some coal yields five times as much as this and unusual samples have yielded at the rate of 150 cubic feet per ton of coal. The proportion of methane in the gases also varies but from most coal mines it is in excess of 75 per cent, the remainder being carbon dioxide, oxygen and nitrogen.

Origin. — Methane in coal undoubtedly is a product of the decomposition or molecular rear¬ rangement of organic matter during its trans¬ formation into coal by putrefactive bacilli. The process may have continued for some time but is now no longer in progress in the coal. Pos¬ sibly, however, the diminution of pressure in the coal by erosion of overlying strata or even Dy mining may effect disassociation of some as yet unrecognized intermediate compounds with resulting emanation of more or less additional methane.

Probably different degrees of putrefaction had much to do with variations in the amount of methane in coal. Renault has studied the' process in detail and discovered remains of the various organisms which cause putrefaction in vegetal accumulations. It was found that the process. varied with the nature of the materials and their rate of deposition, and accordingly the resulting gases vary in character and propor¬ tions. The stage of progress when the vegetal matter was buried by sand or mud and the nature of the cover had great influence. Natu¬ rally all these conditions varied from place to place so that the variation in the volume of methane now found in the coal was largelv caused earlv in its history. Of course there has been more or less subsequent escape of the gas, especially where overlying strata are porous or have been thinned by erosion. Ordinarilv

there is more methane in anthracite than in bitu- minous coal and if this gas was developed when the coal was formed it is a mistake to suppose that in anthracite most of the volatile matter has been ((baked out® and escaped through porous rocks and joints. It is im¬ possible to conceive of the loss of the heavy hydrocarbons of the so-called <(volatile matter® a?d the retention, of several volumes or any of .the highly volatile methane. As shown above it is most improbable that any notable amount of the methane developed after the ((metamor- phism.®

Fire Damp.— The term fire damp is applied to mixtures of methane and air in which the proportion of the former is from 4 to 30 per cent. Pure methane is not explosive because a large amount of oxygen is required for its combustion, and ordinarily when its proportion falls below 5 per cent the danger of explosion is passed. A proportion of 9l/2 per cent of methane causes the most violent explosion and Barrell ˆ and Siebert have found that mixtures containing less than 5.5 per cent or more than •a ˆer will not

explode. The limit of inflammability is near 30 per cent, the mixture burning quietly between this proportion and ex- plosibility (12.8 per cent). However, propor¬ tions of methane abov.e 4 per cent are highly dangerous because a slightly increased rate of emanation might bring the proportion up to the explosive figure and mixtures containing more than 12.8 per cent may quickly become di- utm,wlth sufficient air to make them explosive.

The proportion of methane in the air in a mine depends not so much on the amount given off by the coal as on the volume of air used for ventilating the workings. Therefore for comparisons it is best to consider the volume of methane in a unit of time. This depends upon the amount of coal mined but with notable variations from. place to place and in different mines and districts. There has been consider¬ able discussions as to what constitutes a gas¬ eous mine but most authorities agree that 2 per cent of methane in the return air places the mine well within the category, especially if there is . liability of a sudden increase. In certain mines in the northern anthracite basin of Pennsylvania with total discharge of 2,000 to 3,000 cubic feet of methane a minute, the per¬ centage approaches 2. The return air from a group of mines in Prussia carried from .13 to 1.5 per cent of methane and some of the more gaseous ones gave off 256,500 to 897,600 cubic feet of that gas a day. Some Austrian mines carried from .68 to 1.90 per cent of methane in their total returns, Russian mines .13 to 2.92 per cent and mines in Scotland .05 to .5 per cent.

Mode of Entry. — Gas escapes from coal mostly through pores and minute fissures but in places ˆfeeders® or «blowers® occur which yield large volumes of gas. These are not al¬ ways in. the most gaseous mines. A persistent blower in the Pelham mine in England in 1847 for a while discharged 47,000 cubic feet a minute. Some blowers continue for many years. The gas is mostly methane with 5 to 20 per cent of nitrogen and a small amount of carbon di¬ oxide. In a few mines in Europe blowers of carbon dioxide occur. Sometimes in the course of mining and especially through ((runs® or <(falls® of coal, ˆsqueezes® or roof caving, large bodies of gas come suddenly into a mine and

such ˆoutbursts® have caused some very serious explosions. In places gas accumulates in pockets and this is rapidly liberated when large volumes of coal are shattered. Many runs of coal are caused by gas pressure. An outburst in a mine six miles west of Pottsville, Pa., liberated a body of gas estimated at 50,000 to 200,000 cubic feet; at Agrappe Colliery, Belgium, in 1879 an outburst of 85,000 cubic feet caused the death of 121 miners ;

at Besseges, Belgium, in 1890 an outburst of 28,000 cubic feet exploded killing 131 miners, the outflow continuing 12 hours. At Morrissey in British Columbia in 1904 an outburst threw out 3,500 tons of coal with emission of about 5,000,000 cubic feet of gas. At Abercarne mine in south Wales the face blew out and about 1,000,000 cubic feet of gas were emitted. The great squeezes at Pittston, Pa., in 1904 and at Warrior Run, near Wilkes-Barre, Pa., two years later, gave off vast vol¬ umes of explosive gas. It is estimated that 357 of the explosions in Belgium mines from 1850 to 1908 with large fatalities were due to gas. Doubtless some of the great dust explosions in coal mines have been started by ignition of a gas outburst.

Volume. — The amount of methane given off in mining coal differs greatly in various regions and mines and parts of mines. In 23 mines in the Saarbruck'en Basin, Germany, it ranged from 16 to 1,060 cubic feet to the ton of coal mined or from to 30 times the volume of the coal and in one case the volume of gas was 2,160 cubic feet to the ton (a ton of coal is about 20 cubic feet). The total ema¬ nation from these 23 mines ranged from 8,870 to 732,566 cubic feet a day, with a yearly total of about two and one-quarter billion cubic feet or 44,000 tons. Certain mines near Wilkes- Barre, Pa., producing about 2,000 tons of coal a day each, give off 2,000 to 3,000 cubic feet a minute or 1,500 to 2,500 cubic feet of methane to the ton of coal mined. Other mines in the same basin with equal output gave off only 15 to 75 cubic feet to the ton of coal produced.

In gaseous districts in Austria the methane emanation averaged 7,479 cubic feet to the ton of coal extracted or 370 cubic feet of the gas to a cubic foot of coal, and the average in the less gaseous mines was 26 cubic feet to the ton. The Prussian Commission found 30 to 120 cubic feet to the cubic foot of coal removed and in one district the amount was 14 cubic feet. It was found by Darton that in the north¬ ern anthracite coal field of Pennsylvania the average amount was 140 cubic feet and in mines in the bituminous field of central Illinois the amount ranged from y2 to 10 cubic feet of gas to the cubic foot of coal removed. Generally the amount is less in old mines because much of the gas has escaped. In most cases also the cessation of mining on Sundays and other times showed material diminution in the gas emanation. Some comparisons made after a shut down of one month caused by a strike in Pennsylvania and Illinois mines showed a marked decrease in parts of most mines but in a few places there was no change or a slight increase. The general decrease in a group of Illinois mines was 32 per cent.

Pressure. — The gas confined in coal beds must exert a pressure proportionate to its rela¬ tive volume and as the volume is variable the pressure varies accordingly. Observations made

with tubes sunk in the coal faces in various mines showed pressures from almost inappreci¬ able amounts to several hundred pounds to the square inch. The cause of the variation is difficult to understand. Pressure is manifested in many places by the disposition of the coal to break out of the face in mining and often men are killed by this cause. Naturally, how¬ ever, some of the evident pressure in the face is due to stress from the roof and other sources. The pressure observations gave varied results. In a group of English mines the pressures ranged from 28 to 461 pounds to the square inch, in Belgium mines the range was 187 to 555 pounds, in Lievin, France, 64 to 96 pounds while at Saint Etienne it ranged from V2 to

44 pounds and in Austria 82 to 142 pounds. In a mine near Wilkes-Barre, Pa., a pressure of

45 pounds was observed and in several mines in central Illinois the pressure ranged from a few ounces to 33 pounds. At most places where the pressures were notable several days were required for the maximum amount to be mani¬ fested in the gages used in the tests. The pres¬ sure shown was seldom closely related to the amount of gas escaping. In a given locality the highest pressure was usually found in the deepest test holes and compactness of the coal has much influence because the gas escapes from the coal near the face and the pressure rapidly declines, especially in the more permeable coal. It is well known that considerable gas escapes through permeable rocks adjoining the coal, in some areas reaching the surface of the ground. Much gas also flows into the mine workings by this means.

Volume in Coal.— The volume of gas in coal which has been removed from the mine varies greatly. Samples heated to 212° F. gave the following amounts :

Volume of Gases Given Off by Various Coals

at 212° F.

Constitution

KIND OF COAL

Volumes

CH4 per cent.

COj per cent.

English, bituminous ….

semi-bituminous

anthracite .

Ryhope district .

.32- .82 . 99-5 . 07 7.50-8.11 11.00 .4-1.9 2.5 2.5

5-36 5-13 2- 5 16

60-94

84

43-87

.8-6.00 . 3-1 . 00

i

16

German, various mines . .

“ Saarbrucken . . .

Belgian .

Volumes of Gases Given Off by American . Coals at Ordinary Temperatures in Several Months.

LOCALITY

Volumes

Relative volumes

CH«

C02

Monongah, W. Va . .

.90 4.00 .05 1.13 1.95 .55 .09 .25 . 17

Nanticoke, Pa .

Pocahontas, Pa .

.04 1.08 1.82 . 18 .07 .22 .16

.01

.05

.13

.37

.02

.03

.01

Harrisburg, Ill. . . .

Benton, Ill .

Sheridan, Wyo .

Rock Springs, Wyo. . . . Hanna, Wyo .

Connellsville, Pa . . .

These had all lost much gas in mining.

GASES IN MINES AND COAL

327

. Condition. As the volume of gas in coal is in most cases greater than that of the coal and vastly more than that of the interstices or pores, its physical condition is problematical. 1. here must be condensation under such high pressure. . When coal is mined and especially when it is crushed, a large proportion of the gas escapes rapidly, but much time is required for the complete liberation of the gas as its tension decreases. Chamberlin found on crush¬ ing coal in a vacuum only one-quarter as much gas was given off in the process as was given off in vacuum in six months following.

It would seem that powdering the coal would open all of its pores and liberate practically all the gas, but this is not the case. It was found that even under an applied pressure of 75 pounds to the square inch coal samples con¬ tinued to give off gas. No relation has been found between the proportion of gas and the texture of the coal or of the components of the coal as indicated by chemical analyses. Coals highest in "volatile

constituents® are not highest in methane.

It has been shown that methane and other gases escape from coal while it lies in the ground, while it is being mined and for a long time after it is mined. The rate of escape varies with different coals and the proportion of methane in the admixture also varies, but in general in the laboratory it is found that the methane is given off somewhat more slowly than the other gases. Samples under different test conditions gave off the gases very unevenly. Crushed samples of bituminous coal from Monongah, W. Va., gave off 1.5 volumes of methane rapidly and then continued to give off a gradually diminishing amount for six months, one-third additional volume coming out in that time. Fine pulverization hastens the emana¬ tion but in most cases did not add to the ulti¬ mate total.

Relation to Weather and Earth Move¬ ments. — It is an old and deeply-seated idea that there is close connection between the weather and the amount of fire damp in mines, and miners generally regard increased gas emana¬ tion as an indication of the approach of stormy weather. The idea has been prev¬ alent also that explosions in mines are more frequent at times of low atmos¬ pheric pressure. Sir F. Abel has shown that this is not the case for in explosions from 1875 to 1885 involving the loss of 2,729 lives only 17.4 per cent of the mortality was at a time when the barometric pressure was below the average and half of the explosions occurred when the pressure was increasing. It is now known, however, that many of the explosions were caused by dust and had no relation to in¬ crease of gas in the mine. Diminution of atmospheric pressure undoubtedly affects the liberation of gas from coal surfaces and es¬ pecially from old workings and crevices where gas has accumulated, but it cannot materially affect the gas under high pressure in the body of the coal. Investigations in English, French, Prussian and Austrian mines all showed in¬ crease of methane in the returns when atmos¬ pheric pressure diminished, especially if the change was rapid, but in nearly all the tests there were extensive old workings containing more or less gas. Tests with coal samples showed no relation up to a diminution of pres¬

sure amounting to one and one-half inches of mercury.

It has been claimed that earthquakes, sun¬ spots and other natural disturbances affect the emanation of gas in coal mines but investiga¬ tion has not shown any such relation. G. H. Darwin has shown that variations in atmos- pheric pressure cause up-and-down movements of the earth's crust which may amount to sev¬ eral inches in vertical amplitude. These might cause slight cracldng in some places and so affect gas emanation. From a consideration of a larSe amount of evidence the author believes that ordinary earth movements do not materi¬ ally affect the emanation of

methane in mines unless possibly to precipitate an outburst that is about ready to take place; ordinarily a blast in a nearby chamber would cause much more local movement than an average earthquake.

Poisonous Gases. — The physiologic effect of gases in mines varies greatly. Any air in which the oxygen content falls below 7 per cent will not support human life and half the normal amount or 10/2 per cent is dangerously low, so that whenever air is mixed with an excess of inert gases it may prove fatal. Methane and carbon dioxide are probably not toxic and per¬ haps no more deleterious than the harmless nitrogen, but their proportion may become so great in the mine air that they will not support human life. It is. claimed by some physiologists that carbon dioxide has slight toxic effect but this is by no means proved. Carbon monoxide, however, which is produced in certain amounts in the ignition of fire damp and coal dust, in explosions and by mine fires is highly poison¬ ous. It is the toxic agent in the afterdamp resulting from explosions that kills many miners and is very dangerous to those endeavoring to rescue the men imprisoned in the mine. Air containing a very small proportion of carbon monoxide will cause death, especially if the pro¬ portion of the oxygen is diminished. The amount that can be endured by a person de¬ pends mainly on his vitality and the length of time he breathes the gas, but no one can sur¬ vive more than a few minutes in air contain¬ ing one-half of 1 per cent. The effect is cumulative and half this proportion would be fatal if breathed for a long time. No gas masks will satisfactorily remove the gas al¬ though it is absorbed by blood and decom¬ posed by certain copper compounds under fa¬ vorable conditions. Removal from the bad air and vigorous long-continued artificial respira¬ tion, especially with oxygen, may save a person who has succumbed, but the chances of re¬ covery are much less than in suffocation by carbon dioxide or other inert gas.*

Bibliography. — Arnould, G., (£tude sur les degagements instantanes de Grisou dans les mines de houille du bassin Beige5 (Ann. Trav. Pub. Belgique, Vol. XXXVII, pp. 1-108, 1880) ; Austrian Fire Damp Commission Publications, Abstract Fed. Inst. Min. Eng. (Vol. Ill, pp. 531—550, 1892) ; Barker, P., (Occluded Gases in Illinois Coals5 (Ill. Geol. Survey Bull. 14, 1908) ; Beard, J. T., XLV, 1897) ;

Burrell, G. A., and Siebert, F. M., inflam¬ mable Gases in Mine Air> (Bureau of Mines Technical Paper, 39, 1913) ; Chamberlin, R. T., Explosive Mine Gases and Dusts) (U. S. Geol. Survey Bull. 383) ; Chesneau, G., (De l'etude des mouvements de l'ecorce terrestre au point du

vue de leur rapports avec les degage- ments de produits gazeux) (Annales des mines, ser. 8, Vol. IX, pp. 207-281, 1886, Vol. XIII, pp. 389-428) ; Darton, N. H., Occurrence of Explosive Gases in Coal Mines > (Bureau of Mines, Bull. 72, 1915) ; Ghysen, H., (Quelques considerations sur les degagements instantanes de grisou) (Review Univ. des Mines, ser. 3, Vol. LIX, pp. 1-61, 1902) ; Hilt, C., (Bericht iüber Versuche betreffend den Einfluss des wechseln- den Luftdruckes auf die Entwickelung des Grubengasses) (Auftrage der Preuss. Schlag- wetter Commission, Zeitschr. Berg-Hutten- Salinenwensen, Vol. XXXIV, pp. 72-90, 1886) ; Kohler, G., (De l'influence des variations de la pression atmospherique sur les degagements de grisou' (Bull, de la soc. l'indus. min., ser. 3, Vol.

I, pp. 627-655) ; Le Chatelier, H., (Le Grisou) (Translation Col. Eng., Vols. XIII and XIV) ; Mallard, E., (Experiences sur la pression du grisou dans la houille) (Annales des Mines, ser. 8, Vol. I, pp. 530-551, 1882) ; Maquet, A., ˆesures des pression du grisou dans Beaulieu- sart du Fontaine lEveque' (Ann. Trav., pub. Belgique, Vol. XLIV, pp. 405-451, 1886) ; Milne,

J. , 'On Earth Pulsations and Mine Gas) (Trans. Fed. Inst. Min. Eng., Vol. V, pp. 203-230, 1893) ; Morin, L., (De l'influence des variations de la pression atmospherique sur les degage¬ ments de grisou) (Annales des Mines, ser. 10, Vol. XVI, pp. 285-437, 1909, and Eng. and Min. Jour., Vol. XC, pp. 565-568) ; Parr and Barker, (The Occluded Gases in CoaP (Univ. of Ill., Bull. 32, 1909) ; Porter and Ovitz, (The Escape of Gas from CoaP (Bureau of Mines, Tech. Paper 2, 1911) ; Simon, A., Experiences faite aux mines de Lievin' (Ann. des Mines, ser. 9, Vol. VIII, pp. 219-231, 1895) ; Wood, L„ Ex¬ periments Showing Pressure of Gas in CoaP (Trans. N. of Eng. Min. Eng., Vol. XXX, pp.

163-256, 1880-81).

N. H. Darton,

United States Geological Survey.

GASES IN ROCKS. Rocks contain small amounts of various gases; some minerals have minute cavities containing liquid and gaseous matter, usually both. Meteorites contain gas, some of them in large relative volume. Many igneous rocks when subjected to high tempera¬ ture in a vacuum give off several times their volume of gas. Chamberlin has determined the volume and proportion of gases in many samples of rocks of various, classes and ages. The tests were made by heating the pulverized rock in a vacuum. The accompanying table gives aver¬ ages of the results.

Among igneous rocks classified by age the oldest rocks generally contained the most gas. the smallest amount being in recent lavas (.60 volume). Fine grained igneous rocks yielded more gas than the more coarsely granular ones. In the sedimentary rocks tested there was less difference in relation to age. The condition of these gases is somewhat in doubt. Small amounts are in minute cavities, some other portions are doubtless occluded, and from some

rocks possibly considerable of the gas given off is due to chemical reaction at the high temperature. Consult Chamberlin, R. T., (The Gases in Rocks' (Carnegie Inst, of Washington, Publication No. 10, 1908).

Analyses of Gases from Rocks and Meteorites. (Relative Volumes).

TYPE OF ROCK

No. of

Analyses

N

O

o

CO

a

O

*e**

M

*e**

£

c n «

a

Total

Schist, basic .

2

4.06

0. 19

0.05

3.44

0.13

0.00

7.87

Diabases and ba-

salts .

14

3.96

.44

. 12

2.54

.11

. 19

7.36

Gabbros and dio-

rites .

11

2.31

. 13

.07

2.09

.11

.02

4.73

Granites and

gneisses .

19

1.47

.22

.05

1.36

.09

.00

3.19

Andesites .

7

1.86

. 18

.06

.20

.09

.00

2.39

Syenites .

4

. 18

.07

.05

.91

.04

.00

1.25

Rhyolites .

4

.69

.05

.02

.06

.05

.00

.87

Shales (non-bitu-

minous) .

3

3.72

.45

.11

.97

. 18

.00

5.43

Sediments (meta-

morphosed) .

13

.77

.22

.05

1.52

.05

.57

3.18

Sandstone and

quartzite .

12

.29

.11

.02

.17

.08

.02

.69

Meteorites, stony. .

12

3.77

.24

.20

.50

.09

.00

4.80

Meteorites, iron. . .

9

.21

.67

.02

1.67

.24

.00

2.83

GASH VEIN. See Vein.

GASKELL, Elizabeth Cleghorn Steven¬ son, English novelist: b. Chelsea, 29 Sept. 1810; d. Alton, Hampshire, 12 Nov. 1865. She was brought up by an aunt at Knutsford in Cheshire, where she spent the greater part of her early life. This town is said to be the original of the village in her story of (Cran¬ ford, } described as inhabited exclusively by maiden ladies and widows of limited means. She married in 1832 the Rev. William Gaskell (q.v.), a Unitarian clergyman then recently ap¬ pointed minister of Cross Street Chapel, Man¬ chester. Her first work, (Mary Barton, ‘ ap¬ peared in 1848. The A thenceum says it raised the Lancashire dialect almost to the level of the broad Doric used by Scott in his northern novels. In this, as in most of her works, Mrs. Gaskell appears as a social reformer. Her moral

and economical theories may be ques¬ tioned, but as a writer of fiction she wields artis¬ tic and dramatic powers of a hio-h order. (Mary Barton > represents the struggles formerly so rife in Lancashire, and which have since passed in new phases and into other quarters, between workmen and employers. (The Moorland Cot¬ tage' appeared in 1850; and in 1853, her next novel, 'Ruth,' which aims a distinct blow at the common moral judgments of society. The tale is powerfully told, but will hardly satisfy a dispassionate reader of the soundness of Mrs. Gaskell's moral theories. Her later works in¬ clude 'Cranford' (1853), an English classic, the popularity of which is constantly increas¬ ing; (North and South' (1855); 'Sylvia's Lovers' (1860); (Cousin Phillis' (1865);

(Wives and. Daughters' (1866). In 1857 ap¬ peared a Eife of Charlotte Bronte,' of which the Athenceum observed: <(As a work of art we do not recollect a life of a woman by a woman so well executed." Consult Chadwick, E. A., (Mrs. Gaskell, Haunts, Homes and Stories' (New York 1911) ; Shorter, C. K. 'Mrs. Gaskell' (London 1904).

GASKELL, Walter Holbrook, English sci¬ entist: b. Naples, Italy, 1847; d. 1914. He re¬ ceived his education at Cambridge University and studied medicine at the University Hospital and also at the University of Leipzig. He was ap¬ pointed lecturer in physiology at Cambridge in

1883, _ and six years later was made Fellow of Trinity Hall. He received a gold medal from the Royal Society for his investigations of the nervous system. He became known inter¬ nationally for his theory concerning the cen¬ tral nervous system of vertebrates which he claims is derived from a union of the nervous system of an ancestral crustacean form with the alimentary canal. He became head of the physiological department of the British Asso¬ ciation for the Advancement of Science in 1896.

GASKELL, William, English Unitarian clergyman : b. Latchford, near Warrington, Lancaster, 24 July 1805; d. Manchester, 11 June

1884. He was graduated from the University of Glasgow in 1824; studied theology at Man¬ chester College, York, in 1825-28; was junior minister of Cross Street Chapel, Manchester, from 1828, and senior minister from 1854. In 1840-46 he was secretary to Manchester New College, and in 1846-53 professor there of English history and literature. He also taught logic and English literature in Owens College. He was an editor of the Unitarian Herald 1861-75 ; made a favorite rendering of Luther's (Ein

feste Burg) ; wrote many original hymns, of which some appear in James Martineau's (Hymns of Praise and Prayer> (1874); and published numerous tracts and sermons, be¬ sides (Two Lectures on the Lancashire Dialect > (1844), appended to the 5th edition (1854) of the (Mary Barton > of his wife, Elizabeth Cleghorn Gaskell (q.v.).

GASOLINE, a colorless, inflammable liquid, one of the lighter distillates of petroleum. In early use it was a general name for all the lighter oil ranking above kerosene, but as mineral oil came to be separated into a larger number of grades, of varying specific gravity, gasoline became the accepted name for distillate having a specific gravity between .629 and .667 (of 95° to 80° Baume scale). The generally accepted European name for the same distillate is petrol. Gasoline has become of great com¬ mercial importance as the most convenient source of vapor for internal-combustion engines of the types used in automobiles, motorcycles, aeroplanes, etc. The continued increased de¬ mand forced up the price 70 per cent between July 1914 and July 1916.

Crude petroleum, under ordinary methods of distillation, yields but a small percentage of gasoline, and the increased demand stimulated effort to increase the supply, and improved processes are now yielding a much enlarged production of this valued disjtillate.

Gasoline, like all other products of crude petroleum, was for a long time disposed of as waste in the effort to make kerosene ; it was there and had to come out. In the latter sixties it was exported to Europe in small quantities. Representing nearly the lightest portion of crude oil, gasoline is extracted by distillation, just as whisky is produced, and in much the same sort of apparatus. The stills or retorts may be of any shape and size ; both are imma¬ terial, and practice has differed. They may be

cylinders placed horizontally and in banks, or cylindrical or conical, standing perpendicular and having curved domes. Rectification is ef¬ fected by a copper coil, many feet in length in¬ side the retort and passing through the crude petroleum, carrying steam at a high pressure, assisted by^a gentle direct fire varying from 122° to 257° F. Each retort has an inlet pipe for the crude petroleum and an outlet pipe for the distillant. The outlet pipe passes over the side and down to a cooling coil or worm immersed in cold running water. This worm acts as a condenser that changes back to liquid form the vapors driven off the petroleum by the heat. A smaller pipe leads from the condenser to a re¬ ceiver having glass sides through which the (

When the demand for more gasoline began to press upon the petroleum industry, it was at first met by the recovery of more ((casing-head gas.®

Natural gas and petroleum come from the same wells, usually on the first flow the gas being in the excess, for it is simply the vapor of petroleum. Much natural gas is lost from new wells, but it is possible to conserve a large part of the lighter product at the casing-head or mouth of the well, and much of the light oil, in a condition closely approaching gas, is now retained in the casing-head and drawn off for distillation into gasoline.

About 1913 the bracking® process of pro¬ ducing gasoline began to come into use, being first exploited as a secret process; but its prin¬ ciple has gradually become known and it is now generally practised by oil refiners. Crude oil, which has yielded its product of gasoline and

other of the lighter distillates by the ordinary methods, is confined in a vessel and subjected to both heat and pressure, which breaks up the hydrocarbons or "cracks® the oil. One author¬ ity gives 932° F. as the proper temperature and 50 to 75 pounds the proper pressure for crack¬ ing oil to secure gasoline. In a preferred form of cracking apparatus the top and walls of the cylinder containing the oil are lined with steel balls, placed in layers. The oil is vaporized in passing out through the mass of hot balls, and released by a valve into an upper gasoline tank. Another type of cracker heats and compresses the oil in a coil or tube, which is so arranged that the production is continuous. It is a pe¬ culiarity of the cracking process that it may be repeated many times, and more gasoline is formed every time. Even the heavy oil paraf¬ fine can be cracked into crude oil, and the crude oil cracked into gasoline. The cost of crack¬ ing is not prohibitive, and it appears to have settled the problem of gasoline supply.

GASOLINE ENGINE. See Internal Combustion Engine.

GASOMETER, or GAS HOLDER, an in¬ verted cylindrical vessel of sheet iron, placed in a tank of cast iron, stone or brick containing water. A pipe ascends from the bottom of the tank through the water, to admit the gas to the space between the surface of the water and the crown of the gas holder. Sometimes a second pipe descends through the water and the bottom of the tank, for the issue of the gas to the main pipe. Frequently only one pipe is used for the inlet and outlet alternately. The water is for the purpose of retaining the gas within the vessel. The pressure of the gas raises the gas holder; and the weight of the gas holder, or such part of it as is not taken off by balance weights, impels the gas through the pipes. When balance weights are necessary, they are attached to the edge of the crown of the gas holder by long chains, which pass over pulleys on the top of columns which

serve also to guide the motion of the vessel in rising and falling. Gas holders are constructed of various sizes, some exceeding 200 feet in diameter and having nearly 6,000,000 cubic feet capacity.

GASOMETRIC ANALYSIS. In chemis¬ try, the art of separating and of estimating, quantitatively, the several constituents of a gaseous mixture. The methods employed may be divided into three general classes: (1) Those based on diffusion; (2) those based upon the absorption of certain constituents by sub¬ stances over or through which the mixed gases are passed; and (3) those in which the given mixture is oxidized and its original composition inferred from an examination of the products of the oxidation. In the application of diffusion methods, the mixture is caused to pass through a porous septum of graphite, gypsum or baked clay. The lighter constituents pass through faster than the heavier ones, so that a partial separation is effected. By causing the mixture to pass through a succession of such porous partitions, the concentration effects may be cor¬ respondingly increased. This method has been employed in many chemical researches, espe¬ cially for effecting the concentration of gaseous substances that are present in a mixture in very small quantity. Its value as an experi¬

mental method was well demonstrated in con¬ nection with the study of the rare gases of the atmosphere, in effecting the separation of helium from argon. In general, the rates of diffusion of two gases are proportional to the square roots of their densities ; and the den¬ sity of argon being 10 times that of helium, it follows that helium will diffuse through a por¬ ous septum about 3.2 times as fast as argon.

In the analysis of gases by the absorption of certain of their constituents by means of chem¬ ical substances, use is made of the following facts (among others) : Water absorbs HC1, HBr, and HI, very readily; solid caustic potash, when moist, absorbs all acid gases, such as CO2, S02, H2S, HC1, etc. ; dilute sulphuric acid absorbs all alkaline gases, such as am¬ monia ; concentrated sulphuric acid also absorbs water, alcohol, ether, methyl oxide, and (more slowly) propylene and its homologues ; alkaline solutions of pyrogallic acid absorb oxygen very readily; cuprous chloride in solution in hydro¬ chloric acid absorbs oxygen and carbon mon¬ oxide; and solutions of Cr03 and of KMnO absorb H2,S and S02. In the study of special problems, certain unusual absorbenta also sug¬ gest themselves. Thus in the isolation of the rare gases of the atmosphere, great use was made of the fact that red-hot metallic magne¬ sium absorbs nitrogen gas, while it is without effect upon argon, helium, and the other gases of that group.*

The combustion methods are particularly ap¬ plicable to those cases in

which the mixture to be analyzed is capable of being burned so that the final products are water, carbon dioxide, and free nitrogen, together with excess of such gas as may have been added in order to effect the combustion. The combustion is effected in an instrument called a "eudiometer,® which com¬ monly consists of a graduated glass tube that is closed at the upper end, and which is provided with a pair of platinum electrodes fused through the glass near the closed end. A sample of the gas to be analyzed is introduced into the tube (the lower end of which dips into a mercury bath), and its volume is determined by reference to the graduation marks ; readings being simultaneously taken of the thermometer and barometer, so that the observed volume of the gas can be reduced, in the subsequent cal¬ culations, to standard conditions of tempera¬ ture and pressure. A known quantity of such gas as may be required to effect the combustion is next added; pure oxygen being used if the gas under examination is rich in carbon and hydrogen, and pure hydrogen being used if it is highly oxygenated or chlorinated. It is usual, also, to add a known quantity of "fulminating gas,® which is prepared by the electrolysis of water and consists of pure oxygen and hydro¬ gen in the proportion in which they combine to form water. The mixture is then exploded by passing an electric spark between the electrodes that are sealed into the eudiometer near its closed end, and after the heat developed by the explosive combustion has been lost by radiation, the volume of the mixture is again determined. The several constituents that remain in the eudiometer tube are then removed, one by one, by the temporary introduction, into the tube, of suitable absorbent substances. The volume of the gaseous contents of the eudiometer tube are

observed after each partial absorption, and ˆroJT1 the data so obtained the quantities of carbon, oxygen, hydrogen and nitrogen that were present in the original sample may be calculated. Consult Hempel, (Methods of Gas Analysis) (trans. New York 1912) ; Sutton,

GASPARIN, gas'pa'ran, Agenor Etienne,

Comte de, French author : b. Orange, France, 12 July 1810; d. near Geneva, Switzerland, 4 May 1871. Elected to the Chamber in 1846, he attracted attention by his advocacy of religious liberty, prison reform, abolition of slavery and social purity. At the outbreak of the Ameri¬ can Civil War he published two books main¬ taining the justice of the Federal cause entitled, (The Uprising of a Great People' (1861), and (America Before Europe' (1862). Other im¬ portant works were (Slavery' (1838);

Chris¬ tianity and Paganism' (1850); (Liberal Chris¬ tianity' (1869); Hnnocent III,' published posthumously.

GASPARIN, Valerie Boissier, Comtesse de, French author: wife of A. E. de Gasparin (q.v.) : b. Geneva, Switzerland, 13 Sept. 1813; d. near Geneva, 1894. Two of her works ob¬ tained the Montyon prize at the Academie Fran¬ chise: 'Marriage from the Christian Point of View,' and 'There are Poor in Paris and Else¬ where.' Among her other publications are 'Journey in the South by an Ignoramus' ; (Let's Go Make a Fortune in Paris' ; 'A Book for Wives' ; (Read and Judge' (strictures on the Salvation Army), and (The Near and the Heavenly Horizons.' Several of her books were translated into English, the last named being read very widely in America in its Eng¬ lish form.

gasp£, gas'pa', Philip Aubert de, Cana¬ dian author: b. Quebec, 30 Oct. 1786; d. there, 29 Jan. 1871. A lawyer, afterward sheriff, he became involved in debt for which he was imprisoned four years ; and when released, secluded himself on his estate of Saint Jean Port-J.oli. His 'Old-Time Canadians' (1863), and his (Memoirs' (1866), treat of Canadian traditions and folklore, and were written in French. The former was perhaps the most popular book ever published in the province of Quebec. English translations have been made by Mrs. Pennie and G. C. D. Roberts.

gasp£, Canada, a district in the province of Quebec, consisting of the counties of Gaspe and Bonaventure, and forming the northern part of the peninsula that lies between the Bay of Chaleur and the Gulf of Saint Lawrence. Area, 8,015 square miles. Pop. (1911) 63,111. The name is sometimes extended to the whole peninsula. Cape Gaspe is a bold headland of the Schikshock or Notre Dame Mountains, terminating the peninsula and forming the north shore of Gaspe Bay. The inhabitants are chiefly engaged in important fisheries, which, with the export of lumber, form the staple in¬ dustries. Gaspe, a village and port of entry in Gaspe Bay where Cartier landed in 1534, set up a cross and assumed formal possession in the name of the king of France, is the capital and commercial centre of the district. Pod

606.

GASPEE, The, British revenue vessel, burned 1772. She was an armed schooner of eight guns, stationed at the entrance of Narra- gansett Bay to prevent that evasion of the Brit¬ ish navigation laws which had largely built up the prosperity of the Atlantic Coast and was al¬ most the entire subsistence of Rhode Island. Its authorities connived at the traffic, and at a regular price furnished false flags, which for years passed muster, but Lieutenant Dudingston of the Gaspee adopted the method of searching

thoroughly every trading vessel which entered or left the bay, without regard to her flag or papers, and sending the contraband goods to Boston for adjudication. This meant ruin to Rhode Island ; the executive wrote demanding Dudingston's authority, and the chief justice sent a sheriff on board; both held that his pro¬ ceedings were illegal, as he should have a commission from the governor and be sworn in. They were referred to the admiral, and then to the British Secretary of State. On 9 June 1772, the regular packet left Newport for Providence without notifying Dudingston, who gave chase but ran the Gaspee aground at Namquit Point, seven miles below Providence, at low tide. That night the leading men of that city, with a com¬ pany of assistants, set out in eight large boats, boarded and captured the vessel, badly wound¬ ing the commander, set the crew on shore and burnt the schooner. The Rhode Island authori¬ ties opened an investigation with great zeal, and offered rewards for the apprehension of the guilty persons, but could discover none. The home government was greatly incensed, and appointed colonial commissioners, who sat at Newport 4-22 Jan. 1773, to make inquiry, and ordered Governor Wanton to arrest the offenders and send them to England for trial. The governor and. the chief justice applied to the assembly for instructions, which body re¬ ferred it to the discretion of the chief justice, who refused to allow any arrests for transpor¬ tation to be made.

GASQUET, gas'ka', Francis Aidan, Car¬ dinal, English Catholic divine and historian : b. London, 5 Oct. 1846. He was educated at Downside, became a novice of the Benedictines at. Belmont in 1865 and was ordained to the priesthood in 1874. He was prior of Downside from 1878 to 1885. During his term of office the school was modernized and the abbey church begun and carried on toward com¬ pletion. In 1886 he began systematic historical research work. He was a member of Leo XIIPs Commission on Anglican Orders in 1896; was the recipient of a brief from that pontiff dated 17 March 1897 and was appointed by Pius X a consultor of the pontifical Com¬ mission for the Reunion of Dissident Churches. He was abbot-president of the English Bene¬ dictine Congregation and abbot-titular of Saint Alban's, Reading, in 1900-14. During his term of office, Downside, Ampleforth and Donai-at- Woolhampton were raised to the rank of ab¬ beys; a house of studies was opened near the British Museum, and another at Cambridge. In 1907 he was appointed president of the Com¬ mission formed to examine the text of the Latin Vulgate Bible and to collect material for amending it. At the last consistory held by Pius X, in May 1914, he was created a cardinal priest by the title of Saint George in Velabro (Cardinal Newman's titular church). This

church he resigned in 1916 for that of Santa Maria in the Campitelli. As a writer Cardinal Gasquet has won a generally conceded suprem¬ acy as the authority on Pre-Reformation monasticism in English. Among the works which have gained him his pre-eminence as a historian are (Henry VIII and the English Monasteries5 (1888-89) ; (Edward VI and the Book of Common Prayer5 (1890) ; (The Great Pestilence) (1893) ; (The Last Abbot of Glastonbury) (1895) ; (A Sketch of Monastic Constitutional History5 (1896) ; (The Old Eng¬ lish Bible and Other Essays 5 (1897) ; III and the Church5 (1905);

GASSENDI, ga'san'de' (properly GAS- SEND), Pierre, French philosopher and math¬ ematician : b. Champtercier, near Digne, Pro¬ vence, 22 Jan. 1592; d. Paris, 24 Oct. 1655. At 19 he was appointed to fill the chair of philos¬ ophy at Aix, and although the authority of Aristotle was still warmly maintained, he ven¬ tured publicly to expose the defects of his sys¬ tem. His lectures on this subject,

G ASTER, Moses, Jewish theologian and Orientalist: b. Bucharest, 16 Sept. 1856. Gradu¬ ating from the Breslau University (1878), he returned to his native city, where he published a history of Rumanian popular literature (1883) and became lecturer in Rumanian lan¬ guage and literature at Bucharest University (1881-85). In 1885, having been expelled by the government, he went to England, where he was appointed Ilchester lecturer in Slavonic

literature at Oxford, his lectures being pub¬ lished in 1886 under the title (Greco-Slavonic Literature.5 He refused the government's in¬ vitation to return home, although the decree of expulsion was canceled. His report on British education (1895) at Rumania's request was accepted as a basis for educational reform in that country. In 1887 he was appointed Haham or rabbinical head of the Spanish and Portuguese Synagogue of London and from 1891-96 principal of the Judith Montefiore Col¬ lege, Ramsgate. A writer of many mono¬ graphs in the transactions of Oriental societies, he published (Jewish Folk-Lore in the Middle Ages5 (London 1887) ; (The Sword of Moses5 (1896) ; (The Character of Terahmeel5 (1899) ; c History of the Ancient Synagogue of the Spanish and Portuguese Jews5 (1901); and contributed numerous articles to periodicals in Oriental lore. He is prominently identified with the English Zionists.

GASTINEAU, gas'te-no-', Benjamin, French author: b. Montreuil-Bellay, 1823; d. 1904. He learned the trade of printer and in 1851 wrote a series of articles for L'Ami du Peuple. The publication of these led to his arrest and sub¬ sequent exile to Algeria. Three years later he returned to France and in 1856-58 edited the Guetteur de Saint-Qucntin. His management of this journal again brought him in conflict with the authorities and he was

again sent into exile. He returned in 1871 and by the Com¬ munists was put in charge of the Mazarin Li¬ brary. He was again exiled in 1872 but re¬ turned within a short time under the terms of a general amnesty. His published works in¬ clude (La lutte du catholicisme et de la philoso¬ phic5 (1844) ; (La bonheur sur terre5 (1844) ; (La guerre des Jesuites5 (1845);

GASTON, William, American jurist: b. Newbera, N. C., 19 Sept. 1778; d. Raleigh, N. C., 23 Jan. 1844. He was graduated at Princeton 1796; was admitted to the bar 1798; elected to the State senate 1799; and congressman 1813-17, voting with the Federalists and oppos¬ ing the <(Loan Bill.55 Returning to the practice of the law he obtained great reputation as an orator, and was frequently a member of the State legislature. He drew up the act creating the Supreme Court of North Carolina and served as judge of that court 1834-44. During his later years he was a Whig, opposing nulli¬ fication.

GASTONIA, N. C., city and county-seat of Gaston County, 24 miles west of Charlotte, on the Carolina and Northwestern, the Piedmont and Northern and the Southern railroads. It contains several industrial establishments, in¬ cluding cotton and cottonseed-oil mills, wood fibre works, cement and broom factories, and manufactories of cotton-mill machinery. The city government is vested in a mayor and coun-

cil and owns the electro-lighting plant and the water supply. Pop. (1920) 12,871.

GASTORNIS, a genus of fossil birds of the epyornis family, whose remains, indicating several species, have been found in the Eocene rocks of both England and France. They were birds of the size of an ostrich, with long legs, weak wings and little if any power of flight.

GASTRiEA, gas-tre'a, a hypothetical primi¬ tive animal consisting simply of a sac or stom¬ ach, with an ectodermal and endodermal layer of cells. This simple organism, to which the embryonic gastrula-stage (see Embryology) is the nearest modern approach, and was regarded by Haeckel as recapitulative of the primitive gastraea, Haeckel assumes to have been the first animal generated on the earth, and the germ from which the whole animal kingdom with its infinite diversities was gradually evolved. His hypothesis, called the Gastraea theory, asserted that there must have been many species, fami¬ lies, etc., of these primitive organisms, whence all the Metazoa have been evolved. These gen¬ eralizations were

announced by Haeckel in (Die Gastraea-theorie, die Phylogenetische Classifica¬ tion des Thierreichs und die Homologie der Keimblatter, > published at Jena in 1874, and have since been extensively considered in all works on embryology.

GASTRALGIA. See Indigestion.

GASTRECTOMY, the removal of a part or the whole of the stomach-wall. It is per¬ formed for the cure or relief of deep ulcera¬ tions, cancerous growths or contractions of the wall that cause serious obstruction.

GASTRIC JUICE, the secretion of the stomach, is in man a clear almost colorless fluid of acid reaction, containing one-half of 1 per cent solids. The amount secreted varies with the demand, but approximates 1,600 cubic centi¬ metres in 24 hours. In health secretion, takes place only under the stimulus of food. Hydro¬ chloric acid, the chief constituent, is present in one or two parts per thousand. During the first stage of digestion it is all combined with the food, but later it is found free. The other important ingredients of this secretion are pep¬ sin, a ferment that has the power of converting albuminous foods into forms that can be ab¬ sorbed and assimilated; and rennin, a ferment that causes coagulation of milk by converting the casein, one of the milk proteids. Inorganic salts, the alkaline chlorides and phosphates, and phosphates of calcium, magnesium, and iron constitute most of the solids.

GASTRITIS, gas-tri'tis, a general term that includes all strictly inflammatory diseases of the stomach. Acute gastritis or acute gas¬ tric catarrh is an acute inflammation of the lin¬ ing mucous membrane. The membrane be¬ comes swollen, is covered by a coating of tena¬ cious mucus and tends to bleed at minute points. Errors in diet, either by over-indul¬ gence or the ingestion of improper food, is the most frequent cause of the malady. Certain chemicals and drugs, very hot food or liquid, foreign bodies and unripe fruits may cause the irritation. . The symptoms depend on the sever¬ ity of the inflammation, the milder forms being spoken of as subacute. Frequently premoni¬ tory symptoms, such as a feeling of fullness or tenderness, or the eructation of gases, may be

noticed, and may be soon followed, in the more severe cases, by nausea, vomiting and a rise of temperature, accompanied by painful thirst. If the retching or vomiting of mucus continues, there is apt to be great weakness and prostra¬ tion. The duration of the disease under proper treatment is seldom over three or four days. The stomach should be given absolute rest for 24 hours, or even longer if nausea or i etching continue. The intense thirst may be reheved by small pieces of ice, but not even the drinking of water is permitted. Rest in bed may be indicated in the more severe cases

and, if so, hot poultices applied to the stomach re¬ gion relieve some of the distressing symptoms. Drugs are of little value except to quiet exces¬ sive vomiting. Toxic gastritis is that form caused by the ingestion of corrosive and irri¬ tating drugs and chemicals. It is a severe form of acute catarrh, with the added effect of the particular poison taken. Strong acids and corrosives cause destruction of the deeper tissues, with ulceration and even perforation of the wall. The treatment depends upon the poi¬ son taken, but dilution by the imbibing of de¬ mulcent drinks is usually of value if taken sufficiently early. Chronic gastritis or chronic gastric catarrh is a chronic inflammatory change in the mucous membrane of the stom¬ ach. It is a most wide-spread malady, affect¬ ing all classes and ages. Not uncommonly successive attacks of acute gastritis, even in early life, start those progressive changes that sooner or later make themselves known as chronic catarrh. The most common cause is the repetition of irritants taken into the stomach in food, both as to quantity and qual¬ ity, and in drink irritating from high tempera¬ ture or presence of alcohol. Other causes may operate, such as venous congestion from dis¬ ease of the heart, liver and spleen, changes in the. blood-elements and the constant poisoning of infectious diseases. A most important cause for chronic gastritis is a continuous mental irritability, which accompanies intense anxiety, impatience, bad temper and inability to push one s work ahead with ease and sang froid. Liberal doses of good humor and increase of human sympathy will cure this.

. For an understanding of the symptoms of this affection it must be appreciated that three mechanisms make up gastric digestion — the nervous, the muscular, and the secretory. De¬ viation from the normal in any one of these is almost certain to act on the others, and when, in addition to these mechanisms, the close relation of the stomach and other diges¬ tive organs is considered, a marvelous complex is apparent. The symptoms of a chronic catarrh may be unnoticed, may be merely evi¬ denced by changes due to poor gastric diges¬ tion, or interwoven with resulting derangement of all the digestive aoparatus. In the early stages the mucous membrane is swelled, the gas¬ tric, juice still has its normal ingredients and in addition the membrane secrets a mucus owing to degeneration of the cells. From this stage to a complete absence of acid, and then of ferments, the change is gradual, the final stage being known as atrophic gastritis. No symptom or group of symptoms, is characteris¬ tic of the disease, the diagnosis being made with accuracy only by examination of the gas¬ tric contents. At one time or another one or

more of the following symptoms are noticed: Absence of appetite, bad taste in the mouth, coated tongue, nausea and, occasionally, vomit¬ ing, eructation of gases and some liquid, heart¬ burn, and a feeling of fullness or bloating after meals. The presence of inflammation, and the stage, are determined by chemical and micro¬ scopical analysis of the contents of the stomach after a test-meal has been eaten. In all except the atrophic stage there is always more or less mucus found mixed with the food. This is the distinguishing feature.

Of itself the disease is not fatal, but severe disorders of nutrition may result that render the sufferer more liable to other diseases.

The treatment consists in correction of the causes as much as possible, particularly in a dietetic regimen free of irritation and of ready digestibility. Lavage or washing of the stomach is of supreme importance where it can be borne. Drugs are of little use except for the relief of distressing symptoms. Where great diminution or absence of acid is found, it may be supplied, but the large amount neces¬ sary usually makes the procedure imprac¬ ticable. Electricity, massage and hydrotherapy may be beneficial.

GASTROENTERITIS. See Cholera ; Enteritis.

GASTROMANCY. See Superstition.

GASTROPODA, the largest and most typical and familiar of the four classes of mol- lusks (phylum Mollusca) . The name refers to the most prominent tribal characteristics, namely, that the inferior surface of the body forms a flattened sole or disc called ®foot,® by the contractions of which the animal ad¬ vances. In all these animals the primitive symmetry of the body is obscured by the un¬ equal development of parts, whence results the spiral disposition of the majority. The simplest gasteropods, however, such as the chiton, are symmetrical, not lop-sided like the higher forms. They have the mouth at one end of the long axis of the body, the anus at the other; the gills, kidneys, genital ducts, and circulatory organs are paired; there are two pairs (pedal and visceral) of nerve cords run¬ ning parallel to one another along the body, and the ganglia are slightly developed. Of all mol- lusks these simplest gasteropods are probably nearest the hypothetical worm-like ancestor. When a shell is present it consists of only one piece, whence the name ˆunivalve,® formerly applied to the class ; or if of more than one piece the separate portions are placed one be¬ hind the other in the axis of the body (Amphi – neura, chitons). The gasteropods agree with the cephalopods in possessing a distinct head, con¬ taining a feeding instrument or <(tongue® in the form of a lingual ribbon, but are separated from that class by the mode of formation of the shell, and by the absence of arms around the head. The lingual strap or

odontophore consists of a central portion (rachis) and lateral pieces (pleura). On all three of these, on the central, or only on the lateral regions are placed sili- cious denticles, whose number, form, and ar¬ rangement have been made the basis of classi¬ fication of genera.

Mode of Life. — Though the number of ter¬ restrial gasteropods, breathing the air directly by means of a pulmonary chamber, is very large

— over 6,000 living species — those living in water are greatly in the majority, including over 10,000 forms, mostly marine. Of these, some 9,000 or so belong to the prosobranchs or Strep- toneura, a relatively small minority being opisthobranchs and nudibranchs. The 'hetero¬ pods and some opisthobranchs enjoy a free- swimming pelagic life, but most marine forms frequent the coasts either on the shores or along the bottom. Deep-sea gasteropods are compara¬ tively few. The locomotion effected by the con¬ tractions of the muscular <(foot® is in almost all cases very leisurely, and the average tendency is toward sluggishness. As to diet, the greatest variety obtains ; most prosobranchs with a respir¬ atory siphon and a corresponding notch in the shell are carnivorous, and so are the active heteropods ; most of the rest are vegetarian in diet. Numerous genera, both marine and terres¬ trial, are very indiscriminate in their feeding; others, are as markedly specialists, keeping almost exclusively to some one vegetable or animal diet. Some marine snails partial to echinoderms have got over the digestive diffi¬ culty presented by the calcareous character of the skins of their victims by a secretion of free sulphuric acid from the mouth. This acid changes the carbonate of lime into sulphate, which is brittle and readily pulverized by the rasping tongue. A few are parasitic — for ex¬ ample, eulima, stylifer, and the very degenerate Entoconcha mirabilis , all occurring in or on holothurians.

Life-history. — The eggs of gasteropods are usually small, and are surrounded with albumen, the surface of which becomes firm, while in the common snail (Helix) and some others there is an egg-shell of lime. The eggs not unfrequently develop into embryos within the parent, but in most cases they are laid, either singly or in masses, and often with cocoons which take on various forms. Inside each of the numerous egg-cases are many embryos, but only a few reach maturity, the others serving as food ma¬ terial, an infantile cannibalism or struggle for existence not uncommon in the class. As to development it may be noted that the ovum divides more or less unequally, according to the amount of yolk, that a gastrula-stage occurs as usual, and that this is succeeded in typical cases, first by a ((trochophore® and afterward by a <(veliger® larva (see Mollusca).

General Interest. — As voracious animals, furnished with powerful rasping

organs, many gasteropods play an important part in the struggle for existence among marine organisms. Oyster beds, for example, are infested by thou¬ sands of industrious <(borers® of several kinds, that perforate the shells of oysters, clams, etc., fatally sucking out the life-blood of their occu¬ pants. Certain terrestrial forms, as slugs, are most destructive devastators of vegetable and flowering plants. From very early times, vari¬ ous gasteropods, such as whelks, have been utilized for human consumption and also as bait, while yet more frequently the shells, often so beautiful in form and color, have been used for the decoration of the person and the dwelling, for the basis of cameos, as domestic utensils, or even as weapons, and in many other ways. From the mucous glands of the roof of the gill-cavity in the genera Purpura and Murex, there exudes the famous secretion, at

first colorless, but afterward becoming purple or violet, which furnished the ancient Tyrian dye. bee Shells.

Qe°l°80cal History. — A few gasteropods oc-

r in strata as far back as the Cambrian, from w iich remote period they have continued with a steady increase. Almost all the Pabeozoic genera are now extinct, and during these ages tne siphon-possessing forms seem to have been almost if not altogether, unrepresented. A host of new gasteropods appeared in the Juras¬ sic period, and many of the modern families have their origin in Cretaceous times. Numer¬ ous as the fossil forms are, the number of types wholly extinct is comparatively small ; both as regards persistence of types and in¬ crease of numbers, the gasteropods are a peculiarly successful class.

Classification. — The grouping of forms within the class is as follows, according to the latest conclusions of naturalists, as summarized by Cooke in the third volume of the Cambridge 'Natural History (1894) :*

Class Gasteropoda; order Amphineura; sub¬ orders, P olyplacophora, Aplacophora; order Prosobranchiata ; sub-orders, Diotocardia, Mo¬ no tocardia ; order, O pisthobranchiata; sub¬ orders,. Tectibranchiata , Ascoglossa , Nudi- branchiata, Pteropoda; order, Pulmonata; sub¬ orders, Basommatophora, S tylommatophora.

(For the characters of the orders see Classi¬ fication in the article Anatomy). The sub¬ divisions are based upon different anatomical categories in each order. Thus the first sub¬ order of Amphineura embraces

all the ordinary chitons having a foot and plated shell, both of which are absent in the degraded Aplacophora. Among the Prosobranchiata (which embrace the ordinary marine shells) two auricles in the heart characterize the Diotocardia, a single auricle the Monotocardia, of which the strange pelagic Heteropoda are now regarded as only a subordinate group. The O pisthobranchs are classified according to gill-features; and the Pulmonata, according to relative position of the eyes.

See Mollusca; Snail; Whelk, etc., and consult the works cited thereunder, especially Cooke,

GASTROSTOMY, the operation of making a more or less permanent opening between the interior of the stomach and the overlying sur¬ face, the lining membrane of the stomach being joined to the skin entirely around the margin of the opening. This procedure is undertaken when for any reason the entrance of food into the stomach by natural passage is prevented.

GASTROTOMY, a simple incision of the wall of the stomach, usually undertaken for the exploration of the interior or for the removal of foreign bodies.

GASTRULA. See Embryology; Gastrˆa.

GASZYNSKI, ga-shin'ske, Konstanty,

Polish poet: b. Malawies, 1809; d. 1866. He took part in the insurrection of 1830-31, and at its close removed to France, where he settled at Aix-en-Provence. He wrote in both verse and prose and his sonnets attracted general attention. In 1833 a collection of his stories was published in Paris. His works are 'Piesni

*pielgrzyma) (1833) ; (Poezye) (1856); 'Sie- lanka moldosci * (1855); 'Reszty pamietnika Macieja Rogowskiego* (1847); 'Kontuszowe (1851); (Listy z podrozy po (1ˆ53) ; 'Pan Dezydery Boczko) (1846). In 1870-74 a collected edition of his works appeared.*

GATA, ga'ta, Cape de. See Cape de Gata.

GATACRE, Sir William Forbes, English soldier: b. 1843; d. 6 March 1906. He joined the English army in 1862; was instructor of surveying in the Royal Military College in 1875— 79 , deputy-adjutant and quartermaster-general in the Hazara Expedition in 1888, and in the Burma, Tonhon, Expedition in 1889 He led the British forces in the Sudan in 1898, dur¬ ing the first advance against Atbara, and later commanded a British division in that region during the movement against Khartum and

Omdurman. When the war in South Africa broke out he was ordered there and given an important command. He was repulsed at Stormberg with heavy loss. In April 1900 he was recalled to England.

*GATAKER, Thomas, English Puritan divine: b. London 1574; d. 1654. He was edu¬ cated at Saint John's College, Cambridge ; be¬ came in succession preacher at Lincoln's Inn, rector of Rotherhithe and member of the As¬ sembly of Divines at Westminster. He opposed the imposition of the covenant and was one of the 47 London clergymen who condemned the trial of Charles I. In 1652 appeared his 'Mar¬ cus Antoninus, * the Greek text with a Latin translation and commentary which Hallam pro¬ nounced "the earliest edition of any classical writer published in England with original anno¬ tations. w He also1 wrote commentaries on Isaiah, Jeremiah, and Lamentations; 'Opera Critical (1648; 1698); 'Of the Nature and Use of Lots) (1619; 1627) ; 'Cinnus, sive Ad¬ versaria Miscellanea > (1651). Consult Brook, 'Lives of the Puritans:* (London 1813).*

GATCHINA, ga'che-na. See Gatschina.

GATE CITY, The, a name given to Keokuk, Iowa (q.v.), and to Atlanta, Ga. (q.v.).

GATE OF TEARS, or GATE OF MOURNING, the Straits of Bab-el-Mandeb, Arabia; the term is an exact translation of the words Bab-el-Mandeb, which have reference to the many shipwrecks which anciently occurred thereabouts.

GATES, Caleb Frank, American Congre¬ gational clergyman: b. Chicago, Ill., 18 Oct. 1857. In 1877 he was graduated at Beloit Col¬ lege and in 1881 at the Chicago Theological Seminary, and was ordained to the Congre¬ gational ministry the same year. From 1881 to 1894 he labored as a missionary of the American Board of Commissioners for Foreign Missions at Mardin, Turkey, Asia Minor. In 1894-1902 he served as rector of Euphrates College, Harpoot, Turkey, and in 1903 was chosen president of Robert College, Constan¬ tinople. He published 'A Christian Business Man) (1893).

GATES, Eleanor (Mrs. Frederick Ferdi¬ nand Moore), American author: b. Shakopee, Minn., 26 Sept. 1875. She received her education at Stanford University and the University of California. While pursuing her studies she

was on the staffs of the Examiner , Call and Chronicle of San Francisco,

and the Enquirer of Oakland. In 1901 she married Richard Wal¬ ton Tully, and in 1914 took as her second hus¬ band Frederick Ferdinand Moore. She is the author of (The Biography of a Prairie GirP (1902) ; (The Plow-Woman) (1906) ; (Good Night ' (1907); (Cupid, the Cow-Punch) (1907); (The Justice of Gideon) (1910); spinners5 (1913) ; and the plays, (The Poor Little Rich GirP (1913), play and novel; (We are Seven) (1913) ; (Apron Strings) (1914) ; (The Bad AngeP (1915).

GATES, Elmer, American psychologist and inventor: b. Dayton, Ohio, 1859. He was edu¬ cated in common and normal schools, but mostly by private tutors, followed by special courses in several colleges. He has done much original work in electric meteorology and has rnade several electrical mining inventions. He is the author of a system of mind-building and experimental psychology, having four labora¬ tories for experimental research in these fields. These have educational and not commercial ends in view. He has established an organiza¬ tion through which the new methods of scien¬ tific investigation will be made available and the new system of science-teaching practically applied, and is training associates therefor. He has devoted most of his inventions to the sup¬ port of scientific research. He is professor of psychology at the Pennsylvania School of In¬ dustrial Art and is a member of the American Academy of Political and Social Science and many other learned societies. Among his works are (Psychurgy or the Art of Using the Mind) ; (Art of Mind-Building.'

GATES, Frederick Taylor, American cler¬ gyman : b. Maine, Broome County, N. Y., 2 July 1853. In 1877 he was graduated at the Univer¬ sity of Rochester and in 1880 at the Rochester Theological Seminary. He was ordained to the Baptist ministry in the latter year and for the ensuing eight years was pastor of the Central Church, Minneapolis. From 1888 to 1893 he was corresponding secretary of the American Baptist Education Society, and from 1893 to 1912 was employed as business and benevolent representative of John D. Rockefeller. He is chairman of the General Education Board and of the trustees of the Rockefeller Institute for Medical Research.

GATES, Horatio, American military offi¬ cer: b. Maldon, Essex, England, 1728; d. New York, 10 April 1806. He joined the British army early in life; in 1755 was assigned to duty at Halifax, N. S., and later served with Braddock's expedition. In July 1775 Congress appointed him adjutant-general; in 1776 he was given a command in the Northern army and 2 Aug. 1777 assumed command of the Northern department. He defeated Burgoyne at Sara¬ toga, 7 Oct. 1777, the British general surround¬ ing his army on the 17th. (See Saratoga, Battle of). In November of the same year he was appointed president of the new Board of War and Ordnance; and in 1778, while hold¬ ing that post, sought with the aid of his friends in

Congress to supersede Washington as com- mander-in-chief. This action soon brought him into discredit, and he resigned from active service. In June 1780 he again entered the

army, becoming commander of the troops in North Carolina. On 16 August of that year his army was defeated near Camden, S. C. He was soon afterward suspended from duty, but- reinstated in his command in 1782, after the capture of Cornwallis.

GATES, Lewis Edwards, American edu¬ cator and critic: b. Warsaw, N. Y., 23 March 1860. He is a brother of M. E. Gates (q.v.). He was graduated at Harvard 1884, instructor in forensics there 1884—87, instructor in English 1890-96, then becoming assistant professor of English. He is a frequent contributor of criti¬ cal articles to the magazines and became well known by his critical essays on Matthew Arnold, Francis Jeffrey and John Henry New¬ man, which were published in volumes of selec¬ tions from their writings. He has published Selections from Jeffrey) (1894) ; Selections from Newman' (1895) ; Selections from Mat¬ thew Arnold' (1898) ; (Three Studies in Liter¬ ature' (1899) ; Studies and Appreciations'

(1900).

GATES, Merrill Edwards, American edu¬ cator: b. Warsaw, N. Y., 6 April 1848. He was graduated at the University of Rochester 1870, was principal of the Albany Academy 1870-82, president of Rutgers College 1882-90, and presi¬ dent of Amherst College 1890-99. He has been very active in promoting civil service meas¬ ures, and ballot reform. He was made chair¬ man of the United States Board of Indian Com¬ missioners 1884, and was president of the American Missionary Association 1893-98. For several years he was president of the Lake Mohonk Indian Conference. He received the degree of LL.D. from a number of universi¬ ties. He has published (Athens and the Greeks of To-day' ; (Sidney Lanier, Poet and Artist' ; (The Debt the School Owes the State' ; (Land and Law as Agents in Educating the Indians' (1885); (International Arbitration' (1897);

(The Highest Use of Wealth' (1901). He has written and lectured much upon religious, so¬ cial and educational themes.

GATES, Seth Merrill, American public official : b. Herkimer County, N. Y., 1800 ; d. 1877. In 1827 he entered on the practice of law at Le Roy, N. Y. On his election to the State legislature in 1832 he procured a charter for the first railroad in western New York, which subsequently became part of the New York Central system. In 1838 he became editor and proprietor of the Le Roy Gazette. He was a member of Congress from 1839 to 1843 and

author of the famous protest by the Whigs in that body against the annexation of Texas in 1843. His opposition to slavery provoked a Georgia planter to offer $500 for him <(dead or alive."

GATES, Sir Thomas, English colonial gov¬ ernor of Virginia : d. after 1621. He sailed from England in May 1609, in charge of a col¬ ony of 500 emigrants to the New World, but his vessel, the Sea Venture, was stranded on the rocks of Bermuda. Here the passengers built two new ships and finally reached Vir¬ ginia in May 1610. Gates went to England in the meantime and returned in 1611 with 300 more emigrants. He was made governor the same year and held that office till 1614, when he returned to England.

GATESHEAD, England, a parliamentary, numcipal county borough and seaport of Dur¬ ham, on the south side of the Tyne, opposite Newcastle. Ihe church of Saint Mary is a handsome cruciform structure assigned to the k1 century, but it has been almost entirely rebuilt the earlier edifice having been burned m load, i rinity Chapel is believed to occupy the site of an ancient monastery. Among the public buildings are the town hall, public library and hospitals. There is also a public park of 52 acres. The manufacture of locomotives, anchors, chain cables, etc., is extensively car¬ ried on. The Northeastern Railway has repair shops here and there are large chemical and glass works. Excellent grindstone is quarried and coal is mined. Daniel Defoe lived here and his dwelling is still pointed out: Consult Welford, (History of Newcastle and Gates- head) (Newcastle-on-Tyne 1885).

GATESVILLE, Tex., city and county-seat of Coryell County, on the Saint Louis South¬ western Railroad, 80 miles north of Austin. It is situated in the fertile valley of the Leon River and has considerable agricultural, stock-raising and produce-shipping interests. There are cot¬ ton gins and compress, oil works and flour and planing mills. The State Juvenile Training School is situated here. Pop. (1920) 2,499.

GATEWAY, the opening in a castle or other wall which may be closed by a door or gate hung at its edge. The gateway being a most important point in all fortified places, is usually protected by various devices. It is flanked by towers with loopholes, from which assailants may be attacked, and is frequently overhung by a machicolated battlement, from which missiles of every description may be poured upon the besiegers. In the Middle Ages gates were also fortified with one portcul¬ lis or more, and had frequently

an outer work or barbican in front of the gate defended with drawbridges. > City gates and gates of large castles have in all ages been the subjects of great care in construction ; and when from some cause, such as the cessation from con¬ stant fighting, or a change in the mode of warfare, gateways have lost their importance in_ a military point of view thev have main¬ tained their position as important architectural works, and although no longer fortified have become ornamental. In very ancient times we read of the ˆgate® as the most prominent part of a city, where proclamations were made, and where kings administered justice. The Greek and Roman gates were frequently of great magnificence. The propylaea at Athens is a beautiful example, and the triumphal arches of the Romans are the ornamental offspring of their city gates. At Autun in France two Roman gateways, and at Treves in Germany one, still exist, and formed the models on which early mediaeval gateways were designed. Most of the English towns have lost their walls and city gates; but a few, such as York and Chester, still retain them, and give us an idea of the buildings which formerly existed, but which now remain only in the name of the streets where they once stood. English castles retain more of their ancient gateways, and from these we may imagine the frowning aspect these large buildings presented during the Middle Acres. Abbeys, colleges and every class of

fOL. 12 — 22

buildings were shut in and defended by similar barriers; many of these still exist at Cambridge and Oxford.

GATH. See Townsend, George Alfred.

. .GATH (Heb. ((wine-press®), one of the five cities of the Philistines which were presided over by so many princes or lords from the time of Joshua to a comparatively late period. It was situated on the borders of Judah, and was in consequence a place of much importance in the wars of the Jews and the Philistines. It is stated in Joshua that Gath was one of the cities in which, at the time of the conquest, there still remained some of the ancient Anakims or giants, and they appear to have perpetuated the race here till much later times, for it was from Gath that the renowned Goliath issued. The exact site of the ancient city cannot be deter¬ mined with any degree of certainty, but some identify it with the eminence Tell-es-Safieh, about midway between Ekron and Ashdod.

GATHAS, ga'thaz. See Avesta; Lalita- Vistara; Zoroaster.

GATINEAU, ga'te'nc/, a river of Canada, in the province of Quebec, rising in a chain of lakes in the county of Wright (48° N. latitude) from which it

flows south, and falls into the Ottawa opposite the city of Ottawa. The scenery on its course is of the wildest and most roman¬ tic description. Great quantities of lumber are floated down the river. Its total length is 240 miles.

GATLING, Richard Jordan, American in¬ ventor: b. Hertford County, N. C., 12 Sept. 1818; d. New York, 1903. While a boy he as¬ sisted his father in perfecting a machine for sowing cotton seed, and another for thinning out cotton plants.. Subsequently he invented a machine for sowing rice. Removing to Saint Louis in 1844, he adapted this invention to sowing wheat in drills. For several winters he attended medical lectures in Cincinnati, and in 1849 removed to Indianapolis, where he en¬ gaged in railroad enterprises and real estate speculations. In 1850 he invented a double¬ acting hemp brake, and in 1857 a steam plow, which, however, he did not bring to any prac¬ tical result. In 1861 he conceived the idea of the revolving battery gun which bears his name. Of these he constructed six at Cincinnati, which were destroyed by the burning of his factory. Afterward he had 12 manufactured elsewhere, which were used by General Butler on the James River. In 1865 he improved his inven¬ tion, and in the year following, after satisfac¬ tory trial, it was adopted into the United States service. It has also been adonted by several European governments. At the time of his death he was perfecting a few business formali¬ ties prior to placing his new motor plow on the market. Although best known as the inventor of a terrible death-dealing weapon, he was the gentlest and kindliest of men. The sight of returning wounded soldiers early in the Civil War led him to consider how war's horrors might be alleviated. By making war more terrible, it seemed to him nations would be less willing to resort to arms, and he accord¬ ingly devoted himself to the study of ordnance and ballistics, with this end in view.

GATLING GUN. See Guns.

GATSCHINA, or GATCHINA, Russia, town in the government of Petrograd, 30 miles by rail west of Petrograd. A former suburban residence of the Russian tsars, the imperial palace of Italian design, dating from 1770, is the chief building, and other notable features are the model military barracks, military orphanage, horticultural school and porcelain factory. On 29 Oct. 1799, the treaty of alliance between Russia and Sweeden was signed at Gatschina. Pop. 15,000.

GATTI, gat'te, Bernardino (<(Il Solaro55), Italian painter: b. Cremona,

about 1493; d. 1575. He was in all probability the pupil of Cor¬ reggio, but he certainly imitated the latter to such a degree that his work with the greatest difficulty identified from that of the master. He painted the cupola of the Steccata at Parma and completed the tribune of Pordenone in Santa Maria di Campagna, Piacenza. Many of his works are in the cathedral of Parma and in Saint Peter's, Cremona. Pavia Cathedral has his (Mater Dolorosa.5

GATTI-CASAZZA, gat'te-lca-zat'sa, Guilio, Italian operatic manager b. Udine, Italy, 3 Feb. 1869. He received his education at Fer¬ rara and Bologna and in 1890 was graduated naval engineer at the Polytechnic College of Genoa. His father had been director of the municipal theatre at Ferrara and in 1892 was called to another position at Rome. Giulio thereupon abandoned his proposed career of engineer and took charge of the theatre at Ferrara, where he remained until 1898. From 1898 to 1908 he was director of the Teatro Alla Scala of Milan, and made that house the fore¬ most operatic centre of Italy. His conspicuous success there attracted such general attention that in 1908 he was induced to become director of the Metropolitan Opera House, New York. Here he again made a wonderful administrative success and this great institution has under him reached the pinnacle of success both artistically and financially. He has always encouraged home talent and every season sees the production of at least one new opera by an American com¬ poser. The able hand of the director is dis¬ cernible in every department. In 1910 he took his company to Paris and the French capital was amazed at the exceedingly capable artists and management from overseas. It is safe to say that Mr. Gatti-Casazza has made the famous New York opera house the premier of the world in its field. On 4 April 1910 he mar¬ ried Frances Alda, a member of his company. He is director of the New York Institute of Musical Art.

GATUN. See Panama Canal.

GAUBIL, go'bel', Antoine, French mission¬ ary to China: b. Gaillac, 1689; d. Pekin, 1759. In 1704 he entered the Jesuit order and in 1723 accompanied several members of the order to China. There he became wonderfully proficient in the languages of the. natives; gained a place at court, and by his influence with the em¬ peror saved the Jesuits from the troubles which befell other missionary bodies. The emperor made him official interpreter and director of the . imperial colleges. He carried on diplo¬ matic correspondence with Russia and was elected member of the Saint Petersburg Acad¬ emy. , He also was correspondent of the Academie des Sciences de Paris. His works

include (Histoire de Gentchiscan et de toute la dynastie des Manchoux5 (1739) ; (Traite de chronologie chinoise5 (published 1814) ; trans¬ lation

of (Le Chou King5 (1771), and miscel¬ laneous articles in Remusat, (Nouveaux melanges asiatiques.5

GAUCHOS, gow'choz, hybrid inhabitants of Argentina, South America, mostly cattle- raisers or cowboys of nomadic habits. They are natives of the pampas, and descendants of Spaniards and Indians. The white strain has largely faded out from them, and a modified Indian type has been developed which has an ethnological interest. As a distinct people, however, they may be said to be disappearing. They are now mainly confined to the Chaco region. Many of them possess figures and bearing which show a proud descent. They wear a costume picturesque in fashion and color, and their skill as horsemen and in using the lasso and bolas is remarkable. They are noted for their hardiness, bravery and free mode of existence. Consult Koebel, W. H., (Modern Argentina5 (Boston 1912) ; Temple, Sir Edmond, (Travels in Various Parts of Peru5 (London 1830).

GAUDEN, ga'den, John, English bishop : b. Mayland, Essex, 1605; d. 2 Sept. 1662. In the early part of his life he belonged to the popular party. After the outbreak of the Civil War he hesitatingly submitted to the Presbyterian dis¬ cipline, omitted the liturgy from the Church service and even subscribed to the covenant, although he secretly wrote a treatise against it. After the Restoration he was appointed chap¬ lain to Charles II, and successively created bishop of Exeter and of Worcester. He claimed the authorship of the

GAUDRY, godre', Jean Albert, French

palaeontologist : b. Saint Germain-en-Laye, 16 Sept. 1827 ; d. 27 Nov. 1908. In 1852 he made explorations in Cyprus and Greece and from 1855 toˆ 1860 resided in the latter country. At Pikermi he investigated the deposit of fossil vertebrata and uncovered notable mammalian fauna of the Miocene period. He had already in 1853 been appointed assistant to d'Orbigny in the chair of palaeontology of the Paris Museum of Natural History. He became full professor in 1872 and 10 years later was elected member of the Academy of Sciences. In 1900 he pre-

sided over the Eighth International Congress of Geology at Paris. His studies in fossil mam¬ malia did much to support the theory of evolu¬ tion. His works are (Anmaux fossiles et geologie de l'Attique5 (2 vols., 1867) ; (1896). Consult memoir in Geological Magazine (1903, p. 49).

GAUERMANN, gow'er-man, Friedrich,

Austrian painter : b. Wiesenbach, Lower Aus¬ tria, 20 Sept. 1807; d. Vienna, 7 July 1862. He studied landscape painting under the direction of his father, a landscape painter of merit, and copied the works of the best animal painters from the galleries of Vienna. He also made tours in Styria and the Tyrol. In 1824 he ex¬ hibited two animal pieces and in 1826 received commissions from Prince Metternich and the French Ambassador at Vienna. In 1829 he ex¬ hibited (The Storm5 which at once won him general recognition. It was followed by (The Field Laborer5 and now his work commanded high prices and was much sought after. Other notable works by him are (Vultures Hovering above a Wounded Deer) ; (Husbandmen Ploughing5 ; (Cows, Horse and Sheep5 ; (Well in the Tyrol.5 Very many of his animal studies are in the Vienna Academy. Many of his pic¬ tures have been engraved.

GAUGE, gaj, the name of many different instruments and appliances used for measuring various dimensions, forces, etc. The various kinds of gauge are distinguished by means of special names indicating the use to which they are applied. Among the most important con¬ trivances of this nature are the instruments fixed to engine boilers for registering the force of the steam and the level of the water. In one of its simplest forms the pressure or steam gauge consists of a bent siphon-tube, with two unequal legs, partly filled with mercury. The top of the shorter limb is connected to a short pipe, which enters that part of the boiler which contains the steam ; the other end is open to the atmosphere. A stop-cock is generally placed between the gauge and the boiler, so that it may be put in communication with the boiler at pleasure. When the stop-cock is open, the steam, acting on the mercury in one leg of the gauge, presses it down, and the mercury in the other leg rises. The difference between the two columns is the height of mercury which corre¬ sponds to the excess of the pressure of the steam in the boiler above the pressure of the atmosphere. For high-pressure engines, how¬ ever, the steam-gauge usually works in the man¬ ner of an aneroid barometer, a pointer moving on a circular scale under the influence of the motion of a corrugated diaphragm ; or, as in the Bourdon gauge, the tendency of a bent tube to straighten itself under the influence of the steam pressure communicates movement in a similar manner to a pointer or index hand. The water-gauge is a vertical glass tube called a gauge-glass, _ communicating above and below with the boiler. The gauge-glass is not fixed directly to the boiler, but to a brass column known as the gauge-column, communicating with the boiler by two copper tubes of consider¬ able length, the upper leading to the steam space

and the lower to the water space. These tubes are fitted with cocks or valves. Two gauge- glasses of different lengths are sometimes fitted to the one column. Gauge-cocks are used as checks on the water-gauges. There are usually three of them on the front of the boiler, one at the normal level

of the water, one above and one below. As applied to railroad the term gauge signifies the clear distance between the rails. The usual distance in the ordinary or narrow gauge is four feet eight and one-half inches. The broad gauge of the Great Western Railway of England was formerly seven feet; the Irish, Indian and Spanish gauge is five feet six inches. Special narrow gauges have been adopted for certain lines, especially for moun¬ tain and mineral lines, such as the three feet six inch Norwegian gauge. Gauge is also the name applied to various contrivances for meas¬ uring any special dimension, such as the wire- gauge, an oblong plate of steel, with notches of different widths cut on the edge, and numbered, the size of the wire being determined by trying it in the different notches till one is found which it exactly fits. The thickness of sheet- metal is tried by a similar gauge. See Anemom¬ eter; Railways.

GAUGUIN, go'gari', Paul, French painter: b. Paris, 17 June 1848; d. Isle of Dominique, 9 May 1903. His mother was a Peruvian and the future artist was brought up at Lima and in his grandfather's home at Orleans. From 1865 to 1871 he spent his time at sea visiting many parts of the world. For a time he engaged in bank¬ ing and in his leisure moments took up painting as a hobby. He at length joined the Impres¬ sionists and was soon recognized as the most radical of the group. He painted many land¬ scapes of Brittany and southern France, but the most noteworthy work of this first period is (The Yellow Christ.5 In 1891, becoming dis¬ gusted with civilization and its artificiality, Gauguin went to Tahiti and for two years lived in the manner of the natives. There he painted a Tahitan series, including the (Maori Venus5;

(Spirit of the Dead5 ; (Maori Women,5 which when exhibited at Paris created a furore. Sev¬ eral of his works were exhibited at New York in 1913. He returned to Tahiti in 1895. Con¬ sult De Rotonchamp, (Paul Gauguin5 (Weimar

1906).

GAUL, gal, Alfred Robert, English com¬ poser and organist: b. Norwich, England, 1837 ; d. 1913. He was chorister and assistant organ¬ ist of Norwich Cathedral 1846-59, and subse¬ quently organist of Saint Augustine's Church, Edgbaston, Birmingham. He composed an ora¬ torio, (Hezekiah5 ; the cantatas (Ruth5 (1881), (First Psalm,5 (Ninety-sixth Psalm,5

GAUL, Gilbert William, American his¬ torical and genre painter: b. Jersey City, N. J., 31 March 1855; d. 21 Dec. 1919. He studied under J. G. Brown and at the National Academy of Design, of which he became a member in 1882. He painted many genre pictures, such as (In¬ dian Girl5

(1880) ; (01d Beau5 (1881), but was at his best in his battle pictures of the Civil War, which are characterized by clever coloring,

notable dash and spirit and great truthful¬ ness of detail. Among the best are (Charging the Battery* ; (Saving the Colors * ; < Battery H in Action* (Toledo Museum) ; (Exchange of Prisoners* (Democratic Club, New York). Among his more recent paintings are (Golden Prospects* (1910) ; (Sioux Indian* and (Loot* (1911); (Ration Day* and the (Peace Confer¬ ence* (1912). He also painted landscapes and achieved considerable success in this field also.

GAUL, GALLIA, the country of the Gauls, which extended in the times of the Romans, from the Pyrenees to the Rhine, and on the side of Italy, beyond the Alps to the Adriatic. It was divided into Gaul on this side (the Italian side) of the Alps (Gallia Cisalpina), and Gaul beyond the Alps (Gallia Transalpina).

Gallia Cisalpina, which extended from the Alps to the Adriatic Sea, and consequently com¬ prised all Upper Italy as far as the Rubicon and Macra, on account of its adoption of the Roman toga was called Gallia T ogata. It was divided into Liguria ; Gallia Transpadana; Gallia Cispa- dana. Liguria was inhabited by the Ligurians, pallia Transpadana principally by the Taurin- ians, Insubrians, and Cenomani ; Gallia Cispa- dana by the Boii, Senones, and Lingones, all of them nations of Gallic descent.

Transalpine Gaul was also called Gallia Comata in distinction from Gallia T ogata, be¬ cause the inhabitants wore their hair {coma) long, or Gallia Braccata, because, particularly in the southern parts, they wore a peculiar kind of breeches (bracccc). Caesar, who conquered Transalpine Gaul at a later period, found it divided into three parts : Aquitania, extending from the Pyrenees to the Garonne, chiefly occu¬ pied by Iberian tribes; Gallia Celtica, from the Garonne to the Seine and Marne ; Gallia Belgica, in the north, extending to the Rhine.

The Gauls were the chief branch of the great original stock of Celts. On the whole, a strong resemblance appears to have existed among all the Celts. And although they were divided into numerous tribes, there were but few branches that were perceptibly different from each other. It is probable that coming from the east, they took their way along the south side of the Danube, having the numerous nation of the Thracians in their rear and the Germans on their side ; but the period of this event is so re¬ mote that we_

cannot even venture a conjecture in regard to it.

A too great population (which is not un¬ common in half savage and partly nomadic nations whose means of supplying their wants are very imperfect, and who require a great extent of country), and the pressure of Ger¬ man and Thracian tribes, caused general migra¬ tions among the Gauls about 397 b.c. Colonies from many tribes took their course over the Alps into Italy, and eastward along the Danube. This passage of the Celtic Gauls over the Alps first brings that nation into the region of history.

Our accounts of the course of the eastern Gauls along the banks of the Danube are very imperfect. This, however, is evident, that their movements occasioned the migrations of whole nations. One hundred years after the burn¬ ing of Rome, the eastern Gauls, from 280-278 b.c., made three destructive irruptions into

Macedonia and Greece, which had already been depopulated by former wars. Ptolemy Cerau- nus, king of Macedonia, and Sosthenes, the commander of the army, fell in battle, and Greece trembled. But in an attack on the temple of Apollo at Delphi (which contained immense treasures, but was protected by its situation) the terrors of religion and the as¬ saults of the elements (tempest and hail-storms) came over them; they were defeated, and hunger, cold, and the sword of the Greeks com¬ pleted their destruction. Several tribes pursued their course into Asia Minor, where, under the name of Galatians, they long retained their na¬ tional peculiarities, and preserved their language even to the latest period of the empire. The reaction of these migrations upon Gaul itself appears to have been considerable. The Gauls along the banks of the Danube and in the south of Germany disappear from that time. Tribes of German origin occupy the whole country as far as the Rhine, and even beyond that river. The Belgae, who were partly Ger¬ man, occupied the northern part of Gaul, from the Seine and Marne to the British Channel and the Rhine, from whence colonists passed over into Britain, and settled on the coast dis¬ tricts. The Celtse in Gaul attained a higher degree of cultivation, to which probably their intercourse with the Greeks in Massilia (Mar¬ seilles), whose letters they used in writing their own language, and with the Carthaginians, in whose armies they frequently served as mer¬ cenaries, contributed in a great measure. But they were then hardly able to resist the Ger¬ mans who lived on the other bank of the Rhine. Their kinsmen, the Britons, who fought from chariots, and practised polygamy, were more fierce than the Gauls.

Meanwhile the Gauls of Cisalpine Gaul had taken up their residence in the fertile plains of Upper Italy. Rome trembled at the irruption of these barbarians into Italy; but Caius Marius saved the republic. In two bloody

battles, at Aix (Aquae Sextiae) in 102, and at Vercelli in 101 b.c., he destroyed these nations. Only that portion of them which had remained in Gaul to await the issue of the expedition escaped the general ruin. Forty-three years after this event Caius Julius Caesar received the procon¬ sulship over the countries bordering on Gaul. He resolved to subject all Gaul, and executed his purpose in less than nine years (58-50 b.c.), in eight blocdy campaigns.

The religion of the Druids, being suppressed in Gaul by Tiberius and Claudius, it gradually retreated into Britain, where, particularly on the small islands near the British coasts, the priests established their mysterious rites, of which in ancient times strange and dreadful accounts were current. The Britons also were soon conquered by the Romans. After the ex¬ tinction of the family of the Caesars, the Gauls once more made an attempt to recover their liberty by the aid of the Germans, but in vain. After this. last effort they gradually became Roman citizens, and so entirely Romanized that even their ancient language, the Celtic, was sup¬ planted by a corrupt Latin dialect, retaining, however, a considerable number of Celtic words, especially as roots, which, intermingled with Franco-Germanic words, formed the modern language. About the year 486 the Franks sub-

dued the greater part of Gaul, and put a period t0 dotmmon of the Romans in that country.

Bibliography. — Despardins, (Geographie his- tonque et administrative de la Gaule romaine> (Pans 1877) ; Fustel de Coulange, (Histoire des institutions politiques de l'ancienne France) (h>aris 1877) ; Goodwin, (History of France) (New York 1860) ; Holmes, (Caesar's Con¬ quest of Gaul> (Oxford 1911); Marin de Syr,

La France avant Cesar> (Paris 1865) ; Martin, (Histoire de France) (Paris 1865) ; Roget, (Paris 1868-75) ; Sihler,

Annals of Caesar > (New York 1911) ; Thierry, (Histoire des Gaulais> (Paris 1872).

GAULEY BRIDGE, W. Va., an important strategical point at the head of Kanawha Val¬ ley, and one of the three passes of the Alle- ghanies. It was the objective point of General Cox in his campaign from the Ohio in July 1861, and was occupied by him and strongly fortified after he had driven General Wise from the valley and eastward to Lewisburg. After the battle

of Carnifax Ferry Rosecrans advanced to Sewell Mountain, confronted Gen¬ eral Lee, who had assumed command of the Confederate forces, for several days, and then fell back to Gauley Bridge, disposing the greater part of his army from 5 to 12 miles in front of it, along the Lewisburg road. With Lee's assent General Floyd, with about 5,000 men, crossed New River and moved down its south side to Cotton Hill, a bold height in the angle formed by the junction of the New and Gauley rivers. He got artillery in position command¬ ing Gauley Bridge, the ferry across the Gauley and the road leading to Rosecrans' camps. On the morning of 1 November the artillery opened fire, sunk the ferryboat and, with sharpshooters beyond New River, stopped the passage of Rosecrans' supply-trains. The contest on both sides, with artillery and musketry, across the narrow river was severe, and ended only by darkness. The next day it was resumed and continued for 10 days, the trains moving only by night. Meanwhile Rosecrans was preparing to capture Floyd by moving a force on his left and rear, a movement in which Cox, who was in command at Gauley Bridge, was to co¬ operate. On the 10th Cox crossed his brigade in boats over New River, at and near its mouth, and drove Floyd from Cotton Hill, after a sharp fight of two days. The co-operative movement on Floyd's left and rear failed. Floyd became aware of it, and on the 12th re¬ treated as rapidly as possible, abandoning wagons and supplies, and pursued as far as Fayetteville. He continued his retreat to Dub¬ lin. on the Virginia and Tennessee Railroad.

GAULEY MOUNTAINS, W. Va., a range in Pocahontas and Randolph counties, with an altitude of about 4,000 feet. There is a lower ridge in Kanawha and Fayette counties ex¬ tending eastward for about 30 miles, from the Kanawha River near Charleston which bears this name also. The maximum altitude of the lower ridge is about 2,000 feet.

GAULEY RIVER, W. Va., an affluent of the Great Kanawha River. It rises in the Black Mountains in Pocahontas County, and after a course of 75 miles, first westward between the Gauley Mountains (q.v.), then southward, joins New River which, from the point of junction

at Gauley Bridge, is called the Great Kanawha,

a tributary of the Ohio.

GAULS. See Gaul; France.

„ gait (originally a local name in

Cambridgeshire, England, for clay), one of the subdivisions of the Cretaceous system (q.v.).

j gault is a stiff, bluish-gray clay, which here and there contains indurated nodules and sep- taria. Now and again it becomes somewhat calcareous, or sandy and micaceous. In some parts of Sussex a band of phosphatic nodules occurs at its base. The deposit is of variable thickness — reaching in some places over 300 feet, while occasionally it hardly attains a greater thickness than 50 feet, and forms a well-marked geological horizon — forming the bottom member of the Upper Cretaceous rocks. It is abundantly fossiliferous, the remains being almost exclusively marine, only a few drifted land-plants having been met with. The gault is extensively employed in the manufacture of bricks and tiles ; it forms a retentive and rather unproductive soil.

GAULTHERIA (named for Dr. Gaultier of Quebec), a large genus of evergreen shrubs, or under-shrubs, with small, axillary, nodding flowers, white, pink or red, having a corolla and calyx with five divisions, the former urn-shaped or companulate ; and a berry-like fruit, red or blackish, consisting of a fleshy calyx enclosing a capsule. There are about 100 species, found mostly in the Andes, a few being Asiatic and North American. Of the latter, the best known is G. procumbens, the familiar aromatic or creeping wintergreen, known in different local¬ ities as checkerberry (a name sometimes applied to Mitchella re pens), boxberry, spice-berry, ground-berry, mountain tea and partridge- berry (q.v.). This plant is found in cool, damp woods, chiefly under the shade of evergreens, in Canada and the United States, extending southward along the Alleghanies. The leaves are mostly clustered at the top of branches rising from creeping stems; the flowers are white, the berries red and spicy, with a flavor (also characterizing the leaves) resembling sweet birch. The leaves of G. procumbens and G. hispidula contain an aromatic oil which has a greater density than any other essential oil. It contains about 10 per cent of a terpene called gaultherilene and about 90 per cent of methyl salicylate. Oil of wintergreen is color¬ less when fresh, but later becomes yellowish, and is used for flavoring candy and for disguis¬ ing the taste of unpleasant medicines. This oil may be extracted from a few other plants, particularly sweet birch (Betula lenta). See Wintergreen.

GAUNT, John of. See John of Gaunt.

GAUNTLETS (spelled also gantlets). A defensively armored glove. Before the 14th century already the sleeves of the chain mail hauberk had become extended over the hand, and, through an opening in the palm side, the hand could be extracted, leaving the hand free and the glove part hanging like a pouch. By the beginning of the 14th century gauntlets were in use (rarely) made up of scales of leather, metal or horn on the upper surface. About 1330 the separate armored gauntlet was in frequent use as an integral piece of armor.

Steel plates were now being- fastened to the leather glove ; they belong to the (

German Late Sixteenth Century Gauntlet

points or knobs on the knuckles ; they were termed ((gads® or <(gadlyngs.® Historical in¬ cidents are recorded of most effective, stunning blows being given with these formidable offen¬ sives. The defective open space between the single broad plate protecting both wrist and knuckles seems to have been eradicated about 1400 by rivetting the glove to the plate. By the 15th century the knuckle part was made of a separate plate articulated by rivets to the wrist-piece. By about 1433 this broad-plate gauntlet had fallen into disuse, being displaced by the steel <(miton® with a <(cufP pointed on its arm end. The (

Single Gauntlets. — There were several kinds of gauntlets made to wear singly. One was the ((close® or <(tourneying® gauntlet (some¬ times erroneously termed (

Bibliography. — Cosson, Baron de, (On Gauntlets) (in Archaeological Journal, London 1884) ; Dillon, Viscount, (Single Gauntlets > (in Archaeological Journal, London 1913). See also bibliographies under titles Chain Armor; Plate Armor.

Clement W. Coumbe.

GAUR, gowr, a very large, fierce and un¬ tamable ox (Bos gaurus) found in the forests of India and Burma, called ((bison® by Anglo- Indian sportsmen, and distinguished by the Malays into two varieties called ((sladang® and <(sapio.® Old bulls are sometimes six feet high at the shoulders, making them the largest of wild oxen. The horns spread laterally and curve upward to the length ordinarily of 20 to 30 inches, and are large and flattened, while the ridge of the forehead between them leans for¬ ward decidedly and is covered with a mop of gray hair. The general color is smooth, shin¬ ing, blackish brown, with the feet white. This magnificent animal, which is semi-domesticated to some extent in northern India and never in the south, wanders about the jungles in small shy herds under the leadership of a powerful bull, as is the habit of forest oxen generally. It is one of the foremost objects of rifle sport in India, and the best accounts of its habits are to be found in the books of sportsmen-writers, such as Baker, Kinloch, Shakespeare, Hornaday, etc. The animal must be followed on foot, in which the aid of good trackers is essential ; and when it has been

overtaken it is usually hidden in some dense cover, whence it is likely to charge without warning. Its flesh is excellent. See Gayal.

GAUSS, gows, Karl Friedrich, German mathematician: b. Brunswick, 30 April 1777; d. Gottingen, 23 Feb. 1855. At 18, while a student at Gottingen, he solved a problem (that

GAUR, GENET, ETC

1 Gopher (Geomys bursarius)

2 Genet (Viverra genetta)

3 Gayal (Bos frontalis)

4 Galago (Otolicnus galago)

5 Gaur (Bos gaurus)

6 White-tailed Gnu (Connochaetes gnu)

GAUSSEN

GAUTIER

343

of the division of the circle into 17 equal parts) which had occupied geometers from the time of Euclid. In 1801 was published his discjuisitiones Arithmetics, > treating of inde¬ terminate analysis or transcendental arithmetic, and. containing, in addition to many new and curious theorems, a demonstration of the famous theorem of Fermat, concerning triangu¬ lar numbers. He calculated, by a new method, the orbit of the newly discovered planet Ceres, and afterward that of Pallas, for which he re¬ ceived from the French Institute in 1810 the medal founded by Lalande. In 1807 he became professor of mathematics and director of the observatory at Gottingen, a position which he held till his death. In 1821, being charged by the government of Hanover with the triangula¬ tion of that country and the measurement of an arc of the meridian, he rendered the most dis¬ tant stations visible by means of the heliotrope, an instrument of his invention for reflecting sola jht ; and in connection with Weber made valuaole investigations concerning terrestrial magnetism. He was pronounced by Laplace to be the greatest mathematician in Europe. Among the more celebrated of his works are (Theoria Motus Corporum CcelestiunP (1809) ; (Intensitas Vis Magneticae Terrestris) (1833) ; (Dioptrische Untersuchungen) (1841) ; and (Untersuchungen fiber Gegenstande der

hoheren Geodeˆe (1844). Consult Schering, E. J., (Gaus s Collected Works > (Gottingen 1863-*

71).

GAUSSEN, gow'sen, Louis, Swiss theo¬ logian: b. Geneva, 25 Aug. 1790; d. Les Grottes, 18 June 1863. He was appointed pastor of Satigny in 1816. A close follower of the early Calvinists he refused to adopt the new cate- ch'sm which the consistory introduced. He was censured by the Geneva ministers and was de¬ posed in 1832. In this year, with two others, he founded a society for the dissemination of Bibles and other religious literature. Four years later he was made professor of theology at the Evangelical School of Geneva. He wrote

GAUTAMA, gow'ta-ma, or GOTAMA, the

patronymic of several celebrities connected with Hindu Vedaism, and of Siddartha Gautama, the founder of Buddhism. See Buddha.

GAUTHEROT, got'ros Gustave, French educator and author. He was educated at the College of Mont Roland and the universities of Dijon and Paris. He was professor of history at the College of Vaugirard, Paris, and after¬ ward became professor of the history of the French Revolution at the Institut Catholique de Paris. In 1914-16 he was commandant of the 29th Infantry Reg:ment, and in 1917 was made captain of the Etat-Major of the 5th Army. He has published (Histoire de la Revo¬ lution Frangaise dans l'ancien Eveche de Bale (1908), crowned by the French Academy; des relations Franco-helvetiques de 1789 a 1792 (1908) ; (L'echange des otages sous la Com- mune) (1910) ; (La question de la langue aux- iliaire international (1910) ; (Gobel, Eveque metropolitan constitutionel de Paris* (1911); (L'Assemblee Constituante) (1911) ; (La jour- nee du Dix Aout, 1792, et la Marseillaise*

(1912) ; (La Democratic Revolutionnaire (1911); (L'Epopee Vendeenne* (1913), which was crowned by the French Academy; (Le Van¬ dalismˆ Jacobin: Destructions administratives d'archives, d'objets d'art, de monuments re- ligieux a l'epopee revolutionnaire* (1914) ; (L'Agonie de Marie-Antoinette) (1914). He contributed to the (Catholic Encyclopedia) and to La Croix, L'Univers, Revue des questions historiques, Revue Lrangaise, Revue pratique d'apologetique, etc.*

GAUTHIER, gd'te'a', Charles Hughes,

Canadian prelate: b. Alexandria, Ontario, 3 Nov. 1845. He was ordained to the priesthood in 1867 ; consecrated archbishop of Kingston (Roman Catholic), 29 July 1898, and was trans¬ lated to the archiepiscopal diocese of Ottawa in September 1911.

GAUTIER, go'tya, (Charles) Lucien,

Swiss theologian: b. Cologny, 1850. He re¬ ceived his education at the universities of Gen¬ eva, Leipzig and Tubingen. From 1877 to 1898 he was professor of Old Testament exegesis and Hebrew at the University of Lausanne. He presided at the synod of the Vaudois Eglise libre in 1885, 1886, 1891 and 1892. To his travels in the Holy Land in 1894 and 1899 we owe several interesting volumes. His works include (Au dela du Jourdain) (1895) ; Sou¬ venirs de Terre-Sainte) (1898) ;

(1911).

GAUTIER, Emile Theodore Leon, French scholar and critic: b. Havre, 8 Aug. 1832; d. 1897. He was educated at Laval and at the Col¬ lege Sainte-Berbe de Paris. He held offic al positions connected with the schools and libraries of his native place till his growing eminence as a writer brought him to Paris. In 1886 he be¬ came chief secretary of the national archives and in 1887 was chosen member of the Inst.tute. His works, which place him among the very fore¬ most authorities on mediaeval European liter¬ ature, include (Scenes et nouvelles catholiques) (1861) ; (Quelques mots sur l'etude de la pale- ographie et de la diplomatic (1858; 3d ed., 1864) ; definition Catholique de l'Histoire) (1860) ; (Benoit IP (1863) ; (Etudes litteraires pour la defense de l'eglise* (1864) ; (Ltudes his¬ toriques pour la defense de l'eglise* (1864); (Epopees frangaises* (1866-67) ; (Vingt nou- veaux portraits> (1878) ; (La Chevalerie) (1884) ; (Histoire de la poesie religieuse dans les cloitres des IXe et Xle siecles* (1888) ; (Etudes et tableaux historiques) (1890) ; (Bib- liographie des Chansons de Geste> (1897).*

*GAUTIER, Judith, French novelist, daugh¬ ter of Theophile Gautier (q.v.) and Carlotta Grisi, the famous Italian singer: b. Paris, France, 1850. She married Catulle Mendes, but was divorced from him and in 1913 married Pierre Loti, the celebrated novelist. Her first work, under the name <(Judith Walther,** was (The Book of Jade) (1867), a collection of prose and verse translated from the Chinese ; it*

was followed by (1869), a Chinese romance, signed <(Judith Mendesˆ ; (The Usurper, > a Japanese romance, crowned by the French Academy in 1875; (Lucienne> (1877) ; (The Cruelties of Love) (1878) ;

(1884), adapted from the Japanese; (Potiphar's VVife> (1884), a Persian romance; (1888), a drama adapted from the Chinese;

GAUTIER, Theophile, French poet and prose writer: b. Tarbes, France, 31

Aug. 1811; d. Paris, 23 Oct. 1872. He was educated at the grammar school of his native town, and after¬ ward at the College Charlemagne in Paris. He applied himself at first, but without much suc¬ cess, to painting; and then turned to litera¬ ture. In verse he published (1839); (Militona> (1847);

Tiger's Skin> (1852); (Jettatura (1857); (Captain Fracasse* (1863); (Handsome Jenny) (1865) ; (1866), etc. He was drawn early to feuilleton writing, and for more than 30 years contributed to the Paris newspapers criticisms on the theatre and the salon. He also wrote (Journey in Spain> (1843); (Zigzags* (1845); (Constantinople > (1854);*

(Journey in Russia (1866), etc., which rank among the most delightful books of modern travel. Still other works were an enlarged edi¬ tion of (Enamels and Cameos* (1872); (The Grotesques) (1844); (History of Dramatic Art m France* (1859); (Balzac* (1858); (Private Menagene) (1869), biographical; (History of Romanticism* (1872) ; (Literary Portraits and Souvenirs* (1875) ; (The East* (1877), the last two being posthumous. Gautier's whole phi¬ losophy is a philosophy of paradox, his ideal of life hardly more than a picturesque vicious¬ ness. His besetting sin was a desire to say something clever and wicked to shock the Philistines. (See Mademoiselle de Maupin) He was one of the most interesting figures in the literary world of Paris in his day; was cosmopolitan in his tastes and employed a style remarkable for its faultlessness. His frank ex¬ pression of hedonism and his contempt for the common canons of morality as expressed in many of his works kept the Academy forever closed to him. Consult lives by Feydeau (1874); Bergerat (1878); Richet (1893); Brunetiere, (Evolution de la poesie lyrique> (1894) ; Du Camp (1890) ; also Deschamps, (La vie et les livres) (Paris 1900) ; Faguet, (Le XIXe Siecle* (ib. 1894); Henriot, E., (The¬ ophile Gautier, poete* (in Annales Romantiques, 1912) ; Huneker, J. G.,*

GAUTIER DE COSTES. See Cal-

PRENEDE.

GAUTSCH VON FRANKENTHURN,

gowtsh fon frank'en-toorn, Paul, Baron von, Austrian statesman : b. Vienna, 1851. He was educated at the University of Vienna. He en¬ tered the service of the Department of Educa¬ tion in 1874, and from 1885 to 1893 served as Minister of Education in Taafe's Cabinet. From 1895 to 1897 he was again Minister of Education under Premier Badeni, and in 1897- 98 succeeded his chief, and also held the port¬ folio of Minister of the Interior. He next served as president of the Supreme Court of Accounts

and at the end of 1904 became Premier in succession to Koerber. He developed a scheme for universal suffrage which failed of passage and resulted in the fall of his cabinet in May 1906. He was a second time Premier from 26 June to 31 Oct. 1911.

GAUZE (French gaze, Middle Latin gaz- zatum), a light, transparent silk stuff, or some¬ times a fabric of silk and cotton or silk and hemp, or of other material. In weaving gauze, at every third cast of the shuttle the warp- threads are turned or twisted after receiving the woof from right to left, and the reverse, alternately, between each throw of the shuttle, so that the weft-threads are separated from each other, the slight texture being thus pro¬ duced. Gauzes are either plain or figured. The latter are worked with flowers of silver or gold, on a silk ground, and are chiefly made in China.. For antiseptic purposes, etc., cotton gauze is specially made for the use of surgeons. Special fabrics to which the name is given are also manufactured to be made into light under¬ wear. The term has further been extended to any slight open material, as bolting-cloth and wire-cloth for various purposes. A wide- meshed,. unsized cheese-cloth, which is called gauze, is considered by surgeons to be the cheapest and most convenient material for dressing wounds, being comfortable and ab¬ sorbing fluid without disagreeable matting.

GAVAGE, ga'vazh', a method of feeding resorted to when the individual is unable or unwilling to take food in the usual manner. A rubber catheter is employed and is joined by means of a glass tube to a flexible rubber tubing with a funnel at the end. The catheter is inserted and passed into the stomach and the food is poured into the funnel.

GAVARNI (properly Sulpice Guillaume Chevalier), French caricaturist and illustrator- b.. Paris, 13 Jan. 1804; d. 23 Nov. 1866. He came of poor parents, but while apprentice in an engine-building factory, managed to study mechanical and free hand drawing. After many disappointments in his early attempts to market his drawings he succeeded admirably in 1838 in drawing for a fashion journal. He be¬ came director of the periodical Les gens du monde and from this time his success was me¬ teoric. Financial difficulties put his journal hors du combat and himself in prison. After his. release he joined the staff of Le Charivari, which journal he made a success. He depicted with facile pencil all the foibles of the Parisians. He also illustrated books, among them Sue's Wandering Jew. A visit to London in 1849 the bent of his work, which hitherto had been laughing and joyous, into a somewhat morose and dismal outlook in human life,*

caused by his visits to the submerged hosts of London. Consult Maherault and Bocher

10ˆ0 \ raisJonn6 d.e 1'oeuvre de Gavarni> (Paris lo73) and Curtis, (Masters of Lithography) (New York 1897).

Cascade de, France, a water- tall in the Cirque de Gavarnie, Pyrenees. It is the second highest in Europe, being 1,385 feet in height.

GAVARNIE, Cirque de, France, a natural amphitheatre in the Pyrenees. It is 4 miles in width and 5,380 feet in height.

GAVAZZI, ga-vat'se, Alessandro, Italian reformer: b. Bologna, Italy, 21 March 1809; d. Rome, 9 Jan. 1889. At 16 he became a monk of the Barnabite order, and subsequently was appointed professor of rhetoric at Naples, where he speedily acquired a reputation as an orator. On the ascension of Pius IX to the papal chair, he devoted himself to the diffusion of political enlightenment and patriotic aspirations among the masses of the Roman population. Later he forsook the papal ranks, and to Gavazzi's fervid and patriotic oratory may be attributed, in no slight degree, the universal spirit of self-sacri¬ fice evoked throughout Italy during this period of her history. He was called Peter the Her¬ mit of the national crusade. On the establish¬ ment of the republic at Rome he was appointed almoner-in-chief to the national army. Rome having fallen, Gavazzi went to England, where he delivered numerous addresses and lectures illustrative of the political and religious aims of his country. He twice visited the United States. He was the founder of the Free Christian Church of Italy in 1870, and author of Recol¬ lections of the Last Four Popes) (1859) ; (No Union with Rome) (1871), etc.

GAVELKIND, a system of tenure formerly existing in England and Ireland, now confined to the county of Kent and a few other parts of England. It preceded and survived the feudal system. Its great principle was that the estate descends not to the eldest son but to all the sons, or, in the case of deceased sons, their representatives, in equal shares. It is sup¬ posed to be of Celtic origin, was general in Anglo-Saxon times, and at the Conquest was among the ˆliberties® won from William by the men of Kent. Elsewhere it was superseded by the feudal law of primogeniture. In Wales it survived down to the reign of Henry VIII, and it is not quite extinct yet in some parts of England. In Irish gavelkind the land was not divided among the sons, but reverted to the common stock and '-as again divided among the surviving members of the tube. See In¬ heritance; Tenure; and consult Robinson, (On GabelkindP

GAVERE, ga'vr, Belgium, town of the province of East Flanders, about five

miles from Ghent. Here in 1453 Philip the Good, Duke of Burgundy, inflicted a severe defeat on the in¬ habitants of Ghent. There are few manu¬ factures and those that exist are purely local. In August 1914 Gavere was occupied by the Germans in their rush on Paris. Pop. 1,900.

GAVESTON, gav'es-ton, Piers, favorite of Edward II, king of England: b. 19 June 1312. He was a Gascon by birth, and on account of his father's services to Edward I was chosen companion to the Prince of Wales, over whom

he acquired a complete and very mischievous ascendency, wasting his resources and breeding dissension between him and his father. Edward I banished him in 1307, but died the same year, and Edward II at once recalled him, made him Earl of Cornwall, and gave him in marriage his niece, Margaret de Clare. Intoxicated with his elevation and honors Gaveston became intoler¬ ably insolent and exasperated the nobles. He was again banished, again recalled, and, the barons having declared war, was captured and executed near Warwick.

GAVIAL, ga'vT-al, or GHAVIAL, the

common crocodile of northern India (Gavialis gangeticus) , characterized by its greatly pro¬ longed and slender snout, a peculiarity which increases with age and varies according to sex. In the male the nose is very much swollen, and can be inflated like a bag when the nostrils (at the extremity) are closed. The teeth are very numerous — usually more than 100. The cranial structures accompanying these peculiari¬ ties indicate a separate family (Gavialidcu) , which first appears in the Upper Cretaceous! and has had many fossil genera and species, among them an Asiatic monster (Rhampho – suchus crassidens) of the Pliocene which was 50 feet in length. The gavial inhabits chiefly the basins of the Ganges, Indus and Brahma¬ putra, and reaches a length of 20 to 25 feet. In the Ganges it is of a deep sea-green color above, with numerous irregular brown spots, smallest and thickest about the jaws, and below pale yellowish white. It feeds on fish and is harmless, in spite of its huge size. Its habits are little known; and still less is known of a closely related but smaller gavial (Tomistoma schlegeli) of Borneo and Sumatra.

GAVOTTE, ga-vot, or GAVOT, originally a dance of the Gavots or people of the Gap, de¬ partment of the Upper Alps in France. It was a peasant dance, not unlike a minuet, and hap¬ pily uniting liveliness with dignity. It was popular from the 16th to the 18th century, and at one period was in favor at court. After un¬ dergoing modifications it fell into disuse. The name is also given to a kind of music at first intended for such a dance. It came into great favor and was a frequent movement in suites, sonatas, etc.,

having been used by Bach and other great composers. In our time it has again become popular.

GAWAIN, ga'wan, nephew of King Arthur, son of Loth of Orkney, and the most famous hero of the Arthurian cycle. He is supposed to have reigned in Galloway, was dispatched as ambassador to the Roman camp, accompanied Arthur to England and was slain in the battle which took place soon after their landing. Consult Weston, Jessie L., (The Legend of Sir Gawain) ; id.,

GAY, Delphine. See Girardin, Madame de.

GAY, Edward, American landscape painter: b. Dublin, Ireland, 23 April 1837. His family was compelled to leave Ireland on account of the political difficulties of 1848, and came as refugees to America, settling in Albany, N. Y. As they had become greatly impoverished, the boy never had a day's schooling, but was put to work to earn his living. At an early age he showed great facility in drawing, and some

sketches he made on the cellar doors of an otfice building attracted the attention of James M. Hart and George H. Boughton, who gave him the freedom of their studios. In 1862 he went abroad and studied under Schirmer and Lessing in Carlsruhe, Germany. His first large picture after his return, (The Suburbs, 5 was exhibited at the National Academy of Design in 1872 and resulted in his becoming an asso¬ ciate of that body. At the Centennial Exhibi¬ tion (1876), (Late Afternoon) won him dis¬ tinction. Of (Washed by the Sea,5 which was purchased by Mr. Layton and presented to the Layton Museum, Milwaukee, George Inness wrote, ((No greater landscape has been produced in America Some years later his < Broad Acres5 was awarded the prize of $2,000 by the American Art Association, New York, and pre¬ sented to the Metropolitan Museum of Art.*

(Mother Earth5 which is to hang in the High School, Mount Vernon, N. Y., was exhibited at the World's Fair, Chicago, and the following year received a medal at the mid-winter exhibi¬ tion at San Francisco. One of Mr. Gay's finest paintings, (The Fields at Eastchester,5 also hangs in the High School, Mount Vernon. In the Executive Mansion at Albany hangs (Where Sea and Meadow Meet, 5 a painting that has met with much praise. In 1903 he was awarded the Shaw Prize by the Academy of Design for the best landscape in the exhibition, (Mia- mus River,5 and in 1905 the

Inness gold medal for the most meritorious landscape in the Acad¬ emy exhibition. He was made a life member of the Lotus Club for his achievements in art and in 1907 a member of the National Academy. About this time he painted (Ruins of the Greek Theatre in Taormina, Sicily,5 which now occupies a lunette in the Mount Vernon Li¬ brary, and is perhaps the most popular of his paintings. < Waving Grain5 is owned by the Minneapolis Gallery of Fine Arts, (Waste Lands5 hangs in one of the rooms of the Mount Vernon Library. (E1 Dorado5 ;

Mr. Gay sees nature under large and sunny aspects, painting meadows, the flow of rivers, wide orchards in springtime, and great billowy fields of grain in the sunshine or the full light of day. His works have been prominent in the New York Water Color Society, of which he is a member.

GAY, John, English poet and dramatist : b. Barnstaple, Devonshire, England, baptized, 16 Sept. 1685; d. London, 4 Dec. 1732. In 1712 he became secretary to the Duchess of Mon¬ mouth, and two years later, to Lord Clarendon, with whom he went to the Continent. After having made considerable money out of his publications, he lost it in South Sea specula¬

tions in 1720. Four years later his success in drama relieved his money difficulties. His life was one more or less literary success. In 1713 he published his 'Rural Sports,5 which he ded¬ icated to Pope. This compliment introduced them to each other, and proved the foundation of a friendship which lasted for life. In 1714 his caricature of Ambrose Philips' pastoral poetry was published under the title of 'The Shepherd's Week. 5 His pleasant mock-heroic poem, entitled 'Trivia, or the Art of Walking the Streets of London,5 was published in 1715, and in that year also was acted his burlesque drama of 'What d'ye Call It?5 followed by a farce, in conjunction with Pope and Arbuth- not, called ' Three Hours after Marriage.5 In 1720 he published his poems by subscription, in 1723, his tragedy, 'The Captives,5 and in 1726 his well-known (Fables. 5 His (Beggar's Opera5 was first acted in 1727 at Lincoln's Inn Fields, where it ran for 63 nights, but the lord-chamberlain refused to license for per¬ formance a second part entitled 'Polly.5 The latter part of his life was spent in the house of the Duke of Queensberry, where he wrote his sonata (Acis and Galatea5 and the opera (Achilles.5 He was interred in Westminster Abbey, where his monument bears a flippant epitaph taken from one of his letters to Pope. Among his smaller pieces, his two ballads of 'Black-eyed Susan5 and ''Twas when the Seas were Roaring,5 are much admired. Consult Johnson, 'Lives of the Poets5 (London 1854) ; Thackeray, ' English Humorists5 (London 1853).

GAY, Maria, Spanish opera singer: b. Bar¬ celona 1880. Until her 16th year she devoted her attention to sculpture, ' but in 1897 began her studies

of piano. Through a chance meet¬ ing with Pugno she was induced to join his concert troupe as a singer. At Brussels by a fortuitous chance she was given the role of Carmen to study, mastered it in five days and scored a triumph in the Opera de la Monnaie. This was in 1902 and now she determined to cultivate her voice under the best masters. At Paris she studied for one year under Madame Adiny and the following year began her long series of tours in Europe and America. In 1908-09 she was at the Metropolitan Opera House, New York.

GAY, gb Nicolay, Russian painter: b. 1831 ; d. 14 June 1894. He achieved real suc¬ cess with his (Puschkin5 and his (Peter I 5 as Muther says with rather pointed brevity,

Vs ˆ seems that his other works, or some

fbem,— – so familiar to the public through reproductions, -merit a more attentive study. In religious painting, for example, he appears at first sight to be Ivanov's nearest successor because of similarities in the aims and problems of the two artists; but A. Benois has shown clearly in The Russian School of Painting5 (New York 1916) that Gay's whole personality differed essentially from Ivanov's. Gay's high¬ est technical achievement is a certain brilliancy and originality of coloring, but the drawing in his canvases is, with rare exceptions, childish or slovenly; Ivanov, on the contrary, was brought up under the old scholastic discipline and drill oi the Academy and showed the results in very stroke of his brush. Again, Gay's themes, marked with the stamp of almost hysterical passion, were diametrically opposed to the holy

tranquillity of Ivanov's aspirations. It is only lair to correct a popular misconception and to regard Gay as (despite his faults) a well-pro¬ nounced and brilliant artistic personality espe¬ cially in his last works, which expressed a pecul¬ iar and very <(Russian® attitude toward the Scriptures. c'He views the New Testament,® says Benois, ((as the gospel of spiritual beauty exclusively, and purposely emphasizes the out¬ ward of both Christ and his surroundings. Had Raphael seen 'The Crucifixion) and other of Gay's paintings, monstrous in their ugliness, he would have torn his garments in his indignation. Different would be the relation of Gay to Rem¬ brandt, in whose gloomy art the same notes sound as in Gay's. But Rembrandt was too much of an artist not to conceal the inten¬ tional ugliness of his images under the beauty of paintings and coloring. Gay, however, with true Russian straightforwardness, and with truly Russian

nihilism, ever in quest of har¬ rowing impressions, strove to depict what ap¬ peared to him as truth.® Hence these creations — repugnant, quivering with life, inspiring ter¬ ror; nevertheless luminously devoid of trivi¬ ality, wholly individual utterances, white-hot with sincerity and conviction. (

GAY, Sidney Howard, American journalist and author: b. Hingham, Mass., 22 May 1814; d. New Brighton, Staten Island, N. Y., 25 June 1888. Unwilling to take the oath to support the Constitution of the United States, which fostered and protected slavery, he gave up a legal career and devoted himself to anti-slavery journalism and lecturing. He became, in 1842, editor of The Antislavery Standard, a posi¬ tion he retained till he joined, in 1857, the edi¬ torial staff of the New York Tribune, of which he was managing editor 1862-66. From 1867 to 1871 he occupied the same position on the Chicago Tribune, and for another two years was managing editor of the Evening Post. He was the author of Bryant and Gay's (Popular History of the United States, } and in 1884 wrote the life of James Madison in the Amer¬ ican Statesmen } series.

GAY, Walter, American artist: b. Hing¬ ham, Mass., 22 Jan. 1856. He is a nephew of S. H. Gay (q.v.), and W. A. Gay (q.v.). At 20 he went to Paris, where he studied art under Bonnat, and he has been a frequent exhibitor at the Salon. He resides in Paris since 1879, and has disposed of more pictures in France than any other foreigner. Among his paintings, which have won many medals, are (Benedicite,) now in the Museum of Amiens, France, ((The Cigarette Sellers)) in the Luxembourg, Paris; and (The Spinners) and other canvases in the Metropolitan Museum of Fine Arts, New York, the Museum of Fine Arts, Boston, and several noted collections in

Europe. He is represented also in the mu¬ seums of Chicago and Pittsburgh, and in the late Gallery, London. He was made a Chev¬ alier of the Legion of Honor in 1894, becoming an officer in 1906. His latter work is devoted to rich interiors without figures. The more important of these are (Interior, J (Gold and White, } (The Medallions) in the Luxembourg Gallery; 'Palazzo Barbaro Interior) in the Bos¬ ton Museum; (Interior of the Petit Trianon) in the Providence School of Design.

GAY, Winckworth Allan, American artist: b. Hingham, Mass., 18 Aug. 1821; d. 1910. At an early age he became a pupil of Rob¬ ert Weir, professor of drawing at West Point, subsequently went to Europe, and passed five years there in study, a part of the time under Troyon in Paris. He painted exclusively in landscape. 'A Scene in the White Mountains,) a picture painted for the Boston Athenaeum, is a good specimen of his method of treatment of mountain scenery. Some of his best works depict

that region. But he also painted views of Nantasket beach and rocks, which have at¬ tracted much attention, and some critics have pronounced coast scenery to be his proper specialty. Among his best works are Mack¬ erel Fleet off Beverly Coast) ; (Harbor Day at Cape AmP ; (Forest Sanctuary) ; (Ninieh on the Nile) ; (Windmills of Delfthaven, Hol¬ land,) all in the Boston Athenaeum; and (Scene in Japan) in the Somerset Club, Boston.

GAY-LUSSAC, ga-lii-sak, Joseph Louis,

French physicist: b. Saint Leonard, Haute- Vienne, France, 6 Dec. 1778; d. Paris, 9 May 1850. In 1804 he was the first to make balloon ascensions for purposes of scientific investiga¬ tion. He became a member of the Society of Arcueil, and was introduced to Humboldt, with whom he prosecuted an investigation of the polarization of light and other subjects. He also devoted much of his time to the study of chemistry, and to him we are indebted for the discovery of the hydro-sulphuric and oxy-chlo- ride acids. In 1830 he became a member of the Chamber of Deputies, and in 1839 was created a peer of France. He enjoyed several official ap¬ pointments, and was professor of chemistry at the Jardin du Roi.

GAY HEAD, a promontory and lighthouse on the western extremity of Martha's Vineyard, Mass. Lat. 41° 21′ N., long. 70° 50′ W. See Martha's Vineyard.

GAY SABER, name of a committee of seven troubadours who in 1324 convened at Toulouse with the object of restoring Proven¬ cal language and customs.

GAY SCOFFER OF SEVILLE, The.

See El Burlador de Seville.

GAYA, gi'a, India, chief town of a district of the same name in Bengal, on the Phalgu, a tributary of the Ganges, 57 miles south of Patna. It is a place of the greatest sanctity, from its associations with the founder of Buddhism, and is annually visited by about 100,000 Hindu pilgrims, who pray for the souls of their ancestors at the 45 sacred shrines within and without the walls. The most impos¬ ing of the shrines is the temple of Vishnu, which is crowned by a pyramid 100 feet in height. In the Gava proper the Brahmans re¬ side; adjoining is Sahibganj, the trading and

official quarter. They are manufacturers of oil, metal work, baskets, rope,

mats and twine. It contains also a hospital and a high school. Six miles south is the village of Buddha-Gaya, the home of Buddha. (See Buddhism). Pop. about 2,225,000 for the district; city, 49,921.

GAYAL, gi'al, or MITHAN, a tame ox (Bos frontalis) of northwestern India and the hilly regions of Indo-China, known principally in the herds of the semi-civilized hill-tribes, but which also exists wild in Tenasserim. These cattle are kept for the sake of their beef, gayals never being put to any sort of work, as are humped cattle. This ox is somewhat smaller than the gaur (q.v.), has proportionately shorter legs, rounder and shorter horns, a flat¬ ter forehead and greater dewlap. It will inter¬ breed with the gaur and various other bovine species.

GAYANGOS Y ARCE, gi-ah'g6s e ar'tha, Pascual de, Spanish Orientalist : b. Seville, 21 June 1809; d. London, 4 Oct. 1897. In 1822 he was sent to be educated at Pont-le- Voy, near Blois, and six years later entered on the study of Arabic under Silvestre de Sacy. He made a visit to England and on his return was employed in the treasury at Madrid and in 1833 was made translator to the Foreign Office. He revisited England in 1836, wrote for sev¬ eral English journals and published a trans¬ lation of Almakkari, (History of the Moham¬ medan Dynasties in Spain.5 In 1843 he was appointed professor of Arabic at the Univer¬ sity of Madrid, which post he held until 1881, when he became director of public instruction. He resigned after a few years; was elected senator for Huelva, and spent his latter years in cataloguing the Spanish manuscripts in the British Museum.

GAYARRE, ga-a-ra', Charles Etienne Arthur, American lawyer and historian: b. New Orleans, La., 9 Jan. 1805; d. 11 Feb. 1895. He was admitted to the bar in 1829 ; was sev¬ eral times a member of the Louisiana legis¬ lature; deputy State attorney-general (1831); secretary _ of state of Louisiana (1846-53). Among his works, which deal largely with the history of his native State, are < History of Louisiana,5 in French (1830); (Louisiana, its History as a French Colony) (1851) ; ˆPhilip II of Spain) (1866); (Fernando de Lemos,5 a novel (1872).

GAYLER, Charles, American playwright : b. New York, 1 April 1820; d. Brooklyn, 28 May 1892. He removed to the West, was a law pupil of Abraham Lincoln, was admitted to practice, in 1848 edited the Cincinnati Evening Dispatch, and in 1850 became connected with the New York press, to which he contributed for many years. He wrote for English and American production a large number of plays, according to some statements, nearly 400. These include

GAYLEY, Charles Mills, American edu¬ cator: b. Shanghai, China, 22 Feb. 1858. He was graduated at the University of Michigan in 1878, studied at

Giessen and Halle, Germany, in

1886- 87. From 1880 to 1886 he taught Latin at the University of Michigan, and English from

1887- 89, and became professor of the English

language and literature in the University of California in 1889. He has chosen as his special field the history and criticism of the English drama, of which his works are considered au¬ thoritative. His publications include 'Songs of the Yellow and Blue5 (1889) ; ' Guide to Liter¬ ature of ˆEsthetics5 (1890); (English in

Secondary Schools5 (1894); (Classic Myths in English Literature5 (1893) ; 'Methods and Ma¬ terials of Literary Criticism,5 with F. N. Scott (1899); Representative English Comedies5 (5 vols., 1903— 13) ; (The Star of Bethlehem5 (1904); 'Songs of California5 (edited 1905);

(Plays of Our Forefathers5 (1907) ; 'Idols of Education5 (1910); 'English Poetry: Its Prin¬ ciples and Progress,5 with C. C. Young (1911) ; 'Beaumont the Dramatist5 (1913).

GAYLEY, James, American manufacturer: b. Lock Haven, Pa., 11 Oct. 1855; d. 25 Feb. 1920. Graduated in engineering at Lafayette College in 1876, and in 1870—80 was chemist for the Crane Iron Works at Catasauqua, Pa. ; in 1880-82 for the Missouri Furnace Company. He was superintendent of blast furnaces of the Ed¬ gar Thomson Steel Works, was subsequently promoted to manager of the Edgar Thomson plant and later was managing director of the Carnegie Steel Company until 1901. From 1901 ffi 1909 he was first vice-president of the United States Steel Corporation, with charge of ore mining, shipping and transportation. His in¬ ventions include a bronze cooling-plate for blast furnace walls and an auxiliary casting-stand for Bessemer steel plates. He received the Elliott Cresson medal of the Franklin Institute, Phila¬ delphia, for invention of the dry-air blast. He was president of the Sheffield Iron Corporation, the American Ore Reclamation Company, a trustee of Lafayette College and ex-president of the board of directors of the American Institute of Mining Engineers.

GAYNOR, William Jay, American jurist and public official : b. Whitestown, Oneida County, N. Y., 23 Feb. 1848; d. at sea, 10 Sept. 1913. He was educated at the Whitestown Academy and Assumption Academy, and studied theology for about three years at Saint Louis, Mo. He traveled for sometime, taught school in Boston, removed to Brooklyn in 1873, where he was for a time a journalist. He studied law also at this

time and was admitted to practice in 1875, removed to the town of# Flatbush, and gained considerable fame as a political reformer, helping elect a reform administration, and be¬ coming police commissioner himself. In 1885 he removed to the city of Brooklyn, and con¬ tinued his reform work, successfully exposed several corrupt politicians and frauds, was elected to the Supreme Court of New York in 1893. For frauds committed at this election he secured the conviction of John Y. McKane and several of his political henchmen. He was re¬ elected judge in 1907, and in 1909 was elected mayor of New York by a large plurality, being the only candidate on the Democratic ticket to secure election. He at once set about putting

ihc city administration on an efficient basis, and thereby lost the support of Tammany Hall. On

Aug. 1910 he was shot by a discharged city employee just as he was going aboard a steamer u "ProPe- He never fully recovered from the effects of the wound, although he resumed his official duties. In the autumn of 1913 he was a candidate for re-election, this time on an independent ticket, having by his efficient busi¬ ness methods and incorruptibility incurred the displeasure of his former supporters, the poli¬ ticians of Tammany. His letters brought him considerable fame and were remarkable for their caustic wit and their exposure of fraud and sham in any guise, and were a constant joy to the newspapers and the public. He died before election, while on a voyage to Europe. Consult the volume (Some of Mayor Gaynor's Letters and Speeches) (New York 1913)

GAZA, ga'za, Theodorus, Greek scholar: b. Thessalonica, Macedonia, about 1400; d. Italy 1478. He fled about 1444 before ' the Turks to Italy, where he became teacher of Greek at Ferrara, next of philosophy at Rome. Gaza has been warmly praised by subsequent scholars, such as Politian, Erasmus, Scaliger and Melanchthon. His principal work was a Greek grammar in four books, first published by Aldus Manutius at Venice in 1495. He translated into Latin portions of Aristotle, Theophrastus, Saint Chrysostom, Hippocrates and other Greek writers.

GAZA, ga za, Syria, an ancient town, capi¬ tal of the district of the same name, about three miles from the mouth of the river Gaza, 50 miles from Jerusalem, on the high road between Egypt and Damascus. The bazaar and markets are of considerable importance. Gaza is a depot for barley and has many potteries. The district of Gaza occupies the southwest corner of Syria,

having the Mediterranean on the west, the valley of the Jordan and of the Dead Sea on the east and Arabia Petrsea on the south. It was a city of importance 1,000 years before the Christian era and figures frequently in the history of Babylon, Egypt, the Pilisti and the Persians. It was taken by Alexander after a short siege. In Roman times it was known as Constantia and regained much of its former prominence. It became a centre of Hellenic culture and rivaled Antioch, Alexandria and Athens in this respect. Proclus, Olympianus and Isidor were among its most celebrated teachers. Christianity found learned defenders amongst its citizens, notably Procopius, Chori- cius, and Joannes. The city was taken by Omar in 634, and it fell into decay. It was in ruins the time of the Crusades. A citadel was built by Baldwin II in 1149; Saladin sacked it in 1170 and captured the citadel from the Templars in 1187. Napoleon took the city in 1799. On 7 Nov. 1917 it was taken by the British in their advance on Palestine. See War in Europe: Turkish Campaign, and consult Clermont-Gan- neau, Archaeological Researches in Palestine) (London 1896) ; Gatt, "Gaza" in Zeitschrift des deutschen Paldstina Vereins , Vol. I (1888); Meyer, M. A., (A History of Gaza> (New York 1907) ; Schiirer, (Geschichfe des judisrhen Volkes) (4th ed., Leipzig 1907) ; Smith, his¬ torical Geography of the Holy Land) (London 1895) ; Stark, (Jena 1852).

GAZALAND, ga'za-land, Portuguese East Africa, a district extending north from the Manhissa River, Delagoa Bay, to the Pungwe River. It is a well-watered and fertile region. About 1832 the Portuguese secured a footing in this territory, but it was not until 1895 that all opposition to Portuguese rule ceased. In fauna, flora and commerce Gazaland resembles the adjoining regions of Portuguese East Africa (q.v.). Consult Maugham, R. C., (Vol. V, ib. 1908).

GAZELLE, a small antelope of the genus G azella, or some related genus, exemplified by the "ariel" or "dorcas" of the Saharan and Syrian deserts, famous in poetic literature. The group contains some 25 species scattered throughout all Africa and southern Asia; and as a whole is characterized by small or mod¬ erate size, a sheep-like dentition, sandy colora¬ tion with white belly, and the usual presence of dark and light stripes on the face and flanks. The horns are of fair length, ringed, lyrate and usually present in both sexes. The gazelle (G. dorcas), stands about 24 inches tall at the shoulders, and has horns about 13 inches long. It is of delicate budd, and extreme swiftness, leaping high as it runs, so that at full speed it seems. to skim the ground like a flying bird. Its color is a light fawn upon the back, deepening into dark-brown in a wide band which edges the flanks and separates the yellow-brown of the upper portions of the body from the pure white of the abdomen. The face is marked with two stripes of contrasting colors, and the ing comparison to that of a woman. Gazelles is large, soft and lustrous, and has been long employed by Eastern poets as the most

flatter¬ ing comparison to that of a woman. Gazelles feed generally at dawn and at evening, and ap¬ proach water only once in 24 hours. They are hunted in various ways, and their flesh is ex¬ cellent. This species is becoming rare, but may still be found throughout the Sahara, and in the stony deserts of Syria. Many local names have been applied to it in books of travel and reference, most of which belong elsewhere. Such are the "korin" or "corinne" of Senegal (G . rufifrons) ; the West African "mohr" (G. mohr), the largest (32 inches high) and tallest of the race; the "aoul" (G. scemmerringi) of Abyssinia and Somaliland, the "dama" (G. dama) of the Sudan, and others formerly con¬ fused with G. dorcas. Still other species range the plains of Central and South Africa, where some, as the springbok (q.v.), formerly assem¬ bled in vast herds, as described under Antelope. Another group is formed by three similar Asiatic gazelles, — one common in Persia (G. gutturosa) , and the others eastward, where the "goa" dwells on the high Tibetan plateau. Lastly in the Indian gazelle (G. bennetti), the "ravine- deer" of Indian sportsmen, we have a species with almost . straight horns, which is about 26 inches tall, light chestnut in color with a blackish tail, and dwells in small bands in the dry plains along both sides of the Indus.

GAZETTE. Ga zetta was the name of a small coin once in use at Venice, and also of a kind of primitive newsnaner, published by the government there in 1566 and sold for that' sum. Gazzetta, Spanish Gazeta, French Gazette, are

still used for a newspaper, but the term in England is confined to that paper of news pub¬ lished by authority of the government. The first Gazette in England was published at Ox¬ ford 7 Nov. 1665. From that period the Gazette has appeared regularly twice a week, and besides the notifications published by court and government contains those required by law in private transactions. Similar gazettes are published in Dublin and in Edinburgh. See Newspapers.

GAZETTEER, a geographical dictionary. The first work of this kind with which we are acquainted is that of Stephen of Byzantium, who lived in the beginning of the 6th century. We have only an abridgment of it. The first modern work of the kind is the 'Dictionarium Historico-Geographicum) (Geneva 1565), by Charles Stephens, with additions by N. Lloyd (Oxford 1670, and London 1686). The works of Ferrari ((Lexicon Geographicum, 1627) and Baudrand ('Geographia Ordine Citerarum Dis- positaC 1682) are full of the strangest errors. Those of Maty (1701), Thomas Corneille*

(1708), and Savonarola (1713) were based on the former, with additions and corrections. The 'Dictionnaire Geographique, Historique et Critique, } of La Martiniere (1726), superseded all that had gone before it, though it retained many errors. The 'Geographisch-Statistisches Handworterbuch) of the eminent German geog¬ rapher Hassel (1817) was the result of labori¬ ous and judicious investigations. The Univer¬ sal Gazetteer, > by Cruttwell (London 1808) and the 'Edinburgh Gazetteer> (1817-22), once the principal works of the kind in English, were in course of years superseded by several others, among them Macculloch's Geographical Dic¬ tionary, > Blackie's 'Imperial Gazetteer (Glas¬ gow 1850), Lippincott's 'Pronouncing Gazet¬ teer of the World (Philadelphia 1855, com¬ pletely rewritten with new editions and re¬ visions 1911), and Longmans' 'Gazetteer of the World) (London 1906). The most valuable among European gazetteers further include the French 'Dictionnaire Geographique Universe!, > Saint-Martin's 'Nouveau Dictionnaire de Geo¬ graphic Universelle) (Paris 1879-1900), and Ritter's 'Geographisch-Statistisches Lexikon* (Leipzig 1874; 9th ed., 1905 et seq.) ; also Garollo's 'Dizionario geographico universal (Milan 1898), notably accurate. There are also gazetteers confined to individual States of the Union, and others to particular countries of the world. Among the latter is the elaborate 'Gazetteer of India* by Hunter (London 1886-*

88).

GAZOGENE, an apparatus for the genera¬ tion of carbon dioxide used in the manufacture of carbonated waters ; also a generator of illu¬ minating gas after the du Motay process.

_ GEANTICLINE. See Folds.

GEAR LOCOMOTIVES. See Loco¬ motive.

GEAR WHEELS, toothed wheels for the transmission of motion or power, or both, from one part of a machine to another. They are of several forms, including spur gears with teeth parallel to the axis of the wheel, worm wheels, bevel wheels, etc. These forms are familiar to most people to-day, being found in watches, automobiles, sewing machines, printing presses,

etc. Consult Beale, 'Practical Treatise on Gearing) (10th ed., Providence 1911).

GEARING. See Gears.

GEARS, the moving parts of a mechanism for the transmission of motion. The commoner gears may be grouped into six classes: (1) spur gears; (2) bevel gears; (3) worm gear¬ ing; (4) spiral gear; (5) helical gear; and (6)

chain gearing.

Spur gears are toothed wheels in which the teeth are parallel with the axis. This is the commonest gear in use, and is employed to transmit motion between lines of shafting which are parallel. Bevel gears are toothed wheels in which the teeth are formed on the beveled sur¬ face of cone frusta: they are used to transmit motion to shafting which intersects at right angles. W orm gearing is a combination of a screw and a toothed wheel : it is used in the transmission of motion where shafting crosses at right angles, but not in the same plane. Spiral gears are formed of wheels which are practically sections of screws of very steep pitch: they are used to transmit motion be¬ tween shafting crossing at acute angles, and not in the same plane. Helical gears are composed of toothed wheels and pinions in which the teeth or cogs are cut on the lines of a spiral angle of 23 degrees. They are seldom used in the single form on account of the axial thrust de¬ veloped, but they are cut in herring-bone fashion, right hand on one face of the wheel and left hand on the other, forming a tooth shaped liked a broad V. This cutting is known as double helical gearing. It is regarded as the most perfect of all gears, transmitting in some instalments 98 per cent of the power. Great speed is obtained, as a pinion may have as few as seven teeth to 140 in the wheel. Moreover, in operation the gear is nearly noiseless. Where reversing the motion is necessary, triple helical gearing is used, the teeth being cut in three trends. Beveled helical gears are also in use, in both the single and double types. Chain gearing makes use of two spur wheels with peculiarly shaped teeth, on shafts at a con¬ siderable distance apart. Motion is transmitted by means of an endless chain having flat open links which engage the teeth of the wheels.

Many forms of gearing have been devised for the transmission of interrupted motion, and for the conversion of continuous motion into special directions. These gears are of most in¬ tricate and ingenious character. Illustrations and descriptions of some of the more important may be found in 'Mechanical Appliances; Me¬ chanical Movements; and Novelties of Con¬ struction (New York 1914), by G. D. Hiscox See Wheel Gearing. Consult Flanders, R. E. 'Gear Cutting Machinery> (New York 1909) • Ingham, A. E., 'Gearing (London 1914).*

GEARY, John White, American military officer and politician : b. Mount Pleasant, West¬ moreland County, Pa., 30 Dec. 1819; d. Harris¬ burg, Pa., 8 Feb. 1873. He was a lieutenant- colonel in the Mexican War; went to California

*a i iappo*ntec* P°stmaster at San Francisco in 1849, being the first to hold that position in the city. In 1850 he was elected the first mayor of San Francisco, and in 1856 was made terri- tonal governor of Kansas. When*

the Civil War broke out he enlisted in the Union army and became brigadier-general of volunteers 25

April 1862 He was in the battle of Cedar Mountain 9 Aug. 1862, and commanded a di¬ vision at Chancellorsville, Gettysburg and Look¬ out Mountain- He also participated in Sher¬ man s march to the sea. He was governor of 1 ennsylvania from 1867 till shortly before his death.

GEBA, zha'ba, a river of western Africa, nowing in a southwesterly course through Por¬ tuguese Guinea. It enters the Atlantic by a wide estuary and close to the town of Geba.

GEBAL, ge'bal, the name of two places in Palestine, the name signifying mountain. The first is a mountainous district south of the Dead Sea in the land of Edom. It is undoubt¬ edly referred to in Psalm Ixxxiii, 8. The second is a city and district located near Mount Lebanon on the shores of the Mediterranean. It was included in the original Promised Land but was not occupied by the Israelites at any time. The city was about 20 miles north of the present city of Beirut. It was known to the Greeks as Byblus. Its name appears often in Phcenician and Assyrian inscriptions and on the Tell El- Amarna tablets. Pliny calls it Gebale. It was famous in the ancient world as the birthplace of Adonis, the Syrian Tammuz and his worship. In the time of the writer of 2 Kings v, 18, the inhabitants were evidently skilled stone-workers if the accepted text of the passage is correct Ezekiel xxvii, 9, speaks of the "wise men of GebaE as being experienced ship calkers, or carpenters of the ships of Tyre. According to Strabo their work was much interfered with by robbers which infested the Lebanon range. Pompey not only destroyed the robber nests, but delivered the city from a tyrant. Later the city was an episcopal see in the patriarchate of Antioch subject to the metropolitan of Tyre. Quite recently it continued to furnish the title for an episcopal see. It is now largely in ruins and has only a small population. It is called Jebail by the Arabs.

GEBAUER, ga'bow-er, Jan, Czech philol¬ ogist : b. Ubislavicz, Bohemia, 1838; d. 1907. He received his education at the University of Prague and became instructor in literature there and in 1874 was appointed to the chair of Slavic philology. He made many transla¬ tions from Bulgarian, Russian and Sanskrit. He is best known, however, for his philological researches in old Czech literature. He wrote (Zaltar Wittenbersky) (1880); 'Historical Czeclrc Grammar) (1898) ; 'Old Czech Dic- tionary) (1903). He was a member of the edi¬ torial staff of the Listy Filologicke after

1874.

GEBER, the supposed name of an Arab scholar and author, of whom nothing is known beyond his works, about 26 in number, which repose in various continental libraries. Latin translations have been made of some, such as 'Geberi Philosophi de Alchimia Libri Tres) (1531); 'Geberi Arabis Chimia sine Traditio Summae Perfectionis et Investigatio Magisterrp (1668, English translation by Russell 1678). Consult Berthelot (La chimie au moyen age> (Vol. Ill, Paris 1893) and Wustenfeld, 'Ges- chichte der arabischen Aerzte) (Gottingen

1840).

GEBERT, ga'bert, Johannes Sophus,

American sculptor: b. Schleswig, Denmark 10 Dec. 1852. Worked as a wood carver from

1ˆ67 72, graduated with honors from the Royal Academy of Fine Arts, Copenhagen, 1875. Worked in Pans 1877-78, exhibited at the Salon 1S/8 a colossal group, (The Norse God Thor wrenching the head of a bull.> Worked for Prof R. Simermg in Berlin 1879-52. He re- ceived a scholarship from the Danish govern-

?iooto?vhlˆh ena.bled him to study in Rome loo2-83. Returning to Copenhagen he executed architectural statuary and ornaments for build- mgs in Denmark and Sweden. He emigrated

5°oooAmeTrTica ***n 18ˆ7 and became a citizen in 1892. He was established as a sculptor in Chicago until 1898, since then in New York. He has executed the following public monu¬ ments : Hay Market Monument, Hans Chris¬ tian Andersen and Beethoven, Chicago ; deco¬ rated the Chicago Herald building with his- to/ic!*** *statuary, likewise the Auditorium and McWicker s Theatre ; executed a monument, portrait statue of General Grant, with bas- relief representing Lee's surrender at Appomat¬ tox; Furman statue in Vanderbilt University, Nashville; also a cemetery monument to Fur¬ man in Nashville; statue of Napoleon for the Missouri State building, Saint Louis, now in Art Museum there; also a statue of Gothic Art for the porticos of the Art Museum of Saint Louis and a statue of General Stevens, the founder of the city of Minneapolis. He executed four statues for the Aptrop Apart¬ ment building, /The Four Seasons J ; four statues representing Roman civilization for the Brooklyn Institute of Science and Art. Deco¬ rated the Bergen County courthouse with nine statues and a historical frieze. He has executed numerous portrait busts and bas-re¬ liefs all over the country;*

was a member of the International Jury of Awards, Chicago Fair, 1893; was awarded three gold medals — two in Philadelphia for ideal works : a group of children called 'The Little Architect and a statue of 'Theseus courting Andromeda.) At the Nashville Centennial Exposition he was awarded a gold medal for the 'Wounded American Soldier. > In the United States Custom House, New York, there is, among other statues representing 12 seafaring na¬ tions, a statue of Denmark executed by him. He has executed numerous ideal statuary, for instance two dancing Bacchantes (Berlin) 1881. One of h.s latest, a family group repre¬ senting 'Evening Prayer > (1913), was exhibited at the San Francisco Fair 1915.

. GEBHARD, gab'hart, Heinrich, American pianist: b. Sobernheim, Rhine Province, Ger¬ many, 25 July 1878. In 1889 he settled in Bos¬ ton; studied pianoforte, theory and composi¬ tion under Clayton Johns of that city and un¬ der Leschetizky at Vienna in 1895-99. In 1900 he returned to Boston and in the same year made his professional debut with the Boston Symphony Orchestra. He has appeared in the principal cities of the United States with the Kneisel Quartet and in recitals of his own, and with other orchestras.

GEBHARDT, Eduard von, German painter: b. Saint Johannes, Esthonia, 13 June 1838. He studied at the Petrograd Academy in 1854-57, and later with Wilhelm Sohn at Diisseldorf, where he established his studio and attracted much attention by his religious works, in which

he treated biblical scenes after the manner of the Dutch and Germans of the 15th and 16th centuries, imitating their introduction of cos¬ tumes and other features contemporary to them. He also painted many scenes from the period of the Reformation. In 1873 he was appointed professor . in the Diisseldorf Academy. His subjects include (Christ's Entry into Jeru¬ salem) ; {The Rich Man and the Beggar Lazarus) ; (The Last Supper, } his chief work (National Gallery, Berlin) ; (The Ascension, y one of his best canvases; (Religious Conversa¬ tionˆ and (1877 Leipzig Museum). Other important canvases are (The Crucifixion } (1873), in the Hamburg Gallery; (1893), both in the Dresden Museum; (Christ and the Rich Youth) (1892) and (The Sermon on the Mount) (1893), both in the Diisseldorf Gallery; (Heal¬ ing of the Palsied) (1895), in the Breslau Gal¬ lery; < Christ upon the Waters 5 (1902), in the Diisseldorf Gallery. There is also a series of six mural paintings by him dealing with scenes in the life of Christ, painted in the old mon¬ astery of Lokkum. This series shows some Pre-Raphaelite tendencies. There are also fine mural paintings

by h m in the Friedenskirche, Diisseldorf. He is a member of several national academies and has received numerous awards. Consult lives by Rosenberg (Leipzig 1899) and Schaarschmidt (Munich 1899).

GEBHART, Emile, French author: b. Nancy, 1839; d. 1908. He received his edu¬ cation at the Lycee of Nancy and at the French School at Athens. He was appointed professor of foreign literatures at Nancy in 1860 and 19 years later removed to Paris as professor of Romance literatures. He was chosen member of the Academy in 1904. He published

(Rabelais, la renaissance et la reforme) (1876) ; (Les origines de la Renaissance en Italie> (1879); (L'Italie mystique) (1890); (Moines et papes) (1896; 4th ed., 1907); (Au son des cloches > (1898) ; (1902) ; (Jules ID (1904); (1907).

GEBWEILER, gab'vi-ler, Alsace, town situated at the foot of the Vosges, on the Lauch, 14 miles south of Colmar. The prin¬ cipal buildings are Saint Leodgar's Church, dat¬ ing from the 12th century, the Evangelical church, the synagogue, the town hall and the old Dominican convent now converted to secular uses. > The principal industries are dyeing and spinning, cloth weaving, machine-making, soap, sugar and brick manufacturing, and white wines. The . town is mentioned first in 774; for a long time it was part of the foundation of Murbach and in 1759 became the residence of the abbots. The Revolut:on brought de¬ struction to the monastic establishment and the great library there was lost. Roman Catholi¬ cism is the prevailing religious faith. Consult Dietwiler, (Gebweiler Chronik) (Gebweiler 1898). Pop. 13,100.

GECKOS, gek'oz, the small lizards of the family Geckonidce, distinguished from other lizards by structural peculiarities which indicate that the group is a very ancient and distinct one. Externally their robust forms, short heads and thick, but fragile tails; the skin, in most

soft and pebbled with minute bony concretions (osteoderms) ; the lack of eyelids, the ball of the eye being studded by a transparent watch- glass-likeˆ scale ; and adhesive feet are so highly characteristic that a gecko is usually recogniz¬ able at a glance. The group consists of about 50 genera, comprising some 270 species, and they are scattered all over the warmer part of the globe, occurring even in New Zealand and many oceanic islands. Most of the species are small, the largest not much exceeding a foot. They dwell mainlv in the woods, and among rocks, hiding by day, or basking quietly in the sun, . and becoming active at night. They are carnivorous, the smaller eating insects and the larger bigger insects and whatever else they can catch. They are well fitted for scrambling about tree trunks and cliffs, as is seen in the agility of the common ((taren- tola,®

((osga® and other geckos of southern Europe, and the almost domestic (

(Hemidactyhis) of Ceylon and India, which are numerous both outside and inside of farm and village houses, snapping up flies. They will climb a smooth wall or even a window pane without difficulty, and even run back downward along the smooth whitewashed ceiling. This is possible for them by the fact that the soles of the cushions of the toes _ are furnished with transverse lamellae beset with tiny hair-like ex¬ crescences, between each two of which a vacuum is formed by the pressure of the foot on every step. Upon the differences in the arrangement of the pads and lamellae are based generic dis¬ tinctions. In addition to this facility of move¬ ment, one species (Ptychozoon homalocepha- lum), the flying or fringed gecko of the Malayan region, has a lateral parachute-like membrane assisting it to make long leaps from tree to tree.

Geckos are entirely harmless and could not inflict a painful bite if they tried; yet the peas¬ ants of Spain and Italy fear as poisonous even those which they see daily in their houses, and the Egyptians accuse them of leprosy. When encouraged they become tame and friendly and show considerable intelligence. Their voices produce a feeble clicking sound, often repeated, from which comes the term <(Gecko® and such local names as/(toco-toco® and the like. They reproduce by hiding among rotten wood two or three globular hard-shelled eggs, from which the young hatch, and are ready at once to be¬ gin to care for themselves. Consult Gadow,

< Amphibia and < Reptiles > (1901); Gosse, (A Naturalist's Sojourn in Jamaica* (London

1851).

GED, William, Scottish goldsmith, in¬ ventor of stereotyping : b. Edinburgh, 1690 ; d there, 19 Oct. 1749. In 1725 he took out a patent for his method of stereotyping, which was for long the only one in use. He met with such opposition in Edinburgh that he went to London, but there also failed to get his inven¬ tion adopted. In 1731 he obtained a contract to print Bibles and prayer-books for the Uni¬ versity of Cambridge, but only two prayer- books had been executed when the lease was surrendered. He stereotyped an edition of Sallust in 1744. Consult (Memoirˆ by Nichols

(1781) .

GEDALIAH is the name of no less than hve ln(hvlduals in the Old Testament.

The most important was the son of Ahikami

and grandson of Shaphan, the secretary of Kmg Josiah (2 Kings xxii) ; Gedaliah was ap¬ pointed by Nebuchadnezzar as governor over

the poor of the people that were left in the land. He ruled only two months and was treacherously assassinated. He set up his gov¬ ernment in Mizpah. Jeremiah the prophet, and many dispersed Jews and the remnants of the army gathered about him. This was not to the liking of Baalis, king of the Ammonites, who plotted to destroy ((the remnant of Judah® and its governor. A bandit in his service, Ishmael of the royal line of Judah, who had been a high officer under King Zedekiah, was a trait¬ orous tool ready for his purposes. With 10 of his men Ishmael sought Gedaliah, and though warnings were not lacking, was cordially en¬ tertained by him. The plot was successful. Gedaliah and his little group of followers were slain, it is thought, while they were dining. Their bodies were cast into the cistern of Asa (Jer. xli, 9). Fearing the displeasure of the Babylonian authorities, the remnant fled to Egypt, compelling Jeremiah to accompany them (Jer. xii, 2, 18). The assassination occurred on the third day of the month of Tisri, which has ever since been observed as one of the four fast days among the Jews. By the assassina¬ tion of Gedaliah and the dispersion of his fol¬ lowers, the final utter ruin of Judea was ac¬ complished.

GEDANUM. See Danzig.

GEDDES, ged'es, Alexander, Scotch Ro¬ man Catholic clergyman: b. near Ruthven in Banffshire, 14 Sept. 1737; d. London, 26 Feb. 1802. He studied eight years at the Roman Catholic Seminary at Scalan and seven at the Scotch College in Paris. In 1780 he settled in London. He published two volumes (1792-97) containing the Pentateuch and the historical books; (Critical Remarks on the Hebrew Scrip¬ tures* (1800); several volume of poems; iA Modest A.pology for the Roman Catholics of Great Britain* (Anonymous 1800). Consult Good, John Mason, (Memoirs of the life and writings of Alexander Geddes) (London 1803).

GEDDES, Andrew, Scottish painter: b. Edinburgh 1783; d. London 1844. He studied at the university in his native city and held a post in the excise office for five years. After his father's death, he entered the Royal Acad¬ emy art schools at London in 1831, and in the following year was elected associate of that institution. He painted portraits chiefly, but exhibited also a few genre and historical sub¬ jects, chiefly (The Ascension,* now at the church of Saint James, Garlick Hill, London; the (Discovery of the Scottish Regalia* (1821). His best-known portraits are those of Wilkie (1816); his

mother; Miss Nasmyth as (Sum- mer) ; (Dull Reading, a portrait study of Daniel Terry and his wife, — all in the National Gallery of Scotland, — and an admirable por¬ trait of Sir Walter Scott, in the Scottish Na¬ tional Portrait Gallery. He executed also some excellent copies of the old masters and several fine etchings. Geddes' distinguishing character- istics are his feeling for personality, and his discriminating use of color. Consult McKay, W. D.,*

(1906).

GEDDES, Sir Auckland Campbell, Brit¬ ish physician and diplomat: b. 1879. He was

educated at George Watson's College, Edin¬ burgh ; Edinburgh University ; the London Hos¬ pital and at Freiburg. He was for some time demonstrator and. assistant professor of anatomy at Edinburgh University ; thereafter professor of anatomy at the Royal College of Surgeons, 1m, and later professor of anatomy at Mc¬ Gill University, Montreal (principal of the lat¬ ter, 1919—20). Sir Auckland served in the South African War as a lieutenant in the Third Highland Light Infantry. He served during the European War in various canacities from 1914 until 1916 when he was made director of re¬ cruiting. From 1917-19 he was Minister of Na¬ tional Service. He was also president of the Local Government Board in 1918, president of Board of Trade 1919-20. He was Minister of Reconstruction in 1919. He was knighted in 1917. In 1920 he was made Ambassador to the United States.

GEDDES, Sir Eric Campbell, British statesman and administrator: b. Agra, India, 1875. Intended for the army, young Geddes was sent to Scotland and educated at Merchis- ton Castle School, Edinburgh. He later passed the . preliminary examinations at the Oxford Military College at the age of 17, but did not pursue the course. Working his passage to America, he found employment in the Carnegie steel works at Homestead,' Pa. Afterward he drifted to Nicolette,. near Parkersburg, W. Va., and worked for a time in a lumber camp. He was then 20 years old. A young woman tele¬ graph operator at a nearby station taught him the Morse code. Geddes' next undertaking was that of a switchman on the Baltimore and Ohio Railroad. He rose to station master at a small place, remained there three years and then re¬ turned to England. Before long, however, he set out for Australia, but disembarked at Ceylon and took up sugar planting. After try¬ ing this occupation for a short time Geddes went to India and became manager of a large forestry concern. Here he brought his Ameri¬ can experience into play by constructing and run¬ ning, a two-foot six-inch light railway

through the jungle. His little railroad was eventually amalgamated with a larger line and Geddes be¬ came traffic manager of the Rohilkund-Kumaon Railway. He resigned in 1903, returned to Eng¬ land, and entered the service of the North¬ eastern Railway. From claims agent he rose to deputy general manager, which position he held at the outbreak of the European War in 1914. When the British government took con¬ trol. of all the railroads, Geddes was appointed chairman of the central committee of railway authorities for the mobilization of the Northern District.

In the early part of 1915, when a Ministry of Munitions was instituted, Lloyd-George, first head of the new department, appointed Geddes deputy director-general of munitions supply. Between May and December 1915 he controlled and organized the supply of rifles, machine- guns, small arms, ammunition, optical instru¬ ments -and glass, transport vehicles and salvage, and also had administrative control of the Royal Ordnance Factories of Woolwich, Wal¬ tham and Enfield. At the end of 1915 he had put all departments in working order and del¬ egated their supervision. He retained control of Woolwich Arsenal and was placed in charge of the filling of min ammunition and the

organization of the national filling factories. During the battle of the Somme, when the supply of munitions had become abundant and the fill¬ ing factories were in full operation, Geddes went to France to report on the transport situation there. He next reorganized the whole trans¬ portation services behind the front. This led to his appointment as director-general of mili¬ tary railways at the War Office, exercising supervision over transportation in all theatres of war and also being responsible for obtaining the necessary supplies of material and arrang¬ ing the personnel for the services. While at the front he was invited by Sir Douglas Haig to join his staff as director-general of trans¬ port. By arrangement, the unusual course of having a War Office official on the staff and a commander in the field was agreed to, and Geddes, now Major-General Sir Eric Geddes, undertook both duties. Meanwhile, it was de¬ cided to revive the long obsolete office of Con¬ troller of the Navy. On 28 March 1917 it was announced that Geddes had been appointed in¬ spector-general of transportation in all thea¬ tres of war. On 14 May came the official announcement that Sir Eric Geddes was (

Henri F. Klein,

Editorial Staff of The Americana.

GEDDES, James, American scholar : b. Boston, Mass., 29 July 1858. He was gradu¬ ated from Harvard in 1880, was instructor in Romance languages at Boston LTniversity in 1887-90, assistant professor in 1890-92, and in 1892 was appointed professor. His writings include various monographs and articles for periodicals, and students' editions of Spanish and Italian classics and 'Canadian French, the Language and Literature) (1902) ; French prose translations of Muller text of old French poem, (La chanson de Roland) (1906) ; Wrench Pronunciation (1913). He is a member of the Executive Council of the Modern Language Association of America.

GEDDES, James Lorraine, American soldier: b. Edinburgh, Scotland, 1827; d. 1887. After residence in Canada from 1837 to 1843, he studied in the British military academy of Calcutta, India, entered the British army and distinguished himself in the Punjab. He set¬ tled at Vinton, Iowa, in 1857. In the Civil War he served from 1861 to 1865, and attained

the brevet rank of brigadier-general of volun¬ teers. Later he held various positions in the Iowa College of Agriculture from 1870, after having been principal of the Vinton College for the Blind. He wrote (The Stars and Stripes,' (The Soldier's Battle Prayer' and other war verse.

GEDDES, Patrick, Scottish biologist: b. Perth 1854. He was educated at Perth Acad- emy, the Royal School of Mines, University College, London, the Sorbonne, the universities of Edinburgh, Montpellier, etc. He was suc¬ cessively demonstrator of phys'ology at Uni¬ versity College, London; of zoology at the University of Aberdeen; of botany at Edin¬ burgh; lecturer on natural history in the School of Medicine, Edinburgh, with intervals of travel, explorations in Mexico, visits to Con¬ tinental universities, zoological stations and botanic gardens, as also to Cyprus and the East, the United States, etc. His educational work dealt mainly with the organization of University Halls, Edinburgh and Chelsea, each as a beginning of collegiate life. He also be¬ came interested in a printing establishment deal¬ ing with Celtic and general literature and art. He also has been actively employed in city im¬ provement, town-planning and educational in¬ itiatives at home, on the Continent and in India. He is professor of botany at Uni¬ versity College, Dundee (Saint Andrew's Uni¬ versity). His publications comprise numer¬ ous articles in the (Encyclopaedia Britannica,' 'Chamber's Encyclopaedia,' etc.; 'The Evolu¬ tion of Sex) (1889) ; (Chapters in Modern Botany > (1892); City Development' (1904);

(Cities in Evolution' (1908).

GEDDIE, John, Canadian missionary: b. Banff, Scotland, 1821 ; d. 1895.

He was brought to Nova Scotia in childhood and in 1838 was ordained to the ministry of the Presbyterian Church. In Nova Scotia he planned the missionary movement of his Church and in 1846 was sent as missionary to the Hebrides, the first missionary to labor in those islands. He translated schoolbooks, hymn- books, general devotional works and the New Testament into the native tongue of the island¬ ers. He published 'Memorial to the Presby¬ terian Synod of Nova Scotia) (1844); 'The Proposed Mission to New Caledonia) (1846) ; 'Universal Diffusion of the Everlasting Gos- peP (1846), and letters to period. cals of Nova Scotia describing his missionary labors.

GEDEN, Alfred Shenington, English Methodist divine: b. Didsbury, Manchester, 26 Nov. 1857. He was educated at the Manchester Grammar School and at Magdalen College, Ox¬ ford. He entered the Wesleyan ministry in 1881, and in 1887-88 was principal of the Roya- pettah College, Madras. Since 1891 he has been professor of Old Testament languages and lit- ˆratlJre> and of comparative religion at the Wesleyan Theological College, Richmond, Surrey. He translated Deussen's 'Philosophy of the Upanishads) (1906) and published 'Hebrew Exercises) (1897); 'Studies in Com¬ parative Religion' (1898); 'Studies in Eastern Religions.' (1900) ; 'Outlines of Introduction to the Hebrew Bible' (1909); 'Studies in the Religions of the East' (1913); 'Comparative Religion' (1917); articles in Hastings' 'Ency-

clopaedia of Religion and Ethics J ; (Dictionary of Christ and the Gospels, etc. He was joint editor of Concordance to the Great Testa¬ ment (3d ed., 1913).*

GEDIMIN, ga'de'min, or GEDYMIN,

Grand Duke of Lithuania; d. 1342. He inherited vast regions comprising Lithuania, Red Russia, Minsk, etc., and immediately had to undertake defensive operations against the predatory Teu¬ tonic knights. The better to effect his purpose he secured the protection of the Holy See and opened his lands to men of every order and pro¬ fession, the first to open semi-savage Russia to the influences of western culture. He was soon engaged in war with the Teutonic knights, but succeeded in extending his domains to the south and east. He was a wise ruler; fie protected the clergy of all faiths, encouraged them to civilize his subjects, built strong fortresses along his borders, and built several towns, in¬ cluding Vilna,. his capital. He was killed at the siege of Wielowa. Consult Narbutt, Teodor, 'History of the

Lithuanian Nation> (Vilna

1835).

GEE, ge, Thomas, Welsh preacher and journalist: b. Denbigh, 24 Jan. 1815; d. 28 Sept. 1898. In 1829 he entered his father's printing office and in 1837 went to London to attain greater proficiency in his trade of printer. Soon after his return fie engaged in literary and re¬ ligious work, established the magazine Y Traet- hodydd (Tfie Essayist), issued the 'Gwyd- doniadur Cymreig) (Welsh Encyclopaedia) and Evan's (English-Welsh Dictionary (1868). He also founded the Bauer Cymru (Welsh Banner) which in 1859 was merged with Yr Amserau (The Times). This paper was a pillar of strength to the Nationalist movement in Wales and its circulation there was universal. In 1847, Gee was ordained to the Calvinistic Methodist ministry and did much for the pro¬ motion of temperance and Sunday-school work. He believed in complete disestablishment and favored an itinerant unpaid ministry ratfier than the usual settled pastorate.*

GEEFS, gafs, Gillaume, Belgian sculptor: b. Antwerp, 10 Sept. 1806; d. Brussels, 24 Jan. 1883. He became professor at the Academy of Antwerp in 1834. Among his most important works are the monument to the victims of the Revolution of 1830 at Brussels, a statue of Rubens in front of Antwerp Cathedral and statue of King Leopold.

GEEFS, Joseph, Belgian sculptor : b. Antwerp, 25 Dec. 1808; d. there, 10 Oct. 1885. He was a brother of Gillaume Geefs (q.v.). In 1841 he was appointed professor of sculpture in the Antwerp Academy, and in 1846 became a member of the Belgian Academy. Among his principal works are a statue of Vesalius, at Brussels, one of Martens, the first Belgian printer, at Aelst, an equestrian statue of Leo¬ pold I, at Antwerp, and (The Fallen Angel, in the Brussels Palace of Fine Arts.*

GEEL, gal, Jacob, Dutch scholar and critic: b. Amsterdam, 12 Nov. 1789; d. Leyden, 11 Nov. 1862. In 1811 he settled at The Hague where for many years he was employed as tutor. In 1823 he was appointed sub-librarian and in 1833 chivf librarian and honorary professor at Leyden. He published editions of Theocritus (1820) ; of the 'Anecdota Hemsterhusiana)

(1826) ; of Ruhnken's 'Scholia in Suetonium / oon ' °* Vatican fragments of Polybius (18w9) ; wrote (Historia Critica Sophistarum Graecorum > (1823) ; (Commentarius de Reliquis Dionis Orationibus* (1840), and Catalogus Lodi cum Manuscriptorum qui inde ab anno 1741 Bibliothecae Lugduni Batavovum Accesse- runt (1852). He also translated several Ger¬*

man and English works into his native tongue.

GEELONG, . ge-long', Australia, city of Grant County, Victoria, on Corio Bay, 45 miles southwest of Melbourne. The gold discoveries m 18a 1 added to its prosperity. Limestone, coal, and a kind of marble are found in the neighborhood. It was early noted for its wool trade, the first mill in Victoria being erected here. The industries are the manufacture of woolen cloths and paper, meat preserving, leather, flour, cement, . tanning, rope making! fishing, etc. The city is lighted with gas, and has two parks, botanical garden, government buildings, a town hall, hospital, chamber of commerce, mechanics' institute, etc. Corio Bay is a favorite bathing resort. Within the years 1905-10 the city spent $2,000,000 for dock and harbor improvement. Ships of 23-feet draft may now draw up to the docks, which have railroad connections, and a large export and brokerage trade in wool has arisen in conse¬ quence. Pop. 13,618; with suburbs about 27,000.

GEELVINK (gal'vmk) BAY, an arm of the Pacific in New Guinea. Its entrance, about 155 miles wide, is protected by several islands.

GEERTZ, garts, Julius, German painter : b. Hamburg, 21 April 1837; d. 1902. He was a pupil of Gunther and Martin Gensler at Ham¬ burg, of Descoudres at Carlsruhe and of Jor¬ dan at Diisseldorf. In 1864 he set out from home to study the old masters and he visited Paris, Brittany and Holland. It was on his re¬ turn that he set up his studio at Diisseldorf, and established his reputation by his skilful genre scenes, of which the 'Criminal after Con¬ demnation' was the first to win prominent notice. His works, characterized in general by . excellence of design and color, fidelity of interpretation and a capital sense of humor, include (The Fly-catcher ; 'Die Wacht am Rhein* ; 'A Prisoner of War* ; 'The Vil¬ lage Hero) ; 'Alms.* During a visit to the United States he painted portraits of Oswald Ottendorfer, Carl Schurz and other German- Americans.*

*. GEESE, a large group of water-birds al¬ lied to the ducks and swans, and forming with them the family Anatidce . It is not possible to separate geese and ducks into two well-defined groups. . Generally speaking, however, geese are distinguished by their larger size; short, heavy bill, with reduced lamellse; longer legs, placed nearer the centre of the body; and the absence of enlargements of the bronchial tubes. They are better walkers than ducks ; the sexes are generally alike in plumage, which undergoes only one moult a year; and both parents attend to the young. They are long-lived, cases having been known when they attained the age of 40. Some 30 species of true geese exist, and about a dozen others are usually known by that name. Males are called "ganders,** and young birds "goslings." The most typical geese are those of the genus Anser, represented in*

Europe by the gray lag (A. cinereiis) , bean- goose (A. segetum) and white-fronted goose (A. albifrons) . A variety of the last occurs also in North America. The gray-lag goose is the original of the domestic races of geese. In its wild state it ranges over nearly the whole of Europe and northern Asia, and was formerly an abundant breeder on the British Isles.

The best-known wild geese in America are the Canada goose (Branta canadensis'), the brant (B . bernicla) and the snow-goose (Chen hyperboreus) . The first-named presents several varieties differing mainly in size, the Hutchin's and cackling goose of the West being not larger than big ducks. One form or another occurs all across the continent, breeding mainly north of the United States, migrating south¬ ward in the autumn and wintering on the coasts and inland waters, where they are regu¬ larly hunted by sportsmen. In early spring the northward flight of these geese in their customary V-shaped rank is heralded as an in¬ dication that winter is over. The brent goose or brant is a smaller, darker bird, breeding far northward and occurring along our coasts often in immense numbers during the winter and also on the coasts of Europe, being everywhere a salt-water bird. The black brant of our western coast and the bernicle goose (q.v.) of the north of Europe are allied species. Several species of snow-geese, or laughing geese, are found in America, most plentiful in the in¬ terior. Most of them are pure white in the adult state, more or less gray during the first year; but the blue goose (Chen cceru'escens) is always bluish gray, with the head white in the adult.

In Patagonia and the adjacent islands are several peculiar geese in which the sexes differ totally in coloration, the males being white and the females brown ; some of them are strictly upland birds. The largest known goose is the Chinese swan-goose (Cygnopsis cygnoides) , which is supposed to be the parent stock of the domestic geese of some Eastern countries. The peculiar Cape Barren goose of Australia {Cere- op sis novce-hollandice) , an upland goose which has lost the power of flight, has the webbing of the toes greatly reduced and the bill very short and rounded. Another curious species is the spur-winged goose of Africa (Plectropterus rueppelli) which possesses hornlike weapons on the bend of the wing. This is a beautiful bird bred in captivity by fanciers for ornamental service.

Domestic Geese. — The breeding of geese is followed on a large scale in some countries and was formerly extensively carried on in parts of England, where the flocks were regularly tended by a gooseherd a.id driven daily to pasture and water. Two broods are sometimes produced in a

season. 10 or 11 in a brood, and the young geese are ready for table three months after they leave the shell. Until the invention of the steel pen, goose quills were used for this purpose. Geese are valuable not only for their flesh and eggs, but for the plumage and where kept for the latter purpose are plucked four or five times a year. The feathers are used chiefly for stuffing pillows, etc. ; but as a result of public sentiment against the use of the plumage of wild birds in millinery, the manu¬ facture of artificial plumes and feather-orna¬ ments for hats is becoming an important in¬

dustry and goose-feathers form the basis of most of these fabrications. Geese are often specially fattened for the table, the flesh of which is 82 per cent edible and 18 per cent refuse. The liver of a fat goose is often larger than all the other viscera. The celebrated pates de foie gras of Strassburg are made of goose- livers, which are brought to a state of abnormal enlargement by keeping the birds in an apart¬ ment with a high temperature and cramming them with food. The oily fat and preserved breasts of geese are German delicacies. Six standard varieties of domestic geese are kept in the United States, for practical purposes, as follows :

Gray Toulouse. — Derived from the neigh¬ borhood of Toulouse, France; compact in form; gray, with brown wing-quills, hazel eyes and bills and feet deep orange; full weight, 20 pounds. They are late in maturing and hence are often called Christmas geese; their flesh is not of the best, but they are good egg-layers. They are bred largely by farmers.

White Embden. — Large, tall, snow-white geese derived from Westphalia, weighing 18 to 20 pounds when adult ; eyes blue, bills flesh- color; feet deep orange. They are highly re¬ garded by farmers as practical birds.

Gray African. — Tall, with long necks and large heads, a large knob on the base of the bill and a heavy dewlap ; general color gray, darkest on the back; eyes hazel; bill black; feet dark orange ; weight, 18 to 20 pounds. These are by many raisers considered the most profitable of all geese to keep. They grow the heaviest in the shortest space of time, are ready for market in 10 weeks and as compared with other geese give the most satisfactory returns for the least labor and time spent in growing them. They are first-class layers and their flesh is fine and nicely flavored.

Chinese Geese. — Small graceful geese in two varieties, brown and white, weighing as adult 12 to 14 pounds. In colors and the shape of the head and knobbed bill they resemble the African breed ; the white variety is pure white throughout, with the bill orange instead of black. They are the most prolific layers of all the breeds, averaging 50 to 60 eggs a year ; and are otherwise commendable, especially for the table.

. Wild Geese. — Descendants of the American wild goose ; weight 14 to 16 pounds. They are very generally bred throughout the country and exhibit many good qualities.

Consult Weir, (New York 1903) ; and Farmers' Bulletin 64, the United States Department of Agriculture.

GEESTEMUNDE, ga'ste-mon'de, Ger¬ many, seaport town in the province of Hanover, Prussia, at the mouth of the Geeste, opposite Bremerhaven and 32 miles north of Bremen. Its life began in 1857 when the construction of the harbor works was put under way. It has a splendid harbor, safe and commodious and able to care for the largest sea-going craft. It is the most important fishmarket of Ger¬ many. The port is protected by great forti¬ fications. There are shipyards, foundries, en¬ gineering works, saw-mills, rope works and lumber dressing factories. Pop. 25,000.

GEEZ, gez, a name applied to the inhabit¬ ants of Semitic origin dwelling in Abyssinia

and to their language also. The word means "wandering,® which evidently refers to the nomadic character of the tribes.

GEEZEH. See Gizeh.

GEFFCKEN, gef'ken, Friedrich Heinrich,

German diplomatist and jurist: b. Hamburg, 9 Dec. 1830 ; d. Munich, 1 May 1896. He was educated at the universities of Bonn, Gottingen, and Berlin, and in 1854 became secretary of legation at Paris. From 1856 to 1866 he was diplomatic representative of Hamburg in Berlin and subsequently removed to London in a similar capacity. In 1872 he was appointed professor of constitutional history and public law at the reorganized University of Strassburg. He was made member of the Council of State of Alsace-Lorraine in 1880, but retired after two years and resided thereafter at Munich, where he was suffocated by escaping gas in his bedroom. He was a trusted adviser of Fred¬ erick William, afterward Frederick III, and is the supposed author of the German Federal Constitution, which he drew up at Bismarck's suggestion. He also drew up the memorandum which Frederick sent the Chancellor on the occasion of the former's accession in 1888. In October of that year Geffcken published in the Deutsche Rundschau extracts from Frederick's diary which gave umbrage to Bismarck and Geffcken was prosecuted for treason but was

released after three months. He wrote (Die Reform der preussischen Verfassung) (1870) ; (Der Staatsstreich von 1851 und seine Riick-wirkung auf Europa> (1870) ; (1875; Eng. trans., 1877) ; (Zur Geschichte des orientalischen Krieges 1853— 56> (1881); (Politische Federzeichnungen> (2d ed., 1888) ; (Frankreich, Russland und der Dreibund> (1894); (1889). y

GEFFCKEN, Johannes, German classical scholar: b. Berlin, 1861. He received his edu¬ cation at Strassburg, Gottingen, and Bonn ; was appointed teacher at a Hamburg gymnasium in 1887 and was appointed to a chair at Rostock 20 years later. He has published (Timaios' Geographic des Westens> (1892); (1896); (Oracula Sibyllina> (1902); Composition und Entstehungszeit der Oracula Sibyllina> (1902) ; (1907); (Die christliche Apokryphen) (1908) ; (1909) ; < Kaiser Julianus> (1914). He was coeditor of Lubker (Reallexikon des klassischen Altertums) (1914 edition).

GEFFRARD, zhe-frar, Fabre, Haitian President: b. L'Anse-a-Beau, 19 Sept. 1806; d. Kingston, Jamaica, 11 Feb. 1879. In 1843 he joined General Herard's insurrection against President Boyer and as commander of Herard's advance guard annihilated Boyer's force at Numero Deux. In the wars with Santo Domingo (1849, 1856) he fought with distinc¬ tion, later led a successful insurrection against President Soulouque, and was President from 1859-67, when a conspiracy of Salnave, an army officer, obliged him to escape to Jamaica.

GEFLE, yaf'la, Sweden, a seaport town and capital of Gefleborg, at the mouth of a river of same name in the Gulf of Bothnia. It stands on both sides of the river and two islands formed by it, consists of spacious and well-paved streets and houses partly of wood and pardy of stone. It has an old castle, ship¬ building yards and an excellent harbor. Pop. about 32,000.

The district of Gefleborg has an area of 7,614 square miles ; a coast deeply indented by bays and an interior partly mountainous and covered with pine forests and containing a large number of lakes, which, with the streams be¬ tween them, form a kind of continuous net¬ work. The rearing of cattle is the chief em¬ ployment. The most valuable mineral is iron. Pop. about 260,000.

GEFLEBORG. See Gefle.

GEGENBAUR, ga'gen-bowr, Karl, German anatomist: b. Wurzburg, 21 Aug. 1826; d. Heidelberg, 14 June 1903. He was graduated at the University of Wurzburg in 1851, having studied under Kolliker and

Virchow. After three years of travel in Italy and Sicily he became privatdozent at his alma mater and in 1855 became extraordinary professor of anat¬ omy at the University of Jena and in 1858 he became ordinary professor. In 1873 he was appointed to Heidelberg as professor of anat¬ omy and director of the Anatomical Institute there, where he remained until his retirement in 1901. He was one of the leading compara¬ tive anatomists of his time, ranking with Owen and Huxley, and is regarded as the founder of modern anatomy as based on the theory of evolution. He wrote (Grundzuge der ver- gleichenden Anatomie) (1870); (Grundriss der vergleichenden Anatomie> (1878); (Lehrbuch der Anatomie des Menschen> (1883; 3d ed., 1886) ; (Vergleichende Anatomie der Wirbel- thiere mit Beriicksichtigung der Wirbellosen> (1898). He published an autobiography en¬ titled

1903).

GEGENSCHEIN, ga'gen-shen, a spot of light in the heavens diametrically opposite to the position of the sun. It has been observed to be connected with the zodiacal light (q.v.) by faintly luminous bands and is consequently believed by some to be due to the same causes as the zodiacal light proper. It has at any rate been ascertained by means of polariscopic and the spectroscopic investigations that neither the zodiacal light nor the gegenschein is self- luminous and that they both arise from the reflection of solar light by some body or bodies.

F. R. Moulton, on the basis of a theory of the zodiacal light which makes it due to the reflec¬ tion of the solar rays by a swarm of small particles the orbits of which lie just outside of that of the earth, explains the greater lumi¬ nosity of the gegenschein as due to the retard¬ ation of these particles and their consequent banking up by the perturbations induced by the proximity of the earth. Arrhenius, on the other hand, considers that it is formed by a stream of particles repelled from the earth by the sun, after the fashion of the tail of a comet. To be easily visible, the gegenschein must be well

above the horizon and is hence best seen in low latitudes. A clear sky is also usually essential, though certain marked anomalies have been observed in this connection. The gegenschein is obscured by the milky way in June, July, December and January and from its extreme faintness is

invisible during moonlight or in the neighborhood of a bright star or planet.

GEHENNA, ge-hen'a. See Hell.

GEHENNAM, ge-hen'am. See Tophet.

GEHLENITE, ga'len-It (named by Fuchs after his colleague Gehlen), a grayish-green or brown tetragonal mineral; hardness 5.5 to 6; specific gravity 2.9 to 3.1; lustre resinous or vitreous; fracture uneven to splintery. It is composed of a silicate of calcium and aluminum, CasAhShOio. This mineral has feeble double refraction. It is found in the Tyrol and in Banat and occasionally occurs among the scoriae of furnaces.

GEIBEL, gi'bel, Emanuel, German poet: b. Liibeck, 17 Oct. 1815; d. there, 6 April 1884. He was educated at the University of Berlin ; was tutor at Athens for two years ; traveled extensively in the Grecian Archipelago with Ernst Curtius. In 1840 he returned to Liibeck and subsequently lived at Stuttgart, Hanover and Berlin. He received a pension from the king of Prussia in 1843 and 10 years later became professor of aesthetics at the University of Munich. He wrote much lyric poetry, the volumes (1896) ; con¬ tributing most to his fame. With Curtius he collaborated in (Klassische Studien) (1840) ; with Heyse in (Volkslieder und Romanzen der SpanieU (1843) ; and (Spanisches Liederbuch> (1852) ; with Leuthold in (Fiinf Bucher fran- zosischer Lyrik (1862). He also wrote the tragedies (Brunhild) (1858) and*

1905).

GEIERSTEIN, gi'er-sten, Anne of, a novel by Sir Walter Scott, first published in 1829. Its subject matter is the war between Switzer¬ land and Burgundy in the 15th century.

GEIGER, gi'ger, Abraham, theologian and critic: b. Frankfort, 24 May 1810; d. Ber¬ lin, 23 Oct. 1874. Well equipped with rabbinic and Oriental knowledge, which he proved by his university prize essay on the relations of Judaism and Mohammedanism (originally is¬ sued in 1833 and translated into English as (Judaism and Islam, Madras 1898), he became rabbi of Wiesbaden in 1832 and in 1835 was one of the most brilliant contributors to the Zeitschrift fiir Jiidische Theologie (1835-39, 1842-47). Called to Breslau 1838-63, he de¬ veloped into the practical leader of the Jewish reform movement, and wrote many of his scholarly works, in particular his*

clude monographs on Hebrew, Samaritan and Syriac subjects in the magazine of the German Oriental Society; a (Grammar and Reader of the Language of the Mishna) (1845) ; (A Study of Maimonides (1850) ; (Sadducees and Pharisees) (1863); a bold and thoughtful (Judaism and*

*Its History * (1865-71), besides editing a magazine (1862-74).*

GEIGER, Lazarus, German philologist : b. Frankfort-on-Main 1829; d. 1870. He received his. education at the universities of Bonn, Heidelberg and Wurzburg, and from 1861 to 1870 taught German and Hebrew at the Frank¬ fort Jewish High School. He is the author of the very important philological treatise (Ursprung und Entwickeling der menschlichen Sprache und Vernunft) (2d ed., 1889; Eng. trans., 1890) ; and (Der Ursprung der Sprache (1869). For biography consult Rosenthal, L., (Lazarus Geiger * (Stuttgart 1884).*

GEIGER, Ludwig, German historian : b. Breslau 1848. He was educated at the uni¬ versities of Heidelberg, Gottingen and Bonn, and in 1873 was made history dozent at the University of Berlin. Seven years later he be¬ came professor of modern literature there. His original studies in humanism have con¬ tributed much to the elucidation of that sub¬ ject. His works include (Nikolaus Ellenbog, ein Humanist und Theolog des sechzehnten Jahrhunderts) (1870) ; (Johann Reuchlin, sein Leben und seine Werke) (1871) :

Italien und Deutschland (1882); (Das Studium der betraischen Sprache in Deutsch¬ land vom Ende des I5ten bis zur Mitte des 16ten Jahrhunderts) (1870) ; (Geschichte des Juden in Berlin* (1871); (Vortrage und Ver- suche* . (1890) ; < Berlin 1688-1840* (1893-95) ; (Das junge Deutschlass und die preussische Zensur* (1900);*

(Charlotte von Schiller (1908). In 1886-92 he edited Zeitschrift für Geschichte der Juden in Deutschland.*

GEIGER, Wilhelm, German Oriental scholar: b. Uuremberg, 1856. He received his education at the University of Erlangen, and in 1891 was appointed to the chairs of Sanskrit and Indo-Germanic philology at the institution. Since 1905 he has been a member of the Land- tag of Bavaria. His works include (Handbuch der Awestasprache) (1879) ; (Ostiranische Kul- tur (1882) ; (Elementarbueh der Sanskrit- Sprache) (2d ed., 1909); (Ceylon) (1898);*

GEIJER, gi'er, Eric Gustaf, Swedish his¬ torian, composer and poet : b. Ransater, Werm- land, 12 Jan. 1783; d. Stockholm, 23 April 1847. Beginning to lecture at Upsala in 1810, he was elected in 1815 assistant professor, and in 1817 professor of history at Upsala. Geijer exer¬ cised a marked influence no less on the poetic than on the historical literature of Sweden,

Great as is the value of Geijer's historical works, he unfortunately did not complete any one of the vast undertakings which he planned, ihus, of the (Svea Rikes Hafder,) or (Records of Sweden) (1825), which were to have em¬ braced the history of his native country from mythical ages to the present time, he finished only the introductory volume. This, however, is a thoroughly good critical inquiry into the sources of legendary Swedish history. His next great work, (Svenska Folkets Historia) (1832-36), was not carried beyond the death of Queen Christina. Of his other historical and political works may be mentioned (The Condi¬ tion of Sweden from the Death of Charles XII to the Accession of Gustavus IIP (1838), and (Feudalism and Republicanism) (1844). During the last 10 years of his life Geijer took an active part in politics ; but, although his political writings possess great merit, the very versatility of his powers diverted him from applying them methodically to the complete elaboration of any one special subject. He was also known to his countrymen as a musician and composer of no mean order and a poet of note. His collected works were published by his son, with a biographical sketch (13 vols., 1849-56). Some of his best poems appeared in Iduna, a magazine in which Geijer and his friends were interested. As a musician he set many of his own songs to music which caught the public fancy and were very popular. He was also a writer of excellent hymns. Consult Carlson,

(Biography of Eric Gustaf Geijer) (1870); Malmstroem, (Life of Geijer) (1848); Niek- sen, (Erik Gustaf Geijer) (1902).

GEIJERSTAM, Gustaf af, Swedish novel¬ ist and dramatist: b. Province of Vestmanland,

5 Jan. 1858; d. Stockholm, 6 March 1909. He pursued studies in the Faculty of Philosophy at Upsala 1877-79; entered the career of a writer 1882, and served as literary manager for the Gernandt Publishing House in Stockholm from 1897 to 1902. Geijerstam's earliest work is in the field of the realistic novel. in 1888. He is particularly popular, as a dramatist, in plays dealing with peasant life in Sweden, such as (Per Olsson och hans karing,) (Lars Anders och Jan Anders och deras barn) ((Per Olsson and his Old Woman, > (Lars Anders and Jan Anders and their children, > 1894), and as the author of the comedy (Stiliga Augusta) and the fairy-play (Stor Klas och Litt KlasP He returned to the novel in 1895, producing a number of less realistic works, including (1896) ; (Vilse i lifvet> (1897); Pet yttersta skareD (1898); (Aktenskapets komedP (1898); fyckliga manniskor) (1899); HCvinnomakP (1901); (Nils Tuvesson och hans moder) (1902) ; (Sko- gen och sjoP (1903); (1904); (Karin Brandts Drom) (1905); (Broderna Mork) (1906); (Den eviga Gatan) <1907).

Two works are autobiographical in

character: (1900), and (Mina pojkar) (1907). None of Geijerstam's works has^ been printed in English translation, but there is a collected edition in German.

Jacob Wittmer Hartmann.

GEIKIE, ge'ki, Sir Archibald, Scottish geologist and scientific writer: b. Edinburgh, 28 Dec. 1835. He entered the Geological Survey in 1855 and has since had a brilliant career of dis¬ covery and experiment and held many im- P2^ant Posts- Among his publications are The Story of a Boulder) (1858) ; (Elementary Lessons in Physical Geography) ; (Scenery of Scotland Viewed in Connection with its Physi¬ cal Geology) ; (Outlines of Field Geology) ; and (Text-Book of Geology> (3d ed., 1893) ; (The Ancient Volcanoes of Britain> (1897); (Types of Scenery> (1898); Scottish Reminiscences) (1904); landscape in History) (1905);

(Charles Darwin as Geologist) (1909) ; (The Love of Nature Among the Romans) (1912).

GEIKIE, James, Scottish geologist, brother of Archibald Geikie (q.v.) : b. Edinburgh, 23 Aug. 1839; d. 1 March 1915. He was educated at Edinburgh University in which he held the chair of geology .from 1882 until his death. He is the author of (The Great Ice Age) (1874); Prehistoric Europe) (1882); Out¬ lines of Geology) (1884) ; fragments of Earth Lore) (1892); (Earth Sculpture) (1898); Structural and Field Geology) (1905); foun¬ tains, their Origin, Growth and Decay) (1913) ; (The Antiquity of Man in Europe) (1913).

GEIKIE, John Cunningham, English Anglican clergyman : b. Edinburgh, 26 Oct. 1824 ; d. Bournemouth, 1 April 1906. He was edu¬ cated at the University of Edinburgh and Queen's College, Kingston, Ontario, was pastor of Presbyterian churches in Halifax and Toronto, was ordained priest of the Established Church in 1876, and was successively curate of Saint Peter's, Dulwich, 1876-79; rector of Christ's Church, Neuilly, Paris, 1879-81 ; vicar of Saint Mary's, Barnstable, 1883—85 ; and vicar of Saint Martin-at-Palace, Norwich, 1885-90. He earned a wide popularity as a writer on biblical and religious subjects and his works include (The Life and Words of Christ) (1877) ; (01d

Testament Portraits) (1878); (The English Ref¬ ormation) (1879); fours with the Bible) (1881-84) ; (Landmarks of Old Testament His¬ tory) (1894).

GEIL, gil, William Edgar, American ex¬ plorer: b. Doylestown, Pa., — . He

was edu¬ cated at the seminary of his native place and at Lafayette College. In 1896 he studied archaeology in western Asia. Starting in 1901 he toured all parts of China and in the pigmy forest of Africa and lectured in China, Japan, Australia, Great Britain and the United States. He has published Pocket Sword} (1895) ; faodicea) (1898); (The Isle that is Called Patmos) (1898) ; (Ocean and Isle) (1902) ; (A Yankee on the Yanktze) (1904); (The Man of Galilee) (1904) ; (A Yankee in Pigmyland) (1905); (The Man on the Mount) (1905); (The Automatic Calf) (1905) ; 'Cannibals Be¬ fore and After) (1907) ; (The Great Wall of China) (1909-11) ; Pighteen Capitals of China) (1911) ; (Adventures in the African Jungle hunting Pygmies> (1917).

GEILER VON KAYSERSBERG, gi'ler fon kiz'ers-berg, Johann, Catholic mystic and preacher: b. Schaffhausen, V '5 ; d. 1510. He received his education at Ammersweier and Freiburg, was ordained to the priesthood in 1471 and joined the faculty at Basel, where in 1475 he became professor of theology. In 1476 he was made rector of the University of Frei¬ burg, and two years later was appointed cathe¬ dral preacher at Strassburg, where he remained for over 30 years. His principal sermons are contained in the volumes (Navicula sive Specu¬ lum FatuorunP (1510) ; (Das Schiff der Poni- tenz) (1514) ; (Der Seelen Paradies) (1510) ; (Christliche PilgerschafD (1512). Consult De Lorenzi, (Geilers ausgewahte Schriften) (1883); Godeke, (Grundriss zur Geschichte der deutsch- en Dichtung> (1884) ; Dacheux, (Un refor- mateur catholique a la fin du XVe siecle> (Paris 1876) ; Lindemann, (Johann Geiler von Kaisersberg> (Freiburg 1877) ; Schmidt,

GEINITZ, gl'nits, Hans Bruno, German geologist : b. Altenburg, 1841 ; d. 1900. He re¬ ceived his education at the universities of Ber¬ lin and Jena; in 1850 was appointed professor of mineralogy at the Dresden Polytechnic In¬ stitute, and from 1857 to 1894 was director of the Dresden Museum of Mineralogy. His pub¬ lished works include (Charakterisk der Schich- ten und Petrefakten des sachsisch-bohmischen Kreidegebirges) (1843); (Die Versteinerungen der Steinkohlenformation in Sachsen) (1855) ; (Geologie der Steinkohlen Deutschlands und

anderer Lander Europas) (1865); Carbon-

formation und Dyas in Nebraska (1866);*

(Geologie von Sumatra (1875) ; (Ueber*

fossile Pflanzen und Tierarten in den argen- tinischen Provinzen San Juan und Mendoza)

(1876).

GEISHA, ga'sha, a Chino-Japanese word, meaning (

GEISSEL, gis'sel, Johannes von, German Catholic prelate: b. Gimmeldingen, 1796; d. 1864. He was educated in the seminary of Mainz, and in 1818 was ordained to the priest¬ hood. In the following year he became pro¬ fessor at the Speyer gymnasium. In 1836 he was made dean of the chapter, and in 1837 was consecrated bishop. He became coadjutor arch¬ bishop of Cologne in 1842 and archbishop in 1845. He became a member of the Prussian Constituent Assembly in 1848 and helped materially in securing liberty to the Church under the new Prussian constitution. He was created cardinal in 1850. He supported the Jesuits and in general the Ultramontane party in the Church and suppressed Hermesianism within his archdiocese. He also brought con¬ struction work on the famous cathedral to com¬ pletion. Consult Dumont, (Diplomatische Cor¬ responded fiber die Berufung des Bischofs Johannes von GeisseP (Freiburg 1880), and- the biography by Pffilf (ib. 1896).

GEISSLER, gls'ler, Heinrich, German mechanician : b. Igelshieb, Germany, 26 May 1814; d. Bonn, Prussia, 24 Jan. 1879. He be¬ came known as a maker of physical and chem¬

ical apparatus and principally as the inventor of Geissler's tubes (q.v.), an apparatus for pro¬ ducing light by an electric discharge in vacuo.

GEISSLER'S TUBES, tubes made of very hard glass, and containing highly rarified gases. Each end of the tube has a platinum wire sealed into it to serve as electrodes. When a discharge of electricity is caused to take place in these tubes by connecting the electrodes to the terminals of a Ruhmkorff's coil or a Holtz's machine, very brilliant effects may be produced. The invention was named after Heinrich Geissler (q.v.).

GEIST, gist, term meaning ((spirit,® used frequently in the compound Zeitgeist , (

GEITNER, glt'ner, Ernst August, German chemist: b. Gera, 1783; d. 1852. He was for many years director of a chemical works at Loasnitz and in 1815 removed to Schneeberg where he founded another chemical factory of which he remained manager until his death. He discovered the alloy argentan, or German silver; made original investigations in dyeing, and was a pioneer in the use of chromic salts for vegetable and animal dyes. He wrote (Briefe fiber die Chemie) ; and (Die Familie West, oder

Unterhaltungen fiber Chemie und Technologies

GEITONOGAMY. See Pollination.

GEL A, je'la, Sicily, a city of ancient Greece, situated on the island between Agrigentum and Camarina; founded in 690 b.c. by the Cretans and Rhodians. The colony was remarkably prosperous, and in 528 b.c. sent out a portion of its inhabitants, who founded Agrigentum. In 280 Phintias, the tyrant of Agrigentum, utterly destroyed Gela.

GELADA, gel'a-da, a kind of baboon (q.v).

GELASIUS (je-la'si-fis) I, Saint, Pope: d. 19 Nov. 496. He succeeded Felix III on 1 March 492. At the Council of Rome in 496 he distinguished the canonical books from the apocryphal of Scripture. He also regulated the canon of the Mass. He was succeeded by Anastasius II.

GELASIUS II (Giovanni di Gaeta,

ga-a'ta), Pope: d. Cluny, France, 29 Jan. 1119. He was cardinal and chancellor under Urban II and Paschal II and on the death of the latter was chosen Pope by the party hostile to the Emperor Henry V. The imperial party at Rome under the Frangipani seized his person, but were forced to set him free by the menac¬ ing attitude of the mob. The new Pope fled be¬ fore the advancing imperial troops to Gaeta, where he first received his consecration, and whence he excommunicated Henry V and Gregory VIII, the antipope Henry had set up. Soon after he was able to return to Rome, but ere long had to betake himself for protection to France, where he died in the monastery of Cluny.

GELATINE, jel'a-ten, or GELATIN

(Latin, gelatus, ((frozen,® so named from the tendency which the substance has to congeal and become to a certain extent solid), in chem¬ istry a substance also known as animal glutin, obtained by treating bones with dilute hydro¬ chloric acid, which dissolves the mineral con-

stitucnts of the bone, consisting of phosphates and carbonates of calcium, magnesium, etc., and leaves the bone cartilage. This, when boiled for a long time with water, dissolves, and forms gelatine, which can be purified by dissolving in hot water and precipitating by alcohol. A pure variety known as isinglass is obtained from the swimming bladder of the sturgeon and

other fishes. Impure gelatine glue is prepared by boiling down pieces of hide, horn, hoof, cartilage, etc., with water under pressure. Pure gelatine is amorphous, transparent in thin plates, of a yellowish-white color; it has neither taste nor smell, and is neutral to vegetable colors ; it is insoluble in alcohol and in ether. In contact with cold water it swells up, and is soluble in hot water. It is not precipitated by acids, except by tannic acid, which gives a flaky precipitate insoluble in water, alcohol and ether. The aqueous solution of gelatine turns the plane of polarization to the left. Gelatine subjected to dry distillation yields methylamine, cyanide of ammonium, pyrrhol, etc. ; by oxidation with sulphuric acid and manganese dioxide, or with chromic acid mix¬ ture, it yields hydrocyanic acid, acids of the fatty series, benzoic aldehyde and benzoic acid, leucine and glycocol, but unlike most other proteids, no tyrosine. Gelatine boiled with caustic potash yields glycocine and leucine. Gelatine contains about 50 per cent of carbon, 6.6 of hydrogen, 18.4 of nitrogen, 25.1 of oxygen and a small amount of sulphur. Moist gela¬ tine exposed to the air rapidly putrefies, the liquid becoming first acid, but afterward it gives off ammonia. Gelatine gives no precipitate with lead acetate, alum or ferrocyanide of po¬ tassium. A mixture of gelatine with potassium dichromate becomes, when exposed to the ac¬ tion of light, insoluble in water. The nutritious value of gelatine has been much overestimated. Gelatine is also made use of in photography (q.v.).

GELATINE PROCESS. See Photog¬ raphy ; Photo-engraving.

GELCICH, gel'tsik, Eugen, Austrian scien¬ tist : b. Cattaro, Dalmatia, 1854. He became director of naval schools at Lussinpiccolo and Triest and since 1902 has been chief inspector of commercial and naval schools in Austria. He wrote extensively on geography and mag¬ netism. His published works include (Ge- schichte der UhrmacherkunsC . (5th ed., 1887); (Estudios sobre el desenvolvimients historico de la.navigacion) (1889) ; (La scoperta d' America e Christoforo Colombo nella letteratura mo- derna5 (1890) ; (Die Uhrmacherkunst und die Behandlung der Prazionsuhren) (1892) ; (Die astronomischen Bestimmungen der geograph- ischen Koordinaten) H904) ; (Weichs-Glon oes- terreiche Schif-fahrts-Politik und unseres nau- tisches Bildungswesen) (1912).

GELDERLAND, gel'der-lant, GUELD- ERS, or GUELDERLAND, a province of Netherlands, with the Zuyder Zee on its north¬ ern boundary. Area, 1,906 square miles. The surface is level, the soil of the north sandy, the southern part low, marshy, but, when cultivated, fertile. The principal rivers are the Rhine and the Meuse. The capital is Arnhem (q.v.). Pop. 662,250. Gelderland, or as it was originally known, the county of Gelre, first enters into his¬ tory as a portion of the empire in the middle

of the 11th century. In the 14th century it oc¬ cupied a leading place among the provinces of the Netherlands. Its rulers, who belonged to the house of Nassau, were raised to the rank of dukes in 1339, but the family soon died out. Gelderland was incorporated into Julich. Gel¬ derland suffered greatly from the incessant strife of contending claimants to its rule. Charles the Bold of Burgundy was Duke of Guelderland from 1472 to 1477, and from him the duchv passed to Austria, and ultimately to Spain. The greater part of Gelderland — the so-called. Lower Gelderland — joined its for¬ tunes with the remainder of the Protestant Netherlands. Upper Gelderland was kept by Spain, but during the War of the Spanish suc- session was taken by Prussia. Part of it, how¬ ever, underwent thereafter the successive regimes of Spain, Austria and the Independent Netherlands. During the French Revolution and the Napoleonic era, more or less of Gelder¬ land was under French rule. In 1815 it was divided by the Peace of Vienna between the Netherlands and Prussia. (See Netherlands). Consult Westerate, ˆGelderland in der patriot- tentijd) (Utrecht 1903).

GELDNER, Karl Friedrich, German Ori¬ entalist: b. Saalfeld, Saxe-Meiningen, 1853. He was educated at the universities of Tubingen and Leipzig, removed to Halle in 1887 and three years later to the University of Berlin where he was appointed associate professor of Indo- Iranian languages. He removed to Marburg in 1907 where he holds the chair of Indo-Iranian languages. He has published (Ueber die Met- rik des jiingeren Avesta) (1877) ; (Studien zum Avesta) (1882); (Drei Yasht aus dem Zenda- vesta> (1884) ; (Vedische Studied (1889-1901) ; (Glossar zu den Rigveda) (1907) ; (Der Rig- veda in AuswahP (1907) ; (Zur Kosmogome des Rigveda, mit besonderer Beriicksichtigung des Liedes 10,129) (1908) ; (Vedismus und

Brahmanismus> (1911). He edited (Avesta: the Sacred Books of the Parsis> (1895) ; (Grundriss der iranischen Philologie> (2 vols.,

1896-1904).

GELE, zhal, Alphonso van, Belgian ex¬ plorer: b. Brussels, 1849. He was educated in his native city and at the University of Ghent. He went to Africa in 1882 and was appointed administrator of a district adjacent, to Stanley Falls. In 1885 he explored the tributaries of the Kongo and traced the course of the Ubangi to long. 23° E. He showed that this river is identical with Schweinfurth's Welle.

GELEE, zhe-la, Claude. See Claude Lor¬ raine.

GELERT, Johannes Sophus, American sculptor : b. Nybel, Schleswig,

Denmark, 10 Dec. 1852. He studied in the Royal Academy of Fine Arts at Copenhagen in 1870-75, removed to the United States in 1887, received a gold medal and honorable mention at the World's Colum¬ bian Exposition (1893), a gold medal at the Nashville Centennial Exposition (1897), and honorable mention and a gold medal at the Paris Exposition of 1900. . His works include the monument to the policemen killed by the Chi¬ cago anarchists, Haymarket Square, Chicago ; statues of Beethoven and Anderson in Lincoln Park, Chicago; a statue of Grant at Galena, Ill.

GELIGNITE. See Explosives.

GELIMER, jel'i-mer, or GILIMER, the

last monarch of the African Vandals, great grandson of Genseric. In 530 he deposed his cousin Hilderic, seized the throne, but was soon afterward defeated at Carthage and Trica- marum by Belisarius, general-in-chief of the Byzantine army. Gelimer was taken captive to Constantinople and forced to walk in a tri¬ umphal procession. Subsequently the Emperor Justinian granted him an estate in Galatia, where he spent his remaining years.

GELL, Sir William, English explorer: b. Hopton, Derby, 1777; d. 1836. He received his education at Jesus College, Cambridge. In 1800 he was. sent on a mission to the Ionian Islands and in 1814 was appointed chamberlain to Caroline, Princess of Wales, and at the investigation by Parliament into her conduct after she became queen he testified in her favor. He resided mostly in Italy, in Rome and Naples. He devoted most of his time to geographical studies and published (1807) ; (1823); (The Topog¬ raphy of Rome and its Vicinity) (1834; new ed., 1846) ; Tome and its Environs J (1834). The British Museum has his original drawings of classical ruins.

GELLERT, Christian Fiirchtegott, Ger¬ man professor and author: b. Hainichen, Sax¬ ony, 1715; d. 1769. At Leipzig he studied the¬ ology and subsequently was connected with the university there in the capacity of teacher and professor. He wrote fables, plays and novels and lectures which attained a wide popularity in Germany. His best work is (1869) and the life by Doring (Greiz 1833).

GELLIUS, Aulus, Latin author: b. pos¬ sibly at Rome about 130 a.d. He studied rhet¬ oric at Rome and philosophy at Athens, and practised as a

lawyer at Rome. He is the au¬ thor of. (Noctes Atticae (in 20 books), full of interesting observations and quotations, from the best Latin and Greek authors, relating to language, literature, history, and antiquities. This work was partly compiled in the winter nights during his residence at Athens. It is now of great value., as the authors from which he drew his materials are. in a great measure lost. Among the best editions is that of Hertz (1883-85). The <(editio principes** was issued at Rome in 1469; and Gronov:us published a critical edition at Leyden in 1706. Numerous other editions have been published. In all of them the eighth book of the original 20 is lack¬ ing. An excellent edition appeared in an Eng¬ lish translation by Beloe in London in 1795. Consult Foster, (Studies in Archaism in Aulus Gellius* (New. York 1912); Knapp, (Archaism in Aulus Gellius) (in Classical Studies in Honor of Henry Drisler,* New York 1894) ; Nettleship, (The Noctes Atticse of Aulus Gel- lius) (in (Lectures and Essays,* Oxford 1885) ;*

Sandys, (A History of Classical Scholar' hip (Cambridge 1906).*

*GELNHAUSEN, geln'how-zen, Prussia, town in the province of Hesse-Nassau, on the Kinzig, 25 miles northeast of Frankfort. It is a walled town and contains a 13th century church, *a Rathaus, a so-called witches' tower and the ruins of a palace of Frederick Bar- barossa, a monument to Philip Reis, pioneer telephonist, who was born here. It was at one time an Imperial city but has long since fallen into decadence. The chief manufactures are those of rubber goods, shoes, cigars, chemicals, organs, sealing-wax, etc. There is a brisk trade in fruit and wines. Pop. 4,900.*

GELON, je'lon, tyrant of Gela and after¬ ward of Syracuse : d. about, 478 b.c. He was a scion of a noble family of the former city and succeeded its tyrant, Hippocrates, in 491 b.c. Six years later he made himself master of Syracuse also, which then became the seat .of his government, and to which he transferred the majority of the inhabitants of Gela. Gelon refused to aid the Greeks against Xerxes, as they declined to comply with his demand that he should be appointed commander-in-chief. The clemency and wisdom of Gelon rendered him so generally beloved that when he appeared unarmed, in an assembly of the people and de¬ clared himself ready to resign his power, he was unanimously hailed as the deliverer and sovereign of Syracuse. He seems to have been an enlightened ruler and to have advanced the interests of his dominions. After his death he was long remembered with affection and was regarded as one of the national heroes.

. GELOSE, je'lo-s, a pectic substance con¬ taining carbon, 42.77 ; hydrogen, 5.775 ; oxygen, 51.455, prepared by Payen from a commercial article entitled Chinese moss, which consists of long white threads made up into bundles, and from various seaweeds. It is used for food and is said to

be the juice of a lichen growing on trees in the south of China and in the Philip¬ pine Islands. The moss, when boiled in water, dissolves, with the exception of 2 or 3 per cent of nitrogenized corpuscles and traces of other matter, and on cooling forms a trans¬ parent colorless jelly, which when dried con¬ stitutes gelose. It is distinguished from other bodies by certain characteristic reactions.

. GELSEMIUM, jel-se'mi-um, yellow jas¬ mine, the dried rhizome and roots of GelsctniuMi sempervirens, a southern climbing shrub with a large woody underground stem and dark-green leaves, and bright yellow sweet-scented flowers. It grows from Virginia southward in woods, and mounts to the tops, of tall trees. The active constituents contained in the underground stem are two alkaioids, gelsemine and gelseminine, the latter of which is. the more potent. Gel- semium is an acute poison, acting both on the sensory and motor end-organs, causing anaesthe¬ sia and motor weakness. The early symptoms of large doses are loss of power in the muscles of the eye, causing drooping of the lids, dizzi¬ ness, drowsiness and disturbance of vision. In poisonous doses there is marked diminution in

force of the pulse and respiration, with difficulty of speech, coldness of the body sur¬ face and general loss of skin sensations. Death results from asphyxiation. Its most im-

ortant medicinal use is in neuralgias, in sick- eadache and as a general nerve tonic.

GELSENKIRCHEN, gel'sen-ker-Hen, Prussia, town in the province of Westphalia, on the Rhine-Herne Canal, five miles north of Essen. It is a thriving industrial centre, with coal mines, iron and steel works, rolling mills, flour and saw mills boiler works, soap and chemical works, etc. In 1875 it was made a city and in 1903 several suburbs were incor¬ porated with it. Pop. 170,000.*

GELVES, hel'vas, Los, a small island in the Gulf of Cabes in the Mediterranean. It is famous as the scene of a battle between Span¬ iards and Turks in 1790. Of about 8,000 Spaniards only 1,000 remained after a siege of eight weeks. It was one of the greatest defeats ever inflicted by the forces of Islam on those of Christendom.

GEMARA, ge-ma'ra, part of the two Tal- muds, Babylonian and Palestinian, which con¬ tains annotations, and commentaries of the Talmudic law. That of the Babylonian Tal¬ mud is more diffuse and is a

valuable authority. It was completed about 600 a.d. See Talmud.

GEMATRIA, a mystic system of scrip¬ tural interpretation, consisting in the substitu¬ tion of, or finding of one word in another, the letters of which have the same numerical value.

GEMBLOUX, zhan'bloo', Sigebert of.

See Sigebert of Gembloux.

GEMBLOUX, zhan'bloo', Belgium, town of the province of Namur, 25 miles southeast of Brussels. It has a fine Benedictine abbey, dating from the 10th century and now used by the Royal College of Agriculture. It contains large railroad repair shops and engine works. In 1578 the Spaniards here defeated the Dutch. Pop. 4,800.

GEMINI, jem'i-nl, the Twins (II), the third sign of the zodiac. The sun enters this sign on or about 21 May, and leaves it on or about 21 June. The name belongs also to a northern constellation, of which the two chief stars are Castor and Pollux. They are very nearly equal in brilliancy, which fact probably suggested the name. Pollux is slightly the brighter. It is a quadruple star. Castor is one of the finest of the double stars. Turner dis¬ covered in 1903 a star of the 7th magnitude in this constellation ; and Enebo, in 1912, discov¬ ered, at Domaas, Norway, a second one, of the fourth magnitude. See Astronomy.

GEMINUS, Greek writer: flourished probably in the first half of the 1st century b.c. Rhodes is supposed to have been his birthplace. We possess only one of his works, introduc¬ tion to Phenomena, > a work on astronomy. It was published together with a Latin translation by Hilderic (Altdorf 1590) and with a French translation by Halma in his (Chronologie de Ptolemee (Paris 1819L Geminus' best work was the (Arrangement of Mathematics. Of this there are a few fragments preserved in Pappus, Eutocius and Proclus.*

GEMISTUS, je-mis'tus, Georgius. See

Pletho, Georgius Gemistus.

GEMMAE, jem'me, various vegetative bodies which form in certain liverworts (q.v.).

GEMMELLARO, jem'mel-la'ro, Gaetano Giorgio, Sicilian naturalist: b. Catania, 1836; d.

1904. He received his education in his native city and at the University of

Naples. He became pro¬ fessor at Palermo and subsequently was rector of the university there. He made origiria1 re¬ searches in volcanology and Monte Gemmellaro near Mount Etna is named after him. He pub¬ lished (Descrizione di alcune specie di minerali dei vulcani estinti di Patagonia (1856) ; (Pesci fossilli della Sicilia ˆ (1858) ; (Studi paleonto- logici sulla fauna del calcare a Terebratula jani- for) (3 vols., 1876) ; (La fauna dei calcarP (1899) ; (I crostacei dei calcarP (1890) ; (Icela- lopodi del Frias superiore della regione occiden¬ tal della Sicilia > (1904).*

GEMMI (gem'me) DIE, Switzerland, a narrow pass, nearly two miles long, which crosses the Alps at a height of 7,553 feet, and connects the Swiss cantons of Bern and Valois.

GEMMULES, jem'ulz. (1) In actual bi¬ ology gemmules are aggregations of cells set apart in the body of sponges and polyzoans to serve as reproductive agents. They are actu¬ ally the lowest unit in organic life, the most primitive form of reproduction. (2) In philo¬ sophical biology gemmules are hypothetical, self-reproducing particles in the reproductive protoplasm (a structure which is assumed) sup¬ posed to be bodily transmitted from parent to child, and to carry such qualities as are in¬ herited by offspring. The word gemmules orig¬ inated with Darwin. Herbert Spencer in 1864 called them physiological units; Haeckel and Erlsberg gave them the name of plastidules; Nageli applied the term micella; Detmer, Le- benseinheiten or vital units; Hugo de Vries, pangens; Verwom, biogens; and Weismann, biophors, which by combining make up the units in the next scale above them or determi¬ nants, which in their turn ids and ids idantes. W. Roux named his elementary units meta- structural parts; Haacke, gemma; and Weis- ner, plasomes. See Biology; Embryology.

GEMOT, ge-mot', an assembly of freemen among the Anglo-Saxons convened both for legislative and judicial purposes. The term in time came to designate any formal gathering, and even local assemblies or moots. Such were the shire-gemot, or county court, burg-gemot and halle-gemot, which were held monthly. The great council of the nation was known as the witenagemot. The word moot is derived from gemot. A clash of arms was the usual mode of signifying approval of a proposition and grows to express its rejection or disapproval.

GEMS. See Mineral Productions of the United States ; Precious Stones.

GEMS, Engraving of, the glyptic art, gem sculpture or lithoglyptics ; the art of represent¬ ing designs on precious stones, either in raised work (cameos), or by figures cut into, or be¬ low the surface (intaglios). The latter method was practised at a very early period, the oldest examples being the engraved cylinders found in Mesopotamia, and, more rarely, in

Egypt. The art dates from at least 4000 b.c. and perhaps a millenium earlier. While there is no means of determining exactly whether it originated in Egypt or in Babylonia, the records and the re¬ mains we possess seem to indicate that it was first practised by the Sumerians, who developed a high civilization in Babylonia before the ad-

vent of the Semites in that region, and that it was thence brought to Egypt. The designs rep¬ resent divinities and objects of traditional or re¬ ligious significance and the cylinder was pierced so that by passing a cord through the aperture it could be worn suspended either from the neck or from the wrist. It seems quite prob¬ able that at the outset these engraved cylinders were worn to satisfy a religious or superstitious belief, but an almost equally prevalent use, and one that soon came to be the predominant one, was for personal signets, the so-called "rolling- seals," for by rolling one of them over a sur¬ face of freshly-baked clay, the impression of the intaglio would appear thereon in relief. The concave shape of the earliest cylinders hence indicates that the clay bricks on which they were pressed curved up toward the centre, while the slightly barrel-shaped cylinders sometimes made in Persian times were adapted for use on bricks of concave form. In Egypt the cylinder was at a very early period supplanted by the scarab seal, the precious material being given the figure of the sacred beetle (Scarabeeus sacer), with the legs closely drawn up beneath the body.

The first Babylonian seals antedated the use of writing, the designs representing divinities and symbolical objects, being so differentiated as to constitute each seal a personal mark ; later on, with the invention of a form of writing, the design was frequently supplemented by the char¬ acters denoting the name of the owner, and often by a brief invocation of one or more of the gods. Dr. Stewart Culin has conjectured that the cylindrical form may have been suggested by the still earlier use of short joints of reed for the same purpose. The earliest Babylonian cylinder seals that have been preserved are made of the core of a soft conch shell, or of a soft serpentine. In either case no special grav¬ ing tools were needed. Later, however, from about 3000 b.c., many silicious stones were used, such as jasper and chalcedony, and it is prob¬ able that the cutting tool employed was tipped with a fragment of corundum. Until about 1500 b.c. all the work was done with a free hand, there being no indication of the use of the re¬ volving wheel at an earlier date. Other ma¬ terials used for the early Babylonian cylinder seals were lapis lazuli, amazonite and white marble, and, somewhat later, from about 2000 b.c., hematite and the blue chalcedony known as saphirine. Still later, several other stones were

employed, there being even a very few jade cylinders.

Gem-cutting in the Greek world dates from at least 2000 b.c., and was first highly developed in Crete, this "Minoan" art having its best pe¬ riod from about 1800 b.c. to 1600 b,c., and flour¬ ishing down to about 1200 b.c. The Mycsenean art of the Greek mainland had almost as early beginnings and flourished up to perhaps 1000 b.c., its best period being 1600-1400 b.c. The term "vEgean gems" is sometimes used to cover both those of Cretan and those of Mycenaean art. Later than this comes the so-called Archaeic Greek art (600-480 b.c.), to be suc¬ ceeded in turn by the best period of Greek gem¬ cutting, dating from about 480 b.c. to 400 b.c. Already in the time of Solon the custom of in¬ casing cut stones as seal-rings appears to have been general among the Greeks. One of the earliest artists in this branch of whom mention

is made is Mnessarchus, the father of the phi¬ losopher Pythagoras, and consequently a con¬ temporary of that Theodorus of Samos wdio engraved the famous emerald signet set in the ring of Polycrates, of which such wonderful stories are told by ancient authors. These early works were probably intaglios; the artist made use of the lathe, the corundum-point — possibly of the diamond' point also; indeed some have believed that diamond dust was used. However this very early use of dia¬ mond is questionable, as there is no proof that it was known to Europe at such an early date. In the 4th century the most renowned gem-cut¬ ter seems to have been Pyrgoteles, to whom Alexander the Great gave the exclusive priv¬ ilege to engrave his likeness. The artists, whose names are but rarely engraved on their works, often took the masterpieces of sculpture for their subjects and models. Under the Roman emperors, in particular, this was quite common. The chief early Greek engraver whose name is known from extant works of his is Dexamenos of Chios (late in the 5th century). The gem engraved by Dexamenos the Chian, and bearing his full signature, was found at Kertch (the ancient Panticapseum) in the Crimea. It is a scaraboid, and shows a representation of a fly¬ ing stork (pelasgos ;) the national emblem of Chios. This unique gem is in the great collec¬ tion of the Hermitage at Petrograd. (C. W. King, (Antique Gems and Rings, > London 1872, P. 408) The names of Dioscorides, Apollonides' Aulos, Hyllos, Cneius, Solon, Evodus, remind us of some of the most perfect works of this branch of art, but many of the signed gems are forgeries, or old gems with famous names forged on them. However, no distinguishing names are borne by some of the greatest ancient works — the famous sardonyx of the Bibliotheque Na- tionale (Paris) ; the apotheosis of Augustus, at Vienna ; the onyx at The. Hague, represent¬ ing the apotheosis of Claudius; Achilles la¬ menting Patroclus ; the head of Julius Ciesar — these like the Brunswick vase and the Tri- vulcian and Neapolitan cups, do not perpetuate the names of the artists. However two

of the finest antique cameos of the Bibliotheque Na¬ tional are signed: the head of Maecenas cut on an amethyst by Dioscorides and the fine cameo bearing the head of Julia, daughter of 1 ltus, done on an aquamarine by Evodus 1 ompey consecrated the dactyliotheca or col¬ lection of rings of Mithridates, as a votive of¬ fering in the capitol, and Julius Caesar, six tab¬ lets with six gems in the temple of Venus at Rome At a later period the collections of Herodes Atticus, of Vespasian, etc., were cele¬ brated; yet this general taste was not able to preserve the art from decline. One of the most noted antique gems, a head of Medusa carved in a boss of translucent chalcedony, probably executed for Emperor Hadrian, was in the fa¬ mous Marlborough collection. It was sold at Christie s in September 1918 for $8,750. The finest of the Marlborough gems, however, the splendid sardonyx cameo depicting the hy¬ meneal Procession of Eros and Psyche," is

?°?oS B°ston Museum, which acquired it in 1899, for $10,000. A most interesting class of gems was those produced under the influ¬ ence of the Gnostic heresy, in the 2d and 3d centuries b.c. These are commonly known as Abraxas gems or Basilidian gems, the former

PRECIOUS GEMS AS THEY ARE FOUND

COPYRIGHT, 1910. BY F. E. WRIGHT

1 TOURMALINE (New York)

2 TOURMALINE (Ural)

3 CHRYSOPRASE

4 EMERALD (Peru)

5 CHRYSOBERYL (Ural)

6 TURQUOISE

7 DIAMOND

8 SPINEL RUBY

9 GARNET

10 TOPAZ (Ural)

11 AQUAMARINE (Ural)

12 LAPIS-LAZULI

13 BLOODSTONE

14 TOPAZ (Brazil)

15 OPAL

16 AMETHYST

designation referring to the symbolic figure rep¬ resenting the divine principle Abraxas, and the latter to Basilides, the leading spirit in the founding of the principal Gnostic sect.

That, however, gem-cutting still persisted in the Western world to a small extent is pioved by historic records, as well as by a few engraved gems in bishops' rings, up to the end of the 7th century. In the 9th century, with the advent of the Carolingians, there seems to have been a limited revival. At this time rock crystal was the stone preferably chosen, the finest ex¬ ample being the (

The Early Renaissance saw a timid revival, scattered notices from about 1315 to 1450 men¬ tioning briefly the names of a very few en¬ gravers on gems. One of the earliest appears to have been Benedetto Peruzzi of Florence, who flourished about 1379, and who is said to have cut an imitation of the seal of Charles of Durazzo. Perhaps better authenticated is Vittore Pisanello, who lived about 1406 in Florence. Among the Germans the earliest that is noted is Heinrich (or Daniel) Engelhard of Nuremberg, a friend of Albert Durer, who died in 1512. The discovery of some fine antique specimens in Italy, particularly in Florence, and the display of gems by the Emperor Palseologus, at the Council of Florence in 1438, were per¬ haps the original cause of the taste of the Medici for engraved stones. Forerunners as patrons of gem cutters, and as collectors of gems, were the Popes Martin V (1417) and Paul II (1464). A Florentine artist, generally called on account of his great skill in engraving carnelians, Giovanni delle Carniole (1470-aft. 1516), distinguished himself in this early mod¬ ern period. There are few gems which can be ascribed to him with any confidence, except the famous carnelian in the Uffizi, at Florence, bearing the portrait of Savonarola, and the inscription Hieronymus Ferrariensis ordinis prcedictorum, prof eta vir et martyr. This stone, which must have been engraved later than 1498, is given in D'Agincourt's great v.ork. Contemporaries and rivals of Giovanni were Nanni di Prospero delle Carniole, in Florence, whom Francesco Salviati directed in his works, and Domenico dei Camei (of the Cameos), a Milanese, whose portrait of Duke

Ludovico Sforza, called II Moro, cut in a balas-ruby, is still preserved in the Uffizi at Florence.

Perhaps the most prolific gem engraver of this period was Valerio Belli, surnamed II Vicentino (1460-1546) ; he was employed by Popes Clement VII and Paul III. Another celebrated engraver was Giovanni Bernardi di Castelbolognese. who worked for Duke Alfonso of Ferrara and was the first of these early Renaissance engravers to sign his work. This art found patrons in all the Italian princes, the number of artists constantly increased and the sphere of their art was extended. A most in¬

teresting application of it was in the engraving of the indomitable diamond, the first work of this kind being attributed to Clemente Birago of Milan, who is stated to have cut a portrait of Don Carlos, son of Philip II, on one diamond and the Spanish coat-of-arms on another ; a rival claimant to the first exercise of this diffi¬ cult art is Jacopo da Trezzo, also a Milanese; Jacobus Thronus is said to have engraved on a diamond a portrait of Queen Mary I of Eng¬ land. The names of many of the engravers are not known, because they were but rarely put on the stones. Many gems, too, are still con¬ cealed in the cabinets of the wealthy or the treasuries of princes. Till these are accurately described, as are those of the Ambrosian col¬ lection, it will be difficult to obtain a complete general view.

Subjects of antiquity especially appealed to the artists of the 15th, 16th and 17th centuries, who treated them with such ability that it often requires the skill of the most accomplished con¬ noisseur to distinguish them from genuine an¬ tiques. The dispute concerning the so-called <(Signet of Michelangelo® is well known. It is not improbable that this carnelian is the work of Pier Maria da Pescia, to whose name the figure of a boy fishing (pescia) makes punning allusion. This artist belonged to the age of Leo X, as did also Michelino, another noted gem-cutter. In order to give the gems more completely the appearance of antiques, some artists engraved their names on them in Greek characters, but with so little knowledge of the language that they sometimes betrayed them¬ selves by this artifice. To this time we must ascribe the gems with the name Pyrgoteles, which Fiorello endeavors to prove were the work of an Italian of Greek descent (Lascaris).

The art of engraving was also applied to glass and gold. The crystal box of Valerio Belli, the most skillful and industrious artist in this branch during the 16th century, deserves particular mention. It was intended by Clement VII as a present to Francis I, when Catherine de' Medici went to Marseilles in 1533. At present it is in Florence. The Milanese par¬ ticularly distinguished themselves in gem- sculpture, as the wealth of the principal citizens of Milan enabled them to patronize this art. Jacopo da Trezza, the

same artist who in 1564 executed for Philip II the famous tabernacle of the Escurial, is, as we have noted, said by some to have made in Milan the first attempts at engraving on the diamond. The greatest cameo work of modern times is the stone in the Florentine Museum, seven inches in breadth, on which Cosmo, Grand Duke of Tus¬ cany, .with his wife, Eleonore, and his seven children are represented. A Milanese, Giovanni Antonio dei Rossi, who was a contemporary of the Saracchi family (about 1570), is the artist. The Saracchi were five brothers, and the crystal helmet of Albert of Bavaria is a proof of rheir skill.

Gein-engraving was popular in the 18th and 19th centuries in Italy, Germany and England; the most proficient in France was Jacques Guay, court engraver to Louis XV ; the French en¬ graver Siries and the German engravers Natter and Pichler did much pi their work in Italy. Toward the end of his life Natter was em¬ ployed in England, where the English engraver Marchant (1755-1812) may be considered to

have been the most artistic, of the native gem- cutters of the period. The best-known en¬ graver in England in the first half of the 19th century was Benedetto Pistrucci (b. in Rome 1784) ; his two daughters Elena and Maria Elisa practised the art in Rome. Notable 18th century engravers are Antonio Berini, a native of Rome, who with Cervera and Giromelli at Rome, and Putinati, at Milan, produced very fine works. In our own times the demand for cameos and intaglios in the United States was greatest from 1870 to 1880. During that time more than 100 workmen found employment here, — many of them as portrait artists. Among these was Lebrethon, who had as a pupil our great sculptor, Augustus Saint Gaudens ; another, Zollner, who engraved some fine and important cameos, took up brass work¬ ing. Perhaps the greatest artist and the most active, L. Bonet, has to-day scarcely one-sixth of his time occupied, whereas in the ((Cameo Age® he required the aid of nine assistants. Some excellent work has been done in New York by Ottavio Negri, formerly of Rome. In 1903 there appeared a slight revival of the wearing of antique and old-fashioned cameos of rather a pronounced form, and quite pos¬ sibly the glyptic art is destined to experience a return of popular favor.

A few of the famous collections of engraved gems are the Rev. C. W. King collection of antique gems, of the types used in his works, and the Cesnola and other collections, at the Metropolitan Museum of Art, New York city; a fine collection at the Boston Museum of Fine Arts ; while the Walters collection, at Balti¬ more, Md., contains many of the finest gems in

America. In Europe the first rank is taken by the collections of the British Museum, of the Cabinet des Medailles (Bibliotheque Nationale), Paris, and of the Imperial Museum in Vienna, to which must be added the Royal Collection at Windsor Castle, and those of the Uffizi Gal¬ lery at Florence, of the National Museum at Naples, of the Hermitage in Petrograd and of the Antiquarium, Berlin.

In the course of the centuries, almost all precious stones, as well as some other sub¬ stances, have been utilized by the gem-engravers. It has already been noted that some of the oldest Babylonian cylinders, engraved from 5,000 to 5,500 years ago, were of shell. Of the stones, the earliest to be used was soft serpen¬ tine, but soon the harder serpentines, aragonite, lapis-lazuli, chalcedony, the jaspers, quartz crystal, anhydrite, marble and hematite, as well as, rarely, jade were utilized. To these must be added, for cylinders of later date, cer¬ tain other materials, such as micaceous iron, gneiss and blue and green glass. Among the Hittite, Assyrian, Cypriote, Syro-Hittite, Sa- bean, Phoenician, Early Persian and Sassanian cylinders, appear, in addition to the materials already mentioned, red and pink sard, rose quartz, carnelian, matrix-emerald, _ the blue chalcedony called saphirine, and steatite, besides basalt, iron ore and iridescent glass. The J. Pierpont Morgan collection contains exam¬ ples of all these materials. In the collection of Babylonian and Assyrian cylinders gathered together by the present writer for the Morgan collection of the American Museum of Natural History in New York are to be found the following materials : Ruin agate, amazon-stone,

serpentine, hematite, aragonite, lapis-lazuli, jasper, shell, rock crystal, steatite, anhydrite, the translucent chalcedony with round red spots that has been called <(Saint Stephen's Stone,® jaspery agate, marble and amethyst. For their engraved scarabs the ancient Egyp¬ tians especially favored lapis-lazuli, carnelian,. hematite, red and green jasper, garnet, amethyst, and green feldspar, as well as red porphvry and basalt.

A few specimens of royal Babylonian cylin¬ ders exist, one of the more interesting being in the J. Pierpont Morgan collection. It is of green serpentine, dates from about 2450 b.c., and is inscribed with the name of Gudea, ruler of Lagash (Shirpurla), and with that of c(Abba the scribe, thy servant® ; thus it bears both the name of the one who stamped the royal seal on a document or record, as well as that of his sovereign. Another royal seal in this col¬ lection, one made of black serpentine, is en¬ graved with the name of Ine-Sin, king of Ur, about 2700 b.c., and who styles himself ((servant of the god Adar.® Still another Babylonian cylinder is notable as well for its material as for design and inscription. It is of jade (nephrite) and dates from the period between 2000 and 1500 b.c. On it is figured the goddess Ishtar, one foot advanced and resting on a lion, or

dragon; above her shoulders rise the shafts of arrows from the quivers on her back. In one hand she holds the Babylonian caduceus, with its two serpents, in the other the serpent scimitar. Facing her is the god Martu, fol¬ lowed by the goddess Shala. The inscription proves that this was the seal of Imgur-Sin, who was ((The anointer® in the temple of Belit (Ishtar), and who proclaims himself ((the serv¬ ant of the goddess Bau,® consort of the god Ningirsu.

In Graeco-Roman and later times, while many of the precious materials in early use were still employed by engravers, we have en¬ graved emeralds, such as that in the ring of Polycrates, as well as engraving on aquamarine and other beryls. To these must be added sard, sardonyx, nicolo and onyx, which have been used more often for engraving than any other stones. Carnelian, almandine and other garnets, notably the fiery-red pyrope garnet often designated "carbuncle,® have been also highly favored, as was topaz. Still other stones used were amethyst and other quartz gems, as well as turquoise, jacinth, plasma and infre¬ quently opal. The corundum gems were more sparingly employed, as their great hardness de¬ fied the tools of the earlier engravers, and they were not favored, though very occasionally used, in the Renaissance period, as was even the diamond (q.v.), partly because of the mechan¬ ical difficulty of engraving on them, and partly because of the value and beauty of the un¬ engraved stones. Still we have, as far back as the later Roman period, the signet of the Eastern Emperor Constantius II (317-61), en¬ graved on a sapphire weighing 53 carats. It is worth noting that shell, the earliest material used by< the engravers, was the one most em¬ ployed in the revival of interest in cameo¬ cutting in the first half of the 19th century, and one that was freely used in the 17th and 18th centuries.

Bibliography.— d'Agincourt, T. B. S., (Sculpture) ; Mariette, P. J., (Traite de Pierres

G.raX.ees) ; Bellerman, (Urim und Thummim, die altesten Gemmen) ; King, (Antique Gems and Rings, } (Handbook of Engraved Gems) ; Middleton, (The Engraved Gems of Classical Times) ; Cicognara, (Storia della Scultura) ; Natter, (Traite de la Methode Antique de Graver en Pierre Fine, Comparee avec la Methode Moderne) ; Babelon. (Le Cabinet des Antiques a la Bibliotheque Nationale) ; Ward, William Hayes, (Cylinders and other Ancient Oriental Seals) (in the library of J. Pierpont Morgan); Osborne, Duffield, (Engraved Gems; Dalton, O. M., (Catalogue of Engraved Gems of Post-Classical Periods in the British Museum. >*

George F. Kunz.

GEMS, Mythology of. The ancients be- • lieved that each month of the year was under the influence of a precious stone, and in modern times this superstition has found many devo¬ tees. It is quite the prevailing custom in many fashionable European capitals to wear birth- month stones, in preference to other jewels. The following list has been current for many years :

January . Garnet . Constancy

February . Amethyst . Sincerity

March . Bloodstone . Courage

April . Diamond . Innocence

May . Emerald . Success in love

June . Agate . Health and long life

July . Cornelian . Content

August . Sardonyx . Conjugal felicity

September . Chrysolite . Antidote to madness

October . Opal . Hope

November . Topaz . Fidelity

December . Turquoise . Prosperity

The seven gems which are supposed to be un¬ der the influence of the seven chief planets are these :

Saturn . Onyx

Jupiter . Cornelian

Mars . Diamond

Sun . Sapphire

Venus . Emerald

Mercury . Loadstone or lodestone

Moon . Crystal

The legend of the diamond tells how Diamond was the name of a beautiful youth of the island of Crete, who was one of the attendants of the infant Jupiter in his cradle. Diamond, not to be subject to (

GEMSBOK, gemz'bok, a large South African antelope (Oryx gazella), gray in gen¬ eral hue, but along the back, on the hindquar¬ ters, and along the flanks the color is deep black. It has a short erect mane, a long sweeping black tail and long sharp-pointed heavy horns, nearly straight from base to tip, and obscurely ringed throughout the lower half. It is asserted that the gemsbok never drinks water, the moisture wh:ch it needs being obtained from the succu¬ lent bulbous plants on which it feeds. It is one of a group of large antelopes, including the oryx, beisa and addax, which are sometimes called the geinsboks, and the numbers of all

vvhich are rapidly diminishing toward extinc¬ tion. See Antelope.

GEMUNDER, August, ow'goost ge'miin- de, German- American violin-maker, brother of George Gemiinder (q.v.) : b. Ingelfingen, Wurtemberg, 1814; d. New York 1895. He studied the art of violin-making with Vuillaume at Paris. From 1846 to 1860 he was at Spring- field, Mass., where he won wide recognition for his violins ; and in 1861 established his busi¬ ness in New York. His most important work was a copy of an Amati owned by Pablo Sara- sate, the well-known Spanish violinist, who de¬ clared it equal to the original instrument.

GEMUNDER, George, German-American violin-maker, a brother of August Gemiinder (q.v.) : b. at Ingelfingen, Germany, 1816; d. New York 1899. He was a pupil of Baptiste Vuillaume of Paris, came to America in 1847, won the first prize with his violins at the Crys¬ tal Palace exhibition, London (185 1) , and in 1873 sent to the Vienna exhibition a copy of a Guarnerius declared by the jury of experts to be an original. It is said that his were the finest violins yet made in America. He pub¬ lished (George Gemiinder's Progress in Violin- Making) (Astoria, N. Y., 1881).

GENALA, ja-na'la, Francesco, Italian

statesman : b. Soresina, Cremona, 1843 ; d. 1893. He studied law and was admitted to the practice of his profession at Florence, where he resided after 1862. He organized the city finances there and in 1871 published his well- known work, (Rappresentanza proporzionaleP He entered the Chamber ©f Deputies as a mem¬ ber of the Left; was made Minister of Public Works in 1883 under Depretis and again under Giolitti in 1892-93. He originated the plan for the lease of the national railways to private

corporations which was adopted in 1885.

GENAVA, See Geneva.

GENAZZANO, ja 'nat-sa'no-, Italy, town in the province of Rome, situated in the Sabine Hills, 25 miles east of the capital. It is the seat of II Capello della Madonna del buon Consiglio, a renowned place of pilgrimage, and contains also the ancient castle of Colonna. Pop. 4,200.

GENDARMES, or GENS D'ARMES

(zhon'darm), Fr. plur. of gendarme, meaning man-at-arms. The Gens D'Armes are horse soldiers in full armor when they first appear in history. They were originally mounted lancers, attended by five inferior soldiers, who were furnished by the holders of fiefs; these were replaced by Charles VII's compagnies d'ordon- nance, which were dissolved in 1787, one com¬ pany gendarmerie being retained as the body¬ guard of Louis XVI. Since the French Revolu¬ tion, except for a short interval at the Restora¬ tion, the gendarmes have constituted a military and rural police, which superseded the old marechaussee, and comprises both cavalry and infantry; divided into legions and companies, and these latter into brigades, the organization of the force corresponds to the territorial di¬ visions of the army. The men receive higher pay than the rest of the army, of which, how¬ ever, the corps is a part, its members being drafted from the line for this service. Ger¬ many also since 1808 has had its gendarme. See Police.

GENDER, in grammar, a difference in the forms of words to express distinction of sex, whether real or fictitious. Some languages are rich in such forms, others are altogether lack¬ ing in them. In the strictly grammatical sense of the word the latter languages are without gender. Primarily there are only two genders, masculine and feminine, corresponding to the natural divisions of sex, male and female. In very early times man seems to have regarded all the world as animate, even the rivers and clouds, the sun, moon and stars, .and the still more inanimate things such as earth, sticks stones, the atmosphere, sunshine, fire and water, light and darkness. Abstract qualities, too, were considered as living and very active beings. All nature being animate to the mind of primi¬ tive man, there was no room in his world for more than two genders, masculine and feminine, corresponding to the male and female beings of his associations or of his imagination. As he never pictured anything as being inanimate he could have had no conception of or use for a neuter gender. It

was only when man began to doubt that some of the forms of nature were endowed with life and volition that the neces¬ sity arose for grammatical forms to express this difference. Many of the more primitive languages, notably those of the American con¬ tinents, have never reached this latter stage. Most grammarians class these latter as having no gender; but they really form the best ex¬ amples of primitive gender making. A language does not necessarily require to be primitive to be in this stage. But it is necessary that the people using it shall hot have passed beyond a certain stage of development; for language is the reflection of the mind of thinking man. As the mind becomes more complex it invents grammatical forms to express this complexity of thought and relationship. Primitive gender was expressed in a very simple manner, gen¬ erally by attaching to the common noun, the word <(man® or ˆwoman,® ((male® or <(female):> or their equivalents. Thus man-child, woman- child, male-child, female-child, are true cases of gender, since they are grammatical distinc¬ tions in the use of words. In this early stage of a language a word might be of common gen¬ der; but it was never neuter, in the sense that implies the absence of the distinction of gender or of the masculine or feminine qualities. The gender was simply expressed as common or more properly, disregarded on occasions when no necessity arose to assert the male or female attributes of the object designated. In the course of time, as man's conception of the true condition of inanimate nature changed, it is probable that the less active words became neuter, expressing the idea of no sex and, later still, no volition ; while those expressing living beings who did not enter actively or seriously into man's life were expressed by the common word alone without the gender desig¬ nation. But before this happened a -long period of evolution had to take place. Even in such a highly developed and inflected language as Anglo-Saxon, not only are the primitive gender forms strongly in evidence, but also the forms by which the idea of neutrality in gender are expressed are plainly in evidence. The word mann was still of common gender; but it did not express the human race, since to convey

this idea, the word cynn had to be added to it, thus forming the collective noun manncynn, mankind, a strictly non-gender word, in its original conception. The wsepenmann, the weapon being, was the male being, or man, in the modern sense of the word. Here we see how adjectives, which were expressive of activities of the nouns to which they were at¬ tached, came, in some languages, to have masculine and femine forms. Wsepen being the symbol of militant man, came to have the adjective meaning of male or masculine; and waepenlic was manlike, or masculine. Wifa, in Anglo-Saxon signifies woman; but wife- child is a female child or girl. A being that, while human or endowed with animal life, is yet neither male nor female, that is a her¬ maphrodite, is called waepenwifestre, that is an armed female or a male-female.

In the strictly grammatical sense, English is a non-gender language, as it possesses no form of words distinctive of sex. Boy represents a male being, girl a female being; but there is no grammatical form assumed by either word which enables us to say that it is masculine or feminine. In order to arrive at this knowledge we must go beyond the province of grammar and find the meaning and use of each word.

It is customary to say that boy is of the masculine gender because it represents a male being ; but this is equivalent to saying that a thing is what it is because it is what it is. It is an admission of the fact that modern Eng¬ lish grammar has no forms of words by which it distinguishes sex; and that, if we wish to distinguish the sex of the being represented by any definite word we must have recourse to our own knowledge of its meaning or, in default of this, to the dictionary. We know that wife is feminine because it represents a female being; but we do not know this by virtue of its gram¬ matical form. In the Latin languages, on the contrary, the grammatical distinction is prac¬ tically always in evidence. Thus, for example, ˆesposo,® in Spanish is husband and <(esposa)) is wife. The (

gender. But they now exist only as curious survivals of the past and as an almost negligible exception to the rule that English is a non¬ gender language.

Old Gender Forms. — There linger in the English language many old forms reminiscent of hs early history and its long transitional period. Some of these indicate grammatical gender in a fragmentary way. Some are reminiscent of the German affinities of the tongue while others are of Latin or Greek origin. Fox takes the feminine vixen; the feminine of wizard is witch, and that of widower is widow. These and a few others are gender forms of Germanic origin; but they only constitute exceptions in the general con¬ sideration of English gender. A number of words form the feminine by the addition of -ess to the masculine. These generally indicate grammatically the feminine gender but not the masculine. In count, countess, for example, the gender of countess is plainly indicated by the form of the word-ending. But this is not so as regards count, the gender of which can be fixed only by first ascertaining the meaning of the word itself. Not only does this list of words indicate only partially the gender of the words contained therein, but it is in origin not English at all. It is extended to a compara¬ tively small list of words, and even they are barely domesticated in the language. The same is true of the whole list of Latin and Greek gender terminations in English. They are strangers in a foreign

land and their influence is negligible because they are so few in numbers, and they have not been able to put off their strange dress. This dispenses with the very few gender forms of nouns which are practi¬ cally all of foreign origin and distinct from those of the older English tongue.

Gender of Pronouns. — It is a common as¬ sertion of grammarians that the personal pro¬ nouns in English afford evidence of true gender; but this is far from being the truth if gender is considered as a purely grammatical distinction. It is impossible to tell by the form of the words I, we, you and they whether the person to which they refer is male or female. It is only in the third person that something like true gender is found in he, she, it, his, hers, its. But the plural forms they, theiFs are de¬ void of gender terminations or inflections. All the other forms of personal, relative, demonstra¬ tive and possessive pronouns are similarly with¬ out true grammatical forms indicative of gender.

In older English, adjectives and certain verbal forms were declined to indicate gender, but these distinctions have now disappeared so completely that there does not survive a single exception to prove the ancient rule.

To sum up, therefore. True grammatical gender, as a general rule, does not exist in Eng¬ lish. Not a single neuter word has a gram¬ matical termination of English origin in¬ dicative of the fact that it represents an inanimate thing. Practically no names of male beings have distinctive grammatical inflections by which it can be at once recog¬ nized that they represent male beings. The terminations of the few feminine designations that may be said to indicate true gender in English are all of foreign origin, and their use has had practically no influence on the position VOL 12—24

of gender in the language. There is no gender evident in the pronouns in English except in the third person singular of personals and pos- sessives, and even these forms have now be¬ come arbitrary, so that the meaning of the pronoun itself, in each case, has to be first de¬ termined before its gender can be ascertained. Adjectives, gerunds and other verbal expres¬ sions have no grammatical forms in English indicative of gender. English, therefore, in the proper grammatical sense of the term, is a gen¬ derless language.

Bibliography.— Abbott, E. A., (Boston 1796); Ash, John, Grammatical Institutes } (Boston 1785) ; Baker, J. T., Gorrect English (Baltimore 1907) ; Barrett, S., Principles of Grammar) (Albany 1848) ; Brown, Goold, (The Grammar of English Grammars) (New York 1851) ; Latham, R. G., (A Handbook of the English Language) (New York 1870) ; Lewis, W. D., Practical English for High Schools) (New York 1916) ; Metcalf, R. C., (English Gram- mar) (New York 1894) ; Murray, Lindley,

(English Grammar> (1795); Sweet, Henry,

John Hubert Cornyn.

GENDER, a Javanese musical instrument. It consists of a row of parallel metallic plates supported horizontally by two strings passed through the respective nodal lines of the plates. Underneath each plate is an upright bamboo, containing a column of air of such a height as to reciprocate the sound of the plate above.

GENDRON, zhon'dron', Auguste, French painter: b. Paris 1818; d. there, 12 July 1881. He was long a pupil of Delaroche, and several times visited Italy, where he painted his first important works. In addition to several can¬ vases, including (The Island of Cythera) ;

(Tiberius at Capri); (Sunday in Florence — 15th Century,) he executed frescoes in the Louvre and the church of Saint Gervais.

GENEALOGY (from the Greek genos, race, and logos, discourse), the systematic ac¬ count of the origin, descent and relations of families is an auxiliary of historical science. Genealogical knowledge becomes important in a personal or legal view, when family claims are to be established. Genealogy is founded on the idea of a lineage or family. Persons descended from a common father constitute a family. Under the idea of degree is denoted the nearness or remoteness of relationship in which one person stands with respect to another. A series of several persons, descended from a common progenitor, is called a line. A line is either direct or collateral. The direct line is divided into the ascending and descend¬ ing. The ascendants are called, in general, majores (ancestors), and the descendants posteri (or posterity). The collateral lines comprehend the several lines which unite in a common progenitor. They are either equal or unequal, according as the number of the de¬ grees in the lines is the same or different. The collateral relations on the father's sire are termed agnati, on the mother's cognati. Chil-

dren stand to each other in the relation either of the full blood or the half blood, according as they are descended from the same parents, or have only one parent in common.

For illustrating descent and relationship gen¬ ealogical tables are constructed, the order of which depends on the end in view. In tables the object of which is to show all the indi¬ viduals embraced in a family, it is

usual to begin with the oldest progenitor, and to put all the persons of the male or female sex in de¬ scending, and then in collateral lines. Other tables exhibit the ancestors of a particular per¬ son in ascending lines, both on the father's and mother's side. In this way 4, 8, 16, etc., ances¬ tors are exhibited. The tables showing the succession of rulers contain merely the descent of the persons who have reigned in succession, or who have claims to the government. In connection with them stand the tables of dis¬ puted succession, which represent several lines of a family, or several collateral families, in order to deduce their rights of succession from their degree of relationship. Synchronical tables consist of the genealogies of several families placed together, in order to compare, with facility, relationships, marriages, divisions of inheritance, etc. Historical genealogical tables differ from mere genealogical tables, as they attach to the descent the biographies also of the members. The common form of genea¬ logical tables places the common stock at the head, and shows the degree of each descendant by lines.

The earliest genealogical tables are perpetu¬ ated in the Biblical family records of succeed¬ ing generations, in graven stone memorials of ancient Egypt, Assyria, Persia, India and other Oriental countries. Genealogical knowledge was most important in the Middle Ages, when the nobility was distinct from the other classes. Ancestors were unblushingly and imprudently fabricated, the absence of criticism and the de¬ sire to flatter important people causing the in¬ troduction of the most absurd fables into genealogy, especially after the 14th century. Few families, no matter however distinguished and noble, can trace their ancestry beyond or even as far as the middle of the 11th century. The advance of civilization and particularly the institution of corporations and guilds in the towns of the principal European nations afforded a wider scope for genealogy, and in the 12th and 13th centuries family names be¬ gan to be more common. The oldest trace of family names according to Gatterer is in 1062 when a Henricus de Sinna is mentioned in Schannat's <(Buchonia Veteri.® After history in general had attained a more systematic char¬ acter, the Germans in particular treated gene¬ alogy on a more scientific basis. Ruxner's

perfection by Konig, Von Imhof, and especially by Hiibner in his (Genealogische Tabellen) (4 vols., 1725-33; new ed., 1737— 66) , to which Lentz added

The principal genealogical MSS. sources in Great Britain are the public records, heraldic registers and the parish registers of births, marriages and deaths. The chief printed col¬ lections of genealogical information are the well-known Burke, Debrett, and other like pub¬ lications of (

In the United States, genealogy was gen¬ erally neglected until the latter part of the 19th century, when the organization of patriotic, State and colonial societies, like the Society of the Cincinnati, the Holland Society of New York, the Southern Society, etc., aroused an in¬ terest in genealogy. Genealogical societies have been organized in several States and the subject has received more or less attention. New York society folks in 1901-02 began to take up genealogy as a special fad or hobby and num¬ bers of persons adopted the study of family trees as a regular employment. The principal publications in the United States on genealogy are (The New England Historical and Genea¬ logical Register > ; cThe New York Genealogical and Biograohical Record ; The Heraldic Jour¬ nal; the various biographical- dictionaries and cyclopaedias ; the printed transactions and archives of State and city historical societies; county, State, city and town histories.*

GENEE, zhe-na', Adeline, Danish ballet dancer: b. Aarhuus, Jutland, 1878. In 1886 she made her first public appearance and in 1895 became first dancer at the Royal Opera House, Copenhagen. She appeared subsequently in Berlin and Munich and in 1897 was engaged for 10 years at the Empire Theatre, Leicester Square, London. There she appeared with great success in all the ballets brought out under the management of the Empire. In 1908 she appeared in New York in

GENEE, Richard, German composer : b. Danzig 1823; d. Baden 1895. At first he studied medicine but soon abandoned it for music and went to Berlin where he studied under Stahlknecht. He became a successful orchestra leader, successively at Riga, Reval, Cologne, Aix, Danzig, Diisseldorf, Mainz, Schwerin, Amsterdam, Prague and Vienna. He composed several operettas, which were highly successful. They include (Der Geiger von TiroP (1887) ; (Der Musikfeind, (Die Gen- eralprobe) (1868) ; ˆosina5 (1868) ; (1887) ; (Im Wunderlande der Pyramided ; (1887) ; (Die letzten Mohikaner* (1887) ; (Die*

Piiatw>,oˆˆ87):

, GENEE, zhe-na, Rudolf, German author : b. Berlin, Prussia, 12 Dec. 1824; d. Berlin, 19 Jan. 1914. He abandoned wood engraving for journalism and then became an instructor in literature at Berlin. As a reader and inter¬ preter of Shakespeare he attained distinction ; but his plays — (1854) ; is a historical novel that passed two edi¬ tions, and his (Bismarckiade) is an addition to German history.

GENELLI, ga-nel'le, Bonaventura, Ger¬ man painter: b. Berlin, 28 Sept. 1798; d 13 Nov. 1868. He was the son of Janus Genelli (1771— 1812) , an engraver, with whom he early studied. His chief artistic training was ob¬ tained as a pupil of Johann Erdmann Hummel at Berlin and at Rome, where he resided in 1822-32, and executed numerous pencil and india-ink drawings which carried his name over much of the Continent. From 1836 he was in Munich, often in poverty; for he received no public commissions and his work had as yet met its due recognition among but a few. In 1859 he was called by Grand Duke Charles Alexander. to Weimar, where ample leisure was afforded him for his larger works in oil. He was a classicist like Carstens, whose methods he followed, and with him the chief thing was the rendering of line. Among his many works are the series of drawings for Dante's (Divine Comedy, } and for Homer; other drawings in ink or water-colors, such as (Hercules Playing the Lyre ; The (Vision of Ezekiel,* and (ˆEsop Telling His Fables,* and the pictures in oil:*

(Abraham and the Angels) ; (The Battle of Lycurgus with Bacchus ; (Bacchus among the Muses.* There is a biography of Genelli by Jordan (1869). Consult also Muther, History of Modern Painting) (1907).*

GENERAL, (1) A military rank and title. In the United States army, this rank, as dis¬ tinguished from and superior to the major- general, was created for Washington by Con¬ gress, 3 Alarch 1799. He died shortly after, the office remained vacant, and in 1802 it was abolished. It \yas revived in 1866 for U. S. Grant, and on his accession to the Presidency in 1869 was conferred on William T. Sherman. On his retirement, 1 Nov. 1883, the rank was allowed to lapse. In June 1888 it was revived for Philip H. Sheridan, and on 6 Oct. 1917 for John Joseph Pershing (q.v.). The address of general is commonly accorded to lieutenant- generals, major-generals and brigadier-generals. Over 200 generals of the different grades are on the retired list of the United States army. The highest army officer has now the title of chief of staff. (See General Staff Corps). The French have brigade-generals and division- generals. The Germans and Russians classify their generals as ((of artillery,® «of cavalry,® and «of infantry.®*

(2) The name given to the general superior of religious orders and congregations of men in the Roman Catholic Church. The general is usually elected in general chapter and holds

office for three years. In the Society of Jesus the general is elected for life. The generals of regular orders have been granted by popes spec al privileges, as power of absolution in re¬ served cases in relation to their subjects. Sev¬ eral modern congregations of women have gen- eral superiors, but their canonical position is quite different from that of the

general of the orders of men.

(3) A term added to various civil titles, as postmaster-general,. attorney-general, indicating a broad authority in the office held. Compare Admiral.

GENERAL ASSEMBLE

ely. General; Presbyterians.

GENERAL AVERAGE.

TIME.

. See Assem- See Law, Mari-

GENERAL BAPTISTS. See Baptists.

GENERAL CONFERENCE MENNON- ITES. See Mennonites.

GENERAL CONFERENCE OF THE METHODIST EPISCOPAL CHURCH.

The Methodist Episcopal Church is one of the most highly, organized bodies in the world. Its organization is an evolution produced by the ever-growing needs of the Church and the times. Its episcopacy was gradual in its growth. The General Conference has come to be what it is now by a slowly developing process.

Development.— When Francis Asbury first arrived in this country in 1771 there were only nine preachers in the whole Church, so there was no necessity for a General Conference. Later, when , the work was extended and the men were widely scattered, the preachers met annually in groups. Thus the Annual Con¬ ferences. came to be formed. In order to have uniformity of discipline and coherence in the whole body, a General Conference became a necessity. In 1784 the Christmas Conference, as it is called, met at Baltimore. Its gathering marks the specific organization of the Church as a separate ecclesiastical body. Among the items of business of its session was the ordina¬ tion of Thomas Coke and Francis Asbury as general superintendents. Francis Asbury had for some years been exercising nearly all the prerogatives of a bishop of the Church. They were the choice of John Wesley, but would not consent to ordination until confirmed by the franchises of those present. Nearly 60 of the total of 81 preachers were present and voted unanimously for the ordination. The second General Conference met in 1792 and thereafter quadrennially. The first General Conferences were not delegated bodies, all ministers in full connection had the right to attend. In 1800 a restriction was made that eligibility required membership in a Conference for four years. The first delegated Conference

met in 1812 and consisted of 90 members. In 1872 the laymen were introduced, two from each Conference. The first woman delegates appeared in 1888! The final step in giving laymen their rights was taken in 1900, when the number of clerical and lay delegates was made equal. In 1812 the ratio of representation was made 1 delegate to each 5 ministers; in 1816, 1 to 7 ; 1836 1 to 25; 1856, 1 to 27; 1860, 1 to 30; 1872, l' to 45. The Conference of 1864 declared that each Conference, no matter how small, is en-

titled to one delegate. Now each Conference is entitled to one clerical and one lay delegate for each 45 members. If the fraction of three- fourths of 45 should remain, the Conference is entitled to another delegate. The General Conference of 1796 met in November, but be¬ ginning with 1800 the Conference has always met in the month of May. A special session has never been called by the bishops or a ma¬ jority of them. The ministerial and lay dele¬ gates vote together unless a third of either the clerical or lay delegates demand a separate vote. The place of meeting is selected by the committee of arrangements appointed at the previous General Conference. It is the sole law-making body of the Church. The Annual Conference is an administrative body only.

Delegates, how Elected. — The ministerial delegates are elected by ballot by the Annual Conference in the session just previous to the meeting of the General Conference. They also elect reserve delegates. The election of the lay delegates is more complicated. At a meet¬ ing of the congregation of a local church all members over 21 years of age elect a delegate to the lay electoral Conference, which meets during conference week at the same place as the Annual Conference. These delegates from the local churches elect from their number the proper number of delegates to the General Con¬ ference. They also elect two or three reserve delegates who serve in the place of deceased or absent members of the delegation.

Organization. — The organization of the Conference is highly efficient. The presiding officer is always a member of the board of bishops. In case, however, that all the bishops should be absent, the Conference would elect a president pro tern. The bishops preside in the order of seniority of election. The secre¬ tary is elected by the body and chooses quite a large staff of assistants. The great bulk of the work is done by committees, who debate all questions referred to them and bring their conclusions to the main body, which accepts or rejects the findings of the committee. First of all is the committee of reference, com¬ posed of five persons — two ministers, two lay¬ men and the secretary of the Conference. There are 16 general committees to which ref¬ erence is made. Thirteen of the

committees include one clerical and one lay delegate from each Conference as members. The following are the ˆstanding committees,® as they are called: (1) Episcopacy; (2) Judiciary, con¬

sisting of 19 members, usually men of a legal turn of mind, and including several lawyers from the lay delegates; (3) Itinerancy; (4) Boundaries; (5) Revision — 19 members; (6) Temporal Economy; (7) State of the Church;

(8) Book Concern; (9) Foreign Missions;

(10) Home Missions and Church Extension;

(11) Education; (12) Freedmen; (13) Sunday Schools; (14) Epworth League; (15) Deacon¬ ess Work — 39 members; (16) Temperance, Prohibition and Public Morals. The commit¬ tees do not have the power to originate busi¬ ness, only to pass upon that referred to them. Other special committees are appointed as needed. Usually the delegates vote together, but the clerical and lay delegates may vote sep¬ arately when one-third of the delegates of either order request it.

Powers. — (1) The Conference elects the bishops and decides where they shall reside for the ensuing quadrennium. It also, through the Committee on Episcopacy, reviews their work for the previous four years. The Conference may accept the resignation of a bishop, retire or depose him. Twice have bishops in active service resigned — Bishop L. L. Hamline and Missionary Bishop W. F. Oldham, later elected bishop. Wilbur Fisk was elected bishop but declined to serve. Joshua Soule was elected and refused ordination, but was later re-elected. James R. Day was elected but immediately re¬ signed before ordination. Never has there been a retirement or deposition for moral cause. A bishop (

(2) The Conference elects the editors of all official publications of the Church, including the editor of Sunday School publications, and the editor of The Epworth Herald and The Methodist Review. It also elects the secre¬ taries and managers of the various benevolent and executive boards, the agents of the Book Concern, the Book Committee and the trustees of the Methodist Episcopal Church.

(3) It may repeal any laws made by previous General Conferences, except the ˆrestrictive rules.®

(4) It may enact any laws it may see fit. In case of constitutional changes or amend¬ ments they must be submitted to the Annual Conferences and the Lay Electoral Conferences for an expression of opinion. A two-thirds vote of all members present and voting in all the Annual Conferences and Lay Electoral Conferences suffices to authorize the next Gen¬ eral

Conference to alter or amend by a two- thirds vote any provisions of the constitution except the ˆrestrictive rules.®

(5) The bishops are the official interpreters of the law of the Church, but the General Con¬ ference may give a contrary interpretation through its judiciary committee, binding the bishops to another method of procedure.

(6) The General Conference is a final court of appeal for minister, bishop, layman, Church or Annual Conference.

(7) It determines the boundaries of the Annual Conferences.

(8) It receives fraternal delegates from other Churches and hears their messages.

(9) It receives the reports from the various benevolent and executive boards and disposes of them.

(10) Through its various commissions au¬ thorized, it carries on its work through the quadrennium. The members of • the commis¬ sions are appointed by the bishops.

Restrictions of Towers. — The restrictions of the powers of the General Conference are embodied in the ˆrestrictive rules® and are six in number. They are :

(1) (

(2) ((The General Conference shall not

organize, nor authorize the organization of an Annual Conference with less than 25 members"

(3) (

(4) <(The General Conference shall not re¬ voke nor change the General Rules of our Church."

(5) ((The General Conference shall not de¬ prive our ministers of the right of trial by the Annual Conference, or by a select number thereof, nor of an appeal ; nor shall it deprive our members of the right of trial by a com¬ mittee of members of our Church, nor of an appeal."

(6) <(The General Conference shall not ap¬ propriate the produce of the Book Concern, nor of the Chartered Fund, to any purpose other than for the benefit of the traveling supernumerary and superannuated preachers, their wives, widows and children."

Methods of Business. — The order and con¬ duct of all business of the Conference is gov¬ erned by 58 rules. The sessions of the General Conference are almost entirely held in the forenoon. The committees meet in the after¬ noon. Soon after the Conference has con¬ vened the bishops present, through one of their number, read their Quadrennial Message. This custom originated with Bishop McKendree, who presented his message to the General Con¬ ference of 1816. It then goes to the committee on reference which distributes its parts to the proper committees. The presentation of this (

Publications. — In addition to the Daily Christian Advocate published during the session of the Conference, the secretaries publish, after the Conference adjourns, 'The fournal of the General Conference, > which contains all acts and other papers in full. It also contains all proceedings but none of the debates; these are found only in the Daily Christian Advocate. They also publish (The Doctrines and Dis¬ cipline of the Methodist Episcopal Church, which contains all the Church law for clergy*

and laity, addresses of Church officers, and the Conference Course of Study for students for the ministry. Consult Sherman, D., (History of the Discipline (3d ed,, New York 1890) ; Merrill, Stephen M., (Digest of Methodist Law) (revised by David G. Downey, New York 1912) ; Neeley, T. B., (History of the Origin and Development of the Governing Conference of Methodism* (Cincinnati 1892) ; Buckley, J. M., (The Constitution and Parliamentary His¬ tory of the M. E. Church* (New York 1912).*

The General Conference of the Methodist Episcopal Church South has almost identical powers, restrictions and methods of business. The ratio of representation is 1 to 48, and one of the lay delegates from an Annual Conference may be a local preacher. A further difference lies in that the bishops may veto a constitutional change after it has passed by a two-thirds vote of the General Conference and three-fourths of the members of all the Annual Conferences, if in their judgment it is unconstitutional. The Methodist Protestant Church, not having an episcopal form of government, elects its pre¬ siding officer by ballot. Their ratio of repre¬ sentation is one minister and one layman for each 2,000 persons in full membership. Two-thirds of the whole number of the Annual Conferences have power to call special sessions of the General Conference. Ministers and lay¬ men may vote separately if a call is made by five persons.

The Free Methodist Church includes the bishops as members of the General Conference. Their ratio of representation is one layman and one clergyman, and when the aggregate mem¬ bership of an Annual Conference reaches 800 members in full relation it is entitled to two additional delegates for every subsequent 600 members in full relation within the Conference. They have three ˆrestrictive rules." Among other things mentioned by other churches as prohibited from being changed by the General Conference is The free-seat system of our churches." The will of the General Confer¬ ence is carried out by a bishop, a minister, and a layman from each General Conference dis¬ trict, known as the executive committee. There are 6 General Conference districts in the Free Methodist Church. There are 15 in the Metho¬ dist Episcopal Church. The powers of the executive committee include the filling of all vacancies in General Conference offices, and the supervision of the publishing interests of the Church.

The United Brethren in Christ have a Gen¬ eral Conference which has similar powers and restrictions to the other churches mentioned.

The African Methodist Episcopal Church is organized after the fashion of the Methodist Episcopal Church. The same may be said of the African Methodist Episcopal Zion Church, and the Colored Methodist Episcopal churches.

Samuel G. Ayres, Librarian, Garrett Biblical Institute.

GENERAL COURT, the name of the legislative assemblies of Massachusetts and New Hampshire during colonial times, and sub- sequentlv applied to their State legislatures. The old English name of the meeting of a body of managers or members of any corpora¬ tion is (

a court; then the primary assembly of freemen under its charter was called the General Court ; and the name was retained after it became a representative body. There was the further reason that it really was the supreme judicial as well as legislative body. See Massachu¬ setts.

GENERAL EDUCATION BOARD, an

organization chartered by Congress in 1903, primarily to enable John D. Rockefeller to dis¬ tribute his gifts and aids to education, and secondarily to make it possible for other men of means to promote the advancement of edu¬ cation in the United States in a more effective and systematic manner

than had heretofore been possible. The sphere of the General Edu¬ cation Board embraces the promotion of prac¬ tical farming and of public high schools in the Southern States ; of negro education and in¬ stitutions of higher education everywhere throughout the United States. Under an agreement entered into with the United States Department of Agriculture in 1906 the General Education Board contributed $405,700 for the promotion of practical farming within the province of the charter of the organization. This was employed in promoting demonstration farms and the furnishing of instructors for the education of farmers. The work of the Board also influenced the practical teaching of agri¬ culture in the schools of the South. In the promotion of public high schools in the South¬ ern States the Board appropriates for the use of each State Department of Education or State University the funds necessary to pay the salary and traveling expenses of a special high school representative whose business it is to stir up public sentiment in favor of public high schools, and to organize the different sec¬ tions where he is at work so as to promote the end in view. The Board has already devoted large sums of money to this department of its work; and the high school representatives paid by it have raised several millions of dollars for the establishment of public high schools in the South. So effective was this part of the work that by 1911 over 700 new high schools had been opened through direct work of the Board. On the same date the General Education Board had already appropriated over $25,000,000 as gifts to encourage institutions of higher learn¬ ing made to some 82 colleges and universities in the United States and for other educational ends. Of this sum $2,300,000 went to colleges in the Southern States ; $2,510,000 to those of the Western States; $1,805,000 to those in the Middle and Eastern States. About half a mil¬ lion dollars had also been devoted by the Board for the promotion of negro education.

The work of the General Education Board has both a practical and a social side. Over 200,000 farmers are being influenced for the betterment of agriculture by its exertions, while State agents paid by the Board have for some time been conducting demonstration work among boys under actual farming conditions, and by the establishment of "corn® and other clubs. Other clubs of a social nature have been organized for the promotion of more social life in farming communities ; while edu¬ cative clubs to study house management, poul¬ try, preservation of fruit and other subjects directly related with agricultural life have also

been encouraged in various ways, more es¬ pecially in connection with the girl's clubs.

Since 1911 the work of encouraging the es¬ tablishment of public high schools in the United States has progressed rapidly, carried along by its

own momentum and the ceaseless work of the educational representatives of the Board. But the same may be said of the work of the Board in all the departments of its self-imposed activities.

GENERAL GRANT NATIONAL PARK, California, located in Tulare and Fresno counties; usually mentioned in connec¬ tion with Sequoia National Park (q.v.) be¬ cause, though separated by six miles of moun¬ tain and forest, the two are practically the same governmental reservation. The area of the former, the subject of this paragraph, is 2,536 acres and its altitude ranges from 5,250 feet to 7,631 feet. Created primarily (by act of 1 Oct. 1890) for the protection of the General Grant tree, a very beautiful Sequoia Wash- ingtoniana, 264 feet high and 35 feet in diameter at the base, the park has made such substantial progress that its superintendent in 1915 men¬ tioned in his report the hotels, stores, feed- yards, post offices, telephone stations and photo¬ graph galleries within his jurisdiction. It is situated on the western slope of the Sierra Nevada 46 miles from Sanger. Between that station (on the Southern Pacific Railroad) and the park regular transportation service has been established. The number of visitors was 7,022 in 1915 (1 April to 10 August), of whom 5,019 arrived in automobiles. Mammals native to the parks are the elk, deer, mountain sheep, squirrels, flying squirrels, porcupine, hares, rabbits,. bear, wolves, foxes, mountain lion, lynx, ring-tailed cat, raccoon, wolverine, etc. The Sequoia and General Grant parks are homes of both migratory and breeding birds. Owing to the topography of the parks and their varied climatic conditions, birds of both the torrid and frigid zones come to them. There is a constant movement of the birds north and south and from the high mountains to the lower and from the lowlands to the higher ele¬ vations ; in all, 194 species have been observed, including plover, grouse, partridges, pheasants, wild turkey, hawks and eagles. The best sea¬ son for tourists is between the middle of June and October, when the atmosphere is usually cool and clear. The main tourist camp ground in General Grant National Park consists of 35 acres fenced with steel woven wire attached to cedar, posts. A description of the forests with their "big trees® is given in the article Sequoia National Park. See also National Parks and Monuments.

GENERAL HOSPITAL. See Hospitals,

Military.

GENERAL ISSUE, in English law, is a plea denying the whole declaration or indict¬ ment, without offering any special matter by which to evade it. It is called the general is¬ sue, because, by importing an absolute denial of what is alleged in the declaration, it amounts at once to an issue, or fact affirmed on one side, and denied on the other. This is the ordinary plea upon which most causes are tried, and is now almost invariably used in all criminal cases, when the prisoner at the bar pleads "not guilty.® To money counts the plea

is never indebted® ; or to actions on simple contract nunquam assumpsit (((never under¬ taken®). This plea puts everything in issue, that is, denies everything, and requires the party to prove all that he has stated. It is a frequent question, What can be given in evi¬ dence by the defendant upon this plea? and the difficulty is, to know when the matter of de¬ fense may be urged upon the general issue, or must be specially pleaded upon the record. See Plea and Pleading.

GENERAL PARESIS (known also as general paralysis, softening of the brain, par¬ alytic dementia, general paralysis of the insane, etc.), a disease of the nervous system that usually begins in early adult life, progresses steadily with increasing mental enfeeblement, and leads to ultimate motor paralysis, decay of all of the mental faculties and death within a period averaging from three to five years. From the type indicated in this brief general definition there are numberless variations. It is a disease which, when well advanced, is recog¬ nized with great ease, but in its early stages it may be extremely difficult to know. From the standpoint of the patient's family and friends it is important to be able to recognize the dis¬ ease; for it is in this initial period that the patient often ruins his business, his friends, his family and brings shame and discomfort to all those connected with him. Much of this might be averted if the layman were better informed of this early period of one of the worst scourges of modern times. The disease has probably existed for many centuries, but it is only within comparatively recent times that its true character has been recognized, and in its present extreme forms it seems to be a product of the modern complex social system. It has been aptly termed a disease of civilization and syphilization, an alliteration that contains much truth. Syphilis is the sole cause of general paresis. The disease is a parenchymatous syphilitic disease of the brain, a special trend taken in the development of brain syphilis.

(See article on Brain Syphilis). Before the Tre¬ ponema pallida, the name given to the nrnute parasitic organism which is the cause of syphilis, had been found in the brain tissues of paretics, the statistical study of the disease had proved its syphilitic origin for about 90 per cent of the cases, but with the advances made by medi¬ cine in refined methods of diagnosis, the dictum, no syphilis, no general paresis, has come to have universal recognition. There are forms of pseudo-paresis which in their clinical appear¬ ances may resemble paresis, but a study of the blood and of the cerebro-spinal fluid, which should be done in all suspected cases, will establish the correct diagnosis. Among the dis¬ orders which may resemble pares' s are brain tumor, poisoning by mercury or lead and by alcohol. Certain senile softenings of arterio¬ sclerotic origin may resemble paresis. Certain maniacal trends in manic depression psychoses often are confused with the early maniacal phases of pares's. Bromide poisoning some¬ times resembles paresis. General paresis is com¬ moner in men than in women, the proportion among different peoples and races, and times, varying from 25-1 to 3-1. Although it is a disease usually beginning in the 30's or 40's, juvenile forms are known, and sometimes the

old man is a victim. It seems to be more prevalent in crowded communities, for there the stress of excitement and depression, of gaiety and sadness, of extravagance and destitution, is more pronounced, for both extremes of the mental pendulum must be considered in the esti¬ mation of the strain on a syphilitic brain. The brilliant financier, or the actress who succumbs to this disease may be more in the public eye, and moralists may adorn a tale concerning their supposed profligacy, but the poor, harassed workman, diseased through lack of knowledge, and drink-sodden to escape the reproofs of his conscience, may also be the victim.

The initial symptoms are usually very insid¬ ious, although occasionally the disease appears in full-blown vigor. The previously healthy, neat and careful workman begins to forget things. There is a period of disturbed mental¬ ity. Noises affect him unpleasantly. Undue ir¬ ritability is evidenced by unwonted explosions of anger. This state may be weeks or months in its evolution, and may be confounded with a condition of overwork or overworry. In fact, such a condition is present in many tired people who never develop paresis. Added to this there are vague apprehensions in the patient's own mind of his gradually declining power; head¬ aches, neuralgias, and vague pains may also be present ; and poor sleep may be another symp¬ tom of the early stage. All of these symptoms are common to many people who have over¬ worked, and should not occasion alarm. But when, little by little, one shows increasing care¬ lessness in his personal habits, such as neglect¬ ing to button his trousers, or perm'tting his food to spill on his clothing, when he shows signs of mental exaltation and dreams of won¬ derful th ngs, then the true disease

begins to show itself. From this point on there are countless variations, but in general the typical paret'c behavior that leads the person into economic danger, if not disaster, is character¬ ized by an expansive and exaggerated conduct. Buoyancy and elation with great projects and sanguine hopes 'mark the in'tial stages of the paretic's mental decay. He becomes restlessly busy, is continually entering into new schemes, is incessantly talking about his affairs with effusive geniality, not only to his friends, but to utter strangers, and he even communicates to others his closest domestic concerns. There is a gradual breaking down of the finest sensi¬ bilities and, closely following this, slight evi¬ dences of the loss of the most del'cate motor adjustments become manifest. It is in th's stage that the symptoms become unmistakable. The partial impairment of the motor functions shows itself in an increased lack of control of the finer motions of the tongue, the lips and the hands. There is a fine tremor in the tongue when it is protruded ; on showing the teeth, the angles of the mouth betray a fine tremor; and the handwriting is seen to be less firm and even, approaching that of the formative period of the man's youth. The mild grade of in¬ flammation in the brain causes certain changes in the reflexes of the body. Thus the pupils of the eyes are not ant to act as rapidly as in health ; they may be unequal in size ; thev are sometimes very small and do not open wide in the dark as is usual. With these symptoms the diagnosis becomes moderately certain, and

from this time on the mental degeneration be¬ comes marked. The carelessness becomes slovenliness; the memory goes rapidly; the loss of the finer sensibilities deepens to obscenity, to faithlessness, to utter loss of the moral faculties ; the buoyancy becomes foolishness, and big projects are often launched, resulting in financial ruin. Grandiose ideas usually enlarge, and the afflicted one dreams of millions of money, of being a king or president, or Christ, or a god. His personal strength is like that of Samson, his beauty comparable to Apollo's; his voice, his oratory, his writing, his poetry, his acting are superb — in short, his whole per¬ sonality is puffed up with an amazing exaltation of the ego. Exulting self-confidence dominates all his designs, and a restless, busy, subdued delirium actuates his every thought and move¬ ment. From this stage, usually termed the grandiose stage, and which may persist for from six months to a year or more, the mental deterioration commences to show itself in a gradually progressive dementia. Mental dilapi¬ dation becomes mental decay. The motor rest¬ lessness goes on to loss of power and a gradual paralysis of the motor functions begins, passing through the stages of progressively increasing inco-ordination to complete powerlessness. Tottering, shambling,

stumbling incompetence finally advances to absolute motor impotence. This affects all of the muscles of the body, but is appreciated in the speech more readily and earlier than in other motor acts. The loss of ability to repeat the r's and l's, as in ((truly rural,® "artillery,® etc., is an early sign of this speech-defect. Finally the only answer that can be obtained from the patient is that he is "all right.® The lack of motor power further manifests itself in the increasingly dimin¬ ished control of handwriting. The paretic is unable to keep to a line. His writing goes up and down, letters and words are omitted, the up strokes are very wavy and the letters be¬ come unequal in size.

Thus the course of the disease progresses until, in from two to three years, on the aver¬ age, the paretic is a bedridden dement, who dies of exhaustion or an apoplectic or epilepti¬ form convulsion. Occasionally remissions of the disease occur. These are particularly try¬ ing to most of the paretic's friends, for hopes of recovery receive a sudden stimulus only to be destroyed after a period of from six months to a year or so. Occasionally the remissions last a number of years, but at the present time it is believed that general paresis is a necessarily fatal disease.

The main features of a central type of the disease are here given, but there are countless variations. Acute maniacal states sometimes occur, and the patient dies in a galloping frenzy in from three to six months. Occa¬ sionally a paretic is melancholic or stupor¬ ous throughout. A small proportion, one-half per cent of the cases, show this type. Oc¬ casionally — and many modern alienists believe this to be more common at present — a gradu¬ ally progressive dementia without grandiose ideas marks the entire course of the disease. Most cases of paresis have apoplectiform or epileptiform attacks at some period of the dis¬ ease. A few begin in this manner. There are countless numbers of mixed forms, the details

of which may be consulted in textbooks of mental disease. Here also the subd'visions of the disease into stages may be found. Of the treatment little may be added. The most es¬ sential step in relation to this disease is its early recognition. To be able to know what is the matter before the patient has ruined his busi¬ ness, or his family and friends, is the most im¬ portant feature for the layman to grasp. The paretic himself is doomed, but it is not neces¬ sary for those dependent on him to suffer irretrievable loss because of his disease. The proper course to pursue is to place the patient in a sanatorium or asylum at the earliest pos¬ sible moment, the place selected depending largely on the means of his friends or relatives. Consult Maudsley, (Pathologyof Mind (1895) ; Chase, (General Paresis * (1902) ; Kraepelin,*

(General Paresis, Nervous and Mental Dis¬ ease Monograph Series) (the

best short dis¬ cussion in English) ; Jelliffe and White, dis¬ eases of the Nervous System) (2d ed., 1917). See Dementia; Insanity.

Smith Ely Jelliffe, M.D.

GENERAL PAUSE, in music, a pause for all instruments, or a pause for parts in a composition. It is often employed with strik¬ ing effect, when so introduced as to break the rhythm. To render its length indeterminate a "hold® «'Ts is placed over it.

GENERAL SESSIONS, Court of. See

Court.

GENERAL STAFF CORPS. The Gen¬ eral Staff Corps of the United States Army, created in conformity to the act of Congress in 1903, is composed of the grades and number specified in said act, detailed for service in said corps for a period of four years unless sooner relieved, under rules of selection pre¬ scribed by the President. Upon being relieved from duty in the General Staff Corps officers return to the branch of the army in which they hold permanent commissions and except in case of emergency or in time of war are not eligible to further detail therein until they have served for two years with the branch of the army in which commissioned. This ineligibility does not apply to any officer who has been re¬ lieved prior to the expiration of four years' duty with the corps; but such officer becomes ineligible as soon as he shall have completed a total of four years of said duty. While serv¬ ing in the General Staff Corps officers may be temporarily assigned to duty with any branch of the army. The law establishes the General Staff Corps as a separate and distinct staff organization, the chief of which has supervision, under superior authority, over all branches of the military service, line and staff, except such as are exempted therefrom by law or regula¬ tions, with a view to their co-ordination and harmonious co-operation in the execution of authorized military policies.

The General Staff Corps, under the direction of the Chief of Staff, is charged with the duty of investigating and reporting upon all ques¬ tions affecting the efficiency of the army and its state of preparation for military operations, and to this end considers and reports upon all questions relating to organization, distribution, equipment, armament and training of the mili¬ tary forces (regulars, volunteers and militia), proposed legislative enactments and general and

GENERAL THEOLOGICAL SEMINARY

special regulations _ affecting the army, trans¬ portation, communications, quarters and sup¬ plies; prepares projects for manoeuvres; re¬ vises estimates for appropriations for the sup¬ port of the army and. advises as to disburse¬ ment of such appropriations ; exercises super¬ vision over inspections, military education and instruction, examinations for the appointment and promotion of officers, efficiency records, details and assignments and all orders and in¬ structions originating in the course of adminis¬ tration in any branch of the service which has relation to the efficiency of the military forces ; prepares important orders and correspondence embodying the orders and instructions of the President and Secretary of War to the army; reviews the reports of examining and retiring boards and acts upon such other matters as the Secretary of War may determine.

The General Staff Corps under like direc¬ tion is further charged with the duty of pre¬ paring plans for the national defense and for the mobilization of the military forces (in¬ cluding the assignment to armies, corps, divi¬ sions and other headquarters of the necessary quota of general staff and other staff officers), and incident thereto with the study of possible theatres of war and of strategic questions in general ; with the collection of military infor¬ mation of foreign countries and of our own ; the preparation of plans of campaign, of re¬ ports of campaigns, battles, engagements and expeditions and of technical histories of mili¬ tary operations of the United States. To offi¬ cers of the General Staff Corps are committed the further duties of rendering professional aid and assistance to the Secretary of War and to general officers and other superior com¬ manders and of acting as their agents in in¬ forming, and co-ordinating the action of, all the different officers who are subject under the provisions of law to the supervision of the Chief of Staff. They perform sifch other mili¬ tary duties not otherwise assigned by law as may from time to time be prescribed by the President.

Officers of the General Staff Corps assigned to duty with commanders of armies, divisions, separate brigades and territorial departments are collectively denominated the General Staff serving with troops. They serve under the immediate orders of such commanders ; those not so assigned perform duty under the im¬ mediate direction of the Chief of Staff and con¬ stitute the War Department General Staff. To facilitate the performance of its duties this lat¬ ter is arranged in sections, each under the direction of an officer of the General Staff Corps designated by the Chief of Staff. Such committees are designated in the sections from time to time as may be necessary to facilitate the transaction of business in hand. The War Department General Staff in its several sec¬ tions and committees stands in an advisory re¬ lation to the Chief of Staff in the performance of the duties herein devolved upon him. The distribution of duties to the

several sections and committees is regulated by the Chief of Staff.

The command of the army of the United States rests with the constitutional commander- in-chief, the President, who places parts of the army and separate armies whenever constituted under commanders subordinate to the general

command; and, in case of exigency seeming to him to require it, he may place the whole army under a single commander subordinate to him ; but in time of peace and ordinary conditions the administration and control of the army are effected without any second in command. The President's command is exercised through the Secretary of War and the Chief of Staff. The Secretary of War is charged with carrying out the policies of the President in military affairs. He directly represents the President and is bound to act in conformity to the President's instructions. Under the law and the decisions of the Supreme Court his acts are. the Presi¬ dent's acts and his directions and orders are the President's directions and orders. The Chief of Staff reports to txie Secretary of War, acts as his military adviser, receives from him the directions and orders given in behalf of the President and gives effect thereto. For pur¬ poses of administration the office of the Chief of Staff constitutes a supervising military bureau of the War Department.

The general staff of a command consists of general staff officers of such number and grades as may be assigned to it on the recommenda¬ tion of the Chief of Staff. The senior general staff officer on duty with a command, unless otherwise directed by the War Department, is the chief of staff of the command. Ordinarily he is so assigned by the War Department. The duties of the chief of staff of a command are as prescribed for officers of the General Staff Corps, and in addition he, under direction of the commander of the troops, performs all duties analogous to those devolved upon the Chief of Staff of the army. The other general staff officers serving with troops are employed under the direction of the commanders thereof upon the duties prescribed for officers of the General Staff Corps, and they perform such other duties within the scope of general staff employment as may be directed by such com¬ manders. General staff officers are not as¬ signed to other than general staff duties except by special authority of the War Department. The two general officers authorized for the General Staff Corps are detailed by the Presi¬ dent from officers of the army at large and below the grade of brigadier-general. All vacancies that may occur in the General Staff Corps in grades below that of brigadier-general are filled on the recommendation of a board of five general officers of the fine, not more than two of whom shall be members of the General Staff Corps, convened by the War Department at such times as may be necessary. The board is sworn to recommend officers solely on their professional efficiency and on

their probable aptitude and fitness for general staff service, and selects such number of officers of the proper grades to fill existing or expected vacan¬ cies as the War Department may direct.

Edward S. Farrow.

GENERAL THEOLOGICAL SEMI¬ NARY, a seminary of the Protestant Episcopal Church in the United States, established in 1817. Instruction was begun in New York city in 1819, but in 1820 the seminary was removed to New Haven. It was again re-established in New York in 1822. The gifts of Dean Hoff¬ man to the school amounted to over $1,000,000, while in 1910 the total resources of the school

were over $2,000,000. The theological course oi the school extends over a period of three years, and there is a graduate course. The de¬ grees of D.D. and B.D. are conferred. The control of the seminary is vested in a board of trustees composed of the presiding bishop of the Church; the bishop of New York; the dean of the seminary; 10 bishops chosen by the House of Bishops ; 10 presbyters and 10 lay¬ men chosen by the House of Deputies of the General Convention; and three bishops, three presbyters and three laymen chosen by the associate alumni. There are about 150 stu¬ dents in regular attendance.

GENERAL TICKET. See Conventions, .Political; Elections; Vote, Voters, Voting; Balloi ; Primary, Direct ; Primary, Presiden¬ tial Preference; Caucus; Congress; United States — The Beginning of the Party Or¬ ganization ; and the parties by name.

GENERALIFE, ha-na-ra-le'fa (Arabic, Garden of the Architect), a summer palace of the Moors at Granada, Spain, near the cele¬ brated Alhambra. The Darro flows through the grounds, which contain many splendid cypresses years old. There are a raised garden and belvedere. The palace and grounds are the property of the Marquis of Campotejar.

GENERATION, popularly used as a meas¬ ure of time, and usually represents about 30 years, the period which man requires to attain maturity, and the age at which, as a general rule, the first child is born. This secondary sense of the term is thus indirectly derived from the primitive meaning, which has refer¬ ence to the origin of living things. In the higher animals and plants the offspring is due to the congress of distinct individuals or ele¬ ments. (See Reproduction). Alongside of this process, sometimes even concurrently with it, new forms may arise by fission, or by

bud¬ ding; by a process akin to the latter, as in the parthenogenesis of bees, etc. ; or by a combina¬ tion of the sexual and asexual processes, alter¬ nate generation.

GENERATION, Spontaneous. See Spon¬ taneous Generation.

GENERATIVE CELL, the cell which di¬ vides its stalk and body cells in gymnosperms ; the cell formed by the first division of the nu¬ cleus of the pollen grain in the angiosperms. See Spermatophyte.

GENERATORS. Generators are machines which are used to transform mechanical energy into electrical energy. Where the electrical machines are used to convert electrical energy into mechanical energy they are termed motors.

If we simply desire to raise the voltage or pres¬ sure of the source of supply to a higher value, such, as in long-distance electric power trans¬ mission, we use a stationary device with two separate windings of a definite ratio of terns of wire .which is called a transformer. If we choose simply to change from one form of elec¬ trical supply such as alternating currents to another form such as direct currents we use a machine with a rotating element known as a rotary converter, the alternating current passing in one side, the direct currents leaving from the other side. The rotary converter is really a di¬ rect current generator and an alternating cur¬

rent motor, combined in one apparatus. When an alternating current is converted into a pul¬ sating direct current we may use a stationary device consisting of a glass sealed container having a vacuum, containing mercury with sev¬ eral terminals known as a mercury arc rectifier. For further explanation as to the principles in¬ volved in these devices the reader is referred to articles on Electricity and Electric Direct Current.

The general method of using electrical gen¬ erators is to locate the power-house either near some natural source of energy such as a water fall or near the centre of distribution of some large city, preferably near a river or lake where adjacent water may be used for cooling the con¬ denser of the steam-engines. Starting with 1878 with the patenting of the first incandescent lamp by Thomas Edison the development of small electrical generators became rapid, the general plan being to drive the electrical' gen¬ erator with a steam-engine. Where water power is plentiful it is used in preference to steam. In using water power it should be un¬ derstood that while the expense for coal is elim¬ inated still there is a larger initial investment for pipe-lines, dams, reservoirs, etc., necessary, the interest on which capital forms a large yearly expense. In many places where water power generators have been installed, due to fluctuations in the water

supply, it has been necessary to reinforce them with steam-driven generators.

In the early days of commercial electrical de¬ velopment electric, generators were only of a small size consisting of a few horse power. Generators are rated in kilowatts, a kilowatt bemg 1,000 watts, 746 watts equalling one horse power. The size grew rapidly until at the pres- fjjt day we have turbine-driven generators of 50,000 horse power operating in some of our large central stations.

Thomas Edison developed the direct-current system of electrical generators and distribu¬ tion. Due to the large loss in energy in the form of heat by the electric current passing through the wires it became necessary in the early days to build a new power-house everv few miles. At one time New York City con¬ tained a large number of small power-houses containing generators which supplied power to the subscribers in their immediate territory. Due to these limitations electric power develop¬ ment, especially for electric lighting, would have been extremely limited in its application were it not for Nikola Teslas developing and patent- mg the alternating current system of distribu¬ tion. Tesla s patents covered the generator, transmission lines and power apparatus at the end of the line. He patented the complete sys¬ tem, and while it required the expenditure of large sums oi money before the manufacturers could develop practical apparatus, still the pat- ents were basic and controlled the art in the United States for many years. To understand t le general principal of operation of electric generators and the structural difference between direct and alternating-current machines it is necessary to go back to the fundamental prin- aple of electro-magnetic induction discovered by Michael Faraday in 1831. He noticed that when a loop of wire of several turns was re¬ volved between the poles of an electro-magnet

a flow of electric current took place in the wires of the loop. The rotation of the loop was about an axis perpendicular to the lines of force emanating from the pole.

The term electromotive force represents the pressure which forces an electric current through a circuit. In a generator its magnitude depends upon the rate of cutting of magnetic lines of force. These lines of force are hypo¬ thetical and indicate the magnitude and direc¬ tion of the force of a magnetic field. To con¬

tinuously produce an electromotive force, con¬ tinued cutting of lines of force is essential. The magnitude of the electromotive force induced in a loop which is revolving in a magnetic field is directly proportional to the rapidity with which the loop is revolved, to the number of turns of wire in the loop and to the strength of the magnetic field. The direction of the E. M. F. induced in a loop depends upon the position of the loop relative to the poles. When one of the wires of a loop passes one pole, an E. M. F. is induced in the wire which tends to send a current in one direction, this direction changing as the wire cuts the flux at the other pole. Opposite sides of the loop pass poles of opposite polarity simultaneously, a current there¬ fore tends to flow in one direction around the loop. The direction of the E. M. F. in the loop changes as the wires pass from a north to a south pole. When the loop is connected by two

slip rings, as illustrated in Fig. 1. and revolved, an alternating current may be obtained by at¬ taching to the slip rings suitable collecting de¬ vices. The substitution of a two-part commu¬ tator, Fig. 2, for the slip rings will rectify the current and produce a direct current, or a cur¬ rent which flows continuously in one direction.

Modern electric generators are divided into two distinct classes, those which generate a direct current and those which generate an al¬

ternating current. It is customary, with a few exceptions, to term the part of a machine in whose coils the E. M. F. is generated the arma¬ ture, and the parts that produce the flux the field magnets. Dynamo electric machines are further classified as to their mechanical opera¬ tion into machines in which : (a) The armature

revolves and the field magnets are stationary ; (b) the field magnets revolve and the arma¬ ture is stationary; and (c) the field and armature coils are stationary and iron core re¬ volves. It is obvious . from previous mention that a dynamo electric machine may supply either a direct or an alternating current depend¬ ing upon whether it is fitted with a commu¬ tator or with slip rings. Machines termed rotary converters possess both a commutator and slip rings, their function being to convert alternating into direct current or vice-versa. If the ma¬ chine be driven by an external force, either di¬ rect or alternating current may be obtained by making the proper brush connections. The ro¬ tary converter when operated in this manner is termed a double-current generator. As the con¬ struction of the armatures of direct-current machines, rotary converters and a large num¬ ber of alternating current machines is similar with the exception of their commutators or slip rings, the construction of the armature of a direct-current machine will be given in detail.

Direct-current Armatures. — A direct-cur¬ rent rotative armature consists essentially of three parts, an iron core mounted upon a shaft, a number of conductors wound upon the sur¬ face of the core or embedded in slots near the surface, and a commutator. See Electric Di¬ rect Current.

Core. — The object of the core is to facili¬ tate the passage of lines of force from one pole of the field magnet to another. If this core were not present fewer lines of force would pass through the armature, and this would tend to decrease the E. M. F. generated by the machine. For equal magnetizing forces a sample of iron may carry 2,500 times the num¬ ber of lines of force that would be carried if air were substituted for it. An iron core in a coil is 2,500 times as strong a magnet as a coil having no core.

The periphery of the armature core of large machines is usually slotted longitudinally, the purpose of which is to admit the conductors and to decrease the air space, termed the air- gap, between the core and the pole faces, a thing which is very desirable.

The core is composed of iron discs punched from sheets. These discs are punched out whole for small machines, or are made in segments, the junctions of which are staggered in large machines. The discs in machines of large ca¬ pacity are mounted upon a form of proper di¬ mensions, which in turn is fastened to a spider and keyed to the shaft. The punchings are as¬ sembled with their planes perpendicular to the axis of rotation. The reason for using discs in¬ stead of a solid casting is that the iron core is equivalent to a conductor revolving in a field. Currents, termed Foucault currents, flow through the iron in the direction of the axis if the discs are not properly insulated. This cur¬ rent unduly heats the armature and is there¬ fore undesirable. _

Armature Windings. — The wires distrib¬ uted over the periphery of the core of an arma-

ture constitute the generating part of a direct- current machine. Armatures in which the wind¬ ings are only upon the periphery are termed drum armatures. When the core of the arma¬ ture is in the form of a ring and the wires are wound in and out around the ring the armature is called a ring armature. Drum armatures are in use commercially to a greater extent than ring armatures particularly in the case of large ma¬ chines. In the drum armature a greater por¬ tion of the winding is active in producing an electromotive force than in the ring armature. The. ring armature has

considerable wire upon the inner, face of the ring in which very little eletromotive force is induced.

The length of active conductor connected in series on an armature determines the magni¬ tude of the electromotive force generated by a given, magnetic field. In machines of large magnitude two volts or more are generated per foot of active conductor.

Many forms of armature winding are in vogue. The designing engineer is often called upon to design a machine of given capacity which will generate a certain pressure at a defi¬ nite speed. To do this he must place sufficient wire in series to produce the required E. M. F., and this wire must be of sufficient cross-section to carry the current it will be called upon to deliver. To meet these conditions and still have an armature which is not abnormal in size often results in a very complicated series multiple winding. Machines of large capacity usually have more than one pair of poles and have brushes between successive poles around the commutator. These serve to conduct the cur¬ rent to the main circuit.

An economical method of winding drum ar¬ matures consists in the employment of formed coils. These coils are wound upon a collapsible form of proper dimensions and after being thor¬ oughly insulated and shellacked are removed from the form. They are then inserted in the slots of the armature core. The distance be¬ tween the two halves of the loop is nearly equal to the distance between the centres of two poles of opposite polarity. The terminals of the loop are connected to two adjacent commutator seg¬ ments. The next loop is placed in slots and similarly connected, care being taken to connect the two coils in series to a common commutator segment. By this method the current tends to flow in one continuous direction. Manv modi¬ fications are made to this form of winding but the principle of connecting the coils so that their E. M. F.'s will be cumulative is common for all machines. Some machines have two or more separate windings upon the same core.

Commutators. — A commutator consists of an assemblage of small forgings or castings of copper called segments, Fig. 3, which are thor¬ oughly insulated from each other. These seg¬ ments are assembled around a tube. The tube is threaded at both ends to receive nuts to hold the segments together. Mica is usually em¬ ployed to insulate the segments from each other, from the nuts and from the tube. In addition to its high insulating properties, mica possesses the advantage that it wears under the brushes at about the same rate that copper does. This maintains a smooth surface at all times upon the surface of the commutator. The maximum voltage between adjoining segments is seldom allowed to exceed 20 volts. Assuming that the

voltage is uniformly distributed, a 240-volt ma¬ chine with a closed winding would therefore have 12 bars between adjoining brushes, or for a two-pole machine 24 commutator segments. In Fig. 3 the perpendicular projection, ˆP,® of

Fig. 3.

the commutator segment protects the coils on the armature, and is made to receive the ex¬ tremities of the coils of the armature windings. The wires in some cases are fastened to the lugs, ((P,® with set-screws and then soldered. The commutator complete is keyed to the arma¬ ture shaft.

*Brushes. — Carbon and copper are the two materials usually selected for brushes; carbon for high potential machines and copper for low potential machines. When a coil is entering commutation it has a current of electricity flow¬ ing in it. The direction of this current changes when the coil is commutated. The current flow¬ ing in the coil before commutation tends to keep up because of its self-induction. In the time it takes a strip of insulation to pass under the brush, the current flow in the coil must be stopped, and a current of equal value started in the opposite direction. Both operations may be done by counter E. M. F., or the current flow may be stopped by a high resistance and started by fringe flux. The transition resistance of brush to commutator usually causes a fall in the potential of about one volt for every brush. The pressure of the brushes against the com¬ mutator varies, the average value is about 1*4 pounds to the square inch. The necessary area of rubbing surface of carbon brushes is one square inch for 40 amperes, and copper brushes permit of 200 amperes for the same cross- section. See Fig. 5.*

Field Magnets and Field Frame.— The

field magnets produce the magnetic flux in which the armature rotates. The flux is cre¬ ated by a current of electricity traversing many turns of wire which are wound upon iron cores. A north or a south pole is produced, depending upon the direction in which the current flows through the coil. The coils on the field magnets are connected in series and so arranged that the polarity changes consecutively from pole to pole. Modifications are sometimes made to this form of winding when it is desirable to produce a machine which will supply a three- wire circuit. The machine is then designed as a four-pole machine having two adjoining north poles and two south poles similarly placed.

The laws governing the flux of magnetic lines are similar to the laws of current flow. The flux which will flow in a magnetic circuit is equal to the magnetizing force (termed the

magnetomotive force) divided by the reluctance of the circuit.

Magnetomotive Force

Flux = – - –

Reluctance

The reluctance of a magnetic circuit is a property analogous to the resistance of an elec¬ tric circuit. To obtain a maximum flux through an armature with a given magnetomotive force it is necessary to reduce the reluctance of the magnetic circuit to a minimum.

In the design of a generator it is often con¬ venient to first design the armature and then obtain the magn:tude of the flux which must be generated by the field magnets. Having se¬ lected a given material for a field frame, a given air gap, a given length and cross-section of magnetic circuit, the total reluctance of the cir¬ cuit is determined. The reluctance varies di¬ rectly as the length of the circuit, directly as the reluctivity of the material and inversely as the cross-section. Knowing the total flux and the reluctance of the circuit, the magnetomotive force is determined, and this quantity divided by 1.257 gives the number of ampere turns necessary to produce the magnetic field.

Field Coil Connections. — Generators may be shunt wound, series wound or compound

Pig. 4. — Connections of series, shunt, and compound generators.

wounds. (See Fig. 4.) In the series generator the armature circuit, the field circuit and the ex¬ ternal circuit are all in series. Series motors are used for traction purposes as they give a large starting torque. Series dynamos are used for arc lighting, as they generate a constant current. Shunt wound machines have their field circuit, their armature circuit and their external circuit connected in multiple. A shunt machine is designed to generate a constant potential, or when operated as a motor to run on constant potential. The field coils of a generator may be separately exc'ted, in which case an ex¬ ternal source furnishes the current for exciting the coils. Separately excited machines are usually employed in large power-houses where it is desirable to have a flexible system, which means the ability to vary the pressure sent out on the line at any instant of time. In the United States where 40,000 horse-power gen¬ erators are now in successful

operation, each machine is taken as a unit and the control of

the exciting current for the fields is a very important factor. The machines are separately excited ; the exciting dynamo being supple¬ mented by a bank of storage batteries as an emergency. A compound winding cons sts of an additional winding upon the field, this wind¬ ing being connected in series with the line. It may be placed in series with the armature and the field connected in multiple, or it may be con¬ nected in series with the armature alone, its connection depending upon the percentage of compounding required. By compounding a machine the strength of the magnetic field is increased in proportion to the current generated by the machine, the percentage depending upon the number of turns in the compound coil and as to the way in which it is introduced in the circuit. If a shunt machine be not compounded, the potential falls with an increase above nor¬ mal of the generator output.

Methods of Excitation. — A dynamo electric machine may be separately excited or self- excited. When self-excited the machine builds up slowly to its normal potential and when dis¬ connected from the main circuit the field mag¬ nets gradually discharge themselves as the speed of the machine decreases. The polarity of a self-excited machine may become reversed or the machine may fail to generate sufficient pres¬ sure to magnetize the field magnets. Both of these conditions are serious. When the field coils of the separately excited machine are con¬ nected to an external circuit they definitely as¬ sume their proper polarity and there is no pos¬ sibility of this polarity becoming reversed. In addition to this the field magnets of the sep¬ arately excited machine rapidly build up to the point where the machine generates its normal potential. The disadvantage of this mach'ne is that when disconnected from its external excit¬ ing source its fields must be slowly discharged as there is danger of the fields discharging through the insulation of the machine, if it is opened suddenly.

Speed Conditions. — Consider a motor oper¬ ating under normal conditions from an external supply of E. M. F. The armature of this motor is rotating in a magnetic field and therefore has an E. M. F. induced in its armature wind¬ ings. The direction of this E. M. F. is such as to tend to send a current of electricity in the opposite direction to that passing through the armature under the influence of the external supply. This E. M. F. is termed the counter electromotive force. The pressure of the ex¬ ternal source remains approximately constant and the counter E. M. F. varies with the arma¬ ture speed. As the motor is loaded its speed tends to decrease. This decrease dimin'shes the counter E. M. F., and a larger current is permitted to pass through the machine. The difference between the impressed and the counter E. M. F.'s divided by the resistance of the armature gives the magnitude of the armature current. It is obvious that a

very large current would flow through a station¬ ary armature of low resistance, if the arma¬ ture were connected directly to an ord:nary commercial lighting or power circuit. To pre¬ vent this large current flow, devices called start¬ ing boxes are employed for starting motors. The function of a starting box is to first com¬ plete the exciting circuit of the field magnets

and then gradually to cause a rise of the im¬ pressed potential upon the armature terminals, from zero to that of the supply circuit. The latter is accomplished by gradually diminishing resistance which is in series with the armature until the speed of the machine is almost normal, when all the resistance is entirely removed.

Nikola Tesla was the first to see the pos¬ sibilities of generating alternating currents. This invention is called Tesla's rotating mag¬ netic field, and it made possible the present long-distance transmission of power by elec¬ tricity. This condition has led to expansion of territory by the users of alternating-current dynamos, until practically all companies en¬ gaged in the distribution of electricity have settled down to the same practice, generating current with alternators of the polyphase type at large central stations and transmitting it at high pressure to substations, where it can be sent out under lower pressure, as either direct or alternating current, or used to charge storage batteries.

PARALLEL MOVEMENT. BRUSH HOLDER.*

Fig. 5. — Standard Brush Mounting.

Induction Motors.— In the year 1888, Mr. Tesla introduced his dynamo electric machine, which is now termed an induction motor. This motor had two great advantages over the direct- current motor, in that it possessed no com¬ mutator or brushes to be cared for, and it could be operated by alternating currents. It possessed the disadvantage that there was no ready means of regulating its speed. There is considerable difference between the construction of an induction motor and that of a direct-cur¬ rent motor. Induction motors have a revolving element whose laminations are somewhat simi¬ lar to those of the armature of a direct current motor, as they fulfil the same function. The movable part of an induction motor is called the rotor and the stationary element surrounding the rotor is called the stator. In a common form of rotor, called the squirrel cage, the in¬ ductors are insulated and embedded diagonally in slots around the

periphery, and at each end of the rotor these inductors are connected to¬ gether to a common ring. The coils of the stator which create the magnetic field are so wound that several out-of-phase alternating currents have their magnetic actions superrn- posed upon each other and thus produce a field which continually shifts. This field is termed

a rotating field. The stator field induces cur¬ rents in the rotor which react upon the field and cause the rotor to revolve. The motion of the rotor is not synchronous with respect to the field of the stator, but slower. The ratio of the deficit of the rotor speed to the speed of the stator field is termed the slip of the induc¬ tion motor.

Time Limit Relays. — Generators are liable

to be subjected to an excessive overload for a short period of time. This sudden variation in load often occurs in the operation of railroad trains, mining machinery, mills and machines of a similar nature. It would be very inconvenient to have breakers open the circuit whenever these sudden variations in load occur, especially as the generators are usually designed to stand an overload of 25 per cent for half an hour and an overload of 50 per cent for one minute. The time limit relay performs the same func¬ tion that a circuit breaker does, namely, opens the circuit whenever an excessive overload occurs. There is this difference, however, be¬ tween the two devices : the operation of a cir¬ cuit breaker is practically instantaneous, whereas a time limit relay has a time element associated with it. This time element is adjustable and may be arranged so that the circuit will be opened after a definite interval of time follow¬ ing the overload. In one form the magnetic action of the relay is opposed by a bellows or a dash-pot, which contains air. When the relay begins to operate, a solenoid draws a plunger down, which in turn compresses air in a re¬ ceiver. The force exerted by the compressed air is lessened by leakage. When the limit is reached, say five seconds, the circuit breaker is automatically opened.

Reverse Current Relay. — If a generator

become disabled and is unable to develop a pressure equivalent to that generated by ma¬ chines linked in with it, there is a possibility of a large cross-current flow into the disabled generator from the other machines. To prevent power returning into such a machine a device termed a reverse current relay is employed which automatically cuts out the machine from the service.

Lightning Arresters. — Transmission and distributing systems are subject to abnormal voltage strains due to lightning and potential surges. These disturbances tend to weaken or destroy the insulation of the circuit. While

there is nothing that will protect electrical ap¬ paratus from a direct stroke of lightning, still means have been provided to protect the in¬ sulation from the induced potential resulting from lightning discharges occurring in its vi¬ cinity and also from surges which sometimes occur during the operation of the system. It is customary to protect transmission lines by installing one or more overhead ground wires which are frequently grounded at intervals along their course. The object of these ground wires is to shield the transmission wires from the influence of lightning and also to provide a freer path for the lightning discharge to the earth. These ground wires are not, however, perfect protection and some of these potential disturbances travel along the transmission line to the generating or substations. Hence, pro¬ tective apparatus is needed at the point where each line enters the station. As lightning fre-

quently oscillates with a very high frequency, a reactance coil, commonly called a choke coil, is installed at this point to impede the discharge of lightning and make it tend to seek another path. This auxiliary path is provided by the lightning arrester which is connected -to each line at the point where the transmission cir¬ cuit is connected to the choke coil. The light¬ ning arrester consists of a path of low im¬ pedance which has a means provided for pre¬ venting the normal line current flowing to ground following lightning discharge. The most efficient form of lightning arrester is known as the aluminum cell arrester which con¬ sists of a number of cells formed of aluminum plates upon which are special films which have a remarkable property of allowing only a small leakage current to flow through the cells in normal potential which will allow higher or abnormal voltages to be discharged to ground. This form of lightning arrester is used for both alternating and direct current circuits. An¬ other form of arrester is the graded shunt multigap. This arrester consists of multiple paths containing graded amounts of resistance in parallel with spark gaps. The application of these multigap arresters is confined to lower voltage alternating current circuits. For the protection of direct current circuits, there is, in addition to the aluminum cell, several forms of gap arrester. These consist of gaps in series with a low resistance and a means pro¬ vided for extinguishing the power current which follows the lightning discharge across the gap. The best-known form is the magnetic blow-out type which has a magnetic coil con¬ nected in shunt with a part of the resistance. When the lightning discharges to ground through the gap and resistance, the line current sustains the arc at the gap. This current flow¬ ing through the coil produces a strong mag¬ netic field in the gap which repels the arc through a suitably formed arc chute by means of which it is

quickly extinguished and the cir¬ cuit restored to normal conditions of operation.

Central Station Economics. — It is desirable to reduce the initial cost of the production of electric power to a minimum wherever fuel is expensive and natural sources of energy, such as water power, are absent. Such conditions are met with in many of our large c:ties. This reduction is accompkshed by installing engines and generators of the highest efficiency and by employing all methods which will tend to in¬ crease the efficiency of the plant. One of these methods is to d:rectly connect the armature of the generator to the shaft of the engine. This eliminates the fricffon losses which would occur if belting were employed, but necessitates good speed regulation, as the pressure of a gener¬ ator is directly proportional to the speed with wh'ch it rotates. It is essential for good service that the speed be regulated to within 1 per cent, otherwise lights will flicker and their use will be objectionable. Sometimes in large electric¬ lighting systems the voltage of a given part of the system may vary as much as 5 per cent, but this varation is not continuous and is due more to the local loading of the mains and not to the generator at the central station.

Throughout the western part of the United States much use is made of water power for generating purposes. Power-houses are situated in the bottom of ravines and are operating

under heads of water as great as 2,000 feet. The famous Colgate plant on the Yuba River has transmitted power 253 miles, one of the longest power transmissions in the world. Al¬ though the cost of water is small compared with the cost of coal, still the cost of electric power

Fig. 6. — • Direct Current Motor.

generated from water is not much cheaper than when generated from coal. This is due to the fact that the initial investment in a water-power plant is much greater than in a steam plant of the same magnitude. Much capital must be spent in the construction of expensive dams, waterways and pipe lines.

Transformers. — One of the greatest ad¬ vantages of electrical energy over other forms of energy is its flexibility. It may be generated in one place, and its pressure may be trans-

Fig. 7. — 'Common type of air-cooled transformer.

formed from a low voltage to a high voltage. The electrical energy in this form may be trans¬ mitted to a distant place where the reverse transforming process occurs. The higher the voltage under which power is

transmitted the smaller need be the cross-section of the trans¬ mission line. A stationary static transformer operating upon the principle of induction is all

that is essential to transform alternating cur¬ rents, but with direct current transformation, it is necessary to employ rotating apparatus.

Fig. 8. — Transformer with external radiator.

In principle the transformer is a sort of modernized induction coil. Its essential parts are a core of laminated sheet-iron, wound with two coils of copper wire, one coil consisting of a great many turns of fine wire, and the other of a few turns of coarse wire. If the fine wire coil is connected to the line, a current at a much lower pressure can be drawn from the other coil, or secondary, as it is called. If the connec¬ tions are reversed, and the fine wire coil be used for the secondary, a current at a greatly in¬ creased pressure is generated. Thus the trans¬ former can be used either to (

Transformers have been built for operation on circuits having voltages as high as 150,000 volts. For experimental purposes apparatus for much higher voltages has been developed. At the Pittsfield works of the General Electric Company, located in the Berkshire Hills of Massachusetts, the majority of transformers used in the United States are constructed. This plant was at one time the Stanley Electric Man¬ ufacturing Company operated by William Stan¬ ley, one of the pioneers in the development of transformers and long distance electric power transmitting.

At the Pittsfield works 6,000 hands are em¬ ployed. Here elaborate testing equipment is provided for testing transformers and for re¬ search work. In figs. 7, 8 and 9 are shown three types of transformer in general use in the United States.

Without the transformer, long distance. elec- tric power transmission would be practically impossible. Therefore, with the development of the alternating current system of distribu¬

tion, the use of the transformer has become very extensive. As the voltage and size of trans¬ formers have been increased, extensive develop¬ ment has been necessary to overcome the prob¬ lems involved.

In the early development of the transformer air was used generally for cooling the windings. With the advent of oil as an insulating and cool¬ ing

medium, the possibilities of the transformer were extended. With the increase in demand for large transformers several forms of tanks for radiating the heat produced in the trans¬ former were developed. For transformers cooled by the air, circulating around the tank, corrugated tanks or tanks with external radia¬ tors were used to increase the amount of sur¬ face exposed. For larger sizes of transformers cooling coils were submerged in the oil and water passed through the coil, thus dissipating the heat. In this way larger output was ob¬ tained with a smaller floor space. Transform¬ ers have been built in sizes up to 25,000 kv-a. — such transformers being cooled by means of water passing through cooling coils as indicated above.

It is not considered good engineering prac¬ tice in the United States to use direct current for transmission purposes. Alternating current is used for this purpose and direct current is employed for distribution. Several machines have been designed which will transform direct current from one voltage to another voltage. They are termed motor-generators, dynamotors and boosters. A motor-generator consists of a motor and a generator coupled together upon

Fig. 9. — Water-cooled transformer.

one shaft. The speed of the motor may be va¬ ried, which will correspondingly alter the vol¬ tage, generated by the dynamo. A dynamotor consists of two armature windings upon the

same core, rotating in one field. The armature has two commutators, one at each end of the shaft. This type of machine has practically no armature reaction and therefore has a small tendency toward sparking. The main disad¬ vantage of this machine is that it is impossible to vary the field strength for purposes of regu¬ lation without correspondingly altering the vol¬ tage of the dynamo. A booster is a machine used extensively to raise the potential of rail¬ way feeders. Its armature is usually placed in series with the feeder and driven by some ex¬ ternal source of energy. When its field coils are in series with the line, it is termed a series booster, and when the field coils are connected in multiple it is called a shunt booster. The capacity in watts of a booster is determined by the product of the feeder current into the max¬ imum change of voltage which it causes.

Fuses. — The simplest protecting device con¬ sists of a fuse. . Fuses are made in many forms. The link fuse is made in strips, or as wire of an alloy

possessing a low melting point. When the current strength exceeds a certain limit, the heat developed in the fuse by the pressure over¬ coming the resistance of the fuse is sufficient to melt it and interrupt the service.

Circuit Breakers. — Where heavy currents have to be interrupted an electro-magnetic de¬ vice termed a circuit breaker is employed. This device consists of an electro-magnet of low re¬ sistance placed in series with the circuit. When the current in the circuit exceeds the normal amount, the magnet attracts an armature which releases a catch, and allows a spring to open the switch governing the circuit.

Sydney W. Ashe,

Educational and Welfare Department, General

Electric Co., Pittsfield Works.

GENESEE (jen-e-se) RIVER, a remark¬ able stream rising in Pennsylvania, and flowing nearly 200 miles north through western New York into Lake Ontario, seven miles north of Rochester. The Genesee is famous for its ex¬ traordinary falls. Three of these occur within a distance of one and one-half miles; two are respectively 68 and 90 feet high, and the Por¬ tage Falls are 110 feet high. The river has also a sheer fall of 95 feet at Rochester, utilized for water power; and another cascade, a few miles below, is almost as high.

GENESEO, Ill., city in Henry County, 20 miles southeast of Moline, on the Chicago, Rock Island and Pacific Railroad. It contains a Col¬ legiate Institute, public library and city hospital, also canning factories. It has extensive agri¬ cultural and stock raising interests and has a large trade in farm produce and live stock. It owns the water supply system. The govern¬ ment is vested in a mayor and council. Pop.

(1920) 3,375.

GENESEO, N. Y., village and county-seat of Livingston County, 30 miles from Rochester, on the Genesee River and the Erie Railroad. The State Normal School and Wadsworth Pub¬ lic Library are situated here. It is an agricul¬ tural town, has a large vegetable canning fac¬ tory, and manufactures jam, flour, gloves and mittens. The waterworks are the property of the village. Pop. (1920) 2,253.

GENESIS, Book of. Name. — The book of Genesis is the first of the so-called wFive

Books of Moses® or the ˆPentateuch® (q.v.), which constitutes the first division of the He¬ brew Bible. Its Hebrew name is Bereshlth, <(In Beginning,® after the opening word of the book

-ˆ•eˆ)re.w The designation Genesis, meaning Generation® or ((Origin,® is derived from the translation of Genesis ii, 4a in the early Greek translation known as the Septuagint (q.v.), and is meant to be descriptive of the contents of the books.*

Contents. — The book of Genesis falls nat¬ urally into two parts : I. The beginning of all things (i, 1-xi, 9). II. The stories of the Patriarchs (xi, 10-1, 26). All ancient peoples sought answers to the questions, Whence came the World? Whence came man? How did sin come into the world? How did differ¬ ent languages and races arise? etc. Genesis i, 1-xi, 9, contains the answers of Hebrew religious thinkers to these questions. The chap¬ ters tell of the creation of heaven and earth, man's original habitation, the entrance of sin into the world, the beginnings of civilization, and the growth of population. The spread of sin and wickedness, following the develop¬ ment of civilization, was punished by a flood which destroyed the human race, with the ex¬ ception of one family; the descendants of this family repeopled the earth and gave rise to various nations and races.

From the beginning of things in general the book passes to the beginnings of the Hebrew people, in which the author is primarily inter¬ ested. The Hebrews possess numerous char¬ acteristics common to the group of nations called the Semitic race. The racial relations of the Hebrews are briefly touched upon in xi, 10-26, which traces the genealogy of Shem down to Abraham, whose migration from southern Babylonia (Ur of the Chaldees, commonly identified with the modern Mukayyar, near the Euphrates, about 125 miles northwest of the Persian Gulf) to Canaan marks the first begin¬ nings of the Hebrew people. The rest of the book consists of narratives centring around the three patriarchs, Abraham, Isaac, Jacob, and around Joseph, the favorite son of Jacob. (The book gives <(Abram® as the original name of the first patriarch; the change to ((Abraham® was due, according to the popular etymology in xvii, 5, to the promise that the bearer of the name Was to become the father of a multitude of nations) .

The lives of the men named are narrated with considerable fullness, down to the descent of the family of Jacob into Egypt, with an ac¬ count of which the book closes.. The connect¬ ing bond throughout is the promise to Abraham (xii, 1-3) and the covenant. based upon it, the unfolding of which is exhibited in the lives of the patriarchs and in the rise of the twelve tribes. The successive steps in the development are connected, and the interest is concentrated, by the use of the formula, ((These are gener¬

ations of®: Shem, xi, 10; Terah (Abraham), xi, 27; Ishmael, xxv, 12; Isaac, xxv, 19; Esau, xxxvi, 1, 9; Jacob, xxxvii, 2.

Composition. — In its present form Genesis is a compilation of material taken from three originally separate sources, commonly desig¬ nated by the letters J, E and P. (For proofs of this assertion and for the significance of these symbols see article Pentateuch). Mate¬ rial from J and P is found throughout the

entire book. E does not appear to any extent until chapter xx, though some extracts are found in chapter xv. J comes from the 9th century, E from the 8th and P from the 6th or 5th. Though not without distinguishing characteris¬ tics, in substance of tradition as also in manner of treatment J and E closely resemble each other — due in large part to the fact that both come from the creative age of prophetic nar¬ ration; hence it is not always easy to disen¬ tangle them ; on the other hand, P is easily dis¬ tinguished from the JE elements.

J is a first class narrator; in vigor, simplic¬ ity and artistic skill he is without equal in the Old Testament; the style of E is perhaps a little more terse than that of J, and at times may lack the spontaneous charm and strength of the other; but on the whole it is not easy to tell where the E narratives are inferior to J. The style of P is cold, precise, stereotyped and prosaic. (For a more complete characteriza¬ tion of the several documents and a discussion of the manner of compilation see article Pen¬ tateuch ; for an analysis of the book of Gene¬ sis according to the several sources consult any modern commentary or Old Testament Intro¬ duction. The contents of each source are re¬ produced consecutively in Kent, C. F., (The Student's Old Testament ; Carpenter and Bat- tersby, (The Hexateuch) ; Brightman, E. S., (The Sources of the HexateucfC).

Genesis and Archaeology. — This subject is of importance because of its bearing on the historical value of Genesis. For an adequate consideration of the subject it may be of value to separate the stories in Genesis i, 1-xi, 9 from the patriarchal narratives in xi, 10-1, 26. Archaeology has discovered in the litera¬ ture of Babylonia myths and legends which strikingly resemble some of the stories in Gene¬ sis i-xi. The parallels are closest in the accounts of creation and of the flood, but the resemblances are by no means confined to these. There are certain features in the Genesis story of paradise and of the fall which strongly point to Babylonia; the antediluvian patriarchs have their counterparts in Babylonia, and the story of the Tower

of Babel certainly presupposes a knowledge of Babylonia and may rest upon some Babylonian legend.

The resemblances are easily accounted for. The Hebrews were Semites ; so were the Baby¬ lonians. Peoples belonging to the same race, springing from a common stock, might be ex¬ pected to possess similar traditions and beliefs. Moreover, as the result of more or less con¬ stant intercourse between Assyria-Babylonia and Palestine elements of Babylonian civiliza¬ tion would inevitably find their way to the lands and nations along the eastern shore of the Mediterranean Sea.

However, the numerous points of contact must not blind the eye to the presence of even more significant points o'f contrast. The latter appear principally in the spirit and. atmosphere pervading the Hebrew stories, which separate these widely not only from the Babylonian sto¬ ries but also from all similar stories in other extrabiblical literature. While there, is in many cases agreement in form, there is in the He¬ brew records ((an intensity of spiritual concep¬ tion, a sublimity of spiritual tone, an insight into the unseen, a reliance upon an invisible yet

all-controlling power, that create the gap be¬ tween the Hebrew and his brother Semite be¬ yond the River.®

Archaeology has thrown little light on the patriarchal narratives; for not a single inci¬ dent in the patriarchal story is referred to in any of the inscriptions read thus far. On the other hand, as the result of archaeological inves¬ tigation, the age of the patriarchs has been won¬ derfully illuminated. In the words of one scholar, <(Formerly the world in which the patriarchs moved seemed almost empty ; now we see it filled with embassies, armies, busy cities and long lines of traders passing to and fro between one centre of civilization and an¬ other.® (

Permanent Significance of the Genesis Narratives. — Here again it is necessary to separate the narratives dealing with the be¬ ginnings of things, i, 1-xi, 9, from the patri¬ archal narratives, xi, 10-1, 26. Formerly the opening chapters of Genesis were thought to give an absolutely accurate account of cre¬ ation and of the earliest history of mankind. But as the result of investigations along various lines this view has become untenable. ((We are forced,® says a well-known com¬ mentator, <(to the conclusion that though the writers . . . report faithfully what was cur¬ rently believed among the Hebrews respecting the early history of mankind, yet there was much they did not know, and could not take cognizance of. These chapters consequently contain no account of the real beginnings, either of the earth itself, or of man and human civilization upon it.® Which means that if any one is in search of accurate information regarding the age of the earth, or

its relation to sun, moon or stars, or the exact order in which plants and animals first appeared, or the rise of civilization, or the origin of languages and races, and similar questions, he should go to books embodying the results of scientific and historical investigation and not to the book of Genesis. So far as the scientific or his¬ torical knowledge furnished in the latter is concerned it is of little more value than that contained in similar stories among other nations.

Nevertheless there is a difference in value between these Genesis narratives and extra- biblical stories describing the same unknown ages. The latter are of interest simply as relics of a distant past. Not so the biblical narra¬ tives: They are and ever will be of inestimable value, not because of their scientific teaching, but because they embody sublime religious truth in the crude forms of primitive science. Consequently, if any one, instead of searching for accurate scientific information, wishes to know what connection the world has with God ; if he seeks to trace back all that now is to the fountain head of life; if he desires to discover some unifying, principle, some illuminating pur¬ pose in the history of the earth, he may still turn to these chapters as a trustworthy guide.

In any consideration of the historical value of the patriarchal narratives it must be kept in mind that, whatever the origin of the book of Genesis, or of the Pentateuch, may have been, these stories were handed down for sev¬ eral centuries by word of mouth ; which means that they were exposed to all the dangers which ordinarily threaten narratives thus transmitted. And though it may be granted that among peoples without written records the memory is unusually tenacious, and that popular stories once enshrined in the memory of a clan or tribe may be transmitted practically unaltered for many generations, nevertheless, the possibility of their becoming materially altered must be reckoned with. These modifications may be accidental, due to failure of memory, or in¬ tentional, for the purpose of bringing a story into harmony with the ideas, conditions and practices of a later age. As a result it becomes impossible to regard the patriarchal stories as historical authorities in the proper sense of that term.

At the same time, there is insufficient ground for doubting the substantial accuracy of the narratives, properly interpreted. The modern critical view has furnished a strong argument in support of their general trustworthiness. Leaving aside the late P, the older documents J and E offer two independent descriptions of the patriarchal age, one written in Judah, the other in Israel, which, though differing in de¬ tails, are in fundamental

agreement in their representation of early events. In other words, the traditions of north and south appear to go back to what R. Kittel has called (

Moreover, the religious value of the narra¬ tives remains undiminished. ((Abraham is still the hero of righteousness and faith; Lot and Laban, Sarah and Rebekah, Isaac, Jacob and Joseph, in their characters and experiences are still in different ways types of our own selves, and still in one way or another exemplify the ways in which God deals with the individual soul, and the manner in which the individual soul ought, or ought not, to respond to His leadings.® Historically, as well as religiously, therefore, the patriarchal narratives are of per¬ manent value and significance.

Bibliography. — In addition to those already mentioned the following works in English may be named: Bacon, B. W., (Genesis of Gene- sis5 (Hartford 1892) ; Bennett, W. H., (New York 1889) ; Dillmann, A.,

of the Pentateuch (New York 1916) ; Gordon, A. R., Early Traditions of Genesis) (Edin¬ burgh 1907) ; Gray, G. B., (Introduction (New York 1913) ; McFadyen, J. E.,*

Frederick Carl Eiselen, Professor of Old Testament Interpretation,

Garrett Biblical Institute.

GENET, or GENEST, zhe'na', Edmond Charles Edouard, French diplomat: b. Ver¬ sailles, France, 8 Jan. 1765; d. Schodack, N. Y., 14 July 1834. As his father was the chief of the Bureau of Correspondence of the Depart¬ ment of Foreign Affairs, young Genet was early thrown into contact with many foreigners and developed a fondness and talent for foreign languages. In 1777 he translated into French a Swedish history of King Eric XIV of Sweden. In 1789-92, was French charge d'affaires at Saint Petersburg and from 1793-94, when he was recalled at Washington's request because of attempts to compel the United States to a war with England, was French Minister to the United States. During these years he had had a very wide experience in diplomatic life. He had been attached to the French embassies at Berlin and Vienna, had succeeded to his father's office in the Department of Foreign Affairs; and had been secretary to the French Embassy at Saint Petersburg. On the out¬ break of the Revolution he had become an ac¬ tive member of the Girondists; had been sent as Ambassador to Holland and from there as Minister to the United States with instructions to attempt to induce the latter country to de¬ clare war against Great Britain. He was also commissioned to fit out privateers in American ports. Encouraged by the warm reception he received on his

*arrival in the United States he set about his work which included expeditions against Florida, Louisiana and New Orleans, then Spanish possessions. Jefferson warned him that America was neutral in the war and that he must cease his unneutral acts. But he went on with his work, of equipping privateers, which were aided by two French privates. These captured some 50 British vessels and brought them to American ports. The United States government forced his recall. In the meantime the Girondists had got into trouble in France, so Genet remained in the United States, where he became an American citizen and married the daughter of Gen. George Clinton. Consult Genet, 'Genet and the Federal Government * (New York 1793) ; Turner, (Genet's Projected Attack on Louisiana and the Floridas> (in American Historical Review, Vol. Ill, New York 1898) ; 'Policy of France Toward the Mississippi Valley 11 (in American Historical Re¬ view, Vol. X, New York 1905).*

GENET, je -net', a civet (q.v.) of the genus Genetta; also, a trade-name for the fur of this animal, or of some other fur like it. The best known is the common genet (G . vulgaris), of the Mediterranean region, called "berbe® in the south of France. It is a very beautiful and graceful animal, gray, with many dark patches,

and a full furry tail, banded with black and white. The size is about that of a house-cat. Their fur is made up into tippets, muffs, etc., but is of no great value, and often domestic cat-skins are substituted under the same name.

GENETHLIALOGY, astrology as con¬ fined to the prediction of births or foretelling future events from the stars in the ascendant at the time of one's birth.

GENETIC PSYCHOLOGY. The study of the evolution and development of mind is termed genetic psychology. It is the historical aspect, or division, of the general science of mental life, and it is therefore definable, as con¬ trasted with other branches of the science, only in terms of its purpose or aim, which is genetic description. As compared with the genetic psychologist, the student of human psychology is a narrow specialist, for he is intent upon one particular form of mind among the myriads which exist or have existed in the course of the evolution of life.

D .visions. — With respect to its major ma¬ terials, genetic psychology is divisible into two parts— the study of the development or growth of mind in the individual (technically called the ontogenesis of mind), and the study

of the evolution of mind on the earth (technically, the phylogenesis of mind). The nearest popular equivalent for the term psycho-ontogenesis is child psychology ; and for psychophylogenesis, animal psychology.

The study of the development of mind in the individual is less difficult and, in many other respects, more satisfactory than that of the evolution of mind, for whereas many of the steps or stages in the latter process have com¬ pletely disappeared by reason of the extinction of the types of organism to which they be¬ longed, the various stages in individual de¬ velopment are continuously presented for observation. The mental life of the dinosaur cannot, now, be scientifically described because the organism no longer exists, and further, be¬ cause records of its structure, habits and habitat are extremely meagre. But by contrast, the growth of mind in the mouse, rat, cat, dog, monkey, man, may be described in detail, since each day and hour new individuals of these types are coming into being. The story of mental evolution can be told only very incom¬ pletely from direct observation, whereas that of mental growth or development can be told wholly and in detail.

These two divisions of genetic psychology are intimately related and necessarily supple¬ ment one another, since the process of phy¬ logenesis is repeated more or less completely in the growth of every individual. According to the theory of recapitulation, mental develop¬ ment in man presents, cinematographically, the major steps or stages in mental evolution. The mental constitution of the gamete, with which, structurally, the existence of the human individual begins, is perhaps comparable with that of certain one-celled plants or animals; that of the foetus may more or less closely resemble that of various invertebrates ; that of the new-born infant may be compared with certain types of lower vertebrate. And so, as the individual develops, racial type after type of mental organization appears, plays its genetic role and disappears. Just as in the

development of the body, structures, such for example as the gill slits, appropriate to earlier types of organization, appear, function par¬ tially or completely for a time, and partially or wholly disappear. Apparently, nothing which has existed in the organic realm is totally lost. Even the extinct dinosaur may have bequeathed to us humans certain briefly visible and func¬ tional structures. Who knows but that for some brief period in our existence we are in form, behavior and experience amoeba-like, fish-like, monkey-like. G. Stanley Hall, the foremost of genetic psychologists, has pictur¬ esquely expressed this idea. ((In this process the individual in a general way repeats the history of its species, passing slowly from the protozoan to the metazoan stage, so that we have all traversed in our own bodies ameboid, helminthoid, piscian, amphibian, anthropoid, ethnoid, and we know not how many intercalary stages of ascent.® (Adolescence, }

Vol. 1, p. 2).

Studies in individual mental development constantly suggest problems in mental evolution and the reverse. Thus, the investigation of reacting tendencies or methods of adaptation to environment in an organ'sm at different stages suggests the question, <(Do these various ten¬ dencies to action and adaptive responses rep¬ resent different levels of mental evolution? Are they the characteristic and appropriate modes of response of various existing or ex¬ tinct types of organism?® Otherwise stated, <(Do we human beings at first react ineffectively as does the fish, turtle or guinea pig; later, more highly adaptively as does the dog; still later, more . intelligently as does the monkey or anthropoid ape?® Such crude questions as these are being asked to-day not idly or vainly, for it is obviously possible to obtain definite, if not complete, answers. There is developing an interest in the problems of genetic psy¬ chology which promises soon to tear aside the vale of ignorance and reveal the related proc¬ esses of mental development and evolution.

Materials. — No fact of mind is valueless for genetic psychology. There are, however, four major groups of psychological materials which are contributing heavily to the advance¬ ment of genetic description. They are (1) the facts of individual development as gained from studies of foetal or embryonic life, infancy, childhood, adolescence, maturity and senility. (2) Of mental characteristics of organic types or races, including the study of man, other animals and plants. For there is as much reason to speak of the psychology of the rac¬ coon, fox, dog, horse, monkey, ape, as of that of man. Indeed, the investigation of more nar¬ rowly 1 mited groups of organisms follows hard upon the description of a particular type of living thing. Thus, in ethnic psychology, the attempt is made to describe various kinds of human mind. Similarly, we might have, and doubtless shall have, in the course of the de¬ velopment of science, canine, bovine, feline, piscian and simian ethnic psychology, just as we now have the human. (3) Facts of social relations, which constitute the psychology of social groups. These must necessarily be used because it is the rule that individuals exist in social relations and are mentally different be¬ cause of the social features of their environ¬ ment. The evolution of social relations, social

groups, institutions, is one phase or aspect of the great task of genetic psychology. (4) The tacts of mental deficiency, deviation and dis¬ ease. . these should be made to contribute to genetic psychology, because in psychopathology, stages, phases and peculiar complexes of mind appear

dissociated, exaggerated, as it were held up for inspection. In the insane man or lower animal, certain phenomena of response which under normal conditions are dfficult to observe may appear clearly. The genetic psychologist would be stupid indeed were he not willing and eager to make use of these apparently bizarre but actually extremely illuminating conditions of mental life in the interests of genetic de¬ scription.

History. — Genetic psychology, a historical science, lacks historical background, for as a special aspect of psychology, it has only re¬ cently been recognized. Formerly, it was hid¬ den in comparative, animal and child psychology.

Clearly enough, the ground for its develop¬ ment was prepared by the evolutional biologists in the last century, notably by Darwin, Wal¬ lace, Huxley, Lamarck and Weismann. These and many other observers prepared the way for our modern inquiries into the history of mind. Darwin himself contributed important material to genetic description through his studies of various animals; and somewhat later Romanes set himself the special task of outlining the course of mental evolution.

From these modest beginnings in England, interest in what only very recently has come to be known as genetic psychology spread over the world. The recent developments of this divis'on of psychology can best be described in connection with methods and biological relations.

Methods. — Svstematic comparison of facts is the natural and necessary procedure of the genetic psychologist, since he needs above all knowledge of the developmental or genet'c re¬ lations of his materials. It is not strange, then, that comparative psychology should be used as almost synonymous with genetic psychology. That thrs usage is not scientifically satisfactory becomes evident when we realize that in strict¬ ness comparative psychology should designate a special method of inquiry, whereas genetic psychology should designate a special purpose, task or scientific goal, namely, the description of mental development and evolution.

The closest of relations exists between ex¬ perimental biology and genetic psychology, for many of the chief problems of the latter are those of heredity. It is not surpris'ng, there¬ fore, that the development of a special science of genetics (for the study of the phenomena of heredity, see Genetics) should have occurred in biology simultaneously with the development of genetic description in psychology. Ideally, genetics as a biological science should include the study of m:nd. But since most biologists do not so understand the term, it is doubtless desirable to continue to designate the study of mental development in evolution as genetic psychology or psychogenetics.

Further, the genet' c division of psychology is dependent upon other and varied biological sciences, in wh'ch ordinarily a student of hu¬ man psychology has slight professional interest. Among these are palaeontology, anthropology,

experimental zoology, comparative physiology, comparative neurology and neuropathology. For from these special sciences, facts pertinent to those of mental evolution may be derived by the skilled observer. Indeed, everything having to do with life sooner or later becomes of service to the genetic psychologist. An emi¬ nent student of human psychology once re¬ marked, °I am interested in everything human.)} He referred to the products of human activity as well as to the facts of mind. The genetic psychologist must be able to say, «I am inter¬ ested in everything living.)J

Problems. — There are two slightly separable classes of problems in genetic psychology, ques¬ tions of origin and questions of development or genetic relationship. The former are diffi¬ cultly soluble; the latter are much more amen¬ able to study.

Of the problems of genetic relations, upon which attention is focused, the following are some of the most important :

(1) Problems of receptivity or the develop¬ ment of sensibility in its various modes, quali¬ ties and relations. These all have to do with the so-called special senses or their forerunners.

(2) Problems of affectivity. The appear¬ ance in the individual or in the race of forms of feeling, emotion, sentiment; their character¬ istics, their relationships and their modes of expression are investigated. It has been sug¬ gested that. feeling, or affectivity, as a mental factor in life, may antedate sensation. This, however, is a problem of origins which re¬ mains unsolved. The growth of # the affective life in man from birth to maturity is one of the most fascinating chapters of psychology.

(3) Problems of hereditary response or in¬ stinct. These properly belong to the general science of genetics and only by reason of neces¬ sity does the genetic psychologist attempt their solution. They include all questions concerning instinct as consciousness and as adapted re¬ sponse. In this field a most important question is, ((How do instincts orig'nate?® The distant goal of the student of psychic heredity is the ability to create and to control instinctive characteristics.

(4) Problems of individual acquisition, ex- perence or habit. These can be solved com¬ pletely only in conjunction with problems of instinct, for acquisition is grafted upon heredity. The evolution of the learning process

or proc¬ esses, and the development of modes of learn¬ ing in various species of organism, constitute a most fascinating and pract'cally important field of inquiry. Language habits are at present commanding attention, as they manifest them¬ selves in infrahuman and in human organisms.

(5) Problems of imagination. These in¬ clude all questions concerning the genesis of memory, of reproductive imagination and of creative imagination as well. They are of obvious importance, since the transition from mere awareness of the present moment of life to more or less definite consciousness of yes¬ terday and of to-morrow separates the lower from the higher organisms.

(6) Problems of thought and reasoning. Although these are intimately bound up with problems of imag'nation, they may be discussed separately because reasoning is a form of think¬ ing peculiar to recent stages in mental evolu-

tion. It may or may not prove to be distinc¬ tively human, but at any rate it exists in com¬ plex form only among the higher mammals. The student of reasoning is beginning to ask, instead of the old question, ((Do animals reason?®, ((What is the genesis and natural history of reasoning processes?®

(7) Problems of the relation of mind to body. Mental evolution exists for the scientist in association with an organism. It is one of his tasks to discover whether there exists some definite mode of energy which should be desig¬ nated as psychic, and if so, how this energy is produced and how it influences behavior. The notion that mind is epiphenomenal, aloof from life, a sort of penumbra, is in disfavor.

It remains to indicate, briefly, the chief achievements of genetic psychology. The most notable achievements may be summarized under the captions mental development and mental evolution. In both fields of genetic description, progress has been rapid during the last two or three decades.

Mental Development. — Darwin's notes on the mental development of one of his children set the fashion. Ever since, parents, teachers and more disinterested psychological observers have followed his lead. The resulting diary records of mental growth in infancy, childhood and adolescence are invaluable.

The work of Preyer in Germany is conspicu¬ ous in the early history of

ontogenetic psy¬ chology, for he observed carefully, collected and systematically arranged the data of others, and in his several books offered what long remained the best systematic discussion of child psychology. His studies extend even to the mental life of the foetus or embryo, for in common with many other observers, he recog¬ nized signs of mental life prior to the physical incident of birth.

To Preyer and his European contemporaries, psychology owes chiefly its data on (1) the early stages of sensory development : the first appearance of sensory functions in the indi¬ vidual, their characteristics, relations and their role in individual development; (2) the essen¬ tial features of the growth of perceptual con¬ sciousness; (3) the important stages in the de¬ velopment of will ; (4) the nature and order of co-ordination in experience and in response; (5) the history of language habits; and (6) the development of imagination, thought, reasoning.

To these several groups of facts, important contributions have been made in recent years, so that psychology possesses to-dav a good working outline of the development of the human mind. Such an. outline may not be re¬ produced here even briefly, but it may be ob¬ tained from the works of Preyer, Tracy and Stumpfl, Baldwin, Hall and others.

The diary method, by which from day to day new and changing facts of mental life are recorded, has been supplanted by more definitely planned and systematic experimental observation.

Preyer, Kussmaul and others used the ex¬ perimental method nearly 40 years ago in the study of children. Baldwin experimented with his children, and like Darwin set a fashion. But since experimentation with in¬ fants and young children is difficult, progress has been halting.

The Binet method of measuring intelligence

and the hosts of practical psychological tests and special scales for mental measurement which have followed upon it are to-day re¬ sponsible for renewed interest in the problems of ontogenetic psychology. It is even probable that these crude methods of mental measure¬ ment will eventually be so perfected as to further the solution of many genetic problems.

Animal psychology, other than human, has followed in the path blazed by Darwin and Preyer. First to appear were diary records of the development of young animals. Such are the psychological contributions of Wesley Mills, through his observations of dogs, cats and doves. Similar and more detailed ontogenetic studies have been made with mice, rats and the domestic fowl. Consult the works of Whit¬ man, Craig, Breed, Pearl, Small, Watson,

Allen and Yerkes.

Mental Evolution. — Even in the infancy of genetic psychology attempts were made to outline the process of mental evolution. Romanes early presented a general scheme of development, and since his time various other speculative accounts of the course of mental evolution have been published. Such discus¬ sions, although obviously demanding facts, have served the excellent purpose of stimulating re¬ search. Conspicuously important stages in mental evolution are to-day being studied ; but the animal series is a long one, and phyloge¬ netic description is meagre, despite the rapid de¬ velopment of animal psychology. Naturally enough, the line of evolution of the human mind has commanded attention, and in the at¬ tempts which have been made to trace our ancestry, many vertebrate types have been studied more or less carefully. But despite their closeness of relationship to us, the other primates have been neglected, chiefly because of their costliness and the difficulties in keep¬ ing and studying them. Neither the monkeys nor the anthropoid apes, still less the lower types of primate, have been systematically studied, from the psychological point of view.

For a long time to come, phylogenetic psy¬ chology must remain fragmentary and at loose ends. Facts will more and more abound, efforts to correlate them will become more numerous, and more fruitful, but the story is long and it will require persistent and intensive effort to discover it. Yet, logically as well as psychologically, genetic description should be the primary aim of the student of psychology. It should be the material about which special modes of description should centre. Studies of particular groups of facts, as in plant psy¬ chology, animal psychology, child psychology, the psychology of sex, of social relations, of ethnic groups ; studies by special and peculiar methods, as for example the introspective, comparative, physiological ; and studies for particular ends, like the educational, vocational, medical, theoretical, should all exist and thrive, for many and varied reasons. But each should have as its centre of reference genetic psy¬ chology.

Bibliography. — Baldwin, J. M., (Mental

Development in the Child and the Race) (New York 1906) ; Hall, G. Stanley, (Adolescence > (2 vols., ib. 1905) ; Tudd, C. H., (Genetic Psy¬ chology for Teachers (1903) ; Mills, W., (The Nature and Development of Animal Intelli- gence) ; Moore, K. C., (The Mental Develop-*

ment of a Child,) Psychological Monographs,) 3 (1896) ; Preyer, W., (The Mind of the Child (New York 1888-89) ; Romanes, G. J., (Mental Evolution in Animals) (London 1885) ; Spencer, H., Psychology) (New York 1890) ; Shinn, M. E., (The Biography of a Baby) (1893) ; Tracy and Stumpfl, (The Psychology of Childhood) (Boston 1910).

Robert M. Yerkes,

Professor of Psychology, University of Minne¬ sota.

GENETICS, the science which deals with the coming-into-being of organisms. It is one of the fundamental assumptions of modern biology, amounting almost to an axiom, that no organisms at the present time originate de novo, but only from previously existing similar organisms, which either divide to form new individuals by processes called vegetative or asexual, or else produce new individuals from single cells, the so-called reproductive cells. Examples of reproductive cells are the spores of ferns and mosses and the eggs and sperm- cells of the higher plants and higher animals. In some cases the egg-cell of a flowering plant or of an animal, like the spore of a fern, may by it¬ self produce a new individual, but in the great majority of the higher plants and animals (in¬ cluding man and his domestic animals) a new individual arises only from the union of two unlike reproductive cells, an egg-cell and a sperm-cell. These when united, an egg-cell with a sperm-cell, a process which constitutes the "fertilization)) of the egg, form a zygote (a joining-together of two reproductive cells) and the zygote grows into a new individual. The fact that an individual so formed resembles its parents is called heredity. It is due, other things being equal, to the similarity in nature of the reproductive cells from which an indi¬ vidual arises and the reproductive cells from which its parents arose. The connection is closer than most persons suppose. In reality the parent does not produce the child nor even the reproductive cell which functions in its origin. The parent is himself merely a by¬ product of the fertilized egg (or zygote) out of which he arose. The direct product of the zygote is other reproductive cells, similar to those from which it arose. Thus the zygote begins its development by dividing into two cells, these divide into four, and so on until a great number of cells arise, among which differences in form and function can be recog¬ nized. Some become bone cells, some muscle cells, some nerve cells, others blood cells, and thus the body is produced. But a very few cells derived from the zygote do not change into anything. They remain, like the zygote from which they arose, reproductive cells and when they leave the body it will be as repro¬ ductive cells capable of forming new zygotes. Hence heredity (that is, the resemblance be¬ tween parent and child) depends upon the close connection between the reproductive cells which formed the parent and those which formed the child, one being the immediate and direct product of the other. This

principle of the "continuity of the germinal substance® (re¬ productive cell material) is one of the founda¬ tion principles of genetics. It shows why body changes produced in a parent by environ¬ mental influences are not inherited by the off¬ spring. It is because offspring are not the

product of the parent's body but only of the germinal substance which that body harbors. Changes produced in the body alone are called acquired characters to distinguish them from characters dependent upon the nature of the germinal substance itself, which form the basis of heredity. That "acquired characters are not inherited® follows as a logical necessity, if the principle of germinal continuity is sound. To August Weismann belongs the credit for first making this clear. He mav thus be re¬ garded as one of the founders of genetics. His contribution consists of the two points (1) that the body is a product of the germinal sub¬ stance plus environment, but is not itself the producer of germinal substance but merely harbors it, inheritance being from germ cell to germ cell; (2) that changes in the body pro¬ duced by the environment ("acquired char¬ acters®) are not inherited, since the body is not a vehicle of inheritance. In qualification of these principles, it should be stated that the possibility is admitted, though not conclusively proved, that the environment may directly modify the structure of the germinal sub¬ stance and thus indirectly affect inheritance, but if so this is not accomplished through the mechanism of bodily changes ("acquired char¬ acters®) but only of germinal changes. Genetics assumes the validity of the evolutionary hypothesis, that changes in germinal substance do from time to time occur and that thus organisms come into being which differ from their progenitors. If this did not occur, the organisms of to-day would be substantially identical with those of 10,000,000 years ago, which we know from the geological record is not the case. To Charles Darwin belongs the credit for establishing beyond question the fact of organic evolution, that is, the fact that or¬ ganisms vary and that such variations as best meet the requirements of the environment sur¬ vive while others perish. Thus from age to age organisms change more or less extensively, though retaining unmistakable resemblances to their. progenitors. In terms of Weismann's principles, the variations of organisms which result in evolution have their origin in changed structure of the germ-cells, but. the natural selection which determines survival is made upon the bodies which harbor the germ-cells. The practical result is the same as if the germ- cells themselves were subjected to competitive elimination rather than the bodies which rep¬ resent them as by-products. This more com¬ plete analysis of the process of evolution through natural selection was made by Weis¬ mann after Darwin's death. Darwin rested with the demonstration of the fundamental fact that organisms vary genetically (that is, as regards the factor of heredity) and that such variations through natural selection result in

evolution. He above all others is therefore the founder of genetics. Weismann carried the analysis of the method of evolution an important step farther. He also called attention to the chromosomes of the cell nucleus as the prob¬ able "bearers of heredity,® these being the com¬ ponents of the germ-cell in which structural changes probably occur which result in herit¬ able changes of body form.*

The next important step in the develop¬ ment of the science of genetics was made in 1900 in the rediscovery of Mendel's law of

heredity. Gregor Mendel, while a teacher of natural science in a monastic school at Briinn, Austria (between 1858 and 1865) carried out experiments in the hybridization of different varieties of garden peas which led him to the discovery of a fundamental law of heredity, perhaps the fundamental law of heredity, known after him as Mendel's law. The discovery was later lost sight of, its fundamental character not being recognized until 1900 when it was rediscovered by Hugo DeVries. This law was promptly verified by numerous other plant hy¬ bridizers and was also shown to apply to ani¬ mals as well as to plants. In accordance with this law it is found that when parents differ, as regards hereditary characters, in several particulars, their descendants may show com¬ binations of those particular characters which were found in neither parent, though other descendants may have the same combinations of characters as the parents had. This leads to the conclusion that separate characters are independently inherited. If we adopt Weis- mann's suggestion that the bearers of heredity are in the chromosomes, we may suppose that characters which are independently inherited have their determiners in different chromo¬ somes, a conclusion supported by a large amount of evidence derived from a study of the struc¬ ture of the germ-cells. The greatest probabil¬ ity that such a relationship exists is also afforded by breeding experiments with the fly, Drosophila, carried out by T. H. Morgan and his pupils. In these experiments parents have been crossed which differ in many heritable characters and it has been found that certain of these characters tend to be inherited in groups similar to the grouping of characters in the respective parents. But not all the charac¬ ters of one parent form a single group. There are in reality as many different groups of char¬ acters as there are chromosomes in the germ¬ cell of Drosophila, viz., four. The conclusion is drawn that each group of characters has its determiners located in a single chromosome, and that for this reason the corresponding characters usually go together in heredity. There is, however, found a considerable varia¬ tion in the tenacity with which characters of

the same group tend to hang together. Some characters break away from the common group¬ ing more readily than others. It has been suggested that those characters which most commonly go together have their determiners close together in the same chromosome, while those which are more readily separated lie farther apart in the same chromosome. Many lines of experimental evidence support this view, which therefore marks a further im¬ portant advance in our knowledge of the genetics of both animals and plants, for it has been found that the same phenomenon of ˆcoupled® or ˆlinked® character groups occurs both in animals and in plants.

The science of genetics is still very new, a development of scarce 60 years, but the prin¬ ciples already established are finding important applications in animal and particularly in plant breeding. Hybridization allows of the produc¬ tion of new combinations of the heritable characters found in existing races, some of which new combinations may have distinct economic advantages. Thus our plant breeders seek to combine hardiness and disease resist¬

ance found in certain varieties of plants with the greater productiveness of related varieties. Animal breeders often wish to combine the size of one breed with the color, hornlessness or fecundity of another. Mendel's law shows that such combinations are obtainable in a defi¬ nite number of generations by cross-breeding and indicates the precise procedure necessary to obtain the desired result. But experience shows that the procedure of combining in one race different heritable characters found in separate races is one that requires considerable ingenuity and skill on the part of the breeder. The chief obstacle encountered is the instability in hybridization of the most prized characters of pure-bred races. Characters which clearly follow Mendel's law in heredity, emerging from a cross in new combinations, often emerge in altered form, the desired character of high standard which the parent race possessed emerging with standard lowered. Thus when a parent race possesses an intense black or a clear yellow color which the breeder wishes to transfer to another breed, it is usually found that the intense black emerges from the cross much dulled in character or that the clear yel¬ low has become muddy. Also color patterns, such as those of Dutch-marked cattle, Dutch- marked rabbits and hooded rats, usually emerge from crosses in modified form, which only slow and tedious selection can restore to the original condition. (See Stock Breeding). Further, some characters, such as size, seem to blend rather than to segregate in crosses, so extensive is the modification which regularly occurs. It is even an open question whether the inheritance of such characters is not better described as blending than in terms of Mendel's law. This is one of the questions which a further study of genetics must clear up.

. The great principles so far established in this subject, or found fundamental to it, are: (1) Organic evolution, origin of new races from previously existing ones by descent with modification and survival of the fittest; (2) non-inheritance of acquired characters; (3) great stability of organic form under vegetative or asexual methods of reproduction, as in graft¬ ing, reproduction by stolons, cuttings, etc. ; (4) wide prevalence of reproduction by the zygote method (single cells uniting in pairs) among all rapidly evolving organisms such as the flow¬ ering plants and higher animals. Since this method allows of crossing in every generation, it favors variability through the production of new character combinations or through charac¬ ter modification; (5) any departure from cross fertilization in reproduction by zygotes, such as the occurrence of self-fertilization among certain plants and among some animal para¬ sites, restores stability of organic form like that found in vegetative or asexual reproduction. Hence the constancy of self fertilizing varieties of cereals and legumes; (6) Mendel's law of heredity shows how in reproduction by zygotes crossing may lead to the production of new character combinations and thus favor progres¬ sive evolution; (7) selection acts in two ways upon the variable material furnished by zygote reproduction attended by crossing, (a) It iso¬ lates desirable new character combinations, (b) It isolates desirable modifications of char¬ acters in . combinations already secured. These modifications may arise in consequence of cross-

ing or irrespective of it, as they are known to do in asexual reproduction or among self fer¬ tilizing organisms.

Bibliography.— Bateson, W., (Mendel's Principles of Heredity5 ; Castle, W. E., (Genet¬ ics and Eugenics5 ; Darwin, Charles, (Animals and Plants under Domestication5 ; Morgan, T. H., et al., (The Mechanism of Mendelian Heredity5 ; Weismann, A., (The Evolution The¬ ory5 (Eng. trans. by Thomson).

William E. Castle,

Professor of Biology , Harvard University.

GENEVA, Ill., a city and county-seat of Kane County, about 33 miles from Chicago, on the Chicago, Burlington and Quincy and Chi¬ cago and Northwestern railroads. It was set¬ tled in 1832 and was incorporated as a city in 1887. It is a popular residential section for Chicago merchants. It contains a fine court¬ house, a public library, the State Reformatory for

Female Juvenile Offenders. The manufac¬ tures include windmills, glucose, sadirons, flour, boxes, candy, shoes, , sanitary cups and hard¬ ware. It is also a milk and butter centre. The city owns and operates its own electric-light plant and water supply. Pop. (1920) 2,803.

GENEVA, Neb., city and county-seat of Fillmore County, 55 miles west of Lincoln, on the Burlington and Missouri River and the Chi¬ cago and Northwestern railroads. The State In¬ dustrial School for Girls is located here. It contains a Carnegie library. The chief indus¬ tries are brickmaking, farming and stock rais¬ ing. There is also a large nursery. It owns its water plant. Pop. 1,741.

GENEVA, N. Y., city in Ontario County, on the north shore of Seneca Lake and the main line of the Lehigh Valley, the Auburn Branch and the Pennsylvania Division of the New York Central and Hudson River Railroad. There are two interurban trolley lines connect¬ ing with adjacent towns. Rochester is 52 miles west and Syracuse 52 miles east. Geneva is situated in a rich agricultural country and has one of the largest manufactories of cereals and corn products in the United States, using 10,000 bushels of corn daily. The city has extensive manufactories including stoves, steam boilers, optical goods, motors and motor boats, cutlery, glass, etc. The excellent transportation facili¬ ties, cheap fuel supply, gas and electric power offering unusual advantages. The United States census of manufactures for 1914 showed within the city limits 52 industrial establishments of factory grade, employing 1,953 persons; 1,692 being wage earners receiving annually a total of $1,054,000 in wages. The capital invested aggre¬ gated $4,773,000, and the year's output was val¬ ued at $5,241,000: of this, $1,956,000 was the value added by manufacture. The Geneva cut¬ lery works runs out more razors daily than any other factory in the world. Geneva is the seat of Hobart College for men and Smith College for women. The New York Experiment Sta¬ tion and the Smith Observatory are here. Geneva's public, parochial and private schools rank among the best in the State. In the 18th century the Indian village of Kanadesoga was located near the present site of Geneva. Gen. James Clinton attacked and destroyed the village in 1779. Geneva was chartered as a city in 1898 and is governed by a mayor (elected

every two years) and a municipal council. The city owns and operates the waterworks. The assessed valuation is $8,000,000. Pop. 15,000, with a tributary trading population of 50,000.

GENEVA, Switzerland, canton, bounded on the north by the canton of Vaud and the Lake of Geneva, and on the east, west and south by France. In addition to the territory thus bounded, the communes of Celigny, Le Coudre, aJ\d Petit Bois, enclosed by Vaud, belonged to this canton, which

is one of the smallest in the Swiss Confederation, the area being only 108 square miles. The whole canton belongs to the basin of the Rhone, and the only streams of importance are that river and the Arve, which joins it a little below the town of Geneva, the capital of the canton. While the soil is not very fertile, careful cultivation has rendered four-fifths of it productive. It produces cereals, fruits, wine, vegetables in quantities. Its in¬ dustries, however, make it perhaps the leading canton of the Federation. Near the end of the 16th century the watch-making trade was brought here from France and has become the main industry. Instruments of precision, tele¬ scopes, range finders, mathematical instruments, etc., are made in large quantities. Cheap water¬ power is furnished by the Rhone and has helped to locate these industries within the canton. There are over 500 establishments employing 14,000 workers. The silk industry has declined. As regards government, the Grosser Rat exer¬ cises legislative functions and consists of 100 members. There are seven members in the council of state in which reposes all executive functions. There are courts of arbitration for settling matters in litigation between capital and labor and the ordinary courts of civil and crim¬ inal jurisdiction. The territory of Geneva hav¬ ing, by the arrangements of the congress of Vienna, obtained an accession of 15 communes, detached from France and Savoy, was admitted a member of the Swiss Confederation in 1814, and ranks as the 22d canton. A constitution, somewhat aristocratical in its nature, was framed, and continued in force till 1830, when a considerable modification of it took place. In 1841, in consequence of a popular tumult, the original constitution was abandoned for one in which the democratic principle is completely pre¬ dominant. This new constitution was modified under popular pressure in 1847. Nearly one- third of the population is of foreign birth, chiefly French and Italian. About 90 per cent of the inhabitants speak French. The capital is Geneva (q.v.). Pop. 156,288.

GENEVA, Switzerland, the capital of the canton of the same name; at the western ex¬ tremity of the Lake Geneva, where the Rhone issues, here crossed by several bridges and dividing the town into two portions. The old city is irregularly built and has narrow, crooked streets, except along the river front, where there are several broad highways and well- planned wharves ; it is the financial and business section of the city. The Quartier Saint-Gervais, as the section on the opposite bank is called, is the residential section, with several large hotels for tourists, of whom there is always a great number in Geneva. The city contains many fine gardens, promenades, squares and parks, the most noteworthy being the Place des Alpes, the Place Neuve, the Promenade des Bastions, the

Promenade du Lac and the Jardin Anglais.- Boulevards occupy the site of the ancient walls of the city. The more important public build¬ ings are the Cathedral or Church of Saint Pierre, a Gothic structure of the 10th, 11th and 12th centuries ; the town-house in the Florentine style; the Musee Rath, containing a collection of pictures, etc. ; the university building, nearly opposite the botanic garden, rebuilt in 1867-71, and containing the public library, founded by Bonivard in 1551, and now numbering over 200,000 volumes; and the Museum of Natural History. There are several commercial and technical schools and academies of art and music. Geneva is an important manufacturing centre and particularly as a clock, watch and jewelry centre. There are also iron and chem¬ ical works, and enameling, diamond-cutting and music box establishments. Scientific and surg¬ ical appliances are manufactured on a large scale. It is favorably situated for commerce and exports its own manufactures chiefly to France and Italy. Since 1847 many municipal improvements have been inaugurated, break¬ waters protecting the lake harbor, and hydraulic plants supplying water to the city and power to the industrial establishments. The city owns and operates the gas and electric-lighting plants.

Geneva was a part of the territory of the Allobroges in Caesar's time, and afterwards part of the Roman Provincia Maxima Sequanorum. The Franks took possession of it in 534 and about three centuries later it was incorporated with the kingdom of Transjurane Burgundy. In 1531 it became a member of the Swiss Con¬ federation. The doctrines of the Reformation were preached here by Farel and were promptly accepted. In 1535 the Reformed religion be¬ came the established religion and soon after Calvin was called to Geneva to become public teacher of theology. Through his teaching the town acquired an important influence over the spiritual life of Europe. In the 18th century the city was troubled by continued feuds be¬ tween the aristocratic and popular parties, until 1782 when France and Sardinia intervened taking the part of the aristocrats. The French Revolution precipitated other troubles ; the aris¬ tocratic party was overthrown in 1794, equality of all citizens proclaimed, and a reign of terror set in. In 1798 the city and canton became part of France, as Department of Leman. At the Congress of Vienna Geneva again became inde¬ pendent and gained additional territory. Dur¬ ing the first three quarters of the 19th century it was the scene of perpetual strife betwen the clericals, conservatives and radicals. The refer¬ endum was adopted in 1879 and 12 years later Initiative and Recall were introduced. The final battle between the political factions centred on the separation of Church and state, and resulted in the separation being carried by a referendum in 1907, and the triumph of the progressive par¬ ties. In 1912 the canton purchased the central railroad station from the Paris-Lyon-Mediter- ranee

Company of France.

Bibliography. — Blavignac, (Etudes sur Geneve (Geneva 1872-74) ; Boissonas (Geneve a travers les siecles* (ib., 1900) ; Chapuisat, (La municipality de Geneve pendant la domina¬ tion frangai'se 1798— 1814ˆ (2 vols., ib., 1910) ; Cherbuliez, (Geneve, ses institutions, etc.* (ib., 1868) ; Galiffe, (Geneve historique et archeo- logique> (ib., 1869) ; Pictet de Sergy, (Geneve,*

origine, etc. (ib., 1843-47) ; id., (Geneve ressus- citee* (ib., 1869).*

GENEVA, Lake of, or LAKE LEMAN

*(Latin, Lacus Lemanus), the largest of the Swiss lakes, extending in the form of a crescent, with its horns pointing south, between France and the cantons of Geneva, Vaud and Valais; length, 55 miles ; central breadth, about 6 miles ; area 224 square miles; greatest depth, 1,095 feet. It is 1,230 feet above the sea. On the north the shore is low, and the ground behind ascends gradually in beautiful slopes. On the south, and particularly at the east end, the shore is rocky and abrupt, and lofty precipices often rise sheer from the water's edge. It contains various species of fish. The water is remark¬ ably pure and of a beautiful blue color. The Rhone, which enters the eastern extremity, a muddy, turbid stream, issues from the western extremity perfectly pellucid, and likewise of the finest blue. Peculiar phenomena associated with the lake are the so-called <(seiches,** or fluctuations in the level of the water, caused by sudden alterations in the atmospheric pres¬ sure. The seiches longitudinal es run from one end of the lake to the other ; the seiches transversales cross from the Swiss to the Savoy side in 10 minutes. Through deposition the lake at its northeast end has contracted con¬ siderably. Villages formerly on its shores are now miles inland. The lake has many in¬ teresting literary associations ; among them with Voltaire, Rousseau, Byron, and the elder Dumas.*

GENEVA, University of, a Swiss univer- versity founded in 1559, as the Academy of Geneva, and called a university only since 1873. It has about 1,700 students, mostly from abroad, and the principal studies are medicine and philosophy. Women have of recent years been admitted on the same conditions as men. As an academy there were faculties of theology, philosophy, science and law. The theological faculty was the most famous because of the influence of Calvin and Beza, its early directors. After the revocation of the edict of Nantes the university became the centre of French Protestant influence and culture, which it con¬ tinued to be almost without interruption to the beginning of the 19th century and in a certain degree to the present day. Among the names which have added lustre to the institution are those of Scaliger, Casaubon, De Saussure, Le Sage and De Candolle. Consult Borgeaud, C, (Histoire de l'Universite de Geneve (2 vols., Geneva 1909).*

GENEVA ARBITRATION, or GENEVA AWARD, the settlement of the Alabama claims by five arbitrators, appointed under the Treaty of Washington (Feb. 1871) by the President of the United States, the Queen of Great Britain, the King of Italy, the President of the Swiss Confederation and the Emperor of Brazil. These rulers, in the above order, named as arbitrators Charles Francis Adams, Lord Chief Justice Sir Alexander Cockburn, Count Federigo Sclopis, Mr. Jacques Staempfli and Baron d'ltajuba. J. C. Bancroft Davis and Lord Tenderden, respectively,

represented as agents the United States and Great Britain. The tribunal met at Geneva, Switzerland, 15 Dec. 1871, and Count Sclopis was made presi-

\

GENEVA, SHOWING MT. BLANC

dent. The United States claimed damages both tor direct and for indirect losses, and for in¬ juries occasioned by 13 vessels. The tribunal decided to allow only direct losses caused by the Florida and the Alabama, with their tenders, ana by the Shenandoah during part of her cruise. Various rules of international law were laid down which supported most of the con¬ tentions of our government. On 14 Sept. 1872, the tribunalˆ ((awarded to the United States a sum of $15,500,000 in gold as the indemnity to be paid by Great Britain to the United States as the satisfaction of all the claims referred to the consideration of the tribunal.® The British representative cast the only dissenting vote, but Great Britain accepted the decision and paid the award within a year.

GENEVA BIBLE, a translation of the Bible into English, made and published at Geneva, chiefly by English Protestant refugees. It was the first English Bible which adopted the Roman instead of the obsolescent black type, and the first which recognized the division into verses; it was the first also which omitted the Apocrypha. From its stating (Genesis iii, 7) that our first parents made themselves ((breeches,® it is sometimes called the Breeches Bible. See Bible.

GENEVA CATECHISMS, two cate¬ chisms in French written by Calvin and pub¬ lished, the larger in 1536 and the smaller in 1541. The latter was subsequently translated into German and Hungarian and adopted as the formulary of the Reformed churches in Switzerland and Hungary.

GENEVA COLLEGE, Pa., a coeducational institution in Beaver Falls, founded in 1848, under the auspices of the Reformed Presby¬ terian Church; reported at the end of 1915—16 : Professors and instructors, 17; students, 425; volumes in the library, 5,000; productive funds, $208,101 ; grounds and buildings valued at $250,- 000; income, $28,000.

GENEVA CONVENTION (1864 and 1868), international agreements for mitigating the sufferings of war. The first was initiated by the efforts of two Genevans : a physician named Dunant, who wrote a sickening descrip¬ tion of the military hospitals at the battle of Solferino ; and a public-

spirited citizen named Moynier, who formed societies in various places to urge the neutralization of field ambulances, and called the attention of European govern¬ ments to it. The majority of these sent rep¬ resentatives to an international conference held at Geneva under the presidency of Gen. Wil¬ liam Henry Dufour, the eminent Swiss soldier and statesman. The agreement adopted was signed 22 August; all the European states have since joined in it, and the United States, and several Latin American and Asiatic countries have acceded also. The articles are in sub¬ stance: (1) Ambulances and military hospitals shall be inviolable while containing sick or wounded; (2) so shall their staff; (3) whether they are occupied by the enemy or not; (4) if the attendants choose to leave the hospitals, they can only take their private property, not the relief appliances, except ambulances and their contents; (5) a house with a sick or wounded soldier shall be neutral and not subject to have

soldiers quartered in it, or to requisitions with specific exceptions ; (6) the convalesced shall be sent back to their own country under parole for the remainder of the war; (7) hospitals and ambulances, to claim these rights, must carry a uniform flag with a red cross on a white ground as well as their national flag, and the staff must wear a like badge on their arms; (8) special ar¬ rangements to be made by the commanders. In 1868 a second convention at Geneva adopted a supplementary convention, to extend the prin¬ ciples of the first to naval warfare, and amplify the first.. It provided on the latter point that the medical and surgical staff should receive their regular pay if they remained after occu¬ pation by the enemy, and if th'ey left should do so at a time fixed by the commander; that mili¬ tary requisitions should be modified according to the expenditures of the given places in har¬ boring the wounded, and to charities extended toward them; that the paroling home of con¬ valesced soldiers shall not include officers, as they could make their knowledge very service¬ able without serving in the field. The marine rules were, that hospital ships, merchant ves¬ sels with wounded on board, and boats rescuing men in the water, shall be inviolable, on consid¬ eration of carrying their red-cross flag and their crews wearing the red-cross arm badge, that government hospital ships shall be painted white with a green stripe, and private societies white with a red stripe ; and that whenever one party in a naval war has sound reason to believe the ether is abusing the convention, the first may suspend it till the other proves its honesty, and if proof is not given, may suspend it for the duration of the war. See Red Cross Society ; War.

GENEVIEVE, zhon've-av', Saint, the patron saint of Paris: b. near Nanterre, Paris, 423; d. Paris, 3 Jan. 512. When yet very young she took a vow of perpetual virginity and subse¬ quently she went to Paris. The city was about to be deserted when Attila with his Huns broke into France ; but Genevieve assured the inhab¬ itants of complete security if they would seek

it in fervent prayers. Attila took his course from Champagne to Orleans, returned hence into Champagne without touching Paris, and was defeated in 451. By this event Genevieve's reputation was established. In a time of fam¬ ine she went along the river Seine from city to city, and soon returned with 12 large vessels loaded with grain, which she distributed gratui¬ tously among the sufferers. Her remains were placed in the subterranean chapel which Saint Denis had consecreated to the apostles Paul and Peter. Clovis, by her request, built a church over it, which was afterward called by her name, as was also the abbey founded there. Another church, consecrated to this saint, was built near the church of Notre Dame. By a decree of the National Convention, 1791, this edifice was named the Pantheon, but its original name was restored officially in 1851. Her relics, which were preserved in the former till its de¬ struction at the Revolution, are now in the church of Saint Etienne du Mont. Her fete is held on 3 January. Consult Delalain,

GENEVIEVE, Saint, duchess of Brabant, wife of Siegfried, count palatine in the reign of Charles Martel (about 750). Being accused by her intendant Golo of adultery during her husband's absence, on his return she was con¬ demned to death; but the vassal to whom her execution was entrusted allowed her to escape, and she lived six years in a cavern upon no¬ thing but herbs. She was finally found, and carried home by her husband, who in the mean¬ time had become convinced of her innocence. This legend is the subject of one of the finest and most perfect of the German popular tales, which appears to have been written by Emmich about 1472. The story has been retold by Tieck and Maler Muller, and dramatized by Raupach.

GENGA, jen'ga, Girolamo, Italian painter and architect: b. Urbino, 1476; d. 1551. He was for many years a pupil of Luca Signorelli, whom he assisted in numerous pictures, and also of Perugino; painted a (Resurrection) in the church of Saint Catherine of Siena at Rome ; and found a generous patron in the Duke Francesco Maria of Urbino, who finally appointed him court-architect. Among his ar¬ chitectural works were the church of Saint John the Baptist at Pesaro, the restoration of the palace courtyard there, and the bishop's palace of Sinigaglia. With the versatility of the Renaissance, he wrote on the fine arts, and was a musician and sculptor.

GENGHIS KHAN, jen'gis khan, or JEN- GHIS KHAN, Mongol conqueror : b. near the Onon River, Mongolia, 1162; d. 24 Aug. 1227. His father was chief over 30 or 40 clans, but paid tribute to the Tartar Khan. He

succeeded his father when only 14 years of age, and made himself master of the neighboring tribes. A great number of tribes now com¬ bined their forces against him and he found himself hard pressed. He found a powerful protector in the great Khan of the Karaite Mongols, Oung, or Ung, who gave him his daughter in marriage; but who ultimately be¬ came jealous of his military talents and ordered his assassination, but Genghis made his escape to his own country. Subsequently after much internecine warfare with various Tartar tribes Genghis was proclaimed Khan of the United Mongol and Tartar tribes.

He now professed to have a divine call to conquer the world, and the idea so animated the spirit of his soldiers that they were easily led on to new wars. The country of the Uigurs, in the centre of Tartary, was easily subdued, and Genghis Khan was now master of the greatest part of Tartary. In 1209 he passed the great wall of China, the conquest of which country occupied him more than six years; the capital, Yenking, now Peking, was taken by storm in 1215 and plundered. The murder of the ambas¬ sadors whom Genghis Khan had sent to the king of Kharism (now Khiva) occasioned the invasion of Turkestan in 1218 with an army of 700,000 men ; and the two cities of Bokhara and Samarcand were stormed, pillaged and burned. Seven years in succession was the conqueror busy in the work of destruction, pillage and subjugation, and extended his ravages to the banks of the Dnieper. In 1225, though more than 60 years old, he marched in person at the head of his whole army against the king of Tangut (northwestern China), who had given

shelter to two of his enemies. A great battle was fought, in which the king of Tangut was totally defeated with the loss of 300,000 men. The victor remained some time in his newly subdued provinces, from which he also sent two of his sons to complete the conquest of northern China. At his death which took place in Mongolia, his immense dominions were di¬ vided among three of his sons. A great part of the empire, however, came into the hands of Kublai, who is considered as the founder of the Mongol dynasty in China. The only me¬ morial of the conqueror now known to exist is a granite tablet discovered among the ruins of Nertschinsk. The inscription in Mongol has been deciphered by Schmidt of Saint Peters¬ burg. It had been erected by Genghis Khan in commemoration of his conquest of the king¬ dom of Saratogal (better known as Karakitai). His armies owed their success to their admir¬ able discipline and organization, and to the celerity with which, being mainly horsemen, they moved. Merciless as a conqueror, he nevertheless showed high qualities of statesman¬ ship, and it is said so organized his vast em¬ pire that one could travel from one end of it to the other without fear of molestation. Con¬ sult Douglas, (Life of Genghis Khan5 (London 1877) ; Howorth, (History of the Mongols5 (London 1876-88) ; Johnston, (Famous Cavalry

Leaders5 (Boston 1908).

GENGLER, geng'ler, Heinrich Gottfried,

German jurist: b. Bamberg, 1817; d. 1901. He received his education at the universities of Wurzburg and Heidelberg, and for over half a century was professor of law at the Uni¬ versity of Erlangen. He published

GENII, je'rn-I, among the Romans, were protecting spirits, who were supposed to ac¬ company every created thing from its origin to its final decay, like a second spiritual self. They belonged not only to men, but to all things ani¬ mate and inanimate, and more especially to places, and were regarded as effluences of the divinity and worshipped with d vine honors among the Romans and Greeks. Not only had every individual his genius, but likewise the whole people had theirs. The statute of the national genius was placed in the vicinity of the Roman forum and is often seen on the coins of Hadrian and Trajan. The genius of an indi¬ vidual was represented by the Romans as a figure in a toga, having the head veiled and the cornucopia or patera in the hands; while local genii appear under the figure of serpents eating fruit set before them. Quite different are the genii whose Arabic name, Djinn or Jinn, was translated by the Latin term genius, for want °r a better word, or from the casual similarity of the sounds. The Romans came to believe ˆ evˆ genii who seem to have been little different from the good genii except in their intentions toward the person to whom each attached himself.

. idea °f protecting spirits was not orig¬

inal with the Romans and the Greeks, but has been held by most primitive races. Most of the

tubes of American Indians believed that every one had his guardian spirit who played a very important part in his life. In India, Persia and Egypt the belief in guardian spirits was com¬ mon ; and the Mohammedans not only believe in personal guardian spirits but have classified them and given them various ranks and rulers. Christian theology made of the guardian spirit a guardian angel, retaining for the latter prac¬ tically all the functions and powers of the genii of classical Greek and Roman times. Consult Bekker, (Le Monde enchante) (Amster¬ dam 1691) ; Conway, M. D., (Demonology and Devil Love (New York 1889); Thompson, R. C., (Devils and Evil Spirits of Babylonia) (London 1903). See Familiar Spirits.*

GENIPAP, a West Indian and South A.merican fruit, which is produced from the Genipa Americana. It is a double-cell berry, with numerous seeds, grows to the size of an orange, is greenish-white in color, and has a very agreeable taste. It closely resembles the Cape jasmine.

GENISTA, je-nis'ta, a genus of low, branching sometimes spiny shrubs, belonging to the pea family, with usually simple leaves and yellow flowers. There are about 100 species, a few of which are cultivated for ornament. See Broom ; Dye-weed.

. GENITIVE, the name of one of the cases in grammar, which indicates the source or origin of the thing associated with it. For a discussion of the logical notions of case and case endings consult Mauthner (Zur Grammatik und Logik) (Stuttgart 1913) ; Paul, (Prmzipien der Sprachgeschichte> (Halle 1909) and Van Ginneken, (Principes de linguistique psychologique) (Paris 1907).

GENIUS, in Roman mythology, a tutelary deity. See Genii.

GENIUS OF CHRISTIANITY, The.

Chateaubriand's (Genius of Christianity } ((Le Genie du Christianisme)) is a book cardinal in the development of French literature as well as in that of the mind of its author. This be¬ comes clearer if the story be regarded as an integral part of it. as it was in the book's initial publication. The year of its ap¬ pearance, 1802, was a turning point also in the moral and political life of the French nation. Its immediate popularity and large influence was chiefly due to the fact that it echoed senti¬ ments that were awaiting some such utterance. It fostered an ethical movement that it did not originate.

The (Genius of Christianity > appeared at the moment when Napoleon, having attained almost unchallenged power in a France weary of the political disorders and moral negations of revo¬ lution, was about to give official recognition and restoration to the chastened national church. France had shown abundant practical evidence since 1796 that it was ready for this act, and Chateaubriand's book served at once as its glorification and its justification. It is a bril¬ liant piece of special pleading for the supreme and unique excellence of traditional Christian¬ ity, rigidly logical in form, systematically analytic in the development of its theme, but based rather on what its author called ((a rational instinct of submission to all that was beautiful — religion, justice, equality, liberty,

glory® than on reasoned dogmatic conviction. To the France of the Consulate he commended Christianity rather because it was beautiful in its works and ways than because it was true in its teachings. In doing this he

laid aside ne ther his pesimism nor even his underlying scepticism, as is clear from his incorporation in the book of the little half-autobiographical story of Rene, a morbid toying with melancholy. His ambition was rather <(to rival Bossuet and ruin Voltaire® than to maintain logical con¬ sistency in a mind, made, as he said, «to be¬ lieve in nothing, not even in itself.®

(The Genius of Christianity) in its four parts, discusses first the dogmas and mysteries of the faith; then, with more zest, its mani¬ festations in poetry, art and literature, and, in the closing section, in worship and ritual. Christianity, the author contends, has more to convince the mind and satisfy the heart than any other faith; it has contributed more to man's aesthetic enjoyments; it has rendered greater services and benefits. The reasoning is often puerile, but the passionate eloquence is still stirring. The doctrine of divine father¬ hood is supported by such observations as that "domestic animals are born with just enough instinct to be tamed,® that birds migrate just at the season when they are convenient for human food, and that in French the first syllable of the word for hearthstone (foyer) sounds like the word for faith (foi). The three Graces of classical mythology are offered as an adumbration of the Trinity, the con¬ stellation of the Southern Cross. as a witness to the Crucifixion. Not much is gained for Christian apologetics by the discussion ((whether the divinities of paganism have poetically a superiority over the Christian divinities,® but there is a stirring emotional appeal in the cumulative contrasts of pagan and Christian fathers, mothers, sons, daughters, priests, sol¬ diers; of Christian poetry and pagan, and especially of the Bible with Homer. Orator- ically notable are the descriptive passages, leading the mind through the marvels of nature to the acceptance of Divinity, and the remarkable chapters on Christian Missions and the Eucharistic Sacrifice.

(The Genius of Christianity was a revindi¬ cation of the rights of sentiment from the materialism of the encyclopaedists and the philosophes. Thus it contributed essentially not only to the re-establishment of Roman Catholicism in France but to the approaching revival of the more personal forms of writing, especially of lyric poetry and of introspective prose, that literature of ((confessions,® of whose morbidity Rene was the prototype, which was so characteristic of the young Romantic School. The (Genius of Christianity) has been translated and edited by C. L. White, and selections from it under the title (Spirit and Beauty of the Christian Religion) by E. B. Stork. Consult also Sainte Beuve, Chateau¬ briand et son groupe litteraire sous l'empire) (2 vols., 1861).

Benjamin W. Wells, Author of c Modern French Literature. >

GENLIS, zhon'les', Stephanie Felicite Ducrest de St.-Aubin, Comtesse de,

French writer: b. Champceri, Burgundy, 25 Ian. 1746;

d. Paris, 31 Dec. 1830. At the age of 16 she was married to the Comte de Genlis, and in 1770 was made lady-in-waiting to the Duchesse de Chartres. In 1782 the Due de Chartres, afterward known as Egalite, appointed her "governorˆ of his children, including Louis- Philippe. She wrote a variety of works for her pupils, among others : (Theatre of Educa¬ tion (1779-80), a collection of short come¬ dies; (Annals of Virtue (1781); (Adele and Theodore, or Letters on Education (1782) ; (The Virgils of the Chateau* (1784). On the breaking out of the Revolution she took the liberal side, but was ultimately compelled to seek refuge (1793) in Switzerland and Ger¬ many. When Bonaparte became consul she re¬ turned (1799) to Paris and received from him a pension. Her writings fill some 90 volumes. Among them are (Precis de la Conduite de Madame de Genlis) (1795) ; (Chevaliers du Cygne) (1795) ; (Madame de la Valliere* ; the romance, (Mademoiselle de Clermont* (1802) ; (Memoirs* (1825) ; Baron d'Holbach's Din¬ ners.) The last contains a great deal of curi¬ ous but malicious information concerning the freethinkers of the 18th century. Consult Bearne, C. M., (Heroines of French Society) (New York 1907) ; Chaband, L., (Les pre- curseurs du feminisme* (Paris 1901) ; Har- mand, J., (A Keeper of Royal Secrets) (Lon¬ don 1913) ; Sainte-Beuve, (Causeries* (Vol. Ill, Paris 1857).*

GENNADIUS, Greek patriarch of Constan¬ tinople: b. about 1400; d. 1478. In secular life he was known as George Scholarius. He visited the Council of Florence with John Palaeologus in 1439, where he tried to bring about a union of the Eastern and Western churches. After his return to Constantinople he became a monk and in 1453, after the capture of the city by the Turks, he was chosen patriarch.. At the request of the invaders he drew up a confession of faith, which is a complete exposition of the doctrines of the Greek church. Gennadius resigned his high office in 1459 and retired to a monastery. He wrote many works, few of which have been published. Consult Schaff, (Creeds of Chris¬ tendom (4th ed., 3 vols., New York 1905). For some of Gennadius' works consult Migne's (Patrology* (Vol. CLX, Paris 1856).*

GENNESARET, je-nes'a-ret, LAKE or SEA. See Galilee, Sea of.

GENOA, jen'6-a (ancient Genua), Italy, a fortified city, situated on the Gulf of Genoa, at the foot of the Apennines, on the Bisagno River, the capital of the province and the most important seaport. While worthy of its

*title, <(Genoa the Superb,** as viewed from the sea, it is in reality built awkwardly on irregular rising ground, and consists of a labyrinth of narrow and intricate streets. Of the palaces the most famous are the ducal palace formerly inhabited by the Doges, now appropriated to the meetings of the senate; and the Doria, presented in 1529 to the great Genoese citizen Andrea Doria, whose residence it was during his presidency of the republic. The palaces Brignole-Sale, Reale, Durazzo-Pallavicini, Spinola, Balbi-Senarega, and others possess great interest on account of their historical fame and architectural beauty. Many of them contain galleries of paintings :*

the Brignole-Sale has works by Van Dyck, Rubens, Albrecht Diirer, Paolo Veronese, Guercino, etc. Among the churches are the Cathedral of Saint Lorenzo, in the Italian Gothic style ; the Church of Saint Ambrogio (1589), containing pictures by Guido Reni and Rubens. The marble municipal palace, built in the Late Renaissance style, with a magnificent vestibule, courtyard and galleries, and the palace of the Dogana must also be mentioned. Genoa has a university, founded in 1243, a library of 116,000 volumes; also numerous technical schools, and institutions of higher education. The hospital, the asylum for the poor (capacity 2,200), the deaf and dumb institution, and the hospital for the insane are among the finest in¬ stitutions of their kind in Italy. There are numerous excellent philanthropic foundations, as the Fieschi, an asylum for female orphans. The public library contains 50,000 volumes ; and there are the Academy of Fine Arts, founded (1751) by the Doria family; the Carlo Felice Theatre, one of the finest in Italy: and the Verdi Institute of Music. Genoa is the commer¬ cial outlet of a wide extent of country, of which the chief exports are rice, wine, olive oil, silk goods, coral, paper, macaroni and marble. The imports are principally raw cotton, wheat, sugar, coal, hides, coffee, raw wool, fish, petroleum, iron, machinery and cotton and woolen textiles. The total commerce in 1912 amounted to $306,- 140,000. The imports equalled $207,680,100; and the exports $98,360,000. The chief imports were coal, about $20,000,000; wheat, $25,310,- 000; cotton, about $44,000,000; metals, $24,000,- 000. The manufactures are velvet and silk fabrics, woolen goods, cotton goods, ribbons, damask, embroidery, artificial flowers, hats, paper, leather and leather goods, furniture, ob¬ jects in gold, silver, ivory, marble, alabaster and coral, essences, soap, preserved fruits, choco¬ lates, macaroni and vermicelli. There are also several flour mills. The harbor has an area of over 600 acres, and consists of the Porto, with a depth of 19 feet, the Porto Nuovo with 32 feet of water, and the Avamporto with 45 feet of water. There is an elaborate system of quays, floating docks, etc. The improvements to the harbor began in 1877 and were com¬ pleted at a cost of $12,000,000 in 1895.

The history of Genoa may be traced back in legendary traditions to a time

preceding the foundation of Rome. It was one of the most considerable cities of the Ligurians, and is men¬ tioned by Livy (under the name of Genua) as being in friendly relations with Rome at the be¬ ginning of the second Punic war. It was sub¬ dued and partly destroyed during that war by a Carthaginian fleet under the command of Mago. The Romans rebuilt it, and it afterward became a Roman municipium. After the decline of the Roman empire in the West it fell into the hands of the Lombards, and with them became subject to the Franks. After the downfall of the empire of Charlemagne, Genoa erected itself into a republic, and till the 11th century shared the fortunes of the cities of Lombardy.

If Genoa had adopted a wise colonial system she would have held the first rank among the commercial nations at the end of the Middle Ages. After the conquest of Constantinople by Mohammed II in 1453, the Genoese soon suf¬ fered for the aid they had imprudently afforded the Turks. Mohammed took from them their

settlements on the Black Sea in 1475, and at length all access to this branch of trade was de¬ nied them by the Turks.

While the power and commercial rank of Genoa were attaining their height by means of their foreign trade and acquisitions of territory the city was internally convulsed by civil dis¬ cord and party spirit. The hostility of the demo¬ crats and aristocrats and the different parties among the latter occasioned continual disorders. In 1339 a chief magistrate, the Doge, was elected for life by the people, but he had not sufficient influence to reconcile the contending parties. A council was appointed to aid him; yet after all attempts to restore order to the state, there was no internal tranquillity; indeed, the city some¬ times submitted to a foreign yoke in order to get rid of the disastrous anarchy which the con¬ flict of parties produced.

In 1528 the disturbed state regained tranquil¬ lity and order which lasted till the end of the 18th century. The form of government estab¬ lished was a strict aristocracy. The doge was elected to be the head of the state. The nobil¬ ity were divided into two classes — the old and new. To the old belonged, besides the families of Grimaldi, Fieschi, Doria, Spinola, 24 others who stood nearest them in age, wealth and consequence. The new nobility comprised 437 families. The doge might be taken from the old or new nobles.

Little by little Genoa lost all her foreign possessions. Corsica, the last of all, revolted in 1730 and was ceded in 1768 to France. When the neighboring countries submitted to the French in 1797 the neutrality which the republic had strictly observed did not save the fluctu¬ ating government from ruin. Bonaparte gave to them a new constitution formed on the prin¬ ciples of the French representative system. Two years afterward a portion of the Genoese terri¬ tory fell into the hands of the Austrians; but the fate of Genoa was decided by the battle of Marengo. A provisional government was estab¬ lished, and in 1802 it received a new constitution as the Ligurian republic and acquired some in¬ crease of territory, and had in 1804 a population exceeding 600,000. Its naval force, which was so formidable in the Middle Ages, at last dwin¬ dled down to a few gallevs and barques ; the land force became almost equally insignificant.

On the overthrow of the French empire Genoa was occupied by the British with whose permission the ancient constitution was re-es¬ tablished. But the Congress of Vienna in 1815 assigned Genoa with its territories to Sardinia, stipulating that it should have a sort of repre¬ sentative constitution. In 1821 it joined for a moment the revolutionary movements of Italy. In the spring of 1849, after the defeat of Charles Albert of Novara and the conclusion of a truce with the Austrians, a revolutionary out¬ break took place, the national guards occupied the forts, and the garrison was compelled to withdraw. A provisional government was formed and the independence of the republic was proclaimed. But a large body of Sardinian troops under Gen. Della Marmora, soon ap¬ peared before the city; a bloodv struggle en¬ sued and the forts and principal points of the city were taken by the royal soldiery. Mean¬ while a deputation was sent to Turin, which returned with the amnesty of the King, exclud¬ ing the chief leaders of the movement, who,

however, escaped on board an American vessel. In April the city was disarmed and the mon¬ archical government restored. Following the fortunes of the Sardinian states, Genoa became a portion of the kingdom of Italy. Pop. 272,- 221. Consult Bent, (Genoa: How the Re¬ public Rose and Fell) (London 1881) ; Canale,

Nuova Istoria della Republica di Genova J (4 vols., Florence 1858-64) ; Carden, (The City of Genoa' (New York 1908) ; Duffy, (The Tuscan Republics, with Genoa) (ib. 1893) ; Mallison, (Studies from Genoese History > (London 1875) ; Staley, (Heroines of Genoa and the Rivieras) (New York 1911).

GENOA, Bank of. The organization known to economic works as the Bank of Genoa was not originally a bank. In the 12th century it consisted of a group of enterprising persons connected with the cathedral and see of

Genoa, who had the address to engage the military forces of the republic in the plunder of Saracenic Spain. At that period Genoa had secured a footing in the Balearic Isles, an advantageous base for such operations against the Moors as in a future age Cortes and Pizarro conducted against the Mexicans and Peruvians.

Says Anderson in his (History of Com¬ merce) : ((The Genoese were frequently in¬ stigated against the Moors of Spain. In 1136, with 153 ships and 60 galleys, aided by large land forces, they took Almeria with great slaughter and a vast booty. In 1137 they as¬ sembled their forces at Barcelona and were equally successful in the reduction of Tortosa.))

. Tˆe envoys, promoters, or speculators who initiated and incited these enterprises advanced to the Genoese Republic the pecuniary means to carry them out, upon condition, however, of being repaid in treasury bills secured by pledges of certain Genoese revenues and the further condition that such bills should be receivable as money at public sales of captured property and of taxed farms, or as right to collect the public revenues. Thus the state was induced to supply men, ships and munitions of war for these expeditions and to reward the promoters, who risked nothing, with the coveted privilege of being preferred creditors and bidders at the sales of spoil and tax-farms. Armed with these advantages, treated as preferred and fa¬ vored creditors, they became, says Anderson, the richest citizens of Genoa, with ((most of the cities and territories pawned, or rather sold to them, which terrains this Society (of San Gior¬ gio) governed and defended. Machiavel was of opinion that in time this bank (of San Giorgio) would get possession of the whole city and re¬ public.)) This is precisely what happened: the bank absorbed the republic.

The treasury bills issued by the republic for the advances made by the speculators, were called mahonas, probably after Port Mahon in the Balearics, whence the earlier expeditions sailed. Increased caution on the part of the Moors, the resulting scarcity of spoil, an ex¬ pensive and fruitless war with Aragon, the destructive feuds of the Guelphs and Ghibellines and other circumstances, rendering Genoa un¬ able to meet the outstanding certificates upon their maturity, the republic was fain to offer still further advantages to the bill-holders, who with the view to make the most of such advan¬ tages, assembled 1345 and organized 1346 as The Compera di San Giorgio, their certificates

taking the name of comperas (purchasers) probably in allusion to their

legal attribute of purchasing any spoil or tax-farm offered at public sale.

After the drained and impoverished republic had fallen into the arms of France (reign of Charles VI), the Compera was reorganized by Marshal Boucicaut, 2 March 1408, as the Ufficio di San Giorgio, with a capital consisting of the outstanding comperas.

Rights and Privileges Ceded to the Banks.

a. d.

1417. Right to prescribe public laws, civil or criminal.

Right to apply the jus gladii, or penalty of death in all matters relating to the bank.

Right to establish exclusive and appellate tribunals and to appoint the judges.

1420. Privilege of being legally regarded as first mortgagee of all property, real or personal, of every individual indebted to the bank.

1425. Passports of departure from the state declared void as to persons indebted to the bank.

1453. Right to compel the doge or other executive of the State -to swear upon his inauguration to maintain the privileges of the bank.

The " loughi " (shares in the bank) declared to be inviolable, and exempt from taxes, attachment, seizure or any other process of law.

1463. Right to invoke the power of ecclesiastical excommu¬ nication against all refractory debtors to the bank, clergymen as well as laymen.

1539. Seventy-six branches of the public revenue pledged to the bank forever.

All existing compere declared unredeemable and per¬ petual. (Del Mar, " Politics of Money").

The restrictions imposed upon their avidity by Marshal Boucicaut only lasted long enough for the influential proprietors to make suitable representations at Rome ; when the marshal was removed and the process of absorbing the re¬ public was resumed by the Ufficio, until the great events of the 16th century, the discovery of America by Columbus, the Protestant Ref¬ ormation by Luther and the consolidation of the German Empire by Charles V confronted the Ufficio with foreign complications

concern¬ ing which only a sovereign state was competent to deal. Hence the republic of Genoa was now once more enabled to raise its head ; and after a long and vexatious process of reaction, the am¬ bitious Ufficio was finally reduced to the modern condition of a bank, subject to the state and amenable to its laws. This conversion is usually assigned to the year 1673.

Although the Compera of 1346 and the Ufficio of 1408 had both, on certain critical oc¬ casions, stopped payment, the bank of 1673 had no such bar sinister in its escutcheon. It was practically a new organization, of ample capital and excellent connections both in Italy and the northern countries. On the other hand a new order of public affairs had arisen in which Genoa played but a very insignificant part, a fact that the Florentine navigator Ves¬ pucci lays great stress upon. The oriental trade of Genoa was lost, its Mediterranean trade was divided and dispersed among several rivals. The textile trades formerly largely engrossed in the Levant and Italy had found more favor¬ able conditions in England, Flanders and the German states; while new empires had arisen in Spain and Portugal, with rich trades in America and the Orient, in none of which could Genoa now hope to take part.

The bank of Genoa (properly the Bank of San Giorgio) received money on deposit, al¬ lowing interest for the same. It paid out money upon the presentation of warrants, bills

of exchange and orders (cheques) ; it dis¬ counted commercial paper; it issued bills of ex¬ change payable in distant cities ; it dealt in uncurrent coins ; it also acted as negotiant, or umpire, or referee, in the matter of certain foreign claims upon Genoa for damages at sea. The promotion of companies to despoil the Spanish Moors and Jews, as organized under the Compera, seems to have been abandoned for lack of material. The commercial agency established by the Ufficio was continued by the bank and proved very useful to merchants both in Genoa and elsewhere. Genoa struck its first gold coin, the genovina (ducat) in 1252. From that time onward numerous changes of the ratio between gold and silver coins were made by the Compera and Ufficio, both of whom in turn had control of the mint. To the monetary confusion thus created the bank of 1673 con¬ tributed a further source of dispute. It insti¬ tuted distinctions between moneta permesso, moneta di paghe and moneta cartularo, from which the profit was small in proportion as the public vexation was great. The republic was dead ; and the bank, still living on its remains, was finally extinguished by Napoleon in 1797. For the history of other ancient banks, see Barcelona, Bank of; Byzantium, Bank of Fuggers, Bank of the; Medici, Banks of the; Tyre, Bank of; Venice, Bank of.

GENOA, Gulf of, a large indentation in the north shore of the

Mediterranean, north of Corsica, having between the towns of Oneglia and Spezia a width of nearly 90 miles.

GENOUDE, zha'nood', Antoine Eugene,

French publicist: b. Montelimar, Drome, 1792; d. 1849. He studied philosophy, subsequently became a devout Catholic and supporter of the Bourbon dynasty. He was a pioneer advocate of universal suffrage ; founded Le Defenseur in 1820, which was followed a year later by L'Etoile. In 1825 he revived the Gazette de France. After 1830 he attacked the new party. In 1835 he took holy orders and in 1846 became a member of the Chamber of Deputies. He pub¬ lished 'Voyage dans la Vendee et dans le midi de la France) (1820) ; (La raison du christian- isme (1835) ; 'Histoire de France) (16 vols., 1844-47), and a translation of the Church Fathers to 300 a.d.*

GENOUILLERE, zha'noo'yar', in fortifi¬ cation, a part of the interior slope of a parapet which covers the lower portion of a gun car¬ riage. See Fortification.

GENOVESI, ja'no-va'se, Antonio, Italian philosopher and political economist: b. 1712; d. 1769. With a view of entering the ministry of the Church he began the study of theology in a monastery, took holy orders and became pro¬ fessor of rhetoric at Salerno. He soon became dissatisfied with his position, went to Rome, studied law and was admitted to practice as an advocate. Later he abandoned this profession also and devoted his attention to philosophy. In the University of Naples he was made ex¬ traordinary professor of philosophy and opened a private college. In 1743 he published his 'Elements of Metaphysics, 5 and his 'Logic ap¬ peared two years later. His discussions of metaphysics involved him in difficulties with the authorities and not without difficulty did he*

obtain the chair of moral philosophy and that ot theology was later denied him. Despite the opposition to Genovesi on the part of the Scholastics Benedict XIV, several cardinals and many learned men approved his course. Geno¬ vesi became first professor of political econ¬ omy at Naples, in which he was the first to use Italian in the lecture room. He wrote (Lezioni di commercio o sia economica civile) (1765). His (Opera scelte) in four volumes was issued at Milan in 1835. Consult Bobba, (Commemo-razione di A. Genovesi> (Benevento 1867).

GENRE (zhon-r) PAINTING, in art,

from the French genre (sort or kind), which was originally employed to designate pictures of which the subjects were copied directly from nature, such as landscapes, scenes of every-day life, animals, fruit, and even portraits; in con¬ tradistinction to those which were more the product of the imagination, such as historical, religious, and purely ideal paintings. The term is now restricted to denote scenes of every-day life, such as Hogarth and Wilkie loved to depict. A genre painter is not confined to low subjects, nor need his paintings be vulgar in the ordinary acceptation of the word, though the great mod¬ ern masters in this style, the Dutch, have owed their inspiration and fame to scenes of very humble and often coarse life. In short the human element is the dominant note in genre painting. This style of painting was not un¬ known to the ancients. Pyreicus, a Greek painter of the time of Alexander the Great, painted barbers' shops, cobblers' stalls, and the like, and according to Pliny, his pictures were highly prized. Genre painting had become pop¬ ular in the late Greek and Roman periods, and the excavation of ancient classical cities has brought to light numerous fine examples of the work of the artists of these later classical periods. In Italy the painters who have worked in this style are Caravaggio, Manfredi, Salvator Rosa, Benedetto Castiglione, etc. But the art received its highest development in the Netherlands; Teniers the younger, Jan Van Mill, D. Ryckaest, Rembrandt, Nicholas Maas, Gerard Dow, Jan Steen, the Van Ostades, Brauwer and Bega, are among the best exponents of the style. In Great Britain, after Hop-arth and Wilkie, al¬ ready mentioned, come Leslie, Mulready, Mac- lise, Egg, Millais, Faed and others. The British school has sought to lend a dignity to the style by the introduction of the dramatic element. But genre painting has never been neglected in any of the European countries since the days of the early Netherland masters who depicted every phase of the life in which they lived. In the 18th century the French artists carried out the traditions of the genre masters and elaborated them in their own distinctly national way. Among these who acquired an international reputation were Boucher, Chardin, Fragonard and Lancret. Since then France has never lacked genre painters. Bargue, Meis- sonier, Roybet and Vibert were brilliant ex¬ ponents of the art in the middle of the 19th century; and they had many followers and imitators. See Painting.

GENS, among the Romans, denoted that those persons belonged to the same gens who bore the same name; were born of freemen; had no slave among their ancestors ; and who had not been reduced from a superior to an inferior VOL. 12 — 26

condition. The gens consisted of many families, supposedly of kindred blood, but was also ap¬ plied to a whole community, the members of which were believed to be descended from a common stem. Consult Lange, (R6mische Alterthumer> (3 vols., Berlin 1877).

GENSERIC, jen'ser-ik, or GAISERIC,

king of the Vandals: b. about 400; d. 477 a.d. He was a natural son of Godigisdus, the great leader of the Vandals when they over¬ ran Spain. Goderic succeeded the latter as ruler of the conquered territory; and on his death Genseric, who had shown special capabili¬ ties as a ruler of men, became king. An in¬ vitation in 429 from Boniface, Count of Africa, viceroy under Valentinian III, to come and help him against his rival Aetius, gave him a chance to display his military ability. Genseric landed in Africa with 50,000 men and swept everything before him in Mauritania, where the natives flocked to his standard. Boniface real¬ izing that he had made a mistake in inviting the terrible leader of the Vandals to aid him, hastily attempted to organize his forces to op¬ pose him. Twice defeated he was finally driven into the mountains and slain, and all northern Africa from Carthage westward, and finally the latter city, surrendered to Genseric who ex¬ tended his conquests to parts of the islands of Sicily, Sardinia, and Corsica. He made Car¬ thage the capital of this new empire in 439. In 455, on the invitation of the Empress Eudoxia, Valentinian's widow, who sought his assistance against Maximus, the murderer of her husband, he landed at Ostia and marched to Rome, which he stormed and gave up to pillage for 14 days. On his departure he carried off the empress herself and her two daughters, one of whom he married to his son Huneric. Two attempts on the part of the empire to shake off the rule of Genseric were unsuccessful. The western em¬ peror Majorian sent a great fleet against the Vandals in 457. This Genseric met and des¬ troyed in the Bay of Carthage. A similar at¬ tempt on the part of the Eastern Emperor Leo, in 468, met with a like fate at Bona. Thus, under Genseric, the Vandals became as for¬ midable on sea as they had become on land. Consult Gibbon, (Decline and Fall of the Ro¬ man Empire ; Hodgkin, (Italy and her In¬ vaders^ (1892-95); Martroye, (Genseric: La Conquete vandale en Afrique) (Paris 1907) ;*

(Cambridge Mediaeval History (New York*

1911).

GENSFLEISCH, gens'filsh. See Guten¬ berg, Johannes.

GENSICHEN, gen'sik-en, Otto Franz,

German author : b. Driesen, Prussia, 1847. He received his education at the University of Berlin; from 1874 to 1878 was engaged as dramaturgist at the Wallner Theatre, Berlin. After 1878 he devoted himself exclusively to literary work. He published

GENSONNˆ, zhan'so > 'na', Armand, French politician: b. Bordeaux, . 1758 ; d. 1793. He was elected to the Legislative Assembly from the Gironde and subsequently served as commis¬ sioner to La Vendee. He proposed the law of

31 Dec. 1791 in which several accusations were hurled at the brothers of the king and members of the aristocracy. Many other projects were introduced by him, especially that confiscating the property of the emigres. In March 1793 he presided over the National Convention, but in the following June he was thrown into prison, was tried on a charge of treason in October and was executed with other Girondists on the 31st of the same month.

GENTH, Frederick Augustus, American chemist: b. Wachtersbach, Hesse, 1820; d. 1893. He received his education at the University of Heidelberg, and also at other German seats of learning. In 1845A8 he was assistant to the celebrated Bunsen. In 1848 he came to Phila¬ delphia and organized an analytical laboratory. He became professor of chemistry at the Uni¬ versity of Pennsylvania in 1872, resigned in 1888, and re-established his laboratory. He wrote much on chemistry and mineralogy and isolated about 23 new minerals. His published works include Researches on the Ammonia- Cobalt Bases5 (1856) ; (Corundum) (in Amer¬ ican Philosophical Society Proceedings, 5 1873), and reports while employed as mineralogist of the Geological Survey of Pennsylvania.

GENTH, Lillian Mathilde, American artist : b. Philadelphia, 1876. She studied art at the Pennsylvania School of Design for Women, and under Whistler at Paris. She re¬ turned to her native land in 1903. She painted many female nudes with landscape backgrounds and also several portraits in which she became very popular. She was awarded the Mary Smith prize in 1904, the Shaw memorial prize in 1907 and the Hallgarten prize of the National Academy in 1911. She is represented in the National Gallery, Washington, the Carnegie In¬ stitute, Pittsburgh, the Brooklyn Institute Mu¬ seum, and the Metropolitan Museum, New York.

GENTHITE, a hydrous nickel-magnesium silicate, 2Ni02Mg03Si026H20, but nickel con¬ tent is variable. It occurs at Nickel Mountain near Riddle, Ore., also in Towns County, Ga.

GENTIAN, a genus, Gentiana, of plants of the family Gentianacece. More than 300 species are known, distributed throughout the temperate and

mountainous regions of the world. Most of the species have blue flowers and many are celebrated for their beauty. In eastern North America the best known species are the fringed gentian, G. crinita, soapwort gentian, G. saponaria, and G. andrewsii , closed gentian, but many other species occur, scattered nearly throughout the continent.

In pharmacy gentian is the dried rhizome and root of Gentiana lutea. This is the yellow gentian of Europe, a tall mountain perennial, growing abundantly in southern and middle Europe and Asia Minor. The chief sources of supply to the drug market are Switzerland, southern France, and the hilly portions of Ger¬ many. The main constituent of the root is a bitter glycoside, gentiopicrin. It also contains sugar, gums, and salts. The action of gentian is that of a simple bitter and it is used to im¬ prove the appetite and thus secondarily affect the general constitution.

GENTILE, Da Fabriano. See Fabriano,

Gentile da.

GENTILES (Latin gentilis, from gens , a tribe, clan or family), originally used by the Jews to signify non-Israelitic peoples. It is used to signify, in Scripture, all the nations of the world, excepting the Jews. In the Old Testament it is the rendering of the Hebrew word goim, peoples, nations, the plural of goi, a nation, a people. At first it was used as a mere ethnological word, and quite respectfully, but as the Jews became more conscious of their privileges they employed it more and more scornfully of the nations around (Gen. x, 5; Isa. lxvi, 19; Jer. xiv, 22). This attitude was especially noticeable after the occupancy of Canaan and the growth of Hebrew national spirit and power; and it was due, in part at least, to the fierce and frequent struggles with the surrounding nations, which had early taken on a semi-religious, semi-political complexion which tended to increase among the Jews the feeling that they were a race peculiarly favored by the Lord of Hosts and the God of Gods. In the New Testament Gentiles is the render¬ ing of the Greek ethne, the plural of ethnos, a number of people living together, a nation. Saint Peter, moved by a vision, was the first of the Twelve to preach to the Gentiles (Acts x) ; but the Apostle of the Gentiles was Saint Paul (Gal. ii, 15). Jewish law divided the Gentile residents in Palestine into two classes, the permanent (ger), resident and stranger (within the gates, zar). The former had nu¬ merous privileges which the latter did not have ; in fact they had some privileges not accorded to the Jews, as, for instance, the removal of certain food restrictions. In the course of time the idea that the Jewish people constituted a specially and divinely privileged people, a sort of holy entity, created peculiar relations be¬ tween them and the Gentiles who were conse¬ quently looked upon as unholy, and as, there¬ fore, the inferior of

the Jews. They could not. therefore, be met by the latter as equals. This attitude accounts for the fact that the Jew has ever since retained his racial characteristics wherever he has preserved his religious faith. See Barbarian; Philistines; Israel.

Consult Bertholet, (Die Stettung der Israe- liten und der Juden zu den Fremden) (1896) ; Farrar, (Saint PauP ; Josephus, (History of the Jewish War5 ; Oehler, (01d Testament Theology5; Pfleiderer, Aaulinismus5 : Schultz, (01d Testament Theology5 ; Scheurer, An¬ cient Hebrew Tradition5 ; Tacitus, histories15 ; French, (New Testament Synonims5 ; Weiss, (New Testament Theology5 ; Weizacker, (The Apostolic Age.5

GENTILESSE, jen'ti-les', a poem by Geoffrey Chaucer, preserved in a ((morale balade55 of Henry Scogan. The entire ballad has appeared in all editions of Chaucer, al¬ though as early as the 15th century John Shirley recognized the interpolation. In Skeat's edition the part by Chaucer was for the first time printed separately. Scogan was a disciple and admirer of Chaucer.

GENTILI, Alberico, Italian-English jurist, founder of the science of international law : b. Sanginesio, 14 Jan. 1552; d. London 19 June 1608. He was educated at the University of Perugia, where he received the degree of doc¬ tor juris civilis. For a short time he held a judicial office at Ascoli, after which he re-

turned to Sanginesio and set about recasting ordinances. His Protestant opinions obliged him to seek refuge in Carniola. He was designated as contumacious by the Inquisi¬ tion and he soon had to quit Austrian territory. In 1580 he settled at Oxford and soon after¬ ward began to lecture on Roman law. In 1587 he was appointed regius professor of civil law at Oxford University. His lectures and commentaries greatly enhanced his reputation as a jurist, especially his application of old legal maxims to the then new problems arising from the growing intercourse between nations. In 1584 Gentili was consulted by the English gov¬ ernment in the Mendoza case. The latter, while Ambassador of Spain to the court of Elizabeth, had been discovered plotting against her. Gen¬ tili later expanded his answer in the work, (De legationibus libri tres? A treatise on the law of war ((De jure belli commentatio prima) appeared in 1588, and was subsequently ex¬ panded to(De jure belli libri tres> (1598). He was admitted member of Gray's Inn in 1600, and five years later became counsel to the king of Spain. The (Libri duo Hispanicse advoca- tionis)*

contains the record of his work in this service. Not until the last quarter of the 19th century did the world assign Gentili his true place as the first to define adequately the rela¬ tions of states and to indicate the solution of international problems according to the princi¬ ples of natural law and the common sense of mankind, without regard to precedent or the still more hampering rules of the Church. A monument to Gentili was erected in England in 1877 and in 1908, on the tercentenary of his death, a statue of him was unveiled in his native city. Consult Holland, T. E., Studies in In¬ ternational Law) (1898) and Walker, T. A.,

(History of the Law of Nations) (Vol I

1899).

GENTILLY, zhan'te'ye', France, town in the department of the Seine, about two miles south of Paris, of which the city wall divides the town into Great and Little Gentilly. It contains a 13th century church, potteries, chem¬ ical works, tanneries, etc. Pop. 11,000.

GENTLE. See Flesh Fly.

GENTLEMAN DANCING-MASTER,

The, a comedy of Wycherley (q.v.). It first saw the light in 1671.

GENTLEMEN-AT-ARMS, a bodyguard of the king of England, of which the full designation runs ((His Majesty's Bodyguard of the Honorable Corps of Gentlemen-at-Arms? It was instituted by Henry VIII in 1509 and was at first called "Speers? and later "Gen- tlemen Pensioners? Its present designation dates from 1834. It is the second oldest corps in the British service and does duty only at drawing rooms, levees and other important i unctions. The Crown appoints the members from among military officers of distinction on the retired list and on the recommendation of the commander-in-chief. The captaincy of the corps is vacated with each ministry.

GENTOO, corrupt form of the Portuguese gentio,' heathen, which was formerly employed to designate some peoples of India, especially the Telugu.

GENTZ, Friedrich von, German statesman: b. Breslau, 1764; d. 1832. He was educated at

brankfort and Konigsberg and in 1786 was ap¬ pointed secretary of the General Directory and in 1793 became war councilor of Prussia. At first a follower of Rousseau and Kant he was in favor of the great popular

movement in r ranee, but was soon diverted from this course by the writings of Burke, Mallet du Pan and Mourner. A stay in England made him a strong advocate of the constitutional system of that country. He founded the Neue Deutsche M onatsschrift in 1795 and after its demise in 1798 the Historisches Journal. In the latter he attacked the Revolution so persist¬ ently that he was obliged to leave the country. In 1802 he became Imperial councilor in Aus¬ tria and bitterly opposed Napoleon. He wrote several proclamations against the French. Sub¬ sequently he supported Metternich's policy and in 1818 founded the Wiener Jahrbiicher der Litteratur. In 1815 he served as secretary to the Austrian plenipotentiaries at the Congress of Vienna and at the subsequent conferences of Aix-la-Chapelle, Troppau, Laibach, and Ver¬ ona. He led a dissipated life and squandered his substance. His motives were seldom pure and were nearly always mercenary. His writ¬ ings are contained in edited by Weickz (5 vols., Stuttgart 1838) and in (Kleine Schriften> edited by Schlesier (5 vols., Mannheim 1840) and in (Urbana, Ill., 1912) ; Liiblee,

< Friedrich Gentz und Heinrich von Sybil > (Gottingen 1913).

GENTZ, Wilhelm Karl, vil'lielm karl gents, German painter: b. Neuruppin, Brandenburg, 9 Dec. 1822 ; d. Berlin, 23 Aug. 1890. He traveled in Spain, Morocco, and Egypt, depicted Oriental civilization and the life of the desert with in¬ creasing insight and success, and at first turned his attention to the rendering of biblical scenes in the spirit of the actual East. Of the works of this period are (Christ in the House of Simon ; (Christ among the Pharisees and Pub¬ licans? Despite the skill with which he ren¬ dered the brilliant light effects peculiar to those regions, his work was slow in making its way. Ultimately, however, he was ranked not at all inferior to the most distinguished French color¬ ists. He was a professor in the Berlin Acad¬ emy, . from 1877 a member of the Senate; and obtained the great medals of Berlin (1866), Vienna (1873) and Munich (1876). In 1873 he visited Palestine to make local studies for his greatest achievement, (Entry of the German Crown Prince into Jerusalem, 1869? which was completed in 1876 and hung in the National Gallery of Berlin. Other of his canvases are (Mecca Caravan at Prayer 5 ; (Meeting of Two Caravans in the Desert* ; (Evening on the Nile> ; (Funeral Celebration at Cairo*; Ser¬ pent Charmer* ; < Alley of Sphinxes in the The- baid);*

made illustrations for Eber's (Egypt) and others of his popular works.

GENUA, ancient name of Genoa (q.v.).

GENUFLECTION, jen-u-flek'shon (Mid¬ dle Latin genuflexio, bending of the knee) the act of bending the knee in reverence or adora¬ tion. In the Roman Catholic Church the mem¬ bers genuflect when passing before the taber¬ nacle where the Blessed Sacrament is reserved. If the Sacrament is exposed a double genuflec¬ tion (on both knees) is usual. Genuflection is used at various times during the church serv¬ ices. The early Christians prayed standing on Sundays, and from Easter till Pentecost, and only bent the knee in sign of penance; hence a class of penitents were known as Genuflectents. In the rubrics of the Anglican Church double genuflection, or kneeling, is enjoined in some parts of the service. Kneeling and bowing the head at the name of Jesus occasioned much con¬ troversy, especially among the Puritans. It seems probable that genuflexion crept into the church from its contact with the ceremonies of the royal court in Egypt, the prostrations of the Orient and like ceremonies among other neigh¬ boring civilized nations.

GENUNG, John Franklin, American cler¬ gyman and scholar : b. Wilseyville, N. Y., 27 Jan. 185U ; d. 1 Oct. 1919. He was graduated from Union College in 1870, the Rochester Theological Seminary in 1875, and from the University of Leipzig, Germany, in 1881 ; was for a time active in the ministry of the Baptist Church, and later was appointed professor of rhetoric in Amherst College. After 24 years in that chair he was transferred to the department of literary and Biblical interpretation. He had degrees as follows: Ph.D., Leipzig; 1881; D.D., Yale University, 1905; L.H.D., Union University, 1913. His publications number Tennyson's In Memoriam: Its Purpose and Structure> (1883) ; Practical Elements of Rhetoric) (1886) ; (Hand-book of Rhetorical Analysis > (1888) ; The Epic of the Inner Life, a new translation with annotations of the Book of Job (1891); (Outlines of Rhetoric) (1893); The Working Principles of Rhetoric (1902); (Stevenson's Attitude to Life) (1901); (Words of Koheleth) ; the Book of Ecclesiastes, with new translation and commentary (1904) ; The Hebrew Literature of Wisdom: a Synthesis* (1906); The Idylls and the Ages,* a valua¬ tion of Tennyson's Idylls of the King (1907); The Man with the Pitcher and his Story> (1912) ; (A Guide Book to the Biblical Litera¬ ture* (1916).*

GENUS, je'nus, in zoology and botany, a systematic term applied to any group of species (q.v.) lower in rank than a tribe, sub-family, or family. A genus may be composed of a single, several, or many species. Genera usually differ in structural details, while species differ in size or color, or in the structure of some special organ or portion of the body. It is, however, often difficult to draw the line between genera and species. As an example of a genus may be cited Equus, or the horse genus, represented by Equus caballus, the domestic horse ; Equus asinus, the ass ; Equus zebra, the zebra, etc. A genus may be. represented by species inhabiting different

continents, but sometimes a genus is confined to a single geographical realm or

region. See paragraph on Classification in Anatomy.

GEOCENTRIC, astronomical term em¬ ployed to designate the position and motions of the planets from the position of a supposed ob¬ server stationed at the centre of the earth. See Heliocentric.

GEODE, a cavity of small' size in a rock mass, which cavity has been lined or even filled with mineral matter that has been carried in by the circulating waters. Sometimes the lining is silica deposited in layers in the form of banded agate, sometimes it is quartz or cal- cite in beautiful crystals.

GEODESY. The science of measuring large portions of the earth's surface, continents, countries, etc., with a view to determining the form and dimension of our globe and of mak¬ ing maps of extended regions of its surface, differs from surveying (q.v.) in the wider re¬ gions which its scope includes, and in the cor¬ responding necessity of more delicate and re¬ fined instruments and methods. As an example of the problem it involves : If a map of the United States is to be made, one of the many questions arising would be that of the exact distance on the earth's surface between two cities. This is obviously impossible of measure¬ ment in the familiar way with the tape line. To carry out such measurements the method of tri¬ angulation must be applied. To do this, two points must be found a few miles apart so sit¬ uated that the distance between them can be directly measured on the ground, and that from each of them several different points in the region to be surveyed are visible. Let AB be

F^- – A

C

the two points chosen and C, D, E, F, etc., some of the distant points. The line AB is called the base line of the triangulation, and is measured by means of rods closed in wooden cases to protect them from rapid changes of temperature, which are successively placed end to end from the point A to the point B. Re¬ cently it has been found that steel tape can be used much more expediently and with all the precision that is required for the purpose. Having found the exact length of the base line, a theodolite is mounted at A and vertical rods or signals are erected at B C, so that the angle BAC can be measured with the greatest pos¬ sible exactness. Then the theodolite is carried to the point B and the angle is measured in like manner. If practicable the theodolite may also be mounted at C in order to

measure the re¬ maining angle of the triangle. The sum of the angles should come out 180°, this being the sum of the angles of any plane triangle. These three measurements will show any error in the measurement of the angles. Knowing the three angles and of the side of the triangle, the com¬ putation of . the two remaining sides is a very simple one in trigonometry.

Commonly there, will be a number of points, C, D, E, F, etc., which can be determined at the same time. Having done this, any of the lines

*f:°“ A or B *9 C, or between any two of the other known points, may be used as a new base line and the distance of yet other visible points measured in the same way. These, again, can be used as new base lines, and so on indefinitely. } . s method is especially expeditious in moun¬ tainous regions, where observations can be made irom peak to peak at distances sometimes ex¬ ceeding 100 miles.*

A fundamental point in which geodesy dif¬ fers from surveying is in the combination of measurements of the earth's surface, with ob¬ servations of the stars; the object of the com¬ bination is the determination of the curvature of the earth's, surface and the size of our globe.

The principle involved will be readily seen by a little careful thought. It is obviously im¬ possible to determine with any exactness the

degree on the earth's surface. This distance can be determined between any two points which are connected by a geodetic measurement. The difference of longitude may also be determined astronomically by telegraph and by geodetic measurement of the earth's surface. The rela¬ tion between the two measures shows the curva- ture in the east and west direction.

. Pn,e °r mSst difficult questions connected with the figure of the earth is that of the exact elhpticity or flattening of our globe. The pre¬ cise figure of the earth itself does not admit of definition on account of the irregular outlines of the mountains. Hence, as a basis of all exact statements, geodesy takes, as a standard body representing the earth, the figure that would be formed by the surface of the ocean if the continents were removed so that the

curvature of the earth's surface by observations made solely on that surface. But the surface of the ocean, which is taken as the basic one, is everywhere perpendicular to the plumb-line. It follows that the angle

between the directions of the plumb-line at two points will be equal to the curvature of the ocean surface between the points. By skilful astronomical observa¬ tions it is possible, on any part of the solid earth where an instrument can be mounted, to determine the exact declination in the celestial sphere from which the plumb-line points, which is, in fact, the zenith. The declination of the zenith is the latitude of the place; it follows, that if the latitude of two points north and south of each other is accurately determined, and found to be one degree, for example, the distance between them is the measure of one

ocean would cover the whole globe. It is clear that if the earth did not rotate on its axis, the form assumed by an ocean covering it would be that of a sphere. But, owing to the rotation, the equatorial regions of the earth are expanded and the polar regions contracted so that the ideal form is that of an ellipsoid. If all parts of the earth were of the same density this ellip¬ soid would be easily determined; but owing to the inequality of density of different parts of the earth, the figure of the ocean itself is not an exact ellipsoid. The best that can be done is to make the calculations assuming it to be such, and to make the best allowance that we can for such small deviations as may be discovered.

Measures for this purpose have been carried on or are in progress in most civilized coun¬ tries. The exact form and size of the earth

cannot be determined in the best way through observations in any one country, but require a combination of the geodetic surveys of various countries as widely separated as possible. With a view of securing co-operation in the solution of the problem, an International Geodetic Asso¬ ciation was formed, comprising the United States and the leading countries of Europe. This association, represented by members from the various countries, meets from time to time to carry out the co-operative work of the asso¬ ciation, and decide upon the best way of com¬ bining the several geodetic surveys.

The accompanying map shows the principal modern geodetic arcs which have been com¬ pletely measured in different parts of the world, and affords a comparison of the work done by the United States with that of foreign countries. The two arcs already completely measured in the United States are those of the thirty-ninth parallel of latitude, and the eastern oblique arc. The arc along the thirty-ninth parallel extends across the country from Cape May, N. J., to Point Arena, Cal., a distance of 2625

statute miles (4225 kilometers). Its triangulation in¬ cludes 10 base lines having an aggregate length of 53.5 miles, one of them being nearly 11 miles long. In the Rocky Mountain region many of the triangle sides are over 100 miles in length, and some of the triangulation stations are more than 14,000 feet (4300 meters) above the level of the sea. To fix the position of this arc on the surface of the earth, and to determine the true direction of the lines of triangulation, the latitude was accurately determined at 109 stations, the longitude at 29 stations, and the azimuth at 73 stations.

The eastern oblique arc extends from Calais, Maine, to New Orleans, La., a distance of 1623 miles (2612 kilometers). The triangulation in¬ cludes six base lines. The latitude was deter¬ mined at 71 stations, the longitude at 17, and the azimuth at 56. The measurement of the arc is a result obtained from the triangulation which forms the primary control of the surveys of the Atlantic Coast executed by the United States- Coast and Geodetic Survey.

Of the work now in progress, the principal measurement is that of an arc of the ninety- eighth meridian west of Greenwich. This work is practically completed within the limits of the United States, and preparations are being made for its extension northward into Canada, and southward into Mexico.

The principal arcs measured in foreign countries are the Anglo-French meridional arc extending from the north of the British Isles southward through France and Spain into Africa; the great Russian meridional arc ex¬ tending from the Arctic Ocean to the northern boundary of Turkey; the European latitudinal arc extending from the southern part of Ireland eastward into central Russia ; and the great Indian meridional arc extending from the south¬ ern point of the Peninsula of India northward to the Himalayas.

The total length of all the arcs completely measured in all parts of the world during the modern period amounts to a little more than two-fifths of the girdle of the earth along a great circle.

The exact form of the earth as given by these measurements is such, that with consider¬ able exactness all parallels of latitude are

circles, and all meridional great circles are ellipses. The dimensions and form of the spheroid, or more properly, ellipsoid of revolu¬ tion given by these co-ordinate circles and ellipses are usually stated in terms of its equatorial and polar radii, or diameters, and the two most notable computations of these dimensions are those made by Bessel in 1841, and

those made by Clarke in 1866. The dimen¬ sions as determined by these computations and the compression values deduced therefrom, which are applied to all calculations in connec¬ tion with modern geodetic work, and in the preparation of maps for exact surveys, are given in the following table, both the Bessel and Clarke computations being given in meters and English statute miles.

Bessel

Meters)

Clarke

(Meters)

Bessel

(English

statute

miles)

Clarke

(English

statute

miles)

a. Equatorial Radius.

6377397

6378206

3962.72

3963 . 23

b. Semipolar Axis. . . .

6356079

6356584

3949.48

3949.79

Difference a — b. . .

21318

21622

13.25

13.44

a-b. .

1

1

1 statute mile

*— soar**

uompi cssioii

a

299.12

295 . 00

1609.347

meters.

Both sets of dimensions very closely approxi¬ mate to the truth, but the number of recent measurements is insufficient to determine which of the two is more nearly correct. It is quite probable that the true dimensions lie between the two. A very clear idea of the small amount of flattening at the poles indicated by the figures of either set may be had by constructing a globe approximately five feet in diameter. In order to represent the shape of the earth, the equatorial diameter of the globe will have to be made one-fifth of an inch longer than its polar diameter. The consequent distortion from a perfect sphere will be unappreciable to the eye unaided by the use of measuring instruments.

Another, wholly different, method of deter¬ mining the form, though not the size, of the earth is afforded by the force of gravity, as determined by

the length of the seconds pen¬ dulum. It is well known that gravity is less in the equatorial regions of the earth than at the polar regions, from two causes. One is the centrifugal force of the earth's rotation, and the other is the greater distance of the centre of the earth's surface at the equator. The result is that a clock pendulum, swinging exact seconds near the pole, would lose several seconds a day when taken to the equator ; hence, a pendulum which would beat exact seconds must be made continually shorter as we approach the equator. The determination of its length in various lat¬ itudes thus becomes an important problem in geodesy. When it is known, the ellipticity or flattening of the earth may be determined from it.

What makes all the problems associated with this so complex are the small irregularities in the direction and force of gravitation wherever measures and determinations have been made. It is always found that when the latitudes of places are determined by the direction of the plumb-line, which is the only astronomical method, they seldom agree with the differences between the places as determined by geodetic

measurements. The reason is, that the plumb- line is deflected by the attraction of mountains and denser portions of the interior of the earth which do not admit of exact computation. These irregularities are greater in mountainous regions, in the Himalayas sometimes rising to 30 seconds. But even in plain countries devia¬ tions of two or three seconds are found. The errors arising from these deviations would not be important in themselves, the difficulty being that they operate like a small error in a foot rule when the latter has to be used for measur¬ ing a very long stick of timber. In such a case an error even so small as one-eighth of an inch in the rule would amount to an error of a foot in measuring a pole 100 feet long. As the measurement of a whole continent, even of the earth itself, has to start from short base lines, the error may be multiplied many fold in the final result.

Simon Newcomb.

Revised by Eric Doolittle.

GEODETIC SURVEYING. See Sur¬

veying.

GEOFFREY (jef'ri) OF MONMOUTH

(called also Geoffrey ap Arthur), English chronicler : b. probably at Monmouth about 1100; d. Llandaff, 1152 or 1154. According to Leland he was educated at Monmouth, in a con¬ vent of the Benedictines, whose society he en¬ tered. He was afterward made archdeacon of Monmouth, whence he was, in 1152, raised to the bishopric of Saint Asaph. The state of affairs in North Wales induced him to retire to the court of Henry II. He wrote various works; but his (Historia Regum Britannia is his most important production. This is now known to be, as the compiler states, chiefly a translation from Armorican manuscripts dis¬ covered in Brittany by Walter Calenius, an arch¬ deacon of Oxford. It contains a pretended genealogy of the kings of Britain from the time of the fabulous Brutus, or Brute, the Trojan, to the death of Cadwallader, king of Wessex in 688. It was first printed by Ascenius at Paris, in 1508. An English translation by Aaron Thompson, at London in 1718, was re¬ printed in Bohn's Antiquarian Librarv, 1848. We are indebted to Geoffrey for preserving, and perhaps reconstructing, the legends of Arthur and his knights, the exquisite fiction of Sabrina introduced into Milton's (Masque of Comus, the subject of Shakespear's (King Lear,* and many of the finest episodes in Drayton's*

GEOFFRIN, zhd—fran', Marie Therese Rodet, the holder of a noted Parisian literary salon: b. Paris, 2 June 1699; d. there, 6 Oct. 1777. By the grace and vivacity of her man¬ ners, aided by a refined and cultivated taste, she drew around her much of the fashion, wit, and learning of Europe. Early left a widow, with an opulent fortune, her charities to the poor, and her benevolent aids to literature, en¬ deared her as much to society as her wit and virtue delighted. Three of her friends, Thomas, Morellet, and D'Alembert, dedicated particular writings to her memory. Consult Aldis, (Mme. de Geoffrin and her Times) (New York 1905).

GEOFFROY, zho'frwa', Jean, French artist: b. Marennes, Department of Charente- Inferieure, 1853. . His art studies were made under the supervision of Levasseur and Eugene

Adan. He first exhibited in 1874 and has be¬ come famed as a master in depicting childhood and poverty. In the Amiens Museum is his (The Unfortunates ; while the Luxembourg Gallery has his Wishing Day at the Hospital,* and (Prayer of the Meek.* These are his principal works. In 1900 he was awarded a gold medal at the Paris Exposition.*

GEOFFROY, Julien Louis, French dra¬ matic critic: b. Rennes, 1743; d. 1814. He was educated with a view of entering the Jesuit order, but when it was suppressed in 1774 he became a teacher. He was successively editor of L'Annee Litteraire , the Journal de Monsieur and L' Ami du Roi and during the troubled years of the Revolution lived in retirement. In 1806 he

joined the Journal des Debats as dramatic critic. He opposed the Encyclopedists and especially Voltaire, who was his pet aversion. He was a dramatist of somewhat narrow views, but his learning was extensive and solid. Con¬ sult Gosse (Cours de litterature dramatique) (1820), containing his daily criticisms, and Geoff roy's (Discours sur la critique) Paris

1779).

GEOFFROY SAINT-HILAIRE, san'te lar', Etienne, French naturalist: b. Etampes, France, 15 April 1772; d. Paris, 19 June 1844. He was educated at the colleges of Navarre and Lemoine, and became a favorite pupil of Hairy. At the age of 21 he obtained the chair of zoology in the Parisian Jardin des Plantes. As a member of the Egyptian expedition in 1798 he founded the Institute of Cairo, and re¬ turned about the end of 1801 with a rich col¬ lection of zoological specimens. In 1807 he was made a member of the Academy of Sciences, and in 1809 professor of zoology at the Faculty of Sciences. He devoted himself especially to the philosophy of natural history. He was closely associated with Cavour; but they differed on the mutability of species, the former supporting and the latter opposing the theory. Among his principal works are (The Principle of Unity in Organic Composition) (1828); (Philosophy of Anatomy (1818—20) ; (Natural History of the Mammifers* (1820- 42) ; (Ideas of Natural Philosophy* (1838).*

GEOFFROY SAINT-HILAIRE, Isidore,

French physiologist and naturalist, son of the preceding: b. Paris, 16 Dec. 1805; d. there, 10 Nov. 1861. He was elected to the Academy of Sciences in 1833, and afterward became suc¬ cessively inspector-general of the university, member of the council of instruction and pro¬ fessor of zoology at the Academy of Sciences. One of his chief works, (History of Anomalies of Organization in Man and the Animals (1832-37), adds valuable confirmation to the theories of his father. He was the means of founding the Acclimatization Society of Paris. He paid much attention to the domestication of foreign animals in France, as appears from his treatise domestication et Naturalisation des Animaux utiles* (1854), and advocated the use of horse flesh as food in his (Lettres sur les substances alimentaires* (1856). He also pub¬ lished an excellent life of his father (1848).*

GEOGNOSY, je-og'no-si, that branch of Geology that treats of the materials that com¬ pose the earth. See Calcite; Limestone; Mineralogy; Quartz; Rocks, etc., also section on Geognosy in the article on Geology.

GEOGRAPHER OF THE UNITED STATES. The Continental army in the Revo¬ lution had a geographer to make maps and plans; and on 4 May 1781 Thomas Hutchins (q.v.), a protege of Franklin's, was on his recommendation appointed geographer to the Southern, (Greene's) army. After the peace, Hutchins's services were retained as geogra¬ pher, in connection with the surveys of the Western lands ceded by the States. The first official note of the office is in the draft of the general land bill reported 26 April 1785, where it is referred to as existing, and shortly after¬ ward Hutchins is referred to as occupying it. He was to supervise the State surveyors ap¬ pointed by Congress, suspend them if unsatis¬ factory, and report to Congress. He was re¬ appointed in 1788, for two years, but died the next year.

The first known official holder of the office of Geographer of the United States was Col. Robert Erskine. On the recommendation of Gen. James Clinton to Washington, Simeon De Witt the first graduate, in 1776, of Rutgers College (q.v.) was in 1778 appointed assistant to Erskine, whom he afterward succeeded, as per order of Congress, 4 Dec. 1780. He held this office until the end of the war. He then became Surveyor-General of the State of New York, holding that office for 50 years, though in 1796 offered the post of Surveyor-General of the United States, an honor which he de¬ clined. De Witt organized a corps of surveyors under Lieut. Benjamin Lodge, who with com¬ pass and chain measured every rod of Sulli¬ van's great march from Easton to the Genesee valley, into the wilderness and lake region of New York. The maps then made, under the supervision of De Witt, became the basis of the subsequent cartology of Central New York, and these, with the maps made in 1778, by Captain Grey, auxiliary to the same expedition, are in the New York Historical Society library and are known as (The Simeon De Witt Col¬ lection^ They were utilized especially by Gen. John S. Clark, in the years before 1889, in his remarkable identification of the places, with Indian names, referred to in the 42 journals of the officers in Sullivan's expedition.

GEOGRAPHIC NAMES, United States Board on, a board of 15 members, chosen from the executive department, the Government Printing Office, and the Smithsonian Institution, invested with power to render final decision, bind ng on all departments of the government, in settling the names of stations and places throughout the United States and Alaska, and to fix the spelling of the same in accordance with local usage. The board was instituted in 1890 by President Harrison. A separate board exists for the Philippine Islands. The reports of the board are issued from time to time by

order of the Congress.

GEOGRAPHIC POSITIONS. See

Geodesy.

GEOGRAPHIC SOCIETY, National, an

American organization with headquarters at Washington, D. C. It was formed in 1888, and offers annual lecture courses in Washington upon popular geographical subjects. The Na¬ tional Geographic Magazine is published monthly by the Society, which had about

300,000 members in 1917 and a collection of rather more than 50,000 volumes in the library maintained in its building in Washington.

GEOGRAPHICAL BOTANY. See

Plant Geography.

GEOGRAPHICAL CONQUESTS. The

18th century, the third after the discovery of America drew to its close with darkness still shrouding half the globe from the eye of civilized man. A Strabo or a Ptolemy, if questioned in 1800 as to how much of the earth's surface he could describe with accuracy, would have had to confess that he was quite familiar with only one of the grand divisions, and that one embracing only a tithe of the land of our planet. He might perhaps have claimed that he could make a tolerable map of South America, whose interior had been partly opened up by the zeal of the Jesuit mis¬ sionaries. It would, however, have been full of great voids representing regions unknown to him. He would have been able also to construct a map of Asia, approximately reproducing its main features, but his outlines would have been merely the framework of blurred and empty pictures. The Himalayas had not been measured — 'the Andes figuring as the highest mountains on the globe. There was a bound¬ less area within the Chinese Empire untrodden by Europeans. In Asiatic Turkey, Persia and in Afghanistan, in Turkestan and the Pamir, there were whole regions removed from the ken of cartographers. Scant information ex¬ isted regarding Japan, Farther India, and the Malay Archipelago ; next to nothing was known about Korea, and the interior of Arabia was almost a blank. Australia was still floating as a cloud on the horizon. Most of the lands north of America had not yet been discovered, and the Antarctic realm had barely been touched.

The accurate knowledge of Africa was lim¬ ited in the main to a narrow strip along the coast. As for the interior, comprising about one-fifth of the

earth's land surface, geograph¬ ical learning had hardly begun to outgrow its mediaeval estate. Cartographers had been grop¬ ing their way amid the confused reports of traders, slave dealers, and missionaries. The feature of Equatorial Africa regarding which the most correct conjecture had obtained for centuries, was the source of the Nile, which river, in accordance with the teachings of Ptolemy and the old Arab geographers, was represented on the maps as issuing from some lakes in the heart of the continent, fed by the Mountains of the Moon. Geographers knew of a great river that flowed by Timbuktu, the Queen of the Desert, and which they called the Niger, a name handed down from the time of the ancients. It had long been supposed that this stream had a western course and that the Senegal and Gambia formed its delta. A coun¬ ter theory was that it flowed east to a large lake, a view based in part on vague reports Tchad. Still another theory re¬ garded the Niger as one of the great arms of the Nile.. The Kongo was known only in the last portion of its interminable course, though as far back as the 17th century the opinion had been entertained that it issued from the same quarter of the continent as the Nile. The Sahara remained untraveled by Europeans, ex-

cept near its margin, and the great lakes of Africa were known only through tradition or vague report.

A I1? North America, the region between the Mississippi and the Pacific and north of New Mexico still belonged in great part to the realm of fancy. British America remained in great part unexplored, and the coast of Alaska had barely been grazed. There were whole regions, like the Adirondack wilderness, included within the bounds of the original States of the Ameri¬ can Union, wh.ch were still sealed to geogra¬ phers.

Nearly 300 years after the tracing of the coast line of Africa was completed by the voy¬ ages of the Portuguese, the systematic explora¬ tion of the interior may be said to have com¬ menced in 1788 with the foundation in London of the African Association, an event which inaugurated a new era in the history of geo¬ graphical discovery. This society had the good fortune to command almost at the start the services of the intrepid Scotchman, Mungo Park. Before this, it is true, the pioneer of modern African exploration, Sir James Bruce, had made his memorable journey along the Blue Nile, and the ornithologist, Le Valiant, had traveled in the hunting grounds of South Africa. Just before we hear of Mungo Park, the record of discovery also tells of a narrow wedge driven toward the heart of the continent in the journey of Browne from Assuan to Darfur. The African

Association assumed for one of its first tasks the unraveling of the mys¬ tery of the Niger. The journeys of Mungo Park (who perished in the stream in 1806), of Clapperton and Denham, and of Lander, covering together the period from 1795 to 1830, revealed the course of the river. The French, meanwhile, explored the Senegal and Gambia. At this time English explorers began to push from the Guinea coast into the warlike king¬ doms of Ashanti and Dahomey. In 1826 the ill-fated Laing, and in 1828′ Caillie, succeeded in reaching Timbuktu, that mysterious seat of Islamism which had for centuries fascinated geographers. (See Figs. 1 and 2).

The close of the 18th century was the begin¬ ning of a new era in the annals of American exploration. The travels of Alexander von Humboldt between 1799 and 1804 in the basins of the Orinoco and Magdalena, and in the Andes and Mexican Cordilleras, mark an epoch in the history of geography and natural science. His work was taken up and extended to other regions, especially Brazil, by eminent natural¬ ists like Maximilian of Wied, Spix, Martius, Auguste de Sainte-Hilaire, Orbigny and Poppig. These had worthy successors in the brothers Schomburgk (British Guiana), Darwin (Pata¬ gonia, Tierra del Fuego), Ave-Lallemant (Bra¬ zil), Tschudi (Andes, Brazil), Castelnau (Bra¬ zil, Bolivia, Peru), and Burmeister (Brazil, Argentina).

By the acquisition of the Louisiana territory in 1803 the United States came into possession of a boundless domain, in great part as far removed from the knowledge of white men as the heart of Africa. (See Figs. 5 and 6). An exploring expedition was immediately sent into this terra incognita under Lewis and Clark, who proceeded up the valley of the Missouri, crossed the divide of the Rocky Mountains and followed

the Columbia down to the sea. The explorations of Pike, Long, Bonneville, Catlin, Nicolett, and Fremont, the opening of overland routes to Utah and Cal fornia, and the government sur¬ vey for a Pacific railway made deep rifts in the trans-Mississippi region ; but its greatest won¬ ders were to remain enshrouded till the tide of colonization had begun to sweep over the whole area. It was not till 1832 that the Mississippi river was traced to its source by Schoolcraft.

The exploration of the Arctic regions in the hope of finding a north water route for the trade with the East, had lost much of its fasci¬ nation by the 18th century. Russia alone prose¬ cuted it systematically in the course of that cen¬ tury, accomplishing a great work in tracing the coast line of Siberia. About the beginning of the 19th century the idea of a Northwest Pas¬ sage was revived in England and the dream of reaching the pole began to be entertained. (See Figs. 3 and 4). A great and persistent onslaught on the frozen North was inaugurated in 1818. The labyrinth of islands, peninsulas, and ice¬ bound passages north of the American conti¬ nent yielded up its intricacies to the assaults of Parry, the two Rosses, Sir John Franklin (to whose tragic end Arctic discovery owed much of its rapid progress), McClure, Kane, Mc- Clintock and Hayes. The exploration of Arctic British America was prosecuted on land with heroic energy by Franklin, Back, Richardson, Beechey, Dease, Simpson, and Rae. Parry in an attempt to reach the pole in 1827 dragged his sledges over the floating ice fields to the parallel of 82° 45', eclipsing all previous records by more than a degree of latitude. In 1831 James Clark Ross solved the mystery of

the position of the north magnetic pole, which he located in the peninsula of Boothia. McClure entered the Arctic Ocean through Bering Strait in 1850, proceeded east, was beset for years in the ice, joined hands in 1854 with an expedition which had come in the opposite direction, and thus carried off the laurels of the Northwest Passage. While a great breach was being made in the Arctic fast¬ nesses, Bellingshausen, Weddell, Dumont d'Ur¬ ville, Sir J. C. Ross, Wilkes, and others ex¬ tended geographical discovery into the Antarc¬ tic regions. Ross discovered Victoria Land, with its active volcanoes, and in 1842 advanced beyond the 78th parallel. During this same period the arid depths of Australia, whose coast had been explored by Flinders in 1801-03, were invaded by Sturt, Eyre and the ill-fated Leichhardt.

A flood of light was thrown on the geog¬ raphy of Northern and Central Asia in the first half of the 19th century by the journeys of Ermann, Humboldt, Middendorf, Hue (who entered Lhassa, the holy city of Tibet) and others ; while men like Webb, Moorcroft and Wood scaled the heights of the Himalayas and the Pamir, and reached the head streams of the Indus, Ganges and Amu Daria. From 1848 Mount Everest, with the 29,002 feet given to it by the trigonometrical measurement of Sir Andrew Waugh, figured as the highest point on the globe. Among the naturalists who were attracted to the Himalayas, the name of the botanist Hooker stands pre-eminent. The most distinguished traveler in Southwestern Asia in the early part of the century was

Burckhardt, who succeeded in entering the holy places of Mecca and Medina. In 1829 Ararat was ascended by Parrot. In 1832-33 Alex¬ ander Burnes performed his famous ride from India to Bokhara. The travels of Crawfurd and MacLeod in the second quarter of the cen¬ tury dispelled in part the obscurity hanging over farther India. Between 1835 and 1849 the naturalist Junghuhn explored Java and parts of Sumatra. Among his successors in the Malay Archipelago were St. John and Wallace.

Down to the time of the French Revolution, Europe had hardly dared to cast a covetous eye on the interior of Africa. Portugal, Eng¬ land and France held sway at a few stations along the coast. The sturdy Boers, near the Cape of Good Hope, alone represented actual colonization by Europeans. The Revolution brought in its train Bonaparte's conquest of Egypt, the first great onslaught on African territory on the part of Christendom in mod¬ ern times. The consequences of the French domination, brief as it was, were far-reaching in the loosening of Turkey's

hold upon that country. Another result of the wars of the revolution was the supplanting of Dutch do¬ minion at the Cape by that of England. An army of ardent missionaries now made their way into the interior of South Africa. While England was laying the foundations of an empire at this end of Africa, France suddenly invaded the north and conquered Algeria (1830-48). A few years before this invasion, Mehemet Ali, viceroy of Egypt, brought Nubia and Kordofan under his sway. This ambitious potentate, who, for the first time since the days of Saladin, made the aggressive power of Africa felt in another continent, in his role of modernizer of Egypt, sent various scientific expeditions to explore the Nile, which was now traced almost to the equator. To this period of African exploration belong the travels of Ruppell, the brothers Abbadie, Beke and Krapf in Abyssinia.

With the middle of the 19th century com¬ menced an extraordinary era in the history of geographical discovery. The world began to close in upon the dark interior of Africa, and in the course of a generation the great features of the continent were unfolded almost in their entirety. In 1847 the German missionaries Krapf and Rebmann discovered the snow¬ capped peaks of Kilima-Njaro and Kenia, near the equator. In 1849 Livingstone discovered Lake N garni, in the heart of South Africa, at a distance of 1,000 miles from Cape Town. In the course of the next seven years he extended his explorations to the Upper Zambesi, of which mighty stream hardly anything had hitherto been known, followed it up, struck out west along the edge of the Kongo basin (a circumstance unknown to him), made his way to the Portuguese possessions on the At¬ lantic, then, turning back, followed the Zam¬ besi down stream, discovered the Victoria Falls, the rival of Niagara, and came to the shores of the Indian Ocean. While Livingstone was drawing a luminous trail across South Africa from sea to sea, Heinrich Barth was lifting the veil from the depths of the continent on the other side of the equator by his extraordinary journeys in the. west half of the Sudan. In the sixth and seventh decades of the century large

accessions were made to the knowledge of the Nile basin and the surrounding regions, includ¬ ing Abyssinia, by the travels of Petherick (who explored the basin of the Bahr-el-Gazal), Mun- zinger, Beurmann, Heuglin, and others. In the meanwhile the French were pushing into West Africa on the side of Senegambia, Du Chaillu traveled in the country back of the Gabun and through the wilds of the Ogowe, the home of the gorilla and the pvgmy Obongo ; Burton scaled the peak of Kamerun, and Von der Decken explored what is now British East Africa.

Just as Barth was emerging from the scorch¬ ing suns of Central Africa, laden with the knowledge of countless peoples, in another con¬ tinent three equally intrepid Germans proceeded to explore the most elevated region of

the globe. The brothers Schlagintweit crossed the Himalayas and the Karakoram, traversed the lofty plateau of Tibet and surmounted the Kuenlun, reaching heights to which no traveler had ever climbed.

Soon after Livingstone's traverse of South Africa, the beginning was made of those dis¬ coveries which unraveled the most interesting problem presented by the geography of that continent. In 1858 Burton and Speke, dis¬ patched by the Royal Geographical Society in quest of a great reservoir of fresh water which was believed to exist somewhere in the region whence the Nile issued, discovered -Lake Tan¬ ganyika. Before the close of that year, Speke discovered a still larger lake, the Ukerewe, or Victoria Nyanza, which he assumed to be a reservoir of the Nile, though as yet its outlet remained to be found. To what river system, if any, Lake Tanganyika belonged was a prob¬ lem which was to wait still many years for a final solution. In 1859 Livingstone came to the shores of a third great lake, the Nyassa, a feeder of the Zambesi. Within the next five years the question of the sources of the Nile was approximately settled by the explorations of Speke, Grant and Baker. The last named, ascending the river from Egypt in 1864, dis¬ covered the lowest of the Nile reservoirs, the Mwutan Nzige, or Albert Nyanza. What Ptolemy had laid down on his famous map 1,700 years before was found to be substan¬ tially correct, and the discovery later on of snow-clad mountains near the Albert Nyanza, culminating in Ruwenzori, substantiated what the Greek had taught regarding the Mountains of the Moon.

The problem of the Nile was closely inter¬ woven with that of the Kongo, the greatest mystery that still confronted geographers out¬ side of those presented by the polar regions. The Nile question, indeed, could not be re¬ garded as completely settled till the watershed between the two rivers had been determined. Of the Kongo basin, equal in extent to that of the Mississippi, but a mere fraction was known to the world. A boundless maze of tropical forests and rivers had thus far escaped the eye of Europeans. Geographers were not even agreed as to whether the Kongo issued from the heart of the continent or whether it was not rather in the nature of a coast river. Livingstone applied himself with heroic resolu¬ tion to the task of ascertaining the parting of the waters that found their way to the Mediter-

ranean and those that flowed toward the At¬ lantic. In 1867-68 he discovered the Luapula, the east headstream of the Kongo, and its two large reservoirs, Mweru and Bangweolo, and in 1S71 stood on the banks of the great river that hurries past Nyangwe, but not possessed of the

information that would assure him be¬ yond doubt that it could be no other than the Kongo.

During these years wide explorations were made in Central Africa, north of the equator, by Rohlfs, Nachtigal and Schweinfurth. Nach- tigal, a worthy successor of Heinrich Barth, succeeded in making his way into Wadai, a Mohammedan state in Sudan, a goal the pur¬ suit of which had cost the lives of two emi¬ nent explorers, Vogel (1856) and Beurmann (1863). Schweinfurth penetrated into the cannibal regions west of the equatorial Nile, and in 1871 came to the Welle, whose west course convinced him that he had traveled be¬ yond the bounds of the Nile.

These journeys were coincident with a re¬ markable epoch in the geographical annals of America. The explorations of Dali revealed the extent of the Yukon; the mountain systems of the West were explored by Wheeler, Whitney and Hayden; Powell traversed the grand canon of the Colorado; Washburne and Hayden made known the marvels of the Yellowstone. The knowledge of British America was at this time greatly extended by the travels of Bell, Selwyn, Dawson and others. Simultaneously with the exploration of the mountains of North Amer¬ ica, the geological structure of the Andes was laid bare by Reiss and Stiibel, who ascended the volcano of Cotopaxi to its summit.

While the rest of the world was engaged in prying open the recesses of the continents, the Russians were displaying extraordinary activity in the exploration of their vast Asiatic domain and the regions bordering on it. In the first 15 years of the reign of Alexander II, Sem- yenov, Valikhanov, Radlov, Ostensacken, Sye- vertsov, Fedtchenko and Kaulbars assailed that mighty mountain barrier composed of the Altai, Alatau, Tian-Shan, Alai Tagh and the Pamir, which shuts off the elevated desert region of Central Asia from the plains of Western Turke¬ stan and Siberia. During the same period Shishmarev, Mattussovski and Pavlinov pene¬ trated into Mongolia, and Palladius into Man¬ churia. The Russian advance into Central Asiatic highlands met with a prompt response from beyond the Himalayas, whence Hayward, Shaw and Forsyth pushed into Eastern Turke¬ stan, while the pundit Nain Singh made a memorable traverse of Tibet.

When Japan and China, soon after the mid¬ dle of the 19th century, opened their portals to the world, the work of exploration, previ¬ ously inaugurated by dauntless missionaries and naturalists, proceeded with a new im¬ petus. Great journeys were made in China by Blakiston, Pumpelly, Ney, Elias, Bastian, Cooper and Richthofen, who belong to the foremost ranks of Asiatic explorers. In the decade beginning with 1861 explorations were made in the Caucasus, by Radde, in northern Arabia by Palgrave, and in Turkestan by Vambery and Lagree and Gamier traced the

course of the Mekong as far up as the Chinese province of Yunnan. Contemporaneous with these travels were the remarkable journeys per¬

formed in Australia by Burke and Willis, Mac- Kinlay, Stuart and Forrest, whose exploits were emulated by Giles and Warburton.

The year 1871 is memorable in the history of geographical discovery for the dramatic epi¬ sode of the finding of Livingstone by Stanley. The meeting by the waters of Tanganyika was followed by the exploration of the north end of the lake which was found to have no out¬ let in that direction. Livingstone then returned to the scene of his recent labors, the Luapula- Lualaba basin. On 1 May 1873, he expired on the shores of Lake Bangweolo, which he had discovered and which he had become convinced belonged to the Kongo system. In 1874 Cam¬ eron discovered that Lake Tanganyika was con¬ nected by an outlet, the sluggish Lukuga, with the river formed by the Lualaba and Luapula. This river (which Livingstone had reached in 1871 at Nyangwe) was found by Cameron to flow at too low a level to admit of its belonging to the Nile system. This fearless traveler was prevented by the hostility of the natives from descending the stream and verifying his belief that it was the Kongo. It was reserved for the dauntless spirit of Stanley to bring the mightiest of African rivers within the ken of mankind. In November 1876 he embarked at Nyangwe in a fleet of canoes, and performing an unprecedented voyage which twice carried him across the equator, he reached the tides of the Atlantic in August 1877. And now came the great task of exploring the Kongo tribu¬ taries, which enlisted the energies of Stanley, Capello and Ivens, Buchner, Pogge, Wissman, Grenfell, Wolf, Bruckner and Van Gele.

While the veil was being lifted in this quar¬ ter, new light was thrown on the regions west of the Upper Nile by the travels of Junker, Casati, Gessi and Lupton, the country between the Ukerewe and the coast was opened up by Fischer, Thomson, and Johnston, the naturalist Emil Holub traveled in the Zambesi region, and the explorations of Brazza between the Ogowe and the Kongo laid the foundations of a new French colony. Between 1878 and 1881 Serpa Pinto made his traverse of South Africa, Oskar Lenz performed a journey from Tangier to Timbuktu and thence to the Senegal, and Matteuci crossed from Egypt to the Gulf of Guinea. At this time began the extraordinary career of Emin Bey (Eduard Schnitzer), ad¬ ministrator, explorer, naturalist and linguist, in the region of the equatorial Nile. This heroic commander, the peer of the great Gor¬ don, was cut off for years from the world by the Mahdist uprising, till at last Stanley suc¬ ceeded in reaching him by way of the Kongo and Aruwimi, an exploit which recalled the days of the Conquistadores. In 1887 the Rudolf lake was discovered by Teleki. In 1889 Meyer reached the summit of Kilima-Njaro.

During the years which revealed the sources of Africa's greatest rivers the exploration of the mighty tributaries of the Amazon was prose¬ cuted by Chandless. A little later Crevaux won laurels in the same field and to him succeeded Karl von dem Steinen and Ehrenreich.

The decade which witnessed the solution of the Kongo problem, the last great mystery that had remained hanging over the equatorial zone, was marked by renewed activity in Arctic re¬ search. The passage leading north from Baffin Bay, beginning with Smith Sound, appeared to

promise access to an open polar sea, the theory of whose existence had been put forth by Kane. The American expedition under Captain Hall in 1871 proceeded up this channel and the splen¬ didly equipped British expedition under Sir George Nares in 1875 followed in its wake; but Kane's theory was not verified. Some of Nares' men in 1876 reached the parallel of 83° 20', eclipsing Parry's record by more than half a degree. Lieutenant Lockwood of the ill-starred Greely scientific mission in 1883 made a farther gain of four minutes. In 1873 the Austrian expedition of Weyprecht and Payer discovered Franz-Josef Land. In 1878-79 Nor- denskjold immortalized himself by accomplish¬ ing the Northeast Passage.

While Stanley and his successors were open¬ ing up the exuberant forest realm of Equato¬ rial Africa, the arid expanse of Central Asia, stretching from the Pamir on the west to the highlands of Manchuria on the east and em¬ bracing the desert of Gobi (Shamo), the Tarim basin, with the Takla Makan desert, and the ranges of the Tian-Shan, Kuenlum, Altyn Tagh, and Nan-Shan, was attracting the most intrepid explorers from all parts of the world. This illustrious roll includes the great Przhevalski (whose name is borne by the former town of Karakol, in Turkestan, where he died in 1888) ; Sosnovski, Mushketov, Kostyenko, Potanin, Regel, the pundit Krishna (who removed the long-existing doubt regarding the identity of the Sanpo and Brahmaputra), Pyevtsov, Bell, Bogdanovitch, Roborovski, Carey, the brothers Grum-Grzhimailo, Rockhill, Younghusband, Bonvalot, and Henry of Orleans. These had distinguished successors in the last decade of the century in Dutreuil de Rhins, Littledale, the Swedish geologist Sven Hedin, Obrutchev, Futterer, Holderer, and Deasy. Among the host of ardent explorers who have traveled in China ˆ since 1875 are Sosnovski, Baber, Gill, Szechenyi (son of the great Hungarian patriot, Count Stephen Szechenyi), Kreitner, Easton, Hosie, Colquhoun, Henry, and Younghusband. It is only since 1880 that the geography of Ko¬ rea has emerged from its obscurity.

In the last quarter of the 19th century the dimensions of the unknown in

Alaska, the Northwest Territories, and Labrador were vastly reduced by the explorations of Muir, Allen, Schwatka, Dawson, Ogilvie, Russell, Low, and others. In 1888 the first crossing of Green¬ land's great ice cap fin its southern part) was accomplished by Nansen. In 1892 Peary and Astrup made a sledge journey of more than 1,000 miles over the northern end and deter¬ mined the extension of the island in that direc¬ tion. In 1893-95 the gap between the North Pole and the highest latitude ever before reached (Lockwood's 83° 24′ in 1883) was bridged almost half over by Nansen's drift voy¬ age and sledge journey, which carried him to the parallel of 86° 14'. This record was eclipsed in 1900 by the expedition of the Duke of Abruzzi, which reached 86° 33'. . The results of these expeditions rendered it improbable that any extensive land mass remained undiscovered within the Arctic Circle ; physical conditions verified 6 April 1909, when Com. R. E. Peary reached the North Pole by a sledge journey from Cape Columbia, Grant Land. His sound¬ ings at the Pole reached no bottom, the depth exceeding 9,000 feet.

In the same year in which Peary and Astrup crossed the fathomless ice cap of Greenland the gigantic glaciers of the Karakoram were ex¬ plored by Sir William Martin Conway, who climbed to an elevation of about 23,000 feet, eclipsing the record of all former travelers. In 1897 Aconcagua, probably the loftiest peak of the Andes, was scaled to its summit by Zur-briggen, the Swiss guide, and Vines, the geolo¬ gist of Fitzgerald's expedition, the elevation obtained for it by barometric measurement be¬ ing 23,080 feet. In 1898 Conway accomplished the ascent of Illimani, one of the rivals of Aconcagua.

At the close of the 19th century the atten¬ tion of the world was once more turned, after a long intervals, to the Antarctic regions. The British expedition under Borchgrevink (1898- 1900) succeeded in locating the south magnetic pole and attained to the parallel of 78° 50', sur¬ passing by 40′ the <(farthest south® achieved by Ross in 1842. In the expedition of 1907-09 Sir Ernest Henry Shackleton reached lat. 88° 23′ S., long. 162 E., within 97 miles of the Pole. On 16 Dec. 1911 Capt. Roald Amundsen reached the South Pole and returned safely. His tent and records were found a month later, 18 Jan. 1912, by the ill-fated Capt. F. R. Scott, who with three companions died from privation while returning, 29 March 1912. When the 19th century opened, geographical science had half a world to conquer. At its close this conquest may be said to have been well-nigh achieved.

GEOGRAPHICAL DISTRIBUTION OF GOLD MINING. See Gold Mining.

GEOGRAPHICAL SOCIETIES are as¬ sociations formed with the view of obtaining and disseminating geographical knowledge. This is attained, in

the first instance, by mem¬ bers undertaking distant travels, at their own expense in some cases, in others assisted by the funds of the society or grants from govern¬ ment; and, in the second instance, by lectures delivered and works issued under the auspices of the society, or by papers read and commented on at the periodical meetings. In point of seniority the first of these associations is the Societe de Geographic of Paris, founded in 1821. The German Gesellschaft fur Erdkunde held its first sittings in Berlin in 1828, under the presidency of Ritter, and has counted among its members many of the most famous of modern geographers. By far the most import¬ ant of these institutions in Europe, however, is the Royal Geographical Society, established in London in 1830. The principal travelers and geographers of Great Britain, or indeed of the world, are or have been connected with this society, and such names as those of Living¬ stone, Burton, Baker, Speke, Barth, Wallace, Cameron, Stanley, Thomson, Johnston, Bent, Curzon, Markham, Nansen and many other well-known travelers, are to be found attached to papers in its Journals (1831-80, 50 vols.) and Proceedings (ceased in 1892), or in the Geographical Journal, which it has issued since 1893 in monthly parts, and which includes the society's proceedings. It also issues a (Year Book,' pamphlets, etc., and large sums are de¬ voted annually to aid the cause of geographical research, or as awards and recognition of serv¬ ices rendered to the science. The Russian Geographical Society, founded at Saint Peters-

burg in 1845, has greatly extended our knowl¬ edge of Central Asia and Asiatic Russia. Fol¬ lowing the lead of other nations, Italy has her bocieta Geografica, founded at Florence in 1867, and issuing an annual Bolletti.no. The Amer¬ ican Geographical Society (q.y.) was founded at New \ ork in 1852 and the National Geo- FaPhic Society (q.v.) at Washington, D. C, in 1888. The Royal Scottish Geographical So- cl

GEOGRAPHICAL SOCIETY, American,

a society established at New York in 1852 to encourage geographical exploration and dis¬ covery, to disseminate new geographical infor¬ mation, and to maintain a place where the means shall be afforded of obtaining accurate infor¬ mation for public use concerning every part of the globe. In 1916 the members of the society began to extend its field of usefulness in sev¬ eral directions. It gave financial support to the Crocker Land Expedition in that year. It also gave public exhibitions of war maps and also did good work in illustrating various phases of economic geography. The old Bulletin of the society has become the Geographical Review, a periodical larger in scope than its prototype. A special volume is issued annually by the society. The first volume, that of 1916, was Isaiah

Bowman's In 1918 the society issued a volume on the relation of topography to military strategy on the battle fronts of Eu¬ rope. Fellows of the society are entitled to free copies of these publications. The society has at present over 3,600 fellows.

GEOGRAPHICAL SOCIETY, Royal,

was founded at London in 1830 to aid in scien¬ tific research in geography, and received a char¬ ter in 1859, under which its objects have been the advancement and diffusion of geographical science and the encouragement of exploration. Its pursuit of those objects has been character¬ ized by ability, energy and wise generosity. See Geographical Societies.

GEOGRAPHICAL SOCIETY OF BAL¬ TIMORE, organized in 1902 for the study of geographical science. It acquired over 1,000 members during the first year of its existence. Daniel C. Gilman was its first president.

GEOGRAPHICAL SOCIETY OF PHILADELPHIA, an organization devoted to the advancement and diffusion of geographi¬ cal knowledge. It confers annually, as a re¬ ward for eminent service to the science of geography, the Elisha Kane gold medal ; it sup¬ plies funds for use in exploration; it publishes a bulletin and maintains a library. The society dates its incention from 1891. As the «Geo- graphical Club of Philadelphia® it received a charter in 1893 — the first president being An¬ gelo Heilprin; and four years later adopted the present title. The membership numbered about 1,000 in 1917.

GEOGRAPHY, by derivation, means (added a study of meteorologi- ca and climatic conditions, of the character of soils, and of the distribution of life both ani¬ mal and vegetable, was the first true impulse given to modern geographical research. For a comprehensive knowledge of the earth the aid oi all branches of natural science is sought. Geography, while it is specifically the science or knowledge of the earth, is dealing with phe¬ nomena and studying laws which belong to the universe. One of its important functions is the investigation of the reciprocal relations exist¬ ing between man and his physical surroundings. I he average text-books have fallen far below such a standard. Cartography and statistics orm the sum and substance of these treatises. Maps constitute an essential feature of geog¬ raphy, but are commonly read with less intel¬ ligence than the working drawings of an engi¬ neer or architect. Lists of cities with their populations, and the names of rivers, bays mountains and islands are of great value in the way of information, but they are of secondary importance. It concerns the student of geog¬ raphy less to know that New York is the largest city in the world and the greatest sea¬ port of America

than to discover the causes which have led to such growth and development.

1 he physical or social reasons for the fixing of political boundaries are of greater interest than the mere location of or changes in the bound¬ aries themselves. Happily a change for the bet¬ ter may be observed. The recognition some years ago of the scientific and practical value of geography by German scholars and the sys¬ tematic work done by them have already borne fruff Departments of geography have been established in universities and higher institu¬ tions of learning. Geographical societies have been organized in all the. leading countries of the world, and a broader interest in the subject has been aroused.

Historical.— When Columbus (q.v.) made his. first voyage of discovery, popular belief maintained that the earth was flat, though the scholars of the time recognized its spherical form. The first people to add to a knowledge of distant lands were the Phoenicians. Thev had founded colonies as early as 1200 b.c., and exerted much influence upon the progress of civilization. Herodotus, the father o.f history and geography, and himself a great traveler, records a Phoenician expedition in the 7th cen¬ tury b.c., which, starting from the Red Sea, re¬ turned by way of the Pillars of Hercules and the . Mediterranean, having circumnavigated Africa. While the story has been doubted, the incidents of the narrative give it much color of probability. Herodotus leaves an account of the conception of the earth's extent in the 4th century b.c. The scanty knowledge of the time comprised the coast regions of the Medi¬ terranean Sea extending vaguely to the north and south, with the Atlantic Ocean and the Persian empire constituting the western and eastern boundaries. Strabo's voluminous work on geography, at the dawn of the Christian era, itself a valuable treatise, is of special import¬ ance in affording a glimpse of the efforts of

earlier geographers, whose books are lost. Eratosthenes, the most remarkable of these scholars, made wonderful advances in mathe¬ matics and astronomy. He measured the obliq¬ uity of the ecliptic, described the earth as a sphere revolving on its own axis, and con¬ structed maps with parallels of latitude and longitude. Beyond influencing the belief of a few learned contemporaries, his work was practically unavailing. Ptolemy, who lived in the 2d century a.d., was the supreme authority in astronomy and geography, not only in his own time, but during the Middle Ages. In ac¬ cordance with his system, which was really a compilation of the views of earlier writers, the centre of the universe was the earth, around which the

various heavenly bodies revolved. The travels of Marco Polo in the 14th century and the introduction of the mariners' compass were instrumental in changing the whole history of the human race.

Though the knowledge of our world pro¬ gressed by leaps and bounds, it is interesting to note what a large proportion of that knowledge has been the result of modern investigation. Explorers on the sea had by the end of the 18th century become familiar with the range of the ocean, the outline of the continents and many islands, but at the beginning of the 19th century four-fifths of the land area were unknown. Africa, with the exception of a narrow rim of coast, was indeed a <(Dark Continent.ˆ Lit¬ tle had been added to our knowledge of Asia since the days of Marco Polo. West of the Mississippi, North America was a terra incog¬ nita , and the existence of the Rocky Mountains was not suspected. Even the coast of Australia was not completely traced, and nothing had been learned of its interior. South America, which was better known than any continent except Europe, is now the least explored of all the large land masses.

While the unity of geography should never be overlooked, the subject is commonly divided into different branches, the chief of which are mathematical, physical and political geography.

Mathematical Geography considers the earth as a globe, with its motions and their effects, and teaches the methods of representing the whole or portions of the earth's surface on globes or maps. Observation and careful meas¬ urements have proved the earth to be spheroidal in shape. As it is flattened at the poles, it is not a perfect sphere, nor even a perfect ellip¬ soid, but a ball with slight irregularities of sur¬ face. Its longest diameter is 7,926.6 miles, and its shortest 7,899.6 miles. The circumference is approximately 24,000 miles.

The axis of rotation of the earth is its shortest diameter. The ends of the axis point to opposite parts of the sky, and these, called the poles of the heavens, seem to stand still while the rotation of the earth causes an appar¬ ent revolution of the sky from east to west. The whole system of determining position and direction is established by the earth's rotation. The great circle midway between the poles is the equator. Great circles extending north and south through the poles are meridian circles. Distance from the equator toward either pole is called latitude, and is measured along a meridian. Zero is at the equator, and the quarter circle north or south is divided into

90 degrees (expressed as 90°). Small circles parallel with the equator are parallels of lati¬ tude. The equator and parallels are continually moving from west to east, and the meridians, which cross them at right angles, are

carried in succession directly beneath the sun. All points on any meridian turn around the axis at the same rate, but the actual distance traversed varies from nothing at the poles to more than 1,000 miles per hour at the equator. The uni¬ form rotation of the earth provides a means of measuring time. The sun crosses the meridian or midday line of any place midway between the hours of rising and setting, and the inter¬ val between two successive noons is called a day, which is divided into 24 equal parts or hours. It is always noon on some meridian, but never on more than one at the same instant. As a complete rotation through 360° occupies 24 hours, meridians 15° apart vary one hour in local time. A person traveling toward the east completely around the world gains a day, but if he makes the same journey in a westerly direction he loses a day. Distance east or west is measured on the equator or a parallel, and is called longitude. Some prime meridian, usually that of Greenwich, is the zero, and measure¬ ments are made 180° east and west. The length of a degree of latitude is a little more than 69 miles, but as the meridians converge toward the poles, degrees of longitude diminish in length as the distance from the equator increases. If the latitude and longitude are unknown, the former is determined by observing the altitude of the pole of the heavens, while the latter is obtained by comparing, with the aid of a chro¬ nometer, the exact moment at which the sun crosses the meridian with the local time of the prime meridian at the same instant. Tables, showing the relative positions of heavenly bodies for each day in the year, are calculated in advance and enable captains of vessels to find their position at sea.

The imaginary network of meridians and parallels can be actually drawn upon a globe. The outline of the continents and the location of places may thus be depicted with great ac¬ curacy. A map is much more convenient than a globe, but, as the surface of a sphere cannot be spread out flat, no map is ever absolutely correct. Various projections are employed to modify the distortion. Mercator's projection, and others similar in plan, are modifications of the result obtained by drawing lines from the centre of a sphere through the parallels and meridians to the surface of a cylinder touching the sphere at the equator. This style of pro¬ jection is employed for navigators' charts, for while areas are distorted, a straight line drawn between any two points correctly represents direction. Several hemispherical projections upon a flat background are used. These, though approximately preserving dimensions, distort directions. For limited areas the coni¬ cal projection is of value. The meridians and parallels appear as they would if traced on a transparent cone placed on the globe.

Physical Geography deals with tlhe earth in its relation to nature. The surface is irreg¬ ular, the hollows being filled with water and the projecting parts forming the dry land. It is surrounded by a gaseous envelope. The solid portion is often called the geosphere or litho-

sphere ; the liquid layer, the hydrosphere ; and the outer mantle, the atmosphere. See Air: Atmosphere; Vapor.

1 he earth is believed to be a cooling and contracting body. With a reduction in size the outer crust becomes wrinkled. The crests of these wrinkles protrude above the water, which fills the troughs. Without altering the relative positions of the exposed land masses and the oceanic basins, a comparatively slight increase in the depth of the latter would cause more land to be uncovered. Or were the bed of the ocean to be raised slightly, the sea would flow over the coast regions and accessible low-lying valleys. Were the solid crust uniformly smooth, it would be completely drowned by a continu¬ ous sea about two miles in depth.

By the present arrangement, the land area constitutes 28 per cent of the surface. The ocean covers about 72 per cent, but by evapora¬ tion and condensation, some of the water is dis¬ tributed over the continents to be retained in lakes or returned to the sea by rivers. Though special names, are given to different portions of the ocean, it is a continuous body of water.

The surface temperature of the ocean varies with the latitude. Ice floes and icebergs form in the polar seas, while an average temperature of 80° is maintained in the tropical ocean. The daily or seasonal range is not great in any lati¬ tude. Even in the tropics heat does not extend far below the surface and the ocean as a whole is a mass of cold water.

The amount of dissolved salts in sea water averages 3.5 per cent. The salinity is not uni¬ form, as portions are regularly freshened. These are chiefly the belts of equatorial rains, the regions affected by the melting ice of the polar seas and those near coasts receiving the drainage of large land areas. As heat ex¬ pands sea water, thus reducing its density, it generally happens that the surface water is saltier than the colder layers below. The dis¬ tribution of heat and the modification of climate effected by ocean currents is of vast importance. Nearly half the sun's heat in the Torrid Zone is carried to higher latitudes. The Arctic regions receive more heat from the Gulf Stream than they do directly from the sun. The west¬ ern coast of Europe from the North Cape to Gibraltar has a climate much warmer than that of the opposite coast of North America and this work of the Gulf Stream is in a measure duplicated on the western coast of North Amer¬ ica by the Japan current. Cold currents from the southern ocean soften the climate of the western tropical coasts of Africa and South America. If the

water completely covered the earth, a double wave caused by the attraction of the moon would, on account of the earth's rotation, travel around the globe every day. This ideal arrangement of tides is not realized except in the southern ocean, and, with a general movement to the west, the tidal wave is deflected northward in the other oceans.

In determining the height of mountains or any part of the land surface, it is necessary to have some common level as a basis of com¬ parison. For this purpose the surface of the sea has been chosen, but on account of the many movements to which the ocean is subjected and because of the attraction exerted by elevated land masses, its surface is not level, and all

comparative heights are of doubtful value. Ef¬ forts have been made to determine the mean level of the whole land surface. While much has yet to be accomplished in securing the requisite data, it has been quite clearly shown that such a line lies about 10,000 feet below present sea-level. The abysmal area below this "ne ˆ equal extent with the area above it. As the exposed continental area occupies 28 per cent of the earth's surface, it follows that 22 per cent is covered by water less than 10,000 leet in depth. Quite a large part of this region slopes gently away from the coast line to a depth of 100 fathoms, forming the continental shelf. The area of this submerged shelf is very nearly the same as that of the low costal plains of which it is a continuation. Were the level of the sea to be reduced 600 feet, 10,000,000 square miles would be added to the land area, and the present exposed surface would sustain a loss somewhat greater were the sea to rise an equal amount. The proportion of land is much greater in the northern than in the southern hemisphere and the large land masses have their greatest width in the north.

The destructive agencies are so active that in a short time all the land would disappear and be distributed over the bed of the ocean were it not for the upheavals due to the contraction of the crust. From causes, concerning which all geologists do not agree, lines of weakness are developed and portions of the crust are forced up into mountain ranges or broad plat¬ eaus, while other adjacent portions are de¬ pressed. The outer rocks or those forming the slopes of a young mountain range are composed of the sediment of older rocks. They are the result of processes of destruction and recon¬ struction, which are to be at once renewed. For no sooner are new areas exposed than the sun either by direct heat, or through the agency of wind, frost, rain, or. running water, proceeds to carve the surface into new forms, carrying away the waste to cover the rocks with soil for the support of vegetation or to fill up the hol¬ lows of the sea. .Rain not only attacks the rocks by force of impact and solution, but by moving broken fragments from higher to lower levels it uses them as cutting tools. The sur¬ face water and that flowing from springs form little streams,

which uniting produce rivers. In its upper course, which is the steepest, the work of a stream is purely destructive. It is cutting a gorge or valley in the high land. As the slope becomes more gradual, it is alternately depositing its load of stones and gravel or sweeping them away to some lower point. In its final stretch through a nearly level area it is building up an alluvial plain. Deltas and many interior valleys, like that of the Missis¬ sippi, are thus formed. Rivers carry away im¬ mense quantities of solid material and are con¬ tinually cutting down or extending their basins. The tendency of river work is to reduce the land to a dead level and a subdued surface is usually an indication of old age.

Relief, or the vertical aspect of a land area, is the result of the forces of upheaval and erosion, which are continually at work. The arrangement of mountains, plateaus and valleys varies in the different continents and upon the arrangement, climate, the possibilities of de¬ velopment, and the history of a county largely

depend. The principal mountain ranges are however, so disposed that the largest drain¬ age areas are tributary to the Atlantic Ocean or its arms. Asia, the largest continent, has the greatest average elevation and the highest point of land.

The many changes in the inorganic world profoundly affect the organic world and the distribution of life. In turn the very processes of nature are largely influenced by living or¬ ganisms. The spread of any species, animal or vegetable, is promoted or retarded by such geographical features as oceans, mountains, plains, deserts and climate, but marine animals, by withdrawing -dissolved carbonate of lime from the sea water, have constructed mountains of limestone, and vegetation retards the work of denudation, regulates rainfall and modifies the rate of evaporation. Plants alone are able to construct organic from inorganic material and animal life is dependent directly or indirectly upon plants for food.

All plants and animals are adapted to cer¬ tain environments and could not live if the essential conditions were changed, but every form of life does not of necessity reach every region suited to it. Natives of one country when carried to another frequently develop with amazing rapidity, even to the extent of crowd¬ ing out indigenous species. In the tropics, the forests contain a variety of forms and the large animals live singly or in families. In the temperate zones many plants and animals for mutual protection are gregarious. Forests often contain only one kind of tree and the variety is

never great. Grasses do not grow singly as in hot climates, but form a sod. An¬ imals move in herds and fish in shoals.

Natural distribution has been greatly modi¬ fied by man. In some regions the large land animals have been exterminated and vast for¬ est tracts have been removed. Domestic ani¬ mals and cultivated plants have replaced the native species. Man alone of living creatures is able to rise superior to his environment, to conquer and control adverse geographical con¬ ditions. This faculty is acquired and is the result of long development. Primitive man was undoubtedly as helpless as other animals. The same sort of barriers that retard the migration of species, have also affected the growth of na¬ tions and no thorough conception of history, which is a record of man's development, can overlook the fundamental importance of geog¬ raphy. It was not until the barriers were broken down and until isolation gave way to intercourse with other peoples that civilization made safe and permanent advances.

Political Geography deals merely with the distribution of the human race in different com¬ munities, but an intelligent study of the boun¬ daries of states involves an acquaintance with natural geographical conditions and the history of the inhabitants. It has been proposed to di¬ vide history into three periods. The first, known as the Fluvial, includes the growth of nations developing in fertile river deltas, with such scanty means of intercourse as the streams afforded. The Mesopotamian nations of Assyria and Babylon, the Egyptians and the Hindus are well-known examples. As the sailor became more venturesome and skirted the shores of large inland seas, the Mediter¬

ranean period succeeded the Fluvial. Columbus and Vasco da Gama inaugurated the last, or the Oceanic period. Such a view is at least not inappropriate in tracing the development of commerce.

Commercial Geography is the most prac¬ tical branch of the subject. It means a knowl¬ edge of the distribution of the world's prod¬ ucts, of existing demands for these commodi¬ ties and satisfactory means of transportation and exchange. The Phoenicians were the first great traders. Their horizon was practically limited by the shores of the Mediterranean, al¬ though they sailed beyond its confines and many of the goods with which their ships were laden were brought to Syria by caravans. The Phoenicians were succeeded by the Cartha¬ ginians and the Greeks, but the typical mer¬ chants of the Mediterranean class were the Venetians. Their supremacy in the world's commerce was unquestioned until, at the close of the 15th century, the Atlantic succeeded the Mediterranean as the highway of trade. The centre of the world's commerce then passed in succession from Portugal to Spain and then on to Holland, the Hanseatic towns and

London. To-day commerce is not a monopofy, but is world-wide. In volume of trade the United States is surpassed by no other nation, but competition is keen and the successful mer¬ chant of the future must be well versed in that knowledge of which geography forms the basis.

The growth of commerce has been in di¬ rect ratio to the extent and rapidity of geo¬ graphical discovery. Some of the conditions which are favorable or unfavorable to trade are quite obvious. An indented continental out¬ line and navigable rivers reaching the interior are most desirable features. In these respects Europe and North America are fortunate. Asia also is penetrated by arms of the sea, but her largest rivers, like the northern streams of North America, are practically useless, be¬ cause they are tributary to an inhospitable frozen sea. Africa has no breaks in its con¬ tour and its rivers reach the sea by dropping from a plateau. Though lying next to Europe it baffled both the curiosity and the greed of her adventurers until the latter half of the 19th century. South America is not wanting in inlets and her river systems are remarkable, yet very little is known of some portions of the interior. It becomes evident that latitude is an important factor in the case of both Africa and South America. The torrid heat, the burning desert and the deadly fever were obstacles which the African explorer dreaded. The stag¬ nation of Amazonian regions in South Amer¬ ica is also explained when their tropical posi¬ tion is considered. Aside from topography and climate, the character of the inhabitants has much to do with the success of commercial intercourse.

Commerce has expanded because man has been able to meet and to overcome natural ob¬ stacles. He has to a great extent eliminated time and distance by cutting canals through isthmuses, by connecting the shores of the oceans by continental railroads, by the substi¬ tution of steam vessels for those propelled by the wind and by girdling the globe with the telegraph. He has modified climate both as to rainfall and healthfulness by the planting

or removal of trees and by drainage of the ground. By irrigation he has made the arid waste productive and fruitful. At the begin¬ ning of the 19th century, the merchant was obliged to visit the region in which he desired to purchase his commodities and to carry with him the money for payment. Now, by the aid of a cosmopolitan system of credit, he may within a few hours buy in one part of the globe and sell, in another without leaving his office.

Bibliography. — Champault, P., (Des Bases Methodologiques de la Geographie Humaine) (Revue de Philosophic, Paris 1914) ; (Grande Geographie Bong Illustree> (Paris 1911-14) ; Markham, C. R., (The History of the Gradual Development of the Groundwork of Geographi¬ cal Science > (Geographical Journal, London, 1915) ; Mill, H. R., as editor, (The Interna¬ tional Geography, > by 70 authors (New York 1912) ; Suess, E., (La Face de la Terre) ((Das Antlitz der ErdeP trans. and annotated by Emm. de Margerie, Tome III, 2° partie, Paris 1911, and other parts and dates).

F. B. Greene, A.M.,

Former Sec. Geographical Soc. of Philadelphia.

GEOGRAPHY, Biblical, embraces the ex¬ tent of the earth's surface known to the Bibli¬ cal writers in Biblical times, and also the views commonly held during the Biblical ages rela¬ tive to the shape of the earth and to the prob¬ lems of its relation to the rest of the universe. There is no reason to believe that the Jews were more advanced in their geographical knowledge than were the Egyptians, Greeks, Romans and other civilized peoples of their own time. As there are no Biblical writings extant which furnish a statement as to the views held by pre-Christian Jewish writers, these views must be gathered from allusions, statements and other incidental information of a like nature scattered through Biblical litera¬ ture. The view certainly seems to have been held that the earth stood still and that both the sun and the moon made daily journeys across it. The earth seems to have been regarded as a great disc bounded by a very distant horizon beyond which was the great primaeval ocean. This surface was thought to be divided into four equal parts, each one of which was known as one of the quarters of the earth. The ends of these quarters, that is, the parts boi dering on the primeval ocean, were known as the four corners of the earth.. Another view held of this latter expression is that the <(four corners of the earths were the extreme points of the imaginary lines dividing the earth into quar¬ ters.

Josephus, speaking of the Garden of Eden, says : (

course of time this cosmic myth seems to have become localized among the Jews and to have been given a tribal signification applied to a certain restricted spot which was tlhe scene of man s creation, first years on earth and fall

u-1)1 LVor, 111 the eyes of the Creator. But while the description of the Garden of Eden was thus a restriction of the cosmic myth to a certain locality and race, there are evidences that the myth itself as known to the

Greek, Romans, Egyptians and other peoples of Bibli- cal days, continued long to represent the Jew-

earth ˆ °f ˆ f°rm and relationshiP of the

In later Biblical literature the earth is still represented as Mounded upon the seas and es¬ tablished upon the floods® (Psalms xxiv, 2). Above the earth stretched the firm and ever- Jastmg heavens, the abode of the Creator who planted his footsteps on the storms and used the earth for his footstool.

The four quarters of the earth seem to have retained, even in later Biblical days, among the Jews their designation as the home of the tour winds; but how much of the primitive mythological conception went with this parti¬ tion at this later date, it is hard now to deter- mine owing to the difficulty of ascertaining when the writer is using imagery called out of the past, and when he is using the beliefs cur¬ rent in his day. The last seems to have been ever the primal direction from which all other directions were taken. In primitive myth it was the source of light and life. Therefore the eastern division of the earth was symbol¬ ically sacred. This is why temples, among many peoples, were always so constructed as to face to the east. This governed the manner of naming the directions of the compass which were designated as the direction before (east), the rising; the direction above, or to the left (north) ; the direction below, or to the right (south) ; and the direction behind, or the goingr down (west).

Definite Knowledge.— The Hebrews had a definite knowledge of their own land and of those of the races neighboring on their's; but beyond this their knowledge seems to have been very imperfect, even of the great nations of ffieir day. Away to the north, according to Hebrew statement or description, stretched the great Euphrates. There, too, lay Assyria and Babylonia. But as to the extent of these and what lay beyond them, little or no information is furnished in Biblical literature. The land to the south was a general designation of Egypt, whose exact position, boundaries and extent are not indicated. This lack of detailed informa¬ tion is evidently not due to a want of geograph¬ ical terms in the Hebrew tongue with which to describe in detail these various foreign lands,, since the minutest descriptions are found in connection with localities intimately known to the writers. The conclusion is, therefore, that geographical knowledge of foreign countries was both limited and indefinite among the He¬ brews in Old Testament times. Their knowledge of. local geography was requisite owing to the tribal divisions among the Jews and the close relationship of the tribes with one another. These relationships produced a large vocabu¬ lary of exact, definite and comprehensive tech¬ nical terms; and these seem to have been in¬ creased and perfected through contact with the

Egyptians. Even the indefinite conception of distant countries of the Hebrews was not far- reaching. The eastern end of the Mediterra¬ nean Sea, Egypt, Babylonia, Assyria, the Land of the Medes and the Persians, are presented more or less distinctly; but before the coun¬ tries lying beyond these the curtain is gener¬ ally drawn, or at the best, one corner is slightly turned back revealing uncertain glimpses of mysterious, indistinct lands within. Even this is more extensive than the geographical knowl¬ edge possessed by the patriarchs before they came into contact with Egypt. It follows, therefore, that the Hebrews had no real con¬ ception of the extent of the earth, the centre of which was, in their conception, their own land, and in later days, Jerusalem.

The limited geographical knowledge pos¬ sessed by the Hebrews in earlier days was ex¬ tended through contact with neighboring na¬ tions voluntarily or forced. The Babyoniap captivity was the first event that seriously turned the national vision outward and made the Hebrews intimately acquainted with a pow¬ erful neighboring nation, thus broadening very greatly their geographical vision and giving them intimate knowledge of Assyria, Babylonia and Media, which formed one great commercial centre. The Hebrews also had an indefinite knowledge of the <(Isles of the Gentiles,® gath¬ ered, undoubtedly, from their venturesome neighbors, the Phoenicians, who were well ac¬ quainted with all the countries on the shores of the Mediterranean. This knowledge tended to become somewhat more definite as time went on, and as the Hebrews became a more mercan¬ tile race and more of a political factor in west¬ ern Asia. In later Biblical days, they acquired a much more definite geographical knowledge of all Asia-Minor and all the northern and east¬ ern shores of the Mediterranean to beyond Italy. This again was steadily extended, until their position as a trading people about the be¬ ginning of the Christian era would warrant the belief that they possessed as wide a knowl¬ edge of the known world as was then held by people of the most advanced nations. This belief is confirmed by the fact that Syria was closely connected with Rome, and that the He¬ brews, having been carried so often into cap¬ tivity, and having been forced into commercial life, had begun to spread over the known civil¬ ized world and to become active in all the great centres of population. There is, there¬ fore, a very considerable difference between the geographical knowledge possessed in Old Testament and in New Testament times. The eminence of Jews in literature among the nations in the century preceding the beginning of the Christian era, and in several centuries following, is eloquent of this wide distribution of the race at this comparatively early period. Yet, with all this wide distribution the Jews have left no earlv work on geography ; though there is good reason to believe that works of this kind existed among

Greeks, Egyptians, Phoenicians, and Romans. However, the first attempt at Biblical Geography was probably the

Sacra)- After this Wells, Reland, Dr. Robin¬ son, and Ritter followed, each successively treating the subject from his own point of view. Yet each of these works, in some one or more respects, falls short of what a good Biblical geography ought to be, especially from the historical, philological and mythological points of view.*

GEOLOGICAL SOCIETY OF AMER¬ ICA, an organized association, the outgrowth of the geological section of the American As¬ sociation for the Advancement of Science. The society has a membership of about 365 ; it holds one general meeting annually, and publishes — also annually, but in four quarterly parts • — its valuable Bulletin, a single serial octavo, the edition limited to 700 copies. The organization of the society having been completed in 1888, the first volume of the bulletin was dated 1890, and in this the object of the society was declared to be the promotion of the science of geology in North America. Article V of the provisional constitution provides that ((The an¬ nual meeting shall be held between Christmas and New Year, at a place to be designated by the executive council.® Provision was also made at that time for special meetings.*

GEOLOGICAL SURVEY, United States,

a bureau of the Interior Department created for the purpose of preparing a map of the United States, classifying the public lands, examining the geological structure, mineral resources and the products of the country. To these duties were added those of investigating the extent to which the arid lands of the West can be re¬ deemed by irrigation, segregating the irrigable from the nonirrigable lands, and the selection of sites for reservoirs and canals for the pur¬ poses of irrigation. The maps made by the Geological Survey are all on a large scale, and have a degree of accuracy and a minuteness in detail incomparably greater than ordinary maps. The smallest scale is 1-250,000, or about four miles to the inch, and this scale has been em¬ ployed for regions of the West which are thinly settled, and where the topography is mountain¬ ous. But it has been superseded by scales of 2 miles and one mile to the inch, the latter for populous regions with slightly or moderately diversified topography, like Massachusetts and New Jersey. The maps are engraved on sheets which, with the 4-mile scale, embrace 1° of latitude and 1° of longitude. The 2-mile maps embrace tracts of half the above linear or one- fourth the areal dimensions; the 1-mile maps embrace one-fourth of the above linear and one-sixteenth the areal dimensions. The to¬ pography is represented by ((contours® or "grade curves® ; that is, by lines of equal altitude above the sea. The contour intervals are uni¬ form for each sheet, but vary in different sheets

according to the character of the. country. In some tracts the contour intervals represent a difference of elevation of 200 feet, these being in very mountainous countries, while in flat countries and on large-scale sheets they may be as small as 20 feet. The general construction and methods of all maps are, however, the same.

There are three principal branches of the geological survey: (1) Geology proper; (2) topography; (3) irrigation surveys. The geo¬ logical branch investigates the stratigraphy, the geological structure and history, the lithology,

mineralogy and palaeontology, the ores and mines, and in general the natural economics, re¬ sources and physical geography of the country. 1 he topographic branch prepares the maps; the irrigation branch investigates the possibili¬ ties of irrigation and selects the irrigable lands and sites available for reservoirs and canals. The work of the topographic branch is the basis of the work of the other two, and all the results of the latter are projected on the maps. Ihe publications of the survey are: (1) the annual report of the director, which, besides the administrative report, contains memoirs on geologic subjects by members of the survey, and is distributed according to the regulations of the Interior Department; (2) monographs on the leading subjects of special investigation by the geologists; (3) bulletins on more lim¬ ited special subjects of research; (4) an annual volume of mineral statistics. The last three are distributed gratuitously only to designated libraries and to learned corporate societies, which send their own publications in exchange. Otherwise they are sold by the director and the money deposited in the treasury. See Geology; Irrigation ; Topography.

Methods and Publications. — The preced¬ ing paragraphs state in a general way the func¬ tions of this Survey as originally defined by Congress, together with subsequent modifica¬ tions which included within the scope of its duties the study of the hydrographical condi¬ tions relating to water power, and to the irriga¬ tion of the arid lands of the western States.

As the geologic and hydrographic work de¬ pends upon the topograhpic work, the prepara¬ tion of a suitable topographic map received primary consideration, and the general lines of operations extended to secure it were very defi¬ nitely outlined from the earliest period of the Survey, so that at the present time almost the total area of the United States, exclusive of Alaska, has been surveyed and mapped for this purpose.

In the execution of the field work the pro¬ cedure has conformed to the general methods employed in accurate trigonometrical surveys; but the enormous extent of the territory sur¬ veyed; the great diversity and the peculiar ar¬ rangement of the natural features of the coun¬ try, and the necessity for executing the work as expeditiously as possible, and yet consistent with all the requirements of thorough accuracy, have tended to develop methods which are not only specially applicable to the work of the Survey, but also form a group of comparatively new methods available for any other line of topo¬ graphical work. These methods may be briefly outlined as follows:

The surveying and mapping operations con¬ form to the general plan which divides the whole area of the country into a series of quadrangles each of which is equal to a square degree, that is, each quadrangle is bounded on the east and the west by a degree of longitude, and on the north and the south by a degree of latitude.

The surveying operations consist in the ex¬ tension of a system of primary and secondary triangles with tertiary triangulation points over the whole country, accompanied by three sys¬ tems of level lines, supplemented by a system of road and stadia traverse.

The primary triangulation has been planned

for the control of the work over the whole country, thus insuring the accurate ultimate meeting of fragmentary surveys which may be initiated a hundred or even a thousand miles apart. In this work, the triangles are ex¬ panded from accurately measured base lines, and connect various points of reference the geographical positions of which have been ac¬ curately determined by the most approved astronomical methods. The astronomical work consists of (1) the measurement of the zenith distances of stars by means of delicate zenith telescopes, for the determination of latitude; (2) the exchange of telegraphic time signals between unknown astronomical positions and a known astronomical position, such as a first- class observatory, for the determination of the differences of longitude; and (3) the observa¬ tion of circumpolar stars for the determination of the azimuth of a line, such as a base line, or the side of a primary triangle. The base lines are measured by means of base bars, iced bars, or steel tapes, proper allowances being made for sag, pull, etc., and the measurements repeated several times in order to reduce the probable error to a minimum of less than one in 1,000,000. The elevations of the various stations are established by lines of precise levels run from the datum of mean sea level determined by means pi accurate tide gauges. The angles of the triangles connecting these stations are measured by means of theodolites equipped with high power terrestrial telescopes. From the data thus obtained, the

lengths of the sides of the various triangles are computed and the entire system of triangulation plotted on the topographic map to furnish the primary control for the secondary detail.

The secondary triangulation is usually exe¬ cuted by means of the plane table, and new points located so as to give from one to three good tertiary triangulation points per square mile. The elevations of these points, usually hill summits, are determined by the measure¬ ment of vertical angles of elevation and depres¬ sion, depending upon spirit levelling, while the lower relief of the country is determined by lines of secondary spirit levels run six miles apart with intermediate lines of flying levels run three miles apart with sufficient accuracy to allow them, to close on the secondary levels within the limits of one or two feet.

Traverse Lines. — Where the country is covered with dense forests, or where the sur¬ face relief is insufficient for triangulation pur¬ poses, both the primary and secondary control consists of a system of primary traverses checked by primary triangulation locations, or by astronomically determined positions. These traverses are run by compass and plane table, and a secondary system of traverse lines con¬ sisting, of odometer and stadia measurements of roads is interwoven with the plane table work. The data obtained from the secondary traverses is plotted upon the plane table sheets during the progress of the work, and is subsequently ad¬ justed upon the final map between the check points established by the primary traverse, or by the plane-table triangulation, the distances between which are so short — one to four miles — that errors of location are scarcely percepti¬ ble upon map scales of one inch to one or two miles.

The work of primary triangulation and pre-

cise levelling is usually executed a season in advance of the topographic sketching, while the secondary triangulation, traverse work and lines of flying levels are immediately followed by the topographic sketching, both classes of work being done by members of the same party. The data obtained from the secondary triangulation and traverses is then plotted upon a sketch sheet. This data is of such a character that each sheet includes from two to five trigono¬ metric locations; from four to eight inches of road traverse; and one or more instrumental elevations, per square inch. Equipped with a sketch sheet thus prepared, the topographer

places himself at a point of known elevation and sketches on the sheet by eye with the aid of a hand level the plan of the contour line which passes through his position. In open country, the contours may be located in this manner quite accurately for a distance of half a mile in either direction from his position, corresponding to a total distance of an inch upon the sketch sheet. In wooded country where the figure of the contour cannot be seen beyond his immediate position, he proceeds by road carefully observing the variations of the slope, and determines the differences of eleva¬ tion for short distances between check points by means of the aneroid, and sketches in the plan of the contour according to the data thus obtained. In cases where the number of ac¬ curately determined elevations are insufficient, more locations are fixed by vertical angulation, or by flying levels as the work of sketching progresses. In this manner a system of con¬ tours is built up along the roads and water¬ courses, and if the lines do not practically fill up the entire sheet, the topographer walks into the spaces within the road circuits, and by means of stadia lines for long distances, or by pacing for short distances, determines the posi¬ tions of the contours required to complete the sheet. The sketches thus obtained are inked in, either in the field or at the office, and are then reduced to the scale of the final map by photog¬ raphy and form the copy for the engravers.

*The great topographic map of the United States now being thus prepared by the Survey, is published in atlas sheets of aproximately uniform size, I6J/2 by 20 inches, on which the mapped area occupies a space \7y2 inches in height, and 11 y2 to 16 inches in width according to the latitude. The division of land repre¬ sented by an atlas sheet is called a ˆquadrangle,** and is always bounded by parallels of altitude and meridians. Although the sizes of the sheets are always the same, three different scales are employed in the mapping of the surveyed areas in order to serve different purposes and to suit various conditions. A scale of 1 : 62500, very nearly one inch to one mile, is used for map¬ ping the thickly settled, or industrially import¬ ant sections of the country. The. sheets on this scale cover an area of 15′ of latitude by 15′ of longitude. A scale of 1: 125000, very, nearly one inch to two miles, is used for mapping the greater part of the country. The. sheets on this scale cover an area of 30′ of latitude by 30′ of longitude. A scale of. 1 :250000, very nearly one inch to four miles, is used for mapping the desert regions of the western States, and gives sheets which include an area of 1° of latitude by 1° of longitude.*

This map is printed in three colors and

shows the following named classes of natural and artificial features: (1) Water, including seas, lakes, ponds, rivers, creeks, canals, swamps, etc., are shown in blue. (2) Relief, including mountains, hills, valleys, cliffs,

etc., are shown in brown contours. (3) Culture, or the works of man, such as villages, towns, cities, roads, rail¬ roads, boundary lines, etc., are shown in black. The features shown in blue and black are self-explanatory. In the case of the brown contour lines, each contour passes through points which have the same altitude above mean sea level, and a series of such lines arranged one above the other at regular vertical intervals, but ap¬ pearing on the map at irregular intervals, that is, close together where the slopes are steep, and far apart where the slopes are gentle, ac¬ curately delineates the general configuration of the country, and gives the elevations of all points above the level of the sea. The vertical interval adopted varies according to the char¬ acter of the country mapped. In a flat country it may be as small as 10 feet, while in a moun¬ tainous region it may be as large as 200 feet, usually, every fifth contour is made heavier than the others, and is accompanied by figures giving its elevation above the level of the sea. The heights of many other points, such as the intersections of ordinary roads and highways, railroad crossings and stations, the summits of uplands, hills and mountains, and definite bench marks, are also given in figures which are placed close to the points to which they refer, and are correct to the nearest foot. Each sheet is designated by the name of a principal town, or the name of some prominent natural feature within the district represented, and the names of the adjoining published sheets are printed on the margins. Explanations of the various con¬ ventional signs used are printed on the back of each sheet, and materially assist in the reading of the map.

This topographic map is the base on which the facts relating to the geology and the min¬ eral resources of a quadrangle are represented, and constitute the sheets of the Geologic Atlas of the United States published by the Survey. The price of the topographic sheets is five cents each when the number purchased is less than 100 copies, and two cents each when they are ordered in lots of 100 or more copies. In the Geologic Atlas the topographic and the geologic sheets of a quadrangle are bound to¬ gether, and, accompanied with a textual de¬ scription of the district represented, constitute a folio of the Atlas. These folios are sold for 25 cents each, except those that have received special treatment and are unusually comprehen¬ sive. The price of such varies according to the character of the information afforded, the num¬ ber of the maps, in the folio, etc. All com¬ munications relative to these maps, or any other publication of the Survey should be addressed to The Director, United States Geological Sur¬ vey, Washington, D. C.

The accompanying map is a small portion of the Housatonic quadrangle which includes por¬ tions of Massachusetts, New York and Con¬ necticut. It affords a general idea of the topo¬ graphical treatment; but, being printed only in black and white, it fails almost completely to give, a true

idea of. the actual beauty of the original sheet as printed in the three conven¬ tional colors already described.

GEOLOGY

421

The importance of the topographical and geological publications of the Survey cannot be overestimated. The maps form the basis of all the State and county maps of the United States published for commercial purpose. Their accuracy is such that they are readily available for use in connection with the preliminary work of railroad, canal and other surveys, and for purposes of verification in damage suits and other legal proceedings before the various tribunals.

It is true that the work of the survey costs the government hundreds of thousands of dol-

vey set the standard for this country and are invaluable not only to the student-engineer, but also to the actual worker in the field. These publications may be obtained by application to the Director of the Survey at Washington, D. C Consult Branner, J. C., {The relations of the State and National geological surveys to each other and to the geologists of the country) (Salem 1890) ; Johnson, D. W., (Field methods in physiographic geology (Lancaster 1913) ; Lesley, J. P., (The utility of government geolog¬ ical surveys > (Philadelphia 1874) ; Hayes, C. W., (The State geological surveys of the United*

Portion of Housatonic Quadrangle

Scale 125006

t

s Miles.

s Kilometers.

Contour Interval 40 feet

*Datum, is m*anna,lttmL*

lars annually, but the returns through the vari¬ ous industrial channels and through the develop¬ ment of the natural resources of the county, amounts to hundreds of millions.

This is especially the case relative to the work and publications of the

Geologic Depart¬ ment, without which the high economical de¬ velopment of the mineral resources of the country would be practically impossible.

In the matter of the use of instruments, such as the plane table, stadia and tape, and in the application of precise but rapid methods in the execution of the particular class of surveying practised, the various publications of the sur-

States) (Washington 1911) ; Wood, G. M., (The principal faults found in manuscript submitted for publication by members of the United States Geological Survey) (Washington 1906).

GEOLOGY (from Greek ge, earth, and logia, account). Geology is that science which treats of the history of the earth. It begins with the remotest periods and traces in orderly manner all those changes in structure, material and external form which our planet has under¬ gone. The record is read from the rocks themselves and interpreted in the light of proc¬ esses now known to be taking place. Among those processes earthquakes and volcanoes were

early recognized as important "by reason of their cataclysmic nature ; but later and more detailed studies show that quite as important, perhaps vastly more so, are the unobtrusive activities of rain, wind, running water, glaciers, waves, tides, and even organic agencies.

In following out these processes it must be always borne in mind that they operate with exceeding slowness. Indeed it is only through the conception of a history enormously long, expressed in millions of years, that we can un¬ derstand the truly stupendous character of the work accomplished. (See section on Age of the Earth). With this vast length of time emphasized in the thought it must be further borne in mind that the great changes of the geologic past have been produced for the most part by the operation of those forces now going on before our very eyes. For that reason, we study closely the changes now taking place in order that in their light we may properly inter¬ pret the records read in the rock pages of the geologic volume.

In its broadest sense geology is one of the most inclusive sciences. The life records of the past can be read only in terms of modern biology; the remoter history of the earth's be¬ ginnings are inextricably interwoven with as¬ tronomy; physics and mechanics must be invoked to explain tides, interior rigidity, earth heat, and many other problems ; the ultimate

analysis of the materials of which our globe is composed must be referred to the chemist, as must also many of the changes involved in weathering and metamorphism to be detailed later; meteorology and climatology furnish the only rational background for the adequate study of those external forces now modifying the earth's surface. And so in nearly every respect it is seen that geology overlaps other funda¬ mental sciences.

Geology Subdivided

Geology covers an extensive territory and is usually subdivided into the following more or less generally recognized branches.

Cosmic Geology treats of the origin of the earth, its relations to the other bodies of our solar system, and its general relations in space, thus encroaching on the field of astronomy. See Cosmogony.

Geognosy treats of the materials of which the earth is composed, air, water, and solid crust, known as the atmosphere, the hydro¬ sphere and the lithosphere.

Mineralogy includes a study of the chemical composition, crystal form, origin, and occur¬ rence of the large number of definite chemical compounds (minerals) of which the earth is made up. Optical mineralogy deals with the study of the optical properties of minerals with the polarizing microscope.

Petrology treats of the origin, occurrence, constituent minerals, and texture of the rocks of the earth.

Petrography , used loosely as a synonjun for petrology, is in reality a more restricted term applying to a study of the structure, texture, and composition of rocks either macroscopically or microscopically, but not concerned with origin or occurrence. In later usage there is even a tendency to restrict petrography to microscopic study.

Lithology, formerly used in the same sense

as petrology, is beginning to be confined by many to the macroscopic study of rocks as contrasted with petrography. See Mineralogy ; Metamorphic Rocks ; Petrology ; Rocks ; Sedi¬ mentary Rocks ; Etc.

Dynamical Geology treats of the forces which tend to change or modify earth structure or earth form. It details the agencies at work and the processes by which they operate. These forces are hypogene (internal) and epigene (surficiaD. Three great processes are usually recognized, gradation, diastrophism and volcan- ism. Gradation is surficial and due directly to the

action of rain, wind, running water, glaciers, wave work, tides, plants and animals. Volcan- ism is internal and deals with great movements of fluid rock, the most striking exhibition of which is to be seen in volcanic phenomena. Diastrophism, also internal, treats of the move¬ ment and distortion of rock masses (deforma¬ tion) which the earth's crust undergoes, and which are best known through the manifesta¬ tions of earthquakes.

Structural Geology, also known as geotec¬ tonics, deals with the arrangement of the ma¬ terials of which the earth is made up. Its province is to investigate the origin of these structures and their practical importance in applied geology. It has to do with the causes of layering or stratification in rocks, the origin of folds and dislocations, and other problems of similar nature.

Physiography (geomorphology), now gen¬ erally recognized as a science distinct from geology, deals with the origin and development of land forms, traces out the topographic ex¬ pression of structure, and embodies a logical history of oceanic basins, and continental ele¬ vations ; of mountains, plateaus and plains; of hills and valleys. Physical geography is used loosely as a synonym, but the term is more properly applied to the borderland between geography and physiography; dealing, as it does, largely with the human element as influ¬ enced by its physiographic surroundings. See Geomorphology ; Physiography.

Paleontology treats of the life of the geo¬ logic past. It outlines the methods by which the evidences of that life are preserved in the rocks, traces in detail the development of vari¬ ous life forms, and attempts to correlate extinct with living genera. It overlaps the fields of botany and zoology, throws enormous light on the problems of evolution, and constitutes the real basis of all efforts to determine the relative ages and relations of strata in widely separated regions (Stratigraphic Correlation). Palceo- botany is a sub-branch which deals exclusively with the palaeontology of the plant world. See Fossils ; Paleontology ; Paleobotany ; Petri¬ faction; etc.

Stratigraphy is not infrequently called his¬ torical geology though the latter term also properly includes paleontology. It is concerned chiefly in the working out of the history of past . geologic ages. One of its problems, as has just been stated, is the correlation of strata in widely separated regions. Without this phase of geology little systematic advance in the science would have been possible.

Economic Geology. — Soil, water supply, mineral fuels and oils, building stone, base and precious metals ; — all these and many other constituents of the earth have been widely ex-

ploited by man for his use. Economic geology deals with the application of geologic principles to this exploitation. It is concerned witfh the distribution, mode of occurrence, mineralogic content, and origin of these economically valu¬ able substances. See Coal; Economic Geology; Gold ; Silver ; Iron.

Mining Geology. — There has grown up a treatment of applied geology particularly adapted to the mining engineer and known as mining geology. As one of its fundamental phases this obviously embraces economic geol¬ ogy. It also is concerned largely with structural geology, since the miner is interested likewise in the structure of the rocks in which the eco¬ nomically valuable minerals occur.

Glaciology. — Glaciers have been responsi¬ ble for much modification of topographic form over large areas, and as detailed study of exist¬ ing glaciers and glaciation and glacial phenom¬ ena in the past has increased, there has grown up a separate treatment of the subject under the name of glaciology. See Glacier; Glacial Period; Pleistocene Epoch.

Oceanography. — The publication of a vast mass of information resulting from several im¬ portant deep-sea dredging expeditions has re¬ sulted in the development of this branch of the science to such proportions that many writers give it the rank of a separate branch of geology. See Oceans ; Deep Sea Exploration ; Chal¬ lenger Expedition ; etc.

Metamorphic Geology. — Under the influ¬ ence of favorable conditions in nature many minerals break down and their elements re¬ combine to form new compounds. This process is very extensive and frequently results in the formation of entirely new rock types. The process by which one rock is altered into an¬ other is known as metamorpihism, and the branch of geology which treats of the cause and nature of this change is known as metamor¬ phic geology. See Rock Cleavage; Metamor¬ phism ; Metamorphic Rocks ; Rocks.

Development of Geology as a Science.

Probably the earliest geologic phenomena to cause comment were earthquakes, active vol¬ canoes and floods. These were the cause of fruitful, if unscientific, conjecture among the earliest peoples who were wont to ascribe them to the vagaries of mythological monsters. Aristotle believed earthquakes were due to sub¬ terranean winds, and recognized a relation be¬ tween them and volcanoes. Strabo followed in the same belief and going further was able to show the true nature of long dormant or ex¬

tinct volcanoes. As early as the 6th century b.c. the presence of marine shells far inland was pointed to as an evidence that the land had been elevated from beneath the sea. Somewhat later it was affirmed that rivers eroded valleys and that land emerged from the ocean and was again resubmerged with exceeding slow¬ ness.

But these advanced ideas took little hold upon the mind of the time and during the Middle Ages the dominance of the Church with its insistent adherence to the exact letter of the biblical story of creation was a strongly deterrent factor in the growth of all scientific thought. The presence of fossils in the rocks was ascribed by some to Noah's flood. Others seriously taught that the Creator made many

unsuccessful attempts before the right forms were finally produced, and that fossils were these rejected forms. Others even insisted that fossils were made by the devil to perplex the faithful.

Nicholas Steno (1631-1687) was one of the earliest observers to work out consistent geo¬ logical theories. He developed the idea of the marine nature of fossils and showed evidences that the stratified rocks in which they occur are similar to marine sediments now accumu¬ lating. He advanced the idea that these rocks, where not now horizontal, must have undergone upheaval and deformation, and cited such fold¬ ing as one of the chief causes of mountains. Steno had followers, but at best his ideas gained ground slowly.

Many wildly fanciful speculations have been advanced to account for the origin of the earth, but the first serious scientific attempt was made by Descartes about 1644. He conceived the earth to have been at one time a molten mass like the sun, which cooled down to the con¬ dition of a molten center with a solid crust. Thus he laid down the foundation of the now famous nebular hypothesis.

Guettard (1715-1786) was the first to make geologic maps showing the distribution of vari¬ ous rock formations and mineral deposits. He also did much to systematize paleontology. He published a work on the erosional effects of running water, citing many specific instances of its efficacy; suggested that the salinity of the sea was due to salts carried to it from the erosion of the land; and was the first to recog¬ nize the true nature of the group of extinct volcanoes in Auvergne.

In 1763 Desmarest, a Frenchman, made a careful study of the basalts of Auvergne, and by noting their intimate association with vol¬ canic scoriae became convinced of their volcanic origin. In this belief he was strongly opposed by Werner (1749-1817), professor of mineralogy and mining at the Freiberg Mining Academy, who was probably the first to attempt to

work out a stratigraphic classification of the formations of the earth's crust, which he be¬ lieved could be applied everywhere. It is essen¬ tially as follows : There existed a universal ocean from which the oldest or Primitive Rocks were chemically precipitated. As the earliest formations in the regions studied by him were granites, gneisses, basalts and other crystalline rocks, he assumed that these were of chemical origin. As the land gradually emerged from the universal ocean, erosion progressed and the Transition Rocks were mixtures of mechanical sediments with the Primitive series. As the waters became still further restricted mechani¬ cal deposits predominated to which he gave the name Floetz Rocks. These in turn were fol¬ lowed by the Alluvial series or recent clays, sands and gravels. He maintained strongly the chemical origin of basalts, as did his followers, and around him grew up a school known as the Neptunists, who vigorously argued his be¬ liefs. The adherents of the igneous origin of basalt were also organized into a school under the name of the Plutonists and the controversy between them was for many years a bitter one. Though Werner was an enthusiast, his rigid ad¬ herence to h:s own doctrines in the face of evidence to the contrary probably did much to retard real geologic advance.

Notable among the Plutonic adherents were Hutton (1726-97), and Playfair, one of Hut¬ ton's most ardent followers. They, however, gave most to geology in another field. The cataclysmic events of earth history are most striking and the majority of the earlier students of geology, including Werner, belonged to the school of catastrophism ; that is, they placed most emphasis on those changes in earth his¬ tory that were sudden or startling. Hutton and Playfair, on the other hand, while not the first to see the slow processes of geologic nature, were the first to give to these slow ˆactivities their just place in the science. The school they founded has been called the school of uniformitarianism and their ideas' still dominate geology. Sir Charles Leyell (1797— 1875) became the greatest exponent of this school.

ˆ ■'Paleontology, the study of which was gain¬ ing in interest continually, received added im¬ petus from the work of Lamarck (1744-1829) and Cuvier (1769-1832), the former of whom antedated Darwin, though less definitely so, in ideas of evolution. The final impetus to paleontology came in the Darwinian theory which is now inseparably linked with all pa-leontologic research. The first real application of paleontology to stratigraphic correlation was made by William Smith (1769-1839), who showed that it was possible to trace certain formations for long distances

by means of the fossils they contained. This constituted the real beginning of stratigraphy as the science is now known. Following him Murchison and Sedgwick carried the idea much farther and succeeded by the use of fossils in working out the extremely complicated succession of older rocks in western England and Wales.

ˆ Erratic bowlders scattered over England, over most of northern Europe, and over a large part of northern United States and Canada, were the cause of much geologic speculation. It was variously conjectured that they were carried there by Noah's flood, by rivers now extinct and by icebergs floating in an ocean much more extensive than that now existing. Playfair first suggested that they might have been transported by glaciers, but it remained for J. L. R. Agassiz (1807-73), whose studies of Swiss glaciers well fitted him for his task, to demonstrate glacial efficiency in the transportation of such bowlders. He is quite properly called the father of glaciology.

In this brief sketch of the development of the science, many important names have neces¬ sarily been omitted. Attention should be called, however, to those institutions and societies now actively furthering the science. Practically all large universities have departments of geology engaged not only in teaching but in research as well. Most of the civilized nations of first rank and many provinces, states and colonies main¬ tain geological surveys whose major work is directed to the economic aspects of the sub¬ ject. Most notable among such organizations are those of the United States, Canada, Great Britain, Germany and France, though many others are doing effective work. In the United States all but a few of the individual States maintain surveys. These organizations all publish the results of their work, usually for free distribution,

Cosmical Geology.

Cosmical geology, or cosmogony, brings out certain harmonies in the solar system, namely, . that the orbits of all the important planets are practically in the same plane and nearly,, though not quite, circular; that they all re¬ volve in the same direction in their orbits ; ; that most of them rotate in the same direction on their axes; and that these peculiarities of movement are shared by most of the satellites. These harmonies have led to the widespread belief among astronomers in a common origin for all the bodies of the solar system. Many theories of origin have been advanced, but only two are considered of sufficiently serious im¬ portance to be outlined here. See Astronomy;, Laplace; Nebula; Solar System; etc.

Nebular Hypothesis. — This theory, known also as the Laplacian hypothesis, has had more widespread acceptance than any other. It

postulates a slowly rotating gaseous nebula,, very tenuous, with its centre at the site of the present sun and so expanded that it filled all1, the space now occupied by the solar system. The nebula was supposed to have cooled and shrunk, the rapidity of rotation increasing with the cooling. Centrifugal force caused a bulging, at the equator, with the final separation of am equatorial ring which further cooled and con¬ tracted until it broke and condensed into a planet. Several such occurrences in turn gave the several planets while the remaining portion of the parent nebula constitutes the sun. In a. similar manner the planets gave off satellites.. The molten earth is then supposed to have under¬ gone progressive cooling, resulting in the for¬ mation of a solid crust. Certain mechanical difficulties inherent in the theory, but much toe abstruse to be considered here, finally led1 Chamberlin and Moulton to the formulation of the following theory.

Planetesimal Hypothesis. — In brief the elements of this hypothesis are as follows: There are known to be in the heavens a large number of spiral nebulae consisting of a main or central nebular mass and two curved or spiral arms in which are smaller nuclei or knots of varying sizes within a nebular haze. Each separate solid particle of matter is considered as a planetesimal (little planet) and the parti¬ cles in such a nebula are supposed to have finally gathered together by overtake collisions while pursuing slightly different orbits. The central core became the sun, larger knots became planets and smaller knots became satellites, by gradual infall of solid planetesi- mals.

Under the nebular hypothesis the earth, once a molten mass, underwent progressive cooling until a rigid crust formed, perhaps over a still molten interior. It was not until this crust be¬ came rigid and at least moderately cool, that oceans could form and the ordinary geological processes go on. Under the planetesimal hypothe¬ sis, the earth was never molten, probably never very hot. As soon as it grew to sufficient size to have the necessary gravitative attraction, an atmosphere gathered, oceans formed, and the agencies of gradation began operation. The history of our earlier geologic eras thus would differ greatly in the minds of adherents of these two opposing hypotheses. See Cosmog- PNY,

Geognosy.

Geognosy, already defined, may be treated under the topics atmosphere, hydrosphere and lithosphere.

The Atmosphere may be considered as a gaseous envelope entirely surrounding the earth and penetrating into the pores of the outer crust. It consists essentially of 79 per cent nitrogen and 21 per cent oxygen. Carbon dioxide (C02) makes up about 0.03 per cent, and water vapor, dust and rare gases are pres¬ ent in variable but small amounts. Nitrogen is very inert ; but the oxygen, carbon dioxide and water vapor are all geologically active agents, the activities of which will be further discussed under dynamical geology, in the sec¬ tion devoted to the work of the atmosphere. See Atmosphere; Wind; Meteorology.

The Hydrosphere, including the waters of the oceans, lakes, rivers and underground cir¬ culation, constitutes a second but only partial en¬ velope surrounding and penetrating the earth's crust. Geologically such waters are important agents both chemically as solvents and mechani¬ cally as a means of erosion, of transportation of sediments and of deposition. These activi¬ ties will be more fully treated in the section de¬ voted to dynamical geology under the topics of ground water, running water, oceans and lakes. See Rivers; Ocean; Lake.

The Lithosphere is the solid crust of the earth. For the most part it consists of a few common chemical elements in great abundance and a great many rarer elements in extremely minute quantities. Below are given the eight leading elements in the order of their abund¬ ance.*

Oxygen .

. 47.07

Calcium .

Silicon .

Potassium .

_ 2.45

Aluminum. . . ,

Sodium .

Iron .

- 4.43

Magnesium .

_ 2.40

Total. . .

It will be noted that the only useful metals in the list are iron and aluminum. Aside from these eight all the remaining known elements together make up less than 2 per cent of the crust. Estimates express zinc, tin and lead in the third or fourth decimal place, copper in the fourth or fifth, silver in the sixth or seventh, and gold in the seventh or eighth. (See Chemistry) . These elements are combined in various ways to make up a large number of minerals, the most abundant of which are the feldspars, quartz, the pyroxenes, the amphiboles, the micas, calcite and kaolinite. Such minerals are definite chemical compounds. See Feldspars; Mineralogy; Quartz; etc.

These minerals aggregated mechancally in varying proportions constitute rocks, which differ from minerals in not having a definite chemical composition. Three great classes of rocks are recognized. Certain ones of these, known as igneous, have cooled and solidified from a hot fluid mass called a magma. The igneous rocks are further subdivided on a two¬ fold basis, that of mineralogical content and that of texture. No attempt can be made here to outline the classification. Suffice it to men¬ tion granite, syenite, diorite, gabbro, rhyolite, diabase and trap as among well-known igneous rocks. (See Rocks; Igneous Rocks; Petrol¬ ogy; Granite; Gabbro; etc.). Another great group of rocks are those laid down as deposits

or sediments by water, wind, or glacial ice. They are usually stratified and are called sedi¬ mentary rocks. These may be further classified as aqueous, eolian and glacial ; or as chemical, mechanical and organic. The common types are sandstone, shale, limestone and conglomerate. Sedimentary rocks are usually said to be de¬ rivative, inasmuch as they have all been de¬ veloped by the weathering of igneous rocks by processes to be outlined under dynamical geology. (See Rocks; Sedimentary Rock; Sandstone; Shale; etc.). Both igneous and sedimentary rocks, by undergoing great heat and pressure or shearing stresses, may be altered (metamorphosed) to other rocks. Such altered rocks either of igneous or sedimentary origin are called metamorphic rocks, the most com¬ mon types of which are marble, slate, quartzite, schist and gneiss. (See Rocks; Metamor¬ phism ; Marble ; Petrology ; etc.) . Clays, sands and gravels, though unconsolidated are con¬ sidered rock by the geologist and so classified. To this unconsolidated surficial material usu¬ ally denominated soil is often given the name mantel-rock or regolith, as distinguished from solid rock or bedrock. See Soil.

. Interior of the Earth. — The above descrip¬ tion applies to what is usually known as the crust of the earth, that is, the outer shell of a few miles regarding which information is available. Concerning the interior of

the earth, sometimes called the pyrosphere or the centro- sphere, little is really known. It was long thought that the interior was molten, the belief being based on the extrusion of lavas, the ex¬ istence of hot springs and the known rate of increase of temperature in deep mines. But it is a well-known principle that for most substances increased pressure increases the melting point, and it is quite possible that the enormous pres¬ sures prevent the rocks from becoming molten. The rigidity of the earth has convinced physi¬ cists that, whatever its temperature, the in¬ terior acts as a solid mass. Of the composi¬ tion of the interior next to nothing is known. The fact that the earth as a whole has a higher specific gravity than its surface rocks has led many to suppose that the interior consists of very heavy minerals or metals, perhaps iron, or even precious elements. This, however, is mere speculation.

Dynamical Geology.

The surficial forces of dynamical geology will be discussed under the process of grada¬ tion, the internal forces under the processes of diastrophism and volcanism.

Gradation. — The external forces are con¬ tinually at work tearing down earth structure at one point, building up at another. This tearing down and rebuilding is known as grada¬ tion. Degradation, erosion and denudation are practically synonyms for the tearing down process ; aggradation and deposition for the building up. The first step is the reducing of rock material to fine particles ready for re¬ moval and is known as weathering. The re¬ moval of the material is known as transporta¬ tion, and both steps are subprocesses of ero¬ sion. The main agents by which these pro¬ cesses are carried on are the atmosphere ground water, running water, oceans, lakes and organisms.

The Work of the Atmosphere is both me-

chanical and chemical. Mechanically, it works by means of wind, frost, sudden temperature changes and rain impact; chemically, by oxida¬ tion, carbonation, hydration and solution.

Wind work is everywhere operative but is much more effective in arid than in humid re¬ gions. Deserts are especially exposed to its activity, due to lack of vegetation, which in humid regions forms a protective cover. Wind laden with drifting sand is an important agent of erosion. Rocks of uniform hardness are worn smooth, rocks that are less homogeneous are etched into

relief by the cutting away of softer parts, cliffs are undercut and desert re¬ gions are thus rendered famous for their fantas¬ tic forms. Desert sands are in many places strewn with highly worn and polished pebbles which represent the harder particles of rock left behind after the softer rock is ground fine and blown away. Wind also has a notable transport¬ ing power. At no time is the air free from fine dust. Falls of dust and volcanic ash on ships at sea and films of dust on unbroken snow fields of high altitudes testify to the carrying power of even moderate breezes. The great sand and dust storms of arid regions are well known. On the margins of deserts thick and extensive deposits of wind-blown soil called loess occur. Famous loess beds occur in China and in the United States, in the latter particu¬ larly along the lower courses of Missouri and Mississippi rivers. Wind-drifted sand accumu¬ lates in hills whose gentle slopes are toward the wind. Because sand drifts up the incline and slides down the steeper lee slope, such sand dunes continually migrate in the direction of wind movement and not infrequently encroach upon arable land causing destruction of prop¬ erty. As a result of such damage much has been done in the study of the prevention of dune migration. Wind-blown material of this sort may become buried, ultimately consolidated and finally form sedimentary rocks. Eolian de¬ posits are called terrestrial or continental, as opposed to marine deposits laid down in the sea. Wind also influences climate and rainfall, controls waves and currents and acts in many ways as an indirect geologic agent. See Desert; Dune; Eolian Deposits; Loess; Meteorology; Wind; etc.

Freezing water exerts an expansive force of about 2,000 pounds to the square inch. Water in minute pores of the rocks, or in larger open¬ ings such as joints or bedding planes, is an efficient agent of disintegration in those lati¬ tudes and at those altitudes subject to sudden and repeated freezing and thawing. It crowds and wedges off large angular blocks from every exposed ledge. The great talus slopes of moun¬ tain regions afford well known illustrations. See Frost; Ice; Talus; etc.

If a rock be heated in a campfire and drop¬ ped into cold water, the sudden contraction of a rapidly cooling exterior over a still heated interior causes the disruption of the mass. A similar phenomenon takes place in desert re¬ gions where, due to lack of moisture and pro¬ tecting vegetation, the daily range of tempera¬ ture is extreme. In the Sahara the daily range is said to be over 100° F., and explorers state that at night there may frequently be heard the report of breaking rocks. A rock like a granite made up of several different minerals is more subject to such disintegration than a sand¬

stone which is homogeneous in composition. This is because the different minerals expand at different rates upon heating and tend to tear asunder.

Change of temperature usually results in the breaking off of curved concentric masses of rock, hence the term exfoliation is sometimes applied to it. See Desert; Ex¬ foliation ; etc.

In soft rocks, the impact of falling rain drops, entirely aside from any erosive effect of running water, has a disintegrating action. This is usually effective only in regions of light vegetation, and is therefore most strikingly ex¬ hibited in our so-called <(bad lands.8 (See Bad Lands). The above forces are wholly me¬ chanical in their activity. They are for the most part agents of weathering, and only in the case of the wind are they important in trans¬ porting or depositing soils.

The chemical work of the atmosphere will be described briefly under the topics of oxida¬ tion, carbonation, hydration and solution. Oxi¬ dation is the union of some rock element with oxygen. The affinity of ferrous iron and sul¬ phur for oxygen is a familiar fact and the group of sulphur bearing minerals (the sul¬ phides), particularly pyrite and chalcopyrite, as well as many minerals containing ferrous iron, especially the so-called ferro-magnesian min¬ erals of which the pyroxenes and amphiboles are examples, are subject to oxidation. The iron ultimately forms hematite or limonite and the sulphur becomes sulphuric acid. This process of oxidation is of great economic im¬ portance in the secondary enrichment of sul¬ phide ore bodies. See Chalcopyrite; Econom¬ ic Geology ; Mineralogy ; Oxygen ; Pyrite.

Carbonation consists of the union of some element in the rock with carbon dioxide, to form a carbonate. The most common car¬ bonates are those of lime, magnesia, iron, pot¬ ash and soda. The feldspars, aluminum silicates of lime, soda and potash, are the minerals most influenced by carbonation. The lime, soda and potash combine with carbon dioxide from the atmosphere, are set free as carbonates and usu- ahy go out in solution. The alumina remains combined with part of the silica to form the mineral kaolinite, more commonly known as clay. This mineral is relatively insoluble, the clay remaining behind as a residual product. Some soluble (colloidal) silica is set free, which goes out in solution and ultimately is precipitated in the pores of the rock as cement, or in cracks as quartz veins. See Carbon Dioxide; Feldspars; Mineralogy, etc.

Hydration is the taking on of water by cer¬ tain minerals during the process of weather¬ ing. The common red oxide of iron thus be¬ comes the hydrated brown oxide, limonite. The kaolinite above described takes on water during its formation. Hydration is usually accom¬ panied by an increase in volume and a general weakening of the rock mass.

Even pure water dissolves certa n very soluble minerals, but when charged

with car¬ bon dioxide or organic acids from decaying vegetation it has a much greater solvent power. Among the more soluble compounds often re¬ moved by solution are the carbonates men¬ tioned above. Limestone (calcium carbonate) is weathered chiefly by solution, the carbonate dissolving away and the insoluble impurities remaining behind, usually as a flinty clay, the

most common type of residual soil in limestone regions.

Mechanical weathering (disintegration) re¬ sults merely in grinding up the rocks into finer particles of the same substance. Chemical weathering (decomposition) removes the solu¬ ble substances, chiefly the lime, magnesia, soda and potash, and leaves behind the insoluble sub¬ stance as residual soil. This residue consists chiefly of sand, clav and iron oxide. All of our soils were ultimately derived from the weathering of rocks. As they consolidate, the sands form sandstone ; the clays, shales ; the gravels, conglomerates. The lime and mag¬ nesia are carried away to the sea, there to form limestone; the soda is taken to the ocean, there to become the salt of sea water.

Work of Ground Water — That there is much water in the pores of rocks far under¬ ground, is evidenced by the constant supply in wells and springs. Most of this seeps in from rainfall on the surface and is known as meteoric water. A much smaller part is believed to be given off from molten rock (magma) as it cools deep in the earth. This is called magmatic water, and, though probably of small amount, is believed to be of great importance in the for¬ mation of mineral veins. (See Economic Geol¬ ogy and Ore Deposits). Most of the vast body of water thus derived is held in the minute pores of the rock, just as a pan full of sand will absorb nearly one-fourth of its volume of water, which is held in small openings be¬ tween individual grains. There are few under¬ ground rivers and these are usually in limestone, a rock easily dissolved.

When a well is sunk a level is usually found, below which the ground is saturated. This level, known as the water table, is not an even plane, but follows roughly the surface irregu¬ larities, though in a less accentuated form. In valleys it is met at shallow depths, but under ridges it is not so near the ground surface. Its position is often modified by the porosity of the rocks, since some layers are so impervious that they let the water seep downward only very slowly. It is usually deep in arid regions. Ground water is in constant movement ; above the water table the direction is

chiefly down¬ ward, at the water table it is chiefly lateral as the water moves to its points of outlet in nearby valleys. Below the water table the movement is extremely sluggish and chiefly con¬ centrated along fractures or through the more porous layers. Hot magmatic waters will move from deep seated magmas toward the surface. The work of ground water is mostly chemical since it moves too slowly to be effective in erosion.*

Chemically, solution by ground water in limestone or gypsum results in caves, the action beginning along joints which gradually enlarge into passages and chambers. Waters trickling in from the roof and charged with calcium carbonate in solution evaporate and stalacites are built in much the same way as icicles are formed. They may be colored by various sub¬ stances, and often assume great complexity. Waters dripping on to the floor of a cave build similar deposits known as stalagmites. Sink holes are formed by the collapse of cavern roofs, or by solution enlarging joints in lime¬ stone, allowing the soil to slump, leaving a funnel shaped depression. Sinks are rare in

other than limestone regions. See Cave; Luray Cave; Mammoth Cave; etc.

Circulating ground waters carry much mineral matter in solution. This, where de¬ posited in fractures in the rock, forms veins. The mineral matter may originally be derived from deep seated magmas brought up by magmatic waters, or it may be leached from adjacent or. overlying rocks by either hot or cold meteoric waters. Precipitation may result from organic matter, from loss of heat, from decrease in pressure, or from still other causes. Many veins consist wholly of worthless sub¬ stance, such as quartz or calcite, while others carry values in gold, silver, copper, zinc, lead, etc. A thorough knowledge of ground waters is essential in the study of ore deposits. See Economic Geology; Ore Deposits.

Ground water is secured for human use by artificial openings known as wells. To have a constant supply a well must extend below the water table. Open-textured, porous rocks such as sandstones, conglomerates, and gravels form the best water-bearers (aquifers) from which the water usually seeps slowly into the well, though occasionally the supply comes from cracks and cavities.

Wells often are sunk from which the water flows without pumping. These are called artesian (from Artois, France). The word is often, but incorrectly, used for any deep well. The best usage now applies the term to any well even though not a flowing one, in which the water tends to rise by its own pressure above the depth at which it was encountered. The conditions necessary for artesian flow are described in a separate article. See Artesian Well; Wells; Water Supply.

Any natural outlet for ground water is a spring. As a rule springs are most abundant in lowlands and valleys where the ground sur¬ face is nearest the water table. At any point, however, an impervious layer beneath a porous bed may prevent the downward seepage of water and deflect it laterally to outlets or springs. Most small springs are mere seep¬ age from porous rocks or soils. Larger ones usually come from fissures, and some of the largest known like those in the Ozarks, flow from caves in limestone regions, and are power¬ ful enough to furnish considerable water power.

Warm or hot springs are known in many regions. In some cases it is believed the heat is due to the great depth from which the water ascends along large fissures or faults. In other regions of recent volcanic activity the heat is probably derived from still uncooled masses of rock buried beneath the surface. Such are the hot springs of Yellowstone National Park. The temperature of the water in springs varies from the normal ground temperature to the boiling point. See Spring; Volcanoes; etc.

Geysers are a special variety of hot springs from which the water and steam are violently erupted at intervals more or less periodic. They are invariably found in regions of recent volcanic activity, and the two most noted areas are in Yellowstone National Park in the United States, and in Iceland. See Geysers; also Volcanoes.

Work of Running Water. (Rivers). —

Running water is the most important geologic

agent in the shaping of land forms, though its efficacy was long unrecognized. In early times it was scarcely realized that valleys are carved by the rivers that occupy them and that most land forms are strongly modified by running water. This work can be divided into erosion (denudation or degradation) and deposition (or aggradation). Erosion includes the mak¬ ing of rock material into fine particles (weath¬ ering) and its removal (transportation).

There is a constant struggle between the internal and external forces of the earth. The former no sooner bodily raise a region out of the sea (see section on Diastrophism) than the latter tend to tear it down and carry it back. If given sufficient time any region, no matter how high it may have been elevated, will be reduced again to a featureless plain, at or near sea level. The level below which rivers can¬ not reduce a region is known as base-level and a region so reduced is said to be base-levelled or peneplained

(made almost a plain). The complete history through which a region passes from the beginnings of the first drainage es¬ tablished on it after its emergence back to a peneplain only slightly above sea-level is said to constitute an erosion cycle. In the earliest stages of the cycle a few very crooked streams without valleys and with few tributaries ac¬ commodate the run-off from rainfall. Large areas are almost without drainage. Each stream, however, using the sand or gravel of its bed as tools, starts wearing its channel deeper and deeper until deep but still narrow valleys alternate with broad flat undissected divides. Undrained depressions are still occu¬ pied by lakes and the streams usually have falls and rapids because they cut more rapidly on soft than hard rocks, making their gradients very uneven. This stage is known as youth. As the valleys deepen, gullies are cut in their slopes and these enlarge into tributaries which work back until the entire area is dissected. There are no longer flat-topped divides but an intricate network of valleys, each carved by its own streamlet. The main streams have cut as low as they can and yet have sufficient gradient to flow to the sea. Even the harder rocks of their beds have been planed down and falls and rapids are almost worn away. Lakes are filled up with sediment or drained by the wearing down of the outlet. The region is now in maturity. Since the streams are now as low as they can erode, their chief work is to carry away the material which weathering and minor tributaries bring to them from the valley sides. The valley, though no longer deepening, is rapidly widening. Divides become more and more worn away until they are re¬ duced to mere gentle swells. Each stream be¬ comes sluggish, is easily deflected by obstruc¬ tions, and begins to wind (meander) in great curves over a broad flat bottom known as a flood plain. In times of floods the curves are cut through and loop-shaped portions of the channel are abandoned and constitute oxbow lakes. The region, now in old age, is said to be base-levelled or peneplained. Youth, matur¬ ity and old age are only comparative terms to express how far a region has progressed in the erosion cycle. It cannot well be expressed in terms of years since a region on soft rock might progress to old age before an adjacent

region on harder rock had well reached maturity.

Many factors tend to modify the apparent simplicity of the above history. When hard rocks overlie soft ones, the latter frequently wear back faster, causing an undermining of the hard projecting layer. Many cliffs are of this origin. When such a cliff lies athwart a river course a fall or rapid results which re¬ treats upstream by undermining. A good illus¬ tration of this is Niagara, which is retreating about four feet a year. In arid regions where there is little precipitation erosion may go on very slowly. What rainfall there is, however, frequently comes in sudden storms and, as there is no protecting vegetation, may be very effective. (See Deserts). Where the rocks are flatlying, or homogeneous, the familiar branching treelike or dendritic

pattern of drainage results. Tilted layers of hard and soft rock frequently result in long parallel ridges and valleys, a pattern of drainage known as latticed or trellised. Streams working on the softer layers of rock have an advantage in that they cut faster and ultimately capture their less fortunate neighbors. (See Stream Piracy). Thus there is brought about what is known as structural adjustment or the close control of drainage by rock structures. Changes of level may take place at any stage of the cycle. A base-levelled region when uplifted enters upon a second youth, is said to be reju¬ venated and may again pass through another cycle. Gradual depression of a region, on the other hand, tends to slow up erosion or even to inaugurate desposition.

The fine material furnished in the course of the erosion cycle by weathering and by the constant attrition of the stream itself is car¬ ried away by the running water, most of it to ultimately find its way to the ocean. Soluble carbonates, sulphates and chlorides are carried in solution. Calcium carbonate (limestone) is abundant in most river waters. Very finely divided clay or sand is carried in suspension and causes the turbidity of river water. Coarser sand and gravel are rolled along the bottom. The total amount of sediment carried by the rivers of the United States in a year is greater than the total tonnage of all our rail¬ roads. A most significant factor in transpor¬ tation by running water is the sorting which the sediment undergoes. Because it is more easily carried, the finer material is borne away, the coarse left behind. If a residual soil from a granite consists of a mixture of sand and clay (see section on chemical work of the atmosphere), running water tends to sort the finer clay from the coarser sand and ultimately clay and sand come to rest in widely separated areas. Alternations of shales (consolidated clay) and sandstone (consolidated sand) in the rocks of any region are a resultant of the sort¬ ing power of moving water.

Where rivers emerge from mountainous regions and flow across plains the velocity is suddenly checked and deposits are built up, which, if steep, are known as alluvial cones, if low and flat, as alluvial fans. Alluvial fans are common at the base of practically all moun¬ tain ranges. Where several adjacent fans coalesce, the sheet of debris is spoken of as a piedmont alluvial plain, or sometimes as a

mountain apron. Intermontane valleys in arid regions frequently fill to great depths by this process, because, since there is no drainage to the sea, all the material brought down by water from the melting snows is perforce

lodged in the adjacent valleys. In the lower courses of many streams, as they pass from maturity into old age, the valleys become wide flood plains over which streams meander slug- ishly and the velocity may not be enough to carry off the sediment carried down from the more vigorous upper reaches. Consequently broad sheets of fine sediment may be laid down over these plains. At their seaward edge these deposits grade into deltas, built by rivers in lakes or the ocean where the velocity is checked by quiet water. The delta plains of large rivers are low and swampy and like flood plains subject to frequent overflows. The soil is usually fine since the velocity of the stream in its lower reaches is not sufficient to trans¬ port coarse material. Flood plains and deltas, when they can be properly drained and pro¬ tected against flood, are usually rich agricul¬ tural areas. See Delta; Flood Plain; Physiography; Rivers; Terrace; etc.

Work of Glaciers. — Wherever more snow falls than melts perpetual snow fields occur and the snow may gradually be compacted till it becomes granular neve, as it is called, and ultimately pass into ice. If the accumulation becomes sufficiently thick it may begin a slow outward creep from the point of origin and become a glacier. In mountains these bodies of ice often occupy valleys and are termed valley or alpine glaciers. In polar regions they frequently spread over vast areas and are then spoken of as ice caps or continental glaciers. See Glacier.

One school of glaciologists holds that glaciers erode powerfully carving out deep valleys and removing great masses of sediment; another believes that glacial modification of topography is not profound. Be that as it may, it is a well-known fact that the appearance of a region is much changed by the passage over it of a great ice sheet. As the ice, into the base of which are frozen sand and bowl¬ ders, scours over the rocks it scratches long parallel marks known as striae which reveal the direction of movement. Rock hills and ledges (roches moutonnees) are worn smooth with the more gentle slope in the direction from which the ice came. Projecting spurs and promontories are truncated and valley bot¬ toms rounded into characteristic U-shapes. By deepening and widening trunk valleys tribu¬ taries are left hanging high above the floor of the main stream, resulting in discordant junctions or hanging valleys. By freezing to the walls of the valley heads and plucking away the loosened bowlders, glaciers carve amphitheatre-like bowls, known as cirques.

As the glacier moves forward sand and bowlders frozen into or resting on the ice are carried for long distances. Since it is held rigidly by the ice, the material being transported undergoes no sorting, a marked feature of glacial as compared with river transportation.

Along the sides of a valley next to its rocky banks much material

accumulates on the ice. These ridges are known as lateral moraines and when by the junction of two glaciers a

moraine occupies a central position it is known as a medial moraine. After the melting of the ice these are rarely preserved as distinct ridges. More important is the material accumulated at the front of the glacier, when the rate of melting just balances the rate of advance and each bowlder brought forward is contributed to the growing mass, known as a frontal or terminal moraine. In the case of continental ice sheets such ridges of clay, sand and gravel may be traced for many miles. The material is usually unsorted and unstratified. Rounded elliptical hills of unstratified glacial debris with their longer axes in the direction of ice move¬ ment are known as drumlins. They are com¬ mon in southern Wisconsin, central New York and the vicinity of Boston. Their cause is not well understood.

Much water, the result of melting, usually flows away from an ice front, tending to pro¬ duce stratified glacio-fluvial deposits. A river flowing from the front of a glacier fills the valley bottom for miles with a valley train of stratified sand and gravel. Spread out in a broad sheet in front of the ice, such a deposit is called an outwash plain. Large blocks of ice are frequently buried in outwash plains and melt very slowly, the resulting depressions, often occupied by lakes, being known as kettle holes. Eskers, long, winding ridges of strati¬ fied gravel greatly resembling railroad embank¬ ments, are believed to be deposited by streams flowing in tunnels under the ice. Glacial de¬ posits in general are known as drift and are classified as stratified drift, and as till or un¬ stratified bowlder clay.

In regions that have been strongly scoured by ice the preglacial topography is largely ob¬ scured, the original drainage being entirely dis¬ arranged by the complete filling of the old valleys. Such a region shows many features of extreme youth, as lakes and swamps, falls and rapids. Bed rock where exposed may be striated and polished, and many erratic bowl¬ ders, foreign to the country, lie strewn every¬ where, having been brought by the ice from distant regions.

It is known that several times in geologic history glaciers have been more widespread than now. During the Pleistocene most of Canada and a large part of northern United States south to the Ohio and Missouri rivers was cov¬ ered by an ice sheet as was also most of north¬ ern Europe. During the Permian there was widespread continental glaciation in South Africa, Australia and India reaching into the torrid zone both north and south of the equator. Continental glaciation occurred in the Cambrian period in China, and probably during the Algonkian in Canada. See Glacier ; Algonkian; Cambrian; Permian; Pleisto¬ cene Epoch.

Work of the Ocean. — Practically three- fourths of the earth's surface is covered by oceans, which have a maximum depth of about 30,000 feet, and an average depth of about two miles. Sea water contains 3.4 per cent of dis¬ solved matter, of which about three-fourths is common salt, (NaCl) and about 0.3 per cent calcium carbonate.

Of all the movements of ocean water waves are geologically the most striking and their chief work lies in modification of the shore line.

Wave impact striking blows of 600 to 2,000 pounds per square foot and armed with sand and pebbles gathered on the shallow bottom may become powerful agents of erosion, wear¬ ing back steep shores with a constant tendency to undercut and form cliffs, grinding finer and finer the mantle of sand and pebbles on gentler beaches. The' eroded material is gradually rolled and dragged out into deeper water by undertow and currents. Incidental to the erosion produced by waves are many peculiar shore line features such as sea caves, isolated stacks or pillars, natural archways and wave- cut terraces. Along the chalk cliffs of Eng¬ land and France the waves wear back the shore line in places at the rate of several feet a year. The island of Heligoland once very much larger than it is now has been nearly cut away by wave work. (See Heligoland). Many geologists believe that such marine planation is even more important than river peneplana- tion in the wearing away of continental masses. The detritus formed by wave wear is drifted by the undertow or by currents parallel to the shore and built up into sand beaches. On gently inclined shores where the waves break some distance from land barrier beaches or islands often form. Aided by the work of the wind in drifting the sand into dunes, such barriers may effectually isolate bodies of ocean water which then become lagoons or salt marshes. These fill rapidly with vegetation which may form peat.

Shore lines are frequently modified by changes of level. Since the ocean bottom is not subject to erosion it is much less rough than land. An uplift would cause smooth ocean bottom to become land resulting in long straight coasts accompanied by beaches elevated far above the reach of. waves. A sinking of the coast would allow the sea to enter many valleys and result in an extremely irregular shore line. See section on Diastrophism.

The material contributed to the ocean by rivers plus that worn from shore lines by waves accumulates steadily on the ocean floor, there to rest till uplift exposes it again to weathering and erosion. Along the littoral belt, that is, between the reach of highest and lowest tide, coarse gravel or sand

is the rule, with here and there areas of finer muds near the mouth of some large river. Such sediments are likely to change rapidly from point to point and to show crossbedding and ripple marks. (See section on Structural Geology). Further out in the shallow water belt the sediments become finer, the coarser material derived from the land settling out nearer shore. Beyond the gravels are sands and beyond these clays and muds. These deposits are much more constant in character than those near shore, with no such rapid changes in the coarseness or the nature of the material. Very minute lime- secreting animals live in this zone, where the waters are clear. Their skeletons settling to the bottom form accumulations of lime oozes that later become limestone, which may be in- terstratified with beds of clay or sand. Other oozes are also known. (See Ooze). Where the water is especially clear, coral polyps live both in the littoral and shoal water zones and build coral reefs and islands of large dimen¬ sions. (See Coral and Coral Islands).

Little material derived from the land ever gets into the abysmal ocean. Insoluble windblown material largely of volcanic origin, meteoritic dust, and insoluble remains of marine organ¬ isms accumulate very slowly forming the red clays of the deep sea. Since it is believed that the ocean deeps have remained great deeps throughout much of geologic time, it is thought that these deposits are rarely exposed on land ; but the shales (clays), sandstones (sands), and limestones (lime oozes) formed in the shallower ocean frequently are exposed by up¬ lift, and a large proportion of our present sedimentary formations are of marine origin, in contrast to the eolian, alluvial, and glacial deposits already described, which are classed as terrestrial or continental. See Beaches ; Limestone; Ocean; Sedimentary Rocks; Shore Lines, etc.

Work of Lakes. — Lakes are the result of imperfect drainage, and may be due to original depressions in the land surface as it emerged from the sea ; to later obstructions of drainage lines by uplift athwart their course ; to filling by glaciers ; or to other factors. In humid climates most lakes have outlets which tend to lower by erosion, and this is a factor in their final destruction. More important is the filling of the basin. All lakes, because the water flows through them very slowly, act as settling basins and retain most of the sediment brought to them by streams. The depression soon becomes filled with mechanical, chemical or organic deposits and the lake ceases to exist. The mechanical sediments include clays, sands and gravels. As in the oceans, the coarser deposits form nearest shore, the finer out in deeper and more quiet water. Chemical deposits are characteristic of arid regions where few lakes have outlets. All the dissolved matter brought in by streams remains in solution until the water becomes so concentrated that the salts must be precipitated. Common salt, gyp¬ sum and limestone are usual chemical precipi¬ tates from lakes. (See Gypsum; Salt). Many important

beds of gypsum and much salt in the United States have been formed in this manner. Organically certain small plants known as Chara cause the deposition of calcium car¬ bonate. Such accumulation are the most com¬ mon source of marl in our northern lakes. (See Marl). Many water plants, especially sphagnum moss, accumulate and form peat (see Coal; Peat; Peat Bogs; Swamp; etc.), which may ultimately become coal. Bog iron ore, chiefly limonite, accumulates, partly as a chemical precipitate, partly as the result of so- called iron bacteria. All deposits laid down in lakes are known as lacustrine in contrast to glacial, alluvial and eolian deposits. During geologically recent times lakes have existed that are now extinct. Their boundaries have been traced by the old beaches. The more noted of these lakes in the United States are lakes Agassiz, Bonneville and Lahontan. See Lake ; Great Salt Lake ; Lake Agassiz ; Lake Lahontan, etc.

Work of Plants and Animals. — Organ¬ isms are important geological agents. Mechan¬ ically, roots grow in cracks and wedge rocks apart, trees blow over and expose fresh soil at the surface ; earthworms, moles, and other burrowing animals bring soil to the open air.

\ egetation also acts as a cover preventing drifting of sand, erosion by running water, and the rapid heating and cooling of rocks. Chem- lcally, decaying organic matter yields carbon dioxide and acids that act as solvents for mineral matter, and that aid in weathering. Accumulating vegetation forms peat and finally coal. Coral polyps secrete lime and build whole islands of coral rock. Limestone consists largely of the skeletons of minute lime-secreting animals and many other deposits are formed by organisms of one sort or another. Plant and animal remains embedded in the rock as fossils form the basis of most of our efforts to corre¬ late rock layers and to divide geologic time into units. Man, by means of deforestation, irrigation and other activities, is coming to have control over geologic processes.

Diastrophism. — Diastrophism may be con¬ sidered as the deformation of the earth by in¬ ternal forces, the origin of which is not well understood but which are believed by many to be the result of the cooling and shrinking of the earth in its passage from the molten to the solid state. Others believe they are due to the settling of heavy wedge-shaped seg¬ ments of the earth's crust (oceanic blocks) and the forcing aside and upward of lighter segments (continental blocks), since actual experiment with a pendulum seems to show that the specific gravity of the rocks under the oceans is greater than that of those under the continents. Be that as it

may, it is a well- known fact that the earth's crust is undergoing almost constant deformative movements which are usually divided into two classes, epeiro- genic and orogenic. See Isostasy.

Epeirogenic movements are those which involve the uplift of whole continental masses very slowly without appreciable folding or dis¬ location except gentle warping. Most of the great interior of the United States between the Appalachian Mountains and the Rocky Moun¬ tains consists of flat lying rocks varying from 500 to 2,000 feet above sea level. These rocks show conclusively by their character and fossils that they were laid down beneath the sea, and that they now occur at this elevation proves a broad extensive uplift. That such changes of level are still going on is best shown along sea coasts where elevated beaches and wave cut terraces and caves not yet obliterated by weathering testify to recent uplift. Such ele¬ vated beaches are known at several different levels along the coast of California. On the other hand, off the Atlantic coast the channel of the Hudson River can be traced many miles along the bottom of the shallow ocean across the continental shelf. There is not sufficient current to account for the erosion under water, and it seems practically certain that the channel was carved at a time when this shelf was land, and that the coast has since been submerged. There is abundant evidence that certain regions have been thus elevated and again depressed many times during their history. See Beaches ; Continent; Shore Lines; Unconformity.

Orogenic movements are mountain making, involving intense crumpling and dislocation of the rock masses, the result of powerful lateral thrust which has caused the rocks to arch and buckle and even to break and slide over each other for long distances. The cause of such lateral compression is still one of the

great unsolved problems of geology. The in¬ tensity and magnitude of these forces may be judged when it is known that in many areas the rocks have shoved over and past one an¬ other distances of several miles. The pressure and accompanying heat often profoundly alter or metamorphose the rocks, with the develop¬ ment of new minerals, the formation of cleav¬ age, and the destruction of bedding and fossils, until in many regions it is impossible to deter¬ mine whether the rocks were originally igneous or sedimentary. Quartzite, gneiss, schist, slate, and marble are the usual resulting products. See Rock Cleavage; Folds; Fault; Meta¬ morphism; Metamorphic Rocks; Mountains; Structural Geology ; etc.

Earthquakes. — The processes outlined above may usually be considered as the result¬ ant of a very great number of successive small but sometimes sudden movements. Along any line of weakness the stress gradually accumu¬ lates until suddenly the rock yields by bending or breaking,

causing a tremor known as an earthquake. The stress is relieved and years may intervene before there is sufficient accumu¬ lation of forces to cause another movement in the same place. Considered broadly, earth¬ quakes are geological results rather than causes, but they in turn produce certain minor effects of geologic importance. They are a frequent cause of landslides and avalanches. Under¬ ground water circulation is often disturbed by the cracking of the rock, so that springs and wells go dry and new springs are formed. Along the fracture or faults that caused the shock there is frequent shifting of the walls, one side not uncommonly being raised so that a low cliff or scarp is formed, which may ob¬ struct rivers and form lakes or falls. Per¬ manent changes of level frequently accompany earthquakes. In Alaska in 1899 portions of the coast were uplifted 47 feet. In thickly settled regions destruction to life and property is a notable result. See Earthquake.

Volcanism. — Volcanism includes all those phenomena dependent on the movement of mol¬ ten rock (magma) within the earth or on its surface. The cause of volcanism is another great geologic problem which is far from being settled. One school believes that the lava is a still uncooled residue from a once molten earth. Another believes lavas form from the melting of rocks in the earth's crust due to re¬ lief of pressure caused by the arching up of folds, to heat generated by crushing and shear¬ ing of rock masses, or to< still other causes. From its deep seated source, this fluid rock works its way toward the surface, sometimes along cracks, sometimes by melting its way through the rocks. That which reaches the surface may pour out quietly or burst forth with explosive violence.

Volcanic products are of three types, gases, liquids and solids. Of the gases, steam and carbon dioxide are by far the most abundant. Sulphur gases, chlorine, hydrochloric acid, and a number of rarer substances are also usually present. These may be derived in part from the sediments traversed but are largely original in the magma. Highly heated fluid rock called lava is the most abundant product. Such rock, when it cools slowly at great depth and retains its water content, is usually coarsely crystalline and forms granite, gabbro, etc. When forced

out at the surface, where it cools quickly and loses its moisture, it forms very fine crystals or becomes glassy, in which case we have basalt, trap, rhyolite, obsidian, etc. (See Basalt; Granite; Igneous Rocks; Trap; etc.). During explosive eruptions much solid material is blown out of the crater. If very fine, this is known as ash ; if slightly coarser, lapilli ; and these when

consolidated form volcanic tuff : Still coarser material is known as volcanic breccia or agglomerate. Lava hurled into the air in a semifluid form and rapildy rotated takes on a circular shape forming volcanic bombs. Such material if highly porous is called pumice. The solid volcanic ejecta are known as pyroclastics.

Extrusive Phenomena. — Material which actually reaches the earth's surface is said to be extrusive. Among the most important ex¬ trusive phenomena are cones, craters, lava flows and ash beds. The cone is the hill built up around the volcanic vent, and where formed wholly of lava it is low and flat, but a cinder cone of solid ejecta is capable of standing in steeper slopes. Composites of both types are most common. Most large cones show numer¬ ous secondary or parasitic cones built over sub¬ ordinate vents. The crater is the hollow in the cone from which the lava issues. In the great Hawaiian volcanoes the craters are several miles across and constitute veritable lakes of hot liquid rock. After volcanoes become ex¬ tinct, the craters may be occupied by lakes, as in Crater Lake, National Park, Oregon. Where the lava is stiff and viscuous it may flow only a short distance, but with very fluid lavas the flows may be many miles in extent. In the Columbia Plateau of Central Washington one such flow followed another, with thin beds of sand and gravel between, to a total thickness of from two to four thousand feet. The sur¬ faces of lava flows are usually cindery or scoriaceous, and full of blow holes. As the flows move forward they often pick up water- worn bowlders of rock, fragments of trees, and other debris. They may later be buried under hundreds of feet of sediments, but the scoriaceous surfaces, steam cavities, and in¬ cluded bowlders serve to prove their surface origin. Volcanic ash is often very fine and may be wind drifted for miles. In Nebraska, many miles from the nearest possible volcanic source, are beds of such ash varying from a few inches to several feet in thickness now buried under other rock.

Intrusive Phenomena. — Fluid rock which forces its way into and through the surrounding rocks but is not poured out at the surface is said to be intrusive. It occurs in a variety of forms the most important of which are dikes, sills, laccoliths, and batholiths. Fluid rock fill¬ ing fractures in other rocks constitutes dikes, which may occupy any position whatever, but are usually more nearly vertical than horizontal. Thin sheets of lava insinuated between beds along bedding planes are known as sills. They may be either horizontal or vertical, dependent on the position of the beds between which they are intruded. Bodies similar to sills but thick enough to arch up the overlying beds into domes are called laccoliths. Very large irreg¬ ular-shaped bodies which melt their way across the enclosing rocks at any angle are known as batholiths and may be many miles in extent.

Pipes and plugs are nearly circular small bodies, and stocks and bosses are

essentially small batholiths.

Contact Metamorphism. — At the contact between igneous rocks and the rocks into which they are intruded, particularly if the igneous bodies are very large and at very high tempera¬ tures, there is usually profound alteration or metamorphism of the wall rocks. New miner¬ als are formed, usually silicates, since these are best adapted to conditions of high temperature and great pressure. Garnets are .commonly de¬ veloped in limestones and aluminum silicates in shales. Quartzites suffer less change. See Andalusite; Garnet; Magnetite; Metamor- piiism ; etc.

Volcanism and Ore Deposits. — With few exceptions the great ore deposits of the world are connected with igneous activity. In a few cases, as in certain magnetite deposits, and in the case of the Sudbury nickel district, the ores have probably actually solidified from a fluid state with the enclosing igneous rock. In other cases, as at the Clifton-Morenci copper camp in Arizona, bodies of igneous rock have meta¬ morphosed the adjacent limestones into a great mass of garnet rock and copper ore, the ore probably coming from the hot igneous rock. In still other cases the igneous rocks upon cooling have given off hot magmatic waters with ores in solution. These have passed up¬ ward into cracks in the overlying rocks and as they cooled have deposited their metals. This is now believed to be the origin of a very large number of the ore deposits. In still other cases the igneous rock has heated the ordinary ground water, thus giving it a greater power of dissolving mineral matter and render¬ ing it more efficient in the gathering together of ore deposits. See Dike; Economic Geol¬ ogy; Metamorphism; Magmatic Segregation; Ore Deposits; Volcanoes; etc.

Structural Geology (Geotectonics).

This branch of geology outlines the way in which earth materials are put together. Certain structural features imparted to the rocks at the time they are formed are called original ; others imposed on the rocks by deformation at a subsequent period are called secondary or induced structures.

Original Structures. — Practically all sedi¬ mentary rock shows a tendency toward arrange¬ ment in parallel beds, due primarily to the sorting power of wind or moving water. Just so long as the water of a lake, for example, is strongly agitated only coarse material settles out. This makes one bed. When the water becomes quiet, the fine material settles out, and another layer is formed, differing slightly from the first. On a sea bottom where clay has been deposited, uplift may bring the area closer to shore, and sand beds may follow, or sinking may cause the reverse change. Some layers may be many feet thick, others thin as a sheet of paper. But the final result is that most sediments are layered or stratified. The struc¬ ture is highly

important, for it aids in weather¬ ing, helps to control the shapes of cliffs, hills, and various land forms, modifies the circula¬ tion of ground water and aids in quarrying. See Stratification.

In sand dunes, sand bars, alluvial fans, deltas, spits and beaches where there are cur-

rents, layers of sand or mud are often laid down on sloping instead of horizontal surfaces. This may produce for short distances inclined layering known as false bedding or cross bed¬ ding which in small exposures may be mistaken for true bedding, and lead to the incorrect idea that the beds have been tilted, when as a matter of fact they have been formed in this inclined position.

Ripple marks may be defined as rhythmic undulations made on the surface of unconsoli¬ dated sediments. They may be formed by run¬ ning water on the surface of sand bars. Al¬ most everyone has noticed the little closely spaced ridges occurring after a downpour along the bottoms of channels that were re¬ cently full of running water. Wind also makes tiny ripples on sand dunes. The constant back and forth movement of waves makes similar small parallel ridges of even more regular pattern on the sandy bottom of shallow bodies of water. If these ridges become buried be¬ fore they are destroyed and the material hardens, the real ripple may be preserved with its duplicate in reversed form as a cast on the lower surface of the overlying bed. Practiced observers can frequently tell the ripple from its reversed cast and are thus enabled to tell whether the beds are right side up, even in regions where there has been intense folding. Ripples are rarely found in deep sea sediments as the water is too deep for waves to disturb the bottom. See Ripple Marks.

Mud flats that are long exposed to the sun's rays crack to considerable depth, the crack being widest at the top and pinching out below. If sand drifts over this surface and fills these little fissures, the beds may subsequently solidify and the filled crack be preserved in the rock. As the crack is widest at the top, this structure too can be used to tell whether or not the bed is right side up. Sun cracks are found- in ter¬ restrial sediments, but obviously not in marine beds.

Slight showers sometimes leave rain drop imprints on mud surfaces. These may like¬ wise be buried, harden, and be preserved. Little rill marks, channels made by running water, may be preserved in a similar manner, as

may also foot prints left by animals in the mud. These are all characteristic of terrestrial rather than marine sediments and, as in the case of ripples and sun cracks may be used to tell top from bottom of beds.

A layer of sediment may be formed beneath the sea, the region may then emerge and be carved into hills and valleys. Another sub¬ mergence may cause' continued sedimentation, later beds being laid down on top of the old erosion surface. Such an erosional break in the continuity of deposition is said to be an unconformity, and the upper beds rest uncon- formably on the lower. At the time of emer¬ gence there may be folding, the folds being planed off by the subsequent erosion. The later series of beds may then be laid horizont¬ ally across the truncated upturned edges of the older beds. This is an angular unconformity, and the beds are said to be discordant. A knowledge of unconformity is highly important in studying the geology of a given region. See Unconformity.

Secondary or Induced Structures— Joints are fractures which traverse rock masses.

Sometimes they occur in definitely spaced sets, in which case they comprise a joint system. Two or more systems may occur in the same region dividing the rock into regular blocks. Columnar jointing in lavas is supposed to be due to shrinkage from cooling. (See Giant's Causeway). Other joints are the result of internal deformation that bends and cracks the rock. Still other joints may be due to shrink¬ age of sediments from loss of water on drying. Jointing modifies ground water circulation, favors the deposition of mineral matter as veins, and aids in quarrying. See Joints.

Faults are fractures along which there has been slipping of one of the rock walls past the other. In extreme cases one wall has dropped several thousand feet with respect to the adja¬ cent side, resulting in a cliff known as a fault scarp. Erosion, however, soon removes such a cliff and the majority of faults, unless very re¬ cent, have no scarps. Sometimes the plane of breaking is nearly horizontal, and lower and older beds have been thrust far out over younger formations. Such thrust faults are most common in closely folded mountain re¬ gions, and are sometimes known with move¬ ments as great as fifteen miles or more. Min¬ eral veins or seams of coal may be faulted off and portions of them never discovered. The entire subject of faulting is one of great inter¬ est in mining. See Fault.

In many regions, particularly in mountain¬ ous ones, compression has caused the buckling of the rocks into great folds. Upward arches are known as anticlines, trough-like folds as synclines. Folds vary from a few inches

across to many miles, and from the gentlest swells to structures in which the beds are vertical or even overturned. An anticline when first formed constitutes an elevation or mountain which, however, may soon be completely re¬ moved by erosion, though the structure is still called a fold. After peneplanation the beds on either side will be exposed in long parallel lines, and if there are many parallel folds the same formation may outcrop repeatedly. See Folds.

In intensely folded regions where rocks have undergone great pressure, new minerals usually grow with their longer dimension at right angles to the pressure, as that is the eas¬ iest way for them to develop. As a result the rock manifests a tendency to split more easily parallel to the long dimensions of the minerals, just as wood splits parallel to the grain. Such a tendency is called cleavage and is best shown in schists and slates. See Rock Cleavage.

Stratigraphy.

Correlation. — Practically all the success that has been attained in working out earth his¬ tory in detail has depended on the ability to correlate beds of rock in widely separated areas. Such stratigraphic correlation rests on two highly important principles. The first of these is that in regions where the beds preserve their normal order, undisturbed by folding, the older beds are below and the younger above. The second is the principle of progressive evo¬ lution ; that is, in the earliest geologic periods simple forms of life predominated, but as time went on old forms became extinct and new forms evolved, so that of two assemblages of fossils from rocks of different ages certain forms may be common to both, certain forms

found in the older will be absent from the younger, and certain forms found in the younger will not be present in the older.

Admitting these two principles, let it be as¬ sumed that in an unfolded region three forma¬ tions A, B and C rest one on the other, A being the lowest (oldest) and C the highest (young¬ est). In a region several miles away three for¬ mations are also found, the lowest bed of which has the same fossils as B, the middle stratum the fossils of C; while a still higher formation has fossils not found in the first region. This latter assemblage may be called D. It is at once obvious that D is younger than any bed in the first region. This illustrates in its simplest form the principle of stratigraphic correlation by fossils. If in a distant region which is much folded, rocks

with the same assemblages of fos¬ sils are found standing vertical, it thus becomes possible to determine which is the older. See Fossils ; Palaeontology ; Paleobotany.

Divisions of Geologic Time. — At various times in the earth's history there have been great though slow diastrophic revolutions, re¬ sulting in the formation of mountain ranges, the emergence of vast areas from the sea, and notable climatic changes. These profound modifications of living conditions have made equally profound changes in life forms, bring¬ ing about the extinction of many unfit genera and the development of new genera better suited to the changed conditions. These more pronounced revolutions in geography and life have been used as the dividing points between the larger time units in geology, known as eras. Less notable changes of similar nature have given rise to periods. Divisions which suit the facts in one locality may not apply elsewhere, and with increased information there has been a constant growth and modification of time nomenclature. The accompanying table of time units is the one used by the United States Geo¬ logical Survey. With minor modifications the scheme is accepted over practically all of the civilized world. A few of the names are rem¬ nants of the older ideas. Tertiary and Quater¬ nary remain from a day when it was believed all geologic time was divisible into four units, Pri¬ mary, Secondary, Tertiary and Quaternary. Carboniferous (coal bearing) and Cretaceous (chalk bearing) are remnants of the idea that rocks could be correlated on the basis of simi¬ lar composition. It is now known, however, that rocks of identical character may have formed during many widely separated periods.

Era

Cenozoic. .

Mesozoic

Paleozoic

Proterozoic

Period Quaternary . .

j

Tertiary .

f Cretaceous \ Jurassic [Triassic

Carboniferous

Devonian Silurian Ordovician t Cambrian

f Algonkian

I Archean .

Epoch

/ Recent \ Pleistocene

{Pliocene Miocene Oligocene Eocene

[Permian •I Pennsylvanian [Mississippian

/ Keweenawan \ Huronian j Laurentian \ Keewatin

The tendency now is to derive names from re¬ gions where certain units are well exposed. Devonian from Devonshire, Jurassic, from the Jura Mountains and Huronian from Lake Huron are examples.

The rocks of a certain period are spoken of as a system, for example, the Cambrian system, the Cretaceous system. The smallest units to be given separate rank on a map are subdivisions of the system called formations, which usually, though not always, consist practically of one kind of rock, as the Saint Peter sandstone for¬ mation, the Madison limestone formation, and which are usually given the name of a locality where they outcrop prominently. The major facts of history for each period will be given in a separate article on that period, these facts including the thickness and nature of the sedi¬ ments, whether terrestrial or marine, chemical or mechanical ; the extent and importance of unconformities ; geography of the period, whether land or sea, plains or mountains ; cli¬ mate, folding and faulting, volcanism, glacia¬ tion and a careful study of the life record. See Cf.nozoic Era ; Devonian ; etc.

Age of the Earth. — Much interest has al¬ ways attached to the determination of the length of geologic time. Physicists computing the length of time which it has taken the earth to cool at the present rate from the highly heated condition assumed under the nebular hy¬ pothesis arrive at a figure of about 20,000,000 years. Geologists have approached the problem in other ways. One of these is the computa¬ tion of the length of time it might take to ac¬ cumulate the known thickness of sedimentary rocks. By careful studies it is possible to get an average figure for the rate of accumulation of sediments in the ocean at the present time. It is also possible to determine the average thickness of sedimentary rocks in many regions. Assuming the present rate of accumulation to have been constant throughout geologic time, the required time to accumulate the known

thickness of rocks is about 100,000,000 years.

Still another method of attack is based on the salinity of the ocean. All rivers carry com¬ mon salt to" the ocean, and it is believed that all the salt of the sea has been so derived. The area, average depth, and percentage of salinity of the ocean being known, its volume can be computed and the total number of tons of con¬ tained salt be determined. The composition and amount of water delivered to the sea each year by all the larger rivers of the world is known, so the total amount of salt added to the ocean each year is determinable. Dividing the total salt in the ocean by the amount added each year, gives 70,000,000 years as the time it has taken to reach the present degree of salinity. This computation is based on the two assump¬ tions that little salt is ever removed from the ocean, and that rivers have always carried salt in about the present amount. These assump¬ tions are not strictly true and necessary cor¬ rections have been attempted. Such computa¬ tions involve so much that is uncertain that they are to be accepted with the utmost caution. They establish, however, beyond much doubt that geologic time is enormously long. All geologists agree that it is to be measured in millions of years, rather than in hundreds of thousands.

Bibliography. — American Geologist (Min¬ neapolis 1888-1905) ; American Journal of Sci¬ ence (New Haven 1818-date) ; Arrhenius, S., (Lehrbuch der Kosmischen Physik) (Leipzig 1903) ; Ball, R. S., 'The Earth's Beginnings) (London 1901) ; Bischof, Gustav, (Chemical and Physical Geology5 (ib. 1854—59) ; Blackwel- der, Eliot, (Handbuch der Regionalen Geologie, United States of North America5 (Heidelberg 1910) ; Blackwelder, Eliot, and Barrows, H. H., 'Elements of Geology5 (New York 1911) ; Bul¬ letin of the Geological Society of America (Rochester 1890-date) ; Chamberlain, T. C., and Salisbury, R. D., 'Geology5 (3 vols., New York 1905-06) ; Cleland, H. F., 'Geology, Physical and Historical5 (ib. 1916) ; Cole, G. A., 'Aids in Practical Geology5 (6th ed., London 1909) ; Credner, H., 'Element der Geologie5 (Leipzig 1897) ; Dana, J. D., 'Manual of Geology5 (4th ed., New York 1895) ; Davis, W. M., 'Geo¬ graphical Essays5 (New York 1909) ; De Lapparent, A., 'Traite de geologie5 (5th ed., Paris 1906) ; De Martonne, E., 'Geographic physique5 (ib. 1909) ; Elsden, J. V., 'Prin¬ ciples of Chemical Geology5 (London 1910) ; Farrell, J. H., 'Practical Field Geology5 (New York 1912) ; Geikie, Sir Archibald, 'Out¬ lines of Field Geology5 (5th ed., London 1900) ; id., 'Textbook of Geology5 (4th ed., ib. 1905) ; id., 'The Founders of Geology5 (2d ed., ib. 1906) ; id., 'The Scenery of Scotland5 (3d ed., ib. 1901) ; Geikie, J.,

‘Structural and Field Geology5 (3d ed., New York 1912) ; Geological Magazine (London 1864-date) ; Gilbert, G. K., and Brigham, A. P., ‘Introduction to Physical Geography5 (New York 1908) ; Grabau, A. W., ‘Principles of Stratigraphy5 (New York 1913) ; Grubenmann, U., ‘Die Kristallinen Schiefer5 (Berlin 1910) ; Haug, E., ‘Traite de geologie5 (Paris 1907) ; Hayes, C. W., ‘Handbook for Field Geologists5 (New; York 1909) ; Hilgard, E. W., ‘Soils5 (New York 1911) ; Hobbs, W. H., ‘Earth Features and Their Meaning5 (ib. 1912) ; Joly, J., ‘Radioactivity and Geology5 (New York 1909) ; Journal of Geology (Chi¬ cago 1893-date) ; Keilhack, K., ‘Lehrbuch der Grundwasser und Quellenkunde5 (Berlin 1912) ; Kemp, J., ‘A Handbook of Rocks5 (5th ed., New York 1911) ; Lahee, F. H., ‘Field Geology5 (ib. 1916) ; Lake, P., and Rastall, R. H., ‘A Text Book of Geology5 (London 1910) ; Le Conte, J., ‘Elements of Geology5 (5th ed., New York 1903) ; Leith, C.

K. , ‘Structural Geology5 (ib. 1913) ; Leith, C. K., and Mead, W. J., ‘Metamorphic Geology5 (ib. 1915) ; Leyell, Sir Charles, ‘Principles of Geology5 (10th ed., London 1867) ; Merrill, G. P., ‘Contributions to the History of American Geology5 (Washington 1906) ; Merrill, G. P., ‘Rocks, Rock-Weathering, and Soils5 (New York 1897) ; National Geographic Magazine (Washington 1888-date) ; ‘Neues Jahrbuch fiir Geologie, Mineralogie, und Palaontolo- gie5 (Stuttgart, 1881-date) ; Norton, W. H., ‘The Elements of Geology5 (New York 1905) ; Paulcke, W., ‘Das Experiment in der Geologie5 (Berlin 1912) ; Pirrson,

L. V., and Schuchert, C., ‘A Text Book of Geology5 (New York 1915) ; Prestwich, J., ‘Geology, Chemical, Physical and Stratigraph- ical5 (Oxford 1886-88) ; Quarterly Journal of the Geological Society (London 1845-date) ; Reade, T. M., ‘Evolution of Earth Structure5

(New York 1903) ; Rice, W. N., and others, ‘Problems of American Geology5 (New Haven 1915) ; Richthofen, F., von, ‘Fiihrer fiir For- schungsreisende5 (1886) ; Ries, H., and Watson, T. L., ‘Engineering Geology5 (2d ed., New York 1915) ; Russell, I. C., ‘North America5 (ib. 1904) ; Schwarz, E. H. L., ‘Causal Geol- ogy\ (London 1910) ; Scott, W. B., ‘An Intro¬ duction to Geology5 (2d ed., New York 1909) ; Shaler, N. S., ‘The Story of Our Continent5 (Boston 1892) ; Suess, E., ‘Das Antlitz des Erde5 (translated into the French ‘La face de la Terre5— and the English, ‘The Face of the Earth5 Prague 1883-88) ; Tarr, R. S., ‘New Physical Geography5 (New York 1908) ; Tarr, R. S., and Martin, L., ‘Alaskan Glacier Studies5 (Washington 1914) ; Walther, J., ‘Das Gesetz der Wiistenbildung5 (2d ed., Leipzig 1912) ; Wright, G. F., ‘The Ice Age in North America5 (New York 1890) ; and ‘Man and the Glacial Period5 ; Wright, W. B., ‘The Quaternary Ice Age5 ; Zeitschrift fiir Glets- cherkunde (Vienna 1907-date) ; Zeitschrift fiir praktische Geologie (Berlin 1893-

date).

For special bibliographies, see Economic Geology; Rocks; Mineralogy; Physiography; Glaciers ; Volcanoes ; Paleontology ; Fossils ; etc.

Charles L. Dake,

Professor of Geology, School of Mines and Metallurgy, University of Missouri.

GEOMANCY, je'6-man-si (Greek, ge, the earth, and manteia, divination), a kind of divi¬ nation formerly practised. Sparry, in his trans¬ lation of Cattan's 'Geomancie5 (written about the middle of the 16th century, and translated in 1591), says: "Geomancie is a science and art which consisteth of points, prickes, and lines made instead of the foure elements, and of the starres and planets of heaven. . . . And this art may be made on the earth or on white paper, or uppon any other thing whereon it may commodiously be done, so that the prickes and lines may be knowen.55 See Divination; Fung-

SHUI.

GEOMETRIC SERIES. See Series.

GEOMETRICAL MEAN of two numbers is that number the square of which is equal to the product of the two numbers ; thus, the geometrical mean of 9 and 16 is 12, for 9 X 16 = 144— 122. Hence the geometrical mean of two numbers is found by multiplying the two numbers together and extracting the square root of the product.

GEOMETRICAL OPTICS. Fundamen¬ tal Laws. — The fundamental characteristics of the mode of propagation of light in so- called isotropic media are usually explained in terms of three propositions, namely, (1) the law of the rectilinear propagation of light, (2) the mutual independence of the "rays55 which constitute a beam of light, and (3) the abrupt changes in the directions of the rays of light produced by reflection or refraction at a sur¬ face of separation between two media of dif¬ ferent optical densities like air and glass. These laws (which are to be regarded as only partially exact) are concerned essentially with the directions which the light pursues under given conditions and are therefore purely geometrical ; and hence the science which is based upon them and which seeks by their aid

to explain the phenomena of light, either as they occur in nature or as they are produced by the agency of optical instruments, is called Geometrical Optics.

The fact that light traverses a homogeneous medium in straight lines is confidently assumed in matters of everyday life, although it is known to be not absolutely and unexceptionally true. When an opaque body is interposed any¬ where in the straight line joining a luminous object with the eye, the object is thereby ren¬ dered invisible, and the familiar phenomena of shadows find their simplest explanation in this law. The principle of the mutual independence of the rays of light assumes that each ray in a beam of light is somehow separate and distinct from its fellows and has therefore a certain physical existence, although it is impossible to isolate a single ray of light. Actually, we have always to deal with a bundle of rays, which may be homocentric or monocentric (in case all the rays of the bundle meet in one point), but which, in general, is astigmatic (which means literally < (without focus®). The laws of the re¬ flection and refraction of light remain to be stated.

N

Fig. 1.

When light is incident on a smooth, polished surface separating two isotropic media of dif¬ ferent optical densities, part of the light will be reflected back into the first medium and part will be refracted into the second medium, ac¬ cording to the following laws :

(1) Both the reflected and refracted rays lie in the plane of incidence (which is the plane determined by the incident ray and the normal to the boundary-surface at the point of in¬ cidence: see Fig. 1).

(2) The angles of incidence (a) and re¬ flection (p) are equal in magnitude but op¬ posite in sign (P = — a); that is, the incident and reflected rays lie at equal angular distances from the normal on opposite sides thereof (Law of Reflection).

(3) The sines of the angles of incidence (a) and refraction («') are in a constant

ratio, which is equal to the ratio of the veloci¬ ties of light (v , v') in the two media; that is,

sin a; sin a-' = v:vr = constant.

The value of this constant depends only on the nature of the two media and

the color of the light or its wave-length in vacuo. (Law of Re¬ fraction).

By the angles of incidence, reflection and re¬ fraction are meant here the acute angles be¬ tween the incidence-normal and the incident, reflected and refracted rays, respectively.

This constant ratio of the velocities of propagation of monochromatic light in two different media is called the relative index of refraction of the two media. The absolute index of refraction of an optical medium for a given kind of light is defined to be the ratio of the velocity of light in vacuo to its velocity in the medium in question. If the absolute in¬ dices of refraction of two media are denoted by n and n' then v:v' = n':n, and, accordingly, the law of refraction may be written in the following invariant form :

n ' sin a~n' ' sin a'.

Since the velocity of light in a medium is different for light of different colors, the index of refraction of a medium depends on the color of the light, and hence in speaking of the index of refraction of a substance it is neces¬ sary to specify the quality of the homogeneous or monochromatic light to which this number refers. Usually its value is found to be greater for yellow light than for red and greater for blue than for yellow; so that, in general (al¬ though there are some curious exceptions), light is found to be more and more "re¬ frangible® as we proceed from the red to the violet end of the normal spectrum. When we say, for example, that the index of refraction of water is 1.334 or that of alcohol is 1.363, generally it is tacitly assumed that the value ap¬ plies to rays of light corresponding to the Fraunhofer D-line in the light yellow part of the solar spectrum, which is characteristic of the light emitted by incandescent sodium vapor. Thus,

_ velocity of yellow light in vacuo

velocity of yellow light in the given medium

The indices of refraction of the more useful kinds of glass used for optical prisms and lenses vary from about nD = 1.49 to 7iz > = 1.65. The index of refraction of air at 0°C- and under a pressure of 76 cm. of mercury is nD = 1.0002429, which is so nearly equal to unity that it is usually so considered.

The color dispersion of an optical medium is estimated by its dispersive power , which is de¬ fined by the following ratio :

tv «f — nc

Dispersive power = – -

where the symbols tic, «d, t if, denote the magni¬ tudes of the indices of refraction for light cor¬ responding to the Fraunhofer lines C (red), D (yellow), F (blue), respectively. The reciprocal 6f the dispersive power of the more important varieties of glass used in the manu¬ facture of optical instruments varies between the limits 70 and 30.

Optical Images. — Generally, when an ob¬ ject is viewed, directly or indirectly, not all or even most of the rays which are emitted are

utilized for the purpose of vision. In fact, it is usual to interpose in front of the luminous object an opaque screen with a suitable opening in it for the express purpose of intercepting the needless or undesirable rays and permitting the others, called the effective rays, to pass unhampered through the opening. This is admirably exempli¬ fied by the iris opening in the human eye which enables the observer to utilize only those rays which are best adapted to the organ of vision, so that from each point of the object in the field of view there comes into the eye a bundle of effective rays whose aperture is de¬ termined by the dimensions of the pupil. The organ of vision is subject to optical illusions in regard to the external world, due to various causes, among others to the fact that the eye judges the object to be at the place whence the rays emanate just before entering the eye, which may not correspond to the place where the object actually is. Thus, for example, if the bundle of rays proceeding originally from a luminous point of the object has been modi¬ fied by reflection or refraction before entering the eye, the object itself will not be visible, and at best the eye can perceive only a so- called image of the object, which in general will be blurred and distorted and situated dif¬ ferently from the object as to both distance and direction. In the singular and very special case when the effective rays after emerging from the optical system of isotropic media, which are here supposed to be interposed be¬ tween the object and the eye, all meet again in one point, there will be formed at this point an ideal optical image of the luminous object- point. And even when the image is not abso¬ lutely ideal, it may be so nearly perfect that the limited resolving power of the human eye is not able to discern its faults, so that then the image is practically ideal.

Nearly all optical instruments are contriv¬ ances for utilizing the phenomena of light in order to reproduce as distinctly and faithfully as possible images of luminous objects. Such instruments (e.g., microscope,

telescope, photo¬ graphic lens, etc.) are usually composed of a single lens or combination of lenses. The word lens is used in optics to denote a portion of a

CC ir C

Fig. 2.

transparent substance, usually isotropic and most often made of glass, comprised between two smooth polished faces, one of which may be plane. (If both faces are plane, it is not a

lens but a prism — or a slab, in case the two plane faces are parallel). The faces of the lens are generally, but not necessarily, spherical in form. The optical axis of a lens is a

4r c

Fig. 3.

straight line which is normal to both faces, and consequently a ray whose path lies along the axis (the axial ray) will pass through the lens without being deflected from this line. A lens is said to be convex or concave according as it is thicker or thinner, respectively, in the middle along the axis than out toward the edges. A convex lens may be double convex (Fig. 2, a), plano-convex (Fig. 2, b) or a convex meniscus (Fig. 2, c) ; similarly, a concave lens may be double concave (Fig. 3, a), plano-concave (Fig. 3, b) or a concave meniscus (Fig. 3, c). A convex glass lens of moderate thickness, sur¬ rounded by air, will be found to converge a beam of parallel rays of sunlight to a focus on the far side of the lens; and hence it is said to be a convergent or positive lens. On the other hand, a concave lens under the same circumstances will render a beam of sunlight divergent, and hence it is called a divergent or negative lens.

The lenses in an optical instrument are al¬ most invariably disposed so that the centres of the spherical refracting surfaces lie all on one straight line, which is an axis of symmetry (optical axis). The instrument is said to di¬ vide the surrounding region into two parts known as object-space and image-space ; which, however, are not to be regarded as separate and distinct parts of space, but rather as names to be applied, to different aspects of the same space ; whereby any point or straight line may be considered as belonging equally to either region depending merely on the point of view. The effective rays before they enter the instrument are called object-rays, since they have their origins in the luminous object; whereas the emergent rays which go to form the more or less imperfect image are called image-rays.

if the problem is restricted (for example, by a suitable arrangement of (with very narrow openings) to such rays as are never at any stage in their passage through the sym¬ metrical optical instrument very far from the optical axis (so-called paraxial rays), it may be shown that under these circumstances (assum¬ ing also that we have to deal only with monochromatic light) there will be ultimately strict collinear correspondence between object- space and image-space ; so that the bundle of image-rays corresponding to a homocentric

i

bundle of object- rays will also be homocentric, and accordingly every point P of the object will be reproduced by an ideal image P' which is said to be ((con jugate® to P. According as the image-rays, on issuing from the instrument, converge to a (real) focus at P' or diverge as though they had come from a (virtual) focus at P' the image is described as a real image or a virtual image , respectively.

Gauss Theory, Cardinal Points, Focal Lengths, etc. — Although it is difficult to realize even approximately the conditions that are necessary for a collinear correspondence of object-space and image-space, nevertheless the assumption of this geometrical relation does afford a fairly accurate conception of the fundamental connections of the position and size of the image with those of the object and enables us to form an idea of the general and salient characteristics of the imagery. A gen¬ eral method of treating the problem of the imagery produced by the refraction of paraxial rays through a centered system of lenses was published by C. F. Gauss in his famous Dioptrische Untersuchungen in 1841. Accord¬ ing to this theory the action of such a system is completely determined by the positions on the axis of four cardinal points, namely, the two focal points F and F' (Fig. 4) and the two principal points H and H\ These points must now be defined.

In every centered system of spherical re¬ fracting surfaces there are two (and only two) transversal planes at right angles to the optical axis which are characterized by the following properties :

A bundle of paraxial object-rays which all meet in a point in one of these planes (the primary focal plane) will emerge from the sys¬ tem as a cylindrical bundle of parallel image- rays; and, similarly, a cylindrical bundle of parallel object-rays will emerge from the sys¬ tem as a bundle of image-rays which all meet in a point in the other one of these planes (the

secondary focal plane). The points where the focal planes are pierced by the optical axis are the primary and secondary focal points F and F' above mentioned.

Moreover, in every symmetrical system of lenses there is one (and only one) pair of conjugate planes perpendicular to the axis which are distinguished by the property that in these planes object and image are congruent; and, therefore, any straight line drawn parallel to the axis of symmetry will intersect these planes in a pair of conjugate points. These are the so-called principal planes, one belong¬ ing to the object-space (the primary principal plane) and the other belonging to the image- space (the secondary principal plane). The primary and secondary principal points H, H' are the axial points of the principal planes.

Construction of the image. — Provided the positions of the cardinal points F, F' and H, FT are given, the image-point Q' conjugate to an extra-axial object-point Q may be found by the following geometrical construction (Fig. 4).

Through Q draw the straight line QV' parallel to the axis meeting the secondary prin¬ cipal plane in V', and also the straight line QF meeting the primary principal plane in W. The required point Q' will be at the intersection of the straight line V'F' with the straight line W Q' drawn parallel to the axis. The feet of

the perpendiculars let fall from Q, Q' on to the axis will locate also a pair of conjugate axial points M, M', and M'Q' will be the image of MQ.

Fig. 4.

Thus, point by point, the image-relief cor¬ responding to a given 3-dimensional object may be constructed; and in this image-relief object-planes perpendicular to the axis will be repro¬ duced by similar plane figures placed at right angles to the axis, but in general the magnifica¬ tion-ratio (M'Q' :MQ) will be different for different pairs of conjugate transversal planes, assuming all possible values positive and nega¬ tive depending on the place of the object.

However, in the special case when the object- point is infinitely far away, the construction as given above fails. Suppose, for example, that the object is a distant star seen by the naked eye in the direction of the straight line FI (Fig. 5) which makes an angle w ˆ HFW

with the optical axis of the instrument. Its image will be formed at the point I' (conjugate to the infinitely distant object-point I) where the straight line WI' drawn parallel to the axis meets the secondary focal plane.

Focal Lengths. — The focal lengths, denoted by f and are defined to be the abscissae of the principal points with respect to the corre¬ sponding focal points as origins; thus, / = FH, f = F'H' ; and if the indices of refraction of the object-space and image-space are denoted by n and n', respectively, the theory shows that

/ _ n

*f n **

This fundamental relation may be expressed by saying that the focal lengths of a centered system of spherical refracting surfaces are proportional to the indices of refraction of the first and last media, and are opposite in sign ; except in the single case when the optical sys¬ tem includes an odd number of reflecting sur¬ faces, under which circumstances the focal

lengths have the same sign ˆ ~ — = _] _ •

In particular, when the media of object- space and image-space are identical (n' = n), the focal lengths are equal in magnitude (/' =

/, or, in case of an odd number of reflecting surfaces, /' = /).

GEOMETRICAL OPTICS

439

Image-Equations. — If the co-ordinates of the pair of conjugate points Q, Q' (Fig. 4), re¬ ferred to two systems of rectangular axes with their origins at the principal points H, H' are denoted by (u, y) and (u\ y') ; that is, if u — HM, y = MQ and w' = H'M', y'= M'Q', the following relations may be derived immediately from the figure:

f r

H — — + 1 = 0 (abscissa-equation),

u

u

J_ _ / r+u'_ J.u'

y / + « f f- u

(magnification-formula) .

These are the so-called image-equations re¬ ferred to the principal points. If we introduce the symbols

£/. =

n

U' =

n

« =

n

u u f f

where n, n denote the indices of refraction of the media of the object-space and image-space, these equations may also be put in the follow¬ ing simple and convenient form :

y' U .

U'=U + F,

U'

The magnitude denoted by F is called the re¬ fracting power of the optical system, and the symbols U, U ' denote the so-called reduced vergences of the object-rays and image-rays. If the linear magnitudes u, u, f and f are ex¬ pressed in meters, the reciprocal reduced magni¬ tudes U, U' and Ff will be expressed in terms of a unit called a dioptry (sometimes written diopter or dioptre), which is defined to be the curvature of a sphere of radius one meter. This unit which was introduced into lens-optics by the opticians and spectacle-makers has been adopted into optical science.

Stops. — But the mere geometrical assump¬ tion of a point-to-point correspondence be¬ tween object-space and image-space by means of rectilinear rays (even were it realizable) is not by itself sufficient to explain the modus operandi of an actual optical instrument, be¬ cause it leaves entirely out of account two fundamental conditions which are essential to all mechanical contrivances for the production of an optical image; namely, first, the fact (al¬ ready alluded to) that the bundles of effective rays are necessarily limited by the transversal dimensions of the instrument (the diameters of the lens-fastenings, artificial diaphragms or "stops® and walls of the tube) ; and, second, the fact that the image, instead of being

left floating in the air, is cast on a screen or sur¬ face of some kind, for example, the ground- glass plate of a photographic camera, or in the last analysis the surface of the retina of the observer's eye. Obviously, it will only be under very exceptional circumstances that this receiv¬ ing surface will contain all the image-points that are conjugate to the points of the object- relief ; so that even though the imagery were ideal in the sense of collinear correspondence between object-space and image-space, some parts of the image projected on the screen will be more or less blurred and indistinct due to this method of representation.

In addition to the circular fastenings of the lenses, the system may also be provided with artificial diaphragms or "stops,® disposed at various places along the axis of the instrument.

A "stop® is usually formed by a plane opaque screen, perpendicular to the axis, pierced by a round hole concentric with the axis. To an eye looking into the instrument from the side of the object, only such stops as lie in front of the first lens will be directly visible. Any other stop or lens-rim will be seen only by means of the real or virtual image of it that is cast by that part of the optical system which is be¬ tween it and the eye. Now these impalpable stop-images, whether visible or not, are just as effective in cutting out the rays as if they were actual material stops; because, obviously, any ray that goes through an actual stop must necessarily pass, either really or virtually, through the corresponding point of the stop-image; whereas a ray that is obstructed by a stop, will not go through the opening in the stop-image.

If the optical instrument is directed toward the object and focussed on some selected point M on the axis, this point of the object will be reproduced in the image-space at the point M' conjugate to M; and, on the assumption that the imagery is ideal, the transversal planes perpendicular to the axis at M and M' are a pair of conjugate planes which play a very es¬ sential role in the theory of the imagery pro¬ duced by an optical instrument. The plane in the object-space may be called the focus-plane (or the plane which is in focus on the "screen®), and the conjugate plane in the image-space may be referred to as the screen- plane.

Now if the eye is supposed to be placed at the axial object-point M and turned toward the instrument, the stop or stop-image whose aperture subtends at M the smallest angle is called the entrance-pupil of the system. All the effective rays in the object-space must be directed to points which lie within the circum¬ ference of the circular opening of the entrance- pupil. On the other hand, when the eye is placed at M' so as to look into the instrument through the other end, the stop or stop-image which subtends the smallest angle at M' de¬ termines in the same way the so-called exit-

pupil, through which all the effective rays, when they emerge from the instrument, must pass, really or virtually. The exit-pupil is, in fact, the image of the entrance-pupil produced by the optical system as a whole, and the pupil-centres O, O' are, therefore, a pair of conjugate axial points. The apertures of the ray-bundles in the object-space and image-space are deter¬ mined by the diameters of the entrance-pupil and exit-pupil, respectively. Each of the pupils is the common base or cross-section of the cones of effective rays in the region to which it belongs.

Now if the cardinal points of the optical system are assigned, the image-relief corre¬ sponding to a 3-dimensional object may be con¬ structed, as has been explained. This image- relief (as was stated above) is almost invari¬ ably received on a surface or screen of some kind, which may. here be assumed to be a plane surface coincident with the so-called screen-plane. In the diagram (Fig. 6) the point M' conjugate to the axial object-point M is represented as sharply focused on the screen. Evidently, the system cannot be in focus for all the different points of the object- relief at the same time, because the screen-

plane is conjugate to only one transversal plane of the object-space, namely, the focus-plane perpendicular to the optical axis at M. Thus, for example, the reproduction of a solid ob¬ ject, such as the image of a landscape cast on the ground-glass plate of a photographic camera, is not an image at all in the strict sense of the word, inasmuch as it is not conjugate to the entire object point by point. Only such points of the object as happen to lie in the focus-plane will be reproduced by sharp point-images in the screen-plane; whereas object- points situated on one side or the other of the focus-plane will be depicted by small luminous areas which are sections cut out by the screen- plane from the cones of image- rays emanating originally from these points. These little patches of light, which are more or less ellipti¬ cal in contour and whose dimensions depend on obvious geometrical factors, are the so-called blur-circles, in consequence whereof details of the image as projected on the screen are im¬ paired to a greater or less degree or are, as we say, <(out of focus.®

The object-figure in the focus-plane which is optically conjugate to this configuration of image-points and blur-circles cast on the screen may be easily constructed by projecting the points of the object on to the focus-plane by cones of rays which have the entrance-pupil as their common basis. This "vicarious® object to which the image on the screen is optically conjugate is sometimes called the "projected copy of the object-relief.®

It hardly needs to be said that the blur- circles which are incident to this mode of projecting the optical image of a solid object on a surface are due to no faults of the optical system itself, but are inherent in the method of representation and really have their origin in the object-space itself. The only possible way of diminishing or eliminating the indistinctness or lack of detail consists in reducing the diameter of the aperture-stop or, as we say, "stopping down® the instrument; until, finally, when the stop-opening is contracted more and more to the dimensions of a pin-hole, the pupils likewise will tend to become mere points at their centres O, O', and the blur-circles in both the focus-plane and the screen-plane will dimin¬ ish in area pari passu, and ultimately collapse also into the points where the so-called chief rays, which intersect at the pupil-centres, cross this pair of conjugate planes. Under such cir¬ cumstances, the pupil-centres O, O' are to be regarded as the centres of perspective of the object-space and image-space, respectively..

The extent of the field of view in the object- space is determined by that one of the stops or stop-images which subtends the smallest angle

at the centre O of the entrance-pupil. It is called the entrance-port. Similarly, the field of view in the image-space is limited by the so-called exit-port, which is the stop or stop- image on that side of the instrument which sub¬ tends the smallest .angle at the centre O' of the exit-pupil. Just as the exit-pupil is the image of the entrance-pupil, so also the exit-port is the image of the entrance-port produced by the optical system.

Aberrations. — As a matter of fact, actual optical images which are necessarily formed by ray-bundles of finite apertures are, in gen¬ eral, more or less faulty, so that the theory of optical instruments is greatly complicated by numerous practical and well-nigh insurmount¬ able difficulties. These faults — which are called aberrations — may sometimes escape unnoticed merely because they are too slight for the eye to perceive, but usually the image will be seriously impaired unless they are corrected as far as possible. This is a subject which cannot be adequately treated here, and we can merely say that there are two principal kinds of aberra¬ tion, namely, (1) the chromatic aberrations or color-faults of the image in consequence of the different refrangibilities of light of different colors, whereby the image is affected with residual color-effects which are not apparent in the object, and (2) the so-called spherical aberrations caused by the imperfect convergence of rays of light of the same color. A problem of the greatest difficulty in the design and con¬ struction of optical instruments is to determine the various factors (indices of refraction, radii of the surfaces, lens thicknesses and distances etc.) so that these defects will be at least comparatively negligible.

Newton erroneously concluded from his prism-experiments and investigations of dis¬ persion of light that it was impossible to pro¬ duce an achromatic image by refraction, and, despairing therefore of being able to improve refracting telescopes, he turned his attention to reflectors, as is well known. But in 1757 Dollond, a London optician, was able to con¬ struct an object-glass, which was achromatic for red and blue light, and which consisted of a combination of a "crown glass® lens with a "flint glass® lens, of which the former was the weaker in respect to both refraction and dis¬ persion. For many years to come this re¬ mained the high-water mark of practical achievement in the construction of optical in¬ struments, and indeed no further progress was possible on account of the lack of suitable varieties of optical glass. Fraunhofer clearly perceived the difficulty in the way of advance¬ ment in the manufacture of optical instruments, but it was not until the time of Abbe and the establishment in 1886 of the Glastechnisches Laboratorium of Schott und Genossen, where the now world-famous Jena glass is produced, that this obstacle was triumphantly overcome ; and by the aid of the new kinds of optical glass it was possible to take another step in the cor¬ rection of the chromatic aberrations by abolish¬ ing also the so-called "secondary spectrum® in the image.

In the older types of optical instruments (telescope and microscope), the first attempts at correcting the spherical aberrations were confined almost entirely to the improvement of the image of an object-point situated on the

axis. With the development of the photo¬ graphic lens and instruments with an extended field of view, it became more and more essential to take into account the other kinds of spherical aberrations as well as that along the axis. Among these may be mentioned astigmatism and "coma? which are concerned especially with lack of detail in the image, curvature of the image, which is fundamentally involved when the image has to be focussed on a receiving screen, and distortion due to the unequal mag¬ nification of the parts of the image which are at different distances from the axis. How these difficulties and defects have been practically surmounted in the best types of modern optical instruments is a record of painstaking achieve¬ ment which cannot be described within the space allotted to this article.

James P. C. Southall,

Associate Professor of Physics, Columbia

University.

GEOMETRICAL PROGRESSION. A

series of quantities is said to be in geometrical progression when the ratio of each term to the preceding is the same for all the terms, that is when any term is equal to the product of the preceding term and a factor which is the same throughout the series. This constant ratio or factor is termed the common ratio. See Progression.

GEOMETRIDˆE, je- 6-met'ri-de, a family of moths whose larvae walk by arching the body and so bringing the hinder feet (prolegs) close up to the forward (thoracic) feet, and again reaching forward. Hence they are called hoopers,® "inch-worms,® etc. See Measuring- worms.

GEOMETRY, the science of the formal properties of the space in which we live, either in its concrete application to this space, or as a study of pure mathematical form ; by exten¬ sion, any one of an indefinite number of sciences which deal with mathematical systems more or less closely related to that of the space in which we live. The mathematician is only concerned with the purely formal and structural properties of the systems with which he deals (see Mathematics), and in none of the following articles on various branches of geometry will we find any matters treated in detail except such as deal with this form. For a general treatment of the question of the relation of these forms to the space in which we live, see Space. For the several branches of geometry, see the articles immediately following.

GEOMETRY, Cartesian. Between num¬ ber and the properties of number, on the one hand, and space and the properties of space, on the other, there is, strictly speaking, no re¬ semblance ; and the science of number, i.e., algebra or analysis, and the science of space, i.e., geometry, are essentially, psychologically, and logically independent doctrines. But de¬ spite their fundamental unlikeness and inde¬ pendence, there is between the two, broadly speaking, a fact-to-fact correspondence. For example, there subsists, or may be established, a unique and reciprocal, or one-to-one, corre¬ spondence between the real numbers and the points of a straight line or other curve; between the real numbers and the lines of a flat pencil (see Projective Geometry) or the tangents to

a curve ; between the pairs of real numbers and the points or the lines of a plane ; between the triplets of real numbers and the circles of a plane or the points or planes of space; between the quartets (permutations four at a time) of the real numbers and the lines or the spheres of space. (See Line Geometry and Allied Theories). The theory of the correspondence thus simply exemplified, the logically organic body of propositions setting it forth, is the science called analytic or algebraic geometry. It is often called co-ordinate geometry from the fact that the set of numbers determining or

corresponding to a geometric element are called the co-ordinates of the element. By virtue of the correlation between analytic facts and geometric facts, it is frequently possible, when facts of the one type are known, to infer the corresponding facts of the other, and so to investigate space analytically (algebraically, arithmetically) and to investigate number geometrically. Under either of these aspects, analytical geometry appears as a method: ana¬ lytic investigation of geometry, geometric in¬ vestigation of analysis. Usually it is the former aspect under which the doctrine is regarded, geometry being the subject-matter, and analysis the means or instrument of re¬ search.

The science presents numerous branches or varieties. These differ among themselves in various ways. Two varieties may differ in respect to what is often called their "spaces,® i.e., in respect to the domains, fields, regions, or extents (as curve, surface, space) containing the configurations with which they deal. Thus arise such distinctive designations as geometry of (on, in) a plane, or plane geometry, geometry on a surface or a curve, geometry of space. Again, a given "space® or domain may be con¬ ceived in countless ways. It may be con¬ ceived as the assemblage of its points or of its lines or of its circles, and so on. Accordingly two geometries relating to a same "space® or domain may yet differ in respect to their primary elements, in respect, i.e., to the ele¬ ments of which the configurations investigated are regarded as composed. So arise, for ex¬ ample, such distinct theories as the point, line, circle, ...» geometries of the plane, and the point, line, plane, circle, sphere, . . . , geome¬ tries of space. Once more, as will appear in this and related articles herein cited, a chosen element in any given domain may be referred to different kinds of configurations of refer¬ ence ; it may, in other words, be determined by, made to correspond to, or be associated with, different kinds of co-ordinate systems. Upon the choice of co-ordinate system depends, ceteris paribus , the analytic form of a given geometric theory. Accordingly, two geome¬ tries that are identical in content may differ in form, in algebraic guise or garb.

The primitive, by far the oldest, variety of analytic geometry, the parent of all other varieties, is the Cartesian, so called from its founder, Rene Descartes (1596-1650). Though originally a plane geometry, its procedure is equally adapted, and has been extended, to spaces of every dimensionality in points. (See Hyperspaces). It is characterized partly by its primary element, the point, and partly by its co-ordinate system, which will be explained

below. Descartes' geometry, contained in his Discours de la methode pour bien conduire sa raison et cliercher la vSritS, dans les sciences, published in 1637, is to be regarded, on account of its influence on mathematics and upon knowl¬ edge in general, as one of the very greatest contributions ever made to science. Descartes was not indeed the first to apply algebra to geometry. That had been done by ((the great geometer, » Apollonius of Perga (about 260- 200 b.c.), who had referred the conic sections to their tangents and diameters, expressing the relations by linear equations between areas. In the 14th century Oresme and others had applied numbers («latitudo» and «longitudo,)> precursors of the modern ordinate and ab¬ scissa) to refer a point to two chosen rectan- ular lines or axes. The point was confined, owever, to the first quadrant. In this way the straight line, the circle and the parabola were studied. Other predecessors of Descartes were Vieta (1540-1603), Cavalieri (1598-1647), Roberval (1602-75), and the brilliant Fermat (1601-65), who more nearly than any other approaches Descartes in his understanding of the analytic method. Even Fermat, however, had apparently not seen what Descartes saw, the possibility of referring at once to a single co-ordinate configuration different curves of different orders.

The following paragraphs give a very brief account of the elements of Cartesian, or ordinary analytical, geometry with special reference to the straight line and the conic section and the simplest configurations of space.

The Plane.

Cartesian Co-ordinates. — Any two straight lines, as XX' and FF', are assumed as lines of reference, or co-ordinate axes. The former is X-axis or axis of abscissae, the latter is F-axis or axis of ordinates. The point O is the origin of distances; the (half) line OX, the origin of angles. Distances on or parallel to the X-axis are regarded positive (+) if meas¬ ured to the right, negative (—) if to the left. Distances on or parallel to the F-axis are re¬ garded positive if measured upward, negative if downward. Angles are regarded positive or negative according as they are conceived to be generated by counter-clockwise or by clockwise rotation. (See Trigonometry). Conceive drawn all lines parallel to the X-axis and all parallel to the F-axis. Any pair of these lines, one of the former set and one of the latter, determine

Y

(intersect in) a point, and all points of the plane are thus determined. Conversely, any point determines (is the common point of) a pair of the lines, and all the pairs of the par¬ allels are thus determined. Obviously any line-

pair or its point determines two real numbers : the distances OF and FP in terms of any con¬ venient unit. These, denoted respectively by x and y, are named respectively the abscissa and the ordinate , together the co-ordinates, of the point. Conversely, any pair of real numbers determine a point. It is thus seen that, by means of a pair (system) of axes, a one-to-one correspondence is established between the points of the plane and the assemblage of real number pairs. Any such point and its pair of coordinates are said to correspond ; the point is said to depict or represent its pair of numbers geometrically, and the number pair is said to represent the point arithmetically or alge¬ braically or analytically.

Transformation of Cartesian Co-ordinates. — It is plain that (the unit being the same) the co-ordinates of a point referred to one pair of axes will not coincide with its co-ordinates referred to a different pair. Formulae for expressing the old in terms of the new co¬ ordinates are exceedingly useful. To find such

formulae, consider first the case where the old and new origins coincide. Denote by « and ft the angles made with OX by OX' and OF' respectively. Let x and y be the old, and x and y' the new, co-ordinates of any point P, and denote the angle XOF by w. The formulae in question are readily seen to be : a- sin w =-

x* sin, (w — «) + y' sin (w— – /?), y sin v = x' sin

a y' sin P. If the origins do not coincide

and if h and k be the co-ordinates of the new

origin O' with reference to the old axes, the formulae of transformation are found by adding li sin a) and k sin w respectively to the right- hand members of the foregoing equations. Most commonly the axes are assumed to be rectangular. In that case, w =90°, sin u = 1, P — (90 0 + a), and the equations of trans¬ formation become: x = x' cos a — y' sin a + h. y = x' sin a + Cos a + k. The equations for effecting the inverse transformation are found by solving for x' and y' the equations of the direct transformation.

Polar Co-ordinates. — Though it is never necessary, it is often convenient to employ other than Cartesian co-ordinates to determine the position of a point. Of such other co¬ ordinate systems, the most familiar is the polar. About any point O (as centre), called the pole, suppose drawn all possible concentric circles ; also suppose drawn out from the pole all pos¬ sible rays (half-lines). Any circle and any ray determine (intersect in) a point, and all points of the plane are thus determined ; con¬ versely, any point

determines (is common to) a circle and a ray, and all pairs of such lines (circle and ray) are thus determined. A circle is given by its radius p. and a ray by its

angle 0 made with a fixed ray, as OQ, called the initial line or polar axis. All the circles are obtained by letting p vary from 0 to oo, and all rays by allowing 0 to vary from 0 to 2x

or 360°. Obviously, to any pair of values (within the ranges of variation mentioned) of P and 0 there corresponds one point, and con¬ versely. The pair of numbers (p, 0) determin¬ ing or determined by a point P are called the polar co-ordinates of P. In particular, p is called the radius vector, and 0 the vectorial angle, of P.

Transformations from Cartesian to Polar Co-ordinates. — We present here only the simplest and most important case, viz., that wherein the Cartesian axes are rectangular, the origin coinciding with the pole, and the positive half of the X-axis with the polar axis. Let P be any point. It is clear, Fig. 3, that the equa¬ tions of direct transformation are: x = p cos 6; 0=p sin 0. Solving these for p and 0, the equa-

Y P'

Fig. 4.

tions of the inverse transformation are found

to be: p—\jx2 +y2; #=tan— .

oc

Distance between Points.— Henceforth the axes will be assumed to be rectangular. Let P and P' be any , two points, of co-ordinates (x, y) and (x, y') respectively. From Fig. 4, by the Pythagorean theorem, d2=(x — x ')2 ~r(y — y')2, whence the distance between any two points (x, y) and (x\ y) is found to be

d=ˆJ (x — x')2~h(y — y')2. Transforming to polar co-ordinates (p, 0) and (p\ 6'), and reduc-

ing, there results d = \/ p2 + pfi — 2pp' cos (0 — 0'), in agreement with the Law of Cosines. (See Trigonometry).

Division of Line-segment in Given Ratio.

— Suppose P divides the segment PtP2 in the

ratio, wi:w2. By hypothesis, PiP:PP2 = nu:m2\ hence, from similar triangles,

mi:nt2 = (x — xi) \(x2 — x) — (y — yx) :(y2 — y) ; these equations, solved for x and y, yield x —(niiXi + m2xi) :(wi + ma) and y~{nuy2 + w2yi) :(wtx + m2).

If the division be exterior, i.e., if P be outside the segment, as at (P), one term of the ratio is negative, and the formulae are :

x = (ni\x 2 — m2xi) : (Wi — m2) , y = (*n\y2 — m2y i) : (nu — m2) .

^_ P be the interior mid-point, Wx = m2, and

‘ x y ~ (y* + y *) if Wx — — m2, P is the exterior mid-point and its co-ordinates are both infinite unless the segment is parallel to an axis, in which case but one of the co¬ ordinates is infinite.

Locus of Equation.— An equation, f(x, y)

0, between the variables x and y, defines a system or aggregate or assemblage of pairs of numbers, viz., the assemblage of pairs of values of ^ and y that satisfy the equation. To each of such pairs of (real) values, a system of axes and a unit of distance being chosen, there corresponds a point. The assemblage of all the points so determined constitute the (real) locus of the equation. In general, as x or y varies continuously, y or x will vary continuously, and accordingly the correspond¬ ing point will trace a continuous path, some curve, the locus in question. Conversely, if a point move subject to some geometric condition, its path will be a curve such that the co¬ ordinates of its points and of no other satisfy some equation. An equation and its locus or curve are each said to represent the other, and, from the properties of either, corresponding properties of the other can be inferred. An equation defines its locus, a locus defines its equation. Any equation, f(x, y) = 0, is, of course, satisfied by countless pairs of values of which either (or both) is imaginary or complex. To such a pair no real or «visible) > point of the plane corresponds. Nevertheless, in order that the geometric and analytic lan¬ guages shall be coextensive, it is customary to . say that any pair of numbers of which at least one is complex represents an ((imaginary point® of the plane. Accordingly the locus (in gener¬ alized sense) of an equation is composed of a real part and an imaginary part, the latter consisting of all imaginary points whose co¬ ordinates satisfy the equation. The intersection of two loci or curves consists of the

points (real and imaginary) whose co-ordinates satisfy the equations of both curves. The foregoing remarks respecting equations in Cartesian co¬ ordinates apply equally to equations in polar co-ordinates.

The Straight Line and the Linear Equa¬ tion. — Let (1) be any line through the origin, and denote by 0 its angle with OX, and let m = tan 0. Obviously the x and y of any (every) point of (1) and of no other point are connected by the equation y = mx, which there¬ fore defines, and is called the equation of, line (1). To each line through 0 there corresponds

one value of the slope m, and conversely. Any line not through 0 is parallel to a line through 0. Hence (2), parallel to (1), represents any line not through 0. Clearly by adding b to any y of (1) the corresponding y of (2) is found, while corresponding Fs are the same. Hence the equation of (2) is y = mx + b. The quantity b is called the Y -intercept of the line; if b is zero, (2) goes through 0, and conversely. The equation represents a line for every pair of real values of m and b; conversely, every line

Fig. 6.

has a slope and a F-intercept (positive or nega¬ tive). Hence every equation of 1st degree in x and y represents a straight line, and con¬ versely. Solving the equation y = 0 of the X-axis and the equation of (2) as simultane¬

ous, the intersection is found to be

or (a, 0), whence the equation of (2) may be

- . y written —

a b

1, called the intercept or sym¬

metric form, a being the X-intercept. The equation y — mx Ar b is called the slope form. Other forms are readily obtainable, of which one of the most important is the so-called standard or normal form, x cos a f y sin a — P — 0, readily deducible from the figure, where p is the length of the perpendicular (normal) from O to (2), a is the angle indicated, and P is any point of (2). The general equation

Ax + By + C=- 0

can be reduced to any of the foregoing forms. To reduce it to the normal form, it suffices to

multiply by the normalizing factor, 1 :\f A2 f B2 , yielding

Ax

l By

V a2+ b~ V*

where cos a. = A : V

C

r= = 0,

V

sin a = B : V

— C: V , that sign before the radical be¬ ing chosen which renders the constant (or absolute) term negative. A line is determined by yet other pairs of data, as by its slope m and a given point (xt, yi) or by two points (xi, yO, (x2, y2), and its equation assumes cor¬ responding forms, which may be called respect¬ ively the point-slope form and the two-point form. The former plainly is y — yi — m(x — Xi). The necessary and sufficient condition that this line shall pass through (x2, ya) is y2 — yx = m (x2 — Xi). Combining the two equations by division, there results the two-point form, (y — yi) '(yi — yi)=(— xx) :(x2 — xx), equa¬ tion of the line fixed by the points (xh yx), (x2, y2).*

Distance from Point to Line. — The equa¬ tion of any line (3), parallel to (2), Fig. 6, is x cos a + y sin a. — p'~ 0, where />'= p + d.

The condition that (x\ y') be on (3) is x cos a f y' sin d — p\ Subtracting p from both members, we find d — x' cos «+y' sin a — pf the distance from (x\ y') to x cos a + y sin a — p— 0.*

Angle between Lines. — Let be the angle

between two lines whose slopes are mx and ra2. Then tan

= co , and 1 + nnm2= 0, whence m1m2= — 1, condition of perpendicularity.

The Circle and Its Equation — About any point (a, b) as center describe a circle of any radius r. Let P(x, y) be any point of the circle. A glance at the figure shows that x and y are connected by the relation

(x-a)2+ (y-b)2-P = 0,

equation of the circle. By comparison with the equation x2 + y2 A~ 2 Ax A- 2By f C = 0, the latter is found to represent a circle of center

(— A, — B), and radius \/ A2 A B2 — C. If the radicand be negative, the radius and hence

the circle is imaginary. The tangent (1) to the circle at the point (x\, yY) is

(Xi — a) (x — a) + (yi — b) (y — b) — r* = 0; the normal (2) is

(yi — b)(x — Xi) — (xi — a) (y — y0 = 0.

If the center be at the origin, the circle is x2 + ya = r3, the tangent at (xlt ya) is x2x + yxy — r2 — 0, and the normal is y^x — xcy — 0. The line y = mx + c is tangent to x2 A~ y2 — r3 = 0 when and only when the distance from O to

the line is r, i.e., when c — ± rV 1 + m2 ; hence

y = mx ± r\/ 1 + m2 is tangent to the circle and as m varies completely envelopes the circle. Similarly it may be found that for every value of m the line y — b — m(x — o) ± ryj m2 is

tangent to the circle of center (a, b) and radius r. This equation (in slope form) of the tan¬ gent is sometimes called the magic equation of the tangent. By transformation of co-ordinates or otherwise the polar equation of the circle of center (p', 6) and radius r may be found to be P2 — 2 p' p cos (0—6') + p'2 —r2= 0.

The Conic Sections: Ellipse, Parabola, Hyperbola. — The equation of the path, locus, or curve generated by a point (x, y) which so moves that the ratio of its distance from a fixed point (called the focus) to its distance from a fixed straight line (called the directrix) is a constant e (called the eccentricity) is of the form Ax2+ By2+ Cxy + Dx + Ey + F =0 ; conversely, the locus of every equation of sec¬ ond degree is a curve of the kind in question. All such curves are called conics or conic sections, because any one of them is the inter¬ section of a plane and a cone, where by cone

is meant the surface that may be generated by a straight line revolving about a fixed point (vertex) and making a constant angle with a fixed line (axis) through the point; conversely, every such intersection is a conic, curve of second degree. The conics, of the very greatest importance alike in pure and in applied mathematics (cf. Astronomy), were studied by the ancients (cf. Apollonius), who conceived therrt as intersections of plane and cone. There are three species of conics, a conic being named ellipse (E), parabola (P), or hyperbola (H), according as the eccentricity e <■, — , or ■> 1. The foregoing equation repre¬ sents an E, a P, or an H, according as 4 AB — C1 is positive, zero, or negative. Among the conics of any species are degenerate or de¬ graded or so-called improper conics of that species. The degraded form of E is any pair of imaginary straight lines intersecting in a real point (center of the conic, vertex of the cone) ; any pair of parallel real straight lines is a degraded P; and any pair of non-parallel real lines is a degenerate H. By suitable trans¬ formations of co-ordinates the equation of any conic may be made to assume a simplest, named standard, form. The standard forms of the species are presented below.

Ellipse. — The standard form of the E is x* y2

ˆ• + ˆ7=1, in which a is the half major and

b the half minor, axis of the E. The focus and directrix are respectively F and DD or F' and D'D'. The equations of the directrices are x= ± a:e ; e = c:a. The sum of the focal radii of any point of E is p f p' ==2a, a prop¬ erty often taken as definition of the E, instead of the relation p — ed. If b — a, the £ is a circle; hence the circle is an E of coincident

Fig. 8.

foci and eccentricity zero. The area of E is i rab .

Hyperbola. — The standard equation is

— — r7=l, where a is half of the transverse, ar cr

and b is half of the conjugate, axis. The equa¬ tion represents the curve composed of the two branches (1) and (2). For any point, pr — p=2ay a defining property of the H. The H composed of (T) and (2') is called conjugate

to the other one and has — t; — — 1 for its

equation. The two oblique lines through O tangent to both H's at oo are named asymptotes of the curves. The equations of the asymp¬ totes- are $y = \pm - x$. The corresponding lines

a

of the E are imaginary, $y — \pm i \sim x$. If $a =$ by the H, x ■* — $ya = at$, is called equiaxial or equi-

Fig. 9.

Parabola. — The standard equation is $y2 = 4 px$. The equation of the directrix is $x = — p$; the co-ordinates of the focus are (/>, 0) ; for any point p — d. The second focus and the center lie at oo on the axis of the curve.

For some account of plane curves of higher order or degree, see the article Higher Plane Curves, and for elaborate and detailed treat¬ ment of the analytical geometry of the plane, including exhaustive discussion of the conics, see works cited in bibliography below. We add here a note introducing the Cartesian geometry of

Space.

Co-ordinate Configurations. — Space is

tri-dimensional in points, three independent data being necessary and sufficient to determine the position of a point. Of such data the simplest are the distances, Cartesian rectan¬ gular co-ordinates, x, y, z, of a point P from three fixed planes XOY, YOZ. ZOX, each per¬ pendicular to the other two. These co-ordinate planes determine three lines, called co-ordinate

Z

N

axes, having a common point O, the origin. Positive directions are indicated by the arrow¬ heads. The cylindrical co-ordinates of a point P are z and a set of ordinary polar co-ordinates

p and # taking the place of x and y in the XY plane. The polar co-ordinates of a point P, Fig. 12, are the radius vector p, and the vecto¬ rial angles 0 * and , $y = p \sin 0 \sin (j)$, $z — p \cos 6$, $P =$

Vx2 f y2 + z2, tan p — y :x, cos = z :p, formulas of transformation from one system to the other. If a, (3, y, are the direction angles (made respectively with OX, OY , OZ) of the radius vector p of any point P, Fig. 11, then x — p cos a, y — p cos (3, z— p cos y, and 1 = cos3a + cos*/3 j cos3/, sum of squares of direction-cosines of p. Any linear equation Ax--By--Cz--D= 0 represents a plane. The

x y c

symmetric equation of a plane is 1 – + — =1,

a b z

a, b, c being the axial intercepts extending from O to the plane. In normal form the equation of the plane is x cos a f y cos (3 -j-z cos y— p where p is the length, and cos a, cos (3, cos y are the direction-cosines, of the perpendicular from O to the plane. To convert Ax + By + Cz~-D = 0 to the normal form it suffices to multiply it by the normalizing factor, 1 :

\/ A2 H~ B2 + C3, the new coefficients A : \/ ,

B : y/ _ C : V , being cos a, cos (3 , cos y, and

D: V being — p. The angle 9 between two planes Ax + By + Cz + D = 0 and A'x + B'y --Cz--D' — 0 is determined by the relation cos ff=(AA' + BB' + CC') :

V (A 3 + B2 + C) (A'3 + B'3 + C'3), whence the planes are parallel when and only when A :A' — B :B' — C :C', and are perpendic¬ ular when and only when AA,Jr BB'{ CC — 0. The equations of any two of the planes con¬ taining a line, together represent the line. Ac¬ cordingly in space the line has two equations. Its simplest equations are those of any two of the three planes containing the line and being perpendicular respectively to the co-or¬ dinate planes, as x — mz + p, y = nz + q. Such a pair are unsymmetric. Symmetric equa¬ tions of the line directed by a, (3, y , and going through the point (xi, yi, zP) are

(x — xP) : cosa — (y — yi) : cos (3 ~(z — zP) : cos y

in number three of which but (any) two are independent. The angle 6 between two lines whose direction-cosines are proportional to L, M, N and L', M', N', respectively, is deter¬ mined by the relation

cos 6 =(LL'+ MM'+ NN') :

V (L2 + M2 + N2) (L'2 + Mn +N'2Y,

whence the lines are parallel if and only if L :L' — M :M' — N :N', and are perpendicular if and only if LL' + MM' + NN' — 0. The angle 0 between a line of direction -cosines

proportional to L, M, N and a plane Ax + By + Cz + D — 0

is given by the relation sin 0 = (AL + BM + CN) :

V (A2 + B 3 + C3) (L3 + M* + N3), whence the line and plane are parallel if and only if AL + BM + CN— 0 and are perpen¬

dicular if and only if A :L — B \M = C :N. The necessary and sufficient condition that the line x —nhz + ph y = Mi z + q\, shall intersect the line x = m-iZ \ p 2, y — nrt + qi , is that inu — m2) : (ni — n2) = (pi — pP) \{qi — q2).

The literature of the analytical geometry of space, herewith barely introduced, is extensive. For some account of further developments of the subject, see Surfaces, Theory of; Curves of Double Curvature. In the doctrine above introduced the point is employed as element. Some account of the theories that arise on choosing for element some other geometric entity, as the plane, the line, the sphere, etc., may be found in the articles, Geometry, Modern Analytical, and Geometry, Line, and Allied Theories, in this work.

Bibliography. — College text-books of ana¬ lytical geometry abound. One of the scientific¬ ally best American texts is W. B. Smith's Co¬ ordinate Geometry. 5 The most comprehensive English works are Salmon's Conic Sections) and Ceometry of Three Dimensions) (both of which have been translated into French by O. Chemin, and supplemented and translated into German by Wilhelm Fiedler), and Frost's (Solid Geometry.)

Cassius J. Keyser,

A drain Professor of Mathematics, Columbia U niversity.

GEOMETRY, Elementary. Geometry is the science of space. Its object is the study of the properties of forms (configurations, fig¬ ures) of every conceivable kind. The subject is thus endless in two ways : in the first place, the number of configurations is infinite — this is so even if we restrict ourselves to curves and surfaces ; in the second place, any one type of figure has an inexhaustible variety of prop¬ erties.

Elementary geometry may be roughly de¬ scribed as the study of the simpler or more evident properties of the simpler configurations. Specifically, the title refers to the body of geometric truths incorporated by

Euclid in his famous (Elementsˆ The text-books on ele¬ mentary geometry used throughout the civil¬ ized world for the last 20 centuries are in fact merely revisions of the (Elements } ; so that the subject itself is often referred to, especially in England, as the study of Euclid. The majority of the theorems refer to points, straight lines, and planes, with their combina¬ tions. Of curves, only the circle is considered, and of surfaces those related to the circle (spherical, cylindrical, conical).

It is not the object of this article to give a resume of the standard theorems of elementary geometry, but rather to indicate some of the more significant general features, especially in the light of the more recent developments.

Logical Foundations.

The most prominent aspect of elementary geometry is the logical aspect : a great number of propositions, termed theorems, are deduced from a comparatively few propositions as¬ sumed at the outset and termed axioms or postulates. In the ideal treatment of the sub¬ ject, all the assumptions should be enumerated explicitly, so that, if the question is asked, <(Are the theorems of geometry true,® the mathe¬ matician can answer correctly, ((Yes, if my

postulates are true.ˆ As to whether the postu¬ lates aie true, that is not a matter for the mathematician as such to consider, but rather comes within the province of the physicist, psychologist or philospher.

The ordinary course in geometry, modeled after Euclid, does not carry out this ideal. Assumptions are continually being made as they may be needed for the purpose of proof, in . addition to those explicitly enunciated as axioms and postulates. For example, in the first proposition of Euclid, dealing with the construction of an equilateral triangle on a given segment AB, circles are drawn with centres A and B and common radius AB, and it is then assumed that these circles intersect. The only justification given is the diagram or the appeal to spatial intuition. Again, in dealing with the congruence of triangles, it is assumed that a triangle may be moved about without altering its sides or angles, though the stated axioms do not even mention displacement. In spite of himself, Euclid's treatment is (partly) physical or intuitional, instead of purely mathe¬ matical, that is, purely logical.

. ˆ is only within the last few years that the

ideal has been (practically) attained; that is, a set of explicit assumptions (termed axioms or postulates indifferently) drawn up, from which the propositions of ordinary geometry follow by purely logical processes. Geometry be¬ comes then a branch of pure mathematics. As Poincare expresses it, in this ideal treatment (,We might put the axioms into a reasoning apparatus like the logical machine of Stanley Jevons, and see all geometry come out of it.): >

Many contributors have aided in this devel¬ opment, among whom may be mentioned Gauss, Lobachevskv, Pasch, Veronese, and especially Peano and his coworkers in symbolic logic, Pieri and Peano. The first elaborately worked out system is that of Hilbert (1900). We give a brief account of his axioms. Since then Veblen and Huntington in this country have developed much clearer and simpler systems. Consult Veblen, O., (A System of Axioms for Geometry) (trans. Am. Math. Soc. 1904).

Geometry deals with three systems of ob¬ jects or elements termed points, lines (used here in sense of straight lines), and planes, connected by certain relations expressed by the words lying in, between, etc. It is not necessary for the development of the subject that these words should suggest visual images ; in fact the concrete nature of the elements and relations is to be eliminated from the discussion. To emphasize this abstract aspect, it is con¬ venient to use symbols, say capital letters for points, Roman minuscules for lines, and Greek letters for planes. The axioms are arranged in five groups as follows :

1. Axioms of Association or Connection. — 1. Any two different points A, B determine a line a. (Such points are then said to lie on the line.)

2. Any two different points on a line deter¬ mine that line.

3. In any line there are at least two points, and in a plane there are at least three points not on a line.

4. Any three non-collinear points A, B, C determine a plane a.

5. Three non-collinear points of a plane determine that plane.

6. If two points A, B of a line a are in a plane a, then every point of a is in a. (The line is then said to lie in the plane).

7. Two planes «, (3 which have a point A in common have at least a second point B in common.

8. There exist at least four points not in one plane.

II. Axioms of Order. — These deal with the relation expressed by the term between.

1. If A, B, C are points of a line and B is between A and C, then B is between C and A.

2. If A and C are points of a line a, then there exists on a at least one point B between A and C, and at least one point D such that C is between A and D.

3. Of any three collinear points, one and only one is between the other two.

These three axioms deal with the line, while the fourth deals with the plane.

4. If A, B, C are any three non-collinear points, and a is a line in their plane passing through a point of the segment AB, but not through A or B or C, then a contains a point of either the segment AC or the segment BC.

III. Axioms of Congruence. — The first five axioms of this group relate to congruent seg¬ ments and congruent angles. For example, a segment AB is congruent to itself and to the reversed segment BA; and segments con¬ gruent to the same segments are congruent to each other. Finally, the sixth is a metrical axiom concerning triangles : if two sides and the included angle of one triangle are con¬ gruent respectively to two sides and the in¬ cluded angle of another triangle, then the re¬ maining angles are also congruent.

The. fact that the remaining sides are con¬ gruent is not included as a part of the axiom be¬ cause it may be proved. The other cases of congruent triangles are theorems. In Euclid the above statement is a theorem, but this is possible, as already observed, merely on account of unstated assumptions relating to displace¬ ment. Euclid's axiom that all right angles are congruent, in Hilbert's system becomes a theorem.

IV. The Axiom of Parallels. — This contains only the so-called Euclidean axiom, in the form : Given a line a and a point A not on a, then in the plane a determined by a and « there is only one line through A which does not intersect a.

V. Axioms of Continuity. — The continuity notion is analyzed into two parts of which the first (1) is stated in the axiom Archimedes.

1. On a straight line consider any two points A, B and a point Ai between them; construct

the points As, As., . in order, so that Ax

is between A and As, As between Ax and As, etc., and so that the segments AAx, AiAs, AsAs, ..., are congruent; then among the points so constructed there exists a point An such that B is between A and An. That is, by repeatedly laying off a given segment however small any assigned point of the line will be passed after a finite number of steps.

This axiom is sufficient for the development of the usual theorems of geometry. However the space to which the theorems apply would not be continuous in ordinary sense. It would in fact contain only those points of the space considered in analytical geometry whose co-or¬ dinates are rational or expressible by radicals

of the second order. To identify with con¬ tinuous space it is necessary to add a final axiom (2) relating to convergent point sets, or else the so-called axiom of completeness which states that the system of elements (points, lines, planes) cannot be enlarged by adjoining other elements in .such a way that all the previous axioms are preserved.

The fact that this set of axioms is suffi¬ cient is shown by actually deducing the usual body of theorems. This is done in Hil¬ bert's ˆrundlagenP Diagrams are here used, it is true, but only for convenience ; the proofs can be given without any reference to the diagrams. Often the deduction of those re¬ sults which are evident to the intuition is long and complicated. This is the case, for ex¬ ample, in showing that a triangle (or any simple polygon) has the properties expressed by the terms inside and outside. It must be shown from the axioms that the given triangle brings about a division of the points in its plane into three classes, namely, points P, points I, and points O , such that any two / points or any two O points may be connected by a broken line not containing any P point, while any broken line from an I point to an O point necessarily contains P points. To the intui¬ tion, of course, the P points are the points on the perimeter of the triangle, the / points are those inside, and the P points are those out¬ side.

In the development it is important to ob¬ serve that some theorems depend upon only part of the axioms. Thus from group I alone it follows that two planes having a point in common necessarily have a line in common, and that a line and a point determine a plane. The property of triangles and polygons stated above follows from group I and II. The theory of proportion may be established without employing group V. The theorem that if two triangles in one plane have their sides re¬ spectively parallel, the lines joining correspond¬ ing vertices are either parallel or concurrent (a special

case of Desargues' theorem), can be proved without using axiom III 6 if and only if the spatial axioms in addition to the plane axioms are employed.

An important result which has been ob¬ tained recently is that while the areas of plane polygons may be treated without appealing to the continuity axioms, this is not possible with the volumes of polyhedrons. The dif¬ ference is observed in Euclid's proofs : the proposition that triangles having the same base and altitude are equal in area is demon¬ strated by adding or taking away congruent parts from congruent figures, while the corre¬ sponding proposition concerning triangular pyramids is proved by the method of limits, or the equivalent method of exhaustion. That this difference in treatment is' not avoidable was established by Dehn (1901), who showed that there exist polyhedrons of equal volumes which cannot be formed by the addition or sub¬ traction of respectively congruent polyhedrons. In plane geometry this formation applies to any two polygons with the same area.

The most fundamental question concerning the set of axioms is that of consistency. In the development of geometry no contra¬ diction has thus far presented itsdf ; but will this always be the case? Can it be shown

that no inconsistency can ever arise? The only known method of answering this question depends upon establishing a correspondence between the geometrical elements and certain numerical entities, and showing that any in¬ herent contradiction in geometry would in¬ volve contradictory relations among these entities. The question is thus transferred to the field of arithmetic. Are the axioms of number (commutative, associative, distribu¬ tive, etc.) inconsistent? No perfectly satis¬ factory disproof of this has yet been devised. See however Alegebra : Definitions and Fun¬ damental Concepts.

Another question to be considered is the in¬ dependence of the axioms. If any one axiom can be deduced from the others, it may be omitted from the list and introduced as a theorem. It is therefore desirable that the axioms should express mutually independent statements. The standard method employed in proving the independence of an axiom or group of axioms consists in devising a set of objects of any kind which, when considered as ele¬ ments, fulfill the relations expressed in remain¬ ing axioms, but for which the axiom or group in question is not satisfied. Thus the fact that the axiom of parallels (IV) cannot be de¬ duced from the other axioms is shown by the non-Euclidean geometry of Lobachevsky. Similarly, the independence of axiom VI is proved by means of the non-Archimedean geometries of Veronese and Hilbert. Various apparently artificial systems have been devised in this connection, which, while not amenable to the

intuition, are conceivable and mathe¬ matically true because based on assumptions which may be shown to be free from incon¬ sistency.

The set of axioms presented above is of course not the only one which may serve as foundation for ordinary geometry. Thus the axiom of parallels may be replaced by the statement that the sum of the angles of a triangle is two right angles. In general the propositions of a given collection may be derived from various sets selected from the total collection. In the present case the possi¬ bilities are endless.

Geometry may also be founded on other primative (undefined) concepts than those introduced above. Thus in the discussions inaugurated by Helmholtz and continued by Lie and Poincare, the principal concept is that of transformation (displacement, rigid motion) and the axioms include the group property (the resultant of two displacements is itself a displacement). The straight line is then no longer, as in Hilbert's system, a primitive concept, but receives definition : if in a dis¬ placement two points are fixed, there are an infinite number of fixed points forming, by definition, a straight line (the axis of rotation).

In the usual intuitional treatment the con¬ cept of general surface is assumed as a starting- point and the plane is then defined as a surface such that if any two of its points are joined by a straight line, the latter lies entirely in the surface. This obviously states more than is required for the determination of the surface. To meet this objection the plane is sometimes defined as generated by drawing straight lines from a fixed point A to all the points of a straight line a. To obtain the entire plane

it is necessary to add the line through A parallel to a. This definition is therefore un¬ satisfactory, because parallel lines require in their definition the previous definition of the plane. Peano has met the difficulty by this definition : Consider three fixed points A, B, C not in a straight line ; take a fixed point D within the segment BC, and on the segment AD take a fixed point E; a plane is then gen¬ erated by the lines (rays) from E to every point of the perimeter ABC. It may then be proved that a straight line connecting any two points of such a surface lies on the surface.

Problems and Constructions.

The only instruments whose use is implied in the postulates of elementary geometry are the ruler (straight-edge), for drawing straight lines, and the compass, for drawing circles. Only those problems are considered as

coming within the domain of elementary geometry which can be solved by a finite number of oper¬ ations with these instruments. Such construc¬ tions are termed Euclidean, or sometimes simply geometric. An example is the construc¬ tion for bisecting an angle. With the vertex V as centre and any radius describe a circle cutting the sides of the angle in points A and B ; with these points as centres and any (suffi¬ ciently large) radius describe circles inter¬ secting in points C and D; the line joining C and D necessarily passes through V and bi¬ sects the given angle.

However, many problems arise which cannot be solved in this way. A well-known example is the problem of trisecting an angle. For centuries the Greek geometers and their follow¬ ers sought for a solution ; only within the present century has it been shown that such attempts must necessarily fail. The statement that the problem is impossible does not deny that lines trisecting the given angle exist, but means simply that such lines cannot be obtained by a construction employing a finite number of straight lines and circles.

No one has yet succeeded in demonstrating this impossibility by purely geometric means. The question arises naturally in elementary geometry, but apparently cannot be answered by elementary methods. We give now an out¬ line of the algebraic method for deciding whether a given problem comes within the class of possible or the class of impossible problems.

Any line segment may be represented by a segment, namely, the ratio of the given seg¬ ment to an assumed unit segment. Conversely, any number then represents a segment. Con¬ sider now the elementary operations of arith¬ metic or algebra in relation to geometric con¬ structions.

If a and b denote given segments, or the corresponding numbers, the sum a + b is con¬ structed by transferring the segment b, by means of the compass, so that it is collinear and adjacent to a. The difference a — b is also readily constructive.

The product x — ab may be defined by the proportion 1 :a — b:x. The proper construction is then suggested by the theorem that a line parallel to the base of a triangle divides the sides proportionally. Draw any triangle with I and a as two of the sides ; along the first VOL. 12—29

side prolonged if necessary lay off segment b ; from the terminal point draw a line parallel to the base of the triangle ; this cuts off on the second side a segment equal to the required x. The quotient y ~a/b is obtained similarly from the proportion 6:1 — a :y. Hence all rational expressions, that is, expressions formed by a finite number of additions, subtractions, multiplications, and divisions are constructible.

Furthermore, extraction of square roots is possible. For z— 's/ a may be defined by Hence if on 1 \ a as diameter a semicircle is described, the perpendicular at the end of the unit segment is the required z. Therefore,

Theorem I. — Any expression involving only rational operations and the extraction of square roots can be constructed with ruler and compass.

Expressions which cannot be reduced to this form cannot be constructed. This we now prove in the form of the converse :

Theorem II. — Any segment which can be constructed with ruler and compass is ex¬ pressible algebraically by rational operations and the extraction of square roots.

For any such construction consists in draw¬ ing a finite number of straight lines and circles and finding their intersections. Employ¬ ing Cartesian co-ordinates (see Geometry, Car¬ tesian), the equation of a straight line is of the form ax + by + c = 0, and that of a circle is of the form a-2 + y2 + ax + by + c — 0. The intersection of two straight lines leads to the solution of two equations of the first degree, which requires only rational operations. The intersections of a straight line and circle, or of two circles, depends on the solution of quad¬ ratic equations and leads to radicals of the second degree.

We proceed to apply these theorems to sev¬ eral examples.

Consider first the problem of bisecting an angle. The given angle 0 and the required

6

angle — may be determined by their cosines.

2

_ 0

Let a — cos 6 and x — cos — From trigonome-

2

6

try cos 6 = 2 cos 2 – 1, that is, 2v2 — 1 = a.

2

*Hence x — • * a . Therefore, by Theorem I,*

N 2 :

the problem is elementary. The formula also indicates a definite method of construction.

In the trisection of a given angle we require

0 6

the formula cos/? = 4 cos8 – 3 cos — . Here

3 3

6

*cos 6 — a is known, and cos — = * is required.*

3

The equation of the problem is 4×3 — 3x — a — 0.

When solved by Cardan's formula this leads to cube roots. But before Theorem II can be applied it must be shown that no expression involving only square roots can satisfy the equation. This is true in the present case by

the following general theorem taken from the theory of equations :

Theorem III. — An irreducible equation whose degree is not a power of two cannot have a root expressible by radicals of the second degree. (The term irreducible equation is here employed to describe an equation f(x)~ 0 with rational coefficients whose left member cannot be factored rationally).

In general the algebraic questions which arise in this connection require for their com¬ plete discussion the powerful Galois Theory of Equations. See Equations, Galois' Theory of.

A second of the so-called famous problems of elementary geometry is the Delian problem, of the duplication of the cube. Given a cube with side a, to construct a cube with side x having double the volume. The equation of the problem is x3 — 2a3 . Theorem III and then Theorem II apply. The

corresponding problem concerning the square, leading to the equation x2=z2 a2, is easily solved: the side of the required square is simply the diagonal of the given square.

Regular Polygons. — The construction of a regular polygon of n sides is equivalent to the division of a given circumference into n equal arcs. The only cases treated by Greek geom¬ eters and the ordinary text-books are, for prime numbers, n = 3 and n — 5; from these constructions of the regular triangle and pentagon, combined with the construction for bisecting an angle, the constructions for the cases 2K, 3 -2, 5-2K, 3-5-2K, where a is any in¬ teger, are easily found.*

No advance was made, that is, no new con- structible polygons were discovered, until Gauss, about a century ago, applied the algebraic method. The equation of the problem may be put into the form

xfi — 1 + xn — 2 + . . . + x + 1= 0,

which is then termed the cyclotomic equation. When n is a prime number the equation is irreducible. Hence by Theorem III the con¬ struction is possible only when n — 1 is a power of 2. That is, n must be of the form 2/“ + 1. Prime numbers of this type are

necessarily of the form 22V + 1, and are known as Fermat primes. The values v — 0 and v=\ give the familiar cases n~3 and n — 5 ; the first new case, arising from v=2, is n = \7. The construction for the regular polygon of 17 sides is complicated, but the steps are indi¬ cated definitely by the algebraic solution of the cyclotomic equation, which is in fact solva¬ ble by square roots.

The general result on regular polygons is as follows: The regular polygon of n sides can be constructed with ruler and compass if, and only if, the prime factors of n are 2 re¬ peated any number of times and distinct Fermat primes.

The first impossible cases are n = 7 and

n — 9.

Quadrature of the Circle — This most famous problem of geometry requires the con¬ struction of a square having the same area as a given circle. That this is impossible (that is, that the construction cannot be effected with the ruler and compass) was not definitely shown until 1882, although the failure of innumerable attempts had led many to suspect the true re¬ sult. The rectification of the circle, that is the

construction of a straight line having the same length as a given circumference, is an equiva¬ lent problem, and hence also impossible. This is so on account of the theorem that the area of a circle equals one-half of the prod¬ uct of the radius into the circumference.

The ratio of the circumference to the diam¬ eter is the same for all circles : the constant thus arising has been generally denoted by the symbol x since the time of Euler. It was proved quite simply by Legendre that x is not rational (i.e., cannot be represented ex¬ actly by the ratio of any two integers, and hence, in particular, cannot be represented by a terminating decimal). The difficulty consists in showing that x is transcendental, that is, is not the root of any algebratic equation

aoocn--a\Xn~l-- . . . T

where n is a positive integer, and the coeffi¬ cients are any integers. This was finally proved by Lindemann in 1882, after Hermite in 1873 had shown that e, the base of the Napierian system of logarithms, is transcen¬ dental. The two numbers are connected by

the remarkable relation ei7T~ — 1, where i is

the imaginary unit number V — 1. Since x cannot satisfy any algebraic equation, it cer¬ tainly cannot be expressed by square roots. Hence Theorem II proves the impossibility.

Approximate Constructions. — The prob¬ lems considered cannot be solved exactly by ruler and compass, but they can be solved to any required degree of approximation. Thus a simple approximate solution of the rectifica¬ tion problem is the following: Let O be the centre and AB any diameter of the given circle. At the middle point E of AO construct a perpendicular cutting the circumference in C and D. On AB prolonged lay off EF = CD. Draw FD, and on this line lay off FH = AB. Then the segment HD is approximately one- fourth the circumference. The error is less than one part in 5,000.

Other Instruments. — The problems con¬ sidered may be solved exactly if other instru¬ ments in addition to ruler and compass are allowed. Thus the trisection and duplication problems (like all problems depending on cubic and biquadratic equations) can be solved by the instruments for drawing parabolas or other conics, or by appropriate linkages. The quad¬ rature of the circle, being a transcendental problem, cannot be effected by any instrument which draws algebraic curves. It can be solved by various transcendental curves (quad- ratrix, sinusoid, cycloid) ; or by the integraph (an instrument which draws the curve

(x) dx, where y = f (x) is a given curve).

We consider now various restrictions which may be imposed on Euclidean constructions.

(1) Ruler Constructions. — Here only the straight-edge is allowed. For the possibility of such a construction it is necessary but not sufficient that the corresponding algebraic ex¬ pression should be rational. If two parallel lines are given, then through a given point a line may be drawn parallel to given lines by a ruler construction. But this is not the case when a line is to be drawn through a given point parallel to a given line. The impossibility

proof, based upon projection, may be carried out by pure geometry.

(2) Mascheroni Constructions.— Here only the compass is allowed. A straight line is con¬ sidered as known when two of its points are determined. Mascheroni, in 1797, showed that all problems which can be solved by the ruler and compass can be solved by the compass alone.

(3) Poncelet and Steiner have shown that if a single fixed circle with its centre is given, all elementary constructions may be carried out by means of the straight-edge. Again, if a ruler with parallel edges may be employed (it is then, for instance, possible to place the instrument so that each edge goes through an assigned point), all elementary problems may be solved without the compass.

(4) Hilbert considers constructions with the straight-edge and sect-carrier. The latter de¬ notes a compass used not to draw circles, but merely to lay off a given segment on a given line. All such constructions can be carried out by the straight-edge and a movable unit sect. The test for deciding the possibility or impossibility of a problem in this sense is exceedingly complicated, depending on the higher theory of algebraic numbers.

Geometrography.— A problem of ele¬ mentary geometry can usually be solved in a variety of ways by the rule and compass. Thus for the Apollonian problem (to construct a circle touching three given circles) over 100 distinct solutions have been worked out (Apol¬ lonius, Poncelet, Steiner, Lemoine, Study, etc.). How can we compare these as regards sim¬ plicity? It is necessary to adopt some stand¬ ard or measure of simplicity. One method, for instance, would be to take the number of lines and circles as the measure of simplicity.

A more complete (but still somewhat arti¬ ficial) discussion has been elaborated by E. Lemoine in his (Geometrography. 5 Construc¬ tions are analyzed into the following element¬ ary operations : Operation Ci consists in plac¬ ing one point of the compass on a given point in the plane of construction ; including a given length between the points of the compass is then denoted by 2 Ct\ placing a point of the compass on an undetermined point of a line is operation C2; drawing a circle is (A; making the edge of the ruler pass through an assigned point is operation Rh and through two as¬ signed points is 2Ri ; finally, drawing a straight line is operation R2. Any construction may then be represented by a symbol hRi + hRt + ntiCi + m2C2 H~ nuCz, where the coefficients represent the numbers of elementary opera¬ tions involved. The simplicity is measured by It + /a + mi + wi2+ mz, and the exactness by h + m2 + mz (the preparatory operations). The number of lines employed is given by U and of circles by mz. In case of construction for the bisection of an angle explained above the symbol is 3Ci+3Ca+2Ri~-R2. The construction which leads to the smallest possi¬ ble value for the simplicity is termed the geo- metrographic solution. There may be more than one solution of this kind.

Bibliography. — Casey, (Sequel to Euclid5 (Dublin 1888) ; Euclid, Elements5 (Editions by Hall and Stevens, Harper, Nixon, Todhun- ter, etc.) ; Hadamard, (Legons de geometrie elementaire5 (2 vols., Paris 1898, 1901) ; Hil¬

bert, (Grundlagender Geometrie5 (Leipzig, 1899, 2d ed., 1901) ; translation by Townsend (Chicago 1900) ; Halsted, (Rational Geometry > (New York 1904) ; Kempe, (How to draw a straight line* (London 1877) ; Klein, (Elemen- targeometrie5 (Leipzig 1895) ; translation by Beman and Smith (Boston 1897) ; Phillips and Fisher, (Elements of Geometrie5 (New York 1896) ; Legendre, (Elements de geom¬ etrie* (Paris 1794) ; Lindemann, (Ueber die Zahl 7r5 (Mathematische Annalen, Vol. XX, 1882) ; Vahlen, (Abstracte Geometrie5 (Leip¬ zig 1905).

Edward Kasner,

Instructor in Mathematics, Columbia Univer¬ sity.

GEOMETRY, History of the Elements

of. The history of the science of geometry begins in Greece. It is true that mensuration was developed to a considerable extent at an early period in Egypt, Babylonia and India, and that this work involved the measurement of angles in the astronomical observations of the people of these countries, but the abstract science of form never attained any prominence before the Greek period. In Egypt, for exam¬ ple, the harpedonaptae (rope stretchers)

knew the right-angled triangle whose sides are 3, 4, 5 and stretched their ropes to lay out a right angle in much the same way that a modern sur¬ veyor erects a perpendicular by the help of his chain; but there is no evidence that the Egyp¬ tians thought of proving the Pythagorean The¬ orem. Herodotus testifies to the fact that the Egyptians divided the land that was subject to the overflow of the Nile into quadrilaterals, and therefore they must have had some knowl¬ edge of elementary surveying. Indeed, long before this time Ahmes (see Algebra, History of the Elements of) gave certain rules, partly incorrect, for measuring areas and vol¬ umes, in particular an interesting one for the area of the circle, a = (d— i d)2. All of this work was, however, very elementary, and the rules were merely the result of unscientific ob¬ servation.

In Greece the science of geometry may be said to have begun with Thales (q.v.), who was born at Miletus, c. 640 b.c., and who died at Athens in 548. Brought up in contact with the learning that drifted from the East to the shores of the Mediterranean, in his younger days devoted to those commercial pursuits that made Miletus a centre of wealth, he traveled extensively and devoted his later years to phi¬ losophy. From Egypt he seems to have taken back to Ionia whatever of primitive geometry was known, and his school at Miletus was de¬ voted to the study of philosophy, astronomy, and the science of form. Thales is supposed to have proved the propositions concerning the equality of vertical angles, the sides opposite the equal angles of a triangle, the determina¬ tion of a triangle by one side and two angles, the bisection of a circle by a diameter, and the nature of an angle inscribed in a semicircle. His most famous pupil was Pythagoras (q.v.), who was born at Samos c. 580 and died in southern Italy c. 501. A man of great personal magnetism, a mystic, and versed in the lore of the Orient, Pythagoras made his school at Cro- tona the mathematical centre of his time. Al¬ though none of his works is extant, if, in¬ deed, he wrote any, it is known that he proved

the famous theorem which bears his name (Euclid I, 47), a proposition already known empirically to the Egyptians and Chinese, and probably to the Hindus, at least for special cases. Pythagoras also gave much attention to the study of proportions and irrational quanti¬ ties, always from the standpoint of geometry. He also knew the size of the angle of a regular n-gon, and the stellar pentagon was made the badge of his order.

The century following Pythagoras was one of discovery. Among the most noted geometers was Hippocrates of Chios, c. 440 b.c., who must not be

confounded with the great physician who may have been the author of a treatise on the mystic number 7. Hippocrates, who had come in contact with the Pythagoreans, wrote the first Greek text-book on mathematics and designated the geometric figures by letters placed at the angles. To him is due the first example of the quadrature of a curvilinear fig¬ ure, a proposition known as the lunes of Hip¬ pocrates. The theorem asserts that if semi¬ circles be described on the three sides of an isosceles right-angled triangle in such way as to form lunes on the two shorter sides, the area of the lunes equals that of the triangle. In his attempt to duplicate the cube he showed that the problem can be solved if two mean propor¬ tionals can be found between e and 2e, where e is the edge. This problem was one of the three famous problems of antiquity, the others being to square the circle and to trisect any given angle. It is now known that these problems, easily solved if the necessary instruments are allowed, cannot be solved merely by the use of an unmarked ruler and a pair of compasses. Contemporary with Hippocrates lived Hippias of Elis, to whom is probably due the quadra- trix which Dinostratus afterward studied and named. About the same time Antiphon and Bryson sought the quadrature of the circle by means of inscribed and circumscribed polygons, the number of sides being successively doubled, and with them begin the theories of limits and of exhaustions.

The influence of Plato (429-348 b.c.) on elementary geometry was greater. than is usually supposed. He found the science in a disordered state, a mass of unrelated propositions, very likely covering much of plane geometry as found in Euclid. His philosophic mind led him to the attempt to put the science on a more satisfactory foundation by insisting upon accu¬ racy of definition, upon a limited number of postulates (including axioms), and upon definite bounds to plane geometry. As a result, only those figures capable of construction by the help of an unmarked ruler and the compasses are recognized as belonging to the field of ele¬ mentary geometry. To the school of Plato is also due the analytic method of attack in geom¬ etry, including the rednctio ad absurdum. Although not himself a great discoverer in mathematics, two of Plato's pupils reached high eminence in geometry. Of these the first was Eudoxus, who extended the theory of propor¬ tion, founded the doctrine of similar figures, gave much attention to the problem of the golden section, applied the method of exhaus¬ tions to the mensuration of solids, and wrote the first text-book upon stereometry. The sec¬ ond was Menaechmus, who, in his attempts to solve the duplication (or Delian) problem, dis¬

covered the conic sections. The study of the five regular polyhedra also occupied the at¬ tention of Plato's pupils, so much so that they received the name of Platonic bodies.

The influence of Aristotle was directed to the encouragement of the study of the history of geometry and the applications of mathe¬ matics. As a result, his followers began to collate the work of the earlier Greeks ar.d to consider its relation to physical problems. Ele¬ mentary geometry now enters the text-book period and several attempts at works of this character appear in the 4th century, b.c. This movement culminated in the works of Euclid (q.v.), a man of whose personal life we know practically nothing save that he taught and wrote in Alexandria c. 300 b.c. Probably of little originality in the way of mathematical discovery, Euclid had a genius for compilation, and this showed itself in the 2roˆeta (con¬ nected series), or Elements, as it was called in later times. This famous work is devoted prin¬ cipally to plane geometry, and it has formed the basis of practically all elementary treatises up to the present time. The natural effect of Euclid's work was to give the impression that the field of elementary plane geometry was ex¬ hausted. Mathematicians therefore directed their energies to the applications of geometry, to stereometry and to conics. Archimedes (q.v.), writing at Syracuse c. 240 b.c., opened the great field of mathematical physics and car¬ ried the study of elementary geometric solids to its greatest height among the Greeks. To him is also due the limits 3| and 3|f f °r 7r» the study of the spiral that bears his name, and the quadrature of the parabola. Apollonius of Perga (qv.), <(the great geometer, w wrote eight books on conics c. 225 b.c., and set a standard which still influences the text-books in analytic geometry. Of the minor geometers who fol¬ lowed Apollonius, two may be mentioned. Nicomedes (c. 180 b.c.), who invented the con¬ choid, a curve which easily solves the trisection problem, and his contemporary, Diodes, whose cissoid furnishes an easy means for duplicating the cube. Of the later Greek geometers the most noteworthy is Hero of Alexandria (see Hero of Alexandria), whose personal history, like that of Euclid, is practically unknown, and to whom it is difficult to assign a date even within a century. His most interesting contri¬ bution to elementary geometry is the formula for the area of a triangle in terms of the sides,

A — a) (s — b) (s — c).

Possibly contemporary with Hero lived Menelaus, whose theorem, known in the Mid¬ dle Ages as the Regnla sex quantitatum, has made his name well known. His most im¬ portant discovery, however, was the- projective property of the anharmonic ratio. By this time the age of discovery in geometry had passed in Greece, and the efforts of the Neopythagoreans at Alexandria were productive of little that is remembered. Pappus (c. 300 a.d.), an Alexan¬ drian mathematician and geographer, may be called the last of the Greek geometricians who showed any originality. He suggested the the¬ ory of involution of points, restated the pro¬ jective property discovered by Menelaus, and discovered the theorem (which also bears the

name of Guldin) concerning the volume gen¬ erated by a plane figure revolving about an axis.

GEOMETRY, LINE-

453

The Orientals contributed but little to ele¬ mentary geometry, their interests being rather directed to algebra (q.v.) and trigonometry (q.v.), with astronomy as the leading applica¬ tion for their advanced mathematics. Brahma¬ gupta, a Hindu, born in 598, generalized the Hero formula, showing that the area of an in¬ scribed quadrilateral is expressed by

$$A = V(s - a)(s - b)(s - c)(s - d),$$

but aside from problems in mensuration, geom¬ etry played but little part in India. The Bagdad school of c. 800 was chiefly inter¬ ested in geometry only as it concerned trig¬ onometry, and its greatest contribution to the science consisted in the preservation of the works of the Greeks. Euclid, for example, was first made known to Christian Europe in the Middle Ages through a translation from the Arabic possibly by Adelhard of Bath, c. 1120.

Among the first books on mathematics to be printed was Euclid's

Bibliography. — Allman, (Greek Geometry from Thales to Euclid) (Dublin 1889) ; Gow,

(History of Greek Mathematics > (Cambridge 1884) ; Bretschneider,

David Eugene Smith,

Professor of Mathematics, Teachers College, Columbia University, New York.

GEOMETRY, Line-, and Allied Theories.

For geometric purposes space may be con¬ ceived in an endless variety of ways (see Geometry, Cartesian), i.e., as the manifold of all the geometric entities of any given kind con¬ tained in it. In particular, it may be viewed as the assemblage (manifold, aggregate, plenum) of its points or of its planes or of its lines. According as one or another of these views be adopted as fundmental, any configuration, as a curve or a surface, will present as fundamental the corresponding aspect, i.e., it will appear as the locus (assemblage) of its points or as the envelope (assemblage) of its tangent planes or as the envelope (assemblage) of its tangent lines. These

various views or aspects are not independent. Each involves the others, but they are not co-ordinate : one of them being assumed as fundamental or primary, the others appear as derived or secondary. Space accord¬ ingly admits of various geometric theories distinguished by and taking their names from their primary elements. Line-geometry con¬ templates space as primary composed of lines, employs the line as fundamental element, and has for its subject-matter the relations and properties of line configurations. Thus the role of the right line in this doctrine is quite analogous to that of the point or the plane in the older geometries. The plane, too, has a line-geometry (see Geometry, Modern Analyt¬ ical), but the line and the point theories of the plane, being analytically identical, are best treated simultaneously as dual aspects of a single doctrine.

The honor o.f having been the first to make formal and systematic use of the right line as primary element in the geometry of space belongs to Julius Pliicker (1801-68), whose (Neue Geometrie des Raumes gegrundet auf die Betrachtung der geraden Linie als Raum- element,) 1868-69, is the first great contribu¬ tion to the subject. The idea of employing the line as space element had indeed occurred to him at a much earlier date. (Cf. his (System der Geometrie des Raumes,) 1846). His first memoir on the subject, entitled (On a New Geometry of Space,) was published in English in 1865 and may be found in Vol 14 of (The Proceedings of the Royal Society of London) and elsewhere. Certain important line sys¬ tems, as congruences and complexes (names given by Pliicker), had indeed been previously studied to some extent by others. The notion of congruences of. lines naturally first presented itself in geometric researches in optics, and in fact the first appearance of the concept of the line complex seems to be that found in the (Traite d'Optique) of the physicist, Ltienne Louis Malus (1775-1812). The point-plane and line-line correlations or null-systems estab¬ lished by the linear complex were considered in 1827 by the Italian geometrician Giorgini ((Memorie dei XL,) Vol. 20), and in 1833 by Moebius in a memoir entitled (Uber eine besondere Art dualer Verhaltnisse zwischen Figuren im Raume) ((Crelle's Journal,) Vol. IX-X). Nevertheless the invention of the line geometry of space is, as said, to be properly ascribed to Pliicker. His work in this field is the beginning of a great epoch in the science of 'analytical geometry. The undying influence of that work is due neither to its content nor.

strictly speaking, to its method, important as these are. It is rather due to its spirit, which is the spirit of freedom, emancipating alike from traditional concepts and traditional modes of procedure. Since Plucker's time the

science begun by him has been greatly refined and vastly extended, and out of it have come great and growing kindred doctrines, as the sphere and the circle geometries of space, and allied theories in spaces of higher dimensionality. The following paragraphs present a brief ac¬ count of the elements of some of these theories, especially of line geometry, together with some indications of further developments and refer¬ ences to the corresponding literature.

Line Co-ordinates. — In Cartesian co-ordi¬ nates (see Geometry, Cartesian) the line is determined by any pair of its projecting planes, e.g., by the pair x — rz + p, y= sz+o ; con¬ versely, any such pair determines a line. Ac¬ cordingly the position of the line depends upon four independent quantities or co-ordinates, r, s,*

- *+ 512X2+513X3 + 514X4=0,*

*521X1 4~ * j 523X3 +524X4=0,*

*531X1 + 532X2+ * +534X4ˆ0,*

*541X1+542X2+543X3+ * ==o,*

where pqjk—Zm~ZkVj,i-P being a proportional¬ ity factor; e.g., pqn—ZiVi —ˆVv As xjk— — qkj, there are but six numerically distinct coeffi¬ cients 5. These are connected by the quad¬ ratic identity 512534 + 513542+ 514523= 0 ; as, more¬ over , only their ratios are essential, the six q's are equivalent to but four independents. Ac¬

cordingly the q's may be, and for the sake of symmetry are, adopted as six homogeneous co¬ ordinates of the line regarded as the axis (en¬ velope) of a pencil of planes.

The line has another aspect ; it may be viewed as locus of its points, determined by any pair of them as xi and yi. Thus considered, it is represented by the pair of point equations Zxitji—O, 2yt-£t= 0. The line is equally deter¬ mined by any two points of the range 2 (xi + tyi) f,*= 0 and in particular by any two of the four points in which the line pierces the faces (planes) of the fundamental tetraedron. Of these points the equations are*

- *--pl2h2~{~pl3ˆ3 + £h£4=0,*

*p2\Hl " f" * i~Pˆ3-p2iˆi=01 p3lHl "+ p32ˆ2 "+ * +/J34|'4=0,*

*/?4l£l+/>42S2+p43£3+ * =0,*

where vpkj = xjyk — xkyj. The six p's satisfy an identity like that of the q's , the ratios of the p's are alone important, and, again with a view to symmetry, the p's are chosen as the six homogeneous co-ordinates of the line conceived as a locus (range) of points.

*It is readily found that the line pjk and the line qjk are one and the same when and only when pn : 534 = pu : q*2 = £n : 523 = £34 : 512 = pa : 513 =£23:514. Accordingly, disregarding both the locus and envelope aspects of the line, we may employ for its co-ordinates any six quantities rjk which, p and er being proportionality factors, satisfy the relations: rn~pqn= op3<, ris=P5n*

*=Gp*2, Tli=pqii= Gp23, ˆ34 =:Pq3* = 0p\2, f42=P542 =*

op™, f23=P523=cr£u. The identity connecting the r's may be written (after Koenigs) u® = 2 (ri2r34 + r 13ˆ2 + rur23) =0 .

Passing from homogeneous to Cartesian point co-ordinates, i.e., from a finite tetraedron to an infinite one having three of its faces mutually perpendicular and for the fourth the plane at 00 , there result the six homogeneous line co-ordinates employed by Pliicker. The transition is effected by substituting x , y , z , 1 respectively for xi, x2, x3, x*, and x", y ', z" , 1 for yi, y2, y% yˆ; the Pliicker co-ordinates ac¬ cordingly are :*

p\2=x'y" — x"/ , £. 3 = x's" — x'V, £23 = y'z" — y"z

£i4=x'— x", pA2=y" — yf , pˆz'—z".

If we replace x" , ... by x~ˆdxr, . . . i.e., if we regard the line as determined by consecu¬ tive (neighboring, <(infinitely near®) points, the Pliicker co-ordinates assume the form adopted by Sophus Lie. The primes being omitted, the Lie line co-ordinates are: pn — xdy — ydx, £13= xdz —zdx, p23—ydz — zdy, £u = — dx, pa=dy, p3 = — dz.

The general co-ordinates rjk admit of further generalization. They may be replaced by linear functions of them ; i.e., if rjk = C jk,xVi + Cjk, 2V2 + . . . + Cjk,(,vi>, where the determi¬ nant of the C's does not vanish, the six varia¬ bles Vi may be employed as line co-ordinates. The v's satisfy a quadratic identity £ (z/)— 0, into which w (r) = 0 is converted by the fore¬ going transformation. A simple special case of this transformation yields an elegant svstem of line co-ordinates introduced by Felix Klein. Replacing the v's by s, the special transforma¬ tion is: Xi =f 12ˆ34, ixt— ri2 — r34 ; X3 = ri3 + r42, ixi—rn — u 2; X5 = ri4 + r23, ixs = ru — r23] where

i— V — 1. The Kleinian line co-ordinates are

xi O'— 1» • • . , 6). The identity connecting them is Zxj* = 0.

Condition of Intersection of Lines.—

The two lines may be conceived as loci, or as axes, or one as a locus and the other as an axis. In the first case, suppose the lines are deter¬ mined respectively by the point pairs (xi , yi) (x'i, y'i) . The lines p and p' will intersect when and only when the four points lie in a plane, for which the necessary and sufficient condi¬ tion is

Xi X2 X3 Xi

yi y* y* y 4

Xi X2 X3′ Xi

y* y * y* y*'

which on expansion yields pup's* + pizp'n + pu/' 23 H~ pup 12 pap'u + p2zp 0. Of this con- dition the first member is

du{p)

. dp

12

P'l 1 +•

.Mp)

"T P * 2

dpn du(p')

, dp'vi

pn + . . . +

d* > (P') . 1.

dp'a pi\

Denoting this polar form by w (/ >, p'), the condition that the two lines

(loci, point ranges) P and p' shall have a common point is u(p,p') — 0. In like manner, the condition that the lines (envelopes, axial pencils of planes) q and q' shall have a common plane is w (qfq') = 0. If one of the lines be regarded as a locus, the other as an envelope, the condition of intersec¬ tion is 2 pjkq'jk = 0 or 2 qjkp'jk = 0. Disregard¬ ing the aspects of the lines r and r, the condi¬ tion is u{r,r')=0. The preceding transforma¬ tion from r' s to v's converts w(r, r') into tj(y, v'),

where 2 ij(v, v')= »/ + •.. + v*.

dv i dVe

Hence the condition that the lines v, v shall intersect is £ (v , v ') —0. In Klein co-ordinates, the condition for the intersection of the lines x and x' is %xjx'j= 0 (j= 1, . . . 6).

Pencils and Hyperpencils. — Let v- and v"

be any two intersecting lines. These deter¬ mine a flat pencil, viz., that whose vertex is the common point of v' and v" and whose lines lie in the plane of v' and v" . All and only the co-ordinates of the lines of the pencil are given by the formula vi—hvi' fi-pvi". For, first, £ (*0 = = f (v') ^ iy', v") V + f (»") P2, and, by hypothesis, £ (v') = 0, f (v") — 0, £ (v' , v") = 0;

hence £ (v) = 0, and v% represents a line for all values of the parameters A and p. Secondly, if vi'" be any line cutting v' and v" , £ (v', v'")=0, Z(v", v'") = 0; hence t; (v, v'") = 0, for f (v, v'") =htj(v', v"') --pt;(v", v'"); therefore the lines vi belong to the pencil. Thirdly, these are all of the lines of the pencil, for it is easily proved that the ratio, A;// can be determined so that the corresponding vi shall cut any given line not contained in the plane of the pencil.

Koenigs has suggested the name hyperpencil (hyperfaisceau) to denote alike the totality of lines of a plane and the totality (sheaf, bundle) of lines through a point. A hyperpencil is determined by any three lines (not in a same pencil) of which each intersects the other two. If three such lines be v % , vi", v%") then all and only the co-ordinates of the hyperpencil are given by the- formula vi—^vi' + pvi" + vvi"', A, p, v being parameter. The hyperpencil will be a sheaf or a plane of lines according as the

given lines determine but one point of three points.

Line Systems in General. — Just as, for example, in ordinary analytical geometry, we study systems (loci) of points represented by equations in point co-ordinates, so in the present subject we are concerned with line

systems represented by equations in line co-ordinates. The line, we have seen, depends on four inde¬ pendent variables, co-ordinates or parameters. The totality of lines in space may be called the 4-parameter system; it contains oo4 lines, a line in it has four degrees of freedom, one degree for each of the free (unconditioned) parameters or co-ordinates. One condition on the four parameters renders them equivalent to but three independent ones; hence the lines represented by one equation constitute a 3-parameter system, called by Pliicker a line complex. A complex contains oo3 lines, a line in a complex has but three degrees of freedom. A 2-parameter system or congruence (Pliicker), containing oo lines, allowing the line two degrees of freedom, is defined by a pair of equations. A triplet of equations repre¬ sents a 1-parameter system, a ruled surface, or, better, a line series (Serie re glee Koenigs) ; it contains oo 1 lines ; in such a system the line has but one degree of freedom. Finally, a 0-para- meter system, defined by four simultaneous equations, contains but a finite number of lines. In order, then, that five or more equations should represent a common system of lines, it is necessary that their coefficients satisfy some condition or conditions.

The Linear Complex. — The complex de¬ fined by an equation of degree n is said to be of nth degree. If n=l, the complex is called linear. The general equation of the linear com¬ plex is CiZh + C2V2 + . . . + c6Ve ˆ 0, or briefly, lcjvj=0, where f(») = 0. How are the lines distributed? Let vi=ˆvfi fi-pvi" fi-vvi'" be an arbitrary hyperpencil. In order that a line of the hyperpencil shall belong to the complex, it is necessary and sufficient that ˆcˆvi' + pvi" + vvi"')— 0, a single linear condition of the (two independent) ratio A; p\ v. Hence a single in¬ finity of the lines of the hyperpencil belong to the complex. For if ufi — \vi -f pm" + vm'" and ui"—h2vi" + p2vi" + v2v%" be any two of them, then plainly all lines of the pencil (u\ u") belong to the complex. On the other hand, un¬ less the entire hyperpencil belongs to the com¬ plex, no other line u'" does so belong, for if it did, then every pencil determined by u'" and the lines of (u u "), i.e., all lines of the hyper¬ pencil, would belong to the complex. Hence the proposition: The lines of a linear complex are so distributed that every hyperpencil in space contains a pencil of lines (and no other line) belonging to the complex „ unless the hyperpencil itself is entirely contained in the complex. These pencils are called the pencils of the complex. The proposition admits of various equivalent statements of which one of the most illuminating is : Given a linear com¬ plex, in general, each point of space is the ver¬ tex of a pencil of lines of the complex and con¬ tains no other line of it; in each plane in gen¬ eral there is a pencil of lines (but no other line) of the complex. In the former case the plane containing the pencil of the point is called the polar (plane) of the point; in the latter, the

vertex of the pencil in the plane is called the pole (point) of the plane. Thus a linear com¬ plex serves to pair the points and planes of space as poles and polars, any pole and its polar being united in position. If a point P and a plane x be united in position, the pole P' of tt and the polar x' of P are also united. Not only, however, are points and planes paired, but lines are paired with lines. The line com¬ mon to two poles corresponds to the line com¬ mon to their polars. Two such corresponding lines are called conjugates with respect to the complex. To a range of points (poles) cor¬ responds an axal pencil of planes (polars), the base of the range and the axis of the pencil being conjugate lines. A line cutting two con¬ jugates belongs to the complex, and all lines of the complex that cut a given line cut its conjugate also. If two lines intersect, so do their conjugates. Every line of the complex is its own conjugate, and conversely. If a point moves along a line of the complex, the polar plane turns about the same line. This is a special case of the proposition that if a point glides along any line, the polar plane rotates about the conjugate line. Hence, if Pi, P2, Ps, P4, be any four positions of the moving point and if tti, x2, 7t3; 7r4 are the corresponding planes, then the anharmonic ratios are equal, i.e., (P1P2P3P4) = (x \x 2Tr37Ti) • In general: if C

planes, the polars, conjugates and poles (with respect to a given complex) constitute a con¬ figuration Cr. C and C' are called reciprocal configurations. The points, lines and planes of either correspond uniquely and respectively to the planes, lines and points of the other. In particular, if C is a polyedron, so is Cf. The edges of either are conjugates of the edges of the other; the vertices and faces of either are respectively the poles and polars of the faces and vertices of the other. The vertices of either lie in the (polar) faces of the other.* Invariant of Complex, Special Complex, Directrix. — The condition,

2f(»/) = -ˆr "i + • • • + v'-< (P .

that the line v shall intersect the line vf, rep¬ resents a special complex, viz., that of which all the lines cut a given line vf, called the directrix of the complex. The complex Zcjvj— 0 is, then, special when and only when

df . df 0£

— • — ˆ—7 — Cl :c*: • • • :Cs

dvi dv2 ovs

These equations yield the values of (the ratios of) the vjd in terms of the cj. Substituting those values in there results a homogene¬

ous quadratic ˆ (c), so that f (vd) = £2 (c) . Hence Q (c)— 0 when and only when | £ (ik?) = 0; hence the necessary and sufficient condi¬ tion that 'ZcjVj—O shall represent a special

complex is that fl© =0. In such case the co-ordinates of the directrix are the co-effi¬ cients cj. The expression & (c) has been named by Klein the invariant of the complex hcjvj= = 0. The complex is, therefore, special or non-special according as its invariant vanishes or does not. If t;(v) be reduced to the Pliicker type w (v) = 2(viVi + vxh 4- VzVs), the invariant assumes the form (c) ~2(ciCi + C2C5 4* c3c3). In case the above-mentioned Klein co-ordinates are em¬ ployed, the form of the invariant is&(c)=2c/

(/- 1 _ ,6).

Pencils of Complexes, and Line Con¬ gruences. — The system of lines common to two complexes is named a line congruence. It is plain that the lines of the congruence deter¬ mined by two complexes 2cˆ.= 0 and ˆc'-v- — 0

are common to the complexes of the pencil McjOj + pZc'jvj = 2 (lCj + pc'j)Vj=0 of com¬ plexes and that the congruence is equally de¬ termined by any two complexes of the pencil. Does the pencil include special complexes? If so, how many? The condition, Q (hc=g-c') — 0, for special complexes, is quadratic in the ratio A :/i of the parameters, and hence yields two values for that ratio, which may be real and distinct, real and equal, or imaginary. Accord¬ ingly, every pencil of complexes contains two and but two special complexes, real and distinct, coincident or imaginary. The directrices of the special complexes are cut by all and only the lines of the congruence and are called the directrices of the congruence. Conversely, the assemblage of lines that intersect two given lines is a congruence. Hence a congruence is often defined to be the totality of lines inter¬ secting two fixed lines. The directrices of a congruence are conjugate lines with respect to every complex of the corresponding pencil of complexes. In case the discriminant of the foregoing quadratic is zero, the directrices coincide. The (double) directrix is a line of the congruence. That discriminant is called the invariant of the congruence. The vanishing of the invariant signifies coincidence of the two special complexes and of their directrices. It may happen that the quadratic is identically zero. Then all complexes of the pencil are special and the directrices constitute a pencil of lines.

Angle of Complexes; Involution. — Let a, b, c, d be any four values of the parameter A ; /j. of the above pencil of complexes. The anharmonic ratio (abed) may be called the anharmonic ratio of the four corresponding complexes. If l be a line of the congruence, x a plane of /, and Pi, P2, P3,

P4 be the poles of 7r as to the complexes a, b, c, d respectively, then the anharmonic ratio (PiP2P3Pi) = = (abcd) . Also, if xh x.h 7t3) 7t4 are the polar planes of a point P of l with respect to the four com¬ plexes, then (7Ti7r27r37r4) = (abed). Hence (xix2 7r37r4) = (P1P2P3P4), and these equal ratios remain constant as x rotates about (P glides along) l and also as / varies its position in the congruence. We may suppose that b and d correspond to the special complexes of the pen¬ cil and denote by F and F' the .points common to l and the directrices and by and p the planes determined by l and the directrices. Then (P-LFP2F') = (abcd)—(xi(l > x2

Klein the angle of the complexes a and c. If a and b be so taken (and that is possible) that A— 90°, whence r — — 1, then the two corre¬ sponding complexes are said to be orthogonal or in involution. The geometric significance of this relationship is that, when and only when it subsists between two complexes, each contains the conjugates of its lines with respect to the other. This subject of involution is inti¬ mately connected with the general doctrine of linear systems of linear complexes, but it cannot be further pursued here.

Hyperpencil of Complexes. — We may

thus term the system 2 (Xcj f pc'j + vcj")v = 0

determined by three independent complexes. ˆcjVj = 0, ˆc'jVj = 0, 2,cf'vj = 0. The name,

system of three terms, is often employed in¬ stead of hyperpencil. The oo1 lines common to the three fundamental complexes are obviously common to all complexes of the hyperpencil. They constitute a ruled surface of second order. That the surface is of second order appears from the fact that the number of points in which it is pierced by a line uj, i.e., the number of solutions of the equations 2c,jvj = 'Zc'jVj = = Zc/'vj = % (v) = % (Vy u), is two. The surface is in general an hyperboloid of one sheet; in special case, a hyperbolic paraboloid. The lines constitute, however, but one system of generators. What of the other system? To answer, observe that the condition, \ pc' --vc") = 0, that the hyperpencil shall contain special complexes, yields oo1 pairs of values of the (two independent) ratios 4 \ w. Hence the hyperpencil includes oo1 special complexes. The directrices of these con¬ stitute the second system of generators. These last are not lines common to the hyperpencil, on which account it seems better (after Koenigs) to call the lines common to the hyper¬ pencil not a ruled surface,

but a demi-quadric or series of lines.

Complex of Higher Degree. — An equation fn(v) = 0 of degree n in line co-ordinates vj defines a complex of degree n. Any line-pencil of space contains n lines of such a complex, so that the degree of a complex may be geo¬ metrically defined to be the number of lines common to the complex and an arbitrary pencil. The lines common to a complex of nth degree and a hyperpencil constitute a cone of order n if the hyperpencil is a sheaf, and envelope a plane curve of class n if the hyperpencil is a plane of lines. The cone is called a cone of the complex; and a curve, a curve of the com¬ plex. Every point of space is the vertex of such a cone, and every plane contains such a curve. As above seen, if n — 1, the cone de¬ generates into a plane (pencil of lines) and the curve degrades into a point (pencil of lines enveloping it). The (Neue Geometrie) of Pliicker is chiefly devoted to the quadratic com¬ plex, n — 2, and many of its cardinal proper¬ ties are there discovered. For the literature of the subject, including the general doctrine of complexes, the reader is referred to the works above cited and to the bibliography below. We give next a very brief account of certain closely.

Allied Theories

the study of whose connections and general comparative anatomy is one of the most in¬ structive and fascinating chapters in the de¬ velopment of modern geometry.

Plane Geometry of the Point in Four- space. — Space that is 4-dimensipnal in points is also 4-dimensional in lineoids (ordinary 3-di¬ mensional spaces). It is 6-dimensional in lines and also in planes. Hence in 4-space the point and the lineoid are dual (reciprocal) elements, and so the the plane and the line. The lineoid contains oo4 lines; the point, 00 4 planes. The lineoid contains oo 8 points and as many planes; the point contains co 3 lineoids and as many lines, Hence in 4-space, the point, plane and

line geometries of the lineoid are respectively dual to the lineoid, line and plane theories of the point. Between any two of these pairs of reciprocal geometries there is a fact-to-fact correspondence, and the algebras of any such pair are identical. The emphasis here falls upon. the. fact that the line geometry of the lineoid (i.e., ordinary line geometry) is pre¬ cisely the same analytically as the geometry of the 4-space point regarded as the assemblage of its (generating) planes. For an introduc¬ tory detailed account of the elements of the latter theory, and of the mentioned parallel¬ ism, consult (The Plane Geometry ofvthe Point in Point-space of Four Dimensions) ˆAmeri¬ can Jour, of Math.P Vol. XXV).

Geometry of (Ordinary) Space in Penta¬ spherical Co-ordinates. — The square of the tangent-distance from a point to a sphere is named the power of the point with respect to

the sphere. Denote by xk(k = 1, . , 5) the

powers of a point with respect to five fixed mutually, orthogonal spheres. The xk Satisfy the. identity lxk2 = 0. To any set of values of their ratios there corresponds a definite point and conversely. The quantities hxk are called pentaspherical point co-ordinates. Their dis¬ covery and introduction into geometry are mainly ascribable to Gaston Darboux (cf. his memoir (Sur une classe remarquable de courbes et de surfaces algebraiquesP 1873), but in part also to Felix Klein and Sophus Lie (cf. (Mathe- matische AnnalenP Vol. V). In these co-ordi¬ nates the equation of a sphere is linear, viz., 2 mk xk — 0 (k — jl, . . . 5) ; conversely, every such equation represents a sphere. The radius

is p = (V 2m V) : 2(m/c-f- Rp), where the Rk are the radii of the fundamental spheres. Certain analytic correspondences between line geom¬ etry (in Klien co-ordinates) and point geometry in pentaspherical point co-ordinates are imme¬ diately obvious. For example : in the former = 0 (j = 1, ...» 6) is the identity satisfied by the line co-ordinates xj ; in the latter, 2 xk2 = 0 (k — l, ..., 5) is the identity connecting the pentaspherical point co-ordinates ; in the former, 2 ntjxj =0 represents a linear complex; in the latter, 2 nikXk = 0 represents a sphere ; in the former, .2m/ 2 =0 means that the com¬ plex is special; in the latter, 2m2 =0 signifies

that the sphere is a point; and so on and on.

Sphere Geometry of Space. — In this doc¬ trine, due to Sophus Lie, the sphere is taken as primary element. To pick out a sphere from among all the spheres of space, it is necessary and sufficient to know four independent things about it, as the (three) co-ordinates of its centre and the length of its radius. Hence the sphere like the line, has four independent co¬ ordinates, it has four degrees of freedom, and sphere geometry, like line geometry, is 4-di¬ mensional. We have seen that every equation 'ZmkXk — O in pentaspherical point co-ordinates Xk represents a sphere, and conversely; hence the five coefficients mk may be taken as homo¬ geneous sphere co-ordinates, their ratios being equivalent to four independents. The system may be rendered homologous to that of the six line co-ordinates by introducing a sixth sphere co-ordinate mo by the definition,

fm0=y 2m&2, where i = V — land(£=l, .. ., 5). The six homogeneous, sphere co-ordinates nij (/"!> • 6) satisfy the quadratic identity

Zmj = = 0, identical in form with that con¬ necting the Klien line co-ordinates. The condi¬ tion that the spheres m and m' shall be tangent is 2mjm/= 0, which is precisely like the con¬ dition, Zxjxj'— 0, that the lines x and x' shall in¬ tersect, a most interesting and fruitful principle of correspondence discovered by Lie in his brilliant memoir, (tlber Complexe, in besondere Linienund Kugel-Complexe, mit Anwandung auf die Theorie partieller Differentialgleichungen) ((Mathematische Annalen,) Vol. V, 1871).

Circle Geometry of Space. — In this beauti¬ ful and growing theory, principally due to the French mathematicians E. Cosserat, C. Stepha¬ nos, and G. Koenigs, the circle is employed as primary or generating element of space. In this element, space is 6-dimensional, like point 4-space in lines or planes. A circle is deter¬ mined as the intersection of two spheres, as '2mjXj = 0, Zmfxj = 0 (;'=1, . . . , 5). It is equally determined by any two spheres of the pencil or range, 2(mj + m/)xj = 0, of spheres containing it, and, in particular, by any two of the included five of which each is orthogonal to one of the fundamental spheres. The equa¬ tions of those special spheres correspond to the five 7,-values that render the coefficients 0 in succession. For the sake of symmetry, the ten coefficients pik=(/^kt — mkm are taken as homogeneous co-ordinates of the circle. That the ten are equivalent to the necessary and sufficient number six of inde¬ pendents is seen in the facts that only their rations are essential and that they satisfy five (equivalent to three independent) quadratic identities of the form «0(p) = 2(p/3ypd£ + pfidpey + pft£p/d) = 0. The circle geometry of space is not parallel to the line geometry of ordinary space, but it is parallel, in a fact-to-fact fashion, to the line and the plane geometries of point 4-space.

Theory of Circles Orthogonal to Sphere.

— Two spheres mk and m&'(£=l, ... , 5) are or¬ thogonal when and only when 0 ; hence

there are oo3 spheres orthogonal to a given sphere. A circle is orthogonal to a sphere when and only when any two (and hence all) of its generating spheres are orthogonal to the sphere. There are, accordingly, oo4 circles orthogonal to a given sphere. A one-to-one correlation subsists between such circles and the lines of space. If, in the assemblage of spheres orthogo¬ nal to a given sphere, four mutually orthogonal spheres be taken as fundamental or co-ordinate sphere any equation 1mkXk—0 (k — 1, • .

. , 4) will represent a sphere of the assemblage, and conversely. Hence a pair of such equa¬ tions will define a circle orthogonal to the fixed sphere, and conversely. It is imme¬ diately plain that the co-ordinates of the circle regarded as element of the assemblage of circles orthogonal to a given sphere are analytically precisely the same as the line co-ordinates of space. Hence the geometry of such a circle assemblage is analvtically identical with line geometry. The first chapters of such a circle geometry are found in (The Geometry of Circles Orthogonal to ,a Given Sphere,) by C. S. Forbes (Columbia University Press, 1904).

Bibliography. — The literature of line geometry and allied theories is extensive and is rapidly increasing. In addition to the fore¬ going citations, may be mentioned the follow¬ ing works, which together with further cita¬

tions contained in them constitute a complete bibliography of the subject: Cayley (On the Six Co-ordinates of a Line) (Collected Papers, Vol. VII) ; Cosserat, (Sur le cercle considere comme element generateur de l'espace) (see preceding reference) ; Jessop, (Treatise on the Line Complex) ; (Encyklopadie der Mathema- tischen Wissenschaften) (Vol. Ill) ; Klein, (Einleitung in die hohere Geometrie) and vari¬ ous memoirs by him in Vol. V and subsequent volumes of Mathematische Annalen; Koenigs, (La geometrie reglee et ses applications) (A fi¬ nales de la Faculte des Sciences de Toulouse , Vols. Ill et seq.) ; Loria, HI passato ed il presente delle principali teorie geometriche) ; E. Pascal, (Repertorio di mathematiche superiorF ; Sturm, (Die Gebilde ersten und zweiten Grades der Liniengeometrie,) a syn¬ thetic treatise; Pasch, (Zur Theorie der linearen Complexe) (Crelle's Journal, Vol. 75) ; Study, (Geometrie der Dynamen.)

Cassius J. Keyser,

Adrain Professor of Mathematics , Columbia U niversity.

GEOMETRY, Modern Analytical. No

preliminary statement of the significance of this title could be quite satisfactory to any, much less to all. ˆ An adequate sense of its meaning can be gained only by study of the subject itself ; and in this case, as in that of most other doctrines, it is better for the reader to end, than for the writer to begin, by an attempt at definition. Logically and historically mod¬ ern analytical geometry is the outgrowth of Cartesian geometry (q.v.). The former, while in a sense it includes the latter as a special case, avails itself of many principles, processes, and points of view unknown to the older doctrine. It is the aim of this article to give a brief account of some of the modern notions and methods, with particular reference to the geometry of the plane. For further informa¬ tion the reader may see the articles :

Geometry, Cartesian; Curves, Higher Plane; Geometry, Line and Allied Theories; Curves of Double Curvature; Surfaces, Theory of ; Hyperspaces. As to related matter of pure geometry, see the articles : Geometry, Elementary ; Geometry, Pure Projective ; and Geometry, Non-Euclidean. In the follow- ing, acquaintance with the elements of ordinary (Cartesian) geometry will be presupposed.

One-dimensional Spaces: Range and Pencil; Elements at Infinity. — Any geometric entity in a given space may be taken as generat¬ ing element of the space, which is then regarded as the assemblage of all the elements of the chosen kind. A space being assumed, its di¬ mensionality depends upon the choice of gene¬ rating element and is the number of independ¬ ent parameters, or co-ordinates, necessary for the determination of the element as in some sense a continuous function of them. This is what is meant, to take the most familiar examples, by saying that any surface, say a plane, . is two-dimensional, and that ordinary space is three-dimensional, in points. Any space being assumed, it is always possible to select as element an infinity of different kinds of entities for any one (kind) of which the space shall have prescribed dimensionality k. Thus the plane is two-dimensional in lines (see below), its dimensionality is 3 in circles, 4 in

parabolas, 5 in conics, , while the

dimensionality of ordinary space is 3 in planes, 4 in lines or in spheres (see Line Geometry), 6 in circles, etc. A plane curve may in general be conceived either as a locus, assemblage of its points, or as an envelope, assemblage of its (tangent) lines. In either view the curve appears as a one-dimensional space, of points in the former view, of lines in the latter. Of such one-fold spaces, the simplest, and hence in a sense the most important, varieties are the range and the pencil, the former being the straight line regarded as the locus or assemblage of its points, and the later being the point regarded as the envelope or assem¬ blage of its lines (the lines through it). Com¬ monly the line is called the base of its range, and the point is called the vertex of its pencil. In passing it may be pointed out that if a pair or triplet, . . . of points (lines) be taken as element of the line (point), the line (point) appears as a space of 2, or 3, ... dimensions

in such pairs, triplets. . . .

Let V and b respectively be any pencil and range. The plane being supposed Euclidean in respect to parallels (see Geometry, Non- Euclidean), V

contains a single line parallel

to b. Plainly, through any (finite) point of b there passes one and but one line of V ; and, conversely, every line of V, except the mentioned parallel, passes through a (finite) point of b. In order to avoid the exception and render the one-to-one correspondence complete, a convention is made, namely, that every range shall be regarded as having one and but one infinitely distant point Poo, called the infinite point of the range, and that the infinite point of any range is identical with that of any parallel range. Accordingly any infinite point of the plane is the vertex of a pencil of parallel lines, and the system of lines parallel to a given one constitute a pencil vertexed at oo . The notion of parallel lines meeting at oo had occurred to Kepler, but the systematic introduction of the convention was made by Gerard Desargues (1593-1662), chief among the founders of modern pure geometry. From that convention it readily follows, by the theory of similar triangles, that the natural assumption concerning the (infinite) distances from any two finite points of a range to its infinite point is that they are equal. The locus of the infinite points of the plane is a straight line, called the infinite line of the plane. As for space, the locus of its infinite points is a plane. In general the locus of the infinite points in a point-space of n dimensions is a point-space of n — 1 dimensions. If a range rotate (in a plane) about one of its finite points, every other point

*of the range will generate a circle; the path of the infinite point being a straight line, the latter appears as a circle of infinite radius ; a perfectly natural phenomenon, for the curve- ture, 1 :r, of a circle of radius r, vanishes for r= < * > .*

Non-homogeneous and Homogeneous Co¬ ordinates of Point and Line of Range and Pencil. — • In a range choose a point O for origin of distances. Denote by d the distance from O of an arbitrary point P of the range. Let x — pd, where the factor p may have any chosen value whatever. To any value of x there corresponds a position of P, and con¬ versely. Hence x may serve as co-ordinate of the elements of the range. If a pencil be paired with a range as above, x will equally serve for co-ordinate of the lines of the pencil ; or, in the latter case, d may be taken to repre¬ sent the tangent of the angle made by a vary¬ ing line of the pencil with a fixed line o, called origin of angles. Any point (line) of a range (pencil) will be represented by a linear equa¬ tion ax + b = 0, the co-ordinate of the element being — b :a. Conversely any element is defined by such an equation. In general n elements will give rise to an equation of nth degree in x, and any such equation will represent n elements. These (points or lines) will be real or imagi¬ nary elements of the range or pencil according to the corresponding character of the roots of the equation. All the equations can be rendered homogeneous by replacing x by the ratio xi :x2

and clearing of fractions. The quantities &xi and

t being any chosen finite quantity called pro¬ portionality factor, are described as homogene¬ ous co-ordinates of the point (line) of the range (pencil). The position of the element depends on the ratio of the quantities, which is the same as the ratio of the x's, and the element is accordingly spoken of as the point or line (xi, x2). One obvious advantage of the homo¬ geneity thus introduced lies in the artistic quality, notably the symmetry, which it lends to the analysis ; for example, the equation of a point assumes the form aixi + a2×2=0] in par¬ ticular, the equations of the origin and Poo are respectively Xx~ 0 and xr= 0. Obvious analogous interpretations hold for the pencil. Indeed it is at once evident that the geometry of the range and that of the pencil are analyt¬ ically one. The algebra remaining the same, either geometry passes over into the other on a mere exchange of notions: point (line) for line (point), pencil (range) for range (pencil).

Geometric Interpretation of Homogene¬ ous Co-ordinates. — In case of the range assume two origins O x and 02 instead of one and let them be 3 apart. These divide the range into two parts, the short segment be¬ tween and the long one (including Poo) not between Ox and 02. Strictly, any point of the range other than Oi or 02 is between these points, for the range is a closed figure, but the meaning of the preceding sentence is sufficiently clear. Let it be agreed that a point in the shorter segment is on the positive side of both O's, whence, naturally, a point in the longer segment will be on the positive side of the more remote, and on the negative side of the nearer, O. Denote by Xi and x2 respectively the distances of any point P from Ox and Oz. For any P, Xx + x2= =. To any pair of x's satisfying

that relation there corresponds a point, and conversely. The homogeneous co-ordinates cxi, &X2 of a point of a range are the dis¬ tances (multiplied by any finite constant) of the point from two chosen fixed points. Analogously for the pencil, where, however, distances are replaced not by the angles but by the sines of the angles made by the variable line p with two fixed lines Ox and o2, and where it is understood that an angle and its vertical angle are one and the same angle.

*Anharmonic Ratio. — The ruling notion in * the doctrine of the range (pencil) is the anhar¬ monic (double or cross) ratio of four elements.*

If Xi, x2) Xe, Xx be any four numbers (say any four values of a continuous

variable x) the

expression (xt — x2 • Xo — *) (x2 — x3-x4 — Xx) is called the anharmonic ratio of the four values taken in the order Xx, x2, x3, Xi, and is con¬ veniently denoted by the symbol {xxx2 × 3 × 4) .

If a one-to-one correspondence be established between the continuum of ˆ— values and the elements of a geometric continuum, the notion of the anharmonic ratio of any four —values may be and is associated with the correspond¬ ing four geometric elements, as the points of a range, the lines of a pencil, the planes of an axial pencil (assemblage of all planes containing a same line), and so on. The order of ele¬ ments is essential. The 24 possible per¬ mutations of 4 elements yield six (in general distinct) values of their anharmonic * ratio. The exchange of two alternate elements, as Xi and Xx, inverts the ratio. Thus, if (XxX2 × 3 × 4) —r, then (xixix3 × 2) = 1 :r. To exchange two consecutive elements, as x2 and x3, takes the complement of the ratio to 1. Thus (xxx2 × 3 × 4) — 1 — r. The six values are r , 1 :r, 1 — r, 1 :(1 — r), (r— 1) \r, r:(r — 1).

Geometric Interpretation of Anharmonic Ratio in Range and Pencil.— Let xi, x2, x*, x4 be the distances of the points Px, P2, Pz, P4 of a range from the origin. Then Xx — x2, x3 — x4f x2 — x 3, x 4 — Xx represents, in sign and magni¬ tude the distances P xP 2,P 3P 4,P 2P 3, P4Px. Hence (XxX2 × 3 × 4) = (PxP2P3P4) — the ratio of the dis¬ tance ratios PxP2:P2F3 and PxP4 :P4P3. In case of a pencil, if the x's denote the tangents of the angles Ox, a2, a3, a4 made by the lines px, p2, ps, p4 with the origin, or fixed line, o, then Xx — x 2, . . . are the tangent differences tan ax — tan a2, . . . and (xxx2 × 3 × 4) = (pxp2p3p4) =

| (tan ax — tan a2) (tan a3 — tan a4) [:{ (tana2 — tan

a3) (tan a4 — tan «i) [= \ (sinˆi — a2) (sin a3 — a4) } :

\ (sin a2 — a3) (sin a4— aj) [= the ratio of the sine ratios (sin pxp2) : (sin p2p3) and (sin pxpi) :

(sin pipx), where pipk means the angle between pi and pk reckoned from the former to the latter.

Special Relations of Four Elements. — These

correspond to equalities among the six anhar¬ monic ratios, and conversely. By equating r in succession to each of the other ratios, the following special values of the ratios are found: 1, — 1, 0, co, 2, o, and <*>‘, the last two being the imaginary cube roots of — 1. If r— 1, the six values are 1, 1, 0, 0, 00 , oo ; if r — — 1, the six are — 1, — 1, 2, 2, £, £; if r, = o) or o', they are «, a>, o, 'o', o', o'; finally, if r — 0 or oo, the

six values are 0, co, 1, oo, 1,0. The special relations accord¬ ingly fall into three cases, viz., r= 1, r=— 1,

r — o. If r= 1, either xi = x3 or x2 = x4, i.e., two of the points (lines) coincide. Hence this case is called the coincident case. If — 1,

then, if Si and s2 are the intervals into which the range (pencil) is devided by a pair of alternates, one elment of the remaining pair is in Si and the other is in s2; the pair xit x3 is said to be harmonically related to the pair x2 x4\ and conversely. In particular if one of the points bisects the finite segment St the alternate point bisects the other segment s2, i.e., it is the infinite point of the range. And if one line bisects the angle s%, the alter¬ nate line bisects the supplementary adjacent angle s2. The case, — 1, called the har¬

monic case, is of great importance, leading to the theory of involution; all point (line) pairs of a range (pencil) that are each harmonic (conjugate) to a fixed pair are said to con¬ stitute an involution of points (lines.) The case, r = w, is called equianharmonic (by Cremona) because the six values fall into two triplets, instead of three pairs, of equals. This case serves as a door for the entrance of imaginary elements into the geometry of the range (pencil), for obviously four real points (lines) cannot have an imaginary anharmonic ratio.

Conjoined Range and Pencil. — A range

or any line is cut by any pencil, as in Fig. 1. If the elements be paired so that each line corresponds to the point it passes through, the range and pencil are said to be in perspec¬ tive or to be conjoined. Two ranges (Fig. 2) conjoined with a same pencil are said to be in perspective; the vertex of the pencil is called the centre of perspective. Also two pencils

Fig. 2. Fig. 3.

(Fig. 3) conjoined with a same range are said to be in perspective; the base of the range is named axis of perspective. If a range and a pencil are conjoined and if Px, P2, P3) P4 be any four points of the range and px, p2, p3, p4 are the corresponding lines of the pencil, then, by definition of anharmonic ratio it may be shown that (PxP2P3P4 = PxP2P3Pi) , a theorem which in another form was known to Pappus (about 300 a.d.). It follows that corresponding anharmonic ratios of any two perspective ranges (pencils) are equal.

If the elements of two ranges or pencils or a range and a pencil be paired in such way that corresponding anharmonic ratios are equal, the two systems are said to be pro¬ jective. Obviously, if the anharmonic ratio of four

elements of which three are known be given, the fourth element is uniquely determined. It follows that any two pro¬ jective systems can be placed in perspective by a congruence transformation. To place two projective ranges Px, P2, P3, Pi, ... , and Px , iY, P3/ Pi, . . . , in perspective, it suf¬ fices to place Px on Px' and to take for per¬ spective centre the common point of the lines

joining P2 to Pf and P3 to Pf. Similarly for two projective pencils.

The Anharmonic Ratio as Co-ordinate. — Let (abcx)—r be the anharmonic ratio of four elements of which a, b, c are fixed and .r is variable. To each value of x, i.e., to each point (line) of the range (pencil), there corre- ponds one value of r, and conversely. Hence the anharmonic. ratio r may be taken as co-ordi¬ nate of the point (line) of a range (pencil), referred to three arbitrarily taken fixed points (lines) of it. Now, (oo 1 0 x) \=x) hence, if x in case of a range denote distance from the origin, it appears that the ordinary distance- co-ordinate of a point is its anharmonic ratio referred to the infinite point, the point 1 and the origin, of the range. Similarly, if for fixed lines be taken two perpendicular lines (of which one is the ordinary origin) and the bisector of their angle, the anharmonic ratio of those lines and a (variable) fourth line is the tangent (co-ordinate) of the angle of this line and the origin. The anharmonic ratio is thus seen to be the co-ordinate par excellence of the element of any one-fold continuum.

Linear Transformation.— The importance of the anharmonic ratio in the theory of simple continua comes clearly to view in connection with the linear transformation of them. The general equation of such transformation is x'-(ax-fb) : (cx+d) . To any point (line) x corresponds one point (line) x'. Viewing the transformation as an operation on all the ele¬ ments at once, we say that each element x is transformed or converted into an element xf. Obviously the range (pencil) is converted into itself as a whole, the arrangement of the ele¬ ments being in general changed. It is plain, too, that the transformation can be used to pair the elements of a range (pencil) with those of a pencil (range) or to pair two ranges or two pencils. The three independent ratios of the coefficients a, b, c, d are the parameters of the transformation. Hence there are oo3 transformations. The successive application of any two of them is equivalent to that of a third, and so they constitute a group (see Groups, Theory of) ; and the parameters can be so determined as to convert any specified three elements into three specified elements. If Xi, x 2, X&, x 4 be any four elements of a system (range or

pencil) and if Xi, xf, xf, xf be the correspondents of the same or another system of the same or the other kind, then (xiX2XiXi) — (xi Xz xd Xi) ; i.e., the anharmonic ratio is an absolute invariant (see Invariants) under every transformation of the group. It is this property of invariance that lends the anhar¬ monic ratio its great importance in geom¬ etry. Because anharmonic ratios are pre¬ served by it, the linear transformation is called projective: any two systems paired by it are projectively related. Every trans¬ formation of a system into itself leaves two elements fixed. These are found by writing x for x' and then solving for x. The fixed elements, variously called the poles, foci, double or conjugate elements, of the transfor¬ mation, will be real and distinct, coincident or imaginary, according as the discriminant, D = (d — a)2 + 4bc, is positive, zero, or negative; and the corresponding transformations are described respectively as hyperbolic, parabolic, and elliptic, — distinctions that cannot be here

further pursued. In homogeneous co-ordinates the linear transformation is defined by the pair of equations pxi' = axi-{-bx2, pxf—cx-iA-dxi Range and Pencil; Dual Elements of the Plane. — Hitherto we have been mainly con¬ cerned with the line and the point (the range and the pencil) considered in themselves. These one-dimensional spaces are now to be viewed as elements of a two fold space, the plane. In Cartesian co-ordinates the equation of the line is Ax + By + C— 0, or ux + vy + 1 = 0. The equa¬ tion, which represents the line as a range of points (x, y) contains two parameters u and v, which determine the range, or line. Hence the plane is two-dimensional in ranges (lines) as well as in pencils (points). Since one and but one line is determined by any pair of values of u and v, u and v may be employed as co-ordi¬ nates of the line. We may speak of the line (u, v) as well as of the point (x , y). If u and v vary and x and y do not, the equation repre¬ sents the point (x, y) as a pencil of lines (u,v). We have here simple illustrations of three im¬ portant principles of modern analytical geome¬ try. As the equation of the line contains two independent parameters, we conclude that the plane is two-dimensional in lines. The dimen¬ sionality of any space in an element is always the number of independent parameters involved in the general analytic representation of the element. This principle of enumerating con- stants to determine questions of dimensionality is one of many principles introduced into ana¬ lytical geometry by Julius Plucker (1801-68). Another is that of multiple interpretation of equations. Thus we have seen that a same equation may be interpreted to represent now a point and now a line. Another great principle is that of duality or reciprocity introduced into analytical geometry by Plucker, though it was before employed in pure geometry by Poncelet (1788-1867) and his contemporary Gergonne, to the latter of whom geometric nomencla¬ ture is indebted for the world duality. Two elements e and e' of a given space are dual elements of it when its

dimensionality is the same in both and when the analytic rep¬ resentations of e and ef are identical in form. Thus the point and the line (that is, the pencil and the range) are reciprocal elements of the plane. The analogues for space are the point and the plane, the equation ux-fvy-fwz-f 1— o representing either a plane (u,v,w) as a field of points or a point (x, y, z) as a sheaf (bundle) of planes. The mentioned reciprocity of the point and the line is immediately evi¬ dent in such familiar pairs of propositions as : two points (lines) determine a line (point) ; three points (lines) determine three lines (points). In general, to any proposition about points (lines) corresponds an immediately de¬ rivable proposition about lines (points). So arise two parallel geometries of the plane, or rather, two reciprocal aspects of one geometry. These two aspects have the same formal algor¬ ism, which is susceptible of two interpretations. Using two variables, as G V, to denote either point or line, any equation /(f, ?) = 0 will represent either a curve as an assemblage or locus of points or a curve as an assemblage or envelope of lines (tangents). The degree of the equation is called the order of the locus, i.e., the number of points common to it and an arbitrary range, and it is called the class of the

envelope, i.e., the number of lines common to it and an arbitrary pencil. The two curves are in general not the same. But every curve, the point and line excepted, is conceivable as both a locus and an envelope and may at once be doubly generated as such: i.e., by the figure of

the line is continuously tangent to the point's path at the point ; such twofold genesis being another conception due to Pliicker. Accord¬ ingly a curve has a point equation and a line (tangential) equation. For example, the ordi¬ nary point equation of the circle, centre at origin and radius r, is x2 + y2 = P ; the line equation is P(u2 + v2) — 1. These are of the same degree, exemplifying the fact that every curve of second order is of second class, and conversely. In general, however, the order and the class of a curve are not equal ; for example, the curve whose point equation is x3 +y3 +1 — 0 has for line equation the sextic, ue + v* — 2 (u3 + mV + v3) +1 = 0, and is accordingly of order 3 and class 6.

Homogeneous Point and Line Co-ordi¬ nates and their Geometric Interpretation. —

By replacing x by X\ :xs, y by x2:x3, u by G: and v by £2+3, all equations of loci and en¬ velopes may be rendered homogeneous. In par¬ ticular the equation of the line (point) becomes £1X1 + £2*2 + Z3x=Q.

The three £'s (+s), or arbitrary multiples g&i (mjxj) of them on whose two independent ratios the line (point) depends, are called the homogeneous co-ordi¬ nates of the line (point). Such co-ordinates admit of various closely allied interpretations of which the simplest is that (Fig. 4), in which the x's (ij's) are the distances of the point (line) from the sides (vertices) of an assumed fundamental triangle, or triangle of reference, signs being so determined by convention that a point within the triangle is on the positive side of the three sides and that any two of the f's agree or do not agree in sign according as the corresponding line does not separate or separates the corresponding vertices. Such co¬ ordinates are often called triangular or triline ar, plainly, they may be replaced by arbitrarily chosen multiples of them. The x's (£'s) are, of course, not independent. If d denote the

area of the triangle and Oi, a2, a3 the lengths of its sides, the distances x satisfy the identity aiXi + a2×2 + a3×3 = 2 J . An analogous identity connects the £'s. The +s and the £'s need not be referred to the same triangle, but when they are (and that is generally the most convenient convention), the foregoing equation of the line (point) signifies also that the line and point it represents are united in position. Homogeneous co-ordinates were first employed, from mechan¬ ical motives, by Mobius in his (Barycentrischen Calcul, 1827, and by Pliicker, from geometric motives, in his (Analytisch-geometrischen EntwickelungenP 1828. The artistic and eco¬ nomical device of denoting several co-ordinates by a single letter distinguished by subscripts was introduced by Hesse (1811-74), whose (Analytische Geometrie des Raumes,* 1861, remains a model of elegance.*

The Method of Abridged Notation, and the Conics. — This powerful method, simul¬ taneously and independently introduced into geometry by Pliicker (cf. ˆntwickelungen, above) and by Bobillier ((Annales de Gergonne,* Vol. XVIII, 1827-28), consists primarily in de¬ noting by a single letter the left-hand member of the equation of a curve or surface, whence the curve or surface is represented by placing the letter equakto zero. The advantages of the method, as combining ideally with the method of parameters and as greatly economizing at once both physical and intellectual energy, are obvious. For an illustration, let P*EEXilG + X2V2 + x3*G and £»=&»* 1 + fjxt + then*

the equations P1= = 0, L1= 0, will respectively represent a point and a line. If P'= 0 and P"= 0 be two points, their range is represented by P' + 7p" = 0, definite points of the range corresponding to definite values of the param¬ eter 7,; in like manner the pencil determined by two lines L'=0 and L"= 0 is L'+7 L"= 0. In general the points (lines) common to any two loci (envelopes) C= 0 and C"= O are common to all the loci (envelopes) of the family C'7C"=0. If 7'= (a 7 b) . (c7+ d), the two

pencils, Z/+ 72/'= 0, L'" + 7/ Liv = 0, are projectively related. Any pair of corre¬ sponding lines determine a point. By elimina¬ tion of 7 and 7', the equation of the locus, Fig. 5, of all ' such points is found to be aZ/ Z> — bL"L™ — cL'L'"+dL"L'"= o. This being of second degree in point co-ordinates, the locus is of second order, a conic containing the ver¬ tices of the . given pencils. Reciprocally, the en¬ velope, Fig. 6, aP' p™ — bP"Piv — cP' P'" +

dp"p"'= 0 0f the lines joining corresponding points of two projective ranges, P'+7P" = 0, P'" + Ti'piv— 0, is of second class, a conic touching the (bases of the) given ranges. The number and species of the conic depend on the ratios of the Constances a, b, c, d. Obviously

there are oo 3 loci of the second order (envelopes of the second class) passing through two given points (touching two given lines).

Fig. 6.

Related subjects sudh as the general conic, systems of conics, poles and polars, transforma¬ tions, the circular points at infinity, circle and other geometries of the plane, cannot here be broached, much less the corresponding subjects in space.

Bibliography. — In addition to the works above cited, the following may be named as those which render the subject most readily accessible : Fiedler's German edition of Salmon's (Conic Sections) and 'Geometry of Three Di-mensions) ; Lindemann's (Vorlesungen fiber Geometrie von Clebsch) (also in French, by Benoist) ; Charlotte A. Scott, (An Introductory Account of Certain Modern Ideas and Methods in Plane Analytical Geometry.1

Cassius J. Keyser,

Adrain Professor of Mathematics , Columbia

University .

GEOMETRY, Non-Euclidean. A geo¬ metrical system which agrees with that of Euclid in all matters excepting those depend¬ ing on the properties of parallel lines. For many centuries, in fact, until well along in the last century — the geometry handed down to us by the great Greek mathematician Euclid (q.v.) was regarded as a perfect example of all that a mathematical system should be. It was considered that the initial

propositions called axioms and postulates on which Euclid grounded his system were self-evident, unas¬ sailable truths, on the validity and certainty of which the whole validity and certainty of geometry rested. Among Euclid's axioms and postulates is one to the effect that if a straight line /, meets two straight lines m and n so as to make the sum of the two interior angles on the same side of l, when taken together, less than two right angles, then m and n, if pro¬ duced sufficiently far, will meet on that side on which the angles are less than two right angles. This postulate is far too intricate to be intui¬ tively certain. Accordingly, from the very start attempts were made to replace it by sim¬ pler propositions, or to derive it from the re¬ maining axioms and postulates of Euclid. The efforts of Proclus and of Ptolemy (q.v.) in this direction have come down to us.

This postulate of Euclid is obviously in inti¬ mate relaton to the properties of parallel lines, which are defined by Euclid -as coplanar lines which do not intersect. In 1794 Ludlam pointed

out that Euclid's postulate could be replaced by the postulate that two parallels to a given line cannot intersect — that is, that given a line l, and a point P, not more than one line m exists which contains P and is parallel to /. This is unjustly known as Playfair's axiom. It is not quite sufficient to secure the ordinary geomet¬ rical properties of space, for it does not guar¬ antee that there exist any parallels whatever. If amplified to cover this contingency, it will read, "given a point P and a line l, one and only one line m can be drawn through P par¬ allel to /.»

Before Ludlam two other modern writers had made important transformations of Euc¬ lid's postulate. Wallis (1663) stated it in the form, <(To any triangle another triangle as large as you please can be drawn which is similar to the given triangle.® Saccheri (1733) put it, "There is a triangle the sum of the an¬ gles of which is two right angles.® These two forms were probably chosen by their respective discoverers in part on account of the fact that they seemed more intuitively certain than the form in Euclid. Saccheri, however, tried to demonstrate his postulate on the basis of the other axioms and postulates of Euclid by a reductio ad absurdum. To do this, it was nec¬ essary for him to draw the consequences of the falsity of the postulate. He considered the quadrilateral formed by a linear segment, two equal perpendiculars erected in the same direc¬ tion at its extremities, and the segment con¬ necting the free end of the perpendiculars. The angle between one of the perpendiculars and the segment connecting their free ends, in want of further information, may be consid¬ ered as acute, right, or obtuse. Saccheri de¬ veloped the conclusions of all these hypothesis in some detail, but believed, or said he be¬ lieved, that he had found contradictions in all but the second of them.

It became obvious, however, that in some manner or other the Non-Euclidean assump¬ tions were capable of being developed to a high degree of mathematical perfection. We find throughout the ensuing century works which claim more or less explicitly to be vindi¬ cations of Euclid, but which really turn out to be Non-Euclidean geometries. Chief among these are the works of Lambert (q.v.), Schweikart, Farkas Bolyai (q.v.) and Lobach¬ evsky (q.v.). Lobachevsky, professor of mathe¬ matics at the University of Kazan, has the credit of publishing the first book on Non-Euclidean geometry (1829-30). He developed the consequences of Saccheri's (), as it is called, will with a proper choice of the unit of length be 2 tan"1 (e-p). The following year the young Hungarian Janos Bolyai (John Bolyai) (q.v.) independently published an appendix entitled, (The Absolute Science of Space,1 for a work

of his father. In this a Non-Euclidean geometry is for the first time propounded without any logical misgivings. The system treated is the same as that of Lobachevsky. Bolyai demon¬ strates that the area of the greatest possible tri¬ angle is 7T k 2, where k is what is called the space- constant, and that such a triangle has all its sides parallel and all its angles zero. Among the theorems which are easily proved on the hypoth¬ esis of Bolyai and Lobachevsky are : that the sum of the angles of a triangle is less than two right angles; that parallels continually ap¬ proach; that the points a given distance from a straight line and on a given side are not col- linear; that the limit of a circle as the radius increases is not a . straight line, but a curve; and that two perpendiculars to the same line spread apart as they recede from the line. The space of Bolyai and Lobachevsky has later come to be known as hyperbolic space. In considering the history of this period of mathematical thought, it must not be forgotten that the great Gauss interested himself in the problems of Non-Euclidean geometry, though he never published on this subject.

The next important advance in Non-Euclid¬ ean geometry was made by Riemann. In 1867, after Riemann's death, there was pub¬ lished an inaugural lecture which he delivered in 1854: (On the Hypotheses which are at the Foundation of Geometry. } Here occurs for the first time the extraordinary advance that the straight line may be closed and finite ; that space though unbounded may still be finite ; that, for example, a finite number of our com¬ mon building bricks might be written down which would be more than our universe could contain. This at once gave Saccheri's <(hypoth- esis of obtuse angle® equal standing with his other two; giving a new genus of non-Eucli- dean geometry, the Riemannian.

The work of Lobachevsky, Bolyai and Rie¬ mann consisted in substituting two possible alternatives for Euclid's postulate of parallels, and of drawing the consequences from the sets of axioms made up of the remainder of Eu¬ clid's axioms and one or the other of these al¬ ternative parallel axioms. These sets of postu¬ lates have been developed and their conse¬ quences deduced in the utmost detail, and no contradictions have been found. That no con¬ tradictions have been found, however, is no guarantee that none exist. As is pointed out in the article on Postulates, the only way of positively proving a set of postulates con¬ sistent is the exhibition of a system which sat¬ isfies them. Since we are taking the validity of Euclidean geometry for granted, it will be enough if we give illustrations of several Non- Euclidean systems constructed out of the enti¬ ties of Euclidean space.

Let us then see what concrete systems we can construct from Euclidean material that exemplify the geometrical sets of postulates embracing the two Non-Euclidean hypothesis. We shall first consider the Lobachevsky sup¬ position on a plane. Let us take an ordinary Euclidean plane, and after the method of Cayley (q.v.) and Beltrami describe a circle on it. (Fig. 1). Let us limit our attention to those points situated on the inside of this circle, and let our lines be those linear segments bounded by the circle. It will be seen that two lines may

have one of three relations : they may intersect within the circle (/andwi), or on the circle (/ and m3), or they may fail to intersect at all in the region under consideration (/ and

v

I

I

l

Fig. 1.

m 2). These three relations will be denomL nated respectively intersection, parallelism and non-intersection. It will be seen that through every point, two and only two parallels may be drawn to a given line, as is the case in a Lobachevskian geometry. If the distance be¬ tween two points, P and Q be defined as

A P. BQ

[Q. BP/

where k is an arbitrary constant, it will be found that distance defined in this manner will satisfy all those properties in Euclidean geom¬ etry that do not depend on the parallel postu¬ late. If we call this distance PQ (to distin¬

guish it from the Euclidean distance PQj it may be shown by the principles of projective geometry (q.v.) that PQ remains unchanged

under any projective transformation which turns our defining circle into itself. We thus see that a transformation which leaves dis¬ tances unchanged' — that is, a congruence-trans¬ formation (such as an Euclidean translation or rotation) — may always be effected by a pro¬ jective transformation of the defining circle or absolute, as it is called by Cayley, and vice vfersa. If we substitute a sphere for a circle, we shall get a similar representation of a three dimensional Lobachevsky space.

The definition of angles and their measure is a somewhat more complicated matter. From every point outside a circle, as is clear, two tangents can be drawn to the circle. If we confine our attention to real, visible space, no tangents can be drawn to a circle from points on its interior. However, if instead of real space, we consider the system of number-pairs

(uA~iv, wPiz), where t = V — 1, and if we define

the various geometrical entities in a manner which forms a natural extension of the cor¬ responding definitions in real analytical geom¬ etry, we shall find that from any point on the

inside oi a circle two imaginary tangents may e drawn to the circle. If / and in are any two lines, then, in our plane Lobachevskian geometry, they determine at their point of intersection P two other lines, n and o, the two tangents to the absolute. Though we cannot

represent this by a diagram, the representation of the analogous situation, where P lies outside the absolute C, is simple enough, and is shown in Fig. 2. We shall define the angle between / and m as the appropriate value of

l_ , /sin

2 i e \sin

It may easily be shown that this definition will satisfy all those laws

concerning angles which do not depend on the parallel postulate.

There is a mode of picturing ordinary Eu¬ clidean space which well illustrates the relation between Euclidean and Lobachevskian space. As is shown in the article on projective geom¬ etry (q.v.), we may consider that every line on a Euclidean plane possesses a point at in¬ finity where it intersects its parallels, and that these points constitute a line with no intrinsic marks to distinguish it from any other line in

the plane. This being so, let us take a line in the finite part of our plane — the line i in Fig. 3 — and call it the line at infinity. Two lines are parallel when they meet at infinity — that VOL. 12 — 30

is, / and are parallel when their intersection lies on i just as in a Lobachevskian geometry two lines are parallel when they intersect on the absolute. It may furthermore be shown that the angle between the two lines / and nt in this geometry is

(_ j /sin

2f e \sin

when a remains constant and b approaches 0. As a locus, it approaches y = 0; as an envelope,

the two points (x = ± Va, y = 0). It will be seen that Euclidean geometry, in so far as the

properties of parallel lines and of angles are concerned, differs from Lobachevskian geom¬ etry in that the absolute, instead of being such a typical conic as a circle, is a degenerate conic. This analogy can readily be carried to three di¬ mensions. For a more detailed treatment of this subject and for a discussion of distances in Euclidean space see Analytical Metrics.

An analogous Cayleyan treatment of a Rie- mann space is possible if we make the absolute imaginary. . Then it is obvious that any two real lines in the. same plane will have a real intersection. This illustration, however, can¬ not easily be presented to the eye. An ocular illustration of a Riemann space can be made by the -surface of a sphere, if we make great cir¬ cles, or lines of the least spherical distance, take the place of straight lines (Fig. 4), and use the corresponding definition of angles and their measurement. This type of illustration, which was first consistently used as a method

by Riemann, is historically prior to that al¬ ready given. It will be observed that every two lines intersect, and that there are no paral¬ lels. All the other properties of the Rieman- nian plane will be found to be satisfied. How¬ ever, in this type of Riemann geometry, two lines will intersect twice. By defining as our points pairs of Euclidean points diametrically opposite, we obtain another type of geometry, where two lines intersect only once. The first type is called ˆspherical,® the second ˆelliptical.® By introducing the notion of a four-dimen¬ sional space, we can regard a three-dimensional spherical space as the three-dimensional (

Among the axioms of geometry which do not depend on the parallel postulate there are those which secure the free mobility of any figure in space. This means that space is the same in nature throughout and that any figure can be carried along it without stretching or tearing or crumpling. This is obviously true of the plane and the surface of the sphere, it is also true, however, of certain other surfaces, at least if the dimensions of the figure are suffi¬ ciently small. There is a certain expression in¬ volving the equation of the surface and the co¬ ordinate of a point, called the Gauss curvature (see Surfaces, Theory of) which will be con¬ stant on all such surfaces, and only on such sur¬ faces. Among the surfaces of constant Gauss curvature is that which is formed by revolving the tractrix

$x = a$ seek — 1 (y/a) — Vaa-y2

about the x — axis. (Fig. 5). It will be seen that this surface is everywhere saddle-shaped. Con¬ sequently no portion of it can be transferred by mere bending, without tearing or crumpling to a plane or a sphere, as it will always be too «full» about the edges. The geometry of this surface, then, though Non-Euclidean, must be¬ long to a different type than that of the sphere, and as we should expect, turns out to be essentially Lobachevskian. The analogues of straight lines are naturally those curves which, if we take sufficiently small parts of them, rep¬ resent the shortest distance between the points they join — that is, the geodesics. Angles re¬ tain their usual definition.

The tractrix space, however, is not a com¬ plete Lobachevskian plane, but a portion thereof with its edges joined to themselves by the same process by which a cylinder can be formed from a strip of Euclidean plane. Now, while a small piece of cylindrical surface can be moved on the cylinder without stretching, tearing, or crumbling, a portion reaching entirely around the evlinder cannot be rotated freely. In the tractrix surface of revolution, free mobility is likewise confined to regions that are sufficiently small. We thus see that besides the four ca¬ nonical types of space in

which alone, as was shown by Lie, free mobility is always possible — the Euclidean, Lobachevskian, elliptic and spherical spaces — other types can be formed which agree with one or the other of these spaces in regions less than a certain size, in which the free mobility of figures is also con¬ fined to figures of less than a certain size. Spaces of this sort may be of two or three or

even more dimensions, and are characterized by multiple connectedness — that is, it is possible to draw two closed curves in one of these spaces which cannot be transformed into one another by a continuous series of distortions. The theory of multiple connected spaces was de¬ veloped by Clifford (q.v.).

As would be expected from the fact that we have given the geometry of the surface of

the sphere as an example of a Riemannian

geometry, the formulae of spherical trigo¬ nometry will carry over into Riemannian space. Thus we have sin a: sin b : sin e~ sin A: sin

k k k

*B : sin C, *where a , b, and c are the sides of a triangle; A, B and C the angles opposite them; and k the constant which appears in the dis¬ tance-expression of the space in question. (As will be remembered the distance between P and Q was equated to k times the natural*

Ti

logarithm of the cross-ratio between P and Q, on the one hand, and the points where PQ cuts the absolute, on the other). This sine- law is precisely the formula which holds on a sphere of radius k. If & is a pure imaginary, this formula becomes the law of sines for a Lobachevskian space. Again, in a spherical triangle, the area is proportional to the dif¬ ference between the sum of the angles and 180 degrees. This is true in both Lobachevskian and Riemannian space, where the area is in fact k 2 times this difference. In a spherical or Riemannian triangle, as can be seen from Fig. 5, this difference is an excess of the sum of the angles over 180 degrees, while in the Lobachevskian triangle, as in the case of Fig. 5, it is of the nature of a defect. Because k2 is positive in the first case and negative in the second the area is always positive.

The reciprocal of this quantity l is called

k2

the curvature of the space. It may be shown that it is identical with the Gauss curvature on a surface of constant curvature, if the geodesics of the latter be interpreted as straight lines and the angles receive their Euclidean measure. It will be noticed that it is definable entirely in

terms of the Non-Euclidean space to which it pertains, as is shown by the trigonometric formulae given above, and involves no tacit reference to a Euclidean hyperspace. It is

**The definition of sin is purely analytical, not geomet¬ rical.*

positive in a Riemannian space, zero in a

Euclidean space, and negative in a Lobachev- skian space.

All three types of space can be exemplified by the selection of entities from Euclidean space, as we have seen, and the three therefore have an equal mathematical right to exist. None of them is in any sense imaginary or hypo¬ thetical. As to the particular space of up and down, right and left, back and front in which we live, the usual assumption made is that it is Euclidean. It is certain that if it is Non-Euclid¬ ean, its curvature must be very small in com¬ parison with those curvatures which we are accustomed to measure, if our ordinary criteria of distance hold good, for we find that in the course of our surveying or even of our astro¬ nomical observations of parallax no error has been found which depends on supposing our geometry to be Euclidean. It is quite possible, however, that our space is Non-Euclidean, as a very small value of the curvature could not be distinguished from 0 by any measurement within our power. The fact that Riemannian space is finite, and that Riemannian lines are closed, does not exclude our world from being Riemannian, for we have no way of knowing that these sup¬ positions are not so. The closedness of the Riemannian line might seem to make it probable that in such a space we could see the same stars by looking in either direction, so that the heavens would appear symmetrical with regard to the centre of the earth. By supposing a small space-cirtwature and an absorption of light in space, this difficulty may be overcome. If the world is Non-Euclidean, this fact could theoretically be demonstrated by sufficiently precise measurements. It must be remembered, however, that our physical definition of distance is not altogether determinate, but as Henri Poincare has shown involves a large number of imperfectly analyzed factors, and that one of the unconscious motives which have led it to assume its present form is probably the superior simplicity of Euclidean space. See Analytical Metrics; Geometry, Elementary; Geometry, Pure Projective; Space, etc.

Bibliography. — For the early sources on the subject, in so far as they are available in English, consult Lobachevsky, (Theory of Par¬ allel Lines J (Berlin 1840; trans. by Halsted, Austin, Texas, 1891) ; Bolyai, Janos, (The Science Absolute of Space> (1831; trans by Halsted, Austin, Texas, 4th ed., 1896). For the subject itself, consult Barbarin, P., (La geometrie non-Euclidienne) (Paris 1902) ; Bonola, R., (La geometria non-Euclidea) (Bologna 1906) ; Burnside, W., XXVI, 1894); Coolidge, J. L., (The Elements of Non-Euclidean Geometry) (Oxford 1909) ; Fontene, J. L.,

(Rational Geometry) (New York 1904) ; Killing, W., (Die nicht-Euklidischen Raum- formen in analvtischer Behandlung) ; Klein, F., (Zur nicht-Euklidischen Geometrie) (Math. Annal, v. XXXVII) ; Study, E., (Uber nicht- Euklidsche und Liniengeometrie) (Jahr. d.

P) eutsch Math, lˆer., v. XV, 1906) ; Veronese,

G., (Fondamenti di geometria) (Padua 1891) ; Whitehead, A. N., ˆUniversal Algebra) (Cam¬ bridge 1898) ; (The Geodetic Geometry of Sur –

faces in Non-Euclidean Space) (Proc. Lond Math. Soc., v. XXIX).

Norbert Wiener,

Editorial Staff of The Americana.

GEOMETRY, Pure Projective. Intro- ductory.— Projective geometry, as the name indicates, has to do with the theory of projec tion. Pure projective geometry is that which is conducted by means purely geometric, with¬ out initial recourse to algebraic methods (see Geometry, Modern Analytical), and which makes only subordinate mention of properties other than projective. The adjective synthetic is frequently used as practically a synonym for pure.

The process of projection is of constant occurrence — e.g., in photographing (the lens must be strictly rectilinear), in preparing a lantern-slide from the photographic plate and in throwing the image upon a screen. Thus in passing from an object to its representation upon the screen there are three successive projections — a fourth enters with the visual image formed upon the retina when the screen is viewed. Fig. 1 serves to illustrate the

P,r°DˆSAwpr°J ecting a ˆne ABCD into another A B C L) .

Fig. 1.

Reference to the figure will show that the length of a line is changed by projection. AB is not equal to A”B”. Moreover, even the ratio of two lengths is changed. AB-ˆBC is not equal to A” B” r B” C” . The study of pro¬ jective geometry is the study of such properties of figures as are unaltered by successive pro¬ jections. Lengths and ratios of lengths are not such properties and by right enter only subordinated into pure projective geometry.

Historically considered, projective geometry arose by considering changes in lengths and was thus far from pure. A theorem attributed to Pappus (q.v.) states that the double ratio of the lengths is unchanged by projection — thus,

AB # AD A’B’ A’D’ A”B” A”D” BC • DC B’C : D’C’ B”C” EMC”

It was upon such basis as this that the sub¬ ject developed until von Staudt (q.v.) in his famous (Geometrie der Lage,) published in 1847, showed how the development might proceed in a manner more truly in the spirit of pure projective geometry. From the publi¬ cation of this book dates the modern point of view in treating projective geometry as a pure self-sustaining branch of mathematics. It is this point of view that is here adopted.

Fundamental Notions. — Properly to ap¬ preciate pure projective geometry it is necessary definitely to take a point of view radically dis¬ tinct from that taken in ordinary elementary

geometry. This may perhaps be done best by making a first appeal, as von Staudt did, to the physical sensation of sight. What characterizes ordinary geometry (which is usually called metrical, as opposed to projective geometry) is its close relation to the concep¬ tions of rigid motion, of distance and of measurement — in short, to things connected with the sensation of touch. Whereas pro¬ jective geometry is intimately concerned with the look (Schein) or projection of objects and not with their actual dimensions. Thus in the figure the set of points A, B, C, D would have the same (look) to an observer at O as would A ', B', C, D' ; and these in turn would appear the same from the point O' as would A", B", C", D". There is, however, one respect in which the idea of (looking) must be generalized. If the view-point is situated, between the points A', B', C' and A", B", C", as in Fig. 2,

the sets of points are still said to <(look)) the same, or to be projections of one another with respect to the point O'. Precisely herein lies the distinction between projective geometry and what has been called descriptive geometry. (B. Russell, Principles of Mathematics,5 p. 393). Namely, the former considers the line of vision or projection to be the whole line through the point of observation, whereas the latter takes it as merely a half-line and thus corre¬ sponds somewhat more closely to the real visual space.

The point, the straight line and the plane are assumed as the fundamental geometric elements. They are denoted respectively by italic capitals A, B, C,...; by lower case italics, a, b, c,...; and by Greek letters, a, /3, y, . . . It may be noted that these elements are themselves projective, that is, appear re¬ spectively as points, line and plane from any view-point not situated upon them. A circle has not this property : for when viewed from any point, not upon the line through its center and perpendicular to its plane, it appears non¬ circular. Hence the circle could not serve as a fundamental locus in pure projective geom- etry.

Fundamental Propositions. Parallelism.

— There are a considerable number of imme¬ diately obvious relations connecting the funda¬ mental elements, points, lines, planes. From among these it is necessary to select a certain number to serve as fundamental propositions or premises for future deductions. (Note. The propositions so selected may be called axioms or postulates. This, however, is not the place to discuss such matters, which belong to the foundations of mathematics. See Logic, Sym¬ bolic and Postulates.)

F. P. 1. Two points determine a line — the line joining them and upon

which they lie.

F. P. 2. Two planes determine a link — their

line of intersection and through which they pass.

F. P. 3. Three points not in the same line determine a plane — the plane passed through them and in which they lie.

F. P. 4. Three planes not passing through the same line determine a point — their point of intersection.

F. P. 5. A point and a line not passing through the point determine a plane.

F. P. 6. A plane and a line not lying in the plane determine a point — their point of inter¬ section.

From these propositions follow a number of theorems :

Th. 1. If two points lie in a plane, the line joining them lies wholly in the plane. Proved from F. P. 3 and F. P. 5.

Th. 2. If two planes pass through a point, their line of intersection passes through the point. Proved from F. P. 4 and F. P. 6.

Th. 3. If two lines have a point in common, they determine a plane. Proved by F. P. 3 and Th. 1.

Th. 4. If two lines lie in the same plane, they intersect in a point. Proved by F. P. 4 and Th. 2.

Th. 5. If two triangles are so situated that the lines joining corresponding vertices meet in a point, the points of intersection of corre¬ sponding sides lie on a line.

*The proof in case the triangles do not lie in the same plane is as follows: Let ABC and A'B'C be the triangles. As AA' and *BB ' meet in a point, the lines AB and A'B' determine a plane (Th. 3, Th. 1) in which they intersect (Th. 4). But as AB lies in the plane ABC, and A'B' in the plane A'B'C', they can only intesect on the line common to these two planes. Hence the intersection of AB and A'B' is on this line. Similarly BC and B'C, and CA and C'A ', intersect on this line. The proof in case the triangles lie in the same plane is obtained by comparing each of them with a triangle out of their plane.*

Th. 6. Converse of Th. 5. Proof similar.

Th. 7. If two triedral angles are so situated that the lines of intersection of corresponding faces lie in a plane, the planes determined by corresponding edges pass through a line. The proof follows that of Th. 5.

Th. 8. Converse of Th. 7. Proof similar.

From the point of view of elementary geometry theorem 4 is incorrect and should read (if two lines lie in the same plane they either intersect or are parallel.5 What has become of parallelism? Reflection will dis¬ close that for projective geometry there is no such thing as parallelism. For, • consider two parallel lines upon a horizontal plane and project them upon a vertical plane (as is done in photographing a straight, flat railroad track). In the projection the lines meet upon the horizon (Fig. 3). Thus the property known as parallelism in elementary geometry is not unchanged by projection and cannot enter into projective geometry. From the visual point of view all lines seem to intersect. F.P.2, F.P.4 and F.P.6 are subject to the same comment. From this it will be seen that the statements for projective geometry are much simpler than those for elementary geometry, inasmuch as no special cases or exceptions need

be introduced to cover the possibility of paral- e ism. At first this might seem unnatural or even wrong, but it is in the true spirit of the subject and after a little usage appears as one

of the principal beauties. The points which must be assigned to ordinary space to make parallels meet are called the points at infinity and in a projective w-space constitute an n — 1- space — the n — 1-space at infinity. This is pro- jectively indistinguishable from any other n — 1- space. The term (

4. Harmonic Elements. Duality.— A set

of points situated upon a line is called a range. A set of planes passing through a line is called a pencil of planes. A set of lines lying in a plane and passing through a point is called a pencil of lines.

It may be said that the fundamental con¬ struction of projective geometry is the con¬ struction of a harmonic range. Given a pair of points A, B on a line (Fig. 4) and a third point C. To find the fourth harmonic point D draw through C any line. In the same plane draw AE and BE cutting the line through C in F and G. Join F to B and G to A by lines interesecting in H. Draw the line con¬ necting E and H and let it cut the line AB in D. Then D

is said to be the fourth har¬ monic point in the range AB C. It may be proved by the theorems given above that: 1° no matter how the construction be carried

out, it always leads to the same point D ; 2° if the three given points be AB D, the fourth harmonic is C and hence the pair of points C, D may be said to divide the pair A, B harmonically; 3° the pair A, B also divide C, D harmonically and hence the pairs AB CD may simply be called harmonic pairs or a harmonic range.

A pencil of lines such as E-AB'CD which cuts a line in a harmonic range is by definition

*a harmonic pencil. It may be shown that if any me cuts a harmonic pencil, the range of points t ™lc' . Similarly if a pencil of planes i * • ne 1TC 111 a harmonic range, it cuts every*

[™Lin .a harmomc range and is said to be a f°niS Pfnci1 The harmonic property is thus evidently a true projective property, being unchanged by projection. P g

A chaiacteristic of higher geometry is the

mpSI1ˆ fUSC ?orresPondences — that is, of methods for obtaining from a given group of

diff°prp?tS an0tiler gr?up merely by substituting different words in the statement of the given

t eorem. The simplest of these correspond- duality. There are several dualities established in projective geometry. Of these

dualhjfn 'tZˆne in ˆ "d

words "plane «line,» "point,* and making such corresponding changes from "pass through* to lie on as may be necessary. In the undamental propositions the duality appears. Thus F. P. 1 and F. P. 2 are dual statements. The same is true of F. P. 3 and F. P. 4 and of*

j a and F P. 6. As this dual relation extends . through all the fundamental propo¬ sitions, it must extend through all propositions immediately derived from them. For, the proof of a dual proposition may be given by merely making in the proof of the given propo- sition the same changes as in its statement. As this may be done at every step, the two sets of propositions may be developed side by side, and the duality can never break down

• • e introduction of some additional definition or fundamental proposition which 1S ,no^, accomPanied by its dual. Thus Th 1 and Th. 2 are dual, and the proof of Th. 2 is the exact dual counterpart of the proof of Th. 1.

The duality in the plane may be obtained by substituting for "point® and "line® the words "line® and "point.® A "range of points® becomes a "pencil of lines® and vice versa. Thus Th. 1 and Th. 4, and in case the construction be confined to a plane Th. 5 and Th. 6, are duals. According to the definitions above given it did not appear that the har¬ monic pencil was the dual of the harmonic range. > It is, however, possible to give for a harmonic pencil a construction which is the dual of that given for the range, and it may be proved that this construction is equivalent to the earlier definition. Therefore all theo¬ rems concerning harmonic properties have dual counterparts.

If four lines no three of which pass through the same point be drawn in the plane, they will intersect in six points. This figure is called the complete quadrilateral (the heavy lines of Fig. 4, except ED. The three dotted lines are the three diagonals). In a dual manner the six lines which may be drawn through four points (no three of which lie on a line) in the plane constitute the complete quadrangle. The properties of these two figures are much studied in plane projective geometry.

5. Order, Continuity, Projectivity, Cor¬ relation. — If three lines a, b, c, lying in a plane, pass through a point, they determine a cer¬ tain order in which the pencil may be conceived as described by a movable line — the order abc

to which cba is opposed. Two lines alone cannot determine the order of description : for it is possible to pass from one to the other in either of two ways. Similarly three points upon a line determine an order upon the line, and three planes through a line fix an order about that line; but two cannot. (See § 7). Thus a new element, order, is added to the fundamental elements, point, line, plane. It is intuitively obvious that :

F. P. 7. Order is unchanged by projection. Thus if a point describe a range in the order ABC, its projection will describe the projected range A'B'C' in the same order. (See Figs. 1 and 2).

One more fundamental proposition, the so- called postulate of continuity, the importance of which is quite overlooked in all but the best and most recent works, may be stated as follows :

F. P.8. If a line be ordered and if Y follow X in that order; if, moreover, the points of the segment XY be divided into two classes so that 1° every point of the segments belongs in one of the classes and 2° every point of one class precedes all points of the other class, then there must be a point Z in the XY such that every point which precedes Z lies in the first class and every point which follows Z lies in the second.

If one range may be obtained from another by successive projection, the two ranges are said to be projective. The relation between the ranges is called a projectivity. (Similar definitions cover the relations between ranges and pencils or between two pencils. For simplicity the treatment will be confined to ranges).

Fundamental Theorem. — Three corre¬ sponding points A, B, C and A', B', C' determine uniquely the projectivity between two ranges. That three elements of one range may be pro¬ jected into any three elements of another range may be seen from Fig. 2. That the pro¬ jective relation is thereby uniquely deter¬ mined follows from F. P. 8. In like manner the correspondence of four points, no three of which lie on a line, determines the projec¬ tivity between two planes (which may coin¬ cide) ; and five points determine the projectivity between two three-spaces (these must coincide) in a three-dimensional projective geometry.

If the points of the plane are placed in correspondence with the lines of a second plane (which may be coincident with the first) in such a manner that to each point corre¬ sponds one line and conversely, and to the intersection of two lines corresponds the line joining their corresponding points, the relation is called a correlation. A correlation is com¬

pletely determined by the correspondence of four given elements. (In the figure corre¬ sponding elements have the same letters).

6. Conics. — If in one and the same plane a correlation be so established that when the point P corresponds to the line p, then con¬ versely the line p corresponds to the point P, the correlation is called a polarity. Corre¬ sponding points and lines are poles and polars in the polarity. In general the poles do not lie on the polars : But certain of the poles do usually lie on their polars. The locus of the poles which lie on their polars is a curve to which the polars themselves are tangent and is called a conic. This definition is self-dual. A large number of theorems and their duals follow from the definition. For example, with their duals :

1. Pole, polar and conic cut out a harmonic range on any line through the pole.

2. The locus of the intersections of corre¬ sponding lines of two projective pencils is a conic.

3. If a hexagon be inscribed in a conic, the points in which the three pairs of opposite sideˆintersect lie on a line.

This last is the famous Pascal's theorem, which with its dual, Brianchon's theorem, is very useful in the theory of conics. The second theorem is taken to define conic sections by many less modern writers. It is a very con¬ venient graphical method. From it the various other properties may be deduced, though with much less directness and power than in the way here sketched. The first theorem is taken to define pole and polar by most of the writers who base conic sections on the second theorem. Another method of treating poles and polars is to consider projectivities not merely on a line but on a conic. The points of a conic are associated so that to each point A, B, C, . . . , corresponds a point A', B\ C\ . . . Three pairs of corresponding points determine the pro¬ jectivity. If it so happens that A', B\ C', ... , correspond conversely to A, B, C, the pro¬ jectivity is called involutory (just as the polarity was the involutory correlation, § 4) or merely an involution. The study of involutions on a conic leads to an elegant theory of poles and polars.

Quadric surfaces may be defined analogously to conic sections. The treatment of cubic curves on such surfaces has been considerably developed. The treatment of plane curves of order and class higher than conics may be developed to some extent synthetically', but is generally carried on analytically. (See Curves, Higher Pt.ane). The linear and tetrahedral line complexes and certain line congruences have received synthetic treatment. The ana¬ lytical discussions are, however, better known. See Geometry, Line-.

7. Relations to Metrical Geometry. — If

the word meet be changed to meet or are parallel, every theorem of projective geometry becomes a theorem of metrical geometry. But in order conversely to interpret a metrical theorem as a theorem of projective geometry, it is first necessary to state the theorem in terms unchanged by projection — that is, in terms of double ratios (§ 1). This is usually done in one of two ways.

First, if the point D retreats indefinitely,

AD/DC approaches — 1 and the double ratio

AB . AD BC ‘ DC

approaches the simple ratio AB/CB. Thus any ratio in metric geometry may be turned into a double ratio and rendered projective by adding the point at infinity upon the line to the three finite points A, B, C. In the particular case of a harmonic range (§ 4) ˆ D be at infinity, C bisects AB. This introduction of a point at infinity also accounts for the fact that a pair of points AB suffice in metric geometry to determine an order on the line (§ 5). The order is that of AB oo.

The relation between metric and projective geometry may be used to obtain metrical theorems from projective theorems by speciali¬ zation of the figure, or to obtain projective theorems from metrical by generalizing the figure by projection. Thus thˆ theorems <(the diagonals of a parallelogram bisect each other® and (

Second, the double ratio of four lines a, b, c, d may be written as

sin ˆ ab sin ˆ ad

A = – - – - .

sin ˆ be sin ˆ dc

If only a simple angle such as bd is given, the two other lines of the pencil may be as¬ sumed to be the <(minimal lines® or <(lines to the two circular points® of the plane of the first two lines determined by

x ±∨ — 1 y = 0.

These circular points are the intersections of these lines with the line at infinity. The double ratio 7 becomes

?i=e2t — cos 2 (f> f i sin 2 f

Thus an angle has been expressed in terms of a double ratio 7 by the introduction of the two circular points. If, in particular,

The properties of circular points most neces¬ sary to establish the relation of metrical to projective geometry are: They lie on the line at infinity. All circles pass through them, the lines (imaginary) joining the centre of a circle to the circular points are tangent to the circle. Thus the theorem <(the locus of the vertex of a right angle (or any angle) whose sides pass through two fixed points is a circle through the fixed points® becomes <(the locus of the vertex of a harmonic pencil (or any pencil of constant

double ratio) whose sides pass through four fixed points (two of these correspond to the circular points) is a conic section passing through the four fixed points.®

8. Relations to Analytic and Non- Euclidean Geometry.— The fact that in met¬ rical geometry the point 1 upon a line is half¬ way between the points 0 and 2 furnishes a clue for constructing a projective scale purely by harmonic constructions. Let three points A, By C be arbitrarily assigned the numbers 0. 1, oo. By finding the fourth harmonic to 0 with respect to 1 and oo , a point is constructed

to which the number 2 is assigned. In like manner all the positive integers may be located, ihe negative integer — N is assigned to the harmonically situated with respect to ‘ v and the pair, 0, oo. By projecting 0, N,

? into 0, 1, co the points \/N, 2/N . can

be located. Thus all the rational numbers are assigned to points on a line. By use of F.P P. 8 it may be shown that to each point of the line corresponds a number rational or irrational or

00 >. ar*d to each number corresponds just one point.

To obtain a system of co-ordinates for the plane, assume two lines in the plane. Mark their intersection as 0 and upon each of them mark arbitrarily the points 1, oo . Then to

each point of each line corresponds one num¬ ber. To find the co-ordinates of any point P of the plane draw lines connecting P to the two infinite points. 1 he points in which these intersect the given two lines furnish the co¬ ordinates of P. A more convenient system may be obtained by rendering the co-ordinates homogeneous. (See Geometry, Modern Ana¬ lytical). Upon this purely projective basis all analytical geometry may be built up. The system is evidently that which is obtained by projecting the ordinary Cartesian system of co-ordinate axes into the system here assumed. In practically all treatises upon analytical geometry the co-ordinates are introduced as metrical quantities and are only later proved to be truly projective. Analytical projective geometry is closely related to Invariants and Covariants (q.v.), Geometry of Hyperspaces (q.v.), Modern Analytical Geometry (q.v.), Higher Plane Curves (q.v.) and Determinants (q.v.). .

Projective geometry includes in itself not only metrical geometry, but the ordinary non- Euclidean geometries as well. This is seen from examining the fundamental propositions upon which those geometries are based, or, better, by following the analytical method of A. Cayley (q.v.), and defining

distance in the various geometries as the logarithm of a double ratio. See Geometry, Non-Euclidean.

9. New Problems and Bibliography. — It may well be said that pure projective geom¬ etry, which rose with von Staudt in 1847 and was carried on by numerous investigators during the next 50 years, has now reached a stage that is near finality, and that new problems are likely to be on neighboring fields. Thus at present there is a great deal of work on the foundations of mathematics. For pure projective geometry this means the determina¬ tion of one or more sets of postulates and fundamental concepts which shall be 1° pro¬ jective, 2° complete, 3° compatible, 4° inde¬ pendent and irreducible, and 5° as nearly self- dual as possible. This problem has been

settled in a wholly satisfactory manner by the researches of P.ieri, Schur, Moore, and espe¬ cially Young and Veblen. The fundamental propositions assumed in earlier sections are far from satisfying rigorously all these conditions. They are, however, sufficiently good for most purposes.

The theory of involutory projectivities has been satisfactorily developed as far as its application to transformations which leave a quadratic form fixed is concerned, but for the general case there remains much to be done. And so with many other special problems which might be enumerated.

Of late Wilczynski has been developing a projective theory of curves and surfaces which, though not wholly in touch with pure projective geometry, promises valuable additions to the subject.

A bibliography of memoirs and books may be found in the historical account of the sub¬ ject by Ernst Kotter, (Die Entwickelung der synthetischen Geometric- ; consult also Ency¬ clopedic der mathematischen Wissenschaften* (Vol. Ill, Pt. 1), and the improved French edi¬ tion, (Encyclopedic des Sciences Mathematiques* (Tome III, Vol. II, 1-143). The following textbooks may be cited: (Beitrage zur Geom¬ etric der Lage) (1856-60) ; Boger, (Geometrie der Lage* (1900) ; Cremona, (Projective Geom¬ etry* (1893; trans. by Leudersdorf) ; Duporcq, 'Premiers principes de geometrie moderne) (1899) ; Enriques, (Lezioni di geometria pro- jettiva* (1898; trans. into German as (Vor- lesungen fiber projektive Geometries (1903); Poncelet, 'Traite des Projections) (1866) ; Reye, 'Geometrie der Lage* (1892-99; partly trans. as 'Geometry of Position* by Holgate in 1898) ; Sannia, 'Geometria Projettiva* (1895); Steiner,*

(Vorlesungen fiber syn- thetische Geometrie (1898); Veblen, O., and Young, J. W., (Projective Geometry* (2 vols.,*

1910-17).

Edwin Bidwell Wilson, Professor of Mathematical Physics, Massachu¬ setts Institute of Technology.

GEOMORPHOLOGY (Greek ge, earth,

morphe, form, and logos, speech). The science of the development of the configuration of the surface of the earth, i.e., the sculpturing, of mountains, hills, valleys and shores, the accu¬ mulation of wind blown sand, lavas and other detrital materials, the development of plains, terraces, deltas, talus and spring deposits, coral reefs and fault scarps, the relations between land forms and rock structure and the history of uplift and degradation and the topographic features which result. Geomorphology is largely a branch of geology (q.v.) because the proc¬ esses are all geologic but the results are geo¬ graphic and especially physiographic, therefore geomorphology is by many regarded as a branch of physiography (q.v.). The word geo¬ morphogeny is used as an equivalent by some writers. Most treatises of geology and physi¬ ography devote a large portion of their contents to a discussion of the origin and development of earth forms. J. W. Powell, G. K. Gilbert, W. M. Davis and Geikie have given great im¬ petus to the study of geomorphology. (See Geology; Physiography). Consult Powell, J. W., Explorations of the Colorado River of the West ; Gilbert, G. K., 'Geology of Henry*

Mountain ; Powell, J. W., and others, Phys¬ iography of the United States* ; Davis, W. M., Physical Geography* ; Geikie, J., (Earth Sculp¬ ture* ; Davis, W. M., 'Erklarende der Land- formen* ; de la Noe, G., and de Margerie, Emm., (Les form du Terrain* ; Penck, Mor¬ phologic der Erdoberflache* ; de Martonne, E., 'Traite de geographic physique* ; Lapparent, A., 'Legons de geographic physique* ; Salis¬ bury, R. D., Physiography* ; Tarr, R. S., and Martin, L., (College Physiography* ; Salisbury, R. D., and Atwood, W. W., interpretation of Topographic Map* (U. S. Geol. Survey, Prof. Paper 60) ; Suess, E., Pas Antlitz der Erde* ; Fraas, E., (Scenerie der Alpen.**

Nelson H. Darton, United States Geological Survey.

GEOPHAGY, je-of'a-ji, GEOPHAGISM or DIRT-EATING, the practice of eating some kind of earthy matter, as clay or chalk, common among uncivilized peoples, such as the South American Ottamacs, the Indians of the Hudson Bay country, the West Indian blacks, the negroes in some of

*the United States, and among the less civilized whites in the mountain districts of Tennessee and Kentucky. In some cases**it is probably used to allay hunger, but it is also practised where the supply of food is sufficient. Among chlorotic young women a similarly depraved appetite is not uncommon. It is likely to terminate fatally in dropsy or dysentery. See Hookworm Disease.*

GEOPHILOUS PLANT. See Geophyte.

GEOPHYTE, a perennial plant of which the principal organs lie under the ground. For them winter is a rest period but in summer they put forth aerial organs. Bulbous plants such as onions and lilies are of this class. In some species the entire plant is hidden during the period of rest, in others some organs are visible. Of the latter lawn grasses and clovers offer good examples.

GEOPONICI, Greek term used to desig¬ nate both Roman and Greek writers on agricul¬ ture and kindred topics. The chief names in this field are: of the Greeks, Democritus, Aris¬ totle, Theophrastus and Xenophon; of the Romans, Cicero, Horace, Cato the Censor, Varro Columella and Palladius. Consult Schneider, J. J., (Scriptores Rei Rusticae (4 vols., Leipzig 1797; 3d ed., 1821) and Meger- stedt, 'Bilder aus der romischen Landwirt- schaft* (5 vols., Sonderhausen 1862).*

GEOPONIKA, a Greek work on agricul¬ ture, which reached its present form about the 10th century. It was compiled from an earlier work of the 6th century and by some is sup¬ posed to be based on the Latin translation of a work of Mazo the Carthaginian by order of the Roman Senate. In it are cited most of the authorities of the ancients. There are extant translations in Arabic, Syrian and Armenian. For a good edition consult that by Beckh (Leipzig 1895). Consult also Krumbacher, ˆByzˆantinische Litteraturgeschichte (Munich*

GEORGE, Saint, the especial patron of chivalry and tutelary saint of England: d. Nico- media, 23 April 303. Though venerated both in the Eastern and Western Churches, his history is extremely obscure, the extant accounts con¬ taining very much less history than legend. The

story in the (Acta Sanctorum) (III, and in 1350 this was made the Order of the Garter, of which accordingly Saint George is the patron.

GEORGE, Duke of Clarence and brother of Edward IV, king of England; b.

1449; d. 1478. He espoused the cause of Henry VI and his queen, Margaret of Anjou, against his brother and sovereign. He married in 1469 Isabella, daughter of the Earl of Warwick, and joined him in his rebellion, took the king pris¬ oner, but was forced to release him. He after¬ ward deserted to Edward and fought on his side. Some years afterward he sought the hand of Mary, Duchess of Burgundy, but Ed¬ ward vetoed the proposal. Later he was ac¬ cused of compassing the death of the king, was attainted and condemned, and is traditionally reported to have drowned himself in a butt of wine in the Tower of London.

GEORGE, Prince of Denmark: b. 1653; d. 1708. He was son of King Frederick III, and husband of Queen Anne of England. He sided with William of Orange in the Revolution of 1688, and received the title of Duke of Cum¬ berland. Later he became lord high admiral, a post for which he was quite unfitted.

GEORGE I (George Lewis), king of Great Britain and Elector of Hanover: b. Hanover, Germany, 28 March 1660; d. Osnabriick, 12 June 1727. He was the son of the Elector Ernest Augustus, by Sophia, daughter of Frederick, elector palatine, and granddaughter to James I. In 1682 he married his cousin, Sophia Dorothea, daughter of the Duke of Celle. The union was not a happy one. George I was both a faithless and a jealous husband, and when his wife, who was guilty of some imprudences, brought on herself the suspicion of carrying on an illicit intrigue with Count Konigsmark, he caused her to be imprisoned and kept her in confinement for the rest of her life. The off¬ spring of the marriage were George, Prince of Wales, afterward George II, and Sophia, the mother of Frederick the Great. In 1698 he suc¬ ceeded to the electorate, and in this succession was joined in the alliance against France. The command of the imperial army was conferred upon him in 1707, but owing to jealousies among his confederates he resigned the com¬ mand at the end of three campaigns. At the Peace of Rastadt Louis XIV recognized the electoral dignity in the house of Lunenburg, as he had already by the Treaty of Utrecht recog¬ nized the succession of the same house to the throne of Great Britain, which event took place on the death of Anne in 1714, when the elector was in the 55th year of his age. His reign in England was disturbed first by a rising in 1715 of the Scottish Jacobites in favor of the son of James II, and afterward by wars with Spain, undertaken first in conjunction with Holland and France (the Triple Alliance of 1717), after¬

ward in addition with Austria (the Quadruple Alliance of 1718), with the view of checking the schemes of the Spanish minister Alberont. The bursting of the South Sea Bubble in 1720 caused an acute financial crisis. George I was plain and simple in his tastes and appearance ; he had a high personal courage ; he possessed much natural prudence and good sense and his*

management of his German dominions, to which he showed more attachment than to his English dominions, was able. His preference for Hanover and the greed of his German mis= tresses and favorites made him unpopular in England. His inability to speak English made him unable to preside over his council of min¬ isters and led to the cabinet system of govern¬ ment in Great Britain. Consult Coxe, (Life of Walpole' (1808) ; Wright, (England Under the House of Hanover' (1848) ; Thackeray, (The Four . Georges' (1860); Melville, (The First George in Hanover and England' (1908).

GEORGE II (George Augustus), King of Great Britain, son of George I : b. Hanover, 10 Nov. 1683; d. London, 25 Oct. 1760. He mar¬ ried in 1705 Caroline of Bradenburg-Anspach. In 1708, then electoral prince of Hanover, he distinguished himself under the command of Marlborough and fought at Oudenarde and Dettingen. He came to England with his father at the accession of the latter and was created Prince of Wales. He was made regent during the. king's visit to the Continent in 1716, but a political difference ensuing, he lived some time estranged from the court. This breach was finally adjusted and in 1727 he succeeded to the throne. He inherited in full force the predilection of George I for Hanover; and the same system of politics and the same ministers continued to govern the nation after his accession as before it. In the earlier part of his reign, during the greater part of the ministry of Walpole, the neutrality of England was preserved during the wars on the Continent. In 1739 the depredations committed by the Spaniards in America on the commerce of Eng¬ land led to war, which brought about the resig¬ nation of Walpole in 1742. England next took part in the war of the Austrian Succession, in which George II himself shared, being present at the battle of Dettingen in 1743. His reign is also memorable on account of the second Jacobite rising in Scotland in 1745-46, headed by Prince Charles Edward. In 1755 the dis¬ putes between Great Britain and France in re¬ lation to their respective boundaries in Canada produced hostilities in that country, and the Seven Years' War broke out the following year. The events of this war, in which the principal powers of Europe became engaged, raised Great Britain to a pinnacle of power under the able auspices of Pitt (first Earl of Chatham), whose accession to power was extremely distasteful to the king and was strenuously resisted by him, but who yielded him his confidence wholly when it was once gained. George II was a prince of very moderate abilities, parsimonious and wholly regardless of science or literature ; hasty and obstinate, but honest and open in his dis¬ position. His queen, the cultivated and well- informed Caroline, acquired a great ascendency over him, which did not, however, prevent some of the irregular attachments so common with royalty. George II was the last British

sovereign to appear in action. He founded the University of Gottingen in 1734 and was the patron of Handel. Consult Hervey, (Memoirs of the Reign of George II> (1854); Walpole, (Memoirs of the Last Ten Years of the Reign of George IP (1822-46); Lucas, (George II and His Ministersˆ (1910) ; Schmucker, his¬ tory of the Four Georges> (1860) ; Thackeray, (The Four Georges) (1860) ; Jesse, 'Memoirs of the Court of England from the Revolution of 1688 to the Death of George IP (1843); Wilkins, (Caroline the Illustrious } (1904).

GEORGE III (George William Fred¬ erick), King of Great Britain: b. London, 4 June 1738; d. Windsor, 29 Jan. 1820. He was the eldest son of Frederick, Prince of Wales, by the Princess Augusta of Saxe-Gotha. On the death of his father in 1751, his education was entrusted to the Earl of Harcourt and the bishop of Norwich; but the formation of his opinions and character seems to have been materially influenced by the maternal ascend¬ ency of the princess dowager, who was prin¬ cipally guided by the counsels of the Earl of Bute. George III, the first of his house to be born and reared in England, who had been previously created Prince of Wales, ascended the throne on the demise of his grandfather, George II, being then in his 23d year. In the following year he married the Princess Char¬ lotte Sophia of Mecklenburg-Strelitz, a union which in its result operated materially on the domestic character of this reign. In 1763 the Seven Years' War was concluded by the Peace of Paris under the ministry of Lord Bute. In 1764 George Grenville, who had become premier by the retirement of the Earl of Bute, began those measures in relation to the American colonies, the consequences of which proved so momentous ; and the Stamp Act was passed the following year. About the same time, in con¬ sequence of some appearances of the mental derangement of the king, a bill was passed to enable his majesty to appoint the queen or any of the royal family residing in England guard¬ ian to his successor and regent of the king¬ dom. In 1766 the Rockingham administration repealed the American Stamp Act; at the same time passing a declaratory act asserting the right of taxing the colonies. The Rockingham cabinet was dissolved 30 July 1766, and suc¬ ceeded by one formed by Pitt, now Earl of Chatham. In 1768 Lord Chatham, disgusted with the conduct of his colleagues, resigned the privy-seal and was succeeded by Lord Bristol. The same year was distinguished by the return of John Wilkes for Middlesex and the popular tumults attendant upon his imprisonment and outlawry. In 1773 the discontent in America burst into an open flame, and a royal message, in the commencement of the session of 1774, called on Parliament to maintain the English supremacy. Notwithstanding the subsequent loss of an empire, George III, by the steadiness with which he put down the coalition adminis¬ tration, acquired a degree of popularity which never afterward

entirely deserted him. The smooth course of the early years of the admin¬ istration of Pitt materially added to this dis¬ position, which exhibited itself very strongly when the constitutional malady of the king again displayed itself in 1789, and still more upon his subsequent recovery. In reference to

the French Revolution, and the important con¬ tests which arose out of it, it is sufficient to remark that George III zealously coincided in the policy adopted by his administration. A similar observation will apply to the domestic and Irish and Indian policy of the Pitt cabinet; as also to the transactions connected with the Irish rebellion. George III was immovable in his opposition to the demands of the Irish Catholics, and, seconded by the influence of the Church and the popular feeling, was enabled to eject the Fox and Grenville administration, which succeeded on the death of Pitt. The pro¬ ceedings of the Perceval administration, until the final retirement of the king in 1810, need not be detailed here ; while the insanity of the monarch renders the interval which elapsed from his retirement to his death a blank in his biography. George III possessed personal cour¬ age and steadiness of character in a high de¬ gree, but his aspirations after real kingship and personal rule had disastrous consequences. Of a plain, sound, but not enlarged understanding, he acted upon his convictions with sincerity. His tastes and amusements were plain and prac¬ tical. Literature and the fine arts engrossed but a small share of his attention, and hunting, agriculture (he was half-derisively known by his subjects as "Farmer George®), mechanical contrivances and domestic intercourse, seem to have chiefly occupied his leisure. Religious, moral, temperate and somewhat parsimonious, the decorum of his private life was always exemplary. His deportment both as a father and a husband, according strictly with the na¬ tional notions of propriety, rendered him and the queen a constant theme of praise; and the throne was regarded as a pattern in respect to conjugal duties. Consult Walpole. (Memoirs of the Reign of George IIP (1894) ; Massey, his¬ tory of England During the Reign of George IIP (1855) ; (Grenville Papers) (ed. by Smith, 1852) ; Lecky, (History of England During the 18th Century) (1878-90) ; Trevelyan,

George III and Charles Fox> (1912).

GEORGE IV (George Augustus Fred¬ erick), King of England: b. London, 12 Aug. 1762; d. Windsor, 26 June 1830. He was the son of George III and the Princess Charlotte of Mecklenburg-Strelitz. His dissipated life, his extravagance, his marriage with a Roman Catholic, Mrs. Fitzherbert (21 Dec. 1785), in breach of the Royal Marriage Act of 1782, and whom he afterward repudiated and shame¬ lessly deserted, and his connection with the most prominent members of the Opposition, alienated from him the affection of his father and the esteem of the nation. In .1795 he con¬ sented, on condition of the payment of his debts, to marry the Princess

Caroline of Bruns¬ wick, but he soon began to treat her with neg¬ lect, and after the birth of their daughter, Char¬ lotte Augusta, abandoned her. (See Caroline Amelia Elizabeth). On 3 Feb. 1811, he was appointed regent, with limited powers, on ac¬ count of the king being attacked the previous yea.r by a repetition of the mental malady to which he was subject. The Whigs, his former friends, now hoped to come into office, but the prince showed a sudden change of sentiments, and maintained the Perceval ministry in power. The distress caused by the interruption of the demand for manufactures and the high price of

the means of subsistence after the general peace of 1815, occasioned great discontent among the people, and the violent measures adopted by the government increased the unpopularity of the regent, upon whose life an attempt was made in 1817, when he was going to open the session of Parliament. In 1820 he became king, on the death of George III. In February 1827 Canning became head of the government. The most important event after his attaining the throne was the passing of the Catholic Emanci¬ pation Act by the Wellington ministry, in 1829, and to which he was strongly opposed. Dur¬ ing his reign the Crown suffered not only a serious diminution in power but its personal hold on the people sank low. George IV left no descendants, his only daughter, the Princess Charlotte, wife of Leopold of Saxe-Coburg, having died childless in 1817. He was suc¬ ceeded by his brother William, Duke of Clar¬ ence (William IV). Consult McCarthey, his¬ tory of the Four Georges and of William IV> (1884-1901) ; Thackeray, (The Four Georges) (1860) ; Croly, (Life of George IV} (1830) ; Lady Bury, (Diary of the Times of George IV> (1838); Huish, (Memoirs> (1830); Fitzgerald, 'Life of George IV> (1881); Melville, (The First Gentleman in Europe (1906).*

GEORGE V, King of Great Britain and Ireland, Emperor of India: b. Marlborough House, London, 3 June 1865. George Frederick Ernest Albert is the second son of the late King Edward VII and the Dowager Queen Alexandra, daughter of the late King Chris¬ tian IX of Denmark. He married, as Duke of York, 6 July 1893, Her Serene Highness, Princess Victoria Mary of Teck, his second cousin once removed. Their Majesties have six children: (1) Prince Edward Albert, Prince of Wales, heir apparant to the crown, b. 23 June 1894; (2) Prince Albert Frederick, b. 14 Dec. 1895; (3) Princess Victoria Alex¬ andra, b. 25 April 1897 ; (4) Prince Henry William, b. 31 March 1900; (5) Prince George Edward, b.

20 Dec. 1902; (6) Prince John Charles, b. 12 July 1905. The king has three sisters living: Princess Louise (Princess Royal), widow of the late Duke of Fife; Princess Maud, wife of Haakon VII, King of Norway, and the Princess Victoria, who is un¬ married. The late Queen Victoria, grand¬ mother of the king, was a descendant of the House of Hanover, the 6th sovereign in suc¬ cession of that dynasty. By her marriage in 1840 to Prince Albert of Saxe-Coburg and Gotha, the House of Hanover came to an end and the dynasty became the House of Saxe-Coburg and Gotha, with the family surname of Wettin. The European War of 1914 produced a strong revulsion of sentiment throughout the British Empire against German names. Reflecting public sentiment, King George issued a proclamation on 17 July 1917, declaring that ((We, having taken into consider¬ ation the Name and Title of Our Royal House and Family, have determined that henceforth Our House and Family shall be styled and known as the House and Family of Windsor,® and to (

queens of England. Windsor Castle dates back to William the Conqueror (1066), the founder of the House of Normandy; for nearly 1,000 years it has been the home of British sovereigns.

As already mentioned, King George is the second son of King Edward. The eldest son, the Duke of Clarence, was 17 months older and, consequently heir presumptive to the throne, the father being then Prince of Wales and heir apparent. The two boys entered the navy together as cadets in 1877 and spent two years on the Britannia. They were then transferred to the Bacchante and made a voyage round the world. Prince .George was promoted midship¬ man in 1880, sub-lieutenant in 1884 and, after passing the necessary examinations, rose to lieutenant in 1885. After serving on various ships he received his first command, a torpedo- boat, for the naval manoeuvres in 1889. In 1890 he commissioned a first-class gunboat and served a year on the North American station. Returning in 1891, he was promoted commander and took part in manoeuvres in command of a cruiser. He was definitely committed to a sea¬ faring career when the death of his brother in 1892 placed him in direct line of succession. For a time he continued in the navy, became captain in 1893 and commanded H. M. S. Cres¬ cent as late as 1898. By that time he was an Elder Brother and Master of the Corporation of Trinity House, a bencher of Lincoln's Inn, LL.D. of Cambridge and a Fellow of the Royal Society. He later became an admiral of the fleet, a field-marshal in the army and colonel of numerous regiments. Shortly after the death of Queen Victoria he made a tour of the British Empire and opened the first Parliament of the Commonwealth of Australia. After the death of King Edward (6 May 1910) he was crowned in Westminster Abbey, 22 June 1911 and in the same year went to Delhi with the queen and was crowned emperor of India. No British monarch every came to the throne with a wider knowledge of the world in gen¬ eral

and of the empire . in particular than George V ; he was also the first king of Eng¬ land since 1743 to join his troops in the field. During the European War he crossed over to France on several occasions; from one trip he was brought home on a stretcher, having been injured by his horse falling on him. Both he and the queen have devotedly applied them¬ selves to the special calls of the hour, inspiring people and fighting men, and comforting the wounded. His connection with army and navy is close and personal, not limited by mere titular ties.

Henri F. Klein,

Editorial Staff of The Americana.

GEORGE I, King of Greece ; title, King of the Hellenes : b. Copenhagen, 24 Dec. 1845 ; d. Salonika, 18 March 1913. He was second son (Prince William) of the king of Denmark. In 1863 he was elected king by the Greek National Assembly. In 1867 he married the Princess Olga, a niece of the Russian tsar. He ruled during a critical period in Greek history, was pan-Hellenic in his policy and had just emerged from a successful war with Turkey, waged between 1911-13, when he was assassinated by a drunken Greek degenerate. He was succeeded by the crown prince, who ascended the throne as Constantine I.

GEORGE, Greek prince, 2d son of George I, King of the Hellenes: b. Corfu, Ionian Islands, 24 June 1869. While traveling in Japan, in 1891, with his cousin, the grandduke (after¬ ward Nicholas II) of Russia, he rescued the latter from death at the hands of a religious fanatic. He married in 1907 Princess Marie Bonaparte.

GEORGE V, King of Hanover: b. Berlin, 27 May 1819; d. 12 June 1878. He was son of Ernest Augustus. He ascended the throne of Hanover in 1851 ; in the war between Prussia and Austria in 1866 sided with the latter, and the same year was removed by Prussia, which annexed the kingdom on 20 September. As ex- king he assumed the titles of Duke of Cum¬ berland and Teviotdale (Great Britain) and Earl of Armagh (Ireland).

GEORGE II, Duke of Saxe-Meiningen : b. Meiningen, 2 April 1826; d. 25 June 1914. He was educated at Bonn, received the commission of major in the Prussian cuirassier-guards, succeeded upon the abdi¬ cation of Duke Bernhard, his father, in 1866, and served in the Franco-German War as Prussian general of infantry. Assisted by the manager Cronegk he did

much' to improve Ger¬ man drama. His son, Prince Ferdinand, was killed at the siege of Namur, 23 Aug. 1914.

GEORGE, surnamed <(The Bearded,® Duke of Saxony: b. 27 Aug. 1471; d. 17 April 1539. He was the son of Albert the Brave, the founder of the Albertine line of Saxony, and succeeded, in 1500, to the hereditary dominions of the Albertine house. Later on he became involved in the turmoils of the Reformation period. He was not at first wholly hostile to reform, but thought that it could be better ef¬ fected by means of papal edicts than by the revolt of Luther. Accordingly he became em¬ bittered by the uncompromising tone of Luther's later writings, and endeavored to suppress the Reformation in his dominions by violent meas¬ ures. These, however, were unsuccessful, and in 1539, on the accession of his brother Henry, who was a Protestant, the Reformation was in¬ troduced into the dominions of the Albertine house of Saxony.

GEORGE, King of Saxony: b. 1832; d. 15 Oct. 1904. In 1846 he entered the army and in 1849-50 studied at the University of Bonn. In 1866 he fought against the Prussians and commanded a corps in the Franco-Prussian War of 1870-71. In June 1902 he succeeded to the throne on the death of his brother Albert. He was succeeded by his son Frederick Au¬ gustus.

GEORGE, David Lloyd, British states¬ man: b. at 5 New York Place, Chorlton-on- Medlock, Manchester, 17 Jan. 1863. His father, William George (born 1820), who came of farming stock in South Wales, married Eliz¬ abeth Lloyd (died 1896), daughter of David Lloyd of Llanystmdwy, North Wales. He was a Unitarian schoolmaster and held schools in Lancashire; two of his children were born in Manchester. Under the strain of city life, his health began to fail ; he took a farm at Haver¬ fordwest, in Pembrokeshire, and there suc¬ cumbed to pneumonia 7 June 1864. In her distress the widow appealed to her bachelor brother, Richard Lloyd, the village shoemaker

of Llanystmdwy, and he invited her to bring her family to share his home. Richard Lloyd (d. 1917) was a man of strong personality, who, in addition to his ordinary avocation, min¬ istered to the local congregation of the Church of Christ or the Disciples — the community to which President Garfield was attached — and into fellowship with which the future prime minister was in due time baptized.

Lloyd George's upbringing was Spartan in its simplicity, and the environment of his youth, raised as he was on the edge of the poverty line, is significant of much in his outlook on the world. His uncle's (

Copyright, Underwood & Underwood, New York

RT. HON. DAVID LLOYD GEORGE

Prime Minister of Great Britain

/

it

GEORGE

477

sired to be buried beside his daughter; and he claimed the right to select the spot where the man should be buried. Lloyd George advised that the rector's action was illegal, the gates of the churchyard were forced, and the interment took place in accordance with the quarryman's last wishes. The case was fought out in the courts, and in the end the young solicitor's action was fully vindicated. In the same year he married Miss Maggie Owen, of Mynydd Edynfed Fawr, Criccieth. Four children — two sons and two daughters — have been born of the union.*

In 1888 Mr. Lloyd George was chosen Liberal candidate for the Carnaroon Burghs, and was returned at a bye-election in 1890 "bv a narrow majority on a platform the chief plank in which was Welsh Nationalism. He did not at first take much part in the debates ; but in 1894 led a revolt against the Rosebery ministry because Welsh Disestablishment was not given a place in the government's legislative program for the session. His rise into prominence dates from the South African War. He was travel¬ ing in Canada when in September 1899 the crisis approached in the relations between the British and the Transvaal governments. He hur¬ ried home, and on the outbreak of war at once took up a position of strong antagonism to the government's war policy, and became the real leader of what was termed the <(pro-Boerw sec¬ tion of the Liberal party. It required courage to face the hostility of popular audiences when the war spirit was running high ; and at a meeting in Birmingham — the stronghold of the Colonial Secretary, Mr. Chamberlain — his plat¬ form was stormed, and he was compelled to make his exit. He specially singled out Cham¬ berlain for attack, and was by no means scrupu¬ lous in the line he took, as when he charged that the Colonial Secretary had brought on the war in order to fill the pockets of his relations ; but his boldness and pertinacity began to tell, and from that time he was a force to be reck¬ oned with. He took a prominent part in the opposition to Balfour's Education Act of 1902 and strongly opposed Chamberlain in his tariff reform campaign. On the accession of the Lib¬ erals to power in 1905 he was invited to become

president of the Board of Trade (11 December). To this time he had been known chiefly as a platform speaker with a gift for repartee and as an adroit and effective debater. As president of the Board of Trade he applied him¬ self assiduously to the duties of his office, spoke little, and presently began to manifest qualities hitherto held in the background — skill in con¬ structive legislation, open-mindedness and tact in the handling of men. The Patents Bill of 1907 and the Port of London Bill, and his adroit handling of the railway strike and the cotton trade dispute, were proofs that a new Lloyd George had arisen. On the death of Sir Henry Campbell-Bannerman and the accession to power of Mr. Asquith, Mr. Lloyd George suc¬ ceeded the latter as Chancellor of the Ex¬ chequer (12 April 1908). In the following month he passed the Old Age Pensions Bill, which had been framed by his predecessor. His first budget, introduced 29 April 1909, gave rise to a prolonged and bitter controversy. It pro¬ vided, among other things, for heavy increases on the income tax, and — an entirely novel pro¬ vision — for a tax of 20 per cent on the un¬ earned increment in land values — the moneys

thus provided to be devoted to social legisla¬ tion. The budget was received with enthusiasm by advanced Liberals ; but it was strenuously opposed b powerful interests. The Chancellor conducted a vigorous campaign on behalf of his budget, in which he gave full rein to his wit and homely eloquence ; but he did nothing to reconcile his opponents beyond hitting them on the head, a notable example of his method be¬ ing furnished in the famous Limehouse oration. So strong was the opposition that the House of Lords was emboldened to take the danger¬ ous and unconstitutional course of rejecting the Finance Bill introduced to give effect to the resolutions of the budget. There is no reason to suppose that the Chancellor was anything else than completely satisfied with the action of the House of Lords ; for in the result it had signed its own death warrant. The Prime Minister promptly accepted the challenge. Parliament was dissolved, and — with the assistance of Na¬ tionalists and Laborists — the government was again returned to power and the disputed budget put through. Meantime the Parliament Bill had been introduced providing for the effective cur¬ tailment of the powers of the Upper Chamber — a measure which was passed only after the verdict of the country had again been taken and after a political deadlock which ended when the assent of the Crown was announced to the crea¬ tion of a sufficient number of peers to force the measure through the House of Lords in the event of that assembly proving obdurate. In 1911 the Chancellor passed the National Insur¬ ance Act — a far-reaching but somewhat hastily constructed and insufficiently deliberated meas¬ ure making provision for wage-earners. In 1913 a foolish investment of his in the shares of the American Marconi Company, with the parent company of which the British postotfice had contracts, laid*

him open to personal attack and was the subject of parliamentary inquiry. Dur¬ ing the Home Rule controversy in the years immediately preceding the Great War, Mr. Lloyd George's influence was, cast on the side of moderating counsels.

When Great Britain, following on the viola¬ tion of Belgian territory, declared war on Ger¬ many on 4 Aug. 1914, eyes were naturally turned to Lloyd George, and there were not a few who expected him, owing to what were regarded as his pacifist tendencies, to resign from the Cabi¬ net ; but his speech in the Queen's Hall on 19 September showed that he was wholeheartedly in favor of its prosecution. As Chancellor of the Exchequer he took prompt and wise meas¬ ures to maintain financial stability. Right from the outset of the war he appeared to realize, better than others in the Cabinet, the magnitude of the task that confronted the Allied nations, and early began to manifest some impatience with the slowness with which munitions were being supplied — especially high-explosive shells. Partly as a result of this — combined with the attacks of the Northcliffe press on Lord Kitch¬ ener's administration of the war office — he was, on the formation of the Coalition Ministry in May 1915, appointed Minister of Munitions. This task called for a combination of qualities; and under his direction a network of arsenals soon covered the land, new workmen were trained, and women enlisted into the service. Not the least difficult of his tasks was in inducing the trade unions to forego — for the

duration of the war at least — the exclusive and ((ca' canny® policy dear to the heart of the British workman, in order that by dilution of labor the claimant needs of the nation might be met ; and where his stirring appeals had no re¬ sult, he succeeded in shaming them into ac¬ quiescence. Realizing the need of men, he sup¬ ported from the outset, and forced to a head, the movement for compulsory national service. On the death of Lord Kitchener (June 1916) he became Secretary for War.

A crisis in his relations with the head of the government in December 1916 resulted in the accession to power of Mr. Lloyd George as Prime Minister. On land the war was not going well with the Allied nations ; Rumania was being overrun and Bucharest had fallen ; and there was a strong feeling in England — fanned into flame by the Northcliffe press — that Mr. Asquith was too inert, and that the method of conduct of the war on the civilian side would require to be drastically overhauled if satis¬ factory results were to be obtained. On 1 De¬ cember Mr. Lloyd George, under threat of resignation, urged on his chief the necessity of placing the direction of the

war in the absolute control of a war committee of four members, of which he (the Prime Minister) should not be one. After some negotiation and a modifi¬ cation of the original proposal, Mr. Asquith declined to accede, and the Chancellor resigned. As the Unionist members of the Cabinet sup¬ ported Lloyd George, and his administration was therefore doomed, the Prime Minister placed his resignation in the hands of the king; and after the Unionist leader, Mr. Bonar Law, had declined to form a government, Mr. Lloyd George was on 6 December entrusted with the task of forming an administration. He began by a revolution. Instead of following the tra¬ ditional British custom of forming his govern¬ ment exclusively from men holding seats in Parliament, he gave some of the most important portfolios to recognized experts who had had no political or parliamentary experience and had seats in Parliament provided for them. He found places in his inner war cabinet for Mr. Arthur Henderson, one of the labor leaders, and for two of his strongest opponents of other days — Lord Curzon and Lord Milner. Indeed it may with truth be said that since his acces¬ sion to power his foes have been chiefly those of his own household. His government has been called to face an extraordinary series of crises, in the surmounting of which he has shown great resourcefulness and audacity; and he had the misfortune to assume control just before the defection of Russia. He is regarded in Great Britain and the Dominions as the in¬ carnation of the democratic spirit; and despite certain readily understandable limitations, such as lack of broad culture and occasional inac¬ curacy of statement, his flaming oratory, quick¬ ness in seizing the salient points of any situa¬ tion, driving force, enthusiasm and dauntless courage, which mounts the higher when the tide of disappointment or misfortune rises, braced the British people to dare all and to surrender all that victory might be won, and proved an asset of incalculable value to all the Allied nations. And not the least of his services was in securing unified com¬ mand of the Entente armies, the fruits of

which began to be gathered in the series of military successes that crowned the autumn of 1918. He was one of the most prominent mem¬ bers of the Peace Conference at Paris in 1919.

Consult (1916) ; and (Lloyd George and the War,5 by an Independent Lib¬ eral (1917). His earlier war speeches have been published under the title (From Terror to Triumph> (1915).

D. S. Douglas,

Editorial Staff of The Americana.

GEORGE, Grace, American actress : b. New York 1880. In 1894 she made her first public appearance in (The New Boy.5 In 1899 she starred in (The

Princess Chiffon5 and in (Her Majesty5 (1900). Subsequent triumphs came in (Under Southern Skies> (1902) ; Prou-Frou5 (1903); Pretty Peggie) (1904) and (The Two Orphans5 (1904). As Cyprienne in (Divorcons5 she achieved a splendid success in both London and New York in 1907 and in the subsequent revival of this piece in 1913. Other plays in which she appeared were (Sylvia of4 the Letters5 (1909) ; (A Woman's Way5 (1909); (Just to Get Married5 (1912); (The Earth5 (1912) ; (Half an Hour5 (1912) ; (The Truth5 (1914). Consult Winter, William, (The Wallet of Time5 (2 vols., New York 1913).

GEORGE, Henry, American political econ¬ omist: b. Philadelphia, 2 Sept. 1839; d. New York, 29 Oct. 1897. In boyhood he made a voyage before the mast to India; made his way to California as a sailor in 1858 and from thence to Vancouver Island; returning to Cali¬ fornia, worked at his own trade of printer and other employments, until he became a reporter for the San Francisco Times, and in 1867 the editor of the same paper. While in Cali¬ fornia he became deeply impressed with the evils of land monopoly as evidenced by the for¬ tunes accruing to the holders up of the soil, and this set a stamp on his after career. In 1871 he published (Our Land and Land Policy5 in which he advocated the single tax theory, later developed more fully in (Progress and Poverty5 (1879). In this latter work, he not only explained his policy of land taxation (see Single Tax), but also attacked the doctrine of Malthus (q.v.), and the ((wages fund55 theory, advancing the theory that the wages of labor are paid out of the value that the laborer creates, not from a ((fund55 of capital. The book did not at once attract much attention, and was first widely noticed in England; later attaining great popularity in this country. George visited Eng¬ land in 1880-81, and on his return settled in New York, where he devoted his time to writ¬ ing, and agitation and organization for the single tax movement. In 1886 he was nomi¬ nated for mayor of New York by the United Labor party, but was defeated, though receiv¬ ing over 67,000 votes. In 1897 he was again nominated for mayor and took an active part in the campaign, but died before election day. His works, besides those already mentioned, in¬ clude (The Irish Land Question5 (1881) ;

(Social Problems5 (1883) ; (Property in Land5 ; (The Condition of Labor5; Protection or Free Trade5 (1886). His complete works were pub¬ lished in 10 volumes in New York in 1904. Con-

^^Ge^rge, (Life of Henry George) (New

GEORGE, Henry, American legislator and economist: b. Sacramento, Cal., 3 Nov. 1862; d. Washington, D. C., 14 Nov. 1916. He was a son of Henry George, the political econ¬ omist. He was educated in the public schools, and entered a printing house at 16. He entered on a journalistic career in 1881 ; accompanied his father as secretary on a lecture tour of Great Britain in 1883; and on his father's sud¬ den death during the New York mayoralty campaign of 1897, he was nominated to succeed his father as candidate of the Jeffersonian party, but was defeated at the polls. In 1906 he was correspondent in Japan for a syndicate of newspapers and magazines, and in 1909 for Collier's Weekly. He campaigned for Lloyd-George in the British general election of 1909. He was elected to the 62d Congress (1911—13) from the 17th New York District, and to the 63d Congress 1913-15 from the 21st New York District. He published (Life of Henry George) (1900);

GEORGE, James Zachariah, American politician: b. Monroe County, Ga., 20 Oct. 1826; d. Mississippi City, Miss., 14 Aug. 1897. He fought in the ranks in the Mexican War, after¬ ward studied law, became brigadier-general in the Confederate army during the Civil War, and in 1879—81 was chief justice of the Supreme Court of Mississippi. In 1880 he was elected to the United States Senate as a Democrat, and in 1886 and 1892 was re-elected. As a jurist he aided in drafting the present State constitution of Mississippi, and in the Senate he was well known as an orator.

GEORGE, Stefan (Stephan Anton George), German poet: b. near Bingen on the Rhine, 12 July 1868, is the accepted head of a group of young poets who attempted to estab¬ lish a school of new lyricism which should con¬ sciously, almost polemically, break with the old traditions, especially of artificial popular poetry, of naturalism and of the reigning sym¬ bolism. George could not create new meters, nor new rhymes, but his independent use of these and his originality are always in evidence. He is seldom reminiscent and never an imitator.

A selection of his earliest poems, treating in fairly original, carefully polished form the com¬ mon subjects of love and loss, fate, spring, home, faith, the transience of things, is now accessible in {Die Fibel5 ((The Primer,5 1901). Of greater power and intensity of feeling are the (Hymns, Pilgrimages, AlgabaP ((Hymnen Pilgerfahrten AlgabaP) with their ((pilgrimage® toward artistic perfection, reveal¬ ing hopes, fears, disappointments and dis¬ couragement. . The lyric story of the Syro-Roman Imperial degenerate Elgabolus, with its mixture of Oriental splendor and Roman tyranny, crazy jumble of mad religious super¬ stitions, of sloth, crimes, suicidal impulse, love of life, lusts, pleasures, and the Imperial realiza¬ tion of the vanity of life, has even been taken to symbolize the history of that lyric poetry with which the new school are

done. This ((nightmare,® which George seems to call it in

the last poem of the book, has probably more admirers than any of his other works.

This aesthetic pilgrimage is continued in the

Books of the Shepherds and of the Eulogies, of Sagas and Songs of the Hanging Gardens5 (Die Bucher der Hirten und Preisgedichte, Der

/?onir\ Uni^' und der hangenden Garten)

(1895) which pass in review primitive, Hellenic, mediaeval and modern man. (The Year of the SouP (

The (Seventh Ring5 ((Der siebente Ring>) contains many poems passed over in other volumes, and good odes. (Der Stern des Bundes) (1913) was the last important work before the European War of which it was curiously prophetic. Finally, George's transla¬ tions (Ubertragungen) of his spiritual kin Rossetti, Swinburne, Verhaeren, Verlaine, Mal- larme, D'Annunzio and others are excellent. Consult Goldschmidt, K. W., in Literarische Echo (1905-06); Meyer, R. M., in Deutsche Literatur des XIX Jahrh.; Zwymann, Kuno, (Das Georgesche Gedicht5 (2d ed., Berlin 1904)!

Carl E. Egger,

Assistant Professor of German, University of

Michigan.

GEORGE, W. L., English author : b. Paris, 20 March 1882. He was educated in Paris and served in the French army. He was educated successively as an analytical chemist, an engineer, a barrister, a soldier and a busi¬ ness man, and having proved a failure at all these, took to journalism about 1907. He has contributed to most London publications on topics ranging between the art of the trouba¬ dours and the finance of railways. He is es¬ pecially interested in feminism ' and its sub¬ sidiaries : marriage and divorce problems, fashions, votes for women, and sex questions generally. In politics he is an aggressive pacifist, an opponent of the idea of nationality and a republican (this latter subject to the view that the people should not be trusted but led). He has been special correspondent of various papers in France, Belgium and Spain. He wrote. (Engines of Social Progress) (1907) ; (France in the Twentieth Century5 '(1908); (Labor and Housing at Port Sunlight5 (1909). He became convinced in 1909 that social and philosophic ideas are best spread through fiction and wrote (A Bed of Roses) (1911) ; then fol¬ lowed (The

City of Light) (1912); (Until the Daybreak) (1913) ; (The Making of an English¬ man (1914); and (The Second Blooming5 (1916) ; the latter was one of the most success¬ ful novels of 1915, 10 editions of it being sold. He also wrote (Woman and To-Morrow) (1913); (Dramatic Actualities5 (1914); (Anatole France5 (1915) ; (01ea Nazimov5 (1915) and (The Stranger's Wedding5 (1916).

GEORGE, William Reuben, American so¬ ciologist : b. West Dryden, N. Y., 4 June 1866. He received his education in the public schools and in 1880 settled in New York. From 1890 to 1894 he made a practice of taking numbers

of boys and girls on a vacation during the summer months. From this he conceived the idea of a junior republican community in which the members would work for what they re¬ ceived, but would all have a voice in the man¬ agement of the community. In 1895 the plan blossomed forth in <(George Junior Republic,® at Freeville, N. Y. He originated also the social service prison reform method, which is being adopted by many State penal institutions. Al¬ though the invitations to public office have been numerous he has refused holding any such, wishing to devote his whole time to the de¬ velopment of the self-support and self-govern¬ ment idea among the youth of the country. See George Junior Republic.

GEORGE, Lake. See Lake George.

GEORGE, Order of Saint. See Garter, Order of the; Orders (Royal); Russia, Bavaria, Hanover , Sicily, Great Britain.

GEORGE-A-GREENE, The Pinner of Wakefield. A comedy written in 1595-96 and on slender evidence attributed to Robert Greene. It is founded on an old prose romance entitled (The History of George-a-Greene> and a ballad, (The Jolly Pinder of Wakefield with Robin Hood, Scarlet and John^

GEORGE BARNWELL, or The London Merchant, a prose tragedy, dealing with bour¬ geois society, and written by George Lillo. It was produced at Drury Lane Theatre, 22 June 1731. Consult Cibber, Colley, (Life of George Lillo. >

GEORGE OF CAPPADOCIA, some¬ times called George the Arian, also George the Fuller of Cappadocia. His father was a fuller by occupation. The date of his birth is not known; d. Alexandria, Egypt, a.d. 361. He belonged to the Arian party in the Church, and is credited by the opposite

party with having been a despicable parasite and vagabond, ex¬ ceedingly corrupt, vile and ignorant. He was for a time a subaltern in the Commissariat De¬ partment of the army and embezzled funds and had to flee.. He then became a low vaga¬ bond.. Of his ignorance it was said by his enemies that he had ((no knowledge of letters and still less of the Holy Scriptures.® The Emperor Constans favored the Arian party, and when an assembly of 30 Arian bishops met at Antioch in the year 356, George was sent to Alexandria to govern the . Church and to see Athanasius. George was given a bodyguard of soldiers commanded by Sebastian, Duke of Egypt, who was a Manidhsean. All sorts of sacred places were entered in search for Athanasius and a reign of terror ensued. Six¬ teen bishops are said to have been banished and others fled or submitted. The Alexan¬ drians rose against George and he was obliged to fly from the city. Later he returned backed up by the authority of Constans. The pagans were his enemies because he had pillaged their temples. They arose against him and mal¬ treated him. The next day they paraded him about the city on the back of a camel, and finally threw him and the animal upon a blaz¬ ing pile of combustibles. His ashes were thrown to the winds and his house plundered. The Emperor Julian wrote to the rioters, con¬ demning them seriously, but let them go with¬ out punishment. George had an extensive

library which the Emperor Julian tried to re¬ cover. He may have been as bad a man as represented, but the fact that he owned a large library was certainly not in keeping with the claim that he was ignorant. All the writings that survive that time are from the pens of members of the other party, and were written in the white heat of partisanship. We shall probably never learn the exact truth concern¬ ing him.

GEORGE ELIOT. See Eliot, George.

GEORGE JUNIOR REPUBLIC, the

community established (1895) near Freeville, N. Y., by William R. George (q.v.) as a method of reform in the treatment of dependent and delinquent boys and girls. The organization is that of a miniature village, in fact the whole principle of the Junior Republic is embodied in the following statement: The Junior Republic is a village, just exactly the same as any other village in the country. This means that it em¬ bodies the same social, civic and economic conditions. The one essential difference is the fact that its citizens reach their voting age when they are 16 instead of 21 years. Its operation has been successful. Students from all parts of the world have made pilgrimages to Freeville to see the little colony in operation. Originally it was designed to be used for delin¬ quents only, but its scope has enlarged so that its citizenship is made up of boys and girls of all classes and conditions of society, in addi¬ tion, to those who have been delinquent. It

is possible for the young people to learn a trade in this community, likewise prepare for college. The idea has extended to other States, and at the present time there are seven other republics in different parts of the United States. There is also a little commonwealth in England which is carried on in much the same manner. Many of the institutions in the country have adopted some of the Junior Republic ideas. Particularly is this true in some of the prisons.

GEORGE PEABODY COLLEGE FOR TEACHERS. See Peabody College for Teachers.

GEORGE SAND, zhorzh'e sand. See

Sand, George.

GEORGE OF TREBIZOND, noted Greek scholar: b. Crete, about 1396; d. 1484. His family belonged to Trebizond. He was invited to Venice by Francesco Barbaro and in that city became a teacher of rhetoric and philos¬ ophy. Subsequently he served as secretary to Pope Eugenius IV and later to Pope Nicholas V. At Rome his fame spread as a Greek scholar and translator. His work as translator was severely criticised by contemporary scholars. He was a follower of Aristotle in philosophy and was in frequent conflict with the Platonist, Gemistu.s Plethon. George's works include (Rhetorica) (1470) ; (Comparationes Philos- ophorum Platonis et Aristotelis) (1523). Con¬ sult Fabricius, 'Bibliotheca Graca (Vol. XII, Hamburg 1790-1809), and Voigt, 'Die Wieder- belebung des Classischen Altertums) (2d ed., 2 vols., Berlin 1893).*

GEORGE WASHINGTON UNIVER¬ SITY, Washington, D. C. Founded in 1821 as Columbian College ; by amendatory acts of Congress its name was changed in 1873 to Columbian University and in 1904 to The

George Washington University. It has col¬ leges and schools as follows : Columbian Col¬ lege (academic), Teachers College, the College of Engineering and the Graduate School — all comprehended in the Department of Arts and Sciences — the Medical School, the Dental School and the Law School. Also it has af¬ filiated with it the National College of Phar¬ macy and the College of Veterinary Medicine. It repeats morning instruction in the 'late afternoons, thereby meeting the needs of gov¬ ernment employees and others holding salaried positions.

GEORGE'S CHANNEL. See Saint George's Channel.

GEORGETOWN, capital of British Guiana, situated on the eastern side of the Demarara River, at its mouth, with the Carib¬ bean Sea for a second' frontage. The city covers an area of 1,200 acres. Nearly every building in the quarters devoted to private dwellings is isolated from its neighbor and surrounded by palms, shrubs, or forest trees. The streets cross each other at right angles ; those which run north and south in some cases have long canals in the centre, beyond which are the roadways — the width of such streets being more than 100 feet. On Main (or High) street are situated the town-hall, Victoria law courts, police magistrate's office, Colonial Bank, Presbyterian church, Portuguese Roman Catholic church and the Methodist- church. The public buildings, where the Court of Policy sits, and the Anglican cathedral are also in this section. Another fine street is the Brick Dam, the two rows of houses in which constituted the entire town of Stabroek before the colony was captured by the British. The finest building in the colony, the Roman Catholic cathedral, stands a short distance east of this street. The Royal Mail Company, with its fortnightly mail service, makes the port of Georgetown a terminus; boats of the French Compagnie Generale Transatlantique call monthly on the way to Cayenne; the Dutch Mail does the same when going to Surinam ; and steamers of a Canadian line also call every fourth week. Vessels drawing more than 20 feet cannot cross the bar at the mouth of the river, and those of even lighter draught are obliged to wait for high water. A line of steamers subsidized by the government makes daily trips from Georgetown to Essequibo ; three times a week a steamer runs to Berbice ; twice a week up the Demarara and Berbice rivers; and there is fortnightly communication by boat with Morawhanna, the capital of the northwestern district. A railway also connects Georgetown with Mahaica, on the east coast. The West India and Panama Telegraph Com¬ pany also puts the city and colony in com¬ munication with other countries. There are good street car and telephone services. The city water, brought from creeks 20 miles dis¬ tant through the Lamah Canal, is chiefly valu¬ able in case of fire; it is not sufficiently pure for household use. The city is lighted by gas and electricity. Municipal affairs are managed by a mayor and town council. The value of real propertv is nearly $8,000,000 ; the portion held by Europeans and Creoles (other than Portuguese) being valued at $4,611,575; the portion held by Portuguese at $1,938,370; by

East Indians, $101,930; and by Chinese, $45,750. The tax-rate is usually 2 per cent per annum on the appraised value of private property. There is a well-equipped and trained fire brigade ; nevertheless the precautions which have been taken failed to prevent very destructive fires (22 Dec. 1913; also in 1873 and 1896). Among the important institutions are the Royal Agri¬ cultural and Commercial Society, which has a library of over 17,000

volumes, and maintains reading-rooms, etc. ; the Institute of Mines and Forests and the Chamber of Commerce. Of the newspapers, one is issued daily, and a num¬ ber weekly, bi-weekly or tri-weekly. The port is regarded as healthful. There were two or three severe attacks of yellow fever half a century ago, but since that time the drainage has been improved, and the neighborhood of the wharves kept clean, and during the past 50 years only one serious outbreak has occurred. The number of inhabitants is given as 59,955. See Guiana, British.

GEORGETOWN, city in the Straits Settlements. See Penang.

GEORGETOWN, Colo., town and the county-seat of Clear Creek County, situated, at an altitude of 8,475 feet, in a valley in the Rocky Mountains, 52 miles west of Denver on Clear Creek and the Colorado and Southern Railway. It is the centre of an important silver district, and has also gold, lead, zinc and copper interests. The town is picturesque and health¬ ful and enjoys some reputation as a summer resort. It has a park, public library, hospital and gas and electric-light plants. The water system is owned by the municipality. Pop.

(1920) 703.

GEORGETOWN, Del., town and the county-seat of Sussex County, 40 miles south by east of Dover, on the Pennsylvania Railroad. It is situated in an agricultural district. The chief interest is the canning industry. Pop.

(1920) 1,710.

GEORGETOWN, D. C., formerly a town in the District of Columbia; now included within the limits of Washington (q.v.), and sometimes called West Washington. It was at the head of Potomac navigation, and the port of entry for the District of Columbia.

GEORGETOWN, Ky., city and the county- seat of Scott County, 12 miles north of Lexing¬ ton and 20 miles east of Frankfort, on the Frankfort and Cincinnati, the Cincinnati, New Orleans and Texas Pacific and the Louisville Southern railroads. It is in the heart of the ((blue-grass)) region, and the centre of an im¬ portant stock-raising and agricultural districts. Flouring-mills, brick-works and other indus¬ tries are also located here. Georgetown College (q.v.) is here situated. The (

GEORGETOWN, Ohio, village and the county-seat of Brown County, 42 miles east by

south of Cincinnati and seven miles north of the Ohio River, on White Oak Creek and on the Cincinnati, Georgetown and Portsmouth, and the Ohio River and Columbus railways. It is the centre of an agricultural region, the growing of tobacco being an especially import¬ ant industry. There are also some manufac¬ tures, and blue limestone is quarried in the vicinity. The village operates an electric plant. Pop. 1,580.

GEORGETOWN, Ontario, town and rail¬ way junction of Halton County, 25 miles west of Toronto, on Credit River and the Grand Trunk Railway. The water-power is excellent. There are paper-mills, knitting-machine manu¬ factories, knitting and woolen factories and carriage works. Pop. 1,583.

GEORGETOWN, P. E. I., town and port on the eastern coast, the capital of King's County, by rail 39 miles east of Charlottetown. It has a fine natural harbor, is the chief winter port of the island, is a favorite summer re¬ sort and has a lobster packing industry. Pop. about 1,500.

GEORGETOWN, S. C., city, port of entry and county-seat of Georgetown County, at the head of Winyah Bay, 60 miles northeast of Charleston, on the Seaboard Air Line. The various streams entering the bay are navigable for an aggregate of 1,000 miles and make Georgetown the centre of an extensive agri¬ cultural area. Steamers connect the city with Charleston, Baltimore, New York and other points. Rice, shingles, turpentine, lumber, grain, fish, alcohol, and cotton are exported in large quantities. The annual port commerce is about $10,000,000, and the annual tonnage 500,000. It contains machine shops and foundries, bottling works, chemical and canning factories, saw mills, an alcohol factory and an ice factory. It has a chamber of commerce, nine building and loan associations and three banking insti¬ tutions. The post office and customs buildings are worthy of notice, and there are several churches and schools. Georgetown was settled about 1700 and incorporated in 1805. It was the landing place of Lafayette on his first visit to the United States in 1784. The government is vested in a mayor, elected every two years, and a council elected at large. The waterworks are the property of the municipality. Pop. 4,579.

GEORGETOWN, Tex., city and the county-seat of Williamson County, 28 miles by rail north of Austin, on the San Gabriel River and on the Missouri, Kansas and Texas and the International and Great Northern railways. The surrounding region is agricultural and pastoral. Georgetown has cotton-gins, a cot¬ tonseed-oil mill and the planing-mills, and manu¬ factories of plows, ice, harness and woodwork. Here are located mineral springs whose waters are similar to those of the well-known springs at Karlsbad,

Germany. Georgetown is the seat of Southwestern University, an institution of the Methodist Episcopal Church, South, founded in 1873. Georgetown was settled in 1848, incorporated as a town in 1866, and char¬ tered as a city in 1890; it is governed by a mayor and council, elected biennially. The electric-light and water systems are owned by the city. Pop. (1920) 2,871.

GEORGETOWN COLLEGE, Kentucky, a coeducational institution in Georgetown, founded in 1829. It is under the auspices of the Baptist denomination in Kentucky; reported at the close of 1916: Professors and instructors, 28; students, 371 ; volumes in the library, 14,000; productive funds, $310,000; grounds and build¬ ings valued at $240,000; income, $40,000; num¬ ber of graduates, 950.

GEORGETOWN INDIANS. See Sali-

shan Indians.

GEORGETOWN UNIVERSITY, Dis¬ trict of Columbia, an institution of higher edu¬ cation, under the direction of the Roman Cath¬ olic Church. The plan of the institution was undertaken as early as 1785 by the Rev. John Carroll, later first archbishop of Baltimore. In 1786 the corporation of clergymen in the chap¬ ter held at Whitemarsh, Md., adopted a series of resolutions directing the establishment of the institution and the erection of its first building. The year 1789 is generally considered the year of the foundation of the university, though stu¬ dents were not received until 1791. Upon the reorganization of the Society of Jesus in Mary¬ land in 1805, the Georgetown College, as it was then called, was transferred to that society, under whose direction it still remains. In 1815 the university was empowered by act of Con¬ gress to confer any degree in the arts, sciences and liberal professions which are conferred in other coHeges and universities, and, in 1833, the Holy See empowered the university to confer, in the name of the Church, degrees in philos¬ ophy and theology. The university is composed of the college; the school of medicine, organ-, ized in 1851 and including since 1901 a school of dentistry; and the school of law, organized in 1870. The college comprises three distinct de¬ partments, the graduate school, the undergrad¬ uate department and the astronomical observ¬ atory. A preparatory department is also con¬ nected with the university. The teaching of the university is guided by the principles of the Ratio Studiorum, formulated by the Jesuit order, and a strict standard of scholarship is maintained. The facilities of the university in¬ clude the Coleman Museum of Natural History, the Beauchamp Hughes Art Cabinet and the Riggs Memorial Library. In 1916 there were reported a faculty of 196 and a student enrol¬ ment of 1,526. Books in library, 153,000.

GEORGIA, in Europe (by the Russians called Grusia, by the natives Karthli), formerly a kingdom, but now included in the Russian government of Tiflis and Kutais, though the name is sometimes loosely employed to desig¬ nate a much larger portion of the territory pos¬ sessed by Russia south of the Caucasus. Area, in the latter sense, about 34,000 square miles ; of Georgia proper, about 15,000 square miles. The history of the Georgians first become trust¬ worthy about the time of Alexander the Great, to whom they became subject. After Alexan¬ der's death, in 323 b.c., they gained their inde¬ pendence under Pharnvas. The country was then governed by various dynasties of kings. Christianity was introduced toward the close of the 4th century; soon after the death of Mo¬ hammed, numerous followers of his entered the country and compelled the inhabitants to accept Islam. In the 11th century Georgia was twice

invaded by the Seljuk Turks, but regained its independence under David III (1090-1125), and in the 13th, after widespread devastation, was captured by the Mongols under Timur. The Mongols were expelled in 1403 by George VII who committed the error of dividing it among his three sons, further subdivisions making it into 26 different principalities. In the 16th and 18th centuries Georgia was harried by the Per¬ sians, and at the same time the Turks were con- tinuallv making encroachments. Aga Moham¬ med Shah in 1795 razed Tiflis to the ground, the king, Heraclius II, abandoning all resist¬ ance and taking refuge in the mountain fast¬ nesses. Russian influence, begun by lending aid against invasion, had been growing steadily; and in 1799 George XIII formally resigned the crown in favor of the Emperor Paul of Russia, and in 1801 Russia annexed the country. Con¬ sult Brosset, (Elements de la Langue Geor- gienne) (1837) : Chubinov, (Russian-Georgian Dictionary > (1846; new ed., 1886); Leist,

(Georgische Dichter VerdeutschD (1887); Wardrop,

GEORGIA, the last settled of the 13 origi¬ nal States of the American Union; bounded on the north by North Carolina and Tennessee, on the northeast by South Carolina, on the east by South Carolina and the Atlantic Ocean, on the south by Florida and on the west by Ala¬ bama ; capital, Atlanta ; area, 59,475 square miles, of which 495 are water.

Topography. — The northeastern part of Georgia is traversed by that part of the Appa¬ lachian chain of mountains known as the Blue Ridge, which in Georgia has an altitude of from 3,000 to 5,000 feet above sea-level. After running one third the distance across the State, it terminates abruptly,

but appears again in short ranges and detached peaks. Northwest Georgia, the limestone region, embracing about 3,600 square miles, has an altitude ranging from between 600 and 700 to 2,500 feet above sea- level. About 6,000 square miles of northern Georgia are above the altitude of 1,000 feet. About 20 miles to the west of the Blue Ridge lies the Cohutta Range, a continuation of the range known in Tennessee as the Unaka. The Cohutta has an altitude of 3,000 feet above sea- level with an abrupt escarpment toward the valley of the Oostenaula on the west and then continues into Alabama in a low elevation called Dugover Mountain. To the northwest are Lookout and Sand Mountain ranges, which with their table-lands constitute a part of the Alleghany range, which, like the Blue Ridge, belongs to -the great Appalachian system.

High Point, the loftiest part of Lookout Mountain, has an elevation of 2,408 feet. Its northeastern spur, called Pigeon Mountain, has an elevation of from 1,800 to 2,000 feet above the sea, its highest point rising to 2,331 feet. Another spur of Lookout, called Round Moun¬ tain, has an elevation of over 2,200 feet. Tay¬ lor's Ridge and its prolongation, called the White Oak Mountains, rise to an elevation of from 1,300 to 1,500 feet above sea-level. A little farther south, Rocky Face Ridge, with an elevation of from 1,500 to 1,700 feet, forms the eastern watershed of Chickamauga Creek (or river, as it is sometimes called), which flows through the valley at an elevation of 900 feet

above the sea. There are several detached peaks, among which the most noted are Pine, Lost and Ivennesaw Mountains, the last named with its double peak rising to the height of 1,809 feet. In De Kalb County, 14 miles east of the city of Atlanta, in a comparatively level country, Stone Mountain, a vast mass of gran¬ ite, rises to the height of 1,686 feet.

One of the most prominent features of north¬ east Georgia is the Blue Ridge chain of moun¬ tains, already mentioned. Some of the peaks of this chain rise to an elevation of 5,000 feet. The following is a list of the most noted of the mountain peaks of Georgia with their height above the level of the sea : Sitting Bull (mid- dle summit of Nantahela), in Towns County, 5,046 feet; Mona (east summit of Nantahela), 5,039 feet; Enota, in Towns County, 4,797 feet' Rabun Bald, in Rabun County,' 4,718 feet; Blood, in Union County, 4,468 feet; Tray in Habersham County, 4,403 feet; Cohutta,' in Fannin County, 4,155 feet; Dome, in Towns r County, 4,042 feet ; Grassy, in Pickens County, 3,290 feet ; Tallulah, in Habersham County, 3,172 feet; Yona, in White County, 3,167 feet. In all the mountain section of Georgia are charming valleys abounding in very productive lands. The most noted are Cedar, Texas, Broomtown and Vann's valleys in northwest Georgia, and Nacoochee (Evening Star) and Sautee valleys in the northeast section of the State. Among the interesting features of

northwest Georgia are numerous caves. Har¬ din's Cave, near Kingston, has chambers 20 to 30 feet high. Middle Georgia is the most thickly settled section of the State. With the exception of two mountains, this region varies in. altitude from 180 to 500 feet, and in a few instances to 1,000 feet. Lands too steep for the plow are seldom found in middle Georgia.

South Georgia embraces more than half the area of the State and extends from the south¬ ern limit of middle Georgia to Florida and the Atlantic coast. Its altitude ranges from 100 to 500 feet. About 3,000 square miles of the coastal region have an elevation of 100 feet.

Rivers. — The drainage system of Georgia comprises nine basins. The Tennessee basin is drained by tributaries of the Tennessee River. The Mobile basin is drained into the Gulf of Mexico by the Coosa and Tallapoosa rivers and their tributaries. The Apalachicola basin is drained by the Chattahoochee and Flint rivers. These, uniting in the southwestern cor¬ ner of Georgia, form the Apalachicola River which, flowing through Florida, empties into a bay of the same name, an arm of the Gulf of Mexico. The Altamaha basin is drained by the Oconee and Ocmulgee rivers, which empty into the Altamaha, flowing into the Atlantic Ocean. The Ogeechee basin is drained by the Ogeechee River into the Atlantic Ocean through Ossabaw Sound. The Savannah basin is drained by the Savannah River and its tributaries into tlˆe At¬ lantic Ocean. The Ocklockonee basin is drained by the river of that name into the Gulf of Mexico through Ocklockonee Bay. The Su- wanee basin is drained by the river of that name into the Gulf of Mexico. Although the Suwanee runs for the greater part of its course through the State of Florida, it rises in south¬ east Georgia, and two of its main tributaries, the Allapaha and Withlacoochee rivers, are

streams of south-central Georgia. The Satilla and Saint Mary's basin is drained by the Satilla and Saint Mary's rivers. The Satilla is the more northern and enters the Atlantic through Saint Andrew's Sound. The Saint Mary's enters the Atlantic Ocean through Cumberland Sound. Between these rivers lies the noted Okefinokee swamp. Its numerous large rivers furnish the State with excellent water trans¬ portation. Although the extensive railroad lines have built up in Georgia flourishing cities and towns remote from any water highway, yet those which are upon navigable streams enjoy the advantage of a competing water line. The Savannah is the most important river of Georgia for the reason that over 18 miles of its course is navigable for ocean vessels. The Savannah is navigable for river

steamboats to Augusta, 230 miles to the north. The Chatta¬ hoochee is navigable for steamboats from Co¬ lumbus to the Apalachicola and through that stream to the Gulf of Mexico. Through its several steamboat lines Columbus has a con¬ siderable river trade. The city of Rome in northwest Georgia has besides its several rail¬ road lines a fine river trade through the Oostanaula and the Coosa. Steamboats carry to Rome the productions of the Coosa Valley, lumber, iron, grain and cotton, and the staple products of the Oostanaula valley. Albany, in southwest Georgia, enjoys an extensive steam¬ boat traffic by the Flint River. The Saint Mary's River is navigable for the largest ves¬ sels up to and beyond the town of that name, which is nine miles from the ocean. The Satilla and Ogeechee are each navigable for some dis¬ tance, but their advantages have not been utilized to any considerable extent. Other navi¬ gable waters of Georgia are the inlets and sounds flowing between the mainland and the islands that skirt the coast from the Savannah to the Saint Mary's rivers. Through Saint Simon's Sound the largest vessels pass up the Turtle River, a short but deep stream, to the city of Brunswick, the second in importance of the ports of Georgia, being, like Savannah, the centre of a fine fruit and trucking section. Every section of Georgia is drained by rivers of considerable size and is consequently a splendid agricultural country. Its numerous navigable streams, supplementing its great rail¬ road systems, conspire to give its people unusual advantages for both internal and foreign commerce.

Climate. — Of nine climate belts in the United States eight are represented in Georgia. The lowest of these eight belts in mean annual temperature is below 40°, the highest between 70° and 75°. The climate of less than 40° mean annual temperature is found only on some of the mountain peaks. On the sides of these mountains below the summit the mean annual temperature is between 40° and 45°, correspond¬ ing with upper New England and New York and the mountain region of Virginia. There is a still larger climate zone of between 45° and 50° which corresponds with that to be found in portions of New York, Pennsylvania, and Ohio. The zone of between 50° and 55° em¬ braces a narrow strip which runs northward through North Carolina and Virginia up to New Jersey. The zone between 55° and 60° of mean annual temperature contains an area two

or three times as large as all the preceding zones together and, passing through both Caro- linas, ends in Virginia. The zone between 60° and 65° embraces nearly all of middle Georgia, corresponding with that of upper Alabama, Mis¬ sissippi, Louisiana, Texas, west Tennessee and Arkansas, and extends into Virginia. The mean annual temperatures at some of the important stations in this area are: Rome, 61.9; Gaines¬ ville, 61.3; Atlanta, 61.4; Carrollton, 62; Ath¬ ens, 63; Augusta, 64; LaGrange, 64.1; Thom¬ son. 64.7.

The climate of southern Georgia is between 65° and 70° of mean annual temperature and corresponds with that of southern Texas, Louisi¬ ana, Mississippi and upper Florida. At Ma¬ con it is 66.1°; Cuthbert, 68.1°; Americus, 68.2° ; Brunswick, 68.7°. Blackshear with 70.2° is the only station touching the zone between 70° and 75°. For the whole State the mean temperature for July is 81.8°. The isothermal line of 80°, July temperature, runs above Au¬ gusta and Macon to West Point. Above this line embracing the greater portions of north and middle Georgia the July temperature is be¬ tween 75° and 80°. Below this line, embracing the greater part of east Georgia and nearly all of southeast and southwest Georgia, the July temperature is between 80° and 85°. The climate of Atlanta, situated as it is on a ridge 1,050 feet above sea-level, corresponds with that of Washington, Saint Louis and Louisville, the winters being warmer and the summers cooler. Snow seldom falls in southern Georgia, and then rarely to a depth of more than two inches. In middle Georgia the fall of snow is a little more frequent and to a greater depth, while both its frequency and depth are greatly in¬ creased in the mountain region. The annual average rainfall of Georgia is 49.3 inches, the highest being at Rabun Gap, 71.7 inches, the lowest at Swainsboro, 39.4 inches. Atlanta's annual rainfall is 52.12 inches. The average for different sections of the State is: Middle Georgia, 49.7 inches; east Georgia, 41.4 inches and northwest Georgia, 60.3 inches. The sum¬ mer rainfall averages : For north Georgia, 13.6 inches; for southwest Georgia, 14.5 inches, and for the entire State, 13.4 inches. The sum¬ mer rainfall averages at different localities: Rome, 10.2 inches; Atlanta, 10.8 inches; Rabun Gap, 15.4 inches; Americus, 16 inches; Bruns¬ wick, 16.6 inches.

Agriculture. — The northwestern section of Georgia presents a great variety of surface and soil. The slopes of the mountains and hills are well suited for the grazing of stock, and abundance of land, either rolling or entirely level in the valleys, is adapted to the raising of vegetables, fruits, corn, wheat, rye, oats, bar¬ ley, buckwheat, cowpeas, clover, timothy, or¬ chard grass, Bermuda, Johnson, crab, red top and many other grasses useful for hay and pasturage. Cotton also is a profitable crop as far north as Floyd County, above which very little of this crop is raised. Some of the chief fruits are peaches, apples, pears, cherries, all kinds of berries and grapes of every variety. The forest timbers are oaks of several varieties, pines of two varieties, also the poplar, ash, beech, elm, chestnut, hickory, maple, walnut, iron wood, sugar berry, sycamore, sweet-gum, dogwood, persimmon, sassafras, wild cherry,

GEORGIA

Estimated population, 2,856,065 COUNTIES

Pop.

12.318 Appling . H8

. Atkinson . G 9

(Pop. incl. in Coffee Co.)

. Bacon . G 8

(Pop. in cl. in Appling and Pierce Cos.)

7,973 Baker . D 9

18,354 Baldwin . f 5

11,244 Banks . F3

. Barrow . E 3

(Pop. inch in Walton, _ _ „ Gwinnett & Jackson Cos.)

2o, 388 Bartow . C 3

11,863 Ben Hill . > 8

22,772 Berrien . >9

56,646 Bibb . E 6

. Bleckley . p 7

„„ „„ (Pop. incl. Pulaski Co.)

23,832 Brooks . E 10

6,702 Bryan . J8

26,464 Bulloch . 17

27,268 Burke . I 5

13,624 Butts . .E 5

11,334 Calhoun. . C9

7,690 Camden . 1 10

10,874 Campbell . . C4

. Candler . H 7

(Pop. incl. in Bulloch and Emanuel Cos.)

30,855 Carroll . B 4

7,184 Catoosa . B 2

4,722 Charlton . H 10

79,690 Chatham . j 7

5,586 Chattahoochee C7

13,608 Chattooga . B2

16,661 Cherokee . D3

23,273 Clarke . F4

8,960 Clay . B8

10,453 Clayton . D4

8,424 Clinch . G 10

28,397 Cobb . C 4

21.953 Coffee . . . g 9

19,789 Colquitt . E 9

12,328 Columbia . H 5

. Cook . F 9

(Pop. incl. in Berrien Co.)

28,800 Coweta . C 5

8,310 Crawford . E 6

16,423 Crisp . E 8

4,139 Dade . A 2

4,686 Dawson . D3

29,045 Decatur . C 10

27,881 Dekalb . D4

20,127 Dodge . F7

20,554 Dooly . E 7

16,035 Dougherty . D9

8.953 Douglas . C4

18,122 Early . C9

3,309 Echols . G 10

‘9,971 Effingham . J7

24,125 Elbert . G 3

25,140 Emanuel . H6

. Evans . H 7

(Pop. iDcl. in Tattnall Co.)

12,574 Fannin . D 2

10,966 Fayette . D 5

36,736 Floyd . B 3

11,940 Forsyth . D3

17,894 Franklin . F3

77,733 Fulton . D4

9,237 Gilmer . D 2

4,669 Glascock . G 5

15,720 Glynn . J 9

15,861 Gordon . C3

18,457 Grady . D 10

18,512 Greene . F5

28,824 Gwinnett . D4

10,134 Habersham . E 2

25,730 Hall . E 3

19.189 Hancock . G 5

13,514 Haralson . B4

17,886 Harris . C 6

16,216 Hart. . . . G 3

11.189 Heard _ ‘ . B 5

Pop.

19,927 Henry . d 5

23.609 Houston . E7

10.461 Irwin . p 8

30,169 Jackson . . . . .’.E 3

16,552 Jasper . e 5

6,050 Jeff Davis . G 8

21,379 Jefferson . H 5

11,520 Jenkins . j 6

12,897 Johnson . g 6

13.103 Jones . e 5

35,501 Laurens…. . G7

11.679 Lee . d 8

12,924 Liberty . is

8,714 Lincoln . H 4

24.436 Lowndes . F 10

5,444 Lumpkin . V…D2

10,325 McDuffie . H 5

6,442 McIntosh . j 9

15,016 Macon . D7

16,851 Madison . . . F 3 ‘

9,147 Marion . ’ c 7

25,180 Meriwether _ ,…C5

7,986 Miller . . C 9

7,239 Milton . D 3

22,114 Mitchell . D9

20,450 Monroe . E 6

19,638 Montgomery . G7

19,717 Morgan . F5

9.763 Murray . . .c 2

36,227 Muscogee . C 6

18,449 Newton . E4

11.104 Oconee . F4

18.680 Oglethorpe . F4

14,124 Paulding . C4

9,041 Pickens . D3

10,749 Pierce . h 9

19,495 Pike . d 5

20,203 Polk . B 4

22,835 Pulaski . F7

13,876 Putnam . F5

*4,594 Quitman . *.B 8*

5,562 Rabun . . . F 2

18,841 Randolph . C8

58,886 Richmond . H5

8,916 Rockdale . E 4

5,213 Schley . D7

20,202 Screven . I 6

19,741 Spalding . D 5

9,728 Stephens . F 2

13.437 Stewart . C7

29,092 Sumter . D7

11,696 Talbot . C 6

8,766 Taliaferro . G4

18,569 Tattnall . 17

10,839 Taylor . D 6

13,288 Telfair . G 8

22,003 Terrell . D8

29,071 Thomas . E 10

11,487 Tift . F 9

11,206 Toombs . H7

3,932 Towns . E 2

. Treutlen . G 7

(Pop. incl. in Mont¬ gomery Co.)

26,228 Troup . B 5

10,075 Turner…... . E8

10,736 Twiggs . F 6

6,918 Union . E 2

12,757 Upson . D 6

18,692 Walker . B 2

25,393 Walton . E 4

22,957 Ware. . „ . H 9

11,860 Warren . G 5

28,174 Washington . G 6

13,069 Wayne . I 8

6,151 Webster . C7

. Wheeler . G 7

(Pop. incl. in Mont¬ gomery Co.)

5,110 White . E 2

15,934 Whitfield . C 2

13,486 Wilcox . . . .F 8

23,441 Wilkes . G 6

10,078 Wilkinson . F8

19 147 Worth . E 4

Incorporated Cities. Towns, and Villages

1,201 200 1,043 751 1,902 816 99 306 249 10,604 532

356 109 8,305 174

Abbeville . F 8

Acree, Dougherty . D 9 Acworth. Cobb …. C 4

Adairsville . C 3

Adel . F 9

Adrian . G 6

Aikenton . E 5

Alley . G 7

Alamo . G 7

Albany . D 8

Allapaha . F 9

Alma . H 8

Alpharetta . D 3

Alto . E 3

Americus . D 7

Andersonville,

Sumter . D 7

481 Apalachee . F4

433 Arab! . E 8

280 Argyle . G 9

1,308 Arlington . C 9

162 Armena.. ....p 8

2,214 Ashburn . . E 8

17,846 Athens . F4

190,558 Atlanta . . . .D 4

59 Atwater, Upson… D 6

217 Auburn . E 3

50,245 Augusta . H 5

755 Austell . C4

60 Avalon, Stephens.. F 2

228 Avera . H 5

402 Babcock . C 9

391 Baconton . ..D9

4,217 Bainbrldge _ …CIO

Fon.

280 Baldwin . EL 3

,, 448 Ball Ground . D 4

•>,068 Barnesville . D5

303 Barney . F 10

384 Bartow . H 6

381 Barwick . . E 10

831 Baxley . H 8

358 Beach . H 8

193 Bell ton. Hall . E 3

209 Bethlehem . E 4

104 Between, Walton .E 4 14 Beverly, Elbert. . .G 3 463 Bibb City, Muscogee

C 6

268 Bishop, Oconee… F 4 1 235 Blackshear . H 9

203 Blairsville . E 2

838 Blakely . B 9

898 Blue Ridge . D2

325 Bluffton . c 8

257 Bogart, Oconee. . .F 4 111 Bold Spring, Walton

E 4

144 Bollngbroke . E 6

1 130 Boston . E 10

333 Bostwick . E 4

541 Bowdon, Carroll . .B 4

398 Bowersville . G3

738 Bowman . G3

64 Boykin, Miller. . . .C 9 95 Braswell, Paulding C 4

890 Bremen . B4

214 Brewton . G 7

707 Brinson . C 10

198 Bristol . H 9

465 Bronwood . D 8

361 Brooklet . I 7

1 040 Broxton . G 8

10.872 Brunswick . J 9

462 Buchanan . B 4

384 Buckhead . F 5

1,061 Buena Vista . C7

1 683 Buford . E 3

204 Bullochville . C 6

173 Bushnell . G8

705 Butler . 1)6

300 Byromville . E 7

154 Cadwell . G 7

1,505 Cairo . D 10

1,652 Calhoun . C 3

241 Camak . G 5

1,827 Camilla . D 9

145 Campton, Walton. E 4

728 Canon . F 3

2,002 Canton . D 3

166 Carl, Barrow . E 3

325 Carlton . F3

322 Carne8ville . F3

3,297 Carrollton . C4

4 067 Cartersville . C 3

805 Cave Spring . B 3

354 Cecil . F 9

3,551 Cedartown . B 3

208 Center, Jackson . .E 3 119 C entralhatchee.

Heard . B 5

147 Chalybeate Springs,

Meriwether .... C 5

129 Chamblee . D 4

314 Chatsworth . C 2

350 Chauncey . F 7

278 Chester, Dodge ...F7

312 Chickamauga . B 2

742 Chipley, Harris . . . . C 6

528 Clarkes ville . E 2

349 Clarkston, Dekalb. D 4

1 008 Claxton . I 7

541 Clayton . F 2

328 Climax . C 10

254 Cobb town . H 7

1,638 Cochran F7

255 Colbert . . F 3

354 Coleman . C 8

2 173 College Park, Fulton

D 4

327 Collins . H 7

600 Colquitt . C 9

25,950 Columbus . B 7

868 Comer, Madison … F 3

2,238 Commerce . . F 3

450 Concord . D 5

303 Coolidga . . . E 10

1 919 Conyers . E 4

5,883 Cordele . E8

147 Corinth . B 5

1,114 Cornelia . E2

290 Cotton, Mitchell.. D 9

2,697 Covington . . .E4

150 Covington Mills,

Newton . E 4

220 Crandall . C 2

871 Crawford . F4

688 Crawfordville . G 5

159 Crest, Upson . D 6

198 Orosland . E 9

365 Culloden . . . . D 6

305 Cumming . D 3

34 1 Cusseta . . C 7

3,210 Cuthbert . C8

169 Dacula . E 4

829 Dahlonega. . D2

1,259 Dallas….. . C4

Pop.

5,324 Dalton . B 2

272 Danburg . G 4

323 Danlelsville . F3

299 Danville . F 6

1,391 Darien . j 9

589 Davisboro . G 6

3,827 Dawson….. . D8

179 Dawsonville . E 3

2,466 Decatur . D4

760 Demorest . F2

149 Deepstep, Washing¬ ton . G 6

288 De Soto . D 8

550 Dexter . F 7

173 Dickey, Calhoun.. C 8 400 Diffee, Decatur . .C 10

106 Dillard . F 2

242 Dixie, Brooks . . .E 10

630 Doerun . E 9

747 Donalsonville . C 9

163 Dooling . E 7

147 Doraville, Dekalb. D 4

3,550 Douglas . G8

1,462 Douglasville . C4

5,795 Dublin . G7

302 Dudley . F 7

469 Duluth . D 4

342 Du Pont . G 10

291 East Ellijay,GIlmer'D2 73 East Lake, Dekalb. D 4

2,355 Eastman . F 7

3,682 East Point . D 4

385 East Thomaston,

Upson . D 6

127 Eastville, Oconee. F 4

2 036 Eatonton . . . . . f 5

841 Edison . c 8

6,483 Elberton . G3

123 Elizabeth . c 4

273 Elko . e 7

672 Ella ville . D7

659 Ellijay . d 2

316 Emerson . C3

338 Enigma, Berrien. .F 9 218 Ep worth, Fannin. D 2

80 Etna, Polk . B 4

307 Eton . n 2

1,395 Fairbum . C4

326 Fairmount . C3

709 Fayetteville . C5

211 Ficklin, Wilkes. . .G 4

232 Finleyson . . . .F 7

5,795 Fitzgerald . F 8

142 Flint Stone, Walker B 2

495 Flo villa . E 5

373 Flowery Branch . . D 3

355 Folkston . H 10

173 Forest Park, Clayton

2,208 Forsyth . ,D 5

1,320 Fort Gaines . B 8

2,697 Fort Valley . E 6

340 Franklin . b 5

95 Frazier, Pulaski . .F 7

326 Fry, Fannin . D 2

K HP Funston, Colquitt. E 9

5,925 Gainesville . E 3

319 Garfield . h 6

210 Gay . '.C5

210 Geneva . C6

313 Georgetown . B8

367 Gibson . g 5

216 Gills ville . e 3

227 Girard . 1 5

640 Glennville . H9

347 Glennwood . G 7

337 Godfrey, Morgan .F 5

151 Good Hope . e 4

702 Gordon . F6

193 Graham . g 8

1,132 Grant ville . c 5

95 Gratis, Walton . . . E 4

417 Graymont . H 7

278 Grayson . d 4

152 Graysvllle, CatoosaB 2

2,120 Greensboro . F 5

909 Greenville . C 5

7,478 Griffin . D5

61 Gro vania . e 7

558 Grovetown . H 5

545 Guyton . j 7

312 Haddock . E 6

784 Hagan . 1 7

650 Hahira . F 10

403 Hamilton . c 6

1,093 Hampton . d 5

864 Hape ville . D4

736 Harlem . H5

*174 Haralson . *.c 5*

383 Harrison . G 6

1,882 Harrisonvllle, Rich¬ mond . h 5

2,007 Hartwell.. . G3

3,420 Hawkinsville . F 7

1,181 Hazlehurst . H 8

890 Helena . F8

656 Hephzibah . 15

‘. 214 Herod, Ferrell _ D 8

226 Hiawassee . e 2

231 Hickox . 19

207 Higgston, Montgom¬ ery . G •

GEORGIA — Ccn.inued

Pop.

550

209

93

174

4ˆF254

1,230

251

114

228

437

429

194 133 186 459 249 111

1,862 662 332 1,207 740 237 191 1,415 970 225 573 413 190 522 267 1,226 241

J21 1

1,590 5,587 285 1,712 1,518

430 77

705

531

206

100

393

545

221

375 533 227

1,428 716 600 247 1,039 54 198 165 541 309 1,195 1 140 349 322 927 1,253

882

1,160

160

74

4 5,757

2,412

922

589

290

5,949

1,082

337 334 805 233

G97

376 109 314 408 603 287

4,385

2,030

1,247

400

338 221 398 184

3,029

1,630

1,508

312

302

195 383

High Shoals, Oconee

F 4

Hillsboro . g 5

Hilton . B 9

Hinesvllle . £8

*Hiram . £ *

Hogansville 05

Holly Spring, Chero- ltcc «•••••'*'' D 3*

Homeland . H 10

Homer . F jj

Homerville . G 9

Hoschton ..... • – E

Howell, Echols . .G 10

Hull . F 3

Ideal, Macon – - D 7

Iron City . C 10

*Irwinton . * °*

Isabella . E 8

Jackson . e 5

Jakin . C9

Jasper . ˆ 3

Jefferson . £ J

Jeffersonville . F 6

Jenkinsburg . E 5

Jersey . E 4

Jesup. .

Jonesboro . D 4

Junction City . C 6

Kennesaw . C 4

Kestler . C 9

Kingsland . I 10

Kingston . . • • C 3

*Kingwood, Colquitt E 9 Kirkwood, Dekalb D **

Kite, Johnson . G 6

Knoxville . E 6

Lafayette . B 2

La Grange .....Bo

Lake Park . F 10

*Lavonia. . . * *-*

Lawrence ville . E 4

Leary . . • • • • c y

Leatherwood, Doug¬ las . C 4

Leesburg . D »

Eela . CIO

*Lenox. . . *,y*

Leon, Dodge . F 7

Leslie . B> 1

Lexington . . . F 4

Lilly . E 7

Lincolnton . H 4

Linwood, Walker . B 2 Lithia Springs,

Douglas .... – C 4

Lithonia . D 4

Locust Grove . D 5

Logan ville . E 4

Lone Oak . C 5

Louisville . H 6

Louvale . G 7

Lovejoy Station . . D 5

Lovett . . • . G 6

Ludowicl . 18

Lula . E 3

Lumber City . G 8

Lumpkin . C 7

Luthersville . C 5

Lyerly . B 3

Lyons . .H 7

McCaysville, Fannin

D 2

McDonough . D 5

McRae . . . . G 8

Machen . E 5

Machinery City, Cobb C 4

Macon . E 6

Madison . F 4

Manchester . C 6

Mansfield . E 5

Mapleton, Mitchell D 9

Marietta . C 4

Marshallville . E 7

Martin . F 3

Maxeys . F 4

Maysville, Banks . . F 3

Meansville . D 5

Meigs . D 9

Menlo, Chattooga. B 2

Merrillville . E 10

Metcalf . D10

Metter . H 7

Mid ville . H 6

Milan . G 8

Milledgeville . . . . . .F 5

Millen . H 6

Milltown . F 9

Milner . D 5

Mineral Bluff . D 2

Mitchell . G 5

Molena . D 6

Moniac . H 10

Monroe . E 4

Montezuma . E 7

Monticello . E 5

*Moreland . C 5**

Morgan . C 8

Morganton, Fannin D 2 Morven . F 10

Pop.

3,349 Moultrie . E 9

256 Mount Airy . E 2

158 Mountain City,

Rabun . F 2

605 Mt. Vernon . G 7

226 Mountville . C 5

140 Mystic . F8

990 Nashville . F9

1538 Naylor . F 10

503 Nellieville, Rich¬ mond . H 5

550 Nelson, Pickens. . .D 3

475 Newborn . E 4

139 NewEngland.Dade A 2

5,548 Newnan . C 5

364 Newton . D 9

(5720 Nlcholls, Coffee. . .G 9

167 Nicholson . F 3

968 Norcross . D 4

648 Norman Park . . .E 9 87 Norristown ..... G 6

340 Norwood . G 5

174 Nunez . H 7

144 Oak Park, Emanuel H6 276 Oakfield, Worth . .E 8 233 Oakhurst, Dekalb . D 4

110 Oakwood . E 3

350 Ochlochnee . E 10

2,017 O cilia . F 8

10 Oconee . G 6

161 Odessadale . C 5

258 Odum . .H 8

483 Offerman . H 8

924 Oglethorpe . D 7

101 Ohoopee . H 7

243 Oliver . J 6

209 Omaha . C 7

274 Omega . E 9

457 Orland . G 7

655 Oxford . E 4

922 Palmetto, Campbell. C 4 360 Parrott . C 8

32 Patten, Thomas. E 10

264 Patterson . H9

572 Pa vo . E 10

558 Pearson . G9

1 ,880 Pelham . D 9

467 Pembroke . I 7

239 Pendergrass . E 3

475 Penfield . F 5

454 Pepperton. Butts. E 5

649 Perry . E 7

451 Pinehurst . E 7

708 Pineview . F 7

279 Pitts . F 8

400 Plains . D7

148 Plain ville . B 3

337 Pooler, Chatham. .J 7

652 Poulan . E 9

315 Powder Springs . . .C 4

259 Preston . C 7

369 Prestoria . D 9

57 Primrose, Meri¬ wether . C 5

63 Princeton, Clarke. F 4

207 Pulaski . 17

3,915 Quitman . F 10

113 Raccoon Mills. . . . B 3

300 Rays Mills . F 9

252 Rebecca . E 8

454 Reidsvilie . 17

275 Rentz . F 7

12 Resaca . C 2

521 Reynolds . D 6

321 Rhine . . . F 8

1,250 Richland . C 7

398 Ringgold . B 2

225 Rising Fawn . B 2

139 Riverdale . D 4

170 Riverside, Colquitt. E 9

227 Roberta. Crawford E 6

[860 Rochelle . . F 8

152 Rockledge . G 7

1,034 Rockmart . B4

385 Rocky Ford . I 6

61 Rocky Mount. Meri- .

wether . C 5

15,120 Rome . B 3

173 Roopville . B 5

1,059 Rossville, Walker. B 2

1,158 Roswell . D3

1,422 Royston . F3

. 88 Ruckersville Elbert

G 3

120 Russell, Jackson. .E 3

696 Rutledge . E 4

91 St. Charles, Coweta.C 5

272 St. George . H 11

54 St. Marks . C 5

691 St. Marys . 110

402 Sale City . E 9

2,641 Sanders ville . G 6

441 Sasser . D8

68,805 Savannah . J 7

212 Scott . G 6

276 Screven . I 8

120 Seney, Polk . B 4

1 111 Senoia . D 5

193 Seville . E8

344 Shady Dale . E 5

246 Sharon . G4

Pop.

166 Sharpsburg . C 5

985 Shell man . C8

266 Smithsonia . F 4

574 Smithvllle . D 8

599 Smyrna . C 4

1,590 Social Circle . E 4

469 Soperton . G 7

842 Sparks . F 9

1,715 Sparta . G 5

370 Spread . G 5

504 Springfield . J 7

[242 Spring Place . C 2

1 62 Springvale . C 8

2 529 Statesboro . 17

621 Statham . E 4

149 Stella ville . H5

171 Sterling, Glynn. . . .J 9

645 Stillmore . H 7

1,062 Stone Mountain . . . D 4

1 97 Sugar Valley . B 2

125 Summertown . G 6

657 Summerville . B 2

4,361 Summerville, Rich¬ mond . H 5

566 Summit . H 6

336 Sumner, Worth ...E 8

259 Surrency . H 8

250 Suwanee . E 3

1,313 Swainsboro . H6

107 Swords, Morgan . F 4

296 Sycamore . E 8

1,400 Sylvania . 16

1,447 Sylvester . E8

1,081 Talbotton . D6

108 Talking Rock,

Pickens . D 3

2,117 Tallapoosa . B 2

85 Tallulah Falls . F 4

236 Tarrytown . G7

VI 97 Taylorsville . . C3

711 Temple . B 4

145 Tennga . . . . . .C 1

1,622 Tennille . G6

138 The Rock . D 6

1,645 Thomaston . D6

6,727 Thomasville . E 10

2,151 Thomson . ,.G5

2,381 Tifton . F9

125 Tiger . F 2

320 Tignall . G 4

242 Tilton . C2

3,120 Toccoa . F 2

404 Toomsboro . F 6

302 Trenton . B 2

1,721 Trion . B 2

Pop

295JTunnelhlll, Whitfield ’

/ C 2

263 Turin . C 5

786 Tybee, Chatham. . .J 7

276 Ty Ty . E 9

1,003 Unadilla . E7

534 Union City . C 4

1,363 Union Point . F 4

7,656 Valdosta . F 10

189 Van Wert, Polk . .B 4

1,776 Vidalia . H 7

75 VIdette . H 5

1,564 Vienna . E7

855 Villa Rica . B 4

326 Waco, Haralson . .B 4

872 Wadley . H 6

243 Waleska . . . D 3

112 Walnut Grove. ...E4

149 Waresboro . G 9

1,368 Warrenton . G5

151 Warthen . G5

226 Warwick . D 8

3,065 Washington . G 4

543 Wassaw, Chatham .J 8

483 Watkinsville . E4

19,869 Waycross . H 9

2,729 Waynesboro . 15

250 West Buford, Gwin¬ nett . D 4

319 Weston . C 8

1,906 West Point . B 6

627 Whigham . D 10

230 Whitehall, Clarke .F 4

|407 White Plains . F 5

[315 Whitesburg, Carroll B 4 50 White Sulphur Springs, Meri¬ wether . C 5

960 Willacoochee . F9

179 Williamson . D 5

443 Winder . E 3

2,204 Winokur . H 9

168 Winston . C 4

465 Winterville . F 4

155 Woodbine . I 10

917 Woodbury . C 6

189 Woodland . C 6

442 Woodstock . D3

162 Woolsey . D5

169 Worth . E 8

616 Wren . H 5

389 Wrights ville . G6

1 366 Yates ville . D 6

283 Young Harris . . . .E 2 602 Zebulon . D 5

rosebud, warhoo, cedar and buckeye. In north¬ east Georgia but little over 12 per cent of the land is under cultivation, because this part of the State is thinly inhabited ; but many of the tillable lands have a very rich, dark red soil. Little Tennessee Valley in Rabun County and Nacoochee Valley in White County are noted for fertility, bearing all kinds of crops, fruits and grasses. About 75 per cent of the whole area known as middle Georgia is under cultivation. The central cotton region of the State includes the southern part of middle and large areas of southern Georgia. This region embraces the sand and pine hills belt, the red hills belt and the yellow loam region. The first of these covers about 3,000 square miles, the other two about 12,000 square miles. Large crops of corn and cotton are raised throughout this area ex¬ cept in the sand hills belt. In the long-leaf pine region there are 17,000 square miles and here the vast forests of long leaf pine have been a great source of wealth to the State, but less now than formerly. Wherever the timber lands are cleared, they are being put under cultivation. The marls and swamp muck found in this section, when mixed, form a cheap and excellent fertilizer. The pine and palmetto flats around Okefinokee swamp furnish large quantities of long leaf pine, cypress and saw palmetto, while along the creek-bottom and hummock lands are found these same trees, black-gum, tupelo-gum, titi and maple. The coast region,

about 2,045 square miles, includes the savannas, live-oak lands and islands. The coast ˆ lands from the Savannah to the Saint Mary's River are noted for magnificent live oaks, also red and water oaks, red cedar, hick¬ ory, chinquapin, sassafras, cabbage and the blue palmetto. Along the coast lands rice is culti¬ vated, and the Georgia sea islands produce the larger part of. the finest cotton known to com¬ merce. All over middle and southern Georgia grows the sugarcane, richer in saccharine mat¬ ter than any other known plant from which sugar is extracted.

By reason of its more than 4ˆ2° of latitude and different altitudes of its various sections, Georgia produces the crops and fruits of every section of the Union, and on its sea islands and extreme southern section of its mainland many of those of the tropics, such as oranges, lem¬ ons, bananas, etc. Pomegranates and figs are found all over the State.

The census of 1900 gave the total value of Georgia's agricultural products at $86,345,343. The census of 1910 gave the value of Georgia's agricultural products as $226,595,436, an in¬ crease of 162.4 per cent. The value of all farm property according to the census of 1900 was $228,374,637, and by the census of 1910 was $580,546,381, an increase of 154.2 per cent. The Georgia cotton production for the five years from 1911 to 1915 gives a five-year average of 2,323,000 bales per annum. The largest yearly production during that period was 2,794,000 bales in 1911 and the smallest was 1,812,000 bales in 1912. The crop of 1915 was 1,937,000 bales. The five-year average of Georgia's cot¬ ton crop was $142,429,000. The largest yearly value of the cotton crop in Georgia was $174,- 540,000 in 1913, and the lowest $119,400,000 in 1912. The value of the crop in 1915 was $139,- 570,000, In any ordinary year the peach crop

of Georgia is worth at least $4,000,000, and in some years it will far exceed those figures. Georgia outranks all the States in the number and quality of her watermelons.

Stock raising is very profitable to those who engage in it. In southern Georgia cattle and sheep need very little shelter and for only a few weeks of the winter. The number of specified domestic animals in 1918 was : Dairy cows, 435, 000 ; Other neat cattle, 755,000; horses, 130,000; mules and asses, 334,000; sheep (lambs not included), 144,000; swine, 2,766,000. Of poultry there were 4,549,144 chickens, 103,416 turkeys, 208,997 geese and 64,895 ducks. The total value of domestic animals, poultry and ˆes in 1900 was $35,200,507 and 1910 it was ˆ80,393,993. an increase of 128.4 per cent. The average value of land per acre was $5.25 in 1900 and $13.74 in 1910, an increase of 161.7 per cent.

Geology and Mining. — There are three main geological divisions of Georgia. The Palaeozoic in the northwest embraces the counties of Dade, Walker, Catoosa, Whitfield, Chattooga, Floyd, and the greater parts of Murray, Gor¬ don, Bartow and Polk. Cambrian, Silurian, Devonian and Carboniferous formations are represented. The rocks are chiefly shales, sandstones, limestone, quartzites and cherts. This is a region of parallel valleys and moun¬ tain ridges in which are found valuable de¬ posits of coal, iron, aluminum (or bauxite), manganese and roofing slate. Hydraulic cement rock is found in large quantities in Bartow County. The crystalline area includes that por¬ tion of the State not in the Palaeozoic area that runs north of a line extending through Colum¬ bus, Macon, Milledgeville and Augusta. In this area are granites, schists and gneisses, and in the region which borders both the Palaeozoic and crystalline areas are found the marbles for which Georgia is so famous. The marble belt traverses Fannin, Gilmer, Pickens and Cherokee counties, the most important quarries being in Pickens County. Large quantities of granite and gneiss are found in many localities in the crystalline area.

The gold deposits are found in four belts. The first runs through Rabun, Habersham, White, Lumpkin, Dawson, Forsyth, Cherokee, Cobb, Bartow, Paulding, and Haralson counties. • The second belt traverses Rabun, Habersham, Hall, Gwinnett, Forsyth, Milton, De Kalb and Fulton counties. A third belt traverses Cobb, Paulding and Carroll counties. A fourth belt goes through Lincoln, Columbia, McDuffie, and Warren counties in the southeast part of the crystalline area. There are some irregular de¬ posits in Towns, Union, Gilmer, Fannin and Meriwether counties. The iron ores are in the Palaeozoic area. The brown iron ores are mined in Bartow, Polk and Floyd counties. The red iron ores are mined in Walker and Chattooga counties. Ochre occurs in Bartow County, manganese in Bartow and Floyd. The largets bauxite deposits are in Floyd and Bar¬ tow counties, but it occurs also in Polk, Walker and Chattooga counties. Corundum deposits are found in Rabun, Towns, Union, Haber¬ sham, Carroll and Heard counties. Laurel Creek mine in Rabun County near the Carolina line is the largest in Georgia, and one of the most noted in the United States. Pyrite is

found in Lumpkin County; copper in Murray and Fannin counties; graphite near Emerson; asbestos in several localities in the crystalline area ; talc in Murray, Fannin and Cherokee ; mica in Union and Fannin; barite in Bartow. Of precious stones amethysts are found in Rabun County, a few diamonds in Hall County, some good moonstones in Upson County. Rubies and sapphires of small size have been found in the northeast part of the

crystalline area. The coal fields of Georgia are in Dade and Walker counties.

Limestone beds of good quality for both calcimining and building purposes are found in the Palaeozoic area and in Hall and Haber¬ sham counties in the crystalline area. Lime¬ stone for calcimining is also found in different localities in the coastal plain region, which takes in all the southern portion of Georgia. In this region are found marls and phosphates. Through all that part of the State north of the fall line, which runs from Columbus through Macon to Augusta, are found clays suitable for the manufacture of common brick and the coarser grades of earthenware, while imme¬ diately below the fall line in a narrow belt across the State are clays suitable for the manu¬ facture of porcelain, enameled brick, china- ware, terra-cotta, sewer pipes, etc. The annual output of all the mineral products of Georgia is nearly $5,000,000.

Manufactures. — Georgia stands in the front rank of the Southern States in the variety and value of its manufactures and the number of its manufacturing establishments.

The latest report of "textile mills in Georgia is that issued by the Georgia Department of Commerce and Labor under date of 31 Dec. 1917. It is as follows: 171 mills; capital, $60,- 513,980.76; spent for raw material, $102,992,- 982.03 ; value of manufactured products, $147,- 405,1 32.33. These products were from coarse to the finest cotton fabrics. There were 2,448,- 260 active spindles and 46,038 active looms. The wage earners numbered 42,011 and their wages amounted to $18,577,577.44.

The textile mills include cotton, woolen, knitting mills and one silk mill. Besides these there are manufactories of pants, overalls, shirts, garments for women and children, awn¬ ings, tents and mattresses. Among other manu¬ facturing interests the most important are printing establishments, flour and grist mills, furniture factories, brass, steel and iron works, foundries, blast furnaces, carriage factories, car shops, blacksmithing and wheelwrighting, brick, tile and pottery manufactories, marble and stone works, manufactories of paints, chemicals and ice; electric light plants, carpen¬ ter work, canning factories, creameries and numerous others.

The cotton oil mills in operation in 1901 numbered 58. They paid above $5,000,000 for cotton seed, which they manufactured into various products, valued at $14,000,000. The fertilizer factories registered with the Com¬ missioner of Agriculture for the season of 1902-03 numbered 82, many of them being of great capacity and having an immense trade all over the Southern States. The cotton oil mills in 1917 numbered 180, and manufactured products to the value of $52,000,000. The fertilizer

factories and mixing plants in 1917

numbered 303, and sold products valued at

$41,640,000.

The United States Department of Com¬ merce in April 1916 gave for Georgia the fol¬ lowing comparative summary of total manu¬ factures for 1914 and 1909. Capital in 1914 was $258,849,000 as compared with $202,778,000 in 1909; cost of materials in 1914 was $160,199,- 000 as against $116,970,000 in 1909; value of products $253,320,000 in 1914 as against $202,- 863,000 in 1909; value of products, less cost of materials, in 1914 was $93,121,000 against $85,- 893,000 in 1909. (

Railroads. — The total steam railroad mile¬ age of Georgia in 1917 is 7,385, and the electric lines will increase this to above 8,000 miles.

Highways. — Georgia has 80,000 miles of public roads, of which 40,000 can be traveled by automobile. The highway commissioners, in co-operation with the counties and aided by the Federal government, hope to have 5,500 miles of perfect highway within the next five years.

Telegraph and Telephone Lines. — Georgia ably supplements the United States postal routes and free deliveries with 207,000 miles of telephone wires and more than 100,000 miles of telegraph wires.

Electric Lights.— More than 160 towns and rural retreats are lighted by electricity, also many country homes near cities and large towns.

Banks and Finances. — Georgia has 638 state banks with 25 branch banks, which have a capital of $28,388,701.89, a surplus of $18,026,- 660.75, and deposits of $108,269,388.76. Georgia's national banks number 111, and have a capital of $14,653,000, a surplus of $9,- 509,000 and deposits of $95,572,000. The Fed¬ eral Reserve Bank of the 6th regional district is located in Atlanta. In 1910 the assessed valuation of Georgia's property, including pub¬ lic utilities, was $766,787,139 ; the bonded debt was $6,844,000, and the tax rate was $5 per $1,000. The assessed valuation in 1915 was $951,763,472; the bonded debt was $6,844,000, and the tax rate $4.80 per $1,000.

Religion. — The number of communicants in the various Christian bodies in Georgia is approximately as follows: Baptists, 672,000; Methodists, 420,000; Presbyterians, 30,000; Episcopalians, 12,000; Disciples, 10,000; Roman Catholics, 25,000. The Hebrews in Georgia number about 7,000.

Education. — In the public school system there are 8,363 schools, of which

4,985 are for whites and 3,378 are for negroes. The total number of teachers is 14,382, of which 10,013 are white and 4,369 colored. The number of normal trained teachers is 5,548, of which 4,424 are white and 1,124 colored. The total number of children of school age is 795,484, of which the whites number 429,011 and the colored 366,473. The total enrolment is 625,- 854, the whites being 385,167 and the colored 240,687.. The above figures are for 1915, dur¬ ing. which year the attendance was 422,838, of which 273,388 were white and 149,450 colored. The per cent of attendance was 70.9 for white and 62 for colored. The amount of money given by the State for the support of the public schools in 1915 was $2,700,000, and the amount raised by local taxation was $2,387,729. a total of $5,087,729. The total number enrolled in

State colleges was 5,073 ; in denominational and private colleges, 4,588. In negro institu¬ tions, 1,544. The private schools below college grade would add to the above enrolment some 5,000 more.

Schools of Higher Learning. — In addition

to Georgia's excellent public school system, she has many colleges, also schools where special industrial work is done. A list of the schools of higher learning is as follows: Georgia Nor¬ mal and Industrial College, for girls, and Georgia Military College (Milledgeville) ; Au¬ burn College, Christian (Auburn) ; Mercer University, Baptist, including the Mercer Law Schools and the Mercer School of Pharmacy; Wesleyan College, Methodist Episcopal Church, South, the oldest chartered institution for females in the world; Saint Stanislaus, Catholic ; Mount de Sales, Catholic ; Georgia School for the Blind, White Department (Macon) ; First District Agricultural School (Statesboro) ; Fourth District Agricultural School (Carrolton) ; Chatham Academy, an en¬ dowment school from the early colonial days (Savannah) ; Rhinehart College, Methodist Episcopal Church, South, co-ed. (Waleska) ; University of Georgia, with Academic, Law School of Pharmacy; State Normal School, co-ed; Georgia State College of Agriculture; Lucy Cobb Institute (Athens) ; Seventh Dis¬ trict Agricultural School (Powder Springs) ; Eleventh District Agricultural School (Doug¬ las) ; Agnes . Scott College, Presbyterian; Donald Frazier Institute (Decatur, DeKalb County) ; Emory University, Methodist Epis¬ copal Church, South (Decatur, Atlanta) ; Shorter College, Baptist (Rome); Georgia In¬ stitute for the Deaf, White Department (Cave Springs) ; Atlanta Medical College (Emory University, Methodist Episcopal Church, South) ; Emory Theological Department; Marist Col¬ lege for Boys,

Catholic ; Georgia College of Eclectic Medicine and Surgery; Atlanta Dental College; Southern Dental College; Atlanta Col¬ lege of Pharmacy; Atlanta Law School; At¬ lanta Theological Seminary, Congregational; Georgia School of Technology (Atlanta, Ful¬ ton County) ; Emory University, Methodist Episcopal Church, South ; Oglethorpe Univer¬ sity, Presbyterian (Atlanta, DeKalb County) ; Cox College for girls, Baptist; Georgia Mili¬ tary Academy (College Park) ; Ninth District Agricultural School (Clarkesville) ; Piedmont College (Demorest) ; Brenau College, Female; Riverside Military Academy (Gainesville) ; Tenth District Agricultural College (Granite Hill, near Sparta) ; Warthen College (Wrights- ville) ; South Georgia Normal College (Valdosta) ; North Georgia Agricultural Col¬ lege (Dahlonega) ; Bessie Tift College, Bap¬ tist (Forsythe) ; Brewton-Parker Institute, Baptist (Mt. Vernon- Ailey) ; Eighth District Agricultural College (Madison) ; North High¬ land Industrial School (Columbus) ; Emory College, Methodist Episcopal Church, South (Oxford); Gordon Institute, for boys and girls ; Sixth District Agricultural School (Barnes- ville) ; Andrew Female College, Methodist Episcopal Church, South (Cuthbert) ; Academy of Richmond County, one of the Colonial en¬ dowed schools ; Georgia Medical College, a branch of the State University (Augusta) ; Third District Agricultural School (Ameri- cus) ; South Georgia College, Methodist Epis¬

copal Church, South (McRae-Helena) ; Second District Agricultural School (Tifton) ; Young Harris College, Methodist Episcopal Church, South, for boys and girls (Young Harris) ; Hiawassee College, Baptist, for boys and girls (Hiawassee) ; LaGrange Female College, Methodist Episcopal Church, South ; Southern Female College, Baptist (LaGrange) ; Fifth District. Agricultural School (Monroe).

Institutions for Negroes. — Atlanta Uni¬ versity, Clarke University, Morehouse College, Morris Brown College, Spelman Seminary (At¬ lanta) ; Payne College, Methodist Episcopal Church, South (Augusta) ; Georgia School for the Deaf, Colored Department (Cave Springs) ; George School for the Blind, Colored Depart¬ ment (Macon) ; Georgia State Industrial Col¬ lege (Savannah).

Benevolent Institutions.— There are in Georgia a number of noted benevolent institu¬ tions. Some of the more important are given below: Hebrew Orphan Home; Old Ladies' Home ; Florence Crittenden Home ; Confed¬ erate Soldiers Home (Atlanta) ; Augusta Or¬ phan Home (Augusta) ; Orphan Home of the North Georgia Conference (Decatur) ; Bap¬ tist Orphan Home (Hapeville) ; Orphan Home of South Georgia Conference; Appleton Home for Girls ; Episcopal Home for Old Ladies ; Georgia Industrial Home; Masonic Home (Macon) ; Georgia State Sanitarium (Milledge¬ ville) ; Bethesda Orphan Home, founded in 1739 by

George Whitfield; Abram's Home for Widows; Saint Francis Orphan Home, Catholic; Savannah Female Orphan Asylum; Episcopal Orphan Home; Saint Mary's Or¬ phan Home (Savannah).

The following are benevolent institutions for colored: Carrie Steele Orphan Home, Leonard Street Orphan Home (Atlanta) ; Colored Orphan Home and Industrial School, Chatham Colored Orphan Home (Savannah, Chatham County) ; Negro Orphan Home (Augusta) ; Negro Orphan Home (Macon).

Local Tax Counties. — The following counties supplement the State public school fund with a local school tax: Bacon, Ben Hill, Bibb, Bryan, Burke, Butts, Camden, Chatham,' Clarke, Clinch, Coffee, Columbia, Crisp, DeKalb Echols, Emanuel, Fulton, Glascock, Glynn, Han¬ cock, Hart, Henry, Houston, Irwin, Jasper, Jeff Davis, Jenkins, Jones, Lee, McIntosh, Mitchell, Monroe, Montgomery, Morgan, Muscogee, Newton, Pulaski, Quitman, Rabun, Randolph, Richmond, Screven, Spalding, Stewart, Talbot, Terrell, Tift, Walton, Wayne, Wheeler, Worth.

State Government.— The State constitu¬ tion adopted in 1877 carefully guards the rights of the people and prevents extravagant appro¬ priations by the legislature. The governor is elected for two years and receives a salary of $5,000. The state-house officers are : the attor¬ ney-general, comptroller-general, adjutant-gen¬ eral, treasurer, secretary of state, state school commissioner, commissioner of agriculture, commissioner of commerce and labor, State geologist, State librarian, commissioner of pen¬ sions, three prison commissioners and three railroad commissioners. The prison commis¬ sioners have charge of prisons and of highways. The Supreme Court consists of one chief jus¬ tice and five associate justices. The Court of Appeals consists of six judges. There are 28 superior court circuits, each having a judge

and a solicitor. Georgia is represented in the national Congress by two senators and 12 repre¬ sentatives.

Population and Division. — The population of Georgia at each census is as follows: (1790)

82,548; (1800) 162,686; (1810) 252,433; (1820) 340,985; (1830) 576,823 ; (1840) 691,392; (1850) 906,185; (1860) 1,057,286; (1870) 1,184,109; (1880) 1,542,180; (1890) 1,837,353; (1900) 2,-

216,331; (1910) 2,609,121. The total white population in 1900 was 1,181,109, and the total colored 1,034,998. There are 152 counties in the State. The total white population in 1910 was

I, 431,802, and the total negro population was 1,- 176,987. There were also 95 Indians, 233 Chi¬ nese and 4 Japanese. The total native popula¬ tion was 2,593,644 and the total foreign 15,477. In 1920, Georgia, according to the United States census, had a population of 2,895,832.

Of 3 72 incorporated places in Georgia 73 had a population in 1920 of more than 2,000 and 26 of these had a population in excess of 5,000. Atlanta, the capital, had 200,616; Savannah, the chief seaport, had 83,252; Augusta, one of the greatest cotton manufacturing cities of the South, had 52,548 ; Macon had 52,995 ; Colum¬ bus, another great cotton manufacturing city, had 31,125. Other cities of the State having over 7,000 inhabitants in 1920 are : Albany,

II, 555; Athens, 16,748; Brunswick, 14,413; Americus, 9,010; Rome, 13,252; Griffin, 8,240; Waycross, 18,068; Valdosta, 10,783; La Grange, 17,038; Dublin, 7,707; Newman, 7,037, and Thomasville, 8,196.

History. — A charter for the establishment of the colony of Georgia was obtained from George II, king of England, in June 1732, by a number of benevolent gentlemen of London, whose design was to found a home for the poor of Great Britain and a place of refuge for the Salzburgen and other persecuted sects of the continent of Europe. The colony was also in¬ tended as a military settlement to serve as a barrier against encroachments of the Spaniards upon South Carolina. Gen. James Edward Oglethorpe, a man of great liberality and of marked ability and experience in military af¬ fairs, being selected by the trustees as governor, brought over 116 emigrants. Landing at Yama- craw Bluff on 12 Feb. 1733, they laid the foun¬ dations of the city of Savannah and colony of Georgia. At first rum and slavery were prohib¬ ited, but in 1747 these restrictions were removed. During the 10 years of Oglethorpe's adminis¬ tration many settlers of a very desirable kind were brought into the colony, peace with the Indians was secured by treaties, their lands being in every instance procured by purchase, a formidable Spanish invasion was defeated, John and Charles Wesley and George Whitfield preached to the people and Whitfield founded the Orphan Home at Bethesda, a few miles from Savannah. In 1752 the trustees of Geor¬ gia surrendered their rights to the Crown and in 1754 John Reynolds was appointed governor. At the close of the French and Indian War the boundaries of Georgia, which had embraced a territory between the Savannah and the Alta- maha rivers, were extended to the Mississippi on the west, and to latitude 31° and the Saint Mary's River on the South. Subsequently they were extended on the south to lat. 30° 21′ 39". Georgia

united with other colonies in resisting the aggressions of the mother country. On 11

May 1775 Col. Joseph Habersham and Com¬ modore Bowen and 30 volunteers seized the powder magazine at Savannah and secured 13,000 pounds of powder, of which the Georgia authorities sent 5,000 pounds to the Conti¬ nental army at Boston. In March 1776 the Georgians under Colonel McIntosh aided by the Carolinians under Colonel Bull burned three and disabled six' out of 11 merchant vessels which under the protection of some British war ves¬ sels were endeavoring to carry on trade with some loyalist planters. In April 1776 Georgia instructed her delegates in Congress to vote for Independence. The signers of the Declaration on the part of Georgia were Button Gwinnett, Lyman Hall and George Walton. In December 1778 the British captured Savannah and early in 1779 Augusta. But the Carolinians under Andrew Pickens and the Georgians under John Dooly and Elijah Clarke by the victory of Kettle Creek recovered Augusta. Subsequently the British defeated Ashe at Brier Creek and repulsed the combined attack of the Americans under Lincoln and the French under D'Estaing at Savannah. This battle at Savannah was one of the most important conflicts of the Revolu¬ tion. After the fall of Charleston, S. C., in 1780, the British overran all eastern Georgia. But Col. Elijah Clarke made a desperate effort to retake Augusta. Failing, he tried again in 1781 and by the assistance of Pickens and (

In 1802 Georgia ceded to the Federal gov¬ ernment all her lands west of the Chattahoo¬ chee embracing the greater part of the present States of Alabama and Mississippi. In 1807 Milledgeville became the capital. During the second war with Great Britain 1812-15 the Georgians under Gen. John Floyd gained sev¬ eral battles over the Indians and shared with the Tennesseeans in the decisive victories won over the savages by Gen. Andrew Jackson. In the Mexican War, Georgia's sons were distin¬ guished, among whom Col. James S. McIntosh was killed at Molino del Rey and W. H. T. Walker was desperately wounded at Chapulte- pec.

Georgia seceded from the Union 19 Jan. 1861 and furnished to the Confederate army 94 regiments and 36 battalions, embracing every arm of the service. On Georgia soil were fought the battles of Chickamauga, Ringgold, Resaca, New Hope Church, Kennesaw Moun¬ tain, Peach Tree Creek, Atlanta, Jonesboro, Allatoona and numerous smaller engagements and skirmishes. At the close of the Civil War, Georgia resumed her enterprises in every indus¬ trial line, not waiting even for her re-entrance into the Union, which occurred in 1870. Dur¬ ing the Spanish-American War Georgia fur¬ nished more volunteers in proportion to popu¬ lation than any other State.

Among prominent Georgia citizens have been Gen. Joseph Wheeler, William H. Craw¬ ford, Tohn McPherson Berrion, George M.

State Capitol at Atlanta

Troup, George R. Gilmer, Herschel V. John¬ son, Howell Cobb, Robert Toombs, Alexander H. Stephens, Joseph E. Brown, John B. Gordon, Alfred H. Colquitt, Benjamin H. Hill, Sidney Lanier, Frank Starton, Charles Hubner, James R. Randall, Dr. F. O. Ticknor. Some of the above list of prominent Georgians were born in other States, but they belong to the list of Georgia citizens. Dr. J. Crawford Long, the discoverer of anaesthesia ; Bishop George F. Pierce, and a long list of able governors too numerous to name here. Between 1868 and 1870, in Augusta, pupils of the author of this sketch, included Woodrow Wilson, now Presi¬ dent of the United States; Joseph R. Lamar, late justice of the United States Supreme Court, and Pleasant Stovall, former United States Minister to Switzerland.

The following is a complete list of the gov¬ ernors of Georgia :

UNDER THE TRUSTEES.

James Edward Oglethorpe . 1732-1743

William Stephens . 1743-1751

Henry Parker . 1751-1754

UNDER THE CROWN.

John Reynolds . 1754-1757

Henry Ellis . 1757-1760

James Wright . 1760-1782

Governor Wright fled the colony, when in 1776 the patriots seized the reins, but soon after the capture of Sa¬ vannah on 29 Dec. 1778, returned as royal governor for all that part of Georgia in the hands of the British. He remained in that capacity until 11 July 1782, when Savannah was formally surrendered to the Americans who had recovered all upper Georgia on 5 June 1781, when Pickens, Lee and Clarke captured Augusta

and its British garrison.

UNDER THE AMERICAN RULE IN THE COLONIAL PERIOD.

Wm. Ewen, President of the Council of Safety and recog¬ nized by the patriots as

Governor . . 1775-1776

Archibald Bulloch, President of the Provincial Council

and Commander-in-Chief. 20 Jan. 1776—22 Feb. 1777 Button Gwinnett with same

title . 22 Feb. 1777-8 May 1777

UNDER THE STATE CONSTITUTION ADOPTED IN 1777

John A. Treutlen .

John Houston .

John Wereat, President of Executive Council, Acting

Governor .

George Walton .

Richard Howley .

Stephen Heard, President of Executive Council" and

Acting Governor .

Nathan Brownson .

John Martin .

Lyman Hall .

John Houston .

Samuel Elbert .

Edward Telfair .

George Mathews .

George Handley .

George Walton, Democratic-

Republican .

Edward Telfair, Democratic-

Republican .

George Mathews, Demo¬ cratic-Republican .

Jared Irwin, Democratic-

Republican .

James Jackson, Democratic- Republican .

8 May 1777-8 Jan. 1778 8 Jan. 1778-29 Dec. 1778

29 Dec. 1778-4 Nov. 1779 4 Nov. 1779-7 Jan. 1780 7 Jan. 1780-7 Jan. 1781

7 Tan. 1781-15 Aug. 1781 15 Aug. 1781-8 Jan. 1782

8 Jan. 1782-9 Jan. 1783

1783

1784

1785

1786

1787

1788

1789- 90 !

\

1790- 93 ’

1793-96

1796-98

1798-1801

Beginning under the State constitution of 1777 and continuing under the State _ constitution of 1798, in which there was a clause forbidding the African slave trade m Georgia.

UNDER THE STATE CONSTITUTION OF 1798.

David Emanuel . Democratic-Republican. 1801

Josiah Tattnall . “ “ 1801-02

John Milledge .

1802-06

Jarerd Iwin . Democratic- Republican.

David B. Mitchell .

Peter Early . . • .

David B. Mitchell .

William Rabun . “

Mathew Talbot . “

John Clark .

George M. Troup . “

John Forsyth . “

George R. Gilmer . National Republican

(later Whig) .

Wilson Lumpkin . Democrat .

William Schley . “ .

George R. Gilmer . Whig .

Charles J. Macdonald . . Democrat .

George W. Crawford. ... “ .

George W. B. Towns. . . “ .

Howell Cobb . “ . . .

Herschel V. Johnson.. . . “ .

Joseph E. Brown . “ .

James Johnson . “ .

Charles J. Jenkins . “ .

Gen. T. H. Ruger . Military .

1806-09

1809-13

1813-15

1815-17

1817-19

1819

1819-23

1823-27

1827-29

1829-31

1831-35

1835-37

1837-39

1839-43

1843-47

1847-51

1851-53

1853-57

1857-65

1865

1865-67

1867-68

UNDER THE STATE CONSTITUTION OF 1868.

Rufus B. Bullock . Republican . 1868-71

Benjamin Conley . “ . 1871-72

James M. Smith . Democrat . ■ . 1872-77

Alfred H. Colquitt . “ . 1877-82

First term under State constitution of 1868, the second under State constitution of 1877.

OTHER GOVERNORS UNDER THE STATE CONSTITUTION OF 1877.

Alexander H. Stephens. . Democrat . 1882-83

Henry D. McDaniel…. “ . 1883-86

John B. Gordon . “ . 1886-90

William J. Northen. ... “ . 1890-94

William Y. Atkinson .. . “ . 1894-99

Allen D”. Candler . “ 1899-1903

Joseph M. Terrell . “ . 1903-07

Hoke Smith . “ . 1907-09

Joseph M. Brown . “ . 1909-11

Hoke Smith . “ (1 July- 15

Nov.) . 1911

Joseph M. Brown . “ . 1911-13

John M. Slaton . “ . 1913-15

N. E. Harris . “ . 1915-17

Hugh M. Dorsey . “ . 1917-21

Bibliography. — Bulletins of the Geological Survey of Georgia (1914 et seq.) ; Brooks, (History of Georgia) (Philadelphia 1913) ; Derry, (Story of Georgia5 (Chicago 1913) ; Evans, (History of Georgia5 (New York 1903) ; Jones, (History of Georgia to 1783 5 (Boston 1883) ; McCallie, (Mineral Resources of Geor¬ gia5 (Atlanta 1911) ; McElreath, (The Con¬ stitution of Georgia5 (Atlanta 1911) ; McPher¬ son, Government of the People of the State of Georgia5 (New York 1913) ; Stephens, (\Var between the States5 (Philadelphia 1879) ; Stevens, Wright and Derry, Georgia, Historical and Industrial5 (Atlanta 1901) ; White, Statis¬ tics of the State of Georgia5 (Savannah 1849), and (Historical Collections of Georgia5 (New York 1855).

Joseph T. Derry.

GEORGIA, South, an island in the south Atlantic, 850 miles east-southeast of the Falk¬ land Islands, of which it is a political de¬ pendency. It is 120 miles long from northwest to southeast and 30 broad; its coasts are rock-bound and more or less precipitous, but the sea locks afford excellent anchorage. Inland a range of mountains culminates in Mount Paget (8,383 feet). Whaling is the only industry. Pop. over 1,000.

GEORGIA, Strait of, a large inlet of the North Pacific Ocean, between the continent of North America and Vancouver’s Island; about 250 miles in length from north to south; the breadth varies greatly in its different parts, from 6 miles to 25. It communicates with the ocean on the north by Queen Charlotte’s Sound, and on the south by the Strait of Juan de Fuca.

GEORGIA, University of, an important university which is at the head of State educa¬ tion in Georgia. It was chartered in 1785 and is the oldest State university. The charter co¬ ordinates primary and secondary schools with the university in the scheme of education by the State. The institution was located at Athens, and began academic work in 1801. This is the parent institution and includes four colleges: (1) Franklin College, the college of the liberal acts. (2) State College of Agricul¬ ture and the Mechanic Arts, on the Morrill foundation. (3) Law School. (4) Graduate School. The phrase ((University of Georgia® in the wider sense includes

the various colleges in different parts of the State which are declared by law to be "parts® of the university. These are: North Georgia Agricultural and Mechan¬ ical College, at Dahlonega; Medical College, at Augusta; School of Technology, at Atlanta; Georgia Normal and Industrial College, for women, at Milledgeville ; State Normal School, for men and women, at Athens ; Industrial Col¬ lege, for negroes, at Savannah. The university, in the collective sense, including students of college grade and those in professional schools and in its preparatory schools, had an attend¬ ance of about 5,000 in 1917. The members of the faculties number 165. These institutions are managed for the most part by local boards or commissions, but legal title and control of all of them is vested in the single board of trustees of the university. This is a unique feature of organization of the higher education of the State and differentiates it from the system of any other State. Understood in the narrower sense, the single institution at Athens has regu¬ larly from 350 to 400 students, and its income is $50,000 per annum. Among the alumni of national reputation are Howell Cobb, speaker of the House of Representatives for one ses¬ sion and (under Buchanan in 1857) Secretary of the Treasury; Alexander H. Stephens; John A. Campbell, justice of the United States Su¬ preme Court; Senators Robert Toombs, Ben¬ jamin H. Hill, Augustus O. Bacon; Joseph and John LeConte, afterward president and pro¬ fessor in the University of California Henry Timrod, poet ; Henry W. Grady and J. L. M. Curry, diplomat and educator. As the univer¬ sity is a State institution, tuition is free for residents of Georgia in all schools except the professional schools; non-residents pay a small fee.

GEORGIA BARK, a small tree, Pinck- ueya pubens, of the Southern States, closely re¬ sembling the cinchona or Peruvian bark, and belonging to the family Rubiacea. It has pretty large white flowers, with longitudinal stripes of rose-color, disposed in beautiful clusters at the extremities of the branches ; each flower is ac¬ companied by a floral leaf, bordered with rose- color near the upper margin ; the corolla is tubular ; the stamens five, with a single style ; and the capsule contains two cells and nu¬ merous seeds. The wood is soft a.nd is there¬ fore unfit to be used in the arts. The inner bark is extremely bitter, and is employed with success in intermittent fevers.

GEORGIA SCHOOL OF TECHNOL¬ OGY, a scientific institute at Atlanta, Ga., founded in 1888, and forming part of the Uni¬ versity of Georgia. It has a hospital, medical

school, Y. M. C. A. building and a large athletic field. It has also modern electrical, mechanical and civil engineering laboratories. The value of the plant is about $800,000. The library con¬ tains 15,000 volumes. It has 60 instructors and 1,000 students in all departments.

GEORGIAN ARCHITECTURE, a neo¬ classic style of architecture that flourished in England from about 1715 to 1820, during the reigns of the four Georges, from whom it de¬ rives its name. It is a modified form of the Italian or Palladian style, divested of excessive ornamentation and was well adapted for do¬ mestic architecture and interior decoration, and is to be found throughout the United States in buildings of the Colonial period, where it is known as the Colonial or old Colonial style. Among its prominent exponents were Gibbs, Campbell, the brothers Adam, Chambers and Dance; Somerset House and the church of Saint Martinls-in-the-Fields, London, are fine types of the style. It was abandoned during the architectural stagnation in the second quarter of the 19th century, and was followed by the Gothic and Greek revivals. Consult Wallis, F. E., (The Georgian Period) (3 vols., Boston 1898-1902).

GEORGIAN BAY, Canada, formerly Lake Manitoulin, the northeastern part of Lake Huron, partly separated from the main body of the lake by the peninsula of Cabot's Head and the island of Great Manitoulin, prov¬ ince of Ontario. It is about 120 miles long and 50 broad.

GEORGIAN SERIES. See Geology;

Cambrian System.

GEORGIANS, or IBERNIANS, or GRU- SINIANS. The people (about 600,000) who speak the Georgian language call themselves Karthveli, but are also named Grusini, and in¬ habit the valley of the upper and middle Kur, those of the Rion and Tchoruk, as far as the promontories of the Ararat chain and north to the Alazan, beyond which their language is mixed with the tongues of Shirvan and Dag¬ hestan as far as the Caspian Sea. Probably descendants of the Colchi and Albani, they were anciently called Iberi, and, according to tradition, are akin to the Armenians, although their language differs from the Haikanian (Somasi in Georgian), and is believed by their learned prince Theimuraz to be primitive. Brosset and Voss (1847) place it among the Indo-European languages. It consists of sev¬ eral dialects, namely: The Karthveli or Geor¬ gian proper in the centre, the Kakheti and Imerethi next, then the Mingreli and Guri, and more remotely the Suani and the Lazi, which reaches almost to Trebizond. A colony trans¬ ported into Asterabad in Persia in 1622 is said to speak a purer idiom than any of those now spoken in Georgia. Georgian literature is mostly founded on that of Greece, with which country relations were very intimate, and it reached its highest development in the 17th and 18th centuries. The Bible was partly translated in the 8th century, finished in the 18th and splendidly printed at Moscow, Tiflis and Saint Petersburg. Arabic and European works have also been translated into Georgian. We can mention but a few of the many remarkable national works. Among the

romances are the following: (TarieP (Of the Man in the Tiger

Skin), by Skhotta of Rusthvel, a general of the heroic queen Thamar, with a commentary by King Wakhtang VI (Tiflis 1793) ; 'Dared- jamiani0 (Deeds of Amiran, son of Daredjan, Bagdad), by the courtier Moses of Khom ; 'Visramiani0 (Love of the Princess Vis for Prince Ramin), somewhat resembling Rousseau's 'Heloise0 ;

GEORGICS OF VIRGIL, The. This work followed the

their verse form, and passages of exceedingly beautiful and emotional description and story whose connection with the subject of agricul¬ ture is hardly more than a matter of sugges¬ tion. They are at the same time artificial and simple; they are full of sympathy with the life of the humble, and ornamented with barren Alexandrian conceits. They are at the same time scientific and superstitious; in them the facts of experience and the scientific doctrines ° • Lucretius and the Greek specialists alternate with the traditional lore of miracles and por¬ tents. They are at the same time the poem with a purpose, written at the suggestion of the court to encourage a "back to the soil® movement by glorifying the life of orchard and field and pasture, and the product of real poetic inspiration.

*The inspirational quality of the 'Georgies0 goes far toward compensating for their un¬ evenness of texture. Many of the episodes in which the poem abounds are of the highest ex¬ cellence. No one can forget the beauty of such passages as the story of Orpheus and Eurydice at the end of the fourth book, or the praise of country life at the end of the second, or the praise of Italy in the same book. It is this last passage which Andrew Lang has in mind when he speaks of "Virgil, in one splendid passage,, numbering the glories of the land as a lover might count the perfections of his mis¬ tress.® Such is the splendor of digressions and episodes like these that the reader is carried over the more prosaic reaches without much loss of exaltation. They give the whole of the poem a strongly original and a strongly Roman character in spite of its many Greek features. It is full of the love of nature and of Italy, of sympathy with the simple manners, morals and religion of the farmer folk, of pride in the beneficent might * of the Roman state. The 'Georgies0 are really a national poem. Its ob¬ ject, aside from the aesthetic object of self- expression on the part of a poet whose heart was charged with love for a beautiful native land and pride in a great civilization, was, as Merivale says, "to recommend the principles of the ancient Romans, their love of home, of labor, of piety and order; to magnify their domestic*

happiness and greatness ; to make men proud of their country on better grounds than the mere glory of its arms and the extent of its conquests.® If Virgil is the sacred book of the Romans, as Homer was of the Greeks, the Georgies may be called, in the phrase of Myers, "the Psalm of Italy.® The 'Georgies0 may be read in the verse translation of Dryden, or the prose translations of Conington, Mackail and Fairclough. For appreciation, see article 2Eneid, The.

Grant Showerman.

GEOSYNCLINE, je-6-sin'klin, a trough¬ shaped fold of the earth's crust, which affects the strata to great depths. It is similar to the syncline. The term was first employed by J. D. Dana, who inferred the existence of such folds from the presence of sedimentary strata in many mountain ranges. See Folds ; Geology.

GEOTECTONICS. See Structural Ge¬ ology.

GEOTROPISM, je-ot'ro-pizm, the influ¬ ence which causes a tendency in plants and

animals to grow toward the centre of the earth ; it is defined by Dr. John Coulter as "sensitive- ness to gravity.® Geotropism in its simplest form, called "positive,® causes growth directly downward, as in the tips of roots, which strike straight down into the earth. So strong is this influence upon roots that they will turn from any abnormal position in which they are placed and bend downward until they reach and pene¬ trate the ground, — an adaptation for the preser¬ vation of plants against dislodgment by wind or water. The reverse of this is negative geotro¬ pism (apogeotropism), the influence which causes parts of plants, particularly stems, to grow away from the earth. A demonstration of these opposing influences in regulating plant- growth is found in the fact that when seedlings are caused to revolve continuously and rapidly for a period, their stems point and increase to¬ ward the centre of the centrifugal force, while the roots take the opposite line of growth. A third form of the tendency is called "diageotro- pism,® and leads parts subject to its influence, as runners and rhizomes, to grow horizontally; that is, in a direction at right angles to the plane of positive geotropism. This influence is seen in the tendency of branches and foliage to assume a horizontal position. In all these cases, however, the result is modified and com¬ plicated by influences of sunlight, moisture, etc., styled heliotropism, hydrotropism, chemotro-

pism, etc. (qq.v.) ; and sometimes, as in the case of twining plants, it is impossible at pres¬ ent to extricate them and assign to each its part in the result.

Geotropism, or the influence of gravity, has had a great effect, also, upon the forms of ani¬ mals, especially in determining proportions and strength of parts with reference to weight. As¬ sociated with other influences it determines the "instinct® which leads many of the lower forms of life to seek the earth whenever possible, or at the proper time, a striking example of which is found in those caterpillars which, born in tree-tops, migrate to the ground as soon as born or when ready to begin their metamorphoses.

GEPHYREA, jef-i-re'a, worms allied to the chsetopod annelids, but differing from them in not being segmented, though provided with bristles. The mouth is either surrounded with a circle of tentacles, or is overhung by a large broad "proboscis,® which in the European Bonellia may be several times as long as the body and forked at the end. The vent is either terminal or situated dorsally on the anterior end of the body. They possess a true blood system similar to that of annelid worms. The young free-swimming larvae of certain forms (Echinrus) are like the Trochophores (see Larva) of ordinary annelids. The male of Bonellia differs remarkably in shape and size from the female, being only one millimeter in length, while the female measures three inches, with a proboscis from 8 to 12 inches in length. Our most common form is Phascolosoma, which is cylindrical, its mouth surrounded with tentacles, the vent opens near the head, it is without bristles, and lives in dead shells, build¬ ing out the aperture by a conical tube of sand. Its larva is cylindrical, the head small, with a circle of cilia.

GEPIDiE, jep'i-de, a people of Gothic origin who settled about the mouth of the Vistula in

the 3d century. Before the 5th century they had migrated to the Lower Danube, where they were subjugated by the Huns; but, revolting against Attila's son, they recovered their free¬ dom and established themselves in Dacia. There their power grew so great that they levied tribute from the Byzantine emperors down to Justinian's days. In the end of the 5th cen¬ tury a powerful enemy arose to them in the Ostrogoths ; and after them came the Longo- bards, who, in alliance with the Avars, inflicted a crushing defeat on the Gepidae in 566. A part of the last named then submitted to the Avars, while a part accompanied the Longobards to Italy. Henceforward they passed out of his¬ tory.

GERA, ga'ra, Germany, a town in the prin¬ cipality of Reuss-Schleiz, on the right bank of the White Elster, 35 miles from Leipzig. Among the chief buildings are the castle, the old Trinity Church, the town hall (16th cen¬

tury), gymnasia, theatres, library, museum, town hospital, textile school, etc. It is the seat of important woolen manufactures ; other in¬ dustries being carpets, printing, machinery, brick and leather works, jewelry and nurseries. Gera was stormed by the Bohemians in 1450 and burned by the Swedes in 1639, and was again destroyed by fire in 1686 and 1780. Pop.

49,276.

GERACE, ja-ra'cha, Italy, city in Calabria, on the east slope of the Calabrian Mountains and the shores of the Ionian Sea, 34 miles northeast of Reggio, and 64 miles by rail. It is on the site of the celebrated Greek colony of Locri Epizephyrii. The cathedral, rebuilt in 1783, is partly of ancient materials. The dis¬ trict produces abundantly grapes, oranges, olives and grain ; and coal, iron and marble are worked in the neighboring mountains. Pop. of commune, 11,009.

GERAH, ge'ra, the smallest piece of He¬ brew money, being the 20th part of a shekel, or about three cents. Also, in Hebrew weights, a weight corresponding to the coin.

*GERAINT, a king who figures prominently in the Arthurian legends. He appears in (Geraint the son of ErbainC the Mabinogion romance founded on Chrestien de Troyes's (Erec et EnideC and also in Tennyson's (Geraint and Enid.**

GERALD DE BARRI. See Giraldus be

Barri (Cambrensis).

GERALDINI, ja-ral-de'ne, Allesandro,

the first Roman Catholic bishop of Santo Do¬ mingo : b. in Italy, 1455 ; d. in Santo Domingo, 1525. He was a soldier and served in the army of Spain against Portugal, 1475-76, be¬ fore taking orders. His learning and his friend¬ ship with Archbishop Mendoza, of Toledo, pro¬ cured for him the tutorship of the royal prin¬ cesses of Castile. He had great influence in the Spanish court, and is said to have first inter¬ ested Ferdinand and Isabella in behalf of Columbus. In 1520 he was made bishop of Santo Domingo, after having held many high places in Church and state. His residence and labors in the island, where he spent the re¬ mainder of his life, went far toward bringing law and order out of the chaos that followed upon the rule of the Spanish conquerors. His narrative of his journey thither and his de-

'?CiA?H°n- °fr Santo Domingo, printed in Latin t ooi;, is ot great value and interest. He also wrote a lite of Catharine of Aragon in verse.

GERANDO, zha'ron'do, Joseph Marie,

*gA*0* F/ench author : b. Lyons, France, 29 beb. 1772; d. Pans, 11 Nov. 1842. He became governor of Catalonia in 1812, and was pro¬ fessor ot public law in the law faculty of the University of Paris from 1828 to 1842. His works, treating law, philosophy and other sub¬ jects, include (Des signes* et de Tart de penser5 (1800); (Histoire comparee des sys- ternes de philosophie) (1803); Unstitutes de droit administrate5 (1829), and (1839).*

GERANIACE2E, je-ra-ni-a'se-e, the ge¬ ranium family, consisting of herbaceous plants or shrubs with opposite or alternate leaves, and white, red, yellow or purple flowers with five sepals and five petals. Eleven genera and about 500 species are known. They are found in temperate or hot climates, rarely in the arctic regions. They are often astringent and aromatic, abounding in vegetable oil.

GERANIUM, the typical genus of plants of the family Geraniacea? (q.v.), having pal- mately lobed leaves, regular flowers and a five- lobed ovary, terminated by a long thick beak and five stigmas. On coming to maturity the carpels separate from the base and become reso¬ lute or spiral. The spotted crane's-bill (G. maculatum) is a very familiar species in the eastern and northern United States. The root is astringent and has. been used medicinally. The tubers of G. parviflorum are eaten in Van Dieman's Land, where it is called the native carrot. Indian geranium is the name given by perfumers to a species of Andropogon. The so-called geraniums of gardens are mostly spe¬ cies of P elargonium, and are natives of south¬ ern Africa. See Crane's-bill; Pelargonium.

GERARD, zha'rar', Balthasar, French fa¬ natic: b. Villafons, Franche-Comte, 1558; d. 1584. Taking the name of Frangois Guion he joined the army of William of Orange and on 10 July 1584 assassinated the Prince at the entrance to the latter's palace at Delft. Gerard was put to death later in the same month. His family was ennobled by King Philip II.

GERARD, Cecile Jules Basile, French traveler: b. 1817; d. West Africa, 1864. He traveled much in Africa and earned for himself the soubriquet of <(Gerard, the Lion- Killer.® His adventures in Algeria are de¬ scribed in (La chasse aux lions5 (1855) and (Gerard, le tueur des lions5 (1858). He set out on a tour of West Africa in 1863 and met his death there by drowning the following year.

GERARD, Conrad Alexandre, French diplomat: b. Massevaux, Upper Alsace, 1729; d. 1790. As a young man he entered the diplo¬ matic service, serving as secretary of legation at Mannheim in 1753-59 and at Vienna in 1761- 66. In the latter year he became secretary of the council of state and chief clerk in the Bureau of Foreign Affairs. In 1778, acting under Vergennes, he conducted negotiations with Franklin, Deane and Lee, the result of which was the treaty of 6 Feb. 1778 by the terms of which France sided with the United States. In the following month he sailed to America as first French Minister to the United

States. In 1779 he was succeeded by Luzerne. He advocated a close alliance between France and the new nation and to this end subsidized many writers and congressmen. Yale conferred on him the degree of LL.D. After his return to his native country he was made a Councillor of State.

GERARD, Dorothea. See Longard de Longgarde.

GERARD, zha-rar', Etienne Maurice,

rrench marshal: b. Damvillers, Meuse France 4 April 1773; d. Paris, 17 April 1852. For his brilliant services at Austerlitz (1805) he was appointed general of brigade; he also took a notable part at Jena (1806), Erfurt (1806) and

a!o"aoni. • During the Russian campaign of 1812 he rendered conspicuous service at the capture of Smolensk in the battle of Valontina- Gora, and at the passage of the Beresina. In

1831 he commanded the French army sent to the assistance of the Belgians against the Dutch whom he drove out of Flanders, and 27 Dec!

1832 compelled the citadel of Antwerp to capitulate. After the July revolution of 1830 he was appointed marshal and War Minister by Louis Philippe; he was again War Minister from July to October in 1834.

GERARD, Frangois Pascal, a French por¬ trait and historical painter: b. of French parentage, Rome, Italy, 11 March 1770; d. Paris, 11 Jan. 1837. At 10 he was brought to r ranee, and at 16 became the pupil of David. In 1795 he exhibited (Belisarius,5 which first brought him into notice; shortly afterward he painted (Psyche receiving the First Kiss from Cupid. 5 His portrait of Madame Bonaparte in 1790 was the beginning of his career as the (XVIII.

GERARD, James Watson, American diplomat and lawyer: b. Geneseo, N. Y., 1867. Educated at Wilson and Kellogg's School, New York city, Saint Paul's School, Concord, N. H., Columbia University and New York Law

School, he was admitted to the bar in 1892 and commenced practising in New York, where he became counsel for several important corpora¬ tions. He figured in a number of prominent cases and in 1907 was elected a justice of the Supreme Court of the State of New York for the term 1908-21. Mr. Gerard joined the Na¬ tional Guard of New York as a second lieuten¬ ant, was made captain in 1892, and served on the staff of Gen. McCoskey Butt in the Spanish- American War.. In 1900 he was appointed quartermaster with the rank of major. He re¬ signed his seat on the bench in July 1913, when President Wilson appointed him United States Ambassador to Berlin. The European War brought Mr. Gerard conspicuously before the

public as the only representative of a great power left in Germany during the first two- and-a-half years of the conflict. The manage¬ ment of British interests in Germany were committed to his care when Sir Edward Gos- chen, the British Ambassador, left Berlin. In his – last report to the Foreign Office (8 Aug. 1914) Sir Edward made special mention of <(the great assistance rendered to us all by my Amer¬ ican colleague, Mr. Gerard, and his staff. Unde¬ terred by the hooting and hisses with which he was often greeted by the mob on entering or leaving the embassy, his Excellency came re¬ peatedly to see me to ask how he could help us,® and that he had extricated many stranded British subjects from difficult situations ((at some personal risk to himself.® For over two years it was Mr. Gerard's task to conduct the diplomatic negotiations between the American and German governments on the thorny prob¬ lems of international law involved in the Ger¬ man submarine campaign and the Allies' block¬ ade policy against Germany. During the time he also visited internment camps where British prisoners of war were held, and secured at least promises of improvement from the Ger¬ man military authorities in the treatment of British prisoners. These episodes and the nu¬ merous interviews he passed through with the Kaiser and German officials are described in the two books which he published in 1917 and 1918, (My Four Years in Germany1 and (Face to Face with Kaiserism.* On 3 Feb. 1917 Count Bernstorff, German Ambassador in Washington, was handed his passports and Mr. Gerard was recalled from Germany. Two months later the United States declared war on Germany. Mr. Gerard retired from the diplo¬ matic service in July 1917 and resumed his legal practice.*

GERARD, John, English surgeon: b. Nant- wich, Cheshire, 1545; d. 1612. He traveled much in early life and afterward settled in London, where he became superintendent of gardens to Lord Burghley, Queen Elizabeth's

Secretary of State. In 1608 he was elected master of the company of barber surgeons. He was also famed as a botanist and in 1596 published a catalogue of 1,039 varieties of plants. In 1597 he published his ˆHerballP The genus Gerardia was named by Linnaeus in his honor.

GERARD THE GREAT. See Groot.

GERARD DE NERVAL, zha'rar' de-nar'-

va', the pen-name of Gerard Labrunie, a French author: b. Paris, 21 May 1808; d. there, 25 Jan. 1855. His first book to attract atten¬ tion was a volume of poems, _ (Elegies Nationales. In 1828 he produced his transla¬ tion of Goethe's (Faust, > which brought him the author's personal approval and which Berlioz (q.v.) used largely as the score for his (La damnation de Faust.) Gerard also wrote several original plays ; was a regular contrib¬ utor to various periodicals, and published (Les illumines) and (Contes et faceties* (1852), (Scenes de la vie orientale) (1848-50). While insane he committed suicide. His writings were collected in five volumes in 1868.*

GfSRARD DE RAYNEVAL, ra'ne-val', Joseph Mathias, French diplomat : b. Masse- vaux, Upper Alsace, 1746; d. 1812. In 1767 he received his first appointment in the diplo¬

matic service as charge-d'affaires at Ratisbon, and two years later was removed to Dantzig in a similar capacity. In 1782 Vergennes sent him to England on a secret mission, which Franklin and the other American commissioners at Paris learned of, and suspected to be inimi¬ cal to the interests of their country. This it was that impelled them to conclude a pre¬ liminary treaty of peace with England con¬ trary to the instructions of Congress. In 1783- 92 Gerard was French Minister to England, and filled the post admirably during a most critical period in the relations of the two countries. After 1792 he lived in retirement during the re¬ maining years of the Revolution. Subsequently he engaged in journalism and studied history and international law. He wrote (Institutions du droit de la nature et des gens> (1803). Consult Masson, (Le department des affaires etrangeres pendant la revolution (Paris 1877).

GERARD THOM (and variously also Tunc, Tum, or Tenque), Italian monk, founder of the order of the knights hospitallers of Saint John of Jerusalem: b. Amalfi, about 1040; d. 1120. In the latter part of the 11th century he first visited Jerusalem, and while there was appointed the superior of a hospice for the convenience of pilgrims, and there he organized the religious order afterward so cele¬ brated, duly recognized by a bull of Pascal II in 1113.

GERARDMER, zha'rar'mar', France, cap¬ ital of a canton in the department of Vosges, on Gerardmer Lake, 35 miles east of Epinal. It has linen and cheese manufactories and is a favorite summer resort because of its splendid location in the mountains. It was so named from Gerard of Alsace, who built a tower here on the lake shore in the latter half of the 11th century. Pop. 10,500.

GERARDO DALLE NOTTI, ja-rar'dd

dal-le not'te. See Honthorst, Gerard van.

GERARDY, zhˆ'rar'de', Jean, Belgian musician : b. Spa, 1877. In 1884 he began the study of the violoncello under Bellmann, and in the following year entered the Verviers Con¬ servatory of Music. By 1888 he had become a finished virtuoso and left the institution. In the same year he made his debut in London, appearing the same night with Paderewski and Ysaye. He next toured Belgium, Holland, Ger¬ many, Russia and France. He visited the United States in 1899, where he appeared with Ysaye, Kreisler, Marteau and others. He made several subsequent visits to America, ap¬ pearing in 1914 with Ysaye and Godowsky.

GERASA, jer'a-sa, Palestine, an ancient city of Palestine, 20 miles north of Philadelphia and a like distance east of the Jordan. In 83 b.c. it was captured by Alexander Jannaeus, and was rebuilt by the Romans in 65 b.c. In the reign of Vespasian it was taken and burned by Lucius Annius. It was once the seat of a Christian bishop, but soon sank into decay. The modern name is Jerash. The ruins of the old city are extensive, many fine columns and walls attesting its former splendor. Consult photographs of the ruins published by the Palestine Exploration Fund (1867).

GERBA. See Jerba.

GERBER, gar'ber, Ernst Ludwig, Ger¬ man musical authority : b. Sondershausen, Ger-

many 29 sept 1746; d. there, 30 June 1819. He published (Historische-biographisches Lexi¬ con der Tonkunstler,) a work which, com¬ menced in 1790, was not completed until 1814.

GERBER, Johann Gottfried Heinrich,

German engineer: b. Hof, Bavaria, 1832; d.

At • received his education at Nuremberg and Munich. He was a successful designer of bridges and originated the ((1863)- (1870).

GERBERS. See Guebers.

GERBERT. See Silvester II.

GERBERT, Martin, Baron von Hornau, German Roman Catholic prelate: b. Horb, 1720;

r \v3:t He .was educated at the Tesuit school ot b reiburg m Breisgau, entered the Benedic¬ tine order in 1737 and became a priest in 1744. Subsequently he became professor of theology and abbot of the monastery in 1764. In 1759-62 he traveled throughout Europe seeking out old collections of musical literature housed in the monasteries. He wrote cDe Cantu et Musica Sacra} (1774). ‘ Monumenta Veteris Liturgke Alemannicae) (1777); (Scriptores Ecclesiastici . de Musica Sacra) (3 vols., 1784), his greatest work and still of the highest value for the his¬ torian of musical literature; < Codex Epistolaris Rudolphi P (1772) ; (Historia Nigrae Silvas Ordims Sancti BenedictP (1788). Consult the life by Misard (Paris 1867).

GERCKE, gar’ke, Alfred, German scholar: b. Hanover, 1860. He received his education at the universities of Bonn and Berlin, and in 1886-88 he was professor at the Luisen Gym¬ nasium of Berlin. He became privat docent at Gottingen in 1890, remaining until 1893. From 1895 to 1909 he held a professorship at Greifswald, and in the latter year removed in a similar capacity to the University of Breslau. He published numerous works on the writers of antiquity, including

GERDA, jer’da. (1) In Scandinavian my¬ thology, wife of Freyr and daughter of the giant Gymer; she is so beautiful that the brightness of her naked arms illuminates both air and sea. (2) In astronomy, an asteroid, the 122d found; discovered by Peters, 31 July 1872.

GEREZ, ha’res, Sierra de, Portugal, a mountain chain which ramifies from the moun¬ tains of Asturias and stretches between the basins of the Douro and Minho, from north to south, for about 18 miles. It consists generally of a succession of granite peaks, the loftiest of which, Murro de Burageiro, has a height of 4,296 feet.

GERFALCON, or GYRFALCON. See

Jerfalcon.

GERGONNE, ger’gun, Joseph Diez,

French mathematician: b. Nancy, 1771 ; d. 1859.

army 1ˆ92 and was attached to the Moselle division, taking part in the cele¬ brated battle of Valmy. After a brief course at. the Chalons artillerv school he was com¬ missioned lieutenant and took part in the cam¬ paign in the Pyrenees. Returning to Nimes, he was made professor of mathematics at the Lcole de Nimes; removed to Montpellier in 1816 as professor of astronomy, and in 1830 became lector of the academy there. His fame rests on his being one of the founders of modern pro¬ jective geometry and his enunciation of the principle of geometric duality. He published Annales de Mathematiques from 1810 to 1831.

GERGOVIA, the modern Gergovie, and in Roman times the capital of the Arverni. In 52 b.c. Julius Caesar made an unsuccessful at¬ tack against it. Consult Holmes (Caesar's Con¬ quest of Gaul> (2d ed., 1911).

GERHARD, gar hart, Eduard, German archaeologist : b. Posen, 1795; d. 1867. He was educated at Breslau and Berlin, and after 1816 resided in the former city. He became pro¬ fessor at the Gymnasium of Posen in 1816 and lemained there three years. Failing eyesight led to his resignation, and he set out for Italy. From 1822 to 1837 he resided in Rome and prosecuted there his archaeological studies He became archaeologist of the Berlin Museum in l837, became professor of the University there m 1844, and was made a member of the Royal Academy. He was one of the founders of . the Institute di Corrispondenza Archeo-logica, later the Imperial German Archaeological Institute. He gave a great impetus to archaeol¬ ogical study by promoting an orderly classifica¬ tion .and publishing seriatim important groups of monuments, artistic remains, etc. Many of his papers are found in the Gesammelte academische Abhandlungen und kleine Schriften> (Berlin 1866-68). His published works include (Rapporto intorno i vasi VolcentP (1831); (Antike Bildwerke) (1844); (Aus- erlesene griechische Vasenbilder> (1839 et seq.) • (Griechische und etruskische Trinkschalen> (1843) ; (Etruskische und campanische Vasen- bildeD (1843) ; (Apulische Vasen) (1846) • (Trinkschalen und Gefasse> (1850); (Etrus- kische Spiegel > (4 vols., 1843-68; 5th vol, by Ixlugmann et al., 1897). Consult Jahn, (Ed¬ uard Gerhard, ein Lebensabriss) (Berlin 1868), and Sandvs (A History of Classical Scholarship) (Vol. Ill, Cambridge 1908).

GERHARD, William Paul, American sani¬ tary engineer: b. Hamburg, Germany, 30 July 1854. He was. educated in Alexandria, Egypt, and later on in Germany; was graduated at Technical University of Karlsruhe, Baden, and served as volunteer in Prussian Railroad Regi¬ ment, 1875-76, Berlin. He came to the United States in 1877, and received honorary degree of doctor of civil engineering from Technical Uni¬ versity of

Darmstadt, 1911. He worked under Colonel Flad and under Captain James B. Eads in Saint Louis, 1877-80; became chief assistant engineer to Col. George E. Waring, Jr. at New¬ port, 1881-83, and has since practised his pro¬ fession in New York. He was editor of Building, an architectural journal, 1885—86 ; served as consulting sanitary engineer on staff of New York State architect Wa« United

States delegate to First International Confer¬ ence on Public Baths at The Hague, 1910. Member of technical societies and author of numerous American works on sanitation, house drainage, water supply, fire protection, gas lighting. Has also published three German works.

GERHARDT, Dagobert von. See Amyn-

tor, Gerhard von.

GERHARDT, Eduard, German painter: fo. Erfurt, 1813; d. 1888. He began life as a lithographer, next studied architecture at Cologne and under Semper at Dresden. In 1837 he took to painting at Munich, and subse¬ quently studied his art in Italy and the Iberian Peninsula. For some time he was an instructor in the royal household at Lisbon, but in 1851 returned to Munich. His portrayal of Moorish architecture is unrivalled. His most notable works are (Palace of the Inquisition at Cor¬ dova > (1863) ; (Lion Court at the Alhambra, Granada) (1861); (Saint Marc's, Venice J (1864), all in the Pinakothek, Munich; 'The Alhambra by MoonlighD ; 'Generalife and (The Comares Tower,) in the Schack Gallery, Munich.*

GERHARDT, Elena, German singer : b. Leipzig, 11 Nov. 1883. In 1899 she joined the Leipzig Conservatory, and for four years studied there under Marie Hedmont. In 1903 her debut in a recital at Leipzig was an in¬ stantaneous success and by popular demand she was induced to try opera. After eight appear¬ ances at Leipzig she decided to confine her efforts to concert work. She soon became known as the greatest lieder singer of modern times. In 1912 she visited the United States and made a most successful concert tour with the principle orchestras. In 1913 she reappeared in America and the entire country did homage to her genius.

GERHARDT, Karl, American sculptor: b. Boston, Mass., 7 Jan. 1853. He was a ma¬ chinist at Chicopee, Mass., and he showed con¬ siderable talent in this field, in which he later became a designer of machinery at Hartford. He became interested in sculpture and he was so successful that he .was ultimately sent to study in Paris, where his work was exhibited in

the salon and won prizes. His works in¬ clude busts of Gen. U. S. Grant, Henry Ward Beecher, Samuel L. Clemens, etc. ; and statues of Nathan Hale, in the Connecticut State capitol ; Gen. Israel Putnam at Brooklyn, Conn., and other Americans of note.

GERHARDT (Fr. zha-rar'), Karl Fried¬ rich, French chemist: b. Strassburg, 21 Aug. 1816; d. there, 19 Aug. 1856. He studied chem¬ istry under Leibig at Giessen. In 1838 he went to Paris, where he lectured on chemistry, and there with his friend Cahours he commenced his researches on the essential oils. In 1844 he was appointed professor of chemistry at Montpellier. About this time he published his 'Summary of Organic Chemistry. In 1848 he resigned the chair and returned to Paris to devote his time and energies to chemical in¬ vestigations. His works attracted world-wide attention, and resulted in his becoming, in 1855, professor of chemistry at Strassburg. His ideas and discoveries are embodied in his 'Treatise on Organic Chemistry) (1853-56). Consult*

Grimaux, (Charles Gerhardt (Paris 1900) ; Ostwald, 'Grosse Manner (Leipzig 1909).*

GERHARDT, Paul, German hymn-writer: b. Grafenhainichen, Saxony, 1607 ; d. Liibben, 7 June 1676. He studied at Wittenberg, and became pastor at Mittenwalde. Removing to Berlin in 1657, he became deacon at the Nicol- aikirche, where he remained until 1666, when he was deprived of his office because of his refusal to accept the diet of Frederick William. Later this deprivation was annulled through popular intercession, but Gerhardt would not compromise, and remained for a time without employment. In 1668 he became archdeacon at Liibben, where he remained until his death. He was staunch in his support of the Lutheran doctrines, and defended them ardently against the Reformed Churches. He is especially re¬ nowned for his hymns, ranking in that field with Luther. They were published first in hymn-books, but the earliest complete set is the (Geistliche Annalen) (1666-67) with music by Ebeling. Consult critical editions by Bach- mann (Berlin 1866) and the Goedeke (Leipzig 1877) ; and the (Life) by Langbecker (Berlin 1841). The best modern editions are by Wackernagel (1843), which has gone through many editions, and an English translation by Kelley, (Paul Gerhardt's Spiritual Songs'1

(1867).

GERHARDUS MAGNUS. See Groot.

GERHART, Emanuel Vogel, American German Reformed clergyman : b. Freeburg, Snyder County, Pa., 13 June 1817; d. Lancaster, Pa., 6 May 1904. He entered the ministry in 1842, was president of Tiffin College,

Ohio, 1851-55, and of Franklin and Marshall College, Lancaster, Pa., 1855-66; and professor of theology at the theological seminary at Lan¬ caster from 1868. He published (Philosophy and Logic) ; institutes of the Christian Re¬ ligion) (1891).

GERI (ga're), and FREKI, fra'ke, the wolves attendant on Odin's throne in Valhalla. When he feasts with his heroes, having no need of food, he gives all the viands placed before him to his faithful attendants, Geri and Freki.

GERIATRICS. See Old Age and Its

Diseases.

*GERICAULT, zha're-kc/, Jean-Louis An¬ dre Theodore, French painter: b. Rouen, 26 Sept. 1791 ; d. Paris, 18 Jan. 1824. He was edu¬ cated at the Lycee Louis-le-Grand, studied art under Vernet and Guerin. He exhibited at the salon of 1812 his 'Cavalry Officer on Horse¬ back (now in the Louvre) and his reputation was at once established. In 1814 followed his 'Wounded Cuirassier, * which was only mod¬ erately successful. The artist now joined the army and served for some time at Ver¬ sailles. He went to Italy in 1817 and studied the great masters there. His work was pro¬ foundly influenced by his stay in Italy. (The Raft of Medusa) belongs to this period of his career and is one of the great world master¬ pieces. It was exhibited by the artist in England and brought $4,000. His stay in England pro¬ duced the 'Race for the Derby at Epsom,* his last big work. In the Louvre, at Rouen Museum at Paris and elsewhere are numerous sketches, lithographs, bronze models, etc. A fall from a*

horse in 1822 greatly injured his frame and his last two years were spent in great bodily dis¬ tress. Consult Clement 'Gericault: Etude biographique et critique' (Paris 1868) ; Muther, History of Modern Painting' (London 1907) • Brownell, 'French Art, Classic and Contem¬ porary' (New York 1901).

GERICKE, ga'rik-e, Wilhelm, German orchestra leader: b. Gratz, Austria, 1845, He entered^ the Vienna Conservatory in 1862 and in 1865 became kapellmeister of the Linz theatre. In 1874 he became record kapell¬ meister of the Vienna Court Opera under Hans Kichter. In 1880 he succeeded Brahms as con¬ ductor of the Gesellschaftsconcerte and sub- quently became conductor also of the Sing- verein. In 1884-89 as leader of the Boston Symphony Orchestra he made it one of the great orchestras of the world. From 1889 to 1895 he was back at his old post in Vienna but in

1898 returned to Boston and until 1906 was in charge of the orchestra there. He retired in the latter year. He has published a number of works for orchestra, also pianoforte works, and some chamber music.

i .

GERIG, ga'rig, John Lawrence, American educator: b. Columbia, Mo., 1878. In 1898 he was graduated at the University of Missouri, and subsequently studied at the University of Nebraska and at Paris. In 1901-03 he was in¬ structor at the University of Nebraska and in 1905-06 at Williams College. From 1906 to 1911 he was successively lecturer, tutor, in¬ structor and assistant professor of Celtic and the Romance languages. In 1911 he became associate professor at the same institution. He collaborated in Edgren's 'Italian Dictionary' (1902) and contributed to encyclopedias, and was also associate editor of the Romanic Review.

GERING, Ulrich, Swiss printer: b. about 1440; d. 1510. Under direction of Guillaume Fichet, rector of the Sorbonne, and in conjunc¬ tion with Michael Friburger and Martin Crantz he set up the first printing press ever set up in France.

GERIZIM, ger'i-zim, one of the highest mountains in the central Palestine chain (3,000 feet), separated from Ebal Mountain by a deep narrow valley, in which stands the town of Nablus. The valley between them is very fer¬ tile. Jacob's well stands where the vale joins the plain of Moreh. Mount Gerizim (with Mount Ebal) was the scene of an imposing ceremony after the crossing of Jordan, in which the entire people of Israel took part, in obedience to a command which Moses had given them. (Deut. xxvii). The Samaritans built a temple on Mount Gerizim as a rival to that of Jerusalem, and organized a rival priest¬ hood; and the Samaritan Pentateuch closed the Decalogue with the injunction, "Thou shalt build a temple on Mount Gerizim, and there only shalt thou worship." And, though the Samaritan temple was destroyed by Hyrcanus about 200 years after, the mountain on which it stood continued to be held sacred by the Samar¬ itans. It was to Mount Gerizim that the "woman of Samaria," referred when she said to our Saviour; "Our fathers worshipped in this mountain, and ye say that in Jerusalem is the place where men ought to worship." The Samaritans claim that Gerizim was the scene of

the sacrifice of Isaac, and on its summit the Samaritan passover is solemnized. See Ebal.

T7 J . . * gar'lant, Ernst Wilhelm*

ˆerdinand, German Byzantine scholar: b. Ims- hausen, Hesse-Nassau, 19 May 1870. He was educated in the public schools of Partschendorf and tt ˆ §Vmna.sia at Troppau, Silesia

tTA- ersˆa<ˆ> Prussia, and the universities of Berlin and Jena. In 1893 he took up his duties as teacher at the gymnasium of Hom- burg von der Hohe, being made professor five \ears later. For many years he has been en- gag?.d ,in Siting the collections of Gelzer leilnehmerhsten der altern Konzilien,' and Notitiae episcopatuum' for the Prussian Academy of Sciences under the titlfe, 'Corpus notitiarum episcopatuum ecclesiae orientalis Graecae,' in collaboration with August Burck- hardt, Nicola Radojsic, and Peter Thomsen. Under the auspices of the Schonhauser Fund he traveled for special studies to the Institute tor Austrian Historical Research, Vienna, and to the archives and libraries of Venice and Macerata in 1897— 98, and to Florence in 1900. He is the author of 'Das Archiv des Herzogs von Kandia im koniglichen Staatsarchiv zu \ enedig' (1899); 'Geschichte des lateinischen kaiserreiches von IConstantinopel' (1905) • 'Histoire de la noblesse cretoise' (1907; Italian trans., 'Bolletino araldico,' 1908). He col¬ laborated in 'Historisches Jahrbuch der Gorres-Gesellschaft' (1899) ; 'Neue Jahrbiicher fur das klassische Altertum' (1902-04); 'Scrip- tores sacri et profani' (1903) ; Krumbacher (Byzantmische Literaturgeschichte' ; 'Mittei- lungen des Vereins fur Geschichte und Alter- tumskunde zu Homburg von der Hohe.' He contributed to the 'Catholic Encyclopedia,' the Byzantmische Zeitschrift, Revue de l' Orient latin, Literarische Centralblatt, Berliner Philo- logische Wochenschrift, Historische Zeitschrift, etc., etc.

GERM or MICROBE, a term applied to any microscopical form of life, plant or ani¬ mal, any individual micro-organism that has been found to have a life history. Vegetable germs are recognized as the causes of fermen¬ tation and putrefaction. They are nature's scavengers. At one time in the given theory of disease most of the communicable or infectious diseases were thought to be spread by microbes or germs of animal origin, but the study of these diseases in recent years show that both lowly organized plants and animals may be the sources of infection. Diseases caused in this way are known as germ diseases. It is known that malaria, for example, is caused by parasitic germs brought into the blood by mosquitoes, and typhus fever by body lice, while typhoid fever, acute pneumonia, infantile paralysis or poliomyelitis, .and tuberculosis for example are caused by microscopical vegetable growth, known as bacteria. The microscopic plant has in itself the seed or power of reproducing a plant of like kind. As Tyndall puts it "as surely as a thistle rises from a thistle seed, as surely as the fig comes from the fig, the grape from the grape, the thorn from the thorn, so surely does the typhoid germ (or seed) increase and multiply into typhoid fever, the scarlatina germ into scarlatina and the

small-pox germ into small-pox." While the infecting germ of measles and of some other communicable dis-

eases has not yet been isolated and studied, progress is being made toward their discovery. Plants as well as man and other animals have diseases, and probably there is no living ani¬ mal or plant that does not have to struggle directly or indirectly with either plant or ani¬ mal germs. Fortunately while ordinary at¬ mospheric air frequently contains many germs, they are content usually to live on dead plants and animals — and even so-called disease germs may be harmless to human beings in a good condition of general health. But when an individual has a depressed vitality, there is a suitable soil for the development and propaga¬ tion of disease germs. They now live on live tissues. It is estimated that in suitable soil one bacterium in 24 hours will have 17,000,000 descendants. Germs enter the body through the nose by inspired air, by the throat with air and infected food, and through abrasions and wounds of the skin. Excreted from the body they can convey infection to others. It is now recognized that germs of diphtheria, typhoid fever and infantile paralysis for example, find¬ ing lodgement in the bodies of healthy persons, may through the excretions from these bodies produce infection for others. These persons are designated ˆcarriers.® Dust is a great holder of certain disease germs, so are articles of food and clothing, bedding, carpets, any de¬ composing material, etc. In the prevention and treatment of infectious or germ diseases, ciyic, house and personal cleanliness are of prime importance. See Microbes ; Infection ; Disease, Germ Theory of; Plants, Diseases of ; Parasites ; Bacteria ; Protozoa.

GERM CELLS. See Cell; Embryology.

GERM-LAYER THEORY. See Embry¬ ology.

GERM-PLASM, in biology, the protoplasm peculiar to a germ or ovum. The power of propagation depends upon the possession of germ-plasm, which is the means of preservation of species. In unicellular organisms the germ-plasm is contained in the cell that constitutes the body, but in multicellular animals and plants there are distinct germ-cells, out of which the new individual is formed. The plasm of those cells Weismann calls germ-plasm, which is there¬ fore the actual bearer of the phenomena of heredity. Upon this fact he based his well- known theory of the continuity of germ-plasm. Nageli gave it the name of ideoplasm. See Biology; Embryology; Weismann, August.

GERM THEORY OF DISEASE. See

Disease, Germ Theory of.

GERMAIN-EN-LAYE, zher'man-an-le', Saint. See Saint Germain-en-Laye.

GERMAN ART. See Germany — Archi¬ tecture; Painting; Sculpture.

GERMAN BAPTIST BRETHREN,

known also as <(Dunkards,® ((Dunkers® or ((Tunkers,® bodies of Christians of German origin, consisting of four divisions. (1) Con¬ servative, (2) Old Order, (3) Progressive, (4) Seventh Day. The movement, a distin¬ guishing feature of which is baptism by trine immersion (candidates are dipped at the utter¬ ance of each title in the Trinity — Father, Son, Holy Ghost — in the formula), arose in Swartzenau, on the Oder, in Germany, near the

beginning of the 18th century (1708), Alex¬ ander Mack, a miller, being the founder. It was mystical and pietistic in character, and its members, rejecting formulated creeds, turned to the Bible as their only rule of faith and practice, and for nearly two centuries strict adherence to the letter of the Scriptures has been observed. Religion is carried into all the affairs of life and business and social relations, as well as into all church matters; and fellowship, worship, work, conduct as individuals in all things were regulated by decisions of the annual con¬ ference, based upon passages of the Word of God. Nonconformity to the world was applied as a principle to the whole body of the Brethren in the United States, until the last quarter of the 19th century, when the influence of other Christian bodies and of general education broke down exclusiveness, and let in some of the spirit of the world, giving rise to the first three divisions, Conservative, Progressive and Old Order, described below. Under the dominance of this principle, the costumes of both men and women, the manner of wearing the hair and beard were prescribed, and fashion's decrees set at naught. Bonnets for women, hats for men, carpets for the floors, pianos or organs in the house, and many other things were resisted successfully for many years, in one way or another. When articles of wear and use be¬ came common the rule was gradually relaxed. At first colleges were forbidden and for a time high schools were under the ban, the text sup¬ porting it being Romans xii, 16, ((Mind not high things, but condescend to men of low estate.® Nevertheless, high schools and colleges came a little later, and are carried on both in the Con¬ servative and Progressive branches. Like the Mennonites and Friends, the Brethren are op¬ posed to war and to the taking of juridical oaths and restrain their members from litiga¬ tion.

The Dunkards suffered persecution in Witt¬ genstein and removed to Crefeld and to other places in Germany, Switzerland and Holland. But their practices differing from those gen¬ erally prevailing, the atmosphere became un¬ friendly almost everywhere, and emigration to the United States, beginning in 1719, soon brought large companies of the Brethren to this country. Most of them settled in Pennsyl¬ vania, whence they found their way gradually to the South and West. One' of their number set up a printing house in Germantown, Chris¬ topher Saur, from whose press was issued the first Bible in German printed in America.

Among the peculiarities of the Brethren is the observance of the communion as an even¬ ing meal, accompanied by the ceremony of foot¬ washing, the giving of the holy kiss, and the use _ from the first of unfermented wine. Participation in slavery, in the making, selling or drinking of intoxicants, was forbidden be¬ fore the close of the 18th century; also the use of tobacco, membership in secret societies, the taking of juridical oaths, and activity in politics.

The Brethren are simple, plain-living, de¬ vout Christians of the evangelical type, carry¬ ing on their church work in much the same way as other denominations, their form of church government being congregational among the Progressives and Old Order Brethren,' with some modification among the Conservatives,

who give some ecclesiastical power to the an¬ nual comerence.

The customs, manners and methods of life of the communities of which the Brethren formed . a part, gradually took effect among them, giving rise to differences of opinion on questions relating to nonconformity, and finally precipitating divisions into Progressive, Con¬ servative and Old Order branches. The Old Order Brethren, the strictest of the three in matters of discipline, withdrew in 1881 as a protest against relaxation; the next division occurred in 1882 when the Progressive Breth¬ ren withdrew because the main body was not sufficiently liberal in discipline, according to their thinking, and especially because it had departed from the congregational principle of church government.

The Conservatives, calling themselves Ger¬ man Baptist Brethren, who became a separate body in 1881, are by far the most numerous branch. In addition to the annual confer¬ ence, a great event among them, there are 40 or more . district conferences, whose business is local in character. They

have colleges and col¬ legiate institutes, carry on home and foreign missions, conduct Sunday schools, and have a large publishing business. In 1916 it reported 100,000 members, with 980 churches and over 3,000 ministers, including deacons, elders and bishops. . The bishops are local church officials of the highest order. The territory covered by the Church embraces 35 States, stretching from New York west to the Pacific and from the Canadian border to the Gulf.

The Progressives, who have adopted the name Brethren Church for their organization, differ from the Conservatives in the stress they lay on the congregational system and in matters of discipline. All ecclesiastical power is lodged with the local church. They have district con¬ ferences and a general conference, which have no ecclesiastical functions. This body main¬ tains a university at Ashland, Ohio, is active in missionary work, promotes Sunday schools and has societies of Christian Endeavor. It had in 1916, 24,794 members, 230 churches and 314 ministers. It is increasing slowdy.

The Old Order Brethren, dating from 1881, were organized to preserve, from the inroads of modern social life and customs the church of the fathers. They insist upon non-conform¬ ity, hold that marriage is indissoluble, and ob¬ serve the simple life, dressing plainly and living quietly. They are not growing in numbers. They reported in 1916, 3,500 members, 70

churches and 219 ministers. They do not con¬ duct missions, nor Sunday schools.

The German Seventh-Day Baptists began their history when John Conrad Beissel with¬ drew from the Brethren because he had been led to adopt the Seventh day as the Sabbath and the principle of celibacy. This was in 1728. Four years later, he took up the lif.e of a hermit at Ephrata, Pa., where he organized a celibate community, known as the Ephrata Society. Two houses were built, one for the sisters, with a prioress in charge, and one for men, with a prior. A school was established in 1735 and a printing house in 1750. As a celibate community the society began to dwindle, celibacy was dropped and by 1830 the members had been scattered and community life was abandoned. In belief, these churches are

in general harmony with the other bodies of Brethren, differing somewhat in practice. In 1906 they reported 167 members ; in 1916, 300, with 15 ministers, and 6 churches.

. The f°ur bodies had in 1916 a total of 3,645 ministers, 1,295 churches and 128,594 members. Consult Brumbaugh's (History of the German

Baptist Brethren in Europe and America) (Elgin, Ill., 1899), Falkenstein's (History of the German Baptist Brethren Church> (Lan¬ caster, Pa., 1906).

H. K. Carroll.

GERMAN CATHOLICS, a religious sect which sprang up in Germany about the close of 1844, which rapidly increased during the four or ?ve following years and then as rapidly declined. The immediate cause of the forma¬ tion of this sect was the exhibition by Arnoldi, bishop of Treves, of the holy coat preserved in the cathedral of that city and said to be the coat of . Christ. The bishop accompanied the exhi¬ bition of the holy coat by a promise of plenary indulgence to whoever should make a pilgrim- age to Treves to honor it. The announcement of this proceeding on the part of the bishop of Treves produced a feeling of general astonish¬ ment in Germany and drew from a Silesian priest called J. Ronge, who had already been suspended from his charge on account of his independent views, a letter protesting against the exhibition of the holy coat and denouncing the projected pilgrimage as idolatry. This letter was published in the (Sachsische Vaterlands- blatter) on 16 Oct. 1844, and produced an amount of excitement that was quite unantici¬ pated by the. writer. Ronge was excommuni¬ cated, but this only increased the general en¬ thusiasm in his favor, and when he entered into relations with Czerski, another independent priest who had seceded from the Church, and made along with him an appeal to the lower grades of the clergy to unite in founding a National German Church independent of the Pope and governed by councils and synods, the appeal received a ready answer from a con¬ siderable number of those to whom it was addressed. A number of congregations belong¬ ing to the new body were formed in the more important towns, especially in Leipzig, under the celebrated Robert Blum, and in Magdeburg under the teacher Kote. In the spring of 1845 there were already about 100. At this time (March 1845) a council was summoned to meet in Leipzig to deliberate on the affairs of the body. Only 20 congregations were repre¬ sented there, but these nevertheless at once proceeded under the presidency of Professor Wigard to arrange a system of doctrine and practice which was to form the basis of union for the whole Church. The Bible was recog¬ nized as the sole standard of faith and its in¬ terpretation was left to reason, "penetrated and animated® by the Christian idea. Only two sacraments were admitted, baptism and the Lord's Supper. In matters of ritual each con¬ gregation was left free to carry into practice its own views. The organism of the new Church was almost the same as that of the Presbyterian dissenting churches of Scotland. Each con¬ gregation was to choose its own pastor and elders. Affairs of a general interest were en¬ trusted to the management of a general council to meet every five years, but the decisions of

this council were to be ratified by a majority of the congregations before they came valid. The confession of sins, the hierarchy of the clergy and the celibacy of the priests were abolished and the authority of the Pope was not recognized. On the subject of purgatory nothing was declared either for or against it. The constitution of the new Church was thus a Protestant one, but in some respects the Ger¬ man Catholics went even further than the majority of Protestants in a liberal direction, inasmuch as they claimed for all, complete re¬ ligious liberty and declared their religion to be capable of development and modification with the progress of the human mind.

The Church established on this basis had at first, as has already been stated, great success. The most eminent men of the liberal party re¬ garded the movement with sympathy, or at least with interest. Gervinus expressed his belief that great benefits might result from it. Many Protestants, dissatisfied with the subjection of their religion to state supervision, joined the body, which, at the end of 1845, counted 298 congregations. But it was not long before the spirit of opposition began to show itself. The majority of the governments in Germany at the instigation both of the Protestant and the Roman Catholic clergy began to use re¬ pressive measures against the new body. Prus¬ sia contented itself with regulating the exercise of their worship ; but some of the other states went further. At Baden the adherents of the sect were deprived of their political rights. Austria took the course of banishing them from her dominions. But persecution from without did less hurt than the divisions within the body. Almost immediately after the meeting of the council at Leipzig a congregation had been formed at Berlin which refused to abide by its decisions. Czerski and Rpnge, the two origi¬ nators of the sect, became the leaders of two opposing parties within it, one of which, that headed by Czerski, clung to the traditions and doctrines of the Roman Catholic Church, re¬ jecting only the supremacy of the Pope and the union between Church and State ; while the other sought for more freedom, converted re¬ ligion into a sort of popular philosophy and began to mix up with it questions of politics, exhibiting strong democratic tendencies. These were most plainly manifest during the revo¬ lutionary epoch of 1848. The schism between the two parties was then complete. One section of the congregations of German Catholics pro¬ fessed to have only religious ends in view, while another section openly pronounced itself in favor of socialistic principles.

From the year 1850, however, there were several attempts to re-establish the unity of the body. An effort was made to reintroduce har¬ mony by widening the basis of union. Instead of founding a religion, a council held at Gotha in June 1859, proposed the formation of a religious association

or confederation into which all free Protestant and even Jewish con¬ gregations were to be admitted. Legislation in the different states had become more tolerant and the carrying out of the scheme of the council of Gotha seemed to be at least prac¬ ticable. But the result proved otherwise. The associations consisted of too heterogeneous ele¬ ments. While some of the members receding

further and further from orthodoxy proclaimed simple design as their religion and abolished baptism and the Lord's Supper, others on the contrary lost themselves in an exaggerated mysticism. According to the most recent sta¬ tistics there are still about 100 congregations of German Catholics in Germany; but their num¬ bers only amounted to about 6,200 in 1895. Consult Bauer, (Geschichte der Griindung und Fortbildung der deutschkatholischen Kirche' (Meissen 1885) ; Kampe, (Wesen des Deutsch-katholicismus' (Tubingen 1850) ; Findel, (Der Deutschkatholicismus in Sachsen' (Leipzig

1895).

GERMAN CLASSICAL SCHOOL OF POLITICAL ECONOMY. See Economics.

GERMAN COMMERCIAL COLLEGES.

See Commercial Education.

GERMAN EAST AFRICA (now Tangan¬ yika Territory). See East Africa, German.

GERMAN, Edward, English composer : b. Whitchurch, Shropshire, England, 17 Feb. 1862. He was educated at Bridge House School, Chester, and thereafter studied at the Royal Academy of Music from 1880-87. After com¬ pleting his musicaj course, he, for some time, played the violin in leading orchestras and later devoted himself entirely to composition. His orchestral publications include music to Rich¬ ard IIP (1889) ; 1 Symphony No. 1 in E Minor ' (1890) ; (Funeral March' (1891) ; music to (Henry VHP (1892); (Gipsy Suite) (1892);

(Symphony No. 2 in A MinoP (1893) ; music to (The Tempter ' (1893) ; (Symphonic Suite in D Minor) (1895) ; music to (Romeo and Juliet' (1895); music to (As You Like It' (1896); Camlet,' a symphonic poem (1897) ; music to (Much Ado About Nothing' (1898) ; (The Seasons,' a symphonic suite (1889) ; music to (Nell Gwyn' (1900) ; (The Rival Poets,' an operetta (1901) ; (The Emerald Isle,' a Savoy opera, with the late Sir Arthur Sullivan (1901) ; (Tom Jones,' a comic opera (1907) ; (Moon Fairies,' a Savoy opera, with the late Sir W. S. Gilbert (1909) ; (

Coronation March and Hymn,' performed in Westminster Abbey at the corona¬ tion of King George V. (1911) ; (Theme and Six Diversions' for the Royal Philharmonic Society (1919).

GERMAN EMPIRE. See Germany.

GERMAN FURNITURE. See Furniture,

Medieval.

GERMAN IVY (Gynasys cor difolia or Senccio scandens), a creeping plant of the Composites family, with fleshy light-green leaves. It is commonly grown as a house plant.

GERMAN LANGUAGE AND LITERA¬ TURE. See Germany — History of Lan¬ guage; History of Literature.

GERMAN LUTHERANS. See Luth¬ eran Church in America.

GERMAN MEASLES. This disease is acute, very contagious and of unknown caus¬ ation. It differs from measles in the mildness of its onset and symptons, in the quicker ap¬ pearance of the rash after the first signs of illness, and the more rose-red tint of the de¬ veloped rash. It is distinguished from scarlet fever by its mildness of onset, the patchy char¬ acter of the rash, without diffuse redness and the shorter duration. The disease develops in

10 or 12 days after exposure, lasts about 3 to 5 days and is followed by a moderate branny desquamation. Complicating bronchitis, pneu- moma, gastro-intestinal catarrhs and kidney disturbances may occur, but are infrequent.

GERMAN METHODISTS. See Evan¬ gelical Associations.

GERMAN OCEAN. See North Sea.

GERMAN REFORMED CHURCH. See

Reformed Church in the United States German.

GERMAN SEVENTH-DAY BAPTISTS.

See Baptists.

GERMAN SILVER, a white alloy used in many ways as a substitute for

silver, consist¬ ing of nickel, copper and zinc in various pro¬ portions. The best quality consists of four parts copper, two parts nickel and two parts zinc, but this quality is the most difficult to work. For some purposes the proportion of copper is slightly increased, and for articles which are to be cast instead of stamped or hammered about 2 per cent of lead is added. To make a good malleable alloy, the three metals of which it is composed should all be of the best quality. It is harder and tougher than brass and takes a fine polish. In color it is sufficiently near silver to make it valuable for plating with that metal. This, together with its hardness in resisting wear, has caused a great demand for German silver for certain wares made in Birmingham and Sheffield.

Spoons and forks of this alloy are made in immense numbers. Such articles as salvers, dish-covers, jugs, teapots and the like are also largely made of it, but these objects, or at least some of them, are still more largely made of a greatly inferior alloy, because much softer. German silver has a coppery odor and is readily attacked by acid liquids, such as vinegar, which coat it with verdigris. Spoons and forks made of this alloy should therefore either be plated with silver or carefully kept clean. Of late years, through care in preparing a suitable alloy, large objects, such as the bodies of jugs and coffee-pots can be formed of sheet German sil¬ ver by ˆspinning® it on the lathe, instead of by stamping or by the slow process of hammering. Formerly it was only a soft alloy that could be so treated. For some time past there has been a tendency to substitute for electroplate — that is, German silver plated with real silver — white alloys having nickel for their basis. These, however, are but varieties of German sil¬ ver known under different names, such as silveroid, argentoid, navoline and nickeline. Some of them contain small quantities of tin, cadmium and other metals. Mountings for ship-cabins, bar-fixtures, forks and spoons, and other similar articles have been manu¬ factured on a considerable scale from these new alloys. See Electroplate; Metals.

GERMAN SOUTHWEST AFRICA, a

former German colony, which is now under a mandate to the Union of South Africa, situated on the southwest coast of Africa. To the west of it lies the Atlantic Ocean ; to the north, Angola (Portuguese West Africa) ; to the east and south, British South Africa. The whole territory comprises aboht 322,000 square miles and has a coast line a little less than 1,000 miles. Almost in the centre of this coast line is the

British territory and port of Walfish Bay com¬ prising an area of about 430 square miles. Po¬ litically this territory forms a part of Cape Colony.

Topography. — German Southwest Africa is divided naturally into three

parts ; a long sandy strip about 10 miles wide skirting the Atlantic Coast; an equally barren steppe of about 50 miles wide behind this coastal region ; the eastern slope toward the British territory. I he central steppe extends into a mountain range from 3,000 to 8,000 feet in height, the higher part of the range being known as the Omatako Mountains. The eastern section merges into the Kalahari desert. Throughout the whole territory there are many rivers and streams ; but owing to the prevalence of the southeast trade winds, which blow for the most part overland, they become dry almost alto¬ gether for a considerable part of the year, the Orange, Kubango and Cunene alone maintain¬ ing currents of water throughout all seasons. It naturally follows, therefore, that the territory is, in general, very dry. There is a short modi¬ fied rainy season on the uplands, when the streams are filled by intermittent thunder storms.. This is the season of the most activity.

Agriculture and Industries. — Most of the activities of German Southwest Africa are given over to stock raising. In the last normal year (1913) before the outbreak of the Euro¬ pean War, the stock raised on the colony is given as follows : Sheep, 543,34 7 ; goats, 516,904; cattle, 205,643; horses, 15,916; mules and asses, karakul, 11,194; swine, 7,772; camels, 709. This estimate of production includes that of the white and native population alike; but as the country is large, exceedingly rough in parts and difficult of communication, it is probable .that a very considerable part of the native production went unrecorded, being used as food or -exported secretly into Portuguese or British territory.

Though German Southwest Africa possesses promising mining regions; and the valleys of the rivers of the uplands are often capable of producing many European ptoducts, little has been done in the way of development. This is due, in part at least, to the small white popu¬ lation which, on the outbreak of the European War was about 15,000, most of whom were Germans, out of a population of about 100,000. The few of these not engaged in stock raising, occupied administrative positions principally in trade and commerce. Less than 30,000 tons of copper were exported in 1913. The previous year 766,465 carats of diamonds were mined in the Luderitzbucht region.

The commerce of the territory is very small compared with its extent and population. The exports, which consist principally of cattle, hides, ostrich feathers, copper ores, diamonds, skins and guano, range from $6,000,000 to $9,000,000 a year; while the imports amount to about $8,000,000 in normal times. These im¬ ports consist principally of food stuffs, textiles, beer, tobacco and iron in various forms. Naturally, before the beginning of the Euro¬ pean War, most of the foreign trade through the seaports was with Germany.

Transportation, considering the extent of the territory, is very poorly developed, though perhaps nearly as much so as that of East Africa. One long highway stretches through-

out the length of the colony from north to south, connecting the interior with the coast, and also with some interior points. Over 1,300 miles of railway give the colony better railway facilities than either of the other German African territories possess. The Otava Rail¬ way is 417 miles in length; the Swakopmund- Windhoek, 237; the Northern, 314; the South¬ ern, 339. Internal telegraph lines connect with the railway telegraph lines and with the Cape and Mossamedes cable by way of Swakopmund. While there are numerous harbors on the At¬ lantic coast, there are only three of any com¬ mercial importance. These are Angra Pequena, Swakopmund and Walfish Bay (British). Of these the second is of most importance form¬ ing as it does, the outlet for Swakop Valley and the highlands beyond it. This harbor too, before the outbreak of the European War, was connected by a line of steamers with Ham¬ burg.

History and Government. — A Bremen mer¬ chant by the name Liideritz established at Angra Pequena, a trading station in 1883, and acquired certain rights over surrounding terri¬ tory. These the German government took over the following year, and extended its holdings gradually northward, southward and into the interior. Portugal and Germany mutually settled the northern boundary between their respective territories in 1886; and four years later Great Britain came to an understanding with the German government as to the eastern and south¬ ern boundaries of German Southwest Africa. The domination of the territory went steadily forward. In 1903 a Hottentot tribe, the Bon- delzwarts, took up arms in the south against the invaders and carried on war for over a year. They had scarcely been put down when the Hereros in the north rebelled against German authority, massacred the whites everywhere and threatened to wipe them out entirely. The colony was saved by the arrival of reinforce¬ ments from Germany. The southern Hotten¬ tots joined in the war on the foreigners against whom they held their own for over a year. In this war which' lasted into 1906, the Germans lost over 2,000 men out a force of about 15,000. The natives, too, suffered severely, for both sides resorted to the most savage practices. Notwithstanding this, the war broke out again three years later, under the leadership of Morenga, a former leader who had taken refuge in British territory. But this time the Germans were better prepared and Morenga was driven into the mountains and finally killed. From this time on German authority was practically supreme in the colony

until after the outbreak of the European War. In August 1914 the British government proposed to the government of South Africa the seizure of the ports of German Southwest Africa and such territory as might be thought advisable. But a serious insurrection in the British colony prevented this step being taken and it was not until the end of this trouble that operations began against the German possession in January 1915; though some preliminary steps had been taken in Sep¬ tember 1914, when Liideritz Bay had been seized: Swakopmund fell in January and two armies were sent against the capital of the ter¬ ritory, Windhoek, one under Botha from the north and the other under Smuts from the south. Botha reached Windhoek on 12 May and the

country was captured from the Germans in July 1915. Consult Dove, (Sudwestafreka) (Berlin 1913) ; Watermeyer, (Deutsch-Sudwest Afrike) (Berlin 1899).

GERMAN STOCK EXCHANGES. The

German stock exchanges are under government supervision. Prices are officially fixed. In the case of cash transactions, a uniform price for each stock is calculated daily, and all orders carried out accordingly. Quotations for the account vary according to the business done. Industrial securities can only be dealt in for the account, if officially admitted. The prin¬ cipal German Exchange is the Berlin Borse. Prior to 1913, the nominal value of the securi¬ ties quoted on the Berlin Borse has had an average annual increase of 2l/2 milliards of marks.

In consequence of a more concentrated in¬ dustrial activity and less inflation of stock and bond issues, interest is, as a rule, some¬ what higher in Germany than in the neighbor¬ ing western countries, gilt-edged securities and first-class shares producing a better average yield.

Number of officially quoted securities — The Berlin Exchange — (1813), 29; (1848), 85;

(1880), 950; (1912), 3,200. Consult Ger¬

many's Economic Forces) (1913).

GERMAN Y LLORENTE, her'man e lor-en'ta, Bernardo, Spanish painter: b. Se¬ ville, 1685 ; d. 1757. His artistic training was due to his father and Cristobal Lopez. His portrait of Don Philip, the Infanta caused Philip V to offer him the position of court painter which he refused because of his desire to remain independent. He was made academ¬ ician of Saint Ferdinand in 1735. In many countries his works have been sold as original Murillos, because of the resemblance in draw¬ ing and grouping, although

of course otherwise inferior. He frequently painted the Virgin Mary as a shepherdess and thus earned the soubriquet of (

GERMANDER, jer-man'der (French, ger- mandree) , Teucrium, a large and widely dis¬ tributed genus of labiate herbs, of which all the European species are of old medicinal repute on account of their aromatic bitter and stomachic properties. The species are numer¬ ous. The wall germander or true germander (T . chanuzdrys), often found on ruined walls in Great Britain, has probably been introduced from Europe. Wood germander or wood sage (T. scorodonia) is a very common British plant, in dry bushy or rocky places. It is very bitter and slightly aromatic. It is used in the Island of Jersey as a substitute for hops. Water germander (T. scordium), in wet meadows, has a smell like garlic. Cat or sea thyme (T. marum), of southern Europe, like catmint and valerian root, has great attractive¬ ness for cats. It is still sometimes used in the preparation of sneezing powders. The Ameri¬ can species (T . canadense) is also known as wood sage.

GERMANIA, a country of ancient Europe.

See Germany. •

GERMANIA. Tacitus's

the geography, peoples and institutions of the Germans. The larger portion of the work — and by far the most interesting — is devoted to a consideration of those customs and institu¬ tions which are common to the Germans as a whole. Thus Tacitus tells us that the govern¬ ment was democratic. Kings and generals were selected by the people. Their power was limited, not arbitrary. Minor matters were de¬ termined by the chiefs, but on more important issues the whole tribe deliberated. The men assembled in arms and listened to speeches by the king or military chief, indicating their dis¬ sent by loud murmurs, their approval by rat¬ tling their spears. As to-day, war was ((the chief industry.® In battle it was considered a disgrace to have survived one's chief and to have returned alive from the field. To defend the chieftain, to protect him, to ascribe one's own brave deeds to his renown, was the height of loyalty. (

The purpose of the Germania has been dif¬ ferently conceived by different critics. Some have thought that Tacitus' object was, by holding before his countrymen a picture of the Germans, to mark the contrast between the two civilizations, German and Roman, and to com¬ mend the rugged simplicity of the one as op¬ posed to the degeneracy of the other. Others

have regarded the treatise as a political pam¬ phlet, written in support of Trajan, and in¬ tended to justify the attention which that prince was then bestowing upon the problems presented by the tribes of the north. Yet others have thought that the work was prepared as an introduction to the extensive historical writings which Tacitus had already projected. But there are serious objections to each of these views. Moreover it seems less probable that the Germania should have been composed with any ˆtendency® or purpose beyond the

perfectly natural and obvious one of acquaint¬ ing its readers with accurate details of German geography and institutions. The German peo¬ ple had long been known to the Romans, and for a century and a half had furnished a more or less constant opposition to the Roman arms. Nor was the subject new ; Caesar, Livy, Pliny and others had given detailed accounts of this in¬ teresting and important race. That Tacitus, therefore, should have undertaken a fresh presentation of their geography and customs seems perfectly natural, without resort to the theory of a special extraneous motive.

Whatever its original purpose, the Ger¬ mania must be recognized as a mine of authen¬ tic information concerning the ancient Ger¬ mans. It is not merely this, but is also a source of first importance for all modern study of Germanic institutions in countries outside of Germany itself. The seeds of many vigorous Anglo-Saxon institutions are readily recog¬ nizable in the descriptions of Tacitus. Trans¬ lation by Maurice Hutton, in the Loeb Library.

Charles E. Bennett.

Late Professor of Latin, Cornell University.

GERMANICUS C2ESAR, Roman general: b. 15 b.c. ; d. Epidaphnae, near Antioch, 9 Oct. 19 a.d. He was the son of Nero Claudius Drusus, and of Antonia, daughter of Mark Antony and niece of Augustus. By desire of Augustus he was adopted in the year 4 a.d. by Tiberius, whom he accompanied in the war against the Pannonians, Dalmatians and Ger¬ mans. In the year 12 he was consul, and next year was appointed to the command of the eight legions on the Rhine. He was at Lug- dunum Batavorum when news came of the death of the Emperor Augustus and of the mutiny for more pay and shorter service among the soldiers in Germany and Illyricum. Ger- manicus hastened to the camp and quelled the tumult by his personal popularity; and at once led his soldiers against the enemy. Crossing the Rhine below Wesel, he attacked and routed the Marsi, and next year marched to meet the redoubtable Arminius (q.v.), the conqueror of Varus and his legionaries, whose bones had lain unburied for

six years in the Teutoburg Forest. With solemn rites his soldiers buried these sad relics of disaster, then advanced against the foe, who, retiring into a difficult country, managed to save himself, and was not subdued till the year after, when Germanicus again carried a part of his army up the Ems in ships, crossed to the Weser and completely overthrew Arminius in two desperate battles. Tiberius, jealous of the glory and popularity of Germanicus, recalled him from Germany in the year 17, and sent him to settle affairs in the East, at the same time appointing as viceroy of Syria, in order secretly to counteract him, the haughty and envious Gnseus Calpurnius Pisco. Germanicus died, probably by poison adminis¬ tered at the instigation of Tiberius. His wife, Agrippina, and two of her sons were put to death by order of Tiberius; the third son, Caligula, was spared. Of the three daughters who survived their father, Agrippina was as noted for vice as her mother for virtue. His literary remains were first published at Bologna in 1474.

GERMANIUM, a metallic chemical element discovered in 1886 by Dr. Winkler in a silver

ore (argyrodite) ; symbol, Ge. ; atomic weight, 72.3. It has a melting-point about 1,650° F. (900 C.) ; is oxidized when heated in air;

crystallizes in octahedra ; has a perfectly me¬ tallic lustre and is of a grayish-white color. As gallium had been named from France, the new metal was named after Germany. Fifteen years before its discovery its existence was prophesied by Mendeleeff as required to fill the gap in the periodic table between silicon and tin.

GERMANO, SAN, or CASSINO, Italy, town situated at the base of Monte Cassino, in the province of Caserta, about 50 miles north northwest of Naples. It contains handsome public edifices, and is surrounded by the re¬ mains of monuments and buildings of high anti¬ quarian interest; it is built on the site and from the ruins of the ancient Volscian town, Casinum or Casca. The principal ruins of the ancient Volscian period are a monument, supposed to have been a tomb, an amphitheatre and a tem¬ ple. The monument building is now used as a church ; it is square, in the form of a Greek cross, constructed with enormous squared blocks of stone, on the Cyclopean principle. From its form, it is called the Church of the Crucifix, or Croce fisso. The amphitheatre must have been a magnificent building, and it is still in a state of preservation sufficient to give an idea of its original vast proportions. The tem¬ ple, adjoining the amphitheatre, was

built probably in conjunction with it, at the cost of the Volscian matron, Umidia Quadratilla, men¬ tioned by Pliny. The Benedictine monastery of Monte Cassino, two miles from San Ger- mano, is one of the most renowned religious communities of Europe. Its foundation by Saint Benedict dates from 529. It contains one of the most beautiful churches of Italy, and an extensive library, and in its archives a collec¬ tion of the most precious documents of the Middle Ages. The district surrounding San Germano is highly cultivated and beautiful. The town was admitted to Roman citizenship about 188 b.c. We find occasional mention of it (as Casinum) in the narratives of the Hanni- balic War. Varro built a villa in the neighbor¬ hood, in which at a later period were held orgies by Mark Antony. The town become a prcefectura toward the close of the republican period and under the empire it is named a colony, although two inscriptions refer to it as a municipium. It is mentioned both by Strabo and Varro. The hill near the monastery has an elevation of 1,715 feet above sea-level, and there still exist traces of the ancient fortifica¬ tions in Cyclopean masonry. Numerous Roman inscriptions from the ancient Casinum are pre¬ served in the monastery. On the opposite bank of the rapids lies a group of ruins called Monti- celli, and by many considered the remains of Varro's villa. Much of the stone was drawn away by architects and builders in the 16th cen¬ tury.

On 16 March 1815 the town was the scene of an Austrian victory over Murat. Pop. 14,220. Consult Ashby, T., (Papers of the British School at Rome) (Vol. II, p. 19).

GERMANTOWN, Pa., formerly a suburb ˚f Philadelphia; now the 22d ward of that city, within the municipal limits of which it has been included since 1854. It was settled by Germans, under a grant from William Penn, in October

1683. The town became famous as the scene of one of the really significant events of the Revolutionary War. Here, on 4 Oct. 1777, a battle took place between the armies under Washington and the English under Howe. See Germantown, Battle of; and Philadelphia.

GERMANTOWN, Battle of, 4 Oct. 1777. Howe having captured Philadelphia, stationed his army across the Germantown road north of the city and east of the Schuylkill; the left wing with its supports on the river, the right 'fin the air® to the east. He shortly detached part of it to reduce the forts which blocked the Delaware below the city; and Washington planned the capture of the weakened army, starting after dark on the evening of 3 October. His right under Sullivan and accompanied by himself, with six brigades, was to move down the main street and crush the British left; the Pennsylvania militia to march along the river and take it in

flank; the left under Greene was to divide, three brigades under himself taking the British right in front and flank, while two others were to move to the east and come up in its rear. This would drive it back upon the left and both on the river, and it was hoped would compel surrender. A mile or so north of the British centre on Mount Airy were a battalion of light infantry and a battery; in a field just left was a regiment under Colonel Mus- grave ; a little south on the main road was the massive stone house of former Chief Justice Chew. At sunrise a heavy fog came up and left all darker than ever. The British advance bodies were overwhelmed by the Americans, and the battery captured; but Musgrave took shelter in Chew's house, and after an unsuc¬ cessful attempt at breaching it with the light guns, the Americans left a brigade to besiege it and pushed on. Despite this delay and the warning to the British, both their wings soon began to give way before the American onset. But in the fog, the heavy firing at Chew's house drew General Stephen with his brigade, on Greene's right, too far west, thinking the main fight was there; and Wayne on Sullivan's left had turned considerably east and came in front of Stephen, who took him for the enemy and attacked him in the rear. Wayne's men were driven against the next left of Sullivan's re¬ maining brigades, a panic started and a general retreat began. The British took the offensive, and reinforced by Cornwallis from Philadel¬ phia, pressed the Americans hard; but the lat¬ ter soon regained composure and retired in good order, though one regiment of Greene's was surrounded and captured. The Americans, however, brought away several captured cannon! and all their own and their wounded. Their loss in killed and wounded was 673, the British 535. Stephen was accused of having drunk too much on the night march, court-martialed and dis¬ missed from the army. Despite the failure of the plan, the ultimate results were very great. The audacity of the Americans in attacking the British so soon after the defeat of the Brandv- wine, together with Gates's success at Sara¬ tov ,wer(r larffe factors in determining the rrench alliance. Consult Carrington, (Battery of the American Revolution > (New York 1878) ; Lossing, (Field Book of the Revolu¬ tion) (ib. 1859) ; Jenkins, (Washington in Ger¬ mantown5 (ib. 1905).

Longitude East

from Greenwich

SWEDEN

Til'1*

cbswftld«P

Arnnia

.Bornholm I.

](To Denmark)

Briistcr Oi

ihlrwlndt

Roane

AH**®1

^WannVglauken ..

/yf„f

, ‘X ^GutnbinucQ

w.w«‹y « / <

■4* Aiw»i l?* *

” ‘ r /DarK«limeolL!,

Oertoeo

/ – An?crburg

- *

“^lau o \KtlU“ >

-Ut-loicVto ^-r-\

P . Kojtncn

- – ■NtjWnlB*®®*

V pillVaUeo

RixTioIt

Moeh

Falster

Oardctcher Sc*

/? 1 Laalandv

J/kiel BAY

~Xl Jyˆ Sdion berz

rt /pk0<ˆ< > V r)

Stolpmunˆˆ Vˆ

X – 4

XTStolp Pottand / V_o Rathsdamniw

Ooldap

■ˆmieUigenbeil \ pr0u*8isct

Draunsberg >EylauX

Fehmabn I.

a Burg

v8tnH

R.UGEN

HEL£OLAND

HeIOOIaRD I. –

B Dismantled f

rrjtT«isi*»-u —

i .(..VsH

Riigenwaldfc-

r/ /U IMMehlsack'

fe£hof fMuhlhausen Bartcn»<

9\ ElWng Q (0VormdifQe

byuk • c . Preusstsdt- \ O.

ˆJrL \ Holland J _ – X

Schlawe ˆ_/o Zanow Koslln Pollnow o

oFrmnzbuqj^^ |X /-ˆGriinmeaJ Greifswald\vJ

Eolberg

Rostocl

iTreptow

Bclgard

- ”’”“I’ler oltiehoaˆ

(Gliiclcatadt „ iXlmabo?.’1”1’

V\ \ Pinneberg

jTpreussiss^’

JV,, Stargard

Heidcmuhl

Bubliti

Kammia,

JPtT (4 *VV /Schwaanii

Jf’S’U’Tsinarˆ But.o. y

J S

y «9*d”#r’N^‘KnU,

NeuBucknw

Xubeeln

,Greifenberg

[Allcaateln

y/^euhausVV Frt 9 Kappel \j

vCLehe

UBremerhaven <$ta^ kJ^Geestemiinde J

tlr^V

Scharmbeck k_G* ^°Oeterholx \Tege6ack

'sbarat' _ _

oV fcSjke V^Verden VMldeshausen

fer ;

X? Karastorf -1

/v* *> °

I ^ Barenburg A

y Stolienau oS

Leuiforde

\ ..Mlnden J/v.|

'Mewe

(TNorden'] Wilheli ^ /_o Aurlch

limnin'

rWollin

Marlon *®rl

fnisburg

-r '-Ml ;• MarleU^or

N Ankiain\ -Treptow

Vf, Vciwi

f\Neubrand<

WStargariL;

.Ratzeburg IJi

Wam|slK»«ikyv

'HAMBURG

ˆrimburg Jutn'w U °/W 5ˆ"

ˆ W f/V /iTJ; ffVsmdsburg SoV /<\

Kallies) :?/*'&" C f Krone f K""

' J. . ?Si *® ˆ / } s? / Jgbsepa Mrotat-hMi/ ˆ <

- I ˆTrdi, \

r\ Schloupe » , .

\ » s n5*6 1 /

\ivvf

— J® ~ \ Filehae Budsla r r_L_,r > —

ˆblu/N"ut*rdVu

1 _ J ,—y Wangorln

Jˆ3>XJoUnow –

/ Frˆfenwab

ˆˆlˆNstni-ganlV r~

Dnif / vs. ˆ 'L. — W yfMadiˆSoo J JL vGreifent»gen \

'iPyritz TSˆV- iBnhnf yArns«ˆ

.K5»ipi

t 0Sob|oaioss jriedebcTi ✓ˆSoldin x)V\c?vˆ Niudamm S

jhen»t«'n \ £

ˆkG«l«e°Vut*

XWˆnburg

,u%[

— 3j)L Bredow iˆ7 Grabow • y SleUin j uPrenzlau «_.y

\(irnul

JabtonovrOˆ

.Vnr«M’

U llnriiˆj

,Buchbolz /j

Laotenbuiy

}Hazenoi

! Eiaa„b’

\)strolb.ˆa

Jlfanbiirg

Wescnl

ˆGollub

Pritzwalkiˆ

ˆ|M(aVˆCjfurstoDberg Wj

s»i •U‘05/T”“ > !ˆ(|

ViAasamuad

uimobV – ,ifˆber.a5dr

ValUob IjOrameabure ” euen . i (, ˆendorf

nˆftn, J ‘ Bernau

X?’.rˆBERLIN

> -^2Sj/ \Z”S > K!

Treuenbriet’zen “Y”1- Buchholi ... X /^Luckenwalde \ [

‘Sobwedt

^Perleb«rg\ . Witten berge « S’^WIlsnack:

Argennu

n ’ yji] Izen | Munatcr/^- v^BiBerbeck

A®*11® Knhf.M-

i Liicbow \ I Salz we del V^SedinuseD

jSoltau ‘ HElOi Offen o I

LonIngea_0 v

Quakenbrni. *!

Tl / Dam ^LingenpursteQi

*• J Bramscbe y i ^.Ibbenl/ur

ZUIDER

ZEE

AY toe ta^

jbwlu

W ronk*

Sain ter Biriibauin

0 wy

[

yf*’^7Sonnenburg r Kiistrin Bleseno \ |Dro33en ‘ •>

lde\ /^^Zieleutig^ -V;inkfili*t^8ternber? Neutomlj

) ScEwtebuV^

T / X. Ziillichnu yWolH r? L X

EBurgcfo

OVER-

SIcml

Sclune

‘pfliloori llfferafoort a-‘pJi/. -V

lXjXude’vlU 1 ° Schwa!

V W reache n; J

/ A

X) Schrodˆˆj | Schrimm II Ij*

tadto Pinne ˆ tz v — — .

I Opolcnitz»/ — ‘

Lebus(

•Furateniv

jRhelne

’Emadettel

Gronati;

7\iˆGenthiu

■

d X u

Bentacheu

> endechorat o

Zerkow

Xdioaten \ hiniegel

r Bocholt /

- / 1 _Xu arot*

xx7 ˆX > ˆben

Kribca

/Krotoschiaˆrv Kalis*

‘ & Kalbe

yStaasturˆTˆXˆE

•-o_/ J > XˆX[\Kotbon msen El›lebou\ BrehnaXj

SteSr”#;

**~ > < MerseburgHv

„.. Welsscnfeh

ˆ /

eirnar **« , . . Z

[Juterbog | Golssen V bubben <« •» W n

erg ˆJLuokftUˆsˆTˆ \ Rol

“X) Kdaa KˆSoaˆrfeld J

> WPalkenberg-ˆ |\ / •) XˆSon

fclSpremberg’r

> TˆvXˆnusc

\ MuskauX’r’

» / – — ‘ llB

‘■ˆˆStishra y/Kamenit/r, *’V/\.\‘\ A

> – Uˆ:’ ˆGroeeenbaiijA 3 ‘ ‘ ‘

“ > ’*‘7 XrTRad.bk-MlV ■ *-8225®.“ -4

aBˆiaTˆOTTJaˆ Siˆfataui

X XDRESOEJtO.X-y

!p\avfrSˆgX < 5fSi.2;1 ?Wf

u\ “X A*T*-ˆˆTetsclieti f/fˆS ‘ ’

nbereˆV’ jf ‘X lloiHtenberg ‘vyif , jftfV/ i/’ LeitmcrUx \

V zXˆhlen / RxXH;;iter

XHairnn ˆ Lippatadt Ptderborn

% V vXx _ (X„.. HombXX Xx

■ Tawe\

Gilget

Lira*

\ (Drtfcc J* cSchU

Neusalz\f Fraustadt > °

‘reiit . i ■ 1 1 j Xyx

ySugan Glogjiu j

ˆˆTSprottau]

ihrau

Ktruivo . 1

l/cfAdeinnu

Lh ˆ

Scniblberg A

Mazowieckb

.maszu >

jnftenbcre

Rau

[Tracbenberg

bl.a > Treboif

‘Auras » /

f BariiiJ

•Iberfeli

’Hfmsrf

fStoinau

| \V ilhelmsbruok i

lauscn

, S.s.

;ecipcn

— ;MEtreSiW

ieumarkt

X°Kanthjv\ ° Jeltschi ˆ Ohlau ‘4nn f

SflixvpidnUz Brieg

’ X Rekhenbach / \T

Frankenstein W F| ˆNeuroˆeXMunsterbergJ ˆ y*

•OGNE-

/koln)|

■ndsbei

KreutburgX- b,Karlsruhe\ Ichurgast ‘ k (Radau

**n\ > erg*

‘A’zeslochowi

[potjoJe’

Lu’Alolul

ntilRz’iy

juiessonv^*0

*[•Ulan VOGELS^*

^ndernaob

^Geye^J

Trautcnau

[image]

\r ‘

0 Leschnluv

M auen Oelsnit

C > KomOUu

nnebew;^5”,’“T1

NailaX^ V

, s-‘VZI

Stadtsteinacb

5\o«Hz

Jungbunzlai

Obcr-

Glogau

— ~ > ’^Gelnbau8en E <

iFU?J \ \ p

*liiaii *v_ J jGemunden hch t . X |*

L Lohr^TTl

■r Ascbaffen /urgX" — X-f

[Jobernbu^g \ T

X.tjotlb nv li rzNblirgJ 1

Nitnburg

Kladuo

Karlsbad

Ichtenfols'

'eisseiistadt

mI

mheimi'

I^Staffel3teln \ .

r BnyretUK'

Bamherg , ^

•gnl^ — Eecbenbacl ForchhelmX ° Weideui

,v >

.• .iboes / i II

"PRAGUE

-(-Prag) –

^FICHTE

Koiio"' (^'ivenht'0'Gzi

VBielit*

^Birlcenfel

Kitzingen

,ru > XlS„dJ

(Neustadt

Rothenburg * v* Ansbaoh Scb if abac bj

rS “‘tl J t- – r .ˆu;u\X/°4

»t« d , Wi- bacb-j .Nlederstet toi ‘HockertClm JalˆMockmuhl

’Wankenthof

Ludwlgshafeui

»!«!! < tri® — X < %'ey'r*J

[Sulzhacb

Doˆlurfˆ)W

Rosenthal rˆJ

\ Nieder- f| \Sdionhausen\

Blankenlj’ur

BERLIN

AJiI > K.\ VIKO.NS.

Scales.

Statute Miles, 4.3 = 1 Inch.

• Conflai

Klattau

Mai chow

Neutnarkt

Windsliach

Thnkow

F, I c h 8 ta t USxX

Nordllngcn

ns Dooauwortb n “■ Trrˆs*ˆ|

/ZypUl Nouburg Wertlngen

U lngen j ˆ

T-ˆ- Jf . |(2. pi

ˆNta!A«S*l|

X W eiasen horn ˆ//)Tf rle* I \ iKruinbacb1 / / ,

Iphelm ‘y / *!

liKellmunz /8cbwabmu

YMindelhdmXXˆLand sb 1jlX = ˆ — p/ BukiucjX VMemmlngen.KaofVy’

Tf ˆ ””

■nKempten

» Schoimol: ■KalilenA. \ jbjjBerge n.

■Dinkel3bulil~‘x

Xˆeiˆenburgl

JUTILLEB?ˆ

a’lSHOOTINOˆ

telaGflouNa_

Heinersdor

Vdibwge

Kilometres, 7 = 1 Inch.

oAsbal

. . St ra u It i n g~ˆX.\

‘Abensberg X ˆv*ˆXk

allersdbrfX^ Plattllng ‘XA

y Neufah rn

1 (— -^r^i Landau

Dingolfing dniXLanda h ut ‘v y | \ / Pfarrkircben

r\— Bricknane ^dwlgsbuxg X Gmvind ‘

annslatt

Budwels

selheltn.

Hoheu-

ichbubu/isen

Marz/iliu-

5^’- GrafcMU^IJl Freyung.

MX .

Schonbausen

)p ingen

Ylola5®

xy xReutl lngen ^OWtl-EhlogooV J,

offlngaii ‘ //— <5 *

/X7!

Bi bench J

WUstend

iesdorf

^RLOTTENBURG

Braunau

iniinelsbuq

Iruuewald

‘Tittnioniug’

Wasscrburg

Straiau

»eu«tadt

£f4V st’X:

*‘yV aldshut JlXX ‘**

ˆKarlsborst

Hjlibneberf

Ifurwi

Be J fort

•Uberlii

Iblfzell

DRILLING Gr.OUND\ OF THE GARRISONˆ Sˆ3kOF BERLIN

P IIH\be LT _ _

fflue mpelhof

Ravens bi

Gmund

Montbeliard

ingwalU Sec

Steglits-

ˆtPlauti Demcne Ki L>Iarlcn-vv \ tbnlˆj, Jo

BB eidc-

>. . . . ,.-v olp4/ Sl’,,,ei7;,

*w”. J-stf**: -X . _ y*

,2«

ˆ<9 7?

VJest Frisian Is.

Xv

V/. 4,k, t,v.v/

N

N. E. EXTENSION

l’ Telslii 56

EXPLANATORY KEY

1. Schleswig-, plebiscite.

2. Heligoland, to be dismantled.

3. Moresnet, ceded to Belgium.

4. Eupen |To be decided by Malmedy) League of Nations

6. Saar Basin under French

control.

7. Alsace-Lorraine, ceded to

France.

Batthj>rvˆ“fol’“lJpX“ cS““iF jjb 8. Leebschutz, ceded te Czecho¬ slovakia.

9. Upper Silesia, plebiscite.

10. Area ceded to Poland.

11. Danzig, a free city.

12. East Prussia, plebiscite.

13. Memel, to be decided by Allied and Associated Powers.

GERMAN EMPIRE

SCALES

Statute Miles, 63 = 1 Inch.

Kilometres, 101 = 1 Inch.

r 50 70 9° 110 130 150

*Eaod, Mc.N.Uj i Co.'., N«. 11 * 14 Map of Gorman F.mpiro. Copyright by Rand. McNally-* Co. '*

340°

-'CJ— 1

. .

• '.

.

'

-

*. ■

•

■

■

-*

- • ■ '■*

GERMANY — PHYSIOGRAPHY (1)

505

GERMANY, or THE GERMAN RE-

*•11 ur *n the f°ˆowing series of articles will be found the history and*

development of Germany before 1914. The history of 1914-18 is described in a later volume under the title War, European, or . Great World War. In view of that epochal event, these articles will lie found worthy of careful study by all stu¬ dents of history, government, national ideals, and of the rise and fall of nations. For the Political History of the German Empire since 1918 see article 17. The series comprises the following articles:

1. Physiography.

2. Political History to 1871.

3. Political History 1871 to

1918.

4. Parties and Party Poli¬

tics.

5. The Government.

6. The Judiciary.

7. History of German Lan¬

guage.

8. History of German Lit¬

erature.

9. History of German Sci¬

ence and Philosophy.

10. History of German Re¬

ligion.

11. The German University

System.

12. German Schools.

13. German Painting.

14. German Sculpture.

1.5. German Architecture.

16. German Music.

17. Germany since 1918.

18. Germany's Economic Or¬

ganization.

19. Germany's National

Wealth.

20. German Commerce.

21. German Industries.

22. German Architecture.

23. Money, Banking, Ex¬

change.

24. Traffic and Transporta¬

tion in Germany.

25. German Army.

26. German Navy.

27. Germany and the War.

1. PHYSIOGRAPHY. Germany (still officially the German Empire, Deutsches Reich, notwithstanding the change in the form of gov¬ ernment from a monarchy to a republic), with an area of 208,830 square miles, was, until after the World War, third in size of the European states, covering the territory between the Alps and the North and Baltic seas, between 56° and 47/20 N. and 6° and 23° E. Under the Treaty of Versailles its area was reduced to approxi- matelv 182,995 square miles.

Physiographically, the German territory con¬ sists of three main divisions : The Alpine region, the ˆMittelgebirge® (Central Ranges), and the North German Lowland.

The highest elevations are in the south, where the Northern Limestone Alps

*enter on Bavarian territory (Zugspitz, 9,660 feet). At their base a plateau covered with glacial drift, about 2*000 feet high, interspersed with many lakes (Bodensee, Stranberger, Chinemsee) stretches north as far as the Danube, drained by the tributaries of this river which bounds it along a large fault line.*

The Mittelgebirge is an old mountainous country of Appalachian type, whose ranges are controlled by two directions of tectonic move¬ ments : The Rhenish, running southwest- northeast, and the Hercynian System, running southeast-northwest. To the former belong (see map), beginning in the south: The Swa¬ bian Jura, Erzgebirge, Black Forest-Odenwald-Spessart, Taunus, Westerwald on the right, and Vogesen-Hardt, Hunsriick and Eifel, left of the Rhine; to the latter: The Bohemian Forest, Thuringian Forest, Teutoburger Forest, the Weser Mountains and Sudeten; the horseshoe- shape of the Fichtelgebirge and the parallelo¬ gram of the Harz present a combination of the two. Intersecting each other in many places, these ranges produce a chessboard-like dissection of the country which has not been without influence on the political dissection of central Germany into many small states.

The north is a large lowland, narrow at the

west and widening toward the east where it joins the great Russian lowland. It is dissected by two heights of land extending, respectively, from Silesia along the middle course of the Elbe and across that river between the lower courses of Elbe and Weser to the North Sea, and from eastern Prussia along the Baltic Coast into Slesvig-Holstein. The latter culmi¬ nates near Dantzig in the Turmberg (1,000 feet) and is dotted with innumerable lakes VSeenplatten® of Prussia, Pomerania and Mecklenburg) ; the former consists mostly of glacial sands (Flaming, Liineburger Heide) and is of little interest economically or scenically.

Rivers.— The courses of the rivers are ad¬ justed to these topographic conditions flowing partly in one, partly in the other, direction. Thus the Rhine flows first north-northeast, then west-southwest, then northwest. The Danube first northeast and then southeast ; the rivers of the lowland; Weser, Elbe, Oder, alternate be¬ tween a more westerly or northwesterly direc¬ tion where they follow the general slope of the Flercynian system predominating in the east and a northerly course where they cut through the heights of land. The Main is perhaps the best illustration of the complicated topography of central western Germany; Neckar, Moselle and Lahn aissect, the former, the terraced country east of the Black Forest; the latter two, the old peneplain through which the lower Rhine has cut its gorge. The largest tributaries of the lowland rivers on the right repeat the zigzag of the main watercourses so exactly that they almost establish

connections between the corresponding reaches of the latter: Weser- Aller-Elbe, Llbe-Havel-Spree-Oder, Oder-War- the-Netze- Vistula. An extensive canal system utilizes these conditions for commercial pur¬ poses, thus reconstructing the watercourses of the glacial period when at different stages of the advance and retreat of the ice sheet the waters collected at its southern margin and flowed westward or northwestward along it to join the ocean in the present lower courses of the Weser and Elbe. The tributaries on the left generally continue the south-north reaches of the main rivers, and during the eastward ex¬ pansion of the nation often gained strategic importance, such as the Saale-Elbe line in the struggles with the Slavs. The Vistula partly bounds East Prussia on the southwest; east of it the Pregel and Memel are coastal rivers of great commercial importance; so is the Ems in the extreme northwest; the Eider in Slesvig, by means of a small canal, once connected the Baltic with the North Sea until it was super¬ seded by the large Kaiser Wilhelm Canal. Of the large _ rivers the Rhine is the only one which, owing to its Alpine origin, affords good shipping all the year round. The others gen¬ erally suffer from lack of water during the dry season, and only by extensive river regula¬ tion has it been possible to satisfy the needs of modern river transportation.

Harbors. — The seaports suffer from similar disadvantages. The Baltic Coast has good river harbors (Konigsberg, Stettin) or fiords (Kiel), but their location on an inland sea, though recently improved through the Kaiser Wilhelm Canal, puts them at disadvantage. Those on the open North Sea have to combat with the dangers of shallow water on a sinking

coast (ˆWatten®), and Hamburg and Bremen ewe their importance more to the energy of their merchants than to natural advantages. Wilhelmshafen, the naval port on the Jade Bay, is an entirely artificial creation. The chain of the Frisian Islands represents the old coastline, Heligoland being the only genuine island in that region. On the Baltic Coast, Riigen is the largest and most picturesque of the German islands.

Climate. — Being open to the mild westerly winds, Germany has a milder climate than would be expected from its latitude. There is little difference between the north and south, as in the latter higher elevation counterbal¬ ances the southerly location. The mean annual of Hamburg is 48° F., of Leipzig, 47° . of Munich, 45°. A greater contrast exists between the east and west, the lowland sharing al¬ ready the continental climate of Russia with colder winters and warmer summers. The lat¬ ter allow the vine to reach here its most north¬ erly location on the earth, at Griineberg on the

Oder, in lat. 52° N. The valley of the upper Rhine is the only part of Germany where low elevation and low latitude are combined ; here we find, therefore, the warmest parts of the empire, where Indian corn is cultivated and chestnut forests abound.

States. — 'Politically, the old German Empire was a union of 26 states under the leadership of an emperor. Twenty-two were monarchies : four kingdoms (Prussia, Bavaria, Saxony, Wiirt- temberg), six grand-duchies (Baden, Hesse- Darmstadt, Oldenburg, Saxe-Weimer-Eisenach, Mecklenburg-, Schwerin, Mecklenburg-Strelitz) , five duchies (Anhalt, Saxe-Altenburg, Saxe- Meiningen, Saxe-Coburg-Gotha, Brunswick), seven principalities (Waldeck, two Schwartz- burg, two Lippe, two Reuss), each under its own king, grand-duke, duke or prince, and with an upper and lower house (except Meck¬ lenburg which did not have a constitution) ; be¬ sides these there were three republics: Ham¬ burg, Bremen and Lubeck, the old Hanse towns with their territories, and one ((Reichs- land» (imperial territory) : Alsace-Lorraine, regained from France in 1871, and, for lack of a hereditary prince, placed directly under the imperial government, with a governor appointed by the emperor. Prussia alone oc¬ cupied about two-thirds of the whole empire, practically all of northern Germany, with ex¬ ception of a few of the smaller states inter¬ spersed between her provinces. From 1871 to 1918 the king of Prussia held the office of German Emperor, which was made hereditary in the Hohenzollern dynasty, and Berlin thus became the seat of both the Prussian and the federal government. The latter consisted of the em¬ peror and two houses, similar to the state gov¬ ernments, but the members of the lower house were elected by direct and secret vote, while the modes of the state elections were quite intricate.

1 he upper houses of the state and the empire consist of representatives of the governments.

Population. — 'Exclusive of Berlin, Germany had, in 1915, 40 cities with over 100,000 in¬ habitants, mostly industrial centres and state The maj °rity the population

(pU,u(j(J,0U0) were of Germanic origin, espe¬ cially in the older countries west of the Saale- Llbe line. East of this line lives a more colo¬

nial race, with a large admixture of Slavic blood. Among and beyond them there were 3,000,000 Poles in the formerly Polish provinces of Prussia: in the east 140,000 Masurians, 106,000 Lithuanians, 100,000 Cassubians ; on the upper Spree 90,000 Wends; 220,000 French in Alsace- Lorraine; 11,000 Walloons along the Belgian, and 140,000 Danes near the Danish line. Al¬ though no more than one-tenth of the whole population, these

foreign elements were not in¬ significant, because most of them had their mother country back of them, and the problem was still more complicated by the overlapping of the German race into foreign territory on the northeast, southeast and south.

Geology.— The oldest parts of Germany, geologically, are the metamorphic rocks of the Bohemian Forest-Erzgebirge-Sudeten region, the Thuringian and Black Forests, the Vosges, etc. Of paleozoic rocks, Algonkian and Cam¬ brian schists and quartzites occur in the south¬ west, Erzgebirge (Vogtland), the southeast, Thuringian Forest (Frankenwald), and Eichtel-gebirge. Silurian schists, limestones, and sand¬ stones occur above them in these three ranges and the eastern Sudeten, while the Rhenish Slate Mountains (Eifel) are the classical locality of the German Devonian, and the Harz includes portions of all paleozoic formations. Igneous rocks (diabases) and mineral veins intersect them.

. Between the lower and upper Carboniferous this whole area of paleozoic rocks was folded into a mountain system of Alpine height, ex¬ tending from Belgium to the Sudeten («Va- riscian Mountains® of Suess, or Paleozoic Alps). Eruptions of volcanic matter accom¬ panied the mountain making forming the gran¬ ite massifs of the Erzgebirge, Black Forest, etc. In the valleys between the ranges and in the low country at their base the deposition of the carboniferous formation took place. The German Carboniferous belongs to the terres¬ trial facies of the period, the lower part (Culm) being shales and sandstones of litoral origin with occasional coal seams (Hainichen, Saxony); the upper includes the productive coal fields. They extend with little interrup¬ tion from Belgium along the northern slope of the Rhenish Devonian into Westphalia (Ruhr Basin), and with the fields around Saarbriicken farther south, in Saxony (Zwickau), and Silesia (Waldenburg, Myslowitz), are the most import¬ ant sources of coal supply in central Europe.

The Permain consists of two epochs: Rot- liegendes and Zechstein. During the Rotlie- gende the area remained land, the Paleozoic Alps were worn down to Mittelgebirge heights, and their deposits filled the depression with sands and conglomerates of a reddish color; hence the name. Occasionally coal beds occur between them. Volcanic activity continued in some places (porphyrites and pitchstones of Saxony). In the Zechstein epoch the ocean advanced again, leaving its deposits on the northern edge of the Mittelgebirge, especially around the Harz and in northern Thuringia. Among them are the famous copper-bearing shales of Mansfeld, the Zechstein proper (shal¬ low water limestone), and the immense salt beds of the upper Zechstein epoch (Stassfurt, Sperenberg) with their large supplies of gypsum and <(araum® salts.

GERMANY — PHYSIOGRAPHY (1)

■H* . Triassic period consisted of three epochs in Germany. In the first a shallow sea covered especially western Germany, forming the reddish sandstones (Buntsandstein) which cover miles and miles from Basel to Osna- bruck, the western slope of the Eifel, the re- aionnd Tarnowitz in Silesia, and form the cliffs of Heligoland. This sea deepened in the

Seun nR°clA Pro.ducing a shell limestone (Mu- schelkalk), but in the third (Keuper, pron- coiper) was cut oft from the main ocean and ormed gay colored marls and sandstones with occasional coal seams. (Lettenkohle) . The uppermost stage of the Keuper, the Rhaetic, shows the baginning of another transgression of the ocean, that of the Jurassic period.

About the Alpine facies of the Triassic, see Alps.

The Jurassic ocean overflooded all of cen¬ tral Europe, with only the tops of the moun- tains standing out as isles. It reached a great deal higher up on their sides than its present distribution would indicate, since the highest deposits were probably eroded in subsequent periods. At present we find its deposits in South Germany on both slopes of the Black Forest and Vosges, and especially in the range of the Swabian-Franconian Jura, where the lithographic stones of Solnhofen belong to its upper epoch. It also occurs in the north foot¬ hills of the Mittelgebirge, near the Elbe in Saxony, in Silesia, and evidently underlies the whole lowland, cropping out frequently from under the younger deposits.

Likewise a zone of Cretaceous hills skirts the northern border of the Jurassic ranges, with many isolated occurrences in the lowland. The second part of the Cretaceous again witnessed a large advance of the ocean, its deposits often lying on rocks several periods older in places which had never been submerged since ; on ar¬ chaic and paleozoic rocks in Saxony, on Carbon¬ iferous in Westphalia, etc. The white chalk cliffs of Riigen and the Planer sandstone of Saxon, Switzerland, are the best known ex¬ amples of German Cretaceous.

The Tertiary was again a period of great geological disturbances : Mountain folding, vol¬ canic eruptions and changes of shore-lines. During the Eocene, almost all Germany was land ; but in the Oligocene a shallow sea ex¬ tended over the lowland as far as Bonn, Leip¬ zig and Silesia. Local oscillations favored the formation of coal beds, to which soft coal measures (Halle and Leipzig) owe their origin. From the south the sea entered the rift valley formed by the breaking in two of the Black Forest-

Vosges massif, the present Upper Rhine Valley. Toward the end of the Miocene, the folding of the Alps began and gradually shut off this bay from the ocean; it became brackish and finally a freshwater lake drained by the later Rhine ‘ (Mainzer Becken). All through the Mittelgebirge region volcanic eruptions ac¬ companied these tectonic processes ; the vol¬ canoes and volcanic rocks of the Eifel, Sieben- gebirge, Westerwald, Vogelsgebirge, Meissner, Rhon, northern Bohemia and the eastern Su¬ deten, together with the hot springs which have created a belt of famous watering places along this line (Ems, Schwalbach, Wiesbaden, Nauheim, Kissingen, Franzensbad, Karlsbad, Marienbad, etc.), in the south the Kaiserstuhl,

the Hegan volcanoes (Hohentwiel) and those of the Suabian Jura date from this period. During the Pliocene practically the whole of Germany was land again and ready for the in¬ vasion of the Pleistocene ice sheet.

In the Pleistocene six glacial and five in- terglacial stages have been distinguished of winch, however, only the second (the Kansan of America) and third (corresponding to the Wisconsin) deserve special mention. At the time of its largest extension the Scandinavian glacier reached the northern foot of the Mit¬ telgebirge from the lower Rhine southeast- ward into Silesia. The terminal moraines are vvell developed along this line and the whole lowland is covered with till and strewn with erratic boulders. Another inland glacier stretched northward from the Alps, covering the Bavarian plateau ‘with its moraine mate- AUj- The Black and Bohemian Forests and the Sudeten (Riesengebirge) had local glaciers of smaller size.

. Palaeontology. — The geological description indicates the old faunas and floras. Special mention deserve :

Devonian : Eifel limestones : Brachiopods crmoids, corals.

The Rotliegende of Chemnitz : cycads, coni¬ fers, especially treeferns ; of the Saar valley and the Plauen Grund (Dresden) : Stegoce- phales (larvae and adults).

Zechstein shales of Mansfeld: Ganoid fishes.

Buntsandstein rocks have few fossils but contain footprints of various animals (Thurin¬ gia,- Franconia) .

Muschelkalk limestone (Thuringia, Wiirt- tembeig) are packed full with fossils, few spe¬ cies, many specimens : molluscs, besides brachi¬ opods, ammonites, crinoids. Terebratula vul¬ garis is very common, the stalks of Encrinus form whole beds. Ceratites nodosus, practically confined to Germany, is common everywhere.

Keuper sandstones of Wiirttemberg: well- preserved amphibia and reptilia ; gigantic Mas- todonsaurus, Capitosaurus ; huge Belodon, Zancloden. Famous is a slab with 24 speci¬ mens of Aetosaurus (Stuttgart Museum).

4 he Jurassic rocks, especially of Swabia and Franconia, show a marvelous wealth of beauti¬ fully preserved fossils of all kinds ; sponges, corals, jelly-fish, sea-urchins, crinoids, brachio¬ pods, molluscs (ammonites and belenmites es¬ pecially), crustaceans, insects, many fishes (ga¬ noids especially), and above all the reptiles: Ichthyosaurus, Plesiosaurus, Teleosaurus, the Pterosaures, the unique Campsognathus, finally the two specimens of Archaeopteryx so far known. Holzmaden (Wiirttemberg), Solnhofen and Eichstatt (Bavaria) are the famous lo¬ calities. The finds fill the collections of Banz, Stuttgart, Munich, Berlin. Tubingen has a slab (15 X 24 feet) with 24 Pentacrinies (some measure three feet across).

The flora of the Wealden formation (north¬ western Germany) looks like jurassic.

Suddenly the dicotyledons appear in the upper Cretaceous beds.

The Tertiary climate was warm, the flora had a tropical or subtropical character. Dur¬ ing the Oligocaene epoch corals could grow. The dense forests and swamps resembled those of Florida and Louisiana of to-day, although plants of a former more Indo-Australian flora

survived: Conifers (sequoias, cypresses), ever¬ green oaks, gardenias, fig trees, cinnamon trees, palms, magnolias, laurels, but also poplars, alders. Several oscillations during the Oli- gocsen'e and Miocaene favored the formation of extensive soft coal measures. The amber (East Prussia), the fossil resin of pines and especially one spruce (Picea Engleri) contains a rich in¬ sect fauna related to those of North America and East Asia of to-day.

The Miocaene flora much resembled the modern North American and Japanese floras: sequoias, bamboo, palms, laurels, camphor and cinnamon trees, fig trees, evergreen oaks, chest¬ nuts, magnolias, myrtles, acacias, mimosas ; but also poplars, maples, elms, walnuts, hazel nuts, willows, birches. The fauna likewise shows many specimens found now only in warm coun¬ tries : elephants, Mastodon, Dinotherium, Rhi¬ noceros, Hippopotamus, tapirs, antelopes, mon¬ keys, together with wild boars, deer, large and small carnivores, and the ancestral forms of the horse.

In the Pliocaene epoch the climate became temperate, animals and plants resembled those of modern North America.

The ice masses of the Pleistocaene advanced and many animals and plants were extermi¬ nated, some, however, adapted themselves. The narrow belt finally left between the north¬ ern and southern ice sheets had an arctic fauna and flora that had come in from the north. The glacial and interglacial periods caused plants and animals to migrate back and forth. Survivors of the Tertiary were: Hippopotamus, hairy elephants, the mammoth, hairy rhinoce¬ roses ; arctic forms : the musk-ox, reindeer, lemming; others: horses, deer, fallow deer, elks, the aurochs, the urus, wild boars, bears, tigers, hyenas. The ice retreated, a wide pla- teauland or rolling country was exposed. Ani¬ mals and plants found to-day in the steppe of southeastern Russia and southwestern Siberia came in and mixed with the others: jerboas, bobacs, marmots, altaic gophers, voles, calling-hares, ermines, the Saiga antelope, wild horses, bustards.

Many arctic animals and plants could not stand the change and followed the retreating ice northward or climbed the mountains. Thus the fauna and flora of the Alps and many lower mountains (Schneekoppe, Brocken) con¬ tain arctic specimens.

Soon a denser covering with vegetation de¬ veloped, immigrations from all sides occurred, a new fauna and flora resulted. Lack of con¬ nection with a region where the old Tertiary forms had survived prevented restocking. Thus we find fewer species and less variety than in North America or East Asia, and only the Ter¬ tiary forms of the three countries are much alike.

Old Germania was moist and cool, had ex¬ tensive swamps and perhaps 75 per cent of her area covered with dense forests.

Flora. — The flora is that common to north¬ ern Europe. Germany lies entirely within the northern forest zone of phytogeography and is pre-eminently a wooded country. Even to-day forests abound (26 per cent of the area; France, 16 per cent; Great Britain, 3 per cent). Man has taken care of the woods, dried out or drained swamps, regulated rivers, planted fields,

and thus caused great changes. Little <(prime- val forest® is left. (North and northeast, Bo¬ hemian Forest.)

The flora comprises about 2,200 phanero- games, 60 vascular crytogames; 6 coniferous forest trees: fir, spruce, pine, larch, juniper, yew, 40 deciduous forest trees, 20 shrubs.

An alpine flora (one-third of the alpine plants) is found in the Bavarian

Alps and spreads along the rivers onto the high plateau. The Sudeten Mountains (with some arctic forms missing in the Alps) and the tops of other high mountains (Brocken) are isolated centres of alpine plants.

The southern mountainous region (so-called Hercynic flora) is characterized by the fir (Abies alba) and shows a varied flora, the valleys having the Baltic, the mountain slopes a subalpine character. Vine culture is possible only here.

The Baltic flora occupies the northern lowland.

The forest line on the mountain slopes is at about 4,000 feet (Brocken, 3,400; Vosges, 4,264). Above is a zone of trailing trees and shrubs up to about 4,500 feet: Mountain pine (Pinns montana), dwarfed willows and juni¬ pers, rhododendron (in the Alps); above this the true alpine region with its peculiar flora. The highest peaks have only cryptogames (lichens, mosses). The alpine region in Ba¬ varia begins at 5,500 feet, spruces go up to 5,900, larch trees to 6,200. Generally, heights above 3,500 feet are unfavorable to tree growth and covered with grasses and often heather. In the Alps the region above timber-line is pas¬ ture with many flowers (gentians). Many species which are missing in the arctics probably represent alpine plants of the Tertiary (Edel¬ weiss).

The deciduous forests are diminished by secular changes (natural rotation?) : the spruce (Picea excelsa) is everywhere gaining ground at the expense of the red beech which, as is almost certain, once crowded out oaks, pines, and birches (known to have happened in Denmark). In West Prussia pines replace oaks and birches.

To-day, deciduous forests occupy only the lower mountain slopes, above are coniferous forests. The Spessart only has retained its old oak and beech forest to the top. The large Buntsandstein area in southwestern Germany not good for agriculture supports magnificent forests.

The pine is typical for the northern low¬ lands and forms forests even on the sand plains. The spruce has spread from the south all over the country. The larch forms groves in the Alps but is not confined to them. The Swiss Stonepine (Pinus cembra) occurs in a few places in the Bavarian Alps. The yew once common has almost disappeared and is found only in East and West Prussia, and occasionally in the mountains. The juniper is a tall tree in the East, smaljer and rarer in the West, miss¬ ing in East Friesland; a shrub in the mountains and in the heath.

Deciduous forests are usually mixed, beech lorests, however, common. The northern limit for the beech is south of Konigsberg. In the north the oak is

most characteristic (two kinds) ; it is the national tree celebrated by

songs, poems and myths. Maples, elms, horn¬ beams, birches, ashes, mountain-ashes, poplars, aspens, wild apples and pears, hawthorns, serv¬ ice trees form the mixed forests which contain no trees with showy flowers, except wild fruit trees, have little underbrush and no climbing vines, except hop, clematis, and ivy. The autumn coloration is not remarkable. The beauty of the mountain forests lies in the mix- *ure °f. light deciduous and dark coniferous woods, interspersed here and there with mead¬ ows or heath patches.

The linden marks former Slavic regions. The chestnut (Mediterranean flora) thrives along the Rhine. The evergreen holly (Medi- terranean) is confined to Western Germany. The evergreen box avoids the cold east.

Introduced trees: American horsechestnuts quite common, especially in the cities; Ameri¬ can lodust trees belong to the flora now and form woods in Anhalt ; Oriental cherries, plums, prunes, apricots; and walnut trees are common fruit trees. Along the highways tall Lombardy poplars are seen, but also apple, cherry and plum trees.

Meadows occupy marshy districts along the shores, and together with woods, the flood plains of rivers, and form patches in the moun¬ tains and in the Alps. They are a dense growth of grasses (20-30 species) intermingled with a great variety of flowering herbs (meadow saffrons in the fall) ; natural or cul¬ tivated, always indicating moist soil.

On sandy soil birches and pines may grow or the heath develops (heather and vaccinium) (Northwest Germany, tops of mountains, high plateaus of South Germany).

Bogs and swamps cover large areas of the lowland and of the southern plateaus. They are the coldest parts of the country and retain arctic plants. Rushes, sedges, reeds, sphagnum mosses and the insectivorous sundew, Utricu- laria, and Pinguicula form their flora.

Along the shores a salt flora develops with fleshy leaves and stalks. It is occasionally found inland (near Halle).

Sand dunes have special grasses and thistles.

Elodea canadensis introduced in female plants only has multiplied so that it

often blocks navigation in rivers and canals.

Red poppies, blue bachelors' buttons, and purple corncockles adorn the grain fields. Many plants, especially weeds, are spread by man, railways and modern traffic, and foreign plants are mixed in with the native flora.

Difference in climate: fruit trees bloom in Memel about four weeks later than on the Rhine.

Fauna. — Old Germania had a rich wood¬ land fauna. Directly and indirectly man has caused many changes. Many animals were ex¬ terminated, others were too much disturbed in their habits and disappeared. The creation by farming of an artificial steppe (ˆKultursteppe®) invited others. Some were protected, other useful or injurious ones introduced.

Mammals. — The urus became extinct prob¬ ably in the 17th century. The last bison (aur¬ ochs) was killed in East Prussia in 1755. The elk is now confined to a few preserves in East Prussia. Wild boars much reduced in number survive only by protection. Bears have not been seen since 1835 (Bavaria). The wolf is now only found along the western mountainous

border and in the large eastern forests. The lynx, common in the 17th century, seems to have disappeared (last ones: Harz Mountains, 1818; East Prussia, 1861; Wollin, 1875). Wild cats are scarce. The beaver has narrowed down its habitat to a few quiet places (Elbe near Dessau). The black rat (Mus rattus) which spread during the 12th century (from Asia?) is crowded out by the brown rat (Mus decumanus) which migrated in from Asia in the 17th century.

The snowhare in the Alps is an arctic relic. I he hare, the most popular game, has many enemies, but is still common (game laws). Rabbits have been introduced and occasionally run wild. They are bred here and there, but are not popular.

Red deer are the pride of the woods, the ambition of the huntsmen, the subject of songs and poems. They and the smaller roe deer give the best venison (game laws). The fal¬ low deer, introduced in the 16th century, is usu¬ ally kept in game parks.

Other mammals are : fox, two martens, htchet, ermine, \veasel, otter, badger, a mink called ((N6rz);> (Putorius lutreolus, very rare in Northeast Germany, reaching here its western limit of distribution) ; the insectivores : hedge¬ hog, mole, six shrews; the souslik (western limit in Silesia), the hamster (a steppe form which is comfortable in the fields).

The mammalian fauna comprises about 65 species, 16 per cent of the mammals of the paraearctic region.

The avifauna has about 225 species. The many singing birds and water-birds are char¬ acteristic. Among the former are : finches, bullfinches, skylarks, nightingales thrushes,' orioles; among the latter: rails, coots, cranes, herons, bitterns, storks, the spoonbill, swans, geese, brants, many ducks, mergansers, peli¬ cans (very rare), cormorants, many gulls, sternas, greebes and loons, auks, murres. Flamingoes (Mediterranean) have been met with on the Rhine.

The cuckoo (nesting parasitism like the American cowbird) is the only member of a family of about 200 mostly tropical species.

The lammergeier, the largest bird-of-prey of the Old World, seems now exterminated in the German Alps. Three of the Mediterranean vultures occur rarely. The golden eagle has become very scarce, the imperial eagle some¬ times penetrates to Germany. The osprey is common, the sea-eagle is found. Gledes, spar- rowhawks, hawks, kites, buzzards, falcons are the birds-of-prey. The capercailzie and the heath grouse are interesting (game laws). The large bustard, a steppe animal, is found espe¬ cially in Saxony.

Many birds of passage breed in Germany and leave in the fall ; northern birds spend the winter and go north in spring. From the East birds of the Pontic fauna often penetrate into Germany, sometimes repeatedly until they estab¬ lish themselves as new members of the fauna. Pallas' sandgrouse (Syrrhaptes paradoxus) has several times arrived in large flocks. The large bustard, some larks, quail and partridges, the house-sparrow seem to have come in that way, and like the ˆKulturs teppe." The small bus¬ tard, the bee-eater (M crops), still breed in Southern and Eastern Europe but penetrate occasionally to Germany. They may be about to

immigrate. The southwestern gate into the Rhine valley is often used by Mediterranean birds.

*In autumn most of the migrating birds fly to the Rhine valley and then south to the Rhone. On Heligoland where many migrating birds take a little rest 396 different species have been observed. The black guillemot breeds here. **

Thirteen Reptiles belong to the fauna. One tortoise occurs in ponds east of the Elbe. Three lizards (including the blindworm), the ringed snake, and

the poisonous adder are common, the smooth snake is common in certain regions. Other lizards and snakes reach the southwest so that here all twelve of them occur; among them is the venomous asp (Metz) and the deadly ammodyte viper.

The Amphibia have twelve batrachians and six urodeles. The nurse-frog and the Swiss newt reach into the Rhine valley, the black salamander is alpine.

A great variety of freshwater fishes (64 species) is characteristic, and is due to the double drainage (Atlantic and Pontic). Smelt, salmon, eel, sturgeon are missing in the Danube, hucho, Acipenser ruthenus in the Rhine. The alpine lakes and those of the Northeast have many specific fishes, especially Salmonides which have become landlocked. The most im¬ portant food-fishes are perch, pike-perch, carp, dace, roach, tench, bream, pike, eel, lamprey; those of the German seas : mackerel, cod, hali¬ but, plaice, flounder, sole, herring, sprat. The piscifauna is diminishing as the industrial de¬ velopment progresses (withdrawal and pollu¬ tion of the waters).

The land and fresh water molluscs number 240, the genus Helix alone 40. Helix pomatia is the edible snail (snail farms in Swabia). The pearl mussel occurs in some districts. The Pontic Dreissena polymorpha has spread by migration and transportation through vessels into the larger rivers and is now spreading into their tributaries.

Marine food mussels are: the edible mussel, scallops, oyster (Ostrea edulis, an expensive luxury). Oyster beds are confined to the North Sea.

The insect fauna is numerous (6,000 beetles, 3,500 butterflies and moths), many are injurious, many useful. Immigrations can be traced from the Southwest and the East. [Praving mantis (Rhine), Cicada orni (Southwest), death's head moth, Sphinx nerii, migratory locusts]. The potato beetle has appeared here and there, the American Phylloxera has done enormous damage.

The great many Carabidae are characteristic. The cockchafer (periodicity four years) is a serious pest. The gypsy moth (East and Bavaria), the processionary moths (Northwest and Northeast) are others.

Of the Crustaceans the common crayfish is widespread and a much-relished titbit.

We can distinguish three faunal districts: (1) the alpine region (chamois, snowhare, mar¬ mot, snowgrouse, chough, many insects and molluscs) ; (2) the mountainous regions with a western and eastern section; (3) the

lowlands again with a western and eastern section.

Bibliography. — Geography: Kutzen, (Das deutsche Land) (3d ed., Breslau 1880) ; Leh¬ mann, R., and Kirchhoff, A., (Forschungen zur deutschen Landes und Volkskunde) (14 vols.

Stuttgart, 1885-1903, being continued) ; Partsch, (4th ed., Leipzig 1903). Badeker's Guide Books: (Northern Germany) ; (Southern Germany. } Maps: (Die Karte des deutschen Reichs> (scale 1:100,000, 674 sheets, published by the Royal Prussian Topographical Survey) ; (Topographische Ubersichtskarte des deutschen Reichs) (scale 1:200,000, published since 1900 by the same) ; Vogel, (Karte des deutschen Reichs> (scale 1:500,000, 27 sheets, Gotha 1893).

Geology: Lepsius, (Geologie von Deutsch- land} (Stuttgart since 1889) ; Credner, H., Cle¬ mente der Geologie) (9th ed., Leipzig 1902). Maps: Lepsius, (Geologische Karte des

deutschen Reichs) (27 sheets, Gotha since

1894).

Flora: Drude, (Deutschlands Pflanzen- geographieˆ (Stuttgart 1896) ; Leunis, Synop¬ sis der drei Naturreiche) (11 Batanik, 3 vols., Hanover 1883).

Fauna: G. Jager, (Deutschlands Tierwelt nach ihren Standorten- eingeteilL (Stuttgart 1874) ; Brehm, (Tierleben) (3d ed., Leipzig) ; Leunis,

Karl Wilhelm Genthe, Formerly Assist. Prof, of Nat. Hist., Trinity

College.

Martha Krug Genthe, Associate Editor (Bull. of the Amer. Geogr.

Soc?

2. POLITICAL HISTORY TO 1871. The

place of origin of the Germans is doubtful and even the theory, based on similarities of language, that they formed part of one great Indo-European race is no longer tenable. One race may readily impose its language on an¬ other, as the Germans on their Slavic neighbors.

Quite early we find German tribes in con¬ flict with the Romans. Marius (in 101-02 b.c.) gained victories over bands of Cimbrians and Teutons that had penetrated to Provence and Northern Italy. . Caesar, after a struggle

with the German Ariovistus, established the Rhine as a Roman boundary. Augustus undertook an invasion of Germany and his stepsons, Tiberius and Drusus — also, later, the son of Drusus, Germanicus — penetrated far into the land and built camps and fortifications, of which the remains are still to be seen. But the Cheruscan Arminius (or Hermann) at the head of a coalition of tribes defeated the Ro¬ man general Varus in the Teutoburg Forest (9 a d.) and liberated Germany. Augustus began the Limes or great fortified wall which, under his successors, was extended across the whole frontier. The Germans were not always un¬ friendly and a considerable trade sprang up.

From being, in the days of Tacitus, a great number of semi-nomad tribes, the Germans coalesced into larger bodies called ˆsterns or nations, ˆ among which the chief were the Goths, Vandals, Saxons, Burgundians and b ranks (q.v.). The Goths were the first to*

GERMANY — POLITICAL HISTORY TO 1871 (2)

accept Christianity — in the Arian form, indeed T and we.r1e ˆpresented by their own bishop at the council of Nicea. Throughout the 3d and 4th centuries the Germans made themselves more and more felt in the affairs of the Roman Lmpne, and thousands were allowed to settle on Roman soil. The advent of the wild hordes °/ t“e T“ms (Tv.), who first crossed the Volga about 375 a.d., started the ((wandering of the nations and brought about the disintegration of the Western Empire and the rise of new kingdoms. Of these the only one that proved permanent was the kingdom of the Franks. Its survival is ascribed to the facts that it never lost touch with Germany, and that it adopted the Roman Catholic form of Christianity, thus finding support in the clergy of its conquered provinces.*

Under the Merovingian Clovis and his sons an end was put to the remnant of Roman rule in Gaul. Provinces were wrested from the Visigoths (q.v.) to the south; while, to the east the Allemanians (q.v.) and Burgundians (q.v.) were subjugated. Though the race of the Merovingians (q.v.) steadily degenerated, the affairs of the new kingdom were well adminis¬ tered by the chief officials, the mayors of the palace, who contrived to make their own posi¬ tion hereditary and who handled the kings like puppets. Several mayors in turn distinguished themselves by quelling revolts, but the most brilliant achievement of all was the driving back of the Saracens by Charles Martel (q.v.). The battle near Poictiers (732 a.d.) was one of the world's great combats. The Saracen war is notable, too, as marking the beginning of the feudal system (q.v.). The first fiefs were lands of the Church, confiscated and parceled out by Charles Martel with the understanding that the persons thus favored should provide themselves with horses and perform military service.

Pepin, son of Charles Martel, put an end to the fiction of Merovingian kingship (752 a.d.) by imprisoning the last of the line and causing himself to be proclaimed king. This he did with the sanction of Pope Zacchary, who declared the Frankish crown hereditary, anointed Pepin's sons and pronounced a curse on those who should choose a king from any other line. Charles, known as <(the great,® then brought the work of consolidating the kingdom to its culmi¬ nation. He conquered the last free German tribes, notably the Saxons, with whom he warred for 30 years. He interfered in Italy, overthrowing the Lombard kingdom, and he conquered the wild Avars in the present Austria. He came forward as the champion of Pope Leo III, who had traveled to Germany to ask aid against a faction of the Romans. Charles con¬ ducted a sort of trial over the Pope's enemies, finally banishing them from Rome. Leo, in re¬ turn, ˆ surprised Charles as he knelt in Saint Peter's by crowning him as successor to the old Roman emperors (800 a.d.). Charles, who had already subdivided the greater part of Ger¬ many into administrative districts, now cen¬ tralized the government still more by requiring a new oath of allegiance and by sending out envoys with power to examine into the actions of all officials. It was a flourishing period not only politically, but also in learning, literature and art. Unfortunately Charles's son, Louis the Pious, proved unequal to the task of governing.

He allowed the clergy to override him and did humiliating penance for alleged faults; he quarreled with his sons about their rights to the succession and became involved in civil war, which kept up after his death and only ended with the treaty of Verdun, in 843. (See Peace .1 rea ties). This treaty divided civilized Europe into three parts, one nearly corresponding to

m°i et.n ˆ'r.ai]ce» another to modern Germany and the third being a strip between the other two, extending from the North Sea far down into Italy. After the death of Lothair and of one of the latter's sons this middle strip (Al- sace -Lorraine) was divided between Germany and France (Treaty of Mersen (q.v.) 870), but remained a bone of contention down to our own day. Lothair's other son retained Italy.

From 885 to 888 the dominions of Charles the Great were reunited under his great grand- son, Charles the Fat. Unable to cope with the invading Norsemen Charles the Fat was de¬ posed and five independent kingdoms arose : Germany France, Italy, Upper and Lower Bur¬ gundy. Germany itself narrowly escaped fur¬ ther subdivision, but the danger was averted by the election of Conrad of Franconia, chosen possibly because he was related to the Caro- lingian house. So slight was the political co¬ hesion that Conrad went to war with the heads of each of the great duchies in turn — Lorraine, Saxony, Swabia and Bavaria — and that he felt compelled on

his deathbed to urge the election ˚f jHunry ˚f Saxony simply because that prince had been the most powerful of his opponents and could, it was hoped, hold the discordant elements together. It was a good choice. Henry proved a great organizer, training an army, building fortresses and overcoming the wild Hungarians and other Slavic tribes. He left Germany so consolidated that, at the coronation of his son and successor, Otto I, the heads of the duchies — Lorraine, Franconia, Swabia and Bavaria — did feudal, almost menial, service as cup-bearer, steward, chamberlain and marshal. Later, indeed, Otto had to put down rebellions on the part of all these dukes, and he came to rely on the ecclesiastical princes as the stanch¬ est supporters of his throne. He inaugurated the policy, which proved unfortunate in the end, of endowing the clergy with great landed pos¬ sessions. The benefit to him was that at every vacancy, as bishops had no lawful descend¬ ants, these lands reverted to the crown and could again be used to reward faithful service. Grants made to the nobles, on the contrary, came to be looked upon as hereditary family possessions, which, being let out in return for feudal service, assured the owners of large bands of faithful retainers. These local powers, especially the great dukes, were very often arrayed against the Crown.

Otto kept not merely the German, but also the Roman, Church in subjection. Drawn into Italian affairs by an appeal from the heiress to that k'ngdom, he put her enemies to flight, mar¬ ried the heiress, Adelaide, and himself assumed the titles of ((King of the Lombards® and <(King of the Italians.® He restored the empire of Charlemagne with the title of «Holy Roman Empire of the German Nation,® and, for mis¬ conduct, deposed the very Pope (Tohn XII) who had crowned him emperor. Unfortunately these Italian interests drew Otto's successors

away from their duties as German rulers. Aga n and again, with German armies, they de¬ scended upon Italy; each felt it a vital neces¬ sity to be crowned with the imperial crown at Rome. One consequence of their repeated absences was the loss of the supremacy over the Slavic nations on the German borders.

Otto's ecclesiastical policy was imitated by his son and grandson and led to a gigantic con¬ flict with the papacy. It was a question ulti¬ mately as to who should control the elections of the German bishops. If the Pope, then he had simply to adjudge the rich German sees to his partisans ; the emperor lost the supporters of his throne and the lands might practically as well have belonged outright to Rome. It seemed a life and death struggle,

which accounts for its long continuance and for the venom displayed on both sides. There were wonderfully dra¬ matic moments, like the penance at Canossa of Henry IV (1077), who amid winter snows appeared barefoot on three successive days be¬ fore the Tuscan castle in which sat Pope Gregory VII, refusing him absolution, or the capture, in Rome itself, by Henry V, of Pope Paschal II and all his cardinals. This so-called investiture quarrel ended in 1122 with the Con¬ cordat of Worms, a compromise by which there were to be two investitures, one with the tem¬ poral estates by the emperors, the other with the spiritual power by the Pope. It had taken 50 years to arrive at this simple solution of the matter. See Investiture.

New conflicts with the papacy broke out under succeeding rulers. Frederick Barbarossa warred for years with the semi-independent Lombard cities which werfe upheld by Pope Alexander III. Defeated at Legnano (1176) he was obliged to conclude the Peace of Venice with the Pope (1177), and that of Constance (1183) with the Lombard cities. See Peace Treaties.

The fact that Barbarossa's son, Henry VI, acquired Sicily by marriage, made the enmity of the popes and the emperors implacable. The papal possessions seemed to be held in a vise. It was this jealousy and fear that led to the papal determination to destroy the house of Hohenstaufen, root and branch. Other pretexts were never wanting. Frederick II was placed under the papal ban for delaying to accomplish his crusading vow and again for starting when forbidden. Crusades were preached against the emperor himself, who retaliated by capturing a whole shipload of prelates on their way to a council at Rome. It was a Titan struggle, the Sicilian kingdom being always the real bone of contention. The papacy conquered, with the aid of Charles of Anjou, who was promised the rule over Sicily. The last scion of the Hohen¬ staufen line, after losing the battle of Taglia-cozzo (1268), was beheaded in the market-place at Naples.

Meanwhile the continued absence of the law¬ ful rulers from Germany, and also the gifts of land and of privileges with which they had tried to win the support of the German nobles in the Italian campaigns, had led to the rise of many small and almost independent states. Frederick Barbarossa had still been strong enough to put down his most powerful vassal, Henry the Lion, and divide up his lands. Frederick II's death (1250) brought anarchy; and when, after an in¬

terregnum, Rudolph of Hapsburg was made king, it was practically a confederation over which he ruled.

Yet, strange to say, the age of the Hohen- staufens marks a great advance in civilization and well-being. It was the age of the crusades (q.v.) and of chivalry (q.v.), an age that marked an era in commerce, in leani ng and

literature and in luxurious living. It is from this time that some of the great cathedrals date. Germany's boundaries, too, were pushed to the east and north by colonization and occasionally by war.

The 14th and 15th century kings left little impression on the history of Germany. They were men of no great force and they advocated no great principle. Henry VII and Louis of Bavaria renewed the old struggles in Italy but with no lasting results. The quarrel of Louis with Pope John XXII, indeed, is memorable for the literary productions that it called forth. The success of the Defensor Pads of Marsilius of Padua was phenomenal. Never had the papacy been so assailed.

Charles IV was a man of no high aims, and his reign is chiefly remarkable for his promulga¬ tion of the so-called Golden Bull (q.v.) in favor of the seven electors. The earlier kings of Ger¬ many had been chosen by the whole body of the princes. At the election of Rudolph of Haps¬ burg, however, seven — the three archbishops (Mainz, Treves and Cologne) and the dukes of Saxony and Bavaria, the Margrave of Branden¬ burg and the Count Palatine — had been espe¬ cially prominent. Bavaria's vote, indeed, was adjudged later to Bohemia. This electoral col¬ lege became very powerful, exacting promises from the successful candidates and even depos¬ ing an emperor. The Golden Bull (1356) fixed the elaborate ceremonial of elections and the functions, rights and prerogatives of each of the seven electors. They were accorded almost sovereign rights.

Equally remarkable with the growth of the duchies and electorates was the development of the free towns. We find them banding to¬ gether into commercial leagues and exercising real political power, such as setting their own king on the throne of Denmark. The Hanse¬ atic League had its own fleet and its settlements in foreign lands. It enjoyed monopolies of trade and built great halls or warehouses that excite admiration to-day.

Another important organization was the Teutonic Order, a band of knights who had un¬ dertaken the convers:on of wild Prussian tribes and had ended by building up a great state with the Marienburg for its centre. The order be¬ came rich and powerful and was visited by the greatest princes. It degenerated at last and be¬ came involved in a long war with Poland. By the Peace of Thorn (1466) the part of its ter¬ ritory known as West Prussia passed into Polish hands, while even the portion that was left became a Polish dependency.

Throughout the 1 5th century the cohesion of the different parts of Germany was slight. The interests of its rulers lay elsewhere : in Hun¬ gary, Bohemia, Italy or Luxemburg. Emperor Wenceslaus was deposed for staying away as much as eight years at a time. Sigismund made his first

appearance four years after his election. Frederick III once retired in a fit of anger and

did not come near a diet for 27 years. Yet the chief courts of justice followed the king's per¬ son! No wonder a secret tribunal, the Veme, could become the chief upholder of law and order and even venture to summon the king himself. Like the Hausa and the Teutonic Order the Veme had its flourishing days and then sank into disrepute ; the end of the 15th cen¬ tury marks the decline of all three institutions.*

After 1437 Hapsburgs, many of them ineffi¬ cient, held the imperial throne in almost un¬ broken succession. After the Councils of Con¬ stance and Basel Frederick III, by a concordat or agreement with the Pope, renounced practi¬ cally all the benefits that Germany had obtained. Frederick is noted for the fact that the great Renaissance movement began under his reign. His son, Maximilian, was a regular product of the Renaissance, versatile, talented, but lacking in balance. Maximilian was personally active in a scientific, literary and artistic way, and was full of political projects, some of which were almost too wild for belief, aiming as they did at making him world-ruler. He was, for in¬ stance, to combine the offices of Pope and emperor in his own person, and to succeed Perkin Warbeck as king of England.

In Maximilian's reign, independent of him yet a product of the Renaissance spirit, falls the beginning of the German Reformation. The in¬ vention of printing (about 1450) had provided a channel for the rapid dissemination of ideas, and pungent satires like Erasmus' (Praise of Folly, J Brant's (Ship of Fools, > and the anony¬ mous (Letters of Obscure MerP had mercilessly assailed abuses in the Church. Inflammatory writings of various kinds had made the peasants familiar with the idea of vengeance on the clergy and nobles, in whose favor they were overtaxed; while payments for the support of the papal court at Rome were becoming de¬ cidedly unpopular. Altogether, the ground was well prepared when the monk Martin Luther (q.v.) launched his demand for a discussion of the matter of papal indulgences, a demand that drew down an avalanche on his own head and that altered the whole course of German history.

Luther had soon found that the indulgence- preacher, Tetzel, was merely the instrument of higher personages and was not altogether to blame for his extravagant utterances. He then joined issue directly with Pope Leo X, who had authorized the indulgences, and with the archbishop of Mainz, who

was to benefit largely by them. Luther's sovereign prince, the elector of Saxony, though a professed Roman Catholic to the end, came forward as the re¬ former's protector, and Luther, in response to his own demand for a fair hearing, was sum¬ moned to meet the Roman cardinal, Cajetanus, at Augsburg. The meeting proved fruitless, as did one with the legate Miltitz, who had been sent to Saxony to bribe the elector with the gift of the golden rose. A disputation with the theologian Eck, at Leipzig (1519), only served to clarify Luther's own ideas and to widen the breach with Rome. In three great writings he attacked the Pope and the doctrines of the Church, drawing down upon himself the papal ban. But the bull of excommunication was publicly burned by Luther at Wittenberg. The new emperor, Charles V, felt compelled, by a recent agreement with his princes not to condemn any one unheard, to summon Luther vol. 12 — 33

to his first German diet (Worms, 1521). By this time, if we can believe the Roman legate himself, nine-tenths of the German people were more or less in favor of Luther. Crowds gathered all along his route. His final word at Worms was: . ((I neither can nor will recant anything, for it is neither safe nor right to act against one's conscience. God help me. Amen.® He left as a convicted heretic, an edict signed by a majority of the princes declaring him in the ban of the empire. His life was in danger, but by order of the friendly elector of Saxony fie .was attacked by seeming brigands and spirited away to the Wartburg, where he em¬ ployed his time in preparing a translation of the Bible. Germany meanwhile was in a fer¬ ment and the number of polemical publications became enormous. Luther himself, by 1523, had published a hundred writings. Radical elements, men who claimed to be following Luther's own teachings, soon caused disturb¬ ances and drew him from his seclusion. His successful effort at restoring order in Witten¬ berg was one of the causes that prevented his arrest. His role in the great peasant revolt that broke out in 1524 was not so admirable. His incendiary eloquence had been taken by the masses as an invitation to iconoclasm. Discon¬ tent against the nobles, fanned by long oppres¬ sion, had blazed up fiercely and 300,000 peasants rose in revolt, sacking castles and monasteries in all directions. Luther preached against them as <(brands of hell,® and urged every man to strike them dead. The revolt was quelled and horrible vengeance taken, but Luther, naturally, lost many adherents, and the course of the Reformation was changed. Reliance had now to be placed on the princes rather than on the people. The Edict of Worms was never carried out, though still considered in force as late as 1530. Charles V was hampered by political considerations and by his wars with Francis of France and the Pope. His enmity to the latter once led him to remark that <(Martin Luther might, after all, prove a useful man.® Luther was able at his leisure to organize his new church; and the diet of Spires, in 1526, unani¬ mously passed a decree . which practically al¬

lowed the Lutheran princes to conduct the religious affairs of their lands as pleased themselves.

The reversal of this decree, in 1529, by a simple majority vote, drew forth the "Protest® from which the ((Protestant® party takes its name. Charles V had meanwhile gained the advantage both of the papacy and of France (treaties of Cambray and Barcelona) and his adherents were feeling very aggressive. They wished to force the issue, and they succeeded. The ((Protest® was a technical one against the right of the diet to reverse the former unani¬ mous edict. Charles himself earnestly sought to bring the schism to a peaceful end. He in¬ vited discussion and summoned conferences, act¬ ing not at all like the tyrant that many writers have made him out. He staved off war for 17 years, and then entered into it more on political than on religious grounds. Several Protestant princes fought on his side. This war with the Smalkald League, of which Elector John Fred¬ erick of Saxony and Margrave Philip of Hesse were heads, ended in the defeat and capture of those princes and in their long captivity. The electoral dignity in Saxony passed to the other

branch of the house, the head of which, Maurice, had helped the emperor. But Maurice in turn, dissatisfied because Charles did not fully keep his promises, and alarmed at the emperor's at¬ tempt to have his son, Philip II of Spain, de¬ clared successor to the throne, headed a revolt which reduced Charles to great straits. A tem¬ porary peace was concluded at Passau (1552), but the final settlement was delayed by the dis¬ unity of the Protestant princes, the Margrave of Culmbach and Maurice of Saxony fighting on opposite sides. Maurice was killed at Sievershausen (1553).

Finally at Augsburg (1555) a general peace was concluded between the Protestant and Catholic princes ; but by Ferdinand, not by Charles V — the latter preferring to abdicate rather than to make the needed concessions. The basis of the peace was free choice on the part of each lord of the land of the form of faith to be tolerated. There were, unfortu¬ nately, ambiguous clauses that led to later con¬ flicts.

For the next 20 years Protestantism had the upper hand ; but while the Roman Catholic party was strengthening itself by internal reforms, the Protestants, through dogmatic disputes, were becoming greatly weakened. Saxony (Lutheran) and the Palatinate (Calvinist) allowed their private enmities to ruin their cause as a whole. The Jesuits, marvelously trained for such work, made it their chief purpose to combat Prot¬ estantism. They

secured the majority of votes in one bishopric after another, and even in the imperial diets and in the law courts.

A revolt of the Bohemians (Protestant) against the house of Hapsburg precipitated a European war. The acceptance of the Bo¬ hemian crown by Frederick V of the Palatinate was a challenge on political as well as on re¬ ligious grounds; for the other German states could never suffer one of their number to hold two of the seven electoral votes. The Pope, the king of Spain, the elector of Bavaria, even the Protestant elector of Saxony rallied to the Hapsburgs. Frederick proved but a winter king and, before a year was over, was decisively de¬ feated on the White Hill near Prague. New allies came to the fore in time : Bethlen Gabor, prince of Transylvania; Mansfeld, the Savoy condottiere; Christian of Brunswick; the Mar¬ grave of Baden Durlach, and, last but not least (1530), Gustavus Adolphus of Sweden. The emperor, Ferdinand II, would have succumbed to Gustavus Adolphus, who won a great victory at Brietenfeld and made a triumphal progress as far as Nuremberg, had he not, by enormous con¬ cessions, succeeded in inducing the mysterious Wallenstein, who was living in forced retire¬ ment, to re-enter his service. Wallenstein, en¬ dowed with dictatorial, almost royal rights, raised a huge army, compelled Gustavus Adol¬ phus to withdraw from Nuremberg, and, finally, engaged him in a battle at Liitzen, near Leipzig, that cost the Swedish conqueror his life. Later, indeed, doubts arose in many quarters as to Wallenstein's ultimate purpose. As far as we can judge now, it was to dictate a peace to Germany even at the risk of having to intimidate the emperor. Just at what stage his dealings with the Swedes and Saxons became treasonable is hard to establish, but treasonable they were at the last. An order was given for his arrest, living or dead; and some of his own officers

joined in a deliberate plot to kill him. His room was invaded, he himself stabbed in the breast (1634).

The war now entered a new phase. It was no longer merely a question of religious inter¬ ests, for Catholic France joined in on the side of the Protestants. The struggle finally became one merely for compensation and costs. For four years it went on simultaneously with peace negotiations (at Osnabruck and Munster in Westphalia) which ended in an agreement as to mutual religious toleration and in a readjust¬ ment of the map of Europe. Unfortunately the boundary between Germany and France was es¬ tablished by an ambiguous formula and, later, led again to war (1688-97).

The most important development in the period following on the peace of Westphalia was the rise of the Brandenburg-Prussian monarchy. See Prussia. After the Great Elector (1640-88) had consolidated his posses¬ sions, his son, Frederick III, was allowed to assume the royal title as

compensation for aid furnished the Hapsburg emperor in the Spanish Succession War. The Spanish throne, vacant by the death of the childless Carlos II, was claimed by Emperor Leopold for his son Charles (VI), and by Louis XIV for his grand¬ son, the due d' Anjou. . Against Louis XIV was arrayed the grand alliance, consisting of Eng¬ land, Holland, Austria, and the majority of the German states. With Louis were the electors of Cologne and of Bavaria. The war, which lasted 13 years, showed an almost unbroken series of victories — Blenheim, Turin, Ramifies, Malplaquet and others — for the Grand Al¬ liance. Yet by the Treaty of Baden (1714) the German states gained absolutely nothing, Eng¬ land and Austria having already secured their own advantages by the treaties of Utrecht and Rastadt.

Meanwhile in Prussia (see Prussia) the first king, Frederick I, had been succeeded by the great organizer, Frederick William I, who remodeled the administration, brought the army to the highest pitch of efficiency, and placed the finances on a good basis. It was these reforms that enabled Frederick the Great to play a com¬ manding role in European history. Scarcely had Frederick come to the throne (1740) when he made a descent on the Austrian province of Silesia, advancing old claims of his house, not altogether unwarranted, to a portion of the ter¬ ritory. Received with opeh arms by the in¬ habitants of Breslau, who had chafed under the Austrian rule, he won the battles of Mollwitz and Chotusitz, and compelled the Archduchess Maria Theresa to conclude the Peace of Breslau (1742) which left Silesia in his hands. Austria and England continued the war with France. Austria's growing strength and pres¬ tige, and especially the fact that, in 1744, she concluded a treaty with Saxony, determined Frederick to re-enter the arena. He did so os¬ tensibly in support of the new emperor, Charles VII of Bavaria, the only man not a Hapsburg chosen, to that position in 300 years. In the Bohemian campaign of 1745 Frederick suffered severe reverses, but at Hohenfriedberg, at Sohr, and at Kesselsdorf he gained important victories and was able to obtain at Dresden the same terms as in. the Peace of Breslau, compelling Saxony, besides, to pay an indemnity. Charles VII having died, Maria Theresa's husband was

now elected emperor, and took the name of Francis I.

Eleven years later Frederick, learning through secret channels that Maria Theresa, the Czarina Elizabeth, and Augustus of Saxony- Poland were plotting the dismemberment of Prussia, concluded the Convention of Westmin¬ ster with England and prepared for a new war (1756). France,

where Madame de Pompadour was now all powerful, joined the two empresses. Madame de Pompadour boasted that the Treaty of Versailles (May 1750) was her work. It was followed by a second, offensive, treaty signed at the same place. (See Peace Treaties)'. The odds against Frederick in this Seven Years' War were very great, for though England sent him money and though she maintained an army of Hanoverians, she sent him no direct rein¬ forcements. The allied forces often outnum¬ bered his own by two and three to one, yet in the teeth of such superiority he gained some of his most splendid victories: Rossbach, Leuthen, Zorndorf, Liegnitz and Torgau. There came a time, indeed, when even victories were of small avail, for there was no way of filling the ranks. The death of the Tsarina Elizabeth (1762) did more for Frederick than many battles and even neutralized the effect of the desertion of Eng¬ land, which country, under the new Bute minis¬ try, suddenly left him in the lurch and tried to compel him to make peace. The new Tsar, Peter the Third, became Frederick's ally but was deposed before his troops could be of much assistance. France, however, had also with¬ drawn from the struggle and concluded the pre¬ liminary Peace of Fontainebleau with England. Maria Theresa saw the helplessness of continu¬ ing alone the task she had been unable to ac¬ complish when aided by powerful allies, and sent an envoy to treat for peace. After seven weeks of negotiation an agreement was signed at the castle of Hubertsburg (1763) which in every respect was a return to the condition of things before the war.

Later Maria Theresa and her son, the Em¬ peror Joseph, joined with Frederick and with Catherine of Russia in dismembering Poland — a step which the demoralization of the Poles in¬ vited if it did not excuse. Though Frederick the Great's share was but one-third the size of that of either of his allies, it was doubtless of greater proportionate value, as it comprised West Prussia, the land that had once belonged to the Teutonic Order, and rounded out his domains. Austria and Prussia once more went to war (1778-79), this time with regard to the Bavarian succession, claimed by Joseph. The acquisition of a German electorate would have assured the preponderance of Austria in all the affairs of the empire and would have been a fatal blow to Prussia. Frederick and his brother Henry took the field in person, but no battle of importance took place and the war was stopped by the intervention of France and Russia. Frederick devoted his last years to or¬ ganizing a league of German princes for mutual protection against Austria. It was a powerful weapon, for three of the members were electors and might readily be in a position to frustrate the choice of a Hapsburg as emperor.

Frederick's policy of opposing Austria with the aid of other German states was not carried further by his successor, Frederick William II. Indeed the latter sided with Austria in an at¬

tempt to intimidate the French revolutionists, and joined with the Emperor Leopold II in the declaration of Pillnitz (1792). Frederick Wil¬ liam himself took the field. The blatant mani¬ festo of his chief commander, the Duke of Brunswick, roused the French to fury and en¬ couraged them to win the battles of Valmy and Jemmappes (1792).

Frederick William's attention was diverted from France by further partitions of Poland (1793 and 1795) which gave him a vast terri¬ tory ; but the new provinces were badly admin¬ istered and proved a source of weakness rather than of strength. Prussia had greatly lost her prestige even before Frederick William con¬ sented to the disgraceful Peace of Basel (1795), which secretly bound Prussia to non-interfer¬ ence even though France should annex the left bank of the Rhine. Austria was left to con¬ tinue alone the struggle that had been begun in common, but in 1797 concluded the Treaty of Campo Formio, which contained secret clauses about the left bank of the Rhine similar to those signed by Prussia.

The Holy Roman Empire, as it was still called, was in an incredible state of disintegra¬ tion. At the Congress of Rastadt (1798) the French envoys openly came out with their de¬ mand for Rhenish territory, and the dispossessed princess clamored for compensation elsewhere in Germany. A witty publicist thereupon drew up the last will and testament of the old em¬ pire. Austria renewed the war, indeed, but was defeated at Marengo and Hohenlinden and, by the Peace of Luneville (1801), was obliged to take active part in the dismemberment of Ger¬ many. An executive council of the Diet, called the Imperial Deputation, passed a decree (1803) which practically annihilated more than 200 German states and divided up 50,000 square miles of territory. The compensations were arbitrarily apportioned so as to serve French interests, Napoleon Bonaparte's idea being to strengthen the South German states and create a ((Third Germany^ to be under his own in¬ fluence. He treated Germany as conquered territory, sending his troops to occupy Hanover, carrying off and putting to death the Duke of Enghien, who thought himself safe on Baden soil, and causing a bookseller of Nuremberg to be shot for selling a harmless publication which bewailed the general state of affairs.

The murder of the Duke of Enghien was one of the occurrences that roused Alexander of Russia to form a third coalition which was joined by Austria and England, but not by Prussia. The Napoleonic victories at Ulm and Austerlitz (1804) routed this coalition, and by the Peace of Pressburg (1805) Austria was di¬ vested of 28,000 square miles of territory and 3,500,000 inhabitants; while Wurttemberg and Bavaria, which had aided Napoleon, were raised to the dignity of kingdoms. They formed the nucleus of the Rhine Confederation, which now formally repudiated the jurisdiction of the Holy Roman Empire. This caused Francis I to abdicate the throne

(1806), though he had carefully provided for the future, in 1804, by having the Hapsburg possessions declared an empire by themselves.

Prussia was now goaded into war with Napoleon by violation of her territory and by double-dealing with regard to Hanover. But never had a seemingly strong state shown more

abject weakness; never was military organiza¬ tion more faulty. The defeats of Jena and Auerstadt (1806) were overwhelming and the fortresses with which the land was studded fell like houses of cards. A brief rally at Eylau, where the Prussians were joined by Russian forces, was followed by the defeat of Friedland which frightened Alexander into signing a truce. By the Treaty of Tilsit (1807), Prussia was humbled in the dust and was shorn of half of her provinces. They went to form the kingdoms of Westphalia for Jerome Bonaparte, and the duchy of Warsaw for the king of Saxony.

Then began a time of moral and physical re¬ generation. In every department arose earnest workers: Stein and Hardenberg, Scharnhorst and Gneisenau, Jahn and Arndt, Fichte and Schleiermacher. Austria, too, arose from her lethargy, but struck her blow at Napoleon too soon and collapsed after # Wagram (1809). Napoleon made Prussia join him in his in¬ vasion of Russia, but his disasters gave the Prussians their longed-for opportunity. Gen¬ eral Yorck, in command of a Prussian auxiliary force, renounced his allegiance to France, and even the phlegmatic Frederick William III was finally carried away. Landwehr and Landsturm were called out; England, Russia and Austria came to Prussia's aid and the war of liberation began (1813). Napoleon returned from Paris with a new army and gained the battles of Liitzen and Bautzen. But Blucher showed in¬ domitable energy. After a series of defeats and one. more victory Napoleon was penned in in Leipzig, and only escaped after an ultra- bloody three days' battle. He was eventually followed into France and was forced to sur¬ render. His return from Elba and his defeat at Waterloo are too familiar to be more than mentioned. See Waterloo, Battle of.

The Congress of Vienna left Germany in a very unsatisfactory condition, as a loose con¬ federation with Austria at the head, and with a Diet that was to meet at Frankfort. There was no central army, no treasury. The only means of coercion was federal execution, the deputing of one state to punish another.

The policy of the reactionary Austrian minis¬ ter, Metternich, dominated the next 30 years. He made it his life-work to prevent the Ger¬ man states from introducing constitutional gov¬ ernment. He saw conspiracies everywhere and became the bitter enemy of the Burschen- schaften and Turnvereine, comparatively in¬ nocent student organizations which held meet¬ ings like the Wartburg and Hambach festivals (1817 and 1832), where there were inflamma¬ tory demonstrations. The murder of the Rus¬ sian agent Kotzebue by the Jena student Karl Sand enabled Metternich to thoroughly frighten Russia and Prussia, which had formed with Austria a ((Holy Alliance.® Draconian decrees were passed, and a sort of revolutionary in¬ quisition was established at Mainz (1819). The Burschenschaften were dissolved, but the discontent of the students simmered on until

1848.

The hope of Germany, as we know now, lay in the supremacy of the strongest state. It was a great step forward when, between 1828 and 1842, Prussia managed to enroll in her Cus¬ toms Union all the other German states except Austria. Commercial hegemony then paved the

way for political leadership. One deterrent was the imperviousness of the Prussian king to liberal ideas. Frederick William IV steadfastly refused to give his subjects a written constitu¬ tion, though at times using language that im¬ plied sympathy with the popular demands. In 1848 the happenings in France unchained the spirit of revolt all over Germany. There were bloody uprisings in Berlin and Vienna, and a national parliament met at Frankfort. The crown of a new empire was offered to Fred¬ erick William IV, but he spurned it as a crown plucked from the gutter and reeking like car¬ rion. He got the better of the Prussian Revolutionary Parliament, but felt obliged to grant a constitution which, as he wrote to a friend, was liberal enough to make his own stomach ache. It is the constitution still in vogue in Prussia. The Frankfort Parliament was finally dispersed by force of arms, and Prussia endeavored to form a "Union® of which she should be head (1849). At Olmutz (1850), at the peremptory summons of Austria, she desisted, and consented to a simple restora¬ tion of the old confederation, with its diet, as before, at Frankfort. To this diet the Prus¬ sian delegate was Otto von Bismarck who, for 10 years, made it his special task to combat Austrian pretensions. Later he attacked the problem by strengthening the Prussian state, being called by King William to be prime minis¬ ter, and so put through a great increase in the Prussian army. This was done by technically unconstitutional means and in the teeth of violent opposition from the Parliament, which was not appeased until the utility of the new measures had been proved beyond a doubt in the victories over Denmark (1864) and over Austria (1866). The

Danish War had been undertaken in common with Austria because of Danish efforts to incorporate the province of Schleswig-Holstein; the conflict with Austria had arisen with regard to the disposal of the spoils. Austria, supported by the minor Ger¬ man states, had threatened federal execution. Prussia had accepted the challenge and declared her intention of founding a new confederation which the other states were to be compelled to join. After the swift overthrow of Saxony, Hesse, Hanover and Nassau, and after the great victory over Austria at Koniggratz, this plan was easily put into execution. Prussia became the head of the North German Con¬ federation, from which Austria was excluded. By the mediation of the French emperor, Napoleon III, it was stipulated that the South German states might form their own organiza¬ tion, which they never did. Prussia was allowed to annex much of her conquered terri¬ tory.

Napoleon's own prestige demanded that France, too, should have some annexations to show. He begged for the Rhenish provinces, he tried to buy Luxemburg. But Bismarck was inexorable. Hatred of Prussia became a domi- passion with the French, and when, in 1870, a pretext was found in the candidacy of a Hohenzollern to the vacant throne of Spain, the nation rushed joyously into war. When the candidacy was withdrawn the chamber sent an insulting demand that the king of Prussia should promise that it should never be renewed. Bismarck's publication of a terse version of the incident aroused intense excitement in Ger-

many ; 1 but it was the French who began hostili¬ ties. I heir total want of preparation and the wonderful organization of the Germans, for ™ch Moltke was largely responsible, brought about the long series of French defeats and re¬ sulted in the capture of the two main armies, as

j oSj0f the emPeror's own person (Metz and. Sedan). After the successful siege of Pans the war closed with the treaty -of Frank¬ fort (May 10, 1871). Already on 18 January, by invitation of all the states, King William of Prussia had assumed the Crown as German emperor.

Bibliography. — Andrews, Contemporary Lurope, Asia and Atrica> (Philadelphia 1902) ; Armstrong, (Charles V' (London 1902) ; Bern-imox1' Germany and the Next War' (London 1912) ; Banng-Gould, 'Germany, Past and Pres- ent} (ib. 1881) ; Blum, 'Das deutsche Reich zur f'vu Bismarck) (Leipzig 1893) ; Bryce, James, i he Holy Roman Empire)

(New York 1892) ; Bulle, 'Geschichte der neuesten Zeit, 1815-71 ' (Leipzig 1886-87) ; Cambridge Modern History ' (Vols. X, XI, XII, New York 1903-12) ; Dahl- mann-Waitz-Herre (eds.) 'Quellenkunde der deutschen Geschichte> (Leipzig 1912) ; Dawson, (The Evolution of Modern Germany) (New York 1913) ; Debidour, (Histoire diplomatique de 1' Europe, 1814-78, (Vols. I and II, Paris 1891) ; Denis, (La fondation de l'empire alle- mand) (ib. 1906) ; Eltzbacher, 'Modern Ger- many5 (London . 1905) ; Erdmannsdorffer, Deutsche . Geschichte vom westphalischen Fneden bis zum Regierungsantritt Friedrichs des Grossen,. 1648-1740) (Berlin 1892-94) ; Fisher, (Mediaeval Europe' (2 vols., London 1898) ; Gardiner, 'The Thirty Years' War> (1874) ; Gebhardt, (Handbuch der deutschen Geschichteˆ (2 vols., Stuttgart 1910) ; Gutsche et alii, (Bibliothek deutscher Geschichte) (ib. 1876 et seq.) ; Headlam, James, (Bismarck) (London 1899) ; Henderson, E. F., (Short His¬ tory of. Germany) (latest ed., New York 1916) ; id., 'History of Germany in the Middle Ages' (ib. 1894) ; id. 'Bliicher and the Uprising of Prussia against Napoleon' (ib. 1911) ; Hurd and Castle, Che German Sea Power' (London 1913) ; Hill, 'History of Diplomacy in the In¬ ternational Development of Europe' (6 vols., New York 1905-14) ; Janssen, (History of the German People' (London 1907) ; Lamprecht, 'Deutsche Geschichte' (12 vols., Berlin 1891— 1909) ; Lowell, Covernments and Politics in Continental Europe'. (New York 1896) ; Mal- leson, Che Refoundinc" of the German Empire, 1848-71' (London 1893); Muller, 'Political History of Recent Times, 1816-75' (New York 1882) ; Murdock, Che Reconstruction of Europe' (Boston 1889) ; Nitzsch, 'Geschichte des deutschen Volkes bis zum Augsburger Reli- gionsfrieden' (3 vols., Leipzig 1892) ; Marcks, 'Germany and England: Their Relations in the Great Crisis of European History, 1500-1900' (English trans., London 1900) ; . Oncken, 'Das Zeitalter der Revolution, des Kaiserreiches und der Befreiungskriege' (Berlin 1892) ; Priest, 'Modern Germany' ; Reddanay, W. F., 'Fred¬ erick the Great and the Rise of Prussia' (Lon¬ don 1904) ; Roberts, 'Monarchial Socialism in Germany' (New York 1913) ; Schierbrand, 'Germany: The Welding of a World Power' (ib. 1907) ; Stubbs, 'Germany in the Early Mid¬ dle Ages' (ib. 1908) ; id., 'Germany in the

Latei . Midd.le Ages' (ib. 1908); Seignobos, Political History of Europe Since 1814' (ib. 1900) ; Seeley, 'Life and Times of Stein' (London 1879) ; Treitschke, 'Deutsche Gesch¬ ichte im neunzehnten Jahrhundert' (Leipzig 1879-94) ; Tout, T. F., Che Empire and the Papacy' (1898) ; Tuttle, 'History of Prussia' (3 vols., Boston 1888) ; Von Billow, 'Imperial Germany' (New York 1914).*

Ernest F. Henderson,

Author of ' Short History of Germany' ;*

3. POLITICAL HISTORY 1871-1918.

After the foundation of the new German Empire, on 18 Jan. 1871, Bismarck (q.v.) was at the helm and directed national affairs al¬ most according to his own supreme will. The old king of Prussia, William I, now Ger¬ man emperor by the grace of the other rulers of the non-Prussian parts of the territory, had an almost blind confidence in the wisdom and energy of his Chancellor, and merely lent the great weight of his personal prestige to Bis¬ marck in directing affairs, and the young na¬ tion, still in the process of consolidation, fol¬ lowed more or less reluctantly the lead of the "Man of Blood and Iron," being thoroughly cowed by the glittering successes on battle¬ field and in statecraft with which he curtly silenced his opponents on all critical occa¬ sions. From a mere "geographical idea," which Germany had been up to 1866, she had suddenly and portentously risen to be a most powerful and aggressive entity before the eyes of amazed contemporaries. Yet the task of internal consolidation was a herculean one, requiring not alone almost autocratic prerog¬ atives — 1 such as, indeed, the new imperial con¬ stitution, being of Bismarck's own drafting, clothed the Chancellor's office with — but in¬ finite tact, patience and sympathetic insight. But Bismarck, after all, was a Prussian, even a "Junker" (younker) by descent and practical training, and tact and patience were scarcely a part of his equipment. He certainly had spared the finer susceptibilities of the minor crowned heads of Germany very skilfully to enable the establishment of an imperial ruler at all, notably in the case of those of Bavaria and Wurttemberg, and during his regime he did not depart from this line of internal pol¬ icy. But it was otherwise in sundry other respects. . He certainly proved not nearly so effective in his internal policy as he had been as a state-builder. This came to be seen very soon after the Peace of Frankfort had ratified the successes of 1870-71. The so-called Kultur-kampf (q.v.) broke out in 1873 and continued virulently till 1879. This split the whole nation into two unequal halves, the Protestant and the Catholic, antagonizing each other and bearing th' seed of bitter and ceaseless internecine strife. It came soon after, and as an out¬ cropping consequence of, the declaration of papal infallibility by the Vatican Council, this novel dogma having undoubtedly a tend¬ ency in Germany of arraying the' spiritual against the temporal power. The so-called Maigesetze, or May laws, were passed by the Reichstag, and these amongst other things de¬ creed the expulsion of the Jesuits and similar bodies from German soil. They also denied, in

a number of crucial points, the right of the Catholic hierarchy of interfering

in many ad¬ ministrative state matters, in ˆmixed® and civil marriages and in the intimate supervision by bishops of the family life of their flocks. High tension prevailed for years ; under the surface a religious war was waged in every town and hamlet. Several unyielding archbishops in Prussia were incarcerated. Bismarck, in one of his embittered moods, declared in a Reich¬ stag speech that he was firmly bent on uphold¬ ing the supremacy of the state, and thai he should never ((go to Canossa® (a historical reminiscence of the time of Emperor Henry IV). But in the end, after the lapse of six implacable years, he yielded nevertheless in a measure to papal diplomacy, and a compromise with the Vatican was effected, Leo XIII mean¬ while having succeeded Pius IX. In part this was due to a new and just as formidable in¬ ternal foe having loomed up, requiring all the strategical ruthlessness of the dreaded Chan¬ cellor; namely, the Socialists. Against their passionate agitation Bismarck got the Reich- .stag to enact the so-called Ausnahmegesetze (or exceptional laws), which put millions of Germans, both men and women, under the ban. These drastic laws, too, were passed for a speci¬ fied term of years. They drove many thou¬ sands of Germany's skilled artisans, small tradesmen, etc., Socialists by faith, into neigh¬ boring and less autocratically administered countries, and also to the United States, where most of them became good and useful citizens. The entire Socialist press was suppressed throughout Germany, but a vigorous contra¬ band trade in Socialist literature was, just the same, carried on constantly, especially across the Swiss border.

In 1878, at the Congress of Berlin, Ger¬ many's preponderance in the affairs of Europe became patent to the eyes of the beholder. This body of delegates, embracing the foremost statesmen from the principal countries of Eu¬ rope, was commissioned to adjust the final out¬ come of the Russo-Turkish War. Bismarck presided at it in Jove-like style, although he publicly vindicated to himself merely the hum¬ bler title of <(the honest broker.® The Con¬ gress ended with Russia's being stripped of nearly all the fruits of her victory, notably of her much-coveted position as arbiter in and protector of the Balkan region with its Slavic populations. It left a bitter sting behind in Russia. The Russian Prime Minister, Prince Gortchakoff, a rival of Bismarck's in the arena of high statesmanship, turned his envenomed foe, and the Russian people as a whole attrib¬ uted chiefly to Bismarck, and far less to the British wizard, Beaconsfield, their being juggled out of their spoils at the conclave. As a mat¬ ter of fact, Russian enmity thenceforward be¬ came active and, at times, virulent and embar¬ rassing to Germany. Russia began to turn her eyes away from the Spree and toward the Seine. The Franco-Russian entente virtually dated from that hour of impotent chagrin. Thus, > from an occasion when the new and frowning empire, founded on war and with a primarily militaristic basis, had apparently ar¬ rived at the apogee of power and influence, from

its very zenith of glorification, dates, in truth, one of the hidden springs of the great war that exploded in 1914; from a symbol of

tower-like strength it became a symbol of inner weakness.

Enormous sums of money and gigantic labor were devoted by the new Germany to the per¬ fection of her system of internal canalization. Her chief rivers, the Rhine and Elbe, Weser and Oder were thus tapped and connected with each other, and cheap water transportation con¬ tributed greatly to traffic and trade. From one point of view the most important of these canals, viz., the one joining the Baltic to the North Sea, commonly styled the Kiel Canal, doubled the availability and striking power of the new and steadily growing German navy. It was inaugurated on 19 June 1895 amid impres¬ sive ceremonies by the young emperor. Its construction, all told, had cost some $80,000,- 000. The organization of the judicial system, to correspond in scope and competence to the duties imposed upon the empire as such, was an important task which it took years to ac¬ complish. An imperial court was established, with its site in Leipzig, a court whose functions in most respects are not dissimilar to those of the United States Supreme Court at Washing¬ ton. More and more uniformity of jurisdic¬ tion became the fact. Criminal and civil pro¬ cedure were made of one kind throughout the country as a whole. Federal laws were enacted dealing with trade organization, banking, mer¬ chant marine, patents, etc. The Imperial Civil Code, after labors lasting for many years, was adopted and went into effect in 1900. A whole group of laws, beginning in the '80's and continuing into the new century, was framed, the so-called S ozialgesetzgebung (social bene¬ fit legislation), having for aim the material safeguarding of the bone and sinew of the na¬ tion — the laboring element, the skilled toilers, the shopkeepers and smaller dealers — and started by Bismarck himself, being originally a sop thrown to these hitherto oppressed and dis¬ affected strata of the population from which the Socialists had chiefly recruited themselves. But this type of legislation was steadily ex¬ tended, long after Bismarck's dismissal, and attained a couple of years before the outbreak of the great war a fairly comprehensive point, as it took care of its beneficiaries in cases of non-employment, of sickness, of invalidism, of old age, of death and devoting to these pur¬ poses (although the enforced weekly contribu¬ tions of the toilers themselves furnished the bulk of the funds) on the part of government and employers some 250.000,000 marks annu¬ ally, In all some 17,000,000 of the population of Germany profit from these laws. Again, as a parallel to the already existing statutes en¬ abling cities and towns to regulate their own municipal affairs, undisturbed by the state and nation, a body of laws was enacted conferring similar prerogatives on the rural communities, the Landgemeindeordnung. These two sets of laws have powerfully aided decentralization and local independence. Bismarck, who all his life

abhorred red tape, had also initiated the latter sort of legislation.

Meanwhile the movement looking toward the acquisition of a colonial empire abroad had set in. Bismarck all his life had not favored this much. He questioned, for one thing, the fitness of the German people as colonizers. He also dreaded complications for his foreign pol- lcy growing out of it. He knew that at best

scarcely any territories in the temperate zone, and hence capable of settling many German emigrants, were available for appropriation. Nevertheless, the current of feeling in favor of colonies, greatly promoted by the emperor, ran so high in Germany for many years that at last he was forced to yield. From 1884 on, when¬ ever opportunity offered, the German people have seized, purchased or otherwise acquired territories for colonial purposes, the official title for such lands being Schutzgebiete, j.e., protectorates. In this way, until the war de¬ prived her of them, Germany gradually accu¬ mulated territory (nearly altogether located in the torrid and tropical zones) in various quar¬ ters of the globe many times larger than her own home territory. This comprised German Southwest Africa (mostly arid soil, but the only one of her colonies in which white men can live permanently and raise families), ad¬ joining British South Africa, next Kameroon, Togo, German East Africa, German New Guinea, the Bismarck Archipelago, Samoa and some smaller groups of islands, all acquired be¬ fore or in 1890. Then she obtained the Caro¬ lines, as well as in China the small territory of Kiaochou. Opinions are rather divided as to the kind of use made by Germany of her colo¬ nies. Certainly, the first 20 years undeniable blunders were made. The formidable uprising of a warlike tribe in German Southwest Africa, the Hereros, and its suppression with great bloodshed and cruelty, made much talk. But on the whole it appears to be the fact that little by little — during the altogether but 30 years that Germany had to gain practical experience — in several of her larger colonies she began to be fairly successful, both as to commercial results and as to administrative methods. The oft-tested <(trade follows the flag® seems to have once more held true. And certainly it seems to be also true that in some of the more valuable and larger German colonies, notably in German East Africa and in German Southwest Africa, the natives during trying war times showed as much attachment to their German overlords as they could reasonably be expected to show in a cause of which they understood nothing. Some of the intrinsically most valuable colonial lands

once held by Germany were ex¬ changed for the tiny, but in naval strategy ex¬ tremely vital, island of Heligoland, near the mouth of the Elbe River, by the successor of Bismarck, General Count Caprivi, a complete disbeliever in German colonial aggrandizement. These were the sultanate of Sansibar and the lands of Uganda and Witu in Africa, now be¬ longing to Great Britain.

Returning to Bismarck, the year 1888 brought on not only the final demise of his nonagenarian ((old master® (as he spoke of him), William I, but also, after but a three- months' sorrowful reign, that of his son, the more liberal-minded Frederick III, and after acting for so many years very successfully the part of the major domus, the real head, under his attached sovereign, a man singularly free of personal ambition, the stern old Chancellor stood facing the young and impetuous successor, Wil¬ liam II. It was a situation inherently impos¬ sible for any length of time. William II all through his reign has only tolerated for any length of time mediocrity in his immediate en¬ tourage. He could not brook such a mentor as

Bismarck. After some 20 months of semi-hostil- lties, after the patching up of several quarrels between them, the complete rupture came at last, in March 1890, and the gnarled old states¬ man formally resigned and retired to his bosky Tusculum at Friedrichsruh, near Ham¬ burg. I here the present writer paid him, eight years later and but six weeks before his death, a visit for the purpose of learning the old statesman s views regarding the Spanish-Ameri-

Up to 1879 the young empire, largely to foster its nascent industry, had adhered to low import and export duties. But in that year, internal political considerations rendering it in¬ advisable for the government longer to resist the steady pressure exerted by the land-holding classes, . the so-called Agrarians (identical in the main with the rural aristocracy of the Prussian provinces lying east of the Elbe, and whence the larger half of the higher and more influential office-holders and army commanders are drawn), a high protective tariff was en¬ acted. This and subsequent even more drastic measures of a similar kind bore with particular weight upon the lower classes, the humbler breadwinners of the industrial towns, since it greatly heightened the price of all foodstuffs without a corresponding rise in wages. Some articles of diet, meats particularly, increased almost to prohibitive rates. This state of things remained unaltered from early in the nineties on. Reciprocity treaties were con¬ cluded, one after the other, with Austria-Hun- gary, Russia, the Scandinavian countries, Hol¬ land, Belgium, Switzerland, etc. These in a measure shifted economic conditions in this respect. From then on German industry grew rapidly in volume and efficiency. In 1876, at the Philadelphia Exposition, the imperial com¬

missioner, Reuleaux, in his official reports, had been obliged to stigmatize German industrial exhibits as <(cheap and nasty.® Now, under these novel conditions, German industry had rapidly become so formidable a competitor that England decreed herˆMade in Gremany® man¬ date, vainly attempting thereby to stem the tide of German exports. Part of what William II designated as his <(Weltoolitik® consisted in this strenuous race for mercantile supremacy, and he took good care, in his speeches to his

people in season and out of season, to impress them with the necessity of a constant growth as an exporting nation. Similarly, German ship¬ ping and German trade increased by leaps and bounds. The world began to take note of the <(German danger.® But in 1902 a new tariff law passed the Reichstag, once again enhancing the duties on foodstuffs, once more with the aim of favoring the Agrarian (or younker) in¬ terests of the nation. The Socialist party coined as an election slogan the phrase "bread usury.® At the new Reichstag elections, in June 1903, it was clearly shown that the hum¬ bler classes condemned outright the new tariff. While the Socialists increased their delegation in the Reichstag from 56 to 81 and their popular vote from 2,107,000 ballots to over 3,010,000 cast, the Agrarian vote considerably diminished and even the biggest party, the Centre, mus¬ tered but 1,875,000 votes. However, the non- Socialists in the Reichstag pooled their issues and showed a united front in that body, thus enabling them to enact the new Zolltarif of 1904, granting none of the Socialist demands. However, even this unwise legislation was not able to retard the rapid increase of Germany's industrial progress. It outdistanced England's, relatively speaking, in many quarters of the globe.

While the chief claim of his grandfather, William I, to the title of. a great ruler, had consisted not so much in his own initiative and in his own qualities, but rather in a wonderful knack possessed by him in unerringly picking the right man for the right place and then modestly stepping back and allowing him a free hand, William II prided himself on the contrary in always leading the van in all that he deemed might advance the interests and power of Ger¬ many. In the endeavor to found a colonial empire, in the promotion of German industry, trade, shipping, in all the measures that were calculated to consolidate the nation, in a reform of the German school system, in the fashioning of the most powerful army on the globe, and lastly in the creation of a huge navy William II was always the driving agency, the deter¬ mining factor. He aimed at turning the Ger¬ man school system into one having a purely national and patriotic basis, so that the

German boys and youths should not become, as he put it, "young Romans or Greeks,® should not deem the acquisition of classic lore the chief desideratum, but rather first become deeply versed in the language, literature and history of their own country and race ; and in a measure he succeeded. With his own conviction that Germany needed a navy large and efficient enough to cope with any foe, no matter which, on the water, the overwhelming bulk of the nation for years and years did not agree. Re¬ luctantly only the German people followed him on this path. In the south and in the interior provinces especially, those far removed from the Waterkant and unfamiliar with the sea, the Kaiser's naval program was never popular. Nevertheless, with resistless energy he pursued his way, overcoming all obstacles. The Ger¬ man navy, in its development, was based, first, on the Reichstag act of 1900, supplemented by those of 1906 and 1912. The latter program was to have been completed by 1923 and pro¬ vided for a fleet of 41 first-class battleships, 12 battlecruisers and 30 smaller cruisers, with an

additional 18 cruisers for foreign service and also to replace worn-out vessels. In 1914-15 the naval budget was $117,000,000 and its man power comprised 3,700 commissioned officers, with 75,468 men. For a decade and more before the outbreak of the war the keynote of Ger¬ many's foreign policy was a growing estrange¬ ment from Great Britain. At the bottom of this feeling was commercial rivalry. The Kaiser aided this by his indiscreet utterances on the occasion of the Jameson raid and during the early stages of the Boer War in South Africa. In the Russo-Japanese War Germany's attitude was friendly to Russia. Then came the first Morocco episode, Germany thus testing the strength of the Franco-British understand¬ ing. It led to the very brink of war in 1905, until at the conference of Algeciras the moot points were settled, greatly to Germany's dis¬ satisfaction. To her dismay even her nominal ally, Italy, had sided against her at Algeciras. Biilow, then Chancellor, in an attempt at self¬ irony, referred to the incident as an <(extra tour.® Twice before since 1871, still under the Bismarckian era, , war with France had been near, in 1875 and in 1887 (during the Boulanger obsession), but had been averted by the con¬ summate statesmanship of the old Chancellor. With the Kaiser, being in fact his own Chancel¬ lor, things could not run so smoothly. Largely this was owing to the peculiar mental and moral makeup of William II. A firm believer in the divine origin of his office, as confessed by one of his most noted utterances, wherein he declared that he owed his (

The "zigzag course,® as Bismarck called it, pursued by . the Kaiser was, of course, reflected in his choice of Chancellors after the real founder of the empire had been dismissed in disgrace. Caprivi's term was short; a thorough disbeliever in the colonizing venture, his views

did not harmonize at any time with those of r?asˆer» but he obeyed the latter as his chief commander,® without questioning his orders. Prince Clovis Hohenlohe, the scion of a famous and ancient house, members of which been leaders when the Hohenzollerns were still in obscurity, was a man of different type — used to the democratic ways of the South Ger¬ mans, a kindly grandseigneur of the old school, cˆsy-going, to be coaxed rather than bidden. When, however, the Kaiser over the head of the old gentleman had plunged into the Kiaochou adventure and almost precipitated war, Hohen¬ lohe got out from under and made way to an¬ other man from the north, to Prince Billow, courtly, of artistic leanings, a clever, pliable diplomat, not a statesman. He in turn met his fall by, for once, siding with the liberal Left in the Reichstag in favor of a more equable distribution of taxes in a pending bill, one making the Agrarians (and Younkers) bear a juster share of the burdens. Biilow was fol¬ lowed by Ernst von Bethmann-Hollweg, a well- meaning mediocrity whose will to arrive at a better understanding with Great Britain was good, but who shrank from the only means to arrive at that result.

When, in 1908, Austria-Hungary annexed Bosnia and Herzegovina, and when Russia and Serbia made warlike preparations, the Germany of those days identified herself with her neigh¬ bor and ally and unready Russia backed down. In 1910 the problem of a fairer and more liberal electoral system for Prussia played the greatest part, and the Prussian Diet (with the co-operation of the cabinet) succeeded in de¬ feating the proposed reform. The three-class electoral system, characterized by Bismarck himself as (

whole period of 1871-1914, the country unmis¬ takably exhibited an inner rift, occasioned by the fact that the wonderful economic progress of the nation was not accompanied by a similar political progress. The Reichstag membership was still based on the old population census of 1870, taking no account of the enormous growth of the urban population, with its over¬ whelming Socialist makeup, so that the out¬ worn rural predominance of the Younker class was still retained. In the Prussian Diet (and, in a minor degree, in the other states of Ger- many) the misrepresentation was far worse. Practically, the ancient system amounted to a partial disfranchisement of the most progres¬ sive and best portions of the nation. The large cities, it is true, nearly all sent Socialist dele¬ gates to the Reichstag, where, however, they found themselves impotent to effect serious political reforms because of the greater num¬ ber of the Younker element

and its allies whose election was rendered feasible under the mis-representative old census.

In foreign policies Germany had been, ever since the formation, first, of the Zweibund (Austria-Hungary and Germany) and, next, of the Dreibund' (with Italy added), dominated by the parlous situation thus created. For Ger¬ many it had been a veritable Procrustean bed. Europe was, for many years before the actual eruption of 1914, practically divided into two hostile camps, with France, England and Russia on the one side and the Dreibund on the other, thus paralyzing all efforts of the nations to live in hearty concord, a thoroughly unhealthy state of things, one breeding all around distrust and hatred and rendering impossible harmony.

Of course, there had been manv seeing eyes in Germany herself which discerned clearly the abnormal features in the above, features threatening perpetually the peace of the world. Bismarck, himself the creator of the Zweibund, and subsequently of the Dreibund, was by no means blind to the inherent dangers lurking in such a federation. In his literary legacy, his two volumes (with a separate appendix) of reminiscences and political reflections, published under the title of Gedanken und Erinnerungen, he dwells at length on the genesis of these two compacts. He discusses dispassionately their value as measures of safety and defense, and reaches the conclusion in so many plain words that neither the Zweibund nor the Dreibund were in themselves blessings, but rather tem¬ porary remedies to meet temporary exigencies. As to their weak points he had no illusions. Italy he would have liked to eliminate as a partner altogether. But above all, in his dis¬ cussion of the whole problem he emphatically insists that the alliance between Germany, Aus¬ tria-Hungary and Italy ought not to be looked upon as one calculated to possess permanence, giving his reasons for this opinion in unvar¬ nished terms. It is a singular fact, neverthe¬ less, that during this period here under dis¬ cussion, beginning with the erection of a new Germanic empire and ending with the frightful war, although a period amazing so far as Ger¬ many's material progress goes, there had been but a handful of German writers doing distin¬ guished service in elucidating public opinion as to her vital political life. Heinrich von Treitschke, who for a number of years helped to form polit¬ ical opinion in Germany, may be called the

intellectual father of the Pan-German cast of thought and of the whole movement so de¬ nominated. Hans Delbriick, another university professor; Nietzsche with his pitiless <(super- man» philosophy; Franz Mehring, the

Socialist expounder of scientific Socialism ; Friedrich Naumann, the originator of the (

Bibliography.— Arndt, F. E.,

(Politik > (ed. Max Cornicelius, Leipzig 1899- 1901) ; Ziegler, T., (Die geistigen u. sozialen Stromungen d. 19 Jahrh. (Berlin 1899).*

Wolf von Schierbrand.

4. PARTIES AND PARTY POLITICS.

The popular organ of government in the old German Empire as in the new was the Reichstag (Diet). According to the constitution it was supposed to be a co-ordinate factor with the Bundesrat (Federal Council) in Imperial legis¬ lation. However, since the latter body sanctioned all laws, and. since by practice almost all the important legislation started in the Bundesrat, and since above all the chancellor and the heads of the executive departments were not respon¬ sible to the Reichstag but to the Kaiser, the function of the Reichstag was in fact not more than to control the government as carried on by the sovereigns of the different states under the very prominent leadership of the king of Prussia. From this situation it can easily be seen that party politics did not plav the same important part as in countries where the head of the government is in general the leader of the party in power, as in England or in the United States.

Franceses and Constituencies.— The fran¬ chise for the Reichstag was granted to all male citizens of the age of 25. Disfranchised were persons under guardianship, those in a state

of bankruptcy, and those who had received alms from public funds during the year pre¬ ceding the election. Persons active in naval or military service were suspended during their period of active service. The qualifications for candidates were the same as for voters, except that the former must have been citizens of any of the federal states for at least one year. Thus we see that practically every male citizen had one vote in deciding the composition of the popular legislative branch of government in Germany.

However the arrangement of constituencies was such that a large number of the people had proportionally two or more votes. According to the Election Law a population of 100,000 was to elect one representative. Each state was given at least one representative regardless of population. This law contained also the pro¬ vision that a rearrangement of the constitu¬ encies was to be made according to the increase or decrease of the population. Yet this redis¬ tribution had never taken place in spite of the enormous shifting from the rural districts to the cities as a consequence of

the industrial and commercial development of Germany. Eventu¬ ally the deputies of the largest constituencies rep¬ resented several hundred thousand, while those of the smallest voting districts represented only from 15,000 to 30,000 people. In case of a strictly arithmetical redistribution the Social- Democrats would have had more than twice the number of !the Conservative groups, having behind them 4,250,000 voters against the 1,933,000 of the Conservatives, while in 1917 the Socialists had 110 seats and the Conservatives 74. But the German government looked at the represen¬ tation in the Reichstag as that of interest rather than that of. numbers. It was afraid that other¬ wise the agricultural interests would be drowned. The European War fully justified the attitude of the government. Without the good condition of its agriculture, which to a very great extent was made possible through the special care and protection of the government, Germany would in spite of her early military victories have been forced to surrender unconditionally to her enemies.

The Personnel of the Reichstag.— The

personnel of the Reichstag compared in general favorably with that of other popular legislative bodies. Men from all walks of life were rep¬ resented among the 397 members of the Reich¬ stag; 88 members were engaged in agriculture, 5 in industry, 17 in commerce, 2 in trade, 3 were unskilled laborers, 13 lived on their own income, and the remainder, 250, were in professional life. Of these latter, 58 were journalists and writers, 20 were Catholic priests, 1 was a Protestant minister, 22 were professors and teachers, 8 were physicians and apothecaries, 39 were lawyers ; 24 were judges, 21 were state officers, 7 were com¬ munal officers, and 50 were professional em¬ ployees. Of the deputies, 206 had an academic graduate training, 80 of the members were officers of the reserve. Most of the deputies had some political training in city' or local govern¬ ment before their election to the Reichstag. More than half of the members of the Reichstag of 1917 were re-elected or had been members dur- mg a previous legislative period.

Parties and Party Principles. — The numer¬ ous parties of the Reichstag may be grouped into four great parties: Conservatives, Clericals,

Liberals and Social-Democrats. From the loca-

theif seats > as viewed from the speaker's platiorm, they were often referred to as the Kight, the Centre, the Left, and the Extreme Left

respectively. 1 he basic philosophical prin¬ ciple of the conservative parties was author¬ ity from above. Throne and altar, i.e., mon- archy by the grace of God and the established L-nurch, were, according to their conception, the two strong pillars of the state. They were strongly opposed to the introduction of the democratic form of government. The public schools they felt should be supervised by the state. . Part of the Conservatives, sometimes the majority, believed in special legislation against the Jews, in whom they feared the absolute representatives of commerce and industry, of the metropolitan press and of the exchange, the powerful enemies of the interests which the Conservatives promote. In regard to social re¬ form the Conservatives enthusiastically sup¬ ported the so-called state socialism inaugurated by Bismarck, the most important results of which were the splendid compulsory insurance laws of the '80s. They regarded social reform as a voluntary but necessary gift of a state the government of which was based on the Christian principle of love and care for the poor and unprotected people.

. The Conservatives were in late years split into the High-Conservatives (or Conservatives proper), the Free-Conservatives (or Imperial Party), the Economic Union, and the Christian Socialists. . While the High-Conservatives fre¬ quently disagreed with progressive policies of the government, the Free-Conservatives were the government party, par excellence. They separated from the High-Conservatives in the 70s in order to support Bismarck. The Economic Union emphasized the protection of the middle class, and the Christian-Socialists emphasized social . reform through the government in the Christian spirit. At one time there existed the Anti-Semites, and the Farmers' Union or Agra¬ rians as distinct, conservative parties, and their spirit long continued to have influence among the Conservatives. The Agrarians extended their influence oyer the Clericals and partly over the National-Liberals.

Fundamentally the Clericals were conserva¬ tive. . Their main principle was the upholding of the interest of 'the Catholic minority in Ger¬ many. In this policy rested their strength. For this reason they counted almost all the Catholics among their followers, rich and poor, employers and employees, industrial working men, and above all, the peasants. Naturally in order to hold this heterogeneous mass of voters together they had to combine conservative and democratic principles. This they successfully did and in that way were able to keep their hold on the Catholic population of Germany. In regard to school policy and social reform they generally agreed with the Conservatives. The organization and leadership of the party were splendid and has a great deal to do with its steady success.

The philosophical principle underlying liber¬ alism is individual liberty. The Liberals are, so to speak, the Protestants in the field of politics. The

danger of liberalism is weakness in discipline and organization, obstinacv in plac¬ ing a certain dogma above all other beliefs with the result that the party is easily split into many

inefficient groups. This was the fate of the Liberals in Germany until late years. Sev- S,ia FlF168 fhey were divided into Progressives, h re e- T hink ing- Union, South-German People's I arty, Democratic Union, etc. Ultimately they foimed two units : the National-Liberals and the Liberals proper or Radicals.

The National-Liberals were in many re¬ spects more conservative than liberal. They were a middle party of compromises. They were the strongest believers in nationalism and imperialism, and, as a whole, represented the spirit of imperial Germany better than any other party.

. The Radical-Liberals advocated especially an arithmetical redistribution of the constituencies tor the Reichstag, the introduction of universal manhood suffrage in the several states, above all, in Prussia, abolition of any special privi¬ leges of the nobility, extension of the power of the Reichstag, introduction of parliamentary government, a public school free from the supervision of the church, substitution of in¬ direct taxes by direct taxes.

The aim of the Social-Democrats was two¬ fold. In the economic field they worked for complete socialization of all means of produc¬ tion and a more just valuation of labor. In the political field they wanted to establish a direct true, democracy. Therefore they advo- cated : initiative, referendum, recall, universal suffrage with proportional representation, a free church, free public schools including univer¬ sities, free legal and medical help, high income and inheritance tax, and abolition of all in¬ direct taxation. . The German Social Demo¬ crats, like the socialists in all countries, were in¬ ternally divided into two groups, the Revision¬ ists who wished to participate in all constructive legislation tending to the socialistic goal, and the Radicals, who believed in the principle ((all or nothing.ˆ. Up to the European war, how¬ ever, the differences of opinion were fought out within the party and in the end the party always voted as a unit according to majority rule. During the war a small party of Inter¬ nationalists separated from the large party and with this the solidarity of Social-Democracy was, for the first time, broken.

Besides, these four big groups there were a few. deputies in the Reichstag who protested against the incorporation of certain races in the empire.. The strongest of these, the Poles, voted in almost all other questions with their co-religionists, the Clericals. The same was true with the Alsatians. The one Danish repre¬ sentative voted usually with the Liberals. The Guelph party,

which protested against the an¬ nexation of Hanover by Germany, went out of existence after the marriage of the Duke of Brunswick, heir to the throne of Hanover, to the daughter of Kaiser Wilhelm the Second, and his acquiescence in the existing situation.

In regard to class interests the different parties showed, roughly speaking, the following representation in 1917 : »

Conservatives — Agriculture, crafts, shop¬ keepers, higher and middle rank officials, ortho¬ dox Protestant Church.

Clericals — Above all the interests of Cathol¬ icism from Catholic nobility to peasantry.

Liberals — The right wing, or National Lib¬ erals: large industrial and commercial interests,

science; the left wing: commerce, crafts, sci¬ ence, communal officers, middle and lower rank officials.

Social-Democrats — Workmgmen.

The tariff policy of the different parties was consequently as follows :

Conservatives — High protective tariff, es¬ pecially for agricultural products.

Clericals — Protective tariff.

National Liberals — Protective tariff, es¬ pecially for commerce and industry

Liberals — Free trade or very low protec¬ tion for industry and commerce.

Social-Democrats — Free trade.

Outline of Party History.— 1871-1878. During this period the National Liberals were by far the strongest party and Bismarck re¬ lied on their support and that of the Free-Con- servatives. These parties rendered the same service to the new German Empire which the Federalists rendered to the young republic of the United States. With their assistance the organization of the government was estab¬ lished on a firm basis. This period is filled with the deplorable conflict between the state and the

Catholic Church, the so-called Kultur- kampf. Finally the government had to com-

the Imperial government relied in the Reich¬ stag on the Conservative Clerical Union or Bloc.

1907- 1908. But the Clericals were very un¬ reliable and demanded special privileges in re¬ turn for their co-operation with the govern¬ ment. When for this reason they refused to grant the necessary money to put down the Herero rebellion in German Southwest Africa, the government dissolved the Reichstag and appealed to the people. The election brought the government a majority of a Con¬ servative-Liberal combination. However, this unnatural alliance was dissolved in the very next year because the two parties could not agree on part of ths financial reform of the Empire.

1908- 1918. Therefore Biilow resigned as Chancellor and Bethmann-Hollweg returned to the old bloc of Conservatives and Clericals, the National Liberals holding the balance of power. For subsequent history see Political History of THE German Republic since 1918; article 17 in this series.

The following table shows the party move¬ ment in the Reichstag from 1871 to the 1912 legislative period :

PARTIES

1871

1874

1877

1878

1881

1884

1887

1890

1893

1898

1903

1907

1912

Conservatives .

Free Conservatives .

Anti-Semitics, Agrarians .

54

38

21

33

40

38

59

56

50

28

78

28

80

41

1

98

32

99 32

11

3

73

20

5

106

37

42

76

35

3

72

28

16

96

37

53

48

44

3

56

23

24 102

33

47

50

56

6

52

20

18

100

31

50

36

81

9

60

25

27 104

28 56 50 43

4

43 15 14 93

30

44

45 110

3

Center (Clericals) .

Poles, Alsace-Lorraine representatives, Guelphs, Bavarian Farmers' Union . . .

National Liberals and Allies .

Liberals of the Left .

Social -Democrats .

Independents .

58

21

150

47

1

28

91

33

152

50

19

8

93

28

127

48

12

11

93

35

98

34

9

13

98

43

45

114

12

7

99

42

50

74

24

2

promise with the rapidly growing Clerical party. The National-Liberals were dropped as ((factio non grata,)J because they opposed the special legislation of persecution proposed by Bismarck against the growing Social-Demo¬ cratic party, and the creation of financial in¬ dependence of the empire without political responsibility to the Reichstag.

1878-1887. In the following decade Bis¬ marck depended for the support of his bills mainly on the Conservatives and Clericals. In the year 1879 Bismarck, with the help of the Conservatives and Clericals, changed the tariff policy from free trade to protection. The National-Liberals split over this issue.

1887-1890. In the year 1887 the Reichstag was dissolved because the

government could not find a majority for its demands of a strengthening of the army, necessitated by the threatening ˆrevanche® of France under the leadership of General Boulanger. The result of the election of 1887 was the victory of the government which, found a working majority in the Conservatives and the National-Liberals, a union known in German parliamentary his¬ tory as the Cartell.

1890H907. In the election of 1890 the Car¬ tell majority broke down and the government had to make further concessions to the Cleri¬ cals in order to win their support. Until 1907

Bibliography.— Mahler, K., (New York 1912) ; Kruger, F. K., Gov¬ ernment and Politics of the German Empire) (Yonkers-on-Hudson 1915) ; Büilow, B. von, Umperial Germany> (Pt. II, New York 1914).

Dr. Fritz-Konrad Kruger, Author of (Government and Politics of the Germ an E m p ire. J

. 5. THE GOVERNMENT. Generally speak¬ ing, the predecessor of the former German Empire was the Holy Roman Empire of the German Nation whose origin may be dated back to the year 800, when Charlemagne, ruler of the Germanic Francs, assumed the Imperial crown of the old Roman Empire, thus reviving the ancient idea of an <(imperium mundi. But in constant struggles with the papacy, which as the ((sacerdotium mundU considered itself the master over the imperium and with the territorial rulers and lords within the empire, the central authority was steadily weakened so that at the end of the Thirty Years' War (1648) the power of the emperor was merely a s"ad˚w;. the real power being in the hands of the territorial rulers, secular and ecclesiastic of whom there existed about 300. The German*

GERMANY

The City of Frankfort

GERMANY

1 Brandenburg Gate, Berlin

2 The Royal Museum, Berlin

GERMANY — THE

of these times had no national fatherland ; his iatherland was the small state in which he was born and reared. A Prussian regarded a

rV\x7”n as a f°reigner, a Bavarian a citizen of Wurtemberg, etc. As a matter of fact, when in the year 1S05 the last German emperor abdicated, the thousand year old state was, as \ oltaire had expressed it, neither rioly nor Roman nor an empire. It had given UP its intimate connection with the Catholic Church, the Italian parts of it had separated from it, and- the sovereign empire had changed into a confederation of numerous sovereign states. It was not difficult for the genius of Napoleon I at the head of a regenerated and uurted national France, to destroy this skeleton, vvith one swreep the revolutionary contemptor of tradition decreased the number of the Ger¬ man states from ca. 300 to some 30, thus un¬ knowingly rendering a valuable service to the future unification of Germany. After the complete defeat of the strongest German state (1806-07), Prussia, and its reduction to about half of its territory, almost all Germany was at the mercy of the French victor who treated it contemptuously as his vassal. But during this time of extreme humiliation the fundamental strength of the Prussian state and the splendid spirit, of its citizens became manifest. In a surprisingly short time, a thorough regenera¬ tion took place under the leadership of Stein, Hardenberg, Scharnhorst and many other prominent men. The purpose of these reforms was to increase in the citizens a feeling of responsibility in the affairs of the government by direct participation in them. The reforms began with the revival of self-government in the cities, as it is still essentially in existence at the present time. It was Stein’s intention gradually to extend this participation of the citizens in . state government and finally to unite the different states in a federation with one head and a national representative legisla¬ ture. Flowever his dreams were not realized. The southern states of Germany adopted con¬ stitutions between 1818 and 1820, the central and some smaller northern states followed in the 30’s, but Prussia and Austria, the two lead¬ ing German states, had to be forced to introduce constitutional government through the revolu¬ tion of 1848. At the same time the hope for a real national German state was for the time lost when, at the Congress of Vienna (1815), an unsatisfactory, loose confederation of the German states was formed under the name ((Der Deutsche Bund.® But the longing for a pow¬ erful national German state was strong among the German people, and several attempts were made to bring it about. The most notable of these was the German Parliament at Frank- fort-on-Main 1848, chosen by universal suffrage for the purpose of drawing up a constitution and electing a German emperor. This attempt, like all the others, was unsuccessful. An empire with, two jealous rivals, Austria and Prussia, fighting for the leadership, w^as impossible. Bismarck’s political genius clearly recognized this.. Only <(with blood and iron and not by orations® could the new empire be established. The rivalry between Austria and Prussia led to the so-called German War in the year 1866.

As a result of it Austria had to give up her con¬ nection with the rest of the German states, a federation of the northern German states under

the leadership of Prussia was formed and the three southern German states entered into an allmnce with the North-German Federation (the Norddeutsche Bund).

The alliance of North and South Germany was tested in the Franco-German War of 18/0-71. The outcome of the brilliant victory ot united Germany over France was the es¬ tablishment of the national German Empire, 1 Jan. .1871. (The date of the revised constitu¬ tion is 16 April 1871).

Nature of the German Empire.— The Ger¬ man Empire before 9 Nov. 1918 was a federa¬ tion of 26 states — 22 monarchies, three repub¬ lics and one «Reichsland.» In joining the Union the states voluntarily gave up their sover¬ eignty and received a share in the sovereignty of the empire. Sovereignty rested with the Bundesrat, since it was this body that had the final say in regard to all laws including the supreme law of the land — the constitution. The Bundesrat was the representative body of the princes and the senates of the 26 states.' There¬ fore, strictly, speaking, the German Empire was an aristocratic polyarchy. However, the powrer of the Kaiser as Prussian member of the Bun- desrat and as head of the imperial administra¬ tion was so preponderating that from the view¬ point of practical politics the German Empire was a monarchy, limited by the representation of the people in the Reichstag and by that of the states in the Bundesrat, or in other words, it was a constitutional monarchy limited federatively.

The Organization of the Government: The Kaiser.— The ((German Kaiser® — this is the proper title — was always the King of Prus¬ sia. Prussian law determined the succession. It was accordingly a hereditary office. Most of the power of the Kaiser in the empire was de¬ rived from his position as the head of the strongest and most privileged state in the Union. As such he controlled about one-third of the votes in the Bundesrat, and through his prestige, he was an almost controlling influence over this important organ of legislation. He had a veto on all constitutional amendments and on changes of existing taxes and custom duties. He appointed the members of the important committees in the Bundesrat for the army, the navy and fortresses. The legislative bodies were convened, opened, adjourned and dissolved by the. Kaiser. The executive functions of the Kaiser were of the greatest importance. He ap¬ pointed and dismissed the Chancellor and all imperial officers, and thus controlled the admin¬

istration of the empire. International represen¬ tation of the country lay entirely in his hands. With unessential limitations in regard to Ba¬ varia and Wurtemberg, mentioned belowT, he wras commander-in-chief of the army and navy in times of . war and peace, and could declare mar¬ tial law in any part of Germany. He appointed and removed the governor of the imperial ter¬ ritory Alsace-Lorraine and thus controlled its votes in the Bundesrat. Governmental authority in the protectorates was also, by special law, vested in the Kaiser. Like all other rulers he had an extensive pardoning powder. The Kaiser ((could do no wrong.® The responsibility for his public acts was assumed by the Chancellor. As German Kaiser, he received no financial re¬ muneration except a comparatively small amount for purposes of state representation.

GERMANY — THE GOVERNMENT (5)

The Bundesrat. — The Bundesrat, or Fed¬ eral Council, represented the federal principle. Its members were instructed delegates of the sovereigns of the several states, i.e., of the princes of the 22 monarchies and of the senates of the three republics. The members of the Bundesrat were responsible to their respective sovereigns for their votes in this body. The votes were not counted individually but as units for each state. Unlike the Senate of the United States, state representation in the Bundesrat was unequal. However, it was not in proportion to the territory or population, for in such a case Prussia would have had a majority of three- fifths and the purpose of the Bundesrat as a co¬ operative federal organ would have been de¬ stroyed. Therefore a somewhat artificial distri¬ bution of votes, based upon historical precedent, was made and Prussia was given 17 votes (through control of the one vote of the princi¬ pality of Waldeck and the three of Alsace-Lor¬ raine it really had 21), Bavaria 6, Wiirtemberg and Saxony, 4 each, Baden and Hesse, 3 each, Mecklenburg-Schwerin and Brunswick, 2 each, and the remaining 17 states 1 vote each. The presiding officer of the Bundesrat was a Prus¬ sian member, ordinarily the Chancellor. The business of the Bundesrat became so extensive that in practice it came to be a permanent body, although, as said before, not in theory.

The Bundesrat was above all a legislative organ. Laws could be and were usually first discussed in this body and always had to be sanc¬ tioned by it. As an administrative organ, the Bundesrat took action upon the general admin¬ istrative provisions and arrangements necessary for the execution of the imperial laws. Like the Senate of the United States, it had the right to recommend and elect some higher ad¬ ministrative officers. A great deal of ordinance power was also delegated to the Bundesrat. In the judicial field

the Bundesrat acted frequently as an imperial administrative court. Upon com¬ plaint, the Bundesrat could force a state to ren¬ der justice to an individual. In a very re¬ stricted sense the interpretation of the constitu¬ tion was left to the Bundesrat. At the request of one of the parties, the Bundesrat decided disputes in public law between several states and constitutional disputes within the state.

The Reichstag. — • The Reichstag was the representative body of all the German people. Its 397 members were chosen by universal male suffrage, the voting being secret and direct. Every German man 25 years old had a vote and was eligible to the Reichstag. The disqualifica¬ tions were essentially the same as in the United States. An absolute majority was necessary for election. If no candidate had such a majority a second election between the two highest can¬ didates took place within 14 days after the general election. Elections were protected by special provisions in the Criminal Code of the empire. The Reichstag was judge of the cor¬ rectness of the elections. Its organizations and proceedings with the exception of the selection of committees were almost the same as in the United States. The committees, in which as a matter of fact most of the business was done, just as in the United States, were elected in the following way : At the beginning of the legis¬ lative period the members were divided by lot into seven equal sections. Each section elected an equal number of men to each committee.

The deputies enjoyed the usual parliamentary immunities. After 1906 they reserved a small annual remuneration of 3,000 marks and free use of the railroad. Twenty marks were de¬ ducted for absence from a meeting. The meet¬ ings were public while those of the Bundesrat were secret. The legislative period was five years, but could be shortened by a dissolution of the body through the Bundesrat with the consent of the Kaiser. A new election then had to take place shortly afterward. The Reichstag had to be convened at least once a year.*

The Reichstag participated in legislation with the Bundesrat and could introduce bills, just as the Bundesrat. Its approval was necessary for imperial loans, certain ordinances and treaties, if these affected the citizens directly. The Reich¬ stag could as a body petition the Chancellor and express its disapproval of his policy by a vote of want of confidence, which, however, in Ger¬ many had no effect on the position of the Chan¬ cellor. The representatives of the government and the Bundesrat had at any time the right to appear before the Reichstag and advocate and defend the bills of the Bundesrat. They had, however, no vote. See article Parties and Party Politics.

The Chancellor and the Administrative Officers. — The supreme and only

officer created by the constitution was the Chancellor. He was the chairman of the Bundesrat and head of the whole imperial administration. By counter¬ signing all imperial documents he assumed the responsibility for them. He was appointed and removed by the Kaiser, neither Reichstag nor Bundesrat could force his resignation. The kind of responsibility was not fixed by the constitu¬ tion or by law. At the head of the different branches of the administration were secretaries of state who were subordinated to the Chancel¬ lor and who remained in office only as long as they were in harmony with the policy of the Chancellor. There existed the following su¬ preme offices which were presided over by sec¬ retaries: Interior, treasury, justice, post, for¬ eign affairs, army, navy. These secretaries could also countersign the acts of the Kaiser. The leading position of Prussia in the German Federation required that the Chancellor be at the same time the Prime Minister of Prussia, al¬ though this was not laid down in the constitu¬ tion. Twice the two positions were in different hands, but both times the experiment was a fail¬ ure and was soon given up. Under the heads of departments a host of civil service officers served who were, according to their training, salary and, social position, divided into three classes. They were subject to a special law, held their office during life or good behavior, and received a pension in case of disability or old age.

The Functions of Government: Legisla¬ tion. — Bills, as said before, could be proposed either by the Reichstag or the Bundesrat. The majority, however, were prepared in the Prus¬ sian ministries and introduced in the Bundesrat by Prussia. Here they went through the 'custo¬ mary readings and committees. A bill was passed by a majority vote, in case of a tie Prus¬ sia's vote decided the matter. No state was al¬ lowed to vote on matters in regard to which it enjoyed special privileges. Constitutional amendments were treated just like other bills, except that 14 votes were sufficient to kill them,

ˆch gˆr f nussit an absolute veto in this re- spect Ihe bill when passed, was then sent to the Reichstag. Here it was usually given to a committee after the first reading, and from there was reported to the Reichstag, and after two more readings was passed, rejected or passed with amendments. If passed, it went to the undesiat for final approval. The sanctioned DUI was then examined by the Kaiser as to the constitutionality of its form (but not its con¬ tents), promulgated and published with the countersignature of the Chancellor in the official Imperial Gazette. Whenever it was later on found out that imperial and state law conflicted, the rule was, that imperial law

took precedence over state law.

Administration.— While in the United States

Q principle of. relationship between the Union and the States in regard to legislation and ad¬ ministration is, that laws made by the Union are executed by federal officers and laws made by the states are executed by state officers, in Germany the general rule was that imperial laws were carried out by state officials. The empire reserved to itself merely the right of supervision, so that the laws were carried out in the spirit in which they were made. If a state refused to carry out an imperial law it could be forced to do so by the Kaiser upon a decision by the Bundesrat. This process, which never became necessary, was called (

The Empire and the States.— The unequal position of the individual states in the federal representative organ, the Bundesrat, and the relation of imperial legislation and state admin¬ istration, as well as the special position of Prussia have been described previously. There remain to be mentioned a few special privi¬ leges of certain states. These privileges could be abolished only with the consent of the re¬ spective states. Thus Bavaria had privileges in regard to railroad regulation, military matters,' post and telegraphs. Bavaria, Wiirtemberg and Baden had the right of taxation of wine and beer, produced in their territory. Wiirtemberg had some special privileges in regard to her post and telegraph service and in regard to the organization of 'her army. Hamburg and Bremen enjoyed the privilege of a small freeport, i.e., a territory exempt from the customs duties of the empire.

All matters not regulated by the constitution of the empire or by imperial law were left to the legislation of the states. Among these were: A large field of taxation, laws relative to church and schools, agriculture, forestry, mining, hunt¬ ing, water and road rights.

The Organization of the States. — The three republics of the Federation were the so- called Hanse Cities — Hamburg, Bremen and Liibeck. Their organs of government were a Senate elected by the lower House and presided over by a mayor and a lower House, the

Burgerschaft, elected by universal suffrage in Hamburg and by a property class system in the other two city-states. The two bodies were co-ordinated factors in legislation. The ad¬ ministration was in the hands of .members of the Senate, the mayor being the head of the ad- ministration. In the two grand duchies of Mecklenburg the monarchs were limited by a representation of two estates. All the other states (four kingdoms, four grand-duchies, five duchies, seven principalities) were modern con¬*

stitutional monarchies. The rulers were limited in the exercise of their governmental rights by legislative chambers, in the larger states, after the English model by two chambers, in the smaller states by one. The Upper House was composed of hereditary members of the nobility and prominent citizens appointed by the sover¬ eigns. The suffrage for the lower chambers differed widely. Prussia had a class system of voting based on the amount of direct taxes, giving the wealthy people a preponderating in¬ fluence in the affairs of the state, while Wur- temberg had partly introduced proportional rep¬ resentation. Even before Germany became a re¬ public it was expected that soon the suffrage for the Reichstag would be introduced in all states for the election of the lower Houses.

The local government of the different states differed widely. There were even fundamental differences within the larger states. The reason for this somewhat strange situation was found in the historical development of the different parts of Germany. In general, the western and south¬ ern parts of Germany which had been strongly under Napoleonic influence had developed and preserved a more bureaucratic administration, while the central German parts under the in¬ fluence of Stein-Hardenberg had introduced the English and old Germanic system of self- government, and in the eastern thinly popu¬ lated parts, where landlordism had been so long in existence, some remnants of the old feudal system were still to be found. The smaller states had usually two divisions of local gov¬ ernment, the larger ones three. It is impos¬ sible to discuss even in outline form the many differences of local government in the several states of the empire. We can only state very briefly the organization of local government in the central and eastern parts of Prussia. The largest unit of local government was the prov¬ ince, of which Prussia had 12. Its local af¬ fairs were partly administered by state and partly by unpaid honorary lay-officers, promi¬ nent, public-spirited, inhabitants of the province. It had a large legislative assembly elected by the assemblies of the circles, a smaller executive council and an administrative head. The next subdivision, the district, was purely a division of state government. A district contained several circles, which were organized in analogy to the provinces. The circle was composed of county and city communities. The city had the most perfect self-government of all the divisions of local government. Its organs were a large as¬ sembly, elected by a suffrage somewhat similar to that for the lower state legislature (which with modifications, was the model for all elec¬ tions in local government), a small council, elected by the assembly, and one or two mayors, usually elected by the assembly alone or by both

bodies for a period of 6 or 12 years, or some¬ times for life. The members of the council were partly unpaid honorary laymen, partly highly trained and well paid administrative of¬ ficers. Country communities were organized on a similar basis. Besides these units of local gov¬ ernment, there existed a number of manors, in which tne lord of the manor had all the rights and duties of government.

Alsace-Lorraine. — The pre-1918 legal status of the imperial territory Alsace-Lorraine dates back to a'iˆ imperial statute of 1911. At the head of tile government was a governor who was appointed and removed by the Kaiser. The governor, inderectly, therefore, the Kaiser, in¬ structed the three representatives of Alsace- Lorraine in the Bundesrat. Their votes were not counted for Prussia unless this state had a majority without such votes. Neither were they counted when an amendment to the Con¬ stitution was proposed. The legislative depart¬ ment consisted of two houses with equal rights in lawmaking. Of the members of the upper House one-half were nominated by the Bundesrat and appointed by the Kaiser; the rest were mem¬ bers either by virtue of holding certain offices or by being elected as representatives of mu¬ nicipal, industrial, and commercial bodies. The franchise for the lower House was the same as for the Reichstag. The legislative period for both Houses was five years. The Kaiser had an absolute veto in regard to laws made by the legislature of Alsace-Lorraine. For the pur¬ pose of local government the territory was di¬ vided into three districts, and these were in turn subdivided into circles and communes. For the present status of Alsace-Lorraine see War, European-Peace Treaties; also Germany Since 1918; article 17 in this series for informa¬ tion abdut the new German Government.*

Bibliography.— Burgess, J. W., (Political Science and Comparative Constitutional Laws) (2 vols., Boston 1893) ; Howard, B. E., (The German Empire) (New York 1906. At the end of the book an English translation of the Con¬ stitution) ; James, H. G., Principles of Prus¬ sian Administration } (New York 1913) ; Kruger,

F. K., Government and Politics of the German Empire) (Yonkers-on-Hudson 1915. Contains a systematic bibliography) ; Lowell, A. L., Government and Parties in Continental Europe) (2 yols., Boston 1896) ; Ogg, F. A.,

G. M., Germany since 1740) (Boston 1915).

Fritz-Konrad Kruger,

Author of (Government and Politics of the German Empire P

6. THE JUDICIARY. The system of law and the organization of justice of the German Empire differs in every respect from that of the United States of America. The law of the United States is the Anglo-Saxon common law, based upon precedence; the law of Germany is codified, laying down principles of justice appli¬ cable to definite legal disputes and crimes. While in the United States all legal cases are settled in the same courts, German legal conception dis¬ criminates between two distinct branches : Or¬ dinary law (civil and criminal law) and admin¬ istrative law, which are administered in two entirely different types of courts. Further¬ more, while the United States recognizes two separate sets of courts, the Federal and the

State courts, between which jurisdiction is di¬ vided, the German system of ordinary law knows only one law, the imperial law, which is administered by state courts alone with final appeal in most cases to the only imperial court, the Reichsgericht in Leipzig, Saxony.

Organization of Ordinary Courts. — The organization of ordinary courts is laid down by an imperial law of 1879. The lowest ordi¬ nary court is the Amtsgericht (County Court). The next highest court is the Landgericht (Dis¬ trict Court). Superior to this court is the Oberlandesgericht (Provincial or State Court). Some of the smaller states have one Ober¬ landesgericht in common. A few of the largest states with several Oberlandesgerichte have designated one of them as the Supreme State Court, to which certain cases are delegated, which otherwise go to the Supreme Court of appeal, the Reichsgericht or Imperial Court. Besides these regular courts of ordinary law there are a few special courts, such as the Kam- mern fuer Handelssachen (Commercial Courts) in connection with the larger Landgerichte, the military courts, colonial courts and imperial consular courts, in a very few half-civilized countries.

At the head of the Amtsgericht is one sin¬ gle judge who in criminal cases is assisted by two laymen as jurors. The Landgericht has three divisions. The decision of civil cases rests with three judges. Minor criminal cases are tried by the Strafkammern or Chambers for Criminal Cases, consisting of five judges. Al¬ most all other cases go to the division called Schwurgerichte or Courts of Jury. These are composed of three judges and 12 lay jurors. The Oberlandesgericht and the Reichsgericht are divided into senate, or departments for civil and departments for criminal cases. The de¬ partments of the Oberlandesgerichte are com¬ posed of five judges, those of the Reichs¬ gericht of seven.

Civil and Criminal Codes. — The excellent Civil Code of the German Empire went into ef¬ fect 1 Jan. 1900, after a most careful prepara¬ tion of 23 years. It is generally recognized by foreign jurists as a masterwork of jurispru¬ dence. The code is divided into five parts : General principles, law

of obligations, law of things, family law, and law of inheritance. The Criminal Code of the empire dates back to 31 May 1870. It is in many respects antiquated, and preparations for a new criminal code are under way. Besides the Criminal Code there are many individual imperial laws which, pro¬ vide punishment for misdemeanors and crimes, such as the Press Law, the Espionage Law, the Pure Food Law, the Trade Law, etc. Punish¬ ment for violation of police regulations, min¬ ing, fishing, hunting, and forestry laws are left to the individual states.

Procedure in Civil and Criminal Law. — In litigation in private law, involving a sum not exceeding 600 marks (about $150), the Amts¬ gericht is the first court. In all other cases suits start in the Landgericht. The course of appeal is from the Amtsgericht to the Land¬ gericht, from the Landgericht to the Ober¬ landesgericht, and from the Oberlandesgericht to the Reichsgericht for revision. Minor cases in criminal law are also settled first in the Amts¬ gericht. All serious criminal cases, such as are punishable up to a maximum of five years of

penal confinement, repetition of misdemeanors, theft and concealing of stolen goods, are tried by the Strafkammer. All other criminal cases are under the jurisdiction of the Schwur- gerichte, except cases of high treason and es¬ pionage which are decided by the Reichsgericht alone. Appeal in criminal cases is only per¬ mitted from the Amtsgericht to the Strafkam¬ mer. The decisions of the other courts are only subject to revision by the Oberlandesge- richt and the Reichsgericht.

Judicial Officers. — The judges of the Ger¬ man courts are appointed for life. They may be permanently or temporarily removed from officer or transferred to another office or re¬ tired against their will, but no judge can be re¬ moved or transferred for other than legal rea¬ sons and without a legal process. The law code may fix age limitations on reaching which judges may be retired. The training of judges is the same all over the German Empire. After a post¬ graduate course of at least three years in the de¬ partment of jurisprudence in a German university they must pass a rigid examination. They further receive practical training of three or four years in the different legal offices and after passing a second examination of a more practical nature they are appointed judges whenever a vacancy occurs. The jurors are lay judges without re¬ muneration and decide only the question of guilt or innocence of the accused. A public prosecutor is connected with each court who, in the case of the Amtsgericht, is a civil service officer of the middle rank, in all other cases a judicial officer of the same training as the judges. With the exception of a few cases in which the interest of the state is not directly concerned the public prosecutor must

prosecute any case brought to his attention. Attorneys at law (and in almost all states also notaries) have the same legal training as judges. In civil cases they are assigned to a certain court, in criminal cases they can practise at any court. The clerks of the courts are civil service officers who are trained in the principles of law.

Administrative Law. — Administrative law fixes the details of the organization of the gov¬ ernment, determines the competence of the ad¬ ministrative authorities and gives the individual redress in case his rights are violated. This type of law is administered by special admin¬ istrative courts of the different states. These courts are at the same time purely administra¬ tive bodies in local government. In Prussia small executive committees of the circle and the province, composed partly of lay members, partly of professional administrative officers, serve as administrative courts of first and sec¬ ond instance. In addition, Prussia has estab¬ lished a supreme administrative court, the Oberverwaltungsgericht in Berlin. This is a purely judicial body. No member can be less than 30 years of age. Half of them must be judges, half of them qualified for the higher positions in the administrative service. They cannot be removed except for legal reasons. The empire as such has very little administra¬ tion of its own and consequently there exists very little imperial administrative law with few imperial administrative courts. Some of them are the Railroad Commission, the Supreme Maritime Office, the Imperial Insurance Office, the Patent Office, etc. vol. 12 — 34

Question of Legality and Constitution¬ ality • — The question whether or not the courts have a right to test the legality of laws and ordinances is disputed. The majority of writ¬ ers concede the right to the courts arguing that the privilege of applying the law involves the duty of investigating its legal form. In Prus¬ sia, however, a clause of the Constitution (Art. 106) expressly forbids the courts to test the legality of properly proclaimed laws or royal ordinances. In regard to the question of de¬ claring laws unconstitutional the general opin¬ ion is that the German courts have no such right. This is also the opinion of the Reichs¬ gericht (in a decision of 26 March 1901). Ger¬ man jurisprudence considers lawmaking as an act of the sovereign who is superior to the serv¬ ants of the sovereign, i.e., judges or adminis¬ trators. It is true that this situation leaves the whole field of constitutional law with little legal protection, for the institution of impeachment has not yet been developed. The principle of ministerial responsibility, to be sure, has been laid down in all constitutions of the empire. Some of the individual states have also laid down the procedure of impeachment. In the empire itself and in the leading state, Prussia, nothing but the principle is stated. However, in Prussia, and in some other states, a superior officer can submit the question to the Oberver¬ waltungsgericht whether an indicted official under his authority, against whom civil or

criminal charges for agts done in his official capacity have been preferred, has violated his duty or not. If this question is decided in the affirmative, the case is tried in the ordinary courts.

Conflicts of Competence. — It can easily be seen that conflicts might arise as to which set of courts, administrative or ordinary, a case should go. The empire leaves it to the indi¬ vidual states to settle these conflicts. Prussia and some other states have established special Courts of Competence (Kompetenzgericht- shofe) composed of higher administrative and judicial officers. They decide to which court a case should go if both, administrative and ordi¬ nary courts, claim or reject a case.

Non-contentious Jurisdiction. — In addi¬ tion to the ordinary and the administrative law th e so-called non-contentious jurisdiction must be mentioned. This is the administrative as¬ sistance of courts or judicial officers in the cre¬ ation of private rights. It is usually performed by the Amtsgerichte. The subjects of non- contentious jurisdiction are: Registration of land titles, guardianship, registration of mar¬ riage contracts and commercial firms, probate matters, and in some states authentication of documents.

Bibliography. — Borchard, E. M., Guide to the Law of Germany) (Washington 1912) ; Howard, B. E., (The German Empire) (New York 1906) ; Kruger, F. K., Government and Politics of the German Empire) (Yonkers-on- Hudson 1915) ; Schuster, E. J., (The Principles of the German Civil Law) (Oxford 1907).

Fritz-Konrad Kruger, Author of (Government and Politics of the German Empire P

7. HISTORY OF THE GERMAN LAN¬ GUAGE. The Modern German Language, as written, spoken on the stage and also, with

certain provincial variations in the ordinary in¬ tercourse of the educated classes of the German Empire and of parts of Austria and Switzer¬ land, is a literary language which has arisen by a process of selection and refinement from the popular dialects formerly used in their respec¬ tive territories and preserved even now in the natural speech of the uneducated and, to some extent, in dialectic literature. At the beginning of historical tradition these dialects, in their entirety, had certain important characteristics which justify their classification under the com¬ mon head of German. They were distinguished from, though closely related to, the

Frisian and the Anglo-Saxon, and together with them they constituted the West Germanic branch of the Germanic family of languages, the other branches of which were the East Germanic, comprising Gothic, Vandalian, Burgundian, and the North Germanic, or Scandinavian, compris¬ ing Swedish, Danish, Norwegian, Icelandic. From the beginning, two main groups may be distinguished : High German and Low Ger¬ man, the former spoken in the hilly and moun¬ tainous midland and south, the latter in the low and level north. High German differs from Low German and from all the other Ger¬ manic dialects chiefly by the so-called High German shifting of consonants, which prob¬ ably took place between a.d. 500 and 700. By this process original d changed to t; original t, initial and after consonants (or doubled) to z or tz (pronounced ts), after vowels to a sound sim¬ ilar to which much later became identical with s; original p, initial and after consonants (or doubled), to pf, after vowels to ff, f; original k, initial and after consonants (or doubled) in the extreme soutih only, to kch, later ch, after vowels to ch. A similar change, some¬ times classified here, original th to d, began much later, but spread over the entire High and Low German territory. In consequence of these changes High German differs in its con¬ sonants more widely from Modern English than do the Low German dialects. Examples :

English

Low German

High German

day

dag

tag

tide

tid

zeit

plant

Plante

P flans e

water

water

wasser

pipe

pipe

Pfeife

corn

korn

(chorn , Alemannian)

make

maken

machen

that

dat

das

One of the chief divisions of Low German, Low Franconian, gradually separated from the other German dialects and developed a literary-language of its own, which in its modern form is called Dutch or Hollandish. Hence < (Low German® is sometimes used in the more re¬ stricted sense excluding Low Franconian. The dialects thus designated were for a long time used extensively for literary purposes, but gradually High German gained ground, and by the end of the 16th century Low German had almost ceased to be written, the people of the north adopted the common High German liter¬ ary language for all higher purposes, and the use of the Low German dialects, in their modern form also called Plattdeutsch, was restricted to more intimate intercourse and to consciously dialectic literature. The modern literary language has drawn upon Low German for contributions to its vocabulary, notably terms relating to the sea, navigation and transmarine commerce, but

in the main it is based upon High German dialects. The latter form two groups : Middle German and Upper German. Middle German comprises Franconian (not including the Low Franconian mentioned above), and Thuringian, Upper Saxon, and Silesian. Upper German com¬ prises

Alemannian with its subdivisions, Swiss and Swabian, and Bavarian, which includes Austrian.

At first all the dialects ranked practically alike, every writer using the speech of his own region. There was, indeed, at first no name of national significance applied to the whole group of dialects ; the word deutsch, which later came to mean <(German,® denoted originally <(popu- lar,® and was used mainly of the language of the people as distinguished from Latin, which was the language of church, school and, to some extent, of government. This indicates the beginning of a struggle for pre-eminence be¬ tween German and Latin which continued for many centuries and which may be characterized by a few especially important facts and dates. Religious writings in poetry and prose are found in German as early as the 8th century, but for a long time the majority of them continued in Latin. About 1230 we find the first code of laws in German, the Low German Sachsenspiegel, also the first history in German, a chronicle of the world (in Low German), and the first legal documents ; but for many years afterward Latin continued to be used alongside of the vernacular for all such purposes. The Reformation gave a great impetus to the use of German for all literary purposes, but even in 1570, 70 per cent of all the books printed in Germany were in Latin, and as late as 1691 more than 50 per cent. In the winter of 1687—88 Christian Thomasius gave at Leipzig the first lectures in German in any German university. Even works of poetry were up to the 17th century mostly in Latin. By the end of the 18th century the use of Latin had become generally limited to a few branches of learning, chiefly philology and jurisprudence.

It is customary to divide the history of the German language in three periods. The first of these, from the beginnings to about 1150 (Old High German, Old Low German), was charac¬ terized by full inflectional and derivative suf¬ fixes, showing a great variety of vowels : singan, smgu, sin git, sungun, sun gin, gasungan, salbota, lebeta, zunga, zungun, guoter, guotaz, etc. From the beginning a tendency to weaken these end¬ ings is noticeable and by the end of the period their vowels had, with slight exceptions, been reduced to the indifferent e: singen, singe, singet, sungen, siingen, gesungen, salbete, lebete, zunge, zungen, guoter, guotez, etc. Another im¬ portant change affected the stem vowels, namely, vowel assimilation or <(Umlaut®, when the suf¬ fix contained an i or j, a changed to e, e.g., gast, pi. gesti (later geste, now written Gdste) ; u changed to u (written iu), e.g., hut (now Haut), pi. huh, hiute (now Haute) ; uo changed to He, e.g., vuoz (now Fuss), pi. vuozi, viieze (now tusse), etc. The change from a to e took place in the. 8th century; the others do not appear in writing until the end of the period. The period was further characterized by crudity of vocabulary and of syntax, the latter due chiefly

t0uthj- tˆ1ˆt 8rammatical means of subordination, viz., relatives, conjunctions, and a characteristic word order, while alreadv in existence, were not yet fully developed. Trans-

lations from Latin clearly show the inadequacy of the language to render easily sentences of complex period structure. During the period also a considerable number of words were adopted from the Latin. The oldest stratum of these was due to the first contact with the Romans, irom whom the Germans learned some of the fundamental arts of civilization. Hence terms referring to commercial intercourse like Pfund (Lat. pondo), Miinze (Lat. moneta), Strasse (Lat. [via] strata),Zoll (Lat teloneum, Low Lat. toloneum) , Meile (Lat. milia [pas- suum]), etc. ; the names for the months, Januar, Februar, Mars, etc., which supplanted the native IVintermonat, Hornung, Lenzmonat, etc.; terms relating to building, Maner (Lat. mums), Pfeiler (Late Lat. pilarius), Keller (Late Lat. cellarium) , Kammer (Lat. camera), Ziegel (Lat. tegula), etc.; terms of agriculture, horticulture, and especially viniculture, Pflanze (Lat. planta), Sichel (Lat. secula), Pflaume (Lat. prunum), IVein (Lat. vinum), VVinzer (Lat. vinitor), Essig (Lat. acetum), etc.; terms relating to cookery and eating, Koch (Lat. coquus), Schiissel (Lat. scutella), Tisch (Lat. discus), Kessel (Lat. catinus), Becken (Low Lat. bac- cinus), Kohl (Lat. caulis), Pfeffer (Lat. piper), etc. The second stratum includes the terms re¬ lating to the Christian Church, the oldest of them of Greek origin, e.g., Kirche (Gr. kyriake), Pfaffe (Gr. papas), the majority from the Latin, e.g., Messe (Lat. missa), Kreuz (Lat. crucem), predigen (Lat. praedicare) , kasteien (Lat. cas- tigare), etc.; also terms relating to school and the art of writing, e.g., Schule (Lat. schola), Tinte (Lat. tincta), etc. Sometimes Latin in¬ fluence is seen in the make-up of a compound of native elements, e.g., in Gevat ter — Lat. com- pater, Gewissen — Lat. conscientia. Most of the words of these oldest strata have been thor¬ oughly assimilated in form and meaning, and few have ever been given up again.

The second period, from about 1150 to about 1500 (Middle High German, Middle Low Ger¬ man), was characterized by smoothness and melody of sounds, simplicity of grammatical forms, flexibility and variety of construction, and great richness of vocabularv. This was particularly true of the language of Middle High German poetry during the 13th century, which was not inferior to any mediaeval lan¬ guage as a means of poetic expression. It showed in all parts of the High German terri¬ tory such a uniform poetic diction and tech¬ nique, that scholars for some time assumed for this period the existence of a common literary language ranking above the dialects. This is now generally regarded as overstating the case ; the poets traveling much from place to place probably learned to

avoid words of distinctly local color and range, but in regard to pronun¬ ciation greater variety must have prevailed than the unreliable spelling of later manuscripts and the uniformized spelling of modern text editions suggest. The language of the prose literature of the time, homilies, chronicles, philosophical works, shared in this improvement over that of the preceding period. If the impetus given to literature by the Crusades, by the bloom of chiv¬ alry, and by other contemporary events and con¬ ditions had continued, it is likely that a common literary language ranking superior to the dialects would before long have developed; but the im¬ petus was of short duration and in the middle

of the 14th century we find, together with the decay of chivalry and literature, a rapid de¬ terioration of the language and a great increase of dialect differences. For this reason the time from about 1350 to about 1500 is sometimes reckoned as a transition period. The contact with French knighthood during the Crusades and the predominating social and literary in¬ fluence of the French during the whole period of chivalry led to the introduction of many French words. Some of them, being technical terms, were given up again with the things they represented; others are still in common use, e.g., Abenteuer (Fr. aventure), Lanze (Fr. lance), Palast (Fr. palais), priifen (Old Fr. preuf), preisen (Fr: priser) . German thus gained even two important and prolific suffixes : the Old French verbs in -ier (Modern Fr. -er) were adopted with the infinitive form ieren, eS > parlieren (Old Fr. parlier, Modern Fr. parler), and this suffix then spread to other verbs of foreign and later to such of native origin, e.g., komponieren (Lat. componere) , hal- bieren, irrlichtelieren; the French suffix -ie (Lat. -ia), Middle High German -ie gave by regular phonetic change Modern German ei, e.g., Mel odei (but also, under a reassertion of French influence, Melodie) , hence Biiberei, Druckerei, etc.

The third period from about 1500 to the present day (New High German, New Low German), is characterized by the creation of a common literary language and its superimposi¬ tion upon the dialects. The latter continued to develop and diverge, and an inhabitant of the extreme south would now probably find it diffi¬ cult, if not impossible, to communicate with one from the north if each could understand only his own dialect. The common language was composed of elements contributed by the dia¬ lects, but its spread was not brought about by the assimilation of dialects, but by the substitu¬ tion of the common language for the dialects for one purpose after another, by one class of the people after another, in one region after another. The beginnings of this common lan¬ guage may be traced back to the middle of the 14th century, by which time German had gen¬ erally taken the place of Latin in public docu¬ ments. From 1347 for almost a hundred years the chancery of the empire was located at Prague, in the borderland betwen Upper and Middle Germany. The documents issued

from here were written in a language in which Bavarian-Austrian and Upper Saxon elements were blended which was comparatively readily understood in other parts of the country, and which the chanceries of the various German states found therefore easy to imitate. The chancery of the Elector of Saxony was among the first to approximate to the language of the Imperial chancery; others followed and thus a larger and larger part of the country came to make use of a comparatively uniform language for the business of government. The extension of the use of this common language to general literature and finally to all the higher forms of intercourse was largely due to the enormous popularity and deep influence of Luther's writings. The great reformer deliberately and avowedly chose as his medium the language of the Saxon chancery, and he was therefore not, as he has been often called, the creator of the modern German literary language; but while

his standard served him well enough in matters of linguistic form, the chancery language, owing to the limited range of subjects treated in public documents, could offer him little help as regards words and idioms. Luther had a remarkable natural command of language, but he also pro¬ ceeded with the utmost care and spared no pains to learn from the mouths of the people and through his correspondence with men in all parts of the country the most widely understood and yet vigorous and effective forms of ex¬ pression. Thus the form as well as the sub¬ stance of Luther's numerous writings caused them to find a ready reception and enormous sale throughout the country, and his prominence in the most important affairs and the most stirring events of the period gave a peculiar authority to the form of his utterances.

The principal formal characteristics of the new common language were as follows :

(1) The diphthongs no, He , and ie of the Middle High German are regularly contracted into u, u, and i (the latter continuing, however, to be spelt ie) : guot, giiete, Hebe became gut, giite, llbe (spelt liebe). This change was orig¬ inally a Middle German characteristic.

(2) The long vowels l, u, and u, (spelt iu) of the Middle High German are regularly diph¬ thongized into ai (written ei), au and oi (spelt eu) : mm and hits became main (spelt mein) and haus (the English mine and house have gone through similar changes), and hiite (spelt hiute) became hoite (spelt heute) . This change was originally a Bavarian-Austrian charac¬

teristic.

(3) The diphthongs ei and ou are regularly changed to ai (continuing, however, to be spelt ei) and au: kein and bourn became kain (spelt kein) and baum. This was also first a Bavar¬ ian-Austrian characteristic.

(4) In the combinations si, sm-, sn-, sw-, sp-, st-, the initial sound has regularly changed to the sound represented now by sch, though in the last two combinations s continues to be writ¬ ten : Middle High German slange, smelzen, sriiden, sunmnien, sprechen, sterne appear as schlange, schmelzen, schneiden, schwimmen, schprechen (written sprechen), schtern (writ¬ ten stern).

(5) A later change, which came about dur¬ ing the period itself, consists in the lengthening of most short stem vowels in open syllables; by analogy many in closed syllables have fol¬ lowed suit. New High German sa-gen, fah-ren, neh-men, Voter, Hof, Weg, etc., had originally short stem vowels. On the other hand many originally long vowels and diphthongs followed by more than one consonant have been short¬ ened, hence, brachte, Mutter, Jammer.

*(6) By the end of the 17th century the old * differences between the stem vowels of the preterit singular and preterit plural of strong verbs had been wiped out : sang-sungen had become sang-sangen ; the only exception re¬ maining is ward-wurden.*

(7) The influence of Latin exercised through the traditions of the chancery language on the one hand, and through the clerical and human¬ istic training of Luther and his followers on the other, resulted in a cumbersome and greatly involved sentence structure, from which Luther's style in his most popular works, not¬ ably his translation of the Bible, is happily

free, but which in the writings of others, notably in more or less technical works, has been carried to such excess that it has seriously interfered with the acquisition and spread of the German language among foreigners, and only in modern times has the style of the best writers become reasonably free from this de¬ fect. The influence of Latin showed itself further in the vocabulary, not only in the bor¬ rowing oi Latin terms, but also, as in the first period, in the coining of German compounds on Latin models. During the 17th century, chiefly as a result of the Thirty Years' War, the lan¬ guage became so corrupt with Latin and French words that it was scarcely recognizable. A re¬ action, however, set in, societies were formed by scholars, writers, and patrons of letters for the purification and refinement of the language, and these conscious efforts for improvement have continued with more or less persistence to the present time, so that the

language of the best writers of our day is freer from unneces¬ sary foreign words than that of Lessing, Goethe, and Schiller. Indeed Modern German is. espe¬ cially compared with English, a very homo¬ geneous language, which shows itself not only in the small number of foreign words, but also in the thoroughness with which most of these have been naturalized in pronunciation and in¬ flection.

In spite of the great influence of Luther and other favorable circumstances it must not be supposed that the introduction of the new literary language did not meet with more or less conscious and unconscious resistance. The south was slower than the north to accept it; being largely Catholic, it looked askance at the ((Lutheran» language. The political independ¬ ence of the Swiss made them ambitious to raise their native Alemannian to the position of a literary language. Not until, the middle of the 18th century had all resistance practically ceased, and the German-speaking countries pos¬ sessed and were conscious of possessing a common literary language. The provincial char¬ acteristics which still remain, especially in Austria and Switzerland, are slight in compari¬ son with the unity that has been attained. Moreover the common language has not only supplanted the dialects in literature, govern¬ ment, school, and church, but also in the or¬ dinary intercourse at least of the educated; on the other hand it is still constantly drawing

upon the dialects to replenish and rejuvenate its stock of words.

Bibliography.— Riickert, H., (3d'ed' Strassburg 1911); Behaghel, O., (8th ed., Strassburg 1914) ; Kluge, F.,

i aa!? bis Lessing) (4th ed., Strassburg

1904) ; Diekhoff, T., (The German Language (New York 1914).*

Hans Carl Gunther von Jagemann, Professor of Germanic Philology, Harvard Uni¬ versity.

8. HISTORY OF LITERATURE. Ger¬ man literature which, as far as its documents are preserved, extends over a period of 15

centuries, may be considered in more than one way a history of the very soul of the German people, reflecting its ideals and innermost aspi¬ rations in the productions of the poets and writers of the various centuries, and showing at the same time the development and growth of these ideals and

aspirations in their influence upon the people as a whole. ˆLiterature,® says Goethe, ((is the fragment of all fragments, the least of what happened and was spoken was put in writing, and of that which was written the least has been preserved.®

There are many reasons for assuming the existence of a richly developed poetry among the Germanic tribes long before we meet any records of it in writing. The nature of this poetry was, without question, that of the poetic productions of most primitive peoples, inasmuch as it originated with their religious cults, their festivities and games, and showed the elements of lyric, epic, and dramatic poetry in their original combination. With this opinion ac¬ cord the accounts given by Tacitus of old Ger¬ manic poetry, according to which its character was partly religious, partly heroic. Later sources assure us of the existence of nuptial poems, funeral hymns, love-songs, and dramatic plays. There was scarcely a manifestation of old Germanic life which was not accompanied and permeated by poetry. But with the excep¬ tions of a number of charms and incantations, such as the Merseburger Zauberspriiche, little of this oldest poetry has been handed down to us. Its metrical form was the alliterative verse, as is shown not only by these charms, but also by numerous ancient riddles, proverbs, and the richly developed gnomology of the various Ger¬ manic tribes.

The alliterative verse, whose origin was pre¬ sumably contemporary with the development of the Germanic word-accent, was the metrical form also of the old heroic poetry that flour¬ ished chiefly during the time of the migrations, the truly heroic period in the history of the Germanic tribes. The heroic song was culti¬ vated by a special class of rhapsodists whom we And mentioned among the Goths, the Fran¬ conians, the Anglo-Saxons, etc. Their lays are almost entirely lost to us, but from the Beowulf and the later Nibelungenlied and the Gudrun, all of which originated among these rhapsodists, we may still form an idea of the greatness of their poetic productions. A fragmentary relic of this early period, though not recorded in writing until about 800, is the Hildebrandslied, the highly dramatic account in alliterative verse of the fight between Hildebrand and Hadu-brand, father and son.

The chief reason why so much of the oldest German poetry was lost or suppressed must be ascribed to the Church. The introduction of Christianity in Germany meant the decline of popular national poetry as well as the rise of new ideals resulting from the acquaintance with Christian religious life and ancient civilization. Unfortunately, it was not the civilization of classic antiquity, but that of the decaying Roman Empire with which the youthful German people were brought into contact.

The earliest German written literature was produced by the clergy, and its

chief character, therefore, is learned and religious. As the old¬ est document of this kind may be mentioned the translation of the Bible into the Gothic lan¬

guage by Wulfila (►f 381), of which, however only fragments are preserved. They are of the greatest value not only from a linguistic point of view, but also as a document of the in¬ tellectual character of the Goths, whose name quite unjustly became synonymous with ((bar- barous.®*

Among the earliest products of Christian poetry in Germany may be mentioned the (Heliand, > an epic poem in alliterative verse of the 9th century, possessing considerable literary merit in its representation of the story of Christ as the story of a powerful Germanic king. The (Heliand> was written in Old Saxon, a dialect agreeing in its consonant system with English and Dutch, but differing from Old High Ger¬ man, which was destined to form the basis of the future literary language of Germany. It was due chiefly to the patriotic efforts of Charlemagne, who collected the old Germanic heroic songs and began the writing of a Ger¬ man grammar, that a certain unity in the lit¬ erary use of the various Old High German dialects was attempted even at this early period, the Franconian dialect attaining, of course, a certain preponderance in this literary language.

Of less poetic value than the (Heliand, though displaying the marks of serious literary industry and patriotic sentiment, is the (Evange- lienbuch) by Otfried (ca. 868), a monk in the monastery of Weissenburg. He was the first to employ the rhyme in his work; the structure of his lines still show, however, the rhythmic char¬ acteristics of the old alliterative verse.*

*Otfried's complaint in the Latin dedication of his book to Archbishop Liutbert about the lack of grammatical rules in his mother tongue makes it quite evident that even then a chasm existed between clerical learning and native German speech and poetry. The learned dis¬ regard for the poetry of the people, the opposi¬ tion between artificial and popular poetry, seems to have continued during the 10th and part of the 11th centuries, although in the monastery of Saint Gall we find a laudable exception. Here lived the greatest of the early German gram¬ marians, Notker 1022), and Here the monk Ekkehard I 973) turned into Latin hexame¬ ters one of the famous old Germanic hero- songs, the song of (Walther and Hildegunde.**

Popular German poetry did not, however, cease to exist during this period; it was culti¬ vated by the Spielleute or traveling minstrels, a class of poets less dignified than the old German rhapsodists, but equally influential. They were the first to seize upon a subject matter which a period, fond of fabulous tales of adventure, as was the age of the Crusades produced in great abundance. Thus a number of epic poems originated of which the charming (Konig Rother is the most important. In the meantime the clergy, who always had a strong antipathy against the minstrels and the worldly spirit of their poetry, turned their literary efforts also in the direction of the epic, choos¬ ing their subjects partly from the stories of the Bible, partly from history. But the exclusive literary predominance of the clergy soon had to make room for chivalry which gradually as¬ sumed the leadership in matters of literature.*

The conditions from which chivalrous so¬ ciety developed in .Germany during the 12th century were essentially the same as in Eng¬ land and France, Hence the similarity, too, of

ideals: chivalrous valor and virtues, culminating in the ((service of ladies.ˆ But although we are still able to follow the paths by which these ideals entered Germany from France, their lit¬ erary expression in Germany is not merely im¬ itative of French models. It is an acknowledged fact that the great German court epics of Hart¬ mann von der Aue ()) of Gottfried von Strassburg ((Tristan und Isolde and, above all, of Wolfram von Eschenbach (spruche (didactic poems) were admired long after the dissocia¬ tion and decline of the court-society had taken place as the result of economic conditions no less than of inherent elements of unnatural and immoral artificiality.

By introducing into his poetry the healthy sentiment of the folk-song Walther von der Vogelweide attempted to stem the degeneration of the Minnesong into artificial unnaturalness, against which the women of the time themselves seem to have occasionally protested. A similar patriotic protest against the popularity in fash¬ ionable court circles of Franco-Celtic literary models and subjects seems to have led to the final shaping into epic-poems of the old Ger¬ manic hero-legends such as underlie the (Nibel-ungenlied, the*

The period of classical productions during the latter part of the 12th and the beginning of the 13th centuries was followed by a period of poetic dearth in which great literary activity was, however, not wanting. The place of the chivalrous Minnesingers is taken by the so- called Mastersingers, mostly honorable citizens and tradesmen, fond of cultivating the didactic, the mystic and abstruse in their songs. A simi¬ lar decline we notice in epic literature. At the same time we may, however, observe the be¬ ginnings of new forms of literary expression, such as prose, the drama, and folk-song, all of which were developed especially during the 15th and 16th centuries.

During the classical period of Middle High German literature a general uniformity in the language of poetry had been sought and, to a certain degree, attained by the best writers. It was essential that a like uniformity, displac¬ ing the various dialects, should be established

for the literary use of German prose which, from the 13th century on, had been employed more and more in sermons, mystical writings, and in chronicles. According to the testimony of Luther (1483-1546) he found the form of German prose, which became so powerful an instrument in his hands, in the language used by the imperial Saxon chanceries. It was Luther's genius and great personality which as¬ sured this Saxon dialect the future literary pre¬ dominance over the other High German dialects. For the language of his classical translation of the Bible and his powerful church-hymns soon became the authority for the grammarians and the best writers.

The origin of the German drama must be traced to the simple dramatic representations given by the Church at Easter, Christmas, etc., the old Germanic plays having gradually died out. How popular these performances soon be¬ came may be seen from the great number of Easter, Christmas, and Passion plays, of Car¬ nival plays and farces which have come down to us. It is the dramatic form gradually devel¬ oped in these plays which we find also in the dramas of Hans Sachs, the foremost German dramatist and mastersinger of the 16th century. An enthusiastic admirer of Luther and his work, Hans Sachs (1494-1576) did inestimable

service to the cause of Reformation by popu¬ larizing its ethical ideas in his numerous dramas, farces, and poems.

The most perfect poetic productions of the 15th and 16th centuries are, however, the (Volkslieder (folk-songs), the direct and art¬ less expression in verse of inimitable beauty and simplicity of the very soul of the people, who were then still feeling and thinking as a whole, and were as yet undivided into the learned and the unlearned. The discovery later by Herder of the truth, the ethical force, and the beauty in which human nature reveals itself in these songs, contributed greatly to the re¬ juvenation of German life and literature during the 18th century and afterward.*

Great as the influence of the Renaissance was on the intellectual life of Germany during the 16th century, the indebtedness to this in¬ fluence of the really great writers, of men like Luther, Hans Sachs, and even Johann Fischart, was after all comparatively small. The attempt to reform German literature after the model of the ancients was, however, made during the 17th century by Martin Opitz (1597-1639). The principal features of this attempt, the effects of which are noticeable even in the classical literature of the 18th century, were the breaking with the life and the literary traditions of the past, and the beginning of an entirely new lit¬ erary development. While in matters of metrics Opitz's reform was fully justified, this reform meant, nevertheless, mere imitation and the in¬ troduction of a literature of the learned for the learned. The people as a whole were forgotten, if not disregarded ; the writing of poetry be¬ came, as with the Neo-Latinists of the 16th century, a conscious labor, the result of reason¬ ing and calculation instead of the product of the free play of inspired imagination.

Neither Opitz nor his more gifted immediate followers produced poetry of more than ordi¬ nary value. In their endeavor to surpass the former and by their imitation of contemporary Italian and Spanish models the writers of the

next generation, known as the Second Silesian ~r °u ' ended in bombast and filthy sensuality. Much oi the pitiable condition into which Ger¬ man literature fell during the 17th century was, ot course, due also to the degenerating effects upon the intellectual, political, and social life of Germany produced by the Thirty Years' War.

It was due to the efforts of numerous noble and patriotic men during the 18th century that German literature as well as German life under¬ went a great regeneration. The rejuvenation of the German nation and of mankind

in general was m fact, the ultimate aim in the efforts of a“ the great thinkers and poets of this period, and nowhere can we follow this process bettei than in their writings.

*Long before Rousseau’s panacea, ((back to nature,** became the watchword in literature, we notice in these writings the endeavor to find, independently of the ancients, nature, truth and reality. Poets like A. von Haller (1708-77) and F. von Hagedorn (1708-54) discover the rich inner world of man as the only great object of poetry. And in C. F. Gellert (1715-69) the preclassic period produced a writer of extraor¬ dinary popularity. A harmonious personality who discarded traditional learning, he exerted a liberating influence on his time by pointing to the human heart as the source of true life.*

Hand in hand with these attempts of the poets proceeds the work of criticism in ascer¬ taining the nature of the beautiful and thereby the nature of what constitutes true humanity. It is characteristic of German poetry since Opitz that the creative activity of the poets is accom¬ panied by a conscious reflection concerning the nature of poetry: thus it came about that Les- sing, Herder, Schiller, and Goethe were also great critics.

The discovery by the Swiss critics, Bodmer and Breitinger, of the imagination as the true source of poetry prepared the way for the first great poet of this period, F. G. Klopstock (1724—1803). The influence which the latter, through his (Messias) and his

Yet Klopstock’s principal work, the (Mes- sias, was, with regard to the subject matter and its treatment, a mistake. It was the task of Lessing (1729-81) to establish the laws of poetry, particularly those of the epic and of the drama. This he did in the*

In Lessing’s path as a critic followed J. G. Herder (1744-1803), one of the most remark¬ able geniuses of this period. Correcting’ and supplementing Lessing’s discoveries in his early

writings, Herder soon became a critical path¬ finder who pointed out with prophetic instinct fe/ˆCOUrSe intellectual development

n Guermany was 1° take. To him is due above all the momentous discovery of the true nature of popular poetry and, moreover, a conception of history such as no previous historian had thought of.

With Herder began the so-called (

(Tasso, (Hermann und Dorothea,* (Wilhelm Meister,* etc., and with Schiller’s (Don Carlos,**

(Wallenstein,

That the new German spirit, created by the co-operation of the poets and philosophers, gradually became recognized as a powerful in¬ fluence outside of Germany, that its political significance for the fatherland was emphasized, and that in place of the abstract cosmopolitan¬ ism to which even Goethe and Schiller were inclined, the conception of nationality was established, was due to the Romantic School, which in the main was a continuation of the storm and stress period, particularly of Her¬ der's ideas and discoveries. Two groups of writers may be distinguished in the Romantic School, an older and a younger one. Although the members of the older group, Friedrich Schlegel, Novalis, A. W. Schlegel, and L. Tieck, were lacking in plastic creative power and were frequently losing themselves in fantastic dreams or in the clouds of mysticism, they glorify the mission of the poet and revel in the enjoy¬ ment and appreciation of beauty in art and nature. Hence they excel chiefly as critics, interpreters and translators, and the influence of their new approach to life upon art, music, science and even politics and religious life was extraordinarily great. It was the spirit of Romanticism which, in protest against ab¬ stract rationalism of the 18th century, inspired the distinguished theologian and philosopher,

Friedrich Schleiermacher (1768-1834) to write his famous (Reden fiber die Religion, > and it was the same spirit from which emanated the Hegelian conception of the state as the realization of the mind of the people or the embodiment of the divine idea. To the Romantic School, finally, belongs the credit for the revival of the historical understanding and of the discovery of the beauty and greatness of German antiquity as revealed in the art and literature of the Middle Ages, the investigation of which was undertaken by the brothers Grimm, by L. Uhland and by their numerous followers. An even greater effect upon the awakening of national consciousness and the desire for German unity was made by the politi¬ cal humiliation and the military oppression to which Napoleon I had subjected the German people. The powerful and impressive (Reden an die deutsche Nation } by the great philoso¬ pher, J. G. Fichte (1762-1814), the passionate and lofty patriotic lyrics of E. M. Arndt, Theo¬ dor Korner, Max von Schenkendorf and Fried¬ rich Rfickert, and the patriotic plays of the emi¬ nent dramatist, H. von Kleist, roused the nation from its political lethargy and despair, and gave evidence of the transition from dreaming to action which then took place in the German mind and affected future literary expression.

The national hopes fanned by patriotic feel¬ ing during the wars of liberation remained un¬ fulfilled, however, and a period of political stagnation and depression followed during which the younger group of Romanticists, the great singers, L. Uhland (1787-1862) and Jo¬ seph von Eichendorff (1788-1857), and the novelists, C. Brentano, A. von Arnim and E. Th. A. Hoffmann, hold the attention of the nation. Other writers such as the talented Austrian dramatists, F. Grillparzer (1791-1872) and A. von Platen (1796-1835), follow essen¬ tially in the footsteps of the German classics, as had at the beginning of the century Fried¬ rich Holderlin (1770-1843), the author of the novel (Hyperion, > a story full of patriotic and heroic prophecies, and of a collection of lyrics of exquisite beauty. As the chasm between the ideal world created by the poets and thinkers and the wretched political and social reality of the time had weighed heavily upon Holder¬ lin, so it was felt even more keenly by the younger men who had fought for freedom and a united Germany. Disgusted with the turn of things numerous scholars and professional men emigrated to America. Chief among them were Karl Follen, the later champion of aboli¬ tionism and religious freedom in this country, and Karl Postl (Charles Sealsfield), the great novelist. While literature and philosophy re¬ mained the principal objects of national interest even after the wars of liberation we may notice during the third decade of the century a grad¬ ual awakening of the desire for the realities of life. Elements of realism as well as a fore¬ cast of later social and democratic tendencies appear already in the work of Jean Paul (Rich¬ ter) (1763-1825), Germany's foremost humor¬ ist. The strides made by the natural and ap¬ plied sciences, the unprecedented industrial development with its subsequent economic changes, nourish still further the growing sense for the concrete and the actual which finally was to make itself felt also in literature and

philosophy. A group of writers, generally known by the name of <(Young Germany,® were the first to champion the new spirit of the time. The cry for a common national feeling and for real life in place of abstract knowledge and learning is heard, especially strong, in the (Hfs- thetische Feldzuge) of L. Wienbarg, a series of lectures containing the program of the new school. While most of the members of this school (L. Borne, H. Heine, Karl Gutzkow, H. Laube) still show the Romantic influence, they protest in the name of liberalism against the reactionary tendencies of degenerate Ro¬ manticism and, following certain contemporary movements in France, proclaim a curious mix¬ ture of democratic and socialistic ideas. With the exception of Heine, whose lyric poetry at¬ tained wide popularity, the writers of Young Germany were chiefly journalists and essayists who created a new style of prose, but their attempts in the fields of the drama and the novel did not produce literature of permanent value. The realism coveted by them so eagerly was attained, however, in a remarkable degree

in the graphic pictures of American life and land¬ scape contained in the stories of the German- American novelist, Charles Sealsfield (1793—1864). Undisturbed by contemporary literary feuds two of the foremost German lyricists produced their best songs during this period : Nicolaus Lenau (1802-50), the forerunner of later pessimism in literature, and Eduard Morike (1804-75) in whose poetry and stories the best traditions of the folksong and of Ger¬ man classicism are revived. On the other hand, the struggles for national unity and politi¬ cal freedom which stir the German mind dur¬ ing the subsequent decade and culminate in the Revolution of 1848 are reflected in the patriotic poetry of such men as Georg Herwegh, Ferdi¬ nand Freiligrath, Hoffman von Fallersleben and Emanuel Geibel.

The failure of the revolution, due chiefly to abstract professorial theorizing and to the fruit¬ less . wrangling of the liberal and conservative factions, left the nation in a state of depression even worse than that after the wars of libera¬ tion. . It was during this period that the ma¬ terialistic theories of Ludwig Feuerbach (1804- 72) and the pessimist philosophy of Schopen¬ hauer (1788-1860) gained their widespread in¬ fluence which few writers could thereafter en¬ tirely escape. Nevertheless we find during the fifties and sixties, the period sometimes called the ((silver age® of modern German literature, a number of highly talented dramatists and novelists whose best work is at least in part of permanent value, and foreshadows in some re¬ spects the literary development of the future. The principal figure among these writers is probably Friedrich Hebbel (1813-63), next to Kleist, the foremost German dramatist of the 19th century. Although his dramas show a decided tendency toward philosophical reflec¬ tion, the result of the author's study of the iesthetic theories of Hegel and Schopenhauer and the lack of the background of a richly de¬ veloped national life, they give evidence of great dramatic power, of a masterly technique and of a psychological treatment quite in con¬ trast to the poet's usual predilection for ab¬ stract ideas. Among his plays < Judiths (Maria Magdalena, > < Agnes Bernauer> and (Die Nibel-

ungen > may be mentioned as his most note¬ worthy efforts. Compared to Hebbel, Otto Ludwig (1813-65), a contemporary dramatist, possessed the greater poetic talent and excelled his rival as an outspoken realist, but his most successful plays, (Der Erbforster) and (Die Makkahaer, > though rich in wonderful details, do not attain Hebbel's dramatic force nor his art of constructing a strong plot. Ludwig's story (Zwischen Himmel und Erde) is one of the finest early specimens of the realistic novel in German and his

famous critical

While, on the whole, conditions in Germany were not favorable to the development of the drama during this period, prose fiction in the form of the novel and the short story flour¬ ished all the more. Its chief representatives are Karl Gutzkow ((Die Ritter vom GeisG) Gustav Freytag ((Die Leute von Seldwyla), Theodor Storm, Paul Heyse, and the writers of village stories such as Jeremias Gotthelf, Ber- thold Auerbach, Melchior Meyr, and their numerous followers. The most original of these novelists, a master of the first rank, whom Paul Heyse fittingly called the Shakespeare of the German novel, is the Swiss writer, Gottfried Keller (1819-90). Next to him in eminence ranks Theodor Storm (1817-88), a prose poet whose*

The fulfilment of patriotic hones and wishes which the national rising of 1870 brought was, however, slow in manifesting itself in literature. Music, the plastic and graphic arts, and the natural sciences had taken the position which poetry had hitherto occupied in the German

mind. Under the leadership of Bismarck's towering personality, the very embodiment of elemental will power, a new spirit soon began, howeyer, to pervade the nation, directing its energies from mere thinking and dreaming to a life of action and to a new sense of the con¬ crete in every sphere of life. Filled with this new spirit and encouraged by certain foreign authors, such as Zola and Ibsen, a group of \oung men undertook during the eighties to re¬ form German literature along the lines of nat¬ uralism and to win back for it its lost prestige in the estimation of the nation. Mmch in this movement was abstract theorizing and fruitless aesthetic experimentation of doctrinaires, whom Goethe would have called "forced talents.® In their futile effort to vie with the method of exact science the real leaders of the movement found, however, a new way of observing reality and of reproducing what they considered "life.® This new literary technique, the only permanent contribution . to literature of the movement, manifested itself first in the revival of lyric poetry, represented by such men as Arno Holz, Karl Henckel and especially by Detlef von Liliencron (1844-1909), the greatest poetic tal¬ ent among these early impressionistic lyricists. It was, however, through the novel and the drama that the militant naturalists carried on their chief campaign. Stories such as Lilien- cron's (Kriegsnovellen> (1893), W. von Po- lenz's (Büttnerbauer> (1895), Hermann Suder- mann's (Frau Sorge> (1887), Georg von Ornp- teda's (Sylvester von Geyer> (1897), and Helene Bohlau's (1896) are

some of the best specimens of the new realistic romance, to which also an older master, Theo¬ dor Fontane (1819-98), contributed several of his maturest works (Urrungen, WirrungenP 1888, (Effi Briest,> 1895). Yet it was in the field of the drama that the realistic movement created its most

permanent values and won its greatest success. It was inaugurated with much noise by several dramas such as Holz- Schlaf's (Familie Selicke) (1890) and Ger- hardt Hauptmann's (Vor Sonnenaufgang> (1889) and (Die Weber > (1892) in which the young playwrights, all careful students of Ib¬ sen, presented a photographic picture of social conditions as they saw them and as they agreed with the strong socialistic tendency of the times. The fact that many of these pictures ac¬ centuated the ugly and gloomy aspect of life was due, however, not only to a clearer vision of reality and to strong socialistic sympathies, but also to the pessimistic mood which had enthralled the German mind for generations and had been the dominant note even in Wag¬ ner's music drama. That the German spirit was liberated, from this mood, that in place of senile pessimism it embraced a youthful opti¬ mism, the will to live, to face the problems of the present and to love life, that the individual freed itself from the bonds of tradition and the uniformity of mass life and took courage to become what it was destined to be : a free personality striving continually toward the more perfect and beautiful life of a higher humanity, was the work of the poet-philosopher Friedrich Nietzsche . (1844-1900). Much in his aphor¬ istic teachings, expressed in the most exquisite German prose, which becomes mannered only when it affects the language of the Sermon on

the Mount, was exaggerated, misleading and transitory, but the influence of his chief work (Also sprach Zarathustra (1883-91), upon the literature and the intellectual life of Germany in general has been very great. A pathfinder and perhaps a prophet, who fell a victim to the inner struggles of a time of transition, his message produced above all a deep longing for new religious and ethical values and a revival of the idealism of the classical and romantic period. The return to the inborn idealism of the German mind without sacrificing the best attainments of the realistic movement can be seen in the career of Gerhardt Hauptmann (b. 1862), Germany's greatest contemporary dramatist. It is noticeable already in the fairy drama (Hannele's Himmelsfahrt* (1893) and becomes more pronounced in the subsequent plays (Die versunkene Glocke) (1896), < Michael Kramer) (1900), (Der arme Heinrich* (1902), etc. The recovery of the domain of imagina¬ tive freedom, the emancipation of personality and the reverence for beauty which the Neo- Romantic revival of the last decades brought, are evident also in the new novel and in the new lyric of this latest period. While there is no genius of the depth and greatness of a Goethe and a Schiller, or even of a Novalis and Holderlin among the present writers, there is an abundance of eminent talent of which any country might be proud. The work of novelists like Thomas Mann ((Die Budden- brooks,*

1901), Arthur Schn'tzler, Clara Viebig ((Die Wacht am Rhein, > 1902), Isolde Kurz (Utalienische Erzahlungen, 1895), Hermann Hesse ((Peter Camenzind,* 1904), and Ricarda Huch ((Ludolf Urslen,* 1893) and of lyricists like Richard Dahmel, Hugo von Hofmannsthal and Stefan George — to mention only a few representative names — bears witness to the weightiness of content and the finish of artistic workmanship at which the German literature of the present has arrived.*

Bibliography.— Gervinus, G., < Geschichte

der poetischen Nationalliteratur der Deutschen) (2d ed., 1871-74) ; Koberstein, A., (Grundriss der Geschichte der deutschen Nationalliteratur (6th ed., 1884) ; Goedecke, K.,*

Julius Goebel,

Professor of Germanic Languages in the Uni¬ versity of Illinois.

*9. HISTORY OF SCIENCE AND PHI¬ LOSOPHY. The German nation has often been called a people of ((thinkers.** That had perhaps in the past sometimes a slighting impli¬ cation, as if the Germans lived in a world of dreams and were unfit for success in the prac¬ tical world of reality; only the last decades have removed completely such a tacit meaning, since the German Empire has proved itself not less strong in its achievements in commerce and industry and politics than in the fields of science and scholarship. Yet, on the whole, it was at all times a sincere acknowledgment of that German contribution to the progress of human civilization which has been most original and most lasting. German earnestness and thor¬ oughness, German love of truth and of free¬ dom, have blended, at least twice since the days of Leibnitz, into a productiveness of knowledge which is not paralleled in the world.*

*1. The most valuable contribution of the earliest times was the historiography done in the German cloisters. Their <(annals** were faithful work and Einhardt's (Life of Char¬ lemagne* (written 820) is a noble piece of history writing. But the scholarly thought was still essentially imitative. When in the 9th century the Benedictine Rhabanus Maurus in the cloisters of Fulda wrote his encyclo¬ paedia (De Universe,* in 20 books setting forth the status of German knowledge in the time of Charlemagne, it was on the whole a repeti¬ tion of that which Isidor of Sevilla had brought together in the 7th century. All thought about nature was controlled by the ancients. And when in the 11th century a new European movement of thought was growing, the great scholastic effort to harmonize belief and reason, France, Italy and England gave the signal. Yet Germans, as, for instance, Hugo, Count of Blankenburg, took an important part, and Al¬*

bert von Ballstadt, called Albertus Magnus (1193-1280), was one of the deepest and most brilliant scholastic thinkers, whose knowledge of natural science, too, was far superior to his age. Theologians and philosophers of repute, like Thomas von Strassburg, followed in the 14th century and certainly no thinker of the 15th century equalled the Cardinal Nicolaus von Cusa (1401-61), who combined scholasti¬ cism and Platonism, mathematics and theology. In the meantime Germany had founded its famous seats of higher learning, the universities, which have been always at the same time schools for the professional training of clergy¬ men, teachers, doctors and lawyers and centres of productive scholarship. (See Germany, University System in). Through the 13th century the University of Paris was the point of crystallization for scholasticism; in 1348 the first German university was founded in Prague, soon after that the University of Vienna and Western Germany followed immediately with Heidelberg (1385) and Cologne (1388). The political disturbances in Boehmen brought about a secession in Prague, and its immigrating scholars founded the University of Leipzig (1409). These new centres of scholarlv influ¬ ence increased the independence of German scholasticism of the dogmas of Paris, and in the declining period of mediaeval thought the German systems of nominalistic philosophy played an important role.

The opposition to the hairsplitting rational-

ism of scholastic tho-ught came from two move¬ ments which better expressed the German in- stincts mystosm (q.v.) and humanism (q.v.). Mystical speculation became influential from the beginning of the 14th century; in an immediate personal unity with God there was sought a deeper knowledge than that of Church and university . Master Eckhart's pantheistic mys¬ ticism a Christian neo-platonism, stands with such daring independence against the doctrines o the hierarchy that it must be acknowledged as the first original German philosophy, in spite of its unsystematic character. The mys¬ tical schools develop themselves, especially ' in western Germany, through the 15th and loth centuries and emphasize now the theo- logical interests or even the practical religion (Ihomas a Kempis, imitation of Christ) now the naturalistic interests. The mystical study of nature was most strongly influenced by the physician Paracelsus (1493-1541). His aim was a fundamental reform of medicine which had still the stamp of Galen and Avicenna. But to understand mans body the microcosmos must be understood as image of the macrocosmos and thus natural science, astronomy, and theology become the basis of medicine. His numerous writings influenced, through all Europe, medicine,*

alchemy, and theosophy. The last great mystic was Jacob Boehme (1575—1624), whose speculations con¬ cerning God's relation to the world and its evils became influential through the following centuries.

Far more systematic and scholarly was the opposition which arose against scholasticism from the humanistic side. The European Renaissance which flourished from the 14th to the 16th century found nowhere a more enthusiastic echo than in Germany. The best minds entered into its service and here, too, the movement took a threefold form : it created the historical aesthetic interest in the literary treasures of classical antiquity, it opened the eyes to nature and it liberated from the mediaeval onesidedness of christianized Aristotelianism. The time thus demanded philology, natural science, and independent phi¬ losophy. The great philological movement was carried by Germans like Johann Wessel, Ru¬ dolph Agricola, Johann Reuchlin (1455-1521), whose handbooks and editions stimulated the study of Latin and Greek throughout Germany, and who at the same time inaugurated the study of the Hebrew language in western Eu¬ rope ; Erasmus of Rotterdam (1457-1537), the most eminent scholar and the most witty writer of his time, who published the first edition of the Greek New Testament, and whose writings fill 24 folio volumes ; and above all the (appeared in 60 editions during his lifetime.

The return to nature and the striving for scientific knowledge is expressed in great scholars like the mathematicians and astrono¬ mers Nicholas von Cusa, Georg Peurbach, Regiomontanus (1436-76), famous for his (Ephemerides ab Anno) ; Martin Stoffler, and epoch-making Copernicus (1472-1543), whose discovery that the planets moved around the

sun was worked out in (De Orbium Celestium Revolutionibus. The movement culminated in Johann Keppler (1571-1630), who discovered that the planetary orbits are elliptic and that the squares of the periods of revolution of any two planets are to each other as the cubes of their mean distances from the sun.*

Humanism thus brought to Germany ample results in the fields of philology and natural science, but seemed without such 'results in that held in which the other countries gained most by the Renaissance: philosophy. The German philosophical humanistic reaction against mediae- valism (q.v.) and scholasticism (q.v.) was inhibited by the religious movement which ab¬ sorbed Germany's metaphysical energies — Protestantism. (q.v.). The Protestant religion, no doubt, ultimately reinforces knowledge and scholarship. Its appeal to the sources, its at- tack . on authority, liberates the spirit of criticism and research. The great progress of Germany's scholarship in all fields in the 19th century is the work both of the Protestant parts of Germany and of the Catholic regions. German

philosophy, more than any other branch of knowledge, shows the Protestant character from Leibnitz to Kant and Fichte and Hegel. But in the days of the new awakening, when Italy and France and Holland and England produced great philosophical systems, Protes¬ tantism necessarily inhibited the metaphysical movement in Germany.

Scholasticism had been a union of Church theology with rationalistic philosophy, an effort to bring the religious belief into harmony with reason. The Reformation agreed, of course, with the new humanistic antagonism against those scholastic systems, but not in the interest of an independent philosophy, rather in the in¬ terest of an independent theology — independent alike of the Church and of abstract logic, faithful only to the individual religious instinct and to the revelation of the Scriptures. Mar¬ tin Luther, with his mystical tendency, had no sympathy with the logical definitions of human thought and no trust in the power of merely human intellect. The hunianists who in the first decades of the 16th century defeated the scholastic world and who fought for literary- aesthetic ideals and platonistic philosophy soon felt that the Lutheran movement was unfriendly to . the cherished arguments. It is true, Zwingli stood nearer to philosophy, and Me¬ lanchthon became a most influential teacher °f . philosophical doctrines; his philosophical writings, not only the commentaries to ancient philosophers, remained the best books of Prot¬ estant Germany for a century. Yet Melanch¬ thon, too, was more original as theologian than as philosopher. The theological discussions filled the time and reached the masses, and the humanistic movement, which fascinated the few, was necessarily the loser in Germany. The in¬ crease of religious strife was accompanied by a decrease in independent interests of thought' throughout the land. The lowest point was reached when the Thirty Years' War destroyed the power and prosperity of the commonwealth ; the moral and intellectual energies of Germany seemed paralyzed and German universities and German scholarly interest had never so little dignity and authority in the world as through the first two-thirds of the 17th century. Natu¬ ralists and philosophers like J. E. Sturm or

Joachim Jungis stood under the influence of the great French thinkers, and even the famous jurist Samuel Pufendorf (1632-94), the first German teacher of natural law, is under foreign leadership. Indeed, the neighboring countries had incomparably better conditions for scholarly activity than the devastated land of Germany, and while they did their utmost to reinforce the spirit of productive scholarship through the founding of academies and

the high social posi¬ tion of the scholars, Germany had no academies and no protectors of knowledge : university life itself became vulgar and barbaric.

The new spirit had thus to come from for¬ eign lands. The French language and litera¬ ture and philosophy entered at first the courts of Germany and soon after its universities; the humanistic neo-classical interests were replaced by the more "modern® efforts which had been developing in the neighboring country since the days of Descartes. The universal thinker who stands at the threshhold of a new and better time is Leibnitz.

2. Gottfried Wilhelm von Leibnitz (1646- 1716), a man of the great world, brought Ger¬ man thought in contact with the advanced scientific spirit of France, Holland and Eng¬ land. Through his influence the Berlin Academy was founded in 1700 with the aim to create a place for the real advancement of knowledge at a time when the universities felt, on the whole, satisfied with handing down the scholarly tra¬ ditions. He created the most elegant instru¬ ment of natural science : the differential cal¬ culus, which he published (1684), in his essay (Nova methodus pro maximis et minimis. } But still more important was his metaphysical sys¬ tem. It shared with Descartes and Spinoza the rationalistic belief in the power of transcending experience through reason, but Descartes' sharp separation of mind and body and Spinoza's monism were left behind by Leibnitz's "monad- ology.® His monads, held together by pre- established harmony, represent a continuous series of simple substances which are without windows, each containing the whole world as perceptions, but each apperceiving only a vary¬ ing part of them. His system fulfils in an original way the purpose of every great philoso¬ phy: to justify and to harmonize both the cau¬ sal, mechanical, and the teleological idealistic knowledge of the time. And thus Germany had finally, as the last of European nations, a real philosopher who was to introduce the en¬ lightenment of the 18th century.

While Leibnitz brought the modern interests to the German courts and academies, the uni¬ versities, too, reflected the progressive time. Halle, founded in 1694, and Gottingen, founded in 1737, became the new centres of an activity which had no sympathy with the doctrines of authority, either the theological ones of the church or the classicistic ones of the humanists. An independent free thought, working with mathematics and logic and empirical observa¬ tion, was the demand of the time in every field. The jurist Thomasius (1655-1728) became the leader of the academic movement of protest against all narrowness and prejudice, fighting alike against the mediaeval methods of legal and equivocal prosecution, against the superstitions of orthodox theology, and against the artifi¬ ciality of classical learning. He was the first to emancipate German

university instruction from

the traditional Latin and to publish a literary critical magazine in the German language. After conflicts with Leipzig he became one of the founders of Halle, and his spirit of modern intellectualistic enlightenment came to be charac¬ teristic of the place. To be sure, on theological grounds the opposition against orthodoxy did not move so much toward theoretical rational¬ ism, but took at first the turn toward practical religiosity. The great pietistic anti-clerical movement which Spener (1635-1705) started, influenced by English puritanism, was continued in Halle by Francke (1663-1727), to whom true Christianity was not an object of science but a living duty; and yet even the insistence on the Bible as the only true source of religion meant here, as two centuries before in Luther, in first line not a binding of the free intellect, but a liberalizing and modernizing opposition against the orthodox spirit of the past. The full de¬ velopment of theological criticism in Halle be¬ longs rather to the influence of Sender (1725- 91), whose historical interpretations of the Bible open the way for the new rationalistic theology.

The most influential separation from church authority, however, on all fields of human thought came through Halle's fertile philoso¬ pher, Christian Wolff (1679-1754). His sys¬ tem was no great original construction — it was essentially Leibnitzian philosophy — but it gained its new strength and power by being really a system. Dogmatic rationalism herein reached its most self-conscious expression and Wolff's didactic treatment of ontology, cosmology, psychology, theology, ethics, economics, and pol¬ itics soon penetrated the whole Protestant schol¬ arship of Germany. Theology and metaphysics, morality and jurisprudence had to become "nat¬ ural® and "rational® ; the ideals of mathematical knowledge and social happiness determined the whole period. The Leibnitz-Wolffian movement was not without opponents like Crusius and Rudiger, and yet the adherents carried the day. Among Wolff's pupils, besides interesting phi¬ losophers like Bilfinger and Lambert, Baumgar- ten (1714 — 62) must be mentioned as the founder of German "aesthetics,® a name which he invented. The scholarly rationalistic phi¬ losophy yielded quickly to its natural tendency to subserve the practical purposes of human vir¬ tue and happiness, to be reached by the emanci¬ pation of the individual from every authority but its own reason, and with this practical aim came the tendency to popularization. It was a movement to which Frederick the Great lent himself from the Prussian throne, and authors like Moses Mendelssohn and Reimarus, Nicolai and Engel, Tetens and Moritz spread it through¬ out Germany. Here also is the place for the important scholarly writings of the poet Lessing (1729-81), who stimulated theoretical aesthetics as well as philosophy of religion and philosophy of history.

While thus the new philosophical and theo¬ logical spirit of the 18th century radiated from Halle, it was the University of Gottingen in which the new scientific and philological im- pujses started, till finally the light came from Konigsberg. In Gottingen taught (next to Linnaeus most eminent biologist of the time) Albrecht von Haller (1708-77), famous for his botanical books, but still more influential by his medical studies. He introduced the physio-

logical experiment, and his demonstrations of what he called sensibility and irritability of nerves and muscles, became the starting point • r biological theories which controlled the med¬ ical discussions of Europe down to the time of cellular pathology. Among those who took part in these physiological, pathological, and thera- peutica1 controversies of the 18th century Frank, Weikard, Roschlaub, Pfaff, and others belong to Germany; and especially the group of those who defended that branch of Haller's system which had found its development in r ranee under the name of vitalism: Blumen- bach Red, and Hufeland. Blumenbach (1752- 1840), who interprets the organic world by his msus formativus,» became the founder of anthropology; the doctrine of the five human races is his. He was also the first to lecture on comparative anatomy. Red considers life as a galvanic process, and with Hufeland the doc- tnne of animalism becomes practical medicine, bide branches of this vitalistic movement are mesmerism and homoeopathy, whose founders Mesmer (1734-1815), and Hahnemann (1755— 1843), are German physicians.

.. ˆyhilc biological studies flourished in Gottingen through Haller and Blumenbach, mathematical and physical, historical, juristic, and philological scholarship also found there the most brilliant representation. Lichtenberg (1744-99) had there his model laboratory for physics and his theories of electricity became victorious. Tobias Mayer (1723-62) worked out there his famous catalogue of zodiacal stars and Kaestner (1719-1800) attracted the mathe¬ maticians. All three stand as foremost repre¬ sentatives of the inorganic sciences of the time; yet Euler (1707-83), whom Frederick the Great called to Berlin, was perhaps more original in his numerous works dealing with mechanics and dioptrics, integral calculus and astronomy. Chemistry which began to demolish the old phlogiston theory was largely enriched by the comprehensive analyses of Scheele (1742-86), by Klaproth and others, and Richter (1762- 1807) became the founder of chemical stoechiometry.

The classical philology of the 18th century also took, in Germany, a new turn. It was the time of the great literary movement in which every mind was directed toward the beauty of art. The new aim for the student of

antiquity was to join the interest in classical fine arts with the interest in the writings and to approach the literature of antiquity with the attitude of aesthetic appreciation. Gesner (1691-17611 had revived the Greek studies throughout Germany; his Gottingen successor, Heyne (1729H812), who edited Virgil, Homer, and Pindar, and ex¬ plained Greek mythology, did much to give clas¬ sical studies the aesthetic interest. The whole revival was known as the neo-humanistic move¬ ment. The greatest exponent was Heyne's pupil, F. A. Wolf (1759-1817), whose Pro¬ legomena in Homerum) were epoch-making. With Wolf, the one-sided aesthetic attitude goes over into an enthusiastic interest for the whole of Greek life, its religion and art, its politics and history. The study of antiquity became for him a system of 24 different disciplines.

3. While thus the spirit of enlightenment in philosophy and natural sciences, in jurisprudence and theology, and the aesthetic spirit in litera¬ ture, history and philology gave interest and

value to the intellectual life of Germany, the greatest emanation of the German genius had prepared itself. In the year 1781 appeared the

J"Tee great critiques of Immanuel Kant (1724-1804). Kant's critique of pure rea¬ son, critique of practical reason and critique of Judgment, represent the most essential progress of human thought since Plato and Aristotle. Ihe preceding rationalism which sought knowl- C u metaPhysical reality through reason and the preceding empiricism which sought knowledge from the impressions on the senses were equally superseded by Kant's "criticism » which proves that knowledge does not mean a reproduction of an independent reality, but a reconstruction of objective data by the subjec¬ tive categories of perception and understanding. Knowledge is thus not concerned with a metaphysical reality; but we belong to the world of reality as free subjects of will who are de¬ termined not by the causalty of phenomena, but by duties. This gigantic reorganization of hu¬ man knowledge and morality inspired the leaders of German culture; in Schiller it came into live contact with the great literary move¬ ment of Germany.

In the philosophical discussion of Kantian philosophy Jacobi, Beck, Maimon, Reinhold .rries, represent most different attitudes, yet none, of them suggests real progress. ' But Kant s system demanded further development ■ the subjective factor of his system was not really connected with the objective factor The genius of Fichte (1762-1814) created a system whose ethical idealism made the object itself dependent upon the will-act of the subject, while Herbart (1776-1841) moved in the opposite direction, developing out of Kant's objective factor a realistic system which gave impulses to modern psychology. Directly from Kant, too, is derived

Schopenhauer s (1788—1860) voluntar- lstic , system of pessimism, which combines Kant s doctrine of the categories with Platonism and Buddhism. Schleiermacher (1768-1834) finally seeks to harmonize the ideal and the real factor in the interest of ethics and religion.

It was Fichte's system which showed the direc¬ tion for the further movement. The life of nature had been neglected in Kant and Fichte; as soon as it becomes a factor in philosophic thought, ethical idealism turns into the objective idealism of Schelling (1775-1854), and ulti¬ mately into the absolute idealism of Hegel (1770-1831), which understands nature and mind as the logically necessary expression of the Absolute. At every stage idealism exercised influence on the intellectual life of the time. From Fichte started the ethical regeneration of Prussia, expressed in the foundation of the Uni¬ versity of Berlin (1810), and the romantic move¬ ment of Schlegel and Novalis. Schelling, on the other hand, influenced most deeply the natu¬ ralists, men like Oken, Oersted, Carus, Ness von Esenbeck, and many others who brought natural science itself under the categories of Schelling's system of identity, but philosophers like Krause and Solger also followed him. The strongest philosophical influence, however' resulted from the Hegelian system which, at about 1830, entirely controlled the academic philosophy of' Prussia. But the triumph of Hegelianism meant an overtension of purely speculative thought, the maximum distance of theoretical and metaphysical construction from

the facts of observation. This neglect of ex¬ perience demanded a necessary reaction against speculation ; the breakdown of metaphysical one¬ sidedness was disastrous. In the fourth decade of the 19th century the defeat of philosophy seemed complete and it meant the triumph of natural science as against metaphysics, of analysis as against synthesis, of realism and materialism as against idealism, of technique as against art, of specialization as against general¬ ization. This naturalistic reaction filled the larger part of the 19th century in all civilized countries and brought to them the manifold discoveries and inventions which seem most characteristic of the time. Only at the end of the 19th century does the pendulum seem to begin again its backward swing with a new awakening of the idealistic spirit and deeper philosophical interests as re¬ action against the philosophical superficiality and incoherency of mere specialistic science.

4. In every new phase of this 19th century movement German scholars have taken the leadership. The deep philosophical longing of the German soul had created the unique move¬ ment which led from Kant to Hegel, but

when the opposite tendency of the newer time de¬ manded the patient work of the specialist, it was the world-known German thoroughness which won the laurels for the German laboratory ex¬ periment and naturalistic research and historical investigation.

Of course this specializing work had not waited for the downfall of philosophy; it took its rise in the work which we traced through the period of enlightenment in the 18th century. And further, the emphasis on specialization does not mean that the scientific life of Ger¬ many lacks in the 19th century great central figures, scholars with broad synthetic energy: the geographer Alexander von Humboldt, the physicist Helmholtz, the pathologist Virchow, the historians Ranke and Mommsen, are cer¬ tainly not specialists in the narrow sense of the word. A short survey of the different fields indicates the abundance of brilliant thinkers who were grouped about such leaders. We may begin with mathematics and the inorganic natural sciences, then turn to the organic sciences and medicine, then to the historical and philological, economical and juristic fields, finally to the theological and philosophical.*

For mathematics the first place belongs to Gauss (1777-1855) and after him the chief ad¬ vance came through Jacobi, Dirichlet, Riemann, Kronecker, Weierstrass and others; yet the mathematical achievements were always blend¬ ing with the works of physicists and astron¬ omers — as not a small part of the mathemati¬ cal progress belongs to naturalists like Kirch- off, Helmholtz, Enck, Clausius, etc.

Gauss gave the strongest theoretical impulse also to astronomy, while Bessel (1784—1846) may be considered the founder of the practical astronomy of the century. Most influential for the theory were Hansen and Encke and their followers, Bruhns, Argelander, Briinnow, Auwers, etc. Here belongs also as a special triumph of German thought, the discovery of spectral analysis by Kirchoff and Bunsen, ap¬ plied by Zollner and others.

In physics the turning point of the century lies at its middle when Helmholtz (1821-94) and independently R. Mayer (1841-78) formu¬

lated the law of the conservation of energy. In the first half of the century the best work in physics was done outside of Germany; among the Germans Ohm excelled (1787-1854) with his fundamental theories of galvanism ; the brothers Weber, Poggendorff, Lenz, belong to the same period. The influence of Helmholtz is felt not only in the theory of energy, but in the whole field of mechanics, optics, and acous¬ tics, besides physiology and psychology. The next and last climax is reached by Hertz through his study of the propagation of electric waves. Important too are the thermodynamics of Clausius, the electrolytic work of Hittorf, and most recently the

discoveries of Rontgen concerning cathode rays.

In chemistry the decisive step was the foundation of a chemical university laboratory in Giessen by Justus Liebig (1803-73), the greatest chemist of his time, who revolution¬ ized organic chemistry and whose researches became invaluable for agriculture, pharmacy, the preparation of food, etc. Out of his school came influential chemists of all nationalities ; in Germany itself especially, Kekule, Hofmann, Fehling, Kopp, Bayer, V. Meyer. Other centres of chemical ideas were the laboratories of Wohler in Gottingen, of Bunsen in Heidelberg, of Mitscherlich and Rose in Berlin. The theory of atomistic combination was furthered by the antagonists Kekule and Kolbe, . stereochemistry by Wislicenus and von Meyer, inorganic analy¬ sis by Wohler, Winkler, Kirchoff, Bunsen, whose epoch-making spectral analysis has been mentioned before. The first organic synthesis is the famous work of Wohler in 1829. It opened in long series of synthetic successes of which not a few became technically important, as those of Fettig, Grabe, Hofmann, Fischer. Practical gain also to pharmacy came directly from German chemistry; chlorohydrate and chloroform, salicyl and antipyrin, etc., are prod¬ ucts of German laboratories. The incomparable position of German chemical industry is the immediate outcome of the wonderful develop¬ ment of chemical science in German universities and technological institutes.

The independent growth of physical chemis¬ try prepared by Kopp, Bunsen, Wiedemann, be¬ came most significant in recent times through Ostwald, Van't Hoff, Nernst, etc. Mineralogy and crystallography connects its development in Germany in first line with the name of C. S. Weiss in Berlin, Neumann in Konigsberg, Hessel in Marburg, Rose in Berlin, von Rath in Bonn, Zirkel in Leipzig, etc.

Geology became a _ science in Germany through A. G. Werner, in Freiberg, at the be¬ ginning of the century, and L. v. Buch devel¬ oped the doctrine of the slow upheaval of con¬ tinents his geological map of Germany ap¬ peared in 1824. But greater was their pupil, Alexander yon Humboldt (1769—1859), the most comprehensive German naturalist of his time. His studies in South and Central America and in Asia, his incomparable richness of observa¬ tion in all fields of descriptive science, his unifying apperception of nature, as expressed in his Kosmos make him the most imposing and most sympathetic figure in the German science of the first half of the last century.

Inasmuch as Humboldt's geography was es¬ sentially physical, it seemed opposed to the historical-geographical interest. A synthesis of

both tendencies characterizes the work of Carl Ritter (1779-1859), whom his time considered the founder of scientific geography. His con¬ tributions to theoretical geography found a bril- fiant continuation through Peschel, Kiepert, Ger- land, Katzel, and others. In the meantime, prac¬ tical geography was stimulated by Richthofen Peschuel-Losche, etc. Well known are the maps of Petermann, Perthes, etc.

Geography may connect the inorganic with the organic world. To begin with botany, the first decades of the last century belonged to plant anatomy ; the highest point was reached by H. v. Mohl. Then came, about 1840, the turn to the genetic study and the development of plant histology. The epoch-making discov¬ eries of Schleiden (1804-81) and of Nageli showed the way. The morphologic work, partly with histological, partly with phylogen¬ etic interest, was continued by Schwann, Hof- meister, Pringsheim, DeBary, Strasburger, bolms, etc. The fundaments of plant physiology were laid by Julius Sachs, whose Experimental Physiology of Plants* appeared in 1865. Pfef- fer, Klebs, Stahl, etc., followed.

In zoology the century began with systematic interests, but turned soon to morphological ones and came on this path to the brilliant achieve- ments^ connected with the names of Kollicker and Siebold, Ehrenberg and Max Schultze, Ley- dig, Leuckart, and Hertwig. The leader in com¬ parative anatomy, which started in Germany with Meckel, the ((German Cuvier,** was Gegen- baur ; the prophet of Darwinism became Haeckel, and the most influential critics of Darwinism, Wagner and Weismann.

The progress of human anatomy links itself partly with the same names which became in¬ fluential in zoology; at the middle of the cen¬ tury the anatomists Henle, Hyrtl, Baer, and Kollicker stand as the acknowledged leaders. His, Hertwig, Roux, and Waldeyer represent the later decades. Yet, it is characteristic for the German mind, that its most brilliant achieve¬ ments belonged to physiology rather than to anatomy. No field, indeed, has greater names than physiology, with Joh. v. Muller and Helm¬ holtz. Rudolphi and Burdach, whose large physiology appeared in 1832, made physiology at home in Germany, and soon came the master, Johannes v. Muller (1801-58). His influence — it is said that he wrote 16,000 printed pages — was deeply felt throughout physiology, embryol¬ ogy, anatomy, and zoology; most popular is, per¬ haps, his doctrine of the specific energy of the senses. Among his many important pupils none was greater than H. v. Helmholtz (1821-94), whose invention of the ophthalmoscope (1851) created the new ophthalmology. His physio¬ logical optics and his book on tone sensations are still authoritative to-day. Dubois-Rey- mond's investigations of electrophysiologica! phenomena, and Ludwig's analysis of

the func¬ tions of the heart opened new ways also, and so did yoit, Pettenkofer, Hering, Briicke, Pfliiger, etc., in various directions.

In the development of pathology the central figure is Rudolf Virchow (1821-1902), whose cellular pathology revolutionized the theory of disease and led it to the heights of modern histology. His pupils, . Cohnheim and Reck¬ linghausen, continued his proof that the organic laws working in disease are identical with those of the normal organism. A new movement

came in with bacteriology; the discovery of the tubercle bacillus (1882) through R. Koch and his investigations of anthrax, turned his atten¬ tion trom the diseased cell to the microscopical causes of the diseases. From bacteriology pa¬ thology finally turned to chemistry, studying the substances produced by the diseased tissues. 1 his led to the theory of antitoxins and to Behring s discovery of the antitoxin treatment of diphtheria. Practical medicine was in the meantime led by men like Frerichs and Erb Langenbeck and Billroth, Graefe and Griesinger!

5. In the world of mental sciences it is phdology whose specialistic ramification in the 19th century is similar to the work of the natu- r jStf' The clas.slcal philologians led the way and the grammatical scholar Hermann deepened the linguistic interest in the classical authors- his opponents, Boeck, Welcker, O. Muller, and others stood for the wider view of F. A. Wolf taking philology in its fullest meaning. Zeller! Niebuhr, Droysen, Mommsen, Curtius gave new life to the thought and politics of the old nations, and Lachmann, Haupt, Ritschl and others interpreted their authors.

Germanic philology is entirely a product of the 19th century. The romanticists, Schlegel and lieck, stimulated interest in it, but it be¬ came a real branch of scholarship through Lach- mann, Benecke, and especially the brothers £E5m C1785-1863) and Wilhelm Grimm \yo6-lob9), whose studies in the history of the German language and literature became of paramount importance. As to other languages German scholarship has contributed much to Romanic, English, Slavic, but most of all to Oriental philology in the widest sense of the word and throug-h Bopp, Pott, Benfey, W. v. Humboldt, Schleicher, etc., is the compara¬ tive science of language essentially a German creation.

. . History, too, took the stamp of the special¬ izing scholarship of the century. An over¬ whelming mass of material has been gathered by the research of the German historical schools. Typical are the (Monumenta Ger¬ manise historical But the pride of this field of German scholarship is the noble line of great historical writers. Niebuhr (1776-1831) gave to the world a perfect reconstruction of early Roman history, and Mommsen

(1817-1903) equally eminent as historian, jurist, and phi¬ lologist, . gave in his Roman history the German masterpiece of classical history writing. Yet the greatest figure of this group was Leopold Ranke (1795-1886), whose works deal with the popes, with Prussia, England, France, especially in the 16th and 1 7th centuries, and in the last years of his life with world history; they are famous alike for their style and composition, for their richness of material, and for their objective presentation. Schlosser and Gervinus went their own way; Sybel and Waitz, Giese- brecht and Treitschke, however, were deeply under Ranke's influence.

*The economic life of the social community was seen at the beginning of the century through the eyes of France and England. The abstract theory of economy with its individualistic tend¬ ency controlled the first decades; of this the work of Rau is typical. With the year 1840 begins the growing reaction. The ˆhistorical relativistic view is developed by Roscher, Kries and others, and List, in his (National System,**

Rodbertus, in his (Social Lettersˆ Marx, in his 'Kapital, led the attack of collectivism against the abstract individualistic theory. Brentano, Knapp, and Schmoller turned the attention to the objective history of economic conditions.*

The legal life of the community and the theory of law was the object of not less intense discussion. Among the leaders of the century Savigny, Windscheid, and Jhering may be men¬ tioned for Roman Law, Eichhorn and Grimm for German Law, Mohl and Bluntschli for State Law, Feuerbach and Mittermaier for Criminal Law, Thibaut and Dernburg for Private Law, etc.

In the field of religion the naturalistic tend¬ ency of this post-idealistic period demanded, first of all, historical criticism, and yet positive theology was not idle. In the study of the Old Testament most fundamental research work was done by Hengstenberg, Delitzch, and Hofmann ; in the study of the New Testament by F. C. Baur, the founder of the school of Tubingen, D. F. Strauss, and in sharp contrast to them, Ritschl and Weizsacker; in the study of Church history by Planck, Neander, Ritschl, and Har- nack; in the study of Systematic Theology by Schleiermacher, Rothe, Lipsius, Nitzsch, Ritschl.

And finally, philosophy. The period which we have just characterized by the abundance of its specializing work began with the downfall of

Hegelianism. The age became indifferent to real philosophy and substituted either an un¬ critical materialism with Buchner, Vogt, or the history of philosophy which naturally became the domain of Hegelians like Erdmann, Kuno Fischer, etc., or developed a specialistic study of empirical psychology. In the latter field Germany founded, through Fechner and Wundt, the new science of experimental psychology. In the last two decades of the century new in¬ terest in real philosophy has set in, partly in the midst of the special sciences, as mathematics, physics, history, etc., where a disappointment in mere fact-gathering has everywhere led to the deeper problems of principle, partly in pure philosophy. This new idealistic movement has grown rapidly; logical, ethical, metaphysical, sesthetical discussions come again more and more to the foreground, welcomed by the em¬ pirical sciences which held them in contempt for half a century. And thus it can be said that with the beginning of the 20th century the anti-idealistic specialistic movement, which be¬ gan in the third decade of the last century, has come to an end and a new synthetic idealistic tendency appears to-day throughout German science and thought.

Hugo Munsterberg,

Late Professor of Psychology, Harvard Univer¬ sity.

10. HISTORY OF GERMAN RELI¬ GION. The earliest religious ideas and forms of worship among the ancient Germans have been the object of scientific study since the epoch-making work of Jakob Grimm (q.v.) (d. 1863), but so far without such generally ac¬ cepted results as give confidence in their cor¬ rectness and completeness. The Germans ap¬ pear to have shared the religious conceptions of the great ˆIndo-European® family, to which, in the absence of entire certainty as to their origin, we continue to assign them. Their religion thus presents, at the time when they first enter

into the field of historical inquiry, the aspect of a well-developed mythology.

Beginning presumably with a simple rever¬ ence and dread for the beneficial and harmful forces of outward Nature, they had advanced with a more highly developed social organi¬ zation to a more elaborate system of personal deities. Three central ideas seem to have been common to the several tribal groups into which the people thought of themselves as divided. The god of War (Thiu, Thiwas), the god of the Storm (Wotan, Odin), and a goddess of Fertility (Freya) appear in a variety of forms and have their history of local adherence, of diffusion and of adoption. These figures are distinct enough to have left their names on .days of the week and to have attracted the attention of Roman observers. In the descrip¬ tions of Caesar

and Tacitus they appear re¬ spectively as Mars, Hercules, and Isis, so that we may be quite sure that at the beginning of our era these principal figures had taken on a fairly definite shape. They were accompanied by a world of secondary mythological creations, spirits of the air, the forest, and the stream, giants, dwarfs, and other half-human personali¬ ties. Later, and especially among the Teutons of the far north, there was added the concep¬ tion of a cosmos created out of nothing, and, as the climax of the system, appears another equally vivid notion of an ultimate cataclysm in which gods and universe alike shall be over¬ whelmed.

In their dealings with the unseen powers the Germans seem not to have evolved or needed any formal ritual in the hands of an organized, mediatorial priesthood. The chiefs of the family or the tribe performed the neces¬ sary sacrifices by which the favor of the gods was propitiated or their wrath averted. No theology or speculative development of these original simple ideas was ever reached. The whole system bears the marks of a fresh, vigor¬ ous and spontaneous expression of intimacy between conquering freeman and the divine governance under which they lived. The con¬ flicts of the gods, their spacious repose in Wal- halla, reflect the ideals of a race which from our earliest glimpses of it appears in a slow, but steady movement upward toward higher levels of social, economic, and spiritual experi¬ ence.

Thus equipped the Germanic peoples enter upon their fateful contact with the Romans. In the course of this contact, whether in the form of Roman military or commercial visits to them, or in their own military service in the Roman armies, they may have undergone a species of religious disintegration such as often accompanies profound changes of national ex¬ perience. The ancient gods of the tribe could not long maintain their hold on the affections of a people whose tribal life was shattered to its foundation by the manifold reactions of the Roman culture. It was probably this weaken¬ ing of the ancient ties of religion that com¬ bined with the more obvious political motives to bring about the transition to Christianity.

It is an undoubted fact that all those Ger¬ man tribes which left their ancient homes be¬ yond the Rhine and the Danube and moved in mass southward and westward on to the lands of Rome had already at the time of this occu¬ pation become converted to the religion of

Christ. T he process of this conversion is, however, almost entirely obscure.

Among the Greek and Roman populations Christianity had made its way for three centuries, wholly by the method of individual conviction, and even during the 4th century, after the weight of imperial pressure had been added, the same process had gone on. Christianity had made its appeal to these highly developed peoples as a system of thought and as a rule of life. To the uncultured and intellectually undisciplined Germans such an appeal seems obviously im¬ possible. They encountered Christianity long after it had entered upon its institutional stage. They met it as one of those governmental agencies by which Rome seemed to have grown great, and adopted it as a new means of great¬ ness for themselves. Once adopted they clung to it with unshaken loyalty and gradually came to understand its spirit. Further these same peoples, — the migrating tribes in stricter sense, including the Visigoths, Ostrogoths, Burgun¬ dians, Vandals, and Lombards, — were all con- yerted to the Arian form of Christianity, that form which was condemned by the first General Council at Nicsea (325), but which continued during the next two centuries, under various disguises, to maintain a powerful hold on East¬ ern speculative thought. Attempts have been made to show that this doctrinal divergence of the Germans is to be accounted for by some spiritual affinity between their mental attitude and that of the Arian agencies through which they received the new faith. It does not, how¬ ever, _ seem likely that it is to be explained on any intellectual grounds whatever. Their con¬ version took place mainly from the East at a time when Arianism was dominant at Constan¬ tinople, and it was altogether in accord with their stage of religious culture that they should take what was offered them without nice dis¬ crimination. Later, long after their settlement in their respective homes on Roman soil, such of these tribes as survived changed their form of Christianity to that which had then, under the leadership of the bishops of Rome, come to be dominant in the western world. But one really striking figure emerges out of the ob¬ scurity of this period, that of Ulfila the Visi¬ goth, whose translation of the Hebrew and Christian Scriptures from Greek into a written Gothic language which he himself invented for the purpose, remains the most important docu¬ ment of the conversion, precious alike to the theologian and the philologist. A copy written in silver letters upon purple parchment and known as the (

Quite similar in motive and process, but infinitely different in result, is the conversion of those Germanic peoples who did not aban¬ don their ancient homes, but remaining rooted there sent out branches to overspread the more or less Romanized lands of Gaul and Britain. The Anglo-Saxons, coming over into England from about 450 onward and striking upon a Christianized Keltic population not greatly supe¬ rior to them in culture, early developed a race antagonism which prevented any effective re¬ action upon themselves. It was not until the close of the 6th century that

they were visited by missionaries sent out directly from Rome by Pope Gregory I and converted to Christianity under the Roman form. Their attitude toward vol. 12 — 35

it seems to have been the same as that of their brethren of the lower Danube two centuries be¬ fore. 1 hey accepted it at the bidding of chief¬ tains who saw in it a means of sharing in the larger life represented to them by the name of Rome. A generation later Anglo-Saxon Chris¬ tianity was undoubtedly promoted by Keltic missionary activity in the North. The Anglo- Saxons appear to have been quite uninfluenced

their teutonic neighbors and kinsfolk across the Channel, the Franks, whose conversion had taken place almost a century before.

The elements of the story in the case of the Franks are again much the same : a heathen kmg (Clovis) married to a Christian Germanic wife, to whom freedom of worship has been guaranteed, a series of persuasions all based on the superiority of Christianity as a working religion and finally a dramatic event, the vic¬ tory of the Frankish host over a heathen enemy, and then a tribal conversion with wholesale baptism. In the account of these events writ¬ ten a hundred years later by the bishop Gregory of Tours, the gods of Clovis are described in Roman terms as Jupiter, Hercules, etc., so com¬ pletely had the sense of distinction among heathen religious systems disappeared from the Christian consciousness.

The decisive incident in these two northern conversions was that they were made into the fellowship of the Roman Catholic Church and thus . determined for the future the religious allegiance of those two Germanic races which were destined to survive or to incorporate the rest. In the furious struggles for power among the Merovingian successors of Clovis, the Church appears as the one civilizing and human¬ izing agency in a society that seems to be on the verge of complete disintegration. Yet even its influence was fitful and ineffective. The Roman bishopric, involved in a life and death struggle with German Arian invaders and with the re¬ vived activity of the Eastern empire in Italy, was unable to offer to the West the unifying force it. needed. The great efforts of Gregory I in this direction do not seem to have had permanent results in placing the Church of Gaul on a solid basis. It was reserved for the newly established power of the Carolingian Majors Domus, especially the sons of Charles Martel, about the middle of the 8th century, to reorganize the Frankish Church on the twofold foundation of national control and papal super¬ vision.

This alliance of the Frankish state with the Roman power was strengthened by the effective work of the Anglo-Saxon Winfried, who under his. Latinized name of Boniface became the active agent of both in the definite

establish¬ ment of the Roman Church system in Germany. He was made first Archbishop of Mainz and was the founder of the monastery of Fulda in Hessen, long to be the most important outpost of Franco-Roman Christianity toward the still heathen Saxons and Frisians lying in the vast lowlands of the North from Rhine to Elbe.

The contemporary accounts of the long con¬ flict of Charlemagne with the Saxons shows them at practically the same stage of civiliza¬ tion as were their kinsfolk in the narrative of Tacitus 700 years earlier. Still almost un¬ touched by Roman influences, they resisted with heroic courage every attempt to impose upon them Frankish supremacy and Roman religion.

Their final defeat and incorporation into the political scheme of Charlemagne was by far the most important contribution yet made to¬ ward the upbuilding of a distinctively German Christianit}'. So complete was this process of assimilation that when, about a hundred years later, one of their own historians tells the story of their conquest, the tribal point of view is almost wholly forgotten in the pride of the writer over the delivery of his people from the bonds of a degrading superstition. Epis¬ copal centres were established at Minden, Paderborn, Verden, Bremen, Osnab'riick, and Halberstadt, and were henceforth maintained as bulwarks of the Church against the still rampant heathenism of Scandinavia and of the Slavic peoples beyond the Elbe. From an early day the bishoprics of Germany shared with other landholding interests the character of territorial lordships, closely identified with the soil, loyal to the vast Roman ecclesiastical system of which they formed a noteworthy part, but primarily German in character and sentiment. In the struggles for power in the 9th century among the local chiefs the support of the great bishops was indispensable, and they came out in the 10th century firmly established as the equals of the highest among the lay lords, and even superior to many of those in the wide range of their influence and the security of their landed revenues.

With the definite organization of Feudalism (q.v.), after the break-up of the Carolingian system they enter into the scheme of his newly constructed society as in some ways its most important units. Their selection is so largely influenced by the kings, whenever these chance to be men of weight, that the bishops come to be thought of as a kind of royal officials, and from this close association with temporal affairs come those often well-founded charges of worldliness which are the moving cause of the clerical reform movement of the 11th century. In this movement for the betterment

of society through an increased emphasis on the ascetic life Germany took less active interest than those southern regions, notably of France, in which it originated. German monasticism had from the beginning an eminently practical char¬ acter. Its work had been largely that of the pioneer in a new country, developing industry by the improvement of the land and cultivating learning in the comparative security of its pro¬ tected life. On the whole we hear little of the corruption that had often led to serious out¬ breaks against the monastic system in the South. The leading abbacies in the houses for women as well as for men were often filled by members or intimate connections of the royal families, and such persons, as for example, the abbots of Fulda, Saint Gallen, or Reichenau, take their place alongside the bishops as feudal princes. Also their appointments, like those of the bishops, were greatly influenced by the policy of the government.

It is largely this close identification of the higher church offices with the royal power that leads to the most important struggle of the Middle Ages, the Wars of the Investiture (1075-1122). The direct issue in that long conflict was whether the German Church was to continue in its former intimate relation to the German king or was to become, through

the process of the papal investiture, subject to a foreign political control. The outcome as expressed in the Concordat of Worms (1122), was in appearance a compromise based upon a division of the temporal from the spiritual powers of the episcopate; but in reality reso¬ lute kings continued afterward, as before, to bring pressure upon the higher clerical appoint¬ ments. During this period it is the Holy Roman Emperor of the German Nation who stands forth as the spokesman of all temporal powers against the aggressions of his colleague in the administration of the Christian world of the West, the successor of Saint Peter. The conflict is mainly political on both sides, but political ideas were during the strict mediaeval period hopelessly entangled with religious claims. The defeat of the imperial power in its efforts at aggrandizement in Italy was an ad¬ vantage to the greater clerical powers in Ger¬ many as it was also to the territorial lords. From the middle of the 13th to the middle of the 14th century Germany passed through that development of almost independent princi¬ palities which were guaranteed by the Golden Bull of 1356. The control over the clergy formerly exercised by the Emperor passed thus into the hands of a group of princes with whom the central power of the Church has henceforth to deal. During the Con¬ ciliar period (1408—48) it is they who present schemes of reform for the action of the Councils at Constance and Basel, and who enter into Concordats with the Papacy of the Reaction after 1448, by which it was hoped that the ever-increasing complaints against clerical abuses might forever be laid to rest.

The agitations of the Conciliar period, how¬ ever, especially in Germany,

had driven men into deeper reflection upon the actual sources of authority for religious faith and practice Three directions of thought were thus stimu¬ lated which were to move on side by side into the full current of the Protestant Reformation. These were the "evangelical, » the mystical, and the intellectual. (1) The first of these found its support in the doctrines of Wicliffe in Eng¬ land and Huss in Bohemia in regard to the ultimate authority of Scripture. Whatever in the thought or in the institutions of the Church was. not plainly to be discovered in these original documents of Christianity was open to criticism and ought at least to be investigated. If not clearly deducible from Scripture it ought to be reformed. (2) The mystical tend¬ ency of German thought was a reaction against the overgrown institutionalism of the later mediaeval Church. If it was true that the abso¬ lute comprehension of God and the complete identification of the devout soul with Him was possible through a process of individual disci¬ pline,. then obviously the importance of all ecclesiastical mechanism was proportionately re¬ duced. A formal priesthood might come to be rather an obstacle than an aid to the highest attainment of religious certainty. So, also, the most elaborate demonstrations of scholastic ingenuity were made unnecessary by this direct process of spiritual illumination. (3) The purely intellectual element came, in Germany, with the general awakening of the spirit of in¬ quiry in the. Revival of Learning. The serious northern mind turned at once away from the

frivolities of mere intellectualism to its bear¬ ings upon the vital problems of religion. The principle of "common sense® found for the first time its application to religious as to other questions. Especially was this true in the field of textual study and criticism. The German Johann Reuchlin (q.v.) (d. 1522) was the first to break through the barrier of ignorant super¬ stition that had prevented the study of Hebrew. The German Erasmus (q.v.) was the earliest scholar to approach the Greek New Testament in the true scholarly spirit.

On this threefold foundation of scriptural authority, direct spiritual insight, and the right of the human intellect to work out its own conclusions, the German Reformation built up its defense against the institutionalism of the mediaeval church system. Its central doctrine, the Justification by Faith, was the expression, crude though it might be, of that harmony between the righteous soul and the order of a divinely governed universe, which had ever been the truest ideal of Christian thought. Its emphasis on the idea of individual sinfulness, exaggerated as it may now seem, was the necessary counterpoise to the equally exagger¬ ated laxness in the existing methods

of dealing with this never-ending problem. The outward success of the German Reformation was largely due to the skill with which its leaders, notably Luther (q.v.), succeeded in avoiding the logical extremes of doctrine into which a radical wing under the lead of Thomas Miinzer (q.v.) and others sought to force them and also to the clear insight which led them from the first to identify their cause with that of the independ¬ ent territorial princes. By this eminently con¬ servative and constructive policy they were able to give to their work a distinctively na¬ tional character, to ensure it against attack from without and thus to make it the starting point for still further advance.

Under the protection and hence to a certain extent under the direction of the several gov¬ ernments Lutheranism acquired during the 16th and 1 7th centuries a rigidity of form and of doctrine apparently no less dangerous to the free movement of human thought than the system it had supplanted. The doctrine of scriptural authority endangered by an inevitable freedom of interpretation was pushed by one wing to an extreme of literalism which could end only in self-destruction. The doctrine of the <(enslaved will,® strengthened by the re¬ action of Calvinistic predestination, was in danger of hardening into an unchristian fatal¬ ism. From these dangers Germany was saved by the growth, first, of a healthy, humane spirit, such as had always served to modify the severity of Luther's theology, and second, of a new philosophy or method of thought, which gave an ever-widening scope to the exercise of plain human reason. Luther himself had in¬ deed laid the foundations deeper and broader than he knew when he had declared that he could be convinced of error only by <(Scripture and plain reason.® If these two were to have equal rights in determining religious truth it must follow of itself that reason should be applied to the interpretation of Scripture.

This is the special service of Germany in the field of modern religious thought: to have given to the accepted doctrine of Christianity

a form that might make it acceptable to the modern world. The key-note is sounded in the writings of Gotthold Ephraim Lessing (q.v.), and this the more clearly because Lessing had no formal system of philosophy to offer, but approached this subject as he did all others from the point of view of the free human spirit working on the divine mysteries in virtue of a divine element within itself. Especially he de¬ manded in religious matters the widest possible use of the critical method, the freest investiga¬ tion into the original sources, in short, the treat¬ ment of the Bible as a collection of literature produced by human means and therefore sub¬ ject to the same rules of criticism as all other human productions. In so far Lessing stood on the same ground as the English Deists of the previous century and their French followers, Voltaire and the Encyclopedists; but Germany was not

ready at once to give up its adherence to. formal Christianity. As it had escaped the frivolity of the Renaissance, so it sought to avert the frivolity of (

This solution is the special contribution of Immanuel Kant (q.v.) (d. 1804). Others had struggled to find an expression for the idea that our reason may accept anything that is not above it, provided only it be not called upon to accept anything that is contrary to it. Kant analyzed the nature of Reason itself and found a distinction between pure reason which could never penetrate into the supernatural and a ˆpractical® reason to which the absolute moral law is revealed. Through this principle it be¬ came possible to give new interpretations to the formal doctrines of Christianity. The intense emphasis thus laid upon the thinking individual as the final authority could not fail, however, to produce in Germany, even among most seri¬ ous thinkers a growing indifference to the formulae of faith and to the institutions that had come to represent them. Out of this com¬ parative indifference to formal dogmas grew the two directions of religious life and thought which have specially characterized Germany to the present day. Pietism (q.v.), the emphasis upon an overstrict personal morality as the only real condition, of religious satisfaction, had al¬ ready found its chief expression at the Uni¬ versity of Halle under the teaching of Spener (q.v.) (d. 1705), and Francke (q.v.) (d. 1727). It was profoundly modified by the new philo¬ sophic impulse, but it had sunk too deep into the character of the German people to be easily removed. On the other hand Rationalism, the right of the human reason to be heard in every determination of religious truth and in every institution of the religious life, was greatly strengthened by the Kantian reconciliation.

Both these directions of thought, Pietism and Naturalism (q.v.), go back in the last analysis to the same principle of the individual as the unit of religious experience and the ultimate authority in matters of faith. German religious thought in the 19th century tried to keep its hold on both these aspects of indi¬ vidualism. In various organizations, notably in the Evangelical Union and the Protestant- enverein it sought to embody the practical

demands for a reformed faith that should not give up the personal and social foundations of the early Reformation. In the successive schools of theological interpretation, the "rational- supernatural® of Schleiermacher and Neander (qq.v.), the "historical® school of Tubingen (q.v.), and mediatorial school of Ritschl (q.v.), Germany has aimed to keep the

balance be¬ tween the extravagance of modern materialism and a relapse into an official literalism. The problem of the moment in Germany as else¬ where is to bring back a sentiment of religious obligation without sacrificing the gains of modern exact science.

Bibliography.— Grimm, J., (Deutsche My¬ thology (4 Aufl. 1878, English transl. 1888) ; Simrock, K., (Handbuch der Deutschen My¬ thology (4 Aufl. 1874) ; Golther, W., (Hand- buch der Germanischen Mythology (1895) ; Mogk, E., (Deutsche Mythology (in Paul's (Grundriss der Deutschen Philology 1900) ; Meyer, E. H., (Mythologie der Germaneffi (1903); de la Saussaye, C., (Religion of the Teutons) (1902) ; Hauck, A., (Kirchengeschichte Deutschlands) (4 Bde. 1904) ; Rettberg, F. W.,

(Kirchengeschichte Deutschlands) (2 Bde. 1848) ; Michael, Emil, (Geschichte des Deut¬ schen Volkes seit dem 13n JahrhunderP (3 Bde. 1903) ; Janssen, J., (Geschichte des Deutschen Volkes seit dem Ausgang des Mittelalters) (8 Bde. 1894, English transl., 8 vols., 1905) ; Ranke, L., (Deutsche Geschichte im Zeitalter der

Reformation (4 Aufl., 6 Bde. 1868, English transl., 3 vols. 1847, 1 vol. 1905) ; Beard, G., Reformation of 16th Gentury) (1883); Fisher, G. P., (The Reformation ; Bezold, F.,

(Geschichte der Deutschen Reformation (1890) ; Egelhaaf, G., 'Deutsche Geschichte im Zeitalter der Reformation (2 Aufl. 1885) ; Baur, F. C., 'Vorlesungen fiber die christliche Dogmengeschichte } (3 Bde. 1867) ; Schwane, J., (Dogmengeschichy (4 Bde. 1895) ; Har- nack, A., 'Lehrbuch der Dogmengeschichte) (3 Bde., 3'e Aufl. 1897); Dorner, J. A., 'Geschichte der Protestantischen Theologie) (1867, English transl. 1871); Pfleiderei, O., development of Theology in Germany) (seit Kant, 2d ed., 1893).

Ephraim Emerton,

Winn Professor of Ecclesiastical History, Har¬ vard U niversity.

11. THE GERMAN UNIVERSITY SYS¬ TEM. The conception of a university is, as part of the German educational system, free from all the difficulties of determination which are involved in the American usage of the word. In the United States the university means some¬ times the best equipped colleges as distinguished from the poorer ones ; sometimes those institu¬ tions which combine colleges and professional schools; yet at the same time many of the smallest and newest schools leading to the bachelor's degree call themselves universities, while the older and better ones keep the tra¬ ditional name of college. Thus there is on the American side no sharp demarcation line, and hundreds of hardly comparable

institutions may be called universities. The situation in Ger¬ many is in every respect the opposite of this. The German Empire has 21 universities which, at least in theory, all stand on exactly the same level, have uniform entrance conditions and de¬

grees, are sharply and absolutely different from a German school or gymnasium, from the acad¬ emies and technical schools and from every American institution; comparable perhaps with the four post-graduate departments plus the junior and senior classes of an institution like Harvard University,

The oldest German universities lie outside of the present German Empire, in Austria : Prague was founded in 1348 and soon after, Vienna. In the Germany of to-day none is older than Heidelberg, founded 1385. The others are, in historical order: Leipzig (1409), Rostock (1419), Grief swald (1456), Freiburg (1457), Tubingen (1477), Marburg (1527)', Konigsberg (1544), Jena (1558), Wurzburg (1582), Giessen (1607), Kiel (1665), Halle (1694), Breslau (1702), Gottingen (1737), Erlangen (1743), Munster (1780), Berlin (1809), Bonn (1818), Munchen (1826), Strassburg (1872). A lively agitation makes it probable that the next univer¬ sity will be founded in Hamburg.

Sixteen universities, some of them of great historical importance, existed for some centuries and disappeared again, as, for instance, Koln (1388-1794), Erfurt (1392-1816), Ingolstadt (1472-1800), Mainz (1477-1798), Wittenberg (1502-1817), Frankfurt a. O. (1506-1810), Helmstadt (1576-1809), Altdorf (1622-180 7).

The essential features of these 21 institu¬ tions are given in the fact, firstly, that they are state institutions ; secondly, that the instruction is adjusted to the professional training of the lawyer, the physician, the minister, the high school teacher and the scholar; thirdly, that the teachers are appointed for their achieve¬ ments in productive scholarship ; and finally, that the students are left to the complete free¬ dom of independent young scholars. We have to consider carefully the bearing of these four features to understand the meaning of those in¬ stitutions which have been throughout the whole of the 19th century the chief pride of the Ger¬ man nation, and have secured to German scholarship the acknowledged leadership in the civilized world.

. State Institutions. — The German universi¬ ties are state institutions. While in America the State has organized university life wherever private initiative has been insufficient, giving to the State universities on the whole a supple¬ mentary character, inasmuch as all the leading historical universities have been under the con- tiol of private corporations, the

German nation takes for granted that the higher education is a matter for the state. This administrative de¬ pendence upon the state alone can secure the necessary uniformity in the preparation of the state employees, teachers, judges, and so on. And, on the other hand, as the state demands that its employees shall have studied a number of years in German state universities, it would be impossible to develop universities on private foundations. Germany thus represents in this respect the opposite extreme to England, while America takes a middle place. But it is not the empire which has any control of the uni- versities. The higher education is a function of the particular states. Thus, Berlin is under the control of Prussia; Leipzig, of Saxony; Munich, of Bavaria; Heidelberg, of Baden; and so on. The state appoints the professors, de¬ termines their salaries and their functions and

clctei mines the requirements for the state ex¬ aminations. All the expenses of the university, salaiies and pensions, buildings and equipment, figure in the state budget, and are independent oi the small fees which the students pay and which go directly to the professors whose lec¬ tures they attend, ihus the income of the in¬ structors comes from two sources : the salary and the fees. In the case of disability of the professor, his whole salary is to be paid until his death; and in every case, the state takes care of the widow and orphans.

1 he state expenses for the universities have been about 30,000,000 marks for regular yearly expenses and about 6,000,000 marks every year for extraordinary expenses.

The leading personality in the governmental administration of the last two decades has been Dr. Friedrich Althoff, the eminent head of the Prussian University Department; his greatest achievement is the development of the natural¬ istic laboratories and of the clinical institutions.

This state character of the universities is in no way antagonistic to an extraordinary demo¬ cratic freedom in these institutions. Their whole organization is in its essentials that of self-governed corporations, with powers in the hand of the professors which in many respects exceed those of the American faculties and which still show much of their origin in the free mediaeval institutions of Germany. Funda¬ mental is the right of the faculties to fill their vacancies by co-operation. Whenever a profes¬ sorship

is to be filled, the faculty selects three candidates and the government is bound to ap¬ point a professor from among this number. The faculties, also, choose each year the presi¬ dent, the so-called rector, out of their own number. The teaching staff consists further, not only of full professors and assistant profes¬ sors, but also of docents (privatdocenten) who have no salaries, but fees only, and their ap¬ pointment is absolutely in the hands of the faculty. In earliest times the universities even had their own courts. This exemption from civil law has been abolished, but some discipli¬ nary rights have still been kept up. Above all, the state has no right to interfere with the teaching of any instructor. No political pres¬ sure can be applied, and no professor can be removed from his place against his will. There is no sphere of public activity in the German Empire. in which the state control is so little felt as in the university; everything is adjusted to the greatest possible freedom of thought.

Professional Faculties. — The universities are schools for professional training. They stand hereby in sharp contrast to the English and American systems. In America the law schools, medical schools, and some of the divin¬ ity schools, stood in old times on a very low level of general education. Almost anyone was admitted. And independent of these, the country had its colleges as places of highest education ; these were the real universities of the land, with the aim of furnishing the highest liberal education, accessible alike to the future business man and to the professional students. In Germany the situation has beep just the opposite of this since the days of the first uni¬ versity in the 14th century. From the begin¬ ning, each university has had its four faculties, and one of them, the faculty of arts, the latter so-called philosophical faculty, was distinctly

the preparation for the three upper faculties of divinity, law and medicine. The faculty of arts had not the co-ordinated character because its professional aim of preparing school teach¬ ers had not reached an independent standing, as all teaching was done by the clergy. As soon as lay teachers were demanded, the fac¬ ulty of arts, too, became professional, and the four co-ordinated faculties represented the uni¬ versity. Thus none but professional men have a real right to existence in the German univer¬ sity. The strong social effect of this historical development cannot be overlooked; it charac¬ terizes the social difference between Germany and the Anglo-Saxon countries. While in America the community of the best educated is represented by the alumni of the colleges, with¬ out reference to the question whether the way from the college leads to the court and hospital or to the bank and office, in Germany the circle of the intellectual leaders is confined to the pro¬ fessional men, as they alone have had reason to attend a university. Only the army ranks with them socially, while the representatives of all commercial and industrial activities take a second place, as they have no university edu¬ cation.

In a certain way the philosophical faculty is still to-day introductory to the three others. The students of medicine here receive the bio¬ logical foundation, the students of law and divinity find here the historical, economical and philosophical work. At certain places the phiF osophical faculty itself has been divided into two, a naturalistic and an historical faculty. Everywhere it is at present the most developed one, with the largest number of teachers and students. The most rapid development in the last century belongs to the medical faculty, which stood far behind the law faculty a hun¬ dred years ago, while it has now far surpassed the law faculty in the number of teachers, and, for a period of years, even in the number of students.

In every faculty the foundations of the in¬ struction are historical and theoretical. The law faculty, for instance, develops the juristic problems from a systematic point of view and leads up to the existing law through the his¬ tory of Roman and German law. The practical preparation which the case system of the Ameri¬ can law school provides is left in Germany to the so-called Referendarzeit, a period of several years which every young jurist — whether he goes into the career of the lawyer or of the judge — has to pass in the court for practical training after passing his examinations in the university. Besides the state examinations for all professions, the university offers the doctor's degree in philosophy, law and medicine, which in itself gives no right to any appointment or to any professional work, with the exception of the career of the university docent. Yet the doctor's degree is taken by most of the profes¬ sional men too, as it gives by tradition the stamp of real scholarship.

The relations of the different faculties may be characterized by the following figures. In the year 1900 there were in the philosophical faculties 571 full professors, 52 associate pro¬ fessors, 323 assistant professors, 419 privatdo- cents, and 12,244 students. In the Protestant divinity faculties 110 full professors, 7 associ¬ ates, 33 assistant professors, 37 docents, 2,352

students. In the Catholic divinity faculties 62 . professors, 2 associate, 10 assistant professors, 10 docents, 1,546 students. In the law faculties 156 professors, 12 associates, 32 assistant pro¬ fessors, 40 docents, 9,259 students. In the medical faculties, 224 professors, 19 associates, 219 assistant professors, 329 docents and 7,433 students. To characterize the growth of the faculties the following figures may be added: In the year 1850 the German universities had 12,246 students (1,615 Evangel, div.,

1,391 Catholic div., 4,306 law, 1,932 medicine, 3,102 philosophy). In the year 1880, 22,863 students (2,786 Evangel, div., 706 Catholic div., 5,297 law, 4,779 medicine, 9,295 philosophy). In the year 1903, 37,677 students (2,197 Evangel, div., 1,580 Catholic div., 11,747 law, 6,948 medicine, 15,205 philosophy).

The Teachers. — The teachers of the univer¬ sity are appointed with reference to their achievements in the advancement of knowledge. No one can understand the meaning of the German university who does not acknowledge this principle as the central energy of German academic life. In this respect Germany stands in contrast to both England and France. In England the greatest scholars, from Bacon to Darwin and Spencer, have stood outside the university life, and even the leading professors of Oxford and Cambridge have little to do with the regular teaching, which is in the hands of tutors and fellows. In France the provincial universities are professional schools whose pro¬ fessors are expected to be first of all teachers, while scholarly production is concentrated in the academies of Paris. In Germany alone is a complete unity of academic teacher and pro¬ ductive scholar demanded. It is a rare excep¬ tion when an important scholar does not become a university teacher in Germany, and every uni¬ versity teacher without exception is expected to have added to the storehouse of the world's knowledge. America comes nearer to this Ger¬ man system than any European country ; and yet in every American university productive scholars and reproductive scholars are mixed; the contributions to knowledge still appear as a kind of private undertaking, while the appoint¬ ment refers to the teacher as teacher. This cannot be otherwise in a country where there is no sharp demarcation line between the small college, which demands school teachers, and the large university from which the mere school work ought to be banished. Germany's power to reserve all university teaching for the pro¬ ductive scholar thus stands in immediate rela¬ tion to the sharp and uniform demarcation line, between all schools, on the one side, and the universities on the other.

This principle involves the most characteris¬ tic features, of German university teaching. The university lecture is not intended as a re¬ production of ready-made knowledge and the imparting of mere information is its least im¬ portant function. Its essential trait is rather that which the productive scholar alone can offer, the training in scholarly methods. The gymnasium teaches facts ; the university teaches a critical attitude toward all knowledge. Its vehicles are partly lectures, partly seminary ex¬ ercises. The lectures are meant to be strictly personal and critical outlooks over a whole field of knowledge, independent of any special text¬ book. They are not to be substitutes for any¬

thing printed, but have to find their value in the contact of the student with

a personality, acknowledged as an original productive scholar. The German idea is decidedly that the mastery of method which such a teacher has shown in his works will be more helpful and suggestive for the student than any brilliant rendering of second-hand knowledge. The seminaries, which have taken the place of the formal disputations of earlier centuries, lead the most advanced stu¬ dents to make individual efforts toward schol¬ arly production.

This principle gives meaning also to the in¬ stitution of privatdocenten. In America the young scholar has to find his academic career mostly by ascending through positions in small colleges without higher university aims, where he finds neither the means nor the time nor the advanced students for higher work. This is necessary as the large universities have merely salaried teachers whose number has, of course, to be adjusted to the demand of the instruction. The result is that the academic career is dis¬ couraging for the most vigorous minds, which see before them years of a second-rate activity. In Germany the opposite prevails. There is no limit to the number of teachers of highest class in the university. The docents have no salaries, to be sure; but their right to lecture on any specialty to advanced students is equal to that of any full professor, and no obliga¬ tions are involved. It is the ideal situation for the young scholar who wants to live in the academic atmosphere from the first and who wants to devote his life to productive scholar¬ ship. A remarkable piece of scientific achieve¬ ment is the only condition for his admission, however large the number of teachers in the same specialty may be. This docent system thus. separates the university, career from its be¬ ginning, from that of the simple teacher; con¬ fines it to productive work; and has its external advantage in the fact that out of these docents the universities choose the candidates for va¬ cant professorships. The result is that the fin¬ est and. most vigorous minds of the country are drawn into this career, and it is this personal factor above all which gives to the German university its superiority. Germany is the only country in which absolutely the best human material of the nation enters into the academic career; and the docent system is the necessary condition for this situation.

Thus the German university has no exact equivalent to the American university instruc¬ tor, as the instructor has a paid position and is appointed with definite obligations as to teach¬ ing, while the docent may offer within the lim¬ its of his chosen field whatever fie likes. The professor extraordinarily corresponds to the American assistant professor; the ordinarius, to the full professor. But it must be understood that in Germany both categories are appointed for life, and that the full professors only con¬ stitute the official faculty in which the adminis¬ trative duties are settled. Very frequently the title of professor, extraordinarily is given to docents after a series of years, of valuable work.

I his is,, then, merely a title without any profes¬ sorial rights.. No docent earns by his years of service any right to be advanced to a real pro¬ fessorship, and seniority plays no role in the question of advancement. The principle of in- breeding, so habitual in American universities,

is strictly avoided in Germany. A constant mi¬ gration of the professors is the rule, and this migration includes the German universities of Austria and Switzerland too. The faculty asks merely for the best productive scholars avail¬ able, and this rejection of all claims resulting from years of service secures the eminent char¬ acter of the faculty.

The Students. — The students attend the university for from three to five years for the purpose of being prepared for a profession through a critical scholarly study of its scien¬ tific basis. The attitude of the student, at least in theory, corresponds, therefore, to the schol¬ arly character of the faculty. This is ex¬ pressed by the scholarly preparation demanded as entrance condition, and is expressed further by the complete freedom of the student in every respect. As to the entrance conditions, recent years have modernized the system by giving to the more naturalistic realschule the same rights as to the classicistic gymnasium. But in no case can a student be matriculated as a full student with the right to pass state examina¬ tions- who has not passed the nine years' course of one of the higher schools which presuppose a three years' course in a primary school. This 12 years' work is usually completed with the 19th year and is tested by the Abiturienten ex¬ amination, which closes the school life. It is difficult to compare this point of intellectual achievement with that of American schools. On the whole, it might correspond to the beginning of the junior year in the leading American uni¬ versities or to the bachelor's degree in the smaller colleges of good reputation. Those German students who have not passed this ex¬ amination can enter merely as special students, so-called Horer, without the right to pass uni¬ versity examinations. Foreigners cannot pass state examinations at all ; but they can be ma¬ triculated and attain the doctor's degree. The American bachelor's degree is, then, usually counted as substitute for the German school examination, and years of post-graduate work in such American institutions as belong to the American Association of universities are ac¬ credited to them to a certain extent.

The time of study toward the philosophical degree is nearly always four years ; for the medical degree, five years. The unit of study is not the academic year but the half year, the semester, of which the one lasts from

the middle of October to the beginning of March and the other from the middle of April to the beginning of August. The right of women to be matriculated dates from recent years only, and is not uniform throughout the different parts of Germany. But every university now admits well-prepared women as special students.

The freedom of the student goes far beyond the American habit, and is not at all confined to complete freedom in the election of courses. He is not only not limited to a minimum or maximum number of courses, but the university also does not demand any kind of test for suc¬ cessful study in those courses. There are no course examinations, and, of course,, no. regis¬ tration of attendance. The student is his own master and is expected to make just such use of his opportunity as befits his scholarly aims. No textbooks are prescribed in the courses; no questions are asked of the student and the

final examinations have no reference to any particular courses. The majority of students change the university repeatedly, attracted by special great teachers, or by the special charms and facilities of a university town ; this migra¬ tion of students is one of the strongest ties which bind the states of the union together and make the German Empire an intellectual unity. But of course it works against that spirit of loyalty which binds American students toward a particular university. In the same di¬ rection works the fact that the graduates of a university have in Germany no further adminis¬ trative connection with that particular place. That which binds many German students to their special alma mater for their whole life is rather their belonging to a special corps or burschenschaft or other social club.

The social life of the German student finds its characteristic expression in such club-like institutions, which have a strong intercollegiate affiliation. There is not and cannot be any class life comparable with the undergraduate depart¬ ments of American universities, but these his¬ torical clubs furnish a large amount of par¬ ticular academic feeling among the students. Those students who do not belong to them live, on the whole, like any private young gentleman. To live together in dormitories is unknown, and common academic occasions are somewhat rare ; but the students of the fashion¬ able corps and of dozens of other clubs, with their colored ribbons and colored caps, domi¬ nate the social life so completely that they appear to the outsider the only typical aca¬ demic citizens. Their forms of social enjoy¬ ment can be understood merely historically. All the well-known excessive formalities in the regulation of beer-drinking and fencing and dueling are remainders of the 17th century and partly of earlier periods. Yet the overwhelm¬ ing majority of the students spend their uni¬ versity years only for a limited time, or not at all, under the influence

of these traditional forms of enjoyment. They are seriously work¬ ing in pursuit of their earnest scholarly aims and in preparation for the difficult state ex¬ aminations. Sport, beyond fencing, is on the whole little developed. It must not be forgotten that the year in the army, which is the real physical training for the German nation, falls into the university years of almost every student. Politics, too, plays a very small role in the academic body, while, to be sure, religious tendencies, especially Catholic and anti-Catholic movements with political character, have re¬ cently not seldom disturbed the peace of the student community.

The literature on German universities is recorded in the recent work of Erman and Horn, (Bibliographic der deutschen Universi- taten> (Leipzig 1904). The first general part contains the references for 17,363 writings; the second part, referring to the special universities, contains 21,725 titles. The best books on Ger¬ man universities are Lexis, W., (Die Universi- taten im Deutschen Reich } (Berlin 1904), and Paulsen, Friedrich, (Die deutschen Universi- taten und das UniversitatsstudiunP (Berlin

1902).

Hugo Munsterberg,

Late Professor of Psychology, Harvard Uni¬ versity.

12. GERMAN SCHOOLS. There is a somewhat perplexing puzzle which confronts the foreign students of the German educational system, especially the students of the lower and intermediary (secondary) schools. The puzzle consists in the seemingly irreconcilable conflict of two principles; i.e., the principle of uniform¬ ity, often referred to as almost regimental, expressing itself in the unity brought about by the effective measures of universal state control and the principle of almost bewildering variety and individualism within the vast range of the diffeient schools themselves. The abundance of different types expressed by the very names of the schools existing within the frame called i-e-> occurrence of such widely different types as volk-schule, mittel-schule, real- schule, oberrealschule, gymnasium, progym¬ nasium, realgymnasium, prorealgymnasium, re- form-schule, fully suggest the need of inter¬ pretation, not alone of the individual mean¬ ing of at least the principal types but also of their correlative meaning and of the part which they play within the total of the national edu¬ cational system. As a general guide this defi¬ nition might be. descriptive : Variety in its

ultimate aim which is common to all its mani¬ fold forms has been

organized into Unity, while Unity finding its essential vigor in widest pos¬ sible differentiation of its individual constituents should be regarded merely as a safeguarding principle guaranteeing the unhampered develop¬ ment of the parts.

Historical Synopsis — The growth of the leading ideas governing the system of the Ger¬ man schools of to-day is best shown by way of a brief historical synopsis: As in the case of other European nations the beginnings of Ger¬ man public instruction must be traced back to the early functions of the Catholic Church. In the case of German public instruction there has been an. early blending of the interests of the latter with the interests of the state. Al¬ though rather a short-lived experiment the rule of Carolus Magnus with its unmistakable tend¬ ency to create a uniform social order has left its trace; it has once for all times firmly estab¬ lished the business of public instruction as one of equal importance to both state and church. Even in the case of municipal care, rivalling as it were in course of time with state and church officials, the fundamental principle governing matters of education was never lost sight of.: schools should train the children to be intelligent and moral members of the com¬ munity. The sole reward of the national edu¬ cator even in the earliest days has been to produce good and valuable citizens. The reign of Charlemagne has remained substantially pro¬ ductive and suggestive in still another direction : it has clearly pointed out the road which Ger¬ man public instruction was to follow, namely, in exploiting the intellectual treasures of an¬ cient Roman civilization. Ever since the war- filled period of the migration of the peoples the Germanic people had benefited substantially from contact with other peoples; under Charle¬

magne, instead of chaos, a highly organized form presented itself which was readily ac¬ cepted and which remained a shining light and guide for well-nigh 800 years. The higher goal was the world of the scholar whose intellectual interests throughout the greater part of the Middle Ages expressed themselves in Latin. Public education, although changing in the course of time, its chief protectorate as well as many of its original features, never lost its ad¬ herence to the classical ideal. Intellectual activity of this kind has accordingly produced a rather high class of national educators and must be looked upon as one of the chief sources of high ideals governing the education of the broad masses of the people. As has been in¬ timated, the highest authorities of church and state were early rivals. Ambition and competi¬ tion above all other things led to the general acceptance of one principle of highest import¬ ance, namely, that each community should pos¬ sess a school as good as that of every other.

Although the history of the German people, certainly up. to the close of the Thirty Years' War, is a history of evolution in decentraliza¬ tion, public

instruction can be said to have de¬ veloped along lines of just the opposite prin¬ ciple. The days of the Renaissance found not only the German scholars but the German people as. a whole ready and prepared to absorb the additional influx and enrichment. The im¬ mediate result in Germany, in spite of political decentralization and inefficiency, was the foun¬ dation of a veritable host of universities for which in turn the schools were obliged to offer adequate preparation. The interests of the state — whether the state be large or small, empire or duchy or municipal community — and interests of the intellectual plurality of the nation must be regarded as some of the deter¬ mining factors in the history of German edu¬ cation. A third factor largely determining the character especially of the German schools — only indirectly the character of the universities — is. the unique influence of the home and family. There can be no doubt that the youth of. the German people has early been disciplined within the humble order of parental tradition toward readily accepting the validity of one golden rule, namely, that a task, no matter whether pleasant and attractive or not, must be respected for its own sake and that intel¬ lectual. activity to the untrained is not a matter of choice but of duty as long as there are elders who assume the responsibility to make such a task compulsory. Based undeniably on author¬ ity, yet stimulated at the same time by an enor¬ mously suggestive environment, German school¬ ing has been productive not so much through blind obedience but through home-made power of imagination and through home-made zeal toward learning as such.

Within the general system of the German schools, two distinct subdivisions must be treated separately: the public schools (volks- schule) and the schools of the higher order (gymnasium, realgymnasium, ober-realschule) .

6 7

(VIII) (VII)

THE PUBLIC SCHOOLS

Average age on entering, 6

8 9 10 11 12 13

(VI) (V) (IV) (III) (II) (I)

On leaving, 14 Continuation schools

(14) 15 16 17 (18)

(Time of apprenticeship)

jirl-schools are modelled much after either the lower or the higher schools for boys; only in very small communities there are no special schools for girls, which causes coedu¬ cation as a matter of necessity rather than of choice.

The public school (volks-schule, sometimes also called Gememde-Schule®) offers a curricu¬ lum to be covered in eight years of instruction, free of charge throughout the country. The number of individual classes actually established on this eight-year plan depends on the size of the local population, to some extent also on its wealth, although any marked lack of local funds

(municipal budget) — invariably means that state iunds will be offered for the maintenance of a fixed minimum as regards equipment, teachers salaries and pension. In most of the towns, even of smaller size, public schools are found with eight classes and at least one teacher to each class, while many of the schools in the country (dorf-schulen) , in villages with no larger a population than 2,000, have from four to five classes and as many teachers. There are communities in rural districts with hardly more than 50 children between the age of 6 to 14. It is in such cases that the ((one class — – one teacher® plan is carried out throughout the entire eight years of compulsory school attendance. But even in the latter case the idea of invisible division is not given up; it calls for a highly developed method which, of course, is one of the chief objects of the teachers' training' schools.

As an example of an elementary school showing the highest degree of differentiation a schedule of the public schools of Greater Berlin may be studied :

Course of Study of the Elementary Schools

at Berlin.

Lower stage

Middle

stage

Upper stage

VIII

VII

VI

V

IV

III

II

I

Religion .

3

3

3

4

4

4

4

4

German .

8

7

7

6

6

6

6

6

Object lessons . . .

2

2

2

History .

2

2

2

2

2

Arithmetic .

4

4

4

4

4

4

4

4

Geometry .

3

3

2

Nat. science. . . .

2

2

2

2

2

Geography .

2

2

2

2

2

Drawing .

1

2

2

2

2

2

2

Writing .

2

2

2

2

1

1

1

.Singing .

1

1

2

2

2

2

2

2

Gymnastics .

2

2

2

2

2

2

2

2

Totals .

20

22

24

28

In the case of girl-schools, geometry is not begun until the seventh year and there are but two periods instead of three in the classes I and II. There are instead two periods less in these classes in arithmetic, also one period less in history in the last form than in the boy-school. There are added 14 hours of instruction in sewing and needle-work, i.e., two each in the forms VI, V and IV, three in form III and four in the two upper forms.

As a selection . representing average condi¬ tions the following sketch may serve to

illustrate general conditions in the rural dis¬ tricts : The village of Badersleben, north of the Hartz Mountains and south of Brunswick (Lat. 32°, Long. 11°, i.e., a selection al¬

most from the centre of the German Empire), formerly within the bishopric of Halberstadt, has a population of about 3,000 inhabitants, of whom about two-thirds are Protestants and one- third Roman Catholics. In this community two public schools are maintained, one for the chil¬ dren of the Protestants of five classes with five teachers, the other for the Catholic children accordingly smaller. In the main the village budget defrays the expenses of these schools, but the Protestant church being richly endowed in real estate is sharing heavily toward lessen¬ ing the burden to the community. This has been possible on account of the co-operative spirit between the trustees of the church and the board of local aldermen. In addition to the five classes and teachers — the latter live in a settlement in separate houses surrounded by ample garden land — there is a (sixth) class for kindergarten work with a specially ap¬ pointed (woman) teacher. The senior teacher (Haupt:Lehrer) is practically the director of the entire school, while the responsibility of general supervision (visitation within certain intervals, the submitting of reports to the cen¬ tral board of the province, etc.) rests in both instances with the local minister of the church. The minister is one of the local school board but otherwise not engaged in instructing classes beyond the annual religious preparation of the children who are to be confirmed (Konfirman- den-Unterricht). In the regular periods of in¬ struction in religion the accent is on the his¬ torical side of the Christian religion, the chief aim being to give a fair acquaintance with the development of Jewish religion (Old Testa¬ ment) and with the main

events in the history of the Christian Church until the present day. Literary documents, including some of the more popular hymns, the subjects of special attention; confessional differences, although being made clear, are not to be overemphasized. A whole¬ some jealousy on the side of the teachers who do not wish to see religious instruction slip back into the hands of the Church is a fair guaranty for a prudent discharge of this ob¬ viously delicate duty of the German educator.

For those boys who remain in the village after leaving public school— (some of the boys enter into local apprenticeship, but most of them are farm-hands) — continuation school courses are organized by the same authorities which handle the matters of the local schools. These courses (evening classes), which are conducted by the two senior teachers, are so arranged as not to interfere with the general work during the heavy season in farming. In¬ cidentally the largest agricultural establishment of. Badersleben, the "Kloster-Gut,® a manor originally forming a part of the local settle¬ ment of the Roman Catholic Church, has pro¬ duced an agricultural school of considerable standing. In it two main courses in two years are offered. The curriculum in the first place takes up the subjects which would be offered in the. continuation school. Thus boys attend¬ ing this school are excused from attending the latter. Secondly, the curriculum covers the elementary branches of scientific farming. A considerable part of the time is given to prac-

tioal work in field and nursery. Some six to seven teachers, including the director, who preferably is the owner of the farm, constitute the teaching staff. While this school is practi¬ cally self-supporting and independent of state help, it is formally endorsed by the provincial government. The granting of the ((licentia docendiˆ in the case of appointment of the director is a matter of approval on the ground of university courses covered successfully by the applicant (generally at the agricultural de¬ partment of the university of the province, in this particular case Halle /a. Saale). The school of agriculture of this German village (although having the character of a boarding school) can well be classed with the trade schools of a city. It covers the ground which continuation schools are to cover and in addi¬ tion it offers a valuable training in farming. Not a few of the young men in this school are natives of the village who after graduation take up practical farming. Another school of this kind in the neighborhood within less than two hours' railroad distance is the Ackerbau- schule in the city of Helmstedt, formerly a university town in the duchy of Brunswick. From this can be gathered the frequency of such schools within a section of the

country of which comparatively little is known outside of Germany. This district cannot be called highly populated ; it furnishes rather a fair mid¬ dle between the crowded conditions of the big cities and the industrial districts and such con¬ ditions as may be found in the thinly populated provinces of the east. In each case, however, the volks-schule as a public utility of first order is expected to lay the foundation for continuation schools and trade schools, thus making education a common thing to the entire nation. While it perpetuates safely the social structure of the nation it creates a common ground from which those whose ability has been tested may rise by entering systems of the higher order.

The nine years' course of gymnasium, real- gymnasium, ober-realschule, is preceded by a three years' course of vor-schule. The latter is not necessarily an organic part of the school systems to which it leads up, but for reasons of economy many municipal budgets show the maintenance only of the complete nine years' course of the gymnasium or realgymnasium or ober-realschule. In this latter case the work preparatory (preliminary) to entering the gymnasium, etc., is assigned to the lower classes of the volks-schule. Thus the princi¬ ple of possible transition from volks-schule to gymnasium is firmly established at the early age of nine. Entrance into the gymnasium takes place automatically; i.e., without special ex¬ amination, wherever the vor-schule has been made an organic part of the higher system. The nine classes of the latter, whether gymnasium or realgymnasium or ober-real¬ schule, are : Sexta, Quinta, Quarta, Unter-tertia, Ober-tertia, Unter-sekunda, Ober- sekunda, Unter-prima, Ober-prima or in the

customary abbreviation: VI, V, IV, UIII, 01 II, UII, Oil, UI, 01. (The «a» in the German word gymn "a stum is pronounced like the first (*

The schools referred to are non-coeduca- tional. Not all boys enter exactly at the age of nine; also, transfers owing to change of the parental home which is quite frequent in the career of governmental officials, illness and actual delay through inability to cover the course, account for the average age at the time of graduation at the end of the ninth year to be about \9y2 to 20. There are two distinct goals for which the gymnasium, real-gymnasium and ober-realschule prepare : First, promotion from unter-sekunda to ober-sekunda implies that a great many branches of civil service and co-ordinated private careers are open with¬ out examination. In a nation which has prac¬ tically espoused public ownership for most of its public institutions and utilities a vast range of opportunities and careers is open to the youth of the country upon having passed this first goal in the curriculum of the schools of the higher order. Careers of this kind are those in the postal service of the nation which includes all telegraph, telephone and essentially all parcel (express) service, in the railroad service of the

country; to which should be added the field of electric street-car service gen¬ erally under municipal control, gas and power plants being owned and run by the communi¬ ties, also forestry service which is manipulated by the nation's appointees. Public instruction and, of course, the entire professional person¬ nel of the national army and navy must be included. Intermediary positions fully estab¬ lishing a livelihood much coveted are open in all these branches. While transition from careers thus entered upon into positions re¬ quiring higher degrees of training are rare, yet by no means legally excluded, the passing of the second goal, graduation after nine years, carries with it universal recognition for every branch of public life.

The certificate issued by these schools of the higher order upon promotion into ober-sekunda entitles the bearer to possible promotion in the reserve military forces of the nation ; this meaning substantially a more rapid passing through elementary stages of military training; i.e., the shortening of the universal original one-time term from two to one year — al¬ though the final sum of time spent during obligatory terms of service in periods up to 56 days at a time fully brings the individual's contribution up to the two years' standard. This is the significance of the more popular term ˆeinjaehrigen-zeugnis® (one-year-term- certificate). Only in schools of medium-sized cities the classes shrink noticeably in size owing to the exit after passing unter-sekunda by those who have reached the goal of the <(one-year- certificate.® (The advantage of classes of smaller size for carrying on instruction in the following three upper grades cannot be under¬ estimated; the maintenance, however, of a

Age on entering, 9 On leaving, 18 (normally)

*S – A“ — N / – * – *

9 10 11 12 13 14 IS 16 17

VI V IV U.III O.III U.II O.II U.I O.I

555

GERMANY — GERMAN SCHOOLS (12)

greater variety of schools of the higher order m cities with greater population as well as fre¬ quent parallel classes cause the drop in enrol¬ ment after unter-sekunda to appear but slight). Moreover, the number of those who enter

The general system, far from being regi¬ mental in any sense of exclusiveness toward those with no distinct intellectual inheritance, has

rather encouraged the instincts for social rise through education and transition from the lower grades to the higher, so much so that the system has frequently been criticized for producing a surplus for which it is difficult to provide the kind of livelihood to which from the mere point of education these ((new-arrivals® would be entitled. (Note the term academic proletariat in modern analysis of the country's social conditions). With the growth of in¬ dustries, however, and in view of the fact that the educational requirements insisted upon even by private concerns (such as banking institu¬ tions, large farming concerns where there are sugar-refineries and chemical laboratories for the testing of seed produce, etc.) have con¬ stantly been raised, the output of graduates from the schools of the higher order has been bound more and more not to exceed the de¬ mand. It might be expected that after the heavy drain caused by the war the ((surplus- problem® will have ceased to be serious. To

sum up : The present system of the schools of the higher order in its essential aim to be of greatest possible service to the nation through the privileges which it grants to its graduates by the so-called (

The gymnasium, the realgymnasium and the ober-realschulen widely differ among them¬ selves as regards the curriculum. The chief characteristic of the gymnasium is that Latin is taught throughout the entire nine years' course; whereby a weekly total of 68 periods of instruction, approximately one hour each, in Latin (covering all classes of the school) is reached as against 49 in case of the real¬ gymnasium. The corresponding figures in arithmetic and mathematics are : for the gymnasium 34, for the realgymnasium 42, in natural science for the gymnasium 18, for the realgymnasium 29. The third type of the schools of the higher order, the ober-real¬ schule offers no Latin at all, but instead the curriculum contains 47 periods for French (gymnasium 20, realgymnasium 29) and 25 periods for English (gymnasium until recently only a total of six periods in the three upper classes Oil, UI, 01; — which, moreover, are (

gymnasium and ober-realschule), the gym¬ nasium is guardian of the classics, and is carrying out distinctly the ideals of the period of Humanism (15th and 16th century).

Hence, its most frequent name, the humanistic gymnasium ; while the two other systems have obtained their popular name, realgymnasium

and ober-realschule, on account of their carry¬ ing out the ideals which were elaborated by the philosophy of realism. They can be traced

back to the very cradle of modern science, i.e., to the influence of Bacon and Descartes upon German educators (Comenius 1592-1670), and thus are by no means void of traditional values which to the superficial observer often seem to be claimed solely by the gymnasium. As a most striking example of the period of transition from the time-sanctioned type of the humanistic gymnasium to realism in the sense just described there should be mentioned the far-reaching work of the German educator, August Hermann Francke (1663-1727). A quotation from Cotton Mather may indicate the scope of hopefulness to which the educational enterprise of Francke gave rise in those days to an American : (

The passing of the gymnasium's monopoly as the only school preparing for university was inaugurated by a step of momentous importance in the history of German schools. After much discussion of the merits and demerits of the exclusive position held heretofore by the humanistic gymnasium a conference was called in December 1890, by Emperor Wilhelm II, and subsequently a new order of public instruc¬ tion was issued. Among the issues placed be¬ fore this conference through the personal ini¬ tiative of the head of the nation were : Adapta¬ tion of instruction to the demands not only of scholarly standards but of modem needs of the people; a fair reduction of Latin, i.e., making Latin no longer compulsory and a conditio sine qua non for university immatriculation — Latin composition, heretofore an ingredient part of the prima curriculum, disappeared com¬ pletely — greater consideration for individual talent. A second reform, also along progres¬ sive lines, took place in 1901. The most far- reaching result of the new order has been that it extended equal recognition to gymnasium, realgymnasium, and ober-realschule. Naturally, future students of theology, classics, ancient philology, Roman law, history and philosophy would still figure largely among those who make up the roll-call of the humanistic gym¬ nasium. There were until recently in Prussia : 341 schools of the gymnasium type, 162 of the realgymnasium type and 99 ober-realschulen. The following figures illustrate the distribution of schools of the higher order in Greater Ber¬ lin : 75 of the nine years' course, out of which about 30 are of the gymnasium type, about another 30 of the realgymnasium type and the rest ober-realschulen. The average maximum of classroom attendance in these schools is 40; there were in the state of Prussia 24.2 pupils to every teacher (university-trained teachers only) which figure differs but very slightly

from the corresponding figure for the empire

(24).

Closely related to gymnasium, realgymna¬ sium and ober-realschule, and in fact constantly everging from one of the latter or from previous combinations of the latter, are the re- form-schulen. The principal new departure of the reform-schools is the postponement of Latin until lower tertia (U III). There are three years of teaching which are common to all the pupils of these reform-schools after which appears plainly the character of the former familiar types, branching off, as it were, either into gymnasium, realgymnasium and real- schule, or at least into two of these final forms. The Frankfort system, also that of Altona and Hanover (Leibnitz-school) are still regarded as leading types. By this time approximately 130 reform-schools should be added to the figure given above as regards schools of the higher order in Prussia, while the additional figure for the empire would be about 160. All these schools have been fully recognized and have passed the state of experimentation, al¬ though the name ˆreform-schule® might still suggest a state of untested novelty or even of fighting still for recognition. All these sys¬ tems, so far described, consider themselves equally progressive. They carry on instruction according to the individual needs of the youth of the nation, not in any hostile competition, but, as it were, in the spirit of team-work for the sake of perpetuating their historical in¬ heritance and with a distinct ambition to trans¬ mit as best they can the essential intellectual and spiritual values of the nation and to be a link rich in actual life between past and future of this nation.

Besides the municipal schools which to-day together with the state schools constitute the bulk of the schools of the higher order, there existed early in the Middle Ages schools of high reputation founded bv some ecclesiastical order (cloister — or monastic schools) or by a bishop, generally on the estate of a cathedral (dom- or kathedral-schule) . Schul-pforta, a monastic foundation whose impressive build¬ ings, half-way between Leipzig and Jena just north of the Thuringian hills, date back as far as the 12th century, became a model of the humanistic gymnasium during the first half of the 16th century (charter 21 May 1543), and has since remained an educational institution of highest quality. Schul-pforta, from the very beginning an endowed school, still receives its pupils after a special entrance examination (into lower tertia, there being no sexta quinta and quarta courses) and upon the recommenda¬ tion of other schools in which the pupils ex¬ celled in scholarship. Other schools are the Kloterschule-Ilfeld, the Fuertenschulen Meissen and Grimma in Saxony (1520), Thomas-Schule, Leipzig, founded a.d. 1212, and the Fulda- Gymnasium, founded in the 8th century. To most of these schools even parents of modest circumstances may send their sons ; their exclusiveness, which sometimes has been re¬ ferred to, excludes only candidates who give little promise as to (special) excellence in scholarship. Inasmuch as many of the

nation's pedagogues and head-masters graduated from these endowed schools the influence of this type of schools has not been confined to their

own group merely. Apart from these forces of tradition, one great value of the present lies in the remoteness of most of these schools from modern city turmoil and its unavoidable disturbing effects upon city school-life ; another distinct advantage is the assuredness of their time-tested environment safeguarding the per¬ petuation of a healthy and steady intellectual atmosphere combined with all the stimulants of a self-sufficing and often economically self- supporting community life of their own. Like elsewhere, supervision by the state is a guaranty that the needs of modern life will not be seriously neglected. (It is in school communi¬ ties like that of schul-pforta, or joachimsthal, recently transferred from Berlin to Templin, where the ideals of all schools of the higher order, i.e., the training of the nation's youth toward independent instinct for research work, has been carried out most completely. In the in¬ stance of throwing the German gymnasiast and real-gymnasiast at an early age on the re¬ sources of Lexicon in his home-work in foreign languages, also in the instance of ex¬ pecting from him invariably a sufficient analysis of at least the syntactic elements of his daily texts, we can see some essential steps toward this goal of instruction, toward the spirit of research which later on in the uni¬ versities and in the institutions of technology, agriculture, etc., has to be solely depended upon). Naturally, in schools of the boarding- school type (schul-pforta) much room can be made for independent reading, especially for the development of taste for literature. An¬ other trait which should not be overlooked in a sketch of the essential features of this Ger¬ man educational system is that the departmental activities of the school are deliberately brought into mutual relation. Inasmuch as there is no¬ where in the curriculum of the schools a sud¬ den breaking off, all subjects being carried into the ninth course (absence of the credit-system for preliminary or intermediate work), such bringing into correlation of the various branches of instruction is, of course, made much easier, e.g., instruction in history, which nowhere stops short of an adjoining field, comprises the en¬ tire history of Europe and the entire history of the Hellenic Age and of Rome, and in covering these fields seeks to be supplemented and aided from the realm of studies going on parallel to it and vice-versa. Geography, al¬ most invariably in the hands of the teacher of history, is most obviously a supplementary sub¬ ject of this kind, but the most extended use made in this direction of bringing out col¬ lectively the diversified values of school in¬ struction has been composition work in the native language. A perusal of the new order for schools of the higher order issued in 1892 will show

plainly the emphasis laid on this kind of concerted activity of departmental instruc¬ tion. Thus, the encouragement of the spirit of research leading ultimately to an increase of what has been termed <(problem-solving-ability® is a matter not of casual occurrence — though naturally conditions as well as results must vary — but it is an integral part of the school's duty toward the nation and accord¬ ingly felt as such, i.e., as equally essential a goal to be reached as would be that primary object of all teaching, namely, the imparting of information.

Organization. — With every respect which is due to tradition and habit the question must be raised : Which are the chief conditions

guaranteeing the actual working of such sys¬ tem of schooling, in fact on what ground, in the face of so much variety in aims and forms, is the term system® applicable? In a country which has no central bureau of education, no board ruling over college entrance require¬ ments, in which none of the 26 federal states interferes to the slightest degree with the in¬ ternal affairs of other states, such as happen to be matters of public instruction, it is indeed surprising to find an almost universal accept¬ ance of at least the main principles which have been referred to in this article. The most exhaustive cause (explanation) is found in the leveling influence of the German university idea. All standardization is derived from the latter. This refers to the training of the nation's teaching staff as well as to the spirit in which the individual governmental authori¬ ties conceive their duty of administration, namely, as in inseparable conjunction with their duty toward all educational institutions of the nation.

Some of the chief functions of the govern¬ mental authorities are to produce the best pos¬ sible conditions for the training of the teaching staff, to assist those who have obtained the <(facultas docendi® in keeping in touch with the larger world of research in spite of their having entered upon the narrow routine work of school instruction. This is partly accomplished by providing scholarships at fair intervals for at¬ tending extension courses at the universities or even by giving leave of absence for a semester's sojourn in a foreign country, especially Greece, Italy, England and. France. An essential func¬ tion of the state is to secure for its teacher a maximum of material independence including the case of voluntary retirement. ((A good- sized pension, generally 75 or 85 per cent of his regular salary, relieves him of the fear of having to spend his old age in poverty . . .

he does not need to curry favor with his supe¬ riors, much less with the citizens of the com¬ munity, and in case of sickness or other mis¬ fortunes he does not have to use up his strength to the point of exhaustion from fear that he may lose his position® (United States Bureau of Education, Bulletin No. 24, 1913, ((A com¬ parison, of Public Education in Germany and in the United States, by George Kerschensteiner. Director of the Schools of Munich-Bavaria,® page 9). Naturally a system with a teaching staff drawn from the high plane of academic aspirations must be expected

to have produced at certain times teachers who felt aloof from the youth and its still undeveloped taste for learning. There is, however, a noticeable change in recent years, partly due again to the faithful, carrying out of the suggestions laid down in the Regulations of 1892 mentioned above. <(There is a constant decrease of the former distance between teacher and youth, and a constant increase of mutual appreciation be¬ tween both teacher and youth® ((Unterrichts- und Erziehungswesen Gross-Berlins, ed. by Wilhelm Muench, Berlin, 1912, page 109). A further task of the highest central bodies (indi¬ vidual federal officials) directing the educational affairs of the nation consists in the co-operation with the intermediate authorities as are for*

instance in Prussia the <(Provincial-Schul-Kol- legian® (provincial school boards), in Ba¬ varia the (

Bibliography. — (Education in Germany,) a reprint of the article on the German educa¬ tional system from Volume III of the Cyclo¬

paedia of Education, > edited by Paul Monroe (New York 1912) ; (The Higher Girls' Schools of Prussia, } by C. Wm. Prettyman, Foreign Research Grant Report No. 1, Teachers' Col¬ lege, Columbia University (New York 1911) ; (German Education, Past and Present, by Friedrich Paulsen (trans. by Th. Lorenz, New York 1908).*

Dr. K. O. Bertling,

Amerika Institut Berlin, Department of Edu¬ cation.

13. GERMAN PAINTING. The only re¬ mains of German painting during the early Middle Ages are to be found in text illustra¬ tions in old manuscripts. Much study has been given to this subject in recent years and clever deductions have been made as to the style of painting, now unhappily lost but contemporary with these illustrations. On the whole, how¬ ever, the two arts are too different to permit of definite conclusions. The first historical ref¬ erence to a German painter is contained in the recognition bestowed by Emperor Charles IV on Nicolaus Wurmser, in 1359. Soon after also Theoderich of Prague is mentioned. A set of religious pictures in Castle Carlstein is cus¬ tomarily assigned to these men. The drafts¬ manship is good, while the technique of paint¬ ing is poor. In conception they reveal two points for which the whole of early German art is known: (1) A peculiar tenderness of thought, and (2) a close observation of some characteristic details of nature. Contemporary with these two

artists working in Bohemia was Meister Wilhelm of Cologne, by all odds the strongest artistic personality of his time, of whose works only fragments remain in the city hall of Cologne. Many pictures, however, are extant by what is called his school, and all are characterized by great winsomeness. The love with which they were painted is unmistakable. In contrast with their Italian contemporaries, the German artists were little interested in studied abstract principles of technique. Per¬ spective in general was known to them, but it never occurred to them to make the technique of the picture its main feature. On the con¬ trary the main appeal of all German pictures was not to the intellect, but to the emotions. From this fact springs another defect noted in early German art by those familiar with the best in Italian art, namely its lack of dramatic force. The best preserved work of this period is the altar piece in the cathedral of Cologne by Meister Stephan. With the exception of this panel of the Annunciation, Meister Stephan contented himself with painting noble figures on a flat background, unconcerned about visualizing the actions which he endeav¬ ored to portray. The figures themselves are undoubtedly influenced, if not actually copied from the mystery plays (mysterien-spiele) which were very popular in Germany at that time. One result of this is that the characters are all humanly near to the spectator. During the 15th and 16th centuries it was not Italian art, as one would have expected, which strongly influenced German art, but the art of the Neth¬ erlands. This was due to the strong ties of race and propinquity. Nor do the extant pic¬ tures permit, as is possible in Italian art, the study of the gradual advance from early en¬ deavors through faithful application to per¬ fection. The transition from the half-crude

pictures of the early Germans to the almost perfect work of Holbein, Differ, and Cranach is incredibly swift, and only few intervening personalities stand out with sufficient clearness. Martin Schongauer (1446-88) is one of them, and he has been called the first really great Ger¬ man painter. Although few of his pictures have been preserved his greatness is attested to by his wonderful engravings. In him the leahstic tendencies of his predecessors were coupled with a delicate sense of the ideal. Hans Holbein the Elder (1460-1524), whose reputa¬ tion has suffered by the fame of his younger namesake, belonged like Schongauer to the southern German school. He was especially successful in catching convincing poses and facial expressions and being a good drafts¬ man, painted pictures which can hold their own by the side of those of the High Renais¬ sance in Italy. Characteristic of him was a sense of the ornamental, and a telling use of architectural forms in his pictures. His son, Hans Holbein the Younger

(1497-1543) sur¬ passed him to such an extent that the younger Holbein is justly ranked among the world's greatest painters. He had inherited from his father a clear eye for things as they are and the gift of selecting essentials. In addition he had the rare power of indicating, by never a line that overshot its mark, the spiritual atti¬ tude of his subject. This made him one of the greatest portrait painters of all times. He trav¬ eled extensively, knew the art of all countries, but remained faithful to his one great teacher, nature herself. He enjoyed great popularity in all countries and painted, among others, some of the most important personages in Great Britain. Albrecht Durer (1471-1528) was the equal of Holbein in artistic achieve¬ ment, but in everything else fundamentally dif¬ ferent. While the latter was objective, cool and observant, Durer was fervently imagina¬ tive. Efolbein knew how to efface his own per¬ sonality. The personality of Durer, conscien¬ tious, fervent, thoughtful and inspiring, is everywhere apparent. Unlike Holbein, whose interest in nature was confined to animate na¬ ture, Durer loved plants and rocks and water equally well. The whole world in fact was his. He visited Italy twice. After his first visit he tried to copy the exquisite beauty of line of the Florentines!. After his second visit, the rich color of the Venetians had greater inter¬ est for him. He was, however, no slavish imi¬ tator, and throughout remained distinctly Ger¬ man. Some critics, therefore, miss in him <(that largeness which seemed native to his Italian contemporaries,® and find fault with (

Unlike the three great men just mentioned their successors were unable to continue the study of Italian art, begun by them, without becoming enslaved by it. Slavish imitation is incompatible with great achievements. In the world at large Italian art was all powerful, and Holbein, Differ and Cranach were soon for¬ gotten. The remarkable spectacle is therefore offered of a whole nation turning, as it were, a8ˆinst the achievements of its own great men rniT the example of another people.

1 he 17th and 18th centuries in German paint¬ ing constitute in Germany as well as in Italy the age of the imitators. Among the best- known German painters of this period are Adam Elzheimer (1574-1620), Balthasar Den-Voni\ (1ˆ85-1749), Daniel Chodwiecki (1726- 1801), the painter of the period of Frederick the Great, Anton Graff (1736-1815), and the decorative painter Daniel Gran (1694-1757). Toward the end of the 18th century a reaction set in against the imitation of the Italian Renaissance and its excesses. Coinciding with a renewed interest in the classics and a renewed study of the culture of Rome and of Greece, this period is frequently called the Classical Revival. Anton Raphael Mengs (1728-79), Asmus Jacob Carstens (1754— 98) and Angelica Kauffmann (1741-1807) are the best known ar¬ tists of this period. The early 19th century was characterized by the same interest in the classics, and since classical art had to be studied from extant statutes, i.e., lines rather than

color, the classicists laid the emphasis upon draftsmanship, and at times actually spurned color, or at best regarded it as a necessary evil Genelli (1798-1868), Preller (1804-78), who tried to revive the ancient world in his pictures of the Odyssey, and Rottmann (1797-1850) are the chief exponents of this tendency. They painted also huge landscapes, peopling them with the heroes of antiquity, and lived alto¬ gether in an imaginaiy world of classical style. It was natural that a reversion of feeling should soon take place. This made itself felt even before the classical style had run its course. A double opposition rose against the classicists, first the opposition of those who be¬ lieved the classicists to be of pagan spirit. These men, who loved to paint scenes from the life of Christ, are called Nazarites, were joined by those who wished to have rich colors in their paintings rather than mere line. These latter are called Romanticists, because the rich and vivid imagination of the colorist is ever ready to forsake the realities of life for the quest of romantic subjects. The best known Nazarites and Romanticists are Cornelius (1783-1867), Wilhelm von Kaulbach (1805-47), Friederich Overbeck (1789-1869), and Schnorr von Carols f eld (1794-1872). Other good names, well known in many German households, are Rethel (1816-59), von Swind (1804—71), Lud¬ wig Richter (1803-84), and Baron von Blom- berg (1820-71). As the natural result of the conflicting art ideals of the Classicists on the one hand and the Nazarites and the Romanti¬ cists on the other hand, there was an increased interest noticeable all over Germany in the technical questions concerning art. Art schools of special prominence appeared in Diisseldorf, Munich, Berlin and Hamburg. The most fa¬ mous schools frequented also by many for¬ eigners, among them notable Americans, were

those of Munich and Diisseldorf, where such well-known American artists as Duveneck, Chase, and Ennecking received their instruc¬ tion. Friederich Wilhelm von Schadow (1789- 1862) has been called the father of the Diisseldorf School. He succeeded Cornelius as the director of the Academy and became bet¬ ter known as a teacher than as an executing painter. He was the first man in Germany to lay emphasis on a sound technique and to op¬ pose all the weight of his great influence to the erroneous notions that since the what of a picture was of greater importance than the how , the how mattered little. He rightly understood that without technique even the most conspicuous artistic gifts would fall short of accomplishing artistic successes. His teaching was especially needful in Germany at that time because many German painters in their eager quest for the ideas had utterly neglected the ac¬ quisition of a sound technique. Three classes of pictures were especially cultivated in Diisseldorf : Landscapes, historical

and romantic incidents, genre. Andreas Achenbach (b. 1815) was well known for his landscapes; Karl Friederich Less¬ ing (1808-80) won fame in both landscapes and historical paintings ; while Ludwig Knaus (1829) gained universal popularity with his genre pictures and occasional excursions into the religious genre. Benjamin Vautier (1829- 98), Wilhelm Camphausen (1818-85), and Adolf Schrbdter (1805-75) are among the many other well-known artists of this school. Of the early Munich school it suffices to name Heinrich Biirkel (1802-69), H. M. von Hess (1798-1863), Christian Morgenstern (1805-67), and August Riedel (1802-83). In Hamburg Philipp Otto Runge (1777-1810) stood head and shoulders above his colleagues ; while in Berlin Franz Kruger (1797-1857) became known for his portraits and pictures of horses, and Karl Eduard Blechen (1798-1840) was the first to anticipate to some extent the phases of tech¬ nique which were destined to become all absorb¬ ing during the latter half of the 19th century. He alone, for instance, at that early day con¬ ceived as beautiful the motive of thin blue smoke escaping from a factory chimney into the soft air of evening. Early in the 19th century a remarkable change took place, and in common with artists the world over, the German painters had their eyes opened to the charms of color, after they, the countrymen of Holbein, had been unconscious of it for cen¬ turies. This change in Germany can be defi¬ nitely traced to the influence of Belgian art, especially the works of Gallait and Biefve, whose gorgeous use of color and realism in composition made the beholders forget their theatrical exaggeration which to-day is most apparent. The new ideas took the strongest hold in Munich, with Karl von Piloty (1826- 86) as protagonist. His success in Germany was instantaneous. He was hailed as the prophet of a new art, and in their enthusiasm his con¬ temporaries overlooked the fact that his figures were often posed for effect and that he fre¬ quently forgot the truth of actual occurrences. Hans Makart (1840-84) was Piloty's most famous pupil. He and his art has been suc¬ cinctly described as follows : ((Surrounded with wealth and luxury, and worshipped al¬ most like a god by his contemporaries, he poured forth with incredible velocity the most

sensuously beautiful symphonies of color that had issued from the brush of an artist. For values in the modern sense of the word he had no eye. The slow and thoughtful art of Whist¬ ler he would not have understood. His colors were many and rich ; they were meant to win admiration by storm, and had no message for those who love to think and dream over a pic¬ ture. Makart died a young man, rushing through life, a meteor on the art heaven of Germany.® To a certain extent Makart was an individualist, which permits one to group him with the other great German individualists, Bocklin, Feuerbach, Klinger, and Marees. "These four great men are alike only in their general attitude toward art. They hated im¬ pressionism —

ˆtranscribing nature as you pass along" — and believed that <(art is a speech of emotions. Where words fail, art begins.® Anselm Feuerbach (1829-80) preferred the antique, but unlike the classicists he based his art on emotional rather than intellectual studies. His masterpiece is a picture of Iphigenia — ((her yearning soul in search of Greece and home.® Here the soberness of his style is in perfect harmony with the simplicity of his subject. His very soberness,- however, prevented him from winning the success which he so richly deserved, and his reputation is posthumous.- In this respect Arnold Bocklin (1827-1901), a native Swiss, was far more fortunate; for he lived to see himself acclaimed by admiring na¬ tions as the greatest artist of all. His short¬ comings, due in part to his disregard of the correct anatomy of the human body, and often hasty drawing, were forgotten over the sensuous beauty and rich imagery of his compositions. His pictures are fairy tales, and Germany has ever been the home of such tales. This accounts for his enormous popularity. Trees, figures and poses, which in themselves may have been unreal, become real in the setting Bocklin gave them. Max Klinger (b. 1857) is the youngest and most versatile of this group of artists, and is as well known as a sculptor as a painter. Unlike the others he takes pleasure in solving technical problems, and often sets himself tasks which by their stupendousness would frighten lesser men. His portrait of Beethoven, while not faultless, is the most gorgeous at¬ tempt at portraying superhuman qualities ever made. Unlike Klinger, Hans von Marees (1837- 87) refuses to freight his figures with the depths of thought. On the contrary, it has been said of his graceful and correctly modeled figures that ((they mean nothing, are not intended to mean anything, and are content with merely existing.® Their very existence, however, gen¬ erally nude in simple landscapes fills the be¬ holder with an inexpressible delight, if for no other reason than that ((a thing of beauty is a joy forever.® Because of his great accuracy in draftsmanship one may be tempted to claim Marees as. one of the so-called Realists, from whom choice of subject rather than technique differentiates him. The pioneer Realist of Ger- many, if not of the world, and certainly an acknowledged master everywhere, was Wilhelm Leibl (1846-1900). He held that life properly studied is more interesting than dreams about it, and confined himself to observing and accu¬ rately transcribing life. To be successful such an. art needs a masterful technique, and this Leibl possessed as few men before him or

alter him There are, however, limitations to the art of painting in so far as it is capable of accurately reproducing life, and these limi¬ tations are the limitations of Leibl. Judging by his art he never wished anything greater nor

aspired to anything higher than what could be clearly perceived by- the sense of sight and be accurately reproduced with the colors on the artist's palet. A greater man than Leibl was Adolf von Menzel (1815-1904), who was one of the most versatile of artists. Realist, to a certain extent he was at the same time the first impressionist of all, for long before the famous Frenchmen became interested in the play of light and what has been called ((values ,® he had grown interested in and solved many of the difficult problems of light and shade. In one of his most famous pictures, (The Factory Forge, > he brought order out of a seemingly hopeless chaos, and proved himself a technician second to none. Among the many portrait painters of the second half of the 19th century by far the most famous is Franz von Lenbach (1836), whose (Bismarck, ; are known the world over as among the strongest portraits ever penned. He was less successful in the portraiture of women, having to yield the palm in this field to Fried- erich August von Kaulbach (b. 1850). Well known in Germany, although of a lesser inter¬ national reputation, are Franz Defregger (b. 1835), who delights in pictures of the Tyrolean peasant life; Eduard von Gebhardt (b. 1838) whose religious pictures can be seen in many households ; and Munkacsy, whose real name was Michael Lieb (1846-1900), whose pictures displayed great pathos and glowed in rich colors. He was a native of Hungary. The «Open Air Art,® which was all prevalent in France during the latter half of the 19th century, found its chief exponent in Germany in Max Liebermann (b. 1849), and in a long list of artists, generally grouped together as ˆSecessionists.® It is un¬ deniable that this ((Open Air® style gave an impetus to art and to individuality in art un¬ like anything that had preceded it, and that it created an interest in painting in the public mind which was most stimulating and helpful to the artists themselves. The end of the 19th century, therefore, and the early part of the 20th saw a revival of art in Germany, and a wealth of talent, which only a later generation will be able to judge and classify according to its desert. Scarbina, Stuck, Thoma, Uhde, Leistikow, Mackensen, Modersohn, Vogeler, Pepino, Fritz Overbeck are only some of the names which it seems certain will survive from the great number of executing artists busy in almost every corner of Germany.

Bibliography.— Forster, (Geschichte der deutschen KunsP ; Knackfuss, H., Zimmermann, Max, Gg., and Gensel, W., (Leipzig 1903) ; von Mach, E., (Out- lines of the History of Painting (1906); Muther, R., (History of Modern Painting> (1907) ; (Die Deutsche Jahrhundert-Austellung Berlin 1906) (Munchen 1906).*

Edmund von Mach,

Author of (Outlines of the History of Paint¬ ing ; (The Art of Painting in the Nineteenth Century . **

14. GERMAN SCULPTURE. Ge rman sculpture as an independent art appears for

the first time during the 11th century in the shape of small statuettes and reliefs, or in the decoration of large bronze work, such as the Bronze Column of Hildesheim, surrounded by a sculptural frieze, or the entrance gates of the cathedrals of Hildesheim, Augsburg and elsewhere. The style of all these figures is crude in the extreme. The heads are dispro¬ portionately large, the eyes staring, and the bodies exaggerated, which makes them at the same time heavy and weak. It almost seems as if sculpture was resorted to, not because there were sculptors in Germany who had a message to deliver, but because it had become the fashion in other parts of the world to have sculptured decoration. This state of affairs does not materially alter, although there were occasionally better works created, until the reli¬ gious enthusiasm which culminated in the Ro¬ manesque style of architecture, kindled also the plastic genius of the people. The earliest fruit of the new spirit has survived in the magnificent sculptures of the Externsteinen on the northeast slope of the Teutoburg Forest.

The Externsteinen is a group of sandstone cliffs the largest of which rise like giant teeth to a height of from 100 to 150 feet above the parklike surrounding. Steps have been cut in two of them, and from their top a magnificent view is to be had. In the westerly of these two (< teeth ® a grotto has been cut. A Latin inscription here of the year 1115 states that Bishop Heinrich of Paderborn dedicated the grotto as a funeral chapel. At the entrance a large relief, about 16 feet high by 11 feet wide, has been cut in the face of the cliff, repre¬ senting the descent from the cross, with God the Father above and Adam and Eve below. The figures have suffered much by the ravages of the weather, but the truly artistic grouping and the sincerity of the whole conception are unmistakable. The very style appears to be demanded and to be determined by the loca¬ tion of the monument. This remained a char¬ acteristic of all German sculpture of the Middle Ages. Roughly speaking, it did not exist for itself alone, but merely in connection with archi¬ tecture. Its early uncouthness and ignorance of true form, however, soon disappeared, and as early as the first part of the 13th century real life permeated the works of German sculp¬ ture which had. dedicated itself to the service and to the embellishment of monumental struc¬ tures. The first notable achievements, of which we know, belong to the Saxon school, and of these the most famous is the so-called golden gate of the cathedral of Freiberg. <(Golden® only figuratively in the sense of valuable, for the figures are all cut out of ordinary stone. Almost, equally as well known are the interior decorations of the cathedral of Wechselburg, the chancel and the altar, most especially the crucifix, the cathedral of

Naumburg, the me¬ morial monuments of Heinrich der Lowe and his wife in Brunswick, and the southeast portal of the cathedral of Bamberg (dating from 1250) offer other instances of this art. Bronze sculp¬ ture, with its unique demands on technique, flourished to the same extent, largely in smaller articles such as baptismal fonts and the like, but occasionally rose, to such masterpieces as the Lion of Brunswick, an exact replica of which was presented some years ago by the

Duke of Brunswick to the Germanic Museum of Harvard University. Bronze doors from this period, for instance those in Gnesen, are also extant. When Gothic architecture sup¬ planted the Romanesque style, new and rich opportunities were offered to the sculptors, and they availed themselves of them to the fullest extent. The figures became imbued with ever varying energy and vivacity, and the earlier squatness of the body gave way to a slender¬ ness, sometimes exaggerated, but often seem¬ ingly demanded by the style of the architecture. The facial expression unfortunately overstepped not infrequently the bonds of sentiment and became sentimental or morbid. Excellent in¬ stances of. the best of this Gothic sculpture can be found in Freiburg, Strassburg and Wetzlar. By the middle of the 14th century German sculpture, while still closely allied with archi¬ tecture, had won its place as an independent art. No longer restricted to simple forms or ideas, it charms by the richness of its imagery and astounds. by the perfection of its technique. This phase is best studied in the numerous churches of Niirnberg. In Niirnberg also is one of the earliest examples of independent monumental German sculpture, in the shape of the Fountain, known even to-day as the Beautiful Fountain. It is, however, very not¬ able that this monument also is designed ac¬ cording to the prevailing cathedral style of architecture, the main shaft of the Fountain representing a cathedral spire. Only gradually the complete emancipation of sculpture from the overlordship of architecture took place. The first indications of this are to be found in the funeral monuments, often of stone, but more frequently of bronze, which during the 14th century were ordered in ever larger num¬ bers by wealthy patrons. When this took place, quite naturally the individuality of the artists began to have a freer scope, and individual artists became known in their own times, and were remembered by their works bv later generations. In the hands of these individual artists, German sculpture freed itself entirely from the bonds which the subordination to the greater sister art of architecture had cast over it, and every vestige of the conventional gave way to the often passionate longing of the individual artists for unique expression. At first the best German achievements were made not in stone or in bronze, but in

wood. In Swabia two men of the name of Syrlin, of Ulm, were masters in this art. Hans Decker and Veit Stoss in Niirnberg, and in the same city the unknown artist of the famous statue of The Sad Virgin, rivaled with Dill Riemen- schneider of Wurzburg. Among the sculptors in stone of this period Adam Krafft is best known, while in bronze sculpture the Vischer family of Niirnberg stands unsurpassed. Of this family Peter Vischer is undoubtedly the most famous. Great as were these men they were unable to have their art and the greater freedom permeating it supplant the earlier art entirely. This, it has been claimed, was due to the stonecutters' unions who were unwilling to discard their standards, instruments, and measurements based on the requirements of an earlier style. In the northern part of Ger¬ many, which is poor in stone, there were no stonecutters' unions or establishments, and it is here, therefore, where the new art, especially

of wood carving, unobstructed by conservative and selfish adherence to antiquated standards, gained its supreme success. Splendid examples of this northern sculpture are to be found in the cathedral of Schleswig (Bruggemann's altar), in the Marienkirche in Liibeck, and in Calcar, Kolti and Xanten. With the first fore¬ runners of the Reformation and the consequent changes in social conditions, loosening the tyranny of the unions, in common with the tyranny in other spheres, sculpture became a free art like painting, and boldly took its place as such. Italian art was at that time all power¬ ful in Europe, having undoubtedly achieved the greatest success of the arts of the civilized countries. It was the age of the imitators, and most of the German sculptors espoused Italian ideals with almost passionate eagerness. The only patrons of importance of the arts continued to be the princes, and at their courts unfortu¬ nately foreign artists often were preferred to the native talent. This lessened the opportuni¬ ties, and where opportunities are few, art has never been able to accomplish its possible best. What this best might have been appears from the magnificent monument to Elector Moritz in Freiberg, and the still more famous monu¬ ment to the Emperor Maximilian in Innsbruck. With the outbreak of the Thirty Years' War the terrible conditions of the country called a cruel halt to the progress of the art of sculpture. Faint revivals took place toward the end of the 17th century, in the north under Dutch influ¬ ence, and in the south under the continued in¬ fluence of Italy. Austria had suffered less by the ravages of the war than the rest of Germany. It was here, therefore, and in the neighboring Bavaria, that the revival was the earliest. Architecture again called sculpture to her service. The Gothic style had disap¬ peared long ago, and the baroque style with its bold exaggerations of form ruled the day. This was reflected in the sister art, and while a certain grandeur of conception and joy in execution are unmistakable, still the baroque style is so alien to the taste of the early 20th century that neither the buildings nor the sculp¬ tures of this period

have much of a message to bring to the people of to-day. There are exceptions, and among these Schliiter's colossal statue of the Great Elector in Berlin deserves attention. Other sculptors of equal excellence with Schliiter were Grupello in Diisseldorf, Peter Wagner, and Raphael Donner in Vienna. During the 18th century the influence of France gained ascendancy over the minds of the edu¬ cated classes in Germany by leaps and bounds, and since in France at that time a shallow classicism, coupled with mannerism, prevailed, it was inevitable that the same tendencies should make themselves felt also in German sculpture. The general slavish imitation of French tastes at that time is less surprising than the occa¬ sional perseverance in sound principles of art which is shown in the art of some of the Ger¬ man sculptors of this time. Among them may be mentioned Alexander Trippel in Weimar, Johann Heinrich von Dannecker of Stuttgart, whose Ariadne5 in Frankfurt-on-the-Main is justly classed among the famous statues of the world, Gottfried von Schadow and Christian Daniel Rauch, both of Berlin. The most famous statue of the latter is his (Friederich Der Grosse) in Berlin, which unfortunately

% :H|1

GERMANY

The Gutenberg Monument, Frankfort

563

GERMANY — GERMAN SCULPTURE (14)

suffers by the small scale in which it has been executed in bronze. This design demands a heroic presentation. A promising school of portrait sculpture flourished for a time in Dres¬ den, with Ernst Julius Hahnel (statue of Raphael) and Ernst Rietschel . (statue of Less¬ ing). Both artists successfully freed them¬ selves from the thraldom of (

A younger man than these two, Ludwig Schwantaler was the favorite sculptor of King Ludwig II of Bavaria, the patron of Wagner, and builder of fantastically beautiful castles, fitting into the magnificent scenery of his na¬ tive Bavaria. Schwantaler's sculpture, partly theatrical, partly really grand, is a product of the exotic conditions flourishing under the rule of that fantastic king. His largest and best- known work is his colossal statue in Miinchen. As a national monument this statue ranks second only to the Hermann Monument high up on the northern cliff of the Teutoburg Forest, by Ernst von Bandel, erected to com¬ memorate the final union of the several German tribes in the new German Empire. Subject and location combine to give this monument a unique place. As a work of art, however,

it is far surpassed by the ultra-modern (Bis¬ marck } in Hamburg, by Lederer. Raised on a bold platform, with legs apart, bare-headed, garbed in the armor of a knight, the national hero, Bismarck, stands like Roland of old, with his sword ready to protect, at all times, the empire he helped to build. Designs for the proposed Hamburg monument were submitted

during the first year of the%20th century; and by a strange coincidence this very year marked also the beginning of that series of monuments erected under the auspices of the emperor in the (Sieges- Allee) in the Tiergarten of Berlin. In strong contrast to all the models submitted in Hamburg and especially the one finally selected the Berlin statuary is quiet and refined and almost shrinks from innovations. Only its technique will indicate to future generations the date of its execution; for in later years German sculpture has shown the same mastery of technique which is characteristic of her painting. In the Chicago World's Fair Exhi¬ bition of 1893 Hundrieser's (Sleep } was char¬ acterized as a ((work of rare beauty and tender¬ ness.® It has been acquired for the museum of Saint Louis. Max Baumbach's (Siesta/ the statue of an obese sleeping faun, was said to be a <(triumph of clever marble-cutting.® The same high praise both for conception and masterful execution was bestowed at the World's Fair in Paris in 1900 on Peter Breuer's (Adam and Eve/ while Robert Diez's (The Tempest won admiration with its ((whirling figures of horses and marine monsters.® While Paris, London, Rome and Saint Petersburg have become familiar through international exhibitions with the works of many modern German sculptors, America has had little op¬ portunity to study them. The Exhibition of Contemporary German Art in the Metropoli¬ tan Museum of Fine Arts in New York, Bos¬ ton and elsewhere in 1909 contained only few pieces of sculpture. Cipri Adolf Berman showed his versatility in two heads, one of which, (01d Man's Head/ a bronze, was almost antique in conception and execution, while his beautiful marble head of a woman suggested the fanciful imagery of Rodin. Of the several portrait busts that of (Professor Flossman> by Adolf von Hildebrand (b. 1847) was the strong¬ est and fully explained the great reputation enjoyed by Hildebrand, the ((technician,® as he has been called, (III and (A Stag/ neither of which belonged to his best works. Franz von Stuck, better known as a painter (b. 1863), was represented by three works, the most daring and skilful one of which was his (Athlete/ a study in muscles, one might say. It is char¬ acteristic of modern German art that many men work both in painting and in sculpture.*

Next to von Stuck, if not ahead of him, the best known painter-sculptor is

Max Klinger (b. 1857). He has been attracted by polychrome sculpture, not in the sense of actually painting his statues as did Arthur Strasser (b. 1854) and Rudolf Maison (b. 1848), but to the extent of selecting variously tinted marbles, stones, gold and other precious materials for the several parts of his statues. His (Beethoven and his (Salome * are the best-known instances of this class of his work. In any list of modern Ger¬ man sculptors the name <(Eberhardt® deserves mention. Johann Heinrich Eberhardt (1739- 1813), a sculptor of note, was the father of Konrad (1768-1859) and Franz (1767-1836). Konrad was the most important artist of these three. He spent much time in Rome, where he was almost as popular as Thorwaldsen and Can- ova, so long as he too followed the classical style. Later he forsook the study of the classics and under the influence of the <(Nazarines® con¬ fined himself to religious sculpture, in which branch he did his best work. Serafin Eberhardt (b. 1844), although no relation of the other Eber¬ hardt, followed in the style of Konrad. Gus¬ tav Eberlein (b. 1847) is one of the popular sculptors of the Sieges-Allee in Berlin referred to above. Although a pupil of Gustav Blaser (1813-74) whose animated statuettes are re¬ membered, while his more pretentious eques¬ trian statues and ideal figures are forgotten, Eberlein followed in his own work the pic¬ turesque modeling of Begas. Three distinct periods mark his work; first from 1880 to about 1888, when he was best known for his ((ideal figures® and well-modeled nudes ; second from about 1889 to about 1898, when the deaths of Emperor William I and Emperor Frederick III and the deaths of Bismarck and Moltcke called for large monuments throughout the empire. This is Eberlein's monumental pe¬ riod, and among his best monuments the Em¬ peror William P in Mannheim may be men¬ tioned. His third period began at about 1898, when he began to be interested in <(tragic® motives: (Man's First Sin,* (Adam with Abel's Corpse,* (Joseph of Aramathea holding the Dead Christ,* etc. These works, while greatly admired by some for their masterly modeling, are severely criticized by others for their <(the- atrical poses.® Nobody, however, denies his great genius in designing monumental pieces of sculpture. Owing to his international repu¬ tation along these lines he was chosen by the authorities of Buenos Aires to design and erect a national monument of the Argentine Republic. Of other well-known names it may suffice to mention Anton Ritter von Fernkorn (1813— 78), a pupil of Schwanthaler, who settled in Vienna and whose many works mark a distinct epoch in the history of sculpture in Austria ; Friederich Tieck (1776-1851), whose decora¬ tions for the Schauspielhaus in Berlin and por¬ trait busts are best known; August Kiss (1802- 65), whose beautiful and daring composition of a mounted Amazon fighting a panther adorns one side of the entrance to the Old Museum of Berlin, while the (Lion Hunter* by Albert Wolf (1814—92) adorns the other side;*

Friederich Drake (1805-82), whose statue of Frederick William III in the Tiergarten of Berlin is famous for its delightful reliefs on the pedestal; Fritz Schaper (b. 1841), whose

admirers acclaim his (Goethe MonumenP as the best of the many erected in Germany; The¬ odor Kalide (1801-63), the creator of the first modern statue of a Bacchante, full of life and daring; Adolf Donndorf, a pupil of Riet- schel and popular sculptor of Bismarck busts; Viktor Tilgner (1844-96), the ((father of realistic sculpture in Austria® ; Kaspar Zum- busch (b. 1830), whose (Maria Theresia and (Field Marshal Radetzky* decorate Vienna; Ed¬ mund Hellmer (b. 1850), whose Goethe Monu¬ ment is likewise in Vienna; Wilhelm Ruemann (b. 1850), famous for the realistic aspect of life of his nudes; and Erich Hosel (b. 1869) whose (Hun Woman * represents a primitive woman crouching on a horse while a wild storm is sweeping over both her and the horse. The spirit of the statue is akin to the best of the figures of Indians by Dallin and other American artists. Modern German sculpture as a whole deserves praise for masterful technique. This it shares in common with the sculpture of France, America and Italy. In the choice of their subjects, however, the Ger¬ man sculptors are unique, for while the con¬ servatism of most art-loving modern nations limits their sculptors in the range of their sub¬ jects, modern Germany has given her artists carte blanche. Every exhibition is full of new subjects, treated in individual and often daring fashion. Among this output there is undoubt¬ edly much which is bizarre and needs must be of short life. But there is also much which is great, because it is the true and unhampered ex¬ pression of what the artist has dreamed or felt or seen.*

*Consult Kraus, (Real-Encyclopsedie der christlichen Altertiimer) ; Bode, (Geschichte der deutschen Plastik) ; Liibke, (Geschichte der deutschen Kunst) ; Reber, (Geschichte der neue- ren deutschen Kunst.**

Edmund von Mach,

Author of c Outlines of the History of Paint¬ ing' ; cThe Art of Painting in the Nine¬ teenth Century* ; cGreek Sculpture, Its Spirit and Principles.**

15. GERMAN ARCHITECTURE. When the Germanic races came in contact with Rome as conquerors German art was born. While Rome had. been victorious on the battlefield her higher civilization and her art had been scorn¬ fully rejected by the people she had made subject to her rule. There are to this day remnants of Roman buildings in Germany but their style has had little or no effect on the development of German architecture. Theodoric the Great, king of the Ostrogoths (455 (or 454)-526), who resided . throughout most of his reign in Ra¬ venna, is the first who consciously endeavored to turn the minds of his people to the art of

architecture, and his well-preserved tomb in Ravenna may be called the first extant Ger¬ manic building of art value. As was natural the plan of the building follows the plans of similar buildings in vogue in Italy at that time, a circular and vaulted central hall. Unique, however, and characteristic of the almost bar¬ baric splendor of the great king, is the huge vault itself, chiseled from , a gigantic monolith. The (

(tongues® ornament, carries a definite reminder of Germanic workmanship: for it was well known to the Germanic peoples while it was never used in distinctly Italian buildings. Great as were the deserts of Theodoric in the interest of German art, they are insignificant compared with those of Charlemagne (742-814). He was the first of the great emperors whose aim it was to develop their own country rather than to cross the Alps and settle there. His artistic inspiration, of course, came from Italy, but not only from Rome, with its treasures of antiquity, but also from Ravenna with its many early Christian churches and the monuments on which Theodoric had breathed the spirit of Germany. One of the best-known instances of the archi¬ tecture under Charles is the chapel of his pal¬ ace in Aix-la-Chapelle, badly altered by later additions, but unmistakably influenced by churches like San Vitale in Ravenna and the so-called old cathedral of Brescia. Otto von Metz is mentioned in history as the architect of the chapel of Aix. If, however, he made any designs for the details, he found at home no men sufficiently trained to execute them ; for columns, windows and other parts of the building were bodily brought across the Alps. The plan of the building is a vaulted octagonal central hall to which are added in the east a rectangular space for the altar, and opposite this another which served as the entrance hall. Above this latter was the seat for the emperor. The final decoration in the shape of marble in¬ crustations and mosaics and iron-wrought balustrades was not added to the building before the time of Otto III (983-1002). The bal¬ ustrades were native work and they surprise by their almost classic beauty and simplicity. The whole building was a revelation to the people, and it is not surprising that it was copied in many parts of Germany, although only the chapel in Ottmarsheim in Alsace has been preserved to this dav. On the whole, how¬ ever, the Aix Chapel was not destined to be¬ come typical for German church architecture.

It happened to represent the less popular of the two styles of early Christian churches, the Central Hall and the Basilica. The former found its finest development in the East, while the West, including the Germanic countries, pre¬ ferred the basilica. With its lofty and spacious main nave and, for

additional space, two or four side aisles, with its raised apse admitting the altar and in front of this the seats for the clergy, with its easy adaptation to an easterly orientation, popular with the Christians, it is not astonishing that the basilica type of church completely satisfied the needs of church builders. This type had been developed in Italy. Under the great Charles and his suc¬ cessors it was destined to become also the distinctly German type — with one notable al¬ teration, the lengthening of the cross aisle (which was frequently interposed between the main nave and the apse). The effect of this was the introduction of the shape of the cross into the ground plan of the buildine. Another innovation, found as early as the Carolingian era, was the extension of the choir (the space in front of the altar), which lengthened the lines beyond the cross aisle, and thus mate¬ rially helped to give to the ground plan the shape of the cross. The cross was the symbol of the Church, and symbolism was destined to

play an important part in the whole of early German architecture. In the Italian prototype the choir and the apse had been but slightly raised. In the German churches they were raised considerably, and beneath them crypts were built. Frequently the German churches were dedicated to more than one saint or martyr, and in that case additional choirs be¬ came a necessity. Instances of such churches are found in Fulda, in Cologne (the old cathe¬ dral), and in Saint Gall. While the latter church has been destroyed, the original plans, not only for the church, but for the whole monastery, are extant. They were sent to the Abbot Gozbert by an unknown friend about 820, and thus permit the detailed study of Ger¬ man architecture at that time.

Charlemagne was the last important inter¬ nationalist, ruling like the old emperors of Rome, not only over his own people but also over the whole western civilized world. His successors were unable to maintain their power; great changes took place in the world; and when the next great emperor, Otto I (936- 973) ordered the emperor's crown to be placed on his head, he was a national ruler, holding sway, himself and his successors, in their native Germany and only occasionally also in con¬ quered Italy. Germany as well as France had become distinct nationalities, each with a well- defined national consciousness. This is the first characteristic of the. ensuing art. Another is the result of the submission of the individual to the doctrines of the Church. It was the age of the Crusades, of blood shed copiously and exultantly in the service of the Lord of Peace. It was the great age of contradictions, of splendid edifices housing men and women who had dedicated their lives to poverty; of humility toward God and their fellow-men; of contempt for worldly goods but devotion to the finest that art could give. Art in any age depends on man's relation to nature. The

ancient Greeks and Romans had loved her, and this had shown in their art. In the Middle Ages reli¬ gion attempted to draw man's thoughts away from nature. Saint Augustine exclaimed that God can be known only to the extent to which He is loved. The love of God and of the saints is at the bottom of German church-architecture of the Middle Ages, which can be understood and appreciated only from this point of view. At first the technical knowledge at the disposal of the architects was insufficient to accomplish their, aims, but when the principles underlying Gothic architecture had freed artists from the demands made by the weight of the material in which they built, the structures they erected were the adequate expression of man's yearning for God and His Heaven. Living in nature, the mediaeval architects had to borrow their forms from nature. But it was not the simi¬ larity of these forms to nature, but their ability to express ideas and emotions which counted. The so-called Romanesque architecture is a Germanic product, springing up during the Middle Ages independently in every country where Germans lived or where the admixture of Germanic blood was very strong, as in the northern part of France, in Normandy, Bur¬ gundy, Lombardy and England. The ground plan of the Romanesque churches was practi¬ cally the. same as that of the modified basilica as used in Germany. Secular and ecclesiastic

princes vied with each other in the erection of costly and huge buildings. Cologne had her art-loving Archbishop Bruno, the brother of Emperor Otto I. Heinrich II did most for Regensburg and Bamberg; Conrad II for Lim¬ burg and Spires; Henry III for Goslar; while Henry IV ordered a new cathedral for Spires. Among the art-loving princes of the Church, Bernward von Hildesheim, Poppo von Stablo, Benno von Osnabriick, Adalbert von Bremen and Otto von Bamberg are the most famous.

Instances of the early Romanesque style dur¬ ing the 10th century are to be found in Reich- enau, Quedlingburg, Gernrode and Paderborn. These buildings are heavy in appearance, being far more massive than structural necessity de¬ mands. Everywhere the artist is the slave of his material. During the 11th century greater freedom was obtained, at first in Lower Saxony and soon everywhere. The Michaels- kirche in Hildesheim (dedicated in 1033) is a basilica with a flat ceiling. Other magnificent basilica-like structures are the cathedral of Hildesheim (1061), the abbey-church of Gan- dersheim, the emperor's cathedral in Goslar (dedicated in 1050 and destroyed in 1820), and the palace church in Quedlingburg (1070- 1129). Often columns took the places of pi¬ lasters and great attention was paid to the elevation, as e.g., in the Saint Moritz Church of

Hildesheim (latter half of the 11th century), the monastery church of Hersfeld (1038-1144), and the cathedrals of Minden, Bremen and Paderborn. In the Rhenish provinces the at¬ tempt was sometimes made to attain greater space by combining the ground plans of the basilica, with that of the vaulted central hall, as for instance in Santa Maria of the Capitol in Cologne (1049). On the whole, however, the pure basilica type held its own also there, as in the splendid cathedrals of Mayence (1016), Spires (1030) and Worms (1036), all of which received vaulted ceilings in later days, and in the cathedrals of Wurzburg and Con¬ stance, and the monastery church of Limburg on the Hardt. During the 12th century, when the architects had attained considerable free¬ dom, and the religious fervor, which had been kindled by the Crusades, was reflected in art, the Romanesque style enjoyed a period of un¬ wonted splendor. Vaulted ceilings are the rule, and in loftiness many of the churches erected at this time approach the magnificence of the Gothic style. . It is the great building period, which makes it impossible to mention more than a mere fraction of the finest structures. Among the finest is the cathedral of Limburg on the Lahn (dedicated in 1235), with its seven most imposing steeples. The cathedrals of Soest, Osnabriick, Munster and Paderborn, all in Westphalia, while stately, do not approach the magnificence of the Rhenish churches. Among the Saxon churches those of Paulinzelle, Wecheselburg and Riddaghausen, and the cathedrals of Brunswick (1194) and Naumburg may be mentioned. In the district of Fran¬ conia, the cathedral of Bamberg is the most stately, while along the upper Rhine, where the influence of the technical ability displayed in Burgundy was strongest, the cathedrals of Basel, Zurich and Strassburg are well known. Else¬ where in Germany fine churches were built but few of them deserve mention by the side of those given above. Of the many secular build¬

ings of this period the castles (Burgen) of the knights and the palaces of the princes (e.g., the emperor's house in Goslar) deserve mention. Long before the Romanesque style had run its course or had exhausted its possibilities, the Gothic style, invented in the neighborhood of Paris during the middle of the 12th century, swept everything before it, first by introducing modifications, and then by completely super¬ seding the Romanesque style. The most not¬ able outward characteristic of the Gothic style is the pointed arch. This is first found in soli¬ tary instances in the church of Saint Gereon in Cologne (1219-27), in the cathedral of Lim¬ burg, mentioned above, and in the monastery church of Heisterbach. Its first use as an integral part of the construction of a German church may be noted in the cathedral of Magde¬ burg (begun in 1207). The Leibfraunkirche in Treves and the Elisabethkirche in Marburg are the first distinctly Gothic German churches. On the upper Rhine the Gothic style made the quickest headway, and the cathedrals of Frei¬ burg and of Strassburg (in part) are its finest

monuments there. In Cologne the cathedral was begun in 1248 in imitation of the cathedral of Amiens. It was, however, left unfinished until the end of the 19th century. In Saxony and elsewhere in Germany the Romanesque and Gothic styles were as first mixed, with an ever stronger emphasis being placed on the Gothic (e.g., the cathedrals of Halberstadt, Meissen and Minden). In 1275 the cathedral of Regensburg was begun, which has been called the finest ex¬ ample of German Gothic architecture. Among the secular buildings of this period the homes of the orders of the knights deserve special mention, and among them again the Marien- burg near Danzig.

The great political disturbances of the 14th century, the decline of the empire, the increase in power of the burghers, and the gradual transition of artistic initiative from the princes, both secular and ecclesiastic, to the wealthy patricians of the many flourishing cities, or to the cities themselves, wrought great changes in the architecture of Germany. The great increase in population of the larger cities de¬ manded larger churches, and hugeness of space rather than artistic perfection was sought for. This led to changes in the ground plan, where the central hall was often preferred. The so-called Luxemburg emperors having displayed great activity in building in Bohemia, it was this section of the empire whence the new style spread. The cathedral of Prague (begun in 1334) became typical for many churches, especially in Bavaria and the whole of Austria! The Theyn-Church in Prague, while retaining the long main nave, omitted the cross nave, and this also became typical for many German churches, for instance, the cathedral of Schwer¬ in and the Marienkirche of Rostock. The huge Stephanskirche in Vienna (begun in 1359) is akin to these churches, as is also the Lam- bertskirche of Munster. In all these churches the greatest attention was paid to the towers and steeples. While at first individual architects are rarely mentioned, their names came into prominence from the 14th century onward, and often whole, families of architects enjoyed T'ePVtaˆon during succeeding generations. The Erwins were natives of Strassburg; and the Parlers of Prague. Ulrich von Ensingen,

who died in 1419, built the tower on the west tagade of the cathedral of Ulm, and carried the north tower of the cathedral of Strassburg rip to the octagonal belfry which was finished in 1439 by Johann Hiiltz of Cologne. Other famous names are Matthaus von Ensingen, Wenzel von Krumau, Hans and Matthaus Bob- lmger, and Hans and Kaspar Kun. The late Gothic, so-called, characterized by great tech¬ nical perfection and a tendency at solving, in the design of the arches and of the vaults, difficult

mathematical problems, prevailed dur¬ ing the 15th century, not so much in building new churches, as in restoring or remodeling old ones. During the latter part of this century the effort is noticeable, especially in secular buildings, to have the Gothic forms create new ones, by more closely approaching nature in their ornamentation, and by supplanting the pointed arch with arbitrary creations of the artist's fancy. A well-known instance of such tendencies is the Albrechtsburg in Meissen. Gradually also the Renaissance style, which had become all powerful in Italy, gained in favor in Germany, where it made its first ap¬ pearance early in the 16th century. When the great religious cleavage took place in Germany, and the Protestants built their own new churches, it was natural that they should prefer also a new style. Thus the great palace church in Torgau is built as a great hall in the Renais¬ sance style. This same style was also preferred for princely residences as in Dresden and Heidelburg (the so-called Otto Heinrich part, built 1556-63) and for town-halls, as in Cologne, Bremen, Augsburg and Regensburg. As the best instance of the High Renaissance the castle of Aschaffenburg may be mentioned. Of German buildings erected at this time by Ital¬ ian artists, the Belvidere in Prague is the best known. Toward the end of the 16th century what is called the ((Baroque® with its fanciful and heavy lines and decorations began to gain favor also in Germany (e.g., the Friedrichs' part of the castle of Heidelberg), but before it could win general acceptance, the Thirty Years' War broke out, and by the misery which followed in its train put an abrupt end to all art endeavors in Germany. When the war was over, and conditions had become more settled toward the end of the 17th century, the religious division of Germany was reflected in the resumption of her artistic endeavors. In the north her art was under the influence of Protestant, Netherlandish artists, and later the Protestant Huguenots. In the south the Catholic Italians were preferred. This latter preference was most natural, because during the war and soon thereafter a great many Italian artists had been at work in Austria, where they had erected among other churches the magnificent cathedral of Salzburg. The Theatine Church in Munich was built by Zuccale, the cathedral of Passau by Antonio Carlone and the Hofkirche in Dresden by Chiavery. In the north, both na¬ tive and foreign architects were at first pri¬ marily interested in finding new forms adapted to Protestant worship. Gradually, however, also here artistic endeavors came into their own, and among the earliest great architects of this new period Korb in Hanover and Starke in Dresden may be mentioned. The latter built the palace in the ((Grossem Garten.® Greater, however, than either of these men was

the architect of the royal castle in Berlin, Andreas Schliiter, a distinct personality in the history of art, with some leanings toward the baroque style. The best-known representatives of this exaggerated style, however,

were to be found in Dresden, where M. D. Poppelmann built the most perfect baroque building known as the <(Zwinger,® and George Bahr designed the typical Protestant church in the shape of the Frauenkirche. While churches continued to be built during the 18th century, the greatest artists were called into the service of the reign¬ ing houses who filled their places of residence with castles and palaces in imitation of the great French king, Louis XIV, and his succes¬ sors. In France at that time the Renaissance style, had begun to give way before a formal classicism, and it was inevitable that German art had to follow much the same course. The love which Frederick the Great bore for every¬ thing French made Berlin the centre of classi¬ cism, although throughout Germany the way for the French imitation had been prepared by the previous generation of fine interior deco¬ rators who had introduced in Germany the light and fanciful French rococo. Some of the rococo artists later espoused the cause of classi¬ cism, as did von Knobelsdorf, the architect of the Royal Opera house in Berlin, who pre¬ viously had decorated the castles of Potsdam and Charlottenburg, and achieved a reputation second only to that of Cuvillies and Effner in Munich, or of Knofel in Dresden. C. G. Lang- haus (the architect of the Brandenburg Gate in Berlin), Unger, von Gontard, Gilly, Gentz (the architect of the Mint), K. F. Langhaus, in Berlin; Neumann the Younger, in the west¬ ern part of Germany; von Fischer, in Munich; Weinbrenner, in Karlsruhe; Laves, in Han¬ over; von Erdmannsdorf, in central Europe; and Nobile and Spranger in Vienna were among the most famous classicist architects. All these men, however, were but forerunners to the really great German classicists, Leo von Klemze in Munich and Friederich Schinkel in Berlin. The latter especially was no mere for¬ malist ; for he was deeply impressed by the dis¬ coveries which had then begun to be made in Greece and the fine interpretation of which by the English scholars had opened the eyes of the most thoughtful to the singular beauty and simplicity of Greek architecture. Of his many works it may suffice to mention ((The New Guard,® the Royal Theatre and the old Mu¬ seum, all in Berlin, and the castles Glienicke, Charlottenhof and Babelsberg. His design for a magnificent castle for the empress of Russia in Orianda in the Crimea was unfortunately not executed. Schinkel's followers, therefore, were properly called ˆHellenists,® or according to the great textbook of their school, Botticher's (Tektonik der Hellenen, or ˆectonistsP Stiller, Schadow, Strack, Hitzig, Gropius, Ad¬ ler, Orth, Jakobstal and Eggert are among the best-known architects of this school. The re¬ markable thing about the greatest of these so- called classicists was their versatility. They refused to be bound by one style, and Schinkel, for instance, loved the old GeFman art of the Middle Ages as dearly as that of the classicists. He was in fact, jointly with Friedrich Gartner of Munich, the founder of the so-called Ro¬ manticist school whose representatives were offered ample scope by the restoration of old*

churches which took place all over Germany. Ahlert, Zwirner and Voigtel restored and re¬ built the cathedral in Cologne. Statz, Denziger, Beyer, von Schmidt, Mocker, and especially Otzen, Mockel and Hase achieved great suc¬ cesses. By the side of these men who drew their inspiration from the Middle Ages, an¬ other school developed, basing its efforts more largely on the Renaissance. The earliest of these men and the one whose books on the subject were most influential was Semper. Other artists following the same lines were Leins and Engle in Stuttgart; Nicolai in Dres¬ den; Demmler in Schwerin; Forster, Hausen, von der Null and Siccardsburg in Vienna; and Neureuther in Munich. None of these men, however, was the slave of the Renais¬ sance, and it is noteworthy that in designing churches they more than once employed Gothic forms. It was in short characteristic of practi¬ cally all great architects of Germany during the 19th century that they looked upon the styles of the past which they most admired, not as copy plates to be imitated but as sources of in¬ spiration. Consequently it is not astonishing that the distinction between the Romanticists and the Renaissance men soon disappeared. The great endeavor of many of these men was to initiate a modern style, i.e., a style adapted to the modern age, expressive of the spirit permeating their own age, and at the same time satisfying the artistic craving of those who had become familiar with the best archi¬ tecture of all ages.

Since few men are experts both in designing the structure and in decorating its details, it frequently happens that two or more men com¬ bined in one architectural firm, and beginning with the middle of the 19th century such firms rather than individual architects appear as the builders of many of the best-known edifices. Among such firms may be mentioned : Ende and Bockmann, the architects of the Red Castle, the Industrial Building in Berlin, the Ethnograph¬ ical Museum and many banks; von der Hude and Hennike, who built the Lessing Theatre in Berlin and several large hotels; Kyllmann and Heyden, who built several museums ; Ebe and Benda, who built the <(Pringsheim House" in the Wilhelmstrasse in Be-rlin in the style of the Italian High Renaissance, and by the use of glass mosaics and terracottas introduced a gaiety of colors which made this house the talk of Berlin, if not of the whole of Germany. Kayser and Grossheim were equally as fond of polychromy in architecture, while Gropius and Schmieden made use of it in telling mod¬ eration, especially in their well-known Arts and Crafts Museum in Berlin. Among the best architects of railway stations, Franz Schwechtern deserves mention, who built the Anhalter Bahnhof in Berlin, while August Sol- ler, Eduard Knoblauch and Johannes Otzen are among the best-known church architects. Soller built the Catholic Saint

Michaelskirche in adaptation of the brick churches of upper Italy; Knoblauch made use of Moorish elements which he cleverly combined with structural iron in his ((New Synagogue"; and Otzen gave pref¬ erence to the Romanesque and the Gothic in his Protestant churches. Beginning with the '80s of the 19th century, Berlin was one of the fastest growing cities of the world, which ac¬ counts for the fact that more architects of im¬

portance found occupation there than anywhere else in Germany, in spite of the great oppor¬ tunities offered by the art-loving King Ludwig II of Bavaria. Next to Berlin, however, Munich continued to be a centre of good archi¬ tecture. Of the long list of good architects there, Lorenz Gedon deserves special mention as the builder of the Schack Gallery, erected soon after the creation of the new German Empire, in the style of the German Renaissance. Of the other cities of Germany, Frankfort holds a unique position with its many fine buildings, the new Museum, the Grand Central station, the Exchange, all built by native talent for only the Opera house was entrusted to an out¬ sider, Richard Luca of Berlin. Of the most important outside commissions entrusted to Frankfort architects, the Grand Central station in Vienna and the town hall in Hamburg were given to Karl Mylius and Alfred Bluntschli, while the Reichstag building in Berlin was given to Paul Wallot. Wallot endeavored to find a modern national style, but as he him¬ self once said, you cannot find such a style from to-day to to-morrow, and although he has cleverly combined many elements of Ger¬ man Gothic and German Renaissance and has added not a little of his own, the result is not altogether pleasing. The demands of the inte¬ rior, adapting it to the convenience of the mem¬ bers of Parliament and to their needs, were greater than could be met in the given space without forcing compromises in design such as had to tell unfavorably on the exterior. Every¬ body familiar with our own, externally magni¬ ficent Capitol in Washington and its waste of space internally, will appreciate the difficulty of the task set to Wallot, and will appreciate his relative success rather than criticize his shortcomings. All the buildings mentioned thus far may be grouped together as following the historical style of architecture. In the hands of masters this style was able to produce fine structures. Unfortunately, however, the amount of building done in Germany from 1871 on, when the new empire was founded and the huge increase in population began, was so enor¬ mous that in most instances artisans rather than artists had to take charge of designing and erect¬ ing the buildings. In the hands of many of these master builders the historical style de¬ teriorated to a mere fashion, and since it was used irrespectively of the requirements of given cases, Germany is unfortunately filled, espe¬ cially in the smaller towns and cities, with buildings of which a future generation will hardly be proud. It was natural therefore that a reaction should set in. The exact date of its beginning it would be difficult to tell. Early in the 20th

century, however, it was an accomplished fact. The aims of the modern German architects have been thus formulated by as keen an observer as Prof. Walther Gensel : ((Clearly to express the purpose of the building; to work from the inside out; not to do violence to the material selected by forcing it into forms contrary to its nature; to pay chief attention to proportions; and to consider the requirements of the building either as a part of the street where it is to be erected, or as a spot in the landscape" are the aims of modern German architecture. Working along these lines it is not astonishing that the present generation of German architects should have

achieved singular successes. The greatest teacher of these principles is perhaps Karl Schafer in Karlsruhe; the number of men fol¬ lowing them, however, is too great to mention more than a very few. Gabriel Seidl built the new National Museum in Munich; Hugo Licht the Public Market in Leipzig, and Alfred Mes- sel, the great Wertheim Stores in Berlin. A survey of modern German architecture would be. incomplete without a reference to the many private residences, in town as well as in the country, which have latterly been built. The earlier delight in display has disappeared. The individual building does no longer endeavor to force the attention of the passer-by. On the contrary, it is satisfied with being a part of an artistic whole, or, in the country, with har¬ monizing with its surroundings. Wherever possible, stately soberness has given way to simple gaiety, in keeping with the turn of mind of the German people early in the 20th cen¬ tury, which took great pleasure in life. No¬ where, however, is this gaiety permitted to obtrude itself where it would be out of place, as for instance in large industrial plants, rail¬ way stations or elevated railroads. These are treated without any attempt at disguising their purpose. Excellent instances of this are found m the railway stations and elevated railroads in Berlin.

Bibliography.— Reber, (History of Mediaeval Architecture } ; Liibke, Ecclesiastical Art in Germany During the Middle Ages) ; Liibke, (Geschichte der Renaissance in Deutschland^ ; Licht, (Architektur Deutschlands) ; Knackfuss, H., Zimmermann, Max, Gg., and Gensel, W., (Allgemeine Kunstgeschichte) (Leipzig 1903).

Edmund von Mach,

Author of (Outlines of the History of Paint –

ing } ; cThe Art of Painting in the Nineteenth

Century y, etc.

16. HISTORY OF GERMAN MUSIC.

The chief epochs in the history of German music are these, — sacred, polyphonic music, and its culmination in the works of Bach and Handel ; the birth and development of modern instrumental forms; the German romantic opera, — von Weber; the German Lied; the Romantic school, Schumann, Liszt; the music dramas of Wagner; modern tendencies as found in the works of Strauss and others.

The first promising epoch in the develop¬ ment of German music was the Reformation. In that period of storm and stress, of burning questions and of intense longing for religious and social independence, sacred music, that ex¬ pression of man's belief in the Eternal, was cultivated with the greatest fervor. The music which was the natural outcome of such con¬ ditions was of far-reaching influence, especially upon the great vocal and instrumental compo¬ sitions of Sebastian Bach (q.v.).

Martin Luther, the leader of the movement, was not a composer of chorals or hymn-tunes, as is often supposed, but a writer of the words of hymns to which he and others set traditional melodies taken from the rich stores of religious folk-songs then extant. Luther's distinct con¬ tribution to the musical life of the time was (1) his writing of about 30 hymns which, deeply imbued with patriotic and moral feeling, spoke directly to the heart of the German people, and (2) his associating with him the

best musicians of the period to collect and write chorals suited to his words. Of these the most famous were Johann Walther and Ludwig Senfl.

r In 1524 there was published in Wittenberg Walther's choral-book with a preface by Luther. The melody of (Ein Feste BurgP which Fred¬ erick the Great called <(God Almighty's grena¬ dier march,® has exercised a powerful influence throughout the course of German music, as may be seen from the prominent part it bears in the works of Bach, Mendelssohn (Reformation Symphony), Meyerbeer (Huguenots) and finally in Wagner who uses its strains in the (Kaiser- March > ˆ to typify the military triumphs of united Germany.

The first representative composer, often spoken of as ((the father of German music,® — whose works clearly foreshadowed two of the important directions of modern art, — was Heinrich Schutz (q.v.). He was born in 1585, just a century before Bach, and died in 1672, while he was court director of music at Dres¬ den. Quite early in life he came under the stimulating influence of the Venetian school as a pupil of the famous

Giovanni Gabrieli. Schutz, as the composer of the first German opera (Daphne, > is the progenitor of the line which includes Gluck, Mozart, von Weber and Wag¬ ner. Schiitz's real importance however centres in his sacred compositions, the (Resurrection,) the < Seven Last Words > and the four settings of the Passion. In these works, in which a sacred story in dramatic form is told without the aid of scenery or action, Schutz was the real founder of German oratorio, and in his power of vivid, dramatic characterization antic¬ ipated some of the essential features in the Passions and oratorios of Bach and Handel. In Schutz we also see traces of that Teutonic power of introspection and deep thought which prevented German oratorio from yielding to the baleful theatrical influence of Italian music, and which, exercised by the great composers of the _ following century, led to such triumphant achievements in German art. The prime of Schiitz's life unfortunately coincided with the Thirty Years' War (1618-48)— that time of devastation and horror which diverted all men from the peaceful cultivation of either art or literature.

On the other hand this period of ferment and of the breaking up of established routine had a stimulating effect upon German music in that composers were brought into closer touch with men and ideas from other nations. Ger¬ man artistic development had suffered from too much isolation, but henceforth, by reason of this intermingling of Continental peoples, music began to speak a more universal language. This change is strikingly typified in the instru¬ mental suite which was a somewhat loosely connected series of national dances- — as may be seen from the names of the principal num¬ bers, allemande (Germany), courante or corrente (France or Italy), sarabande (Spain), bouree and gavotte (both French), and jig (English).

Prior to the complete development of the sonata and rondo forms in the time of Haydn, the suite was about the only instrumental form (with the exception of the fugue), which made any pretense to artistic organization, and was

the favorite form in the clavichord composi¬ tions of Bach, Handel and contemporary com¬ posers.

The real supremacy of German music dates from the 18th century, for at that time began the careers of Bach and Handel (qq.v.), both born in the year 1685.

Handel was undoubtedly a man of great force of character and of quick comprehensive intellect ; in whatever he undertook, as com¬ poser, impresario or chapel-master, he suc¬ ceeded through sheer force of will and personal magnetism. His purely musical gifts, great as they were, often seem the least of his powers. His varied career affords a striking contrast to the simple life of Sebastian Bach, who spent his days in a rather obscure part of Germany, was practically unknown and certainly unappre¬ ciated outside his native land, and began to receive due recognition only about a century after his death.

Handel's early studies were made in Italy and in his 47 operas he stood forth as the finest representative up to that time of the flowing Italian vocal style. These operas, although now entirely obsolete on account of their weak, meaningless libretti and lack of dramatic unity, yet contain some of Handel's finest songs, and as a song-writer his power is undoubted.

Handel's fame to-day rests almost entirely upon his oratorios, among which may be mentioned (Israel in Egypt, > (Sampson, >

(Judas Maccabaeus) and the (Messiah. His vast number of other instrumental and vocal works on account of their old-fashioned, con¬ ventional idiom, and their somewhat monoton¬ ous harmonic scheme, are fast becoming obsolete. In the oratorios, although they con¬ tain many arias noted for pathos and beauty of expression, the choruses are the portions in which Handel's distinctive power is chiefly shown. His vocal solos are too often of stereo¬ typed design and defaced by meaningless roul¬ ades — a survival of the vainglorious operatic style of the period. As a chorus-writer, Handel is supreme in the history of music. He was a great impressionist and for dramatic effect, for majesty and dignity of utterance in dealing with large masses of voices, has never been sur¬ passed. Early in middle life Handel became a naturalized Englishman, wrote his most famous works to English words, with special reference to English religious feeling, and so his influence there has at times amounted almost to idolatry. Upon other nations, France, Italy and Germany, Handel's influence has been much less and is weakening year by year.*

If human greatness is to be measured by a constantly growing consensus of approval, Bach was in some ways the greatest musician who ever lived. He is practically the founder of modern music, and his influence is supreme in such different composers as Beethoven, Schu¬ mann, Chopin and Wagner (qq.v.). In wealth of harmonic resource Bach was at least a century ahead of his time, and only recently have the inexhaustible vitality and suggestive¬ ness of his works been fully appreciated. Bach's power is shown in three important branches of composition — as a choral-writer, as an organ-composer and as the precursor of the important modern

developments in piano¬ forte style and pianoforte playing. Bach's great

choral-works are the two settings of the (Passion according to Saint Matthew > and (Saint John, the (B minor Mass,* the Christ¬ mas Oratorio,* and innumerable church can¬ tatas. Words are entirely inadequate to describe the sublimity and pathos of these stupendous cathedrals in tone. In the words of Schumann ((music owes almost as great a debt to Bach as religion owes to its Founder.**

To the general public Bach is best known by his organ-compositions, Preludes, Fugues, Toccatas, Fantasies, Choral-Preludes, etc., and as an organ composer no one can even be mentioned in the same class. These works are all remarkable for their variety of construction, for their free, untrammeled use of every possible contrapuntal device, and notwithstand¬ ing. their intricacy, for the complete subordi¬ nation of mere learning to the needs of a per¬ sonal expression of mood. Bach's most im¬ portant work for clavier — the prototype of our modern pianoforte — is the (Well-tempered Clavichord. This work, in substance a set of 48 preludes and fugues (in all the major and minor keys), took its name from the new system of tuning, largely originated and sanctioned by Bach, by which all keys became of equal importance, and modulation was made possible into remote tonalities. The (Well- tempered Clavichord, * often called the mu¬ sician's Bible, represents not only the essence of Bach's genius, but contains within it the seeds of the whole growth of music since that day. In strong distinction to the somewhat local influ¬ ence of Handel, the leading composers of every nation, Italy, France, Germany, America, etc., have taken Bach as their model and have stated unmistakably that they have based their work on his. Other notable compositions of Bach are the French and English Suites, the Chromatic Fantasie and Fugue and the Two and Three- Voiced Inventions. Mention should be made of the Orchestral Suite in D, of the Sonatas for Violin and 'Cello, and of the celebrated Chaconne for violin solo.*

Between the culmination of the vocal style of Bach and Handel and the development of modern instrumental music there was an interregnum, a period of overlapping tenden¬ cies, and of experimentation as to what the course of music should be.

Sebastian Bach himself said in the latter part of his life that musical taste had altered wonderfully and that the old music no longer sounded good to the ear.

Among many worthy names, two are of real prominence. Gluck (q.v.) (1714-87), will al¬ ways be honored as the first reformer of the opera, and although his best works, Uphigenia in . Aulis) and (Iphigenia in

Tauris, were written to French libretti and brought out in Paris, the peculiarly Teutonic characteristics of the man, his sincerity, his courage and unerring instinct for dramatic truth were the animating causes of his reforms. To carry them out Gluck needed all the strong physical and mental qualities which came to him from his peasant ancestry. Italian opera as he found it was an artificial and undignified form of art, in com¬ plete subservience. to the capricious whims of singers and the vitiated taste of ignorant pa¬ trons. . Gluck's title to fame is the fact that in such circumstances he set himself resolutely to*

express himself in his music, and to make it manly and sincere. His dramatic creed is ex¬ pressed in the famous preface to 'AlcesteP One of his chief canons was to make the music subordinate to the spirit of the words, — a principle sometimes carried so far as to make the music lacking in beauty for its own sake.

Gluck is rightly regarded as the father of modern opera; his theories and reforms have had great influence upon all opera composers, notably upon Wagner, and his works are the earliest which hold the stage to this day. He was great both in impassioned and pathetic melody and his dramatic use of the chorus is unsurpassed. He was also the first to antici¬ pate in many ways the organization of our modern orchestra.

Emmanuel Bach (q.v.) (1714-88), third

son of the great Sebastian, the forerunner of Haydn and Mozart, is important for his contri¬ bution to the development of instrumental form, especially in music for the clavier. In fact many of his first movements all but reach the completely organized sonata form as found in Haydn. He was also an important factor in settling the most effective manner of writing for the clavier, i.e., solo-melodies lightly ac¬ companied, brilliant passage-work, etc., instead of the old polyphonic style on a vocal basis. His celebrated treatise on (The true art of playing the Clavier) contains the principles which have since been developed by dementi, Cramer and others into the pianoforte style of our own time.

Haydn (q.v.) (1732-1809) is called the

father of the symphony and the string quartet, and the term, though a slight exaggeration, is well deserved, for he summed up and amplified the tentative efforts of the many instrumental composers of the period. Born at Rohrau in Austria, near the Hungarian frontier, his peas¬ ant origin and

his life-long contact with the common people and with rural life must be kept in mind in estimating his music. Much light has been shed upon the causes of Haydn's peculiar genius by the researches of a Croatian scholar, Dr. Kuhac, who has shown conclusively that Haydn was of Croatian stock. The evi¬ dent and pervasive signs in Haydn's music of light gipsy dance rhythms and of folk-songs are thus accounted for. His earlier years were of intense hardship and his musical education due almost entirely to his own efforts. Finally he came in 1761 under the patronage of the Esjterhazy family in Hungary — a post held uninterruptedly for 30 years, in which Haydn's status was typical of the musical patronage in vogue at that epoch. The most prominent external events of Haydn's life were the two visits to London in 1791 and 1794 at the invi¬ tation of the violinist Salomon. For these occasions were composed the 12 <(Salomon Symphonies® which include Haydn's best work — the (Surprise, J the < Oxford, > etc. Haydn received the degree of doctor of music at Ox¬ ford and also became acquainted with the vocal style of Handel, which influenced him in the composition of the Creation1 and the ˆSeasons,* those remarkable works of his old age. Haydn, a distinctly uneducated man, but one of great musical concentration, was just suited to organize the tunes and rhythms of the people into coherent forms of art. In move¬ ments in the so-called sonata form his estab¬*

lishment of the second theme and free treatment of thematic development were organic changes of the greatest moment. To the old three- movement sonata or symphony with its mechanical contrast of fast, slow, fast, Haydn added the minuet, in which his fondness for light graceful rhythms and spirit of playful humor found free scope. The modern string quartet owes almost more to Haydn than the symphony. His string quartets contain his most vital and lasting work and show his in¬ exhaustibly fertile invention in varied rhythms and in the individualizing of the instruments. Haydn's music is noted for its cheerfulness and dainty grace, and though it seldom rises to a high level of dignity, bids fair to be immortal as a genuine expression of the optimistic sunny temperament of the man.

Mozart (q.v.) (1756-91), a most prolific genius, worked in every form of musical art known to his time ; his significance, however, (from the standpoint of historical development) lies in his symphonies, his string quartets and allied forms, and most of all in his operas. Born at Salzburg, the son of Leopold Mozart, a famous violin teacher, the first 25 years of his life were chiefly spent in professional tours. His marvelous precocity both as composer and executant is well known. In 1772 he became music director at Salzburg, but unable to endure the galling system of patronage went in 1781 to Vienna, where he continued to pour forth masterpieces until his tragic death, largely brought on by poverty and hardship. He was buried in a pauper's grave. Mozart is the supreme example in history of the

inborn spontaneous musical temperament, and his wonderful gifts were supplemented by a perfect mastery of the technique of his day. In some ways his music is more Italian than Teutonic, and though often limited in depth of expression, is perfect in its beauty of melodic outline, in its fineness of detail and in its serene purity of sound. His works are a complete embodiment of abstract classic beauty in distinction to the arbitrary self-expression of the Romantic com¬ posers.

Mozart's first string quartets (1782) were dedicated to Haydn, who greatly improved his own symphonic style by a study of Mozart's three great symphonies., all written in 1788. His pianoforte sonatas, owing to the limitations of the instruments of that time, are often super¬ ficial, but in his compositions for pianoforte and orchestra he is virtually the founder of the modern pianoforte concerto.

Mozart's most vital influence is felt in his operas. In no way a reformer like Gluck, he accepted the existing Italian models, but through sheer power of musical beauty and wonderful dramatic characterization he creates the greatest operatic works of his century, which to-day are still full of life. The most important are (Don Giovanniˆ (Figaro) and (Cosi fan Tutted The operas written to German words, including (Die Entfhrung aus dem SeraiP and (Die Zauberflote) are of historic interest from their connection with the German Singspiel and as forerunners of the romantic opera of the following century.

Beethoven's (q.v.) (1770-1827) historic re¬ lationship is akin to that of Bach in that he concentrated all forms of expression then

extant, and also foreshadowed many of the im¬ portant developments still to come. His artistic growth is to be studied in relation to his times. His life coincided with the French Revolution, with the American War of Inde¬ pendence and the German struggle for national unity; the most prominent single note in his music, the free expression of individualism, is a definite result of the spirit of emancipation so prevalent in both literature and political life, and shows Beethoven's intense suscepti¬ bility to all the contemporary currents of thought. With him music ceases to be merely an art depending for its effect upon fineness of workmanship ; it becomes a language capable of expressing the deepest emotions of the com¬ poser and voicing the joys and sorrows of humanity. Beethoven, of mixed ancestry, was born at Bonn but spent the chief part of his life in Vienna and its neighborhood. His sturdy characteristics of body and mind may be traced

to his Dutch grandfather while his intensely emotional and romantic nature came from the German blood on the maternal side.

Beethoven's greatness depends on the perfect equipoise found in his works of the intellectual and emotional elements. His symphonies and sonatas embody the most carefully planned musical architecture and yet are so surcharged with emotion that our deepest feelings are touched. In him the principle of thematic de¬ velopment reached its climax ; entire move¬ ments were founded on some striking motive, e.g., the opening movements of the

Beethoven's sketch books illustrate his method of work; we see how an idea springing from an emotional source was worked over, changed and improved, until it could stand forth as a perfect expression of musical thought. This concentration is shown by the fact that, although an unceasing worker for 37 years, he produced but 133 works, in contrast to the many hundreds of Haydn and Mozart which are largely in the same style.

Beethoven in variety of conception ranks with Shakespeare. Each of his nine sym¬ phonies is unique, differing from any one of the others. He also first revealed the possibilities of humor in music as distinct from the light wit and playfulness of Haydn, and in many of his works substituted for the minuet a move¬ ment to which he gave the name ((Scherzo.):> His nature had a vein of brusquerie and irony and this may be seen manifested in such move¬ ments as the scherzi of the Third and Fifth symphonies and in the finale of the Eighth. .

Great advance in the art of orchestration is due to Beethoven ; he studied the expressive qualities of each instrument and first showed the entire capabilities of the horns, clarinets, kettledrums, contrabass, and bassoons. His im¬ agination was distinctly orchestral, even when he was composing for the pianoforte. In Beethoven's works we see striking anticipations of modern ˆprogrammistic® tendencies, witness the frequent titles, e.g., the (Heroic) and (Pastoral > symphonies, the overtures to ˆorio- lanus) and

generally composed with some poetic thought in mind, and his music is often symbolic of mental states. His favorite name was (

During the latter part of Beethoven's life, i.e., the first quarter of the 19th century, there were going on two most important movements in German music, the creation of a distinctly German opera, and the establishment of the German Lied. The former is chiefly due to the genius of von Weber (q.v.) (1786-1826), the latter to that of Franz Schubert (q.v.) (1797-1828). Both these achievements had their birth in the war of

liberation waged in art and literature against the long domination of French and Italian standards. Weber did not create the German romantic opera de novo. Its origin was in the Singspiel, a light piece with plot and characters drawn from native sources, copiously supplied with incidental music often based on folk-songs. Fairy tales and local legends were also much used. Closely con¬ nected with this operatic movement was the Romantic school of poetry founded about 1800. Breaking away from classic themes the Roman¬ ticists found their inspiration in the German world about them, the mystery of the forest, the charm of out-of-door peasant life, etc., and upon such themes and other fantastic subjects suggested by his glowing imagination Weber built his dramatic works. His first success was gained during the Napoleonic invasion by some spirited settings of Korner's war songs (Lyer und Schwert. His great operatic triumphs began with (Der Freischutz) in 1821, that most German of operas, the mere name of which affords a clue to the wealth of color and fancy displayed in the descriptive music.*

Weber's wonderful power of characteriza¬ tion was unique at the time, and has by no means lost its telling force to-day. He was completely saturated with the romantic spirit and entered in his works all the realms of fancy thrown open by the poets. Thus in (Euryan- the) we are taken back to the Middle Ages, and the days of chivalry in (Oberon, brought out in London in 1826, we hear <(the horns of Elfland faintly blowing.® Weber was also of considerable influence in his pianoforte com¬ positions, as a forerunner of the ((brilliant® school of Liszt (q.v.), and others.*

Spohr (q.v.) deserves passing notice as an associate with Weber in the romantic movement in opera, and as one of the great violinists of his day. Although essentially a classicist, Spohr otten gave titles to his instrumental works. They are lacking, however, in real poetic vitality, and so are seldom heard to-day.

Schubert (q.v.), the inheritor of Mozart and Beethoven, the last of the purely classic school, notwithstanding the many interesting phases of his genius, must be treated here as the founder of the German Lied (see Lied), the first of the great group of song composers which in¬ cludes Schumann, Franz, Brahms, and Richard Strauss. Schubert, whose highest gift was that of expressive melody, with an imagination keenly susceptible to poetic suggestion, lived at just the right epoch to take full advantage of the wealth of German lyric poetry which was one of the results of the romantic movement. The difference between the Lied and other earlier forms of solo

song, aria, etc., is that no longer the music itself is the chief element, but the word-text. Instead of setting several stanzas to the same simple tune the composer endeavors by continuous musical development to suggest every sentiment and mood of the poem. Imagination is made submissive to the suggestiveness of the poet. The music exists not independently, but as a means of carrying the essence of the poem to the soul of the hearer. Words and music are blended in a composite form of art, which is always en¬ hanced by suggestive pianoforte accompani¬ ment. In the union of these three factors Schubert was supreme. With few exceptions he always selected poems of intrinsic merit, e.g., by Goethe, Schiller, Shakespeare, Klopstock, Muller, and Heine; of unsurpassed power as a melodist, he followed each varying sentiment of the words in the most subtle manner, and although recent composers have enlarged the scope of the piano accompaniment, he first re¬ vealed its possibilities. In illustration of the last point we may cite the accompaniment to (Der Erlkonig) and

In 1830, two years after the death of Schu¬ bert, began the career of Schumann (born in 1810), the most prominent — together with his great contemporary, Berlioz (q.v.) — of the romantic composers in the realm of instrumen¬ tal music. In Schumann we have a unique per¬ sonality, intensely subjective and of deep poetic feeling — ((the greatest musical thinker since

*Beethoven** according to Liszt. Manifesting very early a strong love for the imaginative poets of the period, notably Jean Paul Richter (q.v.), Schumann definitely molded his music in accord with poetic ideas, and with his great literary gifts became the formulator of the romantic idea in the entire musical thought of the time. Up to 1840 Schumann's chief work \vas his pianoforte compositions. These al¬ though in small form, from the novelty of their style, and their exquisite fancy, began a new epoch in pianoforte music. These pieces all have titles, (Papillons,* (Nachtstiicke,* (Fan- tasiestiicke,* etc., and indicate with delicate touches of romanticism the moods which the music is to symbolize. In his larger piano¬ forte works the two sonatas, the Fantasie in C and the Etudes Symphoniques, the defects as well as the merits of the school are apparent. Together with a wealth of invention there is often a lack of balance and unity. The ro¬ manticist always teems with emotion ; whether he succeeds in impressing this on the hearer by means of music is quite another question.*

In 1840, the year of Schumann's marriage with Clara Wieck, most of his wonderful songs were composed. In some ways these surpass even Schubert, especially in delicate treatment of subtle shades of meaning in the poems and in variety of piano accompaniment. Many of his most inspired songs are set to poems by Heine. In his four symphonies, Schumann was of unequal power, and opinions vary as to their permanent worth. There is no doubt of the warmth and variety of the original ideas, but sustained development is often lacking and the orchestration leaves much to be desired. By far the strongest of the symphonies is the Sec¬ ond in C major in which the Adagio with its poignant pathos reaches a high point of emo¬ tional expression. The Fourth symphony is noteworthy for experiments in a more plastic treatment of the conventional symphonic form. Schumann's vocal works, though unequal, con¬ tain much fine inspiration — the most sustained is (Manfred. Schumann's literary labors in founding (Die neue Zeitschrift fiir musik) in 1834 must not be overlooked. His critical writ¬ ings with those of Berlioz and Liszt have revo¬ lutionized musical taste and established new ideals.*

Mendelssohn (q.v.) (1809-47), Schumann's contemporary, although classed with the Ger¬ man school from the style of his works, is, strictly speaking, outside the Teutonic line, as he was of Jewish extraction on both sides.

Franz Liszt (q.v.) (181 1—86) , although likewise not of pure Teutonic blood — his father was a Hungarian — is of far greater im¬ portance, not only for his intrinsic powers as composer and pianist, but for the stimulating influence he has had upon the musical culture of the day. Any sketch of Liszt must be in¬ adequate, and is to be supplemented by refer¬ ence to the vast amount of biographic and criti¬ cal literature connected with him and his tendencies. He is one of the compelling forces in music of our times. The greatest pianist the world has ever seen, the modern school of pianoforte playing is largely derived from him. In his pianoforte compositions many new ele¬ ments were introduced in rhythm, harmony, freedom of form and pure pianistic effect. In many of these pieces a strong Hungarian,

*gipsy element is found. In his orchestral works Liszt is a firm adherent of the program school, agreeing with Berlioz as to the descriptive value of music. His two great symphonies, the (Faust) and the * Dante, > are unique works in their subtle musical characterization and in their beauty of*

orchestral tone-painting. In the (Symphonic Poem) an entirely new form was contributed, one which has had far-reach¬ ing consequences not yet exhausted. A sym¬ phonic poem is a work in a single movement in which the classic sonata form is abjured and the entire structure and style of treatment are made subservient to the guiding spirit of the poetic subject. Of these works the most famous are (Orpheus, } (Tasso, >

and (Les Preludes. > Liszt was also a prolific vocal composer and his masses and oratorios of (Saint Elizabeth > and

The comparative youth of modern music and likewise its continuity of development is strikingly shown by the fact that the birth of Wagner in 1813 is within four years of the death of Haydn in 1809. The mere name of Wagner (1813-83) provokes a wide range of discussion, but though to the specialist he may be of interest as a philosopher, a writer on aesthet¬ ics and a sociologist, by the general public he is admired as the founder of the music-drama, and as a mighty musician. Considerable harm, in fact, has been done to Wagner's music by the metaphysical speculation in which his rabid admirers have tried to submerge it. ((I require nothing from the public,® writes Wagner to Liszt, (

In his mature works, (Der Ring, (Tristanˆ (Die Meistersinger) and (Parsifal,* traditional forms, the aria, the set chorus, etc., are entirely renounced, and the growth and form of the music are derived from the spirit of the text. Richly accompanied recitative makes up the body of the work. The melody is composed poetically and, to use Wagner's term, is <(end- less,® running sometimes through a whole act without a break. The expansion of the de¬ scriptive powers of the orchestra reached a climax in Wagner. His power as a musical scene-painter is incontestible. Building on the work of von Weber, Berlioz, Meyerbeer and Liszt, he evolved an entirely new orchestra boundless in wealth of tone-color and in power of emotional appeal. In fact, the chief beauty is often in the instrumental part and the vocal melody is at times rather crudely plastered upon this. As a discoverer of new harmonic effects and as a contrapuntist, Wagner ranks with Bach and Beethoven.*

One of Wagner's organic changes was the use of <(Leading Motives.® These are not mere musical labels with fantastic names, — this con¬ ception is due to the misguided Wagner com¬ mentators, — but musical epitomes of the chief characters and the important objects in the drama, e.g., (Wotan, the (Sword, * (Fire,* etc. By their use the music though plastic becomes highly organic. Wagner himself says it is the thematic development of Beethoven expanded and used for dramatic purposes.*

Not the least feature in Wagner's operas are the scenic effects. He

revolutionized the art of stage mounting. Such scenes as the Grail Castle in (Parsifal and the final scene of (Die Walkure) have never been surpassed. Wagner's pen as a literary man was ever busy. His writings are collected in 10 large volumes. The essays (On the Art of Conducting) and on the symphonies of Beethoven are noteworthy.*

*The position of Brahms (q.v.) (1833-97) in modern music is remarkable in that by tem¬ perament standing apart from two of the main tendencies of the times, the operatic and the programistic, he made free use of the polyphony of Bach and the classic forms of Beethoven to voice his own individual message. A man of singularly deep and simple human feeling, — what strikes us most in his music is its emo¬ tional wholesomeness. Never morbid, hysteri¬ cal or theatric, Brahms' compositions in their broad impersonality make the imoression of a work of nature. With the exceptions just noted, Brahms has worked in every field of modern art. His pianoforte music, with its complexity of rhythm and its subtle harmonic tissue, is distinctive and novel. His songs in their consummate blending of poetic sentiment and musical expression are the most perfect since Schumann. The chamber-works for strings alone or for various combinations of instruments contain some of the noblest thoughts ever uttered in that form. Brahms' four symphonies are comparable with those of Beethoven in their variety and latent strength. Each has its own peculiar atmosphere; Brahms has not written one symphony in four parts. His (German Requiem * is one of the grandest compositions of modern times.*

Debate is still going on as to the final posi¬ tion. of Brahms. To some he seems austere, lacking in emotional warmth; to others he

GERMANY — GERMANY SINCE 1918 (17;

represents all that is truest in music. He is certainly one of the few since Beethoven to sound the note of sublimity. His music is Miltonic in its dignity and repose. Such quali¬ ties may well be considered lasting in music.

i Wagner and Brahms the German

school has been most prolific but there are only a few men in modern German music who count at all. Most important is Richard Strauss (Q-V-) (1864) , who has carried the program method to undreamed-of lengths. In technical resource Strauss is undoubtedly the greatest master of the orchestra who has yet appeared. In his great symphonic poems (Don Juan,5 lod und Verklarung,5 (Also sprach Zara- thustra,5 and others, by utilizing and expound¬ ing the discoveries of Berlioz, Liszt and Wag¬ ner, he has produced orchestral effects of bril¬ liance and sonority which are

unparalleled. Strauss is also a composer of prodigious contra¬ puntal skill, and his works are marvels of musi¬ cal architecture. In fact so audacious is the use he makes of his descriptive and realistic powers that music seems to be changing its entire nature. The controversy rages about him and his tendencies as violently as in former times about Wagner. It would be pre¬ mature to forecast Strauss' permanent rank. Whatever else he has done he has weakened the former assertion that music has no power of definite portrayal. So wonderful are his efforts of musical symbolism that music just stops short of being articulate. Such vast works as (Ein Heldenleben) and (Don Quixote5 have emanated from the most daring musical imagination of our time, and embody tendencies which cannot be ignored. Music no longer exists primarily for its own sake, but as a means of descriptive expression for whatever philosophic or psychologic scheme the composer may have in mind. Strauss has also written in the smaller forms with distinct success piano pieces, chamber music, etc. His songs are in direct contrast to the complexity of his orchestral works and abound in simple and yet characteristic melody. Strauss' four operas, (Guntram,5 (Feuersnoth,5

Among other modern German composers are Wolf, Schilling, Huber, Mahler, Humper¬ dinck, Weingartner, Reger, Korngold, Pfitzner, and Schonberg (qq.v.). Of these Arnold Schonberg is the only really first class com¬ poser. A general review of German music by Pierre Lalo, the Parisian musical critic, son of the composer of (Le' Roi d'Ys,5 is interesting for comparative value. Lalo's professional duties called him to Germany annually for 20 years. Writing in 1915 and deprecating the decline in German musical taste marking its modern standards, he remarks:
<(During 150 years Germanic countries produced a great number of magnificent musical geniuses, and during those years no other country could rival them. But it was only during that period; in the Middle Ages music was Italian, not German ; at the Renaissance, it was French and Flemish; in the 17th and to the middle of the 18th century it was sometimes Italian and sometimes French. It is only with Handel ana Bach that the greatness of German music begins — and it has ended with Wagner.55 A closing word must be said about the great

array of critics, biographers, historians and teachers which Germany has produced. Such men as Jahn, Spita, Pohl, and Chrysander in their well-known biographies ; Ehlert, Hanslick, and . Ambros as critics; Haupt, Jadassohn, Kneinberger, and Riemann as theorists and teachers have had world-wide influence and are largely responsible for the fact that Ger¬ many up to the outbreak of the European War in 1914 was the chief centre of a comprehensive musical activity.

Bibliography. — Ambros, ; Finck,

How Music Developed5 ; Helmholtz,

Walter Raymond Spalding,

Assistant Professor of Music , Howard Uni¬ versity.

17. GERMANY SINCE 1918. Germany ceased to be a monarchy on 9 Nov. 1918 when, after having ruled since the death of his father, Frederick III, in 1888, . Emperor William II abdicated and took up his residence in Holland. Since then the country has been a federal re¬ public. But, notwithstanding the change in the form of government, the old appellation ((Ger¬ man Empire55 still stands, the official designa¬ tion of the national state being now, as it was prior to 1918, Deutsche Reich.

Following the Kaiser's abdication — one of the results of a revolution then in full sway — the government was taken over by the Council of. People's Commissioners in Berlin and the reigning princes of the various component states either abdicated or were deposed. One of the first acts of the provisional authorities was to declare the Imperial Parliament dissolved. Thereafter arrangements were begun for estab¬ lishing a new and permanent form of govern¬ ment.

A National Assembly was chosen at elections held in January 1919 at which all German men and women over the age of 20 years voted. It consisted of 423 members divided as follows : Majority Socialists, 165; Centre (Catholic) Party, 90; Democrats, 75; Conservatives, 42; Independent Socialists, 22; German People's Party, 22; minor parties, 7. Owing to disor¬ derly strikes and frequent local outbreaks, it met at Weimar, instead of Berlin, on 6 February. Five days later Friedrich Ebert was chosen first President of the republic on a tentative consti¬ tution. On 31 July 1919 the Assembly adopted a permanent constitution which was promulgated

11 August and under which on 21 August Pres¬ ident Ebert was formally installed.

New German Constitution. — The constitu¬ tion adopted at Weimar asserts that the German national state is a republic and that the power of the State is derived from the people; that all Germans are equal before the law ; that men and women have fundamentally the same civil rights and duties ; that public advantages or disadvan¬ tages of birth or rank are suspended ; that titles of nobility shall be accepted only as part of a name

and may not be conferred any longer; that titles, academic degrees excepted, may be conferred only when they designate an office or profession ; that orders and insignias of orders may not be conferred by the state and that no German may accept a title or order from a for¬ eign government. No state church is recog¬ nized and religious freedom is guaranteed. Freedom of speech and freedom of the press likewise are guaranteed. One of jthe most im¬ portant provisions extends the right of equal suffrage to all German men and women over 20 years of age.

After accepting the universally recognized principles of the laws of nations as binding on Germany, the constitution declares that the gov¬ ernment shall have the exclusive right of legis¬ lation over foreign relations, colonial matters, state property, immigration and emigration, ex¬ tradition, military organization, coinage, cus¬ toms, posts, telegraphs and telephones. It fur¬ ther asserts the national government's right of legislation over such matters as civil law, crim¬ inal law, poor laws, judicial proceedings, pass¬ ports, health, labor, industrial pursuits, insur¬ ance, mining, weights and measures, highways, theatres, navigation, railways, taxes and other sources of income in so far as they may be claimed in whole or in part for its purposes.

Every component state is required to have a republican constitution and state officials must be chosen by universal, equal, direct and secret vote of all men and women citizens on the basis of proportional representation. Government laws, it is asserted, transcend state laws. How¬ ever, so long and in so far as the government makes no use of its right of legislation the con¬ federated states are permitted to legislate for themselves except with respect to matters rela¬ tive to which the right of exclusive legislation is reserved to the government.

Two legislative bodies are created. A new Reichstag takes the place of the old, and a body called the National Council, or Reichsrat, sup¬ plants the old Bundesrat. In the latter body, formed, it is asserted, for the representation of the German states in national legislation and ad¬ ministration, every state must have, at least, one vote. Larger states are entitled to one vote for every million inhabitants, but no state is per¬ mitted to have more than two-fifths of all votes. The Reichstag is elected for four years and chooses its own president and secretary. Dele¬ gates thereto are chosen on the basis of univer¬ sal, equal, direct and secret vote of all men and women over 20 years of age in accordance with the principles of proportional representation. Elections must be held on Sunday or a day of rest. The Reichsrat consists of 55 members, Prussia having 22; Bavaria, 7; Saxony, 5; Wiirtemberg, 3; Baden, 3, and the other states, 15. The Reichstag, in 1921, had 466 members,

divided as follows: Majority Socialists, 113; Independent Socialists, 81 ; Centre Party, 69 ; German National People's Party, 66; German People's Party, 62; German Democratic Party, 45; Bavarian People's Party, 20; other parties,

10.

Projects of legislation must be introduced by the government or from the body of the Reich¬ stag. Legislation proposed by the government must have the assent of the Reichsrat, or Na¬ tional Council. The National Council is given the right of veto against laws approved by the Reichstag, and the principle of referendum is provided for.

Successors to President Ebert, who was chosen by the National Assembly, will be elected by the direct vote of all citizens, men and women, over 20 years of age. The term of of¬ fice is seven years, and to be eligible therefor a candidate must have completed his 35th year. An incumbent is eligible for re-election. The President may be deposed by a referendum re¬ quested by a two-thirds majority of the Reich¬ stag. The constitution authorizes the President to conclude, subject to the approval of the Reichstag, alliances and treaties with foreign powers. He receives and appoints ambassadors, is supreme commander of the military forces of the republic, appoints the Chancellor and, upon the latter's recommendation, the ministers of government, but the cabinet thus appointed must enjoy the confidence of the Reichstag. All ar¬ rangements and dispositions of the President, in¬ cluding those concerning the army, to become valid, must be countersigned by the Prime Min¬ ister or by a duly qualified government minister. (The President receives a salary of 100,000 marks a year and an additional allowance of 100,000 marks).

Justice is administered through national and state courts and judges administering regular justice are appointed for life. Judges may be permanently or temporarily removed from of¬ fice, transferred to other offices, or retired against their will only by virtue of judicial decisions and upon the grounds and in the forms pro¬ vided by law. Judges may be retired upon reaching age limitations fixed in the Law Code. Extraordinary courts are illegal. (The -new judiciary system of Germany does not differ materially from the old, which is treated under the heading Germany — The Judiciary (6)).

One section of the constitution establishes a national budget system ; another provides for compulsory education for a period of eight years; still another annuls- the constitution of 1871, but provides that other laws and regula¬ tions of the nation shall remain in force in so far as they do not conflict with the new consti¬ tution.

Area and Population. — The present Ger¬ man Empire has an area of approximately 182,- 995 square miles, and a population, according to a census taken 8 Oct. 1919, of 60,846,273. The old Empire had an area of 208,830 square miles and, at the outbreak of the World War in 1914, an estimated population of 67,700,000. Prior to 1918, the third state in size in Europe, Germany is now fourth, being exceeded in area by Rus¬ sia, France and Spain. It is bounded as fol¬ lows : East by Poland, southeast by Czechoslo¬ vakia and Austria, south by Austria and Switz¬ erland, southwest by France, west by Luxem-

burg, Belgium and The Netherlands, northwest by the North Sea, north by Denmark and the naltic Sea. East Prussia, as a result of the 1 reaty of Versailles, is detached from the rest °i by Danzig and the northwest arm

oi Poland. It is bounded southeast, south and southwest by Poland, west by Danzig, northwest by the Baltic Sea, north by Memel and east by Lithuania.

The following table gives the approximate area and population of the states constituting the new German Empire :

States

Anhalt .

Square miles

Population

m o cq

Baden .

7 OOQ CA3

*Bavaria *. . .*

L , ZU o ,

7 1 ACi 12 2

Bremen .

• i 1 , >3oo

1 OAA

Brunswick ....

Hamburg . .

Hesse .

1,050,359

1 70 O OQQ

Lippe .

i , zyu , voo

1 C/l 71 Q

Lubeck .

1 70

Mechlenburg-Schwerin .

Mechlenburg-Strelitz. .

Oldenburg .

Prussia .

658,943

106,394

517,765

37,665,094

A ^2 70Q

Saxony .

Schaumburg-Lippe .

Thuringia .

Waldeck .

46,357

1,508,025

AXO

Wurttemberg .

2,518,773

Total .

60,846,273

• **, Coburg which on 30 Nov. 1919, voted for union*

with Bavaria.

Under the Treaty of Versailles Germany ceded Alsace-Lorraine to France ; the greater part of West Prussia and a part of Eastern Silesia to Poland; part of Upper Silesia to Czechoslovakia ; Memel and Danzig to the Allies; Eupen and Malmedy to Belgium. All told she lost approximately 25,835 square miles of territory with a population of 5,367,621 by these enforced concessions.

Plebiscites for determining the fate of other portions of the German Empire were provided for in the treaty as follows: The Saar Basin, after 15 years; Schleswig, in two zones; certain districts in southern East Prussia, in West Prus¬ sia, and in Upper Silesia. In March 1920, Upper Schleswig voted for annexation with Den¬ mark while Lower Schleswig voted to remain a part of Germany. In July 1920, the East and West Prussian districts referred to voted to remain in Germany. The Upper Silesian plebiscite took place in March 1921. The vote was in favor of Germany, but the Poles, resid¬ ing within the area, rebelled and brought about a . situation which threatened to disrupt the friendly relations between France and Great Britain. For some time there was fighting be¬ tween the insurrectionists, led by Adalbert Kor- fanty, and a small German army under the lead¬ ership of Lieutenant-General Hoefer. France's attitude indicated that she sympathized with the Poles; England took the German side of the issue. Eventually, when a very tense situation had been created, the Poles and Germans were persuaded to suspend hostilities, and the Upper Silesian question was referred to the Allied Supreme Council for settlement. It met in Paris 8-12 Aug. 1921 and, failing to agree, re¬ ferred the whole matter to the Executive Coun¬ cil of the League of Nations, the members pledging

themselves to be bound by the latter's findings.

Defense.— Army — The Treaty of Ver¬ sailles fixed the maximum strength of the Ger¬ man army at 100,000 men, including not more than 4,000 officers. It stipulated that, within three months after its coming into force, the German army should be reduced to 200,000 men and that thereafter it should be further reduced, under supervision of Allied military experts, to the maximum mentioned above. Universal, com¬ pulsory military service in Germany is abolished by the Treaty, so also is the great German gen¬ eral staff, and similar organizations. Germany can recruit and maintain her army only by vol¬ untary enlistments for periods of 25 consecutive years in the case of newly appointed officers and 12 consecutive years in the case of non-commis¬ sioned officers and privates. For further details see War, European — The Armistices (13); Peace Treaties (18).

Navy. — Surrender and other clauses em¬ bodied in the Armistice and the Treaty of Ver¬ sailles virtually wiped the German navy out of existence The armistice required her to sur¬ render or dismantle all of her effective fighting ships while the Treaty forbids her to have any submarines and stipulates that her fleet shall consist of not more than six battleships of the Deutschland and Lothringen type (antiquated vessels displacing approximately 13,000 tons and mounting four 11 inch and 14 6.7 inch guns), six light cruisers, 12 destroyers, 12 torpedo boats, or an equal number of ships built to re¬ place them. The personnel of the navy is lim¬ ited to 15,000 men, including not more than 1,500 officers of all grades, and must be main¬ tained, and recruited by voluntary enlistment en¬ tered into for a minimum period of 25 consecu¬ tive years for officers and warrant officers and 12 consecutive years for petty officers and men. For details see War, European — The Armis¬ tices. (13) ; Peace Treaties (18).

Air Force. — The Treaty provides that the armed forces of Germany must not include any military or naval air forces. See War, Euro¬ pean: Peace Treaties (18).

Fortifications. — 'Germany is required under the Treaty to disarm and dismantle all fortifi¬ cations west of a line to be drawn 50 kilometers east of the Rhine and is forbidden to erect any new fortifications in their stead. The fortifica¬ tions on the eastern and southern frontiers may be maintained.

Reparations.— Under the Treaty of Ver¬ sailles Germany is required to compensate the civilian population of the Allied and Associated powers for all damage done to them and their property during the period of the belligerency of each. A Reparations Commission, appointed to determine the amount Germany should pay, fixed her liability at 132,000,000,000

gold marks, or, in round figures, $33,000,000,000, less such amounts as she already had paid. After vari¬ ous attempts to have the damage bill reduced, Germany, on 11 May 1921, finally agreed to pay in full, having been warned by the Allies that the Ruhr Valley would be occupied by them on 12 May unless she yielded before that date. The reparation terms imposed upon Germany pro¬ vided that she should deliver to the Reparations Commission three instalments of bonds — one instalment, for 12,000,000,000 marks, to be .de¬ livered 1 July 1921, another instalment, for 38,000,000,000 marks, to be delivered 1 Nov. 1921, and a third instalment, for 82,000,000,000

marks, also to be delivered 1 Nov. 1921; all bonds to be secured on all of the assets and revenues of the German Empire and the Ger¬ man States. The bonds in the last instalment are to be held by the Reparations Commission until it is satisfied that the payments, which Ger¬ many is required to make, are sufficient to pro¬ vide for the interest and sinking fund charges thereon. Bonds of the first and second instal¬ ments bear interest at the rate of 5 per cent and in addition carry a sinking fund charge of 1 per cent. Until all of these bonds shall have been redeemed, Germany is required to pay each year 2,000,000,000 gold marks plus a sum equiva¬ lent to 26 per cent of the value of her exports, these payments to be reduced as Germany dis¬ charges her obligations.

Political Part.es. — Soon after the break¬ down, setting in with the flight of the Kaiser and his eldest son to Holland, all the political parties adopted new names, though remaining practically otherwise unchanged. The National People's party, under the leadership of Count Westarp and Baron Gamp, stuck to their old gospel of Pan-Germanism, conservatism, mili¬ tarism and monarchism. Most of the members of the old National Liberal party, under Dr. Stresemann, joined the re-baptized Conservatives. They, too, remain faithful to their old gods. They deprecate and dislike a republic. The Centre is now called the Christian People's party. Their efforts to draw other than Catholic elements have had scant results. Those three parties of the right, then, are capitalistic, though occasionally supporting socialization. On the left, a new German democratic, or liberal, party has been formed out of the smaller left parties of old, and the smaller half of the National Liberal party has joined them. This new party collaborates with the Majority Socialists and shares control of government. As to the dominant, the Socialist party, they split from the beginning of the

war. The seceding members of it, at first a mere handful, crys¬ tallized under the name of Independent So¬ cialists. From the first they opposed the war on several grounds, chiefly because, as they said, it subserved solely capitalistic aims and interests. The Majority Socialists supported the war until the German cause was hopeless. Led by Ebert and Scheidemann, it is this party that has been chiefly in control since the abdication of the kaiser. In theory, therefore, they differ but little from the new German liberal, or demo¬ cratic, party, but very much so in makeup, being proletarian, the other middle-class. The Inde¬ pendent Socialists are really composed of two wings, the Spartacists, or Communists, forming by far the smaller half. The less extreme wing stands on the Erfurt program of the unadulter¬ ated Socialism of 1891 and demand immediate and unreserved socialization. The Spartacists are closely related in their tenets to the Bolshevists of the Lenine type and would abolish all public offices, both in civil administration and army, and for. the latter would substitute a proletarian militia. They opposed violently the new con¬ stitution of Germany, and tried to hinder by all possible means the convening of the National Assembly. . They do not rely on elections, but on direct action. This group, too, is responsible for the almost continuous strikes throughout Germany. The election for the National As¬ sembly was held under the decree of 30 Nov.

1918, providing for universal adult suffrage — there being registered 21,000,000 female and 18,- 000,000 male voters. The voters in Alsace-Lorraine (still German soil at the time) and of the so-called Polish provinces were practically excluded by France and Poland. The proceed¬ ings during the long session of the National Assembly deliberating on a new constitution for Germany, with the avowed purpose of turning a semi-autocratic and wholly militaristic empire into something aporoximating a real republic, were not devoid of general interest. For one thing, during its earlier stages, there was the fear of a coup d'etat undertaken either by the Independent Socialists, and more especially the Spartacists, or by the groups of the right more or less tinged with monarchism and militarism. This fear was not without foundation, as a number of facts proved. Had it not been for very rapid and energetic action taken by Noske, the then Minister of National Defense, strong bands of Spartacists from Jena, Leipzig and Erfurt might have succeeded in seizing Weimar itself and making the holding of the convention impossible or at least hampering it for a time. The monarchists did not play their cards so openly, but they, too, had similar plans afoot. 1 here was, also, at first, much unwillingness shown on the part of the latter to participate in the whole session actively. As during part of the session period clashes between armed troops of new Poland and remnants of the regular German army were rather frequent, some of the monarchist hotheads within the Assembly tried hard to frustrate Ebert in his attempts to main¬ tain, at least officially, the peace.

All these and a number of other difficulties naturally inter¬ fered much with the quiet and orderly discharge of the chief duty devolving on this body com¬ posed of rather heterogeneous elements jointly making up the National Assembly. For an account of The German Revolution of 1918 see War, European : Events Subsequent to the Armistices.

18. GERMANY'S ECONOMIC ORGAN- ˆATION. In the territory which comprised the old German Empire there were only about 16,000,000 inhabitants in the year 1816. When tne empire was founded in 1871, the population was 41,000,000; when Kaiser Wilhelm II came to the throne in 1888, it was 48,000,000 and 25 years later, in 1913, it was 67,000,000. In 1919, despite the loss, as a result of the European War, of 25,835 square miles of territory, embrac- mg a population of 5,367,621, Germany's inhabit¬ ants still numbered 60,846,273. The country's rapid growth since 1888 undoubtedly was due very largely, if not wholly, to its highly devel¬ oped economic organization. The wellsprings of thcd organization may be found in a highly efficient political organization which was devel¬ oped during the reign of Kaiser Wilhelm II The Economic Factors Outlined.— An out- ine of its principal factors will demonstrate its thoroughness. The whole system is co-ordi¬ nated so that, cross-friction is eliminated to the greatest possible extent and every activity of German economy developed to the ultimate de¬ gree. Germany's economic organization really begins in the home with maternity insurance and benefits for certain classes of women workers. . The infant thus, at birth, is already a beneficiary of the system. The child next feels the good influences of the system in the

strict discipline of the German home, which staits him on the path of life with proper re- spect for his parents and a valuable element ot self-control ingrained in his character. The steP is the kindergarten, which gives the child an excellent start for school work. The tegular schooling follows, up to a certain point, where the ˆ wisdom of the system is shown by the branching off which occurs sufficiently early in life to prevent the wasting of years in stud¬ ies that will have no bearing on the pupil's later career.

In the case of pupils taking up technical careers, one year's shop or field work is re¬ quired prior to entering the university.

Upon leaving the primary schools the Ger¬ man youth becomes an apprentice in the trade which he selects. As a rule he is paid a small wage, though in some instances he must work for nothing and in certain trades,

such as that of the goldsmith, he must pay a substantial sum, often as high as 4,000 marks, and in other instances must bind himself for a term of years, in order to gain the privilege of learning the trade. He may also have to agree not to seek employment in certain districts within specified periods and not to become an employee of a competing concern. But because a youth leaves school early on account of not being able to enjoy the advantages of high school education does not by any means block his subsequent progress. After he has learned his trade, at¬ tended continuation school and become a journeyman, he may at a later date become a master workman and be entitled to engage in business on his own account, employing other workmen. His further rise then depends upon his ability, and he may eventually be employ¬ ing as technical experts his apparently more fortunate companions who were able to take the higher branches of education.

The German system sees to it that every youth is given an education and is equipped with a thoroughly mastered trade or profession, and thus the individual is made self-reliant and a useful member of society. As the master workman must pass a state examination before being allowed to engage in business on his own account, it is obvious that the public cannot be practised upon by fakirs and incompetents as no such persons have licenses to engage in business. Bismarck laid down the principle of the right to work and he embedded it in the German economic system in such a way that every man who is willing to work need never go hungry. To carry the principle into effect, the state first conducts employment bureaus to the number of over 300, in different parts of the country. Over a million positions annually are filled in this manner and the man and the job are thus brought together. The labor exchange in Berlin was established in 1888 and finds em¬ ployment annually for over 100,000 persons at an operating cost of $25,000.

The right to work is not interpreted to mean that every man must be provided continu¬ ously with a highly paid position, a thing be¬ yond the powers of any state, but it is regarded as meaning that the state's duty is to provide temporary opportunities for work during periods of industrial depression, which will serve to tide the workman over. The work provided by the state in Germany at such times is on public enterprises which may thus be con¬

structed without drawing labor from other fields of industry. In the conduct of such en¬ terprises, it has been found, however, undesir¬ able to offer wages much below the prevailing rate, on account of its demoralizing effect upon industrial conditions in general. The right to work is a principle which has, however, a broader application than the mere phrase im¬ plies. It applies not only, as indicated, to the providing of employment bureaus and

of actual work in times of depression, but also among other things to the safeguarding of the inter¬ ests of the worker in his position. The prin¬ ciple does not extend, of course, to the point where the worker may be regarded as having a vested right in his position, but once he has a position, he is guaranteed against sudden ter¬ mination of the work and against impositions on the part of the employer. This is accom¬ plished largely through the industrial courts which are preliminary or informal courts in which minor matters of dispute are considered. Every city of 20,000 or upwards has one or more of such courts, of which there are about 500 in all Germany. In the year 1908 the num¬ ber of cases in the industrial courts was 112,281. Such courts are prompt, economical and effi¬ cacious. Over 90 per cent of the cases brought in them are so adjusted and only 7 per cent are appealed to the formal courts. One and one-half per cent of the cases last over three months and the costs are only those actually incurred. Such proceedings are more in the nature of arbitrations than of court actions, but they are very effective since business men and employers do not like to have a record of being continually haled before the court. Employers also resort to the industrial courts, though not by any means to the extent of the actions taken by employees. In 1908, of 14,522 cases brought in the industrial courts of Berlin, 702 cases were brought by employers and 13,820 by employees. The econ¬ omy and ease of taking such action is highly beneficial, since both employer and employee, knowing that unjust and oppressive actions can be so quickly brought to book, are more careful to act justly and equitalbly.

In pursuance of the policy of the right to work, the German workman is given every in¬ centive to remain permanently in his position, and there is accordingly little changing from position to position. This German tendency to stick to the job has the effect of stimulating German industry as a whole in a marked man¬ ner, since the workingman, expecting as he does to remain permanently with the one firm, becomes more diligent in promoting the firm's business than if he expected to remain only a short time, since his own continued prosper¬ ity depends on the firm's prosperity. The Ger¬ man workman also is induced to remain per¬ manently in his position through contributions to accident, sickness and other insurance and pension funds. To change his position then means a loss of money and seniority of benefits so that it is often more lucrative to remain than to change.

German concerns of large size often build garden cities and erect workingmen's homes which are rented or sold to their workmen on very favorable terms, while residence in such garden cities or workingmen's villages is more economical than residence elsewhere, through

the purchase of supplies in bulk and the oper¬ ation of company's stores or of communal co¬ operative stores.

Workingmen's Insurance. — An especially important feature of Germany's economic or¬ ganization is her highly developed systems of workingmen's accident, sickness, invalidity and other forms of compensation insurance. Both employers and employees are obliged by law to contribute to such insurance funds, and the re¬ sult is that a German workman, when injured or ill, is not left without assistance, nor his family in distress, at the moment he is incapac¬ itated.

Compensation insurance has reached an enormous state of development, over 50,000,000 policies being in force, although there are not that many individuals insured since many are protected by more than one kind of policy. In 1910 the premiums which had been paid to workers since the inception of the system amounted to over $2,000,000,000, while over 95,000,000 cases of sickness among the insured had occurred. The following table shows the vast extent of compensation insurance :

Co-operative Loan Societies.

GERMANY, 1911

952 Schulze- Delitzsch Co-operative Societies

Other Co-operative Societies

(Co-operative Societies Statistically Included)

Members .

620,660

1,755,175 (15,473)

MillionMarks

Million Marks

Loans granted during the year .

4,428

1,285

226

99

1,223

1,945 (13,642)

2,154 (13,800)

102 (15,473)

93 (15,473)

2,685 (13,872)

Debtors at end of year. Deposits by members. .

Reserve funds .

Outside creditors .

A form of communal co-operative activity which forms an important factor in Germany's economical development is that of Consumers' Unions. As will be seen from the table there are some 2,300 co-operative stores which are the retail selling depots of the Consumers' Unions. The principle upon which this form

Compensation Insurance.

FORM OF INSURANCE

Number of insured in

1910

Compensation paid to workers

Number of cases in which payments have been made

Since

beginning

1910

Since

beginning

1910

In million marks

Sickness insurance .

13,955,000

24,154,000

15,660,000

4,352

1,973

2,068

357

164

197

92,582,319

2,273,130

5,060,300

5,704,429

1,017,570

1,335,697

Accident insurance .

Invalidity insurance .

Tqtal .

8,393

718

99,915,749

8,057,696

Co-operative Societies. — The value of Ger¬ many's policy of economic organization is shown by the great number of co-operative societies and organizations which are in exist¬ ence, largely the result of encouragement by the governmental departments. The tremen¬ dous effect of such widespread co-operative endeavors is obvious and is one of the import¬ ant factors in Germany's progress. There are some 32,000 co-operative societies with about 5,000,000 members, of which two-thirds are agricultural in character. The most important of the societies, however, are the co-operative loan societies, numbering over 18,000 and hav¬ ing a membership of 2,500,000 with an annual turnover equivalent to six and a quarter bil¬ lion dollars. The increase of co-operative societies in the past generation is surprising, as will be seen from the following table:

Number of Co-operative Societies.

FORM 1880 1911

Co-operative loan societies . 1 , 895 18,126

Co-operative trade societies . 333 1,961

Co-operative agricultural societies (1895). . 2,956 7,089

Co-operative stores . 645 2,355

Miscellaneous societies . 1,920

The great volume of business of the co¬ operative loan societies may be seen from the following table, divided between the Schulze- Delitzsch and other co-operative societies :

of co-operative activity is based is that of wholesale purchasing for the benefit of the consumer-members. The members of a con¬ sumers' union pay a small annual fee for their membership cards in the union and they then patronize the union's store, paying cash for their supplies. The manager of the store collects information from the members from time to time as to what their probable needs will be during ensuing seasons for the various kinds of products. This information he compiles and uses as a basis for the wholesale purchases of the store. In this manner the store is able to order the proper quantities of produce and knowing in advance when it will be required can always order to the best advantage. As vari¬ ous stores unite into general organizations and increase further by the establishment

of addi¬ tional stores and local unions, the purchasing power of a group of stores becomes very great and the produce needed is thus obtained on the most favorable terms possible. The unions issue bulletins or small newspapers periodically, giving prices and market conditions and advis¬ ing members of opportunities to make favorable purchases. The bulletins also contain recipes for cooking and other information of benefit to the members.

The unions do not attempt to make a profit but sell as nearly as possible at cost plus over¬ head charges and expense of handling. A

small surplus accumulates, however, on account of the margin being kept on the right side. Ihis margin is distributed to the members as an annual dividend in proportion to the aggre¬ gate amount of their purchases. This distribu¬ tion usually occurs just before Christmas and serves as a fund for the purchase of Christmas presents. The popularity of consumers' unions is very great and they perform a considerable service, not only reducing the cost of living to their members but in acting as a standard by which the patrons of other stores may judge whether or not they are being overcharged.

The German government, through its health officers and through stringent regulations, en¬ sures to the public a high standard of food products free from adulterations. The Ger¬ man economic system does not stop, how¬ ever, with providing work and guarding the public health and purse, but con¬ tinues even to the supervision and manage¬ ment of various forms of amusement for the public. A considerable part of this work is done by municipalities rather than by the gen¬ eral government and each city has officials who have charge of public amusements in the parks and playgrounds where athletic contests and games are conducted and all sorts of outdoor sports encouraged. The cities also subsidize theatres and theatrical companies, which en¬ ables theatrical performances and operas to be given at extremely low prices. Such perform¬ ances are regarded as of educational value and it is no more expected in Germany that the classics of music and drama will pay their own way than that the public schools could be con¬ ducted by charging admission. In addition to dramatic and operatic performances, the municipalities supply concerts and lectures of various kinds and the public thus has a wide variety of recreations to draw upon. The di¬ rection of such recreations is recognized as a definite occupation and is placed in the hands of experts.

The Birthrate and Immigration. — Ger¬ many's prosperity has had the effect of decreas¬ ing her birthrate, a practically invariable re¬ sult of

national prosperity, though this univer¬ sal law has had much less effect in Germany than elsewhere. The reduction of the death- rate, however, has been much more rapid so that the net result has been favorable. From 1871-80 to 1901—10 the number of births per 1,000 inhabitants dropped from 40.7 to 33.9, while deaths dropped from 28.8 to 19.7, with the re¬ sult that the birth excess increased from 11.9 to 14.3, this being due to decrease of deaths more than to the birth figures. From 1871 to 1880, however, was a post-bellum period dur¬ ing which there is naturally a large birthrate. Although the rate of increase is not as favor¬ able as might be desired, a comparison with the figures of immigration shows in a true fight the prosperity of Germany. In the dec¬ ade 1881-90 there were 1,342,000 German emigrants as compared with a total birth ex¬ cess of 5,500,000; in the following decade there were 528 000 emigrants to 7,300,000 birth ex¬ cess, while in 1901-10 there were but 220,000 emigrants (an average of 22,000 per year) compared to a birth excess of 8,670,000. In 1912 the number of German emigrants was 18,500, while in 1913 it was but 13,000. The position of Germany, too, is seen to be much

more favorable, when immigration is con¬ sidered, for since the middle of the nineties there has been an excess of immigration over emigration.

Savings Bank Deposits. — The remarkable efficacy of the German economical organiza¬ tion is reflected in savings bank deposits. In 1910 there were 21,534,000 savings bank de¬ positors in Germany, whose deposits aggre¬ gated 16,780,500,000 marks, or an average of $64 per capita for the entire population, in¬ cluding non-depositors. The savings bank de¬ positors of the United States numbered 9,143,- 000 and had on deposit the equivalent of 17,- 096,000,000 marks, an average of $46 for the whole population, while the depositors of Great Britain numbered 13,209,000 and had on deposit the equivalent of 4,422,300,000 marks, an aver¬ age of $24 per capita, and France had 14,069,- 000 depositors with deposits equivalent to 4,514,500,000 marks, an average of $28 per capita.

Germany's Technical Organization.— The

underlying technical principle of Germany's eco¬ nomic organization is the development of her re¬ sources in population and the sale of their prod¬ ucts ; that is to say, she develops the laborer into the skilled artisan and then utilizes his skill in transforming low grade raw materials into highly valuable finished products. The prin¬ cipal export of Germany, accordingly, is the skill of her artisans and technicians, the raw material plus the skilled labor-technique con¬ tent. As Germany's population is increasing rapidly, at the rate of about 1,000,000 per year, there is thus no

limit to the prosperity that may be attained. The part that is played in the de¬ velopment of Germany's resources in skilled labor by her technical organization is of para¬ mount importance, for skilled workmen would not be so great an asset without inventors and technicians to devise and improve manufactures and processes for them to carry into execution. Germany accordingly devotes great attention to the subject of technical and scientific education. Technical training is begun early in the school life and there are a large number of technical schools, high schools and universities, the lat¬ ter having world-wide reputation as the fore¬ most institutions of their kind. In addition, the government maintains testing laboratories and research institutions while large concerns have staffs. of investigators, inventors, scientists and technicians constantly at work in producing new inventions and processes.

The patent system of Germany is adapted to give the greatest possible protection to the work of inventors and the banking system to extend adequate financial encouragement, so that no. man in Germany with an idea need let it remain unused. On the contrary, every man who is capable of producing new ideas meets with every possible encouragement. The great technical and scientific activity of Germany is shown by the number of scientific books pub¬ lished which amounted to 10,400 volumes in the year 1910.

Illiteracy. — Another evidence of the effect¬ iveness of Germany's system is seen in a com¬ parison of illiteracy in the various countries. There is practically no illiteracy in Germany, it being less than .02 per cent. The number of illiterates in Belgium is 10.2 per cent; in France, 14 per cent; in Great Britain, 13.52 per cent;

in Italy, 30.6 per cent; in Austria, 26 per cent; in Hungary, 40.9 per cent; in Russia, 617 per cent ; and in the United States, 7.7 per cent.

Bibliography.— Helfferich, Dr. Karl, Ger¬ many's Economic Progress and National Wealth> (Berlin 1914) ; Koester, Frank, (The Price of Inefficiency (New York 1913), and 'Secrets of German Progress* (New York 1915) ; Dresdner Bank, 'Germany's Economic Forces) (Berlin 1913) ; 'Deutschland als W.elt- macht* (Berlin 1911).*

Frank Koester,

Consulting Engineer , New York City.

19. GERMANY'S NATIONAL WEALTH. For many generations the poor neighbor nation of Europe, Germany after 1890 acquired wealth and prosperity. The in¬ crease of wealth is indicated by the savings bank deposits. In 1888 they amounted to $1,137,500,000 while 25 years later they had grown to $4,500,000,000, an increase of nearly 400 per cent.

During the same period the total turnover of the Reichsbank (Germany's governmental central bank) including checks and discounts increased from $19,950,000,000 to $103,500,- 000,000, while the turnover of the Deutsche Bank, the largest private bank, increased from $4,525,000,000 to $33,050,000,000. Bills of ex¬ change increased from $3,000,000,000 in 1887 to $8,500,000,000 in 1912. The expansion of in¬ ternal trade is shown by the increase of the post office receipts from stamps and telegraph messages from $47,500,000 in 1887 to $196,000,000 in 1911. The total deposits in banks and other institutions of deposit were $1,625,000,000 in 1888, but by 1913 the aggregate was $7,500,-

000,000.

A collateral evidence of the growth of wealth in Germany is seen in the increased consumption per capita of products of various kinds. At the close of the Franco-Prussian War the general standard of living was low and there were few large cities. Modern stand¬ ards of living were confined to the well-to-do and frugality was the necessary virtue of the times. The increase of wealth was accom¬ panied by increasing demands for better living conditions. A comparison with the increases of other countries shows that from 1886 to 1906 the consumption of wheat and rye in Ger¬ many per capita increased 39 per cent, in the United States 28 per cent, in Italy 18 per cent and in Austria-Hungary 16 per cent, while the consumption in Great Britain remained station¬ ary and in France decreased 4 per cent. In barley, oats and potatoes Germany's increase per capita was 70 per cent, 39 per cent and 49 per cent respectively. For the consumption of meat, statistics are less completely available, but indicate a consumption (1912) of 51.9 kilo¬ grammes (113 pounds) per capita. This com¬ pares with the figures for 1904 in Great Britain. Between 1890 and 1904 the British consumption increased from 99 to 114 pounds per capita. There was in 25 years no increase per capita in the consumption in Germany of alcoholic beverages or of tobacco. The per capita consumption of sugar, although it in¬ creased from 14.9 to 41.8 pounds per capita from 1885 to 1911, remained far behind that of other countries, whose increases were as fol¬ lows: Russia, from 8.1 to 22.2 pounds; Aus¬ tria, from 11.2 to 28.6 pounds; France, from

25.9 to 42.5 pounds, now equal to Germany's; the United States from 49.3 to 79 pounds and Great Britain from 70.2 to 90.4 pounds. In cotton there

was an increase in Germany of from 9.2 pounds per capita in 1886 to 13.4 in

1912.

A number of estimates of Germany's na¬ tional wealth and income have been made from time to time and these estimates accord within reasonable limits. Any estimate of national wealth and incomes must naturally be more or less approximate, as many factors escape sta¬ tistical review, but the means of checking the figures which are available prove that the final results are reasonably accurate. The returns of the income tax provide a means of estimat¬ ing the private income of the citizens in gen¬ eral. The figures are taken from 1896 onward as the income tax was not established until 1892 and several years were required to get it into normal operation. The income tax in Prussia is more stringently enforced than in the other two-fifths of Germany, and furnishes a more exact index of incomes than do any other returns. The result of Prussia's assess¬ ment for 1912 showed aggregate taxable in¬ comes of $3,810,000,000. The incomes of those exempt from the tax and of those whose in¬ comes were too small to be taxed amounted to about $1,785,500,000. These two items aggre¬ gate $5,595,000,000. An addition of 10 per cent is considered proper to cover taxable incomes which evade taxation, which would amount to $381,000,000. A further addition should be made to cover earnings placed in reserve by corporations, instead of being declared in divi¬ dends, which is estimated at $55,000,000. The total for Prussia would thus be about $6,000,- 000,000. The population of Prussia being about 40,000,000, the average income on this basis would be about $150 per annum, or for a family of six, the average size, $900 per annum.

In Saxony and the Hansa cities incomes are higher, while in Baden, Wiirtemberg and the Thuringian states they are lower, but on the whole the average throughout the empire is about equivalent to that of Prussia. Applying the Prussian average to the whole population the grand total of private income would be from $9,750,000,000 to $10,000,000,000 per annum. To the total of private incomes should be added the net income of public corporations, or about $250,000,000 more, so that the income of the citizens and corporations amounts to fully the estimated figure of $10,000,000,000. It should be. noted that dividends are included in the private income, rather than as corporation net income. A calculation for the year 1896 would show an analogous income of $5,375,000,000 or about $102.50 per capita. The increase of the aggregate income during the 16 years there¬ fore amounts to about 80 per cent, while the increase of the average per capita income is about 45 per cent.

The income of the French people was esti¬ mated some years since at

$6,250,000,000, at a time when the German income was about $8,-750,000,000. . Taking the year 1908 as normal, the average income of the German people would be $138.75 (555 marks) as compared with $128.50 (514. marks) for the French people.

The English national income was estimated some years since, at about $8,750,000,000, or exactly equal to that of Germany at the time.

Sv2S'7ctke avera8e English income would be • u cj? (815 marks) per cap.ta as compared with $138.75 per capita for Germany.

ihe statistics of savings banks for 1910, however, show that Germany had 21,534,000 depositors with an aggregate of $4,195,125,000 on deposit, an average of $64 per capita, for the whole population, whde Great Britain had 13,209,000 depositors with an aggregate of $1,055,575,000 on deposit, an average of $24 per capita, while France had 14,069,000 depositors with deposits of $1,128,625,000, an average of $28 per capita, and the United States had 9,143,000 depositors with an aggregate of $4,-274,000,000 on deposit, an average of $46 per capita.

An illustration of the increase of wealth in Germany is seen in the number of those who have passed into the income tax paying class in Prussia, which is representative of the whole country. The number of persons with incomes of $225 or below decreased from 8,614,000 to 8,159,000 in the period from 1896 to 1912. The number of taxpayers with incomes above $225 rose from 2,859,000 to 7,542,000. There were thus about 500,000 fewer low-incomed persons and about 5,000,000 with higher incomes. The number of persons exempt from the tax, in¬ cluding their dependents, fell from 21,066,000 to 16,005,000, but the number of taxpayers, in¬ cluding their dependents, increased from 10,- 283,000 to 24,232,000. Thus while more than two-thirds were exempt from the tax in' 1896 because their incomes did not reach the mini¬ mum tax limit, in 1912 less than two-fifths were exempt.

The increase of those taxable indicates the prosperity among those whose incomes are in the lowest classification, but a striking proof that wealth is equitably distributed in Germany is shown in the increases in the next two classes, those whose incomes range from $225 to $750 per annum and those whose incomes range from $700 to $1,500 per annum ; that is to say, the middle classes. For a just comparison the fact should be borne in

mind that the pur¬ chasing power of the dollar in Germany is almost double that of the dollar in the United States. In these two groups the increase of income since 1896 has been about $1,700,000,000, while the aggregate increase of all taxable in¬ come was about $2,250,000,000. The middle classes have thus absorbed the larger part of Germany's prosperity. In 1896 the number of persons in the class $225-$750 was 2,321,000 and they had incomes of $799,250,000, while in 1912 they had increased to 6,123,000, with in¬ comes amounting to $2,146,000,000. In 1896 the number of persons in the $750-$!, 500 class was 215,000, with incomes aggregating $218,500,000, while by 1912 this class had increased to 548.000, with incomes aggregating $536,000,000. Thus these classes enjoyed two and one-half fold increases.

In higher classes the increases were not so large, but it is to be noted that the increases in the $750— $1 ,500 group was lessened by those who passed to the next higher state. In the highest group of all, those having incomes of $25,000 or over, the total in 1896 was 1.700 per- sons, with aggregate incomes of $100,000,000, while in 1912 this class had 4.500 members with aggregate incomes of $273,500,000.

That the increase in incomes in Germany was not due merely to more rigorous assess¬ ments is shown by the fact that wages have similarly increased. As an example, the wages of coal miners may be taken. In 1888 in the Dortmund district the average yearly wages were 863 marks ($215) and in upper Silesia 516 marks ($129). In 1913 the figures had in¬ creased to 1,586 marks ($396.50) and 1,053 marks (8263.25) respectively, or in one instance more than double. The figures are net as payments for insurance averaging 204 marks ($51) per annum are deducted. Other wage figures dem¬ onstrate the same truth, that Germany's wealth is widely distributed.

The yearly income of all Germany of $10,- 000,000,000 is the gross result of Germany's economic activity. To obtain the net result it would be necessary to deduct the amount con¬ sumed each year, the greater part of which is used in meeting living expenses and in state administration. Although the state expenses might be ascertained, it is not possible to esti¬ mate private expenditures, so that to find out the amount of Germany's annual surplus it will be necessary to ascertain the annual increase of the national wealth, which can be estimated within reasonable limits.

A preliminary basis for estimating national wealth is to be found in the property tax assess¬ ment. The following table shows the increase in tax assessments for Prussia from 1896 to

1911 :

YEAR

TAXABLE

PROPERTY

Increase

Total

Per annum

1896 .

$15,894,500,000

17,510,500,000

18,912,500,000

20,602,500,000

22,913,250,000

26,014,250,000

1899 .

1902 .

1905 .

1908 .

1911 .

$1,616,000,000

1,402,225,000

1,689,750,000

2,310,750,000

3,104,000,000

$538,750,000

384,000,000

563,250,000

770,250,000

1,117,000,000

The taxable property of Prussia was thus in the year 1911 $26,000,000,000. Allowing an addition of 20 per cent for unassessed property, since no declaration is required and since landed estates are returnable at a value esti¬ mated on net income and not on property values, and further additions for tax exempt properties ; for those which are exempt when the owner's income is below 900 marks ($225) ; for furniture, clothing and household utensils and for certain other properties, the total amount of private property in Prussia may be fairly esti¬ mated at $40,000,000,000, which is an average of $1,000 per capita for the whole population. Assuming the same ratio for the other states, the total of private property for the whole of Germany would be $65,000,000,000. To the pri¬ vate property must be added the value of the state railways, estimated at some $5,000,000,000 to $6,250,000,000. In addition must be. included the property of the states and municipalities which are engaged in many enterprises, such as mining, forestry, canals and river improve¬ ments, post-office, telegraphs, gas, electric and waterworks, public insurance institutions and the like, schoolhouses, administrative buildings,

etc., and the property of the army and navy. A conservative estimate of these assets would be from $6,250,000,000 to $7,500,000,000, so that the total assets of the empire, states and com¬ munities, would be about $12,500,000,000, from which, however, $6,250,000,000 should be de¬ ducted as representing the public debt. Adding the public property to the private property the grand total of $71,250,000,000 is obtained.

A valuable check on this estimate which proves that it is low rather than high is seen in the insurance on real and personal property carried by German policyholders.

tions of foreign companies and various agri¬ cultural, industrial and commercial undertak¬ ings conducted by Germans, have been variously estimated, holdings of securities alone being estimated at from $2,500,000,000 to $3,500,000,- 000; but the total of all foreign interest may be conservatively put down at $5,000,000,000.

It will thus be seen that while the estimate of Germany's wealth based on the property tax yielded a total of about $71,250,000,000, the second method, which mainly uses the fire in¬ surance statistics, gives a total value of $83,- 000,000,000. It may be assumed that the actual

Insured Values (In millions of dollars).

YEAR

In public institu¬ tions

In joint- stock companies

In mutual associa¬ tions

Total

Increase

Total

Per annum

1896 .

10,725

13,766

15,290

17,369

19,842

15,760

20,164

23,411

27,203

30,905

2,840

3,072

3,646

4,017

4,500

27,235

37,003

42,242

48,592

55,249

1902 .

7,678

5,244

6,342

6 , 659

1,279

1,748

2,114

2,219

1905 .

1908 .

1911 .

These figures include some $5,000,000,000 carried by German companies which must be deducted, being insurance on property outside of Germany, leaving a total of $50,000,000,000 for real and personal property in Germany cov¬ ered by insurance. This is a very conservative estimate since no addition is made for German property abroad insured outside of Germany. It fails also to include property not insured or inadequately insured. Furthermore, it cannot include land values which are not insured. Estimates of the value of land vary greatly,

ranging from $12,500,000,000 to $25,000,000,000!

The value of land in cities based on an estimate of the land value of Berlin at from $1,750,000,000 to $2,000,000,000 would indicate for all German cities a value of $7,500,000,000. Agricultural lands and forests in Germany amount to about 50,000,000 hectares (123,500,000 acres). Of this 26,400,000 hectares (62,208,000 acres) are devoted to fields, gardens and vine¬ yards, about 6,000,000 hectares (14,820,000 acres) to meadows, 2,700,000 (6,669,000 acres) to pastures and 14,000,000 hectares (34,500.000 acres) to forests. An average value of $200 per hectare ($81 per acre) for the land, in¬ cluding all improvements not insured against fire, would show a total value of $10,000,000,000 for all lands outside of the cities. The mining property not insured against fire is valued at $1,250,000,000 to $1,500,000,000. Vessels in in¬ land and seagoing commerce not insured against fire are valued at $250,000,000, and the value of goods in transit at least another $25,000,000. Metallic money in circulation amounts to about $1,000,000,000. In addition the property of the state railways is not in¬ cluded in the list of property insured against fire, its value being estimated, as stated, at about $6,250,000,000. The same is true of har¬ bor works at seaports and on internal water¬ ways and of certain other public works and properties, such as post office and telegraph facilities and public buildings, which may be estimated at $2,500,000,000 for the group.

Germany's investments abroad, including foreign government bonds, stocks and obliga-

value of Germany's national wealth lies be¬ tween the two limits or in the neighborhood of

$75,000,000,000.

Bringing together the various forms of pub¬ lic wealth, the following result is obtained:

Real and personal property insured against

fire .

Land in city and country .

Mining property .

Shipping, goods in transit and metallic

money .

Public property, including railways, not

insured against fire .

Capital investments abroad .

$50,000,000,000

17,500.000,000

1,500,000,000

1,500,000,000

7,500,000,000

5,000,000,000

Total

$83,000,000,000

In 1895 the national wealth of Germany was estimated at about $50,000,000,000, but since that time the property assessed in Prussia for the property tax has increased in value from $15- 894,500,000 to $26,014,250,000 or some 65 per cent, and the real and personal property in¬ sured against fire increased in value from $29 – 325,000,000 to $52,600,000,000 or nearly 80 per cent. Even if one-fourth of such increase be regarded as due to a more rigid assessment and a more complete insurance of property, an in¬ crease of national wealth of from 50 to 60 per cent between 1895-96 and 1910-11 would be indicated. If the national wealth of $50,000,- 000,000 in 1895 be assumed to have increased proportionately, the total would now reach $75,000,000,000 to $80,000,000,000 for 1910-11, a lesult which is not far from the previously

Ennnnestimates of $71 >250,000,000 and $83,000,- 000,000. These estimates ind'cate a per capita wealth of from $1,150 to $1,225 for the entire population of Germany.

The yearly gross profit of the German peo¬ ple, estimated at $10,000,000,000, is to a great but not yet determinable extent absorbed in ex¬ penses. The remaining surplus is the yearly increment of wealth, or national savings. A considerable, part of the expense or absorption of income is taken up by the governmental expenses. Those of the empire amount to about $750,000,000 and those of the several states to about

$1,450,000,000, or a total of

mnmn0ˆ'00?' 0f.1thls total> however, $900,- 000,000 is for railways and other business undertakings of the empire and states, which is balanced by receipts and thus not chargeable as net expenses. The sum of $1,300,000,000 re¬ mains as the actual consumption for public purposes. The special expenses of the govern¬ ment in business undertakings also are not properly chargeable against expenditures, as they aie merely transactions of a commercial nature.

To the state expenditures must be added the expenses of municipalities and other public corporations and governmental organizations which amount to about $500,000,000. The total consumption for administrative purposes is thus about $7,000,000,000, or about one-sixth of the gross. This total does not include the con¬ tributions for labor insurance, now exceeding $250,000,000 a year, or more than the total normal expenses of the army and navy in times of peace. These contributions partly reappear as national savings or investments and partly as income in the cases of those who receive pensions or aid from the funds. Only the cost of administering the funds, about $20,000,000 a year, should be charged as expense.

The goyernmental expenses are the only ex¬ penses which can be estimated with any de¬ gree of accuracy, as personal expenditures can¬ not be ascertained. Since, however, the na¬ tional savings appear in certain definite forms, such as new issues of securities, bank deposits, savings bank deposits, co-operative loan socie¬ ties, etc., a useful estimate may be made by calculating what remains rather than what is spent. In the 27 years from 1886 to 1913 the issue of new stock exchange securities has been from $13,250,000,000 to $13,500,000,000, or some $500,000,000 annually. For the last seven years the increase has been very nearly $750,000,000 per annum. While a considerable part of the new securities represent refunding operations and the transformation of private firms into corporate organizations, there has been on the other hand a considerable investment in foreign securities and in home securities not listed on the exchanges.

The deposits in German credit banks in¬ creased from 1895 to 1912 more than $1,875,- 000,000, having risen from $442,500,000 to $2,340,000,000; the yearly average having been about $140,000,000. The German savings banks increased from $1,700,000,000 in 1895 to $2,200,- 000,000 in 1900 and to $4,450,000,000 in 1911. This is a total

increase of $2,750,000,000 from 1895 to 1911, or an average of $172,500,000 a year. The assets of the labor insurance institu¬ tions have a yearly gain of at least $125,000,000.

The sum of these items of new issues of securities, bank and savings bank deposits and the increase of labor insurance assets amounts to $1,125,000,000. This sum, however, repre¬ sents only a part of the increment as it does not include the _ new capital that goes into the numerous private companies and enterprises that escape statistical notice, nor the ever-growing personal property of the general public. The increasing demands for articles of comfort and luxury as individual incomes increase is also a large factor in the disposition of the income increment. A still further manifestation of the national savings is seen in the increased price of land, especially in growing cities, a form of

increment which is unearned as far as the indi¬ viduals who are the beneficiaries of it are con¬ cerned, but which in the eventual analysis is an inclement earned by the public in general, and in the main coming into the hands of the for¬ tunate individuals obtaining it through increased rents and the increased cost of merchandise resulting therefrom. In some German states, however, this increment is the subject of a tax. According to the estimates which have been given, about one-third of the total wealth of Germany is represented by the property as¬ sessed in Prussia for the property tax, amount¬ ing to $26,000,000,000, while two-thirds of the total wealth is represented by the property in¬ sured against fire, or some $55,250,000,000.

Using these figures as a basis for calculation and deducting one-fourth as an allowance for a more rigorous assessment and a more com¬ plete insurance, the following conclusions are reached regarding the growth of the entire national wealth of Germany. The increase of the property tax from $15,900,000,000 in 1896 to $26,000,000,000 in 1911 was about $10,000,000,000. The increase of the total wealth according to that ratio would be three times as great, or $30,000,000,000. Deducting the one-quarter allow¬ ance noted the net sum would be $22,500,000,000, or an average of $1,500,000,000 a year for 15 years. The increase, however, was much more rapid during the latter part of the period, in¬ creasing from about $1,000,000,000 a year during the early years of the period to about $2,500,- 000,000 a year during the latter part. Estimates of the yearly increase based on the figures for fire insurance show the increase to be some¬ what larger. The increase in insurance was from $29,325,000,000 in 1896 to $55,250,000,000 in 1911, or about $26,000,000,000. Adding half this amount and deducting the one-fourth allow¬ ance, the total increase would be $29,250,000,000, or nearly $2,000,000,000 per year. The increase during the first few years of the

period is a little less than an average of $1,500,000,000 per year while during the last few years of this period the increase is a little less than an aver¬ age of $2,500,000,000 a year, or very similar to the average shown by the first estimate.

From these estimates it would appear that the annual increase of Germany's wealth aver¬ aged from $1,500,000,000 to $1,750,000,000 for 15 years, and that in late years the increase was at the rate of about $2,500,000,000 a year, about one-half of which came into evidence in the new securities and other visible forms of invest¬ ment mentioned. This includes, of course, as nearly as may be ascertained the unearned in¬ crement before mentioned. Various estimates have been made of the total of the unearned increment, the most careful computations plac¬ ing it at from $375,000,000 to $500,000,000 per year, including all lands and properties to which such value accrues. Deducting this from the previous figures the yearly increase of the national wealth directlv earned is seen to be from $2,000,000,000 to $2,125,000,000 per year.

While these figures are as nearly correct as may be it is obvious that no estimate of na¬ tional wealth can lav any claim to mathematical exactness. The approximation, however, is sufficiently valid to indicate in broad outline the resources, income and capital of Germany. A further factor of uncertainty is the value of money itself which appears to have depreciated

to a certain extent all over the world, though not sufficiently to have any great effect on the figures given. From the estimates made, Ger¬ many's wealth may be summarized as follows :

The national income amounts to $10,000,- 000,000 per year as compared to $5,500,000,000 to $6,250,000,000 in 1895. Of this income of $10,000,000,000 about one-sixth, or $1,750,000,000, is devoted to public purposes, and about $6,250,000,000 is consumed for private purposes, while from $2,000,000,000 to $2,125,000,000 (in¬ creased to $2,500,000,000 by the unearned incre¬ ment) is annually added to the national wealth, compared with from $1,125,000,000 to $1,250,- 000,000 annually 15 years before. The total national wealth of Germany in 1911 amounted to more than $75,000,000,000 as compared to $50,000,000,000 in 1895. These figures demon¬ strate the strides made by Germany before the war.

Bibliography. — Helfferich, Dr. Karl, Ger¬ many's Economic Progress and

National Wealth5 (Berlin 1914) ; Koester, Frank, (The Price of Inefficiency5 (New York 1913) ; and (Secrets of German Progress5 (New York 1915) ; Dresdner Bank, Germany's Economic Forces5 (Berlin 1913) ; (Deutschland als Weltmacht5 (Berlin 1911).

Frank Koester,

Consulting Engineer, Neiv York City.

20. GERMAN COMMERCE. History.—

Until the beginning of the 19th century the smaller German states and the different prov¬ inces of the larger German states were sepa¬ rated from each other by customs boundaries. Not only the states but the provinces being semi-independent the organization of national production was inefficient, commerce small and, over those economic boundaries, restricted to a few articles of high quality or to monopoly products, the standard of living low and con¬ sumption limited to what we think now to be almost the necessities of life. But in this way a diversity of production and accordingly a diversity of human interests were kept alive.

Prussia in 1805, under Freiherr von Stein, was leading in breaking up these local economic units by abolishing the customs boundaries which separated her different provinces. By that measure in connection with the develop¬ ment of the means of transportation (build¬ ing of roads, canals, somewhat later railroads and the introduction of steam power) and the favorable geographic position of Prussia to the most important navigable rivers of Ger¬ many, Prussia's economic preponderance amongst the states of the German Federation, as founded by the Congress of Vienna, was secured. In 1833 the economic union between Prussia and the most important South German states was established by the famous Customs-Union (Zollverein), which was extended during the '40s and '50s over almost the whole of modern Germany and became more and more centralized under Prussian leadership.

In fact, the economic union of Germany was well-established before the political union was won, simply by economic necessity and of course sometimes against the sentiments of the statesmen of the middle states. The economic meaning of the foundation of the German Empire was the stabilization of peace. The German question was settled satisfactorily to

the German states and the German people, stabilizing the European equilibrium by creat¬ ing a strong and essentially peaceful state and replacing the European battlefield of fore¬ going centuries, under the leadership of Bis¬ marck, who was a European no less than a German

statesman.

From 1840-1910, while the population has increased about 100 per cent, the value of the total foreign trade (imports and exports) has increased 1540 per cent. Since the foundation of the empire, while the population has in¬ creased by more than one-half, the tonnage of imports has risen above four and one-half times, that of exports almost six times, and the value of imports has increased almost three • times and the value of exports nearly four times. In absolute figures, the value of the trade in the three main divisions of trade statistics, in raw materials, in manufactures and in foodstuffs and animals, has risen as well in exports as in imports from 1874 to 1913. But the relative importance of these three headings has changed considerably. Both exports and imports of manufactures have increased relatively, both exports and imports of foodstuffs and animals have decreased relatively. But while from 1874-75 to 1913, exports of manufactures have risen . from 39 to 75 per cent of the total ex¬ ports, imports of manufactures have only risen from 20 per cent to 25 per cent of the total imports; and while exports of foodstuffs and animals have decreased from 27 per cent to 10 per cent of the total exports; imports of food¬ stuffs and animals have decreased from 33 to 29 per cent of the total imports. Per head of population the export of manufactures amounted to $6.2 in 1872 and to $23.9 in 1913. While in 1874-75 the excess of imports over exports in raw materials was (in billion dollars) 0.42, it was 1.73 in 1912-13. One thou¬ sand marks ($250) would buy on the average in 1912-13 69 tons of the imports, but 75 tons of the exports; in 1874-75, it would buy 45 and 48, respectively.

*Internal and Foreign Commerce. — Com¬ merce may be internal or foreign. Foreign commerce is of course only a small part of the whole commerce transacted, but a very important one. As a rule every article of commerce in the process of production, distri¬ bution and consumption will be the object of commercial transactions several times. Some idea of the extent of the internal commerce will be gathered from the figures of the ex- ports. and imports, of the agricultural and in- * dustrial production, of the traffic on railroads and waterways and on the banking transactions (of articles under these headings). To give a correct interpretation to these figures it must be kept in mind that production and especially distribution are more decentralized in Germany than in the United States and a larger part of the local production is consumed locally and that commerce is largely dependent on the density of population; the quantity of produc¬ tion being increased with the increase of pop¬ ulation but generally not in the same but in a smaller ratio.*

To Germany foreign commerce is of vital importance because being very limited gener¬ ally in the productive power of her soil she is completely

deficient in products of the sub-

tropical and the tropical zone and very re¬ stricted in the products of the warm temperate zone.

Principal Articles of Export and Import. —

weight the imports of 1913 amounted to

In

74,600,000 metric tons, the exports to 75,400,000 tons> the value of the imports being $2,700,000,000 and that of the exports $2,500,- 000,000. In the following table the main groups ot the imports and exports are given according to the official German statistics.

Value of German Imports and Exports in

1913.

CLASSES

Imports

Per cent

Exports

Per cent

Raw materials. . . . Manufactures for

$1,251,000,000

47

$379,000,000

15

further mfture. . Manufactures for

310,000,000

11

285,000,000

11

consumption . . .

370,000,000

14

1,599, 000 , 000

64

Foodstuffs .

690 , 000 , 000

25

259,000,000

10

Animals .

72,000,000

3

2,000,000

Total .

$2,693,000,000

100

$2,524,000,000

100

The list below shows only those kinds of merchandise where there is a substantial sur¬ plus (of at least $25,000,000) on the import or on the export side and only the excess of imports over exports or of exports over im¬ ports. The exports of industrial metals other than copper and iron,

viz., lead, zinc and tin, being so large as not to leave a considerable excess in the imports the figures have been dropped. Because only differences are given the tables comprise a much larger part of Germany's foreign commerce than the figures themselves seem to indicate. Thus a true pic¬ ture will be given as to what Germany really needs and what she is really able to sell.

The textile industries are the most depend¬ ent on foreign production, the net imports of cotton, wool and raw silk accounting for $288,000,000. Of grain, including bran and rice, imports exceeded exports to the extent of $222,000,000. Imported barley (to the amount of 3,100,000 metric tons) constituted 50 per cent, imported wheat (to the net amount of 2,000,000 metric tons) 35 per cent of the total amount available for consumption (that is, de¬ ducting the amount of the home production necessary for seed), while in rye there was a not inconsiderable (500,000 metric tons) and in oats a smaller surplus (200,000 metric tons) of exports. Rice and maize are not produced in Germany. The net imports in fats and oils and in materials for fat and oil production of animal and vegetable origin amounted to $204,000,000, which figure is not far behind the amount of net imports in breadstuffs. Coffee, cacao and tea together accounted for $69,000,000 in the net imports. The net imports of cotton amounted to 486,000 metric tons, about 16 pounds per head of population, those of wool to 183,000 metric tons, about six pounds per head of population (besides a large home pro¬ duction), and of coffee to 164,000 metric tons, about 5.4 pounds per head of population. In mineral products the net imports constituted in 1912 24 per cent of the total consumption

of iron ores (10,000,000 metric tons out of 42,000,000), 82 per cent of copper (196,000 metric tons out of 241,000), 19 per cent of lead (45,000 metric tons out of 232,000), while the

Exports and Imports of Important Merchan¬ dise in 1913 — Balance of Exports and Imports.

Balances over $25,000,000 only.

ARTICLES

Imports

Exports

Raw materials and foodstuffs of animal origin:

Wool .

$106,000,000 94 , 000 , 000 59,000,000

52,000,000 48 . 000 , 000 38,000,000 31,000,000 30,000,000 28,000,000

144,000,000

122,000,000

98,000,000

89,000,000

71,000,000

Hides .

Animals for meat .

Animal fats and oils (except butter) .

Eggs .

Raw silk .

Fishes and clams .

Butter . . . .

Horses .

Raw materials and foodstuffs of vegetable origin:

Cotton .

Materials for oil-production . . Barley .

Wood" .

Wheat .

Sugar .

$66,000,000

Coffee .

55,000,000

38,000,000

20,000,000

25,000,000

Bran .

Oil cakes .

Maize .

Raw materials of mineral origin: Coal (coke) .

108,000,000

Copper .

81,000,000

55,000,000

53,000,000

43,000,000

41,000,000

Iron ores .

Other ores .

Mineral oils .

Chilean nitrates .

Potash, sodium .

31,000,000

283,000,000 170,000,000

93 , COO , 000

67,000,000 57,000,000

52,000,000 52,000,000 49 . 000 , 000 39 , 000 , 000 28,000,000 26,000,000

Manufactures:

Iron merchandise .

Machines .

Cotton goods .

Electrical goods .

Woolen goods .

Dyes of aniline, alizarine, in¬ digo .

Leather and leather goods. . . .

Paper .

Silken goods .

Clothes .

To vs .

net exports of coal (coke and lignite) amounted to 5 per cent of the total production (14,000,000 metric tons out of 256,000,000), and of zinc to 18 per cent of the total production (48,000 metric tons out of 269,000). A large amount of materials imported is exported in a man¬ ufactured form, especially in the leather and silk industries. With manufactures even if classified under the same statistical item, im¬ ported goods are generally not the same as exported ones. Especially in the textile trade imports of manufactures are large, those of cotton yarn amounting to $29,000,000, of woolen yarn to $27,000,000, of cotton goods to $18,000,- 000, and of woolen goods to $11,000,000. The only other large item in the imports of man¬ ufactures are machines to the value of $20,- 000,000, of these mowers amounted to $5,600,000, and of metal-working machines to $2,200,000. Books and maps are exported to the value of $18,600,000, pianos and organs to the value of

$13,900,000.

Geographic and Political Distribution of Germany's Foreign Commerce. — German sta¬ tistics are not very reliable as to countries of

origin and destination since a very consider¬ able amount of German foreign trade is car¬ ried on via Great Britain, Holland, and Bel¬ gium and a smaller amount via France (Mar¬ seilles), Italy (Genoa) and Austria (Trieste). But there is no doubt that the oversea com¬ merce has been increasing faster than the con¬ tinental commerce and the commerce with coun¬ tries of economically colonial character consid¬ erably faster than with the old-settled countries of Western and Southern Europe. But even now the European commerce of Germany is by far the most important especially in exports comprising more than one-half of all imports and three-quarters of all exports.

the empire lasted until 1879. It placed Ger¬ many in a very dangerous position, both for her agricultural product.on (in the free com¬ petition with American agriculture), and in her industrial production (in free competition with the technically highly developed British indus¬ tries). The fundamental change for a protective policy was marked by the Tariff Law of 1879. The free trade policy of 1892 aimed at a Con¬ tinental European economic union, with Ger¬ many as the leading industrial country, thus procuring profitable labor for her increasing population. That policy, however, failed in the main aim owing to the national jealousies among the European nations, but led to the

Most Important Countries in Imports and Exports, 1913.

Imports to Germany from

United States .

Russia .

Great Britain .

Austria-Hungary . .

France .

British India .

Argentina .

Belgium .

Holland .

Italy . _ .

(estimated)

Australian Confederation .

Brazil .

Dutch India .

Sweden .

Switzerland . !

Chile . .

Spain .

(Only figures above $50,000,000 are given.)

Exports from Germany to

.... $428 , 000 , 000 Great Britain .

.... 356 , 000 , 000 Austria-Hungary .

.... 219, 000 , 000 Russia . » .

_ 208,000, 000 France .

.... 146,000,000 United States .

_ 128,000,000 Holland .

_ _ 124,000,000 Belgium .

.... 86 , 000 , 000 Switzerland .

.... 83 , 000 , 000 Italy .

.... 79 , 000 , 000 Denmark .

.... 74, 000 , 000 Argentina .

.... 62 , 000 , COO Sweden .

.... 57, 000 , 000 Brazil .

_ 56,000,000

_ 53,000,000

_ 50,000,000

_ 50,000,000

$359,000,000 276,000,000 220,000,000 197,000,000 178,000,000 173,000,000 138,000,000 134,000,000

98 , 000 , COO

71,000,000 66 , 000 , 000 57,000,000 50,000,000

The problem of international exchange is made very difficult for Germany by the fact that the figures of export and import with the most important countries differ widely and that countries exporting raw materials and food¬ stuffs most needed by Germany are, generally, not the countries needing most and in adequate quantities the products of German industries. This is especially true of the United States.

The trade of Germany with the Entente Powers of Europe (Great Britain, France, Rus¬ sia, Italy, Belgium, Rumania, Portugal, Serbia, Montenegro, and their non-European political dependencies) constituted in 1913 almost one- half of the total German foreign trade and more than one-half of the imports alone, amounting to about $1,280,000,000 in the im¬ ports and about $1,210,000,000 in the exports. The trade with the British Empire amounted to about $550,000,000 in the imports, or 20 per cent of all imports, and about $470,000,- 000 in the exports, or 19 per cent of all exports. The trade with Sweden, Norway, Denmark, Switzerland, Holland, Spain and Greece and their non-European political de¬ pendencies amounted to $370,000,000 in im¬ ports and $540,000,000 in exports, or 17 per cent of the total German trade. The trade with the countries united in the Confederation of the Central Powers (Austria-Hungary, Tur¬ key, Bulgaria) was, with a total of $560,000,000 — $240,000,000 in imports and $320,000,000 in exports — only about 10 per cent of the total German trade and only about one-half of the total German trade with Pan-America which amounted to $1,100,000,000, of which $730,000,- 000 was on the import side and $370,000,000 on the export side.

Commercial Policy. — The free trade policy already inaugurated before the foundation of

establishment of a system of commercial treaties binding together the European states for periods of 12 years (the first ending 1904, the second so far as not terminated by the out¬ break of the war, 1914—18). The tariff of 1902 (the basis of the tariff treaties of 1904-05) was again highly

protective, especially for the agri¬ cultural interests, partly as a result of the growing conviction that a large raw production in agriculture and in mining was necessary to preserve the political independence of the na¬ tion. But it was only during the last few years before the war that the question of raising all the necessary foodstuffs in Germany proper was discussed.

Customs Duties. — The gross amount of cus¬ toms duties collected in 1913 was $181,000,000. There is in Germany a system of export cer¬ tificates on some dutiable products like rye which allow for free imports of a correspond¬ ing amount of dutiable foodstuffs and which are used for the payments of import duties. The amount of duties paid by those export certificates (in 1913 about $40,000,000) is not included in the figures above. By far the greater part of the customs duties ($138,500,000) is derived from foodstuffs. The German con¬ sumer had to pay in the price of the foodstuffs imported on the average one-fifth more, and of grain particularly one-third more than the price would have been if free imports were granted. The German farmer, especially the larger one, enjoys the benefit from the higher price level being stabilized in this position by the system of export certificates if Germany's own produc¬ tion should exceed the amount that she wants for her own consumption. By agreement be¬ tween the government and the parties the re¬ ceipts from the raising of the grain duties in the Tariff Law of 1902 had to be reserved for

tnc establishment of a national insurance for widows and orphans (introduced by the Insur¬ ance Law of 1911). That clearly indicates the close connection between the protective and the social policy of the German Empire.

Germany's Commerce with the United States. In 1913 the United States occupied the first place in imports to, but only the fifth place in exports from, Germany, according to German statistics, and Germany held the sec¬ ond place in imports to, and the third place in exports from, the United States, according to American statistics. Of the total exports from the United States 14.5 per cent went to Ger- many, of the total imports 10 per cent came from Germany. Of the total imports into Ger¬ many 16 per cent came from the United States, while of the total exports only 7 per cent went to the United States. The trade balance be¬ tween the United States and Germany is over¬ whelmingly in favor of the United States. Ger-

the last 25 years. In 1890 the trade balance was slightly in favor of

Germany. Since 1890 the exports from the United States to Ger¬ many have increased more than 300 per cent, while the exports from Germany to the United States did not increase 100 per cent. That development is due to the growing industrial¬ ization of Germany with growing needs of im¬ ports in raw materials and foodstuffs, cotton, fats,, wheat, copper, and to the growing indus¬ trialization of the United States, backed by a strong protective tariff policy which tends to exclude foreign manufactures from the Ameri¬ can market. While Germany needs urgently some of the products in which the United States abound, there is no corresponding de¬ mand in the United States for goods produced in Germany.

Concerning the articles of import from the United States to Germany, the concentration on a few articles extensively produced in the

YEAR

1890. . . .

1900 .

1913 .

Development of German Trade with the United States.

(According to both the American and German statistics.)

*German imports from the United States German exports to the United States ‘ – * – - ˆ – - – — – - – - . – - – * _*

German

$102,000,000 255,000,000 428 , 000 , 000

American

$85,000,000

187,000,000

332,000,000

German

$106,000,000

110,000,000

178,000,000

American

$90,000,000

97,000,000

189,000,000

Some of the Leading American Exports to Germany.

Cotton .

Copper .

Wheat .

Lard, margarine .

Mineral oils .

Hides, largely for furs . . . Grains, other than wheat

Oil cakes, cotton oil .

Resin, turpentine oil .

Fruits, fresh and dried. . . Meat, tallow, intestines. .

1890

$35,000,000 100,000 2,200,000 11,600,000 15,900,000 1,900,000 11,600, 000 2,000, 000 2,000, 000 400 , 000 2,500,000

1900

$64,700,000 25,300,000 15,100,000 21,000,000 18,900,000 1,500,000 29,000,000 9,100,000 6,600,000 3,000, 000 9,100,000

Some of the Leading German Imports to the United States.

Half silken goods .

Woolen goods .

JpO , oUU , uuu

Cotton hosiery and gloves .

1 , oUU , UUU a ?nn nnn

Cotton laces .

Leather gloves and leather for gloves .

Hides for furs and others .

z , OUU , UUU

5,800, 000

2 inn nnn

Potash, potassium chloride, etc .

Porcelain .

4,700,000

A Ann nnn

Toys .

4r , UUU , UUU 7. Ann nnn

Chemical dyes .

^ Ann nnn

Tropical products (rubber, oil) .

Books, prints .

3,000,000

4,000,000

1913

$115,400,000 73,500,000 41,200,000 33 , 300 , 000 20 , 600 , 000 19,900,000 18,200,000 9,700, 000 9,000, 000 8,500,000 4,400,000

$1 ,500,000 2,100,000 5,300,000 3,200, 000 5,300,000 12,200,000 17,400,000 2,700,000 8,100,000 9,500, 000 5,600, 000 1,500,000

man statistics show American imports to Ger¬ many amounting to $428,000,000 against ex¬ ports to the United States amounting to $178,- 000,000. American statistics show American imports into Germany amounting to $332,000,000 against German exports to the United States amounting to $189,000,000. In the figures of the American statistics the freight costs of the German exports to the United States are al¬ ready included in the prices of the imported goods to America, while the freight costs from the United States remain to be paid for. Ac¬ cording to the American statistics that means when the freight costs are already paid or have to be paid by Germany there remains a balance against Germany of $143,000,000. Sup¬ pose the German capitalist investments in the United States (about three-quarter billion dollars, mostly railroad bonds) yield a yearly income of $50,000,000, there remains a passive balance of more than $90,000,000. That unfavorable trade balance has been developed gradually during

United States has become more and more ac¬ centuated ; in 1913, cotton, copper, wheat, lard and margarine accounted for almost two-thirds of the total imports. American imports con¬ stituted 76 per cent of the total German im¬ ports of cotton, 88 per cent of copper, 40 per cent of wheat, 77 per cent of lard, and 54 per cent of mineral oils in 1913. In the same year, the more important items of products of American manufactures imported to Germany were mowers, $4,400,000; machines for the working of metals, $1,400,000; cash-registers, $1,100,000; and typewriters, $1,100,000. Con¬ cerning the articles of export from Germany to the United States there is not one item of considerable amount, but most are very small. Considering only those amounting to $1,000,000 or over, the textile industries leading with $21,- 000,000 ; next come the products of the German potash mines, with $17,000,000; the leather in¬ dustries, $17,000,000; the chemical industries especially dyestuffs, $12,000,000. The table of the

leading import goods from Germany in 1890, 1900 and 1913, shows clearly the influence of the American tariff legislation in excluding Ger¬ man and fostering American manufactures. Half silken goods, the dominant article of German export in 1890, has ceased to be of any importance, woolen goods, leather gloves, cot¬ ton hosiery, porcelain, all prominent features of the exports of 1890 or 1900, have greatly de¬ creased in importance. No corresponding ten¬ dency of excluding American products is ob¬ served, all the leading items of American im¬ ports to Germany showing large and continual gains. Concerning the

imports of products of the slaughter-houses from the United States to Germany, one may remember that the United States has ceased to be a meat-exporting coun¬ try, while the decrease in exports of other grain except wheat, is largely counterbalanced by the increase in the exports of wheat.

Bibliography.— Barmen, R.,

H. Lufft.

21. GERMAN INDUSTRIES. The foun¬ dation of modern German industrial progress was laid in the first two decades following the Franco-Prussian War, and its cornerstone was the improved processes of iron and steel pro¬ duction. . In addition to Germany's original milling districts, there were in the territories ac¬ quired from France large deposits of iron ore which at that time were of negligible value, since the purer ores of England and the United States could be produced much more cheaply.

Germany's production of pig iron in 1887 was 4,024,000 tons, as compared with Great Britain's production of 7,681,000 tons and that of the United States of 6,520,000 tons, while the production of steel was 954,600 tons, 2,403,200 tons, and 2,604,000 tons, respectively. About. that time new metallurgical processes were invented, notably the Thomas-Gilchrist process for the elimination of the phosphorus of iron ore, which not only made available Germany's vast unused deposits of iron ore, but also stimulated agriculture through rendering the phosphorus available for fertilizer.

Within. 20 years Germany's pig iron produc¬ tion had increased 400 per cent, while Great Britain's had increased only 30 per cent. Ger¬ many's steel production had increased 1,300 per cent, while Great Britain's had increased only 150 per cent. Thus Germany had outstripped England and was within a comparable distance of the United States with its much greater de¬ posits. Meanwhile Germany had been making great strides in technique and organization, and taken in connection with the tremendous im¬ petus of the flood of iron and steel, the whole industrial life of Germany quickened and grew to gigantic proportions. See article Germany's Economic Organization.

While the iron and steel production would have made Germany prosperous under ordinary conditions, it can only be regarded as the fuel in the great engine of German organization, a policy which almost automatically, once adopted, put Germany at the head of the industrial pro¬

cession. That policy is one of encouragement, supervision, initiatiye and

direct participation by the government in the industrial life of the nation. Other governments are content to see their industries develop of their own accord and to take any action relative to industrial matters only when forced to do so by the pres¬ sure of public opinion. The German system is to take the initiative, devise means of stimu¬ lating industry, direct, supervise and participate in industrial undertakings, provide systems whereby workers may be properly trained, raw materials procured, invention stimulated, capi¬ tal obtained, the evils of competition avoided and finally markets for the goods developed. Thus every possible encouragement is offered to industry by the German government.

The basic technical principle of Germany's industries is that of transforming cheap raw materials into highly valuable finished products. Being rich in man power and comparatively poor in raw materials and natural resources, the tendency has been to conserve as far as possible the resources in materials and to use to the best possible advantage the man power available and to increase its skill and multiply its productivity by new inventions and efficient methods of utilization.

In every department of industrial activity the same general principle is followed of utiliz¬ ing cheap raw materials for the manufacture of highly valuable products.

The political organization upon which Ger¬ man industrial progress is founded was estab¬ lished at the time of the founding of the Ger¬ man Empire at the end of the Franco-Prussian War. It is in a sense paternalistic, but pater¬ nalistic in the best sense.

Germany has a highly effective political system, whose policies when determined upon by the Bundesrat are carried into effect forth¬ with and effectively. When the government adopts a policy of industrial encouragement, it is certain to be carried into effect. Where 'private, activity is insufficient the government enters into the scheme of things directly, which is especially true in the encouragement of scien¬ tific and technical schools, and in the mainte¬ nance of testing laboratories and of corps of ex¬ perts who are constantly engaged in perfecting and developing new inventions and industrial processes and who are always ready to assist manufacturers in the solution of their partic¬ ular problems. Professors of technical uni¬ versities are making constant contributions of an inventive nature to the general fund of in¬ dustrial and technical knowledge and are al¬ ways ready to lend their time and facilities to the cause of industry, while large industrial concerns maintain staffs of experts for the special consideration of their own problems.

The activities of German technique are re¬ flected in the number of

technical publications in the German language, which is annually sev¬ eral times the number of publications in all other languages combined. Such a vast volume of technical effort does not fail to make itself felt. It is the driving force back of German prosperity. It is not a force, however, which is permitted to wear itself down. The government constantly keeps in touch with the industrial life of the nation and does not permit its self¬ improving spirit and initiative to flag. Not only by direct supervision is industry stimulated, but

indirect ways it is even more effectively en¬ couraged. For example, the successful man of business, the notable inventor or technician is lonored with positions of political importance and with decorations signalizing his work.

The German business man has opportunities of serving the government to which he may properly aspire as do our great lawyers to the Supreme Court bench, and as a consequence the government, service attracts and rewards the brightest minds and gives as well as acquires prestige. Springing from such a source, it will be obvious that the energies of the government directed toward the improvement of industry will be effective and that any lack of individual incentive will be supplemented by governmental initiative.

Not alone in a technical sense is industry encouraged, but financially as well, since it is realized that, without suitable provision for capital new industries cannot make headway and old ones will languish. Snecial banks make it a feature of their business to provide capital on fair terms to new. industries and inventions which are seen upon investigation to be worthy of encouragement. Thus any meritorious en¬ terprise is sure of a fair start and does not have to run the gauntlet of unsavory promotions as in some countries. Once started, new in¬ dustries are protected so that larger concerns cannot drive them out of business, and thus the small business man, on whom the prosperity of the public eventually depends, is protected in his undertakings. In the place of trusts, which are of a predatory nature and seek to ruin com¬ petitors with the ultimate object of despoiling the public, German industry is organized as a number of cartels which are encouraged by law and in which even the government participates as a member. In its organization, the cartel ap¬ proaches that of the price-fixing pool in vogue in the United States before the era of trusts. In the pool, the various competing firms agreed on prices to be charged to the consumer by all the members, and upon volume of output to be allowed to each member. In some cases the earn¬ ings were lumped or pooled and later divided on a certain pro. rata basis. This made it pos¬ sible for competing firms to exist

and do busi¬ ness at a profit, which would otherwise have cut each other's prices to a point of bankruptcy. It is obvious that business to exist must make a normal profit, but in a state of unregulated competition the richer firms may sell their goods at such low prices that the small firms are ruined.

In Germany the tendency of business men to form into self-protecting groups was recognized as a proper and necessary effort. The individ¬ ual business men and companies of an industry were permitted to organize themselves into a loose form of organization known as the cartel. In some cases there would be one or more car¬ tels in an industry, and in others but one cartel for a number of industrials. Individual firms may remain outside of cartels if they prefer. The cartel is empowered to fix prices to be charged to the public and to allot the amount of business to be done by each member or the proportion of output to be allowed as compared with the output of the whole cartel. Competition is thus largely confined to quality and economies in production and service rather than price. A living profit is made possible and

stability of the market insured. The public is not mulcted since the cartels are under legal supervision and are not allowed to fix prices at unreasonable levels.

The German industrial system is thus very flexible, being adapted to meet in the most fa¬ vorable manner any and all of the problems which may arise. It preserves individual initia- tave, promotes proper competition but prevents its destructive manifestations, and is capable of meeting the most formidable rivalry, whether such rivalry exhibits itself at home or abroad. The. efficacy of the German industrial system is particularly shown in the foreign field. The government is constantly active in foster¬ ing foreign trade and in seeing the German manufacturers and exporters make use of every opportunity which presents itself. Even should the immediate business in hand not promise an inviting profit, the manufac¬ turer is encouraged to occupy the field from motives of patriotism, in the knowledge that once the market is occupied by German goods other goods will be shut out and in time the trade will prove profitable. Suitable banking and financial arrangements are made so that the customs of foreign business may be observed and thus every effort is made to permanently establish German trade in every quarter of the globe. It is not surprising, therefore, that Ger¬ man industry,, with such far-reaching plans of organization in operation, should have made enormous strides.

The figures of the increase of iron and steel production previously referred to are an index of Germany's industrial growth.

Pig Iron Production (in tons).

Increase

countries 1887 1911 per cent

Germany. . 4,024,000 15,574,000 387

United Kingdom . 7,681,000 10,033,000 30

France . 1,568,000 4,411,000 281.3

United States . 6,520,000 24,028,000 368.5

It will be seen that the percentage of in¬ crease is greater for Germany than even for the United States.

Steel Production (in tons).

Increase

COUNTRIES 1886 1910 percent

*Germany . 954,600 *13,698,600 1335*

United Kingdom . 2,403,200 6,106,800 154.1

France . 427,600 3,390,300 692.9

United States . 2,604,400 26,512,400 910.3

The proportionate increase of Germany's steel output is vastly greater than that of any other country and has reached one-half of that of the United States, with its immeasurably greater deposits.

Of known supplies of coal, it is calculated that Germany's coal will last over 1,000 years; that of France 500 years and that of the United Kingdom only 300 years. Of known iron de¬ posits, the calculated amounts are : Germany, 3,878,000,000 tons; France, 3,300,000,000 tons; United Kingdom, 1,300,000,000 tons and the United States 9,855,000,000 tons.f Germany's share of the European supply is 32.3 per cent

- *In the year 1912 Germany's steel production was 15,019.300 tons.*

t The restoration of Alsace and Lorraine to France materially alters the relative, positions of France and Ger¬ many in regard to iron deposits.

and of the world's supply 17.3 per cent. Her pig iron and steel output is only slightly less than one-fourth of the world's total output.

The increase in production in all countries shows the great strides of modern industry all over the world. The present figures show an activity and volume of business that makes the world of a generation ago seem poverty-stricken by comparison.

In the production of coal and lignite Ger¬ many has made progress almost as great as in steel and iron. The comparative figures are as follows :

Coal and Lignite Production (in tons).

Increase

COUNTRIES 1885 1910 per cent

Germany . 73,675,000 222,375,000 201.8

United Kingdom. 161,909,000 268,677,000 65.9

France . 19,511,000 38,350,000 96.6

United States…. 100,843,000 455,042,000 351.2

Coal and Lignite Consumption

(tons per capita).

COUNTRIES

1885

1910

Increase per cent

Germany .

_ 1.50

3.25

116.7

United Kingdom.

_ 3.63

4.07

12.1

France .

_ 0.79

1.41

78.5

United States . . .

_ 1.76

4.78

171.6

The great increase in the production of coal is an index of the growth of Germany's indus¬ tries both actually and in proportion to her population ; the increase per capita is a demon¬ stration of the intensification of her industrial activities.

The total value of Germany's mined coal in 1887 was 351,300,000 marks while in 1911 it was 1,756,100,000 marks, an increase of 400 per cent. The United States, which was consider¬ ably behind Britain, is now far in the lead while Germany has almost equaled Britain and now produces one-fifth of the world's total output of coal.

In coke production Germany has substan¬ tially passed Great Britain.

Coke Production (in tons).

Increase

countries 1905 1910 per cent

Germany . 16,491,000 23,600,000 43.1

United Kingdom . 17,732,000 19,642,200 10.8

France . 2,268,000 2,688,000 18.5

United States . 29,240,000 37,838.000 29.4

Germany thus produces one-quarter of the world's coke and is increasing her production at a far more rapid rate than are the other countries. In coke by-products the increase is far more rapid and reflects the important de¬ velopment of Germany's chemical industries.

Coke By-products, Production in Dortmund District (in tons).

BY-PRODUCT 1896 1911 Increase

Sulphate of ammonia . 20,975 244,567 1:11.7

(Eleven fold)

Tar . 28,341 550,300 1:19.4

Benzol . 215 53,941 1:250.9

In addition to her supplies of tar used in chemical industries Germany imports large quantities of tar from the United States which serves to conserve her supplies of raw material. Her gas industry in 1910 consumed coal to the value of 120,000,000 marks ($30,000,000), pro¬

ducing 2,500,000,000 cubic metres of gas (as compared with 325,000,000 in 1877), having a value of 375,000,000 marks ($93,750,000), with by-products having a value of 83,300,000 marks

($20,825,000).

In addition to iron, steel, coal and coke, Germany has other highly important mining industries which have made immense advances in the past generation.

Mining Output (production value in marks).

product 1871 1910 Increase

Coal and lignite . 244,600,000 1,705,200,000 1:7

(Seven¬

fold)

Iron ores . 30,800,000 106,800,000 1:3.5

Potash and other salts. 4,500,000 97,800,000 1:21.7

Zinc, lead and copper

ores . 25,700,000 82,700,000 1:3.2

Other mining products 8,600,000 16,000,000 1:1.9

Total . 314,200,000 2,008,500,000 1:6.4

The increase in mining output thus, of more than sixfold, is due very considerably to the numerous new chemical and technical processes which have made it possible to recover ore values that would otherwise have remained un¬ obtainable. In 25 years the total value of the direct products of German mining have in¬ creased from 700,000,000 to 2,000,000,000 marks and this vast augmentation of wealth has transformed Germany from one of the poorest to one of the richest of countries.

In the consumption of copper Germany has a long lead over Britain and compares favor¬ ably with the United States and is growing much more rapidly than either.

Copper Consumption (in tons).

Increase

countries 1901 1911 percent

Germany . 84,800 225,800 166.3

United Kingdom . 105,200 159,400 51.5

Rest of Europe . 102,100 221,100 116.6

United States . 192,300 321,900 67.4

Total . 494,200 959,400 94.1

Germany is thus using practically one- quarter of the world's copper output.

In the consumption of cotton Germany occu¬ pies third place.

Cotton Consumption.

1910—1911 Cotton

COUNTRIES (bales) spindles, 191 2

Germany . 1,685,192 10,598,752

United Kingdom . 3,384,480 55,164,794

France . 945,815 7,400,000

United States . 4,696,000 29,522,597

It will be seen that the consumption of cot¬ ton as compared with the number of spindles is much larger in the United States and Ger¬ many than in Britain. This does not mean that the consumption per spindle is necessarily greater, but rather that more cotton is used for purposes such as the manufacture of explosives than for weaving. The industrial use of ex¬ plosives has greatly increased in recent years, especially in the United States, where less than 1 per . cent of the output of explosive fac¬ tories is devoted to the military purposes of the national government.

The. superiority of Germany in brewing is rather in the number of breweries than in the volume of the brew.

Brewing (in 1911).

COUNTRIES

Germany .

United Kingdom. . . .

France .

Austria-Hungary

Production in hectalitres

65 , 089,003 58,813,000 17,942,000 25,571,000

Number of breweries

12,009

4,226

3,203

1,240

, German output of manufactured to¬

bacco has not greatly increased as regards cigars, ut cigarette manufacture has increased in a very marked manner.

Tobacco Manufacture.

PRODUCT 1875

Cigarettes … 152,000,000

Cigars . 5,234,000,000

1903 19H

3,200,000,000 9,382,000,000 7,384,000,000 8,000,000,000

The great strides of German technical prog¬ ress is seen in a comparison of the number of

*?rwˆer** ***n 1ˆ95 to 2,358,000 horse power and in 1907 to 5,190,000 horse power. During this period of 25 years, therefore, the capacity in¬ creased more than fourfold, and in the 12 years from 1895 to 1907 it was more than doubled. In the whole German Empire, for which comparative figures are available only since; 1895, the development was similar. In the year 1907 the census showed 124,000 steam engines with a capacity of 7,587,000 maximum v****:uSe Power» or 5,185,000 effective horse power. What these figures mean becomes clearer when mechanical and human capacity for work is compared. The effective capacity of one me¬ chanical horse power is about the physical labor equivalent of 10 men. Upon this basis the actual work done by German steam engines in the year 1907 was equivalent to the work done by 52,000,000 men, and the increase of actually effective steam horse power from 1895 to 1907*

Persons Employed in Various Industries.

INDUSTRIES

1882

1895

1907

Percentage of increase,

1882-1907

Mining, smelting and saltworks (also wire drawing for 1882) Stone and earths ....

430,134

3Z.O 1 0A

536,289

879,600

747,057

905,868

1,171,783

167,670

95,957

1,094,955

225,046

206,313

736,424

104.5

Metal working . .

d.co 71 x

JJO , ZoO

111.1

Machinery. . .

xza nao

Ov)y, /oo

97.1

Chemicals .

71 777

OOZ , O/Z

229.1

Illuminating materials, fats, oils, soaps, etc . . .

42 , 705

om nco

1 1j , Z41

57,909

133.6

124.7

Textiles . .

Paper .

1 HO 1 c /;

yyj , Z5 /

20.3

Leather .

171

loz , yuy

124. 7

Wood and woodworking.

46Q 60S

lOU , 444 /in/;

68.8

Foods, beverages, etc .

743 881

1 091 /inn

56. 8

Clothing trade and cleaning .

1,259,791

q xx ˆ 1 1

z, a , -*yu

1 2on aha

1 , 260 , 580 1,562,382 1,576,804 243,262

69.5

Building trade .

A , 391/ , OvN

1 f\A c ci/;

24.0

Printing, art reproduction, etc. .

85,394

A , U AO , O A O 14.7 74A

195 . 6

184.9

persons employed in the various industries, with the increases in output previously given. From the following table it will be seen that while the number of persons employed has in¬ creased, the increase has been very much smaller proportionally than the increase of out¬ put.

Another valuable index of the progress of German industry is seen in the

increase in the use of, power for industrial purposes. In Prussia's industries the capacity of steam en¬ gines amounted in 1882 to 1,222,000 horse

was equivalent to an increase of the working population by about 28,000,000 men.

. These figures should be placed in juxtaposi¬ tion with those of the working population of the empire, which showed 18,900,000 persons for 1895 and 24,600,000 for 1908. In the year 1895 there was, accordingly, for each person engaged in labor, not much more than one equivalent of his labor represented by steam power. But whereas the laboring population increased from 1895 to 1907 by 5,700,000 per¬ sons, the steam engines of Germany under-

Mechanical Power in Various Industries.

- – - – - – — – - – - –

INDUSTRIES

Steam power (in horse power)

Electrical power 1907 (in kilowatts)

1895

1907

Percentage

increase,

1895-1907

Mining, smelting and salt works (also wire drawing for 1882). Stone and earths .

995,069 197 796

332,968

134.5

1 C/1 7

422,782,000

88,570,000

128,909,000

225,026,000

42,288,000

Metal working .

147 141

AAX 99/4

A04. /

911 R

Machinery .

184 871

1 1 J 1 LL i

1,215,512

109 on/;

Z 1 A . o C C7 7

Chemicals .

83 587

1 iq n

Illuminating materials, fats, oils, soaps, etc. .

29,942 515 583

77,265

RR/; 575

A Ao . y

158.1

71 7

Textiles . .

, uuu

Paper .

201 42?

419 on#

/ A . / i cia n

/5 , 126 , 000 54,966.000 19,302,000 56,325,000 152,763,000 18,999,000 21 ,497,000 40,950,000

Leather .

32 377

85 504

iuˆ . y

1 (\X c

Wood and woodworking .

203 235

346 024

70 X

Foods, beverages, etc .

686 263

1 185 819

/U. J

79 R

Clothing trade and cleaning .

19,235 46 274

54 852

1 QC 9

Building trade .

189 117

A OO . Z •2HQ 7

Printing, art reproduction, etc .

18,793

35,974

oUo . /

0 1 A

VOL. 12

38

594

GERMANY — GERMAN INDUSTRIES (21)

went an increase of 2,800,000 horse power; hence the steam power in 1907 represented more than two equivalents of human labor for each person employed in gainful occupations. In reality the increase of mechanical labor power was even considerably greater than finds expression in the above figures, for whereas steam was, along with water power, which was relatively little developed, almost the ex¬ clusive source of power for motor purposes till into the last quarter of the 19th century, the development of the electrical industry and the invention and improvement of explosive motors has, during the 25 years under consid¬ eration, raised up a new and rapidly develop¬ ing competitor of steam power.

The preceding detailed table shows the rela¬ tive use of power among different industries. In addition to steam power, there is given a column covering the use of electrical power, and this substantially augments the total. No figures showing the increase of electrical power are given, as electrical power only began to be used to any appreciable extent about the middle of the last decade of the 19th century.

A summary of the operations of individual corporations in Germany for the year 1911 shows their prosperous condition. The total reserve fund amounted to 23 per cent of the outstanding capital stock and an average divi¬ dend of 8.1 per cent was paid. Since German corporations are organized on a sound stock basis, the figures are a real index of conditions.

The rapid development of German industry during the last generation has been accom¬ plished for the most part by the larger estab¬ lishments. The smaller establishments, though they have not decreased actually, have gained little ground while the large establishments have grown rapidly both in number and size.

Hand industries, the operations of which are carried on by individual workers or small groups of workers in their homes, have existed in Germany for many centuries and do not readily yield to the encroachments of the larger units, but they have not been gaining proportionately. The factory has absorbed all the increase and in some cases has made in¬ roads on the home industries. More recently, the improved facilities for the distribution of electrical power have given the home indus¬ tries a new advantage as manufacturers and electric central station concerns find it profitable to install small, electrically operated machinery in the workers' homes, which enables the serv¬ ices of certain of the members of the family to be utilized, keeping the machines constantly at work in specialized operations, producing parts, which are assembled in the factory into the finished product.

This is a modern phase of home industry quite unlike that of olden times in which the home workers were highly skilled and produced finished products which could not be matched by the factories. Home industry varies widely according to location. In the cities such prod-

CORPORATIONS, 1911. – CAPITAL AND PROFITS.

INDUSTRIES

Mining .

Quarries, brickworks, etc .

Metal working .

Machinery industry . . .

Chemical industry .

Textile industry .

Paper .

Leather and rubber .

Wood .

Food, etc .

Clothing .

Cleaning .

Building trade .

Printing, newspaper trade, etc. . . .

Commerce .

Banking .

Insurance .

Transport . .

Miscellaneous .

Total (statistically dealt with)

Number

of

companies

Million marks

Dividends per cent

Paid up share capital

Reserve

funds

Deben¬

tures

Net

profits

257

2,369.3

512.3

702.2

291.4

9.14

348

448.9

68.0

105.2

44.1

6.38

160

278.6

43.2

48.7

34.8

7.64

534

1,789.5

351.0

694.9

218.3

8.70

302

637.8

180.7

168.5

126.9

13.95

352

637.7

165.1

155.8

73.8

7.44

99

178.6

41.5

65.3

19.7

8.16

58

122.9

40.3

36.5

20.6

10.59

62

73.5

9.3

15.7

8.2

7.83

812

1,027.9

207.6

246.3

114.9

7.47

12

20.3

2.9

2.2

3.0

11.45

3

0.3

0.02

0.07

0.01

2.5

43

80.6

11.5

7.6

16.7

12.13

114

83.0

11.7

7.3

9.3

6.96

268

494.3

48.6

146.2

41.7

4.88

415

3,815.4

1,042.7

127.3

397.1

7.91

130

155.2

238.0

0.3

69.2

23.14

479

1,543.5

226. 1

657.8

104.1

4.98

232

470.2

54.1

159.7

41.7

5.81

4,680

14,228.0

3,255.0

3,347.0

1,636.0

8.09

The figures in the various tables given are only up to 1911, but are the latest obtainable. They were compiled from original governmental sources, but as such figures are available only in reports from various departments, often not in published form, the assembling of the com¬ parative figures demands considerable work and time and the interruption of the war makes later data unavailable. In iron and steel and certain other lines production was greatly augmented by the war so that the conclusion of the conflict saw largely increased facilities in many lines of industry.

ucts as clothing, men's furnishings, women's apparel, leather goods, jewelry and ornaments, linen and wash articles are favored, while in fural, woodland and mountainous districts, as in middle and southwest Germany, household articles are produced such as wooden articles, knit goods, brushes, toys, embroideries, clocks, violins and the like. Manufactured farm, meat and dairy products are also largely produced in the rural districts rather than in packing establishments. The drift to the cities has been affected by and has affected the industrial situa¬ tion. The invention of labor-saving agricul-

tural machinery and processes of cultivation have increased the productivity of the farms at a saving of labor, though the increased demand for food by reason of the growing population has somewhat offset the freeing of agricultural laborers for other pursuits by reason of such improvements.

The industrial censuses of 1882, 1895 and 1907 show the extent of the drift to the cities. The total number of persons employed in agri¬ culture, industry, trade and transportation was as follows :

Total Number of Persons Employed.

1882.. 16,203,000 persons or 35.4% of the whole population

95.. 18,912,400 persons or 36.4% of the whole population

1907.. 24,617,200 persons or 39.7% of the whole population

This indicates an increase in the propor¬ tion of persons employed in these

activities, which may be accounted for by the fact that the size of families has decreased while the population has increased, there being fewer de¬ pendent members of the family in the later years than in the earlier years, compared with the whole population.

The decrease in the proportion of depend¬ ents of those engaged in agricultural pursuits while the proportion of dependents in industry and trade, however, as shown by the following table, is due more to the fact that Germany has enjoyed a considerable immigration of adult farm laborers and to the fact that much of the agricultural labor is performed by a float¬ ing class of adults, workers who drift into other occupations during dull seasons of the agricultural year. The following table shows the distribution of workers among the main branches of industry.

ural growth of the population into a source of increasing wealth. The prosperity and activity of German industry has caused the, earnings of workers to be increased materially until in actual amounts, as well as in purchasing power, the German industrial worker is the best paid worker of his class in Europe.

Germany's great progress brings more and more, completely into effect the signal charac¬ teristic of modern industry, that of the division of labor and the association of labor. Division of labor is the giving to each worker of a single form of work in which he becomes highly profi¬ cient while association of labor is the bringing together of workers, each performing his own special task, into a group which produces a finished product in the most efficient manner through the economies effected by the division of the several operations and the combination of their results. The tendency of the associa¬ tion of labor is toward larger and larger groups. Thus certain factories own their own mines and transportation facilities so that from the time the ore is taken from the earth until the finished mechanism or product into which it is transformed by tlje successive operations to which it is subjected is delivered to the pur¬ chaser, the whole procedure is carried out by the one concern.

It appears, therefore, that of all persons en¬ gaged in gainful employments in 1882, 59 per cent were employed in small concerns, 18.5 per cent were employed in medium and 22.5 per cent in large concerns. In 1907, on the other hand, only 37.3 per cent were employed in small concerns, 25.7 per cent in the medium concerns and 37 per cent in the large concerns. Whereas, therefore, more than two and one-half times

Distribution of Workers.

CALLINGS BY GROUPS

Years

Persons

employed

Persons

employed,

including

dependents

In percer whole p(

Persons

employed

itages of Dpulation

Employed

and

depend¬

ents

‘

1882

8,236,500

19,225,500

18.0

42.0

Agriculture and Forestry .

1895

8,292,700

18,501,300

15.9

35.6

1907

9,883,300

17,681,200

15.9

28.5

1882

6,396,500

16,058,100

14.0

35.1

Industry . .

1895

8,281,200

20,253,200

15.9

38.9

1907

11,256,300

26,386,500

18.2

42.5

1882

1,570,300

4,531,100

3.4

9.9

Trade and Transportation .

•1895

2,338,500

5,966,900

4.5

11.5

1

1907

3,477,600

8,278,200

5.6

13.3

In connection with this readjustment the displacement as between the population of coun¬ try and- city is to be noted. In 1885, 8,600,000 persons or 18.4 per cent of the whole population lived in cities of more than 20,000 inhabitants, while in 1910 22,400,000 persons or 34.5 per cent of the whole population lived in such cities. The number of inhabitants in the large cities of more than 100,000 population, of which there were 21 in 1885 and 48 in 1910, amounted in 1885 to 4,400,000 persons or 9.4 per cent of the whole population and in 1910 to 13,800,- 000 persons or 21.1 per cent of the whole popu¬ lation. While there are certain drawbacks to this shifting of the population, it has been the factor which has made it possible to give labor and sustenance on German soil to the vastly increased population and to transform the nat-

as many persons were employed in small con¬ cerns in 1882 as there were in large ones, the two classes had almost reached an exact equal¬ ity by 1907. From 1882 to 1907 the number of persons engaged in small undertakings increased not quite one-fourth, whereas the number in the great concerns increased more than threefold, and those in the very largest concerns four and one-half fold.

In individual groups of callings this de¬ velopment was still more pronounced than in the general average ; as, for example, in metal working, in the machinery, instrument and apparatus industries, in the industries of wood and woodworking and in the building trades. In metal working there were 288,000 persons employed in 1882 in small concerns, and only 85,000 in large ones. In the machin-

ery industry the ratio in 1882 was 123,000 to 166,000 persons, but in 1907 it was 136,000 to 788,000. In the building trades it was 245,000 to 95,000 in 1882, but 315,000 to 633,000 in 1907. In mining and smelting, in which small and medium concerns were quite insignificant already in 1882, not less than 832,000 out of a grand total of 861,000 persons employed in 1907 were in the large concerns. The de¬ velopment of the second form of association of labor, namely, that of bringing together various processes of production into a central¬ ized undertaking — did not lag behind the shifting in the sizes of undertakings just de¬ scribed. The production of raw and secondary materials was united, on a large scale, with manufacturing concerns ; businesses producing semi-manufactured goods found it to their ad¬ vantage, in an increasing degree, to take in hand the production of finished goods ; produc¬ ing establishments annexed transportation un¬ dertakings, so far as these were not monop¬ olized. This development was seen not only in industry, but also in agriculture, where dairies, distilleries, breweries, sugar factories and the like have become Jo an increasing de¬ gree a part of the regular appurtenances of the great agricultural establishments.

The development of business enterprises into larger and larger units is shown by the following table :

The internal division of labor finding outlet in the foreign trade has therefore contributed in its development, not only toward giving the German people more abundant and more varied means for satisfying their wants, but has really created the conditions that made it possible for the great increase of the population during recent decades to find the means of

subsistence on German soil.

Bibliography. — Helfferich, Dr. Karl, Ger¬ many's Economic Progress and National Wealth) (Berlin 1914) ; Koester, Frank, (The Price of Inefficiency. (New York 1913) ; and Gecrets of German Progress) (ib. 1915) ; Dresdner Bank, Germany's Economic Forces* (Berlin 1913) ; (Deutschland als Weltmacht* (ib. 1911).*

Frank Koester,

Consulting Engineer, New York City.

22. GERMAN AGRICULTURE. In the

middle of the 19th century Germany was still predominantly an agricultural country. At that time 65 per cent of her total population were engaged in occupations relating to the soil. By 1882 only 42 per cent were so employed, and in 1907 (the last official census that dealt with vocation) this figure had further decreased to 31 per cent. Germany was no longer able to feed her people on products of her own soil ; she had become an importer of foodstuffs on a

Number of Establishments and Persons Employed.

SIZE

1882

1895

*1907**

Establish¬

ments

Persons

employed

Establish¬

ments

Persons

employed

Establish¬

ments

Persons

employed

Small, 1-5 employees .

Medium, 6-50 employees .

Large, 5 i -1,000 .

1 ,000 and more employees .

Totals .

2,882,768

112,715

9,974

127

4,335,822

1,391,720

1,613,247

213,160

2,934,723

191,301

18,953

255

4,770,669

2,454,333

3,044,267

448,731

3,124,198 267,410 32 , 007 506

5,353,576

3,644,415

5,350,025

954,645

3,005,457

7,340,789

3,144,977

10,269,269

3,423,615

14,348,016

- *Not including music, theatres and public amusements.*

To what degree the organization of German public economy has been perfected during the past 25 years, to what degree it has increased the productive capacity of German economic labor and contributed toward enhancing the wealth of the public, is strikingly illustrated by the statistics of German exports and imports.

In the year 1912 foreign trade reached a total of $4,900,000,000 of which $2,675,000,000 was imports and $2,245,000,000 was exports. Of the imports, $2,275,000,000 was in food prod¬ ucts, animals, industrial raw materials and semi-manufactured products, and only $400,000,- 000 in finished goods. On the other hand, not less than $1,450,000,000 of the total value of $2,245,000,000 of exports was in finished goods.

Germany accordingly exchanges to a very great extent the products of its industrial labor for the primary products of field, forest and mines, which owing to the disproportion of its population to its area and the climatic re¬ strictions upon its agricultural producing ca¬ pacity, it can produce in only insufficient quan¬ tities or not at all.

large scale, and fully one-third of her total population was forced to depend upon these imports in order to live. The main sources whence

Germany had to draw for victuals from abroad were Russia, the United States, Hun¬ gary, Rumania and Argentina, and the chief staples obtained from these countries were rye, wheat, barley, oats, meats of every kind, lard, bacon, cattle feed, etc., besides which fish, potatoes, condensed milk, butter, cheese, etc., were also bought from Switzerland, Holland, Norway, Denmark and Sweden in huge quan¬ tities. However, the Great War wrought con¬ siderable changes in all this. By obtaining their nitrogen in unlimited quantities from the air, by chemical processes, instead of relying on the guano of Chile to manure their fields with ; by cultivating even portions of the barren regions formerly used as mere wild pasture lands, such as the vast Lunebiirg heath and the moor¬ lands of East Frisia, the hitherto sterile tracts of the basaltic Eifel region, the meagre soils of East Prussia, the rocky slopes of the Black Forest, of ((Saxon Switzerland® and the lower

ranges of the Erzgebirge and Fichtelgebirge between Saxony and Bavaria, and by draining and utilizing some of the bogs of the North Sea coasts and clearing some forest lands, the total yield of the empire has been somewhat increased since 1914, despite scarcity of labor and the otherwise unfavorable conditions pre¬ vailing in war times. But, of course, these achievements are purely experimental, and eco¬ nomically were only made possible by the enormous advance in food values due to the blockade. They will disappear with peace re¬ stored. Up to 1914 of the total area of 208,830 square miles, some 78 per cent, or about 105,- 000,000 acres, in Germany was farmland, and some 60 per cent of this was under cultivation, the remainder being meadows, some pastures, orchards and vegetable gardens. About 25 per cent of the total area of Germany is in forest and but 7 per cent wasteland, city buildings, etc. The best farming lands are in the warm, well-sheltered Rhine Valley, with its rich alluvial soil, where vegetation is usually a fort¬ night ahead of the rest of Germany and where the vine flourishes in special excellence. Many of the hill slopes throughout the highland of Germany are terraced and cultivated, but the mountains are forest-clad, and cultivation is chiefly confined to the plains and vallevs. Soils differ greatly, of course ; but generally speak¬ ing, that in the western portion of Germany is preferable in fertility to that of the low plains of the north and east, the latter being more sandy. Even before the war the available land was tilled with great care and intelligence, not only in the fertile valleys of the south and west, but also on the less productive lands of the north and east. Germany is a country where agriculture has become almost a perfect science. In her agricultural colleges and uni¬ versities, in her technical schools teaching a thorough knowledge

of soils and tillage, of crop conditions, of fertilization, of cattle rais¬ ing, fruit growing and gardening, everything that tends to rational agriculture and fitting means to the end is inculcated in a thorough manner, and many of her most expert scientists have devoted themselves since the days of Liebig and Pettenkofer to original research work in this line, experimenting with seeds and soils and temperatures and moistures, much in the same way in which similar work is being done in the United States in agricultural ex¬ periment stations under State supervision or of that of the American Department of Agricul¬ ture. Germany thus grows every variety of grain and fruit produced within the temperate zone. Of cereals, wheat, rye, barley, oats, are raised in all sections of the country; spelt (about one-half million tons per annum) and maize or corn (popularly called in Germany (

the vicinity of Magdeburg, Erfurt and Merse¬ burg, that the sugar industry first arose, due to the special adaptability of the soil. The sys¬ tem in vogue in Germany for many years, the so-called <(three-year rotation,® allowing the land to lie fallow every third year, has been done away with long ago, and the regular alternation of crops is supplemented by an orderly and plentiful application of fertilizers and soil foods. This systematic enrichment of the soil has resulted in a steady amelioration in effects obtained. The average yield per acre on every kind of crop has risen for the empire as a whole by about 137 per cent within the past 40 years, as partly shown in the table below :

CROP

Produced in 1880, metric tons

Produced in 1913, metric tons

Potatoes .

19,400,000

4,952,000

2,059,000

2,076,000

3,700,000

29,142,000

54,121,146

12,222,134

4,655,156

3,073,254

9,713,678

**29,154,194*

Rye- .

Wheat .

Barley . .

Oats .

Hay .

- *Owing to a great diminution of pasture land within that period.*

By far the most important part of the crop in Germany is that of rye, wheat, oats, barley and potatoes. Rye predominates, not only as a matter of expediency for climatic reasons, but also because rye bread for general use as a chief food is preferred by the whole nation, rich and poor alike, to wheat bread. German wheat, besides, is somewhat deficient in gluten and hence less nutritious. Flour of rye and wheat mixed is liked best by many. In 1913 there were in Germany 16,035,347 acres de¬ voted to rye culture, only 4,935,4 32 to wheat, 11,095,338 to oats, 8,530,037 to potatoes, 4,134,- 527 to barley. Despite the above brilliant show¬ ing in enormous increased yield, however, there has been, year after year, more urgent need of large imports of cereals, meats, etc., and this not only because of the rapid growth in popu¬ lation per square mile (that being now 317, according to the census figures of 1910), but because the diet of the nation had become more generous, not to say luxurious, with its rising wealth. The showing made, however, by the above table demonstrates clearly the superior methods, largely by means of the most efficient labor-saving machinery, employed in the empire in husbandry, methods which have enabled her to enlarge the total yield from her soil so enormously in spite of the fact that her agricultural population has not alone rela¬ tively but even absolutely diminished greatly, millions being diverted to industrial pursuits in town and city. Of other products, besides cereals and hay, beet root, tobacco and hops are noticeable. The. yield in sugar beet is larger in Germany than in any other country; this is partly, indeed, owing to the granting of export bonuses by the government (so that Germans at home

have to pay more for German sugar than they do abroad) and to other means of encouraging the industry, such as favorable legislation, but also partly to the excellent methods of utilizing the beet and growing the one variety giving, on each particular soil, the best all-around results in saccharine percentage

and quantity, the average beet giving no less than from 17 to 22 per cent of sugar. The sugar beet crop has, of course, shown corre¬ sponding increase. It rose from 547,631 acres in 1882 to 1,369,062 acres in 1913, that being the last date on which reliable official figures were published. The hop production, on the other hand, decreased within the same period from 132,087 acres to 67,922; so did the tobacco acreage, from 59,944 acres to 35,452, but in yield much more, namely, from 52,197 tons to 10,671. Viticulture has not made any appre¬ ciable advance for many years. Vineyards ex¬ ist, indeed, in the larger portion of Germany, from as far east as Silesia and the Kingdom of Saxony to the valleys of the Rhine and all its tributaries, notably the Main, Neckar, Moselle, Saan Nahe, etc., and to the sunny Suabian and Baden lowlands. But the wine really worth drinking is grown on a restricted territory. In 1913 vineyards covered 277,312 acres, and the wine made from the grapes grown averages in selling value about $27,000,000 per year, differing greatly in quantity and quality both, though the well-known vintages of Rhine and Moselle never fail to fetch good prices. It ought to be mentioned, though, that Germany imports right along twice as much wine as she exports, and that the ravages of the philloxera and other harmful insects have made wine-growing a rather risky occupation if depended on alone as a source of income.

From the detailed occupational census of 1907 the following facts and figures are cited as to the ownership of farm lands in Germany and other data : There were cultivated each by one household, farms between 2Vz and 25 acres, 2,305,562 ; between 25 and 250 acres, 674,097 ; above 250 acres, 23,183. The total number of all farms, including those of less than 2ˆ2 acres and of over 2,500 acres, num¬ bered 5,736,062, and the acreage amounted to 105,000,000. A peculiar feature of these tables is the overwhelming number of very small farms, those measuring less than 2ˆ2 acres (or one hectare) being 47 per cent of the total; and those below 25 acres in size being 87 per cent of the aggregate number. And another curious fact is that although numerically the owners of large farms (2,500 acres, or 1,000 hectares and over each) are but a handful, they possess almost one-fourth of the entire area of the tilled land, and that nearly all of these big land holders are to be found in that portion of _ Prussia

denominated popularly Transelbia, i.e., those seven original provinces of Prussia lying east of the Elbe River and being the least progressive and politically the most dominated by the ((J tinker® class of landed- gentry, or by aristocratic capitalists. It tallies with these significant facts that over 85 per cent of the entire agricultural land in Germany is tilled and harvested by the owners, and less than 15 per cent by tenants or hired laborers. About 40 per cent of all the farmers cultivate their own land exclusively; a little over 30 per cent cultivate rented land beside their own, and ‘ the remaining 30 per cent cultivate alto¬ gether rented land. In these last-named re¬ spects there has been hardly any change within the past 40 years.

As to the breeding of livestock, that is also an important part of farming in Germany. The marshy plains of the north, the grassy slopes

of hills and valleys in the west and south, and the moderate climate as a whole with its absence of rapid extremes, are admittedly well adapted to the cattle-raising industry. As a matter of fact, this branch has likewise im¬ proved on a large scale within the past two gen¬ erations. The raising of sheep and goats is the sole exception to this, and the decline in this particular, which has been going on for several decades, has been due to the strong com¬ petition of Australia and Argentina, and to the low prices for wool incident thereto. How¬ ever, in the plains of Brandenburg, Silesia and Saxony sheep-growing is still of importance. What has helped Germany in her endeavor to render profitable the breeding of cattle has been (besides protective legislation) the scientific cultivation of nutritious fodder grasses, such as lucerne, alfalfa, and the selection and im¬ provement of the breeds themselves, including the fattening process for the market (rape oil cakes, sunflower cakes, etc., used). Cattle are raised principally in the rich marshlands along the North Sea (Holstein, Oldenburg, East Frisia) and in the fertile valleys and mountain slopes of Wiirttemberg, Alsace-Lorraine and Bavaria. Horses are bred of various types ; the heavy, hardy draft horse of Mecklenburg, Holstein, Hanover and West Prussia, the less weighty horses of East Prussia, Saxony and Hesse, etc. The government studs of Prussia, such as the ones in Trakehnen, Uelzen, Han¬ over, etc., are largely responsible for keeping up the rather high standard of horses through¬ out Germany, both for military and civilian purposes. Of horses, Germany owned, in 1912, 4,516,297 (an increase of about 50 per cent against 1882) ; of cattle, 20,158,738, in the same year (an increase of 25 per cent when com¬ pared with 1882) ; of sheep, 5,787,148 (a de¬ crease of about 75 per cent) ; of goats, 3,533,970 (a similar decrease) ; and of hogs, 21,885,073 (an increase of about 40 per cent).

Some 34,500,000 acres of the area of Ger¬ many are covered with forest

and the cultiva¬ tion, preservation and renewal of which re¬ ceives much attention by a large corps of specially trained men, the bulk of whom are in the government service. There are four for¬ estry colleges in the country. But while the annual output of merchantable lumber and tim¬ ber is very large, it is not large enough to satisfy the demand made for industry and the building trade, and part of this demand must be supplied from abroad. The larger woods and forests in most of the separate states of Germany belong to the different governments or are so-called ftCrown lands.® These are usually under the care of special boards of management, and these also exercise certain rights of control and supervision over all forest lands, whether public or private. For the country as a whole, about one-third of all the wooded land is fiscal and about one-sixth is communal, while the <(Crown forests,® i.e, owned by the various hereditary rulers and their families, measure. 675,000 acres. The re¬ mainder is chiefly private property, subject, however, to a certain government control, the main object of which is to prevent the spread of conflagrations, of noxious insects, etc. The most valuable forest lands are to be found in the states of Bavaria, Saxony, Hesse, Baden and Wiirttemberg, these being rich in leaf trees

— oak, beech, birch, ash, etc., while Prussia has the most extensive government-owned forests, mostly coniferous, such as pines and firs.

The German fisheries, for some unexplained reason, have remained far behind those of most of the empire's neighboring states and in the number of persons engaged in that branch of work are not very considerable. Still there has been improvement in recent years, and the an¬ nual. German catch of the North Sea and the Baltic amounts to some $9,500,000 in value, about equally divided between the two seas. Cod and herring, besides some smaller fish (like sprotten, a species of anchovy), are taken both in the North Sea and in the Baltic. The imperial government has made some effort to increase the deep-sea fishing fleet and to en¬ courage the consumption of fish and other sea food as a popular nutrient, but has met with scant success. As a matter of fact, about $20,000,000 of fresh, salted or canned fish are imported annually. The number of persons em¬ ployed by the fisheries on both oceans amounts to but 42,000. In German rivers, ponds and lakes are found salmon, carp, trout, eels, pike, but no concerted movement to stock these waters plentifully and steadily has yet been made.

Bibliography.— Arndt, E., (Deutschlands Stellung in d. WeltwirtschafD (Leipzig 1908) ; Barker, E. M., (Modern Germany) (London 1912) ;

Meyer, H. E., (Deutsche Volkskunde> (Strassburg 1898) ; Partsch, R., (Central

Europe > (New York 1903) ; Ratzel, F.,

Wolf von Schierbrand, Professor of German Language and Literature.

23. MONEY, BANKING, EXCHANGE.

The modern German monetary system origi¬ nated with the foundation of the German Em¬ pire. In 1871, gold was declared the standard of value. The unit of value is the mark which is divided in 100 pfennig. In gold 4 marks are equal to $0.95284, or 1 mark is equal to 23.82 cents United States gold. For statistical purposes $1.00 is generally regarded as four marks. Gold has been coined and not melted down again until 1915, to the amount of 5,120,000,000 marks (710,000,000 marks in 10 mark pieces). Of these 5,000,- 000,000 marks a large quantity has been ex¬ ported or used up in industries, probably about one-half. During the war, of course, no gold is in circulation in Germany, but it is hoarded either in the federal bank or privately. More than 2,500,000,000 marks gold — German coins, foreign coins and bars — have been concen¬ trated in the federal bank. Silver has been coined to the amount of 1,160,000,000 marks.

Moneys

Federal Treasury Notes — Reichskassen- scheine. — In withdrawing existing paper money of the different states, united in 1871, 120,000,- 000 marks ($30,000,000) Federal Treasury notes were issued. By a law of 1913, the amount of Treasury notes- was to be doubled and a cor¬

responding amount of gold was to be with¬ drawn from circulation and deposited as a special War Reserve Fund. When war broke out the law had not been carried out to its full extent. The Treasury notes are now circulating in denominations of 5 and 10 marks.

Federal Loan Bank Certificates — Dar- lehenskassenscheine. — The issue of these cer¬ tificates is a war measure to meet the demand of quick money by the citizens on their loanable property. The conditions being not very favor¬ able the amount of these certificates has not become very large. By the end of 1914 $329,- 000,000 worth, of these certificates had been issued, but being replaced constantly by bank notes, only one-third of that amount was actu¬ ally in circulation.

Bank-Notes. — There are five banks of issue, the Federal Bank (Reichsbank) , the Bayerische Notenbank, the Sachsische Bank, the Württembergische Bank and the Badische Bank. The notes of the Federal

Bank are in circulation all over Germany, while the circulation of the notes of the other banks is more or less re¬ stricted to their state territories. More¬ over, the issue of the notes of the Federal Bank may be regarded as unlimited for practi¬ cal purposes. So the Federal Bank holds a pre¬ dominant position, while the four other banks are only of local importance and their special and differing regulations may be disregarded. The Federal Bank is a private joint-stock com¬ pany with a fully paid capital stock of $45,000,- 000, and reserves of $20,000,000, but regulated in its scope of business by law and controlled by the government, the director being nominated by the Imperial Chancellor. Bank notes are issued in the denominations of $250, $125, $25.00, $12.50 and $5.00.

Above the amount of lawful money in the possession of the banks of issue, notes can be issued not subject to any tax, to the amount of $155,000,000 generally, and $205,000,000 during one week at the end of each quarter of the year (of this $137,000,000 generally and $187,- 000,000 at the end of the quarter are issued by the Federal Bank). Above that amount the Federal Bank is entitled to issue notes but against payment of a 5 per cent tax involving an effectively restrictive discount rate of at least 5 per cent on first-class commercial paper, and the total amount of notes outstanding is not allowed to exceed three times the amount of cash in the hands of the bank. The cir¬ culation of bank-notes is the elastic varying ele¬ ment in the German monetary system. . The principle of an elastic but gradually restrictive note issue as stipulated by the Bank Law of 1875, has since been introduced in most modern monetary systems, last of all in the monetary system of the United States by the Federal Re¬ serve Act.

The Latent Monetary Crisis in Germany, 1900-14. — During the last few years before the war the German monetary system has under¬ gone very considerable changes. Before 1900, the policy of the Federal Bank, under the presidency of Koch, was more that of a cen¬ tral credit than that of a central currency in¬ stitution. The gold holdings of the Federal Bank were dangerously small compared with the enormous foreign trade which was, more¬ over, mostly financed by French short call money and British trading firms. Since 1900

or thereabouts, the upward tendency in prices especially of raw materials and foodstuffs im¬ ported by Germany, combined with the natural increase of population and the important sur¬ plus of immigration over emigration, and a growing industrialization, demanded a quick increase of money in circulation. Since new money can be created in Germany only by coining

new gold or depositing new gold in the Federal Bank (besides the automatically restrictive emergency money of the bank-notes) and gold is not produced in Germany in any considerable quantity but must be imported as needed like merchandise, Germany faced a difficult and almost dangerous situation from 1900 to 1914 in meeting the increased demand for money, which held a large part of the non¬ durable note-issue in constant circulation re¬ stricting the amount of reserves or emergency money (in 1913, of the total amount of that note-issue of # $155,000,000, $151,000,000 were on the average in circulation). In order to meet this latent crisis, gold was bought and im¬ ported like merchandise, burdening the trade with the task of paying for these gold imports. As late as 1907, the amount of gold in the Fed¬ eral Bank touched the low mark of $149,000,000 (with no other strong gold reserves in private possession available). Gold purchases abroad during the years 1908-13 amounted to $326,000,- 000 (in 1913 to $79,000,000), and the amount of gold in the hands of the banks rose to an average of $199,000,000 in 1908-10, and of $267,000,000 in 1913. In order to strengthen the national gold reserve, gold was replaced by paper in the circulation. For that purpose the notes in the small denominations of $12.50 and- $5 were created and bank-notes were declared to be legal tender but redeemable against gold on presentation (Law of 1906), In order to adjust the amount of emergency money to the enormous development and to the increased demands of commerce and industry the non¬ durable note-issue was almost doubled (Laws of 1901 and 1909) as compared with 1875.

Banking.

There is no state concession of banking in Germany and no special bank law (besides that regulating the note-issuing banks) since the foundation of the empire. The banks have been able to develop their own methods of busi¬ ness and standards of safety. But there is one bond uniting and regulating all credit re¬ sources of Germany — the elastic emergency and credit > currency which is handled in a liberal, strict and cautious manner by the Federal Bank in order to foster industry and commerce. In performing their task of stabiliz- mg the established national wealth by creating new wealth the German banks combine the functions and interests which in America are generally divided among banks and bankers, trust companies, promoters, stock dealers and brokers. The large German banks accept de¬ posits on the one hand, carry on a circulation and check business, and give credit for ex¬ change, mercantile and other securities as in the ordinary bank routine, while on the other hand they buy and sell stocks for others and on their own account, engage in all sorts of financial, industrial and mercantile under¬ takings, promote the establishment or develop¬ ment of industrial enterprises and undertake

the flotation of public and industrial loans of every kind. As a whole the German system has proved to be safe and sane, and even the large depreciation of private property in Ger¬ many caused by the heavy increase in taxation of every description during the last few vears preceding the war did not undermine and not even severely injure the prosperity of the banks.

The Modern Development of Concentra¬ tion and Expansion.— Not only the task of distributing the large risks which of course have to be incurred by the great German banks but the very fact of their intimate connection with industrial and commercial enterprises, with production, distribution and consumption all over Germany and in the trade between Ger¬ many and foreign countries, induce the banks to strengthen their means as far as possible and to expand their business connections geographically. The statistics available are restricted to joint-stock banks; there are other very large and much older banks in Germany which are owned by individuals representing family estates, like Bleichroder and Rothschild.

Increase of the Home Resources of the Banks. — The five greatest German joint-stock banks have increased their capital stock from $71,000,000 in 1888, to $152,000,000 in 1898, to $255,000,000 in 1914, or an increase of 225 per cent between 1888 and 1914. That amount has not only been fully paid in (conforming with the requirements of the German laws), but since the emission price of the new shares was much above the nominal value, the actual in¬ crease of capital was much larger, the differ¬ ence between the nominal value and the actual value being assigned to the reserve funds and constituting the larger part of them. The re- serve funds of these five Berlin banks amounted to $81,000,000. Besides the open reserves there are very large «silent reserves® which have grown out of the intimate connection of the banks with the industries, simultaneously with the growth of these industries.

*Systematic Concentration of Deposit and Savings Money. — To provide the industrial and commercial development with the neces¬ sary capital the German banks have to over¬ come both the shortage of capital in Germany and the German legislation which restricts the capital investments of a productive character by forbidding the issue of industrial and com¬ mercial shares in small denominations (gen- erally. less than $250). They have succeeded in doing so largely by the development of the deposit business, spreading a system of deposit- offices over the large cities of Germany and supplanting partly the savings banks by their methods of business. Thus deposits \n the ™ding Berlin banks have increased from $166,000,000 in 1896, to $693,000,000 in VIQ?' *° $956,000,000 in 1913, or an increase of 470 per cent from 1896 to 1913, and the relation between capital stock plus reserves and deposit money has become almost 1:3. Provincial banks*

have followed later in that kind of busi¬ ness and their inability tb develop their de¬ posits to a corresponding degree is one of the reasons for the rapid concentration in German banking.

Territorial Expansion. — First, an expand¬ ing bank by opening a new branch, or buying some local bank or establishing a community of interest with a local bank preserving some

sort, or at least appearance, of local independ-

erCe,£cln another city has gradually spread a net ot offices over a large territory. Out of these organizations have grown up great banking concerns by combination of one of the great .berlin banks with important provincial banks, these

The five leading Berlin banks are the Deutsche Bank with $91,000,000 capital and reserve, the Disconto Gesellschaft with $95,- 000,000 capital and reserve, the Dresdner Bank with $65,000,000 capital and reserve, the Bank fur Handel und Industrie with $48,000,000 capi¬ tal and reserve, and the Berliner Handelsgesell- schaft with $36,000,000 capital and reserve. Of these five banks the first three are the most progressive while the Berliner Handelsgesell- schaft is deliberately preserving the type of an old-fashioned commercial bank. The Deutsche Bank commands the largest amount of deposits, while the Disconto Gesellschaft and the Dresdner Bank, for a long time in¬ ferior to the Deutsche Bank, have during the last few years before the war made good head¬ way in equaling it. The figures given above comprise the increase in capital effected in 1914.

Combination Among the Leading Banks. — Among the leading banks as representatives of their banking concerns alliances are fre¬ quently formed for some special purpose of a more or less lasting character, just as between independent states, say the financing of some large enterprise, or the floating of a loan, home or foreign.

Creation of German ((Foreign Banks.® —

In promoting the commerce with foreign coun¬ tries ((foreign banks® have been created mostly by one or more of the leading Berlin banks. The most important of these foreign banks with the amount of capital stock and reserve are the Deutsche Ubersee Bank ($10,000,000), operating mostly in South America, the Deutsche Orientbank ($8,000,000), the Deutsche Sudamerikanische Bank C85, 000.000), the Deutsch-Asiatische Bank

($5,000,000), and the Brasilianische Bank fur Deutschland ($4,-

000,000).

The growing concentration and expansion of some large banks have caused a gradual dis¬ appearance of the small banker all over Ger- • many.

The position of banking toward industry and commerce is very strong. In very many of the important industrial and commercial firms a high official of one of the leading banks is a member of the board of directors or trus¬ tees, and the banks are continually extending their influence, using partly their control of credit, partly their already stabilized control over other firms. Only a few very large indus¬ trial and commercial concerns have been able to preserve their independence or even to dic¬ tate their terms . in their relations with the banks. The dividends paid on the nominal capital by the five great Berlin banks in 1913 were between 12J4 per cent (Deutsche Bank) and 6l4 per cent (Bank f. FI. u.). The policy of the banks in fixing the dividends is very conservative and cautious, the rate of dividends being only raised above the customary level if it can be reasonably expected that the higher level can be maintained.

Mortgage Institutions. — In North Ger¬ many the credit on rural property is generally provided by institutions of an official or semi¬ official character, the most important of these are the ((Landschaften® for the landed aristoc¬ racy, founded on co-operative principles. The credit on rural real estate in South Germany and on urban real estate in North and South Germany are provided by mortgage banks. By the law on mortgage banks of 1899, they are regulated in their scope of business and in the issuing of bonds, and the government is enti¬ tled to exercise the right of control on every mortgage bank at any time. The total amount of bonds issued on real estate property was, in 1912, $4,260,000,000, of this (in 1913) $2,750,- 000,000 had been issued by mortgage banks.

Sayings Banks. — Savings banks are mostly municipal institutions and are used by all classes of the people. The amount saved — $4,700,000,000 — and the number of accounts' — almost 23,000,000 — are both striking. The capital is mostly used in buying bills of ex¬ change, in mortgages and mortgage bonds, and by recent legislation the banks are compelled to have inyested a considerable part in bonds of the empire and the states.

Co-operative Credit Institutions. — Ger¬ many was leading in developing the methods of furnishing the small artisan in the town and the small farmer with productive credit. There were, in 1908, 16,100 credit corporations with 2,203,000 members which were organized in 60 central credit corporations and 33 associations for auditing. The importance of

these latter institutions rests on the power of the govern¬ ment to transfer to them its right of supervis¬ ing and controlling the small individual corpo¬ rations, irrevocably unless gross misconduct has been proved. The concession of this right to the leading Polish bank in Posen by the Prussian government has become the legal basis of the most important financial organization of the Prussian Poles. A powerful credit and rural banking system has grown up on this basis and is backed by the Central Co-operative Bank (Zentralgenossenschaftskasse), a Prus¬ sian state institution with a capital of $19,000,- 000 in 1909. In 1901 money to the amount of

$223,000,000 was paid into the bank on current account, while the total turnover of the bank was $4,100,000,000.

The Federal Bank as the Central Credit Institution. — The backbone of the credit sys¬ tem is the Federal bank in its right of an elas¬ tic practically unlimited but restrictive note issue. There was never any danger of a cash crisis in modern Germany which was the crit¬ ical point of the economic system of the United States up to the creation of the Federal Reserve Bank system. First of the banks, the Federal Bank has spread a system of branch offices all over Germany and has now established branches in about 490 cities. Based on this branch sys¬ tem it has established a clearing house system uniting all Germany; in 1913 the amounts of payments made in that clearing house business amounted to $47,000,000,000, as against $20,400,- 000,000 in 1900, and $7,100,000,000 in 1890; and it has. concentrated a very large part of the trade in bills of exchange in its hands during the last few years, especially in bills of ex¬ change on foreign places; the number of bills bought by the Federal Bank maturing in Ger¬ many being 5,400,000 in 1913 as against 4,500,000 in 1901, and to the amount of $2,900,000,000 in 1913 as against $1,500,000,000 in 1891, while the number of bills of exchange on foreign places was in 1913, 100,000, as against 23,000 in 1901, and to the amount of $280,000,000 in 1913, as against $40,000,000 in 1901. These bills are generally sold to the Federal Bank some few days, now by statute of the Federal Bank at least 10 days, before maturity. Having grown up as the useful servant of the private busi¬ ness interests while their means were very lim¬ ited, even somewhat disregarding its duties as a political and currency institution, it is now a powerful master even toward the largest of these bank concerns representing the public interests against their private interests. So during the last few years it has forced from the great banks the publication of balances every two months, the enlargement of their deposits free of

interest with the Federal Bank, and the gradual increase of the cash held by the banks against their deposits until one-tenth of the amount of those deposits was to be reached. Further, in connection with the mortgage insti¬ tutions the Federal Bank has concentrated the cash transactions on the mortgage market. And by the medium of the Central Co-operative Bank it is closely connected with the co-oper¬ ative credit system. An advisory board of the president of the Federal Bank is composed of the leaders of the most important credit insti¬ tutions of the empire.

Exchange.

International Position of the German Stock and Produce Exchange. — The German stock exchange has not been able to secure an international position equal to those occupied by the stock exchanges of London, Paris and New York. And likewise the German produce exchange has not succeeded in getting a lead¬ ing position equal to the produce exchanges in Great Britain and America.

Besides the scarcity of German capital power and the unfavorable geographic position of Germany both for production and distribu¬ tion one reason more will be found in the very

*marked distrust or open hostility displayed by the agrarian and socialist majority of the Reichstag and backed by the popular judgment against the man operating in the stock or produce exchange. Besides the Berlin stock exchange, which is of course the most power¬ ful, the stock exchanges of Frankfort-on-Main and Cologne are important and largely inde¬ pendent, while the stock exchanges at Leipzig and Hamburg are strong but more closely con¬ nected with Berlin. Concerning the produce exchanges, beginnings have been made to build * up international markets in Germany in some of the leading staple products, for instance wool, at least for continental Europe.*

German Capital Investments. — The amount of stocks and bonds admitted at German ex¬ changes in 1911-13 ($2,878,000,000) has not risen considerably above that of 1899-1901 ($2,454,000,000), but government borrowing al¬ ready large in 1899-1901 — about 31 per cent of the whole amount — has increased very sub¬ stantially (to 41 per cent), both in home and foreign loans. The investments in bonds of cities has decreased absolutely and of course even more relatively (from 38 per cent to 30 per cent). And so have decreased investments in stocks and bonds of banks and of railroads, already small in 1899-1901 (from 6 to 3 per cent and from 10 to 6 per cent). Industrial stocks and bonds, both domestic and foreign, have in¬ creased (from 17 to 20 per cent). The invest¬ ments in bonds and stocks admitted at the Ger¬ man exchanges constitute, however, only a

part of the total German capital investments which are considered to amount to about $2,000,000,000 every year.

According, to official compilations of Ger¬ man capital investments in foreign countries the amount was between $1,759,000,000 and $1,934,000,000 in 1898, and between $2,007,000,- 000 and $2,306,000,000 in 1907-08. In 1909, the investments in the United States and Canada were estimated at $687,000,000, in Central Amer¬ ica, $272,000,000; in the countries of the West Coast of South America, $131,000,000; of the East Coast, $362,000,000; in Africa, $332,000,- 000; in Turkey, $81,000,000; in Persia and British India, $19,000,000; in Eastern Asia, $106,000,00.0; in Southeastern Asia, $106,000,- 000; and in Australia and Polynesia, $87,000,-

000.

Taxation.— In principle the taxation by the empire is indirect, by the states direct, while the communal taxation is mostly fixed in per cent of and additional to the state taxation. Both in the states and the communes the in¬ come derived from productive enterprise (mostly railways, forests and mines in the case of the . states, trolley cars, water, gas, electric power in the case of the communes) forms an important item. The development of the inher¬ itance tax and the general introduction of the income tax as the basic duty of the system of direct taxes are the prominent figures of the modern development. The increase in taxation during the last few. years before the war was very large, almost injuring the needs of pro¬ duction. It has been estimated that every Ger¬ man has, on the average, to work two months m the year for the empire and the states and the other public bodies. Even before the in¬ crease in taxation during the last few years

the taxation already borne by the largest and most prosperous German corporations in the coal and iron industries amounted from 60 to 75 per cent of the total profits. It is a splendid proof of the economic excellence of the Ger¬ man system of social insurance as introduced by the empire, and of the policy of social wel¬ fare as practised by the states and the com¬ munes, that in spite of these taxes the German industries were, generally speaking, increasingly prosperous.

Bibliography.— Heilfron, Ed.,

H. Lufft.

24. TRAFFIC AND TRANSPORTA¬ TION IN GERMANY. Germany's railroads are nationalized and the profits they make are devoted to

governmental purposes, thus lessen¬ ing the burdens of taxation to that extent. In the year 1911 the total^ freight earnings of Ger¬ man railroads were $516,303,000 or $8 per cap¬ ita or $40 per family of five. The net profit of the German railroads is devoted to governmental purposes.

The average passenger fare for a second class ticket, which compares favorably with the ordinary day coach in America, is 1.8 cents, while the first-class rate is 2.5 cents per mile, the third class 1.1 cents per mile, and the fourth class but 0.8 cent per mile.

Until 1 April 1920 the German railroads were owned by the various states, but were under the administration of the empire. The supreme authority in railroad administration was the Bundesrat (Senate of the empire). The head of the state railroads in Prussia was the Minister of Public Works, appointed by the king, while the Reicheisenbahn Amt (Imperial Rail¬ road Bureau), the members of which were ap¬ pointed by the emperor, exercised general super¬ vision over the whole system. General confer¬ ences .were held from time to time in which the various railroads were represented in proportion to their mileage. A committee of the conference consisting of 16 members selected- by chambers of commerce and boards of agriculture and con¬ stituted of five representatives of manufacturing interests, five of agriculture, five of distributing and commercial interests and one of the Bavarian government, decide upon rates as worked out by a permanent rate commission. There were simi¬ lar district boards of conference for more local problems.

On 1 April 1920 all of the various state rail¬ ways in Germany were transferred to the cen¬

tral government. On 31 Dec. 1918 the total length of the railway lines in the empire was 38,809 miles. Of this total 36,006 miles belonged to the states.

For the physical operation of the roads, there is a central department at Berlin which supervises equipment and serves as a centre for administration. As the roads are the property of the government, they are made to serve the pub¬ lic interest, and the rates are so adjusted as to cause the roads to have a stimulating effect upon general business conditions.

Thus, for example, shipments from abroad if made in German vessels are given prefer¬ ential rates on canals and railroads in Ger¬ many. This amounts to a ship subsidy and en¬ courages the ship-building industry. Again, special rates are often made so that the geo¬ graphical location of a factory will not be a handicap to its business, and this preference enables

factories to be operated in cities and districts where they could not otherwise exist, making industry more widespread and contrib¬ uting to the prosperity of the country as a whole rather than to congested districts. The underlying principle is to use the public utili¬ ties as an instrument to promote the general welfare as well as a means of transportation.

Although the railroads of Germany are highly developed, the building of canals, water¬ ways and harbors has been carried out upon an enormous scale, and is planned far ahead in a vast and far-reaching system. The similar developments in other countries are entirely overshadowed. When completed, canals will unite the Rhine, the Danube, the Oder, the Vistula, the Elbe, the Weser and the Meuse, of sufficient dimensions to carry large craft. The navigable waterways of Germany amount to 8,600 miles, of which 2,200 miles are in canals. In 1911 there were transported 408,- 870,000 tons of goods on railroads and 76,632,- 000 tons on waterways, or more than one-sixth of the amount carried by rail. Berlin, as the result of canal building, now has an in and out traffic of 8,000,000 tons, and though 400 miles from the sea is a seaport only exceeded by the North Sea ports and certain cities on the Rhine. In a few years Berlin will be con¬ nected by canals with the Rhine on the west and the Danube on the east, and as a result ves¬ sels will pass from the North Sea to the Black Sea. The building of many of Germany's canals is carried out in the face of great engineer¬ ing difficulties, which are, however, overcome and highly efficient systems of waterways con¬ structed. In some instances canals are elevated and placed above railroads and streets, and in¬ stead of locks, a whole section of the canal with water and vessel is lifted on the elevator principle, to the next water level, effecting a great saving of time. The canals carry the heavy bulk freight, such as coal, iron ore, lum¬ ber, grain and the heavier articles of commerce on which very low freight rates are charged. The railroads, canals, waterways, overseas shipping and ports are operated in conjunction with each other and ample facilities are pro¬ vided for transshipment of freight. The public- lias the full benefit of the cheapest forms of transportation, with its consequent stimulation of industry.

One of the great advantages enjoyed by

German commerce is in the free ports of Ham¬ burg, Bremen and Liibeck. They were, in for¬ mer centuries, independent states and controlled the Hanseatic League, the dominating force in mediaeval commerce of the north. They came into the German Empire retaining many of their privileges, among them being the right to main¬ tain free ports; that is to

say, ports in which car¬ goes may be received, transferred, dealt in and reshipped independent of the tariff barriers of the rest of the nation. This freedom from tariff restrictions made England the mistress of the seas and it has made the free ports of Germany the rivals of England as places for the exchange of goods from all parts of the world. While in tariff countries goods may be put into bond and taken out again for re¬ shipment to other countries without paying duty, the inconvenience is so great that vessels from all parts of the world prefer free ports in making their exchanges and will go hundreds of miles out of their courses to avoid the in¬ conveniences of tariff regulations. This has made Hamburg one of the largest ports in the world, exceeding Antwerp and rivaling New York, although its geographical position is far less favorable. In administering the free ports,

has increased markedly in the past generation, as is shown by the following table :

1885

1911

Increase in per¬ centage

Length of railroads (in kilo-

meters) .

37,190

59,763

60.7

Capital invested (million

marks) .

9,722

17,833

83.4

Officials and laborers .

333,439

713,187

113.9

Locomotives and power cars .

12,450

28,088

125.6

Passenger cars .

22,735

59,857

163.3

Freight and express cars ....

250,640

596,763

138.1

Gross receipts (in million

marks) .

997

3,271

218.0

Freight carried (in million

ton kilometers) .

16,600

61,870

272.7

Passengers carried one kilo-

meter (in millions) .

7,932

37,855

377.1

The railroad development in Germany in length of line operated shows an increase from 1890 to 1911 of 42.6 per cent. In that year the total mileage of railroads in Germany was 38,462 miles.

The operations of railroads in the principal

Comparative Railroad Development.

Germany .

England .

Capital invested (in million marks) end of

Passengers carried one kilometer (in millions)

Freight carried one kilo¬ meter (in million tons)

Total revenues (in million marks)

1895

1910

1895

1910

1895

1910

1895

1910

11,407

20,022

12,471

46,595

18,664

26,370

15,099

77,352

14,344

37,613.7

25,486.4

53 ,803.8

1,513.9

1,730.2

1,003.7

5,217.1

3,092.3 2,485.5 1 ,813.7 13,211.5

France .

United States ….

10,671.0

19,940.4

20,976.8

54,846.0

12,914.1

139,379.6

27,733.0

custom officials regard the free portions of the harbor as foreign territory, and though goods are handled and transshipped on the piers and docks and stored in the warehouses, nothing is admitted to the tariff-protected part of the port until the duty is paid. In this way Germany enjoys the advantages to commerce of free trade and the protection to her industries of the tariff.

Germanv's progress during the past gen¬ eration is shown by the figures for trade and transportat'on and overseas shipping. The business of the post-office increased from 1,303,400,000 letters in 1887 to 5,994,300,000 in 1911, or 359 per cent, and the number of post- offices increased from 19,476 to 40,987 or 110 per cent. During the same period the increase of population was but 37^ per cent. The num¬ ber of post-offices in Germany per 100,000 population in 1909 was 79, in the United King¬ dom 53 and in France 34. During the same period, 1887 to 1911, the number of telegraph offices increased from 14,565 to 46,444 or 218 per cent, while the number of messages in¬ creased from 17,860,000 to 49,643,000 or 178 per cent. The number of telegraph offices in Germany per 100,000 population in 1909 was 69. The receipts of the post-office from postage and telegraph charges amounted in 1887 to $47,500,000 and by 1911 they had in¬ creased to $196,000,000. The railroad system

countries from 1895 to 1910 may be seen in the summary given in the table above.

The inland waterways of Germany including navigable rivers are 12,226 miles in length. Those of the United Kingdom are 8,127, France 8,015 and the United States 20,915 miles. In the year 1887 there were 20,390 vessels engaged in inland navigation in Germany, 19,989 of such vessels having a total capacity of 2,100,000 tons. In 1907 there were 26,191 of such vessels having a carrying capacity of 5,900,000 tons. In 1911 the traffic on the inland waterwavs was 76,- 000,000 tons, or one-sixth of the railroad ton¬ nage.

The development of Germany's overseas commerce is even more striking than that of her inland waterways. In the period from 1888 to 1913 her tonnage more than doubled.

In 1888 she had 3,034 sailing ships manned by 21,053 sailors, having a net register of 758,- 359 tons. By 1913 the number of sailing ves¬ sels had decreased to 2,420, having a net regis¬ ter of 396,904 tons and manned by 12,980 sailors, but her steam vessels had increased from 717 in 1888, having a register of 470,364 tons and manned by 15,856 sailors, to 2,098 vessels having a net tonnage of 2,655,496 tons and manned by 63,713

sailors. In addition she had in 1888, 60 sea-going lighters of a net register of 11,459 tons, manned by 167 sailors, while in 1913 there were 332 lighters, having

i egister of 101,324 tons and manned by 1,053 sailors The total increase was from 3,811 snips, having a registered tonnage of 1,240,182 ions, manned by 37,076 sailors, in 1888, to 4,850 ships, having a register of 3,153,724 tons, and manned by 77,746 sailors in 1913. Thus the tonnage increased two and one-half times and the number of sailors more than doubled. The tonnage of steam vessels which was hardly more than half of that of sailing vessels in 1888 had increased to seven times as much in 1913, which is even more important for purposes of traffic than would appear from the figures since the steam vessels, making greater speed, are able to make a greater number of round trips m a year than are the sailing vessels. More than one-quarter of the gross steam tonnage on 1 Jan. 1913 was represented by steamers less than five years old while more than half was by steamers less than 10 years old. This indicates the rapidity with which the steam vessels have been constructed. The sea-going traffic at German ports has been developed much more rapidly than has the same traffic elsewhere in Europe, as will be seen from a comparison of the figures for the year 1887 with those of 1911. In 1887 the number of merchant vessels carrying cargoes arriving in Germany was 29,359, carrving 1,675,498 regis¬ tered tons of cargo,, wh.le in 1911 the number of vessels was 56,544, carrying 5,397,913 tons of cargo, an increase of more than 300 per cent. The number of outbound vessels in 1887 was 28,564, carrying 1,661,471 register tons, while in 191 1_ it had increased to 55,795 vessels, carrying 5,495,791 register tons.

For all other European ports, including Great Britain, the number of vessels arriving in 1887 was 18,891, carrying 5,917,242 tons of cargo, while in 1911 the number was 41,443, carrying 15,330,754 tons. The number of out¬ bound vessels at all other European ports in 1887 was 14,995, carrying 4,467,353 tons of cargo, while in 1911 the number of vessels had increased to 23,441, carrying 8,975,655 tons, or a little more than double the tonnage. During the same period Germany had more than tripled her export tonnage. Germany's improvement in her commercial fleet is illustrated by the following comparisons, taking the figure's for 1885 and for 1911 : In 1885 Germany had 3,438 sailing vessels of a capacity of 854,900 regis¬ ter tons, while by 1911 the number of sailing vessels had decreased to 2,723 with a capacity of 510,000 tons. The United Kingdom had in 1885 sailing vessels to the number of 17,018 with a capacity of

3,457,000 register tons, but by 1911 the number had decreased to 8,714 with a capacity of 971,700 tons, a much more rapid decrease than that of Germany. The United States had in 1885 sailing vessels to the num¬ ber of 18,564 with a capacity of 2,771,000 gross tons. The number of sailing vessels in 1912 had decreased to 10,969 with 2,147,700 gross tons capacity, a smaller decrease than either Germany or the United Kingdom. The de¬ creases in sailing vessels was largely due to the building of steel hull steam vessels during the period in question, consequent upon the cheapening of the processes of steel manufac¬ ture. The decrease in the number of sailing vessels in the United States was correspond¬ ingly less, due to the stagnation in shipbuilding and the retaining of the old vessels in use.

The next two countries of importance in sea traffic are Norway and France, together equal to Germany, but both suffered decreases tp a8ffregate tonnage during the period men¬ tioned.

In the development of what are termed in¬ land harbors Germany has progressed. This is especially noticeable on the Rhine where a great traffic has been built up through en¬ couragement to navigation by the cities bene¬ fited, act.ng under the direction of the govern¬ ment in the working out of the system. The largest harbor on the Rhine is the Duisburg- Ruhrort harbor, in reality a group, it being a transfer point for coal from railroad to river. In 1907 the traffic was 31,000,000 tons or as great as Hamburg's overseas traffic. The har¬ bors at Mannheim-Ludwigshafen on opposite sides of the Rhine have a traffic greater than the seaward traffic of Bremen. Other prominent harbors are at Crefeld, Muhl- heim, Cologne, Diisseldorf, Worms, Carlsruhe, Frankfort, Offenbach (on the Main) and Strassburg. The rivalry between these cities keeps the harbor facilities constantly up to the highest point of efficiency. The larger part of the Rhine traffic is inland bound and iron ore and grain form two-thirds of the total, while coal for export forms half of the outward traffic. Two-thirds of the Rhine traffic is in foreign exports and imports and one-third in domestic goods. In 1907 the total Rhine traffic was 64,500,000 tons, an increase of 400 per cent over 1885. The chief articles of the Rhine traffic are wheat, rye, iron, coal, coke, manu¬ factured iron, soda, salt, stone, sand, gravel, brick, wood, cement, fertilizer, petroleum, coffee, fruit, wine, tobacco and machinery. The in¬ crease in the river traffic is shown by the fol¬ lowing tables, selected from the reports of vari¬ ous harbors, as indicating the increase at har¬ bors of different sizes.

Mannheim

1870 .

1893 .

1901 .

1909 . .

41 ,000 tons 2 , 200 , 000 tons 5,145, 000 tons 6 , 085 , 000 tons

Rheinau

1901 .

1903 .

1909 .

562,000 tons 1,011 ,CC0 tons 1 , 797,000 tons

Ludwigshafen

1870 . 135,000 tons

'909 . 2,178,000 tons

The whole German system of traffic and transportation, rail, inland waterways and over¬ seas, is all one co-ordinated organization, each element of which is developed in its proper relation to the whole and each of which is em¬ ployed to promote the prosperity of the other and of the country at large.

The preferences in rates on the inland lines promote the overseas traffic, which proves a consequent stimulus to the building of liners and other vessels whose passenger traffic in turn is of great value to the railroads. An endless chain of benefits is thus established for an efficient traffic and transportation system, not only highly profitable in times of peace, but effective in times of war for the national defense.

Bibliography.— Helfferich, Dr. Karl, Ger¬ many's Economic Progress and National Wealthy (Berlin 1914) ; Howe, Frederic C., Socialized Germany) (New York 1915) ;

Koester, Frank, (The Price of Inefficiency (New York 1913) and (Secrets of German Progress* (New York 1915) ; Dresdner Bank, (Germany's*

Economic Forces) (Berlin 1913) ; (Deutschland als Weltmacht (Berlin 1911).*

Frank Koester,

Consulting Engineer , New York City.

25. THE GERMAN ARMY. Historical Outline. — Modern military systems trace their origin back to the general introduction of fire¬ arms, which toward the end of the 15th century rendered the knight in armor and the whole consequent structure of feudalism obsolete. France organized companies of mounted order¬ lies, forming the first germ of the standing army, Spain created a large army and armies of German and Swiss mercenaries appeared. The feudal levy was displaced as a military force by armies of hirelings, particularly dur¬ ing the Thirty Years' War (1618-48), of a licentious character.

In Brandenberg and Prussia the idea of re¬ cruiting the army from the people began early to take form. The Great Elector (1640-88) was the first to assign regiments to definite dis¬ tricts from which their recruits and reserves were to be drawn in time of war. The Great Elector laid the foundations for the future power of Prussia by rigid economy in civil and military administration, and the raising of the national spirit of the Germans which had fallen to a very low ebb. His son and grandson, Frederick I and Frederick William I, continued his policies until the army was augmented to 84,000. The corps of the officers was selected from the nobility and carefully educated, form¬ ing the mainstay of the system.

When Frederick the Great came to the throne in 1740 Prussia thus had an excellent army and a good system of recruitment which enabled him to keep up his forces under the strain of the Seven Years' War, inspired as it was with a strong national feeling and enthu- siam by the monarch, in opposition to the enormous odds of the coalition of Austria, France and Russia.

After his death, however, abuses having crept in, the spirit of the army departed, and Napoleon, the great master of the art of war, with a national army, new methods, implements and strategy, destroyed the superannuated Prussian armies and humbled the state. By the Treaty of Tilsit, Prussia agreed to keep her army down to 42,000 men.

Reforms were introduced, recruits were dis¬ charged after one year's training, and in 1814 universal obligation to military service was in¬ troduced, so that by 1815 the armies under Bliicher, Gneisenau and York rose to 250,000 men.

In the slow period of recuperation after the Napoleonic wars progress was only gradually made. In 1859 the standing army consisted of 140,000 men and in 1860 the reorganization raised the annual levy from 49,000 to 63,000. In the wars of 1864 and 1866 Prussia was able to bring 600,000 men under arms and become for the second time in history the model for the armies of the world. In the war of 1870-71 with France, considerable over a million men were placed in the field, and on 18 Jan. 1871 the German Empire was proclaimed in the halls of Versailles. The essential details of

the German military system only can be given here.

Liability to Service. — Until the system was abolished by the Treaty of Versailles every male German was liable to military service. Only members of the ruling family and medi¬ atized princely houses were exempt. Evasion of service by means of substitutes was not permit¬ ted. The obligation to service existed between the age of 18 and 45 years inclusive, and con¬ templated service either (1) in the army, navy or (2) in the Lansturm.

Service in the army began at the end of the 20th year and terminated on the 31st of- March of the calendar year in which the man com¬ pleted his 39th year of age.

The first levy of the Landsturm consisted of all men from the end of the 17th year to the 39th year who had not served in the standing army in peace times. The second levy included all up to the end of the 45th year, whether they had or had not served in the army. The Land¬ sturm was intended for home defense, but in extraordinary cases could be utilized to recruit the army.

Service with the army was either with the colors, followed by the reserve and first and second levies of the Landwehr or in the Ersatz reserve. The periods of service in times of peace were as follows :

SERVICE

Cavalry and horse artillery

All other arms of the service

With the colors .

In the reserve .

3 years .

4 years

3 years

9 years

(about)

2 years 5 years 5 years 7 years

In the Landwehr, 1st levy .

In the Landwehr, 2d levy .

Men in reserve were simply on furlough and returned to the colors when called for.

Volunteers of sufficient education who bore their own expense were furloughed at the end of one year's service. School teachers, clergy¬ men, apothecaries and medical students and cer¬ tain others enjoyed reductions of service.

Members of the annual contingents in ex¬ cess of the number required for training with the colors in peace time were placed in the Ersatz reserve, from which were drawn the first reserves necessary on mobilization.

Officers and Non-Commissioned Officers. "—The officers of the German army enjoyed a dis¬ tinguished social position, though not forming a special social caste, and were drawn from the higher grades of society, that is the nobility, sons of officers, officials, owners of estates, etc. The corps of officers was recruited in two ways (1) through volunteers called Fahnenjunker, who joined the ranks with a view of obtain¬ ing commissions and (2) through assign¬ ment of cadets from preparatory schools. All officers before being commissioned as second lieutenants of a regiment had to be accepted by a vote of the officers of that regiment. Officers of reserve were recruited from former one-year volunteers or from retired officers. Officers of the Landwehr were taken from officers of the reserves, from officers who had left the stand¬ ing army, and from one-year volunteers and non-commissioned officers who on discharge were recommended for these positions. Officers at

disposal could be recalled to active service on mobilization. The officers of

the German army were divided into grades as follows :

(1) Generals, including field marshals,

colonel-generals, generals of infantry, cavalry or artillery, lieutenant-generals and major- generals.

(2) Field officers : Colonels, lieutenant-

colonels and majors.

(3) Captains, first and second class.

(4) Subalterns: First lieutenants and sec¬ ond lieutenants.

, The non-commissioned officers were divided into two general classes. The first class were quasi-officers, wore officers' swords and cor¬ responded to our non-commissioned officers of the staff corps, first sergeants and quarter¬ master sergeants and included candidates for a commission (Fahnriche).

The second class corresponded to our

sergeants, corporals and lance corporals (Grefreite).

Numbers Available. — The peace strength (1900) was as follows: Officers, 23,844; non¬ commissioned officers, 80,556; privates, lance corporals, etc., 495,500; volunteers (one year service), 9,000; total 608,900.

In 1913 this total was 620,000 and at the be¬ ginning of 1914, 810,000. The total number of trained men available (excluding Land¬ sturm) was over 3,000,000. The number of men in the Ersatz Reserve and Landsturm was about 4,800,000, of whom 800,000 had been trained..

Men of the Reserve and Landwehr were called out from time to time for brief periods of training in accordance with the orders of the emperor.

War plans called for a division of the army into (1) field troops, (2) field reserve troops, (3) Landwehr troops, (4) Depot troops and (5) Landsturm troops.

The field troops consisted of the standing army filled up by the reserves, the field reserve troops consisted of the first levy of the Land¬ wehr to which some officers and men were as¬ signed from the active army. The Landwehr troops were formed from the second levy of the Landwehr and they usually served on the line of communications. Depot troops were formed from the Ersatz Reserve and recruits. The Landsturm was for home defense and was called out by Imperial proclamation when required.

Organization. — The troops of the German army in times of peace (1909) were combined into army corps, which were assigned to terri¬ torial district with headquarters, as follows :

Guard 'Corps, Berlin:

I. East Prussia, Konigs- berg.

II. Pomerania, Stettin.

III. Brandenberg, Berlin.

IV. Prussian Saxony1 Mag¬

deburg.

V. Lower Silesia, Posen.

VI. Silesia, Breslau.

VII. Westphalia, Munster.

VIII. Rhineland, Coblenz.

IX. Schleswig-Holstein and Mecklenburg, Al- tona.

X. Hanover, Oldenburg. Brunswick, etc., Hanoyer.

XI. Thuringia and Nas¬ sau, Cassel.

XII. Saxony, Dresden.

XIII. Wiirttemberg, Stutt¬

gart.

XIV. Baden, Karlsruhe. XV. Alsace, Strassburg.

XVI. Lorraine, Metz. XVII. West Prussia, Dant- zig.

XVIII. Hesse- Nassau,

Frankfort-on-the-

Main.

XIX. Saxony, Leipzig.

I. Bavarian, Munich.

II. Bavarian, Wurzburg III. Bavarian, Nurnberg

The field army was divided into armies, the number and composition of which was kept

secret, but war plans contemplated a number of these composed of units of from three to six army corps, several cavalry divisions and a variable number of reserve divisions.

Non-com-

—

missioned

Horse

ORGANIZATION

Officers

officers

Horses

bat-

and

privates

teries

Infantry, 216 regiments.

12,448

371,350

Sharpshooters, 18 bat-

talions .

406

11,051

Machine gunners, 16

sections .

64

2,533

1,412

68,896

864

68,506

96

Cavalry, 101 regiments.

Field artillery, 94 regi-

ments .

3,064

64,944

36,158

3,030

Foot artillery, 18 regi-

ments .

1,008

25,584

1,258

Pioneers, 29 battalions,

1 company .

679

17,179

Railway troops, 7 bat-

talions .

179

4,394

Telegraph troops, 4 bat-

talions and 2 com¬ panies .

104

2,180

208

Aviation, 1 battalion, 1

section .

22

407

59

Experimental section . . .

32

140

Traffic officers .

3

7

Transport troops, 23

battalions, 7 sections.

351

7,797

5,236

Recruiting bureaus, 303.

904

6,227

Special formation (col-

leges, half-invalids,

guards, etc.) .

609

1,654

1,396

Non-garrisoned officers .

3,154

Total .

25,560

**584,636*

112,289

3,126

**0.92 per cent of total population, 1909 (63,554,700). With a population of 67,700,000, the army was increased in the spring of 1914 to a grand total of 810,000, thus 0.83 per cent of the total population serving in the army.*

The strength of units varied both in officers and men; those on the frontiers having a some¬ what higher peace establishment than the nor¬ mal given below.

INFANTRY

UNITS

Peace

War

Officers

Medical officers and officials

enlisted men

Horses

Officers

Medical officers and officials

Enlisted men

Non-

combatants

Horses

i

Wagons

Company.. .

4

142

1

5

250

5

8

3

Battalion. . .

18

3

570

7

22

4

1,002

29

46

15

Regiment.. .

57

12

1,768

28

68

12

3,017

93

149

46

Brigade ….

116

24

3,536

64

138

24

6,037

193

312

93

CAVALRY UNITS

Squadron .

5

• • •

135

144

5

• •

150

11

175

3

Regiment .

25

12

687

667

22

602

61

741

17

Brigade .

•

48

18

1,206

135

1,496

35

There were 11 guard, 155 Prussian, 16 Saxon, 10 Wurttemberg and 24 Bavarian infantry regi¬ ments. There were also 18 battalions of rifles (sharpshooters) which in strength and organi¬ zation closely resemble infantry.

Cavalry regiments had five squadrons in peace and only four in war, one being left as a depot. They were classified as follows :

Prussia: (73 regiments). — Ten cuirassiers (2 of the guard) ; 26 dragoons (2 of the guard) ; 18 hussars (1 of the guard) ; 19 lan-

cers (3 of the guard) ; 5 squadrons Jager zu Fferde. (Mounted sharpshooters).

Saxony: (6 regiments). — 'Two heavy cavalry (1 of the guard) ; 2 hussars, 2 lancers, 1 squad¬ ron Jagers zu Pferde.

Wiirttemberg : (4 regiments). — Two dra¬

goons ; 2 lancers.

Bavarian: (10 regiments). — Two heavy

cavalry; 2 lancers; 6 light horse.

Field Artillery: Consisted of 42 horse bat¬ teries and 532 field batteries.

WAR STRENGTH

Officers

/

Men

Horses

Guns

Caissons

! Store

wagons

j Provision wagons

Forage

wagons

Horse batteries (42) ,

each .

5

157

218

6

6

2

1

1

Field batteries (532),

each .

5

162

132

6

6

2

1

1

Two or three batteries formed a battalion, two or three battalions a regiment and two regi¬ ments a brigade.

Foot Artillery. — There were 149 batteries of foot artillery organized into battalions and regi¬ ments. War strength of battery, 4 officers, 209 men. Armament, various calibres of siege, posi¬ tion and coast defense artillery.

T echnical T roops — • Pioneers. — Each army corps had a battalion of pioneers (4 com¬ panies) ; three of the corps had two battalions each. Each company had 4 officers and 154 men in peace, 6 officers and 200 men in war.

Cavalry divisions had pioneer detachments of 1 officer and 30 men.

Railway Troops. — 'There were seven battal¬ ions of railway troops (4 companies each). A company consisted of 5 officers and 151 men. War plans provided for expansion of the com¬ panies into construction companies, operating companies and companies of laborers.

The Train. — In time of peace there were 23 skeleton battalions of the train, one for each army corps. War plans provided for expansion of these so that each provided transport for 6 provision columns, 7 wagon park columns, 1 field bakery column, 3 bearer companies, 1 horse depot, 1 reserve bakery column and 1 reserve column for line of communications.

Medical Units. — There was one bearer com¬ pany for each division and an additional one for each army corps. Each company had 3 officers, 8 medical officers, 2 officials, 39 men of the train and 210 bearers, nurses, etc., with 46 horses and 13 vehicles.

The Infantry Division. — This unit consisted of: The staff of the division; 2 brigades of in¬ fantry; 2 or 3 squadrons of cavalry; 1 brigade of field artillery; 1 or 2 companies of pio¬ neers; 1 divisional brigade train; 1 bearer company.

Its fighting strength was 12,000 rifles, 300 to 450 lances and 72 guns.

The Cavalry Division. — As a rule it consisted of: The staff of the division; 3 brigades of cavalry ; 2 batteries of horse artillery with light ammunition column; 1 pioneer detachment.

Its fighting strength was 3,600 lances, 30 rifles and 12 guns.

The Army Corps. — 'This unit formed a small army complete in all its parts. It was composed

of: The staff of the army corps; 2 infantry divisions ; 1 battalion of rifles ; 1 telegraph sec¬ tion and the corps trains.

Fighting strength — 25,000 rifles, 900 lances and 144 guns.

Arms and Equipment — Infantry and Pio¬ neers. — • Magazine rifle, model 1898, calibre 7.9 mm. Ammunition : 120 cartridges on the

person, 72 in the company wagon, a reserve in the ammunition column; total, about 300 rounds per man. Bayonet (Seitengewehr) new model.

Equipped for the field each soldier carried a pack (tornister) and in its compartments or attached thereto the following articles : 1 shelter tent and three-jointed pole; 1 pair of lace shoes; cleaning, polishing, washing and sewing ma¬ terials; 1 pair of stockings or foot cloths; 1 handkerchief; 1 shirt; 1 pair of drawers; 1 cap; 1 cooking utensil (of aluminum) with 1 ration; 3 iron rations; 1 handbook; and 1 song book. The soldier also carried a felt- covered canteen of aluminum and a haversack containing 1 helmet cover, 1 knife, 1 fork, 1 spoon and 1 ration of bread (262/s ounces) for the journey by rail. The overcoat and shelter tent in a roll surround the pack. The total load, including clothing on the person, arms and ammunition, was 58ˆ4 pounds.*

Cavalry. — The weapons of the German cav¬ alry were (1) the lance, which was a hollow steel shaft 10 feet 6 inches long; (2) the cavalry sword or sabre; and (3) the carbine, which was simply a short rifle and used infantry ammuni¬ tion. Officers and non-commissioned officers carried sabre and revolver.

Artillery. — • The field and horse batteries had the rapid-fire field gun of nickel steel, calibre 7.7 cm. The howitzer batteries had the field howitzer, model 1898, calibre 10.5 cm. Officers and mounted men carried swords and revolvers ; men on foot carried sword bayonets and revolvers — in the ammunition columns, carbines and sword bayonets. The foot artillery had guns of various calibres, 3.7 cm. to 21 cm., depending upon whether they belong to siege, fortress or coast-defense artillery. The men were armed with carbine and sword bayonet.

For the record of the German army in the World War, see War, European. (Under the Treaty of Versailles the maximum strength of the German army is fixed at 100,000 men. See War, European : Peace Treaties (18) .

Bibliography.— Deutschland, (Die Herre und Flotten der Gegenwart5 (1903) ; Edmonds,

(Handbook of the German Army5 (1900); Lehnert's (Handbuch fur den Truppenfiiher.5

Frank Koester,

Author of (Secrets of German Progress ?

26. THE GERMAN NAVY. Historical Outline. — The history of the German navy dates back to the 12th century, when the Ger¬ man Emperor Henry VI made important be¬ ginnings in the Mediterranean. In 1226 Lu-beck was made a free, city and developed an oversea trade and a fleet of fighting ships which became the backbone of the powerful league of Hansa cities. In 1487, during the war with France, Emperor Maximilian estab¬ lished an imperial admiralty. In 1570 efforts were made to build up a navy capable of com¬ bating the power of the Danes and Swedes but without effective result. In 1675 the Elector Frederick William chartered three frigates and two smaller craft from the Dutch

foi opeiations against the Swedes, and the es¬ tablishment was later increased, but after the

0 ˆ ˆ.e Great Elector it fell into decay, although victories had been scored against Spanish fleets.

Frederick the Great revived the maritime policy and engaged the Swedes in 1759 but without decisive results. For over half a cen¬ tury Germany was not represented on the high seas by any force of consequence.

In 1848 a Danish fleet blockaded German ports and inflicted considerable damage. This led to the augmentation of the fleet and the establishment of the navy as an independent unit, previous to 1861 it having been a depart¬ ment of the army administration. At the out¬ break of the war against Denmark in 1864 the navy was of but small size, consisting of three corvettes mounting 27 guns, and one of 17, with four first class gunboats mounting three guns, 17 second class mounting two guns and a number of sailing ships with little or no fighting value, while Denmark had 31 steam war vessels and other craft and was aided by Austrian vessels from the Mediterranean. Several victories, however, were scored. Dur¬ ing that war vessels were purchased from other countries and one was paid for by popu¬ lar subscriptions, showing the keen interest of the public in the navy.

By 1870, after the formation of the North German Confederation, the fleet numbered 47 ships with 480 guns, with a personnel of four admirals, five full captains, 19 captains, 33 captain-lieutenants, 101 lieutenants and 3,655 men, besides marine infantry and naval artil¬ lery totaling almost 1,000 men more.

During the war with France, 1870-71, the French forces were greatly superior, but for political reasons it did not attack, and only minor engagements took place, one off Havana in which the German gunboat Meteor de¬ feated the French despatch boat Bouvet. The inconspicuous naval results of the war as com¬ pared with the work of the army caused the navy to be neglected by public opinion for many years.

Meanwhile Germany about 1884 had ac¬ quired a mass of African and other colonies and had traded with England for Heligoland. In 1887 the old Emperor William I started the Kiel Canal, and in 1888 William II came to the throne. As the grandson of Queen Victoria he had had many opportunities to witness the great sea power of England, and he was sub¬ sequently made admiral of the British navy, an honorary office of command never held by any other foreign sovereign.

During the first 10 years of his reign no particular results were achieved by his naval policy and the public remained indifferent, but meanwhile the German oversea commerce de¬ veloped and the necessity of a navy to match Germany's growing maritime commerce and colonial development became evident. Ad¬ miral von Hollman, Minister of Marine from 1890 to 1897, finally resigned in despair, and the emperor appointed a comparatively unknown naval officer to his post, Tirpitz, born in 1849, the son of a judge, who had entered the navy as a cadet and gradually came forward. Von Tirpitz proved the man of the hour. He pro¬ ceeded in a diplomatic manner to induce the

Reichstag to authorize, in 1898, a plan which called for the following program :

Battle Fleet.

19 battleships

8 armored coast defense vessels 6 large cruisers 16 small cruisers

Foreign Service Fleet — Large Cruisers.

For East Asia . 2

For Central and South America . EE! 1

Material reserve . 3

6

Small Cruisers.

For East Asia . 3

For Central and South America . 3

For East Africa . 2

For the South Seas . 2

Material reserve . 4

14

‘ 1 – -----

1 Station ship

A highly important principle was adopted at the same time, that of making the program extend over a period of years, so that no change would take place in the appropriations from year to year, at the will of the legislative branch, without a repeal of the entire naval law. This bound the Reichstag to the pro¬ gram and enabled German shipbuilders to lay their plans ahead for the building of ships and the investment of capital, which could not be risked had the Reichstag continued to change its mind about the size of the fleet from year to year as had previously been the case.

A further important principle was intro¬ duced, that of limiting the life of the ships to a definite number of years and providing for the building of a new ship of the same class at the end of that period as a replacement, while the old ship was relegated to minor serv¬ ice. The program for replacements thus pro¬ vided for a period of 25 years for the capital ships, 20 years for the cruisers and 15 years for the smaller vessels. This replacement period was later considerably reduced.

Another wise provision was developed, of not calling for the building of ships of an exact pattern or tonnage, leaving this to be de¬ termined not by the Reichstag which was not technically capable of doing so, but by the naval designers of the department, who were thus not hampered by inexpert opinions of the legislators. This authorization, however, was utilized in making replacements, to substitute, much larger and more

powerful ships as time went on and naval needs developed, so that in addition to the replacement of obsolete ves¬ sels, the power of the navy increased vastly with the repeated legislative struggles which would otherwise have been needed to gain the same ends. Von Tirpitz was thus practically given carte blanche to make the German navy what he thought it ought to be.

The principle of national service had long since been applied to the navy, so that person¬ nel for the manning of the ships as fast as they were constructed was always ready, and at vastly less expense than was the case with such powers as depended upon voluntary en¬ listments.

The program adopted in 1898 thus finally placed the German navy on the road of prog¬ ress and invigorated it with the seeds of

growth which caused its ultimate remarkable development.

The program of 1898 was projected for seven years, but before it was finally adopted this period was reduced to six years. Hardly, however, was it well started when the Boer War broke out, and the great success which Great Britain obtained in transporting troops and the effectiveness of her navy reacted power¬ fully on German public opinion, and in 1900 the naval program was more than doubled, a thing von Tirpitz could not have expected in a decade under ordinary circumstances.

Public opinion was enunciated through the Navy League, a widespread organization of a large number of members paying a nominal membership fee, and this, together with the increasing influence of the German press, caused the whole German nation to turn its ener¬ gies toward the support of the new naval policy.

In a few years, however, a profound change took place in naval architecture, due to the les¬ sons of the Russo-Japanese War, to the in¬ vention of telescope sights for large guns and to the development of the submarine.

Previously all nations had been building battleships with many different sized guns capa¬ ble of rapid fire, on the theory that an im¬ mense number of projectiles dropped on oppos¬ ing vessels would decide an engagement. The Russo-Japanese naval engagements proved that vessels with a few very large guns, sighted with the telescopic sight, could stand at a great distance and destroy the vessels carrying the more numerous smaller guns without

suffering any injury. British designers having been aboard the Japanese vessels had first at hand the technical details and proceeded to lay down keels for new vessels of the new sort. Ameri¬ can designers also proceeded along the same lines and England launched the first dreadnought, embodying the new principles, 10 Feb. 1906.

This, with the gradual improvement of the submarine in France and America, created an entirely new condition in naval construction, and rendered obsolete for all practical pur¬ poses the navies of the entire world.

Germany consequently adopted a new naval program in 1906 and 1908 and embarked in the construction of the dreadnought type of vessel as dictated by the experience of the Russo-Japanese War. This program contin¬ ued actively in force until 1912 when an addi¬ tional program was laid out.

The growth of the German navy can be appreciated by a comparison of the capital ships provided for by the various programs, which are as follows :

Act of 1898 — 17 battleships and 8 large cruisers Act of 1900 — 38 battleships and 14 large cruisers Act of 1906 — 38 battleships and 20 large cruisers Act of 1908 — 58 dreadnoughts Act of 1912 — 61 dreadnoughts

This program had proceeded to the point of development at the outbreak of the Great War, 1914, of :

20 large battleships (dreadnought type)

20 battleships 8 battle cruisers 33 protected cruisers 8 old armored cruisers 8 old protected cruisers 14'gun boats (for service abroad)

120 torpedo boats over 500 tons

60 small torpedo boats used for mine sweepers and school ships and for special purposes.

The program also provided for 72 subma¬ rines of which 39 were said to have been built by 1914.

It will thus be seen that the real develop¬ ment of the German navy began only in 1898, and that in its ultra modern aspect it was but the work of a few years after the adoption of the dreadnought type.

A feature that made it particularly effective, in addition, was the fact that in peace times it was manned up to about 80 per cent of its effective power,

while the navies of other coun¬ tries are maintained at but half or less than half of their effective strength.

Organization. — The German navy was the navy of the German Empire and not of any of its constituent kingdoms or states. Its mem¬ bers took the oath of allegiance to the emperor and it flew the colors of the empire. Article 52 of the old constitution of the German Empire stated : (

From March 1899 until his abdication, 9 Nov. 1918, the emperor was in chief command of the navy. The organ that carried out his orders was a naval board presided over by an admiral in the emperor's retinue.

Every ship in foreign service which had spe¬ cial orders from the chief of the admiral staff was independent of the others and was in polit¬ ico-military matters directly subordinate to the emperor, but otherwise to the station com¬ mander of its home port.

The highest in command on land were the naval station commanders of the Baltic (Kiel) and of the North Sea (Wilhelmshaven) ; the station commanders being admirals.

The immediate subordinates to the station commanders of the Baltic were the first naval inspector, . torpedo inspector and inspector of the naval infantryˆ and to the naval station com¬ mander of the North Sea were: the second naval inspector and the inspector of the naval artillery.

The rank of naval inspector corresponded to that of brigade commanders in the army and was filled by a rear-admiral who regulated the service of the sailor and wharf divisions as well as of the reserve divisions.

The inspection of the naval artillery (Wil¬ helmshaven) was concerned with the develop¬ ment of the ship and coast artillery department as well as with the mine department and was in charge of the following: The artillery

brigades: (1) Friedrichsort, (2) Wilhelms¬

haven, (3) Lehe, (4) Kuxhaven, (5) Heligo¬ land, for the coast defenses and mines, the artillery and mine school ships, the artillery testing ships and commissions, the mine testing commission and the naval telegraph school. The inspection of the naval infantry (Kiel), and the first marine corps (Kiel) and the sec¬ ond marine corps (Wilhelmshaven) ,. was under the authority of an inspector equivalent in rank to a major-general.

Only the coast fortifications of the harbor of Kiel, at the Elbe, on Heligoland, at the eser and on the bay of Jade were assigned to the navy,

and manned by the navy naval artillery that also laid the mines and manned the torpedo boat batteries, while the fortifications

along the coast of Prussia (Memel, Pillau, J/Ceufahrwasser), and the coast of Pomerania (bwinemiinde, Stralsund, Riigen), were not subordinate to the navy, but to the foot artil¬ lery of the army.

Personnel. — In 1905 the personnel of the navy consisted of :

1. Admiral of the fleet (gross-admiral), namely, the Kaiser.

2. Twenty-seven flag officers, — five ad¬ mirals (admirale) ; six vice-admirals (Vize- admirale) ; 16 rear-admirals (Kontre-admirale).

3. Five hundred and fourteen staff officers, — 6 7 captains (Kapitane zur See); 447 com¬ manders (Fregatten-Kapitane) and lieutenant-commanders (Korvetten-Kapitane) .

4. Eight hundred and eighty-three senior lieutenants, lieutenants and sub-lieutenants (Kapitan-Leutnants, over eight years' service; Ober-Leutnants zur See, less than eight years' service; Leutnants zur See).

The entire naval personnel in 1905 consisted of 1,832 officers, 208 doctors, 271 paymasters, 1,762 warrant officers, 8,461 petty officers, 27,302 seamen, 1,109 ship-boys; aggregate 2,311 offi¬ cers and officials, and 38,632 men.

Subsequent, however, to 1905 the personnel was increased, so that by July 1912 it reached a total of 66,000.

Owing to the large number discharged from service in previous years and their subsequent experience as in the merchant marine, etc., the supply of experienced men was adequate to any possible development oif the navy.

The officers were drawn from the naval cadets, the latter being selected from young men of approved origin and education. The recruits were taken from sailors, fishermen, sail- makers, ships' stewards, cooks and waiters ; also from men employed on rivers and canals, and from non-seafaring people, such as fire¬

men, machinists, painters, etc.

The period of duty was divided into the ac¬ tive period and the furlough

period. The active period was for three years; the furlough period was divided as follows :

Reserve . . 4 years.

Seewehr — corresponding to Landwehr:

1st levy . 5 years.

2d levy . . . To end of 39th year.

Naval Ersatz (supernumeraries) men of seafaring

or quasi-seafaring population . 12 years.

For the record of German navy in the World War, see War, European.

As a result of the conditions imposed upon Germany by the armistice and the Treaty of Versailles, her navy was practically wiped out of existence. See War, European : The Armis¬ tices (13) ; Peace Treaties (18).

Bibliography. — Ferber, Organization and Dienstbetrieb der Kaiserlichen Marine ; Bras- sey, 'The Naval AnnuaP ; Jane, (Fighting Ships) ; (Deutschland als Weltmacht* (1911); Hurd and Castle, 'German Sea-Power* (1913); Koester, 'Secrets of German Prog- ress) (1915). Frank Koester,*

Author of ' Secrets of German Progress 2

27. GERMANY AND THE WAR.

When the German Empire was created in 1871, it straightway became a factor in the attrac¬ tions and repulsions historically existent among the ruling powers of Europe and making them¬ selves felt not only in Europe but over prac¬

tically the whole earth. Since the German Empire carried a pushing and expanding per¬ sonality into ah established group, the members of which, in spite of their riper years, showed no abatement of watchfulness and vigor, an international situation was created which, amidst bewildering shifts of relation and numerous diplomatic incidents bearing witness to the constantly growing competition of the governments, carried Europe along with ever increasing momentum until its statesmen lost control of its fate and stood helplessly by while it plunged into the cataract of the Great War. Only a rehearsal of the story evaluing the main elements of conflict can at all make clear how the catastrophe occurred. First, to recall the situation

created by the Franco-German War: the acquisition of Alsace-Lorraine by Germany gave her a permanently embittered neighbor on the west. German public opinion had in¬ sisted on the cession of the two provinces on the ground that they had been originally Ger¬ man and were appropriated by France in victorious wars. France for her part con¬ sidered herself the victim of an unjustifiable violence and nursed a sentiment of revenge which dug an unbridgable chasm between the two countries. Bismarck, eager above all to safeguard the empire which he had founded, entered into various diplomatic agreements, all of which looked to making Germany secure and which culminated in 1883 in the Triple Alliance of Germany, Austria and Italy. Its purpose, so far as Germany was concerned, was to isolate and checkmate France, and this purpose may be said to have been fully achieved until, begin¬ ning with the year 1890, France drew close to Russia and gradually perfected, as a diplomatic counterweight to the Triple Alliance, the Dual Alliance between Russia and herself. Mean¬ while Germany had begun to take increasing part in a movement which has given her the place she holds in the modern political world. The movement has been called by various names and may as well be called imperialism, if it is understood that imperialism means the expansion of life which has been effected by modern science, trade and industry, and which has gradually gained dominance among all those nations endowed with the energy and elasticity necessary to bring about a social, economic and political adjustment to the new world forces. Imperialism aims to carry the products of the home industries, cheapened and multiplied by the factory system, to the markets of the world; it is ambitious to plant its flag over unoccupied or backward regions in order to rule or settle them as dependent colonies; it is keenly on the lookout for raw products for profitable investments, for it is identified with the capitalist classes which are everywhere the real agents of imperialism and reap, if not the exclusive, at least the chief benefits from an expansion policy.

European imperialism is an ancient move¬ ment and has only gradually assumed its present developed and intensive character. It was an early, youthful imperialism which in the days following the discovery of America drove Spain, France and England out upon the high¬ ways of the sea to seek the fabled wealth of the Indies and to appropriate, much in the spirit of careless adventure, whatever lands they found. In the long conflicts for mastery

which followed, England ended by gaining a decisive victory, giving her control of the seas and a colonial empire on which "the sun never sets. By

the middle of the 19th century only

two other countries counted in the colonial

world at all, France and Russia, but each in

only a limited sphere determined by physical

proximity. France reached an arm across the Mediterranean to northern Africa and Russia pushed her huge bulk clear across northern Asia to the Pacific. On the wide ocean spaces, controlled by the British navy and dotted with innumerable British areas, France and Russia had little to say, for they had no means at their disposal for challenging British ascendancy. Nevertheless they nursed imperialist ambitions and would have to be given respectful consider¬ ation in any further distribution of the earth's lands and markets. In this connection the fact must be kept in mind that while the colonial movement had, in the 18th century, been brought to a certain conclusion by the settlement of the Americas and the victory of England in India, the appropriation of the tropical regions of Africa and the command of the markets of such backward countries as Persia and China still awaited a decision. It was not till the last two or three decades of the 19th century that the industrial organization of Europe advanced to the degree required for broadening these fur¬ ther issues. Therewith the world embarked on the newest and latest phase of imperialism of which the living generation of men has been the witness. The late birtih of the German Empire made it impossible for Germany to enter any but this last stage of the imperialist development and for a while it was doubtful whether, be¬ cause of the heavy handicap of the delayed start, the German government cared to enter the race at all. Bismarck, the foreign minister, possessed, as was natural enough, a prevailingly continental outlook, and only in the '80s, and then very reluctantly, yielded to the pressure of the merchant classes of Germany to enter the colonial field. The partition of tropical Africa was the question of the day and Germany regis¬ tered a claim to the general booty just in time to secure consideration. She acquired Togo, Kamerun, and German Southwest Africa on the west coast and the province of German East Africa on the east coast. For good measure, as it were, she was at the same time acknowl¬ edged mistress of certain island groups in the neighborhood of Australia, particularly of a large section of unexplored New Guinea. These gains were made possible only by the goodwill of Great Britain, which from its high eminence welcomed rather than otherwise the appearance of Germany among the colonial powers. Re¬ newed friction had recently developed between Great Britain and her older rivals, France and Russia, and under the circumstances the British government naturally enough inclined to the opinion that Germany, favored by Great Britain and colonially harmless, might prove a valuable

support. The Anglo-German treaty of 1890 regarding Africa is the documentary witness of this English attitude. The world spoke of an Anglo-German honeymoon, though not for long, since the next decade quickly dissipated every vestige of goodwill between the two Northern powers. The '90s were characterized by a sur¬ prising development of Germany in industry and commerce which awakened in her capitalists

the hope and resolve of invading every profit¬ able market of the world. Carefully con¬ sidered, this domestic development was at the bottom of the colonial movement which, as we have seen, had put forth its first feelers in the '80s and which in Germany as everywhere proved to be the unfailing concomitant of busi¬ ness expansion. The business men of Great Britain, already comfortably ensconced in the centres of trade of every continent, began to feel the ever growing competition. The British government, more deliberate than its traders, ignored the situation until a new German sover¬ eign, William II, the grandson of Queen Vic¬ toria, who had come to the throne in 1888, not only identified himself with the imperialist policy but seized every occasion, in season and out of season, to proclaim his intention to carry Germany into the realm of world politics monopolized hitherto by Great Britain, France and Russia. It meant not the belated and oppor¬ tunist imperialism of Bismarck but a set pro¬ gram steadily pursued. While the emperor's forceful language — and it was often offen¬ sively forceful — might be discounted and ridi¬ culed as music of the future, the eloquence of the bare figures of the German exports and im¬ ports and the growth of German merchant ton¬ nage could not be gainsaid nor the conclusion controverted that they formed a very genuine basis for a German Weltpolitik. The "Haves,® are never distinguished by much goodwill for the "Have-nots,® and it is not to be wondered at that neither London, Paris nor Petrograd appreciated the assertive attitude of the German newcomer. But when all is said, Great Britain was the power particularly affected, for it was she and not France or Russia who boasted a world trade based on ocean routes and who was most acutely exposed to the German compe¬ tition. _ While Great Britain was still deeply pondering the German commercial phenome¬ non, Germany embarked also upon a naval policy. Every country with trade and bottoms desires to protect its floating interests and col¬ onies, and that Germany should, toward the end of the 19th century, have begun the build¬ ing of a navy was but to fall in line with es¬ tablished precedent. For England, however, it signified the confirmation of her mounting sus¬ picion that the lusty power across the North Sea was a dangerous rival and that in support¬ ing the German colonial cause in its earliest stage she had reared a serpent. The German navy which, once undertaken, grew rapidly, lent weight to German diplomatic action and was, at least by the patriot section of British public opinion, regarded as nothing less than a challenge of the English sea and

world supremacy. Con¬ cerning the maintenance at any cost of their great position, won by a score of famous wars and a thousand unremembered little heroisms, all Britain was practically unanimous. Early ln the 20th century the rift, long apparent, had widened to a chasm and the two countries were threatened with permanent estrangement. True, earnest efforts at reconciliation on the part of notable groups of intellectuals, merchants and workingmen were not lacking, and these efforts were heartily endorsed by the liberal section of the press, but every fresh diplomatic encounter blew the latent national excitement into new flame and invalidated the efforts of the well-dis¬ posed. Thus, in, spite of the courageous flutings

of peace societies, trade and naval rivalry con¬ tinued to sow their insidious poison ; but since issues of trade affect a limited upper group, whereas the navy, visible symbol of pride and prestige, appeals to the whole nation, the naval issue was pushed more and more, and with wax¬ ing resentment, into the foreground of discus¬ sion. By steadily enlarging their own naval program the British easily maintained their traditional ascendancy. This had long since crystallized into the doctrine of the two-power standard, by virtue of which Great Britain aimed at a tonnage in first-class battleships as great as that of any two possible enemies combined. After a decade of feverish competi¬ tion, in which all the powers joined, each with a naval program of its own, Britain made a re¬ markable effort to call a halt : she made over¬ tures to Germany proposing a limitation of armaments on the basis of the existing British superiority. The German viewpoint was stated by Chancellor Buelow in the Reichstag (24 March 1908) : ((We do not dispute England's right to draw up her naval program in accord¬ ance with the standard which its responsible statesmen consider necessary for the mainte¬ nance of British world supremacy, and similarly it can not be taken amiss that we should build those ships which we require." The answer of the British naval secretary, Mr. Churchill, to the effect that the German navy was <(a luxury" showed how irreconcilable the two gov¬ ernment attitudes had become. The rock-bot¬ tom facts, determinative alike of policy and sentiment, were that Great Britain was an over¬ whelmingly industrial nation depending on food imports made secure by a navy, while Germany, rapidly becoming industrialized, required in¬ creasing food imports and, for purposes of in¬ surance, the protection of an efficient fleet. The food shortage in both England and Germany was the inevitable result of the modern indus¬ trial development and of the imperialism brought in its train ; imperialism, involving national prestige and provocative of passion, in its turn led to an

exasperated state of mind which was only too likely on some sudden oc¬ casion to release an explosion. Early in the 20th century the British government, which throughout the previous century had acted on the assumption that its potential enemies were France and Russia, definitely saw Germany in this sinister light and accordingly resolved to court the friendship of its older rivals and bring the outstanding disputes with them to a settlement. The Anglo-French treaty of 1904 inaugurated the change and was followed in 1907 by a treaty with Russia. By the treaty of 1904 France, in return for leaving England in undisturbed possession of Egypt, acquired a lien on the vast territory of Morocco, while the Anglo-Russian agreement practically partitioned Persia between the two signatories. It should be kept in mind that Morocco and Persia were two wholly independent Mohammedan states. The criticism occasioned by this procedure in certain English Liberal circles was drowned in the chorus of satisfaction elicited by the draw¬ ing together of Great Britain and her former foes. The treaties meant not an alliance but an understanding, which might the more easily ripen into an alliance since France and Russia were already bound by the firmest mutual ties. The new alignment came to be known as the Triple

Entente, under which firm-name the three asso¬ ciates henceforth presented a solid front against the Triple Alliance of Germany, Austria and Italy. It goes without saying that the division of Europe into two hostile, all-inclusive camps greatly reduced the possibilities of mediation in future disputes. While the formation of the Triple Entente signified a general reduction of German influence in Europe, the really important feature for Germany was the disposal of such immense territories as Morocco and Persia without her being called into consultation. For here was the capital issue of the age, the issue of imperialism. The distribution of lands, un¬ occupied and backward, and the conquest of markets capable of absorbing manufactured goods had been proceeding apace, and Germany, though a latecomer, had won a place at the board which she was resolved to maintain. That Great Britain, France and Russia, on the ground of prior claims, should, as it were, form a Colonial Trust and crowd her from the table she was not minded to allow. Her leaders with the instinct of men involved in a struggle for power saw clearly that if they submitted without protest in the crucial cases of Morocco and Persia, they would permit a precedent to be established that would work automatically to eliminate Germany from all other world issues and reduce her to the status of a purely European power. But for better or worse she had developed the will to be a world-power, exactly like the members of the Triple Entente, and firmly asserted her right to <(a place in the sun." In the name of the imperialism, at whose shrine she worshiped like the rest, she claimed the privilege to share in the distribution of all remaining opportunities

throughout the world for colonial and capitalist enterprise. This general position the German government an¬ nounced on the very morrow of the Morocco agreement and frequently repeated its warning during the following months. On 28 Nov. 1905, for instance, it made this statement in the Reichstag: ((The difficulties which have arisen between us and France in the Morocco ques¬ tion have had no other origin than an inclina¬ tion to settle without our co-operation affairs in which the German Empire also had interests to maintain." But though Germany had what she considered a grievance, she was confronted with an accomplished fact and the question was what practical steps were open for her to take in order to win consideration for her views. The Morocco issue was made particularly diffi¬ cult by the fact that the open and published treaty of 1904 affirmed and emphasized the inde¬ pendence of Morocco. Great Britain and France could therefore profess that they harbored no designs upon that state. In secret treaties, however, to which Spain was a party, Morocco had, with British participation, been partitioned between France and Spain. To be sure, the world, and more particularly, Germany, sus¬ pected the existence of a land bargain but in the face of the upright professions of the con¬ spirators could prove nothing. In fact it was not till 1911, that is, till after Morocco had been gobbled up, that the secret treaties were revealed. Germany waited a year after the Anglo-French treaty of 1904 had been arranged to have matters cleared up, and then in the face of the cloud darkening over Morocco took ac¬ tion which left no doubt as to where she stood.

614

GERMANY — GERMANY AND THE WAR (27)

In the course of a cruise to the Mediterranean the German Emperor cast anchor off Tangier and formally declared (31 March 1905) to rep¬ resentatives of the Sultan who had come to meet him that he considered ((the Sultan as an abso¬ lutely independent sovereign.® Threatened in the execution of their secret design, France and Great Britain took umbrage at this action, and with alarming suddenness Morocco leaped into prominence as the burning issue of European diplomacy. The immediate tension caused by William II's visit to Tangier was in¬ deed relieved by a general congress in Spain, at Algeciras, which was called together to discuss the Morocco question and which wrote the independence of the African sultanate into in¬ ternational law (1906). With quiet tenacity, however, due to the-pledged support of Great Britain, and on pretexts of maintaining order such as are the stock-in-trade of all imperialists, France worked her way from point to point into Morocco, and in 1911, by a sudden stroke, occupied Fez, the capital, with 20,000 men. The act signified, in spite of Tangier, in spite of Algeciras, the consummation of the Anglo- French agreement, and

if Germany intended to protest before the curtain fell upon the play she would have to be prompt about it. By hurrying the small gunboat Panther to Agadir, a Moroccan port on the Atlantic, she took em¬ phatic and spectacular action similar to that of 1905. The sending of the Panther proclaimed that for her the status of Morocco was still that of a sovereign power as defined by the Act of Algeciras. Another period of fierce ten¬ sion, under which the very foundations of Europe cracked and rocked, was at last relieved by an arrangement between the main contest¬ ants, France and Germany, whereby Germany accepted French control in Morocco in return for certain French regions in tropical Africa. It was a poor quid pro quo from an imperialist standpoint, but the best to be had short of the hazard of war. War Germany was not ready to risk nor really capable of undertaking, in view of the fact that Morocco was a sea-issue in which France would have to the uttermost the backing of England, the unchallenged mistress of the seas. On looking back from the height of 1911 over eight years of crisis connected with Morocco, Europe might well heave a sigh of relief, for a general war, threatened again and again, had been averted by compromise. But over what Europe, had it been wiser than it was, would have remained profoundly anxious was that rancors had been created, so terrible they hardly admitted of appeasement. Hence¬ forth a volcano was stirring underneath the continent which could not be extinguished by any amount of diplomatic hocus-pocus. Com¬ pared with the Anglo-French agreement of 1904, the Anglo-Russian treaty of 1907 caused hardly more than a ripple. Both Russia and Germany showed a conciliatory spirit, perhaps because they were genuinely alarmed by the spectacle of war so violently raised by the Mo¬ roccan conflict. True, Germany could no more hinder the partition of Persia from being car¬ ried out than she had been able to hinder the Morocco partition, but she was successful in persuading Russia to recognize her as an inter¬ ested power and to concede an exchange of fa¬ vors. By the Potsdam agreement of 1910 Rus¬ sia, on being promised undisturbed enjoyment of

her Persian sphere, agreed to put no obstacles in the way of Germany's railroad policy in Asia Minor and Mesopotamia. Evidently the relations of Germany with Russia were easier than with the two Western members of the Entente. If the intimacy could be still further developed the whole embittered European situation would show a heartening improvement, since in the light of a series of imperialist concessions the complaint of German statesmen, repeated again and again, that the Triple Entente was forging an iron ring to lock Germany up in Europe and shut her off from the seas and outlying con¬ tinents, would fall to the ground. The fear of encirclement or Einkreisung had become a national nightmare, on the dispersal of which the amicable solution of the imperialist rivalries mainly hinged. The Potsdam agreement con¬ tained a gleam of promise which, though des¬

tined to be miserably extinguished, needs to be fully understood. The treaty pointed to certain Turkish regions as proper areas for German exploitation and indicated that Turkey, following Morocco and Persia, was the next on the list of backward states to be taken over by the powers for a course of modern rehabili¬ tation. But Turkey, occupying provinces of southeastern Europe as well as of western Asia and straddling the Bosporus and Dardanelles, was an infinitely more complicated issue than Morocco or Persia, and presently developed such inflammable problems, many of which had been smoldering for ages, that one sharp crisis followed another without interruption. The upshot was that the general war repeatedly threatened since 1904 but happily adjourned, came at last via Turkey and the small Balkan states, former dependencies of Turkey and since their liberation engaged in fierce national¬ ist rivalries among themselves and with their neighbors, Turkey, Austria and Russia. At the time of the Potsdam agreement the German interests in Turkey were already more than a generation old. Beginning on a very modest scale and gradually enlarged through the me¬ dium of banks and ship-lines, they were not thrust into the foreground until the hostility oi England, becoming settled, made all expan¬ sion by the open sea highly problematical and underscored the advantage of a continuous land-route to the East. France and Great Britain boasted commercial houses and lucrative concessions in Constantinople, Smyrna and else¬ where long before Germany put in an appear¬ ance, but as they enjoyed openings in many other parts of the world which drew the atten¬ tion of their . business men and absorbed the capital of their financiers, Germany by concen¬ trating on Turkey as soon as its many advan¬ tages were manifest, was able to catch up with them. German enterprise turned presently to railroad development in Asia Minor and, just as the century was rounded, made its appearance with the famous Bagdad project. This was a plan to continue the railroad from Constanti¬ nople to Konia, already under construction, be¬ yond the Taurus Mountains to Bagdad on the

• imianL fioally to the Persian Gulf. When, in lv(J3, the Sultan granted a German company

the necessary firman, great rejoicings rang out from German imperialist circles. The British imperialist groups, however, rose as one man to vent a vehement protest. The English Foreign Office, unable to resist the pressure from the

business world, threw every possible obstacle in u tˆie ®a£ > dad ˆne»

thereby confirming

the German suspicion of a secret program of encirclement, of which Great Britain was the director. Though the railroad was delayed by this hostility it was by no means abandoned by the Germans, and as each new year added to its mileage and its fame it gave birth to ex¬ pectations, intelligible enough though often foolishly extravagant, of a German expansion movement into Asia Minor and Mesopotamia which would carry not only German capital and civilization but even German colonists into these desolate regions, once upon a time, under strong rule, the most prosperous of the earth. Intoxicated by this rosy dream, increasing seg¬ ments of German public opinion consoled them¬ selves for the Morocco and Persian fiascos and for the encirclement apparently effective in the West. The German hand held the Near-East and by this avenue Germany would realize her plan to be a world-power along with France, Russia and Great Britain. German influence at Constantinople, due originally to an economic program, led in the course of time, as economic power in backward states inevitably does, to the exercise of political control. For over a hundred years before the appearance of Ger¬ many in the Near-East, that is, through a part of the 18th and the whole of the 19th centuries, Great Britain and Russia had been engaged in a diplomatic duel on the Bosporus with the result that each had alternately swayed the Sultan and his ministers in its interest. From about the time of the Bagdad project the Ger¬ man influence loomed so large that both the older powers found themselves eclipsed. While this was a considerable German triumph from the point of view of a Near-East policy, it would amount to little or nothing if the situa¬ tion among the small Balkan states, and par¬ ticularly in Serbia and Bulgaria, became at any time so unfavorable to Germany as to cut the communications with Constantinople. Germany, Austria, Serbia, Bulgaria and Turkey repre¬ sented the succession of territories which would have to maintain mutual goodwill and harmony if the German economic program in Asia Minor was to meet with success. The Austro-German alliance assured a common policy toward the Balkan Peninsula on the part of Berlin and Vienna, but Serbia and Bulgaria were uncer¬ tain quantities and might prefer to play their own hand. While Bulgaria was at least not unfriendly, Serbia, after some hesitation, threw in its lot with Russia and the Entente. There¬ with Serbia inevitably became a point where the rival imperial systems into which Europe was divided met in violent collision. The story of recent Serbian policy is inextricably bound up with the complicated tale of Balkan develop¬ ment, to which only the barest reference is possible ‘here. The outstanding fact of the peninsula throughout the last few generations has been the uninterrupted decay of Turkey. The fatal weakness of the Ottoman state was a constant temptation to its small but lusty Christian neighbors, Bulgaria, Serbia and

Greece, to plan for their aggrandizement at Turkish expense, and all the great powers, and more particularly Austria and Russia because directly abutting on the peninsula, kept a sharp lookout lest some sudden displacement of forces occur derogatory to their interest. Austria

therefore had her own reasons, quite apart from German promptings, to cultivate good relations with her Balkan neighbors. Not to be outdone, the Tsar spread his net at Sofia and Belgrade, and because of racial and religious affiliations with the Serbs and Bulgars, he gen¬ erally enjoyed a noticeable advantage over his Austrian competitor. Passing in review the Austro-Russian relations since the Treaty of Berlin (1878), it becomes apparent that they have gone through numerous and vehement changes. Periods of fair weather have been followed by foul until, beginning with 1908, a succession of crises was precipitated which ended by producing war — a Balkan war of course, which, however, because of the align¬ ment of the powers into two bitterly opposed groups and their solemn engagements to each other, automatically expanded into a world war of unexampled dimensions. These Balkan events must now engage our attention.

The crisis of 1908 began in July with the so- called Young Turk revolution at Constanti¬ nople. While a Liberal movement aiming at internal reform, the revolution was also in¬ spired by a fervid Turk nationalism and planned to cement firmly together all the remaining ter¬ ritories of the Ottoman Empire. Such a move¬ ment augured ill for the small Balkan states which had been looking forward to a Turk dissolution and it filled them with vague appre¬ hension ; it augured ill also for Austria-Hun¬ gary which at the Congress of Berlin had ac¬ quired Bosnia and Herzegovina from Turkey but only <(to occupy and administer,® not in full sovereignty. To be sure, for 30 years Turkey had exercised no shred of authority in the two provinces; however, should the Young Turks take it into their heads to revive an obsolete claim a very awkward situation was certain to result. To forestall trouble, Austria, in October 1908, issued a proclamation which annexed Bosnia and Herzegovina and provoked a loud outcry from the patriotic Young Turks. When Austria stood pat, the uproar in the course of a few weeks subsided and amicable relations were resumed between the two powers. Far more violent and enduring was the outcry in Serbia, which country, though it did not, like Turkey, have a claim in law to the two provinces, looked upon them as destined to be ultimately united to Serbia in fulfilment of the national mission of the Serb state. For some decades prior to 1908 Serbia had been culti¬ vating the view of itself as ((the Piedmont of the Balkans,® called by fate to gather into one family all the scattered branches of the South Slavs. On Bosnia and Herzegovina, inhabited by Serbs and Croats, it therefore looked, in spite of Austrian occupation, as earmarked for absorption, and was fiercely disappointed by

the act of annexation. As little Serbia by itself could do nothing, everything depended on the word of Russia, Serbia's Slav brother and pow¬ erful friend. When not only Russia but also France and Britain drew up behind Serbia, Austria called on her ally, Germany, and a very breathless situation followed. It was re¬ lieved only on Russia's yielding ground and advising Serbia to accept the annexation and promise Austria to live with her on terms of friendship (March 1909). The crisis passed, but would it not revive? Indeed would it not be sure to revive if Serbia felt emboldened to

continue secretly the nationalist propaganda which she had just pledged herself not to pur¬ sue, and if, on the occasion of some fresh con¬ flict, Russia undertook to back her little brother to the limit? The following years brought a steady flow of Balkan troubles, keeping the great nowers in perpetual excitement and cul¬ minating in the war of 1912 of the Balkan al¬ lies against Turkey, and in the war of 1913 of the Balkan allies among themselves. In these two struggles Serbia played a prominent part, emerging from them with increased territory which carried her far southward into Macedo¬ nia. Not only she but all the related groups of the South Slavs very naturally felt puffed up by her achievements with the result that the agi¬ tation over Bosnia was spontaneously revived. Bosnian secret societies sprang into being charged with spreading Serb propaganda ; na¬ tionalist societies located at Belgrade took it upon themselves to direct the underground movement and to supply money and literature. Agitations of this sort, appealing with particu¬ lar force to the young, have a way of getting out of hand. On 28 June 1914, a group of youthful Bosnian conspirators took advantage of an official visit which the heir to the Austrian throne, the Archduke Francis Ferdinand, paid to Sarajevo, the Bosnian capital, and assassinated him and his wife as they drove through the streets. Here was the Serb crisis back again and in its most acute form ! For the past six years the Balkan peninsula had been in wild ebulli¬ tion, apparently incapable of finding rest; for the past six years the two groups of European powers had confronted each other with waxing suspicion and waning good temper; for the past six years the Hapsburg monarchy had faced a subtle undermining of its control not only over the Bosnians but over its South Slav subjects generally in Hungary, Croatia and Dalmatia. The murder of the heir-apparent marked a climax and Austria resolved at any cost to end the long and insufferable tension. On 23 July 1914 the Austrian ambassador pre¬ sented an ultimatum at Belgrade which planned to dig the grave of the nationalist agitation In Bosnia by binding Serbia to sweeping and humiliating guarantees. On the failure of Serbia to meet in full the Viennese demands, Austria on 25 July withdrew her ambassador

from Belgrade and three days later, on 28 July, declared war against her little neighbor. In every phase of the terrible crisis which fol¬ lowed the Austrian ultimatum to Serbia Ger¬ many stood unwaveringly behind her ally for the reason that she shared in every, particular Austria's view of the Serb danger. In German eyes Serbia had become a critical issue, perhaps it is not too much to say the issue, from the moment the Serb policy of a South Slav state, created with the aid of Russia on the ruins of Austria-Hungary, defined itself on the Balkan horizon. Such a policy, if crowned with suc¬ cess, meant the blocking of the road to the Near-East. Once again the iron ring drawn by the Entente group rose before Germany's eyes and stiffened her determination to see the neigh¬ bor monarchy through a situation which while challenging the integrity of Austria, no less certainly threatened with disaster Germany's cherished Turkish program. During the tense and nerve-racking diplomatic action which at¬ tended the Austro-Serb developments Germany

pursued successively two objects. First, she used her influence to limit the issue to Austria and Serbia in order to enable Austria to achieve her purpose of putting a definite end to Serbian agi¬ tation within the Austrian borders. This ac¬ tion against a little but cantankerous neighbor was to be made palatable to the powers by the pledge given again and again beginning 24 July (Austrian Red Book, Dispatches 18, 26, 32, 38, etc.), that Austria contemplated no territorial changes and no infraction of Serb sovereignty. In this policy aimed at localizing the conflict Germany failed because Russia had gone so far in supporting Serbia that both her honor and interest moved her to interfere, not only diplomatically, which was proper and usual, but also in a military way, which was very danger¬ ous. No sooner was Austria's purpose of pun¬ ishing Serbia clearly seen than Russia ordered a limited mobilization beginning 25 July. This step intended to convey that Russia positively refused, in spite of the Austrian territorial pledge, to look upon the Austro-Serb conflict as a local issue. When the Russian mobiliza¬ tion had advanced to a certain stage and be¬ come a matter of common knowledge, the Ger¬ man government turned its attention to its second object, which was the exorcising of this new danger. It brought to the attention of Mr. Sazonov, the Russian Foreign Minister, that since Austria was mobilizing only against Seibia, the Russian mobilization exposed the Austrian . flank and would inevitably occasion iff1 Austrian counter-mobilization; further, that if the Russian mobilization grew in scope and reached the districts adjoining the German border, the German government would have to answer with a general mobilization order and that war would immediately result since Germany could not afford to wait while Russia drew her great masses of troops from the ends

?o i iF iomS1/eoiGerman -White Book > Exhibits to, 11, 18, 23, 24). In spite of all warnings the

Russian government, profoundly moved by the plight of Serbia and encouraged by the full support of France and the partial support of Great Britain, proceeded with its military plans and in the early morning hours of 31 July, took the decisive and fatal step of ordering a gen¬ eral mobilization. When this action was re- ported at Berlin, the German Chancellor, Bethmann-Hollweg, dispatched an ultimatum to Petrograd,. setting Russia a time limit of 12 hours to withdraw her measures. When Russia ignored the request,. Germany in the late after¬ noon of 1 August simultaneously mobilized her forces and declared war against Russia. Ow¬ ing to the Franco-Russian alliance war between h ranee and Germany was certain to follow the breach between Berlin and Petrograd. Merely to test the situation, the German chancellor on

'ZJJT "fteM day (31 July), which saw the dispatch of the ultimatum to Russia, requested France to declare within 18 hours whether in the event of a Russo-German conflict France would remain neutral. When the French Prime ™!s eJ answered on 1 August that France would act as her interests demanded, mobiliza- tmn was ordered also against France and war followed In the general crash of the edifice o peace the British position was for a short time in doubt. On the evening of 2 August Germany requested at Brussels an unmolested passage for her troops through Belgium, and

when this was indignantly refused on the ground ot Belgium's neutrality guaranteed by the international act of 1839, Germany on 4 August committed an act of war against Bel¬ gium by sending troops across the border. On that same day the German chancellor, in a speech before the Reichstag, freely admitted the illegality of Germany's action but attempted to justify it by reason of military necessity, that is Germany s military plight due to the simulta- neous exposure of her two flanks. The violation ot Belgian neutrality and international law on becoming known in Great Britain released a general storm of fury and outraged feeling. I he British public was instantaneously converted to a policy of war, and when on 4 August the British government sent to Berlin an ultimatum on the subject of Belgian neutrality which met with rejection, neither Parliament nor people brooked fuither delay and the declaration of war was issued against Germany on 5 August. That the war, once unchained, became general, drawing a constantly increasing number of nations, both great and small, into its vortex was, in view of. the close associations of the modern world, inevitable. That, as the un¬ paralleled struggle developed, every purpose, every interest, every ideal dear to each member of the warring groups should be brought to the front and earnest hopes be voiced for their

realization as fit reward for heroic effort was equally natural. A complex of exalted emo¬ tions thus caused the original cause of the war to be lost from view, especially among the Entente allies. Overwhelmed by the magnitude of the disaster and revolving plans to make an end of war and of all other human ills by one great cure, their public men and journal¬ ists multiplied the objects of the war almost ad infinitum , specifying, among others, the safeguarding of the small peoples, the over¬ throw of Prussian militarism, the democratiza¬ tion of Germany, the ejection of the Turks from Europe, the dissolution of Austria-Hungary, the sanctity of treaties, and a permanent league of peace, all voiced in the rhetoric and set purpose of a generous idealism. For her part Germany underwent a similar change in the public profession of the motives which kept her in the field. She stated again and again that she was fighting a defensive war, but by her actions, as distinct from her words, she made it clear as day that what she understood by defense was the right to figure as an imperialist power, chiefly by keeping open the communica¬ tions to the southeast, to Constantinople and beyond. It was over competitive imperialism that the war began, and the historian may per¬ haps without presumption declare that im¬ perialism remains its leading content and that its rival claims must in some way be regulated and harmonized if a workable peace is to suc¬ ceed the unexampled agony.

Ferdinand Schevill, Ph.D., Professor of Modern History, University of Chicago.

28. DIPLOMATIC RELATIONS OF THE UNITED STATES WITH GER¬ MANY. Although American diplomatic and political relations with Germany did not assume large importance until the end of the last cen¬ tury, comparatively unimportant historical rela¬ tions were begun a century earlier. American hopes of Prussian sympathy in the Revolution

*were disappointed. Arthur Lee, who was sent to Berlin as American envoy, failed to secure official recognition, although Prussia maintained a fnendly neutrality toward the struggling colo- n*es- brederick the Great, although he favored the American war of independence because of his resentment against England, refused to open r m Emden to American privateers and*

failed to keep his promise (made to Lee) to rec¬ ognize the United States whenever France did so.

In 1785, the last diplomatic act of Franklin abroad was to negotiate with Prussia a treaty of amity and commerce, providing (for 10 years) for abolition of blockades and privateer¬ ing and inviolability of private property at sea, provisions which were omitted in the later note¬ worthy treaty of 1799 (also limited to 10 years), negotiated by John Quincy

Adams in substitu¬ tion of that of 1785 which expired in 1796.

The American treaty of 1827 with the Hansa, and of 1828 with Prussia, contained the new Henry Clay principle of absolute reciprocity of tonnage duties. The Prussian treaty, although differently interpreted by the two governments, remained in force, for matters not governed by subsequent convention, until America was forced into the World War in 1917.

In 1835 Henry Wheaton arrived in Berlin as the first American Minister after Adams, lie had instructions to direct his attention to three purposes: to establish commercial rela¬ tions with the German states, to secure the removal of droit d'aubaine and droit de detrac¬ tion (tax on estates of foreigners, and tax on emigration), and (in accord with resolutions of Congress, 1837-38) to secure reduction of duties on tobacco and rice. He negotiated for six years, embarrassed somewhat by the question of the obligations assumed in the ((most-favored nation® . clause – — a question which had first arisen in the interpretation of the Louisiana Treaty with France. In 1838 he appeared be¬ fore the Zollverein (formed 1834) at Dresden and obtained a reduction on rice. In 1842-43 he attended other sessions but found difficulties because of the American tariff of 1842. He finally obtained a commercial treaty of 1844 on a reciprocal basis, and also an agreement to reduce duties on tobacco and lard and not to impose any duty on unmanufactured cotton. The treaty was rejected by the American Sen¬ ate by a strictly party vote of 26 to 18 on the ground that the State Department had no right to interfere in regulation of commerce. An extradition treaty of 1845 with Prussia was also rejected, because under it a state was exempted from the necessity of surrendering its own citizens. Meantime, in 1840, Wheaton arranged a treaty with Hanover. The United States always refused to recognize the right of Han¬ over to impose duties (tolls) at Staade on ships ascending or descending the Elbe. By treaty of 1846 Hanover agreed to levy no higher duties on tonnage or cargoes of American vessels than on vessels of Hanover. This treaty was annulled by the conquest of Han¬ over and incorporation into Prussia in 1866. In 1861 the United States, like

other powers, agreed to pay indemnity to Han¬ over in consideration of the total' abolition of the Staade dues and maintenance of works necessary for free navigation as before. An American treaty of 1845 with Bavaria was ratified with amendments later accepted by Ba¬ varia. Between 1852 and 1857 extradition trea-

ties with various German states were negotiated at Washington. In 1852 Prussia concluded such a treaty for herself and 18 other states of the Germanic confederation.

In the American Civil War Germany was friendly to the American Union. During the war, as a result of increasing German emigra¬ tion to America after 1840, negotiations were begun on the question of the status in Germany of German emigrants who after naturalization in the United States returned temporarily to the land of their birth, which required an ab¬ sence of 10 years for expatriation. In accord¬ ance with an act of Congress (of 1868) asserting the right of expatriation and for providing for defense of American citizens abroad, George Bancroft, the American Minister at Berlin, pressed, first upon the German states and later on the German Empire, the American principle in regard to international status of naturalized citizens. In 1868 he obtained from the North German Union and other German states a satis¬ factory treaty acknowledging the right of citi¬ zens to transfer their allegiance by an uninter¬ rupted residence of five years, accompanied by naturalization. After the creation of the Ger¬ man Empire, Secretary Fish desired to replace this and other German naturalization treaties by a new treaty with the whole empire, including Alsace-Lorraine, but Bancroft did not think the time auspicious to negotiate a treaty which would relieve emigrating Germans from the rigor of German military laws.

Americans sympathized with the German struggle for liberty and with the achievement of German unity. Many, through dislike of Napoleon III, were strongly pro-German in the Franco-Prussian War, even though the new republic of France was seriously crippled by the heartless indemnity exacted by Germany and by the unnatural transfer of Alsace-Lorraine. In 1872 the German emperor arbitrated the San Juan boundary question, deciding in favor of the United States. A year earlier, the German Minister at Washington confidentially sounded Secretary Fish on how the United States would regard a proposed joint concerted movement of European powers to urge on Venezuela a more orderly government and better observance of her engagements. Secretary Fish replied that the answer would depend on Germany's complaint, the precise object and means pro¬ posed and the limit of operations, but that he hoped joint intervention could be avoided. In 1875 the American government included Ger¬ many in the list of powers whom it invited to join in mediation between Spain and Cuba.

In the last quarter of the 19th century the chief subjects of correspondence in American diplomatic relations with the German Empire were: relations of Church and State (1871-76) ; German emigration to the United States (in¬ cluding emigration of convicts) ; expulsion of American emigration

agents (1873 to 1897) ; liability of naturalized American citizens (of German birth) for military service in Germany in case of return to Germany (and arrests or fines incident thereto) ; American students in Germany; attitude of Germany on the Eastern question (in 1878) ; German alliance with Aus¬ tria-Hungary (in 1879) ; German agitation for colonial expansion (especially in Africa) after 1883; German policy in Samoa after 1884; Ger¬ man annexation of islands in the Pacific (in

1886-87) ; difficulties of Germany with Spain over the possession of the Carolines (in 1886) ; bimetallism (in 1895) ; trichinosis (in 1887-88) ; German restriction and prohibition on American pork (in 1882-97), and on American cattle (1890-96) ; and the tariff (especially in 1897).

Relations after 1880 were affected by Ger¬ man commercial restrictions. In the latter part of the decade before 1880 new industrial con¬ ditions tended to change early German-Amer- ican commercial relationship. These resulted in the German agrarian protection policy inagura- ted in 1879, made more stringent in 1881 and in¬ tensified by acts of 1885 and 1887, culminating in 1890 with the resignation of Bismarck. Much friction resulted from a series of German im¬ perial executive measures restricting American imports, beginning with the regulation of the import of American cattle in 1879 and the re¬ striction on the import of American swine or pork products in 1881. The most important of these decrees was the prohibition in 1883 of the import of American pork, which after long and energetic action of American diplomats was finally removed by the <(Saratoga Convention® of 1891 — Germany agreeing to accept American pork inspected under law of March 1891, and the United States guaranteeing to Germany free sugar as provided by the McKinley tariff bill. In 1894 a new decree prohibited the import of live cattle from the United States.

Under a reciprocity treaty negotiated in 1891, Germany agreed to admit at lower duties all American food products and many American manufactures, and for this concession the United States agreed to admit German beet sugar into American ports free of duty. The later American tariffs of 1894 and 1897 precipi¬ tated new questions of diplomatic discussion. Under the Dingley tariff, the President, with power to apply by proclamation varying fixed maximum and minimum rates, was able to pre¬ vent retaliatory and discriminating tariffs, and in 1900 secured from Germany favorable treat¬ ment for American merchants. Although, under Caprivi, the German government in 1891 adopted a more liberal commercial policy, in 1901 it increased duties on many agricultural products and manufactures, and after 1903 in¬ augurated a new tariff law standing for higher protection all along the line. Efforts were made to utilize German-African colonies as an aid to freeing German cotton

industries from the uncertainties of the American cotton market.

Incident to the discussion regarding trade and tariff were several other conditions giving rise to misunderstandings and confusion in German-American relations. Germany regarded the Prussian treaty of 1828 as applicable to the whole empire, although the Bancroft treaties did not apply to Alsace-Lorraine. She also dis-. agreed with the United States in the interpreta¬ tion of the most-favored nation clause and was not entirely satisfied with the extradition trea¬ ties whose scope she wished to extend to in¬ clude additional extraditable crimes.

Jhe decision of Germany, between 1880 and 1890, to become an imperial colonizing power had a large influence on Americo-German rela¬ tions. Although the German government, con¬ trary to the earlier policy of Bismarck, was led by 1884 to establish colonies in South Africa and East Africa, the American government, in¬ fluenced by traditional policy, held aloof. Even

in accepting an invitation to the Berlin con-

*• ˆr!jCe reffarding the Kongo in October 1884, it did so only with the expressed understanding ˆ *S noˆ American policy to intervene in the affairs of foreign nations to decide terri- torial questions between them. Although recog¬ nizing the International Association of the Kongo, it did not submit the Berlin treaty to the Senate for ratification.*

About 1883, just before Germany was ad¬ mitted to colonial possessions in Africa, Ger¬ man professors began to attack the American Monroe Doctrine. Soon thereafter, Americans, observing the increasing German immigration and business relations in Latin- America — es¬ pecially in Brazil, Patagonia, Venezuela and Mexico began to be concerned lest Germany would extend her colonial ambition to South America. In March 1883 the American Minister at Berlin called the attention of the government at Washington to the disposition of the German government to take possession of Patagonia and other South American ter¬ ritories. German hate of the Monroe Doctrine grew in a ratio proportional to the growth of the German navy. Even Bismarck, who claimed to be friendly to the United States, and opposed the inauguration of the German colonial em¬ pire, characterized the doctrine as ((an inter¬ national impertinence.® In October 1897, un¬ drew D. White, the American Minister at Ber¬ lin, informing his government that Germany was anxious

to increase her colonial posses¬ sions, stated that efforts were being made to direct German immigration to South America, especially with a view of taking advantage of the. anticipated eventual breaking-up of the United States of Brazil, and therefore that Germany was opposed to any international recognition of the Monroe Doctrine and dis¬ pleased with any reiteration of the doctrine by the American government.

Although, as early as 1871, the German gov¬ ernment was reported to have considered the question of the acquisition of Samana, the first actual evidence of territorial rivalry with the United States appeared in the Pacific. The American government — following the German absorption of the northern side of New Guinea in 1884, the dispute between Germany and Spain for the Carolinas in 1885 and the Ger¬ man occupation of other islands by imperial decree in 1886 — decided to maintain rights to which the United States had become entitled in any of the few remaining unappropriated Pacific islands which were under independent and autonomous native governments, and so notified the German government. It was es¬ pecially determined to preserve Samoan inde¬ pendence.

In Americo-German diplomatic relations, the question of the Samoan Islands attained a prominence disproportionate to its importance. In 1887, American interests and responsibility in the islands, under a treaty of 1878, came in conflict with German intervention. In 1885, the German consul, on pretext of an agreement of 1884 with the native king, precipitated a crisis by raising his flag over the royal hut at Apia and taking possession in the name of his government. In the following year, the Ameri¬ can consul, in order to counteract German in¬ fluence, proceeded to raise the American flag, and proclaimed a protectorate which the Ameri¬

can government later disavowed while speak- . ing in a determined tone regarding the protec¬ tion of American rights in the Pacific. In 1887, a conference at Washington failed to agree upon a plan of adjustment. The real obstacle to agreement was the traditional American be¬ lief in the right of self-government. A second crisis was reached when Germany forced King Malietoa to abdicate, imprisoned him on a Ger¬ man war vessel, carried him to Berlin and de¬ clared war on Samoa. A new crisis, resulting from rival warships at the islands, was averted by a providential hurricane. Relations were decidedly strained until, by invitation of Bis¬ marck, earlier unsuccessful conferences were resumed at Berlin, resulting in a treaty of 1889 which recognized the independence of the islands under a tripartite, hybrid system of government of the islands under joint pro¬ tection of the United States, Great Britain and Germany. Ten years later, this cumbersome government was abandoned and terminated by a treaty of 1899 providing for a division of the islands between the United States and

Germany, each with jurisdiction in its own territory. Thus, Germany obtained a colony and the United States a coaling station.

At the opening of the Spanish-American War a more serious international situation arose in connection with the appearance and action of the German squadron under Admiral Diedrichs at Manila Bay, which precipitated a controversy with Admiral Dewey of the Ameri¬ can fleet. The incident indicated an apparently unfriendly attitude of Germany, and produced strained relations, which but for the attitude of the commander of the British fleet might have degenerated into actual conflict. The report of the affair awakened many Americans to the necessity of larger naval preparation for de¬ fense against German designs. The chief fac¬ tor in determining the American government to decide upon the acquisition of the entire Philip¬ pine group was the apprehension that whatever was left would be taken by Germany — an ap¬ prehension which was justified by the previous action of the German fleet during the American occupation of Manila harbor, and which was later proven not without foundation by the prompt German purchase of all remaining pos¬ sessions of Spain in the Pacific (the Carolines and the Ladrones) in 1899.

Relations with Germany became more strained each year after the Spanish-American War, and additional evidence of German greed and jealousy, already shown in the German seizure of Kiau-Chau, appeared in the apparent purpose of Germany to secure the partition of China by the instigation of Russian aggression, and in the severity of German policy following the Boxer uprising in China — all of which were opposed by the United States. Especially after Cleveland's warning relative to the Mon¬ roe Doctrine the German government watched for an opportunity to humble the United States while the emperor used various forms of flat¬ tery and seduction to establish in America a wide German influence through agents, advo¬ cates and promoters of the glory of the Hohenzollern dynasty. Although Germany in 1899 signed The Hague treaty which was to lead the way to disarmament, she proceeded without delay to spend millions in increasing her navy.

The result was to make Americans suspicious of the designs of Germany — especially in re¬ lation to interference in Denmark to prevent the ratification of the American-Danish Treaty of 1902 for the transfer of the Danish West Indies, interference in Colombia to prevent the conclusion of a treaty for the construction of the Panama Canal, and initiation of an assault against Venezuela to defy the United States and destroy the Monroe

Doctrine which stood in the way of German designs in the Caribbean. Germany's relations with Latin America were especially regarded with watchful suspicions by the United States. In 1900, Senator Lodge, advocating the maintenance of a proper navy, referred to the possible future necessity of protecting the Monroe Doctrine in Brazil, in which country Germany had developed intimate relations through new postal and commercial arrangements.

To allay American suspicion, and remedy the growing alienation between the two coun¬ tries, the Kaiser, becoming demonstrative in declarations of friendliness, diplomatically initiated attempts at reconciliation by sending his brother on a visit to the United States (pro¬ fessedly on a friendly mission but also to solidify the German-American movement in be¬ half of the fatherland), and by other acts, in¬ cluding the ill-timed presentation of a statue of Frederick the Great to the United States, and the later arrangement for exchanges of university professors — thus providing a more pleasant atmosphere for negotiations on the question of German restrictions on American trade.

These acts, however, did not make the American government under Roosevelt less alert in scenting danger in the gravity of the events in Venezuela by which Germany sought to test the strength of the Monroe Doctrine. As the isthmian canal project developed into a possible certainty, Germany increased her efforts to obtain a foothold in the western hemisphere, and especially in the vicinity of the canal. In May 1901, Hay had information that Germany contemplated occupation of two islands off the coast of Venezuela as naval base, and later he learned of negotiations for the purchase of two harbors on the coast of lower California. About the same time the more real danger began to develop in Venezuela as a result of a German debt-collecting expedi¬ tion and <(pacific blockade® which sought a pretext for occupation of Venezuelan coast towns. On 11 Dec. 1901, the German Am¬ bassador, in stating to the American govern¬ ment that Germany found it necessary to use coercive measures against Venezuela for satis¬ faction of claims, gave assurance that his gov¬ ernment under no circumstances would con¬ sider the acquisition or permanent occupation of Venezuelan territory. Later, when Germany declined to arbitrate the Venezuelan question, Roosevelt firmly applied pressure and took steps which seemed necessary to prevent any occupation of Venezuelan territory, and thus induced the emperor to accept arbitration.*

The formal German blockade of the Vene¬ zuelan port was terminated in February 1903 by diplomatic intervention of the American government. At the suggestion of President Roosevelt, who declined an invitation to act as arbitrator, the question at issue was submitted

to The Hague Court. In connection with the . controversy the manly utterances of England's Premier (Balfour) in favor of the Monroe Doctrine were in striking contrast with the melodramatic performance of Germany's Chan¬ cellor in the Reichstag to elicit applause of the gallery. British statesmen, dealing with Ameri¬ can questions, had long learned that American public opinion is molded by the people, but Ger¬ man statesmen remained ignorant of American democratic conditions.

Although Germany was victorious by the de¬ cision in the settlement of the Venezuelan dis¬ pute, she received a lesson in regard to Ameri¬ can determination to maintain the Monroe Doc¬ trine, against which Pan-Germanists have raged so furiously, and discovered that the American government will oppose encroach¬ ments which might result from intervention in American States. President Roosevelt inter¬ preted the Monroe Doctrine so clearly that there was no remaining excuse for misunder¬ standing. In 1906, at the turning point in Ger¬ man colonial policy, the Kaiser, in dictating that the American government must be invited to the Algeciras Congress to participate in the decision of the question whether Germany should have a foothold in Morocco, sought to embroil the United States in European affairs in a way that would compromise the Monroe Doctrine, but failed in his purpose. Germany felt a keen disappointment in the failure to secure a port at Morocco, which by its near¬ ness to the southeastern coast of South America would have given her a great advantage in trade competition with the United States in that region, and might have served as a valuable outpost in the realization of Pan-German am¬ bition in Brazil where interference would have resulted in an inevitable collision with the United States.

At the second Hague conference, in 1907, Germany led the opposition against the Ameri¬ can proposal for a form of treaty to secure obligatory arbitration at The Hague Court for certain cases of international controversy, and induced four other powers (including Austria and Turkey) to vote against it. Explaining this opposition, she said that although not op¬ posed to obligatory arbitration in principle she was not ready to sign such a treaty with all the powers including backward as well as ad¬ vanced.

. . Although various international amenities initiated by the German Imperial government brought a decline of American suspicion which had grown from Pan-German clamor, the American government after 1910 was consider¬ ably disturbed by a new source of possible con¬ flict with Germany furnished by insurrectionary conditions in Mexico which threatened foreign interests and raised questions concerning the application of the Monroe Doctrine. In March 1914, Senator Fall of New Mexico asked for immediate intervention in Mexico to prevent intervention by Germany.

At the beginning of the World War, which opened with Germany's brutal attack on Bel¬ gium in order to seize northern France, the German Ambassador at Washington, without in¬ vitation or suggestion from the American gov¬ ernment but to calm possible apprehension not felt, submitted a positive denial of any purpose to acquire territory in America in connection

with the war; and later Dr. Dernberg, the un¬ official representative of the emperor, elabo- ratcd the statement to include North America and denied that Germany had the slightest in¬ tention of violating any part of the Monroe Doctrine.' Significant to Americans, however, was the fact that Germany saw nothing im¬ moral in taking colonies elsewhere belonging to other nations, or in the occupation or possession of small states which have strategic importance.

Later, while the American government still sought to remain neutral, the German govern¬ ment deliberately violated American neutral rights on the seas by a system of piratical war¬ fare, inaugurated negotiations for an alliance with Mexico and Japan against the United States and conducted a secret campaign against American domestic security by fomenting strikes, by hiring criminals to destroy property, by subsidizing a propaganda of disloyalty, by placing spies in government offices, and by other unfriendly acts which forced the United States to enter the war in order to enforce peace and preserve civilization.

Bibliography.— Coolidge, A. C., 'United States as a World Power (1917) ; Edginton, T. B., (The Monroe Doctrine) (1904) ; Fisk, George M., (Beziehungen zwischen Deutsch¬ land und den Vereinigten Staaten* (1897) ; Henderson, J. B., (American Diplomatic Ques¬ tions) (1901) ; Latane, J. H., (America as a World Power* (1901); Moore, J. B., (Digest of International Law) (1906) ; Thayer, W. R., (The Life of John Hay* (1915).*

James M. Callahan,

Professor of History and Political Science, West Virginia University.

GERMANY, Emperors and Kings of.

Up to the Treaty of Verdun (843 a.d.) we can¬ not speak of a king or emperor of Germany. Charlemagne was ((King of the Franks® and ((Emperor of the Romans.® But as he was the first to unite all the elements that later made up Germany, he rightly heads our list.

NAME

Dynasty

Date of Reign

Philip of Swabia Otto IV .

Jointly

Hohenstaufen

Otto IV (alone) .

Frederick II (whose reign was interrupted by the

following) .

Henry (Landgrave of Thuriniga) merely nom¬ inal .

Guelph

Hohenstaufen

William of Holland (chosen by the ecclesiastical elect¬ ors) merely nominal .

Richard, Duke of Corn¬ wall, England, merely nominal .

Alphonso of Castile, merely

nominal .*

Rudolph .

Adolphus .

Albert I of Austria .

Henry VII Louis IV Frederick the Fair Charles IV Gunther, Count of Schwarz-

burg (rival king) .

Wencelaus (deposed) .

Rupert, Count Palatine. . . . Sigismund of Brandenburg. Jobst of Moravia (pre¬ tender) .

Albert II .

Frederick III .

Maximilian I .

Charles V .

Ferdinand I .

Maximilian II .

Rudolph II .

Matthias .

Ferdinand II .

Ferdinand III .

Leopold I .

Joseph I .

Charles VI .

Charles VII .

Francis I .

Joseph II .

Leopold II .

Francis II .

*William I** .*

Frederick III . .

William II .

I Were con- | tenders.

Hapsburg

Nassau

Hapsburg

Luxemburg

Bavaria

Austria

Luxemburg

Luxemburg

Bavaria

Luxemburg

House of Austria Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Hapsburg Bavaria

Hapsb'g-Lorraine Hapsb'g-Lorraine Hapsb 'g- Lorraine Hapsb'g-Lorraine Hohenzollern Hohenzollern Hohenzollern

1197-1208

1208-1215

1215-1250

1246-1247

1247-1256

1257-1272

1273-1291

1292-1298

1298-1308

1308-1313

1314-1347

1314-1330

1347-1378

1349

1378-1410

1400-1410

1410-1437

1410-1411

1437-1439

1440-1493

1493-1519

1520-1556

1556-1564

1564-1576

1576-1612

1612-1619

1619-1637

1637-1658

1658-1705

1705-1711

1711-1740

1742-1745

1745-1765

1765-1790

1790-1792

1792-1806

1871-1888

1888

1888-1918

NAME

Dynasty

Date of Reign

Charles the Great or Char¬ lemagne .

Louis the Pious (emperor)..

Lothair (emperor) .

Louis the German (first real king of Germany) . . . Charles III, the Fat (king

Carol ingian Carolingian Carolingian

Carolingian

768-814

814-840

840-843

843-876

and emperor) .

Arnulf (king and emperor) .

Louis the Child .

Conrad I .

Henry I, the Fowler .

Otto I the Great .

Otto II .

Otto III .

Henry II the Holy .

Conrad II the Salian .

Henry III .

Henry IV (whose reign was interrupted by the

four following) .

Rudolph of Swabia .

Herman of Luxemburg …. Conrad (son of Henry IV) . Henry (son of Henry IV) . . Plenry V (same as above) . .

Lothair the Saxon .

Conrad III .

Frederick I Barbarossa …. Henry VI .

Carolingian

Carolingian

(illegitimate)

Carolingian

(illegitimate)

Franconian

Saxony

Saxony

Saxony

Saxony

Saxony

Franconian

Franconian

Franconian

Franconian

Saxony

Hohenstaufen

Hohenstaufen

Hohenstaufen

876-888

887-899

899-911

911-918

919-936

936-973

973-983

983-1002

1002-1024

1024-1039

1039-1056

1056-1106

1077-1081

1081-1087

1093-1098

1105- 1106

1106- 1125 1125-1137 1138-1152 1152-1190 1190-1197

- *The period from 1250 to 1272 is generally called an interregnum.*

- *Between the end of the "Holy Roman Empire" (1806) and the beginning of the new German Empire (1871) ; fall of the German Confederation (1815-1866) and the North German Confederation (1867-1871)*

Consult Henderson,

GERMERSHEIM, ger'mer-shim, Germany, town in the Bavarian Palatinate, on the Rhine, 10 miles southwest of Spires. In Roman days it was a station called Vicus Julii and in 1793 it witnessed the victory of the Austrians over the French. It has manufactures of ornamental stonework, blocks for paving, beer and pressed yeast. There is also a large river trade and the fishing is not inconsiderable. Pop. 5,800.

GERMICIDES, agents used to destroy or to hinder the growth of microscopical forms of plant and animal life.

Germicides may be grouped under three gen¬ eral heads, those that act mechanically, those that destroy life by physical means and those whese action is chemical. Inasmuch as each particular germ is an individual with its own

particular characters, definite methods for its killing must be devised. Thus it is well known that quinine, for instance, is very active in de¬ stroying animal parasites, such as the malarial organism, but it is practically of no service in combating a large number of vegetable forms; and vice-versa, many substances which are capable of destroying plant germs are in¬ efficient when applied to animals.

Of the physical agents, heat, light, cold and electricity, heat is the most satisfactory. High degree of temperature will destroy all forms of parasitic life. The animal forms succumb very readily to the influence of heat, and most of the plant parasites are destroyed by it ; but whereas heat may be applied with great suc¬ cess as a germicide in general disinfection, it

naturally cannot be used as a general agent on the body. The red-hot iron in the form of a galvanocautery, or a heated wire, makes a most efficient form of cautery to destroy the poison of dog-bite, or to destroy localized forms of tuberculosis, etc., but heat is thus limited in its application.

Cold was formerly regarded as a powerful germicide ; but now there is a tendency to em¬ phasize other factors than cold itself as potent. Cold — which kills the bacteria of yellow fever, but not those of smallpox or typhoid — may even act as a preservative of germ life, as is established by the high germicidal content of frozen food stuffs, after months and weeks in cold storage. Recent investigation has led to the conclusion that the degree of cold, time of freezing, crystallization and external pressure, and the composition in which the freezing oc¬ curs, all have an influence on the germicidal potency of cold.

Light, especially sunlight, is a very efficient germicide, but the exposure must be continued for an appreciable length of time. Sunlight is nature's great germicide. Within recent years the light given by the Rontgen ray (X-ray), by radium, polonium, thorium and similar agents, has been used with great success in the treatment of certain parasitic skin diseases, but whether the effects are due To any ger¬ micidal action of the light, or to a normal tissue stimulation, is not decided. It seems from experiments thus far recorded that these forms of light are not definite germicides. Various colored lights, particularly red and am¬ ber, are known to restrict the growth of certain forms of bacteria. They do not, however, de¬ stroy them. This principle is made use of in smallpox hospitals and similar institutions, but it does not seem that the results are sufficiently striking to base any general deductions thereon. Electricity is not an efficient germicide. The passage of electrical currents through water does not necessarily kill the bacteria contained therein, notwithstanding the many claims made by enterprising manufacturers of electrified water, said to be made germ-free by the electri¬ cal current.*

Chemical germicides are numerous, both for external and internal use, although intracel¬ lular germicides, or those that can be used within the tissues of the body, are much to be desired. The list of chemical germicides is enormous. Thousands of different agents have been used and these exhibit varying degrees of germicidal activity. As has already been said, each form

of germ possesses its own powers of resistance, and each germicide its ability to kill in varying degrees of strength. The germicides in popular use are chlorinated lime, carbolic acid, creosote, alcohol, boracic acid, ammonia, formaldehyde, hydrogen peroxide, iodine and its preparations, mercury and its preparations, volatile oils of cinnamon, mustard,

peppermint, turpentine, pen¬ nyroyal, oxygen, quinine, salicylic acid and its derivatives. Of these for external use, for use in closets, in bedding, for linen, etc., carbolic acid in the percentage of 1 to 50 of wa-ter, for¬ maldehyde in percentage of a teaspoonful of the 40 per cent solution of the gas to a quart, bichloride of mercury in the proportion of one part to 1,000, are the most practical and con¬ venient germicides. So far as is now known, quinine is about the only efficient chemical sub¬ stance that can be used as an intracellular ger¬ micide. It has the singular property of poison¬ ing the malarial parasites within the red blood¬ cell without poisoning the blood-cell itself, a selective property which most poisonous agents lack.

The great germicide of the human body, and the one that protects it in its various strug¬ gles with different forms of parasites, is the blood-serum. This is a very efficient germicide, a full consideration of the action of which will be taken up under the heading of Immunity. Consult Buck, (Reference Hand-Book of Med¬ ical Sciences } (1902), article on Germicides ; Harrington, Practical Hygiene) (1901). See Batericide ; Bacteria ; Disinfection ; Germ ; Immunity.

GERMINAL, zhar'me'nal', the seventh month of the first French republican calendar, 21 March-19 April.

GERMINATION, in botany, the first act of growth, which takes place in an embryo plant. See Seed.

GERMINIE LACERTEUX, zhar'me'ne'

la'sar'te, a romance by Edmond and Jules de Goncourt, published in 1865. It aims to present a so-called ((clinic of love® and was dramatized by Edmond. In 1889 it was produced at the Odeon.

GERNSHEIM, gerns'him, Friedrich, Ger¬ man composer: b. Worms, 17 July 1839. He studied at Mainz, Leipzig and Paris, became an instructor in the Conservatory of Cologne in 1865, and in 1873 also kapellmeister of the the¬ atre there. In 1874 he was appointed director of the Rotterdam school of music, and in 1890 of the Stern Choral Union of Berlin. His works include chamber-music, three sympho¬ nies and other instrumental compositions ; the song-cycle

GERO, ga'ro, a hero in the (Nibelungen- lied) and a real historic character. He was Margrave of Ostmark and in 939 conquered the Slavic peoples between the Elbe and the Oder.

g£r6me, zha'rom', Jean Leon, French

painter and sculptor: b. Vesoul, Haute-Saone, 11 May 1824; d. Paris, 9 Jan. 1904. He was a pupil of Delaroche, who early credited him with originality and style. When he exhibited his (Fighting Cocks) in 1847, Theophile Gautier wrote in La Presse, <(Let us mark with white this lucky year, for unto us a painter is born.® He accompanied Delaroche to Italy, 1844-45,

aild vi5i!e-d Russia.and Egypt in 1854. He first snowed his power in some Egyptian studies, but only reached the level of intensity and vivid¬ ness vyhich characterized all his succeeding work m his < Duel after a Masked BallP In 1od5 he exhibited (The Age of Augustus, a picture in which were harmoniously blended marvelous historic faithfulness with a powerful allegory by which the culmination of pagan*

Tfea-tio-n an<ˆ ***ts Sra(ˆual paling in the dawn ot Christianity was finely suggested. His grasp of classic motifs was united to an extraordi¬ nary mastery of archaeological detail, and his (Gladiators in the Amphitheatre*** *(1859), and (Phryne before her Judges* (J861), are startling in the impression which they convey of antique life in its movement, sentiment and passion. In this special depart¬ ment of historical genre Gerome easily led the European painters of his century. Other of his paintings are lTwo Augurs* (1861) ; (Cleopatra and Caesar) (1866); and (Pollice Vorso* (1873). Specimens of his work are in the Boston Museum, Metropolitan Museum and the Vanderbilt Collection, New York, and the Wal¬ ters Gallery, Baltimore. He was elected a member of the Institute in 1865, was chevalier of the Legion of Honor in 1855, and later commander. In later life he devoted himself mainly to sculpture. Consult Claretie, (Peintres et sculpteurs contemporains) (1884); Cook, (Art and Artists of Our Time) (1888); biography by Hering (1892) ; Van Dyke, (Modern French Masters 5 (1896).*

GERONA, ha-ro'na, Philippine Islands, town of Tarlac, province of Luzon, 10 miles north of Tarlac, on the Dagupan-Manila Rail¬ way. Pop. 14,000.

GERONA, Spain, a city and capital of the province of Gerona, 65 miles from Barcelona. It is celebrated for its churches : the cathedral is the finest specimen of Gothic architecture in Spain, the nave of which is the widest pointed vault in Christendom ; the apse of San Pedro is probably of the 10th century, and the church of San Feliu is of the 14th century. In its stormy history the town has undergone 25 sieges, the last, from May to December 1809, being distinguished by a heroic defense against the French

(who lost 15,000 men) until disease and famine enforced its surrender. Pop. 17,416. The province of Gerona has an area of 2,264 square miles. Pop. over 300,000.

GERONIMO, je-ron'i-m6, Apache chief of the Chiricahua band' b. about 1834; d. Fort Sill, Okla., 17 Feb. 1909. In 1884-86 he be¬ came noted as the ring-leader in the harrying of Arizona and New Mexico. (See Apache). In 1882 he organized a raid into Sonora ; in 1884 he instituted a reign of terror in New Mexico " and Arizona. General Crook forced him to a stand on 25 March 1886, but Geronimo refused to surrender except for two years, the band to be sent East with their families and then re¬ placed on the ol

ordered them sent to Saint Augustine, but Geronimo and 14 others were sent to Fort Pickens, Fla., and afterward to Fort Sill, Okla. Consult the (Story of his Life, edited by S. N. Barrett (New York 1906).*

GlSRONTE, zha'ront', a type of aged man, found frequently in French classic comedy. The attributes vary in the presentation of the several authors; compare, for instance, Cor¬ neille's 'He Menteur) ; Moliere's (Le medecin malgre lui ; (Les fourberies de Scapin) and Reynard's (Le joveur) and other comedies.*

GERONTES, ge-ron'tes, in ancient Greece, a number of magistrates of Sparta who, with the ephors and kings, had the supreme power in the state. They were not eligible for elec¬ tion before they had attained the age of 60 years. Their number is variously sta ted at 20 and 32.

GEROUSIA, je-roo'shi-a, the name of the Senate of Sparta, which was analogous to the Boule of the Athenians. Consult Gilbert, (Greek Constitutional Antiquities (London*

1895).

GERRESHEIM, ger'es-him, Prussia, town of the Rhine province and suburb of Dussel- dorf. It contains a Romanesque church of the 13th century. Its industrial establishments comprise glass works, rivet and wire factories, silk factories, foundries, etc. In 1909 it was included within the municipal limits of Dusstd- dorf. Pop. 14,400.

GERRY, ger'i, Elbridge, American states – man: b. Marblehead, Mass., 17 July 1744; d. Washington, D. C., 23 Nov. 1814. He was a member of the Continental Congress 1776-80 and 1783-ˆ85; delegate to the Constitutional Con¬ vention in 1789; member of Congress from Massachusetts 1789-93; commissioner to France 1797-98; governor of Massachusetts 1810-12; and Vice-President of the United States 1813-14.

It was during his term as gov¬ ernor that an unsatisfactory redistricting of the State took place, in which he was supposed to have taken part, whence arose the term (

(1828-29).

GERRY, Elbridge Thomas, American law¬ yer and philanthropist: b. New York, 25 Dec. 1837. He was graduated from Columbia in 1857, was admitted to the bar in 1860, and was a member of the State Constitutional Conven¬ tion of New York 1867. Subsequently he be¬ came an associate of Henry Bergh in the Amer¬ ican Society for the Prevention of Cruelty to Animals, of which he was for many years vice- president. In 1874 he was the leading organ¬ izer of the Society for the Prevention of Cru¬ elty to Children, of which he was the president in 1876-91, and which became so closely identi¬ fied with his name as often popularly to be termed the Gerry Society. He was chairman of the commission on capital punishment which substituted execution by electricity for that by hanging, in New York State (1886-88). He also held many important offices of trust, and became known for his interest in yachting af¬ fairs, having been commodore of the New York Yacht Club in 1886-93. He is a grand¬ son of Elbridge Gerry (q.v.). With A. F. Cur-

rier he wrote (Corporal Punishment for Cer¬ tain Forms of Crime > (1895).

GERRYMANDER, ger'i-man-der (hard g: now chiefly used as a verb), the arranging of election districts by the party in power in a State when passing a redistribution act so as to concentrate its opponent's majorities and dis¬ tribute its own, thus giving itself as many with light majorities and its rival as few with heavy ones as possible. Many States are to some ex¬ tent gerrymandered by nature, the heaviest vote of one party being compacted into a minor sec¬ tion : Indiana and New York are notable cases — the one on account of the southern agricul¬ tural population having been kept from expan¬ sion by more energetic streams of a different character, the other from the development of a vast city at political odds with the rural parts. Law usually and fairness necessarily provide that the State shall be districted in solid blocks of contiguous territory, so that (subject to the above limitation) the district elections shall correspond roughly to the popular majorities in the State. But since early in the century, all parties in turn have violated political equity by establishing artificial gerrymanders when in power; sometimes creating a popular revolt which has cost them

the object of the scheme, but the rival party has rarely learned wisdom from that result, usually reversing the gerrymander for its own profit. As counties are fair models of what election districts should be, the gerrymander is generally worked by dis¬ regarding them ; but the following illustration of its working with them is the simplest form. Suppose nine counties casting 10,000 votes each, the whole lying in a block thus arranged, and the votes divided between party A and party B as indicated within :

a Now let one dis-

B 5150 trict be formed

from the diagonal

- counties 1, 5 and 9,

8 and three others,

A 4750 respectively, from 2 B 5250 and 4? 3 an(j 5(an(j

_ 7 and 8. Party A

has 52,000 against

A 7000 Bs 48)000 altogether

B 3000 or a popular major¬ ity of 4,000; but it only carries one district out of four because the gerrymander has made it waste most of its votes and its rival wastes almost none. Yet the law has been observed, as all the counties in each district are contiguous. Of course, in practice such perfect cases do not occur, and towns or counties are grouped raggedly in forms often grotesque. As a political expedient it dates from 1709, when a combination of Pennsyl¬ vania's counties sought to deprive Philadelphia of its proper representation.

The origin of the name was probably from the following early _ case. Massachusetts, in 1812, had its senatorial districts identical with the counties ; the State constitution gave the legislature the power of redistricting, however, and the Republicans (corresponding to the Democrats of to-day), carrying the legislature in that year over the Federalists, at once gerry¬ mandered it in a very outrageous fashion. The Boston Sentinel published a colored map of one

district in Essex County, whose sprawling towns with a huge prong to the northwest see-med like some monstrous animal of fable; and on an

indignant Federalist saying that it <(looked like a salamander,® another retorted, ((Better call it Gerrymander,® from the Re¬ publican governor, Elbridge Gerry (q.v.), whose signature had made it law. Gilbert Stuart (q.v.), the artist, drew a completion of it into an ungainly bird, which figured largely as a campaign document. The Federalists re¬ captured the legislature the next year and re¬ pealed the bill. The most famous of many great gerrymanders in the United States is the "Shoestring District® (Sixth Congressional) of Mississippi, formed to minimize the negro vote, and consisting of all the counties in the State touching the Mississippi River; it is about 300 miles long bv an average of 20 broad. (See Appointment). Consult Griffith, E. C., (Rise of the Gerrymander } (Chicago 1907) ; and article by Dean in the (New England Historical and Genealogical Registerˆ (Vol. XLV, Boston

1892).

GERS, gar, France, a department of the southwest, formerly included in the provinces of Gascony and Guienne. It has an area of 2,428 square miles. It is traversed by the Gers, the Adour Gimone, Bayse and Save. Its sur¬ face is largely devoted to grape culture and great quantities of brandy and wine are pro¬ duced. It is the homeland of the brandy known as Armagnac, second only to that of Cognac. Cereal crops and flax are extensively grown and cattle-raising has attained large proportions. Auch is the capital.

GERSON, zhar'son', Jean Charlier de,

French theologian; b. Gerson, near Rethel, 14 Dec. 1363; d. Lyons, 12 July 1429. His parents were simple peasants of deep piety, who in¬ fluenced 9 of their 12 children to pursue ecclesiastical careers. At the age of 14, Jean, under the patronage of the Duke of Burgundy' was sent to the College of Navarre. Here he continued his theological studies until 1384 distinguishing himself by his brilliance and diligence in his work. From 1383-84 he served as procurator of the Gallic nation, and in 1387 was sent to Pope Clement VII by the univer¬ sityˆ as its representative in the dispute con¬ cerning the doctrine of Immaculate Conception. In 1395, his teacher, Pierre d'Ailly, was ap-

°01cnC(. Puy> and Gerson was chosen

to >11 the vacancy thus caused in the chancellor¬ ship. His occupancy was marked by the high¬ est zeal and the greatest vigor in reforming the morals and the curriculum of the school of theology. In his letters, particularly his

In the schism which followed the death of Gregory XI in 1378, Gerson took

an active part in urging its conclusion. As a result of his unceasing efforts, a council was finally assem¬ bled at Pisa and Alexander V was chosen

1

4

A 8750

A 5250

B 1250

B 4750

2

5

A 4500

A 7500

B 5500

B 2500

3

6

A 5100

A 4300

B 4900

B 5700

Pope. But the much-hoped for reforms were not instituted, and the death of Alexander re¬ sulted only in the election of an inferior ruler, John XXIII. In the meantime political influ¬ ences began to predominate. Gerson had al¬ ways been an adherent of the house of Bur¬ gundy, while Pierre d'Ailly had remained faithful to the house of Orleans. In 1407, the Duke of

Orleans, brother of the king, was mur¬ dered by Jean sans Peur, Duke of Burgundy. Jean Petit, a theologian to whom Gerson was hostile, defended the assassination in a stirring address which won the acclamation of many people. Gerson, contrary to the sympathies of the university, openly denounced the act with equal vigor. He then undertook intense literary activity in behalf of his convictions on this subject, as well as on ecclesiastical reform and the healing of the schism, urging the assembling of a council to decide the issues involved. Finally the Council of Constance (1414-18) was convened. Here Gerson's influence reached its climax. The council refused to oppose the Duke of Burgundy, made allowances for Petit and accomplished nothing further. Thereafter, Gerson's prestige vanished altogether, Unset¬ tled national conditions made his return to the university inadvisable, and he sought refuge at Tirol, where Albert of Bavaria offered him protection. He busied himself with an elaborate and vigorous (Apology, > and wrote four books of (De Consolatione Theologiae) in imitation of the work of Boethius. After a short sojourn at Venice, he returned to France and entered the convent of the Celestins where his brother was prior. His last years were spent in conducting a school for children at Lyons, and in literary work. To him was attributed the work on Umitation de Jesus-ChristC which was later assigned more correctly to Thomas a Kempis. The first edi¬ tion of Gerson's works appeared at Cologne in 1483 ; the best was published by L. Ellies Du Pin (5 vols., Antwerp 1706). Consult Hundes- hagen, (Die mystische Theologie Gersons> (Leipzig 1834) ; Schmidt, C., (Essai sur Jean Gerson, chancelier de l'Universite de Paris) (Strassburg 1839) ; Schwab, J. B., (Johann Gerson (Wurzburg 1858) ; Tschakert, P., (Peter von Ailli) (Gotha 1877), and Jodart, (Jean de Gerson) (Paris 1881).*

GERSTER, gar'ster, Etelka (Madame Gar- Dini), Hungarian singer: b. Kaschau, Hungary,

16 June 1857; d. 1920. She was a pupil of Madame Marchesi in Vienna, and made her first appearance in Venice in 1876, as Gilda, in (Rigo- letto. In 1878 and also in 1883 and 1887, she made successful tours in the United States. In 1887 she married her director, Pietra Gardini, and after 1896 was at the head of a singing school in Berlin.*

GERSTLE, Lewis, Californian pioneer: b. Bavaria, 17 Dec. 1824; d. San Francisco, Cal.,

17 Nov. 1902. Coming to the United States as a lad, he settled in Louisville, Ky., and joined the fortune-seekers in California in 1850. With Lewis Sloss he subsequently formed the Alaska Commercial Company. Their enterprises by sea and land aided largely in building up California, and Gerstle always displayed a public spirit and faith in the future of the

State. He was treas¬ urer of the University of California, and identi-

fied with many Jewish and general charities, to all of which he was a generous giver.

GERTRUDE OF WYOMING, a narrative poem by Thomas Campbell, written at Syden¬ ham, in 1809. He chose the Spenserian stanza for his form of verse, and for his theme the devastation by the Indians, in 1778, of the quiet valley of the Wyoming, in Pennsylvania, on the Susquehanna. The poem opens with a de¬ scription of (

GERVINUS, ger-fe'noos, Georg Gott¬ fried, German historian : b. Darmstadt, 20 May 1805; d. Heidelberg, 18 March 1871. In 1825 he went to the University of Heidelberg, where the lectures of Schlosser inspired him with a peculiar love of historical studies. In 1831 he visited Italy, where he remained for a year collecting materials for the works he was meditating. His (Historische Schriften, pub¬ lished after his return (1833), excited the at¬ tention of scholars, and secured him in 1835 an extraordinary professorship in the University of Heidelberg, where he was in 1844 appointed to a professorship. In 1836 he was appointed professor at Gottingen, and in the following year was deprived of his chair and banished for protesting against the suspension of the Han¬ over constitution. From 1845 he took an active part in the liberal movement in Germany. It was at this period that he wrote his (Mission der Deutschkatholiken) and (Die Protestant- ische Geistlichkeit und die Deutschkatholiken.* In 1847 he founded in Heidelberg the Deutsche Zeitung, which advocated a representative system for Germany and a clearly-defined fed¬ eral constitution. His chief works are (Ge- schichte der poetischen National-litteratur der Deutschen) (1835-42), in which he endeavors to show how the development of German poetry is connected in all its phases with the history of the nation and other European countries ; (Shakespeare } (1849-50); (Geschichte des

*neunzehnten Jahrhunderts (1855-66). All his works, even his more purely sesthetical ones, such as that on Shakespeare, are more or less colored by his political views and aims. In the last years of his life he zealously endeavored to secure the popularity in Germany of the works of Handel, whom he regarded as the greatest genius in the musical sphere that the world had ever seen. He viewed with dislike the manner in which German unity was achieved under the aegis of Prussia. His (Autobiography * ap¬ peared in 1893.*

GERYON, je' ri-on, in the mythology of Greece a king of Hesperia, son of

Chrysaor and Callirrhoe, a three-headed giant. He possessed numerous and fine herds, which were guarded by the two-headed dog Orthrus and the giant Eurytion. The herds were carried away and Geryon and the two guardians slain as one of the 12 labors of Hercules.

GESELLENVEREINE, Roman Catholic

benevolent associations of German origin/called into existence in 1846 by a number of journey-

men mechanics under the guidance of Adolf Kolping, a member of the Dominican Order, a philanthropist who had traveled throughout Switzerland, the greater part of Germany and the better part of Austria. In Switzerland Kolping personally established and spread the influence of the Gesellenvereine. And when he died in 1865 there were in existence about 400 such guilds on the continent of Europe. Under his first successor, General-President Schaffer, the total number of such institutions amounted to, in 1901, about 1,086 confederations. In the practice of administration, and to serve other es¬ sential functions, the membership of Gesellen¬ vereine was parted into two divisions. A mem¬ ber, so proficient as to be able to follow his calling independently and to teach others, re¬ ceived officially credentials to that effect, and was called a master. The remaining members, persons who could not assume the duties of a teacher, but having merely a diploma to the effect that their apprenticeship had been served, were called, collectively, journeymen. In 1901 the total memberships of the 1,086 existing guilds numbered 80,000 journeymen and 120,000 mem¬ bers holding a master's degree. It was Adolf Kolping himself who set the goal and pointed out the path for the institutions to follow, in¬ stitutions which in so large a measure owed their origin to him. The purpose of this well- intentioned man was threefold. He aimed: (1) To further the education and promote the well¬ being of the masses. (2) To furnish them with clean amusements ; to entertain them away from vice. (3) To induce all members to become and remain strictly observant Christians and moral citizens.

This threefold goal, if attained, it was rea¬ sonably hoped, would ensure to all members of the Gesellenvereine the recognition that gen¬ uine citizenship always receives. But besides the religio-moral concerns of these confedera¬ tions, a fourth feature received greater atten¬ tion for the first time about 1890. Since 1890 considerable emphasis was given to the activities designed to graduate expert mechanics, mer¬ chants and men of

business, generally; in short, to the promotion of trades of all kinds. It can¬ not be gainsaid that these educational measures, as well as, if not in particular, the religio-moral measures of these Gesellenvereine, resulted in very great gains to the man of labor.

These institutions own, perhaps, 400 hos¬ pices in which a traveling journeyman can find lodging, maintenance and, if need be, even nursing; and a member (for the masters like¬ wise enjoy these privileges) may have all these till, he can find such work as his particular training fits him to do. Besides, those who are employed can find in these hospices, and at an almost nominal price, both board and lodging. These hospices are bound together under the control of a single central office : the officiating General-President haying his station fixed at Cologne. The associations of the individual dioceses are under the administration of a diocesan praeses, an officer appointed by the bishop. The total amount of money deposited in savings banks in 1903 by the members of the Gesellenvereine amounted to 2,000,000 marks or nearly $500,000. The number of organiza¬ tion in existence in 1904 is said to have been

Even early in the 19th century the proto¬ types of these guilds existed in Germany. After one had served as an apprentice a number of years, he was known as a ˆGeselle.® As such it was customary for one to travel from town to town until he found employment at his pe¬ culiar calling. He was often called «Hand- werks-Bursche® and in most towns taverns were set aside to accommodate him and his comrade "Gesellen.® Such laboring men were each time they left town obliged to show a certificate, their «Wander-Bursch,» to some one in author¬ ity and have it signed.

• gd-za'ne-oos, Friedrich Hein¬

rich Wilhelm, German Orientalist: b. Nord-

VˆUoSenVTSaxonˆ 3 Feb- 1786 > ' d. Halle, 23 Oct. 1842. He studied at Helmstedt and Gottingen, and at Halle in 1810 became extraordinary, in 1841 ordina-ry, professor of theology. Here' he lectured for more than 30 years, broken only by the closing of the university during the War of Liberation (1813-14), and by lengthened visits to France and England in 1820, to Eng¬ land and Holland in 1835. His first great work was his (Hebrew and Chaldaean Hand Diction¬ ary ˆ1(F~12)'. -His (Elementary Hebrew) (1813-14) consisting of the (Hebrew Gram¬ mar, and the (Hebrew Reader, > has contributed enormously to the knowledge of the Hebrew language, not only in Germany, but through translations also in England and the United States. Later works are his (Critical History

 (1815) ; On the Origin, Genius and Authority

the Samaritan Pentateuch) (1815);

GESHUR, an ancient state of Aramaea, east or the Jordan, probably in the southern part of Jaulan, as.it .is constituted to-day. Maacah bordered on it in the north. It is mentioned m Deut in, 14, Joshua xii, 5, as one of the states bordering on the domain of Og of tf ashan. A Geshur is mentioned also in Joshua xm 2, and 1 Sam xxvii, 8, which seems to nave been located in southwest Palestine.

GESNER, Abraham, Canadian geologist:

M N S 2TMay 1797 ; d. Halifax,

N. S., 29 April 1864. He studied medicine in London, and returned to Nova Scotia. Later ioioe?me interested in scientific research In 1838 he was appointed to examine the report on the geological resources of the lower prov¬ inces of British North America. He discovered how to produce oil suitable for lamps from bituminous shale and cannel coal, and this oil he called Kerosene, > which name was after¬ ward given to other illuminating oils. This oil was made and consumed by him in his public lectures at Prince Edward Island in 1846, and subsequently at Halifax, N. S. His patents were afterward sold and the oils were manu- tactured and sold under the denomination of

"kerosene oil.® His publications include (Re- marks on the Geology and Mineralogy of Nova Scotia (1836); 'Reports on the Geological Survey of the Province of New Brunswick* (1836-42); (New Brunswick, with Notes for Emigrants) (1847) ; 'Industrial Resources of Nova Scotia) (1849) ;*

GESNER, Konrad von, Swiss naturalist: b. Zurich, Switzerland, 20 March 1516; d. there, 13 Dec. 1565. In 1537 he was appointed pro¬ fessor of Greek at Lausanne. This chair he exchanged four years later for that of physics and natural history at Zurich. He was an in¬ defatigable writer of books and in the course of his life published no less than 72 works, be¬ sides leaving at his death 18 others in progress. His Universal Library) (1545) contained the titles of all the books then known in Hebrew, Greek and Latin, unpuolished as well as pub¬ lished, with criticisms and summaries of each. His next undertaking was the (Animal History) (1551-58). The first book treats of viviparous quadrupeds, the second of oviparous animals, the third of birds and the fourth of fishes and aquatic animals. He collected more than 500 plants undescribed by the ancients, and ap¬ pears to have been the first who made the great step toward a

scientific classification of dis¬ tinguishing genera by the fructification. He also wrote on other branches of science, as med¬ icine and mineralogy, and composed a great number of works dealing with the ancient classics, the (Mithridates sive de Differentia Linguarum) (1555) being the most notable.

GESSLER, ges'ler, Albrecht, or Herman,

called also Gessler von Bruneck, legendary Austrian official, in 1300 appointed joint-gov¬ ernor with Berenger von Ladenberg, of the Waldstaden or forest cantons (Schwytz, Unter- walden, and Uri), by Albrecht I of Austria. According to the traditions connected with Wil¬ liam Tell (q.v.), his oppressive edicts and wan¬ ton cruelty so enraged the inhabitants that a conspiracy was formed against him, and he was shot by Tell in a narrow pass near Küssnacht in 1307.

GESSNER, ges'ner, Salomon, Swiss poet, painter and etcher: b. Zurich, 1 April 1730; d. there, 2 March 1788. In 1758 he published an idyllic pastoral, (Der Tod Abels.) In 1762 he published, in four volumes, the poems which he had previously given to the world on different occasions. In 1772 he published another volume containing a collection of poems, to which he gave the name of 'Idyllen) (idyls), a name which he had already given to a previously pub¬ lished volume of poems. Their quiet, amiable character pleased many in Germany; and in France, where they were translated by Huber, they were received with enthusiasm, and the author was regarded as a poet of the first rank. From France his fame spread over all Europe. The most popular of his idylls is the (Death of Abel,) since translated into many foreign lan¬ guages. His ˆLife by Hottinger was published in 1796, and his Correspondence with His Son) in 1801.*

GESTA ROMANORUM, gesffa ro-ma- no'rum, 'Deeds of the Romans, the title of a collection of short tales, legends, etc., in Latin, very popular in the Middle Ages. The book*

was probably compiled about the close of the 13th century. The separate tales making up the Gesta are of diverse contents, and belong to different times and countries, the sources from which they are derived being partly classical, partly Oriental and partly western. ' Whatever may have been the intention of the original com¬ piler, they very soon were adapted to the moral¬ izing tendencies of the time, and moral re-

*jStl0n,? an< * ajle.g°ri?al interpretations were added to them, it is said, by a Petrus Bercorius or Pierre Bercaire of Poitou, a Benedictine prior.*

GESTATION, the period of development

k- u 6 ˆoeˆus .ˆrom. time of conception to birth. _ Even in animals, where only a single insemination is allowed, the length of the gesta¬ tion cannot always be foretold with exactness. The human foetus is carried in the uterus about 280 days. For periods of gestation in animals, see Breeding. See also Obstetrics ; Preg¬ nancy.

GET A, je'ta, Septimus, Roman emperor: r A D- » 211 a.d. He was the second son

of the Emperor Severus, and brother of Cara- calla, with whom he was associated in the em¬ pire on the death of his father. Caracalla, who envied his virtues and was jealous of his popularity, after having endeavored to effect his death by poison, murdered him, and wounded their mother, who was attempting1 to save him.

GETHSEMANE, geth -sem'a-ne, or GETH- SEMANI (Boustanez-Zeitoun) , an olive gar¬ den or orchard to the east of Jerusalem, on the road leading from the brook Kedron to the Mount of Olives. The place has specially sacred associations for Christians, as the tradi¬ tional site of "Our Lord's Agony in the Gar¬ den® (Matt, xxvi, 36-57; Mark xiv, 32-53; Luke xxn, 39-53; John xviii, 1-13). The place is now in possession of the Franciscan Fathers of the Holy Land, who, in 1848, built a wall around it the better to protect it. There are eight very ancient olive trees in the garden, and these are traditionally supposed to have been there at the time of our Lord. In the cen¬ turies intervening between the Crucifixion and the visit of the Empress Helena to Jerusalem in 326 a.d. direct and conclusive evidence as to the actual location had been lost, and the present site was fixed upon at that time. The present appearance of the garden, however, is in accordance with the description as found in the Gospels. Another site, a little to the north, is claimed by some as the true site. Consult Condor, (The Bible Places) (London 1897) ; Sanday, 'Sacred Sites of the Gospels) (Oxford 1903) ; and especially Smith, G. A., Jerusalem) (London 1908).

GETTY, George Washington, American soldier: b. Georgetown, D. C, 2 Oct. 1819; d. Forest Glen, Md., 3 Oct. 1901. He was grad¬ uated from the United States Military Academy in 1840, fought in the Mexican and Seminole wars, in the Civil War attained the brevet rank of major-general, United States army. He sub¬ sequently was commander of numerous military districts; was transferred to the artillery in 1871 and retired from the service in 1883.

GETTYSBURG (named after Gen. James Gettys), Pa., a borough and county-seat of Adams County, 35 miles southwest of Harris-

burg; on the Gettysburg and Harrisburg and Western Maryland railroads. It is the seat of a Lutheran theological seminary founded in 1826, and Pennsylvania (Gettysburg) College (Lu¬ theran) founded 1832. One of the most famous battles of the Civil War was fought here on 1, 2 and 3 July 1863. (See Gettys¬ burg, Battle of). The location of the borough among the hills of southern Pennsylvania, near the Maryland boundary line, is decidedly picturesque, and the region is well adapted to agriculture. A national park now includes the entire battlefield, and a national cemetery, dedi¬ cated by President Lincoln 19 Nov. 1863, con¬ tains 3,629 graves — nearly one-half those of the ˆunknown® dead. The borough, dating from 1780 and incorporated in 1806, is governed — under the charter of 1853 — by a burgess and council. Pop. 4,400.

GETTYSBURG, Battle of, the most im¬ portant event of the American Civil War and the turning point in the long and stubbornly- fought contest.

Preliminary Campaign. — After the battle of Chancellorsville (q.v.), 1-3 May 1863, the opposing armies resumed their positions on the Rappahannock, Lee's army on the south side of the river, at Fredericksburg, Hooker's on the north side, opposite. Encouraged by victory, and desiring to relieve Virginia of the presence of the Union army, Lee determined to transfer the seat of war north of the Potomac. His army, 1 June, was composed of the three corps of Longstreet, Ewell and A. P. Hill, and Stuart's cavalry force of 12,000 men, in all about 76,000, with 190 guns. Hooker's Union army was composed of seven corps, the First, commanded by Reynolds; Second, by Hancock; Third, by Sickles; Fifth, by Meade; Sixth, by Sedgwick; Eleventh, by Howard; and Twelfth, by Slocum; aggregating, 10 June 82,000 in¬ fantry and artillery ((present for duty and equipped,® with 410 guns, to which were added Pleasonton's cavalry force of about 12,000.

Lee began his campaign 3 June by sending Longstreet and Ewell to Culpeper Court House, where the cavalry, under Stuart, was also con¬ centrated. A. P. Hill remained at Fredericks¬ burg to watch and detain Hooker. Hooker suspected Lee's movement and, under his direc¬ tion, Sedgwick laid bridges, crossed the rivqr, and reported that Lee's main body seemed to be still there. Pleasonton was ordered to feel the position at Culpeper. Reinforced by two infantry brigades, he crossed the Rappahannock on the morning of the 9th, encountered Stuart at Fleetwood and Brandy Station (see Fleet- wood or Brandy Station, Battle of), and reported the greater part of Lee's army at Culpeper, preparing to move on Washington. Hooker sent three corps up the Rappahannock to prevent Lee's crossing. On the 10th Lee sent Ewell, preceded by two . brigades of cavalry,

to the Shenandoah Valley to clear it of Union troops. Ewell defeated and dispersed Milroy's command at Winchester (see Opequon, Bat¬ tle of the), took Martinsburg and cleared the valley; and on the 15th Rodes' division crossed the Potomac at Williamsport, sending Jenkins' cavalry brigade in advance to Chambersburg, and on the 19th moved to Hagerstown. John¬ son's division crossed the Potomac and marched to Sharpsburg, and Early's moved to Shepherds-

town to threaten Harper's Ferry. In these posi¬ tions Ewell waited until the 21st for the other two corps to close up, when he advanced to Chambersburg. Longstreet moved from Cul¬ peper on the 15th and, advancing along the east side of the Blue Ridge, occupied Ashby's and Snicker's Gaps. Stuart's cavalry was thrown out in front of 'Longstreet to watch Hooker, and on the 17th had a severe fight with the Union cavalry at Aldie and was driven back to Middleburg. A series of cavalry combats ensued, at the end of which Sjuart was driven behind the Blue Ridge. On the 24th Longstreet moved by way of Berryville, crossed the Poto¬ mac at Williamsport on the 25th and 26th, and marched to Hagerstown, thence on the 27th to Chambersburg. A. P. Hill remained at Fred¬ ericksburg until the 14th, when, Hooker having fallen back, he moved down the Shenandoah Valley, crossed the Potomac at Shepherds- town, and joined Longstreet at Chambersburg. Stuart was left to guard the passes of the Blue Ridge and watch Hooker, whom he was to harass as much as possible, should he attempt to cross the Potomac. Meanwhile Hooker, starting from the Rappahannock on the 13th, ' was moving cautiously back toward the Potomac and covering Washington. On the 25th, 26th and 27th he crossed the Potomac at Edward's Ferry, near Leesburg, and on the 28th his army was grouped about Frederick, with Slocum's corps on the left near Harper's Ferry. He de¬ sired to send Slocum's corps and the 10,000 men, composing the garrison at Harper's Ferry, against Lee s rear, but General Halleck, com- mander-in-chief, refused the request for the garrison, and Hooker asked relief from com¬ mand. His request was promptly granted, and 28 June Gen. George G. Meade was assigned to the command. Halleck granted Meade's re¬ quest to utilize the garrison at Harper's Ferry and Meade ordered the abandonment of the place and the transfer of the garrison to Fred¬ erick and Washington.

Lee, deprived of the use of his cavalry, had been unable to get information of Hooker's movements , and to retain him on the east side of the mountains, after he had entered Mary¬ land, Ewell had been instructed, on the 24th, to send a division across the South Mountain to threaten Baltimore. Early's division, de¬ tailed for the purpose, went as far east as York, the other two divisions of the corps marching from Chambersburg to Carlisle. Jenkins' and Vy hite s cavalry were in advance at Wrights- ville and above on the Susquehanna, threaten- mg to cross and take Harrisburg.

Lee now made preparations to advance upon Harrisburg, but on the night of the 28th received informa¬ tion that the Union army had crossed the Poto¬ mac and was moving northward, its head of column already at South Mountain. His com¬ munications thus menaced, Lee resolved to pre¬ vent the further progress of the Union army by concentrating his own on the east side of the mountains; accordingly Ewell was ordered to turn back from the Susquehanna, Carlisle and York, and march for Gettysburg, and Longstreet and Hill were directed to march from Chambersburg to the same place. On the night of the 30th Rodes' division of Ewell's corps was at Heidlersburg, eight miles north¬ east of Gettysburg, with Early's and Johnson's

PA,

GETTYSBURG,

Entrance to National Cemetery

New; York State Monument in National Cemetery

divisions near Hill was at Fayetteville and Cashtown, eight miles from Gettysburg, and Longstreet was still at Chambersburg.

On the morning of the 29th under the im¬ pression that all of Lee's army was along the Susquehanna, Meade marched by three diverg¬ ent roads in that direction and on the night of the 30th his forces were thus distributed. Buford, with two brigades of cavalry, was in advance at Gettysburg; Reynolds' First corps on Marsh Creek, five miles southwest of Gettys¬ burg ; Sickles Third Corps at Taneytown, and Howard's Eleventh corps at Emmitsburg. These three corps, constituting the left wing of the army, were under command of General Reynolds. Hancock's Second corps was at Uniontown ; Syke's Fifth corps at Union Mills; Sedgwick s Sixth corps at Manchester; and Slocum's Twelfth corps at Littlestown. Gregg's cavalry division was at Westminster. Kil¬ patrick's division, after a spirited fight with Stuart's cavalry at Hanover, bivouacked near that place. When Buford reached Gettysburg he went into camp just beyond the western limits of the town and threw out skirmishers three miles west and north.

The First Day's Battle. — Heth's division, the advance of Hill's corps, moved from Cash- town at 5 o'clock on the morning of 1 July, coming in sight of Buford's skirmishers about 9 o'clock, at which hour Buford fired his first gun as a signal for his skirmishers to open fire, and the battle of

Gettysburg began. Heth ad¬ vanced and Buford was slowly driven back, con¬ testing every foot of ground, until Reynolds came up with Wadsworth's division, which be¬ came immediately and desperately engaged. During this encounter Reynolds was killed. Doubleday, succeeding to the command of the first corps, continued the contest. The other two divisions of the corps came up at 11 o'clock, followed at 12.45 by Howard's corps, one divi¬ sion of which was placed in reserve on Ceme¬ tery Hill, the other two forming on Doubleday's right along Seminary Ridge. Meanwhile Hill had arrived with the remainder of his corps, and Ewell, arriving at 2.30 p.m. with Rodes' and Early's divisions, formed on Hill's left. Hill made successive assaults on Doubleday from the west, and Ewell upon Howard from the north, which were repulsed ; but finally, after desperate fighting and great losses on both sides, Early struck Howard in flank, causing him to give way, and the entire Union line was driven back through the town to Cemetery Hill, about half a mile south, which had been chosen by Howard as a rallying point for the two corps, and upon which he had placed one of his own divisions. When Meade heard that Lee's advance had reached Gettysburg, and that Reynolds had been killed, he was at Taneytown, 14 miles away, preparing to take up a defensive line along Pipe Creek. He ordered Hancock to ride forward and take command at Gettys¬ burg. Hancock arrived as the Union troops were retreating through the town. He was struck with the advantages presented by Ceme¬ tery Ridge for a defensive battle and he de¬ termined to hold it and so notified Meade. He sent one of Doubleday's small brigades to hold Culp's Hill, on the right, and made an ostentatious display of Buford's cavalry on the extreme left. This show of force, and the

great loss — over 7,000 — sustained by the Con¬ federates during the day, caused Lee to defer operations. Two divisions of Sickles' corps came up at dark; Slocum's corps came about the same time, and Slocum, as ranking officer, assumed command of the field, Hancock riding back to report to Meade that Gettysburg — to which point Meade had already ordered the concentration of his army^ — was the proper place to fight a battle. Hill's and Ewell's Con¬ federate corps were all up by night, and Long- street bivouacked four miles in rear of Hill.

The Second Day. — General Meade arrived on the field at 1 o'clock on the morning of the 2d. All his troops except the Sixth corps were up by noon. The Sixth corps, having 34 miles to march from Manchester, did not come up until between 2 and 4 o'clock in the after¬ noon. The position on which Meade disposed his army was in the shape of a fishhook. As finally posted, the Twelfth corps was on the right at Culp's Hill, facing east; Wadsworth's division on its left, facing north; the Eleventh corps on Cemetery Hill, on the left of Wads¬ worth, its right facing northeast, its centre and left facing northwest, with Robinson's division of the First corps on its left,

Doubleday's division in reserve. The Second corps, facing west, was on the left of Robinson; the Third corps on the left of the Second, with the Fifth, later in the day, on the extreme left. The Sixth corps was in rear of Round Top, on the left, as a reserve. Sickles, not satisfied with the position assigned the Third corps, moved to the front about three-fourths of a mile, from where Meade would have recalled him, but it was too late to do so in presence of a vigilant enemy.

The main part of Lee's army was on Semi¬ nary Ridge, a short mile west of Meade's left and centre; Longstreet on the right, with Hill on his left. Ewell's corps on the left held the town, and was at right angles to Hill and Longstreet. Pickett's division of Longstreet's corps had not come up. Skirmishing began in the morning. At 4 o'clock in the afternoon the battle opened by Longstreet's advance. He attacked Sickles with great fury and, although reinforced by Caldwell's division of the Second corps, and Barnes' and Ayres' divisions of the Fifth, after heavy fighting and great losses the Third corps and its supports were driven back beyond the main line. Longstreet followed, but was checked by a charge of Crawford's division of the Fifth corps and the firm and solid appearance of the Sixth corps. On Long¬ street's right Hood's division advanced to seize Round Top, but was repulsed by Vincent's and Weed's brigades of the Fifth corps. Vin¬ cent and Weed were killed, and Hood wounded. During the latter part of Longstreet's engage¬ ment with Sickles two of Hill's brigades as¬ sailed Hancock's line and broke it, but were soon driven back. At about the same time Hays' and Hoke's brigades of Early's division assaulted Howard's line on Cemetery Hill, but were driven back with the assistance of two regiments and Carroll's brigade of Hancock's corps. Still further on the Confederate left Johnson's division of Ewell's corps assaulted Culp's Hill, then held by Wadsworth's division of the First corps and Green's small brigade of the Twelfth corps, the rest of the corps having

been withdrawn and sent to the assistance of the left. Johnson's right, continuing the fight until late in the night, was repulsed, but his left entered, unopposed, the strong works thrown up by the Twelfth corps, and was per¬ ilously near the practically unguarded reserve artillery and ammunition train of the Army of the Potomac. Upon the return of the Twelfth corps during the night to its former position, finding it occupied, it waited until daylight be¬ fore attempting to retake it. Meanwhile John¬ son was being reinforced by three brigades, that he might hold his ground and renew his fight.

The Third Day.— The battle of the third day began by a struggle of the Twelfth corps to regain their works. At 4 a.m. the corps artillery, five batteries, opened a furious fire upon Johnson, at a range of 600 to 800 yards, other batteries followed, in the midst of which Johnson attacked the left of the Twelfth corps and the right of Wadsworth's division the combat extended to the right, was taken up by Y\ imams division, and for six hours the strug¬ gle continued, at the end of which Johnson was repulsed. At 10.25 Johnson massed his forces in column of regiments and made a determined assault upon the right of Geary's division, by which, with the assistance of Shaler's brigade, he was repulsed, and driven beyond Rock Creek with a loss of nearly 2,000 killed and wounded and three colors. At 11 o'clock the battle ceased on the Union right, with the Twelfth corps line fully re-established. There was more spectacular fighting on other parts of the field but none more desperate and bloody than on the wooded Culp s Hill. Meanwhile Lee was preparing an attack upon the left centre of Meade's army. Pickett's division had now come up, and Longstreet was directed to form a column of assault composed of Pickett's divi¬ sion, Pettigrew s division, and two brigades of Pender's division, under Trimble, of Hill's corps. To prevent Meade from reinforcing the threatened point, Stuart s cavalry was ordered to go around Meade's right and attack his rear; 135 guns were disposed on Seminary Ridge; and at 1 p.m. the signal-gun was fired, and the 135 guns opened fire to crush out all opposition at the point to be attacked; the fire was replied to by 85 Union guns, and for two hours the hills shook and the earth trembled. As soon as the Union fire slackened, the great column of attack moved forward, Pickett's division on the right and Pettigrew's on the left. Petti¬ grew was supported by the two brigades of Trimble, and Pickett by the brigades of Wilcox and Perry. Pickett and Pettigrew, at the start from Seminary Ridge, covered a front of 1,600 yards. They had 1,400 yards of open ground to traverse before reaching the Union line ; and the assaulting column numbered 14,000 men. As soon as it started, the Union artillery opened on it with shot and shell, tearing great gaps in the line; as it came nearer, canister did its deadly work; it was attacked on both flanks; and as it approached the Union line, held by Gibbons' and Hays' divisions of Hancock's corps, a flame of musketry burst forth before Which nothing could live, and the men began to retreat ; but, on the right, Armistead, com¬ manding one of Pickett's brigades, broke the .Union line, and, with less than 100 men, crossed*

the Union works and seized a gun; a short hand-tohand encounter ensued; Armistead was killed, and his small party killed or captured. Pickett saw the failure of his as¬ sault, and ordered a general retreat, after losing over 5,000 men. Wilcox's and Perry's brigades, which should have supported Pickett's right, were not prompt in starting, became grated from it and,

attacking the right of the First corps, were driven back, losing many prisoners, and the battle of Gettysburg was ended. On the Union right Gregg's cavalry division, aided by Custer's brigade, defeated otuart, after a severe fight, and thwarted his attempt on Meade's right and rear. On the left Kilpatrick, with two cavalry brigades, recklessly charged Confederate infantry in dense woods and behind stone fences, west of Round Top' in which assault General Farnsworth, command¬ ing one of his brigades, was killed. On the morning of 4 July Lee withdrew from his ad¬ vanced positions, put his trains in motion for the rear, retreated at night and, followed and harassed by the Union cavalry, reached Wil¬ liamsport on the 7th; but as the pontoon bridges had been destroyed and the Potomac had risen, he was unable to cross, and so en¬ trenched. Meade followed by a circuitous route through Frederick and, after some delay, again confronted Lee on the 13th. He was about to attack when Lee recrossed the Potomac on the night of the 14th, his rear-guard, under General Pettigrew, being attacked by Kilpatrick, during which fight Pettigrew was mortally wounded and many prisoners were taken.

Prom first to last the Union forces on the held numbered about 88,000 effective men; the

V?°nnn erate ˆorces on tlie field numbered about 73,000 men As officially reported, the Union loss was 3,072 killed, 14,497 wounded and 5 434 imssmg; aggregate of 23,003; the Confederate loss 2,59~ killed, 12,709 wounded and 5 150 missing; an aggregate of 20,451.

*Bibliography. — Alexander, (Military Mem- oirs °f a Confederate) (New York 1907) **

?p£,hieU iLltfe Gordon Meade)

(Phi adelphia 1897) ; Bates, 'Battle of Gettys¬ burgˆ ; Comte de Paris, (The Battle of Gettys- burg (Philadelphia 1912) ; Doubleday, 'Chan- cellorsville and Gettysburg) (New York 1882) ; Drake, Battle of Gettysburg) (Boston 1891) • Goodnow, The Battle of Gettysburg) (Wash- rngton 1896) ; Johnson and Bud, battles and Leaders of the Civil War} (New York 1897) • (femoirs of Robert E. Lee> (New York 1886) ; Longstreet, From Manassas to Appo-

?au01 (PTh!ladelphia 1896) ; Nicolay and Hay, Abraham Lincoln) (New York 1890) • 'Offi- Clal Records) (V°1. 27) ; Pennypacker,' < Gen¬ eral Meade> (New York 1901) ; Powell 'His¬ tory of the Fifth Army Corps); Ropes, 'The Story of the Civil War) (New York 1913) lQnme: QAmfncan Campaigns) (Washington S>Wnun' Jwflve Decisive Battles of the \Var (New York 1867) ; Walker 'Gen-

cpa i Ha£coTck> (New York 1894) ; ' White

(NewYork 1897)d the S°Uthem C°nf^racy"

„ E. A. Carman.

GETTYSBURG ADDRESS delivered by President Lincoln at the dedication of the Na-

18Ma UTiU-y at Gettysburg, Pa., 15 Nov. 1063. Of Abraham Lincoln (1809-1865) as an

orator, the last of the great anti-slavery group, it is unnecessary to speak at length. The Lincoln-Douglas debates, the Cooper Institute speech, the Gettysburg oration, and the Second Inaugural need no comment beyond the re¬ minder that the general consensus of mankind is that neither England nor America has fur¬ nished more perfect English or purer litera¬ ture than are contained in the two last-named orations.® Consult Rines, I., (The United States (Vol. IX, p. 279, New York 1916). The Gettysburg oration reads as follows :*

(

GEULINCX, He'lmks or zhe-lanks, Arnold, Dutch philosopher: b. Antwerp 1625; d. Ley¬ den 1669. He was one of the disciples of Des¬ cartes (q.v.), and a leading exponent of the speculative doctrine known as Occasionalism. For 12 years, from 1646, he lectured successfully at Louvain, was then deposed for some reason not ascertained, and, after living at Leyden in great distress, was in 1665 appointed professor of philosophy there, but died four years later. His ideas are expounded in books entitled Sat¬ urnalia ; (Logica* ; (Ethica,* published in his lifetime, and in*

GEUM, je'um, a genus of plants of the family Rosracea, distinguished from Pot entilla by the hardened hooked styles which crown the carpels, so that the fruit becomes a burr. They are perennial herbs with pinnate or pin-

natified leaves, and white, yellow or purple flowers. There are about 50 species, about 20 being found in North America. They are com¬ monly known as avens. The roots of G. rivals, purple or white avens, and of G. urbanmn have astringent and tonic properties. The latter is used for flavoring ale. Geum strictum is known as chocolate root. A few of the

species are cultivated, G. chiloense being especially or¬ namental.

GEYSERITE, ge'ser-it, or SILICEOUS SINTER, is amorphous silica containing a varying amount of water. It is white or gray¬ ish in color, and is deposited about the geysers and hot springs of Wyoming, Montana, Iceland and New Zealand as hard masses or in filament¬ ous or cauliflower-like forms, sometimes of great beauty. In the Upper Geyser Basin in the Yellowstone Park the formations of geyserites are abundant and most beautiful. The great terraces of the Mammoth Hot Springs are not geyserite, but are chiefly calcareous deposits.

GEYSERS, a name derived from an Ice¬ landic work signifying ((to burst forth with vio¬ lence,® and applied to natural springs of hot water of the kind that were first observed in Iceland, and since in Yellowstone Park in the United States and in New Zealand. They may be described as volcanoes of hot water, for they resemble volcanoes in every particular — in the vibrations of the earth and dull rumbling sounds or loud reports by which the eruptions are preceded, in the intermittence of the phe¬ nomenon, and in the form of the opening at which the eruptions take place, like an inverted cone with a deep central throat. Natural phi¬ losophers are not agreed as to the mode in which this phenomenon is to be explained.

Cleland gives the following explanation : l<(When the [geyser] tube is so long [and nar¬ row] that the water cannot circulate with rapid¬ ity, the water at some distance below the top of the tube will increase in temperature more rapidly than at the surface. Eventually the water at a depth of a number of feet will reach its boiling point with the resultant formation of bubbles of steam, which, in turn, will cause the water to spill over the edge of the opening. This overflow promotes boiling by reducing the pressure upon the water deep in the tube. As a consequence a large quantity of water, which was not quite at the boiling point because of the weight of the overlying column of water, will instantly burst into steam and will eject the overlying water from the tube, sometimes to a great height.® The best proof of the above theory lies in the fact that artificial geysers, constructed in conformity with the above idea, actually erupt periodically. In these the tube is of glass, and the steam action can be studied.

The geysers of Iceland lie about 30 miles west of Mount Hecla, and 16 miles north of the town of Skalholt, in a plain covered by hot- springs and steaming apertures. They are nearly 100 in number, and are scattered over a surface scarcely more than two square miles in extent. The two most remarkable are the Grand Geyser and the New Geyser or Strokkur (churn). The Great Geyser rises from a tun¬ nel-shaped basin, lined and edged with silicious deposits. The pipe or throat at the bottom, from which the jet issues, is about 10 feet in diameter, and the basin at its outer edge is

above 70. The emissions generally take place at intervals of six hours, and last for about five nunutes at a time. The column, as meas¬ ured by a quadrant, has been seen to rise as high as 212 feet. It is impossible to fix the age of the Great Geyser, but that its eruptions have taken place from the most remote antiquity is proved by the fact that, althcDugh there has been no sensible increase in the depth of the silicious deposit since the earliest recorded ob¬ servations, it is now more than 16 feet deep.

The geysers of Iceland, long the only ones known to exist, are surpassed by those which have been discovered in comparatively recent times in the Yellowstone National Park. The largest of them is called the Grand Geyser It begins an eruption by filling its basin With boil¬ ing water, forming a well 20 by 25 feet in dia¬ metric measurements, and having a visible depth when quiet, of 100 feet. The explosion is pre¬ ceded by clouds of steam rushing up to a height of 500 feet, the great unbroken body of water succeeds, ascending in one gigantic column to a height of 90 feet; while from the apex of the column there radiate five great jets, which shoot up to the unparalleled height of 250 feet from the ground. Among the other remarkable gey¬ sers of this district are those named Old Faith¬ ful, the Beehive, the Giant, the Giantess, etc. The number of hot-springs in the Yellowstone is not less than 1,500, all varying in times of action, force, deposits and color of water.

GEZER, an ancient city of Canaan. It is mentioned, in Josh, x, 3 and xvi, 10, in con¬ nection with King Horam. As Gaz-ri, the city is noted in the Tell-el-Amarna letters. It fell into the hands of the king of Egypt, who gave it to the king of Israel in dowry for his daugh¬ ter. In Maccabees, it is frequently mentioned as an important fortress. A palace was built there by Simon. Under Pakestina I it was made an episcopal city, called Gadara. It was also the scene of the defeat of Saladin by the Crusaders in 1177. Important excavations con¬ ducted by the Palestine Exploration Fund under the leadership of Macalister have unearthed interesting historical remains, revealing five main epochs, from the cave-dwelling period to the Canaanitish. The modern site of the citv is at Ramleh. y

GHALEB, ga-leb', the last of the great poets of the old Turkish school. His ˆHusn-u- Ashk) (Beauty and Love), written about 1800, has been called one of the finest productions of Ottoman genius.

GHAVIAL* gav'i-al. See Gavial.

GHEE, ge, or GHI, a peculiar kind of but¬ ter in use among the Hindus. It is made in the following manner : The milk when brought from the cow js poured into earthen vessels, in which it is boiled for one hour, often for two or three hours. It is then put in a cool place, and#a little curdled rnilk is added. By the next morning the whole is converted into sour curd¬ led milk. A layer of five or six inches deep is then taken off the. top of the contents of each vessel, and is put into another larger vessel, in which the whole mass is gently stirred for half an hour with a split bamboo-cane. A little warm water is then added, and the stirring is continued for another half-hour, when the but¬ ter begins to form. After being kept for three

days — a period long enough for the butter to become rancid in so hot a climate — it is melted in another earthen vessel and boiled until all the water it contains is evaporated. A. little more curdled milk is then added, along with some salt or betel-leaves, and the butter, which is now ready, is then put in pots, in which it is kept till required. In this state it will keep for a long time, being sometimes used a year after it is made. This butter has naturally a very strong taste, _ insupportable to a European stomach, but it is in general use among the Hindus who are rich enough to buy it and is an important article of commerce.

GHENT, gent, Belgium (French, Gand; Flemish, Gend or Gent), capital of the province of East Flanders, at the confluence of the Lys with the Scheldt. It is upward of eight miles in circumference, and is -divided by canals into a number of islands connected with each other by bridges, of which there are about 200. Ex¬ cept in some of the older parts, it is well built, and has a number of fine promenades and many notable buildings. Among the latter are the cathedral of Saint Bavon, the crypt of which dates from the 10th century; the church of Saint Nicholas, the oldest in Ghent; the church of Saint Michael, with a celebrated Crucifixion by Van Dyck; the university (q.v.), a hand¬ some modern structure, with a library of about 350,000 volumes and 700 manuscripts; the bel¬ fry, a lofty square tower surmounted by a gilded dragon, and containing chimes of 44 bells; the Marche du Vendredi, an extensive square, interesting as the scene of many im¬ portant historical events; the town hall; Palais de Justice; Institute des Sciences; and Les Beguinages, extensiye nunneries founded in the 13th century, the principal occupation of whose members is lace-making. Ghent has long been celebrated as a manufacturing town, especially for its cotton and linen goods and lace. Other industries of importance are sugar-refining, hosiery, thread, ribbons, instruments in steel, carriages, paper, hats, delftware and tobacco!

I here are also machine works, engine factories roperies, tanneries, breweries and distilleries'

I he trade is very important. A canal connects it with the Scheldt at Terneuzen. Another canal connects the Lys with the canal from Bruges to Ostend. Ghent was mentioned as a town in the 7th century. In the 9th century Baldwin, the first Count of Flanders, built a fortress here against the Normans. Under the counts of Flanders, Ghent continued to increase I wo great revolts took place under the leader¬ ship of the Van Arteveldes (1338 and 1369) against Burgundy, and again in the 16th cen- tury against Charles V, and the citizens of Ghent, besides losing their privileges, had to pay for the erection of a citadel intended to keep them in bondage. In 1792 the Netherlands tell under the power of France, and Ghent be¬ came the capital of the department of Escaut (Scheldt). In 1814 it became, along with Flan¬ ders, part of the Netherlands, till the separa¬ tion of Belgium and Holland. Ghent fell into German occupation after the fall of Antwerp in 1914. Pop. 167,477. P

GHENT, Treaty of (24 Dec. 1814), the treaty which closed the War of 1812. The British advantage was enormous; the war had been discreditable and rather disastrous to

GEYSER

Old Faithful Geyser, in Yellowstone Park

America on land, half paralyzed as that country was by incompetent administration and dissen¬ sions among the States, while even the fleet had not maintained its early triumphs; the over- 1 Napoleon had let loose a mighty army,

and had Great Britain persevered she might almost have exacted her own terms. But the British were tired of the burdens of a 20-years war, and the ministers were anxious to have done with fighting and settle down to peace; and American privateers and the American navy were playing havoc with their commerce, lo our good fortune, also, the British sent third-rate negotiators to Ghent — Lord Gambier, Henry Goulburn and William Adams. Amer¬ ica, on the other hand, sent some of the strong¬ est men in the country: John Quincy Adams, James A. Bayard, Henry Clay, Jonathan Rus¬ sell and Albert Gallatin.

In 1813, when Russia offered mediation, Bayard and Gallatin went to Saint Petersburg to negotiate, but England at that time refused the offer. Their instructions had included an article against impressment; but as it was notorious that the Napoleonic wars alone made this a practical

question, and those were now ended, the government allowed them to waive that point. The British claims at first set up were extravagant and untenable: the establish¬ ment of the boundary fixed by the Indian Treaty of Greenville in 1795 (see Greenville, Treaty of), as a permanent line beyond which neither party should acquire territory, thus cut¬ ting off the entire Northwest from the United States; the cession of the mouth of the Niagara and Sackett's Harbor, in New York, prohibit¬ ing the United States from keeping land or naval forces on the Lakes; and allowing free navigation of the Mississippi to England. Finally the prolonged negotiations of the entire autumn and early winter ended in this treaty, which was scarcely more than an agreement to cease hostilities and settle the disputed questions at some other time. The questions of impress¬ ment, on which the war had been opened; of the extent of the right of blockade; of the American right to fish in British waters ; of the British navigation of the Mississippi; and trade with the Indians; of the armaments on the Lakes; of the American claim for British spo¬ liations — all were silently passed over. The treaty, as ratified 17 Feb. 1815, and proclaimed on the 18th, restored the status quo of terri¬ torial possessions except some islands in Pas- samaquoddy Bay; public or private property in the surrendered places not to be destroyed or removed; a commission was appointed to decide on the ownership of the islands above, the matter to be referred to arbitration if they failed to agree; and other commissions to settle the boundaries provided in the Treaty of Paris (1783) — from the Saint Croix to the Saint Lawrence at lat. 45° N., thence to Lake Su¬ perior, and from Saint Mary's River to the Lake of the Woods. The last article binds both parties to use their best endeavors to suppress the slave trade. The centenary of the signing of the Treaty of Ghent was the occasion of representative gatherings and of mutual felicita¬ tions on the part of the United States and Great Britain and Canada. Consult Adams, H., (The United States) (Vol, VII, chaps. 4 and 14,

1891).

GHENT, University of, Belgium, founded 1816 by William I of Holland. In 1820 an old Jesuit college was remodeled for its use. V&rL ous other schools have been merged into the university. ˆThere Wete in 1913 1,253 students, of whom 272 were foreigners. The institution is maintained by the state, which supports a combined library of city and university/ confin¬ ing over 350,000 volumes.

GHERAKpi, ga-rar'de, Bancroft, Amer¬ ican naval officer: b. Jackson, La., 10 Nov. 1832 ; d. Stratford, Conn., 10 Dec. 1903. He en¬ tered the navy in 1846, and was at the Naval Academy in 1852. He was lieutenant on the Lancaster of the Pacific squadron at the com¬ mencement of the Civil War, and in 1862 was made lieutenant-commander. During the war he

commanded the Chocorua and the Part Royal, being on the latter vessel in the battle of Mobile Bay, in which he was distinguished for bravery and gallantry. He became rear- admiral in 1887 ; was commandant of fhfi Brooklyn navy yard in 1887; commanded the North Atlantic squadron; and directed the Columbian naval review in New York Harbor in 1893. He retired in 1894.

GHETTO, get'o, a Jewish quarter in large' cities. The ghetto of Rome, instituted in 1556 by Pope Paul IV, was removed in 1885, its demolition having been rendered necessary by the new Tiber embankment. The ghetto in New York is one of the largest and most densely populated in the world. In a single tenement building are housed as many as 600 persons and a single city block or square con¬ tains 3,000 to 5,000 inhabitants. The majority of these people are employees of the sweat¬ shops. The ghetto in Prague (q.v.) is a noteworthy section of that ancient city. We mention also London's Jewry and similar quar¬ ters in the wealthy cities in northern Italy which (both cities and quarters) were more prominent in Renaissance days than in the cen¬ turies that followed.

GHIBELLINES, gib'e-lmz, Italian political party of the 12th to the 15th centuries. On the death of Lothaire II, Emperor of Germany, 4 Dec. 1137, Conrad, Duke of Franconia and Lord of Weiblingen (which by corruption became Ghibelline), was elected his successor. His right to the imperial throne was, however, dis¬ puted by Henry the Proud, Duke of Saxony and Bavaria, who was in consequence declared an outlaw and shortly afterward died. His ad¬ herents transferred their allegiance to his son, Henry the Lion, at that time a boy of 10, and the whole empire was divided into the parti¬ sans of Conrad, who assumed the name of Ghibellines, and those of Henry, or the Guelphs. , These titles were first used at the battle of Weinsberg in 1140. The strife between the two parties subsided in Germany, but continued in Italy, resulting in war in 1159. The supporters of the popes were termed Guelphs and those of thq emperors Ghibellines. Charles of Anjou expelled the Ghibellines from Italy in 1268; but the contest between the two factions continued till the French invasion in 1495 united them against a common enemy. See Guelphs.*

GHIBERTI, ge-ber'te, Lorenzo, Italian

sculptor: b. Florence about 1378; d. there, 1 Dec. 1455. He early learned from his step-

father, Bartoluccio, an expert goldsmith, the arts of drawing and modeling, and that of cast¬ ing metals. He was engaged in painting in fresco at Rimini, in the palace of Prince Pan- dolfo Malatesta, when the priori of the society of merchants at Florence invited artists to propose models for one of the bronze doors of the baptistery of San Giovanni. The offering up of Isaac was to be executed in gilt bronze, as a specimen of the work. The judges selected the works of Donatello and Ghiberti as the best, but the former voluntarily withdrew his claims, giving the preference to Ghiberti. After 21 years' labor (1403-24) Ghiberti completed the door, and, at the request of the priori, executed a second, which occupied him from 1425-52. Michelangelo said of these, that they were worthy of adorning the entrance to paradise. During these 40 years Ghiberti also completed many other important designs, such as the bronze reliquary of Saint Zenobius, the sepul¬ chral monuments of Dati and pf the Abruzzi. The dryness of the school of Giotto appears in his early works; the later are in imitation of the Greeks, and are marked by continually in¬ creasing vigor and firmness. The reliquary and the baptistery doors of San Giovanni are, to this day, among the finest specimens of art in modern Italy. His work is inspired by the deepest religious feeling, and he succeeded in breaking down the narrow conventionalism that hampered the sculptor's art up to his time. Ghiberti also executed some excellent paintings on glass for the churches of Or San Michele and Santa Maria del Fiore. His (Commen- tarii,) a work on Florentine art, is still pre¬ served in MS. Consult Freeman, Utalian Sculpture of the Renaissance) (London 1901) ; Perkins, 'History of Tuscan Sculpture) (Vol' l> London 1867) ; Scott, L„ < Ghiberti and Donatello (London 1882) ; Vasari,*

*GHIL, zhel, Rene, French poet: b. Tour- coing, department du Nord, of Spanish parent¬ age, 26 Sept. 1862. He made his literary debut in 1884 with a volume of poems entitled 'Legendes d'ames et de sang, * which he after¬ ward disowned. He claimed for himself the title of "Maitre de l'lnstrumentation et de la Philosophic evolutive,® and expounded his principles in a 'Traite du verbe,* which ran into several editions. Not the least feature of his strange originality is the choice of titles for his books: 'Nature: I, Le Meilleur devenir; II, Le geste ingenu.)*

GHIRLANDAJO, ger-lan-da'yo, II (orig¬ inally Domenico Bigordi), Italian painter: b. Florence, 1449; d. there, 11 Jan. 1494. There were three brothers of this name (Davide,

' Benedetto and Domenico) among Italian art¬ ists of the 15th century, and Domenico was the greatest . of the three. The great works on which his fame rests were painted in 11 pro¬ ductive years. He was thoroughly original and independent in his style and while he lived just after Masaccio and just before Michel¬ angelo, he was distinct from either. He was skilful

*in portraiture and his large frescoes of religious subjects are historically interesting from the fact that he introduced as spectators of the incidents portrayed the figures of dis¬ tinguished Florentines of his dav. His great fresco of 'The Calling of Peter and Andrew**

in the Sistine Chapel at Rome is much ad¬ mired, and in his 'Last Supper at Papiguano he has introduced the portrait of Amerigo Ves¬ pucci. His finest work is the 'History of Saint Francis) in the church of the Trinity at Flor¬ ence. He was also a skilful worker in mosaics, which he called ((painting for eternity.® He died of the plague in his 45th year and was buried in Sta. Maria Novella, in Florence. Consult Vasari, (Lives of the Painters) (10 vols., New York 1912) ; Crowe and Cavalcaselli, 'History of Painting in Italy* (London 1903).*

GHOST DANCE, a religious ceremony which originated among the Piute Indians in Nevada about 1889, so named from the fact that the dancers wear a white robe over their ordinary dress. It was the outcome of a re¬ ligious belief which maintained that a messiah was soon to appear, who would rid the land of the white man and restore to the Indians all their rights. A Piute Indian named Wovoka, a native of Mason Valley, Walker Lake, Nev., and known among the whites as "Jack Wilson,® while in the delirium of fever claimed to be this savior and obtained a marvelous influence over not only his own tribes, but also all the Indians from the Missouri River to the Rockies. His teachings were very much the same as those of modern Spiritualists, he promising to procure them communication with the spirits of deceased friends. He advocated peace and refused to allow any references in their cere¬ monies to warlike subjects. The ghost dance is held at night, men and women joining hands and circling around, singing the ghost songs, which are principally chants in 'the form of messages from their spirit friends. Sometimes the > participants appear to fall into a trance, during which they are supposed to commune with residents of the other world. The Sioux outbreak of 1890-01 was due indirectly to the ceremonies of this dance and the United States government sought to suppress it. Since that time no trouble has arisen, partly through the failure of Wovoke's prophecies to materialize at the scheduled time, but the dance is still prac¬ tised by the Indians. (See Indians). Consult Worney, J., (Washington 1896).

GHOSTS. The belief that the spirits of the departed are occasionally presented to the sight of the living has existed in all ages and countries, and usually declines only when a people has advanced considerably in the knowl¬ edge of physical conditions and laws. We can understand the inability of the primitive man and the savage to realize death. The memory of the deceased lends power to call up his ap¬ pearance. The primitive man does not observe accurately the distinction between fact and fancy —

between what is seen in dream and what is seen in reality. (See Dreams). The belief that man has a soul capable of existing apart from the body to which it belongs, and continuing to live, for a time at least, after that body is dead and buried, fits perfectly in such a mind with the fact that the shadowy forms of men and women do appear to others, when the men and women themselves are at a distance, and after they are dead. We call these appari¬ tions dreams or fantasms, according as the person to whom they appear is asleep or awake • and when we hear of their occurrence in ordi-

nary life, set them down as subjective proc¬ esses of the mind. Among the less civilized races, the separation of subjective and objective impressions, which in this, as in several other matters, makes the most important difference between the educated man and the savage, is much less fully carried out. The Dyaks regard dreams as actual occurrences ; and many savage races believe that dreams are incidents which happen to the spirit when it is wandering from the body. In sleep, the soul is supposed to leave the body and travel about. The man who fancies he sees at night the figure of a friend, or of an enemy, supposes he sees this dreamer's wandering soul. Among primitive races there is a superstitious objection to rousing a sleeper, lest he should awake before his soul has had time to return to the body. Death is regarded as another form of sleep; and during that sleep the spirit is wandering, and when wandering, may be met. See Sleep.

Witchcraft, necromancy, has always been in¬ timately connected with the spirits of the dead, and this is regarded as the parent of all re¬ ligious worship. The savage man fears the dead and seeks to propitiate them, and gradu¬ ally forgets that the ghosts are those of an¬ cestors, and considers them as demons, a sepa¬ rate order of spirits ; and, as he advances in intelligence, these demons cease to be altogether demoniacal, and become gods. Be that as it may, it is certain that the propitiation and even worship of the dead has formed an integral part of all primitive religions, and has main¬ tained its hold among the more ignorant after it has ceased to affect the more educated.

The fear of seeing something often so daz¬ zles and bewilders the visual organ that it sees the things that were feared. This accounts for many stories of the sight of apparitions in haunted houses. A crime is supposed to have been committed in some old house, and the superstitious believe that the spirit of the mur¬ derer or of the murdered person cannot rest. Whoever is nervous and timid, and visits this house at night, is predisposed to see the wander¬ ing spirit, and the fear that is present deprives the

judgment of its power of taking accurate observations of what really is seen, and so superinduces a lax condition which is ready to be deceived. There may be conditions of body which allow, of a sight beyond what is given to most, as it is certain that beasts see and scent and hear what our own faculties fail to per¬ ceive. But what we insist on is, that the great¬ est caution should be exercised in receiving stories of apparitions, and the utmost care taken to investigate every case of apparent spiritual manifestation. Before we can admit that there are genuine cases of ghosts having been seen, we must be satisfied that the ob¬ server was in full possession of his faculties, that his attention was on the alert, that he was capable of judging between subjective and ob¬ jective presentments, and that he was healthy in mind and body.

In 1882 a Society for Psychical Research was founded in London for the scientific and systematic investigation of reported apparitions, clairvoyance, haunted houses, hypnotism, thought-reading and spiritualistic phenomena; it publishes regular reports of its investigations.

The subject of ghosts is treated from other and various viewpoints under Apparition, (See

also Spiritualism; Witchcraft). Consult Brewster (Natural Magic' (1832); Ingram,

Haunted Houses' (1884) ; Jastrow, (Ghostly Phenomena' (1910) ; Myers, 'Phantasms of the Living' (1886); Owen, 'The Debatable Land' (1°'4) ; Spencer, 'Principles of Sociology' (1885) ; Stead, 'Real Ghost Stories' (1891).

GˆpSTS. As early as November 1880, when Ibsen was living in Rome, he was medi¬ tating on a new play to follow 'A Doll's House.' When he went to Sorrento, in the summer of 1881, he was hard at work upon it. It was finished by the end of November 1881, and, soon after its publication, Ibsen was deluged with letters from people decrying or commending it.

There were many lines in 'A Doll's House' which might be taken as indication of what the new play would be. Instead of the general query, "Did Nora return to her children"? the stress should have been laid on the problem of what would have happened to Nora's chil¬ dren had she and Helmer persisted in living the life they were accustomed to — a life of lies and subterfuges. The moral rottenness of Oswald Alving, his degenerate relationship with Regina, the serving maid, who proves to be in the end his half-sister, are the direct product of the moral unsavoriness of Captain Alving, whose past life has been covered through the moral smugness of his wife, acting under the advice of the conventional minister, Pastor Manders.

If Dr. Rank, in 'A Doll's House,' was suffering from the sins of his fathers, Oswald Alving is the product of the moral de¬ generacy of his father and the moral weakness of his mother. Thus, Ibsen's 'Ghosts' be¬ comes an answer to the question whether Nora had a right to leave her children when she did.

It was not an edifying canvas that Ibsen selected for his play, nor did he mean to have it so. What he sought to do was to show the gradual development of Mrs. Alving to that point where she reacts against the spiritual con¬ ventionality of Manders, and refuses any longer to respect or protect the memory of her hus¬ band, whose life was to have such an evil effect upon Oswald's physical and moral character. When, finally, in a revolting scene between Oswald and Regina, suggesting in its degen¬ eracy what must have taken place between Captain Alving and Regina's mother, we at last get the awakening of Mrs. Alving to the unsound foundation upon which her family life had been resting all these years, Mrs. Alving's regeneration, we know, has come too late. The canker-worm eats inwardly and un¬ dermines the whole physical side of Oswald. The play ends in a most tragic manner, and yet the only way in which the play could end. Oswald's imbecility, which falls upon him as the moral atmosphere begins to clear, is the just retribution, and technically, as far as Ib¬ sen's own art is concerned, produces one of the most remarkable instances of heredity tak¬ ing the place of Greek Fate in its tragical workings.

The stage history of 'Ghosts,' since its first performance at Helsingborg, on 22 Aug. 1883, is varied in its continual progress. It was not given in London until 13 March 1891, at J. T. Grein's Independent Theatre, it having been held in check by the censor. "England," writes

William Archer, (may not be publicly acted.® It was first produced in New York on 5 Jan. 1894, and by the New York Independent Theatre, in 1899, with Miss Mary Shaw as Mrs. Alving. In 1895-96 Madame Nazimova, with Paul Orleneff, gave a notable production of (Ghosts) in a small room in the lower East side. When Nazimova was a student in Russia She wanted to "play Regina for my graduation piece at the dramatic school at Moscow, but they would not let me.

Montrose J. Moses.

GHURI, goo're, an Asiatic dynasty who had the seat of their empire in the country of Ghur, and ruled over Persia, Afghanistan, northern Hindustan

and Transoxiana. Ghur first appears in history in connection with Mah¬ mud of Ghazni and his son Masaud, the latter of whom subjugated the region in 1020. About a century later Malik Izzuddin made himself ruler of all the Ghur country. His son, Alaud- din Jahansoz (the Burner), fell upon Ghazni, and burned it to the ground. This prince's nephews, Ghiyassuddin and Muizuddin, estab¬ lished their power in Khorasan and Ghazni. The latter, crossing the Indus, then conquered successively the province of Multan (1176), La¬ hore (1186), and Ajmere (1190), and, in the course of the next six years all Hindustan as far south as Nagpur and east of the Irawaddy. On the death of Muizzuddin the Indian states asserted their independence, the power of the Ghuri being confined to Ghur, Seistan and Herat. This last feeble remnant was taken from them by the Shah of Kharezm about 1215. Some 30 years later the Ghur princes managed to revive something of their former power at Herat, which they retained by sufferance from the Mongols down to 1383, when the city was captured by Timur, and the Ghur sovereignty came to an end.

GHURKAS, goor'kaz, GURKAHS, or GOORKHAS, a tribe of northern India, named from the village of Ghurkas in Nepal, formerly the capital of the Ghurkas, before the formation of the present kingdom of Nepal. The Ghurkas are the mountaineers of Nepal, and speak a Sanskritic language. The Mohamme¬ dans drove them out of Rajputana and they migrated to Nepal, of which they took posses¬ sion in 1768. When the English first invaded India the Ghurkas were formidable opponents, but are now most friendly. A large number of them are in the Anglo-Indian army, chiefly in the infantry, as they have no regard for the cavalry service. Besides their rifle they carry a formidable short-bent sword called a koorkree, with the edge on the inside of the bend, with which at close quarters they do dreadful execu¬ tion. See Nepal.

GIACOMOTTI, zha'ka'mo'te', Felix Henri, French artist: b. Quingey, Doubs, 19 Nov. 1828; d. 1909. He was a pupil of Picot at the Beaux-Arts, Paris ; obtained the Grand Prix de Rome in 1854 ; established his studio in Paris in 1861, and painted numerous subjects from mythology, religious works and portraits. Among his canvases are (Centaur and Nymph) ; 'Christ Teaching in the Temple^ ;

(The Mount of Calvary.) He also executed a fresco for the ceiling of one of the salons of the Luxembourg representing the apotheosis of Rubens and paintings.

GIACOSA, Giuseppe, Italian dramatist: b. Colleretto Parella, Piedmont, 21 Oct. 1847 ; d. 2 Sept. 1906. His father, a distinguished lawyer and magistrate, destined him early for the bar, but an early dramatic attempt, 'Una partita a scacchP (A Game of Chess), writ¬ ten in 1871 for private

amateur performance, was so successful that it induced the young lawyer to seek a career in literature and the theatre. Giacosa's work as a dramatist may be roughly divided into three periods. His early plays, 'Una partita a scacchiP 'Trionfo d'amore (Triumph of Love, 1875), are romantic comedies in verse, dreamy dramatic legends of the Val d'Aosto of the 14th century. These were followed in 1877 by (I1 Fratello d'armP (Brothers at Arms), a romantic drama in four acts. In the. subsequent plays, while the plots are still laid in mediaeval Piedmont, the author changes from the rhymed Martelliani of the comedies to an. unrhymed hendecasyllable and turns to historical melodrama, a transitional step toward the more modern realism of his later works. This is the period of HI Conte Rosso) (The Red Count), 'Luisa* (1881) and 'The Lady of Challant,* the last written for Sarah Bernhardt and first produced by the French actress in America. With (Tristi AmorP (Hapless Love) the healthy romanticism of Giacosa's early manner is abandoned for the modern social drama. Writing now in prose only, Giacosa interests himself in the conflict between idealism and various aspects of bour¬ geois materialism. In the powerful domestic triangle of 'Tristi AmorP (1888) and in the one-act (Diritti dell' anima* (The Rights of the Soul, 1894), an Italian counterpart of Ib¬ sen's .'A Doll's House,* the influence of the Scandinavian dramatist is apparent. 'Come le foglie) (Like Falling Leaves, 1900), a pitiless study of the disintegration of an Italian family, is a great modern play, and with 'Tristi AmorP represents the author at his best. Giacosa's last play, (I1 piu forte > (The Stronger), pro¬ duced in 1905, portrays the struggle between the antagonistic ideals of father and son. In addition to his work as a dramatist, Giacosa wrote in collaboration with Luigi Illica the libretti for Puccini's three operas, 'La Bo- heme, > (Tosca> and 'Madame Butterfly. > He founded La Lettura in 1901, which magazine he directed until his death, 2 Sept. 1906. He was also the author of historical works, essays and short stories, among which 'Castelli Valdos- tani e Canavesi* (1898), 'Novelle e paesi val- dostanP (1886), 'Impressioni d'America) (1898) are the most noted for their penetrating observation and for their clearness and vigor of thought. Consult Updegraff, A. and E., 'Three Plays by Giuseppe Giacosa) (New York 1913) ; Trombley, A. E., 'Unhappy Love) (Boston 1916) ; and translations in The Drama (Chi¬ cago 1911 and 1913). On the author see Oietti, U., in the 'Nuova Antologia* (November 1906); Croce, B., in La Critica (Vol. VI) ; and Smith, S. A., in The Drama (May 1913).*

Alfred G. Panaroni.

GIANT CELLS, in pathology, a form of large cells many times the size of the cells of

£he body with which they are associated. They very frequently have a large number of nuclei, sometimes as many as 100 or more. It is sup¬ posed that giant cells originate from a lack of cell-division, rather than by a coalescence of a number of small cells. Many giant cells are found in the neighborhood of active growing tissue, associated with infectious disease proc¬ esses, such as tuberculosis and carcinoma. It is thought that the function of giant cells is protective.

GIANTS, persons or races of extraordi¬ nary stature. History, both sacred and pro¬ fane, makes mention of giants. The first mention of giants in the Bible is in Gen. vi, 4, where the Hebrew word used is nephilim, a word which occurs in only one other passage, where it is applied to the sons of Anak, who dwelt about Hebron, and who were described by the terrified spies as of such size that compared with them they appeared in their own sight as grass¬ hoppers. A race of giants called the Rephaim is frequently mentioned in the Bible. In Gen. xiv, 5, and xv, 20, they appear as a distinct tribe, holding possessions in Canaan. At the period of the conquest of Canaan, Og, king of Bas'han, who had a bedstead nine cubits long, is said to have remained alone of this tribe, but this must be taken to mean alone on the east side of Jordan; for giants, who were probably of the same stock, are subsequently mentioned as living about Mount Ephraim (Jos. xvii, 15) and among the Philistines (2 Sam. xxi, 18). Goliath, who measured six cubits and a span, and who was slain by David, is the most cele¬ brated of the giants mentioned as living among the Philistines. The other races of giants who are mentioned in the Bible (besides the sons of Anak already referred to) are the Bmim, who occupied the country afterward held by the Moabites, and the Zuzim (a branch of the Rephaim), who lived on the east side of the Jordan, between the Arnon and the Jabbok. In Deut. ii, 20, they are said to have been called by the Ammonites, who conquered them, Zam- zummim.

The giants of Greek mythology are believed by some to represent the struggle of the ele¬ ments of nature against the gods, that is, against the order of creation. They were said to have sprung from the blood of Uranus, which fell into the lap of Ge (the earth). Their mother, indignant at the banishment of the Titans into Tartarus, excited them to revolt against the gods. They hurled mountains and forests against Olympus, disdaining the lightnings of Zeus. An oracle having declared that the gods could not conquer except by the assistance of a mortal, Athene called Heracles to their aid. He slew Alcyoneus and Porphyrion, the most formidable of the giants. Apollo and Heracles shot out the eyes of Ephialtes; Dionysus slew Eurytus with his thyrsus ; Hecate and Hephae¬ stus killed Clytius with clubs of hot iron; Po¬ seidon hurled a part of the island of Cos on

Polybotes ; Athene buried Enceladus under the island of Sicily and flayed Pallas and made a shield of his skin. The remainder perished under the hands of other deities by the thun¬ derbolts of Jupiter or the arrows of Heracles. This fable perhaps indicates volcanic eruptions, for which the Phlegraean fields, where the chief

scene of this struggle is placed and where the two principal giants were born, were remark¬ able. Cos and Sicily, which figure in this fable, are also volcanic. Ovid has described the war of the giants in the beginning of his (Metamor¬ phoses. }

Giants figure largely in Celtic and – Scandi¬ navian mythology and legends. In the- legends of the Irish there are the two giants, Fingall or Finn MacCumhal and his son Ossian. The giants of the Welsh are familiar to everyone through the achievements of Jack the Giant Killer, the representative of the Scandinavian Thor, the destroyer of Skrimmer, and the Swiss giants.

Giants are rarer in occurrence than dwarfs, and like them and other abnormalities are fre¬ quently sterile. They are generally of a lym¬ phatic temperament and are seldom long-lived. Legends and traditions that have been handed down of giant races having inhabited the earth in remote and prehistoric times have been dis¬ counted by scientific investigation, though fos¬ sil bones, which may be those of mastodons or mammoths, have been mistaken for those of giants. On the other hand, the belief that primaeval man was of a dwarfish stature and that races of pigmies now existing represent the sur¬ vival of the earliest are equally unfounded.

The following are regarded as in the main authentic instances of giant stature: In the time of Augustus there were to be seen in the Horti Sallustiani at Rome, the bodies of a giant, Posio, and a giantess, Secundilla, each 10 feet 3 inches high. In the reign of Claudius, an Arabian giant named Gabbaras, 9 feet 4 inches high, was exhibited at Rome. The Emperor Maximin, a Thracian, was nearly 9 feet high. A Jewish giant, about 10 feet high, is men¬ tioned by Josephus. Long Mores, an Irish giant, of the time of Edward III, was 6 feet 10jˆ inches high. Queen Elizabeth's Flemish porter was 7 feet 6 inches ; and J. Middleton, or the Child of Hale, born in 1578, attained the height of 9 feet 3 inches. C. Munster, a yeo¬ man of the guard in Hanover, who died in 1676, was 8 feet 6 inches high ; and Cajanus, a Swedish giant, about 9 feet high, exhibited in London in 1742. C. Byrne, who died in 1783, at¬ tained the height of 8 feet 4 inches ; and Patrick Cotter O'Brien, a native of Kinsale, who lived about the same time, was 8 feet 7jˆ inches.' In 1884 died Pauline Wedde (called Marian), a German giantee, over 8 feet 2 inches at the age of 18; and in 1887 Josef Winkelmaier, an Aus¬ trian, 8 feet 9 inches, aged 22. Anna Swan, a

native of Nova Scotia, above 8 feet high; her husband, Captain Bates, a native of Kentucky, of the same height ; Chang-wu-gon, the Chinese giant, 7 feet 9 inches high; and Feeder Ma- chow, a Russian, 7 feet 9 inches, are other in¬ stances.

GIANT'S CAUSEWAY, Ireland (deriv¬ ing its name from a legend that it was the com¬ mencement of a road to be constructed by giants across the channel to Scotland), a nat¬ ural pier or mole of columnar basalt, project¬ ing from the north coast of Antrim, Ireland, into the North Channel, seven miles northeast of Portrush. It is part of an overlying mass of basalt from 300 to 500 feet in thickness, which covers almost the whole country of Antrim and the eastern part of Londonderry. It is exposed

for 300 yards and exhibits an unequal pave¬ ment formed of the tops of 40,000 vertical closely-fitting polygonal columns, which in shape are chiefly hexagonal. The diameter of the pillars varies from 15 to 20 inches. Each pillar is divided into joints of unequal length the. concave hollow at the end of one division fitting exactly into the convex projection of the other. The rock is compact and homogeneous and is somewhat sonorous when struck with a hammer. The Giant's Causeway is itself formed of three causeways, the Little, Mid¬ dle or Honeycomb and the Grand Causeway. Un the Little Causeway may be seen an octa¬ gon pentagon, hexagon and heptagon all to- gether ; on the Middle Causeway is the famous Wishing Chair, with two arms and a back, on a platform where the columns rise to a height of about 10 feet. On the Grand Causeway are pointed out the Lady's Fan, an exact arrange¬ ment of five perfect pentagons surrounding a heptagon; the keystone of the Causeway — a sunk octagon ; and the single triangle. At the starting point is the Giant's Loom, an imposing row of columns, 30 feet high, each intersected PX ii °ut joints; to the left is the Giant's Well, to the right the Giant's Chair. An elec¬ tric tramway connects Portrush with the Giant s Causeway.

GIBARA, ge-ba'ra, Cuba, a seaport on the northern coast of Santiago province. It has a fine harbor protected by a fort at the entrance.

1 here is a military hospital here. The district is rich in timber ; coffee, sugar and tobacco are among its products. Pop. 6,841.*

CHI3I3ILS, Robert Wilson, American scien-

sman,? rSl°ni? : £harJeston' S. C, 8 July

1809; d. Columbia, S. C., 15 Oct. 1866. He was

graduated from South Carolina College (Co¬ lumbia) in 1827, from the Medical College of

i i c Car°lma . (charlest°n) in 1830. In loZ/ 35 was assistant professor of chemistry

geo ogy and mineralogy in the South Carolina Gollege, in 1852-60 was a newspaper editor at Columbia and in the Civil War was surgeon- general of South Carolina. His contributions to science appeared in the (JournaP of the Academy of Natural Science and other learned publications. His paper on (Typhoid Pneu¬ monia' (American Journal of the Medical Sciences, 1842) was the first to urge the substi¬ tution of stimulants for the knife in the treat¬ ment of that disease. He published docu¬ mentary History of the American Revolution'

(3 vols., 1853-57).

. GIBBET, jibet, a gallows, formerly in use in certain European countries, on which the bodies of criminals who had been guilty of par¬ ticularly atrocious crimes were suspended after execution, encased in an iron frame near the spot where the crime was committed.

. GIBBON, gi bon, Edward, English histo¬ ry b- Putney, Surrey, 27 April O. S. (8 May) 1737; d. London, 16 Jan. 1794. He was the eld¬ est son of Edward Gibbon and Judith Porten . e family was originally Kentish, and Gibbon gives some extended account of its origin in hi< = justly celebrated < Memoirs.' He there erred however, as he suspected before the close of JJ.1 ,llfe* ,irL facing the connection to Robert Gibbon of Rolvenden. He was really descended Horn Thomas Gibbon of West Cliffe, a younger branch of the family. It is significant that the*

arms of the younger branch, rather than that of the Rolvenden Gibbons, appears on the Gib¬ bon bookplate, perhaps one that his father had used before him.

Gibbon's father was a care-free pleasure- loving gentleman. He married against his father s wishes and lost thereby a large share of an ample fortune. He lost still more in the expensive pleasures of the mid-18th century in which he took a too active part. His public life was limited to sittings in two Parliaments t jry' and to an aldermanship of the city of London for a few months. After some 10 years of married life Gibbon's mother died and his father, deeply mourning his loss, but also deeply in debt, retired to Buriton and the quiet life of a secluded country gentleman.

Gibbon's grandfather was a man of more force of character. The son of Matthew Gib¬ bon, linen-draper of London, he became an un¬ usually successful business man. He contracted to clothe King William's troops in Flanders. He was made one of the commissioners of cus¬ toms and was commended by Lord Bolingbroke for his exceptional knowledge of the trade of England. He became a director of the ill- starred South Sea Company, only to lose the labors of 30 years in the crash of 1720. Yet before fus death, 16 years later, he amassed an- other fortune, almost, if not quite, as large as the first.

The future historian was a sickly child whose life was often despaired of. The famous prac¬ titioners of the time were frequently called to attend ? him. Fortunately, in addition to a mothers care, he had the loving devotion of her maiden sister Catherine, to whom he ac¬ knowledges that he owed his life. He was taught at home, partly by a domestic tutor until almost nine, when he was sent to the school of Dr. Wooddeson at Kingston-upon-lhames. Here he remained some two years "reviled and buffeted" as a Tory, yet gaining an elementary knowledge of Latin «at the ex¬ pense of many tears and some blood » But the precocious boy was gaining more from his early and invincible love of reading » which

ruanStenOfTgeb by hiS ,CuItLvated and judicious aunt. Of her he says, she was (

0 ± mind as well as of my health " He thus read Popes the (Arabian Nights' Drydens (Virgil,' Ovid's < Metamorphoses ' besides many English pages of poetry and ro¬ mance, of history and travels." Gibbon was next sent to Westminster School, which his father had attended before him. This was the etisier because his aunt, who had been left de-

fnnWb by th? bankrYPtcy of her father, now took charge of one of the homes for the boys

and could still care for him. Yet his bodilv afflictions sadly interfered with his studies He

hnL»nily tfan.sf.erred to Bath and then to the louse of a physician at Winchester. In his 15th

yeˆF PlbbonrS beaIdl wonderfully improved and after a few ineffective weeks in the home

of Rev. Philip Francis at Esher, Surrey, he was quickly transferred to Oxford, where he be-

fe ™in Aprils C°mmoner of MaSdalen Col¬ in before this time the genius of

the fu-

ture historian had asserted itself in the char- acter of his reading. Some 20 volumes octavo ° a . uitversal History' were devoured by the mere boy as they appeared. He then took up

GIBBON

ddo

individual work on ancient or modern times, ranging through a vast number with great ra¬ pidity. It was Echard's (Roman History > that hrst led him to the period he was later to make his own. From this he extended his reading to the mediaeval age of Europe and, before he was 16, had exhausted all English sources in his favorite field. While he was yet to make himself the authoritative scholar, he already showed that marvelous ability in acquiring his¬ torical knowledge that marked his later man¬ hood.

This remarkable self-education may be em¬ phasized the more because Gibbon was soon to experience the inadequacy of university train¬ ing in his time. He entered Oxford before he wyas 15 years old. Yet he soon found that reg¬ ular tasks were not enforced, that absence from the university was not noticed, that folly and even vice were not restrained. Though un¬ usually fond of reading, as we know, he fell into idleness and the mild, if expensive, pleas¬ ure of travel. Only in the long vacation did he again read assiduously and begin his first in¬ dependent work, an essay on the (Age of Se- sostrisP Under such circumstances it is not strange that Gibbon so severely arraigned the university in his (Memoirs > : «To the Univer¬ sity of Oxford I acknowledge no obligation.

. . . I spent 14 months at Magdalen College ; they proved the 14 months the most idle and unprofitable of my whole life.®

Yet Gibbon's mind was not wholly inactive at this time. The key of Magdalen library had been delivered to him and he was soon tempted by what he had heard of Middleton's

The course taken by Gibbon's father in these unusual circumstances was to have more than one important effect on the historian's life. He was sent to Lausanne, Switzerland, to the home of a Protestant pastor, who became his tutor and guardian. Here he remained almost five years, pursuing a regular and valuable course of instruction with Pastor Pavilliard. Through the same instrumentality and his own reflec¬ tions he again became a Protestant. He also learned French as a native, thus commanding another important literature. He acquired a thorough acquaintance with Latin and a begin¬

ning in Greek. He carried on with growing maturity his historical reading. His keenness for intellectual pursuits led him to correspond¬ ence with several European scholars, and he once visited and was received by Voltaire. So valuable were these years that Gibbon put the highest estimate upon them : (

Nor must one other episode of those years be forgotten. At Lausanne the young Gibbon met and loved the brilliant and beautiful Susanne

Curchod, daughter of a Swiss clergyman. The affection was sincere on both sides. But the engagement was conditioned on the approval of Gibbon's father, on whom he was dependent, and that approval was promptly refused on his return to England. Under these circumstances Gibbon did what many another young man of his country has since done. He <(sighed as a lover,® he "obeyed as a son.® And if the fail¬ ure of marriage was harder for the daughter of the poor Swiss clergyman, she was consoled not many years after with what proved a more remarkable match. She became the wife of Necker, afterward French Minister of Finance, and the mother of Madame de Stael.

Before leaving Switzerland Gibbon had begun his first published work, his (Essay on the Study of Literature. It was written in his adopted language and was the result of his classical studies, with which it especially dealt. It was completed in the year of his return to England, though not published until 1761. Then it gained some recognition on the Continent, where it was republished the following year. In England it was little noticed, though a trans¬ lation was finally made.*

Gibbon returned to England in 1758. As he had taken up no profession he was still depend¬ ent for the next 12 years upon his father's bounty. Two years and a half of this time (1760-62) he spent as captain in the South Hampshire militia, the result of a wave of mili¬ tary enthusiasm which had swept England on a threatened invasion by the French. This largely withdrew him from historical studies, but he acknowledges that these years again made him an Englishman and that the military experience had ((not been useless to the his¬ torian of the Roman Empire.® Every vacation, too, was spent with his beloved books, and he meditated for treatment several historical sub¬ jects, among them the life of Raleigh, the lib¬ erty of the Swiss and a history of the republic of Florence.

As soon as he was freed from the militia, Gibbon hastened to the Continent to complete his education by travel and study. In this he spent another two years and a half, at Paris, Lausanne and in an extended Italian tour. Everywhere he was reading as well as seeing, so that it is not strange that on this tour he should finally have chosen the subject of his life work. The

resolution was taken in Rome as he sat musing in the evening, while the Franciscan friars ((were singing vespers in the temple of Jupiter on the ruins of the capital.® It was 15 Oct. 1764, and Gibbon had about half completed his 28th year.

*Yet the great work could not be immediately begun. Gibbon was still dependent. At home he could not be master of his time. In Lon¬ don he could not use his books. Other plans also intervened in the five years following his second return to England (1765). His friend Deyverdun visited him and with his assistance Gibbon undertook the history of the Swiss, writing it also in French. But the historian was unacquainted with German and far from the Swiss archives, so that the first book of his projected work was finally committed to the flames. Then Gibbon assisted his friend in the (Memoires Litteraires de la Grand Bretagne, * which were published in 1767 and 1768. In 1770 he also printed anonymously his*

(Critical Observations on the Sixth Book of the 2Eneid,5 a brilliant and conclusive answer to a theory of Warburton in his (Divine Le¬ gation of Moses.)

Meanwhile the historian had begun the more serious study of his Roman subject in 1768, after the failure of the Swiss project. Two years later he was left independent at his father's death, and establishing himself in Lon¬ don in 1772 he began the composition of his 'History of the Decline and Fall of the Roman Empire. On the death of Goldsmith (1774) he was made professor of history at the Royal Academy. The same year he was elected to Parliament, "at the beginning of the memorable contest between Great Britain and America.® Yet he was to attain fame not by tongue but by pen. Silent in the House of Commons, he sprang at once into public esteem when the first volume of his 'History5 issued from the press in 1776. The first impression was soon exhausted. A second edition was sold and a third printing within a year. "My book,® he says, "was on every table and almost on every toilette; the historian was crowned by the taste or fashion of the day, nor was the general voice disturbed by the barking of any profane critic.® The lasting fame of the author was once for all established.

From the publication of the first volume of the (Decline and Fall5 to the issue of the last three (1788) is a period of 12 years, the whole period of collecting materials and composition covering two decades. Of these 12 years the first seven were the most active. After the first enthusiasm for his

‘History5 had sub¬ sided, a storm of clerical criticism burst upon his treatment of the growth of Christianity in the early centuries. This he did not at first answer, but when his good faith was attacked he at last replied in a ‘ Vindication5 (1779). In the same year he prepared a state paper, the ‘Memoire Justicatif,5 against the French course in relation to the American war. He was also made one of the Lords Commissioners of Trade. In 1781 he published the second and third volumes of the ‘Decline and Fall.5 The following year he lost his seat in Parliament and his place as Lord Commissioner, and though some offers were made of other public positions he never again took part in public life.

Gibbon now resolved on an unusual move for an Englishman. While by no means a poor man, he thought his income insufficient for Eng¬ lish life. He therefore decided to remove to Lausanne and unite his establishment with that of his friend Deyverdun. To his friend and the place he was bound by ties of early affec¬ tion. He could live well in Switzerland and yet save money. He could complete his ‘His¬ tory5 and return to England at the age of 50 a comparatively rich man. So he explained his purposes and he finally settled in his new home in 1783. Four years later he returned to Eng¬ land with the last three volumes of the ‘De¬ cline and Fall,5 which were published on his birthday, 1788. After a year in England, how¬ ever, he went back to Switzerland, fully satis¬ fied with his foreign residence. Deyverdun died in 1789, but Gibbon still clung to his adopted country.

He was now to undertake the one other im¬ portant literary work of his lifetime. In the year of the publication of his ‘History5 he be¬

gan the celebrated ‘Memoirs,5 which have de¬ lighted the world for more than a century. On these he was engaged at intervals for the next six years, and he left six different sketches covering more or less fully different portions of his life. The ‘Memoirs5 were finally printed in 1796 with the ‘Miscellaneous Works5 of the historian, edited by Lord Sheffield. The manu¬ scripts remained in the possession of the Shef¬ field family for a century, when they were de¬ posited in the British Museum and the whole of the six partial sketches were published. Then it was seen that Lord Sheffield had taken unusual liberties with Gibbon’s autobiography, though preserving much the larger part of the sketches not overlapping.

In 1793 Gibbon hastened to England on the death of the wife of Lord Sheffield, his inti¬ mate friend. During the year he was still full of plans. He had once hinted a supplement to his ‘History.5 He now meditated a series of biographies of eminent Englishmen. He even set his hand to a prospectus which should an¬ nounce the editing of English historical writers by John Pinkerton. But all such plans were to be stayed. A disorder with which he had long been afflicted led to dropsy, for which he was

treated at different times in the fall of 1793. At last he became rapidly worse at the beginning of the new year and died very suddenly.

Gibbon's fame rests upon his one great un¬ dertaking, the 'History of the Decline and Fall.5 It was the most monumental work of its age, as he was the most erudite historical student of his time. In his 'Memoirs5 Gibbon hesitates to class himself with Hume and Rob¬ ertson, but he is the only one of the three to outlive a century of wonderful progress in his¬ torical research. It is true some defects have been found in his famous 'History,5 and newer views of historical development find some omis¬ sions. But the century-old work has been the basis for all later research, while it is still edited by learned historians instead of being replaced by labors of tffiffr own. See Gibbon's Autobiography.

Bibliography.— For the 'Decline and Fall5 : Oxford ed., 8 vols., 1828; ed. by H. H. Mil- man, 12 vols., 1838—39 ; by W. Smith, 8 vols., 1854-55; latest and best by J. B. Bury, 7 vols., 1896-1900. French, German and Italian trans¬ lations appeared in Gibbon's lifetime; Polish, Greek and Magyar since.

For 'Memoirs5 : 'Miscellaneous Works 5 2 vols., ed. by Lord Sheffield, 1796; 2d. ed., 'en¬ larged to 5 vols., 1814; 'Memoirs,5 ed by Milman, 1739; 'Letters of Gibbon,5 ed. by Prothero, 2 vols., 1896; 'Autobiographies,5 ed. by Murray, 1897; 'M,emoirs,5 ed. by 6 F Emerson, 1898; by G. B. Hill, 1900, and I. A. C. Morrison's study in the 'English Men of Let¬ ters5 series, 1901. Notes on life in Gentleman's Magazine, lviii, lix, lxiv, lxvi ; Egerton Bryd- gess 'Autobiography5; Boswell's 'Johnson5; Walpole's 'Letters5 ; Mme. de Deffand's 'Let¬ ters to Walpole5; D'Haussonville's 'Salon of Mme Necker5 (1882); 'Girlhood of Maria Josepha Holroyd, 5 ed. by J. H. Adeane (1896) ; 'Historic Studies in the Vaud, etc.,5 by Mere¬ dith Read (1897).

Oliver Farrar Emerson,

1 rofessor of English, Western Reserve Uni¬ versity.

GIBBON, a tailless anthropoid ape of the East Indies, the several species of which con¬ stitute the genus Hylobates of the family Sinii- idce. They are nearly allied to the orangs and chimpanzees, but are smaller, of more slender form, and their arms are so long as almost to reach the ground when the animal assumes an erect posture ; there are also naked callosities on the buttocks. In general the gibbons are the lowest among the

anthropoid apes, and connect them with the Old World monkeys by way of the semnopithecine group. (See Langur). The gibbons are inhabitants of forests, their long arms enabling them to swing themselves from bough to bough, which they do to wonderful distances and with extreme agility. They can¬ not, however, move with ease or rapidity on the ground.

GIBBONS, Abigail (Hopper), American philanthropist : b. Philadelphia, 7 Dec. 1801 ; d. New York, 10 Jan. 1893. She was daughter of Isaac T. Hopper (q.v.) and wife of James Sloan Gibbons (q.v.). She taught in Philadel¬ phia and New York, in 1845 assisted in found¬ ing the Women's Prison Association, and was also a founder of the Isaac T. Hopper Home for discharged prisoners. In the Civil War she was active in Federal hospitals and camps. It was chiefly through her instrumentality that the New York State reformatory for women and girls was established by the legislature.

GIBBONS, Edmund F., American Roman Catholic bishop : b. White Plains, N. Y., 16 Sept. 1868. He was educated at Christian Brothers Academy, Albany; Niagara Univer¬ sity and the American College,' Rome. He was ordained in Rome 27 May 1893 by Cardinal Parochi. Upon his return to America he went to Williamsport, Pa., and later was made secre¬ tary to the late Bishop Ryan of Buffalo. His next station was Saint Mary's, Niagara Falls. In 1900 he was appointed superintendent of parochial schools, diocese of Buffalo, by Bishop Quigley. In 1902 he became rector at Silver Springs ; in 1904 was removed to Attica, and in 1916 assumed charge of Saint Teresa's parish, Buffalo. Upon taking charge of this large par¬ ish Father Gibbons resigned the superintendency of schools, in which office he had won high praise from the ecclesiastical and school authori¬ ties of the Church as well as the commendation of the State Board of Regents. On 10 March 1919 he was appointed to the see of Albany, N. Y.

GIBBONS, Grinling, English sculptor and wood-carver: b. Rotterdam, 4 April 1648; d. London, 3 Aug. 1721. In 1671 Evelyn found him at Deptford carving on wood Tintoretto's (Crucifixion) ; and on Evelyn's recommendation he was appointed by Charles II to a place in the Board of Works, and employed in the orna¬ mental carving of the choir of the chapel at Windsor. His works display great taste and delicacy of finish, and his flowers and foliage have almost the lightness of nature. For the choir of Saint Paul's, London, he executed the foliage of festoons, and those in lime-tree which decorate the side aisles. At Chant9worth, at Burleigh, at Southwick, Hampshire, and other mansions of the English nobility, he executed an immense quantity of carved embellishment. The ceiling of a room at Petworth is regarded as his chef d'oeuvre. He also produced several vol. 12 — 41

fine pieces in marble and bronze. Among these are the statue of James II, Whitehall; the base of the statute of Charles I, at Charing Cross ; and that of Charles II, at the Royal Exchange.

GIBBONS, James, Cardinal, American Roman Catholic prelate : b. Baltimore, Md., 23 July 1834; d. there, 24 March 1921. When very young he was taken to Ireland to be educated. He returned to America in 1853 and resided in New Orleans until 1855, when he matriculated at Saint Charles College, near Ellicott City, Md., where he was graduated with distinction in 1857. He then pursued his theological course at the Seminary of Saint Sulpice and at Saint Mary's University, Baltimore. On 30 June 1861 he was ordained a priest, his first mission being at Saint Patrick's Church, Baltimore, where he was assistant. Transferred to Saint Bridget's Church, Canton, he ministered to a small congregation until 1865, when Archbishop Spalding made him chancellor of the archdiocese and his private secretary. The Second Plenary Council at Baltimore, 1866, made him its assist¬ ant chancellor, and in August 1868 he was con¬ secrated titular bishop of Adramyttum in partibus infidelium and first vicar-apostolic of North Carolina, erected by bull of His Holiness, Pius IX, dated 3 March 1868. He found three churches, two priests and about 1,000 Roman Catholics scattered over the entire State. He opened a school, which he personally con¬ ducted ; built six churches ; introduced into the vicariate the Benedictine order at Belmont, Gas¬ ton County, where Mary Help abbey was later erected; established the Sisters of Mercy and built for them a school for whites and one for negroes in Wilmington. He made the personal acquaintance of every adult Roman Catholic in the State, and met them at their homes, traveling from the seaside to the mountains, up and down the State, and that none should be neglected. After four years he was translated to the see of Richmond in 1872. Here he erected five churches, Saint Peter's Academy in charge of the Xaverian Brothers, and Saint Sophie's Home for Old People in charge of the Little Sisters of the Poor, in Richmond, Va., and parochial schools in Petersburg and Portsmouth, Va., and enlarged Saint Joseph's Female Orphan Asylum, Richmond, Va. In 1877 Archbishop Bayley asked to have Bishop Gibbons appointed his coadjutor, and on the death of Archbishop Bayley in October of that year Bishop Gibbons became archbishop of Baltimore, the highest ecclesiastical dignity of the Roman Catholic Church in the United States. He headed the delegation of American prelates who visited Rome in 1883 to represent the affairs of the Church in the United States at the Vati¬ can, and to outline the work of the Third Plen¬ ary Council to meet in 1884. Pope Leo XIII ap¬ pointed Archbishop Gibbons to preside over the council. In directing the proceedings of the council he co-operated in the enactment of many important new decrees, made necessary by the progress and development of Catholicism in America ; and these acts and decrees were, after mature

deliberation, approved by the ecclesiastical authorities. Leo XIII expressed his approval of the action and course of Arch¬ bishop Gibbons and created him cardinal 7 June 1886, and on 30 June 1886 Archbishop Kenrick of Saint Louis, representing the Pope, be-

stowed the insignia of his office upon the newly-made cardinal. Cardinal Gibbons sailed for Europe the next year to receive the apostolic benediction and to be admitted to membership in the college of cardinals, the 25th in succes¬ sion. While in Rome he interpreted to the Pope the democratic spirit of American Catholicism in respect to the labor organizations in the United States and the exact relation existing between the employers and the employed. He was installed as pastor of his titular church 25 March 1887, and was assigned to the church of Santa Maria in Trastevere, a church of great antiquity, on the Tiber. He returned to Amer¬ ica in November 1887; on 24 May 1888 laid the cornerstone of the Catholic University, Washington, D. C, and dedicated the divinity building 13 Nov. 1889. Cardinal Gibbons was chancellor of the university from its foundation to his death. In November 1888 he celebrated at Baltimore the centenary of the founding of the Catholic hierarchy in the United States, sub¬ sequently convening a congress of Catholic laymen, the first ever held in the United States. Cardinal Gibbons was president of the Bureau of Catholic Indian Missions, and was the first American cardinal to take part in the election of a pope. A model churchman, he was also a typi¬ cal American citizen, loyal, progressive and pub¬ lic-spirited. On 20 Oct. 1918 his golden jubilee, commemorating an episcopate of half a cen¬ tury, the first American prelate to complete 50 years as a bishop, was celebrated with a special message from Pope Benedict XV, testi¬ monials, congratulations, the attendance of dele¬ gations from all parts, including commissions from Italy, France and Great Britain. He published (The Faith of Our Fathers > (1876: 58th ed. 1903) ; (Our Christian Heritage> (1889); (The Ambassador of ChrisU (1896), etc.

GIBBONS, James Sloane, American banker: b. Wilmington, Del., 1 July 1810 d. New York, 17 Oct. 1892. He early became a strong abolitionist, and in 1863 his house in New York was sacked by a mob, during the draft riots, because he had illuminated it in honor of Abraham Lincoln. His fame rests chiefly on his patriotic song, which was very popular during the Civil War, (We Are Coming, Father Abraham, Three Hundred Thousand MoreP*

GIBBON'S AUTOBIOGRAPHY. Of

the six memoirs written at various times and published under this title, the latest is the most finished, if not the most interesting. We could wish that the space given to Gibbon's family history had been devoted to fuller details of his own education, conversion to Catholicism and reaction therefrom. The style, admirably balanced and dignified, well conveys the man, whose sincerity is yet tempered by a certain coldness. One is somewhat jarred to read that Gibbon abandoned his engagement to the at¬ tractive Mile. Curchod because of his father's disapproval, saying, «I sighed as a lover, I obeyed as a son® : that father, of whose death he writes, "The tears of a son are seldom last¬ ing. » Characteristic, too, it is that he should use the word « passion » solely in reference to his studies. But the value of his record lies in the light it throws for us on the workings of his most distinguished mind, a mind which

does not, like that of other writers, reveal it¬ self wholly in its work. Without the auto¬ biography we should not have known how Gib¬ bon's habits of systematic industry and absorp¬ tion in his task were fostered by his long resi¬ dence in Switzerland and the friendships formed there. The composure of these pages, their steadfastness and elevation of thought, remain inspiring. From them we gain not only real knowledge of the man who wrote the (Decline and Falip but a necessary insight into the influence of that greatest of all histories over the ideas of the 18th century.

Anna Robeson Burr.

GIBBS, Alfred, American soldier: b. Suns- wick, L. I., 22 April 1823 ; d. Fort Leavenworth, Kan., 26 Dec. 1868. He was graduated from the United States Military Academy in 1846, served in the mounted rifles during the Mexican War, was brevetted captain, and until 1861 was em¬ ployed in frontier and recruiting service. He served in the Federal army during the Civil War and attained the nank of major-general of volunteers and brevet brigadier-general United States army. He was mustered out of the volunteer service in 1866, became major of the Seventh Cavalry in that year, and until his death was stationed at various Kansas forts.

GIBBS, George, American mineralogist : b Newport, R. I., 8 Jan. 1782; d. Newtown, N. Y.,

5 Aug. 1833. Early becoming interested in the study of mineralogy, he collected during his travels in Europe, chiefly by purchase, a very extensive and valuable cabinet of minerals, the most extensive at the time that had been brought together in the United States. This collection he set up in the public rooms of Yale College, where it remained without charge from 1811-25, and in the latter vear it was purchased for the college for $20,000.

. GIBBS, James Edward Allen, American

inventor: b. 1 Aug. 1829; d. Raphine, Rock¬ bridge County, Va., 25 Nov. 1902. While a young man the subject of the sewing-machine was called to his attention and presently he thought out the idea of the revolving hook which is the main feature of the Willcox and Gibbs machine. In all he took out 12 patents covering the sewing-machine. The village in which he resided was named by him when he l etui ned to it in middle life. The name is from the Greek word which means ((to sew.®

GIBBS, Josiah Willard, American philol¬ ogist: b. Salem, Mass., 30 April 1790; d. New Haven, Conn., 25 March 1861. He was gradu¬ ated at Yale College in 1809, and in 1824 was appointed professor of sacred literature in the theological department of Yale College, which he held till his death. He published a transla¬ tion of Gesenius' (Hebrew Lexicon of the Old Testament J (1824) ;

˚glcal Studies > C 1857) ;

*GIBBS, Josiah Willard, American mathe¬ matician : b. New Haven, Conn., 11 Feb. 1839 * d. there, 28 April 1903. He was a son of the preceding and was graduated from Yale in 1858 He was professor of mathematics at Yale in 1871 and held the position at the time of his*

death Thermodynamics was the field in which

e achieved his greatest renown. He was orig¬ inal in his. manner of teaching and extremely successful in the class room. The work that brought him first into prominent notice was his tieatise on the (Equilibrium of Heterogeneous Substances, > published in 1875 by the Connecti¬ cut Academy of Arts and Science. His last contribution on this subject was his book in the Bi-Centennial series at Yale, entitled wherein he set forth what are likely to be the foundations of this branch of science in the future. In 1881 he began the development of the Vector analysis and applied it to problems in crystallography and to the computation of the orbits of the planets and comets and also to problems in the theory of light. His work gave strong support to the electro-magnetic theory and powerful influence in securing a general adoption of this theory by physicists.

GIBBSITE, gTb'zit, a mineral usually oc¬ curring in mammillary or stalactitic masses or incrustations, or in monoclinic crystals (hydra- gillite). Its color is usually white, often tinted with^ green, yellow or red. Its

hardness is 2.5 to 3.5 and its specific gravity about 2.4. It is an aluminum hydrate, A1 (OH)„ containing 28 per cent of aluminum. It occurs in the Urals, Nor¬ way, Brazil and at Richmond, Mass. It was named after George Gibbs (q.v.).

GIBEAH, gib'e-a, the name of several towns in ancient Palestine, including the birth¬ place of Saul, and the scene of Jonathan's ro¬ mantic exploit against the Philistines.

GIBEL, or PRUSSIAN CARP, a Euro¬ pean carp (Cyprinus gibelio) of small size, without barbels and with a forked tail. It oc¬ curs in England and is good food.

GIBEON, one of the ancient cities of the Canaanites, in Palestine, a «great city® of the Hivites, who at an early stage of Joshua's con¬ quests entered into a stratagem to get terms of peace for themselves. Taking old clothes on their persons, and dry and moldy bread in their bags, they professed to have come from a far country, and proposed an alliance with the Israelites, which was accepted by Joshua before the stratagem was discovered. When the dis¬ covery was made, the covenant was strictly observed, but the Gibeonites were condemned to be ((hewers of wood and drawers of water unto all the congregation® (Jos. ix, 21). Joshua later protected Gibeon against the Amorites, and it was then that tradition put the time when the sun and moon stood still at Joshua's com¬ mand. The town of Gibeon fell afterward to the lot of Benjamin. It was made a Levitical city, and the Tabernacle was transferred there from Nob after the slaughter of the priests. The engagement between the men of Abner and David took place here. Gibeon has been identified with the modern El-Jib. A large number of the Gibeonites, who had made a covenant with Joshua, were massacred by Saul, for which crime seven of Saul's sons were de¬ livered up by David to the Gibeonites to be hanged (2 Sam. xxi, 1-9). Solomon sacrificed there at the beginning of his reign.

GIBRALTAR, ji-bral'tar (Sp. he-bral- tar'), a town and strongly fortified rocky penin¬ sula at the southern extremity of Spain, prov¬

ince of Andalusia, at the western entrance of the Mediterranean, belonging to Great Britain. This remarkable fortress, which lies opposite Ceuta in Africa (distance between Europa Point and Ceuta 14p2 miles), and forms the key to the Mediterranean, is connected with the mainland of Spain by a low sandy isthmus, the peninsula having the Bay of Gibraltar on the WeS_ anC^ open sea of the Mediterranean on the east. The British territory has a length of two and three-fourths miles and a greatest breadth of three-fourths of a mile, the greater part of it consisting of «the rock,® at the foot of which, on the north, is a race course, ceme¬ tery, etc. The highest point

of the rock is about 1,400 feet above sea-level. Its north face is almost perpendicular, while its east side also presents tremendous precipices. On the south it is almost inaccessible, making approach from seaward impossible; the west side, again although nearly as rugged and precipitous as the others, slopes toward the sea; and here the rock is secured by extensive and powerful bat¬ teries and other works, rendering it apparently impregnable. The body of the rock consists of a kind of dense limestone arranged in beds of 30, 40 and 50 feet in thickness. There are a number of remarkable caves in various parts of the rock, but all difficult of access.

Vast sums of money and an immense amount of labor have been spent in fortifying this cele¬ brated stronghold. Numerous caverns and gal¬ leries, extending two to three miles in length, and of sufficient width for carriages, have been cut in the solid rock, forming safe and sheltered communications from one part of the garrison to Another in cases of attack. Along these gal¬ leries are port-holes opening toward the bay or toward the Spanish territory (between which and the British territory there is a strip known as <(the neutral ground®) ; while trees, shrubs and flowers of various kinds have been planted at different points, both for ornament and util¬ ity. On the summit of the rock there are bar¬ racks, signal-stations, etc. Of late years the fortifications have been carefully strengthened at every vulnerable point, and guns of the new¬ est construction have been mounted in them. Gibraltar has a naval dockyard, and is a vic¬ tualing and coaling station of the British navy. Great harbor works have been constructed, in¬ cluding a large area of sea enclosed by massy walls, and graving-docks large enough to ac¬ commodate the largest battleships. There are three extensive moles, respectively one mile, 3,660 feet and 2,717 feet in length. The ma¬ terials have been mostly brought from the east side of the rock by means of a tunnel specially constructed for this purpose. Vessels entered in 1914, 4,247, with a tonnage of 6,323,658 tons.

The town of Gibraltar is situated on the west side of the peninsula, fronting the bay. It consists of two portions, the North Town and the South Town, the former being much the larger and separated from the South Town by the Alameda Gardens, parade ground, etc. The principal buildings are the governor's house, the naval hospital, the civil hospital, the garri¬ son library, the courthouse, revenue offices, remains of an old Moorish castle, and the bar¬ racks. The water for the supply of the town and garrison is collected in tanks during the rainy season. Splendid reservoirs for water have recently been constructed by the govern-

nient. Gibraltar is a free port, and serves as a valuable entrepot for the distribution of British manufactures to the neighboring countries. Ihe administration is that of a Crown colony, and is vested in the governor, who is also commander-in-chief of the troops. The settle¬ ment is treated as a garrison town, the power of enacting laws being vested in the governor alone. All criminal cases are determined ac¬ cording to the laws of England. Newcomers to Gibraltar are stringently looked after. For¬ eigner are permitted to remain during speci¬ fied periods only, and on giving the required security. The revenue for 1914 was £ 89 721 and expenditure, i 121, 424. The currency is

British, but Spanish money is freely circulated rhf P°Pulatl?n ˆ 1911 included 19,586 civilians and 5,340 military. The permanent residents are of very various origin — Spanish, Portu¬ guese, Maltese, etc.

,T,he,n;Lme.is formed from the Arabic words gebel al Tank (the height or rock of Tarik),

e, Tank Ibn Zeiad, .the general of the caliph Valid, at the time of the irruption of the Moors into Spam (711 a.d., and following years), landed at the foot of this rock (known as the Calpe> of antiquity and one of the «Pillars of Hercules ■— Abyla in Africa being the other), where he founded a strong fortress. About the begmnmg of the 14th century it was taken from

-H?°rS by Ferdinand, king of Castile, but in 1335 it was recovered by them, and was not finally acquired by the Spaniards till 1462, when it was taken in the reign of Henry IV. The Duke of Medina-Sidonia, who had assisted in gaining it for the Christians, took forcible pos¬ session of it for himself, and it remained in the keeping of his family till 1501, when the Span- m j°Yereign gQt E into his own hands. The duke unsuccessfully tried to recover it in 1506, by which time the fortress had undergone altogether some half score of sieges. The pirates of Algiers subsequently made an attack upon it, but were forced to retire. The German engineer, Speckel of Strassburg, in the reign of the Emperor Charles V, substituted for the old Moorish fortifications works in the European style In the war of the Spanish Succession the Spaniards were obliged to surrender this fortress 4 Aug. 1704, to the British admiral, Kooke, assisted by a body of troops under

*iTtu? 5e°r,g?*7n/ • Darmf; adt- From October 1704 to April 1705 it was besieged by the Span-*

GEˆˆured to Britain by the Peace o Utrecht in 1713. Since this time nothing has been omitted by Britain to render this fortress which forms a bulwark

of her Mediterranean trade, absolutely impregnable. As the increas-

i °f tbe place rendered the possession of Gibraltar more desirable to Spain, the siege of it was commenced 7 March 1727, but raised upon the approach of Admiral Wager, with 11 ships. °f the Hnc Spain then offered £2,000,- 000 sterling for the delivery of the place, but in vam; and by a compact at Seville in ' 1729 Spam agreed to renounce, all its claims upon it. Still the Spaniards omitted nothing to pre- vent all entrance into the fortress, and to cut it off from the mainland, by constantly strength¬ ening the lines of Saint Roch and Algeciras.

But it was easy to supply the inhabitants and garrison by sea. In the war which broke out between Britain and Spain in 1779 the last at¬ tempt was made for the recovery of Gibraltar.

It now underwent the famous four years' seige from 1779 till 1783, but was ably and success¬ fully defended by General Elliot, afterward Lord Heathfield. It was secured to Britain by the peace of 1783. Since that time in the various British and Spanish and also French wars, Gibraltar has been blockaded only on the land side. Consult Drinkwater, 'History cf the ˆege of Gibraltar (1785); Mann, ' History of Gibraltar* (1870) ; and Spilsbury, 'Journal of the Siege of Gibraltar* (1908).*

GIBRALTAR, Bay of, an inlet of the At¬ lantic formed by the headland of Cabrita and Europa Point, four miles distant from each other and is spacious and well adapted for shipping, being protected from all the more dangerous winds ; the extreme depth within the uS JdO fathoms. To increase the security u the harbor extensive moles have been con¬ structed The Spanish town and port of Al¬ geciras lie on its western side.*

■t-j GIBRALTAR, Straits of (anciently called Pillars °F Hercules); the straits connecting the Mediterranean Sea with the Atlantic Ocean extending from Cape Spartel to Cape Ceuta on the northwest coast of Africa and from Cape lafalgar to Europa Point on the southwest sea¬ board of Spain. They narrow toward the east their width between Europa Point and Cape Ceuta being, only 15 miles, while at the west extremity it is 24 miles. Length, about 36 miles.

irough these straits a constant current runs so strongly from the Atlantic that sailing ves¬ sels bound west can pass them only by the aid a FeXanter, or strong breeze from the east It is believed that the waters of the Mediter

undercurrent. ˆ °Ut'et here by "eanS of an

GIBRALTAR OF AMERICA, Quebec,

Ca ud- °n account of Fs command- mg sffuaffon and its one-time well-nigh impreg¬ nable defenses, both natural and artificial

GIBRALTAR APE or MONKEY. See

Barbary Ape.

• GIBRALTAR of THE EAST a name

*Since 1839 *1 t?Wn Siaport 0>f Arabia-*

has belonged to the British and its

fortifications have been greatly strengthened

and improved. . The citadel is built on f rocky

eminence and is of great strategic importance7

terKS1n°n between Asia and Africa like that of Gibraltar between Europe and Africa.

traUBh°r7' ,CharIew Dana> American Ulus- tmtor b. Roxbury, Mass., 14 Sept. 1867 He

York^hp1 the,Art Students' League (New York) became known as an illustrator for pe- P.°dlccalsL Particularly for 'Life, and through his satirical presentations of wealthy societv (but most of all by reason of his insistence upon an ideal type of "American girl,** or more properly "Gibson girl**) attained a wide reputa- r°n S has Polished 'London, as seen by*

n8?6WP°n i08^ ; (PiGtUres of PeVe> (1896); 'People of Dickens (1897); 'Sketches*

nl99W0T°bnS p,°898.); itches in Eg^pt (1899) The Education of Mr. Pip* (1899) •*

< Americans- (1900);

Uu M •Q?01)'-'The Social Ladder- (1902) <

GIBSON, John, English sculptor: b near

^866^14 ^a,es.\ 19 July 1790; d. Rome, 27 Jan. 1866. He was the son of a landscape gardener,

and was apprenticed to a wood-carver at Liver¬ pool, where he attracted attention by a figure of 'Time,* modeled in wax, which he exhibited at the age of 18. The patronage ot W. Roscoe (q.v.) assisted him to go to Rome, where he was cordially received by Canova. On the death of Canova in 1822 Gibson entered the studio of Thorwaldsen. In 1838 he was made a royal academician; but to the end of his life continued to make Rome his chief place of resi¬ dence. Among his best works are (The Wounded Amazon* ; (The Hunter and His Dog*; 'Hylas and the Nymphs*; (Helen) ; 'Proserpine* ; and 'Sappho,* and busts of Auskisson and Sir Robert Peel. The subjects of most of Gibson's works are taken from classical mythology, but he was no servile im¬ itator of the antique ; on the contrary, he ex¬ hibited thorough originality in his treatment, and gave marked individuality and expression to the goddesses, nymphs and heroines of antiquity that proceeded from his studio. He was the author of one remarkable innovation, at least in modern sculpture, that of coloring his figures, and though he believed to the last that the experiments of this nature which he made were successful, he never succeeded in securing the approbation of other artists for the practice. He was a man of great kindliness of disposition, but so absent-minded that his friend and only pupil, Harriet Hosmer, the American sculptor, said of him : "He is a god in the studio, but God help him out of it.** His 'Life,* with an autobiography, was edited by Lady Eastlake (1870).

GIBSON, John Monro, British Presbyte¬ rian clergyman : b. Whithorn, Scotland, 24 April 1838. He received his education at Uni¬ versity College and at Knox College, Toronto, where he studied theology. From 1864-74 he was minister at Erskine Church, Montreal ; lec¬ turer in Greek and Hebrew exegesis in Mon¬ treal Theological College 1868-74 ; minister of the Second Presbyterian Church at Chicago (1874-80). Rev. Gibson was appointed mod¬ erator of the Presbyterian Church of Eng¬ land in 1891, and was also president of the National Council of Free Churches (1897). He has published 'Ages before Moses* (1879) ; 'The Foundations* (1880) ; 'The Mosaic Era* (1881) ; 'Rock versus Sand* (1883) ; 'Pome¬ granates from an English Garden* (1885) ; 'Christianity according to Christ* (1888) ; 'Gospel of Matthew* (in 'Expositor's Bible* 1890) ; 'From the Outpouring of the Spirit to the Death of Saint Paul* (in 'People's Bible History,* 1895) ; 'Unity and Symmetry of the Bible* (1896) ; 'From Fact to Faith* (1898) ; 'A Strong City and Other Sermons* (1899) ; 'The Glory of Life* (1900) ; 'Apocalyptic Sketches* (1901) ; 'Protestant Principles* (1901) ; 'Devotional Study of Holy Scripture* (1904) ; 'The Inspiration and Authority of Holy Scripture* (1908).

GIBSON, Sir John Morison, Canadian legislator: b. township of Toronto, 1 Jan. 1842. He was graduated at the University of Toronto in 1863, and was called to the bar in 1867. He takes an active part in military affairs, served during the Fenian raid in 1866 and commanded an infantry brigade 1905-09. He was first elec¬ ted to the provincial legislature in 1879; has held various portfolios, and was lieutenant-governor

of Ontario 1908-13. He was created K. C. M. G. in 1912.

GIBSON, Randall Lee, American politi¬ cian: b. Spring Hill, Woodford County, Ky., 10 Sept. 1832; d. Hot Springs, Ark., 15 Dec. 1892. He was graduated from Yale in 1853, studied law in Tulane (then the University of Louisi¬ ana) and Berlin, was a sugar planter in Louisi¬ ana until the Civil War, entered the Confeder¬ ate army in the ranks, and finally attained the rank of major-general. Subsequent to the war he practised law, and having entered public life was elected to Congress as a Democrat in 1872, though not seated, was in the House from 1874-82, and in the Senate from 1882 until his death.

GIBSON, Robert Atkinson, Protestant Episcopal bishop: b. Petersburg, Va., 9 July 1846; d. 17 Feb. 1919. He entered the ministry in 1870, was rector of Moore Memorial Chapel, Richmond, Va., 1872-78; of Trinity Church, Parkersburg, W. Va., 1878-87 ; and Christ Church, Cincinnati, 1887-97. In November of the year last named he was consecrated coad¬ jutor-bishop of Virginia, succeeding to the bish¬ opric on the death of Bishop Whittle in 1902.

GIBSON, Robert Williams, American architect: b. Essex, England, 17 Nov. 1854. He studied at the Royal Academy of Arts, came to the United States in 1881 and has since prac¬ tised his profession in New York. He has designed many important American buildings, among which are the Episcopal cathedral at Albany, N. Y., and many churches, the Botan¬ ical Museum, New York, and banks at Buffalo, Albany, Utica and elsewhere; the New York Clearing House, United States Trust Company building, office buildings, country residences, etc.

GIDDINGS, Franklin Henry, American sociologist : b. Sherman, Conn., 23 March 1855. He was graduated from Union College in 1877, and engaged in journalism until 1888, when he became lecturer in political science at Bryn Mawr. In 1896 he became professor of sociol¬ ogy and the history of civilization at Columbia University. He has written 'The Principles of Sociology ; 'The Theory of Socialization* ; 'The Elements of Sociology* ; 'Democracy and Empire* (1900); 'Inductive Sociology* (1901); 'Descriptive and Historical Sociology > (1906) ; 'Pagan Poems* (1914) ;*

'The Western Hemis¬ phere in the World of Tomorrow (1915). He has greatly aided in systematizing the facts and theories of his department, and is distinguished from other modern sociologists by the emphasis he lays on the "consciousness of kind** as the distinguishing motive of the social individual, and one of the chief factors in the organization of society.*

GIDDINGS, Joshua Reed, American statesman: b. Athens, Pa., 6 Oct. 1795; d. Montreal, P. Q., 27 May 1864. He was ad¬ mitted to the Ohio bar in 1820; elected a mem¬ ber of its legislature in 1826, and of Congress in 1838, where he was prominent as an oppo¬ nent of slavery. Not only did he predict the tightening of the slavery chain about the neck of the two parties, but he foresaw the armed struggle. On different occasions in different speeches he prophesied the Civil War and as a political abolitionist sought to hasten it by

using the power of political organization. In I

*GIDEON (Heb. Feller, Hewer), deliverer of Israel from the Midianites. These nomad Arabs of the Syrian and Arabian deserts had invaded the central district of Palestine. In one of their expeditions they had murdered Gideon's brothers at Tabor. He is called by an angel of the Lord to save Israel. He is also bidden to destroy the altar of Baal, and to erect a sacrificial altar to Jehovah in its place. He gams from the performance of this command the name of Jerubbaal. Collecting the men of his clan Abieger he surprises the Midianites under cover of night, drives them toward the Jordan and captures and slays the two princes Oreb and Zeb. Continuing his pursuit to the Jordan he overtakes and kills the kings Zeba and Salmunna. The Israelites wished to make Gideon king as a reward for his valor, but be asks merely for the golden earrings taken in the spoil, out of which he makes and sets up an ephod to Jehovah. The victory of Gideon is one of the remarkable events in Jewish his¬ tory. ((The day of Midian** is spoken of in the prophets, and allusions are found to it also in the Psalms, and even in the Book of the Reve¬ lation.*

GIESSBACLI (gesbaH) FALLS, Switzer¬ land, aˆ cataract of the Giessbach, falling into Lake Brienz, consisting of seven cascades, the largest of which has a fall of 190 feet.

GIFFEN, Sir Robert, English economist: b. Strathaven, Scotland, 22 July 1837; d. Lon¬ don, 12 April 1910. He was acting editor of the Economist under Walter Bagehot 1868-76; then founded the Statist and became chief

*of the statistical department in the Board of Trade and assistant secretary in 1882. He was John Morley's assistant on the Fortnightly Review in 1873-76; and is the author of reports, papers and essays which have given him a high rank. His works include (American Railways as In¬ vestments * (1873) ; 'Stock Exchange Securi¬ ties) (1877) ; (Essays in Finance) (1879) ; 'The Progress of the Working Classes in the Last Half Century) (1884); (The Growth of Capi¬ tal) (1890); (The Case Against Bimetallism) (1892); 'Economic Inquiries and Studies) (2 vols., 1904). V*

. GIFFORD, Robert Swain, American ar¬ tist: b. Naushon Island, Mass., 23 Dec. 1840; d. New York, 15 Jan. 1905. He studied with Albert Van Beest in Rotterdam, Holland; traveled through California and Oregon in 1869, and in Europe and North America 1870- 71. He was best known as a painter of land¬ scapes and seashore scenes, and among noted paintings by him were (The Rock of Gibraltar) ;

GIFFORD, Sandford Robinson, American artist; b. Greenfield, N. Y., 10 July 1823; d. New \ ork, 29 Aug. 1880. He was educated at vLPJVIL University ; studied painting in Europe 1855-57 ; and served in the Civil War. His works include (A Lake Scene in the Catskills * Ruins of the Parthenon) ; (Sunrise on the*

Matterhorn) ; 'Home in the Wilderness) ; 'Lake Geneva ; (Fishing-Boats in the Adriatic* ; 'San Giorgio, Venice*; 'Near Palermo*; 'Morning in the Adirondacks.**

GIFFORD, William, English critic : b. Ash¬ burton, Devonshire, April 1756; d. London, 31 Dec. 1826. Left an orphan at 11 years of age, he became a cabin boy and was thereafter ap¬ prenticed to a shoemaker. Through the interest of a local surgeon he was sent to Oxford, after¬ ward traveled on the Continent with Lord Bel- grave for some years, and on his return to England devoted his time to literary pursuits. In 1794 he published 'The Baviad, a poetical satire, in which the poetasters of the Della Cruscan school are the chief objects of his ridicule, and in 1795 appeared 'The Maeviad, * a severe animadversion on the degraded state of the drama. These works, though virulent and coarse, display much critical ability. In 1797 he became editor of the Anti-Jacobin newspaper — an office which involved him in a quarrel with Dr. Wolcot, against whom he published' a pamphlet in verse, entitled 'An Epistle to Peter Pindar.* His translation of the 'Satires of Juvenal* was published in 1802, and is executed in a manner highly creditable to his abilities. He edited the plays of Massinger, with notes, and a life of that dramatist (1805) ; and after¬ ward in a similar manner the works of Ben Jonson, Ford and Shirley. He also translated the Satires of Persius.* In 1809 he entered on th£ editorship*

of the Quarterly Review of which he continued to be conductor till 1824 when he resigned. He showed himself a tactful editor and gathered round him a group of dis- tinguished contributors ; but he was an un¬ scrupulous and violent partisan of the ultra- ory type, and assailed bitterly the works of such men as Hazlitt, Hunt, Lamb and Shelley. His attack of Keats' 'Endymion, which ap¬ peared in September 1818, with its sad sequel is well known. He was interred in West¬ minster Abbey.*

GIFFORD LECTURES. An annual lec¬ tureship on subjects in the field of Natural Iheology founded by Adam, Lord Gifford of Edinburgh — a Scottish jurist, judge of the Court of Sessions. He left by will for the

nnAnˆt-5nJ°f the lectureship the sum of £80,- 000, divided among the four Scottish universi-

zonnnn ' , being apportioned to Edinburgh,

PKmn ,ea(Q1 -to Aberdeen and Glasgow, and £15,000 to Saint Andrews. This is, one of the most liberal foundations known. The lectures may be of any relig on or way of thinking, or (as is sometimes said) thev may be of no reli¬ gion, or they may be by so-called skeptics or agnostics or freethinkers.)) The first lectures were given in 1888, _ by Max Muller. In his vol¬ ume the will is given in full. A list of the lecturers and subjects is given up to 1905 by L

v / ln (Comparative Religion (New*

York 1905, pp. 570-571). The following lectures have since been published : 1907-10

/onVfh 'P6, Re?l" of Ends> (London 1912) , 1909-10 Fowler, Wm, Warde, (Religious

Exper.ences of the Roman People from the ailiest Times to the Age of Augustus (Lon¬ don 1911); 1910-12, Watson, John, 'The Inter- foˆt! °nio?if RJrhg10US Experience* (Glasgow*

JfH Y S- BoSaniquet' Bernard, 'Principle of individuality and Value (London 1912) ;*

1912-13, Pringle-Pattison, Andrew Seth, (The Idea of God in the Light of Recent Philoso¬ phy' (Oxford 1917) ; 1914, Balfour, Arthur J., (Theism

and Humanism' (London 1915).

GIFT, in law, a voluntary conveyance of property, usually without legal consideration, or the property so conveyed. The term is oc¬ casionally used in law to signify alienation either with or without consideration. To constitute a valid gift there must be an actual or construc¬ tive delivery of the property during the life¬ time of the donor. This refers to both per¬ sonal and real property. Formerly land could be conveyed by oral gift and delivery of pos¬ session only, but to-day such gifts usually must be in writing. Gifts are of two kinds : causa mortis, or those given while the donor believes himself in imminent danger of death, and inter vivos, or those given when the donor is in no fear of death. (See Donatio Causa Mortis). Examples of constructive delivery are: (1) A makes a gift of all the money he has on de¬ posit in a savings bank to B and delivers the deposit book to him, assigning the money. (2) A makes a gift to B of all the goods he owns on. a ship at sea and delivers to B a bill of lading for the goods.

In order that a gift may be legal, there must not only be actual or constructive delivery, but the donor must have acted of his own free will and be competent to contract. In addition, nothing must be necessary to make the gift complete and it must be effectual absolutely and immediately. Some authorities hold that the gift must be accepted by the donee to make it effectual, but this is not correct in all cases. Acceptance will be presumed in law if the gift is entirely beneficial, in the absence of evidence to the contrary. A mere expression of an in¬ tention to make a gift is not effectual, as where A gives his promissory note to B without con¬ sideration, payable in 90 days. The courts treat such transactions as unenforceable because made without consideration. After all the requisites above mentioned are complied with, the gift becomes irrevocable as between the parties, but under certain circumstances it may be attacked and set aside by creditors as in bankruptcy pro¬ ceedings.

GIGANTISM, a rare form of disease sup¬ posed to be associated with changes in the pituitary body; characterized by abnormal proc¬ esses of growth, chiefly in the bones of the face and extremities. . Most giants, as seen in circuses, etc., have this disease or develop it in time. Technically the disease is known as acromegaly (q.v.).

GIGANTOPTERIS. A genus of very large, remarkable fern-like fossil plants from the coal fields in China and found also in Oklahoma and Texas. The age is Permian. The plant probably belongs in the Cycado- filices or Pteridosperms rather than among the ferns.

GIGANTOSTRACA, ji -gan-tos'tra-ka. See

Eurypterus.

GIGNOUX, zhen-yoo', Francois Regis,

French painter : b. Lvons 1816 ; d. Paris, 6 Aug. 1882. He studied at the Beaux-Arts and with Delaroche, and in 1840-70 was in the United States, where he became a national academician. Many of his work are in the possession of private collectors of New York. Fie painted

chiefly studies of natural scenery, such as In¬ dian Summer' ; (Niagara by Moonlight' ; (The Bernese Alps at Sunrise.'

GIGOUX, zhe-goo', Jean, French painter: b. Besangon, 8 Jan. 1806; d. 13 Dec. 1894. He studied at the Beaux-Arts, and as a pupil of Gericault and Sigalon, and achieved a high reputation by his historical works, religious and secular, in which he displayed forceful coloring and a faithful attention to detail. By his draw¬ ings on the stone, he did much to further the development of lithography. He executed 600 illustrations on wood for an edition of (Gil Bias.' Among the best of his paintings are (The Eve of Austerlitz' ; (The Death of Cleopatra) ; (The Good Samaritan' and (The Death of Leonardo da Vinci,' his chief work, now hung in the Besangon Museum. The cross of the Legion of Honor was conferred on him in 1880. He published (Causeries sur les artistes de mon temps' (1885).

GIHON, gi'hon, Albert Leary, American sanitarian : b. Philadelphia, Pa., 28 Sept. 1833 ; d. New York, 17 Nov. 1901. He was appointed assistant surgeon in the United States navy in 1855 ; took part in the attack and capture of the barrier forts, near Canton, China, in 1856; and served throughout the Civil War. He was promoted senior medical director in 1895, and was retired with the rank of commodore the same year. He served as president of the American Academy of Medicine, the American Public Health Association and the Association of Military Surgeons of the United States. He published (Practical Suggestions in Naval Hy- giene) (1871); (Need of Sanitary Reform in Ship Life' (1877) ; (Sanitary Commonplaces Applied to the Navy' (1877); Prevention of Venereal Diseases by Legislation' (1882) ; and was editor of Annual of the Medical Sciences for six years.

GIL BLAS, zhel bias. In France the Span¬ ish novel of roguery was imitated during the 17th century chiefly by Sorel in (Fran- cion' and Scarron in (Le Roman comique,' and, during the 18th century, most effectively of all, by Alain Rene Le Sage in ˆ Gil Bias.' This masterpiece of picaresque fiction consisted of 12 books, six published in 1715, three in 1724, and three in 1735. Le Sage was in his 48th year when the first instalment appeared, and already was known as a student and translator of Spanish letters. Long

afterward, three sev¬ eral charges of plagiarism were brought against him, alleging his more or less complete de¬ pendence upon a Spanish original, Voltaire maintaining that Le Sage had merely adapted the (Marcos de Obregon' of Vicente Espinel, Padre Isla assuming that he had exactly ren¬ dered into French a lost Spanish manuscript, and J. A. Llorente ingeniously attempting to identify this manuscript as a novel by Antonio de Solis y Rivadeneyra, which, he declared, Le Sage had further used in his (Bachelor of Salamanca.' All three charges have been duly heard and dismissed by scholars, who at most have found, in (Gil Bias,' a few passages sug¬ gested by the Spanish novels — especially by (Marcos de Obregon' (1618) — together with Spanish local color and a picaresque plan. This plan involves the autobiography of an easy¬ going fellow rising through the service of various masters whose traits and wiles he

describes in satirical vein. His shifts of con¬ dition enable him to survey ironically different social conditions. . His ups and downs are

many, but his main drift is from indigence to prosperity.

Le Sage perceived the possibility of thus re¬ viewing French society and human nature in general, and the advantage of being able to cloak his satire beneath a Spanish disguise. He refined what was crude and inartistic in the .Peninsular novels; he tempered his satire with wit ; he universalized his situations and people, without sacrificing their picturesque quality; and he transformed his protagonist from a PicaroF or rogue, into an agreeable ad¬ venturer. It is true that Gil Bias helps him¬ self to his uncle's ducats on setting forth in the world, and is forced by bandits to rob on the highway, but, having been more sinned against than sinning, he turns to service, and there- after is fairly loyal to his 15 successive masters I hese range from a quack, an actress, and a decrepit old roue, to an elegant mar- an archbishop, and the prime ministers of Philip III and Philip IV. Gil Bias shares the special folly of each of these masters stooping to quackery with Sangrado, to gaming and intrigue with Mathias de Selva and to chicanery at court ; but rising to rectitude with the righteous. He is literally all things to all men. In the end, however, he has learned that honesty is the best policy. His experiences in service occupy but half of the story, which is made up for the rest, of accounts of his progiess from town to town when out of a place, and of the activities of those whom he meets and their extended life-histories. Al¬ though several tales are lugged in by main force most of the many episodes are knit more closely to the main action than was ever the case m the Spanish novels.

As compared with these, shows further a development of personality in its principal actors, the avoidance of any gross realism that might offend, a tendency to mini¬ mize the portrayal of low life and emphasize that of the middle and the upper classes, and to replace attacks, upon particular evils by laughter at inconsistencies of character In¬ stead of ignoring morality, like the Spanish burlesque fictions, or tediously obtruding it like Guzman de Alfarache) or (La Picara Jus- tina, Gil Bias5 suggests, without a word of sermonizing, that virtue is the road to hap¬ piness. As a novel, it constitutes the most im¬ portant link in the chain of picaresque in- fluence that reaches from 17th-century Spain to loth-century England. Smollett in particular elt its charm, but .most of his contemporaries "new and admired it, and in all civilized coun¬ tries it is. to-day recognized as the finest ex- } ts kmd. The best single discussion of Gil Bias will be found in 'Le Sage ro- mancier5 (1890), by Leo Claretie. g

Frank W. Chandler.

GILA' he'la, a river of the United States, an affluent of the Colorado. It rises among the mountains in the western part of New Mexico, and Hows in a southwesterly direction

aCr°1SoSAAri-Z,0na' lts total lenFth being about 470 or 480 miles. Its upper course and middle reaches are through mountains, with manv deep and precipitous canyons; farther south and west it flows through an open and compara¬

tively level country, the valley being produc¬ tive when irrigated. About 200 miles from the Colorado is the reservation of the Maricopa and l ima Indians. Ancient ruins are numerous on the . banks, bearing mute witness in part to a vanished aboriginal semi-civilization.

GIJLA MONSTER, the poisonous lizard {Helodermci suspectum) of the sandy deserts of the southwestern United States, so called be- cause first brought to notice in the valley of the Gila River, Arizona, and on account of the great size (two feet in length) which it sometimes attains Another ˆspecies55 (probably a variety horndum) exists in the arid parts of Mexico, where it is called ˆcaltetepon® or crust- lizard. These constitute a family Heloder- matidce, characterized by the pre-sence of pleu- rodont, fang-like teeth, each with a groove on its front and rear surface, and each having near its base a labial gland which was supposed to secrete venom of the same nature as that of serpents The Gila monster has a rough and warty skin, variegated in black and yellow. Its poisonous, nature is yet, however, undetermined as there is a conflict of scientific authority on me point. Instances, however, are on record of its bite proving fatal to man. Its food consists of worms, centipedes, the eggs of birds and lizards, frogs and other

small animals which its bite paralyzes or kills. Its anatomy is de¬ scribed in the (Proceedings 5 of the Zoological Society of London (1900).

ˆnn,? Hartley, American ac- tress . b. Rochdale, England, 21 Oct. 1821 ; d Chicago, Ill., 2 Dec. 1904. She was a graceful dancer in early life, and later became very suc¬ cessful in high comedy. She was married to George Henry Gilbert, a dancer, in 1846 She visited the United States in 1846, and in 1849 made her home here. In 1869 she became a member of the Augustin Daly's company, her especiai roRs being those of old women, in which she achieved very marked success. After Galy s death she was under the management of Charles Frohman, and later joined Miss Annie Russell s company. On 21 Oct. 1899, her birth¬ day was observed by her admirers by a special performance, a reception and the presentation

York T SerVne u the Lyceum Theatre, New

noon (?0nSxA-t her„ Stage Reminiscences5 (1901) ; also Winter, W.,

, GILBERT, Charles Henry, American ich

Dec °1859 aH edllcatorˆ b- Rockford, III., 5 Gee. 1839. He was graduated at Butler Uni-*

versity, Indiana, in 1879, and became professor

?0C°0lT0gy m the Leland Stanford University in 1891. In 1902 and 1906 he made important ex" plorations for the United States Fish Commis- sion and m 1909-13 conducted investigations for the Bureau of Fisheries. He is the au ho? of Synopsis of the Fishes of North America > S'1'1 Pav'd Starr Jordan (q.v) • 'The Dee'n Tm!) £ °905);*

cIercvmrmEU' HGeorge Holley, American

TTd educator: b. Cavendish, Vt 4

College 5 1878 Tf- gradaated, Horn Dartmouth 188ˆnrt Vltt ˆmo-n Theological Seminary 1883, and the University of Leipzig with the de¬ gree of Ph.D. 1885. On his return to America he became acting professor of New Testament Literature in Chicago Theological Seminary and

was professor from 1887—1901. He now resides at Dorset, Vt., devoting his time to literary work. He is the author of (The Poetry of Job) (1888);

(The Student's Life of Jesus) (1899); (The Student's Life of PauP (1899); (The Revelation of Jesus) (1900); (The First Interpreters of Jesus> (1901); (1902); (A Short His¬ tory of Christianity in the Apostolic Age> (1906); (Interpretation of the Bible, a Short History } (1908); (The Acts, the Second Vol¬ ume of Luke's work on the beginnings of Christianity > (in the (Bible for Home and School > series, 1908); (Jesus> (1912);

GILBERT, Grove Karl, American geol¬ ogist: b. Rochester, N. Y., 6 May 1843; d. 1 May 1918. He was graduated from the Uni¬ versity of Rochester in 1862 and was geologist of the United States Geological Survey from 1879. He published (Geology of the Henry Moun¬ tains' (1879-82) ; (Lake Bonneville) (1890) ; the volume (Glaciers and Glaciation (in the report of the Harriman Alaska Expedition. 1904) ; transportation of Debris by Running Water (1914) ; numerous reports issued under the direction of the United States government and numerous papers in scientific journals.*

GILBERT, Sir Humphrey, English navi¬ gator: b. Devonshire 1539; d. September 1583. He was a step-brother of Sir Walter Raleigh, studied at Eton and Oxford, and adopting the military profession, he served with reputation in France and Ireland. He was knighted in 1570, and sat in the House of Commons as member for Plymouth in the following year. Possessing a strong propensity for speculation and enterprise, he turned his attention to maritime exploration, projected voyages by both the northeast and northwest passages, and pub¬ lished (A Discourse of a Discovery for a New Passage to Cataia (1576) ; reprinted in Hakluyt's collection of voyages, Vol. III. In 1578 Sir Humphrey Gilbert obtained from the queen a patent empowering him to discover and colonize in North America any land then unsettled. His first voyage ended in failure, but in 1583 he sailed again with a small fleet, and on 5 August landed in Newfoundland, took possession of the harbor of Saint John's, and thus founded the first English colony in North America. He continued his explorations southward to Cape Breton Island, and on his return voyage to England in a small sloop was lost in a storm off the South Azores. Consult Hakluyt's (Voyages) ; Adams, (English Heroes in the Days of Elizabeth* (1902) ; (Lives) by Edwards (1868); St. John (1868); Tytlor (1833) ; Payne, (Voyages of the Elizabethan Seamen* (1880) ; Slafter, (Sir Humfrey Gyl- berte and His Enterprise* (1903).*

GILBERT, Sir John, English painter: b. Blackheath, near London, 21 July 1817; d. Blackheath, 5 Oct. 1897. In 1836 he began to exhibit both in oil and water colors; and in 1852 he was elected an associate, in 1854 a member, in 1871 the president of the Society of Painters in Water Colors, receiving at the same time the honor of knighthood. He be¬ came a royal academician in 1876 and a

chevalier of the Legion of Honor in 1878. His oil paintings include (Don Quixote and Sancho Panza; ; (Education of Gil Blas) ; (Murder of Becket ; (Joan of Arc Entering Orleans) ; (Crusaders* ; (Wolsey at Leicester* and Corn¬ ing of Agincourt.* He was a well-known and popular illustrator of books and of one of the pioneers of pictorial journalism. He presented a number of his later works to public galleries in England.*

GILBERT, Linda, American philanthro¬ pist: b. Rochester, N. Y., 1857 ; d. 1895. She be¬ came known for her work in the interest of prison reform and by her success in placing libraries in prisons. She was also foremost in obtaining the incorporation under the laws of the State of New York of the Gilbert Library and Prisoners' Aid Society.

GILBERT, Rufus Henry, American in¬ ventor : b. Guilford, N. Y., 26 Jan. 1832; d. New York, 10 July 1885. He was graduated at the New York College of Physicians and Surgeons; served as surgeon in the Fifth New York Infantry in the Civil War; and was ap¬ pointed superintendent and medical director of the United States army hospitals. Owing to the failure of his health after the war he abandoned his profession and engaged in the railroad busi¬ ness, making a special study of the needs of rapid transit in New York. The result was the erection (1878) of the Sixth Avenue Ele¬ vated Railway in that city.

GILBERT, William, English physician and physicist: b. 1540 at Colchester; d. 1603. At the age of 18 he entered Saint John's College, Cambridge, from which he graduated in 1560. In 1601, he was elected president of the Royal College of Physicians, an honor which was fol¬ lowed by his appointment as chief physician to Queen Elizabeth.

Gilbert's fame rests on the discoveries which he made in electricity and magnetism and which he tersely recorded in his work on the magnet (De Magnete magneticisque Corporibus, pub¬ lished in London in 1600. He devoted all the time he could spare from his professional duties during a period of 18 years to the researches described in this remarkable treatise, which re¬ searches he informs the (*

In magnetism, Gilbert recognizes the mag¬ netic field, the effects of heat, magnetic induc¬ tion and magnetic screening; but his cardinal discovery is that the earth itself is a great mag¬ net with its magnetic poles, equator and axis. He was led to this generalization by prolonged experiments with globular magnets, or terrellas, on which he poised small magnetic needles, find¬ ing that, however placed, they always pointed to the poles. He confirmed his theory by refer¬ ence to the prevalence of magnetic materials in the crust of the earth, the behavior of the com¬ pass-needle and the dip circle, and also by the magnetic condition of vertical masses of iron such as

the crosses of church-steeples.

Gilbert was an ardent advocate of the Coper- nican theory, and there is reason to believe that

his magnetic work was undertaken in its de¬ fense, convinced as he was that the revolution of the earth round the sun and its suspension in space would follow at once from the magnetic attraction of the other planets provided the earth itself could be proved to be a colossal magnet. Gilbert was belittled in De Augmentis Scienti- arumby Chancellor Baom, who was a staunch anti-Copernican, but was praised and admired by Galileo and Kepler. Two translations of (De Magnete) have been made, the first by P. Fleury Mottelay of New York (1893), and the second by the Gilbert Society of London (1900). Gilbert s work stands out as the second land¬ mark on magnetic philosophy, the first being a treatise on the lodestone by Peregrinus (q.v.) a.d. 1269.

GILBERT, Sir William Schwenck, Eng¬ lish dramatist: b. London, 18 Nov. 1836; d. 29 May 1911. He was a clerk in the Privy Coun¬ cil Office 1857-61, and in 1863 was called to the bar. He contributed to the magazines and was on the staff of Fun, in whose columns his celebrated (Bab Ballads began to appear in 1866. His burlesque 'Dulcamara* (1866) was followed by burlesques, dramas, comedies and fairy comedies. But it is the librettos of the Savoy operas, written with Sir Arthur Sullivan (q.v.) as musical composer, that form his en¬ during title to fame. The series began with (Trial by Jury* in 1875, ended with 'The Gon- doliers) in 1889, and included (The Pirates of Penzance, > 'The Mikado* and 'The Yeoman of the Guard } ; but a financial dispute with Sullivan and D'Oyly Carte, the producer, brought the series to a close. In his better-known works Gil¬ bert displays a whimsical humor that is often subtle, always healthy in tone, and his peculiar blend of humor with a genial cynicism earned for itself the title "Gilbertian.** (See Mikado, The; Patience; Pinafore; Bab Ballads).' Consult Fitzgerald, P., 'The Savoy Opera and the Savoyards * (1894).*

GILBERT ISLANDS, or KINGSMILL GROUP, a group of 18 islands in the south Pacific Ocean north and south of the equator and lying between long. 172° and 177° E. The area is 166 square miles. They are the most easterly of the groups collectively consti¬ tuting Micronesia and are of coral formation, all low, the highest land in the group not ex¬ ceeding 20 feet. The natives resemble the Malays. The whole group came under the

protection of Great Britain in 1892, but the islands have a limited self-government. Pop. 26,417 natives, and 446 foreigners.

GILBERTINES, The, a religious order founded about 1130 by Saint Gilbert (1083- 1189), a parish priest of Sempringham, Lincoln¬ shire, England. It was the only purely English order ever established prior to the Reformation.

In 1147 he also founded a congregation of priests and lay brothers. At the dissolution of the order in the reign of Henry VIII it numbered 22 convents. Consult Berthand, (Life of Saint Gilbert (Paris 1892) ; Graham, (Saint Gilbert of Sempringham and the Gilbertines> (1901).*

GILBOA, a chain of hills in Palestine, be¬ tween 500 and 600 feet high, overhanging the site of the ancient city of Jezreel and rising between the fertile plan of Esdraelon and the valley of the Jordan. It is memorable as the

scene of the defeat and death of King Saul and his three sons at the hands of the Philistines (1 Sam. 31; 2 Sam. i, 6; 1 Chron. x, 1-8).

*GILCHRIST, William Wallace, Amer¬ ican musician: b. Jersey City, N. J., 1846; d. 20 Dec. 1916. He was a pupil of Clarke at the Uni¬ versity of Pennsylvania, was an organist in Cin¬ cinnati 1872-73 and from that time was in Phila¬ delphia, where he became a member of the fac¬ ulty of the Musical Academy and a leader of choral societies in Eastern States. His setting of Psalm XLVI for solo voices, chorus, organ and orchestra obtained the prize for composition at the Cincinnati festival of 1882. Two years be¬ fore he had won the Mendelssohn Glee Club (New York) prize, with the composition 'Au¬ tumn Dreaming. * He was conductor of several important Eastern choral societies and his com¬ positions, particularly for the Church, are very widely known. Other important compositions aJe (Song of Thanksgiving,) arranged for chorus and orchestra; a cantata 'The Rose)*

(1887) ; the 'Ode to the Sun ; two symphonies in D and C and some chamber music ; two big oratorios. He received the degree of Mus.D. from the University of Pennsylvania in 1896.*

GILDAS, the earliest British historian. He seems to have been born in the early 6th century. He says that he was born in the same year that the battle of Mount Badon took place, which makes it about 516. From his famili¬ arity with the Bible it is evident that he was of some clerical order and his statement that he used foreign sources indicate that he spent some time on the Continent. According to the 'Cambrian Annals, > he died in 570. His book was written under the title 'Gildse Sapientis De Excidio et Conquestu

Britanise ; and has gone through many editions. It is a curious jumble of vague statements and erroneous conclu¬ sions and is of little historical value. The period covered begins with the invasion of Britain by the Romans and ends with the au¬ thor s time. The best edition is by Mommsen in 'Monumenta Germanise Historica Auctores Antiquissimi* (Berlin 1894)*

GILDER, Jeannette Leonard, American editor: b Flushing, N. Y., 3 Oct. 1849; d. New York, 17 Jan. 1916. Having entered journalism in 1869, she became editorially con¬ nected with Scribner's Monthly (the present Century Magazine), was a member of the New lork Herald staff as literary editor and later musical and dramatic editor ' (1875-80) and in 1881 with her brother, J. B. Gilder (q.v.), iounded and became editor of the Critic, a monthly review of literature, drama and art. .he Critic was a pioneer in its field and among its . contributors were many notable writers Using the pen name "Brunswick,® Miss Gilder was tor many years the New York correspond¬ ent of papers in Boston, Chicago, Philadelphia and other American cities. Her articles during this period made her well known as a jour¬ nalist. She wrote many magazine articles, short stories and plays. At the time of her death she was the editor and proprietor of the Reader, 'or book buyers. She was the editor ot Essays from the Critic > ; 'Representative Poems of Living Poets ; 'Pen Portraits of Literary Women) and 'Authors at Home.* She wrote 'Taken by Siege> (1886-96) ; 'The Auto-*

biography of a Tomboy> (1900), and

GILDER, Joseph Benson, American jour¬ nalist : b. Flushing, N. Y., 29 June 1858. After varied experience in journalism he with his sis¬ ter, J. L. Gilder, established the Critic , of which he became an editor. In 1895 he was appointed literary adviser to the Century Company and subsequently literary representative of Dodd, Mead and Company in London. He was later American dispatch agent, London (1902-04) ; editor of Putnam's Mag a zinc (1906-10) and of the New York Times (Review of Books) (191 0— 11). Since 1914 he has been secretary of the Industrial Finance Corporation. He is also editor of (The American Idea)(1902) ; Andrew Carnegie's (Gospel of Wealth) (1900); John Hays, ^Addresses (1906) ; and James Russell Lowell's (Impressions of Spain* (1899).*

GILDER, Richard Watson, American ed¬ itor and poet: b. Bordentown, N. J., 8 Feb. 1844; d. New York, 18 Nov. 1909. He was a private of artillery during the campaign in Pennsylvania (1863) and later managing editor of the Newark (N. J.) Advertiser. He sub¬ sequently established, with Newton Crane, the Newark Register , was editor of Hours at Home , a monthly of New York and when this was merged in Scribner's Monthly became managing editor of the latter (1870). In 1881 he succeeded J. G. Holland (q.v.) as editor-in- chief of the Monthly, in which capacity he remained after it became the present Century Magazine. He was prominently identified with public affairs as chairman of the New York Tenement-House Commission (1894), member of the council of the National Civil Service Reform League and other posts and was a founder of the Authors' Club, the International Copyright League and the Society of American Artists. The best of his verse, most of which originally appeared in magazines, was collected in (Five Books of Song) (1894). Later vol¬ umes are (In Palestine and Other Poems) (1898), and (Poems and Inscriptions (1901). Consult Gilder, R., (Letters of Richard Watson Gilder* (1916).*

GILDER, William Henry, American jour¬ nalist and Arctic explorer : b. Philadelphia, 16 Aug. 1838 ; d. 1900. He served in the Civil War and was brevetted a major at its close. He accompanied Lieutenant Schwatka in 1878 on a polar expedition and in 1881 was a member of the Rodgers expedition as a correspondent of the New York Herald. His chief works are (Schwatka's Search (1881); (Ice Pack and Tundra* (1883).*

GILDERSLEEVE, Basil Lanneau, Amer¬ ican classical scholar : b. Charleston, S. C., 23 Oct. 1831. He was graduated at Princeton in 1849 and studied in Germany for several years. He was professor of Greek at the University of Virginia from 1856 to 1876, when he was appointed professor of Greek at Johns Hop¬ kins University. He founded and edited the American Journal of Philology and published among other works (A Latin Grammar (1867, 1894, 1899) ; (Satires of Persius Flaccus> (1875) ; (Justin Martyr* (1875) ; (Odes of Pin¬ dar* (1885) ; (Essays and Studies) (1890) ; (Hellas and Hesperia* (1909) ; and, with C. W.*

E. Miller, (Syntax of Classical Greek from Homer to Demosthenes) (New York, Part I in 1900 and Part II in 1911).

GILDING, the art of applying and per¬ manently altaching gold leaf or gold dust to surfaces of wood, stone, metals, etc. The Egyptian monuments present numerous traces of the existence of the art in ancient Egypt. I he process seems to have been the same with that now used. The Persians also were ac¬ quainted with this art as appears from the ruins of Persepolis. The Greeks and Romans em¬ ployed gilding for many purposes. The Greeks used to gild the hoofs and horns of victims. The practice of gilding

statues prevailed in the infancy of the art of sculpture and was never entirely dropped by the ancients. The Romans used to gild sweetmeats and many articles of furniture and utensils which have come down to us are gilt. Ihere are also specimens of gilt glass and metals. The gilding which still re¬ mains on some ancient bronze monuments is remarkable for its brilliancy. The ancients car¬ ried the practice of gilding to a greater extent than the moderns; they gilded almost all their statues of bronze, wood or plaster and fre¬ quently those of marble, the ceilings of rooms and even marble columns. The most remark¬ able examples of gilding employed with taste and effect in architecture are the ceiling of Saint Peter's and that of Santa Maria Mag- giore.

The art of gilding at the present day is per¬ formed on metals, or on wood, plaster, leather, parchment, paper, glass, etc. Chemical proc¬ esses are jhose which are usually employed for metals. Gilding on copper is performed by the process called wash or water gilding, with an amalgam of gold and mercury. The surface of the copper, being freed from oxide, is covered with the amalgam and afterward exposed to heat till the mercury is driven off, leaving a thin coat of gold. Copper, however, is rather too soft and dark-colored a metal to be treated in this way with advantage. Brass is a very suitable metal for this mode of gilding, but the best of all is a mixture of copper with one- seventh of brass. Copper, brass, etc., are gilded by being attached to wires and plunged into a mixture, where they are allowed to remain as long as the workman thinks necessary, from a few seconds to a minute when the mixture is newly prepared, but longer if it has been used for some time. Gilding is also performed by dipping a linen rag in a saturated solution of gold, and burning it to tinder. The black powder thus obtained is rubbed on the metal to be gilded with a cork dipped in salt water till the gilding appears. Iron or steel is gilded by applying gold leaf to the metal, after the surface has been well cleaned and heated till it has acquired the blue color which at a cer¬ tain temperature it assumes. Several leaves of gold are thus applied in succession, and the last is burnished down cold. The same process may be applied to copper. The operation of gilding may also be performed on iron and steel by diluting the solution of gold in nitro- hydrochloric acid with alcohol and applying it to a clean surface. A saturated solution of gold in nitro-hydrochloric acid, being mixed with three times its weight of sulphuric ether, dissolves the chloride of gold and the solution

is separated from the acid beneath. To gild the steel it is merely necessary, the surface being previously well polished and cleaned, to dip it in the

ethereal solution for an instant, and on withdrawing it to wash it instantly by agitation m water. Before being gilded, masonry must be rendered waterproof by means of a solution of shellac and gutta percha in naphtha or some other coating.

_ Gilding on wood, plaster, leather, parchment or paper is performed by different processes of mechanical gilding. The first of these is oil gilding, m which gold leaf is cemented to the woik by means of oil size. In the case of paper or vellum the parts to be gilded receive a coat of gum water or fine size to render them non¬ absorbent, and the gold leaf is applied before the parts are dry. They are afterward bur¬ nished with agate. Lettering and other gilding on bound books are applied without size. The gold leaf is laid on the leather and imprinted with hot brass types. Brass rollers with thin edges are employed in the same way for lines, and similar tools for other ornaments. When the edges of the leaves of books are to be gilded they are first cut smooth in the press, after which a solution of isinglass in spirits is laid on, and the gold leaf is applied when the edges are in a proper state of dryness.

J apanner s gilding is another kind of mechanical gilding which is performed in the same way as oil, gilding, except that instead of gold leaf a gold dust or powder is employed.

Porcelain and other kinds of earthenware as well as glass may be gilded by mixing a layer of gold in a powdered state by the action of fire. The gold dust or powder required in this opera¬ tion may be obtained by precipitating it from a solution m aqua regia, either by means of sul¬ phate of iron or protonitrate of mercury. In order that the gold powder may be applied to the sui face of the article to be gilded it must be well mixed with some viscous vehicle such as spirits of turpentine mixed with some fatty mat¬ ter, or strongly gummed water. It is then laid on with a fine camel's hair brush. When the article to be gilded is made of soft porcelain, delft-ware, or any kind of earthenware with a plumbiferous glazing, nothing else is required than to apply the gold in this manner, and then subject the piece of earthenware to a heat suffi¬ cient to soften the glazing, and thus fix the gild¬ ing. But in the case of hard porcelain, some kinds of stoneware and other varieties of pot¬ tery, in which the glazing does not soften at a suitable temperature, the gold powder, before being mixed with the viscous vehicle by which it is applied, must have a flux added to it, which serves as a means of attachment between the metal and the earthenware. The best flux is oxide of bismuth precipitated by water from a solution of nitric acid, with the addition of one-twelfth part of melted borax. One-tenth or one-fifteenth part of this flux is added for every part of gold contained in the mixture, which is applied to the surface of the earthen¬ ware. Heat is applied in the same way as in the previous case to melt the flux, and thus

fix the layer of gold to the article. The gilding must finally be burnished in order to bring up the gold color. Another method of gilding these substances is to mix neutral chloride of plati¬ num with rectified spirits of turpentine in such a mannei that the chloride is held in suspension

in a finely divided state in the turpentine, to apply this liquid to the article to be gilded by means of a brush, and then to subject the article to heat so as to volatilize the spirits of turpentine and leave a uniform layer of platinum affixed to the glass or earthenware. The article, after being cooled, cleaned with aqua fortis and washed with water, is next dipped in a gilding liquid ; the gilding is then completed by rubbing the gilt parts with chamois leather. This method of gilding has the advantage of enabling the gilder to dispense with the burnishing, which is a very hazardous operation for fragile articles, and in the case of those which are of a very intricate form or very deeply cut out often im¬ practicable.

It was announced in 1912 that the brothers Marino, Italian chemists, had invented a process whereby metals and metallic alloys can be de¬ posited on other metals, ceramic ware, wood, celluloid and other substances by electric agency. In the case of glass, for example, the surface to be metallically mounted is first subjected to sand blasting, to remove the polish and give the metal a grip. This abrased part is then chemically treated, so that when the article is suspended in the electro-plating bath, the metal, whether it be of gold, silver or any other metal or its alloy, is attached and forms an integral part of the foundation. See Metallurgy.

a country on the east side of the Jordan at one time a portion of the kingdom of Israel. Its exact area is doubtful ; but the southern bound- ary, the nver Arnon, and the western boundary the Jordan River, are well defined. The Yar- muk is given by some as a northern boundary • and some historians mention the country of Gilead as extending to the shores of the sea of Galilee and the plains of Bashan. The eastern boundary was «the desert.» It is a mountainous country traversed by many small streams which ow into the Jordan. All the mountains are mentioned frequently as fountains of Gilead »

aiJd °?e 9alled in ancient history, «Mount

of Gilead/0 This peak is thought to be the one now known as Jebel or Djabal (mount) Osha. I he soil is fertile and the vegetation generally luxuriant and the region is well wooded and well watered. The low round mountains or hills are no hindrance to cultivation as practised by t le native inhabitants. A considerable portion }??voted to pasturage and large herds of cat-

I!mi flaCks °f S£eej? graze on the hillsides and table-lands as in the times mentioned in the Old

Testament The true balm of Gilead was a

product of the. B alsamodendron gileadense, now

MtinCt !t Palestine> hut still cultivated about Mecca. It was probably a native of East

■ i, • Tm te,reblnth tree and the oak still J bb k m Gl ead> orally in the valley of the

nr u r • V- ,,clonea irequently ln the g;ble

Much of its history before the birth of Christ

anf Mn ‘ Klhe °‘d TeStament In Deuteronomy and Numbers may be found an account of the

conquest of the country and the transfer of a

part Reuben and Gad. In Judges and Kings

JLacreC-°rd °f th,e ™ars waged uP°n Gilead by

the Syrians, the Midiamtes and the Ammonites7 and finally the victory of the Assyrians. The flight of Absalom is given in 2 Sam. xiii In 1

thTsonf nfS c” 1account1°.f the battle in which the sons of Saul were slain, and of Saul’s own

GILES — GILGAMESH EPIC

053

death. It is there told that <(the valiant men of Jabesh-Gilead arose and went all night, and took the body of Saul and the bodies of his sons from the wall of Beth-Shan,® and burned them according to the custom of the times. And afterward these ((valiant men® fasted several days. The chief cities of Gilead were Jazer, Mizpeh, Mahanaim, Penuel and Succoth. * Con¬ sult Oliphant, Lawrence, (The Land of GileacP (London 1880).

GILES, jllz, Saint (Saint Aegidius), a na¬ tive of Greece, who, according to legend, lived in the 7th century. He gave all his property to the poor, and went to France, where he lived in solitude for many years. Finally he permitted companions in his retreat, and founded a house of the

Benedictine order. A town grew up around it, and was called Saint Giles. The saint is the patron of many churches in France, Ger¬ many, Scotland and Poland.

GILES, William Branch, American poli¬ tician: b. Amelia County, Va., 12 Aug. 1762; d. Albemarle County, Va., 4 Dec. 1830. He was educated at Hampden-Sidney College and at Princeton, studied law and practised at Peters¬ burg, was a member of the Federal House of Representatives in 1790-98 and 1801-02, and of the Senate in 1804-15. In 1827-30 he was gov¬ ernor of Virginia. Originally a Federalist, he later became a Republican, and was the leader of his party in the Senate 1804—11. He took a prominent part in the Virginia Constitutional Convention of 1829-30. He was an effective speaker, assertive in methods and frequently broke with his party, in which he finally lost influence. His (Political Letters to the People of Virginia) appeared in 1813.

GILES, Saint (Saint Giles in the Fields),

a parish in London in the metropolitan borough of Holborn, a mile to the northwest of Saint Paul's. The church is in classical style, and contains the remains of Chapman, Shirley, Mar¬ vell, Lord Herbert of Cherbury and Sir Roger L'Estrange. One district of it, by its poverty and wretchedness, long formed a very striking contrast to the west end of the metropolis, so that Saint Giles and Saint James were spoken of as typical of wretchedness and luxury, respec¬ tively. There is another London church of Saint Giles, called Saint Giles Cripplegate, which contains the tomb of Milton.

GILFILLAN, George, Scottish writer: b. Comrie, Perthshire, 30 Jan. 1813; d. 13 Aug. 1878. He received his education at Glasgow University, studied theology at The Divinity Hall of the Secession Body and was ordained in 1836. He accepted a pastorate at the School Wynd Church, Dundee, where he remained until his death. His first publication was a volume of sermons (1839), followed by Gal¬ lery of Literary Portraits) (1846), and a second and third He was most popular as a lecturer and preacher.

GILGAL, gil'gal, the name of several an¬ cient towns near the Jordan, where the Israelites passed the river into Canaan, where they were circumcised and held the first Passover after leaving the desert (Joshua iv, 19). Here rested

the tabernacle, till removed to Shiloh ; here Samuel held court as judge of Israel, and here Saul was crowned. It is frequently mentioned in the Bible; a school of the prophets was es¬ tablished here (2 Kings iv, 38), yet it afterward became a seat of heathen worship (Amos iv, 4). Josephus places one of the towns within two miles of Jericho, but no traces of it are at this

day extant.

GILGAMESH EPIC, the story of the tra¬ ditional hero of Babylonia, found in the library of Ashurbanabal. It originally included 12 tablets and 3,000 lines, about half of which are now available. The name of the hero was at first rendered ((Izdubar,» until a key was dis¬ covered by Pinches which indicated that ((Gil- gamesh® was the proper equivalent. The story has as its basis a mingling of mythological mat¬ ter with historical tradition, just as one finds in various national epics. Gilgamesh is evidently regarded as a demigod and as a great ruler at the same time. The scene of the story centres about the city of Uruk or Erech in Babylonia. The first tablet describes various misfortunes which have fallen on the city. In the second, Gilgamesh comes forward as the hero into whose hands the place has fallen. To resist his ruthless treatment, the goddess Aruru, the creator of the hero, is appealed to to create a creature to resist the mighty conqueror. Ac¬ cordingly, Eabani, a wild man, is made. But Gilgamesh, by the use of Ukhat, a courtesan, succeeds in winning over Eabani, who becomes his valuable assistant in all of his enterprises, chronicled in the third and fourth tablets. They conduct a campaign against Khumbaba, and succeed in capturing the wonderful grove there. Very little of the fifth tablet has been pre¬ served, but in the sixth, a new phase is de¬ veloped. The wily goddess, Ishtar, the ((crea- tor® goddess, who has become notorious for de¬ stroying those whom she has made to love her, endeavors to induce Gilgamesh to wed her. This he refuses, and for this insult loses his chance for immortality. Ishtar, angered, seeks the aid of her father, Anu, the ruler of heaven, in gaining retribution. Anu creates a huge bull to destroy Gilgamesh, but this plot is unsuc¬ cessful. Eabani and the hero vanquish the bull, and his horns are sent to Lugal-Marada, the patron of the hero, amid general rejoicing. However, here the climax of the hero's glory is reached. A grave calamity befalls him in the death of Eabani, and his great strength be¬ gins to decline. Fearing lest the same disease destroy him also, Gilgamesh goes forth in search of Parnaphistim, son of Kidin Marduk, to seek the gift of immortality. The way to the god lies first through a vast desert, in¬ habited by scorpion men, and thence across a mighty sea, guarded by the goddess Sabitum, who refuses Gilgamesh passage, except on the condition that he gain the guidance of Ardi-Ea, the ferryman of Parnaphishtim. Gilgamesh is successful in securing the services of the boat¬ man and together they come to the dwelling- place of the immortal god. Here, however, the hero is told that no mortal may escape death, and though sympathy is offered, nothing is ac¬ complished. The long story of how Parnaphis¬ tim gained immortality is interposed at this point, in answer to the queries of Gilgamesh. At the advice of Ea, Parnaphistim escaped a

dangerous flood by building a houseboat for himself and his family, and when the storm ceased, Bel, who was the author of it, endowed Parnaphistim and his family with immorality, permitting him to live forever at the con¬ fluence of the four rivers, where lay the tradi¬ tional Paradise of the Babylonians and Hebrews. The parallel between this storm story and the narrative of the deluge in the Hebrew Bible is obvious. Probably both were derived independently from separate in¬ terpretations of the narrative of the destruc¬ tion of a great city or district. The wife of Parnaphistim prepares, at her husband's bid¬ ding, a magic food which partly cures Gilga- mesh of his disease ; and then, after bathing in the waters of the fountain of life, he finds himself completely restored. Before he sets out to return to his native land, the hero is informed of a certain thistle-like plant which will restore his youth. His search for this is successful; but just as he is about to take pos¬ session of the wonder-working herb, an evil demon disguised as a serpent steals it from him. He returns to his native city, weary and penitent, and thus the eleventh book ends.

The twelfth book deals with the search of Gilgamesh for knowledge of the life hereafter. He calls upon Eabani to reveal the secret to him, and, with the consent of the god Nergal, is granted an interview with his lost companion. Eabani describes the gloomy abode of the afterworld, and tells of the various futures that await the dead, according to the manner of their ends. With this picture, the entire epic is brought to a close.

In this story, one finds a curious blending of the philosophy, history, mythology and re¬ ligion of ancient Babylonia. In frequent re¬ countings of the tale, doubtless new stories and interpretations were interspersed, until it reached the form in which it has come down to us. Allegorically, the whole poem takes on the aspect of the mystical life of man — his search for the secrets of life, death and immortality. Created by the gods, he acquires for his assist¬ ance crude force and power, by means of which he is able to conquer his enemies and establish his greatness. But this strength leaves him, and he is left diseased and desti¬ tute. Of disease he is able to cure himself; but then, he finds himself face to face with the inevitability of death, gloomy and terrible in its outlook. •

To what extent the Gilgamesh epic in¬ fluenced the story of Nimrod in the Hebrew Bible is difficult to determine, though com¬ parisons are profitable in revealing similarities.

It is interesting to note also that the exploits of Hercules in the Greek legends had several points in common with those of Gilgamesh ; and that in the legendary career of Alexander the Great, several incidents in the life of

the Babylonian hero are incorporated. Consult Haupt, Paul, (Das Babylonische Nimrodepos) (Leipzig 1884-91); Sauveplane, F., (Une Epopee Babylonienne, Ishtubar-Gilgames) (Pans 1894) ; Jastrow, (Religion of Babylonia and Assyria > (Boston 1898) ; Sayce, (Edinburgh 1903) ; Meissner, B., Alexander and Gilgamos) (Leipzig 1894).

Rose Boochever,

Editorial Staff of The Americana.

GILL, gil, Sir David, Scottish astronomer: b. Aberdeen, 12 June 1843; d. 24 Jan. 1914. He was chief of staff of the private observatory of Lord Lindsay (afterward the Earl of Crawford) at Dunacht, founded in 1870; in charge of Lindsay's expedi¬ tion to Mauritius in 1874 to observe the transit of Venus and the opposition of Juno, by means of the heliometer, for the de¬ termination of the solar parallax. He deter¬ mined the longitudes of Malta, Alexandria, Suez, Aden, Bombay, Seychelles, Reunion, Mauritius and Rodriguez by cable and chro¬ nometers, and measured the first base-line for the Egyptian triangulation at the request of the khedive. In 1877 he was in charge of the ex¬ pedition to Ascension to observe the opposition of Mars for parallax; and was director of the observatory at Cape of Good Hope, 1879 to 1907. In 1896 he originated and carried through the geodetic survey of Natal and Cape Colony and in the following year that of Rho¬ desia. He introduced the cataloguing of the stars by the aid of photography. He contrib¬ uted largely to the literature of astronomy, and was the author of the (History of the Royal Observatory, Cape of Good Hope) (1913).

*GILL, John, Baptist minister: b. Ketter¬ ing, Northamptonshire, 23 Nov. 1697; d. Cam¬ berwell, 14 Oct. 1771. He was practically self- eaucated, and at the age of 19 began to preach. His first regular pastorate was at the Baptist congregation at Horsleydown in Southwark. Here he remained from 1719 to 1757, when he became pastor at a chapel near London Bridge. He lectured at Great Eastcheat also from 1729- 56. The University of Aberdeen awarded him the degree of D.D. in 1748. His works include (Exposition of the Song of Solomon) (1728) * (lhe Prophecies of the Old Testament Re¬ specting the Messiah > (1728); (4 vols., 1731) ; Exposition of the Bible* (10 vols., 1 7 46—66) . He left a fine collection of Hebrew and Rabbinical literature, and on the subject of the Hebrew language wrote*

GILL, Theodore Nicholas, American edu¬ cator: b. New York, 21 March 1837; d. 1914. He became professor of zoology in Columbian (now George Washington) University in 1884. His publications include (Synopsis of Fresh Water Fishes) (1861); (Arrangement of the Families of Mollusks>

(1871); Catalogue of the Fishes of the East Coast of North Amer- lSa>.i18£3) ; (Bibliography of the Fishes of the Pacific Coast of the United States to the End

J (T?82rh (Pnnaples of Zooffe°graphy

(1884) ;

Scatophagoid Fishes (1891); < Notes on the*

TetradontmdeaC (1892) ; < Parental Care among

Fresh Water Fishes > (1906) ; and, with Elliott

Coues, Material for a Bibliography of North

American Mammals > (1877).

GILL NET, a net suspended vertically, by means of floats, and leaden weights, in standing °r running water, fresh or salt. It has meshes which allow the head of the fish to pass, but are

too small for the body beyond the gills to get through, and when the captive tries to draw back, catch in the gills, from which no effort can disentangle them.

GILLEM, Alvan Cullem, American sol¬ dier: b. Jackson County, Tenn., 1830; d. near Nashville, Tenn., 2 Dec. 1875. He was gradu¬ ated from the United States Military Academy in 1851, served in the Seminole War (1851-52), in the Civil War became brevet colonel. United States army, and brigadier-general of volunteers, and upon the reorganization of the State gov¬ ernment of Tennessee was vice-president of the convention for revision of the constitution and a member of the first legislature of the new regime. In 1867-68 he commanded the district of Mississippi. . He attained the rank of colonel and brevet major-general in the regular service.

GILLENIA, ji-le'ni-a, or PORTERAN- THUS, a North American perennial genus of Rosacea, closely allied to Spircea, embracing only two known species; also called Indian physic, bowman's root and American ipecac. See Bowman's Root.

GILLESPIE, gi-les'pi, Eliza Maria, Amer- can philanthropist: b. near West Brownsville, Washington County, Pa., 21 Feb. 1824; d. Notre Dame, Ind.,

4 March 1887. In 1853 she be¬ came a member of the congregation of the Holy Cross, and after a novitiate in France was ap¬ pointed in 1855 superior of the Saint Mary's Academy, Bertrand, Mich. She later trans¬ ferred the academy to its present location, Saint Mary's, Ind., and established nearly 30 similar institutions in the United States. During the Civil War she directed from Cairo, Ill., an im¬ portant hospital work for Federal soldiers. Upon the separation of the congregation of .the Holy Cross in the United States from the order in Europe she was for two terms superior.

GILLESPIE, George de Normandie,

American Protestant Episcopal bishop: b. Goshen, N. Y., 15 June 1819; d. Grand Rapids, Mich., 19 March 1909. He was graduated from the General Theological Seminary in New York in 1840, entered the ministry and held rectorates at Leroy, N. Y. ; Cincinnati, Ohio ; Palmyra, N. Y., and Ann Arbor, Mich. In 1875 he was consecrated bishop of Western Michigan. He published many religious works.

GILLETT, Ezra Hall, American clergyman and educator: b. Colchester, Conn., 15 July 1823; d. New York, 2 Sept. 1875. He was grad¬ uated at Yale College in 1841 and from Union Theological Seminary in 1844. For the next 25 years he was pastor of a Presbyterian church in Harlem, New York city. In 1868 he became professor of ethics, political economy and his¬ tory in New York University and served until his death. His extensive library containing a very complete collection on the Deistic Con¬ troversy is the property of Union Theological Seminary. He was the author of many arti¬ cles contributed to the theological reviews, and author of (The Life and Times of John Huss' (2 vols., 1861) ; (Life Lessons in the School of Christian Duty' (1864) ; (History of the Pres¬ byterian Church in the United States' (2 vols., 1864) ; (England Two-hundred Years Ago'

(1866) ; (What Then, or the Soul's Tomorrow' (1866); (Ancient Cities and Empires: Their Prophetic Doom' (1867) ; and an authoritative work on the Deistic Controversy — (God in

Human Thought' (2 vols., 1874) ;

GILLETTE, William, American actor and playwright: b. Hartford, Conn., 24 July 1855. He took special courses of study at the Univer¬ sity of New York, Massachusetts Institute of Technology and the University of Boston while playing in stock companies. From 1877 de¬ voted himself zealously to work on the stage, playing with different stock companies in New Orleans, Boston, New York and other cities. He has since then acted important parts in many of his own plays. Among his best-known

productions are (The Professor' (1881) ; < Es¬ meralda' (1881), with Mrs. F. H. Burnett; (The Private Secretary' ; (Held by the Enemy' (1886) ; A Legal Wreck' (1888) ;

GILLIS, gills, James Melvin, American astronomer: b. Georgetown, D. C, 6 Sept. 1811; d. Washington, D. C., 9 Feb. 1865. He en¬ tered the navy in 1827, soon obtained leave of absence and was graduated at the University of Virginia, and then spent six months in study in Paris. He was in charge of the observation of occultations and transit observations made in connection with the Wilkes exploring ex¬ pedition, Gillis making the observations at the Washington end at a little observatory on Capitol Hill. He had charge of the United States astronomical expedition to the southern hemisphere, and in 1861 was appointed superin¬ tendent of the national observatory at Wash¬ ington, D. C. He published Astronomical Ob¬ servations' (1846) ; (Report of the United States Astronomical Expedition of 1849-52'

(1855).

GILLIS LAND, an Arctic region north of Spitzbergen, first sighted in 1707 by Gillis, a Dutchman, in lat. 81° 30′ N. and long. 36° E., but not visited by him. Some geographers identify it with King Charles or Wiche Land, one of the Spitzbergen group.

GILLMAN, Henry, American botanist : b. Kinsale, Ireland, 16 Nov. 1833; d. Detroit, Mich., 30 July 1915. He settled in Detroit, Mich., in 1850; and was United States consul at Jerusalem in 1886-91. During his consulate he so strongly opposed the Turkish govern¬ ment in its expulsion of Jews from Palestine that several European countries supported him, and the exclusion laws were modified. He is best remembered for his researches in archae¬ ology and botany and his procurement and pub¬ lication of photographic facsimiles of texts of early Christian MSS., including the Didache. He published (The Wild Flowers and Gardens of Jerusalem and Palestine' (1894) ; (Hassan' (1896); (Vericourt Westhrop and Issue' (1903) ; also many scientific and other papers, including (The Ancient Men of the Great Lakes'; (Is a Variety an Incipient Species?'; Adonis in Livery' ; (Under the Sign Taurus' ; (Gilbert Jervis,' etc.

GILLMORE, Quincy Adams, American military officer : b. Black River, Lorain County, Ohio, 28 Feb. 1825 ; d. Brooklyn, N. Y., 7 April 1888. He was graduated at West Point in 1849; promoted captain in 1861, and brigadier- general of volunteers in 1862. He displayed skill as an engineer by the capture of Fort Pulaski in April 1862, and was appointed com-

mander of the Department of the South in June 1863. He made a successful attack on Morris Island in July 1863, began to bombard Fort Sumter and Charleston in August, and took Fort Wagner in September; Fort Sumter was reduced to a ruinous condition, but its garrison continued to hold it till 17 Feb. 1865. General Gillmore commanded the Tenth corps near Richmond in 1864, and was brevetted major-general, United States army, in 1865.

GILLOTT, jil'ot, Joseph, English manufac¬ turer: b. Sheffield, 11 Oct. 1799: d. Birmingham, 6 Jan. 1872. He shares with Sir Josiah Mason the credit of having brought the manufacture of steel pens to its present state of high per¬ fection.

GILLS, the breathing organs of fishes, larval amphibians, crustaceans and certain other aquatic animals. See Respiratory System, in article Anatomy, Comparative; also Fish.

GILLYFLOWER, a popular English name for some of the cruciferous plants most prized for the beauty and fragrance of their flowers, as the wallflowers and stocks ; also for Hesperis matronalis , dame's rocket or dame's violet (q.v.). The name gillyflower has been re¬ garded as a corruption of July-flower; but in Chaucer it appears in the form gilofre ; and the French giro flee indicates the true derivation from girofle, a clove, the smell of the clove- gillyflower, or clove-pink, having suggested the name of that flower.

GILMAN, Arthur, American educator: b. Alton, Ill., 22 June 1837; d. 28 Dec. 1910. He was engaged in banking in New York 1857- 62, when he removed to Lenox, Mass., and de¬ voted himself to literary and educational work until he went to Cambridge in 1870. He was the originator (1876) of the Harvard Annex, of which he became executive officer, and, upon its organization as Radcliffe College, re¬ gent. In 1886 he founded and became director of the Cambridge school for girls, known as the Gilman School. He edited Chaucer's works (1879) and other collections, collaborated in several volumes of the (Stories of the Nations > series, and wrote a number of educational works, chiefly historical in character, such as (The Story of Rome) (1886); (The Coloniza¬ tion of America) (1887).

GILMAN, Caroline Howard, American author: b. Boston, 8 Oct. 1794; d. Washington, D. C., 15 Sept. 1888. In 1819 she was married to the Rev. Samuel Gilman (q.v.) and removed with him to Charleston, S. C., where she began to edit in 1832 the Rosebud, a juvenile weekly newspaper, which

subsequently took the name of the Southern Rose, and contained articles of much literary merit. From this periodical she reprinted at different times the Recollec¬ tions of a New England Housekeeper (1835) ; Recollections of a Southern Matron) (1836) ; Ruth Raymond, or Love's Progress) ; Roetry of Traveling in the United States) ; < Verses of a Lifetime* ; (Mrs. Gilman's Gift Book) ; and other volumes. The first two of these works attracted particular attention by their practical lessons as well as their genial simplicity and humor, and passed through many editions. She was especially successful, also, in her books for children.*

GILMAN, Charlotte Perkins Stetson,

American lecturer and writer: b. Hartford, Conn., 1860. She is a daughter of Frederic Beecher and was married to G. H. Gilman in 1900. She is a prominent advocate of equality for women and has published (Woman and Economics (1898) ; (In This Our World, * a book of verse (1898); (The Yellow Wall PapeU (1899); 'Concerning Children) (1900); (What Diantha Did> (1910);*

uaniel Uoit, American edu¬ cator: b. Norwich, Conn., 6 Tuly 1831; d. there, 13 Oct. 1908. He was graduated at Yale Col¬ lege in 1852; was professor of phvsical and political geography in Yale in 1856-72; and president of the University of California 1872- 75. When Johns Hopkins University was founded in Baltimore, Md., in 1875, he was elected its first president and served in that capacity till 1901, when he resigned. In 1896-97 he was a member of the commission to settle the boundary line between Venezuela and British Guiana, and in the latter year also served on the commission to draft a new char¬ ter for Baltimore. He was president of the American Oriental Society 1893-1906, and vice- president of the Archaeological Institute of America, executive officer of the Maryland Geological Survey and president of the Na¬ tional Civil Service Reform League from 1901 to l,9?7' He wrote Rife of James Monroe

ˆ■ˆMAN, John Taylor, American states¬ man: b. Exeter, N. H., 19 Dec. 1759; d. there 31 Aug. 1828. In 1775, on the morning after the news of the battle at Lexington and Con¬ cord reached Exeter, he marched with 100 other volunteers to Cambridge, Mass., where he served in the provincial army. In 1782 and 1783 he was a member of the Continental Con¬ gress, and in 1797 he was chosen governor of New Hampshire, and was annually re-elected for 10 successive years. In 1813-14-15 he was. again elected governor, after which he declined to be a candidate. He was a zealous Federalist and his popularity in New Hampshire was so great that he was frequently chosen governor when his party was in the minority.

GILMAN, Nicholas, American statesman : b Exeter, N. H,, 3 Aug. 1755; d.

Philadelphia, 2 May 1814. He was a brother of J. T. Gil¬ man (q.v.) and like him served in the Con¬ tinental army during the War of the Revolu¬ tion. He represented New Hampshire in Con¬ gress in 1786, and again 1789-97, and was a L mted States senator 1805—14. He was one of

the framers of the Constitution of the United States.

GILMAN, Samuel, American clergyman and author: b. Gloucester, Mass., 1791; d. 1858. He was educated at Harvard LIniversity, where he wa'j graduated in 1811. Eight years later he was made pastor of a Unitarian church in Charleston, S. C. He continued in this post until his death; was a great promoter of tem¬ perance and an excellent pulpit orator. He married Caroline Howard, daughter of Samuel Howard. His published works are (Memoirs of a New England Village Choir> (1829);

GILMER

GILPIN

057

/PifoxUreS and Pains o£ a Student's Life> (1852) ; 'Contributions to Literature, Descrip¬ tive Critical, Humorous, Biographical, Philo¬ sophical and Poetical) (1856) ; also translations from Boileau and articles in periodicals.*

GILMER, Jeremy Francis, American soldier: b. Guilford County, N. C, 23 Feb. 1818; d. 1 Dec. 1883. He was graduated at West Point and entered the engineer corps of the United States in 1839. At the opening of the Civil War he resigned his captain's com¬ mission and entered the Confederate service, becoming major-general in 1863.

GILMOR, Harry, American soldier: b. Bal¬ timore County, Md., 24 Jan. 1838; d. Baltimore, 4 March 1883. He entered the Confederate army at the beginning of the Civil War, became known for his exploits as scout, in 1863 raised a battalion of horse of which he was made major, and later in that year, in command of the First Maryland Confederate regiment, cap¬ tured Frederick, Md., and Chambersburg, Carlisle and Gettysburg, Pa. In 1864 he led Early's advance into Maryland. He was elected Baltimore's police commissioner in 1874, and wrote (Four Years in the Saddle5 (1866).

GILMORE, James Roberts (Edmund Kirke), American editor and writer: b. Bos¬ ton, Mass., 10 Sept. 1822; d. 1903. He was at first in mercantile life, subsequently entering journalism and literature, and his earlier works were written under the pseudonym, ((Edmund Kirke.® He wrote (Among the

Pines) (1862) ; 'My Southern Friends5 (1862) ; (Down in Tennessee5 (1863); Wife of Garfield5 ; (Among the Guerrillas5 ; (Adrift in Dixie5 (1863) ; (On the Border5 ; 'Patriot Boys5 ; (The Rear-Guard of the Revolution ; 'John Sevier as a Com¬ monwealth Builder5 ; 'The Advance-Guard of Western Civilization5 (1888) ; (Personal Recol¬ lections of Abraham Lincoln and the Civil War5 (1898), etc.

GILMORE, Joseph Albree, American poli¬ tician : b. Weston, Vt., 10 June 1811; d. Con¬ cord, N. H., 17 April 1867. He became super¬ intendent of various New Hampshire railway lines, was elected to the State senate in 1858 and re-elected in 1859. In 1863 he was elected governor by the legislature, and in 1864 re¬ elected by popular vote. His energy increased the troops furnished by New Hampshire to the Federal armies from 15,500 to 33,258.

GILMORE, Patrick Sarsfield, American musical conductor: b. near Dublin, Ireland, 25 Dec. 1829; d. Saint Louis, Mo., 24 Sept. 1892. He went to Boston at 18 and the next year or¬ ganized Gilmore's band. In 1869 he arranged the Peace Jubilee in Boston, and in 1872 the World's Jubilee, in Boston also. Later he formed the noted 22d Regiment band in New York, which gave concerts in the United States and made a European concert tour in 1882. He composed but little; an anthem entitled Colum¬ bia,5 intended to serve as the country's national hymn, was his only work of note.

GILMOUR, Richard, American Roman Catholic prelate : b. Glasgow, Scotland, 28 Sept. 1824; d. Saint Augustine, Fla., 13 April 1891. He was ordained priest in 1852, and after vari¬ ous pastorates, including those at Portsmouth, Ironton, Cincinnati and Dayton, was conse¬ crated bishop of Cleveland in 1872. His ad-

ministration of the diocese was markedly effi¬ cient, and particularly so along the lines of Roman Catholic education. He published a 'Bible History5 (1869) ; a series of 'Catholic National Readers,5 and other books, and in 1874 founded the Catholic Universe, an influen¬ tial journal.

GILOL°, je-lo-lo, JILOLO or HALMA- HERA, an island of the Molucca group in the Indian Archipelago, belonging to the Nether¬ lands; area 6,500 square miles; length 225 miles. It is of singular form, consisting of four penin¬ sulas, radiating from a common centre, and having large bays between. It is rugged and mountainous, the mountains being volcanic. The original inhabitants have been gradually pressed into the interior by the*

Malays. Pop 120,000. y

GILPIN, Bernard, English clergyman, known as the "Apostle of the North55: b. Kent- mere, Westmoreland, 1517; d. Houghton-le- Spring, 4 March 1583. After studying at Queen's College, Oxford, where he was elected Fellow, he was ordained in 1542. Subsequently he became student of Christ Church. The Ref¬ ormation soon assumed great importance at Oxford, and Gilpin at first reacted unfavor¬ ably toward it, but later was partly won over. In 1552, he was given the vicarage of Norton and obtained a license to preach throughout the kingdom during the lifetime of Edward VI. When Mary succeeded to the throne, Gilpin left England and spent several years at Louvain and Paris, pursuing further religious studies. On his return to England, he was given the vicar¬ age' of Easington and the archdeaconry of Durham by his uncle, Bishop Tunstall of Dur¬ ham,' who also protected him against the enemies who attacked him on the ground of his severe criticism of the clergy. He was reported to Bonner, bishop of London, and prepared to give himself up. An accident delayed his jour¬ ney, and in the meantime, Elizabeth ascended the throne. Gilpin returned to Houghton-le- Spring, where he remained as rector for the rest of his life. Here he became known for his lavish benevolence and charity, his wisdom as a judge, his fearlessness and great goodness. He was active in promoting education, built and endowed a grammar school at his own expense; maintained scholarships for poorer children; sent many of the more promising students to the university; and actually boarded some of them at his own house. He made frequent journeys to the neglected counties of North¬ umberland, Yorkshire, Cheshire and Cumber¬ land, constantly stimulating and encouraging the work of the clergy there. During his fre¬ quent absences, he provided for his own parish by supporting an assistant. As for his position in the religious controversies of the day, it was peculiar to himself. He accepted none of the reformed systems in entirety, although he tolerated various liberal theories. Consult the life by George Carleton, in Bates's 'Vitae selectorum aliquot virorum5 (London 1861). It was translated by William Freake (London 1629; reprinted, Glasgow 1852).

GILPIN, gil'pin, Henry Dilwood, American

lawyer : b. Lancaster, England, 14 April 1801 ; d. Philadelphia, 29 Jan. 1860. He was graduated from the University of Pennsylvania, studied law and became State attorney in 1822. He was

United States attorney for Pennsylvania in 1832, and Attorney-General of

the United States 1840—41. Besides (Reports of Cases^ he pub¬ lished 'Opinions of the Attorney-Generals of the United States from the Beginning of the Government to 1841 > (1841) and edited (The Papers of James Madison (1840); translated Chaptal's cEssay on Import Duties and Pro- hibitions) (1841); and published (Life of Martin Van Buren) (1844). Consult Memor¬ ial of Henry Dilwood Gilpin* by his wife (Philadelphia 1860).*

GILPIN, John, the hero of a well-known ballad by William Cowper. See John Gilpin.

GILPIN, William, American soldier, pio¬ neer and public official : b. 4 Oct. 1822 ; d. 19 Jan. 1894. He received his early education in England, returned to America and was gradu¬ ated at the University of Pennsylvania. In 1836 he was graduated at the West Point Military Academy and in 1838 took part in the Florida War. At its close he resigned and for about a year conducted the Missouri Argus at Saint Louis. He became secretary of the Missouri general assembly, was admitted to the bar, and established his practice at Independence, Mo. He went to Oregon City in 1843 and organized a provincial government there. On the outbreak of the war with Mexico he was chosen major of the First Missouri Volunteers. In 1860 he was one of the few Southerners who voted for Lincoln, and prior to the latter's inauguration Mr. Gilpin was one of 100 who formed the per¬ sonal guard of the President-elect. Lincoln appointed him governor of Colorado and it was largely through the new governor's efforts that Colorado was saved from secession. He published (The Central Gold Region) (1860) ; (Notes on Colorado (1870) ; (The Mission of the North American People) (1874) and (The Cosmopolitan Railway, Compacting and Fusing Together all the World's Continents* (1891).*

GILSONITE, giPson-It, also called UIN- TAPIITE, a natural hydrocarbon compound; a pure hard variety of. asphaltum. It is very brittle, a lustrous black in color and fuses. It is used for a great variety of purposes in the arts, for instance in the manufacture of varnishes. Mixed with heavy California maltha or with petroleum residuum it has been used as a pav¬ ing cement. The principal deposits in the United States are near Soldiers' Summit in Uintah County, Utah. The total output in 1902 was 4,052 short tons, valued at $61,182. The total output of gilsonite and the closely re¬ lated bitumen Wurtzilite (Elaterite) in 1916 was 26,870 short tons valued at $629,640.

GILTHEAD, or GILTEYE, English names for a small and beautiful sea- bream (Chryso – phrys aurata), with conspicuous gold-colored spots over the eyes. It abounds in the Mediter¬ ranean, and ranges northward to England and southward to the Cape of Good Hope. This was one of the

fishes kept and fattened by the Romans in their vivaria. Several other species are known in the Far East, one species (C . berda), being one of the favorite fishes of Madras under the name of black rock-cod.

*GIN (more properly Geneva, from Fr. genievre, <(juniper**), a compounded spirit, pre¬ pared by redistilling plain spirit with juniper berries, coriander seeds, angelica root, etc., or*

by adding various essential oils to rectified spirit. The gin produced by distilling possesses a much more delicate flavor than that produced by mixing or compounding. The strength of gin varies from proof to 50 under proof. It was first made in Holland, notably at Schiedam.

GIN. As used in machinery, gin is an abbreviation of engine and is used of Whitney's device for separating cotton-seed from the fibre, and more generally of a portable hoisting ma¬ chine whose frame is a tripod, one leg being movable so as to vary its angle of elevation, and thus determine the height of the apex. The other two legs preserve their relative distance and form standards for the drum, round which the rope is wound by power applied to the hand¬ spikes. For heavy weights a fall and tackle is used; and for hoisting a bucket from a well or mine, simply a couple of pulleys to change the direction of motion of the rope. One pulley is suspended from the apex, and the other attached between the two permanent legs, so as to change the rope to a horizontal position, for the attach¬ ment of a draught horse.

GIN, Cotton. See Cotton; Cotton Ma¬ chinery.

GINATILAN, he-na-te'lan, Philippines, a town on the western coast of Cebu, at the mouth of the Rio Ginatilan. There is valuable timber in the vicinity.

GINEVRA, gi-nev'ra, or je-nev'ra, the title of . a noted narrative poem by Samuel Rogers. It is named for its heroine whose affecting story is also recounted in (The Mistletoe Bought a ballad by Thomas Haynes Bayly.

GINGAL. See Jingal.

GINGER, in botany, Zingiber officinale , common or narrow-leaved ginger, and in ordi¬ nary language the rhizomes of the same plant, which has subsessile linear-lanceolate smooth leaves, oblong. spikes, acute bracts and a three- lobed lip. It is a native of India, but is culti¬ vated in most tropical countries. A broad¬ leaved ginger, Z. serumbet, also a native of India, is used externally for cataplasms and fomentations, but is not eaten. The pieces or races of the rootstocks are usually from two to four inches long, branched, .flat and of a pale buff color. Ginger is known in commerce

under two forms, coated and uncoated or scraped; the latter is deprived of its epidermis when in the green state, and sold as white ginger. The chief varieties imported into the United States are Jamaica, Cochin, Bengal, Japan and Afri¬ can. The first three are scraped gingers, and of these Jamaica is the most esteemed owing to its color and flavor. Ginger is an agreeable aromatic, and a valuable stomachic; but is more largely used as a condiment than as a medi¬ cine. Preserved ginger, imported from China in jars, consists of the young rhizomes boiled in syrup. Ground ginger is frequently adulterated with sago flour, wheat flour, ground rice and arrowroot.

GINGER ALE or BEER, an effervescent drink, made of ginger, water, sugar, cream of tartar (or lemon juice), etc. A well-known method is by pouring a gallon of boiling water over three-fourths pounds of loaf-sugar, one and one-fourth ounces of sliced ginger and the peel of one lemon, and after allowing the mixture to

cool till it is milk-warm adding the juice of a lemon and a spoonful of yeast.

GINGERBREAD TREE. See Doom

Palm.

GINGHAM (ali, gingamo, from Guingamp, a town in Brittany, where the fabric was woven), a kind of cotton, the manufacture of which was introduced into Great Britain through France from India. It is distinguished from calico by haying the colors woven in with the fabric, not printed on it. The patterns are various; sometimes fancy designs, sometimes checkered, and sometimes striped.

GINGILI (jin'ji-li) OIL, a name often given to the bland fixed oil obtained by expres¬ sion from the seeds of Sesamun Indicum. It is used medicinally as laxative or mild purga¬ tive. See Sesame.

GINGILLINO, jin-jil-le'no. In the literary movement which preceded and prepared the uprising of 1848 in Italy,— a movement char¬ acterized by the political writings of Gioberti, Balbo and d'Azeglio, by the inspiring pamphlets of Giuseppe Mazzini, an important place must be made for the Tuscan satirical poet, Giuseppe Giusti. In (Gingillino5, composed at Pescia in the spring of 1845, Giusti gives us a master¬ piece of satire in his own special field, a genre picture of the abuses of his times.

As the poet states in his ˆCorrespondence,® Gingillino5 was written ((to show by what paths and through what sort of apprenticeship government posts could be reached® in Tuscany. The name Gingillino® has since become syn¬ onymous in Italy of the man who to seek ad¬ vancement utilizes every cunning art of hypoc¬ risy and pandering. Written at a time when political conditions throughout Italy were at a low ebb, when the oppressive hand of Austrian and Bourbon princelings lay heavily over the country, (Gingillino) reflects in biting satire the stagnant enervation in Tuscany under the reign of the Grand Duke Leopold II, (

The poem itself which the author calls a dithyramb is a polymetric satire in praise of Gingillino, the perfect example of the cringing place seeker, whose career the poet describes from the cradle lullaby crooned to him by such deities as Cupidity, Duplicity, Sordidness, In¬ trigue, etc., to the final Credo of materialistic greed uttered by Gingillino in his maturity. It is#difficult to decide whether to admire most the richness and variety of the metre so full of movement and animation, the subtle irony which the great poet and critic Carducci com¬ pares to Parini's immortal verse, the Byronic incisiveness and pungency of the satire, the picturesque colloquialness of the Tuscan idiom which the poet wields with unerring skill, or the power of political invective which makes him the greatest Italian satirical poet of the 19th century. With the lapse of time and the changes in political conditions, the satire has

lost some of its sting. Then too the language of Giusti is so characteristic of his native province that it takes a Florentine to get the real flavor and tang of Gingillino.5 It re¬ mains none the less, with its enormous popu¬ larity in its own day and its wholesome moral tone, one of the noblest poems of Giuseppe Giusti.

For the Italian text and criticism consult (Versi editi e inediti di Giuseppe Giusti5 (Flor¬ ence 1852) ; Carducci, G., (Poesie di Giuseppe Giusti5 (1859) ; Puccianti, G., (Poesie di Giu¬ seppe Giusti5 (1913). Also Horner, Susan, (The Tuscan Poet, Giuseppe Giusti, and His Times) (London 1864) ; Howells, W. D., (Modern Italian Poets) (New York 1887).

Alfred G. Panaroni.

GINGKO, the Japanese and also the scien¬ tific name of a genus of trees, forming a pe¬ culiar family, Gingkoacece, of the gymnosperms. Gingko biloba, the only species, is a tree which sometimes attains a height of nearly 100 feet. Its head is conical, and the branches are usually horizontal. The leaves are fan-shaped, thick and coriaceous, marked with longtitudinal ner-vures, their resemblance to the maidenhair fern giving it its English name of maidenhair tree. It is a native of China and Japan, although it is not

known in a wild state, and was first intro¬ duced into Europe in 1754. Its fruit, which is of the size of a small plum, has a pulp with a disagreeable odor of butyric acid and enclos¬ ing a kernel which, when roasted, may be used as food, having a taste like that of maize. It is largely eaten throughout China and Japan. The Japanese consider the tree sacred and plant it near their temples. The gingko is con¬ siderably used as an ornamental tree in Eng¬ land and in the United States. It flourishes best in the shade, in a deep and somewhat moist soil.

GINIGARAN, he-ne-ga'ran, Philippines, a pueblo of the province of Negros Occidental, at the mouth of the Ginigaran River on the ea'st shore of Guimaras Strait, 29 miles south of Bacolod; it is also on the West Coast road. Pop. 13,620.

GINKGOLA.S. See Paleobotany.

GINSBURG, Christian David, eminent rabbinical scholar: b. Warsaw, 25 Dec. 1831; d. London, 7 March 1914. He was educated at the Rabbinic College in his native city, but came to England as a young man and spent the rest of his life there. He was one of the original members appointed by Convocation for the revision of the English version of the Old Testament, and was the author of (An His¬ torical and Critical Commentary on the Song of Songs) and on (Ecclesiastes) (1857). For over 50 years Dr. Ginsburg enriched biblical literature with his erudite contributions. He rendered important service in 1883 by exposing the forgery committed by a well-known dealer in antiquities, named Shapira, of a manuscript purporting to be part of the ˆsources® of the book of Deuteronomy. Among his numerous works are (The Kariates, their History and Literature5 (1862) ; (The Essenes5 (1864) ; (The Kabbalah, its Doctrines, Development and Literature5 (1865) ; (The Massoreth-ha-Masso- reth of Elias Levita5 (in Hebrew, with trans¬ lation and commentary, 1867) ; (Jacob ben

Chajin's Introduction to the Rabbinic Bible) (1867) ; (The Moabite Stone) (1871) ; (A Com¬ mentary on Leviticus } (1882) ; (4 large vols., 1880-86) ; a translation of the New Testament into Hebrew; (Critical Text of the Hebrew Bible) (1894) ; (Introduction) to the Massoretico — critical edition of the He¬ brew Bible) (1897); series of facsimiles of

Hebrew MSS. of the Old Testament-) (1898) ; (Relation of Codex Babylonicus to the Present Recension of the Massoretic Text of the Bible)

(1899); (The Hamburg Stadt-bibliothek Co¬ dex No. P (1903) ; (Pentateuchus Diligenter revisus juxta Massorah> (1908); Smith's 'Dictionary of Christian Biography and An¬ tiquities. J

GINSENG, jin'seng, several species of herbs of the genus Panax, family Araliacea?. The most noted species are Panax ginseng, a native of China, and P. quinquefolium, of east¬ ern North America. These two species so closely resemble each other that the discovery of the latter near Montreal, Quebec, in 1716 was based upon a description of the former. The plants grow about 18 inches tall, bear 3 leaves, each composed of 5 leaflets, and end in a flower-stem bearing an umbel of small flowers from which develop conspicuous scarlet, generally two-seeded berries. The light yellow root, especially of the former species, is used by the Chinese for every conceivable domestic and medicinal use, and specimens resembling the human body often command their weight in gold because of supposed occult virtues. Neither species, however, is considered by Occi¬ dental physicians to have any pronounced medi¬ cal qualities. The Asiatic species has long been cultivated in China and Korea.

Shortly after the discovery of the American species a shipment of the wild root was made to China and soon a trade was established. Since the plant has a natural range from the valley of the Saint Lawrence to the mountains of Georgia and westward to the eastern bank of the Missis¬ sippi, the wild supply of roots long met the de¬ mand. In 1858 the price was 52 cents a pound; in 1902, $5.55, the advance being largely due to the decrease of the native supply. In the latter year many lots of northern root (considered always better than southern) sold for $8 or even more. The advancing price led to many attempts to cultivate the plant, but until about 1885 none were reported successful. Then George Stanton of Apulia, N. Y., succeeded by growing the plant in beds prepared in the forest and later under lath sheds. These methods have led to the establishment of American ginseng growing. Cultivated ginseng has com¬ manded about 20 per cent more than wild root from the same locality.

The plants thrive best in a well-drained, rather loose soil, well supplied with humus, potash and phosphoric acid, but not with nitrog¬ enous material. Little has been done to im¬ prove the plant, but the time required to mature a crop of roots can probably be shortened con¬ siderably and the size of the root increased. In 1902 most growers calculated upon five years as necessary to mature a crop, but at the price of $2.50 a pound they figured upon making a profit under reasonably favorable conditions. The

exorbitant prices paid for plants and seed during 1898-1903 were largely due to specu¬ lation, an exaggerated estimate of the demand in China, which is almost the sole market, and to the novelty of the industry, and

hence the scarcity of plants and seed. Consult revised edition of Bulletin No. 16, Division of Botany, United States Department of Agriculture (Washington, D. C.) ; Kains, (New York 1902).

GINX'S (ginks'ez) BABY, the title of a famous book by John Edward Jenkins. It is a satire on the English poor laws and the admin¬ istration of sectarian charitable associations, and was published anonymously in London in 1871. It speedily ran through many editions, was republished in the United States and ex¬ cited warm controversy in the press and even in Parliament. It was followed by satires on other phases of social economy, but none of the other works of this author attained such a vogue or exerted such an undoubted influence upon the direction of social reforms.

GIOBERTINE (jo-bert'in) TINCTURE, a preparation for restoring writings which have become illegible through age, or faded pictures. The inventor of it was Giovanni Antonio Gio- berti, a native of Piedmont (1761-1834). The invention has been invaluable in restoring the original writing of palimpsests. See Palimp¬ sest.

GIOCONDA, La, a tragic opera by Amil- care Ponchielh (1834-861, with libretto by A Boito, first produced in Milan in 1876, in New York 20 Dec. 1883 and London 7 June 1886 Adapted from Hugo's 'Tyrant of Padua, > the plot is intensely dramatic, with a plentiful sprinkling of criminal deeds relieved by delight¬ ful music. The heroine, La Gioconda, is a beautiful ballad singer on the streets of Venice, with a blind mother, La Cieca, and a noble Genoese ship captain named Enzo Grimaldo as her lover. The villain, Barnaba, is a police spy of the Inquisition, and also in love with La Gio¬ conda, whom he is determined to possess. The opening scene represents a Venetian regatta, in the course of which Barnaba declares his love to the girl and is repulsed by her. Barnaba in¬ cites the defeated regatta champion, Zuane, to kidnap La Gioconda's blind mother, whom he accuses of witchcraft. Enzo, however, comes to the rescue. Laura, a former love of Enzo is now the wife of Alvise, one of the chiefs of the Inquisition Council. She throws her pro¬ tection over La Cieca when Enzo recognizes hei, and his old love revives. Barnaba informs him that Laura intends to visit his (Enzo's) ship that night, which sends the captain hurry- mg back on board. Barnaba now writes to Alvise telling him that his wife plans to elope with Enzo on the latter's vessel. That night Enzo. is on deck awaiting Laura; Barnaba disguised as a sailor, is near in a boat, having notified his police to be on hand. Laura ap¬ pears, and Enzo prepares to set sail when La Gioconda enters; she quarrels with Laura and is about to stab her when her eyes fall on Laura's rosary. Repenting of her rashness, she aids her rival to escape and tells Enzo that Barnaba s war galleys are approaching to seize the ship. Enzo sets his ship on fire. Alvise in his palace, orders his wife to take poison and

leaves the room. Gioconda suddenly appears and gives Laura a narcotic to produce a trance, which the latter takes. Her husband, return- mg, thinks she has taken the poison, seeing her apparently lifeless body. Alvise later is giving a gorgeous masked ball in his palace, at which Enzo is present. Barnaba whispers to him that Laura is dead. Enzo denounces Alvise and is seized; the latter draws a curtain and exhibits the body of Laura to the horrified guests, ac¬ knowledging his crime. La Gioconda with help succeeds in carrying the unconscious Laura to a lonely island in the Adriatic and, having sent for Enzo, intends to restore the lovers to each other and to commit suicide herself. On the arrival of Enzo — who expects to see Laura's grave — he goes through a bitter scene with Gioconda. Laura returns to consciousness ; Gioconda helps them to escape together and is then about to take the poison when Barnaba ap¬ pears and fiercely asks why she broke her word to him. The girl pretends to yield; as Bar¬ naba moves toward her she stabs herself to the heart exclaiming, ((Gioconda is thine!® Bend¬ ing over the corpse, Barnaba shrieks into her ear that he had strangled her blind mother the night before.

GIOJA, jo'ya, Flavio, Italian mariner: b. Pasitano, near Amalfi, in the latter part of the 13th century. He is said to be the inventor of the mariner's compass, of which he made use in 1302-03. The tendency of the loadstone to turn toward the north was known before his day, but the compass then in use consisted only of a magnetized reed floating upon cork in a ves¬ sel of water. Gioja invented the plan of sus¬ pending it on a pivot, thus leaving it free to move in any direction, whereby observations were rendered both more easily and more exact.

GIORGIONE, jor-jo'ne (easel name of Giorgio Barbarelli or Barbarella), Italian painter: b. Castelfranco, 1478; d. Venice, 1511. He was a pupil of Giovanni Bellino and painted history and portraits. He was one of the most celebrated of the Venetian school, was a fellow student of Titian, whom he might have rivaled had he not died of the plague in early life, while Titian lived for nearly a century. In his work he introduced the places and scenes of his nativity. To him Venetian painting owes much of its marvelous technique, and by his example in the use of pigments and glazings he set an example many followed; he has had more pictures by other hands attributed to him (nearly a hundred) than any other Italian master. Even connoisseurs have been deceived by the depth and richness of coloring, the luminosity of aerial perspective, which his imitators had learned from him too well. Yet there are not more than 12 authentic pictures by Giorgione. Among these may be mentioned (The Enthroned Madonna with Saint

Francis and Liberal, an altarpiece for the church of Castelfranco; (The Gypsy and Soldier,* and (The Family of Giorgione) at Venice; (Three Philosophers* and (Evander showing ˆEneas the Site of Rome) in Vienna; and the (Sleeping Venus> in the Dresden Gallery. Consult Berenson, Htalian Painters of the Renaissance1* (New York 1910) ; Cook,*

GIOTTO, jot'to (called Giotto di Bon- done), Italian painter and architect: b. Ves- pignano, near Florence, about 1266; d. Florence, 8 Jan. 1337. He was the son of a peasant and his first employment was in the tending of sheep and cattle. But having been on one occasion seen by Cimabue, as he was drawing figures of his sheep upon a piece of slate with a stone, that artist obtained leave from his father to take him with him, carried him to Florence and taught him painting. This may be a mere story, but at any rate his first teacher was Cimabue. His natural talent, and especially the gracefulness so peculiar to him, developed so rapidly that he soon surpassed all contem¬ porary artists. He represented the human figure in his pieces with truth and nature and excelled in the dignity and pleasing arrange¬ ment of his figures and in his regard to cor¬ rect proportions and natural disposition of the drapery. His earliest extant works are mural paintings in the church of Saint Francis at Assisi, executed before the end of the 13th century. He was now called to Rome, and after painting various works there he went to Padua in 1303 and adorned the chapel of the Annun- ciata dell' Arena with a series of famous fres¬ coes, including 38 subjects, disposed in three rows, on the sides of the chapel and the front of the chancel wall, with a vast representation of the (Last Judgment filling the west end. Dante was his guest at Padua in 1306, and he is celebrated in the great poet's (Divina Corn- media.* He was also a friend of Petrarch. He _ worked at Milan, Verona, Ravenna, Rimini and Arezzo. In 1330-33 he was at Naples and in 1334 was appointed master of the cathedral works and other undertakings at Florence, where he designed the celebrated Campanile, a structure finished by his scholar and godson, Taddeo Gaddi. Besides the fres¬ coes at Assisi and Padua, comparatively few works of Giotto are extant. Among his most celebrated pieces is the (Navicella* (ship) at Rome (a picture of (Peter Walking upon the Waves,* in mosaic). The National Gallery possesses a (Coronation of the Virgin* painted in tempera, on wood. ((The influence of Giotto was profoundly felt over the greater part of Italy. His exatnple caused a revolution in art, the effects of which are traceable into the 15th century.** Many anecdotes of more or less authenticity are told regarding this painter. On one occasion, when asked for a sample of his art to show the Pope as a guarantee of his ability, Giotto is said to have drawn a perfect circle with a single stroke; whence ((round as the O of Giotto** became proverbial. Consult Crowe and Cavalcaselle, (History of Painting in Italy* (1864-66) ; Janitscheck, (Die Kunstlehre Dantes und Giottos Kunst* (1892) ; Ruskin, (Giotto, and*

His Works in Padua (1854-60) ; and monographs by Perkins (1902); Thiorle, (1902) ; and Zimmermann (1899).*

GIPPSLAND, Australia, the southeasterly of the four districts into which Victoria is di¬ vided, so named after an early governor. It forms the southeast portion of Victoria and has an area of 13,898 square miles. Its length from west to east is 250 miles and mean breadth about 80. It was originally called Caledonia Australis by Macmillan, its first explorer

(1839):

_ GIPSY-MOTH, a large moth (Porthetria or Ocnena, dispar), of the family Liparidc e is of common occurrence in central and southern Europe and the temperate parts of Asia. Pro¬ fessor 1 rouvelot imported them for research purposes in 1868 into Medford, Mass, and by accident some specimens escaped: but it was not till 20 years after that its rav¬ ages became a menace by defoliating shade-

£enmnnnd k -!jas CuSt thf State upward of iM,UUU,U00, besides the outlays of individuals*

and municipalities. The sexes of the moth diner greatly, the male expanding only about one and a half to. two inches, while the female measures across its expanded wings two and a j l mchcs ; the female is spotted brownish and the male is white, marked with black lines, ihe former lays her eggs in .masses to the num- oer of 500 wherever convenient, covering them w.th hairs and scales from her own body. The females .have such heavy abdomens that the wings are inadequate for flight, hence the in¬ sect, owing to the measures which have been employed to prevent its artificial carriage, has not spread far beyond the place where orig¬ inally introduced. The. caterpillar measures when mature about 1.5 inches, is white, with black markings and furnished with long hairs. It is arboreal and capable of being most trouble¬ some on shade, forest and fruit trees, but when abundant it feeds and develops on any form of vegetation. A single generation is produced annually. The best . means of combating it are spraying with arsenical mixtures the collection of the cocoons and egg-masses and destroying them; the scraping of loose bark from trees thus destroying the young and depriving them of hiding places; also the destruction of the eggs by means of oily substances and the trap¬ ping of the larvae with strips of burlap placed about the infested trees. Consult (De¬ partment of Agriculture, Washington 1898).

GIRAFFE, ji-raf', or CAMELOPARD,

the tallest of mammals (Giraffa Camelopardalis), the type of a family of ruminants (Giraffidoe), intermediate between deer and antelopes, and also containing the okapi (q.v.). It is a native of Africa south of the Sahara, but is now to be found only in the interior, remote from civili¬ zation and where there are brushy plains or open forest, and is fast decreasing. It occurs gen¬ erally in small herds of from 5 to 40. It feeds on the leaves and small branches of trees, es¬ pecially mimosas, which in districts where the animals abound are kept cropped to a convenient height for browsing. Its general aspect is re¬ markable from the height of the foreparts and great elongation of the neck, the head being sometimes 18 feet from the ground. The num¬ ber of vertebrae in the neck, however (seven), is not greater than in other quadrupeds, and it has no extraordinary flexibility, although its form and movements are very graceful. The length, therefore, is due to the elongation of each cervi¬ cal vertebra. The body is short, and the back slopes from the shoulder to the tail; yet the greater height of the foreparts is not entirely owing to the greater length of the fore-legs, l. |0 the neural processes of the vertebrae, which form a basis for the support of the neck and head. The head is long, capable of a wide*

range of movements, and the upper lip is pro¬ jecting and somewhat prehensile, while the tongue is remarkably capable of elongation, and can be thrust far out of the mouth, and em- ployed to grasp and take up even very small objects; it is said that its tip can be so tapered as to enter the ring of a very small key. The usefulness of such an organ for drawing in leaves and branchlets to the mouth is obvious. Ihe giraffe adroitly picks off the leaves of acacias and other thorny plants, without taking the thorns into its mouth. The dentition of the giraffe agrees with that of antelopes, sheep and oxen; the upper jaw of the male is destitute of the canine teeth which are present in the male of many deer.

Anatomically the most remarkable feature of the giraffe is the presence in both sexes of two protuberances between the ears, generally de¬ scribed as horns,, but very different from the horns of other animals, and each consisting of a permanent bone united to the skull by an ob¬ vious suture, covered with skin and hair, and terminated by long hard bristles. These long outgrowths correspond to the bony core of the antelope s horn or to the pedicel of the antler in the deer. There is also a projection on the forehead, which, in the giraffes of South Africa, is so elongated, as to indicate a separate species (Gr. australis) in the opinion of recent natural¬ ists. If this view be accepted then the name Camelopardalis applies properly only to the giraffes now. to be found only in Somaliland. Moreover, Sir H. Johnston has reported that there exists in Uganda a very brilliantly col¬

ored form which has five horny protuberances, instead of three, upon the head; and when bet¬ ter known may prove to be in a new genus as well as ot a novel species. The hair of the gnaife is short and smooth, with a short mane on the neck, and a tuft on the end of the tail. Ihe color is reddish-brown in irregular areas sharply marked off by white borders, like the mortar between brick-work; but there is much variation in tint as well as pattern. A few ex¬ tinct forms are found fossil in the Pliocene beds of China, India and Greece, of which P>amothcruim and Hallidotherium are promi¬ nent examples; they had a shorter neck and legs and more bovine appearance than their successors, and. the males alone have horns.

Ihe giraffe is an inoffensive animal, and gen¬ erally seeks safety, if possible, in flight, although t is capable of making a stout resistance, and

flinch! t0 !rati,0ff -the llon by kicking with its hind-legs, discharging a storm of kicks with

extrordmary rapidity It is not easily over¬ taken even by a fleet horse, and has greatly the

£rmnndageTt°f a ho9se ,on uneven and broken ground. Its pace is described as an amble

thL egTh°f Jame S1

and was exhibited in Roman spectacles. Repre-

t,vnctatnnJ °f i!1 appear among Egyptian antiqui- ties. it has been supposed to be the zemer of

Bibl/TBeuFx^lf Cham°iS in ,he EnS,ish

•111! °ne tbe 90sthest and most uncommon mals in menageries, although in former years they were kept and bred in Europe. The flesh is excellent meat, and the hide is thick and

Saba' 8n°A>\eatTeG FnSU

maha (1902), Lyddeker,

GIRALDA

GIRARD

663

Africa5 (1908) and the writings of naturalists and sportsmen in Africa,

especially Johnston, Baker, Bryden, Gordon, Cumming, Harris, Holub and Selous.

GIRALDA, he-ral'da (Spanish girar, ((to turn round®), a weathercock in the form of a figure or statue. It is pre-eminently applied to the weathercock, and from that to the Moorish tower or minaret (part of the cathedral) which it surmounts at Seville, Spain. The figure in this weathercock is that of Faith, which turns round to face every wind and storm. In the copy of the tower of Seville Cathedral which appears in Madison Square Garden, N. Y., the figure of Faith is replaced by that of Diana.

GIRALDUS CAMBRENSIS, or GERALD DE BARRI, Welsh churchman and historian: b. Pembrokeshire c. 1146; d. 1220. His (Topo- graphia Hibernica) and his (Expugnatio Hi- bernica5 written as the result of a journey to Ireland in 1184 as chaplain to Prince John, are valuable but somewhat biased descriptive and historical records of the Ireland of the period. His best work is the (Itinerarium Cambrense) written after he went to Wales in 1188 with the primate Baldwin to preach the Third Cru¬ sade. He received his early education from his uncle the bishop of Saint David's, and con¬ tinued his studies at Paris. After several pro¬ gressive church positions, in 1198 he was elected bishop of Saint David's, but strong opposition set in, and despite three visits to Rome, in 1202 he was superseded in the new election ordered by the Pope. His numerous writings appeared in the Rolls edition (8 vols., London 1861-91); his itineraries in one volume are published in (Bohn's Antiquarian Library.5 Consult Gross, (Sources and Literature of English History 5 (London 1900) ; Hoare, trans. (Itinerary through Wales5 (2 vols., London 1806) ; Owen, (Gerald the Welshman) (London 1889).

GIRARD, Charles, American naturalist: b. Miilhausen, France, 1822;. d. 1895. In 1839 he was a pupil of Agassiz, at Neufchatel, Switzerland, and soon became one of his assist¬ ants, accompanying him to America, and re¬ maining his assistant until 1850. He was at¬ tached to the Smithsonian Institution 1850-59, and has published (Herpetology of the United States Exploring Expedition under Captain Wilkes5 (1858) ; and many professional articles and monographs.

GIRARD, zhe-rar, Marc Amable, Cana¬ dian politician : b. Varennes, province of Quebec, 25 April 1822; d. Winnipeg, 10 Sept. 1892. In 1871 he was admitted to the bar of Manitoba, in whose politics he was long active as treasurer (1870-72), premier (1874), and later secretary, minister of agriculture and president of the council. In 1871 he was ap- appointed a senator of the Dominion of Canada.

GIRARD, Paul, French scholar: b. Paris, 23 March 1852. He is professor of Greek lan¬ guage and literature in the University of Paris; also he is a lecturer and writer on antiquarian subjects and has been very actively engaged in organizing conferences of various kinds, but all of a scientific nature. He is a member of the Antiquarian Society of France since 1896 and also of the Ecole Frangaise of Athens. Among his published works are

(1881) ; (De Locris Opuntiis5 (1881) ; ^'Edu¬ cation athenienne aux Ve et IVe Siecles avant J.-C.5 (1889) ; (La Peinture antique5 (1891). He was also a regular contributor to the Revue des Deaux-Mondes and the magazine Le Moment , the latter the official publication of the Society for the Advancement of Greek Studies.

GIRARD, Paul Frederic, French legal writer: b. 26 Oct. 1852. He is professor of Roman law in the faculty of law, University of Paris, and was lecturer on law in the law school at Montpellier (1880-88), and the law school of Paris (1888-93). He has done very much research work of an original character in Roman law, and has to his credit a long list of works on the subject, in magazines, society journals, reviews and in books issued under his own name. Among the latter are (La garantie d' eviction en droit romain5 (1884) ; (Textes de droit romain annotes5 (1890-1903) ;

(Manuel de droit romain5 (1896-1906) ; (His- toire de l'organisation judiciaire des Romains5 (1901); (Actions noxales5 (1887-88); (His- toire de la Condictio5 (1895) ; (Histoire des XII tables5 (1902) ; (Edit Pretorien5 (1904). He also translated into French Mommsen's Toman Public Law.5

GIRARD, Philippe Henri de, French in¬ ventor: b. Lourmarin, France, 1 Feb. 1775; d. Paris, 26 Aug. 1845. Successively painter, soap- maker and professor of chemistry, he was a man of versatile, scientific tastes, who con¬ centrated his powers on mechanics. When Napoleon offered 1,000,000 francs as a prize for a machine that would spin flax, Girard in¬ vented the machine, but the fall of Napoleon deprived him of the reward. In 1815 he set¬ tled in Austria, built a flax-mill at Hirtenberg and afterward inaugurated steamboat service on the Danube. At the invitation of the Rus¬ sian tsar he went to Poland in 1825, established a flax-mill which became the centre of the village of Girardou, and became chief engineer of the mines in Poland. He returned to France in 1844.

GIRARD, Stephen, American financier and philanthropist: b. Bordeaux, France, 24 May 1750; d. Philadelphia, 26 Dec. 1831. He followed the sea, becoming a master in 1773 and soon afterward engaging in the West In¬ dian and American coasting trade. In 1769 he settled in Philadelphia as both shipmaster and merchant. After the Revolutionary War his business

rapidly increased. He invested largely in the shares of the old Bank of the United States in 1810, and in 1812, upon the lapsing of its charter, purchased a controlling interest and the building. He named it the Bank of Stephen Girard and, retaining the old officers, made it one of the foremost financial institu¬ tions of the country. During the War of 1812 Girard was the principal financial support of the American government ; in 1814 he subscribed for about 95 per cent of the war loan of $5,- 000,000. His fortune at the time of his death was undoubtedly the largest in America, amounting to about $7,500,000, almost all of which he left in public benefactions. For the erection and maintenance of a school for white male orphans he left about $5,260,000. (See Girard College). He was a man of unusual individuality, brusque and distant in manner,

possessed of great foresight, practical and generous in his charities. During the rage of yellow fever in Philadelphia in 1793 he was ever present in relieving the afflicted, both by his free giving and by his personal care. Con¬ sult Ingram, H. A., (Life and Character of Stephen Girardˆ (Philadelphia 1884) ; Mac- Master, J. B„ ib. 1898).

GIRARD, Kan., a city and county-seat of Crawford County, on the Atchison, Topeka and Sa.nta Fe and Saint Louis and San Francisco railroads. Its situation is well adapted to agricultural pursuits, stock-raising, etc., and the industries include zinc smelting, stove manu¬ facturing, flour-mills and brickyards. The city owns its own waterworks and electric-lighting plant, and has adopted the commission form of government. Pop. (1920) 3,161.

GIRARD COLLEGE, Philadelphia, Pa., an institution for the vocational education and maintenance of (

GIRARDIN, zhe-rar'dan, Madame Del- phine Gay de, French poet and novelist: b. Aix-la-Chapelle, Rhine Province, Prussia, 26 Jan. 1804; d. Paris, 29 lune 1855. Carefully educated by her mother, Sophie Gay, her poetry attracted notice at the age of 15, and she afterward attained some success in prose fiction and in writing for the stage. In 1831 she mar¬ ried the eminent journalist, M. Emile de Girardin. She contributed to the Presse , conducted by her husband, her cLettres parisiennes, which, under the pseudonym of the (< V icomte de Launay,® attracted admira¬ tion by their wit and liveliness and are the best*

of her work. Her beauty no less than her wit made her salon a centre of

attraction.

GIRARDIN, Emile de, French journalist and politician: b. Paris, 22 June 1802; d. there, 27 April 1881. He bore the name of Dela- mothe till 1827, when he assumed that of his father, Alexander, Count Girardin, who ac¬ knowledged him in 1847 ; and his first attempt in literature was a novel, / Emile, in which he pleaded the cause of illegitimate children. After the July revolution of 1830 he established the Journal des Connaissances Utiles, and in 1836 founded the Presse, an Orleanist journal with Conservative leanings. Its rivals accused it of being subsidized by the government, and one of the unfortunate results of the quarrels thus fastened on Girardin was his duel with Armand Carrel, editor of the National, in which the latter fell. He promoted Louis Napoleon's election to the presidency, and afterward became a Socialist. In 1856 he sold his share of the Presse, but became its editor again in 1862, eventually abandoning it for the direction of the Liberte, which he maintained till 1870. During the Commune he proposed a scheme for splitting up the republic into 15 federal states. In 1874, however, he founded the France, and both in its pages and in the Petit J ournal supported the republic. He wrote (sometimes quite successfully) for the stage ; his political ideas he gave to the world in a host of brochures; and he did not shun the serious handling of large public questions. We men¬ tion particularly (La Politique universelle) (4th 1854), and (Le Supplice d'une Femme*

zni-rar don, Jhrangois, French

sculptor: b. Troyes, 17 March 1628; d. 1715. He began life as a wood carver, learned to paint, but all the while intended to become a sculptor. His first effort was a statue of the Virgin for Troyes, his birthplace. With Bandesson, his master in wood-carving he was engaged in renovating the chateau of Seguier at Saint Liebaut. Seguier took a deep interest in the young craftsman and sent him to Paris and later to Rome. At Rome he came under the influence of Bernini. In 1657 he entered the Academy of Painting and Sculpture and was married to the painter, Catherine Duche- min the same year. He was sent to Toulon in 1667 to supervise the decoration of naval ves- Se ˆ second visit to Rome followed in 1668 and the following year he returned to Paris where he lodged in the Louvre and was pro¬ fessor at the academy. He enjoyed a large measure of court favor and was made chan¬ cellor of the academy in 1695. The Richelieu monument at the Sorbonne is his greatest work Happily it was saved at the Revolution in the Louvre are several busts and other small works. The palace and park of Versailles contains most of his decorative work. Consult Corrard de Breban, (Notice sur la vie et les oeuvres de Girardon (Paris 1850).*

i .i/“J?ˆARDVILLE, Pa., borough in Schuyl- kill County, 60 miles northwest of Reading, on r> e ..ˆgh Valley and the Philadelphia and Reading railroads. It is the seat of a State hospital. Anthracite coal mining is the chief industry. The borough was settled in 1841 and is governed by a chief burgess and council of nine members. Pop. 4,396.

CTENOPHORES

VENUS’ GIRDLE AND OTHER COMB-JELLYFISH

GIRART DE ROSSILHO, zhe-rar’ de

ros-sil o, an epic in northern Provencal and part of the great Carlovingian literary cycle, (bee Provencal Literature). Consult Saints- lW) French Literature> (6th ed., Oxford

. GIRASOL, precious stones which reflect bright or red or yellow light apparently from the centre of the mineral. The fire opal is the best-known kind. Among the ancients such stones were highly prized and were bought for lˆrge sums. Modern inventive genius has suc¬ ceeded in making them artificially and they are no longer high-priced nor highly prized.

nJS££SOLE’. or JERUSALEM ARTI¬ CHOKE, a species of sunflower, of the genus Henan thus, native of the western hemisphere In northeastern United States and adjacent Canada this and other closely allied species de¬ velop edible tubers. The tubers arise from un¬ derground stems or earth-branches but differ from the potato in that the branch itself may swell up and become a tuber. The species pro¬ ducing tubers are H. tuberosus, H. subtuber- osus, the so-called Indiana potato of Michigan and Minnesota. The species, H. doronicoides, native from Ohio to Arkansas, is used as food in Europe. These tuber-bearing species were well known to the aborigines of America be- for the advent of the whites. We find them mentioned by Champlain in 1603, and specimens of H. tuberosus were brought to France by Lescarbot. The Jerusalem artichoke (H . tuber¬ osus) is the tuber-bearing species par excel¬ lence, . and is the only contribution of North America, exclusive of Mexico, to the vegetable garden of the world. The name artichoke ap¬ pears to have been given it solely on account of its flavor, which is more or less similar to that of the Old World artichoke (Cynara scolymus), while ˆJerusalem® is an English cor¬ ruption of the Italian Girasole, sunflower. The term Jerusalem artichoke® is therefore very misleading. At the present time it is in higher esteem in the Old World than in the land of its origin. The tubers are planted three feet apart, in

rows two feet apart, each plant occupying six square feet. In good soils no fertilizer is needed and the yield averages about nine tons to the acre. As compared with potatoes the yield per acre is greater in the regions best adapted to the artichoke — the in¬ termediate region between the sweet potato of the South and the potato of the Northern and upland regions. It is an excellent food for hogs and may also be used as a boiled vegetable, as salad or in soup for man. Consult Warmers' Bulletin 331 > (Washington, D. C.) and article by T. D. A. Cockerell (in The Scientific Monthly, March 1918).

GIRDER, a beam, of wood or metal, span¬ ning the distance from wall to wall or pier to pier, and used to support a superstructure or superincumbent weight, as a floor, the path¬ way of a bridge, etc. Girders are often com¬ pound, the timbers being scarfed together and stayed by truss-work or fished at the joint. The ends of the girder rest on the wall or pier, the length of the bearing depending upon the length of the span (increasing proportionally), the material of the girder and the weight to be sustained. The ends rest on templates. Girders are of various sorts, according to the

purpose for which they are required. A sand¬ wich girder is one which is composed of two wooden beams with an iron flitch plate be¬ tween, all bolted together. See Bridge Con¬ struction, Modern Methods of; Building.

GIRDER BRIDGES. See Bridge Con¬ struction, Modern Methods of.

GIRDLE OF VENUS. See Venus' Gir¬ dle.

GIRDLER, a small American longicorn beetle (Oncideres cingulatus) , which in August lays an egg in a hole bored into a twig of a hickory, pear or other tree, and then gnaws a deep groove below the egg, thus girdling the twig. This kills the extremity and provides a supply of dead wood as food for the grub, which is. soon hatched. The grub eats all the woody tissue, and within the concealing shell of bark remaining, pupates and passes the winter, becoming a full beetle and emerging the following spring.

GIRDNER, John Harvey, American sur¬ geon: b. Cedar Creek, Tenn., 8 March 1856. He was graduated from Tusculum College, Tenn.., 1876, and from University and Bellevue Hospital and Medical College, 1879. He was first to graft skin successfully from a dead body onto a living; invented the telephonic bullet probe and also the phymosis forceps. Author, (Newyorkitis) (1901).

GIRDWOOD, Gilbert Prout, Canadian educator : b. London, England, 1832. He re¬ ceived his education at University College and Saint. George's School of Medicine, London, and in 1864 became assistant

surgeon to the British Grenadier Guards. He settled in Mon¬ treal and in 1865 became surgeon to the Third Regiment, Victoria Rifles, and served during the campaign against the Fenian raiders of 1866. From 1872 to 1894 he held the chair of practical chemistry at McGill University, Montreal, and was made professor emeritus in 1902. He also served as director of the electrical department and Roentgen rays at the Royal Victoria Hos¬ pital. He is a Fellow of the Royal Society of Canada and is a member of many scientific societies, both Canadian and foreign. He is the author of many articles on medical and surgical topics contributed to the Lancet, the Montreal Medical Journal and the Transactions of the Royal Society of Canada.

GIRGEH, ger'ga, Egypt, capital of the province of the same name and once the capital of Upper Egypt, on the Nile, 90 miles southeast of Assiut. There are many ancient tombs and cemeteries in the neighborhood. The town contains several mosques, a Coptic convent, a government cotton factory and has a great weekly market. Pop. 20,000, including about 5,000 Copts.

GIRGENTI, jer-jan'te, Sicily, capital of the province of the same name, on the Drago, 85 miles southeast of Palermo and about 1,000 feet above sea-level. It is situated about three miles inland, is an episcopal see and a military headquarters for the province. It contains a magnificent 14th century cathedral, a mu¬ seum with many ancient and priceless relics, numerous catacombs, a public library, technic school, gymnasium, normal school and munic¬ ipal theatre. It has large salt mines and ex¬ ports sulphur, wine, oil, grain, cheese, honey

and fish. Consult Baedeker, Southern Italy) (Leipzig 1912) ; Picone, (Memoire stariche agngentine (Girgenti 1865).*

GIRL OF THE GOLDEN WEST. The

name (1) of a play by David Belasco, produced in 1905, and (2) of an opera composed by Giacomo Puccini, under the Italian title of (La Fanciulla del West, > first produced at the Metropolitan Opera House, New York, 10 Dec. 1910. . On that occasion the principal character, Minnie (the girl) was played by Mme. Emmy Destinn ; that of Ramerrez the highwayman — alias (

GIRLS CLUBS, societies with a member¬ ship ot girls banded together for recreation, study, mutual helpfulness, etc. Formerly there was apparently less spontaneity among girls than among boys in regard to the for¬ mation

of clubs ; now large numbers of girls are found in clubs organized and to a greater or less degree supervised by older persons. In women's clubs, so called, large numbers of girls are found either as regular members or in a junior branch or department. Some large societies, such as the Young Women's Chris¬ tian Association, do not apply the name club to any of their branches, and could not accu¬ rately do so, and yet the opportunities they afford to girls for entertainment, self-improve¬ ment and social intercourse and the use of rooms for gatherings, reading and writing, etc., afford to members what is largely equivalent to club membership, a fact appreciated by the girls themselves, who sometimes give as a rea¬ son for joining such societies the wish to be connected with (

It ensures the privileges of the society to its members wherever they may be, by giving them an introduction from one branch to another. The parent society was started in England in 1875 (at a time when much interest was shown in ˆrescue work®), with the central idea of

helping young women along preventive rather than reformatory lines. The form of organiza¬ tion follows as far as possible that of the Church of England, being diocesan and paro¬ chial. Any girl of good character 12 years of age or over may become a member, and younger girls may become probationers or candidates. Associate members must be communicants. This society now extends wherever the English lan¬ guage is spoken and is the largest society of girls and women in existence, with a continu¬ ally increasing membership. The Girls' Friendly Society in America is under the auspices of the Protestant Episcopal Church. Branches were started in Lowell, Mass., and in Baltimore, Md., soon after the organization of the Eng¬ lish society, and a central council was formed in 1886. . In 1916 the society reported 900 branches, in 67 dioceses ; and a total member¬ ship (including associates, probationers, can¬ didates, etc.) of 52,000. There are six holiday houses, belonging respectively to the diocesan branches of Massachusetts, New York, Penn¬ sylvania, Rhode Island and New Jersey. The organs of the society are two monthly periodi¬ cals, The Girls' Friendly Magazine and The Associates' Record. The central office is in the. Church Missions House, New York. Some individual churches maintain girls' clubs as a of their parish work. The club connected with Saint Bartholomew's Church, New York, has a clubroom, baths, classes of various kinds and a mutual benefit jund. In the social, uni¬ versity and college settlements in large cities throughout the United States, clubs for girls generally constitute an important feature of the work.

• ?he se ˚.-he word ((girl® in connection with working-girls' clubs is somewhat vague, as the term is very elastic in its application. In most working-women's dubs girls are admitted who have passed the age of 14, but in some cases there are also junior clubs for the younger girls. These*

((sub-club-s® are to some extent under the supervision of the older members, but usually have their own officers and constitution. The ˆ State and city associations of working- girls clubs secure for the individual clubs belonging to them enlarged advantages and more effective working. The results of united effort are illustrated by the success of the movement for the early closing of stores in Boston in 1896-97, a step due in great part to clubs having a membership largely drawn from girls in stores and factories. One of the objects of the Massachusetts association is to assist clubs in obtaining the services of good teachers, physicians and lecturers. Among the subjects very frequently taught in the classes connected with working-girls' clubs are plain sewing and embroidery, millinery, cooking, gymnastics and singing. Lessons in English literature, elocution, French, German, stenog¬ raphy, drawing, modeling and painting are also offered to many club members. In some of the clubs the teachers are paid and in others they contribute their services. Besides the more formal lessons, talks, are often given to club girls on hygiene, nursing, morals, manners, etc. ; and concerts, lectures and readings, with <(even- mgs of travel® fill many of the evenings de¬ voted to entertainment. Outings of various kinds form a summer feature in many clubs,

and vacations are often made possible at cheaper rates than could otherwise be obtained by the members. Large clubs or associations conduct vacation houses at the seashore or in the country. The pleasures and privileges con¬ nected with club life form the brightest and most hopeful element in the life of many a self-supporting girl. See Boys' Clubs; Club; King's Daughters and Sons, International Order of ; Lend a Hand Clubs ; Women's 'Clubs; Workingwomen's Clubs.

GIRLS' FRIENDLY SOCIETY. See

Girls' Clubs.

GIRON, Colombia, town of the department of Santander, on the Lebrija River. Gold min¬ ing and tobacco culture are the principal indus¬ tries. It was founded in 1631. Pop. 6,202.

GIROUARD, Desire, da-ze-ra zhe-roo-ar, Canadian jurist: b. Saint Timothee, prov¬ ince of Quebec, 7 July 1836; d. 1911. He practised as a member of the Montreal bar 1860-95, and was a member erf the Dominion Parliament for Jacques Cartier 1878-95. He carried the Deceased Wife's Sister Bill in 1882 and after 1895 served as a justice of the Su¬ preme

Court of Canada. He published (Essai sur Lettres de Change5 (1860) ; (The Bill of Exchange Act5 (1890);

GIROUARD, zhe-roo-ar', Sir Edouard Percy Cranwill, Canadian soldier and railway official : b. Montreal, 1867. He was educated at the Royal Military College of Kingston, On¬ tario, and served for a time on the engineering staff of the Canadian Pacific Railway. In 1888 he was made second lieutenant of the Royal En¬ gineers, and lieutenant three years later. From 1890 to 1895 he was railway traffic manager at Woolwich. In 1896-97 he served in the Dongola expedition under Kitchener, was director of the Sudan railways in 1896-98 and in the following year president of the Egyptian railway board. During the war in South Africa he was director of railways there; in 1902-04 he was railway commissioner of the Transvaal and Orange River Colony; was made lieutenant colonel in 1904 and assistant quartermaster-general of the Western Command in 1906. In 1907 he was appointed High Commissioner of northern Nigeria and in 1909-12 was governor of the protectorate of East Africa. He was knighted in 1900. He wrote (History of the Railways during the War in South Africa5 (1905).

GIRONDE, zhe-rond', France, a depart¬ ment of southwest France, bounded north by the estuary which gives it its name and the department of the Charente; east by Dordogne and Lot-et-Garonne; south by Landes; and west by the Bay of Biscay; area, 4,140 square miles. The whole department, with exception of the west, which sends its waters either di¬ rectly to the coast or the long series of lagoons by which it is lined, belongs to the basin of the Gironde, which is formed in its interior by the junction of the Dordogne and Garonne. The only other streams deserving of notice are the Leyre, which discharges itself into the most southern lagoon; the Ciron, a left affluent of the Dordogne; and the Isle, with its tributary Dronne. The quantity of waste land is very great, amounting to more than one-third; while the arable land is rather less than one-fourth

of the whole surface. Of the remainder about one-seventh is occupied by vineyards, and one- ninth under wood. The great staple of produc¬ tion is wine. The most celebrated wines are Medoc, Graves, Cotes, Palus and Entre-deux- Mers. (See Wines). The trade, which has its centre at Bordeaux, is very important. The principal exports are wine, brandy, corn, flour, fruit,, resin, liqueurs, etc. The oyster fisheries are important.. For administrative purposes Gironde is divided into six arrondissements — Bordeaux, Bazas, Blaye, Lesparre, Libourne and La Reole. The capital is Bordeaux (q v) Pod 829,095. P'

GIRONDIST, ji-ron'dist, or GIRONDIN,

the name of a great political party in France; one of the most powerful factors in the earlier part, of the first French Revolution. When the Legislative Assembly met in 1791, it contained representatives of the upper, the middle and the lower classes. The Girondists were the party of the middle classes, and were republican in sentiment, but suffered from the lack of a definite policy. They obtained their designation from the fact that their most celebrated leaders, Vergniaud, Guadet and Gensonne, were mem¬ bers for the department of the Gironde, origin¬ ally lawyers in the law court of Bordeaux. Sometimes they were called Brissotins from Brissot, their most eloquent leader. They were the most powerful party in the Assembly, and for a time shaped the policy of their country. When conservative Europe threatened France with invasion, the Girondists in April 1792 de¬ clared war, the Jacobins deprecating hostilities, as fearing the result. To overcome their monar¬ chic rivals, the Girondists coquetted with the last-named party, and found that they had gained, not a servant, but a cruel and exacting master. The quarrel between the two arose af¬ ter the massacres perpetrated in August and September 1792, and the extreme revolutionists ultimately prevailing, an armed mob on 31 May 1793 assailed the convention, and demanded the imprisonment of 29 Girondist deputies. These were arrested on 2 June, and 21 of them were guillotined on 31 October. Others were subse¬ quently put to death; a few who escaped reap¬ peared in the convention after the fall of Robespierre.

GIRTON (ger'ton) GOLLEGE, England, a noted college for women, instituted at Hitchin, Hertfordshire, in 1869, but removed to Girtonj near Cambridge, in 1873. The students, about 160 in number, are admitted after an entrance examination; the ordinary course extends over three years, half of each year being spent in college. Degree certificates are granted for the B.A. of Cambridge University. The college is governed by an executive committee, a mistress and vice-mistress.

GIRTY, Simon, American frontiersman and leader of the Indians: b. present Dau¬ phin County, Pa., 1741 ; d. Canada 1818. He became a second lieutenant of Virginia militia, later an Indian interpreter, deserted to the Eng¬ lish in 1776, was appointed an interpreter to the English Indian department, and was declared a traitor by the Pennsylvania legislature. His name was popularly associated with many In¬ dian atrocities on the frontier, although it is likely that he was not at any time commander

of a large force and that his prestige among the savages was much less than was supposed. He did, however, lead the Indians who attacked Dunlaps

Station (1791) and Fort Jefferson

(1791).

GIRVAN, Scotland, seaport and market town of Ayrshire, on the west coast, 20 miles southwest of Ayr. Herring fishing and weaving are its principal industries, but there is a large trade in coal and limestone which are produced nearby. The town is a popular health resort. Pop. 5,331.

GISBORNE, Frederick Newton, Cana¬ dian electrician and inventor: b. Broughton, Lancashire, England, 8 March 1824; d. 29 Aug. 1892. He went to Canada in 1845 and soon after engaged in telegraph work. He laid before the Nova Scotia authorities in 1850 a plan for telegraphic communication between Newfound¬ land and Ireland, and the first cable in America, which connected Prince Edward Island and New Brunswick, was laid by him 1852. In 1879 he was appointed superintendent of the Domin on government telegraph service. He achieved some note as an inventor.

GISLASON, gisla-son, Konrad, Icelandic philologist: b. Longumyri, 1808; d. 1891. He was educated at the University of Copenhagen and from 1853 to 1886 held the chair of ancient Norse languages there. His editions of the (Gislasaga> (1849) and VII-VIII).

GISMONDITE, or GISMONDINE

(named after C. G. Gismondi, an Italian min¬ eralogist), a monoclinic transparent or trans¬ lucent mineral of vitreous lustre, its hardness 4.5; specific gravity 2.27; sometimes colorless, sometimes white, bluish-white, grayish or red¬ dish. It is optically biaxial. Composition: Sil¬ ica 35.88; alumina, 27.23; lime, 13.12; potassa, 2.85 and water, 21.10. Occurs in leucitic lava near Rome and in Sicily.

GISSING, George, English novelist: b. Wakefield, 22 Nov. 1857; d. Saint Jean de Luz, France, 28 Dec. 1903. In his stories he made a remarkable study of the London masses, from the ranks of skilled labor to the most noisome human refuse of the slums. He published (1886); Hsabel Clarendon5 (1886) ;

(Eve's Ransom5 (1895); (The Whirlpool5 (1897); (Human Odds and Ends5 (1897);

cThe Town Traveler5 (1898);

GIST, or GUEST, Christopher, Colonial scout, woodsman and surveyor; prominent in historical records 1749-53; was the son of Richard Gist who

became presiding magistrate of Balt-more in 1736. His grandfather, after whom he was named, was an emigrant from England, who settled in Maryland on the south

side of the Patapsco River in 1682, but in 1691 removed to Baltimore County. From 1749-52 he explored the Ohio Valley as far as the mouth of the Scioto River in the interests of the Ohio Company (q.v.), and the country north of the mouth of the Kanawha. While among the Miamis, Shawnees and Delawares, in 1750-51, his party founded Picktown or Pickawillany on the Big Miami, 150 miles from its mouth, which led to complications with the French. It was during this expedition that an' old Delaware chief shrewdly asked him : <(The French claim all the land on one side of the Ohio, the English all on the other side, tell me where does the Indians' land lie?55 On 14 Nov. 1753 Washington on his important expedi¬ tion to the Ohio to ascertain the French designs met Gist at Will's Creek (Cumberland River) and, previously acquainted, prevailed upon him to accompany the expedition as guide. He is said to have saved Washington from drowning while crossing the Allegheny River. His jour¬ nal formed the foundation of the historical accounts of the expedition. He married Sarah Howard, whose father took an active part in quelling Monmouth's rebellion in England. Their son William, who became an officer in the British army, married Sarah Fincher, and was the grandfather of William Henry Gist (q.v.).

GIST, George. See Sequoyah.

GIST, Mordecai, Revolutionary soldier: b. Baltimore, Md., 1743 ; d. Charleston, S. C., 2 Aug. 1792. He came of the same family as Christopher Gist (q.v.), and in early life be¬ came a merchant in Baltimore. At the outbreak of the Revolution, he became captain of the first regiment raised in Maryland, and rapidly advanced to the rank of brigadier-general. He took prominent parts in the battles of Long Island, August 1776; in the battle of German¬ town, September 1776; at the disastrous battle of Camden in 1780, with his brave Marylanders bearing the brunt of the conflict; and at the battle of Combahee, 26 Aug. 1782, saved the fortunes of the day, changing a disastrous de¬ feat into a brilliant victory. He aided mate¬ rially in the operations that led to the capitula¬ tion of Charleston and was present at the sur¬ render of Cornwallis. The remaining years of his life were spent on his plantation at Charles¬ ton, S. C.

uioi, wmiam fienry, 4Uth governor of South Carolina (1858-60) : b. Charleston, S. C.

d Rose Hill, S. C., September 1874. He was the son of Francis Fincher Gist and great-grandson of Christopher Gist (q.v.). In 1819 his parents*

removed to Union County and he was educated at the South Carolina College. He became the leading lawyer in the State; an active politician; was elected to the senate 1852-56; and governor of South Carolina in 1858. A staunch believer in State sovereignty, when the legislature met 5 Nov. 1860 he sent a message advocating both seces¬ sion _ and resistance in the event of Lincoln's election and on 20 Dec. 1860 signed the ordi¬ nance of secession.

GITANOS. See Gypsies.

• GIH?FRIDA-RUGGERI> gwe-fre'da ro- je e, Vincenzo, Italian ˆ anthropologist: b. Catania 1872. He settled in Rome as a practis-

mg physician in 1896, made anthropological studies and taught this subject successively at Rome, Pavia, 1906-07, and since the latter year at Naples. He has published (Sulla dignita morfologica dei segni degenerativi5 (1907) ; 'Homo sapiens : Einleftung zu einem Kurse der Anthropologie) (1913) ; L'U'omo attuale, una specie collettiva) (1913).

GIULIO ROMANO, joo'le-d ro-ma'no (properly Giulio Pippi de Giannuzzi), Italian artist, architect and engineer: b. Rome, about 1492; d. Mantua, 1 Nov. 1546. He assisted Raphael in several of the latter's works, includ¬ ing the (Benefactors of the Church5 in the In- cendio del Borgo, and at Raphael's death in¬ herited a great part of his wealth and completed the (Battle of Constantine5 and the (Apparition of the Cross5 in the Hall of Constantine in the Vatican. He built the Villa Madama, for which he painted a fresco of Polyphemus. In 1524 he accepted the invitation of the Duke of Mantua to undertake for him a series of archi¬ tectural and pictorial works, restored the Pa¬ lazzo del Te, the cathedral, the streets and a ducal palace at Marmirolo, near Mantua. Among other Mantuan works of his are the (History of Troy,5 in the castle, and (Psyche,5 Ucarus,5 and the (Titans,5 in the Te palace, and his abilities as an engineer were attested by his draining the marshes surrounding the city and protecting it from the overflow of the rivers Po and Mincio. In Bologna he designed the fagade of the church of Saint Petronio. Other works are the (Martyrdom of Saint Ste¬ phen,5 at Genoa; (A Holy Family,5 at Dres¬ den; (Mary and Jesus,5 and the (Madonna della Gatta.5

GIURGEVO, joor-ja'vo, or GIURGIN,*

Rumania, town in Wallachia, on the Danube, opposite Rustchuk, 35 miles southwest of Bu¬ charest. It is the port of the capital, has a custom house

and exports grain, petroleum and salt. It is one of the chief commercial centres of the country, almost all the trade with Bul¬ garia passing through it. It was founded by the Genoese in the 14th century and under the Turks was a fortified military station. It suf¬ fered greatly in the wars between the Turks and Russians. Pop. 15,000.

GIURGIN. See Giurgevo.

GIUSTI, joos'te, Giuseppe, Tuscan satirical poet : b. Monsummano, near Pescia, 13 May 1809; d. Florence, 31 March 1850. Son of well- to-do and intellectual parents, his early studies were made in Florence and Lucca. In 1826 he was sent greatly against his will to study law at the University of Pisa, but so little did he care for this career that it was only in 1834 that he got his degree and was admitted to the practice of his profession. Better known to the grand ducal police than to his teachers, already noted in his student days for his liberal associations and for his satirical verses against the Tuscan authorities, it was not long before Giusti abandoned law fo letters. In 1833 he satirized Francis IV, the ferocious Duke of Modena, in (La Guigliottina a vapore5 (The Steam Guil¬ lotine) with such success that the young author established himself quickly as the Beranger of Italy. His political and social satires, under the name of (Scherzi5 (Pleasantries) and (Versi,5 circulating at first surreptitiously in

manuscript form, attacked the abuses of the day, the petty tyrants and the foreign oppres¬ sors of the peninsula. On the death of Francis I of Austria, Giusti wrote in 1835 his famous (Dies I rse,5 a bitter invective against the im¬ placable persecutor of Italian liberals. In the following year appeared (Lo Stivale5 ((The Boot), a pathetic, ciuaint and pointed allegory, a plea for a united Italy. The poet rose to higher lyric pinnacles in the satirical ode, (L'Incoronazione5 (1838), when he bitterly as¬ sailed the coronation of Ferdinand I of Austria at Milan. (La Vestizione5 ((The Inaugura¬ tion,5 1839), (I1 Ballo5 and (La Scritta5 (1841) lay bare the abjectness of the old nobility and the upstart crassness of the new aristocracy. (I1 Brindisi di Girella5 (1840), a brilliant satire on political chameleons, addressed to Talley¬ rand; (La Terra dei Morti,5 a reply to Lamartine's strictures on Italy; (I1 Re Travicello5 ((King Log5) ; and other poems ap¬ peared in rapid succession. On account of his health, which had always been delicate, the poet interrupted his work in 1844 to travel to Rome and to Naples, then to Leghorn and finally to Pescia, where in 1845 he wrote (Gin- gillino,5 .probably the loftiest in moral tone of his social satires. In 1846 he composed the splendid patriotic poem, (Sant' Ambrogio,5 and his powerful (Delenda Cartago,5 stirring in its fervid invective against the foreign oppressors. The latter years of Giusti's life were spent in the activities of the revolt of 1848. In 1847 already he was a major in the Guardia Civica of Pescia; in 1848 and again in 1849 he was elected a*

deputy to the Tuscan legislature, al¬ though his health soon became too delicate to permit his continuance in politics. As a politi¬ cal satirist, Giusti was a bitter opponent of foreign rule and interference in Italy. So greatly was his verse feared by the authorities, that no edition dared be printed before 1844. Giusti wrote in his racy Tuscan idiom, employ¬ ing the popular dialect of his province with singular felicity, with a mastery of invective and a skill for concise characterization inimit¬ ably his own. His field at times is narrow, the abuses in local conditions and the evils of his day. He gave, however, to political satire a freshness of form, a vivacity of metre and a variety in rhythms that stamped him at once in Italy as the creator of a new type of poetry. Lacking the universality, the breadth of Beranger, to whom he has often been com¬ pared, he surpasses his French counterpart in form, in technical equipment and above all in poetic inspiration. Although his reputation has suffered somewhat through changes wrought by time and varying taste, Giusti's name <(will survive as that of an original poet who sought and attained noble aims in civic education.55 See Gingillino and consult Carducci, G., (Poesie di Giuseppe Giusti5 (Florence 1859) ; Puccianti, G., (Poesie di Giuseppe Giusti5 (Florence 1913) ; Martini, Ferd., (L'Epistolario di Giuseppe Giusti5 (Florence 1904) ; Horner, Susan, (The Tuscan Poet, Giuseppe Giusti, and his Times5 (London 1864) ; Howell, W. D.,

(Modern Italian Poets5 (New York 1887).

Alfred G. Panaroni.

GIVET, ge-va', France, town in the de¬ partment of Ardennes, on the Meuse, near the Belgian frontier and 25 miles south of Namur. It was formerly a fortified town but in 1892 the

fortifications were made into boulevards and promenades. In August 1914 the town wit¬ nessed the stubborn defense of the British ex¬ peditionary forces against the advancing Ger¬ mans, to whom it fell during the latter part of the month. Brewing, tanning, pencil-making and marble-working are the principal indus¬ tries. Pop. 7,759.

GIVORS, ge-vor', France, town in the department of the Rhone, on the Gier and Rhone, 15 miles south of Lyons. It has ma¬ chine works, bottle and glass factories, and coal mines. Pop. 12,500.

GIZEH, ge'ze, GHIZEH or GEEZEH,

Egypt, a town on the left bank of the Nile, almost directly opposite Cairo. Near it is the vice-regal palace. It was formerly an import¬ ant place, beautified by palaces, but now forms a scene of ruins, amidst which the town is built. Five miles to the west are the great pyramids which have been named from this town, and here also is the famous Sphinx. Pop. about 11,500. Consult on the work here executed by the British School of Archaeology, Flinders Petrie, (London

1907).

GIZZARD, a stomach or a part of it or of the alimentary canal where it is unusually mus¬ cular and tough, so that it is able to crush or grind solid food. . It is not possessed by ani¬ mals whose food is soft or else is chewed be¬ fore swallowing; and is best developed among seed-eating birds, which frequently swallow pebbles to assist the gizzard in its grinding work. Birds not accustomed to hard food, if compelled and able to adopt such a diet, will develop a serviceable gizzard. Various fishes, reptiles, crustaceans, insects, worms and other invertebrates have gizzards. See Digestive System under Anatomy, Comparative; Stomach.

GJELLERUP, Karl, Danish author: b. Roholte, 2 June 1857. His home has been at Dresden during the greater part of his literary career. His interest in all things German, particularly in German art and music, has al¬ ways been very great, and found its written evidence in (Richard Wagner i hans Hoved- waerk Nibelungens Ring> ((Richard Wagner in his Chief Work, the Ring of the Nibelung, 189(F). Among his novels are (1894). Ex¬ cept for the translation of a novel dealing with the mystic life of India, (The Pilgrim Kamepita, none of his work has been printed in English. The Nobel Prize for Literature, for 1918, was divided equally between Gjel- lerup and another Danish writer, Henrik Pontoppidan (q.v.).*

GLACIS BAY, Canada, situated in Cape Breton County, Nova Scotia, about 15 miles east of Sydney, on the Sydney and Louis- bourg Railway. It is the centre of a consider¬ able fishing industry, and has also machine works, but the great industry is coal mining, being the seat of the Dominion Coal Company, which has a payroll of 5,000 men, and disburses annually in wages $5,000,000. Pop. 16,562.

GLACIAL ACETIC ACID. See Acetic Acid.

GLACIAL DEPOSITS. See Glaciers;

Glacial Period ; Rocks ; Sedimentary Rocks ; and section on Glaciers in article on Geology.

GLACIAL DRIFT. See Drift.

GLACIAL EPOCH. See Glacial Period.

GLACIAL GEOLOGY, that branch of geology that treats of glacial phenomena both past and present. See Cambrian; Geology; Glacier; Glacial Period; Permian; Pleisto¬ cene Epoch.

GLACIAL PERIOD, or ICE AGE. Over nearly all of the North American continent north of the 40th parallel and over a vast tract of the continent of Europe, due to the work of moving ice sheets or glaciers, rock surfaces have been ground and polished, great boulders have been carried and deposited long distances from the ledges whence they came, and the topography has been given characteristically rounded outlines. Since the marks of the ice chisel are plainly visible on hard rocks, and even on easily weathered rocks that have been protected by a thin layer of soil, it is evident that the ice finished its work recently.

*Effects of Glaciation. — At the opening of the Glacial Period most of the land surface over which the ice advanced was covered by a deep soil grading through partly decayed rock into solid rock. Undoubtedly the ice did not level off the general surface of the country as much as has been supposed, but it wiped off the soil and partly decayed rock and dumped it into the valleys, rounded the outlines of hills, broadened north and south valleys and pushed before it or carried along a mass of detritus which formed, whenever the ice stopped its ad¬ vance, a terminal moraine. It is possible that clay and boulders were laid down in a thin sheet under the ice in places at least, forming what is known as boulder clay or till and near the southern edge of the ice sheet, producing oval hills of clay and boulders known as drum- lins. Other deposits were formed along the edge of the ice, from material worked over by water and known as stratified drift. These de¬ posits include irregular hills of sand, gravel and boulders, called kames, and long winding ridges of the same material called eskers. These latter are supposed to represent the filled channels of subglacial rivers. Irregular depressions known as kettle holes occur in a glaciated region where isolated masses of ice were. buried as the ice sheet retreated. It is in fact in the retreat of the ice front that topog¬ raphy was most modified, the terminal moraines, at each pause in the retreat, dammed river . valleys, while the valleys were filled sometimes to a depth of hundreds of feet with detritus.. Between the morainic dams in front and the ice in the rear, great lakes were formed one of these, Lake Agassiz in Minnesota, the Dakotas and Manitoba being 700 miles long from north to south. At the same time, the Great Lakes stood at a much higher level than now. Their outlet through the Saint Law- ˆ r*Ce !Yer was still blocked with ice, and they drained by various channels in part through I he Chicago River to the Mississippi, m part by other outlets. At a later stage they drained through the Mohawk Valley into the Hudson River and thence to the Atlantic*

Ucean. iheir history has been very complex,

and is traced largely in the beaches which they left Since these beaches are not now horizon¬ tal it is known that changes of level have oc¬ curred since glacial times. As the glacial retreat was recent, streams have not had time to cut down valleys and so a glaciated region is a region of lakes.

Cause and Duration of the Glacial Period.

— Though several theories of the cause of the Glacial Period have been proposed, no one has received general acceptance. The existence of Glacial periods in past geologic ages is well es¬ tablished. Some writers hold that north¬ ern North America and probably Scandinavia were much elevated at the close of Tertiary time and that this elevation of the land caused so heavy a snowfall that snow lay on the ground all the year round, and glaciers started. Another hypothesis, that of Croll, is that owing to variations in the eccentricity of the earth's orbit around the sun the hemisphere having winter when the earth was farthest from the sun would for a period have protracted winters, and during this period great masses of ice might accumulate. Whatever the cause, the ice sheets formed and advanced. In North America three centres of glaciation are gen¬ erally recognized, the Cordilleran along the Rocky Mountains in British Columbia, whence the ice flowed eastward possibly 1,000 miles or more ; the Keewatin, near Hudson Bay, whence the ice advanced southwest, south and southeast, reaching as far south as Iowa; and the Laurentide, north of the Saint Lawrence River and in Labrador, whence the ice advanced over eastern Canada, New England and the Central States as far west as the Mississippi River. The retreat of these ice sheets was ac¬ companied or preceded by changes of level, until at the close of the Ice Age, during the so-called Champlain stage, or its equivalent, the Columbian, the ocean covered what is now dry land in the vicinity of Saint Lawrence River and Lake Champlain, and the climate was milder than now. The ice did not advance nor retreat steadily. Some geologists recognize in the Mississippi Valley four or five advances and corresponding retreats, and speak of these as epochs or stages. The time since the close of the Ice Age has been variously estimated; average estimates being around 20,000 years. There is good evidence for believing that as much time elapsed between some of the ad¬ vances of the ice. > Hence it is sometimes said that we may be living to-day in an Inter-glacial Period. It is certain that man was in Europe in what is known as the Chelean Epoch, or early Pleistocene. He may have been in America at the same time, but no certain evi¬ dence of his presence

has been found. See Columbian' Formation; Diluvium; Cham¬ plain Stage; Drift; Drumlin; Glacier; Till.

Bibliography. — Agassiz, (Systeme Glaciale) (1847) ; Croll, (Climate and Time) (1885) ; Dawson, (Canadian Ice Age (1894) ; Bonney, (Ice Work, Past and Present* (1896); Geikie, (Great Ice Age1* (1895) ; Heim and Penck, (On the Ancient Glaciers of the Isar and Liuth> (1886) ; Wright, (Ice Age in North America* (1890) ; Upham, ˆGlacial Lake Agas¬ siz* (United States Geological Survey, Mono¬ graph XXV).* *C. L. Dake,*

Assistant Professor of Geology and Mineralogy, Missouri School of Mines and Metallurgy.

GLACIER, a current of ice formed from compressed snow. Water, changed into vapor by sun-heat and carried by the winds over frosty highlands, is crystallized into snow. Glaciers take their rise in regions which lie above the snow-line. Upon these regions from their geographical position and elevation, the quantity of snow that falls exceeds the quantity melted and immediately evaporated. The sur¬ plus, instead of accumulating indefinitely, is changed by the pressure of its weight into ice, which, though hard and apparently as brittle and inflexible as glass, flows down toward the sea in beautiful swaying undulating lines, as if soft like honey or tar. Thus the overbur¬ dened regions above, the snow-line are relieved and a continuous circulation is maintained, — ocean water flying away through the air in the form of vapor, but in returning creeping along the ground in the form of ice, grinding and crushing the rocks that lie in its way, and leav¬ ing a heavier track than anything else that moves on the face of the earth.

In general a glacier flows like a river, and drains off snow as a river drains off rain. At different places it moves at different rates, not only along its cross-sections, but along its length and also from surface to bottom, as friction and the declivity of its bed varies. The velocity of the swiftest parts of the largest glaciers of the Alps is about from one foot to three feet per day; of the smallest, about as many inches. The lower central part of the Muir Glacier of Alaska flows about 10 feet a day. Some of the Greenland glaciers are said to flow much faster, from 59 feet to 100 feet having been recorded for 24 hours. Glacier motion, however slow, is continuous. It is less in winter than in summer, and slightly less in frosty nights than in warm and rainy days. Differences are noted also where the neighbor¬ ing peaks constrict the ice flow to a narrower path. At such points the speed is increased.

Crevasses.— Though obedient to the laws of liquid motion in general, a glacier refuses to stretch, as is shown by its breaking sharply asunder at

right angles to tension strains, thus forming the so-called transversal, longitudinal, marginal and bergschrund crevasses. The first two are caused by unevenness of the channel, the marginal by differential motion, the berg-schrund by the glacier flowing away from the motionless snow attached to the head of its basin. The last is of course a feature of all glaciers; so are the marginal crevasses, since the middle of all glaciers flows faster than the sides ; but large central areas, where the bed is regular in slope or slightly concave, are free from crevasses. The largest crevasses are sev¬ eral miles long, 1,000 feet deep or more, and 30 or 40 feet wide, though at first they are usually too narrow to admit a knife-blade. In some places all sorts of crevasses are interlaced, forming labyrinths of yawning gulfs defying the skill and will of the bravest mountaineer who tries to hew a way through them. The ridges between closely spaced crevasses are known as seracs.

Regelation. — The brittleness of ice, with its flowing motion, is partly explained by regelation' (refreezing). In 1850 Faraday dis¬ covered that when two pieces of thawing ice are placed together they freeze at the points of contact. Snow at a temperature of 32° F.,

stuffed into a mold and squeezed, becomes trans¬ parent ice. So also fragments of ice pressed in a mold break, are crushed and recongealed into. a solid mass, of the form of the mold, illus¬ trating the breaking of glaciers and their regela¬ tion when from change of position the sides of the chasms, great or small, are pressed together.

Moraines. — The life of a glacier is one eternal grind. Its draining streams are always milky with rock mud rubbed off its bed, and separated from the large detached masses by the waters. Moraines, lateral, medial and terminal, are the general detritus of a glacier and the weathered heights about it, drawn out and arranged, by the ice currents, and located as their names indicate. The medial moraines, of which each glacier usually has one fewer than the number of its tributary glaciers, are formed by the union of two laterals at the confluence of the tributaries, and extend down the trunk in beautiful order. The terminal moraine is made up of parts of all the others. The moraine material, clay, sand and boulders, of the great continental, glaciers of the Ice Age, is often called drift. The detached rock masses, borne along by the ice currents and left in the terminal moraines, or if the glacier reaches the sea, dropped perhaps hundreds of miles away by iceberg, are called erratics.

The most striking features of large glaciers are. the medial moraines, the

lakes and streams on its surface, the wild ice cataracts correspond¬ ing to the cascades and rapids of rivers, and the discharging frontal wall, with its icebergs. Glaciers vary widely in size and form; they may be classified as follows:

(a) Continental glaciers, of which only two now exist, the Greenland and South Polar ice caps, dome-shaped ice deposits covering the entire face of nature beneath. Similar in char¬ acter to the continental glaciers are the ice caps of Norway, Iceland and Franz Josef Land and the masses of (

(b) Glaciers of the first order, which are more, or less river-like, flow into the sea, and terminate in. berg-discharging ice cliffs.

(c) Glaciers of the second order, which approach the sea, but do not enter it, and of course do not discharge icebergs, waste from melting and evaporation equaling the snow supply.

(d) Glaciers of the third order, residual branches of those of the second, separated and made independent by the melting away of the trunks to which they belonged. Nearly all the glaciers of the world are now of this order. The last three types are often called valley or alpine glaciers.

Distribution of Glaciers. — Most of the glaciers of North America are distributed along the mountain ranges of the Pacific coast from central California northward. About 65 small residual glaciers a mile or less long still linger on the Sierra Nevada of California between lat. 36° 30′ and 38°, at an elevation of 11,000 to 12,000 feet above sea-level. Groups of larger glaciers drain the snow-fields of Mount Shasta and the. high volcanic mountains of the Cascade Range in Oregon and Washington. From ice-crowned Mount Rainier, 14,600 feet high, eight glaciers, 5 to 10 miles long, descend into the forests to within 3,000 and 4,000 feet of sea-

level. The broad, lofty mountain chain ex¬ tending along the coasts of British Columbia and southeastern Alaska is generally ice-laden; the upper branches of the main valleys are oc¬ cupied by glaciers, which gradually increase in size and descend lower, up to the highest and snowiest region of Alaska between lat. 56° and 61°, where a considerable number flow into arms of the sea. This is the region of great¬ est glacial abundance on the continent. To the north of lat. 61° the glaciers gradually diminish in size to about lat. 62° 30′ or 63°. Beyond this, to the north end of the continent, few, if any, glaciers now exist, the ground be¬ ing comparatively low and the snowfall light.

Glaciers of . the third order, a mile or two to 15 or 20 miles long, fill the upper canyons and hollows of the highest region in countless thousands.

The large glaciers of the. second order num¬ ber about 100. They are distributed along the coast from the mouth of the Stickeen River to Cook Inlet and the Alaska Peninsula. The ex¬ panded fan-shaped ends of many of this order are from two to four or five miles wide and constitute what are known as bulb glaciers or, if very large, piedmont glaciers. The largest among these are the Malaspina Glacier, the Miles, Yakutat, Grand Plateau, Crillion and La Perouse, fronting the sea along the Saint Elias and Fairweather mountains. The Malaspina is the largest of them all, being about 20 miles long and 65 or 70 miles wide, — a grand undu¬ lating ice prairie sloping gently from the base of the Saint Elias Mountains, and separated from the sea by a girdle of forested moraines five or six miles wide, except at Icy Cape, where it presents bluffs . of pure ice that are being continually, undermined by the waves and are discharging icebergs into the sea. The La Perouse also presents ice bluffs to the open ocean, which at high tide are wave-washed, and small bergs are occasionally detached; but far the greater number terminate a mile or two from the tide line, back of moraines in rather low-spreading crevasse-gashed brows, over which one may easily climb.

The great glaciers of the first order flowing out.into deep ocean water and discharging fleets of icebergs number about 31. One, the south- most, flows into the Le Conte Fiord in lat. 56° 50', four into branches of Holkam Bay, one into Taku Fiord, nine into the Glacier Bay fiords, two into Lituya Bay at the base of Mount Fairweather, three into Disenchantment Bay and 11 into the wild fiords of Prince Wil¬ liam Sound, the northmost being a little above the 61st parallel. . The birth of icebergs from this type of glacier is attributed to the thin¬ ning of the foot of the glacier from above, and the upward force exerted by the lighter specific gravity of ice as compared with sea water at a depth of several hundred feet.

The scenery of these fiords is of the grand¬ est description. From wall to wall they are en¬ cumbered, of ten. jammed with icebergs, which by the most active glaciers are discharged at intervals of a few minutes with thundering roaring that may be heard 5 to 10 miles away, proclaiming the restless work and power of these mighty crystal rivers, in striking contrast with the dead silence of those of the second order, though they also, except at their decay¬ ing ends, are ceaselessly flowing and grinding.

GLACIERS

1 Hanging Glacier

2 Front of Muir Glacier

GLACIERS

1 Small Residual Glacier

2 Front of Columbia Glacier

Glacier Bay is the iciest of the inlets which fringe the coast. Both to the north and south of it the glaciers are generally less lavishly snow-fed, and of course give birth to fewer icebergs. Of its nine glaciers of the first order, the Muir is the largest. It is about 50 miles long, the main trunk below the confluence of the principal tributaries is about 25 miles wide and probably about 1,500 feet deep. The berg- discharging part of the sea-wall is less than two miles wide, rises above the water to a height of 250 to 300 feet, and sinks to a depth of about 700 feet.

The grandest of the Prince William Sound glaciers are, the Columbia, Barry, Harvard, Yale and Harriman. Some of the smallest of the noble company descend flowery mountain¬ sides in the wildest and most imposing ice-cata¬ racts.

Residual glaciers from a mile to 10 or 12 miles long, including neve, are distributed throughout the Rocky Mountain ranges from lat. 43° to 53°. The greater number lie between 50° and 52° 30′ at the heads of the Saskatche¬ wan, Athabasca and Columbia rivers. The largest groups are magnificent rags and patches of an ancient ice-sheet, some of them covering an area of 40 to nearlv 100 square miles and sending down river-like glaciers six to eight miles long.

Glaciers of the third order abound on the Alps, the Pyrenees, the Caucasus, the Scandi¬ navian Peninsula, the Andes, the lofty snowy ranges of Asia and on the mountains of New Zealand.

More than 1,000 with an area of about 1,200 square miles have been surveyed and named in the Alps. The largest are river-like, 10 to 15 miles long, descend into the forests and ter¬ minate at an elevation of 4,000 to 6,000 feet. Most of the smaller ones are like masses of pure snow, and terminate about 2,000 feet higher.

The Caucasus is perhaps about as heavily ice-laden as the Alps. Few of its glaciers are knowm to descend much lower than 6,000 and 7,000 feet. Those of the Pyrenees are compar¬ atively small.

Many of the glaciers of Norway pour grandly down from extensive neve fields to within 1,000 feet of the sea-level. A few ap¬ proach the shore and

may rank as glaciers of the second order, while one, the only one in Europe of the first order, discharges into Jokul Fiord, near the 70th parallel. Between the larger glaciers flowing toward the heads of the fiords there are many hanging and cascading glaciers, ranged along the brows of plateaus, some of which pour over precipices in separate bergs with loud roaring like that of glaciers discharging into the sea. At the foot of the cliffs the battered fragments are welded by the accumulating weight and thus these wild ice-streams, after their plunge through the air, are made whole again and flow quietly on their way as ˆregenerated glaciers, the space between their upper and lower parts being only a wider and more complete crevasse.

The low-descending New Zealand glaciers almost rival those of the Alps in size, while their beauty is greatly enhanced by the rich vegetation through which they flow.

The glaciers of South America are distrib¬ uted along almost the whole extent of the

Andes. According to Whymper those under the equator attain their greatest size on the snow-laden, storm-beaten summits of Antisana, Cayambe and Chimborazo. On Cayambe 12 glaciers of considerable size were counted, flow¬ ing from the central neve reservoir, descending to about 15,000 feet above sea-level. To the south of lat. 46° many approach the sea.

On the lofty mountain chains of Asia, espe¬ cially the snowy Himalaya, Karakoram, Hindu- Kush, Kuen-Lun and Thian-Shan, thousands of little known residual glaciers still exist. The largest which have been explored are the mag¬ nificent Biafo and Baltoro Karakoram glaciers, 30 and 35 miles long, descending to about 11,500 and 12,000 feet.

Excepting Australia, which seems to have lost all its glaciers, Africa is glacially the poor¬ est of the continents. Its only known glaciers are those of the tw'o great snowy mountains, Kenia and Killimanjara, near the equator.

The Arctic islands — Jan Mayen, Nova Zembla, Spitzbergen, Franz-Joseph Land and many others — are heavily ice-laden. Their largest glaciers are broad sheets discharging magnificent bergs into the frozen sea.

But it is on Greenland and the South Polar lands that glacier ice reaches its grandest de¬ velopment. Excepting a narrow interrupted strip around its shores, Greenland lies buried beneath a continuous mantle of ice thousands of feet in thickness, through which only the rock tops of its highest peaks, called <(nuna- taks,ˆ protrude. From this ice-cap huge glaciers pour into

the sea, discharging icebergs of enor¬ mous dimensions, some of which sail into the Atlantic thousands of miles from home.

Still greater is the South Polar ice-cap, probably over two miles in thickness. The sea front of some of the glacier currents it pours forth are from 100 to over 400 miles wide, from which flat-topped island-like icebergs 5 to 10 miles long are discharged. Here the great cos- mical winter of the Glacial Period still exists in severe, serene grandeur.

Greater Extension of Glaciers. — That a great part of the earth in both the northern and southern hemispheres, now warm and fruitful, was recently covered by flowing, grinding ice, is well known. Over the eastern half of North America from the Arctic regions to lat. 40° or lower, moraines and beds of moraine material variously modified, grooved, scored and pol¬ ished surfaces, with other characteristic traces of glacial action, are displayed in wonderful abundance and uniformity.

Along the mountain ranges of the west side of the continent they extend still farther south. The broad Rocky Mountain chain and the plains along its flanks abound in glacial traces on a grand scale. On the Sierra Nevada pol¬ ished and striated rock surfaces, the most evan¬ escent of glacier inscriptions may still be found as far south as lat. 36° ; while a degree or two farther north, at an elevation of 7,000. to 8,000 feet above the sea, there are broad glacier pave¬ ments in so perfect a state of preservation that they reflect the sunbeams like glass and attract the attention of every observer.

Over the greater part of Oregon, Washing¬ ton, British Columbia and the Arctic and sub- Arctic regions about Bering Sea and north¬ western Alaska, the rocks in general are less resisting, and the weathering they have been

subjected to is, more destructive. Therefore the superficial records of glaciation are less clear in these northern regions than in California.

Lut in all glaciated regions there are other monuments of ice action which endure for tens of thousands of years after the simpler traces we have been considering have vanished. These are the sculpture and configuration of the land¬ scape in general, — the canyons, valleys, fiords, mountains, ridges and roches nioutonnees, the forms, trends and correlations of which are specifically glacial and almost imperishable, .these also, it is true, suffer incessant waste, being constantly written upon by other agents. But because

they are so colossal in size and peculiar in form and arrangement they continue to stand out clear and telling through every after-inscription, showing how great the ancient glaciers must have been, and how great are the geographical and topographical changes they have produced. Where man is busiest, even in the parks and gardens of New York, glaciated rocks shine and call attention to the story of the Ice Pei iod; and in orchards growing on moraine soil around the town of Victoria on the west side of the continent, fruitful boughs diop apples and peaches on the edges of glacier pavements, while the harbor rocks are still bright notwithstanding the centuries of wave- action they have been subject to.

Only yesterday, so to speak, much of our continent was buried under a dreary expanse of ice, as Greenland is to-day. It has left its trace in lake and swamp, in polished outcrop and rounded hill, in countless islands and fring¬ ing fiords. Under the influence, however, of a gradually warming climate, the glaciers have wasted away into insignificant remnants. See Glacial Period ; Pleistocene Epoch ; Geology . Bibliography — Agassiz, L„ 'Systeme Gla- ciale (Pans 1847) ; Arctowski, H., (Gotha 1903) ; Bonney T G

*W£rkV ?*sS and Present> (New York*

189d) L F°;b?obrJ- D' (Edinburgh 1845) ; and ˆNorway and Its Gla¬ ciers (Edinburgh 1853) ; Geikie, T.,*

*Great ICreˆ,AgeTT (New York 1895> 1 Gilbert, y- *>•» Whe Harriman Alaska Expedition (l904); Harper, A. P., (London 1896) ; Heim, A., (Handbuch der Gletscherkunde) (Stutt¬ gart 1885) ; Hobbs, W. H., Characteristics of Easting Glaciers> (New York 1911); Larden, W., (Argentine Plains and Andine Glaciers) (London 1911); Matthes. F. E., 'Mount Rainier and its Glaciers) (United States Inte¬ rior Department 1914) ; Meyer, H„ < Across East African Qaaers) (London 1891); Russell,*

L U, daciers of North America) (Boston 1897) ; Scott, R. S., 'The Great Ice Barrier and the Inland Ice) — Antarctic (Geographical Journal, London, Vol. 46, pp. 436-447 1915) • Sherzer, W H 'Glaciers of the Canadian Rockies and Selkirks) (Smithsonian Insti- tution 1907) ; _ Tarr , R. S„ and Martin. L., Alaskan Glacier Studies) (Washington 1914) •

7Q2}da11 /Gladej;s of ˆe Alps) (Boston 1861); Wright, G. F., 'The Ice Age in North America) (New York 1902), and

/ˆry JCeiˆe> ; Zeitschrift fur Gletscherkunde (Berlin 1893 to date).

GLACIER BAY, Alaska, a fiord 60 miles long north of Icy Strait. It extends

in a north¬ erly direction through the Saint Elias Moun¬ tains which discharge several glaciers into it.' The Muir Glacier is the largest, being three miles broad at the sea and about 200 feet high. Its area is 1,250 square miles, or about that of the State of Rhode Island. The bay is so en¬ cumbered with ice that navigation there is attended with considerable danger.

GLACIER BEAR, a small gray or "blueˆ betir (Ursus emmonsi) of the Saint Elias Alps Alaska. See Bears.

GLACIER NATIONAL PARK, The, a

public park set aside by presidential proclama¬ tion pursuant to authority conferred by the act of 11 May 1910. It lies just south of the Ca¬ nadian line, including portions of Teton and hlathead counties, Mont. It includes that part of the front range of the Rocky Mountains in Montana. In shape it is an irregular rec¬ tangle. On the west it is bounded by the north fork of Flathead River, on the south by the middle fork of Flathead River and the Great Northern Railroad and on the east by the lackfeet Indian Reservation. The Continental Divide extends through the park from north¬ west to southeast. The eastern face is pre- cipitous. Long ridges or shoulders extend from the Divide westward. This mountain chain is not a single narrow ridge, as may be assumed from its appearance at a distance, but is many miles in width, varying from 18 to 25 miles, and consists of a network of ridges and high spurs, ihe mountain mass has been regarded as two distinct ranges, the Livingston range on the west, and the Lewis range on the east. The Continental Divide joins the two ranges at r lattop Mountain by a low pass. The park covers 915,000 acres, or about 1,450 square miles. Ihe greatest length at any place of the irregular outline is about 45 miles. The greatest width is along the Canadian-United States boundary line, nearly 35 miles. There are about 80 glaciers between five square miles and a few acres in area. These glaciers, scattered throughout the area, give the name to the park.

I here are about 250 lakes, from those covering a ..few. ayes t0 those of larger size, several miles in length. The lakes are surrounded by steep and beautiful mountains. One of the interesting features of the park is the peculiarly rugged topography, the abrupt mountains in this part of the range being largely in the park area, there are mountains with vertical walls from a few hundred to more than 4,000 feet in height. Glaciers are perched high along the range m protected places, with waterfalls and cascades from a few feet to 2,500 feet. The western slope of the mountains is gradual and covered with timber, while the eastern face is abrupt. One passes at once from the rugged peaks, glaciers and waterfalls to the smooth treeless, glaciated plains. The high summits are not regularly arranged,

some occurring in the Continental Divide, others on the spurs pro¬ jecting rom either side. While the mountains

? iCc?°r hlgh ithey nse from low Plain or valley iiQA fed elevation at Lake McDonald and 4:186 at Waterton Lake on the north. They rise to heights of over 10,000 feet, with im-

nri? /rancJeur> The Peaks rising more than 1U,UOO feet above the sea are Mount Cleveland.

GLACIER NATIONAL PARK

‘

1 Lake Ellen Wilson and Gunsight Pass, from the trail

2 Looking west from Going-to-the-Sun Chalet

GLACIER NATIONAL PARK

Huge Glacier formed from

Copyright by Underwood & Underwood, X. Y.

snow banks that thaw enough to soften and then freeze into glacial ice

GLACIER NATIONAL PARK

675

10,438; Mount Stimpson, 10,155; Kintla Peak, 10,100; Mount Jackson, 10,023; Mount Siveh, 10,004. The Garden YVall is a name applied to the stupendous portion of the Divide between Swift Current Pass and Gould Mountain, above Grinnell Glacier. This portion of the mountains is of marvelous beauty and grandeur. Other precipitous walls of great height are seen on the way from Saint Mary Lake to Lake Ellen Wilson on the trail over Gunsight Pass. At Triple Divide Peak the water flows from its sides into three oceans through Norris Creek and Saint Mary Lake to Hudson Bay and the Arctic; through Cut Bank Creek into the Mis¬ souri and the Gulf of Mexico; and through Nyack Creek into Flathead River, thence to Clark’s Fork of the Columbia River and the Pacific. The abruptness, beauty and mag¬ nificence of the mountains have been produced by uplifting and faulting of the rocks. Break¬ ing in the rock strata in a number of places occurred, and the rocks on the west side of the folds were pushed upward and eastward over the then surface rocks. The mountain rocks were shoved over the rocks of the plains, pro¬ ducing an overthrust fault. Through these

hard and precipitous cliffs streams have cut through the overthrust mass and down into the soft rocks of the plains. This overthrust fault may readily be traced on the surface, as it makes an irregular zigzag from spur to valley. This thrust has been traced through and beyond the park in either direction. The full extent is not yet determined, but in one place the rocks have been shoved over the underlying former surface a distance of 15 miles, the direction being northeast. Streams and glaciation have carved the mountains in later times.

Of the 250 lakes of the park about 50 are large enough to command more or less attention. Lake McDonald is perhaps best known. Its lower end is but a short distance from the Belton entrance to the park. Saint Mary Lake (upper) is the first park point touched by travelers from the Glacier Park (station) entrance. Three lakes with name Two Medi¬ cine retain that Indian name. Hidden Lake lies high in the almost inaccessible mountains. Grinnell and Gunsight lakes lie at the foot of mountains of the same name. Waterton is partly in the park, partly in Canada on the north. Iceberg Lake, visited without difficulty, lies at the foot of a 3, 000-foot cliff on the north side of Mount Wilbur. Kintla lakes are in the northwestern part, as yet rarely visited by the tourist or traveler. Avalanche Lake lies below the shoulder on which is Sperry Glacier. Bowman, Quarts, Logging and Trout lakes, all of elongated form, are on the western slope between high ridges. The many smaller un¬ named lakes in various parts of the park, and some that formerly had names, have been given names of women, as Sue, Helen, Janot, Isabel, Lena, etc.

The depths of a number of the lakes have been determined. They are usually deepest at the upper end. Although formerly supposed to be ˆbottomless® they are not as deep as reports would indicate, as seen from the following: Lake McDonald, 387 feet; Avalanche, 63 feet; Bowman, lower end, 90 feet; Waterton, 317 feet; Haunted Lake (Tanot Lake), 10 feet; Dixon (Francis Lake), 75 feet; McDermott, 36 ieet; Iceberg, 149 feet; Saint Mary (upper),

200 feet; Gunsight, 63 feet; Louise (Ellen Wil¬ son Lake), 244 feet; Peary, at upper end of Sperry trial, 32 feet ; upper Two-Medicine, 65 feet; Red Eagle, 58 feet.

fvlany of the lakes are without fish, due to high falls below the lakes. Gunsight and upper Two-Medicine were stocked by David Ross of Kalispell in 1915, and in 1916 he also stocked McDermott, Josephine, Grinnell and Ellen Wil¬ son. The larger lakes are accessible for fish and are well stocked. The park glaciers are but remnants of the larger ice masses which in former ages extended far into or over the valley on the east and down the stream and river valleys on the western slopes. Of the number

previously mentioned only a few are of special importance. Sperry is easiest to reach. In a day from Lake McDonald one may reach the glacier, spend a couple of hours on the ice and return. Sperry is probably three-quarters of a mile long and over a half-mile wide, much crevassed toward the lower edge. Black- feet Glacier is the largest. Blackfeet and Red Eagle on the north or Hudson Bay side, and Harrison and Pompelly on the south or Pacific side of the Continental Divide, are really one continuous mass of ice. They extend along the Divide for more than three and a half miles, and cover a surface of between 5 and 10 square miles with solid ice of unknown depth. Black- feet Glacier is easily reached from Gunsight Lake. The most imposing glacier and the one most difficult to reach is Harrison. It seems to barely hang on the steep side of Mount Jackson. Grinnell Glacier covers less than a square mile. It rests on a steep shelf at the foot of the Garden Wall and between Grin¬ nell and Gould Mountains, both of which are magnificent park features. This glacier is one of the beautiful natural objects of the park. It is reached either from Grinnell Lake or from Granite Park, and without special trouble. Chaney Glacier lies high on the Divide, Hudson Bay side, but can be reached quite readily from the main trail over Flattop Mountain. It is not large, perhaps a half mile in extent in any direc¬ tion, and flanks the precipitous walls of Mount Merritt. The trail over Swift Current Pass gives a fine view of the small but wonderfully beautiful Swift Current Glacier. Kintla and Agassiz glaciers, on Kintla and Kinnerty peaks, are high up and difficult to reach, and are also in a portion of the park seldom visited, the high mountains near the northern boundary. Rain¬ bow and Vulture glaciers are of considerable size but rarely visited. The original trails in the park were made by hunters, surveyors, prospectors and Indians, and were in many cases the poorest kind of passageways. They were steep, boggy, narrow and dangerous at times and in places. Since the establishment of the section as a park the trails have been vastly improved. They are now easily traversed, are wide, have low grade and are well walled and bridged. New trails are being built annually.

Glacier Park is a wonderland of mountain crags, dizzy cliffs, dashing waterfalls, clear lakes, eternal snow and ice, primaeval forests, wild game, blue sky and brilliant sunshine. Here the works of Nature have not been marred by the hand of man.

Morton J. Elrod,

Director of Biological Station, University of Montana.

GLACIO-FLUVIAL DEPOSITS, those deposits of glacial origin which have been laid down by waters from the melting ice. They are characteristically stratified and are often called stratified or modified drift. Eskers, kames, outwash plains and valley trains afford the most common examples. See Eskers, Geology, Kame, etc.

GLACIOLOGY. See Glacial Geology.

. SLACKENS, William J., American artist: b. Philadelphia, Pa., 13 March 1870. He was educated m the public schools, the Pennsylvania Academy of the Fine Arts and also studied in Europe. He exhibited at the Paris Salon of 1896 and at the Paris Exposition of 1900. In 1901 he was awarded a gold medal at the Buffalo Exposition and three years later his work won silver and bronze medals at the Saint Louis Exposition. In 1906 he was made asso¬ ciate of the National Academy and is also mem- ber of the Society of American Illustrators and the Society of American Painters and Sculp¬ tors. His best-known works are (May Day Party5 and 'Girls Bathing5 (1911). He has been successful in portraiture, landscape and figure drawing, his work impressing with its gift of spontaneity. Especially noteworthy was his tableau representing (Russia, 5 one of the most striking of those produced by leading- artists who volunteered their services in the decoration of the Avenue of the Allies, New York, during the campaigns for raising the loans to carry on the war against Germany.

glad'baH, or BERGISCH- GLADBACH, Prussia, town of the Rhine Province, 10 miles northeast of Cologne. It has manufactures of paper, cigars, lumber, dye- wood, dyes, iron ore and metal products fire clay and powder. Pop. 15,200.

t3a9ˆuADBA(!:H' or MUNCHEN-GLAD- BACH, Prussia, town of the Rhine Province 15 miles west of Diisseldorf. It contains a fine 12th century church, the Miinster-kirche, sev¬ eral monasteries and a teacher's training school.

It has manufactures of silk, cotton and woolen goods, dyes, thread, shoes, candies, wagons, leather, paper, furniture, brick, machinery,' ropes, etc. The town grew up about the Bene¬ dictine monastery, founded here in the 8th cen¬ tury and suppressed in 1800. Pop. 67,000.

GLADDEN, Washington, American Con¬ gregational clergyman: b. Pottsgrove, Pa., 11 Feb. 1836; d. Columbus, Ohio, 2 July 1918 He was graduated at Williams College in 1859; ordained in the Congregational Church, and after several other pastorates became pastor of the First Congregational Church in Colum¬ bus, Ohio, in 1882; in 1914 he was made pastor emeritus. From 1904 to 1907 he was moderator r-u National

Council of Congregational Churches. He was widely known as a writer on social reforms. In 1905 Dr. Gladden led a fearless attack on "tainted money. 55 It began when John D. Rockefeller offered the American Board of Commissioners for Foreign Missions of the Congregational Church $100,000 for its work in converting heathens. In opposing this gift Dr. Gladden characterized it all ill-gotten wealth and unfit for Christian use. «If the Church unfits itself for work by taking bribes of tainted money,® he said, "she ought to perish

*with the money, and she will.® His uncom¬ promising stand resulted in a widespread con¬ troversy, and although he was overruled by the board of missions. Dr. Gladden continued his fight against his Church forming close relations with "predatory wealth.® As a reformer he entered politics and was elected a member of the city council of Columbus. He wrote many notable works on religion, several poems and hymns and on social reform. The include (Plain Thoughts on the Art of Living) (1868) **

(Workingmen and Their Employers5 (1876); 'The Christian League of Connecticut5 (1883) ; 'Things New and Old5 (1884); 'The Young Men and the Churches5 (1885); 'Applied

*S5S^aniS;) <1887>; "Parish Problems> (1888); 'Burning Questions5 (1889); 'Who the Bible> (1891) ; 'Tools and the Man5 (1893); 'Social Facts and Forces5 (1897) * 'Art and Morality5 (1897); 'The Christian Pastor (1898) ; 'How much is Left of the Old Doctrine5 (1899) ; 'Straight Shots at Young Men5 (1900); 'Social Salvation5 (1901); 'The Piactise of Immortality5 (1901) ; 'Witnesses of the Light (1903); 'Where does the Sky Be- fVonc-N ' 'Christianity and Socialisms5*

*0905) ; 'The New Idolatry5 (1905); 'The Church and Modern Life5 (1908)- 'Recollec- tions5 (1909); 'The Labor Question5 (1911) – 'Uffuna Veritas5 (1912) ; 'Present Day The¬ ology (1913) ; 'Live and Learn5 (1914) * 'Com¬ mencement Days5 (1916).*

GLADHEIM, glad him, in north European mythology, the last dwelling-place of Odin, the heaven of all things, containing the hall of heroes (\ alhalla). It has a ceiling of spears,

t r?uf °er Edda' js sa- tQ have upward

•Kir gaoS throuSh each of which it is pos¬ sible for 800 men to enter abreast.

GLADIATORS (Lat. "swordsmen®), com¬ batants who fought at public games in Rome tor the entertainment of the spectators. Gladi¬ ators were first exhibited at Rome in 264 b c by Marcus and Decimus Brutus at the funeral of their father ; and the custom probably orig¬ inated in Etruria, where a slave was killed at his master s pyre. In the course of time the shows, begun as part of funeral rites, became a popular amusement, and gladiators also fought at public festivals and other entertainments.

hey were . at first prisoners, slaves or con¬ demned criminals ; but afterward freemen fought in the arena, either for hire or from choice. Under the empire persons of senatorial rank, and even women, fought in the arena One of the most celebrated of these shows was given by the Emperor Trajan, when 5,000 gladi-

fo°limh Ufbht U1 thC Tna- AttemPE were made to limit them as a danger to the public peace.

The regular gladiators were instructed in

schools ("ludi®) established for this purpose

The overseer of the school ("lanista®) pur-

thpm t 1 Vi gladiators, trained them and rented them to those who gave games to the people Men of posmon, especially such as aimed at popularity, sometimes kept gladiatorial schools of then- own and hired lanistae to instruct them 1 he gladiators fought in the schools with wooden swords The games were commenced by a praelusio,® in which the combatants fought with their weapons of wood till, upon a signal

they assumed their arms and began in earnest to fight in pairs. In case the

vanquished was not killed in the combat, his fate was decided by the people. If they decreed his death, the thumb was held up in the air ; the waving of handkerchiefs was the signal to save him. In general they suffered death with wonderful composure, and the vanquished often exposed himself to the death-blow. If he wished to appeal to the people he raised his hand. When a gladiator was killed attendants dragged his body away with iron hooks. The gladiators were often released from further service and presented with wooden swords as badges of freedom, from which they were called ((rudi- arii.® The gladiators were divided into classes, according to their mode of fighting: the (

The most celebrated gladiatorial statues are:

(1) The Gladiator Borghese, a combatant with extended arm in the act of warding off a blow. It is a statue of the first rank, made of fine grained marble, and is nqw in the capitol, to which it was restored from Paris in 1815.

(2) The Dying Gladiator, purchased from the Ludovisian collection for the Museum Capi- tolinum. It is a dying warrior and not a gladi¬ ator, probably, to judge by his <(torques® or twisted necklace, a Gaul who is wounded and is trying to rise. Consult Friedlander, (Roman Life and Manners in the Early Empire) (New York 1909).

GLADIOLUS, gla-di'6-lus (Lat. «a small sword®), a. genus of plants of the family Iri- dacece. It received its name from the shape of its leaves. It has bulbous rhizomes, and the stems are leafy and bear beautiful flowers which, in garden culture, open in midsummer. There are about 160 species, some of them natives of southern Europe, the greater num¬ ber being found in South Africa. Gladiolus is largely cultivated in the United States as an ornamental plant, and Long Island, N. Y., has important fields of it.

GLADSTONE, Herbert John, 1st Vis¬ count, English statesman: b. London, 7 Jan. 1854. He was educated at Eton and Oxford. He was secretary to his father 1880-1901; under-secretary home office 1892-94; first com¬ missioner of works 1894-95 ; and Secretary of State for Home Affairs 1905-09; and first gov¬ ernor-general of South Africa 1909-14. He sat in Parliament for Leeds 1880-85, and for Leeds West from 1885-1909.

GLADSTONE, John Hall, English scien¬ tist : b. London 1827 ; d. 6 Oct. 1902. He was Fullerian professor of chemistry at the Royal Institution 1874-77. As a member of the London school board 1873-94, he rendered ad¬ mirable service to the cause of education. He published (Life of Michael Faraday) (1872) ; Spelling Reform from an Educational Point of View) (1878) ; (Chemistry of Secondary

Batteries) (1883).

GLADSTONE, William Ewart, British statesman, orator and author: b. Liverpool, 29

Dec. 1809; d. Hawarden, England, 19 May 1898. He was of purely Scottish ancestry, the fourth son of John (afterward Sir John) Gladstone, a merchant of Liverpool and mem¬ ber of Parliament for the city, by his second wife, Anne, daughter of Andrew Robertson, of Stornoway. He was educated at Eton and at Christ. Church, Oxford. He greatly im¬ pressed his contemporaries at school and col¬ lege by his earnestness and piety, was president of the Oxford Union, and made his first notable speech before that society in opposition to the Reform Bill. As nominee of the Duke of Rut¬ land, he was returned in the Conservative in¬ terest for the ducal burgh of Newark on 13 Dec. 1832. His maiden speech was in vindica¬ tion of his father's treatment of his slaves in Demerara. On 26 Dec. 1834 he was appointed one of the junior lords of the treasury under Sir Robert Peel, and in the following year was for a few months under secretary for the colonies. In 1838 he published a volume that aroused some controversy, (The State in its Relations with the Church, > which showed its writer to be at that time a zealous church-and- state man. On 25 July 1839 he married Cath¬ erine Glynne, the elder daughter of Sir Stephen Glynne. On the accession of Peel to office in September 1841 he became vice-president of the Board of Trade and president in May 1843. In January 1845 he resigned office on what was regarded at the time as the quite inadequate ground that the proposed increased grant to the Catholic College of Maynooth was incon¬ sistent with his views as expressed in (The State in its Relations with the Church. He returned to office in December of the same year as Secretary of State for the Colonies. His ap¬ pointment as Colonial Secretary necessitated his re-election for Newark; he resigned his seat, but did not seek re-election, and as a conse¬ quence was not in the House of Commons during the eventful session when the great battle for free trade was fought and won. But he rendered magnificent service to Peel in preparing and adjusting the new fiscal arrange¬ ments — a work of extraordinary difficulty. On the defeat of Peel shortly after the triumph of free trade, he vacated office.*

Up to the time of the abolition of the corn laws, or at least until the movement for their abolition, Gladstone had been regarded as the <(rising hope of the. stern, unbending Tories,® and was regarded as in sympathy with that party for years after. In 1847 he was returned as one of the members for Oxford University. He visited Italy in 1849, and in 1851 he startled the whole civilized world by the terrible description he gave of the condition of the prisons of Naples, under the king who was known by the nickname of <(Bomba,®. and the cruelties which were inflicted on

political prisoners. His dis¬ closures and the denunciations with which he accompanied them helped to prepare the way for the revolutionary movement in Italy and the establishment of the kingdom of Italy.

The death of Sir Robert Peel in 1850 raised Gladstone to a commanding position in the House of Commons, and from that time may be said to have dated his almost unrivalled par¬ liamentary eminence. An unpremeditated reply to Disraeli on the budget of 1852 was followed by the defeat and resignation of the Derby ministry. In the coalition of Whigs and

Peelites that then came into office under Lord Aberdeen, Gladstone was Chancellor of the Ex¬ chequer. His budget of 1853 marked an epoch in finance, and the speech in which it was in¬ troduced was one of the greatest of its kind ever made in the House of Commons. He im¬ posed for the first time a succession duty, the preparation of which, he afterward declared, was the most laborious task he ever undertook. He also proposed the extinguishing of the in- come tax after an interval of seven years ; but the breaking out of the Crimean War inter¬ vened to prevent this from being done.

. The Crimean War also broke up the coali¬ tion . ministiy. A motion by Roebuck for an inquiry into the condition of the army before Sebastopol was carried by a large majority against the government. Lord Aberdeen at once resigned. Lord Palmerston was the one indispensable man, and he became Prime Min¬ ister. Gladstone gave the government of Lord Palmerston a general support until after the attempt of Orsini on the life of the Emperor Napoleon III in 1858, when Palmerston intro¬ duced his ill-fated Conspiracy to Murder Bill.

I he government was defeated, Lord Palmerston resigned, and Lord Derby was called on to form a new ministry. Under Derby, Gladstone un¬ dertook .a special commission to the Ionian Islands.

The year 1859 saw Lord Palmerston back again in office and Gladstone as Chancellor of the Exchequer. The budget of 1860 was re¬ markable for its repeal of the paper duties, vvhich passed the House of Lords in the follow¬ ing year; and for the conclusion of a commer- cl.al treaty with France. In the general election of 1865 Gladstone was defeated in Oxford Uni¬ versity and returned for South Lancashire, the death of Lord Palmerston in 1865 called Lord Russell to the position of Prime Minister. Gladstone s mind had long been turning in the direction of an extension or rather

expansion of the suffrage. The bill he proposed was de- feated (1866), but when Disraeli came into office he (dished. the Whigs® by introducing a reform bill of his own, which was practically a measure of household suffrage for cities and boroughs.

At Christmas 1867 Earl Russell died, and Gladstone became the leader of the Liberal party. About this time his attention began to be attracted to Ireland. He determined that the time had come for the disestablishment of tj Episcopal State Church in that country. He defeated the government on a series of resolutions foreshadowing his policy; and the ensuing appeal to the country resulted in the return to power of the Liberals by a large majority, and Gladstone, who had been de¬ feated in South Lancashire, but was returned |or Greenwich, became Prime Minister (1868).

In his first session he accomplished his purpose of disestablishing and disendowing the State Church in Ireland. This Parliament was fruitful in important reforms. In 1870 Gladstone began the first of a series of ameliorative measures dealing with the Irish land question. Patronage \ as abolished in the public service ; the system of purchase of commissions was abolished in the army, as were also religious tests in the universities; for the first time in England a national system of elementary education was established, and voting by ballot was intro¬

duced. There is also standing to his credit the submission of the Alabama claims to arbitra- T°n» — and that too by one who had supported the national status of the Confederate States A measure introduced in 1873, which aimed at establishing an Irish university acceptable to both Roman Catholics and Protestants, failed to pass, and shortlv thereafter his government resigned office (1874). Disraeli was returned to power, and in the following year Gladstone formally resigned the leadership of the Liberal party.

For a time he occupied himself with those literary and historical studies that were always dear to him ; but the outbreak of the Bulgarian atrocities in 1875 stirred him to indignant pro¬ test. The foreign policy of the Disraeli govern¬ ment was afterward subjected to severe criti¬ cism, especially in so far as it aimed at bol-. stering up Turkish power in Europe. He was invited to stand for the county of Midlothian, delivered a series of speeches throughout 1879 and the spring of 1880 that destroyed the popularity of the Disraeli government, was re¬ turned triumphantly for Midlothian, and again brought back to power.

It was an unpropitious hour at which to re- turn to office. In Afghanistan and in South v u-1Cj tbe Teaconsfield government had left behind a legacy of . troubles ; an agrarian revolution had begun in Ireland, and there the

Home Rule party was under the resolute and uncompromising leadership of Parnell. Much as Gladstone abhorred the widening of imperial obligations, his government had to intervene

at ruej.t0.re SrdeJ ir} Egypt ; the successes of the Mahdi in the Sudan and what looked like the desertion of General Gordon, followed by his death at Khartoum, told heavily against the prestige of the ministry. In Ireland, a Land Act was followed by agrarian outrages and boycotting; by a coercion act; the assassination ° j u l1(T. secretary and the under secretary- and by the imprisonment of Irish leaders The practice of obstruction was reduced to a fine art by the Irish members in the House of Com- mons, and feeling between them and the Liberal government became very embittered.

In June 1885 the government was defeated on the budget ; Lord Salisbury assumed office – and m an election that followed shortly thereafter on a franchise which for the first time gave household suffrage to the counties, the balance

berf°Wer WaS m thC handS °f the Irish mem‘

m Then followed a dramatic change. Mr. Gladstone, had appealed to the country to give him a majority that would make him independ¬ ent of the Irish vote, and the Irish vote had been cast against the Liberal candidates in Great Britain; but he determined to accept the con- stituhonaly expressed verdict of Ireland winch had returned 87 Home Rulers out of a

ti 10i men?bers> and to give Home Rule

Ireland a place on. the Liberal program.

A f J ln t j e Salisbury government was

defeated,, and Gladstone for the third time be¬ came Prime Minister. His announcement that he intended to introduce a Home Rule bill at

P™du?ed ,a clea.vage in his own party; Whigs hkeLorcl Hartington and Goschen were joined by Radicals like Chamberlain and Bright and on the second reading of the bill it was defeated by a majority of 30. The general

WILLIAM EWART GLADSTONE

;€H.

election following resulted in a great majority

u thi5 Unionist Party. It was not till 1892 that the veteran statesman resumed the reins of power with a majority of 40 at his back. He promptly brought in another Home Rule bill, which was passed by the House of Com¬ mons but rejected by the House of Lords. On 4 March 1894, Gladstone, on whom the weight of years was beginning heavily to tell, resigned office, and was succeeded by Lord Rosebery. He still took an interest in public affairs, and busied^ himself with library studies. In 1894 and 1895 he was roused to^ indignation by the outrages committed by the Turks on the Armenians, and spoke with something of his old power at a series of public meetings. In January 1898 he published his reminiscences of Arthur Hallam ; but the end was near, and after some months of acute suffering, he died at his home at Hawarden. He was buried in Westminster Abbey. Beside him, two years later, his wife was laid to rest. He was also survived by a family of three sons and three daughters. Herbert John, his younger son, is the first Viscount Gladstone (q.v.).

Gladstone made considerable contributions to literature, and was deeply interested in a wide variety of subjects. He was specially ab¬ sorbed in the literature that has gathered around Homer and Dante, and wrote much on these subjects, as well as on ecclesiastical and litur¬ gical history. Among his works are (The State in its Relations with the Church (1838); 'A Manual of Prayers from the Liturgy* (1845); (Two Letters on the State Persecutions of the Neapolitan Government (1851); (Studies on Homer and the Homeric Age* (3 vols., 1858) ; (A Chapter of Autobiography* (1868) ; 'Ju- ventus Mundi* (1869); (The Vatican Decrees, bearing on Civil Allegiance* (1874); 'Vati- canism) (1875); (Gleanings from Past Years* (8 vols., 1879-90) ; 'The Irish Question) (1886); 'A Translation of Horace* (1894); and 'The Psalter with a Concordance.*

For over 40 years Gladstone held a com¬ manding place in the public life of his country. He was primarily a House of Commons man, and in that most critical of assemblies stepped at a bound into the front rank by an almost unequalled debating talent, skill in ex¬ position and constructive genius. It was only in his later years that he took to the platform and swept the country in his ((pilgrimages of passion. ® His faults lay in diffuseness, in the elaboration of fine points, and in the drawing of too subtle distinctions ; but he could on occasion speak with remarkable concentration. As a financier he carried on the traditions of Pitt and Peel. No man, intent on keeping a sharp eye on the outgoings in his own business con¬ cerns, could have maintained a more scrupulous exactitude than did Gladstone in the handling of the national accounts. The idealist and the practical man were strangely compounded in his make-up: "Oxford on the surface, Manchester below.® Viewed broadly, there is a singular unity in

his career; from first to last he stood for peace and retrenchment, and steadily set his face against all profusion or extravagance. He had an intense dislike to the bullying of small and weak nations by strong and powerful ones, did not hold with those who say that there is one morality for individuals and another for the state, but sought to bring the golden rule

into operation in the intercourse of nations. He was conservative in all his instincts, and one who was slow to unlearn his prejudices; but once the process of conviction and conversion was completed, there was no turning back. He was possessed of a dialectical strength which, as Mark Pattison said of him, could twist a bar of iron to its purpose. His missionary zeal had sometimes its ridiculous side, as when he called on the civilized world and Providence to be his supporters in the advocacy of contrary policies. He was accused by his onponents of truckling to majorities and the mob; but it should be borne in mind that he had not in¬ frequently to create the public opinion on which he depended. He failed to carry Home Rule for Ireland; but his was the propelling force that made its final settlement inevitable. His personality and the influences that molded his career were summed up by Lord Salisbury when he said that Gladstone was "a great Christian.® With him the passion for righteousness was as a fire in his bones.

Consult the official 'Life by Morley (3 vols., 1903) ; Paul, in the dic¬ tionary of National Biography* ; Lathbury, 'Religious Life of Gladstone) (1909) ; Glad¬ stone's own 'Chapter of Autobiography * (1868), in which he explains his attitude on Irish disestablishment; and 'The History of an Idea* (1886), referring to Home Rule; Hamil¬ ton, 'Gladstone* (1898) ; Buxton, 'Gladstone as Chancellor of the Exchequer (1901) ; and Morley's 'Recollections* (2 vols., 1917).*

D. S. Douglas,

Editorial Staff of The Americana.

GLADSTONE, Mich., city of Delta County, on the Escanaba River, the Minneapolis, Saint Paul and Sault Sainte Marie Railway, 10 miles north of Escabana. It has a cooperage, ma¬ chine shops, gun works and lumber mills. It has also a good trade in flour and coal. The city government rests in the hands of a mayor and council elected yearly. The waterworks and electric-lighting plant are owned by the municipality. Pop. (1920) 4,953.

GLAGOLITIC (glag-6-Ht'ik) ALPHA¬ BET, a Slavonic alphabet classed as ancient Bulgarian. There is a MS. of the 11th century written in this alphabet in the Vatican, contain¬ ing extracts of the Gospels for each day in the year; there are extant also three other MSS. v/ritten in the same

letters.

The origin of this alphabet is undiscover- able. It is older than the Cyrillac; it may be a modification of Greek cursive writing; per¬ haps it is connected with Armenian and Al¬ banian alphabets. Its use is confined to the liturgical books of Dalmatian Slavs. Cyril, a monk of Constantinople, invented the Cyrillac alphabet, of which this has sometimes been con¬ sidered a variant. Both of these differ from the current Russian alphabet.

GLAGOLITSA. See Glagolitic Alpha¬ bet.

GLAIR (Lat. clarus, clear, Fr. clair), the white of eggs prepared and used as a varnish for preserving paintings. For this purpose it is beaten to an even consistence, and commonly mixed with alcohol to make it work more freely, and with a little fine sugar to give it body and prevent it cracking, and then spread over the picture with a soft brush. Book-

binders also use it for finishing the leathern backs of books.

GLAISHER, gla'sher, James, English meteorologist : b. Lewisham, Kent, 7 April 1809 • d. Croydon, Surrey, 7 Feb. 1903. In 1840 he be¬ came superintendent of the magnetical and me¬ teorological department of the Royal Observ¬ atory, a post which he held for 34 years. Be¬ tween 1862 and 1866 he made 28 balloon ascents for the purpose of studying the higher strata of the atmosphere, on one occasion reaching a height of over seven miles. He was the founder of the Royal Meteorological Society, and of the Aeronautical Society, wrote numer¬ ous papers on subjects relating to astronomy and meteorology and was the author of < Trav¬ els in the Air> (1871).

GLAMORGANSHIRE, Wales, the south¬ ernmost county of the principality, bounded north by Brecon, east by Monmouth, west by Caermarthen and south and southwest by the Bristol Channel. It contains great coal beds and is the seat of great iron industries. Agri¬ culture is also well developed and grain, cattle, hogs, horses, sheep, etc., are raised successfully. Cardiff, Merthyr-Tydvil and Swansea are the largest towns. Pop. over 1,000,000.

GLANCE, English equivalent of the Ger¬ man glam, a term applied to opaque minerals of which the high lustre and color indicate their metalliferous character. The following are some of them: Antimonial copper-glance, or wolchite, sulphide of antimony, copper and lead, with a

little iron; antimony-glance, or stibnite, sulphide of antimony; bismuth-glance, or bismuthinite, sulphide of bismuth; cobalt- glance, or cobalite, sulph-arsenide of cobalt, sometimes with a little iron, also nickel and antimony; copper glance, sulphide of copper; glance-blende, or manganese blende, sulphide of manganese; glance-coal, anthracite; iron- glance, or specular iron, oxide of iron; lead- glance, sulphide of lead or galena; nickel- glance, amoibite or gersdorffite, arsenide and sulphide of nickel, with cobalt, iron, etc. ; silver- glance, sulphide of silver; yellouhgold-glance, or sylvanite, telluride of gold and silver; zinc- glance, silicate of zinc. German miners use almost indifferently the term glanz and kies, the latter signifying pyrites, as iron pyrites, copper pyrites ; but glance is not so frequently used among American and English miners, though copper-glance, antimony-glance, are sometimes employed by scientific men as well as in the mines.

GLAND, in anatomy, a term originally ap¬ plied to such beanlike structures as occur all over the body in connection with the lymphatic system ; but the meaning has now been extended to embrace any group of secretory cells. Such structures separate from the blood the charac¬ teristic constituents of their various secretions, and in most cases they are arranged in the form of small sacs, with contracted necks or ducts, through which the secretions are poured. Some glands, however, such as the thyroid and the suprarcnals, are ductless, and their elabo¬ rated. products must be absorbed by the blood or by the lymph, for which reason they are sometimes called vascular. The liver is the largest glandular organ in the body, and weighs nearly four pounds. On the other hand, the

peptic glands of the stomach are of microscopic dimensions, and consist of simple tubular re¬ cesses lined by a secreting cellular membrane, around which the blood circulates. The sali- vary > gastric and intestinal glands secrete the various fluids necessary for the digestion of food; while the kidneys and sweat glands are excretory, and pass waste products out of the circulation. Adenalgia and adenitis are terms applied to pathological conditions of the glands . 4 pain and inflammation in them. The func¬ tions of the ductless or blood glands are im¬ perfectly understood, but the thyroid secretion has a profound influence on the nutrition of the nervous system, the suprarenals determine cer- tain blood conditions, while the spleen and lymphatics are largely concerned with the pro¬ duction of the cellular elements of the blood. Of late years extracts of various glandular tissues have been administered in cases of ill¬ ness which appear to depend on defective gland secretion. The treatment has been a brilliant success in myxedema and in cretinism, which result from disease of the thyroid gland.

GLAND, in plants, a cell or group of cells of a glandular character in which is formed and secreted some substance. Plant glands are either superficial

or internal. The secretion is generally formed by the protoplasm within the walls of the cell, but in some cases is produced at – u ,surˆace- . The glands are further distin¬ guished according to the matter or substance secreted, as lime, water, resin and oil glands.

GLANDERS, the most dangerous form of equinia, and one of the most formidable dis¬ eases to which horses are subject. It is diag¬ nosed by a discharge from one or both nostrils with a hard enlargement of the submaxillary glands. It is distinguished into acute and chronic. In acute glanders the discharge from both nostrils is so great as ultimately to impede respiration and produce death from suffocation Chronic glanders may run on for years before it terminates in the acute form of the disease.

1 he discharge is usually confined to one nostril is only occasional and sometimes trivial with a moderate swelling of the gland on the 'affected side ihe only other symptom of disease is a harshness of the coat. In the later stages the discharge becomes offensive. The disease i< = highly infectious, and acute glanders may be communicated to healthy horses and asses while the animal first affected is still able to feed and work apparently as well as ever. It may even be communicated to man by the pustular matter coming in contact with any part where the skin is broken ; and not a few deaths have happened through this cause. The disease is often diffi¬ cult to determine, as the discharge is only offen¬ sive in the later stages. The symptoms may be mitigated by tonics and other treatment but it is rarely if ever cured. The disease is now known to be produced by a species of bacillus (mallei) about the size of the tubercle-bacillus discovered in 1882. Latent cases are diagnosed by means of mallein, the injection of which is accompanied . by a rise in temperature and an extensive painful swelling at the seat of in¬ jection. See Farcy.

• GLANDINA, glan-di'na, a genus of large spirally elongated snails (q.v.), which attain their maximum development in the southern c lilted States and in Mexico. They include

many species, all graceful in outline and beauti¬ fully colored. A rosy species (Glandina trun- cata) is common along the coast of Florida and . . ˆ ch. varies greatly in size accord¬

ing to its circumstances, in favorable localities reaching a length of four inches. These mol- lusks are most commonly found among the marsh-grasses, where they hunt for and devour other snails by filing through their

shells and rasping away the flesh by means of their lingual ribbons. Marine mollusks and other animals are also attacked.

GLANEUSES, Les, la gla-nes' («The Gleaners), a painting by Jean Francois Millet, finished in 1857. It represents three peasant women who gather the forgotten stalks and ears in the wake of the harvesters. Its light effects are remarkable and it is considered one of the artist's greatest efforts. It is housed in the Louvre.*

GLANVILL, Joseph, English ecclesiastic : b. Plymouth, 1636; d. Bath, November 1680. After studying at Exeter College, Oxford, he pursued theological studies at Lincoln College, being graduated M.A. in 1658. He held the post of chaplain at Eton, and after the Refor¬ mation became in turn rector of Wimbush, Essex, vicar of Frome Selwood, Somersetshire, rector of Streat and Walton. From there he was appointed to the Abbey Church at Bath, and in 1678 became prebendary of Worcester Cathedral. From 1672 until his death he was chaplain in ordinary to Charles II. His earl est work was (The Vanity of Dogmatiz¬ ingˆ by which he is best known. It is the basis for Matthew Arnold's poem, (The Scholar Gipsy.) Beginning with the Cartesian theory of cause and effect, Glanvill advances to the conclusion that there is only one great cause to which all others are merely secondary. Scientific reasoning, therefore, becomes the means for establishing the basis of faith. The (

(Rationalism in Europe) (1865).

GLANVILL, Ranulf de, chief justiciar of England, who flourished in the 12th century. He is known chiefly as the author of the first standard book on English common law. The facts of his life are few, but his career ap¬ pears to have been somewhat as follows : He became sheriff of Yorkshire (1163-70) ; and in

1173 was appointed sheriff of Lancashire. He participated in the battle of Alnwick (1174) and in the following year was reappointed to his post at Yorkshire. The king then appointed him justice of the king's court and itinerant justice of the northern circuit, and in 1180 he was chosen chief justiciar of England. He rose to prominence and power during Henry's reign, but the king's successor, Richard I, threw him into prison. After ransoming him¬ self at a handsome figure, Glanvill joined the Crusaders and perished at the siege of Acre in 1190. His work, which was written either by himself or under his supervision, was pub¬ lished under the title, (Tractatus de legibus et consuetudinibus regni AngliaU It was the first important treatise on English law from the point of view of procedure, and is an invaluable source for information concerning ancient customs and laws, particularly of the Curia Regis. For many years, until superseded by

the monumental works of Bracton, it remained the authority on all matters of legal procedure. It was reprinted many times and re-edited with annotations from time to time. The Scottish work, 'Regiam Majestatem which follows it closely, is generally supposed to be a copy or an adaptation of Glanvill. Glanvill's treatise was first published in 1554. An English trans¬ lation was not completed until 1812, when John Beames published his work with careful notes and introduction. An early French version is available in manuscript form. The latest edi¬ tion is by J. H. Beale (Washington 1900).*

GLARUS, gla'rus, Switzerland, a canton of the Confederation bounded north and east by Saint Gall, south by the Grisons and west by Uri and Schwyz. It has an area of 267 square miles and is composed of a valley en¬ closed on three sides by lofty mountains and open to the north. It is traversed by the Linth which flows into the Wallensee. It manufac¬ tures silk, woolen and cotton goods and beer. There is a large trade in textiles, but agri¬ culture has not as yet been satisfactorily de¬ veloped. The legislative power is vested in the people, who meet annually in the Landes-gemeinde. The executive power rests in a council of seven, elected for three years by the Landesgemeinde. The people are nearly all German speaking Protestants. Glarus (q.v.) is the capital. Pop. 33,000.

GLARUS, Switzerland, capital of the can¬ ton of the same name, on the Linth. It con¬ tains a fine Gothic church, government build¬ ings, a museum and an art gallery. ' It has cotton mills, cotton bleacheries, cigar works and distilleries. Pop. 5,000.

GLAS, John, founder of the Glassites, bet¬ ter known as the Sandemanians : b. Auchter- muchty, Fife, 1695; d. Perth, 2 Nov. 1773. He was educated at Saint Andrews and Edinburgh, took orders and became a preacher of note. In 1727 appeared his 'Testimony of the King of Martyrs,) in which he maintained that all religious establishments and all interference by the secular arm in ecclesiastical matters are contrary to the true nature of the Church. For advocating these views he was deposed from the ministry in 1730. He founded an independ¬ ent congregation at Dundee and later removed to Perth, where he built a church. He was

joined here by Sandeman, who became his son-in-law, and who became a prominent leader in the independent church movement in Scot¬ land. His

works were issued at Edinburgh in 1761 and at Perth in 1783. His (Christian Songs > passed through its 13th edition at Perth in 1847.

GLASER, Otto C(harles), American zoologist: b. Wiesbaden, Germany, 1880. In 1900 he was graduated at the University of Johns Hopkins, and in 1904 received therefrom the degree of D.Ph. In 1901-02 he was assist¬ ant in the United States Bureau of Fisheries and in the North Carolina Geological Survey. In 1903 he was marine biologist of the Gulf bio¬ logical station and from 1905 to 1907 was teacher of biology at Wood's Hole, Mass. Since then he has been connected with the University of Michigan, becoming in 1908 as¬ sistant professor of biology.

GLASGOW, Ellen Anderson Gholson,

*American novelist: b. Richmond, Va., 22 April 1874. She was educated privately and became prominent as an interpreter of the transition period in the Southern States after the close of the Civil War. Her works include (The Descendant (1897) ; (Phases of an Inferior Planet) (1898) ; (The Voice of the People) (1900) ; (The Freeman and Other Poems) (1902); (The Battleground) (1902); (The De- liverance) (1904); (1909); (The Miller of Old 09*1 6)1> ('1911'); 0913); (Gabriella)*

GLASGOW, Ky., city and county-seat of Barren County, on the Louisville and Nashville Railroad, 100 miles south of Louisville. It is the seat of Liberty Female College and is lo¬ cated in an oil-producing region. It has lumber mills, tobacco warehouses and factories, fur¬ niture and handle works and a large trade in lumber and livestock. Pop. (1920) 2,559.

GLASGOW, the chief commercial and manufacturing city in Scotland, and as regards population the second in the British Isles, is situated on both banks of the Clyde, about 14 miles from Dumbarton where the river broad¬ ens into a firth; latitude 35° 51′ 32″ N. ; longiture 4° 17′ 54″ W. Distance northwest by north of London 348 miles as the crow flies, and by the various railway routes from 400 to 450 miles ; west by south of Edinburgh, by road and rail, from about 42 to 50 miles; south of Inverness 206 miles by rail. The original city was wholly in Lanarkshire but was extended into Renfrewshire. By statute the whole mu¬ nicipal area as it existed in 1911 (12,796 acres) was in Lanarkshire. In 1912 extensions were made in Renfrewshire and Dumbartonshire, the total area of the. municipality being now 19,183 acres. For certain administrative purposes that area forms by itself the County of the City of Glasgow.

Topography. — In prehistoric times, though subsequent to the appearance of man in the dis¬ trict, the lower pjirt of the Clyde Valley, in¬ cluding a large portion of the site occupied by the modern city, formed the bottom of

an estuary as is evidenced by the discovery of canoes as well as marine shells and other organ¬ isms in localities at a considerably higher level

than the existing waterway. A very different condition of things existed when, in the 16th and 17th centuries, documentary evidence is procurable. Owing to shoals, produced by rock and other obstructions, no vessels other than small boats could then come within 12 miles of Glasgow. Deepening of the channel was com¬ menced in the middle of the 18th century, and this, and other improvements for facilitaTng navigation have since been prosecuted with such success that for a long time the largest trading vessels have had free access to the har¬ bor at Broomielaw.

Glasgow streets are in general wide and straight. This is now the case even in the older portions of the city, the operations of the improvement trustees, under their act of 1866, having removed most of the buildings bordering on narrow thoroughfares and substi¬ tuted spacious streets for the former over¬ crowded lanes. At first the citizens got build¬ ing material, consisting of a light-colored free¬ stone, within their own lands, and similar sup¬ plies were subsequently procured from quarries in the neighborhood; but a red sandstone brought from a distance is now being freely employed. Brick is seldom used in street front¬ age. Substantial masonry, combined with archi¬ tectural beauty and amenity, generally prevails throughout the city.

Bridges. — The north and south sides of the river Clyde are connected by bridges and ferries at convenient intervals, and there is likewise a tunnel under the river Clyde for the accommo¬ dation both of pedestrians and vehicular traffic. The bridges are (1) the Caledonian Railway bridge, giving access to the Central Station ; (2) Glasgow or Broomielaw bridge, 80 feet broad, in line with Jamaica street, rebuilt in 1899, the features and materials of Telford's earlier bridge of 1833-36 being retained; cost $500,000; (3) Portland street suspension bridge; (4) Victoria bridge, erected in 1851 to replace the old Glasgow bridge, supposed to date from the 14th century; (5) the Glasgow and South- Western Railway bridge leading into Saint Enoch's Station; (6) the Albert bridge built in 1871 of stone and iron, in line with Salt- market and Crown street; cost $280,000; (7) Saint Andrew's suspension bridge and (8) Pol- madie bridge, both communicating with Glas¬ gow Green; (9) Rutherglen bridge, 60 feet wide, three granite arches, opened in 1896; cost about $367,500; and (10) Dalmarnock bridge. There are also several bridges over the river Kelvin and other streams within the city.

Parks. — Glasgow Green, superseding a smaller space known as the Old Green, though incorporating a portion of ancient burgh terri¬ tory, was mainly formed on lands acquired in 1662 and subsequent years, but was not specially laid out as a public resort till the beginning of the 19th

century. Since that time it has been chiefly used as a public park. Area 136 acres. One of the attractions is the People's Palace and Winter Garden, opened in 1898. The fol¬ lowing are the other city parks, with the dates of acquisition and areas : Kelvingrove Park intersected by the river Kelvin (1857-97) 85 acres; Queen's Park, embracing an old British camp and part of the site of the battle of Langside (1857-94) 146 acres; Alexandra Park (1871-91) 104 acres; Cathkin Park, gifted by

James Dick (1886) 49 acres; Ruchill Park (1892) 53 acres; Bellahouston Park (1895— 1903) 185 acres; Tollcross Park (1897-1900) 83 acres; Richmond Park (1898) 44 acres; Spring- burn Park (1892-1900) 67 acres; Maxwell Park, gifted by Sir John Stirling Maxwell (1890) 21 acres; Rouken Glen Park, gifted by Mr. A. Cameron Corbett, M. P. (now Lord Rowallan) (1905) 220 acres; Botanic Gardens, with exten¬ sive ranges of hot-houses and green-houses (1891-1901) 43l/2 acres. Mr. Cameron Corbett also presented to the citizens in 1906 the moun¬ tainous estate of Ardkinglas in Argyllshire, containing upwards of 14,000 acres ; Elder Park, Govan, gifted by Mrs. Elder (1885) and Victoria Park, Patrick (1889-1909) 65 acres, arc now within the city boundaries.

Monuments, etc. — In George Square are statues of Queen Victoria, Prince Albert, James Watt, Lord Clyde, Robert Burns, Dr. Living¬ stone, Sir John Moore, Mr. Gladstone, and others, and in the centre a tall fluted Doric col¬ umn surmounted by a statue of Sir Walter Scott. An equestrian statue of King William III stands near Glasgow Cross, a similar statue of the Duke of Wellington is placed in front of the Royal Exchange in Queen street, an obelisk to Nelson and the highly ornamental Doulton fountain are conspicuous in Glasgow Green, John Knox has a tall monument in the Necropolis, and a memorial pillar is erected on the site of the battle of Langside, where Queen Mary's chance of regaining the crown was finally lost.

Buildings. — The oldest as well as the most interesting and picturesque building is the cathedral, erected piecemeal in and between the 12th and 16th centuries, mainly in the early English style but marked by individuality. It contains nave, aisles, transepts, choir and crypt or lower church with chapter-house and Lady- chapel. Length of building 319 feet; breadth 63 feet ; height of nave 90 feet and of choir 85 feet; height of central spire from floor of nave 217 feet. Two western towers were, under what is now regarded as a grievous error of judgment, removed in 1846 and 1848 respec¬ tively. In the vicinity of the cathedral were the

residences or manses of the 32 canons, all of which buildings have now disappeared with the exception of the manse which was occupied by the prebendary of Provan. This pre-Ref- ormation dwelling, the oldest in Glasgow, is still occupied. The cathedral belongs to and is maintained by the Crown, but the choir is used as one of the 10 city churches belonging to the municipal corporation, and the latter keep up the fittings connected with the religious services. Several of the other churches, be¬ longing to different denominations, are of high architectural merit. Among other conspicuous buildings are those of the university, occupying about four acres of elevated ground, overlook¬ ing Kelvingrove Park. Consisting of an oblong rectangular pile, in the Collegiate Gothic style of the 14th century, and having a tower and open work spire about 300 feet high, the new premises were opened in 1870, replacing the old college which stood in High street on a site obtained shortly after the foundation of the original "Pedagogy® in 1451. At a short dis¬ tance, on the opposite side of the river Kelvin, is the United Free Church College, built in the

Italian style, with a high tower; and still nearer to the college, within the bounds of the park the new art galleries have been erected. Saint Andrew's Halls, for concerts and other public gatherings, were erected by private en¬ terprise but were acquired in 1890 by the cor¬ poration who used the adjoining ground as the site of the new Mitchell Library which was opened in 1911. Besides the older city hall in Candleriggs street, the corporation pos¬ sess other halls throughout the city for the accommodation of the respective districts. The city chambers, in the Italian Renaissance style of architecture, and occupying the whole of the east side of George square, with a central tower 216 feet high, were erected under the authority of an act of Parliament obtained in 1878 and were formally opened by Queen Victoria in 1888 though not occupied till the following year. Cost of site, buildings and fur¬ nishings about $2,756,000. Also abutting on George square are the general post office, the Bank of Scotland and the Merchant's House; and a few paces off, in George street, is the Glasgow and West of Scotland Technical Col¬ lege. Of other buildings throughout the city may be noted the Royal Exchange, in the Corinthian style, surrounded by a circular clock tower; the Stock Exchange, in the By¬ zantine style, the Athenaeum buildings, the Deaf and Dumb Institution, the Christian Institute, the Royal Infirmary and the Western and Victoria infirmaries, the hotels connected with Saint Enoch's Station and Central Station and the hall belonging to the Faculty of Procurators.

Libraries. — The principal libraries are (1) the University Library (founded in the 15th century q.v. Glasgow University) ; (2) public libraries administered by the corporation, com¬ prising the Mitchell Library (largest public reference library in Scotland) over 200,000 volumes, with 16 district libraries (for defray¬ ing cost of which Mr. Andrew Carnegie gave

$500,000) each 8,000 to 17,000 volumes ; (3) Stirling's Library (established 1792) 50,000 volumes; (4) Baillie's Institution Library; (5) United Free Church College Library; (6) Libraries of Faculty of Physicians and Sur¬ geons, Faculty of Procurators, Glasgow Athe¬ naeum and Royal Philosophical Society. There are also numerous libraries in connection with scientific and other societies, churches, etc.

Art Galleries. — The corporation may be said to have begun its collection of works of art in 1670 when portraits of Kings Charles I and II were ordered from London. Portraits of other sovereigns were subsequently pro¬ cured and were hung in the Council Hall ; but it was not till about the year 1856, when the town council acquired the exhibition galleries and pictures which had belonged to Baillie Archibald M'Lellan, that the gallery and museum enterprise in Glasgow took definite shape. In consequence of many munificent donations and of judicious purchases, the col¬ lection became more and more valuable and rapidly increased, necessitating the finding of additional accommodation. This object was obtained when the new art galleries in Kelvin¬ grove Park were occupied in 1902. Cost of construction $1,279,700. Branch art galleries have also been opened at the People's Palace on Glasgow Green (cost of construction, in-

eluding Winter Garden, $83,375) and at Camp- hdl in the Queen's Park. Glasgow is now famous as an art centre, and has given its name to the Glasgow School of Painting.

Churches. — Churches of the various de¬ nominations are well represented, those of the Presbyterian order preponderating, but there are numerous places of worship belonging to the Episcopal Church of Scotland, the Roman Catholic and other churches.

Educational Institutions. — The principal educational institutions are the university al¬ ready referred to, Saint Mungo's College, the Glasgow and West of Scotland Technical Col¬ lege (including Anderson's College Medical School and Allan Glen's. School) ; the Union Free College (for divinity students) ; Queen Margaret's College for women, connected with the university; the Glasgow Athenaeum, the Glasgow School of Art, the Veterinary College, the West of Scotland Agricultural College, the Training Colleges for Teachers in connection with the Church of Scotland and the United Free Church, the Glasgow Academy and the Kelvinside Academy, the high school and others under the school board, with several educational establishments conducted by pri¬ vate enterprise.

Charitable Institutions. — Besides the three infirmaries already mentioned, Glasgow has an Eye Infirmary,, the Royal Hospital for Sick Children, the Glasgow Samaritan Hospital for Women, the Glasgow Maternity Hospital, the Royal Asylum for the Blind, the Glasgow In¬ stitution for the Deaf and Dumb, the Glasgow Royal Asylum at Gartnavel, several minor hos¬ pitals and dispensaries, nursing institutions and convalescent homes.

Public Works. — The water supply of Glas¬ gow was originally derived from the nearest streams and wells, and when these sources be¬ came insufficient water companies were formed for bringing in supplies by gravitation works and pipes. In 1855 the corporation acquired the works of these companies, at the same time obtaining statutory authority to bring water from Loch Katrine, 34ˆ2 miles north of Glas¬ gow. Amount of capital expenditure on water supply to 31 May 1913, $22,513,340. Consump¬ tion per head (population of supply area 1,104,000) per day 41 gallons for domestic pur¬ poses and 24ˆ2 gallons for trade and public purposes. The gas supply, formerly in the hands of private companies, was taken over by the corporation in 1869. There are 1,048 miles of mains, and the number of consumers, 286,883. Street lighting and the lighting of common stairs, together with street cleaning, the fire brigade and all matters relating to pub¬ lic health, including the management of fever hospitals, are under the charge of the police department. In 1890 the corporation obtained statutory authority to supply electricity, and the necessary works having been put in opera¬ tion, the streets are now lighted by that means, and the demand by the public both for lighting supply and motive power has been large and always on the increase. The total cost of the electricity works up to 31 May 1913 was about $13,923,042; there were 27,848 private consum¬ ers and 1,649 public lamps. In 1900 the cor¬ poration obtained from the Postmaster-General license to construct and work a telephone ex¬

change over the Glasgow telephone area, cov¬ ering about \2/z square miles. A telephone de¬ partment was forthwith organized; but after being in operation for some years, the under¬ taking was transferred to the Postmaster- General in 1906. Markets, slaughter-houses and foreign animals' wharves are managed by the corporation, under a series of acts of Parlia¬ ment, the earliest of which was passed in 1845. The corporation likewise administers the W eights and Measures Acts and manages several model lodging-houses, baths and wash-houses, an Inebriates' Reformatory (situated in Ayr¬ shire) and a labor bureau. The navigation of the river Clyde was in the hands of the cor¬ poration, exclusively, till 1825, when it was vested in a body of trustees under a constitu¬ tion which has since been altered from time to time. There are about 30 miles of main sewers, and the area drained is 41ˆ2 miles in extent. The scheme is, with the . exception of that of the London county council, the largest in the world for

the treatment and disposal of sewage.

Railways. — The principal railway systems are the Caledonian, North British and Glasgow and South Western, all of which have large modern termini in the heart of the city. There are underground railways, a cable subway, with a circular course passing twice under the river Clyde, and having convenient stations for vari¬ ous parts of the city. In 1894 street tramways, formerly worked by a company, were con¬ verted by the corporation into a municipal en¬ terprise. In 1901 the whole system was changed from horse to overhead electric traction; ex¬ isting length 196 miles of single track, and extensions proceeding, wffiich will bring the total up to 238 miles ; total capital expenditure to May 1913, $17,990,476; revenue to 31 May 1913, $4,907,265; passengers for a year, 311,-480,086, at fares of a cent and upwards. The free surplus of $160,724 was paid over to the common good of the city.

Industry and Commerce. — Glasgow is one of the greatest industrial centres of the king¬ dom, and among its older industries are those connected with cotton, linen and wool, includ¬ ing spinning and weaving, bleaching, calico printing, lace making and Turkey-red dyeing. But of late years the progress of textile manu¬ factures has been slow compared with the rapid development of the iron and steel industries. Mechanical engineering, marine engineering and ship-building, with their connected trades, are in extensive operation while chemical in¬ dustries, the manufacture of glass and pottery and brick-making are also actively prosecuted. Some 300,000 tons of shipping are usually built in Glasgow yearly. The 'commerce of the city is commensurate in extent with the importance of its manufactures. Tonnage entered in 1913, exclusive of coasting trade, 2,251,784 tons ; cleared, 3,628,912 tons. The principal articles sent from Glasgow to the United States in 1916 were sulphate of ammonia, $147,712; cotton manufactures, $3,226,187; whisky, $1,707,680; paper stock, $443,140; carpets, $257,762; hackled flax, $300,160. The rental of Glasgow in 1913— 14 was $32,639,281. The combined local rates, imposed on owners and occupiers together, amount to about one-third of the rental.

Banks. — All the leading banks of Scotland

are lepresented in Glasgow by numerous branches, and the Union Bank of Scotland and |he Clydesdale Bank have their head offices here ; as also have the Scottish Amicable, the City of Glasgow and other insurance com¬

panies.

. Government.— Municipal affairs are ad¬ ministered by a town council whose statutory designation is ((the corporation, » consisting of 111 members elected by the voters in 37 wards (numbering in cumulo 230,228), with the Dean of Guild (elected by the Merchants' House) and the Deacon-convener of the Trades (elected by the Trades' House) as ex officio members. The lord provost and magistrates, a river bailie and deputy river bailie, a treas¬ urer (honorary) and a master of works (hon¬ orary) are chosen by the councillors from their own number.

History. — I he origin of Glasgow and its earliest community is beyond the reach of his¬ tory. Joceline, the 12th century biographer of Kentigern, the patron saint of Glasgow, speaks of wandering through the streets and lanes of the city, and in the course of his narrative re¬ lates how its cemetery had been consecrated by Saint Ninian, the 5th century evangelist. More solid ground is touched in a legal document, which must have been compiled before the year 1124, setting forth the result of an inquiry made by King David, then Prince of Cumbria, into the possessions of the see of Glasgow, and from that time onward a fairly continuous outline of the city's history is obtainable. The bishops and archbishops possessed a large terri¬ tory, called in later times the Regality of Glas¬ gow, of which Glasgow was the judicial centre. In 1175-78 King William the Lion authorized the bishops to have at Glasgow a burgh, with a weekly market and all the privileges of a royal burgh. Twelve years afterward the same king granted right to the burgesses to hold a yearly fair in July, a privilege which still sur¬ vives in Glasgow's annual holiday. The market cross of the new burgh occupied the spot where High street and Saltmarket intersect Trongate and Gallowgate. A chapel dedicated to the Virgin Mary adjoined the market cross, and half a mile farther west, a few paces from the present Saint Enoch's station, another chapel was dedicated to Saint Tenew, the mother of Saint Kentigern. Saint Enoch is merely a cor¬ ruption of Saint Tenew which local pronuncia¬ tion reduced to the form of Sanct-enew (or -enoch). Another chapel dedicated to Saint Thomas the Martyr was situated' in the same locality. On the higher ground, adjoining the site chosen for the cathedral, a British fort or rath probably existed in ancient times, giving name to Rattounraw, one of the most ancient of the existing thoroughfares ; and, if so, the rath may be identified with the large earthen mound called ((the know of grummell,ˆ re¬ moved in 1599 to fill up hollows about the town. The rath, or what else served as a stronghold, was in or before the 13th century superseded by the Bishop's Castle, a structure which was not wholly removed till its site was required for the erection of the Royal Infirmary in 1792-94. The cathedral canons and Church dependents dwelt in the vicinity of the cathedral, while the industrial and trading community occupied the ground near the river, over which there

was a primitive bridge at least as early as the year

1285. On the intervening space, somewhat pre¬ cipitous, the Black Friars planted a convent and church in or before 1246. Between the years 1473 and 1479 the Greyfriars likewise settled in Glasgow, a little farther west, the site chosen by them being on the opposite side of the thoroughfare now called High street. A church or chapel in the Gallowgate. dedi¬ cated to Saint Kentigern, was founded in 1500; about the same time another chapel was ded¬ icated to Saint Roche on a site which is com¬ memorated in the place name now transformed into Saint Rollox ; and the collegiate church of Saint Mary and Saint Ann was founded on the siteˆof the present Tron church about the year 1525. Of the four pre-Reformation Hiospitalsˆ and their relative chapels, viz., the Hospital of Saint John of Polmadie, founded in or before the 13th century; the Leper Hospital, of an early but also uncertain date. Saint Nicholas Hospital, founded by Bishop Muirhead (1455— 73), and Stablegreen Hospital, founded by Roland Blacader, subdean (1503-41), only some fragmentary endowments of Saint Nicholas Hospital survive, yielding small pensions to a few aged people. Glasgow was much pervaded by the ecclesiastical element, but this was to some extent advantageous as many of the Church dignitaries were in favor at court, tak¬ ing a prominent part in state affairs, and exert¬ ing their influence for the good of the citizens. At first the Reformation changes produced dis¬ organization and loss of trade. An attempt to arrest decay in the district deserted by the clergy, by the transfer of some of the markets to that locality, proved unsuccessful, on account of difficulty of access. The earlier charters, of Glasgow were granted to the bishops who had the right to elect the provost and bailies. In 1611 King James VI granted a charter to the community direct, and subsequent charters kept to that form, but it was not till 1690, after the abolition of episcopacy, that the town council were allowed to elect their chief magistrates. Many of the inhabitants of Glasgow were op¬ posed to the union, but the municipal authori¬ ties, both at that time and during the risings of 1715 and 1745, remained loyal to the govern¬ ment. Following the suppression of the latter rebellion, heritable jurisdictions were abolished and the regality courts were superseded by those of the sheriff, but the city retained its position as the judicial centre of the district. Shortly after this time the deepening opera¬ tions on the river Clyde, to which reference has already been made, were commenced, and the city entered more fully upon that career of successful commercial prosperity which it has since continuously maintained.

Population. — The population of Glasgow has increased as follows: (1560s) 4,500; (1600)

7,000; (1708) 12,766; (1763) 28,300; (1791) 66,578; (1803) 81.484; (1811) 100,749; (1841) 255,650; (1881) 511,415; (1891) 565,714;

(1901)

761,709; (1911) 784,496. In 1912 the burghs of Govan, Patrick and Pollokshaws, and the dis¬ tricts of Cathcart, Scotstown, Shettleston and Tolcross were added to the city, which in¬ creased the population to 1,010,805. The popu¬ lation in 1914 was officially estimated at 1,032,-

228.

Bibliography. — Several histories of Glas¬ gow have been published, those of John M'Urc, printed by James Duncan who introduced type-

making to Glasgow, in 1718 (1736) ; John Gib¬ son (1777); Andrew Brown (1795); James DenhoJm (1797); and Dr. James Cleland (1816), being the earliest. Original research is well represented in the publications of the Maitland Club and the Scottish Burgh Rec- ords Society, and the materials thus accumu¬ lated have been utilized in various works, such as Macgeorge's <01d Glasgow > (1880) ; M'Gre- gor s (History of Glasgow J (1881) ; Marwick's (Historical Introduction to Glasgow Charters > (1897), and (Early Glasgow> (1911): Prim¬ roses (Mediaeval Glasgow) (1913). (Municipal Glasgow/ edited by the town clerk, Sir John- Lindsay, is well equipped with valuable statis¬ tical matter and contains an excellent historical introduction by the editor (1914, reprinted

D. S. Douglas,

Editorial Staff of The Americana.

GLASGOW, The University of, a corpo¬ rate body founded by a bull of Pope Nicholas V, dated 7 Jan. 1450—51, as a ((studium generate tarn in theologia et in jure canonum et civili quam in artibus et in quacunque licita facul- tateff with the power of creating masters and doctors, who, together with the readers and students, were to enjoy the same privileges and immunities with the University of Bologna. A body of statutes was prepared, and the univer¬ sity established by the bishop and chapter in the same year. The university appears at first to have had neither property nor endowment. A purse was formed of the perquisites procured from matriculations, examinations, degrees, etc., and some of the earlier members be¬ queathed the patronage of a few small chap¬ laincies ; but through the zeal of its founders and the civil and ecclesiastical immunities ac¬ corded to it, the new school of learning pros¬ pered, though in

circumstances so little in ac¬ cordance with modern notions of educational requirements. The clergy were induced to at¬ tend by offers of exemption from taxation and residence. The lectures in theology and in canon and civil law were read at the convent of the Dominicans; but the students of arts soon became so numerous that a house was provided for their residence called the pteda- gogium, and regular teachers were appointed.

In 1460 James, Lord Hamilton, bequeathed to Duncan Bunch, regent of the College of Arts, and his successors, a tenement in High street, with four acres of land adjoining, for the use of said college. On this ground the classes of the university continued to meet for 410 years. In 1577 James VI prescribed rules for the government of the university, and made a considerable addition to its funds. This new charter is called e Nova Erectio. It pro¬ vided for a principal to teach theology and Holy Scriptures, who was also professor of Hebrew and Syriac; and three regents, of whom one taught Greek and rhetoric; another dialectics, morals and politics, with arithmetic and geometry; the third, physiology, geography, chronology and astrology. Between this period and the Restoration the university continued to flourish, and the number of its professors in¬ creased ; but at the Restoration the re-establish¬ ment of jhe episcopacy deprived it of a great part of its revenues, and three of its chairs fell into abeyance. After the Revolution it

continued gradually to expand the scope of its teaching, and has numbered among its pro¬ fessors and graduates many distinguished men. In the end of the 18th century it obtained by bequest the valuable anatomical museum, library and other collections of the famous Dr. William Hunter. Later the old buildings be¬ came quite inadequate and were sold. In 1870 new buildings at Gilmorehill, which cost over $2,000,000, were erected. In 1893 the buildings and grounds were extended by gift of North Park House and grounds for the use of women students, and Queen Margaret College, the women s department of the univers ty, was founded. Through the munificence of the Mar¬ quis of Bute, Bute Hall was built for use in university functions. Considerable additions to the university buildings were made in 1907.

The University of Glasgow comprises five faculties, namely, arts, science, medicine, law and theology. The oldest chairs are those of ˆTLal philosophy (1577), natural philosophy (1577), logic and rhetoric (1577),Greek (1581) divinity (1630), Latin (previous to 1637), mathematics (revived 1601). In the first 20 years of the 18th century six professorships were either originally founded or revived, namely, humanity, Oriental languages, civil law, medicine, church history, anatomy ; astronomy was added in 1760.

Eighteen professorships were founded in the 19th century, including the chairs of civil en¬ gineering and naval architecture. In 1903 the chair of zoology was founded and the chair of natural history became the chair of zoology. In 1911 the chairs of clinical surgery and clin¬ ical medicine, founded in 1874, were suppressed by the establishment of the Saint Mungo chair of surgery and the Muirhead chair of medicine, and in the same year the Muirhead chair of obstetrics and gynaecology were established. The most recent foundation is the chair of Scottish history and literature, established in

*1. 9 1. 3**

The university was reconstituted by the Scottish Universities Act of 1858, and a similar revolution was effected by the act of 1889. Linder the latter act the Scottish Universities Committee of the Privy Council was consti¬ tuted, and exercised powers until the end of 1897, when the founding of new chairs and the making of other ordinances according to a pre¬ scribed procedure, devolved upon the Univer¬ sity Court, consisting of the rector (popularly elected for a .three-year term by the students), the principal, the lord provost of Glasgow and certain assessors, with provision for represen¬ tation by the affiliated colleges. This body also acts . as a court of appeal from the senate, consisting of the principal and professors,' which regulates teaching and discipline. The general court is composed of the chancellor, certain ex officio members and all graduates of the university. This body composes the voters' list, and in conjunction with that of Aberdeen University is jointly represented in the House of Commons by one member. In voting for their lord rector, the students are divided into four nations: Glottiana (Lanarkshire) ; Trans- forthiana (North of the Forth) ; Rothseiana (Bute, Renfrew and Ayrshire); Londoniana (all other localities). M. Poincare, the Presi¬ dent of France, was elected lord rector in 1915.

The students in 1914-15 numbered 1,835 males (a number that was appreciably dimin¬ ished owing to withdrawals for 'military service) and 635 women — 2,470 in all. There are numerous foundations and bursaries in connection with the university, the most lamous of which are the Snell exhibitions at Oxford University, established in 1677, tenable for five years, and of an annual value of $400. The library contains over 210,000 volumes. Consult Stewart, (Universitv of Glasgow) (1891) ; Coutts, (History of the University of Glasgow) (1909).

GLASHAN, John Cadenhead, Canadian educator: b. Ellon, Aberdeen, Scotland, 1844. In 1853 he came to Canada with his parents and was educated at Toronto University. He was appointed teacher in the Provincial Model School, Toronto, in 1864, and later became in¬ spector of schools in Middlesex County. In 1876 he became inspector of schools at Ottawa, in which post he remained until his retirement in 1910. He was made Fellow of the Royal Society of Canada in 1902. He wrote an arithmetic for schools, an advanced arithmetic, and, in collaboration with G. A. Wentworth and J. A. McLellan, (Algebraic Analysis)

(1889).

GLASS, Carter, American congressman : b. Lynchburg, Va., 4 Jan. 1858. He was edu¬ cated in the public and private schools, learned the printing trade and served in the mechanical department of a printing office for eight years. He became owner of the Daily News (morn¬ ing) and Daily Advance (afternoon), both papers of Lynchburg. From 1899 to 1903 he was a member of the Virginia Senate. He served on the State Constitutional Convention of 1901 and was a member of the 57th Congress for the unexpired term of P. J. Otey in 1902-03. He was re-elected to the 58th and succeeding Congresses (1903-19), from the sixth district of Virginia. In 1912 he piloted successfully through the House of Representatives the bank¬ ing bill. In 1918 Mr. Glass succeeded W. G. McAdoo as Secretary of the Treasury and served until 1919, when he was first appointed and later elected United States senator to fill the unexpired term of the late Thomas S. Mar¬ tin, 1919-25.

GLASS, Montague (Marsden), American author: b. Manchester, England, 23 July 1877. In 1890 he came to the United States, was educated at the College of the City of New York and at New York University. He has followed literature as a profession since 1900; is a contributor to Munsey's, McClure's, Metro¬ politan, Short Stories, Delineator, Harper's Weekly, Success, Smart Set, Saturday Evening Post and other magazines, and is the author of (Potash and PerlmutteU (1910) ; (Abe and Mawruss) (1911), (Elkin Tublimer —American } (1912); (Object: Matrimony) (1912); Com¬ petitive Nephew) (1915).

GLASS. Definition and History. — Indus¬ trial art has had no more beautiful and useful material to aid its progress throughout the ages than glass, and many sciences could scarcely have existed, or could not have develoned far, without its assistance. A perfect glass is surpassed in its brilliancy, pellucidity, refractive¬ ness and colorless transparency only by

the d amond itself. Its essential and dis¬ tinguishing features are its freedom from air bubbles, specks of foreign matter and striae. It can be

produced either color¬ less or tinted with any hue, and either transparent or opaque. Its opacity may be either partial or complete. It is smooth and shining on surface and in fracture. It retains its shining surface upon being reheated, and is capable of a high degree of polish when cold. It can be welded by contact while in a semi-molten state, and fractured instantane¬ ously— at a certain stage of manipulation — by chilling. It is tenacious and elastic, and can be blown as thin as gold leaf or spun as fine as the web of silk.

As the medium for one of the world's oldest handicrafts, much that is worth saying ˆbout glass cannot be said without reviewing the operations of its ancient artificers. The volcanic erupt, obsidian, an impure semi-trans¬ parent, vitreous substance, in color varying from a greenish gray to almost black, probablv served as a native material from which article's for. ornament and use were fashioned by the ancients before the event — accident or incident — occurred which gave the world its artificial substitute and complement, glass. This native glass — obsidian — invariably found in the neighborhood of some extinct volcano, was used by the Egyptians in the fabrication of works of art, and in some few known instances in articles of utility, but the artificial product, when once brought under control, effectually put a limit to its usefulness.

It is known that the Romans and the early Mexicans fashioned objects from obsidian, but in all probability the former used it as a variety of glass, and the latter from the fact that glass itself was unknown to them.

The period of the invention of glass cannot now be traced and how it was discovered is a matter of surmise, but of its importance there can be no question. What glass is, and what its possibilities are, no words could define more concisely than do those used by Dr. Johnson in one of his papers to The Rambler. (*

ˆThough mast writers upon glass have quoted this eu¬ logy, I am not aware of any having added the fact that Dr. Johnson in his young days resided in the town of Stour¬ bridge, Worcestershire, England, the principal seat of Brit¬ ish glass manufacturing. With Stourbridge fire clay (for the making oi glass-melting pots) at his feet, glasshouse furnaces blazing all around him, glass manufacturers, proba¬ bly, for his associates, and surely their sons as his pupils (he was one of the masters of the Stourbridge grammar school), he would, in all probability, get his inspiration from locai environment. j. a. S.

more importance, might supply the decay of nature and succor old age with subsidiary sight. Thus was the first artificer of glass employed, though without his own knowledge or expecta¬ tion. He was facilitating and prolonging the enjoyment of light, enlarging the avenues of science, and conferring the highest and most lasting pleasures; he was enabling the student to contemplate nature, and the beauty to behold herself.®

The essential constituents of glass are silica and alkali, and in accepting the authority of the ancient historian that these elements were present in the <(sandy beach under Mount Car- mel^ and the (

<(Rugged with excrescences and clouded with impurities® is a perfect word picture of what the first glass must have been. When and where the "shapeless lump® was first ob¬ served, who were the first artificers employed in bringing it under control, and in what man¬ ner a knowledge of its discovery and usefulness was first made known to the w'orld may never be determined with certainty, but there is evi¬ dence in historic record favoring a division of the honors, giving Egypt and the Egvptians — the world's earliest craftsmen — credit for its invention and initial development, and ceding to the Phoenician merchants — the most notable "traders® among the ancients — the distribution of the knowledge of its existence, of its merits and possibilities.

Glass-blowing was practised by the Egyp¬ tians more than 4,000 years ago, and while there are gaps in the records, we have proof of its continuance during the times of the native monarchs, under the Greeks and the Romans, and again in the 7th century a.d.

Phoenician claims to the invention of glass determine very early association with the art. During the three centuries on either side of the Christian era the Phoenician merchants did much toward the expansion of the industry. Glass found among tne ruins of Mycenae sug¬ gests association with the art among the Greeks about six centuries b.c.

The Roman glass-making period covered several centuries. In early Christian times glass was made in several Eastern countries, and Pliny mentions Gaul among the Western countries practicing the art. Byzantium had its glass workers. The earliest date of which theie is documentary evidence of glass-making at Venice is 1090, but once well established, the industry held a foremost place for about five centunes, declining considerably under competi- tion from western Europe in the 18th century.

1 hough Venetian glass production was limited in volume during the 18th century, some very important work was accomplished toward ad¬ vancing the art in the higher grades, and the foundation was laid for the revival

which oc¬ curred in the thirties of the following century, and has been maintained along the lines of some of its best features.

Western Europe advanced rapidly in the art of glass-making and decorating from the 16th

century on; France, Spain, the Low Countries, Germany and the British Isles all contributing. Glass-making became an established industry in the United States early in the 17th century. Russia made considerable advance in the glass industry during the latter half of last century. Canada entered the field about half a century ago. India is now making glass for seme of its own requirements; and there are indications that Japan is rapidly advancing in the manu¬ facture of several varieties of glass production.

To a question as to the form in which glass has been longest in use, the answer would prob¬ ably be, the bead. To follow the history of the bead the whole range of tradition and record of glass itself would have to be traversed. Beads of the native glass obsidian were in use in Egypt before the artificial substitute was discovered, and in every glass-making per¬ iod since that discovery bead production has been continued. As glass itself resulted from the "fortuitous liquefaction® of two elements, so was the bead the fortuitous result of that liquefaction, and the initial action of the first molten glass was the automatic formation of a bead, without craftsmanship, without tool of any kind.

Beads were among the very first objects adopted as personal ornaments, and cherished as "charms,® and scarcely any important dis¬ covery of ancient glass has been made without beads formed some part of the find. Specimens made any time before 568 b.c. were discovered in the ruins of ancient Mycenae. Fifth century history' (b.c.) mentions "stony molten pendants® with which the ears of the sacred crocodiles of Egypt were adorned. Festoons of "bead-like gems® are mentioned in connection with glass of 300 b.c. The Phoenician and Roman glass- makers made beads extensively. Glass beads of Egyptian characteristics were unearthed in 1892 during excavations at Glastonbury, England, where activities commenced about 150 b.c. were ended prior to the period of the Roman con¬ quest. (Consult Bulleid, A. and Gray, H. St.G., (The Glastonbury Lake Village) (1911). Bead¬ making was practised at Venice in its earliest glass-making days, was an important branch of the industry there in the 16th centurv, and by the end of the 18th over 20 furnaces were employed in producing over 500 species. To come nearer home there are records of bead production in the very earliest days of American glass-making viz., 1621, when a new glass house was built tc accommodate Italian workmen — presumably Venetians — in making beads, "to trade with the Indians.® Such a valuable discovery as glass could not, in the hands of a clever race

of craftsmen like the Egyptians, be long limited in its use to bead or pendant production, but the suggestion for bringing the material under control and making possible its develop- ment. would come from the material itself. In¬ sufficiently fused glass always contains air-bub¬ bles, and if taken from the melting pot in this condition and allowed to stream from the gathering instrument, the glass will continue to extend its length till it is chilled to hardness, me air bubble will remain a cavity, the end ot the shaft or tube formed will be in bead or pendant form, and the hollow section of the shaft will be in form for division info lengths

a uld the first glass bead &et its Perforation and thus was suggested the blowing pipe, the

essential for controlled expansion of molten – glass. It is not outside the bounds of possi¬ bility that a form of decorating solid glass preceded the art of glass blowing. The pre¬ sumed earliest form of ornamentation was by a process of uniting particles of the molten material with the surface of a previously partly fashioned form, and then by the aid of certain instruments and processes so distribut¬ ing this applied material as to form a pattern or imitation of something else than glass, some natural growth or chalcedonic marking. Ex¬ amples of beads so decorated are known and with an antiquity attributed to them more re¬ mote than that of the blown glass objects of similar characteristics there is ground for this argument. Glass workers of Egypt, Rome and Venice all produced ornamental effects by methods easily traceable to this primitive means of bringing molten glass under control. It possesses an advantage in being the most rapid of all the non-mechanical forms of patterning glass, the depositing .movements being almost momentary.

Phoenician. — It has been argued that though the discovery of glass was made in Egypt, and by the Egyptians, the invention was put into practical form upon Phoenician ground, that Phoenician sand was used in its manu¬ facture, and that its merchants were the first traders in the commodity, distributing it ex¬ tensively over a large area in a day when trans¬ portation was not at all easy. Much of the glass, made by the Phoenicians could scarcely be distinguished from that made in Egypt, but they had some characteristics peculiar to them¬ selves. It is claimed that the colored glass bead originated there, was made most extensively and formed a considerable part of the mer¬ chandise with which they traded when traveling over Europe, India and other parts of the East, and into Africa. Discoveries in ancient tombs suggest they made many of the class of small

vases associated with mortuary practices. Though small objects — many of them personal ornaments — appear to have been the principal part of the Phoenician production, they shared with Egypt . a reputation for making large statues, obelisks and columns in green glass, possibly imitative of the emerald. In some classes of production the Phoenicians reached the greatest perfection, and possibly owing to their trading facilities the output of their work¬ shops was larger than any others of their period.

China and India. — The earliest period of glass-making by the Chinese has been put at about two centuries b.c. Whether they dis¬ covered their own processes or developed the inventions of earlier craftsmen is not known, but it was not at all unlikely that the making of glass in the early Chinese form was associated with their efforts in the glazing of pottery, a science in which they excelled. Chinese forms and color effects in glass are suggestive of perhaps earlier work in carving objects from rock crystals, jade and precious stones; an art in which they were among the earliest experts. They made a species of glass known as lieou-li, capable of being worked into imitation pearls. Another kind of glass was named po-li. While some of the Chinese glass showed a distinct attempt to imitate natural stone forms and effects one of their early experts reversed the

order and was accredited with being able, by means of fire, to change stones into crystal. There is no connected history regarding Chinese glass, but occasional record suggests a regular continuation of the industry. In the 7th and 12th centuries there is mention of its use in valuable objects for presentation purposes. The city of Djan-kou is mentioned as a glass¬ making centre in the 12th century. A 16th century writer eulogized a specimen of Chinese glass as ((a fragment of that matter whereof the heavens consist. The work of the Chinese glass maker has been of great assistance to craftsmen in western Europe during the last century, and some of the most artistic glass¬ ware of modern times has resulted from the study of its features.

Ancient Indian glass bore a striking resem¬ blance to that made by the Chinese of the same period.

Greece. — There is not much history to sup¬ port the association of the Greeks with glass¬ making before our era, but mention is made of the use of ((cups of glass, » for drinking pur¬ poses in the 5th century b.c., and burning glasses were also known at that time. Glass for architectural decoration was known to have been used by the Greeks in a very early period.

About the time when the Barberini (Port¬ land) vase — universally regarded as the finest example of ancient glass extant — came into the possession of. the Portland family (1784), there arose a question as to whether this gem was of Greek or Roman origin. While it was known the Romans had very extensively produced this class of form — for sepulchral purposes — and excelled in the art of carving glass; that the urn was found in a Roman tomb, and was sup¬ posed to contain the ashes of a Roman emperor, there were certain characteristics which were decidedly more suggestive of Greek than Roman origin. Some of the critics not only main¬ tained that it was of Greek origin but that it was the work of Phidias himself. Possibly this theory was suggested by the similarity be¬ tween the low-relief carving upon the vase, and the bas-relief sculptures, by Phidias, upon the walls of the temple of Minerva at Athens. If it could be proved to be the work of Phidias (about 430 b.c.), or even of his time, it would be quite as much a tribute to the science of the chemist who compounded the materials, and the skill of the craftsman who fashioned the urn itself, as to the artist who sculptured the figures upon it; that particular form of ornamentation being then at its best in Greece, while the class of glass-making was not perfected till six cen¬ turies later at Rome.

Rome. — An authority upon ancient glass has made the assertion that during the period of the Roman Empire the manufacture of glass reached a point of development which in some respects has never been excelled nor even per¬ haps equalled. This statement was supported by an enumeration of some of the purposes to which the Roman glass was put, and the va¬ riety and extent of its production. Then, as now, the article for domestic use was the lar¬ gest item of production, and this could be set down to the absence in those days of any suit¬ able kind of glazed pottery for the same pur¬ poses. An enormous amount of glass was used for architectural decoration and also for personal ornaments. The wealth and luxury of Rome

had a stimulating effect upon the production of the most costly works of art in several varieties of glass, and no other period has been so prolific in this sense. Pure crystalline glass was the most valued of any kind, and was more costly than the precious metals. Vessels for sacramental purposes, and urns as recept¬ acles for the ashes of the dead, were extensively used throughout the whole period; the most precious examples of glass manufacture were those deposited in sepulchres ; as many as 20 specimens have been found in a single tomb. The manufacture of artificial gems in glass was brought to great perfection. Roman glass of all kinds was

exported verv extensively as has been proved by the abundance of examples and fragments discovered at widely distributed points away from Rome.

Notwithstanding the prodigious output in each of the several varieties, it is a remark¬ able fact that there were few large glass-mak¬ ing establishments, a great part of the produc¬ tion being provided by artificers working on a small scale. The period was also remarkable for the variety of colors employed in glass-mak- mg, for the numerous. processes of manipulation and for the large number of decorative motives; and it is astonishing to what proficiency the glass worker had attained in all these matters. Among colors, blues and greens were most largely used, with many shades of each; then followed purple, amber, brown and rose color. These were transparent colors. In opaque colors, white, red, blue — in tones from lapis lazuli to turquoise, — yellow, green and orange. The yellows and greens were in various tones also. These were mainly self-colors but the range was extended by manipulating processes. A most interesting, and technically a very dif¬ ficult, process in manipulation occurs in the making of the blank forms used in the glass we know as ((cameo.» The Portland vase is the best-known example of this class. The Ro¬ mans produced a vast quantity of it, though it is not quite certain that they originated either the methods of uniting the two bodies of glass required for the cameo effect, or the processes of sculpturing the ornamentation. Transparent blue was the usual ground color for cameo glass and opaque white almost invariably the coating from which the ornamentation was carved. Oc¬ casionally other colors were used. In this case the opaque white was inside the vessel, then a strata of clear glass and then the color or colors from which the ornament was fashioned. Pressed glass was one of the processes for certain forms of cameo. Discs, medallions and panels were produced in large quantities where replicas were required to complete a decorative scheme. It was not usual to duplicate vase forms in cameo ornamentation.

Black glass was largely used in making arti¬ cles upon which food was served. It was also used — as was brown and other colors — in making imitations of onyx. The various uses to which glass of the "mosaic8 class could be put were made the most of by the Roman work¬ men, though some of the motives were of Egyp¬ tian origin. The "mille fiori8 class, imitations of porphyry, and serpentine, agates and granites, were used in architectural decorations, even to pavements and wall tiles. The manipulation of threads of colored glass into patternings of the "vitro di trina8 order was a well-practised art.

A well-practised form of decorating glass by use of gold leaf was invented by the Romans. The gold was embedded in the substance of glass at first, but later a patterning was made of it on the surface. These patternings were

occasionally embellished by a second applica¬ tion of molten colored glass enclosing the gold leaf. By one, or both, of these methods, pic¬ torial effects were occasionally produced. In¬ scriptions in this ornamental form sometimes appeared. In the manufacture of personal orna¬ ments in glass, a process and effect very nearly approaching the cloisonne of later times, was carried to a high state of perfection by the Roman craftsmen. An effect, very much of the appearance of the "deposit8 silver of our own time was made at Rome, but by directly oppo¬ site processes. The design was pierced in the silver vessel and the colored glass blown into it. The same idea has been experimented with in quite recent times, but the annealing process developed difficulties.

Malleable glass was talked of at Rome. It evidently was considered a menace to the in¬ dustry, as the invention and the inventor passed out tragically by the edict of a Caesar. Glass toughened by annealing in oil is its modern equivalent.

Glass prisms were known; "when the sun shone through them they gave the colors of the rainbow.8 Here we have the early form of the chandelier pendant. Magnifying glasses and lenses were also known.

The Romans preserved their choicest wines in amphorae of glass. Window glass was used by the Romans at a time when mica, alabaster and certain kinds of shells were also capable mediums for transmitting light into the homes.

Though the Romans knew that highly pol¬ ished black glass, or clear glass blackened on one side, would reflect images, it is not known for certain whether or not they made glass mirrors. The manufacture of Roman glass ap¬ pears to have weakened as an industry after the fall of the empire, in all branches except mosaics. This class seems to have been con¬ tinued, though with varying success, up to the 9th century.

Eastern Countries and Byzantine.— The

art of glass-making seems to have been culti¬ vated in ancient time in most of the Eastern countries, and though there is no way of link¬ ing the present with the past in this connec¬ tion, there is little doubt the chain has not been broken for any lengthened period, and glass is made to-day in some of the countries that saw the blow-pipe operating in pre-Christian times One writer says— "Glass furnaces flamed on the Syrian coast for 25 centuries.8 Another — "The Sidonians carried the art of glass-making to great perfection8 ; and mention is made of "the celebrated Tyrian glass 8 Glass was made at Antioch by the Jews; at Damascus; at Shiraz in Persia; at Smyrna.' A large part of the ancient glass manufacture was in small

objects, as vases, perfume bottles personal ornaments and articles for sacred pur¬ poses. Articles of general utility were but a small part of the product. It may be, however, that such articles are unknown to us from the fact that they were not of sufficient interest or value to preserve. There were also some curious purposes to which glass was put. In the 12th century a coffin of glass8 is mentioned; also "a

GLASS

1 Enamelled Goblet (Venetian or Franco-Syrian. About 1303 A. D.) 2 Saracenic Enamelled Glass (About 1300. Metal Mounting added in the 16th century)

a t – c _ — /mu

GLASS

1 Glass making at Franco-British Exhibition, London, 1908 2 Glas rntt.'nrr*

3 Flint glass 'works, early 19th century early 19th century

GLASS

691

plate oi glass used to keep dust from settling upon a painting.® Byzantine glass has a long record, its two best periods being the 6th and the 10th centuries. It advanced considerably after the fall of the Roman Empire, probably on account of the aid obtained by securing the craftsmen who had worked at Rome. The great work of the Byzantine glass-makers for some time was in mosaics for church use. In the 10th and 11th centuries personal ornaments were a feature of production, in some of the methods earlier practised at Rome. They also used the Roman methods of pressing glass cameos. They were experts in the art of enameling and gilding of glass, but as the Byzantine decorative motives were employed at other eastern glass-making centres there has always been some difficulty in identifying their work. We know little of what they did in glass for domestic purposes. Byzantine glass¬ making . passed out when Venetian came in.

Venice. — Glass-making has been a Vene¬ tian industry since the end of the 11th century. In mid-12th century Venice employed mosaic craftsmen. Half a century later other pro¬ cesses, those practised by Greek and Byzan¬ tine glass workers had been adopted there. Up to the last decade of the 13th century the art was practised within the city itself, but in 1291 it was decreed that the larger furnaces be de¬ molished and the seat of the

industry removed to nearby Murano. This law remained in force for nearly five centuries. About the beginning of the 14th century glass "lanterns® for galleys and lighthouses were made at Murano, also optical glass, in mass, for use by the makers of spectacles. Mosaic glass, beads, glass for windows and mirrors, vessels for ornament and domestic uses, were all separate branches, each conducted under its own code of laws, binding upon master and workman.

Manufacturing secrets were closely guarded, and the export of raw materials absolutely pro¬ hibited. "Crackled® glass, variegated or (

At this time special privileges were granted

by the Venetian Republic to those who prac¬ tised the art of glass-making and preserved it as a Venetian industry; but punishment, even to the death penalty, awaited those who carried its secrets to other countries.

The glass known as "avanturine® was a Venetian invention of the early part of the 17th century, and its manufacture remained a secret for at least two centuries. It has the appear¬ ance of myriads of atoms of burnished copper diffused through a mass of transparent amber. It was largely used by the Venetians in con¬ junction with other means of decorating glass. It has still many uses of an ornamental nature.

The full period of fame for Venetian glass can be reckoned in centuries, and with the possible exception of cameo glass, every variety of manufacture known to the industry seems to have been produced in some form, from beads and ((burning glasses® to table wares and chandeliers. In the 17th century it reached its zenith, Venice supplied the world with its finest glass. The task, however, was a heavy one, and extensive distribution of the product, combined with other circumstances, forced western Europe — hitherto its best market — into the competition, which by the middle of the 18th _ century had wrested from Venice much of its best trade. _ It is to this period we may assign the foundation of what is now, and has been for at least a century and a half, the principal factor in the flint glass industry, viz., cut glass. As Venice declined, the new aspi¬ rants to precedence in glass manufacturing be¬ gan their effort to advance "wheel-cutting® upon glass, as a substitute for the more fanciful materials which had served Venice so well in the centuries just passed. With "tablewares® as its staple, cut glass then began its revolu¬ tionizing influence. In the thirties of the 18th century one of the Murano manufacturers ob¬ tained permission to re-establish the glass¬ making industry in Venice itself, and with the additional protection of certain patent rights he succeeded in introducing a variety of produc¬ tion somewhat different to that hitherto prac¬ tised. Among his successes were mirrors, with frames of glass ornamented by

methods which have been _ practised in several glass-making countries since that time, and are even now quite familiar in some. Chandeliers orna¬ mented with flowers and foliage — all made in glass — and a continuation of earlier Venetian motives all contributed to the success of his endeavor.

A century later, laudable efforts to revive the glories of Venetian glass were made along some lines of the old-time productions, and fortunately for the industry these efforts suc¬ ceeded, and operations have since been uninter¬ ruptedly continued. Several of the earlier Venetian motives have been further developed, notably the form of decorating with "glass applied to glass® at the furnace. This feature remained long a Venetian characteristic, but in the eighties of the last century both French and English glassmakers adopted it, fruit and flow¬ ers — with their foliage — and grotesque ani¬ mal and reptile creations supplying the motives.

France. — As Pliny mentions the "glass of Gaul® France may be credited with about 20 centuries of association with glass-making. Vessels and fragments attributed to the 2d and 3d centuries have been found in Nor-

mandy, and in the period between 486 and 752 glass-making was practised in several parts of the country. Greek workmen were employed there in the 7th century. There is 9th and 11th century evidence also. In the 13th, 14th and 15th centuries glass-makers worked at Poitou. Provence had its glasshouses as early as the 13th century, and they were quite im¬ portant by the 16th. Window glass was made in Normandy in the early part of the 14th cen¬ tury. In the 15th century it was a custom in France for the proprietors of glass works to become practical in the art themselves, whether they worked at the furnace or not, hence the "gentil'hommes verriers.® In 1556 glass-works were established in Lorraine, upon a site which has not even yet been abandoned. Presumably Venetian modes of production were adopted at the foundation, for as soon as history begins to record its progress we get evidence of opera¬ tions identical with those which carried France along in its glass-making till it eventually — in the 18th century — dispossessed its mentors of a great part of their western trade. In 1664 the disturbing element of warfare arrested the progress of this establishment, but did not stamp it out, and when peaceable times came again preparations were made to restart the furnace fires. On 17 Feb. 1767 land was do¬ nated by royal decree to the promoters of the company, on condition that they erect a factory, homes for workmen and a church. Such success accrued from this incentive that after 20 years of effort to advance the art of glass-making the directors of the establishment

were enabled to present to the Royal Academy of Sciences at Paris the first pure crystal glass ever made in France.

The government— delighted by this achieve¬ ment — granted several thousand acres of forest land to the company — in those days wood fuel was used for melting glass — that all the world might know that it was the first in the French nation to fashion articles in pure crystal glass.

In 1788 three furnaces were in operation and more than 400 people employed in their work¬ ing, an exceptionally large number in those days when small factories were the rule. In the 17th and 18th centuries there were works at La Rochelle and Nantes. Vessels for do¬ mestic purposes and for ornament were made; and enameling was one of the early forms of decorating, family and city "arms® and mottoes furnishing the motifs.

White and colored glass was made, includ¬ ing opalescent and marble effects. The secret also seems to have been known of patterning glass with studs formed in dies and welded on the vessel at the furnace. Much use has been made of this means of ornamentation in quite recent years. Mirror making was practised at Paris and at Cherbourg toward the end of the 1 7 th century. These manufactories were united and the joint production was very large. About 1690 the process of casting glass was invented, and thus it became possible to produce very large plates. In 1693 these interests were trans¬ ferred to Saint Gobain, a great centre of the plate-glass, industry of our own time.

There is scarcely a variety of glass or a decorative motif that has not been practised by the French glass-worker, and in some branches they possess the largest establishments and employ the greatest number of people.

Belgium. — The period when glass-making was introduced into Belgium cannot be fixed for certain, but whenever it occurred it was under Venetian influence. Mirror-making and "glass of crystal in the Venetian manner® are mentioned in 16th century history. Toward the middle of the 1 7 th century a "gentleman glass-maker® from Murano had a patent granted him to make glass at Brussels. The terms of this patent implied an intention to substitute for imported glass a real home-made article.

An example of glass, mounted in silver, in the peculiar "windmill® fashion of this period, is also mentioned. This same verre au moulin example had an engraved pattern upon it. En¬ graving upon glass became a well-practised art later in the century, and continued to be a feature of Belgian glass. Silver mounted glass has been such an important factor in the in¬ dustry during the last 200 years that an early example is worth mention.

in an organization calling itself the

Societe des Manufactures- de Glaces, with offices in Brussels — laid the foundation of a glass¬ making establishment from the operations of which the industry has since gained material benefit in many ways. The manufactories were located in the neighborhood of Liege — Val Saint Lambert and Jemeppe-: — now the princi¬ pal seat of Belgian glass-making, but later were supplemented by establishments near Namur-Jambes and at Charleroi. Though most of the departments of the glass industry of a century ago were operated in connection with the orig¬ inal. foundation, window glass was one of the earliest to be advanced to large proportions there, and claims were established to associa¬ tion with the great expansion which took place in the production, of this commodity — and its accessories — in its many varieties. Among the early products were glass tiles, prism lights, vault lights, glass door signs and the many uses of plate glass. The different classes of glass production are now distributed over dif¬ ferent centres and every demand is provided for ; table glass, in crystal and colors ; ornaments of many kinds ; candle, oil, gas and electric light¬ ing requisites; bottles and jars for the pres ervation of fruits and meats; coal-mine lamp chimneys , toughened glass, in vessel and slab form — and the blanks used in the manu¬ facture of rich cut glass.*

British Isles.— The period when glass¬ making was first introduced into Britain has been assigned to all the Christian centuries up to the seventh, each probability being supported by some historic note or tradition. Furnace remains and fragments suggestive of actual glass-making practices in the 4th century have been unearthed, and there are traditions of window glass-making in very early periods History tells us that in the 10th century "colored windows m churches were the work of high ecclesiastics.® There is no positive evidence however, in way of record, till mid- 15th cen¬ tury times, when "glass windows were added to the homes.® Thomas Charnock tells us that glass-makers were "scant in the land® at that Ume In the early days of the reign of Queen Elizabeth 1558-1603 — an Italian was "making Venice glasses at ye Crotchet Friars in Lon¬ don, and this, may be taken as the starting pomt of British glass-making — other than window glass, wh:ch was in general use at that

time — as an established industry. It may be presumed also that Venetian methods of pro¬ duction were employed, followers of those methods craving permission (

About 1620 glass-making was introduced into Scotland — again under Venetian supervision — and 12 years later into Ireland.

Mirror and spectacle plate glass was being made in England in 1634. Flint glass was intro¬ duced in England in the early part of the 17th century, and by 1673 was in general use; a London manufactory producing it (

The forms in use — for table wares — were very few in number, and all the establishments adopted the same shapes and decorations, being guided mainly by the home furnishings of their period. All through the Georgian times the same class of form obtained, and till well into the 19th century the only appreciable difference was in the elaboration of the several decora¬ tive motives.

Toward the middle of the century there was an all-round advance in range and form, variety of patterning and elaboration of treatment, the more highly skilled branches of craftsmanship being encouraged to meet the tastes and fash¬ ions of the time.

The dinner-table and sideboard needed ad¬ ditional articles and the mantel-shelf and cabi¬ net called for more choice ornaments. Cut- glass furniture for the beautifying of the palaces of Eastern potentates was in demand ; chairs, settees, tables, bedsteads and even balusters for the stairways had to be provided, as also elaborately constructed fountains and lamp stands. A pioneer example of this class is the glass fountain — made for the 1851 ex¬ hibition — still to be seen in the Crystal Palace, London. The 1851 (London) and succeeding international exhibitions very materially as¬ sisted the glass industry and many forms of production developed into large and continuous

business from a single exhibition specimen. New departments of the industry about this time added largely to its wealth and importance. Hand and machine etching upon table-glass were introduced in the late fifties and early sixties, respectively; ornamental glass for table use and home decoration advanced enormously and brought with it extensive use for colored glass. Gas and coal-oil similarly benefited glass-making, without materially reducing the extent of candelabra and candlestick production.

Association with other industries — as the sil¬ versmith — also brought much benefit to the glass interests. Sculpturing of glass, after the manner of the bas-relief marbles of ancient Greece, was introduced in the sixties. The first specimen was in clear flint-glass and its decora¬ tive motif that of Greece in the 4th century b.c. Following this was the effort to revive an art not known to have been practised since Roman Empire times and believed to be of Athenian origin. This endeavor was to reproduce the ((P ortland

Vase5 in its original material — glass. The effort was successful in every sense and resulted in opening the road to several new features in glass ornamentation.

In the late seventies a decorative motif akin to glass sculpturing resulted from efforts to reproduce, in glass, some of the ancient ex¬ amples of carved rock crystal. This effort too was entirely successful and resulted in the es¬ tablishment of another new branch of the industry. In the early eighties, enameling and gilding upon flint-glass was successfully re¬ vived, as also was the intaglio style of cut-glass decoration, now sometimes called ((stone-cut.5 The process of iridising the surface of glass has been practised in England since 1880. In that year its application to very deep shades of blue and green glass produced effects very closely resembling the antiques of Egypt and Rome. The same material and process, used upon a surface ((crackled)> in the 16th century Venetian manner, produced ((Scarahseus glass.5 The manufacturing of flint-glass in Ireland de¬ clined about 1835.

John A. Service.

GLASS, Chemical Properties of. The

surfaces of glass objects, though apparently stable under the conditions of commercial eco¬ nomic uses, are subject to certain chemical changes in favorable circumstances. All glasses containing alkalis, particularly if the proportion is unduly large, will give up a minute portion of that constituent to pure cold water standing against the surface for a pro¬ longed period. If the water is heated the chem¬ ical action of solution progresses faster. This is quite noticeable in the case of cheap window glass used in greenhouses, which soon loses its polished surface on the under side, where it is continually moist and subjected to consider¬ able heat. When the water touching the glass is very hot, as in a steam boiler under pressure, the action is quite rapid, as illustrated by the clouding of the glass gauge tubes of high pressure boilers. A piece of Bohemian (potash) glass placed in very hot water under high pres¬ sure will dissolve completely in a few hours.

Water containing alkalis exerts a chemical action on all forms of glass in which silica is a component, abstracting this substance by solu¬ tion, and later carrying away the released alkalis and basic substances. On the other

hand water containing a percentage of acid is very slow to attack silica glass, the acid seem¬ ing to reinforce the silica and oppose its sepa¬ ration.

Strong acids, however, will decompose slowly glasses which have an excessive content of basic components, or in which there is a rela¬ tively large proportion of boric or phosphoric acids. Strong hydrofluoric acid and phosphoric acid are both destructive of glass surfaces, the former to such a marked degree that it is used to etch patterns upon polished glass. Deteriora¬ tion of the surface also occurs where carbonic acid gas and moisture are both present in the air. The moisture which condenses on the glass begins the dissolving process, and the carbonic acid is absorbed by this alkaline solu¬ tion, uniting with the alkali present to form a salt. In the case of a soda glass, a dry crust of crystalline soda carbonate spreads over the surface giving it a cloudy appearance. An at¬ tempt to wipe this off with a dry rag results in scratching the surface with the sharp soda crystals. It should be gently washed away with warm water, allowing plenty of time for the crystals to fully dissolve. In potash glasses the cloudy appearance is not seen because the potash carbonate is hygroscopic and remains continually in a liquid form. In both cases the alkaline skin or scum becomes a breeding place for certain bacteria or fungi which act destruc¬ tively upon the glass. A percentage of boric acid in the glass mixture tends to prevent this bacterial action, and boric acid glasses are found to be notably resistant to atmospheric deterioration.

Glasses prepared for optical purposes are submitted to approximation tests as to their atmospheric resistance by placing them in a continuous current of moist air at a tempera¬ ture of 175° F. for a period of several days. The durable glasses are unaffected. Those less durable exhibit varying degrees of dimming of the surface. This, however, is an arbitrary method, and it has not been proved that it really determines the relative economic endurance of the glasses tested.

Glass is also affected by prolonged exposure to direct sunlight. The action is most pro¬ nounced as to the ultra-violet rays, which pro¬ duce a discoloration especially noticeable in glasses containing manganese : these glasses be¬ come brownish or purple-brownish. Similar phenomena of discoloration have been noted in glass . subjected to the action of radium. The chemical sensitiveness of glass to the action of light is of considerable economic importance in the manufacture of photographic dry-plates. Glass which has once carried a strongly con¬ trasted negative cannot be coated with emul¬ sion a second time, for the image of the first exposure remains in some degree in the glass surface, and reappears in the second exposure.

The most resistant of all varieties of glass is a borosilicate glass containing some mag¬ nesia. After heating a few times, however, this glass has a tendency to become slightly milky and. finally opaque. Its rival for many purposes is vitrified silica, which resembles glass . in many respects, but, containing no al¬ kali, is .free from the deteriorations which the alkalis

invite.

*Chemical and Physical Properties, Colors, e*c- How long sand and soda served by them¬ selves for the production of glass no one can now*

tell, yet while these elements are always the prime essentials scientific discoveries have from the earliest times so directed the artificer of this most useful commodity that no quality or variety of material and no color or shade of color is now impossible of production. There is scarcely a mineral that has not in some form been employed in glass-making, either for body or color. Sand, flints and various rocks have provided the silica, but sand is now almost uni¬ versally used, as being more free from the im¬ purities which affect glass — in substance or cH˚r the most readily obtained and needing the least preparation. When rocks were used they were calcined, pulverized and freed as far as possible from impurities. There are different grades of glass-making sand. The first bed of the required quality mentioned in glass-making history was situated at the mouth of the river Bel us, near Mount Carmel. The ancient Phoenician glass-makers used this sand, and the supplies were drawn upon extensively as late as the 16th century by the Venetian glass- makers for their finest productions ; though for inferior kinds of glass they could use the sand of their own lagunes. The finer grades of glass require a purified sand and this is obtained by washing and burning out of the earths, metals and vegetable matter which affect glass in various way s if not removed before the melting process takes place. Iron is nearly always- present and

i a ˆ.n<ˆenc>r to. give a green cast to the glass. The proportion of sand in glass i? rarely less than 50 per cent _of the full mixture and not often more than 75 per cent. Outside these bounds the molten glass becomes difficult to manipulate. . Where a more permanent glass is required an increased proportion of silica fused at a higher temperature will produce it, but at the saciifice of other qualities. Various alkalis and alkaline earths are used to fuse the sand, boda and potash are the chief solvents for nearly all the varieties of glass made. The ashes of wood, various plants and seaweed have also answered the purpose. In France during the Middle Ages, the alkali used was produced from fern. There were alkali yielding plants in the lagunes of Venice. In the 15th century the dregs of wine provided Spain with a suitable ash for the purpose, and the early Chinese "made mirrors from pebbles and a material obtained from the sea and reduced to ashes. > A suitable soda can be extracted from sea-salt. Glass made from potash is more limpid than that made from a vegetable ash I he soil of Egypt, where the first glass is said to have been made, contained abundance of soda and sand. An excess of alkali makes glass liable to decompose through the effects of time and atmospheric influence.

Arsenic, alumina, barium, iron, lime, lead magnesia, strontium, zinc are also elements in glass-making The simple glasses are composed principally of silica and alkali; the mixtures varying according to requirements, and embrace tffe several kinds of window and bottle glasses Ordinary window glass contains sand, soda and lime. Crown glass has potash added. Plate-glass, contains sand, soda — or potash — lime, alumina and iron. Bottle glass has sand, soda, alumina and iron. The compound glasses are composed of silica and alkali, with more or less metallic substances. Flint glass is the most important of the compound varieties. Various

recipes are employed in making it, but a well- proved one embraced in its composition sand, red lead, refined ash, saltpetre, arsenic, man¬ ganese and borax. These combined ingredients form the "batch® or "frit.® The proportions are roundly — three of sand, two of lead, one of ash and about one-fifth of one of saltpetre. The arsenic, manganese and borax are added in varying very small quantities, slightly graded in order named. Lead is the most important metallic substance in the compound glasses. It is used in the form of litharge and red oxide. Both are produced in the furnacing of pig lead. Both are active fluxes and glasses made with them require less alkali in proportion to silica than those made without them. The red lead, after it has been ground in water and dried to a very fine powder, is now the more generally used.

For optical glass and the strass from which artificial gems are made, an increased proportion of lead is required, density being the chief aim, though as with an excess of alkali its lasting power is affected. Density, refractiveness and pellucid brilliance are the qualities imparted to glass by the use of red lead. A refined ash ready for use is now obtainable. Saltpetre as¬ sists in driving off the globules of air in the liquid glass. Arsenic and borax are purifying aids. Manganese is used to neutralize the colors imparted by the other elements in glass. The aluminous earth frequently combined with manganese may be removed by a washing proc¬ ess. The aim is to make flint-glass absolutely colorless. It is considered "high® in tone when it assumes a pink cast ; and "low® when of a green cast. The high tone may disappear dur¬ ing the working out of the metal from the melting pot, or it may be reduced by a very uncertain — and not to be commended — trick known to experts, but once low it remains low to the bottom of the pot.

Flint-glass is always liable to get low in color if kept in fusion too long. A "proof® is taken of the color of each pot of metal in the furnace as soon as

the fusion is complete and the rough scum which always arises has been skimmed or raked from the top of the molten mass. The true color can only be correctly gauged by observing it through the thickness at fracture, lengthways of the proof, not through its surface.

The oxide of some particular metal is gen¬ erally employed to . produce particular colors in glass. Metallic substances so employed include antimony for ambers, purples, reds and yellows ; copoer for ambers, blues, greens and reds; co¬ balt for blues and greens; chromium for greens; gold for finest ruby reds; iron for ambers, blues, browns, greens, reds and yel¬ lows; nickel for blues and greens; silver for ambers and yellows; tin for reds; uranium for greens and yellows. Self-colors are usually made separately, but shades of all can be pro¬ duced by superimposing one color glass upon another — or casing as it is familiarly called — and as many as six different colors in one article have been successfully united. A fur¬ ther variation in shade may be obtained by changing the quantities of the separate colors used. Ruby colored glass made from gold is essentially a "easing® material, not for use by itself, heat being an obstacle in the way of controlling the tint, Though the first melting

*of the "ruby® ingredients may show only a golden yellow tint — in which stage it i * gathered into lumps and annealed — when re¬ heated for casing purposes the desired ruby tint develops and continues to deepen in color by continuous heat. A vessel made from uncased ruby would be scarcely transparent, unless very thin. Gold is capable of producing a variety of tints in glass, including — besides ruby — shades of blue, orange, green and yellow. Cop¬ per is also capable of producing ruby tints, and a brownish red is obtained from iron. Sometimes ruby glass is semi-opaque, or what the glass-maker calls "muddy® and some peculiar freaks have occasionally developed from this cause. Some of the freaks in this connection — freaks because they cannot be controlled in the fabrication — show a muddy red exterior which changes to a dull but nearly transparent green when light is passed through it. Opaque and opalescent glasses are obtained from the use of oxide of tin, or from phosphate of lime, in the ingredients.*

Fully opaque glass resembles porcelain, and while all the colors can be made opaque, chalk white, as a ground for other colors, is most frequently in use. Opaque white is used as an enamel, in the fashioning of glass vessels for painting upon, and, when united to another color, for cameo carving. When used for the last named purpose the usual "white® formula must be altered to agree with that of the glass with which it has to be united. Transparent and opaque glasses differ in density in the sub¬ stance and the union of "hard® and "soft® glasses invites trouble after annealing; es¬ pecially so when the abrasion of one of the parts is taking place — as in

cameo carving — ruinous cracks often developing from the slightest initial fracture — as a scratch from any sharp-pointed instrument. Opalescent glass turns from clear to opaque by fire means, and can be controlled. The transition occurs during the process of fashioning the glass vessel, and the opacity can be arrested and largely con¬ trolled at the will of the artificer. When gathered from the melting pot the metal is transparent; a partial cooling influences the ac¬ tion of the opacity-producing chemicals in the ingredients and makes possible both transpar¬ ent and opaque effects in the one article.

There are numerous recipes for coloring glass, but success with any largely depends upon the skill shown in adjusting the quantities of the several ingredients and in regulating the heat of the furnace during fusion ; variations in temperature very materially affecting the shade of color. Various colors have been ob¬ tained from the same metal and various metals have produced similar colors. Amber tints can be obtained from antimony, arsenic, copper, iron, manganese, and silver. Black and browns from charcoal, iron, manganese and zaffre. Greens from copper, cobalt, chromium, iron, nickel and uranium. Purples from antimony and manganese. Reds from antimony, copper, gold, iron, and tin. Yellows from antimony charcoal, iron, manganese, silver, and uranium. Opaque white from antimony, arsenic, phos¬ phate of lime; with sometimes a mixture pre¬ pared from tin and lead. The flint-glass "batch® is usually employed for colored glasses. The presence of iron, copper and other metals, in varying proportions, renders colored glass.

more subject to decomposition than uncolored glass. The iridization seen on ancient colored glass was not intentional in the fabrication, but due to chemical changes of the surface; long exposure and atmospheric influences causing a separation of the constituent parts and produc¬ ing the minute flakes of glass which reflect the light at various angles and give out prismatic hues.

Similar prismatic effects can now be produced by the fumes of certain chemicals dif¬ fused over the surface of a glass vessel during the ˆblowing® process, and made permanent by reheating at the furnace immediately after the fuming has taken place. As with the ancient iridescent glass, dark grounds — especially greens and blues — throw out the prismatic colors best.

Whenever substances containing silica and alkali are subjected to intense

heat, there is always the possibility of glass formation ; as tor instance, reeds or straw burnt in very large masses. Metallurgical operations, such as the smelting of ores, have produced glass. Glass¬ making history often refers to remelting glass. Lumps of glass sent from Spain to the Roman glass-workers were remelted when coloring materials had been added. Efforts to produce a superior glass for rich cutting have been suc¬ cessful when the whole first melting of the flint. <(batch® has been taken from the melting pot in an iron ladle and plunged into a cauldron of water, the effect being to break up the glass into small particles, in appearance like cracked ice. It was then refilled, corrected in color if necessary and remelted, producing a glass as nearly perfect as possible for cutting purposes and free from the striae present at the first melting.

Glass at a high temperature is fluid and solidifies as the temperature is reduced. When regulated. to a semi-fluid state it becomes tract- able and its ductility admits of its being manipu- lated in a variety of ways; blown hollow through an iron blow-pipe, cast in a mold, pressed in a machine or with hand pincers' drawn out into lengths — either solid or hol¬ low, rolled into plates, whirled into discs or sheared as cloth is cut with scissors. The peculiar tenacity of the substance enables any of these processes to be performed, but only jy a pi actised hand, and as the metal rapidly cools, the several operations must be rapidly performed. The molten glass commences to harden immediately it is drawn from the pot m Lie furnace and quickly becomes incapable of expansion by air or manipulation by tool, but it can be softened to the working condition again by a plunge into any sufficiently heated enclosui e, usually the mouth of the melting pot.

A moderate heat is required for the welding of glass, and handles or applied ornamentation can be made quite secure if the parts of union are without. sulphur or smoke from the furnace, both of which elements prevent perfect cohesion of the parts. It is necessary to reheat quickly aftei the union is made. A cold metal coming |n contact with a glass form upon the blowing iron when just cooled to hardness will initiate a fracture at the chilled part which will extend whole of its thickness when given a light blow, and separate the form from the

iron — rod or tube — upon which it has been fashioned. These principles of welding and fracturing, both instantaneous in operation, are important factors possessed by no other material.

John A. Service.

GLASS, Cut or Incised. See Glass, Orna¬ mentation of; Glass, Varieties of.

GLASS, Ornamentation of. In the pref¬ ace to one of his textbooks upon

the applica¬ tion of art, Lewis F. Day says: ((It is only in theory that ornament can be independently discussed. Practically it exists only relatively to its application.® ((The necessity of adapting design to its position and use is as obvious as it is . absolute.® These axioms are especially true in regard to the ornamentation of glass, as well from the nature of the material itself as from the variety in form to which ornament is at once a necessity and a complement. The earliest known manner and process employed in the ornamentation of glass was in all prob- suggested by the ((rugged excrescences® which disfigured the first ((metalline form® de¬ scribed in Dr. Johnson's eulogy. By manipu¬ lating these excrescences and giving direction to the flowing metal, the first effort at orna¬ mentation was accomplished. The same motive is carried out in every epoch of glass-making history from the earliest Egyptian times right into our own day. The principle is that of patterning or initiating a foundation for pat¬ terning by the manipulation of glass in its molten state, either by scoriation of the mass or by welding upon the surface of a partly fashioned form during the process of fabri- cation at the furnace. From the development ot this primitive motive many of the most in¬ teresting and most beautiful decorative fea¬ tures known to the glass-making industry have been evolved. It is the base of the whole range ° , . tJle. reticulated classes of ornamentation which have characterized the efforts of glass-workers m many periods and in most countries. Antique examples in our museums show that ancient craftsmen in the East practised exten- sively this applique mode of ornamenting glass Ihe Greeks and Romans adapted it in various ways It was a feature in Persian and Byzan¬ tine glass-making. Venice employed it in cre- aUons which have influenced ornamental glass production wherever the art has been cultivated during the last five centuries. Spain com¬ menced its ornamental glass production along the same lines and the earliest known drinking vessels of glass used in Britain — supposedly of Roman origin – possessed the same con-

feˆtur(rs- Tt needs no great stretch of the imagination to trace back such contri¬ butions to usefulness in glasswares as handles

ramre ofVˆ V°- thlS Pˆrent stock' The whole range of decorative motives resulting from the

Sasswelded11 °f s,triPs and threads of

glass welded upon the surface of a blown form

belong to this class. There are few records

-ke, ntampulatmg processes employed by the

naˆ sTmg aSS”WOrkert in turninS these welded , ° ornament, but to one conversant with

o 22atnal h 6 difficu|ties are oftentimes not great as they would appear to be The ornamental treatment to follow the applique form ,s largely a matter of surmise, but die evidences are in favor of some form of cutting

CUT GLASS

W

o

HH

W

w 153

co

G

O

•a

o

cd

**3*

G

*cd rr**

w %2

t> ccS

H

W

CO

W

o

£

&

ft

J3

co

“3)

Ch

W

> >

£>

0)

T3

ccS

•> CS

C-J5 o

4->

53ˆ

cd

a

CO

‘CO

ccS

>

o

g 13

2 a

^ d>

cd co

CO

cd

(D

,Q

a

cd

o

4>

co

CO

• H

.a

H

o

■■M

CO

53

cd

ox)

G

cd

‘S

°.s

1 =

CO

B.9

ccS g

•SCO a> „

s I

< 2

o

m

T3

a

cS

O o

ft ® ®

as co*

J3

£?* 13 > o w oft

P

CO

■« .

c/5 g

g-O * >

co u U-g

g c 3

O. CO H

H3

•;S

N (_)

*8

“Si “ « 3j3 ca 4) CS i- 13 ccS ©

ft

So

|s

cs 2

.2 3

*>2 J3 as

.3

»— <

Id 5

o .o

co -t3 •*•« co O

o&

•§w

Pd

CO

3

H

GLASS, ORNAMENTATION OF

1 Antique Mirror 3 The " Elgin Vase "

2 Lord Kelvin by G. Woodall 4 " Elgin Marbles " Claret Jug

GLASS

697

upon a wheel and the gem lapidist seems entitled to the credit of introducing it. Most of the early practised means of abrading glass orna¬ mentally came within the term <(cutting,® though they embraced grinding, scraping, rub¬ bing and scratching.

Ancient examples of transparent glass in the British Museum show unmistakable signs of having been "cut® by means identical with those in use in our own time and it would appear to be unnecessary to look beyond them in an attempt to fix the origin of cut glass. Illus¬ trations and descriptions of these examples appear in (The History of Art in Chaldea and Assyria* by Georges Perrot and Charles Chipiez (Vol. II, pp. 306-307). Layard dis¬ covered them at Nineveh. The first named may have been used for some precious unguent. The description says : <(It has been blown solid and then the inside cut out by means of an instrument which has left easily visible traces of its passage; this instrument was no doubt mounted on a lathe.®

after ˆturning® it into shape — taking up the first glass object ready to his hand and by a chance abrasion discovering a means of orna¬ mentation the very antipodes of the hitherto one and only "applique® method, i.e., cut glass.

The "cut® upon this antique is known as the "olive® and is formed upon a

convex-faced wheel — such as may be used to "concave® a lens — the size of the wheel and the curve of the surface worked upon determining its outline. By encircling a tube form with a row of ((olives® joined together, then repeating above and below in alternate spaces the first row of cuts automatically assume the <(lozenge® form. The irregularity of the placing of the cuts is suggestive of the eventual lozenge pat¬ tern occurring from the accidental joining of a number of haphazard cuts, thus the entirely surrounded ((olive® would become polygonal, while the partially free would have the "scale- like® appearance observable. Drawings B and C show these effects on tubes of same shape with ((cuts® arranged in regular order. (For

(

Drawing A (top). Drawing B (center). Drawing C (bottom).

Without relying upon the ((blown solid® argument the suggestion of a cutting instru¬ ment which left visible traces of its passage comes very near to the glass-cutting operations of subsequent times and incidentally is both an early suggestion of the principle of stopper¬ ing a glass vessel to preserve its precious con¬ tents and the advantages of transparent glass over other substances for such purposes of preservation.

The second example comes nearer still to cut glass as we know it. It is described as "a glass cylinder or tube of unknown use ; it is covered with a decoration made of lozenges with a concave surface.® (See drawing A). The theory that it represents the beginning of glass-cutting gets some support from the class of cut distributed over its surface. In assum¬ ing its period to be about 700 b.c., it is not diffi¬ cult to imagine the Assyrian lapidist who ground into shape the rock crystal lens discovered at same time and place (see Layard's discov¬ eries, > page 197), when about to make the always necessary test of his stone wheel —

application of this motif see The Art Journal deport on International Exhibition, London 1851, pp. 32, 175). Most facetted patternings upon cut glass are produced automatically from the crossing and recrossing of the lines of orna¬ mentation. The remark "of unknown use® for this antique object has its significance. . Pos¬ sibly it had no definite use; the form being the usual experimental one of the glass-blower when testing the clearness of his "metal® and is the preliminary of many blown shapes, fre¬ quently never passing beyond this limit owing to various kinds of defect. The entire absence of any similar antique supports this theory.*

The bas-relief ornamental glass (better known perhaps as cameo) of ancient Greece and Rome, was a form of <(cutting,® the orna¬

mentation being effected in part by the lapi¬ dary's wheel and it is probable the essential to finished cut glass — polishing — was in those times, as now, accomplished partly on the wheel.

The most famous examples of bas-relief ornamented glass known — the Portland vase —

has a highly polished surface and one of the arguments used to support a theory of Greek origin for this classic gem is based upon the known proficiency of the ancient Greek sculptor in the toreutic art.

Any incisory form of ornamenting glass ■ — by diamond or hard metal point or by lapidary's wheel was usually described by early histo- nans as "cut,® but in the 13th century there are Constantinople records of < (glass cups and shallow basins cut with the wheel.® That this was the true type of cutting may be inferred rom the description given — "one cup has the surface so cut away that small cones are left standing up (the diamond cutting of to-day) and another has circles formed in same man¬ ner. The writings of Chardin (mid-16th century) record Persian glass bottles "cut diamondwise. > There is a Bohemian claim to the invention of cut glass early in the 17th century, but as the art was not unknown in ancient Assyrian times and there are evidences ot its practice in the early mediaeval, this claim may have been based upon the discovery of some advanced production of the cutter's wheel ; possibly the one which in later times proved such a boon to the glass industry in several of its departments, not only in 'Bo¬ hemia but in other countries, especially Eng¬ land about the middle of last century. This feature was developed from the substitution of intaglio for "relief® ornamentation upon cased glass of the kind formerly used so extensively by Roman glass-workers. Any colored trans¬ parent glass formed the base and an outer coating of opaque white served as a ground tor the ornamentation which was cut through the casing into the substance beneath ; the con¬ trasting colors clearly defining the lines of the pattern.

Cut-glass patternings are produced by first grinding away the main lines of the design upon an iron wheel, with fine sand and water streamed between the wheel and the glass as the cutting medium. The second process is performed upon stone wheels, of shape and Size corresponding with the iron wheels and kept wet by contact with a moistened sponge.

1 his operation gives definite form and a smooth surface to the cut. The

polishing is effected in various ways by wheels of wood and cork' by wheel brushes and by an acid bath. The wheel polishing mediums are finely ground pumice and rotton-stone mixed with water, for hi st process; and afterward a putty-powder made from lead and tin, also mixed with water.

1 he acid bath is hydrofluoric. The iron wheels rotate toward the operator, other wheels the reverse way.

As some of the descriptions of early "cut® g ass most assuredly point to finely engraved intaglio ornamentation, with figure subjects a frequent motive, the glass-engraver's art must be accredited with quite ancient origin An . th century example is known but some of its ornamentation is so filmy that it may have >een effected by a sharp pointed instrument in¬ stead of the metal wheel. In 15th century his- toiv engraving is mentioned in connection with German, Dutch, Venetian and French glass.

J v end of the century it had advanced consid-

i i

For some considerable time after the 15th century the best work appears to have been done m Germany and Austria — the Bohemians being especially expert craftsmen — though the art was practised in several other European countries The Spanish town of La Granja was famed for its engraved glass and as deco- i atecl mirror making was also a feature of production there the engraved mirrors (of the type shown in illustration) occasionally met with in southern Europe, may have originated un6' Txcellent engraving was done in France Hofland and England throughout the 18th and 19th centuries. Cut glass of the later Georgian periods produced in England, Ireland and Scot¬ land received aid from association with the sister art of engraving and by this co-operat:on ornamental motives were carried to completion that could only have been partially effected by either one of the processes. The broad fea¬ tures pt ornamentation were usually "cut® • the more intricate parts "engraved.®

Since about 1850, the art of glass engraving

rn!HS ˆ §h?st development has been extensively cultivated in the English manufactories. The coming of the international exhibition was the

Gdp11ˆ6′ Artlsts .w,ere encouraged to step out¬ side the commercial production and create a

ˆ standard The Elgin marbles claret jug (see illustration) was produced at Stourbridge*

*“roundethf > anS w»*fbltl°nt • ˆ78, bas been round the world® for exhibition purposes and*

is now in a private collection in London. En

fonnerg h !hls. tyPeis performed upon small copper wheels riveted upon the end of an iron

spindle set in the mandril of a lathe and rotated

emeV0n°otwtdead C; The. cutting medium is fine emery powder mixed with a thin oil. The en-

gravmg is done under the wheel and as the cutting medium obscures the actual contact of vvheel and glass, the direction and duration of each cut is a matter of judgment. The glass-

nf br T DThS °Ver the wheel and the progress the cut can be observed through the glass Polishing of the dulled surface left by the

fˆremyofCatnonˆ > !!eCtnd iUP°n Same lathe aˆ torm of tool with wheels of lead with finelv*

powdered pumice, mixed with water as the brightening medium. The «lead-wheel» process of polishing engraved glass was the customarv one until quite recent years. The subjec on ?he engraved mirror illustrated shows its applica¬ tion. Phe parts shown black, upon the white

engraving1”6 Wh “‘i p0!ishedu Portions of the engraving. When adapting the engraver’s art

bsn, PrinUtChie°‘i °tf imitaL”S °f = ™k had to V a seventies – lead polishing act to be abandoned as too slow a process

Sser0°f ,iferytoa heffeCtS !n ?‘aSS gˆePa new aSe £ , j e „to tae engraver s art and onened

skihedfieofSitsf operation for the most highly smiled of its craftsmen and its adoption as a new ornamental feature may be set down as the most important development, artistically the tab e-glass industry has known in recent times

la needr°bk ˆ in Slass pan -l be obtained by complete restoration of the ‘dull

thegrpolidshingamenta!iion t0 brightness At first but this af nf d°ne, upon wheel brushes, the ires* a StlIl to° sIow a process to meet fied bv q demand which was eventually satis-*

aeid !hpm˚re rapid — and far more effective -acid bath process. The Elgin marbles sub!

ject had also served for the revival of the ancient art of ornamenting glass by relief carv¬ ing. The ((Elgin Vase® (illustrated) is in clear flint-glass and is the work of the late John Northwood of Wordsley, Staffordshire, Eng¬ land. (Photo by special permission of Sir Whitworth Wallis, director of Birmingham Art Gallery). It is the first modern specimen of bas-relief carving in glass. The aim of the artist was to revive this ancient art upon the lines of an ancient ornamental motif, by carv- in ff glass in a design of Grecian characteristics with an effect simulating the bas-reliefs per¬ fected in marble by the Greek sculptor, Phidias, in his decoration of the walls of the temple of Minerva at Athens — commenced b.c. 448.

The accomplishment of this work was pre¬ liminary to John Northwood's more ambitious effort to reproduce in its original material — glass — that masterpiece of ancient art known from the time of its discovery (near Rome, end of 16th century) till the year 1786, as the ((Barberini® and since that time as the «Port- land Vase.® (British Museum).

This reproduction — the labor of years — with every feature of material, form, color and ornamentation in faithful facsimile, ranks among the noblest efforts of skilled craftsmanship in the glass-workers' art. The body of the vase is a deep transparent blue and the ornamentation was carved with steel tools from the ((casing® of opaque white glass which originally cov¬ ered the base and body of the vase up to a line between the junctures of the handles on either side. The long-lost secrets of sculptured glass having been fully revealed in this reproduction, the way was opened for 19th century crafts¬ men to emulate the deeds of ancient Greek and Roman experts in this art. The bas-relief form of ornamentation was almost exclusively adopted by the very limited circle of artists who practised it, a notable exception being the ((Dennis Vase® in which free sculpture in all its purity is shown in the winged horse sur¬ mounting the cover and the forefronts of others forming the handles; all sculptured from shape¬ less masses of opaque white glass, welded to the form during its fabrication. This was also the work of John Northwood. Several decora¬ tive motives were adapted to this form of glass ornamentation, the brothers Thomas and George Woodall collaborating along these lines in the earlier period of the vogue which had been created for this highly skilful class of production. Subsequently decorative treat¬ ments became accessory only to the more advanced figure subjects in which George Woodall practically had the field

to him¬ self, no other aspirant to honors in this direction advancing beyond a second or third effort. While the decorative examples were varied in color, to suit the style of ornamenta¬ tion, it was found that a rich, deep brown glass gave the best effect of light and shade in figure subjects, which were invariably sculptured from a casing of opaque white glass. Very slightly concave round placques also proved to be the most suitable shapes for figure subjects, al¬ though more difficult for the artist to work upon than a vase form. Placques up to 20 inches diameter have been used. George Wood- all occasionally essayed portraiture, and per¬ mission has been granted to illustrate his most

notable effort in this direction; his portrait of the late Lord Kelvin, sculptured from life.

John A. Service.

GLASS, Varieties of. — There are so many forms of glass in use in household and in¬ dustrial economy that a survey of them is simplified by a classification into a few general groups.

Window glass, also known to glass makers as sheet glass, is commonly made in tank fur¬ naces, the tanks being comparatively deep — from 20 inches to 3 feet. Deeper than this the mass of molten glass is found to suffer dete¬ rioration through incipient crystallization, known technically as "devitrification.® The type of fur¬ nace preferred is the high-crowned form, the melting of the glass being accomplished by radiation from the heated crown rather than by contact of the flame of combustion with the body of glass in the tank. The heights of such furnaces vary in different plants, being from two to five feet, with an occasional extreme of six feet, between glass and crown. The materials used are sand, ground lime or limestone, car¬ bonate of soda or ((salt-cake® (crude sulphate of soda), a percentage of oxide of manganese to improve the color and some fluxes. If the salt-cake is used as the source of soda a por¬ tion of carbon is required to reduce it, and this is supplied by anthracite coal. In this latter event it is common to use a reducing flame in the furnace, generated by admitting the air and gas separately to the furnace chamber. This method, however, is wasteful of fuel, and the preferable practice is to combine the air and gas in an outer chamber, in which their rela¬ tive proportions mav be accurately controlled. When the glass is melted to a proper condition the thick conical nose of an iron pipe between four and five feet long, having been previously heated to nearly the temperature of the molten glass, is thrust into the mass in the tank and turned over two or three times to accumulate a sizable lump of the viscid glass. Compressed air is then turned gently into the pipe and the bubble allowed to grow in the mass of glass, which is slowly withdrawn from the furnace and worked by swaying and turning until a

longish cylindrical shape has been attained. The air is then shut off and the rounded bot¬ tom of the big bubble is heated to the melting point. The pressure of the air inside bursts open the bottom and rapid rotation of the blow-pipe distributes the glass into continuation with the plane of the sides of the cylinder. The glass form is then separated from the pipe by cracking it at the "neck® by applving a piece of cold iron. The cylinder, lying on a wooden rack, is allowed to cool somewhat. A thread of soft and very hot glass is then run around the cylinder just below the ((shoulder® and when its heat has been imparted locally, the thread is pushed away and a cold iron laid upon the heated streak. A crack runs around the cylinder in the path of the thread, separat¬ ing the cylinder. The sheet of glass has now a true cylindrical form. To open it out flat it is slit down the inside with a diamond, or is cracked by the application of a hot rod fol¬ lowed by a drop of cold water. The split cylinder is placed on a stone slab in a kiln in heat sufficient to soften the glass and then the rolled up sheet is pressed down flat on the stone with

a special tool made of wood. The sheet is then annealed and after examination for de¬ fects is cut to the largest sizes possible, ex¬ cluding the defects with the smallest amount of waste. Mouth-blowing is still practised in some of the smaller plants, but the success of the compressed air manipulation is crowding the old method out of use. The proposed processes of 'ˆdrawing® glass sheets have been only recently successful. The process begins with a bubble blown upon a soecially formed nose of a short blow-pipe. The lower end of the bubble is dipped into the centre of a hot glass direct from the furnace, and the blow-pipe is attached to a reservoir of com¬ pressed air. The blow-pipe with its bubble is then hoisted vertically upward, the glass being drawn put in the form of a large cylinder, 21 inches in diameter and 20 to 25 feet long,' air being blown in as needed to keep the bubble symmetrical. When the hoist is finished the glass cylinder is cut loose at the pot and then lowered, cut into five-foot lengths and split.

Crown Glass. — The term is applied to the method of its production, now practically abandoned. Almost anv glass can be made by the crown method. A spherical bubble is blown and is opened by breaking off the tip at the blow-pipe, after an assistant has cemented the opposite «pole» of the bubble to an iron rod with a lump of hot glass. The open¬ ing is presented to the furnace opening and softened, the holding rod meanwhile being ro¬ tated. The former sphere assumes the shape of an open bowl and being more swiftly re- volvedˆ flattens into a disc or "table never more than 50*

inches in diameter. This disc al¬ ways has a boss of glass at its centre and gen¬ erally some pronounced wavy corrugations sur¬ rounding it. These irregularities prevent the commercial use of the centre of the sheet, and the size of the square-cornered sheets which can be cut around it are necessarily small, while the proportion of waste is relatively very large.

. Plate Glass is essentially cast-glass rolled into its mold. It is produced in two qualities, in one of which the materials are very care¬ fully selected, as the product is to be ground and polished for plate-glass windows and mir¬ rors. _ The other quality is used for skylights of buildings and shops and its principal quali¬ fication after transparency is cheapness. The defects that would be inadmissible in polished plate-glass are not noticeable in roofing-glass. Roofing plate-glass is of the same composition as sheet glass and like that is made in tank furnaces and in very large batches, up to 150 tons at a . time. _ In casting a plate a long- handled ladle is introduced through the door of the furnace and dipped carefully into the molten mass, scooping up varying weights of glass, according to the size of the plate to be cast — up to 200 pounds. A sling attached to an overhead trolley lifts out the ladle and transports it to the cast-iron rolling table upon which the red-hot mass is thrown out. Guides of iron at the sides determine the thickness of the plate and a roller moving with them flat¬ tens it out. As soon as the sheet has cooled enough for handling, it goes to the annealing kiln, a long, tunnel-like chamber, very hot at the entrance end, and becoming gradually cooler toward the exit. Through this "continuous

kiln," as it is called, the plate travels slowly, losing its heat by degrees. When sufficiently cool it is cut to size with a diamond. Various patterns of ribbed and figured glass are made by an adaptation of the roller method. The plastic glass is rolled out first into a plate be¬ tween two hot rollers set at a fixed distance apart, according to the desired thickness of the finished plate. The rolled hot plate then passes immediately between another pair of rollers, one of which impresses the pattern upon it.

In the manufacture of polished plate-glass the materials are selected with greater care, and the glass is usually (though not alwavs) melted in pots. The simplest practice is to lift these melting pots from the furnace bed by a crane and to pour the glass directly from them upon the rolling table. Some manufacturers pour from the melting pots into casting pots and reheat the glass in the latter before pour- uig. W here tanks are employed for melting, the special casting pot is always used. The rolling of the plate is carried out with great care to ensure as nearly as possible an even thickness. The annealing is done in a chamber with a perfectly level floor of looselv laid fire brick, which is sealed up for the cooling period of four or five days. The initial heat is sufficient to render the plate plastic, so that it settles down perfectly level on the floor. After codling, the plates are cut to

exclude apparent defects, and then ground down on a rotating table with abrasives of successive degrees of fineness.

. he grinding "rubbers are blocks of heavy iron and they also are made to rotate with a motion contrary to that of the table. During this process the plate must be firmly supported over its entire surface to avoid being broken by the pressure, and this is accomplished by bedding it in plaster of Paris upon the iron bed of the grinding table. When one side has been ground down and smoothed to the point where u to, be polished, the table top with the*

attached plate is moved bodily to the polishing machine. The polishing rubbers are of iron faced with felt and are fed with rouge mixed to a thin paste with water. The highest polish is not secured until the glass has become dis¬ tinctly hot from the friction. The surface then seems to become plastic and an actual rear- rangement of its molecules to result. After polishing one side the glass is turned over and placed again in the grinding machine. Usually it is not bedded in plaster for this second grinding. The alternative is to lay it upon a wet woolen blanket on the grinding table.

Jr late-glass is made in very large sizes, up to 25 feet in length and 12 to 14 feet in width Green or Bottle Glass The ordinary green bottle glass has, in addition to lime and soda, a proportion of alumina — up to 10 per cen.t ai?d may also have barium and mag

Sma11 Percentages. The cheapest materials are used: natural alkaline rocks along with blast furnace slag, basalt, etc. The green color is due to a considerable percentage of iron, which is of service in rendering the glass more easily fusible. Where the green

1S r0t \Cry ,stron,g,.tbe c°l°r can be changed to amber by the addition of manganese. Bottle glass is made in the tank furnace the end tartnest from the fire being provided with sev-

hold back the dross and the blowers take their lumps of glass on their blow-pipes from within these rings. By the old process, still in use in a number of the smaller plants, the bottle is blown with the breath. _ After the bubble be¬ comes a certain size it is reheated at the fur¬ nace and then is placed inside of a mold of fire-clay and blown vigorously as the blow¬ pipe is turned round and round. It thus takes the shape of the mold, the neck part becoming quite cool and stiff. The mold is opened, and as the bottle is

removed, an assistant pushes in the round bottom, with an iron rod or ((pontil® having a bit of molten glass on its tip. This attaches the bottle to the pontil, and the neck part is cracked off from the blow-pipe. The assistant then presents the neck end of the bottle to the furnace and after softening it, places it in a machine in which the neck is formed and finished. The newer methods em¬ ploy automatic machinery in which the bottle is blown in a metal mold by compressed air, and the output is increased many fold.

The making of large vessels of bottle glass is a somewhat similar proceeding. A thick sheet of the hot glass is laid upon a perforated iron plate, to which it is held firmly by clamps applied all around the edges. The combination is then turned over, and the plastic glass sags away from the centre of the iron plate. The sag is guided into a hollow mold, and then compressed air is turned on over the perforated plate, and the sag is enlarged and forced into close conformation with the mold. By this process such large glassware as tanks and bathtubs are successfully modeled.

Flint Glass. — The constituents of ordinary flint glass are silica, 53 per cent ; potash, 14 per cent ; and lead oxide, 33 per cent. An¬ other grade, known as <(dense flint glass,® is composed of silica, 38 per cent; potash, 8 per cent ; and lead oxide, 54 per cent. Still another variety, called <(borate flint glass,® is made up of borax, 66 per cent; soda, 4 per cent; alumina, 11 per cent; lead oxide, 7 per cent; and zinc oxide, 12 per cent.

Flint or crystal glass, as it is often called, is made exclusively in covered crucibles, for it must be protected from the chemical action of the furnace gases as well as from dust and bits of lime and silica dropping from the furnace dome. Flint glass is used chiefly for table and other hollow ware, and in the finer qualities for making lenses for optical pur¬ poses. It is valued in its ordinary uses for its brilliancy, imparted by the lead oxide. The same ingredient gives it greater weight in pro¬ portion to its bulk than that of the soda-lime glasses. The action of the lead is also notable in the clearing of the glass mixture, owing to the larger bubbles of oxygen it evolves. Arsenic and potassium nitrate are also employed in flint glass to aid in the clearing. Flint glass appears at its best when blown to the finish, without the intervention of a mold. It then has what is termed the ((fire-polish .® It is ex¬ tremely difficult, however, for the blower to keep so perfect a shape as to satisfy the de¬ mands of symmetry, and as a rule the final form is of the mold into which the glass is blown — as in bottle-making. To restore the brilliancy of surface it is customary to reheat the article at the furnace opening. This is an operation requiring great skill, as the heat

must be sufficient to melt the surface, but not enough to cause a

deformation of the model.

Pressed Glass. — Much time is saved, and a very satisfactory grade of ware is made by pressing the plastic glass directly into a mold instead of blowing it into approximate shape beforehand. Ihe process requires heated molds, and comparatively soft glass. A plunger works down with great force into a cylindrical re¬ ceptacle in which the hot glass is placed, and the molds connected with the cylinder are instantly filled. It is apparent that many articles can be made at the same time, with one stroke of the plunger, depending upon the number of molds connected. Pressed ware lacks the fire-polish of blown ware, but this is partially restored by reheating. Many op¬ tical lenses are made in this way, being pressed approximately to form and afterward ground to the required perfection of curvature.

Cut Glass. — Formerly the "blanks® on which the ornamental cutting was done were blown, and much foreign cut glass is still de¬ veloped in that way, but the American practice is to press the "blanks® into molds, the glass used being dense flint. The blanks are first marked wit'll chalk with the principal lines of the pattern. These are then "roughed out® on a grindstone, or with an iron wheel fed with sand and water. The blank is then chalked with the secondary lines of the pattern, and these are cut with an emery wheel. When all the angles have been trued up, the cut sur¬ faces are polished on finishing wheels dressed with putty powder. A cheaper grade of cut glass is made by pressing the pattern into the glass, and then grinding the irregular faces true on the emery wheel, and polishing. The time saved is fully two-thirds, and as this item is the largest in the cost of making, the product can be sold at about half the former minimum. If the hot glass is properly worked in the press, there is no noticeable difference in the product.

Colored Glass. — • Glasses which are in¬ tended to transmit colored light are prepared by adding certain chemicals to the mixture which otherwise would make colorless glass. Some colored glass is simply tinted white glass, as water may be tinted by adding a dye. In other cases the coloring is quite a different matter : the substance mixed with the glass has the property of stopping certain light rays, while not actually mingling with the glass. It has been suggested that this condition is one of suspension rather than solution, and that the color must be considered as due to the same interferences that obtain in the diffraction spectrum.

The color which any given substance will impart to glass depends in large degree upon the heat to which it is subjected. By different manipulation iron oxide may be used to produce red, orange or green, and intermediate shades. Chromium, added in the form of potassium bichromate, gives tints

of green, and with the further addition of iron oxide or copper oxide yields bluish shades. Manganese, added as the black oxide, produces various shades of pink, lilac, violet and purple. If the temperature is raised to a higher degree the colors are yellows and browns. Copper, introduced either as the metal, or the oxide, yields reds, purples and black. These hues are altered by the addition

of chromium in minute quantities. Repeated heatings will also change the original tint. Gold, added as metal, yields first amber, and by further heatings, red and violet. Uranium, added in the form of uranyl-acetate, or uranyl- nitrate yields yellow and green. Cobalt, added as the oxide, yields many shades of blue, de¬ pending upon the quantity used. Some of the colored glasses are so strongly tinted that in ordinary thicknesses they appear opaque and black. To make them thin enough so that the color shall be disclosed, would leave them too thin for any economic uses. They are there¬ fore <'flashed)> upon white glass by dipping the lump of white glass as it is taken on the nose of the blowpipe into a basin of the colored glass and blowing the two together. Staining is a method of coloring glass by coating it with solutions of metallic _ salts, and afterward fix¬ ing the color by firing the article in a kiln. Glass may also be colored locally by fusing upon it a colored borax enamel.

Optical Glass requires in the first instance perfect homogeneity in order thar such rays as pass through it shall not be deflected by inequal¬ ities in the glass substance. Especially is this qualification necessary in the glass that is to be used for making microscope and telescope lenses. The tendencies of different glasses to disperse the rays of light they transmit to vary¬ ing degrees renders it needful to correct such peculiarities by building up the lens with several different kinds of glass. The centre of experi¬ ment in the manufacture of optical glasses was for some years at the great Jena Works in Germany, and here upwards of 70 distinct varieties of optical glass were made and offered to the lens makers of the world. These were nearly all varieties of crown and flint glasses, but ingredients were multiplied so that phos¬ phoric and boric acid were substituted or added on the acid side of the mixtures, and baryta, magnesia and lithia were added to the avail¬ able bases. Many of these experimental glasses have been discarded for various reasons, but a long list of wonderfully perfect glasses re¬ main at the disposal of the optician and the instrument maker. . Optical glass is usually allowed to get cold in the crucible in which it is meffed. The glass chunk is then broken up into pieces, the faulty parts discarded, and the perfect glass remelted. It is then often pressed into

approximate shape, and tempered for a long time before being ground into the desired form.

Wire-Glass, or wired plate glass, as it is often called, is made by the plate-glass process.

It is dumped from the ladle in a mass upon a hot platform and a roller passes over it flatten¬ ing out the sheet or plate. Closely following is a second roller which lays down upon the hot glass a length of wire netting approximately as hot as the glass. A third roller, bearing ribs, presses the wire into the plate of hot glass about half way through its thickness, and a fourth roller smooths down the plate and rolls it all into one. If the wired glass is to be used for roofing or skylights, no further finish is necessary. For some purposes, however, the glass plate is ground and polished.

GLASS BLOWING. There are three principal kinds of glass — window glass, plate glass and bottles and jars or hollow ware.

Separate factories, or at least separate depart¬ ments of factories, are devoted to each of these classifications. A glass furnace is fitted up for the kind of work it is designed to do. Previous to 1889, the furnace was almost al¬ ways a great circular structure in the centre of a more or less circular building, with aper¬ tures on several sides, so that a number of men could work around it. The bottom of such a furnace is made of clay and is termed a pot. The iuel may be wood, coal, oil, natural gas, a j0Su anytˆ1'nff». but natural gas is the cheapest, and the glass industry thrives where gas is plentiiul and cheap. In 1889 the continuous tank furnace was introduced, each tank having a capacity of about 15 large pot furnaces. In making window glass, which is also termed cylinder glass and sheet glass, a quantity of molten glass is taken up at the end of a long tube called a ponty. This the blower dips into the furnace, and by adroit manipulation brings out a sizable mass of semi-molten glass nearly white hot. Putting the other end of the ponty in his mouth, the glassblower uses all his lung power in rapid blowing, causing the glass at the other end to swell out very much as a child blows a soap bubble. He stands over a small pit, and blows and whirls and swings his ponty, with the hot glass bubble growing bigger and bigger, and by reciprocating it vigorously in the pit, the bubble elongates and soon assumes the form of a cylinder. When it is sufficiently large and has also sufficiently cooled, this cylinder of hot glass may be swung on to a flat table, slit longitudinally with a knife and will settle down in a flat sheet. It

may later be annealed and cut into required sizes.

*j u ii * giaM, jctis, lummers*

and hollow ware generally are also made by

blowing, taking the molten glass from the urnace on a. ponty, but only a little glass is taken at a time, sufficient for one bottle or whatever is to be blown. After the blower has formed this into a hot bulb perhaps half the size of the finished bottle, he puts it into n mold, which he closes with his foot and blows until the glass fills the mold, which de- termines its outer form. This is the hand method of blowing bottles. The machine method was evolved about 1896, and has gradu¬ ally come into extended use, until now a large proportion of hollow ware is mechanically blown. Machine-blown bottles can usually be distinguished from hand-blown by the wide mouths which are essential to the process The glass bottle-making machine has a combina¬ tion ot molds mounted on a rotary table The molds may be individual of double, but each mold has an outer blow-section, with a ring in which the neck of the bottle is pressed, and a telescopic press-section rising within the blow- section and receiving the glass, forming, with the

neck of the blow-section, a pressure-mold I he molten glass is dropped into the combined mo d when in this pressmold position, and the table rotated to a point where the mold is un¬ der a plunger which enters and presses the neck and wind-cavity into the dependent mass

g aSˆ' Th? Plunffer is then withdrawn, the telescopic section of the combined mold is dropped and by another rotation the table

lir'nlVheir d Unc!e.r a blow-stem, exposing t e tolass blank within the blow section. A

bottom plate being inserted, air under pressure -s admitted to expand the glass blank to the lorm of the mold. At the next rotation of the table the finished article is taken off by an •attendant and sent to the annealing oven. Such is the system. In practice, the machines handle from four to eight bottles at a time, and can thus make many more bottles than a man, so that the production of a glass furnace is greatly increased. Only a limited number of blowers, as eight, can work around a pot furnace, as each has to be in a position to reach the molten glass. Therefore, when a machine doing four men's work is put in the place of each man, the output of the furnace is increased four times.

GLASS CRAB, an immature condition of certain crabs (Paiinurus and its allies) which for a time. are flattened and perfectly trans¬ parent, as if formed of a sheet of glass, and have no resemblance to the parent form.

GLASS-MAKING. As found ordinarily in commerce, glass consists of an alkaline sili¬ cate with one or more basic silicates melted to¬ gether. From its molten state glass gradually stiffens as it cools, becoming solid eventually without having gone through a molecular change ; that is to say, it has not crystallized. In this glass mixture silica takes the role of the principal acid, uniting with at least two basic oxides, one being of the alkaline metals. In many of the common forms of glass boron accompanies silica as the acid component. A general classification of the ordinary commer¬ cial varieties of glass would group together (1) those in which silica is the only acid com¬ ponent; (2) those in which only an alkaline base is combined with the silica; (3) those in which other acid components are present with the silica; (4) those in which no silica is present. The first group would contain the commonest of all glass — the soda-lime glass — as used for window glass, white druggists' bottles, table glass and hollow ware, etc. Its composition is silica, 72 per cent ; soda, 13 per cent; lime 13

per cent; impurities 2 per cent. French window glass has slightly less silica, a trifle more soda, and a little larger percentage of lime. The second group would comprise what is known as soluble glass, or water glass. The third group includes most of the optical glasses, and the enamels and imitation gems used by jewelers. The fourth group is made up of the borate and phosphate glasses used in certain combinations in correcting the aberre-tions of lenses.

Raw Materials. — It is imperative that the materials put into the crucible for fusing into glass shall be scrupulously pure, as there is no way of separating impurities after the mass is once melted. The silica which constitutes from 52 to 72 per cent of the mass of the raw material before melting is obtained chiefly from a high grade of quartz sand. It is required to test at least 98 per cent pure silica. Of the impuri¬ ties not more than one-half of 1 per cent of oxide of iron is permissable if the glass is to be used for fine table ware, cut glass, etc. If for optical glass, the proportion of iron oxide must not be more than 0.015 of 1 per cent. If for common window glass of a slightly greenish hue, the oxide of iron may run up to 2 per cent. Some of the <(sand>:) used in making the finest glass is obtained by crushing

quartz ; and, as it is important that the sand be uniform in size of gra n, it becomes neces¬ sary to screen the crushed quartz twice to get rid of the dust and fine stuff, and also of the particles which are too coarse. There are some soft sandstones which provide very good material but the extra cost of crushing and screening restricts their use to high-priced articles.

In the United States glass sands are found in commercial quantities in 18 States. In 1916 the amount produced was over 2,000,000 tons, chiefly from Pennsylvania and Illinois, some¬ what less from West Virginia, and smaller, though substantial, quantities from New Jersey and Ohio. The finest quality comes from Berk¬ shire County, Mass., and is practically pure silica; the Pennsylvania and West Virginia sands contain less than one-tenth of 1 per cent of iron. The New Jersey sand is higher in iron, but of good window-glass quality.

The principal source of soda is sodium car¬ bonate, to be had in the market in a sufficiently high degree of purity. The cheaper sodium sulphate is used in making plate and window glass, but it is more trouble to use, as carbon must be added, usually as anthracite coal, and this is likely to carry other impurities. Sodium nitrate is employed to oxidize any organic mat¬ ter present, and to change the iron from the ferrous to the ferric state. In potash glasses the alkali is obtained from commercial pearl ashes or from salts of tartar.

Lime is provided from native limestone, if sufficiently pure. It must not contain more than 3 per cent of iron, when used for white glass. There is a large saving of heat in the glass furnace by burning the limestone beforehand, and grinding it just before using, although most of the burnt lime used is previously slacked. Natural minerals of the feldspar class are em¬ ployed in common bottle glass, in which mix¬ tures their iron content is desirable as a flux. Granite and basalt are other available sources of silica, soda and alumina, in glasses where all three may be used together. Magnesia is added to such glass mixtures as call for it, either as the carbonate or the oxide. The former is found sufficiently pure in nature, and has only to be calcined to produce the oxide. Barium is employed only in special glasses. It is added preferably as the carbonate, and in some barium glasses the natural mineral with- erite is suitable after being ground to powder. For fine optical glasses the nitrate and the hy¬ drate of barium are made use of. Manganese is widely used in the form of peroxide, occa¬ sionally as the sesquioxide, as a decolorizer in all white glasses. It always contains a percent¬ age of iron and a little silica. In making opal glass, alumina is used in the form of hydrate, which is found in a very pure state in the markets. Zinc, as the oxide, is employed in heat-resisting glass. Lead is largely employed to impart brilliancy. In some plants litharge is used, but the form preferred is the red oxide. Boric acid and borax and arsenic are employed in some glasses. They are bought in the open market. In addition to the primary materials, a bulk of broken glass, known as ˆcullet® is always put in with a batch, sometimes more, sometimes less. As the cullet melts at a lower degree of heat it aids materially in breaking down the other raw materials.

Preliminary preparation is concentrated on the sand, which is washed again and again, then drained for several days, and finally dried — so that no moisture shall be carried into the furnace. Thorough mixture of the ingredients is of first importance. In some plants it is done by hand, but generally it is done mechani¬ cally, a large revolving drum with internal paddles being perhaps the most effective. The exact amount of each constituent used varies with the practice of each manufacturer, and, indeed, depends to a considerable extent upon the plant itself — the degree of heat generated by the furnace, the quality of the goods to be turned out, the methods of hand or machine production, etc. It is impossible to tell by testing any particular sample of glass just what ingredients were put into the furnace to pro¬ duce it, for some of them are dissipated by the intense heat, and others remain in the slag.

Crucibles and Tanks.— The melting of the glass mixture is conducted either in crucibles or in shallow tanks. The crucibles are used for small batches, and the tanks for large batches. The crucibles, or «glass pots}) as they are called, are of various sizes, to hold from 400 or 500 pounds up to two tons, or more. They are usually from 30 to 48 inches in diam¬ eter at the top, and somewhat smaller at the bottom, and their height is about equal to the diameter. They are generally round, but some¬ times oval in outline. For the ordinary kinds of glass the pots are open at the top. For the finer kinds, which must be carefully protected from actual contact with the furnace flames, as well as from possible dropping of clay or other substance from the roof of the oven, the pots are covered oyer with a dome, and the opening is at the side, under a projecting hood with a little «hearth» below it. These pots are made of choice selected fire-clay, a part of which has been previously burnt. The clay is made into a stiff dough with a little water, and the pots are built up gradually, a segment at a time, the process occupying some weeks for large and heavy pots. When the pot is com¬ plete it is allowed to dry for several months. It is then placed in a kiln, and brought slowly to a bright red heat, which is maintained for at least 24 hours, when it is filled with glass mix¬ ture without being permitted to cool.

The tanks are simply basins, 20 inches to 3 feet in depth and often of great size holding up to 200 tons of glass. They are con¬ structed of large slabs of fire-clay material similar to that used for crucibles but somewhat coarser. These slabs are set dry, with no cementing material between. During the melt¬ ing the liquid glass penetrates into the aper¬ tures between the slabs until it congeals from the lower temperature and thus renders the tank tight. The top edge of the tanks thus constructed is on a level with the floor of the furnace, and all parts not to be covered with the molten glass are made of silica brick.

Furnaces and Fuel. — Furnaces for melt- lnff glass have to be of the most highly refrac¬ tory materials. Even fire clay will not stand the intense heat of the glass-furnace flame, and the dome or roof of the furnace, and also all of the walls not covered by the molten glass when in operation are constructed of bricks of almost pure silica, the 2 per cent allow¬ able admixture being of lime and alumina. The

side walls of the furnace are of large blocks of fire-clay, and it is the practice with some builders to put into the material a generous proportion of quartz pebbles. Two types of furnace are in use, one in which the fuel is burned directly in the furnace itself, the other in which an outer chamber is used to convert the fuel into gas which is then mixed with air and ignited, the flame surging through the furnace proper. In the former, the fuel is small coal or coke, and the heat passes upward through a short flue into the furnace chamber above it. The surge of heat strikes against the vaulted

roof of the furnace and is thrown back upon and around the glass pots standing on the furnace floor. For a furnace of this kind several flues are usually provided in order to distribute the heat evenly. The burnt gases are taken out by numerous small openings around the sides so that there shall be no de¬ cided current of flame in any one direction. Very few of such furnaces are in operation, nearly all glass being now made in gas-fired furnaces, in which much higher temperatures are attained. Two types are in favor: the regenerative and the recuperative. In the for¬ mer there are two regenerative chambers, one on each side of the furnace proper. These chambers are of fire-brick with cross walls of loosely piled fire-brick which, while they do not wholly obstruct the passage of the gases delay them while the fire-bricks are absorbing their heat. The waste gases from the furnace are passed through one of these chambers on their way to the chimney, and when it has be- come very hot, these gases are turned through the other regenerative chamber, while the un¬ burned fuel-gas is passed through the hot chamber, in turn absorbing the heat of the fire-bnck walls. This reversal of the flow of the gases is alternated from time to time as the melting goes on, the course being changed about every half hour. The fuel-gas and the air required for combustion are thus heated very economically by the waste heat of the burnt gases.

principle in a different way. The fuel gas and air do not pass through the same chamber through which the waste gases have passed, but through adjoining flues which are heated >y being surrounded by those gases on their way to the chimney. Each method has its

t!ttm,ifdherentS- U is to be said> however, that the recuperative furnace occupies less

space, and does away with the necessitv of reversing valves. It is claimed also that its heat is more constant, as the regenerating c ambers are continually cooling off as the gas takes up the heat from the walls.

In both systems the hot gas and hot air are enterg^h s

en ranee f^rnace.' and are ™ed at the very entrance. A rapid mixing causes a very hot

but short and localized flame. A slow mixing

produces a longer and farther reaching flame

and is better adapted to a larger furnace In

the regenerating furnace the direction of the

tiame is changed from one side to the other

about every half hour, and this gives a more

furnace theUfl°n °f ,heat In the recuperating

direction a ways passes in ,he same

direction, and it is customary to cause it to

return upon itself in the form of the letter U,

and to make its exit from the lurnace at a point close to its entrance.

In the tank furnace the openings for the entrance of the fuel-gas and air, and for the exit of the waste gases after combustion, are generally placed along the side walls of the furnace just above the level of the molten glass, or at the base of the dome of the roof. For tank furnaces the regenerative type is preferred, as the flame and exhaust are alternated at the several ports, and the heat is thus more evenly applied to the melting mass. The proportions of the ingredients used and the method of fusing and handling each special kind of glass are described in detail in the article entitled Glass, Varieties of.

Fusion. — The plant being prepared, the ac¬ tual making of the glass is the successful inter¬ melting of the ingredients. The more refrac¬ tory of these are ground very fine; the sand is used in a granular form, freed from dust and coarse grains ; the soda and salt-cake, which melt readily at a low temperature, are simply broken into small fragments. The weighing out of the several components is accurately done, according to the scheme of the individual glass-maker, each having his own particular variations from the standard formulas. Where hand mixing is employed, the mass is dumped into a bin and turned over again and again by shovelers, being finally passed through a sieve. The cullet is then added with more or less uniformity. If the glass is to be melted in a tank, it is merely shoveled in at the melt¬ ing end, which supposedly contains melted glass — as the operation of the tank furnace is con¬ tinuous. The mixture melts more quickly and with less expenditure of fuel in these conditions than in pots, where there is no melted glass to start with. In the crucible furnace practically all the previous contents of the pots have been emptied out, and the new material goes in dry. As there is much foaming during the melting, the pots cannot be filled at once, but as the melting proceeds more

materials are added from time to time, from four to seven instalments, depending upon the size of the pot and the chemical reactions of the mixture involved. The last instalment is usually of cullet only. The frothing of the glass mixture during melt¬ ing has the effect of filling the molten mass with innumerable bubbles, some of which are air, others carbonic acid or oxygen released in the chemical actions which take place. A high degree of fluidity is required to enable these bubbles to make their way to the sur¬ face of the glass. Some of them are got rid of by stirring with an iron rod, but this is liable to add iron oxide to the mass, and is highly objectionable in some cases.

To aid in this "clearing" process certain sub¬ stances are added to the glass mixture to form large bubbles which shall gather up the tiny bubbles and carry them along to the top. Ar¬ senic and sodium nitrate are often used for this purpose. The molten mass being clear, it is finally skimmed to remove the surface "skin" which contains many floating impurities. Be¬ fore the glass can be worked it must be con¬ siderably reduced in temperature — that is, from the fluid stage to the plastic stage. In crucible furnaces this result can only be accomplished by cooling down the entire furnace. In the tank process the fluid glass usually is made to

flow from the hotter melting end under a par¬ tition wall to the working end of the tank, which is kept at the lower, working temperature.

Annealing. — To avoid sudden fracture in glass, most careful attention is necessary in the annealing, or tempering. The operation must be commenced as soon as the fashioning of the form is completed. Glass expands with heat and contracts again upon cooling. Thick glass is more liable to sudden fracture than if blown thin and an uneven thickness is still more sus¬ ceptible. Unequal contraction, due to the thicker parts retaining the heat longest, is the cause of fracture, and slow cooling to allow of gradual contraction the only safe remedy. Heated air is the most convenient and most generally used annealing medium, but hot water and heated sand have been successfully em¬ ployed for the purpose. Occasionally all these mediums have been requisitioned in the perfect annealing of one article. A flint glass form judged to have been insufficiently annealed by the heated air means has been immersed in a bath of sand and water — of the same temper¬ ature as the glass — raised to the boiling point and kept there for a few hours, then very grad¬ ually cooled off. Glass shrinks very slightly upon cooling and the shrinkage is more per¬ ceptible after slow than quick cooling. Glass of uneven thickness, either blown thick and thin, or made thick in places by parts applied to the surface, will not contract uniformly and requires a slow annealing. Annealing in oil increases toughness in glass. There are dif¬

ferent forms of annealing ovens to meet the requirements of quick or slow cooling periods. Heavily-made glass — especially that intended for cutting — needs very careful and long an¬ nealing and for this a kiln is generally used and is considered the safest. The whole lining of the kiln is of fire-brick. Fire boxes are built on either side of the one opening through which the glass is passed in and taken out. Several hours' firing is necessary to raise the tempera¬ ture of the kiln to that of a little below the melting heat of the glass to be annealed. The glass should be of about the same temperature when it is first placed in the forepart of the kiln, between the two fire-boxes. As the floor space in the front becomes covered with the glass articles the individual pieces are taken up on the prongs of an iron fork, kept hot for the purpose and removed further back in the kiln and arranged so as to cover the whole floor space without the articles touching each other. When the kiln contains all it will safely hold — that is, without any of the arti¬ cles being too near the fire-boxes — preparation is made to close up the kiln by means of iron doors which have inner linings of fireclay. The closing is gradual and depends upon the fire still in the boxes and the kind of articles in the forepart of the kiln. The interstices in the door are sealed with clay, so that no cold air can get into the kiln. When finally closed the doors are padlocked for safety. The closed period depends upon the class of goods within the kiln, but rarely less than four or more than six days is allowed.

The opening of the doors is as important as their closing, and, like the annealing, must be gradual. On removal the glass should be of the same temperature as the outside air to be quite safe.

Should any of the glass be insufficiently annealed — the sign of which is given by the heavier pieces cracking after being taken from the kiln — it may be replaced in the kiln be¬ fore the next firing, with protecting screens of iron around it, and thus gradually heated and cooled again. The lear (or lehr) form of heated air annealing is for the lighter kinds of glass and such of the heavier forms which do not require so long a cooling period. Cool¬ ing in a lear may be effected in from six hours on, the period being determined and the glass placed in position, according to requirements, giving the heaviest pieces the hottest fire and the longest time.

The lear is in the form of a tunnel, with fire-boxes at the receiving end and a smoke chimney near the discharging end. It may be straight or circular and usually has a ˆquick and a ˆslow® side, or both sides may be oper¬ ated quick or slow at will. In a straight lear the glass articles are placed*

upon iron pans – — square or oblong— and as each pan — which has a sprinkling of sand upon it — is filled to capacity with glass it has another one linked to it and by means of a windlass and chain is drawn away from its place contiguous to the fire-box and makes room for the next pan and so on continuously to the end of the week's work. After emptying at the cool end, the pans are returned to the fire end again for refilling.

As with the kiln, the lear temperature is first raised to about that of the glass it is to receive. At the end of the making operations for the week the iron doors of the lear are closed tightly and padlocked to prevent any casual opening likely to admit cold air before the cooling is completed.

A lear is arched over for about 15 to 20 feet but the bed is extended well beyond the arch and into the discharging room. A screen of cloth at the discharging end of the arch pro¬ tects the lear from currents of cold air. The discharging (or sorting) room is constructed as nearly airtight as possible, the entrance to it having two pairs of doors, one pair of which must be securely closed before the other is opened. Cold air currents prevent perfect annealing and the glass upon the pans is liable to crack. An insufficient heat does not prop¬ erly anneal and an excess of heat is liable to melt the forms out of shape so that much skill and care is required in regulating the temperature. The circular lear is considered an improvement upon the straight one but it takes up considerably more space. The anneal¬ ing principles are the same but instead of a series of pans linked up one at a time and drawn away from the fire in a straight line, the circular plan provides two continuous tables — no intersections — flanged at the sides and moving free from each other, for slow and quick annealing, upon a tramway principle. Cogwheels underneath turned from a windlass rotate the separate tables past the fire-boxes as required.

The mouth of the lear and the kiln should be near to the furnace where the glass is made and the glass should be as hot as possible — so that it is below melting heat — when placed inside.

A precautionary measure is sometimes taken when the place in the furnace at which the glass

is made is some distance from the annealing oven of keeping up the heat in transit by hold¬ ing hot metal near the part of the glass most likely to be affected; usually where the iron pontil has been attached.

John A. Service.

GLASS MANUFACTURING IN AMER- ICA. A glass-house built near Jamestown in 1608, the year after Virginia was founded, was the first

factory in the English colonies in America. In that year eight Poles and Ger¬ mans were brought there to make ashes, soap, pitch, tar and glass. From ashes were obtained lye for making soap and potash for fluxing glass. Some glass shipped to England in 1608 or 1609 was among the first exports of the colony. Interfered with by the craze for rais¬ ing tobacco, the manufacture of glass was sus¬ pended about 1615. In 1621 another glass¬ house was erected in which Italians made beads for trade with Indians. One or both glass¬ houses were destroyed in the massacre by Indians in 1622. The next glass works in Virginia of which there is a record were at Alexandria, where 10,000 pounds were manu¬ factured in 1787. Works established at Wells- burg, Va. (now West Virginia), in 1815, were probably the works in Brooke County reported by census as making $20,000 worth of glass in 1820. At the tariff convention, held in New Yoik city in 1831, two flint glass furnaces were reported in operation at Wellsburg and one at Wheeling, also two window glass works at Wheeling.

built in Salem about 1639. To encourage the enterprise the General Court in 1641 author¬ ized the town to lend the proprietors £30. Glass was manufactured there for perhaps 20 years or longer. The General Court of Massachusetts in 1752 granted to Isaac C. Winslow and others the exclusive privilege of making glass in the colony and they probably built a glass¬ house at Boston which was in operation until shortly before the Revolution. The legisla¬ ture, in 1787, granted to Messrs. Whalley, Hun- newell and others a charter, which conferred on them exclusively the right to manufacture glass in Massachusetts for 15 years, and fixed the penalty for infringement' at $500. The capital stock was exempted from taxation and he workmen from military duty. Furthermore, the State paid a bounty on the product, to off¬ set a bounty on glass exports paid by England, under this charter, the manufacture of crown window glass was begun, in 1792, and about

ater the Production amounted to $82,000 per annum The glass, known through¬ out the United States as "Boston window glass was said to be superior to any imported, ihis State-aided enterprise, incorporated in 1809 as the Boston Crown Glass Company, is said to have been the first successful glass works in

MVim0Untry' Works established in 1802 at Middlesex, now a part of Lowell, made annu- a ly, about 1820, about 330,000 feet of window

fo $43 uo' C\ at i q ! ? a 1100"f°ot box amounted //Up20- In l8}2 a glass-house was built at

at EastBr?mh abmUu the same time another Cambridge. .The one at South Boston

buih hv Tbng aSSrW°rks in Massachusetts, was

and das,Th?n Vkilled batch mixer

and glass blower, who had been employed by

the Boston Crown Glass Company. After the W ar of 1812 the business failed. The works at East Cambridge were built by the Porcelain and Glass Manufacturing Company, which em¬ ployed glass workers from Europe. Unsuc¬ cessful in business, the company leased the plant to a firm of workmen, Emmet, Fisher and Flowers. They failed to agree, and, in 1817, the business was sold at auction to the New England Glass Company, which was very suc¬ cessful. In 1823 the weekly production was 22,400 pounds of glass vessels, many of which were equal to the product of the best English flint houses, and some of which were beautifully cut. A plant established at Sandwich, Mass., in 1825, introduced, in 1827, the making of pressed glass. Until then all glass had been either blown or cast. The shaping of glass by ‘ molds made possible the production at low cost of many articles of the same pattern.

Glass was made in New York State under both the Dutch and English regimes, but plants established before 1850 were not permanent. A plant started at Brooklyn, in 1754, existed only a short time. In 1785 Leonard De Neuf- ville and associates, proprietors of a plant at Dowesborough, 10 miles from Albany, applied to the legislature for aid. They gave as a rea¬ son that $150,000 a year was sent abroad for glass. The legislature, in 1793, voted a loan of $3,000 for eight years, free of interest for three years and at 5 per cent for five years. By this time ownership of the works had passed from the De Neufville family to McCallen, McGregor & Company, who con¬ ducted the business successfully, but, in 1815, the works closed for lack of fuel. The South Ferry Flint Glass Company, established in 1823 at Brooklyn, had the reputation, of making the finest flint glass made in the United States, and at the London Exhibition, in 1851, was awarded a medal.

In the first tariff iaw of the United States, enacted in 1789, Congress levied a duty of 10 per cent on various kinds of glass. Congress was petitioned, in 1790, to aid the glass works of John Frederick Amelung at New Bremen, Md. The committee of the House of Represen¬ tatives to whom the petition was referred re¬ ported in favor of a loan of $8,000, security to be furnished, but the report was not adopted. In the debate the statement was

made that Amelung had expended $200,000 on a plant be¬ gun in 1775. Some of the representatives con¬ sidered that such a petition could be presented to the State more properly than to the Federal government, others objected to the loan on ac¬ count of the precedent it would establish and others doubted the power of Congress to grant such a loan. About this time the Baltimore Glass Works began making window glass. Be¬ tween 1760 and 1765, a German named Wister built a glass-house near Allowaystown, N. J. On his failure, at the beginning of the Revolu¬ tion, the workmen went to Glassborough, N. J., and established a factory, which, still in opera¬ tion, is the oldest glass factory in the United States. Glass works were started at Temple, N. H., in 1780, window glass works at Keene, N. H., in 1814. Glass was made at New Haven, Conn., in 1789, and at Hartford also about that time.

William Penn, in a letter written in 1683, alluded to a tannery, sawmill and glass works in

his colony. In 1769 Henry William Stiegel, a German baron, established at Manheim, near Lancaster, Pa., the largest flint glass factory in the country, in which were produced richly colored bowls and goblets. The first glass works in Philadelphia of which we have a record was a plant for making green bottles and perhaps flint ware, established, in 1771, at Kensington. This plant grew until, in 1831, it was the largest glass works in the United States. It then consisted of four furnaces in which 8,000 pounds of batch were daily melted. In addition to wood and coal, the furnaces con¬ sumed 15,000 barrels of resin brought annually from North Carolina. From 250 to 300 men and boys were employed. The product included bottles and apothecaries' vials, the prices for which when imported were extravagantly high. In 1797 a window glass factory was estab¬ lished at Pittsburgh and another at New Geneva, on the Monongahela River, 90 miles south of Pittsburgh. These were the first glass factories west of the Alleghanies. The former was built by Maj. Isaac Craig and James O'Hara, the latter by Albert Gallatin. The former was probably the first in which coal was the fuel, and as late as 1810 wood was the fuel in all glass plants except those in or near Pittsburgh. Writing in 1803, Craig reported an average weekly production of 30 boxes of 100 feet, be¬ sides bottles and other hollow ware to the value of one-third of the value of the window glass. He wrote that 8X10 sold at $13.50 and 10X12 at $15 a box. In the earlier years of the industry most factories that made window glass made also bottles and other hollow ware. For many years the imports of window glass exceeded the domestic production.

George Robinson, a carpenter, and Edward Ensell, a glassworker from England, commenced to build a flint glass-house in Pittsburgh, but, lacking sufficient capital, tney sold the un¬ finished plant, in 1808, to Thomas

Blakewell and Robert Page who completed it, and' who were the first in the United States success¬ fully to manufacture flint glass. In this plant was produced cut glass not inferior to the best cut glass from Europe. By wagons crossing the mountains, pot clay was hauled from Burl¬ ington, N. J., and pearl ash and red lead from Philadelphia, while saltpetre was brought from the caves of Kentucky. Glassmaking in Ohio began at Cincinnati in 1815. The census of 1820 reported ((glass window and hollow ware, chemical and philosophical apparatus, to the amount of $19,000 manufactured in Hamilton County, also flint and cut glass and window glass manufactured in Muskingum County. The first glass works in Missouri, which made flint glass tumblers and other ware, were started at Saint Louis, in 1842, by a company headed by James B. Eads, who later built the Mississippi River bridge at Saint Louis and the jetties at the mouth of the river. The second glass works in Missouri, started in 1851, made window glass at Saint Louis.

The ingredients of flint glass were the best of sand, pearl ash, refined saltpetre and oxide of lead. What was known later as German flint or lime glass, a much inferior product, was composed of sand, lime, soda ash and nitrate of soda. In 1864 William Leighton, Sr., of Wheeling, conducted experiments with pure sand, lime, bicarbonate of soda and refined

nitrate of soda and produced glass much clearer and more brilliant than any except flint glass. It was called bicarbonate glass at first and lime glass later. The cost for batch was not more than one-third that of a lead batch which it largely supplanted.

An exhibit of pressed glass ware, made by James B. Lyons, of the O'Hara Glass Works at Pittsburgh, received first prize at the Paris Exposition in 1867. At the Centennial Exhibi¬ tion at Philadelphia, in 1876, one of the attrac¬ tions was a complete glass works which showed the processes of melting, blowing, pressing, cut- ting, etching and annealing. The exhibit was made by Gillinder & Sons, of Philadelphia.

Pittsburgh became the centre of the indus¬ try, largely because there was in that vicinity an abundance of coal, which was used as fuel in glass-making from 1796 to late in the next century. In 1875 the Rochester Tumbler Works used natural gas for heating lears and partly for furnace heat. About 1880, when wells had been drilled that promised inexhaustible quan¬ tities, natural gas began to be very extensively used for lear heating and batch melting. It provided a cheap fuel, perfectly adapted to the

industry, and thereafter glass manufacturing greatly developed in western Pennsylvania and West Virginia, and later in the gas regions 9ˆ Ohio, Indiana, Illinois, Missouri, Kansas and Oklahoma. When the supply of natural gas became exhausted many factories closed or moved to new gas fields, but in recent years many factories have begun to use artificial gas produced from coal in the plants, and some are now using oil for fuel. Even in the Pittsburgh district the price of natural gas is now so high that producer gas is used to some extent in glass making. Oil or producer gas is used by all plants east of the Alleghanies. The East¬ ern plants, at a disadvantage regarding natural gas, have the advantage of nearness to the larger markets.

The regenerative furnace, an invention of Siemens, first used for melting glass in 1861, was soon adopted in America. By this method the waste heat from the gases generated by com¬ bustion was utilized for heating, and much fuel was saved, the melting time reduced, the out¬ put increased and the quality of the product improved. Another revolutionary invention for batch melting was the tank. In pot furnaces the batch is melted in separate pots, which are placed around the inside furnace walls, while with tank furnaces the tank occupies the whole furnace area. There are day tanks and con¬ tinuous tanks. The latter enable a plant to work to capacity 24 hours a day. Tanks were introduced into America in 1889, after they had been used in Belgium. During the last 30 years many pot furnaces have been replaced by tank furnaces. The only efficient establishments that now use pots are those that make plate glass, very fine qualities of table ware and other fine goods, or a great diversity of colored glass. Until recent times the making of glass was a handicraft, and many glass articles are still shaped by the breath of a blower. Machinery has been invented and improved chiefly for the manufacture of window glass, plate glass, bottles, table ware and lighting goods.

Crown window glass was made in Massachu¬ setts from 1792 to 1826. A bulb was blown, opened, flared out into a disc, cut into half

circles and then into panes. The cylinder proc¬ ess for making window glass was introduced from Europe after 1830. The cylinders, blown on a blow-pipe, were cracked into lengths, split lengthwise and flattened. The great develop¬ ment in window glass manufacture dates from about 1880, when natural gas began to be largely used. At a window glass factory which he erected at Jeanette, Pa., James Chalmers be¬ gan, in 1889, to use the first continuous tank in this country. The first successful machine for making window glass, constructed under the Axr j rs Paˆen-S> was installed by the American Window Glass Company at Alexandria, Ind., m 1903. In this machine and in other types later invented by Americans, the glass is drawn by a «bait member" from the cfmetal» in the tank, and the*

cylinder is formed by a pressure of air in it controlled by an operator. During the blast of 1915-16 the production of 50-foot Ly an< was 3,708,000 and by machine o,j/3,U(J0, the hand production being about 40 per cent of the total. In 1916 there were in the Umted Stˆes 51 plants, with 1,737 pots, in which window glass was blown by hand, and 25 plants with 296 window machines. The intro¬ duction of machinery led to the production of more window glass than the domestic con¬ sumption, with the result that window glass factories are usually operated only seven or eight months a year. Census figures show that

iqooaV

Under the management of Cuthbert Dixon, a plate glass worker and manufacturer from London, England, rough plate glass was pro- duced in 1852 at Williamsburg, L. I. A window glass factory erected at Cheshire, Mass., in 1850, was changed, in 1852-53, to a rough cast plate factory. A window glass factory erected

atpMn ?x iQˆnaCe' Ma,SS" in 1853' was in¬ verted, in 1855 into a plate glass factory. The

successful establishment of the plate glass in- dustry was chiefly due to James B. Ford of Pittsburgh. In 1869 he visited the works at Lenox and learned what he could from foreign plate glass workers there. Then he started a factory at New Albany, Ind., for which he imported grinding, smoothing and polishing machinery This factory, from which he with- \ru- ln ™as successfully continued by

William C. De Pauw. Ford later built plate g ass factories at Louisville, Ky., Jeffersonville, Ind., Creighton, Pa., and Tarentum, Pa. A plate glass plant was established, in 1872, at Crystal City Mo In 1917 there were nine plate glass P aiut-S ˆ Pennsylvania, two in Missouri and one each m Michigan, Ohio, Indiana and Illinois The

15Jwˆln the United States had 113 furnaces and 2,116 pots. From 1875 to 1915 the price of plate glass decreased about 75 per cent. The first process for manufacturing wire glass suc-

?Q09fu Ly- was pate,nted by Frank Shuman in 18U. Since 1890 there has been successful de¬ velopment m this country in the manufacture

of cathedral, opalescent and art sheet glass, and all kinds of figured, ribbed

and colored glass.

Machines for blowing bottles, at first adapted to wide-mouthed bottles only, were not commercially successful until about 1896. Such machines were operated at first by three skilled men, later by two and now by one. In 1908 there appeared a three-man machine for making narrow-necked bottles; in 1912, a one- man machine for wide-mouth bottles, and, in 1914, a one-man machine for narrow-neck bot¬ tles. The one-man machine automatically cuts off the quantity of molten glass sufficient for each mold. In establishments using machines bottles are blown by hand to fill small orders. From the earliest period of glass blowing until 1903 all glass that was blown was gathered on the end of a. blow-pipe. In that year two revolutionary inventions were commercially in¬ troduced, the bottle-making machine by Michael J. Owens and the flowing device invented by Homer Brooke, both Americans. With only an attendant, who is not a skilled operator, the Owens machine gathers the glass and blows the bottle or jar. When a mechanical con¬ veyor is used, the ware is both made and de¬ livered to the lear without handling. More nearly automatic than any other glass-making machine, its output is much greater. The operating speed of the largest type of Owens machines is indicated by the fact that it pro¬ duces more than 75,000 quart fruit jars in 24 hours. The machine and the revolving tank that supplies it are costly and are used only in factories which produce large quantities of bottles or jars of uniform shape and size. The machines were introduced in Europe and more recently in Japan. By the Brooke device the molten glass flows from the furnace to the mold, the quantity sufficient for each mold being automatically severed. The chief advan¬ tages of the Brooke device are that it dis¬ penses with skilled labor ; it can be operated during the hot months when hand gatherers are not readily obtainable, and by it the output is increased while the cost of production is decreased.

The making of coal-oil from coal led, about 1855, to a demand for lamps and lamp chim¬ neys, the use of which greatly increased, about 1859, when refined petroleum was first mar¬ keted. One of the first plants to make a specialty of lighting goods was started in Brooklyn by Christopher Dorflinger, in 1852, but, in 1865, he moved the business to White Mills, Pa., where he established a large cut- glass factory. Lamps and lamp chimneys are still manufactured in considerable quantities and exported to many countries. Chimneys were at first blown off-hand on blow-pipes. Chimneys, light tumblers and other seamless blown ware are now made in paste-mold ma¬ chines, the seams being removed by turning the ware while hot in molds lined with carbon or similar material. The incandescent lamp was perfected by Edison in 1879 and its manu¬ facture became an important branch of the industry. The bulbs are blown in paste-mold machines. All kinds of lighting goods are now extensively made in the

United States.

The popularity of American made cut glass was established by a splendid display by the

Libby Company in a complete glass-melting and cutting establishment at the World's Fair, Chicago, in 1893. Both pressed ware and deep- cut ware were exported to Europe before the war there began. Laboratory ware was little made in the Lfnited States before the war began in Europe, but since 1914 it has been produced here in quantities sufficient for domestic con¬ sumption and for export. Beakers and flasks equal to Jena ware have been made by one factory in New Jersey since 1900 and by plants in several States since 1914. Photographic glass was first made commercially in the United States in 1911 and the domestic production is now large. Optical glass was made experi¬ mentally in the United States in 1912. As a result of the war, the quantity manufactured here became large, the quality being equal to the best European product.

Even with the extensive use of machinery, labor constitutes the chief single item of ex¬ pense in the manufacture of glass. Of 334 industries reported by the census of manu¬ factures for 1914, glass ranked thirteenth in percentage of labor cost based on the value of the product. A government report, issued in 1917, shows that of the total sales value of the product, the cost of labor in the manu¬ facture of various kinds of glass was 40.6 per cent. The same report shows that of em¬ ployees in glass factories, 2.5 per cent were under 16 years of age and 8.2 per cent women, the latter being more numerous in tableware and lighting goods factories than in plants of other kinds. Hand window-glass blowers receive higher wages than skilled work¬ ers in other branches of the industry, and their working hours are relatively short, union hours being 44 a week. Unskilled workers average about 60 a week. Skilled labor is paid at piece rates, unskilled on a time-rate basis. In manu¬ facturing window glass by hand and also blown and pressed ware, which includes tableware, bar goods, lighting goods and laboratory ware, the labor unions limit the output of workers, which restricts production and increases cost. Some branches of the industry operate only a part of the year, hand window glass only about seven months and machine window-glass plants about eight months, while other branches lose one or more months a year. The reasons are fear of overproduction, inability of men to work around furnaces during the hot months and necessity for repairs.

Accompanying tables show statistically the development of the industry in the United States from 1869 to 1914. While the estimated population increased 19.6 per cent from 1904 to 1914, the value of glass manufactures in¬ creased 54.6 per cent. Of the total value, $123,085,019

in 1914, window glass amounted to $17,495,956; polished plate glass, $4,554,326; pressed and blown ware, $30,279,290 ; bottles and jars, $51,958,728; other products, $4,022,932. In window glass, plate glass, pressed table¬ ware, deep cut ware, lighting goods, laboratory ware and optical goods, the quality of the do¬ mestic product is equal or superior to the best that is imported.

The imports and exports of glass and glass¬ ware during the fiscal year 1879 were respec¬ tively $3,281,543 and $768,644; during the fiscal year 1914, respectively, $8,219,112 and $3,729,623.

The imports were 15.5 per cent of the domestic production, $21,154,571, during the calendar year 1879, and 6.7 per cent of the production, $123,085,019, in 1914. The average rate of duty was 57.6 per cent in 1879 and 33.8 per cent in 1914. Before the war in Europe began the principal glass importations were window glass, plate glass, fine blown tableware, toilet ware, colored ware, optical glass and bottles used as containers. Since the war began im¬ ports have suspended and exports increased many fold. Of the imports in 1914, window glass amounted to $1,316,902, of which over 80 per cent was of the three smaller brackets (384 square inches and under), and plate glass amounted to $489,359, also mostly of the smaller sizes. Practically all of the imports of

GLASS SAND, sand used in glass-making, obtained either from sand deposits or from quartzites by crushing to the requisite degree of fineness. Deposit sand must be washed to free it of impurities. Silica is the chief con¬ stituent. Glass sand is found principally in Pennsylvania and Illinois, about $1,500,000 worth being raised in normal years. Consult Merrill, (Non-Metallic Minerals) (New York 1910) and Ries, (Economic Geology (3d ed. ib. 1910).*

GLASS SNAIL, one of the minute, grass- haunting, hyaline land-snails of the genus Vitrina.

GLASS-SNAKE, or JOINT-SNAKE, a

limbless, snake-like lizard of the genus Ophi-

Glass Industry in the United States. General Statistics, 1869-1914.

(Source: Census of Manufactures).

r— — –

1869

1879

1889

1899

1904

1909

1914

Establishments ....

Capital .

Wage earners .

Salaries and wages . . .

Cost of materials .

Value of products .

) – –

154

$13,826,142

15,367

$7,589,110

5,864,365

18,467,507

169

$18,804,599

24,177

$9,144,100

8,028,621

21,154,571

294

$40,966,850

44,892

$22,118,522

12,140,985

41,051,004

355

$61,423,903

52,818

$29,877,086

16,731,009

56,539,712

399

$89,389,151 63 , 969 $41,228,441 26,145,522 79,607,998

363

$129,288,384 68,911 $44,293,215 32,119,499 92 , 095 , 203

348

$153,925,876

74,502

$55,204,723

46,016,504

123.085,019

Value of Glass Production in the United States, 1879-1914.

(Source: Census of Manufactures).

STATES

1879

1889

1899

1904

1909

- –

1914

Pennsylvania .

$8,720,584

1 suo ion

417 1 70 1 J7

$22,011,130

4,547,083

14,757,883

1,871,795

2,834,398

5,093,822

2,756,978

765,564

$27,671,693

$32,817,936

Ohio .

*V * * 1 I » Vj 1 J /*

$39,797,822

19,191,342

14.881,372

Indiana .

A | V/ I J" | vj Z. v

790,781 748,500 901 , 343 2,810,170 2,420,796 919,827

U | Ox/ | 1 oj

9 QO C /inn

9,026,208

14,358,274

West Virginia .

| -4UV

945,224

1 2 79 mi

14,706,929

11,593,094

Illinois .

4,598,563

7,779,48 3

14,631,171

7,680,343

New Tersey . . .

z , 9 / Z , u 1 1 ˆ 9 1 Q i n

5,619,740

5,047,333

New York. . . .

A (3 | 1 j Z 7 77 7 m r >

6,450, 195

6,961,088

7,597,754

Missouri .

z , / zo , uiy

4,279,766

4,508,790

5,156,714

3,882,420

2,005,736

1,500,982

728,681

690,420

-

Oklahoma .

a v# i o zy

1,781,026

-

1,992,883

-

Maryland .

Kansas .

587,000

1,256,697

557,895

589,589 958 720

1,038,368

2,036,573

681,900

Massachusetts .

254,345

851,905

A2 1 / 12 7

-

418,458

924,706

549.031

All other States .

TTO A , /

1 HAS 2fl7

1 ,011,373

-

J | oV /

2,365,165

3,279,481

5,340,263

United States .

$21,154,571

$41,051,004

$56,539,712

$79,607,998

$92,095,203

$123,085,019

-Included in all other States. – - – -

window and plate glass in recent years have been in localities on or near the Atlantic, Pacific and Gulf coasts. The exports include all kinds of glass and glassware made in America.

An extended account of the development of the industry by Joseph D. Weeks appeared in the census report on manufactures 1880. A report on the industry by the undersigned, published by the Bureau of Foreign and Do¬ mestic Commerce, 1917, contains a bibliography with 500 titles.

Walter B. Palmer,

rormer Special Agent, Bureau of Foreign and Domestic Commerce.

GLASS PAINTING. See Glass Stain¬ ing.

saurus (family Anguida), which takes its name from the brittleness of the tail, which is more than twice the length of the body, and whose vertebrae are so slightly connected, that a part or all of the tail will easily break off, or may be cast off ; but the lost part is quickly renewed, lhe head is very lizard-like. No vestige re¬ mains of limbs except two little spikes near the vent; the body is serpentiform, but the stiff armor of scales prevents the graceful move¬ ments of a serpent. The glass-snake (O. pal- last) of southeastern Europe may exceed a yard in length and dwells in bushy

districts where it can hide under leaves and sand, and catch snails and small animals. A smaller species (CA ventrahs) is found in the Mississippi Val¬ ley and the southern United States. It is

FLINT OR GLASS SPONGES

1, 3, 5, 6, 7 Various forms of glass sponges

2, 4, 9, 10, 11, 12, 13, 14, 15, 16, 17 Specimens of flint or glass spicules which form the skeleton of the animals 8 Cross section of a young sponge

greenish-gray or brownish ; sides largely yel¬ low, with narrow black streaks ; but the color¬ ation varies greatly, especially in western spec¬ imens. Several nearly related species inhabit Central America. These lizards are rapacious and devour great numbers of ground-keeping insects and crayfish. They breed by means of eggs hidden in loose soil or leaves; and are of slow growth. They are said to be easily tamed and to show intelligence.

GLASS-SPONGES, certain silicious sponges are so-called from the fact that the fibres or spicules composing their solid frame¬ work or skeleton is like finely spun glass. The glass-sponges, such as the Venus' flower-basket (Euplectella) and allied forms, live in fine sandy mud in deep water. The Euplectella in¬ habits the ocean around the Philippine Islands in from 10 to 20 fathoms. It forms a hollow cylinder or basket-werk of spicules, enlarging at the top, which is broad and a little convex ; it grows rooted in the sandy mud, anchored by its long glass spikes, which at the extremity end in anchor-like hooks. A number of similar but shorter, more dense sponges (Holtenia , etc.) live at great depths in the Atlantic, one kind occurring in shallower water (100 fath¬ oms) in the Gulf of Maine. The glass-sponge of the Japanese seas is Hyalonema, in which the stem is twisted, composed of fibres, like spun glass, while the body of the sponge is long and slender; it grows nearly three feet in length. These glass-sponges, with the spicules having three crossed axes, or six threads radi¬ ating from a common point, are grouped in a family (Hexactinellidce) . The efferent canals are loosely meshed, while the digestive cham¬ bers (ampuliae) are large and barrel-shaped.

GLASS STAINING AND GLASS PAINTING, the art of producing pictures on glass with vitrifiable colors ; but a common ex¬ tension of the meaning is to include all the make and design of ornamental glass windows. Originally there was but one method of mak¬ ing these, and that was to

produce the pattern in outline with frames, into the grooves of which pieces of colored glass or of stained glass were fitted. In the Moslem East these frames were of plaster, or rarely of marble slabs pierced with openings. In Europe, since the 12th century, these frames have been of lead, rolled or drawn into what are called carries, that is, bars of an I section, the two grooves holding the glass firmly. Modern chemistry has so improved the art of glass stain¬ ing that large pictures may now be produced on single sheets of glass, but nowhere have such pictures been successful in an artistic sense. In the original painted glass windows the pictures resembled tables of mosaic work, in which there was no attempt at shading or modification of the tone. What is perhaps the earliest known application of colored glass to window decora¬ tion, in Europe, is that in the monastery of Tegernsee, in Upper Bavaria, which was secu¬ larized in 1802, and is now a private residence. The windows of this structure, executed in the latter half of the 10th century, like all the first attempts, were only tasteful arrangements of colored glass in a translucent mosaic.

In the early part of the 13th century the mosaic patterns gave way to more elaborate de¬ signs, not only in beautiful arabesques, but

even in pictorial composition. In all these the figures were composed of pieces of colored glass combined with marvelous skill and taste. The work of shading and making so-called half-tints was not attempted; but an effect not dissimilar was got by painting in opaque pig¬ ment upon the glass and breaking up this painted surface into patchings and spots as when an artist draws in crayon or charcoal. The finest English examples of this early mo¬ saic work are to be found in the cathedrals of Canterbury, Salisbury and Lincoln. In the 14th century the art of shading was advanced by re¬ moving certain portions of the colored surface. The first period of the art reached the culmi¬ nating point in the 15th century, but with the passing of Gothic architecture, glass painting lost its artistic spirit. Subjects in which were arranged a multitude of personages with all the elaborate artifices of pictorial composition; buildings showing complex linear perspective; foreshortened figures ; the play of light and shade — all this was attempted to be exhibited in painted windows. It soon became apparent that the true art was lost, and though windows continued to be painted, only a few artists ac¬ quired celebrity. Perhaps the best examples of the 15th century period are the windows of the Cologne Cathedral.

About 1600, Bernhard von Linge, an artist from the Netherlands, residing in England, and who may be considered the father of the mod¬ ern art of glass staining, established a school in London, whose influence is evident in the work of the present day. Francis Eginton (1737-1805), a native of England, accomplished much to restore the art during the 18th cen¬ tury. Among his numerous works, all of which are remarkable for brilliancy of

coloring and delicacy of execution, are (The Banquet of the Queen of Sheba) (a copy from Hamilton) ; two (Resurrections) (from Sir Joshua Rey¬ nolds) ; (Christ Bearing the Cross) (from Morales) ; and (The Soul of a Child) (from Peters). Other famous artists of this period were Jouffrey and Baumgartner. The Renais¬ sance in glass painting was contemporaneous with the revival of Gothic architecture in the beginning of the 19th century. Four German artists, Mohn, Scheinert, Ligm and Frank, were prominent as glass Stainers during the century. In 1850, through the generous assistance of King Louis of Bavaria, a school was founded at Munich under the direction of Gartner and Hess, the latter a well-known historical painter, which obtained a world-wide celebrity. Still, however, the purists in Gothic art, and those who were most concerned in the Gothic revival would have none of this glass of the early 19th century. It was seen that the smooth and clear modern glass would never do ; and rough, partly opaque, flawed and bubbled glass was prepared on purpose. This material, known as ˆantique® and as ((cathedral):> glass, and by other names, allowed of a far more decorative effect.

The chief centres of the art in Europe are at Birmingham, England; Edinburgh, Scot¬ land; Paris and Sevres, France, and Munich, Metz and Nuremberg in Germany.

Not until comparatively late in the 19th cen¬ tury did the art of glass staining obtain a place in the United States. Only a few years ago Americans were seemingly content with im¬ ported windows, or with poor imitations made

here. In both cases the windows were but copies of mediaeval work, seldom equaling the originals, and never showing an advance, either in artistic qualities or improvement of method over the windows of the Middle Ages. Several artists and some makers of church furniture began making fine windows, and to-day largely through their efforts American colored glass windows have become celebrated for their color values and their color relations. John La Farge, Louis C. Tiffany and other American artists in glass painting and glass staining took up the art where the medisevalists stopped, in the study of the inherent properties of the glass, both in their color and texture, in order to ob¬ tain in the glass itself light and shade, through depth and irregularity of color, in union with inequality of surface. In this way they sought to avoid the dullness, opacity and thinness which invariably accompany the use of paint, and are marked characteristics of European glass work. It was an American idea to make glass in lumps and

chip it into flakes, to corru¬ gate it, to blow it into shapes, or to pull molten glass out of shape. By such means the artist has succeeded in obtaining effects in this ob¬ stinate material which were deemed impossible. There was introduced a few years since the use of opalescent glass, the plating of glass over glass and developing the mosaic system, substituting it for glass painting. Churches, houses, hotels and theatres are now decorated by the mosaic stained glass which is largely a product of New York studios. Upward of $5,000,000 are invested in the stained glass in¬ dustry in the United States.

GLASSE, glas, Hannah, English writer. She was the author of (The Art of Cookery5 (1747) a volume which became popular. In the fourth edition (1770) she is described as a habit-maker in Tavistock street, Covent Gar¬ den.

GLASSPORT, Pa., borough of Allegheny County, 10 miles south of Pittsburgh, on the Monongahela River, and on the Pittsburgh and Lake Erie Railroad. It has manufactures of tools, steel hoops, spikes, rivets, glass, foundry products, etc. Coal mining is the principal industry. Pop. (1920) 6,959.

GLASTONBURY, Conn., town in Hart¬ ford County, seven miles southeast of Hart¬ ford, on the Connecticut River. It has manu¬ factures of soap, woolens, paper, silverware and a large trade in tobacco and agricultural produce. Pop. (1920) 5,592.

GLASTONBURY, England, market-town and Borough of Somerset, on the Brue, 25 miles southwest of Bath. Its site was once an island, but now forms a peninsula. It was originally called Inis Vitrin, or Isle of Glassy Water, and later became known as Inis Afalon, or Isle of Apples. It has many interesting his¬ torical features. It is famed for its abbey, which dates back to the year 708, when it was built by the Saxon, Ina, in place of the British monastery founded about 601. The abbey is a ruin, and includes different periods of archi¬ tecture. The ruins of the church, Saint Joseph's Chapel, and the Abbot's Kitchen, are the only buildings extant. There is a legend that Joseph of Arimathea came over to Glastonbury and

founded a church there; moreover, he is stated to have planted a graft from the sacred thorn there. Glastonbury Tor is a hill upon which the last abbot of the monastery suffered capital punishment for ((divers and sundry treasons, 55 in 1539. A lake- village dating back to the Celtic period was uncovered nearly in 1892. Pop. 4,250. Consult Gasquet, Cardinal,

GLAUBERITE, gla'ber-It, a mineral hav- mg the formula N^SO-iCaSOi, and crystallizing in the monoclinic system, usually in tabular forms. It is

commonly pale yellow or gray in color, with a white streak. It has a hardness of from 2.5 to 3, and a specific gravity of from 2.7 to 2.85. Glauberite occurs in connec¬ tion with rock salt in various parts of the world. In the United States is found at Borax Lake, San Bernardino County, Cal., and in tabular crystals in the Rio Verde Valley, Arizona.

GLAUBER'S (glow'berz) SALT, sulphate

of sodium, Na2S04, so called from the German chemist, Glauber, who prepared it in 1658 by distillation of common salt with sulphuric acid, named it ((sal mirabilis,55 identified it with the salt of beneficial mineral water and urged its good qualities. It occurs throughout Europe, especially at Carlsbad and Seidlitz, and in North America, notably at the Great Salt Lake 1T Lffah. It forms oblique prisms which effloresce on the soil or on rocks. These are of a gray or yellow color, earthy, but trans¬ parent and vitreous when newly broken. It is readily soluble in water, and when heated or exposed to the air melts in its water of crystal¬ lization. Its chief use is in the manufacture of glass and sodium carbonate.*

GLAUCHAU, glow'chow, Germany, town of Saxony,, on the Mulde, eight miles north¬ east of Zwickau. It has two ancient churches two castles, a Rathaus, a school of weaving and a technical college. It has extensive textile fac¬ tories, numbers of dyeing establishments and manufactures of timber, paper, brick, machin¬ ery, etc. Pop. 25,155.

• u i J sldSin.' an alkaloid contained

m fhe leaves of Glauciuvn flavuin, a sort of P°PPy- The leaves are macerated with acetic acid; the jmce is pressed out, boiled, filtered and the filtrate is treated with lead nitrate which precipitates lead fumarate. The filtrate is treated with HaS, then the glaucine is pre¬ cipitated with tannin, and the precipitate de¬ composed by chalk. Glaucine crystallizes out of water in small scales, is easily soluble in alcohol and ether and forms crystalline salts.

nnGTL/UCODOT' gla'kd-dot, or GLAUCO-

• arn orthorhombic, grayish, tin-white

mineral of metallic lustre and black streak hardness, 5; specific gravity, 6. Composition: Sulphur, 19.4; arsenic, 45.5; cobalt, 23.8; iron, U.3 It occurs in chlorite slate in the province S ed laSC° ln also in fine crystals in*

.GLAUCOMA, gla-ko'ma, a diseased con¬ dition of the eyeball characterized by a reten¬ tion of the fluids within its cavity. As the fluids accumulate, pressure is exerted on the delicate lining, with resulting injury

or destruc¬ tion of sight. It is due to any causes operating

so as to close the place of exit for the fluids of the inner chamber of the eyes. See Eye.

GLAUCONITE, an amorphous green opaque mineral, like earthy chlorite, with a dull or glistening lustre. It is a hydrous silicate of iron and potassium, variable in composition, but averaging: Silica, 49.3; alumina, 3.6; sesquioxide of iron, 22.7 ; protoxide of iron, 6.3; potash, 8.3, and water, 9.6. Its hardness is 2, and its specific gravity about 2.3. There are two varieties of it ; the one the green earth of cavities in eruptive rocks, the other the green grains in greensand formation. The latter, because of its potash content, is used locally as a fertilizer, along the Atlantic sea¬ board. The amount of potash ranges from 2.2 to 7.9 per cent in ordinary varieties such as occurs extensively in upper Cretaceous and lower Eocene strata of New Jersey, Maryland and Virginia. Occurs also in grains in upper Cambrian sandstone in various parts of the Rocky Mountain region and southward.

*GLAUCOPHANE, gla'ko-fan, a mineral of the amphibole group, crystallizing in the monoclinic system, and closely resembling am¬ phibole in form. It is a silicate of aluminum, sodium, iron and magnesium, with variable proportions of the two latter metals. It is blue or gray in color, translucent with a vitreous lustre, and has a hardness of from 6 to 6.5 and a specific gravity of about 3.1 Glaucophane occurs in certain crystalline and mica schists, and is found associated with mica, garnet, epidote and diallage. * In the United States it occurs chiefly along the Coast Ranges of California.*

GLAUCUS, gla'kus, the name of several personages in Greek legend. (1) A sea-god, who was at first only a fisherman, and whose oracles were highly prized by fishermen, ac¬ cording to the legends. (2) The son of Hip-polochus and grandson of Bellerophon. He as¬ sisted Priam in the Trojan War, and was fool¬ ish enough to exchange his golden armor for the iron suit of Diomed. He displayed much courage, but was killed by Ajax. (3) The son of Sisyphus, king of Corinth, by Merope, daughter of Atlas, and born in Potnia, Boeotia. He wished to make his mares swifter than others, for the purpose of vexing Venus, and Venus inspired the animals with such fury that they tore Glaucus to pieces as he returned from the games which had been celebrated by Adrastus in honor of his father. (4) The son of Minos II, and Pasiphae, smothered in a cask of honey, and miraculously

brought to life, by an herb sent by Polyidus the soothsayer.

GLAZE (ceramic), a vitrified coating which gives to earthenware or porcelain its brilliance and impermeability.

Glazes are of three classes : The glaze proper (Fr. couverte) , a soft glaze (Fr. vernis) and the enamel or opaque glaze (Fr. email). The glaze proper is a silicate of calcium, potassium and aluminum and is composed of feldspar chalk or whiting, kaolin and quartz. It is ap¬ plied either to the clay ware (Chinese) or to the soft burned biscuit (modern) ; the whole piece is then burned to a high temperature (about 1,500° C.). Soft glaze comprises the vast range of earthenware and faience glazes and includes the glazes of bone china and soft porcelain. A soft glaze is either a silicate or a

boro silicate, and the bases employed include the oxides and carbonates of the following ele¬ ments : Lead, zinc, potassium, sodium, calcium, barium, magnesium, and as coloring agents the salts of iron, cobalt, copper, nickel, antimony, chromium and manganese.

The range of temperature is very wide. A simple lead glaze will fuse at 900° C. and a hard glaze for white earthenware may need 1,350° of heat. Enamels are sometimes used over other glazes and sometimes upon the biscuit body. Their essential condition is opacity. Oxide of tin, alumina, calcium phosphate and calcium carbonate are used as opacifiers. The early wares made in Italy, Spain and Holland were of this type. (See Majolica). For con¬ venience of application glazes are ground in water and held in suspension, the article to be glazed being plunged into the liquid. For this reason only insoluble substances can be used, and where it is necessary to introduce alkaline salts and soluble boric acid or borates these are rendered insoluble by being melted with in¬ soluble and readily combined reagents, such as whiting and barium carbonate. This melt is called a ((frit® and the operation of melting is known as ® fritting.® Hence some glazes, mainly of the second class, are called fritted glazes, and glazes which contain no frit are termed "raw® glazes. Fritted glazes are, as a rule, harder and clearer than those which contain no frit except in the case of porcelain glaze (cou¬ verte), which is made from natural substances without frit.

GLAZEBROOK, Richard Tetley, English scientist : b. 18 Sept. 1854. He was educated at Cambridge and was principal of University Col¬ lege, Liverpool, 1898-99, has been director of the National Physical Laboratory from 1899. He has published various scientific textbooks and (Laws and Properties of Matter) ; (Clerk- Maxwell and Modern Physics, } etc.

GLAZIER LAKE, Minn., a body of water south of Lake Itasca, into which it

empties through a swift and permanent stream about six feet wide ; named for Capt. Willard Glazier, who claimed for it a geographical importance as the true source of the Mississippi. Lake Glazier has anˆ area of 255 acres. It is esti¬ mated to be 1,582 feet above the Atlantic, and 3,184 miles from the Gulf of Mexico.

GLEANERS, The. See Glaneuses, Les.

GLEASON, Elliott Perry, American in¬ ventor: b. Westmoreland, N. H., 27 June 1821; d. New York, 26 Sept. 1901. Received a com¬ mon school education; was one of the first to manufacture gas burners; and invented the regulating argand burner and other lighting devices.

GLEASON, Frederick Grant, American musician: b. Middletown, Conn., 17 Dec. 1848. He was a pupil of Dudley Buck at Hartford, Conn., studied also at Leipzig, Berlin and Lon¬ don, became an organist at Hartford, and in 1876 removed to Chicago, where he was active as composer, teacher and musical critic of the Tribune. Among his works are songs, trios, sonatas; the cantatas, (Praise of Harmony, (God Our Delivered and (The Culprit Fay* ; and the operas (Montezuma > and (Otho Visconti. >*

GLEBE, gleb (Lat. <(soil,® ˆclod®) , the land possessed as part of the revenue of an ecclesias-

tical benefice in England or Scotland, often scat¬ tered through the parish. Where there are ara¬ ble lands the glebe must consist of 4 acres; where there is none the parson is entitled to 16 soums of grass next adjacent to the church — a soum of land being as much as will pasture 10 sheep or one cow — so that the actual extent will vary with the richness of the soil. The glebe must be taken as near the manse as possible; and where there is no manse, vicinity to the church is the criterion. In general, the glebe is the subject of much discussion in the ecclesias¬ tical law of both countries. Although the in¬ cumbent is temporarily proprietor, he has no right of alienating the glebe.

. GLEDE, gled, an old British name for a bird of prey, the kite. See Kite.

GLEE, in music, a vocal composition in three or more parts, generally consisting of two or three contrasted movements, the subject of which may be either gay, tender, grave or pathetic. It is distinguished from a madrigal by its want of contrapuntal harmony, and in the independence of its parts it differs from a part-song. It is essentially English in origin and cultivation,

and the period during which its vogue was greatest and its form most perfect extended from 1760 to 1830.

GLEET, glet, chronic urethritis; an ob¬ stinate inflammation of the urethra that follows acute gonorrhoea. The disease is evidenced by the continuation of the purulent discharge, or by a mornmg drop, or by the presence of shreds of mucous membrane appearing in the urine. It may be due to small ulcerated patches, the presence of a stricture, or inflammation con¬ tinuing in the tiny pockets and glands. The cure of the inflammation requires astringent and antiseptic injections usually some form of sil¬ ver, and under some conditions the passage of steel sounds.

GLEICHENBURG, gll'Hen-boorg, Aus¬ tria, a watering-place of Styria, over 1,000 feet above, sea-level, near the frontier of Hungary, 40 miles south of Graz. It contains saline alkali springs which are frequented by thou¬ sands annually, and the waters from which are exported. Pop. 1,500.

GLEIWITZ, gli'wits, Prussia, town in the province of Silesia, on the Klodnitz and Klodnitz Canal, 100 miles southeast of Breslau. It contains a very old church, gymnasium, tech¬ nical and vocational schools, a museum, and its industries consist of iron foundries, boiler and wire works, farm implement works, paper, glass, oil, chemical and pipe works, etc. The town was founded in the 12th century. Pop.

67,000.

GLEN RIDGE, N. J., borough of Essex County, on the Delaware, Lackawanna and Western and the Erie railroads, four miles from Newark. It is the seat of Mountainside Hospital and has a public library. It is a residential suburb of the neighboring great cities of New York, Newark, Jersey City. The borough owns the waterworks. Pop. 3,260.

GLENCOE, glen'ko1, Minn., village and county-seat of McLeod County, on Buffalo Creek, on the Chicago, Milwaukee and Saint Paul Railroad, 51 miles southwest of Minne¬ apolis. Stevens Seminary and Saint Joseph's Academy are located here. It is the centre of

a farming and dairying region, and its indus¬ trial establishments comprise flour mills, grain elevators, foundries and machine shops. The waterworks are the property of the village. Pop. 1,728.

GLENCOE, Scotland, a valley in Argyll¬ shire, running for 10 miles east from Ballachu- lish to Loch Etive. It is famous as the scene of the massacre of the MacDonalds on 13 Feb. 1692. (See Scotland, History). Consult Gil-finnan, George, (The Massacre of Glencoe and the Campbells of Glenlyon)

(Stirling 1913) and Macaulay, T. B., (History of England) (3 vols., New York 1908).

GLEN COVE, N. Y., city of Nassau County, Long Island, 25 miles northeast of Brooklyn, on Long Island Sound and on the Long Island Railroad. It contains a library, public schools and a Friends' Academy. It is mainly a residential suburb of the metropolis and has a few local industries. Pop. 8,664.*

GLENDALE, Cal., city of Los Angeles County, north of Los Angeles. It contains a sanitarium, Carnegie library and a high school. Oranges and olives are grown extensively in the vicinity. The city owns and operates the electric-lighting plant. Pop. (1920) 13,536.

GLENDALE, Battle of, also called THE BATTLE OF CHARLES CITY CROSS¬ ROADS, THE BATTLE OF FRAZIER'S FARM, and THE BATTLE OF WHITE OAK SWAMP. The battle of Gaines' Mill f'uf?ht on 27 June 1862. That night the Fifth corps and its _ supports crossed to the south side of the Chickahominy and destroyed the bridges, and the withdrawal of the Army of the Potomac to James River began. The battles of Allen's Farm and Savage Station were fought on the 29th, and on the morning of the 30th the Union army was across White Oak Swamp Creek, covering the roads leading to James River and the immense trains on their way to Malvern Hill and Harrison's Landing. Franklin, on the right, with Smith's division of his f own corps, Richardson's division of Sum¬ ner s and Nagle's brigade of Keyes' corps was at the bridge crossing of White Oak Swamp Creek. About two miles to the left holding the intersection of the Charles City! Darby town and New Market roads, thus cover¬ ing the Quaker road over which the trains must pass, was Sumner, with Sedgwick's division of his own corps, Heintzelman's two divisions of Hooker and Kearny, Slocum's division of Franklins corps, and McCall's division Slo- cum on the right of Sumner's line, was on the Charles City road, about a mile in advance of the junction with the New Market and Quaker roads ; Kearny was on Slocum's left between the Charles City and New Market roads; Mc¬ Call was on Kearny's left, and Hooker to the eft and rear of McCall ; Sedgwick was in sup- P?r t(? McCall, but during the forenoon, two of his brigades were sent to Franklin. Porter's and Keyes corps were at or on the way to MaWern Hill After making these dispositions McClellan left the field.*

General Lee's plan contemplated that Jack- son shoud force a passage at the bridge held ˆy Franklin, turn his right and reach the Union rear; Holmes to attack and turn the Union

*t *. . P.revent its reaching James River, while the divisions*

Huger, supported by Magruder, concentrating at the cross-roads, should cut McClellan's army in two and interrupt its retreat to the river. Early on the morning of the 30th Jackson ad¬ vanced through Savage Station on Franklin, who opened upon him furiously with artillery and checked him. It was a great disappoint¬ ment to Lee, and Jackson's want of enterprise on this occasion has been the subject of much criticism. Holmes advanced on the Confeder¬ ate right with 6,000 men and 6 batteries, to¬ ward Malvern Hill, and was attacked by War¬ ren's brigade of 1,500 men and 36 guns. The gunboats in the river opened upon him and he fell back in disorder, and called for help. Hu¬ ger led the advance down the Charles City road. In an effort to determine the Union position and to protect his own flanks, his division be¬ came scattered, and he devoted the remainder of the day to reconnoitering and an almost harmless artillery duel with Slocum. While this division of 9,000 men frittered away the day, Longstreet and A. P. Hill were maintain¬ ing a furious contest.

Longstreet and A. P. Hill moved on the Darbytown road. Longstreet, in advance, at noon, came upon McCall's pickets on the Fra¬ zier farm, where he formed line and at 3 p.m., closely supported by A. P. Hill, attacked Mc¬ Call, forced back his left brigade (Seymour's) after a hard struggle, and captured several guns. Hooker, with Grover's brigade, fell upon the flank of Longstreet's right brigade (Kemp¬ er's). Sumner's artillery, covering the opening between McCall and Hooker, opened fire, and Kemper was swept back just as Branch's and Pickett's brigades were advancing to his sup¬ port. These in turn were checked, but kept up a stubborn fight until nightfall, when they were joined by Pender's and Archer's brigades of Hill's division, and held the ground from which Seymour had been driven. Wilcox's brigade, which had advanced on Pickett's left, captured Randol's and Cooper's batteries after a very obstinate fight, but was forced back by a coun¬ ter-attack, and Cooper's battery was retaken. Field's brigade, coming to Wilcox's support, forced back Meade's brigade and captured some guns, but Meade rallied and drove it back. Far¬ ther on the Confederate left Pryor's and Feath- erston's brigades, attacked Kearny's left and were several times repulsed. Slocum assisted Kearny with his New Jersey brigade, and Featherston's brigade being thrown into some disorder, Gregg's South Carolina brigade was sent to that part of the field. Late in the day Caldwell's brigade of Richardson's division moved from Franklin's position and reinforced Kearny's left. Two regiments only got into line and fired a volley. The engagement was about

over, and darkness came with Kearny's line intact. Only one division, McCall's, had lost any ground during the day, and it lost its commander who was taken prisoner at the close of the engagement, and 14 guns. The Union troops had resisted three separate attacks on flank and rear, and under cover of their splen¬ did fighting, involving great losses on both sides, the immense supply trains and the reserve artillery reached Malvern Hill at four o'clock in the afternoon. During the night the Union army fell back to Malvern Hill. Consult (Official Records5 (Vol. XI) ; Allan, 'History of the Army of Northern Virginia5; 'McClel¬

lan's Own Story5 ; Webb, 'The Peninsula5 ; The Century Company's 'Battles and Leaders of the Civil War5 (Vol. II).

E. A. Carman.

GLENDIVE, Mont., village and county- seat of Dawson County, on the Yellowstone River and on the Northern Pacific Railroad. It is the centre of a stock-raising and agricul¬ tural region and has railroad repair shops. There are deposits of lignite nearby. The vil¬ lage has three hospitals and a poor farm. The electric-lighting and water plants are the prop¬ erty of the village. Pop. (1920) 3,816.

GLENDOWER, Owen, Welsh chief, a descendant of Llewellyn and an opponent of Henry IV: b. about, 1359; d. about, 1416. Be¬ ing wronged by Lord Grey of Ruthin, he re¬ belled, and assumed the title of Prince of Wales. For over 15 years he maintained an unequal contest, allying himself with the Percies, Ireland, Scotland and France. He captured Grey and Mortimer, but refused to accept pardon from Henry, though his wife and daughter had been made prisoners. Con¬ sult Bradley, 'Ov.en Glyndwr: The Last Strug¬ gle for Welsh Independence5 (New' York

1901).

GLENELG, Charles Grant, Baron, Brit¬ ish statesman: b. Kidderpore, India, 1778; d. Cannes 1866. He was educated at Magdalen College, Cambridge, England, and was called to the war in 1807. He entered the House of Commons in 1811, and from 1813 held a succes¬ sion of portfolios, among them that of Secre¬ tary for War and the Colonies (1835-39), on the assumption of which he was created Baron Glenelg.

GLENELG, a river in the province of Victoria, Australia, about 260 miles long. It crosses into South Australia and debouches into Discovery Bay. It is very shallow and during the rainy season is subject to floods.

GLENN, John Mark, director of the Rus¬ sell Sage Foundation : b. Baltimore, Md., 28 Oct. 1858. In 1879 he was graduated at Wash¬ ington

and Lee University; studied at Johns Hopkins in 1879-80 and in 1882 received the degree of LL.B. from the University of Mary¬ land. In the same year he was admitted to the bar. From 1898 to 1907 he was a member of the supervisors of city charities of Baltimore, acting as president in 1904-07. In 1907 he be¬ came general director of the Russell Sage Foundation of $10,000,000 for the betterment of social and living conditions. In 1901 he was president of the National Conference of Chari¬ ties and Correction.

GLENNON, John Joseph, American Catholic archbishop: b. Kinnegad, Westmeath, Ireland, 14 June 1862. He was educated at Mullingar, and at All Hallows College, Dublin. He was ordained to the priesthood in 1884 and from 1884 to 1887 was assistant pastor of Saint Patrick's, Kansas City, Mo.; from 1887 to 1892 he was pastor of the cathedral there. In 1892-94 he was vicar-general of the diocese and in 1894-95 was administrator. He was ap¬ pointed coadjutor bishop of Kansas- City, with right of succession, and consecrated titular bishop of Pinara, 29 June 1896. On 27 April 1903 he became coadjutor archbishop of Saint Louis and on 13 October following became

archbishop. He is the foremost orator among the Catholic hierarchy of America, since the demise of Archbishop Ryan of Philadelphia.

GLENS FALLS, N. Y., city in Warren County on the Hudson River, Glens Falls Feeder to Champlain Canal and the Delaware and Hudson Railroad and Hudson Valley Trol¬ ley System (running from Warrensburg to Troy) ; about 56 miles north from Albany, 50 miles from Troy, 18 miles from Saratoga and 9 miles from Lake George. The river at this point has a descent of about 60 feet with a suc¬ cession of falls and rapids. Cooper in (Tbe Last of the Mohicans) has celebrated the falls at this place and the famous cave which lies under the limestone formation at this point. This cave cannot be seen at high water in the spring and fall; at other times it is accessible to any tourist who wishes to visit this quasi- historical spot. Glens Falls is in an agricul¬ tural region ; in the vicinity of the river are ex¬ tensive limestone and black marble quarries which have been worked for more than half a century. At the falls are located some of the largest, most extensive, and costly paper mills in the world, as well as various other manufac¬ tories. The chief manufactures of the city are paper, pulp, wall paper, Portland cement, lime, lumber, collars, cuffs, shirts, ladies' shirt waists, flour, laths, Joubert & White buckboards, lan¬ terns, machinery and foundry products, ale brewing, brick (ordinary and artificial), paper

boxes, cigars, confectionery, gold and silver re¬ fining and various minor enterprises. In 1914 there were in operation 82 establishments, em¬ ploying 2,933 persons, and with a capital of $9,732,000. In the same year salaries and wages to the amount of $1,571,000 were paid. The value of the products was $6,535,000, pro¬ duced from materials costing $3,541,000. Twelve miles above Glens Falls is situated the great Spier Falls dam across the Hudson, built by the Hudson River Water Power Company, supplying electric light and power along the Hudson and Mohawk valleys as far south as Albany and west to Utica. Glens Falls has several miles of paved streets, a paid fire de¬ partment, police and all modern municipal equipments. The city owns its own water¬ works system. Glens Falls has an excellent union school system and its high school build¬ ing completed in 1906 cost over $120,000. It has also Saint Mary's and Glens Falls academies, Crandall Free Library, Parks' Hospital, Glens Falls Hospital, Glens Falls Home for Aged Women and the Crandall Park. There are many fine buildings, including the home office building of the Glens Falls Insurance Com¬ pany, the State Armory of Company K, 2d Regiment, N. Y. M., the Ordway Memorial Y. M. C. A. Building, the Village Hall (costing $60,000), and the Empire Theatre Building. There are churches comprising all the leading denominations. Glens Falls has several na¬ tional banks and a trust company with a com¬ bined capital of over half a million dollars. Glens Falls is situated on the Great War Trail leading from Lake George to Albany. Just outside the city limits at the Half-Way Brook was -located throughout the French and Indian War and the Revolutionary War a fortified post. A tablet was erected in 1905 by the New York State Historical Association commemorating the two massacres which oc¬

curred at that spot during this period, also the encampment there of General Riedesel with Burgoyne's forces while on their way to Sara¬ toga. Glens Falls was settled in 1763; incor¬ porated in 1837 and again in 1874 and 1887. In 1864 the village was practically destroyed by fire. In 1884 and also in "'902 it was visited bv disastrous conflagrations entailing a loss of hundreds of thousands of dollars. Pop. 16,591.

GLENWOOD, Iowa, city and county-seat of Mills County, 20 miles from Council Bluffs, on the Chicago, Burlington and Quincy Rail¬ road. The State Institution for Feeble-Minded Children is located here. The chief industries, in addition to corn and live-stock raising, in¬ clude fruit-growing, farming, granite working and vegetable canning. It has a city hall, court¬ house, public library, city park and several churches. Pop. (1920) 3,862.

GLENWOOD SPRINGS, Colo., city and county-seat of Garfield County, southwest of Denver, on the Denver and Rio Grande and other railroads, and on Grand River. It has several hot springs and is a popular health

resort. Cattle-raising, fruit culture and coal¬ mining are extensively carried on in the sur¬ rounding region. Pop. 2,019.

GLIDDON, George Robbins, American archaeologist: b. Devonshire, England, 1809; d. Panama, Colombia, 1857. He succeeded his father as United States consul at Alexandria, and was for a long time engaged in archaeolog¬ ical researches in Egypt and the Levant. Later he came to the United States and lectured in many cities on Oriental archaeology, and was ap¬ pointed agent for the Honduras Interoceanic Railroad Company. His principal works in¬ clude (Appeal to the Antiquaries of Europe on the Destruction of the Monuments of Egypt) (1841); discourses on Egyptian Archaeology) (1841); (Otia dgyptica^ (1849); (Ancient bffyptd ; (Types of Mankind, or Ethnological Researches Based upon the Ancient Monuments, Paintings, Sculptures and Crania of Races, > etc!

GLINKA, glen'ka, Mikhail Ivanovitch,

Russian composer: b. Novospaskoi, 1 June 1803; d. Berlin, 15 Feb. 1857. He came of an aristo¬ cratic family and received an education befitting his rank. His musical education was conducted successively by Bohm, Carl Mayer, Field and Dehn. In 1836 his opera (Life for the Tsar) was presented with success at Saint Petersburg He was regarded as the founder of Russian na¬ tional opera and forerunner of Tschaikowsky and was appointed director of the imperial Opera and Kapellmeister to the tsar. A sec- ond operatic . work, (Russian and Ludmilla) (1842), was inferior. His orchestral arrange¬ ments of Russian dances became well known in foreign countries. He gave a series of concerts m. Pans in 1844 and from 1844 to 1847 he sojourned in Spain and wrote two overtures: (Jota Aragonesa) and fParD isam .

GLISAN, glis'an, Rodney, American physi¬ cian : b. Linganore, Md., 29 Jan. 1827; d. 1890. He was graduated from the medical depart¬ ment of the University of Maryland (Bal¬ timore) in 1849, was assistant surgeon, United States army, in 1850-60, afterward practised medicine in Portland, Ore., and in 1881 was a delegate to the Seventh International Medical Congress. His writings include a < Journal of Army Life) (1874) ; (Two Years in Europe)

(1887).

GLOAG, Paton James, Scottish clergyman: b. Perth, 1823; d. 1906. He was educated at Perth Academy and the universities of Edin¬ burgh and

Saint Andrews. He became minister at Dunning in 1848, removing to Blantyre in 1860. From 1871 to 1892 he was minister of Galashiels, when he removed to Edinburgh. He is the author of several translations of Ger¬ man works on the Bible and of (Assurances of Salvation) (1853) ; (Exegetical Studies) (1884) ; < Introduction to the Johannine Writings) (1891); (Subjects and Modes of Baptism5 (1891) ; (Life of Saint John5 (1892). Consult biography by his wife (London 1908).

GLOBE, Ariz., city and county-seat of Gila County, north of Tucson, on the Arizona Eastern Railroad. Here is situated the famed Roosevelt Reservoir which cost over $8,000,000. The Old Dominion Library is also a centre of interest. Copper mining and smelting, silver and gold mining are the chief industries. The water supply system is owned by the city. Globe was settled in 1873. Pop. 7,083.

GLOBE, a sphere, a round solid body, generated by the revolution of a semi-circle about its diameter. Globe, or artificial globe, in geography and astronomy, is more particularly used of a sphere made of metal, plaster or pasteboard, on the surface of which is drawn a map or representation of either the heavens or the earth, the former being called a celestial and the latter a terrestial globe. The oldest example of a terrestrial globe known is that constructed at Nuremberg in 1492. One of the earliest to contain both hemispheres is that in the New York Public Library, and is of date

1506-07.

The celestial globe is intended as a represen¬ tation of the heavens, on which the stars are marked according to their several situations. The terrestrial globe is an artificial represen¬ tation of the earth, exhibiting its great divi¬ sions. The axis of the earth is an imaginary line passing through its centre, and the wire on which the artificial globe turns represents this line. The poles of the earth are the ex¬ tremities of this axis. The brazen meridian is the circle in which the artificial globe turns, divided into 360 degrees. A degree of a great circle in the heavens is a space nearly equal to twice the apparent diameter of the sun, or to twice that of the moon when considerably elevated above the horizon. A degree on the equator of a terrestrial globe represents 60 geographical miles or 69.2 English miles.

Great circles, such as the equator, ecliptic and the colures, divide the globe into two equal parts; small circles, as the tropics, polar circles, parallels of latitude, etc., divide the globe into two unequal parts. Meridians, or lines of longitude, are semi-circles cutting the equator at right angles. In English maps and globes

the first meridian is a great circle supposed to pass through the Royal

Observatory at Green¬ wich. The equator, when referred to the heavens, is called the equinoctial, because when the sun appears in it the days and nights are equal all over the world. The declination of the sun, stars and planets is counted from the equinoctial north and south. The ecliptic is a great circle in which the sun makes his ap¬ parent annual progress among the fixed stars; it is the real path of the earth around the sun. The zodiac on the celestial globe is a space which extends about 8 degrees on either side of the ecliptic. Within this belt the motions of the planets are performed. The ecliptic and zodiac are divided into 12 equal parts called signs, each containing 30 degrees ; and the sun makes his apparent annual progress through the ecliptic at the rate of nearly a degree in a day. The colures are two great circles of the celestial sphere, one of which passes through the celestial poles and the equinoxes, and the other through the solstices and the celestial poles. The tropics are two smaller circles, each 23° 28′ from the equator, with which they are parallel ; the northern is called the tropic of Cancer, the southern the tropic of Capricorn. The polar circles are two small circles parallel to the equinoctial, at the distance of 66° 32′ from it, and 23° 28′ from the poles.

Horizon when applied to the earth is either apparent or real. The sensible or visible hori¬ zon is the circle which bounds our view, where the sky appears to touch the earth or sea. It extends only a few miles. The real or true horizon is an imaginary plane passing through the centre of the earth parallel to the sensible horizon. The wooden horizon circumscribing the artificial globe represents the true horizon on the earth ; it is divided into several con¬ centric circles arranged in the following order: One containing the 32 points of the compass divided into half and quarter points; another with the 12 signs of the zodiac, with figure and character of each sign ; and another having the days of the month answering to each degree of the sun's place in the ecliptic, and the 12 calendar months. The cardinal points of the ecliptic are the equinoctial and the solstitial points, which mark out the four seasons of the year.

The zenith is a point in the heavens exactly overhead and is the superior pole of our hori¬ zon. The nadir is a point in the heavens exactly under our feet, being the inferior pole of our horizon, and the zenith or superior pole of the horizon of our antipodes.

The pole of any circle is a point on the surface of the globe 90 degrees distant from every part of the circle. Thus the poles of the world are 90 degrees from every part of the equator; the poles of the ecliptic (on the celes¬ tial globe) are 90 degrees from every part of the ecliptic, and 23° 28′ from the poles of the equinoctial. The equinoctial points are in the signs of Aries and Libra, where the ecliptic cuts the equinoctial. The vernal equinox is called the first point of Aries, and the autumnal the first point of

Libra. When the sun is in either of these points the days and nights on every part of the globe are equal to each other. The solstitial points are in Cancer and Capricorn. When the sun enters Cancer it is the longest day to all the inhabitants north of the equator, and

the shortest day to those on the south side. When the sun enters Capricorn it is the shortest day to those who live in north latitude, and the longest day to those who live in south lati¬ tude. The latitude of a place on the terrestrial globe, or its distance from the equator in de¬ grees and minutes, or geographical miles, is reckoned on the brass meridian from the equator toward the pole. The quadrant of alti¬ tude is a thin piece of brass divided upward from 0 to 90 degrees, downward from 0 to 18 degrees ; when used it is generally screwed to the brass meridian. The upper divisions de¬ termine the distances of places on the earth, the distances of the celestial bodies, their lati¬ tudes, etc. ; and the lower divisions are applied to finding the beginning, the end and duration of twilight. The longitude of a place on the terrestrial globe is the distance of the meridian of that place from the prime meridian, reckoned in degrees and parts of a degree, on the equator. Longitude is either east or west, according as a place is east or west of the prime meridian. No place can have more than 180 degrees, or half the circumference of the globe. Hour circles are the same as meridians. The brass meridian and these circles always correspond.

GLOBE-FISH, or SEA-HEDGEHOG,

a plectognathous fish of the family Tetraodon- tidcE, examples of which are found on all the warmer coasts of the world, especially within the tropics. Ordinarily they are oval, spinose, small-finned fishes, which nibble the barnacles and crush the small crustaceans and mollusks near shore, with the rodent-like teeth which give them the name "rabbit-fishes® in the West Indies. The moment any danger threatens they suck air or water into a large bladder-like ex¬ pansion of the abdomen and distend the scale¬ less skin until they are as round as a ball, all the spines are rigid, and they rise and float at the surface belly upward, — a difficult and dis¬ agreeable mouthful; this odd method of self- defense has given them the names "bellows- fish® among English, and "tambor® among Spanish fishermen. Some tropical species are a foot or so in length, but those familiar as "puffers® or "swell-fish® along the coast of the eastern United States are much smaller and serviceable only as comical additions to an aquarium. The flesh of all is poor, and of the hundred species known many are poisonous. The Tetrodon fahaka is well known to travel¬ ers on the Nile.

The two genera are Lago- cephalus and Spheroides, the latter containing the familiar northern puffers. Compare Diodon.

GLOBE TAVERN, Battle of. On 17 Aug. 1864 General Grant, then investing Petersburg, directed that Warren's Fifth corps and some cavalry be sent to destroy as much as possible of the Weldon Railroad and make such a dem¬ onstration on Lee's right as would force him to withdraw a portion of his troops from the Shenandoah Valley, so that Sheridan might strike a blow at the rest of them. Warren was instructed to move at four o'clock on the morn¬ ing of the 18th and make a lodgment upon the railroad two miles south of the Vaughan road, and destroy it as far south as possible. A brigade of cavalry under Colonel Spear was at¬ tached to his command. Warren moved as

directed, drove back Dearing's Confederate cav¬ alry brigade, and took possession of the rail¬ road at Globe Tavern, about three miles south of Petersburg. Griffin's division was formed along the road and began its destruction. Ayres' division moved up the road a mile or more beyond Griffin and Crawford moved up on Ayres' right. About 2 p.m. General Heth, with two brigades, moved out of the Confeder¬ ate works, made a sudden attack upon Ayres' left and drove it back; Ayres rallied and re¬ took the lost ground The Union loss was 544 killed and wounded and 392 missing. On the morning of the 19th Bragg's brigade was sent to the right of Crawford to support him and establish connection by a skirmish-line with the Ninth corps, and Willcox's and White's divi¬ sions of the Ninth corps were ordered to War¬ ren's support. The woods were so dense and the roads so intricate that Bragg failed to es¬ tablish a proper line, and before it could be connected and completed it was broken. A. P. Hill with Heth's two brigades, Mahone's three brigades, Fitzhugh Lee's cavalry and Pegram's batteries, moved to the Vaughan road inter¬ section. At 4:30 p.m. Mahone, in column of fours, broke through Bragg's skirmish-line, faced to the right, and sweeping forward dis¬ persed Crawford's division and the right of Ayres ; at the same time Heth opened on Ayres' centre and left. Warren rallied the broken parts of his line and, advancing, re¬ gained the lost ground, taking some prisoners. Willcox's division engaged Colquitt's brigade, drove it back and captured some prisoners; and Mahone's entire command fell back rapidly in J^reat confusion to their entrenchments, "carrying with them the parts of Warren's command disorganized by the attack on their rear in the woods, and a large portion of the pickets.® Heth made repeated attempts to drive Ayres back but failed. Warren's casualties for the day were 382 killed and wounded and 2,518 missing. On the 20th Warren selected a posi¬ tion on the railroad a mile or two in rear of his line of battle of the 19th, chiefly on open ground, and entrenched. On the morning of the 21st A. P. Hill, with his own corps, part of Hoke's . division, with Lee's cavalry, attacked his position, opening with 30 guns on

his front and right flank, and at 10 o'clock made an as¬ sault, which was repulsed. Later Mahone at¬ tempted an assault on Warren's left, but the artillery fire broke his ranks before they came under musketry fire, and Warren, making an advance, captured 517 officers and men and six flags. Warren's loss was 301 killed, wounded and missing. , No further attempts were made upon Warren's position, and the entrenchments were extended by the Ninth corps from the Jerusalem plank-road to unite with Warren's on the Weldon Railroad. The Union troops engaged 18-21 August numbered about 20,000; the loss was 251 killed, 1,148 wounded and 2,-879 captured or missing. The Confederates engaged numbered about 14,800; the number of their killed and wounded is estimated at 1,200. Consult (Official Records) (Vol. XLII) ; Humphreys, (The Virginia Campaign of 1864 and 1865 } ; Powell, (The Fifth Army Corps) ; Walker, (The Second Army Corps,) and bat¬ tles and Leaders of the Civil War* (Vol. IV).

E. A. Carman,

GLOBE THEATRE, the theatre in South¬ wark of which Shakespeare was a shareholder, and in which many of his plays were acted, as were those of Beaumont and Fletcher, Ben Jonson, Wassinger and Ford. The original theatre was built in 1599 on a tract of land be¬ tween Maiden Lane (now New Park street) by the Burbage brothers, and what was subse¬ quently called Globe Alley; the site is now occupied by Barclay and Perkins brewery. It was octagonal in shape and accommodated 2,000 persons. A patent was granted for this theatre by James I in 1603. It was destroyed by fire in 1613 during the performance of Shakes¬ peare's (Henry the Eighth. > The accident was caused by the firing of the thatch roof, a can¬ non having been discharged during the per¬ formance, and the wadding shot from the stage pierced the roof. This was in 1613. The thea¬ tre was rebuilt the following year but the new fabric never acquired the fame of the old, and it was destroyed by the Puritans in 1644. In 1644 the structure was demolished t-o make room for dwelling-houses. According to pic¬ tures and descriptions which have survived to the present day the old theatre must have been extremely dingy in the interior and uncomfort¬ able both for the actors and spectators.

GLOBIGERINA, glob-i-je-ri'na, one of the most common of the surface-living or pel¬ agic Foraminifera (q.v.), a shelled protozoan of the class Rhizopoda. The animal is like an amoeba, exceedingly simple, although throwing out a great number of long, slender thread-like pseudopods, with

which it draws in and absorbs minute silicious plants, such as diatoms, etc., which serve as food. Though the animal is so simply organized, the limestone shell which it secretes is composed of several chambers, which are like bubbles, hence the name of the com¬ monest species, — Globigerina bulloides. It lives in countless numbers at the surface of the sea, floating on the top of the water, when the sea is calm, with its root-like arms or tentacles (pseudopodia) radiating from the body. The shell, which is of microscopic size, is perforated with fine openings through which the pseudo¬ pods pass out. After death the shells, when not dissolved, slowly fall or rain down to the bottom of the ocean, and so light and minute are they that it is calculated that it requires about a month for them to reach the bottom in the deeper parts of the ocean.

GLOBULINS, a term applied to one of the forms of proteids (q.v.) of animal or vege¬ table origin. The animal globulins are proteids which are insoluble in water, soluble in dilute salt solution and insoluble in saturated solu¬ tions of sodium chloride and magnesium sul¬ phate. They are coagulated by heat, the tem¬ perature causing the coagulation varying con¬ siderably. Fibrinogen, serum globulin of blood ; paramyosinogen and myosinogen, of muscle, vitellin, found in eggs, crystallin, in the lens of the eye; and lactoglobulin, in milk plas¬ ma, are examples of animal globulins. The plant globulins constitute the most important and abundant natural proteids of plants.

GLOCKENSPIEL, glok'en-shpel', musical instrument first made of a number of bells fas¬ tened on an iron rod, one above the other like a pyramid. The bells were struck with a ham¬ mer. Later evolutions are in the shape of a

lyre with metal bars instead of bells, and metal bars enclosed in a box. The modern nursery toy-piano is a variety of the glocken¬ spiel.

GLOGGNITZ, glok'nits, Austria, market town on the Schwarza, 45 miles southwest of Vienna. It has a picturesque castle, which was formerly a monastery, also cotton and woolen mills, quarries, cabinet works and a large paper factory. Pop. 5,296.

GLOMMEN, the largest river of Norway. It rises in Lake Aursundsjo, 2,300 feet above sea-level, flows southerly to the Skager Rack at Fredrikstad, after a total course of 350 miles. The Vormen is its largest tributary. There are several waterfalls which impede navigation but are promising as sources of hydro-electric power.

GLONOIN. See Nitroglycerin.

GLORIA IN EXCELSIS, the original form of the Latin hymn (Glory be to

God on HighP There are four forms of the Gloria, the Greek, the Spanish, the Roman and English. These opening words are taken from the hymn sung b>y the angels at the Nativity. The origin of this composition is lost in remote antiquity; but was first employed in the Greek Church at Matins. It was introduced into the Roman liturgy by Telesphorus, bishop of Rome, 150 a.d. Pope Symmachus, 500 a.d., is said to have or¬ dered its use at the commencement of the Sun¬ day and holy-day services. The hymn in full is as follows : ((Glory be to God on high, peace on earth, to men of good will. We praise thee, we bless thee, we worship thee, we glorify thee, we give thanks to thee for thy great glory, O Lord God, heavenly King, God the Father Almighty. O Lord, the only begotten Son Jesus Christ; O Lord God, Lamb of God, Son of the Father, that takest away the sins of the world, have mercy upon us. Thou that takest away the sins of the world, have mercy upon us. Thou that takest away the sins of the world, receive our prayer. Thou that sittest at the right hand of God the Father, have mercy upon us. For thou only art holy; thou only art the Lord ; thou only, O Christ, with the Holy Ghost, art most high in the glory of God the Father. Amen.®

GLORIA PATRI, the first words in their original Latin of the doxology sung or said in the services of almost all Christian Churches. It is employed as a refrain at the end of psalms and canticles as well as at other parts of the service. The complete form of the doxology is as follows : ((Glory be to the Father, and to the Son, and to the Holy Ghost. As it was in the beginning, is now, and ever shall be, world without . end. Amen.® The doxology is common at the beginning of service in the Greek Church, and was employed at nocturns in the Western or Roman Catholic Church as early as the 6th century.

GLORIETTA, Battle of, an engagement of the American Civil War, fought at Apache Canon, near Santa Fe, 22 and 28 March 1862. On the first day the contest was indecisive and both sides retired from the field but on the 28th the Confederates were completely routed. Colonel Slough commanded the Federals and Major Pyron the Confederates. Consult John-

son and Buel (eds.), (Battles and Leaders of the Civil War) (New York 1888).

GLOSS (Gr. “tongue®), the explanation of verbal difficulties in a literary work, written at the passages to which they refer. The words which are commonly the subject of these ex¬ planations are those taken without

modification from a foreign language, provincialisms, obso¬ lete and technical words, or such as are used by the author in some exceptional signification. The earliest glosses, as those in Greek, Latin and Hebrew manuscripts, were interlinear; they were afterward placed in the margin, and ex¬ tended finally in some instances to a sort of running commentary on an entire book. In Roman law the word is used also of an ex¬ planation, but the explanation is not merely of a word, but deals with the intent of the law. The glosses on the Justinian code, collected by Accursius in the first half of the 13th century, were held almost as high authority as the code. The term is also employed in Biblical criticism for brief readings which, first marginally added to the text for explanatory purposes, have later become part of the text. "Gloss® or "gloze® is also used in an oblique sense to signify a false or disingenuous interpretation.

GLOSSARY. See Dictionary.

GLOSSITIS, glos-si'tis. Acute glossitis is an inflammatory disease of the tongue due to bites, burns and stings or to tuberculosis or syphilis. It starts in the deeper structure of the tongue, causing it to swell rapidly. The affection is very painful, but is ordinarily cured, if properly treated, in five or six days. Small or large incisions may be necessary. Chronic glossitis is a condition of the tongue, due to persistent use of tobacco, alcohol and spices, in which the surface is reddened, cracked and furrowed.

GLOSS OP, England, market town and borough of Derbyshire, 15 miles southeast of Manchester. It is made up of Old Town, Howard Town and Mill Town. It is an im¬ portant cotton manufacturing centre and has many cotton, woolen and paper mills, dye works and foundries. The chief buildings are Victoria Hall, a grammar school, mechanic's institute, town hall and market house, hospital, etc. Pop. 22,000.

GLOTTIS, the upper end including the opening of the windpipe, which latter constitutes a narrow aperture covered by the epiglottis during the act of holding the breath or swallow¬ ing. The glottis contributes by dilatation and contraction to the modulation of the voice. It is sometimes called the rima glottis, a term more properly limited to the opening of the windpipe. See Larynx.

GLOTTIS, CEdema of the, a dangerous affection characterized by the effusion of serum in the tissues of the entrance and the inside of the larynx, causing an obstructive swelling.

It is due to burns, scalds and the lodgment of foreign bodies; to acute laryngitis or tonsilitis; to tuberculous and cancerous deposits ; and to nephritis, measles, diphtheria, scarlet fever- and erysipelas. The symptoms

which usually de¬ velop rapidly are pain, cough, loss of voice and great difficulty of breathing. This difficulty of breathing, unless relieved, may go on to com¬ plete suffocation. Incision of the parts may

give relief, or tracheotomy or intubation may have to be performed. See Nose and Throat, Diseases of.

GLOUCESTER, glos'ter, England, city, municipal and parliamentary borough of Gloucestershire, on the Severn, 114 miles west northwest of London. Public buildings include the cathedral, the 12th century church of Saint Mary, bishop's palace, shire hall, guild hall, prison, public library, technical schools and public baths. It was originally a Roman camp during the Claudian invasion, and fragments of the walls still remain. Shipbuilding, rail¬ way coach and wagon works, brass and iron foundries, flour and saw mills, roperies and potteries, are the leading industries. An abbey built by Osric in 681 was' refounded in 821 for secular clergy, and in 1022 these gave place to Benedictines, introduced by Canute. In the cathedral are the tomb of Edward II, the monument of Osric, the effigy in Irish oak of Robert, Duke of Normandy, and a modern monument by Floxman. Some of the stained- glass windows are of singular beauty. The episcopal see was founded by Henry VIII in 1541 and in 1836 united with that of Bristol. A monument in the precincts of the cathedral marks the spot where Bishop Hooper was burned. In the civil war the city was un¬ successfully besieged by the Royalists. Trien¬ nial musical festivals are held at Gloucester. Pop. 46,000. Consult Masse, (Victoria His¬ tory of the Counties of England) (London

1907).

GLOUCESTER, Mass., city and port of entry of Essex County, near the extremity of Cape Ann, and on the Boston and Maine Rail¬ road, 32 miles northeast of Boston. It is a popular summer resort and contains the Gilbert Hospital, Home for Aged Fishermen, Huntress Home, the Magnolia, Sawyer and public free libraries and several parks. It is one of the most important fishing ports and fish markets in the world, having over 500 vessels and 6,000 men engaged in the fisheries. Cod, haddock, halibut, herring and mackerel are the principal catches. Besides extensive fisheries, the city has large . manufactures of machinery, hard¬ ware, hosiery, nets, sails, fish-glue, oil, shoes, twine and cigars. Shipbuilding and brass found¬ ing and granite quarrying are also important industries. In 1914 87 establishments were in operation, with invested capital of $7,110,000, giving employment to 3,274 persons, and pay¬ ing in salaries and wages $1,801,000. The materials used were valued at $5,590,000 and were turned into finished products valued at $8,834,000. Numerous vessels have been wrecked in the vicinity of Gloucester. A mas¬ sive rock called Norman's Woe was the

in¬ spiration for Longfellow's famous poem, The city was founded in 1623, principally by. settlers from Gloucester, England, from which it received its name; was incorporated as a town in 1642 ; and became a city in 1874. The city adopted the commission form of government in 1908. The waterworks are operated by the city. It has the oldest Uni- versalist church in the United States, founded in 1770. Pop. 24,398. Consult Babson, J. J., his¬ tory of Gloucester > (Gloucester 1860, supp. 1876) ; Pringle, J. R., (History of the Town and City of Gloucester, 1623-1902 > (ib., n.d.).

GLOUCESTER CITY — GLOVE

GLOUCESTER CITY, N. J., city in Cam¬ den County, on the Delaware River and on the Atlantic City and the West Jersey and Sea¬ shore railroads. The manufactures include calico prints, woolen yarns, gas burners, Smyrna rugs, drills, paper and boats. In 1914 there were 23 establishments in operation, capitalized at $6,110,000, and giving employment to 2,100 persons. Salaries and wages were paid to the amount of $959,000, and materials valued at $3,213,000 were turned into products worth $4,711,000. The city was incorporated in 1868, and is governed by a mayor chosen every two years, and by a unicameral council. It has ferry , connections with Philadelphia, and has electric . lights and street railroads. It was settled in 1677, incorporated in 1868 and is governed by a mayor, chosen biennially, and a council. The waterworks are the property of the municipality. Pop. 0920) 12,162.

GLOUCESTERSHIRE, England, mari¬ time county in the west of England, at the head of the Severn estuary. Its area is 1,259 square miles, comprising three natural divisions — the Hill or Cotswold, the Vale and the Forest. The principal rivers are the Severn, Upper and Lower Avon, Wye and Thames. The orchards are extensive and the county is noted for its excellent butter and cheese. The Forest of Dean and the Bristol coal fields produce millions of. tons . of coal annually. Other minerals are iron, limestone, sandstone, ochre and strontium sulphate. Of manufac¬ tures the most important is that of woolens, in¬ cluding fine broadcloths ; others are silk, gloves, glass, pottery, etc. Pop. 736,000. Con¬ sult Ditchfield, (Memorials of Old Gloucester- shire} (London 1911).

GLOUSTER, Ohio, village in Athens Countv, 15 miles north of Athens, on the Kanawha and Michigan, the Toledo and Ohio Central and other railroads. Brickmaking and coal-mining are its principal industries. The village owns the waterworks and electric¬ lighting plant. Pop. (1920) 3,140.

GLOVE, a covering for the hand either for warmth or protection, or for dress. Its use dates back to remote antiquity. Laertes, the farmer-king, wore

gloves to protect his hands from the thorns. Xenophon sneered at the Persians for wearing gloves to keep their hands warm. In their more robust days the Greeks and Romans scorned the use of gloves; but in later times they were used in Rome. The glove appears to have become a well-known article of dress in England about the 14th cen¬ tury, and corporations of gloves were in exist¬ ence in the 15th century. In the days of Queen Elizabeth gloves were made with gauntlets upon which much rich and elaborate embroidery was worked.

Modern gloves are of two distinct classes, woven and knitted gloves, and those made of leather; and the making of these constitute entirely separate branches of manufacture. The manufacture of knitted or woven gloves is an industry allied to the hosiery trade, and the materials comprise all the ordinary fibres, the most important being silk and wool. In some cases these gloves are entirely made and finished by knitting; but in others, the pieces are separately fashioned and sewed together as in making leather gloves. The manufacture is vol. 12 — 46

widespread, but the headquarters of the thread and cloth glove trade are now Berlin and Saxony. The materials used for making leather gloves are principally the skin of deer, sheep and lambs, goats and kids, the latter be¬ ing the most important, though far more ((kid)) gloves are made of sheep than of kid leather. The skins for military and other heavy gloves — doe or buck leather — are prepared by the ordinary process of tanning, or are a fine kind of chamois leather. Those for what are called dressed kid gloves are subjected to a special method of tanning, by which, under the in¬ fluence of heat, and treatment with a mixture of flour, yellow of egg and alum, the material is rendered peculiarly soft and flexible. After the leather has been properly prepared it is cut into pieces of the required size, then folded over somewhat unequally, as the back should be larger than the front. Three cuts are then made through the doubled piece to produce the four fingers ; an oblong hole is cut at the bend¬ ing of the fold for the insertion of the thumb piece ; the cutting of this of the exact shape and size is usually done with dies. The first and fourth fingers are completed by gussets or strips sewed only on their inner sides, while the second and third fingers require gussets on each side to complete them. Besides these, small pieces of a diamond shape are sewed in at the base of the fingers toward the palm of the hand.

A kind of vice or clamp, with minute teeth to regulate the stitches, is used in the making of hand-sewn gloves, by which method all the finest gloves are stitched. Sewing-machines are applied for the ornamental or embroidery stitching on the backs of fine gloves, and for almost the entire

sewing of the cheaper and heavier gloves. The superiority of the French and the best English gloves depends chiefly on the adaptation of their shape to the structure of the hand by giving additional size where the flexure of the hand requires it.

Kid gloves are of two principal kinds, glace and suede, according to the manner of dress¬ ing and finishing the leather used. Glace gloves are those which are dressed, dyed and polished on the hair or outer side of the skin, while suede gloves, are carefully pared, smoothed and dyed on the inner side of the skin for their pur¬ pose, and thus have the appearance of fine cha¬ mois. Paris and Grenoble are the chief seats of the French kid glove trade. Military gloves are made at Niort and Vendome. Brussels and Copenhagen are also important glove-making centres. In England, Worcester is the prin¬ cipal seat of the glove industry; and in a specialty, the so-called English dogskin gloves made from tan skins of Cape sheep, the Eng¬ lish manufacturers are without rivals. Rubber gloves are now made in both Europe and America and are largely used in operations de¬ manding careful asepsis, particularly when the surgeon is forced to operate on a clean case after a septic wound. Gloves with roughened surfaces are made to facilitate the handling of instruments and ligatures. See Glove Manu¬ facture in America.

Production. — The United States census of manufactures for 1914 recorded 352 establish¬ ments in the United States engaged in the manufacture of leather gloves. The output for that year, including gloves, mittens and

gauntlets, numbered 3,082,376 dozen pairs, valued at $20,296,558. As compared with the figures for 1909 the number of factories in this trade has decreased by 6.6 per cent, the out¬ put by 8.5 per cent, and the value by 9.9 per cent. .Of the total production, men's gloves were in much the largest, proportion, amount¬ ing to 2,367,263 dozen pairs. Of women's and children's gloves there were made 425,501 pairs; and of boys' gloves, 289,612 dozen pairs. Of the 3.52 establishments reported, 216 were located in New York, 28 in Illinois, 24. each in California and Wisconsin, 8 in Iowa, 7 in Pennsylvania, 6 each in Ohio and Wash¬ ington, 5 each in Massachusetts and Minnesota, 4 in Indiana, 3 each in Michigan, New Hamp¬ shire and Virginia, 2 each in Colorado, Con¬ necticut, Maryland and Missouri and 1 each in New Jersey and Oregon. _ _

Knitted gloves and mittens are made in the hosiery mills of the country.

The production in 1914 was 2,470,183 dozen pairs, valued at

$10,519,613.

GLOVE MANUFACTURE IN AMER¬ ICA dates from about the year 1760, when Sir William Johnson, chief agent of King George with the North American Indians, brought over from Scotland several families from Perthshire, which settled in the eastern part of what is now Fulton County, N. Y., call¬ ing the town Perth. Many of these settlers had been glove-makers and members of the glove guild in Scotland, and brought with them glove patterns and the proper needles and threads for glove making. The first gloves and mittens were used chiefly by the farmers and wood choppers as a protection for the hands while engaged in the rough and la¬ borious work incident to their occupation. The entire output of the industry for many years was probably disposed of in the immediate vicinity. It was not until about 1809 that gloves were manufactured for more distant markets, and it is stated that Talmadge Edwards, a store¬ keeper of Johnstown, N. Y., was the pioneer in the manufacture of gloves in commercial quan¬ tities. Mr. Edwards took a bag of them on horseback to Albany when making a trip for the purpose of renewing his stock of merchan¬ dise. Finding a good demand for these articles, he had leather dressed in quantities, and secured farmers' girls to come to his factory to cut gloves, which were then sent out to farmers' wives to be sewed. In this manner the glove and mitten industry of the United States was established. During the incipient stages of this industry the goods produced were really mittens, and not gloves. A glove, as distinguished from a mitten, is a covering for the hand in which each finger is separately enclosed, the part above the hand varying in length according to fashion or convenience. About the year 1810 a glove manufacturer, who had been associated with Mr. Edwards, sold a part of his output by the dozen, and this is said to be the first instance i-n which they were sold by the quantity. The local demand continued to increase, and each year some enterprising manufacturer would venture to make an extended trip to dispose of his product. In 1825 Elisha Johnson, of Glov¬ ersville, N. Y., went to Boston with a load of gloves in a lumber wagon, making the journey in six weeks. . This is said to have been the

longest trip that had been made in connection with the industry up to that time, and the re¬ sults were highly gratifying to those interested.

Until 1862 the manufacture of gloves in Ful¬ ton County, N. Y., although even then the chief manufacturing industry, was of comparatively small importance. The stimulating influence of a high protective tariff in 1862 showed itself in the increased business at Gloversville, Johns¬ town and the adjoining village of Kingsbor- ough, which became at once the leading

sources of supply for the home market of gloves of medium grade. .While the protective tariff stimulated home industry in one direction, it limited it in another. The domestic materials that could be used in glove making were con¬ fined practically to deer, lamb and sheep skins. The peculiar qualities of the first established it firmly and independently of any tariff, but the others, being inferior in quality to skins of for¬ eign. production, could not effectually exclude foreign made gloves, but were forced to share the market with them. Still, the demand for cheap and medium gloves was limited, and the American manufacturers saw their development arrested, while France, Germany and England continued to supply all the finer grade of gloves used in this country. In 1872 the tariff on im¬ ported skins was removed amid intense opposi¬ tion and doleful prediction of ruin to the home industry. A large number of skins came from all parts of the world, and the glovers turned their attention to tanning. Instantly experi¬ menting began, and skill in tanning rapidly in¬ creased, so that the highest grade was attained, and to-day the various kinds of leather pro¬ duced in Fulton County are unsurpassed in quality by that furnished in any other part of the world.

. The introduction of free hides made Amer¬ ican glove manufacturers far more prosperous than they had ever been previously. The qual- ity the product has steadily improved, and the variety has been increased until now Amer¬ ican made gloves are steadily driving out the foreign gloves. The skill of American glovers is equal to that of foreign glove-makers, and in some respects notably in the quality and style of the stitching, and in some grades, the shape — the American gloves are the best. The American glovers are more enterprising, and their styles are of a greater and better variety than foreign made gloves. Foreign expert workmen have been drawn over here from the great glove centres in Europe, so that the great¬ est skill has been secured here. The approx- rmate value of the glove industry in Fulton County has reached about $10,000,000. Some of

Most of the work in Fulton County, as abroad, is done at the homes of the workers. I he streets in Gloversville and Johnstown are lined with pretty and tasteful homes, in which the hum of the sewing-machine is constantly heard during the working hours of the day, but the workers are exceptionally fortunate in being able while earning good wages to enjoy all the comforts and surroundings of home, and in be- mg practically their own masters and mistresses, in these homes are installed more than 1 500 electric motors, some dwellings having two.

Electric power adds 30 per cent to the weekly earnings of the operator. The factories are open from 7 a.m. to 6 p.m., but most of the work is piecework, at which each worker is expected to spend not less than seven and one- half hours per day. The delicate operations require a high degree of skill which is well paid for.

When the skins are received at the factory they are thoroughly soaked to open out the tex¬ ture and prepare them for the removal of the hair. Then the skins are placed in vats of lime water, where for two or three weeks the lime works into the flesh and albuminous matter, and loosens the hair. The skins having thus been properly softened, the dirty but picturesque op¬ eration of removing the hair ensues. Before each beamer, as the workman is called, is an in¬ clined semi-cylindrical slab of wood, covered with zinc. The skin is first spread upon this, and the broad curved beam of the knife glides across it from end to end, scraping and remov¬ ing all the loosened hair, the scarf skin, and the small portion of animal matter still adher¬ ing to the skin.. After unhairing, kid skins must be fermented in a drench of bran; the pur¬ pose is to completely decompose the remaining albuminous matter, and also to remove all traces of the lime. The operation is extremely delicate.

With the preparation of kid leather, alum is the astringent curative agent. Its operation is accompanied by that of others ; the purpose is to secure elasticity, and pliability, and mainly to preserve that beautiful texture which makes kid leather superior to all others. The assist¬ ants in the process are eggs, flour and salt. They are combined into what is called a custard, and there is certainly nothing repulsive in the idea of such a delicate agent being used. A proper quantity of the custard and a number of skins having been put together in a dash-wheel, where they are thrown about for some time, opens the pores of the skins, aborbs the custard freely and becomes swelled by the chemical union of the custard and the skin. This having progressed satisfactorily, the skins are folded together with the fleshy side outward, and are dried by a gentle heat. They are now cured, but they are yet hard and rough. The breaking and "staking,® as they are called, are now resorted to to make the skins soft, pliable and of even texture, removing the superfluous chemicals with which they have become charged, and the stiffness by manipulating the fibres. The oper¬ ation of transforming the skin into leather is now finished, but age is necessary to secure per¬ fect pliability and softness. The skins are there¬ fore laid away to let the slow chemical opera¬ tion going on within them be completed. After this has been accomplished the skins are ready for dyeing, cutting and manufacturing.*

Calf skins as well as horsehides are used in the manufacture of workingmen's gloves. They are tanned in two ways, namely, oil tan, with a

preparation that makes them what is called <(fire and water proof,® and they are also dressed and have the same finish as the buck glove.

In the dye-rooms the skins which have already been aged are immersed in dye vats, where the delicate colors are imparted to them. The same care is not required in obtaining the ordinary range of dark colors, for these are "brushed® on, the skin being spread upon a

glass slab and the dye being painted on with a brush. After they are dyed the skins are some¬ times somewhat hard, and some classes have to be staked again in order to restore their pliabil¬ ity. The finishing touches to a kid skin are se¬ cured by rubbing the grain side over with a "size,® which imparts a gloss. The experience of Gloversville manufacturers with buck gloves has enabled them to impart a special finish to a skin the same as the suede finish, which is very popular under the title of ((mocha.® This is the same as suede finish, which is produced in other countries by shaving off the grain side of the skin at an early stage of its progress. The Gloversville method is much better, however, and has more perfect results. Here the grain is removed, and the velvet finish secured by buffing the surface on an emery wheel. The surface of the leather is cut away in minute particles by this process, and the result is an exceedingly even and velvety texture, superior to that obtained by other methods.

The concluding work is as follows: A mar¬ ble slab lies before the cutter on a table and every particle of dirt or other inequality is re¬ moved before Moling.® The skin is spread, flesh side up, upon the slab, and the cutter goes over it with a broad-bladed chisel or knife, shaving down inequalities and removing all the fibrous portions. The dexterity with which this is done makes the operation appear extremely simple, but any but a skilled and experienced operative would almost surely cut through the skin. The most delicate part of the glove- maker's art, in which exact judgment is re¬ quired, comes in preparing the <(tranks® or slips from which the separate gloves are cut The trank must be so cut as to have just enough leather to make a glove of a certain size and number. The operation would be easy enough if the material were hard and stiff, and if the elasticity were uniform, but this is rarely the case.

The gussets, facings, etc., are cut from the waste leather in the thumb opening at the same operation. In olden times an outline was traced upon the leather and the pattern was cut with shears. Modern invention has produced dies and presses which are universally used. Simi¬ lar dies are used in the cutting of the thumb pieces and forchettes or strips forming the sides of the fingers.

Gloves are proportioned by a scale based on the fact that in the average

man's hand the length of the third finger is the same as the width of the hand, and the same figure is the length of the body of the hand to the wrist. It is customary to make the ordinary short glove one-fourth longer than the body. Ladies' gloves are made slimmer in the body of the hand and with relatively longer fingers. The large factories commonly turn out a product comprising 30 distinct sizes.

The gloves are somewhat unsightly as they come from the sewer's hands, and must be made trim and neat. To secure these desirable re¬ sults the gloves are taken to the "laying-off® room. In this are long tables with a long row of brass hands projecting at an acute angle. These are filled with steam and are too hot to touch, but by ingenious devices they are so ar¬ ranged that it is impossible to burn the glove or stiffen the leather by too much heat, a com¬ mon defect in ordinary methods. The oper-

*ation of the ((laying-otf room** is finished with surprising quickness. Before each table stands an operator, who slips a glove over each form, draws it down to shape, and after a moment's exposure to the warmth removes it, smooth, shapely and ready for the box.*

About 25 years ago a skin called (was utilized, and has been ever since, in making fine gloves, and they are finished similar to the suede finish, giving them a very velvety appear¬ ance. They are very soft and pliable, and in fact have been almost as popular as the fine kid and lamb gloves. These mocha skins are all gathered in Arabia, from the peculiar haired sheep of that country. They received their name from the. fact that the first in this country came with an invoice of mocha coffee.

The special census of manufactures taken for the United States in 1914 shows that in that year there were 352 establishments of fac¬ tory grade in the country, making leather gloves and mittens. Of the entire number 216 are in New York State, 24 in Wisconsin and 28 in Illinois. The others are scattering. The number of persons occupied in this industry was .12,345, of whom 10,668 were wage-earners receiving a total of $4,558,360 annually in wages. The capital employed in this factory production aggregated $17,080,398, and the value of the finished product was $21,614,109: of this, $9,- 443,415 had been added by the processes of manufacture.

These figures include some but not all of the home workers; and it is to be noted that the number of factory wage-earners in 1914 is nearly 3,500 less than the number registered (14,180) in the census of 1900. The

remarkable growth of the industry is seen by comparing the above figures with those of the census of 1850. At that time there were 110 establishments of all grades making leather gloves and mittens in the United States. They employed an aggre¬ gate of 1,938 hands, and their annual output was valued at $708,000.

Previous to the outbreak of the war the im¬ ports of leather gloves and mittens from France amounted to about $3,000,000 a year, and from Germany about $2,000,000 a year. Of fabric and knitted gloves nearly the whole sup¬ ply came from Germany. The difficulties in the way of imports had a great stimulative effect upon . the glove manufacturing industry of America.. When the war began the stock of skins suitable for glove making in the country was about enough to last the factories four months. Notwithstanding all efforts to re¬ plenish the stock the scarcity increased and the price rose, the result being that many of the factories making leather gloves took up the manufacture of fabric gloves.

The fabric used in this branch of the indus¬ try is not an ordinary woven cloth, but is made with a combination stitch of which the loop used in knitting forms a part, yielding an elas¬ tic fabric which does not unravel when cut in any direction. The fabric is cut with pattern knives or dies just as with leather gloves, and the process of making is generally the same. Fabric gloves when the sewing is completed are in size fit for a giant. They are shrunk to the proper size, and this process thickens up the fabric to a certain richness and fullness of tex¬ ture peculiar to fine gloves. The materials out of which these gloves are made, in the

order of their value, are Angora, Cashmere, Alpaca and Camels' Hair yarns. The so-called ˆseamless® gloves are not cut out and sewed as with fabric gloves, but are knitted from fine wool threads on knitting machines. Some of the larger concerns buy their raw material in the wool and spin their own yarns as well as dye them.

Knitted gloves of the ordinary type are made with the plain knitted loop, or in the rib and tuck stitches. The hand portion is laid out on a flat frame nine inches wide with 12 needles to the inch. The cuff is first knitted, then the flat of the hand, leaving out the open- ing for the thumb. When the fingers are reached, two strips are knit for each finger but the first, which is knit in one piece in the cen¬ tre of the width, the two pieces for the fourth finger being on the extreme right and left sides of the width. The knitting being completed, the glove is taken from the machine and folded together on itself, along the centre line of the first finger strip, and the parts are sewed to¬ gether along the edges of the finger pieces and along the outside of the hand. The thumb is knitted separately and sewed into place. When finished the glove is subjected to a shrinking process which thickens it up

and makes it much warmer to wear. Mittens are of simpler manufacture, there being but the one seam to sew over the top and down the outside of the hand.

*The imports of gloves from all countries in CM*7noSCaˆ year ended 30 June 1916 amounted to $4,798,943 of which three-fourths came from France and a value of $130,000 from Germany.*

-Benj. Lichtenberg,

Of J. Adler and Company, New York.

GLOVE SPONGE, a poor variety of com¬ mercial sponge found about the Bermudas and in the Gulf of Mexico, which has a branching growth likened to the fingers of a hand or glove.

,, GLOVER, Elizabeth. See Bennett Mary E. ’

c iN/ J˚nn American soldier: b. Salem, Mass., 1732; d. Marblehead, Mass 1797 A shoemaker, and later a fisher at Marblehead he was elected. (1/73) colonel of a militia regi¬ ment known in the Revolution as the Four- teenth or the <(Marine» regiment. In 1775 he with Stephen. Moylan, was appointed director TL manning and equipment of vessels, in 1/76 after the Continental defeat at Long Island superintended the transportation of the army ˆ ork’ and aˆso directed the crossing of the Delaware previous to the battle of Trenton Commissioned brigadier-general in 1777, he par- m Sulllvan’s Rhode Island expedition (1//8), was a member of the court that tried Andre and was retired in 1782. He sat in the Massachusetts convention that ratified the Con¬ stitution in 1788. A bronze statue of Glover stands in Commonwealth avenue, Boston.*

Richard English poet: b. Lon-

n j ’ icl th 25 Noy- 1785. In 1737 he published, the epic poem of which

. ˚,UV. ln. ,n˚hle sentiments, considerably va¬ ried by incident and description, but lacking in interest, and not sufficiently imaginative for asting popularity. The Progress of Corn- mereˆ followed in 1739, one of the objects of which was to rouse a spirit of national hostility

*against the Spaniards and the ministry — a pur¬ pose which was much more effectually an¬ swered by his celebrated ballad of (Hosier’s Ghost.**

In 1753 his tragedy of (Boadicea was performed with partial success. ‘ His (Medea* imitated from Euripides and Seneca, in 1761, obtained greater attention.*

*GLOVER, Stephen, English composer : b. London, 1812 ; d. Bayswater, London, 7 Dec. 1870. He wrote nearly 1,500 compositions, in¬ cluding works for pianoforte, vocal duets, bal¬ lads and songs, many of a sacred character, such as the 12 (Songs from the Holy Scrip¬ tures. * Among his published music are (The Monks of Old* ; (The Gypsy Countess’* ; (What are the Wild Waves Saying?* and a setting for Longfellow’s Excelsior.**

GLOVER, William Howard, English com¬ poser: b. Kilburn, London, 6 June 1819: d. New York, 28 Oct. 1875. For several years he was musical critic of the London Morning Post, and in 1868 became conductor of Niblo’s orchestra and a teacher in New York. His writings in¬ clude the opera cRuy Bias (Covent Garden 1861) ; a cantata, (Tam o’ Shanter,* first pre¬ sented at the New Philharmonic in 1855 with Berlioz as conductor; and the overtures Man¬ fred* and (Comala.**

GLOVERSVILLE, N. Y., city in Fulton County, on the Fonda, Johnstown and Glovers- ville Railroad, 53 miles northwest of Albany. This is the most celebrated glove manufactur¬ ing centre in the world, producing over two-thirds of the entire glove output of the United States. Here are the Nathan Littauer Hospi¬ tal, the Parsons Free Library, the Carnegie library, Federal building and other public insti¬ tutions. Besides numerous large manufactories for gloves, gauntlets and mittens, there are other factories of leather goods. There were in operation, in 1914, 211 establishments with a combined capital of $11,898,000, employing 6,240 persons, and paying $3,341,000 in salaries and wages. Materials to the value of $7,865,000 were turned into products worth $13,384,000. It was incorporated as a village in 1851, although it was settled before the Revolution, being known as Stump City. . It was chartered aˆ a city in 1890. The municipal government under the revised charter of 1899 is administered by a mayor, who is elected by the people every two years, and a common council, elected for a like period. The members of the board of education and the water commissioners are also chosen by popular vote. The municipality owns and operates the waterworks and sewage sys¬ tem. Pop. (1910) 20,642; (1920) 22,075.

GLOW-WORM. See Fire-fly.

GLOXINIA, glok-sin’i-a, a small genus of plants of the family Gesneriacece, distinguished by the somewhat bell-shaped corolla, the upper lip being shortest and . two-lobed, the lower three-lobed, with the middle lobe largest, and also by the summit of the style being rounded and hollowed.-

The species are natives of trop¬ ical South America. The plants cultivated in hothouses under the name of Gloxinia belong to the closely related genus Sinningia, and are natives of Brazil. They are now among the greatest ornaments of hothouses owing to their handsome leaves and their graceful, beautifully colored flowers, which have been greatly im¬

proved by cultivation. The chief species is S. speciosa, with large violet flowers from which many fine varieties have been derived, usually associated under the specific name Gloxinia hybrida.

GLUCINA, the oxide of glucinum (q.v.).

*GLUCINUM, gloo-si'num, or BERYL¬ LIUM, a metallic element which occurs in the minerals beryl, chrysoberyl, phenacite and euclase. The name ((beryllium** was assigned to it on account of its occurrence in the beryl, and the name <(glucinum** on account of the sweetish taste of. its salts. Its chemical symbol is sometimes taken as Be, and sometimes as Cl. Glucinum is a dyad with an atomic weight of about 9.08, and a specific gravity (when com¬ pressed) of about 1.93. It melts at about 2550° F. It resembles steel in general appear¬ ance, and forms hard, hexagonal crystals which are unaffected by air at ordinary temperatures, and which are scarcely affected by oxygen or sulphur, even at a red heat, though when heated in chlorine the metal burns to the chloride, GICL. It dissolves' readily in hydro¬ chloric acid. Sulphuric acid and caustic potash or soda also dissolve it, but nitric acid, even when hot, and concentrated, acts upon it very slowly. The specific heat of metallic glucinum is about 0.400 at ordinary temperatures but it increases rapidly as the temperature rises, and is about 0.58 at 500° F. The oxide of the metal, known as ftglucina,** GIO, was first ascertained to be a new earth by Vauquelin, who in 1798 obtained it from beryl, and pointed out that it differs from alumina in several important ways, notably in the fact that it does not form an alum. Metallic glucinum was first prepared by Wohler in 1828, by the action of metallic potas¬ sium upon fused BeCh. Glucinum forms many salts, but the metal and its compounds are of interest only to the chemist, as they are not used for any purpose in ordinary life. It seems, however, to endow a relatively large quantity of copper with valuable properties.*

GLUCK, glok, Alma (Reba Fierson), American soprano singer : b. Bucharest, Ru¬ mania, 1886. She came to America in 1889 ; was educated in the public schools, Normal College, New York, and Union College, Sche¬ nectady, N. Y. She studied music under Signor Buzzi-Peccia, New York. She made her New York debut in (Werther in 1909, and during the ensuing season sang 11 different roles only two of which she had previously studied. She is noteworthy as one who gained recognition in opera and on the concert stage without European training. In*

1914 she married Efrem Zimbalist.

GLUCK, Christoph Willibald, Ritter von, German composer : b. Weidenwang, in the upper Palatinate, 2 July 1714; d. Vienna, 15 Nov. 1787. After studying, six years at the Jesuit school at Komotow, where his musical talents were especially encouraged, he supported himself for a time, by giving music lessons. Later he at¬ tracted the notice of Prince Lobkowitz, who en¬ abled him to complete his musical education at Vienna. At 26 he was desired to write an opera for the court theatre at ‘ Milan and the result was his (Artaserse, which achieved a great success in spite of many innovations in com¬ position introduced into the work. In 1742 he wrote (Demofoonte* for Milan; (Demetrio ed*

Ipermnestra> for Venice; in 1743 for Milan; in 1744 for the same theatre; and in 1745 ‘Allessandro nell’ Indie> for Turin. His fame had now become European and he went to Eng¬ land to compose for the theatre in the Hay-

7 Jan‘ that theatre was opened with cLa Caduta de Gigantic In London Gluck became deeply impressed with the majestic char¬ acter of Handel’s airs and choruses, and with the simple but natural dramatic style of Arne. Leaving London in 1746 he continued opera composition, among his later works being

/ˆJnˆ certe and (Paride ed Elena>

(1769). In 1774 his Hphigenie en Aulide> was produced in Paris after a considerable amount of opposition from the musical critics of the old Italian and French school, at that time rep¬ resented in Paris by Piccini. The most intense excitement prevailed ; all Paris took sides, and for a long time the Gluckists and Piccinists con¬ tended with the same bitterness as did formerly the Jansenists and Jesuits, and in our own day W agner and his opponents. The victory re¬ mained with the Gluckists. Shortly after the production of the Hphigenie,5 the was adapted for and put on the French stage and was followed by the in 1777, and by the Hphigeme en Tauride> in 1779, his last important work, and by many considered his greatest. It ends the series of works which directed the operatic genius of Mehul and Cherubini in France, and of Mozart, Beethoven and Wagner in Germany. Consult (Lives> by Marx / 1 } j ,pesnoiresterres (1872). Reiss- mann (1882) ; d’Undine (1906) ; Tiersot (1910).

GLUCKSTADT, gliik’stat, Prussia, town of the province of Schleswig-

*Holstein, on the Elbe, ol miles from Hamburg and 28 miles northwest of Altona. It has a fine town hall, a gymnasium, a provincial prison and a peni- * tentiary. Commerce and fishing constitute the chief employments of the people. The city has railroad repair shops, shipyards, furniture, wagon, shoe, soap, cigar, brick factories, etc It was founded in 1617 by Christian IV of Denmark, who fortified it. In 1815 its forti¬ fications were destroyed. It receives consider¬ able shipping at periods when Hamburg is con¬ gested. Pop. 6,500.*

GLUCOSE, glp'kds (from Gr. y'kvK.v?, sweet), in the commercial sense, a very thick syrupy liquid obtained by the partial hydrolyz¬ ing of starch, sometimes called <(cereal syrup®; when in solid state, known as grape-sugar or "cereal sugar.® In Europe it is chiefly made from potato starch, but in the United States it is made almost exclusively from corn; whence its popular name «corn syrup.® In color it ranges from water white to brownish, usually a light amber. It is sweet to the taste but has no distinct flavor. . Nature's process of changing ihe starch stored in the cells of plants into dif¬ ferent forms of sugar was early recognized.*

Jn the case of cane-sugar (sucrose) it was known that the plant absorbs carbonic acid from a1ˆ; other acids from the soil; and by the aid of the sun's heat a chemical process is

evolved that puts into the sugar-plant sucrose or cane-sugar, and into fruits and vegetables fruit-sugar which is found more plentifully in the grape than in any other fruit.

The chemist has endeavored to obtain sugar from starch by a somewhat analogous process, and one similar to that carried on in the human system during the process of digestion, when starch is changed into sugar. Cane-sugar and fruit-sugar as they exist in cane and fruits arc natural products, but whether nature's order of combining the various articles composing fruit- sugar as found in fruits is the same as the order of combination followed by the chemist in making sugar from starch is a debatable question. Some claim that while the glucose of fruits and glucose as obtained by the chemist may be identical so far as their constituent ele-ments are concerned and the proportion of each which is present, it does not follow that they are the same thing, or that their dietetic value is equal Neither does it follow that because the chemical composition of true glucose (dextrose) is almost identical with that of cane-sugar (su- crose) its food value is quite as evenly matched.

Nature and Chemist. — In the laboratory o nature the starch or gum (CgHioOb) which is formed in the plant is treated by carbonic acid taken from the air, and by other acids absorbed from the soil and carried into the

plant by the sap, and through the action of light and heat is changed into cane-sugar (sucrose) Ci2H22Oia.

*Art or chemistry takes starch from corn (maize), treats it with hydrochloric or other acid (which is afterward neutralized or re¬ moved by alkali), the resultant product being glucose CgH1206, differing in its constituent ele¬ ments from cane-sugar in that it contains one more equivalent of water. If to Ci2H220h *s added FLO, it is equal to twice L6Hi206 or. glucose Ci2H240i2. (*

ˆTrgUCPseithe.one e9uivalent of water; and, that found, chemistry can make from starch an article the chemical formula for which is ex¬ actly like cane-sugar. And somebody will some day stumble over the method.®

History of Glucose.— It was in 1792 that Lowitz announced that there was other than cane-sugar, he having obtained dextrose, a dif¬ ferent variety, from grapes. In 1811 Kirchhof, in Russia, in the attempt to find a substitute tor gum arable, obtained dextrose from starch by the action thereon of dilute sulphuric acid By similar process Braconnot, in 1819, obtained

fiV;I0mnm-en raP' saVdust or other vegetable fibre. During the reign of Napoleon Bona¬ parte starch-sugar was made to make good the deficiency which the continental blockade caused in the supply of cane-sugar. Early in the 19th

fVrmanv1ˆ Ta Tade, from potato-starch in ?d !Unng the latter half in France. vlTJr the time the chemists of

,Geˆany and the United States have studied to improve processes, but nowhere in

Seir°r d 1S gluco?e made so perfectly and at

raw ˆ L" the United States > where

l 1S Cherap' and the Processes of manufacture so perfected that this country is

fast meeting the European demand for glucose and causing the industry to dwindle in conti¬ nental Europe. This country can manufacture

glucose, send it to Europe, pay a 30 per cent tariff and then undersell the makers of Europe, the proof of which is the statement which fol¬ lows showing the exports of glucose from the United States. From 1838 the number of fac¬ tories in France and Germany increased until 40 years later there were 85, and in the Austrian Empire, where the industry began about 1840 or a few years earlier, over 100. In 1889 Ger¬ many had 30 glucose factories which produced 34,684,100 kilos glucose syrup and 2,748,000 kilos couleur.

The manufacture of glucose or grape-sugar from starch in the United States began in a small factory at Sacketts Harbor, N. Y., in 1831, under the direction of a chemist named Guthrie. In March 1865 Dr. Goesling began making glucose under a patent he had procured. The sample exhibited led to the formation of a stock company which purchased of Goesling, Bradley & Briggs their patent for manufac¬ turing sugar and syrup from Indian corn. The company began the manufacture of glucose in the old sugar-refinery in Rose street, New York. Unfortunately Dr. Goesling, the German chemist who was to superintend the manufac¬ ture of glucose, died before the first lot of glucose was marketed, and with him perished some of the secrets of manufacture.

By 1870 the new industry had so far de¬ veloped as to be mentioned in the census of that year. In 1874 the Buffalo Grape-Sugar Company was organized ; it grew into a vast concern, and might be said to be the parent of the present industry.

In 1884 there were 29 factories engaged in the manufacture of sugar or syrup from corn and having a combined capacity for absorbing 40,000 bushels of corn per day. At present there are 89 factories which in 1914 used corn, potatoes and wheat flour. These materials were turned into starch, glucose syrups, grape-sugar, corn oil and stock feed of an aggregate value of $68,000,000. Of the 89 factories in 1914, there were 51 in Maine, 7 in Minnesota, 5 in Illinois, 4 in Massachusetts, 3 each in Connecti¬ cut, Indiana and Iowa, 2 each in New York and Ohio, and 1 each in California, Florida, Maryland, Michigan, Missouri, Nebraska, New Jersey, Pennsylvania and Wisconsin. These factories used in 1914 2,480,792,405 pounds of corn.

As found in the market glucose consists of varying proportions of maltose, dextrins (gummy matters), and dextrose (the true glu¬ cose) and from 15 to 22 per cent of water. When starch is hydrolysed by dilute acids it breaks first into dextrins; these into maltose; and this finally into dextrose. By varying the quantity of acid the pressure, and the time of boiling, varying products result — glucose, 70- sugar, 80-sugar, and commercial dextrose. Dextrose is sometimes called ((solid glucose.® It is a mass of white needle-like crystals, micro¬ scopic in size, entangling a small percentage of a non-crystallizable syrup. In the case of glu¬ cose the time of boiling is purposely made short in order to gain more of the intermediate prod¬ ucts and less of the dextrose. As usually pre¬ pared, the starch ˆmilk® is sprayed into a boiler containing water acidulated with hydro¬ chloric acid under pressure of about 50 pounds of steam, and boiled for about 10 minutes. This converts about one-fifth of the starch into

true glucose (dextrose), the remainder being about three parts maltose and two parts dextrins. When made from potatoes, the acid used is sulphuric, and the hydrolysis yields a product about half-maltose and half dextrins.

The process of manufacture has been greatly improved, so much so that, while in 1882 26 to 30 pounds of glucose was obtained from one bushel of corn, 40 pounds is now obtained.

Manufacture, Composition and Commer¬ cial Standard. — The manufacture requires 80 hours, and includes 18 processes of manipulat¬ ing the corn (and starch obtained therefrom) :

(I) steeping; (2) grinding; (3) separation of the starch; (4) cleaning the starch; (5) col¬ lecting the starch; (6) washing the starch; (7) conversion by the action of hydrochloric acid; (8) neutralization with soda; (9) bag-filtra¬ tion; (10) bleaching with sulphurous acid;

(II) bone-black filtration; (12) concentration; (13) second bag-filtration; (14) acid treat¬ ment; (15) second bone-black filtration; 06) final concentration; (17) final filtration; (18) final chemical adjustment. After the corn is steeped it is ground in water, and the wet starch separated and converted in copper con¬ verters by the action of hydrochloric acid, which is later neutralized by chalk or other alkali; subjected to filtration, then concentrated in a vacuum-pan until it tests 41° to 45° Baume, the difference being in the amount of water eliminated; the product, glucose, a liquid substance, or grape-sugar if the process of conversion is carried farther. If the conver¬ sion of starch with acid is carried to a point where a dilute iodine solution will just give a distinct color-reaction, we have glucose ; con¬ tinued to where 95 per cent alcohol gives a faint cloud, hardly a precipitate, we have grape- sugar containing about 85 per cent of

ferment¬ able sugar. For still higher converted sugars a time-factor must be introduced. Carried be¬ yond a given point, a back conversion takes place, with strong decomposition and loss of purity. The ratio of the fermentable sugar to non-fermentable sugar depends on the accuracy in stopping the conversion, for neutralization, at the exact point decided upon. This ratio determines whether the product is glucose or grape-sugar, and no sharp dividing line exists. The rotating powers of glucose and grape-sugar depend absolutely on this ratio. Actually no two batches of # commercial glucose or grape- sugar are identical, but for all practical pur¬ poses they are alike, as a few points either way from the standard decided upon will make no difference in the appearance, taste or working qualities of these products.

Non-crystallization. — Glucose does not crystallize, as does cane-sugar (sucrose), A chemical process was devised by Dr. Arno Behr for the crystallization of glucose, but it is regarded as impracticable by reason of being too expensive. Dr. Behr added to the liquid glucose a very small quantity of _ crystallized anhydrous dextrose. The mixture is filled into molds, and in 72 hours will be a solid mass of crystals of commercial dextrose. The blocks are next placed in a centrifugal machine to throw out the still liquid syrup, and the anhydrous dextrose remains as a crystalline mass.

Varieties of Use. — Because glucose does not crystallize it is used extensively in the pre-

serving industry. Fruit put up in a syrup wholly or partially made of glucose has a more plump and natural appearance than if preserved in sugar. Comb-honey, when put into glass jars, is surrounded by strained honey to which has been added a proportion of glucose which pre¬ vents its candying, and therefore the honey always remains pleasing to the eye. It is very largely used for mixing with cane-sugar mo¬ lasses ; as a substitute for extract of malt in brewing; and very freely in the manufacture ox candy. It is said to have two-thirds the sweetening power of cane-sugar. The extent to winch glucose is used in the making of jams jellies, marmalades, preserves and canned fruit, together with tables showing the composition of commercial glucose and the composition of the ash of glucose, are given in Bulletin No. 00, Bureau of Chemistry, United States Depart¬ ment of Agriculture; also with extensive tables showing the composition of the jams and other preserves in comparison with such as con¬ tained no glucose. As a food it is very largely consumed as table syrups which are 85 per cent glucose and 15 per cent sugar-house syrup

These syrups are well liked and much purer than molasses. Glucose is also used as a filler for cheap soap, and in leather and tannin? extracts.

Some candies are nearly all glucose, partic¬ ularly such as are sold at the lowest prices. In the high-grade confections the finest grade is used, not as a substitute for sugar, but in the place of acids to prevent the cane-sugar from graining, for which purpose only a small quantity, is used. In the brewing of ale and ˆ ˆ claimed that a lighter liquor results when a proportion of glucose is added to the malt and that it is more palatable. It is as¬ sumed that commercial glucose is the same as the glucose which comes from the action of diastase in changing the starch in malt into maltose sugar. As glucose is flavorless, all of the malt cannot be dispensed with. It is claimed that 100 pounds of glucose or grape- sugar is equal to 123 pounds of barley-malt, and is much cheaper.

The Wholesomeness of Glucose.— This is rea ly the most important question connected with glucose, and one that is still unsettled. It Js a Problem for the physiologist rather than the chemist. Owing to many improvements made in the last 30 years, the conclusion ren¬ dered by the government's experts in 1884 could be made much more emphatic in 1916. It was as follows: '(The starch-sugar thus made and sent into commerce is of exceptional purity and uniformity of composition, and contains no in¬ jurious substance. Though at best having only about two-thirds the sweetening power of cane- sugar, yet starch-sugar is in no wav inferior to cane-sugar in healthfulness, there being no evi¬ dence before the committee that maize starch- sugar, either in its normal condition or fermented, has any deleterious effect upon the system, even when taken in large quantities?

Dr H. W. Wiley, formerly chief chemist of the. United States Department of Agriculture, testified before a committee of the United States Senate as follows: "I have had occasion to make careful examinations of almost every variety of food that has ever been exposed upon our markets for sale. In my opinion glucose is not deleterious to health. It is wholesome,

somewhat sweet, readily digested.. I have al¬ ways found, from the time I first began to in¬ vestigate food products, that the series of foods known as glucose or grape-sugar, when properly made, are valuable food material and not in¬ jurious. ˆ

It is conceded by all that glucose is as readily digested as maltose, which is esteemed ajja/°0<ˆ ˆor convalescents. It is sufficient to add here that the industry adds materially to the revenue of the corn-producer, is a great boon to the farmer. The total production of glucose and syrups alone was valued at $18,541,- 429 in 1914 and at $17,922,514 in 1909, the in¬

crease being 3.5 per cent. The total quantity of glucose manufactured during 1914, including that consumed in establishments where pro¬ duced, was 847,180,968 pounds. The output of grape-sugar increased from 159,060,478 pounds with a value of $3,620,816, in 1909 to 174,368,-818 pounds, , valued , at $3,765,515 in 1914, or ˆ ˆ en: in quantity and 4 per cent in value.*

Bibliography.— Armstrong, E. F., 'The oimple Carbohydrates and the Glucosides (London 1910); Dubrunfaut, 'Sucrage des Vendages avec les Sucres raffines de Canne de Betterave* ; Frankel, J., 'Practical Treatise on the Manufacture of Starch, Glucose, Starch- sugar and Dextrine* (Philadelphia 1881); Na¬ tional Academy of Sciences, (Report on Glu- (°Sfu PrePar?d in response to a request made by the Commissioner of Internal Revenue, with bibliography of starch-sugar arranged chrono¬ logically, 1790-1883 (Washington 1884) • 'Glu¬ cose in Confectionery, * a statement frim the National Confectioners' Association of the United States (Philadelphia 1898).*

Richard Ferris.

GLUCOSIDES, gloo'ko-sidz, a class of

complex vegetable substances which under the influences of heat, enzymes or chemical action produce a glucose. Most of the known glnco- sides are derived from dextro-glucose, others from rhamnose or galactose. When the sugar is rhamnose they are known as rhamnosides ; if arabmose, they are known as arabinosides, etc Glucosides containing rhamnose require a sne-cific enzyme to effect their hydrolysis. There are a great many glucosides in nature, and withm recent years a large number have been

Phemical composition of the artificial glucosides is well understood, since they are the result of synthesis, but the make¬ up of the natural glucosides is not clear. From comparison with the synthetic glucosides, how¬ ever, it has been generally accepted that natural glucosides are formed by the elimination of water between a hydroxyl group of the sugar and one. from the. other compound. Although present in plants in very small quantities, glu¬ cosides play a very interesting role in nature By reason of their bitterness and of often being poisonous, they preserve seeds from de-struction by animals, man included, until they shall have ripened, and then on germination plant enzymes or ferments acting on the gluco- sides set tree a certain amount of sugar, which

nUni T h SeTn1Ce S? the y°unZ developing plant. An excellent illustration of their pro-

ective qualities is seen in persimmons, which

when green, are so puckery by reason of the

lloneSldWhennmC- adl that the\are left severely alone. When ripe, however, the tannic acid is

converted largely into sugar, and the fruit, then eaten and carried about by animals, can dis¬ tribute its seed.

Glucosides are obtained by extracting the plant substance with water or alcohol. It is necessary, in most cases, to destroy the accom¬ panying enzyme when water is used as a sol¬ vent, otherwise the glucoside is destroyed dur¬ ing the process. _ The glucosides generally are colorless, crystalline substances having a bitter taste. A typical example is amygdalin, of the bitter almond, and the kernels of peach stones. The larger part of the glucosides belong to the class known as ((saponins55 from their resem¬ blance to the specific glucoside obtained from the root of the Saponaria rubra. The sapo¬ nins are nearly all colloidal substances dissolv¬ ing freely in water, and yielding a froth when the solution is shaken, and produce soapy emul¬ sions with, fats and oils. They are insoluble in alcohol, ether and benzol. From their aqueous solutions the saponins are precipitated by add¬ ing ammonia sulphate. Although one or two of the saponins are useful in the arts (as in bottled soda water and ginger beer, to hold the froth) they are practically all of a poisonous nature. A curious use is made of some of them in the East, where they are strewn upon the surface of shallow waters, with the effect of killing the fish therein : the very small por¬ tion of poison taken in by the fish does not make it unfit for human food. Another im¬ portant class of the glucosides, though much fewer in numbers than the saponins, are the cyanogenetic glucosides, thus named because they yield hydrocyanic acid as one of the products of hydrolysis. They are found in flax and sorghum, and in some of the laurels, magnolias and roses, as well as in other repre¬ sentatives of some of the higher orders of plants. The significance of the glucosides in the plant economy is not known, and eminent authorities differ in their opinions upon this question. In most, perhaps in all, cases the glucoside is accompanied inˆ the plant by its appropriate enzyme, which is able to hydro¬ lyse it. They do not exist in the same cell, but are brought together by the breaking down of the cellular structure. Observation has shown that salicin is formed in the willow during daylight, but after the light has gone the salicin is split into sugar and the alcohol saligenin, by the activity of salicase.

The more important glucosides are amyg¬ dalin — of bitter almonds; prunasin — of wild cherry; sambunigrin — of the common elder; arbutin — of the barberry; phloridzin — of the bark of apple and pear trees; salicin — of willow bark; populin — of the poplar; coniferin — of fir trees; sinigrin — of black mustard; and indican — of the indigo plant. It is interesting to note in passing that in several instances cultivation of wild plants has had the effect of reducing the contained glucoside to an almost unrecognizable quantity. Many glu¬ cosides are affected by heat. Some are split by cooking in water, but a boiling temperature is apt to destroy the action in many. Thus it is necessary to use cold water if one desires to obtain the volatile oil of mustard in making a mustard plaster. Many fungr are capable of breaking down glucosides, which fact is of a great deal of practical importance in medicine, for some active remedies which contain gluco¬

sides, if kept too long on the druggist's shelf, develop molds within them. These destroy the active principle of the drug and thus render it useless. In medicine the most important glu¬ coside containing drugs belongs to what is known as the (

GLUE, an impure gelatine, used as an ad¬ hesive. The substances of which glues are made are ossein of bones and hides, chondri- gen of cartilage, isinglass from the bladders of fishes, and elastin, found in certain liga¬ ments.

In the modern method of making glue from bones they are first crushed, and then placed in pots of stone in a tank or retort, and their fat is extracted by boiling them in a solvent, usually a cheap grade of naphtha. The heat is supplied by steam coils. The first vapors of naphtha contain the moisture of the bones, and these are carried off from the top of the retort into a condenser. When moisture ceases to come over with the naphtha the re¬ torts are closed, and the naphtha with its dis¬ solved fat is drawn off at the bottom. This operation is continued with new naphtha three or four times; the operation requiring about 12 hours. The naphtha remaining in the bones is blown out by passing high-pressure steam through the retort. The bones are then boiled in water under steam pressure of IS pounds to > the square inch, which is later reduced to four or five pounds, when the glue in the interior of the bone fragments begins to ooze out. This is washed down at intervals with a spray of hot water. When the solution in the boiler contains about 20 per cent of glue, it is drawn off, skimmed of any grease which may have escaped the naphtha, clarified with one-half of 1 per cent of potassium alum, agitated at a temperature of 175° F., and then strained through canvas or fine wire gauze. The glue solution then goes to the concentrators where its moisture is removed by the vacuum method at a comparatively low temperature. . The glue is bleached by passing sulphur

dioxide through it while in the liquid form, and it is then run into troughs to the depth of five inches. When the "jelly55 has set, it is cut into thin slices by a wire knife, and placed upon wire nets to dry. As this jelly melts at about 75 degrees, the air currents used in dry¬ ing it have to be cooled below this temperature in summer, and the freezing air in winter has to be warmed to a drying degree. The slices or sheets are dry in four or five days, then still containing 10 to 13 per cent of water. When prepared from clippings of hides, these are steeped in lime water for several days to remove the hair and blood, and then drained and dried in a current of air, that the lime may absorb carbonic acid, and thus prevent the injurious effects of the alkali upon the gelatine. The clippings are then washed first with water and then with dilute hydrochloric acid and again dried. They are then enclosed in sacks

and boiled in water until the solution is found to gelatinize firmly on cooling. The impurities are allowed to settle, and the residuum to gela¬ tinize in shallow wooden boxes ; it is then cut into slices and dried upon nets. Good glue is semi-transparent, and free from spots and clouds. Marine glue, a composition used for cementing materials that are exposed to moist¬ ure is made by dissolving 1 part of india- rubber in 12 parts of mineral naphtha, and adding 20 parts of powdered shellac ; it resists wet, and cements glass and metals as well as wood. Fish glue is made from the skins of uke and other flatfish and the bladders and otfal of any kind of fish. The product is a \ery strong adhesive, but needs deodorizing; this is accomplished by adding about 1 per cent of sodium phosphate together with one-fourth of 1 per cent of saccharin. White fish-glue or diamond cement, is made of isinglass dis¬ solved in alcohol. Before use on important work ˆues are subjected to tests for moisture and ash; for acidity; for contained fat; for gelatine content, for water absorptive capacity; besides several tests of the jelly as to adhesive power, viscosity, tensile strength and tendency to foam (because of included peptones).

The glue industry in the United States was founded by P eter Cooper in 1827, when he established a factory in Brooklyn. About the same time a factory in Philadelphia was started by Charles Baeder and William Adamson. At present glue factories are centralizing near the great slaughter-houses of the Middle West, the sources of raw supplies, and the larger packing concerns, notably the Armours and the Swifts in Chicago and the Cudahy Company in Omaha have their own glue plants. (See Packing In¬ dustry.) The factories still in the East are largely supplied with imported hides. The ex¬ port trade is steadily growing and has passed the

$500,000 mark per annum. France alone surpasses America in the quality of its _finer glues, and these are imported for use in mak¬ ing straw hats. The finest glues made in the United States are prepared from sinews, and it is likely that continual experiment upon them will result in a product equal to the best im¬ ported from France.

GLUME. See Grasses.

GLUT-HERRING, or BLUEJACK, a

herring (Pomolobus cestivalis), abundant in the Southern States, and very similar to the ale- wife (q.v.), but is more elongated, is darker on the back and has a black peritoneum and comparatively small eyes. The quality of its flesh is poor.

GLUTEN (Lat., glue), that part of the protein content of wheat which is insoluble in water. It is a combination of the two proteid substances • gliadin and glutenin, the first con¬ taining 17.66 per cent of nitrogen, and the second, 17.49 per cent. These components, however, do not combine in the wheat kernel, nor in wheat flour to form gluten: it requires the presence of water to initiate the combina¬ tion. Gluten is insoluble in water containing salts, but the gliadin component is soluble in distilled water and also in alcohol. As found in wheat flour dough, gluten consists of about two-thirds gliadin and one-third glutenin, and it is this constituent of wheat flour which

causes the dough to be sticky, entrapping the bubbles of gas from the fermentative action of the yeast, or from the chemical action of baking-powder, and "lightening® the dough into a "sponge.® Some glutens are tough and elastic, others soft and "rotten.® The latter lack the quality of absorbing water, and do not hold the sponge made by the yeast, thus making a poorer bread, and fewer loaves to the barrel of flour. The strength of a gluten depends upon the proportion of gliadin to glutenin, and also to the presence or absence of certain mineral salts. The so-called "hard® wheats and those grown in hot countries have a larger gluten content than the "soft® wheats, or those grown in cold climates. The amount of gluten from any sample of flour, also, in¬ creases with the hardness of the water used .and with the time the dough is permitted to stand, this increase ranging up to more than 6 per cent. The relative elasticity of the glutens in different samples of flour is some¬ times tested with an instrument called the aleurometer, which operates on the expansion of wetˆ gluten when exposed to a temperature u ^^9 but this test in the vital point that the value of a gluten depends not on its Quantity, but on its quality. Of two samples of flour containing equal parts of gluten, one may be worth in bread-making more than twice the value of the other.

To obtain gluten from wheat, the grain is reduced to dough, and the starch removed by mechanical processes, the resultant product be- mg a grayish, tough, elastic, sticky substance which, when rightly proportioned in its gliadin- glutenin content, is capable of being drawn out into long bands or shreds. Crude gluten consists of about 74 per cent of gliadin and glutenin, 7 per cent of non-gluten proteins and the remaining 19 per cent of fat, carbohydrates, fibre and mineral salts. In the domestic opera¬ tion of separating the gluten from flour for making gluten bread for diabetic patients, a strong flour is made into stiff dough with hard water. This is allowed to stand for about an hour. The dough is then kneaded in

water in small portions usually placed in loose muslin bags, the starch escaping through the bag and producing a milky appearance in the water. The kneading is continued in suc¬ cessive waters until no more "milkiness® washes out.

In its highest refinement, gluten exhibits a fine molecular structure, delicate and sensitive to atmospheric conditions, and requires, after separation, immediate handling in its prepara¬ tion for food.

onr2ˆbout 16 pounds of gluten is obtained from 2UU pounds of wheat-flour. On account of its high content of nitrogen, gluten soon deli¬ quesces, sours and spoils after the separation trom the starch, and demands an immediate treatment if desired for food purposes. What are known as gluten feeds are by-products in the manufacture of starch and glucose from corn, and the dried residues from the distilling of spirituous liquors. They have a nutritive value about equal to brewer's grains. To the glucose and starch makers corn consists of starch, gluten, germ and bran, all but the starch being by-products. They are separated ly mechanical processes. The free germs of

the corn are dried, ground to meal, the oil extracted by solvents leaving oil-cake, a cattle- feed extensively used. The wet starch is run through vibratory sieves and over long wooden tables, the starch and gluten forming the mixture which passes through the sieves; the starch being deposited by gravity, the gluten liquid passes off at the ends of the tables. When evaporated, pressed and dried, this con¬ stitutes the gluten-meal of commerce. About five and one-half pounds is obtained from one bushel of corn.

The composition of gluten-meal is, protein 38 per cent, fat 3 per cent and

starch 40 per cent. This is one of the richest and best feed products on the market. The nutritive value is very high, and the factor of digestibility ranges from 92 to 96 per cent. Gluten-meal is treated for the recovery of its starch, and gives two new products, a concentrated feedstuff, characterized by the large amount of proteids (60-70 per cent) it contains, and a maltose syrup. This feedstuff is suitable for animal consumption, and also for raising the percent¬ age of proteids in feeds that have a small amount of these substances. When the wet bran, germs and gluten are mixed in the pro¬ portions as obtained from the original corn and the mixture dried, the resulting feed is known as gluten-feed. This is the most com¬ mon feed product in the starch and glucose industry, and represents about 80 per cent of the by-product output. Its feeding value is very high, and its digestibility above 90 per cent. Its composition shows about 28 per cent protein and 3 per cent fat.

*Corn oil-cake and gluten-meal are exported extensively. The bran and gluten feed is used almost exclusively in the United States. The production per bushel of corn is about 12*4 pounds of food, outside of the glucose or starch.*

The waste product in the manufacture of starch or sugar is relatively much richer in oil and protein than is corn. Most factories are removing part of the corn-oil from the waste, so that nearly all the gluten-meals carry much less oil than they did a few years ago. Gluten- feeds differ from gluten-meals in that they contain a good deal of the corn-bran, and hence less of protein and digestible carbohydrates, and more of the indigestible woody fibre. The relation of gluten to bread making is set forth in detail in Bulletin No. 67, United States De¬ partment of Agriculture. The food value of gum-gluten has been outlined by Prof. Nelson Clark Parshall in a pamphlet published by the Pure Gluten Food Company, New York. Con¬ sult also Jago, W. C., (The Technology of Bread-Making) (London 1911) ; United States Bureau of Chemistry, Bulletin 108, (Feeding Stuffs of the United States> (Washington 1908).

GLUTTON, the English name in Europe of the large fur-bearing badger-like animal known in North America as wolverine (q.v.). It was renowned in mediaeval literature for its excessive greed ; hence the English words ((glut-ton® and its derivatives. The alleged greed is, however, a matter of fable far more than of fact, yet gross exaggerations of the animal's voracity and sagacity survived even in educa¬ tional books until very recent times. That it has in reality a quite extraordinary strength and

cunning, giving some foundation for the super¬ stitious history, will be seen by reference to the article Wolverine.

GLYCERINE, or GLYCEROL. In 1783

Scheele showed that by acting upon olive oil by oxide of lead a substance may be obtained which has a sweetish taste; and in the follow¬ ing year he showed that the same substance may be had by acting in a similar manner upon other oils and fats, such as butter. He also ob¬ served that the substance in question may be obtained in the form of a syrupy fluid; that al¬ though it has a sweetish taste like sugar, it cannot be fermented ; and that although it gives oxalic acid by oxidation, it differs from sugar in many respects. He failed, however, to as¬ certain its true relation to the oils which fur¬ nish it, and to the lead plaster (or Head soap®) which accompanies its formation. The true explanation of the reactions was given some 30 years later by Chevreul, as a result of his fa¬ mous researches upon the animal fats, which were begun about 1811, and were concluded about 1823. In the course of these researches Chevreul showed that an animal fat consists, in general, of a mixture of several definite chemical substances, each of which is itself a fat, and each of which consists of Scheefe's sweetish substance (which is now called ˆgly¬ cerin®), combined with an organic acid. When the fat is treated with an alkali, or with lime or oxide of lead, the organic acid that is present combines with the alkali, or the lime, or the lead, to produce a new substance called a ((soap,® the organic base (glycerin) which was previously combined with the acid being there¬ by set free. Since the time of Scheele and Chevreul much attention has been paid to gly¬ cerin and its compounds, and it is now univer¬ sally agreed that glycerin is a trihydric or tria- tomic alcohol (see Alcohol), having the for¬ mula C3Hb(OH)3, that is, containing the radicle C3Hs in combination with three OH groups. Hence glycerol bears the same relation to ordi¬ nary ethyl alcohol as orthophosphoric acid bears to nitric acid. And just as tribasic phos¬ phoric acid forms three distinct classes of salts with three different proportions of the same base, so does glycerol form three dis¬ tinct classes of esters : monoglycerides, digly¬ cerides and triglycerides, and that it forms an acid and an oxide, and various substitution com¬ pounds and esters, of which latter class the fats (q.v.) are the most important mem¬ bers, and are distinguished by the name of <(glycerides.®

Glycerin does not exist as such in the fats and fatty oils, but is formed by the assimila¬ tion of three molecules of water. However, glycerin does occur in nature in the uncombined form, notably as a constituent of palm-oil, and it is also a product of the alcoholic fermenta¬ tion of sugar, and is therefore a normal con¬ stituent of beer, wine, etc., 100 parts of sugar yielding in fermentation 3.5 parts of glycerin. On the large scale, however, glycerin is pre¬ pared by the decomposition of fats. In com¬ merce, five varieties of crude glycerin are rec¬ ognized : (1) crude saponification glycerin;

(2) crude distillation glycerin; (3) Twitched crude glycerin; (4) fermentation glycerin; (5) soap lye glycerin. The purest form results from the saponification of fats with lime in

open vessels: that from soap lye processes may be equally pure if from a good class of fats, ihe other three sorts contain characteristic organic impurities which are not eliminated by the best known refining processes. The largest output is the soap lye grade.

In soap making the fat is decomposed by heating with an alkali, the soap which is formed by the combination of the alkali with the or¬ ganic acid of the fat remaining in solution until it is precipitated by the addition of com¬ mon salt. The fluid that remains after the soap has been so precipitated contains the liber¬ ated glycerin, which can be separated by dis¬ tilling in a partially exhausted boiler, the gly¬ cerin passing over with the water vapor, from which it may be subsequently separated by re¬ evaporation in a vacuum. In its commercial form it contains from 80 to 86 per cent of pure glycerin, 10 per cent of salts and 4 to 10 per cent of water.

Crude distillation glycerin is obtained in large quantities as a by-product in the manufacture of so-called <(stearin» candles. In this case the fat is not saponified by an alkali, but beef fat, or some other fat that is rich in stearin, is acted upon by superheated steam, by which the stearin, or stearate of glycerin, is resolved into free stearic acid and free glycerin. Fat under¬ goes a similar transformation when treated with a mineral acid; but this method of producing glycerin has the disadvantage that the mineral acid is likely to combine to a certain extent, either with the glycerin, or with the liberated fatty acid, necessitating a subsequent treatment for its removal.

Glycerin is refined by distillation of the crude, and, if for dietetic or pharmaceutical purposes, is redistilled. The finest grade is triple distilled. Pure glycerin is a colorless, odorless, syrupy liquid, with an oily feel and an intensely sweet taste, and a specific gravity of about 1.27. It is. insoluble in ether, but it mixes in all proportions with water and with alcohol. It has a considerable affinity for water, and absorbs moisture from the air quite readily to the extent of 50 per cent of its weight.

It boils at about 600° F., but with partial de¬ composition. Under reduced pressures it boils at lower temperatures. At a pressure of 12.5 millimetres of mercury, for example, it boiis at 356° F., and may be distilled without

change. By subjecting pure glycerin to a temperature of 15 to 20° F., it will solidify in rhombic crys¬ tals, which melt at 68°. A large quantity of glycerin at 32° may be solidified by the intro¬ duction of a few glycerin crystals. Glycerin burns with an almost colorless flame, and dis¬ solves many organic bodies that are insoluble m water. It also dissolves iodine, and many of the metallic oxides.

The solvent properties of glycerin render it valuable in pharmacy, and it is added to baker's cake in small quantities to keep it moist. Large quantities are used in the manufacture of toilet soaps, ci earns and washes, as a preservative medium, and in gas meters and other mechan¬ ical appliances in which a liquid is needed which will not readily freeze nor evaporate, but the largest part of the production is made into dynamite, blasting gelatine and smokeless powders.

GLYCIN, gif sin. See Glycocoll.

GLYCOCHOLIC (gli-ko-kol'ik) ACID,

an organic acid, whose sodium salt is one of the chief constituents of the bile of certain of the vertebrates. It may be most conveniently prepared by the following method: A drop of hydrochloric acid is added to fresh bile, gener- ailv of the ox, and the mixture is shaken and filtered. The filtrate is shaken with hydro¬ chloric acid and ether and allowed to stand until the glycocholic acid separates ip the form of a bulky mass of colorless needle-like crystals. Ihese are collected upon a filter, washed with water containing hydrochloric acid and ether, and finally purified by recrystallization. Gly- cocholic acid is slightly sweet and bitter in its aqueous solution. It is readily soluble in alco¬ hol, but dissolves sparingly in water, ether and ether solvents. It forms numerous salts, known as glycocholates, which are all soluble m alcohol. Those of the alkalis are very sweet, and are freely soluble in water, and yield lathers, like soap. Glycocholic acid is an amido- acid and has the formula C26H43N06, and when heated with potash it is resolved into cholic acid (CˆFUOe) and glycocoll (C2H5N02), ap- parendy according to the equation CaˆNOo + H20 = C04H40O0 + C2H5N02.

ˆrSˆXC?COLL' girkb-kbl, GLYCIN, GLY- COCIN AMINO-ACETIC ACID, or GEL- , BIN SUGAR, a singular chemical substance obtained by heating glycocholic acid (q.v.) with an alkali, or by the decomposition by long-continued boiling of gelatin, glue or gela¬ tinous tissues, with sulphuric acid, or with potash or baryta. When perfectly pure it crys¬ tallizes m tabular, monoclinic crystals which arken at 430 F. and melt at 450° with the evolution of gas, but slight quantities of cer¬ tain impurities induce remarkable changes in its crystalline form. It is insoluble in alcohol and in

ether, but is sparingly soluble in water, its solution having a sweet taste. It is the chief ammo-acid in the sugar-cane. According to its mode of formation from glue, glycocoll is a sugar, the glue acting the part of a glucoside ; but it resembles an acid (although it is neutral to litmus paper) inasmuch as it combines with metallic oxides to form salts. It does not form salts wph the metals of the alkalis, and probably not with those of the alkaline earths. In com¬ bining with acids, glycocoll acts as a base, form¬ ing definite salts such as the nitrate, acetate oxalate, sulphate and hydrochloride. In these compounds the. glycocoll has strongly basic properties, and, indeed, it is usually described as r ulm chemical formula of glycocoll is C2H5N02; or CH2.COOH. Under the name glycm it is used as a photographic de¬ veloper in place of pyrogallol.*

i ^^YCOGEN, gli k6-jen (C6Hio05), was discovered in 1857 by Bernard and was given the name «animal starch.^ It belongs to that class of the carbohydrates called the polysac¬ charides; these are convertible into simple car¬ bohydrates when hydrolysed. Glycogen is the reserve carbohydrate of the animal organism in which it appears to take the place of starch, and it is a normal constituent of all develop¬ ing cells. It is found in the livers of most animals to the amount of 10 per cent and to some extent in the. muscles and other parts of foetal animals. It is formed by the action of a ferment on starches, transforming them into*

sugars which undergo some alteration, becoming less soluble, and are then deposited in the liver and the muscular tissue. This storing of gly¬ cogen takes place in times of liberal feeding, but it disappears rapidly from the muscles in times of exertion. Glycogen is prepared from finely minced fresh liver, which is thrown into boiling water acidified with acetic acid. The proteins which coagulate are filtered out, and the remaining proteins precipitated from the filtrate with trichloracetic acid. From the re¬ maining filtrate the glycogen is precipitated by adding alcohol. It is purified by resolution and reprecipitating with alcohol. It is ob¬ tained as an amorphous, snow white powder, yielding an opalescent solution with cold water. It does not ferment, nor does it reduce Fehling's solution, and it is not affected by boiling con¬ centrated solutions of the alkali?. Acids hydro¬ lyse it eventually to dextrose, but it passes through the phases of dextrins and maltose. Diastase also converts it to dextrins and mal¬ tose. The chief interest attaches to the phy¬ siological function of this substance, and the divergent views taken with regard to it by dif¬ ferent writers. Thus it is said to be the sub¬ stance in the liver mainly concerned in the conversion of starch into sugar. Other phy¬ siologists affirm that no such

transformation takes place, there being no proof of the in¬ crease of sugar after the action of the liver; so that at the present time its exact functions are obscure. It has been suggested that the sugars that are taken into the system with the food are stored up in the liver in the form of glycogen, to be drawn upon subsequently, ac¬ cording to the needs of the system. In cases of diabetes glycogen is found in much larger quantities than usual, and in cases of starvation il is almost wholly absent. It is contained in the white blood corpuscles in very small amount. It is found in oysters to the extent of 3 per cent. It is found also in the cells of certain fungi, and at times in yeast where it may be very abundant, and then quickly disappear.

GLYCOL, or ETHYLENE ALCOHOL,

the most important of the dihydric alcohols (see Alcohol and Fatty Compounds) may be re¬ garded as derived from the hydrocarbon ethane, C2H6, by the substitution of two molecules of hydroxyl (OH) for two molecules of hydrogen. It therefore has the formula C2H42. Glycol may be prepared by acting upon ethylene dibromide, C2H4Br2, by potassium carbonate, K»C03. The reaction is C2H4Br2 + K2C03 + HaO = C2H4a + 2KBr + CO Glycol is a colorless, odorless liquid, having a specific gravity of about 1.12, and a sweetish taste.Q It boils at about 388° F., and solidifies at 11° F. It mixes in all proportions with water and alcohol, and is used to some extent as a solvent. A great many compounds have been derived from glycol, but they are not of general in¬ terest. The word <(glycol55 is also (used as a generic name for all the dihydric alcohols.*

GLYCOLLIC (gli-kol'ik) ACID, or OXY- ACETIC ACID, an organic acid having the for¬ mula HO.CH,COOH, whose potassium salt (that is, potassium glycollate) exists in the grease obtained from sheep's wool, in the juice of un¬ ripe • grapes and as the principal acid in the juice of the sugar-cane. It is also found in the

lime precipitate after treatment of the juice of the sugar beet. It may be prepared by heating a mixture of glycerin, water, calcium hydrate and precipitated silver oxide for four hours, after which the fluid is filtered, saturated with carbon dioxide, boiled, filtered again and finally evaporated until calcium glycollate crystallizes out. The calcium glycollate is next decom¬ posed by oxalic acid, and the filtered solution is neutralized with carbonate of lead. Upon evaporation, well-developed crystals of lead glycollate separate out; and a solution of these, when treated with the proper amount of sul¬ phuric acid, yields free glycollic acid. By evap¬ oration in a vacuum over concentrated sulphuric acid, and subsequent recrystallization from so¬ lution in anhydrous ether, the acid may be ob¬ tained in a very pure form. It is freely soluble in water, in alcohol, in ether and in acetone. Concentrated nitric acid oxidizes it to oxalic acid; and

when distilled with excess of quick¬ lime it decomposes with liberation of methane and hydrogen. Glycollic acid forms an exten¬ sive series of salts called glycollates, those of the alkalis being deliquescent, and it also yields numerous esters and other organic derivatives.

GLYCOSURIA, the presence of glucose in the urine. See Diabetes Mellitus.

GLYCYRRHIZIN, glis-i-ri'zm, or LIQUORICE SUGAR, an organic substance, the calcium and potassium salts of the tribasic glycyrrhizic acid, which occurs in liquorice root (Radix Glycyrrhizce) to the extent of 8 per cent, together with starch, malic acid and various other matters. In the juice of the bitter Anatolian liquorice the proportion ranges from 17 per cent as high as 25 per cent. It may be prepared by extracting the dried and pulverized liquorice root with boiling water containing a small quantity of milk of lime, and precipitating the concentrated extract with cold acetic acid. The gelatinous precipitate is puri¬ fied by dissolving it in 50 per cent alcohol, filtering through charcoal, and finally evaporat¬ ing at 212° F. When dry, glycyrrhizin is an amorphous solid, which swells up in cold water but does not dissolve. It is only slightly soluble in alcohol or ether, but dissolves in hot water, and also in boiling glacial acetic acid. It does not reduce Fehling's solution, nor the ammonical silver solution, but has been re¬ garded as a glucoside. Although boiling with dilute acids decomposes it, it does not appear that any glucose or other sugar is formed, the chief products of the decomposition being para- saccharic acid and a brownish resin called gly- cyrrhetin.

GLYN, Elinor, English novelist: young¬ est daughter of Douglas Sutherland of Toronto, Ontario. In 1892 she married Clayton Glyn, J. P., (d. 1915). Her publications are (The Visits of Elizabeth) (1900) ; (The Reflection of Am- brosine5 (1902) ; (The Damsel and the Sage5 (1903) ; (The Vicissitudes of Evangeline) (1905) ; (Beyond the Rocks5 (1906) ; (Three Weeks5 (1907) ; (The Sayings of Grandmama5 (1908) ; (Elizabeth Visits America5 (1909) ; (His Hour5 (1910) ; (The Reason Why5 (1911); (Halcyone5 (1912) ; (The Contrast, and Other Stories5 (1913); (The Sequence5 (1913); bet¬ ters to Caroline5 (1914) ; (Three Things5 (1915) ; (The Career of Catherine Bush5 (1917).

GLYNN, Martin H., American publicist: b. Kinderhook, N. Y .,27 Sept. 1871. He was graduated at head of his class at Fordham Uni¬ versity in 1894. Has received degree of LL.D. from Syracuse University, Union University, Georgetown University and Fordham University He was

admitted to bar in 1897. Editor and publisher of The Times-Union of Albany, N Y He represented the 20th New York District in the 56th Congress, 1899-1901; vice-president of the United States 'Commission at the Louisiana Purchase Exposition, in 1904; 1906-4)8 comp¬ troller of New York State. In November 1912 he was elected lieutenant-governor of New York and on 14 Aug. 1913 assumed the office of gov¬ ernor, after impeachment proceedings had been instituted against William Sulzer. From 18 Oct.

1913 he was in full possession of the office. In

1914 he was nominated for governor, but was defeated. Mr. Glynn was temporary chairman of the Democratic National Convention of 1916 when his speech framed the issues of the party in that campaign. He served as member of National Industrial Commission in 1920.

GLYOXALIC ACID. See Glyoxylic

Acid.

GLYOXALINE, a substance having the chemical formula C3H4N2, and prepared by act¬ ing slowly upon cold glyoxal with strong am¬ monia in slight excess. Glycosine is thrown down as a brown precipitate, and the filtrate, which contains glyoxaline, is boiled with milk °f. lime (to expel the ammonia), after which it is evaporated to a syrupy consistency, treated with absolute alcohol to separate the mineral salts, and filtered, and the residue subjected to heavy pressure to gain all of the filtrate. The liquid so obtained is distilled, yielding pure glyoxaline in a crystalline mass of dazzling whiteness. Glyoxaline melts at 192° F. and boils at 491° F. It is freely soluble in water, alcohol and ether, and has an alkaline reaction.

It acts as a base and forms salt. It is also the starting point for a series of organic com¬ pounds of analogous composition called glyox- alines. They are amidines in which two hy¬ drogen atoms have been replaced, by the dyad group, — CR'= CR1 — . They are formed by the condensation of compounds containing the di¬ carbonyl group — CO. CO — with aldehydes and ammonia jointly.

GLYOXYLIC or GLYOXALIC ACID,

an organic acid having the formula H.CO.CO- OH, and existing in unripe apples, grapes, plums, currants and others, and in rhubarb and young beets. It may be prepared (along with glyoxal) by oxidizing alcohol, glycol or glycerol with nitric acid. It is a thick syrupy liquid having a specific gravity of about 1.3, and when allowed to stand long over concentrated sul¬ phuric acid it crystallizes in rhombic prisms con¬ taining water.

Glyoxylic acid is very soluble in water, and can be distilled in a current of steam. It is a monobasic acid, forming crys¬ talline salts called glyoxylates. By oxidizing agents it is converted into oxalic acid ; by nascent hydrogen it is reduced to glycollic acid.

It has also the properties of an aldehyde, re¬ ducing ammonical solutions of silver salts, formmg a metallic mirror; also unites with alkaline bisulphites. It acts as a hydrolizing agent toward cane-sugar and starch, and pre¬

vents the fermentation of products thus formed, as it destroys the activity of yeast. Glyoxylic acid, when boiled with excess of lime water, yields calcium glycollate and calcium oxalate.

GLYPTICS, the art of engraving on gems and precious stones. It is generally done with diamond-pointed instruments, or instru¬ ments of exceeding hardness such as stellite.

uˆiriuouiNi, an armored edentate mammal of the extinct family glyptodontidae, which developed mainly in South America dur¬ ing the Tertiary Period. Several genera and many species have been described from Pata¬ gonia, the Argentine pampas, Peru, etc., and northward to the southern United States, asso¬ ciated with the great ground-sloths. These glyptodonts were allies of the armadilloes, and some of the more ancient species of the pam- pean region were very armadillo-like. As time advanced, however, the race developed into huge and grotesque species, the larger ones reaching a total length, including the tail, of 12 or 14 feet, and standing five feet high. Their gen¬ eral appearance must have been that of gigantic high-backed, long-tailed tortoises; their squarish heads were turtle-like in shape; and their movements must have been slow and heavy ior these animals were massively armored against the big and savage beasts of their time.

I he top of the head was protected by a bony casque The body and much of the limbs were enclosed in an immense domed carapace, which almost reached the ground at the sides. «It was composed of very thick polygonal plates of bone (no doubt covered externally with horny plates) immovably fixed together by their rough edges, and ornamented with an elaborate

eenuU> Th ScfuI.?tur,e which varied with the nf Uf n The tai ' oft?n exceeding the body in ength, was enclosed in a defensive sheath of the same nature, and constituted an extraor-

- P°werful, weapon of defense. In Glyptodon it was made up of a series of over- appmg rings, each ring double and brist- g with sharp spikes. In

Sclerocalyptus there were several rings, around the root of the tail diminishing posteriorly, and then blending into a long smooth somewhat flattened tube of

carried rl3t 2“ “V” ˆocthus this tube a heavX’ horn-llke spikes; and in Dcedicurus the very long tube «had its free end

Fhfh1 h exPanded ar»d thickened into a huge, c ub-shaped mass, on the top and sides of which

was6 ofXetdti°ng anLs,harP horns” The skeleton

Senˆthenhed armadl-1,u tyPe> but modified and strengthened, especially in the spine and legs

to enable it to bear the great weight of the

!harnPthe:fand !he hin.d>gs Were much lon£?

aooealanre T M gl™f the._ hiPs a humped appearance. The broad feet had five toes in

with IT’ anfd,in ,ome sPecies these were armed with powerful claws to enable them to dig

roots and tubers All the glyptodonts werf

P!?nVf!fi!ei\ and entirely harmless. «When nr tteibyfthke saber-toothed tigers (Smilodon) the great bears (Arctotherium) they needed only to squat down, bringing the edges of the

savsPSrott0 2 f °Und; an,d draw In ˆhe stTennWg t0 Perf/Ctly protected, while a sweep of the spiny and club-like or horny tail*

path ® The T6611 fatal t0 everything in its Patf- ;,he Texan species (Gomphotherium) smaller, had less armament and a shorter

tail, and survived on the Mexican border, ac¬ cording to Osborn, until near the close of the Ice Age. Consult Woodward, (Vertebrate Paleontology > (London 1898) ; Ingersoll, (New York 1908) Scott, (Land Mammals of the Western Hemisphere) (New York 1913).

Ernest Ingersoll.

GMEINER, mi'ner, John, American Roman Catholic clergyman : b. Barnau, Bavaria, 5 Dec. 1847; d. Richfield, Minn., 17 Feb. 1915. He studied at Saint Francis' Seminary, Milwaukee, Wis., was ordained priest in 1870, was professor in the seminary, and later in Saint Thomas' Seminary, Saint Paul, Minn. In 1899 he be¬ came rector of Saint Francis' Church, Buffalo, Minn., and from 1902 until his death was rector of Saint Raphael's, Springfield, Minn. In 1893 he addressed the World's Parliament of Reli¬ gions at Chicago on ((1884) • (Emmanuel: the Saviour of the World) (1888) ; (Mediaeval and Modern Cos- mology) (1891).

GMELINITE, mel'-i-nit (for Prof. Charles Gmelin), a native hydrous silicate of aluminum, calcium and sodium, crystallizing in the rhombohedral system, usually with a hex¬ agonal aspect. It is colorless or white, often with tinges of yellow, green or red, and trans¬ parent to translucent, with a vitreous lustre. It is brittle, with a hardness of 4.5 and a specific gravity of about 2.1. It loses much of its water of crystallization when heated in a closed tube, and dissolves in hydrochloric acid, with sepa¬ ration of free silica. Gmelinite occurs in the Harz Mountains, in Cyprus and in parts of Italy and Ireland. It is also found at Cape Blomidon and at other points along the coast of Nova Scotia, and fine white crystals of it occur at Bergen Hill, N. J. The mineral was formerly called ((hydrolite."

GMUND, Wiirttemberg, town in the Rems Valley district, 30 miles southeast of Stutt¬ gart. It has ruins of its former splendor as an imperial city. It contains a 14th century church, a monastery now used as a prison, a gymnasium, trade school and teachers' training school. It has manufactures of iron and wooden articles, cigars, flour, chronometers, jewelry, etc. It was an independent city until 1803. Pop. 21,000.

GNADENHUTTEN, gna'den-hiit-ten, Massacre at. For the westward retreat of the Delawares, and their partial conversion to Christianity by the Moravians, see under their name. In 1772 their Great Council settled the Christian Indians on the Muskingum in three villages, Salem, Schonbrunn and Gnadenhiitten (Tabernacles of Grace), the latter being that of the Delawares. Through the Revolution these Indians as a body took no part in war¬ fare, quietly cultivating their farms; but some of the younger ones joined the war-bands, which forced the Moravian villages to give them supplies and shelter. The whites were wrought to frenzy by these atrocities, in which they accused the Christian Indians of being secret participants; and in 1781 a success¬ ful foray against the hostiles was only pre¬ vented from involving the Moravians by the

efforts of Colonel Brodhead. But the first blow against them was struck by the wild In¬ dians and British. In the fall of 1781 Capt. Matthew Elliott, under orders from the British commandant at Detroit, with a body of white

rangers and a miscellaneous horde of Indians from a half-dozen different tribes, forced them to leave their villages, which were half de¬ stroyed; the missionaries were taken to Detroit, and the Christian Indians left on the Sandusky plains, where the wild Indians would have massacred them but for the English. A few es¬ caped and returned to the villages; they were captured by the Americans under Williamson, and taken to Fort Pitt, whose commandant, Gibson, their firm friend and attempted pro¬ tector, sent them back to the villages unharmed. During the winter the rest suffered much from cold and hunger around Sandusky, and by the spring of 1782 some 150 had returned to the villages. Meantime the fiendish Indian outrages were going on ; the borderers accused the Mora¬ vians of being privy to them, and denounced Gibson and Williamson for letting them go; and after a woman and child had been impaled alive by an Indian gang, who afterward re¬ freshed themselves among the Moravians, the whites formed a party of near a hundred under Williamson to exterminate the latter. In March they gathered those in Salem and Gnadenhiitten into two houses at the latter — those at Schon¬ brunn had been warned and escaped — under promises of good treatment; a council was held, at which 18 protested against the contemplated murder and withdrew, taking an Indian lad with them ; the rest went in and killed the 96 inmates, after the latter had prayed and kissed each other farewell, only two other boys es¬ caping. The best men of the borders denounced the cowardly butchery in unsparing language.

GNAT, nat, a somewhat indefinite term applies to various forms of small two-winged flies, especially those annoying to man and do¬ mestic animals. In England mosquitoes are known as Ignats," but in America the term is more restricted to species of the genus Simu- lium, known also as ((buffalo gnats," ((black- flies" and <(turkey gnats," or midges. One of the most remarkable of these species on account of its minute size is the so-called punky or <(no see um" of northern woods. The buffalo gnat is quite as bloodthirsty as the mosquito, but is most annoying to domestic animals, which are frequently worried to death by swarms of these gnats. They differ from mosqui¬ toes in that they are diurnal, while the lat¬ ter normally fly by night. The larvae of most of the gnats, with the exception of the gall and fungus gnats, are the aquatic and do no harm in this stage. There is also a distinctive form of gnats which occur throughout our country, but reach their highest development in the Gulf States. The common species are Hip- pelates flavipes and H. plebjus, which in Flor¬ ida occur in great numbers, and are the direct cause of the disease ((sore eye" which from time to time becomes epidemic in the rural districts.

GNAT-CATCHER, or GNAT-SNAP¬ PER, any of various little birds that snap up minute insects on the wing. Specifically, in the United States, a small bluish-gray flycatcher (Golioptila carulea), common from Maryland

southward, and noted for the exquisite finish of its soft, lichen-covered nest, saddled upon a

horizontal tree-limb. See Maynard, (Birds of Florida) (1872).

GNATHOBDELLIDA, nath-ob-del'li-da,

an order of leeches (q.v.), distinguished by the absence of a proboscis.

GNEISENAU, g'ni'se-now, August Wil¬ helm Anton, Graf Neithardt .von, Prussian field-marshal: b. Schildau, Saxony, 1760; d. 1831. He joined the German mercenary force which in 1782-83 supported the British cause in the American Revolutionary War, but returned in the following year. After taking part in the occupation of Poland, in 1793-95, he led a bat¬ talion at Saalfeld and Jena in 1806, and his de¬ fense of Kolberg in 1807 increased his military fame. Both as a member of the commission for the reorganization of the Prussian army, and as a commander at the battle of Leipzig (1813), he rendered valuable service, which he crowned by his successful direction of the Prussian force, as chief of staff under Bliicher, in the campaign of Waterloo. Gneisenau was made governor of Berlin in 1818 and field-marshal in 1825. He died at Posen, while commanding the forces engaged in suppressing the Polish rebellion. Consult Pertz and Delbriick, (Das Leben des Feldmarschalls Grafen Neithardt von Gneisenau) (5 vols., Berlin 1864-80).

GNEISS, nis, a metamorphic rock, con¬ sisting usually of orthoclase, quartz and mica, though its composition is rather variable. It is akin to mica schist, but contains more ortho¬ clase and less mica; it has the same components as granite, but is stratified or foliated or banded. The geological origin of gneiss is obscure. One theory is that gneiss is the result of the meta¬ morphism of sedimentary rocks; on this hy¬ pothesis gneiss is closely related to conglomerate, which is a mixture of sedimentary pebbles and fine grains resulting from the action of water, while gneiss owes its foliated form to other causes. In some cases this sedimentary theory is undoubtedly true, but in others it is evident that gneiss is the production of eruptive forces, occurring, as it does, in purely igneous rocks. Gneiss is a convenient term for metamorphic foliated rocks, containing feldspar, the different varieties being named from some prominent mineral constituent, as biotite gneiss, horn¬ blende gneiss, etc. In the United States, gneiss, in the ordinary usage of the term, is common, notably in New England and New York, the strata running northeast and southwest; and it is also

common in Canada. It abounds in the mountains of central and northwestern Europe, in the peninsula of India and the Himalayas, and in the ranges of South America. Gneiss is used as a building stone and for flagging.

GNESEN, gna/sen, Poland, town in the province of Posen, 30 miles northeast of Posen.

It contains an ancient cathedral, built in the Gothic style, which contains the remains of Saint Adalbert, bishop's palace, seminary, gymnasium, college, and manufactures machinery, lumber' leather, sugar, flour and dairy products. Ac¬ cording to legend it was founded in 550 a.d., was made the seat of an archbishop in 1000 and was the capital of the Polish kings for a time in the Middle Ages. Pop. 25,000.

GNETALES. See Paleobotany.

GNOLI, nole, Domenico, Italian author:

b. Rome, 1839. Under the nom-de-plume ((1883); (Le opere di Donatello in Roma- ; (I1 banco d'Agos- tmo ChigP ; (1905).*

GNOME, nom (Gr. ˆjudgment.® ˆadage®), a short, pithy saying, often expressed in figur¬ ative language, containing a reflection, a prac¬ tical observation or a maxim. Gnomes are a common form of early literature. In religious literature the proverbs of Solomon, those of Jesus, son of Sirach, and the Sermon on the Mount, are examples. The Ssemundian Edda has preserved excellent proverbs whose author¬ ship it attributed to Odin. The word generally connotes Greek maxims or monitions, and fheognis, Phcylides and others are called the Gnomic poets, from their excellence in this sententious manner of writing.

GNOME, a name also given to certain humming-birds, among them the giant gnome (Patagonagigas).

GNOME ENGINE. See Internal Com¬ bustion Engine.

. GNOME (nom) Owl, one of the burrow- mg or owJs_ of the American plains:

specifically, Glaucidium gnoma.

GNOMES, in European folk-lore, spirits which dwell in the interior of the earth, where they watch over hidden treasure, and hence are the patrons of miners. Ugliness is their appro¬ priate qualitv, though the females, gnomides, are beautiful Among them all Rubezahl (JNumbermp) has

*obtained, by means of Mu- saus popular tales, the greatest celebrity in Germany. The native country of these' poetical beings is the East, whence thev were introduced mto Europe between the middle of the 15th and the beginning of the 16th century by the culti¬ vators of cabalistic philosophy, ' Pico of Mirandola, Marsilius Ficinus, Paracelsus, Car- danus and Reuchlin. The gnomes make a part of Popes machinery in the (Rape of the Lock.**

GNOMON, nomon, an astronomical instru¬ ment for measuring the altitudes and declina¬ tions of the sun and stars. It is usually a pillar or pyramid, erected upon level ground or on a pavement and is especially used for making the more important observations. Manv have pre¬ ferred it to the smallest quadrants, both as more accurate and. more easily made and applied.

J he most ancient observation of this kind extant is that made by Pytheas, in the time of Alex-

fi? ur Great, at Marseilles, where he found the height of the gnomon was in proportion to the meridian shadow at the summer solstice, as 213/2 to 600. This method of observation was by no means accurate in ancient times, since observers did not take into account the sun's parallax, which makes his apparent altitude less than it would be if the gnomon were placed at the centre of the earth; they also neglected

refraction, by which the apparent height of the sun is somewhat increased ; and made their cal¬ culations as if the shadows were terminated by a ray comine: from the sun's centre; whereas it is bounded by one coming from the upper edge of his limb. These errors, however, may be easily allowed for; and, when this has been done, the ancient observations are generally found to coincide nearly with those of the moderns.

Gnomon, in geometry, is the space included between the lines forming two similar parallelo¬ grams, usually squares, of which the smaller is inscribed within the larger, so as to have one angle in each common to both. The word gnomon is also used to designate an odd num¬ ber; one of the terms of a series in arithmetic for the finding of polygonal numbers. See Dial.

GNOSSUS. See Cnossus.

GNOSTICISM, nos'ti-sizm (Gr. yvbciq, knowledge; yvuoTinog, devoted to knowledge), the teaching of various sects in the first Chris¬ tian century, who hovered on the border¬ land between Christianity and heathen

thought. The systems they founded attempted to grapple with the most profound problems of philosophy, such as the creation of the world and the origin of evil. They taught that a series of divine emanations connected the Supreme Being with the visible universe ; that human nature was dual and that the acts of the body had no in¬ fluence on the spirit. They blent their ideas of Christian truth with pagan and Jewish elements, or even with those received from the common belief in magic. They taught that the earthly life of Christ was unreal, that is, He was a phantom and incorporeal, and they held that knowledge (yv&c ng), as they possessed it, was superior to faith.

Thus there was a general tendency to trace the same religious idea through different mythologies (which were held to be the popular expression of religious ideas originally re¬ vealed), and the new religion which aimed at the redemption of the whole world was eagerly seized on as the embodiment of their unifying principle. Christianity was believed to be the full revelation of the deeper truth embedded in all the nature-religions. By adapting their pres¬ entation of Christianity to the form of the ancient mysteries the Gnostic teachers the more easily fastened themselves upon the Christian congregations, and succeeded in taking up a position within them as specially initiated per¬ sons, for which they found a natural support in the prevalent ascetic views and the powerful in¬ fluence of free prophecy. But these were in time forced to separate themselves and form sects, whose great diversity becoming the more apparent greatly counteracted, the influence of the Gnostic leaven in the Christian communi¬ ties. To maintain their theories in the face of the traditional doctrine of the churches they had recourse to the sources of that doctrine. They claimed to have special traditions from certain of Christ's disciples, and applied their exegetical skill to the allegorical interpretation of the writ¬ ten monuments of the apostolic age. Marcion (about 150), believing himself to be a consistent follower of Paul, rejected the authority of the earliest apostles, as well as the gospels ema¬ nating from the circles of their influence, and

professed to hold ((the gospel® known to Paul only. His collection of 10 epistles of Paul was the first attempt to fix the canon of the apostolic Scriptures. Such arbitrary treatment of the Scriptures led the Church to resort to a more thorough study of the historical tradition. In the struggle with Gnosticism it obtained a firm hold of the principle that that alone is to be held true. Christianity which can be shown to be historically derived from Christ and His apostles, and it found the only means to check the license of Gnostic speculation in the de¬ velopment of a Christian theology in accord¬ ance with the positive character of historical Christianity.

The general principles of Gnostic thought may be here summarized, as

fuller accounts of the principal schools are given under their own names or under those of their founders. For the practical doctrine of the redemption of men's souls from sin by Jesus Christ the Gnostics substituted a speculative doctrine of the redemption of the human spirit from matter by religious knowledge. The realistic eschatology of the primitive Church they entirely set aside. The evangelic element in their teaching was obscured by a cloud of heathen mythologies and philosophic subtleties. The Divine Demiurgos and Lawgiver of the Old Testament was dis¬ tinguished from the Supreme Being, and the Hebrew idea of creation was superseded by that of a continuous process of emanations from the divine first cause. The present world was be¬ lieved to be the result of a catastrophe in which the spirit fell under the power of matter, or of an original destiny that powers hostile to God should bring into existence a world in which the spirit born of God should be held in un¬ willing estrangement from Him. All the Gnostic systems are more or less dualistic. In these dualistic theories a philosophical foundation was secured which was by the Gnostics developed to an extreme. The highest duty of man was to become united to the First Source of Spirit through gnosis and the absolute alienation of the human spirit from the body. Others, like Carpocrates and his son Epiphanes, expressed their contempt for the flesh and the ordinances of the Demiurgos in unbridled license. The contrasts of the flesh and the spirit and of the world and the kingdom of God are interpreted as the physical conflict of vast cosmic forces, and are thereby stripped of their moral and re¬ ligious significance. The intervention of Christ is the crisis, not only of the religious history of mankind, but of the whole development of the universe. As the final and perfect TEon, He is distinguished from His visible manifestation. This is held to be: (1) a real human life with which He was connected for a time, or (2) a heavenly or "psychical® creation, or (3) a mere phantasm. Men are divided into two classes: the Pneumatic or "spiritual,® who are constitutionally receptive of Christ's revelation and life everlasting, and the Hylic or "material,® .who are doomed to perish. Valentinians and others add a third, or intermediate class, the Psychical, or men of "soul,® who are not capa¬ ble of apprehending a divine revelation, but only of the popular faith (pistis), yet thereby may attain to a degree of knowledge and salva- tion.

The (Pistis Sophia, } edited by Schwartze and Petermann (Berlin 1853), is the only

Gnostic work that has come down to us in a complete form, except those apocryphal Gospels and Acts of the Apostles which show a Gnostic

tendency. Much of the system's tenets is learned from the writings and sermons of Irenseus, Hippolytus, Tertullian, Ignatius and Justin Martyr. Tatian's (Diatessaron5 was

*used in the Syrian Church down to the 5th century. The Gnostic Bardesanes of Edessa one of the last of the Syrian Gnostics, was the tounder of Syrian hvmnology. See Bousset, Miaupt probleme der Gnosis5 (Gottingen 1911) * Coxe, (Ante-Nicene Fathers) (10 vols., New York 1885—96) ; Faye, (Gnostiques et Gnosti- cisme> (Pans 1913); Mansell, 'Gnostic*

*xieresis ; Neander, 'Genetische Entwickelung der vor Nehmsten gnostischen Systeme5 (1818) • Moller, 'Ki.rchengeschichte,5 Vol. I (1889) * <ˆruan' <<ˆ>ri&ˆnes du Christianisme5 ; King**

T ."e Gnostics and their Remains) (1887) • Hilgenfeldt, .'Ketzergeschichte des Urchristen- thums . (Leipzig 1884) ; Harnack-Preuschen, iorvjS\ iˆer aˆtchnstlichen Litteratur5 (ib.,

*i893\'oˆad' translation (Lon- don 1896) ; Harnack, (History of Dogma) (\ ol I, London 1894); Rainy, (The Ancient Catholic Church5 (New York 1902): Schmidt, C°oPt,ls , gnostische Schriften5 (Leipzig *905) tz' W., (Dokumente der Gnosis5*

(Jena 1910).

GNOSTICS, a religious philosophical sect, who boasted of a deeper insight into the origin of the world, and of the evil of the world, than the human understanding, so long as it remains m equilibrium, can deem admissible, or even possible. Simon the magician, of whom Luke speaks in the Acts of the Apostles, was the first among them. .Even in his dogmas we discover the traces of ideas which were common to all the Gnostics. They may be reduced to the fol¬ lowing principal heads: The world and the human race were created out of matter by one aeon, called the demiurge, or, according to the later systems of the Gnostics, by several aeons and angels. The aeons made the bodies and the sensual soul of man (sensorium , psyche) of this matter; hence the origin of evil in man. God gave man the rational soul ; hence the constant struggle of reason with sense. What are called gods by men (for instance, Jehovah, the God of the Jews), they say, are merely such aeons or creators, under whose dominion man became more and more wicked and miserable. To de¬ stroy the power of these creators, and to free man from the power of matter, God sent the most exalted of all aeons, to which character pimon first made pretension; he was followed m these pretensions by Menander, a Samaritan the most celebrated of his scholars, who, toward the end of the. 1st century, founded a sect at Antioch in

Syria,. Simon and Menander were enemies to Christianity. Cerinthus, a Jew, of whom John the Evangelist seems to have had some knowledge, combined these reveries with the doctrines of Christianity, and maintained that the most elevated aeon, sent by God for the, salvation of man, was Christ, who had descended upon Jesus, a Jew, in the form of a dove, and through him revealed the doctrines of Chris¬ tianity. In the 2d century, during the reign of Hadrian and both the Antonines, these princi¬ ples were adopted by certain Christian philos¬ ophers, who are more particularly known under the name of Gnostics, and still further refined

extended and systematized. Saturninus, a byrian, speaks of an unknown supreme God, who had generated many angels and powers • seven of these aeons were, according to him creators of the world, and soon fell from God" one of them, the God of the Jews, had seduced man to him, whence originated the difference between good and bad men. Saturninus also calls Christ the Saviour sent by God, and the Son of God; but the opinion that Christ was not actually born, and had not a real human body, but only an incorporeal image, is peculiar to him, on which account his followers and other ater Gnostics who agreed with him in this respect were called Docetce (fiom Greek dotieiv to seem) and Phantasiasts. The system of Carpocrates, an Alexandrian, who also flour- ished during the reign of Hadrian, was distinguished from the one which we have just described in this respect only, that he con¬ sidered Christ as a mere man, whose purer and more powerful soul had more accurately remem¬ bered what it had seen with God before its union with the body. The fathers of the Church, Clement of Alexandria, Irenaeus, Euse¬ bius and Epiphamus, from whom, in general we derive all our information concerning the Gnostics, accuse the moral system of Carpo¬ crates of destroying all distinctions between good and evil, and inculcating an unlimited in¬ dulgence of the sensual appetites. Certain it is that his followers practised the most detestable vices, and were the cause of many of the calum¬ nies of the heathen writers concerning the Chris- hans of this century. The Valentinian party which rose toward the middle of the 2d cen- tury m Rome, and especially in Cyprus, and which was distinguished by its austere manners was the most numerous of all the Gnostic sects'*

fu /uunt^nued after the commencement of the 4th century. Marcion of Sinope, and Cerdo renounced many of the absurdities of the earlier Gnostics, and formed a regular sys¬ tem, the characteristic of which was the rejec¬ tion of the Old Testament. Bardesanes, a Syrian, and Hermogenes, an African, who in -gn of the Emperor Commodus, aposta¬ tized from. Christianity and established sects bordered, in their hypotheses concerning the fulglrV°/ go?d and evil, upon Gnosticism. On e whole, when we take into consideration the philosophical tendency of that age, the passion

*f?ˆthe*marveIous that had taken possession of the effeimimte nations of the Roman Empire and the custom of pretending to a deeper in¬ sight into the secrets of nature and the divinity it is not to be wondered at that a religious phi-]osophy which adopted the most brilliant parts of Platonism,, and which afforded nourishment alike to. the imagination and to the vanitv of secret wisdom, should have met with such uni¬ versal success. By the austerity of its precepts and its care for the well-being of the soul it even prepossessed good men in its favor The*

rentnrGc Pietist of the 3d and 4th*

centuries The Roman Catholic Church took

occasion from their heresy to give greater pre¬ cision to the articles of the orthodox faith, there have been no Gnostic sects since the 5th century ; but many of the principles of their sys¬ tem ot emanations reappear in later philosoph¬ ical systems, drawn from the same sources as

tneJbS‘ • P ato,s ilvfiy Representation had given to the idea of the Godhead something substan-

tial, which the Gnostics transferred to their aeons; and Leibnitz’s (Effulgurations of God,5 Ploucquet’s (Real Presentations of God,5 Saint Martin’s (Pictures and Mirrors,5 and the like, as well as the Gnostic aeons, are a proof that the. essays of the human understanding to ex¬ plain the creation and the origin of imperfect beings from the perfect always end in similar results. See Gnosticism and works there referred to.

GNU, nu, a Hottentot name of one of the two species of wildebeest. The wildebeests are African antelopes, forming the genus Con- nochetes. The white-tailed gnu or (

Another species, larger than above, and known as the brindled gnu, whose habitat was north of the Zambesi, has still escaped extirpa¬ tion in the interior. It is named C. taurinus, and has no long hair in front between the fore¬ legs ; there are dark stripes on the sides, and the tail is shorter and black. Consult Brvden (Nature and Sport in South Africa) (London 1897) ; Lyddeker, (Game Animals of Africa) (London 1908) ; Millais, (A Breath from the Veldt5 (1895) ; and the writings of South Afri¬ can sportsmen travelers from Gordon-Cum- ming (1850) onward.

GOA, India, a Portuguese colony on the Malabar coast. It. comprises the

capital, Panjin, and is about 60 miles in length and extends in¬ land to an average distance of about 30 miles. The area is about 1,469 square miles with a population of 515,772. In 1917-18 the estimated revenue of the colony was 1,591,022 escudos ($1,018,254.08) and the expenditure 1,810,977 escudos ($1,159,025.28).* It has a large transit trade, the imports in 1916 amounting to 3,550,984 escudos ($2,272,629.76)* and the exports to 1,209,009 escudos ($773,765.76).* The principal exports are cocoanuts, fish, fresh and salted, spices, caju-nuts, salt and copra. Goa was taken by Albuquerque in 1510 and has since been in the hands of the Portuguese.*

GOA, India, city of the Malabar coast in the Portuguese colony of the same name, of

(Based on the averaged value of the escudo for 1917 ($0.64) its normal value is $1 .09 American currency).*

which it was once the capital. It is the seat of a Catholic archbishopric, and is the primatial see of that Church in India. It contains a splendid cathedral, built early in the 17th cen¬ tury. In the early days of the colony Goa was a thriving city with a population of 200,000 souls, but about the beginning of the 18th cen¬ tury cholera epidemics became frequent and nearly all the Portuguese abandoned it and settled in Panjim, or New Goa, which has since then been the seat of the colonial administra¬ tion. Consult Baden-Powell, B. H., (The Vil¬ lages of Goa in the Early Sixteenth Century5 (London 1900), and Bruce, Henry, 'Letters from Malabar and on the Way5 (New York

1909).

GOA, a Tibetan gazelle.

GOA POWDER, a substance found in the wood of the Andira araroba, a leguminous tree growing in Brazil and the West Indies. It de¬ rives its name from Goa, a Portuguese colony on the southwest coast of British India, to which it was imported from Bahia for the first time in 1852. It has a bitter taste, is consid¬ ered efficacious in certain skin diseases and is used in the preparation of chrysarobin.

GOAJIRA, go-a-he'ra, a peninsula in Co¬ lombia, which forms the most northerly point of South America. It lies west from the Gulf of Maracaibo, or Venezuela, and runs north¬ east from the Sierra Nevada de Santa Marta to the volcanic Sierra Macuira, which forms its apex, . rising to a height of 2,800 feet. The coast is edged with sandbanks, but there is good anchorage at Bahia Honda. Its exports are dye-wood, dividivi, pearls and

wood for cab¬ inet work. Up to 1891 Venezuela laid claim to the peninsula, which in that year was formally ceded to Colombia.

GOAJIROS, go-a-he'ros, an Indian tribe inhabiting the peninsula of Goajira (q.v.), northwest of Lake Maracaibo, South America. They are reckoned at 30,000 souls, are sub¬ divided into numberless septs or clans, and for the most part are nomadic, but engage in fishing and cultivate the soil and keep flocks and herds. They are skilful weavers, and trade in dividivi and fine woods. Their dwellings are rectangu¬ lar in shape and built on piles in the mud in the little lagoons from which the country de¬ rived its name of Venezuela or (

GOAT. There is probably no other do¬ mestic animal that is so widely distributed as the goat, yet there is none of them concerning which we have so little scientific information. There are 10 species of wild goats, all but one of which (the Rocky Mountain goat) are con¬ fined to Europe and the Himalaya Mountains. These 10 species are divided into two groups • — the ibexes and the goats proper. The ibexes are composed of two sub-species — Capra fal- coneri and Capra cegagrus. The C. cegagrus is the Paseng, or Bezoar goat, or wild goat, of Persia, and is the progenitor of C. hircus, through which are descended all of the domes¬ tic goats of all countries. These are numerous in kind and variable in characteristics. Of these only the Angora and the Cashmere breeds and

the several breeds of milch goats are of special economic importance, arid these only will be treated here.

The Angora Goat.— The history of the Angora goat is traced to a distinctive breed even m the days of Abraham. This breed is a nati\ e of Angora, in Asia Minor. The geo¬ graphical distribution of this breed is not ex¬ tensive, their raising as an industry being con- hned to Turkey in Asia, South Africa and the Lmted States. They have been transplanted to many of the European countries, but with¬ out successful result. Australia has had a small number for 50 years, but the industry there can hardly be regarded as important. A few Angoras are thriving in Canada and ex¬ periments are being conducted with them in -Porto Rico and Cuba. Approximately stated

*ˆhmnnme-3'7ca0tl0 °A *hese Soats in Turkey,' 5,000,000 in South Africa and 800,000 in the*

United States. At this time they may be found in every State and Territory,

including Alaska Angoras were introduced into the United States from Asia Minor in 1849 by Dr. James B. Davis, of Columbia, S. C. The war scattered or destroyed nearly all that were in the Eastern and Southern States, but the few that had found their way to California and the South¬ west increased rapidly in numbers by crossing upon the long-haired Mexican goats. The re-

?imVUSt0f • industry came about the year 1900, when it was discovered that this country n˚t only had the mills to consume all of the mohair of domestic production, but was also importing over a million pounds annually. The organization in the same year of the breeders into a registry and fair association gave to the industry its first impetus ; and then the govern¬ ment assisted largely in exploiting the qualities of the animals. About this time, too, the ability of goats for destroying brushwood became widely known. These two leading features have tended to bring about a rapid growth of the industry.

The Angora goat is small, weighing gen¬ erally from 60. to 100 pounds, although many may be found in the United States that weigh as much as 140 pounds, and occasionally one much heavier than this. Males and females alike . have horns and beards, except that in rare instances one without horns may be seen. The h˚.rns of the male grow to a length of 18 to _0 inches and turn upward, outward and backward, while those of the female, which giow to a length of 8 to 10 inches, grow up- ward and point backward with only a slight in¬ clination to twist. The ears are usually medium long and pendant, but there are frequent speci¬ mens having ears that are short, pointed and pricked. Except in rare instances, the fleece is pure white, growing to an annual length of 10 inches and covering the entire body down to the knees and hocks. There is no goat odor with this breed except with the bucks at rutting time. The Angora usually has one kid at a hirth; two are not uncommon, and three are seldom dropped.

The uses of the Angora goat in the United States are three: (1) For the production of mohair (see Mohair) ; (2) for the production of meat; and (3) for the destruction of brush¬ wood and weeds. It is used rarely as a miich animal, owing to the uncertain quantity of milk which it yields.

The uses of mohair are many, and the de¬ mand has stimulated the breeding of animals of better quality. The average weight of the fleece at this time is about three pounds, but there are many animals of exceptional merit that will yield 12 pounds and even more and occasionally a flock that will average five pounds per head. The goats yield heavier fleeces in the colder parts of the country than in the warmer sections; and those animals taken from the southwestern States to the northern part of the United States show an increase the first year.

The Angora is the only one of the numerous breeds of goats that yields a carcass that is edible at all ages. The Angora kids, like those of other breeds of goats, are considered a deli¬ cacy, and the mature animal is free from the strong taste that is characteristic of other breeds. The size, shape and quality of the An¬ gora carcass make it to resemble so much that of the sheep that the packers slaughter large numbers of the low grade Angoras and sell them as sheep mutton. A peculiarity of An¬ gora. mutton is that it requires a longer time for cooking than does sheep mutton. In the south¬ western part of the country, especially on the arge ranches, where it is difficult to keep meat iresh, many grade Angoras are slaughtered for food; but in other parts of the country, where the animals are usually of high grade they are not generally slaughtered, being regarded aS 2,, more value, for mohair production.

Ihe predilection of goats for brushwood fu }veeds 1S characteristic of all breeds, but the Angoras are employed principally for this use because they are able to produce a market- able fleece at the same time they are cleaning

*Hp *he .land- In many parts of the United Mates they are regarded as of more value for c earing brushland than as monair producers .Lffis is especially true where the land cleared is suitable for raising large crops or growing*

rl1?0ˆ118 r°kChaids' iT,he total area of so

cleared of brushwood by these goats eree'ates

many, thousands of acres, and their'work is done in a most satisfactory manner. The goats first eat every twig and leaf within their reach while standing on their hind legs, seldom mak¬ ing any choice as to species of tree, and later

from0tt)SVen rCW paTsrturˆ wiI1 Peel the bark from the saplings. If they are again placed

upon land the second year, so that they may destroy the sprouts that put out from the stumps, their work will be completed, for the stump and roots then die. As the brushwood and weeds are destroyed and the sunlight thus permitted to reach the soil, the grass, if any variety is indigenous to the locality, will soon be observed [to spring up and thereupon spread rapidly. Where a good variety is not indige- nous, a common practice is to sow the seed. This method insures a grass pasture sooner

!kl:r dependm? upon, the natural grasses and their natural distribution over the cleared area

,!ˆLgf˚arS ?.rcfer browsing upon the brush- o eedmg upon the most luscious grasses and clovers and will give the latter very little attention ˆf there is enough of the former to

soilSnndthHlr-hU-nˆr' Thd.r presence uPon the ?£I] 1 a"d theJr mdirect assistance in producing

t e pasture do not make the grass objectionable

be astateTyht0 horses\ cattle or sheep. It should be stated, however, that goats will thrive upon

1 Angora Goat — Young Doe

2 Angora Goat — Buck

>

I

i ,

grass and clover if it becomes necessary, and there is no better rough feed for them in win¬ ter than clover hay.

The Cashmere Goat flourishes in Kashmir, in India, whence it receives its name, and in Tibet. Its color is usually white, and in many other ways it resembles the Angora; but its heavier and outer coat is coarse and not of economic value. Its under coat, called pashm, is very fine and light in weight, and brings very high prices. The amount of pashm produced by each goat annually is between two and three ounces. Most of this fibre is secured by comb¬ ing the animals when it loosens from the skin, but a considerable amount is picked from the bushes where the animals have rubbed in an effort to remove the sloughing hair. The famous Cashmere shawls, which, a half cen¬ tury and more ago sold at $100 to $2,000, were made of pashm. Dr. Davis brought one Cash- mere doe to the United States with his Angora flock in 1849; a buck of this breed died on the voyage. Nine others came in the Brewer im¬ portation about 1858. The Cashmeres appeared not to be able to survive the climatic conditions to which they were subjected here, and at this time there is probably not a single specimen in this country.

Milch Goats. — No one has attempted to state how many breeds of milch goats there are in the world; one writer says that there are no less than 16 in Switzerland. They are found in all European and Asiatic countries and in northern Africa.

In May 1904 there was an importation of 26 Toggenburg and Saanen goats from Switzer¬ land into the United States, and they are thriv¬ ing well in Massachusetts, New York, New Jersey and Maryland. So far as any records show, these are the only goats of pure blood that have been received, except four that came in 1893, which did not thrive well ; but it is believed that a few kids of Italian goats have been brought here by immigrant families from Italy, and that these have matured and been crossed with the common goats that are usually found in the suburbs of the large cities, thus lending something of their milk characteristics to these latter goats. It is not difficult to find good milkers among these common goats.

A good milch goat should have the same leading characteristics that are possessed by a milch cow. The goat should be level on the back, with slightly dropping hips; the hair, whether long or short, should be kept trimmed close on the udder; the udder should have a shriveled appearance immediately after milk¬ ing, and the teats should be long and slim.

Milch goats are prolific, seldom having fewer than two kids at a birth, and sometimes four of them. If not restrained they will breed three times in two years.

The quantity of milk that they give varies; a goat that will give two quarts of milk daily for six months is a good milker, but there are many of the best breeds that will yield four quarts a day with a lactation period of six to nine months. Thus it will be seen that, when body weight is considered, the goat is a larger producer of milk than the cow. The milk has a slightly different taste from that of the cow; the strong, acrid taste so often noted by those who have drunk it is due to unclean methods of milking. If the milk is drawn perfectly

clean and kept clean, it does not have either taste or smell that is offensive. It is highly regarded in the Old World for its health-giving properties and as a food for children. It is used quite largely in the hospitals in the Swiss and French Alps for tuberculous patients and for those suffering from stomach troubles.

Kids that are not to be kept for breeding are disposed of for slaughter, and there is a good demand for them among certain classes in the large cities. The flesh is exceedingly delicate, and nothing but the prejudice of people

against a matter which they have not tested prevents a larger production and consumption of kids. The kids should be from one to two months old when slaughtered, as after two months the flesh begins to grow tougher and stronger.

Common Goats. — According to the census report of 1910 there are 2,915,000 goats and kids in the United States, a gain of over 60 per cent in a decade. Their breeding can hardly be referred to as an industry, for they have thrived and increased in numbers in spite of neglect. They have been useful in an inci¬ dental manner only. A considerable number are used as pets for children, and occasionally a fair milker is found among them. Since the Angoras have demonstrated the ability of the goat to destroy brushwood, the common goats have been brought together in flocks in some localities and there employed also as brush de¬ stroyers. Most of them are in the West South Central division of the United States.

Goat-skins. — In normal seasons there is a considerable importation of goat-skins for glove¬ making, coming chiefly from British India, Mexico, Germany, Russia and Brazil. As much as $30,000,000 worth have been imported in a single year, and many persons have thought that the goat-skin industry ought to be devel¬ oped in the United States, since we have here all that is desirable in the way of climatic, soil and market conditions. This is doubtful, how¬ ever, since in all of the countries where the skins are produced in large quantities the wages of goat-herds is a mere pittance, and the car¬ cass is consumed for food. These two features seem to preclude a large goat-skin industry in this country. Goat-skins are used in the manu¬ facture of shoes, gloves, music rolls, morocco for book bindings, etc. The skin of the Angora goat is used as rugs and robes with the hair intact, and also for children's muffs, capes and for boas.

George Fayette Thompson, Bureau of Animal Industry , Washington , D. C.

GOAT-ANTELOPE, a term applied to certain small mountain-climbing ruminants, which in structure and habits are intermediate between typical goats and antelopes. Such are the white goat of the Rocky Mountains ; the chamois of Europe; and the gorals, serows, etc., of the Himalayan and other Oriental mountain regions. For description see their English names.

GOAT-FISH, one of the gaudy and edi¬ ble fishes, allied to the surmullets, of the genus Upeneus, which abound in the West Indies and Gulf of Mexico, and take their popular name from a fancied likeness of their bearded profile to a goat's. There are several species. The

English sometimes call their filefish (q.v.) by this name.

GOAT ISLAND, (1) an island in the Ni¬ agara River which separates the Horseshoe and American falls. (2) A large island in San rrancisco Bay, where there is a lighthouse and government station.

GOAT-LOUSE, a parasite living in the hair of goats. It is a biting louse of the genus 1 nchodectes , and that which infests the Angora goats (T. limbatus) is often troublesome. Vari¬ ous species occur in various parts of the world.

GOAT-MOTH, a large European malodor¬ ous moth (Cossus ligniperda), whose cater¬ pillar, the "auger-worm,® feeds upon decayed wood, boring a tunnel at the end of which, a|ˆi.'tˆree years of growth, it forms a cocoon of chips gummed together by a secretion, and transforms within it.

GOATSBEARD, a small rosaceous plant of American woodlands (Aruncus aruncus) , closely allied to spiraea, with minute white flow¬ ers in dense panicles blooming in June, in rich woods of the Mississippi Valley; and also on the northern Pacific coast and in Europe and Asia. ˆ 7 • name is also given to a saxifrage (Astilbe biternata) , and to dandelions of the genus Adopogon and some other plants

GOATSUCKERS, a. family of birds, de¬ fined under Caprimulgidce, so erroneously named that the term should be abandoned. See Nightjar; Nighthawk; Whippoorwill, etc.

ffo-ba , Samuel, English mission¬ ary: b. Bern, Switzerland, 26 Jan. 1799- d. Jerusalem, 11 May 1879. After completing a course in Oriental languages in the Mission House at Basel, he became a missionary, going to Abyssinia in 1826 for the English Church Missionary Society. In 1829 he had reached Gondar, but in 1832, upon the outbreak of war jn that part of the country, he returned to Eng¬ land. In 1834 he made another journey to the same country, but owing to illness again had to go home. In 1839 he was sent to Malta, where he worked on a translation of the Bible into Arabic andˆ had charge of the presses there, and in 1845 was appointed a director of the Protestant College. In 1846 Friedrich Wilhelm IV of Prussia placed him in charge of the joint Lutheran and Anglican see of Jerusalem an appointment which he held until his death.

It was in the orphan schools and hospitals of Jerusalem, Nazareth and other cities of Pales¬ tine that he did his greatest missionary work

J°urnal Three Years in Abys- sima (1847). A translation of his biography

by Rovnch appeared in London in 1884.

GOBELIN (gob'lan) MANUFACTORY

a tapestry manufactory at Paris, established by Colbert in 1667. The Gobelin tapestries excel everything of the kind in Europe. Many cele¬ brated paintings of the Italian, French and opamsh schools have, in the most marvelous mannei, been transferred to tapestry. Among the more celebrated of these may be mentioned the portrait of Louis XIV, by Rigaud (the orig¬ inal of which is in the Louvre! ;

T 5fiTlt^x?1%a,lar&e work, 23 feet in height; a head by Nicholas Poussin, copied by Marie Gilbert, etc. The first two of these are to be seen in the Gobelin Gallery. All are character¬ ized by splendor of coloring and delicacy of ex¬

ecution. The establishment is now carried on at the expense of the government.

GOBI, go'be, Desert of, China, the Shamo, °r san) °f the Chinese, an immense tract of desert country, occupying nearly the centre of the high tableland of eastern Asia, between lat. 35° and 45° N., and long. 90° and 110° E., and extending over a large portion of Mongolia and Chinese Turkestan. Its length is probably about 1,800 miles; mean breadth, between 350 and 400 miles ; area, 300,000 square miles. Its general elevation is over 4,000 feet above sea- level. It consists of mountains, tablelands and dreary wastes of sand. The rainfall is slight and the climate is very severe. The East Gobi is occupied by different tribes of the Mongolian race, who have numerous herds of camels, horses and sheep. In the West Gobi are some nomadic tribes of the Tartar race. This tract is supposed at one time to have been a great mHnd sea. Several caravan routes lie across the desert from China proper to Siberia. Most of the inhabitants are Buddhists. Marco Polo alludes to Gobi, but the Jesuit Gerbillon was the first to give definite information concerning it having crossed it several times in 1688-98. Sub- ^quentby it was explored by Ysbrand Ides in }°?2— H and by Lorenz Lange in 1727-28 and 1/30. Within the last half century accurate in¬ formation has been furnished by various ex¬ plorers, notable among whom are Przhevalski and Sven Hedin.

/ u /r ' n ASDury, American edu- ?§£ric\Terre ?a"te, !nd.f 25 March 1842. In lb6^.-o5 he was in the Union army, was gradu¬ ated from Indiana Asbury College (the present DePauw University) in 1870, was admitted a licensed preacher of the Northwest Indiana Conference of the Methodist Episcopal Church

SI1! vanous Pastorates in Indiana. In 1880-86 he was professor of the Greek lan¬ guage and literature at DePauw, in 1886-90 ° Baker University (Baldwin, Kan.) in 1890 became dean of the theological faculty at DePauw Member of the General Confer- 1892v Cleveland 1896, Chicago 1900 and Minneapolis 1912, and member Ecu¬ menical Conference, London, England, 1901 Piesident of DePauw from 1896 to 1903 Vice-president since 1903. . His writings comprise articles and reviews in religious and secular periodicals.

- — w jusepn Arthur.

Count de French diplomat and author – b Bor-

deaux, 1816; d. Pans, 17 Oct. 1882. He served in the French diplomatic corps in the various capitals of Europe, at Athens in 1868, at Rio Janeiro, South America, and at Stockholm.

AsU> MR ?o? a WntlrgS arC (Troi ans en i1859?A .Les rehgiones et les philoso-

des PerscsS> olKc 0865); GOBLET, go-bla', Albert Joseph, Bel-

dT873° dMr and. statesman : b. Tournai 1790; ct. 1873 He participated in the battle of Water-

*l°f°w!d * tCr *he ?evolution became Minister 1 a .re.mainmg m that position until he was made Minister of Foreign Affairs in 1832. In*

nnJ hi ?Ppointed Ambassador of Spain, a R? V!e held for two years, and it was then that

bhn tt e ?u Count d Alviella was bestowed upon him by the queen of Spain. In 1843 he was again appointed Minister of Foreign Affairs,

and for two years in this capacity his influence cn all public matters was felt to a marked de¬ gree. He also planned the fortification along the frontier of northern Belgium, and extended those already built around Antwerp. He wrote (Des cinq grandes puissances de l'Europe dans leurs rapports politiques et militaires avec la Belgique (1863) ; (Dix-huit mois de politique* (1865), etc.*

GOBLET, D'Alviella Eugene, Count, Belgian archaeologist and religious

historian : b. 1846. He became professor of the history of religions at the University of Brussels, after¬ ward being elected a Liberal member of the Belgian Chamber of Deputies. In 1892 he was elected to the Senate. After traveling through the Sahara Desert he began his writings, the more important of which are (Sahara and Lap- land) (1875) ; Unde et Himalaya) ; (The Con¬ temporary Evolution of Religious Thought in England, America and India (1885) ; (The Migration of Symbols) (trans. Sir George Birdwood 1894) ; (Ce que l'lnde doit a la Grece* (1897) ; (Croyances, Rites, Institutions) (3 vols., 1911).*

GOBLET, Rene, French statesman: b. Aire-sur-la-Lys, 26 Nov. 1828; d. Paris, 13 Sept. 1905. He practised law at Amiens, and entering in 1871 the National Assembly, iden¬ tified himself with the left Republican group, and became known as an orator, particularly through his part in the discussion respecting the revision of the pension-list for officials un¬ der the empire. In 1882 he became Minister of the Interior, in 1884 of Education and in 1885 of Education and Public Worship. Prime Minister in 1886-87, he was Minister of Foreign Affairs in 1888-89, was elected senator in 1891 and sat in the Chamber of Deputies as a Radi¬ cal in 1893-96.

GOBY, go'bi, any one of the 400 species of fishes belonging to the family Gobiidoe. They are small carnivorous animals, occurring chiefly on the bottoms of tropical seas and ponds. Most of the species have the ventral fins united into a sucking disc. Most interesting of the gobies are the mud-skippers (Periophthalmus) of the western Pacific, which hop about the shores by aid of their pectoral fins, feeding upon insects and naked mollusks. Many of the gobies make nests for their eggs.

GOCH, goH, Johannes von (proper name, Johann Pupper), German monk, precursor of the Reformation: b. Goch, Prussia, about 1400; d. Mechlin, 28 March 1475. He was edu¬ cated at Cologne. All that is known of his subsequent life is that he established an order of canonesses at Mechlin in 1451, that he at¬ tempted to introduce reforms in the convents there and for 24 years acted as father con¬ fessor of the deaconesses at Thabor. He was a man of great piety and in his day was com¬ pared with a Kempis as a theologian. In his writings he demanded that the Bible should chiefly be explained by itself and laid great stress on love, piety and on evangelical freedom. His principal works are (De Libertate Chris¬ tiana and (Dialogus de quator erroribus circa legem evangelicam exortis.* Consult Clemen,*

GOD, the Supreme Being, the First Cause, and as considered nowadays throughout the

civilized world, a spiritual being, self-existent, eternal and absolutely free

and all-powerful, distinct from the matter which he has created in many forms, and which he conserves and controls.

There does not seem to have been a period of history where mankind was without belief in a supernatural author and governor of the uniyerse. The most savage nations have some rudimentary ideas of God. Man is a religious as well as a rational animal. The instinct of belief in God is asserted by philosophical theists to be reconcilable with reason, although no competent apologist now stakes the existence of God on any. one argument, or exhibits the proof as a series of syllogisms. It is rather maintained that the study of human history, of. human nature especially on its moral and spiritual side, and of the world as far as sci¬ ence reveals it to us make for the existence of a God, demand such a postulate as the key to the universe, and render the belief in a personal God greatly more probable than any other thesis

— a subject vastly too wide for discussion here. But it is necessary to name what are often re¬ ferred to as the four great arguments for the existence of God.

(1) The ontological argument first formu¬ lated by Saint Anselm proceeds from the no¬ tion of a most perfect being to infer his exist¬ ence; without actual existence the idea would fall short of perfection. The argument was restated in a different shape by Descartes (q.v.) and by Samuel Clarke, and though very con¬ temptuously treated by Kant, is still an element of the argument that without a God the world is a chaos.

(2) The cosmological argument, employed by Aristotle, Aquinas and a host of Christian authors, is an application of the principle of causality. We cannot conceive an infinite re¬ gression of finite causes; therefore beyond the last or first of the finite causes is the Infinite. From motion the argument is to a mover.

(3) The teleological argument, or argument from design, proceeds from the order and ar¬ rangement of the universe, the reign of law and beauty and adaptation, to the intelligent and supreme fountain of order. This is the most familiar of the arguments, especially on the lines laid down by Paley. Kant was the first of the moderns to object to this mode of proof. He was followed by Mill and Spencer, whose objections are based upon the relativity of knowledge, which renders a conception of a Supreme Being essentially unintelligible. The more popular objection against the idea of God is that because it is incapable of proof,

— of such proof as is given to the propositions of science.

(4) The moral argument was that relied on by Kant (q.v.) when he destructively criticized the other three, and forms a part of most mod¬ ern theistic arguments. God is a postulate of our moral nature ; and the moral law in us implies a lawgiver without us.

Consult Adeney, (The Christian Conception of God) (New York 1912) ; Clarke, (The Christian Doctrine of God) (ib. 1909) ; Fiske, (Through Nature to God (Boston 1899) ; Martineau, (Study of Religion) (Oxford 1888) ; (The Idea of God* (Boston 1887) ; Flint, (The- ism) (1877) ; Harris, (The Philosophical Basis of Theism* (1883) ; (The Grounds of Theistic*

aAnd Chnstˆn Behef> (1883); the Duke of Argyll, 'The Reign of Law> (1890); Kant's (Critique of Pure Reason; Mill's (Three Es- ˆsVTanef's (Final Causes) (trans. 1878); Gifford Eeetures (1888); Orr, 'Christian View of God and the World > (London 1897) konayne, (God, Knowable and Known) (1898) Driscoll, 'Christian Philosophy — God* (1902)*

/The Development of Religion > (New York 1910).

GOD, Name of, in Different Languages,

may be seen from the following list: Elohim Hebrew; Gott, Swiss and German; Eilah, Chal- dam; Goed Flemish; Eleah, Assyrian; Godt, 5ut.cˆ i ' A.la.h, Turkish and Syraic; Alla, Malay; Goth Teutonic ; AHah, Arabic; Gude, Danish and Swedish; Teut, old Egyptian; Teun, new Egyptian; Gude, Norwegian; Teuti, Armarian ; Bogo, Polish; Theos, Greek; Bung, Polacca ; Jubinat, Lapp; Sire, Persian; Magatal, Tartar; Deus, Latin; Diex, Latin, low; Diu, Gallic; Dieu, hrench; Dios, Spanish; Deos, Portuguese; Diet, Old German; Diou, Provencal; Doue, low Breton; Dio, Italian; Dia, Irish; Deu, Olala tongue; Thios, Cretan; Jumala, Finch; As, Runic; Fetiyo, Zemblian; Istu, Pannonian; Rain, Hindostanee; Brama, Coromandel; Prussa, Chinese; Goezur, Japanese; Zannah, Madagascar; Puchecammse, Peruvian.

GOD SAVE THE KING (or QUEEN),

the burden and common title of the English national anthem.. Concerning the author and the composer opinions differ. It has been as-

*SG-rjeii *bra*i Henry Carey, who lived about the middle of the 18th century, was both ; but, being ignomnt of the rules of composition, employed Dn Thornton, of Bath, or, according to some, Christopher Smith,*

*Handel's clerk, to correct his rough draught, and add the bass. This story gave rise to the assertion that Handel was The words and music were first published in Harmonica Anglicana in 1742 and reprinted in the Gentleman's Magazine in 1745 when the landing of the young Stuart called forth expressions of loyalty from the adherents of the reigning family. After Dr. Arne the composer of «Rule Britannia,® had brought it on the stage, it became very popular. Accord¬ ing to a notice in the New Monthly Magazine, Vol. IV, page 389, there is a copy of this na¬ tional song, published without date by Riley and Williams, in which Antony Young, organ¬ ist in London, is called the author of the air. There is also a story that this national song, as Burney, the author of the 'History of Music,) maintained, was not made for King George • but that, in the older versions, it ran thus, "God save great James our king®; and Burney adds, that it was originally written and set to music for the chapel of James II, but that no one dared own or sing it after the abdication of James, so that the song lay dormant 60 years before it was revived for George II. Another account ascribes the air to John*Bull, who was organist to the chapel of Queen Elizabeth in the last years of her reign. Translated by Heinrich Herries in 1790, it was adapted by G. B. Schumacher as the Prussian national anthem. The American hymn, 'My Country, Tis of Thee,* is set to this tune. Consult !iiˆemari on (National Anthems * (Gentleman's Magazine , Vol. 275, 1893) ; Hadden, 'God Save the Queen Myths* (Argosy , Vol. 72, 1900) ;*

Cummings, 'God Save the King (1902). See National Hymns.*

GODAVARI, ga-da'va-re, a large river in southern India. Its source is in the western Ghauts, about 70 miles northeast of Bombay, and flows southeast into the Bay of Bengal. Its total length is 900 miles; its drainage basin has an area of 112,000 square miles. About 50 miles from the sea the river runs down to the sea through a wide alluvial delta formed by masses of silt deposited by the river, and into which canals have been cut. Its principal tribu¬ taries are the Parna, Pran'hita, Indravati, Man- jera and Maner. In respect to scenery, utility to man and sanctity, this river is surpassed only by the Ganges and the Indus.

GODDARD, Arabella (Mrs. J. W. Davi¬ son), English pianist: b. Saint Servan, Brit¬ tany, 12 Jan. 1836. At eight years old she had lessons from Kalkbrenner in Paris and subse- quently studied under Mrs. Anderson, Thal- b erg and J. YV. Davison in England. She made her debut at the Grand National Concerts at Her Majesty's Theatre in 1850 and was the hrst pianist to play Beethoven's posthumous sonatas in Great Britain. In 1854—55 she went on a concert tour of Germany and Italy, re¬ ceiving great acclaim in Leipzig, where she appeared at the Gewandhaus Concert in 1855. In 1873-76 she toured through America, Aus¬ tralia, India, Java

and China and took part in

-Ar.thur Sullivan's concerts at the Paris Exhibition of 1878. In the same year she retired from public life.

GODDARD, Calvin Luther, American in-

Tnnn°r:TTb- Covington> N. Y., 22 Jan. 1820; d.

1 j f~le was graduated from Yale in 1845 and subsequently devoted his attention to the invention of labor-saving contrivances em¬ ployed in the wool industry. Among his vari- ous inventions of this character may be cited feed rolls for carding machines, a burring picker for the purpose of cleansing wool and solid packing burring machines. He was the recipient of many medals for his inventions and improvements in the handling of raw cot¬ ton, among them a special gold medal from

w World's Fair (1862) and the Paris

Worlds Fair (1867).

GODDESS OF REASON. In 1793, dur- mg the Revolution in France, several officials of the new regime proclaimed the suppression of all religious worship and invited the clergy to alqure thfeir errors. Fouche, at Nevers, was the first who set out to suppress the clergy and to convert sacred objects into either money or bronze for cannon. A great number of the clergy, including Gobel, metropolitan of Paris came forward and abdicated their sacred func¬ tions. To take the place of the o?d cult the Convention proclaimed the feast days of the Goddess of Reason. Notre Dame was dedi cated to her and a solemn celebration took place

£nre « M,OV-J 179Y 4n actress of the Opera, Mile. Maillard, took the part of the goddess

bhe was received by the Convention whence she marched in procession to her temple and there was enthroned on the high altar, while the people sang the Hymn of Liberty. Similar celebrations were held at divers places through- outj the country, but the new worship declined under Robespierre and Notre Dame was re¬ stored to Catholic worship in 1802.

GODEFROI, gdd'frwa, Michael M., Dutch jurist: b. Amsterdam, 13 Jan. 1814; d. Wurz¬ burg, 27 June 1882. Devoting himself to juris¬ prudence,

his abilities soon attracted attention and in 1846 he became judge of the Provincial Court for North Holland, and in 1848—81 was elected member of the States-General. In 1860 he prepared a new code of judicial practice and procedure and in the same year became Minister of Justice. A defender of the rights of the people, he labored none the less to promote Jewish emancipation in Switzerland, Rumania and elsewhere, insisting in exhaustive addresses that no commercial treaties should be ratified with any country until guarantees be given that Netherland Jews receive equality before the law in that land.

GODERICH, gd-d'rich, Canada, capital of Huron County, Ontario, port of entry, on Lake Huron at the mouth of the Maitland River, on the Grand Trunk and Canadian Pacific rail¬ ways, 133 miles northwest of Toronto. It has a good harbor, steamship lines to various ports, and its people trade largely in fish, salt and lum¬ ber. It is in a good farming district, lumber¬ ing and boat-building are important industries, its fisheries are extensive and large salt-wells make salt-refining one of its chief industries. There are also manufactories of foundry prod¬ ucts, machinery, organs, knitting machines, woolen, leather, boots and shoes, woodenware, etc. ; flour and saw mills ; and large grain ele¬ vators. Pop. (1911) 4,522.

GODESBERG, gods'berg, Prussia, a vil¬ lage of the Rhine Province, on the Rhine, near Bonn. It contains mineral springs to which great numbers have recourse annually. In the vicinity lie the ruins of the castle of Godesberg, erected in the 13th century and destroyed by the Bavarians in 1583. The village has ex¬ tensive brickyards and large quilting establish¬ ments. Consult Dennert, (Godesberg, eine Perle des Rheins) (Godesberg 1900). Pop. 10,600.

GODET, go-da', Frederic, Swiss theolo¬ gian: b. Neuchatel, Switzerland, 25 Oct. 1812; d. 1900. After having been tutor to the Crown prince of Prussia, he became in 1850 professor of theology at Neuchatel. In 1873 he left the state Church and was appointed professor by the Free Church of Neuchatel. He is best known for his great commentary on Saint John's Gospel (1863-65; Eng. trans. 1877), fol¬ lowed by commentaries on Luke (trans. 1875), Romans (trans. 1881), and Corinthians, besides Conferences Apologetiques5 ; (Etudes Bib- liques) (trans. as (01d Testament Studies and New Testament Studies, } 1875-76) ; Hntroduc- tion to Paul's Epistles) (1893).

GODETIA, a genus of plants of the Even¬ ing Prmrose family, containing about 30 species, natives of western North and South America, especially of California. The plants are annuals with narrow leaves and spikes of large, showy, rose, purple or white flowers. G. amcena, the best known species, sometimes known as farewell-to-spring, and G. grandiflora are

common in cultivation.

GODEY, Louis Antoine, American pub¬ lisher: b. New York, 6 June 1804; d. Philadel¬ phia, 29 Nov. 1878. He was educated in his native city. He founded the periodical, Godey's Lady's Book , the first women's period¬ ical in the United States, at Philadelphia, in

1830, and continued its editor and proprietor until its sale to a stock company in 1877. His other publications included (Jarvis' Musical Library, > the Young People's Book and the Daily Chronicle.

GODFATHER and GODMOTHER

(also, in infant baptism, called sponsors), the persons who, by presenting a child for the sacrament of baptism and taking upon them¬ selves the vows of faith and obedience, as proxies for the child and in the name of the child, are reputed to contract toward the newly baptized the relation of spiritual parentage. In the Roman Catholic Church this spiritual re¬ lationship is regarded as a species of kindred (whence the name gossip or God-sib, (

In the Church of England, by whose rule two godfathers and a godmother are required at the baptism of a male, and two godmothers and a godfather at that of a female, no impediment of marriage arises from the relation of the sponsors to the baptized. The parents of the baptized are not permitted to act as sponsors in the Roman Catholic Church, one of the objects of the institution being to provide in¬ structors in case of the death of parents; but the rubric of the American Prayer-book does so allow.

The institution of sponsors was very ancient, and Tertullian (192 a.d.) speaks of the promises made by sponsors in baptism. In the early Church no more than one sponsor was required, a man for a man and a woman for a woman. In adult baptism, the godfathers and god¬ mothers are not sponsors, but only ((chosen wit¬ nesses,® as the person to be baptized takes the vows himself and in his own name.

GODFREY, Thomas, American mathe¬ matician and mechanician: b. Bristol, Pa., 1704; d. Philadelphia, December 1749. He was a glazier in his native city; but accidentally meet¬ ing with a mathematical treatise, was delighted with the study, mastered all the books on the subject that he could obtain and instructed him¬ self in Latin in order to read mathematical works in that language. He borrowed a copy of Newton's

vention. The society bestowed on Godfrey a re¬ ward of household furniture valued at £200, instead of money, on account of his intemperate habits.

*r fj*P^FREY, Th°mas, American poet, son or ihomas Godfrey, mathematician: b. Phila¬ delphia, Pa., 4 Dec. 1736; d. near Wilmington, INI. C., 3 Aug. 1763. He is remembered as being the author of 'The Prince of Parthia> (1759) a tragedy, considered to be the first drama pub- United States. In 1763 appeared*

Ihe Court of Fancy; a Poem, modeled some- what upon Chaucer's 'House of Fame,> and in 1/67 his poems were collected in a volume bv his friend, Nathaniel Evans.*

GODFREY OF BOUILLON, boo-yon', king of Jerusalem: b. Baisy, in the Walloon Brabant, near Nivelles, about 1058; d. Jerusa¬ lem, 15 July 1100. In 1076 he succeeded his Un u i duchy of Bouillon. He distin¬*

guished himself by his heroic courage at the siege of Rome, and the fame of his exploits procured him, in 1095, the command of one of the armies of the first Crusade. In 1096 God¬ frey, with his brothers Baldwin and Eustace, commenced his march to Constantinople, the meeting-place of the crusading armies. So great had been the difficulties of the way that it was only a short time before Christmas when he reached Constantinople. Here new delays occurred. The Emperor Alexius Commenus would not consent to allow the Crusaders to cross into Asia Minor until the leaders had sworn to give up to him all the lands which they should conquer which had previously belonged to the Roman Empire, and to remain his faith¬ ful vassals for all time coming. This Godfrey at first indignantly refused to do, but after a long course of hostilities finally yielded to the demands of Alexius. On 1 May 1097 they crossed the Bosporus, and before the end of the year the Crusaders encamped before Anhoch. The town fell into their hands on 3 June 1098, but the citadel held out much longer. In the following year (15 July 1099) Godfrey took Jerusalem itself, after a five weeks' siege. Ihe infidels were indiscriminately massacred notwithstanding the endeavors of Godfrey to put a stop to the slaughter. Eight days after the capture of Jerusalem the leaders of the army elected him king of the city and the territory but Godfrey, declined the kingly title on the ground that it would not be becoming for him to wear a crown of gold where his Saviour had worn one of thorns, » assuming that of baron and guardian of the holy sepulchre. The sultan of Egypt now raised an army of 400 000 men for the purpose of expelling the Crusaders, but Godfiey decisively defeated him in the plain of Ascalon. This victory placed him in pos¬ session of nearly all the Holy Land. Godfrey now turned his attention to the organization of his newly established government, dying just a year after the capture of

Jerusalem. He was buried in the church of the Holy Sepulchre.

GODFREY OF STRASSBURG. See

Gottfried of Strassburg.

GODHAVN, god'havn, or LIEUELY,

Greenland, on the south coast of Disco Island It is the capital of the Danish Northern In¬ spectorate. Pop. 300.

GODING, Czechoslovakia, town in Mo¬ ravia, on the March, 70 miles northeast of

Vienna. It is the seat of an imperial castle surrounded by a great park, both of which are prime objects, of interest to visitors. The towns industrial . establishments include sugar¬ refining works, distilleries, a brewery, saw mills and a tobacco factory. There are also cavalry barracks and horse depot and two high schools, one for Czechs and one for Germans. Pop'

10,230.

GODIVA, go-di'va, a legendary English heroine. She was the wife of Leofric, Earl of Mercia and Lord of Coventry in the reign of Edward the . Confessor. The inhabitants of Coventry having on one occasion offended their master, he punished them by inflicting so heavy a. fine that they were unable to pay it. In their distress they appealed to Lady Godiva to inter¬ cede for them, saying that if they paid the fine they must starve. Godiva, sympathizing with the people, went to her lord to plead that, for her sake, the tax might be remitted. Leofric, when, she persisted in her entreaties, at last half jocularly and half contemptuously, that he would grant her request if she would ride naked through the town of Coventry. Having first re¬ ceived permission from her lord to fulfil the condition imposed Godiva caused it to be made known on what terms the earl had agreed to relieve the people from the tax, and then pro¬ claimed that on a certain day no one should leave his house before noon, that all windows and other apertures in the houses should be closed and that no one should even look out until noon was past. She then mounted naked on her palfrey, rode through the town and returned • and Leofric, in fulfilment of his promise' and in admiration of his wife's heroism, freed the inhabitants from the burdens he had im¬ posed on them. Only one person, the story says attempted to look out, and he was immediately struck blind. The incident is commemorated by a stained glass memorial in Saint Michael's Church Coventry. A mediaeval pageant cele¬ brating Godiva's ride was a. feature of Coventry fair tor several centuries, and recen attempts to revive the pageant have been made. Consult Tennyson s ' Godiva > ; and Harris's

‘Story of Coventry > (London 1911).

GODKIN, Edwin Lawrence, American

jo-nahsl and essayist: b. Moyne, Ireland, 2 Oct 1831 ; d. England, 20 May 1901. He was graduated from Queen’s College, Belfast, in 18M, and subsequently was correspondent dur-

At? thnQCJaf5ar for the London Daily News (1854-56). He came to the United States as correspondent, of that journal and after some time spent in travel was admitted to the New \ork bar in 1858. During the Civil War period he corresponded both for the Daily Vˆ.and the New York Times, and in 1865 fv t ab 1 i s h e d The N ation, which was merged with the New York Evening Post in 1882. He con- tinued to edit both papers from that date until shortly before his death. He published a ‘His-

Mr d °£ ?!lngary> (1856> i (The Problems of Modern Democracy > ; ‘Reflections and Com-

ment)S /i onF\nf °TT Seen Tendencies of Democ¬ racy (1898). He was an able, forceful writer w o often strenuously opposed dominant polit¬ ical tendencies or principles, but whose entire conscientiousness was never disputed Under his management the Post and the Nation ac¬ quit ed a great influence over the more thought¬ ful members of the community. His concep-

tion of public office as a public trust helped mold the best political theories of the time. He condemned the <(spoils® or close party sys¬ tem in American politics, and <(boss® and ((ma- chine rule® in all its forms. His fearlessness in exposing corruption often exposed him to abuse and misunderstanding. In 1890 during an election campaign in New York he pub¬ lished with editorial comment a series of biog¬ raphies of Tammany leaders, which led to his being prosecuted for criminal libel. The charges were dropped, however. In 1897 he received the degree of D.C.L. from Oxford University, and in 1903 a memorial Godkin lec¬ tureship was founded at Harvard dealing with the duties of the citizen and the essentials of free government. Consult Ogden, R.,

GODLESS MONTH, the 10th month of the year with the Japanese, so called by them because then the lesser divinities were consid¬ ered to be absent from their temples for the purpose of paying the annual respects to the celestial Dairi, a word which, in Japanese, means ((the Great

Interior,® that is, of the im¬ perial palace, and in a general sense the person of the Mikado, whose title, <(King of Heaven® or ((Son of Heaven,® implies his divine right to such homage.

GODMAN, John D., American naturalist and medical writer: b. Annapolis, Md., 1794; d. Germantown, Pa., 17 April 1830. He was graduated at the University of Maryland in 1818. In 1813 he entered as a sailor in the flotilla then stationed in Chesapeake Bay, but in 1815 left the service, and commenced the study of medicine. After lecturing for some time at Baltimore in the room of the professor of anatomy in the University of Maryland, and holding a chair of anatomy for a short time at Cincinnati, he settled in Philadelphia as a physi¬ cian and private teacher of anatomy. In 1826- 27 he was professor of anatomy and physiology in Rutgers Medical College in New York, and was one of the editors of the Philadelphia Journal of Medical Science. His chief work is his (American Natural History® (1828). He also wrote (Anatomical Investigations) ; Ac¬ count of some Irregularities of Structure and Morbid Anatomy) ; (Rambles of a Naturalist, etc.*

GODMOTHER. See Godfather.

GODOLLO, ge-del'le, Hungary, a market town 15 miles north by east of Budapest. It contains a royal castle, which, since 1867 is the royal summer residence. It is surrounded by magnificent grounds in which a great royal hunting party is held annually. The town con¬ tains a school for instruction in operating hand looms. Windischgratz, the Austrian general, was defeated here by Gorgey, the Hungarian commander, on 6 and 7 April 1849. Pop. 5,890. Consult Ripka,

GODOLPHIN, Sidney, 1st Earl of, English statesman : b. near Helston, Cornwall, June 1645; d. Saint Albans, 15 Sept. 1715. He was an opponent of James, Duke of York, and a supporter of Shaftesbury during the exclu¬ sion agitation, but nevertheless continued in office after the accession of James II. On the flight of that monarch, Godolphin voted for a regency, yet was, after the settlement of the crown on William and Mary, made first com¬

missioner of the treasury. During the reign of Anne he was appointed lord high-treasurer of England, and did much to improve the public credit, and check corruption in the administra¬ tion of the public funds. In 1706 he was made Earl of Godolphin, and four years afterward was obliged to retire from office.

GODON, Sylvanus William, American naval officer: b. Philadelphia, 18 June 1809; d. Blois, France, 10 May 1879. Appointed mid¬ shipman in

1819, he was active in the Mexican War, and in the Civil War, in command of the Mohican, with rank of captain, took part in Du Pont's attack on Port Royal (1861). In 1863 he was promoted commodore and in 1864-65 commanded the fourth division of Porter's fleet in the attacks on Fort Fisher. Having com¬ manded the South Atlantic squadron in 1866-67 and the Brooklyn navy yard in 1868-70, he was retired in 1871 with rank of rear-admiral.

GODOWSKI, go-dov'ske, Leopold, Polish- American pianist: b. Vilna, Russian Poland, 13 Feb. 1870. A pupil of the Hochschule of Ber¬ lin and afterward of Saint-Saens, he made con¬ cert tours in the United States in 1884-85 and 1890-91. In 1895-1900 he was director of the pianoforte department of the Chicago Conserv¬ atory, to which post he was again appointed in 1902. In 1909 he accepted the office of director of the piano-teacher's school at Vienna. His compositions include concert arrangements of well-known works, concert studies, etc.

*GODOY, go-do'e, Jose Francisco, Mexican diplomat and author : b. Tampico, Mexico, 9 Aug. 1851. He studied law, was admitted to the bar in California and practised in the United States and Mexico. He was also active as a journalist. He entered the diplomatic career in 1888; was charge-d'affaires and then Minister in Central America; several times charge-d'affaires in Washington, D. C., and Minister from 1907 to 1914 in Cuba, where he became dean of the diplomatic corps. He rep¬ resented Mexico at the < San Antonio Inter¬ national Fair (1889 and 1890) ; at the World's Columbian Exposition in Chicago (1893) and at the Pan-American Exposition of Buffalo (1901) and was one of the secretaries of the Second Pan-American Conferences held at Mexico City (1901-02) arid at other gatherings of importance. He has written various works in English and Spanish and lately made a suc¬ cessful Spanish version of ex-Ambassador Gerard's (My Four Years in Germany.**

GODOY, Manuel, Duke of Alcudia, Span¬ ish noble: better known as the Prince of Peace: b. Badajoz, 12 May 1767 ; d. Paris, 4 Oct. 1851. He entered the Guards in 1787 and was admitted to the presence of the queen, whom he at once captivated by his handsome person and pleasing manners. The imbecile king, Charles IV, was as much pleased with him as his spouse and he was thus established as a favorite. In 1795, as a reward for the part he had taken in con¬ cluding peace with France, he was presented with a large landed estate and made a knight of the Golden Fleece. It was on this occasion also that he was named by the king Prince of Peace. Other honors and largesses continued to shower upon him, till at last the whole power of the Spanish monarchy was concentrated in his hands. As he used it in the promotion of French rather than Spanish interests, he became

extremely unpopular and an outbreak took place in 1808. He in consequence sought an asylum in France, where he employed the influence which he still possessed over the Spanish king to in¬ duce him to abdicate in May 1808. Notwith¬ standing the enormous wealth which he had at one time accumulated, he lived a long time in Paris in poverty, maintained chiefly by a small pension from Louis Philippe. He was the author of a work published in a French trans¬ lation made under his supervision (1836-38) under the title of (Memoires du Prince de ia Paix, Don Manuel Godoy, due de 1'AlcudiaP

GODS, Roman and Greek. The following are among the more prominent gods in Roman and Greek mythology:

Gods

Greek

King of Gods .

God of Water .

God of the Lower Regions Messenger of the Gods . . .

God of War .

The Gods' Smith .

God of Light .

Goddess of Hunting .

Goddess of Wisdom .

Queen of Heaven .

Goddess of Tillage .

Goddess of the Hearth. . .

Goddess of Beauty .

God of Wine .

God of Love .

God of Time .

Wife of Chronos .

Queen of Hades .

Goddess of the Rainbows . . Cup-bearer to the Gods _

Zeus.

Poseidon.

Pluto.

Hermes.

Ares.

Hephaestos.

Apollon.

Artemis.

Athene.

Hera.

• *Demeter. Hestia. Aphrodite. Dionysos. Eros. Chronos. Rhea.*

Persephone.

Iris.

Hebe.

Roman

Jupiter.

Neptune.

Pluto.

Mercury.

Mars.

Vulcan.

Apollo.

Diana.

Minerva.

Juno.

Ceres.

Vesta.

Venus.

Bacchus.

Cupid.

Saturn.

Cybele.

Proserpina.

Iris.

Hebe.

See Greek Gods ; Greek Mythology : Mythol¬ ogy.

GOD'S TRUCE, a mutual agreement be¬ tween territorial nobles confirmed and sanc¬ tioned by the Church by which war and violence were to be abstained from for a certain period. In the 9th and 10th. centuries the empire of Charlemagne had become broken up into small territories, dukedoms, baronies, counties. The right of private war was a settled principle of the times and dissensions were frequent and bitter. The peasantry and farmers especially were sufferers from the ravages of this petty warfare. Even the monasteries, cathedral col¬ leges and seats of learning were not left in peace and everything threatened anarchy and dissolu¬ tion. It was at this point that the Church stepped in, as the minister of justice and the guardian of moral order. Stern ecclesiastical penalties were fulminated against all who in the reckless feudal warfare should disturb the peace of churches, priests and tillers of the soil. The

Truce of God was instituted and by its provisions no fighting men should go forth to war on certain days. The little border province of Roussillon was the place where this truce was first agreed upon in the year 1027. Fourteen years later the movement had spread over the whole of France and later it extended to Germany, Italy, Spain and England. The Truce of God in 1041 provided that peace was to last from Wednesday evening to Monday morning of each week; there was to be no war during Advent and Lent nor on certain speci¬ fied saints' days and holy days ; the punishments tor contumacy and disobedience were money

fines, banishment for a long term of years and excommunication ; protection was specially ex¬ tended to all women, pilgrims, priests, travelers, merchants and agriculturists and also to the farm implements and live stock of the peas¬ antry. The Peace of God was confirmed by several councils of the Church, more especially by that of Clermont (1095), when Urban II proclaimed its universal extension throughout Christendom. In spite of its high ecclesiastical sanctions, the peace was often broken with im¬ punity. The centralizing of power in strong kingships, which took place in the 13th century, naturally led to the more speedy subjugation of internal wars.

GODTHAAB, got'hab (Danish, <(Good Hope), Greenland, seaport, on the west coast, capital of the Danish Southern Inspectorate. It is the oldest town in Greenland and was founded in 1721 by Hans Egede, a Norwegian missionary. Pop. 950.

. GODUNOFF, go-do'nof, Boris Feodoro- vitch, Russian tsar: b. 1552; d. 13 April 1605. He was the chief member of the regency dur- ing the reign of the imbecile Feodor Ivanovitch (1584-98) who had married Godunoff's sister Irene. In 1589 he was largely instrumental in effecting the separation of the Russian Church from the patriarchate of Constantinople. He also issued a ukase forbidding the transference of peasants from one proprietor to another. He was accused of having caused the death of the Tsarevitch Demetrius in 1591, but in 1598, upon the death of Feodor, was elected to the throne. . In 1591 he had defeated the Khan of the Crimean Tartars ; in 1595 he recovered territory that, had been lost to Sweden and he i ecoloniz.ed Siberia. His policy was in the main progressive, but much popular discontent, es¬ pecially in southern Russia, was caused by the favors shown by him to foreigners and by his introduction of numerous innovations and re¬ forms.

o WAJ>1' or GODWINE, Earl of the nnrPj ˆ.Aˆ0N-S,' arl ˆnglo- Saxon noble : b. about 990; d 1 April 1053. Godwin became the leading Englishman in the first half of the 11th cen- tury and was father of the last king of the

sto8k- He ingratiated himself with Ulf, brother-in-law of King Canute, the latter gave him his daughter in marriage and he soon became one of the most powerful of the English nobles. He was the most powerful t actor in procuring the English throne for Ed¬ ward the Confessor and from that time headed the national party (1042) in opposition to the Norman court favorites. His son Harold (afterward king) was Earl of East Anglia- his son Swegen was Earl of Hereford, Glou¬ cester and Oxford; his wife's nephew, Beorn was Earl of Hertfordshire and Buckingham¬ shire; and for the service he had rendered to

S1ˆ.Lingm?ˆWarˆi had married his daughter Fditha. I his union, however, was not happv

Editha was cruelly neglected by Edward, and her father, by his dislike of the Normans in¬ curred the royal enmity. A quarrel afterward arose between the king and Godwin, occasioned by the partiality of the former for Norman tavo rites and Godwin in consequence headed a rebellion,, but was compelled to submit and with his family was banished from the kingdom (1051). His estates were confiscated

and then given to favorites. Queen Editha was made to feel even more bitterly the misfor¬ tunes of her family. Her husband seized her dower; he took from her her jewels and her money ; and allowing her only the attendance of one maiden, he closely confined her in the monastery of Wherwell, of which one of his sisters was lady-abbess. In September 1052, however, Godwin returned with an army, forced Edward to enter into negotiations with him, re-established himself triumphantly in his old supremacy and caused the expulsion from the kingdom of most of the Norman intruders.

GODWIN, Francis, English bishop and author: b. Hanington, Northamptonshire, 1562; d. 1633. He was graduated from Christ Church, Oxford, in 1581 ; took orders and be¬ came successively rector of Sampford Dorcas in Somersetshire, vicar of Weston-in-Zoyland and subdean of Exeter in 1587. In 1601 ap¬ peared his (Catalogue of the Bishops of Eng¬ landˆ a work which procured him the bishopric of Llandaff from Elizabeth. Revised editions of this work appeared in 1615 and in 1616 with a dedication to King James I, who in 1617 transferred him to the bishopric of Hereford. Godwin also wrote (Rerum Anglicarum Henrico VIII, Edwardo VI, et Maria regnantibus, An- nales) (1616-28, later published as the (Annales of England); (Nuncius Inamatus in Utopia>*

(1629) ; and (The Man in the Moon, or a Dis¬ course of a Voyage Thither, by Domingo Gon- sales) (1638).

GODWIN, Mrs. Mary Wollstonecraft,

English writer, wife of William Godwin (q.v.) : .b. (place uncertain) 27 April 1759; d. London, 10 Sept. 1797. Her father was Edward John Wollstonecraft, son of a wealthy manufacturer of Spitalfields, London. Her mother was Eliza¬ beth Dixon, an Irish woman. The brutality of her father made Miss Wollstonecraft's home life almost unbearable; and when their mother died in 1780 she and her two sisters left their father's house. One of these sisters married a Mr. Bishop. He proved not less brutal than her father, drove her into hiding and forced her in 1783 to obtain a legal separation. The misfor¬ tunes of Mrs. Bishop, however, provided Miss Wollstonecraft with material for her posthu¬ mous unfinished novel (The Wrongs of Wo¬ menˆ From 1783 to 1785 Miss Wollstonecraft conducted with this sister a school at Newington Green. From this work she went to Lisbon to nurse a friend, Fanny Blood, with whom she had lived from 1780 to 1783 and who had since married a merchant, Hugh Skeys. The death of this friend, from childbirth, 29 Nov. 1785, suggested to Miss Wollstonecraft a pamphlet entitled (Thoughts on the Education of Daughters. } This pamphlet was accepted by Johnson the publisher, and so opened the way for a remunerative business connection. In 1788, after an unpleasant year as governess in the family of Lord Kingsborough, Miss Wollstonecraft removed to London and found employment with Johnson. In the five years that followed, she worked for him as reader and translator, published the first and only volume of her Vindication of the Rights of Women> (1792), and made the acquaintance of many literary people, among whom was the man she afterward married, William Godwin. Her interest in the principles of the French

Revolution led her in 1792 to Paris. There she met Gilbert Imlay, a former captain in the American Revolution. Without the formality of a marriage, which both professed to disapprove, they lived as man and wife, and to them, at Havre, 14 May 1794, was born a daughter. Next year Miss Wollstonecraft followed Imlay to England. He sent her to Norway on busi¬ ness connected with his commercial specula¬ tions and took the opportunity to carry on an intrigue with another woman. Returning, she first attempted suicide by drowning; then, rec¬ onciliation with Imlay. Finally, in March 1796, she agreed to a separation. Her resumption of literary work brought her again in contact with William Godwin. Despite her experience with Imlay, she, like Godwin, still objected to a legal marriage. 'At length, however, both set aside their scruples and on 29 March 1797, they were married. Mary, the future Mrs. Shelley, was born 30 August. The mother, however, died of a fever a few days after — 10

*Sept. 1797. In her memory her husband published the fol¬ lowing year (Memoirs of the Author of a Vin¬ dication of the Rights of Women. * Her works include (Thoughts on the Education of Daugh¬ ter (1787) ; Vindication of the Rights of Men* (1790) ; Vindication of the Rights of Women) (1792) ; historical and Moral View of the French Revolution > (1794) ; (Letters Written in Norway, Sweden and Denmark* (1796) ; (Posthumous Works) (1798).*

Bibliography. — Godwin, William, (Mem¬ oir (1798) ; (A Defense of the Character and Conduct of the Late Mary Wollstonecraft Godwin, > anon. (1803) ; Paul, C. Kegan, Wil¬ liam Godwin, His Friends and Contemporaries> (1876) ; and Vary Wollstonecraft, with Pref¬ atory Memoir (1879) ; Taylor, R. G. S., Vary Wollstonecraft* (1911).*

Arthur H. Nason,

Professor of English, New York University.

GODWIN, Parke, American journalist: b. Paterson, N. }., 25 Feb. 1816; d. New York, 7 Jan. 1904. He graduated at Princeton Col¬ lege in 1834 and having studied law in his native town was admitted to practise in Ken¬ tucky, but did not pursue the profession. From 1837 to the close of 1853, with the exception of one year, he was the coadjutor of his father- in-law, William Cullen Bryant (q.v.), in the editorial management of the New York Evening Post. In 1843 he issued for a time the Path¬ finder, a weekly periodical of a literary and political character. While connected with the Evening Post he contributed frequently to the Democratic Review and he also edited Putnam's Magazine for a time. He translated some of Zschokke's tales and the first part of Goethe's autobiography. Other works of his are (A Popular View of the Doctrines of Charles Fourier (1844) ; (Democracy, Constructive*

and Pacific) (1844) ; Vala, a Mythological Tale) (1851) ; (Handbook of Universal Biog- raphy) (1851) ; Political Essays) (1856) ; (History of France (1st vol., 1861); Cyclo¬ paedia of Biography* (1865) ; Cut of the Past> (1870), essays which he had contributed to Putnam's Magazine; (Biography of William Cullen Bryant* (1883);*

GODWIN, William, English writer and political philosopher: b. Wisbeach, Cambridge-

shire, England, 3 March 1756; d. London, 7 April 1836. He attended

various schools and in 1771 became an usher in that of Robert Akers at Hindolveston. The next year his father, John Godwin, a dissenting minister, died, and in 1773 William removed with his mother to London, where he entered Hoxton Academy. Four years later he began preach¬ ing and between 1777 and 1783 he was minister at Ware in Hertfordshire, at Stowmarket in Suffolk, and, for a brief trial, at Beaconsfield Unsuccessful as a minister, he turned in 1783 to literary work. In the 10 years that followed he supported himself — not over-successfully — by hack work, made many friends, especiallv among Whig politicians and sympathizers with the French Revolution and formulated those radical opinions which he embodied in his Po¬ litical Justice) (1793). He had for some years been satisfied, he says in his Preface, <(that monarchy was a species of government essen¬ tially corrupt? He owed this conviction to the political writings of Swift and to a perusal of the Latin Historians. Nearly at the same time Le derived much additional stimulus from sev¬ eral French productions on the nature of man — the (Systeme de la Nature? the works of Rousseau and those of Helvetius. The work says, «was projected in the month of May,' 1791; the composition was begun in the fol¬ lowing September, and . . . occupied a space

?ln196 m1onths->) The book appeared in February 1793, when England was at a white heat over the execution of Louis XVI and the French declaration of war against England and Hol¬ land. Godwin feared, not without cause, that lie would be prosecuted for such a publication ; but the government seems to have judged that a book costing three guineas would prove harm¬ less. The book met immediate success, running through three editions within five years ; but its author, repenting the radicalism of the first edi¬ tion, made the second and third editions increas- mgly moderate. Godwin's political philosophy attracted wide attention ; and although he never ?r»aiv . aˆemPted so large a subject as in his Political Justice? yet he continued to have a following, especially among young men. Of

these, a few years later, Shelley is a notable instance.

Godwin's first and ablest novel, < Caleb Wil¬ liams? appeared one year after Political Jus-

uˆv/A79-4)- The.story, although since ridiculed by UeCJuincey, enjoyed high success at the time.

*/i*7nn\ Peon' a Tale of the 16th Century) i7nˆ r Va.s ap° successful. Meanwhile, in Godwin had become intimate with Mary Wollstonecraft, then known as Mrs. Imlay. Both held that a legal marriage was undesir¬ able; but, lacking the courage of their convic¬ tion, they were married 29 March 1797. Mrs. Godwin died 10 September after giving birth to a*

daughter, the future Mrs. Shelley. Four years later, having been rejected by at least two other women, Godwin married a Mrs. Clair- mont. ˆ The union brought unhappiness and financial difficulties. In 1805, his wife under¬ took a publishing business. Under the name of Baldwin, he wrote children's books for her- and the Lambs gave them their

Wordsworth. In 1811, the young Shelley was added. When, however, in 1813, Shelley put some of Godwin's moral theories into practise by eloping with Mary Godwin, the philosopher was enraged. A check for £1,000 silenced him. When Shelley and Mary were married, three years later, Godwin was openly reconciled. He had need of the financial countenance of so wealthy a son-in-law. The publishing busi¬ ness was becoming less remunerative. In 1822, Godwin became bankrupt. Literary and politi¬ cal friends tried to aid him, but succeeded only m part. In 1833 they secured him the position of yeoman usher of the exchequer — an office without duties. He died 7 April 1836. Nine years later, DeQuincey wrote of him : ((Godwin's name seems sinking out of remembrance; and he is remembered less by the novels that suc¬ ceeded, or by the philosophy that he abjured, than as the man that had Mary Wollstonecraft for his wife, Mrs. Shelley for his daughter, and the immortal Shelley as his son-in-law.®

-d Af-1S , w_orks include (Enquiry Concerning political Justice and its Influence on Morals and Happiness (1793) ; ˆThings as they are;

*?ˆi!heT-Adv.entures of Caleb Williams) (1794)- f he Enquirer ... a series of Essays * (1797) • 'Memoirs of the Author of a Vindication of ffie Rights of Women > (1798); Paint Leon, a Tale of the 16th Century > (1799); < Antonio, a tragedy in Five Acts in Verse > (1800); Life of Geoffrey ChauceU (1803) Pives of Edward and Tohn Philips> (1815);*

• • inr answer to Mr. Mai thus > (1820) History of the Commonwealth

182Lh28)ReSt0rati0n °f Charles IP (4 vols.'

Bibhography.- C. Kegan Paul's

*vols W111876)S Pnends and Contemporaries * (2*

Arthur H. Nason,

Professor of English , New York University.

F GODWIN-AUSTEN, Henry Haversham,

English topographer and geologist: b. Teign- mouth, 6 July 1834. He is the son of R A ˆC Godwm-Austen, the distinguished geologist-

gaSˆdlK;at— aA t!le R˚yal Military College andhurst; jomed the 24th Regiment of Foot in

1 j ’ ln i?52 went with his regiment to India and served with distinction in the Second Bur¬ mese War and in the Punjab. He then became topographical assistant in the Trigonometrical Survey of India in 1857: and joined the Kash¬ mir Survey party. While connected with this he surveyed a large part of Kashmir and Bal- tistan and discovered the enormous glaciers at he head of he Shigar River and Huk Nagar f omier, including the important Baltoro gla-

7 1. 1 j- l862 h? surveyed the Rupshu and

Zaskar districts in Ladakh during July and

August of that year, making 13 asceifts of

Mam 70607efee; feghest o£ wh!ch was Mala, g(J, 607 feet. He then surveyed the Pang

Kong Lake district nearly to Rudok in Chinese

territory, but was stopped in 1863 by the Lhas-

san governor- during the winter of kAs was

RhmaP„ al?Uty ‘9th the Iast mission ?o

Darie?l’.And i˚u ‘ the courUrv between

Darjeeling and Bunakha. In 1874 he served

with the Bhutan Field Force, and was present

at the capture of Dalmgkote and Chamurchi

orts; took part in the expedition against the

Dafia tribe in the eastern Himalayas ; and in 1877 was retired from the army with the rank of lieutenant-colonel. From 1897-99 he was president of the Malacological Society, and in 1908 president of the Conchological Society. He was awarded the founder’s medal of the Royal Geographical Society in 1910. Mount Godwin- Austen has been named in his honor.

Besides numerous scientific papers on geology and physical features he has written (On the Land and Freshwater Mollusca of India) (1882— 99), in parts, and the volume on mollusca in (The Fame of British Indian

GODWIN-AUSTEN, a mountain peak said to be exceeded in height only by Mount Everest, in the Mustagh range of the Himalayan system. Its height is estimated at 28,265 feet. Distinguished in the records of the great trigonometrical survey only by the sign K2, it was named in 1888 after H. H. Godwin-Austen (q.v.) of the Trigonometrical Survey of India.

GODWITS, a group of wading-birds allied to the sandpipers but with longer legs and bill, and distinguished from curlews by the straight not decurved bill. They constitute the genus Limosa, of which five species are known. All of them are summer residents of the northern part of the northern hemisphere, but on their migrations reach northern Africa and South America, while one species extends its flight to New Zealand. They are noted for their loud, yelping cries. Their plumage is of a pale dull chestnut red barred and varied with black. The females are larger than the males, but most common American species are the marbled godwit (L. fedoa), and the Hudsonian godwit (L. hcemastica), both known to gunners as ˆmarlin.® The marbled godwit is from 16 to 22 inches long, nests chiefly in the interior from Iowa north to the Saskatchewan, and winters in Cuba and Central and South America. It is rare on the coast. In England two other species occur — the black-tailed godwit (L. cegocephala) — which formerly bred in the fens, but the netting by sportsmen, with the reclama¬ tion of these areas, has made it only a summer visitor; and the bar-tailed godwit (L. lap- ponica), a bird of passage, which has been known to breed as far north as Iceland.

GOEBEL, go'bel, Julius, American uni¬ versity professor: b. Frankfort-on-Main, Ger¬ many, 23 May 1857. He studied at the Uni¬ versity of Leipzig in 1879-81, and received the degree of D.Ph. at Tubingen in 1882, in which year he migrated to the United States. In 1885-88 he was instructor in German at Johns Hopkins, and from 1892 to 1905 was professor of Germanic philology and literature at Leland Stanford Junior University. From 1905 to 1908 he lectured on Germanic philology at Har¬ vard, and since 1908 has been professor of Ger¬ manic languages at the University of Illinois. In 1888-92 he served as editor of the Belletris- tisches Journal, and since 1909 has been editor of the Journal of English and Germanic Philology. Lie is the author of (Ueber die Zukunft unseres Volkes in Amerika) (1883) ; (Ueber tragische Schuld und Sune) (1884) ; (Gedichte) (1895) ; (Das Deutschtum in den Vereinigten Staaten> (1904) ; (Der Kampf um deutsche Kulture in Amerka) (1914). He edited (Goethe's Poems) (1901); (Goethe's Faust' (1907) ; ˆSchiller's Poems) (1903). Since 1909

he has been general editor of the German Classics, in Oxford University Press Series, and since 1913 of the (Yearbook of the Ger¬ man American Historical Society. He is a con¬ tributor to the American Journal of Philology, Modern Language Notes, Anglia, Goethe-Jahr- buch, etc.*

*GOEBEL, William, American public offi¬ cial: b. Carbondale, Pa., 1854; d. 3 Feb. 1900. In 1866 his family removed to Covington, Ky. He was educated at Gambier College and the Cincinnati Law School. Soon after his ad¬ mission to the bar he became law partner of Gov. John G. Stevenson in 1875, and of John G. Carlyle in 1886. He became prominent in cases directed against large corporations and was widely known as a friend of the people. He was elected State senator from Kenton County in 1888, and was re-elected for every term up to 1900. Prominent among the laws sponsored by him are that making gambling a felony; the granting to second-class cities the right to erect and maintain free public libraries and that creating a State Electoral Commission. He was one of the nominees for governor in 1899 and a bitter campaign ensued. Taylor, the Republican candidate, was inaugurated, but the election was contested by Goebel and, on 30 Jan. 1900, a test vote in the legislature showed that he would be seated. Goebel was shot that very day while on his way to the capitol. A ma¬ jority of both houses now declared Goebel governor and the oath of office was administered to him. Three days later he died and was suc¬ ceeded by Beckham, who had taken the oath of lieutenant-governor. Consult Powers, Caleb, (My Own Story * (Indianapolis 1905).*

GOEBEN, ge'ben, August von, German military officer: b. Stade, Hanover, 1816; d. Coblentz, 1880. In 1837 he served in the Carlist army in Spain, and afterward returned to Prus¬ sia, where he entered the military service in 1842. As colonel in 1860, he was attached to the Spanish army during the war with Morocco. In 1864 he took part in the campaigns against Denmark, and two years later in the war with Austria, in which he became general of in¬ fantry. As commander of the Eighth Corps in 1870 he took part in the battles of Forbach, Gravelotte and Saint-Privat. Sent into northern France he fought at Pont-Noyelle and Bapaume, and won a great victory at Saint-Quentin on 19 Jan. 1871. He wrote articles in military jour¬ nals on the campaigns in which he had taken part and (Vier Jahre in Spanlen, an account of his sojourn in Spain.*

GOEBEN and BRESLAU, German war¬ ships, respectively the fastest armored vessel in the German navy (22,640 tons; 28 knots) and a fast light cruiser (4,478 tons; 27 knots), both of great coal capacity. At the outbreak of the European War these vessels were cruis¬ ing off the Algerian coast in the Mediterranean. It is supposed that when they received their first sailing orders either the assistance of Italy or the neutrality of England was reckoned upon by Germany, and that these vessels should in

the one case assist Italy and Austria against France and Great Britain, or in the other Aus¬ tria against France. They began operations by firing some shots into the unprotected Algerian coast towns of Philippeville and Bona, then, turning northwest, apparently intended to make

for the Atlantic via the Straits of Gibraltar. They were headed off by the British fleet and arrived at Messina on 5 Aug. 1914, where, ac¬ cording to German reports, the officers made their wills and deposited their valuables with the German consul. By some unexplained chance the Goeben and Breslau eluded the vigilance of the French and British squadrons and managed to reach the Dardanelles, meet- mg only the British cruiser Gloucester off Cape Matapan, which engaged both vessels and in¬ flicted some damage. On arriving at Constanti¬ nople both ships were ((taken over" by the Turkish government. The Goeben was re¬ named Sultan Selim and the Breslau received the name of Midilli. A train of disastrous events was set in motion by the escape of the t\ o ships and their arrival in Turkish waters; Turkey moved steadily and irresistibly toward war from that moment and any temporary wavering was overcome by the impressive long ˆ of the Goeben— 10 11-inch, 12 5.9- inch and 12 21-pounders. Very rarelv in

the history of war has a single blunder led to more far-reaching consequences than the Allied failure to prevent the escape of these vessels, "u waˆnot nearly four years after the event mat the true story of the Goeben and Breslau incident became public. In Tune 1918 Mr Henry Morgenthau, former United States Ambassado'r to Turkey, published it in his experiences in Constantinople during the first two and a half years of the war (The World's Work, New York). Under their new names both vessels were heard of on various occasions during the war, in Black Sea operations on a small scale. In a naval action fought on 20 Jan. 1918, at the entrance of the Dardanelles with a British squadron, the Breslau struck a mine and sank- the Goeben shared a similar fate, but was able to re-enter the Straits to Nagara Point, where she was beached. The vessel was subsequentlv refloated.

GOEPP, gep, Philip Henry, American composer, musical critic and author: b. New \ork, 23 June 1864. After early studies in Germany, he was graduated from Harvard University in 1884, and received the degree of LL-B. from the University of Pennsylvania in 1888. He settled in Philadelphia as a resident lawyer, but soon adopted music as a profession and became widely known not only as an organ¬ ist and composer but as a musical

author, his chief influence upon American art being ex¬ erted. from the literary side. He furnished especially an important factor in the general advance in orchestral taste in the East by his analytical programs, with their crisp musical •essays, now found in evidence at almost every great concert. His published works include < Annals of Music in Philadelphia) (1896) •

(Modern Symphonies) (3 vols., Philadelphia',

3d ed., 1913) ; (The Lost Prince,) a fairy opera; (Lullaby) for violin; numerous songs, anthems,, part-songs and several instrumental compositions, notablv for piano, organ and or¬ chestra. Consult Elson, L., (History of Ameri¬ can Music) (New York, 2d ed., 1916V

GOESSMAN, ges'man, Charles Anthony,

American chemist: b. Naumburg, Hesse-Cassel, Germany, 13 June 1827; d. Amherst, Mass., 2

Sept. 1910. He was educated at Gottingen where he was assistant in the chemical labora¬ tory in 1855-57; came to the United States in 1857 ; in 1857-69 held positions in commercial companies and in 1866-68 was professor of chemistry in the Rensselaer Polytechnic In¬ stitute (Troy, N. Y.). In 1869 he became pro¬ fessor of chemistry in the Massachusetts Agri- ?oJ>oUna ˆate College, Amherst, Mass., ir 1882-94 was director of the State agricultural experiment station there. In 1886-87 he was president of the American Chemical Society. He built up a world-wide reputation as an authority on agricultural chemistry.*

GOETHALS, go'thalz, George Washing- ton, American army officer and civil engineer # b. Brooklyn N. Y., 29 June 1858. He was a ?tucJent of the College of the City of New York m 1873-76 and in 1880 was graduated from the United States Military Academy at West Pomt On 12 June 1880 he was appointed second lieutenant of engineers; was promoted first-lieutenant in 1882; captain in 1891 and lieu¬ tenant-colonel and chief engineer of the volun¬ teer forces in May 1898. In December of the lattei year he quitted the volunteer service and in 1900 became major of the engineering corps. in 19(b he was graduated at the Army War College and in 1915 attained the rank of major- general. He retired on 15 Nov. 1916. He was for several years until 1888 instructor in civil and military engineering at the United S s Military Academy. He was in charge of the lUussei bfioals Canal construction on the Ten¬ nessee River and served on the Board of Forti¬ fications for Coast and Harbor Defenses. His greatest work, however, was performed as chief engineer of the Panama Canal ; in which capacity he served ably from the time of his appointment by

President Roosevelt in 1907 Sif6 ,comPietion of this great waterway in 914, when President Wilson appointed him the first civil governor of the Canal Zone. His efficient work on the canal is well known; to it he brought an adequate knowledge of engi¬ neering coupled with a complete knowledge of army organization and co-operation. The work of the several departments was soon co-ordi-

inifarH 1 7 Comm?? end- The sanitation, hous- 2 ?,nd ˆb?r P[obIems were organized on an equally efficient basis by able deputies and the work went ahead with such efficiency and smoothness that it has come to be a model for

?omffiptnHrPi1SeS ˚f maˆmtude- The canal was ,nHd tf m˚St year ahead of scheduled nWpfl L 16 soundness of the methods em-

r ˚y di hˆve , b,een amp!y justified by time. Geneial Goethals, after the completion of the canal, was obliged to decline various adminis¬ trative posts tendered him, but in 1917 he ac¬ cepted the office of State engineer of New Jersey. From April to July 1917 he was general

*On11?! Dpp1 1017 *rmerSency Fleet Corporation.*

On 18 Dec. 1917 he was appointed acting quar¬ termaster-general of the United States army; became chief of the division of storage and traffic of the General Staff in February 1918 and chief of the division of purchase, storage.

lnrt tra®cT ˆPnl !?18- He received the dl ?an?a Umversity of Pennsyl-

Princeton in 1915.nd fr˚m the Universi‘y of

Vol. 13, GOETHE TO HAW

Americana

:r,, 1

.‘e #V .* V ‘

®asii

n

w!$i

i

1

r-

S J

amp

m. 4&

11

•i,i ;%C

11

‘ M jlvl

\ ˆ ˆ jj .inti3

V U i*

i*U

Jk

|\

1

1

i-JL

ˆIjV* V, >

1

‘… •

I

i r w ■ . - .f - … •. yi

I

\

\

.

%

A.

/

i

i

$

I

I

\

I

d

l

1

l

i

I

I

i

I

1

I

Z

i

THE

ENCYCLOPEDIA

AMERICANA

JT

IgpKY

Vnjvef(sal

JQoMEDGEj

In Thirty Volumes

> >

» » >

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK CHICAGO

1

\

\

i

i

i

&

＞5C\

s

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

\

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING

BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 18 1922

gT.! A654317

/wP J

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XIII

ABRAHAMS, ISRAEL, M.A.

Reader in Talmudic and Rabbinic Literature,

University of Cambridge

GREAT BRITAIN — ENGLISH JUDA¬

ISM

ALEXIS, JOSEPH, A.B., A.M.

Assistant Professor of Germanic Languages and

Literatures, University of Nebraska

GOSTA BERLING, THE STORY OF

ACWORTH, W. M., M.A.

Formerly Lecturer on Railway Economics in the

London School of Economics and Political

Science; Member of various Royal Commissions

and Committees on Railway Matters; Author of

" The Railways of England," *etc.*

GREAT BRITAIN — ENGLISH RAIL¬

WAYS

ANWYL, EDWARD, M.A.

Late Professor of Welsh and Comparative Philology and Dean of the Faculty of Arts at the University College of Wales, -Aberystwyth

GREAT BRITAIN — WALES

ARNOLD-FORSTER, H. O.

Formerly Secretary to the Admiralty and Secretary of State for War; Author of “ The Citizen

Reader,” “ A History of England,” “ In a

Conning Tower,” ” Our Home Army,” *etc.*

GREAT BRITAIN — THE BRITISH

ARMY

AYRES, SAMUEL G., D.B.

Garrett Biblical Institute

GOSPELS, APOCRYPHAL

BAILEY, WILLIAM L., M.A.

Associate Professor of Political Science, Grinnell College

GOOD ROADS MOVEMENT

BALFOUR, GRAHAM, M.A.

Director of Education to the Staffordshire County Council; author of " Educational Systems,"

" The Life of R. L. Stevenson "

GREAT BRITAIN — BRITISH EDUCA¬

TION

BERRY, GEORGE RICKER, Ph.D., D.D.

Professor of Old Testament Interpretation and

Semitic Languages, Colgate University

HABAKKUK, BOOK OF

HAGGAI, BOOK OF

BOTHNE, GISLE, A.B.

Head of Department Scandinavian Languages and

Literatures, University of Minnesota

HAKON, JARL

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

GREAT EXPECTATIONS

GULLIVER'S TRAVELS

BROWN, CARROLL N., Ph.D.

Assistant Professor of Greek, The College of the City of New York

GREEK LANGUAGE

BROWN, REV. JOHN, B.A., D.D.

Formerly Chairman of the Congregational Union of England and Wales; Lyman Beecher Lecturer at

Yale University; author of " History of the

English Bible," *etc.*

GREAT BRITAIN — BRITISH NON¬

CONFORMITY

BROWN, PETER HUME, M.A., LL.D.

Professor of Ancient (Scottish) History and Palaeog¬

raphy in the University of Edinburgh; author of “ History of Scotland,” “ The Legislative Union of England and Scotland,” *etc.*

GREAT BRITAIN — SCOTTISH

HISTORY

BYERLY, WILLIAM E., Ph.D.

Professor of Mathematics, Harvard University

HARMONIC ANALYSIS

CAIRNS, WILLIAM B., Ph.D.

Assistant Professor of American Literature, Uni¬

versity of Wisconsin

GOLD-BUG, THE

CALLAHAN, JAMES MORTON, Ph.D.

Professor of History and Political Science, West Virginia University

GREAT BRITAIN — DIPLOMATIC RE¬

LATIONS OF THE UNITED STATES

WITH

HAITI, DIPLOMATIC RELATIONS OF

THE UNITED STATES WITH

CANNAN, EDWIN, M.A., LL.D.

Professor of Political Economy in the University of London

GREAT BRITAIN — NATIONAL

FINANCE

CAPPER, DAVID SING, M.A., M.I.C.E.,

M.I.M.E., M.I.E.E.

Professor of Engineering, King's College, London; appointed Teacher in Civil and Mechanical

Engineering, University of London

GREAT BRITAIN — ENGINEERING IN

GREAT BRITAIN

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of

Cincinnati

GUZMAN DE ALFARACHE

CIGRAND, BERNARD J.

Lieutenant United States Navy; author of “ Great Seal of United States of America ” and “ History of United States Flag ”

GREAT SEAL OF THE CONFEDERACY

GREAT SEAL OF THE UNITED STATES

COLE, FRANK NELSON, Ph.D.

Professor of Mathematics, Columbia University

GROUPS, THEORY OF

COOPER, LANE, Ph.D.

Professor of English Language and Literature.

Cornell University

GREEK CULTURE

Contributors to Volume XIII — Continued

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

GONZALO DE BERCEO

GOOD COUSINS

GYPSY LANGUAGE

GYPSY RELIGION AND FOLKLORE

HAIDA

COUMBE, CLEMENT W.

Technical Art Expert

GOLDSMITHING

GREEK AND ETRUSCAN POTTERY

DARTON, NELSON H.

Geologist, United States Geological Survey

GRAND CANYON OF COLORADO

RIVER

GREAT PLAINS

DEIMEL, RICHARD F., B.S., M.A,

Assistant Professor of Mechanics, Stevens Institute of Technology

GRAPHICAL STATICS

DERRY, JOSEPH T.

Author of “The Story of the Confederate States ”

GORDON, JOHN BROWN

DOBSON, AUSTIN, LL.D. *

Author of “ Life of Goldsmitn,” *etc.*

GOLDSMITH, OLIVER

DOLE, NATHAN HASKELL, A.B.

Editor of Tolstoi’s “ Collected Works ”

GONCHAROF, IVAN ALEKSANDRO—

VITCH

GRIGOROVITCH, DIMTRI VASILYE—

VITCH

DOLSON, GRACE NEAL, Ph.D.

Professor of Philosophy, Wells College

HARTMANN, KARL ROBERT

EDOUARD VON

EGGERT, CARL E., B.Ph., Ph.D.

Assistant Professor of German, University of

Michigan

HANNELE

ERSKINE, JOHN, A.M.

Professor of English, Columbia University

GREENE, ROBERT

ESTES, DAVID FOSTER, D.D.

Professor of New Testament Interpretation, Colgate University

GOSPELS, THE

FERNALD, JAMES C., A.B., L.H.D.

Editor “ The Students’ Standard Dictionary ”

GRAMMAR

GRAMMAR, ENGLISH

FINCK, HENRY T., A.B.

Musical Critic, “ New York Evening Post ”

GRIEG, EDVARD

FINLAY, T. A., S.J., M.A., F.R.U.I.

Professor of Political Economy, University College, Dublin; President, University Hall, Dublin;

Commissioner of Intermediate Education f r

Ireland; Vice-President of the Irish Agricultural Organization Society

GREAT BRITAIN — IRISH HISTORY

FORD, J. D. M., Ph.D.

Smith Professor of French and Spanish Languages, Harvard University

GUZMAN EL BUENO

GARVIN, J. L.

Editor of “The Observer ” (London); author of

‘ Tariff or Budget,” *etc.*

GREAT BRITAIN — THE BRITISH

TARIFF MOVEMENT

GEHRING, ALBERT, A.B., A.M.

Author of “ The Basis of Musical Pleasure,” *etc.*

HARMONY

GRIFFIS, WILLIAM ELLIOT, D.D., L.H.D.

Author of “ Townsend Harris, First American Envoy in Japan ”

HARRIS, TOWNSEND

HALL, A. D., M.A.

Director of the Rothamsted Agricultural Station

GREAT BRITAIN — AGRICULTURE

SINCE THE 18TH CENTURY

HAMLIN, A. D. F., A.M., L.H.D.

Professor of Architecture, Columbia University

GOTHIC ARCHITECTURE

GREEK ARCHITECTURE

HARRY, JOSEPH E., Ph.D.

Author of " The Greek Tragic Poets," *etc.*

GREEK DRAMA

GREEK FESTIVALS

GREEK LAW

GREEK RELIGION

GREEK SOCIAL LIFE

GREEK THEATRE

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor of German Language and Liter¬

ature, The College of the City of New York

GUTZKOW

HALBE, MAX

HALLSTROM, PER

HARDEN, MAXIMILIAN

HARTLEBEN, OTTO ERICH

HAUFF, WILHELM

HAUPTMANN, GERHART

HEADLAM, ARTHUR CAYLEY, M.A., D.D.

Formerly Principal of King's College, London;

author of " The Miracles of the New Testament "

GREAT BRITAIN — THE CHURCH OF

ENGLAND

HODGKIN, THOMAS, D.C.L., Litt.D.

Author of " Life of Charles the Great," " Political History of England," *etc.*

GREAT BRITAIN — THE CONQUESTS

* Deceased

Contributors to Volume XIII — Continued

ILBERT, SIR COURTENAY PEREGRINE,

G.C.B., K.C.B., K.C.S.I.

Clerk of the House of Commons; author of “ Parlia¬
ment,” ” The Mechanics of Law Making,” etc,

GREAT BRITAIN — PARLIAMENT

JACKSON, A. V. W., Ph.D., L.H.D., LL.D.

Professor of Indo-Iranian Languages, Columbia
University

HAFIZ

JENKS, EDWARD, M.A., B.C.L.

Principal and Director of Legal Studies of the Law Society

GREAT BRITAIN — CROWN AND
CABINET

JENNINGS, HENNEN, C.E.

Consulting Engineer of the United States Bureau of Mines

GOLD MINING AND METALLURGY

KAINS, M. G., B.S., B.S.A., M.S.A.

Horticultural Consultant

GREENHOUSE

*

KLEIN, HENRI F.

Editorial Staff of The Americana

GREAT BRITAIN — ENGLISH NEWS¬

PAPERS

GREAT BRITAIN — THE NAVY

GREAT BRITAIN — FOREIGN POLICY

IN AFRICA AND AMERICA

GREAT BRITAIN — THE POLITICAL

PARTIES 1906-1918

GREAT BRITAIN — PARLIAMENT

ACT, 1911

KNOWLES, LILLIAN, Litt.D.

Reader in Economic History, University of London; Lecturer in Modern Economic History at the

London School of Economics and Political

Science

GREAT BRITAIN — HISTORY OF THE

18TH CENTURY

GREAT BRITAIN — COMMERCE—

18TH CENTURY

GREAT BRITAIN — NAVIGATION

ACTS

GREAT BRITAIN — AGRICULTURE —

THE 18TH CENTURY

GREAT BRITAIN— THE INDUSTRIAL

REVOLUTION

KOESTER, FRANK, C.E.

Consulting Engineer, New York

HARBORS, DOCKS AND BREAK¬
WATERS

LAWRENCE, WALTER ROPER

Formerly Private Secretary to Lord Curzon of Kedleston, Viceroy of India; afterward Member of Council of India

GREAT BRITAIN — BRITISH FOREIGN POLICY IN INDIA

LEE, SIR SIDNEY, M.A., Litt.D.

Editor of the “ Dictionary of National Biography ”

GREAT BRITAIN — THE TREND OF THOUGHT AND LITERATURE IN THE 19TH CENTURY

LEONARD-STUART, CHARLES, B.A.

Author of ” The Great God Pan,” *etc.*

GREECE, ANCIENT

GREECE, MODERN

GREEK MUSIC

LOWIE, ROBERT H., Ph.D.

American Museum of Natural History

HAECKEL, ERNST

MACKENZIE, A. STANLEY, Ph.D., F.R.S.C.

President of Dalhousie University

HALIFAX, CANADA

MACKINDER, HALFORD J., M.A., M.P.

Author of “ Britain and British Seas ”

GREAT BRITAIN— GEOGRAPHICAL

ENVIRONMENT

MACROSTY, HENRY W., B.A.

Lecturer on Economics, School of Economics and Political Science, University of London; author of “ Trusts and the State,” *etc.*

GREAT BRITAIN — THE COOPERA¬ TIVE MOVEMENT

MAXWELL, HERBERT, F.R.S., LL.D,, D.C.L.

Lord Lieutenant of Wigtonshire

GREAT BRITAIN — FISHERIES

MIMS, EDWIN, Ph.D.

Head of the English Department, Vanderbilt University

HAMLET GRANDISSIMES, THE

MOORE, CLIFFORD H., Ph.D., Litt.D.

Professor of Latin, Harvard University

GREEK GODS, THE

GREEK MYTHOLOGY

MORGAN, FORREST, A.M.

Assistant Librarian, Watkinson Library

HARTFORD, CONN.

MOSES, MONTROSE J., B.S.

Dramatic critic

GREAT DIVIDE, THE

MUNROE, CHARLES E., S.B., Ph.D.

The George Washington University, Washington,

D. C.

GUNCOTTON

GUNPOWDER

ODGERS, WILLIAM BLAKE, K.C., M.A., LL.D.

Bencher of the Middle Temple, Recorder of Bristol, Director of Legal Studies at the Inns of Court, Professor of Law at Gresham College.

GREAT BRITAIN — JUDICIAL SYS¬

TEM IN ENGLAND AND WALES

PANARONI, ALFRED G., B.S.

Instructor in Romance Languages, The College of the City of New York

GOZZI, CARLO

Contributors to Volume XIII — Continued

PEASE, EDWARD R.

A Founder and Secretary of the Fabian Society —Honorable Secretary since 1914; Trustee and

Member of the Executive Committee of the Labor Party

GREAT BRITAIN — THE LABOR

MOVEMENT IN POLITICS

PEEL, HON. GEORGE VILLIERS, M.A.

Author of “ The Future of England,” “ The Reign of Sir Edward Carson,” etc:

GREAT BRITAIN — BRITISH FOREIGN

POLICY IN EUROPE

PFEIL, STEPHEN *

Formerly editor of the Philadelphia “ Press ”

HABEAS CORPUS

PILLSBURY, WALTER B., Ph.D.

Professor of Psychology, University of Michigan

HABIT AS A PSYCHOLOGICAL PHE¬

NOMENON

POLLARD, ALBERT FREDERICK, M.A.

Professor of English History in the University of London; author of ”

The Reign of Henry VII from Contemporary Sources ”

GREAT BRITAIN — THE REFORMA¬

TION IN ENGLAND

RALEIGH, THOMAS, K.C., S.I., M.A., D.C.L.

Author of “ Elementary Politics,” etc.; Member of Council of India, 1909-13

GREAT BRITAIN — THE POLITICAL

PARTIES TO 1906

REA, WALTER RUSSELL, M.P.

A Lord Commissioner of the Treasury

GREAT BRITAIN — BRITISH SHIP¬

PING

REDMAYNE, SIR R.A.S., K.C.B., M.Sc.

H. M. Chief Inspector of Mines, Late Professor of Mines in the University of Birmingham, Past

President Institution of Mining and Metallurgy,

Member Institute of Civil Engineers, Fellow of the Geological Society, *etc.*

GREAT BRITAIN — THE MINING IN¬
DUSTRY

RINES, IRVING E.

Author " History of the United States "

GRANT (HIRAM) ULYSSES SIMPSON

ROSE, J. HOLLAND, Litt.D.

Author of " The Development of the European Nations," " The Life of Napoleon I," *etc.*

GREAT BRITAIN — THE FRENCH
WARS OF THE 18TH CENTURY
GREAT BRITAIN — HISTORY OF THE
19TH CENTURY

GREAT BRITAIN — GREAT BRITAIN
AND THE WORLD WAR

SARGENT, A. J., M.A.

Appointed Teacher of Foreign Trade in the Univer¬

sity of London; author of “ The Economic Policy > of Colbert ”

GREAT BRITAIN — BRITISH COM¬

MERCE

SCHUSTER, SIR FELIX, BART.

Governor of the Union of London and Smith’s Bank >

Limited, Vice-President of the Institute of

Bankers; and

SYKES, ERNEST

Secretary of the Institute of Bankers, and of the Central Association of Bankers

GREAT BRITAIN — BANKING

SHAW, WILLIAM A., Litt.D.

Author of “ History of the English Church Under Civil Wars and

Commonwealth," "The Knights

of England," *etc.*

GREAT BRITAIN — HISTORY OF THE

17TH CENTURY

SHOWERMAN, GRANT, Ph.D.

Professor of Latin Literature, University of Wis¬

consin

GREEK ANTHOLOGY

SHUMWAY, DANIEL B., B.S., Ph.D.

Professor of German Philology, University of

Pennsylvania

GUDRUN

SPILLMAN, W. J., B.S., M.S., D.Sc.

Chief, Office of Farm Management, United States Department of Agriculture

GRASSES IN THE UNITED STATES

STRACHEY, JOHN ST. LOE

Editor of ” The Spectator;” author of “A New Way of Life,” *etc.*

GREAT BRITAIN — THE FREE TRADE MOVEMENT

SULLIVAN, JAMES, Ph.D.

New York State Historian

GYMNASIA AND REALGYMNASIA

THOMAS, CALVIN, LL.D.

Professor of Germanic Languages and Literature, Columbia University

GOETHE, JOHANN WOLFGANG

TOUT, THOMAS FREDERICK, M.A.

Professor of Mediaeval and Ecclesiastical History, University of Manchester; author of " The Place of the Reign of Edward II in English History "

GREAT BRITAIN — MEDIAEVAL

ENGLAND

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Univer¬

sity

GRAY, THOMAS

VANCE, LEE J.

Editor "American Wine Press," New York

GRAPE CULTURE

VAN DUZER, LEWIS SAYRE

Captain in the United States Navy; ex-Secretary of the United States Naval Institute

GUNNERY

GUNS, HISTORY AND DEVELOPMENT

GUNS, LAND

GUNS, NAVAL

* Deceased

Contributors to Volume XIII — Concluded

VAN HOOK, LA RUE

Associate Professor of Classical Philology, Columbia University

GREEK LITERATURE,

WALLAS, GRAHAM

Member of Royal Commission on Civil Service smce 1912; Lowell

Lecturer, 1914; author of “ Human Nature in Politics,” “ The Great Society,” *etc.*

GREAT BRITAIN — THE CIVIL

SERVICE

WARD, RT. REV. BERNARD*

Late Bishop of Brentwood, England; formerly

President of Saint Edmund’s College; author of

“ Sequel to Catholic Emancipation.”

GREAT BRITAIN — ENGLISH ROMAN

CATHOLICS

WARD, HENRY B., Ph.D.

Professor of Zoology, University of Illinois

HˆEMOFLAGELLATA

WEBB, SIDNEY AND BEATRICE

Joint authors of “ The History of Trade Unionism,”

“ Industrial Democracy,” *etc.*

GREAT BRITAIN — LOCAL GOVERN¬

MENT

GREAT BRITAIN — BRITISH TRADE

UNIONISM

GREAT BRITAIN — BRITISH FACTORY

LEGISLATION

WILCOX, MARRION, A.M., LL.B,

Authority on Spanish America

GOYAZ

GUIANA

HAITI

WILLIAMS, J. FISCHER, M.A.

Fellow of New College, Oxford; Barrister-at-Law

GREAT BRITAIN — THE ENGLISH

LAND LAW

WILLOUGHBY, W. W., Ph.D., LL.D.

Johns Hopkins University

GOVERNMENT

WRIGHT, HERBERT F., Ph.D.

Sometime of the Department of Latin, The Catholic University of America

GOLDEN ASS, THE

GREGORY, SAINT, OF ARMENIA

GREGORY, SAINT, OF NAZIANZUS

GREGORY, SAINT, OF NE0CA2SAREA

GREGORY, SAINT, OF NYSSA

GREGORY, SAINT, OF TOURS

GREGORY I

GREGORY II

GREGORY III

GREGORY VII

GREGORY XIII

GREGORY XVI

YOUNG, STARK, B.A., M.A.

Professor of English, Amherst College

GOLDEN TREASURY, THE

* Deceased

KEY TO PRONUNCIATION.

a

far, father

n

Span, h, as in canon (can’yon),

pihon (pen’yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

A

a

all, fall

o or 6

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

•

c

her, over: also Fr. e, as in de ;

eu, as in neuf; and oeu, as in

boeuf, coeur; Ger. d (or oe),

as in okonomie.

oi

o or oo

oil, soil ; also Ger. eu, as in beutel

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

£h

father, thither

h

hat, hot

u

mute, use

h or H

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

i or 1

file, ice

him, it

ii

between u and e, as in Fr. sur,

Ger. Miiller

i

between e and i, mostly in

Oriental final syllables, as,

Ferid-ud-din

V

y

of, very

(consonantal) yes, young

•

J

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon¬

point, Jean, temps

‘(prime),

” (secondary) accents, to indicate

syllabic stress

GOETHE, ge’te, Johann Wolfgang

(von), German poet, novelist, play¬

wright, scientist and critic of life:

b. Frankfort-on-the-Main, 28 Aug.

1749. From his father, a well-to-do lawyer

who practised but little, he inherited methodical ways and a serious attitude toward life. His

poetic gift came from his mother, a woman

famous for her sprightly letters which have

often been edited and translated. The boy

Wolfgang grew up in an atmosphere of refine¬

ment, his mind duly wrought upon by books,

pictures, music and his father's reminiscences

of Italy. He never went to school but was

taught at home, partly by his father. He early showed a talent for languages ; read the usual Latin authors, picked up a good knowledge of

French by attending a French theatre that had

been started in Frankfort during the occupa¬

tion of the city by French troops, and learned enough English so that he dared attempt verses in it. As a boy he was very fond of the Bible.

His favorite amusement was the puppet-play.

He began to make verses before he was 10

years old, soon acquired technical facility and presently came to regard himself as a predes¬

tined <(thunderer.® At the age of 16 he

entered the University of Leipzig to study law, such being his father's wish. The lectures

bored him and he failed to find a single appe¬

tizing study. The result was a mood of disgust with book-learning: it seemed to him a matter

of pretentious verbiage, a floating bog of igno¬

rance, guesswork and prejudice, with no rock—

bottom anywhere. Such was the mood from

which his masterpiece <Faust) germinated. His

poetic efforts met with discouragement, so that he despaired of himself and burned what he

had written. Then came a delirious love-affair

with his landlady's daughter, whom he tor¬

mented with morbid jealousy. This experience

revived his poetic ardor and he made a little play out of it — a one-act pastoral in alexan¬

drine verse, wherein an all-too-jealous lover

is duly punished for his perversity. This first play is only a trifle, but it is based on real expe¬

rience. Henceforth ˆconfession® was to be its

author's line ; no more ˆthundering® in ambi¬

tious projects like the <Belshazzar> that he had been working at but the faithful rendering of

the things, however humble, that actually con¬

cerned him. Out of this same love-affair —

the girl's name was Anna Katherine Schonkopf

— grew the collection called < Annette,* con¬

sisting of short poems and prose tales which

were discovered and published in 1885. They

are in the conventional pastoral vein and con¬

tain no forewarning of a notable lyric gift.

Goethe remained at Leipzig nearly three years.

While the university gave him nothing that

he could assimilate he found satisfaction in

Oeser's art-school, where he took lessons in

drawing and etching and learned to admire the

((noble simplicity® of Greek art. At this time he was often moody and morose and lived im¬

prudently in a morbid resolve to punish his

body for the sins of his mind. In the summer of 1768 he was prostrated by a grave internal haemorrhage which was at first thought to por¬

tend consumption. This sent him home without

his degree and doomed him for a year and a

half to the life of an invalid recluse. At first his life seemed to be in danger. As he slowly greAv better he spent his time reading, meditat¬

ing and debating the way of salvation with

a certain Fraulein von Klettenberg, a saintly

pietist who was an intimate of the household.

Under her influence religion came home to him

as a highly personal matter. His was a normal case of conversion save that there was no con¬

viction of sin, no agonizing over the safety of his soul. He remained cheerful but attended

the prayer-meetings of the local pietistic circle, took part in their communion service and for

a while used the language of the very devout.

Later he drifted away from these associations,

but his nature had received an indelible im¬

pression. In time men called him and he

called himself a heathen, but he had been deeply touched by the mystic appeal of religion and

remained to the end of his days deeply sensi¬

tive to all genuine manifestations of religious feeling. As his convalescence proceeded he

took up the study of the occult, reading Para¬

celsus, Van Helmont, Welling and other writers

on magic, alchemy, cabalism and all that sort of thing. He even set up an alchemist's laboratory and performed some experiments in search of

the philosopher's stone. All this, too, was soon left behind, but not without lasting effects. He had got hold of the idea of natural magic

(magia naturalis), something very different

from the vulgar black art and described as the queen of the sciences and the perfect flowering of religion. It was not the art of calling up spirits to do the devil's work, but of getting into communion with planetary beings of a

higher order and thus obtaining direct spiritual 2

illumination and divine power, like that of a

god. This is the kind of magic that he was to utilize in (Faust.) Before leaving home to

continue his university career he published a

small collection of songs which he likened to

wild flowers. To-day they hardly make that

impression, being a young critic's comment

rather than a poet's cry. To this period also belongs, probably, a second play in alexandrines, the cFellow-Culprits.) It is a three-act comedy in which all the characters are morally tainted and finally unmask one another as poor miser¬

able sinners. The piece is not very edifying,

but in after years its author had a certain

fondness for it as an acting play. In April

1770, Goethe went to Strassburg, then a French city. His plan was to

take his degree in law and then to visit Paris for the perfection of his French. But it was not so fated. Circum¬

stances brought it about that in the French at¬

mosphere of Alsace his mind turned against

things French, especially the French drama, and he began to feel pride in his German blood and to seek in the history and traditions of his

own country the inspiration for the imaginative projects that were already haunting him.

Among these were <Faust) and (Gotz von Berlichingen.* After he had been at Strassburg

half a year, studying more medicine than law,

he made the acquaintance of Herder, who was

destined to influence him considerably. Herder

was about six years older than Goethe and in

the first flush of a budding literary reputation.

His temper was that of a radical reformer

sharply at variance with the spirit of his age.

His mind was teeming with the germinant

ideas of a new era in literature, criticism, edu¬

cation and religion. He was an ardent admirer

of the folksong and held that genuineness of

feeling is the only criterion of good literature.

He hated artificiality and imitation and loathed the Frenchified verse of the day. He held that the truly great poets such as Homer, Shakes¬

peare and Ossian — he supposed Macpherson's

Ossian to be a genuine old Celtic bard — were admirable mainly because they had exnressed

the life of their several epochs in its fullness and characteristic flavor. The grand criterion

of merit was not correctness or good taste,

not artistry of any particular kind, but sincerity and fullness of life. The more smell of the

soil the better. In many a talk while he was detained in Strassburg by a tedious surgical

operation Herder poured these ideas into the

listening ear of Goethe, whose mind was all

ready to receive them. The consequence was a

new orientation. The young law-student con¬

ceived a boundless admiration for Homer,

Shakespeare and Ossian, became a zealous col¬

lector of Alsatian folksongs and made a care¬

ful study of the Gothic minster at Strassburg.

He felt himself strangely drawn to the then

despised Gothic style which he erroneously be¬

lieved to represent a national German art. In

1772 he published a short dithyrambic paper

on the cathedral — a paper which counts as* one of the first bugle-blasts of the coming romantic reaction in favor of the Middle Ages. In short, Goethe became — for a little while in his youth — the prey of a perfervid Germanism. And

then there was his brief summer romance with

the country maid, Friederike Brion, who is so

charmingly pictured in the tenth book of his

autobiography. Under the spell of this passion

he began to indite the songs which usher in a new epoch in the history of German lyric poetry.

The characteristic quality of this new lyricism is its power of suggestion. It captivates not

so much by what it says as by the overtones of feeling and association that it awakens. It is very simple in form, without any verbal pyro¬

technics, true to the elemental feelings of hu¬

man nature, and based on the old haunting

melodies of the folksong. In the summer of

1771 Goethe returned to Frankfort with the

title of licentiate (not doctor) and took up the practice of Holy Roman law. His thoughts

were now busy with the (Autobiography of Gotz von Berlichingen,* whom he idealized as a tower¬

ing idealist and a ((rude self-helper in times of anarchy.® He proceeded to turn some of the

more stirring scenes of the old book into dia¬

logue, thus presenting a life-history in a suc¬

cession of dramatic pictures. Gotz was in

reality an outlaw, a typical robber-knight of

the 16th century, who set himself up against

the only forces which were just then making

for public order. But Goethe invested him

with the halo of a martyr to liberty. In writing he had no thought of the stage or of any rules of play-making. His main artistic purpose

was to exhibit the form and pressure of an in¬

teresting past epoch. In thus following his in¬

stinct in defiance of all conventions he believed that he was Shakespearizing. With some re¬

vision the play was published anonymously in

1773 and met with great literary success. Its

vigorous realistic prose, its variety of incident, its bluff and hearty lifelikeness were very re¬

freshing to a convention-ridden age. In 1774

appeared the bufferings of Young Werther,*

the most famous of all sentimental novels. The story is told in letters after the manner of

Richardson and Rousseau. Werther is a super¬

sensitive, weak-willed youth, sadly lacking in

stamina and self-control, who ((suffers» from

over-tension of feeling. He is something of an artist, but does not draw because of his over¬

whelming emotions. A passionate lover of na¬

ture, of children, of humble folk and of the

simple life, he finds the higher social strata everywhere hard-hearted, selfish and conven¬

tional. He falls in love with a betrothed girl whom he can neither win nor renounce. Life

becomes meaningless and hopeless. At last he

shoots himself. This story grew out of experi¬

ences of Goethe at Wetzlar, where he lived

for a short time in 1772 for the purpose of

studying the practice of the imperial Chamber

of Justice. Based to some extent on actual

letters and seeming to be a veritable transcript of life, (Werther) took Germany by storm and

the fame of it soon spread all over Europe.

Essentially it is a morbid book and it loosed a flood of mawkish sentimentalism. Its author

himself had suffered from the melancholia of

adolescence and had even nursed thoughts of

suicide. In writing (Werther) he expelled the

poison from his own system but at tlhe same

time created a gospel of ˆweltschmerz® and

sentimental pessimism for his contemporaries.

People wept copiously over the badness of a

world that had done to death such a noble, deli¬

cate soul as Werther. Withal the splendid liter¬

ary art of the book, its hectic tension of feeling, and the unprecedented power with which famil¬

iar emotional values are exploited, raised it

at once to the position of an immortal classic JOHANN WOLFGANG GOETHE

in its kind. (Wert1her) was followed, also in

1774, by (Clavigo,* a prose tragedy of more

regular construction than <Gotz,) based on the

memoirs of Beaumarchais. A Spanish youth

Clavigo is engaged to a sickly girl but casts her off in the fear that she will be a clog on his ambitious career. Her brother rushes to

Madrid to right her wrong and kills Clavigo in a. duel by the girl's coffin. In the original mem¬

oirs there is no such tragic ending, but in

all his early years Goethe's vision of the tragic always included a girl deserted by her lover

for prudential reasons. In 1775 came Stella,*

in which a man deserts his wife out of sheer restlessness, marries another woman and then

deserts her too. In the play the two women

meet by accident and after painful scenes agree to share the delectable Fernando between them.

So far was Goethe willing to go at this time in championing the rights of the afflicted heart

against the conventions of society. In a later version he made the play end with the fickle

husband's suicide. Several minor works of

Goethe's busy adolescence must here be passed

by. They are chiefly bagatelles of humorous

or satiric import, but one of them is a splendid fragment of a prometheus-tragedy, in which

the Titan artist bravely declares war against

the ever-living gods. It was not here, however, but in (Faust * that the insurgent spirit of young radicalism found its appointed vehicle. A con¬

siderable part of (Faust) was <(stormed out®

in 1774 and 1775. Out of his own transient

disgust with book-learning, his study of the oc¬

cult and his musings on the old legend Goethe had distilled the conception of a superman who despairs of study, deserts the intellectual life and leagues himself with a demon for a grand

sensual debauch. Following hints of the old

story he made his hero a searcher after truth, an eager traveler and a passionate lover of

antique beauty. But for a man of the 18th

century these were of course not the traits of a bad man on the way to hell. As soon as the

imaginary Faust became the mouthpiece of

Goethe's own struggles and aspirations it was

all up with his traditionary badness. At first, however, Goethe did not plan to save his hero any more than to damn him. His scheme was

that after many years of varied experience

Faust would become reconciled to life by find¬

ing some useful work to do — work that would give him the sense of having lived to some

purpose and permit him to die in a rapt pre¬

vision of the benefit others would get from

his performance. From this fundamental plan

of his youth Goethe never deviated. In the

middle portion of his life he decided not only to "save® his hero but to make his ascension

among the saints a part of the dramatic action.

Faust was now thought of as a man who had

gone grievously wrong while wandering in the

dark of passion and instinct, but was essentially a “good man® by virtue of his “striving® and

would one day be led out into the “clear® by the Lord in Heaven. Thus the old tragedy of

sin and damnation was converted into a sym¬

bolic drama of struggle toward ihe light, end¬

ing among the saints in glory. The early scenes of < Faust,* those written before 1776, are

mainly occupied with the love-tragedy of

Gretchen, which is a terribly drastic comment

on the status of the unmarried mother in the

Germany of that day. Still another of Goethe’s major works was begun in the days of his

youth, namely, the tragedy of <Egmont,> whom

he conceived as a “demonic® character borne on to his doom by a levity of spirit amounting to tragic frivolity. In the midst of work on

(Egmont) he was invited by the young Duke

of Weimar, then a youth of 18 who had

lately taken the reins of government from his

mother’s hands, to visit the Weimar court. He

arrived toward the end of 1775, expecting to

stay but a few weeks, but he remained all the rest of his days. The duke liked him, made a friend of him and presently gave him a seat in the government council with the rank of Coun¬

cillor of Legation. There were many misgiv¬

ings over this step, for the new official was not of the nobility, had had no experience of public business and was reputed to be a “genius,®

that is, a person of unsteady and unconventional ways. But he took his new duties very seriously and. for some time quite neglected the literary projects that he had brought with him from

Frankfort.. At different times he had to do

with the mining interests, military affairs, public improvements and finances of the little duchy,

and in 1784 became president of the Council.

He had previously received a diploma of nobil¬

ity. In the new environment he engaged eagerly in the study of mineralogy, geology, botany

and zoology, thus preparing the way for a little paper on the metamorphosis of plants and an¬

other on the intermaxillary bone in the human

skull. These papers and others have given him

a modest place in the history of modern evo¬

lutionism. Hard work and close scientific study, together with a fresh reading of Spinoza's

<Ethics,) exerted a sobering influence on his

character and helped to ban the demons of un¬

rest which had never quite ceased to haunt him since the days of <Werther.) On the other

hand, the new life gradually starved his artistic nature, for he was a born dreamer who liked

nothing else so well as solitary communing

with the creatures of his own imagination.

Thus there came into his life a dissonance

which finally became so sharp that he could

refer to it as a "terrible disease.® From this he sought relief in the

autumn of 1786 by a sudden departure for Italy. He remained there nearly

two years, undergoing a “spiritual rebirth.®

Italy restored his buoyancy of mind, his joy

in life. Naturally the poetic achievement of

that first decade in Weimar was small. Every¬

thing waited for the leisure and the mental

serenity that came first in Italy. Most signifi¬

cant are a number of short poems embodying

a new ethical philosophy of self-control and

high aspiration. He also wrote several dra¬

matic trifles for the amateur actors of the

court circle. But his major works made little

or no progress. He wrote an Hphigenie* in

rhythmic prose, but was dissatisfied with it.

He also began a play on the life of Tasso and worked intermittently on a new novel called

(Wilhelm Meister’s Theatrical Mission, 5 which

was at first conceived as a sort of antidote to <Werther) in that the hero would be saved by

finding a vocation. In these works Goethe

appears as the apostle of a refined personal

culture based on the equilibrium of feeling

and reason. While in Italy he transcribed his

prose Hphigenie* into mellifluous blank verse,

making it a tribute to the sanative power of

ideal womanhood such as his partial imagina-

tion saw in Charlotte von Stein. After his

return he finished (Tasso > in the same verse, putting into it much of the conflict he had

known between the claims of art and of prac¬

tical affairs. These poetic plays, together with <Egmont,) which remained unversified, are the

finest products of Goethe's art in its second

phase. Not highly dramatic they are rich in

delicate commentary on human nature. After

his return from Italy he did not again put on the harness of an administrative drudge, but

devoted himself mainly to letters and scientific study. That emancipation of the sensual man

which had taken place in Italy found expres¬

sion in the frank eroticism of the (Roman

Elegies,* which were written in the early days of his conscience-marriage with Christiane Vul-pius. This relation began in 1788. She kept

his house and bore him several children; but

while he always regarded her as his wife they were not wedded in church until 1806. The

outbreak of the French Revolution awakened

in him hardly any other emotions than those of cynical disgust. The noisy democracy of

France seemed to him to consist only of dupers and duped and he wrote two or three weak

plays to exploit the humbug of the revolution¬

ary excitement. In 1792 he accompanied the

Duke of Weimar on the Austro-Prussian inva¬

sion of France, heard the cannonade at Valmy

and saw the seamy side of war when the

invaders were tumbled back across the Rhine

by the republican armies. And then began, in

1794, under the inspiration of Schiller's friend¬

ship, a new era of notable creation. In 1796

he published (Wilhelm Meister's Apprentice¬

ship, J a cultural novel that had quite outgrown the original scheme. Instead of finding a satis¬

factory "mission® in play-acting and the manage¬

ment of a theatre Wilhelm is made to conclude that the dramatic art is not his true vocation.

Another must be found by search and experi¬

mentation. Thus the original "theatrical mis¬

sion® was changed into an "apprenticeship® in

the school of life. In due time an occasion

was found for sending the hero to Italy. So

the tale was brought to an end unfinished, the way having been prepared for a continuation

under the name of (Wilhelm Meister's Wander¬

ingsˆ which was not completed until 1829.

Taking both parts together <Wilhelm Meister*

is replete with the wisdom of one of the wisest of men, but as prose fiction it is too leisurely and discursive for the modern novel-reader.

A general favorite, on the other hand, is

(Hermann and Dorothea, * written in 1797 in

heroic hexameters. It is a picture of German

still life drawn against the background of the Revolution. Dorothea is a poor refugee who

has been compelled to flee eastward across the Rhine with her fellow-villagers. Amid the gen¬

eral distress she is wooed and won by Her¬

mann, the son of a well-to-do innkeeper. The

story is charmingly told, the stately Homeric

verse applied to such a lowly theme having

somewhat the effect of a subtle humor. Inci¬

dentally the scheme afforded a place for Goethe's riper views of the Revolution, though he was

too close to the great upheaval to see its larger import. Just at the end of the century he

planned a triloev called the (Natural Daughter,*

which was to picture phases of the Revolution, but only one of the three parts was ever writ¬

ten, and this js a literary closet-drama quite lacking in dramatic power and verisimilitude.

The most important work of this period was the completion of the first part of <Faust.) Back

in 1790 he had published some of the scenes on hand under the title (Faust, a Fragment.* As

it ended with the betrayed Gretchen's agony

in the cathedral no one could have divined the plan of the poem as a whole. Resuming work

on his masterpiece in June 1797, 'Goethe first wrote a prologue in which the reader was duly apprised that the new Faust would end in hea¬

ven, not in hell. Then, finding the material as it lay in his mind too vast for a simple play, he decided to make two parts of it and to post¬

pone for a second part all that portion of the plot which was to follow Gretchen's death. The publication of the first part in 1808 made it clear that here was the high-water mark in

German letters; something altogether incom¬

mensurable with aught that had gone before.

From this time forth Goethe deserved the name

applied to him bv Lord Byron — "monarch of

European letters.® The death of Schiller in

1805 was a great bereavement. For 11 years

he and Goethe had been close friends, to some extent collaborators. They worked together on

the (Xenia, * a collection of stinging and sting¬

less epigrams, and also in editing Schiller's

magazine Die Horen. Withal, as director of

the Weimar Theatre — a position he held from

1791 to 1817 — Goethe leaned hard on the

superior dramatic insight of Schiller when it

was a question of telling work for the stage.

The correspondence between the two men is of

many-sided interest and counts justly among the classics of letter-writing. In the stormy years that followed Schiller's death, while Europe

was battling with Napoleon, Goethe kept to his literary work and scientific studies, paying little attention to world-politics. Nationalistic patriot¬

ism was never his affair. What he most cared

for was the perfection of the individual, and

he had seen German culture flourish greatly un¬

der a weak and incoherent empire. He had no

reason to suppose that it would flourish better through the aggrandizement of Prussia or Aus¬

tria. He disliked the Prussians, was suspicious of Russia and as a lover of clearness had much sympathy with the French genius. At Erfurt

in 1808 Napoleon treated him very handsomely

and he was duly grateful. The only path of

safety for himself and his beloved Weimar was

to acquiesce in Napoleon's regime. He was not

a good hater and he acquiesced. The important

works of this Napoleonic period are a third

novel, the (Elective Affinities,* a bulky treatise on the (Theory of Color, * and the beginning of an autobiography entitled (From my Life;

Poetry and Truths The novel is a tragic tale

of disaster due to the invasion of the marriage relation by lawless passion. It has no specific tendency other than to show the danger of

treating moral relations as if they were sub¬

ject to necessary laws like those of chemical

affinity. The heart of the matter is the story of a sensitive girl's suicide from a morbidly

acute sense of remorse. In his (Theory of

Color) Goethe embodied laborious researches

that had extended over nearly 20 years and cost him much vexation of spirit because he could

not make the world believe that Sir Isaac New¬

ton had been a teacher of false doctrine. In

(Poetry and Truth) we have an elderly man's

romanticizing account of his youth. The book

ends with the year 1775 and has much to say of his love-affairs. The ((poetry® of the title does not mean that there is an admixture of de¬

liberate fiction. Goethe held that a fact is im¬

portant not because it is true but because it is significant. To select and record the signifi¬

cant, whether in one's own life, or another

man's, or in that of an imaginary hero, is to perform an act of the creative imagination, in other words, to poetize. On the whole (Poetry and Truth) is as accurate as autobiographies

are wont to be, and the earlier books at least show Goethe's matured prose stvle at its very

best. To the final phase of his career, his old age, belong, aside from

critical and scientific miscellanies, his <Divan) and the completion of (Wilhelm Meister) and <Faust.) In the

(Divan} (1819) the septuagenarian poet turned

to account his recent studies in Persian poetry.

He borrows the imagery and apparatus of

Hafiz and uses it to set forth thoughts of his own. *(Wilhelm Meister) was completed very

inartistically, extraneous matter having been in¬

cluded in order to fill space. The WVanderings*

are most significant for the evidence the book affords of the aging Goethe's interest in the

socialistic theories and speculations that were

just then beginning to make a noise in the

world. From 1824 to 1831 Goethe's principal,

but by no means exclusive, occupation was the

finishing of the great dramatic poem which he

had begun in the nebulous days of his youth.

With engaging humor, with no perceptible wan¬

ing of poetic power, except perhaps in the latter part of the fourth act, and with an astonishing freshness of imaginative vision, he carried his singular hero through a wonderful series of

symbolic experiences and finally took leave of

him as a divine entelechy mounting heavenward

in the train of the Mater Gloriosa, mystically drawn on by the Eternal-womanly. The long

task was finished in the summer of 1831 and

the aged poet now regarded his life-work as

essentially done. He died on 18 March 1832.

There is no authentic record of his last words.

During the 19th century Goethe's prestige in¬

creased enormously, and not merely in his own

country, until it became common to link his

name with those of Homer, Dante and

Shakespeare. Matthew Arnold called him' the

ˆclearest, largest and most helpful thinker of

modern times® ; while Emerson declared that

the <(o*ld Eternal Genius that built the world had confided itself more to this man than to any other.® Such estimates, and many more of like

import might be quoted, imnly a larger rever¬

ence for personal culture and the contemplative life than accords with the temper of the pres¬

ent age. But, however the opinion of coming

generations may shape itself with respect to the {<helpfulness® of Goethe's thinking, he will al¬

ways stand out in the retrospect as the great organ-voice of a unique and memorable epoch.

See Truth and Poetry; Elective Affinities;

Sorrows of Werther; Wilhelm Meister;

Egmont; Hermann and Dorothea; Faust;

Iphigenia.

Bibliography. — The literature pertaining to

Goethe is enormous. Consult Goedeke's (Grun—

drissC 3d ed., Vols. IV and V, where 1,424

closely printed octavo pages of it are listed.

A large part of this literature consists, how¬

ever, of what has been called Goethe-philology, i.e., books, brochures and articles written by

specialists for specialists and dealing with rel¬

atively small questions of biography, criticism, personal relations, influence, provenience of

ideas, *etc.* The chief repositories for this kind of research are the (Goethe-Jahrbuch,* be¬

ginning in 1880, and the (Schriften der Wei¬

mar Goethe-GesellschafP (28 vols., including

numerous portfolios of drawings, facsimiles,

etc.). Good periodical reviews of recent Goethe literature are found in the Jahresberichte fiir neuere deutsche Literaturgeschichte, beginning

in 1892, and in the journals Euphorion and

Das literarische Echo. Editions, complete and

partial, are very numerous since the expiration of the* Cotta copyright. The most ambitious is the Weimar edition, 128 vols., comprising 50

vols. of letters and 13 of diaries, together with copious critical apparatus. More convenient

is the excellent (Jubilaumsausgabe) (Stuttgart

1907-10). Meritorious are also the (Propyla—

enausgabe) (Munich 1909-14) ; the Hempel edi¬

tion, Berlin 1868-79 (new Goldne Klassiker ed., 1910-14) ; the Heinemann edition (Leipzig

1900), and that contained in Kiirschner's

(Deutsche NationalliteraturP

The conversations have been best edited by

W. Biedermann, (Goethes Gesprache) . (10 vols.,

Leipzig 1889-96) ; for the conversations with

Eckermann see also Houben's edition (Leip¬

zig 1911). As before stated, the letters are now available all together in Weimar edition of the works; but special mention may be made of the (Goethe-Schiller Correspondence, > ed. by Graef

and Leitzmann (Leipzig 1912) ; and of the

letters to Frau von Stein, ed. by W. Fielitz

(Frankfurt 1883-86), and by Fraenkel (Jena

1908). The outstanding biographies are those

of Bielschowsky, A. (Munich 1896-1904; trans—

bv Cooper, New York 1905-08) ; Brandes. G.

(Copenhagen 1915) ; Carus, P. (Chicago

1915) ; Chamberlain, H. S. (Munich 1912) ;

Diintzer, H. (Leipzig 1880; trans. by T. W.

Lyster, London 1883) ; Geiger, L. (Berlin

1910) ; Grimm, H. (Berlin 1875; trans. by S. H.

Adams, Boston 1880) ; Heinemann, K. (Leip¬

zig 1895) ; Lewes, G. H. (London 1856) ; Mc¬

Cabe J. (London 1912) ; Meyer, R. M. (Ber¬

lin 1895) ; Thomas, C. (consisting partly of

studies and appreciations; New York 1917);

Witkowski, G. (Leipzig 1899). Miscellaneous

works of importance are Appell, J. W.,

(Werther und seine Zeit) (Oldenburg 1855) ;

Bode, W., (Goethes Aesthetik) (Berlin 1901) ;

Boucke, E. A., (Goethe's Weltanschauung)

(Stuttgart 1907); Gloel, H., (Goethes Wetzlarer

Zeit> (Berlin 1911) ; Graef, H. G., (Goethe

fiber seine Dichtungen) (9 vols., Frankfort

1901-14) ; Maass, E., (Goethe und die

Antike) (Stuttgart 1912) ; Magnus, R., (Goethe

als Naturforscher) (Leipzig 1906) ; Mentzel,

A., (Der Frankfurter Goethe) (Frankfurt

1900) ; Morris, M., (Der junge Goethe) (6 vols., Leipzig 1909-12) ; Schmidt, E., {Charaker-istiken) (Berlin 1896) ; Scherer, W., (Aufsatze fiber Goethe) (Berlin 1886) ; Vogel, J. and

Traumann, E., (Goethes Studentenjahre5 (Leip¬

zig 1910) ; Wasilewski, W. von, (Goethe und

die Descendenztheorie) (Frankfurt 1903) ;

Weissenfels, R., (Der junge Goethe) (Tfibingen 1899).

Calvin Thomas,

Professor of Germanic Languages and Litera¬

tures, Columbia University.

GOETHITE, ge'tit, a hydrous sesquioxide of iron, contains when pure 62.9 per cent of iron. It differs from hematite in having a yellow streak and from limonite in containing more water and crytallizing in the ortho¬ rhombic system. It is known in England and in Saxony as well as in the States of Missouri, Colorado and California. The lower grade yel¬ low or reddish iron ores of the Lake Superior region, particularly on the Mesabic range in Minnesota, contain considerable goethite, and the mineral is thus an iron ore of some im¬ portance, though it is not distinguished com¬ mercially from limonite. See Iron.

GOETSCHIUS, get'shi-us, Percy, Ameri¬ can musical scholar : b. Paterson, N. J., 30 Aug. 1853. He was graduated from the Stuttgart Conservatory, became an instructor there (1876), and was appointed to a royal professor¬

ship (1885) by the king of Wiirttemberg. In 1890 he received appointment to the professor¬ ship of harmony, musical history and advanced pianoforte in the musical department of Syra¬ cuse University, and in 1892-96 was professor of composition in the New England Conserva¬ tory at Boston. He became organist of the First Parish Church (Unitarian) of Brookline, Mass., in 1897. In 1905 he was made head of the theory department at the Institute of Musi¬ cal Art, New York. In addition to his com¬ positions, including anthems, sacred songs and instrumental works, he wrote (The Material Used in Musical CompositioiP (1882) ; (The Theory and Practice of Tone Relations) (1892); (The Homophonic Forms of Musical Composition) (1898) ; (Applied Counterpoint (1902); (Lesson in Music-FornP (1904); Ex¬ ercises in Elementary Counterpoint (1909); Essentials of Music History1) (1913) ; (The Larger Forms of Musical Composition) (1915).

GOETZ, gets, (Leopold) Karl, German theologian and author : b. Karlsruhe 1868. He

received his education at the universities of

Bonn and Berne. Joining the body of Old

Catholics he became, in 1892, pastor of one of their congregations at Passau, where he re¬

mained for eight years. From 1900 to 1902 he

taught in the Old Catholic Seminary of Bonn,

and in the latter year became professor at the university there. He published several works

on church history, seeking more especially to

state the grounds of separation between the

Old Catholics and the Papacy. These works

are Eusslehre Cyprians) (1895) ; (Geschichtliche Stellung und Aufgabe des deutschen Alt—

katholizismus) (1896) (Geschichte der Slavena—

postel Konstantinus und Methodius) (1897) ;

Eazaristen und Jesiuten) (1898); Eeo XIIU

(1899); E. H. Reusch) (1901); (Das Kiever

Hohlenkloster als Kulturzentrum der vor—

mongolischen Russlands) (1904) ; Eirchen—

rechtliche und Kulturgeschichtliche Denkmaler

Altrusslands) (1905) ; (Staat und Kirche in

Altrussland) (1908).

GOETZ, Theodor von, German painter:

b. Lieschen, Siberia, 1826; d. 1892. He began

as a genre painter, but in 1848 entered the

army and during the Schleswig-Holstein cam¬

paigns filled his portfolio with sketches of

march and battle. He thenceforward devoted

himself to painting military scenes, and became renowned as a battle painter. He took part

in the Franco-Prussian War of 1870-71, and

painted many striking incidents of the cam¬

paign. Noteworthy is his Episode in the Bat¬

tle of Sedan) (1875). one among many re¬

markable canvases which render him the

Horace of Germany.

GOETZE, Frederick Arthur, American

engineer: b. Jersey City, N. J., 17 April 1870.

He was educated at Hoboken Academy 1877-82,

Stevens Preparatory School 1882-85, Cooper

Union, New York city 1885-87 and the Colum¬

bia School of Mines 1893-95. He was succes¬

sively assistant superintendent and superin¬

tendent of buildings and grounds, at Columbia

University from 1895 to 1907. From 1907 to

1916 he was dean of the schools of mines, en¬

gineering and chemistry there and since 1913

has served as comptroller and since 1916 as

treasurer at the same institution.

GOFF, John W., American justice: b.

Wexford, Ireland, 1 Jan. 1848. He came to the United States when a child, was educated at

Cooper Union, studied law under Hon. S. G.

Courtney and was admitted to the bar in 1870.

He was assistant district attorney of New York in 1888-91 ; was counsel for the law association in the investigation and prosecution of election frauds in New York, and for the Lexow

senatorial committee of investigation of the

administration of police affairs in New York.

He was last recorder of the city of New York, 1894-1906; and in 1907 became justice of the

Supreme Court of New York, in the First

District, for the term 1907-20. He presided

over the trials of the gunmen and of Charles

Becker in the famous Herman Rosenthal mur¬

der case.

GOFF, Nathan, American legislator: b.

Clarksburg, W. Va., 9 Feb. 1843; d. 23 April

1920. Educated at Georgetown College and the

University of the City of New York, he was ad¬

mitted to the bar in 1866. He served in the

Civil War in the Union army, rising from the

rank of lieutenant to major. He was elected

to the West Virginia House of Representatives

in 1867 ; was United States district attorney in the district of West Virginia in 1868-81 and

1881-82. He served as Secretary of the Navy

in the Cabinet of President Hayes in 1881,

and was a member of the United States House

of Representatives in 1883-89. He was United

States Circuit Justice of the Fourth Circuit in 1892-1911; justice of the United States Circuit Court of Appeals in 1912-13; and in 1913 he

was elected to the full term in the United

States Senate.

GOFFE, gof, William, English regicide : b.

Sussex, about, 1605 ; d. Hadley, Mass., about,

1679. He became apprenticed to a salter in

London; in 1645 became a captain in the New

Model, and served with distinction in the civil wars. He was one of the judges who signed

Charles' death warrant, became a major-gen¬

eral, sat in the House of Commons, and in

Cromwell's ((other house,)) and was a staunch

Cromwellian. Being excepted from the act of

indemnity, in 1660, with his father-in-law,

Gen. Edward Whalley, he fled to America ; and

they lay in hiding round about New Haven

from 1661 to 1664, when they went to Hadley,

Mass. There they lived for many years in

seclusion ; and it is there that, according to the well-known tradition, when the townsmen were

called from the meeting-house to repel an In-

dian attack, and were standing irresolute, Goffe put himself at their head and drove off the foe, and then disappeared as suddenly as he had

come. The genuineness of the story, however,

is more than doubtful; but literary uses have

been made of it by Scott, Fenimore Cooper and Hawthorne. His papers have been printed by

the Massachusetts Historical Society. Consult

Stiles, (History of Three of the Judges of King Charles P (1794), and Judd's 'History of

Hadley) (Springfield 1905).

GOFFSTOWN, N. H., village in Hills¬

borough County, eight miles northwest of Man¬

chester and 15 miles southwest of Concord on

the Piscataquog River, and on the Boston and

Maine Railroad. . The village dates to 1748 and was incorporated in

1761. It is the seat of

Saint Anselm's College and is known as a sum¬

mer resort. It has manufactories of sash and

blinds, bobbins and spools. Pop. 2,579.

GOG and MAGOG, a king and his nation

mentioned in Ezekiel, and the book of Revela¬

tion (((the prince of Rosh, Meshech and Tubal

from the land of Tubafi)). Gog, king of the

Magog people, represented the northern hordes,

who were to invade western Asia (Ezek.

xxxviii, 39). Probably Gog was the Gyges of

the Greeks, Gyges being a typical name for

kings reigning northwest from the Assyrians.

The event predicted was the irruption of the

northern nations into Syria. Gog and Magog

are also the names given to two reputed giants of early British history, whose statues are

erected in the Guildhall in London. The leg¬

end reported by Caxton with reference to these personages declares that they were the last two survivors of the sons of the 33 infamous

daughters of the Emperor Diocletian, who,

having murdered all their husbands, were sent

to sea in a ship, and arriving in Britain and cohabiting there with demons, had a number of

giants for their offspring. These giants, it is said, were conquered and

brought prisoners to

London, where they were kept chained to the

gates of a palace on the site of the Guildhall.

When they died their place was taken by effigies of them. Effigies called Gog and Magog cer¬

tainly existed in London at a very early period, and they were sometimes brought out and

placed on a conspicuous place to welcome

a sovereign entering the city, as was done to Henry V in 1415; Philip and Mary in 1554;

and Queen Elizabeth in 1558. The old effigies

were burned in the great fire in 1666. The

present figures of Gog and Magog, which are

14 feet high, were erected in 1708.

GOGEBIC RANGE. See Iron Ore Dis¬

tricts.

GOGERLY, Daniel John, English mission¬

ary and scholar: b. London, August 1792; d.

Colpetty, Ceylon, 6 Sept. 1862. He became a

Wesleyan preacher at an early age, and in 1818

went to Ceylon to take charge of the Wesleyan mission press at Colombo. In 1822 he became

a missionary and was one of the first to preach to the natives in Singhalese. He devoted him¬

self seriously to the study of the languages of the country and was the

first European to give critical study to the language of the Pali, the native tongue of Buddha's country, Magadha.

He was stationed at Madura in 1834 and there

studied Pali under the native priests. He com¬

piled a dictionary of Pali, 15,000 words, and

induced the Buddhist priests to make copies of all their sacred books, with glossaries and

annotations, a collection which at his death be¬

came the property of the mission. He was

from 1822 one of the translators of the British and Foreign Bible Society, the Singhalese ver¬

sion being in a large measure the result of his labors, and he passed the entire version as

editor and corrector. He was appointed super¬

intendent of the mission in 1838. He made

important contributions to the Journal of the

Royal Asiatic Society, translated the 'Jataka—

pata) ((Book of 500 Births of Buddha)), and

wrote a polemic work against Buddhism

'Christiani Pragnyapti ; the Evidences and

Doctrines of the Christian Religion : in Singhalese) (Colombo 1862). He was widely rec¬

ognized as a master of Pali literature.

GOGGLER , or GOGGLE-EYE, names

given colloquially to several fishes that have

prominent eyes, as the rock-bass, the wall-eyed pike and a tropical crevalle. American gun¬

ners call a duck, the surf scoter, <(goggle-nose,)) in reference to spectacles-like spots on its bill.

GOGOL, go'gol, Nikolai Vassiljevitch,

Russian novelist and dramatist, the father of

modern Russian realism : b. in the government

of Poltava, 31 March 1809 ; d. Moscow, 3 March 1852. From an early period he evinced a lik¬

ing for the drama, endeavored unsuccessfully

to establish himself as an actor, and at 19 en¬

tered the office of the domain of lands at Saint Petersburg as a copying clerk, becoming there¬

after successively professor of history in the

Patriotic Institute, a private tutor, and profes-

• sor of history in the University of Saint

Petersburg. In 1829 he published his first

work (Nights on a Farm near Dikanka,) and

its remarkably vivid character drawing aroused

widespread interest in its author. <AIingorcd)

a collection of tales mainly illustrative of life and customs in Little Russia, followed in 1834.

In 1836 he produced his great comedy, (The

Revizor) (inspector-general), the mordant

satire of which drew a cry of distress from the dishonest and incapable provincial bureaucrats

at which it was aimed, and its representation

would certainly have been banned but for the

Emperor Nicholas I, who appeared rather to

enjoy the situation thus created. But the au¬

thor was somewhat disconcerted by the feeling

aroused by his comedy, and his health suffered in consequence. Between 1836 and 1848 he re¬

sided principally in Rome. In 1842 he produced his most famous work (Dead Souls,) a novel

without a plot, in which he again satirised pub¬

lic abuses and the barbarism of provincial man¬

ners. Laughter with tears in the background

and a note of irony are the dominant notes of this remarkable novel, in which he introduced

succession of types of all classes in Russia.

His health was now failing; he became a vic¬

tim of melancholv and hypochondria; his sec¬

ond volume of ‘Dead Souls) was written, but

in his alienation he consigned it to the flames.

Fragments of a draft that have been recovered

show how great was the eclipse that had

clouded his intellect; for the characters are

dull respectabilities. His last work Corre¬

spondence with Friends) (1847) furnished fur-

ther proof of his ruined intellect : ascetic, mys¬

tical and reactionary, it is a moving and de¬

pressing recantation of his more virile work.

He made a pilgrimage to Jerusalem in 1848.

By temperament, imagination and intellect a

true son of the steppes, Gogol's earlier works are assured of a permanent place in the liter¬

ature of Russia. His principal tales have been translated by Hapgood (New York 1886) ; and

(The Revizor) by Mandell (New York 1910).

See Dead Souls.

GOING, Charles Buxton, American engi¬

neer, author and editor: b. Westchester, N. Y., 5 April 1863. He was graduated at Columbia

in 1882, and in 1896 became connected with the Engineering Magazine, of which he was man¬

aging editor in 1898-12 and editor in 1912-15.

He has been editor of the Works Management

Library since 1915. He has lectured on indus¬

trial engineering at Harvard, Columbia and

New York universities and at the University

of Chicago. He is a member of the American

Society of Mechanical Engineers and corre¬

sponding member of the Canadian Mining In¬

stitute. Author of (Summer-Fallow) with

Marie Overton Corbin (1892) ; (Urchins of

the Sea) (1900); (Star-Glow and Song)

(1909); (Methods of the Santa Fe) (1909);

Principles of Industrial Engineering) (1911),

etc.

GOITO, Italy, village of Lombardy in the

province of Mantua, 11 miles northwest of

Mantua, on the right bank of the river Mincio, and on the road to Brescia. It is located near a bridge, which has given it military import¬

ance, and it has been fortified as a bridge-head at different times. It has seen many battles,

among them the victories of the Piedmontese •

forces over the Austrians 8 August and 30 May 1848. Pop., village, 737 ; commune, 6,702.

GOITRE, goi'ter, an enlargement of the

thyroid gland which may occur sporadically or

be endemic. Isolated cases occur the world

over. In the United States the disease is com¬

paratively prevalent around Lake Ontario and

in parts of Michigan. It is found endemically

in the mountainous regions of Switzerland and

Italy. The cause is unknown, although certain

claims are made that the water is responsible.

The symptoms of goitre consist of a more or

less uniform enlargement of one or both lobes

of the thyroid, causing a puffiness either on one side or both sides of the neck about the region of Adam's apple. When small, no inconvenience

is caused thereby, but if the growth becomes

extensive, pressure on the important structures

of the neck may result in difficulty in breath¬

ing, and occasionally sudden death has resulted.

Tumors of the thyroid glands such as carcinoma and sarcoma sometimes simulate goitre. One

form of goitre, due to abnormal thyroid

function, is known as Graves' disease. (See

Exophthalmic Goitre). Consult article on

<(Goitre® in Osier's (Modern Medicine) (2d ed., Philadelphia 1914) and McCarrison, (Etiology

of Endemic Goitre) (London 1913).

GOKCHA, gok-cha', GOKTSCHA, or

SEVANGA, sa-van'ga a lake in Erivan, in

Transcaucasia, Armenia. It is 6,400 feet above

the sea and has an area of about 540 square

miles. A large number of small streams flow

into it, but the outlet, the Sanga, which flows into the Aras, seems to convey only a small

portion of the waters to the Caspian Sea.

GOLCONDA, India, a fortress and ruined

city of the Hyderabad state, situated on a

granite ridge, five miles west of Hyderabad,

India. In its immediate neighborhood are

the ruins of an ancient city, once the

metropolis of the powerful kingdom of Golconda, which reached its height at the close

of the 16th century and endured till 1687. The place itself is still strong; and about half mile to the north are the solid mausoleums of its

former sovereigns. The fort is held by a small garrison from Hyderabad. Golconda is pro¬

verbially famous for its diamonds ; but they

were merely cut and polished here, as no

diamonds are found in the vicinity.

GOLD (chemical symbol, Au, atomic

weight, 197.3) ; a metal distinguished from

other common metallic elements by its beau¬

tiful characteristic yellow color which it pre¬

serves untarnished on exposure to the atmos¬

phere under nearly all conditions. Many alloys

of copper with zinc, tin and aluminum have

also a more or less golden-yellow color, and

are used as substitutes for and imitations of

gold, being sold under various fanciful names,

such as Dutch metal, Mannheim gold, Abys¬

sinian gold, *etc.* Some of the bronzes have

also a golden color. None of these resist

atmospheric action like gold, but some are

fairly permanent under ordinary conditions.

Pure gold has a high metallic lustre, but is in¬

ferior in this respect to steel, platinum and

silver. The metal possesses a higher specific

gravity than any common metal, but is exceeded in this respect by platinum. The specific gravity varies from 19.2 to 19.4, and the metal is thus one and onehalf times heavier than lead and

nearly twice as heavy as silver, bulk for bulk.

Gold melts at 1,045° C., being somewhat less

fusible than silver and more fusible than copper.

It does not melt in a common fire. At high tem¬

peratures the metal is sensibly volatile, and in the intense heat of the oxyhydrogen blowpipe

or electric furnace may be vaporized. The

vapor is purple.

The pure metal is somewhat harder than

lead, but softer than copper, silver, platinum, zinc or iron. It is consequently too soft, in the pure state, for the purposes to which it is gen¬

erally applied. For practical application it is alloyed with copper or silver, and both these

metals are often present. The former renders

the gold redder and the latter paler than its true color. The proportion of gold contained

in an alloy is expressed in degrees of fineness, or as ((carats® ; fineness is expressed in parts per thousand, for example 916.6, or decimally, .9166; the carat value of the gold is expressed in parts of 24, pure gold being 24 carats fine. Thus

9-carat gold contains 9 parts of pure gold and 15

of some alloy. Sovereign gold consists of 11

parts gold and 1 copper; guinea gold, of 11 parts gold, l/2 part of copper and part of silver.

Standard and guinea gold are thus 22 carats

fine (the legal standard for coins in the United Kingdom and colonies), and contain only two

parts of alloy. The German, American and

Italian standard is 21.6 carat, and is composed of one part copper and nine gold. The follow-GOLD

ing table shows the relative amounts of gold

and baser metal in alloys commonly employed :

Carats Fine

Pure Gold

Alloy

Fineness in thousands

24

24

1000.00

22

22

2

916.66

21.6

21.6

2.4

900.00

18

18

6

750.00

15

15

9

625.00

12

12

12

500.00

9

9

15

375.000-

The lowest recognized standard is nine carat,

but much gold of inferior quality is worked up into ornaments and commonly sold as real gold.

Derby gold is also a common name for this poor material. In the United Kingdom articles of

jewelry, plate, etc., are stamped with certain

marks known as hall marks, or plate marks, as a guarantee that they have the quality they pro¬

fess to have. Tampering with hall-marked arti¬

cles is an indictable offense. Many specious imi¬

tations of hall marks are put upon sham jewelry, but always differ in some essential feature. Gold alloys of a red character are frequently colored.

This consists in treating the article chemically in such a manner as to dissolve out the base metal constituting the alloy, leaving a covering of purer gold, paler than the original. For

this purpose the articles are boiled with one

part of salt, one of alum, two of saltpetre dis¬

solved in four parts of water, for 20 minutes.

Rolled gold is produced by applying thin sheets of gold to a plate of alloy and rolling down.

Pure gold has a tenacity of about seven tons

per square inch, and elongates about 30 per

cent before breaking. A wire one-tenth of an

inch thick will support nearly 200 pounds. Its alloys with copper and silver are stronger.

Standard gold has a tenacity of 18 tons (Aus¬

ten), and extends 34 per cent before breaking.

At very low temperatures this is greatly in¬

creased (Dewar). Gold is the most malleable

of metals, and can be reduced to extremely thin leaves by hammering. (See Gold-beating). Such

leaves sometimes do not exceed 250W of an

inch in thickness, and transmit green light,

though presenting an unbroken metallic surface.

This is best seen by mounting on glass. The

extreme thinness and high lustre of the metal

have led to its use as an illustration of the extreme divisibility of matter. A particle of

gold weighing only 2stn?o<ro of a grain is readily visible to the naked eye. A grain of gold can be made to cover nearly 80 square inches of

surface. The malleability of gold is seriously

affected by the presence of minute quantities

of arsenic, antimony, bismuth, lead, sulphur,

selenium and tellurium. Of the last 0.2 per

cent, and of bismuth 0.5 is sufficient to render the metal crystalline and brittle. Traces of the above elements unfit the metal for gold-beating and coinage. These are removed by passing

chlorine gas through the molten metal, or by

treating the molten metal with mercuric chloride (corrosive sublimate). By continued hammer¬

ing the metal is slightly hardened, and must be annealed. Gold surpasses all other metals in

respect of ductility. The extreme ductility of

the metal is shown by the fact that wires less than of an inch thick were obtained by

Wollaston by encasing a wire of gold in silver and drawing down the compound wire. The

silver was dissolved off by treatment with nitric acid. A length of 500 feet of such wire weighs only one grain. Gold wire is used for making

gold lace. Gold is also extremely flexible and tough. Gold comes from the refinery in the

form of bullion bars, and has to be assayed to determine its value. The bulk of it goes to a mint for coining. In the United States, on

reaching the mint, the gold is melted with 10

per cent of copper and recast into ingots of a convenient size for coining. See Coinage.

Chemical Properties. — Gold alloys readily

with most metals. It is rapidly attacked by mer¬

cury, and dissolves in excess of that metal. If the liquid amalgam be squeezed through wash-leather a yellow pasty mass remains, which may be used in “wash® or “fire® gilding. This proc¬

ess, however, has been largely displaced by

electro-gilding, in which the bath consists of the double cyanide of gold and potassium, and is

used hot. The metal is unattacked by any of the simple acids, save selenic, but dissolves in any mixture in which chlorine, bromine or iodine is liberated. The common solvent is aqua regia, a mixture of one part nitric acid and three or four of hydrochloric acid. The chlorine liberated

from this mixture converts the gold into the tri¬

chloride, an exceedingly soluble body of high

tinctorial power, yielding yellow solutions. In

the finely-divided state gold is dissolved by

chlorine water, bromine water and iodine solu¬

tion or tincture, the trichloride, tribromide and triodide being produced. It also dissolves in

potassium cyanide solutions (in the presence of air) and in cyanogen bromide. These solvents

are employed in the extraction of gold from its ores. Oxides of gold can be prepared with

some difficulty. The monoxide is thrown down

when caustic potash is boiled with gold chloride solution to which a little acetate of soda has been added. A trioxide (Au203), a dioxide

(Au202), and a tetroxide (Au20«) are also

known. What is known as fulminating gold,

Au203(NH3), may be prepared by adding am¬

monia to a solution of gold chloride or by

steeping the hydroxide in ammonia. It is a

green or brownish powder, which detonates

violently when gently heated or when struck.

Two classes of gold salts exist. Of the aurous salts, the principal are sodium auro-sulphite,

auro-thiosulphate, the cyanide and potassium

auro-cyanide. Of the auric salts, the principal are the trichloride and the chlor-aurates. Gold trichloride crystallizes from solution in dark

orange-red crystals, AuC132H20. It is extremely

soluble in water, and volatilizes at 300° in a stream of chlorine gas, but is decomposed on

heating to 200° in air with the formation of

the monochloride and chlorine, and, at a higher temperature, of gold. It is soluble in ether,

naphtha and essential oils.

The chlor-aurates are combinations of gold

chloride with sodium, potassium and other

alkaline chlorides. The best known are

KCl.AuCl3.2H2O, and NaCl.AuCl3.2H2O, salts

commonly sold as gold chloride _ for photo¬

graphic purposes. Gold is precipitated from

solution by most metals. Iron, copper and zinc precipitate it readily, generally in a more or less pulverulent form devoid of metallic ap¬

pearance. Oxalic acid, ferrous sulphate, sul¬

phur dioxide and sodium sulphite, carbon,

grape-sugar and many organic reducing agents,

precipitate the gold from gold chloride. In

some cases the metal is so finely divided that it imparts a ruby color to the liquid and does not settle for months. Purple of Cassius is the

fine purple pigment produced by treating gold

chloride solution with a mixture of tin chlo¬

rides, that is, stannous chloride containing a

little stannic salt. It is used in glass staining, pottery and enamel painting, and for coloring

artificial gems, imparting a pink, rose or red color. The addition of tin chloride to the solu¬

tion obtained by treating an ore with aqua

regia and boiling off the excess acid is a deli¬

cate test for the presence of gold. Finely

divided gold imparts to pottery and glass a

color varying from pink to ruby. Gold resists

chemical action to a greater extent than plat¬

inum or any other common metal, and in alloys protects base metals from the action of acids to a remarkable extent. Owing to the high specific gravity of gold (19.3) it is possible to roughly determine the richness of the alloy by taking

the specific gravity of the article. This is im¬

possible where platinum (specific gravity 21.4)

is present in the alloy. The specific gravity of standard gold is 17.157, and of 18-carat gold

16.8.

Assay of Gold. — The touchstone is em¬

ployed to determine approximately the quality

of the gold. It is a hard, black, silicious or flinty slate known also as Lydian stone. Basalt and black Wedgewood ware are also employed.

The metal to be examined is rubbed on the

stone (any plating or coloring being first

scraped off), and the streak compared with

that made by needles of known composition

differing from each other by onehalf carat.

The streak is also treated with nitric acid and a test acid, and the result of their action observed.

Three or more sets of needles are employed,

the chief being a gold-copper series, a gold-silver series and a gold-silver-copper series.

Sometimes five sets are employed, in which the proportions of silver and copper are varied.

The series to which the article tested belongs is determined by comparison for color, hard¬

ness and toughness, the latter being inferred

from the dryness or greasiness of the streak.

The streak is first treated with pure nitric acid (applied with a feather), which is afterward

rubbed off. With brass and other spurious cop¬

per alloys the streak is completely and instantly dissolved, while poor gold leaves a very faint impression. Nitric acid does not affect any

alloy above 15 carats fine. A test acid consist¬

ing of 98 parts nitric acid (specific gravity

1.34) and two of hydrochloric acid (specific

gravity 1.173) is used if the streak has been unaffected by the nitric acid. Gold of 18 carats fine and over is not affected by this mixture in the cold. This method of testing is only used when a rough idea of the richness is all that is necessary for valuation purposes.

Accurate assays of gold alloys are made by

wrapping a weighed quantity (either five grains or 0.5 gram) in sheet-lead, with sufficient sil¬

ver to equal three times the weight of pure gold present. Lead to the amount of 34 times the

weight of the sample is used for all alloys con¬

taining less than 50 per cent of gold, and less for richer alloys. The samplers dropped on to

a bone-ash cup (cupel) previously heated to

full redness in a muffle furnace. The copper

and all base metals in the alloy are oxidized, and the oxides dissolved in the molten litharge formed by the oxidation of the lead added.

The fused oxides are absorbed by the porous

cupel, thus keeping the metallic surface clear, and at the end of the operation only silver and gold remain behind. After cooling, the button

is rolled into a ribbon, annealed, coiled up and boiled first in nitiric acid of 1.16 specific grav¬

ity, and afterward in nitric acid of 1.26 specific gravity, to dissolve out the silver, and after washing the coherent cornet of gold is heated

to dull redness in an annealing cup and weighed.

The addition of silver in assaying is known as inquartation. It is necessary owing to the pro¬

tective action exerted by gold on other metals.

Origin and Occurrence. — In nature gold

usually occurs native, that is, uncombined.

Less commonly it is found in combination with

tellurium, as tellurides, of which calaverite

(AuTe2) is a well-known example. The na¬

tive gold is often mixed with iron pyrites, the mixture being called auriferous pyrite. Both

the tellurides and the auriferous pyrite usually occur in fissure veins in the rock, into which position they are usually believed to have been introduced by hot waters from deep seated ig¬

neous activity. The Cripple Creek district rep¬

resents the type of the telluride deposits, and the Mother Lode in California the type of

native gold and auriferous pyrite. When gold

bearing veins of this sort are exposed at the surface the rock weathers faster than the gold.

As the lighter rock particles are washed away the heavier gold remains behind associated with gravels in the form of placer deposits. California and Alaska have been the great placer districts of the United States. See Placers and Ore Deposits; Gold Mining and Metallurgy.

World Distribution of Gold. — Gold is very widely distributed, smaller or larger quantities being found in nearly every country. The an¬ cients obtained gold from the Spanish Penim sula, Greece, Asia Minor and India. The Ophir of the Bible has been variously located. Possi¬ bly it was in East Africa. In more modern times Peru, Bolivia, Brazil, Chile, Mexico and other countries of South and Central America furnished immense supplies of gold after the discovery of America until about 1850. By far the greatest discoveries of gold were made during the 19th century. The discovery of the Californian placers in 1848, and of the Aus¬ tralian placers in 1851, produced a mad rush to the diggings. In 1858 gold was found in New Zealand, and in 1861 the Otago district became a large producer. Since then immense develop¬

ments have taken place. Besides California,

Colorado, Montana, Arizona, South Dakota,

Nevada, Idaho and others of the Unted States

have furnished, and still furnish, large supplies, and Alaska and the Philippines must also be

added. British Columbia is an important

source, both alluvial and quartz mining being

followed. Canada has also entered the lists as a gold-producer, and the phenomenal deposits

at Nome and in the Klondike region in the

Yukon Basin continue to be a productive field.

The rich finds in western Australia, in the Cal-goorlie and Coolgardie districts, some years

ago, placed that colony in the front rank as a GOLD — GOLD-BEATING

gold-producer, while Victoria, South Australia

and New South Wales have long been large

gold-producing countries. In Victoria much

energy in the development, more especially of

wdeep lead® mining, is being put forth. The

Witwatersrand district of the Transvaal has

sprung into importance since 1886, and Jo¬

hannesburg is now the largest gold-mining

centre of the world. Russia is also an import¬

ant producer, the gold being obtained beyond

the Ural Mountains. India also produces a

considerable amount. Of the prospective gold

fields the most likely are British Guiana, the hinterland of the Gold Coast, certain parts of China and East Africa. Gold has been found

in several parts of the United Kingdom, prim

cipally around Dolgelly, in Merionethshire, in

Sutherlandshire, in the Lead Hills, in the Wick¬

low Mountains and other places in Ireland.

For world's production of gold see table under Gold Mining and Metallurgy.

The total gold production of the world from

the discovery of America by Columbus to the

year 1916 is estimated to be $16,616,991,763.

Pure gold of this value would weigh about

20,500 tons, and occupy a space equal to 33,400

cubic feet. Graphically this amount could be

represented by a solid circular tower of gold

20 feet in diameter and 138 feet high. The

total yearly world production of gold since 1908

would have increased the height of such tower

about three and onehalf feet each year.

The world's stock of gold is variously esti¬

mated ; it cannot be positively known, as much of it is in jewelry, tableware, etc., in the hands of in¬

dividuals. Some idea of the old gold industry

may be gleaned, however, from the fact that

the (<sweep smelters® of the United States, who handle sweepings of the precious metals from

refineries, and old gold and jewelry, did a busi¬

ness of $22,000,000 in 1909. The gold leaf and foil industry is also credited with using about $1,000,000 of gold annually. The latest estimate of the world's gold, $9,000,000,000, is therefore probably below the real total. The United

States, before the European War, was credited

with nearly $2,000,000,000; Great Britain over

$1,600,000,000; France, about $1,200,000,000;

Russia, $1,000,000,000, and Germany, $1,000,000,-

000. Many have thought the German total an

underestimate. Conditions have tended to in¬

crease the United States stock of gold, as this country's exports have vastly exceeded the im¬

ports, and America is now far in the lead as a money centre.

United States. — The total yield of the

mines of the United States from the first offi¬

cial records of 1792 to the close of the year 1916

has been 185,226,085 fine ounces, valued at $3,-

828,957,200. The 1916 output of 4,479,056

ounces, valued at $92,950,300, was won from

seven various sources, as follows ; 63.30 per

cent ($57,799,310) from dry or siliceous ores;

25.06 per cent ($22,881,663) from placers; 9.07

per cent ($8,286,290) from copper ores; 1.63

per cent ($1 ,486,754) from lead ores; 0.65 per cent ($589,950) from lead-zinc ores; 0.19 per

cent ($171,624) from zinc ores, and 0.10 per

cent ($92,039) from copper-lead and copper-lead-zinc ores.

In 1916 there were in active operation in

the country 5,268 mines producing gold, 3,201

of these being deep or lode mines, and 2,067

placer mines. These figures include silver

mines which also produce gold as a by-product.

The largest number of mines in any one State

is 852 in Colorado ; 825 of these are deep mines and 27 placers. In Nevada there were 714 deep mines and 65 placer mines; a total of 779. In Alaska there were 697 mines; 650 being placers and 47 deep mines. California has 589 mines;

297 of them deep mines and 292 placer mines.

Arizona has 527 mines ; 504 deep mines and 23

placers. Montana has 393 deep mines and 120

placers; a total of 513. The 1916 output was

produced chiefly (nearly 99 per cent) by 10

States, with Alaska and the Philippines. See

table under Gold Mining and Metallurgy.

In California the gold production is in part

from deep mines yielding hard quartz ores, and in part from placers. The deep mines in 1916

yielded $12,835,084, of which 7.2 per cent came from the ores of copper mines. The placers

yielded $8,575,657, of which $7,769,227 was re¬

covered by some 60 dredges operating in many

sections of the State, but chiefly in Yuba, Sacra¬

mento and Butte counties.

In Colorado more than 92 per cent of the

1916 output came from deep mines; about 4 per cent from placers (worked by dredges), and

the remainder from lead and copper ores.

Two-thirds of the total yield came from the

Cripple Creek district, where the Roosevelt

tunnel was advanced 2,311 feet during the

year; making its entire length at the close of 1916 about 22,000 feet.

In Alaska the output was nearly two-thirds

from the placer diggings, less than one-fourth

of the placer gold being gained by the

dredges. A little over 1 per cent was recovered from the copper mines,

and the remainder

from deep mines — nearly all from the group

of 13 low grade ore mines in southeastern

Alaska.

Nevada's 1916 output was gained nearly all

from deep quartz mines, and about half from

the Goldfield and Tonopah districts.

South Dakota's output came almost wholly

from low grade siliceous ores.

The balance of imports and exports of gold

for the calendar year 1916 shows a gain by the United States of $530,197,307. The imports

were chiefly of foreign bullion, $514,425,434; of foreign coin, $155,034,343; and gold in foreign ore and base bullion, $13,402,002. The exports

were in largest items : United States coin,

$106,903,188; domestic-refined bullion, $27,671,-

406; and foreign coin, $20,885,877. It is notable that the excess of imports over exports is $73,-

000,000 more than the entire world's produc¬

tion of gold for the year.

GOLD, Refining of. See Electrochemical

Industries.

GOLD-BEATERS' SKIN, a skin or mem¬

brane of great tenacity used in gold-beating

(q.v.), and specially prepared from the outer

coat of the caecum of cattle. The intestines of 500 cattle are required to make a single packet or Gnold® of gold-beaters' skin, the mold con¬

taining about 850 leaves, between which the

gold to be hammered out is laid. See Gold¬

beating.

GOLD-BEATING, the art of hammering

gold into leaves of extreme thinness for the

purposes of ornamental gilding. For this pur-

pose pure gold is alloyed with small quantities of other metals according to the color re¬

quired. Ten colors are recognized: red, palered, deep-red, orange, lemon, deep-pale, pale,

pale-pale, deep-party, party, besides fine gold.

In the deeper colors copper preponderates in

the alloy, varying from *4 dwt. to 34 dwt. per ounce, and no silver. The pale ones contain

silver varying from a few grains to 1 dwt.

per ounce. The middle ones contain from 34

to a little over 1 dwt. of alloy, of which 2/z is silver and]/$ copper. Ordinary gold-leaf con¬

tains about 21 grains of alloy per ounce and is thus nearly 23-carat fine. The operations are

conducted as follows : The metal is melted

and cast into ingots, which are rolled out into thin ribands between polished steel rolls. Each ounce of gold is rolled to a length of about 10 feet, the riband being 1*4 inches wide and 0.0015 to .001 inch thick. This is cut up into pieces, each weighing about 6 grains, so that

2 ounces — that is, a ˆbeating® — yields 160 to 170 such pieces. These are packed between

intervening sheets of vellum, some 3 inches

square, the surfaces of which have been rubbed over with fine plaster of Paris — brime — to prevent the gold from sticking. A number of

blank pieces of vellum are placed at the top

and bottom of the pile and the packet is bound with straps of the same material. The cutch

thus formed is beaten with a hammer weighing

from 17 pounds upward, or by a power ham¬

mer, till the gold has been extended to the

size of the parchment sheets. The packet is

then unbound, the gold squares each divided

into four by a steel knife and the pieces

packeted between sheets of gold-beaters' skin

(q.v.) about 4*4 inches square. A number of

blank skins are placed at both top and bottom.

The 600 to 700 pieces are all put into the same packet and comprise what is called the shoder.

The shoder is secured by slipping the pile into a parchment band and again into a similar

one at right angles, and is beaten with a

round-faced hammer weighing from 9 to 12

pounds, until the gold has extended across the skins. When the gold has filled the shoder

each leaf is divided into four pieces with a

strip of bamboo sharpened on the long edge.

The 2,500 to 2,800 pieces thus obtained are

packed in three packets between fine gold¬

beaters' skin, 5 inches square. Each of these

packets constitutes a ˆmold.® A large number

of blank skins are placed at either side. The packet is secured as before and each mold is

beaten with the ˆfinishing® or gold hammer,

weighing from 7 to 10 pounds, till the metal

extends to the edges of the skins, and in

some places flows over. When the beating is

finished the mold is opened. Each leaf is then lifted deftly by long wooden tweezers, placed,

with a sudden downward movement, on a

leather pad dusted with brime, and from the

central part leaves 334 inches square are cut

by means of two sharpened bamboo strips

fastened parallel to each other. The leaves

are placed by the tweezers in books of soft

paper rubbed over with red ochre, red bole

and brime to prevent the gold from sticking.

If the leaf does not lie flat, a sudden puff of breath, well directed in the centre, lays it flat.

Each book contains 25 leaves. Fine gold is

more difficult to deal with than that containing a little alloy, owing to its liability to stick when the leaves touch. It, however, beats

equally well. The leaf begins to transmit light when Bofoo of an inch thick. Ordinarily

gold-leaf varies from sn 50W to 25ˆ052 of an

inch thick.

GOLD-BUG, The. <The Gold-Bug, > by

Edgar Allan Poe, belongs to the group which

the author called Tales of Ratiocination. This

type of story, which was virtually created

by Poe and which is exemplified in the many

detective stories written since his day, deals

with the solution of a mystery, and has two

climaxes — the first where the explanation is

made known, the second where the method of

discovering the explanation is revealed. It is

usually told by a friend or semi-confidant of

the person who evolves the solution, since by

this device the author is able to present more easily details in the order necessary to produce the greatest effect. (The Gold-Bug) tells of the discovery of buried treasure through the read¬

ing of a cipher memorandum and the scene

is laid on an island near Charleston, S. C.

As a tale it is remarkably well knit, and re¬

peated readings will discover new instances of

seemingly trivial details which are introduced

because of their relationship to something in

another part of the story. The gold-bug itself, which gives the title, is cleverly used to mislead the reader and to throw him off the true scent when the writer so desires. The work was

first published as a prize story in the Phila¬

delphia Dollar Newspaper in 1843 and ap¬

peared in the volume of Poe's tales issued in 1845. In Poe's lifetime, at least, it was the most popular of his prose pieces, but the

author sometimes spoke of it rather slightingly.

His other chief tales of ratiocination which

may be grouped with it are the detective

stories in which the character of Dupin ap¬

pears — the (Murders in the Rue Morgue,*

the (Purloined Letter) and the (Mystery of

Marie RogetP

William B. Cairns.

GOLD COAST COLONY, a British crown colony on the Gulf of Guinea, West Africa, bounded on the east bv Togoland and on the west by the Ivory Coast (French). Its coast line is about 350 miles: its area, in¬ clusive of Adausi, Ashanfi and the Northern Territories, is about 80,000 square miles; Gold Coast, 24,200; Ashanti, 20,000, and Northern Territories, 35,800 sq. miles. Pop. 1,503,386, including Europeans, 1,900 (Gold Coast, 853,- 766; Ashanti, 287,814; Northern Territories, 361,806). The native state of Ashanti lies inland, at the back of the central portion of the colony. The territories in the hinterland to the north of Ashanti were erected into a separate district, the Northern Territories, in 1897 and placed under the administration of a commissioner. The products are chiefly palm oil, gold, palm kernels, rubber, timber, *etc.* The revenue for 1914 was £1,331,713; expendi¬ ture, £1,755,850. The imports (including bul¬ lion and specie), £4,456,968; exports, £4,942,565. Public debt (1914), £3,464,118. Tonnage entered at ports (1914), 2,812,776 tons. Railways have been built from Seccondee to Coomassie (168

miles), and from Akkra to Mangoaze (40

miles). There are 1,653 miles of telegraphs

in the colony. Chief towns, Akkra, the capital, pop. 19,585 ; Coomassie, 18,853 ; Cape Coast

Castle, 11,364. The government includes a

governor, an executive council, and a nominated legislative council of nine. Trouble arose be¬

tween the king of Coomassie, who had declared

himself king of Ashanti in 1894, and the

British authorities, and in 1895 an expedition

was sent against him, under the command of

Sir Francis Scott, which resulted in the sub¬

mission of the king, who was afterward taken

to the coast. The kings of Bekwai and

Abodom also made their submission, and the

country was placed under British protection,

and a resident appointed at Coomassie. The

Niger Convention, drawn up by the Anglo-French Commission sitting at Paris, and signed

15 June 1898, and the agreement of Germany

1899, settled the boundaries of the hinterland

to the west and the north. Bona and Dokta

were given up to France and the French had

to concede Wa and other points to the east

of the Volta, which had been occupied by them.

GOLD COINAGE IN THE UNITED

STATES. The Constitution having assigned

to the Federal government exclusively the

right of coinage, the Secretary of the Treas¬

ury (Hamilton) in 1791 reported a plan for

the establishment of a mint, and the Mint Act was passed 2 April 1792. In that act provi¬

sion was made for the coining of gold, silver and copper — of gold eagles ($10) , half-eagles

($5) and quarter-eagles ($2.50) ; of equiva¬

lents of the Spanish dollar, designed to contain 371 4/16 grains of pure silver (416 grains of standard silver) ; and at the bottom of the

list, copper cents, although the decimal system was adopted in principle, and that called for

dimes and mills as well as for dollars and

cents. Now, if we overlook, as is indeed

customary, the smallest subsidiaries, it may be proper to say that a ˆbimetallic® system was

thus adopted. The ratio of gold to silver —

the two metals then, and anachronistically

still sometimes, called precious — was 15 to 1; and the standard of fineness of coins made

chiefly of gold was 11/12. The mint was es¬

tablished at Philadelphia: the opportunity for

coinage was both free to all persons and

gratuitous, exactly as instruction and training

at a public school, turning the children taken there into scholars, was free and gratuitous.

So the coinage laws stood until 28 June

1834, when the weight and fineness of gold

coins were reduced (the weight of an eagle

from 270 to 258 grains, and its fineness from 916.66 to 899.225 in 1,000). Here we note the beginning of — or the recognition for utili¬

tarian purposes of — the amended ratio of gold to silver ; since under this act it became ap¬

proximately 16 to 1 instead of 15 to 1. On 18

Jan. 1837 the fineness was made 900 to 1,000, at which standard it has remained ever since.

A sufficient explanation of those changes (1834

and 1837) is found in the statement that gold was underestimated at the mint under the

older mint-ratio of 15 to 1; in consequence

of which little or no gold was taken thither

for coinage; moreover the old coins, minted

during the first part of the century, were with¬

held from the general circulation.

A reversal of the above-mentioned policy of

gratuitous coinage occurred 21 Feb. 1853, when

a charge was imposed of onehalf per cent for coining either gold or silver. Then, too, or

during that mid-century period, important new

coins were authorized : in 1849 the double-eagle and the gold dollar; in 1853 the gold three-dollar piece. Twenty years later (1873) a

thorough revision of the coinage laws had, as

a noteworthy result, the establishment of the

one-dollar gold-piece of 25.8 grains, 9/10 fine, in the post of honor — that of the unit of value.

Again, after an interval of about 17 years,

the purchase of silver was increased under the Sherman Act of 1890, although the coinage of

silver dollars was conditioned upon the number

of them required to redeem the treasury notes

issued in compliance with that act's require¬

ments ; and in the same year the coinage of the one-and three-dollar gold pieces was discon¬

tinued. But in 1893 the Sherman Act was

repealed. Seven years later the socalled Gold

Standard Bill (14 March 1900) was enacted

(<to define and Fix the Standard of Value, to Maintain the Parity of All Forms of Money

Issued or Coined by the United States, to

Refund the Public Debt, and for Other Pur¬

poses.® It provides that the dollar of 25.8

grains of gold, .9 fine, shall be the standard unit of value, and all forms of money issued

or coined by the United States shall be main¬

tained at a parity of value with this standard, and it shall be the duty of the Secretary of the Treasury to maintain such parity.ˆ All

United States notes and treasury notes issued

under the act of 14 July 1890 shall be re¬

deemed in gold coin as above, and to secure

this the Secretary of the Treasury is directed to set aside a reserve of $150,000,000 in gold coin and bullion, to be used for such redemp¬

tion purposes only. If this reserve falls below $100,000,000 despite certain assigned methods

of replenishing it, the Secretary shall pledge

the credit of the United States by issuing

bonds at not exceeding 3 per cent interest,

payable quarterly, exempt from all taxation.

This is not to interfere with the legal-tender quality of silver money already in circulation.

As fast as silver dollars are coined under pre¬

vious acts, an equivalent amount of treasury

notes shall be retired and silver certificates

issued instead. The coinage of subsidiary

silver coins, and the recoinage of such as are out of circulation, are provided for. This act is not to prevent international bimetallism if it is found possible to secure a stable relation be¬

tween gold and silver.

The total coinage, 1793-1911, was $4,304,-

288,083, divided as follows: Gold, $3,271,514,-

410; silver, $971,904,364; subsidiary or minor,

$60,869,308. The gold coins minted have been

(in millions) : Double-eagles of the years

1850-1911, $2,350.0; eagles of the years 1793—

1804, and again of 1838-1911, $492.1; half¬

eagles of the years 1793-1911, $370.0; quarter-eagles of the years 1796-1808, and again of

1821-1911, $38.1; dollars of the years 1849—

1889, $19.8.

The coinage laws make careful provisions

in relation to the abrasion of gold coins. Any coin which has been reduced in weight by

natural abrasion more than onehalf of 1

per cent below the weight required by law

ceases to be legal tender for its face value.

For example, a double-eagle, of which the

standard weight is 516 grains, is not legal ten¬

der after losing more than 2.58 grains. Con¬

sult McLaughlin, A. C., and Hart, A. B.,

(Cyclopedia of American Government > (New

York and London 1914) ; and for lists of all countries wherein we find the gold standard

or the gold exchange standard, and the gold

units employed in those countries, with the

value of each gold unit in terms of gold dol¬

lars of the United States, consult Gonzales,

V., (Modern Foreign Exchange* (New York

1914).

GOLD CONSPIRACY, The. A corner in

gold created in the summer of 1869 by Jay

Gould and James Fisk, Jr., the ((absolute irre¬

sponsible owners of the Erie Railway.® Gould

figured that if gold should rise to 140 or 145

the British market would buy breadstuffs here,

and by this means he could induce the farmers to ship all their grain east. The movement of crops would turn over an enormous and con¬

tinuous amount of freight to the Erie and

Gould would enrich himself from both ends

of his dealings. (For the results of the con¬

spiracy see Black Friday; also Corner). Con¬

sult testimony in the Gold Panic Investiga¬

tion, Report No. 31, 41st Congress, 2d Session) ; Gould's testimony before the Garfield

Committee; Adams, H., <(New York Gold Con¬

spiracy® (in historical Essays,) pp. 318-337,

New York 1891) ; Boutwell, G. S., Reminis¬

cences of Sixty Years in Public Affairs*

(New York 1902).

GOLD-CREST, or GOLDEN-CRESTED

WREN. The British name for one of the

Kinglets (q.v.).

GOLD DREDGING. See Gold Mining.

GOLD LACE, a kind of lace made of gold

wire, flattened between two polished steel roll¬

ers into a ribbon which is twisted round a core of silk. In India (<gold wire® used in the manu¬

facture of gold thread is nearly always com¬

posed of pure silver with a thin coating of

gold. But in European countries it is only the very best qualities of this wire which are made of unalloyed silver. A good quality of Eng¬

lish gold thread is made from wire consisting

of 1 part of copper added to 25 of silver, which is afterward coated with gold. But alloys of

copper and silver in many proportions are used, some wire containing only 1 part of silver to 60 of copper. The silver, or alloy of copper

and silver, is made into a rod V/z inches in diameter, and then annealed and polished to

prepare it for its coating of gold. This is laid on in the form of leaves of pure gold, and sub¬

jected, for the best qualities of wire, to the fire-gilding process — that is, the gold-coated rod is heated to redness on burning charcoal,

which causes the leaf to adhere firmly. Rods

so treated are next smeared with wax, and

drawn through the holes of a steel drawplate.

(See Wire and Wire-Drawing). The wire is

frequently annealed during the process of

drawing, and this requires to be very skilfully done, or the golden tint of the surface is lost.

Gold wire for thread is generally drawn

down to a size measuring 1,100 to 1,400 yards to the ounce of metal. Finer sizes reach the

length of 1,800 to 2,000 yards to the ounce, and to attain this fineness the wire is drawn through perforated gems, such as diamonds or rubies.

The fine wire, after being annealed, is flattened between polished steel rollers. Finally the flat wire, or rather ribbon, is wound over yellow

or orange colored silk, so as completely to en¬

velop it, by a spinning engine. The gold thread is then finished. Some of the best qualities of the metal covering or • <(plate® of this thread have 12 pennyweights of gold to the pound of

silver or of alloy. Inferior kinds have as little as 2 pennyweights to the pound, and still

cheaper sorts of thread are covered with flat¬

tened copper wire which has received a thin

coating of electro-deposited silver, and this

afterward receives, on the outside of the thread only, a still thinner electro-deposited coating of gold — two grains of the precious metal cover¬

ing 3,000 square inches of surface. For this

very cheap kind of thread yellow cotton is used instead of silk.

The only difference between gold and silver

thread is that the thin coating of gold is want¬

ing on the latter. Gold thread is used in the manufacture of military lace. This, however,

is a woven substance and not true lace ; but

some real lace is made both of gold and silver thread. Both kinds of thread are also used for facings of liveries, and for ecclesiastical robes, altar cloths and banners. These and other

fabrics are either embroidered or woven, but

often only in part, with the thread. (See

Brocade; Damask; Embroidery). Much of

the ((gold thread® used for theatrical dresses

and decorations has only a covering of Dutch

metal, and the <(silver thread® in these is spun with a covering of a cheap white alloy, having a mere film of silver on the surface.

GOLD MINING AND METALLURGY.

Gold is found in nearly all parts of the world and small amounts occur in ocean water and

in many rocks. It is mostly in such minute

proportions, however, that it cannot be profit¬

ably extracted and only the more concentrated

deposits can be utilized and some of these only where natural conditions are favorable. It oc¬

curs in all formations from Archean to

Quaternary and in part in association with

various other metals as silver, copper, tellurium, lead and iron. The pure metal usually occurs in connection with silica or quartz, so that lode and vein gold mining is generally known as

quartz mining. Gold has always been precious

and difficult to obtain and never has been found so plentiful as to still the desire for its pos¬

session. In its search and exploitation, nature has generally demanded full toll in labor and

effort. With early, primitive methods only the

easily accessible, pure gold was obtained, but as machinery was developed and processes of ex¬

traction perfected, mining was extended to the

less rich deposits. This development has pro¬

gressed in other lines of mining so that within the last 25 years the production of iron, copper, coal and petroleum has been greater than the

aggregate of all previous times.

History of Gold Mining. — The earliest

records of gold mining are from Egypt, where

pictorial rock carvings indicate the breaking up of ore by stone hammers, its grinding in stone mills, and treatment with water on stone tables.

Shallow earthen dishes were used for final

washings. Inscriptions on monuments indicate

that gold washing was done as early as 4000

b.c. The Argonauts' search for the Golden

Fleece has been explained by the fact that

fleeces have been used effectively to catch fine gold in ditches and flumes, and when much

gold dust adheres it makes a veritable golden

fleece. The Argonauts are supposed to have

made their quest in the direction of the famous gold deposits of Colchis, west of the Caucasus.

Herodotus, 484-425 b.c., refers to several great gold mining centres in Asia Minor, and Strabo, 63 b.c., and Pliny, 23-79 a.d., mention gold

mining in many different places. Pliny gives

many details of ancient placer mining, which

was extensive, for the water used was carried

great distances by long ditches which crossed

valleys in aqueducts. In places ledges were

cut away to make room for troughs of hollowed-out logs. These and other ancient

writers clearly indicate that gold mining was

carried on in Egypt, Asia Minor, Italy, Greece, Spain, France and India before the Christian

era.

History gives no reliable records of the out¬

puts of these different gold fields, but doubtless they were small as compared with modern re¬

turns. Rome's wealth in gold increased as she

took possession of the world, and finally reached a high figure, but during the barbarian in¬

vasions this accumulation of gold was scattered, and gold mining languished in the Middle Ages.

In the 13th century discoveries in the Alps,

Transylvania and various parts of Spain re¬

vived production. In the 16th century the

discoveries of gold in Mexico, Peru, Colombia

and Chile gave new life and system to gold

mining and since that time the gold production of the world has been estimated with a fair

degree of accuracy. Considering, however, the

great part that metals have played in civiliza¬

tion, it is astonishing that we have but meager accounts of the details of their obtainment.

Agricola's (De re Metallica, } in 1556, gave the first extensive and reliable information, with

maps or illustrations, of any class of mining.

This work, written in Latin (translated by Mr.

and Mrs. H. C. Hoover), is the beginning of

accurate mining and metallurgical literature.

In this work appliances and methods used in

both alluvial and lode mining are described

and illustrated.. It shows that the principles of many of the modern devices used in placer and other mining had long been known. A primi¬

tive stamp mill is described, also the use of quicksilver, retorting, assaying, melting and

refining of gold and silver. The relative extent of ancient and modern gold mining is shown

in the following table, which gives the output from the world's mines, with average annual

progressive showings from 1493 to 1917, in¬

clusive :

The contributions of the most important

countries, with dates of initial operations, are approximately as follows :

Approximate date

of starting

Output (in

operations

Country

millions)

1792* .

United States .

$3,913

1851 .

Australia .

3,261

1886 .

Africa (Witwatersrand 2,572;

all other Africa 691) .

3,263

1745 .

Russia and Siberia .

1,566

1537 .

Colombia .

939

1693 .

Brazil .

787

1521 .

Mexico .

502

1858 .

Canada .

412

China and Korea .

281

1493 .

Austria-Hungary .

216

1545 .

Chile and Bolivia .

199

1884 .

British India .

189

1533 .

Peru .

128

1875 .

French, British and Dutch

Guiana .

150

1866 .

Venezuela .

63

Total .

$15,869

Figures for the above table were obtained from De Launay's estimates to 1906 and United States Director of Mint's reports from 1907 to 1917, inclusive.

* Gold mining in the United States started in the Appa¬

lachian States, which have produced over $50,000,000; gold was discovered in California in 1848.

Gold mining is divided into two classes,

placer mining and lode or quartz mining.

Placer Mining. — Placer, known also as

alluvial, or alluvium, mining, is the operation of washing gold or other valuable minerals

from gravel or sand, which is mostly alluvium

deposited by a stream or in a beach, or as talus.

It has been estimated by De Launay that be¬

tween 1848 and 1875, 87 per cent was thus ob-*

tained, but lode or quartz mining has increased so that in 1876 placer mining produced only 65

per cent ; in 1890, 44 per cent ; in 1905, 15 per cent. In the future, placer mining may be¬

come still less important. New deposits can be looked for only in sections which have been

covered by ice, snow and marshy turfs in

polar regions; in forests of the tropics; in

deserts, high valleys and mountain chains.

Further returns may also be obtained from

gravels too poor to yield profit under present conditions. Placer deposits have been classified as shallow, deep, creek, hillside; bench, river bar, gravel plain (tundra), sea beach, lake bed and dry placers. Such deposits have been the

easiest to work for nature has done the major part of the mining and reduction work, and

man has the concentrates for further treat¬

ment. Nature's process was erosion, and her

tools, clouds, rain, ice, snow, glaciers, rills, torrents and rivers. These have carved out

valleys, built up flats and by attrition milled or ground up the materials, carrying away the

softest and lightest. Gold, being the heaviest

World Production of Gold, 1493 to 1917, Inclusive.

Annual

Total for average

period period millions Remarks

1493-1600 . $501,640,000 4.6 From 1493 to 1885 estimates are by Dr. Adolph Soetbeeri since 1885, by United States Director of Mint.

1601-1700 . 606,315,000 6.0 Start placer mining in Brazil, 1693.

1701-1800 . 1,262,805,000 12.6

1801-1850 . 787,463,000 15.7 Start placer mining in California, 1848.

1851-1890 . 4,806,866,000 120.1 Start placer mining in Australia, 1852.

1891-1900 . 2,101,241,400 210.1 Start mining, Witwatersrand, South Africa, 1886.

1901-1910 . 3,780,703,900 378.1 Discovery of gold, Klondike, Alaska, 1897.

1911-1917 . 3,173,691,018 453.4

Total . $17,020,725,318 40.0

of known minerals, excepting platinum and a

few other rare minerals, naturally works to

the bottom of the streams and the coarser

particles cling to the bed rock. The finer the gold dust the further it is carried down the

river systems.

Most placer mining is done in the open and

largely in connection with modern river systems.

Some of the auriferous deposits, however, are

covered by lava or other non-producting cap¬

ping, which necessitates underground working

tunnels, shafts, drives, slopes, *etc.* Such min¬

ing is known as drift or deep-lead mining and it has been done extensively in California and Australia. In most cases the pay dirt is in a few feet of gravel next to the bedrock, but

in some such deposits yields high returns.

After the gravel is mined and brought to the

surface it is washed on floors connected with

suitable sluice system. Auriferous gravel de¬

posits with thickness of only a few feet or in banks of several hundred feet in thickness have been worked successfully. These gravels may

contain boulders several feet in diameter, or

pebbles graduating in size from a few inches

in diameter to fine sands. The gold occurs in scales, grains or nuggets, and all particles are smooth and rounded, thus differing from vein

gold which is sharp and angular, and often the particles, or ˆcolors,® of gold dust are so fine and scaly as to defy ordinary devices of catch¬

ment. The nuggets have varied in size from

small grains to the Australian <(Welcome

stranger,® weighing 2,520 ounces, valued' at

about $42,000. The largest nugget found in

•California weighed 280 ounces. In Russia the

largest, weighing 96 ounces, was found near

Miask. The Klondike has produced an 85-ounce

nugget. The greatest proportion of gold re¬

covered is medium and fine gold dust.

Prospecting Appliances. — The miner's pan,

made of stiff sheet iron and flat-bottomed; the bateau, made of wood with conical bottom ; and the horn spoon, cut out of ox horns, are used for testing the gravel and working the rich

spots. These, with pick and shovel, and beans

and bacon, were the old-time prospector's out¬

fit. For small but rich deposits the cradle or rocker and Long Tom were long employed,

but now they are rarely used.

Sluice and Sluice Mining. — The sluice is

the mainstay of shallow placer mining. It is

a long open box, made of rough boards usually in sections 12 feet long, with varying width

and depth. The sides are protected from wear¬

ing by wooden liners renewed frequently.

The bottom is protected and made effective

for gold saving by a series of transverse or

longitudinal riffles, or as in hydraulic sluices or flumes, with wood pavement of rounded

blocks. The length varies with grade and

other natural conditions favorable for disposal

of tailings. The grades used vary from 2

inches to 20 inches per box (12 feet). Mer¬

cury is sprinkled in at the head of the sluice after washing has been in progress a short time.

The charge of this metal varies with the rich¬

ness of gravel and the magnitude of the work.

A stream of water is turned in at the head of the sluice where the gravel is shoveled or

dumped in. The amount of gravel mined and

shoveled per man varies from 3 to 12 cubic

yards per day. In sluice mining the sluices

can be shifted to suit the mining or the gravel conveyed to the sluice by different appliances.

At many workings long stationary sluices are

constructed with drops to facilitate disintegra¬

tion of the gravel and with undercurrents to

classify the gravel and provide special treat¬

ment for the finer and heavier material. These devices are used mostly in hydraulic mining.

The riffles are taken out periodically, the gold washed from the concentrates by rocker and

pan and the mercury separated from the gold

by retorting.

Hydraulic Mining. — Hydraulic mining was

introduced in California in 1852, to deal with huge deposits of low-grade gold bearing gravel

favorably situated for obtaining the water

necessary for washing, and also for the dis¬

posal of tailings or debris. It is necessary

that abundant water supply should be available.

Hydraulic mining differs from large scale

sluicing only in that instead of using pick and shovel for mining and dumping the gravel into

the gold saving sluices, the water excavates the gravel and debris and conveys them into large

and strongly constructed sluices. Water is

brought to ?he gravel deposits in ditches and

flumes from reservoirs or streams many miles

distant and at such a height that it can be used under a head of several hundred feet. It is

conducted in pipes to ((monitors® which throw

great jets of water on the gravel banks, some of which are from 300 to 400 feet high. The

nozzles of the larger monitors are from 8 to 10

inches in diameter and throw a stream of from 3,000 to 5,000 cubic feet per minute. The gravel banks are prepared for the washing by a loos¬

ening by explosives. These are used in a T sys¬

tem of small tunnels driven into the banks, the entering one being used for tamping, and the

cross drifts for the reception of a heavy charge of black powder or low-grade dynamite sufficient to shake up but not scatter the gravel. After the jets of water have played upon the banks

for a while, large boulders and lumps of pipe clay remain which have to be drilled and

shattered by explosives to allow the water to

convey them to the sluices. To wash a cubic

yard of gravel, from 500 to 1,000 cubic feet

of water is required. Under most favorable

natural conditions and suitable equipment,

operating costs have been as low. as three cents per yard, but for most deposits, large outlays for the purchase of rights, storage and con¬

veyance of the water, and for sluices and tun¬

nels, etc., are necessary to yield satisfactory results. In 1882 all hydraulic mining in Cali¬

fornia dumping tailings into the Sacramento

River was enjoined as detrimental to the navi¬

gation of the river and the <(slikens® or fine sediment assumed injurious to the farm lands

in the valley. This has been a serious set back to hydraulic mining.

Gold Dredging. — Gold dredging originated

in New Zealand and Australia as early as 1865, but the endless bucket chain system was not

started there until 1882. In Montana this sys¬

tem was started in 1894, and in California in 1896. The dredges were used first in active

running water, as in river beds, and later to work ground in benches

or below drainage not

profitable or possible by the sluice system.

A gold dredge is a flat-bottomed boat, with

the forward part of the hull so divided as to form a well in which the ladder and bucket

chain may be raised or lowered. Upon the

boat is mounted a digging ladder and chain of buckets ; a disintegrating and screening appa¬

ratus ; a system of sluice and other gold saving devices ; pumps, anchoring and moving arrange¬

ments ; a stacker for the disposal of the coarser gravel, and motors, winches, gearing, *etc.* The

early dredges were small and driven by steam

power, but the best ones now use electric

power and have been so enlarged and perfected

that they have been able to dig gravel from 50

to 80 feet below water level at the rate of from 300,000 to 400,000 cubic yards a month, with

an operating cost of from three to six cents

per yard. The outlay for such dredges is from $300,000 to $500,000. The main dredging fields

now are California, Alaska, Colombia, New Zealand and Australia. The output from all dredging operations in the United States, from the start to the end of 1916, amounted to $120,103,117. In Alaska, sluice dredging, as also drift mining, is impeded and made costly by the necessity of thawing frozen ground by jets of dry steam which is applied through pipes, also called points, driven in the gravel.

Before starting dredging, the ground is prospected by shallow pits or drilled by Key¬ stone drills, a light self-contained machine capable of boring a six-inch hole to moderate depths and of saving samples of the material passing through. In placer mining the most valuable minerals associated with gold are plati¬ num, found chiefly in Russia, Colombia and California, and tin (cassiterite), found princi¬ pally in Australia. The most abundant mineral association, however, is magnetite (black sand), garnet, zircon (white sand) and monazite (yellow sand).

Lode, Vein or Quartz Mining. — The prin¬

ciples and methods of mining lode gold ores

apply as well to those of silver, copper, lead, tin and zinc. The first requirement is accurate sampling and assaying, valuation of the deposit and the determination of the scale of working; second, prospecting, including diamond drill¬

ing, temporary shafts, winzes and raises;

and third, developing and exploiting the de¬

posit underground. This brings in its train

the consideration of the size and nature

of opening into the mine, whether by tunnel or entry, or incline ; rectangular, round or octag¬

onal shafts; also whether cars, skips, cages,

kibbles or buckets should be used in the hoist¬

ing ways. The system of stations involves

loading devices, levels, cross-cuts and drifts

from the main openings. For exploitation it

is necessary to consider the winzes, raises,

and advisability of overhand, underhand, long

wall, rill or shrinkage stropes ; sub-level, top¬

slicing or other caving systems ; and whether

the support of the ground should be by pillars, square set timber or stalls, waste rock, cribs of timber and waste and tailings.

In the matter of mechanical equipment, the

type of hoisting or winding engines and the

probable output and depth of their working has to be taken into account, as also the advisability of the use of steam, electricity, water or gas, as source of power. It is also necessary to con¬

sider whether direct steam pumps, rod driven

pumps (Cornish), hydraulic, compressed air or

electrically driven pumps, are preferable. Bail¬

ing by tanks attached to the winding engines

is often expedient and in some cases gives ex¬

cellent results. In underground transportation

or tramming, the problems of the use of man

power, compressed-air locomotives, electric—

storage locomotives and electrical haulage pre¬

sent themselves. Drilling and explosives are

vexed subjects. Hand drilling until recently

was the method most in use; now most of the

boring is done by air drills, the two main types being, first, the use of the drill as the piston extension, and second, the action of the piston as a hammer striking the head of the drill. The sizes of the piston and weight of the drills are matters of much import. Air compressors are

of divers makes and are driven either by steam, water, electric or gas power. Great diversity

of opinion exists as to grades of explosives to be used in different deposits. The advisability of the systems are greatly dependent on the

nature and class of the deposit and the economic conditions prevalent in the region. These and

many other details connected with the technique of mining are more fully treated and explained under mining (q.v.).

Treatment of Gold Ores. — The treatment

of gold ores depends greatly upon their rich¬

ness and associations with other minerals, their gangues and rock embediments and the eco¬

nomic conditions in the district in which the

work is performed.

An outline of the ordinary reduction and

recovery can best be considered under the fol¬

lowing headings: Elimination of waste; con¬

veyance to mill or reduction plant; rock break¬

ing; crushing; amalgamation; concentration;

chemical treatment, chlorination, cyanide ;

treatment of amalgam, zinc precipitates, bullion, refining. The site of a reduction plant is in¬

fluenced by the topography of the country, the relationship of mine, mill and water supply, also transportation facilities. The ideal situation is when the mine outlet and mill are close together upon a hillside, with slope allowing gravity

movement of the ore pulp and tailings. This

is rarely obtainable, but excellent results can be obtained on flat ground with suitable machinery.

Elimination of Waste. — The elimination of

waste before treatment was in early practice

largely effected by hand-picking the ore on

dressing floors; in more modern practice the

coarser ore, after screening, is dumped upon

revolving annular tables, or belts, where it is washed and the hand-sorted ore scraped or

dumped into bins or rock breakers. In this

way often a large per cent of the rock hoisted is not sent to the mill and the grade of the ore treated is correspondingly raised. This policy of sorting is of doubtful benefit when the cost of reduction is small, as there must always be some gold in the waste selected, as also added cost from the sorting. In some mines sorting and

packing of waste is done underground.

Conveyance to Mill or Reduction Plant. —

The mills are often some distance from the

mines and made to serve several shafts, outlet adits and tunnels, or a mill may be consolidated with the hoisting appliances of one shaft or

tunnel. The mines, on the other hand, may be

far from the mill and various methods of trans¬

portation, as pack animals, carts, wagons, tram cars, gravity inclines, aerial conveyors, loco¬

motives and electrical haulage, may be resorted to. At some mines a head frame of a shaft,

or the dump from a tunnel, and a mill have

been joined together so that the mine hoist

dumps the ore at such a height that it can be 18

sorted, the rock and ore broken in rock

breakers and the ore run by gravity direct

into the mill bins.

Rock Breaking. — There are two classes of r.ock-breaking machines in general use — jaw breakers with reciprocating motion and the gyratory crusher. The breakers are often placed over the mill bins, sometimes in the head frames of the shafts, now more common in plants to themselves, and the broken rock conveyed to the mill bins by cars or conveyors. In the larger size of crushers the rock as dumped from skip, or car, is led to them in chutes. In some installations there are two sizes of crushers so that the ore can be finer crushed before reaching the stamps or other fine crushers. In some mines the primary rock breakers are placed underground.

Crushing. — The earliest crushing machine in use in America was the Arrastra, being in¬ troduced at the same time as the Patio process, about 1557. It is an apparatus for grinding and mixing ores by means of heavy stones dragged around upon a circular bed paved with stones, and charged with mercury. It was cheaply constructed and worked by animal

power; it ground very finely and often gave

very high extractions. Except for prospecting,

it is almost obsolete, as the output from it is so limited and modern crushing machinery so

improved. The stamp battery is the most com¬

mon form of fine crusher. A stamp is a heavy iron or steel pestle, raised by a cam keyed on a horizontal revolving shaft and let fall by its own weight. They are ranged in line in groups of five, having a mortar box in common. The

box is made of heavy cast iron, especially strong and solid at the bottom. The pestle is shod

with a removable iron or steel shoe, and the

bottom of the mortar clad with iron or steel

blocks known as dies. Water and ore are fed

into the mortars continuously, the water by

pipes and the ore by automatic feeders. The

blows of the stamps splash the water and pulp against screens set in the side of the mortar box and the ore after being crushed to the re¬

quired size thus ejected. The height of drop

of the stamp is usually five to seven inches, the number of drops per minute about 90 and the

size of screening or perforated plates varying

from 40 mesh to the inch to perforations as

large as one-quarter inch. The stamps vary

in weight from 100 to 2,000 pounds, only the

very early stamps were as light as 100, and only South African as heavy as 2,000. The most

common weight is between 1,000 and 1,500

pounds, and with crushing capacity between

three and five tons to the stamp in 24 hours.

The heavy stamps with one-quarter inch screen

apertures and supplemented by fine grinding

tube mills have crushed 20 tons to the stamp.

Crushing rolls, Huntington mills and ball mills have been used to replace the stamp mill and

under certain favorable conditions have given

excellent results, but as a whole the stamp mill may still be considered the most economical

and satisfactory device.

Amalgamation. — The pulp or discharge

from the mortar, or tube mill, passes over cop¬

per plates. These plates are commonly 15 feet by 4 feet 9 inches and given a grade of one and one-quarter inches per foot, sometimes made

shorter in two or three sections with slight drops between. The plates are treated with quicksilver and dressed so that the gold amalgam formed on the. plates is made use of to catch more gold, the quicksilver is fed partially into the mortar which is sometimes supplied with inside plates, and also the outside plates are sprinkled with quicksilver, the amount depending upon the

amount of gold in the ore. The amalgam on

the plates should be neither too hard nor soft.

Cleanups of amalgam are made daily, and the

amalgam squeezed in cloths or chamois skins so as to eliminate the excess quicksilver. The

amalgam is then stored for periodical retorting.

The amount of recovery by amalgamation

varies from 90 per cent for very rich free-mill¬

ing ores to only 30 or 40 per cent for complex ores; the average for the Witwatersrand con¬

glomerates was about 60 per cent. A higher

percentage of amalgamation is obtainable by

finer grinding and longer contact with mercury, as by the Arrastra and Patio processes employed in South America, and amalgamation pans.

Concentration. — The mill pulp after pass¬

ing over amalgamated plates, or sometimes di¬

rectly from the battery, is subject to classifica¬

tion and concentration of the small percentage

of the coarse and heavier materials which carry much of the remaining gold. The amount of

gold so obtained is dependent upon the charac¬

ter and treatment of the ore and varies greatly.

In some cases concentration is omitted and the ore directly treated by the cyanide process. In early practice, after amalgamation, concentrates

were obtained by the use of rough blankets

placed on inclined planes and frequently washed and renewed. The practice of concentration

was further developed by the use of convex

and concave buddies and the use of large areas of canvas on inclined floors frequently hosed

down and cleaned. More perfect concentration

is now obtained by the use of Frue and other vanners, on which concentrates are caught and

subjected to slow constant longitudinal and

slight rapid side-shake movements. Percussion

tables, such as the gilt-edge concentrator, with an end bump, were often used; as also Wilfley tables, with riffles and smooth surface, and lon¬

gitudinal jerking action ; and Hartz and other

jigs, especially useful for coarse-crushed ore.

Hydraulic classifiers are used for obtainment

of concentrates as well as for the separation of sands and slimes for cyanide treatment. There

are several kinds in use • — the Spitzkasten, an inverted pyramid box into which the pulp

stream enters at one side and is discharged at the other, and the coarser material drawn off

at the apex. The regulation of the settlement

is effected by baffles, the angle of sides of the box and the discharge valve at bottom. The

Spitzlutte is similar in principle to the Spitz¬

kasten, but with the addition of an ascending

current of water at the apex and modification

in the dimensions of the pointed box. The

cone classifier works on the same principle but with perfected details. The Dorr classifier is

in the form of an inclined trough, open at one end, in which mechanically operated rakes are

placed to remove the heavy material as fast as it settles, the liquid and slimes overflowing at the closed end.

Flotation. — The flotation process is the

most modern, new and interesting method of

concentration. The Elmore process, in 1897,

demonstrated on a practical scale that by using residuum oil in the crushing of ore, sul¬

phides and metallic particles could be floated

on top of a pulp stream, skimmed and

treated as concentrates, and the earthy and

stone materials kept at the bottom and dis¬

charged as tailings. Many improvements and

innovations have since been made and the proc¬

ess is being extensively used. The _ fundamen¬

tal principles are film suspension, oil buoyancy and bubble levitation. The latter phase de¬

pends upon the aid of bubbles of gas which by attaching themselves to particles of minerals

buoy them to the surface. For a detailed ex¬

planation of the various devices of flotation,

special literature should be consulted.

Chemical treatment, chlorination, cyanide.

— The chlorination process — one of the early attempts at chemical treatment of gold ores —has been extensively used since 1850 for ex¬

tracting gold from concentrates. It has prac¬

tically given place to the cyanide process. The Plattner process, originated in Freiberg in 1848, is the best known. It depends on the fact that chlorine readily attacks gold and forms soluble gold chloride, which is precipitated by suitable reagents. It requires that the sulphide concen¬

trates should be subjected to a dead roast in reverberatory furnaces before the chlorine

treatment is given ; it also requires that the vats have removable tops that may be closed

and sealed. Besides the Plattner there are

several barrel chlorination processes, the best

known being the Thies. In this process chlorine gas is generated inside the barrel by means of bleaching powder and sulphuric acid, and a

gas pressure of a few pounds to the square

inch maintained.

The cyanide process is based on the facts

that dilute cyanide solutions will dissolve the precious metals from their ores when finely

crushed, and that when gold in solution is

brought in contact with zinc it will be precip¬

itated. It is also possible to separate the gold from the solution electrically by using iron

anodes and sheet lead cathodes. The Siemens—

Halske process on this principle achieved some

success, but is unable as a rule to compete com¬ mercially with zinc precipitation. Patents for cyanide extraction were taken out in Great Britain as early as 1840 and in the United States in 1867, but it was not until 1887, through the investigations and experiments of J. S. McArthur and R. W. Forrest, that the cyanide process showed practical results. These investigators demonstrated the benefit of using very weak solutions of cyanide and the precipitation on zinc shavings confined in boxes through which the solution flowed. McArthur and Alfred James, in South Africa, worked out a successful system of economic treatment, which, though since greatly extended and im¬ proved in detail, embodied the basic fun¬ damentals. The benefit of fine grinding or crushing was clearly realized by them in the early days, though not so completely applied as later.

The cyanide process has been a great help in the extension of gold and silver mining. On the Witwatersrand it has been especially bene¬ ficial in that the gold occurs in such fine parti¬ cles that extraction of only 55 to 65 per cent could be obtained by

amalgamation, with but

small addition by concentration and chlorina¬

tion. By amalgamation and cyanide treatment,

however, about 94 per cent is now obtained.

Most gold and silver ores are amenable to

cyanide treatment, though antimony combina¬

tions are very detrimental and the association

with tellurium may require preliminary roast¬

ing or very fine grinding. The field of the

cyanide process has constantly widened since its introduction in South Africa in 1890, and there have been many developments in its details.

The flow sheets of the mills and cyanide works vary, in the same as well as different mining districts. The pulp is classified into sands and slimes and separate treatment given to each.

For details of the process see works mentioned in references.

Treatment of Amalgam, Zinc Precipitates,

Bullion, Refining. — The gold in the amalgam

is separated by retorting; that is, mercury is vaporized by heat, and condensed in cooled

pipes. The gold is left in the form of a yellow sponge which is melted with suitable fluxes in graphite crucibles and poured into bullion

molds. Gold bullion contains some silver,

copper and other metals, which are separated

at mints or private refineries, by sulphuric acid, chlorine gas or electrolytic treatments. See

The zinc precipitate is in the form of im¬

pure brown powder or filter-press cakes. It is treated in various ways; viz.: (1) By direct

fusion with fluxes ; (2) roasting followed by

fusion; (3) treatment with acid, followed by

fusion with or without roasting; (4) reverber¬

atory furnace, lead fusion and cupellation ; (5) blast furnace, lead fusion, then cupellation.

Both rich gold ores and concentrates, especially when associated with lead or copper, are

treated directly in smelters. Considerable gold

is also recovered from copper and lead smelt¬

ing in which gold is a small by-product and

incidentally recovered in refining.

Geographical Distribution of Gold Mining.

— The following table gives the distribution of gold production. It also indicates that the out¬

put has reached its zenith during the past

five years, and now has a downward tendency.

The output for 1917, given at $423,590,200,

is approximately 6.7 per cent less than the out¬

put for 1916. The table gives the percentage of production for all countries for 1913, and shows that the territory of the Entente Allies pro¬

duced 91.3 per cent and that of the Central

Powers only 0.6 per cent of the world's gold.

The greatest gold mining district in the

world is the Witwatersrand, Transvaal, South

Africa. The principal mines are in an area

about 30 miles long by 5 miles wide. The

ore is in conglomerate beds included in a sand¬

stone and quartzite succession, which though

somewhat faulted is so uniform as to permit

one mine opening into another. Although the

conglomerate deposits were originally of placer

origin, the sharp crystalline nature of the gold indicates secondary deposition or reduction.

Some shafts are more than 5,000 feet deep.

Production in 31 years has been about $2,500,-

000,000. The yield per ton has decreased from

$12 in 1890, 'at cost of $10.25 per ton, to

$6.40 in 1916, with cost of $4.50 per ton. The total dividends have been about 24 per cent of the output. The largest force employed has

been about 200,000 natives and 26,000 Euro¬

peans.

GOLD MINING AND METALLURGY

COUNTRIES

1913

Per

cent

1914

1915

1916

1917

North America:

United States .

$88,884,400

19.3

$94,531,782

$101,035,700

$92,590,300

$83,750,700

Canada .

16,598,900

3.6

15,983,004

18,977,901

19,235,000

15,200 000

Mexico .

19,308,800

4.2

4,788,175

6,559,275

7,690,700

9,000,000

Central American States .

2,721,700

6

2,393,190

2,970,271

3,517,600

3,122,000

South America:

Argentina .

2,600

.0

15,300

4,600

Bolivia and Chile .

175,000

.0

202,770

814,418

301 i 000

315,000

Brazil .

2,254,700

.5

2,139,803

2,424,515

2,890,000

2,958,000

Colombia .

2,971,700

.6

4,678,587

5,453,148

6,173,900

6,200,000

Ecuador .

406,500

.1

346,853

545,674

560,000

710,000

Peru .

492,300

. 1

1,022,125

1,109,891

1,267,400

1,300,000

Uruguay .

29,900

.0

15,276

11,836

12,000

10,000

Guiana:

British .

1,353,500

.3

1,126,500

923,892

660,700

600,000

Dutch .

470,400

. 1

503,400

449,054

438,200

400,000

French .

3,050,600

.7

1,959,793

1,959,793

1,600,000

1,500,000

Venezuela .

444,800

.1

612,796

1,395,349

1,269,900

637,000

Europe:

Austria-Hungary .

2,179,300

.5

200,744

1,392,465

1,000,000

1,000,000

Finland .

900

.0

France .

2,127,400

.5

1,400,000

1,400,000

1,000,000

700,000

Germany .

135,600

.0

Great Britain .

17,900

.0

20,238

19,266

5,700

5,000

Greece .

.0

Italy .

17,200

.0

32,145

2,295

2,000

2,000

Norway .

.0

Portugal .

2,300

.0

2,336

661

Russia and Siberia .

26,507,800

5.8

28,586,392

26,322,746

22,500,000

18,000,000

Serbia .

328,000

1

116,000

Spain .

.0

Sweden .

17,600

.0

54,304

25,323

12,200

10,000

Turkey .

500

.0

475

475

Australia:

i rs -a

British New Guinea .

377,200

. 1

377,757

New South Wales .

3,093,200

. 7

2,573,788

2,738,958

2,235,600

Northern Territory .

64,500

.0

52,341

20,351

1 2 , 400

Queensland .

5,493,200

1 2

5,134,779

5,161,911

4.447.800

South Australia .

135,500

.0

145,778

125,701

160,600

Victoria .

8,990,800

1 . 9

8,541 |972

6,802^359

5,305,500

35,945,500

Western Australia .

27,165,700

5.9

25,487,891

25,014,928

21,941,000

New Zealand .

7,102,700

1.5

4,712,226

8’ 740,567

5 , 836 , 000

Tasmania .

690,400

.2

542,491

383,402

326,400

Tatua (Borneo) .

.0

210.500

Asia:

British India .

12,178,000

2.6

11,378,400

11,522,457

11,206,500

10,756,800

China .

3,658,900

.8

3,658,900

2,804,692

3,100,700

3,600,100

Chosen (Korea) .

3,582,500

.8

3,309,870

3,739,477

4,122,400

4,444,000

East Indies:

V

British .

1,352,000

.3

(a)

(a)

(a)

(a)

T)utch .

3,387,100

.7

4.480,853

3,100,000

3,000,000

2,818,000

Federated Malay States… .

282 , 400

. 1

269,147

351,527

327,900

342,300

Formosa (Taiwan) .

814,600

.2

952,806

1,143,017

1,001,200

1,033,000

Indo-China .

74,700

.0

66,419

43,659

65 , 600

50,000

Japan .

3,614,400

.8

4,679,358

5,386,066

5,185,600

4,562,200

Siam .

56,500

.0

i

1

Africa:

(b) 2,935,656

Abyssinia .

497,200

.1

Belgian Kongo .

916,600

.2

1,029,189

1,029,189

2,315,500

2,000,000

Egypt .

95,100

.0

126,842

144,910

130 000

Portuguese East Africa .

.0

231.900

French East Africa .

.0

43,414

43,414

31 1 300

German East Africa .

253,200

. 1

Madagascar .

1,256,200

.3

1,169,055

1,381,354

965 , 000

1,000,000

Rhodesia .

14,274,700

3.1

17,663,686

18,915,324

19,232,200

14,988,600

Sudan .

192,700

. 1

Transvaal, Cape Colony and

Natal .

181,885,500

39.5

173.559.940

188,033,156

192,182,900

186,254,256

West Africa (Nigeria, Gam-

bia, Gold Coast and Sierra

Leone) . .

7,955,300

1.7

8,404,670

8,304,551

7,860,100

7,435,488

Total .

$459,941,100

100.00

$439,078,260

$468,724,918

$454,176,500

$423,590,200

(a) Included in Dutch East Indies. (b) African production undistributed.

The United States, including Alaska, ranks

next to South Africa in production. The out¬

put in 1916 was $92,590,300. # Of this about 25

per cent was from placer mining and more than half of which was

from dredging operations.

Yields and costs vary in different districts.

The greatest producers are mines of low or moderate values in large, massive ore bodies, with favorable conditions for economical work¬ ing. A conspicuous example is the Homestake Mine in South Dakota, which, since 1875, has produced over $147,000,000, with a yield under

$4 per ton, and costs of $2.50 to $3 per ton. Dividends of 27 per cent of the output have been paid. The Alaska Treadwell group of mines, on Douglas Island, Alaska, and the Alaska Gold and Alaska Juneau, which are situated opposite, have the record of the world for the lowest lode-mining costs. The Tread¬ well group treated 25,000,000 tons, yielding $2.37 per ton, with total costs of $1.42 per ton. The Alaska Gold in 1916 produced about 2,- 000,000 tons, with a yield of 97 cents, and oper¬

ating costs of 73 cents. The Portland, a telluride mine, in Colorado, where working costs

are high, has produced $40,000,000 worth of ore, averaging $27 per ton, and declared dividends

of only 20 per cent. The phenomenally rich

ore of the Goldfield Consolidated, Nevada,

though producing $50,000,000, has fallen in

seven or eight years from $38 per ton to $7.52

per ton in 1916.

The yearly production of gold in the United

States, by States, from 1914 to 1917, is as fol¬

lows :

and which has attained a depth of 5,900 feet, vertically.

From the 4th to the 15th centuries ˆChemia,®

or alchemy, flourished and was busied in the

attempt to transmute base metals into gold and silver. The alchemists, though they failed in

their main object, laid the foundations for the science of chemistry and improved the metal¬

lurgy of the metals. The gold seekers have

been instrumental also in the discovery and

opening up of lands in new countries and the

spreading of knowledge. The gold miner has

blazed the trail for civilization in many lands.

It has been well said, ((Trade follows the flag, it is true, but the flag follows the pick.®

Bibliography. — Mining and Mode of Occur¬

rence and Distribution of Gold: Emmons,

S. F., and Becker, G. F., Precious Metals*

(Vol. XIII of Census Reports of 1880, Wash¬

ington 1885) ; Foster, C. LeN., (The Ele¬

ments of Mining and Quarrying) (1903) ;

Hoover, H. C., Principles of Mining) (1909) ;

Lindgren, W., (Mineral Deposits) (1913) ;

Production of Gold in the United States, by States, 1914 to 1917, inclusive.

COUNTRIES

1914

1915

1916

1917

Rank

Alabama .

$12,300

$5,100

$7,400

$2,200

18

Alaska .

16,547,200

16,710,000

16,124,800

14,671,400

3

Arizona .

4,568,900

4,555,900

4,092,800

5,180,600

6

California .

21,251,900

22,547,400

21 ,980,400

20,929,400

1

Colorado .

19,902,400

22,530,800

19,185,000

15,974,500

2

Georgia .

16,800

34,800

20,400

6,500

IS

Idaho .

1,187,200

1,170,600

1,058,300

754,800

12

Montana .

4,143,600

4,978,300

4,328,400

3,673,200

7

Nevada .

11,536,200

11,883, 700

9,064,700

6,932,500

5

New Mexico .

1,219,100

1,460,100

1,350,000

1,085,400

11

North Carolina .

130,300

170,700

23,000

10,800

14

Oregon .

1,589,400

1,867,100

1,901,500

1,687,300

9

South Carolina .

3,200

3,600

300

1,700

19

South Dakota .

7,334,000

7,403, 500

7,471,700

7,372,900

4

Tennessee .

6,400

6,800

5 , 700

5,500

16

Texas .

8,800

1,800

500

100

22

Utah .

3,377,000

3,907,900

3,859,000

3,522,100

8

Virginia .

300

500

500

1,300

20

Washington .

587,800

461,600

580,600

488,200

13

Wyoming .

6,700

13,900

20,200

3,700

17

Other States .

200

300

400

Total .

$93,429,700

$99,714,100

$91,075,500

$82,304,500

Porto Rico .

2,800

700

600

100

21

Philippines .

1,099,300

1,320,900

1,514,200

1,446,100

10

Total .

$94,531,800

$101,035,700

$92,590,300

$83,750,700

The richest gold and silver lode in the

world was the Comstock Lode, which opened

in 1859 and worked extensively for 30 to

35 years, and produced over $470,000,000, of

which about $190,000,000 was gold. The work¬

ing costs were very high. Mount Morgan

Mine, in Queensland, is a great gold and copper deposit. It was started as a gold mine in 1882

as an open-cut working, in a siliceous gossan

capping of a copper sulphide deposit. It is now being largely exploited for copper. It has

yielded in dividends about $43,000,000. Its

costs have been high. The Waihi Gold Mine,

in New Zealand, started in 1887, is still work¬

ing, and has yielded over $30,000,000. It was

one of the first mines to successfully use the cyanide treatment. The Mysore mine in India

has worked since 1880, has been a big producer for a narrow lode and is still operating with shafts over 4,000 feet deep. The deepest and

longest-worked gold mine in the world is the

Saint John del Rey, Brazil, worked since 1830, Lindgren, W., and Ransome, F. L., (Geology

and Gold Deposits of Cripple Creek District,

Colorado) (U. S. Geological Survey, Pro¬

fessional Paper No. 54, 1906) ; Lock, C.

G. W., (Economic Mining) (London 1895) ;

Maclaren, J. M., ˆold: its Geological Occur¬

rence and Geographical Distribution (London

1912) ; American Institute of Mining Engineers, Special Volume, ˆGenesis of Ore-Deposits* by

Posepny, Le Conte, Vogt, Kemp, Rickard, Van

Hise, Emmons, Lindgren, Weed and others

(1901) ; id., (Volume on Ore Deposits* by S. F.

Emmons and others (New York 1915).

General Metallurgy of Gold: Agricola,

Georgius, (De re Metallica* translated from

Latin edition of 1556, by H. C. and L. H.

Hoover (London 1912) ; Charleton, A. G., (Gold Mining and Milling in Western Australia)

(London 1903) ; Eissler, M., (The Metallurgy

of Gold) (5th ed., London 1900) ; Fulton, C. H., Principles of Metallurgv) (New York 1910) ;

Gowland, Wm., Metallurgy of the Non-Fer-

rous Metals) (London 1914) ; Hatch, F. H.,

and Chalmers, J. A., (Gold Mines of the Rand) (London 1895) ; Launay, L. de, (Les Mines

d'Or du Transvaal5 (Paris 1896) ; Lock, A. G., (Gold: Its Occurrence and Extraction5 (with

a bibliography, London 1882) ; Lock, G. W.,

Practical Gold Mining) (London 1889) ;

Percy, John, (Metallurgy of Silver and Gold5

(Vol. I, London 1880) ; Rand Metallurgists,

(TextBook of Rand Metallurgical Practice) (2

vols., 2d ed., 1913) ; Richards, R. H., (Ore

Dressing) (2 vols., 1903) ; id., (Text Book of Ore Dressing) (New York 1911) ; Rickard,

T. A., Variations in Gold-Milling) (New York

1895) ; Rose, T. K., (The Precious Metals,

comprising Gold, Silver and Platinum5 (Lon¬

don 1909) ; Rose, Sir T. K., (The Metallurgy

of Gold) (1915).

Placer Mining: — Bowie, A. J., Jr., Practi¬

cal Treatise on Hydraulic Mining in Califor¬

nia5 (New York 1885) ; Janin, Charles, (Gold

Dredging in the United States5 (Bureau of

Mines, Bull. 127, 1918) ; Jennings, H., (History and Development of Gold Dredging in Mon¬

tana5 (Bureau of Mines, Bull. 121, 1915) ; Long-ridge, C. C., (Hydraulic Mining5 (London

1903 and 1905) ; id., (Gold Dredging5 (London

1905) ; Purington, C. W., (Hydraulic Elevator

Work on Anvil Creek, Nome, Alaska5 (London

1913) ; Weatherbe, D'Arcy, (Dredging for Gold

in California5 (San Francisco 1907) ; Whitney,

J. D., (Auriferous Gravels of the Sierra Nevada of California5 (Cambridge, 1880).

Cyanide Process: Bain, H. Foster, (More

Recent Cyanide Practice5 (San Francisco 1910) ; Clennell, J. E., (Cyanide Handbook5 (New

York 1910) ; id., ˆChemistry of Cyanide Solu¬

tions resulting from the Treatment of Ores5

(2d ed., New York 1910) ; Fulton, Chas. H.,

(Cyaniding Process in the Black Hills, South

Dakota5 (Bull. 5, S. Dak. School of Mines,

1902) ; James, A., (Cyanide Practice5 (3d ed., London 1903) ; Julian, H. F., and Smart, E.,

(Cyaniding Gold and Silver Ores,5 (2d ed., Lon¬

don 1911) ; MacFarren, H. W., (Cyanide Prac¬

tice5 (New York and London 1912) ; Park,

Jas., (The Cyanide Process of Gold Extraction

(Auckland and Melbourne 1896; London, 5th

ed., 1913) ; Rickard, T. A., (Recent Cyanide

Practice5 (San Francisco 1907).

Statistics of Gold Production and Consump¬

tion: Launay, L. de, (The World's Gold5

(translated by O. C. Williams, London 1908) ;

(Mineral Resources, United States5 (U. S.

Geological Survey, Washington, D. C.) ; Soetbeer, A., (Materialen zur Erlauterung and

Beurteilung der wirtschaftlichen Edelmetallver—

haltnisse und der Wahrungsfrage5 (Berlin

1886) ; Annual Reports of the Director of the Mint (Washington, D. C.) ; Annual Reports of

the Royal Mint (London) ; Reports of Chamber

of Mines of Transvaal.

Flotation Process: — Rickard, T. A., and

Ralston, O. C., flotation5 (Mining and Scien¬

tific Press, 1917).

Hennen Jennings,

Consulting Engineer of the United States Bu¬

reau of Mines.

GOLD ORES. See Gold Mining.

GOLD OF PLEASURE, an annual cru¬

ciferous plant (Camelina sativa), with abun¬

dant yellow flowers, called ((cameline55 by the French and (<dotter55 in Germany. It is a weed in lint-fields, but is also cultivated in parts of Europe for the sake of the oil in its seeds. Its seeds and oil-cake are, however, inferior to

those of flax, rape or colza. The stems are

used for thatch, and made into brooms; and

their fibres are sometimes woven into very coarse cloth and packing-paper. The seeds are used

for emollient poultices. C. dentata is similar, but is not cultivated.

GOLD RESERVE. See Banks and Bank¬

ing — Federal Reserve System.

GOLD STANDARD BILL. See Gold

Coinage.

GOLD STANDARD AND GOLD PRO¬

DUCTION. The metal gold is the only sub¬

stance of which the earth is composed that is freely accepted in return for all services and in exchange for all other kinds of property by every race in the world. In other words, it is the world's standard of value ; the one com¬

modity the market for which cannot be glutted ; the one substance that is everywhere accepted

not only without compulsion and without limit

as to quantity, but that is also the particular ob¬

ject of universal desire. As a mineral it has a history that is probably almost as old as the human race that has fought for its possession

with so much avidity. No less than 1,400 years before the dawn of the Christian era, the

Greeks were using it as an object of ornamenta¬

tion, and yet even they were not the originators of the practice. They had borrowed the cus¬

tom of wearing gold to make the person more

attractive from the Egyptians, a people that

had decked its women in gold more than 1,000

years before the Greeks had dreamed of utiliz¬

ing it in this manner. It was, of course, the use of gold as an ornament that first suggested its subsequent use as money, and that finally

made it the standard upon which the coinage of the world is based.

Among the many things for which the 19th

century will always be memorable not the least important will be the fact that it was during this period that the single gold standard was

adopted by practically all the civilized nations of the earth. Beginning with a monetary sys¬

tem that, in a broad sense, may be described as the double standard of

silver and gold, the

nations of the ancient world maintained this

method until sometime in the Middle Ages.

From about the beginning of the 7th century,

however, and until sometime in the 13th cen¬

tury, the single silver standard of coinage pre¬

vailed, and, when the double standard was then reintroduced, it remained in vogue until the

19th century, when the progressive financiers

began to appreciate the need of a better system.

England was the nation that led the way in

the work of exchanging the double standard of

silver and gold for the single gold standard,

but, while this was done in 1816, other coun¬

tries were slow to follow in her footsteps. It was not until 1854, therefore, that the double standard was superseded by the single standard

in Portugal, but Germany followed in 1871 ; the United States, in 1873 ; the Scandinavian States, in 1874; Holland, in 1875; France and the Latin Union, in 1876; Austria-Hungary, in 1892;

British India, in 1893; Japan, in 1898 and Rus¬

sia, in 1899. The gold standard also prevails

in Rumania. Serbia, Turkey and Egypt, but,

while all the South and Central American

countries, with the exception of Bolivia, Colom¬

bia, Guatemala, Honduras, Nicaragua, Salvador

and Paraguay have adopted it, most of them

are almost hopelessly entangled in a mass of

irredeemable paper. It may thus be seen that,

among all the nations of importance, China and Mexico alone failed to adopt the single gold

standard during the 19th century.

It was not alone for this reason that the

19th century was closely identified with the

history of gold, however, for it is this period that will always be noted for having been the occasion of two great events in the world's

record; the greatest discovery of gold and the greatest production of gold. According to the

statistics prepared by the director of the mint, the world's production of gold during the first half of the 19th century was $787,463,000,

while for the second half it was $6,909,040,000.

At the beginning of the century the most im¬

portant gold-producing countries were Mexico,

Colombia, Peru, Brazil and Argentina, in

the western hemisphere, and Russia and Hun¬

gary in the eastern hemisphere. With the ex¬

ception of small quantities that were obtained

in Africa and from the East Indies there was

practically no other places where the metal

could be found. During the period from 1801

to 1810, the average annual yield of these

countries was not in excess of $12,000,000, and fully two-thirds of this amount came from the

American mines. Owing to the revolutionary

disturbances that broke out in Mexico and

throughout South and Central America during

the period between 1810 and 1824, the output of gold, as well as that of silver, was greatly re¬

duced. At this time the world's production of

gold declined until it reached the comparatively low average of about $7,600,000 per annum, an

amount which, in the opinion of William Jacob, one of the best authorities of that period, was insufficient to supply the quantity used in the arts and to make good the loss by accidents,

such as by abrasion, shipwreck, *etc.* As the

restoration of peace was quite generally effected about this time, however, disaster was avoided

for the increase in the production of gold,

which began at once, steadily continued. Even

the average output of Russia commenced to

show some remarkable gains, her production

between 1837 and 1848 averaging more than

$12,500,000 per annum, which was in excess

of the production of the entire world at the

beginning of the century. The following table

gives the details of the world's production dur¬

ing the first half of the century as computed by the director of the mint :

PERIOD

Annual

average

Total for

period

1801-1810 .

$11,815,000

7,606, 000

9,448, 000

13,484.000

36 , 393 , 000

$118,152,000

76,063,000

94,479,000

134,841,000

363,928,000

181 1-1820 .

1821-1830 .

1831-1840 .

1841-1850 .

Half-century .

$15,749,200

$787,463,000

The era of gold discovery dates from 1848,

when James Wilson Marshall, on 19 January,

discovered a small lump of gold in the tail-race of Sutter's sawmill, in El Dorado County, Cal.

Naturally such a discovery led to a search, not only of the bed of the stream but in the adjoin¬

ing ground, and, in both places, rich deposits of the precious metal were found. The story

of the rush that followed this find of new gold fields is a familiar tale to readers of American history. The news spread like wildfire through

California, down the Pacific Coast to South

America, and finally east to the Atlantic States, and so to Europe. In response to these tid¬

ings gold hunters flocked from every inhabitable portion of the globe, with the result that the gold production of California alone amounted

to $36,000,000, or a sum equal to that which the annual average of the entire world had attained during the preceding decade. A year later it

had reached the sum of $56,000,000, and it was in that year that a similar discovery of placer gold was made in New South Wales, which was

followed shortly by a still more important find in the colony of Victoria. New mines were

also discovered in Russia during this period,

and as all these discoveries were attended by

great public excitement and heavy immigration

the new# mines were so well worked that the

production of Australia and New Zealand soon

aggregated $65,000,000, while that of Russia

alone was in excess of $25,000,000.

The finding of the Comstock lode in Nevada

was the next great discovery of the precious

metal. This fissure vein, which was fully four miles long, was in rock of the Tertiary Age,

and was situated at the base of Mount David¬

son, in the Virginia range, an offshoot of the Sierra Nevada. In the central part of the

fissure its width is about 3,000 feet, while the gangue, or veinstone, is quartz, not uniformly

distributed in the fissure, but coagulated in

large bodies commonly known as ˆbonanzas.5*

Apparently the metal had been deposited in this place in solution, while some idea of the

tremendous magnitude of the deposit may be

obtained from the fact that, since 1861, the

year when it was first scientifically worked, the Comstock lode has yielded more than $470,000,-

000 of bullion. At the value ratio of 1 to 16, 40

per cent of the bullion produced was gold,

wrhile 60 per cent was silver. As the richest ore bodies of the lode had been exhausted dur¬

ing the seventies, the annual yield gradually de¬

clined until, in 1882, it was less than $1,500,000, but as attention was then turned to the work¬

ing of such lower-grade ores as had previously been neglected, the annual production gradually

increased until it had again attained a figure of several millions.

It was about this time 0884) that there was

discovered in the Witwatersrand of the Trans¬

vaal a deposit of gold that was destined to sur¬

pass in magnitude, not the Comstock alone,

but every other find of the precious metal that the world had ever seen. Here the country

rock is a bed of sandstone, interlaminated with deposits of conglomerate, known to the Dutch

as ˆbanket.® It is this conglomerate that car¬

ries the gold, the average being 10 pennyweights per ton of material. Borings to the depth of

3,500 feet, however, have found the proportion

of gold in this reef undiminished, while the

outcroppings of the reef have been traced for

a distance of 40 miles. The working of these

mines gave the Transvaal a gold production of

$78,070,761, in 1898. Then came the interrup¬

tions due to the war with Great Britain, in

1899, and this, with other disturbances, made

a full resumption of the work impossible prior to about 1904, although it was believed that the output of the Rand would yet equal the sum of $150,000,000. It reached this vast amount in

1908.

The most surprising discovery of modern

times, however, was the finding of the gold

placers of the Klondike, in 1894. As the ground underneath which this gold is found is perpetu¬

ally frozen, it is quite evident that these de¬

posits must have been laid down at some age

when the climate of that region was much

warmer than it is at present. To procure

this gold to-day, however, it is necessary to

sink a shaft through the frozen ground by the use of hot boulders, after which the drift is run by building a fire against the face of the ground, the gravel which is then thrown out

being left until summer, when it will thaw suf¬

ficiently to permit of washing and panning. It has been estimated that all the gravel which

two men are able to throw out during the

eight months of winter can be washed by the

same men in two months of the summer. In

spite of the difficulties of mining and the cost of transportation the output of the Klondike

region steadily increased until 1900, when it

was estimated at more than $20,000,000. Since

that time there has been a slight falling off in the product, which, in 1904, was figured as somewhat more than $16,000,000. Similar placer

mines have also been discovered in the Cape

Nome region of Alaska, and, in 1904, their out¬

put amounted to more than $9,000,000.

At the present time, however, the most im¬

portant gold-bearing district within the borders of the United States is that at Cripple Creek, Colo. This ore is a telluride, known to mineral¬

ogists as calaverite. The country rock is

altered andesite, granite, or phonolite, contain¬

ing thinly disseminated iron pyrites and tel¬

lurium minerals. The tellurium at or near the

surface is oxidized and the gold when it is

visible exists as an ochre-like powder known

as <(mustard goldT The tellurium, through a

process of roasting, is oxidized, and the gold thus set free in the metallic state is easily solu¬

ble by cyanide or chlorination. The estimated

yield of the Cripple Creek district in 1904 was $24,000,000. The increase in the gold produc¬

tion of Australia during recent years has also been a remarkable factor in extending the

world's output. During 1900, new workings

were established in West Australia, and these,

with the product of the older mines, produce an amount of gold, which, in 1904, was approxi¬

mated at nearly $88,000,000.

The statistics showing the world's produc¬

tion of gold during the 58 years up to 1908 are as follows :

PERIOD

Annual

average

Total of

period

1851-1855 .

$132,513,000

$662,566,000

670,415,000

614,944,000

1856-1860 .

134,083,000

1861-1865 .

122,989,000

1866-1870 .

129,614,000

648,071,000

1871-1875 .

115,577,000

577,883,000

1876-1880 .

114,586,000

572,391 ,000

1881-1885 .

99,116,000

495,582,000

1886-1890 .

112,895,000

564,474,000

1891-1895 .

162,947,000

814,736,000

1896-1900 .

1901-1908…

257,596,000

1,287,978,000

1,613,098,600

Total .

$138,181,000

$8,522,138,600

The production of the world by single years

from 1905 to 1908, inclusive, was:

Year Production

1905 . $380,288,700

1906 402,503,000

1907 . 412,532,900

1908 . 441,932,200

Total for 4 years

$1,637,256,800

The world's production of gold in 1908, ac¬ cording to the same authority, was divided as follows :

Countries

Australia … .

Africa .

United States

Russia .

Canada .

Mexico .

India .

China .

All others… .

Value

$73,327,300

166,520,500

94,560,000

28,052,200

9,842,100

22,371,200

10,598,500

8,647,300

28,013,100

Total

$441,932,200

The production of the United States and its

territories during 1909 was divided as follows: State, *etc.*

Colorado .

California ….

Alaska .

Nevada .

South Dakota

Utah .

Montana ….

Arizona .

Idaho .

Oregon .

All others ….

Value

$21,954,700

21,271,300

20,947,600

14,908,400

6,849,900

3,844,800

3,599,400

2.672.300

1.389.300

712,900

11,081,600

Total

$99,232,200

In concluding this review of the gold situa¬

tion it may be interesting to note the manner in which new supplies of gold operate on prices.

From a commercial point of view, gold stands

for purchasing power, and yet people do not

mark up the prices of their goods merely be¬

cause some new gold mine has been discovered,

but the fact that some men have two dollars in their pocket where they had only one dollar be¬

fore creates a greater demand for goods, and it is to this increased demand that the advance in prices is due. It was in this way thaj the new supplies of gold acted when they brought about an increase in both prices and wages during

the 20 years succeeding the discovery of the

precious metal in California. This result was

not brought about because the community was

richer for the privilege of having two dollars instead of one with which to transact a given amount of business, but because, as Professor

Cairnes shows, the distributions of the earnings of society was shifted by giving the advantage to wage-earners over rentiers and others hav¬

ing a fixed income. The former had more

steady employment and better wages than be¬

fore, while the latter were compelled to pay higher prices for the goods which they con¬ sumed without experiencing a corresponding in¬ crease in their income.

GOLD STICK, superior officers in the English Royal Bodyguard, and captains in the Corps of Gentlemen-at-Arms. They take the name from the gilded batons carried by them on state occasions.

GOLDAU, gol'dow, a valley in Switzer¬ land, in the canton of Schwyz, between Mount Rigi and the Rossberg. On 2 Sept. 1806 a land-

slide from Mount Rossberg destroyed the vil¬ lage of Goldau and three other villages situated in the valley, killing about 450 per¬ sons. A little village built in the valley, near the mines, is called Goldau. It has a popula¬ tion of about 490.

GOLDCHAIN, or GOLDEN MOSS. See

Stone-crop.

GOLDEN, Colo., city, county-seat of Jeffer¬ son County, on Clear Creek, and on the Union Pacific, the Denver & R. G., and the Colorado Southern and other railroads, about 15 miles west of Denver. In the vicinty are deposits of coal and brick clay. The chief industries are smelting, the manufacturing of brick and pottery, tiles and flour milling. A State In¬ dustrial School and a School of Mines are located here. The waterworks are owned by the city. Pop. 2,477.

GOLDEN AGE, among the Greeks and Romans was the reign of Saturn, whose bless¬ ings are described by Virgil in his eclogue ad¬ dressed to Pollio. The Latin poet was borrow¬ ing from the Greek Hesiod who depicted the Golden Age as the patriarchal era of Saturn or Cronos. This was followed by the Silver Age of voluptuousness under Jupiter. Then came the Brazen or warlike age under Neptune.

To this succeeded the Heroic Age under Mars,

the Iron or Utilitarian Age under Pluto, god

of riches. The Golden Age in England was

the reign of Elizabeth (1558-1603) ; in France under Louis XIV. The Golden Age of German

literature included the period between Klopstock and Goethe (1750-1850). The Golden Age of

Italian art was the famous (Cinque Cento) ex¬

tending from the life of Leonardo da Vinci

(d. 1520) to Michelangelo (d. 1576).

GOLDEN ASS, The. The (Metamorphoses) of Apuleius, or (The Golden Ass,* as

they are popularly called, are the most famous, if not the best, of the Milesian tales — collec¬

tions of stories which were intended to tickle the fancy with voluptuous pictures by being re¬

lated in a brief, witty manner. Such tales en¬

joyed universal favor in antiquity and were

probably the prototypes of the Italian (<novelle®

and the French <(fabliaux.® As the opening

words of (The Golden Ass) indicate, the plot

was taken from a still extant Greek work, Lu¬

cius the Ass, > formerly, though probably incor¬

rectly, attributed to Lucian, a contemporary.

Apuleius, however, was no mere slavish trans¬

lator. He improved the plot of the original by shortening several

scenes and cleverly para¬

phrasing others, by embellishing it with other

excellent stories of love, sorcery, jests and rob¬

bers, and in particular by inserting the long and beautiful allegory of Cupid and Psyche (bk.

IV, sect. 28, to bk. VI, sect. 24), which has been described as ((an antique gem in an unworthy

setting.® Probably many of these stories were

not original, but belonged to the common stock of Greek and Latin literature. There were

quite a few collections of these ˆfacetiae,® the most famous of which was called (Milesian

Tales, > originally collected by one Aristides and translated into Latin in late republican times

by the historian Sisenna. Probably some of

these survived in the earlier novel of Petronius.

Although most of the tales are of more than

doubtful morality, Apuleius tells them in such

a rollicking fashion that the spirit of fun pre¬

dominates, just as in Boccaccio's (Decameronˆ

which contain at least two of Apuleius' stories in Italian surroundings. The hero of (Thc

Golden Ass,> one Lucius, traveled into Thes¬

saly where, after a sojourn of a few days, he was. transformed into an ass through his ex¬

cessive curiosity to learn magic. Nothing

could restore him to his own shape but the eat¬

ing of a rose, which he at length obtained by prayer after .many trials and adventures. The

book ends with a fine description of the mys¬

teries of Isis, into which the hero is initiated and through which he becomes purified. The

theme of the work has been explained as some¬

what allegorical : that men overcome by lusts of flesh become practically beasts and are not re¬

stored to their pristine selves except by tasting the rose of reason and virtue to be obtained by prayer. Apuleius has been criticized for his

rare and outlandish words, his coinages and

jingling assonances, his grsecisms and solecisms, but it must be admitted that the style which he has adopted is admirably suited to the character of the work. An eclectic critical text by S.

Gaselee and a reprint of William Adlington's

(1566) translation with improvements appear

in the Loeb Classical Library (1915).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GOLDEN BEETLE, one of the richly

gilded beetles of the family Chrysomelidce

(q.v.).

GOLDEN BIBLE, the Book of Mormon,

which Joseph Smith, Jr., professed to have

found in 1823. He declared that an angel ap¬

peared to him and led him to the discovery.

He was not, however, allowed to take

up the gold plates on which the book

was written until four years later. Joseph

Smith was at first unable to read the <(reformed Egyptian® characters in which the revelation

was written until, in the same box with the

plates, he discovered an instrument called Urim and Thummin, by the aid of which he translated the Golden Bible into English and published it in 1830, with the certificate of 11 men testify¬

ing that they had seen the plates of gold. See Book of Mormon.

GOLDEN BOOK (Libro d'Oro), official

record of the notables of Venice under the Re¬

public. The roll was inscribed in letters of gold, and the term was afterward used to designate

any list of honors. The Golden Book of Venice was destroyed by Napoleon in 1797.

GOLDEN BULL, a name given to several

state documents ; the principal ones are as fol¬

lows :

1. Of Hungary, 1222, wrung from King An¬

drew II by his nobles, just as Magna Charta

was extorted from John of England. Andrew

II of Hungary, surnamed ((Hierosolymitanus,®

was a feeble, self-willed, worthless king, like John of England. Its terms were:

The nobles and the Church were to be ex¬

empt from taxes.

The daughter of a noble without male heir

shall inherit one-fourth of his property.

No noble shall be obliged to follow the king

in any foreign war.

The palatine (that is, mayor of the palace),

shall be the supreme judge.

No foreigner to hold office or dignity with¬

out consent of the council of the realm.

The king shall not grant counties or offices

of any kind in perpetuity.

If the king violates any of the laws in this bull, it shall not be treason to levy war on him.

This bull was so called because the attached

seal was enclosed in a golden case or box. It is rather remarkable that one of the very first countries in Europe to effect the liberty of

subjects should have been one of the last-born nations, the Huns of Hungary.

2. (Bulla Aurea of the Empire,* 1356, pub¬

lished by Kaiser Karl IV at the Diet of Nurem¬

berg, and held the Magna Charta of Germany.

It prevented a repetition of the contests which had hitherto arisen whenever a vacancy in the

throne occurred ; and regulated the functions,

number and privileges of the electors. Called

“golden® because the seal attached to the parch¬

ment was of gold instead of lead, or else that it was enclosed in a golden case.

It limited the number of electors to seven

(three prelates and four lay princes). The prel¬

ates were the three archbishops of Maine, Co¬ logne and Treves; the lay princes were the king of Bohemia, the Duke of Saxon, the Mar— graf of Brandenburg, and the Pfaizgraf of the Rhine. Their persons were declared sacred. Every question was to be decided by majority and without appeal.

GOLDEN CALF, an idolatrous image, doubtless of Egyptian suggestion and symbol¬ ism, cast by Aaron from the earrings of the people, while the Israelites were encamped at the foot of Sinai and Moses was absent on the Mount.

GOLDEN CIRCLE, Knights of the. See

Knights of the Golden Circle.

GOLDEN CROSS, United Order of the.

See United Order of the Golden Cross.

GOLDEN-CROWNED SPARROW, THRUSH, etc., birds so named for some con¬

spicuous yellow marking on the top of the head.

The sparrow (Zonotrichia coronata) is a near

relative of the white-crowned, or Peabody bird

(q.v.), and is seen in the United States only in the spring and fall; it sings brilliantly in its Arctic and Alaskan breeding-home. The golden-crowned “thrush® is a warbler, better known as “oven bird® (q.v.). The “wren® or “gold-crest®

is a kinglet (q.v.).

GOLDEN or WAR EAGLE. See Eagle.

GOLDEN EAGLE, ORIOLE, PLOVER,

SHINER, WARBLER. See Eagle; Oriole;

Plover, *etc.*

GOLDEN CHAIN, or GOLDEN RAIN,

tree of the laburnum family. See Laburnum.

GOLDEN-EYE, WHISTLE-WING or

RATTLEWING, a duck (Clangula clangula)

which breeds numerously in all northern regions where its nest is made in holes in trees, or (in Lapland) in suitable boxes placed in trees. The American birds form a geographical race called

Americana. During cold weather they ap¬

pear in the United States and the middle districts of Europe, traveling about in small, watchful

parties which escape swiftly on the least alarm, and arouse all other ducks within sound of the loud noise made by their wings. An European

name is “garrot.® The general color of the

drake is white beneath, with head and sides of neck rich green, back and tail grayish-black

and the bill bluish-black; it has a round white spot before each eye, the iris of which is golden yellow, and two white bands on the wing; length about 19 inches. The female is ashy, with

rufous head. In the Rocky Mountains and

northward occurs a second somewhat larger

species, Barrow’s golden-eye (C. islandica),

which differs prominently in the greater extent of the loral spot.

GOLDEN FLEECE. See Argonauts.

GOLDEN FLEECE, Capture of the

(<Argonautica)), an epic poem in four cantos, by Apollonius of Rhodes (235 b.c.), a con¬

temporary of Ptolemy Philadelphus. Apollonius

found all the elements of his poem in the

legendary traditions of the Greeks ; the expedi¬

tion of the Argonauts being, next to the siege of Troy, the most famous event of the heroic

ages. The third canto describes the conquest of the Golden Fleece, and the beginning of Medea’s love for Jason, the development of which

forms the finest portion of the poem. The Argonauts

go through the most surprising adventures, and

encounter perils of every description, before

they are able to reach the port from which they started. These various events have allowed the

poet to introduce brilliant mythological pictures, such as his account of the Garden of the Hes-perides. The work has been frequently trans¬

lated, and is admittedly the masterpiece of Alex¬

andrian literature. The <Argonautica> of

Valerius Flaccus is an imitation of that of

Apollonius, regarded by most modern scholars

as without originality or invention.

GOLDEN FLEECE, Order of, a cele¬

brated order of knighthood in Austria and

Spain, founded by Philip the Good, Duke of

Burgundy and the Netherlands, at Bruges, 10

Jan. 1429, on the occasion of his marriage with Isabella, daughter of King John I of Portugal.

The order was instituted for the glory of the saints and the protection of the Church, and

the fleece was probably assumed for its emblem as much from being the material of the staple manufacture of the Low Countries as from its

connection with heroic times. The number of

the knights was 31, and they themselves filled up vacancies by vote. This continued till 1559, when Philip II of Spain held the last (the 23d) chapter of the order in the cathedral of Ghent; and subsequently

Philip obtained from Gregory

XIII permission to nominate the knights him¬

self. After . the death of the last Hapsburg

king of Spain in 1700, the Emperor Charles VI laid claim to the sole headship of the order in virtue of his# possession of the Netherlands,

and, taking with him the archives of the order, celebrated its inauguration with great magnifi¬

cence at Vienna in 1713. Philip V of Spain

contested the claim of Charles ; and the dispute, several times renewed, was at last tacitly ad¬

justed by the introduction of the order in both countries. The insignia are a golden fleece (a sheepskin with the head and feet attached)

hanging from a gold and blue enameled flint—

stone emitting flames, and borne in its turn by a ray of fire. On the enameled obverse is in¬

scribed Pretium laborum non vile. The deco¬

ration was originally suspended from a chain

of alternate flints and rays, for which Charles GOLDEN GATE — GOLDEN MOLE

V allowed a red ribbon to be substituted, and the chain is now worn only by the grand-master.

The Spanish decoration differs slightly from the Austrian. The costume consists of a long robe of deep red velvet, lined with white taffetas, and a long mantle of purple velvet lined with white

satin, and richly trimmed with embroidery con¬

taining fire-stones and steels emitting flames

and sparks. On the hem, which is of white

satin, is embroidered in gold, Je lay empris

(((I have captured it®)- There is also a cap of purple velvet embroidered in gold, with a hood, and the shoes and stockings are red. Consult

Reiffenberg, (Histoire de l'Ordre de Toison

d,Or) (1830) ; and Zoller, (Der Orden vom

Goldenen Vlies) (1879).

GOLDEN GATE, a channel at the en¬

trance to San Francisco Bay, between the penin¬

sula upon which is located San Francisco and

the one upon which Sausalito stands. The

average width is two miles, and the depth is

sufficient for ocean steamers. It is guarded

by Forts Pointe and Mason, both on the south

shore, and by a fort on Alcatraz Island. The

name was given to this channel by Drake, about 1578.

GOLDEN HIND, The, one of the two

vessels in Sir Humphrev Gilbert's colonizing

expedition of 1583. Gilbert's own vessel was

the Squirrel, and he went down with it in a

storm. The Golden Hind, Capt. Edward Hales,

returned to England with the news.

GOLDEN HORDE, body of Tatars who

overran eastern Europe in the middle of the

13th century and founded in Russia the Empire

of the Golden Horde, or, Western Kipchaks.

Their leader was Batu-Khan, son of JujI Khan

and grandson of Jenghiz Khan, and the in¬

vasion, which began about 1237, was character¬

ized by merciless slaughter and destruction. The Golden Horde conquered and burned every¬

thing in their path through Russia and into

Silesia, Poland and Hungary. At Liegnitz they

defeated Henry II, Duke of Silesia, on 9 April 1241, but the cost of this victory was so heavy that Batu-Khan found himself unable to con¬

quer Neustadt, and turning back upon his path

established himself on the Volga, his gorgeous

tent giving rise to the name of the empire

and its followers, the Golden Horde. Here he

summoned the Russian princes to render fealty,

and rapidly established a power which remained

unbroken in the hands of his direct descendants until 1359, when the empire was ruled under

various heads of the old house of JujI, none of them governing the entire empire. In 1378,

however, Toktamish of the Eastern Kipchaks

established himself as emperor of both Eastern

and Western Kipchaks, and for a time main¬

tained something of the old glory of the Golden Horde, but was finally overcome by Timur in

1395. Consult Howorth, Sir H., ‘History of

the Mongols) (1876-85) ; Lane-Poole, S., Mo¬

hammedan Dynasties) (1894).

GOLDEN HORN, the harbor of Constan¬

tinople, an inlet of the Bosporus; so called

from its shape and beauty. See Constanti¬

nople.

GOLDEN HOUSE OF NERO, a palace

which Nero erected for himself at Rome after

the disastrous fire of 64 a.d. This palace

stretched from tihe Palatine across the level

area on which the Flavian amphitheatre was

afterward built to the foot of the Esquiline.

According to Tacitus, whose virulence is often

unjust, Italy and the provinces were plundered

to gratify the emperor’s love of magnificence in the erection of this

structure. Gold and precious stones blazed on its walls ; the grounds around it were variegated with meadows, lakes and

shady woods, and it was considered one of the wonders of the Roman Empire.

GOLDEN HUMMER (Black -EARED

Fairy), Peruvian humming bird (Heliothrix

aurita). It has a sheen of gold over its

plumage which is green and heliotrope above

and white below, with golden shading at the

throat.

GOLDEN LEGEND, collection of legend¬

ary lives of saints, written by Jacobus de

Voragine, archbishop of Genoa. The work was

entitled (Legenda SanctorunP by the author but

was popularly christened ‘Legenda Aurea) or

(Golden Legend) because of its estimated

worth. It was called (Lombardica Historia >

in some early editions, due to the fact that a short history of the Lombards down to 1250 is added to the life of Pope Pelagius which forms next to the last chapter in the book. The work contains 177 chapters, or, by some estimates, 183, and is divided into five parts, from Advent to Christmas, to Septuagesima, to Easter, to the

Octave of Pentecost, to Advent, and gives the

lives of the saints in the order of their festi¬

vals. The book was written with devotional

rather than historical purpose and was not only widely popular in its day but exercised con¬

siderable influence on the religious prose and

poetry of later times. In 1500 it had run

through 74 editions in Latin, besides three trans¬

lations into English, five French, eight Italian, 14 Low German and three Bohemian. The

first English edition was printed by William

Caxton for the Earl of Arundel (1483), which

edition was revised by Ellis (New York and

London 1900). The best Latin edition is that

of Grasse (Dresden and Leipzig 1846, 1850;

Breslau 1890) ; the first French edition was that of Jean Batallier (Lyons 1476), and recent

French editions are those of Brunil (1843,

1908) and Roze (1902). The author, James of

Viraggio, or Jacobus, or Jacopo de Voragine,

was born at Viraggio (now Varazze), near

Genoa about 1230 and died 13 July 1298. He

entered the Order of Saint Dominic, was pro¬

vincial of Lombardy in 1267-86 and held other

high offices in the Church until 1292, when he became archbishop of Genoa.

GOLDEN LEGEND, The, lyric drama by

Longfellow, one of the trilogy entitled

‘Christus,* published in 1851. It has a mediae¬

val setting and is of a religious character.

While some critics find in it a suggestion of ‘Faust,* others ascribe its title and conception as coming from the (Golden Legend> of

Jacobus de Voragine. It is also thought to be based on Hartman von Aue’s (Der Arme

Heinrich. *

GOLDEN MOLE, or CAPE MOLE, a

South African insectivore with fur showing

golden iridescence. It has the habits of a mole, no external ears or tail and the eyes covered with skin; but a greater structural resemblance to the potamogales (q.v.). Five species consti-28

tute the family Clirysochloridce, differing from moles (q.v.) most markedly in the fact that

the forefeet are adapted for digging by the

development of the middle toe into a powerful

tool, and by a hollowing inward of the chest.

The best-known species is Chrysochloris trevel -

yani, about six inches long.

GOLDEN NUMBERS, Cycle of, Metonic

lunar cycle, a period of 19 solar months, or

235 lunations, after which time the new moon

falls again on the same days as in the preced¬

ing cycle. The discovery was made by Meton,

the Athenian astronomer, 423 b.c., who divided

the calendar into periods of 19 years, number¬

ing from 1 to 19, in which the new moons

would come on the same days in the years des¬

ignated by the same numbers. The Athenians

welcomed the system and it was ordered that

the years of the Metonic cycle should be writ¬

ten in gold on marble pillars in the temple,

hence the name, Golden Numbers. The 19

years of the Metonic cycle were purely lunar,

which obviously made it impossible that all the years should be of the same length, a difficulty overcome by assigning to 12 of the 19 years 12

lunations, while the remaining seven had 13.

The 13th lunation was designated as the em—

bolismic or intercalary month. The Metonic

reckoning by the Gregorian calendar is from

1 b.c., as by the Metonic system the new moon beginning the cycle fell on 1 January every

19th year. As in the Julian calendar the

months had no reference to the moon, the early Christians used the Metonic lunar cycle to fix the date for Easter. The cycle was used as

originally devised by Meton until 1582, when

it was revised and incorporated as a part of the Gregorian calendar.

GOLDEN ORIOLE, commonly known as

the Baltimore oriole, an American bird (Icterus galbula), closely allied to the Ploceidce, weav¬

ing birds of Asia. Its nest is skilfully con¬

structed so as to hang in the form of a long slender pouch from the extremity of a bough.

Its plumage is brilliantly contrasted in color, and as black and yellow were the armorial col¬

ors of Lord Baltimore it was named in early

colonial days after that nobleman. It is found in the hot months as far north as the coast of New Brunswick, and westward from the Sas¬

katchewan River to Texas and northern Louisi¬

ana. In winter it migrates to Panama and the

West Indian Islands. It is a powerful and de¬

lightful songster. Its eggs are from four to

six in number and hatch in 14 days. The golden oriole is the farmer's friend and destroys many insect pests which are destructive to vegetation.

GOLDEN ROSE, a rose of gold, or

gilded, blessed by the Pope on the fourth Sun¬

day of Lent and sent to some sovereign or other person who is known for his or her loyalty to the Holy See. It is sometimes sent to noted

churches or sanctuaries.

GOLDEN RULE, the rule laid down by

Jesus in the Sermon on the Mount and stated

by him to be the law and the prophets — that is, a summary of their teaching: ((Therefore

all things whatsoever ye would that men should do to you, do ye even so to them® (Matt, vii, 12). This rule had already been ((examined

and adopted as a standard of ethics by west¬

erns like Socrates and easterns like Theng-

tsen, the disciple and friend of Confucius, some centuries before the birth of Christ.®

GOLDEN SEAL, Order of the, fraternal

organization incorporated in New York State

in 1902. Membership includes life insurance,

as well as covering losses through accident and illness. It is organized with a mutual sharing of profits clause, dividends being declared

every six years. It is governed from a supreme court and distributes about $1,000,000 in bene¬

fits annually. Membership (1918) 10,000.

GOLDEN SEAL, ORANGE-ROOT,

YELLOW PUCCOON, or YELLOW IN¬

DIAN PAINT, a ranunculaceous perennial

plant (Hydrastis canadensis) of wooded re¬

gions throughout the eastern United States,

which sends up in early spring a hairy stem

about a foot high, with large, deeply-lobed

leaves and a single greenish-white flower, fol¬

lowed by a head of crimson berries which re¬

semble a raspberry. The rootstock is gath¬

ered by country people, especially in the South, for the sake of its thick orange-yellow bark

from which a drastic and tonic medicine is

made.

GOLDEN -SECTION (Sectio aurea),

division of a line in extreme and mean ratio, solved by Euclid II, and originally known as

<(divine proportion.® The Pythagoreans used

it in the construction of the regular pentagon, and Eudoxus perfected various theorems re¬

lating to it. Fra Luca Pacioli treated the sub¬

ject at some length in (Divina Proportione'

(Venice 1509; German translation, Vienna

1889) ; and his ideas were embodied in Zeis—

ing's (Neue Lehre von den Proportionen des

menschlichen Korpers) (Leipzig 1854) and (Der

goldene SchnitG (1884). Consult Bochenek,

(Kanon aller menschlichen Gesstalten und

der Viere} (1885) ; Pfeifer, (Der goldene

SchnitG (1885) ; Matthias, (Die Regel von

goldenen Schnitt im Kunstgewerbe) (1886).

GOLDEN SPUR, Order of the, a papal

order of knighthood, whose foundation has a

legendary origin in Constantine the Great, or

Pope Sylvester. Its institution can be traced

historically to Pope Paul IV, 1559. The title

of the members is ((Count Hospitalers of the

Lateran.® The right of bestowing the order is

vested in other prelates and kings beside the

Pope. When it languished, Gregory XVI re¬

vived it in 1841. It is intended to be bestowed as a recognition of conspicuous merit in per¬

sonal character, science and art, and for serv¬

ices done to humanity and the Holy See. The

badge is a gold Maltese cross with white enam¬

eled surface, to which a pendant spur is at¬

tached. On one face of the cross is a bust of Sylvester, with the inscription, Sanctns Sil¬

vester Pont. Max. (Saint Sylvester, Pope). On

the reverse is engraved <(MDCCCXLI Gregorious XVI. restitut® (Gregory XVI restored it in 1841). The order has three grades; the ribbon

is red with black stripes.

GOLDEN STATE, California, so named

on account of its gold deposits.

GOLDEN TREASURY, The, a collection

of English poetry published in 1861. The book

was dedicated to Tennjrson, with whom Palgrave had long discussed his plan. In the

course of 30 years the original form was en-

larged to include other poems of importance

and rearranged to conform more to literary his¬

tory, the latter change in some judgments ad¬

vantageous, in others not. The collection be¬

gins with the Elizabethans, and, with some

rather conspicuous omissions, the old English

ballads or some of Shelley, for example, and

the relative exaggeration of the amount of

Wordsworth included, follows the great names

up through Keats, Shelley and Byron. The

great success of the book can scarcely be said to have diminished to this day. The (Second

Series,* composed of contemporary verse, ap¬

peared in 1897, but was comparatively a fail¬

ure. Palgrave's age and the uncertainties of

contemporary judgment, perhaps, afford the ex¬

planation. Anthologies, collections of the

flowers of poetry, are of ancient origin ; but few — none in English certainly — have rivalled (The Golden Treasury.* Palgrave's original

poetry never attained to great eminence, but

the quality that he gave to his anthology

amounts to a unique and original distinction. It is as if a finely endowed artistic nature had worked, though unable to create through the

brush itself, to bring together a collection of pictures that expressed a veritable artistic crea¬

tion. The author — a word that applies thus

to no other anthology-maker in English — of

(The Golden Treasury) expresses himself

through taste and judgment in poems as an¬

other author might in subject matter and style.

And not the least of the causes to his com¬

plete effect lies in the subtle and exquisite ar¬

rangement by which poems follow one after an¬

other, leading out the thought of one to enrich the other, and often to build up a mood to

which each poem is made to contribute and by

which it is revealed. The combination of the

last five poems in the book, for example, is it¬

self a poem; and the idea of ending the whole with Shelley's ((Music

when soft voices die® is an act of creative imagination.

Stark Young.

GOLDEN VERSES, collection of maxims

credited to the Pythagoreans, containing in

brief sententious form the teachings of every¬

day virtue.

GOLDEN WARBLER, American wood

warbler (Dendroica cestiva), also called yellow bird, summer warbler and yellow warbler.

Their predominating color is a yellowish olive-green, the female being slightly darker than the male. They are common to North America in

general, migrating southward to Central Amer¬

ica and the upper portion of South America.

They are closely allied to the golden-winged

warblers* (V ermivora chrysophtera) , one of the swamp warblers with similar migratory habits.

GOLDEN WASP, or GOLD WASP, a

cuckoo-fly (q.v.).

GOLDEN WEDDING. See Diamond

Wedding.

GOLDEN-WINGED WOODPECKER.

See Woodpecker.

GOLDENROD (Solidago), a genus of

plants belonging to the family Asteracece, con¬

taining about 125 species, most of them natives of North America, where their brilliant yellow

flowers are very conspicuous in the autumnal

months, especially in Canada and the northeast¬

ern United States. Two or three species are

found in Europe, and a few in South America

and Mexico. They are perennial, herbaceous,

with simple undivided leaves and bear numerous

small heads of flowers, disposed in spikes or

panicles. Among the marked forms of inflor¬

escence are the pyramidal panicle of numerous,

one-sided, scorpioid racemes, well illustrated

by S. canadensis and S. rugosa; the almost level cyme of S. rigida; and the dense thyrsus-like

cluster of Y. speciosa. The florets of the ray are about five in number, and yellow, S. bicolor excepted, which has whitish rays. The dried

leaves of the sweet-scented or anise-scented

goldenrod (S. odora) have been used as a sub¬

stitute for tea. This plant yields an aromatic oil with tonic properties. In Europe the dif¬

ferent species are cultivated in gardens for or¬

nament ; one, the Aaron's rod (S', virgaurea), is common in Great Britain. The alpine golden¬

rod is found on the summits of mountains in

Maine, New Hampshire and northern New

York. The seaside or salt-marsh goldenrod

(S. sempervirens) is an especially showy spe¬

cies; and the ˆyellow-weed® (S. canadensis)

sometimes attains a height of eight feet.

GOLER, George W., American physician :

b. Brooklyn, 24 Aug. 1864. He took his M.D,

at the University of Buffalo in 1889. He was

connected with the Infants' Hospital, Charlotte, N. Y., in 1888-97 ; medical inspector of the

Rochester Board of Health in 1892-96; and

since 1896 he has been health officer of

Rochester. He established in 1897 a series of

municipal milk depots which have been recog¬

nized as models and adopted by health authori¬

ties in Europe and America. He established

the Rochester Hospital for Infectious Diseases

in 1904, and since its opening has acted as at¬

tending physician. He has been active in the

crusade against tuberculosis ; was honorary

president of the 4th section of the International Congress for Child Hygiene at Berlin 1911 ; and is a member of the advisory committee of the

National Consumers' League. He is author

of a number of articles on hygiene and sanitary science.

GOLDFINCH. (1) The familiar North

American black-winged <(yellowbirds® or

((wild canaries® of the genus Spinus,' the best known of which is the Eastern thistle-bird or

lettuce-bird (S. tristis), whose wave-like flight across the fields, each male singing sweetly in its course, forms one of the most pleasing in¬

cidents of a rural stroll. These little finches are bright golden-yellow, with the cap, wings

and tail black in the adult male ; while the fe¬

male and immature young are gray-brown and

yellowish ; and in autumn the male discards his conspicuous dress and assumes the plain attire

of his mate. At this season they collect in

flocks and remain together during the winter,

seeking the seeds of the meadow-grasses and

roadside weeds, especially thistles, and often

coming near the house and barn. Their sum¬

mer food includes more soft material, and they gather many caterpillars for their young. The

goldfinch is one of the latest birds to make its nest, delaying until midsummer to fabricate the soft cup of hempen and downy materials

which

is lodged usually in some crotch of a village shade-tree, and contains half a dozen spotless

bluish eggs. Several other species dwell in the 30 GOLDFISH

western United States and southward. (2)

The small European finch (Carduelis carduelis)

to which the name first belonged, and whose

habits are much the same as those above de¬

scribed, but which is more varied in plumage.

The bill is horn-color, the tip black and the base encircled with crimson ; nape of neck white ; top of head, shoulder of wing and a part of the

quills, black; remainder of wing dull yellow;

back and rump dusky brown ; under surface dull white. Its nest is neatly built of moss, twigs, roots, etc., lined with wool, is situated in bushes, hedges or apple-trees, and the eggs are spotted with purple and brown. This finch is one of the sweetest singers of Europe, a favorite cage-bird and the one most often taught pretty

tricks ; it is the most useful decoy in bird—

catching. Examples are to be found in bird—

stores all over the world ; and in the neighbor¬

hood of New York many have escaped and are

living wild in the parks and environs.

GOLDFISH, a carp (Carassius auratus),

highly cultivated long ago in China as a do¬

mestic fish for the sake of its rich redgold color, developed out of an

originally much

duller hue. It was introduced into England in

1728 and has spread over all of Europe and is naturalized in many waters of the United

States as well as everywhere kept in household aquaria. The young are dark-colored, assum¬

ing the golden hue later in life, and sometimes losing it in old age, when the fish becomes sil¬

very. The <(silver fish® is a mere variety, as are the socalled <(telescope fish® with large pro¬

truding eyes and the Japanese <(butterfly fish,®

in which anal and caudal fins become more or

less markedly double. All of these varieties

thrive well in confinement when furnished with

favorable conditions in the aquarium (q.v.),

but are liable to fungus diseases of the skin..

Diseased fish wfill infect all in an aquarium, and the aquarium itself, so that in the case of an inexpensive glass globe it is better to throw

the receptacle away ; a large aquarium should

be emptied and thoroughly treated with some

fungicide (q.v.) before new and healthy fish

are installed. These fish are bred for sale by some fish culturists in various parts of the

United States, who must exercise care or their stock will revert toward the original unadorned type of the species.

GOLDIE, Sir George Dashwood Vaub—

man, British administrator: b. The Nunnery,

Isle of Man, 20 May 1846. He was educated

at the Royal Military Academy, Woolwich, and

entered tihe Royal Engineers with rank of lieu¬

tenant, remaining there for two years. He then engaged in traveling and exploring in Africa

and in 1877 reached the Niger country. Realiz¬

ing the possibilities of development in the coun¬

try of the lower and middle Niger he set about adding those regions to the British Empire.

He chose the Dutch East India Company for his model, secured the consolidation of British

commercial interests in the Niger under the

title United African Interests in 1879, and in 1881 appealed to the government for a charter.

For five years Goldie fought opposition of va¬

rious sorts and met them with achievements

that overruled them. The name of the company

was changed to the National African Company,

its capital increased from $625,000 to $5,000,000, and numerous new stations were established on

the Niger. Treaties, drawn by Goldie, were

made with some 400 lower Niger and Hausa

slates, French territorial rights were bought in 1884 and at the Berlin Conference in 1885 he

was able to establish the fact that the lower Niger territory was Wholly under the British

flag. The Niger coast line was also placed

under British protection. In July 1886, Goldie's efforts were rewarded by the granting of the

desired government charter, the company then

becoming the Royal Niger Company. Lord

Aberdare was appointed governor and Goldie

vice-governor, and in 1895 he became gov¬

ernor. In 1900 the Royal Niger Company ceded

its territories to the British government in con¬

sideration of a payment of $4,325,000, it having become impracticable for a chartered company

longer to maintain its rights against the state-protected interests of France and Germany

Goldie was knighted in 1887 and received hon¬

orary degrees from Oxford and Cambridge. He

served as a member of the Royal Commission

on the South African War in 1902-03, and on that of the War Stores in 1905-06, He is a member of the Royal Society, was president of the

Royal Geographical Society in 1905, became a

privy councillor in 1898 and is president of the National Defense Association.

GOLDING, Arthur, English writer and

translator: b. probably at London about, 1536;

d. about, 1605. He finished the translation of Philippe de Mornay's treatise (Sur la Verite du Christianisme) which was begun by Sir Philip

Sidney and entrusted to his care, publishing it under the title (A Woorke Concerning the

Trewenesse of the Christian Religion, etcP

(1589). Beside making translations of the

works of Calvin and Beza, he also translated

the first four books of Ovid's <Metamorphoses)

(1567).

GOLDMAN, Emma, Russian agitator

and anarchist: b. Kovno Province, Russia,

1869. She emigrated to the United States in

1886 and joined the anarchists in their protests at the executions following the Haymarket

Square riot in Chicago soon after her arrival.

She gained great notoriety by her speeches in

German and Yiddish, denouncing established

order. In 1893 she was sentenced to a year's

imprisonment at Blackwell's Island, New York

city, for speeches and actions inciting to riot.

She lectured extensively in England, Scotland

and the United States, and after 1906 was con¬

nected with Mother Earth, an anarchist or¬

gan. She was a delegate to the Anarchist

congress in Paris, 1899, and at Amsterdam in

1907. In 1917 she was tried for conspiracy

against the Draft Law and on 10 July 1917 was sentenced to two years' imprisonment and fined

$10,000. An appeal was granted by Justice

Brandeis of the United States Supreme Court

on 20 July and she was released on bond. The United States Supreme Court affirmed the sen¬

tence 15 Jan. 1918 and on 12 Feb. 1918 she be¬

gan her sentence at the Federal prison, Jeffer¬

son City, Mo. Under the alien law existing at the time, an alien twice convicted of a crime may be deported ; so that conviction carried

with it a sentence of deportation. She was de¬

ported in 1919. She wrote (Anarchism and

Other Essays* (1910) ; (The Social Significance of the Modern Drama) (1914), *etc.*

GOLDMARK, Karl, Austrian composer :

b. Keszthely, Hungary, 18 May 1830; d. 1915.

He studied at the Vienna Conservatory. His

first compos tion of note was the overture,

(Sakuntala) (1858) ; his first opera the (Queen of Sheba* given at Vienna in 1875. His other

works include (Merlin, * an opera performed

for the first time at the Metropolitan Opera

House, New York, in 1887; the overtures

(Prometheus,) (In Spring* and (Penthesilea) ;

and the symphony (The Country Wedding.*

GOLDMARK, Reuben, American com¬

poser: b. New York, 15 Aug. 1872. He was

educated at the College of the City of New

York and at the Vienna Conservatory of

Music. He was a pupil of Door and Rafael

Joseffy on the piano and of Fuchs and Antonin Dvorak in composition. He was instructor in

piano and theory at the National Conservatory

of Music, New York, in 1891-93 and director

of the Colorado Conservatory of Music in

1895-1901. He returned to New York in 1902,

has given extended courses of lecture recitals

in United States and Canada and produced a

number of compositions. In 1910 he received

the Paderewski prize for chamber music.

Among other compositions are a symphonic

poem, (Samson,) and the overture to Hia¬

watha,* played by the Boston Symphony

Orchestra.

GOLDONI, gol-dd’ne, Carlo, the founder

of modern Italian comedy of comedies : b.

Venice, 1707 ; d. Paris, 6 Feb. 1793. He early showed a taste for theatrical representations,

reading every dramatic production of which he

could obtain possession, especially the works of the popular comic poet, Cicognini, and when

scarcely eight sketched a comedy, which ex¬

cited the wonder of his relatives. His father, a physician then practising at Chiozza, destined him for the medical profession, and took him

occasionally to visit his patients. But Goldoni, dissatisfied with this study, obtained permission to study law in Venice. Soon after, however,

a relative procured for him a place in the Papal College at the University of Pavia, from which he was expelled for writing an abusive satire.

His father died in 1731, and from this time

Goldoni lived an unsettled and wandering life,

resorting to various means to make a liveli¬

hood, but usually living as the companion of

strolling players in a continual scene of dissi¬

pation and intrigue until 1736, when he married and removed to Venice.

Goldoni’s merits in reforming the Italian

theatre cannot be mistaken. He was a most

prolific writer, and in one year produced an

output of 16 comedies. Many of his numerous

pieces still retain possession of the stage in his native country, and, in translations, of the stages of foreign countries. Among the numer¬

ous editions of his works, that published at

Venice in 1788 and 1794-95, in 44 volumes, is the most complete ; and that published at Flor¬

ence in 53 volumes in 1827 the most elegant.

Translations and imitations of some of his

works have been made in French, German and

English. Goldoni wrote memoirs of himself in

French, in which he also composed two come¬

dies, one of which, (Le Bourru bienfaisant,'

was produced at Fontainebleau and Paris in

1771 with great applause, and has maintained

itself on the stage. (See Memoires de Carlo

Goldoni; Un Curioso Accidente). Consult

Memoirs of Carlo Goldoni,* translated by Black, with essay by W. D. Howells (1877) ; Rabany,

(Le Theatre et la Vie en Italie au XVIIIeme

siecle) (1896) ; Copping, (Alfieri and Goldoni*; Chatfield-Taylor, (Goldoni: a Biographv)

(1913).

GOLDSBORO, N. C., city, county-seat of

Wayne County, on the Neuse River, the Atlan¬

tic and Norfolk Southern, the Southern and the Atlantic Coast Line railroads, about 80 miles

north of Wilmington and 50 miles southeast

of Raleigh. It is the site of a State Normal School for colored teachers, the Eastern In¬

sane Asylum, and the Odd Fellows' Orphanage.

The chief manufactures are cotton, agricultural

implements, cottonseed oil, furniture, mat¬

tresses, veneer, bricks, knitting and machinery.

It was settled in 1838 and was incorporated in 1841. The government is administered by a

mayor, elected biennially, and a council. The

waterworks are municipally owned. Pop. 11,296.

GOLDSBORO, KINSTON, and GOLDS¬

BORO BRIDGE, Engagements at. On

11 Dec. 1862, General Foster, in command of

the Department of North Carolina, set out from Newbern for the purpose of taking Goldsboro

and breaking the railroad that connected Rich¬

mond with the railway system of the South

and Southwest, and then forming a junction

with the Union forces at Suffolk and Norfolk,

Va. He had four brigades of infantry, a regi¬

ment of cavalry and seven batteries and two

sections of batteries, in all about 11,500 men and 40 guns. He reached Southwest Creek on

the 13th, to find the bridge destroyed and his passage disputed by about 400 Confederates,

with three guns. The 9th New Jersey and 85th

Pennsylvania soon routed this force, capturing

one gun, and Foster pushed on toward Kinston,

skirmishing heavily on the way, and when

within a mile of the place, 14 December, en¬

countered a force of 2,000 men under General

Evans, posted between the Neuse River and a

deep swamp. After a sharp fight Evans was

driven across the river, firing the bridge behind him ; but the fire was extinguished and 400

prisoners and six guns were taken. Evans re¬

treated through Kinston, reformed his com¬

mand two miles beyond and withdrew toward

Goldsboro. Foster followed, had a successful

engagement on the 16th, at White Hall and,

when nearing Goldsboro 17 December, was

checked by a heavy force under Gen. G. W.

Smith at Goldsboro Bridge. Foster succeeded,

however, in destroying the bridge of the Wel¬

don and Wilmington Railroad over the Neuse,

also several other bridges, and about six miles of railway, and retreated somewhat rapidly to

Newbern, having lost, during his eight days'

campaign, 92 killed, 487 wounded and 12 miss¬

ing. The Confederate loss was 71 killed, 268

wounded, and 496 prisoners. The latter were

paroled.

After the capture of Wilmington by Gen¬

eral Scofield, 22 Feb. 1865, his next objective point and final destination was Goldsboro,

where it had been arranged that he should unite forces with General Sherman, who was march¬

ing north from Savannah. Forces were as¬

sembled at Newbern, and the march began on

1 March. Kinston was occupied 14 March,

after some days' sharp fighting. The railway

and bridges were repaired, and Scofield entered Goldsboro with little opposition on the 21st,

and two days later Sherman joined him. Con¬

sult Official Records, Vol. XVIII; Cox, (The

March to the SeaL

GOLDSBOROUGH, Louis Malesherbes,

American naval officer : b. Washington, D. C.,

18 Feb. 1805; d. there, 20 Feb. 1887. In 1827

he rescued the English brig Comet from a

Greek pirate. Retiring from the navy in 1833

he settled in Florida, and there he recruited a company of cavalry which fought under his

command in the Seminole War on the con¬

clusion of which he returned to the navy ; be¬

came commander in 1841 ; was officer of the

frigate Ohio during the Mexican War and was

present at the bombardment of Vera Cruz. On

his return to the United States he was ap¬

pointed a member of the Joint Army and Navy

Commission in California and Oregon (1849).

He was superintendent of the United States

Naval Academy at Annapolis (1853-57), on

retiring from which he again took up active

military duties. On the outbreak of the Civil

War he became flag officer and rear-admiral

(1862). In 1861 he was put in command of the North Atlantic blockading squadron and the

advice given by him at this time resulted in

the Burnside expedition and the capture of

Roanoke Island with various other positions of

strategic importance in North Carolina. He

was in command of the European squadron

(1865-67) ; commandant of the navy yards at

Mare Island and at Washington (1867-73).

GOLDSCHMIDT, Jenny Lind. See

Lind, Jenny.

GOLDSCHMIDT, gold'shmit, Meier

Aaron, Danish novelist and publicist: b. Vor—

dingborg, 26 Oct. 1819; d. Copenhagen, 15 Aug.

1887. He entered journalism when quite young,

edited the comic paper Corsaren (1840-46),

and in 1847 founded a monthly publication in

which he discussed the political movement of

the time, and showed himself a strong advocate of constitutional freedom. His first novel, <A

Jew, 5 appeared in 1845; other novels of his are <Homeless) (1853) ; (The Heir) (1865) ; and

<The Raven) (1867) ; he also wrote a few

dramas, and his autobiography (1877). His

novels are most remarkable for the skill with

which he pictures the life of the Jews.

GOLDSCHMIDT, Otto, English com¬

poser : b. Hamburg, Germany, 21 Aug. 1829 ; d.

London, 24 Feb. 1907. He was a pupil of

Mendelssohn and Hauptmann at the Leipzig

Conservatory, became a resident of England in

1858, was appointed a professor in the Royal

Academy of Music in 1863 and was its vice¬

principal (1866-68). From 1876-85 he was first

musical director of the Bach Choir. He several times conducted the famous Lower Rhine festi¬

vals at Diisseldorf. His compositions include

the oratorio (Ruth) (1867), and he also edited with Sterndale Bennett (The Chorale Book

for England. } In 1852 he married Jenny Lind

(q.v.).

GOLDSCHMIDT PROCESS, method of

reducing metallic compounds by aluminum, per¬

fected by Dr. Hans Goldschmidt of Essen. Ger¬

many, which overcomes the difficulties hitherto

involved through the extremely high tempera¬

ture necessary to secure the reaction and the

explosive violence attendant upon it.

GOLDSMID, Sir Francis H. (1808-78),

the first Jew to become an English barrister

(1858), entered Parliament in 1860, representing Reading until his death. A generous con¬

tributor to charities, especially University Col¬

lege, London. He was active in the liberal

movement and shared the reputation of mem¬

bers of his family in Parliament and English

life. Of these may be mentioned his father,

Sir Isaac Lyon Goldsmid (1778-1850), chiefly

known for his benefactions to education and his efforts in behalf of Jewish emancipation and

the passage of the Jews' Disability Bill. Sir

Julian Goldsmid, nephew of Sir Francis (1838—

96), was many years in Parliament and an in¬

fluential figure by reason of his ability and

wealth. Sir Frederic J. Goldsmid (1818-1908)

retired as major-general in 1875, after serving in the China War, in the Crimea and in

Egypt. He was distinguished, too, in explora¬

tion and surveying. The Goldsmid family

sprang from Aaron Goldsmid (d. 1787), a

Dutch merchant who settled in England about

1763. His two sons, Benjamin (c. 1753-1808)

and Abraham (c. 1756-1810), were noted for

their public and private benefactions. They

wielded great influence in the money market as bill-brokers during the

Napoleonic War.

GOLDSMITH, Oliver, Irish poet and mis¬

cellaneous writer: b. Ireland,* 10 Nov. 1728; d.

at 2 Brick Court, Middle Temple, London, 4

April 1774. Goldsmith, like Richardson, (<flowered late.® The son of a poor clergyman of

the Established Church, his childhood was spent at Lissoy, a hamlet in Westmeath, lying to the right of the road from Ballymahon to Athlone.

From the first instruction of a female relative, he passed to the care of the village school¬

master, a roving old soldier who had fought in Queen Anne's wars. Thence he went to schools

at Elphin, at Athlone, at Edgeworthstown, earn¬

ing nowhere any particular distinction. He was

regarded as dull and heavy intellectually, al¬

though physically he was robust and athletic.

Now and then he surprised his family by an

unexpected gift of repartee, and he scribbled

verse early. But nothing occurred in his boy¬

hood to favor the supposition that a genius had been born into the world of letters.

In June 1744 after anticipating, in his own

person, the plot of his later comedy of (She

Stoops to Conquer, > by mistaking the house of a gentleman at Ardagh for an inn, his father, impoverished by the attempt to portion his eld¬

est daughter, sent him to Trinity College,

Dublin, as a poor scholar. His college career

was not brilliant. His tutor was hard and

unsympathetic, and devoted to the mathematics

which Goldsmith (like Gray and Swift) de¬

tested, though he had some faculty for ((turning an ode of Horace.® He got a small exhibition

in 1747, a success which he unwisely celebrated by a mixed party in the garret which passed

for his <(rooms.® Into this rejoicing his incensed tutor burst abruptly, and by knocking down

the host, dispersed the guests. Thereupon his

humiliated pupil ran away, vaguely bound for

*The exact place of Goldsmith's birth is doubtful. It is usually said to be Pallas in Longford, but others make it Elphin, Roscommon.

America. Matters were, however, patched up

by his elder brother, and he returned to college, where, in February 1749, he took a low degree.

He left no memories behind him but his

name scratched upon a window-pane, a battered

lexicon scored with (<promises to pay,® and the tradition that, after writing songs at five

shillings a head for the Dublin ballad singers, he used to steal out in the twilight to hear them sung. When he returned to his widowed

mother (his father had died during his college days), he had no more pressing vocation than

to fish in the river Inny, blow the German flute and take the chair at the village <(free and

easy.® When he was old enough, he presented

himself for ordination, but was rejected for

incompetence, aggravated by red breeches. He

next tried tutoring; made a little money, bought a good horse and started again for America.

In brief space he returned on a miserable

hack, and without a penny. Law was then

essayed. Being equipped with £50 for study in

London, he lost it on the road to a sharper.

Finally he did reach Edinburgh, to study

physic. Upon the same pretext he went from

Edinburgh to Leyden. Then, being again with¬

out means, he started — like Holberg — to make a kind of Grand Tour on foot through Europe.

He visited France, Germany, Switzerland and

Italy, flute-playing and disputing at convents

for a subsistence. In February 1756, being

then 27, he landed at Dover with a few half¬

pence in his pocket. He had, however, sent

home to his brother from Switzerland a frag¬

ment of the poem which afterward became

(The Traveler. >

For the moment literature seems to have

been the last thing in his thoughts. He is sus¬

pected to have tried strolling; he is known to have been an apothecary's assistant, a poor phy¬

sician (with a dubious foreign diploma), a

reader and corrector of the press to Richard¬

son the novelist, and an usher in a Peckham

ˆacademy.® Here, at last, he drifted into

authorship, being engaged by Griffiths of the

Monthly Review to supply (<copy® of all work

for that serial. With Griffiths he speedily fell out ; and eventually found his way back to

Peckham, where his old employer promised to

get him a foreign medical appointment. Mean¬

while he published (1758), under a pseudonym,

a translation of the (Memoirs) of Jean Marteilhe of Bergerac, a Protestant condemned to

the galleys for his religion. Failing, for un¬

known reasons, to take up the post at Coro¬

mandel which had been found for him, he

tried to pass as a hospital mate. He was re¬

jected at Surgeons' Hall in December 1758 as

((not qualified.®

We next hear of him as living in a tiny

court off the Old Bailey, writing a high-titled (Enquiry into the State of Polite Learning in

Europe.* This, superficial of necessity, but

bright and epigrammatic, attracted some notice.

He began a miscellany called The Bee, and

was employed on various periodicals. Then

Smollett enlisted him for the British Maga¬

zine', and for Newberry's Public Ledger he

wrote the delightful essays afterward collected

in 1762 as the (Citizen of the World.* By this lime the skies were opening. He had moved

into better rooms at 6 Wine Office Court, Fleet street, made the acquaintance of Johnson, and

was certain of employment. Besides dispersed

papers, he wrote (Memoirs of Voltaire,) a

(History of Mecklenburgh,* a (Life of Richard

Nash* (of Bath). What is more, he was writ¬

ing the (Vicar of Wakefield,* for in October

1762 he sold a third share in that book to Ben¬

jamin Collins, a Salisbury printer, for £21.

How this is to be reconciled with Boswell's

story that Johnson sold the entire novel to a bookseller for £60 has not yet been explained; but internal evidence shows clearly that parts of the book were written in 1762.

His further career must be rapidly abridged.

After much compiling for Newberry, which in¬

cluded an excellent (History of England* in

letters, he published, in December 1764, his

first long poem, (The Traveller; or, a Prospect of Society.) Its sweetness of versification, its simple language and the beauty of its descrip¬

tions at once distinguished it as the best poem since the death of Pope. Its popularity drew

attention to its writer's other work, and a

volume of his collected essays followed in

1765. Upon these came (The Vicar of Wake¬

field 1766. Its success, strange to say, was only gradual, but it continues to this day; and its inimitable types, its happy mingling of Chris¬

tianity and character, its wholesome benevo¬

lence and practical wisdom are not likely to be forgotten. The Primrose family are citizens of

the world.

Goldsmith's next triumph was on the stage.

In January 1768 he managed, after many vexa¬

tions, to get a play produced at Covent Gar¬

den. This was (The Good Natur'd Maud in

which he attempted to combat the insipid ((genteel® comedy made popular by French models

and the novels of Richardson. His efforts were only partially successful, though his profits were sufficient to enable him to move into fresh

chambers in the Temple, whence, in a maze of

miscellaneous ((book-building,® he sent forth, in May 1770, another and a still more beautiful

descriptive poem, (The Deserted Villaged It

was received with enthusiasm, and speedily ran

through three editions. Three years later,

though always hampered with task-work, he

crowned his achievements with the comedy of

(She Stoops to Conquerd In the interval which

had elapsed since (The Good Natur'd Man,*

<(genteel® comedy had passed into the ((sentimental® stage. But Goldsmith's bustling piece,

skilful in construction and brimming with

humor and character, gave a knock-down blow

to the lachrymose drama, which was eventually

dispatched by Sheridan. A few months later, in April 1774, Goldsmith died, and was buried in

the Temple burying-ground. The Literary Club,

to which he had belonged, erected a tablet to him in Westminster Abbey, with a well-known

epitaph by Johnson. (Retaliation* and the

(Haunch of Venison,* two of the happiest of

his lighter poetical efforts, were published post¬

humously.

Goldsmith had many weaknesses. He had

few physical advantages; and he was both sen¬

sitive and self-conscious. But he had the best heart in the world. ((Let not his frailties be remembered,® said his rugged old mentor,

Johnson; <(he was a very great man.® He was

also a very great writer. To have died at 46, after 30 years of purposeless “eddying round

and round,® the author of two admirable

didactic poems, an unique novel and a comedy

which still holds the boards, to say nothing of his essays and familiar verse, which are models in their way, is certainly to deserve a high

position in the work of his century — a position which he retains to-day in virtue of his sim¬

plicity, his kindliness, his humor and the in¬

definable gift of genius. See She Stoops to

Conquer; Vicar of Wakefield; Deserted Vil¬

lage, The; Traveller, The.

Bibliography. — Goldsmith’s life has been

written by Prior (1837) ; Forster (1848-71) ;

Washington Irving (1844-49) ; William Black,

‘English Men of Letters5 (1878) ; and Aus¬

tin Dobson, (Great Writers) (1888; revised

American ed., 1899). His “miscellaneous

works® were first published in four volumes

(1801), with the socalled ‘Percy Memoir.5

Then, in 1820, came a “trade edition,® followed by Prior (1837), and Cunningham (1854—55).

The fullest modern edition is that of Gibbs

in ‘Bohn’s Standard Library5 (5 vols., 1885-86).

There are editions of the poem by Mitford

‘Aldine series) (1831-95) ; Bolton Corney

(1845), and in the ‘Temple Library5 (1889).

A reprint of Marteilhe’s ‘Memoirs5 was pub¬

lished in 1895, and a facsimile reprint of the first edition of the ‘Vicar of Wakefield5 with a bibliography in 1885. Consult also Boswell’s

‘Johnson5 ; and the Wakefield edition in 12

volumes (1900) ; Thackeray’s ‘English Humor¬

ists, 5 and Edinburgh Review, 1846 by Lord

Lytton.

Austin Dobson,

Author of cLife of Goldsmith ,5 *etc.*

GOLDSMITH BEETLE, an attractive

northern dung-beetle (family Scarabaeidce)

measuring nearly an inch in length and shining like burnished gold. It is most abundant dur¬

ing May and June, flying principally at night; and, although it feeds on the foliage of various shade and fruit trees, seldom does much harm.

The name is extended by entomologists to all

scarabs of the sub-family Rutelince.

GOLDSMITH MAID, famous bay trot¬

ting mare, sired by Abdallah. She held the

world one-mile trotting record in 1871-74, tak¬

ing it from Dexter in 2.17 and losing it to

Rarus in 2.1314-She lowered the record to

2.14 before losing it. Her racing career lasted from 1866 to 1878.

GOLDSMITHING. Strictly, the art of

working in gold. More broadly, the term is

used to include the working in the precious

metals (gold, silver, platinum, etc.). In a

still broader sense, the jeweler is often termed a goldsmith although his product consists

largely of pieces of personal adornment in

which stones (precious, semi-precious and other¬

wise) are the main features and the setting

(frequently of other than the precious metals)

is often a matter of minor importance. The

subject as here treated refers to the manipula¬

tion of gold for ornamental purposes. (See

also Silverware). The chief decorative proc¬

esses used by the goldsmith are : Repousse or

driven work, pierced work, chasing, carving,

filigree, enamel work in cloisonne and cham—

pleve styles, niello, *etc.* Enamel work (except

as a subsidiary feature) is done chiefly on or in copper and has been treated elsewhere. (See

Enamels). On account of the high cost of

gold the process of casting is little used as it leaves too thick a relief. See Repousse.

Technology. — Treated in simple language,

the following is the general method of the

artist-goldsmith (as differentiated from the

modern factory technique) : The work is

started with a piece of well-annealed sheet

metal. This is reduced by hammering, or roll¬

ing between steel rollers, to the desired thick¬

ness. It is now beaten out with hammers and

punches into form and decoration — relief and

intaglio (creux). Chasing, chiseling and fin¬

ishing follow. The product of the metal worker has been classified as “flat-ware® and “hollow-ware® ; the treatment for flat-ware (plates,

dishes, saucers, spoons, etc.) is simply one of hammering and punching, etc., the embossed

work from the under or negative side, then

turning the piece {blank) over and working

the depressions from the positive side. In

hollow-ware (bottles, ewers, etc.), where ac¬

cess to the interior is very limited, the diffi¬

culty is overcome by the use of arms (swages) projecting from the anvil or bench and which

enter the interior of the vessel. The “snarling iron® is one of the most useful of these. The ends of these stakes have different forms at

the extremities and afford an inner resisting

medium on which the hammer can operate ex¬

ternally to create embossed ornament. For the

intaglio or depressed work the vessel is filled with a substance (usually pitch) easily melted

yet sufficiently hard, when cold, to afford just enough resistance - to the blows of hammer

and punch. When the work is finished the sub¬

stance is melted and poured out. The number

of tools formerly used by the artist-goldsmith

were more or less numerous, but were fash¬

ioned by the individual worker according to his desires. The fact that nomadic tribes, even

to the present day, such as Arabs, Csechs, Tzi¬

ganes, etc., are able to produce on their wander¬

ings very artistic, if not large, pieces of gold¬

smiths' work proves that a heavy "kit® is not so much the requirement as an extended knowl¬

edge (handed down from one generation of the

family to the next) of the possibilities inherent in each implement. An anvil, vise, drawplate

(for wire), dividers, calipers, hammers with

different shaped "panes® (or "peens®) and

"faces,® punches with various faces, scorpers

(for lowering the surface by removal), set of

engraving tools, swages, soldering irons, blow¬

pipe, etc., are a few of the necessary tools of a practising goldsmith; but the modern factory

outfit adds : draw-bench, turning lathe, polish¬

ing lathe, planishing tools, sets of shears,

"sparrow hawk,® numerous pliers, nippers,

treblets, frame-saws, corn-tongs, gauges, mi¬

crometer, drill-stock, *etc.*

History. — The art of working gold, though

in crude manner, dates back to prehistoric

times. The ancient Egyptian goldsmith did

cloisonne work with inlays of colored stones

and pieces of glass paste. To them we owe

the delicate chain-link termed “trichinopoly.®

Their minute granulated work was done 3,000

years earlier than that of the Etruscans ; their pretty gold necklaces with numerous drops were

in such common use that the word necklace

{nub) was symbol and term for gold. Gold

bead anklets were worn between 8,000 and 5,000

b.c. Their astonishingly artistic gold pectoral

ornaments, pierced, carved and inlaid with

colored stones, prove the high state of their

goldsmiths in art and execution. The ancient

Hebrews derived their knowledge of the art

from their enslavement in Egypt and from

Phoenicia. They made golden earrings, finger—

rings, bracelets, chains; the noted seven—

branched candlestick and altar vessels of Solo¬

mon’s temple and the king’s table service were of gold. The Greeks in

the 8th and 7th cen¬

turies b.c. established colonies from Marseilles to the Crimea and their goldsmiths' work fol¬

lowed in their trade routes. The Scythians had wealth and loved golden ornaments and Greek

pieces were plentiful with them, as is attested by the frequent discoveries of gold ornaments

in the graves. The Etruscan gold jewelry of

beautiful design and such extraordinary deli¬

cacy with its minute filigree and granulation is ever a cause of wonder to this day. Even the conceited spirit of the great Cellini, when asked to make a duplicate of a piece of this antique itation of antique Grecian pieces ; also we find long arm spirals and arm rings, neck-rings,

diadems, large vessels, even axe-heads of mas¬

sive gold of Celtic origin. The ancient Romans do not appear to have been great gold artificers as the Greeks produced all their rich pieces for their palaces, galLeries, *etc.*

Byzantine goldsmiths' work consists largely

of doublets, stones cut en cabochon, gem

plaques, set in relief and enriched with a

groundwork of filigree or sprays of Byzantine

acanthus. Examples of this are the golden

throne of Theophilus, the crown of Charle¬

magne. (See Crowns). Cloisonne enameling

came in vogue in this time and persons wore

many jewels and trinkets. The (<pala d'oro®

of Venice was a 10th century product of the

Byzantine goldsmiths. Gaul saw a renaissance

of goldsmithing in the 5th century and enamel

work is claimed by some ancients to have orig¬

inated in Gaul. They produced torques, brace¬

lets and all kinds of warrors' trinkets with

Etienne De Laulne's Goldsmith's Shop.

ware, declared that Etruscan jewelry was im¬

possible of imitation. The Greek sculptors in

the days of their greatest fame used goldwork

to adorn their ivory statuary (chryselephan¬

tine) ; even the great Phidias was a goldsmith.

Mys was noted for his gold acanthus carving,

also Theokles, Canachus, Smilis, Athenocles,

Acragas, Theodoros of Samos were . noted

among the ancient Greeks for their creations of golden figures, masks and carved plant life.

They placed an embossed gold-piece in the

bottom of their patera (emblemata) , they used

gold ornament on their furniture, even made

furniture entirely of the precious metal. At a festival in honor of Alexander 1,000 guests had a change of gold plates and cups at each course.

From the Tene period (5th to 1st century

B.c.) we find swordhilts and large bronze

brooches (fibulae) decorated with gold by the old northern nations, also Celtic gold coins

consisting of thin “dished* (concavo-convex)

decorations, known as “bracteates,® made in im-

simple plait and carved decoration. All we

possess of the Merovingian period is arms and

fibulae. In the 6th century we hear of Bishop Abbo, Saint Eloi, his pupil, the abbot Thilo of Solignac monastery in the 7th century, all had their goldworking schools. In the 11th cen¬

tury, Bernward, bishop of Hildesheim, had a

school of goldsmithing, and he himself exe¬

cuted fine work, specimens of which still exist in that city. The treasure of Guarrazar (see

Crowns) is evidence of the clever workman¬

ship done by the Visigoths of the 7th cen¬

tury. In Italy the Lombards did lovely work

and the gold antependium made for Basle

Cathedral (now in Cluny Museum), dating late

10th or early 11th century, was one of their

best works. Jewelry, bookcovers, crosses, etc.,

still extant are from their workshops. The

Romanesque period is characterized by arch¬

itectural forms, the reliquary chests (chasses)

are miniature roofed edifices with gables and

arcades containing figures of saints, *etc.* Fill-36

GOLDSMITHING

gree and simple geometrical decoration are the

groundwork for stone plaques and cabochons.

The Saint Remigius chalice of Rheims is a

noted example of this period, all of which work is ecclesiastical.

The Gothic period arrived with the 13th

century and goldsmithing became work of the

laity as well as of the monastery. Guilds were formed to protect the artisan and raise the

level of his art. Examples of the 13th to 15th centuries are rare. The reliquary of Nivelle

belongs to the 13th century. Noted workers

were Jean de Montreux, Gaux de Friburg,

Henri the miniaturist, Hannequin-Duvuvier,

goldsmith to the king in the 14th century, Gio¬

vanni of Piza, who with his brothers worked in the cathedral at Arezzo. All Europe, by the

14th century, was fired by Italy's wonderful

work. Ognabene of Pistoia had made the

great cathedral altar ; Cione was decorating

the altar of Saint John at Florence. Flemish

artists began to exert their influence and we

have the names of Jehan Barbier, Jehan

Fernicle, Hans Croist, *etc.* In the 1 5th cen¬

tury we have the luxurious dukes of Bur¬

gundy collecting the rarest objects from the

goldsmiths' workshops. The collection left by

Louis, Duke of Anjou, had 796 articles of solid plate. The cities were making presentation of

plate to the kings, the princes were making

presents to other courts. Ecclesiastical reli¬

quary caskets (chasses) had become veritable

Gotthic edifices with windows, trellised crest—

ings, pinnacles, clock-towers. The ˆnefs® of

the laity were great examples of hammered

work. We find the names of such noted gold¬

smiths in France as Dufour, Guillaume, Boey,

Jean de Clichy; in Italy worked the great

artists, Pollajuolo, Verrochio, Francia Antel—

lotto Bracciaforte, Maso Finiguera, Andrea

Afditi, Tommaso Ghirlandajo, besides Lorenzo

Ghiberti who founded an entire school. Luca

della Robbia, the goldsmith, was taking up

sculpture. It was the Italian Renaissance in its zenith. In Germany were noted goldsmiths,

Hans Greiff (Nuremberg), Heinrich Hufnagel

(Augsburg).

In the 16th century France came under the

influence of the Italian Renaissance ; Benvenuto Cellini went to Paris in 1537 and started a

school of goldsmithing. Cellini had made a

great reputation in Florence with his superla¬

tive art in gold. Ever in trouble from his

temper he was glad to expatriate himself for

a season. The French love of luxury and the

beautiful developed in a wonderful degree.

And it was during one of his visits to Paris that Cellini is said to have produced the cele¬

brated (Nymph of Fontainebleau. > But an

edict was sent forth forbidding the use of gold in table services. It soon fell into desuetude.

Beautiful models emanated from Delaulne and

Woeirio, designs in pewter from Briot and

grand executive talent is shown by such gold¬

smiths as Desjardins, Ramel, Delahaie, Margot.

Germany showed her Renaissance tendency in

the works of Wentzel Jamnitzer, Peter Vischer, etc., though her Gothic traditions retain some influence in their work. The peculiar

Teutonic temperament is disclosed in her

mountings of coconuts and ostrich-shells, her

bulbous hanaps and pineapple (Ananas) cups.

The spreading of the design engravings of

Holbein the Younger, Diirer, Solis, etc., helped the art propaganda, and the 16th and 1 7th

centuries produced works from Flemish and

Dutch experts such as de Bry, Collaert and the two Vianens of Utrecht. The early 17th cen¬

tury saw the brothers Mosbereaux working in

the Louvre, and other artists in gold such as Carteron, de la Barbe, de Roberdet; Ambrogio

Foppa (Caradossa) was gaining fame in Milan,

and Mignot at Augsburg. Under Louis XIV,

later in the century, Lebrun's master mind was getting grand effects from the Gobelins, and

gold decorative work came from the hands of

de Villiers, Loir, Lepautie, Ballin, Delaunay.

But the <(grande Fonteˆ (lasting six months in 1688 and 1689) swept all the fine pieces of gold-smithery in France into the melting-pot for war funds. With the entering 18th century we see

the grandiose and pompous style of ((le Roi

Soleil® taking on a tenuous and delicate form

from the designs of Berain ; Briceau carried

the idea into goldsmithing. Regency gold deco¬

rative art in France produced large objects in gold but sparingly for it was forbidden. Julien Delafontaine did fine jewelry. The style in

general was to suppress all excess in gold

decoration, yet beauty of effect was produced.

The goldsmithing work of Louis XV ran to

fantastic decoration such as had become the

fashion of all the arts. Some restraint is found in the rococo and rocavlle scrolls and vegetable motifs of Juste-Aurele Meissonier and gold¬

smith Pierre Germain. Roettiers showed

talented work. This was the snuff-box col¬

lectors' period, and the goldsmiths were equal

to their patron's desire for a renewal every

week to his stock of tabatieres of luxurious

decoration. Fine gold decoration was displayed

on milady's fans, bonbonnieres, scissors ; the

dandy's watches, cane-heads, swordhilts, *etc.*

Under all the Louis's French taste ruled over

all Europe; Paul Lamerie, the French goldsmith, at the English capital set the style for that court from his workshop. The work of the goldsmith

under Louis XVI was sober to severe in decora¬

tion; Auguste and Cheret display the style in

vogue. In the return to the antique for form

and decoration during the empire period lies

its true characteristic. Notable goldsmiths

were Odiot, Thomire, Biennais, Fauconnier, the

Fannieres, Froment-Meurice, Christofle.

Modern Goldsmithing. — The. art of the

goldsmith has changed to the industry of gold¬

working- — the factory has taken the place of

the creator's shop. Paris shows pretty and artistic handwork from a Lalique and other true artists, but the rue de la Paix show win¬ dows contain chiefly gold ornament turned out by the die from a stamping machine. Under A. Castellani of Rome industrial jewelry has been produced in late years in remarkably close likeness to antique Greek, Etruscan and Roman examples, and the output has been shipped to the masses of every nation at remarkably low prices in great quantities. England has its jewelry factories in Sheffield and Birmingham; Germany's goldworking factories are located at Pforzheim, Hanau, Schwabisch-Gmund. Ber¬ lin, *etc.* The United States has goldworking industries on a large scale in the Oranges, Newark, the Attleboros and Providence. But individual pieces made by hand in exquisite taste are not going to become extinct while

London has its Bridges or New York its

Tiffany.

Bibliography. — Androuet du Cerceau,

Jacques, (Ornaments d'Orfevrerie propres pour

flanquer et emailler) (reprint London 1888) ;

Bock, F., (Das heilige Koln) (Leipzig 1858) ;

Biirck, A., (Handbuch fiir Juweliere, Gold, Silber, und Schmuck Arbeiten) (Ilmenau 1834) ;

Cellini, B., (The Treatises of Benvenuto Cel¬

lini on Goldsmithing and Sculpture> (London

1898) ; Chaffers, W., (Hallmarks on Gold and

Silver Plate) (London 1875) ; Darcel, A.,

(L'Orfevrerie Civile) (Paris 1890-92) ; Daw¬

son, N., (Goldsmiths' and Silversmiths' Work)

(London 1907) ; Falize, (L'Orfevrerie) (Paris

1891); Havard, H., <L'Orfevrerie) (Paris

1897) ; Hefner-Alteneck, J. H., (Deutsche Goldschmiede-Werke des 16ten Jahrhunderts)

(Frankfort 1890) ; Jackson, C. J., (English

Goldsmiths and their Marks > (London 1905) ;

Karcher. R., (Das deutsche Goldschmiedehand—

werk) (Leipzig 1910) ; Labarte, C. J., (In—

ventaire du Mobilier de Charles V, roi de

France) (Paris 1879) ; id., (Histoire des Arts industries (Paris 1864) ; Lacroix, P., and

Sere, F., (Le Livre d'Or des Metiers* (Paris

1850) ; Lasteyrie, Comte de, (Histoire de l'Orfevrerie* (Paris 1877) ; Molinier, E., (L'Orfevrerie religieuse et civile) (Paris 1900) ;

Moreau, P., (Nouveau et IVe Cahier concer—

nant 1'Orfevrerie, Bijouterie, et Lrnaux* (Crepy 1907) ; Morgan, J. P., (Catalogue of the Col¬

lection of Jewels and Precious Works, the

Property of J. P. Morgan* (London 1910) ;

Palustre, L., and Barbier de Montault, X.,

(Orfevrerie d'Lmaillerie limousines) (Paris

1886) ; Pollen, J. H., (Gold and Silversmiths'

Work) (London 1879) ; Ris-Paquot, (Dictionnaire des Poingons, Symboles, etc., des Orfevres* (Paris 1890) ; Schaefer, H., (Egyptische Goldschmiedearbeiten* (Berlin 1910) ;

Texier, J. R. A., Abbe, (Dictionnaire d'Orfev¬

rerie, de Gravure, etc.* (Paris 1857) ; Wigley, T. B., <The Art of the Goldsmith and Jeweler) (London 1898).

Clement W. Coumbe.

GOLDTHREAD, a low, smooth ranunculaceous herb (Coptis trifolia), closely related to hellebore, whose evergreen leaves are all

basal, long-petioled and divided into three ser¬

rate broadly obvate leaflets ; and the flowers

small and white on scapes. The root consists

of long, bright yellow, bitter threads. This

plant contains a white alkaloid called coptine, and a tea made of it is tonic. It grows in

boggy woods throughout northern North Amer¬

ica. See also Coptis.

GOLDTIT. See Verdin.

GOLDZIHER, golt'se-ar, Ignaz, Hun¬

garian Orientalist : b. in Stuhlweissenburg, Hun¬

gary, 22 June 1850. Privat-docent at Univer¬

sity of Budapest in 1872, he was commissioned

by the government to take a scientific journey through Syria, Palestine and Egypt, . spending

some time at the Azhar mosque in Cairo, where he attended lectures on theology and law.

Since his promotion to professorship (1894),

he has been an exact and untiring writer in

Orientalia, Arabic and Hebrew topics in partic¬

ular. His contributions to learned societies

and congresses have been numerous ; he gained

the large gold medal at the Oriental congress in Stockholm (1889). In 1890 he became lecturer

on religion and philosophy at the Budapest rab¬

binical seminary. While he has won special

eminence for his researches in the field of

Arabic traditions and the history of the civil and religious law of Islam, he has written

many important works on Oriental history and

the science of religion. His (Mythos bei den

Hebraern und Seine Gechichtleche Entwiekel—

ung) was translated into English by R. Martineau (London 1877). Some of his theories

have met much opposition but his erudition is

unchallenged.

GOLETTA, go-let'ta, Africa, the port of

the city of Tunis, from which it is 11 miles north. In the new quarter are the bey's palace, a large dock and an arsenal defended by a

battery. Pop. about 3,000.

GOLF, anciently known as Goff, Gouff or

Gowff, a game of Dutch origin, but generally

identified with Scotland, where as early as 1457

the local Parliament inveighed against its

abuse. The Edinburgh town council in 1592

forbade the playing of the game on the Sabbath and offenders were severely punished. The

game was played for the first time in England after the accession of James I, whose Scottish train played the game on Blackheath. For

over two centuries, however, the game did not

become popular in England. In Scotland it

had spread throughout the land and many

societies and clubs were formed for the practice and promotion of the game, of which the chief was the Royal and Ancient Golf Club of Saint

Andrews, established in 1754, and now the na¬

tional club of Scotland. About the middle of the 19th century the game spread to India, Canada and the United States. The central authority in the United States is the United States Golf Association, organized in 1894 with four clubs. It now consists of about 200 clubs; and there are about 750,000 golfers in the United States. The word, derived from the German Kolbe, in Dutch Kolf, signifies a club. Kolf, resembling golf, is a very ancient pastime in Holland and Belgium, where it is usually played on the ice.

The modern game of golf is played with clubs and balls on specially prepared courses called links, generally laid out on open suit¬able grounds. The simplicity of the game is at¬tractive to beginners, but with a little expe¬rience the beginner learns how necessary are practice, skill and judgment to make one play well enough to be classed as a good golf player. The prime necessity is plenty of room. The ground best suited for the purpose is a reach of undulating country with a sandy soil, short, crisp turf and plenty of holes or ruts, the lat¬ter forming the hazards — natural obstacles —

or bunkers — artificial obstacles — necessary to prevent the game from being too easy. The

links should not be less than three miles round nor more than five. Throughout it are dis¬

tributed 18 artificial holes at any distance from 100 to 500 yards apart. The holes are four

and onehalf inches in diameter, and each is

surrounded with a putting green, a space 60 feet square and made as smooth as possible to

enable the player to aim with accuracy. The

other requisites are two small balls about two inches in diameter and made of gutta-percha,

and a number of clubs adapted to the various

contingencies likely to arise.

There are two styles of clubs, the wood and

the iron; these consist of a long wooden handle, preferably of hickory, securely attached to a

head of beech wood, or of steel as the case

may be. Altogether there are 19 shapes of

clubs, but six are usually sufficient for a player's needs. The different clubs are used under dif¬

ferent circumstances; for example, the chief

wooden-headed clubs are the driver and the

brassy, the first being used for driving the ball a long distance, and the latter, which is shod ■with brass, being employed in special situations, as when the ball is in a hollow. The club

called the putter, used when the ball is near the hole, has the head either of wood or of iron, The iron-headed clubs are the cleek, the iron, the mashie and the niblick, all adapted for

special purposes. The clubs are used for driv¬

ing the balls into the holes, and the object of the player is to get his ball into all the holes successively with the fewest possible strokes.

When played by two persons the game is called singles ; when played by four persons in pairs, it is called foursomes. There are two chief

methods of playing the game, known as match

play and medal play. In the former, two play¬

ers are usually pitted against each other. At¬

tended by their caddies, boys carrying the bags containing the clubs, the players start from the teeing ground where one of them begins the

match by placing his ball on a small heap of sand, or on an artificial rubber cone, known as a tee, and driving it as near as possible to the first hole. A good driving stroke from a tee

would be 200 yards. The record, made at Saint Andrews, Scotland, is 280 yards. The other

player does the same with his ball, after which the player whose ball is farthest from the hole plays again. They continue thus until both balls have been holed. The player who takes the

fewest strokes to do this is said to win the hole and counts one, and if both have taken the

same number of strokes the hole is halved and neither counts. Having

holed his ball the player takes it out, tees it again and starts out for the next hole. Much of the interest of the

game depends on the skilful play required to

avoid the hazards and bunkers, scattered over

the course, or to get one's ball out when it lands in a difficult spot. In medal play the win¬

ner is the player who goes the round of the

course in the fewest possible strokes irrespec¬

tive of whether he had a majority of holes or not. Various modifications of these two modes

of scoring are in use. A hole match may be

won before the round is completed, as, for

instance, when one competitor is four holes

ahead with only three still to be played. When one player has a lead equal to the number of holes still unplayed, he is said to be dormy

that number of holes, thus, a player when dormy three has a lead of three after playing the

fourth last hole, in which case, though he may not win, he cannot lose. The central authority on the game in America regulating the various

championships, etc., is the United States Golf

Association organized 22 Dec. 1894, with which

is now affiliated over 200 clubs throughout the country. Consult Beldan, G. W., (Great

Golfers5 (London 1907) ; Braid, James, Ad¬

vanced Golf 5 (Philadelphia 1908) ; Clark, (Golf : A Royal and Ancient Game) (New York 1899) ;

Haultain, Arnold, (The Mystery of Golf) (2d

ed., New York 1910) ; Hutchinson, H. G., (The New Book of Golf5 (ib. 1912) ; id., (Golf Greens and Green Keeping5 (London 1906) ; Hilton and

Smith, (The Ancient and Royal Game of Golf5

(London 1912) ; Lee, (Golf in America 5 (New

York 1895) ; Taylor, (Origines Golfiance5

(Woodstock, Vt., 1912) ; Travers, Jerome D.,

(The Travers Golf Book5 (New York 1913) ;

Travis, (Practical Golf5 (1901) ; Tulloch, W.

W., (Life of Tom Morris, with Glimpses of

St. Andrews and Its Golfing Celebrities5 (Lon¬

don 1907) ; Vardon, (Complete Golf5 (New

York 1905).

GOLGI, Camillo, Italian neurologist: b.

Corteno, 1843. He studied at the University

of Pavia, and engaged in the practice of medi¬

cine at Abbiategrasso. He was appointed to a

professorship at Siena, and afterward at Pavia.

He specialized in the study of nerve tissues and made a vastly important contribution to phy¬

siology when, in 1885, he demonstrated the fact that the nervous system is not a network.

A further achievement was his identification of a class of nerve endings in tendons which were named in his honor, (<organs of Golgi.55 He is the discoverer of three malarial parasites. In

1906 the Nobel prize for medicine was divided

between him and Cajal. He has contributed ex¬

tensively to the Italian medical journals, the

Italian medical encyclopaedia, and his collected writings were published in three volumes.

(1903.)

GOLGOTHA or CALVARY, Jerusalem,

from Hebrew and Latin calvaria , signifying

((the place of a skull,55 the site of Christ's cruci¬

fixion a.d. 29. The traditional site as discov¬

ered and determined by Bishop Macarius in 325

at the request of Emperor Constantine, is now

enclosed among the buildings of the Church

of the Holy Sepulchre. See Calvary; Holy

Sepulchre, The.

GOLIAD, Tex., city, county-seat of Goliad

County, on the San Antonio River and the

Southern Pacific Railroad, about 45 miles from

the Gulf and 168 miles southwest of Galveston.

There are interesting ruins of the ancient Span¬

ish mission, a courthouse and a public library.

The city contains several cotton gins and is the centre of a cotton growing and stock raising

district. Goliad gets its name from Hidalgo

(q.v.), the patriot priest of Dolores, who in 1810

led the revolution in Mexico against Spain.

When Goliad was founded the people did not

dare to name it Hidalgo, so dropping the silent H and transposing the letters, they made the

word Goliad. This place was the last site of

the ancient mission of La Bahia del Espiritu

Santo (1749). This mission was first founded

at the place where La Salle built Fort Saint

Louis in 1685. Goliad was the scene of a

bloody contest (1812) between the socalled

<(Republican Army of the North,55 under Magee

and Gutierrez, and the Mexicans. Here Magee

died, evidently assassinated. In the Texas revo¬

lution (1835) Goliad was a point of strategical importance to the Texans. It was captured by

Ben Milan and Collingsworth and became the

base of military operations. The independence

of Texas was declared here 20 Dec. 1835.. Ira Ingram and Philip Dimmit were the leaders in

formulating this declaration, and at the meeting there were 92 soldiers and all the citizens of the town. The official declaration of independ¬

ence was made at Old Washington, 2 March

1836. In Goliad, on Palm Sunday, 27 March

1836, the Mexican commander, Urrea, caused to

be slaughtered 300 unarmed men who had sur¬

rendered, Fannin (q.v.) and his command.

1 hcse defenseless men had been promised life

and liberty before being marched out in squads and shot down like dogs. Urrea claimed he

acted under orders from Santa Anna (q.v.).

Afterward a rallying cry of the Texas troops

under Sam Houston was (<Remember Goliad.®

In 1902 Goliad was visited by a disastrous

cyclone which swept away almost the whole

town. Pop. (1920) 1,200.

GOLIARDERY, go'll -ar'der-i, the name

given to the Cannina Burana, a series of satiri¬

cal Latin poems of the 13th century. They

were the productions of the self-styled Goliardi, mediaeval wandering students, disciples of the

mythical Golias. While attacking the abuses

and vices of the period, especially those exist¬

ing in the Church, they glorified also the love of nature, women and wine. This naturally

antagonized the ecclesiastical mind which was

prone to exaggerate into grave sins what or¬

dinary men would consider as mere peccadil¬

loes. From a classical standpoint the majority

of the songs are generally below criticism; from a moral point of view, many of them are vigor¬

ous and healthful, and are popular among Ger¬

man students of the present day. Consult

Schmeller, (Carmina Burana5 (1894) ; Symonds, (Wine, Women and Song) (1884).

GOLIATH, go-ll'ath, a giant of the Philis¬

tines, slain by David. In the war between

Saul and the Philistines, Goliath of Gath came forward daily to challenge the champions of

Saul's warriors to single combat. The youth¬

ful David, armed with a sling and pebbles,

answered the challenge, and overcame the giant.

The Philistines were routed and the victory was won. The story is told in Samuel xvii. In

another place (2 Sam. xxi, 18-22), the van¬

quishing of Goliath is ascribed to Elhanan, one of the greatest of Saul's warriors. As this

tradition is earlier than the David legend, it is probable that the transference of the glory of the victory from Elhanan to David was due

firstly to a confusion in names, since Elhanan was the son of Dodo ; or secondly, that it was resorted to as a means of explaining David's

rapid rise in the favor of Saul.

GOLIATH BEETLE, one of the huge

scarabe beetles of the cetonian genus Goliathus, distinguished by their large size, the horny proc¬

esses on the head of the male, and the teeth-bearing lower-jaws. The name specifically be¬

longs to G. giganteus of the Gold Coast, which is four inches long, and is chalky-white, broadly and variously marked with black. It feeds al¬

most entirely on the sap of trees. Compare

Hercules Beetle.

GOLITZIN, go-lit'sen', Prince Boris

Borisovich, Russian physicist and academician :

b. 1862; d. Peterhof, 17 May 1916. He grad¬

uated at Naval Cadet Corps 1880; entered

Strassburg University 1887 ; was lecturer at

Moscow University 1892; assistant professor of

physical science at Yuriev University, Dorpat,

and assistant of the Academy of Sciences 1893.

From 1899 to 1905 he was manager of the

government printing office; president of the

Seismological Association 1911.

GOLLANCZ, Israel, English scholar: b.

London, 1864. He was educated at University

College, London, and at Christ's College,

Cambridge. He was Quain English student

and lecturer at University College in 1892-95;

university lecturer in English, Cambridge, 1896—

1906; and since has been University professor

of English language and literature at King's

College, London. He is a Fellow of the

British Academy and has acted as its secretary since its foundation in 1903; and was honorary secretary of the Shakespeare Tercentenary

Committee. Author and editor of (PearP

(1891) ; (Exeter Book of Early Saxon Poetry5

(1895) ; (Temple Shakespeare5 (1894-96) ;

(Hamlet in Iceland5 (1898); general editor

(The Temple Classics> ; (The King's Library) ; (The Book of Homage to Shakespeare5

(1916), *etc.*

GOLOMYNKA, or OIL-FISH, a goby¬

like fish (Comephorus baikalensis) found only

in Lake Baikal, about a foot long, destitute of scales, and very soft, its whole substance

abounding in oil, which is obtained from it by pressure. It is never eaten.

GOLONDRINA, green house swallow

(Tacky cineta leuccorrhoa) of South America,

similar to the white-bellied tree swallow

(Tacky cineta bicolor) of North America.

Originally it nested in hollow trees but with

the coming of man it nests beneath the eaves

of buildings. It is white breasted with green

above except for a touch of white on the rump.

Consult . Hudson, (Naturalist in La Plata5

(1903).

GOLOSHES (Fr. galoche, <(a patten, clog

or wooden shoe®) : (1) a kind of wooden clog, with a joint at the instep and upper leathers like those of very low shoes, worn in the Middle Ages. (2) India-rubber overshoes, first manu¬

factured in the United States and introduced

into Great Britain about 1847. The term is

now restricted to the latter meaning, and is

used mostly in England, very rarely in the

United States. See India-rubber; Rubber

Manufactures.

GOLOVNIN, Alaska, native settlement on

Golovnin Bay, 10 miles east of Bluff. There is a Swedish Evangelical Union Mission and a

school under the direction of the United States government. The

natives are largely engaged

in raising reindeer, of which they own more

than 2,000 head. Pop. about 200.

GOLTZ, go-lts, Kolmar, Baron von der,

German soldier and military author: b. Bielken—

f eld. East Prussia, 1843; d. Asiatic Turkey, 19

April 1916. He was educated at the Berlin

Military Academy, had seen extensive military

service, having fought in the Austrian cam¬

paign and having been on the staff of Prince

Frederick Charles in the Franco-Prussian War

of 1870-71. At the close of the Franco-Prus¬

sian War, he was appointed to the historical de¬

partment of the general staff at Berlin and for a time was instructor in the Military Academy.

In 1883 he was sent to reconstruct the Turkish army and remained in Turkey for 13 years. He

was made general of division on his return to Germany in 1896; general of infantry in 1900:

commander of the first corps in 1902; general

inspector in 1907, and lieutenant-general in

1908. In 1908-10 he was again in Turkey, en¬

gaged in reorganizing the army of that coun¬

try. In 1911 he became general field-marshal

and later was inspector-general of the second

corps until 1913. In August 1914, after the

German armies had invaded Belgium and cap¬

tured Brussels, he was appointed military gover¬

nor of the occupied portion of the country,

but in November of the same year, he was re¬

lieved of this command and sent to Turkey,

where he was appointed military commandant

at Constantinople, and acting Minister of War.

He was instrumental in forming the successful

Turkish defense on the Gallipoli Peninsula, and frequently predicted that the Anglo-French fleet would not be able to force a passage of the

Dardanelles. In April 1915, he succeeded Gen.

Liman von Sanders as chief of the first Turkish army. (See War in Europe). He published

(Lion Gambetta und seine Armee) (1877;

French ed. 1877) ; (Das Volk in Waffen)

(4th ed., 1890) ; (Der thessalische Krieg und

die turkische Armee5 (1898) ; (Krieg und

Heerfiihrung5 (1901) ; (Von Jena bis Eylau5

(1907) ; (Kriegsgeschichte Deutschlands im

XIX Jahrhundert5 (1910).

GOLTZ, Max, Baron von der, German

naval officer: b. Konigsberg, 19 April 1838; d.

Potsdam, 20 Dec. 1906. He entered the Prus¬

sian navy in 1853, received rank as ensign in 1859 and that of captain in 1875. He com¬

manded the German Mediterranean squadron

during the Egyptian troubles of 1882 ; and in

1888 attained the rank of vice-admiral, with

the appointment to the command of the

Wilhelmshaven naval station. He was retired

13 May 1895 with the rank of admiral.

GOLTZIUS, Hendrik, Dutch painter and

engraver: b. Miilebrecht, duchy of Jiilich, 1558; d. Haarlem, 29 Dec. 1616. He came of a family of artists. He was taught to paint on glass

by his father and his work as a steel engraver was begun under Coornheert, whose limited

ability Goltzius soon surpassed. He later

worked with Philip Gale, engraving for him a

set of prints of the history of Lucretia. In

1590 he traveled in Germany and Italy, and

conceived an intense admiration for Michel¬

angelo, whom he imitated rather unsuccessfully.

While some of his paintings are in the imperial collection at Vienna, none of them add greatly to his reputation, which is firmly established

by his engravings. His portraits are chiefly

miniatures and are considered very fine, and he executed an exceptionally good portrait of him¬

self. His skilful use of the burin is ranked

with that of Diirer, but he lacked a fine ar¬

tistic appreciation. Nevertheless, his skill of

technique and the free, beautiful lines of his work counterbalance other defects. Excellent

examples of his engravings after the masters

are afforded by his copies of Raphael's An¬

nunciation } ; Parmeggiano's (Visitation 5 ;

Bassano's Adoration of the Shepherds5 ; Ba—

roccio's (Holy Family5 ; Lucas van Leiden's

Adoration of the Kings5 ; and Diirer's Cir¬

cumcision.5 More than 300 of his. engravings

are in existence, and are. catalogued in Bartsch's (Peintre-Graveur5 and in Weigel's supplement

to that work.

GOLUBOVICH, go-lo-bo'vicli, Girolamo,

Illyrian clergyman and author: b. Dalmatia, 7

Feb. 1865. He was educated at the Franciscan

Convent, Jerusalem, entered the Franciscan

Order in 1879 and was ordained to the priest¬

hood in 1888. In 1888-89 he was librarian of

the Franciscan Convent, Jerusalem, and from

1889 to 1895 he was engaged in missionary and parochial work at Larnaca and Limassol, Cy¬

prus. In 1895 Cardinal Ledochowski conferred

on him the title of missionary apostolic. He

was successively professor of rhetoric, at the

Franciscan Lyceum, Aleppo, Syria, and mis¬

sionary to the Greeks, Slavs and Italians of

Alexandria and Port Said, Egypt, in 1895-96.

In 1902-04 he was vicar of the mission of

Constantinople. He was appointed in 1898 his¬

torian of the Franciscan Mission of the Holy

Land and in this capacity visited the libraries of Italy, Austria, Belgium, France and England, to collect and edit many rare documents. He

was one of the editors of the works of Alex¬

ander of Hales and Bartholomew of Pisa 1904—

07; and director of the Archivum francis—

canum historicum5 in 1907-08. After 1909 he

was stationed at Florence. He has published

(Serie Cronologica dei Reverendissimi Superiori di Terra Santa5 (1898) ; HI trattato

di Terra Santa e dell' Oriente di frate Fran¬

cesco Suriano5 (1900) ; Uchnographiae Locorum

et monumentorum veterum Terrae Sanctse, ac¬

curate dilineatae et descriptae a P. Elzeario

Horn5 (1902) ; (Bibliotheca Bio-bibliographica

della Terra Santa e dell' Oriente Francescano5

(2 vols., 1906; 1913). He contributed to (The

Catholic Encyclopedia,5 the Archivo storico

italiano Missioni francescane ; La Verna , *etc.*

^ _

GOMARA, Francisco Lopez de, Spanish

historian: b. Seville, 1510; d. 1560. He was

professor of rhetoric at the University of

Alcala, took holy orders and afterward be¬

came secretary and chaplain to Hernando

Cortez. He is reputed to have accompanied

Cortez to America, but verification of this is lacking. He wrote one of

the earliest his¬

tories of America, but as a historian he is

notable rather for his easy, graceful style than for authenticity. He wrote (Historia general

de las Indias con la conquista de Mexico y de la Neuva Espana5 (2 vols., 1552-53). A modern

edition, with a biography of the writer, is in¬

cluded in Aiblioteca de autores espanoles5

(Vol. XXII, Madrid 1884).

GOMARISTS, the ultra Calvinistic party

in the Dutch National Church, so called from

their leader, Francis Gomar (q.v.).

GOMARUS, Francis, Dutch theologian

and the most eminent opponent of Arminius :

b. Bruges, 13 Jan. 1563; d. Groningen, 11 Jan.

1641. His parents, upon embracing the Re¬

formed faith, removed to the Palatinate in

1578 and Francis was sent to be educated at

Strassburg.* In 1580 he removed to Neustadt

where he studied theology, under Ursinus, Zan—

chius and Tossanus. He visited England in

1582 and attended lectures at Oxford and Cam¬

bridge, being graduated from the latter univer¬

sity in 1584. From 1587 to 1593 he was pastor of a. Reformed Dutch church at Frankfort

and in 1594 became professor of theology at

Leyden where he remained until 1603, when

Arminius joined the faculty and disseminated

Pelagianism. Gomarus opposed him with con¬

siderable success and was aided by Bogermann.

Gomarus now became the recognized leader of

the opponents of Arminius, who after him came

to be known as Gomarists. In 1608 he engaged

in personal debate with Arminius before the

Assembly of the Estates of Holland and in the following year, in the same place, with four

colleagues met five Arminians in debate. When

Vorstius succeeded Arminius, on the latter's

death, Gomarus resigned his chair and became

preacher at Middleburgh in 1611, where he

also taught theology and Hebrew in the new

IUustre Schule. In 1614 he was made professor

of theology at Saumur and in 1618 removed to

Groningen as professor of theology and He¬

brew, at which post he remained until his death.

He took part in the revision of the Dutch ver¬

sion of the Old Testament in 1633. His works

were issued in a single volume (Amsterdam

1645). Consult Dorner, J. S., (History of

Protestant Theology.)

GOMBERG, Moses, American chemist : b.

Elizabetgrad, Russia, 8 Feb. 1866. He studied

at Elizabetgrad Gymnasium, and was gradu¬

ated at the University of Michigan in 1900. He also studied at Munich and at Heidelberg. He

was appointed to the teaching staff of the

University of Michigan in 1893 and held suc¬

cessive positions there, becoming professor of

organic chemistry in 1904. He is a member of

the National Academy of Sciences, and in 1914

received the Nichols medal of the American

Chemical Society. He has written numerous

articles for chemical journals, notably for the Journal of the American Chemical Society, and

the Berichte der Deutsche Chemische Gesellschaft.

GOMEL, or HOMEL, Russia, district

town of the province of Mohilev, on the Soje, a tributary of the Dnieper, 108 miles southeast of Mohilev. It is an important railroad junc¬

tion and has an extensive river trade. Its

population is nearly half of Jewish origin, and in 1903 there was a massacre of the Jewish in¬

habitants. Its industries include sugar re¬

fineries, oil and paper mills; and it has a large trade in hops, timber, hemp and linseed. Pop.

(with Byelitsa suburb) 79,000.

GOMES DE AMORIM, Francisco, Por¬

tuguese dramatist, poet and novelist: b.

Avelomar, Minho, 13 Aug. 1827; d. 4 Nov. 1891.

He spent his early youth in Brazil, returning to Portugal in 1846. He entered government serv¬

ice in 1851, and in 1859 became librarian of

the Ministry of Marines. His years in. Brazil

had great influence over the work of his later years, as had also Almeida-Garratt, who ac¬

corded him much encouragement. He was

deeply in sympathy with Garibaldi, and the

Revolution of 1848, evidenced by (Garibaldi*

and (A liberdadeP He wrote (Cantos matu—

tinos> (3d ed., 1874) ; and (Ephemeros> (2d

ed., 1866) in verse; the dramas (Odio de

raqa* ; (A prohibiqao* ; (Ghigi) ; <0 cedro ver-melho,* etc.; in fiction (Os Selvangens*

(1875); <0 remorse vivo) (1876); and a his¬

tory of the literary movement instituted by

Almeida-Garratt, (Memorias biograficas*

(1881). His collected works were published

(Lisbon 1866). Translations of his dramas

into French were made by Denis and Richon.

GOMEZ, go'mes, Antonio Carlos, Brazil¬

ian composer: b. Campinas, 11 July 1839; d.

Para, September 1896. He was a pupil at the

Milan Conservatory, and had his first opera,

(A noite do castello,* presented at Rio de Ja¬

neiro in 1861. His (Se sa minga* gained notable success at La Scala, Milan, in 1867, and was

followed by a series of varying merit, includ¬

ing <Guarany) (1870) ; (Salvator Rosa) (1874)

and (Lo Schiavo) (1889). He wrote the hymn

(I1 saluto del Brasile> for the Centennial Ex¬

hibition at Philadelphia (1876), and a cantata, c Colombo, > for the Columbian Exposition

(1893). He was director of the Conservatory

of Music at Para, Brazil, 1895-96.

GOMEZ, go'mash, Estevan, Portuguese

navigator: b. about 1474; d. about 1530. He

became an expert pilot in the Portuguese East

Indian fleet, sailed in 1519 on Magellan's voy¬

age as pilot of the Trinidad and was later

transferred to the San Antonio, on board which he contrived a successful mutiny and then

sailed for Spain. There he was imprisoned, but in a short time set free. It appears that in 1524-25 he was sent by Charles V to explore

the eastern coast of what is now the United

States and discover a northern route to the

Orient. A map executed in 1529 by Diego

Ribeira, a cosmographer, marks the territory

included between the present States of Rhode

Island and New Jersey, Tierra de Gomez. Con¬

sult Bourne, (Spain in America) (New York

1904) ; Harrisse, (Discovery of North America) (London 1892).

GOMEZ, Jose Miguel, Cuban general: b.

province of Santa Clara, 1846; d. New York, 13

June 1921. He served in the Ten Years' War

1868-78, and in the Revolution of 1906 attained rank as major-general. He was governor of the

province of Santa Clara under the first Ameri¬

can intervention, and was a member of the

constitutional convention, continuing a gov¬

ernor of Santa Clara under President Palma.

He was active in the revolution against Presi¬

dent Palma in 1906 and was imprisoned until

after the second American intervention. In

1908 he was elected President, inaugurated 28

Jan. 1909 and served until 20. May 1913, when he was succeeded by Gen. Mario Garci Menocal.

In 1917 he again led a revolt against the gov¬

ernment, but was captured, imprisoned and held

for trial.

GOMEZ, Juan Vincente, Venezuelan poli¬

tician : b. San Antonio de Tachira, 1859. He

entered political life in 1892 and at the time of President Castro's flight to Europe he, as

vice-president, became acting president. He

was elected provisional president in 1909 and

constitutional president in 1910, and was suc¬

cessful in extricating his country from the dif¬

ficulties with foreign countries in which his

predecessor had entangled her. Upon the ex¬

piration of his term of president he was re¬

elected, but preferred to take office as com¬

mander-in-chief of the army, Marquez Bustil—

los acting as provisional president. Charges

of alleged pro-Germanism were made against

him in London and in Washington in 1917.

GOMEZ DE AVELLANEDA Y AR¬

TEAGA, Gertrudis, Spanish dramatist and

poet: b. Puerto Principe, Cuba, 23 March

1814; d. Madrid, 2 Feb. 1873. She removed to

Spain in 1836, where her first volume of poems was published with a complimentary preface by

Gallego in 1841. She was married to Pedro

Sabater of the diplomatic service in 1846, but was widowed in less than a year. In 1853 she made a second marriage with Col. Domingo

Verdugo. Her poetry in a measure bridges the

gap between the classic and romantic schools,

and while opinions differ as to her rank arnonft poets she stands unquestionably first among the 42

Spanish women poets of her century. Her

dramas were highly successful, but her novels

vvu-e ot little importance, her fame resting upon nˆr poetic and dramatic works. Gifted with

a high poetic sensibility to beauty, tragedy and devotion she nevertheless lacks somewhat in the broader scope of human sympathies ; and her

constructive power is often unequal to sus¬

tained effort, although she reaches a high point of eloquence and dramatic power in many in¬

stances. Her novels include <Sab) (1839);

(Dos mujeres* (1842); (Espatolino) (1844);

<Guatimozin) (1846), *etc.* Among her dramas

are <Leoncia) (1840) ; (Alfonso Munio)

(1844); (SauP (1849); (Baltasar> (1858),

etc. In verse (Poesias liricas) (1841; enlarged ed., 1850). Her (Obras literarias) (5 vols.,

1869-71) have not been completed.

GOMEZ Y BAEZ, e ba'es, Maximo,

Cuban soldier: b. Bani, Santo Domingo, 1831;

d. Havana, Cuba, 17 June 1905. When Santo

Domingo revolted against Spain he served as

lieutenant of cavalry in the Spanish army;

and when the freedom of the island was de¬

clared he went with the Spanish army to Cuba, but left the army because General Villar mal¬

treated some Cuban refugees. In 1868 he

joined the Cuban insurrection, and through his

ability and daring soon rose to a position of prominence, being in several successful engage¬

ments. Though deprived of his command at

one time, he was soon recalled, and rose to be major-general. On the failure of the rebel¬

lion, he left Cuba and settled on a farm in

Santo Domingo. Returning to Cuba, he was

influential in bringing about the insurrection of 1895-98, and was made commander-in-chief of

the Cuban army. His policy was to avoid open

engagements and to drive the Spaniards out

by devastating the island and constant haras¬

sing of their troops. When the Americans

landed in Cuba (1898) he willingly cooperated

with them. On 24 Feb. 1899 he marched into

Havana at the head of his soldiers and was

received by the United States authorities. In

March of the same year he was deposed from

his command by the Cuban Assembly on ac¬

count of his accepting $3,000,000 for his army from the United States. He assisted the Amer¬

ican governor-general in his work in the island; was governor of the province of Santa Clara

and a member of the Constitutional Convention;

and he continued as governor under the presi¬

dency of Estrada Palma. He wrote (Sanchito

Gomez* and (Mi Escolta) (1896), describing

his campaigns in Cuba. Consult Carrillo, (In

the Saddle with Gomez * (.New York 1898).

GOMEZ-FARIAS, fa-reas, Valentin,

Mexican statesman: b. Guadalajara, 14 Feb.

1781; d. Mexico City, July 1858. He vˆas ap¬

pointed a professor in the University of Guada¬

lajara in 1810, was a Liberal member of the

first Constituent Congress, was elected Vice-President with Santa Anna, and in consequence

of the latter's absence assumed executive

powers 1 April 1833. In 1835 a constitutional

congress refused to acknowledge his authority,

and he was exiled. He returned in 1838; in

1840 led an unsuccessful revolt, and again was banished. Having returned in 1845, he was

elected Vice-President in 1846; later a deputy

to Congress, and was appointed Postmaster-General under Alvarez.

GOMME, Sir (George) Lawrence, Eng¬

lish antiquary and folklorist : b. London, 1853 ; d. 24 Feb. 1916. He was educated at the city of London school and became statistical officer and clerk to the London common council. He

was deeply interested in the rural customs of

England, was founder, president and afterward

vice-president of the Folklore Society, also act¬

ing as its secretary for some years. He was

lecturer at the London School of Economics

and University Extension, and editor of the

Antiquary, the Archceological Review and the

Folklore Journal. He was secretary to the

lieutenancy of London and a Fellow of the

Anthropological Institute. He wrote Primi¬

tive Folk-Moots) (1880); (Chap-books and

Folklore Tracts) (1885) ; ‘Ethnology in Folklore) (1892) ; Governance of London* (1907) ;

(Folklore as an Historical Science) (1908) ;

‘The Makine of London, 191 1* (1914), *etc.*

He also edited (The Gentleman’s Magazine

Library* (1883-1906) ; ‘The King’s Story-Book) (1897) ; (The Queen’s Story-Book0

(1898); (The Princes’ Story Book* (1899);

‘The Princess’s Story-book* (1900) ; and sev¬

eral editions of historical novels.

GOMORRAH. See Sodom and Gomorrah.

GOMPERS, Samuel, American labor leader:

b. London, England, 27 Jan. 1850. He came to

America with his parents and other relatives

in 1863 and became an American citizen at the age of 21. A cigarmaker by trade, he has been known as a zealous worker in the cause of the rights of labor since his boyhood. He was

one of the founders of the American Federation of Labor in 1881 and has been associated with that organization in an official capacity ever

since, with the exception of two years. In 1908

he was sentenced to a year’s imprisonment on

account of defying a court order in connection with the Bucks’ stove

case, which denied the

constitutional rights of free speech and free

press as well as involved the abuses of the

writ of injunction which deprived men of trial by jury and substituted judicial government for constitutional government. The case was ap¬

pealed to the Supreme Court of the United

States, and on 15 May 1913, Justice Lamar

delivered the judgment of the court as follows: ((The judgment of the court of appeals is re¬

versed and the case remanded with directions

to reverse the judgment of the Supreme Court

of the District of Columbia and remand the

case to that court with direction that the con¬

tempt proceedings instituted by the Bucks

Stove and Range Company be dismissed, but

without prejudice to the power and right of the Supreme Court of the District of Columbia, to

punish by a proper proceeding contempt, if any, committed against it.** Contempt proceedings

were again instituted in the Supreme Court of

the District of Columbia by Justice Wright,

who again found Mr. Gompers guilty and im¬

posed the same sentence. The case was again

appealed to the Court of Appeals of the Dis¬

trict of Columbia and to the Supreme Court

of the United States. The Supreme Court dis¬

missed the case because it was outlawed under

the statute of limitations, but sustained the con¬

tentions of the American Federation of Labor

that proceedings for contempt do not differ in essence from any ordinary charge of crime,

and proceedings in contempt courts should be

the same as the proceedings in the case of

crimes.

Under the leadership of Mr. Gompers in

1906, the American Federation of Labor inau¬

gurated a non-partisan political campaign to

secure necessary legislation assuring to the

wage earners lawful opportunity for activities

necessary to protect the rights and to promote the interests and welfare of the working people.

According to this campaign the wage earners

used their political influence to secure the nomi¬

nation and election of government representa¬

tives regardless of party, who pledged them¬

selves and announced their approval of labor's

demands. The result of this political policy has been a group in Congress known as the labor

group, the members of which hold trade union

cards and are affiliated with some labor organ¬

ization. This group has gradually increased

until the 64th Congress there was one senator

and 17 members in the House of Representa¬

tives. As the result of this political activity labor's demands for fundamental rights were

enacted into law in the labor provisions of

the Clayton Anti-trust Act, which became a

law 15 Oct. 1914. Section 6 of this act contains the declaratory statement that <(the labor of a human being is not a commodity or article of

commerce.® This declaration removes associa¬

tions of wage earners from the provisions of

trust legislation. Section 20 of the act limits and regulates the issuance of writs of injunc¬

tion in conformity with the demands and con¬

tentions of the workers.

Under Mr. Gompers' direction the American

Federation of Labor has become very powerful,

and now includes every important union in the

country. In politics, its hand has been seen

indirectly in the enactment of the eight hour

day legislation in reference to all work on government contracts and in enterprises con¬ nected with public utilities, also employers' liability laws. Mr. Gompers has constantly and successfully combatted all tendencies, toward Socialism in the labor movement and is an ac¬ tive promoter of industrial conciliation. See American Federation of Labor.

GOMPHOCERAS, genus of Pakeozoic mollusks with exceptionally full and rounded shells which become narrower toward the opening. They are related to the Orthoceras and are possibly an ancestral forerunner of Phrag— moceras. There are about 150 specimens known, occurring in rocks of the Ordovician and Silurian Age of Europe and North America. The Silurian basin of Bohemia is especially rich in them.

GOMPHOSIS, or EUGOMPHOSIS, joint formed by the immovable implantation of one part in a socket situated in another, as in the socketing of the teeth in the jaws, or the styloid process in the temporal bone. It is also designated as articulation by implantation.

GOMUTI, or GOMUTO, or GUMUTI,

known also as Areng, Ejoo or Eju and Wine

Palm (Amiga sac char if era') , sago-palm of Ma¬

lacca and the Malays, commonly cultivated in

India and growing wild in Burma and Assam.

It is cultivated for a variety of products,

reaches a growth of from 20 to 40 feet tall

with leaves from 15 to 25 feet long. 4 he tree dies after flowering and producing its fruit

and when the sago product is desired it is cut before it flowers, usually at an age between

10 and 15 years. The first product is that of the black horsehair-like fibres, known as the

eju or gomuti fibre, which grow abundantly

from the base of the leaves. The fibre is manu¬

factured into cordage and is plaited for use as ornaments. It is not sufficiently pliable for

running rigging but for other purposes is

desirable because of its strength and impervious¬

ness to the effects of water. The stiffer fibres are used as styles for writing on palm leaves; and within the sheaths is a woolly fibre, called bara, which is in demand in China for the

caulking of boats, and is also used for filling cushions. The coarsest fibre is used for brush¬

making and thatching, and sandals are manu¬

factured from the leaf. The sap is obtained

by cutting the flowers and from it is manu¬

factured palm wine, spirits, sugar and vinegar.

The tree also furnishes Java sago; which, while inferior to that of the true sago-palm, is an important addition to the food supply through¬

out the Malays. It is scarcely profitable for

cultivation for its sugar, but the yield of sago is about 150 pounds per tree, and as 400 trees may be planted to the acre the yield is enormous.

When the palm is permitted to flower and

fruit it dies and the stem soon becomes hollow; and as the wood is remarkable for its lasting qualities when subjected to immersion in water

it is much used for troughs and watering chan¬

nels, lasting well even when placed under¬

ground.

GONAIVES, go-na-ev', Haiti, town on the

west coast on the bay of the same name, 65

miles north-northwest of Port au Prince. It

has an excellent harbor, a naval and military

hospital and a mineral spring. The exports

are cotton, coffee, logwood, salt and mahog¬

any. On 1 Jan. 1804 the independence of Haiti was proclaimed here by Dessalines, and in 1914

two battles were fought here between rebel and government forces. A United States consul is

situated here. Pop. 15,500.

GO NAS. See Hottentots.

GONSALVES DIAZ, Antonio, Brazilian

poet : b. near Caxias, Maranhao, 1823 ; d. at sea, September 1864. He studied law at the Univer¬

sity of Coimbra, Portugal, but upon returning

to Brazil in 1845 he engaged in literary pursuits at Rio de Janiero as a newspaper writer and

poet. His first volume of poems, ˆrimeiros

Cantos> (1846), established his reputation as a poet, being remarkable both for their interpreta¬

tion of Brazilian national feeling and as bear¬

ing the imprint of his own individuality. His

(Segundos Cantos e sextilhas de Frei Antao)

(1848) confirmed his reputation for clear, beau¬

tiful expression and easy rhythm. He was

appointed professor of Brazilian history at the Imperial College of Pedro II at Rio de Janiero in 1849 and in 1851 published his (Ultimos

Cantos) which practically concluded his con¬

tributions to poetry. In 1851—59 he was en¬

gaged in government service, studying educa¬

tional institutions in northern Brazil and in

Europe. Returning to Brazil in 1860 he was

appointed to the expedition sent to make a

historical and ethnographical survey of the

province of Ceara. Illness compelled his

resignation in 1862 and it was when he was re¬

turning from a trip to Europe, in which he

sought to restore his health, that he perished 44

in a shipwreck off the shores of Brazil. Be¬

sides the three volumes of verse already men¬

tioned he was author of (Os Tymbiras) (1857) ; (Diccionario da lingua Tupy) (1858). He

wrote many reports upon his government in¬

vestigations and had written a considerable

part of a work entitled (Historia des Jesuitas de America.* A complete edition of his lyrical poems was published under his own direction

at Leipzig and his complete works were pub¬

lished in Rio de Janeiro.

GONCHAROF, gon-cha-rof', Ivan Alek—

sandrovitch, Russian novelist: b. 18 June 1812, at Simbirsk, on the Volga River; d. Saint

Petersburg, 27 Sept. 1891. His father was a

member of the merchant class, but died at an

early age, leaving the three-year-old boy in the charge of his mother, a woman of unusual

character and ability. He was at first educated at home especially under the direction of his

godfather, a former seafaring man who had re¬

tired from service and was an inmate of Goncharof's household, where his general culture,

his sense of humor and his inexhaustible fund

of anecdotes and reminiscences of travel in all parts of the world made him the central figuie in the best society of the prosperous provincial capital. The boy was in due time entered at a boarding-school attended by the sons of

wealthy landed proprietors, and the principal

teacher, a priest of a different type from the usual country clergyman, who had graduated

from the Theological Seminary of Kazan, was

a man of culture and breeding and was married to a French lady who taught her native lan¬

guage to the students. The school possessed

an excellent library of Russian and foreign

masterpieces — history, fiction, poetry and

books of travel — some of which Goncharof

not only read but even learned by heart. At the age of 12 he was sent to Moscow where his

passion for reading was still further stimulated and he made great progress in French, English

and German. In 1831 he entered the Moscow

University in the department of philology. Here he came under the influence of an unusually

able corps of professors whose lectures on his¬

tory, literature, archaeology and art appealed to his best ability and confirmed him in his love for all that was lofty and beautiful. After fin¬

ishing the full course he returned to his home for some months and then proceeded to Saint

Petersburg where he entered the service of the Ministry of Finance as interpreter. He became

acquainted with the brilliant circle of novelists, poets and journalists, the two Maikof brothers, Nekrasof, Byelinsky, Panayef. He was thus

drawn to literature and wrote his first novel

<An Ordinary Story * (Obuiknovannya Is—

toriya), the first part of which appeared in The Contemporary (Sovremennik) in 1847. He was

already planning a new work and even went so

far as to print some chapters of it under the title, (Oblomof's Dream, * but in 1852 he ac¬

cepted an offer from the Ministry of the Mar¬

ine to accompany Admiral Putyatin as his sec¬

retary on a trip around the world with the aim of concluding a treaty with Japan. The re¬

sult of this experience was given to the public in 1856 and 1857 in two large volumes entitled (Frigate Pallada.* During his journey he

worked desultorily on <Oblomof) and after his

return he went to Carlsbad and finished it in about a month and a half. It was printed in

1858 and 1859 in the Annals of the Fatherland and immediately created an immense sensation,

the hero of the story being recognized as a

very distinctive Russian type. His official du¬

ties and his social diversions largely interfered with his literary activities and he waited 10

years before he published his next and final

masterpiece of fiction, (The Precipice) (or (The Abyss* — Obruif) whidh came out in the Eu¬

ropean Messenger (Vyestnik Y evropui) and in

book-form in 1870. His collected works also

comprise critical articles and translations.

Nathan Haskell Dole.

GONCOURT, de, de gon-koor, Edmond

Louis Antoine Huot: b. Nancy, 26 May 1822;

d. 16 July 1896; and Jules Alfred Huot de:

b. Paris, 17 Dec. 1830; d. Auteuil, 20 June 1870; French novelists. The Goncourt brothers were

not men of letters but artists primarily, and in 1849 they set out, knapsack on back, to traverse France for drawings and water-colors. Their

notebooks made them writers as well as ar¬

tists, and already in 1852 they had commenced

that literary partnership which continued nearly 20 years. Their earliest serious works were a

group of historical studies upon the second

half of the 18th century, intended to be an ef¬

fective resurrection of its habits of life, man¬

ners and costume, which, though elaborate in

detail, lacked calm and impartial historical

sense, breadth of view and creative grasp of

character. These books were (Histoire de la

Societe Frangaise pendant la Revolution

(1854), (La Societe Francaise pendant le Directoire) (1855) ; Portraits intimes du XVIII

Siecle* (1856-58) ; (Histoire de Marie Antoinette) (1858); (Les Maitresses de Louis XV)

(1860-79) ; <La Femme au XVIII Siecle* (1862)

and (L' Amour au XVIII Siecle* (1877) ;

'Gavarni* (1873) and (L'Art au XVIII Siecle) (1874). The more important work of the

De Goncourt brothers was their novel writing;

their conception of the novel was that it should be an imaginative attempt to grasp and sum¬

marize the results of close and minute observa¬

tion ; their aim was to paint manners by taking the traits in which one man resembles a class ; hence they select as generic types only persons of moderate faculties. Their (Journal* (1887—96) is a poignant and significant literary docu¬

ment, valuable for its information on the lit¬

erature of the period. Their novels, descrip¬

tive not so much of passion as of manners, in¬

clude (Les Hommes de Lettres) (1860), repub¬

lished in 1869 under the title, ˆCharles De—

mailly> ; (Sceur Philomene* (1861), describing

the hospital life of a Sister of Charity ; (Renee Mauperin) (1864), a study of social life;

(Germinie Lacerteux* (1865), a character study

of the gradual degradation of a domestic;

(Manette Salomon * (1867), in which an ar¬

tist's model plays the part of human vampire;

and (Madame Gervaisais> (1869), a study of

mysticism. After the death of his brother, Ed¬

mond wrote the (La fille Elisa) (1878), a novel; (L'CEuvre de Watteau* (1876), (L'GEuvre de

Prudhon) (1877) ; arid (La Maison d'un Artiste >

(1881).

On his death, Edmond de Goncourt left the

greater part of his fortune to found an acad¬

emy — the Academie Goncourt — and the first

members of which were nominated by him.

GONDAR

GONG

45

They receive each an income of 6,000 francs;

but membership is forfeited on election to the French Academy. Consult Bellock and Shed-lock, (Edmond and Jules de GoncourC (1895) ;

Paul Bourget, (Nouveaux Essais de Psycholo¬

gy (1885) ; Delzant, (Les Goncourts) (1889) ;

Wells, (A Century of French Fiction) (1898).

GONDAR, or GUENDAR, Abyssinia,

former capital of Amhara, about 21 miles

northeast of Lake Tsana, and on a spur of the Wogara Mountains, 7,500 feet above sea-level.

The town is in a more or less ruined condition, having suffered severly in the civil wars of

Abyssinia and being ruthlessly damaged by

Emperor Theodore II in 1868. It was a loosely built town of districts divided by open spaces and at the beginning of the 16th century was

a small village. It became the capital of the kingdom by choice of Seged I. It was the seat of many churches, castles and palaces and was

at its height in 1736 when the last of the pal¬

aces, that of Negus Yesu II was built. From

that time until the British pacification of the Sudan in 1886-89 Gondar was repeatedly

sacked and fired. The population dwindled

from an estimated 50,000 in 1770 to about 7,000

in 1905. The ruins of the castles and palaces of Gondar show traces of the Portuguese pop¬

ulation at one time numerous there, the build¬

ings resembling in a measure the mediaeval

fortresses of Europe. The churches were built

in the circular Abyssinian manner, but of the

44 which once existed in Gondar or its imme¬

diate vicinity but one remained without serious injury in 1900. The population is chiefly Mo¬

hammedan and there is a settlement of

Falashas. With the pacification of the country

the fortunes of the town have improved and

with an increasing population there is now a

trade between Gondar and the Blue Nile. The industries number those of gold and silver ornaments, cotton and cotton cloth, shoes, saddles and carvings in bone and ivory. Con¬ sult Powell-Cotton, <A Sporting Trip Through Abyssinia) (1902).

GONDOKORO, or ISMAILIA, Uganda, trading-station and formerly a government post, on the east bank of the upper Nile, 1,070 miles south of Khartum by river and 350 miles northwest of Entebbe on Victoria Nyanza. It was first visited by Europeans in 1841—42 and was at one time an important slave-trading centre. A British military station was es¬ tablished there in 1871 but was abandoned by Gordon in 1874 because of the town's un¬ healthful situation. The Mahdists gained con¬ trol of it in 1885, but the town was reoccupied by British troops in 1898. As the head of the navigation of the Nile Gondokoro is of con¬ siderable importance, the journey from there to Uganda being made overland, and it con¬ stitutes an outlet for the produce of that ter¬ ritory. An Austrian Roman Catholic mission was maintained there in 1851-59 and the town

is of some prominence in the early explorations of Africa. It was named ˆIsmailia® in honor

of the reigning khedive by Governor-General

Baker at the time of his establishment of a

military post there in 1871.

GONDOLA, a long, narrow boat used on

the canals of Venice. The middle-sized gon¬

dolas are upward of 30 feet long and 4 to 5

feet broad; they always terminate at each end

in a sharp point, which is raised perpendicularly to the ordinary height of a man. They have

a well-furnished cabin amidship. They are pro¬

pelled by rowing; the oarsman or gondolier

stands in the stern facing forward; sometimes

there are two gondoliers, the second one stand¬

ing in the bow. They are usually painted

black in accordance with an old law of the

Venetian republic, whidh prescribed that all

gondolas should be black, except those of the

Doge and the foreign ambassadors. The gon¬

dolas were until recently the only means of

getting about the city; now steam-launches,

acting as omnibuses, are also used.

GONDS, an aboriginal race of British In¬

dia, a remnant of the Dravidians who were

driven out of the plains by an early Aryan in¬

vasion. They took refuge in Gondawana, a

territory almost identical with what are now

called the Central Provinces. Here their seat

was the Satpura plateau, between the rivers

Pain Ganga, Pranhita and Godavari on the

west and the Indravati on the east, while they were bordered on the north by the river Ner-budda. They still retain their dominion in the mountain forests of Orissa. Gondrin dynas¬

ties reigned from the 14th to the 18th cen¬

turies, when they were subdued by the Mahrattas. Since 1781 they have become subjects

of England, and their speech and religion have more and more conformed to those of the

Hindu. Their language, known as Gondi, is a

Dravldic branch of the Dekhan language. Their

occupational groups are endogamous ; bards,

soothsayers, iron-workers, dancers and prosti¬

tutes, etc., forming practically separate castes.

Their religion is animistic : ancestors are dei¬

fied. Their religion consists in a worship of

many spirits and they are enslaved to their

priests. They have distinct physical character¬

istics which differentiate them from the Hin¬

dus. They are small in stature, well-propor¬

tioned, swarthy, almost black in complexion ;

their hair is long and black, though sometimes it i's of a ruddy tinge. In countenance they

have a broad forehead and small, deep-set eyes.

They wear little clothing. One of their clans, the Moria, tattoo their faces and shave their

heads. Their total numbers over 2,500,000.

Consult Forsyth, (Highlands of Central India)

(1889) ; Dalton, descriptive Ethnology of

Bengal > (1872) ; Risley, (Tribes and Castes of BengaP (1892) ; Holderness, (Peoples and

Problems of India) (1912) ; and the article

"Gondwana® in Hunter's (Imperial Gazetteer

of India> (1908).

GONFALON, an ensign or standard which

used to be borne by the chief magistrates of

many Italian cities, as Florence and Lucca.

These magistrates were hence called gonfalo¬

niers. The title of gonfalonier was also some¬

times bestowed by the Roman Catholic Church

on persons of distinction, who were called gon¬

faloniers of the Church.

GONG, an instrument of Chinese origin,

made of a mixture of metals and shaped into

a basin-like form, flat and large, with a rim a few* inches deep. The sound of the gong is

produced by striking it, while hung by the rim, with a mallet, which puts the metal into a

state of vibration and produces a loud piercing 46

sound. The modern gong or gong-bell is

sounded by striking it with a hammer operated

by machinery.

GONGORA, Luis de Gongora y Argote,

gon’go-ra e ar-go’ta gon’go-ra, Spanish lyric

poet: b. Cordova, 11 July 1561; d. there, 24

May 1627. About 1614 he entered the Church

and became a prebendary of the cathedral at

Cordova, and eventually chaplain to Philip III.

Gongora’s earlier writings — sonnets on a great variety of subjects, lyrical poems, odes, bal¬

lads and songs for the guitar — are inspired

with much true poetic feeling. His later works, consisting for the most part of longer poems,

such as (Solidades) (or Solitary Musings),

‘Polifemo,5 (Pyramo y Thisbe,* are executed

in an entirely different and novel style, charac¬

terized especially in respect of diction, by some of the same distinctive features as are found in Euphuism in England and Chiabrerism in Italy.

This later style of Gongora, which his follow¬

ers and imitators designated the stilo culto, is florid, pedantic, full of Latin inversions and

mythological allusions, pompous and mannered,

and in many places very obscure. He became

the founder of a school, the Gongoristas or Cul-turanos, who were, if possible, more absurdly

euphuistic than their master. His works were

never published during his lifetime. The first

edition was printed by his friend, Vicuna, in

1627. Consult Churton, Gongora5 (1862).

GONIATITES, go”ni-a-ti’tez, a genus of

ammonites (q.v.), including the earliest forms

characterized by the structure of the septa,

which are lobed, but without lateral denticula—

tions, as in the higher ammonites ; they conse¬

quently exhibit, in a section, a continuous un¬

dulating line. Some forms with slightly waved

septa approach very near to the Nautilus. The

siphonal portion is shorter than the sides, form¬

ing a sinus at the back, as in the Nautilus. The last chamber, the one tenanted by the animal,

occupies a whole whorl, and has besides a con¬

siderable lateral expansion. The shells are

small, seldom exceeding six inches in diameter.

This genus is confined to the Palaeozoic strata, especially the Upper Devonian and Lower Car¬

boniferous.

GONIOCERAS, mollusk of the order of

nautiloid cephalopods, marked for its widely

variant forms but in the main of triangular

shape, somewhat flattened (Gonioceras anceps).

It occurs in the Ordovician limestones of New

York State and Canada and also in the extreme northern parts of North America and China.

GONIOMETER, a device for measuring

the angles of crystals. The application goniom¬

eter may be likened to a protractor with a ro¬

tary radius. It is a semi-circle hinged at 90

degrees, to which are attached two arms of

steel which are directly applied to the crystal whose angles are to be measured. Far more

accurate is the reflecting goniometer, consist¬

ing of a graduated circle mounted either verti¬

cally or horizontally upon a stand with an ap¬

paratus for adjusting the crystal, and one or

two telescopes ; it determines through what an¬

gular space the crystal must be turned that two rays of light reflected in turn from two surfaces shall have the same direction.

GONIOPHOLIS, a primitive crocodile of

the Jurassic Period. It is distinguished from

modern crocodiles by several features, espe¬

cially by the bi-concave vertebrae and the ar¬

rangement of the bony plates on the back. It

once inhabited the Jurassic swamps and river—

deltas in Europe and America, along with dino¬

saurs, turtles, *etc.* A complete skeleton is now exhibited in the Brussels Museum.

GONORRHEA is perhaps the most uni¬

versal and widespread of all diseases that

affect the human race. Competent authorities

have computed that fully three-fourths of the

adult male population and from one-sixth to

one-third of the adult female population have

contracted this disorder. The great majority of women who have gonorrhea are reputable mar¬

ried women who have been infected by their

husbands. Material as well as moral and sani¬

tary conditions modify venereal morbidity. It

is much greater in large centres of population than in suburban and rural communities.

Definition. — Gonorrhea may be defined as

a specific inflammation peculiar to certain mu¬

cous membranes, attended with the production

of a purulent discharge. This discharge has

the property of exciting a similar inflammation when brought in contact with other mucous

surfaces susceptible to its action. The urethral mucous membrane in the male and the mucous

membrane of the urethra, vagina and cervix in

the female are ordinarily the seat of gonorrheal inflammation. Almost all mucous surfaces of

the body, particularly the conjunctival mucous

membranes, are susceptible to the irritant action of gonorrheal pus.

Cause. — The cause of gonorrhea is a spe¬

cific micro-organism termed the gonococcus,

which was discovered by Neisser in 1879. In¬

flammation of the urethra may result from a

multiplicity of causes, chemical, irritant and

others, but true gonorrheal inflammation has as its unique etiological factor the gonococcus.

The Gonococcus. — This micro-organism is

a diplococcus ; in shape each individual of a

pair resembles a coffee bean — flat or slightly concave on one side and rounded on the other, with their flat surfaces opposed. The two hem¬

ispheres are separated by such a narrow interval that it is only recognizable under a lens of high power. The diplococci are grouped in pairs,

fours and other multiples of two. Their growth occurs by fissure, at right angles to the central interspace. The gonococci are always grouped

in irregularly shaped columns and are never

met with in chains or pairs, as certain other micro-organisms. The differential characteristic

of the gonococci is, that they quickly take a stain of aniline dyes and are more rapidly

bleached than other micro-organisms. They

may occur both within and without the pus and epithelial cells. In acute cases they are very numerous, but have a tendency to grow fewer

with the decline of the inflammatory process.

They are characterized by a marked longevity,

are susceptible of existing in a latent state for an indefinite period and are capable of being

revived and exalted in virulence by local irri¬

tation which causes congestion of the parts,

or when transferred to virgin tissues in which they find conditions favorable for their germi¬

nation and growth. Numerous cases are on

record where the gonococcus has been found

still conserving all its virulence and susceptible of being provoked into new activity by a variety of irritant causes years after infection.

GONORRHEA

47

Within the past two or three decades our

knowledge of gonorrhea has undergone most

marked and revolutionary changes. The old

conception of gonorrhea was that of a purely

local disease, confined to the mucous tract in which it had its habitual origin, trivial in char¬

acter, of limited duration and entailing no

serious consequences to the individual, except

from neglected complications. The occasional

occurrence of rheumatism or of ophthalmia,

which was recognized by the older observers,

was thought to be due to the development of a latent rheumatic diathesis, to sympathetic in¬

flammation or simple metastasis. The idiosyn¬

crasy of the patient was thought to play an

important role in their production.

Since the discovery of the gonococcus, new

facts have been developed, showing that instead of being limited to the genito-urinary tract,

the range of its morbid action is much more

extensive and not infrequently is radiated to

important internal organs. As a result of mod-

-ern investigations it may be positively affirmed that the gonococcus is susceptible of being taken up by the blood vessels and lymphatics, and

that it may affect almost every organ of the

body. Staining and culture experiments have

demonstrated its presence not only in the

ovaries, tubes and peritoneal cavity, which it

reaches through invasion of the intermediate

mucous membrane, but also in the lining mem¬

brane of the brain and cord, of the heart, of the pleura, liver, spleen, kidneys, as well as the joints and tendinous sheaths.

The number, variety and gravity of these

systemic manifestations has led to the serious

consideration of the question whether gonor¬

rhea is not to be classed as a constitutional affection. The cause or relation between these

systemic affections and the gonococcus has been proved by the identification of the gonococcus

in the lesions it has produced. These general

effects have been also ascribed not simply to the pathogenetic action of the gonococci, but to

their toxins and the presence of certain pyo¬

genic microbes associated with the gonococcus.

Complications. — The more common com¬

plications of gonorrhea are acute and chronic

inflammation of the postate and bladder and

seminal ducts and vesicles, the cord and testes.

Gonorrheal Arthritis. — One of the most

important complications of gonorrhea is seen

in certain joint-affections, which are usually

described under the term of gonorrheal rheuma¬

tism. This complication usually occurs from

the second to the third week of the disease,

but may develop as early as the fifth or sixth day. Gonorrheal arthritis manifests a remark¬

able affinity for the large articulations, as the knee and ankle joints, the hip and elbow. Only one joint may be involved, constituting what

is termed mono-articular arthritis, or a number of joints may be involved, constituting poly¬

articular arthritis. In the latter case, different joints are more likely to be involved in suc¬

cession, rather than simultaneously. As a re¬

sult of the inflammation of the synovial mem¬

brane, which is particularly involved, there often occur serous, fibrinous or purulent effusions.

It is essentially a hydrarthrosis, and in most instances the disease is confined to the synovial membrane of the joint during the whole course

of the affection. Gonorrheal arthritis is usually chronic in duration, often lasting from two to three or for many months. In some cases it

is chronic and practically indefinite. Anchylosis or immobility of the joint from rapid forma¬

tion of adhesions is a not infrequent termina¬

tion. Very often the tendinous sheaths, the

bursae and fascia may be involved.

Unfortunately the treatment of gonorrheal

rheumatism is extremely unsatisfactory. It does

not seem to be susceptible to the curative action of remedies which are valuable in attacks of

ordinary rheumatism. In quite a large propor¬

tion of cases there is more or less deformity or permanent disability.

Gonorrheal Ophthalmia. — There is usually

recognized a distinction between an ophthalmia

which is due to a septic absorption, like gonor¬

rheal rheumatism, and that form of purulent

conjunctivitis which is caused by direct trans¬

ference of pus containing gonococci to the eye.

The former never results from the direct inoc¬

ulation of the contagious matter. Its symptoms

are milder, and there are rarely changes which occasion adhesions or permanent injury to the

sight. On the contrary, purulent conjunctivitis

is due to the inoculation of the mucous mem¬

brane of the conjunctiva. The inflammatory

process is characterized by greater intensity and rapidity of action, and not infrequently results in partial or complete loss of vision. Unless

prompt and efficient treatment be at once in¬

stituted the cornea may rapidly ulcerate and

slough, and prolapse of the contents of the globe of the eye may occur through the perforation.

These changes are sometimes almost incredibly

rapid, taking place in three or four days, ex¬

ceptionally in 24 hours, and leading to com¬

plete destruction of vision. In the ophthalmia

of the new-born, the eyes of the child are liable to be soiled with the uterine and vaginal liquids containing gonococci — one of the most fre¬

quent causes of blindness. It is estimated that from 10 to 20 per cent of all blindness is

caused by gonococcic infection.

Gonorrhea in Women. — Our knowledge of

gonorrhea in women is essentially a modern

acquisition. Until within recent years it had

never been the subject of serious and careful

study. In the female the local and general ef¬

fects of gonorrhea are apt to be much more

serious and permanent, owing to the extent

and character of the structures exposed to in¬

fection. The greater extent of the genital tract permits a larger field for infection by direct continuity of tissue. The periodic vascular

changes incident to the menstrual period, and

the more pronounced modifications caused by

pregnancy, exert a marked influence in accen¬

tuating the gravity of gonorrhea in women.

As a result of these changes gonococci, invading the uterine cavity and ascending along the tubes and ovaries to the peritoneal covering, produce peritonitis. Not only do these inflammatory

changes imperil the life and health of the

woman (which danger, in many instances, can

only be averted by an operation involving the

sacrifice of her reproductive organs), but they may absolutely extinguish her hope of children.

Gonorrhea is one of the most prolific causes

of sterility. The inflammatory changes result in the blocking up of the channels of communica¬

tion between the ovaries and the uterine recep¬

tacle of the ovum, thus preventing contact with 48

the germinative spermatozoids. This mechani¬

cal obstacle to the passage of the ovum is, as a rule, permanent and irrelievable. It thus

happens that the aptitude of the gonorrheic

woman for conception is often extinguished

by the first pregnancy, the first child represent¬

ing the sum total of her productive energy. In this connection, it may be said that one of the complications of gonorrhea affecting the male

(epididymitis) is a very frequent cause of

sterility in men. Neisser believes that gonor¬

rhea in the male is responsible for 45 per cent of sterile marriages. The proportion of sterility due to the husband is variously estimated from 17 to 25 per cent, and almost the entire pro¬

portion of sterility in women is due to gonor¬

rhea communicated to her by her husband.

The low birth-rate of married women is not, as is generally supposed, always voluntary, but it often proceeds from physical causes relating to the health or productive capacity of the married parties; it is not from choice, but from inca¬

pacity.

Gonorrhea as a Social Danger. — Owing to

its great frequency, the persistent vitality and virulence of its germs, even after apparent cure, and especially to the grave nature of the in¬

fection in women, and the serious menace to the health and even the life of the victim — to say nothing of its destructive effects upon the pro-creative functions — gonorrhea is now regarded

by the medical profession as one of the most

formidable social plagues of our age. Every

year in this country thousands of young, inno¬

cent women are infected by their husbands,

who in most cases are not aware that they

carry with them the germs of a disease destined to wreck the health or lives of their partners.

Many such women drag out a miserable exist¬

ence of semi-invalidism, subject to painful or

difficult menstruation, no longer able to walk

freely, condemned to pass their days of suffer¬

ing in a reclining position; and after years, it may be, of this suffering, worn out and desper¬

ate, they apply to the surgeon, who, at the price of the sacrifice of their generative organs, ren¬

ders their existence possible in making them

castrated women.

GONSALVO DE CORDOVA, gonsal'vo de k6r'd6*-va (Sp. gon-tha'lo da kor'doba), in full Gonsalvo Hernandez de Cordova

y Aguilar, Spanish warrior : b. Montilla, near

Cordova, 1453; d. Granada, 2 Dec. 1515. At

the court of Ferdinand and Isabella, Gonsalvo

attracted much attention by his personal beauty, his knightly skill and the magnificence of his apparel and style of living. In the war with

Granada, 1481-92, he took many places by

storm and vanquished the boldest Moors who

dared to meet him in single combat. He was

selected to carry on the difficult and danger¬

ous negotiations with the Moorish king Abu

Abdallah (or Boabdil), which resulted in the

capitulation of Granada and the termination of

Moorish rule in Spain. He helped Ferdinand

II, king of Naples, to drive the French over

the Neapolitan frontiers, and in 1500 delivered Zante and Cephalonia from the Turks and re¬

stored them to Venice. In the war between

France and Spain, for the sovereignty of

Naples, Gonsalvo gained successive victories,

until by the fall of Gaeta, the French were

forced to yield their claim upon Naples. Fer¬

dinand now bestowed upon him the duchy of

Sessa, and appointed him viceroy of Naples,

with unlimited powers, which post he held until 1507, when the jealousy of the king caused his removal.

GONVILLE AND CAIUS (kez) COL¬

LEGE, a college of Cambridge University,

England, was founded in 1348 by Edmund

Gonville of Terrington, Norfolk, and endowed

for a master and three fellows. The original

site was between Free School Lane and the

churchyard of Saint Botolph's. In 1353 William

Bateman, bishop of Norwich, Gonville's ex¬

ecutor, established the college where the Gon¬

ville Court at present stands, and altered the name to the Hall of the Annunciation of

Blessed Mary the Virgin. In 1557 Dr. Caius

obtained the royal charter by which all the

former foundations were confirmed and his

own foundation was established. By this char¬

ter the college was thenceforth to be called

Gonville and Caius College. New statutes were

given by which the college is henceforth to ’

consist of a master, 30 fellows and 36 scholars.

The fellowships are all open, and are not va¬

cated by marriage, but terminate generally at

the end of 10 years from the full standing of M.A. The scholarships are also open. There

are also connected with this college four stu¬

dentships of medicine founded by Charles Tancred, and two Harrow scholarships. Sir Thomas

Gresham, Judge Jeffreys, Jeremy Taylor and

Lord Chancellor Thurlow were connected with

this college. Consult Venn, (Caius College)

(1901).

GONZAGA, gon-za’ga, Thomaz Antonio,

Brazilian poet ; called the Portuguese Anacreon : b. Oporto, August 1744; d. Mozambique, 1809.

After studying law in the University of Coim¬

bra, Portugal, he returned in 1768 to Brazil to enter on an official

career, where he eventually became judge at Villo Rica in the province of Minas. In 1788 he was about to marry Maria

de Seixas, a young lady of distinguished beauty, when he became involved in a political con¬

spiracy. The court condemned him to perpetual

exile on an island on the coast of eastern

Africa, which by special favor it was commuted to 10 years' banishment to Mozambique. He

left Brazil in 1793, and was attacked by fever soon after reaching Africa, from which he re¬

covered only to fall into madness from the ef¬

fect of the climate. The most interesting of

his poems were composed during his captivity,

and celebrate in mournful and tender verse the object of his love under the name of Marilia.

These are the finest collection of erotic verse written in Portuguese to one person. They are

popular alike in Brazil and Portugal, and 'have been often reprinted. In grace, tenderness,

purity of style and harmony of verse, Gonzaga

ranks among the first Portuguese poets.

GONZAGA FAMILY, a noted Italian

family which held the supremacy in Mantua

1328-1707. On 14 Aug. 1328 Ludovico (or

Luigi Gonzaga) assumed the sovereignty after

his sons had driven out the Bonacorsi family

and taken possession of Mantua. He died 1360,

aged 93. Among his descendants, Gian Fran¬

cesco Gonzaga, in 1432, obtained possession of

the city, with its territory, under the title of marquisate, as a fief from the Emperor Sigismund. Gugliemo (1550-87) and Vicenzo (1587-

1612), both rulers of note, were patrons of

the Tasso family, the father of the poet having been secretary to the former. Among the

noted scholastics of the family was Luigi Gonzaga (1568-91), a Jesuit who, canonized as

Saint Aloysius, became the patron saint of

students. With Vincenzo II, the reigning line

became extinct in 1627. The next heir would

have been the Duke of Nevers, but the Duke

of Guastalla, Ferdinand II, one degree more

remote, laid claim to the whole inheritance,

and Charles Emanuel, Duke of Savoy, claimed

Montferrat. It was evident that the Louse of

Nevers had a legal right, and France, Venice

and the Pope supported him. Spain and

Austria, on the other hand, supported the

groundless claims of the Duke of Savoy,

whence arose a war concerning the Mam

tuan succession, which ended with the

triumph of Charles, Duke of Nevers. His

grandson, Charles III, succeeded him in

1637, and during his reign the principality ob¬

tained full independence. He died in 1665.

Many persons of his family have obtained mili¬

tary renown. Others have been conspicuous

for their love of the arts and sciences. Cˆsar, in 1565, erected the academy Degl'invaghiti; and others of the family founded galleries of paint¬

ings and antiquities. Giulio Romano, under their patronage, established an extensive school for

painting, and many celebrated artists received

from them support and honor. Consult Hare,

C., (A Princess of the Reformation) (New

York 1912) ; Solari, E., (Ercole Gonzaga)

(Venice 1904) ; Symonds, (The Renaissance in

Italy> (London 1898).

GONZALES, gon-sa'les, Count Feman,

a half mythical, half historical character who

figures prominently in the literature of the

early days of the conflict between Moor and

Christian in Spain, d. 970. Legend makes him

the hero of many battles and credits him with playing a prominent part in the recovery of

Castile from Moorish control. He first came

into prominence at the battle of Osuma (934) ; and his activities were confined to the northern part of Spain. A long poem in praise of

Fernan Gonzalez still survives. It covers the

period between the first incursion of Spain by the Goths and the year of the battle of Moret (967). This poem, which in general is prosy,

affords little that is not told elsewhere. It

seems to be a poetical copy of the (General

Chronicle) of Alfonso the Wise, and to have

been intended for public recitation. Many of

the incidents of the heroic struggle between

Christian and Mohammedan are spiritedly told,

and the form of the poem and its simplicity are well calculated to interest the age for which it was written. It is undoubtedly one of the many imitations of the (Book of Apollonius) (q.v.)

and the popular poems of Berceo. In fact the

opening of this chronicle of the doings of

Fernan Gonzalez consists of an invocation

copied from Berceo's (San Domingo de Solis.*

But the imitation, in general, ; is one of style, division and handling of subject and employ¬

ment of the rhyme form common to the (Apollonius) and Berceo.

GONZALES, Manuel, Mexican soldier and

statesman: b. near Matamoros, 18 June 1833;

d. Mexico City, 8 May 1893. He entered the

army in 1839 and fought under Juarez in 1861.

In the war against the French he joined Esco—

bedo in 1865 and was made a brigadier-general

and governor of the legislative palace. Later

he joined the party of Diaz and took an im¬

portant part in the battle of Tecoae (1876)

which gave Diaz the upper hand in Mexico and

made him President. He was Secretary of War

under Diaz, 1877-80, and followed him as Presi¬

dent of the Mexican Republic, 1889-84. After

his retirement he was governor of Guanajuato.

GONZALO DE BERCEO, gon-tha'lo da

bar-tha'o, who flourished during the first half of the 13th century, was a secular priest of San Millan Monastery, Spain, and an innovator in

Spanish poetry. Little is definitely known of

his life; but from internal evidence in his

works, he probably died about 1260 at an ad¬

vanced age. His writings are all of a religious character and breathe the spirit of faith and

simplicity of his age. Berceo, as he was popu¬

larly known from the place of his birth, con¬

siderably improved the written Spanish of his

day, but his work lacks the power, movement

and vivacity of the Cid. Berceo's innovation in Spanish literature consisted in the use of what he called the ((quaderna via,® a succession of four lines rhyming with one another. This was

a peculiarity which attracted attention at a

time when the Spanish language was just be¬

ginning to graft rhyme on to its alliterative

verse. It caught the public fancy to such an

extent that there followed a deluge of rhyme,

which was often far from being wisely or

artistically used. However, on the whole, the

introduction of Berceo was of decided advan¬

tage to Spanish poetry ; and his rhyming sys¬

tem was not only imitated, but continued to re¬

tain its popularity for more than two centuries.

The works of Berceo, which are of consider¬

able extent, consist of poetical lives of San

Millan, San Domingo de Silos, and Santa Orita

of the (Martyrdom of San Larenzo,* (Signs

Preceding the Last Judgment,* various poems

on the Madonna, including the (Miracles of the Virgin) and the (Madonna at the Cross, *

hymns and poems on the mass. Nearly all of

this work is written in the four-line inter—

rhyming stanzas introduced into Spanish litera¬

ture by Berceo. The popularity of the subjects treated in a religious age and the novelty of the rhyme raised up for Berceo a school of imita¬

tors many of whom carried the repetition of

rhymes to a wearisome excess. Berceo prob¬

ably borrowed his system of rhyme from Apol¬

lonius of Tyre, though similar rhymes had been used, sparingly, however, by the troubadours,

as early as 1100. It seems probable, therefore, that it mav have come into Spain from

Provence. Berceo was the first to give it a

permanent place in Spanish literature in 1230,

where it still survived at the end of the 14th century. Though of no great reach of imagina¬

tion Berceo, by the carefulness of his rhymes, the beauty of his versification and the general harmony of his language at such an early age

in the history of the Spanish tongue,' has

placed the literature of his country under deep obligation to him. He expresses the spirit that inspired him, in (The Life of Santo Domingo,*

which is the opening poem of his published

works, when he says : (<I intend to tell a story in the plain Romance, in which the common

man is accustomed to converse with his neigh¬

bors.® This choice of the vernacular was for¬

tunate for the popularity of Berceo, and doubly 50

fortunate for the popular speech which had

already began to show its possibilities. Con¬

sult Ticknor, G., (History of Spanish Literature) (New York 1854) ; Wolf, F., (Ueber die

Lais5 (Wien 1841) ; or any good work on

Spanish literature.

John Hubert Cornyn.

GOOBER, or GOUBER. See Peanut.

GOOCH, Sir Daniel, English engineer:

b. Bedlington, England, 24 Aug. 1816; d. Clewer Park, Berkshire, 15 Oct. 1889. Besides invent¬

ing various improvements in the building of

locomotives, he was active in furthering the

laying of the first transatlantic cable, on the completion of which he was created a baronet.

He sat in Parliament 1865-85. He was one of

the superintendents of the Great Western Rail—

Avay 1837-64, and chairman of the company

from 1865 until his death.

GOOCH, Frank Austin, American chemist:

b. Watertown, Mass., 2 May 1852. He was educated at Harvard and was assistant in the chemical laboratory there, 1872-75. He was subsequently chemist on the Northern Trans¬ continental Survey and United States Geological Survey, 1878-86, and has been professor of chemistry at Yale from 1886. His publications include (Analyses of Waters of the Yellow¬ stone Park,5 with J. E. Whitfield (1888) ; Re¬ search Papers from the Kent Chemical Labora¬ tory of Yale University5 (2 vols., 1901) ; Out¬ lines of Inorganic Chemistry,5 with C. F. Walker (1905) ; laboratory Experiments with C. F. Walker5 (1905) ; Outlines of Qualitative Chemical Analysis,5 with P. E. Browning (1906) ; (Methods in Chemical Analysis5

(1912); Representative Procedures in Quan¬ titative Chemical Analysis5 (1915). He also contributed to Rumpelly's (Mining Industries of the United States5 (10th census, 1886), and to (Explorations in Turkestan5 (Carnegie In¬ stitution Report 1908) ; and research papers to the American Journal of Science, the Zeitschift Anorganische Chemie and other journals.

GOOCH, Sir William, English colonial ad¬

ministrator: b. Yarmouth, 21 Oct. 1681; d. Lon¬ don, 17 Dec. 1751. He was a soldier of Marl¬ borough in the Netherlands, and was governor of Virginia from 1727 to 1747. In 1740 he accompanied Vernon's expedition against Car¬ tagena, and in 1749, after a generally excel¬ lent and successful administration, returned to England and was created a baronet. During his term of office he opposed religious tolera¬ tion to religious organizations other than the Establishment.

GOOD, James Isaac, American (German) Reformed clergyman: b. York, Pa., 31 Dec. 1850. He was graduated from Lafayette Col¬ lege, Easton, Pa., in 1872; entered the Re¬ formed ministry and has been successively pastor of Heidelberg Reformed Church, York, Pa., -1875-77; Heidelberg Reformed Church, Philadelphia, 1877-90, and Calvary Reformed Church, Reading, Pa., 1890-93. From 1893 to 1907 he was professor of dogmatics at Ursinus College, and professor of liturgies in Central Theological Seminary Dayton, Ohio, since 1907.

He has published (Origin of the Reformed Church of Germany5 (1887); (History of the Reformed Church of Germany5 (1894) : Ram¬ bles Round Reformed Lands5 (1889) ; (History

of the Reformed Church in the United States5 (1899) ; (History of the Reformed Church in the United States in the Nineteenth Century5 (1911); (History of the Reformed Church of Switzerland since the Reformation5 (1913) ; also (Famous Women of the Reformed Church5 (1901) ; (Famous Missionaries of the Reformed Church5 (1903) ; (Famous Places of the Reformed Churches5 (1910) ; (The Heidel¬ berg Catechism in its Newest Light5 (1914).

GOOD, John Mason, English physician and author: b. Epping, Essex, 25 May 1764; d. Shepperton, Middlesex, 2 Jan. 1827. In 1793 he removed to London, where he carried on busi¬ ness for several years as a surgeon and apothe¬ cary, and after 1820 practised as a physician. His principal works are (Memoirs of the Life and Writings of Dr. Alexander Geddes5 (1803) ; translations of Solomon's Song and

the ‘Book of Job; a translation of Lucretius

(On the Nature of Things5 (1805) ; (Medical

Technology5 (1810) ; (A Physiological System

of Nosology5 (1817) ; (The Study of Medicine5

(1822), and (The Book of Nature5 (1826).

GOOD COUSINS, the name by which the

members of the Carbonari Society were known

among themselves in Germany and France.

The society of the charcoal-burners (Carbonari)

is undoubtedly one of the oldest in Europe.

Some writers on the subject have claimed that

its originator was Philip of Macedon, father of Alexander the Great, while others trace its

origin to the union of charcoal-burners in Ger¬

many in the 12th century for self-protection

against soldiers, robbers and other enemies.

By the 16th century the secret society of the charcoal-burners was strong enough to force

Ulrich, Duke of Wiirttemberg, to abolish cer¬

tain oppressive forest laws. These societies,

which, in their mystical rituals, exhibited a

curious mingling of Christianity and paganism,

spread rapidly throughout the wide forest areas of Germany, France and adjacent countries,

where their secrecy and their faithfulness to the obligations of their

secret society oath became the highest symbol of faithfulness. In Italy,

it was customary to affirm anything strongly by asserting that the statement or promise was

made (<on the faith of a Carbonaro.55 Political plotters in various countries took refuge in the forest, and there, to disarm suspicion, assumed the role and life of charcoal burners and

venders. This enabled them to go into the

cities and towns and the strongholds of their

enemies and there to spy out the land and

meet with other plotters. Thus the Carbonari

frequently played their part in the troublesome politics of Europe, extending their sway and

their methods as far as Ireland and Scotland ; and everywhere the Carbonari were known to

one another by an elaborate series of ritualistic signs, international in their import and inter¬

pretation. This ritualistic organization seems

to have been the result of the combination of the wood-cutters and charcoal-burners societies

upon which was grafted a ritual formed, in part at least, by the political refugees and plotters, who succeeded in giving the association a

world-wide importance, mystic significance and

executive organization it could scarcely other¬

wise have had. Francis I of France plays a

prominent part in the traditions of the Car¬

bonari, at whose feasts the grand master of

the order drinks his health, as its founder. The tradition runs that the king, while out hunting, got lost in the forest. There he was enter¬

tained by the charcoal burners and initiated

into their secret order, in which he afterward took a great interest, elaborating the ritual into which he introduced a deep symbolism. In

this tradition there is probably a shadowy re¬

membrance of the fact that Francis I ‘extended his protection to the Waldenses, many of them

forest people, who had taken refuge in his king¬

dom. One of the traditional leaders of the

Carbonari (who seems to have been a historical character) was Theobald, a hermit of noble

rank who lived in the forest of Suabia ; and

he is said to have become the patron (during

his life) and adviser of the charcoal-burners.

He was canonized by Pope Alexander III in

the 12th century and adopted by the Carbonari

as their patron saint. The deeds attributed to him are a curious commingling of pagan and

Christian traditions which are reflected in the ritualistic hymns which the Carbonari address

to him, invoking his aid as the chief good

cousin of all the (<Good Cousins.® This ritual¬

istic term which has long been employed by

the members of the Carbonari to designate one

another seems to have been first employed by

the wood-cutters of the department of Jura

(France) who termed their secret society <(le

bon coucinage® (the good cousinship), a name

adopted by the Carbonari and applied also to

the individual members of the association, the

first and second degree's of which were termed, respectively, that of the Fendeurs (wood-cut¬

ters), and that of the Carbonari (coal-burners). In the pre-revolutionary days of

France (1770-89) many of the members of the

French Chambers and of other associations

tinged with Republicanism were members of the

Fendeurs, of which there were secret societies

in most of the great centres of population in France, including the capitol itself. The Good

Cousins societies, which afterward became too

strong in southern Italy, were introduced into

that country by returning soldiers who had

taken part in the Napoleonic wars, or by

exiles who had lived in Germany and Switzer¬

land during the occupation of Italy by the

French. The lodge or meeting-house of the

Carbonari was known as the vendita ; and the

decrees of the society were popularly repre¬

sented as those of the vendita. The first lodge or vendita of the Carbonari in Italy, of a formal character, was opened in Capua under the pro¬

tection and auspices of the British, who wished to use the association as a means of uniting

the Italians, in secret societies, against Napo¬

leon. The order, thus encouraged, spread ra¬

pidly, became much better organized and played

a prominent part in the political wars and rev¬

olutionary movements of Italy. See Car¬

bonari.

Bibliography. — Bandini, (Giornali e scritti

politici clandestini della Carboneria Romagnola

1819-21 > (Rome 1908); Cantu, C., (I1 concilia—

tore e i Carbonari } (Milan 1878) ; Colleta,

(Storia del reame di NapolP ; Craven, Hon.

R. K., CA Tour through the Southern Provinces

of Naples) (London 1821); De Witt, (Les societes secretes de France et d'ltalie > (Paris

1830) ; Heckethorn, (The Secret Societies of

All Ages and Countries) (New York 1897) ;

Johnston, R. M., (Napoleonic Empire in South¬

ern Italy and the Rise of the Secret Societies>

(London 1904) ; Orloff, (Memoires sur le royaume de Naples-1 ; (Memoirs of the Secret So¬

cieties of Southern Italy > (London 1821);

Pelico, Silvio, (Le mie prigionP (1832); Pepe,

(Relacion des Evenements Politiques et Mili¬

tates a Naples en 1820 et 1821 > (Paris 1822) ; Saint Edme, Constitution des Carbonari

(Paris 1821) ; Santini, L., (Origine della Carboneria) (1821); Wrightson, R. H., (History

of Modern Italy > (London 1855).

John Hubert Cornyn.

GOOD FRIDAY (God's Friday), the

name applied by the Church of England to the

Friday before Easter, sacred as commemorating

the crucifixion of our Lord; the Great and

Holy Parasceve is the Greek title of it, and it is called in the Roman Missal the Parasceve.

This day was kept as a day of mourning, of

rigid fast and of special prayer from a very

early period. Eusebius (260 a.d.) says that the day had been observed long before his time.

Constantine ordered a cessation from all labor

on that day. It was one of the two paschal

days celebrated by the Christian Church, and

in memory of the crucifixion was called by

the Greeks Pascha Staurosimon or the ((Pasch

of the Cross.® In the Roman Catholic Church

the service of this day consists of what is

called the Mass of the Presanctified, the sacred host not being consecrated on Good Friday,

but reserved from the preceding day. Com¬

munion is forbidden on Good Friday, except

in the case of the celebrant and of sick persons.

The most striking part of the ceremonial is

the ((adoration of the cross,® or, as it was called in the Old English popular vocabulary, <(creeping to the cross.® The black covering is re¬

moved from a large crucifix which is placed

before the altar, and the entire congregation,

commencing with the celebrant priest and his

ministers, approach, and on their knees rever¬

ently kiss the figure of our crucified Lord.

The very striking office of Tenebrce (darkness) is performed on Good Friday, as well as on the preceding two days : it consists of the matins and lauds of the following day, and has this

peculiarity, that by the close all the lights in the church have been gradually extinguished except

one, which for a time (as a symbol of our

Lord's death and burial) is hidden at the

Epistle corner of the altar.

In the Church of England, and in the Prot¬

estant Episcopal Church of the United States,

as well as in the Roman Catholic Church, Good Friday is celebrated with special solemnity:

proper psalms are appointed, and one of the

three special collects is a prayer for *all Jews, Turks, infidels and heretics.® In some churches of the English Church, and of the Protestant

Episcopal Church, the improperia, or reproaches, adopted from the Roman service, are sung;

and Bach's passion music is frequently heard.

The (Three Hours' Devotion, > borrowed from

Roman usage, with meditation on the (seven

last words) from the Cross, and held from 12

till 3, when our Lord hung on the Cross, is a service of Good Friday that meets with in¬

creasing acceptance among the Anglicans. In

England and Ireland Good Friday is by law a

dies non, and all business is suspended; but this is not the case in Scotland or the United States.

In Scotland the day till recently met with no 52

peculiar attention, except from members of the

Episcopal and Roman Catholic communions ;

but of late years services have been held in

many Presbyterian churches, and there is a

growing disposition to fall in with the rest of Christendom in the observance of this day.

GOOD HOPE, Cape of. See Cape of

Good Hope.

GOOD ROADS MOVEMENT, The.

The country road is coming into its own in the recent and current <(good roads movement.® The

importance of the rural highways of the nation has been long neglected, in comparison es¬

pecially with the railroad. Canals and water¬

ways — the other great natural means of trans¬

portation — have been likewise neglected. The

American attitude toward transportation thus

practically reverses the European way of re¬

garding the problems; for in the leading con¬

tinental countries, the highways and waterways

are the principal means of transport and are

regarded as such. This is due to the conditions of our national development, and the time now

seems ripe for a continued interest in the com¬

pletion of a highway system, and a renewed

interest in canals, in order to supplement and render adequate to its special function the vast system of railroads that has been created.

In the first beginnings of our westward ex¬

pansion roads occupied an important place, but

for a while, in the early decades of the last century, were superseded by canals and water¬

ways, as the principal trunk lines of transpor¬

tation to the opening West. However, the out¬

standing fact that the river systems were sepa¬

rated by important geographic features, together with the need for more direct and rapid transit, made road-building still important. The

((railroad® coming into practice about 1830

was really but a greatly modified road, and a supplement to the existing waterway system.

But from its beginning it came rapidly to

supersede all other means of long-distance

transport, and has continued its growth and

importance in the focus of interest, to the

present. The decline of the waterways was very rapid and almost complete, until the very recent awakening of interest in them, as one phase of the conservation of national resources (1908).

Roads became a merely local matter — mere

feeders for the greatly growing railroad

system — the decline of local markets, the cen¬

tralization of industry and commerce in the

great centres, and the urgent need for opening of new roads, all combined to give the highways a secondary place in the national transportation problem.

Within the last 75 years, however, the Good Roads Movement has brought the highway to a place of first-rate importance. It constitutes undoubtedly one of- — if not the — most im¬ portant chapters in rural progress of the last generation. This is indicated by the fact that in the proceedings of the Country Life Com¬ mission (1908), throughout its tour of investi¬ gation in every part of the United States, the matter of ((good roads® was a universal and constant topic of discussion. Within the last 10 years too, State activities in relation to high¬ ways has become one of the largest expenditures of the State governments, ranking next after education, charities and corrections, and at times even superseding these in importance.

The discovery and use of new and distinct sources of State revenues would seem to guar¬ antee the continuance of this activity. More¬ over, the new administrative arrangements under which State aid and control are carried on constitute one of the principal forms of governmental centralization in recent years.

The general strength of the movement may be judged from the following current figures:

The rural public roads of the United States at the present time have a total length of 2,456,000 miles (nearly tenfold the railway mileage). Of this immense total, constituting our achievement in road-building as a nation, to date, already some 12 per cent, or 300,000 miles, are ˆimproved® with some sort of hard surfacing. This is practically all the result of the activities associated with the Good Roads Movement' since 1890.

Thus viewed the movement seems scarcely begun, and the immensity of the task of im¬provement appalling. But it must be remem¬bered that at least half of this enormous mile¬age of pioneer highways consists of roads that are but little used and quite unnecessary. These may with advantage be closed and hence re¬quire no improvement. ˆRelocation® will also in a vast number of cases much reduce the distance, lessen grades and otherwise reduce the problem of good roads for the nation to the limits of a measurable task.

During recent years the total mileage of all roads has remained practically stationary, but

the total mileage of surfaced roads has in¬

creased at the rate of about 15,000 miles per annum. The pioneering work of opening new

roads has thus been accomplished ; the problems of the present and immediate future are those

of maintenance, improvement, relocation and

administrative control.

The year 1917 naturally showed a decrease

of 5,000 miles from the average rate, due pri¬

marily to war conditions, such as scarcity and high price of labor and materials. The in¬

crease in the cost of road work is conservatively estimated at 50 per cent, so that the continuance of the movement even at the present reduced

rate is indicative of its strength and perse¬

verance.

For the years from 1904 to 1916 the expendi¬

tures averaged an annual increase of 12 per

cent. And practically every legislative session

sees some new and important highway measure

enacted, creating new departments and extend¬

ing the powers of those already existent.

From the beginning of the present movement

to good roads the total State expenditures,

under State laws and State administration, have amounted to about one-third billion of dollars

($307,937,833). The rapid increase of this

phase is seen in the growing importance of the State funds both in absolute amount from year

to year, and relatively to the amount of local expenditure. The State aid of 1904 was $2,-

549,912; of 1913, $37,438,172; and. of 1916,

$40,969,001. Thus at present approximately 13

per cent of the expenditures on the highways

of the country come from the State treasuries.

While at present there is still some $15,-

000,000 annually expended in the form of <(convict labor® and <(statute labor,® this element

seems liable to grow less and the measure of

road improvement to be the amount of cash

expenditure for skilled labor and direction.

It must not be thought, however, that State

activity constitutes the Good Roads Movement.

Its total volume is as yet relatively small, though concentrated and consequently more spectacu¬

lar and noteworthy. Its truer measure of im¬

portance is the degree to which it constitutes a pace-maker for new ideas and policies in

road work. The State and State-aided roads

are practically model-roads, and not the least

of the influence of the State highway depart¬

ments has been their advisory and informational activities. The multitudinous local improve¬

ments, too, of the districts, townships and

counties on their own initiative and responsi¬

bility constitute in total a vast volume of road betterment.

Nor can private enterprise and efforts be

neglected in appraising the total movement.

The great new automobile trunk lines, stretch¬

ing between all the great cities, and even con¬

necting coast with coast, are of first-rate im¬

portance, and constitute indeed the most note¬

worthy examples of road-improvement in the

country. These, with the many minor through—

roads which have resulted from the mapping

of routes, associated with State and nation¬

wide touring, are most important, yet do not

come within the scope of the data given.

Transportation has been from the beginning

one of the principal problems of our national

life and it has been dealt with energetically and with largeness of vision at every stage. The

existing network of highways, canals and rail¬

roads flung across the continent in a century, however imperfect in detail and co-ordination,

is a marvelous achievement. Similar large ideas and strenuous efforts are now being put into the Good Roads Movement. The countries of

Europe, with whose highways we are accus¬

tomed to compare ours, have had no such con¬

ditions or needs to face. The history of the

Good Roads Movement, more especially of

recent years, is ample evidence that American

road-builders can crown the work of the last

century, with a couple of decades of rapid

progress toward perfect highways.

For although what is technically known as

State aid, and the Good Roads Movement, is

not really new, it had its latter day origin in 1891 in New Jersey. Kentucky had early in the last century appropriated as a State money for the support of certain toll roads, and New

Hampshire had also extended State aid for

certain specified roads, but no co-operative plan between States and their subdivisions (counties, towns, townships) had been thought of, nor

did any such appear until the date mentioned.

Prior to 1800 there were few roads in the country that deserved to be characterized as "improved.® In 1796 there was but one turn¬ pike on the continent, 66 miles between Lan¬ caster and Philadelphia, built by a private com¬ pany, and hardly conforming to our ideas of a macadam road. Another noteworthy early "turnpike® (socalled from the revolving beam that obstructed the passage at the tollgates) was the ((Wilderness Road® from the Shenan¬ doah Valley in Virginia westward to Kentucky, and still operated in 1895 by the Wilderness Turnpike Company. To supplement such private ventures, many attempts were made to secure road contributions from the National government in the early days of the Constitu¬ tion, but the only road of importance so

financed was the Cumberland road, largely macadam, stretching for 800 miles from Cum¬ berland, Md., to Vandalia, Ill.

The construction of macadam roads in those days was well-nigh prohibitive from the cost

and “corduroy® (log-surfaced roads) were

often built, across wet and soft stretches.

These became very common and with the ad¬

vent of the sawmill were supplemented by

“plank-roads,® particularly for the “toll® roads.

These were a great improvement over the cor¬

duroy, cheaper than the macadam to construct,

but expensive in maintenance. But over such

highways, aided by the rivers, canals and

the beginnings of the railroad system, the great westward pioneering movement took place.

Then after the wave of internal improvements

had swept over the various States in the years from 1835 to 1840, road construction gradually

became a local matter, except where turnpike

companies continued to build stretches of toll—

roads. Even for these, the advent of the rail¬

road lessened the need. Henceforth, little

private or public money was expended upon

the roads ; “working out the road tax® became

the common method of opening and maintain¬

ing highways. Poor roads were the inevitable

result and this general situation continued till long after the Civil War. Then, the rise of

cities, and the beginnings of better paved

streets, made glaring the contrast with the

awful condition of the heavily traveled roads in the vicinity of the great cities. The agitation for better roads grew rapidly and assumed the

importance of a “movement® from 1890 on,

especially in the long settled and highly urban States of the East.

The widespread use of the bicycle and in

more recent years of the automobile has given

great impetus to the movement. In 1916 there

were 3,500,000 registered automobiles — the num¬

ber having doubled since 1914 — making a total of $25,000,000 available from registration and

license fees, of which some $16,000,000 was

under State control, and about $8,000,000 sub¬

ject to the local governments. This amount

constitutes almost onehalf of the total annual expenditure for roads by the State govern¬

ments, and is a good example of the important place the coming of the automobile plays in

road improvement. The bicycle had preceded

the automobile. By 1899 the “craze® was at its height, and over 1,000,000 wheels were turned

out in that year. But by 1904 the interest had so fallen that the product fell to one-sixth of its former volume, and has since remained

stationary. It had, however, done its work for the Good Roads Movement. The rural problem

became a very conscious one also, in this last decade of the century, and gave a new meaning to every movement for the betterment of agri¬

cultural industry and country life.

The movement, too, has been greatly fur¬

thered by the progressive development of road

machinery. For the use of broken stone on

road surfaces depended very largely upon the

development and use of road rollers and stone—

crushers. Most noteworthy and epoch making

of all, however, in its widespread effect upon roads in all parts of the country, was the ap¬

pearance of the “King Drag.®

State action may very well be taken to mark

the rise and development of the Good Roads

Movement and its progress may be conveniently

chronicled by the order in which the various

States have so acted. Their dates are as fol¬

lows : New Jersey, 1892; Massachusetts, 1893;

Vermont, 1894; Connecticut and California,

1895; New York and Maryland, 1898; Maine

and North Carolina, 1901; Rhode Island, 1902;

Pennsylvania, New Hampshire and Delaware,

1903; Ohio and Iowa, 1904; Illinois, Minnesota, Michigan, Idaho and Washington, 1905; Vir¬

ginia, 1906; Missouri, 1907; Georgia, 1908 (but still provides for convict labor only) ; Arizona, Colorado, New Mexico, North Dakota, Utah,

West Virginia, 1909; Louisiana, 1910; Ala¬

bama, Kansas, Nebraska, Oklahoma, Nevada,

South Dakota, Wisconsin, Wyoming, 1911;

Kentucky, 1912; Arkansas, Montana and

Oregon, 1913; Florida, Tennessee and Missis¬

sippi, 1915. Indiana, South Carolina and Texas

have as yet taken no action.

Naturally the particular form and measure

of action taken by these different States differs widely and it is perhaps unfair to so list them, except as a general indication of the scope and direction of the Good Roads Movement. But

the general model was early set and although

there have from time to time been new features added and new policies entered upon, the move¬

ment has been progressive and cumulative and

is now well established in all its essential

features.

In 1889 a general county-road law was passed

by the New Jersey legislature, permitting

counties to issue bonds for broken stone or

hard road construction, and to assess one-third of the cost upon property abutting. Two years

later she passed a State Aid or State Highway Law (re-enacted 1892) which was the beginning

of systematic road improvement in the United

States , under the direction of State officials and with the aid of State funds. Before the close of that year the State paid some $20,000 to

Middlesex County to help meet the cost of

about 10 miles of broken stone road in the vi¬

cinity of Brunswick and Plainfield. Thus was

begun the Good Roads Movement of recent

years.

In 1894 the official State commissioner of

public roads took the place of the president of the State Board of Agriculture, who had ex-officio acted for the State. The movement was

thus fairly launched with the following general policy: Under the original act the State paid

33.3 per cent, abutting property owners 10 per cent, and the counties the remainder. The ini¬

tiative was with the property ‘owners.

Soon the demand for trunk-line improve¬

ments led to the establishment of a continuous system of State roads. The cost of improve¬

ment and maintenance of these was borne en¬

tirely by the State, and all work planned and supervised by the State Highway Department.

Also certain county-roads were improved by

State aid, the State paying 40 per cent of the cost, if the improvement was approved by the

State commission. But these roads are main¬

tained by the counties. The funds for State

aid included appropriations from the legislature and receipts from motor-vehicle licenses and

fines. From such sources to the end of 1915

New Jersey had expended about $8,500,000 for

road improvements. The Good Roads Move¬

ment then began under especially favorable

conditions and acquired powerful initial im¬

petus.

Massachusetts, with the same general condi¬

tions, became active in the movement about the same time. As result of a legislative committee of investigation, a State Highway Commission

was established in 1893, and the first appropri¬

ation made next year. The system is more

highly centralized than in New Jersey. Roads

are improved by the State on petition of the

local authorities, the State paying 75 per cent and the county 25 per cent. Also a certain sum is set aside each year for the direct assistance of the smaller and poorer towns.

The Massachusetts law has particular merit

in being more explicit in regard to maintenance than are State highway laws in general, even

those of later date. Of the funds derived from motor vehicle licenses 80 per cent must be ex¬

pended for maintenance, and special appropria¬

tions are made each year for this same purpose.

Also, the counties refund 25 per cent of the

sums expended by the State for maintenance of

State roads within their boundaries.

The funds in this State are. derived from

State bond issues , usually running five years, one-fifth being issued each year. This system of financing has enabled this State, to become a

leader in expenditures for road improvements,

the amount to the end of 1915 being nearly

$20,000,000. New York adopted State aid in

1898, but has since become the leading exponent of the system. After various changes in the

scheme of organization the work was placed

in charge of a single State Highway Commis¬

sioner who appoints three deputy commission¬

ers. In their charge there are four classes of roads: (1) State roads, improved and main¬

tained wholly by the State; (2) county roads,

improved and maintained jointly by the State,

county and town; (3) country roads, improved

and maintained wholly by the. counties; (4)

town roads, improved and maintained by the

towns, assisted by the State. All classes of

roads are thus assisted and very large expend¬

itures are thus called for. New York leads in amounts expended. A bond issue of $50,000,000

was authorized in 1906 for the improvement ‘of a system of county roads (8,380 miles), to which was subsequently added a system of State roads comprising 3,617 miles. This is a landmark in

the history of the Good Roads Movement and it was followed by another bond issue of $50,-

000,000, authorized in 1912, of which $20,000,000

was for construction and maintenance of State

roads and $30,000,000 for the completion of the county-highway system. The apportionment of

the funds among the counties is on the basis ‘of population, mileage of roads outside cities and villages, and the total area, each factor having a weight of one-third. The total sum expended

by the State to the end of 1915 was about

$97,000,000, or nearly one-third of the total

amount expended by all the States since the in¬

ception of the movement.

Ohio enacted State highway aid laws in

1904. A system of main market roads is im¬

proved and maintained jointly by the State and the counties ; the county and town roads are

improved and maintained by the local authori¬

ties, under State supervision. Under this ar¬

rangement the total amount of State aid to the end of 1915 has been about $8,500,000.

Iowa entered the movement the same year

and has, since 1904, a State Highway Commis¬

sioner. Road improvements are made by the

counties under State supervision and advice.

Main roads, not exceeding 15 per cent of all

roads in a county, are improved and maintained as county roads ; all others are town roads.

Conditions in Iowa call rather for care in main¬

tenance through dragging than for construction,

hence the total expenditure of State funds has not exceeded $300,000 by end of 1915. This

great agricultural State, with its large road

mileage, and exceptional number of automo¬

biles, thus ranks lowest o.f any ‘of the important States, except Indiana, in the Good Roads

Movement.

The expenditure of State funds for rqad im¬

provement throughout the United States has

proceeded in accordance with one or other of

the methods outlined above. A commission,

with an executive commissioner, or one of

these, constitute the models for organization.

The diversion of motor-vehicle fees to State

road improvement is practically universal and

represents the consensus of opinion that these

are the principal, though not the sole factor, in occasioning the need and demand for good

roads. The distinction between State roads and

State-aid roads is quite common, while a large field for strictly local effort is generally left free. There is a strong tendency to financing

by extension bond issues rather than by direct appropriation. Generally the action of the

State goes beyond being merely informational

and advisory.

But there is still much variety both in the

manner of giving State aid and in the sums

given. In California the advisory board of the State department of engineering has general

supervision of road work and a subdivision of

this board is the State Highway Commission.

The State may assist in the improvement of

any road of State importance, but under the

act of 1910 a specific sum was provided for the improvement of a system of State roads, which

in a general way is defined in the act. The sys¬

tem is thus constructed and maintained wholly

by the State, but the counties refund a part

of the cost in small yearly instalments. Funds are derived from bond issues and by special

appropriations, amounting by the end of 1915

to about $15,000,000. California thus ranks

with the States which have entered largely into road building. She has special conditions in

nearly every part of the State which render

State aid peculiarly necessary and advisable.

Other Pacific and Mountain States may like¬

wise be expected to become foremost in State

action because of similar conditions.

Missouri has established the office of State

Highway Commissioner. There is a State

stamp tax on certain documents, the proceeds

of which are divided among the counties in

proportion to the number of school children.

Special appropriations are made for dragging

roads. The amount of State aid to end ‘of 1915

was about $1,500,000.

Georgia has a law for utilizing convict labor

on the roads but has no State Highway Depart¬

ment, nor does it otherwise take part in road improvement. Delaware has a State Highway

Commissioner for one county only. Alabama

has a State Highway Commission. Roads are

improved jointly by the State and the counties, each paying onehalf the cost, but to the end of 1915 the sum amounted to only onehalf mil¬

lion. Kansas gives no money for construction,

but it has a State engineer, a part of whose duty it is to furnish plans, specifications and advice. Nebraska has a State Board of Irri¬

gation, which gives assistance in highway

bridge work and advice on road work. Okla¬

homa has a Highway Commissioner, .whose

duty it is to give advice, plans and specifications.

Nevada has a State Engineer who has charge

of the State-aid road work but no large appro¬

priations have been made. South Dakota has a

State Highway Commission, but merely ad¬

visory.

Wisconsin has a Chief Engineer of the State

who has general supervision of road improve¬

ment. Selected county roads may be improved

jointly by the State, county and town, each pay¬

ing one-third the cost. Specifications and plans are furnished by the State Highway Depart¬

ment ; the roads are maintained, however, by

the counties. About $4,000,000 of State aid

funds had-been expended to end of 1915.

In. the beginning of the movement various

experiments were tried, such as steel-tracked

roadways, but time-approved methods of im¬

provement soon became standard. For many

parts of the country the ordinary dirt road is probably the only economical type. When sur¬

faced with a proper mixture of sand and clay, or topsoil, kept smooth and hard by the fre¬

quent use of a <(road drag,® and well drained, it makes a very serviceable roadway throughout

the year,, with the possible exception of the

early spring .months. This type of road has

been the object, of considerable engineering

study, especially in the States of the great cen¬

tral valley of the United States. About one-sixth of the total 30,000 miles of State-aid

roads in 1915 were of this sand-clay type.

Nearly onehalf the total come under the

classification of <(gravel roads,® a grade better than the sand-clay. These can be built for

$2,500 to $4,000 a mile, and the cost of main¬

taining them generally does not exceed $250

a mile per year. Often these are built of bank-run gravel, but more generally a certain propor¬

tion of sand and clay.or loam is mixed with the gravel to give the mixture the necessary bind¬

ing qualities.

The best type of roads are, of course, the

macadamized, similar to gravel roads, but with

more binding. Instead of small pieces of stone in the form of pebbles and natural fragments,

artificially produced fragments are used, and

instead of sand and loam, rock dust is employed as the binding material. This broken stone is

placed in layers and rolled with heavy steam

road rollers. These roads, sprinkled with

water before first rolling, are called <(water-bound® macadam. Distinguished from it is

the <(bituminous macadam® in which asphaltic

or tar binding material is used, either in place of, or in addition to, the rock dust. Also, many gravel and water-bound macadam roads, either

immediately after completion or subsequently,

are treated with a surface coating of liquid bi¬

tuminous binder, sprinkled over with a layer of sand or stone chips.

These are practically

pavements.

Both gravel and water-bound macadam

roads require ceaseless vigilance in maintenance and without this they rapidly go to pieces under motor vehicle traffic. The pneumatic tires of

motor vehicles appear to be very destructive,

especially in dry weather, by drawing out the

dust binding material and causing the surface to (<ravel.® Hence the vital importance of clauses in road laws relative to maintenance. To pre¬

vent this disintegration there is a great variety of materials, patented and unpatented, to be

applied to road surfaces. These vary all the

way from common salt and calcium chloride to

the many bituminous compounds, e.g., Dusto—

line, Glutrine, Rocmac and numerous petroleum

and tar products. These are all either ((dus-t layers® or (<road binders.® Dust layers are in¬

tended to hold the dust in the road by keep¬

ing the surface damp (as in the case of salt and calcium chloride) or by the capillary attraction of an oily liquid. The road binders have

such adhesive or cementive qualities as to replace the dust as a binder and keep the road surface

intact.

Other phases of the good roads movement

which are important are the relocation of

roads ; the elimination of grades, elimination

of grade crossings, the closing of unnecessary

or little used roads; the provision of proper

drainage ; legislation regarding wagon tires

and weeds; the abolition of toll roads. In some States the movement has entered into the

aesthetics of road improvement, beautifying the

roads with trees, erecting sign posts at cross¬

roads, naming farms.

A new interest in the economics of road

improvement has been a decided factor in the

movement. It is now realized that the first

cost is high but the resultant gain great, be¬

cause of the increased volume of traffic on

them. Nearly 100,000,000,000 pounds of farm

products are annually hauled from farms to

shipping points and to this must be added the enormous weight of products hauled from

farms to mills and from mills back to farms;

as well as the truck, forest and mine products, and the city products that go out into the coun¬

try. The average cost of hauling per ton mile is about 25 cents, which foreign experience as well as government investigations have shown

could be reduced to at least 12 cents or 50 per cent, making a possible saving of over $50,000,-

000 or about the amount now annually ex¬

pended in direct State aid. The Good Roads

Association was formed in 1892 and immedi¬

ately resulted in increased interest. The

separate States have also formed good roads

associations, and the meetings and reports of

these and the national association play an im¬

portant part in disseminating information and

arousing interest. The extension of rural mail

service has been of some effect upon improve¬

ment of roads. In 1917 about 500,000 miles of roads were described and used as post routes.

Indeed every phase of rural betterment calls

for better roads. The movements to the cen¬

tralization and consolidation of schools is

closely connected with the condition of the roads.

The Office of Public Road's, United States

Department of Agriculture, was established in

1893 by an appropriation of $10,000 for the

purpose of making inquiries in regard to sys¬

tems of road management, methods of road

making and to publish and distribute informa¬

tion on these subjects. This bureau has been

steadily increasing in importance. It has a

ˆveil-equipped laboratory for testing rocks and

other road materials and its staff of engineers supervises the construction of experimental and

model roads in various parts of the country,

and gives advice to local road authorities.

Down to date it has directed the construction of some 150 object-lesson roads in 35 States. In

1915 this bureau and others were consolidated

under the name of the office of public roads and rural engineering.

Very recently direct Federal aid has been

extended. The Secretary of Agriculture an¬

nounces the apportionment of $14,550,000 of

Federal funds to be used for the fiscal year

ending June 1919 by the several States in the construction and maintenance of rural post

roads. This is the third apportionment under

the Federal State Aid Act (1916), $4,850,000

having been appropriated for 1917 and $9,700,-

000 for 1918. The amounts available for the

various States range from $749,674 for New

York, to $24,411 for Delaware. This act has

had a favorable effect on the -increasing amount of expenditure for roads, for it requires that before a State can avail itself of the benefits of the act it shall have a State Highway Depart¬

ment, and that the State or subdivisions shall meet the Federal aid dollar for dollar. All the States are now qualified to receive Federal aid, but five States (Georgia, Kansas, Mississippi,

North Carolina and South Carolina) have

made no expenditures. By June 1917 there was

about one-tenth (11.6 per cent) of the public

roads surfaced. Of the total of such (284.047

miles) 69,186 miles had been all-State or State-aid roads. Also 16,160 miles of such State

roads had been built in 1916 and 75,311 miles had been maintained with State aid in that

year. State aid also built 4,490 bridges. The

State funds available for 1917 amounted to

over $60,000,000. There were thus vast sums

available and expended, $40,969,001 of State

aid funds; $33,526,553 of local moneys, a total of $74,495,554. Of this $44,469,824 was ex¬

pended for construction of roads, $5,414,331 for bridge building, while maintenance of roads

and bridges called for $18,452,861.

William L. Bailey,

Grinnell College, Grinnell, Iowa.

GOOD TEMPLARS, a temperance society

which combines the principles of teetotalism

with certain mystic rites, imitated less or more from freemasonry, having secret signs, pass¬

words and insignia peculiar to itself. It origi¬

nated in Utica, N. Y., where it was organized by Daniel Cady and others, in 1851, and ex¬

tended to England in 1868. There is no re¬

striction placed on membership on account of

color, age or sex. The organization consists

of local ˆsubordinate® lodges, county (<district®

lodges, national ((grand® lodges and an interna¬

tional <(supreme® lodge. A ((juvenile order® is also attached, and the Templars have founded

an orphanage at Sunbury, near London, at a

cost of $50,000. The Prohibition party was

formed in 1869 by a committee appointed by the Right Worthy Grand Lodge, the then highest

governing body of the order. In 1874 Good

Templar women founded the Women's Chris¬

tian Temperance Union. The order maintains

the Washingtonian Home for Inebriates at

Chicago, Ill., and an orphans' home at Vallajo, Cal. It has no beneficiary system. Its plat¬

form consists of total abstinence from all in-

toxicating liquors as a beverage, no license,

but prohibition of manufacture and sale, and

the election of men who will enforce the liquor laws. The rqotto of the order is <(Faith, Hope and Charity.ˆ It is an outgrowth of the Sons

of Temperance. The recent reports of the

international secretary returned the number of

rand lodges as 70 and the membership in

oth adult and juvenile branches, 620,000.

There are grand lodges in nearly all States of the Union, in England, Ireland, Scotland,

Wales, Denmark, Germany, Sweden, Norway,

Switzerland, Hungary, Rumania, Holland, Can¬

ada, the West Indies, South Africa, Australia,

New Zealand, British India, Iceland and other

countries.

GOODWILL, the benefit derived from a

business beyond the mere value of the capital, stock, funds or property employed in it, in

consequence of the general public patronage and encouragement which it receives from constant

and habitual customers. It is legally considered a subject of sale along with the stock, premises, fixtures, trade debts, *etc.* It is usual for the

seller to enter into an express covenant not to carry on a business of the same kind at some specified moderate distance from the place

where the purchaser resides, and if he breaks

the covenant he is liable to an action for

damages. In most of the States of the Union

the purchaser of goodwill can only cut the

seller off from soliciting old customers of the business surrendered and from otherwise at¬

tempting to supplant the new tenant in popular favor, by securing a written contract.

GOODALE, Dora Read, American poet:

b. Mount Washington, Berkshire County, Mass.,

29 Oct. 1866. With her older sister, Elaine

Goodale (q.v.), she began to write verse in

early childhood. Her poems, and those of her

sister, appeared in magazines at that time and attracted much favorable notice. With her sis¬

ter she published (Apple Blossoms) (1878) ;

(In Berkshire with the Wild Flowers) (1879) ;

(All Round the Year) (1880), and (Verses from Sky Farm) (1880).

GOODALE, Elaine (Mrs. Eastman),

American poet : b. Mount Washington, Mass.

9 Oct. 1863. In June 1891, she was married to Charles A. Eastman, M.D., an educated Sioux

Indian. At an early age she began to write

verse and with her sister Dora (q.v.) published (Apple Blossoms: Verses of Two Children*

(1878) ; (In Berkshire with the Wild Flowers)

(1879); (Verses From Sky Farm* (1880). She

was sole author of (Journal of a Farmer's

Daughter* (1881); (Little Brother .of Dreams)

(1910) ; (Yellow Star* (1911) ; (Wigwam Even¬

ings } (1909), also contributions to. newspapers and magazines of articles on Indian life and

character and the education of the Indian; also stories, poems and articles on child culture.

She taught for some time in the Hampton In¬

stitute in Virginia, and edited the Southern

Workman (1883). In 1885 she visited the Great

Sioux reservation, and subsequently taught

school at White River Camp, Lower Brule

Agency, Dakota. She afterward became super¬

visor of Indian schools, retaining this position until 1891.

GOODALE, George Lincoln, American

botanist: b. Saco, Me., 3 Aug. 1839. He was

graduated from Amherst College in 1860 and

has been instructor and professor of botany at Harvard from 1872. He has published Con¬

cerning a Few Common Plants> (1879); Phy¬

siological Botany* (1885); (Wild Flowers of

America* (1886); (Useful Plants of the

Future. *

GOODALL, Edward, English line—

engraver: b. Leeds, 17 Sept. 1795; d. London,

11 April 1870. He was self-taught, and early

in his career attracted the notice of Turner, a number of whose pictures he engraved. He

also engraved many plates for the annuals.

GOODALL, Frederick, English painter:

son of Edward Goodall (q.v.) ; b. London, 17

Sept. 1822; d. London, 29 July 1904. At 17

years of age he began to exhibit and he has pro¬

duced some pictures of high excellence. He was elected to the Royal Academy in 1863. Among

important works of his are (Raising the May—

pole in the Olden Time* (1851); (Cranmer at

the Traitors' Gate) (1856) ; (The Subsiding of the Nile> (1873); 'Andromeda* (1887); (The

Thames from Windsor Castle) (1890) ; (Isles of Loch Lomond) (1891) ; 'The Palm Grove*

(1894).

GOODELL, Henry Hill, American edu¬

cator: b. Constantinople, Turkey, 20 May 1839: d, at sea, 23 April 1905. He was graduated from Amherst College in 1862; was in the Union army in 1862-63 ; professor in the Massa¬ chusetts Agricultural State College in 1867— 86, and in 1886 became its president. For sev¬ eral years he was chairman of the executive committee of the Association of American Agricultural Colleges and Experiment Stations, and in that capacity did much to further the interests of agricultural education.

GOODELL, William, American mission¬ ary: b. Templeton, Mass., 14 Feb. 1792; d. Phil¬ adelphia, 18 Feb. 1867. He was graduated from Dartmouth College in 1817, and from the An¬ dover Theological Seminary in 1820; was or¬ dained to the Congregational ministry in 1822, and in the same year went to Syria as a mis¬ sionary. In 1823 he assisted in the establish¬ ment of the mission-station at Beirut, in 1823-28 was active there, in 1828-31 at Malta, in 1831-65 at Constantinople. Among his most important works was the preparation of a trans¬ lation of the Bible into Armeno-Turkish.

GOODELL, William, American abolition¬

ist: b. Coventry, N. Y., 1792; d. 1878. He was'

in business at different times in Providence,

Alexandria, Va., and New York; in 1827 began

at Providence the publication of the Investiga¬

tor, and later was editor of a series of abolition periodicals, including the Friend of Man, official mouthpiece of the New York Anti-slavery

Society; the Radical Abolitionist, and the Prin-cipia. His published volumes include 'Views

of American Constitutional Law* (1844) ; 'The

Democracy of Christianity) (1851); (Slavery

and Anti-slavery* (1852); 'The American

Slave Code) (1853).

GOODKNIGHT, James Lincoln, Ameri¬

can educator : b. Allen County, Ky., 24 Aug.

1846; d. 2 Oct. 1914. He was graduated froni

Cumberland University (Lebanon. Term.) in

1871, from the Union TheologicaJ Seminary in

1879, studied also at Edinburgh and Jena, and

was president of West Virginia University

(Morgantown). From 1900 to 1904 he was

president of Lincoln (Ill.) University, business manager of the Courier Company (of news¬

papers) (1904-11). His articles have appeared

in various periodicals.

GOODLAND, Kan., county-seat of Sher¬

man County ; on the Chicago, Rock Island and

Pacific Railroad. The manufactures are flour

and machinerv. The city contains railroad re¬

pair-shops and grain elevators, and is the centre of trade for a large agricultural region in

which there are a number of cattle ranches.

Pop. (1920) 2,664.

GOODNOW, Frank Johnson, American

legal scholar: b. Brooklyn, N. Y., 18 Jan. 1859.

He was graduated from Amherst College in

1879, from the Columbia Law School in 1882,

studied also at the Paris Ecole Libre des

Sciences Politiques and Berlin University, and

was appointed to the chair of administrative

law at Columbia in 1883. He became adjunct

professor in 1887, and full professor in 1891. He was a member of the Public Owner¬ ship Commission to investigate municipal ownership in Europe in 1906-07, and in 1913-14 was legal adviser to the Chinese government, and since 1914 president of Johns Hopkins University. A recognized authority on municipal, administrative and constitutional law, he published (Municipal Home Rule) (1890) ; Comparative Administrative Law5 (1893) ; (Municipal Problems5 (1897) ; (Poli¬ tics and Administration5 (1900) ; City Gov¬ ernment in the United States5 (1905) ; Prin¬ ciples of the Administrative Laws of the United States5 (1905); Municipal Govern¬ ment5 (1910) ; (Social Reform and the Con¬ stitution5 (1911), and is editor of (Selected Cases on the Law of Taxation5 (1905) ; c Selected Cases on Government and Adminis¬ tration5 (1906) ; (Selected Cases on the Law of Officers5 (1906).

GOODRICH, Alfred John, American writer on musical subjects: b. Chilo, Ohio,

1847. Largely self-taught, he was professor of musical theory in several institutions, and from 1899 directed his attention wholly to writing and private instruction. (Music as a Language5 (1880) ; Complete Musical Analy¬ sis5 (1889) ; (Analytical Harmony5 (1894) ; Che Theory of Interpretation5 (1898), and (Synthetic Counterpoint5 (1903), are among his books and essays.

GOODRICH, Charles Augustus, Ameri¬ can Congregational clergyman : b. Ridgefield, Conn., 1790; d. Hartford, Conn., 4 Jan. 1862. He was graduated at Yale in 1812 and held pastorates of Congregational churches in Wor¬ cester, Mass., 1816-20, Berlin, Conn., 1820-48 and Hartford, Conn., from 1848. He pub¬ lished (Lives of the Singers5 (1829); (History of the United States5 (1852-55) ; (Universal Traveler,5 *etc.* He was a brother of S. G. Goodrich (q.v.).

GOODRICH, Chauncey Allen, American clergyman and lexicographer: b. New Haven, Conn., 23 Oct. 1790; d. there, 25 Feb. 1860. He was graduated at Yale College in 1810, and

was tutor there 1812-14. After a course of theological study he entered the ministry and was pastor of a Congregational church in Middletown, Conn., 1816-17 ; was elected pro¬ fessor of rhetoric and oratory in Yale 1817— 39, and became professor of pastoral theology

in the theological department of the college in 1839. While tutor he published in 1814 a Greek grammar, translated chiefly from the grammar of Hachenberg. This he. subsequently revised and enlarged, and published under his own name. It was often reprinted, and for many years was extensively used. About 1832 he published (Latin Lessons5 and (Greek Lessons,5 in which the precepts of grammar are throughout accompanied by practical exer¬ cises — a method subsequently applied by Ol¬ lendorff to modern languages. In 1828 Noah Webster (his father-in-law) entrusted to him the superintendence of the octavo abridgment of his large dictionary, by J. E. Worcester, with discretionary power to conform the orthography more nearly to the common stand¬

ard. After several years of labor, he pub¬

lished in 1847 greatly enlarged and improved

editions of the 4to and 8vo dictionaries of Dr.

Webster. In 1856 he published in 8vo the

university edition of Webster's dictionary, and

in 1859 a new issue of the unabridged 4to

dictionary.

GOODRICH, Frank Boot (Dick

Tinto), American writer: b. Boston, Mass.,

14 Dec. 1826; d. Morristown, N. J., 1894. He

first became known by his Paris letters to the New York Times. He was the author of

<Court of Napoleon: or, Society Under the

First Empire5 (1857) ; (Women of Beauty and

Heroism5 (1859) ; (World-Famous Women,

from Semiramis to Eugenie5 (1870), *etc.*

GOODRICH, Samuel Griswold (Peter

Parley), American writer: b. Ridgefield,

Conn., 19 Aug. 1793; d. New York, 9 May

1860. He began as a publisher in Hartford,

and established himself in 1824 as a publisher in Boston. He edited there, from 1828 to

1842, The Token, an annual to which he

contributed several tales and poems, and in

which also appeared some of Hawthorne's

(Twice-Told Tales.5 His famous Peter Par¬

ley series of popular and juvenile books was

begun soon after his removal to Boston, and

gradually extended to more than 116 volumes,

comprising geographies, histories, travels,

stories and various illustrations of the arts and sciences. The geniality of these, and the ad¬

mirable manner in which the author enlisted

the sympathies of children, procured for them

an immense success, which led to the issue in England of some spurious books under the

name of ((Peter Parley.55 In 1837 he pub¬

lished a collection entitled (The Outcast, and

Other Poems5 ; and in 1838 an ethical and

educational work entitled < Fireside Education.5

In 1841 appeared a selection from his various

contributions to annuals and magazines under

the name of. (Sketches from a Student's Win¬

dow5 ; and in 1857 (Recollections of a Life¬

time,5 a most entertaining account of his own

history and that of his contemporaries.

(Merry's Museum5 and (Parley's Magazine5

were conducted by him from 1841 to 1854.

Under Fillmore's presidency he acted as Amer¬

ican consul at Paris, and published there in

French a treatise on (American Geography

and History.5 The last work from his pen

was the Ullustrated Natural History of the

Animal Kingdom5 (1859).

GOODSELL, Daniel Ayres, American

Methodist Episcopal bishop: b. Newburgh,

N. Y., 5 Nov. 1840; d. 1909. Graduated from

New York University (then the University

of the City of New York) in 1859, he entered the Methodist ministry in the same year ; in

1880-88 was literary editor of the Christian

Advocate of New York, and in 1888 was

elected bishop and became secretary of the

Methodist board of education. He wrote Ma¬

ture and Character at Granite Bay' (1901) ;

(The Things that Remain) (1904) ; (Peter the

Hermit' (in (Men of the Kingdom Series,'

1906).

GOODWIN, Maud Wilder, American his¬

torical novelist: b. Ballston Spa, N. Y., 5 June 1856. She married Almon Goodwin in 1879.

She has published (The Colonial Cavalier' ;

(The Head of a Hundred) ; (White Aprons:

An Historical Romance) ; (Dolly Madison,) a

biography; (Historic New York) (1898) ; (Sir

Christopher' ; <Flint) ; (Four Roads to Paradise) (1904) ; (Veronica Playfair,' *etc.*

GOODWIN, Nat(haniel) C(arl)., Ameri¬

can actor: b. Boston, 25 July 1857; d. 31 Jan.

1919. His first appearance was made in (Law

in New York,' at the Howard Athenaeum, Bos¬

ton, and subsequently he became known in bur¬

lesque and light comedy. Among the dramas

which he presented are (A Gilded FooP ;

(In Mizzoura) ; (An American Citizen) ;

(Nathan Hale) ; and (The Altar of Friend¬

ships He also essayed <(Shylock" in Shake¬

speare's (AIerchant of Venice.) In 1907 he

toured in repertoire, in 1911 he played in vaude¬

ville and in 1912-13 he made a great success, artistic and financial, as Fagin in the centenary production of (01iver Twist.'

GOODWIN, William Watson, American

Greek scholar: b. Concord, Mass., 9 May 1831;

d. 1912. He was graduated at Harvard College

in 1851 ; and was Eliot professor of Greek there 1860-1901. He published (Syntax of the Moods

and Tenses of the Greek Verb' ; (Greek Gram¬

mar } ; and a revised translation of (Plutarch's Morals) (1871).

GOODY, a local name in the Southern

States for a small bay fish (Leiostomus

x anthurus), much liked as a pan-fish, and

known also as Nafayette" and about New York

as <(spot." It is one of the family Scicenidcr (see Drumfish), has a deep, compressed

body, bluish above and silvery below, with

about 15 narrow, dark, wavy bands extending

from the dorsal downward and forward to be¬

low lateral line; a round black humeral spot

rather smaller than the eye. It abounds from

Cape Cod to Texas.

GOODYEAR, Charles, American inventor:

b. New Haven, Conn., 29 Dec. 1800; d. New

York, 1 July 1860. After coming of age, he

joined his father in the hardware business at

Philadelphia. Among the improved imple¬

ments introduced by them was the steel pitch—

fork, a substitute for the heavy iron fork pre¬

viously used. The firm being overwhelmed by

the commercial disasters of 1830, Goodyear

selected as a new occupation the improvement

of the manufacture of India rubber.. The first important improvement made by him was at

New York in 1836. This, was a method of

treating the surface of native India rubber bv dipping it into a preparation of nitric acid.

This discovery enabled the manufacturer to

expose an India rubber surface in his goods,

which on account of adhesiveness was before

impracticable. The nitric acid gas process, as

it was called, was introduced into public use, and met with great favor, especially in the

manufacture of shoes, which continued to be

made, by that process in great numbers at

Providence, R. I., until it was superseded by

the invention of vulcanized rubber, for which

he obtained a patent in 1844. From this period he employed himself

in ascertaining new

methods of employing rubber till the patents

granted him were 60 in number. He received

medals from the exhibitions at London (1851)

and Paris (1855), but his rights were con¬

tinually infringed, and he remained poor while

others were enriched by his inventions. Con¬

sult Parton, (Famous Americans of Recent

Times) (Boston 1867) ; Pierce, (Trials of an

Inventor' (New York 1866).

GOODYEAR, William Henry, American

writer on art: b. New Haven, Conn., 21 April

1846. He was graduated at Yale in 1867, and

studied art history in Heidelberg and Berlin

1867-70. He traveled extensively in Europe

and the near Orient in making his original

studies, especially in architecture. From 1881

to 1886 he was curator in the Metropolitan

Museum of Art, New York, and after 1899 he

was curator of fine arts in the Brooklyn In¬

stitute Museum. He is especially known for

his discoveries in the architectural refinements, particularly in mediaeval church buildings. In

numerous contributions to scientific periodicals

he demonstrated that Egyptian, Greek, Roman and mediaeval buildings are constructed with intentional asymmetry intended for optical effects. He became honorary member of so¬ cieties in Rome, Edinburgh, Milan and Venice, and a corresponding member of the Society of American Architects. He has published An¬ cient and Modern History' (1883) ; (History of Art' (1887) ; (The Grammar of the Lotus' (1890); (Roman and Mediaeval Art' (1893); (Renaissance and Modern Art' (1894) ; (Greek Refinements' (1912), *etc.*

GOOKIN, Daniel, American author and official : b. Kent, England, about 1612 ; d. Cam¬ bridge, Mass., 19 March 1687. He came with his father to Virginia in 1621, whence he re¬ moved in 1644 to Massachusetts, in conse¬ quence of his sympathy with the doctrines of the Puritans. He settled in Cambridge, was soon after appointed a captain of militia and in 1656 became superintendent of all the In¬ dians who had submitted to the government of Massachusetts, an office which he held till his death. He protected the fugitive regicides

in 1661, was appointed one of the two licensers of the Cambridge printing press in the follow¬

ing year, became unpopular during King

Philip's War by the protection which, as a

magistrate, he extended to the Indians, and in 1681 was made major-general of the colony:

His (Historical Collections of the Indians of

Massachusetts' bears the date of 1674, and

was first published bv the Massachusetts His¬

torical Society in 1792. He is said to have

written also a history of New England, of

which no manuscript has been found.

GOORKHAS. See Ghurkas.

GOOSANDER. See Merganser.

GOOSE. See Geese.

GOOSE-BARNACLE. See Bernicle-

GOOSE-FISH, or ANGLER, a marine

fish (Lophius piscatorius) of the order Pedi—

culati, with an enormous head and mouth, no

scales and brightly colored fringes about the

jaws, which serve as lures to attract within

reach the small fishes on which it preys ; the first three rays of the dorsal fin are separated from the others, and spring barbel-like from

the top of the head, nodding in the water and attracting other small fishes — hence the name “angler.** Like all fishes of its order, the

carpal bones are elongated to strengthen and

widen the reach of the pectoral fins, by means of which the fish leaps after its prey. The

angler is popularly supposed to catch geese

and other swimming birds, whence its name.

It reaches a length of four feet, but is useless, and the bane of fishermen. It is remarkable

for its pinkish ribbon-like masses of eggs, a

foot wide, 40 feet in length, which are not un¬

common in summer floating at the surface of

the ocean. The goose-fish occurs on both

coasts of the north Atlantic and has other

names, as “fishing-frog** and “all-mouth.**

Near relatives are the batfish and the frog—

fishes.

GOOSE-GRASS, or GOSLING-WEED,

two of the many names applied to a widely distributed troublesome weed (Galium apar— ine). See Bedstraw ; Cleavers.

GOOSEBERRY, various spiny shrubs of the genus Grossularia, family Grossulariacece, mostly natives of the northern hemisphere, especially of North America; some species are valued for their fruit (berries), others for their flowers. Of the half dozen spe¬ cies cultivated, the European gooseberry (G. grossularia) , which appeared in gardens dur¬ ing the 16th century, has developed the largest number of varieties and attracted the widest interest. Its progeny furnish prac¬ tically all the varieties exhibited at the annual gooseberry shows of England. The fruits of some of these varieties weigh more than an ounce, having been developed by selection and crossing from an original weight of about one-quarter of an ounce. The varieties may be di¬

vided, like apples or pears, into culinary and dessert sorts. Of the American species, sev¬

eral of which bear finer fruits than the natural European species, G. oxyacanthoides is the only one that has produced widely cultivated vari¬

eties. It has also entered into many hybrids

with the European species. These American

varieties are all of the culinary class, or are used while too unripe to be palatable as dessert.

The first one, Houghton, was introduced about

1835, and with its seedling, Browning, still

commands the market.

The gooseberry is one of the easiest fruits

to propagate. Cuttings of mature wood are

most frequently used, but layers and suckers

are also employed. The plants thrive best

upon rather heavy, moist soil, and generally

fail upon light soils, especially if dry. They like partial shade and northern exposure. In

the South they fail. The plants may be trans¬

planted in spring or fall, about five feet apart each way, cultivated frequently until mid-sum¬

mer, trained and pruned like the currant (q.v.), but somewhat more openly, kept free from

fungous troubles by the use of a fungicide

(q.v.) and of insects by the use of an insecti¬

cide (q.v.). The fungi most frequently found

upon the plants are mildew (Sphoorotheca

mors-uvee) and leaf spot (Septoria ribis). The former, which is a surface feeder, appears upon the green parts as a frost-like gray growth,

which later becomes brown. Free circulation

of air, good drainage and open training of the bushes help to prevent attacks. Leaf spot pro¬

duces brown spots upon the foliage, which may

fall prematurely. Spraying early in the season

is believed to be the only preventive. With few exceptions, the insects that attack the goose¬

berry also visit the currant (q.v.) and may be combated by the same remedies. Consult Card,

(Bush Fruits) (New' York 1898) ; Thory, Mon¬

ographic ou Histoire Naturelle du Genre Gros—

seillier) ; Bailey, (Standard Cyclopedia of Horticulture) (1915).

GOOSEFOOT, a family (Ckenopodiacece)

of annual or perennial herbs, rarely shrubs,

with 75 to 80 genera and 550 to 600 species, of wide distribution. The typical genus (Cheno -

podium) contains about 60 species, 15 or 20 of which are native to North America, or have

been naturalized, some of them almost ubiqui¬

tous weeds, such as the pigweed (C. album) ;

the city goosefoot (C. urbicum), thriving in

suburban lots and roadways; the sowbane (C.

murale) ; the feather geranium or Jerusalem

oak (C. botrys) ; and the now world-wide Mex¬

ican tea or wormseed (C. ambrosioides) , from

which is brewed a homemade vermifuge. Other

genera contain allied weeds, as the strawberry

blite (Blitum capitatum) ; the large genus

(Atriplex) of seaside and salt-land weeds

called oraches; the western white sage (Eurotia lanata), a gray-green, pubescent fodder plant of the western plains; the sea-blites (Dondia) and odd brittle glassworts of salt marshes and the spiny greasewood and Russian thistle (qq.v.).

See Chenopodium.

GOPHER, a name given by the early

French settlers in the United States to various animals which honeycomb (Fr. gaufre) the

ground by burrowing in it. In the Central

States the name refers to the too common

“striped** gopher, or ground-squirrel (Spermoph -

ilus tridecemlineatus) , a troublesome little

animal about 10 inches long, a third of which is tail, which is dark-reddish brown, with 6 to 8 light stripes, alternating with lines of dots —about 13 in all; it is yellowish below, with a broad black stripe on each side. It is a familiar object on prairies and grassy fields throughout the upper half of the Mississippi Valley, hurry¬

ing to and from its hole, or standing” upright, but inconspicuous, curiously watching your

movements, but ready to drop out of sight at

the least alarm. The burrows are numerous

everywhere and are injurious not only by the

space they occupy and as traps for the feet of horses and cattle, but because they offer run¬

ways for water and so promote washing away of soil. Some of the holes are short and are

merely shelters ; others are long, have a nest at the. inner extremity and side-chambers in

which in the autumn large winter stores of seeds are laid away. Where these spermophiles are

very numerous, as they have become in the

grain-growing districts of Iowa, Minnesota and

the Dakotas, the amount of grain stolen or

shaken down is a serious tax on agriculture.

Another spermophile, more common northward,

is Franklin's or the <(gray® gopher (S. frank—

Hni), which is much larger and has a harsh

coat of yellowish-grizzled hair. Several other

species inhabit the more western plains. All are truly ground-squirrels of the family Sciuridce,

and closely related to the chipmunk (q.v.).

In the farther Northwest, however, the word

(<gopher® ordinarily means one of the large gray rodents of the family Geomyidcz, distinguished

prominently by having in the cheeks capacious

pouches, lined with fur; hence they are called pocket-gophers and pouched rats. The most

familiar species is Geomys bursarius, which is

about nine inches long and has short legs, close ears and a short hairy tail ; the fore feet are very strong, with the three middle toe-nails long and well adapted to digging, and its burrows

are made with surprising rapidity. Its food in¬

cludes all sorts of vegetable matters, and it

often injures orchards by gnawing the roots.

As fall approaches it gathers a store of seeds, tuberous roofs, nuts, etc., and stows it in its deep residence-burrow, where the winter is

passed in a partial torpidity varying with the climate. These provisions are carried in the

cheek-pouches, which also serve to take out

the loose soil from the burrows. On the Pacific Coast occur several other species, some with

large, pendant cheek-pouches. In the Southern

States is found a species (G. tuza), locally called ˆSalamander,® of large size and common in the

sandy parts of Florida and the country north of it. The Northwest has a second and smaller

kind of gopher (Thomomys talpoides), dusky

bluish-gray in color, with the lower parts whit¬

ish, which is mole-like in its habits, and is known in Idaho as (<camass-rat,® on account

of its fondness for the tubers of the liliaceous plant called camass (Camassia esculenta) by

the Indians.

All of these animals are a pest to agricul¬

ture, and are increasing rather than diminish¬

ing in settled regions, owing partly to the in¬

creased food afforded them by crops, and

partly to the destruction of their natural ene¬

mies, the birds of prey, snakes, weasels, foxes, badgers, wolves, etc., which formerly held them in check. Efforts are therefore made to ex¬

terminate them in various ways, of which the

most effective is by suffocating them with bi¬

sulphide of carbon, placed in their holes by

saturating some porous object and rolling it

into the burrow. Several pamphlets issued by

the United States Department of Agriculture

describe the animals and their habits, and give directions for their suppression.

GOPHER SNAKE, or INDIGO SNAKE,

a variety of a tropical colubrine serpent

(Spilotes corais, variety couperi), common in

the southwestern United States and eastward to

Georgia, which reaches a length of seven and

onehalf feet, and varies in color from brown¬

ish black in Mexico through deep blue to pure black in Florida and Georgia, always with

reddish mark.ngs about the mouth and throat.

The surface cf the skin is so highly polished as to look glassy. <(Its smooth, glittering

length of blue-black body flashing with pris¬

matic colors along the broad plates of the under surface, and its good-natured demeanor, com¬

bine to make it,® says Ditmars, (<a favorite in collections.® This snake burrows beneath loose

soil, and is harmless to man, aiding him, in¬

deed, in getting rid of rats, and in destroying as its prey, gophers, ground squirrels, frogs and other pestiferous animals, including rattlesnakes.

It is a near relative of the tropical rat-snakes and of the northern blacksnakes. Consult Dit¬

mars, (Reptile Book) (New York 1907).

GOPHER STATE, a name sometimes

given to Minnesota.

GOPHER TORTOISE or TURTLE, a

burrowing turtle (Xerobates polyphernus) of

the southern United States, brownish in color

with black head; yellowish below. It is herbiv¬

orous and gregarious, and is most frequently

found in the pine barrens, where it is frequently eaten by the negroes, who are also fond of its eggs.

GORAL, Boleslaus Edward, Polish—

American clergyman and editor : b. Koenigsdorf, Prussian Poland, 12 March 1876. He

received his early training at Koenigsdorf,

came to the United States in 1889, and received his higher education at the Seminary of Saints Cyril and Methodius, Detroit, and Saint Fran¬

cis Seminary, Saint Francis, Wis. He was or¬

dained to the priesthood in 1899 and was suc¬

cessively professor of Polish, German, French,

Greek and Latin (1899-1906) and of homiletics

and philosophy from 1906 to 1908 at Saint

Francis Seminary, Saint Francis, Wis. Since

1908 he has been president and treasurer of the Milwaukee Polish daily, Nowiny, Polskie, and

rector (1908-09) of Saint Vincent de Paul's,

Milwaukee, and after 1909 of Saint Hyacinth's,

Milwaukee. He was founder and editor of the

Oredownik Jezykowy and organized the weekly

Nowiny in 1906, changing it to a daily in 1907.

He is the author of (Zasady interpunkcyi pol—

skiej) (1905); verses and essays (Bells of

Corneville* ; translations of drama and poetry.

He collaborated in (Memories of Milwaukee

County* (1900) ; (The Catholic Encyclopedia,7

etc.

GORAL, a goat-like antelope (Nemor -

rhcedus goral) from the Himalaya Mountains.

It resembles somewhat the chamois, and re¬

mains in small bands on the highest parts of

the mountains. Other species or varieties in¬

habit the high plateaus of Tibet and Mongolia.

GORAMY, or GOURAMI, the Javanese

name of a fish of the genus Osphromenus (Ool -

fax), family Anabasidce or climbing perches,

a native of China and the Eastern Archipelago, but introduced into the Mauritius, West India

Islands and Cayenne on account of the excel¬

lence of its flesh, where it has multiplied rapidly.

It is deep in proportion to its length, and the dorsal and anal fins have numerous short spines, while the first ray of the ventral is protracted into a filament of extraordinary length. It is one of the few fishes which build nests, which it does by interweaving the stems and leaves

of aquatic plants.

GORDIACEA, a class in the phylum

Nemathelminthes (q.v.), or roundworms. They

are common at times in springs, ponds and

even watering-troughs. Popularly they are

known as hair snakes, being supposed to

develop from horse hairs that have fallen into the water. The early stages of existence are

passed as parasites in the bodies of various

insects, chiefly grasshoppers and crickets, from which they break out when fully grown. The

adult condition is entirely without means of

securing nourishment as the mouth or esopha¬

gus is occluded and the stage serves only for reproduction. Consult Ward and Whipple,

(Fresh Water Biology) (New York).

GORDIAN KNOT, a knot tied by Gordius

in the rope which bound the yoke of his chariot to the axle-tree in such an artful manner that the ends of the cord could not be perceived.

The Phrygians had learned by an oracle that

a king would come to them riding in a car, and Gordius appearing thus at an opportune time

received the kingdom. He dedicated his car

and yoke of oxen to Zeus, with the knot still untied. So intricate was it that the report went abroad that the empire of Asia was promised

by the oracle to him who could untie it. Alex¬

ander the Great, wishing to inspire his soldiers with courage and his enemies with the belief

that he was born to conquer Asia, cut the knot with his sword, and so claimed to have fulfilled the oracle. Hence to <(cut the Gordian knot® is equivalent to removing or solving a difficulty

by bold or unusual measures.

GORDIANUS, Marcus Antonius, the

name of three Roman emperors, father, son

and grandson. The first, b. 158 a.d., had gov¬

erned Africa for many years, when he was

proclaimed emperor at the age of 80. He

associated his son with him in the empire, but six weeks later the son was killed in fighting against the rival emperor Maximinus, and the

father, in an agony of grief, died by his own hand. The grandson was proclaimed emperor

by the soldiers in Rome 238 a.d., although not more than 15. He reigned six years, when he

was assassinated by his soldiers at the instiga¬

tion of Philip, prefect of the Praetorian Guard.

GORDON, Adam Lindsey, Australian

poet : b. 1833 ; d. 1872. He was born in the Azores, educated in England and migrated to

Australia in 1851, where he became a horse

dealer and trainer and the best steeplechase

rider in the country. He is one of the strong¬

est and most distinctive of Australian poets.

In narrative and sporting poems based on his

own wild experiences he first taught the outlander to get at the heart of Australia. He

glorifies the horse and rider in ballads that

have the ring of Scott and Macaulay. A

Byronic influence in his work seems never to

leave it. He is a bundle of moods and at times his despair is great. His published works in¬

clude (Sea-spray and Smoke-drifC (1867);

<Ashtaroth) (1867) and (Bush Ballads) (1870).

See Australian Literature.

GORDON, Andrew, Benedictine • monk,

physicist: b. Coffarach, Forfarshire, Scotland,

15 June 1712; d. Erfurt, Saxony, 22 Aug. 1751.

In 1737 Gordon became professor of natural

philosophy at Erfurt. He introduced improve¬

ments in the frictional electric machine, and

invented what is known as the electric whirl, a device that rotates a light wheel by currents of air repelled from it by static electricity. An¬

other invention of his was the socalled ((electric chimes.® He published (Phaenomena elec-

tricitatis exposita) (1744); (Philosophia utilis

et jucunda) (1745); (Versuch einer Erklarung

der ElectricitaC (Erfurt 1745) ; (Physicse ex—

perimentalis elementa) (1751-52).

GORDON, Charles George (“Chinese

Gordon® or ((Gordon Pasha®), English soldier:

b. Woolwich, 28 Jan. 1833; d. Khartum, Africa, 27 Jan. 1885. He entered the Roval Engineers

as second lieutenant in 1852, and served in the Crimean War and during the Taiping rebellion,

with the permission of the English military au¬

thorities, assumed the command of a special

corps of Chinese, trained and led by European

and American officers. With these materials

he performed marvelous feats of skilful sol¬

diership and succeeded in completely crushing

the rebellion. The Chinese government was

eager to express its gratitude, but he refused all offers of substantial reward. On his return to England with the rank of colonel, he was ap¬

pointed chief engineer officer at Gravesend for the construction of the Thames defenses. Here,

while his engineering work afforded ample scope for his military talents, the philanthropy of his nature had full scope. During the six years he lived at Gravesend his house was school and

hospital and almshouse in turn. Many a waif

he rescued from the gutter, establishing evening classes for their benefit and keeping sight of the more deserving till they were provided with a

career in life; all this being done on his pay as an English colonel, without any private re¬

sources whatever. In 1873 Gordon was gov¬

ernor of the Equatorial Provinces of Egypt.

Being thwarted by the governor of the Sudan

in his efforts to suppress the slave trade he re¬

signed and returned to England. He again took

up the post in 1877, on condition that he should be permitted to abolish the slave trade, which he successfully accomplished. In 1880 he went

to China as adviser to the government there

during their strained relations with Russia. In 1881-82 he was commanding engineer in the

Mauritias, and served for a brief period in the latter year in South Africa. In 1884 he paid

a visit to the Holy Lancfc In 1881 Mohammed

Ahmed, a Mussulman enthusiast, had given him¬

self out to be the Mahdi — the long-expected

Redeemer of Islam — and gathered a number

of followers around him who threatened the

safety of the Egyptian garrisons in the Sudan.

It having been decided in 1884 that the Sudan be evacuated, the presence of an English officer of high authority at Khartum was asked, with

full power to withdraw all the garrisons in the Sudan, and make the best arrangements pos¬

sible for the future government of the country.

Gordon, at the request of the British govern¬

ment, proceeded to the Sudan in the hope that his great personal influence and knowledge of

the country wrould help to set matters right.

These hopes were not fulfilled ; Gordon was

shut up in Khartum by the troops of the Mahdi, and for a whole year he held that town against the Arabs who surrounded him. An English

force under Wolseley was dispatched for his

relief, an advance corps of which sighted

Khartum on 28 Jan. 1885, to find that the town had been treacherously betrayed unto the hands

of the Mahdi two days before, and that its

heroic defender had been killed. Gordon had

all the qualities which are found in a success¬

ful military leader, modified, however, by strong GORDON

religious feeling which shaded into mysticism,

and which latterly became so intensified as to give him somewhat the character of a religious fatalist. He left a most interesting journal,

kept during the latter period of his siege in Khartum. Consult Hill, (Gordon in Central

Africa) (1881); lives by Forbes (1884);

Henry Gordon (1886) ; Boulger (1896). An

interesting chapter on his last mission will be found in Morley's Rife of Gladstone,* book

VIII, chap. IX.

GORDON, Charles William (Ralph Con—

norw) , Canadian author: b. Indian Lands, Glen¬

garry, Ontario, Canada, 1860. He graduated at

Toronto University in 1883 and at Knox Col¬

lege in 1887 ; was ordained to the Presbyterian ministry and was a missionary in the mining

and lumbering regions of the Northwest Ter¬

ritories 1890-93. He became pastor of Saint

Stephen's Church, Winnipeg, in 1894, and has

written (Beyond the Marshes) ; (Black Rock' ;

(The Sky Pilot) ; (The Man from Glengarry* ;

(Glengarry School Days* ; (The Prospector) ;

(The Foreigner) ; (Corporal CameroiP ; and

(The Major) (1917) ; works characterized by

vivid descriptions of life and 'seenery in the Canadian west.

GORDON, Lord George, English agitator:

b. London, 26 Dec. 1751; d. there, 1 Nov. 1793.

He was a son of the Duke of Gordon, in his

youth served in the navy, and entered Parlia¬

ment in 1774. In 1778 a bill having been

passed through Parliament for the relief

of Roman Catholics from certain penal¬

ties and disabilities, a society called the

Protestant Association of London was formed

for the purpose of procuring its repeal.

In the following year Lord George was elected

its president, and in June 1780 headed an ex¬

cited mob of many thousands, who went in

procession to the House of Commons to pre¬

sent a petition against the measure. The dread¬

ful riot which ensued, in which the city magis¬

trates acted a feeble and incompetent part, was not suppressed till after the destruction of

many Catholic chapels and dwellings, the prison of Newgate — the 2,000 inmates of which

formed a sensible addition to the strength of

the rioters — and the house of the chief jus¬

tice, Lord Mansfield. Three hundred persons

were killed, 192 rioters were arrested and 25

executions followed. Gordon was arrested on

a charge of high treason, but no evidence being adduced of treasonable design, he was acquitted.

He was convicted in 1787 of libels on the

English courts and on Marie-Antoinette, and

sentenced to five years' imprisonment.. For

Gordon and the riots see Dickens' vivid de¬

scription in (Barnaby Rudge.* Consult also

Watson, (Life of Lord George Gordon) (Lon¬

don 1795; and Vol. XXI of Cobbetts' (State

Trials. * For a number of years before his

death he was a zealous professor of the Jewish faith.

GORDON, George A., American Congre¬

gational clergyman : b. Aberdeenshire, Scot¬

land, 1853. In 1871 he came to America, and in 1874 entered the Bangor Theological Seminary,

whence he was graduated three years later.

His first work was at Temple, Me., after which he studied for a year at Harvard, and in

1881 was pastor at Greenwich, Conn. In 1884

he became pastor at Old South Church, Boston.

From 1886-90 he was university preacher at Har¬

vard and from 1888-1901 at Yale. Bowdoin and

Yale conferred on him the degree of D.D. (1893) and Harvard the degree of S.T.D. (1895).

Columbia awarded him the same honor in 1903.

Among his publications are (The Witness to

Immortality) (1893) ; (The Christ of To-Day*

(1895); Hmmortality and the New Theologv)

(1897); (The New Epoch for Faith > (1901);

(Ultimate Conceptions of Faith) (1903) ;

(Through Man to God) (1906) ; (Religion and

Miracle) (1909) ; Revelation and the IdeaP

(1913).

GORDON, George Henry, American

soldier: b. Charlestown, Mass., 19 July 1824; d.

Framingham, Mass., 30 Aug. 1886. Graduated

from West Point in 1846, he was employed on

various duty, later resigned from the army and practised law 1857-61. In 1861 he organized

the Second Massachusetts Volunteers, and be¬

came colonel of the regiment. He commanded

the United States troops in Florida in 1864, the eastern district of Virginia in 1865, and was

mustered out in the latter year with rank of brigadier-general and brevet major-general of volunteers. He wrote a (History of the Second Massachusetts Regiment* (1876), and other works on the war.

GORDON, John Brown, American soldier: b. Upson County, Ga., 6 July 1832; d. near Miami, Fla., 9 Jan. 1904. He was of Scotch ancestry, his grandfather being one of seven brothers who all fought for American independence in the War of the Revolution. He was graduated at the State University in 1852 and was, a few months later, admitted to the practise of law; but at the outbreak of the Civil War was engaged in mining operations near Raccoon Mountain, Alabama. Here was organized a company, called the Raccoon Roughs,** of which he was elected captain. This company was assigned to the 6th Alabama Infantry, in which he rapidly rose through successive grades to that of colonel (28 April 1862). At Seven Pines, through the wounding of General Rodes, the command of the brigade fell upon him; and at Malvern Hill he led it in the grand charge of D.

H. Hill's division against the Federal position. At Sharpsburg he was

five times wounded. On 1 Nov. 1862 he was

commissioned brigadier-general with command

of a Georgia brigade of six regiments, which

he led with great distinction at Chancellorsville and Gettysburg. On the march into

Pennsylvania, just before the battle of Gettys¬

burg, he reached Wrightsville on the Susque¬

hanna, making the most extended advance

achieved in the East by Confederates during

the war. On the first day at Gettsyburg he

struck the extreme right of the Union army in Ewell's grand turning movement, by which

the victory so desperately striven for by A. P.

Hill was secured, and the Federals were driven through the town of Gettysburg to the heights

beyond. On 6 May 1864, in the Wilderness

leading two brigades, he fell at sunset upon

Sedgwick's corps, driving the Federals from a

large part of their works and capturing 600

prisoners, including Generals Seymour and

Shaler.

On 12 May at Spottsylvania Court House,

commanding Early's division, immediately after

Hancock had overwhelmed Edward Johnson,

Gordon by an impetuous charge first checked

the Federals and then drove them back to the

base of the salient, where the fight continued with great fury to the close of the day. Two days later Gordon was commissioned major-general and placed in command of Evans'

Georgia brigade, Hays and Stafford's Louisiana

brigades and Terry's Virginia brigade — the lat¬

ter being made up of the remnants of the

<(Stonewall® brigade and other Virginia troops.

With this command he participated, under

Early, in the defeat of Hunter's expedition,

the invasion of Maryland, the victory at the

Monocacy, the march into the suburbs of Wash¬

ington and the battles against Sheridan in the Shenandoah Valley, being especially distin¬

guished in the surprise and rout of Sheridan's army in the early morning at Cedar Creek.

Having been assigned to the command of the

Second corps of the Army of Northern Vir¬

ginia, he held his lines with great tenacity, and in March 1865 made the brilliant dash by which he captured Fort Steadman and parts of the

line to the right and left of it. Owing to the failure of the supporting column to arrive in

time, he was obliged to retire to his original position. On the retreat from Petersburg he

protected the rear, and at Appomattox com¬

manded half of Lee's army, making a last bril¬

liant charge of that heroic but now fearfully

depleted host. After the surrender he called

his men about him and made them a speech re¬

markable for its strong declarations of faith in God and earnest exhortations to endure de¬

feat with patience, obey the laws and rebuild

their ruined homes and fortunes. He became

the trusted leader of his people, was twice

elected governor of Georgia, and for two terms represented his State in the Senate of the

United States, on all occasions using his influ¬

ence for peace and fraternity between the late warring sections. As commander-in-chief of

the United Confederate Veterans' Association

he possessed the enthusiastic love and devotion of his comrades, who would never entertain the idea of his retirement from the office to which they every year elected him, declaring repeatedly that death alone could remove him from that

post of honor. His very successful lecture

on <(The Last Days of the Confederacy® was

well known in both North and South. His

war-time reminiscences began to appear in

Scribner's Magazine in 1903 and were published

in book form in 1905.

Joseph T. Derry,

Author of (The Story of the Confederate

States .5

GORDON, Julien. See Cruger.

GORDON, Leon, Russian writer: b. 1831;

d. 1892. His early labors were in the line

of education, being engaged as Hebrew teacher

in the governmental schools of Welna for 20

years and doing much to improve conditions,

despite charges of heresy made against him. In 1872 he was called to Saint Petersburg as sec¬

retary of the Jewish community and of the

society for promoting culture among Jews,

which gave him the opportunity to enlarge his

literary activity. Here, too, his zeal excited

enmity, and accused of participating in 1879 in the attempt to assassinate Alexander II, he and his family were thrown into prison and Jater

exiled, but his innocence was quickly proved and he returned to Saint Petersburg, losing his for¬

mer position. He then became journalist for

two years and was made “honorary citizen® by

the government. He was the leading Hebrew

poet of his day and a prose writer of much

satirical force. His work was twofold — to at¬

tack fanaticism within the camp and to defend

his religion against its enemies from without.

He collaborated in translating the Pentateuch

into Russian.

GORDON-CUMMING, Constance Fred¬

erica. See Cum ming, Constance.

GORE, Charles, English bishop: b. 1853

After studying at Harrow and Balliol College,

Oxford, he became Fellow of Trinity College,

Oxford (1875—95). From 1880-83 he was prin¬

cipal of Cuddedson College, and was selected to take charge of the Pusey Library at Oxford,

which post he held from 1884 to 1893. In that ear he was appointed vicar of Radley, which

e left in 1894 to become canon of West¬

minster. From 1898-1900 he was honorary

chaplain to the queen ; chaplain in ordinary to the queen (1900-01) ; chaplain in ordinary to the king (1901). He was appointed bishop of

Worcester (1902-04) ; bishop of Birmingham

(1905-11) and bishop of Oxford (1911). He

was also editor of Lux Mundi, in which many

of his publications appeared. He is the author of (The Holy Spirit and Inspiration (1890) ;

(The Church and the Ministry5 (1889) ; ‘ˆRo¬

man Catholic Claims5 (1889) ; (Leo the Great5

(1890) ; (The Mission of the Church5 (1891) ; (The Creed of the Christian5 (1895); (The

Body of Christ5 (1901); spiritual Efficiency5

(1904) ; (The Permanent Creed5 (1905) ; (The

New Theology and the Old Religion5 (1908) ;

(Orders and Unity5 (1910) ; (The Question of

Divorce5 (1911).

GORE, Christopher, American statesman:

b. Boston, 21 Sept. 1758; d. Waltham, 1 March 1827. He was graduated at Harvard College in

1776, and studying law, was soon engaged in

good practice. In 1789 he was appointed the

first United States district attorney for Massa¬

chusetts ; in 1796 was chosen one of the com¬

missioners to settle the claims of the United

States upon Great Britain for spoliations, and

remained in London, successfully engaged in

the duties of this office, about eight years. In 1803 he acted as charged’affaires during the ab¬

sence of the American Minister; in 1809 was

chosen governor of Massachusetts ; and in 1814

was elected to the United States Senate. He

left about $100,000 to Harvard College. Gore

Hall, the library building at Harvard, is named in his honor.

GORE-BOOTH, Eva, Irish author: b.

Tissadel, Sligo, Ireland. She is well known as an advocate of women's suffrage and as a trade union worker and writer. Far years she has

been known also as a poet of extraordinary

power and charm. Her early verse was thor¬

oughly Irish in spirit, and one of her poems, (The Perilous Light,5 a simple but exquisite

little lyric, has received such high praise and has been so widely quoted that it may be called a contemporary classic. Her published works

include (Unseen Kings5 ; (The One and the

Many5 ; (The Egvptian Pillar5 ; (The Sorrow¬

ful Princess5 ; (The Agate Lamp5 ; (The Three

Resurrections and the Triumph of Mseve5 ; and

GENERAL JOHN BROWN GORDON

GORGEANA

GORGONIA

(The Death of Fionavar* (1916). The last

named is a poetic drama, which may be de¬

scribed as a plea for peace, a glorification of non-resistance, a Goethe-like defense of thought against action. There is a touch of irony in the fact that this most passionately pacific work

should be illustrated by so convinced and prac¬

tical a direct actionist as the author's sister, the Countess Markiewicz, the most picturesque

figure of the Irish uprising of 1916.

GORGEANA, gor-je-an'a, Me., now York

(q.v.), the first colonial incorporated city in the United States. On 2 Dec. 1631 a grant was

made to Sir Ferdinando Gorges and others of

24,000 acres on both sides of the Accomenticus (Agamenticus, now York) River. Settlements

were founded here, and on 10 April 1641 were

formed into a borough named Accomenticus

or Agamenticus, which on 1 March 1642 was

given a city charter as Gorgeana, with a full apparatus of mayor, aldermen, courts, *etc.* It

had an extent of three miles on the coast and seven up the river, a small tidal stream. In

1652 Maine submitted to Massachusetts ; and to

avoid the city charter and Gorges' rights,

Gorgeana was reincorporated as the town of

York.

GORGES, gor'jez, Sir Ferdinando, colonial

proprietor of Maine, ((the father of English

colonization in America® : b. Ashton, Somerset¬

shire, about 1565 ; d. 1647. He served in the Low Countries and against the Spanish Armada,

and in 1596 was appointed governor of the forts and islands of Plymouth. He was a partner in

the conspiracy of the Earl of Essex, against

whom he testified on his trial in 1601. When

Waymouth returned in 1605 from his voyage to

North America, and brought with him five In¬

dian captives, Gorges took three of them into

his house, caused them to be instructed in the English language, obtained information from

them of the ((stately islands and safe harbors®

of their native country and determined to be¬

come a proprietor of domains beyond the At¬

lantic. He persuaded Sir John Popham, lord

chief justice of England, to share his intentions, and in 1606 the king incorporated two com¬

panies, the London colony, and the Plymouth

colony, between which was divided the territory extending 50 miles inland from the 34th to the 45th parallel north latitude. The Plymouth

colony had the northern portion, which was

styled North Virginia. Three shins with 100

settlers sailed from Plymouth 31 May 1607, and reached the mouth of the Kennebec in Maine,

where they began a settlement, abandoned the

next spring. In 1616 Gorges sent out Richard

Vines with a party, which through the winter

encamped on the river Saco. In 1620 Gorges

and his associates obtained a new incorpora¬

tion for ((the governing of New England in

America,® which was empowered to hold terri¬

tory extending westward from sea to sea be¬

tween the 40th and 48th parallels north lati¬

tude. Gorges himself united with John Mason

in taking grants of the district called Laconia, bounded bv the Merrimack, the Kennebec, the

ocean and ((the river of Canada,® and under his auspices several settlements were attempted.

His son, Robert Gorges, was appointed in 1623

by the council for New England <(general gov¬

ernor of the country.® This council resigned

its charter to the king in 1635, and the elder Gorges now determined to establish a miniature

sovereignty on his own domain. To this end

he obtained from the king a charter constituting him lord proprietary of the province of Maine, with extraordinary governmental powers, to be

transmissible with the property to his heirs and assigns. He sent his son Thomas to be deputy

governor and the officers took an oath of al¬

legiance to the lord proprietary. The province

was divided into two countries, of which Aga¬

menticus (now York) and Saco were respec¬

tively the principal settlements; the former re¬

ceived a city charter, as Gorgeana, in 1642.

But the fatal want was a deficiency of subjects; probably two-thirds of the adult males were in places of authority ; yet the little monarchy con¬

tinued for nearly 10 years. When the four New England colonies formed a confederacy in 1643,

the settlements of Gorges were excluded from

it. On the death of Gorges — who had adhered to the Royalist side in the civil war — his

colonists, at length formed themselves into a

body politic for the purpose of self-government and submitted to the jurisdiction of Massa¬

chusetts. Consult his (Brief Narration of the

Original Undertakings of the Advancement of

Plantations into the Parts of America* (1658)

in Maine Historical Society's Collections; and

Baxter, (Sir Ferdinando Gorges and His

Province of Maine) in the Prince Society Pub¬

lications (3 vols., Boston 1890).

GORGIAS, gor'ji-as, Greek orator and

sophist : b. Leontini, in Sicily. He flourished in the 5th century b.c.,

and was one of the earliest writers on rhetoric. He was one of the first

who introduced cadence into prose. He also

treated of commonplaces, and showed the use

of them for the invention of arguments. This

induced Plato to give the name of (Gorgias) to his elegant dialogue on this subject. Gorgias is said to have reached the extraordinary age of

107 or 108 years. Two works attributed to him are extant, (The Apology of Palamedes,* and

the (Encomium on Helena, * but their genuine¬

ness has been questioned by several critics. See Jebb, (Attic Orators.*

GORGO, gor'go, or GORGON, according

to Homer, one of the frightful phantoms of

Hades ; but Hesiod mentions three Gorgons,

Stheno, Euryale and Medusa. They were all

immortal, except Medusa. Their hair was en¬

twined with serpents, their hands were of brass, their body covered with impenetrable scales,

their brazen teeth as long as the tusks of a wild boar and they turned to stones all those who

looked upon them. According to some authors,

Perseus, when he went to the conquest of the

Gorgons, was armed with an instrument like a

scythe, by Hermes, and provided with a looking-glass by Athena, besides winged shoes and a

helmet of Pluto, which rendered all objects

clearly visible and open to the view, while the person who wore it

remained totally invisible.

With weapons like these Perseus obtained an

easy victory. The head of Medusa remained

in his hands, and he gave it to Athena, who

placed it on her ˆEgis, with which she turned into stones all such as fixed their eyes upon it.

The residence of the Gorgons was beyond the

ocean toward the west, according to Hesiod.

GORGONIA, the type-genus of the Gor—

gonidcc, a family of alcyonarian coral-polyps,

the <(sea-fans® or (<sea-whips,® which have a

calcareous or horny axis, the colony often greatly branched and the branches anastomosing. In

the common gorgonia (Rhipigorgia flabellum)

of the West Indies and Florida Keys the

branches form a flat network. In this and

other sea-fans the short calicles of the single retractile polyps stand perpendicularly to the

axis, communicating by longitudinal vessels

and branching canals. While by far the greater majority of the species are inhabitants of

tropical waters, in the Arctic seas, and in the deeper, cold waters of the Newfoundland banks,

and on Saint George's Bank, two large species

occur: Primnoa reseda and Paragorgia arborea; the latter is of great size, the stem being as thick through as a man's wrist and the entire coral-stock over five feet in height.

GORILLA, the largest of the anthropoid

apes. This term is derived from the <(Peri—

plus® of the Carthaginian navigator, Hanno,

who described, 500 years before Christ, an is¬

land on the west coast of Africa as full of

wild men, which his interpreter called Gorilloi.

When, therefore, Dr. Thomas Savage brought

the first specimen of this animal to the atten¬

tion of science, in 1847, the name ˆgorilla® was applied to it. It now appears probable that the ®Gorilloi® of Hanno were probably baboons.

In (Purchas, His Pilgrims) (1613) an account

is given of a great ape ((called by the Europeans gorilla,® and Bowditch describes the same ani¬

mal (1819) in (Mission from Cape Coast Castle to Ashantee.5 In (Western Africa) (1856) L.

Wilson made the first scientific investigation of the gorilla on the ground. The gorilla of

science, of which _ but one species is known

(Gorilla gorilla), is, with the chimpanzee and the orang-outang, the nearest living relative of man. Structurally it is very closely allied to the chimpanzee. The male is from five and onehalf to six feet in height, while the female is much shorter, measuring generally about four and

onehalf feet. Both are very heavy for their

height, and the male generally exceeds man in

weight; both male and female have very broad

and powerful chests and shoulders and exceed¬

ingly long, well-developed strong arms. The

legs on the contrary are short, thickset and

consequently powerful and the hands and feet

are of a like nature and description. The hair-covered body presents a grim and grayish, griz¬

zled aspect. The skin is black, the hair being blackish and turning gray in old individuals.

The skull has the supraorbital ridges greatly

developed and the crest in the sagittal line is large. The arms are long, the hand reaching to about the middle of the shank, while the hands are webbed to the end of the first joint of the fingers. In the foot the heel is more apparent than in other anthropoid apes, correlated with

its more terrestrial life. The gorilla walks upon all fours, a gait rendered possible by the very long arms.

These apes are limited in their distribution to the forested region of the Gaboon, and go about in families led by an old male. They are mainly diurnal in their habits, seeking their food, which is largely vegetable, during the day. At night the female and young are said to ascend a tree, while the male sleeps at its foot. The stories told of the ferocity of the gorilla are exag¬

gerated; it is an extremely dangerous animal

only when brought to bay. When defending

itself against an attack the male stands erect and is said to knock his adversaries down with his hand and then to use his powerful teeth,

the canines of which are greatly developed.

Consult Elliott, (A Review of the Primates 5

(New York 1913) ; Forbes, O. H., <Monkeys)

(New York 1894) ; Hartmann, (Anthropoid

Apes5 (New York 1885); Huxley, (Man's

Place in Nature) (London 1890) ; Keith, Pro¬

ceedings of the Zoological Society of London)

(London 1899) ; (Royal Natural History5

(London 1895) ; (Standard Natural History)

(Boston 1885).

GORKY, Maxim, pen name of Alexei

Maximovitch Pyeshkoff, Russian author : b. 14

March 1868. He was orphaned at nine, ran

away and served on a Volga River steamer, and was successively a painter of ikons, scullery

boy, gardener, watchman, baker, porter, vendor

of apples and lawyer's clerk. At 19 in a fit of despair he attempted to commit suicide. In

1891 he wandered on foot in the company of

tramps all over South Russia — the class he was afterward to depict so compellingly in his short stories. In 1892 his first story, (_ Makar Chudra,) appeared in an obscure Caucasian journal; and

the discerning at once observed that a new

force had arisen in Russian literature. In 1906

he made an extended tour over Europe, and

crossed to the United States, where on account of his bringing with him a woman who was

not his wife he was subjected to a good deal of criticism and ostracized, and he left the

country. In full sympathy with Russian revolu¬

tionary propaganda, was twice arrested and

banished, and resided for a number of years

on the island of Capri. He was permitted to

return to Saint Petersburg in 1914, and joined the Russian army. He was associated with the

movement that led to the dethronement of the

Tsar Nicholas II in 1917. The varied scenes

and persons he saw in his vagabond life among the lowest of the population furnished him

with rich material for his literary work, in

which he takes upon himself to interpret la

misere as it is in western and southwestern

Europe. His favorite type is the social rebel in full revolt against society. His style is like a flash-light revealing features of debased or

tragic character with vivid realism, but his

view of his subject is tinged with melancholy

pessimism. He is great in the short story, but not so successful in his

longer works. His

plays abound in strong situations, but they are lacking in dramatic cohesion. Among English

translations of his works may be mentioned the following: (The Oreoff Couple5 and Toma

Gordyeef5 (1901) ; (Twenty-six and One> and

(Tales from Gorky) (1902) ; (Heartache, and

The Old Woman IzerofeP (1905) ; (The In—

dividualists) (1906) ; <Mother) (1907) ; (The

Spy) (1908) ; (A Confession (1910) ; (My

Childhood5 (1915) ; (In the World5 (1917),

and the dramas (The Smug Citizen,5 and <A

Night's Lodging.5 See Night's Lodging.

GORMAN, Arthur Pue, American legis¬

lator: b. Howard County, Md., 11 March 1839;

d, Washington, D. C., 4 June 1906. Up to his 27th year he was a page in the United States Senate. He was then appointed collector of

internal revenue in the Fifth District of Mary¬

land. In 1869 he was made general superin¬

tendent of the Chesapeake and Ohio Canal

Company, and from 1872 was president of that

corporation. His influence as a Democrat ex¬

tended from the affairs of Maryland to national affairs and from the house of delegates in his native State he was elected in 1893 to serve as senator of the United States; to which office, after three years of private life, he was re¬

elected in 1902. He was prominent in oppos¬

ing the Force Bill of 1889 and took part in the reframing of the Wilson Tariff Bill in 1894.

GORRINGE, gor'rinj, Henry Honey—

church, American naval officer : b. Barbadoes,

W. I., 11 Aug. 1841 ; d. New York, 6 July 1885.

He came to the United States in youth, entered the Union navy in 1862 and served under

Admiral Porter. He was promoted lieutenant-commander in 1865. He accomplished the re¬

moval of the Egyptian obelisk (Cleopatra's

Needle), which the khedive had presented to

the United States, from Egypt to New York

city in 1880. He published a (History of

Egyptian Obelisks) (1885).

GORSE, or WHIN. See Furze.

GORST, Sir John Eldon, English legisla¬

tor: b. Preston, 24 May 1835; d. London, 4

April 1916. He was educated at Saint John's

College, Cambridge. He was civil commis¬

sioner of Waikato, New Zealand, from 1861 to

1863. In 1866-68 he was in Parliament as

Conservative member for Cambridge Univer¬

sity, from 1875 to 1892 represented Chatham

and from 1892 to 1906 sat again for Cambridge.

He failed of re-election in the latter year. He was appointed Solicitor-General in 1885, and

afterward was successively Under Secretary

of State for India 1886-91 ; deputy chairman

of committees, House of Commons, 1888-91 ;

financial secretary of the Treasury 1891-92;

rector of Glasgow University 1893-94; and

vice-president of the committee of the Council

on Education from 1895 to 1902. After 1903 he actively opposed Mr. Chamberlain's tariff-re¬

form proposals. He wrote (The Children of

the Nation : How their Health and Vigor should be Promoted by the State) (1907) and (New

Zealand Revisited) (1908).

GORTCHAKOFF, gor-cha-kof', Alexan¬

der Mikhail'ovitch, Russian diplomatist ; cousin

of the general of the same name : b. Saint

Petersburg, 16 July 1798; d. Baden-Baden, 1

March 1883. He entered the diplomatic service

in 1824 as secretary to the Russian embassy in London. His experience in diplomacy was ex¬

tended in Vienna, Florence, Stuttgart and else¬

where, and he showed great skill in securing the neutrality of Austria during the Crimean War.

In 1856 he became Minister of Foreign Affairs, and in 1862 Chancellor of the empire, having by that time made himself one of the foremost

diplomatists of Europe. He was friendly to the North during the Civil War in the United

States, and his attitude helped restrain France and England from openly recognizing the Con¬

federate government. He maintained close and

friendly relations with Bismarck until 1878

when at the Berlin Congress over the war with Turkey he felt that Russia had been deserted

by Germany. He set about negotiating the

Franco-Russian entente, and Bismarck re¬

taliated by forming the Triple Alliance. De

Giers succeeded Gortchakoff as Minister of

Foreign Affairs in 1882, but he continued in the office of chancellor until his death. Consult

Bismarck, (Autobiography, > trans. by Butler

(New York 1899) ; Klagko, <The Two Chan¬

cellorsˆ trans. by Tait (ib. 1876) ; Ranband,

Alfred, (A Popular History of Russia, > Vol. Ill (Boston 1882). See Russia; Russo-Turkish

War.

GORTCHAKOFF, Prince Mikhail, Rus¬

sian general: b. 1795; d. Warsaw, 30 May 1861.

He took part as an artillery officer in the battle of Borodino in 1812 and served in the subse¬

quent campaigns of the allies against the

French. He acquired also a brilliant reputation in the Polish War of 1831; and in 1846 he was made governor of Warsaw. In 1855 he was

appointed commander-in-chief in the Crimea,

where he conducted the defense of Sebastopol.

In 1856 he returned to Poland as governor of

the country. By his express desire his body

was carried to Sebastopol and buried in the

place he had so long and so bravely defended.

GORTON, Samuel, New England enthusi¬

ast and first settler of Warwick, R. I. : b. Gor¬

ton, England, about 1600; d. Rhode Island,

November or December 1677. He did business

in London as a clothier until 1636, when he

embarked for New England and settled at Bos¬

ton. Religious disputes induced him to remove

to Plymouth, where we first hear of him as a preacher. He soon exhibited such peculiar

views that he was banished from the colony on a charge of heresy.

With a few followers he

then went to Aquetneck or Rhode Island, which

had recently been settled by exiles from Mas¬

sachusetts Bay; but falling again into trouble, was publicly whipped for calling the magis¬

trates (<just asses® and for other contemptuous acts and was forced to seek an asylum with

Roger Williams in Providence about 1641. Here

he became involved in the disputes of the colo¬

nists on certain questions of boundary. Gorton

was then summoned to Boston but refused to

recognize the jurisdiction thus assumed and

about the same time removed to Shawomet, on

the west side of Narragansett Bay, where he

purchased land from the Sachem Miantonomo.

But in June 1643 two inferior sachems con¬

tested his claims to the land and applied to the General Court at Boston for assistance. A body of 40 soldiers were consequently marched to

Shawomet and Gorton and 10 of his disciples

were carried to Boston and condemned to hard

labor, a sentence commuted to banishment in

1644. Gorton then went to England, where he

obtained from the Earl of Warwick an order

for the land he claimed. Returning to Rhode

Island in 1648 he founded the town of War¬

wick, thenceforth his home and where he oc¬

casionally preached. He wrote several contro¬

versial works, the best known of which is

(Simplicitie's Defense Against Seven-Headed

Policy) (1646). See Janes, < Samuel Gorton)

(1896).

GORZ, or GORIZIA, capital of the former

Austrian province of Gorz and Gradisca, near

the head of the Adriatic, 23 miles north-north¬

west of Trieste, now in Italy from which city it is distant 34 miles by rail. The province, which was once part of ancient Illyria, later of the duchy of Friuli, and a separate duchy from the 11th century, came into Austrian possession in 1500. Containing a large Italian population, the territory was always regarded (by the Ital¬

ians) as part of that ((Italia Irredenta® which it 68

was hoped to reunite with the mother country.

The area is about 1,130 square miles and the pop¬

ulation about 250,000. The town of Gorz lies

in a fertile plain on the left bank of the Isonzo River, on the Trieste-Nabresina-Comorns line

of the Austrian Southern Railway and had a

population of nearly 33,000 (mainly Italians)

before the war. It possesses a fine 14th cen¬

tury cathedral, is the seat of an archbishop,

and has important industries in manufacturing

silks, cotton, leather goods, pottery, *etc.*

Charles X of France died here in 1836 after

losing his throne. On 8 April 1915, eight

months after the outbreak of the European

War, the Italian government formulated cer¬

tain demands upon Austria-Hungary, insisting

inter alia on the cession of the Trentino and the creation of a new eastern frontier, to include Gorz and Gradisca. The rejection of the pro¬

posed terms led Italy to declare war on Austria 23 May 1915. General Cadorna, the Italian

commander-in-chief, directed his initial opera¬

tions toward the points of a great triangle

formed by Trent, Tarvis and Gorz, by which

movements he proposed to keep the Austrians

employed and prevent any flanking strategy

while meantime striking with his main army

at the Isonzo on the road to Trieste, to an ad¬

vance on which the isolation and capture of

Gorz was a necessary prelude. After nearly

15 months of severe fighting on one of the most difficult and complex of all the European

battle-grounds, the Italians succeeded in cap¬

turing Gorz, no longer the pleasant city among orchards which had once made it a fashionable

health resort — the Austrian Nice — but a

dusty, shell-scarred landscape. The immense

geographical obstacles which the Italians sur¬

mounted made the event a great achievement.

The fall of Gorz (Gorizia) created great en¬

thusiasm among the Allies and especially in

Italy, which declared war also on Germany

18 days later (28 Aug. 1916), although for over a year the Italians had already been fighting

against German officers, soldiers and sailors.

As before in Galicia during 1915, the German

war command was called on to reconquer lost

Austrian territory. On 24 Oct. 1917 a powerful Austro-German offensive opened against the

Italian front ; in four days Gorz was recaptured and by the end of the year the enemy was in possession of nearly the whole of the eastern

salient of Italian territory adjoining Austria.

See Italy and the War; War, European:

Italian Campaigns.

GOSCHEN, go’shen, George Joachim,

Viscount, English statesman : b. London, 10

Aug. 1831 ; d. Hawkhurst, Kent, 7 Feb. 1907.

He was educated at Oxford, became a director

of the Bank of England at the age of 27 and entered Parliament as a Liberal for the city

of London in 1863, which he represented until

1880. His business ability, great debating

powers and knowledge of foreign affairs,

quickly gained him the respect of the House

of Commons and he became vice-president of

the Board of Trade in 1865, Chancellor of the duchy of Lancaster in 1866 and First Lord of

the Admiralty 1871-74. With M. Joubert he

went to Egypt in 1876 on behalf of the bond¬

holders to reorganize the finances of that coun¬

try and two years afterward represented Great

Britain at the International Monetary Confer¬

ence held in Paris. He was Ambassador

extraordinary at Constantinople 1880-81. He

declined a place in Mr. Gladstone's Cabinet in 1880 as he was opposed to further extension

of the franchise and represented Ripon in that Parliament. In 1885 he was returned for East

Edinburgh and on the conversion of Mr. Glad¬

stone to Home Rule became one of his most

strenuous opponents and is described by Glad¬

stone as <(in the main supplying brains, soul and movement to the dissentient Liberals.® At the

election of 1886, fought on Home Rule, he lost his seat in Edinburgh. When Lord Randolph

Churchill resigned precipitately from the

Chancellorship of the Exchequer in 1886, he

<(forgot Goschen® as a possible successor, to

which he was immediately appointed. After

an electoral defeat at Liverpool he was returned for the city of London, a constituency which

he continued to represent until his elevation to the peerage in 1900. His chancellorship gave

scope for his great abilities in finance and is remembered for his successful (<conversion® of

the national debt. From 1895-1900 he was

First Lord of the Admiralty. In his later years he combated with all his old vigor and incisive¬

ness Chamberlain's scheme of tariff reform

and was a tower of strength to the free trade Unionists. He was the author of a standard

work on <(The Theory of Foreign Exchanges®

(1864); of the (Life and Times) of his grand¬

father, George Joachim Goschen, a famous

Leipzig banker; and of (Essays and Addresses

on Economic Questions* (1905). His <Life,)

by A. R. D. Elliot, was published in two vol¬

umes in 1911. His youngest brother, Sir Wil¬

liam Edward Goschen (q.v.) was British Am¬

bassador at Berlin, 1908-14.

GOSCHEN, Sir William Edward, British

Ambassador : b. 18 July 1847. He was educated

at Rugby and Oxford University. He entered

the diplomatic service in 1869, was attache at Madrid, and one of the secretaries successively at Madrid (1873), Buenos Aires (1873), Paris

(1875) and Rio de Janeiro (1877). He accom¬

panied the special embassy of his brother, G. J.

Goschen (afterward Viscount Goschen) to Con¬

stantinople in 1880, becoming second secretary

at that capital in the following year, and sec¬

retary of the legation at Pekin (1885), Copen¬

hagen (1888), Lisbon (1890) and Petrograd

(1894). He was for a short time charged'affaires at Washington; envoy extraordinary and

minister plenipotentiary at Belgrade, 1898-1900, and at Copenhagen 1900-05. From 1905—

OS he was Ambassador at Vienna, and from

1908 until the British declaration of war on

Germany on 4 Aug. 1914, was Ambassador

at Berlin. His final interview with Dr. Bethmann-Hollweg, the German Chancellor — when

the latter, in reply to the British Ambassador's intimation that the violation of Belgian terri¬

tory by German forces would be followed by a

British declaration of war, declared that it was just for a word,

ˆneutrality,® <(just for a scrap of paper,® that Great Britain was going to

make war on a kindred nation — is historic.

GOSFORD, Archibald Acheson, 2d Earl

of, British colonial governor : b. 1775 ; d. 1849.

He was appointed governor-in-chief of Canada

in 1835, and held office during the rebellions of 1837-38. He begun by endeavoring to con¬

ciliate the assembly of Lower Canada, but the

publication of his secret instructions by the

lieutenant-governor of Upper Canada, in which

he was empowered to make no concessions to

the constitutional demands of the majority,

precipitated a conflict. His instructions for

the arrest of Papineau and O'Callaghan was the immediate cause of the rising in the lower

province.

GOSHAWK, a falcon of the genus Astur.

The goshawk proper, or (<gentle falcon® (A.

palumbarius) , was a favorite bird in falconry

(q.v.), and is still used for large game, as rab¬

bits, pheasants and the geese from which it

took its name. It is 21 inches in length, the crown, black, bordered on each side by a line of white, finely speckled with black; upper

parts, slate, tinged with brown ; legs, feathered half-way down, and, with the feet, yellow ; tail-feathers with pale bands. It is to be found

throughout Europe and central Asia; and it is

a question whether the American goshawk (A.

atricapillns) is really specifically different.

The latter is a noble bird whose home is in the north, so that it is rarely seen south of the Canadian line except in winter, and uncom¬

monly then. In its boldness, its marvelous

power and control of flight, and its prey, it resembles our more familiar little falcons, the sharpshin and Cooper's hawk. Several other

species inhabit the Orient, an Australian one

being remarkable for its pure white color, with red irides.

It should be noted that the bird called (<goshawk® in Scotland is the peregrine.

GOSHEN, the land given by Pharaoh to

Jacob and his family in Egypt. Authorities

differ as to the exact location of this piece of territory, but it is generally agreed that it

occupied the district between the brook of

Egypt and the Nile delta. Jacob's descendants

lived here until the exodus. (Gen. xlv, 10;

xlvi, 28, 34; xlvii, 27; 1, 8; Ex. ix, 26).

GOSHEN, Ind., city, county-seat of Elk¬

hart County, on the Elkhart River and on the

Cleveland, Cincinnati, Chicago and Saint Louis

and the Lake Shore and Michigan Southern

railroads, about 25 miles southeast of South

Bend and 95 miles southeast of Chicago. It is situated in a fertile agricultural section of the State. Its principal industrial establishments

are flour-mills, bicycle and machine shops,

woolen-mills, farm implements, condensed milk

plants, steel tanks, sash and door factories,

veneering and furniture shops; rubber goods,

underclothing, mittens and shirts are manufac¬

tured here. The city has large lumber, coal and brick yards. Hay, grain and live stock are the chief farm products shipped from Goshen to

larger markets. The public library building,

city hospital, Goshen College and the high

school are the . principal public buildings. The mayor holds office for four years. The city

owns and operates the electric-light plant and

the waterworks. Pop. (1920) 9,525.

GOSHEN, N. Y., village, railroad junction,

and one of the county-seats of Orange County,

on the Erie and the Lehigh and New England

railroads, 59 miles northwest of New York.

Goshen was founded in 1714 and incorporated

in 1809; it has municipal waterworks. It con¬

tains a hospital, a sanitarium and a public

library. The manufactures include bricks, road

carts, tiles, glass, cider and foundry products, but the chief commercial interests are connected with the dairying industry, there being a con¬

siderable trade in milk, butter and cheese, which are widely celebrated for their excellence. The government is administered by a president and

four trustees, elected annually. Pop. 3,081.

GOSLING-GRASS. See Bedstraw.

GOSNOLD, gos'nold, Bartholomew, Eng¬

lish voyager to America: d. Jamestown, Va., 22

Aug. 1607. He joined Raleigh in his attempt to colonize Virginia, and after the failure of that enterprise was placed in command of an expedi¬

tion fitted out at the cost of the Earl of South¬

ampton and others for planting a settlement in New England. He sailed from Falmouth 25

March 1602, with one small vessel and a com¬

pany of 32 persons, 20 of whom were colonists.

Steering directly across the Atlantic, in seven weeks he reached

Massachusetts Bay, first see¬

ing land probably not far north of Nahant.

Thence he turned south and landed on Cape

Cod, to which he gave the name it still bears.

Sailing around the promontory and stopping at

the island now known as No Man's Land, but

which he called Martha's Vineyard, Gosnold

anchored at the mouth of Buzzard's Bay and

resolved to plant his colony on an island which he called Elizabeth, and which now bears the

Indian name of Cuttyhunk. The adventurers

here built and fortified a house, but the hostility of the Indians, scarcity of provisions and dis¬

putes about a division of the profits, disheart¬

ened them, and the whole party returned to

England, taking a valuable cargo of sassafras

root, then highly esteemed as a medicine, cedar, furs and other commodities. Gosnold next

turned his attention toward Virginia, and after long effort succeeded in organizing a company

for colonization in that region, the heads of

which were Edward Wingfield, Robert Hunt

and the famous Capt. John Smith. A charter

was granted them by James I, 10 April 1606,

the first instrument of that nature under which the English were planted in America ; and on

19 Dec. 1606 Gosnold set sail with three small vessels and an ill-

assorted band of 105 adven¬

turers, only 12 of whom were laborers and

very few mechanics. After a tedious voyage,

a storm having driven them into Chesapeake

Bay (26 April 1607), they sailed up James

River, which they named after the king, disem¬

barked about 50 miles above its mouth and

founded the settlement of Jamestown. Sickness

and various disasters destroyed 50 of their num¬

ber before autumn, among whom was the pro¬

jector of the colony. The Massachusetts town¬

ship of Gosnold, comprising the Elizabeth

Islands, was named in his honor.

GOSPELS, Apocryphal. These are some¬

times called the uncanonical Gospels because

they were not included in the New Testament

Canon. They are also called* Pseudepigraphal

Gospels, because of the lack of authenticity for their contents. Some are probably lost en¬

tirely and others have descended to us in

fragments only. James Moffat in his superb

article <(Gospels — Uncanonical® in Hastings's

Dictionary of the Apostolic Church (Vol. I,

pp. 478-506) classifies these writings under

three heads: (1) Gospels relating to the birth and infancy of Jesus; (2) General Gospels

similar to the synoptics; (3) Gospels of the

passion and resurrection. In a general way

we shall follow his order.

The Protevangelion of James. — The oldest

manuscript known dates back to the 10th cen¬

tury in the Greek. It was first published by

Bibliander at Basel in 1552 in a Latin version by William Posted, a traveler who had found

it in current use in some of the Eastern

churches. One or two modern scholars hold

that it had a Semitic original from which the birth stories of Matthew and Luke are taken.

The contents of the Gospel deal with the la¬

ment of the priest Joachim and Anna that they have no child, the subsequent birth of Mary,

the selection of Joseph and his marriage to.

Mary; their journey to Bethlehem; the birth

of Jesus, the flight into Egypt and the mur¬

der of Zechariah, the High Priest.

The Gospel of Thomas, the Israelite. —

The oldest manuscripts of this gospel are of

the 14th or 15th century. Zahn dates the

original gospel early in the 2d century, but

scholars generally place it at a much later date.

It is thought that it had its origin among the Gnostics or Manichaeans. The Gospel gives

the story of Jesus learning the Greek alpha¬

bet and other stories of the childhood of

Jesus. Some of its materials were used in the Gospel of the pseudo-Matthew and the Arabic

Gospel of the Infancy.

The Gospel of Pseudo-Matthew. — So

named by Tischendorf, the first editor of the

Latin Text. It was paraphrased by Hrotswi—

tha, abbess of Gandersheim in the 10th cen¬

tury, in Latin hexameters. The details regard¬

ing the flight into Egypt are very full. It also contains the incident of the taming of the lions.

The History of Joseph, the Carpenter. —

Was preserved in the East in an Arabic trans¬

lation first made known in Europe by Isidore

de Isolanis at the commencement of the 16th

century. It was not published until 1722 when

Wallin printed it from an Arabic manuscript

of the 13th century accompanied by a Latin

translation. It claims to be the story told by Jesus to the disciples on the Mount of Olives.

It is of Egyptian origin not earlier than the 4th century. There are also four Sahidic frag¬

ments of other Nativity Gospels.

Among the general gospels there are four

called (<Jewish Christian Gospels® because they

originate from that source. They are : The

Gospel of the Hebrews, The Gospel of the

Nazarenes, the Gospel of the Twelve and the

Gospel of the Ebionites.

The Gospel of the Egyptians. — So called

because it circulated among them ; is referred to by Clement of Alexandria, Origen and Epiphanius. Its origin has been ascribed to the

Essenes with a very early date.

The Gospel of Peter. — Of very early origin.

It is said to have been used <(either for private reading or in public worship, by the Church at Rhossus on the coast of Syria not far from

Antioch in the last quarter of the 2d century.®

It may have been of Gnostic origin as there

are some elements in it that seem to be Gnostic in character.

The Gospel of Basilides. — Of Alexan¬

drian origin, the group claiming to have the

authority of Peter's interpreter Gloucias in

matters of doctrine. It was composed before

the middle of the 2d century. It is referred

to by Origen. By some critics it is conjec¬

tured that Basilides prepared an edition of the Gospel of Luke for his own purposes.

The Gospel of Marcion. — An edition of

Luke prepared by Marcion for those who like

himself were antagonistic to Judaism.

The Gospel of Apelles, the disciple of

Marcion, is only a conjecture. The text is not known. The thought that such a Gospel is in

existence is based on a single passage in Epiphanius.

The Gospel of the Na&ssenes, a Gnostic

sect, is only known through several quotations

found in the Philosophoumena of Hippolytus.

Oxyrhyncus Fragments. — The excavations in Egypt in recent years have yielded some remarkable results in the discovery of various early Logia of Jesus, edited and published by Grenfell and Hunt in 1897, 1907 and 1911. In 1896 Forbes Robinson published several Sa¬ hidic fragments of importance, but not earlier than the 3d century. See Agrapha.

The Gospels dealing with the Passion and Resurrection are nine in number.

The Gospel of Philip. — Exists in m mere fragment preserved by Epiphanius. It is re¬ ferred to in the (Pistis Sophia. y It was in use by an Egyptian Gnostic sect during the 4th cen¬ tury. It probably had its origin in the last quarter of the 2d century.

The Gospel of Matthias. — Matthias was elected an apostle after the Resurrection and it is assumed that he received secret revelations from Jesus. There are no quotations from the Gospel, but Clement of Alexandria quotes

from the (Traditions of Matthias.) According

to Hippolytus the <Traditions) seem to have

originated with Basilides and Isidore.

The Gospel of Mary. — Exists in three

fragments only, one of which is in Coptic. It had its origin among the Barbelo Gnostics

whom Irenaeus refuted.

The Gospel of Bartholomew. — Exists in

Latin, Greek and Coptic fragments, some of

them as early as the 9th century. According

to the fragments Jesus allows Bartholomew

to see and interrogate Satan. He is 600 cubits high and 300 broad and is guarded by 6,064

angels. Bartholomew kicks and infuriates

Satan and learns from him some of his secrets for tempting men.

The Gospel of Nicodemus. — Is sometimes

called the {Acts of Pilate.) In recent years it had been very widely circulated. It gives an

account by a supposed eyewitness of the trial

and death of Christ with many fabulous addi¬

tions. It is probably not older than the 4th

or 5th century.

The Gospel of Gamaliel. — Is largely con¬

jectural as to its existence. Various frag¬

ments have been considered to belong to it, but without certain proof.

The Gospel of Perfection. — Originated

among the Ophite Gnostics according to Epiphanius. It i-s alluded to in the (Pistis Sophia. >

Further than this neither details nor quota¬

tions are preserved for us.

The Gospel of Eve. — Of Gnostic origin

and Epiphanius preserves the only quotations

from it that have come down to our day.

The Gospel of Judas Iscariot. — Composed

by Gnostic Cainites in the 2d century. It

represents Judas as having a very avaricious

wife who encouraged him to steal from the

Apostolic purse for her benefit. At her insti¬

gation he finally betrayed his Master in order that he might again

minister to her greed.

In addition to these gospels there are a number of Coptic unclassified fragments deal¬ ing with the Passion and Resurrection which are of undoubted early origin, in some cases a near approach to Gospel quotations. In fact they may be passages carelessly quoted from the canonical Gospels. The most famous frag¬ ment was a bit of papyric discovered at Fayum. It is of the 3d century and was first published by Gustav Bickell in 1886.

In addition to all the above documents, the following are mentioned by the early fathers of the Church. There are no fragments or quotations from them in existence known to the scholars of this day: (The Acts of Andrew* ; (The Gospel of Andrew* ; (The Gos¬ pel According to the Twelve Apostles* ; (The Gospel of Barnabas) ; (The Gospel of Cerinthus) ; (The Revelation of Cerinthus* ; (Epistle of Christ to Peter and PauP ; (Gospel of the Encratites* ; (The Book of the Helkasaites) ; (The Gospel of Hesychius* ; (The Book of James) ; (The Gospel of Jude) ; (The Revela¬ tion of Stephen1* ; (The Gospel of the Scythi¬

ans* ; (The Gospel of Thaddaeus* ; (The Gos¬

pel of TrutlP) in use among the Valentinians), and (The Gospel of Valentinus,* besides many

general Acts of the Apostles and specific acts of individual apostles that may have had some

bearing on the gospel narratives.

Samuel G. Ayres,

Garrett Biblical Institute.

GOSPELS, The. The name Gospel is

directly derived from the AS godspel (—God—

message), but ultimately from the earlier form

god spel (= = good message), a phrase probably

coined to represent, as it does very exactly,

the Gr. evafyeXiov. The Gospels are four brief books of the New Testament which present to

the reader something of the life, teachings,

death and resurrection of Jesus Christ. They

are often called so many (<lives of Christ,® but this is an error as the main interest and intent is in none primarily historical or biographical.

They are in every case writings with a pur¬

pose, viz., to present to believers in Jesus such facts in relation to him as seemed to the writer most important and useful. The author of the

third Gospel definitely asserts that he wrote to give to his first reader certainty as to the

matters in regard to which there had been oral instruction (i, 4) ; and

the fourth Gospel had for its avowed and manifest object to set forth the deity of Jesus (xx, 31).

The first use of the term Gospel was not in

reference to written documents. It rather

applied to the message of truth and life brought by Jesus Christ (Rom. i, 1), and it is no¬

where in the New Testament employed in ref¬

erence to the books now called Gospels. In¬

stead we find in Justin Martyr's writings what seems to have been the name first used for

these books, ˆMemoirs,® but in the second half of the 2d century the use of the title later uni¬

versally employed may be distinctly traced.

The form of the title uniformly prefixed to

these books reminds us of the earlier signifi¬

cation of the word. The phrase (<The Gospel

according to Matthew,® <(according to Mark,®

implies to be sure an assertion of authorship, but the thought is not of so many distinct Gos¬

pels, but rather of the one and single Gospel as variously presented by the several evangel¬

ists. In a similar way there are found in the Fathers references to the <(threefold® and ((fourfold® Gospel. When, however, the books were

once called Gospels, the name passed into

uniform and permanent use. In the present

article such facts will be presented as relate to all the Gospels or to several of them, while

for such considerations as apply to a single

Gospel by itself one should consult the article bearing the name of its author.

The Synoptic Gospels. — Practically from

the beginning it has been recognized that there are peculiar resemblances among the first three Gospels which require us to group them to¬

gether over against the fourth Gospel which is in many ways markedly distinct from the others.

The name ((Synoptic® is commonly applied to

Matthew, Mark and Luke because they agree

in giving a ˆcommon view® of the facts about

Jesus, which is implied in the Greek word cvvoipig though the English derivative, <(synopsis,® has

come to have a very different signification.

While Matthew and Luke contain large addi¬

tions to the stock of material common to all

three Synoptics, and in these additions vary

markedly from each other, yet comparison

readily shows that the framework as to place

and time is common to all three ; that many

events and some teachings are related in all;

and that there is often a striking similarity

in the language employed, a resemblance so ex¬

act that, for example, the same parenthetic ex¬

planation uniformly interrupts the report of the words spoken in connection with the cure of

the paralytic. These resemblances are so many

and so marked that the idea that the first three Gospels are so many independent compositions

is now rejected by scholars with practical

unanimity. On the other hand, there are also

striking divergences and diversities; not only

are there facts and teachings peculiar to each of the Gospels, but also the flow of the narra¬

tive common to all three is often interrupted

by most noticeable variations. The fact of the simultaneous existence of such remarkable

agreements and disagreements has given rise

to the socalled ((synoptic problem,® which for more than a century has occupied so large a

place in New Testament criticism with the

endeavor to find a hypothesis which will

plausibly explain the phenomena.

The principal solutionst proposed have been:

(1) that of an oral gospel underlying all three; (2) of dependence of one upon another or

others; (3) of a written source or sources.

1. The argument in favor of the oral gospel

hypothesis is simple and not without a certain plausibility. It will be admitted by all that the gospel story must have been first transmitted

orally, and we have only to think of this oral transmission in a certain way to find a suffi¬

cient solution for the problem. But when we

come to inquire how there could have been

such oral transmission as would provide at once for the agreements and the differences, the

solution seems less plausible. Further, in the

prologue to Luke we find a statement that al¬

ready there had come to be numerous arrange¬

ments of the gospel material, and these arrange-72

ments can be thought of only as in written

form. Accordingly the theory that the oral

gospel explains the phenomena in question is

set aside to-day almost unanimously.

2. The dependence theories have been so

many that it would seem that every combina¬

tion possible had been urged. Only two of the most important can here be mentioned, (a)

As there is very little in Mark which cannot be found in Matthew or Luke, if not indeed in

both, it has been held that Mark was only a

copyist and abbreviator of the other two. But

this does not commend itself on further con¬

sideration. There is some material which is

peculiar to Mark, and this possesses such

tokens of originality, such freshness and pic¬

turesqueness, that it does not seem possible that the author could have been merely a copyist.

Nor is it credible that a competent copyist could have neglected and thrown aside so much inter¬

esting and important material as is found in

Matthew and Luke beyond what is paralleled in

Mark, (b) Only one other form of the depend¬

ence hypothesis has sufficient plausibility to de¬

serve even mention here. It has been held by

some that Mark was used by Matthew, and

then that both Mark and Matthew were em¬

ployed in the construction of Luke. But

unless supplemented from the theory of sources

this explanation fails to explain where the

material in Matthew, additional to Mark, was

obtained, and, in turn, how the writer of Luke made such additions to the Gospels which lay

before him.

3. For a long time now the theory that the

evangelists used written sources as a basis for their work has more and more occupied the

field, so that the points now. chiefly argued are the number and character of the sources em¬

ployed. It is very widely accepted that the prin¬

cipal source of Matthew and Luke is found

most completely in Mark, if that Gospel was

not indeed used by them in its present form.

While the latter hypothesis is often put forward or implied, it is doubtful if those who accept it appreciate the serious difficulties which be¬

set this view. On the one hand, there is much in Mark which it seems incredible that the

author of Matthew, and especially Luke with

his desire for completeness and his keen sense of literary values, could have overlooked, as,

where Mark is fuller than Matthew or Luke,

the additions are usually striking; on the other hand, the second Gospel itself shows distinct

traces of being more than an accumulation of

material, of being in its present form the work of one who edited the material which he had

collected and combined it into a well-ordered

literary whole. Hence many scholars hold that

the common basis of all the Synoptic Gospels

is a source, which is not, to be sure, our present Mark, but which is best reproduced in that work and with the least addition of other material, and so may well be called the Marcan source,

or, as some prefer to style it, <(Ur-Markus,®

that is, the original source of Mark. This

source gave the local and chronological frame¬

work for all the Synoptics, and, so far as it went, provided each and all of them with much of their material. How it arose, when and

where, who was the author, was it John Mark,

or was he the author who on the basis of these notes, together with a limited amount of other material, wrought out the second Gospel, all

these questions remain for future investiga¬

tion, perhaps will long remain matter for specu¬

lation. (See article Mark, Gospel of). This

same source underlies Matthew and Luke no

less than Mark, although it is regarded by many as almost certain that the other evangelists did not possess the <(Marcan source® in the same

form in which it appears in the second Gospel.

The origin of these variations and their extent is likely, however, to remain problematical. One of the most striking theories is that the evangel¬

ist Mark himself issued no less than three

editions of his work, the first having been put out at Jerusalem, which was utilized by Luke

who became acquainted with it during his stay

at Jerusalem or Caesarea; the second at Alex¬

andria which edition Matthew used in the first Gospel, and the third and final edition at Rome in the form which remains our second Gospel.

A statement from Papias, who lived during

the first half of the 2d century, has been pre¬

served to the effect that (<Matthew composed the Logia in the Hebrew language® (more cor¬

rectly in modern speech in Aramaic). Late

criticism very largely makes this document the

second main source to be traced in both Mat¬

thew and Luke, though scholars differ widely

as to the contents and even as to the character of the document. Even the name given to it

varies, as German scholars prefer to style it

<(Q® (from Quelle). So much discourse ma¬

terial in both Matthew and Luke may plausibly

be ascribed to this source that not a few have been inclined to consider that it was merely a collection of the discourses of Jesus, an edition of his sermons, as it were. But as the Greek word ((Logia® means (<Oracles,® rather than

<(Discourses,® it may also have contained narra¬

tive, at least enough to give the setting of the speeches, perhaps more. Various attempts have

been made not only roughly to indicate its

probable scope and nature, but even, by com¬

bining what in Matthew and Luke may plausibly

be attributed to it, to reproduce it supposedly much as it was. But when we remember that if we did not have Mark, but only Matthew and

Luke, it would have been impossible to repro¬

duce with accuracy the Marcan source on

which both are based, it may well seem hope¬

less, if not absurd, to claim any certainty for proposed reproductions of the <(Logia.® It has

repeatedly been suggested, and with much plausi¬

bility, that the first Gospel was attributed to the Apostle Matthew because it was he who was

the author of the collection of Discourses of

Jesus and other matter relating to him which

is the source of so much of that Gospel. It

is indeed held by most that, except the first two chapters, practically the whole of Matthew

may be referred to one or the other of the

Marcan or <(Logia® sources. See article

Matthew, Gospel of.

While attempts to find some traces of the

use of the <(Logia® in Mark have not been re¬

ceived with favor, it is plain that this source was largely employed in the composition of

Luke. There is one marked difference to be

noted, that in Luke the attempt is made to give the sayings of Jesus in their original setting, while in Matthew they are collected into long

discourses as if spoken continuously. The

((Logia® may of course have been somewhat

modified in transmission, so that the document

did not lie in identical form before the authors of the first and third Gospels, and it should also be remembered that, like most who speak

much, Jesus may often have repeated the great

lessons which he wished to enforce, but a dif¬

ference between the evangelists in their manner of treating their common material may also be

accepted. Luke must also have had other sources of information than the two great sources

which have been discussed, which would be

quite in keeping with his claim (i, 3) of wide and thorough investigation. See article Luke,

Gospel of.

It is now generally recognized that the ((Two

Document® theory gives plausible answer to

most of the questions involved in the ((Synoptic Problem,® and consequently scholars are rest¬

ing on it with increasing unanimity and confi¬

dence. At the same time there is no such

general agreement as to details in the appli¬

cation of the theory. (1) While the majority

would say that Mark in its present form, or a document practically indistinguishable from it,

was used in the composition of the first and

third Gospels, yet there are such difficulties in the way of this view it has been strongly urged that the authors of Matthew and Luke must

have had access to the Marcan material only in forms which had come in the process of transmission

to vary widely from each other, or even, as

has already been noted, that we must conceive

that Mark issued his Gospel in no less than

three quite variant editions. (2) It is still fur¬

ther asserted that the Marcan source cannot be explained wholly independently of Q, but that

some traces of the latter should be recognized as existent in the former. (3) This suggests,

again, the uncertainty which still prevails as to the extent of Q, and even as to its character, that is, as to whether it consisted exclusively of discourse material, or included narrative

matter as well. Such uncertainty in regard to

these points at least still reigns that it may perhaps be doubted whether, even if, as seems

most probable, the ((Two Document® theory

should permanently maintain itself, it is also

reasonable to expect that it will be possible, with the material which we possess, to find

satisfactory answer to the questions which arise in its application. Uncertainty as to the exact form in which the sources were at hand for

the composition especially of Matthew and Luke

is increased by the recognition of the fact, on which emphasis has lately been freshly laid,

that the authors of the Gospels were not mere copyists who felt bound exactly and without

modification of form to reproduce all the

material which was accessible to them, their

work consisting merely in piecing it together,

but that they were, rather, authors who without doing injustice to their materials, might and

very possibly actually did select, arrange and

even, to some extent at least, rewrite them in accordance with their own purposes. Thus,

for example, the fivefold arrangement of the

discourse material in Matthew might be due,

not to some source which lay before him, but

to the final author himself.

After the acceptance of the ((Two Docu¬

ment® theory, question still remains as to the ultimate origin of a certain amount of mate¬

rial, relatively small on the whole, which seems to some to stand outside the natural scope of both Q and the Marcan source. One example

is the apocalyptic discourse of Jesus, which,

to_ be sure, is found in all the Synoptics. The criticism which separates this from the Marcan

source is, however, wholly subjective and the

assumption that Jesus cannot have uttered such

a discourse has been fairly styled (<purely gra¬

tuitous.® As to the <(Infancy® chapters in

Matthew and Luke the case stands quite differ¬

ently and for this material special sources must be sought. It has been suggested with great

plausibility that the matter in this section of Luke was obtained from

the daughters of Philip the evangelist, or, even more plausibly still, from Joanna, the wife of Chuza, Herod's steward.

In the latter case it may reasonably be believed that the large section of matter in Luke without parallel elsewhere (Lk. ix, 51-xviii, 14) was

due to the same source.

The Relation of the Fourth Gospel to the

Other Three. — Most of the difficulties con¬

nected with the fourth Gospel relate simply to the book taken by itself, and the discussion of them has no place in an article concerned only with what belongs to all the Gospels or to

several of them (see article John, Gospel of).

One important and difficult problem, however,

grows out of the contrast which appears in

many ways between the fourth Gospel (John)

and the other three. Their unlikeness is so

great that it is scarcely surprising that some have felt that they were positively inconsistent, that if the Synoptics are accepted as authentic, the unauthenticity of John must follow. But

on more careful study many of the superficial

unkkenesses lose their apparent significance.

For example, the mention of three passovers in John and of but one in the other Gospels might seem to give an irreconcilable contradiction as to the length of the ministry of Jesus, but it is very possible that the Synoptics simply failed to mention the occurrence of passovers not con¬

nected with the events which they described,

and there is good reason to hold that the

ministry as recorded in those Gospels requires

a duration of much more than a year. Most

of the events in the active ministry of Jesus as recorded in John occurred in Judea, while

the scene of the synoptic reports is laid in

Galilee, but the ministry is not so reported by either as to forbid the acceptance of the other.

It is needless to multiply examples. Some diffi¬

culties remain unsolved, as to find in harmony with the synoptic reports a place for the rais¬

ing of Lazarus, but it is to be remembered

that both sets of reports are exceedingly frag¬

mentary and that fuller information, could we

obtain it, might relieve the situation. If it is found impossible to reconcile the statements of John and the Synoptics as to the day of the

crucifixion, whether the 14th or the 1 5th of the month (not all critics are sure that there is a clear contradiction), it remains to be settled

whether the statements in John may not have

been written with the definite purpose to cor¬

rect the synoptic reports. While it is now

recognized that ((harmonizing,® i.c., the fitting together in the:r order of all the events re¬

corded, is less easy and certain than was for¬

merly thought, because of the fragmentary char¬

acter of all the reports, yet the same frag¬

mentariness makes it less easy to assert with

confidence that John and the Synoptic Gos¬

pels are contradictory or even inconsistent.

Grouping of the Four Gospels. — It is plain

from the prologue of Luke that there were in

existence at that time various narratives in

relation to Jesus which presumably had gained

some currency. To say nothing of the Apoc¬

ryphal Gospels, most of which are certainly

much later, it appears that the socalled <(Gospel of the Hebrews® and (<Gospel of Peter® found

considerable acceptance for some time. Gradu¬

ally, however, these other narratives were set

aside in favor of the present fourfold gospel.

This can scarcely have taken place in the 1st century, for John cannot have been composed

till nearly the end of the century. But by the middle of the 2d century the ((Diatessaron® of Tatian, a single narrative formed by combining

the four which we now have, shows that the

group ng was already a fact, and by implica¬

tion that it had been accomplished long enough so that it was a familiar and accepted fact.

The testimony of Papias shows that long before the middle of the century this process was

taking place in Asia Minor, if it had not been already accomplished. This fact may be suffi¬

cient to justify that it was in Asia Minor and perhaps in Ephesus itself whither the first

three gospels had been carried and where the

fourth was written, that there came about this grouping of narratives which has given to the

Christian Church its permanently fourfold gos¬

pel. While the accepted group of gospels has

always consisted of the same four books, it is interesting to note that the order in which the books stand in the MSS. varies greatly. Almost every possible order of books is to be found, and the order, Matthew, John, Luke, Mark, is

found only less often than the order which

finally prevailed.

Historicity of the Gospels. — Very positive

assertions were formerly often to be met with

as to the unhistorical character of the Gospels, and every variation in statement was urged as

a proof of their untrustworthiness. But later

and more careful criticism shows that the au¬

thors were honestly trying to set forth facts

as they knew them, and the discovery of the

sources which underlie them increases their

trustworthiness. Not only have the commonly

. accepted dates of the Synoptics been pushed back to points far earlier than the dates proposed

by older scholars, but the sources carry us back much earlier still. The ((Marcan Source® and

the <(Logla® cannot be separated by 30 years

from the events which they record, and may not be more than 15 or 20 years from them. This

fact makes the growth of myth and legend prac¬

tically impossible, and shows that many eye¬

witnesses of the ministry of Jesus were still

living at the time of the composition of the

<(sources,® on which the historicity of the

Synoptic Gospels largely, but by no means ex¬

clusively, depends. That our Gospels embody

so fully and exactly these early sources goes

far to guarantee their trustworthiness.

Bibliography. — Buckley, E. R., (An Intro¬

duction to the Synoptic Problem5 (1912) ; Bur—

kitt, F. C., (The Gospel History and Its Trans¬

mission5 (1906) ; Harnack, A., (The Sayings

of Jesus5 (1908) ; Holdsworth, W. W., Gos¬

pel Origins5 (1913) ; Moffatt, James, intro¬

duction to the Literature of the New Testa¬

ment5 (1911) ; Salmon, George, (The Human

Element in the Gospels5 (1907) ; Sanday, W.,

(ed.), (Oxford Studies in the Synoptic Prob¬

lem5 (1911); Stanton, V. H., (The Gospels as

Historical Documents5 : Part I, (The Early Use

of the Gospels5 (1903) ; Part II, (The Synop¬

tic Gospels5 (1909) ; Zahn, Th., introduction to the New Testament5 (Eng. tr. 1909).

David Foster Estes,

Professor of New Testament Interpretation,

Colgate University.

GOSS, Charles Frederic, American Pres¬

byterian clergyman: b. Meridian, N. Y.. 14 June 1852. He was graduated from Hamilton Col¬

lege in 1873, from the Auburn Theological Sem¬

inary in 1876 and was at first a home mission¬

ary and besides briefer settlements was pastor

of ((The Moody Church® in Chicago for five

years and the Avondale Presbyterian Church

in Cincinnati for 19 years, retiring in 1913. He received his D.D. from his alma mater; was

instructor of biblical literature in the Cincinnati university; minister in residence in Auburn

Theological Seminary in 1912 ; lectured exten¬

sively; wrote for many papers and published

(The Optimist5; (The Philopolist5 (1898);

(The Redemption of David Corson5 (1900) ;

(The Loom of Life5 (1902) ; (Little Saint Sun¬

shine5 (1902) ; (Hits and Misses5 (1899) ;

(Just a Minute5 (1904) ; (A Life of D. L.

Moody5, and a (History of Cincinnati5 (1912).

GOSS, Isham J. M., American eclectic

physician and author : b. Oglethorpe County,

Ga., 16 Aug. 1819; d. Marietta, Ga., 25 Feb.

1896. He was graduated at Emory College, Ga.,

and in 1844 in medicine from the medical de¬

partment of the University of Georgia. For

14 years he followed the practice of the regular or allopathic profession, when he was con¬

verted to American Eclecticism and became a

leader of that school in the South. Several

eclectic colleges conferred upon him the honor¬

ary degree of doctor of medicine. In 1868 he

filled the chair of practice in the Philadelphia Medical University and in 1877 the chair of

materia medica and therapeutics in the

Georgia Eclectic Medical College, reorganized

that year. He wrote (Materia Medica5 (1877) ;

and (Theory and Practice of Medicine5 (1882).

GOSS, Warren Lee, American writer: b.

Brewster, Mass., 19 Aug. 1835. He studied at

the Harvard Law School, served in the Civil

War, first in the United States engineers and

later in the 2d Massachusetts Volunteers; was

president and later historian of the National

Union of ex-Prisoners of War; was for two

years national patriotic instructor of the Grand Army of the Republic. He has been active as

editor, magazine writer and author of such

volumes as (The Soldier's Story of Captivity

at Andersonville5 H866) ; (Recollections of a

Private5 (1890, jhe first seven chapters previ¬

ously published in the Century Magazine), and

several such volumes as (Jed, a Boy's Adven¬

tures in the Army,* and later, (Life of Grant for Boys and Girls5 (1911), and (Boy's Life of General Sheridan5 (1913).

GOSSAN. See Secondary Enrichment.

GOSSE, gos, Edmund William, English

literary critic and poet: b. London, 21 Sept.

1849. From 1875-1904 he was translator to the

Board of Trade, and since 1904 has been

librarian to the House of Lords. In 1884-85 he lectured in the United States. He has made a

special study of Scandinavian literature, and

published (Studies in the Literature of North¬

ern Europe) (1879). Other works of his are

‘Life of Gray> (1882) ; Seventeenth Century

Studies) (1883) ; ‘From Shakespeare to Pope)

(1885) ; ‘Life of Congreve) (1888) ; (History

of Eighteenth Century Literature) (1890) ;

‘Life of Philip Henry Gosse, Naturalist

(1890) ; (Gossip in a Library* (1891) ; Ques¬

tions at Issue) (1893) ; (The Jacobean Poets)

(1894) ; (History of Modern English Literature) (1897); ‘Coventry Patmore) (1904);

‘Father and Son) (1907), a delightful piece of autobiography which was crowned by the

French Academy in 1913; (Portraits and

Studies) (1912) ; . ‘Collected Essays) (5 vols., 1913) ; Some Diversions of a Man of Letters)

(1919).

GOSSELIN, gos-lan', Auguste Honore,

French Canadian historian: b. Saint Charles de Bellechasse, province of Quebec, 29 Dec. 1843. He was educated at Quebec Seminary and Laval University, was ordained to the priest¬ hood in 1866, and has held various clerical ap¬ pointments. He is the author of 'La Vie de Mgr. de LavaP (1890) ; (Les Normands au Canada* (1892-94) ; 'Mgr. de St. Valier et Son Temps) (1900) ; (Jean Nicolet et le Canada de Son Temps* (1905).

GOSSEN, gos'sen, Herman Heinrich, Ger¬ man economist: b. Diiren, 1810; d. 1858. His father and grandfather were government offi¬ cials, and he followed the same career, with a want of success which is attributed to his predilection for abstract studies. He is de¬ scribed as amiable and unpractical. He re¬ tired into private life in 1847, occupying him¬ self first with a project of universal insurance, afterward with his book entitled 'Entwickelung der Gesetze des menschlichen Verkehrs und der darausfliessenden Regeln fur menschliches Handeln* (Brunswick 1854). This work

which had been generally overlooked even in

Germany, and is not mentioned in Roscher's

'History,* was brought to light by Professor

Adamson, and an account of it was given by

Jevons in the preface to the second edition of his (Theory of Political Economy.* It was

extremely rare and was reprinted at Berlin in

1889. The work is an attempt to found

economics on a mathematical basis, and the

author regarded his services in the reform of

the method of the science as similar to those of Copernicus in astronomy. Gossen's book

contains two elements of unequal value; a

somewhat narrow and pedantic application of

utilitarian philosophy to politics and ethics, and a very original formulation of the principle of final utility in economics. In general it may

be said that Gossen is guilty of a fallacy to which mathematical economists are peculiarly

liable; what may be called the "illicit process®

from the principle of utility in economics to

utilitarianism in the philosophy of conduct.

Gossen's strength lay only in the more mechan¬

ical portions of the mathematical theory. He

was a man of one idea; but that was an im¬

mortal one. Consult Journal des Economistes

(4th ser., Vol. XXX 1885, p. 68); Walras,

Leon, ‘Un Economiste Inconnu.*

GOSSYPIUM. See Cotton.

GOSSYPIUM PHOSPHO, a valuable fertilizer composed of a mixture of cotton¬ seed meal and pulverized phosphate rock. The making of this fertilizer is an important indus¬ try in the South, where one factory has an out¬ put of 15,000 tons annually. The phosphate rock, which comes from South Carolina, passes through huge mills of great power, and is ground into a fine powder, after which it is carried through draft pipes to the top of a six-story tower, and there undergoes a process of refinement. The rich yellow meal which comes from the cottonseed oil-mills is mixed with the ground phosphate, and adds materially to its strength as a fertilizer. The mixture thus obtained is collected into immense bins, and treated with sulphuric acid, assuming a semi-liquid state. It is then called gossypium phospho.

GOSTA BERLING, yes’ta bar’ling, The

Story of, a novel by Selma Lagerlof, appeared

about Christmas-time 1891. In the summer of

1890 a Swedish magazine, the Idun, had of¬

fered a prize for the best novel of a certain length. Selma Lagerlof entered the contest

with a few chapters from ‘Gosta Berling,* a

story which was then beginning to take shape

in her mind, and won the prize. In ‘The

Story of Gosta Berling) Selma Lagerlof is a

romanticist and represents a reaction against

the realism which prevailed at the time. As a child she had absorbed the folktales of her

surroundings, and later on in life it occurred to her like a lightning flash that it was her par¬

ticular mission to give these stories expression.

‘The Story of Gosta Berling) has been called

the “prose epic of Swedish country life.® The

scene is laid on the shores of Lake Fryken

(Lake Loven in the story) in Varmland. The

hero, Gosta Berling, is a deposed minister,

who has been saved by the mistress of Ekeby

from freezing to death and thereupon becomes

one of her pensioners in the manor at Ekeby.

As the pensioners finally get power in their

own hands, they manage the property as they

themselves see fit and their lives are filled

with many wild adventures. Gosta Berling is

the leading spirit, the poet, the charming per¬

sonality among a band of revelers. But be¬

fore the story ends, Gosta Berling is redeemed, and even the old mistress of Ekeby is per¬

mitted to come to her old home to die. In

'The Story of Gosta Berling,* as in her other works, the authoress shows a marvelous sim¬

plicity of style. Everything she touches

quickens with new life and takes on a deeper

meaning. Her imagination and her idealism

lend a charm to the story which makes it a

source of keen enjoyment.

Joseph Alexis.

GOTHA, Almanach de. See Almanac.

GOTHAM, a parish of Nottinghamshire,

England, seven miles southwest of Nottingham.

Pop. (1911) 1,086. The people obtained a rep¬

utation for stupidity and simplicity, and the

satirical appellation of "the wise men of

Gotham,® owing to the tradition that King

John journeyed through the town for the pur¬

pose of selecting a site for a palace, and the inhabitants, not wishing to be burdened with

the expenses of a royal residence, devised the plan of appearing stupid and foolish during the visit of his majesty. King John left in dis-76

gust; whereupon the Gothamites said: ((More

fools pass through than live in Gotham.® The

name Gotham is applied also to the city of

New York. Thus used it appeared first in

Salmagundis by Washington Irving and

James K. Paulding. The authors may have

had in mind the worldly wisdom of the city's

inhabitants.

GOTHENBURG (got'en-boorg) SYS¬

TEM, a system of regulating the sale of

spirituous liquors which had its origin in 1865, in Gothenburg, Sweden. A company is

granted a monopoly of the retail and bar sale of those liquors in the town (brandy is the

national drink) ; but the sale of beer and wine is not included in the monopoly. Managers at

fixed salaries are placed in the public houses, part of whose duty it is to provide food at

cheap rates and who get the profits realized on soft drinks. After paying dividends to the

shareholders (not exceeding 6 per cent) the additional profits are divided between the municipality and the central government. In Norway the profits above 5 per cent are ap¬ plied chiefly to a national fund and to objects of public utility other than those supported out of the rates. In addition to a number of towns in Sweden, Norway and Finland, it has been introduced in certain towns and districts in Scotland and England. In the places where the system has been tried it has been success¬ ful in limiting the consumption and in lessen¬ ing the number of licenses; it has tended to ensure the sale of purer liquors ; it has divorced politics from liquor and eliminated the ele¬ ment of private profit; but the temptation to increase revenue has in some places not pro¬ moted temperance, and the association of the municipality with liquor has made the system obnoxious to the great body of temperance opinion.

A modified Gothenburg licensing system was introduced into South Carolina in 1892, when the sale of liquor became a State monop¬ oly and its retail was placed in the hands of salaried dispensers. The system led to intense

dissatisfaction ; charges of corruption were

leveled at its administration ; and in 1907 it was abandoned. Consult Gordon, (The Break¬

down of the Gothenburg System* (New York

1911); Gould, E. R.ˆ L., (The Gothenburg

System of Liquor Licensing* (Washington

1893) ; Pratt, (Licensing and Temperance in

Sweden, Norway and Denmark* (London

1907) ; Rowntree and Sherwell, (Gothenburg

Experiments and Public House Trusts> (Lon¬

don 1901).

GOTHIA, the empire of the Visigoths, or

Western Goths, which extended over Spain

and included Septimania, territory held in

Provence ; Gaul, and the cities of Carcasonne,

Narbonne and Nimes. See Goths; Visigoths.

GOTHIC ARCHITECTURE. The name

<(Gothic® applied to a style of architecture is a misnomer, since the Goths never created any

architecture of their own. It has, however,

come into general use to designate comprehen¬

sively the mediaeval architecture of northern

and western Europe of the period from 1150 to 1500, because in the 16th century the Renais¬

sance writers and artists looked upon all medi¬

aeval architecture as <(barbarous® because dif¬

ferent from antique classical models, and at¬

tributed its origin to the Goths who overran

large areas in Europe in the ((Dark Ages.® The name thus became too firmly fixed to be dis¬

placed, in spite of its unscientific origin.

Definition. — While some writers deny that

any one name can properly be applied to so

vast a body of architecture as is commonly in¬

cluded under the name of Gothic, the following definition of the term is sufficiently compre¬

hensive to cover the styles to which it is com¬

monly applied and sufficiently specific to exclude all others : Gothic architecture is that style

which grew up in northern and western Eu¬

rope, from germinant principles previously de¬

veloped in the socalled Romanesque styles,

taking on new forms and extended applications

in progressive solutions of the problem of the construction and decoration of church edifices

vaulted throughout in stone, especially of

churches having three or five aisles whereof

the central one was loftier than the others and was lighted by a clearstory. The style thus de¬

veloped, first of all and to the highest perfec¬

tion in northern France, was varied in the sev¬

eral countries to which it spread, and its forms were applied to a great variety of buildings,

both religious and secular. Its fundamental

structural principles were the employment of

ribbed groined vaults to cover the several

aisles, the concentration of loads and thrusts

at particular points, and the special disposition of masonry at those points to support the loads and resist the thrusts, with a corresponding re¬

duction of the massiveness of walls elsewhere.

The controlling principle of the design was the frank expression everywhere of the actual

structural framework. The decoration was of

two kinds : first, the adornment of the struc¬

tural members by moldings and carving; sec¬

ondly, pictorial, didactic and symbolic adorn¬

ment by means of sculpture, stained glass and

painting. Applied ornament in stucco, marble

sheathing and mosaic is wholly wanting, except

in Italy. The characteristic features developed

in this architecture were the ribbed vault, the flying arch, buttress and pinnacle, the pointed arch, clustered piers, traceried windows and

towers with spires. As the style spread to re¬

gions where timber was abundant, scientifically

designed ceiling-roofs of wood were often

substituted for stone vaults, and in other re¬

gions brick was used for walls and vaults in¬

stead of stone ; but even in these the concen¬

tration of strains, the frank expression of the structure and the employment of the character¬

istic forms and decoration of the style justify their inclusion under the general name of

Gothic.

Historic Development.— By the middle of

the 12th century the monastic builders of north¬

ern France had developed the ribbed groined

vault, of both the four-part and six-part type (see Vaulting) sufficiently to enable them to

vault successfully the high, broad central aisles of a remarkable series of large and lofty

churches with clearstories; they had begun to

use the pointed arch with increasing frequency, and the flying arch and buttress, in a some¬

what crude form, had appeared in a number of

churches. But the masonry was still massive,

the windows small, and the dead weight of the structure throughout was the main reliance for

its stability. . What distinguishes the early

Gothic buildings is the systematic effort to

- ■ -• ■’. ’••• .

• ■■■■

‘■■ > ’■■■ -.V

i«**ppp

. … ….

King’s College Chapel, Cambridge 2 Side Screen of Choir, Albi Cathedral Westminster Abbey. Chancel 2 Gloucester Cathedral. Cloister GOTHIC ARCHITECTURE

^ ’-‘V ’ ■ ’ ‘ .V ■ ‘ ‘ V” -

4r!S«W

WW«W

SS8f > etS|pijJ >

GOTHIC ARCHITECTURE

divide the loads from the thrusts, and to con¬

centrate the resistance to the latter in deep

buttresses against' the outside walls, transmit¬

ting the vault-thrusts to these by flying half¬

arches across the intervening aisle-roofs. The

clearstory walls and the piers and arches carry¬

ing them could then be made much lighter, and the side-aisle walls between the buttresses re¬

duced to mere screen walls. This lightening

of the walls was greatly helped by increasing

the size of the windows, which increase was

further stimulated by the development of

stained glass, and tracery was devised in order to divide these larger windows into narrower

windows or "lights,® because wide areas of

stained glass are impracticable and unsafe. In

this scientific development of structural light¬

ness the pointed arch was found to be the most flexible and adaptable form, and soon displaced completely the round arch, while the greater

lightness of construction without loss of stability made possible a marked increase of height.

Accompanying all this progress in what may be

called the engineering of church building there was at least an equal advance in artistic taste, in elegance of execution, in refinement of de¬

tail, in decoration by figure-sculpture, orna¬

mental carving and stained glass, and in the

design of the tracery of the great window—

openings. In the carving the classic and By¬

zantine traditions of the Romanesque period

were rapidly outgrown; suggestions of orna¬

mental form were drawn from nature, espe¬

cially from the foliage of common plants, and

religious symbolism added a world of new con¬

ceptions in carved stone, in which beasts, birds, human figures, monsters and grotesques, ingeni¬

ously and often humorously worked into capi¬

tals, corbels, moldings and other details, served at once an allegorical and decorative purpose.

The portals of churches were made deep and

vast and peopled with saints, angels, apostles

and martyrs, and the windows glowed with

brilliant pictures of Biblical scenes and reli¬

gious allegories. This transformation of eccle¬

siastical architecture was effected mainly in

the building of great cathedral churches. Dur¬

ing the second half of the 12th century* the

French bishops acquired much of the power and

prestige previously held by the abbots of the

great Benedictine monasteries, and attracted to

their aid the people especially of the episcopal cities, where the new cathedrals arose, not

merely as bishops' churches but also as civic

enterprises, as great peoples' churches, rivaling and surpassing even such noble abbeys as that

of Saint Denis. Between 1130 and 1200 the

cathedrals of Bayeux, Bayonne, Laon, Lisieux,

Noyon, Poitiers, Senlis and Soissons were en¬

tirely rebuilt, or their rebuilding begun ; while wholly new cathedrals were begun at Bourges,

Chartres, Paris and Tours. During the follow¬

ing half century the great cathedrals of Amiens, Auxerre, Coutances, Evreux, Reims and Rouen

were begun, besides many fine parish churches

and royal chapels like the exquisite Sainte

Chapelle at Paris. As the style developed

it was applied to a great variety of buildings; it advanced in decorative richness, but slowly

declined in power with the diminished demand

for new cathedrals, of which only one, that at Albi, was erected in the 14th century. Chapels, parish churches like Saint Ouen. and Saint

Maclou at Rouen, were erected in the later

phase of the style, called from the flame-like curves of its tracery "Flamboyant,® and earlier buildings were partly remodeled in the same

period, like the choir of the Abbey of Mont

Saint Michel, the fagade of Rouen, and the

transept fronts of Beauvais.

The perfected type of French Gothic cathe¬

dral, as exemplified at Amiens, for example,

has a three-aisled nave, short transepts, a five-aisled choir with ambulatory and radiating apsidal chapels, and shows structurally a skeleton of supporting piers, arches and vaults with a

series of deep buttresses capped by pinnacles

and connected to the wall-buttresses of the

clearstory by flying arches. The spaces be¬

tween these members are filled by light walls

and huge traceried windows. The church is

some 400 feet long and from 100 to 140 feet

high within to the top of the vault. The ma¬

sonry, moldings, sculpture and carving are ad¬

mirable in design and workmanship ; the effect

upon the spectator is one of extraordinary dig¬

nity, solemnity and power, eloquent of the

religious fervor which created it.

Spread of the style. — The earliest spread

of the style beyond France was across the

Channel to England, of which French Nor¬

mandy was in 1174 a province, and the first

work to show the French Gothic influence was

the choir of Canterbury cathedral, rebuilt after the fire of 1174 by a William from Sens, and completed after his death by an English Wil¬

liam. In this work round arches and pointed

arches, round piers and clustered piers, Norman and Gothic details are

found associated to¬

gether, but the predominant character is Gothic.

Lincoln Cathedral was the first to be built

throughout in the Gothic style, though parts

of the Norman fagade of an earlier edifice

were retained. Wells, begun a little earlier but slower in building, and Lichfield a little later, Salisbury, built throughout between 1225 and

1258 (except the central tower and spire) ;

Beverley, York, Southwell and Glasgow cathe¬

drals and Westminster Abbey, all begun be¬

tween 1225 and 1250, are among the most im¬

portant examples in which the English Gothic

style reigns throughout. But in addition one

must note the great number of Anglo-Norman

abbeys and cathedrals which were partly re¬

built in the more modern style like Hereford,

Rochester, Gloucester and Ely cathedrals, hav¬

ing Norman naves (the first three with Gothic

vaulting) and Gothic choirs ; Peterboro, with a Gothic west front, Norman nave and choir and

Gothic retro-choir, and many others. In the

.14th century the Norman naves of Canterbury

and Winchester were rebuilt in the advanced

Gothic style then prevailing. This later phase

is called the Perpendicular, from the character of its window-tracery. Like the Flamboyant

in France it appears chiefly in partial remodel¬
ings of earlier buildings, in parish churches
and in large chapels, of which three are espe¬
cially notable: Saint George's chapel at Wind¬
sor, King's College chapel at Cambridge and
Henry the Seventh's chapel at Westminster.

The English Gothic differs from the French
in its greater massiveness and in exhibiting
less of the French structural logic and struc¬
tural loftiness. On the other hand, the deco¬
rative element is more conspicuous, especially
in the interior treatment. The English multi¬
plied their vaulting-ribs and developed superbly

decorative forms of vaulting, culminating in
the fan-vaulting of the later churches. (See
Vaulting). They also developed the Norman
crossing-lantern into a splendid type of square central tower (Lincoln, Canterbury) sometimes
with a spire (Salisbury). The deep French
portals rich with sculpture are wanting; the
doors are small,, the west fronts picturesque

rather than logically expressive. .The French

apse with radial chapels is found only in West¬

minster Abbey; most of the great churches

have square East ends, after the Cistercian

tradition. The English wooden ceiling on

hammer-beam trussses, seen in many parish

churches and in Westminster Hall, was an ap¬

plication of Gothic principles to a construction in timber. English tracery is remarkably beau¬

tiful and varied.

The style spread in the 13th century to Ger¬

many, but developed slowly, with less of con¬

sistency than in England. The plans are very

varied; the apse surrounded by radial chapels

is found in perfection only at Cologne (1248), and while there and at Regensburg and a few

other places the French influence was strong,

in other examples the details of the Gothic

style were applied in a more or less capricious manner, as at Freiburg, Ulm, Oppenheim, Hal-berstadt, Marburg, *etc.* Strassburg and Metz

are predominantly French. The Germans de¬

veloped the traceried spire and the <(hall—

church,® with aisles of equal height, as their most characteristic contributions to the style.

In Italy, Gothic principles of structural logic were never accepted; the Gothic details were

applied as an ornamental dress to buildings of the most varied construction. A few “Gothic®

churches were built by foreigners early in the 13th century (Assisi, Vercelli) ; others later in the century by Italians (Sta. Maria Novella at Florence, the Frari and Saint John and Saint

Paul at Venice; Sienna Cathedral and the

fagade of Ovieto) ; but the majority of the

Gothic work in Italy dates from the 14th cen¬

tury and early 15th. Santa Croce and the

great cathedral at Florence were begun about

1296; the Certosa at Pavia, San Petronio at

Bologna and Milan Cathedral, nearly a century

later. In all these except Milan, flying but¬

tresses are avoided; on the other hand, colored marble, inlays, mosaic and internal painting of the most splendid character were freely used.

The secular Gothic style of Venice, seen in the Doge’s palace, and other palaces, was a re¬

markably original and effective local develop¬

ment.

Lack of space forbids here any account of.

the ecclesiastical Gothic architecture of Belgium and the Netherlands or of Spain, for which the inquirer is referred to the general histories of architecture and to works and articles on these countries.

Secular Monuments. — The style thus

developed in ecclesiastical edifices was applied also in the design of such secular buildings as were needed, such as town halls, <(palaces of

justice,® hospitals, guild halls and the like.

The city republics of Italy were the first to create distinctive types of secular Gothic archi¬

tecture, because of their strong civic indepen¬

dence. The Bargello and Palazzo Vecchio of

Florence and the Palazzo Pubblico of Siena

date from the latter part of the 13th century; the Doge's Palace at Venice from the 14th and 15th. In France, England, Germany and Bel¬

gium civic independence was slower in asserting itself architecturally; the French Gothic town

halls (as at Compiegne) and palaces of justice (as at Rouen) belong mostly to the 15th and

early 16th century; but there are city gates

and civic towers of earlier date in many French towns. It was in the Netherlands, especially in what is now Belgium and French Flanders,

that civic architecture was most brilliant, espe¬

cially in the latter part of the 15th and early 16th century, as exemplified in the town halls of Arras, Audenarde, Bruges, Brussels, Ghent

and Louvain, and in some of the guild houses

of various cities.

Domestic architecture was at first of minor

importance. The homes of the great feudal

lords were fortified castles (see Military

Architecture) ; those of the commoners mostly

small and insignificant houses on crowded

streets. The 14th century witnessed a great

progressive change; palaces gradually replaced

the castles, and in the cities especially they were often of great elegance (as in the house of Jacques Coeur at Bourges and the Hotel

Cluny at Paris, both of the 15th century) in

France, and in many examples in Italy, espe¬

cially in Venice (Foscari Palace, Ca'd'Oro,

etc.). In these later Gothic palaces the re¬

sources of the florid late Gothic style were

freely employed, with many modifications (e.g.,

dormer windows in France, stepped gables in

Germany and the Netherlands) to adapt them

to their new functions. In England the finest

secular works of the late Gothic period were

the colleges and halls of the great universities, and the manor houses or country palaces of

lords and gentry under the Tudor monarchs.

The Modern Gothic. — During the two mid¬

dle quarters of the 19th century there was a

widespread effort in Western Europe to revive

the use of Gothic forms in modern architecture ; a movement especially strong in England, which

produced not only many interesting churches

but also a large number of town halls, court¬

houses, etc., in free versions and adaptations of the historic Gothic style (Town Hall and Assize Courts at Manchester, the fine Houses of Parlia¬

ment in London, the far less successful Law

Courts in the same city, etc.). The movement

spread, though feebly, to the United States, ap¬

pearing chiefly in churches, of which a few —Trinity and Grace churches and the Roman

Catholic cathedral at New York among others —

are creditable and interesting works. With the

eclecticism of the 20th century in America the details of the style have been applied to com¬

mercial buildings, as in the Woolworth build¬

ing at New York, and the English collegiate

Gothic very successfully employed in college

and university buildings at New York, Prince¬

ton (N. J.), Chicago, Saint Louis, Bryn Mawr

and other places. See Architecture, Modern.

Bibliography. — From the vast literature of

Gothic architecture only a few titles can be

given. For the general discussion: Cram,

R. A., ‘The Substance of Gothic> (Boston

1917) ; Gonse, L., ‘L’Art gothique) (Paris,

n. d.) ; Jackson, T. G., ‘Gothic Architecture’

(Cambridge 1915) ; Moore, C. H., ‘Develop¬

ment and Charpcter of Gothic Architecture’

(New York 1899) ; Viollet-le-Duc, E„ ‘Dictionnaire raisonne,’ *etc.* (Paris 1876). For

French Gothic: Enlart, C., ‘Manuel d’archeolo-

gie frangaise) (Paris 1902), also Gonse, Moore

and V iollet-le-Duc as above. For England:

Bond, F., ˆCathedrals of England and Wales*

(London 1912), and introduction to English

Church Architecture) (ib., 1913) ; Moore, C. H., (Mediaeval Church Architecture of England)

(New York 1912) ; Parker, introduction to

Gothic Architecture) (London 1866) ; Rick¬

man, T., (An Attempt to Discriminate the

Styles, etc.* (London 1848) ; Scott, G., Me¬

diaeval Architecture) (ib., 1886) ; Van Rens¬

selaer, M. G., (English Cathedrals* (New York

1893). For Germany: Foerster, Eenkmale

deutscher Baukunst* (Leipzig 1855-69) ; Hasak,

(Die romanische und die gothische Baukunst*

(Stuttgart 1902) ; Liibke, W., Ecclesiastical

Architecture in Germany, * *etc.* (London). For

Italy: Cummings, C. A., (A History of Archi¬

tecture in Italy* (Boston 1901) ; Street, G. E., Erick and Marble Architecture of Italy) (Lon¬

don 1872). For Spain: Gade, J. A., (Cathedrals of Spain * (New York 1911) ; Lamperez y

Romea, V., (Historia de la arquitectura cris—

tiana Espanola* (Madrid 1909) ; Street, G. E., revised by King, A. G., (Gothic Architecture

in Spain* (New York 1914). For Belgium

and Holland: Klock, L., (Architecktur der

Niederlande) (Leipzig 1894) ; Narjoux, F.,

(Notes and Sketches of an Architect (Boston

1877) ; Schayes, A. G. B., (Histoire de l'architecture en Belgique) (Brussels 1850).

A. D. F. Hamlin,

Professor of Architecture, Columbia University.

GOTHIC ART. The art of the times and

the countries in which Gothic architecture flour¬

ished. The term is a misnomer, because even

if the architectural style were rightly

designated "Gothic,® the wall-paintings, metal

work, etc., of the time are not properly so

described. Still no other term exists for those arts which prevailed in Europe from 1150 to the beginning of the Risorgimento in Italy (about

1375), and in the North until the decided be¬

ginning of the Renaissance (about 1500).

There are certain arts of decoration which

flourished in a wonderful way during this

period, while others attained little excellence.

Thus the pottery of the north of Europe and

even of Italv during the period named has

never attracted much interest in modern times ; very few examples of it remain, and what little there is that is effective in an artistic sense is decidedly Oriental (Saracen and Moslem) in

character. Glass, too, is of little interest ex¬

cept in connection with windows, and apparently few glass vessels were made during the Middle

Ages. On the other hand, metal-work was of

singular interest. Bronze was not as common

as it has always been in the East and as it was to be in Europe at a later period, but wrought iron reached a splendid development in. the

gratings, gates, window-bars, etc., of buildings, and in the singular enclosures made for tombs.

Brass was cast in large sheets and hammered

smooth and then engraved with arms and

legends befitting the burial slab of a knight or noble lady; silversmiths' work was carried to a high pitch of excellence, and the common use

of colored enamels applied to both bronze and

to silver made the ecclesiastical implements and sacred vessels of the

time extremely rich.

Toward the close of the Middle Ages the com¬

plete plate armor of the nobles received a

splendid decoration by means of reliefs and

embossings, and by gilding in patterns and

etching with acid. Very beautiful stuffs were

hardly ever woven in Europe during this period; for splendid weaves France, Germany and

England sought the East; but the cloths and

linens of the time were good and the common

use of embroidery made the costume of the

wealthy very splendid. The beauty of the

costume, both in color and in form, affected

the sculpture of the time; for, as the nude was hardly ever represented, the drapery of the fig¬

ures became the chief object, with expression

of face and gesture, of the architectural sculp¬

tors of the day. Both form and color were

used freely in the beautiful ivory carvings

which were richly painted and gilded.

Sculpture in connection with architecture is

treated above. In the semi-architectural condi¬

tions of tombs and cenotaphs, life-size statues, usually recumbent, are found as early as the

13th century.. These are of marble and other

stone ; and it is quite well ascertained that great numbers of statues in hammered bronze richly

decorated with enamels existed at one time in

the churches of western Europe; these also

being of life-size for the most part. The raised chest or what seems the sarcophagus, the huge

stone box which gives the name of altar-tomb

to these monuments, often had its sides pierced with niches, and these occupied by statuettes of religious or symbolical meaning, often of great beauty. The carvings of decorative objects are

of great variety, such as mirror backs and

boxes to contain small mirrors, panels of book covers and statuettes of sacred subjects, some¬

times 15 inches or more in height, in

addition to elaborate bases upon which they

stand.

Painting in the highest sense of the word,

that is, the representation of human life and

human sentiment, was used with reserve be¬

cause it had to be applied either to the walls of the church and the palace, or to the vellum pages of a manuscript book. On this account

we hardly think of the paintings of the Middle Ages as having led up to that of modern times : we think rather as the origin of modern work

of the painting of the 14th century Italians, who themselves derived much of their art directly

from Constantinople. Still there was a great

skill showing itself in those two ways and the comparatively few remains which exist in

France and Germany of the paintings on walls

and vaults during the years before 1500 are

worthy to be compared with the splendid minia¬

tures in the manuscripts. These last are not

always religious; some manuscripts were of

history and poetry and the illustrations given

to those books were in keeping with their sub¬

ject. There had been a great destruction of

these splendid manuscripts, but many remain

in public and private collections, and modern

books have been devoted to their study and to the reproduction of their finest paintings. The special achievement in the art of decoration

was in the brilliant windows of the time, but for this subject see Glass; also Gothic Archi¬

tecture and Window.

Bibliography. — De Lasteyrie, Etudes sur

la Sculpture Frangaise au Moven Age* (1902);

Gonse, E'Art Gothique) (1890) ; Viollet-le-Duc, Eictionnaire du Mobilier Frangais.*

Russell Sturgis,

Author of (Dictionary of Architecture .*

GOTHIC LANGUAGE AND LITERA¬

TURE. The language of the Goths is the

oldest member of the Teutonic branch of the

Indo-European family. It is known through a

Visigothic Bible translation of the 4th century a.d. The earliest historical indications con¬

cerning the home of the Goths place them along the lower course of the Vistula in modern

Poland and Prussia between Warsaw and Dant—

zic. Here they remained as late as 150 a.d.,

but early in the following century, having been dislodged probably by the movements of their

Hunnish neighbors, they appeared to the north

of the lower Danube and on the northwestern

shore of the Black Sea in modern Rumania and

southwestern Russia as far east as Odessa.

To the west on the Danube were the Visigoths; to the east, in southwestern Russia, the Ostro¬

goths. In 251 they defeated the Emperor De—

cius at Philippopolis, but in 270, after various incursions into Thrace and Greece, were driven

back to their seat north of the Danube. They

were known to the ancient historians and geog¬

raphers as Gotones or Gothones, and later as

Gothi, which points to the native name Gutans

or Gutos.

The only extant monuments of the language

are: (1) Portions of a Bible translation, of a paraphrasing interpretation of the Gospel of

John, and of a calendar contained in fragments of manuscripts written in Italy in the 6th cen¬

tury, presumably by Ostrogoths and known as

the Codex Argenteus. (2) The signatures of

Gothic witnesses on two Latin records or re¬

ceipts, one at Naples, one formerly at Arezzo; the originals of which are now lost. A few

Gothic words and names of alphabetic symbols

in a Salzburg MS. now at Vienna. (3) A few

Gothic words in a Latin epigram, a large num¬

ber of proper names from Greek and Latin

sources, and in old Spanish documents and in¬

scriptions. (4) The scanty records of a Gothic language, probably Ostrogothic, preserved as

late as the 16th century in the Crimea. The

Bible translation, of which there remain por¬

tions of Matthew, Mark, Luke, John, Romans,

1 and 2 Corinthians, Galatians, Ephesians,

Philippians, Colossians, 1 and 2 Thessalonians,

1 and 2 Timothy, Titus, Philemon, Esdras,

Nehemiah, is associated always with the name

Ulfilar or Ulfilas. He was probablv himself a

Goth, born about 310 a.d., made bishop of the Goths 341, removed 348, with a large body of

his followers avoiding persecution, into Mcesia, south of the Danube; died 380 or 381. Ulfilas not only did the work of translation, but he in¬

vented an alphabet for it, using as a basis the Greek uncial alphabet of his time with preserva¬

tion of its order, as well as of the numerical and phonetic values of the letters. He adopted it, however, to its purpose by the use of forms taken from the Latin and Runic alphabets,

creating a system better for the purpose than

either of the three.

The inflexion of nouns is distinguished by

its relatively close approach to the original

Tndo-European system. In its inflection and

phonology it is the most primitive of the Ger¬

manic languages. # Of the cases it preserves

nominative, vocative, genitive, accusative and

dative, the latter including the original instru¬

mental and locative, and to some extent the ab¬

lative.

Consult Balg, Comparative Glossary of the

Gothic Language > (Maryville, Wis., 1887-89) ;

Skeat, <Maeso-Gothic Glossary* (London 1868) ;

Wright, A. J., CA Primer of the Gothic Lan¬

guage * (Oxford 1899).

GOTHIC TAPESTRIES. See Tapes¬

tries.

GOTHS, an ancient Teutonic tribe, whose

earliest known home was the shores of the Bal¬

tic, between the Vistula and the Oder, where

they were living in the 1st century after Christ.

Thence they migrated in the 3d century to the regions adjoining the Black Sea. Many other

tribes were incorporated with them, and by

continual advances and conquests they estab¬

lished, under Ermenric (about 350), the great

Gothic kingdom, extending from the Black Sea

to the Gulf of Bothnia. This naturally brought the Goths into continual contact, on the west

with the western Roman Empire, and on the

east with the Eastern empire as centred at Con¬

stantinople. About the year 369 internal com¬

motions produced the division of the great

Gothic kingdom into the kingdom of the Ostro¬

goths (eastern Goths), on the shores of the

Black Sea, from the Don to the Dnieper, and

the kingdom of the Visigoths (western Goths),

from the Dnieper to the Danube. About the

year 375 vast multitudes of the Huns and of

the Alans, which latter had been subdued by

the Huns, poured out of Asia, and drove back

the Ostrogoths upon the Visigoths. The Goths

obtained permission from the Emperor Valens

to settle in Thrace, but were driven to rebellion by the oppression of the imperial governor. In the war which ensued Valens himself was de¬

feated and slain by them at Adrianople in 378.

The Emperor Theodosius incorporated the

Gothic army into his legions, and henceforth

they had an important influence in the affairs of Constantinople. After many vicissitudes the

Ostrogoths obtained a settlement in Pannonia

and Slavonia, but not till the destruction of the kingdom of the Huns in 453. The Visigoths in

process of time obtained a degree of power

which excited alarm in Greece and Italy. In

369 Alaric made an irruption into Greece, laid waste the Peloponnesus, and became prefect of

Illyria and king of the Visigoths. He invaded

Italy about the beginning of the 5th century,

and by that measure brought on the destruc¬

tion of tl-e Roman Empire, since Stilicho, the Roman general, could only obtain a victory

over Alaric at Verona (Li 403) by withdrawing

all the Roman troops from the borders of the

Rhine. Alaric himself soon returned to Italy,

and sacked Rome in 409, and a second time in 410. In 552 the Goths in Italy were finally

overthrown in battle and expelled from the

peninsula by Narses, general of Justinian. The

Visigoths succeeded in establishing a new king¬

dom, called Gothia, in the southern parts of

Gaul and Spain, of which, toward the end of

the 5th century, Provence, Languedoc and

Catalonia were the principal provinces, and

Toulouse the seat of government. The last

king, Roderick, died in 711 in battle against the Moors after which the Goths became merged in

the Spanish kingdoms. Since the time of Con¬

stantine, Christianity appears to have taken

root among the Goths, whence a Gothic bishop

is mentioned as present at the Council of

Nicaea, 325 a.d. Their form of Christianity

was Arian, like that of their protector Valens, GOTTENBURG — GOTTHEIL

and their bishop Ulfilas. The introduction of

Christianity among these Goths, and the cir¬

cumstance of their dwelling near and even

among civilized subjects of the Roman Empire,

greatly contributed to raising them in civiliza¬

tion above the other German tribes. Consult

Bradley, ‘The Story of the Goths) (New

York 1888) ; (Cambridge Mediaeval History)

(Vol. I, New York 1911). See Gothic Lan¬

guage and Literature; Ostrogoths; Septimania; Ulfilas; Visigoths.

GOTTENBURG, got’ten-boorg, GOTHEN¬

BURG, or GOTEBORG (Swedish Goteborg,

or Gotheborg ; Latin, Gothoburgum) , Sweden,

seaport, the second in the kingdom in respect to population and trade, 25 per cent of the foreign trade of the country being done here, capital

of the county of the same name ; situated on

the Gota, five miles from its mouth, 255 miles west-southwest of Stockholm. It has a dry

dock cut out of the solid rock and five miles of quayage ; and the completion of the Gota Canal and also the railway facilities have greatly in¬

creased its commercial importance. Although

founded in 1618, by Gustavus Adolphus, the

town, in consequence of numerous fires, is

quite modern — the streets are at right

angles and the houses well built. It has a uni¬

versity attended by 2,000 students, and a library of 130,000 volumes. The manufactures in¬

clude iron, steel, machinery, sailcloth, linen

and leather, and there are oil-presses, cotton-mills, dyeworks and building-yards, at

which a considerable number of vessels are

launched; the most important industrial es¬

tablishments are tobacco factories, porter

breweries and sugar-refineries. The trade is

very extensive, the harbor being excellent and

generally free from ice. Its commercial im¬

portance dates from the Continental blockade

of 1806, when it became the chief British depot in northern Europe. The chief exports are

iron ores, wood, pulp, grain, dairy produce,

cattle, matches and soap ; the chief imports

coal, iron, bacon, silk, linen, cotton goods,

petroleum, machinery and implements and salt.

Among social reforms the town is noted for

its licensing system (see Gothenburg System).

It is the seat of a United States consulate.

Pop. 178,875.

GOTTERDAMMERUNG, get”ter-dem’me—

roong, (<the twilight, or gathering nightfall of the gods,® the title of Wagner’s closing opera in his Nibelungen cycle of dramas, first produced

at the Bayreuth Festival 11 Aug. 1876, and in the United States at New York, 25 Jan. 1888. The

subject of the opera is what is called in Scan¬

dinavian mythology the Ragnarok, or end of

the world. This was brought about largely by

the admission of Loke, the god of evil and mis¬

chief, into Asgard, the abode of the gods. It was through Loke that Balder, the bright and

good god, was slain and flung down into the

abodes of Hel, the goddess of death. Confusion throughout the universe is the consequence. The sun and moon are swallowed by giants; con¬

tinuous winters rage without an intervening

summer; the earth trembles in the throes of

earthquakes. Mountains topple down with a

crash; the Fenriswolf breaks its chains and

fetters. The Midgard serpent writhes to get

free; the ship Naglfar, built of the finger-nails of dead men, passes over the sea, filled with

giants of the frost and mountain; Loke leads

the hosts of Hel and bursts upon the scene.

The powers of evil rush to the battlefield

Vigrid, while Heimdal blows his Gjallarhorn,

Odin seeks the giants for advice, the other

gods as well as the heroes of Valhal arm them¬

selves and sally forth, and the battle begins.

While the fight is still raging the immortal god Surt flings light and flame over the world, and the earth, reduced to ashes, sinks beneath the watery waste. See Nibelungenlied ; Ragnarok

and Scandinavian Mythology.

GOTTFRIED (got'fred) OF STRASS—

BURG, German poet : probably b. Strassburg,

about 1200. He was not, like most of the

Minnesingers (ministrels) of his age, a noble.

Besides many lays, he was the author of the

great chivalric poem, (Tristan und Isolde^ de¬

rived from a Celtic original, but possessing as much originality of character as any other Ger¬

man classical work. For grace, elegance and

vivacity of description, richness of coloring and melody of versification, this work stands alone in old German literature. It has had a great

influence on later literature and furnished the theme for one of Wagner's greatest operas.

There are two good editions of this work; that of Bechstein (2 vols., Stuttgart 1881) and

Golther's edition in (Deutsche National-Litteratur,> Vol. IV (Berlin 1888). The translation

into modern German by W. Hertz (2d ed., Ber¬

lin 1894) is considered the superior of all others. For Gottfried's life consult Berge— mann, (Das hofische Leben nach Gottfried von Strassiburg> (Halle 1876) ; Heidingsfeld, M., (Gottfried von Strassburg als Schuler Hart¬ manns von Aue> (Rostock 1886) ; Schmidt, C, (Ist Gottfried von Strassburg Strassburger Stadtschreiber gewesen) (Strassburg 1876) ; Stiebeling, Karl, (Stitistische Untersuchungen fiber Gottfried von Strassburg) (Leipzig 1905).

GOTTHEIL, got'hil, Gustav, American rabbi: b. Pinne, Posen, 28 May 1827; d. New York, 15 April 1903. He was educated at the universities of Berlin and Bonn. In 1855 he was elected assistant rabbi at the Berlin Re¬ form Temple, and in 1861 received a call to the congregation of British Jews, Manchester, England, where he spent 13 years of effective work. In 1873 he was invited to the temple Emanu El, of New York, first as assistant to Rev. Dr. Samuel Adler, and then, on the lat¬ ter's retirement, as sole rabbi. In his new field his activity rapidly developed ; under his personal impetus the Emanu El Preparatory School and

the Jewish Ministers' Association were founded,

and continued for some years. He organized

the Emanu El Sisterhood of Personal Service,

which, adopted by many other congregations,

has become a successful feature of communal

benevolence. A favorite speaker at public

gatherings, his enthusiasm, sympathy and broad

culture did much to win recognition for his

coreligionists. In his last years he was an

ardent champion of Dr. Herzel's movement to

secure a place of shelter for persecuted Jews, the latest development of the Zionistic idea.

Besides contributions to magazines and reviews,

his published works include a hymnbook and

(Sun and Shield, J a book of daily devotion, in both of which he drew largely from non-Jewish

sources.

GOTTHEIL, Richard James Horatio,

American Semitic scholar : b. Manchester, Eng¬

land, 13 Oct. 1862. He was graduated from Co¬

lumbia in 1881, studied also at Berlin, Tubingen and Leipzig, and became professor of Semitic

languages in Columbia, director of the Oriental section of the New York Public Library in 1896

and (1898) president of the American Federa¬

tion of Zionists, of whose principles he is an active exponent. He is also a member of the

central committee of the general organization.

He became an editor of the (Jewish Encyclo¬

paedia* in 1901, and published (The Syriac

Grammar of Mar Elia of Zobha) (1887) ;

Selections from the Syriac Julian Romance)

(1906); (Zionism) (1914). He wrote many

articles on Oriental and Jewish questions for

newspapers and reviews, edited the (Columbia

University Oriental Series,* and the Semitic

Study Series.* He is a vice-president of the

American Oriental Society, and treasurer of the American committee for Lectures on the His¬

tory of Religions and chairman of its committee on publications. He is a son of G. Gottheil

(q.v.).

GOTTHELF, got'helf, Jeremias. See

Bitzius, Albert.

GOTTINGEN, get'ting-en, Germany, town in the Prussian province of Hanover, in the val¬ ley of the Leine, 59 miles south-southeast of Hanover. It is a place of great antiquity, and was once famous for its fortifications. It con¬ tains a gymnasium, trade school, training school for teachers, a museum of antiquities and the Anatomic Museum, with its famous collection of schools. It contains a noted university, founded in 1734. Gottingen belonged to the Hanseatic League and enjoyed great prosperity until the Thirty Years' War. The manufactures consist chiefly of woolen tissues, tobacco, leather, sugar, chemicals, bologna sausages, paper, books and scientific and musical instru¬ ments. Pop. 37,594.

GOTTINGEN, University of, or GEORG— AUGUST UNIVERSITY, German institu¬ tion, was founded by George II of England, known also as Georg August, Elector of Han¬ over. The plan of the school was outlined as early as 1732, was established in 1734 and opened in 1737. Its organization was perfected

by Von Munchhausen, who for many years

directed its destinies. Its popularity decreased after the expulsion of the seven professors:

Albrecht, Dahlmann, Ewald, Gervinus, the two

Grimms and Weber, for political reasons, but

it has recovered itself since 1866, and has in¬

creased with remarkable rapidity since the

beginning of the 20th century, having about

3 000 students in 1914, and several eminent

names among its professors. The principal

building, to which William IV of England con¬

tributed £3,000, was completed in 1837. There

is a large number of laboratories, clinics, etc., connected with the university and also a mu¬

seum with extensive and valuable collections,

an observatory, a well-equipped school of anat¬

omy, botanical gardens and a library of about

600,000 printed volumes and nearly 6,000 manu¬

scripts. It has also a pedagogical seminary,

a gymnasium which dates from the 16th cen¬

tury, a museum, an art gallery of German and

Flemish pictures. Consult Putter, Saalfield and

Oesterley, (Die Georg-August Universitat*

(Gottingen 1838), and Chronik der Georg-August-U niversitdt (annually).

GOTTSCHALK, got'shalk, Louis Moreau,

American pianist and composer: b. New Or¬

leans, La., 8 May 1829; d. Rio de Janeiro,

Brazil, 18 Dec. 1869. He studied in Paris and after his return to the United States in 1853

became the most popular pianist in America.

His playing was confined to his own composi¬

tions. He traveled extensively in Mexico, the

West Indies and South America, and was

taken fatally ill, while playing at Rio Janeiro his latest work, (La Morte.*

GOTZ VON BERLICHINGEN. See

Berlichingen, Gotz von.

GOUCHER COLLEGE, Baltimore, an in¬

stitution of higher learning for women. It was first known as the Woman's College of Balti¬

more, and was founded under that name in

1844 by the Methodist Episcopal Church. In

1910 it took its present name in honor of the Rev. John and Mrs. Mary Goucher, whose

gifts contributed largely to the foundation of

the institution. Dr. Goucher was also president of the college from 1890-1908. The principal

buildings are Goucher Hall, Bennett Hall and

Catherine Hooper Hall. There are also dormi¬

tories and fine libraries and laboratories. The degree of B.A is the only one given. A college course for teachers and graduate courses are

conducted in cooperation with Johns Hopkins

University. The teaching staff numbers 55 and

the students 712. There are about 27.000 vol¬

umes in the library. The president is Dr. Wil¬

liam Westley Guth.

GOUGE, the ground up clay-like material

produced by the rubbing of one wall of a fault (q.v.) against the other. Selvage is another

term for the same thing, and breccia (q.v.) is used to denote coarser material of the same

origin.

GOUGH, gof, John Bartholomew, Ameri¬

can temperance lecturer: b. Sandgate, Kent,

England, 22 Aug. 1817; d. Frankford, Pa., 18

Feb. 1886. He came to America in 1829 and two years later became a bookbinder in New York.

Falling into dissipation, he lost regular em¬

ployment and was reduced to giving recitations

and singing comic songs at low grog shops. In 1842 he was induced to

attend a temperance

meeting and take the pledge; and he then

made up his mind not only to reform, but to

influence others to do likewise. Save for a

short relapse, a few months later, his pledge

was kept, and ere long, as a temperance lec¬

turer, he became one of the most popular of

public speakers in America and England, which

he visited on temperance tours 1853-55, 1857-60

and 1878. In later life he handled literary and social topics as well as temperance themes in

his lectures. He published an <Autobiography)

(1846; enlarged 1870); ˆOrations* (1854);

(Temperance Lectures) (1879) ; (Sunlight and

Shadow, or Gleanings from My Life Work*

(1880).

GOUIN, goo'an, Sir Jean Lomer, Cana¬

dian statesman : b. Grondines, Quebec, 19 March 1862. He is a graduate of Laval University,

was called to the bar in 1884, and engaged in the practise of his profession in Montreal. He was first returned to the provincial legislature in 1897, was appointed minister of works in

1900 and has been premier of the province since 1905. His administration has since that time

been sustained at three successive general elec¬

tions. He is an officer of the Legion of Honor and was created K.C.M.G. in 1913.

GOUJON, goo-zhon', Jean, French sculptor

and architect: b. Paris, 1515; d. about 1570.

He was employed with Pierre Lescot, architect

of the Louvre, on the restorations of Saint Ger¬

main l'Auxerrois, 1542-44; and after the acces¬

sion of Henry II, decorated the Chateau d'Anet for the king and Diana of Poitiers. To him is ascribed what is considered the masterpiece of

French sculpture, the (Huntress Diana,1 now

in the Louvre collection, and the fountain of

the Innocents at Paris was also his work.

GOULD, goold, Augustus Addison, Ameri¬

can zoologist: b. New Ipswich, N. H., 23 April 1805; d. Boston, 15 Dec. 1866. He was gradu¬

ated at Harvard 1825, and in 1856 became visit¬

ing physician to the Massachusetts General Hos¬

pital. His strong scientific tastes led him to take up investigations in botany, zoology and

conchology, and in the latter branch he became one of the most

eminent authorities in the

whole world. He published ‘System of Nat¬

ural History 1 (1833) ; ‘Invertebrate Animals of Massachusetts > (1841) ; (Otia Conchologica)

(1863) ; ‘Principles of Zoology1 (with Agassiz, 1848).

GOULD, Benjamin Apthorp, American

astronomer: b. Boston, Mass., 27 Sept. 1824;

d. Cambridge, Mass., 26 Nov. 1896. He was

graduated at Harvard in 1844 and pursued the

scientific study of astronomy at several foreign observatories, returning to America in 1848.

In 1851 he assumed charge of the longitude

department of the United States Coast Survey,

and perfected methods for determining the

longitude telegraphically. By 1866, 20 longi¬

tudes in the United States had thus been deter¬

mined. He was director of the national ob¬

servatory at Cordova, Argentina, 1870-85, and

there completed three extensive star catalogues, and conducted meteorological and climatological

investigations. He was the founder and edit6r

of the Astronomical Journal (1849-61) and pub¬

lished ‘On the TransAtlantic Longitude, as

Determined by the Coast Survey 1 (1869) ;

‘Uranometria Argentina) (1879), *etc.*

GOULD, Elgin Ralston Lovell, American economist: b. Oshawa, Ontario, 15 Aug. 1860; d. 18 Aug. 1915. He was graduated from Vic¬ toria University, was Fellow (1882-84) and lec¬ turer (1892-97) at the Tohns Hopkins Uni¬ versity, and professor in the University of Chi¬ cago (1895-96). In 1896 he became president of the City and Suburban Homes Company of New York, and at one time vice-president of the American Economic Association. In 1901-02 he was lecturer on political economy at Columbia and was city chamberlain of New York 1902-04. He was active in financial, philanthropical and church affairs and reform movements in New York. He wrote ‘The Housing of Work¬ ing People) ; ‘Popular Control of the Liquor Traffic1 ; ‘The Gothenburg System of Liquor Traffic1 ; ‘The Social Condition of Labor.1

GOULD, George Jay, American capitalist : b. New York, 6 Feb. 1864. He was the eldest son of Jay Gould (q.v.) and was educated privately. In financial circles he was active

chiefly in connection with his large railway in¬ terests, particularly as president, from 1888, of the Little Rock and Fort Smith Railroad, from 1892 to 1913 of the Manhattan Elevated Railroad of New York, and from 1893 of the Saint Louis, Iron Mountain and Southern, the International and Great Northern and the Missouri Pacific. He is a director of many other railroads and is connected with several industrial enterprises.

GOULD, Hannah Flagg, American poet : b. Lancaster, Mass., 1789; d. Newburyport, Mass., 5 Sept. 1865. She was an aunt of B. A. Gould (q.v.), wrote much for magazines and newspapers and at one time very popular as a verse writer. Her verse is simple and pleasant and of a high moral tone. She published ‘Gathered Leaves) (1846); ‘The Diosma) (1851); ‘Hymns and Poems for Children1 (1854); ‘The Golden Vase1; ‘The Youth’s Coronal1 (1850) ; ‘The Mother’s Dream1 (1853), *etc.* ‘The Snow-Flake1 and ‘The Frost1 are still remembered and quoted among her poems.

GOULD, Helen Miller. See Shepard,

Helen Miller (Gould).

GOULD, Jay, American financier: b. Roxbury, N. Y., 27 May 1836; d. New York, 2 Dec.

1892. He was brought up to labor on his

father's farm; and was for a short time a

student at Hobart College. Here he learned

surveying. After making surveys of Ulster,

Albany and Delaware counties, he published a

'History of Delaware County1 in 1856, and in

this same year engaged in the lumber and

tanning business in western New York, dispos¬

ing of his interests prior to the panic of 1857.

After engaging in banking for a few months

he became interested in railroads. This was

directly after the panic of 1857. His first

speculation was the purchase of the bonds of

the Rutland and Washington Railroad from

Troy, N. Y., to Rutland, Vt. He himself be¬

came president, treasurer and superintendent

of the road. Soon afterward he effected a

consolidation of his road with the Rensselaer

and Saratoga line, withdrew his capital, re¬

moved to New York, opened a broker's office

and began dealing in Erie stocks and bonds.

His aim was to gain control of the Erie. This he did by depressing the value of the stock and then buying it in. In association with James

Fisk, Jr., he entered the directory of the com¬

pany, was elected president, while Fisk became

vice-president and treasurer. On the reorgan¬

ization of the company, 1872, he lost official connection with it. His manipulation of Erie

stock was the first of many similar speculations by which he obtained control of several great

railroad systems. His method was to depress

the value of the stock of the road he sought to control and to buy it in while at a low ebb.

He then invested in the Pacific railroads, secured control of several lines, built branches and

effected combinations which resulted in the

establishment of what is known as the "Gould

system.11 Jay Gould and his partner, Fisk, in

1869 entered into a scheme to corner the gold market of New York and this resulted in the

financial crisis and panic known as "Black

Friday11 (q.v.). The attempt netted them about

$11,000,000. He controlled about 10,000 miles

of railroad in 1880, and by merging several competing telegraph lines formed the Western Union system in 1881. In this year he also gained control of the New York Elevated Railroad.

GOULD, John, English naturalist: b. Lyme, Dorsetshire, 14 Sept. 1804; d. London, 3 Feb. 1881. His reputation as a taxidermist procured him the post of curator to the Mu¬ seum of the Royal Zoological Society in 1827, and in 1832 he published (A Century of Birds from the Himalayan Mountains.5 He next un¬ dertook a work of much more extensive charac¬ ter, entitled the (Birds of Europe,5 published 1832-37. This was followed by (Birds of Australia) 1842-48; (Mammals of Australia1* (1859) ; (Monograph of the Trochilidae, or Family of Humming Birds) (1850) ; (Monograph of the Odontophorinae, or Partridges of America,5 *etc.*

GOULD, Sabine Baring. See Baring

Gould, Sabine.

GOULD, Thomas R., American sculptor:

b. Boston, 1818; d. 1881. He was a pupil of

Seth Cheney, of Boston, and there established

his first studio. From 1868 he was in Florence, Italy. His works include a statue of Hancock

in the Lexington town-hall ; portrait-busts of

Junius Brutus Booth, Emerson and Gov. John

A. Andrew; and the ideal statues (The West

Wind,5 in the Mercantile Library, Saint Louis,

Christ1* and (Satan.) Other important works

are a statue in bronze of King Kamehameha I,

Honolulu, and (A Puritan5 on the Common at

Cambridge, Mass. Consult Tuckerman, Rook

of t'he Artists5 (New York 1867).

GOUNOD, goo'no', Charles Francois,

French composer: b. Paris, 17 June 1818; d.

Saint Cloud, 18 Oct. 1893. He began his studies in the Paris Conservatory under Halevy, Le

Sueur and Paer, and carried the Rome prize

with his cantata (Fernando 5 in 1849. While

in Rome he made Italian Church music his

chief study. His mass in the style of Pales¬

trina, which he composed in Vienna in 1843

after his return from Rome, was the first fruits of this study. On arriving at Paris he took

charge of the music in the church of the Mis¬

sions Etrangeres, and produced no original

work until April 1851, when his first opera,

(Sappho, 5 appeared. Gounod's next production

was the five-act opera, (The Bleeding Nun5 ((La Nonne sanglante5) (1854). Following this was

the comic opera founded on Moliere's (Le

Medecin malgre lui5 (1858), and the grand

opera (Faust et Marguerite,5 which latter was a signal success and was produced with much en¬

thusiasm in all the more important opera houses of Europe. Even in Germany, the home of the

Faust legend in music and poetry, the original¬

ity and wealth of melody of Gounod's music,

together with his powerful orchestration, were

so manifest above all else in the opera, that his Faust became a favorite with the public. Later operas of his were (Philemon et Baucis5 (1860), which was not popular; (La Reine de Saba5

(1862) ; (Mireille5 (1864) ; (Romeo et Juliette5

(1867), which was favorably received in every

opera house of Germany; Rolyeucte5 (after

Corneille's drama), which was a failure; finally the comic opera, (Cinq Mars5 (1877), and the

last of his grand operas, (Le Tribut of Zamora,5

which was well received. Besides these oper¬

atic compositions he wrote much religious

mus e, notably the Redemption,5 which was

performed in England and later in Germany,

and has been very popular in the United States.

He also produced at Brussels his (Mors et

Vita,5 and in addition wrote cantatas, sym¬

phonies, pieces for the piano and numerous

songs. During the Franco-Prussian War

(1870-71) he resided in England where he

formed the Gounod Choir, a chorus of mixed

voices, whose concerts were widely popular.

Consult Bellaigue, C., (Gounod5 (Paris 1910) ;

Claretie, (Portraits Contemporains5 (1875) ;

Voss, (Ein Lebensbild5 (1895) ; Hillemacher,

P. L., (Gounod5 (Paris 1905) ; Imbert, H.,

(Charles Gounod5 (Paris 1907) ; Prudhomme,

J. G., (Gounod: Sa vie et ses oeuvres5 (2 vols., Paris 1911) ; Tolhurst, H., /Gounod5 (New

York 1904) ; Paguerre, (Charles Gounod, sa vie et ses oeuvres5 (1890) ; Boret, (Charles Gounod, His Life and His Works5 (1890).

GOUPIL, goo-pel', Jules Adolphe, French

painter: b. Paris, May 1839; d. Neuilly, 30 April 1883. He was a pupil in the studio of Ary

Scheffer and achieved success by his powers as a portrait and genre painter. His most famous picture, (Mme. Roland's Last Day in Prison,5 is in the Luxembourg. His father, Adolph Goupil, did much to encourage the in¬ troduction of French art into this country; well known throughout Europe as a Parisian picture dealer, he opened a branch house in New York.

GOURA, gow'ra, any one of a group of large, handsomely dressed pigeons of New Guinea, constituting the genus Goura and distinguished by their fan-like crests — the crowned pigeons. These birds are found near open or cultivated lands, ranging near the ground in small flocks and feeding on buds, seeds, berries and other fruits, and on worms, snails and insects. In addition to the cooing heard in the nuptial season, they utter harsh, trumpet-like cries. During the heat of the day, or when alarmed, they hide in the thickest jungle. They make rude nests and lay only one white egg. The best-known species (G . coronata) is a beautiful bird as large as a small turkey. It is sometimes kept among poultry, and its flesh is much esteemed. The lovely crests of these pigeons form the millinery orna¬

ment ((goura,55 and the birds were threatened

with extinction on account of the demand for

these feathers until lately put under adequate

protection.

GOURAMI, goo’ra-mi. See Goramy.

GOURD, gord or goord, a plant of the

genus Cucurbita or Lagenaria, or its fruit. In Europe the name is given generally to pump¬

kins, squashes, melons, etc., but in America it is restricted to those with hard-skinned, thin-fleshed, inedible fruits, cultivated for ornament or because their excavated shells are useful as dippers, *etc.* See Calabash Gourd; Cucur-BITACEtE.

The Hebrew word translated gourd in Scrip¬

ture is apparently so much akin to the Greek

word kiki, used by Dioscorides for the castor—

oil plant (Ricimis communis) , that the <(gourd55

of Scripture was probably that species. It is a euphorbiaceous plant. The wild gourd of Scrip¬

ture was a wild vine — that is, was procumbent GOTJRD-SEED — GOUT

and had tendrils. It moreover produced ((death

in the pot,® discoverable in a moment by the

taste. It was probably either the colocynth

(Citrullus colocynthis) or the squirting cucum¬

ber (Momordica elaterium) .

GOURD-SEED. A fish._See Blackhorse.

GOURD-WORM, the fluke-worm (q.v.)

which affects the livers of sheep.

GOURGAND, goor'gan', Gaspard, Baron

de, French general: b. Versailles, 14 Sept. 1783; d. 25 July 1852. Entering the army as lieutenant of artillery in 1802, he distinguished himself in several important battles, and in the battle of Brienne saved Napoleon's life from the Cos¬

sacks. He subsequently became Napoleon's

adjutant, and as his confidential secretary ac¬

companied him to Saint Helena, but for vari¬

ous political reasons left him in 1818. He was subsequently aide-de-camp to Louis Philippe and

became a member of the House of Peers in

1841. In the previous year he was made one

of the commission appointed to bring the re¬

mains of Napoleon from Saint Helena to

France. He was passionately devoted to Na¬

poleon and unreasonably jealous of those who

attended upon the emperor in his exile. He

assisted Napoleon in writing his <Memoires>

and was the author of (La campagne de 1815 > ; (Memoires pour servir a l'histoire de France

sous Napoleon) (1822-23) ; deputation de la

vie de Napoleon par Sir Walter Scott* (1827) ; and a remarkable journal kept during his stay

at Saint Helena, but which remained in MSS.

till 1898. An English translation of selections from the journal by Mrs. Elizabeth Latimer

(q.v.) appeared in 1903. The work is exceed¬

ingly prolix, but of great value, since it records with the minuteness of Pepys, or the precision of Boswell, the incidents of daily life and the conversations of the fallen emperor. In no

other work can the personal side of Napoleon

be so well studied as in Gourgand's journal.

An entire chapter is given to the emperor's

criticisms on his own action at Waterloo, and

of equal interest are his judgments concerning

other great commanders from Caesar's times to

his own. His opinions regarding English char¬

acter are essentially French in their character and amusing from their entire misconception of

it. But in this journal we are shown Napoleon's conversation on almost every conceivable sub¬

ject, insignificant or important, and always with the frankest egotism.

GOURGUES, goorg, Dominique de,

French soldier and adventurer: b. Mont-de—

Marsan, 1530; d. 1593. Captured by the Span¬

iards in Italy, where he was serving in the

army of Marechal de Strozzi (1557), he was

condemned to the galleys and in 1559 his ship was taken by the Turks; the Turkish ship in

turn fell into the hands of the Knights of Malta, who set him at liberty. After many voyages to Africa and South America he signalized his

name by taking vengeance on the Spaniards of

Fort San Mateo, who under Menendez had mas¬

sacred the Huguenots of Fort Caroline, Florida.

He razed Fort Mateo and killed in battle or

hanged every Spaniard he found there. Con¬

sult Parkman, (Pioneers of France in the New

World> (Boston 1903).

GOURLAY, Robert Fleming, Upper Can¬

ada reformer: b. Ceres, Fifeshire, Scotland,

1778; d. Edinburgh, 1863. Before settling in

C anada at Kingston in 1817 he had agitated for a reform of the poor laws in Great Britain.

His attacks on the land system of Upper Can¬

ada brought him into conflict with the govern¬

ment; in 1818 he was twice indicted before a

jury and acquitted, and recourse was then had to provisions of an Alien Act of 1804, under which foreigners were compelled to leave the country unless they could prove their inno¬ cence. On his refusal to leave the country he was arrested at Niagara, and after being im¬ prisoned for seven months was brought to trial and sentenced to banishment in August 1819.

He returned to the province in 1856 and resided there for a few years.

GOURNAY, Jean Oaude Marie Vincent,

Seigneur de, French economist: b. Saint Malo, March 1712; d. 27 June 1759. He received his first ideas on economics from his father, a merchant of Saint Malo. Naturally these ideas were based upon commerce and exchange rather than on agriculture. These early opin¬ ions were reinforced and developed by Gour— nay's long residence in Cadiz (1730-44), and by his journeys to Hamburg, Holland and Eng¬ land. He soon acquired a fortune quite suffi¬ cient for his moderate tastes. He settled down in Paris. The friendship of Machault and Trudaine readily procured him a position

as counsellor to the Great Council, and later

as superintendent of commerce. He wrote

Observations a la suite des memoires de

Forbannais, la prohibition des toiles peintes*

(1755), a translation of several British works

on economics. He exerted a strong influence

on a coterie of his younger contemporaries,

among whom was Turgot. It was in fact

through personal contact with these men that

he played the greatest part in economics,

rather than through his writings. He was a

Physiocrat, and the doctrine of <(Laissez faire, Laissez passer® is largely due to him, but he was not an extreme believer in free trade.

GOUT, a disease of comparative infre¬

quency, affecting for the most part the large

joints of the foot or knee, and accompanied by a deposition in the joints of a salt or uric acid, notably sodium urate. It is a disease that has been observed for many centuries and many

of the older classical writers have left descrip¬

tions, jibes and witticisms concerning it. Not¬

withstanding an immense amount of study of

the many factors concerned with gout it remains true that the real essential causes of the dis¬

ease are still under investigation. Gout is found throughout civilized communities, but it is no

respecter of persons, alike affecting the rich and the poor, although it

is more prevalent among

the former. Whether the afflicted are the ((fagends® of previously well-to-do families is un¬

known. Gout is thought to be much' more com¬

mon in England and in Germany than it is in

the United States, and the few statistics avail¬

able, while notoriously unreliable, seem to bear out this belief. Some observers believe that the disease is becoming more frequent in the United States. On this point, however, there are al¬

most no reliable figures. It is a disease of

middle years, and men are more often attacked

than women.

The symptoms of gout may be grouped un¬

der three general heads, acute gout, chronic gout 86

and irregular gout. In acute gout there may

be premonitory twinges of pain in the small

joints of the hand or foot. These may be ac¬

companied by dyspepsia, restlessness and irri¬

tability. The urine is usually diminished in

amount, is dark in color and strong in odor.

On cooling, a greater deposit of brick-dust

urates occurs than is usual. This brick-dust

sediment, it should be borne in mind, occurs in practically all healthy urine when cooled. It is not a sign of disease, and quacks would starve if the people did not believe their <(brick-dust®

horrors. The gout attack frequently commences

in the middle of the night, not uncommonly

seems to follow an exciting nightmare, often

following attacks of excessive anger. There is

excruciating pain in some one of the joints of the body, usually of the big toe. The pain is accompanied by swelling, redness and stiffness

of the joint, and there may be some constitu¬

tional disturbance with a rise of temperature

to 102° and 103° F. The symptoms may slowly

subside during the day, to recur with equal or diminished severity at a 24-hour interval. After 3, 4 or 6 days the swelling and pain gradually grow less, and in 8 or 10 days the patient may be well. Other joints may be involved, and the attack may last only a few days or may persist for two weeks or more. Occasionally there are

accompanying gastro-intestinal disturbances,

with nausea, vomiting, diarrhoea, dyspnoea and

heart-depression. If an acute attack is followed by other attacks, a condition of chronic gout

develops. The joints become sore and remain,

swollen, and a large number of joints become

involved in the reaction. The joints no longer lose their swollen appearance, since deposits of urates take place in the cartilages and in the ligaments, but become further enlarged and

distorted. These local collections of urates are termed tophi, and they may be found in other

joints — in the hands, knees, elbows and even in the ear-cartilages. The frequent attacks of

pain leave the patient much more irritable. He is apt to be dyspeptic, sallow-faced, and to

show signs of disease in his heart and blood

vessels. Under the term irregular gout have

been grouped a veritable scrap-basket assort¬

ment of symptoms which different clinicians

have thought were undeveloped cases of gout.

By many authorities these irregular forms of

socalled <(gouty diathesis® are taken <(with a grain of salt® ; yet there is little doubt that a number of more or less definite symptoms are

found in those who are moderately gouty which

may be attributed to this disease. These irreg¬

ular forms are frequent in gouty families and

include certain forms of chronic eczema, at¬

tacks of biliousness with marked constipation,

etc. Frequently there is a condition of arterio¬

sclerosis (q.v.) with tendency to the development of slight dropsy or other symptoms of disease

of the heart or kidneys. Nervous headaches or

migraine may be another heritage, although mi¬

graine is such a common disturbance that its

presence proves little for any of the many

one-sided theories concerning it. Itching feet,

hands or eyeballs, irritable bladder with small quantities of acid, high-colored urine, are other symptoms attributed to irregular gout. Occa¬

sionally severe forms of eye-disease occur in

those thought to be gouty, to account for which no other cause seems probable.

The cause of gout is extremely complicated.

The theories are as numerous as the sands of

the sea. A bad heredity is one of the most im¬

portant factors, since from 50 to 60 per cent of gouty patients have had it left to them by their ancestors, one or two generations back. The

boys seem more prone to this influence than

the girls. Advancing age plays some part, the

disease usually setting in before 50 years and generally after 40, although in the markedly

hereditary forms the disease may come on much

earlier, especially in the irregular manifesta¬

tions. Alcohol is perhaps the most important

contributory factor, those indulging in large

quantities of fermented liquors seeming to be

much more liable to contract the disease.

Among the poor it is chiefly in the ale and beer drinkers that the disease is found. Overeating, lack of exercise and minor injuries to the feet are also important causes of the development

of gout. As for the general theories to account for the poisoning — for it seems like a poisoning — all at best are pure hypotheses. Uric acid is considered by many as the chief criminal, but

beyond the fact that ‘there is an increased

amount of uric acid found in the urine during an attack, and deposits of a salt of uric acid in the joints, there is no proof of its causative in¬

fluence. Many modern students believe this to

be a purely secondary condition, and not a

primary one. There is a marked increase in

the metabolism of nucleoproteids which in

large measure accounts for the increase in one of its products of oxidation, uric acid. Clifford Allbutt has well summed it up when he writes

that we are far from sure that gout may not

be due to some extrinsic element. The pecul¬

iar geography of gout is in need of careful

inquiry; the effects of microbic infection of the kidney are unknown in their relation to the

precipitation of uric acid. Again, some internal secretion may be at fault, as in diabetes.

<(Till we know then whether gout is a mere

shortcoming in ordinary metabolism, or a pecul¬

iar perversion of it, or a static susceptibility of fibrous tissue, or a defect of some enzyme, or a perturbation of the nervous system, or again some factor from without, it appears we must

confine the name of gout to the uratic precipita¬

tions which are known, and which can serve

as a touchstone, and as to all other vague

(acidities,) (flatulencies, > (megrims,) and (bil¬

iousness } of whatever occult kind, be content to treat them empirically, awaiting the results of the analysis of our nutritive life upon which biochemistry is actively and hopefully en¬

gaged.® Summing up what is really known

about the pathology of the disease, it seems

established (1) that gout is a morbid condition, of which the most striking phenomena are acute attacks of arthritis (q.v.), which tend to recur and are accompanied by redness, pain and

edema of the part; (2) that the affected joints are found to be the seat of a deposit of urate of sodium, which occurs first in the articular cartilages and afterward infiltrates all the sur¬

rounding structures; (3) that deposits of this

material may also be found in other parts, such as the pinna of the ear, the bursae, *etc.* ; (4) that excess of uratic material may be demon¬

strated in the blood of a gouty patient, the

amount being greatest before an acute attack,

and least immediately after one; (5) that the

influence of heredity in producing gout is un¬

doubted ; and that certain poisons, such as lead and malt liquors, may induce an attack. In

the same manner our ignorance concerning the

cause of gout may be summed up by saying

(1) that it is not known how the excess of

uratic matter is brought about, whether it is

due to an increased intake with the food, to

increased formation in the body or to deficient elimination by the excretory organs; (2) that

it is not known whether the uratic excess is

the cause of the phenomena of the disease or

is a mere casual accompaniment of the per¬

verted state of nutrition; (3) that it is not known in the case of arthritic attacks whether the deposit of urate of soda is the cause or the effect of the local inflammation; in other words, that gout is a disease the cause of

which is not yet fully understood. No study of mental background which is present in gouty

individuals has yet been made, but there are

enough facts to warrant the surmise that the

defect in metabolism which results in a gouty

attack may be induced by faulty unconscious

mental activities. Chronic unconscious grouches

or ingrown bad temper is a most frequent ac¬ companiment of gout and may be a producing cause.

The treatment, however, is on better foun¬ dations. Here empiricism has taught the gen¬ eral rule that most people eat and drink too much and that temperance in all things is bene¬ ficial in gout as in other experiences in life.

Treatment. — No routine line can be laid down that can be adapted suitably to all cases. Individualism — the treatment of the patient, rather than the disease — ‘is the prime feature. The treatment for gout should include (1) the medicinal treatment of the gouty paroxysm, in acute gout; (2) the medicinal and dietetic treat¬ ment of the subacute and chronic conditions, and (3) the treatment of the affected joints, with the object of removing, if possible, the foreign deposits.

The horizontal or slightly elevated position for the limb, with a cradle to take off the

weight of the bed-clothes, warm packs, soothing, lotions such as the lead and opium wash, and

an oil-silk covering constitute the main features in the local treatment of an acute attack. In¬

ternally, colchicum, in dosage to be determined by the physician, is the best remedy. A brisk cathartic aids the action of the colchicum, and a mild diuretic may be combined to advantage

— citrate of potash, cider, lemonade, being reli¬

able. The pain and insomnia should be con¬

trolled by the visiting practitioner. Opium in

all its forms is to be avoided. In the treatment of chronic gout attention must be paid to

diet. Malt liquors are to be avoided, and the heavy wines, such as port and burgundy. There

is no good reason why any particular form of

food should be eliminated, but it is paramount that simplicity and undereating rather than

overeating should be the rule. The socalled

uric acid theory of gout is a pathological hob¬

goblin. Copious drinking of alkaline waters is

of value — largely because of the water. Potas¬

sium salts seem to be of service. Above all a charitable and sympathetic attitude of mind

must be cultivated. Gout frequently develops

in people who have great power or who, uncon¬

sciously, would use it ill. The unconscious

criminal, or desire to master others, is a not infrequent situation in

gout. This should be

rooted out by psychoanalytic procedures.

GOUTWEED, or GOUTWORT, a kind

of wild carrot (TEgopodium podagraria) intro¬

duced from Europe, where in England it is

known as masterwort, herb-gerard, and now

a rare weed in waste places along the Atlantic coast of the United States.

GOUVERNEUR, goo'ver-ner, N. Y., vil¬

lage in Saint Lawrence County, on the Oswe—

gatchie River, the Rome and Watertown Rail¬

road, about 40 miles south of Ogdensburg. It

has large marble works ; the talc mines nearby are well developed, and considerable iron ore

is mined, and woodpulp is manufactured. It is

in a good agricultural region. Pop. about

5,000.

GOVERNING METHODS. See Inter¬

nal Combustion Engine.

GOVERNMENT is the term used to de¬

scribe the mechanism or ensemble of agencies

through which a body-politic formulates and

executes its will.

Governments de facto and de jure. — Since

they act only as the agents of the sovereign

political power, governmental agents in order

legally to exercise the functions of their offices are obliged to possess a delegation of powers

from the state they represent. In case they

are not able to produce a sufficient evidence of this authorization, their acts are ultra vires, and as such of no legal force, and they them¬

selves are subject to civil or criminal suit at the instance of parties whose persons or prop¬

erty they may have injured by their acts.

It not infrequently happens, however, that

persons claiming political authority, while able to produce satisfactory evidence of their official status and competence, do so by referring to

grants of power from a political sovereignty,

the legitimacy of which is not admitted by the parties over whom their authority is attempted

to be exercised. It thus becomes necessary to

distinguish between governments de facto

(sed non de jure) and governments de jure.

The terms de facto and de jure are appli¬

cable to governments in a purely relative sense.

That is to say, which of the two L properly

descriptive of a given political organization

depends upon the point of view of those who

characterize it. Thus a government is de jure

as well as de facto when it has been estab¬

lished by, claims to represent and is in fact guided by the will of a state the legitimacy

of which is recognized by the individuals over whom its control is extended. It is de facto

but not de jure to any particular individual

when,, though actually in existence and able to exercise a certain amount of power, its legal

character is denied by that individual. Thus

in the case of an attempted revolution.; from the standpoint of those who have repudiated their

allegiance to the old state, refuse obedience to its government and have organized for them¬

selves a new political machinery, the old gov¬

ernment has but an actual and. not a legal ex¬

istence, the new government being the. only one in their eyes possessing a legal basis. . Upon the other hand, from the point of view of

those who still support the old state, the newly established government has but a de facto

existence, the old government being conceived

as the one legal organization. Thus, during

the American Civil War, the existence of the

Southern Confederacy as a state was never

recognized by the United States nor by foreign powers. The existence of a de facto Confed¬

erate government was, however, admitted, and

its soldiers recognized as belligerents. The

continued allegiance of its supporters to the

United States was, however, always asserted

by the United States, and no legal force of any sort was ever ascribed, then, or' after the end of the war, to any of its acts. No formal

treaty of peace was entered into with the

Southern Confederacy, the surrender of its

armies being received simply as military acts,

and its government permitted to go out of ac¬

tual existence without any formal act to mark

its demise.

The Ethical Right of Governments to

Exist. — The concrete question as to the moral right of a particular government to exist and

to coerce individuals is often confused with

the abstract one as to the moral justification for the existence of political restraint in gen¬

eral. These two questions are, however, quite

distinct, and are to be answered upon quite

different principles. So long as men's interests conflict, or, at least, so long as they are con¬

ceived by them to conflict, coercion of some

sort must result, for the desires of all, under such circumstances, cannot be satisfied. Some

will have to give way to others, or all yield in part. The force bringing about the final set¬

tlement may be individual, social, political or religious, but in any case restraint is applied and the freedom of action of the individuals

concerned correspondingly interfered with.

This being so, it is clear that the question as to the ethical legitimacy of coercion by the

state is not to be answered by viewing such

coercion as a restraint upon individuals who

otherwise would possess entire freedom of

action. Rather it is to be viewed as a control of individuals who, but for the existence of

political government and law, would be sub¬

ject to the compulsion of other forces. In

other words, so long as men's desires conflict there cannot properly be raised the abstract

question as to the rightfulness of restraint

humanly imposed, or even the question as to its proper amount. The conflict of desires makes

coercion inevitable, and the extent of this con¬

flict fixes its amount. The only questions,

therefore, that rightfully may be raised are as to the form that the compulsion shall assume,

and the general principles that shall guide it.

The justification, then, for the existence of any particular political authority, if justification

there be, consists in the fact that it furnishes a more intelligent, more beneficial, more just

and less painful form of restraint than that

which, in its absence, any other force or forces would supply. A state and its government is

but an instrument humanly devised for a peo¬

ple's good. It, therefore, has to be justified bv its works. There is, thus, no theoretical

difficulty in conceiving of a political authority so corruptly and oppressively administered as

to cause evils overbalancing those that it pre¬

vents. In such a case, it has no ethical right to be. Practically speaking, however, there can

be no question but that so grievous are the

inevitable evils of lawlessness and anarchy

that it is difficult to picture to oneself a politi¬

cal regime so evil in its effects as to render preferable to it a complete absence of political order.

To repeat, then, for the question so often

stated in the abstract form as that of the right of the state to be should be substituted that as to the right of its government to be and to exercise the functions that it does and to exer¬

cise them in the manner that it does. As the author of this article has elsewhere had occa¬

sion to state it : <(The right to be of the polit¬

ical authority itself is not in issue, for, ab¬

stractly considered, that is, as apart from any particular form of organization, or manner of

operation, there is no basis upon which a judg¬

ment may be founded. It is not until the state manifests its power and authority that mate¬

rial is afforded to which moral estimates may

be applied.®

The Doctrine of the <(Consent of the

Governed.® — We are now prepared to ex¬

amine the meaning and validity of that doc¬

trine, promulgated in the Declaration of Inde¬

pendence, and accepted as fundamental in

American political philosophy, according to

which all governments <(derive their just

powers from the consent of the governed.®'

Without stopping to consider what the

founders of the American Union probably

meant by this phrase, it may be here said that the principle stated by it has a validity only in so far as it is held to state or imply that all governments should be so administered as to

promote to as high a degree as is possible the good of all the

governed; and that, therefore, the governed have at all times the moral right — though not necessarily the legal right — to see to it that this is done, and consequently the right, if there be no better way, of over¬

turning an existing government and establish¬

ing in its place one more likely to subserve

their own general good. Imoliedly, then, the

doctrine properly means that every state should be so organized as to render possible and easy the discovery of the best interests of the gov¬

erned. As, however, generally speaking, these

best interests are most certainly to be deter¬

mined by the intelligent wishes of those con¬

cerned, this means, in the first place, that, so far as the state itself is able to provide them, agencies should exist for developing the intel¬

ligence of its citizens and thus qualifying them to know their own best interests ; in the sec¬

ond place that adequate provision should be

made for the free expression by the people of their wishes ; and, finally, in the third place, that sufficient guarantees should exist that

these wishes when made known will be heeded

by those in power.

That the foregoing requirements of an ethi¬

cally defensible government may be satisfied,

it is necessary that all public officials shall be held strictly responsible, politically and civilly, for the manner in which they exercise the

powers entrusted to them ; that freedom of

speech and press shall prevail ; that the rights to petition, to assemble

peaceably and to bear arms shall exist; and that political privileges — the suffrage and the right to be elected or appointed to public office — shall be as widely extended as the intelligence and morality of

the citizens will permit. Speaking negatively

the doctrine of the <(consent of the governed®

does not support the legal right, nor, except

in extreme cases, the moral right, of each

individual citizen to refuse obedience to par¬

ticular laws which he may consider unjust, nor at will to cast off his allegiance to his state, nor to claim the suffrage or public office as an abstract right.

The ethical right of one people forcibly to

subject another people to its political author¬

ity, that is, to destroy the sovereignty of its state and annex its territory, as, for example, the right of the United States to control the political destinies of the Filipinos, or of Eng¬

land to extend her authority over the peoples

of the South African Republic (Transvaal),

and the Orange Free State, is a somewhat dif¬

ferent question from that of the right of a

particular government to exercise a control

over its own citizens. There is an exceedingly strong presumption not only that a given peo¬

ple best knows its own interests and the means of advancing them, but that, stimulated by the consciousness of national independence, it will

develop its latent potentialities in a manner

that it will not, or cannot, do when subjected to an alien authority. But this presumption,

however strong, is one that may be rebutted.

It may be made sufficiently plain that a people, because of a lack of intellectual and moral

development or a deficiency in natural ability

and temperament, is not able either to perceive its own best interests or so to govern its con¬

duct as to realize them when perceived, or, in determining upon its domestic or foreign poli¬

cies, to give sufficient weight to the moral and legal rights of other states and their citizens.

The interests of civilization are superior to

those of any particular people. Judged from

this general standpoint, it may, therefore, often happen that the forcible subjection of one peo¬

ple to the political rule of another is justified.

This right of course appears most plainly in

the case of the subjection of an uncivilized

people to a civilized nation, but is not necessa¬

rily limited to such a case. The continued

unsatisfactory political conditions existing

among many of the peoples of South and Cen¬

tral America, of the races inhabiting the Bal¬

kan Peninsula and of the whole of the Turk¬

ish dominions certainly furnishes to the other

states of Europe and America a very strong

basis of right to intervention. The language

of Prof. J. W. Burgess is hardly too strong

when, after adverting to the fact that it is

in the interest of the world's best civilization that law and order and the true liberty con¬

sistent therewith shall reign everywhere upon

the globe, he declares that <(a state or states, endowed with a capacity for political organi¬

zation, may righteously assume sovereignty

over, and undertake to create order for, a po¬

litically incompetent population.®

Classifications of Governments. — As many

different classifications of governments may be

made as there are characteristics of governments suitable for selection as differentiating elements or factors. The best known of these possible

classifications is the one that has come down

to us from ancient times, which divides the

various kinds of political organization into three main classes, according as the supreme political control is in the hands of a single individual, in which case the government is known as a

monarchy; in the hands of a few persons, when it is described as an aristocracy; or in the hands of the general citizen populace, when it is

termed a democracy. A further or sub-classi¬

fication divides each of these three types into normal and corrupt forms, the corrupt monarchy

being termed a tyranny, the corrupt aristocracy an oligarchy, and the corrupt democracy an

ochlocracy or mobocracy. A still further sub¬

division divides monarchies into elective and

hereditary according to the source whence the

monarch derives his right to office; and into

absolute or limited (or constitutional) according as the monarch in the exercise of his authority is, or is not, controlled by definite constitu¬

tional principles and by the action of other

governmental officials selected by the people;

aristocracies into particular types according to the principle, wealth or birth, upon which mem¬

bership in the ruling class is determined ; and democracies into direct and indirect according to whether their people directly participate in the control of the state or delegate the exercise of their sovereign powers to officials selected by and responsible to themselves. In the latter

case the government is known as a represen¬

tative democracy or republic. The Consti¬

tution of the United States, without defining

the term, provides that : ftThe United States

shall guarantee to every State in this Union

a republican form of government.® The Fed¬

eral courts, though they have several times been called upon to construe and apply this clause, have never attempted directly to determine the

meaning of the term (<republican form of gov¬

ernment.® The eminent constitutional jurist,

Judge Cooley, gives, however, the following

definition which has been generally accepted as correctly expressing the meaning of the phrase

as employed in American law and American

political thought :

By republican "'government, he says," is understood a government by representatives chosen by the people, and it contrasts on one side with a democracy, in which the people or community as an organized whole wield sovereign powers of government, and on the other with the rule of one man, as king, emperor, czar, or sultan, or with that of one class of men, as an aristocracy. In strictness, a repub¬

lican government is by no means inconsistent with mo narchical forms, for a king may be merely an hereditary or elective executive, while the powers of legislation are left exclusively to a representative body freely chosen by the people. It is to be observed, however, that it is a republican form of government that is to be guaranteed; and in the light of the undoubted fact that by the Revolution it was expected and intended to throw off monarchical and aristo¬

cratic forms, there can be no question but that by a repub¬

lican form of government was intended a government in which not only would the people's representatives make the laws, and their agents administer them, but the people would also, directly or indirectly, choose the executive.

But it would by no means follow that the whole body of the people, or even the whole body of adult or competent persons, would be admitted to political privileges; and in any republican state, the law must determine the qualifi¬

cations for admission to the elective franchise.

Another term, often used as synonymous

with democracy, is popular government. Strictly

speaking, however, this latter term should be

employed not to designate any distinct form

of political organization, but to describe any

government the actual administration of which

is to a considerable degree subject to the con¬

trol of the people. A popular government is

thus, in effect, a free government and as such is properly to be contrasted with a despotic gov¬

ernment in which the will of the ruler or rulers and not that of the ruled controls. It is in this sense that we speak of the movement toward

popular government as having made great

strides in England and elsewhere during the

last 75 years, though monarchical forms have

still been retained.

Constitutional Government. — So closely

connected with the advance of popular gov¬

ernment, as to be almost identified with it,

has been the development during the last

century of constitutional government. Those

general principles, written or unwritten, that

determined the governmental organization of

a state and fix the legal competence of its

several organs and officials, taken collectively, are termed its constitution. In this sense every state has a constitution, and its government

may be spoken of as constitutional. But in its stricter and more usual sense, a constitutional government is one in which the principles de¬

termining its specific character, and the extent and mode of exercise of its powers, are defi¬

nitely determined, and, in general, reduced to

precise written statement, and embodied in an

instrument or instruments which are not sub¬

ject to abrogation or amendment except ac¬

cording to certain specified formalities. By

this means not only are definiteness of au¬

thority, and responsibility of those in power

secured, but guaranties provided that existing

political liberties shall not be changed except under conditions which usually include a popu¬

lar assent directly or indirectly given. The

value of constitutional government is thus

usually but not necessarily that in it the exer¬

cise or the direct control of sovereignty is

placed in the hands of the people. Its essen¬

tial feature is that the manner in which the

sovereign power is to be exercised by the

state is definitely determined. A constitutional government may, therefore, both in form and

effect, be but slightly popular in character. In fine, then, the difference between a constitu¬

tional and a popular government is that in

the former the attempt is made to render the

citizens secure against arbitrary action on the part of their rulers; in the latter, means exist for discovering and enforcing the wishes of

the governed. The progress of popular gov¬

ernment and of constitutional government has

almost always gone hand in hand, for the

reason that it is but natural that, once estab¬

lished in the effective control of their states, the citizen bodies should have sought to ren¬

der their power secure by the adoption of in¬

struments of government that might not be

altered except under certain prescribed con¬

ditions.

The truest tests of the excellence of all

governments are the facilities they afford for

the formation of an enlightened opinion of

the people upon matters of political importance and the precise ascertainment of that <(general will® when formed, and the exactness with

which the policies it dictates are carried out in practise. The development of popular con¬

stitutional governments means that these re¬
sults are being achieved to an increasing ex¬
tent. As Prof. Lester F. Ward has said:

<(Government is becoming more and more the
organ of social consciousness, and more and
more the servant of the social will. Our Dec¬
laration of Independence, which recites that
government derives its just powers from the
consent of the governed, has already been out¬
grown. It is no longer the consent, but the

positively known will of the governed, from
which government now derives its powers.®

A characteristic feature of almost all con¬
stitutional governments is the existence of a
system of what has been called <(checks and
balances.® According to this system the sev¬
eral functions of political rule are so distrib¬
uted among different organs of government
that no one of them is given sufficient power to assume an autocratic, despotic control of
the state. Thus, in general, the making, the
interpreting and the enforcing of laws are
placed in different hands. The executive is

thus unable to take legal action without the

authorization of the legislature, and the acts

of both the legislature and executive are sub¬

ject to review in the courts. Furthermore, the legislative body is usually divided into two

chambers, the approval of both, together with

that of the chief executive, being required for a valid act of legislation ; executive officials are often elected for but short terms of office, and in case of non-feasance or malfeasance of

office are subject to impeachment and sum¬

mary removal from office, and subject to civil and criminal suit for any illegal conduct while in office. In the United States of America

the most powerful check of all consists in the fact that the courts have the power of declar¬

ing void all legislative acts inconsistent with the provisions of the written constitutions of

the United States and of its constituent com¬

monwealths. In those European states which

possess written constitutions the courts have

not this power, the legislatures being construed to be the judges as to the constitutionality of their own acts.

Presidential and Parliamentary Govern¬

ments. — A very important classification of con¬

stitutional governments is that which divides

them into Presidential and Parliamentary.

Presidential government, to accept the ex¬

cellent definition of Burgess, ((is that form in which the state, the sovereign, makes the ex¬

ecutive independent of the legislature, both in tenure and prerogative, and furnishes him with

sufficient power to prevent the legislature from trenching upon the sphere marked out by the

state as executive independence and preroga¬

tive.® Thus the governments of the United

States and of Germany are of this type. Upon

the other hand, ˆParliamentary government is

that form in which the state confers upon

the legislature the complete control of the ad¬

ministration of law. Under this form the

legislature originates the tenure of the real

(though perhaps not the nominal) executive,

and terminates it at pleasure; and under this

form the exercise of no executive prerogative,

in any sense and manner, unapproved by the

legislature, can be successfully undertaken.®

As further descriptive of this parliamentary

type it should be said that this controlling

power thus vested in the legislature almost

inevitably tends to become concentrated in its

more popular chamber. The government of

England best illustrates this form of govern¬

ment. That of France may also be placed in

this category. > Because the real executive

power in a parliamentary government is almost

always in the hands of a cabinet of officials holding office only so long as they are able to retain the support of the legislature, this form

of political rule is often spoken of as Cabinet government.

The Sphere of Government. — The legal

power of a constitutional government at any

given time is determined by law. The sphere

of political control thus marked out includes

all those interests which the state has deter¬

mined require public control. As we have

already learned, legally the state is omnipotent, and therefore may subject to its regulation any matter that it sees fit. Actually, however, con¬

siderations of utility and expediency of course control. Regarding the exercise of certain

powers, no opportunity for the employment of

discretion exists. In order to maintain itself

as a sovereign, independent body-politic, it is absolutely necessary that the state should ob¬

tain sufficient means, and exercise sufficient

authority, to protect itself against attacks from foreign sources, and to maintain law and order, that is, to protect persons and their property

throughout its own dominions. The powers,

the exercise of which is thus called for, may, therefore, be termed <(essential powers,® and

in the aggregate they constitute the essential

sphere of the state. By some writers they are spoken of as <(police powers.® German writers,

however, it should be said, use this term some¬

what differently, designating as a <(Police

State® (Polizeistaat) one that English and

American writers denominate a . <(Paternal

State.® The propriety of the exercise by the

political power of these essential duties is not denied by any one except the anarchist. Con¬

trasted to these essential, or, to use the ad¬

jective employed by President Wilson, the

ˆconstituent® functions of government, which

must be exercised by a state in one way or

another, are what may be called the non-essential or ministrant functions which all

civilized states to a greater or Jess extent exer¬

cise. The activities included in this class are those performed by the state for the promo¬

tion of the economic, physical and moral wel¬

fare of its people.

As not being absolutely essential to the very

existence of the state, there are many who

while admitting the necessity for, and the right¬

fulness of, political control in matters of police protection and national self-defense, assert that the assumption by the state of a right thus

further to control the conduct of its citizens is an ethically unjustifiable interference with

their freedom, even though the aim of such

interference is to advance their own good. In

order to maintain this position, however, they

are obliged to fall back upon a doctrine of

<(natural rights,® the invalidity of which is now all but universally recognized. Starting, as

from a premise, with the right of a particular state or government to be, as determined by

the principles already laid down in this article, the conclusion necessarily, follows that, in each individual case, the question whether or not a given matter, whatever its character, shall be

subjected to public control, is one the answer to which should be determined wholly by ex¬

pediency — construing of course expediency so

as to include moral as well as material consider¬

ations. The arguments of those who urge, the

establishment of a socialistic or communistic

regime are, therefore, not to be met by the

simple predication of an abstract individualis¬

tic, laissez-faire doctrine, according to which an extension of state activities beyond the mere

maintenance of order and national independ¬

ence is ethically unjustified whatever the re¬

sults to which it may lead. The claims of

socialists and communists, in other words, may

properly be rejected only by showing that the

actual results to which their proposed policies, if adopted, would in all probability lead, would be ethically unjust, or economically disastrous, or both.

This is not the proper place to discuss either socialism or communism. This one observation

may be made, however, that the performance by

the state of non-essential duties is not, in very many cases, a step toward socialism. The es¬

sential aim of socialism is to suppress competi¬

tion. . When there is assumed by the state a function which otherwise would certainly, or in all probability, not be performed at all, it can hardly be said that the field of private initiative is thereby, lessened. Under the head of these

non-essential, non-socialistic duties, may be

grouped all those state activities that are edu¬

cative rather than coercive, informative rather

than controlling. Of this character, for in¬

stance, is almost all of the work done in the Departments of Labor and Commerce, and of

Agriculture, the Bureau of Education, the Fish

Commission and other scientific bureaus of the

United States government.

As to what the actual sphere of government

in America and Europe is destined to become

within the next few years we, of course, can

only speculate. The probabilities, however,

would seem to be that we are to see a consider¬

able extension of state activities in the sphere of these non-essential, non-socialistic functions.

The movement in this direction has for some

time been very pronounced and is certainly one not to be deprecated. In the field of socialistic activities, namely, those the exercise of which by the state almost necessarily involves a corre¬

sponding diminution of the field of possible

private enterprise, the greatest extension of

public control within the immediate future will in all probability be seen in the assumption of the ownership and control by central and local governments of the socalled natural monop¬

olies, and in the regulation by law of privately owned and managed industries in which the

interests of the general public have become pro¬

nounced. Whether the movement toward in¬

creased governmental control in this last respect will proceed as rapidly as it has done during recent years one cannot say. The observation

may be made, however, that, together with those forces, which, born of the increasing com¬

plexity of our social and economic life, tend

to make necessary an extension of the activities of the state, there are other agencies the in¬

fluence of which may be in the opposite di¬

rection. Out of an increased intellectual en¬

lightenment and a more widely diffused spirit of altruism may easily arise both an increased

ability and a stronger disposition to solve social and economic problems without a resort to the

coercion of law. See State.

Bibliography. — Aristotle, <Politics) ; Plato,

Republic* ; Rousseau, (The Social Contract ;

De Tocqueville, democracy in America*;

Mill, John Stuart, <Liberty) and Representative

Government* ; Bagehot, (The English Constitu¬

tion ; Dicey, (The Law of the Constitution)

and (Law and Public Opinion in England) ;

Bryce, (The American Commonwealth J ; Wil¬

son, *The State) ; Dunning, (History of

Political Theories) (New York 1 902—05) ;

Lowell, (The Government of EnglancP (2 vols.,

London 1912) ; Poley, (Federal Systems of the

United States and the British Empire) (Boston

1913) ; Lefroy, (Canada's Federal System)

(London 1913) ; Beard, (American Government and Politics) (New York) ; Willoughby, Prin¬ ciples of the Constitutional Law of the United States.)

W. W. Willoughby,
Johns Hopkins University.

GOVERNMENT, City. See City Man¬ ager; Commission Government; Cities, Amer¬ ican, Government of; Cities, European, Gov¬ ernment of; Municipal Government.

GOVERNMENT, Proprietary. See Co¬ lonial Government, Proprietary.

GOVERNMENT BY COMMISSION.

See City Manager; Commission Government; Cities, American, Government of; Municipal Government.

GOVERNMENT CURRENCY. See

Currency.

GOVERNMENT BY INJUNCTION, a

term used to characterize the putting down of

strikes by judicial power of laying injunctions.

The first direct interference of the national

government in labor troubles was the dissolution of the great Pullman strike at Chicago in 1894, on the ground that it interfered with the carry¬

ing of United States mails. This was an ex¬

ecutive act ; but the courts have since inter¬

fered in cases where violence was making the

transaction of government business impossible,

and brought irresistible government power to

bear.

GOVERNMENT PAWNSHOPS IN

FRANCE. Historical. — We must go back to

the Middle Ages to find the first French banks loaning money on pledges. The Jews, who

controlled these establishments, carried on this form of business on lines in which usury

played a prominent part. They demanded the

deposit of pledges representing double the

amount of the loan, and exacted interest at a rate as high as 10 per cent per month.

From a very early period, the royal author¬

ities became acquainted with these abuses and

took steps to repress such illegal practises.

The first royal decree dealing with the matter was drawn up by Phillippe Auguste in 1218.

This decree authorized the Jewish bankers to

lend money on pledges, and merely limited the

interest to be charged to two deniers per

livre (*) per week — that is to say that it

was still more than two-fifths of the principal — on sums of money which could not be loaned for more than a period of one year. As the

bankers of those days did not respect the terms of the royal decree they were expelled in the year 1226 and. replaced by Italian bankers,

hailing from Piedmont. These money-lenders

profited by the aforesaid decree of 1218 in re¬

turn for the payment of a certain sum as a

license.

The first socalled pawnshop instituted in a

French town really having the character of a

pledging establishment was founded in 1557

♦Currency of the epoch.

at Avignon, capital of the Comat-Venaissin, at

that time under papal domination. Three

towns followed the example of Avignon : —

Aix, Montpellier and Marseilles, in 1635, 1684

and 1694, respectively. The establishments

profited by the decree issued by Marie de

Medicis, after the States General had sanctioned in 1694 the creation of pawnshops in every

town of the kingdom where such institutions

seemed likely to be of public utility. The

schemes for the establishment of pawnshops

were much delayed owing to lack of capital on the one hand and to illegal activities of power¬

ful adversaries on the other, the latter being fully aware that any new organization would

at once put an end to their usurious practices.

On 9 Dec. 1777, Necker drew up the first

letters patent for the establishment of the Paris pawnshop. In this document it is stated, inter alia, (<A. pawnshop, or general office whose busi¬

ness it is to loan money on pledges, would ap¬

pear to be the best means of suppressing that kind of usury which was only too frequently

the cause of the ruin of many families.)) Ac¬

cording to the aforesaid document, all profits

resulting from such business were to be ap¬

plied to the relief of the poor. All cash in hand, with the exception of the sums to be

paid to the ˆRegie® (state administration) and

those necessary for the administration of the

pawnshop, .were to be handed over to the Gen¬

eral Hospital. It will be shown during the

course of this article that the lien existing be¬

tween the pawnshop and charitable institutions

still exists in modern pawnshops, resulting in

partially paralyzing .their natural evolution.

The success of the Paris pawnshop was so

great, that although created without capital, it obtained all the funds required to carry on its business and was able to make loans on pledges to the public during the period 1778 up to the outbreak of the Revolution in 1789, amounting

to nearly 200,000,000 livres, or a yearly average of more than 15,000,000 livres. The Revolu¬

tion, however, put a stop to the development

of this promising start, and in 1793 the Paris pawnshop was compelled to suspend its opera¬

tions. The. perfect freedom of financial trans¬

actions which had been decreed by the con¬

vention of 11 April 1793 provided an oppor¬

tunity for the usurious bankers, who had not

entirely ceased their operations, to recommence

their corrupt practices on a larger scale and to charge interest, which had previously been lim¬

ited to 18 per cent per annum when pawnshops

were established, to a rate which soon reached 20 per cent per month. During the Directoire

period, the Paris pawnshops endeavored to re¬

commence their operations, but the results were far from satisfactory, due in no small measure to the competition of independent firms. It

was during the Consulate that the idea of

making pawnshops a state monopoly originated.

In a report drawn up by Regnault de St.

Jean d'Augley it was stated: — <(If, in general, all social transactions ought to be free, there are, however, some which should be governed by

special rules in the common interest, so that the public may be protected and not become victims of avarice.)) These ideas took shape and a

law was passed on the 16 Pluviose Year XII

(6 Feb. 1804). In the following pages we will outline the main points of this law, which con¬

stitutes to the present day the legal basis for GOVERNMENT PAWNSHOPS IN FRANCE

the operation of government pawnshops in

France.

General Legislation Governing Pawn¬

shops. — Article 1 of the law of 16 Pluviose

Year XII is formal: — No pledging establish¬

ment can be founded unless the government's

authorization be obtained, and its profits ap¬

plied to the relief of the poor. In order to make it quite clear that it is

a state monopoly, article 2 provides for the closing of any es¬

tablishment, which, during the six months of

promulgation of the law has not been authorized as prescribed in article 1, and such establish¬

ment must cease its operations and wind up its affairs within one year. The law contained all the necessary powers to inflict heavy penalties on offenders, who could be prosecuted before

the police tribunals and condemned to a cor¬

poral penalty ranging from 500 francs to 3,000

francs ($100 to $600), which could be doubled

in case of a second offense. These sentences

were independent of confiscation in every case

of the goods given as security.

The Empire period (1804), which succeeded

the Consulate, ratified the application of the law by a decree of 24th Messidor, Year XII (13

July 1804) providing as follows: — (a) the con¬

ditions under which the total reimbursement

must be effected of the sums paid by the share¬

holders into the funds of the pawnshops and

their elimination from the administration of

the establishment; (b) the administrative or¬

ganization of the Paris pawnshops; and (c)

the rules to be followed by the departmental

prefects for the organization of pawnshops in

places where they would likely to be of public utility, and for the closing of independent firms in such places.

The privilege of making loans on pledges thus organized in favor of pawnshops is still protected by article 411 of the Penal Code which enacts, against those who have kept or established pledging houses, a term of imprison¬ ment amounting to 15 days minimum and three months maximum, apart from a fine rang¬ ing from 100 francs to 2,000 francs ($20-$400). The old regime restored by the law of 16 Pluviose and the supplemental decree of Messidor was still further completed by a de¬ cree of 8 Thermidor, Year XIII (27 July 1805).

This decree, after prescribing the reimburse¬ ment without delay of the shares of the pawn¬ shops, determines the regulations under which the Paris pawnshops will operate thereafter. It is this general regulation which still fixes the principal conditions for the carrying out of loaning operations by pawnshops, and which we will outline in the future in this article. For the present suffice it to say that the terms of the Thermidor decree, by articles 55 and 56,

laid down the method of remuneration to be

received by the pawnshops from the borrowers,

the rates of such remuneration being made up

on the one hand, of the interest on the sums lent, and on the other of the expenses of

valuation, deposit of security and other general administration expenses. The law of 24 June

1851 defined the legal status of pawnshops and outlined the measures to be taken for better

administration. By virtue of this law, pawn¬

shops were recognized as being establishments

of public utility, and were, governed by the

regulations applying to public utility establish¬

ments in general, as laid down in the decree

signed by the President of the French Repub¬

lic. The board of directors of pawnshops is

presided over by the mayor of the commune,

and by the prefect for the department of the

Seine for Paris. For Paris the directors are

nominated by the Minister of the Interior, and for the departments by the prefect. They are

chosen as follows: — one-third from amongst

the members of the municipal council, one-third among the directors of charitable insti¬

tutions, one-third among other citizens domi¬

ciled in the commune. One-third of the mem¬

bers are renewed each year. The retiring mem¬

bers may be reelected. The decree determines

the organization arrangements for each one of

the pawnshops and the conditions for their

management. The manager of a pawnshop,

where such exists, or the responsible official, is nominated by the Minister of the Interior, or

by the prefect, on the recommendation of the

board of directors. In case of refusal by the Minister of the Interior or the prefect, the

board of directors is requested to nominate an¬

other candidate. The dismissal of the manager

is sanctioned by the same authorities. The

pawnshops are, as regards their accountancy de¬

partment, assimilated to charitable institutions, that is to say, they are considered as being gov¬

erned by the same regulations as the latter.

The endowment of each pawnshop is regu¬

lated by article 3 of the law of 1851, and is composed of : — (a) real and personal estate

serving for its establishment and those of which it is, or may become later, proprietor; especially donations and legacies; (b) profits and bonuses shown by the annual inventory and capitalized;

(c) subsidies which may be granted them out

of the communal funds of the department or of the state.

Pawning transactions are effected from: —

(a) funds available from the endowment re¬

serve; (b) those obtained by way of loan or

which are paid as interest into the treasury.

The conditions of the loans are fixed each

year by the administration subject to the ap¬

proval of the Minister of the Interior or the prefect as the case may be. When the endow¬

ment is sufficient either to cover the general expenses or to lower the interest to the legal rate of 4 per cent, the excess receipts are al¬

lotted to hospitals or other charitable institu¬

tions, by decision of the prefect acting on thˆ

recommendations of the municipal council.

A public administrative regulation deals

with the appointment and supervision of the in¬

termediary officials nominated to the manage¬

ment of pawnshops. The law of 1851 not only

dealt with questions concerning the organiza¬

tion of pawnshops, but prescribed in detail under what conditions the borrowers were .authorized

to demand the sale of their pledges. Every

depositor, after a delay of three months from

the date of the deposit, has the right to demand, on the dates of sale fixed by the regulations, the sale of his pledge, before even the date

noted on his ticket. The price of the article is handed without delav to the borrower-pro¬

prietor thereof, after deduction of the interest due and the amount of expenses fixed by the

regulations. New merchandise given as pledge

can, however, only be sold after the expiration of one year. Titles of debt, tickets and docu¬

ments appertaining to the administration of

pawnshops are exempt from fiscal taxes and

stamp duties under the law of 1851. This law, however, stipulates that with the exception of

exemption from taxes, none of its clauses are

applicable to pawnshops established on a purely charitable basis, and which, by means of dona¬

tions or special endowments, lend money gra¬

tuitously or at an interest lower than the legal rate. A transitory article of the law of 1851

provides that the terms of the law shall be ap¬

plicable to those existing pawnshops which have been founded as pawning establishments as dis¬

tinct from all others.

The state council, on being consulted re¬

garding the scope of this transitory text, ex¬

pressed the opinion that it was necessary to

divide the pawnshops into three categories : —

(1) those established on a purely charitable

basis and which by means of special endow¬

ments lend money gratuitously or at an interest lower than the legal rate; (2) those lending

money neither gratuitously nor at an interest

lower than the legal rate are authorized to re¬

tain their excess receipts to constitute or in¬

crease their endowments; (3) those lending

money neither gratuitously nor at an interest

lower than the legal rate pay all or part of their excess receipts into the funds of the

charitable institution under which they were

founded.

The state council afterward defined the ex¬

pression Spawning establishments as distinct

from others^ to the effect that such term was intended to designate pawnshops previously au¬

thorized to retain their excess receipts for the purpose of constituting or increasing their en¬

dowments ; but the law of 1851 could not affect the privileges of the charitable institutions

which profited wholly or in part by the excess revenues. As a result of this interpretation,

very few of the pawnshops connected with

charitable institutions by common interests were able to free themselves from this financial con¬

trol, which unquestionably hindered their evolu¬

tion in the way of reduction of tariffs.

The regulations for loans on corporal guar¬

anty is still further defined by the decree of 24 March 1852, and especially by the general

rules dated 30 June 1865, the principal provi¬

sions of which will be outlined in the first para¬

graphs of Part II. This decree of 1865 divided, in particular, all pawnbroking businesses into

two categories: — firstly, individual firms, the

funds necessary for the carrying on of whose

business is provided by a single treasury and

who have one office only for the transaction of each particular kind of business with the pub¬

lic ; secondly, compound pawnbroker's enter¬

prises, the variety and extent of whose trans¬

actions either necessitate the establishment of

branches or auxiliary offices, or several offices, sections or treasury centres. The pawnbroking

business carried on in Paris falls under the

latter category. Finally, a law dated 25 July

1891 authorized the Paris pawnshops to loan

money on certain fully paid-up scrip to bearer, no operation, however,

to exceed an amount of

500 francs ($100) per borrower. The same law

empowers the government to extend, by decree

in the form of regulations concerning public

administration, the same authorization to such

provincial pawnbrokers' enterprises as the gov¬

ernment shall deem to be in a position to ful¬

fil the requirements prescribed for this kind

of business. It is no longer a question, as re¬

gards loans on scrip, of an exclusive privilege as in the case of loans on corporal security, but of a simple right, limited and carrying with it different facilities, to do business concurrently with banks and other banking establishments.

Pawnbroking Operations. — Every applica¬

tion for a loan on corporal security is subject to various formalities including: Valuation of

the pledge to be given ; offer and acceptation of the loan; the drawing up of a statement of appraisal ; official pawnticket ; various entries on the books of the deposit office; proofs or authentications required by the regulations ; the payment of the loan and delivery of the cor¬

responding pawnticket, or suspension of the

payment and delivery of a document respecting

the pending loan, or the cancellation of the op¬

eration and restitution of the pledge.

In Paris, the valuation of pledges is ef¬

fected for pawnshops by the public appraisers

of the department of the Seine. There are in

all 20 of these public appraisers. According to the rules under which they carry out their du¬

ties, they have the right to choose their assist¬

ants, for whom they are responsible, although

they cannot issue official documents without the consent of the administration. The <(Compagnie des Commissaires Priseurs® (public ap¬

praisers) is responsible to the pawnshops for

the results of the valuation and if the proceeds of the sale of a pledge are not sufficient to cover the amount loaned, said compagnie must

make up the difference between the price real¬

ized by the sale and the valuation on which the loan was based. In the provinces, notably at

Lyons and Bordeaux, the valuation is effected

by public appraisers also. This, however, is

not always the case, as at Lille for instance the appraisement is made by competent valuers at¬

tached to the pawnbroking staff. Furthermore,

commission agents established in Tourcoing,

Armentieres, Hallum, Coumines and Estaires

are attached to the Lille pawnshop. Finally, at Nice another system exists, the two pawnshops

in this town advancing money gratuitously on

gold and silver articles only. The appraise¬

ment is made by a jewelry expert attached to

the administration, by whom he is remunerated.

The amount of the possible advance is fixed ac¬

cording to valuation, and a deposit-receipt to

bearer is given. The limit of loans based on

the valuations is fixed as follows : For silver¬

ware, gold or jewels, four-fifths of the value by weight; for all other articles, two-thirds of their value. The minimum of loans is three

centimes and the maximum is unlimited. Loans

are made for a period of one year. The fore¬

going are not, however, the only regulations

provided in the decree of 8 Thermidor Year

XIII (27 July 1805). For instance, by virtue

of article 49, should a doubt exist as to the identity of the depositor, or his legitimate own¬

ership of the articles, or his right to dispose of the goods, the payment of the loan may be temporarily suspended pending inquiries. The

borrower has the option, however, of giving

surety as to his identity. . As the loan document must bear a signature, if the borrower is un¬

able to write, such document tnay be signed by a responsible party known to the pawnbroking

authorities.

Redeeming of Pledges. — If at the expiration

of the period noted on the loan document, oi

before that date, or even after such date, so long as the sale has not been effected, the bor¬

rower presents the pawnticket and settles his

debt in full, i.e., principal, interest and expenses, his property is restored to him. (Regulations

of Year XIII (1804-05) modified by article 69

of the law of 30 June 1865). Any respite

from sale allowed to the borrower, at his re¬

quest is not suspensive of the rates of interest.

The rate of interest and administrative ex¬

penses payable by borrowers are fixed every six months by prefectoral order, but such rate of

interest must never exceed 12 per cent (decree of 24 March 1852). In 1913, the Paris pawn¬

shops charged 3ˆ4 per cent interest, the same

rate for administrative expenses, plus a special tax of 1 per cent which is always payable what¬

ever the duration of the loan, or a total of 8

per cent. If the borrower loses his pawnticket he cannot redeem his property until the due

date of expiration. He must then give a spe¬

cial release, testified to by a responsible resi¬

dent householder.

Renewal of Loans. — When the borrower is

unable to redeem his loan and desires to avoid the sale of his property, he can demand the re¬

newal of the loan on the same terms as to in¬

terest and duration. No renewal, however, will

be granted unless all taxes and interest to date are paid, such sum being calculated on a re¬

deeming basis. The pawnshop is authorized to

have the pledge revalued, and if it has declined in value the borrower may be called unon to

reimburse a part of the loan. A new valuation is obligatory for the following articles: (1)

Shawls and woolen goods on which a loan of

.50 francs ($0.10) or more has been made; (2) pledges which by special orders and provision¬

ally would no longer be accepted for renewal if this formality is not fulfilled.

It is also obligatory for any articles on

which a sum of 1,000 francs or more has been advanced. By virtue of article 81 of the Regu¬

lations of 30 June 1865, a borrower renewing his loan may demand to see his pledge so as to sat¬

isfy himself as to the proper state of preserva¬

tion of his property. The Montpellier and

Douai pawnshops do not grant renewals, but

they give every facility for payment.

Reimbursement by Instalments. — Borrow¬

ers have the option of redeeming their loan be¬

fore its expiration, by instalments, which, how¬

ever, must not be less than an amount of one franc and which bear interest at the same rate as that charged by the pawnshop.

These instalments constitute what is called

a savings-account, and may be used for the par¬

tial liberation of the loan, or the renewal

thereof.

Payments made by instalment do not, how¬

ever, prevent the property from being sold on

the expiration of the loan, even if the amounts paid are equal to the sum loaned. The admin¬

istration is under no obligation to supervise

these operations and it is, therefore, incumbent on the borrower to take the necessary steps to redeem his pledge or renew the loan, other¬

wise his property will be sold.

Sales. — Should the loan not be redeemed or

renewed at due date, the pledge is sold. Sales take place after the drawing up of an order for pledges to be realized, which order becomes pub¬

licly effective upon executive order of the presi¬

dent. Sales are publicly announced 10 days in ad¬

vance, and the borrower is also advised when

the amount of the loan exceeds 16 francs. No

opposition can be made to the sale, but if the borrower so requests, the administration usu¬

ally grants a respite of three months. Sales are always subject to the supervision of public ap¬

praisers, even at the gratuitous pawnshop of

the ((Fondation Mazurel® of Lille. An excep¬

tion exists, however, in favor of the gratuitous pawnshop of Nice, where sales are made by

sworn experts assisted by the director of the

pawnshop, the justice pf the peace and the

comptroller. As previously stated, if the

amount realized by the sale is insufficient to re¬

imburse the pawnshop, the public appraisers

must make up the deficit between their valua¬

tion and the sale price.

As we have pointed out in Part I, par. 2, the law of 24 June 1851 lays down the conditions

under which borrowers are authorized them¬

selves to apply for the sale of their security.

Bonuses. — The proceeds of the sale are util¬

ized in the first place to reimburse the pawn¬

shop. If there is any excess it is called a

ˆboni® or bonus, and must be paid over to the borrower (Regulations of 30 June 1865, art.

92). These bonuses are held at the disposal

of the parties interested, but if not claimed

within three years they revert to the adminis¬

tration (article 93 of same regulations). A

claim for a bonus must be accompanied by the

pawnticket to bearer. It is not the business of the pawnshop officials to inquire by what means the pawnticket came into the possession of the party presenting it unless it forms the object of a legal attachment. Duval, (Manuel de

i egislation,* 1727.

Nature of the Privilege — Although the

privilege of making loans on personal secu¬

rity is reserved for pawnshops it must not be concluded that this is absolutely exclusive. The Civil Code devotes an entire chapter (articles

2073 and following) to the regulations govern¬

ing the constitution of a private security. But the prescriptions of the Civil Code are very se¬

vere and little suited to facilitate this kind of transaction. A public act, or act by privy seal, registered, is required except in cases where

the transaction does not exceed a sum of more than 150 francs. Moreover, the secured cred¬

itor may obtain payment preferentially on the

effects constituting the security, but in this case he must obtain an order from the courts that

such effects shall remain his property in pay¬

ment, and this up to the amount of a valua¬

tion made by experts, or that such effects be sold by auction. These protective measures

are not, however, the only ones prescribed by

the law. Loans on security made between pri¬

vate parties must be distinct and separate

transactions, for, as we have pointed out, arti¬

cle 411 of the Penal Code deals severely with persons carrying on business in non-authorized

loaning establishments. Jurisprudence has al¬

ways given the broadest interpretation to the

clause contained in the Penal Code in this re¬

spect. admitting, notably, that the fact of hav¬

ing loaned money to several people without

opening a duly authorized loaning establish¬

ment (even without interest) is sufficient to

render one liable to the penalties stipulated in article 411 of said Penal Code. On the other

hand, pawnshops enjoy an especially favorable

regime, such as immunity from fiscal charges

GOVERNMENT PRINTING OFFICE

and stamp duties, and above all they have the right to sell the articles

deposited as security without being obliged to observe the prescrip¬

tions of article 2078 of the Civil Code. It must be admitted that the privilege for making loans on security granted to pawnshops gives them a

veritable monopoly in this respect, even as

regards the constituting of a private security.

Loans on Personal Estate. — The law of

25 July 1891 was not made with the object of allowing pawnshops to encroach on credit or

banking houses by authorizing them to loan

money on personal estate security, the property of the bearer. The maximum fixed for these

transactions, limited to 500 francs ($100),

proves at once that the law merely desired to assist small property holders who had made

safe investments, the limited nature of which

does not interest large banking concerns, and

the facilities granted by pawnshops to under¬

take this kind of ‘business are more in keeping with the momentary needs of small capitalists,

The amount of the advances is calculated on

the official rate of the Bourse, taking as a basis the last rate for cash transactions of the pre¬

ceding day. The amount of the loan is fixed

in the following proportions: (1) French

rentes, treasury notes and bonds, 80 per cent ; (2) securities bearing annual interest and

deemed by the prefectoral authorities to be

good holdings, 75 per cent; (3) ((Actions de

Jouissance,®* 60 per cent.

The borrower can be called upon, during

the duration of the loan, to refund part of the loan if the Bourse rate drops at least 15 per cent, such refund to be made eight daj^s after receipt of notice by registered letter. In case of a drop in the market rate the pawnshop has the right to sell the security on the Bourse in the absence of partial reimbursement, or in the absence of total reimbursement on the expira¬

tion of the loan, without being obliged to no¬

tify the borrower or carry out any formality.

Any deficit resulting from the sale is payable by the borrower; if there is a profit, it is kept at his disposal for 10 years, counting from the date of the sale. After this lapse of time any unreclaimed profit reverts to the pawnshop.

The financing of loans on personal security

must be effected by means of capital distinct

from that used for loans on corporal security.

All the clauses contained in the regulations

which govern pawnshops and are not contrary

to the law of 1891 are applicable to transac¬

tions concerning loans on scrip.

Responsibility of Pawnshops in Case of

Loss of Goods Pledged. — The Decree of

8 Thermidor Year XIII (27 July 1805) gives

borrowers who have not exceeded the date limit fixed for the sale of their pledges the right to claim an indemnity if their property is not re¬

stored to them. This indemnity is based on the estimated value of the property at the time of deposit plus one-quarter thereof. (Article 60

of the General Regulations of said Decree). As a general rule, no other claim can be made by the borrower. Exception, however, is made in

the case of loss of the pledge as the result of fraud or gross negligence on the part of an

employee. In such case ordinary law becomes

applicable and the courts decide the amount of *Such shares do not exist in English or American com¬

panies. Sometimes they are translated by the term “ divi¬

dend shares.”

indemnity to be awarded, due consideiation

being taken of cases of <(force majeuro® when

such exist.

The risks of safe keeping of pledges, prin¬

cipally fire, must be covered by the pawnshop, and by virtue of article 67 of the Thermidor

Decree all real estate and working capital may be held to constitute the guarantee for de¬

positor’s pledges.

Resources and Present Situation of Pawn¬

shops. — No pawnshops, with the exception of

those of Arras, Besanqon, Boulogne-sur-Mer, Douai and Nancy, possess sufficient funds of their own, and they are obliged to borrow to meet their business needs. The working funds of these establishments are derived from an¬ nual loans made to them under decree of 8 Thermidor Year XIII. In Paris, loans are ef¬ fected as required by voluntary deposits o* sums of a minimum of 100 francs ($20). The rate of interest on such investments is fixed yearly, or oftener if any modification is neces¬ sary, under the ruling of the prefect of the Seine after approval by the Conseil de Sur¬ veillance. (Decree of 25 March 1852, art. 7). Different rates are fixed, based on the date of expiration of the ˆBons® (notes) delivered to the security-holders, which notes may be discounted by the pawnshop. To these sums should be added amounts paid to the pawn¬ shops as ˆcautionments® (surety) and depos¬ its.

As regards gratuitous pawnshops, they de¬ rive their funds from foundations or gifts

made to them. These establishments form,

however, an exception, as we have already

pointed out. The present status of pawnshops

in France, or let us say their status before the war, can be seen from the general statistics

published in 1910, which are given in another

part of this article.

GOVERNMENT PRINTING OFFICE,

United States, established in 1861 as tJhe official printing and publishing plant of the United

States government, occupies a seven-story fire¬

proof brick building in Washington, D. C.,

built for it in 1902. Its frontage is 408 by 175

feet on two streets and it has an interior court, 30 by 167 feet. An annex later built in corre¬

sponding height and style houses the office of the superintendent of documents. Connection

with the adjoining city postoffice enables it to deliver its enormous mail shipments there di¬

rect from the workrooms. A vault capable of

storing 2,000,000 electrotype and stereotype

plates extends out under the street pavements.

The main building was put up under an appro¬

priation of $2,249,000. It has its own power

plant and individual motors, without belting or shafting, operating all machinery, elevators, etc., throughout the building. It is equipped with

linotype and monotype machines and with all

other devices, apparatus and machinery to en¬

able it to turn out at the highest grade and in the largest quantity, and especially with the great¬

est rapidity, a great variety of work, including bound books, pamphlets, periodicals, forms,

specifications, ledgers, loose-leaf binders, en¬

velopes, money-order blanks, postal cards, cata¬

logue cards, in fact, every kind of job print¬

ing, binding and book making that Congress

and the government offices can use or issue. It is fitted with every device for the aid, safety and comfort of the workers, including automatic 97

carriers, pneumatic tube distribution, electric

fans, bubbling fountains of cooled and filtered water and a complete hospital with medical at¬

tendance day and night. The cost of the ma¬

chinery in use 30 June 1915 was $2,475,538.86.

The Government Printing Office employs

about 4,000 workers, of whom about one-third

are women. It runs continuously day and night, especially while Congress is in session. The

title of the head is Public Printer. He is ap¬

pointed by the President, but reports to Con¬

gress. All other employees are appointed by

him, under examination and regulation by the

Civil Service Commission. Although most of

the workers belong to unions, yet the govern¬

ment has affirmed it to be an open shop. The only supervision is by the Joint Committee on

Printing of the two houses of Congress, under

which body the office contracts for paper, and which body has power ((to remedy any neglect

or delay in the execution of the public print¬

ing.ˆ A branch printing office and bindery to

do the work of the Library of Congress is in that building, and a smaller branch in the State, War and Navy building, are operated under

the Government Printing Office. The scales of

wages paid are somewhat in advance of those

in commercial establishments, and in addition

each employee is given, for each year of serv¬

ice, thirty days' leave of absence with pay.

The work of the Government Printing Of¬

fice which differs from that of any other com¬

bined job printing and book and periodical pub¬

lishing house — except that this is the largest in existence — is that done for Congress in

abnormal requirements of speed and varying

amounts. This is largely done between 7

or later p.m. and noon of the next day. Con¬

sidering the intervals of slack and rush ac¬

cording as Congress is sitting or not, the totally incalculable and enormously varying amount of

printing for each day's session which must be

rushed through for immediate use, together

with the confidential printing, a government

printing plant seems a necessity. On account

of its own exceptional needs, and also because established under Congress in the beginning,

that body is slow in relinquishing a share in the management to other departments of the

government, although under its control no 10—

year period has passed without an expensive in¬

vestigation of alleged looseness in administra¬

tion. Printing for non-Congressional branches

of the government being now two to three or

more times the quantity done for Congress, it

would seem that a directorate representing all

branches of the government, with the addition

of non-governmental expert membership, might

be the solution of the problem of government

printing administration.

The office of the superintendent of docu¬

ments, created in 1895, was made a subordinate bureau of the Government Printing Office. Its

functions are to act as a clearing-house and

storehouse of United States publications ; to

distribute them by gift to libraries, especially to those designated as depositories, and by sale to individuals ; and to make catalogues and

lists of them. Its library, in which is preserved one copy of every edition of everything pub¬

lished by the government, contained 30 June

1916 a total of 193,533 pieces. Complete cen¬

tralization of distribution in this office has, however, not yet been effected. It delivers to vol. 13 — 7

the nearly 500 depository libraries an average

of 1,000 publications yearly. It issues a list of new publications each month ; an index to the

documents and reports of Senate and House

each session; and at the end of each Congress a full analytical dictionary catalogue of every¬

thing published during the two years.

Appropriations for the Government Printing

Office and the public printing and binding for the year ending 30 June 1915 were $5,907,051.30.

Of this sum $331,395 was for salaries and ex¬

penses of the office of the Superintendent of

Documents. There came under the trimming

machine 64,151,813 books and pamphlets. Case—

bound books totaled 1,744,335. Money order

books were shipped to the number of 677,542.

Of postal cards there were produced 1,038,063,-

199.

Consult reports of the Government Print¬

ing Office, 1853-date, which include, 1895-date, the reports of the superintendent of docu¬

ments. For divisions of the office, personnel

and salaries, consult the United States Census

Bureau, Official Register, latest issue. Reports on operations of the main building were made,

1899-1904, by the officer of the Engineer De¬

partment in charge. (Consult entries in docu¬

ment catalogues, issued by the superintendent

of documents, for those years. Also brief no¬

tices in annual reports of Engineer Depart¬

ment). For description of office consult Pan-American Union Monthly Bulletin, November

1910, pp. 737-755 ; many illustrations; Whelp—

ley, (The Nation's Print Shop and Its Meth¬

ods, } Review of Reviews, 28:556-563, 1903;

Rossiter, (Problem of the Federal Printingˆ

Atlantic, 96:331-344, 1905. For administration

consult United States Printing Investigation

Commission, Report, 1906.

GOVERNMENT OF THE UNITED

STATES. See United States.

GOVERNMENTAL POLICIES, Execu¬

tive Influence Upon. See Executive.

GOVERNOR, in the States, Territories and

acquired possessions of the United States. Be¬

fore the attainment of independence by the

English colonies in regions that now form part of the United States, the term ˆgovernor® de¬

noted the chief executive of each colony, either appointed by the Crown, or by the proprietor

or — as in the case of Connecticut and Rhode Island, and of Massachusetts till it lost its char¬

ter in 1684 — chosen by the freemen of the

colony (compare an article by the late John

D. Long, Governor of Massachusetts 1880-81,

in (Cyclopedia of American Government, > Vol.

II, p. 91, New York and London 1914). In

each State the governor is now a constitutional official, elected by the qualified voters ; his func¬

tions and powers are determined by the State

constitution. In some States there is elected

on the same ballot a lieutenant-governor. As¬

sociated with the governor in a few of the older States there is an advisory executive council,

each member of which is elected by popular

vote from a ((councillor district.® In Massa¬

chusetts their approval ef appointments, is re¬

quired, and the governor's responsibilities are

shared with them in other ways. ftThe pardon¬

ing power is lodged in the governor's hands.

In a few New England States he cannot

exercise it except with the concurrence of the executive council, but in most States, as in the 98

Federal government, it is vested solely in the chief executive.® A tendency is noted to re¬

strict the governor's executive power by assign¬

ing to commissions* the appointment of which

rests with him, supervision and control of such departments of the public service as railroads, water-supply, lighting, *etc.* (<He is still commander-in-chief of the military forces of the

State, and has the appointment of his military staff, but usually the other officers of the militia are now elected by vote from within the vari¬

ous military lines.® In a few States the gov¬

ernor still appoints the judges. . His participa¬

tion in the labors of the legislative branch

is to a certain extent direct. Thus, he can call the legislature together

for extraordinary ses¬

sions; he possesses (save in North Carolina)

the power of vetoing enactments, with the ex¬

ception of constitutional amendments. But not

less important — in time of crisis, indeed, even more important — is the governor's influence

in shaping legislation (<altogether beyond the

limitations of his strict constitutional range®

by the legitimate exercise of powers inherent

in leadership, expressing and enforcing by his

utterances the views, the demands and the

judgment of his State.

The official standing of governors of the

Territories or acquired possessions of the United States is sharply contrasted with that of gov¬

ernors of States. The former receive appoint¬

ment from the President of the United States

and are removable at his pleasure. Moreover,

adaptation to varying conditions and circum¬

stances is often required. For example, in the naval government of the island of Guam (a

naval station) the governor combines execu¬

tive with legislative powers. See Executive.

GOVERNOR, a device which regulates the

admission of steam to a steam-engine, accord¬

ing to the rate of motion. The intention is to maintain uniform velocity, and any acceleration

of speed above a given rate causes a valve to be partially closed, diminishing the area of steam passage. The favorite form of governor has a

pair of balls suspended from a vertical shaft, so as to swing outward when the shaft is rotated.

The greater the speed the greater the centrif¬

ugal force, and consequently the farther the

balls depart from the axis of rotation; the in¬

clination of the ball arms is made effective in working the valve. See Steam-engine.

GOVERNORS, Terms of Office, Age

Limit, etc See Electoral Qualifications.

GOVERNORS' CONFERENCE. The

factors that brought about the establishment

of the governors' conference in the United

States were the three following: (1) the

growing centralization of power at Washington ; (2) the shifting, uncertain status of State's

rights, and (3) the lack of uniform laws. It

was felt by many that the nation was confronted by a grave crisis. Vital problems affecting the general welfare of all the people remained

un¬

solved, though they had reached the acute state where solution was imperatively demanded.

In 1908 a meeting of governors was held at the White House, Washington. It was called by

President Roosevelt, and the principal subject

considered at that time was the conservation of natural resources. Early in the following year

a second meeting, also at Washington, was

held to consider topics coming under State,

and constitutionally not under Federal, adminis¬

tration and jurisdiction — such as the questions relating to marriage and divorce, child labor,

capital punishment, initiative, referendum and

recall, *etc.* In 1910 a third conference was

held at Frankfort, Ky. In 1911, at Spring

Lake, N. J., the governors' conference debated

with special interest the general subject of

intrastate commerce; and the doctrine of State

sovereignty, involving control by the several

States in such matters, was maintained in pro¬

test against the decision of Justice Sanborn, of the Court of Appeals of the United States, in the Minnesota Railway Commission injunction

case. A meeting of Western governors was

held in 1912; and in the same year conferences were held at Richmond, Va., and Washington,

D. C. ; followed by a session at Colorado

Springs in 1913. The conference at Boston,

24-27 Aug. 1915, merits special attention, al¬

though the attendance was not large and it is quite true that, as has been said, ((the high hopes that were aroused at the time of the

first conference of governors have unfortu¬

nately not been fully realized.® One of the

subjects — the most vital of all — discussed at the Boston meeting indicates lines of activity

along which genuine progress can be made and

the public interest faithfully served by the

States' chief executives (see article Governor).

That subject was <(The Relation of the State

to the National Defense.® Finally, the func¬

tions of the governors' conference are officially declared to be: <(Exchange of views and ex¬

periences on subjects of general importance

to the people of the several States, the promo¬

tion of greater uniformity in State legislation, and the attainment of greater efficiency in State administration.®

GOVERNOR'S ISLAND, N. Y„ small

fortified island in New York Bay, south of the Battery, and at the entrance to East River.

It is separated from Brooklyn by Buttermilk

Channel. In 1621, under the name of Nutten

Island, it was a station of the West India

Company. Later it was used as a residence

by the colonial governors of New York, hence

its present name. Wouter Van Twiller was

the first governor (1637) to use the island for a country residence. In 1708 it was in use as a quarantine station, and in 1784 Gov. George

Clinton leased the island to a company who

used it for a summer resort and a racecourse.

Lord Cornbury in 1702 and Governor Hardy

in 1756 urged the erection of batteries on the island; but no definite action was taken until 1794, when there were rumors of a war with

France, the State of New York appropriated

$250,000 for the erection of a fort and earth¬

works. The general government appropriated

$31,117, and the money was expended for the

construction of Fort Jay in the centre of the island. Other sums were used later in im¬

proving the fort, but in 1801 the work ceased until 1806-07, when from ((an enclosed work

of earth and wood® the fort was improved and

faced with permanent masonry at a cost of

$30,000, and was named Fort Columbus, as at

present. The designs for Fort Columbus, also

Castle Williams, were made by Jonathan Wil¬

liams, Lafayette's chief engineer of the army.

The plans called for 104 guns for Fort Colum¬

bus and 100 guns for Castle Williams. The

latter fort exists to this day practically as

it was when completed in 1811. Its area is

three-fifths of a circle which is 200 feet in diameter, and the walls are 40 feet high. In

1861-65 Castle Williams was used as a prison

for Confederates; at one time there were as

many as 1,000 prisoners. After the War of

1812 a fortification called South Battery was

built at a place to command Buttermilk Chan¬

nel. Governor's Island is the army headquar¬

ters ,of the Eastern Department, a most import¬

ant military post, embracing the coast from

New York to Virginia and including Porto

Rico. It has less the look of war than many

smaller forts, but it has a garrison usually of three companies, and it is used as a military prison, nearly all the prisoners being deserters.

A little church, under the care of Trinity parish, Manhattan, residences for the officers and some storage places are the only buildings in addi¬

tion to the forts. At the beginning of the 17th century the island was 1,500 feet long and 900

feet wide with an elevation above high-water

of 20 feet. Its whole area then was 100 acres.

The tide-waters have washed away a large por¬

tion of the island. The War Department begun

in 1903 the work of reclaiming from the sea the land washed away and the island is now re¬

stored to about its former area. The need of

modern forts and better defensive equipment

on Governor's Island no longer exists since an excellent system of fortifications has been estab¬

lished at the entrance to The Narrows and

along the shores of Long Island Sound.

GOVERNOR'S ISLAND, Mass., fortified

island belonging to Suffolk County, in Boston

Harbor. It is just north of the main ship—

channel and of Castle Island. The fortifications form part of the system of defense of Boston

Harbor. Fort Winthrop, the keep or redoubt, is an enclosed quadrangular fort with open bar¬

bette batteries.

GOWER, John, English poet: b. probably

about 1325 ; d. London, October 1408. But lit¬

tle is known of his life save that he was rich and well educated, did not marry till late in life and became blind about 1400. His tomb is still to be seen in Saint Saviour's, Southwark.

He was a personal friend of Chaucer, who,

in dedicating to him his (Troilus and Cressida,5

addresses him as the (<moral Gower55 — an

epithet that has indissolubly linked itself with his name. Gower wrote three large works in

as many languages; the (Speculum Medi—

tantis,5 in French verse, long supposed to be

lost, but discovered by G. C. Macaulay and

published in his edition of the poet's works.

The (Vox Clamantis,5 a tedious poem in Latin

elegiac verse, written 1382-84, describing the

rising of the mob under Wat Tyler; and the

long poem entitled (Confessio Amantis,5 writ¬

ten <(in our English … for England's sake,55

the date uncertain, but at least the poem was in existence in 1392-93. (Confessio Amantis5

consists of a prologue and eight books, written in verses of eight syllables, rhyming in pairs.

The long prologue gives a sombre account of

the state of the world at that time, and the poem opens by introducing the author him¬

self in the character of an unhappy lover. It ends with the lover's petition in a strophic

poem addressed to Venus, her judgment, and

finally the lover's cure and absolution. With¬

out originality — in J. Russell Lowell's phrase he ((raised tediousness

to the precision of a

science” — narrative power, pathos or humor,

Gower yet commands respect for the laborious

equality of his verse, and his work remains a splendid monument of English. Consult

Pauli’s edition (1857) ; Henry Morley’s serv¬

iceable reprint in the (Carisbrook Library5

(1889) ; his (Complete Works,) edited by G. C.

Macaulay (3 vols., New York 1899-1900) ; and

Dodd, W. G., (Courtly Love in Chaucer and

Gower) (New York 1913).

GOWER, Lord Ronald Sutherland-, Eng¬

lish author and sculptor: b. 1845; d. 9 March 1916. He was the second son of the second

Duke of Sutherland. Educated at Trinity Col¬

lege, Cambridge, he sat in Parliament for

Sutherlandshire, and also became known as the

sculptor of such works as (The Old Guard at

Waterloo,5 and the Shakespeare monument at

Stratford-on-Avon. Among his writings are

(My Reminiscences> (1883), a work of much

interest; (The Tower of London5 (1901);

(01d Diaries5 ; (Records and Reminiscences5

(1903).

GOWRIE (gow'ri) CONSPIRACY, an

unexplained episode in Scottish history. On 5

Aug. 1600, James VI, afterward James I, of

England, came to Gowrie House, the residence

of the Earl of Gowrie, in the suburbs of Perth, having been lured thither, according to one

account, by the report of a suspicious person

there held in custody. After dining, the king

was led aside by Alexander Ruthven, younger

brother of the earl, and the king's attendants were told that his majesty had left the castle.

An attempt was made by Ruthven, either to

murder or to bind the king, who struggled

desperately and shouted for help. His retinue

coming to his rescue slew Ruthven and Gowrie.

The motives of the two brothers have been

variously explained. The current belief is that they intended to capture the king and either

give him up to England or administer the gov¬

ernment in his name in the interest of that

country and in that of the Scotch Presbyterian leaders. 'Others supposed that their object was merely to avenge the death of their father,

who had been executed a few years previously.

The heavy indebtedness of the king to Gowrie

was another cause of irritation. Gowrie House

was destroyed and the estates confiscated.

GOYA Y LUCIENTES, go'ya e loo-thean'tas', Francisco Jose de, Spanish artist,

caricaturist, etcher and designer: b. Fuende—

todas, Aragon, 30 March 1746; d. Bordeaux,

France, 16 April 1828. Goya's name ranks

with those of Velasquez and Murillo in the

history of Spanish art. Of peasant birth, 'he

led an early roving and somewhat dissipated

life, his brilliant talents as an artist and a musician with the gift of song making him a

favorite both with the wealthy knd poorer

classes. With the latter he was obviously more in sympathy, and from their daily life drew

the picturesque subjects and motives which he

turned out in a profusion of sketches, paint¬

ings, water colors, portraits, genre pictures,

caricatures, designs and etchings. He was

equally gifted in all lines of his art and his works in the satirical grotesque are described

by Theophile Gautier as <(a mixture of Rem¬

brandt, Watteau and the comical dreams of

Rabelais,® while Champfleury compares him to Daumier, the greatest of modern French car¬ icaturists. His early training in art began under Martinez at Saragossa, near his native village, and afterward at Madrid under Bayeu, whose daughter he subsequently married. To broaden his experience, he joined a traveling troupe of toreadors so as to reach Rome, where he spent a profitable period in the ex¬ amination of the great art collections and in mingling with the everyday life of the people. In 1772, signing his sketch <(Pupil of Bayeu, painter to the King of Spain,® he received sec¬ ond prize in a competition from the Academy of Parma. On his return to Spain he began his professional career by painting from 1772—74 the (Adoration of God,5 ceiling frescoes of the church of Santa Maria at Saragossa, and the frescoes of the (Life of the Virgin) at the Carthusian Convent, Cartuja Aula Dei, six miles north of Saragossa. From 1775-91 he designed cartoons of contemporary Spanish life

for the royal manufactory of tapestries at

Santa Barbara, Madrid; in 1868, long after his death, 43 of these were discovered in a cellar of the royal palace. In 1788 he was elected

honorary member of the Academy of San Fer¬

nando, and was appointed painter of the cham¬

ber to King Charles IV, in 1798 becoming

chief royal painter. In 1793 he had replaced

Calleja as lieutenant director of the Academy

of San Fernando. Spain's political unrest in¬

terfered with his career from 1808 until 1813, and later he was compelled to leave Spain. He visited Paris in 1822, returned for a short pe¬

riod to Madrid in 1827, but spent the few last years of his life at Bordeaux where a monu¬

ment marks his grave. His greatest work is

the series of cupola frescoes portraying the

life of Saint Anthony, completed in 1798 for

the church of San Antonio de la Florida, near Manzanares. He excelled in portraiture and

notable are the paintings of Charles III ;

equestrian portraits of Charles IV and Queen

Maria Louisa; a family group of Charles IV;

a family group of the Duke of Ossuna; a por¬

trait of himself in the Academy of San Fer¬

nando, where also is his famous double por¬

trait of (La Maya,5 a lovely young female,

slightly d/raped, and nude. In the museum of

the Hispanic Society in New York is the por¬

trait of his inamorata, the beautiful Duchess

of Alva, also a portrait of General Forastera

and several drawings. His (Jewess of Tangier) and his portrait of Don Sebastian Mar¬

tinez are in the Metropolitan Museum of New

York city. His work is more popularly known

through his numerous etchings, descriptive and

satirical, widely reproduced, especially the bull¬

fighting series, insurrection street fights, folk picture, genre subjects and by his later essays in lithography of which the (Bulls of Bordeaux) is a well-known example. (Los

Proverbios* (Proverbs) and (Los Caprichos5

(Caprices), virile, weird, grotesque caricatures

of established society and religion, with hidden meanings known only to the initiated, are his

chief etchings. Consult Hofmann, (Catalogue

of Goya Etchings) (Vienna 1907) ; Hunter,

<Tapestries> (New York 1912) ; Vilaamil, (Los

tapices de Goya> (Madrid 1870) ; also biogra¬

phies by Brunet (Paris 1865) ; Calvert (Lon¬

don 1908) ; Hind, <Great Engravers) (London

1911); Muther (London 1905); Stokes (New

York 1914) ; Von Loga (Berlin 1903) ; Yriarte (Paris 1867) ; Zapater (Saragossa 1868).

GOYANA, go-yan'na, Brazil, city in the state of Pernambuco, on the Goyana River, about 20 miles from the Atlantic. It is a ship¬ ping port for sugar, alcohol, dyewoods, cab¬ inet woods and cotton. Pop. 30,000.

GOYAU, go'yo', Pierre Louis Theophile Georges, French editor and author: b. Orleans, France, 31 May 1869. He was educated at the Orleans Lycee, the Lycee Louis le Grand •and the Higher Normal School, Paris, and the French School at Rome. Since 1895 he has been associate editor of the Revue des Deux Mondes. He married the daughter of Presi¬ dent Felix Faure. In 1898 he was awarded the Prix Bordin and in 1908 the Prix Vitet by the French Academy. He is a Fellow of the University of Paris and has published (Le Pape, les catholiques et la question sociale) (1893) ; (Autour du catholicisme sociaP (5 vols., 1896-1912) ; (L'Allemagne religieuse, le protestantisme) (1898; German trans.) ; (L'ecole d'aujourd'hiu) (2 vols., 1899; 1906); (Le francmaqonnerie en France5 (1899) ; (Len— demains d'unite : Rome, royaume de Naples5

(1900) ; (L'idee de patrie et l'humanitarisme,

essai d'histoire francaise5 (1902) ; (Les nations apotres, vieille France, jeune Allemagne5

(1903) ; (L'Allemagne religieuse, le cathol¬

icisme, 1800-18705 (4 vols., 1905-09) ; <Moeh—

ler5 (1906) ; (Jeanne d'Arc devant l'opinion

allemande5 (1907); (Ketteler5 (1907; transla¬

tions in Spanish and Italian) ; (Sainte Melanie5

(1907); (Autour du catholicisme social5 (4th

and 5th series, 1910; 1912); (Bismarck et

l'Eglise: le culturkampf5 (4 vols., 1896-1912);

(Le Vatican,5 with Perate and Fabre (1895;

German trans). He contributed several articles

to the Catholic Encyclopedia.5

GOYAZ, go-yaz', Brazil, state completely

enclosed between the states of Maranhao,

Piauhy, Bahia, Minas Geraes, Sao Paulo, Matto

Grosso and Para. Its area is estimated at

747,311 square kilometers, or, say, 288,536

square miles; but, as a large part of the Araguaya-Tocatins Basin is unexplored, a precise

statement in regard to the extent of its terri¬

tory cannot be justified. The Goyaz plateau

with the Pyreneus Mountain range constitute

the watershed which divides the basin of the

Tocatins and Araguaya rivers from the Sao

Francisco and Parana basins; the headwaters

of the Araguaya and the Paraguay are near

one another; and thus the point of divergence

of great river-systems is found within this

state. The climate of the plateau is excellent ; among the mountains extremes of heat and

cold are felt; and large districts are well

adapted to agriculture. Forests extend along

the river-courses, while the elevated lands of

the interior have only occasional clusters of

trees. The chief products are tobacco, rubber

and cattle ; the gold and diamond washings

which at one time were supposed to be im¬

portant now yield very little. The capital,

Goyaz, formerly called Villa Boa, has about

25,000 inhabitants. The population of the state was given as 340,000 in 1911; of that number

nearly 25,000 were Indians or Mestizos. The

special interest attached to this state is due to a circumstance which is mentioned in a

geographical sketch of Brazil (Washington

1901 ; compiled by the Bureau of the American

Republics), in the following terms: (<This

state enjoys a splendid climate, and has been

selected for the site of the future capital of the republic, the constitution providing for its location on the plateau of Goyaz. A special

commission, at the head of which is the di¬

rector of the observatory of Rio de Janeiro,

has already marked the site for the new cap¬

ital, which is a space 14,400 kilometers square (about 5,500 square miles) on the Upper

Tocatins, in the Pyreneus range of mountains.

It has an elevation of from 200 to 300 metres above the level of the plateau and is drained by numerous streams of pure water, being the

centre of the three hydrographic systems of

Brazil. … It is here, near the point of diver¬

gence of her three great rivers, that Brazil

wishes to establish the national capital.® But

the site thus selected has no natural means of communication with the Brazilian coast. The

Tocatins-Araguaya is navigable for only about

one-tenth of its entire length; its course is

broken by falls and rapids, and as it ap¬

proaches the Gulf of the Amazon it becomes

very shallow. Canals and railways would be

required in order to make the rivers com¬

mercial highways ; moreover, the state is with¬

out seaboard — is, indeed, far inland. The iso¬

lation of the proposed capital suggests that of Bogota.

Marrion Wilcox,

Editor Encyclopedia of Latin America.

G(5zan, Mesopotamia, a district or prov¬

ince called Guzanu in the Assyrian inscrip¬

tions, and known as Gauzanitis by Ptolemy.

It was situated on both banks of the Khabur

River, occupying the upper part of the country which was later the kingdom of Osrhoene.

Its history seems to have been a stormy one.

It became part of the Assyrian Empire in the

9th century b.c., revolting against Adadnirari

V, in the 7th century. In the following cen¬

tury it revolted again, but was put down by

Asurdan III. Gozan was also the name of a

city in the same district, generally supposed to have been the capital of the province of Gozan.

GOZZI, Carlo, Italian dramatist, younger

brother of the brilliant essayist Gaspare Gozzi : b. Venice, 13 Dec. 1720; d. 4 Apr. 1806. On

account of his father's financial embarrassments Gozzi spent three years in Dalmatia, seeking a career as a soldier of fortune (1741-1744).

On his return to Venice he tried unsuccessfully to bring order into the chaotic family affairs.

His natural bent for literature led him to join the Academy of the Granelleschi and to take

part in the quarrels that divided the Venetians into the rival literary camps of the partisans of the dramatists Goldoni and Chiari. . He

attacked both these writers with equal vigor,

the former for his fondness for the newer phil¬

osophy and for his leaning toward foreign

influences in the theatre, the latter for his bom¬

bast and ignorance, in (La Tartana degli In—

flussi per l'anno bisestile 1756), a sort of comic almanack, and in a satirical poem, (La Marfisa bizzarra5. In order to prove to Goldoni that

any novelty, even the most silly, could attract people to the theatre, and that he could succeed with any fairy tale whatever, he wrote the

(Amore delle tre melarancie5 (The Three

Oranges), drawn from Basile's (Cunto delli

CuntP, a 17th Century collection of popular

stories. Produced in January, 1761 by Sacchi's

troupe of comedians, bringing back on the

boards the stock characters of the earlier

Italian comedy of masks, and satirizing the two rivals Chiari and

Goldoni, the one under the

guise of a fairy and the other as a magician, Gozzi's fantastic play won him a magnificent

triumph. Between 1761 and 1765 a rapid succes¬

sion of fiabe dramatized from Neapolitan and

Oriental fairy tales appeared on the stage, II

Corvo) (The Raven), (I1 Re Cervo) (King

Stag), (La Turandot,5 (Zobeide\ (Augellin

Belverde) (The little green bird), (Zeim re

dei Geni> (Zeim, King of the Genii), *etc.*

In many cases only an outline of the scene is given ; in other scenes the entire action is

worked out in prose or in verse. In his later plays Gozzi wrote dramas imitated in the main

from the Spanish of Calderon, Tirso de Mol¬

ina, Rojas and Moreto. His (Memorie inutili

della sua vita) (1797) contains very interesting memoirs. Gozzi's fame rests on his fiabe, of

which HI Corvo) is the best. Written in the

Venetian dialect, they are a capricious mixture of reality and fantasy, of popular forms and

commedia delV arte, of allegory and satire,

of supernatural beings and stock stage char¬

acters. More esteemed abroad than in Italy,

Gozzi's reputation spread quickly in France

and Germany. Goethe, Tieck, Schlegel praised

his work, Schiller adapted his (Turandot) ;

Mme. de Stael, Sismondi and Musset admired him. See Turandot. Consult Magrini, G. B., (I tempi, la vita e gli scritti di Carlo GozzP (Benevento 1883) ; Masi, E., (Le Fiabe5 (Bo¬ logna 1885) ; Svmonds, J. A., (The Memoirs … Gozzi's life, the dramatic fables5 (Lon¬

don 1890).

Alfred G. Panaroni.

GRABEN (German, grave), a term applied to a block of the earth's crust which has dropped between two adjacent faults; also used to describe a valley or lowland on the site of such a block. The Rhine Valley be¬ tween the Black Forest and the Vosges, and the Jordan Valley and Dead Sea depression in Palestine - afford well-known examples. See Fault; Horst.

GRACCHUS, grak'us, Tiberius Sempronius and Gaius Sempronius, two Roman

statesmen; b. about 163 b.c. and 159 b.c.; d. 133 b.c. and 121 b.c. In their attempts to ob¬

tain reforms favorable to the commons, they

awakened popular commotions of which they

themselves became the victims. Tiberius

served under the command of his brother-in-law, the younger Scipio, at the siege of

Carthage, and was the first man to mount the

walls. He was subsequently quaestor to the

army of the consul Mancinus, who at that time waged war against the Numantines in Spain.

After the defeat of Mancinus, he concluded a

treaty with the Numantines, which, without be¬

ing disgraceful to the Romans, secured to the

Numantines their independence.. This, treaty,

however, was opposed by the aristocratic party

and repudiated by the Senate. Tiberius, never¬

theless, upheld by the populace, in 133 b.c. was elected tribune of the plebs, and sought to re¬

form the condition of the poorer citizens who

were without land, and since the great estates of the wealthy were cultivated by slaves, also loa

largely without employment. He endeavored

to attain his object by the revival of the Licin-ian Rogations. It had been decreed, on the

proposition of the tribune, Licinius Stolo,

(<that no one should possess more than 500

acres (jngera , each 28,000 square feet) of the public domain (ager publicus), and that the

overplus should be equally divided among the

plebeians.® This law, which was now called

the Gracchan, the Sempronian, or by way of emi¬

nence the Agrarian Law, he revived, but with

the introduction of several softening clauses.

The proposition of Tiberius Gracchus was met

with the most determined opposition by the

ruling party. To counteract his plans the Sen¬

ate gained over one of the tribunes, Marcus

Octavius; and when Tiberius, after having, ac¬

cording to custom, exposed his law 19 days to the public view, proceeded to take the votes of the assembled people upon it, Octavius inter¬

posed with his veto, and thus seemed at once

to have defeated the whole undertaking. Ti¬

berius now exerted all the prerogatives of his office, sealed up the treasury and forbade all the authorities the discharge of their several

offices. He saw, however, that this was of no service to his plan. He therefore took a step till then unheard of in Roman history. At the next assembly of the people he obtained the

expulsion of Octavius from office, as faithless to the cause of the people. The bill was thus passed, and a committee consisting of Tiberius

himself, his brother Gaius and his father-in-law, Appius Claudius, appointed to carry out its various provisions. All the difficulties which

stood in the way of the law now appeared in

their full light. Even the preparatory business of ascertaining which was the public land, and which private property, was found to have its

full share. Outcries and complaints were

made from every part of Italy. When June

of the following year came on, in which the

tribunes for the next year were to be elected, Tiberius, who had endeavored to regain the

favor of the people by some new propositions,

offered himself again as a candidate for the

office. The aristocrats used every effort to

prevent his election, and the ferment in Rome

was carried to the highest pitch. One election day went by without any election being made.

On the next a vast multitude beset the forum, and the Senate assembled in the neighboring

temple of Faith (Fides). Tiberius strove in

vain to speak, and was killed in the tumult

which followed. The place of the murdered

Tiberius was filled by Licinius Crassus, father-in-law of Gaius Gracchus ; and on his death

Carbo, Fulvius Flaccus and Gaius Gracchus

constituted the committee appointed for the

enforcement of the law.

In this way the parties had struggled with

varying success, when, in 123 b.c., the younger Gracchus, who, as

quaestor, had been with the

army in Sardinia, obtained the tribuneship.

With more varied and shining talents than

his brother, he united a stormy eloquence,

which carried away his hearers. In the dis¬

charge of his office as tribune he first of all renewed his brother's law, which had mean¬

while fallen into disuse, and revenged his mem¬

ory by expelling many of his most violent

enemies from the city. At the same time he

carried through a law <(that every month corn

should be sold to the poor at a low fixed rate,®

and by another law effected some alleviations

in the rigor of the military service, and en¬

sured for the soldiers clothing, besides their

pay. The people were animated with an un¬

limited enthusiasm for their favorite; his

enemies were terrified and weakened ; hence

he obtained the renewal of his office for the following year with ease. His attempt to in¬

troduce 300 knights into the Senate failed; but on the other hand, at his proposal the admin¬

istration of justice was taken from the Senate and transferred to the equestrian order. This

gave rise to a new political power in the Ro¬

man commonwealth, which, holding a station

intermediate between the Senate and the peo¬

ple, had a most powerful influence in its sub¬

sequent history. The Senate now resorted to a

new but sure means of destroying Gaius.

Livius Drusus, a tribune gained over to their

interests, had the art to withdraw the affections of the populace from Gaius by making greater

promises to them, and thus obtained a superior popularity for himself and the Senate. Hence

it resulted that Gaius did not obtain a third tribuneship, and Opimius, one of his bitterest

enemies, was chosen to the consulate. In the

ensuing civil disturbances Gaius was slain by

his slave, at his command. Consult Beesly,

(The Gracchi: Marius and Sulla) (London

1878) ; Mommsen, (History of RomeJ Vol.

IV (New York 1903-05) ; Oman, (Seven Ro¬

man Statesmen of the Later Republic (Lon¬

don 1902) ; Underhill, (Plutarch's Lives of the Gracchi* (London 1892).

GRACE, William Russell, American mer¬

chant: b. Queenstown, Cork, Ireland, 10 May

1832; d. New York, 21 March 1904. In 1846

he worked his way on a sailing vessel to

New York; in 1850 went to Callao, Peru,

where he became a clerk in the shipping office of Bryce & Company, and later partner in

the firm, which eventually assumed the style of Grace Brothers & Company. He organized the

firm of W. R. Grace & Company, now the lead¬

ing American house in the South and Central

American trade, with main offices at New York, and branches at London, San Francisco, Lima,

Callao, Valparaiso, Santiago and Concepcion.

In 1891 he also established the New York and

Pacific Steamship Company. He was Demo¬

cratic mayor of New York in 1881-82 and 1885-86. His philanthropies were numerous, includ¬

ing the gift of one-fourth the cargo of the

United States steamer Constellation, dispatched

to the aid of the Irish famine sufferers of

1880; and large sums for the building

and maintenance of the Grace Institute,

established by him in 1897 at New York

for the instruction of women in domestic

arts and sciences, trades and occupations. He

became a member of the American Museum of

Natural History and the American Geographi¬

cal Society, and organized and was elected pres¬

ident of the Nicaraguan canal syndicate, an or¬

ganization of capital for securing to the United States control of the waterway.

GRACE OF GOD, an expression borrowed

from Saint Paul's writings. The apostle fre¬

quently employs the term grace in the sense of a gift which enables those who have it to do what they could not do without it. In common

parlance we use such expressions as the <(gift of GRACES — GRADATION

music,® the <(gift of poetry,® as belonging to one who might acquire many accomplishments, but

could never acquire what is meant by a gift for anything. Saint Paul, speaking of his own con¬

version, his calling to the apostolate and his many labors, says : ((By the grace of God I am what I am.® Again he addresses his followers

in these words : (<By grace are ye saved ; not of yourselves, it is the gift of God.®

The Church of England and the Protestant

Episcopal Church in the United States teach

that grace is the assistance given by God to

those who believe in Him, so that they may

please Him and keep His commandments. All

the Reformed churches agree on this point and

they also agree that no man can do good works ((as God hath willed

and commanded them to be done® (39 Articles), that is, from a right motive and in a religious spirit of devotion, without the grace of God. They also teach that the prin¬

cipal means of grace is prayer, and study of the Scriptures, which latter make a man ˆthoroughly furnished unto all good works® (1 Tim. iii, 17).

To these means of grace the Catechism in the

Book of Common Prayer adds the two sacra¬

ments, of Baptism and of the Lord's Supper,

which are not only means of grace, but also

((outward and visible signs® and ((pledges® of

the grace received by those who participate in them. As defined by the eminent Roman Cath¬

olic theologian, Perrone, grace is (<that gratu¬

itous inward aid (auxilium) which God affords to fallen man through Christ's merits, to en¬

able him to perform supernatural acts, so that he may attain justification and persevere

therein® (Praelect. Theol., c. d. Gratia). The

Roman Catholic Church's doctrine of grace is

opposed on one side to the teachings of Pelagius, who denied the necessity of grace, and on the other to the teachings of those who held that without grace every act of man is a sin, and specifically that <(the constancy of Socrates, the continence of Xenocrates … . must be regarded, not as virtues but as vices® (Melanc. Loci

Theol.) ; and that ((from man's corrupt nature proceeds naught that is not worthy of condem¬

nation® (damnabile : Inst, i, 2) . Roman Catholic doctrine holds the middle ground between these

extremes. As against the Pelagians the Roman

Catholic Church teaches that for all acts con¬

ducive to salvation (salutares) the inner grace of the Holy Spirit is necessary (Cone. Trid.

Sess. VI, can. ii, 3). As against Melanc—

thon, Baius and the Jansenists, the same Church teaches that fallen man, before he receives the gift or grace of faith, can perform acts that are morally good. Further, the Roman Catholic

Church, in opposition to the teaching of Calvin, holds that a man once justified may fall from that state. Again, the Roman Catholic Church

teaches that in all his acts conducive to salva¬

tion (salutaribus) man is free; in other words, grace imposes on man no necessity.

The Council of Trent in Can. iv of . Sess.

VI, thus defines the Roman Catholic doctrine, of the freedom of man's will while co-operating

with grace: <(If one shall say that man's free will, moved and stirred by God, . co-operates

not, by giving assent to God so inciting and

calling, toward disposing and fitting himself

for grace of justification; or that he cannot, if he wishes, dissent; but that like some life¬

less thing he cannot do anything at all and is wholly passive; be he anathema.® The Roman

Catholic Church further teaches that the state

of grace and holiness in which man was con¬

stituted in Paradise was supernatural, some¬

thing added to the perfection of his human

nature ; in contradiction to those who teach that this state was in the same sense natural to him as any of his mental or bodily faculties. In

consistency with this view such teachers hold

that in his fall Adam lost all power and faculty for doing any good act,, and that whatever he did was sin. All these views seem to have been influenced by the pre-pagan conception of the

graces who bestowed upon man the favors of

the gods, without which one could show no

special gifts, such as oratory, music and poetry.

Thus man, in so far as the graces were con¬

cerned, was fated. Christian theologicians,

among, them Saint Paul, thinking in the terms

of their day and looking upon religion as a

special gift, were naturally guided by Roman

philosophy in describing it. Thus the terms

foreordination and predestination seem to have

formed a part of the conception of certain re¬

ligious sections of Christianity from very early days.

GRACES (Greek, Charites, translated by

the Romans Gratia?), the goddesses of grace,

from whom, according to Pindar, comes every¬

thing beautiful and agreeable, through whom

alone man becomes wise and glorious. They

were the goddesses of heavenly light and seem

to have been connected with bloom and fer¬

tility, which would account for their being

patrons of marriage and might also explain the fact that it was customary to swear by the

graces who brought prosperity and probably

would refuse to be personally favorable to one who swore falsely in their name. According to

Hesiod, and most poets and mythologists, Zeus

was their father, and Eurynome their mother.

Hesiod gives them the names of Aglaia (bril¬

liancy), Thalia (the blooming), and Euphrosyne

(mirth). Homer mentions them in the <Iliad)

as handmaids of Hera (Juno), but in the

<Odyssey) as those of Aphrodite. He conceived

them as forming a numerous troop of attend¬

ant goddesses, whose office it was to render

happy the days of the immortals. Later poets

considered them as allegorical images. They

not only improve corporeal charms, they have

an influence also upon music, eloquence, poetry and other arts; and the execution of acts of

benevolence and gratitude is likewise superin¬

tended by them. Saint Paul uses the word

grace in the old sense of the term, when he

speaks of ((the grace of God,® that is the gift of God. He had in his mind the meaning cur¬

rent in his day when the graces were still be¬

lieved to be the bestowers of special gifts

which we now designate as talents. In the

earliest times the statues of the Graces repre¬

sented clothed forms; at a later period they

were represented as nude. They had many

temples in Greece, partly dedicated to them

alone, partly in common with other deities,

particularly Aphrodite, the. Muses, Eros, Hermes and Apollo. Their festivals were called, in

Greece, Charisia; and libations of wine were

offered them at meals. The most celebrated

Graces of modern sculpture are those of Canova and Thorwaldsen.

GRADATION, that process of dynamical

geology by which the external forces of wind,

frost, running water, waves and glaciers tend

to tear down the earth's surface at one place and build it up at another. The tearing-down

process is degradation, erosion or denudation ;

the building-up process is aggradation or de¬

position. See Erosion and Geology, partic¬

ularly section on Dynamical Geology.

GRADE CROSSINGS, Elimination of.

• — Separation of the grade of a railroad de¬

voted to engine and car traffic from the grade of a street or highway for pedestrian and

vehicular traffic has long been a public problem.

After 1908, when in that year 832 persons were killed and 1,755 injured at grade crossings, the problem received increased attention. Besides

accidents and the vexatious interference with

street traffic, the aggregate amount of time lost at grade crossings by pedestrians, vehicles,

automobiles and street cars was enormous.

Elimination of grade crossings is effected by;

(1) elevation or depression of the street with no change in the grade of the railroad; (2)

partial elevation or depression of the railroad combined with the partial depression or eleva¬

tion of the street; (3) complete elevation or

depression of the railroad with no change in

the grade of the street. Of these three

methods the best is complete elevation or de¬

pression of the railroad with a minimum change in the grade of the street. While ensuring a

perfect roadbed for railroad operation, with a

minimum of interference with the streets, the

cost of warning signs, bells and signals, the

maintenance of gates and the employment of

flagmen is also eliminated, and the railroad is relieved of a large expense due to personal in¬

jury claims. The chief advantage to the rail¬

road is increased speed and freedom of opera¬

tion. By a law passed in 1885 in Connecticut, each road is practically required to eliminate at its own expense one grade crossing each year,

for every 60 miles of road owned or operated.

In Chicago where extensive grade separation

operations were necessary, the railroad was re¬

quired to bear the entire cost of track elevation including the cost of bridges and the reconstruc¬

tion of the streets ; the city paid only the

property damages, which in most cases were

small. In Massachusetts, the railroad pays 65

per cent of the cost, the city not more than 10

per cent, the street railway company using the crossing, not exceeding 15 per cent, and the State the remainder. Unless a street railway is in¬

volved, the State's proportion is 25 per cent.

State aid laws also exist in Vermont and New

York. Consult Bassett, E. M., (Grade Crossings) (in New York Public Service Commission ,

Third Annual Report 1909) ; Whitten, R. H.,

ˆMethods pf Railway and Street Grade Separa¬

tion in Cities } (in Engineering and Contracting Vol. XXXVI, pp. 442-445, 1911).

GRADIENTIA, gra-di-en'shi-a. See Uro-

DELA.

GRADUAL (Lat. Graduate) , in the liturgy

of the Roman Catholic Church, an antiphon

which is sung by the choir or recited by the celebrant of the Mass, immediately after the in¬

toning or the reading of the Epistle (first les¬

son). The gradual nearly always consists of

two or three verses from the Psalms,* suggest¬

ive of thoughts pertinent to the office of the day. Thus the gradual for the festival of Holy Innocents (28 December) is from the 123d

Psalm (in the English Bible 124th) : ((Our

soul is escaped even as a bird out of the snare of the fowler; the snare is broken and we are delivered ; our help standeth in the name of the Lord who made heaven and earth.® Graduale

or Liber Gradualis is also the name of a service book of the Latin Church's liturgy: it takes its name from the gradual as just explained, and

contains all the graduals for the Sundays and

festivals of the entire year, for the use of the choir.

GRADUATION ACT, of 4 Aug. 1854, «An

Act to Gradually Reduce the Price of the Pub¬

lic Lands to Actual Settlers.® All public lands which had been in the market for 10 years and upward prior to the passage of the act were to be sold for $1 per acre; all 15 years, 75 cents; all 20 years, 50 cents ; all 25 years, 25 cents ; all 30 years, 12*4 cents — except United States reservations, grants to States for railroad pur¬

poses or mineral lands held at over $1.25 per acre. No one was to have over 320 acres, in¬

cluding lands previously taken up.

GRADY, Henry Woodfin, American jour¬

nalist and orator: b. Athens, Ga., 24 May 1850; d. Atlanta, Ga., 23 Dec. 1889. He was gradu¬

ated from the University of Georgia in 1868,

studied at the University of Virginia in 1868-70, began his journalistic career with contribu¬

tions to the Atlanta Constitution, and for that journal in 1870 described a press tour of

Georgia and the resources and possibilities of

the State. At Rome, Ga., he edited the Courier, and later established and edited the unsuccess¬

ful Daily Commercial. In 1871 he became

Georgia correspondent of the New York Her¬

ald, and in the same year purchased an interest in the Herald of Atlanta, publication of which was suspended in 1876. He then established

the Courier, which did not long continue, and

in 1880 bought a quarter interest in the Consti¬

tution, of which paper he remained until his

death editor and part owner. He was an able

journalist, writing for the New York Herald

some noteworthy letters, including an account

of the Hamburg riots in South Carolina; and

while editor of the Constitution, publishing in its columns vivid descriptions of the Charleston earthquake, and in various magazines articles

on the condition and promise of the South.

He also became locally known for his oratory,

largely through his lecture, (Just Human, >

given at Atlanta. In 1886, at the annual ban¬

quet of the New England Society in New York,

he made a distinguished address on (The New

South, > which was widely printed and at once gave him a national prominence. Other well-known speeches by him were one on prohibition

at Atlanta in 1887, one at the Texas State Fair in Dallas in 1888, and his final and greatest effort, (The Future of the Negro> (December

1889), before the Merchants' Association of

Boston. Grady was the first to present to the North the views of the more enlightened por¬

tion of the reconstructed South, — its belief that the ˆstruggle between the States was war and

not rebellion,® but at the same time its readi¬

ness to identify itself with the united progress of the nation. His eloquent services in this

behalf were of much importance. He aided

in the establishment of the Confederate Vet¬

erans' Home, the election of Gen. J. B. Gordon as governor of the State and the organization

of the Atlanta expositions of 1887 and 1889.

He declined public office, but was frequently—

mentioned for nomination to the United States

Senate. Consult the c Life, } by Lee (1896).

GRAETZ, grets, Heinrich, historian: b.

province of Posen, Germany, 1817; d. 1891. He

was largely self-taught. In 1853, on the pub¬

lication of his history of the Jews which

won him immediate fame, he was appointed on

the staff of the Breslau Jewish Seminary,

where he labored 38 years, and later became

professor at the Breslau University, which posi¬

tion he held for 20 years. His history in 12

volumes, completed in 1875, has been translated into many languages, and constitutes his chief

work. With a genius for construction out of

mere fragments and scattered sources and a

style picturesque and trenchant, the history

gained him a place among the foremost his¬

torians of his age. Its defects are not to be denied — a personal bias at times and a want of poise. As a biblical critic, he secured high rank by his erudition and sagacity, marred at

times by a fondness for hypothesis and a too

ready acceptance of theory for fact. . His

critical edition of the Psalms (1882-83) is pos¬

sibly his most notable exegetical work; he

wrote also on the (Song of Songs) and on

<Koheleth.) A complete bibliography of his

writings is given in Jewish Quarterly Rezhew,

Vol. IV, p. 194. His son Leo Graetz, born

1856, professor at University of Munich since

1893, is a physicist of note, through his suc¬

cessful methods in heat and electricity and his published works.

GRAFFITI, graf-fe'te, the name given by

archaeologists to the rude designs and inscrip¬

tions of popular origin drawn or engraved with the style upon the walls of ancient towns and buildings, particularly of Rome and Pompeii.

Many of these are valuable for the light they throw on popular habits and modes of thought,

and the illustrations they often in consequence afford of ancient

authors. Graffiti have been

found in Greece and Egypt. Some are traced

with chalk or plaster, but the majority are

scratched on stone or plaster with the stilus, which helps to account for their preservation.

Those in Pompeii are found in the Latin, Greek and Oscan languages, showing that the ancient

language of Campania was still extant among a

portion of the populace. The inscriptions are

most frequently amatory or humorous, some¬

times malicious or obscene. In Rome they oc¬

cur frequently in the catacombs, particularly of Sancta Agnese and San Calisto. Many of these

are by Christians, some by Pagans, in ridicule of Christianity. See Graphitology.

GRAFTAGE, the process and practice

(origin unknown) of propagating plants by the

insertion in one of a bud (stock) or twig

(scion) of another. It also includes the dis¬

cussion of all questions relating thereto. The

stock may be a complete plant, as in peach

budding, or only a part, in which case it may be either a root or a stem part. In some in¬

stances (inarching, see below) both plants may

have roots. Since the process is dependent

upon the coalescence of the cambium (q.v.) of

stock and scion the first essential is to make these two surfaces abut ; the second is to check evaporation from the cut surfaces.

The many scores of styles of graftage fall

naturally into three main groups :

1. Inarching, or grafting by approach, the

uniting of two plants before the severance of

the scion from the plant upon which it grows.

After union the scion is severed below the point of contact and the parts of the stock above this point are removed. The method is rarely prac¬

tised except with subjects hard to graft by more popular methods and for correcting defects of

form, such as Y-crotches in fruit trees, a living brace being formed between the two arms.

Since it is the only graftage found in nature, it is supposed to be the progenitor of modern

methods.

2. Budding or bud-grafting, the inserting of

a single bud beneath the bark of the stock or in some cases (for example, annular or ring bud¬

ding) in the place of a piece of bark removed.

It is always practised upon small stocks prefer¬

ably under two years old, and always when the bark readily separates from the wood as in

spring or late summer. Since spring is a very busy season in nurseries,

budding is practically all done during summer. The universally pop¬

lar method is the shield, socalled from the

shape of the scion. It is practically the only method employed in propagating the stone

fruits — peaches, plums, *etc.* The seedling

stocks, which are usually not less than one-fourth inch in diameter, are stripped of their leaves close to the ground, are cut through the bark twice on the shady side, the cuts forming a T, the bark lifted gently with the specially formed ivory knife-handle, and the bud in¬

serted and tied with raffia, bast or cotton. A small portion of the bark and a little of the leaf stalk accompany the bud, the latter to act as a handle. In about two weeks, if the bud has

taken, the binding is cut on the side opposite the bud to prevent "strangulation.® In case of a

failure other attempts are made. No visible

growth occurs during that season, but in the

spring the bud should become a shoot and the

original top of the seedling stock should then be cut a few inches above the union, and later,

when the union is firm, this stub is cut off short.

At the close offfiiat season the tree is ready for sale.

3. Grafting proper , the inserting of a twig

into a stock. The methods under this head¬

ing may be divided according to the maturity of the scion whether dormant or growing, and also as to the position the graft occupies, whether upon the root, the crown, the stem or the

branches. By far the largest amount of graft¬

ing is done with dormant wood, and probably

upon roots, though grafting upon the branches

is widely popular. In whip-grafting, which is

the one most practised with roots, especially in the nursery propagation of apples and pears and performed in early winter, the seedling roots

are specially grown and are as nearly the size of the scions as possible. Both stock and scion are formed alike, two cuts being made, one

rather long, diagonally across, and the other

parallel with the direction of growth, thus form¬

ing a sort of tongue. The tongue of each is

then fitted into the slot of the other, the pieces wrapped with waxed string, and stored in a

moist, cool place until spring, when they are

planted in the nursery. Usually they are sold

after two seasons' growth.

Cleft-grafting is most frequently used upon

parts of trees above ground or with grapes just below the surface. The stock is sawed across

at right angles to the direction of growth, split with a knife and held open with a wedge until the twigs (scions) bearing two or three buds

and whittled to a wedge form below are in¬

serted, one at each end of the slit. The wedge is then removed and the wounded surfaces

waxed. This method is practised most upon

stocks too large for whip-grafting, limbs even

as large as three inches in diameter being some¬

times used. As a rule small stocks give more

satisfactory results. The method is universally

employed to change long-established trees to

other varieties.

Some other frequently employed methods

are: (1) Bridge-grafting, which is used for

saving young trees that have been girdled by

mice or rabbits or otherwise deprived of their bark. The edges of the injured surface are

trimmed above and below, and scions, with

wedge-shaped ends, are fitted beneath the bark

at each of these points. The whole is then cov¬

ered with wax. Any sprouts that appear are

rubbed off so as to force all growth into the stem. The scions soon unite upon their sides

as well as to the original trunk. (2) Veneer¬

grafting, which is widely used in greenhouses,

consists in inserting a scion upon the side of the stock, binding and protecting it from the air.

The method is practised with both ripened and

immature wood.

Protection from the air is gained in bud¬

ding by bringing the bark of the stock in close contact with the scion and by bandages ; in

grafting, by applying a bunch of damp moss (a greenhouse practice) or covering of grafting

wax, grafting clay, *etc.* (outdoor practice). One of the most popular waxes is made as follows : Melt and thoroughly mix together 3 pounds of

mutton tallow, 5 of beeswax and 10 of resin;

pour into cold water and work with the hands

until the color of pulled molasses taffy. Apply closely while warm enough to spread readily by pressure of the hand. For use in whip-grafting balls of woolen yarn are soaked in melted wax and wound around the grafts. Soft waxes are

less useful, since they are likely to melt on warm days and in warm climates. No horticul¬

tural practice except that of cuttage can com¬

pare with graftage in extent of usage and ap¬

parent necessity. Like cuttage, its strong points are ease and certainty of operation, mainte¬

nance of a variety <(true to type® with the com¬

paratively rare exceptions of bud variation, and the modifications which it permits in the habits of plants. Some of the more important of these last are dwarfing, produced by grafting a strong growing scion upon a small growing stock, as

pear upon quince; hastening or increasing fruit¬

fulness, as when scions from bearing wood are

top-grafted or budded upon young established

trees already in the orchard ; to counteract

injuries (see bridge-grafting above) ; to change poor or unproductive trees into useful ones

(see cleft-grafting above) ; to make possible the growing of certain trees upon uncongenial soils, as peaches budded upon plum stocks for heavy

soils and plums upon peach stocks for light

soils, *etc.*

Much popular misconception exists as to the

limits of grafting. In many instances the possi¬

bilities have been found wholly within the indi¬

vidual species; that is, various different but re¬

lated species fail to unite and grow. Generally, however, the limits are within the genus; for

example, plums, peaches, cherries, apricots, etc., readily thrive upon one another. Again there

are a few instances of different genera which

unite, as among cacti. Genera are, however,

arbitrary, man-made groups. Permanent unions

between oaks and roses, grapes and pears, and

similar widely separated plants have not been

reported by reputable horticulturists. Consult

Bailey, (Cyclopedia of American Horticulture)

(New York 1900-02) ; id., (Nursery Book) (id., 1896) ; Fuller, Propagation of Plants) (id.

1894) ; Baltet, (L'Art de Greff er,> and its Eng¬ lish translation, Pudding and grafting. >

GRAFTON, Mass., town in Worcester County, on the New York, New Haven and Hartford and the Boston and Albany railroads, about six miles southeast of Worcester and nine miles northwest of Milford. In 1728 the first permanent white settlement was made, and the town was incorporated in 1735. As early as 1660 John Eliot (q.v.) established here a settlement of Indians whom he had converted. The manufactures are cotton goods, threads, 'boxes, boots and shoes, emery, and under¬ clothing. The government is regulated by an¬ nual town meetings. Pop. 6,886. Consult Pierce, (History of Grafton> (Worcester 1879).

GRAFTON, N. Dak., city, county-seat of Walsh County, on the Park River, the Great Northern and the Northern Pacific railroads, 15 miles west of the Red River of the North. It is in the great wheat region, and is the trade centre of Walsh County. It has grain eleva¬

tors, flour-mills, a creamery, machine shops and cattle-yards, and manufactures farming imple¬

ments. It is the seat of the State Institute for the Feeble-Minded, contains a hospital and a

Carnegie library. The city owns the water¬

works and electric-lighting plants. Pop. 2,512.

GRAFTON, W. Va., city and county-seat

of Taylor County, located in the northern part of the State, 100 miles southeast of Wheeling, and 100 miles east of Parkersburg -and on the Tygart yalley River and the Baltimore and

Ohio Railroad. The city is the terminus of

four branches of the Baltimore and Ohio and

owes its importance to the establishment there

of the Baltimore and Ohio Railroad machine

shops. Grafton has flour and planing mills, a

pottery, foundries, cigar and glass factories,

and is also engaged in mining and agriculture.

There are 10 churches, public and parochial

schools and four banks, with a combined capi¬

tal of $300,000; two weekly and one daily

newspapers. A national cemetery is within

the city limits containing 1,265 graves, 600 of which are nameless. Municipal affairs are ad¬

ministered by a mayor and two city commis¬

sioners elected for three years. The city owns its waterworks. Grafton was founded in 1854,

incorporated in 1856 and received its charter as a city in 1899. The population are mainly German and English. Pop. about 9,000.

GRAHAM, gra'am, Charles Kinnaird,

American civil engineer: b. New York, 3 June 1824: d. Lakewood, N. J., 15 April 1889. He entered the navy in 1841, during the Mexican War, served with the Gulf squadron, after study of engineering was appointed construct¬ ing engineer of the Brooklyn navy yard, whose

great dry-dock and landing-ways were built by him. At the outbreak of the Civil War, he volunteered in the Federal arm)'-, and during the war he was twice wounded at Gettysburg and there taken prisoner; commanded the gun¬ boat flotilla in General Butler's expedition up the James River, and was brevetted major-general of volunteers (1865). He was suc¬ cessively chief engineer of the New York dock

department in 1873-75, surveyor of the port

in_ 1878-83 and naval officer in 1883-85.

GRAHAM, George Perry, Canadian

statesman : b. Egansville, Ontario, 31 March 1859.

First emplo}ˆed as a teacher, which profession

he abandoned for journalism. He entered the

provincial legislature of Ontario in 1890, was

provincial secretary 1904-05 and leader of the

opposition 1907. He entered the Canadian

House of Commons in 1907, and was Minister

of Railways and Canals in the Laurier admin¬

istration, 1907— 1 1 .

GRAHAM, Hugh, Baron Graham of

Montreal, Canadian newspaperman : b. Hunt¬

ingdon, province of Quebec, 18 July 1848. He

was educated at Huntingdon Academy. His

career forms one of the romances of modern

journalism. At 15 he entered the office of the Montreal Daily Telegraph , of which he became

manager two years later. At 19 he was able to buy a half interest in the Montreal Star, a

paper which he founded, and two years later

was sole proprietor. He has devoted his life

to the paper, and made it one of the most in¬

fluential journals in the Dominion. He has

been closely identified with the principal pa¬

triotic movements in Canada for the past 30

years, is an ardent imperialist and is closely identified with many charitable institutions,

especially those of Montreal, to which he has

been a liberal benefactor. In 1908 a knighthood was conferred on him, and in 1917 he was

raised to the peerage — the first newspaper¬

man in the British overseas dominions and the

first native Canadian to be so honored in this way.

GRAHAM, Isabella (Marshall), American

educator and philanthropist: b. Lanarkshire,

Scotland, 29 July 1742; d. New York, 27 July

1814. From 1774 she was a teacher in Scotland, where, in Edinburgh, she inaugurated the work

which led to the organization of the Society for the Relief of the Destitute Sick. In 1789 she removed to New York, and there for several

years conducted a successful school. Her

philanthropies were many, and were particularly

in the interests of education, religious and secu¬

lar. She founded in 1814 the Society for the

Promotion of Industry Among the Poor.

GRAHAM, James Duncan, American topo¬

graphical engineer: b. Prince William County,

Va., 4 April 1799; d. Boston, 28 Dec. 1865.

Graduated from the United States Military

Academy in 1817, he entered the corps of topo¬

graphical engineers, in which he attained

major's rank in 1838, was astronomer to the

survey which determined the boundary line be¬

tween the United States and the republic of

Texas (1839-40), and later United States

astronomer in the joint survey of the boundary between the United States and the British

provinces. In the determination also of the

boundary between the United States and Mex¬

ico he held a similar post. Subsequently he

directed harbor improvements in the lakes of

the North and Northwest, in which he was the

first to detect the presence of a lunar tide, and was superintending engineer of the Boston

harbor seawalls and of repairs in various har¬

bor-works along the Atlantic Coast.

GRAHAM, John, Viscount Dundee, com¬

monly called Claverhouse, Scottish com¬

mander: b. near Dundee, Scotland, about 1649;

d. Killiecrankie, 27 July 1689. He was educated at the University of Saint Andrews, went

abroad and entered the service, first of France and afterward of Holland, distinguished himself

at the battle of Seneff in 1674, but returned to Scotland in 1677, where he was appointed cap¬

tain of a troop of horse raised to enforce com¬

pliance with the establishment of Episcopacy. He distinguished himself by an unscrupulous zeal in this service, and waged an exterminating war

against conventicles. The Covenanters were

driven to resistance and a body of them de¬

feated Claverhouse at Drumclog on 1 June 1679.

The Duke of Monmouth, however, defeated the

insurgents at Bothwell Brig on 22 June, and

Claverhouse was then sent into the west of

Scotland with absolute power and exercised it

in such a manner as to lead to the belief that in addition to the persecuting policy of his

superiors he was actuated by personal revenge.

The more terrible he made himself to the

Covenanters the more acceptable his career was

to the government. He rose to the rank of

major-general and became a member of the

Scottish Privy Council. In November 1688, after William had landed, he received from James in

London the titles of Lord Graham of Claver¬

house and Viscount Dundee. When the king fled he was in London, but was permitted to proceed to Scotland. He made his escape from Edinburgh with a small company of horse, declared for the king and speedily got together an army of Highlanders, 2,500 strong. He was followed by Mackay, on behalf of the Convention of Estates, whom he finally en¬ countered in the pass of Killiecrankie and thoroughly routedˆ but was himself slain in the hour of victory. After that, his army melted away. Attempts have been made by Sir Walter Scott and others to throw a halo of romance and heroism around his character; but he was the willing instrument of a cruel gov¬ ernment, of the worst government that ever ruled in Scotland, and had himself little senti¬ ment or softness in his nature. Consult Napier, (Memorials and Letters of John Graham of Claverhouse> (1859-62) ; biographies by Bar¬ rington (1911); Mowbray Morris (1887); and Terry (1905); and Scott's (01d Mortality) for the Cavalier point of view.

GRAHAM, Sylvester, American re¬

former: b. Suffield, Conn., 1794; d. 1851. He studied at Amherst College, was ordained to the ministry of the Presbyterian Church about 1826 and became known as a lecturer on tem¬ perance and dietetics. His proposed cure for alcoholism was based upon a vegetarian diet. The article of food made of unsifted wheat flour and known as Graham bread was intro¬ duced by him into general use. His writings include (Bread and Bread-Making,* and the (Graham Lectures on the Science of Human Life> (1839).

GRAHAM, Thomas, Scottish chemist : b. Glasgow, 20 Dec. 1805; d. London, 11 Sept. 1869. He was educated at the University of Glasgow, and in 1828 communicated to the Royal Society of Edinburgh the results of ex¬ periments on the absorption of vapors by liquids. In 1831 he laid before the Royal So¬

ciety of Edinburgh the result of a series of ex¬

periments on 10 different gases, from which he arrived at the conclusion that gases tend to

diffuse inversely as the square root of their

specific gravities, a conclusion which has been received as the law of the diffusion of gases, and was the inventor of ((Graham's tube?*

From 1837-55 he was professor of chemistry in

the University of London; in 1840 he received

the gold medal of the Royal Society, and in the same year was chosen first president of the

Chemical Society, which he had assisted in

founding. He now began to be employed as

consulting chemist in various mercantile and

public undertakings, and it was by his recom¬

mendation that wood-spirit, or methylic alcohol, was used to render spirits sold free of duty for trade or scientific purposes unfit for consump¬

tion as a beverage. In 1846 he assisted in

founding the Cavendish Society, of which he

was elected president, an office he retained till the close of his life. At the same time he was engaged in investigations on the diffusion of

liquids and was the earliest to fully develop

that theory. He was appointed master of the

mint in 1855. He made many other important

discoveries, and was the author of (Elements

of Chemistry) (1842) and various professional

papers.

GRAHAM, William Alexander, American

politician : b. Lincoln County, N. C., 5 Sept.

1804; d. Saratoga Springs, N. Y., 11 Aug. 1875.

He was graduated from the University of North

Carolina in 1824, was admitted to the bar in

1826 and entered practice at Hillsboro. From

1833 he was repeatedly elected to the House of Commons, of which in 1839-40 he was speaker.

In 1840-43 he was in the United States Senate, in 1844 and 1846 was elected Whig governor of North Carolina, declined a third term, and in

1850-52 was Secretary of the Navy, in which

capacity he organized Perry's expedition to

Japan. Though at first opposed to secession,

he later identified his fortunes with those of his State, and in 1864 took his seat in the Sen¬

ate of the Confederacy. Subsequent to the war

he was an executor of the Peabody fund for

the promotion of education in the South and

a member of the commission for settlement of

the undetermined boundary line between Vir¬

ginia and Maryland.

GRAHAM LAND, a tract of land, the

northern extension of Antarctica, discovered in

1832 by Bisco, master of a British sealer. In 1894 Larsen, a Norwegian, reported the dis¬

covery of a continent, one portion of which

he named King Oscar II Land and another

part Foyne Land. Both proved to be on the

coast of Graham Land. The Belgian expedi¬

tion of 1897-98 explored the west coast, and

gave it the name of Palmer Land, in honor

of Nathan Palmer, an American sealer, who

discovered this coast in 1818. Otto Nordensk—

jold spent two years in Graham Land (1901—

03) ; and Charcot, the French explorer, made a series of important surveys between 1905 and

1909. Graham Land is a political dependency

of the Falkland Islands. Whaling has within

recent years attained importance.. A meteoro¬

logical station has been established by the

Argentine government.

GRAH AMITE, a jet black native hydro¬

carbon or asphalt occurring in veins in various rocks. It is used mostly for roofing materials, also for varnish, rubber substitutes and filler for building blocks. When softened with

asphalt it is more rubbery and elastic than gil-sonite and less affected by changes of tempera¬

ture. Occurs in Atoka, Le Flore, Pushmataha

and Stephens counties, Okla., and near Granby,

Grand County, Colo. Formerly extensively pro¬

duced in Ritchie County, W. Va., 25 miles south¬

east of Parkersburg. The production in 1916

was 8,431 short tons, valued at $92,555.

GRAIL, The Holy. The cup or bowl from

which Christ drank at the Last Supper. The

history of the grail as given in most romances is substantially as follows : After the Last

Supper the cup came into the possession of

Joseph of Arimathea, who caught in it some

of the blood that flowed from the wounds of

the crucified Saviour. Being miraculously con¬

veyed to England to escape persecution, he car¬

ried the precious vessel with him. Throughout

his life it furnished him with food and drink, and with spiritual sustenance as well ; and at his death he charged his successor to guard it faithfully. -It was handed down from genera¬

tion to generation, the Fisher King being a de¬

scendant of Joseph. This vessel is the grail.

According to other versions, the grail chooses

its own knights. It possesses miraculous prop¬

erties, and at times is instinct with divine life.

To discover its abiding-place and become one

of its guardians is the ambition of good and

valiant men, but only the pure in heart may

find it. One form of the legend represents

three of Arthur's knights, Galahad, Perceval

and Bors, as being blessed with a sight of the holy relic. Galahad is said to have had it in his possession, who at his death transferred it to Perceval, and after the death of the latter the cup was taken up into heaven. Students

of folklore connect Perceval of the Christian

legend with the Siegfried of early German lit¬

erature and Celtic mythology, but the account

of a sacred spear and bowl, as given in the

grail romances, appears to be mainly of Chris¬

tian legendary origin, and to be based upon the lives of saints and certain apocryphal books of the New Testament, principally the Gospel of

Nicodemus. It is probable that the Perceval

story was familiar, in one or more of its many different forms, to the people of western

Britain, before their conversion to Christianity.

When the French romancers of the 12th cen¬

tury began to develop the grail idea, — the idea of a sacramental symbol, dwelling among men

but discoverable only by the brave and pure, —they wove into their narrations tales of chiv¬

alry, mysterious adventures and legends of folk¬

lore. Chrestien de Troyes, who was possibly

the first writer from whom a grail romance

has come down to us, was evidently intending

to fuse certain elements of the grad and Per¬

ceval legends. He began his work about 1189,

but died without completing it. Chrestien's poem was taken up by several other French writers

after his death. An introduction was fitted to it, MILLET

l BUCK WHEAT

WHEAT

INDIAN CORN

COPYRIGHT, 1913, BY P. E. WRIGHT.

EDIBLE GRAINS

GRAIN

in which a violent attempt was made to reconcile the Christian and heathen elements. Many

thousands of lines were also added, by various hands, in the early years of the 13th century.

Meanwhile, probably before the end of the

12th century, Robert de Borron had written, in Old French verse, a

trilogy, ‘Joseph,* Ber¬

lin, *‘Perceval,* of which the (Joseph) and

part of the <Merlin) have been preserved. It

was he especially who gave to all the mate¬

rial a Christian character. There are also

later prose adaptations of his work. Great

difficulty is occasioned by our ignorance of

where to place the French prose romance, the

‘Queste del Saint Graal,* generally attributed

to Walter Map, or Mapes, and another, the

(Grand Saint Grail,) often accredited to Bor¬

ron. In these the Christian symbolizing tend¬

ency is strong, and the story of Perceval is

buried under many complicated tales of knight—

errantry. They were, however, probably writ¬

ten before 1204. The <Queste) having been

one of the romances followed by Malory in

his ‘Morte Arthure,* the Galahad story has

had a marked influence upon later literature.

There are several other members of the early

cycle of grail romances, but only one is of

great importance, — the (ParzivaP of Wolfram

von Eschenbach. The <Parzival> is his mag¬

num opus. It is also the finest narrative poem of which the authorship is known, between the

era of classical antiquity and the ‘Divine Com¬

edy* of Dante. Furthermore, it is the most

complete, and virtually the final, mediaeval han¬

dling of the two great themes which are in¬

volved in the legend of the holy grail, and

which Wolfram more thoroughly blends than

any other poet.

During tlie next 250 years it was the mis¬

sion of the legend of the holy grail to be the spiritualizing tributary of a broader stream of literature, the full current of Arthurian ro¬

mance. It then remained in obscurity until

the 19th century. Modern English and Ger¬

man poets, in reviving the story of the grail, have been moved by the same moral earnest¬

ness as Wolfram von Eschenbach, and by the

same desire to show the way to seekers after

the spiritual life. The best known of the many modern embodiments of this legend are Ten¬

nyson’s ‘Holy GraiP in the (Idylls of the

King,* and the text of Wagner’s musical drama

‘Parsifal.*

Bibliography. — Baring - Gould, ‘Curious

Myths of the Middle Ages) ; Birch-Hirschfeld,

‘Die Sage vom GraP ; Furnival, (La Queste

del Saint GraaP ; Gurteen, ‘The Arthurian

Epic) (1895) ; Hucher, (Le Saint GraaP

(Paris 1875-79) ; Heinzel, (Ueber die franzosischen Gral-romane) (Vienna 1891) ; Nutt,

‘Studies on the Legend of the Holy GraiP ;

Rhys, (Studies in the Arthurian Legend* ;

Paris (G.), (La litterature Frangaise au moyen

age* (2d ed., Paris 1890) ; Furnivall’s transla¬

tion of de Borren’s ‘History of the Holy

Grail, * Vol. V, containing its sources, char¬

acter and developments (190.5) ; Weston,

(Legend of Sir PercevaP (1906).

GRAIN, the seeds of cereals cultivated for

the production of meal, flour or other forms of cereal food, and for the feeding of livestock.

The principal grains are wheat, oats, corn,

barley, rye, rice, emmer, einkorn, spelt, millet.

proso and sorghum. Buckwheat, though not

a true grain, is usually included. All kinds of grain contain nutritious substances of a sim¬

ilar character, although they vary, both in

quantity and proportion, in various grains.

These elements are : (1) Gluten, which affords

the tissue-building nourishment for the animal

body; (2) Fecula or starch, which provides

the bodily heat and energy; (3) A sweet

mucilage called dextrin, which is more nu¬

tritious than starch, but is small in quantity, and renders, the grain liable to the vinous and acetous fermentation; (4) A small proportion

of fat, ranging from 1 per cent in barley to 6 per cent in oats; (5) A digestible, aromatic substance contained in the hulls, which consist of fibrous matter; (6) Moisture, which is pre¬

dominant even in the driest grain, and increases the weight of the mass, although it lessens the specific gravity; it affords no nourishment,

hastens the decomposition of all kinds of grain, if they are not kept very dry, and influences germination.

According to the 1910 census, grain consti¬

tuted 48.6 per cent of the total value of all farm products in the United States. The

grains are used principally for human food,

although very large quantities are fed to

poultry and cattle and other farm animals.

The greater part of the oat crop goes to feed horses, and a large portion of the corn crop

is used in fattening swine. It has been esti¬

mated that grain products supply about 43 per

cent of the nitrogenous part of human food,

9 per cent of the fat and 62 per cent of the starch. Besides being ground to make flours

and meals, and a variety of cereal food prepa¬

rations, quantities of grain are used in making beers and other malt liquors and _ distilled

liquors. Other quantities are made into glu¬

cose and vinegars, besides the multitudes of

smaller quantities used in the arts.

The efforts to improve the food quality of

the grain crop and to increase its acre-yields are unremitting. In Germany alone there were

before the European War 46 breeders of rye,

84 breeders of wheat, 64 breeders of barley

and 53 breeders of oats. In the United States and Canada every agricultural experiment sta¬

tion is busy with the same problems, and with such success that the possible yield of grain

has been raised within a few years, through

the introduction of new varieties, by four

bushels for every acre sown.

Grain is so large a part of the world's food that its collection and distribution is an im¬

portant part of the world's business. In the

United States and Canada it is usually handled in bulk, although in a few localities, notably on the Pacific coast, it is generally marketed in bags. From the grain farms it is hauled in

the farmer's wagon to the nearest railway

siding, where the grain is emptied into the

chute of a ((receiving house® or railway ele¬

vator holding about 5,000 bushels. It passes

through a cleaner which removes all dirt, grass and bits of straw and sticks, into the “boot®

of the elevator “leg® — a tube in which an end¬

less belt carries attached buckets to the top, or head, of the elevator. From there it is dis¬

tributed to one of the grain bins. Freight

cars are run in under the spouts of the ele¬

vator, the grain is carried up to the elevator head again, thence into a hopper where it is

weighed, and then loaded into the cars. These

cars are made up into trains for Kansas City, Saint Louis or Chicago, as the case may be.

Arrived at one of the great elevators the

grain is again weighed and carefully graded,

and a warehouse receipt issued for it. Through this receipt it goes into commerce, and the

grain may be sold and resold many times with

the transference of the receipt. From these

central elevators it is eventually loaded into

cars, barges or steamships, depending upon its

destination.

Grain is sold generally by sample. Each

grain has its particular grades — as, for in¬

stance, of wheat : white winter, red winter,

hard winter, hard spring, western red, western

white, *etc.* These are market divisions, and

more or less arbitrary, as there are no fixed standards. All grain is inspected as it comes

into the market, and again as it goes out into commerce. This inspection may be done by a

local board of trade or officially by the State.

In the United States a series of reports on

the current condition of the grain crops of

the country is issued every year by the Bureau of Crop Reports. They begin with a report in

March upon the amount of grain still in the

hands of the farmers at that time. The April

report tells the condition of the winter wheat and rye. In May another report on the winter

grain crop tells the acreage which has been

abandoned as not worth harvesting. In June

the report gives the condition figures for the growing winter grain, and the acreage and pros¬

pects of spring wheat. The July report gives

the acreage of corn planted and the stocks of grain at that date remaining in the farmers'

hands, and also another set of condition figures by which the crop about to be harvested may

be very closely estimated. In September the

official estimate of the wheat and rye crops is given, and in October the official estimate of the corn crop and the spring grains. In Decem¬

ber the actual yields of all grains are given.

Aside from the government reports, the grain

exchanges and the large commission houses

throughout the country receive reports from

their own correspondents resident in the grain

regions, and there are also special experts who travel about the grain . country making esti¬

mates and reporting privately to their princi¬

pals, the grain dealers.

The world's production of the principal

grains, according to the latest figures of the United States Bureau of Crop Estimates, is as

follows: Oats (1915), 4,783,778,000 bushels;

wheat (1915), 4,216,806,000 bushels; corn

(1914), 3,864,279,000 bushels; rye (1915),

1,711,158,000 bushels; barley (1915), 1,542,972,-

000 bushels. The grain crop of the United

States in 1915 was: corn, 3,054,535,000 bushels; oats, 1,540,362,000 bushels; wheat, 1,01 1,505,000

bushels; barley, 237,000,000 bushels; rye, 49,190,-

000 bushels. See articles under the names of

the different cereals. Consult Bailey, E. H. S., (The Source, Chemistry and Use of Food

Products) (Philadelphia 1914) ; Carleton, M. A., (The Small Grains) (New York 1916) ; Sher¬

man, H. C, (Food Products) (New York

1914).

GRAIN ELEVATOR, a structure equipped

with adjustable elevating machinery for

the purpose of unloading and storing grain,

which is subsequently loaded directly into rail¬

way cars, canal boats or grain-carrying vessels for transportation. In addition to these primary services the modern grain elevator has machines for cleaning the grain, drying it if necessary and weighing it.

The smaller or ˆcountry® elevator consists

generally of a building or ((house® surmounted

by a smaller structure called the <(cupola.® The house is divided into a series of deep storage bins, while the cupola contains the machinery

for operating the <(elevator leg,® the turnhead spouts, the garners, the weighing machines and

the cleaning machinery. It is usually con¬

structed of timber with brick outside walls for the house, and corrugated sheet iron for the

roof and walls of the cupola. Manv elevators,

practically firepoof, are built with solid brick walls enclosing steel bins surmounted by steel

framed cupolas roofed with terra-cotta or

sheet iron, while in others the construction is of structural steel encased with concrete. Fur¬

ther protection is obtained by housing the steel storage bins and the operating machinery in

separate fireproof buildings, the grain being

handled between them by a system of pneu¬

matic conveyers. Since 1902-05, a period of ex¬

perimentation with not a few failures, the pre¬

ferred material for grain elevator construction

has been reinforced concrete, even for the

smaller buddings. The first cost is usually 20

per cent higher than for wood, but the very

large saving in insurance and depreciation soon account for that difference. The larger plants

are now built with a <(working house® and a

storage section adjacent. In the working house

is gathered all the machinery, and it often con¬

tains considerable storage room. The concrete

bins are cylindrical and built touching each

other, and the spaces between them are also

used as storage bins. The largest grain elevator GRAIN ELEVATORS

1 and 3 Grain Elevators

2 Concrete Silo

/ . .s

V

■ : 4 ‘ • ‘

l

GRAIN ELEVATOR

111

of this type in the world has recently been com¬

pleted for the Armour Grain Company, on the

Calumet River at Chicago, at a cost of $3,500,-

000. The working house has 93 bins 14 feet in diameter and 74 feet high, with a capacity of 931,000 bushels. The main storage bins are 130

in number, 22 feet in diameter and 104 feet

high, with a combined capacity of 4,383,000

bushels. The working house has six receiving

legs, six shipping legs, eight cleaner legs, five clipper legs, three screening legs, six drier legs and three bleaching legs. Each leg has a

capacity of 10,000 bushels per hour. The walls qf the storage bins are uniformly 7 inches thick.

Some of the great Canadian elevators have bins over 30 feet in diameter and 8 inches thick.

There are two distinct types of grain ele¬

vating machinery: that in which the grain is

carried up by buckets attached to an endless

belt traveling in the ˆleg,® and the pneumatic elevator, in which the grain is sucked up a tube by a current of air. In the first type the leg is a two-chambered construction, the endless belt carrying the buckets running up one chamber

and down the other, the whole being capable of vertical adjustment — hoisted high so as to pass over the side of a great ship, or lowered so as to touch the bottom 40 feet or more below.

In operation the leg is lowered into the cargo of grain and swiftly running belt scoops up

the grain in its buckets and empties it in a re¬

ceiving chamber. Here it is taken by another

belt called the lofting belt and carried to the top of the elevator to a hopper known as the garner. Immediately below the garner is the

weighing apparatus into which the grain falls

through a spout, and from which it is sent on¬

ward to the cleaners if necessary and then to the storage bins. In the pneumatic system there is no leg, but the suction tube hangs from the end of a hollow crane-like boom which can be

swung over the vessel to be unloaded. This

tube is flexible and telescopic, so that it can be made to reach any level and into the farthest corner of the vessel's hold. A powerful vacuum pump at the inner end of the boom exhausts the air in the tube, and the air in the hold of the ship rushes up to fill the vacuum,

taking the grain along with it to the vacuum chamber.

From here it is directed to the scales, cleaners and bins. There are several advantages in the

pneumatic system not possessed by the other.

The suction tubes are flexible and extensible,

and may be moved to any point in a ship where the grain may be: the elevator leg is rigid

and the grain must be brought to its foot by hand labor or by supplemental machinery. In

the matter of the health and comfort of the

laborer also the pneumatic system leads, as it produces neither the dust nor the heat of the bucket elevator. On the other hand, the opera¬

tion of the pneumatic elevator is considerably

more expensive and this has militated against

its installation in many of the newer and larger elevators. The pneumatic system has been very

successfully used to transfer grain long dis¬

tances and in this it has no competitor.

Unloading and storing from cars is accom¬

plished as follows: The grain-laden cars are

usually run up along the side of the building so that each car is placed directly under an ele¬

vator leg. Two men in each car, operating

shovels by ropes from a steam-driyen shovel

shaft, shovel the grain into the pits of the

elevator leg, and thus fill the buckets of the conveyor, which, operating continuously, carries

it up to the cupola, where the buckets are tipped over automatically and their contents dis¬

charged into the turnhead spouts. From these

the grain passes by gravity into the garners,

thence into the hoppers of the weighing ma¬

chines, thence to the cleaners if desirable, and finally through a system of spouts to the storage bins.

When transferring grain from ships to rail¬

way cars the elevator legs are swung out¬

side the house and their feet lowered into the hold of the vessel through the hatchways. The

conveyors carry the grain to the turnhead spouts from which it passes to the storage bins, and thence through the floor valves of the bins to the cars placed beneath them. Under such con¬

ditions they are called ((marine elevators,® and when the mechanism is mounted on a barge

or float to permit of its being moved from

place . to place, it is commonly known as a

ˆfloating elevator.® A carload of 1,200 bushels is delivered in about three minutes.

To load grain from an elevator into me

grain-carrying vessels of the Great Lakes, the

vessel is made fast alongside the house, and

its hatches being removed, the grain is poured by gravity in a perfect

torrent into its hold through great spouts which extend to the

hatchways from the floor valves of the bins.

The discharging capacity of these spouts ranges from 12,000 to 60,000 bushels per hour and load vessels of the greatest capacity in two or three hours. In the largest elevator, where the work¬

ing house is separate from the storage house,

the grain is spouted from the bottom of the

bin on to a belt conveyor by which it is carried to the top of the working house wh-ere it is weighed and then delivered to the loading

spouts.

The loading and storing capacities of indi¬

vidual elevators vary greatly according to their location. Innumerable small structures capable

of handling only a few thousands of bushels

each are located along the lines, of railway

traversing the grain-bearing regions of the

Western States. These areˆowned and operated

by the railroads. But at the large centres of flour manufacture and grain transportation,

such as Minneapolis, Duluth and Chicago, are

elevators of mammoth proportions, with indi¬

vidual capacities ranging from 500,000 to

5,000,000 bushels. One of the medium-sized

elevators at Duluth is 285 feet long, 85 feet wide and 150 feet high. Nine belt conveyors

driven by a 200 horse-power steam engine lift

the grain to a height of 145 feet to the turnhead spouts. Each belt carries 125 buckets

having a capacity of one peck each, so that the total load at any working instant is about 270

bushels or 15,000 pounds, representing an un¬

loading capacity of 12,000 bushels per hour.

The cleaning machines have an individual

capacity of 3,000 bushels per hour, and the

dryer house passes 2,000 bushels per hour. In

many of these larger elevators the motive

power is electricity, each machine having its

own special motor.

Throughout the grain-producing regions of

the West the co-operative elevator has become

a very considerable factor in the handling of

the country's grain crops. The movement be¬

gan to take on substantial proportions in the

year 1900. Since then these farmers' coopera¬

tive elevator associations have steadily in¬

creased until at the present time it is estimated that they handle nearly 40 per cent of the grain sent to market. These elevators are all small, but pay their owners dividends, which range up to 7 per cent, although the average would be

nearer . 3 per cent. Consult Grain Dealers'

Journal (Plans of Grain Elevators) (Chicago

1913) ; Ketchum, M. S., (The Design of Walls, Bins and Grain Elevators) (New York 1911) ;

Zimmer, P. G., (Mechanical Handling of

Materials* (New York 1905).

GRAIN INSECTS. Stored grain, corn,

nuts, and the like, are frequently infested and injured by various insects. About 40 kinds of

weevils (q.v.) lay their eggs upon dry grain,

and their grubs bore into and devour the ker¬

nel, so that when they are numerous great

damage may ensue. It has been estimated that

the annual loss in the United States from

this cause alone is about $40,000,000. The most important of these pests are the granary-weevil (Calandra granaria) and the rice-weevil (C .

oryza'). The former is wingless, evidence that

it was domesticated ages ago. It multiplies so rapidly, developing from egg to adult in about six weeks, that five or six generations might

be produced annually in a warm temperature.

The rice-weevil has well-developed wings,

which it seldom uses, showing a strong tend¬

ency to become wingless in time. Much in¬

jury to stored grain is also caused by other

beetles, particularly by three species (Silvanus surinamensis, Cathartus gemellatus and C. ad-vena), but they usually follow the attacks of

other insects. The cadelle (Tenebroides niauri—

tanicus) is to be included in this category, as it has a pernicious habit of gnawing into kernels of grain and destroying the embryo or germ.

Great harm in granaries is done also by small moths related to the clothes-moth, whose cater¬

pillars bind the grains together, forming clots, which both spoil the edible quality of the cereal and clog mill machinery. The most familiar of

these is the European Gelechia cerealella, often called Angoumois grain-moth, but known as

ˆfly-weevil® in the Southern States, where it is so prevalent that grain can nowhere be stored

for a long time. Another imported grain-moth,

troublesome in the United States since about

1890, is Ephestia kuhniella; and a third (Tinea granella), is especially harmful to wheat in Eu¬

rope, but not prevalent in America. Injury by

the Angoumois grain-moth and the rice-weevil,

which obtain entrance to the grain in the fields, can be largely prevented by early harvesting

and by threshing as soon as possible. The

standard remedy for all grain insects, however, is bisulphide of carbon, applied at the rate of one or two ounces to every 100 pounds of

infested grain, which is effective in proportion to the tight closing of the bins. Exposure

should last as long as possible, unless the seed is desired for planting, when an exposure of 24

hours is sufficient and will not detract from

the germinating power. In buildings that can¬

not be tightly closed a larger quantity of the insecticide must be used, and repetition of

treatment is necessary in warm weather at in¬

tervals of six weeks or more. Frequent stirring about of the grain is helpful against these in¬

sects ; and granaries whenever emptied should

be thoroughly cleaned and whitewashed. See

Flour and Meal Insects.

GRAIN-POISONING. See Ergotism.

GRAIN STANDARD ACT. This act of

11 Aug. 1916 authorizes the United States Sec¬

retary of Agriculture to investigate the hand¬

ling and grading of grain and to establish

standards for corn, wheat, rye, oats, barley,

flaxseed and other grain. On the establishment

of any such standard the law prohibits the ship¬

ment, or delivery for shipment, in interstate or foreign commerce originating in the United

States, of any grain sold, offered or consigned for sale by grade without previous inspection

and grading by a licensed inspector, at the place of shipment, at the destination or at some point in transit, provided there is a licensed inspector located at the point of shipment or destination.

In this latter case the grain may be shipped

without inspection; and if there is any dispute over the grading of it, the matter may be re¬

ferred to the Secretary of Agriculture by either of the parties to the transaction. The act pro¬

vides for a public notice of not less than 90

days in advance of the date on which any new standard shall become effective. The object of

the law is to provide a uniform system of grad¬

ing staple crop products, and in this way afford¬

ing the farmer incentive to improve the quality of his product by the careful selection of varie¬

ties, skilful culture and effective methods of

harvesting and handling. Many of the States

have passed similar laws and ranged themselves

by the side of the Federal legislature for the improvement of standards in grain.

GRAINING. (1) In leather manufacture

the process of rubbing leather with a board to raise the grain. The leather having been shaved to a thickness at the beam and daubed is hung up to dry, and is then folded, grain side in, and rubbed on the flesh side with a pommel or

crippler to give the leather a granular appear¬

ance and render it supple. The hi < de is then

extended and rubbed on the grain side. This is termed bruising. Also a process for giving

markings to the surface of leather to imitate

the wrinkled appearance of morocco, hog-skin

and some other leathers.

(2) In painting, the imitation of the natural

grain of wood by means of tools. Combs,

brushes, rollers and the corner of a folded rag are used in making the various patterns.

(3) In lithography, a mode of giving a cer¬

tain texture to the face of a stone. One stone is laid on another with a quantity of sifted sand of a given fineness, and by a peculiar oscillation and gradual progression the surface is cut into a set of fine prominences more or less deep and distant, according to the character of the work to be placed on the stone.

GRAKLE, grak'l, the name of several

kinds of birds. In the United States the black¬

birds (especially the larger ones) of the family Icteridce. (See^ Blackbird) . In India and east¬

ward a mina-bird (q v.) or some related bird

formerly classified in the miscellaneous group

Gracula.

GRAMINEiE, gra-min'e-e. See Grasses.

GRAMMAR is the systematic treatment of

the expression of thought by means of lan¬

guage. Grammar is often called a science, but

in its present state it cannot rank with science#

like astronomy, or chemistry, for instance.

For one thing, it has not the power of predic¬

tion. Adams and Le Verrier, the one in France, the other in England, were able, from ob¬

served disturbances in the solar system, to de¬

termine that there must be a yet undiscovered

planet, and to calculate its orbit and position so accurately that observers, turning their

glasses on the specified locality in the heavens, found the planet Neptune. Grammar has no

such power. All the linguists of Europe could

not have predicted in advance of discovery

what the Chinese language would be like ; nor

could all the linguists of the world determine what would be the language of some people

of unknown origin who might be discovered

to-morrow. The laws of chemistry appear to

be universal. The same elements exist in the

stars, the planets and the sun, as upon the

earth, and so far as our knowledge yet reaches, only the same. Helium was first discovered by

the spectroscope in the sun, but by later re¬

search found upon the earth. Hydrogen and

oxygen will combine in the very same propor¬

tions to form water in India as in Europe.

But grammar can command no such certainty.

Its facts change from tribe to tribe, from dia¬

lect to dialect and with most puzzling and

baffling variations. The crossing of a mountain or a river throws the scholar into some new

system of grammatical construction. Hence

grammar for practical purposes must be viewed

chiefly as a constructive art. In no department of learning is there less room for dogmatism.

The scholar cannot say what shall be, or what should be. He does well if he can discover

and clearly explain what is. The (< rules® of

grammar in any language can be no more than

the statement of the existing facts of that lan¬

guage, as scholarship has discovered, and has

been able to co-ordinate them.

It is obvious that language must have

existed long before grammar. Man would

find means of intelligent expression long be-

, fore he could give systematic explanation of the reason for various forms of expression.

In fact, the earliest grammar known to the

modern world is the Sanskrit grammar of

Panini (about 300 b.c.), giving in 8 books, with 3,000 sections, the rules for classical Sanskrit.

But Panini himself enumerates 64 grammatical

predecessors, and the oldest Sanskrit literature is conventionally placed at 1500 b.c., though un¬

doubtedly much older. A language, however,

must exist in a tolerably complete form before a literature can be composed in it, so that the Sanskrit language reaches beyond the earliest

Sanskrit literature far back into a dim antiq¬

uity. The language had existed for unknown

centuries, and had been the medium of a great literature for probably a thousand years before its grammar began. The impulse of the San¬

skrit grammar was religious, for on the correct rendering of any verse of its sacred books

salvation might depend. Greek grammar had

an independent and later origin. Its impulse

was philosophical and literary.. The Homeric

poems were the monuments it most eagerly

studied. But those poems are placed at 1 100—

900 b c., while the first notable, though discon¬

nected, observations on grammar were made by

Plato (427-347 b.c.), and Aristotle (384-322

b.c.) , carried grammatical analysis so far as to distinguish nouns, verbs and connectives. Tt

was not until Dionysius Thrax («The Thra¬

cian®), who taught in Rome in the 1st cen¬

tury b.c., composed his (Art of Grammarˆ that

the grammar of the Greek language had full

development. Thus again about a thousand

years elapsed after the fullness and power of

the Greek language had been revealed in the

(Iliad > and ‘Odyssey,* before grammatical

analysis was ready to explain what the language had long since done. The record of English

grammar is similar. The first really English

grammar was claimed by William Bullokar,

who published in 1586 (A Brief Grammar for

English, * which he said was “the first grammar for English that ever was, except my gram¬

mar at large.® Ramsey, (English Language and

English Grammar * (pt. I, ch. 3, p. 49).

In 1652 John Wallis published his ‘Grarn—

matica Linguae Anglicanae,* explaining Eng¬

lish usage in Latin, as did other socalled Eng¬

lish grammarians, who still esteemed Latin, as

the only scholarly tongue. The earliest of these works was written 500 years after the Norman

Conquest and two centuries after Chaucer had

shown what the English language by itself

could do. Everywhere we find grammar work¬

ing upon a language already made,* and rich

enough in words and forms to be the vehicle

of a literature before the grammarians sub¬

mitted it to examination and analysis. Every¬

where the office of grammar has been, not to

fix what a language should be, or must be, but to explain what an already existing language

is. Grammar is explanatory and not creative.

So considered, grammar may be defined as

the art of expressing thought by means of con¬

nected words. Grammar has nothing to do with

unconnected words. We may have a very ex¬

tensive list of words without grammar, as the

names in a city directory; but when we con¬

nect them in statement, — as if we say, “George Jones precedes John Jones in alphabetic order,®

— grammar at once begins.

Some very learned authors have stated as

an axiom that ((The sentence is the unit and

starting-point of speech.® How this idea orig¬

inated is difficult to understand. It is not a self-evident truth, for one may say, as some

have said, that ((the name of an object is the unit and starting-point of speech,® and this

statement is as good as the other until the con¬

trary is proved. The account in Genesis reads: “And out of the ground the Lord God formed

every beast of the field, and every fowl of the air, and brought them unto Adam, to see what

he would call them: and whatsoever Adam

called every living creature, that was the name thereof .® Gen. ii, 19.

There is nothing illogical or absurd in this

idea that language began with the names of

objects. Others have thought that verbs, ex¬

pressing action, came first. Still others have

preferred to think that language began with

involuntary exclamations, which we now call

interjections. No one of these theories is self-evidently true or false. The statement that

((the sentence is the unit and starting-point of speech® is equally far from being a self-evi¬

dent truth. In fact, it is a late result of com¬

plicated reasoning. If true, it must be proved to be true, — what are the proofs? In every

generation millions of children, starting with

absolutely nothing, learned their native lan¬

guage. Now, in the acquirement of the modern

European languages, at least, children every¬

where learn the language by isolated words.

It is a triumph when the little one can say, “Papa® or “Mama,® or whatever is the ac¬

cepted equivalent of either, and apply the name intelligently to the right person. This is the most usual ((starting-point of speech,® and

there is no thought or imagination of a “sen¬

tence® about it. Then come names of famil¬

iar objects, as “water,® “bread,® “milk,® etc.; then names of common animals, perhaps called

according to the sounds they utter, as “doggie®

or “bow-wow,® “kittie,® “birdie,® *etc.* Who¬

ever sees much of the home life of other peo¬

ples will find the French, German or Italian

mother teaching her baby in precisely the same way, word by word, object by object. It is

an event when the little one passes beyond

this, and forms its first sentence, as “Mama

come,® “doggie run® or the like. The construc¬

tion of a sentence marks a distinct advance of the baby’s thought after a considerable store of separate words has been acquired.

The same is true of the learning of a foreign language by an adult. The “conversation-books® of ready-made sentences are the stand¬

ing joke of travelers. In real life the sentence one has carefully memorized never fits the

actual circumstance, and the person addressed

never gives the reply that the book prescribes, so that in a moment all is mental confusion.

But one who will learn useful isolated words

of a foreign language can make himself under¬

stood long before he can construct a coherent

sentence. If the English-speaking man enter¬

ing Italy, for instance, will learn certain simple words, as acqua (water), caffe (coffee), latte

(milk), pane (bread), Camera (room), and

some 30 to 50 other words or simple phrases,

with the numerals and names of coins, he can

go all through Italy, communicating sufficiently for ordinary purposes, and gradually learning

to construct sentences.

Grammar thus treats almost wholly of the

forms, relations and connection of words.

The matter is thus stated by one of the most philosophical of modern grammarians :

“Grammar, or the doctrine of language, treats

of the laws of speech, and in the first place of the Word, as its fundamental constituent .®

Maetzner, (English Grammar, > Vol. I, p. 12.

There is no grammar of sentences, except

when two or more sentences are united in one

complex or compound sentence. Pages may

be covered, or a volume might be filled, with perfect sentences, no two of which are grammat¬

ically connected, and — as finished sentences, —grammar has nothing to do with them. The

first thing that grammar does to a sentence is to take it to pieces to break it up into its com¬

ponent parts, the words of which it is framed, and then to show how these are connected to

form that composite thing which we call the

sentence.

Words, so viewed, are appropriately classi¬

fied as “parts of speech.® These parts of

speech may vary in different languages, but

in the Indo-European languages, including

Greek, Latin, Italian, French, German, etc., in the Semitic languages, as Hebrew and Arabic,

and in other groups, they are practically iden¬

tical, showing that the division so widely prev¬

alent is a natural and logical one. In English grammars, and in grammars which English¬

speaking men have compiled for other lan¬

guages, these parts of speech retain, with slight change of form, the names given them by the

ancient Latin grammarians. The parts of

speech are, in the order of their importance : 1. The Noun, or name of an object, whether

a material object manifest to the senses, or im¬

material, manifest only to the mind. The

distinction between concrete and abstract nouns

is metaphysical, but not grammatical. Gram¬

mar treats the names of abstract conceptions

like love, hate, kindness, precisely as it treats the names of material objects like rock, fish, flower. All alike are nouns. Whatever one can

think of as existing may be named by a noun.

2. The Pronoun. — A word that may, on

occasion, stand in place of, or as the repre¬

sentative of, a noun.

3. The Adjective .- — According to its name,

an added word, expressing some quality of an

object, while leaving the noun unchanged to

stand for the general type.

4. The Verb. — This may be described in

general phrase as the action-word. Even those

verbs that express a state of being express it with a suggestion of action or movement, so

that “Time exists ® presents to the mind a more vivid and living idea than the noun-phrase

“The existence of time.® The importance as—

scribed to this part of speech is shown by the name which the old grammarians gave it. The

Latin verbum means simply “word® and they

called the action-word Verbum — pre-eminently

“The Word® as controlling in all expression of thought. No sentence can be constructed and

no complete thought be expressed without a

verb.

5. The Adverb. — A word which intensifies

or shades down the meaning of a verb and

has a like effect on an adjective or on another adverb. It has an especial office as denoting

place (as here, there, everywhere) or time (as now, then, never). In such use adverbs often

become connectives, binding clauses together

(as where’, when, whence, etc.), and are then

often called “conjunctive adverbs.®

6. The Preposition. — A particle, often very

slight in form (as the English of, in, with;

Greek ek or ex, en: syn ; Latin ex, in, cum), showing some relation of a noun or pronoun

to almost any other part of speech, as to a

noun, pronoun, adjective, verb or adverb — in¬

dicating any one of various relations, as of

direction, origin, dependence, *etc.*

7. The Conjunction. — A particle simply join¬

ing words, not as expressing relation, but ad¬

dition or contrast (of which simple forms in

English are and and but). Conjunctions also

connect phrases or sentences (clauses), either

in the relation of equality (co-ordinate con¬

junctions, as and, but) or of dependence (sub¬

ordinate conjunctions, as if, since, though,

unless) .

8. The Interjection. — One of the spontane¬

ous utterances of emotion, as of joy, grief,

anger, surprise, *etc.* It is a dictum of gram¬

mar that “The interjection is independent of

all grammatical relation,® yet it often strongly influences the entire meaning of a sentence,

as in the exclamation, ((Oh, that my people had hearkened to my voice !® where the omission

of the “Oh® would make the sentence almost

meaningless.

These parts of speech and their uses vary

in many ways in different languages. Thus

the Latin or Greek noun can often dispense

with the preposition, the meaning of which is

expressed by a changed form of the noun.

1 he Latin verb can largely dispense with the pronoun, since person and number are suffi¬

ciently indicated by special forms of the verb.

The verb in some languages has more modes

(or moods) than in others, as the Greek opta¬

tive (the wishing mode) is not found in

Latin or in English. The number of tenses

varies greatly. While the Greek, Latin and

English tenses mark quite strictly the divisions of time, as past, present and future, the tenses of the Semitic languages, as Hebrew and

Arabic, denote only completed or uncompleted

action. The Anglo-Saxon, too, had but one

form for the present and future, as we still say, in English, (<I sail for Europe to-morrow."

But, though the details are different, the gen¬

eral scheme is one. The department of gram¬

mar that deals with the parts of speech has

received the conventional name of Etymology.

Syntax (from the Greek syn-tasso, to "ar¬

range in order," as the ranks and divisions of an army, is the name given to the department

of grammar that treats of the due ordering of words in the construction of the sentence. Here the one demand that must in some way be met

in every language is, that the sentence shall

clearly indicate : (1) What is spoken of; (2)

What is said about it.

These indispensable constituents of the

sentence we name the subject and the predicate.

All the devices of grammar have no other

end but to keep these absolutely clear, adding incidentally to either such force or effect as may be possible.

In seeking this result one of the chief ele¬

ments to be determined is, whether the subject of the sentence is to be viewed as the subject or the object of the action; as, "The engine

draw's the train," or "The train is drawn by the engine ." This gives for the verb the active and the passive voice and for the noun or pronoun the various cases, as the Nominative or the

Objective (also called the Accusative) case.

Other cases may indicate other relations. In

an inflected language like Greek, Latin and

others, the cases are indicated by the form of the noun or pronoun, which may, accordingly,

be placed almost anywhere in the sentence.

In an uninflected language, like English, as

there is little distinction of form, the case—

relation is ordinarily determined only by the

position of words, so that the order of words becomes a grammatical element of supreme im¬

portance. In the inflected languages it is nec¬

essary to learn a vast number of forms (de¬

clensions, conjugations, etc.) in order that the meaning intended may be correctly expressed.

In an uninflected language grammar spends

its force in the due adjustment of largely un¬

changing forms for the same purpose, that the

meaning intended may be correctly expressed.

The task and the triumph of grammar in any

language is to teach such combination of words in sentences that the thought of speaker or

writer shall be conveyed without change or

loss to the mind of hearer or reader. See

Grammar, English; Language, Science of..

Consult Benfey, (Geschichte der Sprachwissenschaft* (Munich 1869) ; Baumann, (Sprach—

psychologie und Sprachunterricht, eine kritische

Studie) (Halle 1906) ; Bernard-Leroy, (Le En¬

gage, essai sur la psychologie normale et pathol-ogique de cette fonction* (Paris 1905) ; Finck, 'Die Sprachstanime des Erdkreises* (Leipzig

1909); Giles, (Manual of Comparative Philologie* (London 1901) ; Mauthner, (Die

Sprache) (Frankfurt 1906) ; Nausester, Men¬

ken, Sprechen und Lehren) (2 vols., Berlin

1901-06) ; Moncalm, (Origin of Speech and

Thought* (London 1905) ; Paul, <Prinzipien

der Sprachgeschichte* (4th ed., Halle 1909) ;

Tucker, (Introduction to the Natural History

of Languages* (London 1908).

James C. Fernald,

Editor , cThe Students' Standard Dictionary?

GRAMMAR, English. The first principle

here to be established is that in English gram¬

mar we are dealing with the English language.

English grammar cannot be built up by infer¬

ences from other languages. For instance the

Greek had a definite, but no indefinite, article; the Latin had no article whatever. Would

English have one article or none? The Anglo-Saxon had two articles. Would English follow

that? The Anglo-Saxon had a dative case

and many another modification which English

has dropped. How do we know that English

may not have also dropped the article? Con¬

jecture and inference give us no result. We

are driven back to a study of facts. What does English have? So we learn that, as matter of

fact, English has two articles, the definite and the indefinite. The same might be shown in

numberless instances. English grammar is not

a system that can be built up by a priori rea¬

soning, but is simply the correlation of the

observed facts of English usage.

It has been the misfortune of the English

language that in all the early days its grammar was not so treated. The grammatical treat¬

ment of the language was begun about the

time of the Tudors by Latin scholars and the

first textbooks were even written in Latin.

English was still regarded as an inferior lan¬

guage — “the vulgar tongue” — and must be

shaped as nearly as possible to the model of

classical Latin. Even Lindley Murray in 1795

contrasts English with “the learned languages,”

which for him were notably the Latin and

Greek. But English differs from the ancient

classical tongues as it does also from most of the leading modern languages, in an almost

complete absence of inflection — that is, of

changes in forms of words to indicate their

relations. The eminent English scholar, Dr.

George P. Marsh, says in his (Origin and His¬

tory of the English Language* : “A truly

philosophical system of English syntax cannot

be built up by means of the Latin scaffolding, which has served for the construction of all

the continental theories of grammar, but must

be conceived and executed on a wholly new and original plan.”

The long-prevalent and futile attempt to

shape an uninflected language upon an inflected model cannot be too soon nor too completely

abandoned. English must be recognized as ?.

grand language which has started anew in the

world, which is built upon a model of its own, not to be shaped to the

pattern of any other : and which has proved its right to an independ¬

ent place by a noble literary history of 500

years, including in its array of masters of

philosophy and science, of statesmen, histori¬

ans, orators and poets, some of the greatest

names of all time; and which has proved itself an effective means of communication by its

extension over more than one-fourth of the

habitable earth and its use as their vernacular by some 180,000,000 of its inhabitants.

Here stands among the nations the language

which has done all this. What are its methods of expression? The rational and direct answer

to that question constitutes English grammar.

A sufficient definition is that English grammar is the correct use of English words in English sentences.

We find, then, as matter of fact, that Eng¬

lish possesses the eight parts of speech common in other European languages : noun, pronoun,

adjective, verb, adverb, preposition, conjunc¬

tion and interjection. This can be shown to

be a very logical division of words, but we

accept it, not because it is logical, but because it exists. Some competent grammarians count

nine parts of speech by treating the article as separate from the adjective. Nouns and pro¬

nouns are credited with the four properties of gender, person, number and case.

Gender in English is strictly limited to the

distinction of sex or of the lack of it. Thus there are three genders. Males are masculine,

females are feminine and inanimate objects,

as of no sex, are neuter. That is all there is of gender in the language. But it is sufficient.

One of the greatest achievements of the Eng¬

lish language is the abolition of what is called grammatical gender, which in other languages

generally prevails. The triumph is so com¬

plete that an English-speaking person does not

see how any other system could be possible,

until he learns what is actually done in other languages.

Grammatical gender is gender arbitrarily

imposed upon words without the slightest ref¬

erence to sex. In French, Italian and Spanish

there are but two genders, so that every noun must be either masculine or feminine, even

though it may denote an inanimate object. Ger¬

man has three genders, but they are applied in the most indiscriminate way, without any ref¬

erence to sex in the objects named. Thus, weib, meaning ((woman, wife,® is neuter; so is Mdd-chen, “maiden.® Kopf, “head,® is masculine;

but Aug e, “eye,® is neuter; Arm, “arm,” is mas¬

culine, but Hand, “hand,® is feminine, while

Einger, “finger,® is masculine.

“A German gentleman writes a masculine

letter of feminine love to a neuter young lady with a feminine pen and feminine ink on mas¬

culine sheets of neuter paper, and encloses it in a masculine envelope, with a feminine ad¬

dress to his darling, though neuter, Gretchen.

He has a masculine head, a feminine hand, and a neuter heart. A masculine father and femin;ne mother have neuter children.® — Earle,

(Philology of the English Tongue) (ch. VII,

p. 377).

How such a system was ever fastened upon

any language is one of the puzzles which the

most eminent linguists have not been able to

solve, but from the entire complication Eng¬

lish has shaken itself free. To know the gen¬

der of an English noun, it is only necessary to know its meaning.

The most obvious relations of sex are de¬

noted by independent words; as man, zvoman;

husband, wife; boy, girl ; son, daughter;

brother, sister; *etc.* But wife is not a feminine form of the word husband, nor daughter a

feminine form of son, nor sister of brother.

The words are not at all related in form, but only in meaning, and we know them as mascu¬

line or feminine only by' knowing what they

mean.

A small number of special feminines are

formed directly from masculines 'by the ending

css, derived from the French; as, abbot, abbess; actor, actress, *etc.* From hero we have heroine, derived from the Greek. We have also a very

few rarely used words from the Latin in tor,

which form feminines in trix ; as executor, ex¬

ecutrix. But these endings do not of themselves constitute feminine nouns, for we have addrˆj,

fortran, mattr ess, quarantine, cica/rfir, which

are all neuter. No English noun can be classed as masculine, feminine or neuter, merely by its termination.

The number of nouns with special feminine

endings is constantlv diminishing. In the time

of Queen Elizabeth such words as butleress,

warrioress, waggonness and many similar forms

were used, which have long since disappeared.

Others are constantly falling into disuse. It

is not now good form to say or write author¬

ess, poetess nor songstress. We refer to the

woman, like the man, as author, lecturer, poet, singer, *etc.* The genius of the language tends

strongly to the disuse of all distinctively mascu¬

line or feminine terminations. We even speak

of a woman as the chairman of a meeting, or as a postmaster in the United States mail service, In literary work a woman may be an editor,

but never an editress. In a college she may be president or professor, but never presidentess

nor professoress.

A small number of masculines and feminines

are made by masculine or feminine prefixes, as *ie-goat, j*ie-wolf, man-servant, maid-servant,

etc. But this method is passing out of use, so that the number of such forms remaining is

now very small.

Even in nouns denoting living beings, Eng¬

lish minimizes gender. There is a great class

of nouns like friend, nciqhbor, stranger, citizen, patriot, assistant, helper, etc., that unquestion¬

ably denote living beings, but give no indica¬

tion of sex. If a person says, “My friend

started for home yesterday,® it is impossible to judge from that statement whether the

“friend® was man or woman, boy or girl.

But we cannot sav that the noun “friend® is of neuter gender, like “rock® or “tree.® The

noun “friend® simply waives the question of

gender, makes no affirmation about that matter, but leaves the gender undetermined or indeter¬

minate.

Thus we have a multitude of such familiar

nouns as accountant, acquaintance, advocate,

amanuensis, assailant, assistant, associate, attor¬

ney, citizen, clerk, companion, comrade, cousin, enemy, foe, friend, historian, interpreter,

maniac, monarch, nurse, patient, person, physi¬

cian, relation, relative, reporter, secretary,

sovereign, witness; practically all the uncounted nouns in er, the number of which is increased without limit at any one’s pleasure ; as buyer, doer, driver, giver, hearer, interviewer, in¬

truder, invader, joker, keeper, locker, maker,

mocker, packer, prowler, questioner, reader, re¬

ceiver, singer, speaker, stenographer, stranger,

voyager, worshipper, writer ; all nouns in ist as antagonist, artist, chemist, copyist, geologist,

pianist, psychologist, zoologist; most nouns in

or, as, author, contractor, counsellor, doctor,

editor, orator, visitor; most names of animals; as ape, bear, beaver, bird, butterfly, deer, ele¬

phant, elk, fowl, goat, locust, monkey, mule,

ostrich, robin, shark, sparrow, swallow, and

innumerable others quite innocent of gender.

This non-gender terminology is becoming the

prevalent style in English. The fullest list of unrelated word-pairs denoting gender contains

only about 70 such words, while the nouns with feminines is ess or trix do not probably num¬

ber more than 75 now in approved use. It will be seen that these are incalculably outnum¬

bered by the nouns denoting living beings with¬

out specifying gender, of which the list given in this paragraph furnishes but a few specimens.

These nouns indeterminate in gender are

often said to be of common gender, — a phrase to which there is no special objection, and

which has the advantage of being widely and

generally understood, as signifying that the

word it describes may be either masculine or

feminine.

This use, which has limited place in many

languages, but which is predominant in Eng¬

lish, is in accord with the law of practical

efficiency, not to load down our speech by

mention of unnecessary things. If we say,

((That is an error of the typewriter? it is not of the slightest importance whether the ((typewriter® is a man or a woman. Any one who

should explain the sex, and say ((That is an

error of my typewriter who is a young man,8

— or, (<who is a young lady,® — would make

himself ridiculous. Why, then, should he be

required to give this useless information by a masculine or feminine form of the word? The

very thing for practical purposes is a word that has no gender, and gives no indication of sex.

The entire tendency of the English language is to banish from its grammar all distinctions of gender except where such distinction is abso¬

lutely necessary. This is a great advantage on the scare of freedom and simplicity, as well as of the highest linguistic efficiency.

Person, in English nouns, is practically

negligible. No noun can be used in the first

person without a pronoun of the first person

accompanying it. Such forms as ((I, Paul, say

unto you® are correct, but very rare ; “Paul say unto you® would be impossible. No noun will

be understood to be in the second person, un¬

less by some plain indication of direct address.

Nothing in the form of the noun can mark it as of first or second person. That is, all nouns are in the third person unless an accompanying pro’noun or other special indication marks

them as of first or second.

Number, as singular or plural, is indicated

with special care. On the threshold we meet a conflict of definition, some authorities defining the plural as <(denoting more than one® ; others, as <(denoting two or more.® Between these

definitions come certain fractional quantities.

Shall we say <(One and a half ton was de¬

livered® or <(One and a half tons were de¬

livered®? The prevailing usage is certainly in

favor of the latter form in accordance with the predominant authority of the best modern

dictionaries which treat the plural as denoting more than one.

The general or regular form of the plural

of nouns is obtained by adding j to the singu¬

lar. Where the singular ends in a sibilant

sound as ch, s, sh, x or z, an e is inserted for the sake of euphony, as in churches , bushes,

gases, foxes, *etc.* This formation of the plural by adding ˆ or cjr is so general and so simple that children readily learn it, and incline to use it for all nouns, saying, for instance, mouses until taught to say mice. There is a very small list of irregular plurals; there are also certain exceptional ones, as of foreign nouns, which

may be readily learned by some portion of the pains and care required for learning anything.

Case in English nouns is very slightly indi¬

cated. There are but two case-forms, and but

one change of form for case in either singular or plural. This will startle many who have

learned that every noun has three cases, nomi¬

native, possessive and objective. But a

moment's thought will show that the regular or common form of the noun undergoes but one

change in the singular as, fox, fox's. We use the regular or common form as the subject of

a verb, or as the object of a verb or of a preposition at pleasure, but in so using it we do not change it in the slightest degree. The only change of form for case in the singular

number is by the adding of 's for the posses¬

sive. The possessive of a regular plural differs from the nominative only by the slight addition of the apostrophe (') in writing or printing.

Even this disappears in the spoken language,

where foxes' is indistinguishable in utterance

from foxes. A few irregular plurals form

their possessives by adding 's, as to a singular.

Thus we say or write men's hats ; children's

shoes, *etc.*

The pronoun is the stronghold of gender.

But for the pronoun, gender might be wholly

ignored in English grammar. The two sen¬

tences (<The man spoke,® and (<The woman

spoke,® differ in meaning, but they do not dif¬

fer at all grammatically; in each we have a

noun as the subject of a verb. But the moment we use a personal pronoun, gender becomes im¬

portant : ®The man spoke his mind®, ((The

woman spoke her mind.® The pronoun alone

has English gender in its keeping.

Yet gender is indicated in pronouns only in

the personal pronoun of the third person and

singular number. Pronouns of the first per¬

son, — I, my or mine, me, we, our or ours, us, — or of the second person, — thou, thy or thine, thee, you, your or yours, are utterly inde¬

terminate in gender. It is only when we come

to the forms of the third person that we find gender in he, his, him, she, her, hers, it, its , —and there only in the singular number. The

moment we pass to the plural, — they, their or theirs, them, — we lose gender again. Pro¬

nouns other than personal, as demonstrative,

relative or interrogative, — this, that, who,

which, what, etc., give no sign of gender. All notification of gender that grammar need take

cognizance of is found in the eight pronoun—

forms, he, his, him, she, her, hers, it, its.

Case is fully developed only in the pronoun.

Six pronouns, the personal pronouns, — I, thou, he, she, and it, with their plurals, and the rela¬

tive pronoun who, are the onlv English words

that have distinct forms for the objective case.

The only objective forms in the English lan¬

guage are me, us, thee, him, her, them and

whom, — seven in all. The neuter pronoun of

the third person singular, it, and the plural of the second person, you, are the same in nomina¬

tive and objective, in modern use. The older

English would have added you, the nominative

being ye, but that usage is now obsolete. The seven objectives above named are the only

words that can be in the objective case inde¬

pendently of position in an English sentence ;

as :

Him th’ Almighty Power

Hurled flaming, headlong from th’ ethereal seats.

Whom he would he slew, and whom he would he kept alive.

The English adjective has no gender, num¬

ber, person nor case. How much this means,

the English-speaking man never realizes until

he studies some foreign language, where he

finds that, however well he may know a noun,

he is powerless to use it with article or adjec¬

tive, until he knows the gender of that noun, and has settled that one of the varying forms of adjective or article which may properly be

used for that noun in that particular gender,

number, and case, — which is almost an endless study. By sweeping gender absolutely away

from all adjectives (including the definite and the indefinite article) English has completed

the emancipation of the language from the op¬

pressive burden of grammatical gender. By

the absolute simplicity of the contrivance, all perplexity is banished, and error is made im¬

possible. This is a wonderful linguistic

triumph.

The English verb has very little inflection.

A few verbs undergo some internal change in

the past tense and past participle ; as, go, went, gone. The prevailing system simply adds d or

ed to the present to make the past tense and past participle (which are thus identical in

form). The first system has been called, after Grimm and other German philologists, the

strong, and the second the weak conjugation —

fanciful names, not generally favored by lead¬

ing English and American grammarians, but

often severely condemned. A common and

more intelligible classification designates the

forms in d or ed as regular, because they fol¬

low the prevailing rule or custom, and those

otherwise made as irregular, because they

are few in number, and vary in arbitrary ways, for which no rule can be given. The irregular verbs afford one of the best illustrations of the statement that English grammar is simply the

study and mastery of concrete facts. Those

verbs can be learned only by arbitrary memory.

It is no more possible to reason out the forms of an irregular verb than to reason out the

name of a stranger who is passing on the side¬

walk. But there are very few of them. Out

of at least 8,000 verbs in the English language all but about 200 form their past tense and past participle by adding d or ed to the root-form.

Every new verb is at once and without ques¬

tion so conjugated; as, telegraph, telegraphed;

corral, corralled, *etc.* Also, the number of ir¬

regular verbs is constantly, though silently, de¬

creasing. In one list of 215 irregular verbs, 47

are marked as having also the regular form, so that we may say either awaked or awoke,

burned or burnt, *etc.* ; and it will be found

that in many of these the regular is fast sup¬

planting the irregular form.

Aside from these variations for the past

tense and past participle, the most numerous

and constant inflections occur in the use of

the second person singular — the forms with

thou. But it is precisely those forms that

modern English has discarded. Thou, with its

associated verb-forms, has passed entirely out

of common English speech or writing, being

found only in the older literature, in the lan¬

guage of Scripture, of prayer, etc., and rarely in poetic, oratorical or literary style that is intentionally made archaic. It is found that

all these forms can be adequately taught and

easily learned in a special department of <(The Ancient or Solemn Style,® and the ordinary

conjugations of the verb flow on unvexed by

their inflections. Thus the past tense of do

is the one word did, and of have the one word had, for all persons and numbers in present use.

Omitting, then, the forms used with thou,

we find that in dispensing with verb-inflections the English language has broken all precedent.

The varying forms of Latin and Greek verbs

are counted by hundreds. But (omitting, as

above stated, what may be called the ((thou sys¬

tem®), the most complicated English verb, the

verb be, has but eight inflected forms, be, am, is, are, was, were, being, been. The verb be is alone in this number of inflected forms. No

other irregular verb has more than five inflected forms ; as, give, gives, gave, giving, given. A regular verb has but four inflected forms; as, love, loves, loved, loving. The modes and

tenses, that express the manner and time of

action, are for the most part formed by

auxiliary verbs, be, can, do, have, may, must, shall, will; and when the forms and combina¬

tions of these eight auxiliaries are once learned, they are the same for all our thousands of

English verbs.

English syntax is determined by the lack of

inflection in the language. An inflected lan¬

guage, as the Latin or the Greek, for instance, could put a noun almost anywhere in the sen¬

tence, because the form of the noun would show whether it was the subject or the object of the verb or otherwise accounted for. But in Eng¬

lish whether a noun is subject or object of a verb can ordinarily be known only by its posi¬

tion, as subject when preceding, or as object

when following the verb. The same is true

of most pronouns, seven objective pronoun—

forms — me, us, thee, him, her, them and whom — being alone independent of this rule, since

these alone show by their form the relation they bear to the verb or to a preposition. Since in English the adjective has no change of form

for masculine, feminine or neuter, for nomina¬

tive, possessive or objective, singular or plural, the connection of the adjective can likewise

be known only by its position, as immediately

preceding or following its noun. So the ad¬

verb must be placed as close as possible to the verb, adjective or other adverb it is to modify.

Many ridiculous constructions arise from a

neglect of this requirement.

Some view such an exposition with amaze¬

ment that is almost dismay. They are ready to exclaim, (<Is this all that English grammar has to offer — position®? Hence many carelessly

say the <(English has no grammar,® and Richard Grant White deliberately entitled it <(The Gram¬

marless Tongue.® This is as if one whose

whole idea of numerical notation had been

formed by Roman numerals were to be sud-

denly introduced to the Arabic system. He

has been accustomed to writing a special letter or group of letters for each number, I, II, III, IV, V, VI, VII, VIII, etc., and you tell him that the figure 1 has no meaning except by

position ; that it may mean one unit or ten or a hundred or a million or a million million units, according to its place in the line; or that, on the contrary, it may mean one-tenth, one-hundredth or one-millionth of a unit in a cer¬

tain position after the period. Instead of his complicated system you offer him 10 digits

and position. In fact, it took the world a con¬

siderable time to become sure that this simple system would be adequate. Now mathema¬

ticians tell us that the stellar distances could never have been computed by the Roman

numerals. The simple decimal system of nota¬

tion by position is a necessity for intricate cal¬

culations ; yet, because of its simplicity, children learn it in a surprisingly short time. English speech has rules, just as the Arabic

notation

has rules ; and they are not in either case less imperative because they are simple.

In every sentence there is an essential sub¬

ject (often called the grammatical subject),

without which the group of words would not

form a sentence. This essential subject is com¬

monly known by its position, just as the 1 in 1,000,000 has value by its position. Some¬

thing is settled by elimination, as the object of a preposition cannot be the subject of the sen¬

tence. We say, (<The man with his friends was (not were) present® because ((friends,® as the

object of the preposition ((with,® cannot affect the verb. Similarly the object of a participle cannot be the subject — <(The writer, seeing the difficulties, gives (notj give) his consent.®

<(Writer® is there the only possible subject.

In like manner there is some one verb

(often called the predicate verb) which is the essential predicate (or the grammatical predi¬

cate), without which the group of words would

not form a sentence. Around the essential

subject and around the essential predicate may

be grouped other words or phrases, forming the complete subject and the complete predicate

respectively. When these are settled we have

exhausted the grammar of the simple sentence.

If two or more simple sentences are conjoined, we have only to settle the construction of each as a simple sentence (commonly then called a

clause) ; after which we have only to see that these simple sentences are properly combined

to form the most extended compound or com¬

plex sentence.

The process is not the less worth while be¬

cause it is simple. The very perfection of our best systems of efficiency is their simplicity.

No manager would recommend his system as

admirable because it was complicated. Eng¬

lish grammar is the systematic ordering of

English words for expression of thought, and

the proper knowledge of that system is the

best aid to clearness, force, and beauty in the expression of thought.

Tames C. Fernald,

Editor, (The Students' Standard Dictionary .>

GRAMMAR SCHOOLS. The term gram¬

mar school is generally used at the present time to denote a school maintaining a full elementary or preacademic course and housed in a build¬

ing or buildings by itself separate from the high school or academic

department. Less fre¬

quently a school having only the seventh and

eighth grades is called a grammar school. The

term is usually not employed except in a city or large village.

The course of study in a grammar school is

essentially the same as that commonly prescribed in the rural school or the elementary department of the village high school which usually in¬

cludes both elementary and academic depart¬

ments. The difference is in the number of

studies offered, the length of time given to

class periods, and, in rural schools, the number of classes or grades instructed by a single

teacher.

The subjects usually taught in the grammar

school are reading, arithmetic, elementary Eng¬

lish (including composition, oral and written,

grammar and literature), geography, elementary

United States history, physiology and hygiene,

drawing, music, and in the more fully equipped schools, cooking, sewing and manual training.

More or less physical training is also usually included in the course of study. In an occasional grammar school there are taught the beginnings

of certain subjects which in the past have ordi¬

narily been considered as belonging in the high school: These subjects are Latin, modern lan¬

guages, algebra and elementary general science.

Graduation from the grammar school implies

adequate preparation for high school work.

The typical grammar school offers eight

years or grades of work, with, in many in¬

stances, a year in the kindergarten where pupils, usually not more than six years of age, are given preliminary training before beginning the

regular first year school work. An occasional

grammar school has nine grades, at times

using nine years to complete the work ordb

narily done in eight, and more frequently in¬

cluding some high school work in the gram¬

mar school course.

The number of teachers varies greatly.

There are seldom less than eight, one to a grade, although in small outlying schools one teacher

may instruct two grades. A typical city gram¬

mar school has from 16 to 32 teachers. Each

of the eight grades is divided into sections ac¬

cording to the number registered, and a teacher is assigned to each section. The number and

arrangement of sections varies greatly to corre¬

spond to local needs. According to common

practice, one or more sections of each grade

does the first half of the year's work while

the remaining section or sections is doing the second half. This organization makes possible

a series of 16 steps rather than eight in the course, and permits closer adjustment to the

needs of individual pupils.

The size of a school depends chiefly on two

factors : The density of population, since little children cannot be expected to walk far to

school, and the number of teachers whose work

can be effectively supervised by one principal.

If the number is less than about 16 it is not good economy to pay the salary required to

secure the highest type of supervising principal ; if it is more than 32 it will be impracticable for one man to supervise properly unless as¬

sisted by departmental supervisors. With such

assistance, the number of teachers may be

largely increased.

Registration in each room normally varies

%

from 25 to 50. The ideal registration is prob¬

ably from 30 to 35.

Recent developments in school organization

tend to change the number of grades in the ele¬

mentary school from eight to six and to organ¬

ize a socalled junior high school consisting of what has been in the past the two upper grades of the elementary school and the first year of the high school. For a full explanation of the reasons for this change see the article on the Junior High School.

Randolph T. Congdon.

GRAMME, the standard unit of French

measures of weight. A gramme = T5,432 grains

troy. See Metric System.

GRAMOPHONE. A sound-reproducing

apparatus invented by Emile Berliner and the

basis of all disc phonographs. In principle it is similar to the phonograph (q.v.) and the

graphophone (q.v.), but in its original form

differed from these by employing a glass disc

coated with lampblack instead of a cylinder of wax for its record. This disc carries a stylus connecting with a diaphragm which is vibrated

by the sound-waves, and records those vibra¬

tions upon the lampblack surface in the form

of a long spiral, as the disc is revolved in a horizontal plane. Unlike the record cylinders

of the phonograph or graphophone, the disc

cannot be used directly to reproduce the sounds thus recorded, and for that purpose a corre¬

sponding disc of hard rubber, prepared from

a metal die photo-mechanically etched from

the original markings on the lampblack coating

of the glass disc is employed. In its subse¬

quent development the method of making and

reproducing records has been assimilated to

that for cylinder phonographs.

GRAMPIANS, GRAMPIAN HILLS, or

GRAMPIAN MOUNTAINS. (1) The chief

mountain system of Scotland, extending across

the country from southwest to northeast, for a distance of about 150 miles, and roughly re¬

garded as the dividing line between the High¬

lands and Lowlands. Its limits are not well

defined, but it may be said to commence near

the southwest end of Loch Awe, on the west

coast of Argyleshire, where the main ridge

runs, in a well-marked course, along the north¬

ern boundaries of Perthshire to Cairn Ealer,

where it separates into two distinct branches —one stretching north-northeast on the north

side of the Dee, and terminating near Huntly;

the other running nearly due east on the south side of that river, and terminating in the

neighborhood of Stonehaven. Among its

peaks are Ben Nevis, the highest mountain in

Scotland, 4,406 feet ; Ben Cruachan, 3,689 feet ; Ben Lomond, 3,192 feet; Ben Lawers, 3,984

feet; Schiehallion, 3,547 feet; Ben Macdhui,

4,296 feet; Cairngorm, 4,084 feet; Cairntoul,

4,241 feet. The more remarkable passes are

those of Aberfoyle, Glenshee and Killiecrankie. The principal rivers rising in the

Grampians are the Tay, Forth, Spey, Don and

Dee. The range takes its name from the

Graupius Mons of Tacitus, the scene of Agri¬

cola's defeat of Galgacus in 86 a.d. (the site of which is unknown) and its mistaken ren¬

dering ˆGrampius.®

(2) A low range of mountains in the west¬

ern part of Victoria, in Australia, are called Grampians.

GRAMPUS, or COWFISH, a genus of

porpoises of the family Delphinida. The spe¬

cies inhabiting the North Atlantic (Grampus

griseus) reaches a length of about 12 feet.

The head is globose, with a slight indication of a beak; the lower jaw shorter than the upper; dorsal fin high and falcate. The upper sur¬

faces of the body are gray in color, the belly grayish white. The body is usually marked

with numerous, irregular, light-colored lines

which are believed to be due to the at¬

tacks of the cuttlefish. The young have the

front of the head yellowish white, and six or seven vertical white lines on the sides. There are from 6 to 14 rather large, blunt teeth in the lower jaw, but none in the upper jaw. On the Atlantic coast of North America the gram¬

pus accurs singly or in small schools, ranging southward to New Jersey. It also occurs on

the coasts of Europe. A closely allied species (G . Stearnsii) inhabits the north Pacific, and the genus has been reported from the Cape of

Good Hope and New Zealand. The grampus

feeds upon cuttlefish, and yields oil of superior quality. The name grampus (from the Italian

gran pesce, meaning simply <(large fish®) is

applied also to various other cetaceans, and

especially to the killer whale (Orcinns orca) and to the blackfish (Globicephala) .

GRANADA, Fray Luis de, Spanish

writer and orator: b. Granada 1504; d. Lisbon, 31 Dec. 1538. His father died while Luis was

still a child leaving the family without re¬

sources and his mother did the washing at the monastery of Santo Domingo, the inmates of

which extended help to her in other ways.

The boy showed an early precocity which at¬

tracted the attention of Count Tendilla, who

gave him permission to study with his own

children. At the age of 20 Granada joined the Dominican order and giving up his family

name of Sarria, he assumed that of his native city, Granada. In the monastery which was, in

those days, a sort of university, Granada fol¬

lowed all the courses given and outdistanced

all of his fellow students. He showed special

talent as an orator. Even among the brilliant

students of the monastery he became so noted

for his numerous talents that he was crowned

with the greatest honor the institution could

bestow upon him. In June 1529, after finish¬

ing his course at the monastery, he was elected honor student of his alma mater in the College of Valladolid. On the completion of a bril¬

liant course, broad, farreaching and deep in

its significance, he returned to the monastery

oj Granada as a teacher of higher studies, espe¬

cially philosophy and theology. In Granada he

soon acquired a reputation as a preacher and

orator that surpassed that already acquired

as a student and-teacher. Thousands of all

classes flocked to hear him and among his

hearers he made many influential friends who

served him in good stead when he was ap¬

pointed head of the dilapidated monastery of

Scala Cceli in the mountains of Cordoba. In

the latter Fray Luis gathered about him a body of earnest young monks zealous for the good

of the Dominican order, and with their aid

and that of his influential friends and the good will of the community, he succeeded in making

Scala Cceli one. of the most notable monastic

centres of Spain. There he composed some

of his most important works. After eight

years of labor there he was appointed preacher and priest to the Duke of Medina-Sidonia at

his palace in Sanlucar. This position he relin¬

quished to undertake the task of founding a

great Dominican monastery in Badajos, in

which he was brilliantly successful, due prin¬

cipally to his oratorical ability and his talent for organization. In this new convent he

wrote (Guia de pecadores,> a work which met

with great favor not only in Spain but in all Christian countrips. Scarcely had he finished

his task in Badajoas when Fray Luis was in¬

vited to Portugal by the royal cardinal arch¬

bishop of Evora. So great was his success as

an orator in Portugal that the Portuguese

showered upon him all the favors permitted

by the order; and in 1557 he was elected to the high position of provincial of Portugal, which

made him head of all the Dominican monas¬

teries and establishments in the country. At

the end of his term of office during which he was very active in erecting and improving

monasteries and otherwise advancing the inter¬

ests of the order, Frav Luis returned to Lis¬

bon to convent life, having refused the ap¬

pointment of archbishop of Brega offered him

through the queen of Portugal whose confes¬

sor he had been. He died shortly afterward

of a fever contracted through malnutrition,

the result of his ascetic life.

Fray Luis de Granada set a higher standard

of Spanish prose than any of his contempora¬

ries or predecessors. Among his published

works are (Guia de pecadores) ; (Libro de la

oracion y medilacion) ; <La vida Cristiana) ;

ˆimbol de la Fe} ; (Doctrina Cristiana' ; lLa vida del Padre Maestro Avila) ; (Vida de Mili-cia Fernandez > ; (Vida de Dona Elvira de

Mendoza) ; (Conceptus MundP ; (La escala

espiritual de San Juan ClimacoP For works

and biography see Volumes VI, VIII and XI

of the Biblioteca de autores espanoles (Rava—

deneira) .

GRANADA, gra-na'da, (1) an ancient

kingdom, subsequently a part of southern

Spain, bounded by Andalusia, Murcia and the

Mediterranean. It was included in the

Roman province of Boetica, and after the

Saracen invasion became an independent

Moorish kingdom until it was conquered by

Ferdinand and Isabella in 1492, when it be¬

came one of the 13 old provinces ; it had an area of 11,100 square

miles, and since 1833 is divided into the provinces of Granada, Almeria and Malaga. (2) The modern province,

with a coast line of 66 miles on the Mediter¬

ranean, has an area of 4,928 square miles. It is picturesquely diversified by mountains and

valleys, the chief range being the Sierra

Nevada, which attains a maximum altitude of

11,781 feet in the Cerro de Mulhacen, the lofti¬

est summit in Spain. The province watered

by the Guadalfeo, the Jenil and Darro is com¬

paratively fertile and well cultivated; and

abounds in mineral wealth. Pop. (1900) 492,-

460; in 1917 about 534,000. The capital is

(3) Granada, the ancient metropolis of the

Moors. It is romantically situated on the

rivers Darro and Jenil, at the foot of the snow¬

capped Sierra Nevada, which forms a back¬

ground to the crescent-shaped city, with its ter¬

raced streets, turrets and gilded cupolas ris¬

ing above each other, the whole crowned by

the Alhambra (q.v.), the famous citadel-palace

of the Moorish rulers. After the Moors had

been torced to abandon the rest of their Span¬

ish dominions they held out for 250 years in

the old kingdom of Granada, and during that

period were able to adorn their capital with

this famous palace, which represents the high¬

est achievement of Moorish art in Spain, just

as the mosque at Cordova stands for the Arab

genius. ((Though the one style proceeds out of the other, w Mr. Royal Tyler writes, ((and the superficial resemblances are many, the real dif¬

ferences go very deep. If nobility be the ideal, there is no doubt as to which is the greater; and nature has done well to enhance Granada's

charms by the wonderful setting furnished by

the Sierra Nevada, for otherwise the struggle

would have been too unqual. As it is, the Al¬

hambra will remain for most people the cul¬

minating glory of all Spain.» The gardens of

the Alhambra are surpassed by those of the

Generalife, a delightful place on a neighbor¬

ing hill. The city itself contains very few

vestiges of Moslem times, but has a lovely

Renaissance cathedral, by Diego de Siloe,

which possesses much good sculpture by Alonso

Cano and others. Adjoining it is the Capilla

Real, which shelters the tombs of Ferdinand

and Isabella. The Granadine school of paint¬

ers and sculptors in the 16th and 1 7th centu¬

ries included, beside Alonso Cano who has

been mentioned above, Pedro de Mena, Jose de

Mora and Atanasio Bocanegra, whose work

may be studied not only in the cathedral but

also in the churches of San Juan de Dios, San Jeronimo and the Cartuja. Other notewor¬

thy buildings are the archiepiscopal palace and the residence of the provincial captain-general.

Granada is the seat of a university founded in 1531, of several colleges, a normal school and a school of art. It has various manufactures

of local importance only, such as silks and

woolens, leather, paper, hats, *etc.* Founded by

the Moors before 800, near the site of the

ancient Illiberis, and from 1036 to 1234 in¬

cluded in the kingdom of Cordova, in 1235 it

became the capital of a new kingdom, and at¬

tained almost matchless splendor. In 1491 it

remained the last stronghold of the Moors in

Spain, and mustered 60,000 men to resist Fer¬

dinand and Isabella. The defense proved una¬

vailing and the besiegers took possession in

1492. A year later it was made the seat of an archbishopric. The great body of its inhabitants still were Moors, and its prosperity continued

almost without diminution till 1610, when it

declined with the decree expelling the Moors

from Spain. Pop. about 78,000.

GRANADA, Nicaragua. (1) City, capi¬

tal of the department of Granada, on Lake

Nicaragua and the Pacific Railroad of Nica¬

ragua. It was founded in 1524 and was for¬

merly the chief town of the republic, but has suffered greatly from the civil wars. It is a trading centre for dyewoods, cacao, gold and

silver filigree handmade ornaments and hides.

Pop. 17,092. (2) The department of Granada

lies between the Pacific and Lakes Nicaragua

and Managua ; area about 2,600 square miles ;

highest peak, Mount Mombacho, an extinct

volcano.

GRANADILLA, the edible fruit of cer¬

tain tropical species of passion-flowers (q.v.).

GRANARY, The, an ancient burial ground

in Boston, Mass., in Tremont street. Here are

buried Paul Revere, Samuel Adams, John

Hancock, Peter Faneuil, Chief Justice Sewall and several of the old colonial governors of Massachusetts.

GRANBERY, John Cowper, bishop of the Methodist Episcopal Church South : b. Norfolk, Va., 5 Dec. 1829; d. Ashland, Va., 1 April 1907. Graduated Randolph-Macon College in 1848, he entered the Methodist ministry in that year, was a chaplain in the Confederate army in 1861-65 and in 1875-82 professor of moral philosophy and practical theology in Vanderbilt University. His publications include (Twelve Sermons) (1896) and Experience the Crowning Evidence of the Christian Religion) (1900).

GRANBURY, Tex., town, county-seat of Hood County, on the Brazos River, the Fort Worth and Rio Grande Railroad. The chief manufactures are flour and farm implements. It has a cotton-gin, oil mill, ice plant and is a trade centre for the products of the surrounding agricultural region. Pop. 1,336.

GRANBY, Canada, town on the Yamaska River in Shefford County in the province of Quebec, on the Central Vermont Railway, 55 miles southeast of Montreal and also on the Montreal and Southern Counties Electric Rail¬ way. There are rubber, comb, sash and door and chair factories, and carriage works. Pop. 4,750.

GRANBY TOKEN (1737), a private cop¬ per coinage issued by John Higley of Granby, Conn., where there were copper mines after¬ ward used as Tory prisons and workshops. The obverse was a deer, with the legend <(Value Me as You Please®; Roman numerals III and crescent. The reverse was three ham¬ mers on a triangular field, each surmounted by a crown, and with the legend <(I Am Good Copper.®

GRAND, Sarah, pseudonym of Frances Elizabeth Clarke, English novelist: b. Ire¬ land. When 16 she married Lieutenant-Colonel M'Fall (d. 1898), with whom she traveled in India, China and Japan; in 1901 she visited the United States. She has

been active in the

woman's movement in England. The first

novel that gave her reputation was (The Heav¬

enly Twins5 (1893). Her other writings in¬

clude (Singularly Deluded5 ; (A Domestic

Experience5; (Our Manifold Nature5 (1894);

Ehe Beth Book5 (1897) ; (The Modern Man

and Maid5 (1898) ; (Babs the Impossible5

(1900); Emotional Moments5 (1908); (Ad—

nam's Orchard5 (1912) ; (The Winged Victory5

(1916).

GRAND ARMY OF THE REPUBLIC,

a patriotic association, organized in the inter¬

est of the surviving representatives of the

military and naval forces of the Civil War, the families of those dead, and such objects as

they think cognate with these. The member¬

ship is of soldiers and sailors of the war, hon¬

orably discharged or continuing, and State

militia on active duty subject to national call during that time. It was organized in Illinois in the winter of 1865-66, by Dr. B. F. Stephen¬

son and Rev. W. J. Rudolph, the surgeon and

the chaplain of the 14th Illinois Infantry; the first post was organized at Decatur, Ill., 6

April 1866; the first national “encampment®

was held at Indianapolis, 20 Nov. 1866. Its

assigned objects are fraternity, commemora¬

tion and assistance among the above classes ;

and it has aided in establishing soldiers’ homes and memorials, and maintaining and educating

soldiers’ orphans. It also caused the institu¬

tion of Memorial Day. It ruled in 1869 that

it should not be used for partisan work, nomi¬

nations or debates, but naturally it has been

a powerful factor in political calculations and the shaping of party conduct regarding both

nomination of candidates for office and legis¬

lative action. It has also given out strong

utterances against restraining liberality in pen¬

sion legislation, and has used its influence to prevent official restriction in the expenditure of money under such legislation. It has head¬

quarters in Cincinnati, and in 1921 reported

4,458 posts throughout the country, almost every State being a department with a commander.

The membership was 102,438; it was once over

400,000. The deaths, during the year ended 31

Dec. 1920, were about 16,000. There is a na¬

tional council of administration of 44 members.

It holds annual meetings or encampments in the chief cities; the uniform is dark blue with black slouch hat. Its badge is a bronze star hung

from a strap and ribbon flag; on the star in relief are a soldier and sailor clasping hands in front of a figure of liberty, with two freemen in the foreground, the United States flag on the

sides. Consult Beath, R. B., (History of the

Grand Army of the Republic5 (New York 1889)

and Wilson, O. M., (The Grand Army of the

Republic under its First'Constitution and Ritual5

(Kansas City, Mo., 1905). See Woman's Relief

Corps.

GRAND ASSIZE, a form of the jury sys¬

tem for trying cases involving land titles. It was instituted by Henry II and was available only

to the tenant, who had become defendant in a

suit originating in a writ of right. The assize or jury was formed of knights, ((girt with

swords,® appointed by four knights, who in turn were selected by the sheriff. These four knights chose 12 others and the body thus comprised

either 12 or 16 according as the four electors abstained from or added themselves to the assize.

The grand assize was a great step forward in

legal procedure, since to a very great extent

it abolished the barbarous system of ordeal by battle. It survived until abolished by 3 and 4

William IV, cap. 42, Act of 1834. Consult

Pollock and Maitland, (History of English Law5

(Boston 1899) and Thayer, (Preliminary Treat¬

ise on Evidence at the Common Law5 (ib.,

1898).

GRAND BANK, a submarine plateau, an

extension of the continental shelf in the north Atlantic Ocean, off the coast of Newfoundland.

It stretches about 500 miles toward Europe and skirts the island coast for over 200 miles. It is supposed to be formed of the solid matter

carried from the icy north by icebergs, which

melt in this locality upon coming into contact with the warm waters of the Gulf Stream. The

average depth of water over the Grand Bank is about 50 fathoms. The American side of the

bank is of great economic importance, being a

favorite resort for codfish. Thousands of tons

of these fish are caught here annually by the GRAND BANK — GRAND CANYON OF COLORADO RIVER

great ocean fishing fleets of the United States, Great Britain and France.

GRAND BANK, Newfoundland, town in

the district of Burin, also a port of entry, situ¬

ated on the south shore of Fortune Bay. It is an important depot of supplies for the great

fishing fleets that work in the waters off this coast. For generations

also there has been a

large trade with Brittany and the French colony of St. Pierre. Pop. 1,675.

GRAND CANAL, The (II Canale Grande

di Venezia), the principal waterway of the city of Venice, Italy. It is from 80 to 175 feet

wide and traverses the city in two great reverse curves. The well-known Rialto bridge crosses

the canal, on the banks of which are situated manv of the great Venetian palaces.

GRAND CANYON OF COLORADO

RIVER. In crossing the high plateau region

of southern Utah and northern Arizona, the

Colorado River has cut the greatest canyon

in the world. It is more than a mile deep in places and the deeper portion is about 200

miles long. It is not only the most notable

scenic spectacle of its kind, but a remarkably clear and impressive exposition of geology, pre¬

senting many features that can be readily under¬

stood. The rocks are bare, and while most of

them are in thick beds lying nearly level some are tilted at various angles. They represent

a long portion of geologic time from the

Archaean, or oldest known, to the late Carbon¬

iferous, but deposits of Ordovician, Silurian and most of the Devonian ages are absent. These

rocks constitute cliffs and buttes of great

variety of form and much brilliancy of color,

forming a most stupendous and beautiful specta¬

cle. The features presented illustrate most

clearly the titanic process of nature's sculptur¬

ing, not only in the present configuration but in the former land surfaces of earlier geologic

times.

The term Grand Canyon is applied to that

portion of the canyon of the Colorado River

which lies in northern Arizona. It is in the

midst of a wilderness and inaccessible from

most directions, but the Atchison, Topeka and

Santa Fe Railroad has a branch line to its

southern rim at a locality where some of the

finest features are visible. Here are hotels

from which trips can be made along the rim

and down trails to the river's edge. Some

views in this vicinity are given in the plates herewith. The altitude here is 6,866 feet above sea-level; at the river just north it is 2,355 feet; on the farther rim to the north it is 8,000 feet.

Few persons can realize on first view that

the canyon is nearly a mile deep and from 8 to 10 miles wide. The cliffs descending from the

rim form a succession of huge steps, each 300 to 500 feet high, with steep rocky slopes between.

These cliffs are the edges of hard beds of lime¬

stone or sandstone, while the intervening slopes mark the outcrops of softer shales. These beds are more than 3,500 feet thick and they lie nearly horizontal. Far down in the canyon is a broad shelf caused by a basal hard sandstone; it is deeply trenched by the narrow inner canyon cut a thousand feet or more into the underlying

Archaean ((granite.)?

The rocks of the canyon walls vary in color

from white and buff to bright red and dull

green. They present a marvelous variety of

picturesque forms fashioned mainly from ero¬

sion by running water, the agent which has ex¬

cavated the canyon.

The Colorado River, one of the largest in

North America, rises in the Rocky Mountains

in Colorado and Wyoming and empties into the

Gulf of California. In the Grand Canyon it

is about 300 feet wide and 30 feet deep, flowing about 2 miles an hour with an average volume

of 20,000 cubic feet a second. During freshets the depth, velocity and volume are greatly in¬

creased. In its course of 42 miles through the central or deeper part of the canyon the river falls about 500 feet or 12 feet to the mile. The water contains much sediment, especially in time of flood. Every rain fills the side canyons with rushing torrents which carry into the river a

heavy load of debris from the adjoining slopes.

Thus has the canyon been excavated and the

deepening and widening is still progressing. It began at the surface of the plateau and it will continue until the river reaches a grade so low that it can no longer move the debris ; mean¬

while the side streams will widen the canyon

until its sides become gentle slopes. Under

present conditions and without further uplift of the country this will require a million years or more.

The rocks exposed in the walls of the Grand

Canyon underlie a wide area of the Arizona

Plateau and most of them extend far beyond.

The first 3,700 feet of beds, all of which lie nearly horizontal, are as follows :

LIST OF STRATA FROM RIM TO GRANITE, ETC., IN

WALLS OF GRAND CANYON.

a <q

o 3

•£ S

6 1

Feet

Limestone, light colored, partly cherty, mostly

massive (Kaibab) . 800

Sandstone, light gray, massive, cross-bedded,

(Coconino) . 300

Sandstones and shales, all red (Supai formation) . 1,100

Limestone, massive, light blue-gray, but surface mostly stained red (Redwall) . 550

Shale, with limestone and sand-1

Sarfdstonefhardi dirty gray to buff | Tonto 8rou P • 800

(on granite) . j 150

These formations are readily * recognized by

their color or character as they are practically uniform in aspect and

relative position from

all points of view.

The relations of these rocks are shown in the views and in the following cross sections:

Fig. A. — Section across Grand Canyon from

El Tovar Hotel through Buddha Temple to

Kaibab Plateau. Fig. B. — Section across Grand

Canyon near El Tovar, looking west.

The top limestone, Kaibab, caps the plateaus

on both sides and the highest buttes. The out¬

cropping edge of the Coconino sandstone is

marked by a distinct band of. light gray all

along the canyon walls and capping some buttes 700 to 800 feet below the top. The red beds

of the Supai formation everywhere constitute

the middle slopes and many buttes, usually pre¬

senting a series of relatively small terrace-like steps. The conspicuous cliff below these, and

stained red by their wash, is the hard massive Redwall limestone. It projects in many flat-topped spurs, buttresses and outliers isolated by erosion. The Tonto group,, next below, form¬

ing slopes and a platform, is recognized by its greenish color.

For many miles the shelf of this sandstone

of the Tonto group is cut through by a steep 124

inner gorge which descends to the river 800 to 1,000 feet below, and exposes granite and gneiss of the original earth crust. At certain localities Algonkian rocks lie between the Tonto and the

granite and they occupy a wide area northeast

of Grandview. They consist of 12,000 feet of

limestone, sandstone, red shale and lava, known as Unkar and Chuar group. These beds dip

at moderate angles and on their irregular sur¬

face, which was land in earlier Cambrian time, lies the shale of the Tonto Group.

The first white men to see the Grand Canyon

were Cardenas and his 12 companions, who

were guided to the rim by Hopi Indians in

1541. Nearly 330 years later the first trip ever made down the river was accomplished by

Maj. J. W. Powell. He left Green River, Wyo., 24 May 1869, in small boats and had a perilous and exciting but entirely successful passage.

A memorial to Major Powell has been erected

by the government on the rim at Sentinel Point.

Since his pioneer effort this hazardous journey has been made by a few others, among them a

party surveying for a proposed railroad, a proj-GRAND FALLS, or

COLEBROOKE,

Canada, port of entry, in Victoria County in

New Brunswick, on the Canadian Pacific and

Grand Trunk Pacific railways, 202 miles from

Saint John. It is on the Saint John River,

which is navigable to this point. The falls,

which give the name to the place, are about

80 feet in height. Considerable trade is carried on in agricultural products. It is a tourist and sporting centre. Pop. 1,280.

GRAND FALLS, a cataract of the Grand

River, in Labrador, British America. These

falls are in a canyon of the Grand River, 25

miles long and nearly 500 feet deep. About

four miles above the falls the river begins a rapid descent of 200 feet to the falls, where the precipice is 320 feet deep and 200 feet wide.

Below the falls is another rapid descent of

about 300 feet, and then a gradual descent to the ocean. The total descent from the begin¬

ning of the first above the falls to the ocean is about 2,000 feet. This canyon was discovered in 1839 by a Hudson Bay Company official named

McLean; but no further report being made, its

Sections across Grand Canyon of Colorado River near El Tovar Looking West.

ect since abandoned. The Grand Canyon is

included in a forest reserve and has also been created a national monument administered by

the United States Department of Agriculture.

See National Parks and Monuments.

Bibliography. — • For further descriptions

and details the reader is referred to the fol¬

lowing books: Darton, N. PI., (Guidebook of

Western United States) (Santa Fe Route, Bul¬

letin 613, United States Geological Survey) and ‘Story of the Grand Canyon of Arizona) ;

Dellenbaugh, F. S., (Romance of the Colorado

River } (1902) and (A Canyon Vovage) (Nar¬

rative of the second Powell expedition, 1908) ; Kolb Brothers, (The Grand Canyon of Arizona*

(1913) ; Powell, J. W., (Exploration of Colo¬

rado River of the West* (Explorations in

1869-72, under Smithsonian Institution, Wash¬

ington 1875) and (Canyon of the Colorado*

(1895) ; Wharton, James S., Un and Around

the Grand Canyon of Arizona > (1900) and

(The Grand Canyon of Arizona, How to See

It) (1912) . N. H. Darton,

Geologist , United States Geological Survey.

existence became a memory until 1891, when it was rediscovered and in 1894 surveyed by the Canadian Geological Survey. See Grand River.

GRAND FORKS, N. D., city, county-seat of Grand Forks County, on jhe Red River of the North and the Red Lake River, and on the Northern Pacific and the Great Northern railroads, about 25 miles west of Crookston and 320 miles northwest of Saint Paul. It was settled in 1871 and incorporated in 1881. It is situated in an agricultural, cattle and hog¬ raising and dairying region. Its chief manu¬ factures are meats and packing-house products, flour, sash and doors, candies, creamery prod¬ ucts, foundry products, bricks and steam-boilers. The United States census of manufactures for 1914 showed within the city limits 32 industrial establishments of factory grade, employing 462 persons ; 343 being wage-earners receiving an¬

nually $288,000 in wages. The capital invested

aggregated $1,346,000, and the year's output was valued at $1,816,000; of this, $819,000 was the value added by manufacture. In addition to

the trade in its manufactured articles it has

a large trade in live stock, wheat, oats and

potatoes. The city has five banks with an

aggregate capital and surplus of $800,000. It

is the seat of the North Dakota State Uni¬

versity, opened in 1884, the Wesley College of Music, Saint Bernard's Academy and the Grand

Forks School of Music. Two large business

universities are located here also. The public

school system is excellent and progressive. Saint Michael's Hospital, the city building, the gov¬

ernment building, the Y. M. C. A. building, Saint Michael's Catholic Church, the public library

and the Presbyterian Church are among the

principal buildings of the city. The city owns the electric-light plant for street lighting and the waterworks. In the last decade Grand

Forks increased in population over 50 per cent.

Pop. 15,000; including East Grand Forks, Minn,

(directly across Red River), 17,426.

GRAND HAVEN, Mich., a port of entry,

county-seat of Ottawa County, on Lake Michi¬

gan, at the mouth of Grand River, and on the Grand Trunk, Pere Marquette and Grand River,

Grand Haven and Milwaukee railroads. It

has an excellent harbor open the year around

with steamship connections to Chicago and Mil¬

waukee. The Grand Trunk operates two car

ferries between Grand Haven and Milwaukee.

A big trade is carried on in machinery, leather, fruits and grains. The principal manufactured

products are automobile leather, steam engines

and hoists, refrigerators, pianos, brass and iron castings, stampings, files and rasps, steel boilers and vessels. Large quantities of smoked fish,

berries, grapes and celery are produced. The

city was founded in 1835 ; it has three popular summer resorts, Highland Park, Spring Lake

and Grand River. The form of city govern¬

ment is a modified commission plan with a

mayor and city manager. It has municioal

waterworks, electric plant, a public library, fine parks, electric railroad and radiating system of good roads. Fine high school and Akeley Col¬

lege for girls. Pop. 8,000.

GRAND ISLAND, Neb., county-seat of

Hall County near the Platte River, on the Bur¬

lington & M., the Union P., the Saint J. & G.

I. railroads, about 97 miles west of Lincoln

and 144 miles southwest of Omaha. The first

permanent settlement was made in 1862, and it

was incorporated in 1872. It is situated in a fertile agricultural region. The chief manufac¬

tures are beet sugar, flour, canned fruits and vegetables, machinery, brooms, mattresses, fenc¬

ing materials and chemicals. The United States

census of manufactures for 1914 showed within

the city limits 49 industrial establishments of factory grade, employing 608 persons ; 460 be¬

ing wage-earners receiving annually a total of

$342,000 in wages. The capital invested ag¬

gregated $1,750,000, and the year's output was

valued at $2,101,000; of this, $685,000 was the value added by manufacture. Large railroad

shops for the Union Pacific Railroad are lo¬

cated here. There is an extensive trade in live stock and grain. The city is one of the largest horse and mule markets in the world, the sales annually amounting to about 40,000 head.

Grand Island contains a number of wholesale

establishments and is the distributing centre for a large section of the northwest of Nebraska.

The State Soldiers' and Sailors' Home and

Saint Francis' Hospital are located here. It

is the seat of Grand Island College, opened in 1892 under the auspices of the Baptist Church, and it has a large free library. The present

city charter, of 1901, provides for the election of a mayor every two years and a city council, in whom is vested the government. The city

owns the waterworks and light plant. Pop.

(1920) 13,960.

GRAND JUNCTION, Colo., city, county-seat of Mesa County, at the junction of the

Grand and Gunnison rivers, and an important

point on the Denver and Rio Grande and the

Colorado Midland railroads. It is 4,560 feet

above sea-level. It is nearly midway between

Denver and Salt Lake. It is situated in a very fertile tract known as Grand Valley, and fruit, vegetables, alfalfa, beets and grain are raised in abundance. There are also a number of manu¬

facturing industries, including a beet-sugar fac¬

tory, flour mill, canning factory and meat pack¬

ing factories, and there is a thriving trade in coal, lumber and bricks ; a Carnegie library and Saint Mary's Hospital and a Y. M. C. A. and

postoffice. There are several fine parks. The

city is surrounded by some of the most noted

scenic points in Colorado. The waterworks

are owned and operated by the municipality.

Pop. 10,000.

GRAND JURY. See Jury.

GRAND LAKE, La., one of the shallow bodies of water in the southern part of the State, about 50 miles long. Its maximum width is about nine miles. Its chief inlets are Atchafalaya and Grand rivers, and Lake Ver—net. Its outlet is Myrtle Bayou, which flows into Atchafalaya Bay, an arm of the Gulf of Mexico.

GRAND MANAN, ma-nan', an island at the entrance of the Bay of Fundy, off the coast of Maine. It belongs to Charlotte County, in New Brunswick, Canada; area, 36,552 acres. On the north coast, at Indian Beach, is a settlement of Indians. Fishing is the chief occupation, but the large forests still furnish material for shipbuilding and some lumber. The island is a favorite summer resort, because of its climate and the abundance of small game. Pop. 2,644.

GRAND MERE, gran mar, Canada, town in Champlain County, province of Quebec, on the north side of the Saint Maurice River, 21

miles north of Three Rivers, on the Canadian Pacific and Canadian Northern railways. It is situated in a good farming district with excellent waterpower facilities. Pulp and paper mills, sash and door factories, stove manufacture and bookmaking are the indus¬ tries. Pop. 4,783.

GRAND OLD MAN, The, a name popu— uarly applied to W. E. Gladstone (q.v.).

GRAND PRIX DE ROME, gran pre de r5m, prize given annually by the Academy of Fine Arts in Paris to the most successful com¬ petitor in painting, music, sculpture, archi¬ tecture, *etc.* The winners of the prize become the charge of the government for four years and are sent to Rome to reside at the Villa Medici, the seat of the Academic de France a Rome. Each prizeman receives about $800 for his expenses, and is exempted from military service. The Prix de Rome was instituted by

Louis XIV in 1666 for the purpose of educat¬

ing young painters and sculptors by a study of the Roman antiquities. Architects were ad¬

mitted to competition in 1720. The institution

was suspended for a time during the Revolu¬

tionary period, but was opened again in 1803 by Napoleon who enlarged it to admit musicians,

medalists, engravers. During the Napoleonic

regime the school was removed to the Villa

Medici. Consult Baltard, (La Villa Medicis a

Rome) (Paris 1847). See £cole des Beaux

Arts.

GRAND RAPIDS, Mich., city and county-seat of Kent County, second in State to De¬

troit in population and importance, is situated on both sides of Grand River, about 35 miles

by rail from Lake Michigan, 152 miles from

Detroit, 180 miles from Chicago; lat. 42° 57’

49.02” N., long. 85° 40′ 1.65″ W. Area 18.25

square miles.

Railroads. — The first railroad into Grand

Rapids was the Detroit and Milwaukee (now a part of the Grand Trunk system), from Detroit to Grand Haven, in 1858. Since then have been built the Grand Rapids and Indiana, the Michigan Central, the Lake Shore, the Pere Marquette and three interurban lines. These roads radiate in 11 different directions, with through trains to all important Michigan cities and New York, Chicago, Cincinnati and Toledo. The Grand Rapids and Indiana and the Pere Marquette have extensive shops.

Industries. — Grand Rapids is the base of supplies and the distributing point for western and northern Michigan. It has large whole¬ sale and jobbing houses in groceries, provisions, clothing, dry goods, millinery, carpets, crockery, drugs, paper, cigars, boots and shoes, knit goods, sporting goods, hardware, mill supplies and in other lines. The chief industry is the manufacture of furniture (see Furniture In¬ dustry). New York and Chicago in their order exceed Grand Rapids in the volume of their furniture production, but Grand Rapids is regarded as a leader in design, finish and quality. Semi-annually, in January for the spring season, and July for the fall, buyers come here from all parts of the United States and from foreign lands

to inspect the new

styles and to place orders. Between 300 and

lines in other parts of the country semi-an¬
nually send their samples here for the buyers
to inspect. The outside manufacturers occupy
large furniture exposition buildings built for
their use, in the heart of the city. Other im¬
portant industries are the manufacture of
plaster from gypsum beds under and near
Grand River, knitting mills and textile indus¬
tries, brass works, printing, manufacture of
flour, machinery, carpet sweepers, *etc.*

Fruit-growing. — Grand Rapids is also the
centre of the West Michigan fruit belt, which
extends along Lake Michigan from Saint
Joseph to Traverse City. With an average
crop, the peaches, apples, pears and plums
marketed here will exceed 1,300,000 bushels.
This is also an important winter lettuce centre, Chicago, Cincinnati, Saint Louis and even New
York drawing on the Grand Rapids growers
for their supplies. One of the most popular
varieties of winter lettuce originated here and is named the ((Grand Rapids.®

Banks. — The capital and surplus of banks

and trust companies, September 1916, $6,935,-

000 ; capital, surplus and profits, $7,982,575 ; sav¬

ings deposits amounted to $22,175,302; bank

loans and investments, $40,785,479 ; total bank

deposits, $42,389,693; bank clearings in 1915

amounted to $175,419,457.

Churches, Schools, *etc.* — Many Christian

Church denominations are represented with

congregations and churches. The bishops of

the Grand Rapids Catholic diocese and West

Michigan Protestant Episcopal diocese live

here. The Catholics have a cathedral. The

total value of church property is estimated at $3,620,500; the Catholics hold $1,217,500; Re¬

formed Church in America, $223,500; Christian

Ref ormed, $233,500 ; Methodist Episcopal, $218,-

100; Lutheran, $195,750; Presbyterian, $138,200;

Congregational, $159,100; Baptist, $259,400;

Protestant Episcopal, $207,350; there are also

other and smaller denominations whose prop¬

erty is valued at $385,300. There are 37 public schools, including

three high schools. Calvin

College and Theological Seminary of the

Christian Reformed Church is located here.

The Catholics, Lutherans and Reformed

churches have parochial schools accommodat¬

ing about 8,000 pupils. The total school census in 1916 was 32,100. The Grand Rapids Public

Library contains about 190,000 volumes. It

consists of the Rverson librarv building (a

gift to the city of his birth by Martin A. Ryerson of Chicago), and 41 branches and stations

for circulating books. It is controlled by an

elective board of five members. The museum,

controlled by the same board, administers prop¬

erty valued at $76,000 and is especially strong in natural history specimens.

Public Institutions. — The Michigan Sol¬

diers' Home, maintained by the State with ac¬

commodations for 1,000 veterans and 200

widows, is located three miles north of the city.

There are three large hospitals, two orphan

asylums and two homes for the aged.

Public Buildings. — The public buildings are

city hall, valued at $452,000; courthouse, $300,-

000; Federal building and postoffice, $700,000; county jail, $50,000; Ryerson library building,

$506,000; museum, 876,000; police headquarters,

$138,000.

Clubs and Societies. — The Peninsular Club

owns a clubhouse in the heart of the city

valued with real estate at $200,000. The

Owashtanong Club has a clubhouse at Reed's

Lake costing $60,000. The G. R. Boat and

Canoe Club owns a clubhouse on Grand Rapids

River at North Park valued at $25,000. The

Kent Country Club owns 100 acres of land and a $15,000 clubhouse and the Highland Golf Club

also own land north of the city. There is an Elks temple valued at $200,000; a Masonic tem¬

ple at $500,000; Knights of Columbus building,

$125,000 and the Loyal Order of Moose build¬

ing, $30,000; the Germans have four club¬

houses and halls; the Irish, the Danish and the Polish each one. The Ladies' Literary Club

and the Grand Rapids Woman's Club, the West

Side Ladies' Literary Club and the Saint Cecilia (musical) Society, all made up exclusively of

women, own clubhouses. The Young Men's

Christian Association owns and occupies a

building that cost $250,000. The Grand Rapids

Association of Commerce has 1,400 members.

Parks and Resorts.— The city has John Ball

Park of 137 acres, the original 40 acres being GRAND RAPIDS - GRAND RAPIDS AND INDIANA RAILWAY CO. 127

the gift of John Ball; the Antoine Campau

park of four acres, the gift of Martin A. Ryerson ; Highland Park, 34 acres ; Lincoln Park,

15 acres ; Fulton Street Park and 25 other small parks, playgrounds and squares making a total

of about 400 acres. Comstock Park of 100

acres, north of the city, is owned by the West Michigan Fair Association. Reed's Lake, three

miles east of the city, and North Park, near the Soldiers' Home, are popular nearby summer

resorts. The Lake Michigan resorts at Sauga—

tuck, Holland, Grand Haven and Muskegon

are one hour away by rail.

Public Utility. — The city owns its own

waterworks, with Grand River as a source of

supply; a filtration plant, ensuring an abundant supply of pure water and 229 miles of mains of all sizes ; it also owns its own electric-lighting plant (furnishing light for some of the city

buildings, city hall, library and schools), gar¬

bage burner and market. Seven bridges

owned by the city span the river, two being of concrete construction

and four of steel. Com¬

mercial lighting is furnished by the Grand

Rapids Gas Light Company and the Consumers

Power Company (electric), each company hav¬

ing a monopoly in its field.

Government. — Municipal affairs are con¬

ducted by a mayor, elected for a term of two years, and a council of 24 aldermen, two from each ward elected for two-year terms, half re¬

tiring each year. The fire and police depart¬

ments, the health, the poor and the public

works and parks are under the control of

boards appointed by the mayor. The schools

are under a board of nine members elected by

the people, and the library and museum under

a board of five members, also elected. The as¬

sessed valuation in 1916 was $163,726,341. On

29 Aug. 1916 the electorate approved a new

city charter which provides for a commission—

manager form of government, with seven com¬

missioners, two elected from each of three

districts by the city at large, and one chosen from the city at large. The city commission

selects a city manager, who appoints a director of public service, a director of public safety and a director of public welfare. The city

manager, with these three directors, exercise all of the administrative

functions of the city,

subject to the supervision and regulation of the city commission. The commission selects one

of its members as mayor. This charter be¬

came effective the first Monday in May 1917.

History. — In 1826 Louis Campau established

an Indian trading station here and in 1831,

after the government survey, made the first

entry of land. The first permanent settlement

was made in 1833 by the Dexter Colony, of

about 60 persons, which came from Herkimer

County, N. Y. Grand Rapids was incorporated

as a village in 1838 and as a city in 1850.

Population. — The Federal census of 1910

gave 112,571. Population 137,634 (official cen¬

sus 1920ˆ which made Grand Rapids the 47th

city in th ‘ United States.

James Schriver,

City Clerk, Grand Rapids.

GRAND RAPIDS, Wis., a city and the

county-seat of Wood County, on the Wiscon¬

sin River, the Chicago, Milwaukee and Saint Paul, the Chicago and Northwestern and other railroads, about 70 miles northwest of Oshkosh.

The river is spanned by a fine bridge connecting with Centralia, a suburban municipality prior to 1900, when it was incorporated with Grand Rapids. It contains a public library, a hospital and several parks. Lumbering and agriculture are the chief occupations of the inhabitants and there are lumber, pulp, paper and flour mills, manufactures of furniture, boxes, wagons, ice machines, foundries and machine shops. In the neighborhood are deposits of kaolin. There is abundant water power. The Citizens' Co-operative Society owns and operates the waterworks, telephone, electric lighting and street railway systems. Pop. (1920) 7,243.

GRAND RAPIDS AND INDIANA RAILWAY COMPANY. This company, fifth in succession, owning a completed line of railroad starting at Fort Wayne, Ind., running thence northerly through the city of Grand

Rapids and the western section of Michigan to

the Straits of Mackinac, 366.51 miles main line, with spurs and branches in Michigan, aggre¬

gating 52.52, a total of 419.03 miles, had its inception first in January 1854, at Hartford,

Ind., where a company known as Grand Rapids

and Indiana . Company No. 1 was formed with

the idea of building a railroad from Louisville, Ky., to the Michigan pineries, but accomplished nothing more than locating a line from Hart¬

ford to the northern State line of Indiana, and also as far as Sturgis, Mich.

In May 1855 the Grand Rapids and South¬

ern Railroad Company was organized in Mich¬

igan by the same interests to build a railroad from Grand Rapids to the Indiana State line,

and consolidated with the first company in

September 1855, forming Grand Rapids and

Indiana Company No. 2. Upon this company

the State of Michigan, by an act of 14 Feb.

1857, conferred the lands granted to the State by an Act of Congress 3 June 1856, to aid in the construction of a railroad from Grand

Rapids to some point on Little Traverse Bay.

In June 1857 the Grand Rapids and Macki¬

naw Railroad Company and the Grajid Rapids

and Fort Wayne Railroad Company were cre¬

ated and consolidated, forming Grand Rapids

and Indiana Company No. 3.

The first 13 years of the life of this enter¬

prise is replete with failures to construct any portion of its line between Fort Wayne and

Grand Rapids. With the aid derived from the

bonds voted by the cities of Fort Wayne and

Grand Rapids it finally completed in Decem¬

ber 1867 the first 20 miles of road from Grand Rapids north to Cedar Springs. As early as

1860 and 1861 the company had made two mort¬

gages, the first to secure $5,000,000 and the sec¬

ond $4,500,000.

On 30 Sept. 1869 a contract was entered into

by the Pennsylvania Railroad Company, lessee

of the Pittsburgh, Fort Wayne and Chicago

Railway, the Continental Improvement Com¬

pany and the Grand Rapids and Indiana Rail¬

road Company, for an issue of $8,000,000 7

per cent bonds, secured upon the lands and

road, running 30 years from 1 Oct. 1869 —

$4,000,000 of which were guaranteed by the

Pittsburgh, Fort Wayne and Chicago Railway

Company and $4,000,000 unguaranteed. With part of the proceeds of these bonds and the proceeds of $3,000,000 of debenture bonds, the

Continental Improvement Company completed the road from Fort Wayne to Petoskey (Little Traverse Bay) in November 1873. The cost of road and equipment as per settlement contract was $10,848,250.

In June 1871 the Grand Rapids and Indiana Railroad Company took a lease for 99 years of the Cincinnati, Richmond and Fort Wayne Railroad, then building, and which was com¬ pleted in December 1871, from Richmond, Ind., to Adams (five miles east of Fort Wayne), 86 miles, to be used as an outlet south of Fort Wayne for the traffic of the Grand Rapids and Indiana Railroad.

The Continental Improvement Company, under a contract with the Traverse City Rail¬

road Company, dated December 1871, com¬

pleted the Traverse City Railroad from Trav¬

erse City to Walton Junction, 26 miles, in De¬

cember 1872, and this road was leased to the

Grand Rapids and Indiana Railroad Company

for 50 years from January 1883, rental being

net earnings, which were guaranteed to equal

annual interest on first mortgage bonds,

$250,000.

In June 1881 the Grand Rapids, Indiana and

Mackinaw Railroad Company was organized in

the interest of the Grand Rapids and Indiana

Railroad Company for the purpose of extending

its road from Bay View to Mackinaw City.

This portion of the line was open for operation in July 1882. This company was consolidated

with Grand Rapids and Indiana Company (No.

3) in October 1884, under the name of Grand

Rapids and Indiana Company (No. 4).

The Bay View, Little Traverse and Macki¬

naw Railroad Company, line from Bay View to

Harbor Springs, Mich., six miles, completed its road in 1882; was sold under foreclosure pro¬

ceedings in February 1888, and purchased at

sale by the Grand Rapids and Indiana Railroad

Company, which owned all its stock and bonds.

The Muskegon, Grand Rapids and Indiana

Railroad Company was organized in the inter¬

est of the Grand Rapids and Indiana Railroad

Company in February 1886. The road was

completed from Muskegon to Grand Rapids, 37

miles, in December 1886, and leased to the

Grand Rapids and Indiana Railroad Company

for 99 years from time of its completion, June 1886, rental being net earnings, which were

guaranteed by the lessee to be equal to the

fixed charges (interest on $750,000 5 per cent bonds), and 20 per cent of gross earnings of

all business interchanged; but the excess of

expenditure over earnings forced the sale of

the Grand Rapids and Indiana Railroad under

foreclosure 10 June 1896.

A new company was organized as the Grand

Rapids and Indiana Railway Company, was in¬

corporated in Indiana and Michigan in July

1896, and commenced operation of the road 1

Aug. 1896, with a capital stock of $6,000,000.

Of this, $4,291,000 was exchanged for third

mortgage 5 per cent bonds, and $1,500,700 for

debts, and also provided for a second mortgage of $5,000,000 (2 per cent first year, 3 per cent two years and 4 per cent thereafter), of which $3,962,000 were exchanged for second mortgage

bonds and certain debts of the old company;

the remainder held in treasury for necessary

betterments to the propert)'- in its thˆn depleted condition.

By economical managemen! nr 4 wise ex¬

penditures for betterments and additions, the

company was enabled to make a slight return

in the shape of dividends to its shareholders, first in 1900, beginning with 1 per cent and now paying 3 per cent; but is confronted by such

hostile legislation in Michigan, both in the re¬

duction of its passenger fares and increased

taxation to such an extent that it is a serious question whether it can continue the small re¬

turn to those who furnished the capital, so long in advance of its needs, to develop _ western Michigan and northern Indiana. Dividend of

3 per cent was continued! until April 1910, since when no dividends have been paid.

GRAND REMONSTRANCE, a document

of protest against misgovernment, drawn up

by the House of Commons on 22 Nov. 1641 and

presented to Charles I of England on 1 Dec.

1641. The causes leading up to this written

protest were many, and its passage, by a ma¬

jority of 11, by the House after a long, stormy debate, was undoubtedly hastened by the out¬

break of rebellion in Ireland, and also the ab¬

sence of the king, who at the time was in Scot¬

land. The Puritan leaders had become dis¬

gusted with the intrigues carried on by the king with the Earl of Montrose, and in this docu¬

ment the grievances were set forth in such a

manner that they were in fact an indictment

of the whole governmental policy of the king.

The imprisonment of members of Parliament

without cause, the billeting of soldiers, the

highhanded methods of the Star Chamber,

High Commission and the Council of the

North, the excessive abuses of the commercial

monopolies and the unwarranted extension of

the royal forests, as well as other minor griev¬

ances, in all 204 sections, were the points dis¬

cussed in the manifesto. In it were also asked the appointment of new ministers, and that to

a synod of learned divines be given the task

of Church reform. King Charles ridiculed the

document when it was presented for his consid¬

eration ; on 10 December gave an indirect reply to the criticisms contained therein in shape of a proclamation on religion; on 15 December it was published; on 23 December answered the peti¬

tion in an extremely evasive manner; on 3 Jan.

1642, before the House of Lords, impeached

the leaders in the Commons who were most

opposed to him, and who had been most instru¬

mental in the passage of the document; and on 4 January, attended by a body of armed men,

went down in person to the House of Commons

and invaded the House in an attempt to arrest five of its members. Consult Gardiner's Con¬

stitutional Documents) (Oxford 1889).

GRAND RIVER, tributary of the Colo¬

rado River, which has its rise in the northwest¬

ern part of the State of Colorado, in the Rocky Mountains, and flows south by west into the

State of Utah to lat. 40° 39', and then al¬

most directly south to 35° 40', where it unites with the Green River (q.v.) to form the Colo¬

rado. Its length is almost 400 miles. Its chief tributaries are the Dolores and Gunnison.

There are many deep canyons along its course

through the mountains, and although much of

the valley land is fertile, but few settlements have as yet been made.

GRAND RIVER, in Labrador, is the

largest river in this section of British Amer-

:ca which flows into the Atlantic Ocean. It

rises in the Labrador Highlands, in Ashwanipi

Lake. Its course, which is southward, is about 350 miles in length, flowing partly through a

mountainous region and through a chain of

lakes, and finding its outlet in Hamilton Inlet.

The Canadian Geological Survey of 1894 gives

the first reliable descriptions of this river and the adjacent country. See Grand Falls.

GRAND RIVER, Mich., has its rise in

Jackson County, flows north and west in an

irregular course for about onehalf its dis¬

tance, then west by north to Lake Michigan.

Its whole length is nearly 300 miles, although a direct line from its source to its mouth is only about 100 miles. It is navigable from Grand

Haven, at its mouth, to Grand Rapids, a dis¬

tance of 40 miles. Above Grand Rapids there

is a fall of 18 feet in one mile, which yields excellent water power.

GRAND RIVER, Mo., formed by the con¬

fluence of its Middle, East and West forks in Gentry County. It flows southeast through

several counties, a distance of about 300 miles, into the Missouri River at Brunswick, Mo.

GRAND TRAVERSE BAY, an extension

of Lake Michigan projecting into the State of

Michigan, and named from Grand Traverse

County, by which it is bounded on the south.

The southern part of the bay is divided into

two arms by Preogenise Point, the western arm

being bounded by Leelenau County and the

eastern arm by Antrim County.

GRAND TRIANON. See Trianon.

GRAND TRUNK PACIFIC RAILWAY

COMPANY. This Canadian company was

incorporated by act of the Dominion Par¬

liament, 24 Oct. 1903, for the purpose of con¬

structing a railroad from Moncton, in the prov¬

ince of New Brunswick, to some suitable port

on the Pacific Coast, in the northern portion of British Columbia. It is the joint enterprise of the Canadian government and the Grand Trunk

Railway. The route of the line from Moncton

to Quebec runs near the northern extremity of

the State of Maine; from Quebec the line runs in a westerly direction to a point on the bound¬

ary line between the provinces of Ontario and

Quebec, south of and near Lake Abittibi, thence in a westerly and northwesterly direction pass¬

ing to the north of Lake Nipigon, to a point in the city of Winnipeg, thence westerly passing

Edmonton, and on through the Rocky Moun¬

tains to Prince Rupert on the Pacific Coast.

By an agreement entered into with the Cana¬

dian government, the latter undertook to build

the section from Moncton, N. B., to Winnipeg,

Manitoba, and lease it to the Grand Trunk

Pacific Company for a period of 50 years at ren¬

tal of 3 per cent on cost of construction. For the first seven years the company was to be subject to payment of working expenses only (the.government waiving the rental). For the remainder

of the period, the company pays rental at the rate of 3 per cent on the cost of construction, except that in the event the company fails to earn the rental due for the first three years, fol¬

lowing the period of seven years during which

the company pays no rental (the 8th, 9th and

10th years of the lease), then the rental so un¬

paid shall be added to the capital account and interest paid thereon at the same rate 3 per

cent.

On the section Winnipeg to the Pacific Coast

the Canadian government guaranteed for 50

years the payment of 75 per cent of the princi¬

pal and interest of an issue of bonds not ex¬

ceeding $13,000 a mile for the prairie portion (Winnipeg to the foothills of the Rocky Moun¬

tains, a distance of about 1,200 miles) and

guaranteed for three-fourths of the cost of

the section through the Rocky Mountains. The

remaining 25 per cent is guaranteed by the

Grand Trunk Railway Company of Canada. The

Grand Trunk Pacific Railway is to provide the

equipment for the entire line. The capital stock of the company is fixed at $45,000,000, of which $20,000,000 is preferred stock. The $25,000,000

of common stock is held by the Grand Trunk

Railway Company of Canada.

The railway — although located in a more northerly latitude than any of the existing transcontinental lines — passes through a terri¬ tory in a lower altitude, considerably lessening the cost of operation. The line crosses the extensive region of the Canadian northwest, which is enormously rich in agricultural and mineral products, at or about latitude 55°. The distances are as follows : Moncton to Winni¬ peg, 1,994 miles; Winnipeg to Prince Rupert, 1,746 miles.

Receipts on the Grand Trunk Pacific for year ended 30 June 1916 were: Passengers, $1,029,580; freight, $4,959,573; operating ex¬ penses, $5,902,843.

Construction, however, proved very ex¬ pensive, the endeavor to establish low grades which would permit maximum train loads to be hauled causing greater expense to be in¬ curred than in the construction of either the Canadian Pacific or the Canadian Northern. The line was completed. 7 April 1914, at a point 375 miles east of Prince Rupert, and through

sleeping car and freight service began 2 Sept.

1914. Owing to the inability of the company

to operate the line with any hope of financial success, the eastern section, from Winnipeg to

Moncton, a distance of 1,994 miles, was turned over to the Canadian government in 1915, and

is now operated as part of the government rail¬

ways. (See National Transcontinental

Railway). In 1916 the Grand Trunk Pacific

Railway Company requested the government to

take over the line from Winnipeg to Prince

Rupert, but this proposal was declined. An

offer by the government to <(advance by way of loan sufficient money to supply any deficiency

in the amount required to meet the fixed charges of the Grand Trunk Pacific for a period of

(say) five years,® was met by a declination on the part of the company to accumulate further

liabilities.

GRAND TRUNK RAILWAY SYSTEM

OF CANADA. An international system of

railways extending from Portland, Me., . to

Chicago, Ill., traversing the States of Maine,

New Hampshire and Vermont, the provinces

of Quebec and Ontario in Canada and the

States of Michigan, Indiana and Illinois. . The system (including leased

and controlled lines)

now comprises 5,382 miles of railway, of which about 1,000 miles of the main lines are double-tracked, including practically the entire distance between Saint Tohns, Quebec, and Chicago, Ill., and (from Hamilton) to Niagara Falls.. The

Grand Trunk Railway Company was incor-

porated 10 Nov. 1852, by act of Parliament of the Dominion of Canada for the purpose of

acquiring and operating as a unit various sec¬

tions of railway then built, or in course of con¬

struction. The section between Portland, Me.,

and Montreal, Quebec, was opened in 1853, and

the section Montreal, Quebec, to Sarnia, On¬

tario, via Toronto and Stratford, and the

branch from Richmond, Quebec, to Point Levi,

Quebec, the same year. In 1863 the line from

Port Huron, Mich., to Detroit, Mich., was com¬

pleted, thus providing a through route between

Detroit, Mich., and Portland, Me. In 1880 the

line from Port Huron, Mich., to Chicago, Ill., was completed and opened for traffic.

In 1882 the Grand Trunk acquired control of

the Great Western Railway of Canada, extend¬

ing from Suspension Bridge, N. Y., to Windsor, Ontario, with several branches north and south

of the main line, and also the Detroit, Grand Haven and Milwaukee Railway, whose line ex¬

tended from Detroit, Mich., to Grand Haven,

Mich. In 1883 the Midland Railway of Canada

was acquired, which included the branches north of the Grand Trunk Railway main line, extend¬

ing from Belleville to Peterboro, Haliburton and Midland, in Ontario.

In 1888 an amalgamation was effected with

the Northern and North Western System of

railways extending from Port Dover and Ham¬

ilton to Collingwood, Meaford and Nipissing

Junction, thus completing a network of railways under one management, reaching every town

and village of importance in the southern penin¬

sula of Ontario, and forming the consolidation

of lines now known under the title of the

Grand Trunk Railway System.

The Central Vermont Railroad and its leased

lines, aggregating a total of 536 miles, is also controlled and operated in the interests of the Grand Trunk Railway System.

The Canada Atlantic Railway, extending from Swanton, Vt., to Ottawa, Ontario, the capital of the Dominion, and Parrv Sound, on Georgian Bay, came under the control of the Grand Trunk. Railway in 1905, and in 1914 it was. merged in the system. The Canada At¬ lantic Transit Company, operating a line of steamers from Parry Sound to Fort William, Duluth, Milwaukee and Chicago is under the control of the Grand Trunk. A car ferry sys¬ tem is also operated between Windsor and De¬ troit, Milwaukee and Grand Haven and Coburg, Ontario, and Charlotte, the port of Rochester.

SUMMARY OF MILEAGE.

Lines Owned in Full. Miles

Grand Trunk Railway . 3,410

Leased and Controlled.

Atlantic and Saint Lawrence Railway . . 165

Buffalo and Lake Huron Railway . 161

Champlain and Saint Lawrence . 1

Chicago, Delaware and Canada Grand Trunk Junc¬
tion Railway … … 60

Michigan Air Line Railway . 106

Owen Sound Branch … . 12

United States and Canada Railway . . 22

Leased.

Cincinnati, Saginaw and Mackinaw Railway . 53

Lewiston and Auburn Branch . 6

Norway Branch . _ . 1

Operated under trackage rights… 14

Total operated as Grand Trunk Railway of

Canada … … 4,011

Controlled Lines. Miles

Central Vermont Railway… . 536

Detroit and Toledo Shore Line Railway … . 81

Detroit, Grand Haven and Milwaukee Railway . 191

Grand Trunk Western Railway . 347

Pontiac, Oxford and N. Railway… . 101

Toledo, Saginaw and Muskegon Railway . 116

1,382

At Portland, Me., the Grand Trunk Railway

owns extensive wharf and elevator facilities, the capacity of the latter being 2,500,000 bushels.

Seagoing vessels can dock at any stage of the tide, and trains can be run alongside at any

hour of the day. At Montreal the elevator ca¬

pacity owned by the company is 2,250,000 bush¬

els, while at the various lake ports reached by the company, viz., Midland, Collingwood, Mea¬

ford, Goderich, Parry Sound and Point Edward,

there are large transfer and storage elevators

with a combined capacity of about 5,000,000

bushels.

Several engineering works of considerable

magnitude are numbered among the undertak¬

ings of the company, those particularly worthy

of mention being: (1) The Victoria Tubular

Bridge across the Saint Lawrence River at

Montreal, one and a half miles in length, origi¬

nally opened for traffic in 1860 by the late

King Edward VII, then Prince of Wales.

This bridge cost $7,000,000. In 1897-98 it was entirely rebuilt at a cost of $2,000,000, and is now a modern open truss double-track structure, having carriageways and footwalks on each

side, and is known as the Victoria Jubilee

Bridge. (2) The Niagara Falls double-track

steel arch bridge spanning the gorge, com¬

pleted in 1897, and replacing the old original Suspension Bridge, which was for over 40

years a landmark to travelers and tourists.

This is the largest single-arch railway and ve¬

hicle bridge in the world, having a clear span of 555 feet. (3) The International Bridge be¬

tween Fort Erie, Ontario, and Black Rock,

N. Y., a distance of over a mile, which formerly consisted of iron single-track trusses across the main river and harbor at Black Rock, opened

for traffic in 1873. This bridge was entirely re¬

constructed in 1901, and is now capable of carry¬

ing the heaviest loads. (4) The Saint Clair

Tunnel, under the Saint Clair River from Sar¬

nia, Ontario, to Port Huron, Mich., a distance of two and a quarter miles, commenced Novem¬

ber 1888; finished August 1890. The length

of the actual tunnel under the river is 6,026

feel ; interior diameter, 20 feet.

For the year ending 30 June 1915, the gross

earnings of the Grand Trunk Railway proper

were $36,456,217, of which the freight receipts were $23,714,813, and passenger receipts $12,-

199,082. The operating expenses were $27,-

634,801, leaving a net revenue of $8,822,136.

The equipment includes 1,044 locomotives,

1,069 passenger cars and 39,064 freight cars.

GRAND WASH CLIFFS. In the Colo¬

rado Plateau in Arizona, the rocks are for the most part nearly

horizontal. They are cut, how¬

ever, by several very large faults with a gen¬

eral north-south trend along most of which

the west side has dropped many feet with re¬

spect to the east. The faults are comparatively recent and erosion has, therefore, not yet planed away the scraps; so that they show long lines of cliffs facing west. The most noted of thes-Q

faults are the Hurricane cliffs and the Grand

Wash cliffs.

GRANDFATHER CLAUSE, a clause in

the constitutions of some Southern States

which provides that the law of disfranchisement by means of an educational qualification shall

not apply to white illiterate voters whose fathers or grandfathers had been voters before 1867.

A great majority of negro voters are disfran¬

chised by means of the educational qualifica¬

tion, but the grandfather clause applies only

to whites.

GRANDISSIMES, The, by George W.

Cable. No one has approached George W.

Cable, in portraying and interpreting the charm of picturesque New Orleans. After scoring

a brilliant success in his first volume of short stories, (01d Creole Days,* he undertook the

more ambitious task of writing the novel, (The GrandissimesP The setting is the old Spanish-and-French city that centered about the Rue

Royale — (<a long, narrowing perspective of

arcades, lattices, balconies, dormer windows,

low, tiled roofs, red and wrinkled, huddled

down into their own shadows… . The

human life which dotted the view displayed a

variety of tints and costumes such as a painter would be glad to take just as he found them.®

If the scene of action shifts, it is to some his¬

toric building like the Cabillo, or the cathedral, or a stately mansion situated on the outlying

bayous that then infested the suburbs.

The historic setting is that of the early

years of the 19th century when the Americans

had come into possession of the city and State.

Agricola Fusilier, the representative of the

proud families of the old regime, struggles

somewhat tragically against the new order

represented by the Americans and others with

more modern ideas. Honore Grandissime, the

more progressive member of the Grandissime

family, had been educated in Paris, where he

had caught something of the revolutionary

ideas that were remaking modern life. He

makes the inexcusable mistake of <(going over

to the enemy,® which phrase meant, in the lan¬

guage of the reactionaries, <(affiliation with

Americans in matters of business and of gov¬

ernment, the exchange of social amenities with

a race of upstarts.® It implied a craven con¬

sent <(to submit the sacredest prejudices of our fathers to the newfangled measuring-rods of

pert and imported theories upon moral and

political theories.®

There are many other types of characters,

notably the descendants of the De Grapions, a

charming mother and her daughter, of the

Creole type without the social prejudices of

their clan and in a sense the victims of the social ideas that had prevailed. There are all sorts of negro types : Bras-Coupe, a former

African king and now a slave; Clemence, the

pedler, who goes through the streets singing

the African folksongs with a sort of weird in¬

cantation; and the two mulattoes, Palmyre and

((the free man of color,® who bears the same

name as his white counterpart, Honore Gran¬

dissime. These last two characters have naught

in common with the members of the race to

whom they are linked bv reason of the slightest tincture of negro blood, and yet they are shut out from all the privileges and possibilities of the white race. At the end they disappear

mysteriously from New Orleans and go to

France to end their tragic careers.

To these various types must be added one

who is for a long time an outsider — Joseph

Frowenfeld, a German immigrant with scien¬

tific training sufficient to make him the pros¬

perous owner of a drugstore, and with sufficient knowledge of modern, intellectual and social

ideas to make him a disinterested critic of the existing order in his adopted city. In fact, he is a sort of chorus through whom the author

expresses his own views. He is told by the

representatives of the old regime that he must (<f all in® with the ideas of the community in mind, in taste, in conversation. He does not

do so, but gradually wins to himself all the

more progressive types of the novel, and es¬

pecially the love of the charming daughter of a distinguished Creole

family.

Aside from the setting and characters, the

interest of the novel centres in this interpreta¬

tion of a vanished - social order. There has

been much controversy as to whether the author rightly and justly portrays the people of New

Orleans, and still more as to his views of tne negro problem. It seems as if, in his sense of the tragedy of the free people of color under the old order and the suggestion that the same injustice still prevails now that slavery has

passed away, he becomes in the novel less of

the pure artist that he was in his first volume and more of the propagandist that he was in a later book, (The Silent Souths Whatever

may be said of the justice of these criticisms, the novel remains one of the most ambitious

attempts in American fiction and a very sug¬

gestive, if not convincing, contribution to the question of the relations of the races.

Edwin Mims.

GRANDLEDGE, Mich., city in Eaton

County, on the Grand River and the Pere Mar¬

quette Railroad, 14 miles northwest of Lan¬

sing. The manufactures are flour, canned

goods, sewer-pipe, conduits and tile, furniture

and foundrv products ; and its trade is in its manufactured articles,

and the products of the

surrounding agricultural country. - Coal and

fire clay are found in the neighborhood. The

city is popular as a summer resort. Pop. 3,043.

GRANDPRE, gran-pra', Canada, village in

Kings County, in the province of Nova Scotia,

on the Dominion Atlantic Railroad, 15 miles

northwest of Windsor by rail. The Grandpre

Dyke and Long Island lie between it and Minas Basin. Longfellow's poem, (Evangeline,* has

made famous this village and the country

around. In 1755 the French settlers living

here were driven from their homes by British

soldiers. Pop. 400. (See Nova Scotia). Con¬

sult Eaton, (Acadian Legends and Lyrics*

(1889) ; (Acadian Ballads) (1905) ; Swan, H.

K., (Nature in Acadia* (London 1911).

GRANET, gra-na', Francois Marius,

French painter: b. Aix, in Provence, 1775; d.

there, 21 Nov. 1849. After studying under Con¬

stantin and David, in 1802 he went to Rome,

spending much of his life there. He gained an enviable reputation as a

painter of architectural subjects, though no small number of his works

are historical. He was appointed custodian of

the paintings in the Louvre in 1826, and upon his death bequeathed his fortune to his native city for the erection and maintenance of a

museum there. The most famous of his works

are Hnterieur de l'eglise des Capuchins a

Rome) (1819) ; (Eglise souterraine d'Assise)

(1823) ; (Le Tasse visite dans sa prison par

Montaigne* ; and (Prise d'habit au couvent de

Saint-Claire a Rome.*

GRANGE. See Grangers.

GRANGEMOUTH, Scotland, police burgh,

parish and seaport of southeast Stirlingshire,

situated close to the Firth of Forth and at the entrance to the Forth and Clyde Canal, and

about three miles northeast of Falkirk. Its

large docks are owned by the Caledonian Rail¬

way Company, and it has a harbor and graving dock. The principal industries are shipbuild¬ ing, saw milling and coal mining, while the manufacture of iron and steel, brick and tile is carried on to a considerable extent. The ex¬ ports are mainly coal, iron and machinery; im¬ ports, dyestuffs, iron ore, margarine and pit props. Steamer services are maintained with London, Norway and Sweden, and the Baltic. Pop. of police burgh 10,219.

GRANGER, gran'jer, Francis, American politician: b. Suffield, Conn., 1792; d. 1868. He was the son of Gideon Granger (q.v.). Gradu¬ ated from Yale in 1811, he began the practice of law in 1814, was elected from Ontario County to the State legislature of New York in 1825, was reelected in 1826 and was a delegate to the Harrisburg (Pa.) Protectionist conven¬ tion. He was prominent in the anti-Masonic movement of the time. In 1834 he was a lead¬ ing candidate of the newly organized Whigs for the nomination for governor, and in 1834 and 1838 was elected to Congress, and in 1841 became Postmaster-General in President Har¬ rison's Cabinet. He sat again in Congress in 1841-42, led the stampede of the Whig conven¬

tion at Syracuse in 1850, and in 1861 was a

member of the Peace convention held at Wash¬

ington.

GRANGER, Gideon, American politician:

b. Suffield, Conn., 19 July 1767; d. 31 Dec. 1822.

He was graduated at Yale College in 1787, and having been admitted to the bar, rose to emi¬

nence in his profession, and was elected a mem¬

ber of the legislature of his native State. He had an active part in establishing the Connecti¬

cut school fund, and in 1801 President Jefferson appointed him Postmaster-General. He retained

office during both of Jefferson's terms, and was reappointed by President Madison, whose policy

he nevertheless opposed. He was consequently

displaced in 1814, soon after Madison's second

inauguration. He then removed to Canandai¬

gua, N. Y., and was chosen a member of the

senate of New York in 1819. He promoted in¬

ternal improvements, and gave 1,000 acres to

further the construction of the Erie Canal.

GRANGER, Gordon, American soldier:

b. New York, 1821 ; d. Santa Fe, N. M., 10 Jan.

1876. He was graduated from the United

States Military Academy in 1845, served with distinction in the Mexican War, during the Civil War was appointed, in 1862, to the com¬ mand of the Army of Kentucky, with rank of major-general of volunteers, was prominent at Chickamauga, commanded a division at Fort Gaines (Ala.) (1864). and the 13th Army corps in the capture of Fort Morgan. Brevetted major-general for the capture of these forts, he was mustered out of the volunteers in 1866; in that year was promoted to be colonel, and afterward was commander of the district of New Mexico.

GRANGER, James, English writer and print collector: b. Shaston, Dorset, in 1723; d. Shiplake, Oxfordshire, 15 April 1776. He studied for a time at Christ Church, Oxford, took holy orders, and was assigned to the vicar¬ age of Shiplake. After a long pastorate there he went on a tour through Holland, in 1773. He wrote (A Biographical History of England … with a preface showing the utility of

a collection of engraved portraits, etc.* (1769). By 1824 his works had received enough addi¬

tions to make six volumes. Tn 1806 the Rev.

Mark Noble edited another edition of his

works, and since then several editions of his

works, together with additions by other authors, have appeared. The putting in of blank leaves

into a book for the insertion of portraits cut out of other works is called, after him, <(Gran-gerizing.**

GRANGER, Robert Seaman, American

soldier: b. Zanesville, Ohio, 24 May 1816; d.

Washington, D. C., 25 April 1894. A graduate

of the United States Military Academy (1838),

he served in the Seminole, Mexican and Civil

wars, and in the last named was brigadier-gen¬

eral of volunteers in 1862-65. During the Civil War he commanded the military district of

northern Alabama, in 1864, in the same year

defended Decatur against Hood, and in 1865,

during the occupation commanded northern

Alabama. In this latter year he was made

major-general and later on lieutenant-colonel

of the 11th Infantry. In 1871 he was promoted to the rank of full colonel.

GRANGER CASES (said by Justice Field

during the trial to be the popular term outside for the whole group ; but only as being in the farmers' interest, not because the Patrons of

Husbandry, or any of its lodges as such, had

anything to do with them), six cases decided in the United States Supreme Court, October

term, 1876, all bearing on the same point and decided on the same principles. They were

Munn v. Illinois ; Chicago, Burlington and

Quincy Railroad Company v. Iowa ; Peik v.

Chicago and Northwestern Railroad Company;

Chicago, Milwaukee and Saint Paul Railroad

Company v. Ackley; Winona and Saint Paul

Railroad Company v. Blake*; and Stone v. Wis¬

consin. The first, whose decision ruled the

others and was given at much the greatest

length, was to test whether the act of the Illi¬

nois legislature, 25 April 1871, to regulate pub¬

lic warehouses and the inspection and handling

of grain, was constitutional. The case was an

extreme one; the act was passed for ware¬

houses only in <(cities of over 100,000 people®

(Chicago), and was therefore a spepial dis¬

crimination ; it laid a host of minute, costly and laborious impositions on warehousemen

and elevator owners, and obliged them to pub¬

lish daily in the newspapers a table of the

charges made the previous year, which must

not be increased during the current year —

therefore, of course, never, as each year was a canon for the next. The court decided that,

according to immemorial common law, the gov¬

ernment had a right to regulate the use of

property for the public good, and to fix maxi¬

mum charges tor public services of those with

whom the public has no choice but to deal.

Such regulations were never supposed to de¬

prive private owners of their property, but the devotion of property to a use in which the

public has an interest subjects it pro tanto to public control. In other words, the public is a partner in public corporations. The forms of

law may be changed at the will of the legisla¬

tive body, so long as they only give new effect to old provisions. And warehoused exclusively

within one State may be regulated by State

legislation, even though their business involves interstate relations. Justice Field made a pow¬

erful dissenting argument, concurred in by Jus¬

tice Strong, on the ground that the legislature had no right to meddle with private business,

and it was simply giving that body the power

to confiscate private property, contrary to the Constitution. The railroad cases were all

against the power of the States under legisla¬

tion to enforce maximum transportation rates.

The decisions were the same in essence, but the court declined to pronounce that the roads

would forfeit their charter if they disobeyed

the law, which, nevertheless, was not repugnant to the Constitution. The division of the court was the same; and Justice Field again stated

the case for the companies. It was, that the

charters of the roads were constitutional, and

the right to reasonable compensation was the

essential feature of the grant; that what was

reasonable was a question for the judges and

not the legislature to determine. Such regula¬

tion of fares as would take from a company

the power to meet its just obligations was ille¬

gal, and only the courts could determine the

facts ; this, therefore, was taking away private property without process of law. Such an in¬

terpretation of the limits of legislative power over corporations places them at the mercy of

every legislative majority. It makes all busi¬

ness public business, and practically destroys

all the guaranties of the Constitution. Consult Hare, (American Constitutional Law* (Bos¬

ton 1889).

GRANGERS (O. Fr. graunge, Med. Latin granea, a place to store grain, granum), the popular name for the Patrons of Husbandry, a secret association in the interests of agricul¬ ture. In 1866 the government sent O. H. Kel¬ ley (on the staff of the Department of Agricul¬ ture) to inspect and report on agricultural con¬ ditions in the South, and suggest means of improving them ; he found them very wretched, and the farmers poor, backward and disinte¬ grated. Considering organization the first requisite for self-defense, and for securing improved methods and needed legislation, he, with six others, formed in December 1867 the National Grange (Farm) of Patrons of Indus¬ try. Only farmers could be members ; but their women were admitted both to member¬ ship and office. The machinery was like that of other secret societies ; the local bodies were called granges, and each State had its State grange. There were four “degrees* in local granges, one in State (“Pomona,*) and two in national (“Flora* and “Ceres*). For the first four years the growth was slow; in 1872 it be¬

gan to spread rapidly, in a year it had over 10,000 granges, and in 1875 its membership was 1,500,000, distributed through every State in

the Union. By its rules the order was to have no part in political work, nominations, or dis¬

cussions, and as an order it had none, but the members could not be expected to neglect the

very object of its existence, and almost imme¬

diately they began work against railroad rates

and discriminations, trusts, “futures ,* oleomar¬

garine, etc., besides forming the chief part of the great movement against hard money (see

Greenback Party) — in all of which their or¬

ganization, and the consequent bid for their

support from political parties, aided them enor¬

mously. It is therefore not surprising that

“granger* has become a typical adjective for

all measures in the supposed interest of the

Western and Southern farmers, or of which

they form the chief support, the word having

the sanction of the highest court (see Granger Cases). The Department of Agriculture as

a Cabinet office, the act for founding experi¬

ment stations and the Interstate Commerce

Bureau are among the more legitimate fruits

of the order; others are the subject of much

difference of opinion. It has also done much

to form co-operative societies, and attempted

to make the grain-elevator system a portion of it. The political element, however, was dis¬

crediting the whole movement by its excesses

and ill judgment, and finally took separate

shape as the Farmers' Alliance and the Populist Party (qq.v.), leaving the diminished Patrons

of Husbandry to a useful and growing social

and industrial influence. The farmers' move¬

ment had a membership of about 800,000 in

1874; but this had almost doubled itself in the following year, due to the reorganization of the preceding year. The National Farmers' Alli¬

ance and Industrial Union organized in 1889

was largely confined to the South where it

gained considerable strength. The National

Farmers' Convention held in Saint Louis in

1890 claimed to represent a membership of

over 5,000,000 farmers. In 1892 a large part of the grange organization strength went to

swell the Populist party, which, in the presi¬

dential election of that year, cast 1,041,021

votes.

GRANITE, an unstratified rock, normally

consisting of three simple minerals, feldspar,

quartz and mica, or, in Dana's nomenclature,

of orthoclase, quartz and mica. Granite, in

which the mica is the variety biotite, is called biotite granite ; if musconite, it is named musconite granite; if much hornblende is present,

it is called hornblende granite. It is an “igne¬

ous* rock of “plutonic* type, having originated beneath the surface under high pressure. Like

surface volcanic rocks it has been fused and

afterward cooled; but it does not, like them,

comprehend tuffs and breccias, etc., but as¬

sumes a crystalline texture, destitute of pores, or cellular cavities to which gases entangled

in lava or any such rock give rise. Its coarse crystallinity is due largely to the fact that it has cooled very slowly deep within the earth,

giving plenty of time for complete crystals to form. A proof of its igneous origin is that it has in many places broken through ordinary

sedimentary or metamorphic strata, sending

dikes (q.v.) through them in various directions.

It rarely, however, overtops or caps them, as

if coming up molten through a crater it had

overflowed them above. It is of all ages, some granite in the Alps having broken up through

the strata during Tertiary times, while large

bodies of it are known of Precambrian Age. Granite is of much economic value as a building stone. The production of granite in the United States in 1914 was valued at $20,-028,919. The leading States in its production were Maine, Massachusetts, Vermont and Delaware. See Geology ; Rocks.

GRANITE CITY, Ill., city in Madison County, near the Mississippi, opposite Saint Louis, Mo., on the Cleveland, Cincinnati, Chi¬cago and Saint Louis, the Wabash and several other railroads. It contains a public hospital and has iron and steel works, tinplate works, granite-ware manufactories, bridge works, a sheet-lead mill and a refinery for corn-prod¬ucts. In 1914 there were 39 establishments in operation with an aggregate capital of $18,867,-000, and giving employment to 5,658 persons. The salaries and wages paid amounted to $4,-866,000. The materials used were valued at $9,845,000 and the value of the products was placed at $17,903,000. It was settled in 1892 and the government is vested in a mayor and

council chosen for two years. Pop. 15,142.

GRANITE STATE, The, the popular name of New Hampshire. Fine building granite is quarried at many points, notably at Plymouth, Concord, Milford, Pelham, *etc.*

GRANOVSKII, gran-of'ske-e, Timofei Nikolaevich, Russian educator : b. 9 March 1813; d. 4 Oct. 1855. He received his ele¬ mentary education at home where he studied French and English and spent his leisure in reading novels and works of travel and history. At the age of 18 he entered into a close friend¬ ship with his sisters' French governess, who exercised a powerful influence over him and aroused in him a wild desire for literature. In 1834 he was attached to the Ministry for Foreign Affairs, but four years later he was ap¬ pointed secretary in the geographic department of the Admiralty. A few years later he was sent abroad (Berlin, Dresden, Prague) to spe¬ cialize in history. Of all the historians his favorites were Leopold von Ranke, Ritter and

Verder. In 1839 he went to Moscow and

started a series of most interesting lectures on philology and law. His unusual eloquence

combined with his natural poetic warmth won

his students' sympathy to such an extent that

he was soon recognized as one of the best im¬

provising lecturers in the empire. Besides his

courses at the university he gave a number of public lectures which increased still more his

popularity, for he knew how to draw a syn¬

thesis of events which are described on various pages of history and of which he made always

one picture that possessed a distinct character.

He was not very fond of writing but his mono¬

graphs Contemporary Condition and Import¬

ance of General History,) (Patrimonial Exist¬

ence of the Old Germans,* (About the Fates of Italy, *. etc., display a conscientious historian's activities: he banishes the idea of unilateral ap¬

preciations and optional conclusions, but points to the possibility of cooperation of natural sci¬

ence with history and endeavors to determine

if history is entitled to an individual method, and, if so, to what extent.

GRANT, Sir Alexander, English educator:

b. New York, 13 Sept. 1826 ; d. Edinburgh, 30

Nov. 1884. He went to India in 1859, and in

1862 became principal of the Elphinstone Col¬ lege, Madras, and in 1863 was made vice-chan¬ cellor of Bombay University. In 1868 he re¬ turned to Scotland to become principal of the University of Edinburgh, a position which he held till his death. He wrote (Story of the University of Edinburgh* (1883).

GRANT, Frederick Dent, American sol¬ dier: b. Saint Louis, Mo., 30 May 1850; d. New York, 11 April 1912. He was the eldest son of Gen. Ulysses S. Grant (q.v.), whom he ac¬ companied during several battles of the Civil War, being wounded at Vicksburg, and was graduated from the United States Military Academy in 1871, was assigned to the 4th Cavalry, was aide-de-camp to Sheridan in the latter's Indian campaigns, in 1874 served in the Black Hills expedition, and in 1881 re¬ signed from the army with rank of colonel. He was Minister to Austria in 1888-93, and a police commissioner of New York in 1894—97. At the outbreak of the Spanish-American War (1898) he became colonel of the 144th New York Volunteers, was in the same year ap¬

pointed brigadier-general of volunteers, served for a year in Porto Rico, and subsequently commanded the military district of San Juan. He was also stationed in the Philippines, and appointed brigadier-general in the regular serv¬ ice in 1901. He became major-general 6 Feb. 1906, commanded the departments of Texas 1902-04, of the Lakes 1904, of the East 1904—08, and from 1908 of the Lakes.

GRANT, George Monro, Canadian educa¬ tionist: b. Albion Mines, Nova Scotia, 23 Dec. 1835 ; d. Kingston, Ontario, 10 May 1902. He graduated at the University of Glasgow, was or¬ dained to the Presbyterian ministry in Nova Scotia in 1860, and was minister of Saint Mat¬ thew's Church, Halifax, 1863-77. In 1872 he ac¬ companied Sandford Fleming in his overland journey to the Pacific, of which he has left a graphic account in (Ocean to Ocean) (1873).

In 1877 he was appointed principal of Queen's University (q.v.), Kingston, Ontario, which he found in a languishing and almost moribund condition, but which he raised to a high posi¬ tion among the universities of the American

continent. His literary works include Ad¬

vantages of Imperial Federation (1889) ;

(Our National Objects and Aims * (1890) ;

(Religions of the World in Relation to Chris¬

tianity * (1894).

GRANT, Robert, American author and

judge: b. Boston, Mass., 24 Jan. 1852. He was graduated from Harvard in 1873 and the Har¬

vard Law School in 1879, and has practised law in his native city since 1879. He was one of the water commissioners of Boston 1888-93, and in

the latter year became a judge of probate and insolvency for Suffolk County, Mass. He is

overseer of Harvard College since 1895, and is a member of the American Academy of Arts

and Letters and the Massachusetts Historical

Society. He has published (The Little Tin Gods on Wheels) (1879) ; (Confessions of a Frivol¬

ous GirP (1880) ; (The Lambs, > verse (1882) ; (An Average Man* (1883); (Face to Face)

(1886); <Jack HalP (1887); <Jack in the

Bush* (1888) ; The Reflections of a Married

Man) (1892) ; (The Opinions of a Philosopher*

(1893); (The Art of Living* (1895); <The

Bachelor's Christmas* (1895); (Search Light

Letters } (1899) ; ‘Unleavened Breads a novel

which has been widely read (1900); ‘The

Undercurrent (1901); ‘The Orchid > (1905);

‘The Law Breakers* (1906); (The Chippen—

dales) (1909); ‘The Convictions of a Grandfather) (1912) ; ‘The High Priestess) (1915).

GRANT, (Hiram) Ulysses Simpson,

American general and 18th President of the

Ignited States: b. Point Pleasant, Clermont

County, Ohio, 27 April 1822; d. Mount Mc¬

Gregor, N. Y., 23 July 1885. He was the eldest of the six children of Jesse R. Grant and Han¬

nah Simpson Grant and on the paternal side is supposed to have been of remote Scottish

descent. In 1823, a year after the birth of Ulysses, the family moved to Georgetown, Ohio, where

Ulysses was brought up, working on his father’s farm in summer and attending school in the

winter. He detested the tanning trade, in

which business his father was engaged, but

was fond of agriculture and loved horses, be¬

coming a remarkably proficient rider and team¬ ster at an early age. After an elementary edu¬ cation in John D. White's subscription school at Georgetown, he was sent to Maysville Sem¬ inary, Maysville, Ky., which he attended in 1836-37, and in 1838-39 was provided with a winter term at an academy at Ripley, near Georgetown. In 1839 his father obtained for him an appointment to the Military Academy at West Point, but in making the application for Grant, Congressman Hamer erroneously called him "Ulysses Simpson Grant® instead of Hiram Ulysses, and thus his name appeared on the muster-roll. The young man was not dis¬ pleased by the change and after a few years himself discarded the Hiram, which he had always disliked.

Grant's record at West Point was excellent in mathematics and engineering and fair in other studies but he surpassed all in horseman¬ ship; he graduated in 1843, 21st in a class of 39, was commissioned brevet second lieutenant, assigned to the Fourth United States Infantry, and sent to Jefferson Barracks, near Saint

Louis, Mo. In May 1844 his regiment was or¬

dered to the southwestern frontier and in

September 1845 to Texas as a part of the army under Zachary Taylor. On 30 Sept. 1845 he

was promoted to full second lieutenant; in May 1846 took part in the battles of Palo Alto and Resaca de la Palma (qq.v.) ; in August, at

Camargo, was appointed regimental quarter¬

master and commissary; in September was

present at the battle of Monterey (q.v.), where he performed a daring ride under fire to ob¬

tain new supplies for the troops on the firing line ; and in December was sent with his regi¬

ment to the mouth of the Rio Grande. He par¬

ticipated in all the battles of General Scott's march to Mexico City — Vera Cruz, Cerro

Gordo, Contreras, Churubusco, Molino del Rey

and Chapultepec (qq.v.), being made first lieu¬

tenant for bravery at Molino del Rey and brevetted captain at Chapultepec. His regiment

was at Mexico City until June 1848, when it

was ordered to Mississippi, but Grant obtained

leave of absence and returned home to be mar¬

ried (22 August) to Miss Julia T. Dent. In

July 1852 after four years of garrison duty at Detroit and Sackett's Harbor, the regiment was

transferred by way of Panama to Fort Van¬

couver on the Columbia River; while there he

endeavored to increase his income by farming,

cattle-raising and other enterprises, but in¬

variably failed to improve his fortunes. On 5

Aug. 1853 he was promoted to a captaincy and

ordered to Fort Humboldt, Cal., where he

served until April 1854, but becoming disheart¬

ened by the never-ending vista of barrack life and far removed from the wholesome influence

of wife and family, he fell into evil ways, began to drink and finally, was directed to resign or stand trial on charges. Accordingly he resigned from the service 11 April 1854 to take effect 31

July, and returned to Saint Louis.

Frederick Dent, who lived near Saint Louis,

had given his daughter (Grant's wife) 80 acres of land, and on Grant's return loaned him

$1,000 with which to engage in farming. On

this property Grant built a log cabin, which he called "Hard Scrabble,® and lived there until

1858, clearing the land, hauling wood, plowing, hoeing and enduring all the hardships and

privations of a small farmer. In 1858, however, he abandoned farming because of illness and

returned to Saint Louis, where, during the next two years, owing to his inaptitude for ordinary business life and carelessness in money matters, he earned only a scanty subsistence in the real estate business. In I860 he removed to Galena, Ill., where his father had established a leather store (a branch of his tanning business at

Covington, Ky.), and there he worked at an

annual salary of $800 until the outbreak of the Civil War.

When a war meeting was held to secure en¬

listments Captain Grant was made chairman

of the meeting but declined an offer of the

captaincy of the company enlisted, saying “I

have been a captain in the regular army. I am fitted to command a regiment.® On 25 April,

however, he accompanied the troops to Springfield, where on 8 May he was attached to the adjutant-general’s office as mustering officer,

mustering in several regiments, among which

was the 7th District Regiment (later the 21st

Illinois). On 24 May 1861 he tendered his

services to the War Department at Washington,

suggesting that he was competent to command

a regiment, but received no reply and had al¬

most abandoned hope of making Miy headway

in the military service when (17 June) he was appointed colonel of the above regiment, though compelled to borrow money to purchase the

proper officer’s outfit. He served with his regi¬

ment under Pope in Missouri (endeavoring to

suppress guerilla warfare), until 7 August, when he was appointed bv Lincoln brigadier-general

of volunteers, on 4 September assuming com¬

mand of the district of southeastern Missouri

and western Kentucky, with headquarters at

Cairo. Immediately on his arrival he seized Paducah, Ky., a town of great strategic im¬ portance at the junction of the Tennessee and the Ohio rivers, on 25 September occupied Smithland, and then spent several weeks in organization and drill, in fortifying important locations and in reconnaissances against the enemy. On 7 November he attacked and cap¬ tured the Confederate camp at Belmont, Mo., but the arrival of Confederate reinforcements compelled him to retire to his transports.

In February 1862, after much persuasion, Gen. H. W. Halleck allowed Grant to proceed against Fort Henry on the east bank of the Tennessee. Accordinglv, with 15,000 troops, and accompanied by the gunboat flotilla under

A. H. Foote, Grant set out, and on the 6th, after a terrific bombardment by the gunboats,

compelled the fort to surrender. He then in¬
vested Fort Donelson, on the west bank of
the Cumberland River, 12 miles away. A Con¬
federate sortie on the 15th failed to loosen
Grant's grip and on the 16th Gen. S. B. Buck¬
ner proposed an armistice and the appoint¬
ment of commissioners to settle terms of capit¬
ulation, but Grant replied: ((No terms except
unconditional and immediate surrender can be
accepted. I propose to move immediately upon
your works.5* Buckner surrendered the fort
and about 15,000 troops and Grant became
famous as "Unconditional Surrender Grant.55
This brilliant piece of work was the first im¬
portant victory for the Union cause and its
moral effect was tremendous. In spite of the
jealousy of Halleck and his efforts to belittle and humiliate Grant, who afterward for a time
was virtually under arrest, Lincoln nominated
Grant as major-general of volunteers, to date
from the surrender, and the Senate confirmed
the appointment. See Fort Henry and Fort
Donelson.

.Grant's next important battle was at Shiloh

(q.v.) or Pittsburg Landing. At that point

were five divisions of Grant's army, while he

himself was at Savannah, nine miles away,

awaiting the arrival of an army under Don

Carlos Buell. On 6 April the Confederate

army, under Gen. A. S. Johnston, attacked the

Union troops at the Landing and beat them

back to the Tennessee River with great loss; but Grant, having been reinforced by Buell's army,

reformed his lines, renewed the battle on the

7th and drove the Confederates, now under

Beauregard, Johnston having been killed in

action, back to Corinth, Miss. The highly

colored reports of this battle in the newspapers of the North called forth the most violent and acrid denunciations of Grant, who was charged

with neglecting his army through dissipation,

with recklessly exposing his men and with

being in the rear at a critical time; moreover the public was dismayed by the large loss of life, this being the bloodiest battle up to that time in the history of the country. But Lincoln, un¬

swayed by the widespread clamor for Grant's

removal, resolutely rejected all such demands,

saying ((I can't spare this man, he fights.55 On 11 April Halleck arrived at the Landing and in a spirit of petty jealousy took personal com¬

mand of the army, much to Grant's chagrin,

and the latter, though nominally second in com¬

mand, was completely ignored in the following

ludicrous campaign against Corinth (q.v.),

which was occupied by the Union troops 30

May. Grant was so disgusted by what he

deemed an unwarranted displacement that he

contemplated leaving the army but was dis¬

suaded by Sherman. On 11 July, however,

Halleck was called to Washington and left

Grant in charge of the district of West Ten¬

nessee, embracing the territory west of the

Cumberland River, with headquarters at

Corinth. On 19-20 September Grant forced

Price to retreat at Iuka (q.v.), on 3ˆ1 October a part of his army under Rosecrans signally

defeated Price and Van Dorn at Corinth (q.v.)

and on the 25th he was placed in command of

the Department of the Tennessee, charged with

the special duty of taking Vicksburg.

By November 1862 Grant was in sufficient

force to undertake an offensive campaign.

Sending Sherman to attack Vicksburg in front,

Grant went to the interior to cut off escape by the rear. First came the reverse at Holly

Springs (q.v.) 20 December and on the 29th

the sanguinary battle of Chickasaw Bayou

(q.v.) was fought, but on 10-11 Jan. 1863

Sherman managed to capture Arkansas Post

or Fort Hindman (q.v.) and thus saved from

utter failure a campaign that had been planned on an unsound basis and subjected to consider¬

able interference by a series of political in¬

trigues. Nevertheless Grant possessed the en¬

ergy and perisistency necessary to accomplish

the task before him; the plan of campaign was changed several times without appreciable re¬

sult, but finally, after months of seemingly

hopeless work, by a series of brilliant ma¬

noeuvres, a regular siege of Vicksburg was insti¬

tuted in May and on 4 July 1863 the fortress and town were surrendered with over 30,000 troops,

the largest body of soldiers that had been cap¬

tured on this continent up to that time. (See Yazoo Pass and Steele's Bayou ; Port Gib¬

son; Raymond; Jackson; Champion's Hill;

Big Black; Milliken's Bend; Vicksburg;

Port Hudson). Grant was now the (<man of

destiny55 and a national hero; on 16 July Lin¬

coln wrote a personal letter of congratulation

and nominated him as major-general in the reg¬

ular army; and in October he was placed in command of the Military Division of the Mis¬ sissippi.

The fall of Vicksburg severed the Con¬ federacy and in October, as little opposition was expected in that quarter, Grant proceeded to Chattanooga where Rosecrans, after the Tullahoma campaign (q.v.), and the disastrous battle of Chickamauga (q.v.) 19-20 Sept. 1863, was beleaguered by the Confederates under Bragg, while shortly afterward Burnside was besieged by Longstreet at Knoxville. By a series of swift and dramatic battles, 23-25 No¬ vember, Grant captured Lookout Mountain and Missionary Ridge (see Chattanooga) and com¬ pletely routed Bragg (see Ringgold Gap), then sending Sherman to Burnside's relief at Knox¬ ville (see Cumberland Gap; Rogersville; Campbell's Station; Knoxville). This vic¬ tory opened the way for Sherman's Meridian expedition (q.v.), his capture of Atlanta and his subsequent "March to the Sea.55 At its next session Congress not only passed a vote

of thanks to Grant and his army and ordered

a gold medal to be struck in his honor, but also on 29 Feb. 1864 revived the grade of lieutenant-general and on 2 March confirmed Lincoln's

nomination of Grant to that position. A few

days later Grant proceeded to Washington and

assumed command of the armies of the United

States, making his headquarters with the Army

of the Potomac and immediately formulating

plans to defeat the army under Gen. R. E. Lee and capture Richmond.

Grant's first movements, though unsuccess¬

ful in their main design, resulted in crippling the enemy but only at disheartening sacrifices

of troops. He pursued a merciless policy of

attrition and proposed to exhaust Lee's armv,

even though his gains were not commensurate

with the unprecedented cost of these operations.

In spite of repeated partial reverses and tre¬

mendous losses in killed and wounded, he never relaxed his hold on Lee's army, but slowly and ULYSSES SIMPSON GRANT

Eighteenth President of the United States

GRANT

inexorably drove it back upon Petersburg and

Richmond. Grant sent Sherman against John¬

ston who was protecting Atlanta and ordered

B. F. Butler with the Army of the James to

threaten Richmond from the southeast, while

he himself, with the Army of the Potomac

under Gen. G. G. Meade, attacked Lee. On 4

May 1864, with an army approximately twice

the size of Lee's, Grant crossed the Rapidan,

and on 5-6 May fought the bloody battle of the Wilderness (q.v.), suffering far greater loss

than he inflicted (see also Todd's Tavern).

Sheridan was then sent with the cavalry on a

raiding expedition toward Richmond (q.v. ;

see also Po River) ; and on 10-12 May, Grant engaged in the hardest and closest fighting of the war in the series of battles including the <(Bloody Angle® at Spottsylvania Court House

(q.v.). In spite of Hancock's success at the

"Angle,® Grant failed in his main purpose to

break through Lee's centre, roll up his flanks and thus destroy the fighting morale of his

army. But Grant had said : "I propose to fight it out on this line if it takes all summer,® and accordingly continued to hammer at Lee, though

for some time the latter managed to fight the Union army to a standstill and to frustrate

every effort to draw him from his almost im¬ pregnable position (see North Anna; Hawes' Shop; Pamunkey and Totopotomoy) . By this time also Gen. Franz Sigel had been de¬ feated at New Market (q.v.) and Butler had been bottled up at Bermuda Hundred (see Drewry's Bluff; Swift Creek), wherefore Lee was safe from attack on that quarter and the Shenandoah Valley was open. On 3 June Grant tried to break through Lee's lines at Cold Harbor (q.v.) but the enormous loss of life in this unsuccessful assault convinced him that flanking movements were futile and too costly and that his only hope of capturing Richmond lay in taking Petersburg. Gen. J. H. Wilson led two cavalry divisions around Petersburg, destroying large sections of the Weldon and Southside railroads (q.v.) and Sheridan made a raid toward Trevilian (q.v.), but the midsummer heat prevented extended offensive operations (see Jerusalem Plank Road; Deep Bottom; Saint Mary's Church). On 30 July occurred the explosion of the Pe¬ tersburg mine and the disastrous and abortive assault of the Confederate works. During the

next few weary months attention was centred

on the operations in the Shenandoah Valley

(q.v.) where Jubal A. Early came in contact

with Sheridan and finally on 19 Oct. 1864 was defeated by him at Cedar Creek (q.v.) ; on Sher¬

man's campaign against Hood, resulting in the

capture of Atlanta on 2 September and of

Savannah on 22 December (see March to the

Sea) ; on Schofield's failure at Franklin (q.v.) 30 November, and on Thomas' overwhelming

defeat of Hood at Nashville (q.v.) 15 — 16

December.

During this time Grant was constantly

tightening his hold on Lee's lines (see Peters¬

burg; Deep Bottom; Globe Tavern; Ream's

Station ; Fort Harrison ; Poplar Spring

Church; Hatcher's Run (Boydton Road);

Fair Oaks and Darbytown Road) and waiting

for Sherman and Sheridan to cut off Lee's

sources of supplies from the south and west,

planning thereby to starve him out. On 25

Jan. 1865 Fort Fisher (q.v.) was captured.

Sherman advanced from Savannah and pierced

the Carolinas (see Savannah to Goldsboro;

Kinston), and in March, after the battle of

Hatcher's Run (Dabney's Mill and Armstrong's

Mill, q.v.), Grant began his great offensive

against the Petersburg lines, first repulsing a sortie by Lee at Fort Stedman (q.v.) 25 March.

On 31 March and 1 April, Sheridan won vic¬

tories at Dinwiddie Court House, White Oak

Road and Five Forks (qq.v.), wherefore on the

night of 2-3 April, Lee abandoned his untenable position at Petersburg and ordered his troops

to concentrate at Amelia Court House, south of Appomattox. The next day (3 April) Rich¬

mond was evacuated and the Union forces oc¬

cupied the city, Grant continuing to pursue the Confederates, then in a desperate plight because their supply trains had been sent to the wrong place. By the 8th Lee was almost surrounded

(see Farmville and Highbridge; Sailor's

Creek) and therefore on the 9th, realizing the utter hopelessness and futility of further resist¬

ance, he surrendered to Grant at Appomattox

Court House. Grant afterward stated that he

"felt like anything rather than rejoicing at the downfall of a foe who had fought so long and valiantly and had suffered so much for a cause,®

and therefore his terms of surrender were very generous, winning for him the respect and ad¬

miration of the Southern people. Subsequently,

when a question arose as to whether Lee could be prosecuted for treason, Grant promptly de¬

clared that the terms of surrender included

Lee and if such a course were pursued he

would resign his commission and appeal to the

country. Grant returned to Washington amid

the rejoicing of the entire nation, soon to be plunged into despair by Lincoln's assassina¬

tion. On 23-24 May he reviewed the army

parade at Washington and then visited many

Northern cities, receiving innumerable gifts

from admiring citizens and honorary degrees

from Harvard University and other institutions.

Respecting the reconstruction, Grant at first

favored President Johnson and at his request

made a tour of inspection of North and South

Carolina and Georgia in the fall of 1865r re¬

porting that "the mass of thinking men of the South accept the present situation of affairs

in good faith.® He also accompanied the

President on his famous "swing around the

circle® in 1866, though he took no active part in the President's propaganda in favor of his

reconstruction policy. Having been commis¬

sioned General of the Armies of the United

States (25 July 1866), Grant was now the

foremost citizen of the republic and as he had become an available candidate for the Presi¬

dential nomination, the leaders of both political parties sought to secure his adherence, since it was probable that his popularity would influ¬

ence a considerable independent vote. But

President Johnson involved Grant in the strug¬

gle over reconstruction measures and by his

course drove him into the radical ranks. Tn

August 1867 Johnson suspended Secretary of

War Stanton (q.v.) and appointed Grant Sec¬

retary ad interim, but on 13 Jan. 1868 the Sen¬

ate disapproved of Stanton's suspension, where¬

upon Grant vacated the office. A dispute arose over Grant's actions in this connection, John¬

son questioning his good faith, thus driving

him into bitter opposition to Johnson and mak¬

ing him an advocate of impeachment. Hence,

in May 1868 Grant was unanimously nominated

for the Presidency by the Republican conven¬

tion at Chicago, and though taking little part in the campaign, defeated his Democratic op¬

ponent (Gov. Horatio Seymour), receiving 214

of the 294 electoral votes.

Grant's inexperience in civil administration

was conceded, his lack of political finesse was admitted and his reticence and taciturnity were pronounced, but his strong will was also known and his rugged patriotism had been proven.

He caused much criticism in forming his Cab¬

inet owing to the preponderance of millionaires and personal friends and by making his personal appointments in the President's household

largely from the military staff. However, he

possessed the confidence of the people and this was increased by the negotiation of the Treaty of Washington (q.v. See also Alabama Claims ;

Hamilton Fish ; United States — History

of Arbitrations ; United States — Diplo¬

macy), but his persistent efforts to annex

Santo Domingo led to much ill feeling and also to a rupture of relations with Charles Sumner

(q.v.). Grant was deeply interested in South

and Central American affairs and desired to

recognize the Cuban insurgents but was dis¬

suaded from so doing by Secretary Fish; in

the subsequent Virginius affair, however, popu¬

lar indignation was so thoroughly aroused that

Grant put the navy on a war footing and later Spain rendered adequate reparation. The most

important domestic problem during his first

term, aside from his peaceful Indian policy

and civil service reform, was the reconstruc¬

tion of the Southern States, but as the actual work of reorganization was almost finished, the President was inclined to leave the completion

of-the task to the newly formed State govern¬

ments (see United States — The Reconstruc¬

tion). Still there was a growing conviction

that the administration was inefficient, that the civil service was neglected and abused and

that in his appointments Grant was yielding too frequently to the importunities of politicians;

accordingly in 1872 a great reform movement

was inaugurated, the instigators of which called themselves Liberal Republicans. Grant was

charged with nepotism because of his numerous

appointments to public office of relatives of

his own and of the Dent families and with

being ˆnotoriously loaded down with presents ;®

and the Gould-Fisk attempt to corner gold,

culminating in Black Friday (q.v.), was attrib¬

uted to a New York speculator who had

married into the President's family. But in

1872, despite these and other irregularities, such as the Credit Mobilier .scandal (q.v.), ordi¬

narily regarded as weaknesses in a candidate,

Grant easily defeated his Democratic-Liberal—

Republican opponent, Horace Greeley (q.v.),

obtaining a plurality of over 700,000 and an elec¬

toral vote of 286. The new administration

was almost immediately confronted with finan¬

cial disaster and panic but the President ren¬

dered a great service to the country when he

vetoed a bill passed by Congress for the infla¬

tion of the paper currency and urged the pas¬

sage of the bill for resuming specie payments.

The last years of his Presidency mark the

lowest ebb ever reached in the political morale of the country. The ˆSalary Grab® (q.v.), the

Whisky Ring Frauds (qrv.), the scandal in

the Treasury Department regarding the San¬

born contracts, the Safe-Burglary frauds, the

Seal-Lock frauds, the Subsidy frauds, the im¬

peachment of Secretary of War Belknap (q.v.)

and other malodorous affairs aroused universal

indignation and protest, though the President

personally was in no way implicated. Prob¬

ably never was Grant so low in the popular

estimation as in the summer and fall of 1876.

As a result the Democratic candidate (Samuel

J. Tilden) received a majority of the popular

vote in 1876, but the Republican candidate was placed in office by the decision of the Electoral Commission (q.v. See also United States — Disputed Elections). During this time numer¬

ous threats were made of an appeal to arms,

but Grant's disposition of the army prevented

disorder and his influence counted for peace

and restraint.

At the close of his second term in 1877

Grant, with his wife and youngest son, Jesse,

made a tour of the world; he returned in

September 1879 and in the spring of 1880 an

effort was made to secure for him a third

nomination for the Presidency, but the senti¬

ment against a third term could not be over¬

come. Shortly afterward he moved to New

York city and, besides accepting the unsalaried presidency of the Mexican Southern Railway,

became a special partner in the firm of Grant & Ward ; his name and propertv were used

in the business but he took no active part in the management. In 1884 this firm failed,

ruining Grant and other members of his family, and an unsuccessful effort was made to hold

him personally liable. To satisfy his creditors he surrendered all his property, including the

unique collection of souvenirs, swords and

other mementoes gathered during his tour, and

this collection eventually became the property of the nation. Every token of respect was shown

him and in March 1885, by special legislation, Congress restored him to the rank of General

(since he had resigned to become President)

and retired him on full pay. When the first

storm of criticism had passed, Grant undertook

to write his memoirs, hoping that the sale

would furnish a competence for his wife, and

then began the most heroic year of his life.

Though suffering almost ceaseless pain, owing

to a cancerous growth in his throat, he con¬

tinued steadily at this work, dictating when

he could and writing when speech was impos¬

sible, and ultimately produced a work that took rank as one of the great martial biographies

of the world. In June 1885 he was moved to

Mount McGregor, near Saratoga, N. Y., in the

hope that the change would benefit him, but

the march of the fatal disease could not be

stayed and he died on 23 July. His body found its final resting place in the great mausoleum on Riverside Drive, New York city, overlook¬

ing the Hudson.

Bibliography. — Among biographies of Grant, varying in merit, are those by A. W. Alexan¬ der (Saint Louis 1897) ; W. Allen (Boston 1901); Matthew Arnold (Boston 1887); Adam Badeau (Hartford 1887 and New York 1885) ; W. C. Church (New York 1897) ; F. L. Coombs (New York 1916) ; H. Coppee (New York 1866 and 1868) ; N. Cross (New York 1872) ; C. A. Dana and J. H. Wilson (Springfield, Mass., 1868) ; F. S. Edmonds (Philadelphia 1915) ; T.

G. Frost (New York 1909) ; Hamlin Garland (New York 1898) ; P. C. Headley (New York 1866) ; Charles King (Philadelphia 1914) ; A. D. Richardson (Hartford 1868) ; N. Smith (Milwaukee 1909) ; W. O. Stoddard (New York 1886) ; W. H. Van Orden (New York 1896) ; J. G. Wilson (New York 1897) ; and O. Wister (Boston 1901). Consult also bat¬ tles and Leaders of the Civil War5 (New

York 1884-87) ; Childs, G. W., (Recollections

of General Grant5 (Philadelphia 1890) ; Cramer, J\ G. (ed.), ‘Letters of Ulysses S. Grant to

his Father and his Youngest Sister, 1857— 78)

(New York 1912) ; Dodge, G. M., ‘Personal

Recollections of General Grant and his Cam¬

paigns in the West) (in Journal of the Military Service Institute, Vol. XXXVI, pp. 39-61, New

York 1905) ; Douglass, F., (U. S. Grant and

the Colored People) (Washington 1872) ; Dun¬

ning, W. A., ‘The Reconstruction (New York

1907) ; Eaton, John, (Grant, Lincoln and the

Freedman (New York 1907) ; Force, M. F.,

(From Fort Henry to Corinth5 (New York

1881) ; Farman, E. E., ‘Along the Nile with

General Grant5 (New York 1904) ; Fiske, John,

(The Mississippi Valley in the Civil War) (Bos¬

ton 1900) ; Grant, U. S., (Personal Memoirs)

(New York 1885-86) ; Garland, Hamlin, (Grant

in the Mexican War5 (in McClure’s Magazine,

pp. 366-380, New York 1897) ; Grant, F. D.,

‘Reminiscences of Gen. U. S. Grant) (in Jour¬

nal of the Illinois State Historical Society, Vol.

VII, pp. 72-76, Springfield, Ill., 1914), and

‘With Grant at Vicksburg) (in The Outlook,

Vol. LIX, pp. 533-543, New York 1898) ; Hum¬

phreys, A. A., (The Virginia Campaign of ’64

and ’65) (New York 1883) ; Keating, J. M.,

‘With Grant in the East) (Philadelphia 1879) ; McClellan, C., (The Personal Memoirs and the

Military History of U. S. Grant versus the Rec¬

ord of the Army of the Potomac) (Boston 1887) ; Mosby, J. S., (Personal Recollections of Gen¬

eral Grant5 (in Munsey’s Magazine, Vol. LXIV,

pp. 161-166, New York 1911) ; Nicolay and Hay, ‘Abraham Lincoln, a History5 (New York

1890) ; Porter, Horace, Campaigning . with

Grant5 (New York 1897) ; Ropes and Liver¬

more, (Story of the Civil War5 (New York

1894-1913) ; Rhodes, J. F., ‘History of the

United States5 (New York 1892-1906) ; Swin—

ton, William, Campaigns of the Army of the

Potomac5 (New York 1866) ; Shrady, G. F.,

Ceneral Grant’s Last Days5 (in Century

Magazine, Vol. LXXVI, pp. 102-113, 411-429,

New York 1908) ; Vincent, J. H., ‘The Inner

Life of Ulysses S. Grant5 (in The Chautauquan, Vol. XXX, pp. 634-638, Meadville, Pa.,

1900) ; Wilkin, J. W., ‘Personal Reminiscences

of General U. S. Grant5 (in Publications of

the Illinois State Historical Library,5 No. 12, pp. 134-140, Springfield, Ill., 1908) ; Wilson, J.

H. , (Under T\e Old Flag5 (New York 1912) ;

Woolley, E. C., Crant's Southern Policy5 (in

'Studies in Southern History and Politics,5

New York 1914) ; Young, J. R., 'Around the

World with General Grant5 (New York 1879) ;

the article Che Truth about Grant5 (in The

Army and Navy Journal, Vol. XLV, p. 1100,

6 June 1908) ; and the biographies and memoirs of the soldiers and statesmen of the period,

and works describing the war in its entirety

and also the individual battles.

Irving E. Rines,

Author ' History of the United States . 5

GRANT UNIVERSITY, a coeducational

institution in Chattanooga, Tenn., with depart¬

ments in Athens, Tenn., founded in 1867, under the auspices of the Methodist Episcopal Church.

The . faculty consists of about 65 professors

and instructors ; the average annual attendance

of students is 750.

GRANTS PASS, Ore., city, county-seat of

Josephine County, on the Rogue River and on

the Southern Pacific Railroad, in the south¬

eastern part of the State, about 60 miles from the Pacific. It is the commercial centre of an agricultural, lumbering and mining region ;

and its chief manufactures are lumber, flour,

lumber and brick making. It has large rail¬

road repair shops. Crater Lakes and the

railroad repair shops. Crater Lakes and the

Oregon Caves are situated nearby and attract

great numbers of tourists because of their

scenic interest. Pop. 3,897.

GRANULATION TISSUE, the tissue

formed in wounds to repair loss of substance.

Through the clot in a fresh wound certain

cells of the blood wander and begin to form new tissue. Blood vessels in tiny loops pass out

from the sides of the wound. On the surface

these loops form small rounded elevations,

spoken of as (<granulations.55 As the process

goes on, the new tissue contracts, drawing in

the sides of the wound; the skin grows out in delicate points from the margins of the cut.

If the granulations pass beyond the surface¬

line because of irritation, they are spoken of as “superfluous55

granulations or ((proud flesh.55

GRANVILLE, Granville George Leven—

son-Gower, 2d Earl, English statesman : b.

London, 11 May 1815; d. there, 31 March 1891.

He was educated at Eton and Oxford ; entered

Parliament in 1836 for Morpeth, afterward for

Lichfield, both in the Liberal interest. He suc¬

ceeded his father in the peerage in 1846. He

became Foreign Secretary ‘ 1851-52. In 1855

he became president of the council, and min¬

isterial leader of the House of Lords (1855-58).

From 1859 to 1866 he was again president of

the council, having previously failed to form a ministry under himself as premier. In 1868 he

was Colonial Secretary under Gladstone, and

in 1870 succeeded to the secretaryship for for¬

eign affairs, which he held until 1874. During this period he negotiated the Treaty of 1870

guaranteeing the independence of Belgium, and

“protested55 against the Russian repudiation of

the Black Sea clause of the Treaty of Paris.

On the return of Gladstone to office in 1880

he was Foreign Secretary until 1885. During

Gladstone’s brief administration in 1886 he was at the colonial office. His ‘Life,5 edited by

Lord Edmond Fitzmaurice, was published in

1905.

GRANVILLE, N. Y, village in Washing¬

ton County, on the Delaware and Hudson Rail¬

road, about 37 miles northeast of Saratoga

Springs and 57 miles northeast of Troy. The

village is in an agricultural section, but nearby are valuable slate and building-stone quarries.

The slate is used for mantels, roofing and

marbleized slating. The trade of the town is in stone and slate from the quarries, butter, cheese, hay and vegetables. There are manufactories

of shirts, gloves, infants' wear and condensed

milk. The waterworks are municipally owned.

Population of the village of Granville, not in-140

eluding the several small villages, which are

practically a part of it, was, in 1920, 3,024.

GRANVILLE, Ohio, village in Licking

County, on Raccoon Creek, and on the Toledo

and Ohio Central Railroad, about 25 miles

northeast of Columbus. It has agricultural

and manufacturing interests, but is chiefly noted for its educational institutions, which include

Denison University (Baptist), the Shepardson

College for Women, the Doane Academy and

the Fanny Doane Home for Missionaries' Chil¬

dren. The electric-lighting plant is the prop¬

erty of the village. Pop. (1920) 1,440.

GRAPE CULTURE. The grape is be¬

lieved to be the oldest of our cultivated fruits.

Although some 1,500 varieties of grapes are

cultivated in Europe, they are practically all

from a single species of the vine, known as the Vitis vinifera. It is supposed to have been

indigenous to Asia, where it was widely planted by different peoples centuries before it was in¬

troduced into Europe. The Phoenicians have

the credit of introducing the culture of the vine into Europe, first into the islands of the Grecian Archipelago and thence into Greece and Italy.

The Romans carried vine culture, as a part of their civilization, wherever they settled. Thus, the vine had become well rooted in the south of France, in the neighborhood of Marseilles, at

the beginning of the present era. Its culture

during the next 200 years spread northward.

The native grapes of America are of entirely

different types from the European kinds. The

reason is that America raises grapes largely

for table, while the European grapes are grown for making wine. American grapes are (1) the

native varieties, which are indigenous to the

country; and (2) the vinifera, or European

kinds, which have been transplanted here, and

thrive outdoors only on the Pacific Coast, being suitable for wine.

The vine and its cultivation engaged the at¬

tention of early colonists, who were encouraged by the authorities and by the lawmakers. The

Virginia assembly passed an act awarding pre¬

miums to successful grape growers. When the

second charter was granted to Rhode Island by

Charles II in 1663 it contained an inducement

to anyone who would plant a vineyard. Queen

Christina in her instructions to John Printz,

governor of New Sweden, urged that vine

growing be encouraged, and she instructed the

governor to give the matter his personal atten¬

tion.

Many of the immigrants to the different col¬

onies came from noted vineyard districts of the Old World. It was only natural that they

should try to introduce here the cultivation of those European vines

with which they were

most familiar. Thus, most of the early at¬

tempts to establish vineyards for profit were by foreign or foreign-born settlers. In 1792 or

1793 Pierre Legaux, a Frenchman, interested

a number of Philadelphia gentlemen in his

enterprise, and a company was incorporated for

the purpose of planting vines. A vineyard

was set out at Springmill, near Philadelphia,

on the Schuylkill River. Foreign varieties of

grapes were tried, but the experiment proved a failure.

About the same period (1790-93) a colony of

Swiss grape growers from about Lake Geneva

raised a fund of $10,000 and vineyards were

planted in Jessamine County, Ky. Foreign

varieties of grapes were tried, as had been

done previously, but they all ran out and

perished. Some years later, or about 1802, cer¬

tain members of the Swiss colony removed to

a place which they called New Switzerland

(now Vevay, Ind.), on the Ohio River, 45

miles below Cincinnati. After failing with

the best grapes imported from Switzerland,

they tried a native variety called the <(Cape,®

or the ˆAlexander® grape, and they then met

with some success. This was largely due to

the skill and experience of one member, John

James Dufour, who joined the colony about

1805. He was an intelligent and observing

vine-dresser, and afterward wrote a small

treatise on grape culture and wine making —

one of the first books on the subject published in this country. Dufour produced wine, which

had a fair sale in the West, but by 1835 or 1840 the wines of Vevay were little heard of, and a few years later the vineyards had nearly disappeared.

Such, in brief, were the leading attempts to

introduce the cultivation of European grapes

into the Eastern States, beginning in 1620; not one lasting success is recorded.

However, in 1851 the European grape was

being grown with success about the different

missions. The popular variety was a kind now

known as the ((Mission grape,® which is ex¬

tensively cultivated in southern California to

this day. Other and better of almost all the

leading varieties of European vines have been

planted in that State, and their cultivation was a success from the beginning. Our native

grapes grow there also, but they are not culti¬

vated to any extent west of the Rocky Moun¬

tains. Therefore, grape culture, especially in

California, constitutes a separate chapter in

American viticulture.

The Cultivation of American Grapes. —

After experience had shown that European

varieties of grapes would not thrive, practical horticulturists began to turn their attention to the native vines found growing wild, or par¬

tially cultivated. They saw that success lay in that direction. But the trouble was to obtain

a native grape of superior quality for the table and for wine.

In 1819 Maj. John Adlum noticed a vine

growing in a garden at Georgetown, D. C. The

grape struck him as having many excellent qual¬

ities. He first supposed it to be a European

variety, but the grape was really a native of North Carolina, where it was discovered in

1802, and it took its name from the Catawba

River. Major Adlum was enthusiastic in his

estimate of the value of the Catawba grape. In a letter, written shortly before his death to the Hon. Nicholas Longworth of Cincinnati, Ohio,

he says : ®I have done my country a greater

benefit in introducing this grape than I would have done if I had paid the national debt.®

There is no doubt that the Catawba grape

has played an important part in the grape and wine industry of the United States. This was

largely due to the heroic efforts of Nicholas

Longworth, who is called ((the father of Ameri¬

can grape culture.® He spent 40 years or more of his life and $200,000 in establishing vineyards in the Ohio Valley, and his wine cellars at Cin¬

cinnati, Ohio. His persistent effort to make

the industry a success is a fine example of

American energy and enterprise. Longworth

obtained thousands of vines from Bordeaux

and Burgundy, from the Rhine district of Germany, from Madeira (6,000 vines), and from

the Jura (7,000 vines) in hopes of finding

grapes which would thrive in his Ohio vine¬

yards. He also tried native grapes, but most

of these were given up for the Catawba, which he first received from

Major Adlum in 1825.

Not only as a pioneer, but as a leader in

grape and wine growing, Longworth exercised

great influence on the industry. Many able and practical men in Cincinnati became interested in grape culture and, in 1848, the Cincinnati Hor¬

ticultural Society estimated that within 20 miles of the city more than 1,200 acres were planted in vineyards. During the next three or four

years, some six or eight wine cellars were es¬

tablished at Cincinnati. Longworth had two.

At his cellars dry and sweet wines were made, and ((sparkling CatawbaM — the latter produced

by fermentation in the bottle after the method of French champagne. It was after a visit to

Mr. Longworth that the poet Longfellow wrote

his celebrated poem on (Catawba WineP

In 1858, Erskine made a report to the Brit¬

ish government on the extent and condition of

viticulture in the United States. He gave the

vineyard area of the several States, as follows: 3,000 acres in Ohio ; 1,000 in Indiana ; 500 in Kentucky; 500 each in Missouri and Illinois;

300 in South Carolina; 200 in North Carolina;

100 in Georgia — a total of 5,600 acres of vine¬

yard in the United States. Even at this time

grape culture in the Ohio Valley was on the de¬

cline. The vines there were beine steadily

destroyed by mildew and rot. By 1865, these

vineyards, which had promised so much pleasure

and profit, and on which so much labor and

money had been expended, were disappearing,

and a few years later the grape and wine in¬

dustry of the Ohio Valley became a thing of

the past.

At that time the methods of successfully

treating the two principal fungus diseases of

the native vine — mildew and black rot — were not known to our viticulturists. Later on the

discovery was made that black rot may be kept almost under control by a preparation of sul¬

phate of copper, called the (<Bordeaux mixtureˆ

— the cheapest and best fungicide ever intro¬

duced. As black rot prevailed from an early

date in all the vineyards east of the Rocky

Mountains, it was only after an efficient remedy was found that grape culture could become

commercially profitable in the various Eastern

States. In California, on the other hand, the

vineyards were rather free from fungus dis¬

eases, but there, as in France, the phylloxera began its ravages about 1875, and has been

the worst scourge of the vineyards on the

Pacific Coast since then.

The Growth of Grape Culture in the East¬

ern States. — About 1865 the grape-growing

industry became rooted in the Hudson River

Valley, the lake regions of central and western New York and in northern Ohio, and on the

islands in Lake Erie. New York, Michigan

Ohio and Missouri are the leading States in

the order named. New York's annual produc¬

tion is about 112,000 tons; but in all the other Eastern and Southern States grape growing

exists on so small a scale as hardly to be

termed an industry. Production exists rather

because a large number of small farmers like to grow a few for local use.

The grape industry of the Hudson River

Valley was fairly established in the early '60s.

Here, the Isabella grape was the leading variety.

Like the Catawba, the Isabella is regarded as a native of North Carolina. About 1810 a vine

was sent from the South to Col. George Gibbs, who planted it in his garden at Brooklyn,

N. Y. A few years later, one of the successful pioneer viticulturists of

this country, William

Prince, of Long Island, N. Y., introduced this variety to growers, and he named it the ((Isabellaˆ in honor of Mrs. Isabella Gibbs. For

a long time the Isabella was the standard grape in the New York vineyards, but of late years it has given place to other varieties.

Several varieties of grapes of good quality

originated in the Hudson River district. Per¬

haps the most desirable kinds were the Iona

and the Eumelan. The former was originated

by Dr. C. W. Grant, of Iona Island, N. Y.

With the Delaware it is considered one of the finest flavored grapes of American origin. The

Eumelan is more for wine making than for

eating. The vineyards of the Hudson River

district in 1890 comprised about 13,000 acres.

Since then the industry has gone backward,

and at the present time the vineyard area is

estimated at from 8,000 to 9,000 acres. There

are one or two wine cellars in this district, but about 80 or 90 per cent of the grapes raised along the Hudson River are sold for table

purposes.

The Lake Keuka District. — Small plantings

of vines were made at Hammondsport, N. Y.,

at the head of Lake Keuka, from 1850 to 1860.

But it was not until after 1865 that the grape industry there began to assume some commer¬

cial importance. In 1890, when the statistics of viticulture were gathered for the first time in the United States, there were more than 12,000

acres of bearing vines in the Lake Keuka dis¬

trict, and the growers shipped 20,000 tons, or 40,000,000 pounds, of table grapes to market

annually. In addition to that amount, some

5,000 tons of grapes were sold to the local

wine dealers. The vineyard acreage in this sec¬

tion did not continue to increase so fast, and in 1910 there were in the district 15,000 acres of vines.

The vintage begins usually the first week in

September, when the early varieties (such as

the Concords and Delawares) ripen. It lasts

until the middle of October, when the last of the Catawbas are gathered. The crop is picked

in boxes, which hold from 35 to 40 pounds.

The clusters of fruit are cut from the vines by grape shears. When the boxes are filled they

are carried to the end of the rows, where they are gathered two or three times a day and

taken to the packing-house. Here the grapes

are sorted, and packed in 5-and 10-pound

baskets. This work is done mostly by women

and girls.

The bulk of the grape crop is shipped^ by

fast freight to the large city markets — to New York, Boston, Philadelphia. Within the past

few years new markets have been opened in

the Far West, and now it is common to find

New York State grapes for sale in Denver,

Omaha, Kansas City and even in Manitoba.

The experiment was tried of shipping grapes

to England, but while the fruit arrived there

in fair condition, the cost and prices received did not warrant making further efforts.

The Lake Keuka grape growers now have a

long range of season — that is, they can supply table grapes from early in September till the

following March and April. The early varie¬

ties cannot be held very long, but the Catawba, for example, which ripens late, is a “good

keeper.® The grapes are stored in crates or

trays in a cool building or cellar, and by proper ventilation and by maintaining an even tempera¬

ture they can be kept fresh and fair till spring.

Some years ago the only grapes in market in

mid-winter were hothouse grapes, which cost

from 50 cents to $1.50 a pound. Now these

outdoor-grown grapes can readily be bought in

January or February at 5 and 10 cents a pound.

The wine industry has also made striking

progress in the Lake Keuka district. From the

two or three cellars the number has increased

to 12 at or near Hammondsport, N. Y. This

section of New York State is often called <(the American champagne district,® as it produces

about two-thirds of all the champagne made in

the United States.

There are two important areas of vineyards

adjoining the Keuka district, namely, the Sen¬

eca Lake district of about 5,000 acres of vines in Seneca and Schuyler counties ; the Canan¬

daigua district of about 3,000 acres of vineyard bordering on Canandaigua Lake.

The Chautauqua Grape Belt. — This is the

greatest single strip of vineyard in the Eastern States. It stretches from the hills surround¬

ing Chautauqua Lake, in western New York,

along the shore of Lake Erie for some 50 miles.

The growth of grape culture in the Chautauqua

district was remarkably rapid. The industry

began about 1860, that is rather in advance of the Hudson Valley district. It grew and pros¬

pered, and in 1910 the Chautauqua grape belt

contained about 30,000 acres of vines. The

annual yield of this district is about 5,000 car¬

loads of grapes. Each car holds from 2,300 to 2,500 baskets. In addition, probably one-third,

or more, of this amount is used to make wine.

The making of unfermented grape juice has

become quite a large and growing industry in

the Chautauqua district.

The bulk of the crop (about 80 per cent)

is handled by an association of growers. The

grapes are graded according to their quality,

and the returns from the shipments are

Spooled.® Each grower gets his pro rata share, after deducting expenses. About 85 per cent

of the grapes grown in the Chautauqua belt

are of the Concord variety.

The Northern Ohio Vineyards. — Soon

after the decay of grape culture in the Ohio

River Valley, about Cincinnati, the industry be¬

came established in northern Ohio along Lake

Erie. Here, the Catawba grape, which was

destroyed by fungus diseases in the former

locality, survived and soon became the leading

variety. There are large stretches of vineyards all along the Lake Erie shore from Ashtabula

to Sandusky. There are also several islands in Lake Erie covered with vines ; of which

Kelley's Island and Middle Bass Island are the best known. The total area of these vineyards

in northern Ohio is estimated at from 8,000 to 10,000 acres. The Michigan grape industry be¬

came of some importance toward the close of

the 19th century. It developed mainly in the

southern portion of the State, and by 1910 the annual crop was 60,000 tons, valued at over

$1,500,000. •

Summary. — In the districts above described,

the growing of grapes (both for the table and for wine making) is regarded as the chief in¬

dustry. There are considerable vineyard areas

in several of the Southern and of the Western States, and these may become important in the

near future. New sections are being planted

to vines from time to time; for example, of

late years there has been quite an increase of vineyards in southern Michigan, and in the

Ozark Mountain region of Arkansas and of

southwestern Missouri.

Of American grape culture east of the

Rocky Mountains two things may here be

noted : First, although some 800 varieties are

grown and flourish, yet the bulk of the crop in the leading districts consists of onlv two or

three varieties, namely — the Concord, Catawba

and Delaware; secondly, two-thirds of the

grapes raised in the East are sold and used for table purposes, while only one-third of the

crop is made into wine. It is just the reverse in California, for there two-thirds of the grape crop is turned into wine, the balance being

used for raisins and the table. Therefore, not only in the fact that practically all of the

grapes are foreign or European varieties, but

in making wine the leading product of the vine¬

yard crop in California is sharply defined from the industry east of the Rocky Mountains.

Grape Culture on the Pacific Coast. — Men¬

tion has already been made of the Spanish

Fathers, who planted small patches of vine¬

yards about their missions in southern Cali¬

fornia as early as 1770. The first plantings

were at the mission of San Gabriel, and in the course of the next 75 years there were vine¬

yards of from 5 to 25 acres extending from

San Diego north as far as Sonoma County.

The missions were abolished and their property

confiscated in 1845.

The early settlers who began pouring into

California in 1849 were more interested in gold than in grapes, and it was not until the year 1858 that a genuine widespread interest in

grape growing arose in the new State. During

the next three or four years many vineyards

were planted, and the industry begap to attract considerable attention, so much so that, in 1861, Governor Downey was authorized by the legis¬

lature to appoint three commissioners ((to report upon the best means and ways to promote the

improvement and culture of the grape vine in

California.® One of the commissioners ap¬

pointed was Col. Agoston Haraszthy, who,

by his writings and his efforts, was largely re¬

sponsible for this renewed interest in grape

culture. He went to Europe, visited the lead¬

ing vineyard districts there and secured 100,000

vines embracing 1,400 varieties. These vines

and cuttings were distributed from time to time in small lots to growers in different parts of California, and they formed a basis for the

viticultural industry in that State.

The first, or experimental, era of the young

industry may be said to go from 1861 to 1871.

During this period the most popular grape was

the old (<Mission.® It was hardy, vigorous and a good bearer. The “Mission® yielded a dry

wine of rather inferior quality, which for some GRAPE CULTURE

years prejudiced dealers and buyers against the California product. It will, however, produce

a sweet wine, of the sherry type, of good

quality.

After a while it was demonstrated that the

fine wine grapes of Europe would succeed and

flourish in different parts of California. And

then French, German and Italian vintners

turned their attention to the vines they knew

or had grown in the Old Country.

After 1871 grape growing in the State began

to go backward, and this continued till 1879,

when there came a <(turn® in the industry.

There was a short crop that year ; the prices for grapes and wine went up, and soon there

was renewed interest in viticulture. In re¬

sponse to a demand, a State Board of Viti¬

culture was created in 1880. The board was

composed of able and practical growers from

the leading districts of the State, and their

work resulted in a revival of the industry.

According to the census of 1890, there were

then in California 155,272 acres of bearing

vines. The California grape crop in the

census year of 1909 was 989,843 tons, of the

value of $10,027,961. This is 77 per cent of the entire United States production, though only

49 per cent of the value, since most of the

grapes are grown for wine, and bring a much

less price than table grapes. A large quantity also goes into raisins. The California produc¬

tion more than doubled in the decade from

1899 to 1909. See Raisin Industry, American.

The shipping of California table grapes to

the Eastern markets now amounts to about

1,200 carloads. The California shippers of table grapes labor under the difficulty of long dis¬

tance from their markets. They have fine,

beautiful varieties of grapes, but many of them will not stand the journey to the Eastern

markets.

The leading varieties of California table

grapes are Flame Tokay, Emperor, Cornichon,

Black Malvoisie, Rose of Peru, Muscats,

Thompson's Seedless, the Chasselas varieties.

Practical Side of Grape Culture. — The

practical parts of vine growing cannot be

learned from books, but is the result of hard work and years of experience. However, some

of the more important features of vine culti¬

vation may be mentioned. Of course, climate,

location and soil play an important part in the yield and in the quality of the fruit. From

early times the vine was generally set out on the hills with southern or eastern exposure.

It is another curious fact that the leading grape districts of Europe and of the United States

are located near a body of water. It is so in the great Medoc district of France, situated be¬

tween the rivers Garonne and Gironde, and in

Germany along the river Rhine. In the East¬

ern States we have the leading districts along the Hudson River, on the banks of Lake Keuka

in central New York and along the shores of

Lake Erie in northern Ohio. Such large bodies

of water keep the vines from late spring or

early fall frosts, and from heavy dews and

fogs.

Propagation. — The propagation of the vine

may be accomplished by seeds, cuttings, layers

and grafts. The wild grape grows from, and

multiplies by, the seed only. It reproduces it¬

self, and its seedlings differ seldom from the parent vine. But, if we take the seed of the cultivated vine, the seedlings show a wide varia¬

tion, and that is seldom wanted, unless as an experiment to obtain new varieties. The usual

method of vine propagation is by cuttings,

which are made in the winter from the trim¬

ming of the vines. The cuttings are planted

early in the spring, after the ground is

thoroughly well prepared. It is usual to let the plants grow one or two years. The methods of

transplanting these vines are various, due to

the nature of the vines and to the methods

followed in the various districts. Thus, in

California rooted vines of one year are pre¬

ferred ; in the Eastern States growers prefer

two-year-old transplanted vines.

Grafting. — The grafting of the vine, as

with other woody plants, is quite easy, although it may be done in a number of ways. The

time to graft is early in the spring before the sap starts. Fully a dozen methods have been

named and described. The two kinds in most

common use are the ordinary cleft or shoulder—

graft, and the English or whip-graft. An or¬

dinary graft is simply done by cutting the vine off three or four inches below the surface of the ground, then split with a grafting chisel, and held open with a wedge until the scion is fitted exactly into place. The cleft may be

tied with a string, or covered with clay or

grafting wax, and then the earth is heaped

about the graft, leaving one bud of the scion above the surface. Grafting is of great im¬

portance to every vine grower in Europe and

in California. For it is by grafting European

vines on American stock that they can be pro¬

tected from that dread scourge, phylloxera.

Pruning and Training. — The value of re¬

moving a portion of the vine and other woody

plants was recognized at a very early date.

Most of our native grapes are more vigorous

growers and show a greater tendency to climb

and spread than do the European vines. Prun¬

ing relates to the removal of such parts of the vine as ensures better fruit and larger yield.

The general principles of pruning are practi¬

cally the same for all vines, and these prin¬

ciples as given by Prof. L. H. Bailey are: (1) Fruit is borne on wood of the present season, which arises from wood of the previous sea¬

son ; (2) a vine should bear only a limited

number of clusters, and (3) the bearing wood

should be kept near the original trunk or head of the vine. Thus, the wood is constantly re¬

newed, and new shoots which give wood, or

canes, for the following year, are called

ˆrenewals.®

Training relates to the form and disposition

of the different parts of the vine. It is not necessary to describe the different methods of

training. Each large vineyard district has its

own system.

Brief mention may be made of the three

well-known ways of training the native vine

outside of California: (1) The socalled ((Kniffin system® first obtained in the Hudson River district. The vine is allowed to grow at will the first season after planting; the second year it is cut back two or three buds from the

ground, and from the stub only one shoot is

allowed to grow. This is tied to a stake, at intervals, as it grows, to keep it straight to the height of the trellis. In the third year

posts are set about 16 feet apart between every two vines. Two wires are then stretched along

the posts, the tipper wire about five and onehalf feet above the ground, and the lower one about half way between the upper wire and the ground. The vine is now tied to each wire,

and cut off even with the upper one. The next year all the buds on the vine are rubbed off, except four — two for each wire. The two

arms on the top wire are often bent down to

the second wire, thus forming a droop, and the system is known as the ((drooping system® of

training.

(2) The Chautauqua system of vine training,

as it may be called, is largely used in the vine¬

yards of that district. In the first year the vine is cut back to three or four buds. The second year it is cut back to five or six buds, and three

of the strongest shoots are left to grow the

fruit-bearing arms for the third year. The trel¬

lis consists of three wires. Each year three or four of the strongest new canes are trained

upon the trellis spread out in a fan shape.

(3) The Munson system of vine training is

named after T. V. Munson, of Texas, a prom¬

inent viticulturist, and is adapted to the native vines of the Southern States. The trellis used is little different from that of the other sys¬

tems. Thus, the posts are set about 24 feet

apart, and carry two lines of wire. The vine

is pruned back in the first year, and the next year the two arms may be allowed to bear a

few clusters, if the vine is strong. The <(bearing arms® are then cut back to one or two eyes each ; the other arms to 8 or 10 eyes. These arms bear the next year, and are pruned for

the third year quite short, while the bearing

arms for the next year are pruned long. By

this system of training there is a shifting of the bearing canes from one side of the vine to the other; all of which, it is claimed, gives vigor to the vine and a good distribution of the fruit.

Diseases of the Vine. — These are caused

by animal and vegetable parasites. Of the

former the worst and best known is the

phylloxera. An American entomologist, the

late Prof. C. V. Riley, discovered that some of our native American vines were infested by

phylloxera, but they successfully resisted its at¬

tacks. He therefore recommended to the

French and other growers of European grapes

that they graft their vines on American stocks.

This proved to be the solution of the problem, and practically all of the millions of vines

planted in France during the past 25 years are on ((resistant stocks,® or American species of

vines. It is the same in California, where the vineyards destroyed by phylloxera have been

and are being replaced by vines grafted on

American stocks. The main thing now is to

get the right <(resistant vines® for different

soils and different climates. The other insect

pests are the grape leaf-hopper, the root-worm, the flea-beetle, thrips, rose-bug, *etc.*

The leaf-or vine-hopper often does consid¬

erable damage in the vineyards of the East

as well as in California. The best remedy so

far recommended is a solution of whale-oil soap applied in a spray. The root-worm is at pres¬

ent working in the vineyards of Chautauqua

and in northern Ohio. Two or three sprayings

of arsenate of lead during the season is recom¬

mended, but thorough cultivation is regarded as the best check to the root-worm. See Insecti¬

cides.

The leading vegetable diseases of the vine

are mildew, black rot, oidium, anthracnose,

anaheim, *etc.* The effects of mildew are seen

on the leaves, stem and the fruit. This disease is indigenous in this country, and first appeared in 1878 in Europe, where it spread over the

vineyard districts, France, Germany, Italy and

Spain, doing great damage.

Black rot was also introduced into Europe

from the United States, but there it was not

as serious as with us. The rot first affects the leaves and then passes to the fruit. The condi¬

tion most favorable for the spread of both mil¬

dew and black rot is warm, moist weather. See Fungi and Fungicides.

The Evolution of American Grapes. — It

should be noted, in conclusion, that the develop¬

ment of American grape culture has been a

process of evolution with a survival of the

fittest. Thus, the improvement in the quality

of our native grapes has been something re¬

markable. It represents the difference between

the wild grape — coarse, harsh and often dis¬

agreeable in taste and smell — and the culti¬

vated grape — tender, luscious and sweet and

delicate in flavor.

The botanists have described and put Amer¬

ican grape vines into some 12 or 13 groups or classes. Only four American species of vines

have been cultivated and developed to any ex¬

tent, as follows: (1) Vitis Labrusca; (2) V ,

Estivalis ; (3) V. Rip aria; (4) V. Rupestris.

The V. Labrusca is generally known as the

((fox grape,® and is a native of the Atlantic slope from New England to South Carolina.

The largest number of varieties of grapes in all the Eastern States now cultivated spring from

this species, which includes the Concord, the

Catawba, *etc.*

The V. Estivalis is the ((summer grape® of

the Middle and Southern States. Several vari¬

eties (such as the Lenoir or Jacquez, Herbe—

mont, Cunningham, etc.) have been much used

in France and in California as a grafting stock.

The V. Riparia is the grape vine of the river banks, and is found growing wild from Canada

to the lower Mississippi Valley. This species

is very highly regarded in France and Cali¬

fornia as a stock on which vinifera vines have been grafted with success.

The V. Rupestris is native of the country

west of the Mississippi River from Missouri to Texas. The varieties of this species have not

been much cultivated, but are used, almost ex¬

clusively, as resistant stocks in France and in California.

Thus far, the efforts of our horticulturists

to develop and improve many new varieties of

American grapes have been confined to a few

species. In 1830 William Prince enumerated

but 88 varieties of native grapes ; to-day there are more than 800 kinds. Already they have

accomplished splendid results by cultivation,

and by hybridizing our vines with the best

foreign kinds. We may look in the near future for the production of many choice grapes which will combine all the vigor, beauty of foliage

and resistance to disease of the Labrusca and

other American families with the delicate and

fine qualities of the vinifera, or European

varieties.

Bibliography. — The most complete books

on grape culture have been written by the

French experts, but their writings do not ap-

ply to American grape culture. Among the

best books on the subject in French we may

name the following: Guyot's (Etude des Vig—

nobles de France* (3 vols., Paris 1876) ;

boex's cCours complet Viticulture) (Paris

1875), and Coste-Floret's (Les Travaux du Vignoble) (Paris 1898). The leading journal is

the Revue de Viticulture, published at Paris.

The total United States production of grapes

as reported in the last census for the year

1909 was 1,285,533 tons, of the value of $22,-

027, 961. This was one and a fourth times the production of 1899. California furnished over

three-fourths, New York 10 per cent and Mich¬

igan 5ˆ4 per cent. About three-fourths of these grapes went into wine and raisins. The total

wine and grape juice product in 1909 was 18,-

636,000 gallons, of which California made some

16,000,000 gallons. With the advent of prohi¬

bition production of domestic wines was placed

under stringent restrictions; wine grapes are now exported in large quantities. See also Wick-son, E. T-, ˆCalifornia Fruits) ; Hyatt, (Grape Culture and Handbook for California* ; Hed¬

rick, (Grapes of New York) (1907) ; and the

reports of the Board of State Viticultural Com¬

missioners of California. See Viticulture;

Wine-making.

Lee J. Vance,

Publisher, iThe Beverage News ,* New York.

GRAPE FERNS. See Ferns and Fern

Allies, Ophioglossales.

GRAPE, or GLOBE, HYACINTH. See

Hyacinth.

GRAPE INSECT-PESTS. More than 200

species of insects have been observed preying

on the grape vine in America. The principal

pest is the phylloxera (Ph . vastatrix), which first attracted attention by its ravages in the vineyards of France about 1865. It now oc¬

curs in vine-growing countries all over the

world, and is the worst of the very few insect-pests that have emigrated from America. It

caused the destruction of 2,500,000 acres of

vineyards in the United States in 1884. The

phylloxera is a minute brownish plant-louse

of the aphid family. (See Aphis). The

winged females appear in Europe from August

to October. Each lays about four parthenogenetic ova on the under surface of the vine—

leaves. These ova develop in late autumn

into males and females — wingless and without

the characteristic piercing and sucking mouth—

organs — which migrate to the stem of the

vine. There each female lays a single egg

under the bark. This egg lies dormant through¬

out the winter, and develops in April or May

into a wingless but voracious Wine-louse.®

This form may pass to the leaves, on which it lays parthenogenetic eggs, and forms galls ; but in Europe it attacks the roots, and lays its eggs there. From these in about eight days young

develop, which become mature females in about

20 days, and lay more eggs in the roots.# Half a dozen or more of these parthenogenetic gen¬

erations follow in rapid succession throughout

the summer. The roots become knotted and

deformed ; the whole plant suffers, and, though it may survive for several seasons, eventually

dies. In midsummer, among the subterranean

forms, a generation is born whose members,

after four, instead of the usual three, moltings vol. 13 — 10

associated with adolescence, become the larger

winged females with which we commenced.

The destruction of this scourge of the

grape vine, without also injuring or destroying the plants, has proved exceedingly difficult

when attempted upon a large scale, where the

expense prevents the use of chemicals or

methods effective in a small garden. Water,

wherever it can be applied to the soil so as to saturate and keep it saturated for a time, has proved a safe and effectual destroyer, because

the insect cannot live in a medium saturated

with water for long. Chemical remedies, such

as bisulphide of carbon, have succeeded, when

injected into the soil about the roots. In some of the French vineyards grafting the culti¬

vated vines on certain of the native vines of America has been tried with some success. Al¬

though the insect seems to feed on the roots

of these vines, the greater vigor of the Ameri¬

can stocks appears to enable them to resist the injuries inflicted on them.

An important vine-pest in certain parts of

the United States is the grape root-worm

(Fidia viticida). Injury is chiefly due to the work of the larvae or ˆroot-worms,® but the

beetles also injure the plants by gnawing many holes in the leaves. Arsenical sprays, the de¬

struction of the beetles by jarring and of the pupae in the ground by cultivation, are all use¬

ful. One of the most troublesome enemies of

the vine is the rosechafer (Macrodactylus sub—

spinosus), which is best kept in subjection by planting trap-crops of plants bearing white

flowers which blossom at an earlier date than

the grape, such as white rose, blackberry, spi¬

raea and deutzia. The grape-vine flea-beetle

(Haltica chalybea) does considerable damage

at times to grape leaves, but can readily be de¬

stroyed with an arsenical spray, and may also

be caught in the same manner as the plum

curculio, by jarring the insects onto collecting frames saturated with kerosene. Nearly every¬

where leaves will be seen drawn together and

slowly assuming a brownish hue, and when

these are opened a small caterpillar will be

found actively wriggling about. This is the

grape leaf-folder (Desmia funeralis). When

vines are sprayed for leaf-feeding insects some of these leaf-folders will be destroyed, but

picking and burning the affected leaves is more effective, taking care that the larvae do not

escape to the earth during the process. Leaf—

hoppers do much injury in some localities, par¬

ticularly on the Pacific Coast, and several other important enemies of the grape are known, in¬

cluding cutworms, which climb and defoliate

vines at night, the grape-berry moth, which de¬

stroys the berry, and the grape curculio, which has the same habit. Consult Cornu, (Etudes

sur le Phylloxera vastatrix) (1879) ; Lichten¬

stein, (Histoire du Phylloxera) (1878) ; Riley, (Sixth Annual Report of the State Entomolo¬

gist of Missouri* (1874) ; Saunders, Unsects

Injurious to Fruits) (1883) ; Bruner, (Report

of the Nebraska State Horticultural Society >

for 1895, which gives an extensive bibliography; Marlatt, C. L. Principal Insect Enemies of the Grape) in Parmer's Bulletins Nos. 70 and 284,

United States Department of Agriculture

(Washington 1898).

GRAPE-SHOT is a combination of small

cannon balls put into a thick canvass bag, and 146

corded strongly together, or fixed in a cylin¬

drical frame, the diameter of which is equal

to that of the ball adapted to the cannon. The number of shot in grape varies according to

the service or size of the guns; usually, how¬

ever, a round of grape-shot consists of nine

balls in tiers of three. Grape-shot is now sup¬

planted by shrapnel (q.v.).

GRAPE-SUGAR. See Glucose.

GRAPEFRUIT, POMELO, PUMMELO,

SHADDOCK, a tree (Citrus grandis) of the

family Rutacece , much resembling the orange,

native of southeastern Asia, from whence it

has been introduced in many warm countries.

The name grapefruit seems to be derived

from the fact that the fruits are often borne in clusters of three or more, much like a bunch of grapes. It is widely cultivated in the West Indies, California and southern Florida. It

seems to have been introduced into Florida by the Spaniards in the early part of the 16th century, but commercial culture has been car¬ ried on only for about 25 years. In 1909, 1,061,537 boxes of fruit were produced in Florida and 122,515 in California, valued at over $2,000,000.

GRAPHIC METHOD, a pictorial method of representing statistics by lines. Force, mo¬ tion or any other physical quantity, such as temperature, atmospheric pressure or baro¬ metric height, electric potential, etc., may be represented by straight lines. Graphic methods are largely employed in physical investigations as aids to calculation, and for the purpose of exhibiting the nature of the law according to which some phenomena vary. The principal use of this method is to show the mutual varia¬ tions of two quantities. This we will illustrate by a particular example. Suppose a table is drawn up, in one column of which are the months of the year, and in the other the cor¬ responding average temperatures of the air, at some particular place, during these months (the average temperature for each month being the

mean of the daily temperatures). Let two

lines, OX and OY, be drawn from O, one

horizontally, the other vertically; let the suc¬

cessive months of the year be represented on

any convenient scale along OX, and let tem¬

perature be measured along OY, also on a con¬

venient scale. Corresponding to each month in

the year there will be a length along OX, and to each temperature there will correspond a

point on OY. At the middle point correspond¬

ing to each month draw perpendicular to OX

a line representing the temperature on the scale of OY. A series of lines will thus be obtained, through the upper ends of which there may be

drawn, freehand, a smooth curve. The points

on the curve in the figure represent the upper ends of these lines. Other graphic methods in¬

volve the use of polar, logarithmic and other

varieties of co-ordinates. (See Geometry,

Analytic). A general glance at such a curve

will reveal certain features regarding the tem¬

perature of the . whole year ; at what dates

maxima and minima occurred; when the tem¬

perature rose or fell quickest, and so on.

GRAPHICAL STATICS. Graphical

statics deals with statics by purely graphical or draughting-room methods: constructions made

with straight-edge, dividers, protractors, parallel rules, planimeters, *etc.* The analytic solution of a problem may give rise to a complicated form¬

ula, an infinite series from which it is difficult to compute, or to many simultaneous equations

laborious to solve. Graphical methods over¬

come these disadvantages. They are very rapid

in comparison with mathematical processes and

quite precise when used carefully; they show at a glance the entire mechanism of solution. Al¬

though they give numerical answers — not

formulas — that are only approximately correct, these results need never in engineering prob¬

lems be less precise than the only approximately correct data. With average skill and good in¬

struments it is possible to keep the thickness of points and lines within 0.005 inch and to set off distances of this size and angles of 0.1 degree.

No graphical construction need have an error of more than 0.5 per cent, which is about the pre¬

cision attainable with a small slide rule or with four-place logarithmic tables. All work is done to scale. Land, (Die Maszstaebe bei der Zeich-nerischen Loesung) (Zeitschr . fur Architektur

u. Ingenieurwesen, Heft 4, 1897) showed that

the graphical units of length must satisfy the same relations as the functions themselves.

Thus if z = f(x, y) then ez = f(ex,ey) where

ex is the scale value of x ; i.e., if x is pounds and the scale of pounds is, say, five pounds to the inch, then ex = 5 and is represented by a

line x/ex inches long. Land gives a number of illustrations.

The entire subject is a direct development of

the basic law of statics : the theorem of three forces. This is a form of the parallelogram of forces (see Mechanics) and states that if three non-parallel, coplanar forces (all in one plane) are in equilibrium, the force vectors will be con¬

current (through a common point) and will

have such magnitudes and directions that they

may be translated so as to form a closed tri¬

angle with the arrows running head to tail.

Consequently if any number of concurrent,

coplanar forces are in equilibrium their force

polygon must close with the arrows pointing

head to tail. For, any two of them can be re¬

placed by a single force, this partial resultant can be combined with one of the remaining

forces, and so on until the set is reduced to three which must satisfy the fundamental con¬

dition.

Four Forces. — Before dealing with non¬

concurrent systems we shall discuss the special case of four coplanar forces on account of its importance in engineering. The method was

first extensively employed by Culmann in 1866.

Forces in space are treated at the end of this article. If four forces are in equilibrium the resultant of one pair balances that of the other pair, or since it equilibrates the two remaining forces it must be coplanar with, and concurrent with or parallel to them.

If in Fig. 1 P is given and only the lines of action of Q, R, S are known, we have the con¬

struction shown, which fails, however, when

(a) all four forces are concurrent or parallel, (b) three are concurrent or parallel.

Coplanar Forces in General. — If n forces

P,Q,R,… .Z are in equilibrium any one of them will balance the resultant of the other n — 1.

The construction is made as follows: Resolve

P into any pair of components A and B, com-

bine B with Q, this resultant with S, and so on until Z is left. Then A, Z, and the resultant of the others must satisfy the theorem of three forces. The reader should have this process

clearly in mind while studying the following

illustration.

Let P, Q, R, S in Fig. 2 be in equilibrium ; their vector polygon in ii will close. In ii re¬

solve P into any pair of components A, B.

Draw C (the resultant of B, Q) and D (the

resultant of C, R, i.e., of B, Q, R) ; ii gives only magnitudes and directions, the actual positions

being shown in i. The three concurrent lines

A, B, P in i correspond to the triangle ABP in ii ; similarly, in i, C must be concurrent with B and Q, D with C and R, and D with S and A.

Before going further observe the peculiar cor¬

respondence between the two diagrams : three

Fig. 2.

forces forming a triangle in ii have three con¬

current parallels in i; but there are exceptions to the converse. This is a simple case of recip¬

rocal diagrams or figures, which were so called by Maxwell, (On Reciprocal Figures and Dia¬

grams of Forces* (Philosophical Magazine

1864) who was the first to discuss their proper¬

ties with any degree of completeness. Cremona,

(Le figure reciproce nella statica grafica) (1872), developed them into a branch of geometry.

ABCD in i was named the funicular polygon

by Lame and Clapeyron in 1826 for a reason

which will be evident later. In ii ABCD are

the rays which meet at the pole. The funda¬

mental property of the funicular polygon is that every vertex lies on a force, and conversely.

Balanced forces form a closed vector polygon.

This is necessary but not sufficient for equilib¬

rium, and corresponds only to the conditions for concurrent forces. In order that the system

may not have a resultant moment it is necessary that any force be at least collinear with the resultant of the rest of the set. Thus in i the sum of the moments of P, Q, R, S cannot van¬

ish unless .S' lies on the line of action of the resultant of P, Q, R, i.e., unless S passes

through A and D. This condition requires a

complete or closed funicular polygon. Hence

the graphical criteria of equilibrium are

(1) For equilibrium of translation the force

polygon must close.

(2) For equilibrium of rotation the funicular

polygon must close with a vertex on
every force.

The following solutions show how to apply
these conditions.

1. To find two unknown magnitudes. Sup¬
pose that a weightless beam carries a load W
and rests on two supports as in Fig. 3. It
is required to find the reactions R\ and Ri

W

I

M

ti

Fig. 3.

which are evidently vertical. The answers are

obtained as follows; it is left to the reader to supply the underlying statical reasons. In ii

draw W and any rays a, b, and in i parallels to a, b, intersecting on IV. Ri, as yet unknown, will be determined by some ray c also un¬

known. Now from the two triangles which

any assumed ray c forms, with a and b in ii we can find the two points of concurrence

through which c must pass in i; this gives the true direction of c.

II. To find two unknown magnitudes and

one unknown direction. The rod in Fig. 4

weights 200 pounds, rests on a knife edge,

is hinged at the left, and is subjected to 200

pounds at the right. Find the reactions. In

this problem we shall use a slightly modified

nomics of Construction in Relation to Framed

Structures,* (1873) ; the full power of the nota-148

tion will not be evident until we take up

frames. Letter the forces ab, be, cd, da, nam¬

ing first all those completely known, then cd, known only in direction, and finally the least known force — the hinge reaction da — of

which only a point of application is given.

The forces are to be used in this order. In

ii draw ab, be and rays from any pole O ; this is as far as we can go. However, assume a

ray Od and imagine ii completed. In i draw

oa, ob, oc. Now od must go through the in¬

tersection of oc and cd and of oa and da since it forms triangles with them. But the inter¬

section of oa and da cannot be found unless

oa passes through the hinge. Hence to solve

a problem of this type, start the first ray

through the only given point — usually a hinge — of the force whose direction is unknown;

the solution is then easily finished. Observe

that, for example, the sides ob and oc of the funicular polygon meet on the force be.

III. To find three unknown magnitudes.

Two of the unknown magnitudes can be re¬

placed by a single force through their inter¬

section, unknown in direction as well as in

magnitude. The problem therefore is reduced

to type II.

Properties of the funicular polygon. If a

string, fastened at A and B is in equilibrium under forces ab and be as in Fig. 5 it is evi¬

dent that if O is properly chosen the sides of the funicular polygon will coincide with the

lines of the string. (Latin, funiculus). The

string polygon gives also the lines of thrust

in an arch. The determination of the forces

in a loaded cable or an arch requires the poly¬

gon to pass through two and sometimes three

given points. Consider first the effect of shift¬

ing the pole. Assume, for brevity, two forces

ab, be and construct two funicular polygons

with any poles O and O', Fig. 6.

The pairs of forces O'a and O'b and Oa and

Ob in ii have the same resultant, and if their senses are properly chosen they will be in

equilibrium and form the quadrilateral OaO'bO.

By the theorem of four forces the line through P and R must be parallel to 00' ; by similar reasoning Q is also on this line. Hence cor¬

responding pairs of sides of two polygons in¬

tersect on a line, called the polar axis, parallel to that connecting the poles. Consequently to

pass a funicular polygon through two given

points, say P and P' , proceed thus : draw any polygon through P and pass one side o'b, of

another through P'. This determines a point R

on the polar axis through P. Then O' must

lie on a parallel to PR and on a ray O'b

parallel to side o'b. Furthermore if the

polygon is to go through another point

P" (not shown) besides P and P', the new

polar axis must pass through P, P'. Hence

from O' draw a parallel to PP' ; the new

pole O" will lie on it and its position will be determined by the direction of the side which

is arbitrarily chosen to pass through P".

Historical. — The germ of graphical statics,

dates back to Stevinus, (Beghinselen der Waag—

konst> (1585), who experimented with loaded

cords. But the first systematic geometric treat¬

ment was published by Varignon, (Nouvelle

mecanique ou statique) (1725). For many

years following, graphics was utterly neglected; indeed, Lagrange boasted that his great

(Mecanique analytique> (1788), a work of al¬

most 800 pages, contained not a single diagram.

Poinsot, (Statique graphique) (1804), Lame and Clapeyron (1826), Poncelet, ‘Cours de mecanique industrielle) (1828), and Mobius, ˆLehrbuch der Statik) (1837) were the only important writers after Varignon. The studies of Maxwell, 1864, and Cremona, 1872, cited above, were the first of the modern investiga¬ tions. To Culmann, whose (Graphische Statik) appeared in 1866, belongs the honor of having produced the first great treatise on graphical statistics as a branch of technical mechanics.

Among recent treatises Levy, (Statique graphique) (1886-88), Henneberg, (Statik der starren Systeme) (1886), Miiller-Breslau, (Die graph. Statik der Baukonstruktionen) (5th ed., 1912) and Mohr, (Abhandlungen aus dem Gebiete der technischen Mechanik) (1905) are perhaps the most important. Mohr’s researches, extending over a period of 40 years, are the most note¬ worthy since those of Maxwell and Culmann; he has enriched nearly every department of structural mechanics.

P

Frames. — The principal statical systems to

be studied by the aid of graphics occur in such structures as bridges and buildings. A frame

is a structure built up of rods or links so as to form a geometric net work. It is jointed or

pin-connected if its members are hinged by a

single pin or rivet at each joint. If the joints are made rigid the frame is statically indeter¬

minate but its internal reactions can be ob-

tamed by assuming elastic deformation to take

place. The forces which arise in this case are called secondary stresses. Engesser and Man-derla made the first successful studies of them in 1878 and 1879; for the literature see Gehler, (Nebenspannungen eisener Fachwerkbriicken)

(1910). Consult also the books by Grimm and

Johnson cited below under graphical solutions.

Since the jointed triangle is the simplest frame it is usually chosen as the structural unit. It was used in ancient Roman and Egyptian con¬

structions, and by the 16th century fairly com¬

plicated structures had been built. The external reactions on a frame cannot be found if they

contain more than three unknown elements be¬

cause there are only three conditions for the

equilibrium of the frame as a whole. For this reason the fastenings of a structure to its

abutments (supports) must be designed to

secure rigidity without introducing more than

three unknowns, and to allow slight motion due to deformations caused by elastic yielding and

temperature changes without permitting the

structure appreciably to change its position.

Without going into the details of actual con¬

struction, we shall divide them into two types : hinge support to permit turning, and flat abut¬

ment to allow sliding.

Statically determinate structures. — A struc—

structure is statically determinate when all ex¬

ternal and internal forces can be found from the conditions for equilibrium of a rigid body with¬

out regard to elastic or temperature deforma¬

tions. The idea is due to Mobius. For each link of a pin-connected frame there are three equa¬

tions of equilibrium and for each pin two equa¬

tions. (See Mechanics). Hence a frame con¬

taining / links and p pins will yield 2p + 31

equations. Although the frame as a whole will give three more equations, containing, however, only

external reactions, they are superfluous because they can be derived from the 2 p + 31 equations by eliminating the internal forces. Or from

another point of view, the whole frame is in

equilibrium if every part is. Consider now the number of unknown quantities. The reaction

at a hinge or pin is unknown in both magnitude and direction, or else consists of two forces

unknown in magnitude but given in direction.

That is, since each link can be held in equilib¬

rium by two forces at each end, / links require 4/ unknown external magnitudes, the opposites

of which act on the oins. In addition to these there are in general three unknown external

elements; total, 4/ T 3. As the number of

equations must equal the number of unknowns

$$l = 2p — 3,$$

which is the criterion to be satisfied by a

statically determinate frame. One link with

three pins counts as three links, being statically equivalent to a collapsed triangle ; likewise, one link with n pins counts as 2 n — 3. By similar reasoning we find that l links will rigidly inter¬

connect f frames if l = 3f — 3. Observe that 2 p — 3 is odd. If n links meet at every pin, «

p = 2p — 3 because each link connects two

pins; since p is a positive integer, n — 2 or 3

and 1 — 3 or 9: see Fig. 7. A frame is re¬

dundant or over-rigid if it has more than

enough links, and deformable if it has less.

Some frames which satisfy the criterion may be indeterminate and vice-versa; this is due to

special elements in their configurations. For

example in Fig. 7, i, ii and iii are all con¬

structed in about the same way. But the

forces in ii and iii cannot be determined because instantaneous centers (see Kinematics) can be

found for the parts above the section lines S.

On the other hand v should be indeterminate

but is not ; vi is interesting because it contains no triangles at all.

Graphical solutions. — Graphical methods of

solving problems in statics depend on several

powerful theorems:

I. A body on which forces act at only two

points transmits force along the line joining

those points. The theorem of four forces is a special case, the points being the two inter¬

sections.

Fig. 7.

II. Three forces in equilibrium are either

concurrent or parallel. This is the basis of the funicular construction.

III. A force on a rigid body can be re¬

placed by any set of its components without dis¬

turbing equilibrium. In an elastic body the

state of internal stress would be altered by such a substitution. By means of III we can replace the weight of members, and roof, snow and

wind load's by their equivalent components

acting at the pins of a frame.

IV. The equilibrium theorems as expressed

by the force and funicular polygons and the

reciprocal diagrams explained below.

V. Theorems based on the principle of

work and virtual displacements. These cannot

be dealt with in a brief exposition. Consult

Hudson, (Deflections and Statically Indeter¬

minate Stresses,* (1911) ; Johnson, Bryan and

Turneaure, (The Theory and Practice of

Modern Framed Structures* (9th ed.) ; Grimm,

Reciprocal diagrams. — A frame acted on by

pin loads or by intermediate forces replaced by their equivalent pin components, consists

statically of as many sets of concurrent forces as there are pins. The resulting tensile and

compressive forces in the members, which are

two-point nieces, can be obtained in several

ways, but in many problems in structural en¬

gineering the graphical solution can be carried systematically as shown in connection with

Fig. 8. i shows a simple roof truss carrying

a load W and resting on supports ; the reactions are vertical. They are to be found in the

simplest way; in this case, from the symmetry, each is W/2. Now put letters in the spaces be¬

tween the forces, and numbers in the panels.

The load W is then called ab, the reactions being be and ca. The force in the vertical member

is either 12 or 21 according to the pin on which it acts; in the member between A and 1 it is al or la. This is Bow's notation, mentioned

above. Draw the external force polygon abca,

taking the forces in alphabetical order. At the left pin there are three

forces ca, al, 1 c which must be named and used around the pin in the order the letters have around the truss : clock¬

wise in this case. Since ca, al, lc are in

equilibrium they will form a triangle which is to be attached to the f :e polygon as in ii. In the triangle, al (not la) acts from a towards 1 and therefore pushes on the left pin of the truss; al is thus in compression, lc is in tension be¬

cause lc (not cl) acts from 1 to c and represents a pull. The quadrilateral for the top pin forces la, ab, b2, 21 is drawn in ii ; similarly for the other pins. No pin can be used at which more than two unknowns act. Consider now the

free body cut out by the line ss. Correspond¬

ing to the forces on it — la, ab, b2, 2c, cl —there is a polygon \ab2c\ ; the same is true of any part of the truss as a free body. Con¬

versely, for every force polygon in ii there is a free body in equilibrium in i. This is the most general form of the reciprocal relation already seen in the funicular and force polygons. The

diagrams in Fig. 8 are called Maxwell-Cremona

diagrams ; they were used independently how¬

ever by Rankine, (Applied Mechanics) (1857)

and shortly afterwards by W. P. Taylor, a

practical draughtsman.

Henneberg's method. — The Maxwell-Cre¬

mona construction cannot be employed in all

Fig. 8.

cases. In Fig. 7, i and iv, there is no pin at which there are only two

unknowns, but by

using the theorem of four forces on the parts cut out by the section lines ss, some of the internal forces can be found ; the method then applies.

Fig. 7, vi, cannot be solved by any method ex¬

plained above. An ingenious graphical solution

which has not yet become current in textbooks

was devised by Henneberg, (Statik der starren

Systeme) (1886) . The frame in Fig. 9 will serve to illustrate the procedure. Fz is given and

Flf F« are found in any convenient way. In

order to make the structure indeterminate. intro¬

duce a link L anywhere. Being indeterminate it has an infinity of solutions two of which are to be got thus :

(a) Select any pin at which there are not

more than three rods, e.g., that at Fa ; this will always be possible — see the discussion of determinateness above. Draw any polygon ii

for it and find the remaining forces (not

shown). Observe that P', Q\ R' are not the

required forces in the links of the given frame; they are merely those forces in the members of the redundant frame which can equilibrate. Fa.

(b) The redundant frame may have initial

stress, i.e., if L or any other link is too long or too short it will produce

stress in all the mem¬

bers without the aid of external forces. Find

any set of initial forces P0, Q0, R0 as in iii for the pin at Fz and then find the rest L0, S0y To _ (not shown).

If P, Q, R, S, _ are the actual forces be¬

fore L is introduced we have for the pin F»

the vector sum

Ft + P-}-^-|-R=0. (required forces)

From ii, F, + P' -VQ' R' — 0 (assumed forces) /. (P-P') + (Q-Q')+(R-R') = 0 .... (1)

From iii Po+Qo + Ro = 0 {initial forces) ... (2) Since the sides of the triangles represented

by (1) and (2) are parallel.

P—P' Q—Q' R—R' ,

— 5 — = — - = —5 — = say. ... (3)

r o \lo -Ko

It is on account of the triangles that a three-link pin was selected. In

the same way we

find for the upper left pin

R—R’ S-S’ r-r

= * [by (3)] . .

Ro So To

For the lower left pin

T— V U— U’

V — V’

Vo

To U0

For the pin at F*

{Q—Q’) + {L—L’) + {U—U’) + (W. — W’)

and Qo -j-Lo H-FJo -f” WTo = 0

(4)

(5)

= 0

Since in these two quadrilaterals Qo and Uo

are proportional to (Q — Q’) and (U — U’)

by (3) and (5), the quadrilaterals are similar, whence

r<2— Q’ L—L’ _ w — W>

[Qo Lo W,

GRAPHITE

151

and so on for the other pins. Hence there

are the equations

L — Z/ -f-7 Lo

p=.p’ +)[p0 … (7)

Q=Q’ +*Qo

where P, Q, … are the required, P’, Q’, …

the assumed, and Po, Qo, … the initial forces.

Tensions are positive hence in this case Q’

should be negative. The correct value of L is zero because the redundant link is unnecessary

for rigidity;

so that P,Q, … can be found from (7). The

solution may be shortened by taking one of the assumed forces, as R’, to be zero.

Space forces. The graphical equilibrium

conditions for concurrent forces in three dimen¬

sions are obtained from Fig. 10.

Fig. 10.

P Q R S T U is a closed space polygon and

PQR1S1T1U1 its projection on the plane of

PQ. It is possible for P…U i to be closed

while P…U is open, for instance when the

tail of S is vertically above the head of R; but then no other projection of P…U can

close. Without putting the argument into more

formal shape we may at once conclude that

the necessary and sufficient conditions for the equilibrium of concurrent forces in space are

that the projected polygons on two non-parallel planes shall close. The theorem of four forces in three dimensions follows from the funda¬

mental theorem of three forces : the resultant

of one pair must balance, and therefore be

coplanar with, the other pair. For non-con¬

current space forces in general, the conditions for equilibrium are derived at once from the

fact that if any system is in equilibrium . its projection on any plane is also. The projec¬

tions on the three co-ordinate planes of XYZ

axes give three closed force polygons and three closed funicular polygons if the original sys¬

tem has no resultant force or no resultant mo¬

ment. It is easy to show, as in the case of concurrent forces, that two closed force poly¬

gons are sufficient to make the resultant force vanish. On the other hand all three funicu¬

lar polygons are necessary because each cor¬

responds to a moment condition : the moment

of a force may be zero about two non-rparallel axes without being zero about a third axis.

There are then five necessary and sufficient

conditions for the equilibrium of the most gen¬

eral system of forces :

Two closed force polygons on non-parallel

planes,

Three closed funicular polygons on non-parallel, non-collinear planes.

Richard F. Deimel,

Assistant Professor of Mechanics, Stevens

Institute of Technology.

GRAPHITE, crystalline or amorphous car¬

bon. It crystallizes in rombohedral forms, but

is commonly foliated or earthy. It has a gray metallic lustre, and is greasy to the feel. Its hardness is 1-2 and its specific gravity 2.1-2.2.

The better grades of natural graphite contain

90-95 per cent of carbon, the impurities being chiefly earth or rock. It occurs as an original mineral, minutely disseminated through many

igneous rocks. Its most common occurrence,

however, is in beds of highly metamorphosed

rocks of sedimentary origin, probably repre¬

senting original organic matter, from which, by heat and pressure, the volatile hydrocarbons

have been driven off, leaving pure carbon be¬

hind. It. probably represents the extreme end

product in the same process that forms coal

(q.v.), Most of the domestic supply comes

from pre-Cambrian rocks in the Adirondack

region of New York. Rhode Island is also a

producer. Canada and Bavaria yield important

quantities, while Ceylon is the world's chief

producer. Because of its refractory character

it is used in the manufacture of high tempera¬

ture crucibles. It is also used in paint, and as a lubricant. Much of it is used in making lead pencils (socalled ˆblackleadˆ). Graphite is

made artificially at Niagara Falls, N. Y., where large quantities of anthracite coal and other

forms of amorphous carbon are converted to

this product. The electric furnace process ren¬

ders it possible to make graphite of the high¬

est purity, and also possessing certain definite chemical and physical properties.

The annual electric furnace production of

graphite at Niagara Falls amounts to over 13,-

000,000 pounds, the production increasing

rapidly to meet the demand. About 30 different grades of artificial graphite are now produced.

The art of making graphite in the electric fur¬

nace was invented and developed by Edward G.

Acheson (q.v.) to whom credit for creating

carborundum (q.v.) is also due. Dr. Acheson

is also the inventor of deflocculated graphite, which is graphite reduced to the molecular

condition, this latter process being operated in Port Huron, Mich. In

the deflocculated form

graphite diffuses itself through water and oil, and is the basis for valuable new lubricants

known as oildag and aquadag (qq.v.). See

Electrochemical Industries.

Production. — The amount of crystalline or

flake graphite mined in the United States in

1916 exceeded that of any previous year, and

showed an increase of 55 per cent in quantity and 117 per cent in value over the output for 1915. The 18 mines which were active pro¬

duced 10,931,989 pounds, valued at $914,748.

Alabama continued to be the leading producer,

her seven mines yielding 5,226,940 pounds — 48

per cent of the production of the whole coun¬

try. Pennsylvania's five mines, with a com*

bined output of 1,095,716 pounds, retained her in second place. In New York, three mines were

active; in California, one; in Montana, one, and in Texas, one. Of amorphous graphite, the

domestic production totaled 2,622 tons, mined in five States — Colorado, Michigan, Nevada,

North Carolina and Rhode Island.

Imported graphite continued to dominate the

market, constituting 85.4 per cent of the total supply of the crystalline form — mostly from

Ceylon — and 80.5 per cent of the amorphous

supply — largely from Mexico and Chosen.

The amount imported in 1916 was 64,120,000

pounds of crystalline graphite and 10,857 tons

of amorphous graphite. The enormous in¬

crease in the 1916 consumption of graphite in

the United States above that of 1915, amount¬

ing to 66 per cent in crystalline, and 156 per cent in amorphous graphite, is attributed to the remarkable expansion in the electrochemical

industries, and the consequent demand for

graphite electrodes.

GRAPHOPHONE, an apparatus similar

in principle to the Edison phonograph (q.v.),

and designed to reproduce human speech and

other sounds. It was invented conjointly by

Messrs. C. A. Bell and Charles S. Taintor.

GRAPH OTYPE, a process of engraving

discovered in 1860 by De Witt Clinton Hitch¬

cock, by which the valuable improvement is

effected of enabling the artist to be his own engraver. The discovery is utilized in the fol¬

lowing manner: French chalk is by a careful

process ground to the finest powder, which is

repeatedly passed through a wire-cloth with

10,000 holes to the square inch. It is then laid between a smooth plate of zinc and a smooth

plate of steel and submitted to intense hy¬

draulic pressure, after which it is sized to pre¬

pare it for the artist. The pencils used by the artist are of sable-hair, and the ink is com¬

posed of lampblack and glue. The drawing,

when finished, is gently rubbed with silk velvet or fitch-hair brushes until the chalk between

the ink lines is entirely removed to the depth of one-eighth inch. The block is then hardened by steeping it in an alkaline silicate, by which the whole of the chalk is converted into stone.

Molds are then taken of it, from which stereo¬

type plates are cast for printing. See Zinco—

type.

GRAPTOLITOIDEA, an extinct order of

colonial animals the position of which in the

animal kingdom is only imperfectly known.

While it is usually supposed that they are

Hydrozoa , it has been suggested that they are Bryozoa. They are confined to the Lower

Palaeozoic and are especially common in shales, where their chitinous exoskeleton is found

pyritized or carbonized. The colony seems to

start in its development from a single conical compartment called the sicula. From this

start one or more branched or unbranched tubes called common canals, each opening into one

or more extremely regular rows of cup-like

hydrothecae, which probably constituted the

exoskeletons of individual polyps. The method

of branching and the angle between branches

is quite definite in a given species. In the wall of a single-rowed common canal on the side

opposite the hydrothecae or in the centre of a double-rowed common canal there is usually a

peculiar bar of tissue prolonging the conical

end of the sicula, and known as the virgula.

The graptolites are extremely important in the

correlation of different geological formations,

for it seems that they were attached to sea¬

weeds, and floated with them to all parts of

the ocean, so that their rapid distribution was assured. The many changes which they under¬

went is also an aid to the dating of rocks in which they occur. Consult Bassler, (Dendroid

Graptolites of the Niagaran DolomifeTat Hamilton, Ontario) (Bulletin of the Smithsonian In¬

stitution No. 65, Washington 1909) ; Riide—

mann, ‘Graptolites of New York) (Memoir

New York State Museum, Nos. 7 and 11,

Albany 1905-08).

GRAS, Felix, Provencal writer: b. Male—

mont, near Avignon, 3 May 1844 ; d. Avignon,

4 March 1901. His education ceased at 17,

when he returned to his father’s farm, from

which he was sent, in 1864, to Avignon and

articled to Jules Gieia, a man of letters as well as a lawyer, and a member of Felibrige, a

Provencal literary club of which Frederic Mis¬

tral (q.v.) was a member. Amid such sur¬

roundings he accepted law as his profession but resolved on literature as his vocation. In 1876

he published his first important work, an epic poem in 12 cantos, (Li Carbounie,* which W9n

for him the first place among Provencal writ¬

ers of the younger generation. <Toloza,) an

epic recounting the crusade of Simon de Montfort against the Albigenses, followed in 1882.

He proved himself second only to Mistral

among Meridionals by a collection of his

shorter poems to which he gave the title (Lou Roumancers ProuvengaP (1887). In his col¬

lections of prose stories, (La Papalmo) (1891), he fancifully describes,

in vivid, racy style, the loves and hates, sensuality and “superstition*

of the papal court at Avignon. His greatest

popular success, ‘Li Rouge dou Miejour)

(1896), was published in a translation, ‘The

Reds of the Midi,* before it saw the light in France, where it is not so popular as among

those who read it in the English version alone.

A more recent work, which has been translated

in the United States under the title ‘The White Terror,* describes the retaliatory violence of

the Royalists in the south, when the storm of the Revolution had swept by. For 10 years

previous to his death he had been Capoulie, or president of the Felibrige. See Reds of the

Midi, The.

GRASMERE, gras’mer, England, village, in

Westmoreland County, on the lake of the same

name. It has been made famous by the “Lake

School of Poets* Wordsworth, Southey and

Coleridge. Many places in Grasmere and the

surrounding lake country have been mentioned

in the poems of the authors who frequented

this section, especially by Wordsworth. The

graves of Wordsworth and Hartley Coleridge

are in Grasmere.

GRASS. See Grasses in the United

States.

GRASS, China. See Ramie.

GRASS, STRAW, or PAMPASS CAT, a

wildcat (Felis pajeros) of southern South

America, common on the grassy plains. It is

described by Hudson (‘A Naturalist in La

Plata,) 1892) as not unlike the European wildcat GRASS-BASS —
GRASSES IN THE UNITED STATES

in its robust form and dark color, <(but a longer, more powerful
animal, inexpressibly savage in

disposition.®

GRASS-BASS, the calico-bass (q.v.).

GRASS-FINCH. See Vesper Sparrow.

GRASS-PINK, or CALOPOGON, a

showy orchid (Limodorum tuberosum) , with a

small bulbous root, large ovate leaves, sheathed at the base, and flowers growing in a loose spike upon a slender stem 12 to 18 inches high ;

they are butterfly-shaped, fragrant and ma¬

genta pink; and the lip, which is exquisitely

bearded with gay colors, remains on the upper

side of the flower, giving the blossom an upside-down appearance. It is common in boggy

places from Florida to Newfoundland. Sev¬

eral other species of the genus occur in the

South, one of which (L. multiflorum) bears

many more flowers than does the grass-pink.

GRASS-SNAKE. See Green Snake.

GRASS-SNIPE, a gunner's name for the

jack-snipe (q.v.), and some other shorebirds

of similar habits.

GRASS-TREE, the popular name for cer¬

tain tree-like Australian rushes of the family

Juncacece. Their large stems are crowned by

thick tufts of narrow, pendulous foliage and

by cylindrical flower-spikes like exaggerated

cat-tails. The plants contain an aromatic resin (Botany-bay gum or gum acaroides) employed

in pharmacy, and also used by the natives for a variety of purposes, such as calking canoes, and as a cement or glue. These plants are also called ˆblack-boys® from the appearance of the

stems when charred by fire, and from the fact that the black-skinned natives often use them

as a means of concealment, or even imitate the appearance of a charred stem by crouching into a similar attitude, and so escape the eyes of enemies.

GRASS VALLEY, Cal., city, in Nevada

County, on the Nevada County Narrow Gauge

Railroad, about three miles northeast of Marvs—

ville and 65 miles northeast of Sacramento.

It was one of the first settlements made after gold had been discovered in the State. It is in a rich gold quartz mining region, and the chief occupations are connected with mining. It has

granite and marble works, a distillery and large wineries. It contains a public library, high

school and two orphan asylums. It is the seat of Saint Mary's Academy. Pop. 4,520.

GRASS WORM, the caterpillar of a noc—

tuid moth (Laphygma frugiperda) , which often

does great damage to grasses and cereals in the Southern States, and to a great variety of crop plants, as in 1899, when a serious outbreak of this species extended from Mexico to Chicago.

In the North it is known as the fall army—

worm, from the fact that it appears and travels in greatest numbers in

the autumn, devouring

nearly every form of vegetation encountered in

its line of march.

GRASS-WRACK, a maritime grass. See

Eelgrass.

GRASSE, Francois Joseph Paul, fran-

swa zho-zef pol gras, Count de, French ad¬

miral: b. Valettes, Provence, 1723; d. Paris, 11

Jan. 1788. He first entered the navy of the

Knights of Malta, and served against the

Turks; in 1749 entered the French navy, be¬

came captain in 1762, and rear-admiral in 1778, and was appointed to command a squadron sent

to the West Indies. In 1781 he was given the rank of admiral and sent with a fleet to co¬

operate with the land forces in the American

colonies. He first assisted at the taking of

Tobago, in the West Indies, then sailed to the mouth of the Chesapeake, where he repulsed

the attack of the British fleet under the com¬

mand of Graves, prevented aid from reaching

Cornwallis at Yorktown and cut off his retreat, thus materially assisting the decisive American

victory there; for these services he received the thanks of Congress. He then went to the West

Indies, where for a time he was successful

against the British, capturing the island of

Saint Christopher; but on 12 April 1782 was

surprised by the English fleet under Rodney,

and after a hard fight defeated, and taken

prisoner. He was accused of carelessness and

even treachery, but was exonerated by an official investigation, and at the time of his death held the rank of lieutenant-general of the naval

forces of France.

GRASSERIE, a disease of silkworms

(qv.).

GRASSES IN THE UNITED STATES.

The term ((grass® is popularly applied to the

green herbage on which cattle and other beasts feed, and thus includes many plants which are

not botanically related to the true grasses, such as the clovers, alfalfa, sanfoin, vetches, spurry, etc., frequently referred to as <(artificial grasses,®

while it excludes some of the most important of the true grasses, namely, the cereals. The true grasses constitute the botanical family Gram-inece. They are distinguished from related

groups of plants in that the leaves are arranged in two opposite rows on the stem, with a single leaf at each joint. The stems (culms) are

usually hollow except at the joints, and the

base of the leaf forms a sheath which surrounds the stem above the joints. The sheath is us¬

ually extended a short distance above the base of the blade of the leaf, in a delicate, whitish structure closely surrounding the stem, called

the ligule, the office of which seems to be to prevent rain-water from percolating between

the sheath and the stem. The grass flower

usually consists of the following parts : flower¬

ing glume, palet, lodicule, one to six stamens (usually three), and a one-celled ovary usually with two styles tipped with plumose stigmas.

The flowers are usually arranged in two rows

on opposite sides of the rachilla, constituting a spikelet. At the base of the spikelet are usually two empty glumes. The empty glumes,

flowering glumes, and palet constitute the

((chaff.® The spikelet may contain one to many flowers. The lodicule, which stands in front

of the flowering glume, is very small, usually not noticeable except on close examination. At

flowering time, the lodicule becomes greatly

swollen, and by this means spreads the flower

open. In spikelets that contain several flowers, the palet, or inner chaff, rests with its back against the rachilla, and is concave on the back, with a nerve or keel on either side. Ihe

edges of the nalet are overlapped by the edges of the flowering glume, or outer chaff. The

spikelets are arranged either in spikes, as in wheat, or in panicles, as in oats. Popularly,

these are referred to as the «seed-head,® and

this term will be frequently used in this sense in this article. The fruit of the grasses is a seed-like grain, either adherent to the chaff,

as in barley, or free from it, as in wheat.

This is one of the largest and most widely

disseminated families of plants, and by far the most important to mankind. It includes the

cereals, wheat, oats, barley, rye, rice, millet and corn, sugarcane, sorghum, the cane of the

Southern canebrakes and the bamboo of the

Old World, in addition to the common grasses

of the fields and prairies. It furnishes the prin¬

cipal food of both man and beast, and some of the most beautiful ornamental plants (reed,

Ravenna grass, plume-grass, ribbon-grass, etc.).

The grasses are the foundations of agriculture.

Their principal development is in the temperate zones, though grasses are found wherever veg¬

etation flourishes. Singularly enough, the most

important grasses, the cereal grains, are not

known in the wild state, and their cultivation extends so far back into

antiquity that even

their places of origin are unknown. Either

their wild counterparts have become extinct or

the cereals have been so changed by cultivation that their wild forms are no longer recogniz¬

able. (Wild plants have recently been dis¬

covered in Palestine that are believed to be the progenitors of wheat). There are in all about

4,000 distinct species of grasses known. The

species of only two natural orders of flowering plants exceed this number, namely, the Com¬

posite? and the Leguminosce, though in the num¬

ber of individual plants the grasses far surpass all others. The total number of grass species

growing in the United States is about 1,400; in the limits of the State of Washington about

275 species are found. Originally, nearly half

the area of this country consisted of prairies, the principal herbage of which was grasses.

The existence of these vast stretches of grass¬

land has never been fully accounted for. It is not due simply to climatic and soil conditions, for many species of trees readily grow on the prairies when placed there by man. In recent

years, vast areas that were formerly occupied

by grasses have been invaded by various shrubs and trees, particularly the mesquite tree of the Southwest. This has occurred simultaneously

with the destruction of the grasses by stock, in¬

dicating that the presence of the grasses is in¬

imical to forest growth. It is well known that grasses thrive best on the more compact soils.

On such soils, the abundant growth of grass,

with the fires that have swept over these regions in dry seasons from time immemorial, has kept

in check those classes of vegetation which could not quickly recuperate after the destruction by fire of their aerial portions. On the coarser

types of soil, the sparse growth of grass, and the consequent lack of fuel to feed the fires, has enabled forest trees to become established.

These facts, while they do not entirely account for the existence of prairies, are undoubtedly

an important element. The prairies are partic¬

ularly developed in the arid and semi-arid

regions where frequent drouth has augmented

the destruction occasioned by fires, and partic¬

ularly on the heavier soils of that region which retain sufficient moisture to enable the grasses to form a complete covering over the soil.

Of the many grasses (popularly known as

such) native to this country, or of the intro¬

duced grasses that have become established here, comparatively few are of economic importance.

Their principal use is as food for live stock.

Most of them grow too sparsely to be important for this purpose, and many of them are not

nutritious enough to make them valuable as

food. A considerable number, however, are

both nutritious and palatable to stock. Yet the number of these which are propagated artifi¬

cially is exceedingly small when compared with

the total number of species. This is partly ac¬

counted for by the fact that a few species are surpassingly useful by reason of abundant

growth, ease of propagation, nutritive value

and palatability. When such a grass becomes

established in a region to which it is adapted the effort to find other valuable sorts in a

measure ceases. But there are vast sections of country, particularly in the cotton-producing

States, and the arid and semi-arid West, where good grasses, adapted to local soil and climatic conditions, have not yet become established as

field crops. Not that there are no good grasses known in these regions, for there are many of them, but it happens that these grasses are not easily propagated or have some characteristc

which renders them undesirable. The well-known and valuable buffalo grass (Bulbilis

dactyloides) of the West and Southwest is an

example in point. It is one of the most

nutritious and palatable of all the grasses, and produces abundant feed, but it produces very

little seed, and that only on trailing, yine-like stems, from which it is impractical to harvest it.

Many of the grasses which formerly constituted

important factors on the ranges of the West, and which are eminently adapted to the climatic and soil conditions there, are rendered useless on

cultivated lands by reason of their poor seed

habits. What the breeder's art may accomplish

in rendering these now useless grasses useful,

by improving their seed habit, remains to be

seen. The leading tame grasses of the country

are as follows :

Timothy (Phleum pratense). — The acre¬

age of this grass is the United States is twice as great as that of all other cultivated grasses put together. It may be said to be the hay

grass of the country. Its supremacy is due

first of all to its excellent seed habits. The seed from an acre of it will seed a larger

acreage than is the case with any other grass.

The seed is easily harvested, and retains its

vitality for several years. It also produces

relatively large yields of hay, which, although not so nutritious as the hay from some other

grasses, is eaten readily by all kinds of stock.

It is particularly valuable for horses, because of its favorable physiological effect on the di¬

gestive apparatus. Owners of livery stables,

whose horses are liable to be subjected to hard driving after heavy feeding, will feed no other hay when timothy is available. Timothy is

usually sown with wheat, in fall, at the rate of about eight pounds of seed per acre, the

seed being cast on the bare ground behind the drillplows. Clover is then frequently added,

at the same rate, in earlv spring, though farmers who raise much hay for sale prefer to omit

the clover, as the -pure timothy is preferred by horsemen. . After the wheat crop is harvested,

the grass is ordinarily used for pasture in the fall. The next season a large yield of hay is obtained (one to three or more tons per acre, according to-the fertility of the soil),- but .the GRASSES IN THE UNITED STATES

yield decreases thereafter to such an extent that the best farmers do not attempt to maintain a timothy meadow for more than two seasons,

though such fields are frequently used for

pasture for two or three years longer, before

breaking them up for corn. In the latter case, bluegrass seed (Poapratensis) is frequently

scattered on the timothy sod, so that the pasture consists largely of bluegrass. The production

of timothy hay is confined largely to the region north of and including the eastern third of

Kansas and Nebraska, and to certain restricted

localities in the Rocky Mountains and Pacific

Coast States ; but timothy hay is used almost ex¬

clusively by horsemen in the large cities of all sections of the country.

Kentucky Bluegrass, June Grass or Blue¬

grass (Poa pratensis). — Next to timothy this

is the most important grass in this country,

though it seldom grows large enough to cut

for hay. It is undoubtedly the leading pasture grass in America. Its distribution is nearly

identical with that of timothy. It does not ex¬

tend south of the Ohio River except in a circular area about 100 miles in diameter in Kentucky,

with a point 25 miles north of Lexington as a centre; and in certain portions of Tennessee

and the mountainous portions of the Southern

States. In Kentucky and Tennessee its dis¬

tribution is closely confined to the Cambrian

rocks, which are rich in both lime and mag¬

nesia. Perhaps no other grass is so acceptable to stock as bluegrass. It is one of the most nutritious of grasses, and it is a notable fact that stock raising has never become a prominent feature of farming anywhere in the United

States outside of the bluegrass region, except

of course in the range country of the West,

where ranching rather than farming is the

prevailing form of agriculture. The best blue¬

grass pastures are those which are kept free

from weeds and bushes, not cropped too closely and constantly, and upon which fattening stock

are fed grain and mill products. Such pastures last indefinitely, but are hardly productive

enough to justify their maintenance except on

rough lands not well adapted to the cultivation of ordinary crops. So

highly prized are the

bluegrass pastures in many sections that they

are seldom broken up ; for it is a difficult mat¬

ter to establish a good bluegrass pasture, a

process requiring several years.

Millet. — The term millet is applied to three

more or less distinct groups of grasses. The

more common millets in this country are the

foxtail millets (Chcetochloa) . They include the well-known foxtail, a common weed springing

up in grain fields after harvest, and the hay-producing varieties, Hungarian grass, German

millet, golden millet and a few others, all

annuals which produce an abundant crop of

coarse hay of rather inferior quality. They are grown mostly as catch crops, being sown in

late spring and early summer on fields where

other crops have failed because of drouth.

They are hence confined largely to the semi—

humid region extending from North Dakota to

Texas. Millet hay, when fed to horses that

have no other roughness, has the peculiar prop¬

erty of producing acute rheumatic affections of the joints; but when fed with other hay, the

damage from this source is very slight. An¬

other group of millets, frequently called broom-corn millets, are varieties of the species Pani~-

cum miliaceum. These are little known in this

country, though they constitute important bread—

producing crops in central Asia. A third kind

of millet, usually known as Japanese millet, is a variety of the common barnyard grass, Panicum crus -galli. Some forms of this grass are

common weeds all over this country. Some of

the varieties produce large crops of coarse but palatable hay, particularly on wet lands in the Southern States. The seed of one variety is

used for food by certain Indian tribes of the Southwest. Other varieties are similarly used

in the Old World. This group of millets prob¬

ably deserves more attention than it has yet re¬

ceived in this country.

Redtop (Agrostis alba).— This grass and

its variety vulgaris are widely distributed in

this country, occupying the whole of the timo¬

thy and bluegrass region and extending consid¬

erably farther south; but the only section in

which it may be said to hold first place is in a limited area in southeastern Illinois and ad¬

jacent parts of Kentucky. In this section, prac¬

tically all of the redtop seed of the country is produced. It is rather

distinctly a wet-land

grass, and is usually a valuable constituent of meadows and pastures on. moist lands in all

parts of the country except the extreme South.

It is also well adapted to the acid soils of the Atlantic seaboard, where it is frequently used

in meadow and pasture mixtures. In yield of

hay it is distinctly inferior to timothy, but it withstands cropping and trampling by stock

much better. Although quite nutritious, it is

not nearly so well relished by stock as timothy or bluegrass. ‘

Orchard Grass (Dactylls glomerata). — In

its distribution in this country, this grass is identical with redtop, but it is adapted to drier soils. Particularly in the southern portion of

its area, orchard grass flourishes in the shade of trees, hence its popular name. It may be said to be important as a hay grass only in that part of its range which extends bevond the limits

of the timothy region. It is particularly import¬

ant in the clay soils around the base of the Ap¬

palachian range from Virginia southward,

though it thrives equally well throughout the

timothv region. This grass produces a large

yield of rather coarse hay, which, however, is of excellent quality if cut by the time the blos¬

soming period is over. If allowed to stand

longer, the quality of the hay deteriorates

rapidly because of the formation of woody

tissue in the stems. A rather serious objection to it is that it is inclined to grow in bunches, making a rough and uneven surface dif¬

ficult to mow ; yet it is undoubtedly the

best of the hay grasses in those portions of its region where timothy does not succeed. It is

also an excellent pasture grass, withstanding

much hard usage, and furnishing large quanti¬

ties of herbage. In New Zealand, where this

grass is very popular, and in England, it is

known as cock's-foot, from the fancied resem¬

blance of its branching seed-head to a chicken's foot.

Bermuda (Cynodon dactylon). — With

some reservations, it mav be stated that what

bluegrass is to the North, Bermuda is to the

South. The differences are: Bermuda revels

in the heat of summer, while bluegrass makes

little growth in hot, dry weather. It stands

drouth much better than bluegrass. On good

land, Bermuda furnishes good crops of hay,

which bluegrass does not. Bermuda stands

trampling even better than bluegrass, and yields more pasture. On the other hand, Bermuda

furnishes pasture only during the warm season ; and while it furnishes larger amounts of feed

than bluegrass, stock do not relish it quite so well. The seed of Bermuda is also quite un¬

reliable and very high-priced, so that, to ensure getting a stand of it, it is the usual custom to plant small pieces of sod, which soon spread

over the ground and form a complete covering.

One of the most characteristic features of Ber¬

muda is its habit of sending out long runners which run along the surface of the ground, tak¬

ing root at the joints. This renders it a matter of considerable difficulty to eradicate the grass when it is once established. But this may be

done by growing densely shading crops, such

as oats in winter, followed by cowpeas or vel¬

vet beans in summer, for one or two seasons.

A single season of clean culture, such as cotton receives, will then completely destroy the Ber¬

muda. It may also be destroyed by plowing

very shallow in midsummer, followed by suffi¬

cient harrowing to prevent further growth be¬

fore winter. Saint Lucie Grass is a variety of Bermuda which is found in Florida and near

the Gulf Coast. It grows considerably larger

than the species, and in said to remain green longer in the fall.

Johnson Grass or Means Grass (Sorghum

halapensis). — This grass was introduced into

South Carolina from Turkey near the middle of

the last century. In that State it is generally known as Means grass, from Governor Means,

who did much to popularize it. It was later

taken to Mississippi by a Mr. Johnson, where it became widely known under his name. The

most prominent characteristic of Johnson grass

is its habit of producing an enormous growth of underground stems (rootstocks, or rhizomes),

from each joint of which a new plant may be

produced. It is therefore a matter of extreme

difficulty to get rid of the grass when it is once established. It is now very generally distributed over the cotton-producing States, and is the

most formidable weed found in the South. It is generally believed that it cannot be exterminated by any practicable means. This, however, is not the case. The rootstocks, which make this

plant a formidable weed, begin to be formed

just as the plant blossoms. If the grass be

cut for hay at this time, its energies are then diverted to making growth above ground, the

growth of the rootstocks being checked. A

second crop of hay may be cut when the plants blossom again. Immediately thereafter the land

should be plowed very shallow, and then har¬

rowed frequently to prevent further growth till winter. The rootstocks

formed the previous

year will not survive a second winter, so that land treated as above described will be free

from Johnson grass the next year.

While Johnson grass produces rootstocks in

abundance, it spreads very slowly by this means, but spreads rapidly by seed. These are pro¬

duced in great quantity, are readily eaten by

stock and are thus carried over all parts of a farm on which it has once gained a foothold.

Johnson grass usually gives three cuttings of

hay in a season, of about a ton each on good land. • The hay is of excellent quality, particu¬

larly for cattle and for ail horses except livery horses liable to be subjected to hard driving

after a full feed. In such cases its laxative and diuretic effect becomes objectionable. As

a pasture grass it cannot be compared with

Bermuda, though it is greatly relished by all

kinds of stock. It is soon killed down com¬

pletely when heavily pastured, but when the

land is plowed it springs up again.

Sudan Grass. — This is closely related to

Johnson grass, which it resembles in all re¬

spects except two. It is an annual and it has no rootstocks. It has recently been introduced

into this country from Africa, and is becoming an important hay grass in localities where bet¬

ter grasses are wanting.

Brome Grass (Bromus inermis). — This is

a recent introduction from east central Europe, and on the prairie soils of the Northwest and the Pacific Northwest it occupies the place

that bluegrass holds on the glacial drift of the more humid climate to the East. It is much

larger than bluegrass, and hence furnishes more feed. It is much relished by all classes of

stock. Stock eat with great avidity the straw

from which seed is harvested, and the hay,

cut just after the blossoms fall, is of excellent quality. Brome grass forms an excellent sod.

Italian Rye Grass (Lolium italicum). —

This is perhaps the most important of all the meadow grasses in England and on the conti¬

nent of Europe. It is relished by stock better perhaps than any other of the cultivated

grasses ; yet, for some reason not entirely

clear, it is almost unknown in America.ˆ The

only section of the country in which it has

gained favor is in northwestern California,

western Oregon and western Washington. It

is adapted to a very wide range of soils. It thrives remarkably on land reclaimed from

salt marshes by dyking, and it is also a valu¬

able grass on upland soils that are inclined

to be dry. Practically speaking, it is an annual, but if properly managed it reseeds itself in

such a manner as to be practically a perennial.

It is a valuable constituent of all pasture mix¬

tures, and is a hay grass of much value. It is not well adapted to single culture, being rather too weak of stem to stand alone.

English Rye Grass (Lolium perenne). —

This differs from the last in no essential re¬

spect except that it does not grow quite so

tall, and is slightly more inclined to a perennial habit. It is an important European grass

practically unknown in America.

Tall Fescue and Meadow Fescue (Festuca elatior and variety pratensis). — These

two grasses differ in no essential particular

(from the agriculturist's standpoint) except that the first is taller and more leafy than the

second, and therefore more valuable as a forage plant. The smaller form is frequently known

as English bluegrass, a name which has led

to much confusion, and which should be aban¬

doned. It is not closely related to our Ken¬

tucky bluegrass, nor to Canadian bluegrass

(Poa compressa). Tall fescue is much con¬

fused with meadow fescue by seedsmen, and

it not infrequently occurs that seed of the latter is sold under the name of tall fescue. This

fact has hindered the recognition of the de¬

cided merits of tall fescue. Next to Italian

and English rye grass, these two grasses are

the most important cultivated grasses in Eu¬

rope. But like the rye grasses, they have never GRASSES IN THE UNITED STATES

been recognized as valuable grasses in this

country except in a few restricted localities.

One of these localities is western Missouri and eastern Kansas.

Tall Oat Grass (Arrhenatherum avena—

ceum). — This grass is found occasionally in

all parts of the country, but is nowhere an im¬

portant crop. Stock do not eat it readily at

first, but soon become accustomed to it, and

then eat it freely. It has considerable value

both for hay and for pasture. Its seed drops

promptly when ripe, and is thus very difficult to save.

Cheat, or Chess (Bromus secalinus). — In

the Central and Eastern States, cheat is a per¬

nicious weed in wheat fields, and it is popularly believed that, under certain unknown condi¬

tions, wheat turns into cheat, and it avails

nothing that the fallacy of this notion has been demonstrated time and time again. In some

parts of the South, and in the Willamette

Valley in Oregon, cheat is sometimes grown for hay. It produces a large yield of rather poor hay. Being an annual, it is of little value for pasture.

Velvet Grass (Holcus lanatus). — This

grass is common in the Pacific Coast region

along roadsides and in waste places. On sandy

soils along the coast and on peaty soils that dry out in summer, velvet grass is perhaps the most profitable hay and pasture grass, because the

better grasses do not succeed. Stock usually

refuse to eat it until driven by hunger, but

they will soon acquire a taste for it, and it is exceedingly nutritious. Its worst faults are its low yield and lack of palatability.

Canadian Bluegrass (Poa compressa). —

A grass of small economic value, found quite

generally over the Northern States and in Can¬

ada. It is of some value as a sand binder, and, when kept closely mowed, it forms a smooth,

even sod in lawns. In parts of Virginia and

States to the north it is valued as a pasture grass on sandy loam soils.

Crab Grass (Panicum sanguinale). — This

is not, strictly speaking, a cultivated grass. It springs up in cornfields, and after small grain crops in late summer, and frequently furnishes

a considerable crop of hay, which is of fair

quality. It is universal in the South and ex¬

tends northward to the Missouri and Ohio

rivers.

Fodder Grasses. — Under this term we may

include the coarse-growing grasses such as the

sorghums, Kafir corn, Milo maize, teosinte, *etc.*

On account of their large size, they require to be handled in a different manner from the com¬

mon hay grasses. They are usually cut and

shocked after the manner of fodder corn,

though most of them may be handled by

haying machinery if they are sown quite

thick.

The sorghums (saccharine sorghums) were

introduced into this country about the middle

of the last century, and were extensively grown for syrup making before the now universal

adulteration of this class of food materials de¬

stroyed the market for all farm-made syrups.

At present little sorghum syrup is produced,

but the sorghum plant is much grown for fod¬

der. Its most valuable characteristic is its

ability to withstand protracted drouth. It is

therefore especially adapted to the western edge of the humid region, where it is exceedingly

popular. Sorghum is also very generally grown

in all the Southern States, where the fodder is particularly valuable as a feed for the planta¬

tion mules. In all the cotton-growing States,

as well as along the edge of the great plains, sorghum is a much more certain crop than

corn (maize). Kansas is the leading State in

the production of this crop. Some varieties are grown as far north as Minnesota and North

Dakota. In the South two or three cuttings

may be made in a season.

Several varieties of Kafir corn (non-sac¬

charine sorghums) have become established in

this country in recent years. The plant re¬

sembles a low-growing, branching, very leafy

sorghum. It is cultivated either for fodder or for grain, of which latter it yields abundant

crops. The grain is inferior to corn, but its more certain yield in dry seasons renders it a valuable crop in the same sections where sor¬

ghum is grown. It is rather more distinctly

a southern crop than sorghum, being grown

most largely in Kansas, Oklahoma, Texas and

New Mexico. Milo maize is not very widely

known in this country, but it is gaining a foot¬

hold in parts of Texas, where it is grown after the manner of sorghum and is said to furnish

large crops of valuable fodder or hay. Teosinte (Euchlenea mexicana) is a tropical plant some¬

what resembling sorghum, but in reality more

closely related to corn (maize). It does not

produce seed in this country, but on rich allu¬

vial soils in the Southern States it produces

enormous yields of green fodder much relished

by cattle. It is of no account on poor thin

soils. Near the cities, where dairying is an im¬

portant industry, this crop is of great value in the South. It may be cut several times in a

season, and there is no waste in feeding it, as the stalks are readily eaten.

Pearl millet may be classed with the sor¬

ghums on account of its manner of growth,

but botanically it is quite different from them.

It is a native of Africa, and was introduced

in this country about 30 years ago. It has been tried very generally over the country, but has never gained favor. The seed is frequentlv un¬

reliable, and the stems are inclined to be woody when approaching maturity.

A large number of our wild grasses have

more or less economic importance. In fact, a

majority of them furnish food for domesticated

animals, while some are important for other

reasons, as will appear in the discussion below.

Only a few, however, are of sufficient import¬

ance to warrant their mention here. It is some¬

what remarkable that none of our wild grasses

have been domesticated during the past hundred

years. This is perhaps due to the fact that the best of them were brought into cultivation very early in the history of the country. The more important genera of our wild grasses are:

Andropogon. — This genus is particularly

well developed along the eastern edge of the

Western plains, where several species form im¬

portant constituents of the immense acreage of

wild hay cut in that region ; also in the Southern States, where it constitutes the major part of the growth of grasses in open woods and aban¬

doned fields. A. virginicus is one of the most abundant grasses from Maryland southward.

These grasses are large and coarse, and are not much relished by stock except in the early stage of their growth, whence the common practise

of burning over the prairies to start a new

growth of tender grass.

Agropyron. — This genus is particularly

characteristic of the northern Rocky Mountain

States, where several species are valuable for

forage. They are, as a rule, better relished by stock than the preceding, and some of them

furnish hay of excellent quality. A. occidentale is the well-known blue-stem of the mountain

regions and the western margin of the plains.

It has strongly creeping rootstocks and is per¬

haps the best hay grass among the wild species in the region where it grows. There is reason to believe that it will in time constitute an im¬

portant crop on cultivated lands, particularly

in the moister valleys of the northern portion of the arid region. A. diver gens is the common bunch grass of eastern Washington and Oregon

and northern Idaho. It is valuable on the

ranges and furnishes very good hay where the

rainfall is 20 inches or more. A. repens is the well-known quack grass of our Northern

States. On account of its great development

of rootstocks it is a very pernicious weed. Yet it furnishes fairly good forage and is recom¬

mended by some for cultivation in the semi-arid region. It also has some value as a sand binder. It may be eradicated by methods sim¬

ilar to those described under Johnson grass.

A. tenerum, the slender wheat-grass of the

Northwestern prairies, is a good hay grass,

seed of which may now be had on the markets.

Ammophia. — A genus of one species, known

as beach grass; in Australia and South Africa

called <(marram.® This is as yet the only spe¬

cies of grass that has been used successfully in northern latitudes as a sand-binding grass on

dunes near the coast. For this purpose it is in¬

valuable. Extensive plantations of it have been made on both the Atlantic and Pacific coasts;

also on dunes near the Great Lakes. It is prop¬

agated by digging up bunches of the grass, sepa¬

rating each one into several small bunches and then resetting them in the sand.

Arundinaria. — The cane of the Southern

canebrakes, a relative of the Oriental bamboos.

It is much utilized as winter forage for cattle, which frequently winter in good condition in

the brakes. There are two closely related spe¬

cies, the larger one furnishing the common cane fishing rods.

Avena. — A. fatua, the wild oats of the

spring-wheat producing States, is a weed in

wheat fields. In several States the common hay is cut from patches in wheat fields taken by

wild oats. If cut early enough the hay is of fair quality. Wild oats form an important constit¬

uent of the forage on the ranges of portions of the State of California.

Bouteloua. — This is one of the most char¬

acteristic genera of the arid regions of America, particularly in the Southwest. Side oats grama

(B . curtipendnla) is a handsome and valuable grass on the plains, where it furnishes much val¬

uable feed. Blue grama (B. oligostachya) is

the buffalo grass of the plains of eastern Mon¬

tana, and is also a valuable forage plant.

Bulbilis. — Buffalo grass (B . dactyloides) is

probably the most valuable wild grass of the

plains region, extending from the Dakotas and

Montana to southern Texas and New Mexico

It is one of the most nutritious grasses, rivaling Kentucky bluegrass in this respect, but is less productive than the latter. In Texas and else¬

where there were formerly vast areas of buffalo grass forming a compact sod ; but owing to

overstocking and the depredations of prairie

dogs, the grass is now much less in evidence.

It is not well adapted to use on cultivated land because of its poor seed habits.

Calamagrostis. — An important genus along

the northern border of the United States. Blue-joint (C . canadensis) is an important constit¬

uent of swamp hay, of which a large acreage is cut in Minnesota, Iowa and adjacent States.

Cenchrus. — Two species of Cenchrus are

found in sandy soils in the South and West.

They are noted for the hard spiny ((burs® in

which the seed are found. They are known as

<(sand burs,® and are pernicious weeds in sandy soils.

Setaria (Chaetochloa). — The foxtail grasses.

Two species, the yellow foxtail and green fox¬

tail, are useless weeds which spring up in wheat fields after harvest.

Distichlis. — Salt grass (D . spicata) is com¬

mon in salt water marshes on the coasts and on alkali soils in the arid regions. It has some value as a forage plant.

Elymus — This is a large and important

genus. Several representatives are widely dis¬

tributed and some possess considerable value as forage plants. E. condensatus (giant rye-grass)

is a very characteristic grass in lowlands in the arid regions, where it grows in large clumps, at¬

taining a height of six or seven feet. While

not greatly relished by stock, it frequently suf¬

fices to sustain life during periods when other grasses are covered by snow. It has been sown on cultivated land in some irrigated lands of

the West, particularly where alkali has begun

to appear, and it furnishes large crops of hay.

This hay is rather too laxative for horses, but is said to make good feed for cattle. E. triti-coides (wild wheat) is found in great abun¬

dance on wet meadows in eastern Oregon and

adjacent regions, where it is frequently cut for hay. The forage is said to be excellent. E.

canadensis is a very variable species, common

throughout the Central and Northern States.

Some forms of it are characterized by strongly developed rootstocks and thrive in the sandiest soils. It probably has considerable value for

holding embankments in places where the soil

is sandy. It is also a good forage grass and is worth more attention than it has yet received

for this purpose in the semi-arid region.

Festuca. — One of the characteristic genera of the Western States. F. ovina (sheep's fescue) is one of the most abundant and most valuable grasses of the ranges in the mountain regions.

Hordeum. — Squirrel-tail grass (H . juba—tum) is common on the plains of the West, par¬ticularly in the north. When young and tender it is eaten by stock. When mature, its rough beards are often injurious to stock; they pene¬trate into wounds in the mucous membrane of the mouth and into crevices in broken teeth and often cause the death of horses and cattle. H. murinum, a species found on the Pacific Coast, has barbed beards which penetrate the skin of young animals. It is most pernicious pest.

Muhlenbergia. — A genus particularly well developed in the South, where several species of it are usually found in moist or shady places. Nimble Will (M. diffusa) is one of the com¬monest species. A genus of no particular value.

Panicularia. — Four species of Panicularia

are common swamp grasses of the Northern

States. They are all excellent forage grasses,

but are little utilized, since they seldom grow in situations that permit them to be harvested.

Panicum. — One of the largest and most im¬

portant genera of grasses in the United States, particularly prominent in the Southern States.

Several species have already been noticed in the list of tame grasses above. These are crab

grass, Colorado grass, Japanese millet and the

broom-corn millets. The most prominent re¬

maining species are : P. amarum, a grass with

long creeping stems, common on sands near the

coast from Connecticut to Florida and along the Gulf Coast. This species is of considerable

value for holding drifting sands. P. capillare, Old Witch grass, tickle grass, an annual with

widely branching panicles, common and some¬

times troublesome as a weed in cultivated

ground. P. maximum , Guinea grass, intro¬

duced into Florida from the tropics. A valuable fodder plant, furnishing several cuttings in a

season, sometimes confused with Johnson grass,

but much less hardy. P. proliferum, sprouting

crab grass, growing in much the same region

as crab grassf but extending farther north¬

ward. It springs up in cultivated fields in late summer and is occasionally utilized as pasture or hay. P. virgatum, switch grass, ranging from

Maine to the Gulf and westward to the Rocky

Mountains. It is a perennial, three to five feet high, and, if cut very early, furnishes a large yield of fairly good hay. It deserves attention as a hay and pasture grass in semi-arid regions.

Paspalum. — Another large and important

genus. Seeds usually in digitate spikes resem¬

bling those of crab grass. Carpet grass (P .

compression) is a valuable pasture grass near

the Gulf Coast, particularly on sandy soils. On such soils it will even drive out Bermuda when closely pastured. Its spreading stems form a

dense carpet-like growth which gives it its

popular name of ((carpet grass,® Water grass

(P. dilatation) is another common grass in all the Southern States, frequently found in wet

lands. Its seed has recently been placed on the market and it is used to some extent as a hay and pasture grass. Knot grass (P. distichum),

with creeping stems, is also common in the

South, where it is frequently mistaken for

Bermuda, which it closely resembles. Said to

be valuable on wet lands as pasture.

Phalaris. — One of the species of this genus

(P. arundinacea) , known as ((reed canary®

grass, is one of the most thoroughly cosmopoli¬

tan species in this country. It is found all over the country, usually on wet or overflowed land, but frequently on uplands as well. It is a peren¬

nial with creeping rootstocks (underground

stems) growing four to six feet high. Few

grasses are better relished by stock, either as hay or as pasture; and, were it not for its

habit of shedding its seeds the moment they are mature, it would undoubtedly have become an

important cultivated grass long ago. P. cana—

riensis is the well-known canary grass, seed of which is commonly used as food for canary

birds.

Poa. — This is one of the most characteris¬

tic genera of this country, some representatives of it being well-nigh universal, except in the far South. Kentucky bluegrass, the June grass of

the Northern States, one of the most important grasses in America, has been fully discussed

under the tame grasses above. Many varieties

of this species are found in the wild state in the Northwest, where it is of great importance as a range grass. Even in the region of its

greatest importance it is a semi-wild plant,

springing up everywhere from seed scattered

by the wind or by stock. It is the finest pas¬

ture grass in the world, but not the most pro¬

ductive. P. annua is another representative of

the genus found all over the country. It is

particularly common in the South and on the

Pacific Coast, where it remains green during

the entire winter. This species is not native

here, but is fast becoming one of our common¬

est grasses. It is frequently found in lawns

and in cultivated grounds. It seldom attains

a height of more than a few inches. Texas

bluegrass (P. arachnifera) is noted for the cot¬

tony appearance of its seed. It is also a valu¬

able grass for winter pasture in the South, but is somewhat difficult to establish in a pasture.

Like Bermuda, it is usually propagated by set¬

ting small pieces of the sod a foot or two

apart each way. It is a native of Texas, but is nowhere very abundant. Many species of

Poa are found in the far Northwest, where

they are important range grasses. P. laevigata

is frequently cut for hay on wet meadows in

the mountain regions of Oregon and Washing¬

ton.

Savastana. — Vanilla grass (N. odorata),

commonly called (<sweet grass® in the North¬

west is found from New England to Oregon and

Washington. It is noted for its strong vanilla¬

like odor, resembling the odor of sweet vernal grass. The dried leaves are used by the Indians in weaving small mats and boxes, in which con¬

dition they retain their characteristic odor.

Spartina. — Cord grass (S. cynosuroides) is

an important constitutent of the swamp hay of

which large quantities are cut in Minnesota,

Wisconsin and Iowa. It is frequently found in

large areas growing alone, as if it had been

sown there by hand. The hay is of fair quality and the yield large.

Sporobolus. — Another characteristic genus

of the West and Southwest, where several spe¬

cies are important on the ranges. Saccaton (S.

wrightii) is common in Arizona and New Mex¬

ico, where it grows in large clumps and is fre¬

quently cut for hay. Although decidedly coarse, the hay is valued as forage. Dropseed (S.

cryptandius) , common on the Western plains

and in the Rocky Mountains, is much relished

by stock.

Stenotaphrum. — A single species, S. dimidi—

atum, is of importance. It is frequently used

as a lawn grass from Charleston, S. C, south¬

ward. Sometimes called Charleston lawn grass

and Mission grass. This is the pimento grass of Jamaica. In New South Wales it is called buf¬

falo grass. It grows on all kinds of soils, from heavy clay to almost pure sand, but is seldom found far from the seashore.

Stipa. — A large and important genus in our

western flora. Several species are remarkably

long-awned on the flowering glumes, giving

them the popular designation of needle grasses.

Some of them have the lower end of the seed

produced into a hard, sharp joint which fre¬

quently penetrates the skin of animals, render¬

ing these species somewhat of a nuisance to

stockmen. Many of them, however, make ex-

cellent hay on the great plains. S. leucotricha is the bearded mesquite of central and southern Texas, a valuable wild hay grass. .S’, vaseyi, found in the Rocky Mountains at altitudes of

5,000 to 6,000 feet, has the peculiar property of inducing sleep in stock that eat it, for which reason it is known as <(sleepy grass.® No harm, further than a desire to sleep, seems to follow a feast on this grass ; the effects wear off gradu¬

ally in a day or two.

Uniola. — One species (U . latifolia) has

large panicles of broad, drooping spikelets,

rendering it exceedingly graceful. It is used

as an ornamental, and is indeed one of the most beautiful of the grasses. It is found from

Pennsylvania westward to Illinois and south¬

ward. U. paniculata, seaside oats, grows

abundantly on the sands of our southern At¬

lantic coast and on the Gulf coast where it

serves as a sand binder.

Zizania. — Wild rice; Tuscarora rice. Wild

rice (Z. aquatic a) is one of the most striking in appearance of any of the American grasses. It

occurs on mud flats almost all over the country.

It is very abundant on the tide flats of the Dela¬

ware and Potomac rivers, as well as in many

other places, both in the United States and Can¬

ada. A field of it in bloom presents a very

pleasing appearance with its large, graceful pan¬

icles, yellow below with a great wealth of stam-inate flowers in

drooping branches of the pan¬

icle, the upper, pistillate branches rising grace¬

fully at various angles. When found in situ¬

ations that permit it to be harvested, Indian

rice is cut for forage, yielding enormous quan¬

tities of succulent feed, much relished by stock.

The seed is gathered in quantity for food by

Indians in the Northern States and in Canada.

It is frequently planted in mud or shallow water for its seed, of which fish and birds are exceed¬

ingly fond. The seed is gathered in boats, into which it is threshed from the tall stems grow¬

ing in water. The seed keeps best under

water.

Ornamental Grasses. — A number of valu¬

able ornamental grasses have been mentioned

above. A few others deserve notice. Reed

(Arundo donax) is found in dooryards in

nearly all parts of the country, particularly in the South, though it thrives quite well at the North. It frequently attains a height of 15

feet or more. It resembles sorghum, but is

more leafy and more graceful in appearance.

It is a perennial, springing up in early spring from the roots. As a background for smaller

ornamental plants it is invaluable. Many of

the bamboos are exceedingly useful as orna¬

mental plants. Only a few species are adapted

to northern latitudes. A garden variety of Phalaris arundinacea is common in this country un¬

der the name of ribbon grass. Its leaves are

striped with white. There is also a similar

striped variety of reed. Coix lachryma-jobi,

Job's tears, is a small to medium-sized grass

frequently found in gardens and dooryards ;

it is noted for the indurated, tear-shaped cov¬

ering of the seed. Eulalia japonica of the

Orient. Erianthus ravennce (Ravenna grass) of

Italy and Gyncrium argenteum (Pampas grass)

of the Argentine pampas are other well-known

and deservedly popular ornamental grasses.

W. J. Spillman,

Chief, Office of Farm Management, United

States Department of Agriculture.

GRASSHOPPER-FROG, or CRICKET—

FROG, a small, agile, noisy frog (Acris gryl—

lus), common throughout the warmer half of

the United States, whose spring cry is. like the rattling produced by

striking rapidly two reso¬

nant pebbles. It is about an inch long, brown with a blackish triangular patch on the back

of the head and a dorsal stripe. Its eggs are attached in little masses to a blade of marsh-grass.

GRASSHOPPERS AND LOCUST-PLAGUES. Insects of comparatively large

size of the orthopterous families Acridiidce and Locustidce, or short-horned and long-horned

grasshoppers respectively. In Great Britain

and her colonies the former are the ((locusts®

of popular speech and only the Locustidce are

called ˆgrasshoppers.® (For the allied family of crickets, see Gryllidˆe) . The Acridiidce have the antennae shorter than the body and blunt, the

ovipositor short and its parts divergent at the tip and the sound-producing organs (see

Orthoptera) on the hind thighs and outer

edge of the forewings. In the Locustidce the

antennae are long and tapering, the ovipositor

long and sword-like and the sound-organs are

at the inner base of the forewinˆs. This latter family embraces the katydids, tree-crickets,

green meadow-grasshoppers and certain West¬

ern species erroneously called ˆcrickets® and

the group is more particularly treated under

Katydid. In both families the hinder legs are

greatly enlarged, enabling the insects to make

the long leaps so characteristic of them ; their wings are also capable of carrying them in

some cases many hundreds of miles.

The short-horned grasshoppers are those of

greatest interest economically and those re¬

sponsible for the (<locust® plagues of Africa,

Arabia and southern Asia, as also in our West.

From time to time vast bodies of certain species sweep from one region to another in swarms

many square miles in area and so dense as to darken the sun, feeding on grasses and herbage and consuming not only crops and pasturage as

if by fire, but stripping bushes and trees of foliage and even of the bark. In the ancient

world such visitations, which frequently ex¬

tended into central Europe, caused extensive

local famines, sometimes resulting in the loss of hundreds of thousands of human beings and vast numbers of grazing animals. Such ((plagues®

lasted for two or three years, the hosts breed¬

ing numerously at first, but gradually dying out and ceasing to reproduce outside the limits of their permanent breeding-grounds. The repro¬

duction of grasshoppers consists in the deposit in autumn of eggs laid in bunches, covered with a secretion which hardens into a case or <(pod,®

beneath the surface of the ground, into which

the ovipositor is deeply thrust and where the

eggs remain to be hatched the following spring ; in warm countries, however, two generations

may take place annually. The locusts referred

to in Scripture belonged probably to the species now named Schiztocerca peregrina, of North

Africa and Arabia. The swarms which from

time to time appear in South Africa are of

Pachytylus migratoroides ; while P. migratorius

is the best-known one of southern Europe and

Asia. Similar species inhabit the open interior regions of both North and South America, a

species of Acridium afflicting Argentina.

Of the many species in the United States

lei

those of the genus Melanoplus are of greatest

interest because frequently destructive of crops.

The most conspicuous is M. spretus, the Rocky

Mountain locust, which has been a scourge of

agriculture west of the Mississippi River ever

since settlements began there. Among the more

recent great plagues were those of 1856 and

1874, the latter enduring three years and causing widespread ruin throughout the whole region

between the Mississippi River and the Rocky

Mountains. The Federal government appointed

a commission of entomologists to investigate the habits of the insect and its three (Reports 5

(1877, 1879 and 1882) are exhaustive essays

on the subject. It was found that these and

other destructive locusts bred throughout the

whole plains region in the river bottoms and

sunny depressions and that little could be hoped for in defense except the gradual effect of culti¬

vation in destroying the eggs and young by late and early plowing. This effect has been gained with unexpected celerity; and troublesome

grasshoppers now breed in considerable num¬

bers only in northern Idaho and central British Columbia. Swarms occasionally migrate and

do damage, but the extensive plagues of the past will probably not recur. Nevertheless, grass¬

hoppers are likely often to be locally harmful in the West and must be combated intelligently.

The most valuable preventives are the burning

over or deep plowing of breeding grounds, so

as to turn the eggs out and kill them in the fall or before they can hatch in the spring. The

grasshoppers themselves may be captured by

means of “hopper-dozers® or kerosene pans. A

cheap destroyer consisting of one part of Paris green thoroughly mixed in 60 parts of fresh

horse-dung, two pounds of salt to half a barrel of the mixture being added, after being dis¬

solved in water. This mixture is scattered

broadcast along the edges of crops where in¬

festation is feared and the locusts, liking and eating the poison, die a few days later. The

ordinary bran-arsenic mixture for cutworms

may also be used and in some regions wheat

fields are protected by a trap-crop of rye sown in a strip around the fields and poisoned by

spraying with Paris green.

Bibliography. — Sharp, <Insects) (Vol. VI,

Cambridge Natural History 1900) ; Howard,

<The Insect Book) (1901); Hyatt and Arms,

<Insecta) (Boston 1890) ; Kellogg, ‘American

Insects) (New York 1908) ; Fabre, J. Henri,

<The Life of the Grasshopper5 (1916), and

publications of the United States Department of Agriculture, especially Bulletin 25, Division of Entomology.

GRASSQUITS, a group of interesting little

seed-eating finches of the West Indies, belong¬

ing mainly to the genus Sporophila, and flock¬

ing in grassy lands and pasturage.

GRATIAN, or GRATIANUS FRANCIS—

CUS, Benedictine writer of the 12th century.

He was a native of Chiusi and is considered

the founder of the science of canon law. _ He was the author of a famous work entitled

‘Decretum ; or Concordia discordantium Can—

onium,5 in which he endeavors to reconcile

those canons that seem to contradict each other.

It is a rich storehouse of the canon law of the Middle Ages. The best edition of the text is

found in the ‘Corpus Juris Canonici5 of Rich¬

ter (1833-39).

GRATIAN, or GRATIANUS, gra-shi-

a’nus, Roman emperor, eldest son of the Em¬

peror Valentinian: b. Sirmium, Pannonia, 359

a.d. ; d. Lyons 383. When only eight he was

raised by his father to the rank of Augustus.

On the death of Valentinian in 375 the eastern part of the empire still remained subject to

Valens and Gratian was obliged to share the

western part with a half-brother, a child of four years, associated with

him under the title of

Valentinian II. In the early part of his reign the Goths and Alemanni made incursions into

the Danubian provinces and into Gaul. They

were repeatedly defeated by Gratian and his

generals, but they also advanced into the East¬

ern empire and defeated and killed Valens in

378. Gratian then bestowed the Eastern empire

upon Theodosius, one of his generals.

GRATIOLA, gra-ti'dˆ-la, a genus of

scrophulariaceous plants with many species

widely distributed in temperate regions. A not¬

able representative is the European hedge-hys¬

sop (Gratiola officinalis) , which is extremely bitter, acts violently as a purgative, diuretic and emetic and in overdoses is an acrid poison. It was formerly highly esteemed as a medicine,

and its virtues were supposed to depend on a

bitter resinous principle called "gratiolin.®

Several species are natives of North America.

GRATTAN, Henry, Irish orator and states¬

man: b. Dublin, 3 July 1746; d. London, 4 June 1820. He was called to the Irish bar in 1772, and in 1775 was elected member for Charlemont in the Parliament of Ireland. He im¬

mediately became distinguished in the opposi¬

tion, and infused that spirit into the country which produced in 1782

a repeal of the statute of the 6th George I, which had enacted that

the crown of Ireland was inseparably connected

with that of Great Britain; that Ireland was

bound by British acts of Parliament when named therein ; that the Irish House of Lords had no jurisdiction in matters of appeal; and that the last resort in all cases of law and equity was the British House of Lords. For his share in

the acquirement of this concession the Irish Par¬

liament voted him £50,000 to be laid out in the purchase of a house and lands for him and his heirs forever. He became the leader of the

country party in the House of Commons and

the head of the Irish Whigs. Disgusted by

the Irish Rebellion and its manifold horrors,

he temporarily withdrew from Parliament, but

the project of a union being brought forward

by Pitt, he once more obtained a seat in Parlia¬

ment for the purpose of opposing it. When it

was carried, however, he did not refuse a seat in the United House of Commons, being re¬

turned in 1805 for Malton in Yorkshire, and in the following year for Dublin. His later years were chiefly occupied in a warm and energetic

support of Catholic emancipation. Grattan was

the zealous friend of Ireland from first to

last. As a public speaker he had to contend

with a defective voice; but his eloquence was

bold and commanding, combining strength with

beauty and energy and elevation with elegance.

The best collection of Grattan's parliamentary

speeches is that edited in 1822 by his son

Henrv, who also wrote an account of his (Life and Times5 (1839-46). Consult Leckv (Leaders

of Public Opinion in Ireland5 (1871) ; Me-

Carthy, (Henry Grattan ' (1886); Dunlop,

(Henry Grattan* (1889).

GRATTAN-FLOOD, William H., Irish

organist and author: b. Lismore, 1 Nov. 1859.

He was educated at Mount Melleray, All Hal¬

lows College, Dublin, Carlow College and the

Catholic University of Ireland. He has been at various times theological student, tutor, pro¬

fessor of music and languages and lecturer on

Irish history. He was professor of music at

the colleges of Tullabeg and Clongowes Wood,

served as organist in various Irish churches

and since 1895 has been organist and choir¬

master at the cathedral of Enniscorthy. He was lecturer at the Mangan and Balfe centenaries in 1903 and 1908 respectively and was president

of the music section of the Pan-Celtic Congress held at Brussels in 1910. He was historical

witness at the process for beatification of the Venerable Oliver Plunkett, archbishop of

Armagh. He is a member of the Royal So¬

ciety of Antiquaries of Ireland and of the In¬

ternational Musical Society. His published

works include (History of Irish Music' ;

(Story of the Harp1* ; (Story of the Bagpipe' ; (Memoir of W. Vincent Wallace' ; (Memoir of

Father James Dixon.' He edited (Moore's

Melodies' ; (Spirit of the Nation' ; (The

Armagh Hymnal' and was joint editor of (De

Annatis Hiberniae' ; (The Papal Registers' and

collaborated in Grove's dictionary of Music,'

dictionary of National Biography' ; (The

Catholic Encyclopedia,' *etc.*

GRATZ, Rebecca, American educator: b.

Philadelphia, 4 March 1782; d. Philadelphia, 27

Aug. 1869. Of a family noted for wealth and

culture, she showed her bent of mind by found¬

ing in 1838 in Philadelphia the Hebrew Sunday—

school, the oldest society of its kind in America, and for 32 years she was at its head. Apart

from her labors in behalf of the Jewish poor

and needy, she was quick to respond to the

claims of charity without regard for creed, and she was long regarded as Philadelphia's repre¬

sentative Jewess for her simple piety, personal charm and social standing. Her name will al¬

ways be associated with Scott's Uvanhoe,' for

once when Washington Irving was visiting Sir

Walter Scott and learned that a Jewess was to be introduced in the latter's novel, then in

course of preparation, the American described

Rebecca Gratz with so much warmth — that

Scott was deeply impressed. When Uvanhoe'

was finished he sent the first copy to Irving with the inquiry whether the "Rebecca" of the

romance compared favorably with the real Re¬

becca.

GRATZ COLLEGE, Philadelphia, a Jew¬

ish institution of higher learning, founded under a deed of trust by Hyman Gratz (1856), vested in the Congregation Mickveh Israel of Phila¬

delphia. It is devoted to the dissemination of Hebrew culture and religion and is, in effect, a Jewish teachers' college.

GRAU, grow, Maurice, American operatic

manager: b. Briinn. Austria, 1849; d. Paris,

France, 14 March 1907. He came to the United

States with his parents in 1854; was graduated from the New York College in 1867, and from

Columbia Law School. From 1872 until 1903

he was the most prominent operatic manager in

America, securing a long line of singers, musi¬

cians and actors, including names so diverse as Aimee, Rubinstein, Salvini, Sarah Bernhardt,

Patti, Irving, Coquelin, Jane Hading, Mounet—

Sully, *Mme.* Rejane. As director of the

Maurice Grau Opera Company, he brought some

of the most famous singers of the day to

America. He was manager of the Metropolitan

Opera House, New York, from 1891 to 1903.

GRAU, Miguel, Spanish-American admiral:

b. Piura, Peru, 1834; d. 1879. After studying in the naval school at Callao he entered the Peru¬

vian navy as a midshipman in 1852. In 1871

he was put in command of the turret ship

Huascar, and in the Chilean war of 1879 was

killed by the explosion of a shell while en¬

gaged with two ironclads of the enemy.

GRAUBUNDEN. See Grisons.

GRAVATT, William Loyall, American

Protestant Episcopal bishop: b. Port Royal, Va., 15 Dec. 1858. He was educated at Virginia

State College and Virginia Theological Semi¬

nary. Deacon's orders were conferred upon him

in 1884 and he was advanced to the priesthood in 1885. He was assistant rector of Saint

Paul's, Richmond, Va., 1885-87; and rector of

Saint Peter's, Norfolk, Va., 1887-93. and Zion

Church, Charlestown, W. Va., 1893-99. In 1899

he was consecrated bishop of western Virginia.

GRAVE CREEK MOUND. Set Mound

Builders and Mounds.

GRAVEL. See Calculus.

GRAVELOTTE, grav'lot, Battle of, one

of the most severely contested and most im¬

portant conflicts of the Franco-German War

(q.v.). It is named after a village of Lorraine, seveh miles west of Metz, but is also called by the French the battle of Saint Privat, and of

Gravelotte and Rezonville. After the disas¬

trous defeats at Worth and at Forbach on 6

Aug. 1870 the French in two armies, one under MacMahon and one under Bazaine, retreated

along the line of the Moselle, their object be¬

ing to join forces at Chalons. To prevent this the first German army under Prince Frederick

Charles intercepted Bazaine by a circuitous

march, forced upon him the battle of Courcelles and Mars-la-Tour and compelled him to keep

within touch of Metz. On 18 August the

armies of Prince Frederick Charles and Stein—

metz, numbering about 211,000 troops under

the command of King William, attacked the

position. Bazaine had taken a very strong posi¬

tion with about 111,000 men around Gravelotte

on a ridge of hills to the west of Metz, and fronting westward. His line extended from

Rancourt and Saint Privat on the north through Amanvillers and Chatel to Rozerieulles. The

Germans were not well informed as to the

exact position of the French, believing the lat¬

ter's right to be at Amanvillers, whereas it ex¬

tended fully three miles further north to Ran¬

cour t. A flanking movement against the French right was determined on by the Germans, joined with a frontal attack on the left and centre.

The flanking movement was delayed because

the French right was three miles further north than had been expected and the frontal attacks, which were launched at noon about Verneville,

were checked. A cavalry charge by the Ger¬

mans was also repulsed. The Germans carried

the heights of Moscon, Saint-Hubert and Point—

du-Jour during the afternoon, but the battle

was undecided until about 7 o'oclock, when the GRAVES — GRAVITATION

flanking movement on the French right was

finally carried out. The Prussian Guards and

Saxon troops took Saint Privat and drove the

French right from its position, while the French centre and left were checked from breaking

through at Gravelotte. The Germans lost over

28,000 men and the French over 12,000; the

latter were forced to retreat into Metz, which was immediately invested by Prince Frederick

Charles, and capitulated two months later on

27 October. Consult Bleibtren, C., (Die

Schlachten urn Metz' (Metz 1910), and Erb,

F. E. H., (L'Artillerie dans les batailles de

Metz, 14-18 aout) (Paris 1906).

GRAVES, Anson Rogers, American Prot¬

estant bishop : b. Wells, Rutland, Vt., 13 April 1842. He was graduated at Hobart College

1866. He-was ordained priest in 1871, and was assistant in Grace Church, Brooklyn, 1870-71 ;

rector of Plattsmouth, Neb., 1873: and other

pastorates in Minneapolis, Northfield, Minn.,

and Bennington, Vt. In 1890 he was conse¬

crated bishop of the Platte, now the district

of western Nebraska. He resigned in October

19*10. He has published (The Farmer Boy Who

Became a Bishop) ; (Sermons for Lay-Readers.)

GRAVES, Frederick Rogers, American

Protestant Episcopal bishop: b. Auburn, N. Y.,

1858. He was graduated at Hobart College

(1878), and the General Theological Seminary

(1881). His ministry has been devoted to work

in China, and he is the author of several works in the Chinese language. His consecration as

bishop of Shanghai took place in 1893.

GRAVES, John Temple, American jour¬

nalist and orator: b. Wellington Church, Abbe¬

ville District, S. C., 9 Nov. 1856. He was

graduated at the University of Georgia in 1875.

He is well known as an orator and leader of

patriotic sentiment in the South. He was on

the staff of the Atlanta Journal ; was editor of Atlanta Daily Georgian 1905-07; and from 1907

to 1915 editor of the New York American.

Since 1915 he has been editorial representative of the Hearst newspapers. In 1908 he was

candidate of the Independence party for Vice-President. He became president of the New

York Press Club in 1913; is well known as a

progressive and patriotic leader, an advocate of universal peace bv arbitration, of national pre¬

paredness as the best guarantee of peace, and

of separation of black and white races. He

has written (History of Florida of To-Day' ;

(History of Colleton, S. CP ; (Speeches and

Selections for Schools'1 and (The Negro.'

GRAVES' DISEASE. See Thyroid

Gland, Diseases of.

GRAVITATION. The law of gravitation

is the law discovered by Newton, according to

which every portion of matter attracts every

other portion with a force directly proportional to the product of the two masses, and inversely proportional to the square of the distance

be¬

tween them. The motion of the planets round

the sun in ellipses, each marking out the area of its orbit at a constant rate, and each having a year proportional to the square root of the cube of its mean distance from the sun, implies that there is such a force on each planet exactly pro¬

portioned to its mass, directed toward, and in¬

versely as the square of its distance from the sun. The lines of force radiate out from the

sun on all sides equally, and always grasp any matter with a force proportional to its mass,

whatever planet that matter belongs to. Since

the force is always proportional to the mass

acted on, and produces the same change of

velocity whatever that mass may be, the change of velocity tells us nothing about the mass in which it takes place, but only about the mass which is pulling. If, however, we compare the

accelerations due to different pulling bodies, as for instance that of the sun pulling the earth with that of the earth pulling the moon, or if we compare changes in motion due to the dif¬

ferent planets pulling each other, then we can compare their masses and weigh them one

against another and each against the sun.

All this was clearly seen by Newton, and

was set forth in his (System of the World’

(3d ed., p. 41). Kepler (q.v.) had indeed

given the laws, deduced from observation,

according to which the planets describe

their orbits. From these Newton deduced

the laws of the force in the case of the

planets; and subsequently he generalized the

statement of them, by showing the identity of

the nature of the force that retains the moon in her orbit, and that which attracts matter near to the surface of the earth. Kepler's laws state, first, that every planet revolves around the sun in an ellipse, of which the sun occupies one

focus ; second, that the velocity of any planet at different parts of its orbit is such that the radius vector from the sun to the planet sweeps over equal areas in equal times ; and third, that the distances of the various planets are so re¬

lated to the periods of their revolution that the squares of the periodic times are proportional

to the cubes of the mean distances from the

sun. From these laws Newton made the fol¬

lowing deductions : He inferred from the sec¬

ond law that the planet is acted on by a central force that is always directed toward the sun.

From Kepler's first law he deduced the law of variation of the force for any one planet, and found that the force Varies inversely as the

square of the distance of the planet from the sun. Lastly, he concluded from Kepler's third

law a relation between the forces on the various planets ; namely, that the forces on equal masses of the different planets are inversely propor¬

tional to* the squares of the distances of those planets from the sun. This law indicates the

identity of the nature of the force that acts on the different planets. Newton next proceeded

to consider the motions of the moon ; and to

ask the question, <(Is not the force that causes the moon to fall toward the earth the same as that which influences falling bodies near to the earth's surface?" This question he attempted

to put to the test of calculation. At first he was unsuccessful. The then received estimate of

the dimensions of the earth were so far from

correct that the comparison between the force

of attraction in a stone and that in the moon at her distance from the earth did not exactly

agree with his theory, and he was obliged to

give it up for nearly 20 years. It was not till 1684, when he heard a paper of Picard read at the Royal Society of London, on new geodetical measurements of the earth, that he obtained ac¬

curate data to work with ; and, returning home, he set to work to examine the question afresh.

Newton saw that a mountain mass might be

used, and weighed against the earth by finding 104

how much it deflected the plumb-line at its

base. The density of the mountain could be

found from specimens of the rocks composing

it, and the distance of its parts from the plumb-line by a survey. The deflection of the vertical would then give the mass of the earth. Not

long after Newton's death the mountain experi¬

ment was actually tried. The honor of making

the first experiments on gravitation belongs to Pierre Bouguer (q.v.), whose splendid work

does not appear to have received the credit due it.

Having established the law of gravitation

throughout the solar system, it was natural to infer the universality of its action. We know

on the one hand, by observing the motion of

the planets and satellites, the asteroids, and the comets, that the law holds with great exactness for all these bodies; on the other hand, experi¬

ments of Cavendish with balls of lead, and of others, verify its exactness down to very short measurable distances : and though we are un¬

able with our present appliances to determine

the orbits of double stars and of other stellar systems, still we seem to be fully justified in as¬

suming that in these cases also the law

stated above holds, at least, very approximately.

The track was first laid down by Newton,

based on astronomical observations, and only

made firmer and broader by every later observa¬

tion. Important work in Europe has recently

been done in gravitational experiments by the

late Prof. U. Jolly, and by Profs. Braun, Boys and Poynting, who, with others, have advanced

beyond the results of Henry Cavendish (q.v.),

whose device, known as the Cavendish experi¬

ment, for determining the density of the earth, has so long interested scientists. The latest re¬

search has verified Newton's celebrated guess

that ((the quantity of the whole matter of the earth may be five or six times greater than if it consisted all of water.®

No inquiry on gravitation has showed that

it is related to anything but the masses of the attracting and the attracted bodies. It appears to have no relation to physical or chemical con¬

dition of the acting masses or to the interven¬

ing medium. This independence of gravitation

of any quality but mass, bars the way to any explanation of its nature or source.

There is a point respecting the law which is

almost universally passed over without notice,

although it is one of the most important ques¬

tions with respect to the construction of any

theory to account for gravitation ; namely, the exact proportionality of the gravitating forces

of any two bodies to their masses. The most

delicate experiments show no deviation from

the exactness of this law ; nor has the most

accurate observation of planetarv bodies sufficed to detect any such deviation. This is the fact proved by the well-known guinea-and-

feather

experiment, in which it is shown that though a mass of gold and a feather do not fall equally fast under ordinary circumstances, because of

the unequal resistance of the air in the two

cases, yet that, the air being removed by means of the air-pump, they fall with equal velocity.

The experiment proves that the force of gravity in the two cases is exactly proportional to the mass of the guinea and of the feather. Newton showed the same thing himself with far greater minuteness by vibrating balls of various mate¬

rials similarly suspended. In this, which is

known as Newton's pendulum experiment, it is

shown that pendulums of equal length vibrate

in equal times whatever be the material and the masses of which the bobs of the pendulum are

made. By this experiment, when performed

with all the nicety at command, it is probable that any deviation amounting to a ten-thou¬

sandth or a hundred-thousandth part of the

whole amount considered could be detected.

Planetary motions prove the law to even a

greater degree of accuracy. It is curious that this portion of the law, though it is only proved by experiment and observation, is hardly ever,

if ever, referred to by popular writers. It is either assumed without pretense of proof, or is passed over without remark.

Notwithstanding the vast interest and im¬

portance of the study which this subject pre¬

sents, and all the labors of eminent scientists in endeavors to solve its complex problems, it still remains to be said that the world is yet without any theory which can really be considered as

explaining gravitation. Consult Mackenzie,

(The Laws of Gravitation) (1900).

GRAVITY, in physics, the linear accelera¬

tion downward of falling bodies, due to the

gravitation of the earth. If the earth were a perfect sphere, gravity would be uniform at all points of its surface; but because the earth is flattened at the poles, and therefore the polar radius is less than the equatorial radius, gravity is greater at the poles. Newton (q.v.) and

Bessel have shown that in a vacuum a sovereign and a feather will fall with equal speed, though in atmospheric air the rate will be different

owing to the air's resistance. The attraction

of the whole earth, considered as a sphere, on a body at its surface, is the same as if the whole matter of the earth were collected at its centre, and the nearer to its centre the greater the

force exerted. Gravity is symbolized in physics by the letter g. The value of g as given by Helmert's formula is, in feet per second,

32.0875 (1 +0.0005302 sin2 4* — 0.000007 sin2 2

4>), at the sea-level, $ representing the latitude north or south of the equator. At the equator it is about 32.0875 feet per second, and at the poles about 32.2577 feet per second. See Force of Gravity.

GRAVITY, Specific. See Specific Grav¬

ity.

GRAY, Asa, American botanist: b. Paris,

Oneida County, N. Y., 18 Nov. 1810; d. Cam¬

bridge, Mass., 30 Jan. 1888. He was graduated

at the Fairfield Medical College in 1831 ; but had already acquired a taste for natural science which led him to abandon the practise of medi¬

cine for the study of botany. He became

curator of the New York Lyceum of Natural

History. The flora of the United States was

by no means well known and classified at that period, and many botanical problems were to

be solved by the attainment of new data in his chosen science. He had attracted notice so

early as 1834 and was appointed botanist to the Wilkes Exploring Expedition, which was so

dilatory in starting that he resigned the position in 1837, and in 1842 was elected Fisher pro¬

fessor of natural history at Harvard Univer¬

sity. Between the resignation of his post as

botanist to the Wilkes Expedition and his ac¬

ceptance of the chair at Harvard, he took the opportunity of traveling over Europe, where he

made many social and scientific friends and in England met Dean Church of Saint Paul's,

London, then Fellow of Oriel College, Oxford,

with whom he kept up a correspondence of the

most intimate friendship until his death. Both

were many-sided men of keen intellect and

reverent minds. From 1842 to 1873, when he

retired from his professorate at Cambridge, the life of Gray is to be read in his published works.

He gradually developed the reputation of a

botanist of the first rank, one of the greatest of his century and certainly the greatest his

country had ever produced. His lot was cast at a point in the history of science when the arti¬

ficial system of botany was to pass away, and the new and natural method was to undergo

development. There were vast masses of new

material constantly pouring in from the newly

explored Middle Western Territories, together

with the rich spoils that government expeditions were bringing by sea from the Pacific Coast.

Professor Gray, with the assistance of Dr. John Torrey (see Torrey, John), set about to ar¬

range these multitudinous specimens in accord¬

ance with the newest methods ; to identify, name and classify them. His work was to be called

the (Flora of North America,* and was to be a comprehensive history of the botany of the

country upon a classification basis of natural

affinity. This work was not completed beyond

the order of Composite ?, as the constant acces¬

sions of new specimens rendered the portions

already published out of date, and proved that the attempt at so colossal an undertaking would be premature before all the material was in, and every specimen had been deliberately examined

and classified. Yet Gray's pen could not be idle, and he published volume after volume in which

he showed he was as clear and concise as an

exponent of botany in its elementary principles as he was skilful and bold in wide generaliza¬

tions and profound analysis. His scientific posi¬

tion was that of a theistic evolutionist. He

dissented from Darwin's opinion that variation

was the result of fortuitous contingencies. He

was a teleologist and believed that species were differentiated according to a preordained plan

in the mind of a creator, and he was of the spirit that could subscribe to evolution and yet repeat the Catholic creed. His principal writ¬

ings are as follows: Elements of Botany >

(1836) ; Structural and Systematical Botany >

(1879) ; ˆManual of Botany for the Northern

United States* (1848) ; (Genera Boreali-Americana Illustrata) (1849) ; Eotany of the United States Exploring Expedition under Captain

Wilkes) (1854) ; Elantse Wrightianae Texano—

Neomexicanae) (1853) ; Earwiniana, Essays

and Reviews Pertaining to Darwinism* (1876) ;

Synoptical Flora of North America) (1884) ;

(Natural Science and Religion> (1880); pub¬

lished posthumously, but edited by Sargent,

Scientific Papers of Asa Gray* (1889) ; and

Setters of Asa Gray) (1894).

GRAY, Barry. See Coffin, Robert Barry.

GRAY, David, American journalist: b. Buf¬

falo, N. Y., 8 Aug. 1870. He was graduated

from Harvard in 1892, where he wrote the

Hasty Pudding Club play (The Sphinx,* en¬

tered journalism in 1893 as a reporter and edi¬

torial writer for the Rochester Union and Ad¬

vertiser, became managing editor of the Buf¬

falo Courier in 1897, and after a course in law was admitted to the bar in 1899. He has pub¬

lished (Gallops, * a collection of fox-hunting sketches reprinted from the Century in two

volumes, (Mr. Carteret and His Fellow Ameri¬

cans Abroad,* (Ensign RusselP and various

short stories in current periodicals. In 1906 his play (Gallops* based on his stories was pro¬

duced at the Garrick Theatre, New York, and

ran through the season.

GRAY, Elisha, American inventor : b.

Barnesville, Ohio, 2 Aug. 1835; d. Newtonville, Mass., 21 Jan. 1901. During his attendance at

Oberlin College his skill in handicraft enabled him to support himself by carpentry. He left

college to apply himself to the improvement of electrical apparatus; and in 1867 received his

first patent for self-adjusting telegraph relay.

He subsequently invented the telegraphic

switch and annunciator for hotels and the tele¬

graphic repeater, the private telegraph line

printer. The litigation between him and

Alexander Graham Bell, both of whom claimed

to be inventors of the telephone, resulted in a verdict in favor of the latter, whose rights were sustained by the Supreme Court. The telauto¬

graph, by which written messages were to be

sent over the telephone or telegraph was pat¬

ented by him in 1893. For many years he was

engaged in the manufacture of electrical ap¬

paratus in Chicago and Cleveland and founded

the Gray Electric Company in Highland Park,

Ill. The Congress of Electricians at the World's Columbian Exposition was organized by him in

1893, and he was elected to preside at its sittings.

Among his writings the most notable are Ex¬

perimental Researches in Electro-Harmonic

Telegraphy and Telephony) (1878); and Ele¬

mentary Talks on Science.*

GRAY, Henry Peters, American painter:

b. New York, 23 June 1819; d. there, 12 Nov.

1877. He was a pupil of Daniel Huntington in

1838, and after several years abroad he estab¬

lished himself in New York, and was president

of the National Academy 1869-71. Among the

most important of his works are (Wages of

War,* now in the Metropolitan Museum; (The

Judgment of Paris * ; (Cupid Begging his Ar¬

rows* ; (Apple of Discord) ; Elessed are the Pure in Heart,* an illustration of Irving's

Eride of the Village) ; (Hagar and the Angel.*

GRAY, Horace, American jurist: b. Bos¬

ton, 24 March 1828; d. Nahant, Mass., 15 Sept.

1902. He was graduated from Harvard in 1845 ; from the Harvard Law School in 1849; studied

law also in the office of Judge Lowell; was ad¬

mitted to the bar in 1851, and in 1854-61 was reporter of the Massachusetts Supreme Court.

At the same time he became a leader of the

Massachusetts bar, in 1864 was appointed ?n

associate justice of the State Supreme Court

and in 1873-81 was chief justice. In 1881 he

was appointed to the Supreme Court of the

United States, and this post he held until his resignation in 1902.

GRAY, John Purdue, American alienist : b.

Half Moon, Pa., 1825; d. Utica, N. Y., 29 Nov.

1886. He was graduated from Dickinson Col¬

lege in 1846 and took a medical degree at the University of Pennsylvania in 1848. He was

successively assistant physician and medical

superintendent of the New York State Asylum

at Utica. He introduced many improvements

into the treatment of the insane, and was for 166

many years editor of the American Journal of

Insanity.

GRAY, Maxwell. See Tuttiet.

GRAY, Robert, American discoverer : b.

Tiverton, R. I., May 1755; d. Charleston, S. C., 1806. In 1787 he was appointed to the command of the sloop Washington, equipped by Boston

merchants for trade with the Indians of the

Pacific Coast. He returned in the Columbia in

1790, and, proceeding by way of Canton, was

the first to carry the United States flag around the earth. During a second voyage he discov¬

ered the Columbia River, which he named from

his ship. He was subsequently in command of

trading vessels.

GRAY, Thomas, English poet and scholar :

b. Cornhill, London, 26 Dec. 1716; d. Cam¬

bridge, 30 July 1771. He was the fifth child and only survivor of 12 infants born to Philip Gray, a money-scrivener, and Dorothy Antrobus, a

one-time milliner. The father was brutal and

maltreated his wife, who had to support herself and her son. When Gray was 11 he was sent

to Eton, where his uncle, William Antrobus,

was one of the masters. Here he formed a close intimacy with a few boys of quiet tastes —notably with Horace Walpole (q.v.) and Rich¬

ard West, upon whose death he wrote

one of the few sonnets to be found in the

literature of the early 18th century. Seven

years later (1734), Gray became a pensioner

at Peterhouse, Cambridge, Walpole coming up

the next year but to another college. Gray

found the courses at Cambridge unsatisfactory,

his tastes being at that time literary rather

than scientific and philosophical, and he was not sociable or inclined to sports. He left in 1738

without taking a degree and lived a few months in London before he accepted Horace Walpole's

invitation to become his companion on a (<grand tour® of the Continent. They left England late in March 1739, spent some months in France

and Switzerland, crossed into Italy in Novem¬

ber, visited Florence, Rome and other cities, re¬

turned to Florence in July 1740 and passed some time with Horace Mann, the English Minister,

afterward Walpole's correspondent, and in

April 1741 started for Venice but parted at

Reggio in consequence of a quarrel as famous as it is mysterious in its details. It seems quite certain that Walpole's confession to William

Mason (q.v.), the poet and biographer of Gray, that he treated his sensitive companion super¬

ciliously and so caused the rupture, is in essen¬

tials the true explanation ; it seems also cer¬

tain that their friendship would never have

been renewed jf anything very disgraceful had

occurred ; but it is equally likely that something happened about which it was desirable to keep

silence. Gray went on to Venice by himself,

returned through Verona, Milan and other

places, paid a second visit to the Grande

Chartreuse, where he wrote in the album the

famous (Alcaic Ode) (August 1741 — the origi¬

nal was destroyed by a mob in the French

Revolution), and reached home 1 Sept. 1741.

Two months later, his father, with whom Gray

seems to have been on better terms than the

parent's brutality warranted, died of gout after having squandered a fairly considerable for¬

tune.

Gray and his mother remained in London

for some time, the former suffering from a

naturally morbid temperament and the loss of

his friend West, making but slight efforts to

enter the profession he was dallying with, the law. In October 1742 Mrs. Gray went to live

with her two sisters in the house of one of them at Stoke Poges in Buckinghamshire, and Gray

betook himself to Cambridge in order to study

the civil law. He was made LL.B. in 1743, but really spent most of his time reading Greek and annotating what he read with the care he had

displayed in noting down what interested him

during his tour.

Cambridge, though he disliked the place and

had few congenial friends there, became prac¬

tically Gray's residence for the rest of his life, since he could live comfortably on his small in¬

come and could have access to books. Among

his few friends, who did not, however, remain

in Cambridge permanently, were his corre¬

spondents, Dr. Thomas Wharton and the Rev.

William Mason, the latter a rather servile liter¬

ary follower. In 1744 the friendship with Wal¬

pole was renewed and Gray became a visitor to Strawberry Hill. He also went every summer

to Stoke Poges to see his mother, who died there in 1753. But he could never be drawn out by

others, and he never ((spoke out.® A small liter¬

ary controversy has arisen over the reasons of his sterility as a writer, some attributing it mainly to his retiring character and his con¬

stitutional melancholy and delicate health (cf .

D. C. Tovey, (Gray and his Friends) (1890);

and W. L. Phelps, Selections from Gray's

Poems) (1894) ; others, of whom Matthew Ar¬

nold is the main exponent, emphasizing the

blighting influence exercised upon Gray's es¬

sentially romantic genius by the dominance of

the pseudo-classical school of Pope {cf. Ar¬

nold's essay on Gray in (Ward's Poets, > Vol.

III). There is probably something in both

views. Gray was shrinking and fastidious in

temperament, and he was also depressed by the

standards of his age in respect to poetry; for, if he was not, he presents, as Arnold claimed, the extraordinary phenomenon of a poet whose

achievements show the powers of a master pro¬

ducing far less than equally fastidious and del¬

icate masters who have had the good fortune

to write in epochs more propitious to their

genius.

Meanwhile, Gray, indolent and irresolute •

though he was, had slowly laid the basis of his fame as a poet. In 1742 he wrote the sonnet to West, and the pensive and beautiful (Ode on a Distant Prospect of Eton College> (published

anonymously, . 1747). In 1743 be began, but

soon discontiued, his ably sententious poem

on (<The Alliance of Education and Govern¬

ment® — forestalled by the appearance of Mon¬

tesquieu's < Esprit des Lois,> but an interesting proof that Gray tried to get himself somewhat

in touch with his contemporaries. Five years

later the (Ode to Spring> and the stanzas on the drowning of Walpole's cat appeared, and in

1749 he took up again the most famous of all his poems, the (Elegy Written in a Country

Churchyard,) which had been begun in 1742.

It was finished at Stoke Poges in June 1750,

and attracted so much attention in manuscript

that a pirate announced his intention of print¬

ing it. This caused Gray to authorize Dodsley, to whom he rather loftily yielded all the profits, to print an edition in February 1751. It at¬

tained at once the popularity it has never lost, GRAY — GRAYLING

and was much imitated and parodied through¬

out the Western world. In August 1750 that ad¬

mirable piece of vers de societe, (A Long

Story, } was written, and in 1753 his six best poems, including a (Hymn to Adversity,* were

published with designs by Richard Bentley. The

next four years saw the writing and printing

(at Strawberry Hill) of the two Pindaric odes, (The Progress of Poesy) and (The Bard) —not the earliest but among the best of their kind in English and exhibiting, as Gray and Arnold

thought, the highest reaches of Gray's poetic

genius. Curiously enough many people found

them obscure, but they had warm admirers from

the beginning, one of whom secured for Gray,

late in 1757, the offer of the Laureateship,

which he declined.

The rest of Gray's life is summed up in his

friendship, his studies and his travels. In 1756

he changed his quarters from Peterhouse to

Pembroke because some undergraduates, hear¬

ing that his fear of fire had caused him to buy a rope ladder, induced him by their cries to use it and in consequence to land himself in a tub of water. The rude prank was not followed by

the proper punishment, and Gray was very in¬

dignant. He found consolation, however, in

making young friends like Norton Nicholls, in

studying (1759-61) in the newly opened

British Museum and in taking tours through

regions marked by romantic scenery, to the

beauties of which he was one of the first Eng¬

lishmen to open his eyes appreciatively in a

modern fashion. In 1764 and 1765 he visited

Scotland (making friends with a fellow Ro¬

manticist, James Beattie — q.v.), and in 1769 he paid the famous visit to the English Lakes

described in his journal. In connection with

his love of romantic scenery and with the mor¬

bid temperament, which gave him his post of

eminence among the (<Churchyard Poets,®

should be mentioned his enthusiasm for the

buildings and the writings of the ((Gothic®

past — another characteristic feature of the new school of revolt from classicism. Gray was de¬

lighted with Macpherson's (Ossian) and wrote

in imitation of the Norse and Welsh his (Fatal Sisters) ; (Descent of Odin) ; and (Triumphs of Owen) (published 1768). In 1762 he had ap¬

plied for the regius professorship of history

and modern languages at Cambridge, but had

failed to secure it; six years later, his successful competitor having died from an accident when

drunk, the post with its good salary and nomi¬

nal duties was given to Gray. He did not wish to seem ungrateful and so, in return for the

Duke of Grafton's kindness, he wrote an ode

for the installation of that worthy as chancel¬

lor of Cambridge (1 July 1769). The next year he visited London with his young friend the

Swiss naturalist. Bonstettin, but in 1771 he was forced to deny himself the pleasure of going to see this friend in his foreign home. He was

taken violently ill with gout of the stomach and died on 30 July. He was buried a week later

in a vault with his mother at Stoke Poges.

Despite the paucity of his poetry, Gray's

position as a classic has long been secure. He is the chief English elegist and eminent as a master of the elaborate, not the simple and

singing lyric. His letters are among the most

charming of his period, and his notes on classi¬

cal and mediaeval authors, on genealogy,

heraldry, painting, architecture, ornithology and botany show the extraordinary range of his

accomplishments. His knowledge of Norse has

been greatly exaggerated (cf . G. L. Kittredge in Phelps), but in certain senses Leslie Stephen

did not exaggerate when he wrote in the dic¬

tionary of National Biography, > apropos of a

man who could admire almost equally Shakes¬

peare and Racine, that Gray, ((the most learned of all our poets … was naturally an eclectic.®

See Elegy in a Country Churchyard.

Bibliography. — For Gray's life see the

biography by Mason (1774) — not that by

Johnson, which is one of the worst of the

dives, } — and also the letters given in the edi¬

tions of Mitford and Gosse. The latter (4

vols., 1884), is the fullest. There are numerous editions of the poems, e.g., the new (Aldine)

by John Bradshaw (1891) ; and there is a fair amount of criticism to be found in the books

previously named and in Gosse's biography in

the (English Men of Letters) (1882). Add the

works of Phelps and Beers on English Ro¬

manticism in the 18th century and the histories of English literature, as well as a good essay by Lowell. Tovey's <Gray and His Friends) con¬

tains a considerable amount of previously un¬

published material.

William P. Trent,

Professor of English Literature, Columbia Uni¬

versity.

GRAY, William Crane, American Prot¬

estant Episcopal bishop : b. Lambertville, N. J., 6 Sept. 1835. He was graduated at Kenyon

College (1859) ; ordained deacon in 1859 and

priest in 1860. He was consecrated bishop of

southern Florida in 1892, and retired in 1914.

• GRAY DUCK, the gadwall (q.v.).

GRAY WHALE (of California). See

Rorqual.

GRAYBACK, the name, in popular speech,

of several animals strikingly gray in color, as the gray whale (see Rorqual) ; the knot (q.v.) and certain other shorebirds ; or a body-louse.

See Louse.

GRAYBEARD MOSS. See Usnea.

GRAYHEN. Feminine of Blackcock

(q.v.).

GRAYLAG GOOSE. See Geese.

GRAYLING, a fish of the family

Thymallidce , much resembling a slender salmon,

15 to 18 inches long, and formerly included in the salmon family. Some five species of the

single genus Thymallus are known, all in¬

habitants of northern regions, in rapid streams where the water is clear and cool and the bottom sandy or pebbly. Its habits are similar to those of trout, except that it spawns in the spring.

Its flesh is excellent, with an odor and flavor, when fresh, of wild thyme. It is caught by

fly-fishing as for trout, and is a favorite with anglers. The European grayling extends from

Russia, Siberia, Scandinavia and England to

Switzerland and Hungary. Two species are

known in North America, each with so limited

and scattered a distribution that thev are re¬

garded as modified relics of a preglacial cir¬

cumpolar species. The Arctic grayling, or

((poisson bleu® (T. signifer) of the fur-hunters, inhabits only the Mackenzie Basin and rivers in Alaska. The more southerly and familiar gray¬

ling (T . tricolor) is restricted to certain

Streams in northern Michigan, where it is al-

most extinct, and seems incapable of recovery

by fish-cultural methods ; and to Montana.

These fish are distinguished from trout or sal¬

mon by the large size of the dorsal fin and by their grayish hue, with half-a-dozen deep blue

spots on the forepart of the abdomen. Con¬

sult Pritt's (Book of the Grayling) (London

1888) ; and Jordan and Evermann's (American

Food and Game Fishes) (New York 1902).

GRAY'S INN, one of the four Inns of

Court (q.v.) in London, situated on the north

side of Holborn and to the west of Gray's Inn lane. It contains a hall of the period of 1560.

It derives its name from the noble family of

Gray of Wilton.

GRAY'S PEAK, a peak in the Colorado

range, in Colorado, one of the highest in

the Rocky Mountains. Its height is 14,341 feet.

It was named in honor of Asa Gray, the

botanist.

GRAYSON, William, American revolu¬

tionist and senator : d. 1790. The date of his birth in Prince William County, Va., is un¬

recorded. He graduated at Oxford University,

England; studied law at the Inner Temple,

London, and returned to America to practice as a lawyer at Dumfries, Md. Strongly opposed

to the colonial administrative methods of

George the Third's government, he became an

active revolutionist and in 1776 was aide-de-camp to General Washington. As colonel of

a Virginia regiment he gained distinction at

the battle of Monmouth ; was appointed com¬

missioner by Washington to treat with General

Howe in the exchange of prisoners; and was

a member of the board of war 1780-81. At the close of the Revolutionary War, he again be¬

came a lawyer in Virginia. From 1784— 87 he

was a member of the Continental Congress ;

in 1788 was a delegate to the convention to

consider the new Federal Convention; and the

year before he died was selected as one of the Virginian senators in the first national Con¬

gress.

GRAYWACKE, ˆ gra'wak, a rock name

very loosely used. The term has been com¬

monly applied to a shaly sandstone, usually of dark color. More specifically it indicates a

rock consisting of fine fragments of incom¬

pletely weathered basic igneous rocks bearing

the same relation to these that arkose bears to granite. See Arkose.

GRAZ, or GRATZ, grats, Austria, the capi¬

tal of the province of Styria, on the river

Mur, 140 jmiles by rail, southwest of Vienna.

The town is noted for its beauty and its pic¬

turesque setting in attractive scenic surround¬

ings amid the Styrian Alps. It is traversed

by the river which spanned by seven bridges

connects the inner town on the left bank with the town on the right bank. The inner town

is built around the former fortified Schlossberg, dismantled by the French in 1809. The Stadt-park is at the foot of the Schlossberg, the

summit of which commanding a beautiful out¬

look is reached by a cable tramway. The

mediaeval ramparts and bastions have been re¬

placed by attractive tree-lined promenades.

Graz dates from the 9th century. Among the

chief buildings are the 11th century castle, now used as government offices ; the 16th century

Renaissance landhaus where the local diet as¬

sembles; the arsenal dating from 1644 and con¬

taining a valuable historical armory of 15th to 17th century weapons; the town hall built in*

1807, and rebuilt in German Renaissance archi¬

tecture in 1892; the university buildings dating from 1573; the law courts; the Joanneum Mu¬

seum founded in 1811 with its important col¬

lections and great library, and the technical col¬

lege founded in 1814. The Gothic cathedral of

Saint Ogidius, dating from 1450-62, occupies

the site of a former church founded 1157. The Gothic parish church finished in 1520 was re¬

stored in 1875 ; the Augustinian University

church ; and the small 13th century Leech Kirche are also interesting buildings; the early Gothic Herz Jesu-Kirche, completed in 1891, has a

tower 360 feet high. An important railway

centre with extensive railway shops, and direct communication with the Koflach coal-fields,

Gratz is a busy industrial town manufacturing

and carrying on a lucrative trade in iron and steel wares, paper, artistic printing and lithog¬

raphy, physical and optical instruments, chem¬

icals and a domestic commodities. Pop. 152,000.

GREASE-BUG, or OVERFLOW-BUG,

a ground-beetle (Platynus maculicollis) , com¬

mon in California, and occasionally a pest in

houses because of its disagreeable odor when

crushed, and because it nibbles bread and

meats.

GREASEWOOD, a very thorny, almost

leafless shrub (Sarcobatus vermiculatus) of the goosefoot family (q.v.), which abounds among

the sage brush on the arid plains of the western United States, especially where the soil is saline.

The wood is yellow, very hard and tough.

GREAT AUK. An extinct auk (Plautus

impennis), much like the existing razor-bill,

but larger (nearly the size of a goose), with a larger bill and relatively smaller wings ; for¬

merly called garefowl. It was black above and

white below, with a conspicuous white patch in front of the eye. It was an expert swimmer

and diver, but unable to fly on account of the very small size of its wings. The habits of the garefowl were those of auks generally, but its range was limited on the American coast to the vicinity of Newfoundland. It seems never to

have lived north of the Arctic Circle; but its bones in shell-heaps testify to its former oc¬

currence, at least in migrations, southward as

far as Florida. These birds bred on small is¬

lands off the coast of Iceland, and on the

Orkneys and Hebrides. Early in the 19th cen¬

tury they disappeared from these haunts,

mainly through the persecution of fishermen and sailors who had for years killed them for food, bait and feathers ; but they lingered somewhat

longer in the Gulf of Saint Lawrence. Cartier's vessels visited Funk Island in 1534, and the

crews easily filled two boats with the birds

which they knocked down with sticks ; and their abundance was mentioned as one of the induce¬

ments for settlers to come to Newfoundland.

For many years the colony was ruthlessly har¬

ried, yet a few pairs survived until about 1840.

A small breeding-place remained in Iceland until 1844, when the last few pairs were killed as

museum specimens. The skins of this auk have

been sold for $650, and an egg for $2,500.

About 78 specimens of the bird are preserved

in museums throughout Europe and America.

Consult Newton's (Dictionary of Birds, > article GREAT AWAKENING — GREAT BRIDGE

‘Garefowl,* and articles by F. A. Lucas in (Reports United States National Museum) for

1887-88 and for 1888-89.

GREAT AWAKENING, the popular

name of a great and tenacious “revival” in New England, 1740-45, under the influence of

Jonathan Edwards and George Whitefield. Ed¬

wards had created a similar excitement in

Northampton five years before, the embers of

which were still glowing, but on Whitefield’s

visiting him in the fall of 1740, and preaching his thrilling sermons in addition to Edwards’,

the wave spread all through New England, in¬

volving over 150 towns, and rising almost to

frenzy. It was marked by the extremest ac¬

companiments of bodily seizures, convulsions,

hysteria, etc., and aimed especially to bring

young children under its control. Edwards was

rightly considered its author and was fiercely

denounced for its irrationality and evil effects on public worship, as well as the temporary

ruin of calm and fruitful work; he defended it for some time, but its results at last came to be deplored even by its champions, and by 1742 it was threatening not only the peace but the life of the churches. So bad were its effects that to the reaction has been

attributed the religious

deadness of the country for the next 60 or 70

years. The separation of the “converted” into

an arrogant clique who often seceded in sepa¬

rate churches, the upspringing of a horde of

ignorant lay preachers making physical effects

the touchstone of religion, the indecent rivalry in “manifestations,” the denunciation of all the trained ministry as lacking divine grace, were

only a part of its demoralizing outcomes. The

faculties of Yale and Harvard colleges pro¬

nounced against it, as did the leading divines; the Massachusetts General Convention of 1743

added its testimony, and in Connecticut an effort was made to enforce the Saybrook Platform

against the independence of congregations.

GREAT BARRINGTON, Mass., town in

Berkshire County, on the New York, New

Haven and Hartford Railroad and on the

Housatonic River, 40 miles west of Holyoke.

In the town are three villages : Great Barring¬

ton, Housatonic and Van Deusen. It was settled in 1725, but formed a part of Sheffield until 1761. William Cullen Bryant was town clerk

for several years and the thoughts in many of his poems were suggested by the beautiful

Berkshire scenery. Thet town has two public li¬

braries, the Hopkins Memorial Manse, the

Sedgwick Institute and a number of good ele¬

mentary schools. The manufactures are cotton

goods, electrical apparatus and paper. Owing to the picturesque scenery of the vicinity it is a popular summer resort. The government is

carried on by annual town pieetings. Pop. 6,315*

See Taylor, (History of Great Barrington*

(Great Barrington 1882).

GREAT BASIN, a vast region of interior

drainage, a triangular plateau of North Amer¬

ica, occupying the western part of Utah and

nearly the whole of Nevada, parts of Oregon

and California and extending at its northeast

angle into Idaho. It is bounded on the west by the Sierra Nevada and on the east by the

Wasatch Mountains. The base of the tri¬

angle at the north is 500 miles from east to west and the extent from north to south is

800 miles. The area is about 210,000 square

miles, a little larger than France. It is trav¬

ersed by numerous mountain ranges, irregular

in arrangement; the valleys are mostly sinks,

the chief drainage centre being Great Salt

Lake (q.v.). The areas of greatest depression

are to be found near the borders and the great¬

est elevation near the central part. The high¬

est range is the East Humboldt, one peak of

which, Mount Bonpland, is 11,321 feet in

height. Volcanic masses form or conceal the

original rocks of many of these ranges. The

slopes and the geological markings show that

the lakes and rivers which once existed within this region have become smaller and some have

disappeared. Among the more notable of the

extinct lakes are Bonneville and Lahontan. The

greater portion of this section was once in the basin of the Columbia River. The Great Basin

contains many streams and lakes (the latter for the most part salt) whose waters never reach

the ocean, but are either taken up by evapora¬

tion or their waters sink in the desert sands.

The mean annual rainfall ranges in different

localities from 4 to 15 inches. The plateau is nearly destitute of trees and in general only

the upper parts of the valleys are clothed with desert shrubs, their lower portions often being covered with muddy water or with several

inches of alkaline salts left by evaporation. The chief arid places are the Great Salt Lake Desert, the Mohave Desert and the Carson Desert.

This basin is rich in mineral wealth; gold,

silver, iron ore and copper exist here in large quantities. The Great Basin is among the

large interior drainage sections of the world;

but the interior drainage basin of Asia is

23 times as great and the Sahara 16 times as great.

GREAT BEAR LAKE. See Bear Lake,

Great.

GREAT BEND, Kan., city, county-seat of

Barton County, on the Arkansas River, the

Missouri Pacific and the Atchison, Topeka and

Santa Fe railroads, about 92 miles northwest of Wichita. The Central Normal College is lo¬

cated here and it contains a Carnegie library, a hospital and an Elks' Home. It is the trade center of a rich farming and stock-raising

region, has flour mills, iron works, machine

shops, grain elevators and a refrigerating plant.

The commission form of government was

adopted in 1913. Pop. 4,622.

GREAT BRIDGE, Va., Battle at, 9 Dec.

1775. Lord Dunmore, royal governor of Vir¬

ginia, hearing that a patriot force from North Carolina was on the way to occupy Norfolk,

the largest town in Virginia and its chief port, built a rough fort at Great Bridge, over the

Elizabeth River, commanding the southern ap¬

proach. The Virginia patriots raised a band of sharpshooters, including John Marshall, after¬

ward chief justice of the United States Su¬

preme Court, took possession of the opposite

bank and in a 15-minute fight, which cost Dunmore 61 regulars and the militia none, forced

him to abandon the fort. A few days later the Virginians occupied Norfolk, which the spiteful

governor set on fire before taking refuge in a warship in the harbor. The town was reduced

to ashes.

GREAT BRITAIN. The following series

of articles dealing with the various aspects of British educational, religious, political and com¬

mercial life, presents the history, development

and rise of the United Kingdom to its promin¬

ent position among the leading nations of the

world. The peculiarities of British institutions make it impossible to understand them apart

from their history, and the aim set before the contributors has been to furnish a well co¬

ordinated section, reviewing the leading char¬

acteristics of the British nation and its ad¬

vance, as they are seen to be the natural out¬

come of history.

1. Geographical Environ¬

ment.

2. The Conquests.

3. Mediaeval England.

4. The Reformation in

England.

5. English History of the

17th Century.

6. History of the 18th Cen¬

tury.

7. The French Wars of the

18th Century.

8. History of the 19th Cen¬

tury.

9. The Political Parties to

1906.

10. The Political Parties,

1906-1918.

11. Parliament.

12. Parliament Act, 1911.

13. Crown and Cabinet.

14. The Judicial System in

England and Wales.

15. Local Government.

16. The Civil Service.

17. Scottish History.

18. Irish History.

19. Welsh History.

20. National Finance.

21. Banking.

22. Commerce — 18th Cen¬

tury.

23. British Commerce.

24. Navigation Acts.

25. British Shipping.

26. British Railways.

27. The English Land Law.

28. Agriculture — The 18th

Century.

29. Agriculture since the 18th

Century.

30. British Fisheries.

31. The Mining Industry.

32. The Industrial Revolu¬

tion.

33. British Trade Unionism.

34. The Labor Movement in

Politics.

35. The Co-operative Move¬

ment.

36. British Factory Legisla¬

tion.

37. The Church of England.

38. English Nonconformity.

39. English Roman Cathol¬

ics.

40. English Judaism.

41. British Education.

42. Engineering in Great

Britain.

43. English Newspapers.

44. The Trend of Thought

and Literature in the

19th Century.

45. The British Navy.

46. The British Army.

47. British Foreign Policy in

Europe.

48. British Foreign Policy in

India.

49. British Foreign Policy in

Africa and America.

50. The Free Trade Move¬

ment.

51. The British Tariff Move¬

ment: its Origin, The¬

ory and Prospects.

52. Great Britain and the

World War.

53. Great Britain, Diplo¬

matic Relations of the

United States with.

See also British Empire; England; Wales;

Scotland; Ireland; Australia; New Zealand;

Canada; Newfoundland; India; South

Africa; and other British colonial possessions.

1. GEOGRAPHICAL ENVIRONMENT.

The Greeks could not have played their de¬

cisive role in history had they not dwelt in

the centre of the lands, amid the islands and peninsulas between Europe and Asia. Nor is it

likely that any race less happily endowed could have achieved what the Greeks achieved even

in that favored environment. A like relation is true as between the British race and the British Isles.

The origins of the British race are recounted

in the next article of this volume. It is the aim of the present article to analyse the geographi¬

cal influences which have contributed to British history.

Popular philosophy, as embodied in Shakes¬

pearian phrases such as the ((moat defensive®

and the <(silver streak,® would dismiss the mat¬

ter as almost too simple and obvious for set

discussion. The insularity of Britain has no

doubt counted for more than any other single

geographical cause, but the British polity and

character are in fact the product of a very sin¬

gular combination of geographical no less than

historical circumstances. For the purposes of

this short summary the major geographical con¬

trols of British development may be grouped

under the nine following heads:

1. Insularity.

2. Shallow surrounding seas.

3. Neighborhood to the Continent.

4. Relation to the chief linguistic frontier of Europe.

5. Climate determined by oceanic winds.

6. Internal natural divisions.

7. Adequacy of economic bases.

8. Geographical momentum.

9. The consequences of sea power.

1. Insularity. — Britain has not been success¬

fully invaded since the defeat at Hastings eight and a half centuries ago. The Englishman is

ever conscious of this fact — it is a frequent argument in 20th century political speeches.

The victories over the Spanish Armada and at

Trafalgar have served to increase the sense of security, and freedom at home and empire

abroad are the twin results. At home there

has been an ineradicable jealousy of a standing army, and there has therefore been freedom

for the development of what Bagehot described

as <(government by talk.® The navy on the

other hand has at most times been viewed with favor, for it has screened the experiments and mistakes by which popular government

has

been slowly nurtured. These mistakes were

often such as would have involved a continental nation in the consequences of a Jena or a Sedan.

Insularity has also permitted of a concentra¬

tion of purpose upon the sea which was im¬

possible for the other maritime states along

the western seaboard of Europe. England suc¬

ceeded where Portugal, Spain, France and

Holland failed, because, in the absence of a

land frontier, her economic resources could be

focussed on adventure beyond the seas. In this regard it must be borne in mind that sea-power does not rest on the navy alone, but on the

cooperation of a mobile army with a dominant

navy. An army limited to this subsidiary use

has been possible for Britain because of her

insularity. By her navy and amphibious army

Britain won North America and the sovereignty

of the Indies, while France and Holland were

involved in continental wars. It was by the

exhaustion of her enemies rather than by her

victories that Britain achieved her empire. This is surely the truth which lies behind Seeley's famous utterance that Britain had <(conquered

and peopled half the world in a fit of absence of mind.® Behind her girdle of seas she fought with a limited liability and was immune at

home though often defeated abroad.

John Bull's insularity of character is the

natural result of his strong frontier. Else¬

where the types of humanity merge gradually

where political frontiers are crossed. In some

respects this contrast between the British and

the continental peoples was in the past even

more obvious than to-day. Not only, on the

one hand, is the traffic over the seas more fre¬

quent now, and Britain's isolation in time of

peace less marked, but on the other hand, the change at the conventional continental frontier

has been emphasized owing to the centralized

character of the modern great state. Ever

since the days of the first Edward, the English-GREAT BRITAIN — GEOGRAPHICAL ENVIRONMENT (1)

man has felt himself a foreigner from the

moment that he landed at Calais or Boulogne.

2. Shallow Surrounding Seas. — The Brit¬

ish Isles are the emergent portions of a great shoal known as the Continental Shelf, which

stands out seaward from the mainland coast.

Precisely as waves grow taller until they break on the foreshore, so the tides, which measure

in mid-ocean only some two or three feet in

amplitude, are magnified several fold as they

pass on to the British shoal. Strong currents

are thus generated as the wide British seas

alternately deepen and drain low. Caesar bore

eloquent testimony to the influence of our tidal currents in the defeat of his strategy. The

British tides, however, have had a uniting as

well as a disuniting influence. Streams and

streamlets whose mouths in other parts of the

world would be mere creeks without fame, in

these seas bear the historic names of Thames

and Severn, Rhine and Seine. Even in the

days of steam motive power, the flow and ebb

of the Thames to and past London are worth

much money annually — a fact which is one of

the chief arguments against the scheme often

proposed for erecting a dam below the metro¬

polis and so keeping the water permanently

high. What the tides were in the days before

steam is evident from the position, many miles from the open sea of such ports as London,

Antwerp and Hamburg.

Nor must it be forgotten that the shallow

seas around Britain are exceptionally produc¬

tive of fish. The fishermen of Holland became

the carriers from Lisbon to the Baltic, and

when Lisbon fell temporarily under the power

of Spain, these same Dutchmen extended their

voyages to the Indies. To-day, however, the

fishermen of England and Scotland are in a

great majority on the international fishing

grounds of the North Sea, and their powerful

steam fishing vessels extend their operations

as far as Iceland on the one hand and the coast of Morocco on the other. It is. an important

fact for a state whose power is on the sea

that there are no fewer than 100,000 English,

Scotch and Irish who earn their living wholly

or in part by sea fishing.

3. Neighborhood to the Continent. —

Britain would have had small significance in

the wTorld had her position been distant from

the historic shores of Europe. It is of course true that the ancient writers from Virgil to

Shakespeare are full of the remoteness of

Britain at the end of the known world. It is true also that until a relatively late period in history Britain did not count among the powers which shaped the destiny of mankind. These

very facts however have enabled Britain to

play a part in the last two or three centuries which is comparable to that played by the

Greeks on the smaller stage of the earlier time.

Because of her neighborhood to Europe, Britain

was deeply and repeatedly influenced from

several distinct quarters, yet because of her

insularity was never permanently attached to

any one centre of European culture. It has

been Britain's function to amalgamate the sev¬

eral elements of European civilization, and then to' spread Europe to all the shores of the world.

At least four streams of blood — Neolithic,

Celtic, Roman and Teutonic — and four lin¬

guistic influences, all drawn from across the

narrow seas, have gone to the making of

modern Britain. Yet the Englishman of to¬

day differs generically from all the species of continental European. Britain has been and

is of Europe yet not in Europe.

From this point of view it is important also

to notice that the hilly parts of the British Isles are in the north and

the west — toward the

ocean that is to say, not toward the Continent.

As a result, the agricultural England of the

plain, the dominant partner in the United King¬

dom, lies toward the channel, and London is

close neighbor to Paris and the Netherlands.

History would have been far other than it has been had the hills been in the southeast and

the plains in the north and west.

4. Relation to the Chief Linguistic Frontief

of Europe. — A glance at a map of Europe

showing the areas occupied by the several lan¬

guages would make it clear that the most im¬

portant linguistic frontier, that between the

Romance and Teutonic tongues, traverses

Europe diagonally from the Alps, and comes

down to the coast in the northern corner of

France, within sight of Dover Castle. Eng¬

land has received from the Rhine, the Elbe and the Norwegian fjords her Teutonic language

and the rudiments of her free institutions,

while she has taken from the Seine, and from

the western Mediterranean beyond, her Chris¬

tianity and her scholarship. Scandinavia on

the one hand and Spain on the other possess a geographical separation almost as definitely

secure as that of Britain, but Scandinavia is

Teutonic and Spain is Romance. Britain has

been cross-fertilized from both sources.

Moreover, Britain has reacted upon the

dual Europe with the power due to her posi¬

tion. If the adjoining Continent, with its

greater population and greater aggregate

wealth, had been united politically, the inde¬

pendence of Britain would have been impos¬

sible. As Mr. Peel has shown in his article

(see Great Britain — Foreign Policy in Re¬

lation to Europe), we have at most times used our power to defeat every bid for general

European dominion. Rome conquered a large

part of Europe and she also subdued Britain.

Napoleon's aim was to invade England, and

England only defeated him by overthrowing

his European empire. The task of holding

Europe disunited has been facilitated in every

age by the fundamental antagonism of Roman

and Teuton. Britain's immediate neighbors

across the Channel, to-day, as in the time of Napoleon, of Louis XV, of Louis XIV, and of

Charles V, are on the Rhine and also on the

Seine. In the same connection let us note that in the year 1066, at Stamford Bridge and at

Hastings, England exchanged, as Dr. Hodgkin

points out (The Conquests) in this volume,

a period of Teutonic for a period of Romance

influence.

5. Climate Determined by Oceanic Winds.

— Britain lies further north than any other

country of equally old civilization. Great

Britain occupies almost precisely the same lati¬

tudes as Labrador. The prevalent westerly

wind from the Atlantic, and the set of the At¬

lantic waters from the tropical southwest carry the warmth and moisture of lower latitudes

into a great climatic bay over Britain, in which long frosts and long droughts are equally rare.

Unlike either the south or the east of Europe, there is labor in the fields at all seasons, for 172

GREAT BRITAIN — GEOGRAPHICAL ENVIRONMENT (1)

Britain has neither a Mediterranean summer

nor a Russian winter. May not the moral effect of this continuity of effort account for some of the socalled Anglo-Saxon characteristics?

Yet

the mists of the oceanic air and the long north¬

ern nights are often as unfavorable to repose

in the open as the other conditions are favor¬

able to work there. Hence a second Anglo-Saxon characteristic, the home round the

fireside.

Nor, it must be remembered, is climatic

control limited to agriculture and domestic con¬

ditions. There are splendid waterways in the

wide plains of eastern Germany and Russia,

but navigation is there intermittent owing to

the long grip of the winter frosts. The rivers of Spain and Italy have abundant volume after

the rains and the thaw in the mountains, but

they are reduced in the summer to strips of

pebble desert. The smaller waterways of Eng¬

land, closed neither in winter nor summer, were long ago made navigable by means of locks.

6. Internal Natural Divisions. — Britain is

divided into the two islands of Great Britain

and Ireland. The same causes which have sep¬

arated British conditions as a whole from those of continental Europe have of course tended to separate Irish conditions from those of Great

Britain, but thev have acted with less effect, because Britain by her position has been driven to obtain sea power, and thus for many pur¬

poses to remove her frontiers from her own

coast to the coasts across the water. Thus Ire¬

land has been strategically enveloped by Eng¬

land, yet because adequate English manpower

was lacking in the time of Henry II, Queen

Elizabeth and Cromwell, was never completely

assimilated to England. Ireland conquered

and necessarily conquered, by England, is in

the position that Britain would be in if there were a united Europe across the Channel. Had

Ireland been an organized kingdom in the early Middle Ages, instead of a group of rival and

hostile tribes, she would have supported Scot¬

land against England, would have retained her

independence longer, and when modern con¬

ditions rendered union inevitable, would have

come into the sisterhood like Scotland as an

organized force capable of holding her own.

What every map does not show, however, is

the coherent area of bleak uplands occupying

the centre of the length of Great Britain, and dividing the agricultural lowland of England

from the smaller lowland of Scotland. This

upland area has no single name, but is known

in different parts as the Southern Uplands of

Scotland, the Cheviot Hills, the Pennine Moors, and the Lake Mountains. Until a century and

a half ago it had but a sparse population, and was in fact a broad natural frontier between

the England of London and the Scotland of

Edinburgh. This ˆborder,® utilized by a people

of Teutonic tenacity, was the geographical posi¬

tion from which Scotland for six centuries held at bay the superior might of England. Not a

little of the effect of modern British action in the world is due to the interaction of the two national characters thus evolved in antagonism.

The central uplands of Great Britain be¬

tween England and Scotland are now the seat

of great industries, and for most purposes the two countries form a single economic organism.

But in the Highlands of Scotland on the one

hand, and in the broad upland of Wales on the other, a remnant of Celtic speech still survives.

In all parts of the world there is a marked

contrast between the highlander and the lowlander, but this contrast is here increased by that between Celt and Teuton. Formerly mar¬

riage was between neighbors, and provincial¬

isms were inbred. But modern facilities for

communication lead to distant intermarriages,

which are rapidly imparting a national solid¬

arity of blood to states like Britain. This

crossing of highlander and lowlander, Celt and

Teuton, within Britain must be productive of a change in the race which may prove something

far other than the mere striking of an average.

7. Adequacy of Economic Bases. — All the

proceeding advantages — insularity, shallow

surrounding seas, continental neighborhood,

linguistic division among rivals, soft climate

and internal stimulative contrasts — would,

however, have been of little value unless Britain had had length and breadth enough to supply

the economic bases for a people able to count among the powers of Europe. It is therefore

important to note on the map of Europe a

certain rough equality as between the great

natural regions — the Spanish, Italian and

Balkan Peninsulas ; the plain of the Middle

Danube; the French land between the Alps,

the Pyrenees, the Bay, and the Channel ; the

north German plain ; and the southern habitable portion of Scandinavia. Even the vast Rus¬

sian plain, after all only partially European,

must not deceive by the space which it oc¬

cupies on the map. North and east of the

great bend of the Volga at Kazan it contributes little to the strength of the Russian people.

Many advantages and disadvantages, moreover,

compensate for such differences of mere area

in this bundle of natural regions which we call Europe. Thus there is a rough equality of re¬

source among the tenant nations, and this has

sufficed for a balance of power during several centuries.

Until within the last few generations agri¬

culture was the chief economic base of these

nations. For the reason given just now — the

separation of their agricultural plains — Eng¬

land, Scotland and Ireland were separate eco¬

nomic organisms. Relatively to her population,

England was until lately so adequately en¬

dowed with land that in the Middle Ages she

was the principal exporter of wool, and in the 18th century, of wheat, to the Continent of

Europe. The vast improvement of agriculture

achieved by the English farmer in the 18th cen¬

tury was one of the chief causes — if not the chief — of the wealth which enabled England

to defeat Napoleon. (See Great Britain —

Agriculture in the 18th Century, by Dr.

Knowles).

Though agriculture still remains the greatest

single industry, yet by the aggregate of her

industries Britain is now an industrial rather

than an agricultural country. In other words,

she rests on her output of coal rather than of wheat and meat. The change has, however,

been fully accomplished only in the last two

generations.

The new economic conditions have been

variously influenced by geography. In the first place Scotland has been effectively united to

England. The barren uplands in the north of

England — in the isthmus, that is to say, con¬

necting the two countries — are rich in coal, GREAT BRITAIN— THE CONQUESTS (2)

and a population has grown up in this part of liic island drawn both from Scottish and Eng¬

lish sources, and of an intermediate character.

Moreover, Scotland, by virtue of her own coal, has been able to share in the advantages of the imperial and economic policies of England. At

the time of the union of the two parliaments in 1707 Glasgow was only a village.

The dominance of the trader over the farmer

led in the 19th century to a reversal of the long-settled British policy of protection. England

and Scotland no longer rest economically on

the resources of their own territories. They

produce coal, and are the seat of labor and of capital, but four-fifths of their wheat they im¬

port, and one-fifth of their people are engaged on manufactures for export. Ireland, however,

has very little coal, and must still depend on her agricultural products. Thus, while Scot¬

land and England are now a single economic or¬

ganism, Ireland — with the exception of Bel¬

fast — is another and separate organism. There

is an antagonism of economic interest between

Ireland and Great Britain which may be com¬

pared to the antagonism of interest between the Southern States and the Northern before the

Civil War. If in her own interest Great Britain were to revert to her former economic policy,

an incidental result in the long run might pos¬

sibly be to reconcile Ireland to her.

8. Geographical Momentum. — We must

not however seek to ascribe the present strategic and economic position of Britain in the world, in so far as it depends on geographical causes, wholly to the present action of those causes.

There is such a thing as geographical momen¬

tum. The causes which originally led to the

establishment of a market in a given place may have ceased to act, but the habit of the cus¬

tomers will long compel salesmen to resort to it.

London at the present moment is the greatest

general store in the world. It has no staple indus¬

try, but parcels of almost everything manu¬

factured in other parts of Britain, and, indeed, in almost all parts of the world, are warehoused there. Except for large quantities of staple

goods, many smaller communities find it con¬

venient to give their orders and to make their payments in London. Formerly, no doubt, as

Emerson has said, England as the great shopkeeping nation had a good stand in the world.

Her chief customers were along the European

coast opposite. But now part, at any rate, of her influence is due to momentum from the

past, to the start given to her during the

Napoleonic wars, and by the fact that in the

days before railroads she had coal near the

waterways.

9. The Consequences of Sea Power.

— Britain now lives in part on the products of her own land and seas, in part as a manufac¬

turer for other countries, and in part as a

market. But she also obtains profit * from

her position as the chief sea power. By this

power she prevents her enemies from uniting,

she retains certain open markets, and she pro¬

tects her carrying trade. Sea power, however, is a condition of the existence not only of the

British Empire, but also of the United King¬

dom. This was early made evident. When

Edward the First conquered the Principality

of Wales, he moved the fleet of the Cinque

Ports, then the only fleet available for the Eng¬

lish king, into the rear of his opponent. This he could not have done had not the Lord of

the Isles been defeated shortly beforehand by

the Scotch. For several previous centuries sea

power along the oceanic borders of Britain had been in the possession of a Norse state estab¬

lished in the fringe of islands which extend

round the west of Scotland from the Shetlands

to the Isle of Man. Unless Britain has com¬

mand of her seas the Shetlands and the Orkneys, and indeed Ireland itself, might he held by the foreigner against her, and the foreign invader

might establish his bases even in the remoter

peninsulas, say of Scotland or Wales. It was

from such a peninsular base at Lisbon that

Wellington conducted the war against France

at the beginning of the 19th century.

The very need of sea power, or in other

words, of the sea itself, renders it impossible to put territorial limits to naval action. Britain can command in the British seas only if she

can also command in waters more remote. Her

fleets are now concentrated in European waters

because her possible naval opponents are there

to be found, and for no other reason. It fol¬

lows, however, that Malta and Gibraltar, the

bases of the Mediterranean and Atlantic fleets, are in reality not merely milestones on the road to India, but also outposts for the defence of London. It is this characteristic of sea power, now familiar to all the world through the writ¬

ings of Admiral Mahan, which renders it neces¬

sary for modern Britain — faced by powers that rest upon half continents — to extend her eco¬

nomic bases beyond her original insular terri¬

tory. Whether this is to be done by the method of increasing the insular factories and holding open the overseas markets, or by such a fed¬

eration with her colonies as will in effect base her navy on the agriculture and factories of

a wilder land, is yet the issue of British

politics — the outcome of many centuries of

history in an insular and yet European geo¬

graphical environment.

Bibliography. — Generally: Mackinder, H.

J., Geographical and Historical Studies) (12th

ed., London 1914) ; (The Modern British State: an Introduction to the Study of Civics5 (Lon¬

don 1914), and (Britain and the British Seas5

(2d ed., 1907) ; Chisholm, Stanford's Com¬

pendium5 (Europe, Vol. II, 1902). On the

geographical influences in the early history:

Green, J. R., (The Making of England5 (1882) ; Hodgkin, (A Political History of England to

1066 5 (1906).

Halford J. Mackinder,

Author of (Britain and British Seas ,5

2. THE CONQUESTS. Two, at least, of

the great inrolling waves of conquest, which

have left their mark on the people and the in¬

stitutions of Britain, had spent their force be¬

fore any historian arose to record them, and

are thus for us like the forgotten events of

our unconscious childhood. As to these we can

only speak darkly and doubtfully according to

the scanty evidence furnished by excavations

of the barrows in which the bones of Prehis¬

toric Man are laid. Judging from these, we are able to say that in the dawn of the history of Britain, our island was inhabited by a race

ignorant of the use of metals, of the manufac¬

ture of pottery, and of the art of weaving, but accustomed to the use of stone implements such as wedges, axes and hammers, which they fash-174

ioned with considerable skill. This race is one of those called Neolithic, to distinguish them

from the incalculably older races of Palaeo¬

lithic Man, who also used stone implements,

but who lived before that mighty parenthesis in human history which is called the Great Ice

Age. What the Neolithic inhabitants of Britain

may have called themselves we are utterly un¬

able to say. For convenience they are gener¬

ally spoken of as Iberian, in order to indicate a possible connection with the aboriginal in¬

habitants of Spain, now represented by the

Basques; but this connection is only an ethno¬

logical guess and must not be taken as an es¬

tablished fact. The race in question buried

their dead in long barrows, the excavation of

which shows that they were of short stature,

with skulls tending to the long rather than the broad shape (Dolicho-cephalic rather than

Brachy-cephalic) and that they were probably

black-haired and of dark complexion.

To these aborigines of Britain entered two

tall and fair-haired races, both of them prob¬

ably belonging to that great family of nations which we call Celtic. The first of these in¬

vading races wielded weapons of bronze ; the

second was acquainted with the use of iron,

and this may account for their victory over

their predecessors. At present the tendency of

scholars is to identify the bronze-using people with the Gaels (or as they are now generally

termed the Goidels), who have left their chief mark on the populations of the Scottish High¬

lands, of Ireland, and of Gaul. The wielders

of iron would be the race (now called Brythonic) which gave its name to Britain; which

occupied the greater part of the southern half of the island when Caesar landed; which sur¬

vives under the name of Cymri in the moun¬

tains and valleys of Wales; and whose lan¬

guage, once spoken in Cornwall and Cumber¬

land, is the dearest possession of the eloquent Welsh and has a large currency among the

peasants of Brittany. As to the date of these several movements

accurate information en¬

tirely fails us, but it is probable that several centuries elapsed between the arrival of the two waves, the Goidelic and the Brythonic, and that all had been accomplished several generations

before the birth of Christ.

It was in the year 55 b.c. that the Roman

eagles were first seen on this side of the straits of Dover. Whether Julius Caesar seriously con¬

templated the conquest of Britain, or whether

his two expeditions in that and the following

year were only theatrical performances meant

to overawe the tribesmen of Gaul and to dazzle the populace of Rome, is a question not easily answered. It is certain that, if an abiding con¬

quest was his aim, he had greatly underrated

the difficulty of the task. His own narrative, much more candid than that of most generals

who indite their own bulletins, shows clearly

that neither expedition was really successful,

that the Britons fought well, that the dense

forests of their land, and the chopping tides of their seas powerfully aided their resistance, and that Caesar himself, after the midsummer of 54

b.c., never desired any closer view of the white cliffs of Britain.

But though Caesar was foiled, Rome re¬

mained and was still the world-conquering city.

In the year 43 a.d. when Claudius was Emperor of Rome, an

expedition was fitted out for the conquest of Britain. The commander was the

high-born senator Aulus Plautius, and he had

under his orders four legions with a propor¬

tionate number of cavalry and ˆallies.® The

latter were for the most part armed more lightly than the legionaries and were generally sta¬

tioned in the wings, while the legionaries fought in the centre. The total number of Plautius'

soldiers cannot have been less, and may have

been considerably more, than 40,000. For 17

years no serious misadventure hindered the on¬

ward progress of the Roman arms, though the

Silures of South Wales, under their king, Cara-tacus, kept the invaders at bay for many years.

In the year 59, however, we find the Roman

general Suetonius Paulinus crossing the Menai

straits and conquering Anglesey, and the

Roman soldiers quartered at Chester and at

Lincoln. Then came (60) a terrible reverse of

fortune, the only serious setback to the Roman career of conquest in these earlv centuries.

Maddened by the tyranny of a grasping Roman

official, Boadicea, queen of the Iceni (a tribe inhabiting what is now the county of Nor¬

folk), called her countrymen to arms, sacked

the Roman colony of Camulodunum (Colches¬

ter) and the cities of Verulamium and Londi—

nium, and threatened to root the Romans out

of the land. Suetonius, however, hastened back

into the centre of the island and there, giving battle to the far more numerous forces of the barbarians, achieved a decisive victory.

After this the Roman frontier was pushed

steadily forward, especially by the famous gen¬

eral Julius Agricola (78-84) till it nearly coin¬

cided with that which is now the northern

boundary of England. About the year 120 the

Emperor Hadrian is believed to have built that noble stone wall from the estuary of the Tyne to the Solway, of which important fragments

still remain, forming one of the most interest¬

ing memorials of Roman domination north of

the Alps. Another wall, of turf, was drawn by Hadrian's successor, Antoninus Pius, across

the lowlands of Scotland from Forth to Clyde,

but it was probably not maintained for long as a boundary of the empire, and the hold of the Roman legions on any part of Caledonia was

always precarious. We cannot now do more

than briefly allude to the expedition of the aged Emperor Severus, in which he is said to have

reached the northern extremity of the island

and carefully noted the duration of the long

midsummer days.

Notwithstanding many incursions of the bar¬

barians, and the obviously failing strength of

the empire, the 3d and 4th centuries were prob¬

ably not on the whole calamitous times for the now reconciled and submissive inhabitants of

Roman Britain. At last in 383 a general named Maximus rebelled against the Emperor Gratian,

assumed the purple robe, and carried his legions into Gaul to enforce his claim. It may be

doubted whether the wealthy and timid provin¬

cials ever slept soundly after that fatal depart¬

ure. True, the rebellion was in course of time suppressed, and some portion of the legions

struggled back to. Britain, but more mutinies

followed, Rome itself was in danger from

Alaric and his Goths, and at last about 407, the last of the Roman legions quitted the island

never to return.

Of the next act in the great drama, the con¬

quest of England by the English, we have

hardly any trustworthy information. The

broad outlines of the conquest may be traced.

Three tribes of the Low German stock from the shores of the Baltic and the North Sea cer¬

tainly established themselves here in the course of the 5th century. The Jutes settled in Kent and the Isle of Wight, the South Saxons gave

their name to Sussex, the East Saxons to Essex, the West Saxons established themselves in

Hampshire and Wilts, the East Angles in Nor¬

folk and Suffolk, the Middle Angles in the Mid¬

land counties where they founded the kingdom

of Alercia: Deira and Bernicia, the two king¬

doms which sometime coalesced into Northum¬

bria, were also Anglian settlements : but how

and when all these territorial changes took

place we really cannot state with certainty.

Even the (Saxon Chronicle, } which professes to give dates for the foundation of the kingdoms

of Kent, Sussex and Wessex, tells us scarcely

anything about Northumbria in these early

years, and nothing at all about the other three kingdoms.

The ordinary story of the Saxon conquest

is thus told. On the departure of the Roman

legions the Britons, sore pressed by the incursionˆ of the Northern and Irish barbarians, the Piets and Scots, called on <(Aetius, thrice con¬

sul,® for aid which he was unable to give them.

Thereupon they foolishly turned to the Saxon

and kindred continental tribes for help. Hengist and Horsa, Jutish princes, came at the call, landed on the coast of Kent, repelled the Cale¬

donians, but refused to quit the country after the work of liberation was accomplished. The

infatuated passion of Vortigern, the elderly

British king, for Rowena, daughter of Hengist,

aided the designs of the invaders, who sent

over to the continent for more and ever more

of their countrymen till the conquest at least of the eastern half of the island was accomplished.

For the story thus told the evidence is not

satisfactory. It chiefly consists of the narrative of a Welsh ecclesiastic named Gildas, who lived a century and a half after the legions quitted Britain, and who, though an earnest Christian

patriot, was evidently but slenderly furnished

with historical knowledge. Nor do the very

meagre details of the conquest which are sup¬

plied by the (Saxon Chronicle* carry us much

further. That Chronicle was itself probably not compiled till three or four centuries after the invasion, though some of the material included

in it may be of a much earlier date.

On the whole all that we can safely say ap¬

pears to be that apparently throughout the 5th century a series of attacks on the Romano-British population was being made by the

Ger¬

manic tribes which the Romans had known by

the name of Saxons. These attacks had begun

even in the 4th century and, in order to guard against them, the emperors had created a high

official who bore the name of <(Count of the

Saxon Shore.® The invasion may possibly have

culminated in the year 449, the year assigned by the (Saxon Chronicle) to the landing of Hengist and Horsa, but there is some reason to

think that even that specific event took place eight years earlier. The name of the first West Saxon chieftain, Cerdic, interests us because it is from him that the present royal house of

Great Britain derives its origin. His career of conquest, which had been most successful, was

possibly stayed about the year 516 by a great victory which Gildas reports the Britons to

have won at “Mount Badon.® In the present

state of our historical knowledge no one can

deny that this victory (about which the (Saxon Chronicle) is silent) may have been won by a

Romano-British hero named Arthur.

About 60 years later (577) the great victory

of Deorham, won by Ceawlin, the grandson of

Cerdic, once more carried forward the invading

flood and finally separated the Britons of Wales from their kinsmen in the district which was

then called West Wales, but which we now know as Cornwall.

The Saxon conquest was apparently never an easy one, and became harder and slower as time went on. By the middle of the 6th cen¬ tury, roughly speaking, the invaders occupied all of England that lies east of a line drawn from Berwick to Portland; but it had taken at least three generations to reach so far. Then came the above-mentioned victory of Deorham and the extension of the Saxon border far into Devonshire. In the northwest during the 7th and 8th centuries, the Northumbrian kings cut short the British kingdom of Strathclyde, and perhaps reduced it into a condition of some¬ thing like vassalage. On the Welsh marches, Offa, the great king of Mercia, in the 8th cen¬ tury, carried the western border of England from the Severn to the Wye, and by a substan¬ tial earthwork, some vestiges of which still re¬ main and are known as Offa's Dyke, fixed the dividing line between England and Wales al¬ most in its present position. The actual con¬ quest of Wales and its complete subjection to the English kings had to wait till the

13th century, when it was accomplished by

Edward I.

The four centuries which intervened be¬

tween the departure of the legions and the ac¬

cession of Egbert are generally felt by the his¬

torical student as a wearisome interlude in

which nothing is done toward the real business of the drama, the creation of an united Eng¬

land. In truth, no thought that such was the

real action of the play probably visited the

minds of the chief performers. The invaders

belonged to various clans, tribes and communi¬

ties and though they must have spoken the same or nearly the same language, they had only the feeblest conception of duty toward one common

country. Even within the limits of the same

race we look in vain for any active principle of brotherhood. Angle seems to war against

Angle, and Saxon against Saxon, just as cheer¬

fully as either would war against the other. It is true that the moral conquest which lies out¬

side the scope of this paper, the conversion of the English to Christianity (600-686), did some¬

thing toward quickening the sense of national

unity; but notwithstanding the Church's influ¬

ence, this was still weak when Egbert ascended the West Saxon throne, nor can he, notwith¬

standing the ascendency which he exercised

over the other .still subsisting kingdoms, be re¬

garded as truly king over all England. It was the terrible Danish invasions and the fact that only one champion, the hero king of Wessex

was found able to resist them, which finally

established the unity of Anglo-Saxon Britain

under the rule of Alfred and his descendants.

We call the new invaders, for convenience sake, Danes, but in truth they came not only from

Denmark, but from Norway, perhaps from all

the harbors of the Scandinavian seas. In 789

the Danish storm began to blow, and with one

or two lulls, it blew for three centuries, till Harold Hardrada lay dead on the field of Stam¬

ford Bridge. In the year just mentioned (789)

three Danish ships appeared off the coast of

Devonshire. The mariners resisted the attempt

of the king's steward to levy toll upon them, slew him, and sailed away; Four years after¬

ward came another and more deadly invasion.

<(The heathen men,® says the Chronicle, <(miserably destroyed

God’s Church at Lindisfarne,

with rapine and slaughter.ˆ This ravage of one of the holiest places in Western Christendom

showed the savage heathenism of the invaders

and struck terror into the hearts of noble and peasant alike, who saw that no sanctuary could be of any avail when the terrible raven standard of the Danes was flapping in their harbors.

The usual course of one of the early Danish

invasions was something like this. When spring

days dawned a little fleet of ships, or rather long boats, undecked, with one mast in each,

and seats for 60 rowers, would push off from

the Danish or Norwegian coast and appear in

English or French waters. (It must be remem¬

bered that France and Germany suffered almost

as severely as England from the Danish rava¬

ges). The mariners steered their barks into

some estuary, such as that which then severed

Thanet from the mainland, and leaving them

there under a sufficient guard, spread them¬

selves over the country in quest of horses.

When they had thus mounted themselves at the

expense of the victim country, they made rapid excursions far and wide over the land, burning towns, plundering monasteries and churches,

fighting with and generally defeating the cal—

dorman or lord-lieutenant of a county, who at

the head of his rustic militia (fyrd) came forth to fight his brave but stupid battle of defense.

Their enemies accuse them of inhuman crimes :

the torture of prisoners, the violation of

wiomen, the mirthful slaughter of little chil¬

dren; but there is some doubt how far these

atrocities can be fairly taken as typical of the general character of the Danish invasions. Of

one feature of these invasions there can be no doubt : that is, of the special hostility which they displayed to the churches and monasteries

of Western Europe. The historical literature

of our country has probably to lament the loss of priceless manuscripts, especially in the con¬

vents of Northumbria and Mercia, caused by

the ravages ‘of the Danes.

When the summer was drawing to a close,

and when the long boats were gorged with the

plunder of half a dozen counties, the unwel¬

come intruders would return to their ships,

glide away out of the channel in which they had cast anchor, and f or that year the harried and wasted land would see them no more. This, at

least, was the case in the first stage of the in¬

vasions, for about 60 years after the sack of Lindisfarne. Then, in 851, as the Chronicles

tell us, (<the heathen men settled themselves

over winter in Thanet.ˆ From that time the

invasions of the Danes assumed a m'ore and

more permanent character: from mere free¬

booters they became conquerors: Northumbria

and Mercia were bound to their chariot wheels, and the whole of England would have been sub¬

jugated by them but for the war of liberation which was successfully waged against them by

Alfred the Great (871-900).

Though Alfred broke the Danish yoke, and

although his son and grandson, Edward ajid

Athelstan, triumphantly asserted the suprem¬

acy of the English crown over the Danish chief¬

tains who were left in the land, the result

of the warlike operations of the 9th and 10th centuries was to cause an immense infusion of

Scandinavian blood into the population of Eng¬

land. The Danelaw, as it was called, included

the greater part of the country northeast of the Watling street, the old Roman road which ran

from London to Chester; and in many parts of

this region, notably in Lincolnshire and the

East Riding of Yorkshire, the names 'of places still bear witness by their terminations to the existence there of a large number of Danish

settlements. It cannot be doubted that this

Scandinavian element when subjected, as it

soon was, to the humanizing influence of

Christianity, was a most valuable and virile in¬

gredient in the population of England.

Through the greater part of the 10th century

the Danish inhabitants of England were kept

under by the. strong hand of the English kings, and the Danish invasions nearly ceased. Near

the end of that century they were resumed, and owing to the portentous weakness of Ethelred

and his counsellors, they achieved a greater

measure of success than ever before. An arch¬

bishop was martyred ; six successive payments

of tribute were paid in the vain hope of induc¬

ing the invaders to cease from ravage; and

finally the descendants of Cerdic had to quit

the realm, and Canute the Dane sat upon the

throne of England. As king, however, the

Scandinavian conqueror healed many of the

wounds which his countrymen had inflicted as

ravagers ; and the long and prosperous reign ‘of the Christian Canute marks practically the end

of the period during which the Danish pirates

were a source of terror to the Saxons. The

reign of Canute, however, coincided with one

event in the nature ‘of a conquest, not favorable to England. In the

year 1018 Malcolm, king of Scotland, won the battle of Carham over the

•

men of Northumbria and thereby succeeded in

forcing back the English frontier from the

Firth of Forth to the line which it now occupies of the Cheviots and the Tweed. The rich coun¬

try of the Lothians, which for near five centu¬

ries had formed part of the kingdom of North¬

umbria, was now permanently added to Scot¬

land.

The line of Canute came to a speedy end in

the persons of his worthless sons; and there¬

after, during the central years of the 11th cen¬

tury, under the reign of Edward the Confessor, there was going forward a peaceful conquest of England by the Normans under favor of the

Norman-minded king. In truth there was

much to admire in this young Norman race,

strong with Scandinavian energy, but refined

and liberalized by the memories of Roman cul¬

ture which still lingered in the shattered empire of Charlemagne. Hard and grasping as the

Norman warrior might be — and William the

Conqueror was a typical Norman in this re¬

spect — he was at this period generally chaste and temperate. His

devotion to the Church was

not a mere hypocritical pretense, nor was it

only testified by the magnificent cathedrals

The Tower of London

which he erected. As statesman, as architect,

and as warrior, it must be admitted that the

Norman knight much outshone the Saxon

thegns whom he supplanted.

The peaceful conquest of England by Nor¬

man influence which had been for a time ar¬

rested by the successful rebellion of the half-Danish family of Godwin was succeeded by the

bloody conquest of 1066. Many causes con¬

curred toward this event; the utter feebleness

of the representatives of the line of Cerdic; an uneasy consciousness that Harold Godwineson,

who had been raised to the throne on the

death of Edward the Confessor, was no

rightful wearer of the West Saxon crown ;

the long-lasting feud between his family

and that of the sons of Leofric; but above all the grievously ill-timed invasion of the Nor¬

wegian Harold Hardrada. It wras on an ill day for Scandinavia as well as for himself that he landed with his ally, the traitor Tostig, on the coast of Yorkshire. Unable to conquer Eng¬

land himself, and winning nothing from her

king but the seven feet of earth assigned for his grave at Stamford Bridge, he nevertheless

left her panting and breathless for the en¬

counter with a mighter and unwearied foe.

By the battle of Hastings, England, which

had been for centuries closely linked with

Scandinavian interests, was wrenched away

from that connection, and was forced to revolve in the same orbit with the Latin-speaking races of western Europe. A revival of the empire of Canute, which had bound England, Norway, and

Denmark together, was made forever impossible.

The eyes of the English king turned henceforth toward Rouen, Paris, Angers, Bordeaux; the

lands of the northeast on the far side of the German Ocean were to him a well-nigh for¬

gotten world.

As a matter of tactics the victory of

Hastings seems to have been due to William's

skilful combination of archers and cavalry.

The English forces, though much more imper¬

fectly disciplined and less inured to war than the Normar*, stood well at bay for many hours behind the shield-wall which they knew so well how' to weave, but they were galled by the

thick-flving arrows of the Normans, and were

tempted, by the feigned flight of the enemy, to rush down the hill after them. Then did Wil¬

liam's cavalry, galloping up, thrust themselves

in between their broken ranks, and throw them

into confusion from which they never recov¬

ered. Since the 14th of October 1066 no for¬

eign conqueror has permanently established

himself on English soil, and we may therefore

here close our brief and rapid sketch of the

Conquests of England.

Bibliography. — For prehistoric man, con¬

sult Dawkins's (Early Man in Britain, J and

Beddoe's (The Races of Britain. >

For the interesting subject of British coin¬

age, the great authority is Sir John Evans in his two works, < Coins of the Ancient BritonsP and the supplement thereto.

For the Roman Conquest, consult (Caesar's

Commentaries,* (Books IV and V) ; Tacitus,

(Annals> (Book XIV), and <Life of Agricola) ; Dion Cassius, <Historia Romana* ; the lives of the Roman Emperors, which go by the name of

the (Historia Augusta,* and the History of

Ammianus Marcellinus.

For the end of the Roman period consult

vol. 13 — 12

Paulus Orosius, 'Histories* (Book 7, Anglo-Saxon affairs). The two chief British author¬

ities are the cLiber Querulus* of Gildas, edited by the Rev. Hugh Williams, and Nennius, <Historia BrittonumP edited by Stevenson for the

Historical Society, and by Mommsen in (Monumenta Germanise Historical For the Anglo-Saxon side of the same events the chief authori¬

ties are 'The Anglo-Saxon Chronicle, > and

Bede's 'Historia Ecclesiastical both edited by

Rev. Charles Plummer. For the history of the

7th century, we. may add 'The Life of Wil¬

frid, } by Eddius in the volume 'Historians of the Church of York,* edited by J. Raine (Rolls Series) .

The chief authority for the personal history

of Alfred the Great is Asser, ‘De Rebus Gestis Aelf redip recently edited by W. H. Stevenson,

who in a convincing manner has vindicated

Asser’s authority. The wrorks of King Alfred

have been published in two volumes, Oxford,

1852-53.

Some light is thrown on the Danish inva¬

sions by the Heimskringla (in the Saga Library, edited by Morris and Magnusson), also by Vig-fusson and Powell’s ‘Corpus Poeticum Boreale.*

For the Norman Conquest, the chief authorities

are Ordericus Vitalis, the (Roman de Rou* of

William Wace and pre-eminently the ‘Bayeux

TapestryP edited by F. R. Fowke, London.

Modern writers on the subject are too numerous to mention here, but reference may be made

for the Roman period to Mommsen’s Prov¬

inces of the Roman EmpireP (Vol. I of the

English translation), and F. Haverfield’s con¬

tributions to the Victoria County History of

England.

For later history it will be sufficient to refer to J. R. Green’s (Making of England) and (The Conquest of EnglandP to E. A. Freeman’s

(Norman ConquestP to Sir James Ramsay’s

(Foundations of EnglandP and to C. F. Keary’s (Vikings in Western

Christendom.* But for

the whole subject of the bibliography of Eng¬

lish history from the earliest times to the 15th century no better guide can be found than

(Sources and Literature of English History,*

by Charles Gross, of Harvard University.

Thomas Hodgkin,

Author of ‘ Italy and Her Invaders P (Life of

Charles the Great P (Political History of

England * (Vol. /), *etc.*

3. MEDIAEVAL ENGLAND. The foreign

invader had finished his task when the last

results of the Norman conquest of England

were slowly worked out during the Norman and

Angevin periods. For the future the develop¬

ment of the country was to depend upon re¬

sources supplied from within. The first stage

in this new growth is marked by the reigns of Henry II and his sons. From one point of

view Henry II’s work was but a continuation

of that of his grandfather, Henry I. Recent

investigation has shown that few of the char¬

acteristic features of Henry -II's policy were

specifically his own, and that he never departed far from the lines laid down by his grand¬

father. Yet the use Henry made of the mate¬

rials thus provided for him constituted a new

departure in our history. Dr. Stubbs' well-known description of Henry's reign as a "period of amalgamation® remains as true as ever.

Before his days,, the English and Norman

peoples and English and Norman institutions

remained separate, though side by side. It was the mission of the Angevin despotism to grind

down both English and Norman into a common

nation with a common set of institutions. At

first the process was a mechanical one, for the combination was due exclusively to the will of an absolute monarch, working through the

most effective administrative machinery which

mediaeval times had up to now witnessed. As

long as the Angevin despotism remained in¬

tact, the English and Norman races and insti¬

tutions continued to be kept together through

this external pressure. But they became accus¬

tomed to the new conditions, and when the sys¬

tem of Henry II, which had survived the neg¬

lects of Richard I, broke down through the

active tyranny of John, the union had become

organic to such an extent that it continued, de¬

spite the relaxation of the severe pressure which had brought it about.

The most permanent feature of Henry II's

work lay in the establishment of the unity of England, and the control of the country by a

unified administration dependent upon the cen¬

tral power. Though the upper classes long con¬

tinued to speak French and to bear French

names, they became as English in spirit as their native-born tenants and vassals. Yet neither

Henry nor his subjects had any consciousness

of the results of his work. Henry selected Eng¬

land for more treatment than he devoted to

the rest of his dominions, not because he was an English patriot, but because circumstances

gave him greater control over his English

kingdom than over any other part of his ex¬

tensive territories. His own personal ambi¬

tion was rather to build up a cosmopolitan

Angevin empire, than a national English king¬

dom. This ideal could not be realized be¬

cause it brought his house into direct conflict with the growing monarchy of France, whose

kings were engaged in carrying out over their

dominions similar work to that which Henry

had accomplished for his island kingdom.

With the falling away of Normandy, Anjou,

and Poitou from John, and their absorption into the monarchy of Philip Augustus, the Angevin

empire collapsed. Henry IPs continental pos¬

sessions had contributed next to nothing toward the development of England, but the work he

had accomplished in unifying them had mate¬

rially smoothed the path by which the French

national state was to attain to greatness. The retention of Gascony in the hands of the Eng¬

lish kings kept up the friction between the two nations and brought about that hereditary en¬

mity of France and England, which was so

characteristic a feature of all later mediaeval history. Thus the failure as well as the suc¬

cess of the Angevin rulers had their permanent importance. This was even more notably the

case with other aspects of Henry IPs policy

which may be described as premature rather

than as impossible. Conspicuous among these

were the efforts of Henry II to enlarge the

English kingdom into a monarchy over all the

British islands. The conquest of the more fer¬

tile parts of Ireland by Anglo-Norman feudal

adventurers set up in that island the uneasy

dependence of a Celtic people on the English

King's feudal vassals which had already been

established in southern and eastern Wales since the days of Henry I. Side by side with this, something like a Norman conquest of Scotland

was affected, not so much by the enforced re¬

cognition of English supremacy by unwilling

Scottish kings, as by the gradual infiltration

into the northern kingdom of the system and

habit of thought which had gained the ascen¬

dancy in Henry's own realm. Even the least

successful of Henry IPs efforts was not without influence on the future. After the martyrdom

of Saint Thomas of Canterbury, Henry II re¬

nounced as hopeless any heroic attempt to limit the sphere of the jurisdiction and authority of the Church. Yet his watchfulness in control¬

ling and regulating what he deemed the usur¬

pation of the clerical power was renewed from

time to time by the more strenuous of his suc¬

cessors, and finally attained a full triumph in the period of the Reformation. For all these

reasons, the reign of Henry II is among the

most pregnant of future consequences in all

British history.

The personal prowess and contemporary

fame of Richard I cannot blind us to the in¬

significance of his reign in results. His brother, John, was the worst and most unlucky of Eng¬

lish kings, but the consequences of his failures and blunders determined the whole future course of English history. John's unsuccessful con¬

flict with Innocent III emphasized that triumph of the Church, which even his father had been unable to prevent. The break up of the Ange¬

vin empire, though precipitated by his caprice

and neglect, was sooner or later inevitable.

More important than either of these was the

reaction against his domestic authority, which

resulted in the union of barons and people in an effort to limit the autocracy of the Crown.

The Angevin despotism had done its best work

in bringing about the union of England. Like

all despotisms, it was a bad thing in itself, even when necessary as the only alternative to feudal anarchy. In John's capricious hands it did not so much as secure the continuance of the law

and order for which England had long been

willing to pay a heavy price. When the mass

of the English people, abandoning their tradi¬

tional devotion to the monarchs who had saved

them from feudal disorder, united with the

baronial leaders to wrest from the unwilling

king the grant of Magna Charta, the first faint beginnings of English liberty and constitutional government were already at hand.

Of recent years it has become almost the

fashion to decry the importance of Magna

Charta. It is easy to see that John, in sealing the charter, thought of nothing but obtaining a momentary respite, and repudiated his act as

soon as he found it safe to do so. It is equally patent that the barons who forced John to ac¬

cept the charter were mere feudalists, careless of all but their personal wrongs and the griev¬

ances of their class, and quite unconscious that they were acting otherwise than their ancestors had always acted. Yet emphasizing the un¬

worthiness of these men should not blind us

to the significance of their work. However un¬

conscious they were of their high mission, the Fitzwaltersand the Vescys were in a very real

sense the pioneers of English liberty. The op¬

portune death of the tyrant, the withdrawal

from England of the barons' dangerous ally,

Louis of France, and the wisdom of the papal

legate, Gualo, who accepted in the name of his ward, the infant Henry III, the charter which

John had repudiated, insured the permanence

ot their principles. For nearly a century the

great event of English history is the struggle for the charter. Under the long minority of

Henry III the ideas of limited monarchy and

constitutional control, which were its essence,

had time to assert themselves. When the young

king attained manhood, his personal weakness

made impossible any effective attempt on his

part to carry on the government on autocratic

Angevin lines. The aristocratic control of

the administration was now secured, though it

was long before that control was vigorous or

effective. The chief danger to England was

that the nobles in resuming their former power might also have fallen back on the old separa¬

tist ambitions of their feudal ancestors. Luck¬

ily the reaction toward feudalism was slight and easily suppressed. The baronage of Henry Ill's

reign was a very different body from that of

Norman times, and only a few isolated individ¬

uals still cherished the ancient feudal ambition of each nobleman ruling like a king over his

own hereditary estate, and caring nothing for

the manner in which the central government of

the country was carried on. The barons of the 13th century accepted the unity of England, and accepted the central administration which the

Norman and Angevin kings had built up. Their

chief concern was to see that the government of the country was under their own control, and

not regulated by the, king's despotic caprice.

Thus the unity of England remained, but the

central government was henceforth an aristoc¬

racy rather than an autocracy. The barons

claimed to be the hereditary counsellors of the Crown. Even a strong king was compelled to

frame his policy to their liking, and to admit them into a sort of partnership with him.

Under a weak king, like Henry III, the barons aspired to rule the realm as they would. Their moment of triumph came in 1258, when the

Provisions of Oxford transferred the adminis¬

tration of the country from the monarch to

a committee of 15 barons, without whose coun¬

sel and consent the king was not permitted to take any action. Thus the Angevin despotism

developed into the constitutional monarchy of

later times, though at this stage the only effec¬

tive limiting force was the baronial aristocracy.

Side by side with this constitutional develop¬

ment was the blossoming of every aspect of

mediaeval life, and which made the 13th century one of the most brilliant periods of English

annals. The age of Henry III witnessed the

consummation of Gothic architecture; the be¬

ginnings of the most spiritual aspects of mediae¬

val Christendom in the orders of mendicant

friars; the rise of a new intellectual life in the scholastic philosophy, and the organization

of teachers and scholars, called universities.

For a long time the political weakness of the reign of Henry III checked the general prog¬

ress of the nation, but with the revolt of the barons a new political development began.

The purely baronial conception of the Eng¬

lish Parliament had hardly been formulated

when its inadequacy became self-evident. Even

in Norman and Angevin times the authority of

the Crown had been largely based on the mute

but hearty support which the average English¬

man gave to the one power which could main¬

tain order, and save him from the caprice of the local feudal tyrant. The machinery by which

this popular backing of the royal authority had been effected still survived in the popular local courts, and the jury system of Henry II had

enlarged the representative principle by afford¬

ing facilities for representative committees of

the shir e moots to treat directly with the king or his agents. Administrative convenience and

financial necessity brought about during the

first, half of the 13th century a further ex¬

tension of the idea of representation. It be¬

came not unusual for knights, representing the

shires, and burgesses, chosen from the boroughs, to be gathered together in a single assembly to voice complaints, frame laws, testify to ancient customs, and make extraordinary grants of

money. Such was the state of things when the

narrowness and selfishness of the triumphant

baronial oligarchy provoked a strong reaction

among their own more enlightened supporters,

and gave a unique chance to the broader-minded friends of the monarchy to rescue it from the impotence into which it had fallen. Simon of

Montfort, Earl of Leicester, made himself the

leader of the former; Edward, the king's son,

the future Edward I, put himself at the head of the latter movement. The momentary triumph

of Earl Simon over both his baronial colleagues and his royalist enemies was marked by the

Parliament of 1265, which, if not the «first

House of Commons, » was at least the first oc¬

casion when the new machinery of representa¬

tion was applied to the determination of grave political issues. The effect of Simon's work

was that the lesser landholders and the citizens were called upon to enlarge the narrow circle

which had hitherto alone aspired to control the crown. Though Simon

perished within a few

months on the field of Evesham, his enemy and supplanter, Edward I, carried on and com¬

pleted the work. Edward was every inch a

king, and loved power too well to abandon any of it willingly. But he dreaded the might of

the greater barons and of the still independent Church; he appreciated the advantage of hav¬

ing the people on his side; and he was the

first king after the conquest who was in a real sense an Englishman. Up to now the progress

made in England had been on lines common

to all Christendom. There is nothing specifi¬

cally English in the Church, the friars, Gothic art, scholastic philosophy, the universities,

feudal warfare, or even in the system of rep¬

resentative control of the Crown by the es¬

tates. At last under Edward I a newer and

more specially national note is sounded. Un¬

der this great king the constitutional system

became perfected; the council of the nation be¬

came permanently strengthened with a popular

and representative element; the baronial parlia¬

ment was enlarged with the three estates of

barons, clergy, and commons. Edward I was

even less of an innovator than Henry II, but

old ideas took new shapes under his direction.

The materials of the Constitution had been sup¬

plied during the creative period of the barons'

wars. His work, as Stubbs has truly said, was a work of definition. Henceforward the main

outlines of the Constitution were clearly marked out and defined. As far as outward forms

went, they remained as Edward established

them, until quite modern times.

The most permanent result of Edward I's

work was the creation of the English parlia¬

mentary system. Edward's other ambitions

were less completely realized. He aspired, with 180

but little success, to maintain his position in Gascony and on the Continent against Philip

the Fair, the greatest of the mediaeval Kings of France. He aimed at playing a prominent part

in Europe, and checking the ever-growing usur¬

pations of the Church in the political sphere, and at establishing his authority over all the British Islands. In most of these directions he was not very successful, except that by the de¬

struction of the state of Llewelyn of Wales he made the English monarch supreme over south¬

ern Britain. Even in his lifetime his attempt

to absorb Scotland showed no great prospect

of success. Under his unworthy son, Edward

II, Robert Bruce's great triumph at Bannock¬

burn (1314) secured the independence of Scot¬

land and made permanent the division of the

English race into two unequal halves. So far

as concerned internal politics, the reign of Ed¬

ward II seemed marked by an equally strong

reaction. The Lord Earl Ordainers and their

leader, Thomas of Lancaster, take us back to

the oligarchical atmosphere of the Provisions of Oxford. It was only after their fall that the Despensers identified the triumphant monarchy

■with the representative parliamentary system.

The revolution of 1326, which cost Edward II

his throne and his life, perpetuated the consti¬

tutional authority of the estates. During the

long reign of Edward III, the king's foreign

preoccupations made it essential for him to keep on fair terms with his subjects. The subsidies and support, necessary to enable Edward III to carry on the early stages of the Hundred

Years' War with France, finally consolidated

the constitutional fabric and ensured its per¬

manence.

England had already became a nation under

Edward I. During the reign of his grandson

Edward III the might of the English state

was revealed to all Europe by the extraordinary military successes which laid low the ancient

feudal fashion of fighting in famous battles

such as those of Crecy and Poitiers. It was

now that the English king first aspired to be lord of the seas, and that English mariners and wool merchants prepared the way for the in¬

dustrial England that was ultimately to super¬

sede the military state that now claimed a great place in the affairs of Europe. It was the age of Chaucer and Wycliffe, when the English

tongue and English literature blossomed anew,

and when the new nation became impatient of

the narrow limits and strict restraints of the mediaeval fashions of life and thought. It was in this age that the Church first provoked suc¬

cessful opposition, and first manifested signs of conscious weakness. The ravages of the Black

Death, the direst of mediaeval pestilences, un¬

dermined the old social order and prepared the way for all that ultimately differentiated the

social and economical system of England from

that of its continental neighbors. Chivalry,

whose deeds were glorified in the pages of

Froissart, was threatened with decay at the mo¬

ment of its apparent triumph. The brilliant

successes of the French war were succeeded by

disastrous failures. In his embarrassed old age Edward III saw the loss of his foreign con¬

quests, and the undermining of his authority at home. During the troubled reign of his grand¬

son, Richard II, the economic troubles of the

period culminated in that Peasant Revolt of

1381 which, even in its failure, was to ring the knell of villeinage and the old social system.

As Richard attained manhood, he ventured

upon the most serious effort made by a later

mediaeval king to overthrow the constitutional

system, and strove to make himself an autocrat like his ancestors and his contemporaries, the

French kings. His boldness drove him from

his throne to a prison where he soon met his fate. With the Revolution of 1399 England

was brought back permanently to the constitu¬

tional path.

The Revolution of 1399 was a conservative

reaction in at least two directions. It restored the old parliamentary Constitution and insured

the loyal continuance of a limited monarchy by establishing on the throne with a parliamentary title that house of Lancaster, which' since the days of Earl Thomas had almost continuously

led the constitutional opposition to the sover¬

eign. Under the Lancastrian kings the mediae¬

val constitutional monarchy attained its height.

Not only weak kings, like Henry IV and Henry

VI, were perforce true to their constitutional

obligations. We see the same loyalty even

in a strong monarch like Henry V, who was

vigorous enough to renew Edward Ill's claim

to the French throne and lucky enough to profit by French divisions and make himself ruler of

the more important half of the French mon¬

archy. Under Henry V also the other charac¬

teristic feature of Lancastrian policy mani¬

fested itself most fully. This was the ecclesias¬

tical reaction in favor of the strict orthodoxy with which the house of Lancaster was as much identified as with constitutional principles. If Edward III and Richard II had trifled with

Wycliffe and his followers, Henry IV and

Henry V were only content with extirpating

Lollardy and all its works. Their policy was

made easier by the socialistic and revolutionary extremes into which some of the Lollards had

drifted. The early 15th century was not ripe

for radical revolution in the Church, and the

downfall of heresy was the more rapid and

complete since Wycliffe's teaching had never

really established itself in popular favor. For another hundred years the majestic unity of the mediaeval Church was to be maintained. But

even leading churchmen were half conscious

that the Church's hold over men's minds was

no longer what it had been. The life and fresh¬

ness of mediaeval Christianity were gone, even

though the Church remained as rich, as proud,

and as outwardly glorious as ever. In its weak¬

ness the Church clung for support to the State which in the great day of mediaeval religion

it had aspired to direct and control. A chief feature of 15th century life is the political ec¬

clesiastic serving Church and State with equal

fidelity, but discharging his duty to both mas¬

ters in a thoroughly worldly spirit.

Lancastrian constitutionalism lasted little

more than 60 years, though Lancastrian ortho¬

doxy preserved England from religious revolu¬

tion for nearly a century and a half. It was soon found that constitutional government un¬

der mediaeval conditions meant weak govern¬

ment. Power went, not to the people at large, but to the great landholders. A turbulent aris¬

tocracy took advantage of the rule of a weak

king to wage hereditary feuds against its rivals and reduce the land to a condition of chronic anarchy. Things grew worse when a revival of

French nationality followed the wonderful

deeds of Joan of Arc, and Henry was gradu¬

ally deprived of the monarchy of France which

had been conferred on him in his cradle with

the goodwill of many millions of Frenchmen.

The bloodthirsty heroes of the French war

transferred their fierce activity from France

to their native land, and the permanent anarchy developed into a generation of intermittent civil war. This is the period of the socalled Wars of the Roses, which, beginning with the first

battle of Saint Albans in 1455, went on with oc¬

casional breaks until the Battle of Bosworth in 1485. The nominal occasion for these wars was

the legitimist claim of the house of York as

the true heirs of Edward III, but the real

cause of the triumph of York over Lancaster

lay not in Edward IV's superior nearness in

blood to the common ancestor, so much as in

the fact that Edward IV was a strong man who could give the English people the peace and

order which were necessary to enable the ordi¬

nary citizen to till his farm or transact his daily business. The fall of Henry VI involved the

failure of mediaeval constitutionalism, and the

supersession of a lawless anarchy that adopted

the name of liberty by the capable and auto¬

cratic rule of a vigorous monarch, who cared

little for constitutional forms and everything

for making his authority supreme. Family

divisions within the Yorkist house and the last expiring efforts of the baronial party retarded the restoration of a strong monarchy after the death of Edward IV and gave the house of

Lancaster a chance of reasserting itself. Lan¬

caster was now represented by the Welsh house

of Tudor, which on the female side claimed a

connection of doubtful legitimacy with the line of John of Gaunt. But Henry Tudor's triumph

at Bosworth Field meant not the abandonment

but the strengthening of the new system of

strong monarchy which Edward IV had first

begun. The Tudor despotism continued the

Yorkist tradition and made permanent the fall

of mediaeval constitutionalism. But the middle

ages were now wearing themselves out. The

Church and the baronage had in turn exhausted

themselves, and even the disorder of the Wars

of the Roses did not do much to check the

growth of the middle classes, and the spread of a higher standard of national prosperity than

more heroic earlier conditions had permitted.

The Reformation and the Renaissance were at

hand, and a new chapter in English history

was about to open.

Bibliography.— W. Stubbs' Constitutional

History of England,* in three volumes, gives

not only the most authoritative account of the development of the English mediaeval constitu¬

tion, but the most broad and general commen¬

tary on the turning points of mediaeval political history. More political details can be found in the three volumes of the (Political History

of England,) edited by W. Hunt and R. L.

Poole, which cover this period; Vol. II, 1066—

1216, by G. B. Adams; Vol. Ill, 1216-1377, by T.

F. Tout, and Vol. IV, 1377-1485, by C. W. C.

Oman. For ecclesiastical history, consult W.

R. W. Stephens, 'History of the English

Church, > 1066-1272; and W. W. Capes, 'His¬

tory of the English Church in the 14th and

15th Centuries.) Economic history can best

be studied in W. Cunningham's 'Growth of

English Industry and Commerce,* Vol. I; and

in W. J. Ashley's 'Economic History,* Vol. I,

parts 1 and 2. Much information can be

gleaned from the unequal but often useful

'Social England, * Vols. I and II, edited by

H. D. Traill. Mary Bateson's 'Mediaeval Eng¬

land, > 1066-1350 ('Story of the Nations*) is

very valuable from the same point of view.

Among many studies of detached periods, per¬

sons and aspects of the subject may be included Mrs. J. R. Green's 'Henry II, } and T. F. Tout's 'Edward P (both in the 'English Statesman

Series*); Stubbs' 'Early Plantagenets,* and

Warburton's 'Edward IIP (Epochs of Mod¬

ern History*); C. L. Kingsford's 'Henry V*

('Heroes of the Nations*); W. Hunt's 'Eng¬

lish Church in the Middle Ages,* and R. L.

Poole's 'Wycliffe and the Movements for Reform> (both in 'Epochs of Church History*);

G. W. Prothero's and C. Bemont's 'Simon de

Montfort,* the latter in French; F. A. Gasquet's 'Henry III and the Church,* and the same

writer's 'English Monastic Life) ('The Anti¬

quary's Books*) ; Kate Norgate's 'England

under the Angevin Kings) and 'Jack Lackland)

are important for the 12th and early 13th cen¬

turies; H. W. C. Davis' 'England under the

Normans and Angevins) is valuable up to 1272;

G. M. Trevelyan's 'England in the Age of

Wycliffe) ; A. Reville's and C. Petit-Dutaillis'

'Le Soulevement des Travailleurs d'Angleterre

en 1381 p J. H. Wylie's elaborate 'History of Henry IV* (4 vols) ; J. Gairdner's 'Introduc¬

tion to the Paston Letters,* and the same

writer's 'Life and Reign of Richard HIP Sir

J. H. Ramsay's 'Lancaster and York) (2 vols.)

are a great storehouse of facts for the period 1399 to 1485.

Thomas Frederick Tout,

Professor of Mediaeval and Ecclesiastical His¬

tory, University of Manchester ; Author of

cThe Place of the Reign of Edward II in

English History * (1914).

4. THE REFORMATION IN ENG¬

LAND. There are three main factors in the

Reformation. It represents, first, the conflict

of the growing spirit of nationality, symbolized by the State, with the mediaeval idea of the

unity of the civilized world, expressed especially in the Catholicism of the visible Church. Sec¬

ondly, it embodies the revolt of a laity increas¬

ing in wealth, education and intelligence, against the control and privileges of a priesthood de¬

clining in enthusiasm, conviction and moral fer¬

vor; and, as such, it may also be described as the religious aspect of the political advent of the middle classes. Thirdly, it is an assertion of individuality against a collectivist control

over thought, opinion and curiosity. These

three ingredients are found in varying propor¬

tions in different countries. The second ele¬

ment was obvious everywhere, though it was

weak in such countries as Spain and Poland,

where a commercial class was almost non¬

existent. In Germany, where national unity

had been shattered in. the struggle for empire, and where particularism ran riot in the ab¬

sence of national control, national feeling, after a momentary explosion in the Hundred Gra¬

vamina and a transient enthusiasm for Luther

at the Diet of Worms, failed to concentrate in practical channels, and individual Protestantism

held sway until it too became the state religion of territorial princes. In England all three ele¬

ments were present, though individuality, or

Protestantism, fought an unequal fight with the New Monarchy and toleration was beaten by

an Established Church.

The spirit of nationality, of which the New

Monarchy and the Established Church were

the outward manifestations, had been stimu¬

lated by reaction against foreign influences in the 13th century,

misdirected in the 14th

toward the conquest of France, and dissipated

in the 15th by civil broils. At length it found unity and direction under the Tudors, who

frankly and firmly based their power upon new

social forces. Feudalism, as represented by

the great noble houses, wTas discredited and

trampled under foot; political authority was

taken from it and entrusted to lay or ecclesi¬

astical ministers, who, like W olsey, Cromwell, Cecil, Walsingham, were sprung from the up¬

per or lower middle classes. Order at home

and peace abroad were dictated by the interests of these commercial classes. Peace with money

was Henry VII's ideal. Even Henry VIII com¬

pressed the wars of a reign of 38 years into a few months, and insisted that they should not

disturb trade relations with the Netherlands;

and Elizabeth's wars were waged for piracy or

self-defense. The age of chivalry was gone;

wars, if waged at all, were waged with ledgers, not with lances. Men were made esquires and

knights in the countinghouse and not on the

field of battle.

For these struggles new kinds of brains

were wanted, different from those which had

designed mediaeval castles or coats of arms.

The day of the knight had passed away, and to him succeeded the merchant, the manufac¬

turer, the financial expert. These men were

as yet unused to political responsibility; they needed training under the Tudors — and they

got it. Under that dictatorship Parliament was

molded and developed as the instrument of

government, and Parliament is the work of the

Tudors to an extent which an age nurtured on

Parliamentary legends is unwilling to admit.

Parliamentary privileges first became real in

the 16th century; freedom of speech, freedom

from arrest, and control of taxation are con¬

ceded, not because monarchy is weak, but be¬

cause it recognizes that the people are its

source of strength. Parliament is the founda¬

tion, not the rival, of Tudor power. It is true that in the interests of expediency and effi¬

ciency many a time-honored maxim is strained

or broken ; benevolences are levied, though

benevolences had been declared illegal; but

that is because benevolences, in the words of a Tudor statesman, <(do not grieve the common

people.® Morton's Fork and Dudley's Mills

were instruments of extortion, but the opera¬

tion was not painful to the poor. Dukes and

cardinals passed suddenly and swiftly from the

palace to the prison, but the man in the street did not pass his time in palaces and generally escaped the prison. The success of a dynasty,

whose tyranny has been so loudly denounced,

is, in . the absence of the usual supports of despotism — a standing army or a vast bureau¬

cracy — only to be explained on the supposi¬

tion that, while the vocal classes were offended, the dumb masses were content.

It was the work of Henry VII to base the

Tudor throne upon the interests of the com¬

mercial classes. His son appealed to national

feeling against a universal Papacy and to lay

impatience of ecclesiastical control. But he did not appreciate either grievance until Pope and

Church crossed his personal will. The first

half of his reign was a brilliant and somewhat tawdry pageant, staged by Wolsey with the

effect, if not with the object, of diverting the king's and the nation's mind from more serious matters. In it England played the part of

arbiter of Europe with a success due to the

wealth left by Henry VII, to Wolsey's diplo¬

matic skill, and to the evenly balanced rivalrv between Charles V and Francis I. But the

pageant came to an end ; wars and subsidies

to foreign princes exhausted Henry's wealth

(1522) ; Parliament refused to become the pay¬

master of Europe (1523) ; the balance between

Charles and Francis was destroyed at Pavia

(1525), and Wolsey's influence abroad col¬

lapsed. A domestic question intruded into

Henry's notice. Catherine of Aragon was now

(1527) beyond child-bearing, and her only issue was the Princess Mary. No queen regnant had

ever sat on the • English throne, and it was popularly thought that they were disqualified.

Henry VIII had no brothers, and no nephews

except the alien Scottish king, whose title as an alien might be barred at common law. A

recrudescence of the struggle for the crown

was feared, and various claimants had already

been suggested. The prospect was horrible to

a generation begotten in the civil wars ; and as early as 1514 it was rumored at Rome that

Henry would get a divorce because of Cather¬

ine's failure to present him with an heir to the throne and of the estrangement between Eng¬

land and Spain. But matters mended in this

last respect, and the Princess Mary arrived on the scene; she gave promise of brothers, and

Henry was satisfied for the time. But brothers never came, and the idea of a divorce revived.

There were precedents enough in Henry's fam¬

ily circle; both husbands of his sister Mary

had been released from inconvenient matri¬

monial ties, and his sister Margaret was no less favored by the Papacy. Henry's need was quite

as great as theirs, his merits in his own eyes greater. Anne Boleyn doubtless added zest to

the suit, but Henry's anxiety for a wife and

not a mistress was due to the state of the suc¬

cession.

He met with unexpected obstacles. Pavia

had made, not only Francis but also Clement

VII practically the prisoner of Catherine of

Aragon's nephew. Charles cared little for his

aunt, but it was a matter of vital importance to him that a princess who was half a Spaniard should sit on the English throne and secure

England for the Spanish instead of the French

alliance. His control over Clement would make

a divorce harder for Henry VIII than it had

been for Louis XII, Henry IV of Castile,

Margaret, Queen of Scotland, or the Duke of

Suffolk.

For a time, indeed, success seemed possible

and near. France recovered from Pavia and

sent an army into Italy. Charles's star seemed on the wane: Clement

was freed and Campeggio was sent to England in 1528 with a

commission ample for Henrv's requirements.

But appearances were . deceptive ; the French

hope failed; Campeggio was ordered to do

nothing except pass the time till the fortune of 183

war should decide the d.vorce. In 1529 Italy

became imperialist and Clement with it ; Campeggio was recalled, and the case revoked to

Rome. As Wolsey said, this meant not merely

his own fall but the ruin of the Church in Eng¬

land. He alone stood for 15 years between it

and its enemies. The Parliament of 1514 had

anticipated some of the demands of 1529-36.

The unpopularity of the Church alarmed

ecclesiastics at that time, and men knew well

enough that the Crown had only to abandon

the Church for the Church to fall. Doctrine

had little to do with this antipathy at first.

It was the privileges, the perquisites and the power of the Church which excited discontent ;

not its ritual or its dogma. The laity were

Catholic and they did not object to persecution; but they did object to persecution by priests; they wanted lay control of the penal machine,

and they envied the wealth of the Church. In spite of theological appearances it was a com¬ mercial and utilitarian age which saw no advan¬ tage in vast endowments for contemplative monks or for non-reproductive purposes, and in holy-days on which men were precluded from the pursuit of wealth. There was moreover the sentimental grievance against Papal power which was the tool of a national enemy, and the growing spirit of nationality caused every¬ thing foreign, and especially a foreign jurisdic¬ tion, to be regarded with suspicion.

The first thing Henry did in 1529 was to turn out his ecclesiastical ministers, and put laymen into their places. This restored har¬ mony between Parliament and the government ; and although there were occasions on which Henry VIII came into conflict with the Re¬ formation Parliament and had to give way, both were bent for different reasons on ˆreforming® the Church in the sense of reducing its power. The foundation of that power was the Papacy, an institution beyond the reach of national con¬ trol. The Church in England could never be

curbed so long as it drew support from an independent authority. Nor indeed could a reformation, in a more legitimate sense, be effected by any other means than the national state. General councils had failed; Popes had ceased to try; the acts of a national Church acting independently of the Papacy would be ipso facto void. Not a monastery could be > dis¬solved without the Papal sanction ; and Arch¬bishop Warharri said that he was merely com¬missary of the Pope, exercising as legatus natus a jurisdiction which he did not possess as primate. The national state was the only authority which could act independently of the Pope. The Reformation was therefore a revo¬lution carried out by Acts of Parliament at the expense of the Church. By the successive acts of Annates, Appeals and Supremacy the finan¬cial and jurisdictional rights of the Pope over the Church in England were transferred to the king; the Church was nationalized by the sub¬stitution of a national for a cosmopolitan head, and it became the Church of and not the Church in England.

Such a transformation was incompatible with the continued existence of the monastic

orders. They were a negation of the national

principle, being essentially international in gov¬

ernment and in spirit. They had secured ex¬

emption from every sort of national control ;

and their immediate subjection to the Papacy

caused them to be regarded as in a special

sense the militia of the Pope. This was the

ultimate cause of their dissolution, as opposed to their reform, ihe necessity for reform was

admitted by a Papal commission in 1537, but

Henry VIII and Cromwell assumed the case

for mending the monasteries to be a case for

ending them. They were also useful as a

gigantic bribe to induce the upper class laity to concur in Henry's measures and support

them after his death; but this use of monastic endowments forbade their devotion to educa¬

tional purposes, and from this point of view

an unequaled opportunity in English history

was sacrificed.

So far as doctrine was concerned, Henry

VIII made comparatively little change, though

the denial of purgatory in 1536 cut deep at the root of the Catholic system and there were

indications that the king was preparing for

further changes in 1546-47. But the general

impression was, as Hooper said, that the king

had destroyed the Pope but not Popery; the

doctrinal reformation was the work of Edward

Vi's ministers. Protector Somerset's, changes

were comparatively moderate and are repre¬

sented by the first Act of Uniformity and the First Book of Common Prayer (1549). The

latter especially was a compromise and its de¬

sign was tp open the door for the new learning without closing it upon the old. The definite

breach with Catholicism came when Somerset

had fallen as the result of his sympathies with the peasants in their protest against enclosures.

Northumberland, who engineered the reaction

against the Protector's liberal policy, played for the support of the extreme Protestants on

whom alone he could rely in an attempt to

exclude the Princess Mary from the throne.

In 1552 by the Second Act of Uniformity and

Second Book of Common Prayer the door was

definitely shut on Catholicism ; but so far as inspiration was sought from the Continent and

not from Wycliffe, that inspiration was Zwinglian and not Calvinistic. It was not till the Marian exiles returned from Geneva that Cal¬

vin began to exert an appreciable influence on the Church in England.

Northumberland's championship was enough

to ruin any cause ; and the identification of

Protestantism with his harsh and violent rule

involved it in a discredit from which it was

only redeemed by the blood of the Marian

martyrs. Queen Mary came to the throne as a

representative of the Tudor tradition against

a self-seeking revolutionist; even her Spanish

marriage was based on the approved policy of

alliance with the House of Burgundy, and in

religious matters few dreamed at first of any¬

thing more than a return to the system of

Henry VIII. Wyatt's ill-advised rebellion, the

truculent spirit of Mary herself, the character and conduct of many of the Reformers were

responsible for the persecution which reached

its height in 1555-56. It involved a gross mis¬

calculation. Englishmen of that day were not

squeamish, but no generation in England had

witnessed anything like the burnings of Queen

Mary. They rehabilitated instead of discredit¬

ing the Reformation; and the subsequent popularity of Foxe's ˆBook of Martyrs,* with all

its exaggerations, is proof of the impress of

the persecution on the national mind. It was

deepened by the association of this violent

policy at home with weakness ˆand disaster

abroad. Tudor prestige depended* largely upon

the figure they cut in Europe, and Mary's well authenticated remark about Calais illustrates

her appreciation of the failure of her policy.

Her fate was hardly less tragic, though more

deserved than her mother's.

Elizabeth personified the revolt from Rome,

but not a Protestant or a Catholic theology.

She was purely a politique, and if she ostenta¬

tiously kissed the Bible in the street on her way to coronation, she was careful to show the crucifix in her private chapel to her brother-in-law's ambassador ; and the ambiguity of the

Ornaments Rubric had its value in interna¬

tional politics. That the late persecutions

would cease was certain, but all the rest was made as doubtful as might be to the prying

eyes of the foreigner. It was, however, largely a diplomatic pose adopted by the queen, partly to parry a real danger and partly because

it

was of the essence of her nature to shirk respon¬

sibility. The wonderful unanimity with which

the bishops refused to countenance Elizabeth

and her ecclesiastical settlement shows that they were under no misapprehension. That settle¬

ment was no mere return to the Anglo—

Catholicism of Henry VIII ; it did not go so

far as the second Prayer Book of Edward, but

it went a good deal farther than the first. Nor was repudiation of Catholicism so novel or so

dangerous a thing as in Henry's reign. By the Peace of Augsburg (1555) the empire had re¬

signed itself to the public licensing of heresy.

Calvinism was planted in the heart of Europe;

the revolt of Scotland from the Papacy with¬

drew a thorn from England's side, and civil

war in France placed another Catholic country

hors de combat. Spain alone could think of a

Catholic crusade, and Philip II soon had

enough to do with heretics and rebels in his

own dominions. Elizabeth had more to fear

from plots than from invasion, and her main

task was to keep her subjects in a state of

tolerable suspense until the financial and mili¬

tary weakness of the realm had been repaired.

State and Church had become so closely inter¬

woven that national unity was thought to require some sort of ecclesiastical uniformity. But it

was to be one of externals principally; men must go to church on Sundays, but Elizabeth boasted that she made no windows into men's souls.

It was, however, impossible to avoid religious

persecution when one religion involved a royal, and another a papal supremacy over both

Church and State; and religious persecution

went on in England until the Church prac¬

tically abandoned politics and the State theology.

The plots against Elizabeth were, however,

almost as much political as religious. The Bull of Deposition (1570) was a convenient screen;

but even Philip II did not launch his Armada

until Mary Stuart had left him her claims to

the English throne and Drake had goaded him

into fury by attacks on Spanish trade. The

northern earls who rebelled in 1569 were fight¬

ing the fight of expiring feudalism as much as of the Counter-Reformation ; nor is it easy to believe that the Catholic religion was the sole concern of the queen who married the Pro¬

testant Bothwell according to Protestant rites.

The political chessboard was divided into na¬

tional and religious squares, and the moves

were often complex; for while the bishops were supposed to keep to their own color, the rival queens and their knights might move on either.

From the dynastic point of view Elizabeth was

handicapped. Precluded from matrimony by a

physical defect, she had to leave the succession to look after itself, and makeshift with suitors.

She prolonged this game almost beyond the

limits of public decency; but it was done with inimitable skill and gave England an invaluable breathing space of 30 years. At length the

success of Parma in consolidating his power

in the Southern Netherlands (1580-84) and the

stroke of fortune which gave Philip the Crown

of Portugal with its colonial empire, its har¬

bors and its navy (1580) induced him to make

a bid for the title of which the death of Mary Tudor had deprived him, and the death of

Mary Stuart had left him heir. It was a for¬

lorn hope from the first. Philip's failure in the Netherlands might have warned him of the

odds against him under circumstances far less

favorable. There is no reason to suppose that

Philip would have been successful even if the

Armada had disgorged its hosts on English

shores. Drake and his colleagues saved Eng¬

land not from conquest but from a bloody and

perhaps a long drawn struggle fought on Eng¬

lish soil.

With the defeat of the Armada the work of

the Tudors was done. Their dictatorship was

the result of an emergency at first domestic

and then foreign. So long as the danger lasted of internal disruption or external attack, Eng¬

lishmen acquiesced in the despotic maxims of

droit administrate and Roman civil law. The

people supported arbitrary government to avoid

a greater ill; but with the danger there passed the need and the inclination to subordinate self-government to national security. Elizabeth

lingered a few more years on the stage, but

she was losing touch with her people. Her

waywardness, as Parliament told James I, was

only tolerated because of her age and her sex, and the Commons were girding themselves for

their hundred years' war with the crown.

Bibliography — Documents. — (Letters and

Papers of Henry VII and Materials for the

Reign of Henry VIP (Rolls Series) ; (Letters

and Papers of the Reign of Henry VHP (Vols.

I-XX) ; Catalogue of State Papers: Domestic,

1547-1603; Foreign, 1547-1603; Venetian, 1485—

1603; Spanish, 1485-1547; Sumancas, 1558-1603;

Scottish (ed. Thorp and Bain) ; Irish, 1 509—

1603; Acts of the Privy Council (ed. Nicolas

and Dasent), 1539-1600; Catalogue of Harleian,

Colton, Landsdowne, and Additional Manu¬

scripts in British Museum ; Historical Manu¬

script Commission Report on Lord Salisbury's

Manuscripts (Vols. I-IX) ; Journals of the

Lords and Commons ; Statutes of the Realm ;

Foxe's (Acts and Monuments) ; Wilkens' (Concilia > ; D'Ewes and Townshend's <Journals of

Parliament under Elizabeth.* Contemporary

Chronicles. — Hall, Grafton and Holinshed's

Chronicles*; Stow and Camden's (Annals* ;

Grey Friars' Chronicles*; Wriothesly's

Chronicles,* Chronicles of Queen Jane and

Queen Mary) ; Maehun's ? Diary, J <Narratives

of the Reformation * ; Parker Society's Publica¬

tion (General Index). Later Works. — Strype's

Works (26 vols.) ; Fuller, Heylyn, Burnet and

Dixon's (Church Histories* ; Gairdner's and

Frere's volumes in Hunt and Stephen's (Church

History* ; Busch's (England under the Tudors> ; Gairdner's (Henry VIP ; Bacon's (Henry VIP ;

Brewer's <Reign of Henry VIII (to 1530) >;

Froude's (History* (1530-88) ; Creighton's

(Wolsey and Queen Elizabeth* ; Pollard's

(Henry VIII, *(Cranmer,* and (England under

Protector Somerset* ; Corbett's (Drake and the

Tudor 'Navy,* and Successors of Drake) ;

Beesley's (Queen Elizabeth*; Cambridge Mod¬

ern History) (Vols. II and III) ; Stubb's lec¬

tures on European History) (1904); diction¬

ary of National Biography) ; Acton's (Lectures) (1906).

Albert Frederick Pollard,

Professor of English History in the University

of London; Author of (The Reign of Henry

VII from Contemporary Sources * (1913-14).

5. ENGLISH HISTORY OF THE 17TH

CENTURY. The intensely dramatic nature

of the events of the political life of England in the 17th century has led every English and

American historian to attribute to the period

an exaggerated importance. The generally ac¬

cepted view held by these historians is that the Stuarts attempted to perpetuate or to live up

to the pure type of Tudor despotism, and that partly because of their want of personal popu¬

larity, and partly because of the silent growth of national self-consciousness, the attempt was

a failure ; and that as a consequence the century witnessed the definitive overthrow of the Tudor system of paternal despotism — an overthrow

in which the chief operating factor was the

Great Rebellion.

Such a view involves a serious misconcep¬

tion of the real nature of the problem which the century had to solve and at the same time a

still more serious misconception of the actual

constitutional advance which that century

achieved.

The real problem which the century had to

solve was not the setting up of one ideal of state or government upon

the ruins of another

ideal. History does not concern itself with

ideals. It concerns itself with men and things — men who are flesh and blood and intensely

practical, and things which are more sternly

practical still — such things as, when they

mount the saddle, ride mankind. The real

problem of the century was how to bridge over the gulf between the executive and the legis¬

lative.

Under Elizabeth the central . power from

which the whole executive machinery radiated

was the Privy Council. That body was simply

a small permanent Council of Government or

Council of State. With the sovereign at its

head, it was the government. The whole execu¬

tive administration of the country rested upon

it. Without dividing itself up into committees

at all, but simply sitting together as. a single and permanent body, this Council decided each

and every question of administration, whether

relating to the land forces, the calling out of the militia, their equipment, and the whole plan of any military operations, or to the naval forces, including the arranging of transport, the mak¬

ing of contracts with the victualler, and the

stragetical distribution of men and ships, or

again to diplomacy, including every species of

confidential letters and instructions to ambassa¬

dors and agents abroad, or again to finance, in¬

cluding especially a most strict control of issues out of the exchequer, or finally to every branch of internal administration and law, the main

channel of communication in this last instance

being the justices of the peace in the counties.

Where does the Parliament, England's

glory, come in in such an enumeration? The

answer is simple. It finds no place whatever in it. And if Elizabeth, to take her for the moment as the type, had been able to live off her own, as the kings of England were then supposed

to do, never a word would have been heard of a Parliament. So long as it could pay its way the executive was efficient and sufficient without the Parliament. During the 44 years that Eliza¬

beth reigned she called 13 Parliaments at ir¬

regular periods but with an average interval be¬

tween each of more than three years. These

Parliaments sat as a rule about two months.

The total aggregate period of session of the

whole 13 Parliaments was less than 34 months.

So that out of the whole 44 years of her reign the Privy Council or executive had uncontrolled management of the nation for nearly 42 .years.

Nor would it be correct to say that during the remaining two and a half years the executive

was confronted by the Parliament. That body

was called simply for the purpose of supplying the government with money. Having dutifully

voted its tenths and fifteenths it was allowed to legislate on non-contentious matters and was then dissolved. In the whole of the statutes of Elizabeth's reign there is not one of any con¬

stitutional importance. More than this, not the slightest attempt was ever made by the legisla¬

tive to extort from the executive an account of the expenditure of the money thus granted by

the Parliament. Once the subsidies were voted

there was an end of the matter as far as the two Houses were concerned.

After James I came to the throne this

docile attitude of the Parliament to the execu¬

tive gradually changed. . The important point

about this change of attitude is not the cause which brought it about, but the form it took, the way in which it expressed itself. That ex¬

pression is focussed for us in the terms of the Great Contract, the failure of which led to the dissolution of James' first Parliament in 1610.

In this bargain of the Great Contract James'

position was comparatively simple. In the first year of his reign the Parliament had granted

him for life the subsidy of tonnage and pound¬

age. That grant practically put him in the

same position financially which Elizabeth had

been in throughout her reign. His revenue

(from Crown lands, royalties, casualties and

customs) was his own. He was expected to

live on it, and by that phrase was meant that out of his own he should nrovide for the whole government of the country — regal, legal, civil, military and naval. If debts arose or extraor¬

dinary occasions demanded, he would have to

ask for extra grants of tenths and fifteenths

just as Elizabeth had been obliged to do. These extra grants Parliament never refused to the

Virgin Queen nor did James' first Parliament

refuse them to him. But James tried for some¬

thing more than this. He tried to get an in¬

crease of <(his own* of his life revenue, that standing, permanent ordinary revenue out of

which he had to defray the ordinary expendi-

 ture of the State. Nor was the Parliament in¬

disposed to meet him. It accepted the general

principle of his demand, and agreed tentatively to increase his life revenue by £100,000 a year on certain conditions. These conditions em¬

bodied the Parliament's demands on the subject

of their grievances, the Impositions, such op¬

pressive royalties as purveyance, and certain

ecclesiastical complaints.

Stretch or construe these points as we will

we shall not find in them anything in the nature of a challenge from the legislative to the execu¬

tive. All the points which the Commons de¬

manded were to be conceded by the Crown as a matter of bargain. They were to be voluntary

sacrifices of prerogative on the part of the king in return for so much cash. When carried out, the executive was still as before to occupy the whole governmental field alone. No part what¬

ever of that field was it for a moment in the Parliament's mind to itself occupy or usurp. It never dreamed of demanding some control over

the executive, or even the slightest share in it, either by requesting to be consulted in affairs of state, or by claiming the appointment of any of the king's ministers. The executive was the king's, the ministers were the king's, his com¬

pletely and his alone, and Parliament never once thought of challenging such a flower of the pre¬

rogative. Had the Great Contract gone through

the only difference would have been that for the future the king's executive would have agreed

to avoid certain acts or to cease the exercise of certain rights of prerogative which had been

felt as a grievance. For the rest the executive would have been stronger, not weaker, by the

compact, for it would have been better able to pay its way, and so to avoid frequent appeals to the Commons.

Equally noticeable with the subject-matter of

the Great Contract was its form. The negotia¬

tion was carried on as if it were a treaty be¬

tween two foreign and totally unrelated powers.

The want of connection between the two parties to it could not have been more complete if the king had belonged to one country and the Par¬

liament to another. And between these two

parties, the executive and the legislative, the Crown and the Parliament, there was not even

a regular and recognized channel of communica¬

tion. Practically the only means of intercourse was a direct message or speech from the king

on the one hand or a petition from the Com¬

mons on the other. For the rest all was hap¬

hazard. Such members of the executive as sat

in the House acted individually each as he

thought fit, or as he was bidden, in promoting the king's business. On its side the court party or the executive had no more thought of creat¬

ing and working some_ piece of machinery by

which the king's business could be piloted

smoothly through the House than the House

had on its side of ever challenging a share in the executive. There was a gulf between the

two which neither side dreamed of permanently

bridging over. On neither side did the slightest conception exist of a Constitution in which the executive and the legislative should be linked

together.

It was the problem of the 17th century first

of all to perceive the necessity of such a link, and then to invent the mechanism. If this

statement is a correct diagnosis of the true

bearing of English 17th century history, then

the constitutional importance which has hitherto been attributed to that history will be found to be exaggerated. For the simple fact remains

that the clear perception of the need was only attained at the close of that century, and the mechanism itself was only gradually elaborated

in the 18th century.

Fortunately or unfortunately the Great Con¬

tract broke down, and from that moment com¬

menced that antagonism between Crown and

Parliament which was destined to produce the

Great Rebellion. The steps bv which that an¬

tagonism developed itself until it blazed out in open war need not be detailed here. They are

the commonplaces of history. The point to

notice is that the moment the antagonism

emerged the opposition of Parliament to execu¬

tive, or of nation to Crown became not so

much constitutional as political. What is the

distinction between these two terms? The dif¬

ference is fundamental, for whilst the one is a matter of principle and

abiding, the other is a thing of time and place, and may be transitory.

Had the nation said to James through Parlia¬

ment as its mouthpiece, <(You represent and

wish to perpetuate the Tudor type of govern¬

ment by prerogative; we have outgrown that

and claim for ourselves a share of the govern¬

ment,® such an attitude would have been con¬

stitutional. But nothing of the kind was either said or thought of. The opposition which de¬

veloped itself was conditioned in its form by

the mere force of circumstance. When, after

10 years of rule without a Parliament, James in 1621 summoned his third Parliament, there were

reasonable prospects of a complete agreement.

The House, glowing with Protestant fervor,

made not the slightest reference to the old

burning question of impositions. It sat down

at once to consider supply for the support of a war in defense of the Palatinate. For the

first fortnight of the session James could have done anything he pleased with the Commons.

Ten months later, in December 1621, after with his own hands tearing out of the journals the Protestation of the Commons, the king dis¬

solved the Parliament in anger and sent three

of its members to prison. How could so com¬

plete a change have happened? The answer is

simple. The Constitution provided no mech¬

anism by which James could explain to the

Parliament his foreign policy. He could not,

nor would he if he could, take the whole House into his confidence, and he never thought, any more than did the House itself, of such a de¬

vice as that of taking a select few of the leaders of the Commons into his counsels. Nothing is

more remarkable in this Parliament than the

scrupulous regard which the House paid to the

king's prerogative in the matter of foreign

affairs. It was for the king, and the king alone, to make treaties and to decide peace and war, nor could they press him to disclose his policy.

Had the Commons felt as certain of the

patriotic and Protestant trend of James' foreign policy as the Parliament of Elizabeth's days

had been of her foreign policy, not a word of criticism or contention would have been heard.

But they were not so certain, and as a conse¬

quence felt that they were being called upon

to vote supply for a policy which might even

be the very opposite of that which the nation yearned for. Then a side issue arose. In his

impatience at the slightest doubt being cast

upon his foreign policy James was led to assert his view of the prerogative in so dogmatic a

way as practically to deny free speech to the House. To this the House of Commons replied

by the Protestation, in which they claimed

practically nothing but the parliamentary privi¬

lege of freedom of speech, just as it had

claimed it in Elizabeth's day. This, and this

alone, was the cause of the breach.

Will anyone contend that there is anything

of constitutional principle in this? If the Par¬

liament had said ((We demand to know what

your foreign policy is, and that it is in accord¬

ance with our views before we vote supply,®

there would have been constitutional principle

involved. But over and over again the Com¬

mons disclaimed any such idea. If James was

antiquated in his devotion to the Tudor ideal of prerogative the Parliament was just as anti¬

quated as he in their devotion to it, for they distinctly admitted his view, and when they

joined issue with him it was on the minor point and on the lower plane of parliamentary privi¬

lege.

A remarkable change, however, though

transitory as it proved, came over the scene as James' reign came to a close. For some unex¬

plained reason his powers decayed whilst he was still young, though he died at the age of 59.

Whether it was due to this premature decay, or to his own intense chagrin at the failure of his long negotiation with Spain, we cannot say.

But certain it is that for the last two years of his reign he was a mere tool in the hands of-Buckingham. Had it not been for this senility

it is certain that the astounding constitutional departure which marked the career of his last

Parliament would never have been enacted.

James met that Parliament with the practical

confession that his foreign policy had been a

failure, and he invited their cooperation in the evolving of a policy to take its place. He in¬

formed the Houses that his secretaries would

tell them the whole story of the marriage treaty with Spain. After they had heard the story, he continued (<I shall entreat your good and sound advice .... I assure you you may freely

advise me, seeing of my princely fidelity you

are invited thereto.®

The marvelous thing about this sudden and

revolutionary surrender of prerogative by

James is that it sprang from the dictates of

Buckingham. But more extraordinary still was

the sequel. Following the dictates of the im¬

perious favorite as tamely as a sheep, James,

after receiving the advice of both Houses, in¬

formed them that if they made him a grant for a war they might appoint their own treasurers

to see to the spending of the money, and fur¬

ther <(I promise you on the word of a king that although war and peace be the peculiar pre¬

rogative of kings, yet as I have advised with you in the treaties on which war may ensue, so I will not treat nor accept of a peace without first acquainting you with it and having your

advice.® (8 March 1624).

Accordingly when 12 days later the Com¬

mons voted three subsidies and three-fifteenths, the money was ordered to be paid to treasurers appointed by Parliament and not into the Ex¬

chequer; and at the same time the Houses in

an address to the king plainly laid down the

object for which the money was voted.

In the whole course of 17th century history,

including the civil war and regicide, there is no m(jrf revolutionary incident than this complete, sudden, uninvited surrender of prerogative on

the part of James. Had it happened as the re¬

sult of deliberate thought, and whilst James was still in his prime, it would have shortened by more than a century the birth throes of modern constitutionalism, and have saved the Stuarts

from exile.

But it did not so happen. It was a moment¬

ary inspiration of Buckingham's, the genesis

of which is to be explained by the favorite's own personal position and policy at the time,

and it was by him forced upon the feeble king with an impetuosity that swept everything be¬

fore it. But as with all Buckingham's inspira¬

tions, it was no more than a flash and almost as soon over. After the old king's death the

versatile but unstable minister made one or two disingenuous efforts to revert to such relations with the Commons. Through the mouth of his

creature, Sir John Coke, he submitted to Par¬

liament in July 1625 a rough statement of the expenditure of the subsidies granted in 1624 and again in the following month of August 1625,

when the Parliament was sitting at Oxford, be¬

cause of the plague, the lord treasurer made

a similar statement. But further than this the concession was not carried. From the position

which James had adopted in 1624 Charles grad¬

ually receded, not so much from deliberate de¬

sign as from the mere force of circumstance

and from a growing perception of the revolu¬

tionary consequences which that position en¬

tailed. The desire on the part of the Commons to inquire into the expenditure of the subsidies led them to utter their opinions on the merits of Charles' foreign policy, and in particular to call into question the advice given to the king by the Council of War as to that expenditure.

The moment this was clear to Charles any fur¬

ther surrender of prerogatives was impossible.

Backed by the king the members of the Council of War refused to reply to the interrogatories of the Commons. Their resistance proved suc¬

cessful. Before the determined attitude which

Charles thus took up the House quickly receded and dropped any further attempt at pressing

the interrogatories. (March 1626).

With this incident practically ended the

whole two years' episode of attempting to take the Parliament into partnership with the

executive by means of a voluntary and unde¬

fined surrender of prerogative. Had the king

allowed the members of the Council of War to

answer the interrogatories of the House the

principle of ministerial responsibility (that is, the responsibility of the executive to the Par¬

liament, and not to the king alone) would have stood forth in abrupt nakedness. When Charles

resisted that demand the emergence of such a

principle was postponed for a century. For be

it borne in mind, the impeachment of Bucking¬

ham, and the later proceedings against Straf¬

ford, Clarendon and Danby never advanced the

enunciation of that principle a jot. The mere

punishment of a minister great or small does

not imply ministerial responsibility in our sense of the phrase. All through the 17th century

the ministers were the king's servants and were responsible to him, their master, alone. After

the exile of Clarendon the Commons did not

demand to be consulted as to the choice of his successor, or as to the policy of his successor.

 Charles had simply sacrificed one of his serv¬

ants. That was all. Then he engaged another

servant to do exactly the same things and went on as gay and as unconcerned as before.

But had the episode of 1624—26 ended differ¬

ently the acceptance of the principle of the re¬

sponsibility of ministers to Parliament as well as to Crown would have led inevitably to the

forging of some such link between the execu¬

tive and the legislative as only came generations later. From the moment such a link had been

forged questions of adequate supply for the

services and of a proper audit, and again ques¬

tions of the personal liberty of the subject, of habeas corpus, and what not, would have solved themselves harmoniously. For the participation

of the Parliament in the executive would have

insensibly tinged the spirit of the whole admin¬

istration of the country. As compared with the evolution of such a principle the petition of

right, habeas corpus, nay, even the revolution

itself, are minor incidents.

The remainder of the reign of Charles I,

when he ruled without a Parliament, the out¬

break of the Civil War, and the consequent

military despotism of Cromwell are devoid of

constitutional significance. The rule of Oliver

Cromwell was a despotism as pure as that of

the Tudors, the only difference being that the prerogative of the Crown, which had formed the ultimate sanction of the executive government

of James I and Charles I was replaced by the naked power of the sword. The quarrels be¬

tween Oliver and his Parliaments were in sub¬

stance and essence the same which had been

fought between Charles and his Parliaments.

They one and all turned upon the question as to whether and how far the Parliament, the legis¬

lative ; should thrust itself into the domain of the executive, notably, of course, but not solely, in the matter of the command of the forces. To any such demand Oliver's reply was a much

more peremptory, indignant, instanteous non

possumus than ever James or Charles could

have uttered. And when the sword fell from

his dying grasp and the succeeding anarchy

swept away the chances alike of his dynasty

and of pure republicanism, the Great Rebellion

had become a mere tale that is told. When

Charles II returned at the Restoration in 1660

the Stuart dynasty reassumed the inheritance

of an undiminished prerogative, one that is in no whit distinguishable from the prerogative

wielded by Elizabeth, James I, or Charles I.

He was granted a revenue for life which might, had it been fully realized and carefully hus¬

banded, have made him independent of the Par¬

liament. He was left in uncontrolled possession of the executive. His ministers were his own,

nominated by him and responsible alone to him.

His revenue was his own, to spend as he pleased, without the slightest restriction in the way of appropriation. His foreign policy was his own,

he could make war or peace or treaty unques¬

tioned, and as he chose. Had it not been for the outbreak of the Dutch War it is probable

that his reign would have witnessed no parlia¬

mentary incursion upon his prerogative. As it

was, when under the strain of the shame

caused by the first Dutch War the Parliament

did actually make an incursion into the domain of the executive, the novel departure took ex¬

actly the same form which it had taken in 1624

under James I. No more speaking comment

than this could be passed upon the fruitlessness and futility of the intervening period of civil war, regicide and revolution.

The full story of the episode in question is

too long to be given here. It has been treated fully in the introduction of the second volume of the (Calendar of Treasury Books. > In brief, what happened was this : With the full con¬

sent of the executive (Charles himself) the

Parliament in voting supply for the Dutch

War appropriated that supply specifically to

that war. The necessary corollary was that a

few months afterward the Commons were

driven to demand an account of the expenditure of that supply. Had the war been successful

there would have been no boggling over

such an account. But the war had not been

successful. It had brought with it disaster and humiliation, and men's minds were correspond¬

ingly inflamed. But even so, the action of the Commons was astonishingly mild. Although

the inquiry might have led the Commons to

cover the whole field of administration and to question the whole conduct of the executive

during the war, the Parliament practically in

the end restricted its attention to the question of the auditing of the accounts. Charles at

first resisted the proposal as a breach on his prerogatives ; but in the finish, with his usual subtle adroitness, he gave way.

The immediate outcome of the inquiry was

in great measure the exoneration of the execu¬

tive from the suspicion of financial dishonesty.

But the immediate result is insignificant by the side of the ultimate results. On the one hand it furnished a now unchallengeable precedent

for appropriation of supply and for audit of ac¬

counts ; and once the right of auditing accounts should be fully conceded, the further right of questioning the conduct and policy of the ex¬

ecutive was bound to follow. Once that conse¬

quence was fullv established the gulf which

sundered the (king's) executive from the

(people's) Parliament was narrowing and a

bridge was being built over it. The Parliament was coming to identify its interests with those of the executive instead of maintaining an atti¬

tude of permanent aloofness or even hostility.

Of the two parties to this conversion the Par¬

liament itself was slower of comprehension and

more unwilling of movement than the Crown.

For to identity itself with the administration

was to forfeit all the vantage ground of com¬

plaint and agitation on which it had stood in the past. Accordinglv the change did not actually

accomplish itself in Charles II's time. For the rest of his reign the parliamentary opposition

was swayed by motives which were merely and

purely factious. But as the century drew to a close the gulf was in great measure bridged

over, and in the course of the 18th century the new structure was perfected. The executive

ceased to be the personal property, appanage,

officialdom of the king. It became identified

with the parliamentary system through the de¬

vice of parliamentary departmental heads; and

the practice of annual estimates took the respon¬

sibility for the financial administration of the country from the shoulders of the king, and laid it upon the broader shoulders of the Parlia¬

ment. From that moment the development of

English constitutional and political life has been smooth and harmonious.

But these ultimate results lay unfolded in

the bosom of the future. To Charles II the

Commission of Accounts taught another and

quite different lesson. It taught him the art of parliamentary management, not merely how to

buy off the opposition, but also how to organize his own friends in the House. Danby's corrupt

leadership of the Parliament, and the various

devices employed to influence the constituencies on the one hand, and Sir William Temple's

scheme of a reorganization of the Privy Council on the other, are but manifestations of this

side of Charles' statecraft. Thanks to this

statecraft of parliamentary management, Charles

remained easily master of the situation for the rest of his reign, and when he died he left to his brother a prerogative as unimpaired as that which James I had wielded — complete control

of the executive at home, complete control of

the forces, complete control of the foreign

policy of the nation.

From the point of view which has been thus

expounded, what was the historical significance

of the Revolution of 1688? In a sentence it lies not so much in the direct challenging of pre¬

rogative as in the quiet, undefined, unobserved usurpation of it by the Parliament. In the first place the Parliament voted a standing revenue

of £1,200,000 for the support of the Crown in the time of peace. This

was exactly the sum

which the Restoration Parliament had granted

Charles II in 1660. But whereas in 1660 that

sum was meant to cover the complete national

expenditure, civil and military alike, the details and management of which were left absolutely

unchallenged in Charles' hands, the vote in

1689 was intended only for the civil establish¬

ment in time of peace. Immediately after this

vote the Parliament proceeded to consider the

question of separate supply for the army, navy and ordance, and in order thereto detailed esti¬

mates of the charge of the army and navy were laid before the House.

Herein lies the Great Revolution — not in

the clauses of the Bill of Rights. For the mo¬

ment the Parliament realized that the provision for and regulation of the army and navy was

its province it had assumed to itself half the domain of that kingly prerogative which had

endured through Tudor and Stuart times. It

had stepped over the gulf which had hitherto

divided the domain of the executive from that

of the legislative. Once this first step had been taken, there remained only the problem of

evolving the machinery by which the participa¬

tion of the Parliament in the executive should be expressed and

regulated. The course of the

evolution of that machinery — the selection by the Crown of its advisers and administrative de¬

partmental heads from the chiefs of the parties in the Parliament — was determined by the mere force of circumstance, that is, by the situation in which William III, and again, a generation

later, George I, each found himself as the im¬

ported ruler of a strange country. The gradual development of the party system of government

afforded the key to the solution of the problem of which the 17th century had been so long in labor. For when once the obvious step had

been taken of selecting the partv chiefs as the heads of the various executive departments, the development of the system of Cabinet govern¬

ment was bound to follow sooner or later. But even so, generations had still to elapse before this new parliamentary executive fully grasped

the control of that last and most highly prized flower of the kingly prerogative, the direction of the foreign policy of the country.

So far as these results depended upon the

mere accidents of the Revolution of 1688 and

of the Hanoverian Succession they may be re¬

garded as, in a sense, fortuitous. If it is true that England has blundered into an empire,

much more true is it that she has blundered

into a Constitution.

If the ordinarily accepted view of the con¬ stitutional importance of our 17th century his¬ tory is wide of the mark and distorted, much more truly may this be said of the ordinary view as to the religious history of that period.

The chief outstanding features of that re¬ ligious history are, firstly, the absolutely un¬ reasoning fear of a Catholic reaction, and, secondly, the temporary exaltation of Puri¬ tanism.

These two are by no means synonymous. For whereas the jealous fear of Catholicism was national, pervading the country blindly from end to end, the triumphant emergence of Puri¬ tanism was local, partial, temporary. But if the two are not synonymous they have been alike in their fate. With the inscrutable irony of her passionless lips the Muse of History has consigned them both to the region of human futilities. The further we are drifted from the 17th century by the stream of time the more difficult does it become to us to realize the standpoint of that century on the question of the Catholic reaction. We can see now that whatever form that attempted reaction took,

whether it be of the theological discussions

which waged in the presence of James I as

the divines flocked round his chair, or of

Laud's unattainable conception of an unifying

Catholicity, or again of Charles IPs cynical but more statesmanlike conception of Indulgence,

or finally of James II's grossly bigoted intrigue, in one and all of these or any other forms the movement was doomed to failure before its

birth. The panic, the absolutely unreasoning

fear, the blinded and relentless fury which

seized the nation again and again throughout

the period and which not only accounted largely for the rebellion of 1642 and the revolution of 1688, but also left their malignant trail on two centuries of our later history, fill us to-day with only a sense of disdainful surprise.

As for Puritanism, the second religious phe¬

nomenon of the century, the judgment of our

own day has been more sympathetic, partly be¬

cause it has been the fashion since Carlyle's day to speak of it in terms of respect, and partly because the movement has not yet lost its force in English and American life. But be it borne in mind, in the 17th century Puritanism in its day of power did not show itself a constructive force either in the domain of dogma or in the domain of ecclesiasticism. The dogmatic wran¬

gles of the Westminster Assembly — the discus¬

sions as to the method of the imputation of

Christ's righteousness and what not else — are utterly meaningless to us. And when Puritan¬

ism was called upon to solve the problem of the erection of a national church it completely

failed. In the mere interests of human toler¬

ance Cromwell, himself a Puritan of the Puri¬

tans, was forced to take the problem out of the hands of his coreligionists and thereby to dash to the ground their half-finished and futile

 structure. And will anyone contend that either

in its persecuted birth or in its day of exalta¬

tion, when for a brief span it wielded the

wooden sword, or again in its day of adversity when at the Restoration 2,000 of its ministers left the national church to wander in the by¬

ways of Separatist Dissent, that in any one

of these its forms Puritanism was ever a mis¬

sionary movement or a missionary church in

the sense in which 18th century Methodism

was a missionary movement? Such contention

could not be maintained. The basis of Puri¬

tanism was dogmatic and clerical throughout;

the fervor of humanity never breathed into it

a spark of missionary fire. Its zeal was spent in the dogmatic defense of forms of church

government, in the safeguarding of the church

membership of each little community. To the

nobler issues of life, to the higher conception of toleration, of humanity, or national religion it was, and throughout the succeeding century

it remained, cold and dead.

Bibliography. — The original authorities for

17th century English history consist of :

1. Parliamentary records: the (Lords Jour¬

nal5 and (Commons Journals5 which are in

print ; and much material still in manuscript at the House of Lords, but which is being gradu¬

ally printed by the Historical Manuscripts Com¬

mission. The only full edition of the Acts of Parliament is the (Statutes of the Realm,5 but this collection does not contain the Common¬

wealth Acts and Ordinances. These latter can

only be obtained from the collections of Hus¬

band and Scobell, and from the separately

printed ordinances.

2. The archives in the Public Record Office :

comprising mainly (a) Domestic State Papers

calendared up to 1675 and from 1689-93. (b)

Foreign State Papers, not calendared at all

for the 17th century, (c) Colonial papers, only partially calendared, (d) Certain departmental

archives, and Commonwealth Committee ar¬

chives, only partially calendared as yet. Of

the departmental archives the Treasury Records

are the only ones at present being calendared ; similarly the printing of the (Register of the Privy Council5 has not yet reached the 17th

century.

3. Archives not preserved at the Public

Record Office, viz.: (a) Collections of manu¬

scripts and individual manuscripts at the British Museum, at the Bodleian (including the Clar¬

endon manuscripts, Carte manuscripts, and Tan¬

ner manuscripts), and at Lambeth (including

the Commonwealth Church Manuscripts). So

far as these sources have been worked at all it has only been by individual effort or by socie¬

ties such as the Camden. Of the manuscripts

printed by the Camden Society, the (Clarke Pa¬

pers,5 (Nicholas Papers,5 and (Lauderdale Pa¬

pers5 may be particularly instanced, (b) The

archives in the possession of private families

are being systematically printed by the Histor¬

ical Manuscripts Commission. So many of the

reports bear on the 17th century that it is almost impossible to particularize, but the (Buccleuch

manuscripts,5 (Portland manuscripts,5 (Or¬

monde manuscripts,5 (Cowper manuscripts,5

(Rutland manuscripts,5 (Fleming manuscripts,5

(Stuart manuscripts5 and (Kenyon manuscripts5

may be specially instanced.

4. Printed collections of state papers, *viz.* :

Winwood, Sydney, Roe, Wentworth, Rush-

worth, Nalson, Thurloe, Milton, Clarendon,

Orrery, Macpherson, Hardwicke, Rochester,

Carstairs, Kemble and Stuart Papers.

5. Diaries, memoirs, etc., other than those

published by the Camden Society and other so¬

cieties, *viz.* : Whitlock, Burton, Ludlow, Holies, Fairfax, Hutchinson, Price, Herbert, Reresby,

Warwick, Berkley, Evelyn, Pepys, Anchitell,

Grey, Luttrell, Ellis Letters.

6. Constructive synoptic works : Rapin

and Tindal, Baker, Clarendon's (History5 and

(Life,5 Carte's (Ormond,5 Kennett's (Register5

and (History,5 Burnet's (Own Time,5 Andrew

Marvell's works, Sir William Temple's works,

Boyer, Ralph and Dalrymple.

7. Of tract literature the mass is so great

that the portions which have been printed in the (Cabala, 5 (Harleian Miscellany,5 (Somers'

Tracts,5 (State Tracts of Charles II,5 and

(State Tracts of William III,5 are an incon¬

siderable fragment of the whole.

8. Of modern constructive historical work

the only English one worthy of the name is S.

R. Gardiner's great work covering the years

1603-54. Carlyle's (Cromwell 5 is a construct¬

ive work of distorted view ; Macaulay's history for the latter part of the century represents a type of historical writing which is deservedly

falling into disrepute among professional histo¬

rians. Ranke's (History of England,5 and Doc¬

tor Ono Klopp's work on the fall of the House of Stuart are scientific and exhaustive. For

Church History, Shaw's (History of the Com¬

monwealth Church5 is a specialized work cover¬

ing only the years 1640-60. The various de¬

nominations of the Dissenting Churches, as also the Quakers have an abundant historical litera¬

ture of their own, but, generally speaking,

neither the religious history of the century as a whole, nor the intensely important and inter¬

esting economic historv of the century have as yet received adequate specialized attention,

though Doctor Cunningham has covered many

aspects and much of the ground of the latter

section in his (Growth of English Industry and Commerce.5

William A. Shaw,

Author of (History of the English Church

Under Civil Wars and Commonwealthˆ ;

iThe Knights of England'* ; *etc.*

6. HISTORY OF THE 18TH CEN¬

TURY. Historical Sketch. — The 17th century

had settled two very important questions. It

had been finally decided in 1689 that the gov¬

ernment was to be carried on in accordance

with the will of the House of Commons and

that there should be freedom for both religious and political opinion outside Parliament. The

questions of taxation without consent of Par¬

liament and of the state control of religion,

which had convulsed the 17th century, were no

longer all-absorbing, and the 18th century found an outlet for its energies in new directions. It is therefore the century of great economic ad¬

vance, of commercial wars, of the expansion of trade, of the growth of colonies, culminating

toward the end in the transformation of the

whole rural and industrial life of the country.

The leading features of the period from

1702 to 1815 are those connected with the rule of the great Whig aristocracy in Parliament,

the expansion of England abroad in spite of the opposition of France,

the consolidation of the

Britannic state at home and the change of the whole character of the country by the coming

of machinery. See Industrial Revolution

(article 32).

The great constitutional fact of the 18th

century is that the era of the responsibility of the monarch for the welfare of the nation had passed away for ever. William III had been

called to the throne by Parliament and it was on Parliament that he depended for his sup¬

port. In 1702 the Crown was vested by an Act of Parliament in the Electress Sophia of Hano¬

ver and her Protestant descendants, and the

first two Georges happened to be men who were thoroughly German and so left English affairs

to the English Parliament. Hence the predomi¬

nance of the House of Commons became firmly

established. It was found convenient that a

group of ministers should form a committee to

carry on the affairs of the nation. Gradually

it became the rule for them to be chosen from the party which had the majority in the House of Commons and to vote under the leadership

of one man. The delegation of monarchy to

the Prime Minister and the Cabinet was ac¬

complished by the end of the 18th century. See Crown and Cabinet (article 13).

The Revolution of 1689 had split the country

into two great parties — the Whigs and the

Tories. The Whigs, who were the active com¬

mercial party, were in favor of a Protestant

succession and toleration in matters of religion.

As they believed in a parliamentary king as

opposed to a king by Divine Right they were

bound to reduce the power of the monarchy

but to support the existing line which they

themselves had chosen. The Tories had to

choose in 1689 between their religion and their king. If they supported the king they would

destroy the Established Church and set up the

Roman Catholic Church. Hence they decided

against the king and joined the Whigs to get

rid of the Stuarts. Then they repented, es¬

pecially when they found that the Whigs ob¬

tained all the emoluments of office and to re¬

store themselves to power they looked to France and the descendants of James II who had

French support. Meanwhile they were quite

willing to join the Whigs in depriving the

Hanoverians of as much power as possible and

so we see both parties disposed to lessen the power of the Crown. It was not until the

reign of George III that the Tories became

reconciled to and supported the king de facto.

The Whigs were the great war party because

they were anti-French; the Tories were the

peace party since in France lay their hopes of getting back their own king.

In the reigns of William III and Anne the

monarch was still able to hold the balance be¬

tween the two parties. Under the first two

Georges the Crown could only exercise its

power by means of great ministers, notably

Sir Robert Walpole. George III determined to

throw off the yoke of Parliament and was suc¬

cessful in bringing in the Tories tinder Lord

North in 1770, but even so popular and deter¬

mined a king as George III found it impossible to carry on the government except through

Pitt. The power of the Crown was still fur¬

ther weakened during the period of mental in¬

capacity of the monarch and by the incompe¬

tence of his immediate successors.

During the 18th century it was gradually

found advisable in the interests of the despatch of business that the king should choose his

ministers from that party which had a majority in the House of Commons. In 1696 a party

ministry had been formed, but the lesson was

only slowly learned that the Ministry must

depend on the state of parties in the Lower

House. In the time of William and Anne com¬

posite ministries were the rule. Under George

I and George II there was a constant Whig

majority in the Commons and a Whig Ministry

in power. In 1784, however, George III was

successful in keeping Pitt in power notwith¬

standing an adverse majority in the Lower

House. But the king only anticipated the de¬

cision of the country, for at the next election a House was returned wh ch supported Pitt,

and from that time the Prime Minister and the Cabinet have always been chosen from the pre¬

dominant party.

Thus monarchy, as it ((withered on the

throne took root in the cabinet.® The parlia¬

mentary government of the 18th century was

however by no means government by the people.

It was government by the great aristocratic

families, tempered by deference to public

opinion. It was not till the electoral reforms of the 19th century that the democracy became

predominant. The great era of English expan¬

sion and the command of sea power were at¬

tained under an aristocracy and not under a

democracy.

The question of English colonial expansion

during this period centres round the long

struggle with the French. The most profitable

line of trade in the world was considered to be that of the Spanish colonies and the adjacent

islands, and with these England drove a con¬

siderable contraband traffic. On the other side of the world there were the riches of the East and the wealth of the Spice Islands. It seemed probable in 1701 that France, the great com¬

mercial rival of England, would inherit the

throne of Spain, drive out the English from

the Spanish Main and dominate that trade.

Hence England's intervention in the War of

the Spanish Succession. By a series of brilliant battles won by the Duke of Marlborough be¬

tween 1704 and 1709 she attained her object,

for by the Treaty of Utrecht (1713) England

gained Gibraltar, Port Mahon, Nova Scotia,

and Newfoundland; while the rights of the

Hudson's Bay Company in their vast territory

were definitely recognized. England had se¬

cured a base from which to operate against the French, and at the same time by the Assiento

Contract (see Great Britain — Eighteenth

Century Commerce) she won a share in the

monopoly of Spain in America and prevented

it being closed to her by France. The war

left Holland and France financially exhausted.

The Dutch trade began to fall behind. France

was heaping up financial burdens which were

to lead to national bankruptcy. England alone

was in a position adequately to maintain a

navy and the command of the sea. She thus

became the foremost sea power and secured

her trade supremacy in one of the most im¬

portant quarters of the globe. An attempt to

interfere with it led to the war with Spain

in 1739, which merged into the war of the Aus¬

trian Succession ending in 1748.

GREAT BRITAIN — HISTORY OF THE 18TH CENTURY (6) In another

direction, however, that trade

supremacy was being threatened. In India a

French and an English East India Company

each had trading factories or settlements, the

English posts being Bombay, Madras and Cal¬

cutta. They were not subject to the English

government, but were under the company, and

England had no governmental responsibility

whatever in the matter.

In India there prevailed, about the middle

of the 18th century, a wild anarchy due to the break-up of the Mogul Empire in 1707, and

military adventurers were beginning to make

themselves supreme in various parts. The

French governor of Pondicherry, Dupleix,

a man of great military genius, began to

perceive that it was quite possible for Euro¬

peans to gain predominance in the general

scramble; and by supporting various native

rulers and organizing native troops on the

European model he soon made .himself one of

the chief powers in India. If the English were not to be ousted altogether they too had to

organize. Clive copied the French policy so

successfully that English influence became pre¬

dominant, and the future of India fell into the hands of the English. The French settlements

were restored, but they were no longer military establishments, and France was reduced to rela¬

tive unimportance. In 1784 the English gov¬

ernment became responsible for the adminis¬

tration of India, while the East India company continued to have a monopoly of the trade.

The dominance of England on the Spanish

Main and in India was followed by the ousting of the French in North America. The French

had established themselves at the mouth of the Mississippi, and claimed all the country lying

between the Saint Lawrence and the Mississippi

west of the Allegheny mountains. The Seven

Years' War in Euorpe gave England a chance

to fight the matter out, and at the Peace of Paris in 1763 England gained Canada, all the

land west of the Mississippi, four West Indian islands, and a promise not to fortify the French settlements in India ; and from Spain she ob¬

tained Florida.

Thus by 1763 England was mistress of the

whole American continent, and the dominant

European power in India, while the trade and

commerce of the East and West were in her

supreme control.

England then felt that as she had done so much to protect the young colonies from being swallowed up by the French they ought to pay part of the cost of their own defence in future. She accordingly proceeded to increase the tax on colonial imports, and to prevent evasion in¬ stituted a stricter enforcement of the Naviga¬ tion Acts. She also imposed a stamp tax. The colonists, who were no longer afraid of the French, wished to be free to work out their own destiny in their o\yn way. Hence the re¬ volt of the Americans in 1776, ending in the recognition of their independence in 1783. France and Spain had joined in against Eng¬ land, and, although the result was the loss of the American colonies, England was given a welcome opportunity of sweeping French com¬ merce off the seas, and of finally destroying the Dutch shipping. England emerged in 1783 more decidedly than ever the great trading power of the world.

The loss of the 13 American colonies raised

the question of the disposal of convicts, since they could no longer be sent to the United

States. Hence the Government turned its at¬

tention to Australia which had been explored

by Captain Cook between 1768 and 1770. The

island had been the resort of a few traders, but much preliminary work needed doing before it

could become attractive to settlers, and the

result was that convicts were despatched in

1788 to Botany Bay to do the preliminar> work of road-making. Then, as the wool famine in

England became more and more acute, the

destiny of the colony shaped itself along the

line of sheep-farming.

After the Revolutionary and Napoleonic

wars England made a further addition to her

possessions, gaining the Cape, from which she

has been able to build up a South African

empire. Ceylon, British Guiana, Trinidad,

Heligoland and Mauritius, were -minor acqui¬

sitions made in 1815 ; and the foundations of

her Far Eastern Empire were laid in the ces¬

sion of Penang in 1786, which gave England

a footing in the Straits Settlements.

The United Kingdom emerged from the

Napoleonic wars with a huge national debt, but with an enormously increased trade; with 50

years start of Europe in manufacturing, and

with the unrivalled possession of the sea-power which had been her definite goal from the time of Elizabeth onwards.

This great expansion could not have been

accomplished if England had not been blessed

with internal peace. Had Scotland declined in

1702 to accept a German line of kings and

decided to pursue, as a large faction wished,

her own independent way with her own king,

England would have been in constant danger

of invasion from the north on behalf of the

Stuarts, or of intervention from an unfriendly

kingdom. The Scots having been shut out of

the best trading parts of the world, tried to establish themselves on the Isthmus of Darien,

but met with disastrous failure, a failure which they laid at the door of England. In England

this undertaking aroused a great fear of ulti¬

mate Scottish success in this particular line of commerce. It seemed better to absorb the

Scots than have them as rivals. England was

also anxious to secure the assent of the Scottish to the House of Brunswick as the ruler of the two kingdoms and she accordingly offered

them a share in the whole of the English trade if they would acquiesce to a union. The Scottish who were most anxious to get a part of the

English trade monopoly, assented. The union

of the two kingdoms was thus accomplished,

the Scottish sending members to the English

Parliament and giving up their own, but

preserving freedom in matters of religion.

Scotland thus merged her individuality in that

of England and accepted English trade privi¬

leges as a setoff against a German king.

Ireland was less fortunate. There was not

the same necessity for conciliating her. The

Irish Parliament was dependent on England,

and when the Irish tried to set up their own king — James II — they suffered crushing de¬

feat at the battle of the Boyne. The English

were not afraid of Ireland as they were afraid of Scotland. Ireland was a conquered country

and as such must take the conditions imposed.

She was, moreover, Roman Catholic, and Eng¬

land could not absorb her in the same way as she had Scotland. Hence Ireland was deliber¬

ately prevented from becoming prosperous by

a series of laws which shut her out of the

colonial trade and destroyed her woollen manu¬

factures and cattle trade. At the same time a series of penal laws against the Roman Cath<

olics were instituted which gave the power into the hands of the Protestant minority.

Both trade disabilities and religious oppres¬

sion were successful in preventing Ireland from being a danger to England till the revolt of the American colonies gave Ireland the opportunity

of claiming an independent Parliament, which

demand was conceded in 1782. It became a

question then of settling the trade relations be¬

tween the two kingdoms and of the Irish con¬

tribution toward Imperial defence. No satis¬

factory solution had been reached when civil

war broke out between the Irish Protestants

and Roman Catholics. England felt that the

Protestant interests in Ireland needed protec¬

tion. Moreover the Irish finances became very

involved, and it seemed as if Ireland was on

the verge of national bankruptcy. The Eng¬

lish manufacturers wished to secure the Irish

market whereas the Irish Parliament showed a

disposition to impose protective duties even as against England. It seemed best to the states¬

men of the time to solve all these various prob¬

lems by a complete union of the two countries.

Scotland had come into the English system

when the era of Whig protection was beginning, and she prospered exceedingly. It was hoped

that Ireland would do the same. But Ireland

came in just when England was engaged in a

life and death struggle with France. She felt

all the effects of the dislocation of trade and of the great financial strain. Later on her nascent industries were exposed to the overwhelming

competition of the English machine-made pro¬

ducts, and her provision and corn trade were

vitally and injuriously affected by the English freetrade reforms, while she had no compen¬

sation as England had in her manufacturing

prosperity.

Vast indeed are the changes recorded in the

history of the 18th century. At the beginning

of that century Scotland, jealous, sullen and

separate, was a constant menace to the expan¬

sion of England ; at the end she had become

united with her southern neighbor in a political union cemented by identical trade interests.

Ireland also had been united in a common

Parliament, but cannot be said to have been

absorbed in the same way. William III, like

his predecessor on the English throne, acted

as his own prime minister. Long before the

death of George III the monarch had given

place to one of his powerful ministers as the real head of the executive government. In the

early years of the century party ties sat lightly upon ministers ; at the end of it a cabinet which was not homogeneous would have been an

anomaly. At the beginning of the century

France seemed destined to inherit the riches of the Spanish Main and the East Indies. The

end of the century saw French commerce swept

from the seas in East and West and India

under Britsh rule. England's colonial empire

of the first part of the 18th century was Eng¬

lish speaking and not extensive. By the end

of the century her principal English speaking

possessions had cut themselves adrift; but had

been replaced by a scattered empire of many

races; and the foundations had been laid of

that wide empire, the superstructure of which

is not even yet complete.

Bibliography.— Lecky, ‘History of England

in the Eighteenth Century) ; Stanhope, ‘A His¬

tory of England Comprising the Reign of

Queen Anne until the Peace of Utrecht* ; Coxe, ‘Memoirs of Sir R. Walpole) ; Stanhope, ‘His¬

tory of England from the Peace of Utrecht* ;

Massey, ‘History of England during the Reign

of George IIP ; Lecky, ‘A History of Ireland

in the Eighteenth Century) ; Burton, ‘History

of Scotland) ; Seeley, ‘The Expansion of Eng¬

land* ; and his ‘The Growth of British Policy> ; Lucas, ‘The Historical Geography of the Brit¬

ish Colonies) ; Mill, ‘History of British India) ; Hallam, ‘Constitutional History of England

from the Accession of Henry VII to the Death

of George IP ; May, ‘Constitutional History

of England* ; Lewis, ‘Administration of Great

Britain* ; Koch and Schoell, ‘Histoire abregee

des Traites de Paix.* For the lives of minis¬

ters, etc., consult the ‘Dictionary of National.

Biography* (ed. S. Lee). For the original au¬

thorities of the period consult Gardiner and

Mullinger, ‘An Introduction to the Study of

English History.* Consult bibliographies under

the special articles.

Lilian Knowles,

Reader in Economic History, University of London; Lecturer in Modern Economic His¬ tory at the London School of Economics and Political Science.

7. THE FRENCH WARS OF THE

18TH CENTURY. Hostility to France is one

of the chief characteristics of British policy

in the 18th century. It may be ascribed to

various motives, religious, dynastic, commer¬

cial, and to the purely political motive of main¬

taining the balance of power. At the beginning of the century the first and last of these

motives were uppermost. The first collision

between the two powers arose out of the efforts of Louis XIV of France to gain complete con¬

trol of the Spanish dominions, then compris¬

ing Southern Italy, Milan and the greater

part of the Flemish Netherlands, as well as a large portion of the New World. It is worth

noting that the French threat to the Nether¬

lands touched British policy in a vital spot.

From the time of Richard I and Edward III,

down to those of William III, Wellington and

even to the war of 1914, British rulers have

very rarely hesitated to defend the Netherlands against a great power which sought to annex

them and make them a base of action against

the British Isles. Louis XIV, however, would

hear of no compromise such as was suggested

by William III of England, the Dutch Republic, and the House of Hapsburg, but, in the lack of a direct descendant of the Spanish Bourbons,

claimed the crown of Spain for his grandson

(subsequently Philip V of Spain), a great-grandson of Philip IV of Spain. He did more.

He captured the Dutch troops who shared in

the defence of the “barrier fortresses** of the Netherlands; and in 1701, on the death of

James II, formerly king of England, but now

an exile in France, he promptly recognized his son as king of England. The affront rekindled

 in England the dormant zeal for the Protestant succession; the House of Commons had to

cease from its factious opposition to (<Dutch

William® ; and the king prepared vigorously

to curb the designs of Louis XIV for a uni¬

versal monarchy. He sent Marlborough with

10,000 troops to protect the Dutch Netherlands, and even the death of William, and the acces¬

sion of Queene Anne, who leaned to the Tory

or peace party, could not avert war. William’s last diplomatic work, the grand alliance (1701), with Austria and the Dutch Republic held good, and the elector of Brandenburg-Prussia joined

the league on the understanding that he should receive the royal title

in Prussia, as Frederick I.

The world was soon startled by the display

of genius such as had never been seen in the campaigns of William III. Clogged, as he was,

by the dilatory procedure of the Dutch, Marl¬

borough effected little of note in the years

1702-03; but in 1704, when the Hapsburg forces were sore beset in South Germany by the

Franco-Bavarian army, he resolved to march up

the Rhine valley to the help of the Imperialists in Swabia. Skilfully misleading the French as

to his intentions, he surprised the hostile forces near Donauworth on the Upper Danube and

clinched this success by a brilliant triumph at Blenheim, 13 Aug. 1704. A daring attack de¬

livered across marshy ground against the

French centre cut their array in twain, and

drove thousands of fugitives into the Danube.

Of an army 60,000 strong in the morning only

some 20,000 survived uncaptured at night.

Marlborough was able to effect little in the year 1705, when the interest centred on the brilliant though unsubstantial triumphs won by Lord

Peterborough in Spain. In the campaign of

1706, Marlborough struck a decisive blow at the French army under Villeroi near' Ramillies (23

May) ; the capture of Brussels, Ghent and Ant¬

werp resulted from this victory, which also had the effect of lessening the pressure on the Im¬

perialist leader, Prince Eugene, in Northern

Italy. In 1707 the tide seemed to turn in favor of the French and Spaniards; the latter on 25

April gained a complete victory at Almanza, re¬

gained most of the eastern and northeastern

provinces of Spain for the Bourbon cause. In

July 1708, however, Mlarlborough utterly over¬

threw the French at Oudenard on the river

Scheldt, and followed up his success by bring¬

ing the great fortress of Lille to surrender

(December). These events laid the Spanish

Netherlands at the feet of the allies and opened up a way into France.

Nevertheless, Louis XIV rejected their

terms, and, making an appeal to his people, con¬

tinued the war with fresh vigor, which was

seen in his troops during the stubborn and

murderous conflict at Malplaquet, 11 Sept. 1709.

The skill of Marlborough and Eugene gained

the day, but it was a barren triumph. The war dragged on for three years more ; but the grow¬

ing desire for peace in England, and the

partisan intrigues which resulted in the recall and disgrace of

Marlborough, brought it to a

conclusion in the Peace of Utrecht, 13 March

1713. Great Britain secured Gibraltar and

Minorca, Nova Scotia, parts of Newfoundland,

districts around Hudson's Bay and the French

part of Saint Christopher's. Spain, by what

was called the Assiento Treaty, granted to her the sole right of importing slaves into the

Spanish colonies of America. The Dutch re¬

tained their hold on most of the (<barrier for¬

tresses® of the Netherlands, and that territory along with Naples and the Milanese, went to

the Hapsburg emperor, Charles VI. The tradi¬

tional friendship of Great Britain and Austria

warranted the hope that the Belgic Netherlands

would, in Austria's hands, be safe from French aggression ; and this was soon assured by Bar¬

rier Treaties. Philip V retained Spain and

the Indies, Great Britain rather shabbily de¬

serting the Catalans whom she had instigated

to rise against the Bourbon ruler. The treaty

was not one to be proud of ; but it restored the balance of power and rendered impossible any

further attack by Louis XIV on Great Britain

and Holland. The phantom of an almost uni¬

versal monarchy ceased to trouble the world

until it reappeared a century later in the person of Napoleon. Further, this war of the Spanish

Succession so far exhausted France, Spain and

Holland, as to leave Great Britain mistress of the seas.

The accession of the House of Hanover in

1714 tended to embroil Great Britain in the

political struggles of Central Europe. As elect¬

ors of Hanover, the Georges were among the

chief dignitaries of that venerable but decay¬

ing fabric, the Holy Roman Empire, and in¬

volved England in the disputes caused by the

rivalry of the Houses of Hapsburg and Hohenzollern. The War of the Austrian Succession,

which opened in 1740 with the seizure of Silesia by Frederick the Great of Prussia, aroused the sympathy of Britons with the young ruler,

Maria Theresa of Austria; and when France

joined the ranks of her would-be despoilers,

Great Britain intervened in order to maintain

her power as a counterpoise to that of France.

George II, leading his troops in person, gained a victory over the French at Dettingen on the River Main, 27 June 1743; but two years later (11 May 1745) the British arms sustained a

serious reverse at Fontenoy, near Tournay,

where the genius of the Marechal de Saxe pre¬

vailed over the stubborn valor of the British

infantry. The Guards' Brigade retrieved the

honor of the Union Jack by a splendid advance, which, if supported

by cavalry, might have

turned the fortunes of the day. As it was the defeat at Fontenoy and the romantic campaign

of ((Bonnie Prince Charlie,® grandson of James

II, in Scotland, clogged British efforts on the continent with results disastrous to her allies.

At sea, however, and in the colonies, the Union Jack was nearly everywhere successful, the cap¬

ture of Louisburg (21 June 1745), leading to the reduction of Cape Breton Island and the open¬

ing of the Saint Lawrence to British attacks.

But at Laffeldt near Maestricht, Saxe heavily

defeated Cumberland's army of British, Aus¬

trians and Dutch (2 July 1747). In September

the French took the fortress of Bergen-op—

Zoom and seemed likely to overrun the Dutch

Netherlands. Their fleets, however, were badly

beaten by Warren and Hawke off Finisterre

and Belleisle (May — October 1747). Both

powers at length became weary of the war, and by the Peace of Aix-la-Chapelle (October

1748), agreed to restore their conquests — a

clause deeply resented by British seamen and

merchants, while the surrender of Cape Breton

Island to the French enraged the men of New

England. France guaranteed the Belgic Nether¬

lands to Austria, and agreed to dismantle the

fortifications of Dunkirk. The balance of

power was thus restored, both in European and

Colonial affairs.

In 1756 Austria's grievance against Prussia

concerning the Province of Silesia lit afresh the flames of war in Euorpe, Canada and India.

Already France and Great Britain were practi¬

cally at war in the valley of the Ohio and in the Carnatic, owing to the masterful policy there

pushed on by Montcalm and Dupleix. There¬

fore, when France, reversing her traditional

policy, allied herself with Austria for the parti¬

tion of Prussia, Frederick the Great naturally

became the ally of the Court of London (Janu¬

ary 1756). At first matters went ill with the two Protestant States; Frederick could not at

first make head against the coalition (joined

by Saxony and Russia) ; and Great Britain lost Minorca, largely through Admiral Byng, who

was executed. Matters did not mend until in

June 1757, George II recalled to office the one inspiring personality in English public life, Wil¬

liam Pitt. Acting on the principle summed up

in his famous phrase — ((I will win America in Germany® — he lavished subsidies on Frederick

the Great. Slowly but surely the tide turned;

Frederick's brilliant victory at Rossbach (5 Nov.

1757), over the French and their allies paralyzed the French government; and the results of

favoritism and incompetence became apparent.

The French navy was speedily worsted in sev¬

eral fights ; Louisburg surrendered to Boscawen

on 26 July 1758, and Prince Edward Island also fell to the Union Jack. Late in November

British and Colonial troops captured Fort

Duquesne on the Ohio and it was renamed Pitts¬

burg. In India success was chequered with

failure. By the victory of Plassey (23 June

1757), Clive had subdued Bengal; but after the arrival of French reinforcements, Count Lally,

the successor of Dupleix, captured Fort Saint

David and nearly took Madras. Gradually the

pressure of sea power told in favor of Great

Britain, and the long struggle for the posses¬

sion of the Carnatic was decided bv Eyre Coote's brilliant victory of Wandewash (22 Jan. 1760),

which led up to the capture of the French

stronghold, Pondicherry, a year later.

Meanwhile, though Frederick the Great was

very hard pressed, his western flank was

guarded by a mixed British-Hanoverian-German army ably commanded by the Duke of

Brunswick. Great Britain meanwhile harried

the coasts of France, completed her conquests

of French colonies as well as those of Spain, when she drew the sword for France. Thus

the British race reaped the full reward fore¬

seen by Pitt. That statesman had the gift of

choosing the right men ; and his sagacity dis¬

cerned in a young officer, Wolfe, the con¬

queror of Canada. The manner in which Wolfe

captured the Heights of Abraham (13 Sept.

1759) is too well known to need description.

Quebec and ultimately the whole of Canada

were the fruits of a victory, which itself re¬

sulted from the ability of the mistress of the seas to attack when, where, and in what force she chose.

After the accession of George III to the

throne, and of the Bute Ministry to power, the Anglo-Prussian alliance lapsed; but the war

with France continued. By the (third) Bour¬

bon Family Compact, Spain made common

cause with her neighbor; but the British navy

overbore all opposition at sea; and in February 1763, the Peace of Paris put an end to what had now become merely a maritime and colonial

war. France ceded Canada, Cape Breton Is¬

land, Prince Edward Island, together with

Grenada, Saint Vincent, Dominica and Tobago,

as well as Senegal in Africa. Spain ceded

Florida, but received from France as indemnity

the great district of Louisiana. Great Britain

restored to France several of her conquests in the East and West Indies, also to Spain parts of Cuba. Save that France handed back

Minorca to England, the changes in Europe very slightly affected the Island Power; but she em¬

erged, from what had been at first merely a

continental war, the greatest of the world

powers.

The completeness of her triumph brought its

Nemesis. The American War of Independence

furnished France with the longed-for opportu¬

nity for revenge. She declared war formally

against England in 1778 after her volunteers

had long been helping the colonists. Soon the

maritime policy of her rival leagued together

the northern powers in the League of the

Armed Neutrals. The war, however, having

been described in the article United States —

American Revolution, it is unnecessary to

comment on it here, or to advert to the influ¬

ence which sea power exerted on the decisive

event, the surrender of Cornwallis at Yorktown

(19 Oct. 1781). By the Treaty of Versailles

(3 Sept. 1783), France recovered Senegal, sev¬

eral West India islands, acquired extended

fishery rights on ((the French Shore® of New¬

foundland, and gained Tobago. Of all the wars

between England and France that of 1778-83

was most completely colonial in character and

in its results. Never before had France dealt

her rival so serious a blow ; but it recoiled on herself ; for the ideas of liberty and civic

equality which her soldiers learned in the land of Washington were now carried back to the

mother country with results fatal to the Bour¬

bon monarchy.

The Revolutionary War (1793-1802), stands

apart from the previous struggles in that it was at the outset largely, though by no means

wholly, a war of opinion. It turned mainly on the question whether the French Republic could

with impunity set aside the rights of the Dutch republic over the navigation of the lower part of the River Scheldt, which Great Britain

by

the treaty of 1788 had undertaken to guarantee.

The French in their resolve to make Antwerp

a great port, persisted in ignoring that treaty; and matters were in a very strained state be¬

tween England and France, when the execu¬

tion of Louis XVI at Paris, 21 Jan. 1793, made all hope of compromise impossible. The French

on 1 Feb. 1793, declared war against Great

Britain and Holland. These powers therefore

joined the first coalition (Austria, Prussia, ((the Empire,® Sardinia and Naples) ; but the jeal¬

ousy of Austria and Prussia, the incompe¬

tency of the allied leaders and the enthusiasm and energy of the French soon drove the allies out of their territory. A British force was de¬

feated at Hondschoote near Dunkirk, and had

to retire toward Ostend (September 1793).

To months later Admiral Hood's bluejackets

and their Spanish and Neapolitan allies were

driven from redoubts near Toulon; mainly

owing to the skilful dispositions of Bonaparte, and had to abandon that seaport. The cam¬

paigns in Flanders languished owing to the

paucity of the British forces, which had to leave the Low Countries early in 1795. In that year Prussia came to terms with France.

The coalition was shattered by the aston¬

ishing triumphs of Bonaparte in Italy (1 796—

97), which compelled Sardinia, Naples and

finally Austria, to make peace. Holland and

Spain, having become allies of the French, the war became solely maritime and colonial. Mu¬

tinies at Spithead and the Nore (April-June

1797), threatened to complete England's ruin;

but the gloom of that year was brightened by

the victory won by Jervis and Nelson over

the Spaniards off Cape Saint Vincent (Feb. 14), by Duncan's triumph over the Dutch fleet at

Camperdown (Oct. 11). Pitt's overtures for

peace to the French government in August-September, came to naught. The scene of war

then shifted to the Mediterranean where Bona¬

parte's great expedition captured Malta and

Egypt, with a view to the eventual conquest of India. His schemes were thwarted bv Nelson's

brilliant victory near the mouth of the Nile (1

Aug. 1798) ; and the pressure of sea power re¬

ceived further illustration by a severe check

administered to Bonaparte at Acre by Sir Sidney Smith's squadron. Britain put forth great

efforts in India, where Wellesley's capture of

Seringapatam early in 1799 led to the overthrow and death of that

ambitious ruler, Tippoo

Sahib ; and after Bonaparte's secret departure

from Egypt, a British expedition under Aber¬

crombie and Hutchinson finally compelled the

French army which he left behind to surrender

(27 Aug. 1801). Malta had fallen to the British fleet in 1800.

Meanwhile, the aggressive conduct of the

French government in Europe had enabled Pitt

to form a second coalition which swept the

French forces from Germany and Italy. An

Anglo-Russian force in Holland, however, fared

badly and finally had to leave the country (Oct.

1799) . At the close of the year Russia left the coalition. In 1800 the allies lost ground rapidly.

Bonaparte, virtually master of France after the coup d ' etat of Brumaire (Nov. 1799), over¬

threw the Austrians at Marengo (14 June

1800) ; Moreau completed their disasters at

Hohenlinden in December, and the Court of

Vienna came to terms with France early in

1801. Bonaparte with rare skill now prepared

to turn the tables against England by effecting an alliance with Russia, and reviving the League of the Armed Neutrals. Again his aims were

thwarted by Nelson, whose victory at Copen¬

hagen (2 April 1801), paralyzed the league.

The assassination of the Tzar Paul, and the

accession of Alexander I, facilitated a com¬

promise on maritime affairs; and the losses of the French in Egypt and Malta predisposed

them to peace with England. Ultimately the

belligerents came to terms in the Treaty of

Amiens (27 March 1802), whereby England

agreed to restore all her colonial conquests to France, Spain and Holland (including the Cape

of Good Hope to the last-named), except Trini¬

dad and Ceylon, which the Spaniards and

Dutch, respectively, ceded to her. Malta was to be restored to the Knights of Saint John (on

conditions which proved to be unworkable),

while Egypt reverted to Turkey.

In the Anglo-French wars of the 18th cen¬

tury the importance of the commercial and

colonial motives is increasingly apparent. The

first two struggles originated in dynastic affairs relating to the then dominant principle of the balance of power; but the increasing solidity of the European states and the growth of com¬

merce under conditions which were almost pro¬

hibitive to foreigners, turned the gaze of states¬

men more and more to the new lands beyond

the seas. The result may be estimated by read¬

ing over the causes and results of the wars here briefly set forth. Europe, after settling down

on the foundations laid in 1713 and 1748, occu¬

pied less attention from statesmen at London

and Paris. The French Revolution brought

matters back sharply to the old field of debate between the two powers — the Netherlands;

but when the weakness of the coalition and the genius of Bonaparte made France paramount on

the Continent, the struggle quickly became one

for supremacy in the Levant, and the East and West Indies. The vigor with which he played

the roles of Caesar and Alexander the Great

would have enabled him to wrest from England

her world empire had he not been confronted

by Nelson. Even so, the struggle between the

secular rivals ended in 1802 on terms on the

whole favorable to France; and it was soon

clear that the first consul viewed the Peace

of Amiens as an opportunity of strengthning

the position of France in Euorpe, as well as her fleet and her colonies, in order to resume the struggle for empire under conditions far more

fuvorable than Louis XIV had ever known.

Bibliography. — For a short account of the

wars of the 18th century, consult the histories of England by Dr. J. F. Bright, J. R. Green

and Dr. S. R. Gardiner; also (The Balance of

Power — 1715-89, } by A. Hassall. The fullest

accounts are to be found in the (History of

England in the Eighteenth Century, > by W. E.

H. Lecky (6 vols.), and the (History of Eng¬

land Since the Peace of Utrecht,* by Earl Stan¬

hope (7 vols.). Fortescue, (History of the

British Army* ; Mahan, Capt. A. T., (Influence of Sea Power Upon History,* and Seeley, Sir

J. R., (The Expansion of England,) very sug¬

gestively treat certain parts of the subject. The chief monographs bearing on special topics are

Parnell, Colonel, (War of the Spanish Succes¬

sion ; Wolseley, Lord, (Life of Marlborough*

(incomplete) ; Stebbing, W., (Peterborough J ;

Skrine, F. H., (Fontenoy* ; (Chatham,* by A.

von Ruville (English trans., 3 vols., 1907), also bv Basil Williams (2 vols., 1913 — the best Life of Chatham*), and shorter works bv F. Harri¬

son and A. S. McDowell; Parkman, (Montcalm

and Wolfe) ; Winsor, J., Struggle in America>

between England and France (1697-1763) ;

Wilson, Sir C., (Clive* ; Lyall, Sir A., (Warren Hastings* ; Malleson, C. B., <History of the

French in India* ; Corbett, J., (England in the Seven Years' War.*

For the American Revolution, consult the

Cambridge Modern History* (Vol. VII) ; the

works of John Fiske, Bancroft, J. M. Ludlow,

Sir G. O. Trevelyan and H. Belcher; and, for

the part played by France therein, Balch, T.,

(The French in America During the War of

Independence* ; Towers, C., (Lafayette in the

American Revolution.*

GREAT BRITAIN — HISTORY OF THE 19TH CENTURY (8) 197

For the Anglo-French War of 1793-1802,

consult the ‘Guerres de la Revolution5 by

Jomini, 15 vols. ; ‘Cambridge Modern History)

(Vol. VIII) ; Alison, ‘History of Europe)

(1789-1815, 12 vols.); Thiers, ‘History of the

French Revolution ; Maxwell, Sir H., ‘Life

of the Duke of Wellington5 (2 vols.) ; Mahan, Capt. A. T., ‘Influence of Sea Power on the

French Revolution and Empire5 (2 vols.), and

‘Life of Nelson5 (2 vols.) ; Browning,

‘Napoleon: the First Phase5 ; Rose, J. H., ‘The Life of Napoleon I5 (2 vols.) ; also Fournier, A., ‘Napoleon I5 (2 vols. Eng. trans. 1911) ; Fortescue, ‘History of the British Army.5

J. Holland Rose,

Author of ‘ The Development of the European

Nations, 5 ‘ The Life of Napoleon /,5 *etc.*

8. HISTORY OF THE 19TH CEN¬

TURY. The history of the British people in

the 19th century is dominated by three facts or tendencies, themselves the outcome of its past

history and its physical environment: (1) a

portentous development of the national re¬

sources, resulting from the industrial revolu¬

tion, improved agriculture, and the colonial ex¬

pansion of the 18th and 19th centuries; (2)

consequent collisions or friction with other

growing nations, especially Imperial France and

Imperial Germany; (3) a revolution of feeling

in favor of peace, attention to domestic reforms and commercial expansion by pacific methods.

These three phases of national life are closely related; the first is connected with the life of the 18th century of whose achievements — scientific and mechanical, military and maritime — it was the continuation. The second or war¬

like movement originated in the effort of an ex¬

pansive but insular people to seek overseas the material resources wanting at home, and

prompted the efforts associated with the names

of Nelson and Wellington, Dalhousie and

Dufferin, John A. Macdonald, Parkes, Roberts,

Kitchener and Cecil Rhodes. The third ten¬

dency, prudential or philanthropic in its origin, has as spokesmen Fox, Bentham, Shaftesbury,

Peel, Cobden and Gladstone. The following

brief sketch is not intended to be a commentary on these statements ; but they may be regarded as sign-posts helping the historical traveler

along paths which, though far from easy, yet

frequently run on parallel or converging lines.

The first 15 years of the century witnessed

a phenomenal development both of the material

resources of Great Britain and of the strife

with France — both of them well marked

features of the previous years. In the years

1801-15 the inventions of Watt, Cartwright,

Trevithick and George Stevenson led to an

enormous expansion of the factory system and

means of locomotion. But in those same years

the material resources of the land were con¬

sumed in a struggle for national existence. The year 1803, which saw the renewal of war be¬

tween England and France after the brief truce of Amiens, is marked bv the exhibition of Tre¬

vithick's first locomotive. In the year of

Waterloo (1815) Stevenson proved his Kill—

ingworth locomotive to be a practical success.

The skill and expansive energies of man,

which went to feed the flames of the great war, were also in large measure its cause. The rise of Napoleon to absolute power in France and

his masterful interventions in neighboring

states (especially in the Netherlands, where

British rulers have never suffered a hostile

military power to take root), his prohibition of British imports, and his endeavor to found a

Colonial Empire at the expense of that of

Britain brought about the mightiest of all

Anglo-French wars, that of 1803-14. It is

worthy of notice that the influence of the auto¬

crat brought back the struggle from the sphere of opinion to that of material and colonial in¬

terests characteristic of the 18th century. The war had three well marked stages. Toward

the close of 1805 Trafalgar left England mis¬

tress of the seas, while Austerlitz made

Napoleon master of the Continent. In the next

two years he strove to mass all the continental states against her in a commercial war styled

the Continental System. Its pressure seemed

to be bringing England to the verge of bank¬

ruptcy; but in 1808 the revolt of Spain threw open the Iberian Peninsula and the Spanish

and Portuguese colonies in America to British

trade. The defection of Russia in 1812 ruined

Napoleon's prospects, and the subsequent cam¬

paigns (1813-15) assured the triumph of Eng¬

land and the overthrow of the great emperor.

Her gains were colonial. Mauritius, Tobago

and Saint Lucia were yielded up by France.

For the Cape of Good Hope, Dutch Guiana

and Curagoa, conquered during the war, the

victor paid to Holland a sum-of £6,000,000.

Malta, Heligoland and a protectorate over the

Ionian Isles were the sole acquisitions in

Europe from a war which added more than

£600,000,000 to the national debt. The strain

had been terrible and nothing but the new

strength gained from the factory system, im¬

proved agriculture, and the mastery of the seas, could have brought the country through. Pitt,

"the pilot who weathered the storm,55 died in

1806; but his heirs, the Tories, held on to

power until 1830.

The burden of debt hung like a millstone

round the neck of the nation for the next gen¬

eration. In place of an income tax (then

viewed as essentially a war tax) imposts were

in and after 1815 placed on all possible articles, including foreign corn. Demonstrations and

riots were the result; repressive measures, such as the Six Acts of 1819, were of no avail; and the unpopularity of George IV (1820-30)

brought the monarchy itself into danger. Yet

this time of malaise and political reaction was not fruitless. Canning, as Foreign Secretary,

did much to thwart the reactionary policy of

the monarchs who had framed the Holy

Alliance, and his encouragement of the Liberals of Spain and of the Greek patriots led to

notable results in the lives of those peoples, as also in the attitude of the United States toward Europe. (See Monroe Doctrine). The aboli¬

tion of civil disabilities affecting Nonconform¬

ists in 1828, and the emancipation of Roman

Catholics, in 1829 with the reluctant assent of the Wellington ministry, showed that the days

of privilege were over.

The event of the next year ushered in a

new era. The death of George IV brought to

the throne his far more popular brother Wil¬

liam IV ; and the general election, held during the excitement caused by the deposition of the elder House of Bourbon in the revolution of

July 1830, in Paris, led to the return of a

majority favorable to electoral reform at West¬

minster. After a long and acrid struggle the

 (8) Reform Bill of 1832 was passed. It enfran¬

chised in all parliamentary boroughs house¬

holders paying a rental of £10, also copyholders in the counties. It disfranchised a number of

very small boroughs and transferred their vot¬

ing power to the new manufacturing towns and

districts. Thus the influence exerted by the

second French Revolution on English democracy

was far more favorable than that of the first revolution. The anarchy and the wars result¬

ing from that great upheaval put back the cause of parliamentary reform in England for 50

years. The seeming success of the second

revolution (July 1830) now added vigor to the

English movement which had meanwhile been

strengthened by the silent yet potent changes

in the distribution of population and modes of life resulting from the industrial revolution.

That change, ever working with accelerated

energy, necessitated the transference of power

from the old rural England to the new manu¬

facturing England ; and thanks to the accession of William IV in 1830, and of Victoria in 1837, this momentous revolution took place peace¬

fully. While breaking the power of the old

Tory party, it rooted the monarchy more firmly in the hearts of the people.

The ensuing decades were times of great

strain and stress, but they were met firmly and on the whole successfully. The wider sym¬

pathies and business aptitudes of the new

Parliament showed themselves in the Factory

Act (1833) of Lord Ashley — afterward Lord

Shaftesbury; in the emancipation of slaves in

British colonies, for which a sum of £20,000,000

was voted as compensation to the owners ; and

in the Poor Law Amendment Act of 1834 which

cut at the roots of the growing evil of pau¬

perism. Nevertheless the working classes of

the great towns were in a state sometimes

bordering on sedition, partly owing to resent¬

ment against the Whigs for refusing to extend

the franchise laid down in 1832, and still more owing to the harsh administration of the new

Poor Law. Trade depression, low wages, high

taxes and dear corn swelled the volume of dis¬

content. It took form in two well defined

movements, Chartism and the Anti-Corn Law

League, which, beginning in the year 1837, ran a parallel and competitive course, and ended

in the year 1848, the former in failure, the lat¬

ter amidst almost complete success. This differ¬

ence in the fortunes of the two movements may be ascribed to the following causes. The

Chartists, (q.v.) sought to cure evils, which

sprang mainly from economic causes, by purely

political means. The six points of their Char¬

ter were (1) annual Parliaments, (2) manhood

suffrage, (3) equal electoral districts, (4) pay¬

ment of members of Parliament, (5) abolition

of the property qualification for members of

Parliament and (6) vote by ballot. This pro¬

gram (a revival of the advanced Whig pro¬

gram of 1780) aimed at benefiting the work¬

ing classes through Parliament. The Free

Traders sought to benefit them by altering tax¬

ation so as to let in free, or nearly free, the necessaries and small comforts of life. Further, Chartism suffered from the unwise means used

by the physical force wing of the party whose leaders fell out with one another. The Free

Traders on the other hand had excellent leaders, Cobden and Bright, whose arguments finally

brought over to their side large numbers of the workingmen and the Prime Minister himself,

Sir Robert Peel.

This able man had pieced together the Con¬

servative party from the more malleable of the fragments of the old Tory faction; and, largely owing to the failures of the Whigs in finance, he came back to power after the general elec¬

tion of 1841 with a strong and apparently homo¬

geneous following. His openness of mind soon

brought him into collision with very many of

his followers. He became a Free Trader, while

they remained Protectionists. He soon came to

see that the long series of deficits could be ended only by recourse to direct taxation ; and in his budgets of 1842 and 1845 he abolished or greatly lessened duties on large numbers of

articles, making good the temporary loss by an Income Tax of 7d in the £. He also lessened

the sliding scale duties on foreign corn. The

result was seen in improved trade and in a

decline of pauperism and misery. In 1845-46 the Irish famine brough him to sacrifice the corn

duties — a measure which earned him un¬

measured abuse from Disraeli and Lord George

Bentinck and the gratitude of the poor through¬

out the whole kingdom. Thus the working

classes gained their chief aims through the

efforts of the Free Traders and the legislation of Peel. Consequently

when the continental

revolutions of the spring of 1848 induced the

physical force Chartists to copy the methods

which had been successful in Paris, Berlin and Vienna, the result was a ludicrous fiasco, which brought Chartism as an organized movement to

an end. The spirit that had animated its best leaders, namely a burning love of freedom and a passionate desire for the moral and mental up¬

lifting of the working classes, lived on in those Radical parsons, F. D. Maurice and Charles

Kingsley, in the second founders of the Co¬

operative and Friendly Society movements, and

in the later Radicals, who by wise methods soon gained four of the six points of the Charter.

The same yearnings after ideals far other than those realisable by mere party strifes and sor¬

did commercialism permeated much of the best

work of Carlyle and of his young disciple

Ruskin, and throbbed in the youthful poems of

Tennyson, Browning and Swinburne.

The decade of the forties, marked by political discontent, but dignified by ideal aspirations in all spheres — the disruption in the church of Scotland, the Anglican movement in the church

of England and the pre-Raphaelite movement in

art, belong to that momentous epoch — faded

away into a period marked by expanding trade

and mental quiescence. Gold discoveries, rail¬

ways, steamships, these were the chief pre¬

occupation of mankind; and under their subtle

alchemy democracy and idealism of all kinds

vanished for a time, both in England and on

the Continent. As often happens in these ex¬

pansive epochs (which recur after the intro¬

spective, critical and reforming epochs), a

collision occurred with another growing power,

Russia. The Crimean War resulted largely

from the efforts of that stern autocrat, the

Tsar Nicholas I, to browbeat the Turks, whose

political power was then thought to be essential to the security of the overland route to India.

The hope entertained by the British nation that the Sultan would reform his government and

grant religious liberty soon proved to be vain ; and England came to see that she had cham-199

pioned a moribund cause. She gained nothing

by the war; and its first reverses did much to promote the ferment in native circles in India which led to the terrible mutiny of 1857.

Affairs in Europe soon engrossed public

attention. In the Crimean War, England had

had the alliance of Napoleon III of France and of Victor Emanuel II of the Kingdom of Sar¬

dinia. Her relations with the French emperor

speedily cooled; and complications in the years 1858—59 brought the two people so near to a

conflict as to lead to the revival of the volunteer movement. Far different was the attitude of the nation toward the Italian movement for libera¬

tion and unity. The masterly statecraft of the Piedmontese statesman, Cavour, and the heroic

deeds of Garibaldi in southern Italy in 1860

aroused the keenest interest. The diplomatic

help given by British statesmen, Palmerston

and Lord John Russell, then laid the basis of that friendship which has since subsisted be¬

tween Great Britain and the United Kingdom

of Italy.

Amidst these excitements Cobderi did good

service by promoting a commercial treaty be¬

tween England and France on free trade lines,

(it held good for the years 1860-70) and Glad¬

stone, the Chancellor of the Exchequer, by his budgets of the early sixties succeeded in fur¬

ther cheapening the necessaries of life. But no advance was made on purely political lines,

firstly because the influence of Palmerston, the Prime Minister, barred

the way, and secondly

because popular interest centred largely in the wars of that troubled period — the American

Civil War (which at one time portended a

strife between the two kindred peoples), the

Danish War of 1864, and the Austro-Prussian

War of 1866. The end of this last struggle

brought a lull which favored the hopes of re¬

formers. The death of Palmerston on 18 Oct.

1865, had removed another barrier; for, since

the death of the Prince Consort at the close of 1861, his influence in the political world had been almost without bounds. Other causes now

helped to turn attention to home affairs. The

cattle plague and the sharp financial crisis of the year 1865, the Fenian outrages of the next year, and the general state of malaise through¬

out the United Kingdom brought men once

more to that critical or introspective mood

which is favorable to political reform. A singu¬

lar concatenation of events brought into office in June 1866 a Conservative Ministry headed by Lord Derby and Mr. Disraeli — into office but not into power, for they were face to face with a hostile majority, irritated by the recent re¬

jection of a moderate Reform Bill championed

by Lord John Russell and Mr. Gladstone. The

result was a series of acrobatic performances

whereby Disraeli, erstwhile the denouncer of

the inconsistencies of Peel, foisted on his party in 1867 a measure far

more democratic than

that of the previous year. Household suffrage

was thenceforth the law of the land for all

parliamentary boroughs. After a short time of

uneasy balancing, the Conservative Ministry

was overthrown by the general election of No¬

vember 1868.

Democracy now came in as with a flood.

The Gladstone Ministry (December 1868 —

February 1874), carried legislative activity Jo

lengths never before seen in England. The dis¬

establishment of the Irish church (1869) ; the OF THE 19TH CENTURY (8)

Irish Land Act and the Elementary Education

Act (1870) ; the abolition of the system of pur¬

chase in the army, and the appointment of the Local Government Board (1871); the Ballot

Act and Licensing Act (1872); the Supreme

Court of Judicature Act (1873) — these were

the chief measures passed in this period, which witnessed also the settlement of the Russian

claims respecting the Black Sea and the Ala¬

bama claims urged by the United States. In

these matters, as in the sphere of foreign

policy generally, the Ministry was deemed to

have sacrified British interests needlessly.

The outcome of this feeling, and of the alarm felt by many classes at home whose interests

were injured or threatened, was seen in the

general election of February 1874, which

marked a sharp reaction in favor of Imperial¬

ism and a spirited foreign policy. Disraeli

(created earl of Beaconsfield in August 1876)

came back to power at a time when the Eastern Question entered on an acute phase. The

years 1875-78 were overshadowed by the atroci¬

ties committed by the Turks on their Christian fellow subjects, and by the Russo-Turkish War.

Sharp differences of feeling were caused by

Lord Beaconsfield's treatment of these events,

as also by his acquisition of Cyprus (June

1878). Depression of trade at home and the

outbreak of wars in Zululand and Afghanistan

in 1879 made the Ministry more and more un¬

popular, with the result that the election of

March 1880 brought back Gladstone to power

with a large majority. His second ministry

(April 1880 — June 1885), coincided with a

time of great ferment in Ireland and of unrest abroad, with which he

coped manfully but not

very successfully. Irish affairs were not settled by his drastic Irish Land Act of 1881 ; his very large concessions to the Boers of the Trans¬

vaal in 1881 and 1884 aroused a most bitter

feeling among loyalists in South Africa and

sowed the seeds of future trouble. British in¬

tervention in Egypt (1882) was successful, but

had as an unfortunate corollary the despatch of General Gordon to Khartum ; and the dealings

of the Ministry with Russia respecting the

Afghan frontier at Penjdeh, as also with Ger¬

many respecting various colonial questions on

the coasts of Africa and New Guinea, were

marked neither by foresight nor firmness. In

the midst of these disturbances Gladstone, with characteristic tenacity, pushed through the

Reform Bill of 1884 and the Redistribution Bill of 1885 in face of prolonged opposition from

the Lords. The former measure extended

household suffrage to the counties ; the latter divided the whole country into electoral dis¬

tricts with some approach to numerical equality.

The general election of 1885 was of singular

interest as marshaling the revivified forces of Democracy and Imperialism. The former \yon,v

thanks to the votes of the newly enfranchised

agricultural laborers; but the triumphant Lib¬

eral party was split in twain by Gladstone's Irish Home Rule Bill and Land Bill (April 1886).

The general election of July 1886 reversed the decision arrived at 18 months earlier, and Lord Salisbury took office with a Unionist Ministry

which sought — as he phrased it — to govern

Ireland <(honestly, consistently and resolutely.ˆ

It also passed the local Government Bill (1888) the Irish Land Purchase Bill (1891) and

strengthened the army and navy, and adopted

 (9) a firmer tone on foreign affairs. In 1892 the swing of the pendulum brought Gladstone back

to power — for the fourth time, — but in 1894

he retired and Lord Rosebery undertook to re¬

constitute the ministry. Even his versatility

failed to solve the difficulties arising from dis¬

union in the cabinet and in the Liberal party, and from the tension in public opinion caused by massacres of Christians in Armenia and Crete.

He resigned in 1895, and the ensuing elections brought back the Unionists to office with a ma¬

jority larger than had been known since 1832.

Lord Salisbury's new ministry, which included

some Liberal Unionists, had to grapple with a

succession of difficulties- — the Venezuelan af¬

fair, complicated by President Cleveland's mes¬

sage, Doctor Jameson's raid in South Africa,

complicated by Kaiser Wilhelm's famous tele¬

gram, oppression and anarchy in Crete and

many parts of the Turkish empire, and the cam¬

paign against the Dervishes on the Upper Nile.

To these matters we cannot advert. We can

point out here only two chief facts in the po¬

litical history of the century — the gradual effacement of the old party lines, and the curious periodicity in the political life of Great Britain.

To dwell on the latter of these, it is clear that the main tendency has been toward democracy

and industrial development by peaceful means —

a tendency dominant in the periods 1816-1848,

1866-1874, 1880-1886, 1892-1895. The interven¬

ing years were marked either by the quiescence which comes naturally after great constructive

efforts, or by the striving after national security and the consolidation of the empire which re¬

sults inevitably from the insular position and

expansive force of a virile people. The century closed, as it began, amidst what may be termed the imperial impulse, of which industrialism has been the unconscious but all powerful feeder.

The era of great production, coinciding as it

does with one of militarism and protection on

the Continent of Europe, imposes on England

the need of looking and living beyond the seas to an extent unimaginable to the men of Nel¬

son's generation. In this dualism of her inter¬

ests, democratic and imperial, lies the great

problem of her political life — a problem never to be solved but ever keeping her faculties tense and keen. A word must be said on the devel¬

opment of Socialism in Great Britain. It took

a new start in 1881 with the foundation of the ((Democratic Federation,® which in 1883 became

openly Socialistic. Mr. Henry George's book,

(<Progress and Poverty® (1881) excited some

attention, as did the author's lectures during a visit to England in 1884. But neither his theo¬

ries on the land nor the more systematic Social¬

ism of Karl Marx had a permanent effect on

British workmen, who, certainly up to 1900, pre¬

ferred to act through Trade Unions and Co¬

operative Societies for their own betterment.

The Profit Sharing Movement also brought

ithem into closer touch and sympathy with many 'employers, who adopted that system.

Bibliography. — We can name here only a

ifew of the chief works dealing with the out¬

standing events of British political life and with the men who made history in the 19th century.

Besides the text books on the English history

of the period written by Doctor Bright and

Doctor Gardiner, there are (History of England — 1800-181.5 } and (History of the .Thirty Yea^'

Peace — 1816— 1846) by Harriet Martineau;

(History of England from 1815 } (6 vols.) by

Sir Spencer Walpole (continued up to 1900) ;

(A History of Our Own Times) by Justin Mc¬

Carthy (continued up to 1900, 4 vols.) ; (Social England) (vols. V and VI) edited by Doctor

Trail; (The Political History of England,* Vol.

XI (1801-1837) by Hon. G. C. Broderick and

J. K. Fotheringham ; Vol. XII (1837-1901) by

S. J. Low. Also the following biographies :

< Pitt > by Lord Rosebery (1 vol.) also by J. H.

Rose (2 vols.) ; (Life of Nelson> by Captain

Mahan (2 vols.) ; (Life of Wellington by Sir

Herbert Maxwell (2 vols.) ; (George Canning)

by H. W. V. Temperley; (Peel* by J. R. Thursfield ; (Life of Palmerston* (1846-65) (2 vols.) by Hon. Evelyn Ashley; (Life of Lord John

RusselP by Spencer Walpole (2 vols) ; (Life of Cobden) and (Life of Gladstone) (3 vols.) by

Lord Morley ; (Life of Lord Granville*' by Lord E. Fitzmaurice (2 vols.) ; (Life of Lord

Randolph Churchill* by Winston Churchill (2

vols.) ; (Life of Disraeli* by Monypenny and

Buckle; H. Paul, (History of Modern England)

(to 1895) (5 vols.) ; (Reign of Queen Victoria >

by T. H. Ward; (John Bright,* by G. M.

Trevelyan (2 vols.) ; (Sir Stafford Northcote,*

by Andrew Lang (2 vols.) ; (The Cambridge

Modern History* (Vols. X-XII).

J. Holland Rose,

Author of cThe Development of the European

Nations, 1870-1914 .*

9. THE POLITICAL PARTIES — TO

1906. Party government begins, in primitive

society, with the struggle for power, the nature of whidh is determined in each case by local and tribal conditions, and by the influence of men who are or aspire to be leaders. At a later stage, when abstract logic is applied to questions of policy, the parties begin to argue from principles; they profess themselves friends of the people,

friends of the better class, and so forth. The principles invoked are not scientific propositions; they are rather forms of language, such as are received with favor in a mixed assembly; the

party-leader uses them so as to combine opin¬

ions and interests, to draw together a working majority. Each party borrows freely what

seems to be effective and popular in the pro¬

gram of its opponents. Moderate men of all

parties think very much alike ; they are kept

apart by the personal struggle for power.

These general truths are well illustrated by

the contest between Whigs and Tories in the

17th century. The Whigs were an aristocratic

party, relying on the nobles, the landed gentry, and the city of London. Their principle was,

the supremacy of the law : they were determined that the courts which administer the law and

the high court of Parliament which makes the

law, should be freed from the arbitrary inter¬

ference of the king. Moderate Tories did not

undervalue the law; they argued that by law

the king was entitled to obedience, and that the king then reigning had done nothing to forfeit his claim. The Whigs carried their point in

1688, by bringing in a foreign king, William of Orange, a capable, magnanimous man, not less

firmly attached to his royal prerogative than the Stuart kings had been. With the advent of the House of Hanover in 1714, Whig principles

‘came once more to the front; for the first

(Gporge .and .his .son were Germans 4 they needed 201

 (9) an interpreter between the king and the peo¬

ple ; and the statesman who could manage the

House of Commons was not, like Strafford or

Clarendon, dependent on the support of his

royal master. George III on the other hand

was a patriotic Englishman; he thought himself

strong enough to choose his own ministers and

to throw off the yoke of the Whig nobles.

If he had possessed the administrative talent of Fredrick the Great he might have made himself

the head of the government and set himself

above the parties. But King George was neither a great statesman nor a great soldier; he relied too much on the smaller arts of political man¬

agement; and in the middle of his long reign he came under the influence of a minister whose

commanding character excluded the king from

the personal conduct of national business. It is to Pitt that we owe the outline of our modern constitution. At Windsor he was the servant of the Crown, arguing, often in vain, against the obstinate purpose of his master. In the cabinet he was himself master; he chose his colleagues, and dismissed them when they opposed his pol¬

icy. In the House of Commons, which was still an aristocratic body, his ascendency was never

seriously disputed, and he filled the House of Lords with peers of his own creation. So it

was that Pitt, by birth and training a Whig, be¬

came the founder of the new Tory party.

Pitt's opinions were those of an official Lib¬

eral. He wished to reform the electoral system, to remove religious

disabilities, to relax the

rigor of laws which prevented the expansion of trade. But the fates had imposed upon him the task of steering the ship of State through a

period of wars and revolutions : the work of re¬

form was postponed to the necessities of for¬

eign and domestic policy. When the great min¬

ister died, his unfinished schemes fell into the hands of men with whom postponement was a

settled habit. During the long Tory adminis¬

tration of Lord Liverpool there was, in prin¬

ciple, but little difference between the parties.

The middle classes were impatient, and some

of them joined the workingmen in declaring

that neither of the aristocratic parties could be trusted. These independent men called them¬

selves radical reformers, and they sympathized

with the aspirations of democracy in America,

in Ireland, and on the continent of Europe.

The Reform Act of 1832 was a Whig com¬

promise ; it failed to satisfy the Radicals, but it gave them a foothold which they never lost.

It was indeed the first attempt to apply abstract principles to the English constitution, and it

started a momentous process of change. Tra¬

dition was dethroned, and the old party names

had become unpopular. The Whigs began to

call themselves Liberals, a name which some of them declined, because it suggested humanitarn

tendencies with which they were not in sym¬

pathy. Macaulay, for example, would not call

himself a Liberal, because, as he said, he was in favor of ((war, church establishments, and hang¬

ing.® The Tories in their turn became Con¬

servatives ; they accepted the results of 1832, but deprecated any further change in fundamental

institutions. The Radicals of that day were

middle-class men, disciples of Bentham ; they

stood for cheap government, freedom of con¬

tract and individualism. Socialism made its ap¬

peal to the unenfranchised laborers, but as yet without much visible success. The Factory

Acts, for example, were carried by Tory human¬

itarians, against the opposition of Radical manu¬

facturers. Free trade, when it came, was the

work of a Conservative administration ; the

Liberals approved; the older Whigs, like Lord

Melbourne, thought that Peel had betrayed the

landed interest. Lord Derby, a hereditary

Whig, was carried over to the conservative

Tories by his fears for the Church and his dis¬

like of free trade.

The conflicting tendencies of the half-cen¬

tury after the first Reform Act are summed up in the careers of two men who were to take a leading part in the transition to democracy.

Disraeli entered life as a Radical ; he was al¬

ways hostile to the Whig oligarchy. His sym¬

pathies were with the Tories; his father, a quiet scholar, had taught him to take the side of the Stuart kings, and to regard the old nobility as the true leaders of the people. If Peel had

given him office, he might have become an

orthodox Conservative ; but the leaders of that party had no place for an able Jew, who lacked the public school and university stamp. Dis¬

raeli took his revenge by attacking Peel and his freetrade policy; his merciless wit gave him

the ascendency, even with men who still dis¬

trusted him ; he gained the confidence of Lord Derby, and in alliance with him began the con¬

struction of what was really a new party, the party of Tory democracy. In 1867 the new

Tories took their famous Heap in the dark® by establishing household suffrage in the boroughs.

The immediate result was a crushing Liberal

victory; but in 1874 the forces of Tory demo¬

cracy were strong enough to place their leaders in power. Six years later the pendulum swung

back and Mr. Gladstone was once more supreme.

Lord Beaconsfield died in the moment of

defeat, but his genius presides over the party which he formed, and profoundly affects the

mind of the nation. He never concealed his

belief that the conduct of public affairs, espe¬

cially foreign affairs, must be left to sovereigns and statesmen. At the same time he was al¬

ways in sympathy with the aspirations of the

workingmen. He was the only public man of

his generation who perceived that Benthamite

Liberalism was certain, sooner or later, to be¬

come unpopular, and he prepared the way for

that modified socialism which is now the ac¬

cepted creed of both parties. And again he

perceived that Englishmen, without . distinction

of class, are conscious of their position as an imperial power, and determined to maintain it.

Disraeli himself, in his earlier days, had taken the narrower views of England's responsibility

to India and the colonies; his later speeches are full of the sentiment of empire. Englishmen

are all (to some extent) socialists now; and are all (in one sense or another) imperialists.

Mr. Gladstone began his career as the rising

hope of Oxford Toryism. He was honestly

afraid of Radicalism; he distrusted the Whigs;

the mission of the Tory party was to ((maintain truth® by supporting the Church of Eng¬

land. At the age of 30 he published his book on (The State in its Relations with the

Church) — a noble vindication of the Church

as a spiritual society, pledged to maintain her conflict with sin and selfishness, a society to which the support of the state is not essential,

 but may, under proper conditions, be useful.

It was in the interest of the state that Glad¬

stone argued for the establishment and endow¬

ment of the Church. His argument was coldly

received; the qualified approval of Peel, the

scornful criticism of Macaulay, began to work

a change in Gladstone's political mind. No

criticism touched his ideal ; but in the present age of the world the ideal was, perhaps, un¬

attainable. If Whigs and Conservatives were

equally unable to rise to his conception of the Church, if the price of establishment was to be subordination to the state, what then? The

Church, to preserve her freedom and purity,

might withdraw from the alliance, surrendering

those of her privileges which might be found

inconsistent with abstract political justice.

Within a few jˆears after the publication of his book, Air. Gladstone was discussing the possible advantages of disestablishment.

Sir Robert Peel was not pleased to see an

able young party man so preoccupied with

ecclesiastical questions. He drew Gladstone into his ministry, placed him at the Board of Trade, and worked him very hard. In the transition

to free trade, master and pupil moved steadily together. While Peel was leader there could

be no doubt as to Gladstone's party connection ; when that guiding influence was removed he

was carried about by various kinds of doctrine.

Though more than half a Liberal, he was still afraid of Radicalism. He approved of Lord

Palmerston's passive resistance to the extension of the franchise, but this was his only link of sympathy with the coming leader of the Liberal party. There was much agreement between

Gladstone and Lord Derby; both were Oxford

Tories and devoted Churchmen; but by this

time Lord Derby was identified with Disraeli,

and the Peelites would not serve under the man who had planted so many barbed arrows in the

sensitive spirit of their chief. After long hesi¬

tation, Mr. Gladstone threw in his lot with the Liberals. In June 1859 he supported Lord

Derby in a critical division ; 10 days later he took office under Lord Palmerston.

As a member of a Liberal government, Glad¬

stone stood committed to parliamentary reform.

His Whig colleagues discovered with alarm that

this late convert was not merely a reformer; he was a democrat. He declared, from the Treas¬

ury bench, that the. laboring class had a moral right to come within the pale of the constitu¬

tion. There was now only one link between the Liberal champion and the Toryism of his youth; he was still member for the University of

Oxford. That link was severed when the Uni¬

versity rejected him in 1865. Mr. Gladstone

appealed to the people of Lancashire, and en¬

tered on the first of those oratorical campaigns which were to change the face of English

politics.

The franchise question was settled, for a

time, by the Tories in 1867, and the popular vote of 1868 was a personal vote for Air. Gladstone.

With a wide and varied electorate, and many

interests competing for notice, the people are

easily persuaded to accept the supremacy of one man, who, like General Jackson, <(acts always

for the good of the country.® Under such con¬

ditions the leader of opposition, if he knows

his business, has his rival at a disadvantage. It is the men in power who have to make terms

with foreign governments and to protect the

national purse; however well they do, it is

always easy to show that they might have done better. Mr. Disraeli made good use of his

opportunities, and in 1873 the tide of Liberal success was ebbing

rapidly. Mr. Gladstone was

alarmed, and he would fain have made his de¬

feat on the Irish University question an excuse for bringing his opponents into office. Disraeli saw the snare and avoided it, and the wisdom of his tactics was justified by the Conservative

victory of 1874. As a leader of opposition,

Mr. Gladstone disregarded what were then sup¬

posed to be the conventions of party life. He retired from responsible leadership; returned

to the field just at the moment when his action was most likely to embarrass his successors ;

and finally presented himself to the country as a candidate for power. In the election of 1880

his success was complete, and the death of

Lord Beaconsfield left him without a personal

rival. But once more the tide ebbed as rapidly as it had risen. In a few years it became evi¬

dent that the Liberal party was hopelessly

divided on three issues of cardinal importance —disestablishment of the Church, Home Rule

for Ireland and the scheme of modified social¬

ism advocated by Mr. Chamberlain. Old badges

and cries were out of date. Air. Parnell was

forming an Irish party, so severely disciplined that no member of it could break away or dis¬

obey orders. For a few eventful months there

was also a fourth party, a small band of Tories who obstructed their own leaders, addressed

themselves in a democratic spirit to the con¬

servative rank and file and made themselves so strong that in 1885 Lord Salisbury was com¬

pelled to take them into partnership.

At the general election of 1885 Mr. Glad¬

stone endeavored to keep his party undivided

by postponing all troublesome questions. He

did not declare against Home Rule, but he

pointed out the danger of allowing Mr. Parnell to hold the balance of power. This was his

reason for asking the country to give the Lib¬

erals a majority large enough to make them

independent of the Irish vote. In the event,

parties were so distributed that the Conserva¬

tives and Parnellites, if combined, would be

equal or superior in number to the Liberals.

Air. Gladstone accepted Home Rule. It would

be quite unfair to represent his conversion as a bid for power and nothing more. The argu-both for Home Rule was a strong one, and

both the great parties were studying it in a

practical spirit. But with all his vast experi¬

ence of affairs, Mr. Gladstone was subject to

illusions. He believed that the Irish demand,

as presented by him to the electors of England and Scotland, would prove to be irresistible. In this belief he cashiered those of his supporters who refused to follow, and when the House of

Commons rejected his proposals, he hurried on

a (<penal dissolution® and went again to the

country. The “classes,® he said, were against

him; he appealed to the “masses.® The masses

responded by placing the Unionists in power.

In the Parliament of 1886-92 the Liberal

Unionists occupied a position somewhat analo¬

gous to that of the Peelites in 1850. They were stronger in ability than either of the great

parties ; they sat on the Liberal benches” and cooperated steadly with the Conservatives.

Lord Salisbury in office did himself no dis¬

credit ; but he had to make himself responsible GREAT BRITAIN — THE POLITICAL PARTIES 1906-21 (10) 203

for unpopular measures. The Crimes Act of

1887 was in itself a moderate measure, but it was a deep disappointment to many who had

begun to hope that Ireland might be governed

without repressive legislation. A good many

independent Liberals fell quietly into line with their old party; the swing of the pendulum was felt. In 1892 Mr. Gladstone became Prime

Minister for the fourth time, and entered

buoyantly on the task of framing a second

scheme of Home Rule. When the scheme ap¬

peared his party saw plainly that it was not an improvement on the

bill of 1886. Discipline

was maintained ; the bill of 1893 was carried

through the House of Commons and it was

darkly intimated that the House of Lords must

accept it or take the consequences. The Lords

rejected the bill by a very large majority. Mr.

Gladstone was at the end of his physical re¬

sources ; he was followed by Lord Rosebery,

who, however, was not the man to succeed

where the old leader had failed. The election

of 1895 vindicated the shrewd forecast of the

Lords and restored Lord Salisbury to office.

From this time forth the Liberal Unionists

were identified with the Conservatives ; but in consenting to share the spoils of victory they did not withdraw the Liberal or Radical

opinions which they had professed. Mr. Cham¬

berlain, for example, did not withdraw his

objection to church establishments; but he could not, of course, give effect to his opinion so long as he retained his connection with the Unionist party, which is pledged, as a party, to the de¬

fense of two established Churches. On that

question no difficulty arose, but, at the height of its success, the party was broken up by the tariff controversy initiated by Mr. Chamberlain's at¬

tack on "one-sided free trade® in 1903. As con¬

ceived by its author, the plan of modified

protection had two aspects, socialist and im¬

perialist. It aimed at securing constant employ¬

ment for the British workingman, and at

consolidating home interests with those of the

colonies by means of preferential tariffs. The

plan was advocated in a series of speeches

which could hardly be excelled for clearness

and force; but the electors were not convinced.

In January 1906 the fiscal question held the

field; an'd free trade carried all before it. The Unionist party was left in a helpless minority; its leaders found comfort in recalling the prece¬

dents of 1841, 1874 and 1886 — the years in

which the Conservative party recovered its

ground after an apparently crushing defeat.

The new government was supported by the

Whig Liberals and by the Radicals, who com¬

bine Manchester (free trade) doctrines with

modified socialism as best they can. In former Parliaments, Labor members were few, and

voted with the Liberals. They still prefer Lib¬

erals to Unionists, but their support is given in return for concessions which put a strain on the Liberal members of the Cabinet. On Irish

questions, the Nationalists voted with govern¬

ment, on the understanding that Mr. Glad¬

stone's policy would be revived at an early date; but where Catholic schools are concerned that

vote is hostile to the educational policy which commends itself to most Liberals. The Union¬

ist opposition was seriously embarrassed by

differences of opinion in regard to free trade.

Amid these currents and cross-currents the

leader had to steer the best course he could.

We still defer to the notion that there are two great parties in the state; but the House of

Commons has in fact become a collection of

groups, like the Reichstag or the Chamber of

Deputies.

Thomas Raleigh,

Author of (Elementary Politics, > etc.; Member

of Council of India, 1909-13.

10. THE POLITICAL PARTIES 1906-21.

With the accession of the Campbell-Banner¬

man (q.v.) administration in January 1906, the

Liberty Party returned to power after nearly

20 years' political exile. Excepting for two

short spells of one year and two years the Con¬

servatives, joined by the Liberal Unionists, had been in power since 1886. The socalled “khaki election® of 1900 had kept the Unionists in

office to carry on the South African War, to

which most of the Radicals and Laborites were

bitterly opposed. The late Lord Salisbury

had resigned in 1902 and was succeeded by his nephew, Mr. Arthur James Balfour, who carried

on the government till December, 1905, when

he in turn resigned with his cabinet. Rent

asunder over the fiscal or ((tariff reform® ques¬

tion, the Unionist party was said to be suffer¬

ing from ((senile decay® and the country was

only too willing ((to give the other side a

chance.® Sir Henry Campbell-Bannerman came

in with an overwhelming majority. The Liberals

captured 379 seats out of the total of 670; the Unionists only had 157. In addition, the gov¬

ernment had at their disposal the votes of 51

labor members and 83 Irish Nationalists.

Though a pronounced Home Ruler, the new

Premier did not touch the thorny problem of

Irish separation during his tenure of office.

The two previous Liberal administrations had

been shattered on that rock. He introduced

several highly contentious measures which were

promptly killed by the House of Lords. Yet

his brief administration (he died in 1908) was marked by some daring and really useful acts

of legislation; he settled a very old controversy of many years' standing by passing the De¬

ceased Wife's Sister Act in the teeth of fierce clerical opposition; he introduced a court of

criminal appeal — a much-needed measure;

created a public trustee ; a system of probation for juvenile and first offenders; a protective

patents act, and a merchant shipping act. The

Liberals undoubtedly possessed a set of brilliant and enthusiastic leaders in Mr. Asquith, Mr.

David Lloyd George, Mr. Winston Churchill,

Mr. (now Viscount) Haldane, Mr. (now Lord)

Morley and Mr. Birrell. Beyond offering de¬

structive criticism the feeble opposition could

exert a very limited influence over what they

called the "socialistic orgy® of the Radicals, a generic title applied to the heterogeneous party then in power. Mr. Asquith succeeded to the

the premiership shortly before the death of Sir Henry Campbell-Bannerman. Opinion differed

little about Mr. Asquith : a cool, clever, strong and determined man possessing little imagina¬

tion and no illusions. His predecessor had

held the party and its allies together with

amiable tact ; Mr. Asquith dominated by sheer

force of a commanding personality. He was

ably seconded by the Chancellor of the Exche¬

quer, Mr. Lloyd George, the fiery little Welsh lawyer and orator who, but a few. years before, had been the “best hated man® in the United

Kingdom. In 1900 the latter had had to adopt

the disguise of a policeman to escape from the threatened violence of an infuriated mob in

Birmingham. Also a convinced Home Ruler,

Mr. Asquith realized the futility of introducing any measure of Home Rule for Ireland while

the Lords possessed the power of the veto. He at once opened a campaign to deprive the Lords of that power. Needless to say, he had the

hearty support of the whole Liberal, Labor and Nationalist members, and the most strenuous

opposition of the Conservatives and Liberal

Unionists. The two latter parties, now fully

united, forced a general election in January

1910, when the government’s big majority melted away; from 513 it fell to 124 all told. The Irish Nationalists and the labor parties now had the government in their power; nor did thev fail

to press their demands. The bill of the Parlia¬

ment Act (see article II Parliament) was in¬

troduced in April 1910. Numerous conferences

on the subject between representatives of both

houses failed to produce an agreement, and Mr.

Asquith again appealed to the electorate in De¬

cember of the same year. The result of the

election was that his majority rose by only two; the same number of Liberals were returned as

Unionists, namely, 2 72, and the government was now entirely dependent for its existence upon

the Irish and labor votes. The Parliament

Act Bill was reintroduced in February 1911 and passed by the Lords, and the road to Home Rule lay open. As the ((Osborne judgment,® upheld

by the highest court, had deprived the trade

unions of the right to pay the salaries of labor members in Parliament, every private member

of the House of Commons was voted a salary

of $2,000 per annum. The Unionists vehemently

opposed the measure, and a number of them

have never accepted the payment. By this

means were the Liberals, Laborites and Irish

Nationalists welded into one party pledged to

mutual support. Profiting by the example of

their opponents, those Liberals who seceded

from their party over the Home Rule splits of 1886 and 1893, and retained the title of <(Liberal Unionists® though acting always in accord with

the conservatives, have since gone over entirely to the latter and amalgamated with them. Hence the two parties were simply styled

<(Unionists,®

i.e., pledged to maintain the union between

Great Britain and Ireland. Home Rule was

definitely passed in 1914, but its operation was postponed pending the duration of the war.

See Ireland.

The outbreak of the European War took the

British public and politicians wholly by sur¬

prise. Entirely absorbed in their internal —

and internecine — affairs and party quarrels,

they had failed to observe the war clouds

gathering on the horizon. Only a few days be¬

fore the storm broke the king had told the

warring factions summoned to Buckingham

Palace that the ((cry of civil war® was ((on

the lips of the most responsible and sober-minded of my people.® No sooner, however,

than the European situation assumed-a serious

aspect, the Unionist opposition displayed a

magnanimous sentiment of patriotism by de¬

claring their wholehearted support of the gov¬

ernment in the face of possible perils from

without, an attitude entirely contrary to that

adopted by the Liberals over the South African war in 1899, when the Unionists were in power.

Party strife and criticism disappeared as by

magic in August 1914; the Premier's motions

for a vote of credit for £100,000,000 for war purposes and for the immediate addition of

500,000 men to the army were carried in the

House of Commons on 6 Aug. 1914 without a

dissentient voice. With equal promptness and

unanimity both Houses of Parliament passed

through all their stages a series of emergency acts of Parliament, the most important of which was the Defence of the Realm Act. The life

of a Parliament having been reduced from seven years to five years by the Act of 1911, a general election was consequently due in 1915, but was postponed owing to the war. As a substitute

a Coalition Ministry was formed in May 1915

and nine Unionists were admitted to the

Cabinet of 22. The number was raised to 10

in August 1916 by the appointment of a Union¬

ist (Mr. H. E. Duke) as Secretary of State for Ireland in succession to Mr. Birrell, a Liberal.

The Coalition Ministry collapsed unexpectedly

on 6 Dec. 1916. Mr. Asquith resigned and was

succeeded by Mr. Lloyd George, who formed a

special cabinet of five members for a more

vigorous prosecution of the war. The Cabinet

was composed of two Liberals and three Con¬

servatives (Unionists). In November 1917 the

War Cabinet was reconstituted by the addition

of two members, one being the Boer general,

Jan C. Smuts, of South Africa.

It may not be' out of place here to draw a

comparison between the two historic political

parties of Great Britain. The Liberals or

(<Whigs,® as they were formerly called, have

always been strong on domestic affairs and

social legislation. While they were generally

weak in the management of foreign affairs,

they possessed a remarkable faculty for setting the people by the ears and promoting class

antagonism by raising inflammable issues.

Measures such as church disestablishment, edu¬

cation bills, licensing, socialistic taxation, etc., generally formed the main planks in their plat¬

form. Idealistic and frequently impractical,

they were opposed, on principle, to the main¬

tenance of <(bloated armaments® and sought by

all means to keep expenditure on the navy and army as low as possible. The Conservatives or

(<Tories,® on the other hand, invariably pur¬

sued a strong — if sometimes mistaken — foreign

policy and believed in the efficiency of an over¬

whelmingly strong navy. In legislation they

generally left the people, as well as established systems, customs and laws as much as pos¬

sible alone. Since about 1908 there has grown

up among the British people an increasing dis¬

content with regard to the party system. Many

public men and journals have condemned it as

a ((farce,® a ((make-believe® and a <(hollow

sham,® and a general opinion was entertained

that one result of the European War would

be some revolutionary changes in British

politics.

Henri F. Klein,

Editorial Staff of The Americana.

11. PARLIAMENT. The British Parlia¬

ment has its roots deep in the past. It has

legislated continuously for a period of more

than 600 years, a record unapproached in the

history of the world. It has been developed

by successive stages from the Great Council

of the Norman and Angevin kings. Much of

its ceremonial dates from Plantagenet times.

I he foundations of this procedure are imbedded in Elizabethan journals. It holds its sittings

in a royal palace, which, though for the most part modern in its structure, is venerable in its associations. The new palace yard, through

which members of the House of Commons

hurry to their daily duties, is the yard of the new palace which William Rufus built, and

which is still represented by Westminster Hall.

There is scarcely a feature of Parliament which can be adequately described without long his¬

torical explanations. The present form of

Parliament, as divided into two Houses of

legislature, dates from the middle of the 14th century.

Parliament consists of the King, the House

of Lords, and the House of Commons, or, as

described in the enacting formula of acts of

Parliament, the King's most excellent Majesty,

the Lords Spiritual and Temporal, and the

Commons. These are not as is often, but

erroneously, supposed, the three estates of the realm. The clergy, who once counted as a

separate estate from the Lords and Commons,

have long ceased to do so. The two arch¬

bishops (Canterbury and York) and 24 bishops

sit, as Lords Spiritual, in the House of Lords.

The inferior clergy are for purposes of repre¬

sentation, merged in the laity, and represented in the Commons. An image of the full Parlia¬

ment, as it existed in Plantagenet times, may

still be seen when the king in person formally opens Parliament at the beginning of a session.

The king sits on his throne, attended by his

great officers of state. The benches of the

House of Lords are occupied by the Lords

Spiritual and Temporal, and by the peeresses.

The judges, summoned as attendants, sit on

their woolsacks in the middle. The Commons,

as beseems their humbler station, find such

room as they can, in or about the bar, with their speaker at their head.

The king, acting on the advice of his minis¬

ters, summons, prorogues and dissolves Parlia¬

ment. He communicates with the two Houses

by speech from the throne, commission, mes¬

sage and otherwise. He gives his assent to

bills by commission. But he does not take part in, or attend, the deliberations of either House.

Since Charles I attempted to arrest the five

members no king or queen has been seen in¬

side the House of Commons. Charles II sought

amusement in listeningto debates of the House of Lords, but his example has not been followed.

The House of Lords consisted in March 1918

of 692 members, including three princes of the Blood Royal — the Prince of Wales, the Duke

of Connaught and the Duke of Albany; 2

archbishops, 21 dukes, 29 marquesses, 128 earls, 57 viscounts, 24 bishops, 384 barons, 16 Scot¬

tish and 28 Irish representative peers. There

are, besides, 19 peeresses of the United

Kingdom and 4 Scottish peeresses in their own

right and 19 Scottish and 57 Irish peers who

are not members of the House of Lords. Rep¬

resentatives of the Scottish and Irish peerage

are elected by their peers, Scottish peers for each Parliament, Irish peers for life. But many of the peers of Scotland and Ireland are also peers of the United Kingdom and sit as such.

Of the barons a few hold life peerages, as being, or having been, Lords of appeal ; the other

Lords Temporal hold hereditary peerages.

The House of Commons consists of 670

members, 461 for England, 34 for Wales, 72

for Scotland and 103 for Ireland. Single-mem¬

ber constituencies are the general rule, but in a few cases one constituency returns two mem¬

bers. Every male householder who has resided

in his constituency for a year, and has paid or compounded for his rates, is entitled to be reg¬

istered, and, when registered, to vote as a par¬

liamentary elector for that constituency. This

is the most general franchise, but there are

others, including the occupation of lodgings

rented at £10 a year, and the ownership or

occupation of land or buildings of a certain

value. Eight universities return nine members

elected by their graduates. [Under the provi¬

sions of the Representation of the People Act

(6 Feb. 1918), to take effect at the first subse¬

quent general election, 31 new boroughs are to be created and 44 old ones extinguished. The

number of members will be increased by 37,

making a total of 707, provided there is no

withdrawal or diminution of the Irish represen¬

tatives in the interval. The basis of represen¬

tation is at the rate of one member for every 70,000 of the population in Great Britain and

one for every 43,000 in Ireland. The residen¬

tial qualification for voters is reduced to six months. The register will receive 8,000,000

new voters, of whom 6,000,000 are women,

voting for the first time in parliamentary elec¬

tions. It is estimated that the new register

will contain 16,000,000 voters, or one in every three of the population.] Subject to disqual¬

ifications arising from peerage, holding

of office, bankruptcy, and conviction of

treason or felony, every British subject

who is of full age is eligible as a member of the House of Commons. A peer of the United

Kingdom or of Scotland is not eligible, but a peer of Ireland is eligible for any but an Irish seat. For instance Lord Palmerston was an

Irish peer. _ Where a member of the House of Commons is described as a lord, he is either

an Irish peer, or, more frequently, a commoner holding a courtesy title as son of a peer. In the latter case the baptismal name is used, e.g., Lord Hugh Cecil — a son of the Marquess of

Salisbury. Members of the permanent civil

service, and most judges, are ineligible. All

clergymen of the Church of England, ministers

of the Church of Scotland, and Roman Catholic

clergymen are disqualified.

The evidence of election is the return sent

to the Crown office by the returning officer at the election. If the validity, of an election is disputed, the question is tried and decided by election judges appointed by, and from among

members of the High Court. A member must,

before sitting or voting as such, except in the election of speaker, take the oath of allegiance, or make an affirmation to the same effect.

The chief alterations in the electoral law

which took place in the 19th century were the Reform Act of 1832 which abolished pocket

boroughs and enfranchised the middle classes;

the Reform Act of 1867 which, by establishing

household suffrage and introducing the lodger

franchise in boroughs enfranchised the urban

workingman ; the Ballot Act, 1872, which in¬

troduced secret voting; the Reform Act of

1884, which enfranchised the rural laborer by

extending household franchise to the counties;

and the Redistribution of Seats Act, 1885, which 206

made single member constituencies the general

rule, and raised the number of seats to 670. As stated above, 37 seats are added by the Act

of 1918.

The two Houses hold their sittings in the

Palace of Westminster, which is appropriated

to their use and to the use of the offices con¬

nected with them. The chambers in which they

sit are so placed that, if the intervening doors are open, the King's throne at the south end

of the House of Lords is visible from the

speaker's chair at the north end of the House of Commons. The House of Commons does

not occupy the site of the old Saint Stephen's chapel, which was burnt down in 1834, but is

constructed on the same general plan, and does not provide sitting accommodation, in the body

of the House, for more than about 300 out of the 670 members. For discomfort of

crowding there is some compensation in case

of hearing.

The accident that the House of Commons

sits in a narrow room, with benches facing

each other, and not, like most Continental legis¬

latures, in a semicircular space, with seats

arranged like those of a theatre, makes for the two party system, and against groups shading

into each other.

The duration of a Parliament was limited by

the Septennial Act of George the First's reign to seven years, but its existence was always

terminated by dissolution before the expiration

of that period. The Parliament Act of 1911

reduced the maximum duration to five years.

This measure was introduced by the Liberal

government in April 1910. The royal proclama¬

tion which dissolves one Parliament always

summons another.

There are, or may be, several sessions of the same Parliament. A session is terminated by

prorogation, which is an act of the Crown, done on the advice of Ministers. The business of

each session begins with a King's speech, which announces its program, and ends with another

King's speech, which reviews its proceedings.

Each House has the power of adjourning its

sitting from time to time. Thus it adjourns

from day to day, and always adjourns for a

short recess at Easter and Whitsuntide. The

two Houses usually meet in February and sit

till some time in August, but sometimes hold

a late autumn sitting after an autumn recess.

The time of meeting is practically fixed by

the financial year, which ends on 31 March.

Estimates for the ensuing financial year can¬

not well be got ready before February, and

there is certain financial business which must

be got through before the end of March.

Each House has its own staff. The Lord

Chancellor is Speaker of the House of Lords,

and is assisted by a salaried Lord Chairman

of Committees. The House has a permanent

clerical staff with the Clerk of the Parliament at its head. The Gentleman-Usher of the Black

Rod, who has a Yeoman-Usher to assist him,

summons the Commons when their attendance

is required in the House of Lords, and per¬

forms certain other functions mostly cere¬

monial.

The Speaker of the House of Commons is

elected by the House from among its own

members for each Parliament. He is the rep¬

resentative and spokesman of the House in its

collective capacity (whence his name) ; he pre¬

sides at meetings of the House; and be de¬

clares and interprets its law. Though neces¬

sarily a party man representing a constituency, he is independent of party, and his tenure of office is not affected by a change of ministry.

His powers are more extensive than those of

the Speaker of the House of Lords. He has

an official residence, besides his salary ($25,000).

He is assisted by a chairman and deputy—

chairman of Ways and Means, who take the

chair at meetings of a committee of the whole House (there are temporary chairmen also)

and who can take the speaker's place as deputy speaker during his temporary absence. These

are the only members of the House who receive salaries as officials of the House.

The clerk of the House of Commons is the

head of its clerical staff. The sergeant-at-arms sees to the maintenance of order within

the precincts and to the execution of the orders of the House, and, as housekeeper, looks after its domestic staff and arrangements.

The law of Parliament consists of the rights,

usages, practice and regulations of each House.

It may be classified, from a Benthamic point of view, as a substantive law of rights and privi¬

leges, and an adjective law of procedure; or,

again, as an unwritten customary law to be

gathered from precedents and decisions, and

an enacted law to be found in orders of the

Houses. The substantive law would include

the rules which govern the rights of each

House, or of the individual members of each

House, in their relations to each other, to the Crown, to the executive and judicial authorities of the country, and to individuals and bodies

outside Parliament.

The privileges which are formally claimed

by the House of Commons through its speaker

at the beginning of each Parliament, bulked

large in the 1 7th century controversies between the King and Parliament, and were much in¬

sisted on by the Commons of the 18th century, but in the 20th century have retired into the background. The cases in which a member of

Parliament, as such, can claim any exceptional

privilege or immunity are now few and rare.

The House of Lords is not only a branch of

the legislature but the ultimate Court of Ap¬

peal from the ordinary courts of the United

Kingdom. (Appeals from the colonies and de¬

pendencies and ecclesiastical and certain other

appeals lie to the Judicial Committee of the

Privy Council). It performs its judicial func¬

tions exclusively through those of its members

who hold or have held high judicial offices. It holds its judicial sittings in the morning, and can sit judicially when the legislature is not sitting. For legislative and general business,

its sittings begin at 4.15 in the afternoon and, as a rule, are not of long duration. The cases in which they extend over the dinner hour are exceptional. It does not sit on Wednesday or

Saturday.

The House of Commons, when in session,

sits from 2.45 to 11 on Monday, Tuesday, Wed¬

nesday and Thursday, and from 12 to 5 on Fri¬

day. It begins with uncontentious private bills and other formal business. Questions to Min¬

isters (which are not put on Fridays), occupy

or may occupy the time till 3.45. As soon as questions have been disposed of, the public

business of the day begins. Opposed business

is not taken after 11, unless it belongs to a GREAT BRITAIN—PARLIAMENT (11)

special ˆexempted® class, or unless the eleven

o'clock rule is suspended.

The business of the House of Commons is

threefold, legislative, financial, critical. It

makes laws with the concurrence of the House

of Lords and of the Crown. It imposes taxes

and appropriates revenue. By means of ques¬

tions and discussions, it criticizes and controls the action of the executive.

While a project of law is before either of

the two Houses it is called a bill. When it has received the royal assent it is called an act.

A bill may be introduced into either House

by a member of that House. When it has been

introduced, it is read a first time and is printed by order of the House. The stage of first

reading is formal. On the second reading

questions of principle are discussed. If the

second reading is affirmed, the bill goes to a committee, which, in the House of Commons, is

either a committee of the whole House, or one of the standing committees on bills, or a select committee. In the absence of special order it

goes, under the existing orders, to a committee of the whole House.

A committee of the whole House is really

the House itself sitting in a less formal man¬

ner, presided over by a chairman at the table, the speaker's chair being vacant, and freed

from some of the restrictions which attach to

proceedings when the speaker is in the chair.

The standing committees on bills, of which

there are at present two, are constituted by the committee of selection, and are intended to be microcosms of the whole House. Each of them

consists of not less than 60 members, and the quorum of each is 20.

A select committee is appointed by the

House, and its members are nominated by the

House itself, or, in some cases, either wholly or partially by the committee of selection.

The nomination of members by the House is

made in pursuance of arrangements between

the (<whips® of tiie several parties. There may be joint select committees of the two Houses.

When a bill has gone to a select committee, it must subsequently pass through a committee of

the whole House, but this is not a case with a bill sent to a standing committee.

At the committee stage a bill is gone through clause by clause, and amendments are pro¬

posed, discussed, and, if agreed to, made in the bill. When the consideration of a bill in com¬

mittee is concluded, it is reported to the House, with or without amendments, as the case may

be. On consideration of the report, there is

an opportunity for making further amendments.

The next stage is the third reading. In the

House of Commons this is the final stage, and only verbal amendments can be proposed. In

the House of Lords substantial amendments

can be moved at this stage, and also on the

subsequent question, not put in the House of

Commons <(that this bill do pass.®

When a bill has been passed by either

House it is sent by message to the other House to pass through its several stages there. If

the second House amends a bill thus sent to it, it requests the concurrence of the originating

House in the amendments. Should the two

Houses differ, amendments and counter amend¬

ments pass to and fro until an agreement is

arrived at. Until the Parliament Act of 1911 .

jf no agreement could be arranged, the bill

dropped. If a public bill was not either passed or withdrawn in the course of a session, it

lapsed at the end of that session.

The Parliament Act, however, introduced

some profound modifications in constitutional

procedure and parliamentary practice. These

changes are explained in the next article.

The final stage of a bill is the royal assent, which is given, by commission, in the House of Lords, in the presence of representatives of

both Houses. As the king can only act on the advice of his Ministers,

who presumably com¬

mand a majority in one of the two Houses, the royal assent to a bill is now given as a matter of course. The last instance of refusal was in the reign of Queen Anne.

A distinction is drawn between public bills,

the object of which is to alter the general law, and private bills, the object of which is to alter the law relating to some particular locality,

or to confer rights on or relieve from liability some particular person or body of persons.

The procedure on private bills differs materi¬

ally from that on public bills, and is governed by a different set of standing orders.

Every private bill goes, after second read¬

ing, to a small committee, before whom, if the bill is opposed, witnesses are called and counsel heard. The proceedings before these com¬

mittees are quasi-judicial in their nature.

Many things which used to be done by private

bills, are now done by provisional orders, which are made by a public department, after, local

enquiry, and when made, are confirmed by

provisional order confirmation bills, to wh'ch

they are scheduled. Sometimes, to prevent

hardships, the proceedings on a private bill are continued, by special order, to another session.

The right of granting money in Parliament

belongs exclusively to the House of Commons.

The House of Lords assents to, and could re¬

ject, a grant of money, but cannot initiate or alter a grant. T he Parliament Act (q.v.) de¬

prived the Lords of all powers to interfere with money bills.

The right of the House of Commons to

grant or raise money is subject to two import¬

ant restrictions. It cannot vote money except

in pursuance of a request from the Crown. It

cannot impose or increase a tax unless the tax or its increase is declared by the constitutional advisers of the Crown to be necessary for the public service.

The demand by the Crown for the grant of

money for the service of each financial year is made in the speech from the throne at the be-

* ginning of each session. As soon as practicable afterward estimates are presented to the House

showing the amount which will be required for

the public service. Supplementary financial

estimates for the current financial year are also, if necessary, presented. The ordinary annual

estimates are presented in three parts or divi¬

sions, each comprising one of the three branches of the public service, namely, the navy, the

army and the civil service. Each estimate con¬

tains first, an estimate of the total grant thereby demanded, and, then, a statement of the detaded expenditure under each grant, divided into sub¬

heads or items. For the purpose of considering these estimates, and voting the money renuired, the House resolves itself, at the beginning of each session, into a committee of the whole

House, which is called the committee of supply.

Not less than 20 days must be allotted in each session for the sittings of this committee. Votes which have not been previously considered and

disposed of by the committee are passed en bloc at the end of the session. When the resolutions for the votes have been passed by the committee they are reported to and confirmed (technically (<agreed to®) by resolution of the House. Reso¬

lutions authorizing the grant, out of the consoli¬

dated fund of the money required to make good the supply voted in committee of supply, are

passed by another committee of the whole

House, called the committee of ways and means, and are also confirmed by resolutions of the

House. And these resolutions are finally con¬

firmed by one or more Acts of Parliament called Consolidated Fund Acts, and by the annual Ap¬

propriation Act which is passed when the supply for the year has been disposed of. Before the end of each financial year a vote on account is always necessary to supply the current expenses of the civil service

during the next financial year, and, for a similar reason, a sufficient

amount of money must also be voted for the

navy and army, in whose case there is greater facility for transferring money provisionally

from one vote to another. A Consolidated Fund

Act confirming these votes must also be passed before the end of the financial year, i.e., before March 31. It follows from the principles laid

down above, that the committee of supply and

• the House can reduce, but cannot increase, a grant asked for by the estimates. Nor can they alter its destination.

Once a year the Chancellor of the Exchequer,

in committee of ways and means, makes his

annual budget statement, reviewing the revenue

and expenditure of the past financial year, esti¬

mating the revenue and expenditure for the

next financial year, and proposing such increases or remissions of taxation as are in his opinion required for, or justified by, the position.

These proposals are embodied in resolutions

which, when passed by the committee of ways

and means, and agreed to by the House, are

confirmed by an Act of Parliament, called the

Finance Act of the year. Here again the House and its committee can dissent from, or reduce, a proposed tax, but cannot impose or increase

a tax.

Under the Cabinet system the executive gov¬

ernment is dependent on the support of Par¬

liament, and, in particular, of the House of

Commons. The king appoints a Prime Minister

who can command a majority in that House.

The Prime Minister selects the members of his

Cabinet, and the holders of minor political of-'

fices, from among those of his followers who

have, or are likely to have, seats in one of the two Houses. The Ministry as a whole, and

each Minister separately, is responsible to Par¬

liament, and particularly to the House that sup¬

plies the money without which government can¬

not be carried on. If a Ministry cannot retain the confidence of that House the Prime Minis¬

ter must either resign or appeal to the country by a dissolution of Parliament.

The control of the House of Commons over

the executive government can be exercised,

not only by withholding assent to the legisla¬

tive and financial proposals of the government, but in various other ways. Thus it can obtain information as to the proceedings of the gov¬

ernment by means of questions and of orders

for the production of documents.

Any member has the right to address a question to any Minister of the Crown, being also a member of the House, about the public affairs with which he is officially connected, or a matter of administration for which he is re¬ sponsible. The proper object of such a ques¬ tion is to obtain information on a matter of fact within the special cognizance of the Min¬ ister, and the rules and practice of the House limit the right to ask questions so as to con¬ fine them to this object. Except in special cases, notice of any such question must appear on the notice paper at least one day before the answer is to be given. If a member wishes his question to be answered orally, he marks it with an asterisk, and a time is set apart at the beginning of each afternoon sitting for the answering of such questions. Debate is not allowed during this period, but an unsatisfac¬ tory answer may, if the matter is of sufficient urgency and importance, give rise to a motion for adjournment, so as to provide opportunity for discussion at a later period of the day.

The House can, on the motion of any mem¬ ber, obtain returns supplying such information on matters of public importance as is obtain¬ able through departments of the government.

A motion for a return may be opposed on

grounds of public policy, such as that the dis¬

closure of the information sought is not for

the public interest, or that its supply would in¬

volve unreasonable labor and expense, but much

information thus sought is periodically supplied in the form of <(unopposed returns.® The gov¬

ernment can also, and frequently does, on its

own initiative, lay papers before the House.

Such papers are known as “Command Papers.®

These returns and papers, together with the re¬

turns presented in pursuance of directions con¬

tained in Acts of Parliament, and the Reports

of Parliamentary Committees and of Royal

Commissions, make up the formidable mass of

official literature popularly known as ((Blue

Books.®

But the principal opportunity for criticising

the administrative action of the government is

afforded by the discussions in committee of

supply, for which, as has been stated above, a minimum number of days must be set aside in

each session. On the old principle that redress of grievances should precede the grant of

supply, the action of each Minister and of the departments and officers over whom he has

control, can be discussed on the vote for the branch of expenditure concerned. As has been

seen, the House can reduce but cannot increase expenditure proposed by the Crown, and there¬

fore any complaint made in committee of sup¬

ply must be based on a motion for reduction of a vote, even, paradoxical as it may seem, though it be a complaint of insufficient expenditure.

Other opportunities for criticising the action of the government and raising questions of public

policy are supplied by the debate, at the begin¬

ning of each session, on the address in reply to the speech from the throne, by debate on mo¬

tions which must be made when the House first goes into committee of supply on the navy,

army and civil service estimates respectively, by the evening sittings appropriated to the discus¬

sion of private members' motions, by the second and third reading stages of the Consolidated

Fund Bills and the Appropriation Bill, and by

the motions which have to be made for the ad¬

journment of the House over a recess.

A full account of parliamentary procedure would be impossible here. Some points have been touched on above, a few others may be briefly noted.

Each House has power to make its own orders, supplementing or modifying its cus¬ tomary rules of practice. A standing order continues in force until repealed. Other orders may be made for a particular session, for a more limited period, or for a particular oc¬ casion.

In the House of Commons any question of the law or practice of the House is decided, as a point of order, by the speaker, or, in com¬ mittee, by the chairman.

In the House of Commons, government business has precedence at most sittings, and Thursdays are usually devoted to committee of supply. Private members' bills have prec¬ edence on Fridays, and private members' motions have precedence, during part of the session, between 8.15 and 11 on the evenings of Tuesday and Wednesday.

The quorum of the House of Commons, arfd

of a committee of the whole House, is 40, in¬

cluding the speaker or chairman. (In the

House of Lords the quorum is 3).

A matter requiring the decision of the

House or of a committee is decided by means

of a question put from the chair on a motion proposed by a member.

If the opinion of the speaker or chairman

as to the decision of a question is challenged, he allows two minutes to elapse, in order to

enable members to assemble, and then puts

the question again. If his opinion is again

challenged he directs the (ayes5 to go to the right and the Poes 5 to the left, and appoints two tellers for each. The (ayes) and (noes5

then pass through their respective division lob¬

bies, on each side of the House, their names

are taken down by the division clerks, and they are counted by the tellers, who announce the

result at the table of the House.

If a debate on a question is unduly pro¬

tracted, it can be terminated by means of what is called the closure, the procedure on which is as follows : A member rising in his place may claim to move <(That the question be now put,55

and, unless it appears to the chair that the

motion is an abuse of the rules of the House, or an infringement of the rights of the House, this preliminary question must be put forth¬

with, and, if it is carried, the main question is put forthwith and decided without amendment

or debate. But a motion for the closure can¬

not be carried unless it appears on a division that not less than 100 members voted in the

majority in its support. The result is to leave to the chair discretion as to the time and cir¬

cumstances in which closure should, with pro¬

priety, be granted.

The speaker and chairman are also clothed

with powers for checking irrelevance, prolixity, repetition and obstruction, for preventing the

abuse of dilatory motions, and for maintaining

order and decorum. If a member is guilty of

grossly disorderly conduct, the speaker or the

chairman of a committee of the whole House

can order him to withdraw from the House.

vol. 13 — 14 •

If a member disregards the authority of the

chair, or abuses the rules of the House by per¬

sistently and wilfully obstructing its business, he can be (<named55 for the offence by the

speaker or by the chairman of a committee of

the whole House, and the House can, on motion made, make an order suspending him from the

service of the House for the rest of the session Orders of this kind, when made by the House,

or by the speaker or chairman, are enforced if necessary by the sergeant-at-arms with such

assistance as may be required. In the case of grave disorder arising in the House, the speaker may, if he thinks it necessary, adjourn the

House without question put, or suspend the

sitting.

The Parliament at Westminster is not only

the oldest, but the mother of all existing Par¬

liaments. Those who framed the constitution

of the United States took the British constitu¬

tion as their model, but studied it through the spectacles of Montesquieu, and thus brought

about that separation between the executive

and the legislative powers which makes such

an essential difference between the British

House of Commons and the American Congress.

English parliamentary procedure has made the

tour of the world. The rules adopted by the

French assembly after the Restoration were

based on a sketch of English parliamentary pro¬

cedure supplied to Mirabeau by Dumont. The

influence of English practice, derived either di¬

rectly or through the medium of France, can be traced in the procedure of all Continental legis¬

latures. Thomas Jefferson, when President of

the United States, drew up for the use of Con¬

gress a manual consisting largely of extracts

from English parliamentary precedents, and

Jefferson's Manual is still an authoritative work.

Every legislature of a British colony conforms

to the rules, forms, usages and practices of the British House of Commons, except so far as

they have been locally modified. Of all parlia¬

mentary institutions throughout the world the

Parliament at Westminster remains the arche¬

type.

Bibliography. — May, T. E., (A Treatise on

the Law and Usage of Parliament (new ed.,

London 1912), and Parliamentary Practice5

(10th ed., 1893) ; (Manual of Procedure of the Public Business of the House of Commons,5

prepared by the Clerk of the House for the use of members and laid on the table by Mr.

Speaker (1904) ; Bagehot (Walter) (The Eng¬

lish Constitution5 (new ed.. 1913) ; Anson (Sir William) Paw and Custom of the Constitu¬

tion5 (Part I, Parliament, 4th ed., London

1907) ; Dicey, (The Law of the Constitution5 ; Todd, Alpheus, Parliamentary Government in

England5 (2d ed., 1887-89, out of print)-, Do, abridged and revised by Sir Spencer Walpole

(London 1892, a very useful abridgement of

Todd's work) ; Ilbert, Sir Courtenay, (Legislative Methods and Forms5 (Oxford 1901) ;

Courtney, Lord, formerly Rt. Hon. Leonard,

<The Working Constitution of the United

Kingdom5 (London 1901); Low, Sir S., (The

Governance of England5 (London 1904). For

the early history of Parliamentary procedure

consult Stubbs, Constitutional History of Eng¬

land5 (esp. ch. xx). For Parliamentary pro¬

cedure before the Reform Act of 1832, consult

Porritt, (The Unreformed House of Commons5

(Cambridge 1903). The fullest historical ac¬

count of English Parliamentary procedure is to

be found in Redlich (Recht und Technik des

Englischen Parliamentarismus) (Leipzig 1905).

For documents illustrating the development of

Parliamentary institutions consult Stubbs Se¬

lect Charters, EtcP ; Prothero, < Select Statutes, EtcP ; Gardiner, S. R., (The Constitutional

Documents of the Puritan Revolution (Ox¬

ford 1877).

Courtenay Ilbert,

Clerk of the House of Commons ; author of

c Parliament* iThe Mechanics of Law

Making P

12. PARLIAMENT ACT, 1911. This im¬

portant measure was introduced by the Asquith

administration in April 1910, with a threefold

object: (1) to reform the House of Lords by

substituting a popular or representative basis

for the hereditary one then (and still) existing; (2) to restrict the vetoing powers of the Lords in regard to money and other bills; and (3)#

to reduce the life of a Parliament from seven to five years. Though the entire measure be¬

came law, no step had been taken up to 1921

to alter the constitution of the Upper Chamber ; the two other provisions are in force. The

measure was forced through the House of

Commons on 15 May 1911, after a series of

stormy debates lasting 23 days, thus bringing

to a close the historic struggle which had raged between the two Houses of Parliament for 18

months. See Political Parties.

The act provided (1) that if a money bill,

having been passed by the Commons, and sent

up to the Lords at least one month before the end of the session, is not passed by the House of Lords without amendment within one month

after being so sent up, the bill shall become law, notwithstanding that the Lords have withheld

their consent. It was left to the speaker to

decide what is or is not a money bill, and his certificate to that effect must accompany the

bill on its journey to the Lords; (2) if any bill other than a money bill is passed by the House of Commons in three successive sessions

(whether of the same Parliament or not), and

is rejected by the Lords in each of those ses¬

sions, it shall become an act of Parliament on its third rejection. This provision, however,

does not take effect unless two years have

elapsed between the date of the first introduc¬

tion of the bill and the third passing*in the House of Commons. If the House of Lords

does not pass any such bill without amendment, it shall be deemed to be rejected unless the

amendment meets with the approval of both

Houses. It will be seen at a glance that the Parliament act not merely <(restricted® the veto of the House of Lords, but removed it alto¬

gether, leaving in its place only the power to ((hang up® a measure, in other words, to delay a legislative proposal without being able to

make any alterations or amendments unless the

other House agrees to accept them. The House

of Lords being at all times overwhelmingly con¬

servative, it had long been a legitimate griev¬

ance of Liberal administrations that their legis¬

lative measures suffered far more severely than did those of the Conservative or Unionist

party, when in power, at the ˆrevising® hands

of the Lords. After weeks or months of fierce Parliamentary fighting, the Liberals had fre¬

quently carried some highly contentious bill

through a third reading in the Commons only

to see it (<thrown out® or extinguished by the Lords in a few minutes. The Parliament act

removed that obstacle with one bold stroke.

A committee was appointed to inquire and

report on the nature and limitations of the

legislative powers to be exercised by the re¬

formed Second Chamber, and the best mode of

adjusting differences between the two Houses.

Henri F. Klein,

Editorial Staff of The Americana.

13. CROWN AND CABINET. The crown

is a chattel, and is kept in the Tower of London.

But the genius of the British race, striving un¬

consciously toward the expression of national

unity and permanence, has come to personify

it as a power, which, though necessarily wielded by or in the name of an individual ruler, exists independently of the lives of kings and queens.

The materials of which the crown is composed

will outlast the lives of many rulers. Whilst

they are mortal, is it no-t, in the strictest sense, immortal ?

The late Dr. Hearn pointed out, in his ad¬

mirable work entitled (The Government of Eng¬

landˆ that, in spite of the progress toward

democracy of the 19th century, the British Con¬

stitution remained, in a very real sense, a mon¬

archy. Not only is it still true that, as regards all foreign communities, the empire is repre¬

sented by the monarch alone, and that it would be a gross breach of political etiquette for any person or body to attempt to open up any other channel of official communication with a foreign community, but it is equally true, that every in¬

ternal act of State — legislative, executive, or judicial — both in the United Kingdom and in

the dominions beyond the narrow seas, is done

in the name of the monarch, and that no such act can be ultra vires. It is of the essence of the British conception of State sovereignty that the monarch is incapable of committing legal

wrong.

This apparently Oriental dogma is, however,

balanced by the equally fundamental doctrine,

that for every political act of the monarch there is an appropriate agent, and that such agent acts at his peril. In some cases, the peril is remote and uncertain ; in others it is prompt and defi¬

nite. The Parliament which advises bad legis¬

lation is amenable only to the judgment of the electors expressed at the polls. The judge who abuses his office, though he may be dismissed

by the monarch for actual illegality, is amen¬

able, so far as the citizen is concerned, only to the vote of Parliament. But the executive

official who breaks the law is liable to an action in the ordinary courts by the humblest citizen whom he has injured; and his plea of C(superior orders,® though it may involve the superior also in liability, will not absolve the actual delin¬

quent. And thus, inasmuch as, in the enormous

complexity of State action, it is hardly possible for the personal act of the monarch to reach

the individual except through the hands of some intermediary, the subject is rarely without re¬

dress. Even the House of Lords, the greatest

anomaly in the constitution, can be made to

feel the pressure of public opinion.

The Independence of Ministers. — The nat¬

ural consequence of this fundamental principle

of the responsibility of the Crown agent is the in-211

dependence of the agent toward the Crown.

Historically speaking, the claim of independence was first put forward by the judiciary, whose

members, though for centuries both in law and

in fact the servants of the monarch, liable to dismissal at pleasure, succeeded, before the end of the Middle Ages, in banishing the King from his own law courts, and in acting as an inde¬

pendent department of state. Down to the end

of the 17th century, their success varied with the political balance of power; but it was as¬

sured, soon after the Revolution, by the Act of Settlement, which, in fact, made the judges in¬

dependent of the Crown, though still, techni¬

cally, liable to dismissal for actual misconduct.

Meanwhile, Parliament, a later institution

than the courts of law, had, by a series of strug¬

gles which have made it famous in the world's history, succeeded, not merely in emancipating

itself from the control of the monarch, but in establishing itself as an essential part of the national government. The history of these

struggles is told elsewhere.

Here it is sufficient to remember that, on his restoration to the throne, Charles II realized that Parliament could be cajoled, but could no longer be bullied. Even the enthusi¬ astic loyalty of the Restoration Parliaments would not tolerate violence, though it fell a somewhat easy prey to the more sinister in¬ fluence of corruption.

The executive was much longer in securing its independence. Down to the Revolution, the holders of executive offices were, in fact as well as name, ((His Majesty's servants.® Out¬ side legislation and judicature, the personal will of the King directed the policy of the country, subject only to the indirect check of a refusal by the House of Commons to grant supplies. But, with the accession of a foreign ruler, in the per¬ son of William III, and a renewal of the for¬ eign element with the accession of the House of Brunswick, affairs rapidly changed. William was absorbed in great foreign schemes, and left home affairs to his Ministers. Anne was lethargic, and indifferent to matters which did not concern her personal comfort or the inter¬ ests of the Church. George I knew no English, and soon ceased to

attend meetings of the Coun¬

cil, except purely formal meetings where his

presence was absolutely essential. Thus the real control of affairs passed into the hands of the great officials of state.

At this point there was a real danger (not

sufficiently appreciated by English historians)

that the government of England would become

a bureauracy, each department in effect the

private preserve of its chief, pursuing its way regardless of, or even in opposition to, the other departments, and intriguing for power and

privilege. From this danger the country was

saved by the peculiarities of the political situa¬

tion, and by the financial power, based on long established tradition, of the House of Com¬

mons.

Ministers and the House of Commons. —

During the first half of the 18th century, the dominating feature of the political situation

was the possibility of a Jacobite restoration. So long as the throne was occupied by a daughter of James II, or even by the husband of one of those daughters, the country accepted the Revo¬

lution settlement with acquiescence, if not with enthusiasm. But, when it became clear that

Anne would leave no heir, the hopes of the

Jacobites revived. It was with difficulty that

the Queen herself had been brought to accept

the scheme of the Act of Settlement of 1701,

by which the succession to the throne, on the failure of her issue, had been settled on the Princess Sophia of Hanover, the granddaughter

in the female line of James I. The politically useful legend, that the «01d Pretender® (the

son born to James II on the eve . of his flight) was a supposititious child, had long been ex¬

ploded; the child himself, now a young man of winning personality, was prepared, at Anne's

death to vindicate the claim which had passed

to him on the death of his father; and the

Queen was believed to sympathize fully with his ambitions. The House of Hanover was re¬

garded as a mere stalking-horse for the ambi¬

tions of the Whig statesmen; and the first two of its princes to occupy the throne of Great

Britain and Ireland were looked upon by the

mass of the people as foreigners. In 1715, and again in 1745, the fate of the throne trembled in the balance.

Thus the Ministers of George I and George

II carried their lives, or at least their fortunes, in their hands. A Jacobite restoration meant,

at the very least, banishment and confiscation

for them, if not something worse. They could

not afford to run unnecessary risks.

There can be little doubt that the Whig

leaders would have been glad, in spite of their constitutional principles, to dispense with the

presence of Parliament during these troubled

years. Apart from the possibility — the prob¬

ability — that it might result in an accession of strength to the Jacobites in the House of Com¬

mons, there w<as always the fear that the

license of a general election would be made

the cover of a Jacobite coup de main. This

fear is shown by the striking step taken soon after the accession of George I ; when the

Parliament, at the urgent instigation of Minis¬

ters, prolonged the term of existence, not

merely of its successors, but of itself, from three to seven years, by the Septennial Act of 1715.

Fortunately, however, it was not possible for

the Whig leaders to disp.ense with the assistance of Parliament; and this for the good old reason which had for so long been the sheet-anchor of Parliament in its struggle for power. In spite of the large hereditary revenue settled upon the Crown at the Restoration, and the rich inherit¬

ance of the Crown lands, George I and George

II, like their predecessors, continually needed

money ; and the only stable source of money was a vote of the House of Commons. The chief

secret of Walpole's favor at court, as well as of his ascendancy over his colleagues, was the power which he possessed of securing this vote.

For the first time in the history of England, the power of the executive depended, openly though

not officially, on the fluctuating moods of the representative House.

Gradually, then, by the teaching of events,

the Ministers of George I and George II began to realize the conditions upon which Cabinet

government depends for its success. It was

necessary, if they were to prevent the commis¬

sion of blunders which might bring down the

dynasty and its supporters in one common ruin, that they should, in fact, control the action of the king. To secure this control, naturally very distasteful to monarchs brought up in the abso-212

lutist traditions of mediaeval Germany, it was

necessary that they should (under forms of

deferential politeness) be able both to coerce

and to bribe the occupant of the throne. So

long as they acted as individuals, the former

object was unattainable; for both George I and George II were quite shrewd enough to be able to play off one rival against another. But a

threat of resignation by all his Ministers at

once was more than a foreign ruler, ignorant

of the temper of his subjects and of the ma¬

chinery of government, could safely disregard.

Equally was it desirable, if not essential, that Ministers, if they desired to bribe the king,

should act together. For the means of bribery

were only to be obtained from the House of

Commons ; and that House, though it doubtless

regarded this new harmony of Ministers with

deep suspicion, found it more difficult to refuse supplies demanded by the unanimous voice of

the government, than when it could plead as

an answer to the demands of one Minister, that his colleagues differed from him as to the wis¬

dom of his plans. Thus gradually, from no

very honorable motives, but as a mere counsel

of expediency, Ministers acquired the habit of

talking over their plans together; and the rival, and often openly quarrelling Ministers of

William III and Anne, were replaced by the

Cabinets of George I and his son. No doubt

the unanimity, such as it was, was mainly super¬

ficial ; but, for all that, in a matter wherein ap¬

pearances counted for much, it was important.

The Modern Cabinet. — So much it seemed

necessary to say to account for the appearance in English politics of a phenomenon so remark¬

able as the Cabinet, and so difficult to refer, for an explanation of its origin, to any particular crisis or any official document. Indeed one of the most striking features of the Cabinet system is its wholly informal character — a feature

which adds both to its utility and to its interest as an object of study. It is natural, no doubt, that no one but those who have taken part in its proceedings should be able to speak authori¬

tatively of the details of the working of a

great political organ. But it is none the less curious that, until the appearance of the

masterly essay of Bagehot, entitled (The Eng¬

lish Constitution, > in 1867, even the general out¬

lines of the system by which they had in fact been governed for upward of a century should

have been unfamiliar to a people so keenly

interested in politics as the British. And yet that such was the case is shown by the almost ludicrous difficulties experienced by the self-governing colonies of Australia, when, in the

50's, they endeavored to introduce it into their new constitutions.

But here we must leave the historical

method, passing by the vigorous but unsuccess¬

ful attempt of George III to overturn a system which he thoroughly disliked, the brilliant new development introduced by Pitt in his gallant

struggle against the coalition of Fox and North in 1784, the remonstrance made by Queen Vic¬

toria against the application of its principles to the famous ˆBed-chamber® question in 1839,

and the more successful vindication of her

rights by the same monarch against Lord

Palmerston in 1850. Let us make some attempt

to enumerate the essential features of the system as it exists to-day.

Its Executive Character. — The first point

to notice is, that the Cabinet is not a mere coun¬

cil of political experts, but a body of working administrators. With one or two exceptions,

each of its members is actually responsible to Crown and Parliament for the conduct of some

department of State. It is true that he is

almost invariably, chosen rather for his general political importance than for his skill in the affairs' of his department, i.e., an office is found for him because his presence in the Cabinet is desirable. But, none the less, the official char¬

acter of its members gives the Cabinet a power which no mere advisory council could ever

exert. Not only is the Cabinet aware of the

awkward secrets of public business, and the

practical difficulties of carrying out any line of policy, it is its own executor ; for, except in the improbable case of disloyalty to his col¬

leagues, the Minister to whose department the

carrying out of that policy belongs, at once

insists upon its adoption by his subordinates,

the officials of his department.

Its Parliamentary Influence. — In the sec¬

ond place, and still more important, the Cabinet wields vast Parliamentary influence. In effect,

its members are invariably members of Parlia¬

ment, though, legally speaking, no one of them need be ; and most of them are men of com¬

manding personal weight in the House of Com¬

mons. We have seen how the necessity of

conciliating Parliament was forced upon the

Ministers of George I and George II. It is now fairly well understood that the influence exer¬

cised by those Ministers was obtained by means not the most creditable. But the death-blow to Parliamentary corruption, already checked by

the Place Act of 1742, was dealt when Pitt

appealed from the House of Commons to the

country in 1784; and the coup de grace was

given by the Reform Act of 1832. Since that

date the place of the old sinister influence of the ˆspoils® has been taken by the organization of the party system (see Political Parties) ; and the substitution of examination for patronage, in the vast mass of appointments to the permanent civil service (q.v.) has rendered the working of the party system comparatively pure. For the

most part, Ministers control Parliament by the

support of followers who honestly believe their policy to be good, or, at least, the best available ; and such corruption as exists is confined to the polling booths.

The Escape of 1705. — One of the most

curious facts in the whole history of the Cabinet is that this control of Parliament by Ministers was very nearly becoming, so far at least as

the House of Commons was concerned, a legal im¬

possibility. The Act of Settlement of 1701 (so often alluded to) contained a clause expressly

excluding from the representative House all

holders of office under the Crown. This part

of the act, however, was not intended to take effect until the accession of the House of Han¬

over; and, before that date, it had been repealed by another act of the year 1705. But neither

the statesmen of 1701 nor those of 1705 appear to have had any idea of the importance of the question.

Dependence of the Cabinet on the House

of Commons. — But it is of the first importance to remember that the influence of the Cabinet

on Parliament is at least counterbalanced by the influence of Parliament on the Cabinet. Apart

from the general attitude of the House of Com-GREAT BRITAIN — CROWN AND CABINET (13)

mons toward Ministers, which is, of course,

vital, the opportunities which occur in both

Houses for criticizing every action of the

Executive are of daily occurrence during the

session of Parliament. In fact, one of the chief cares of the Prime Minister in forming his

Cabinet is to provide acceptable champions of

its acts in either House. It is a constitutional maxim, that every department must be repre¬

sented in both Houses, so that there may always be present some responsible Minister to ex¬

plain and give information upon any point of

administration which any member of either

House may. choose to raise. This explanation

and information are rendered chiefly in the form of answers to questions of which due notice has been given ; and a glance at the Question-Paper for any day will reveal the vast and detailed mass of information which Ministers must be

prepared to supply to Parliament. A Minister

can, of course, plead ((reasons of State® for

withholding information. But such a plea is

apt to provoke suspicion ; and if, for that or any other reason, the reply of a Minister is not

considered satisfactory, further steps can be

taken (such as a motion for adjournment, a

proposal to reduce the estimates, or even a vote of want of confidence), in order to impress upon a Cabinet the error of its ways. The discus¬

sion on the budget is the grand opportunity for criticism of the executive by Parliament ; and, though the power is sometimes abused, it can¬

not be denied that the constant liability of

Ministers to justify their conduct in Parliament is one of the most valuable principles of the Cabinet system.

But the essential character of that feature

of the Cabinet system which we are now dis¬

cussing, is best proved by the unquestioned rule of constitutional custom : that a Cabinet de¬

feated on an actual vote in the House of Com¬

mons must instantly either resign or persuade

the king to dissolve Parliament. The former

alternative, established by the resignation of

Walpole in 1742, on the apparently irrelevant

question of the Chippenham election, was long

thought to be the inevitable sequel of defeat in the House of Commons. But Pitt, in 1784,

added the second alternative, with striking suc¬

cess. Whether the king is bound to grant a

dissolution upon the request of a Cabinet, is a delicate question which is said to turn on the point whether the Cabinet was in office when

the previous general election occurred. If so,

the country has pronounced its opinion ; and

the Cabinet is not entitled to a second verdict.

Probably, however, the true doctrine is, that if there is any reasonable probability of the Cabi¬

net securing a majority in the country, it is en¬

titled to a dissolution. Needless to say, if the verdict of the polls is against it, the Ministry at once resigns, as Gladstone's government did in

1874, and Lord Beaconsfield's in 1880. It may

be incidentally remarked, that the fall of the Cabinet results in the resignation of about 30

other high officials, e.g., the law officers, the undersecretaries of state and the chief house¬

hold officials, who, though not members of the Cabinet, are more or less in its confidence and are, in contrast to the permanent officials of the civil service, ((liable to retire from office on political grounds.® These removable officials,

together with the Cabinet, constitute the (<Government® or ˆMinistry.®

Informal Character of the Cabinet — The

third cardinal principle of the Cabinet system

is its completely informal character. The Cabi¬

net is indifferently described as a committee of Parliament and a committee of the Privy Coun¬

cil ; but, in law it is neither. It is true that in eadi House of Parliament there is a Ministerial (not a Cabinet) bench; and that, in the House of Commons, the Cabinet wields a great and

growing control over business. None the less,

it is undoubted that its members sit by virtue of their membership of the House and not by

virtue of their offices and that the measures

which they propose, though commonly called

<(Government measures,® are, with the exception

of financial proposals, technically brought for¬

ward in their capacity of influential members of the House, and *not as Crown officials. Even

the King's Speech, though unquestionably drawn

up by the Cabinet, is delivered in the House of Lords by the King

himself or by special com¬

missioners ; while in the Commons it is read by the Speaker, who is not a government official.

On its executive side, the Cabinet is equally

informal. Its members are always made mem¬

bers of the Privy Council, in order that the

oath of secrecy may be administered to them.

But, as a body, it has no legal existence. It is never constituted by order in council, the clerk of the council is not present at its meetings, no minute or record of its proceedings is made,

no decrees or orders are issued in its name, and it is never alluded to in Acts of Parliament, though the phrase Responsible Minister of the

Crown® is once or twice to be found in the

Statute-Book. The various departments, such

as the Admiralty and Treasury boards, have,

by tradition or statute, certain limited powers of issuing orders and regulations ; but, in the vast majority of cases, the deliberations of the Cabinet appear in the guise of Orders in Coun¬

cil, i.e., commands of the King, issued by the advice of the. Privy Council, or in the form of simple executive acts of the Crown, signified

through the appropriate Minister. Both these

classes of acts always receive the personal ap¬

proval of the King, in whose name they are

done, though the approval of the Privy Council is a pure formality.

The Unity of the Cabinet. — Fourthly, the

unity of the Cabinet is expressed by the Prime Minister, though it is

only within a short time (January 1906) that the existence of the work¬

ing head of the Ministry has been formally rec¬

ognized, and that only by a place in the official Table of Precedence. No Prime Minister's de¬

partment exists, though the estimates have re¬

cently provided for two or three private secre¬

taries. Like his colleagues, the Prime Minister is simply the holder of an executive post, though it is usual to appoint him to a well-paid sinecure (First Lord of the Treasury, $25,000) in order that he may have time to devote to the general policy of the government. But even this prac¬

tice is very recent. Walpole, who really cre¬

ated the position of Prime Minister, always de¬

clined to assume the designation ; and the fiction was long maintained by the unwise practice of

charging the holder of the position with the

actual cares of a working department, such as

the Foreign Office or the Exchequer.

And, even now, the precise relations be¬

tween the Prime Minister and the Cabinet as a whole depend more upon the nice balance cf

circumstances than upon any well-defined tradi¬

tion. The fact that the Prime Minister has

been charged with the formation of the minis¬

try, a fact which in itself is usually (though not always) a consequence of his election as leader of his party whilst in opposition, necessarily

gives him a strong position with regard to his colleagues, who are, in a sense, his nominees.

This advantage is strengthened by the rule that the collective decisions of the Cabinet are

always communicated to the King by his mouth,

while his prominence in the public eye tends

also in the same direction. But the desirability of including in a ministry the ablest and most popular members of the party, the desire of

avoiding any appearance of schism in the ranks of the government, and the almost unfettered

discretion conceded to individual Ministers in

the administration of their own departments,

upon the business of which they communicate

directly with the King, all combine to prevent the leadership of the Prime Minister, in nor¬

mal circumstances, solidifying into actual con¬

trol. Whether this result is desirable or not, may be regarded as an open question. On the

one hand, a weak Prime Minister is said to im¬

ply a weak Cabinet; on the other, a Prime

Minister of overpowering strength is not with¬

out his drawbacks. It is often said, for ex¬

ample, that the Liberal Party was driven into

its long exile in 1895, because, in the later days of his leadership, none of his colleagues was (<able to stand up to Mr. G.®

The Position of the Crown. — In conclud¬

ing this brief sketch of the working of the

Cabinet system, it may be well to anticipate a criticism which every succinct account of the

working of British politics is likely to raise in the mind of a reader not himself personally

familiar with its atmosphere. A foreign ob¬

server may well be expected to say, though it would hardly ever occur to a Briton to say:

<(What then is the use of the King, if he is merely the mouthpiece of his Ministers ; if,

except on the rarest occasions, he is bound to accept the advice tendered to him by his consti¬

tutional advisors? Does it not really seem as

though Carlyle's proposal for a (cast-metal

king> would fit the present British Constitu¬

tion ?®

The first answer to this criticism is the re¬

minder that, though politics are an important

side of public life in the British Empire, they do not by any means exhaust its interests. And the occupant of the throne is by no means con¬

fined to the sphere of politics. As the head of society, as the patron of

religious, charitable, agricultural and scientific enterprises, as the encourager of art and sport, as the focus of that spectacular world which, even to the phlegmatic Briton, is no small share of his existence, the opportunities of the monarch are unlimited, and his personal discretion unfettered. To secure

the presence of the King at any function, is to place success beyond the range of doubt. For

the King to take a personal interest in the

prosperity of a public enterprise, is the surest guarantee of its popularity. The King's Hos¬

pital Fund is but one of countless examples of this truth. And with all these matters the

Cabinet has no concern.

But, even in the realm of politics, the King

is very far from being the mere figure-head

Which superficial observers have sometimes

supposed. It is true that the splendid service which the King renders to the State as the em¬

bodiment and symbol of the unity and per¬

manence of a world-wide empire is, perhaps,

the greatest of all the functions of the Crown ; and, it may be added, there can hardly be any position more truly splendid, more worthy of

the highest powers, more capable of being used as an instrument of good. Its singular value is that, while it affords scope for the powers of genius, the position is capable of being reason¬

ably well filled by any man or woman of mod¬

erate ability and first-rate training, while even an unworthy holder cannot do very much harm

in it. In other words, it is a position singularly well suited to an hereditary monarch.

And it would be a great mistake to assume

that, even in the realm of politics, the function of the monarch is confined to the outward

show of things, and has no place behind the

scenes, where the real fates of nations are de¬

cided. Bagehot, in his work before referred to, has summarized, with his usual justice, the

political rights to which a constitutional mon¬

arch, in a system like the British, is entitled.

He has ((the right to be consulted, the right to encourage, the right to warn.® And, as the

same writer very truly remarks, such rights, in the hands of a monarch of sense and sagacity, and it may be added, of experience, are singu¬

larly effective. In modern conditions, the air

of a court is by no means so fatal to width of outlook and knowledge of the world as in the

days before the popular press and facile travel¬

ing. The late Queen Victoria, for example, was learning politics by instinct when many of her future Ministers were absorbed in the sports of youth or the narrow cares of professional life.

Words of warning or encouragement must

have fallen with singular force from her lips

upon the ears of men upon whom rested the

tremendous responsibilities of empire; while

the completeness with which she could enforce

her undoubted constitutional rights was shown

in. the famous letter in which she consigned

Lord Palmerston to temporary oblivion in 1850.

On that occasion Her Majesty simply insisted

upon her undoubted right to be distinctly in¬

formed of every event, in contemplation or

progress, which might result in an act of the Crown, ((in order that she may as distinctly

know to what she is giving her royal sanction.®

Of late years suggestions have from time to

time been made to the effect that the occupant of the throne should take a more personal and ostentatious part of the details of government.

These suggestions not only savor of the politi¬

cal backwater, but they are singularly ill-advised in the interests of the monarchy. Britons feel so keenly upon political matters, that any*one, however exalted, who takes part in controversial or debatable matters, inevitably meets with

hostile criticism and periods of unpopularity.

From such untoward accidents the Crown is

entirely saved by virtue of its present unique position. Even where, as during the last two

eventful years of the Balfour Ministry, the

policy of the government was unpopular with

the majority of the community, no one dreamed

of blaming the King, for everyone assumed

that he had nothing to do with it. ((The King has no politics, and no

one knows to which

party be belongs;® How different was the atti¬

tude of the country to George III during the

long period in which he strove to restore the older type of monarchy. But perhaps the most com¬

plete testimony to the success of the present

system, so far as the Crown is concerned, is the fact that republicanism, even as an academic

ideal, has practically ceased to exist in the

British Empire. Among all the schemes of

political reform which are from time to time

mooted, no one ever contemplates the disap¬

pearance or modification of the powers of the

Crown ; for the very good reason that the

Crown, so far from being a stumbling-block in

the way of reform, is seen to be capable of

being employed as a valuable instrument to se¬

cure it. The working of the Cabinet system

makes the Crown a splendid fixed sun, sur¬

rounded by a constellation of rolling planets

destined, from time to time, to disappear from sight. No one becomes tired of the sun, because the desire for occasional change, planted in

every human breast, is satisfied by the appear¬

ance and disappearance of the planets. The

Cabinet system may be open to severe criticism ; but its defects will not be amended by any

change which will reduce the monarch from

his proud position as head of a united nation, to the leadership of a faction of irresponsible politicians, opposition to whom would mean op¬

position to the avowed personal wishes of the

Crown. .

Bibliography. — Considering its importance,

very few writers have attempted to deal in de¬

tail with the history and working of the Cabi¬

net system. The following works will be found

useful in studying the subject. History: Morley, (Walpole) (English Statesmen Series) ;

Jenks, Parliamentary England* (Story of the

Nations Series). Working: Bagehot, (The

English Constitution (1867); Hearn, (The

Government of England) (chaps, yiii-x) ;

Anson, Paw and Custom of the Constitution *

(part II, The Crown, chap, iii, 3d ed., Oxford 1909) ; T>raill, (Central Government (English

Citizen Series).

Edward Jenks,

Principal and Director of Legal Studies of the Law Society.

14. THE JUDICIAL SYSTEM IN ENG¬

LAND AND WALES. The English judicial

system, like the English law, grew up naturally and spontaneously. It is of native growth. It

has never been constructed en bloc on any sci¬

entific or strictly logical principle ; but it is per¬

haps none the worse for this. It still contains anomalies, which are relics of Anglo-Saxon cus¬

tom or Norman feudalism; but such anomalies

are historically interesting and do not at all seriously impede the working of the more mod¬

ern machinery.

We now draw a sharp distinction between

courts of civil and courts of criminal jurisdic¬

tion. In the former debtors are compelled to

pay the money which they owe, and wrong¬

doers to compensate those whom they have

injured; so that the proceedings, if successful, generally end in a judgment that the defendant shall pay the plaintiff so much money. The

object of criminal proceedings, on the other

hand, is to punish more serious offences and to prevent their repetition. Hence these proceed¬

ings, if successful, terminate in a sentence inflicting fine or imprisonment on the offender. And for each purpose we now have separate courts. This was not so formerly. At the

time of the Norman conquest the most im¬ portant tribunal in England was the Shire— gemot, or County Court. This court took cog¬ nizance of felonies, breaches of the peace, nui¬ sances, and other offences which concerned the State, as well as of actions involving title to lands and other civil suits, which concerned only the individual suitors; it also heard appeals from inferior tribunals, such as the hundred court. In Saxon times the County Court met twice or thrice a year. In the 13th century in the larger counties it met every month.

Under Henry II the royal power made itself felt throughout the kingdom. His justices in eyre made their circuits through the land and tried the more important civil and criminal cases in the County Court. By the Assize of Clarendon (1166) all landholders were obliged to attend twice a year to meet the King's jus¬ tices. This was the origin of the County As¬

sizes. To this day the King's judges still come at least twice a year into every county in Eng¬

land. To the larger counties two judges come

together, one of whom tries civil causes and the other criminal cases • —"The great judge and the little judge,

The judges of a size ! "

From the ordinary meetings of this ancient

County Court are descended both the County

Quarter Sessions and the modern County

Courts. At the Assizes any crime can be tried which had been committed within the county,

whether treason, felony or misdemeanor. At

Quarter Sessions no crime can be tried, which

is punishable with death or imprisonment for

life (except burglary) ; other grave offences,

such as perjury and forgery, are also excepted.

These Sessions are held at least four times a year in each county; the justices of the peace for the county — unpaid laymen — are the

judges.

The civil jurisdiction of the ancient County

Court had become almost obsolete, when the

County Courts Act of 1846 was passed. This

act created the modern County Court, which is

held in every town of any size in England at least six times a year. Actions for breach of promise of marriage, libel, slander and seduc¬

tion cannot be commenced in the County Court ; nor can actions of ejectment or any other ac¬

tion involving the title to any land worth more than £50 ($250) a year, or to any toll, fair, mar¬

ket or franchise; nor any action of contract or tort, in which the plaintiff claims more than

£100 ($500). This latter does not apply to ac¬

tions under the Workmen's Compensation Act,

where no limit is fixed. Outside of London

the County Courts have jurisdiction in bank¬

ruptcy. There a*re 57 County Court judges;

they are appointed by the Lord Chancellor, and must be barristers of at least seven years'

standing.

So much for the. counties. But even in

Anglo-Saxon times, cities such as Winchester,

York and London had acquired the right of

holding courts of their own in which an officer appointed by the citizens themselves would de¬

cide all civil disputes which arose within the limits of the city, and also exercise some crim¬

inal jurisdiction over the citizens. In less imˆ

portant towns, however, it was found difficult to exclude the jurisdiction of the County Court.

But in the 13th and 14th centuries the policy of the Crown was to

strengthen the towns in order 216 GREAT BRITAIN — JUDICIAL SYSTEM IN ENGLAND AND WALES (14) to create a counterpoise to the power of the

nobles. The ‘three Edwards and Richard II

granted many charters to boroughs, which cre¬

ated borough courts of criminal and in some

cases also of civil jurisdiction. The citizens

wert proud of these local courts, for they were a badge of their independence. Some of them

have fallen into disuse; from the others are

directly descended our present Borough Courts

of Quarter Sessions and our civil Borough

Courts of Record.

In 111 of the larger towns in England and

Wales there is held at least four times a year a Court of Quarter Sessions, which has the same

criminal jurisdiction and adopts the same pro¬

cedure as the Court of Quarter Sessions in a

county. The judge of each of these courts Is

called a Recorder. He is the sole judge of the court, for although the justices of the peace

for the borough are often present on the bench, they take no part in the proceedings. A Re¬

corder is appointed by the Crown on the recom¬

mendation of the Home Secretary. He must be

a barrister of not less than five years’ standing.

He is ex officio a justice of the peace for the borough. He may sit in Parliament for any

other constituency but not for the borough for which he is Recorder. The Recorder of Lon¬

don is judge of the Lord Mayor's Court, with

a salary of $20,000. He is appointed by the

King. There are 118 recorders in England and

Wales, and five in Ireland.

In 18 of the largest cities or towns there

exists also a Borough Court of Record of civil jurisdiction — such for instance as the Mayor's Court, London ; the Court of Passage at Liver¬

pool ; the Salford Court of Record, and the

Tolzey Court, at Bristol. The jurisdiction of

these courts is generally limited to causes of action arising within the borough, but unlim¬

ited as to the amount which can be claimed in the action. In most of them the Recorder of

the borough is the judge.

When our Plantagenet kings were firmly

established on the throne, judicial power became more centralized. The King's Council gradu¬

ally extended the scope of its operations. It

acquired important judicial functions; it be¬

came a court in which the King, in theory, was always present. From this council sprang grad¬

ually the courts of King's Bench, Common

Pleas and Exchequer; which for many centuries

were the three Superior Courts of Common

Law at Westminster.

Then as civilization advanced, it was found

that the rigid rules of the common law required modification to meet special cases. Ancient cus¬

tom had to yield to improved morality. The

Lord Chancellor, who was at first an ecclesias¬

tic, became “the keeper of the King’s con¬

science.® He presided over the Court of

Chancery, which soon assumed power to re¬

strain suitors, from “unconscientiously® enforc¬

ing their strict legal rights.. This Court of

Equity, which usually sat in Lincoln’s Inn, thus acquired control over the three courts of law at Westminster. Two systems of judicature in

.fact flourished side by side, which were in

many respects at variance with each other.

What was right at law was often wrong in

equity. Judgment would be given on the same

facts for the plaintiff in Westminster Hall, for the defendant in Lincoln’s Inn.

By the end of the 18th century the Court of

Chancery had become more technical, if that

were possible, than the courts of common law

themselves; its procedure had ceased to be elas¬

tic; it would only grant relief in certain speci¬

fied cases. A plaintiff, who had undoubtedly

a strong moral claim, was constantly told that he had no equity. And both at law and in

equity, cumbrous procedure, technical pleadings

and preposterous rules of evidence caused the

suitors much vexation of spirit, much unneces¬

sary expense, and worst of all, intolerable de¬

lay. <(Lord Eldon and the Court of Chancery

pressed heavily upon mankind® (Bagehot).

Attempts were made from time to time to

deal with this state of things by legislation —notably by the Common Law Procedure Acts of

1852 and 1854, the Chancery Procedure Act,

1852, and the Consolidated Orders in Chancery

of 1845 and 1860. At last in 1873, Lord Sel—

borne, then Lord Chancellor, with the. assistance of Lord Cairns, his opponent in politics, carried successfully through Parliament the Judicature

Act, which came into force on 2 Nov. 1875.

This act created the Supreme Court of Judica¬

ture, which administers law and equity con¬

currently. Its procedure is straightforward and

simple. Every court now applies the same prin¬

ciples of law and equity to the actual facts of the case ; every court has power to grant what¬

ever form of relief the nature of the case may require, whether legal or equitable. This was

the greatest and most beneficial law reform of Queen Victoria's long reign. On 4 Dec. 1882

outward expression was given to this fusion of law and equity by physically uniting the courts in one building — the new Royal Courts of

Justice.

The Supreme Court of Judicature is com¬

posed of the Court of Appeal and the High

Court of Justice. Thus the civil courts at pres¬

ent are : The County Court, the Borough Court

of Record, the High Court of Justice, the Court of Appeal, the House of Lords and the Judicial Committee of the Privy Council. The High

Court of Justice is divided into the Chancery

Division, the King's Bench Division and the

Probate, Divorce and Admiralty Division.

The Chancery Division has now six judges

who work in pairs, each pair having four mas¬

ters and a staff of clerks working under them.

The bulk of the work of the Chancery Division consists of the equity business, to which its or¬

ganization is especially adapted. Its powers are, nevertheless, not

confined to any particular

subject-matter; it administers law as well as

equity, though it never tries a case with a jury.

The Lord Chief Justice of England, assisted

by 15 puisne (i.e., junior) judges, conducts the business of the King's Bench Division. These

judges try civil causes either with or without a jury; they preside at the Assizes, civil and

criminal, all over England and Wales; they

hear appeals from County Courts and magis¬

trates, and prohibit all inferior tribunals from exceeding their jurisdiction.

In the Probate, Divorce and Admiralty Divi¬

sion there are two judges who decide as to the validity of wills, grant divorces and manage the admiralty business of the country. One of

them is styled the "President® of the Division.

The rules of court made under the Judica¬

ture Act have defined the procedure in the High Court of Justice, which is simple and elastic. A Master now decides all interlocutory matters

on a summons for directions, e.g., whether the action shall proceed with or without pleadings, with or without a formal trial, with or without discovery of documents and interrogatories as

the nature of the case requires. Every amend¬

ment in any record, pleading or proceeding that is requisite for the purpose of deciding the real matter in controversy can be made at any stage of the proceeding.

The Court of Appeal is composed of the

Master of the Rolls and five Lords Justices,

with the occasional assistance of the Lord

Chancellor, the Lord Chief Justice of England,

and the President of the Probate, Divorce and

Admiralty Division.

The Lord Chief Justice of England, the Mas¬

ter of the Rolls, and the Lords Justices are ap¬

pointed by the Prime Minister; the puisne

judges of the High Court of Justice are ap¬

pointed by the Lord Chancellor. The latter is

ex officio chairman of the House of Lords and has a seat in the Cabinet. He goes out of office with the government. (See Lord High Chan¬

cellor).

From the decision of the Court of Appeal,

appeal lies to the House of Lords — to the

judicial body known by this name, not to the

legislative assembly. An ordinary peer of the

realm can no longer sit in the House of Lords when it is exercising judicial functions. The

Judicial Committee of the Privy Council hears

appeals in ecclesiastical matters and also from the colonies. These appellate courts will prob¬

ably soon be merged in one ; they have been

strengthened by the appointment of six paid

Lords of Appeal in Ordinary. A Court of

Criminal Appeal was established in 1907, to

which any person convicted on indictment may

appeal on a question of law, or, by leave, on a question of fact, or against the sentence unless that is fixed by law. But there is no power to order a new trial.

The criminal courts now are: The Magis¬

trate's Court, the Borough Quarter Sessions,

the County Quarter Sessions, the Assizes, the

Central Criminal Court, the King's Bench Di¬

vision of the High Court of Justice and the

Court for the consideration of Crown Cases

Reserved.

The proceedings usually commence with a

summons, bidding the accused appear in court

before the magistrates on a certain day : in

some cases a warrant will be issued at once for his arrest. Simple matters are disposed of sum¬

marily by the magistrates. Graver cases are sent for trial to Quarter Sessions or to the Assizes.

In these graver cases, the prosecution states in detail the precise charge against the prisoner

in a pleading which is called an indictment.

This is laid before a grand jury ; and the ac¬

cused will not be put on his trial unless the grand jury think that there is a case against him fit to be tried. If the grand jury is of this opinion they return the indictment into court,

marked “True bill,39 and the prisoner is then

arraigned. In some few cases the prisoner must state his defense in a written plea; but, as a rule, he merely pleads “guilty” or “not guilty”

orally from the dock. If he pleads, “guilty,” or if after pleading “not guilty” he is tried and convicted, he may be sentenced to fine, im¬

prisonment, or death, according to the nature of the crime which he has committed.

The Central Criminal Court — better known

as the Old Bailey — tries all treasons, felonies and misdemeanors committed in the Metro¬

politan district or within the jurisdiction of the admiralty. The lighter crimes are usually dis¬

posed of by the Recorder of London or the

Common Sergeant; the graver by a judge of the High Court, who

attends for the purpose. This

court is at once both Assizes and Quarter Ses¬

sions for the city of London, and assizes for the counties of Londofi and Middlesex and for

certain specified portions of the counties of

Essex, Kent and Surrey.

The King's Bench Division occasionally ex¬

ercises jurisdiction as a court of first instance in cases of grave public importance, such as the trials at bar of Dr. Jameson and Colonel Lynch in 1896 and 1903 respectively. It also has an appellate jurisdiction over cases brought before it on writs of error or certiorari or on "special cases" stated by justices of the peace.

The court for the consideration of Crown

Cases Reserved was the only criminal court

of appeal till 1907, when its jurisdiction was transferred to the Court of Criminal Appeal.

That court consists of eight judges of the

King's Bench division and the Lord Chief Jus¬

tice of England. The number of judges sitting

in the Court of Criminal Appeal must be an

uneven one, and not less than three.

In the County Court and before magistrates,

solicitors act as advocates. In all the other

courts only barristers can be heard at the actual trial, or on "appeal" ; though solicitors are

allowed to argue minor questions in Judges'

Chambers. A barrister must be a member of

an Inn of Court; he must have passed the bar examination, and then have been "called to

the bar" by his Inn. The four inns of Court

in London possess the monopoly of calling men

to the bar; they will not "call" any woman. In litigation in the High Court it is necessary to employ both a solicitor and a barrister; the

solicitor prepares the case for trial, and "in¬

structs" the barrister by delivering a "brief" to him. Solicitors also dispose of a vast amount

of non-litigious business. Every solicitor must

have been articled to a solicitor for at least three years, and must have passed the Solicitors'

Examinations at the Law Institution in Chan¬

cery Lane, London, W. C.

For further information the reader is. re¬

ferred to Odgers on (Pleading and Practice,*

(London 1891 — now in 7th ed.), on (Local

Government* (2d ed., London 1906), (Odgers

on the Common Laws of England) (1911), and

(Bullen and Leake's Precedents of Pleadings)

(7th ed., London 1915) ; Kenny's (Outlines of

the Criminal Law* (2d ed., Cambridge 1904) ;

Broom's (Common Law) (9th ed., London

1896) ; (A Century of Law Reform* (London

1901).

Willtam Blake Odgers, K.C.,

Bencher of the Middle Temple, Recorder of

Bristol, Director of Legal Studies at the Inns of Court, Professor of Law at Gresham Col¬

lege.

15. LOCAL GOVERNMENT. As in other

large and populous countries, the work of gov¬

ernment in England* is classified as being either * With England is included Wales and the Scilly Isles, but not Scotland or Ireland, which have entirely distinct systems of local government; as have also the Channel Isles and the Isle of Man. The differences are, however, greater in terminology and form than in substance,

national or local. This classification has no

reference to the place in which the work is done or to the area benefited ; in England at any

rate, it is based in practice ■ — whatever may have been its origin — exclusively on the sys¬

tems upon which these two branches of public

administration are organized and controlled.

That part of the work of government which

is undertaken by the national organization of

the state, directed fronf its capital, and ad¬

ministered under the direct orders of its ex¬

ecutive head or principal legislature is termed national government; and is, indeed, by his¬

torians, politicians, and citizens alike, often ex¬

clusively thought of as government. That part

which is left to subordinate organizations, re¬

lating only to particular geographical areas

within the state ; and which is immediately

directed by and responsible to authorities be¬

longing to those areas, subject only to more or less supervision, help, and superior control by the national government, is termed local gov¬

ernment. In England and Wales, even more

than in most other countries, the choice of the particular functions of government to be thus

left to local authorities, and the amount and

kind of the supervision, help, and superior con¬

trol exercised by the national government in

respect to each of these functions, have been

determined rather by historical antecedents than by any consistent or logical theory. The aggre¬

gate amount, variety and relative importance of local government has, during the past three-quarters of a century, steadily increased; until it has come in the United Kingdom, nearly to

equal in magnitude (measured by the annual

cost of administration) that of the national

government itself. This increase has not been

due to any transfer of services from the sphere of national to that of local government. Such

lew transfers as have occurred (like that of

the prisons in 1877) have been actually in the other direction. The enormous development

of English local government has been due,

partly, to the great expansion of the cities,

which need more government than rural dis¬

tricts, partly to the progressive demand for

new and increased services such as schools and libraries, and partly to the tendency to transfer the administration of services of common use

from the sphere of private to that of public —usually local — administration.

The Services Administered by Local Author¬

ities. .

The government at present entrusted to

local authorities in England and Wales may

be divided into four great classes, which we

may term respectively the collective organiza¬

tion of public services, the collective regula¬

tion of individual conduct, the collective provi¬

sion for special classes of the community, and the collective taxation upon individual citizens by which the net cost of the whole of the

local government work is met. It has been a con¬

sequence of the great development of local gov¬

ernment during the past three-quarters of a

century, and of the absence of any logical or deliberately thought out plan of organization,

that this or any other systematic analysis of

local government functions does not correspond

exactly with any definite classification of local governing bodies. We must therefore describe

separately function and structure.

The collective organization of public serv¬

ices, though later in its great development than some other branches, now make up the largest

part of English local government.

1. Protection. — We have first the funda¬

mental service of the protection of the in¬

dividual citizen against aggression, for which

there is, from one end of England to the other — not excluding even the most rural or the

most desolate regions — a series of salaried,

professional and highly organized local forces

of preventive police. In marked contrast with

the practice of most other European countries

(and, indeed, with that of Ireland), these pol¬

ice forces, nearly 200 in number, are (with the exception of that for the metropolitan area)

exclusively under the control of the respective local authorities, and are subject neither to

orders from, nor to control by the national ex¬

ecutive. They are (outside the metropolitan

area) entirely appointed, controlled, and paid

by particular local authorities ; in municipal

boroughs, the town councils by their <(watch

committeesˆ ; in counties, by what are known as <(standing joint committees, ® of which half the members are chosen by the County Council

and half by the Justices of the Peace in Quarter Sessions. The total cost of maintenance of

the provincial police forces is about three and a half million pounds, and that of the two

metropolitan forces two and a half million

pounds per annum, for which nearly 50,000 men

are maintained. A separate grant of part of

this cost (at first a quarter, latterly onehalf) was long made from the national exchequer,

conditionally on the local authority (1) per¬

mitting the Home Secretary to have its. force

inspected annually by an officer appointed for

the purpose, (2) maintaining it at such a stan¬

dard of strength and efficiency as the Home

Secretary might consider satisfactory. No

separate police grant is now made, the amounts (aggregating over

£3,000,000 per annum) hav¬

ing been merged in larger general contributions in aid of local authorities; but a certificate by the Home Secretary that the above conditions

have heen fulfilled is still annually required

before payment is made. In the metropolitan

district (which for this purpose extends to an area of more than 15 miles radius from Char¬

ing Cross) there are two police forces; one of small size, maintained by the Corporation of the City of London, without exchequer aid or

Home Office inspection, for the protection of

the one square mile of the old city; and the other the largest in the world, organized as a local force, but commanded without any shadow

of local control, by officers appointed by the na¬

tional executive itself (Home Office) ; at the cost, partly of a fixed local rate of six pence in the pound, which meets about half the ex¬

pense, and partly of the national exchequer ;

for the protection of the 900 square miles of the metropolitan area. ((Annual Home Office

Reports as to Police) ; <History of Police in

England,) by W. L. M. Lee, 1902).

While the central courts of justice form

part of the national government, some of

the minor tribunals are (though the judges are never elective) supplied by local government,

either in form of (a) petty criminal courts

held by the local justices of the peace; (b)

the more important Courts of Quarter Sessions,

held by the same, (c) stipendiary police magis-GREAT BRITAIN — LOCAL GOVERNMENT (15)

trates in various cities, appointed by the national executive, but paid for by the cities themselves; and (d) a few local civil courts maintained in the city of London and some other of the older cities. The stipendiary police magistrates in the metropolitan district (outside the old city) are maintained in the same way as the metropolitan police force. ((Justice and Police, } by F. W.

Maitland) .

Protection from fire is afforded by sepa¬

rately organized fire brigades, having no con¬

nection with the police. These are in all cases exclusively under the control of the local au¬

thorities ; in London, the County Council ; in the municipal boroughs, the Municipal Corporation ;

in other places, the Urban District Council, or the Parish Council. In London, the fire brig¬

ade is second in size and cost only to that of New York, and it is not clear whether, for the particular conditions of its task, its efficiency is second to that oL any in the world. Its

strength is nearly 1500 men, and its cost over a quarter of a million sterling annually to¬

ward which the fire insurance companies have

to contribute a trifling percentage of the value they severally insure in

London, and the na¬

tional exchequer unconditionally contributes

£10,000 a year in respect of the large amount of*national property in the metropolis. Some

of the provincial cities have also salaried pro¬

fessional fire brigades, often highly efficient.

In less populous centres, according to the un¬

fettered discretion of the particular local au¬

thority in each case, the fire protection passes by insensible gradations (some salaried profes¬

sionals, men in other occupations partially paid for fire service, or unpaid but organized volun¬

teers) down to the mere provision of a hand

pump and buckets, to be used by any zealous

citizen. Protection against fire in theatres and music halls, and against such methods of build¬

ing houses generally as might facilitate danger¬

ous fires, is afforded, in the metropolis, by the stringent regulations and inspection by the Lon¬

don County Council under its special building

act. In other towns the Municipal Corporation

takes such action of a similar kind as it thinks fit, by way of by-laws. Protection against

drowning is afforded in the bathing season by

the boats and boatmen provided by only a few

seaside municipal corporations. The lighthouse

service is maintained at national expense by

the Trinity House, an ancient corporation, now

essentially a branch of the national executive

(Board of Trade).

2. Locomotion. — In so far as locomotion is

not abandoned to private enterprise (railways,

most river steamers, some tramways, omni¬

buses, etc.), the whole provision for this service is left in England to the local authorities. The maintenance of roads, now assisted by the na¬

tional department styled the Road Board, is

performed, over every part of England and

Wales, by one kind of local governing body or another. Within London, it is the council of

the particular metropolitan borough ; in the mu¬

nicipal boroughs, it is the corporation ; in other towns, it is the urban district council ; and wher¬

ever none of these authorities exist, it is the rural district council which is responsible for this service. The method and standard adopted

in each locality is left to the unfettered discre¬

tion of its local authority, which (for the 100,-

000 miles of by-roads) has itself to bear all the expense. But for what are deemed main roads

(apart from London and the principal cities

which are called county boroughs), the county

council either itself undertakes the service or else contributes to the minor local authority a sum agreed between them as the cost of keep¬

ing up such main roads, of which there are 30,-

000 miles. The average amount per mile an¬

nually spent on road maintenance is main roads £60; by-roads, £20; but these sums are largely increased in the growing mileage of roads

now treated by preparations of tar so as to be adapted to the rubber tires of automobiles.

The county council, outside London and the

county boroughs, moreover, maintain the

bridges over streams, etc., with some exceptions.

Where, as in urban districts, the road becomes a street, its maintenance naturally becomes

more costly, and altogether new needs of pav¬

ing, cleansing, and lighting arise, to be dealt with and paid for in each case by the local

authority concerned, at its unfettered discre¬

tion. Further developments of the same serv¬

ice, undertaken under special powers, are the

short lengths of canal of the Exeter and York municipal corporations, and the extensive canal

navigation owned and operated by the Glouces¬

tershire county council ; the harbors, piers, and docks maintained by the Port of London au¬

thority, the Mersey Docks and Harbors Board

and about 60 other local authorities ; the nu¬

merous bridges over the Thames, constructed

and maintained partly by the Corporation of

the City .of London, partly by the London

County Council ; similar bridges over rivers in other cities nearly always maintained by the

local municipal corporation ; the great tunnels

under the Thames constructed by the London

County Council ; a few old-fashioned ferry

services maintained (as at Saltash, Middles¬

brough, and Sunderland) by various local au¬

thorities ; the development of the ferry into a moving ˆfloating bridge® by the corporation of

Southampton ; and into river steamboat services

across the Mersey by the Corporation of Bir¬

kenhead, and across the Thames at Woolwich

by the London County Council. In other direc¬

tions the road has been developed into a tram¬

way; and cars — steam or electric — are now

owned by more than a hundred local author¬

ities, and operated under municipal management

by an ever increasing number of them (in 1918

nearly 50), including the valuable miles of track worked by the London County Council, with

gross receipts from fares which, in a normal

year may be put at more than £2,000,000 ster¬

ling. In a number of cities the municipal cor¬

poration has obtained exceptional power to run

an omnibus service in conjunction with the

tramways. In all other cases the omnibus

service is left to private enterprise. A few

bridges constructed by groups of capitalists,

with power to charge tolls, are still in the same position, as are most of the canals, and all the railways and coast steamboats. The 19th cen¬

tury saw a marked tendency toward freeing

from toll the use of the various means of

locomotion maintained by local authorities.

Their roads and streets — once barred to all but pedestrians by tollgates — are now invariably

free; the bridges, on many of which even

pedestrians were charged a toll, are now (with the exception of a few capitalistic ventures,

still in private hands) uniformly free; the tun-220

nels under the Thames are free to vehicles as well as to pedestrians ; the steamboat service

by which the London County Council main¬

tains the Woolwich ferry is equally free; while the tendency in the municipal tramway, canal

and steamboat services is to charge only the

smallest fares or tolls *e.g.* ((halfpenny fares®

for short stages.

3. Water Supply. — The supply of water is

only in a steadily diminishing number of cities, of which the largest are Bristol and Newcastle, a matter for private enterprise. In 1600

boroughs and urban and rural districts this,

public service is in the hands of the local au¬

thority, usually the municipal corporation, or

(as in the metropolitan district), of a council made up of representatives of different local

authorities, the aggregate amount of capital

invested in these public water enterprises being about £200,000,000 sterling. It is now generally thought to be a defect that there is no system¬

atic distribution, among the great centres of

population, of the natural water basins; and no provincial authorities entitled to control them.

4. Heat, Light and Power. — Gas for light¬

ing, heating, and power is produced and sup¬

plied under the authority of separate statutes, in about 700 cities and towns, besides a num¬

ber of smaller installations started without

statutory powers. These gas works were, in

their origin, mostly private enterprises (though the local governing body of Manchester started

its own gas works in 1816), but there has been a steady tendency to municipalization, until

more than 200 towns already govern their

own gas production, with a capital of £50,000,-

000 sterling invested in their enterprises. Dur¬

ing the last quarter of a century on an average five cities a year have municipalized their gas supply; and as these comprised a majority of

the smaller consumers, about onehalf of the

entire number of the users of gas in the United Kingdom are thus co-operatively supplied by

themselves as citizens (Annual Returns as to

Gas Works, Board of Trade). Electricity,

starting only within the past half century,

has been even more predominantly a matter of

municipal enterprise. Nearly 200 towns have

their own municipal electricity supply, in which some £40,000,000 sterling is now invested. In

Manchester the municipal corporation supplies

also hydraulic power.

5. Education. — The extensive public service

of education — as a function of local govern¬

ment scarcely a generation old — now makes up more than a fifth of the total expenditure of the local authorities. While the national ex¬

ecutive, by contributing more than half of this expenditure on education, exercises great in¬

fluence by means of the conditions which it at¬

taches to its grants, the power of the local

authorities to provide what kind and what

amount of educational facilities they deem fit

over and above the national minimum, is (so

far as secular subjects are concerned) now prac¬

tically unlimited. There is no limit to their

current expenditure, or to the amount of rate

they may levy. There is no limit of grade or of age. Anything that is education — whether ele¬

mentary, secondary, or university in grade;

whether infant or adult;. whether literary,

scientific, artistic, technological or professional in kind — the local authority may, if it chooses, provide, without requiring any sanction or ap¬

proval, in whatever way it chooses, under what¬

ever regulations it chooses, gratuitously or at any fee. It is legally restrained only (1) by the statutory exclusion (or only conditional admis¬

sion) of religious instruction in the nature of a catechism distinctive of any particular denom¬

ination ; (2) by the statutory obligation to pro¬

vide at least the <(national minimum® of efficient elementary schools for all children between 5

and 14 requiring elementary instruction; (3)

by the need for sanction of any projects for

raising funds by loans. In practice, the dis¬

like of the citizens to an undue increase in the rates restrains the local authorities at present to a comparatively limited use of their vast

powers. While elementary schools, of one sort

or another,— now always compulsorily at¬

tended and, with trivial exceptions, absolutely

free of charge — exist in adequate numbers,

there is still an insufficient supply of secondary schools, apart from those maintained from

ancient endowments, under separate governing

bodies; and whilst, in most cities, much has

been done for technological education of an

elementary grade, the provision for university

education and the higher technological instruc¬

tion is, compared with the need, now recognized as inadequate. For everything above the ele¬

mentary school, fees are charged. On the

other hand, London has a ˆscholarship ladder®

unequaled in extent and genuine accessibility

anywhere in the world. By an unlimited pro¬

vision of free places coupled with maintenance

allowances, awarded on a merely qualifying ex¬

amination, the opportunity for secondary and

university education is effectively opened even

to the poorest child of more than average abil¬

ity. Nearly all other local authorities have less extensive scholarship schemes on similar lines.

The result is that the percentage of the popula¬

tion enjoying secondary schooling is greater in London and various other English cities — not¬

withstanding the fee-paying system — than it is in Chicago or even in Boston.

6. Miscellaneous Services. — Brevity com¬

pels the grouping together of a large number

of diverse public services organized and admin¬

istered by local authorities. With the excep¬

tion of a few ancient chartered rights in the hands of private owners (of which Covent

Garden in London is by far the most import¬

ant), the markets are in public ownership, in¬

volving a total capital of some £10,000,000 ster¬

ling, and (while a few are leased) usually

under public administration ; often including

warehouse accommodation, weighing machines,

sometimes cold-storage and abattoir. The

municipal provision of workmen's blocks in

towns and of cottages in the country has been carried on to a great extent, not only by the London County Council, which had already

in 1916 over 30,000 people in its dwellings, but also by about 100 other authorities. ((The

Housing Handbookˆ by W. Thompson, 1904).

The existence of a few <(joint-stock® cemeteries serves to remind us that the provision and man¬

agement of burial grounds is an important

function of the local authorities, in which mil¬

lions of capital is invested, extending in one or two cases (as at Hull), to the provision of cre¬

matoria. Interment is, however, the business

of the undertaker, and remains everywhere in

private hands; not even subjected, as is the

case in some continental cities, to public con-221

trol. The provision of parks and recreation

grounds, with bands of music, gymnasia, facili¬

ties for games, etc., has been lavishly under¬

taken. Hundreds of cities and towns have free

public libraries and reading rooms ; others have also public picture galleries and museums which are uniformly free; while a couple of hundred

places provide for their citizens swimming and

other baths, and public laundries, at low fees.

Among the other miscellaneous public services

maintained by English local authorities are the Bradford ˆconditioning house, w or wool-grading

establishment, the Burnley municipal cold stor¬

age, the Doncaster race course, and various

municipal supplies of sterilized milk. The

tendency of local authorities to embark in these enterprises had led to a discussion of what is called ((municipal trading, » during which munic¬

ipalization has proceeded at a greater rate than ever. (For the abstract case against this tend¬

ency, consult (Municipal Traded by L. Darwin

(1903) ; for an equally abstract defense, (The Commonsense of Municipal Trading^ by G.

Bernard Shaw (1904), and (Mind Your Own

Business, > by R. B. Suthers (1905) ; for stat¬

istics, (The Municipal Yearbook and (The

London Manual > (both annually) ; the seven

volumes of (Local Taxation Returns* annually

published by the Local Government Board; and

the periodical return of Reproductive Under¬

takings carried on by Municipal Boroughs,*

also issued by that office.) In 1916 the amount of capital under municipal management can¬

not be put at less than £1,000,000,000 sterling; the aggregate municipal indebtedness (all repayable

within 20 to 60 years), being over £600,000,000

sterling. Manchester and Birmingham have

over £20 per head of population of capital under municipal management.

The part played by local government au¬

thorities in England in the collective regulation of individual conduct is less conspicuous than

their organization of municipal services, but it is too important to be ignored. It is not merely that practically all these authorities exercise, in their power of making by-laws, a minor legis¬

lative function, on which we to a great extent depend for the prevention and suppression of

nuisances, the regulation of the streets, all the ramifications of public health, and the opera

tions of building and various noxious trades.

If, as in England we must, we include among

local authorities the justices of the peace, the regulation of the sale of alcoholic drink, the places where it may be sold, and to some slight extent the hours during which the sale may take place, fall within the discretion of local govern¬

ing bodies. Finally, in the direction and control of all the provincial police forces, the local au¬

thorities have virtually extensive and scarcely

defined opportunities of supervising and re¬

straining any overt manifestations of individual conduct which is ((disorderly in character, ** and of which local public opinion disapproves.

The collective provision for special classes

of the community is one of the oldest and was, until lately, the most costly of the functions of local government in England. Under the com¬

prehensive term of the Poor Law there is now

included a whole array of specialized provi¬

sions for orphan and deserted children, for the sick, for persons of unsound mind, for physical and mental (<defectives,** for the aged and in¬

firm, and for the men and women who be¬

come destitute, together with their children.

The total amount spent on this service is about £15,000,000 sterling annually. Beyond the

ancient limits of the Poor Law, and still within the sphere of local government, we have, in addition, the provision of hospitals for lunatics, idiots, and epileptics; the costly arrange¬

ments for maintaining and medically treating

those suffering from any infectious disease; and the organized provision now made for the tem¬

porarily unemployed — making an aggregate

annual expenditure from public funds on the

care of particularly distressed or afflicted classes of the community, falling not far short (apart from education) of £30,000,000 sterling.

The taxation by which the local authorities

maintain all these services (apart from the revenue, of municipal property, the receipts from

municipal services and contributions from the

national exchequer), is levied entirelv by them¬

selves. They cannot create a new tax, but once the kind of impost is authorized by Parliament, the rate at which the citizen shall be charged is, as a rule, left to the unrestrained discretion of the local governing body. In amount, there is

no limit to its taxing power. Of the total gross revenues of the English local authorities (apart from loans), which may roughly be put at about £150,000,000 sterling, about £30,000,000 is re¬

ceived from the national exchequer, leaving

some £120,000,000 to be raised locally. Of this nearly £30,000,000 is derived from the receipts from the various municipal enterprises that

we

have described, £5,000,000 from other municipal

property, £2,000,000 from fines and fees, and

£5,000,000 in reimbursements and miscellaneous

receipts, leaving about £78,000,000 to be raised by local taxation. Tolls and dues (apart from

those connected with markets and harbors)

yield less than a million. The whole of the

balance is found by one tax, the socalled

((rate,)) a periodical levy, upon the occupiers of the real estate within the area of each local au¬

thority, of a specified proportionate part of the assessed annual value of that real estate. This universal impost, known as the Local Rate

(sometimes as the Poor Rate, the District Rate, the Police Rate, etc.), varies widely from place to place, but is most commonly between two and eight shillings in the pound, or between 10 and 40 per cent of the annual rental. The actual

average for all purposes, including both urban

and rural areas, is usually about four shillings in the pound, equivalent to an annual levy on the capital value of the real estate of abo t one per cent, and to an annual contribution per head of population of about a couple of pounds.

It is an interesting and little known statistical fact that the amount of this local taxation per head is only about the same as it was a cen¬

tury ago. This local tax is legally payable by the occupier of every house or farm, or other separate holding of real estate, who (if, as is commonly the case, he is not himself the

owner), is left to make his own contractual

relation with the owner or ˆlandlord** ; normally the occupier pays the rates in addition to his rent. But in Rats® forming part of large

blocks, and in property of small annual value, especially that let by the week, the owner

usually ˆcompounds** with the local authority,

in consideration of-a discount to pay the rates himself instead of throwing the burden on the

occupier (the socalled <(compound house-

holder'®), whose rent then includes both rent

and rates.

Local Governing Bodies.

English local government is everywhere,

and for all purposes, carried on by one particu¬

lar form of political machinery, which to the

Englishman seems so inevitable that he seldom

thinks of describing it. The powers and duties of government are vested, not in any officers

personally, but in a board or council of mem¬

bers, having jurisdiction, for specific branches of administration, over a definite area. This

governing body, which is uniformly unpaid and

composed of citizens more or less engaged in

their own avocations, appoints, supervises and

directs a staff of salaried, professional officers (the (<municipal civil service®), by whom the

actual functions are performed. The staff of

salaried officers is invariably appointed by the governing body; and (though service is nom¬

inally only during pleasure), the appointments

are habitually permanent, terminable only on

death, retirement through ill-health, superan¬

nuation or misconduct. There is no such thing

in English local government as removal for

political reasons, or in order to make a vacancy.

The board or council acts collectively, by reso¬

lutions agreed to at its meetings by a majority of the members present. Its deliberations are

presided over by one of its own number, called chairman or mayor, whom it freely elects; and

not by a person separately elected by the people for the presidential position, or appointed to it by some outside authority. Perhaps for this

reason, it is a distinctive feature in English local governing bodies that the presiding mem¬

ber has but little personal power or responsi¬

bility, apart from presiding. Though in prac¬

tice he often exercises out of sessions, some ex¬

ecutive power, by giving orders to the salaried staff, this is always done in the name of the board or council, and subject to its ratification.

The board or council habitually divides itself

into committees, each charged with the super¬

vision of a particular branch of the government, and required to report to the main body. The

result is an intimate combination of legislative, executive, and occasionally even judicial opera¬

tions, which the Englishman takes for granted

as ˆadministration.® It may be added that na¬

tional politics have little influence on local gov¬

ernment. The salaried staff is almost univers¬

ally ((out of politics.® In many cases, perhaps the majority, the elections are not contested on political grounds, or seriously fought by the

political organizations. In London and many

of the large boroughs, the elections are thus

fought, but the issues are not primarily those of national politics, nor is the cleavage of opin¬

ion exactly the same. And once elected, the

members (even where the contests have been

keen) seldom habitually allow their politics or party divisions to affect their municipal admin¬

istration.

The organization of local government in

England, once extremely complicated, has been

much simplified by recent statutes. The era of reform began, indeed, in 1834-35, when the

ancient municipal corporations were made elect¬

ive and systematized, and the Poor Law was

placed in the hands of elective Boards of Guard¬

ians. Between 1848 and 1875, a system of

elective rural and urban district councils was

created principallv for sanitation and roads. In 1888, the county councils were established on an elective basis, to take over from the non-elective justices of the peace the civil administration of the counties. In 1894, the rural parishes were provided with elective parish councils ; and in 1900 the different parts of London with metro¬

politan borough councils. By these successive

statutes every part of England and Wales has

been placed under local governing bodies an¬

nually or triennially elected on the widest pos¬

sible residential qualification, women having a

vote whenever they are independent house¬

holders, and being everywhere eligible for

election. There is, speaking broadly, no prop¬

erty qualification for election, and (unlike the English parliamentary ballotings) no obligation

on the candidate to provide the election ex¬

penses. The members of the local governing

bodies receive no salary or other remuneration

for their work. Only very exceptionally, in posi¬

tions such as the mayoralty of an important

city, is any allowance paid even for expenses.

In spite of simplifying statutes, English

local government is still shared among various

strata of different authorities, constituted for different purposes under different statutes.

The county of London, with 4,750,000 of in¬

habitants, has a local government of its own,

and must be considered apart. We take first

the network of local authorities administering

the more obvious services of municipal govern¬

ment, including sanitation and education. To

begin with the oarish, we see this ancient eccle¬

siastical area in the rural districts forming the lowest unit of government; administered, if

small, by the parish meeting open to all adults; if large, by a parish council triennially elected by the householders. The parish meeting or

parish council may light the village, protect the footpaths and village green, establish libraries and reading rooms, baths and public laundries ; but its power to tax is limited. Next to it

stands the rural district council, dealing with roads and sanitation, triennially elected by and acting for the householders of a group of par¬

ishes. Places in which the population has be¬

come aggregated together, needing greater and

more varied local government services, are (by

Local Government Board order) given the

status of urban districts. The householders of

these urban areas elect an urban district coun¬

cil, which combines the functions of the parish council and the rural district council, with

greatly extended powers. A steadily increas¬

ing number of urban districts (now over 300 in number) have, sometimes because of past his¬

torical importance, sometimes because of present populousness, been given by the Crown (now¬

adays the Privy Council) the status of char¬

tered municipal corporations; these elect their

councils annually by thirds instead of trien¬

nially; their councils elect to preside over

them, not a chairman but a mayor; and they

co-opt into their own bodies additional members styled aldermen. Such of them as have any

considerable population (about 130 in number),

have their own police forces, under the control of their own town councils. Apart from minor

technicalities there is practically no other dif¬

ference between an urban district which is, and one which is not, a municipal corporation. The words ((town® and (<borough,® it may be men-GREAT BRITAIN — LOCAL GOVERNMENT (15)

tioned, are used in England, for any urban

place, irrespective of size. The word “city® is of equally lax usage, but it ought to be re¬

stricted to those towns, large or small, which have been specifically

termed or created cities by statute or royal enactment, together with

some others, usually the seats of bishoprics,

which bear it by old usage. Above all these

bodies stands the county council ; elected triennially by the occupiers of houses or lands within the county, whether residing in rural parishes, urban districts or municipal corporations. The

county council is the authority for education ; it provides the public lunatic asylums ; it either pays for or itself maintains the main roads; it administers various minor services for the

county as a whole ; and it exercises a certain amount of supervision and criticism and some

slight control over the minor local authorities.

It contributes half the members (the justices

of the peace nominating the other half) to the standing joint committee, which controls the

county police force.

Most of the boroughs over 50,000 inhabitants

(and some ancient towns below that popula¬

tion) stand outside the area of the adminis¬

trative county, and are neither represented in

nor controlled by the county council. These,

the socalled county boroughs (now just 7 5 in number) are entirely autonomous municipal

corporations, which have, in addition, the

powers of county councils. The town council,

elected in the same manner as that of other

municipal corporations, and presided over by

a mayor (or in 12 of the larger cities a lord mayor) is (apart from the administration of

justice and of the Poor Law) the sole local

governing authority of the city, with practically unlimited autonomy within the scope of the

statutory authority entrusted by Parliament to

local authorities generally; and except in a few cases, not even subject, as regards its expendi¬

ture on all but one or two subjects, to the gen¬

eral Local Government Board audit. It is an

important feature of these county boroughs that they (like the other municipal corporations of

any size) mostly have their own police forces, exclusively under the control of their own town councils (by the <(watch committee®).

The 4,750,000 persons who inhabit the county

of London have a more complex local govern¬

ment than the citizens of Liverpool or Man¬

chester. London is divided into 29 metropolitan boroughs, one of them being the ancient city,

preserving still its Corporation, its lord mayor, and other dignitaries and various other pecu¬

liarities. These metropolitan boroughs have

each a council, elected triennially by the house¬

holders, which independently administers the

paving, cleansing and lighting of the streets, the minor house drainage, the removal of refuse,

the suppression of nuisances and the collection of all the municipal

taxes. The City Corpora¬

tion, in addition, manages, with its own consid¬

erable estates, the central markets, Srome of the bridges and the special city police force. Above these local bodies stands the London County

Council, with annual receipts and expenditures

exceeding £12,000,000 sterling, with 118 members elected triennially by the householders of the

whole administrative county of London, to¬

gether with 19 co-opted aldermen; and respon¬

sible for education, main drainage, parks and

recreation grounds, the lunatic asylums, the

tramway service, the ferry steamboats, the great street improvements, the demolition of “slum®

areas and the erection of new dwellings, the

administration of the stringent Building Act

and a host of miscellaneous county services, to¬

gether with the management of the debt of Lon¬

don, not only for its own needs, but also for those of the other local bodies (except the City Corporation). The water supply of the whole

metropolitan district, extending to much more

than the county area, is in the hands of the Metropolitan Water Board, a body made up of

representatives of all the local authorities con¬

cerned. The port and river in the hands of the Port of London Authority is constituted in a

similar manner. The upper Thames is adminis¬

tered by the Thames Conservancy Board, a body

of 28 members, appointed by the Corporation,

the Water Board, the County Council and the

Board of Trade.

The foregoing survey of English local gov¬

ernment omits two branches, which, from

historical causes, still retain their separate or¬

ganizations. Nearly the whole of the collec¬

tive provision for special classes (but not that for lunatics, nor that for persons suffering

from infectious diseases) is in the hands of

what are called the Poor Law authorities. The

country is for this purpose divided into 653

unions of parishes, often not corresponding

with the boundaries of urban districts, munici¬

pal corporations, county boroughs or counties.

The householders of each of these unions elect either annually or triennially, a board of guard¬

ians, which administers the public provision for the aged and infirm, the orphan and deserted

children, the indigent sick, the tramps or

vagrants, and the destitute of every kind.

These boards of guardians levy, for the cost of their schools, infirmaries, workhouses and

“outdoor relief,® an unlimited tax on house¬

holders, the celebrated poor rate. They have

complete discretion as to the amount of money

that they will spend, and as to the amount of the relief that they will afford (above the legal “national minimum® of preventing death by

starvation) ; but their discretion as to the mode of relief, as to the erection of buildings, as to the appointment of officers, and as to the rais¬

ing of loans is guided, and, in the last resort, controlled, by the Local Government Board,

which has (in this branch of local government

more than any other) the power of issuing

peremptory orders having the force of law. In

London, where there are about 30 boards of

guardians, these have also a joint body, the

Metropolitan Asylums Board, made up chiefly

of their nominees, which manages the infectious disease hospitals and the asylums for idiots.

The other important branch of local govern¬

ment with an orgamzation of its own, and the

only one not upon an elective basis, is that of the Justices of the Peace. These are gentlemen of position (now frequently including trade

union officials and other prominent workmen)

who are individually appointed by the Crown

(the Lord Chancellor), by being included in

what is termed the Commission of the Peace.

In practice, however, they are almost always

chosen by the Lord Lieutenant of the county,

who, in most counties, defers informally to the wishes of the existing justices and is now

a:ded by an advisory committee of justices.

Thus, the ((County Benches® are, in effect, re¬

cruited to a great extent by an informal sys¬

tem of co-optation. The principal function of

the justices is that of acting as magistrates.

Any one justice can issue summonses to appear

and warrants to the police for the apprehension of offenders ; any two within each county can

hold a petty criminal court (<(Petty Sessions®), with power to inflict sentences of fine and

short terms of imprisonment (subject to appeal

to Quarter Sessions), or to commit to prison

pending trial at a higher court ; and once a

quarter, the meeting of justices in ((Quarter

Sessions® forms a criminal court trying, with

a jury, all but the most serious crimes, such as murder and grave felonies. At Divisional Ses¬

sions, the justices license retailers of alcoholic drink, nominally at their discretion, but really without effective powers of refusing the re¬

newal of existing licenses, except for grave

misconduct. A recent statute enables them to

award compensation, charged by a special rate

on the district concerned, to the holders of

licenses which they withdraw merely on the

ground that they are unnecessary. Finally, the

Justices in Quarter Sessions, by nominating half the members of the standing joint committee

(the County Council sending the other half) go far to control the county police force. It should be said that a slight elective element is infused into the County Benches by the fact that the

chairmen of the urban district councils are

ex officio justices. The county boroughs, and

also most of the smaller municipalities, have

commissions of the peace separate from those

of the counties, and the Justices of the Peace so appointed usually comprise the mayor for

the time being, and some leading members of

the town council. They have the same judicial

and licensing powers (though no control over

the borough police force) ; but in most towns of any size they perform few judicial duties.

In many towns there is also a stipendiary

professional police magistrate, appointed by

the Crown (Home Office) at the request and at the expense of the town council, who relieves

the justices of the police court work. In towns having their own Court of Quarter Sessions,

the duties of judge are performed by the

recorder, also appointed by the Crown (Lord

Chancellor), who is always a barrister of posi¬

tion, merely visiting the town for the purpose of holding the quarterly court, and receiving

for this duty a small annual stipend.

There remain to be mentioned certain local

authorities standing outside the general system.

Mention has already been made of the Port

of London Authority. At Liverpool and some

other ports the port is managed by a harbor

trust or board, usually elected by the payers of dock or port dues, including the shipowners, with more or less representation of other local gov¬

erning bodies. The Mersey Docks and Harbor

Board, as the Liverpool port authority is called, administers a series of docks representing a

capital outlay of some £30,000,000 sterling.

Besides the Metropolitan Water Board, there

are a few other special water authorities. There are also a few federal bodies, made up of con¬

tiguous local authorities for the joint manage¬

ment of water, drainage, asylums or hospitals.

In lowlying or marsh districts there are 300

ancient bodies called commissioners of sewers,

appointed in form by the Crown (Lord Chan¬

cellor), but practically renewing themselves by

co-optation. These bodies maintain the seawalls, sluices and embankments, enforcing on the

neighboring landowners their obligations of

tenure, and levying on them the cost of neces¬

sary common works. The most exceptional of

these authorities is that of Romney Marsh, in

Kent, where the owners for the time being of

23 ancient estates are, by themselves or their deputies, (<Lords of the Level,® with extensive taxing and judicial powers for the maintenance

of the great seawall.

Relation Between Local Authorities and the

National Executive.

In the matter of the relation between the

national executive and the authorities admin¬

istering the various services of local govern¬

ment, England occupies a position intermediate

between that of France on the one hand, and

the New England or Western States of the

United States on the other. The very real

autonomy of the English local governing body

— greatest in the County Borough, or in such

bodies as the Mersey Docks and Harbor Board

or the Commissioners of Sewers of Romney

Marsh, and least in the Boards of Guardians —marks it off from any analogous authority in

continental Europe. The English local author¬

ity for each area is formed without any inter¬

vention of the national executive (except in the cases of the Justices of the Peace and the ordi¬

nary commissioners of sewers, and then mainly

in form only), and entirely independently of its volition. It is, for the most part, not subject to the orders of any part of the national execu¬

tive ; it has, in nearly every case, real and com¬

plete discretion as to the manner in which its services shall be rendered or the law of the

land carried out; it can, for the most part, de¬

termine whether or not a particular service

shall be supplied in its locality; in all cases it decides on its own responsibility upon its own budget of expenditure, and (whilst not able to impose a new kind of tax) as to the rate of the taxation — of the kind prescribed by statute —which it will levy upon its constituency; and

while in particular instances it is required to obtain the approval of the national executive,

either for its projects or to its actual adminis¬

tration, its practical independence is such that a stubborn local authority usually gets very

nearly its own way. To an Englishman it is

almost inconceivable that a local authority

should be appointed, wholly or in part, by the national executive (unless merely in form) —though the Crown nominates a few members to

such bodies as the Port of London Authority

and the Mersey Docks and Harbor Board,

while the Local Government Board nominates

members to, and exercises a real control over, the very anomalous Metropolitan Asylums

Board — that it should receive and obey orders from the Minister of the Interior; or that it should have to submit its budget for the ap¬

proval of any superior. On the other hand, no local authority in England — whatever the case may have been in times past — has any original, inherent, or independent .powers. With the

possible exception of the ancient corporation of the City of London, all the English local au¬

thorities of to-day plainly owe their origin to GREAT BRITAIN — THE CIVIL SERVICE (16)

and derive their governmental powers exclu¬

sively from the statutes which Parliament has

enacted concerning them ; and they are, with¬

out exception, in all cases, subject to the condi¬

tions and limitations of those and any new

statutes. A local governing body has, in Eng¬

land and Wales, no rights, powers, privileges

or duties inherent in it merely because it is representative of the

people of the particular

locality; or secured to it by a constitution or other authority independent of the national

legislature for the time being. Nor is there in England anything corresponding to the com¬

plete separation between the state executive

and the local authorities and their mutual inde¬

pendence of each other that characterizes so

many of the States of America. Every local

authority in England is required by law at least to furnish an annual statement of its accounts to the Local Government Board; nearly all of

them have to obtain the approval of that branch of the national executive before incurring ex¬

penditure to be met out of borrowed money,

and before raising a loan ; most of them receive annual grants from the national exchequer in aid of their expenditure on particular local services, and have therefore to comply with the condi¬

tions that may be attached to these grants by the Treasury, the Board of Education, the Home

Office, the Board of Agriculture or the Local

Government Board; finally, nearly all of them

have to submit — but the municipal corporations only in respect of part of their work — to an annual audit of their accounts by auditors ap¬

pointed by and responsible to the Local Govern¬

ment Board. These auditors do not carry out,

however, the wishes of the national executive ; what they have.to do is to prevent disobedience to the statutes of the national legislature. They have, in fact, to act in a judicial rather than in an executive capacity, having no power to over¬

ride a mere exercise of the discretion of the local authority, but they are authorized, and in¬

deed required, whatever the Local Government

Board, or other executive authority might de¬

sire, subject to appeal to the ordinary courts of law, peremptorily to disallow and to cause to

be refunded, any expenditure that (whether in

respect of its subject matter, or by reason of fraud, embezzlement or mere waste) falls out¬

side the statutory powers conferred upon the

local authority. It should, moreover, be added

that any difference of opinion between the

Local Government Board (or other branch of

the national executive) and a local authority,

or between two local authorities, as to their re¬

spective legal powers and obligations, has to be determined (unless by mutual consent) not by

the decision of any executive officer or by the national executive itself — not even by any

special tribunal which the national executive

might influence — but, as in the United States, by the ordinary courts of justice, applying to the dispute the ordinary law of the land, ex¬

actly as if it were a dispute between private individuals. In the same way, when a local

authority disobeys or fails to comply with any of the statutes, or acts in excess of its powers, it can be coerced to obedience (apart from such disallowance of unlawful expenditure by the

auditor, or such withdrawal of financial assist¬

ance from the national exchequer as has been

already mentioned) only by means of actions in VOL. 13—15

the ordinary courts of justice, which have to be initiated either by aggrieved individuals or by the national executive under the ordinary law.

But any description of the relation between

the national executive and the local governing

bodies in England would miss the most im¬

portant feature if it omitted to lay stress on the Grant in Aid. It is the system of grants in aid from the national exchequer upon which the

smooth and efficient working of the whole or¬

ganization to a large extent depends. The

expressed purposes of these grants in aid are

(a) to assist poor localities, and prevent the local rates rising to an oppressive height, by promoting a partial equalization of burden ; and (b) to induce apathetic or backward local au¬

thorities to incur expenditure on local services in which the community as a whole has a strong interest. Even more important to the student

of political science is the utility of these na¬

tional subventions to local government, when

given in their most efficient form, in securing national efficiency, without destruction of gen¬

uine local autonomy. The basis of English

local government is the statutory enactment, by the national

legislature, of a minimum standard in each public service (notably in sanitation,

education and police), the attainment of which

is legally obligatory on every local authority, and is legally enforceable by mandamus. Be¬

yond that national minimum in each public

service, each local authority has complete dis¬

cretion. It can, at the expense of its ever-rising local rates, and subject to the control implied in periodical popular election, do as

much or as little as it chooses. But if it

chooses to comply with certain specified con¬

ditions imposed by the national executive —

conditions designed to secure a constantly rising standard of efficiency in particular services —it can (especially in education) obtain national grants in aid of its local expenditure, so cal¬

culated as to share the financial burden of in¬

creased efficiency between the national ex¬

chequer and the local rates. The position of

authoritative criticism and ultimate power to

withhold the grant, which this relation gives

to the national executive — while leaving the

local authority both freedom of decision and a genuine choice among methods, as well as com¬

plete autonomy in the appointment of officers —appears, on the whole, the best possible device for combining administrative efficiency with

local popular control.

Bibliography. — Besides the authorities cited

in the text the student should consult Eng¬

lish Local Government, > by Dr. Joseph Redlich and F. W. Hirst; or (The Parish and the County, } by Sidney and Beatrice Webb (1906) ; (The Manor and the Borough) (1908) ; (The

Story of the King's Highway0 (1913) and

(Grants in Aid) (1911), forming an analytic

and historical account of English local gov¬

ernment. Brief descriptions of the actual or¬

ganization of to-day are (Local Government, }

by Percy Ashley (1905) ; and (Local Govern¬

ment, y by Dr. Blake Odgers (1902).

Sidney and Beatrice Webb,

Joint authors of (The History of Trade Union¬

ism, y (Industrial Democracy J *etc.*

16. THE CIVIL SERVICE. The present

organization of the English Civil Service may

be said to have originated in the appointment

by Order in Council in 1855 of a Civil Service Commission sufficiently strong and independent

to check in some degree the then existing

abuses of Parliamentary patronage.

In the earlier years of the reign of George

III the king had kept patronage in his own

hands, and had used it with the single view

of increasing his personal power. Edmund

Burke's reform of the Civil List (1782) brought in a new and more permanent organization of

the government offices, which made royal pres¬

sure on the "placemen® more difficult. In 1809

a Superannuation Act had the practical effect

of giving civil servants the right to hold their office during good behavior. From 1810 they

were paid by salary instead of by fees, and

from 1816 the salaries of many posts were

provided by a Parliamentary grant. By this

time the royal power was exercised by the

cabinet ministers, and they, through the <(Patronage Secretary to the Treasury,® who acted

(and still acts) as Parliamentary "whip,®

avowedly used their patronage on the nomina¬

tion of individual members of Parliament as a

means of keeping together a majority in the

House of Commons. Lord John Russell, in his

(History of English Government and Constitu¬

tion) 1823 (page 402), speaks of Parliamentary patronage as being ((of late years more com¬

pletely organized.®

The legislation which followed the Reform

Bill of 1832 increased the number and import¬

ance of civil service posts, while the growth of the railway system and of other forms of joint stock enterprise made it more difficult for the government to retain its few really able offi¬

cials. The majority of the persons appointed

on the nomination of ministers and members

of Parliament were notoriously incompetent.

Each party respected the appointments of its

predecessor and no one lost his post on a

change of government — a fact which, while it mitigated the evils of the spoils system, added to the permanent inefficiency of the service.

Occasionally a strong man (like Sir James

Stephen, 1789-1859, or Herman Merivale, 1806—

1874), was appointed from outside in middle

age for special work, but as a rule men were appointed young and were employed for their

first 10 or 15 years in copying letters and other routine occupations. The effect on the person¬

nel of the offices is described by Sir Charles Trevelyan and Sir Stafford Northcote (Report

on the Civil Service, 1854) : (<Admission into the civil service is

indeed eagerly sought a£ter, but it is for the unambitious and the indolent or incapable that it is chiefly desired. Those whose abilities do not warrant an expectation

that they will succeed in the open professions, where they must encounter the competition of

their contemporaries, and those whom indolence

of temperament or physical infirmities unfit for active exertion, are placed in the civil service.®

The effect on the constituencies was even

worse. Sir Charles Trevelyan, writing many

years later, says : “Every borough and county

except a few of the largest had its local man¬

ager on either side — a banker, brewer or

solicitor — who purchased the vote and support of the leading men by a judicious application

of the loaves and fishes. The corruption so en¬

gendered was more constant and general than

the bribery carried on by means of money, and it was also more influential, in the degree in which a provision for life for a son or some other person in whom a voter was interested

was more valuable than the customary five-pound note.® (Eaton, (Civil Service in Great

Britainˆ P-431).

In 1853 the government appointed Sir

Charles Trevelyan, with the late Sir Stafford

Northcote (afterward Lord Iddesleigh) as his

colleague, to inquire into the whole question.

Trevelyan had been (1826-38) in the service of the East India Company and was the brother-in-law of Macaulay, who had been (1832-34)

secretary to the India Board of Control and

(1834—38) legal member of the Governor-Gen¬

eral's Council. In 1833 Macaulay had suggested

open competition for the ((writerships® of the

East India Company as the only effective

method of controlling the patronage of the

directors.

The Government of India Bill of 1853 car¬

ried this proposal into effect, the first open ex¬

amination being held by the India Board in

1855.

Trevelyan and Northcote's report was pre¬

sented in January 1854, and proposed open com¬

petition for the English civil service, and the separation of the service into higher and lower division«. Gladstone, as Chancellor of the Ex¬

chequer in Lord Aberdeen's government, agreed

with the scheme, and civil service reform was

promised in the Queen's speech of 1854. Mean¬

while the report had been sent round to a num¬

ber of distinguished educators and adminis¬

trators whose opinions, .mostly pessimistic, were published by the government (Reports and

Papers, 1854-55). In March 1854 the Crimean

War began, which prevented any large reform

being undertaken and the scheme was de¬

nounced in the House of Lords, by Lord

Malmesbury and others, 13 March 1854, as in¬

consistent with aristocratic government. Reso¬

lutions in the House of Commons in favor of

open competition were lost (10 July 1855) and

carried 24 April 1856, and in 1857.

In 1860 a strong select committee inquired

into the whole question and reported that their own preference was in favor of open competi¬

tion, but that in order that the government

should not go beyond public opinion they

recommended the extension of this system of

(<limited competition® to the civil service gen¬

erally. The evidence taken by the committee

showed that some of the older civil servants

still objected to the examination system, even

under the conditions which had prevailed since

1855, on the ground that it had introduced “a class of men above their work.®

The recommendations of the Select Commit¬

tee were accepted by the government, and for

the next 10 years a competition between at least three nominated candidates took place for each

appointment.

The introduction of household suffrage in

towns by Disraeli's <(Leap in the Dark® Re¬

form Bill (1867) and the defeat of the Con¬

servative party at the election of 1868, altered the whole political position of the civil service question. The existing aristocratic political

families felt that their hold on patronage was gone, and were afraid of the results which

would follow from the use of patronage by

members of Parliament under the pressure of

the newly enfranchised voters. The system of

open competition for the Indian civil service

introduced 15 years before had worked well,

and Gladstone was able to publish (4 June

1870), almost without opposition, an Order in

Council throwing open to competition most of

the government offices. The Foreign Office and the Home Office (which controls the police) were excepted, owing to a belief that secrecy was better secured by a system of nomination. A few years later (1873) the Home Office was thrown open.

When the postoffice took over the tele¬ graphs from the railway companies in 1870 it was found that a few women officials were at work. These were retained, and since then the number of women civil servants has been in¬ creased.

Gladstone's Order in Council of 1870 still in essentials regulates admission to the English Civil Service, though alterations of name have occurred, such as the substitution of ((Second Division® for (<Lower Division® in 1890, and changes of salary, status, and examination sub¬ jects.

The system has been worked with a certain amount of elasticity. Men of all ages are from time to time appointed without competition to

posts involving special knowledge, and com¬

petitive examination is never used in such cases as a test of qualifications. In some cases, as in the starting by the Liberal government of 1892-95 of the Labor Department of the Board of

Trade and the Inquiries Department of the

Board of Education, appointments have been

given without examination to men from outside,

although the work to be done is similar to that done elsewhere by civil servants recruited in

the ordinary way. Inspectors are practically

never appointed by examination, and the <(Examiners® of the Board of Education, whose

work is practically that of the “first division clerks® in other offices, are appointed by the president of the Board, generally from men who have just distinguished themselves at Oxford or Cambridge. Artisans at the royal dockyards

and on other government work are appointed

without competitive examination from lists of

waiting applicants, and the same method is used for recruiting the police of London (which is

under the central government). The younger

<(second division clerks® are allowed to compete on equal (or slightly more favorable) terms

with the outside candidates for first division

clerkships, but in no case is competitive exam¬

ination used as the method of selection for pro¬

motion within the service.

Speaking generally it may be said that the

English government believes that competitive

examination in the ordinary subjects of study is an excellent way of selecting young men for

employment at the end of their school or uni¬

versity career, whether at 17 or at 22 years

of age, but that it is not effective when applied to men engaged in professional work or as a

test of professional knowledge. The fact how¬

ever that the main body of the officials are

appointed by competition has produced an esprit de corps which keeps the whole service out

of politics, and the exceptional cases of appoint¬

ment by nomination neither excite nor as a rule deserve criticism.

In 1855 and in 1870 almost all young Eng¬

lishmen of the well-to-do classes who did not

enter the army or navy went through the same

course of education im classics and mathematics at the old endowed ((public schools® and the two great universities. Professional preparation

for the young “gentlemen® followed graduation,

and therefore it was very easy immediately

after graduation to compare their abilities and acquirements by examination. Those who

failed began, without feeling that they had

wasted either time or effort, preparation for

the Bar or the Church or the <(public school®

teaching profession, or more often started

their professional work with little or no pre¬

paration. In the same way an examination for

the lower civil service confined to reading, writ¬

ing, and arithmetic, corresponded to the facts

of the time, for few boys who did not go

through the public school course learnt much

else. Since 1870 the number of “secondary®

and “higher grade® schools with a fairly wide

curriculum has enormously increased. In 1898

it was found that the old narrow examination

for the lower division had become by the mere force of competition a difficult and technical

test for which boys left their schools and pre¬

pared themselves at crammers. A wider cur¬

riculum including modern languages and sci¬

ence was therefore substituted. This fact and

the facilities in London and other cities for

obtaining higher education in evening classes is tending to lessen the educational advantages

possessed by the average first division clerk

over a clever and ambitious second division

clerk, and to break down the original reason

for their life-long difference of status.

Burke in his reform of 1782 not only helped

to create the class of professional <(civil ser¬

vants® but attempted to distribute some of

their work upon a more logical and economical

basis. What we now call (<Government De¬

partments® consisted then of the clerical staff attached, either to certain ancient offices of

State, such as those of the Lord Chancellor,

the Chancellor of the Exchequer, the Post¬

master General, and the Secretaries of State,

or to Committees of the Privy Council, or to

Boards of Commissioners administering other

ancient offices such as those of the Lord High Treasurer, or the Lord High Admiral. Each

office had <(grown® of itself, and new offices had been created as work increased and without reference to any consistent plan. Of the two

principal Secretaries of State, for instance, the Secretary of the North conducted all corre¬

spondence with the Northern powers of Eu¬

rope, and the Secretary for the South not only corresponded with France, Spain, etc., but car¬

ried on Irish business and the whole police

and other work of the ((Home® Department.

Burke re-divided their duties, making the

Northern Department the office of the For¬

eign Secretary, and the Southern Department

that of the Home Secretary. At the same time, England having lost the greater part of her

Empire, he suppressed the Colonial Secretary,

who had existed since 1768, and who had by

hopelessly unworkable arrangement shared his

duties with a Committee of the Privy Council

called the Board of Trade and Plantations.

The work of both was given to the Home Sec¬

retary.

But it was not until the period of legis¬

lative activity which followed the Reform Bill

of 1832 that anything like a complete survey

was made of the functions of government, or

that any serious attempt was undertaken to

create a department for each function. Both

the recognition of the need of such a survey

and the actual form taken by the redistribution of powers were largely

influenced by the sug¬

gestions of Jeremy Bentham in his Constitu¬

tional Code) and other writings.

The Board of Works (Bentham's ((Domain

Minister®) was created in 1832; the Poor Law

Commission (Bentham's ((Indigence Relief

Minister®) was created in 1834, became the

Poor Law Board in 1847, and was merged in

the Local Government Board in 1871 ; the Com¬

mittee of Council for Education (Bentham's

<(Education Minister®) was created in 1839 and

became the Board of Education in 1899; and

the Registrar General (to superintend Ben¬

tham's (<Local Registrars® of vital statistics)

was created in 1837. Separate Secretaries of

State were appointed for War and Colonies

in 1854, and for India in 1858. A Secretary

for Scotland was created in 1885, and a Board of Agriculture in 1889.

At the time of his coronation King Edward

VII created the Imperial Service Order, with

the object of recognizing (<more fully … the faithful and meritorious services rendered to us by members of the Civil Service of the various parts of our Empire.® Recipients of the decora¬

tion bear the letters (<I. S. O.® after their names.

Within recent years the government have in¬

troduced a number of salutary reforms into the complex organization of the Civil Service. New

and improved schemes of examination took

effect in 1900, 1902 and 1912. A significant

change made during 1908 consisted in the

grouping of a number of important offices under a scheme of examination intermediate in char¬

acter between the test for Class I clerkships and that for the second division. This plan had

been adopted tentatively for junior appoint¬

ments under the Admiralty and the War Office,

but is now applied to several other offices and is still being further extended. In 1910 all

previous orders relating to admission and con¬

ditions of service were repealed; such provi¬

sions as were then in force were re-enacted

with amendments. Power was given to the

Civil Service Commissioners, with approval of

the Treasury, to .prescribe the subjects of ex¬

amination, limits of age, etc., for second divi¬

sion clerkships. Compulsory retirement at the

age of 65 was made applicable to all Civil Serv¬

ants. A Royal Commission was appointed in

1912 to overhaul the whole institution, includ¬

ing the diplomatic and consular services. After an exhaustive inquiry the Commission published

its report in April 1914. One of the sugges¬

tions was the creation of two classes in the

General Service — the Administrative and the

Clerical. The former would practically coincide

with the present Class I clerks. The Clerical

Class would be divided into senior and junior

sections with salaries of $425 to $1,750 and $250

to $1,000 respectively. It is possible for a com¬

petition candidate to rise to $12,000 a year. A review of the general results of the competi¬

tions which were held from 1870 to 1913 inclu¬

sive, shows that 46 competitions took place for an aggregate number of 692 clerkships, exclu¬

sive of Assistant-Surveyorships of Taxes. In

the 1914 examination Oxford and Cambridge

University men secured between them 19 of the

20 posts available in the Home Service, and 42

of the 53 Indian posts. The candidate obtain¬

ing the highest marks — 3,876 out of the 6,000

possible — was a student at Rugby School and

Trinity College, Cambridge. The Civil Serv¬

ice Estimates (expenditure) for 1918—19

amounted to $320,148,590 for England, Scotland,

Ireland and Wales. This also included the

Diplomatic and Consular Services, Old .Age

Pensions, Labor Exchanges, unemployment in¬

surance, education, museums, art galleries, law

officers, police, prisons, telegraphs and Pacific cables.

Bibliography. — The only book on the

whole subject is D. B. Eaton's (English Civil Service) (1880), a careful record of facts, but written without special knowledge of English

conditions. The rise of the Indian civil service is admirably treated in A. L. Lowell's (Colonial Civil Service5 (1900). But the main sources

are the reports and evidence of the successive Parliamentary committees and royal commis¬

sions which have sat on the subject, especially the Report of Sir Stafford Northcote and Sir

Charles Trevelyan (1854), Reports and Papers

on the reorganization of the Civil Service

(1854-55), The Select Committee on the Civil

Service (1860), The Playfair Commission

(1874), and the Ridley Commission (1887).

For the organization of government depart¬

ments, consult Sir William Anson's (Law and

Custom of the Constitution,5 Vol. II.

Graham Wallas,

Member of Royal Commission on Civil Service

since 1912 ; Lowell Lecturer, 1914; Author of

(Human Nature in Politics 5 (1908), cThe

Great Society 5 (1914), *etc.*

17. SCOTTISH HISTORY. From the

Invasion of Agricola in 80 A.D. to the Death

of Alexander III in 1286. — In the main lines of its development Scotland has from the be¬

ginning been subjected to the same general in¬

fluences that have determined the civilization

of all the countries of Western Christendom.

Like each of these countries, however, it has

had a history of its own which has given a

specific stamp to the character of its people, to its institutions, laws, customs and social ar¬

rangements. Among the nations of Europe

Scotland has an individuality as distinctive as that of any of its more powerful neighbors,

and it has made its own contribution to the

general sum of knowledge and to the advance¬

ment of humanity.

Remote as is her geographical position,

Scotland, from the moment it appears in his¬

tory, was an integral part of Western Europe.

Like England, France and other countries she

also came under the domination of the Roman

Empire, and her history begins with the in¬

vasion of Agricola in the year 80 a.d. In her case, however (and it is a note of difference at the very beginning of her history), the Roman

dominion never passed beyond a military occu¬

pation, and, except material remains, left no

permanent impression of its presence. The next

powerful influence that helped to determine the future of Europe was the spread of Christian¬

ity, and for this influence Scotland had not

long to wait. About the year 563 Saint Columba introduced Irish . Christianity into the country north of the River Forth, and by the first

GREAT BRITAIN

‘ssssssaii

trm?

ZZ&SSSESZSJ.

¥

Throne-room, Buckingham Palace, London

GREAT BRITAIN

1 Churchyard of Stoke-Pogis, England

2 Ann Hathaway's Cottage, Stratford-on-Avon, England GREAT BRITAIN

Fingal's Cave, Scotland

GREAT BRITAIN

1 Melrose Abbey, Scotland

2 Balmoral Castle, Scotland

GREAT BRITAIN — SCOTTISH HISTORY (17)

229

quarter of the 8th century the whole of North Britain came nominally under the jurisdiction

of the Bishop of Rome. Christianity was a

common factor in the process which led to the formation of the nations of Western Europe,

but in Scotland, as in other countries, there

were specific conditions that determined the

character of her development and permanently

influenced the genius of her people. There

was first the physical nature of the country,

and, second, the fact that peoples speaking dif¬

ferent languages divided the land between them.

As far as her internal history is concerned, the dominating physical fact was the division of

its surface into a Highland and a Lowland

country. The River Forth (<that bridles the wild Highlandman,® dividing these two territorial

sections by a natural line, has been, in fact, a determining factor in the development of the

Scottish nation. To the north and the south of the Forth respectively there have existed to the present day two distinct peoples, speaking dif¬

ferent languages and possessing different char¬

acteristics, partly the result of original racial idiosyncrasies and partly the result of their re¬

spective histories. The mutual relations be¬

tween these two peoples, it will be seen, have been of the first importance in the history of the Scottish nation.

In the first quarter of the 11th century the

entire mainland of Scotland was nominally

consolidated under one ruler, Malcolm II, who

came of the Celtic race beyond the Forth.

Though territorially consolidated, however,

there was little cohesion between the northern

and southern sections of the kingdom, and the

process in the next stage of national develop¬

ment (1100-1300) was the knitting of the bonds between the different peoples and their gradual subjection to an acknowledged head. In this

process, also, there were general causes at work which were common to Christendom, and

causes which were peculiar to Scotland herself.

The general causes were the introduction of

the feudal system, the organization of the

Church with Rome as its centre, and the growth of towns and municipal institutions — all the

result of the general movement among the

countries of Western Europe. Peculiar to Scot¬

land itself during this period of her develop¬

ment was the decisive supremacy obtained by

the Teutonic over the Celtic peoples in the

direction of the national destinies. The mar¬

riage (1068-93) of Malcolm Canmore, a Celtic

prince, with the Saxon Margaret marks the

beginning of the struggle between the two

races which was to decide whether there was

to be the Scotland which exists to-day. From

that marriage issued a line of kings with Teu¬

tonic names, Teutonic sympathies, and with the

abiding purpose of Teutonizing the national in¬

stitutions. The reasons for this policy are suffi¬

ciently obvious. The country between the Firth

of Forth and the Tweed, which had been ac¬

quired through conquest by the Celtic kings of the north, and whose inhabitants were mainly

Teutonic, was the most valuable part of their

kingdom, and naturally tended to become its

political centre. From the death of Malcolm

Canmore in 1093 to the death of Alexander III in 1286, therefore, the task of the successive Scottish kings was, on the one hand, to defend the southern part of their dominions against the encroachments of England, and, on the other,

to hold in check their Celtic subjects to the north of the Forth and in the extensive district of Galloway (also mainly Celtic) in the south¬

west. By the death of Alexander the task had

been accomplished, and Scotland was now a

consolidated kingdom, effectually ruled by one

acknowledged prince, with Teutonic influences

in the ascendant.

The Struggle for Independence. — The

death of Alexander Ill's only heir, Margaret

of Norway, led to the attempt of Edward I of England and his immediate successors to at¬

tach Scotland to the English Crown, and for

more than half a century she had to fight for her bare existence as a nation. The results of the struggle were of the highest importance for the future of her people. Successfully main¬

taining her independence, by the very effort she made for self-preservation she became a united

nation with a consciousness of a distinct destiny which had not been present to her even in the <(golden days® of Alexander III. By the ordeal they had passed through, moreover, the Teu¬

tonic section of her people, who had been

mainly interested in the issue of the struggle, acquired that national characteristic <(the carl o' hemp in man® — that dogged persistence,

which the world has recognized as a peculiarity of the typical Lowland Scot. But, as we shall see, there was another result of the struggle

for independence which, if it did not affect the national character, powerfully influenced Scot¬

land's laws and institutions, political, social and municipal. In the contest with England she

had sought the alliance of France, and for two centuries and a half she was in closer contact with France than with England. Previous to

the War of Independence it was from England

she had borrowed what she needed ; now it was to France that she looked as her model.

The Development of National Institutions

Under French Influence, 1472-1542. — From

the death of David II in 1472 to the beginning of the reign of Mary in 1542 is a well-marked period of Scottish history, during which the

national institutions assumed the general form

which they maintained till the union of the

Scottish and English Parliaments in 1707.

Throughout this entire period the dread of Eng¬

lish aggression was still the constant preoccupa¬

tion of the people, and this permanent dread at once deepened the national traits of hardihood

and caution and contributed to the strengthen¬

ing of national sentiment. In the development

of institutions we have again to note the action of causes common to western Europe. Like

the kings of other countries the kings of Scots deliberately aimed at Crushing the power of the feudal nobles and establishing a central au¬

thority over which they should be supreme.

But in this endeavor they were checked by two hostile forces — the power of the Scottish

nobles themselves and the insubordination of

their Celtic subjects in the Highlands and the Western Islands. As the result of these op¬

posing forces, whose relative strength was con¬

stantly changing, a Parliament like that of

England, with well-defined privileges and effi¬

caciously representing the different classes of

the people, could not come to birth *in Scotland.

In the Scottish Parliament or Estates (socalled in imitation of the French Etats), the Lords

Temporal and Spiritual, the Commissioners for

the Shires and Burghs, sat in one House and

nominally legislated for the nation, but the

actual power of the Parliament was in the

hands of a committee known as (<The Lords

of the Articles,® the choice of which lay with the king or the greater barons according as the one or the other was in the ascendant. Till

the Scottish Parliament ceased to exist, there¬

fore, it was but the convenient instrument 9f

whatever authority chanced to preponderate in

the State. In the case of other institutions it was from France that Scotland borrowed the

models she sought to imitate. It was from

France, mainly during the period of which we

are speaking, that she took over the Roman

law, thus departing from the example of Eng¬

land; and the College of Justice (the present

Court of Session), established by James V in

1532, was formed on the pattern of the Parlement of Paris. In the election of municipal

bodies in the burghs the method of France was likewise adopted (the retiring body electing its successor), a method which prevailed till as late as the 18th century. From France, also, dur¬

ing the same period was taken the arrangement

of feu-farm by which land was leased in per¬

petuity — an arrangement encouraged by the

E*states and intended (ineffectually as it proved) to remedy the system of short and precarious

leases which till the 19th century disastrously affected agriculture in Scotland. When to these borrowings we add the fact that the majority

of highly educated Scots studied in the schools of France, it will be

seen that, apart from the political results of the alliance, the influence of France in Scotland is one of the important facts in the national development.

From the Reformation to the Revolution,

1542-1689; Adoption of Protestantism and

Alienation from France. — With the beginning

of the reign of Mary (1542) Scotland makes

a new departure and enters on a period which

definitely closes with the Revolution of 1689.

The dominating fact of the period was the

adoption of Protestantism in place of Cathol¬

icism as the national religion (1560). The

immediate result of the change of religion was alienation from France as a Catholic country

and approach to England, with an ever-growing

conviction on the part of both peoples that polit¬

ical union was in the interests of both. But

there were other results from the religious

revolution which permanently affected the na¬

tional character and the future of the country.

For the first time in the nation's history an issue was presented which the public mind was

mature enough to comprehend and which was

of a nature to evoke the 'inherent contrarieties of thought and feeling which divide man from

man. From the change of religion and the

political consequences it involved there resulted a collision between two types of mind which

have been in antagonism ever since. But this

very collision of opposites produced a quicken¬

ing of the general consciousness which made

Scotland a nation in the strictest sense of the word. From the Reformation to the Revolu¬

tion the country was cleft in twain by two op¬

posing principles and two opposing parties, be¬

tween which compromise was impossible and

political equilibrium was unattainable. On the

one side were the successive Stewart kings who aimed at absolute control in Church and State, and on the other, the religious party which

adopted Presbyterianism as its form of church

polity and which maintained the Church's inde¬

pendence of the State. After a struggle that

had lasted above a century came the Revolu¬

tion of 1689, when England and Scotland both

cast out the House of Stewart and a new order began.

From the Revolution in 1689 up to the

Present Time; the Union of Scottish and

English Parliaments (1707); The Jacobite

Risings; Subsequent Privileges; Modern

Development. — For Scotland as for England

the Revolution marks the beginning of the mod¬

ern time. Throughout the foregoing period

theological considerations had dominated the

public mind equally in affairs of Church and

State; henceforward secular interests become

more and more the impelling motives that de¬

termine the action at once of the State and of the individual. The immediate result of this

changed attitude was the union of the England

and Scottish Parliaments in 1707. In the pre¬

vious century ecclesiastical differences had

been a bar to this union ; now considerations

of reciprocal interests determined both nations

to accept it. For Scotland the union was a

necessity if she was to take her place among

the nations. Hitherto she had labored under

disadvantages which, in spite of the strenuous

efforts of her people, had impeded her free

development. Her remote situation, her limited

area of arable soil, her long antagonism to

England, her political and religious distractions, and, as the result of all these concurrent

disadvantages, the meagreness of capital, had

crippled her in all her efforts to develop her resources and to compete with more fortunate

nations. The immediate consequences of the

union, however, did not give promise of the future that was in store for her. The old jealousies between the two partners increased rather than abated, and for fully half a cen¬ tury Scotland sullenly acquiesced in a union into which (such was the feeling generally ex¬ pressed) she had been entrapped by unscrupu¬ lous statesmen, and from which she had only received insult and injury. The Jacobite risings of 1715 and 1745 are the significant commentary on the state of feeling even in the Lowlands, but, as the issue of both enterprises proved, the heart of the nation was too deeply committed to the new order to revert to a regime that would have been inherently opposed to the spirit of the new time.

By the middle of the 18th century the advantages that accrued from the union were no longer doubtful, and henceforward the industrial and commercial progress of the country exceeded the expectations of its most sanguine advocates. Manufactures multiplied; the mineral wealth of the country and the riches of its seas were utilized for the first time on an extensive scale. Foreign trade had hitherto been almost entirely re¬

stricted to the exchange of commodities with

the countries bordering on the German Ocean

and the Baltic Sea, but by the opening up of trade with America, Glasgow, Greenock, and

Paisley — mere villages at the time of the union — grew into great towns and important com¬

mercial centres. Hitherto, alsQ, the three types of burghs, peculiar to Scotland — Burghs of

Barony, Burghs of Regality, and Royal Burghs

— only the last had enjoyed the privilege of

foreign trade in staple commodities, but this

privilege gradually fell into abeyance, and

every burgh with sufficient enterprise was at

liberty to compete with its neighbors. In con¬

nection with the burghs a further progress has to be noted. In Scotland, as in other countries during the Middle Ages, trade and commerce

had been shackled by conditions, necessary at

the time but which were incompatible with free national development. Only Royal Burghs had

possessed the privilege of being the homes of

the great industrial crafts ; in all the three types of burghs only burgesses had the right of pur¬

suing any form of trade; jealous rivalry pre¬

vented free commercial intercourse between the

different towns of the kingdom ; and, finally, the fixing of the prices of commodities by the town councils or by the state obstructed the natural competition which is the life of trade. Later

than in England, though not later than in

France and Germany, these restrictions grad¬

ually ceased to be operative, and in 1846 <(exclusive privileges® in trade and commerce were

formally abolished by an Act of Parliament.

Thus by the awakened spirit of her people

and the surprising development of her resources, Scotland, for long a thorn in the side of her more powerful neighbor, came to be England's

valuable ally in the building up of empire. To the growth of the British colonies it is admitted that she has contributed even more than her

relative share : the number of pioneers whom she has sent to New Zealand, to Australia and

Canada is relatively greater than has proceeded from England, and equally out of proportion

is the number of rulers and soldiers she has

given to India and the other dependencies. In

science, philosophy and literature it is sufficient to recall the names of Watt, Adam Smith,

Hume, Burns, Scott and Carlyle, to prove that

she has contributed her own quota to the com¬

mon stock of material and spiritual wellbeing.

In the rapid development of the country

the Lowlands of the south and east were the

principal agents, but the Highlands also were

powerfully affected by the transformation of

the rest of the kingdom. The risings of 1715

and 1745 may be regarded as the last efforts of the Celtic population of Scotland against the

Teutonic element, to which it had been in per¬

manent antagonism since the time of Malcolm

Canmore. Through the action of the govern¬

ment after the last attempts of the Stewarts to recover their heritage the Highlands ceased to

be a source of danger, but became a source

of economic perplexity. The social conditions

under which the Highlanders had hitherto lived

now came to an end: the time-honored raids

into the Lowlands were no longer possible, and the Highland chieftain ceased to be a feudal

lord and became a proprietor interested in the produce of his land. Thus arose the problem,

even yet imperfectly solved, how under their

conditions of climate and surface and soil the Highlands might be made a tolerable abode for

their populations and a partaker in the general prosperity of the country. But, thoueh in the past debarred by physical conditions from playing a

main part in the material development of the

country as a whole, the Highlander is yet a con¬

stituent element of the Scottish nation. The

nature of his home, the romance that has come to surround his character and his history are

valuable assets among the national possessions.

The natural complements the one of the other,

the Lowland Scot supplies the cautious per¬

sistency, the sure hold of the fact indispensable in the conditions of modern life, while his

Highland fellow-countryman by his quicker

emotions and his natural grace is a standing-re¬

minder that there are other ideals than those

of mere material prosperity.

Religion and Education. — We have seen

that during the 16th and 17th centuries public affairs in Scotland were dominated by

ecclesiastical considerations, and that at the

Revolution of 1689 this domination came to an

end, and material interests came more and more to occupy the public mind. Nevertheless, though religion thus ceased to be the determining fac¬

tor in the national policy, it still remained a subject of absorbing public interest to the com¬

munity at large, and throughout the 18th and

19th centuries religious controversy fills a large place in the national history. As a result of the Revolution, Episcopalianism, which had been

made the national church l>y Charles II at his restoration in 1660,

and which clung to the

House of Stuart as its founder and patron,

was disestablished in 1689, and Presbyterianism

put in its place (1690), was bound by its own interests to support the Revolution regime. The National Church thus established remains till

the present day, but in the course of the last two centuries there have been frequent seces¬

sions, resulting in the formation of various

religious bodies of more or less importance.

By the restoration of lay patronage in 1712 a division of opinion was created which led to

the first Secession under Ebenezer Erskine,

whose members are known as the <(Associate

Presbytery,® or popularly as ((Seceders.® Among

the Seceders themselves there soon arose a

division regarding the oath of allegiance enacted from the Scottish burghs, from which sprang

the two bodies, respectively denominated Burgh¬

ers and Anti-burghers. In 1761 came another

Secession from the Established Church, also

occasioned by difficulties connected with pat¬

ronage — the new Secession taking the name of

the ((Presbytery of Relief.® In 1820 the Burgh¬

ers and Anti-burghers united under the desig¬

nation of the ((Associate Synod of the Seces¬

sion Church,® and in 1847 this body joined

that of the Relief, to form the ((United Pres¬

byterian Church.® In 1843, one of the memor¬

able years in Scottish Ecclesiastical history,

the national church suffered its greatest dis¬

aster since the Revolution. Once more on

the question of patronage, as involving

the question of spiritual independence — the

right of a church to independence of the

state in all matters touching purity of doctrine — a numerous body of its ministers, led by Dr.

Chalmers, effected the ˆDisruption® and set up

what was known as the ((Free Church of Scot¬

land.® Finally, in 1900, the Free Church and

the United Presbyterian Church united under

the name of the (<United Free Church of Scot¬

land.® In this union, however, a minority of

the Free Church refused to concur, and a judg¬

ment of the House of Lords (1904) decided

that the property of the church belonged to the minority — a decision which occasioned an Act

of Parliament appointing a commission to allo¬

cate the property between the two sections.

Thus at the present time in Scotland there are two main bodies of the Presbyterian Church:

the Established Church and the United Free

Church. The Scottish Episcopal Church and

the Roman Catholic Church, the latter mainly

consisting of persons of Irish extraction, are

the two other chief religious denominations.

In the recent history of Scottish elementary

education the most memorable event is the

Education Act of 1872, by which Board Schools

were substituted for the old Parish Schools and education was made compulsory from the age of

5 to 14. In 1889 elementary education was

made free. While Scotland has always com¬

pared favorably with other countries in ele¬

mentary education, her provision for secondary

education remains defective, though govern¬

ment grants for that purpose have wrought

much improvement in recent years. Within

the last half century the universities of Scot¬

land have undergone reforms which have

changed their original character and were in¬

tended to adapt them to modern needs. By

the University (Scotland) Act of 1858 they re¬

ceived a common constitution, and by the Uni¬

versities Act of 1889 this common constitution

was further reformed. The supreme body in

each case is a University Court ; there is also a Senatus, consisting of principal and pro¬

fessors, who regulate internal administration.

There are four universities — Edinburgh, Glas¬

gow, Aberdeen and Saint Andrew's, to which

last the University College of Dundee is

affiliated.

Law and Justice. — The law of Scotland was

originally based on Roman law, but there has

been a gradual assimilation between the law of Scotland and that of England. This has been

specially the case with mercantile law, which is now mainly identical in both countries. The

system of real property law, however, is fun¬

damentally different from that of England. In

England the fee simple can be split up into

estates for life, while fee simple in Scotland cannot be split up; and what is called a liferent is merely a burden on the fee. Estates in remainder are unknown; the fee is destined to

institutes and substitutes, and the word entail means in Scotland only a destination that can¬

not be broken except under defined conditions.

In Scotland, in the law of contracts no consid¬

eration is necessary to make a contract action¬

able. In Scotland, law and equity have never

been separated, but have always formed a single system. The law of personal and domestic re¬

lations, being largely founded on Roman law,

differs in its broad principles from that of Eng¬

land. The tendency, however, has been to as¬

similate the two in the course of modern legis¬

lative changes. Marriage, for example, need

not in Scotland be celebrated in facie ecclesiae , but can be constituted by mere informal con¬

tract of the parties. Marriages can also be

more readily dissolved — desertion being suffi¬

cient ground of itself. The administration of

the civil law is vested in the Court of Session subject to appeal to the House of Lords. This tribunal consists of an Inner or Appellate

House, which sits in two Divisions, one of which is presided over by the Lord President and

the other by the Lord Justice Clerk. There is also an Outer House, consisting of five Judges of First Instance who sit singly under the title of Lords Ordinary. There are also in each

county local courts with restricted jurisdiction, presided over by sheriffs or sheriff-substitutes, which in many respects correspond to the

County Courts in England, but have a some¬

what wider jurisdiction. The criminal law is

administered by the same body of judges sit¬

ting on the criminal side and with a somewhat different organization. In his capacity as Head of the High Court of Justiciary, the Lord

President is Lord Justice-General of ScoFand.

There are also Magistrates' Courts, burgh and

county, which exercise police jurisdiction.

These magistrates are for the most part unpaid laymen.

For geography, geology, hydrography, popu¬

lation, education, political constitution, etc., see Scotland, and Scotland, Language and Liter¬

ature of. See also other articles in this sec¬

tion.

Bibliography. — From the Invasion to 1268

— General. — Series of historians of Scot¬

land, } consisting of 10 vols., comprising the

Chronicles of Fordun, Wynton, *etc.* ; Chalmers,

'Cakdonia5 ; Burton, history of Scotland

from Invasion of Agricola5 ; Robertson, 'Early

Kings of Scotland) ; Skene, (Celtic Scotland) ; Mackintosh, history of Civilization in Scot¬

land5 ; Grub, (An Ecclesiastical History of Scotland) ; Bellesheim, history of the Catholic

Church in Scotland) ; Lang, history of Scot¬

land5 ; Brown, history of Scotland.5 Special

— Adamnan, ‘Life of Saint Columba) (edit.

Reeves) ; Rhys, (Celtic Britain) (3d ed.) ;

Bede, ‘Ecclesiastical History5 (ed. Plummer) ;

Camden, <Britannia) ; Anderson, ‘Scotland in

Early Christian Times 5 ; Dowden, ‘The Celtic

Church in Scotland) ; Turgot, ‘Life of Queen

Margaret5 (translated by Hunter Blair) ; Innes, ‘Origines Parochiales Scotiae.5

The Struggle for Independence. — ‘Docu¬

ments illustrative of the History of Scotland

from the Death of King Alexander III to the

Accession of Robert Bruce5 (Record Series) ;

‘Documents and Records illustrating the His¬

tory of Scotland and Transactions between

Scotland and England5 (Record Series) ;

‘Chronicle of the Reigns of Edward I and

Edward II5 (Record Series) ; Barbour, ‘The

Bruce5 (Scottish Text Society) ; Blind Harry,

‘Wallace5 (Scottish Text Society) ; ‘Acts of

Parliament of Scotland5 (Record Series) ; ‘Ex¬

chequer Rolls of Scotland5 (Record Series) ;

Fraser-Tytler, ‘History of Scotland from the

Accession of Alexander III to the Union of

the Crowns5 ; Maxwell, ‘Life of Robert Bruce5

(heroes of the Nations5) ; Francisque-Michel,

‘Les Ecossais en France, et les Francois en

Lcosse5 ; Innes, ‘Scotland in the Middle Ages,5

‘Sketches of Early Scottish History,5 ‘Scotch

Legal Antiquities5 ; Cochrane-Patrick, ‘Mediae¬

val Scotland.5

From 1472 to the Reformation , 1542. — ‘Ex—

tractia e Chronicis Scotiae5 (Abbotsford Club) ; Accounts of the Lord High Treasurer of Scot¬

land (from 1473) ; Jean Chartier, ‘Chronique

de Charles VI5 ; Drummond of Hawthornden,

‘History of the Five Jameses5; Pinkerton,

‘History of Scotland from the Accession of the House of Stuart to that of Mary5 ; Jusserand, ‘The Romance of a King’s (James I’s) Life5;

Smith, ‘The Days of James IV,5 ‘Ledger of

Andrew Halyburton5 (Record Series), ‘A

Diurnal of Remarkable Ocurrents) (1513-75),

Bannatyne Club; Pitcairn, (Criminal Trials in

ScotlancP (1488-1624), Maitland Club.

From the Reformation 1542 to the Revo¬

lution (1689), — Register of the Privy Council

of Scotland (published to 1638) ; John Knox,

(History of the Reformation of Scotland5;

Calderwood, history of the Kirk of Scot¬

land*; Keith, (Affairs of Church and State in Scotland) ; Spottiswoode, (History of the

Church of Scotland) ; Lyndsay of Pitscottie,

(Histone of Scotland) (1436-75) ; Mignet,

(Marie Stuart5 ; Philippson, (Historie du

Regne de Marie Stuart5 ; Froude, (History of

England from the Fall of Wolsey to the Defeat of the Spanish Armada) ; Row, (Historie of the Kirk of Scotland) (1558-1637) ; Balfour, An¬

nals of Scotland5 (to 1652) ; Spalding, (History of the Troubles in England and Scotland5

(1624-45) ; Gardiner, (History of England5

(1603-59); Bishop Burnet, (History of His

Own Time5 ; Wodrow, (The History of the

Sufferings of the Kirk of Scotland from the

Restoration to the Revolution5 ; Lang, (History of Scotland,5 (Vols. II and III) ; Brown, his¬

tory of Scotland,5 (Vol. II) ; Early Travellers in Scotland; Matheson, (Politics and Religion:

a Study in Scottish Religion from the Reforma¬

tion to the Revolution5 ; Chambers, (Domestic

Annals of Scotland.5

From the Revolution (1689) to the Present

Time. — The Lockhart Papers; Mackinnon, (The

Union of England and Scotland5 ; Matheson,

(Scotland and the Union5 ; Rae, (The History

of the Late Rebellion5 (1775) ; Patten, {The

History of the Rebellion in Scotland in the year 1 71 5 5 ; Struthers, (The History of Scotland

from the Union to the Abolition of the Feudal Jurisdiction5 ; Burt, (Letters from a Gentleman in the North of Scotland) ; Chambers, (History of the Rebellions in Scotland5 ; Home, (History of the Rebellion of 1 745 > ; Knox, (A View of the British Empire, more especially Scotland5 ;

Pennant, (Tours in Scotland5 ; Buckle, his¬

tory of Civilization in England5 (Vol. Ill) ;

Craik, (A Century of Scottish History5 ;

Graham, (The Social Life in Scotland in the

18th Century5 ; publications of the Burgh Rec¬

ord Society; (The New Statistical Account of

Scotland5 ; Bremner, (The Industries of Scot¬

land5 ; Groome, (The Imperial Gazetteer of

Scotland5 ; Duke of Argyll, (Scotland as it was and is5 ; Craik, (A Century of Scottish His¬

tory5 (1901).

Peter Hume Brown,

Professor of Ancient (Scottish) History and

Palceography in the University-of Edin¬

burgh: Author of (History of Scotland ,5

(Scotland before 17002 cThe Legislative

Union of England and Scotland 5 (1914), *etc.*

18. IRISH HISTORY. Ireland, lying to

the west of Great Britain, forms one kingdom

with it, which is known as the United Kingdom of Great Britain and Ireland. This designation

was introduced in the year 1800, when the Act of Union which united the Parliament of Ire¬

land with that of Great Britain was passed. So far as political institutions can avail, Ireland is one with the neighboring country. But in spite of the political tie she stands widely divided from Great Britain by most of the characteris¬

tics which are distinctive of a nation — histori¬

cal traditions, racial spirit, social and economic conditions. The distinction is marked even in

the physical character of the island*. Possessing little mineral wealth — iron ores in Antrim and Leitrim and some coal deposits in Antrim, Lei¬

trim and Kilkenny — Ireland has not within it¬

self the resources of a manufacturing country.

The great central plain, stretching across the

island from sea to sea, richly covered with vege¬

tation, is adapted to pastoral and agricultural industries only, while

the hilly regions to the north and south offer a soil that only tillage can make fruitful. Though water is abundant,

waterpower is deficient, owing to the generally low level of the country, fully onehalf of which does not rise to an elevation of 300 feet above the sea.

Ancient Legends. — From the earliest times

to which tradition reaches back Ireland was oc¬

cupied by offshoots of that great Celtic race which spread from the Hellespont to the Eng¬

lish Channel. Lying within easy reach of the

coast of Gaul it was exposed to the incursions of the seafaring Celts of northern Europe. Ac¬

cording to the ancient legends it was succes¬

sively overrun and conquered by five different

invading tribes. The last of these were the

Milesians. The legends represent these invaders

as migrating from Spain about 700 b.c. and es¬

tablishing their sovereignty over the whole of

Ireland. Modern scholars incline to the view

that the story of the Milesian invasion is the record in tradition of an invasion by British

Celts which took place most probably about the beginning of the Christian Era. The political or¬

ganization of the Irish Celts was strictly tribal.

The land of the country was parceled out

among a number of petty chiefs or heads of

tribes, who owed certain duties of tribute and service to the more

powerful over-kings ; above these again was the ard righ or chief king

whose authority was acknowledged in propor¬

tion to his power to make it effective. The

tribal organization remained an enduring source

of national weakness; it hindered the growth

of an effective national power; it prevented any effective combination of the national forces

against foreign invasion.

Christianity Established. — In the second

half of the 5th century Ireland was converted

to Christianity ; its conversion was the work of a few years. That the new faith was accepted

readily may be due to the fact that the previous religion of the people — if it can be called a re¬

ligion — was ill-defined and unsystematized; a

definite belief with a definite system of worship would not have been surrendered without a

struggle. Saint Patrick and the other founders

of the Irish Church accommodated themselves

to the political organization of the country.

Monastic institutions, established on lands

granted by the converted chieftains, became the centres of church government, their jurisdiction being coterminous with the territory on which

they were founded. They seem to have been re¬

garded as identified with the local civil organ¬

ization and were freely plundered and destroyed in the raids which, in the absence of a control¬

ling central power, the petty rulers made on one another. This notwithstanding, monasticism ex¬

hibited remarkable developments in Ireland.

For three centuries after the death of Saint

Patrick the Irish monastic schools were the cen¬

tres of learning in Europe. Scholars flocked

to them from Great Britain and the continent;

and from these schools went forth the teachers who carried faith and knowledge among the

Teutonic conquerors of the Roman empire.

This missionary activity declined with the

growth of civilized institutions in the new king¬

doms that had been formed out of Rome's pos¬

sessions. The source of supply was moreover

sadly disturbed in Ireland. (See Monachism).

At the beginning of the 9th century the North¬

men, at the same time that they began their raids on England, extended their incursions to Ire¬

land. They succeeded in establishing a few im¬

portant strongholds on the coast and carried fire and sword through a country whose warring

rulers met them as enemies or received them as allies according to the needs of their struggles with native rivals. The monasteries were a spe¬

cial object of hate to the Vikings; when their power was at length broken, in the 11th century, Irish monasticism was found to have run its

course, and the field lay open to the Latin or Benedictine monasticism which was to succeed

it.

Establishment of English Power. — With

the 12th century opens that long chapter of

Irish history which records the relations of Ire¬

land to England. The history of those relations is the history of Ireland to the present day. In 1169 the first body of Anglo-Norman adventur¬

ers crossed the Irish Sea, the precursors of

many a subsequent expedition. They came as

the allies of a native chief who had been ex¬

pelled from his territory. They came to stay,

and after them came, in long succession, other bodies of adventurers. It was thus the founda¬

tions of English power in Ireland were laid. It was a fitful and tedious process, carried out for four centuries without any definite plan, and at no time during that period with forces suffi¬

cient to effect a general conquest. On the other hand the native Irish, owing to their tribal or¬

ganization and to the absence of an effective

central authority among them, were never able

to unite for common defense against the in¬

vaders. The growth of a national spirit and a national life was rendered impossible. Politi¬

cally there were two Irelands within the island — one, that portion of the country in which Eng¬

lish law prevailed, and the authority of the

English Lord Deputy was recognized, and which

came to be called the Pale; and, outside this, another, ruled by Irish chieftains, or by Anglo-Norman lords who adopted Irish customs and

who obeyed or resisted the authority of the

Crown as suited their interests. Parliamentary

institutions were introduced into Ireland soon

after their establishment in England. But, as

they were for the English settlers only, and were set in motion chiefly to provide subsidies for the English monarch, and as representation was

bestowed much as the Lord Deputy chose to

distribute it, the occasional summoning of a

Parliament did little to promote the evolution

of a national government. With the reign of

Henry VIII came the Reformation (q.v.), and,

with this, the introduction of a new element of discord into Ireland. Racial and political feuds were now intensified and embittered by religious antagonism. Throughout the desolating wars

of Elizabeth's reign, the ˆPlantations® of

James I, and the sanguinary campaign of Crom¬

well (q.v.) the policy of at once destroying the (<Irish Enemie,® and

extirpating popery, was

consistently pursued. The defeat of the Irish

at the Boyne (1690) made the English interest

in Ireland definitively safe from armed attack.

The English power was now supreme and it

might have been anticipated that the country

would enter on a career of economic and politi¬

cal development. But this was not to be for

some time yet. Religious hate divided the coun¬

try as effectually as animosities of race. A

penal code was passed against the Catholic re¬

ligion which demoralized alike those who ad¬

ministered it and those whom it oppressed. Mr.

Lecky describes it as <(ingeniously contrived to injure, to insult, and to impoverish the people of Ireland.® It is evident there could be no de¬

velopment of political organization in a coun¬

try four-fifths of whose inhabitants were by law excluded from Parliament, from the magis¬

tracy and from the bar, could not vote at elec¬

tions, could not act as constables, sheriffs or jurymen, were debarred from every means of

educating their children, from acting as school¬

masters, ushers or private tutors, could not

marry Protestants or purchase <(manors, tene¬

ments, hereditaments or life annuities.® (Lecky).

English Repression, Subsequent Poverty

and Passage of Land Acts. — A vigorous na¬

tional spirit is the best cure for the excesses of religious intolerance, and through the 18th

century there were causes at work which tended to create and develop this spirit. The English government, under pressure from English agri¬

culturists and manufacturers, had, since the

Restoration (1660), hampered by restrictive leg¬

islation every Irish industry which seemed

likely to compete with England in the home or foreign market. This policy of stifling or starv¬

ing industry affected Irish Protestants and Cath¬

olics alike and roused in them the sense of com¬

mon national interests. The ablest spokesmen

of the dominant party began to demand free

trade for Ireland, a free Parliament and eman¬

cipation for the Catholics. Free trade and a

free Parliament were secured and some of the

more galling disabilities of the Catholics were removed. A genuine national life began to ani¬

mate the country and its progress during the

period of its Parliamentary independence was

unexampled. As Lord Clare put it, ((No na¬

tion on the habitable globe had advanced in cul¬

tivation, commerce and manufacture, with the

same rapidity as Ireland from 1782 to 1800.®

But in 1800 the Act of Union put an end to

the Irish Parliament, checked the further growth of that prosperity which had been stimulated by distinctively Irish legislation and hindered the further development of that spirit of religious tolerance which the sense of common economic

needs and interests was generating. Explain it

as we may, England and Ireland will not, and

apparently cannot, form one economic organism,

in which one stream of industrial life will cir¬

culate. The long series of repressive acts di¬

rected against Irish industries is proof of this for the centuries that are past. For our own

time, the proof is furnished still more cogently.

The 19th century was, for Great Britain, a pe¬

riod of unexampled prosperity. Her growth in

wealth, in power, in population was continuous.

She secured for herself the supremacy among

the manufacturing and trading nations of the

world, and from that eminence she has not yet been displaced. But while Great Britain was

thus rising to unexampled industrial greatness,

the remaining portion of «the United Kingdom®

GREAT BRITAIN

Blarney Castle, Ireland

Custom House, Dublin, Ireland

GREAT BRITAIN

was declining in wealth and population with a

rapidity which has no modern parallel. Thirty

years after the Irish Parliament had been abol¬

ished, the industries which had flourished under its care had almost disappeared. The people of Ireland were, in consequence, thrown wholly

upon the land. Competition for the one avail¬

able means of livelihood became excessive,

holdings were divided and subdivided, and

rents rose far above the economic level. The

population grew, but the means of subsistence

did not increase proportionately. The peas¬

antry subsisted mainly on the potato crop ; in 1846 this crop failed and famine followed. The repeal of the Corn Laws and the competition

of foreign countries brought down the prices

of agricultural produce. High rents could no

longer be paid by small tillage farmers. The

only farm industry as yet safe from foreign

competition was that of cattle raising — the

means of rapid transport from the United

States, the Argentine Republic and Australia

had not yet been perfected — and to make room for large grazing farms the small cultivators

were ruthlessly cleared off the land. With

the famine and the clearances began a move¬

ment of emigration which has reduced the popu¬

lation by nearly onehalf. But in time the

grazing ranches of the United States and the

Argentine, and the sheep farms of Australia

were brought within reach of the English

markets, and prices fell so far that the graziers could no longer pay the high rents. An

agrarian revolution was the consequence. The

government intervened, first to fix farm rents

on the basis of current prices, and, when this was found unsatisfactory, to mediate for the

sale of the land to the occupiers with the aid of state credit.

A series of Land Purchase Acts was passed,

and the transfer of the land to the tenants is now proceeding on a large scale.

Remedial Legislation Passed by English

Parliament. — It must be said that the English government has done much during the last

half century to repair the injustices of the cen¬

turies preceding. Let us reckon briefly what

has been done. Passing over Catholic Emanci¬

pation (1829) and the establishment of the

system of primary education known as the

ˆNational® system (1831), both of which

measures belong to the first half of the cen¬

tury, we have to put to the account of the

English Parliament and government the Dis¬

establishment of the Irish Church (1869), which gave equality to all religions before the law; the system of intermediate education (1878) ;

the Royal University (1879), defective inas¬

much as it did not give university education,

but merely tested it and conferred degrees ; local government (1898), which bestows on elected

bodies the administration of local affairs ; the series of Land Acts designed to improve the

position of the occupier — the Act of 1870,

which put a check on arbitrary eviction and

gave the tenant compensation for disturbance ;

the Act of 1881, which established a tribunal

to which the tenant could appeal for the fixing of a fair rent; the Act of 1885, which made the first advance (£5, 000,000) to the tenants for

the purchase of their holdings; the Act of

1888, which made another advance of £5,000,000; the Act of 1891, which advanced £33,000,000 for the same purpose ; the Act of 1896, which

amended the preceding acts; and, finally, the

Wyndham Act of 1903, which facilitated the

operations of purchase and increased the loan

for buying out the landlords to £100,000,000,

and the Land Act of 1909, providing further

facilities for payment.

Previous to the passing of the 1903 measure

a Department of Agriculture and Technical

Instruction was established (1898) to instruct

the people in the improved modern methods of

agriculture and to diffuse among them a knowl¬

edge of the industrial arts.

Under these acts the operations of purchase

have been carried out on a large scale. Up to 1902, under the earlier acts, over 70,000 tenants had purchased their holdings at sums amounting

in the aggregate to over £20,000,000. In January 1906 the sales under the Wyndham Act had

amounted to £7,207,548. Up to March 1917 the

total amount advanced was £98,531,611, while

£1,677,073 had been paid in cash by purchasers of estates. For the purposes of the Labourer

Acts, 1906, 1911 and 1914 the Land Commis¬

sion had advanced £4,586,821. The total num¬

ber of holdings in 1917 was 572,045.

Prospects. — With all this remedial legisla¬

tion the prospects of Irish industry are im¬

proving. The manufactures are confined

chiefly to the northeastern corner of the island, where the shipbuilding industry of Belfast

and the linen industry in the city and sur¬

rounding country employ a large number of

hands. If we except the brewing industry in

Dublin we may say that the rest of the coun¬

try is devoted to farming. The farming is not of the intensive kind; of the 20,371,124 acres which form the area of Ireland close on

15,000,000 acres are devoted to permanent

pasture and meadow, and thus, as has been

said, <(Two-thirds of the country is never

touched by plough or spade.® Under these

conditions a large population cannot be main¬

tained in comfort. Hence the ceaseless flow

of emigration, chiefly to the United States and Canada. In 1841 the population was 8,175,124;

in 1901 it was 4,458,775 ; in 1911, 4,390,219, and the drain still continues. The cost of the ad¬

ministration of justice is nearly double what

it is in England, where the population is

more than six times that of Ireland; and 10

times what it is in Scotland, where the popula¬

tion is about equal that of Ireland. Of the

103 members sent by Ireland to the Imperial

Parliament over 80 are sent there to offer per¬

sistent resistance to the English government of Ireland. On the whole it must be admitted that under this government Ireland has not enjoyed

the good fortune which the framers of the Act of Union promised her. Nor has Great Britain

derived from the union the advantages which

the authors of the measure anticipated. The

predictions of Grattan and the other far-seeing opponents of the act have found melancholy

fulfilment, and English statesmen of. the pres¬

ent day seem warranted by the experience of a century in reverting to the policy — to which

they are now committed — of trusting to self-government as the best means of securing ma¬

terial prosperity for Ireland and political

harmony between the sister countries.

The Churches.— The principal religious de¬

nominations of Ireland are the Roman Catholic,

the Episcopalian Protestant (late Church of

Ireland, disestablished in 1869), the Presbyterian and the Methodist. The respective numbers of

these communions, according to the census of

1911 are: Catholics. 3,242,670; Episcopalian Prot¬

estants, 576,611; Presbyterians, 440,525; Meth¬

odists, 62,382; and other professions, 68,031.

The constitution and government of the Catho¬

lic, Presbyterian and Methodist bodies are the

same in Ireland as in other countries. The

constitution of the Protestant Episcopalian

Church presents some points of special interest.

The constitution of this church was framed

under the Irish Church Act of 1869, by which

the ˆChurch of Ireland® was disestablished.

The supreme authority is vested in the General Synod. The General Synod consists of two

houses : the House of Bishops, which includes

all members of the Protestant episcopacy, and

the House of Representatives, consisting of 208

clerical and 416 lay members. These repre¬

sentatives are elected by the clerical and lay members of the Diocesan Synods, which, in •

their turn, are elected by the clergy and laity respectively of the several dioceses. The Gen¬

eral Synod is the supreme authority in all mat¬

ters relating to discipline and doctrine within the church. The funds of the church are held

by a body of trustees called the Representative Body. The capital sums in the hands of this

body amount, according to the most recent

returns, to nearly £14,000,000 sterling. See

English Nonconformity and English Roman

Catholics.

Executive. — The supreme executive author¬

ity in Ireland is vested in the king's represen¬

tative, the Lord Lieutenant, who enjoys the

title of Lieutenant-general and General Gov¬

ernor of Ireland. He is appointed by the Crown, and until recently had to be a Protestant.

Sometimes he has a seat in the Cabinet and

takes an active part in the Government of the country; more frequently he is a mere figure¬

head, the real executive authority being held by the ((Chief Secretary to the Lord Lieutenant.®

The Chief Secretary is usually a Cabinet Min¬

ister, and is responsible to the House of Com¬

mons for the acts of the Government. The

salary of the Lord Lieutenant is £20,000 ; that of the Chief Secretary, £4,425. When the Home

Rule Act is put into effect this system of ad¬

ministration will be subject to changes.

Local Administration. — By the Local Gov¬

ernment (Ireland) Act, 1898, administrative

functions in reference to highways, public

health, and relief of the poor, were assigned

to local bodies elected by the ratepayers —

Borough Councils for the six largest towns;

County Councils for the counties ; and under

these, Urban Councils for the smaller towns,

and Rural District Councils for the country

districts.

Judiciary. — At the head of the Irish judicial

system is the High Court of Justice, with a

Court of Appeal. The High Court includes

two divisions — the Chancery and King's Bench

Division. The work of these courts is done by a Lord Chancellor and 16 Judges, all appointed by the Crown. Cases of less importance are

dealt with by the recorders of the cities, three in number, and 18 county court judges, who

hold their sessions at various centres through

the country. A numerous unpaid magistracy,

assisted by (<stipendary® or paid magistrates,

deals with minor cases. The Criminal Justice

Administration Act of 1914 provides for ap¬

peal in almost all cases.

Police. — The police force of the country is

wholly under Government control. Dublin has

a local police force, controlled by Government, consisting of 1,084 men at the end of 1916.

The rest of the country is policed by the <(Royal Irish Constabulary,® a sˆmi-military force of

10,000 men. The Imperial Government pro¬

vides about £1,500,000 per annum to maintain

the police and constabulary.

For topography, hydrography, geology, flora,

fauna, climate, population, agriculture, fisheries, manufactures, trade, commerce, transportation,

finances, banking, etc., see Ireland, and also

articles in this section: Agriculture; Mining;

Land Laws ; Fisheries ; Industries ; Factory

Legislation; Trade Unionism; Commerce;

Free Trade Movement; Banking; Railways;

Shipping, *etc.* For government, education, re¬

ligion, etc., see Ireland, and also articles in this section: Parliament;

Crown and Cab¬
inet; Political Parties; Civil Service; Judi¬
cal System; Local Government; Church of
England; Nonconformity; Roman Catholics;
Judaism; Education; *etc.* For language and
literature, art and architecture, and further de¬
tails of history, see Ireland; Celtic Lan¬
guages; and articles in this section: The Con¬
quests; Medieval England; The Reforma¬
tion; English History of the 17th Century;
Navigation Acts; The 18th Century; The
19th Century; *etc.* See also Irish Music;
Irish Land Laws. For the 1916 revolution
see under Ireland.

Bibliography. — Ball, Historical Review of
the Legislative Systems Operative in Ireland) ;
Barrington, (Rise and Fall of the Irish Na—
tionJ ; Bonn, (Modern Ireland and Her Agra¬
rian Problems > ; Haverty, McGee, Mitchell,

(History of Ireland) (General) ; Lanigan,

(Ecclesiastical History of IrelancP ; Lecky,

(Leaders of Public Opinion in Ireland ; Mor¬ ris, (Present Irish Questionsˆ Murray, Alice E., Commercial Relations Between England and Ireland) ; Plunkett, Ureland in the Nineteenth Century* ; Sullivan, (New Ireland) ; Ureland, Industrial and Agricultural,* issued by the De¬ partment of Agriculture and Technical Instruc¬ tion for Ireland. For more extensive bibliog¬ raphy see Ireland.

T. A. Finlay,

Professor of Political Economy, University College , Dublin ; Commissioner of Interme¬ diate Education for Ireland; Vice-President of the Irish Agricultural Organization So¬ ciety.

19. WALKS. Wales derives its name from a Teutonic root meaning foreign, applied to the country by the English invaders of Britain. In Welsh it is called Cymru (formerly spelled Kymry), a name, in spite of a superficial re¬ semblance, entirely unconnected with the Cimbri

or the Cimmerii. The Welsh term for a Welsh¬

man is Cymro (plur. Cymry), a derivative of

the old Celtic Combrox (plur. Combroges) ,

meaning a Mellow countryman.® This name is

now thought to have been given by the Welsh

and the northern remnants of the ancient

Britons to themselves in post-Roman times in

their joint struggles against the English. Be¬

fore this they seem to have used for themselves GREAT BRITAIN — WALES (19)

the general term Britons (Lat. Britanni, Brittones). For certain purposes, chiefly educa¬

tional, Monmouthshire is now counted as part

of Wales. In Roman times the chief tribes in

Wales were the Ordovices in the north and

centre, the Silures in the southeast and the

Demetae in southwest Wales. In the post-Roman period, and until the assimilation of

the Welsh territorial system to that of England, the chief divisions were Gwynedd (in the

northwest), Powys (in the centre and north—

cast), Gwent (in the southeast) and Dyfed

(in the southwest), together with the con¬

tiguous parts of South Wales. This latter

division in its totality was often called Deheu-barth (i.e . the south part). These divisions

practically survive in the dioceses of Bangor,

Saint Asaph, Llandaff and Saint David's re¬

spectively. The country was anciently divided

into cantrefydd (hundreds), and each cantref

was usually divided into two cymydrau (com¬

motes). Some of these cantrefydd (pi. of

can ft] (hundred), and tref (homestead) , such

as Rhufoniog (Romaniacus) , in Denbighshire,

Dunoding, the land of Dunod (from Donatus),

in Carnaryonshire and West Merioneth, bear

Latin names, and must have clearly obtained

these names during or after the Roman occu¬

pation. The division into county and borough

divisions is due to the assimilation of the Welsh territorial system to that of England. The

title (<Prince of Wales,® derived from the

ancient principality of Wales, is now conferred by the reigning sovereign on the heir-apparent.

In recent times, the connection of this title with Wales has been emphasized by the acceptance

of the office of Chancellor of the University of Wales by His Majesty King Edward VII, then

Prince of Wales, and afterward by the present

king. Wales has also recently received recogni¬

tion of her national emblem of the Red Dragon as part of the armorial bearings of the Prince of Wales.

The Welsh people, though comprising sub—

varieties, form a distinct type among the peo¬

ples of the United Kingdom. The cause of this are largely physical and economic, acting from

the remotest times, and on this basis the Welsh have developed a political, social and mental

history of their own. The individuality of

Wales is the more remarkable owing to her

proximity to England and her exposure to

English influences. The country stands, how¬

ever, in the most obvious contrast to the central plain of England on which it borders, and its individuality has, to a great extent, a geograph¬

ical basis. Wales consists almost entirely of a mass of mountains and uplands, intersected by

various streams and rivers, the largest of which, the Dee, the Severn and the Wye, are on the

east. In the lower valleys and the more level districts of the country, there are tracts of

good land, but the upper valleys in the moun¬

tainous districts are subject to very heavy rain¬

falls, and are of little value for agriculture.

There are also many large upland tracts, which can only be used for sheep-grazing. The popu¬

lation of rural Wales varies in density, but,

owing to the smallness of the farms, it is often larger in proportion than in some of the agri¬

cultural districts of England. In the last cen¬

tury the distribution of the population of Wales underwent a great change by the discovery

(especially in the south Wales coal-field) of

great mineral wealth; and the consequent

attraction of large masses of people into the

industrial districts. These economic develop¬

ments, too, have had a great effect on the social evolution of modern Wales.

Social Evolution and History. — The avail¬

able evidence as to the prevalent type of the Welsh people shows that they are on the whole less fair, tall and bulky than the farmers of the English plains. They are, as a rule, more wiry and hardy than muscular, and a certain

predominance of the nervous over the muscular

system gives them, in certain districts espec'ally, an air of keenness, sensitiveness and vivacity.

The freshness of the air and the beauty and

variety of the scenery also contribute to this end, as well as to an appreciation of linguistic aptness and poetic imagery. The excellent

voices of Welshmen, too, are mainly due to

the purity of the air. Brachy-cephalic types are rare, but mesocephalism prevails. Though the

extreme blonde type is uncommon, there is a

fair proportion of light or reddish hair, and in South YVales especially, a considerable admix¬

ture of pale-faced, black-haired and markedly

dolicho-cephalic men, who look as if their type had been evolved in the shelter of the ancient forests of the country. Generally speaking, it

may be stated that the prevalent types are the natural counterparts of the conditions of life

of the Welsh farmer and his dependents, with

its hard toil, careful calculation and plain fare.

The necessary interdependence of the mem¬

bers of the scattered communities of rural

Wales has produced a certain sociability, fluency and aptitude for cooperation in public affairs, though in religious matters there is consider¬

able cleavage. The chief religious denomina¬

tions are the Calvinistic Methodists, the Inde¬

pendents and the Baptists. In purely Welsh

districts crime is very rare. The conditions of Welsh agriculture from the remotest times,

under necessities of soil and climate wh'ch

often frustrated man's best hopes, have created a deep-rooted sense of man's dependence on

powers that are beyond his control, and beneath the markedly religious spirit of the Welsh

people there lies this fundamental instinct, the traditional intensity of which at times finds

vivid expression. To this feeling are also

linked a sense of the pathos of life, which has found utterance in Welsh poetry, a deep at¬

tachment to the soil, a minimizing of the im¬

portance of human distinctions in the face of

the powers of nature, and a passion for a

kind of natural justice, which has expressed

itself in modern times mainly in a demand for religious equality and the disestablishment and

disendowment of the State Church, and in the

desire to correct by means of education the

disabilities of birth and station.

The social evolution of the country has

been largely conditioned by its geography. This is such that the economic value of land varies greatly. Until recent times, the stress of com¬

petition was almost entirely for the surface

products of the soil. The discovery of mineral wealth, however, has now given the economic,

social and political evolution new directions.

In the hunting, pastoral, fishing and agricul¬

tural life of man in the Stone, Bronze and

Iron Ages, right down to modern times,

whether Wales was invaded by Iberian, Goidel,

Brython, Belgian, Roman, Saxon or Norman,

the motive of the struggle was essentially the same, namely, the possession of the good lands of the country, such as the river valleys and the flatter districts afforded. In Wales, the

records of the ancient system of land tenure

suggest that the weaker and stronger communi¬

ties came to be interspersed, the better type of holdings being held by freemen in family

groups, while the unfree villagers farmed their land mainly by a system of cotillage. The

basis of social life was mainly tribal, and the necessary social adjustments produced a cor¬

relative body of custom and law.

The successive invasions of the country have

left numerous archaeological traces, as for ex¬

ample, the fortresses of unmortared stone of

which Trerceiri in Carnarvonshire is an excel¬

lent instance. This fortress is now assigned by archaeologists to about 100-50 b.c. The Romans

developed the road communications and worked

some of the lead mines of the country. After

the departure of the Romans, the western

coasts were harassed by invaders from Ireland,

and Britons from the north appear to have been invited to assist in their expulsion. Some of

these families, notably that of Cunedda Wole—dig, remained in Wales and became the found¬ers of Welsh local dynasties. The struggles against the English and the Normans brought war into the foreground of Welsh life. The conquest of Wales by Edward I led to the establishment of a network of castles and gar¬rison towns, governed by English law and cus¬tom, while the country districts remained Welsh. This led to constant friction, and the revolt of Owen Glyndwr (Glendower) was essentially a struggle of the country against the towns. The reign of Henry VII (a de¬scendant of an Anglesea Welshman, Owen Tudor) was hailed with great enthusiasm in Wales, but it was this prince and his son Henry VIII who finally assimilated the Welsh legal system to that of England. Wales main¬tained its attachments to the Crown even through the Civil War, and until the second half of the 19th century was mainly conserva¬tive in politics.

The discovery of coal, slate, lead and other

minerals, as well as the industrial and com¬

mercial revolution generally, has given the life of Wales a new aspect. In Glamorganshire,

Monmouthshire, East Carmarthenshire, East

Denbighshire and the slate districts of Carnar¬

vonshire there are thriving and progressive in¬

dustrial communities, with corresponding facil¬

ities for communication by land and sea. The

rapid development in question is well exempli¬

fied in the case of Cardiff, (q.v.) which has grown in a few decades from being a moderate

sized market town into one of the leading coal-ports of Britain. New docks, too, for Irish and Atlantic traffic have been built by the Great

Western Railway at Goodwick in Pembroke¬

shire. There is in Wales a considerable sea¬

faring population and in Montgomeryshire,

Carmarthenshire and Merionethshire there are

some woollen factories. The industrial districts of Wales and the large towns of England, as

well as the United States and the colonies, have absorbed the superfluous population of the

Welsh country districts, until depopulation has

in several places been the result. The price of agricultural labor has gone up, and, owing to

the greater possibility of finding employment

elsewhere, there is a more independent attitude toward the governing classes in religion and

politics. Local government has more and more

fallen into the hands of Liberals and Noncon¬

formists, and there are now no Welsh Conser¬

vatives in the House of Commons, but the landowners are mostly Conservatives. See Local

Government in this section.

Side by side with this development, there has

grown up a desire for a measure of national

self-government, especially in the sphere of edu¬

cation; and the first instalment of this was

given in 1897 by the establishment of the Cen¬

tral Welsh Board for Intermediate Education,

for the purpose of controlling the secondary

schools founded under the Welsh Intermediate

Education Act of 1889. These schools have

made very rapid progress, and there are now

about 120. The establishment of the Univer¬

sity of Wales, federating the University College of Aberystwyth (founded in 1872), Bangor

(1884), and Cardiff (1883) is a phase of the

same movement. (See also British Education

— Wales). Royal charters, too, have been

granted for the foundation of a Welsh national museum at Cardiff and a Welsh national li¬

brary at Aberystwyth. Several private collec¬

tions of Welsh MSS. have been already bought

for the latter. The great difficulty, however, in the way of complete national development and

unification is the absence of a metropolis within easy reach of all parts. The most convenient

meeting-place for the whole of Wales is

Shrewsbury (the ancient Pengwern), which lies

outside the Welsh border.

In addition to the foregoing factors of mod¬

ern Welsh development, it should be stated that in the summer months there is a very great in¬

flux into Wales of visitors from England and

elsewhere, in search of health and pleasure, and that for their accommodation whole towns have

grown up along the coast. This link with Eng¬

land has helped to bring Wales more and more

into closer touch with the outer world, while

still living its own life and maintaining its indi¬

viduality. Of the fine arts music and poetry

are the only ones that have received extensive cultivation.

For topography, climate, etc., see Wales;

for industries, commerce and trade see articles in this section on Agriculture; Mining; Fish¬

eries; Industries; Commerce; Banking; Rail¬

way; Shipping, etc.; for history, and further

details on ethnology, language, literature, etc., see Wales; Celts; Cymry; Celtic Languages;

and in this section: The Conquests; Mediae¬

val England; English History of the 17th

Century; The 18th Century; The 19th Cen¬

tury, *etc.*

Bibliography. — Topography, Ethnology, *etc.*

— Avebury, the Scenery of England) (in¬

cluding Wales) ; Bradley, (Highways and By¬

ways of North Wales,* and (Highways and By¬

ways of South Wales> ; Giraldus Cambrensis,

(Descriptio Cambriae* ; Carlisle, topography

of Wales* (London 1811) ; Lewis, topograph¬

ical Dictionary of Wales> ; Lloyd, (Bilingual

Historical Readers) (Carnarvon) ; Owen, (Pem—

brokeshire* (London 1892) ; Sir Thomas Phil¬

lips, (Wales) (London 1849) ; Rhys and Jones,

‘The Welsh People) ; Seebohm, ‘The Tribal System in Wales) ; Southall, ‘Wales and Her Language’ (Newport) ; T. Stephens, ‘Welsh¬ men’ (Cardiff) ; Report of the Welsh Land Commission.

Social Evolution and History. — Anwyl, ‘Cel¬ tic Religion,’ (Constable) ; Brut y Tywysogion (editions of J. Gwenogfryn Evans and of the Rolls Series) ; Edwards, ‘The Story of Wales’ ; Morris, ‘The Welsh Wars of Edward I’ ; Myvyrian Archaeology of Wales (Denbigh) ; Owen, ‘Laws of Wales’ (Rolls Series) ; Pal¬ mer, ‘History of Ancient Tenures in the Marches of North Wales’ ; Rees, ‘History of Nonconformity in Wales’; Reinach, ‘Mythes, Cultes, et Religion’ ; Rhys, ‘Celtic Britain,’ ‘Celtic Heathendom,’ and ‘Celtic Folklore’; Ripley, ‘The Races of Europe’ ; Stone, ‘Wales’ (1915) ; Tout, ‘The Conquest of Wales’ ; Vinogradoff, ‘The Growth of the Manor’ (Sonnenschein) ; Walter, ‘Das Alte Wales’ ; ‘The Record of Carnarvon’ (Record Series).

Edward Anwyl,

Late Professor of Welsh and Comparative

Philology and Dean of the Faculty of Arts

at the University College of Wales, Aberyst¬

wyth.

20. NATIONAL FINANCE. National

Debt. — The National Debt of the United King¬

dom, in the sense in which the term is under¬

stood in several official returns, amounted on 31

March 1914 to £650,000,000, but in addition to this there were various amounts outstanding which

had been borrowed for military, naval, and

other works and brought the “Aggregate Gross

Liabilities” up to £706,000,000. Further, a sum of £74,000,000 had been borrowed and lent to

local authorities, and another sum of £95,000,-

000 had been borrowed for the purpose of

establishing occupying land-ownership in Ire¬

land by the expropriation of the former land¬

lords. The total £875,000,000 nominally con¬

sisted of £539,000,000 of consolidated 2ˆ per

cent stock (“consols”) redeemable at par at the option of the State only after April 1923, £47,-

000,000 of nearly similar stocks and permanent

debt to the Banks of England and Ireland,

£33,000,000 of treasury bills and exchequer

bonds repayable at various dates, £86,000,000 of the capital value of terminable annuities includ¬

ing those raised for various works chiefly con¬

nected with the navy and the postoffice, £74,-

000,000 of local loans 3 per cent stock and

£95,000,000 of 2Y\ per cent and 3 per cent Irish land stock. But most of the terminable annu¬

ities, about £86,000,000 of the consols, and about £91,000,000 of the other securities were not in the hands of the public but were held by the State itself against its liability to the savings bank depositors, so that it would give a truer account of the real position to say that the total debt consisted of about £640,000,000 in the securities just enumerated, and about £240,000,000 in

money payable on demand or at very short

notice to savings bank depositors.

The main body of the debt was chiefly due

to the wars in which the country was engaged

between 1688 and 1815. During that period

the debt grew from nothing (except a trifling

sum which Charles II had borrowed from the

goldsmiths) to £900,000,000. It then under¬

went steady diminution till in 1899 it had fallen to £628,000,000. The South African war brought

it up again to £771,000,000 in 1903, since which year it had once more been diminishing. The

£56,000,000 of works debt had all been incurred since 1890, and most of it since 1900, when it only amounted to £10,000,000. The amount

lent to local authorities was only £8,000,000 in 1840 and £26,000,000 in 1887. The Irish land

debt took its rise in 1891, but most of it is much more recent.

The interest and sinking fund of the Irish

land debt is naturally provided for chiefly by the payments made by the new Irish landowners, who are paying for their land by in¬

stalments, but a portion falls on funds which

would otherwise benefit Irish local taxpayers

and another portiop is defrayed by the tax¬

payers of the United Kingdom. The local loans

debt is adequately provided for by the interest and repayments received from the local authori¬

ties. The works debt is made a charge upon the annual parliamentary votes for the departments

concerned, in such a way that each loan will be extinguished in 30 years at most. For the main body of the debt the practice has been since

1876 to devote by legislation a certain annual sum, called the "permanent" or "fixed" annual

charge, to interest and repayment taken to¬

gether. As the sum thus devoted considerably

exceeds the interest, this plan, if carried out without modification and without interruption

owing to fresh borrowing, would practically

convert the whole debt into a terminable an¬

nuity and extinguish it in a very moderate

length of time. But as a matter of fact the

“fixed charge” was reduced from £28,000,000

to £26,000,000 in 1888 and by two steps to £23,-

000,000 in 1900, and it was only the fresh bor¬

rowings of the South African war which led

to its restoration to £28,000,000 in 1905 from which it was reduced to £24,500,000 in 1910-11.

The difference between the “fixed charge” and

the interest is sometimes called the “New Sink¬

ing Fund.” The “Old Sinking Fund” is any

actual surplus realized in the year. The gen¬

eral law is that this also must be devoted to re¬

payment of debt, but when any considerable

surplus happens to be realized, special legisla¬

tion usually interferes with the operation of the rule. As stated above, the foregoing shows

the development and position of the National

Debt at 31 March 1914. By the same date in

1918, after 44 months of the European War,

the gross-debt was estimated at £5,850,000,000, of which sum about £1,600,000,000 represented

advances made by Great Britain to her Allies

and Dominions.

Expenditure. — The total expenditure on

revenue account for the financial year 1913-14 is stated at £197,500,000. The total may be classi¬

fied conveniently as follows : Fixed annual

charge for the main body of the debt, £24,500,-

000 ; army, £28,000,000 ; navy, £49,000,000 ; old age pensions, sickness and unemployment in¬

surance, £20,000,000 ; education, £28,000,000 ; mis¬

cellaneous, including the cost of collection of taxes, the administration of justice and the

civil services not included under heads already enumerated, £22,000,000; post office, including

telegraphs and telephones, £25,600,000; and

amount handed over to local authorities, £10,-

000,000. The amount credited to education is

chiefly made over to local school authorities,

but only on conditions which give the central

government a very large measure of control,

not only over the expenditure of the money so granted, but also over what is raised from local sources. The £10, 000, 000 granted to local au¬

thorities, commonly called the ((Exchequer Sub¬

sidies® or ((grants in aid of rates,® consist of sums which are either fixed or vary with the

yield of certain taxes and are not now directly connected with central control, with the ex¬

ception that an amount equal to half the cost of the pay and clothing of a police force may be deducted from the grants due to an authority if it fails to maintain its police force to the sat¬

isfaction of inspectors employed by the central government. The method of distribution between

the various authorities is extremely compli¬

cated and differs in England, Scotland and Ire¬

land. Scarcely anyone professes to understand

it and it is based on no sort of principle except that it is largely dependent on certain propor¬

tions which prevailed in 1888. This plan was

adopted as a temporary expedient and has been

continued not on account of its merits, but

because it existed. These figures, again, refer to the last normal year before the war, an event which naturally influenced the whole domain

of national finance.

Revenue. — The total revenue amounted to

£198,000,000. The great heads were : Customs,

£35,500,000; excise (internal duties on commodi¬

ties), £39,600,000; estate duties (inheritance

taxes), £27,400,000; income tax, £47,200,000;

stamps, £10,000,000; house duty, £2,000,000; post office, including telegraph and telephones,

£30,800,000; and miscellaneous revenue, £4,800,-

000. The duty on imports of tobacco brought

in £18,300,000; tea, £6,500,000; sugar, £3,300,-

000; spirits, wine and beer, £4,500,000. The

excise drew in one way and another over £37,-

000,000 from taxes on the manufacture or

sale of beer and spirits, so that about £42,000,-

000, or 26 per cent of the whole tax-revenue, was derived from intoxicating liquors. The in¬

heritance taxes, christened by Gladstone and

now commonly called the <(Death Duties,® con¬

sist of two distinct parts, one of which is grad¬

uated from one to fifteen per cent according to the aggregate value of the whole property left by the deceased; so that if a man dies worth £400, one per cent has to be paid and if he dies worth over £1,000,000, 15 per cent. The other

part is graduated according to the relationship of the new owners of the property to the de¬

ceased, so that for example, while property be¬

queathed to descendants or ascendants is

charged one per cent, property falling to

brothers or nephews is charged 5 per cent and property falling to other persons is charged 10

per cent. Thus, taking the two parts together, if a man leaving £16,000 bequeaths it all to his children, 6 per cent only will be paid, while on a millionaire's property left to persons not re¬

lated to him, the duties will together amount

to 25 per cent. The Income Tax was levied at the standard rate of Is. 2d. in the £ (i.e., 5.83 per cent), but incomes under £160 were exempt and

certain graduated ˆabatements® were allowed on

incomes between £160 and £700. Reduced rates

were charged on <(earned® income when the

total income, earned and unearned, of the tax¬

payer, was not over £3,000, viz., Is. in the £

when the total was between £2, 000 and £3,000

and 9d. when it did not exceed £2,000. Much

the greater portion of this tax is <(collected at the source,® or at any rate before the income actually reaches the ultimate recipient. For ex¬

ample, the tax on the income arising from lands and buildings is collected from the occupier,

who then, if he is not the owner, has an in¬

alienable right to deduct the tax when paying

his rent; so too the tax on the income from

stocks, shares and bonds of corporations is col¬

lected from the corporation. But this practice

does not defeat the right of the individual landowner or stockholder to exemption or abate¬

ment if his total income from all sources is

under the prescribed limits ; he makes up ac¬

counts with the collectors, declaring his whole income and showing how much has been de¬

ducted from its various parts and if it then ap¬

pears that too much has been paid, the excess is repaid to him in cash. So far as the portion col¬

lected at the source is concerned, the tax works with great efficiency. The amount of evasion

which takes place in regard to the other part, for which personal declarations of the amount

of income are required, is very variously esti¬

mated, but there is little doubt that it is in process of diminution owing to the greater pub¬

licity of modern methods of business and to the checks supplied by the death-duties, which are

administered by the same department. In 1909

a supplement to the Income Tax called the

Supertax was introduced. It was a tax of 6d.

in the £ (2}4 per cent) on the amount by

which an individual taxpayer's total income ex¬

ceeded £3,000. It is not collected at the source but on the declaration of the taxpayer. The

yield, about £3,300,000, is included in the £47,-

200,000 of income tax mentioned above. Stamps

consist mainly of duties on commercial and

speculative transactions. The House duty is

levied at the rate of 9d. in the £ (3 per cent) of the rental value, but there are lower rates for houses of between £20 and £60 rental value, and houses under £20 in Great Britain and all houses in Ireland are exempt. The difference

of £6,200,000 shown between the post office

revenue and expenditures is almost entirely due to the mails, the telegraph and telephone busi¬

ness being unprofitable. In miscellaneous

revenue the most important item is £1,250,000

from the Suez Canal Company's shares, which,

it is well to remember, are a wasting property, the canal having been constructed on a 99-year concession.

War Finance, 1914-18.— Shortly after the

beginning of the war Mr. D. Lloyd George,

then Chancellor of the Exchequer, estimated

the daily expenditure of Great Britain in the

conflict at $3,750000, which he said was a

diminishing figure. For the financial year 1913—14 the total revenue stood at $991,215,000, and the expenditure was $987,463,500. Owing to

the general financial panic prevailing in Europe during the pre-war international crisis, the Lon¬

don Stock Exchange was closed on 31 July

1914 by order of the government, and it re¬

mained closed till 4 Jan. 1915. On 2 Aug. 1914

a moratorium was proclaimed in Great Britain,

which lasted till 4 December. On 6 August

Parliament took the first vote of credit for war purposes — $500,000 000, and the second came

on 16. November, for $1,125,000,000, when the

Premier (Mr. Asquith) announced that

$50,000,000 had been advanced to Belgium and

$4,000,000 to Serbia. Between August and No¬

vember (1914) Treasury Bills to the amount of

$450 000,000 were issued, and in the latter month the first great War Loan for $1,750,000,000 was issued in the form of stock at 95 per cent,

redeemable in 1925-28, and bearing interest at

3/4. The net yield was $1,615,000,000, which

sum was intended to include the repayment of

the Treasury Bills issued. The revenue rose

rapidly. In 1914-15 it was $1,351,660,000, with expenditure of $5,568,270,000; in 1915-16 it was $1,684,000,000, with expenditure of $7,795,790,000.

In 1916-17 the revenue rose to $2,667,140,000,

and the expenditure to $10,990,565,000; in 1917—18 the revenue was estimated at $3,062,500,000

and the expenditure at $11,451,905,000. The

highest point was reached in the Budget for

1918-19, which provided in round figures no

less than $15,000,000;000, with estimated revenue of $4,200,000,000, leaving the balance of

$10,800,000,000 to be covered by loans. The

additions to revenue came chiefly from increases of the income and super tax, the customs and

excise, from the new excess profits duty —

beginning with 60 per cent on profit in excess of that obtained before the war, and the heavy ((luxury taxesw imposed in 1918. The gradual

rise in the war bill of Great Britain and the various votes of credit, loans, etc., by which the money was raised is shown in the following summary :

On 1 March 1915 a vote of credit for

$185,000,000 was passed to cover expenditure

to that date. The total voted since the begin¬

ning of the war to this date — eight months

of war — amounted to $1,610,000,000, and rep¬

resented the difference between the expenditure

of the country on a peace footing and that on a war footing. The average cost of the war

per day was now $7,500,000. On the same day

(1 March) another vote of credit was passed

for $1,250,000,000 to carry on the war for a

period of somewhat more than three months.

This was the largest vote of credit in the

annals of the House of Commons. On 15 .Tune

1915 a supplementary vote of credit (the 5th)

for $1,250,000,000 was taken. The average daily expenditure had risen to $13,300,000, after

standing at $7 500,000 for 240 days — in addition to the expenditure of the normal peace votes.

On 20 Julv 1915 a supplementary vote of credit for $750,000,000 brought the total for the year up to $3,250,000,000, and a grand total of

$5,560,000,000, since the outbreak of the war. On 15 Sept. 1915 a vote of credit for $1,250,000000

was raised to cover expenditure to the middle

of November. The daily cost of the war from

1 April to 30 June was given as $13,500,000;

from 1 July to 17 July it stood at $15,000,000; and from 18 July to 11 Sept. 1915 it was over $17,500,000 per day. On 11 Nov. 1915, a fresh credit vote for $2,000,000 000 was taken, and

two more on 21 Feb. 1916, one for $600,000,000

to cover the remainder of the financial year,

and one for $1,500 000, 000 to start the new finan¬

cial year beginning on 1 April 1916. On this

occasion the Premier stated that the total for votes of credit since August 1914 amounted to

$10,400,000,000, with loans to Allies and do¬

minions to date amounting to $844 500,000.

By 23 May 1916, when the 11th vote of

credit for $1,500,000,000 was taken, the daily

expenditure on the war had risen to $23,750,000.

On 24 July 1916 the 12th vote, for $2,250,000,-

000, represented the largest sum ever asked for by any government in British financial history.

This sum was to carry the war to the end of October, and on the 11th of that month an¬

other vote of $1,500,000,000 was designed to

last till Christmas. A vote of $2,000,000,000 on 14 Dec. 1916 brought the total expenditure

since the beginning of the war to $19,260,000,-

000, while the daily cost for the last 63 days had been $28,550,000. On 12 Feb. 1917 two

votes of credit for $2,750,000,000 broke the

“record® of the previous July; the daily ex¬

penditure had risen to $28,950,000; total since August 1914, $21,500,000,000; advances to Allies and the dominions, total, $4,450,000 000. On 15

March 1917 a vote for $300,000,000 was taken

and the national expenditure reached about

$30,000,000 per day. A vote for $2,500 000,000

on 9 May 1917 was estimated to pay war ex¬

penses to about the 1st of August; by this time British loans to her Allies and colonies at¬

tained to $10,000,000 daily. The greatest vote

of all came on 24 July 1917, when $3,250,000,000

was asked for and granted, bringing the

amount voted for 1917-18 to $7,500,000,000, and for the whole war to date, $27,460,000,000. An¬

other $2,000,000,000 was voted on 30 Oct. 1917

and a further sum of $2,750,000,000 on 12 De¬

cember. A government White Paper issued in

May 1918 estimated the cost of the war to

Great Britain at 31 March 1918 to be $63,750,-

000,000, of which sum $46,525,000,000 had been

spent on the army, navy, air service and muni¬

tions and ordnance works, and that Treasury

loans amounted to $8,750,000,000.

During 1918 further votes of credit were

taken; $2,500,000,000 on 18 June, when the

daily expenditure was stated to be $34,240,000, with debts due from Allies, $8,850,000,000 and

from British dominions, $1,030,000,000 ; on 2 Au¬

gust a vote of $3,500,000,000 brought the total for the current year to $9,000,000,000. On 1 Aug.

1918, Russia owed Great Britain $2,940 000,000; France, $2,010,000,000; Italy, $1,565,000 000;

Belgium, Greece and Serbia together, $595,000,-

000. At the end of July 1918, United States

loans to Great Britain amounted to $3,345,000,-

000. The first British war loan has been men¬

tioned above (November 1914) ; the second

yielded $3,080,000,000; the third, of $5,000,000,-

000, was opened 2 Oct. 1917 and was to remain open till further notice. The loan reached the $5,000,000,000 mark on 15 Aug. 1918. The

Chancellor of the Exchequer had decided to ask the country to lend the money as it was needed, at 100 million to 125 million dollars per week.

For over 10 months money had flowed in stead¬

ily at an average weekly rate of $110,000,000.

On 13 Nov. 1918, two days after the signing of the armistice, a vote of credit for $3,500,000,000

was taken, when the chancellor stated that

Great Britain's debts abroad were not expected

to exceed $5,000,000,000, and that the country

could easily bear this if labor and capital

worked harmoniously together.

Local Finance. — To give an absolutely ac¬

curate account of the finances of local authori¬

ties in the United Kingdom is impossible owing to the complicated relationship of the various

local authorities to each other and to the central government, and also because the three king¬

doms, England, Scotland and Ireland, have en¬

tirely different systems and methods of account¬

keeping. The aggregate debt in 1913-14. including of course the £74,000,000 of debt to the central government mentioned above, is stated (after

deducting accumulated sinking funds) at about

£655, 000, 000, but about £70,000,000 of this con¬

sists of the debt of harbor and dock trustees which is secured only on the harbors and docks, and in no way upon the taxes of any locality, and therefore ought not to be reckoned as local debt. The remainder represents capital invested

in (taking the larger of the various items ap¬

proximately in order of magnitude) waterworks,

street and road improvements, schools, drain¬

age, gasworks, tramways, electric works, workhouses, asylums and the innumerable other

works and buildings required by modern civi¬

lized and especially urban communities. The

aggregate annual repayments of debt and pay¬

ments to sinking funds amount to a little over 2 per cent on the total, but the annual addi¬

tions considerably exceed this amount, so that

the debt increased nearly £300,000,000 in the

first 13 years of this century. In this period however there have been two exceptional in¬

creases. In 1903 the capital of the London

water companies was converted into debt of a

board representing the various local authorities within the area of supply; this added about

£46,000,000 without much altering the liabilities of the inhabitants or owners of the area con¬

cerned. In 1909 an addition of £23,200,000 was made by a similar conversion of dock com¬

panies' capital into stock of the Port of London Authority. About half the total capital has

been raised for purposes which are often pro¬

vided for by private enterprise, such as water¬

works, gasworks', docks, electric works, tram¬

ways and cemeteries, and the other half for

purposes which are seldom so provided for in

modern communities.

The expenditure from revenue of the au¬

thorities, including repayment of debt, amounted in the year 1912-13 to about £170,000,000. About £26,000,000 of this was met by the allocated

taxes and other national grants, chiefly for

education, spoken of above, about £80,000,000 by “rates,® and the rest by the special charges

levied for commodities and services supplied,

and all kinds of miscellaneous revenue.

The “rates® are taxes levied by the local au¬

thorities at a rate of so many shillings or pence in the pound of the annual value of land and all things attached to the land in the concrete form of buildings or works of any kind. The

idea of the Elizabethan rate for the relief of the poor undoubtedly was to assess inhabitants ac¬

cording to their ability, and down to 1840 at¬

tempts were frequently made to extend the sys¬

tem which long prevailed in some parts of the country of assessing stock in trade and other

visible personal prop&rty. But experience

showed that such taxation was utterly unsuit¬

able for small localities, and when the law

courts at last began to favor these attempts,

legislation intervened. The tax is usually levied from the owner in the important case of small house property in England, but in almost all

other cases from the occupier of the property.

The occupier has no right of deducting rates

paid from his rent unless he has so contracted with his landlord, and a contract of this kind is scarcely ever made. There is at present,

under the Agricultural Rates Act, a rebate of

50 per cent in favor of agricultural land, and there are some other differentiations in the

cities. The “rates® are elastic, certain, cheaply collected, and singularly free from disturbing

effects upon production. The fact that they are unpopular is sufficiently accounted for by their enormous yield and their obvious character.

Financial Control. — The finance of the cen¬

tral government, according to the present

theory of the British Constitution, is vested in the House of Commons. All financial legisla¬

tion must originate there, and the Commons will not permit any alteration of their measures by the Lords. But in the House of Commons itself the power of initiation in matters of finance is now entirely in the hands of the Ministry.

Estimates of expenses and receipts made up in

the government departments are considered or

amended by the Ministry in private. The result is then laid before the House of Commons by

the Chancellor of the Exchequer in his “Budget Speech.® A ministry will rarely submit to

modify its proposals in any important respect,

so that the House has to choose between ac¬

ceptance of the budget and a change of govern¬

ment. No ordinary member of the House can

directly propose an increase in taxes or ex¬

penses, the theory being that it is the King who asks his faithful subjects for money, but anyone may propose reductions. The estimates are put

before the House in immense detail, but this

very detail defeats its own end, as there is not and cannot be, time to consider the whole to

any good purpose. The estimates are conse¬

quently passed without material alteration.

This absence of real control by the House of

Commons is probably favorable rather than un¬

favorable to economy. The necessity of finding

new taxes or increasing old ones is much more immediately before the eyes of the Ministry

than of the House of Commons, and the Min¬

istry has also more reason to fear popular re¬

sentment against any increase of taxation. It

is, moreover, in immediate and constant associa¬

tion with permanent Treasury officers whose in¬

fluence is generally cast against temporary

expedients for staving off the day of reckoning.

In the councils which conduct the local gov¬

ernment of the country there is nothing like the Ministry in Parliament, and the system of con¬

trol consequently has a nearer resemblance, as

has sometimes been observed, to that prevailing in the United States Congress. The committees

charged with the various departments of the

council's work, with the assistance of their

executive officers, each prepare their own esti¬

mate of expenses for the coming year. These

are then all added up and put before the finance committee, which usually hands them on with

little or no alteration to the council, merely adding its own estimate of receipts other than rates and a recommendation to the council to

make a rate of as many pence in the pound as is calculated to make up the balance required.

The council discusses the estimate of receipts

and expenses thus put before it, and any mem¬

ber may move alterations in any item. Such

motions are frequently made and sometimes,

especially, of course, in the smaller councils, carried.

The local authorities have no power to con¬

tract debt without special authority. For most

purposes this now means that sanction must be

obtained either from Parliament by special act

or from the department of the central govern¬

ment, called the Local Government Board.

Loans must always be accompanied by pro¬

visions for repayment within the time for which GREAT BRITAIN — BANKING (21)

Parliament or the Local Government Board's

inspectors calculate the work on which the

money is to be spent will last. That the pre¬

scribed sum is being set aside every year for repayment is ascertained by the Local Govern¬

ment Board in each case. Some authorities are

forbidden by statute to borrow more than an

amount bearing a certain proportion to the an¬

nual ratable value of their area, but these

enactments are rendered practically inoperative

by other legislation, and have no influence what¬

ever.

Out of annual revenue the authorities may

generally spend as much as they please, the un¬

popularity of rates being regarded as a sufficient safeguard against extravagance. In regard to

one expenditure only, that for poor relief, the central government attempts to prevent too

much being spent, at any rate in one or two di¬

rections, such as relief to persons not required to enter the workhouse and relief to the able-bodied. In other matters the influence of the

central government, when exercised, is almost

always in favor of increased expenditure. The

threat of ˆwithdrawal of the grant® in respect of a particular school is used every day by in¬

spectors of the central board of education in

order to compel a local authority to spend more.

The central government appoints officers to

audit the accounts of the greater number of

local authorities, but the auditors of the munic¬

ipal boroughs (which include all the great

cities) in England are elected, under the Munic¬

ipal Corporations Act of 1832, by the rate¬

payers. This election is almost always a farce, and the more important city councils have had

to provide a proper audit in addition to the one thus provided by law.

Bibliography. — Information as to the actual

position of British finance can only be obtained by piecing the facts together from a large

number of parliamentary publications, usually

known as ((Blue-books.® Among the most im¬

portant of these are the annual returns entitled (National Debt,* which shows the different

kinds of debt existing at the end of each year from 1835 to date; Government Departments

Securities,* which gives the amount of the

state's securities held by the state itself; the finance accounts of the United Kingdom ; the

(Postmaster-General's Report,* the (Annual

Local Taxation Returns for England and

Wales,* and the same for Scotland and for

Ireland conveniently summarized in the annual

Statistical Abstract for the United Kingdom. *

Besides the above, for historical purposes the

following parliamentary papers may be found

useful: (History of the earlier years of the

National Debt from 1694 to 1786) (C. 9010),

and Proceedings of the Commissioners for the

Reduction of the National Debt from 1786 to

1890* (C. 6539) ; local authorities' liabilities (No. 306 of 1903) ; (Reports of and Evidence

taken by the Royal Commission of 1897 on

Local Taxation.) Among general works on

finance dealing pre-eminently with British con¬

ditions C. F. Bastable's Public Finance) (3d

ed., 1903), is the most complete and gives plenti¬

ful references to earlier works; G. Armitage-Smith's Principles and Methods of Taxation)

(1906) may be useful to anyone requiring less

detail. For the history of taxation, consult

Stephen Dowell, Pistory of Taxation and

Taxes in England* (2d ed., 1888) ; Cannan,

(History of Local Rates in England) (2d ed.,

1912), and William Kennedy, ‘English Taxa¬

tion 1640-1799, an Essay on Policy and Opinion) (1913).

Edwin Cannan,

Professor of Political Economy in the Uni¬

versity of London.

21. BANKING. Banking in Great Britain

as now carried on is the product of a continu¬

ous process of evolution ; it owes very little tu external influences, and can only be properly

understood in the light of the study of its

earlier developments. Its strength is the

strength derived from long tradition founded

upon experience, and its weakness is the weak¬

ness inherent in a system which has developed

with the smallest possible amount of legislative control. This weakness is shown in a lack of

logical coherence and in an occasional absence

of proper definition.

There are few evidences of banking in the

modern sense of the term in England before

the 17th century. In the Middle Ages the bank¬

ers were mainly money changers and money

lenders ; they dealt in coin, not in credit. The Italian colony of the Lombards, however, who

gave their name to Lombard street, seem to

have been well acquainted with the use of bills of exchange, and the banking business of the

country was chiefly in their hands after the

expulsion of the Jews at the end of the 13th century. During the 16th century, however,

the power of the colonies of foreign merchants in London rapidly declined, ending in the break¬

ing up of the German colony in the Steelyard

by Queen Elizabeth. In the 17th century it

became customary for the wealthier classes to

intrust their spare cash to the keeping of the London goldsmiths, a body of men whose occu¬

pation inspired the necessary confidence. The

transition from goldsmith to banker was a nat¬

ural and easy one, and the goldsmiths' <(cash

notes® gradually acquired a degree of negotia¬

bility. Some of the existing London private

bankers find their origin in the goldsmiths of the latter half of the 17th century. Outside

London the early type of country bankers was

evolved from the class of substantial merchants.

Thomas Smith of Nottingham, for instance,

who is the earliest country banker of whom we have any record, and who certainly carried on

business as early as 1688, originally combined

the business of a mercer with that of a banker.

Owing to the unsatisfactory condition of the

public finances under the Stuarts, there was no opening for a public bank such as existed in

Amsterdam and other European centres of in¬

dustry. But the Revolution of 1688 saw the

control of the national expenditure pass from

the Crown to Parliament. The national credit

became, for the first time, an important factor in our economic development, and showed it¬

self in the growth of a national debt. The use of credit spread rapidly and this led to the

development of modern banking. To the efforts

of William Paterson was due the establishment

in 1694 of the Bank of England, founded under the wing of the Chancellor of the Exchequer,

Charles Montague, with the object of lending

the whole of its capital, £1,200,000, to the state.

The Bank of England. — The Bank of Eng¬

land is the pivot round which centres the whole of modern banking in

the United Kingdom.

GREAT BRITAIN — BANKING (21)

In no other country, whether in Europe or

America, does a bank occupy quite an analo¬

gous position. It is not a state bank in the strict sense of the term ; its capital is held pri¬

vately, and its management is not in any way

directly or indirectly controlled by the state.

On the other hand, during its whole history, it has been more or less under the protection of the state ; its operations have been on occasion dictated by the state ; its development has been marked by successive loans of its capital to the state in return for the confirmation or extension of its privileges, and it still continues to exer¬

cise powers and owe responsibilities delegated

by the State.

The Bank of England is controlled by a

governor, deputy-governor and a court of 24

directors who are elected by the proprietors on the nomination of the directors. The selection

is generally made from the members of leading

mercantile firms, and the tradition is not to

elect a member of a banking firm or a director of another joint-stock

bank. The operations

of the bank are now regulated by the Bank

Charter Act of 1844. This act divides the Bank of England into two departments, the Issue De¬

partment and the Banking Department. The

former, as will be seen in a later section, is so strictly regulated by the act that its action is automatic. The latter is for all practical pur¬

poses as free from legal restrictions as any

other joint-stock bank. Yet free as it is from special legal obligations, it has, by its action in the past as well as by its present position, assumed peculiar responsibilities, which, though

ill defined, are well understood, and which the bank does not attempt to disown. These re¬

sponsibilities are due especially to the bank's position as the government banker, the bankers'

banker and the keeper of the country's reserves.

The government accounts are kept by the Bank

of England, the national debt is managed, ex¬

chequer bonds and treasury bills are issued and paid, and many other incidental services of the kind are rendered by the bank. With regard to the other banks, all the settlements at the Lon¬

don Bankers' Clearing House are made by

transfers at the Bank of England, where each

clearing bank is bound to keep an account.

Those banks which do not possess a seat in the Clearing House find it necessary to appoint one of the clearing bankers as agent and to keep

an account with that agent. Practically every

banker in England can, therefore, draw either

directly or indirectly upon the Bank of England and the reserve of the latter has thus to be re¬

garded both as the banking reserve of the

country, and also as the gold reserve, that is to say, the reserve to insure the convertibility of the note issue.

Appended is a copy of a weekly return of

the Bank of England :

BANK OF ENGLAND

AN ACCOUNT , pursuant to the Act 7th and 8th Vic¬

toria, cap. 32, for the Week ending Wednesday, the 25th day of October 1916.

ISSUE DEPARTMENT

Notes issued… £72 , 628 , 275 Government

Debt . £11,015,100

Other Securities 7 , 434 , 900

Gold Coin and

Bullion . 54,178,275

Silver Bullion .

£72,628,275 £72,628,275

BANKING DEPARTMENT

Proprietors'

Capital . £14,553,000

Rest . . 3,171,954

Public Deposits
(including Ex¬
chequer, Sav¬
ings Banks,
Commissioners
of National
Debt, and Div¬
idend Ac¬
counts) . 52,543,213

Other Deposits. 112,171,721
Seven Day and

other Bills… 18,167

Government

Securities…. £42,187,852

Other Securi¬

ties . 102,442,757

Notes . 35,942,255

Gold and Silver

Coin . 1,885,191

£182,458,055 £182,458,055

Dated the 26th day of October, 1916.

J. G. Nairne,

Chief Cashier.

The Private Bankers. — During the 18th

century all the banks in England, with the ex¬

ception of the Bank of England, were private

partnerships, the number of partners being lim¬

ited by an act passed in 1708 to six. Now, how¬

ever, private banks are very few in number, and their influence is a diminishing one, though at one time that influence throughout the country

was great, both socially and politically. The

London private bankers ceased to issue notes

toward the end of the 18th century, but the

country private bankers attached great import¬

ance to their note issues up to the time when the Bank Charter Act of 1844 made further

extension in this direction impossible. Many

of these firms were under-capitalized ; the

banker was often a tradesman as well, and was too much at the mercy of fluctuations in trade.

Consequently in time of monetary stress fail¬

ures were frequent, especially during the early half of the 19th century. Except that their note issue is limited by the Act of 1844, the law im¬

poses no restrictions upon private bankers, and they are not even compelled to issue balance

sheets, though in most cases this has been vol¬

untarily done of recent years. In spite of this absence of control, the existing private banks

inspire a confidence which seldom proves mis¬

placed. Most of them have been established

for many years, for it has proved increasingly difficult for a new private bank to obtain a foot¬

ing in the country. All banks possessing more

than 10 partners must now register as a com¬

pany under the Companies Acts.

The Joint-Stock Banks. — Owing to a clause

in the Bank Charter Act of 1708, joint-stock

banking was not possible during the 18th cen¬

tury, but in 1826 the Bank of England monopoly was so far curtailed as to allow joint-stock

banks to be established, with the right of issu¬

ing notes, provided they had no office in London or within a radius of 65 miles. By an act

passed in 1833, joint-stock banks were permitted within this radius, provided they did not issue notes, and under this act several of the leading joint-stock banks of to-day were founded. The

legal disability to issue notes continues until the present day, and has had a marked effect

on banking in England. The energies of the

joint-stock banks have naturally been centred

upon the development of deposit banking, with

the result that the habit of keeping a banking account has spread more rapidly and more gen¬

erally than in most countries, and the use of notes has correspondingly decreased. Prac¬

tically all the existing joint-stock banks have

registered tinder the Companies Acts with lim¬

ited liability, and in most cases with a reserve of uncalled capital which cannot be utilized ex¬

cept in case of liquidation. During the last 30

years or so a decided tendency has shown

itself, on the one hand, for the amalgamation

of the private banks and the smaller joint-stock banks with the more powerful of the latter

class, and on the other hand for the spread of branch banking. This has resulted in an in¬

creased centralization of the banking system in London, and to a lesser extent, in a few of the leading provincial towns, and in the evolution

of a system which is in distinct contrast to that existing in the United States of America. The

natural consequence is that the magnitude and

importance of the individual bank has very

greatly increased. Yet, large as the liabilities of the leading banks to the public are, their capital, both nominal and paid up, and their

reserve funds, are sufficiently ample to remove any feeling of distrust which might otherwise

be inspired by the volume of their obligations, as will be seen from the accompanying figures

taken from the balance sheets of a few of the most important joint-stock banks.

Date Bank

Dec. 31, 1915 Lloyds Bank Ltd .

London City and Midland Bank, Ltd .

Union of London & Smith's Bk, Ltd .

London County & Westminster Bk., Ltd.. .

National Provincial Bk. of England, Ltd… .

lapse, and it amounts at the present time to

£18,450,000. Any notes issued in excess of this total must be secured by the deposit of coin or bullion to an equal amount. Silver may form

not more than one-fifth of this deposit, but the bank has but seldom availed itself of this privi¬

lege. As the Issue Department is compelled to

buy all standard gold bullion offered to it at the rate of £3 17s. 9d. an once, and always issues notes against the stock in hand, it can be seen that the amount of notes issued is controlled to a very small extent by the bank directors, and that it increases or decreases according to the amount of gold imported or exported. The

Bank of England is, however, not prevented

from offering a higher price than the above,

should it find it advisable to compete for gold in the market ; and in selling gold, if the de¬

mand is for foreign coin or bars, the bank can fix its price according to the demand. Any

notes not required in active circulation are held in the Banking Department and form the

greater part of the Bank of England reserve.

The active circulation is in normal times pecu¬

liarly steady, averaging about £30,000,000 out of a total issue of from £55,000,000 to £60,000,000.

Subscribed

capital

Paid-up

capital

Current and

Reserve deposit

fund accounts

£31,304,000

22,948,000

22,934,000

14,000,000

15,900,000

£5,008,000

4,781,000

3,555,000

3,500,000

3,000,000

£3,600,000 £130,017,000

4,000,000 147,751,000

1,150,000 46,080,000

4,000,000 106,939,000

2,000,000 81,590,000

The Journal of the Institute of Bankers

publishes annually a statement of the capital,

reserve funds, deposits and other liabilities and assets of the British joint-stock banks and such private banks as published accounts. These

were summarized in the issue for May 1916 as

follows :

Bank notes have been in England largely

superseded by the general use of checks by the public, and the demand for an elastic currency has never assumed such proportions as in the

United States. In times of stress, however, the demand for notes has, in a few instances, ex¬

ceeded the bank's power of issue, and on four 15 Clearing Banks .

19 Country Banks…

4 West End Banks .

9 Irish Banks .

8 Scotch Banks .

20 Australian Banks .

6 Canadian Banks .

6 Eastern Banks .

3 Egyptian Banks .

3 African Banks .

4 South American Banks. ._ .

9 Other Foreign and Colonial Banks

Paid-up

capital

£36,338,000

11,551,000

1,635,000

7,309,000

9,227,000

22,028,000

11,827,000

5,201,000

13,810,000

4,931,000

6,300,000

5,262,000

Reserve

funds

£25,510,000

7,076,000

171,000

3,353,000

7,003,000

15,391,000

11,224,000

6,898, 000

1,994,000

2,735,000

5,800,000

940,000

Deposit and

irrent accounts

£834,989,000

168,218,000

16,507,000

77,725,000

140,977,000

218,532,000

157,481,000

80,606,000

15.860,000

47,569,000

44,521,000

11,840,000

106 Totals . £135,419,000 £88,095,000 £1,814,825,000

Foreign and colonial banks having London offices are, it should be noted, not included in the above tables.

Note Issues. — The Bank Charter Act of

1844, which governs the note issues of English banks, aimed at the eventual extinction of all note issues except that of the Bank of England.

This aim has now almost been realized, for at the beginning of October 1916 only nine banks

possessed the right of issuing notes, the maxi¬

mum authorized issues amounting to but

£334,820, and the actual circulation being £121, 329. By this act the Bank of England was

authorized to issue from the Issue Department

£14,000,000 of notes, covered by government

securities, £11,015,000 of which consisted of the government debt to the bank. This fiduciary

issue could be increased, if authorized by an

Order in Council, by the addition of two-thirds of the authorized issue of any other bank which forfeited its right of issue or allowed it to occasions, in 1847, 1857, 1866 and on the out¬

break of the European War in August 1914,

the government has been compelled to inter¬

vene and suspend the clause forbidding the

issue of notes beyond the fiduciary limit, except against the deposit of gold. Bank of England

notes, which it may be noted are legal tender in all payments except by the bank and its

branches, are not issued for any sums below £5, though proposals have frequently been made,

notably by Viscount Goschen in 1891, to au¬

thorize the issue of £1 notes. Since the out¬

break of war in 1914 £1 and 10 shilling cur¬

rency notes have been issued by the British

treasury; they are legal tender and convertible into gold on demand at the Bank of England.

The amount in circulation on 4 Sent. 1918

was £270,352,568 in currency notes and certifi-

cates. Against these the sum of £28,500,000 was held in gold.

The Clearing System. — The system of col¬

lecting checks and settling balances owing be¬

tween bankers, though to the uninitiated it may appear merely an administrative detail, has, in reality, exercised a very important influence on banking development in England. The problem

of clearing checks is comparatively simple

compared with the problem as existing

in the United States or any other coun¬

try occupying a large geographical area,

because practically every English bank or

branch bank is within a day's post of Lon¬

don. Consequently although local checks are

cleared through local clearing houses in some

of the larger towns, the great mass of checks is cleared through the London clearing house,

and this fact has very much accentuated the

centralization of banking in London, which is

the predominant characteristic of the English

system. A seat in the clearing house is a

privilege jealouslv guarded and difficult to ob¬

tain, and it was not until 1854 that any of the joint-stock banks were admitted. Those banks

which do not possess this privilege appoint a

clearing agent, with whom an account is kept and who in many cases acts generally as the London agent. By the rules of the clearing house every clearing bank must keep an account with the

Bank of England, and the daily differences are settled by means of transfers to and from these various accounts and a central account called

the clearing bankers' account.

The total amount of the checks and other

articles cleared through the London bankers'

clearing house in 1913 was £16,436,404,000, being the highest total recorded in the history of the house. The number of banks possessing seats in the clearing house is now 17, inclusive of the Bank of England.

The Money Market. — The London money

market is the name given to the miscellaneous

body of persons who borrow or lend money for

short periods, their operations being roughly

grouped around Lombard Street, Threadneedle

Street, and the adjoining part of the city of London. The money in which they are in¬

terested is sometimes described as the short

loan fund of the money market. On the one

hand is the borrowing portion of the market,

consisting largely of the bill brokers, the stock exchange and an undefined group of financiers ; on the other, the Bank of England, which is

closely connected with the money market, and

which, owing to its position as the guardian of the ultimate cash reserves, is also the ultimate lender when monev cannot be easily borrowed

elsewhere. In between these two extremes are

the clearing banks and other banks having Lon¬

don offices, as well as various financial firms, whose surplus unemployed assets form the

principal part of the short loan fund. The

British government also plays a very important

part as a borrower in the money market, and

the government of India, through the India

council, lends I gely to the market. Besides

these, there is a group of foreign banks with London offices which exercise a growing in¬

fluence in the market, both as borrowers and

lenders.

The index to the general condition of the

market is the bank rate, which is the official minimum rate at which the Bank of England

discounts first-class bills offered to it. All bills so offered for discount must mature within not more than three months and must be accepted

payable in the United Kingdom and bear one

other English signature. The Bank of England

is actuated in fixing the amount of the bank rate by the state of the reserve and the prospects of an inflow or outflow of gold, and speaking

generally, the bank is interested in keeping the rate as high as expediency will allow. The

borrowing portion of the market is naturally

anxious to keep the rate as low as possible.

If, however, there is plenty of money to be lent outside the Bank of England, the bank rate

cannot be effectively maintained at a much

higher figure than the market rate, otherwise

it would be merely nominal. Therefore, the

other London banks to a large extent hold the balance between the Bank of England and the

borrowing portion of the market. They are

actuated on the one hand by the necessity of

employing as large a proportion of their sur¬

plus assets as prudence will allow, and on the other by the responsibility of keeping reserves well above the margin of safety. The relations of the Bank of England to the other banks are of the utmost importance and interest It is

possible that in seasons when money is plenti¬

ful, the enormous floating balances available

for employment in the money market may ex¬

pose the Bank of England to the danger of a

drain of gold. This risk is accentuated by the fact that the funds controlled by the joint-stock banks are far larger than those of the

Bank of England. The bank must, therefore,

be able to control the market rate should neces¬

sity arise, and it must do this by itself coming forward as a borrower (mostly through a

broker) and by offering such a rate as to

divert the loanable funds of the other banks

away from the market. The latter, thus being

denuded of funds, is driven to the Bank of

England.

The Gold Reserves. — London is recognized

as the world's central market for gold and yet her reserve stock of the metal is, notwith¬

standing the enormous volume of her financial

dealings, at time actually less than that of her principal rivals. It is one of London's most

cherished traditions that she puts no obstacles in the way of the export of gold, except making it more worth the while of its owners to keep it there. It may be mentioned that more than

60 per cent of the annual production of the

world's gold is derived from British possessions.

That London can work on such a small basis

of gold is due in the first place to the fact that the English system of a single centralized re¬

serve is a more economical one than the sys¬

tem prevailing in countries where centralization is less developed ; secondly, to the smooth work¬

ing and thorough organization of her banking

system, and thirdly, to the excellent reputation of English credit among other nations, which

enables her to attract gold from abroad with

the least possible delay. But there is a growing feeling that there shoidd be more gold held in reserve in the country; not that bankers are

thought to be working below the safety limit,

but because the necessity for incessant vigilance results in unstable rates of interest with a con¬

sequent derangement of the money market and

an undue accentuation of the speculative ele¬

ment in business generally. This feeling has

been especially prominent since other countries have adopted a gold standard, and many schemes for an improvement of these conditions have been brought forward. The settlement of the question is rendered more difficult by the dual nature of the Bank of England reserve, which is at the same time a currency reserve and a banking reserve. It is felt that the re¬ sponsibility of keeping the former belongs partly to the State; that of the latter to the banking community; and the adjustment of the responsibility has not proved easy.

Banking in Scotland and Ireland. — Both in Scotland and Ireland banking has developed on slightly different lines from those of Eng¬ lish banks. In Scotland especially the ab¬ sence of any joint-stock monopoly like that of the Bank of England resulted in the early evolu¬ tion of a type of powerful bank which crowded out the private banker. Consequently to-day

there are only eight banks in Scotland, all with a large number of branches, and the establish¬

ment of a new bank is practically impossible.

The Scotch people were early in recognizing

the advantages of a good banking system, and

the use of ((cash credits® had an important

effect upon the industrial development of the

country. In Ireland, banking has had a

stormier history, but similar results have been reached, and there are now only nine banks

of any importance in the country. Both Scot¬

land and Ireland differ from England in en¬

joying a circulation of £1 bank notes, which

have survived all attempts at extinction.

The note issues of the two countries are

governed by Bank Acts passed in 1845, which

bear a close resemblance to each other. All the banks in Scotland and six of the Irish banks

are banks of issue, and each is allowed to issue an amount equal to the average circulation

during the year ending 1 May 1845, together

with an amount equal to the amount of gold

and silver coin held at the head office or prin¬

cipal places of issue, the silver coin not to ex¬

ceed one-fifth of the whole. The Treasury was

given power, during the European War, to

permit issues in excess of these limits The

necessity for keeping coin against excess issues of notes brings the Scotch and Irish banks into close relation with the Bank of England.

Neither the Scotch nor Irish banks clear their checks through the London Clearing House, but

through the clearing houses of Edinburgh,

Glasgow and Dublin, hence the connection be¬

tween these banks and the Bank of England

is not necessarily so direct as in the case of English banks. But there are certain recurrent

seasons of the year when an increase of the

note issues always occurs in Scqtland and Ire¬

land, and this necessitates an increase in the stock of coin. As there is no central reserve of gold in Scotland and Ireland, this coin can only be obtained from the Bank of England,

and therefore, at these seasons of the year,

notably during what is called the . autumn

drain, the Bank of England reserve is always

subject to a demand for coin from these coun¬

tries, especially from Scotland.

Banking Methods. — British banking meth¬

ods are distinguished by prudence and caution.

The immense amount of their deposits repay¬

able on demand forbids English banks to em¬

bark upon the general financial business which

forms the principal function of some Con¬

tinental bankers. Enelish banks do not operate

on the Stock Exchange except for purely in¬

vestment purposes, and then only in what are

termed ((gilt edged® securities. Neither do

banks directly interest themselves in the con¬

trol or management of commercial or indus¬

trial undertakings. Furthermore, the manage¬

ment of the large banks is singularly free from political interference of all kinds. On the

other hand, English bankers have allowed to

slip from their control many branches of busi¬

ness which belong legitimately to a banker.

Much of the bill-discounting business is in the hands of the bill broker, who is an expert mid¬

dleman between the banker and his customer.

Until the last few years the business of foreign exchange was left almost entirely in the hands of specialists, or of the br .nches of foreign banks established in London. Most of the large joint-stock banks have, however, now opened

foreign departments and are endeavouring to

bring under their own control this branch

of banking.

Attempts have been made to induce the Eng¬

lish banks to undertake a more ˆadventurous®

type of banking, more akin to that prevalent

over the whole of the European continent, but

English bankers consider it unsound banking,

in view of their large liabilities to pay on de¬

mand, to share the direct trading risks of their customers. It has lately been suggested that a new type of bank should be founded to under¬

take financial risks in support of trade which the existing type of bank decline, and that the characteristics of such new type should be that it should possess a large paid-up capital and that the acceptance of deposits repayable on demand

should be restricted or forbidden. An institu¬

tion of this type has been established under the title of the British-Italian'Corporation with the object of promoting closer trading relations

between Great Britain and Italy, and a com¬

mittee of the Board of Trade, with Lord Far—

ingdon as its chairman, has recommended the

establishment of a British trade bank with a

capital of £10,000,000 which, without coming

under government control, should receive as

much official recognition as possible.

The liabilities of English banks consist al¬

most entirely, first, of the current account

balances in their hands, repayable on demand,

on which it is not usual to allow any interest, and secondly, of sums deposited repayable at a fixed notice, usually seven days, on which Lon¬

don bankers allow interest at one and a half

per cent below the Bank of England discount

rate. London bankers also accept, on behalf

of their customers, bills drawn from abroad,

proper security being deposited to cover the

bankers' liability. Their assets consist of cash on hand and at the Bank of England or their

London agent, money lent at call or short

notice to the money market against security,

bills, being the acceptances of other bankers

or leading merchants bought in the market, in¬

vestments in first-class stock exchange securi¬

ties, and advances to customers, either in the form of loans, overdrafts upon current account, or bills discounted.

During the middle of the 18th century, Eng¬

land was subjected to a series of acute banking crises, notably in 1847, 1857 and 1866, but if we except the grave situation created in 1890 by

the liquidation of Barings, who, it must be

noted, were not bankers, the country has been

free from such disturbances since 1878.

The outbreak of the European War in Au¬

gust 1914 threw a heavy strain on the banking systems of all countries, neutrals as well as

belligerents. It is as yet too early to discuss the lessons which may be learned from the ex¬

perience gained since that time, but it may

safely be said that the British banking system has stood the ordeal well. The worst criticism that has been levelled against it is that bankers displayed a lack of courage in the early days succeeding the declaration of war. Two or

three circumstances stand out clearly; first the strength, unexpected in the circumstances, of

London's international position at the outbreak

of war, when instead of the gold famine ex¬

pected by some, gold poured into London from

all quarters. Secondly, the advantage to the

country of having its banking resources liquid

instead of locked up in trading ventures, where¬

by the maximum financial assistance was

forthcoming for carrying the country through

the ordeal of the war. Thirdly, the vigor and efficiency displayed by the Bank of England as the pivot of our whole banking system.

Bibliography. — History of Banking. — Gilbart's (History, Principles and Practice of

Banking) (first written in the early half of the 19th century and must,

therefore, be read with caution for recent history) ; Macleod's 'Theory and Practice of Banking) (good but disfigured

by an over emphatic style) ; Dunbar, 'Theory

and History of Banking1 (a short American

work) .

Practice of Banking. — Hutchison, Prac¬

tice of Banking1 (4 vols.) ; Moxon, (English

Practical Banking1 (short and concise, but

practical) ; Davis, 'Bank Organization, Manage¬

ment and Accounts.1

Law of Banking. — Sir John Paget's Paw

of Banking1 ; Dr. Heber Hart's Paw of Bank¬

ing.1

General. — Journal of the Institute of

Bankers; The Bankers Magazine; various

Parliamentary Reports; Conant, Principles of

Money and Banking1 (American).

The Bank of England. — Andreades, 'Histoire de la Banque d'Angleterre1 ; Schuster,

'The Bank of England and the State1 ; 'Re¬

ports of the Select Committees of the House of Commons on the Operation of the Bank Acts,

1857 and 18581 ; Stephens, ‘A Contribution to

the Bibliography of the Bank of England.1

Note Issues. — Peports of the Select Com¬

mittees of the House of Commons on the Bank

Acts, 1857 and 18581 : Peport of Select Com¬

mittee on Banks of Issue, 1875 1 ; Macleod,

‘Theory and Practice of Banking1 ; Palgrave,

‘Bank Rate and the Money Market1 ; Conant,

‘History of Modern Banks of Issue.1

The Clearing System. — Jevons, ‘Money1;

Howarth, ‘Our Clearing System.1

The Money Market. — Palgrave, ‘The Bank

Rate and the Money Market1 ; Clare, ‘Money

Market Primer1 ; Straker, ‘The Money

Market1 ; Bagehot, ‘Lombard Street1 ; Schuster, Poreign Trade and the Money Market1 ;

Withers, ‘The Meaning of Money.1

The Gold Reserves. — Palgrave, ‘The Bank

Rate and the Money Market1 ; Goschen, ‘Es¬

says and Addresses on Economic Questions1 ;

various papers in the Journal of the Institute of flankers; Schuster,

‘The Bank of England and

the State,1 and ‘Foreign Trade and the Money

Market.1

Banking in Scotland and Ireland.— Kerr,

‘History of Banking in Scotland1 ; Gilbart,

‘History, Principles and Practice of Banking1 ; Dillon, ‘Banking in Ireland.1

Felix Schuster,

Governor of the Union of London and Smiths

Bank , Limited, Vice-President of the In¬

stitute of Bankers.

Ernest Sykes,

Secretary of the Institute of Bankers, and of

the Central Association of Bankers.

22. COMMERCE — 18TH CENTURY.

— English commerce of the 18th century is re¬

markable for the revolution in the methods

by which it was carried on, for its growth

under the great Whig system of protection and

for its culmination in a tremendous expansion

with the coming of machinery. English foreign

trade had been largely opened out by mer¬

chant companies. The foundation idea was

that English goods should be sold at a high

price and that there should be no glut of goods, no undercutting, but a "well ordered trade.11

Hence rules as to quantities to be exported were a great feature of these companies. There was

no idea of pushing trade or selling at a low price and getting quick returns. Moreover, the

numbers admitted to the companies were lim¬

ited by the high fees charged for entrance,

while no one who did not belong to them

could lawfully engage in the trade. The only

open trades were those to France, Spain and

Portugal. Hence a regular attack on the

monopoly of the companies was carried on and

this constituted the early free trade movement.

It was successful ; after the Revolution the

entrance fees of the companies were reduced

by Acts of Parliament; only the East India

Company and the Hudson's Bay Company con¬

tinued strict monopolies. With the throwing

open of trade it was possible for an enterpris¬

ing man to carry on commerce on any scale, to push his wares and generally increase his sales wherever he could without limitation of any

kind. This amounted to a veritable revolution

in commerce. Alongside of this opportunity

for expansion came the emigration of the

Huguenots into England. Besides introducting

many new industries such as silk, cotton print¬

ing, paper and. linen, there was no branch of English trade which they did not improve with

their taste and skill. Hence England had a

more varied assortment of goods with which

to push her trade. Moreover, the Huguenots

preserved their old business connections, and

England inherited in this way a great deal of the French trade.

At the Revolution of 1689 the control of

economic affairs definitely passed to the House of Commons, and the Whig party became the

arbiters of national policy. The Tories were

inclined toward “free trade.11 They believed

in favoring the consumer and in removing re¬

strictions on intercourse, especially with France, the chief industrial rival of England. The

Whigs on the other hand held very decidedly to a policy of encouraging industry and in so

manipulating commerce that it should react on

the prosperity of industry. Hence they devised

a system of bounties for encouraging the expor¬

tation of silk, linen and corn. Bounties were

also given to the fishing trades, They tried to GREAT BRITAIN — COMMERCE — 18TH CENTURY (22)

stop the growth of competing industries in both Ireland and the colonies, and when Scotland

showed signs of becoming a rival the Union was brought about.

In their fiscal policy and in their trade

treaties the same Whig ideas were carried out.

We first see them applied in the commercial re¬

lations between England and France. England's

great industrial competitor at the end of the

17th century was France. Colbert had been

doing everything in his power to encourage

French industry and had gone so far, in 1667, as to put prohibitory rates on English cloth.

Englishwomen with (to the masculine mind) an

extraordinary perverseness would insist on

wearing French goods when they could get

them. Hence, according to the opinion of the

day, to shut out French goods was to assist

English industry in the best possible way. To

this the Tories were opposed, but the Whigs

were successful, in 1678, in carrying an Act

prohibiting trade and commerce with France.

A system of high duties was substituted for

prohibition under James II, but the Whigs

returned to the early policy. In 1713 a clause was added to the Treaty of Utrecht to the effect that England should admit French goods as in

1664. This gave rise to a tremendous con¬

troversy. Again the Whigs were successful ; the commercial clauses of the treaty were not

carried out, and the policy of protecting English industry by cutting off trade with France was

not reversed till the treaty concluded by Pitt in 1786. By that time England no longer feared French competition and English manufactures

were so much sought after in France that there was a tremendous outcry on the part of French manufacturers.

The Whig desire to shut out competitors

extended to another department of commerce,

namely, the trade with India. The East India

Company had been bringing back silks and

muslin and cotton goods which were worn by

the (<greatest gallants® as well as by <(the mean¬

est cook maids® instead of good English cloth.

Hence employment was being diverted from

Englishmen to Hindoos, and in 1700 an act was passed by which East India goods might be

warehoused for re-exportation, but they might

not be sold within the country.

But it was not enough to shut out possible

competitors. Definite encouragements to Eng¬

lish trade were given by the Methuen Treaty

negotiated with Portugal in 1703, and by the

Asiento Contract obtained from Spain in 1713.

The Portuguese had prohibited the importation

of English cloth, and in 1703 Mr. Methuen was successful in getting this prohibition removed

on condition that Portuguese wines were ad¬

mitted into England at two-thirds of the duty

on French wines. The trade with Portugal

thus opened up was reckoned to be a very large one, and was especially cherished since a large part of the returns was paid in Brazilian bul¬

lion, with which we could renew our depre¬

ciated coinage.

By the Asiento Treaty the Whigs got a

large part of the slave trade with Spanish

America into their hands. They obtained the

right to import 4,800 negroes annually and to

send one vessel of 500 tons to import goods into the Spanish colonies. The West Indies became

a great depot for this trade and under the cover of the one ship the English got possession of much of the Spanish-American trade. From

every point of view the slave trade commended

itself to the general opinion of the time. It encouraged shipping, promoted trade with

Africa — which country took English cloth in

payment for slaves — it supplied labor to the West Indies and Virginia and helped the agri¬

cultural development of the colonies. More¬

over the slaves were a means of carrying on

trade with Spanish-America. But from the

English point of view the economic effects

were still more important. As long as the

colonies had slaves they would never take to

manufacture, the negro being incapable of the

necessary training. The colonies would continue

therefore to grow the tropical commodities for

England to distribute.

Sir Robert Walpole began to reform the

fiscal system with the same object of stimulat¬

ing industry through commerce. Accordingly

he overhauled the book of rates between 1721—

24 with the object, to use his own words, of making (<the exportation of our own manufac¬

tures and the importation of the commodities

used in the manufacturing of them as practical and easy as may be.® He repealed or reduced

the import duties on raw materials and arranged for manufactured exports to be duty free. He

next began to try and stimulate the warehous¬

ing trade which the Navigation Acts (see

Navigation Acts, article 24) were partly de¬

signed to create. He hoped to make England

«one general free port and a magazine and

common storehouse for all nations.®

This system of deliberately building up

English industry was continued until the time

of the younger Pitt, who, following out the

Tory tradition of free intercourse, not merely

reopened trade with France but tried to carry

free trade between England and Ireland, un¬

successfully however, owing to the hostility of the English manufacturers. He also wished to

allow American ships to trade freely with Eng¬

land and the West Indies in spite of the Navi¬

gation Acts. But this Tory reversal of the

Whig policy was doomed to failure.

The French wars prevented any relaxation

of the system for revenue reasons, and it was not until 1846 that the great breach with the Whig policy of the 18th century was definitely made.

During the 18th century English commerce

steadily increased in almost every direction,

especially with the colonies. In 1699 the ex¬

ports had been estimated at £7,302,716. By

1720 they were £8,681,200 and by 1740, £11,-

469,872. In 1760 the figure had reached £15,-

579,073 ; in 1771, £17,161,146; while with machine products the total reached £34,381,61 7, in 1800.

The imports in 1699 were £3,482,586; by

1720 they had nearly doubled, being £6,090,083.

In 1760 they were £9,832,802; and in 1771 had reached £12,821,995. In 1800 they were £28,-

257,781.

It is exceedingly difficult to say whether this increase was a result of the Whig policy or no, but the fact remains that while they held the reins of power English trade extended as they

intended it should, and thus prepared the way

for the introduction of machinery. It was not

accident that the industrial revolution (see Great Britain — Industrial Revolution) occurred in England when it did. At the Restoration English industry was very backward;

English agriculture undeveloped; and English commerce small. By the end of the 18th century England, in spite of the loss of her American colonies, was the greatest trading country in the world. Her goods, through sheer cheapness, were forcing their way into every country. She was the great carrier of the world, and the only people that could compete with her were the Americans, whose shipping had grown up under English protection. She was able to withstand, by her wealth, the great financial strain of the French wars, and to control the access of colonial produce to Europe.

That many mistakes were made is no doubt true, and Adam Smith did not hesitate to ex¬

pose them; but the objects which the Whigs

had at heart were attained to an extraordinary degree during their tenure of power.

Bibliography. — Ashley, W. T., (The Tory

Origin of Free Trade Policy) in (Surveys, His¬

toric and Economic (1900) ; Cunningham, W.,

(Growth of English Industry and Commerce, }

vol. II; (The Mercantile System* (1903), and

(The Rise and Decline of the Free Trade

Movement (1905) ; Dowell, (History of Taxa¬

tion and Taxes in England* (1888) ; Davenant,

(Works* (edited by Sir C. Whitworth) ; Macpherson, D., (Annals of Commerce) (1805) ;

Smith, Adam, (The Wealth of Nations) ; Whit¬

worth, Sir Charles, (State of the Trade of

Great Britain in its Imports and Exports from

the Year 1697 > (1776).

Lilian Knowles,

Lecturer in Modern Economic History, London

School of Economics and Political Science .

23. BRITISH COMMERCE. Volume of

Trade. — It has been estimated that nearly a fifth of the working population of the United

Kingdom depends for existence on the sale of

its products in foreign markets ; add to this

the classes engaged in ocean transport, in

market organization and financial settlements,

and it is possible to arrive at some conception of the magnitude of the interests involved and the importance assigned in the United Kingdom

to oversea commerce. Parliament and the Press

never tire of the theme. Not merely the Board of Trade, but all other great departments of

administration, whether concerned with de¬

fence, revenue, foreign and colonial affairs, or education, find themselves involved in one way

or another in the consideration of the interest of international commerce. So far, indeed, has

been carried this exclusive attention to external relations, that the existence of a home market is not seldom forgotten or ignored. Some

ground for this forgetfulness may be found

in the great value of the foreign trade — over $7,000,000,000 imports and exports in 1913, the last normal year before the war — in relation to a limited population and area; but its real im¬

portance in the economy of the United King¬

dom appears only on a further analysis of the figures.

Of the imports, valued at £769,033,959, three-fourths must be credited to food and raw ma¬

terial, the rest to manufactures of various

kinds. The exports are made up of £525,-

461,416 of British produce and £109,655,718

foreign and colonial re-exnorts. Manufac¬

tures constitute the mass of British produce ex¬

ported, with one important exception — coal.

The figures imply much that is interesting both in past history and present organization. A

country of restricted area and resources ob¬

tained, through various economic and political

accidents, a start in the industrial race a cen¬

tury ago. Some of the necessary raw materials

of industry it cannot produce, of others the

quantity is insufficient for its growing demands.

Increasing specialization leads to greater de¬

pendence on certain types of foreign imports

and greater need for a market abroad for the

constantly increasing surplus of manufactures.

Food, too, must be brought from more favored

regions, and the very success of manufactures

breeds a natural tendency to neglect the inter¬

est of agriculture; though native resources,

utilized to the utmost, would still be insufficient, in the present state of agricultural science, for the needs of the growing industrial population.

The basis of the present system, and the only home product, on a large

scale, which is more than sufficient for the needs of the moment, is coal. Hence it is exported from those districts where it is not utilized in local industries, and where access to the sea is easy; its ultimate functions being to provide power for

British and foreign shipping or for foreign

factories.

The entrepot business, in foreign and colo¬

nial produce, again represents a historical ad¬

vantage. It is a relic of the partial monopoly of the carrying trade, and the control of the supply of tropical, eastern, and colonial com¬

modities to continental markets, long enjoyed

by the United Kingdom. Though aided by the

principle of inertia, and the facilities of old-established commercial centres, such business

has not increased at a rate proportional to the general movement of trade ; in fact, for a long period it was stationary at about £60,000,000,

though recent years have witnessed a great im¬

provement. This slow rate of growth is due

mainly to the development of continental ship¬

ping and the establishment of direct relations

between the European consumer and distant

markets, which have been conspicuous features

in the elaboration of international commerce

during the last generation.

The last point noteworthy in the general

figures, is the vast difference between the value of imports and exports. Apart from minor

questions of statistical method, the excess of

imports represents two main facts : firstly, re¬

turns for the service of some 11,000,000 tons of foreign-going shipping, which carried nearly the whole trade of the United Kingdom and no

inconsiderable portion of that of the rest of

the world; secondly, payments of interest by

debtor nations and foreign industries to the

great creditor nation of the 19th century, or in some cases, perhaps, the redemption or creation of capital liabilities.

Classification and Distribution of Imports.

— The close relationship between foreign com¬

merce and internal organization is best seen by tracing commodities from their sources or fol¬

lowing them to their destination within the

country. For this purpose much of the United

Kingdom can be removed from the map. A

small fragment of Scotland, a single port in

Ireland, the north and part of the midland

and west of England, with London and its

subsidiary ports cover the whole region of

industrial and commercial importance. Lon-

don, including the minor ports from Harwich

to Southampton, receives about 40 per cent of

the total imports of the United Kingdom. Of

this vast trade, food, in one shape or another, accounts for nearly half; fruit, eggs, vege¬

tables, butter and other minor agricultural prod¬

ucts, with large supplies of beet sugar, from

the neighboring districts of Europe ; grain and meat from more distant countries; tea, coffee,

rice and miscellaneous tropical and subtropical products ; all are poured in to supply the needs of the dense population of the London area, or to be distributed over the lines of communica¬

tion radiating northward and westward.

Apart from food, the most important items

o f note in the statistics of London and its sub¬

sidiary ports are the silk, woolens and other

textiles consigned from France and other parts

of the continent. In this matter London ap¬

pears as the great consumer of luxuries ; on the other hand the receipt of raw wool from distant parts of the world to the value of some £37,000,-

000, and of large quantities of tin from the East, shows her as a controller of markets and dis¬

tributor of commodities which she does not

utilize herself. For the rest, the trade is made up of innumerable minor manufactured articles,

chiefly from European countries, and of mis¬

cellaneous raw materials from every region of

the world, partly for use in the many industries of the London area, partly attracted thither

by facilities of transport and marketing.

The only group to compare with London

consists of Liverpool, with the Mersey ports,

now including Manchester. Together they take

another 30 per cent of the total imports of the kingdom. Roughly, a third is staple food stuffs, mainly from across the Atlantic; Liverpool vie-ing with London as a distributor of these com¬

modities ; another third is raw cotton, nearly the whole of the supply needed for native indus¬

tries ; while in the miscellaneous group, the cane sugar and tobacco of the Indies, the palm-oil, nuts and rubber of the African and American

tropics are interesting reminders of the intimate connection of Liverpool with the older colonial and plantation trade. •

The remainder of the import business is

divided between the eastern group of seaports,

represented by the Forth, the Tyne with Mid¬

dlesbrough, and the Humber; and the western,

represented by the Clyde, the Severn and Bel¬

fast. The main intercourse of the east coast

is naturally with the continent of Europe, from the Baltic to the Black Sea; and, for the most part, it can be regarded as merely an extension of London for the receipt of continental goods.

One commodity alone deserves special remark.

Iron, in various elementary stages of manufac¬

ture, enters the Humber from abroad, while

Middlesbrough and the Tyne find it necessary to import more and more foreign iron ore for their smelting industries. The native supplies, for

certain purposes, show a distinct and unpleasant tendency to run short. On the west coast, the Clyde and Severn, like Liverpool, need food for the population concentrated on their coal areas, and have a small share in the sugar and tobacco of the plantation trade. Glasgow must look

abroad for iron ore, Cardiff and South Wales

for iron, copper and tin, while Belfast needs

flax and linen yarn to supplement native sup¬

plies.

All ports alike, trom London downward,

absorb vast quantities of timber in various

shapes. The native supply is a thing of the

past; so northern Europe, North America and

the tropics are called in to provide this neces¬

sary material for railways and mining, and

above all for one of the greatest home indus¬

tries, — building — an industry which does not figure in the export list but is none the less of vital importance in the general economy of

the country. An annual timber bill of £33,-

000,000 is a fairly prominent item in the na¬

tional balance sheet. For food, raw materials,

luxuries, for nearly all the needs of civilized existence, the LJnited Kingdom depends partly

or wholly on supplies from beyond the seas; it is small matter for surprise that the question of safety of trade routes, on the one hand, and of the economic and political policy of the regions from which the necessary supplies are drawn,

on the other, should loom larger and larger in the view of statesmen, as the economic depend¬

ence of the country steadily increases.

Classification and Distribution of Exports.

— As an outlet. for those districts which produce the chief British staples, London cannot com¬

pare with Liverpool. Over a third of the total exports of British produce goes by way of the Mersey, only about a quarter by way of the

London group. At Liverpool, cotton goods

provide half the export, then come iron and

steel in all stages of manufacture, large quan¬

tities of woolens, with textile machinery, chemi¬

cals and earthenware. In fact the main indus¬

tries of Lancashire, Yorkshire, Cheshire and

the Midlands ■ are here represented roughly in

order of their relative importance. With one

or two qualifications, the foreign trade of Liver¬

pool may be taken as a type of that of the whole kingdom.

The export business of the London group is

less easy to define, partly owing to the many minor industries of London and district, partly owing to the modifying effects of cost of trans¬

port from the great producing centres. Tex¬

tiles still hold the first place in the customs list, but large quantities of leather, millinery and

apparel, paper and stationery, provisions, con¬

fectionery, pickles and medicines, suggest rather the minor activities of a great centre of popu¬

lation than the staple industries of modern life.

In short, London may be regarded rather as a

general store, handling every kind of goods and forwarding to all parts. The main activities are typical of commercial rather than industrial

England.

The export trade of the east coast has cer¬

tain peculiarities worth a moment's attention.

Many million tons of coal leave the Tyne and

Humber for European ports, while the textile

industries are represented by yarns and machin¬

ery rather than finished goods. A certain

amount of iron and steel, with ships and their machinery, completes the main features of the

trade. The European markets, owing to their

advance in industrial organization, tend to be

accessible only to certain restricted groups of British industries; the changing conditions are

reflected in the customs records of the eastern seaports.

On the west coast, a few million pounds

worth of cotton, iron and steel, ships and ma¬

chinery represent the industrial activity of the 252

Glasgow district; while the linens of Belfast,

the iron, steel and tin plate of the Severn ports and £18,000,000 worth of steam coal from Car¬

diff complete the schedule of the chief British exports.

In the entrepot business, London and Liver¬

pool alone are worthy of notice. London is still the chief European market for wool, though

her position has been affected by the increase of direct relations between Australia and the

continent. But the supreme control of the

world's tea trade has dropped from her grasp.

The teas of China, whether destined for Europe or America, no longer fill her warehouses. In

this, as in other less important departments of commerce, the development of commercial pol¬

icy of the Powers in the Far East and more

particularly the activity of their shipping, have gradually undermined those special advantages

on which the great entrepot trade was founded.

London still remains a convenient market for

miscellaneous tropical and colonial products,

and this position she shares with Liverpool.

Broadly speaking, the one looks to the east for imports, the other to the west; together they

provide a collecting centre for minor com¬

modities of the whole world. So long as

British trade and shipping exist on their pres¬

ent scale, and London maintains its reputation

in the financial transactions of commerce, this type of commission business is likely to per¬

sist, though it may represent a decreasing pro¬

portion of the total commercial activity of the country.

Changes in Character and Sources of Im¬

ports. — The ultimate destination of exports or the origin of imports may be a matter of indif¬

ference to the individual trader; but in a review of the whole movement of commerce, the ques¬

tion of sources of supply and markets for prod¬

ucts is of the highest interest. In recent years there have been great changes both in the

distribution of British manufactures exported

and in the sources of the national food supply.

Raw materials for the great industries have

been affected to a less degree. A generation

ago Europe vied with North America as an

exporter of wheat and flour to the United

Kingdom ; at the close of the century her share had fallen from over 40 to less than 10 per cent.

North America had annexed the trade, the

larger share falling to the United States, though Canada was rapidly improving her position.

India, the Argentine Republic and Australasia

merely supplemented the deficiencies of this

supply. But the situation has changed radically, in the last 10 years, through the enormous defi¬

ciency in the supply from the United States,

coupled with a corresponding rise in that from India, the Argentine and Eastern Europe.

Moreover, there are elements of permanence in

the change. Apart from the fact that the

United States jnay have considerably less to

spare, in the near future, after the satisfaction of the needs of her own industrial population, there are evident economic advantages involved

in the purchase of food supplies from those re¬

gions which, in their turn, provide an equiva¬

lent market for British manufactures. The im¬

ports of live cattle from Europe have also

ceased, while a new trade in fresh meat with

the most distant regions has been created under modern conditions of transport.

In spite of these changes there has not been

that decrease in west-European imports into the United Kingdom which might have been antici¬

pated. Though staple foods for export are only available on a large scale in the non-industrial eastern districts of Europe, the neighboring

countries of the west still supply, for British consumption, large quantities of the minor per¬

ishable food products. Superior organization

and better facilities for transport enable the

small grower abroad to supply the great con¬

suming centres with much that could readily be produced in agricultural England. Compensa¬

tion has also been provided by the enormous

growth in the import of beet-sugar, stimulated

by the bounty system — a growth of many hun¬

dred per cent in 20 years. Since the abolition of the bounties by the convention which came

into force in 1903 there has been a considerable decrease in the supply of beet-sugar from

Europe, with an increase in that of cane-sugar from tropical regions; but it is impossible to forecast the ultimate position of equilibrium.

Further compensation is to be found in the in¬

creasing volume of the stream of those conti¬

nental manufactures which find a ready market

in the United Kingdom. The net import of for¬

eign manufactured goods, more than half of which are ready for consumption, has doubled in the last generation and was valued at up¬ wards of £193,000,000 sterling in 1913. The greater part of this must be credited to the in¬ dustrial regions of western Europe. Formerly one of the best markets for the British manu¬ facturer, they are now reversing to some ex¬ tent the earlier movement, and invade with suc¬ cess the British market, either supplementing or competing with the native industries.

In raw material the changes are less con¬ spicuous. American cotton and Australian wool still dominate the market ; but the tin for British industries is now largely imported from Malaya and Australia, while even for iron ore it is found necessary to utilize more and more the Spanish, Scandinavian and other foreign supplies. The import trade in raw material and food has one characteristic common to all its branches, that is the vastly increased dis¬ tance from which commodities can be gathered and to some extent the multiplication of pos¬ sible alternative sources. In fact, the need of an alternative, particularly when no native sup¬ ply is available, has so impressed itself, not merely on the individual

importer but on the

great manufacturing interests as a whole and

on many responsible officials and politicians, that it bids fair to give rise to a new type of com¬

mercial policy, in defence of the national eco¬

nomic interests.

Foreign Markets.— The question of a for¬

eign market for British manufacturers raises

more difficulties than that of the source of

imports. As a general rule, the supply of the latter can be safely left to the foreign coun¬

tries interested in their production; but British exports must seek out their market in the face of the world-wide competition. In this connec¬

tion it is worth noting that the proportion of manufactures in the total exports of British

produce to the chief protected foreign coun¬

tries, fell in the last 20 years of the 19th century from 85 to 72 per cent. In the same period the total export of coal more than trebled, while the GREAT BRITAIN— NAVIGATION ACTS (24)

number of the population engaged in mining

shows a heavy relative and absolute increase.

These two facts, taken together, are not without significance ; though a proportion of the coal

exported is accounted for by the enormous in¬

crease in the tonnage of British steam shipping engaged in the trade of the world.

Apart altogether from the effects of fiscal

policy, the development of the industrial activi¬

ties of Western Europe and the United States

has necessarily narrowed the market for British manufactured staples. Both regions take a

smaller proportionate share of British exports,

while in the case of the United States there has been a heavy absolute fall, for which woolens

and tinplate are largely responsible. The Euro¬

pean trade has maintained its value and in some cases has shown a tendency to increase; but

the type seems to be changing steadily ; coal, yarn and machinery for continental industries

tend more and more to take the place of fin¬

ished goods. The census returns provide a

valuable comment on the statistics of exports.

Among the greater industries, iron and steel

and their manufactures alone show an increase

in the proportion of the population employed,

comparable to that in mining. Woolens and

other textiles show a large decrease. Cotton

shows a slight increase in the total number but not commensurate with the growth of popula¬

tion. But allowance must be made for more

efficient machinery and labor; while the activ¬

ity of Lancashire during the last eight or nine years, as evidenced by the building of new

mills and the greatly increased import of raw

cotton and export of finished goods, suggests

that the next census will tell a very different tale.

The cry for new markets and the <(open

doorˆ is not without good foundation. In the

West the United States has evident advantages;

Germany, owing to her position and her land

frontiers, is exceptionally favored for inter¬

course with the purely agricultural regions of

Europe; while, in the Far East, Japan has

started on an industrial career which compels

her to import food and raw material rather

than finished products. There remain as open

markets China nearer Asia, South America and

the British colonial possessions. The fact that staple British exports have found a rapidly ex¬

panding market in the self-governing colonies

has masked the decline in other directions.

How long the expansion will continue it is im¬

possible to say; the colonies are not .without their own individual aspirations, but it is likely to be long before their manufacturing

capacity

overtakes the demand of their vast agricultural populations. It is impossible to forecast the

inevitable changes in international trade result¬

ing from the European War.

Hitherto the British producer and merchant

have risen superior to difficulties; ground lost in one direction has been gained in another,

while competition has served as a stimulus

to greater exertion, and in spite of fluctuations and temporary depressions, the volume of Brit¬

ish trade has steadily increased; and this fact gives strong support to the view that the energy and adaptability of the United Kingdom, alike

in the spheres of industry and commerce, are

as yet far from reaching a limit.

The following statistical tables give a gen¬

eral view of the progress of British trade for 10 normal years.

Value of Imports and Exports of the Mer¬

chandise of the United Kingdom.*

YEAR

Total

imports

Exports

of

British

produce

Exports of

foreign and

colonial

produce

Total

inports

and

exports

1904.

1905.

1906.

1907.

1908.

1909.

1910.

1911 .

1912.

1913.

£

551,038,628

565,019,917

607,888,500

645,807,942

592,953,487

624,704,957

678,440,173

680,157,527

744,640,631

769,033,959

£

300,711,040

329,816,614

375,575,338

426,035,083

377,103,824

378,180,347

430,589,811

454,119,298

487,223,439

525,461,416

£

70,304,281

77,779,913

85,102,480

91,942,084

79,623,697

91,344,819

103,776,104

102,759,134

111,737,691

109,655,718

£

922,053,949

972,616,444

1,068,566,318

1,163,785,109

1,049,681,008

1,094,230,123

1,212,806,088

1,237,035,956

1,343,601,761

1,404,151,093

* The important difference between the system of the United Kingdom and other systems is that the former shows the values at the time of import and export, whilst in most other countries the prices are computed at the prices of a year or more before.

The average share per head of population in

net imports (i.e., total imports less re-exports) for the same decade was distributed as follows : 1904 — $54.16 ; 1905 — $54.42 ; 1906 — $57.98 ; 1907 — $60.80 ; 1908 — $55.86 ; 1909 — $57.52 ; 1910 — $61.40 ; 191 1 — $61.18 ; 1912 — $67.94 ; 1913 — $68.74.

The principal imports on which customs

duties are levied are beer and spruce, chic¬

ory, cocoa, coffee, dried fruits, motor spirits, spirits, sugar, tea, tobacco and wine — spirits, sugar, tobacco, tea and wine yielding the bulk of the entire levies, about $170,000,000 per year.

Bibliography. — Volume of Trade. — The

source of all ordinary information as to British trade is the (Annual Statement of Trade with

Foreign Countries and British Possessions, y

supplemented by the (Annual Statement of

Navigation and Shipping.* The chief defect

in the series is that until 1904 the figures rep¬ resented ports from and to which the goods are shipped, and not countries of origin or ultimate destination. In other words, British trade relations, particularly with certain Euro¬ pean countries, are entirely misrepresented. A supplementary volume is now issued which at¬ tempts to get at the real facts of the case.

Exports and Imports, Distribution and Changes. — Much valuable information as to the historical growth of British trade can be gath¬ ered from the (Report of the Royal Commis¬ sion on Trade Depression* (1886), supple¬ mented by Parliamentary papers. The Parlia¬ mentary paper, (Food Supplies Imported 1870— 1902) (No. 179, 1903), gives in detail the changes in the sources of supplies in the period. The (Report of the Royal Commission on Food Supply in Time of War* contains much miscel¬ laneous information as to sources of imports, including raw materials.

A. J. Sargent,

Appointed Teacher of Foreign Trade in the

University of London; Author of {The

Economic Policy of Colbert.'*

24. NAVIGATION ACTS. In the 17th

century the independence of the English nation

as a nation had been secured. Spain had been

conquered at sea, and henceforth maritime

power became more than ever the great national ideal. Comparatively safe from the dominance

of a foreign power, and her internal resources in process of rapid development, all the condi¬

tions were present for England to expand be¬

yond the seas and to attempt to secure for her¬

self that pre-eminent position in the world's

commerce hitherto held by Holland. England's

dominating purpose during the 1 7th century

was to build up her foreign commerce, to out¬

rival the Dutch at every point, to constitute

herself the great warehousing and distributing

depot of Europe and to induce the colonies to contribute to the power of the mother country

by growing commodities for her to re-export.

When Scotland or Ireland seemed likely to en¬

croach on the colonial trade they were care¬

fully excluded.

All through the changes of dynasty from

Charles I to the time of the Whig predomi¬

nance the same idea holds good; and the instru¬

ment by which all this was to be effected was the series of Navigation Acts or Acts of Trade.

The Navigation Acts were no new thing in

the 17th century. There was one as early as

1390 (5 R. II, St. I, c. 23). It forbade goods to be exported or imported by Englishmen

except <(in ships of the King's liegance.® This act was inoperative, however, owing to the lack of English shipping, but the idea of the statute was never lost sight of. A similar act was

passed in 1463 (3 Ed. IV, c. I) but was dropped after three years. Efforts were again made to

enforce a monopoly for English ships under

Henry VII (I H. VII, c. 8 and 4 H. VII, c.

10) and in 1540 the old laws were re-enacted, the freights defined, and inducements offered

to aliens to use English ships. Elizabeth gave up the policy of confining English trade ‘gen¬

erally to English ships and by an act of 1563

(5 Eliz., c. 5) merely reserved the coasting

trade.

In the 1 7th century the Navigation Acts

were revived. In the early part of the century they took the form of royal letters and procla¬

mations, but in the latter part the policy was embodied in the statutes of 1651 and the series of acts between 1661 and 1696.

From the 17th century till the final repeal

of the acts between 1822 and 1854, the policy of confining English and colonial trade to

English shins was consistently pursued.

The novel feature of the 17th century Navi¬

gation Acts did not lie so much in their con¬

tinuous enforcement as in their enlarged scope

and their application to the colonial trade.

The Dutch being the greatest traders of the

time had got the bulk of the English colonial trade into their hands by making advances to

the colonists on the security of future crops.

These they duly received when grown and dis¬

tributed from Amsterdam. This conduct the

English regarded as directly contrary to the

whole object of colonization, the general view

at that time being that people should only leave the mother country in order to build up Eng¬

lish trade and shipping elsewhere.

The feeling of jealousy with regard to the

Scotch was almost as strong. It is true that

they were not such formidable rivals, but they were said to sail cheaper than the English, and as they had close trade relations with the Dutch it was feared that the latter might get hold of the English trade through the Scotch..

<(The Plantations are His Majesty's Indies®

runs a report of the Commissioners of Customs

(30 Oct. 1661) ((without charge to him secured and supported by the English subjects who

employ above 200 saile of good English ships

every year, breed abundance of mariners and

begin to grow commodities of great value and

esteeme.® Were the Scotch allowed to trade

freely on the same footing as Englishmen it

would <(in one word overthrow the very essence and design of the Act of Navigation.®

The jealousy of both the Dutch and the

Scotch was keenly felt in the 17th century. As soon as the plantations showed signs of de¬

velopment measures were taken, primarily

against the Dutch, in order to secure the grow¬

ing trade for England.

In 1621 we get the first of a series of orders and letters sent out by the King to the colonial governors with the object of having all colonial goods brought to England and brought in

English ships. In 1624 a proclamation ordered

that no tobacco should be imported in foreign

bottoms. In 1629 another proclamation re¬

enacted the old navigation laws as to English

trade generally. In 1633 the question of the

colonial trade was referred to a committee who reported strongly in favor of confining such

trade to English ships, and an order was ac¬

cordingly issued to this effect. In 1637 letters were sent out to the governors in America and the West Indies ordering them to “strictly and resolutely® forbid all trade and traffic with the Dutch.

During the Civil War the Dutch seem to

have got more and more of the trade of the

English colonies into their hands, and it be¬

came necessary to revive the policy which had

been pursued under Charles I. This was done in the act of 1651, which led to the Dutch war.

The commonwealth wished to do a popular

thing by appealing to the English hatred of

the Dutch, and they no doubt also intended to give the ship owners some compensation for

the overwhelming misfortunes which the Civil

War had brought on them. The restrictions

of the act were not new, nor was it enforced any more effectivelv than previous acts had

been. Cromwell indeed did not believe in the

policy, and so great was the danger to English shipping from the Spanish and Royalist

privateers that the government was only too

glad to see trade kept alive in neutral ships.

In the colonies the statute seems to have been generally disregarded. In 1660 (12 C. II, c.

18) the act of 1651 was re-enacted with cer¬

tain additions. The act of 1651 had declared

that no goods ((of the growth, production or

manufacture of Asia, Africa or America®

should be imported into England except in

English or colonial ships. Goods from Europe

might come either in English vessels or in the ships of the country which produced the goods.

As Holland was not a producer she would be

particularly affected by this provision. In . the 1660 act the various clauses were made more

precise. Both the import trade and the export

trade of the plantations were to be carried in ships, English built, English owned and

manned by a crew of whom three parts were

English. By a later statute (14 C. II, c. 11) colonial shipping was put on the same footing

as English for all the purposes of the Naviga¬

tion Acts. Goods from Europe were subject to

the same restrictions as in the act of 1651, i.e., they might be imported either in English ships or in ships of the country of origin. No at¬

tempt was made to restrict the export of Eng¬

lish goods to English ships except in so far as the plantation trade was concerned.

The policy of developing the warehousing

trade through the Navigation Acts as outlined

bv Charles I was again taken up by his son.

A number of commodities — sugar, tobacco,

cotton, wool, indigo, ginger, fustick and dyewoods — were ˆenumerated,® and could only

be exported from the colonies either to England or to another English colony. Rice and naval

stores were added to the list in 1706, and copper and beaver skins in 1722.

The act of 1663 (15 C. II, c. 7) further

extended the policy of making England a great

entrepot by enacting that commodities of the

growth or manufacture of Europe that were

needed by the colonists should be shipped from England in English or colonial vessels.

Thus, according to the Navigation Acts, the

bulk of colonial produce had to be brought to the mother country, and the colonists were

bound to take their manufactures from her or

through her.

It should be observed that by these acts the

Scotch were shut out from the plantation trade and were not even. reckoned as English for the purpose of making up a crew (13 & 14 C. II, c. 11) until the act of union. They petitioned to be allowed to trade with the colonies, but a commission reported strongly against it because

such liberty would bring infinite loss to His

Majesty's customs and ((much prejudice® to

the English.

As to Ireland, enumerated goods could be

imported there, according to the act of 1660,

and it seemed as if an Irish warehousing system might have developed since food was so cheap

that many ships engaged in the colonial trade

went into Irish ports to victual. English jeal¬

ousy of Ireland was, however, too strong for

her to be allowed to encroach on a province

which England regarded as the foundation of

her prosperity. An act was passed in 1670 (22

& 23 C. II, c. 26) by which the staple colonial commodities were henceforth brought to Eng¬

land only. In 1695 Ireland was prohibited from receiving even non-enumerated commodities as

the Bristol merchants complained of the injury

done to their trade.

After the Restoration, English shipping in¬

creased rapidly; but it is not easy to estimate the precise effect of the acts in building up the maritime power of England. The English

mercantile marine doubled between the Restor¬

ation and the Revolution and continued to grow all through the 18th century. Petty, writing in 1699 ((Political Arithmetic,) pp. 258-259), said that shipping had increased three or four fold in the last 40 years; and Child ((Discourse of Trade, > 1695), chronicles the great increase of ((Wharfs and Keys® to accommodate the grow¬

ing trade. It is exceedingly difficult to esti¬

mate the extent to which this increased pros¬

perity was due to other factors as well as the Navigation Acts. The English had been push¬

ing trade in all directions after 1660; Charles II had concluded a series of trade treaties

which gave great openings to English mer¬

chants ; the banking system was developing

with increased facilities for traders; the old

system of a steady but restricted trade car¬

ried on by merchant companies was giving way

to the new principles of pushing trade any¬

where and by all means. All these things

contributed to increase the demand for ship¬

ping. But without the Navigation Acts it

might have been Dutch shipping that would

have profited, since Holland carried at much

cheaper rates than any other nation. At any

rate the acts did secure that the increase of trade should benefit national shipping, although in the Baltic trades the results were at first disastrous. The English had not sufficient

shipping for the trade, hence they could not get timber, and accordingly English ship building

was hampered. It indeed became necessary to

relax the restrictions as far as Norway and

Sweden were concerned for three years (7 &

8 W. Ill, c. 22) to get in naval stores.

The policy of the acts was attacked as

tending to increase prices and limit trade. But the answer always was «that this kingdom is

an island the defence whereof hath always

been our shipping and seamen,® and that there¬

fore ((profit and power ought jointly to be con¬

sidered,® and Child, who thus anticipated Adam

Smith in his doctrine that defence is more than opulence, added ((I think none can deny that

the Act of Navigation hath and doth occasion

building and employing three times the number

of ships and seamen that otherwise we should

or would do.® Decker in 1766 referred to it

as ((that most glorious bulwark of our trade.®

((High Duties,) p. 21). Lord Sheffield called

it in 1783 <(the guardian of the prosperity of Britain,® and even Adam Smith says (<National

animosity at that particular time aimed at the very same object which the most deliberate

wisdom would have recommended.®

Thus contemporaries seem to have believed

that the policy of the Navigation Acts was ef¬

fecting its object and that it did actually build up the maritime power of Great Britain. To

that policy Parliament held steadily till the end of the 18th century.

The result of the acts on the colonial system is also a matter of dispute. They have been

unjustly blamed as being the cause of much

friction between the colonies and the mother

country. Indeed they have been alleged to be

one of the primary causes of the loss of the American colonies. It must, however, be re¬

membered that the acts were by no means

strictly adhered to in the 17th century either in England or the colonies. Especially was

this true in the case of New England where

smuggling seems to have attained the dignity

of a profession. In 1696 it accordingly became necessary to reorganize the Board of Trade,

and Courts of Admiralty were established in

the colonies to see to the more stringent en¬

forcement of the law. A period of lax admin¬

istration, however, began again with Walpole

and lasted till the time of the Seven Years'

War, when an attempt was once more made to

stop evasions. After 1763 the acts were to be worked so as to afford a revenue by which the colonies should contribute part of the cost of their own defence. Before that year the acts

do not seem to have inflicted any great hard¬

ship on the colonists, and the commercial mo¬

nopoly the statutes sought to enforce was

scarcely resented. ((Whenever the act pressed

hard many individuals indeed evaded it,® was

Burke's dictum, and this was certainly true as regards the trade between New England and

the French West Indies and Newfoundland.

The colonists obtained from those places the

French manufactures which according to law

they were bound to get from England, but no

serious attempt seems to have been made

previous to 1763 to stop this illegal trade.

Again, the bringing of the ˆenumerated®

commodities to England involved no verv great

hardship. England was the natural market for

those goods, she being best able fo undertake

the distributing business in Europe with her

old established connections. Where the <(enumerations® worked hardly they could be relaxed,

as was done in the case of rice in 1730. More¬

over, in return for the restrictions thus im¬

posed bounties were given to the colonists on

the production of naval stores and copper.

The growth of tobacco was put down in Eng¬

land so as to give the colonists a monopoly of the market. Another compensation was af¬

forded to the colonies in the great development of shipbuilding and the carrying trade due to

the protection given by the acts to colonial

shipping. Massachusetts not merely sold ships

in Europe, but in England itself. The causes

of the loss of the larger part of the first Eng¬

lish Empire do not lie in the trade policy of the Navigation Acts.

In the 18th century the Dutch were outdis¬

tanced and England at last attained the posi¬

tion at which she had aimed of being the great carrier of the world. There is, however, no

evidence to prove that the Dutch were injured

vitally by the English Navigation Acts. The

English colonial trade even at the end of the 17th century was only a small trade in the ag¬

gregate, and could not have been any very great loss to Holland at the time. The ultimate loss to the Dutch was no doubt great, since they

were shut out of a branch of commerce which

was capable of great development. The

Dutch decline did not begin till 75 years after the passing of the act of 1651. It was the in¬

crease in the volume of English trade while the Dutch trade remained stationary that raised

England to the predominant mercantile posi¬

tion.

Between 1796 and 1822 many minor rela¬

tions of the Navigation Acts were placed upon

the statute book. Between 1822 and 1826 Eng¬

land's policy was materially changed. Reci¬

procity in matters of navigation took the place of monopoly. This involved also an alteration

in the relations between the colonies and the

mother country. To retain for the mother

country the bulk of the colonial trade a sys¬

tem of preferential duties was established

within the empire. Between 1849 and 1854 the

restrictions on foreign shipping and the colonial trade which were embodied in the Navigation

Acts were wholly swept away owing mainly to

the adoption of free trade.

Bibliography. — Ashley, (Surveys, Historic

and Economic (1900), see chapter on ((The

Commercial Legislation of England and the

American Colonies, 1660-1 760) ; Beer, G. L.,

*The Commercial Policy of England Toward

the American Colonies) (1893) : Bruce, P. A.,

(Economic History of Virginia in the 17th

Century) (1896) ; Child, Sir J., New Dis¬

course of Trade5 (1694) ; Coke, R., dis¬

course of Trade5 (1670) ; Cunningham, W.,

(Growth of English Industry and Commerce5

(4th ed. 1903) ; Lindsay, W. S., (History of

Merchant Shipping5 (1876) ; Macculloch, J. R.,

Navigation Acts5 in dictionary of Com¬

merce5 ; Northcote, Sir S. H., (A Short Re¬

view of the History of the Navigation Laws of England5 (1849) ; Reeves, J., (The Law of

Shipping and Navigation from the time of

Edward III to the end of 18065 (1807) ;

Weeden, W. B., dconomic and Social History

of New England5 (1890).

Lilian Knowles,

Lecturer in Modern Economic History, Uni¬

versity of London.

25. BRITISH SHIPPING. To an island

people, and especially to a nation which has

necessarily to import four-fifths of the wheat

it consumes, and fully onehalf of the total

amount of its food from countries beyond the

sea, a large and efficient mercantile marine is a vital need. To such a nation, from a na¬

tional point of view, the shipping and shipbuild¬

ing trades must be the most important of all

trades.

At the present time the shipping trade is not only the most necessary, but in point of magni¬

tude, it is the greatest of British trades. It is impossible to state with precise accuracy its

total volume in terms of money, but a careful and cautious calculation estimated the earnings

of British ships in international trades, for

the carriage of cargo alone, $450,000,000 per

annum. If to this sum be added the earnings

of the passenger and mail services, and of the coasting vessels at home and abroad owned

and controlled by British subjects, the total,

in the opinion of those best qualified to judge of the question, cannot be less than $600,000,000

— an amount greatly exceeding the entire prod¬

uct of the largest British manufacture, that of cotton, which is estimated at $450,000,000, and is about equal to the total gross revenue of all the British railways. Deducting a small per¬

centage for the port dues and charges of the

ships in foreign ports, the whole of this sum is distributed among British industries. Un¬

like the cotton manufacturer who must pay

away half his total receipts for his imported

raw material, the British ship and her engines are built of British materials in British ship¬

building yards, the officers, engineers, and more than four-fifths of the sailors are British sub¬

jects; the vessel is repaired and provisioned in British ports, is coaled at home, and generally abroad with British coal, and insured by

British underwriters. It will be seen that British shipping is emphatically a national industry.

About one man in 36 of the population is di¬

rectly employed in some capacity upon the sea, but those indirectly employed in the trades

ancillary to, and created by, the shipping in¬

dustry are many times greater.

The latest pre-war returns issued by the

board of trade, those of 1914, give the total tonnage of the merchant vessels registered under the British flag as 14,168,274 tons net register, of which 12,415,204 tons belonged to the United Kingdom, and 1,753,070 to the self-governing

colonies and other British possessions. Of the

British tonnage, 12,403,231 tons consisted of

steamships, and 1,765,043 tons of sailing vessels, that is to say 93 per cent of the tonnage of the shipping of the United Kingdom is that of

steamships. The number of vessels (1913-14)

registered in British ports was 39,592. These

figures are calculated in ((net® tons ; the ®gross®

tonnage of British shipping was over 20 millions before the war. It is impossible correctly to

appreciate the value of these figures except by comparison with those relating to other nations.

A mere statement of total tonnage, however, is an incomplete statement of relative commercial

efficiency. The best authorities calculate three tons of sail as being equal to one ton of steam, the latter at the low speed of 10 knots per

hour. Whereas 93 per cent of the tonnage of

British shipping is that of steamers, about one-third of that of other countries consist of sail¬

ing vessels. Further, an analysis of the char¬

acter and speed of the relative fleets gives still further proof of the superiority of the British marine. A high shipping authority, the editor

of the Shipping World (of London), after

long and careful research made and published

as accurate and impartial an estimate as it is possible to make of the comparative efficiency

of the British and foreign mercantile fleets.

Taking a 10-knot steamer as a unit, and add¬

ing and deducting from tonnage in propor¬

tion to the departure from this standard of

speed, to obtain the potential carrying power, he finds that the potential carrying power of

British shipping in 1905 was represented by the figures 16,445,000 against 13,061,000 for that of all other countries combined; while, if steam

tonnage alone is taken, the figures for potential efficiency for the

United Kingdom, and all other countries taken together, were 15,834,000 and

11,555,000 respectively. In 1917, according to

the same authority, about half the ocean-going

ships of the entire world were sailing under

the British flag.

The British demand for new ships is entirely

supplied by the shipbuilding establishments of

the country, which in addition have built for

other nations during the five years 1910-14 in¬

clusive, an annual average of about 1,027,755

tons, exclusive of ships of war. The mercantile fleets of other nations also consist, to a con¬

siderable extent, of the vessels discarded and

sold by the British shipowners.

To this remarkable concentration of a great

trade, one of a specially international character, and one greatly desired by all, in the hands of one nation, many causes have contributed. His¬

tory shows that it cannot be attributed to com¬

manding geographical advantage in the position

of the British Islands, nor to any supreme apti¬

tude of the British people for the life of the sea, and for conducting the oversea trade of

the world. In the art and the science of ship¬

building the French have always been well to

the front. In the Napoleonic wars Nelson's

best ships were those he had captured of French build. In our own time the French have more

than once given a lead in naval construction ; the first armored ship was French; it was the French who introduced the water-tube boilers,

and constructed the first submarines. The

coasts of Normandy and Brittany have always

furnished hardy and courageous sailors and

fishermen, and yet to-day France stands low

in the scale of mercantile maritime powers,

notwithstanding the heavy subsidies she pays

to her shipbuilders and shipowners. America

contests with Great Britain the honor of suc¬

cessfully applying steam to navigation. Ful—

ton's experimental boat in 1798 was four years earlier than Symington's Clermont on the Forth

and Clyde canal. The Savannah in 1819 was

the first vessel with auxiliary steam to cross the Atlantic. Both in the construction of sailing

ships and in the improvement of the early

marine engine America led. The supremacy of

the British mercantile marine, therefore, can¬

not be attributed to the possession of superior inventiveness or aptitude of the British men for the command of the sea. The

phenomenon itself

is a very modern phenomenon. <(It may be

assumed,® says Mr. Cunningham, an authority

on economic history, <(that in the Middle Ages the shipping of the Italian Republics and the

Hanse League excelled that of England.® The

chance of England did not come in fact until

the discoveries of Columbus and Vasco da Gama

opened the western and eastern oceans to

commerce, which, until that time, had been con¬

fined principally to the Mediterranean and other inland seas. In later times we find that Spain and Portugal, and afterward Holland, took the

lead in the new ocean traffic, so much so that in 1603 Sir Walter Raleigh wrote, <(The mer¬

chant ships of England are not to be compared with those of the Dutch.® The English posi¬

tion, however, was improving, and in 1666 Sir

Henry Petty estimated that the Dutch shipping

tonnage amounted to 900,000 tons, English to

500,000, French to 100,000, Hamburg, Dantzig,

Denmark and Sweden to 250,000 and Spain,

Portugal and Italy to 250,000. At this time

English shipping was subject to the celebrated

Navigation Act of Oliver Cromwell (1651), the

principle of which, broadly speaking, was to

confine foreign trade with European countries

to the vessels of Great Britain or of the country with which the trade was carried on; and all

trade with any of the more distant continents, or with any of the plantations of Great Britain, entirely to British ships. The Navigation Laws

of other maritime nations were framed in a

similar spirit on similar lines. In the interna¬

tional race all competitors were pretty equally privileged or handicapped. Although the whole

system had become riddled with exceptions and

exemptions and suspensions, due sometimes to

necessity, and sometimes to reciprocal treaties, the principle of the legislation of Cromwell

remained in force until the Navigation Acts

were finally repealed in 1849. The great expan¬

sion of the trade of the world in the first half of the 19th century together with the improve¬

ment in the size, speed and cost of building and operating the new steam fleets, had rendered it generally impossible to maintain the mediaeval

system of the old Navigation Laws, and

although other nations did not, like Great

Britain, emancipate themselves from these

fetters at a stroke, they have found it impossible to maintain them, and the relics of the ancient system survive in the present day chiefly in the form of the reservation of their coasting trades by many, though not all of the civilized nations of the world; certain restrictions on their

colonial trades, and in addition to this, in the case of the United States, the restriction of the privilege of the American register, with its

exclusive right to the coasting trade, to ships built in America of American materials. The

mediaeval system in its old barbarous form has universally passed away, and for more than half a century Great Britain has carried on her over-258

sea trade in the atmosphere of free competi¬

tion.

In all the previous centuries she possessed no marked superiority as a shipowning and sea¬

faring community, and at the time of the Free Trade revolution (1846) she might only with

some doubt be placed first among the mercantile maritime powers. She was then making no

marked progress in comparison with other na¬

tions, and in some respects was declining. For example, although after the great war in 1815

the shipping tonnage of the United States was

not half that of the United Kingdom, in 1850

the American mercantile marine had grown to

be very nearly equal to that of England in total tonnage, if coast and lake and river steamers

be included, and greatly exceeded it in efficiency, for it included more than half a million tons of steam shipping against less than 200,000 tons of British shipping of the same class. Al¬

though the tonnage of all American ships regis¬

tered for oversea (foreign) trade was at that

time only about one-third of that of Great

Britain, it was superior in quality, and was in¬

creasing with greater rapidity. The Americans

excelled in the speed, efficiency, and beauty of their sailing ships, and the celebrated ((Baltimore Clippers® and ((American Liners® almost monop¬

olized the carrying trade between Great Britain and the United States. In the middle of the 19th century it may be said that Great Britain and the United States were worthy and well-matched

rivals in the race for leadership upon the ocean.

It is an interesting question to ask what are the causes to which this modern phenomenon,

the supremacy of Great Britain in the trades of building, manning, and operating ships, is to be attributed; and especially those which have led to the decline in the mercantile marine of the United States registered for foreign trade, al¬

most to the point of extinction. It would be

erroneous to attribute this commercial revolu¬

tion to any one cause. The substitution of steam for sailing ships does does not appear to have been of any particular advantage to Great

Britain, for during the first 30 years of the ex¬

istence of seagoing steamships America kept

the lead in this class of shipping, and her en¬

gineers contributed largely to the earlier de¬

velopment of the marine engine. The later sub¬

stitution of iron and steel for wood as the ma¬

terial for the construction of ships undoubtedly gave a great temporary advantage to England,

which was at that time and remained for many

years the largest and cheapest producing country of iron and steel, but it does not explain the fact that while the production of iron and steel in America now greatly exceeds that of the United Kingdom, this country has not been able to

regain any considerable portion of the trade of building and operating ships for international

commerce. Undoubtedly the American war had

a disastrous temporary effect upon American

shipping, shown by the decrease in the tonnage of ships registered for oversea trade from 2,-

546,237 tons in 1860 to 1,516,800 tons -in 1870.

The principal explanation of this phenomenon

is undoubtedly to be found in the opposite

fiscal policies pursued by the two countries. It would not be proper in this place to enter into an argument as to the general results of the

British policy of free trade, and the American policy of protection upon the two countries, but it is a fact admitted alike by freetraders and protectionists, that the control of this par¬

ticular trade of international shipowning and

shipbuilding has been determined by their

mercantile policy. (See Great Britain — b REE

Trade). The growth of the shipping supremacy

of Great Britain, a supremacy becoming more

marked each year, dates from the adoption of

the policy of free imports in the years 1840-4)0, coupled with the abolition of the Navigation

Laws in 1849. The process of the absorption of international shipping by British shipowners has undoubtedly been assisted by the protection

policy of other nations. By restricting their im¬

portation of British material goods, the inexor¬

able economic law which compels each trading

nation to pay its debts and balance its inter¬

national accounts, has rendered it more con¬

venient for Great Britain to pay for her great imports of food and raw material to the nations which refused her cotton goods or her iron, in the form of shipping services, which form at

the present time the largest of British exports.

The result has been that while the total volume of British trade amounts to not more than one-seventh of the trade of the world, British ships carry about onehalf of the trade of the

world. The volume of purely foreign trade,

that is of trade between foreign port and for¬

eign port — trade which does not touch the ports of the United Kingdom, carried by British ships — largely exceeds that of the direct trade to and from British ports. In contrast, the gradual decline of the American trade is well set out in a statistical table prepared by Mr. Meikle, Secretary of the Seattle Chamber of Com¬

merce, and published in the report of the

Merchant Marine Commission at Washington

in 1905. It showed that in the year 1821 the percentage of the import and export trade of

the United States carried in American bottoms

was 88.7. This proportion, which remained

fairly steady until 1850, had shrunk in 1860 to 72.5 per cent. From that year onward the de¬

cline became increasingly rapid until in 1900 the percentage carried in American bottoms was

only 9.2. In 1914 British shipping employed

295,652 men and boys. Of these 212,640 were

British, 31,396 foreigners and 51,616 Lascars.

Of the foreign tonnage (61,429,000 tons) en¬

tered and cleared at British ports in 1914, Ger¬

many had nearly 11,000,000; France, 4,759,000;

Russia, 1 ,675,000 ; United States, 1,548,000 and Japan, 682.000.

The total loss of merchant shipping to the

United Kingdom from the outbreak of war to

31 Aug. 1918 was 8,761,368 gross tons, of which 4,544,195 gross tons were replaced by new con¬

struction during the same period, making a net loss of 4,217,173 gross tons — about one-fifth of the British mercantile marine. Shipping cap¬

tured from the enemy amounted to about

800,000 tons.

Bibliography. — Lindsay, (History of Mer¬

chant Shipping) ; (Englische Handels-Politik) ;

Leone Levi, (History of British Commerce) ;

(Annual Statements of Navigation and Ship¬

ping of the United Kingdom) ; (Annual Tables

Showing the Progress of Merchant Shipping

in the United Kingdom and the Principal Mari¬

time Countries > ; (Report of the Commission on the Development of the American Merchant

Marine) (Washington 1905).

Walter Russell Rea, M.P.,

A Lord Commissioner of the Treasury.

26. BRITISH RAILWAYS. Comparisons

and Contrasts Between the Railway Systems

of Great Britain and the United States. — (<The plastic American instinct has introduced the

wholesale principle into regions where the

slower-witted nations of Europe have never

thought of applying it. The factory life of

England is new and British manufacturers fully

appreciate the economies to be effected by turn¬

ing out pins by the million gross, cotton yarn by the million pounds, and steel rails by the tens of thousands of tons. But the Americans have

applied the principle to businesses which have

existed since the dawn of civilization. Their

hotel-keeping is wholesale; their farming is

wholesale; and, most of all, their transportation system is wholesale. The English farmer still

looks upon the railway train as only a slightly magnified carrier's cart, and persists in sending his basket of eggs or his hamper of vegetables to market, as his grandfather did when George

hi was king. The American farmer does his

business in carloads.®*

The writer, in a book written by him 27

years ago, after his first visit to the United States, pointed out in these words what seemed to him then, as it seems to him now, the essen¬

tial differentia between English and American

railroading, and suggested that the difference is not accidental and specific, but part of the

generic difference between the two countries

which naturally arises from their different his¬

torical and geographical position.

But there are other important differences

between the railways of England and the United States. England is an island, and a small one; America is a great continent. The maximum

possible haul within the British Isles is just about as far as from New York to Chicago. In fact there is practically no traffic here requir¬

ing to be carried any such distance. If it did, it would probably go by water, for there is no place in Great Britain more than 80 miles from a sea port. Anything over 100 miles is referred to in England as a long haul ; in the United States the average haul of freight is 156 miles, the average passenger journey in the United

States is 33 miles ; in Great Britain it is prob¬

ably — accurate statistics do not exist — about 10 miles.

Again, Great Britain is densely populated;

the United States is the reverse. On one

twenty-fifth of the area of the United States, England has half as much population. Natu¬

rally, therefore, while the United States has

fewer miles of railway per square mile of area, Great Britain has fewer miles per thousand of

the population. Roughly, the United States has

eight and onehalf miles of railways per 100

square miles of area; Great Britain has oyer 19

miles. But in Great Britain there is a mile of line for every 2,000 of the population ; in the United States a mile of line for every 400. The population of Great Britain and, therefore, its intercourse, per mile being so much greater, it is also natural that a mile of railway is a much more elaborate thing than in the United States.

For every route mile in the United States there are one and onehalf miles of track, while in Great Britain there are nearly two and onehalf miles. In equipment the contrast is even

greater. With only one-tenth of the mileage of * 'The Railways and the Traders.' (London 1891).

railways in the United States, Great Britain has nearly two-fifths the number of locomotives,

half as many more passenger cars, and nearly

as many more freight cars.* Put another way,

a mile of English railway represents an ex¬

penditure of almost as many pounds as a mile

of American railway represents dollars ; a mile of English line earns gross two dollars for

every dollar that an American mile earns and

earns net in the ratio of three to one. In Great Britain the railway occupies in great measure

the place of the street car of the United States, and is the means by which large sections of

the population move daily to and from their

work. And whereas the typical freight consign¬

ment in the United States is a ˆstraight® car¬

load of produce carried for a long distance, the typical consignment in Great Britain is a single box, or bag, or bale, or other package of manu¬

factured articles, carried from one town to an¬

other closely adjacent.

The service required of the railways by the

public of the two countries being so entirely

different, it is only natural that the method of performing it, and the charges made for it

should show equally wide differences. In the

United States the railways receive three cents per mile on the average for every passenger, and at this rate find passenger traffic barely profitable.

In Great Britain the railways receive hardly, if at all, more than one cent a mile on the average.

Yet they can make a handsome profit, despite

the fact that they give a much more frequent

and a faster service, with accommodation cer¬

tainly not inferior in comfort. The mainstay

of railway prosperity in the United States is

in the carriage of freight at a rate of, roughly, four miles for three cents. English companies'

receipts average, it is estimated, not less than two cents for each mile. Yet the prevailing

opinion of those best qualified to judge is that much of the freight traffic in Great Britain is unprofitable, while not a little is done at an actual loss — for the irony of fate has decreed that England, with freight rates undoubtedly

on the average the highest in the world, shall also have certain rates undoubtedly the lowest.

For instance, for eight cents the Great Eastern Railway Company will bring from any of its

country stations, say between 50 and 130 miles off, and deliver to the consumer's door in Lon¬

don a box of farm or garden produce of a

gross weight of 20 lbs.

On the outbreak of the war the government

took over the railways of the country. The

latest available statistics show a total of

40,808 miles of running lines, made up of

23,709 miles single-track; 13,403 miles double¬

track; 1,648 miles three-track; 1,277 miles four-track and 706 miles more than four-track. The

train miles run numbered 273,659,000 passenger,

156,007,000 freight and 666,000 mixed. Includ¬

ing switching (shunting) operations, a total of 621,239,000 engine miles were recorded for the

year. Total number of passengers carried,

1,591,146,000; freight tonnage, 568.201,000.

Similarity. — England and the United States

are the only great countries where the railway system has been provided by practically unaided * Of course in Great Britain the locomotives and cars are smaller and freight cars only one-third of the size of those of the United States. The comparison includes coal cars privately owned (believed to be not less than 700,000 in number which are ignored in English official statistics.

private enterprise, and still remains wholly in the hands of practically independent private

companies. In both countries the state has

found it necessary to interfere at many points, and an interesting essay might be written com¬

paring the methods of government control

adopted in each. But here it can only be very briefly pointed out that in both countries the Anglo-Saxon tradition prevailed, and such gov¬

ernmental control as existed took in the main

a legislative and judicial form. Executive in¬

terference — which in France descends to the

minutest details of everyday operation — is in England still of relatively small importance.

Till recently, however, it was safe to say that English railways were and always had been

more closely supervised by public authority than the railways of the United States. That is no longer true. Such scant powers of interference

as our executive authority, the Board of Trade, possesses to-day, it has substantially possessed from the outset. And there is not much serious public demand for further interference.

Laws Governing the Railway Systems. —

According to the English code of railway law,

which took practically its present shape as long ago in 1845, no company can come into exist¬

ence, no new line can be constructed, no new

capital can be raised without the < authority of a special Act of Parliament, which lays down

in great detail the constitution of the company, the exact route of the line and its method of construction, the amount of the capital and the purposes to which it shall be applied. Maxi¬

mum rates and fares for goods and passengers

are also prescribed. The authorized railway can¬

not be opened for passenger traffic until an in¬

spection by public authority has secured that every possible precaution for safety has been taken.

Once opened, however, the operation of the

company is in the main in its own hands. There is, however, one very important point where the state interferes. Whenever an accident happens

an expert official of the Board of Trade holds an exhaustive inquiry. He has no power except

to inquire and to recommend. . But his report is published, and in normal cases the companies are very ready to fall in with it. If they un¬

reasonably fail or neglect to do so, public

opinion soon converts the recommendation into

a command. It is the simple truth to say that under this system the English railways have

been on the whole over a long series of years the safest in the world. Better proof could

hardly be sought of what Mr. Charles Francis

Adams calls <(The eventual supremacy of an

enlightened public opinion.® On the side of

commercial management such control as exists

is in the main judicial. A special court, the Railway Commission, exists to watch over the

observance of the law of undue preference. Its powers are, it is true, seldom invoked, but that is the best proof of their real efficacy. Further, the same tribunal has power to forbid the in¬

crease of any existing rate for goods, and

does in fact refuse to permit any such increase unless under exceptional circumstances. There

is no popular prejudice in England against

pooling. Our railways constantly enter into

pools or, as we call them, traffic agreements.

In some cases even one company is paid by another a sum of money annually on condition it does not compete for certain traffic. Some¬ times these agreements are specially sanctioned

by Parliament, sometimes they are made by the companies under the general powers and some¬ times they are submitted for approval to the Railway Commission. See Railway Consoli¬ dation, England.

Finance.— The capital of each company is regulated in detail by Parliament. It is an al¬ most invariable rule that not more than one-fourth of the total shall be borrowed money, which you call loans and we call debentures. Railway debentures are consequently among the safest of investments and sell at a price only a very little below that of consols. Of the share capital usually from one-third to onehalf is in the shape of non-cumulative preference shares bearing a fixed rate of interest. The remainder is ordinary stock. But ordinary stock in Eng¬ land, where traffic varies little from year to year, and where railways are complete and fin¬ ished before they are first opened for traffic, pays an almost unchanging dividend from year to year, averaging about 4ˆ4 per cent. And

preference shares accordingly are regarded as

practically nearly as safe as debentures. Rail¬

way stocks of all kinds, debentures, preference or ordinary, were till about 17 years ago the most favorite investment for the savings of the bulk of the people. Since the beginning of this century there has been a marked change. This

is partly due to an external cause — the in¬

creased value of money in the market — but

much more is it due to internal causes. Con¬

stant pressure for lower rates and improved

service by the public, constant demands for

higher wages are made in England, as in all

other countries. But there is more than this.

For a long period, while American railways

were ploughing their earnings wholesale into

the road and Continental railways were forming

sinking funds or paying off terminable annuities, English railways were thriftlessly financed.

They divided up to the hilt, formed no reserves and charged every betterment to capital. Of

recent years there has been a great change for the better. Property is being improved out of

income, reserves are growing. But meanwhile the shareholders are paying, in reduced dividends

and still more in reduced salable value, for the financial errors of the past. Stocks of some of our great companies, which 20 years ago stood

at or near 200 can to-day be bought at about par. And yet meanwhile the dividends will have only fallen from 7 per cent to 6 per cent or from 6 per cent to 5 *4 per cent. The former price was undoubtedly

too high. The present

price is probably too low and at the time of writing recovery seems overdue.

The total paid-up capital of the companies

at the end of 1914 was £1,334,011,000 ($6,670,-

055,000), of which about 15 per cent represents nominal additions due to consolidation, conver¬

sion or division of stocks.

One other point of contact between England

and the United States may be noted in conclu¬

sion. Between them they are responsible for

the original invention of railways, and for every important improvement in railway methods and

practice that has been introduced since. There

are some students of railroad history who,

spite of the fact that the nations of continental Europe are more and more going over to na¬

tional ownership of railways, believe that this is no accident, but rather a natural result of the Anglo-Saxon habit of leaving to private enter-261

prise the utmost freedom which practical ex¬

perience shows to be compatible with the wel¬

fare of the nation at large.

Bibliography. — Findlay, (Working and

Management of an English Railway) (London;

4th ed., 1891) ; Pratt, (Railways and Their

Rates) (London 1905) ; Acworth, (The Railways

of England) (London; 5th ed., 1900); Browne

and Theobald's (Law of Railways) (London;

3d ed. 1899) ; Paish, (The British Railway Posi-.

tion' (The Statist, London 1902) ; Cleveland

Stevens, (English Railways: their Development

and their Relation to the State* (London 1915) ; Lawson, W. R., (British Railways: a Commer¬

cial and Financial Survey* (London 1913).

W. M. Acworth,

Formerly Lecturer on Railway Economics in

the London School of Economics and Political

Science; Member of various Royal Commis¬

sions and Committees an Railways Matters;

Author of < The Railways of England, * *etc.*

27. THE ENGLISH LAND LAW.

Sources and General Characteristics. — The

law of land, or (<real estate® bears the traces of the different streams of influence that have made English history. It derives its main char¬

acteristics from the feudal organization of so¬

ciety, but these characteristics have been super¬

imposed on other systems, or combined with

other elements, which may be of early Ger¬

manic, Celtic, or in some instances even of

Roman origin. Again, the land laws have been

the subject of frequent legislation; in the usual English method particular evils have from time

to time been remedied without any logical re¬

casting of the body of the law, and without the removal of mere anomalies which could not

rank as grievances. But the main principle of

the law may still be called feudal.

The modern law may be compared to a chalk

cliff in which are many fossils ; a cliff pierced by works and tunnels for such useful purposes

as railways or mines, but left, where modern

necessities have not interfered, to the slow de¬

composing action of the elements. The chalk

is the feudalized common law, the fossils are

pre-feudal survivals, such as land of (<copyhold® tenure, the works and tunnels are Parlia¬

mentary statutes and the elements are the forces of public opinion

acting by judicial exposition and construction. Compared to the law as it

was in the early years of the 19th century, the modern law of real property is simple, but if it be tested by any more severe standard it still retains many intricacies for which it is easier to find a historical than a logical explanation.

Land on feudal principles is the subject of

tenure and not ownership. No man owns Eng¬

lish land unless he be King of England. Land

is always ftheld of® some one — either the King, or a tenant in some degree of the King. Land was thus originally looked on rather as the

means of fulfilling a duty than as so much prop¬

erty, and for the comparatively simple concep¬

tion of ownership was substituted the more

subtle idea of ((estates,® i.e., parts of and interests in ownership. Some of these interests were not recognized in the courts of common law but

only in <(equity,® i.e., the extraordinary jurisdic¬

tion of the Chancellor. In time the feudal idea of tenure ceased to express the real state of things, and a tenant in fee simple became and has for many centuries been an absolute owner.

But the inherited complications remained and

indeed grew, being constantly developed so as

to evade and even counteract Parliamentary

statutes which landowners and the legal pro¬

fession viewed with disfavor. In 1832 the

English land law was a vast metaphysical system requiring and developing great acuteness of

intellect among practitioners but utterly un¬

intelligible to a layman.

The feudal theory of tenure gave to English

land holding a certain social character which in many country districts has never been lost. To this day land in rural England is looked on less as a means of livelihood or source of income

than as giving a certain social status to which rights and obligations are attached. Indeed it

would be difficult even now to give a better defi¬

nition according to received ideas of the English upper social class than to say that it consists of the owners of the country estates of England.

The legal position of the possessor of land

may be considered in three main aspects; his

relations to his predecessors and successors, in¬

cluding what may be called family law; his

economic and social relations, including the law of landlord and tenant ; and his relations to the community as a whole including his liability to taxation and generally the rights and powers

of the State.

Family Law; (1) Settled Land. — England

is a country of large properties, and most large properties are, to use a legal phrase, ((Settled Land.® The meaning of this is that by the

terms of some deed or will (called for this

purpose ((a settlement®) the land is not at the disposition of a living person to sell, mortgage or give away ; the apparent owner is only what is called a <(tenant for -life,® and on his death the land will pass to some other person, gener¬

ally his eldest son, if he has children, but if he has not, then to some collateral relative, with¬

out any effort and without any power of inter¬

ference on his part. A ((settlement® of this

kind may be looked on as a temporary and

conventional ((entail® ; it originates in the vol¬

untary act of some tenant .in fee simple and

its duration is limited by law to the life or lives of some person or persons in being when the

settlement is made and a further period of 21

years afterward. The practical effect of an

ordinary English settlement is to preserve the

land for two or even three generations to the eldest living male of the senior line as head of the family to the exclusion of females and younger sons. In most landholding families

as soon as the person who will succeed to the land not merely as a life tenant but with abso¬

lute power of disposition, is next in succession and is 21 years of age, he joins with the exist¬

ing tenant for life — usually his own father —to resettle the land for another two generations.

Thus one settlement succeeds another and a

tenant in fee simple is rarely, if ever, in pos¬

session. Provision is usually made for a widow of a tenant for life by

giving her an annuity known as a “jointure,® and younger children

are given comparatively small sums of capital

known as (<portions® which are made charges

on the estate. The practice of settlement is

permitted but not enjoined by the law; it came into fashion about the middle of the 17th

century. It is thought by some observers that

the practice now shows some signs of being

on the wane, but no direct evidence is available ; 262

certainly it still affects nearly all large prop¬

erties, and therefore the greater part of English land. Its result has been to make each eldest son in turn the proprietor of one or more fam¬

ily estates, to prevent the dispersal of land into many hands and to keep for the head of a fam¬

ily a social prestige and pre-eminence among

both relations and neighbors. If there happens

to be a peerage or baronetcy in the family, the land practically always goes with the title. In fact it is not uncommon even in cases where

there is no title or honor in the family for the settlement to provide that any person succeed¬

ing who does not already bear the family name — e.g., a married daughter, or a daughter’s son — shall take the name and armorial, bearings of the author of the settlement on pain of exclu¬

sion from the property. Younger sons, on the

other hand, after a boyhood spent on the family property are left with slender portions to make their own careers ; thus in their case class dis¬

tinctions tend to be obliterated ; younger sons of the landholding class may be found in al¬

most every branch of activity, in the navy, the army, in orders in the Anglican Church, in

commerce and in the learned professions.

British colonial development owes much to

the adventurous disposition fostered by the out¬

door life and the economic necessities of the

younger sons of the landholding classes.

Formerly the main economic objection to

the legal fetters imposed on landholders by

settlements, was that during a settlement the

land was taken out of commerce as it had no

proprietor who could sell. This difficulty has

now been removed as the result of an import¬

ant act of Parliament (The Settled Land Act

1882). Every English tenant for life may now

be considered as a kind of plenipotentiary agent for the whole family, born and unborn. Sub¬

ject to certain not onerous restrictions, he can sell or lease for long periods on the recognized terms as he pleases, indeed he can do almost

anything which a prudent and honest owner

would do, but always on the terms that the

property or the proceeds of sale are kept to de¬

scend in due course of settlement. But the

real fetters on an English tenant for life are not those which the law imposes, but the fet¬

ters of tradition and family sentiment which no legal power or ingenuity can remove.

(2) Lands Not Settled. — Apart from this

liberty of terminable settlement the English law does not favor restrictions on the powers of a landholder. No entail can by English law be

created which cannot be destroyed as soon as

some persons unborn at the date of its creation attains 21 years of age. In the 15th century

English lawyers, more daring than their Scot¬

tish brethren, with public feeling behind them, went so far as in substance to defeat the pro¬

visions of a Statute of Edward I (De Donis

Conditionalibus, (a.d. 1285), by which Parlia¬

ment had sought to make entails perpetual.

Where land is not settled, in the case of the death of a landholder without a will, the com¬

mon law on feudal principles gives his land

to his eldest son ; pre-feudal customs are, how¬

ever, not left entirely without witnesses; in

parts of the county of Kent the older custom of equal division, known as gavel-kind, still pre¬

vails, and in a few ancient boroughs under the custom known as (<Borough English® the young¬

est son alone succeeds. But cases of intestacy are not common among the wealthy classes.

Wills. — A tenant in fee simple has, contrary

to feudal principles, been gradually empowered

by successive acts of Parliament, culminating

in the year 1662, to dispose of his land by will after his death in the same absolute manner as during his life. He can disinherit totally or

partially all or any of his children and can at his pleasure give the land to strangers or, since the year 1891, even to charity. But the charity as a rule is bound to sell the land and not re¬

tain it.

Landlord and Tenant. (1) The Town. —

There is a sharp contrast between the land sys¬

tem in the towns and in the country. In and

near towns the proportion of settled to unsettled land is probably smaller than in the country;

but even in the case of settled land the tie be¬

tween landlord and tenant is purely economic.

A town landlord may often be of inferior social standing to his tenant; further, urban and sub¬

urban land is often owned by commercial com¬

panies formed for dealings in land. But both

in town and country, England is a land of large properties and it is the exception to find that the actual occupier of land is, in the popular phrase, <(his own landlord.®

On all land in or near towns, building is

usually done on the leasehold system. By this system the land is let, usually to a builder, for a long period, from 80 to 99 years. The lessee contracts to build and keep his building in re¬

pair; to pay an annual (<ground rent®; to dis¬

charge all taxes levied on the land, and in fact to bear all possible burdens connected with it.

At the end of the lease the land and the build¬

ing on it revert to the successors of the original landlord. The long lease thus granted may

usually be sold or mortgaged at the pleasure of the lessee, and the building itself is frequently sublet by the lessee as landlord to the actual oc¬

cupant as tenant, who pays to the original lessee or his successor a full or <(rack® rent for build¬

ing and land together.

Until recent years the whole tendency of the

law was to favor the landlord as against the

tenant, and even now the law can hardly be said not to lean in the landlord's favor, particularly in allowing him the right of distress for rent.

In the exercise of this right, contrary to the general principles of English law, a landlord

whose rent is in arrear can without the judg¬

ment of any court seize and sell any chattels of any person, whether

his tenant or a stranger,

that he can find on the premises, and thus pay himself his rent. Recent legislation (The Con¬

veyancing and Law of Property Act 1881) has,

however, interfered against the landlord, who,

whatever the terms of the lease, can now no

longer forfeit a lease for a casual breach of covenant not deliberately persisted in by the

tenant.

This leasehold system in and near towns,

though frequent, is not by any means universal, especially in the north of England; there, a

common plan is to sell land for building pur¬

poses out and out, in consideration of a per¬

petual rent reserved to the vendor. Further,

the simple plan of the sale of building plots for a lump sum is probably growing in favor, par¬

ticularly in suburban districts developed by

land companies. A company of this kind has

no family pride in the preservation of its estate, GREAT BRITAIN — THE ENGLISH LAND LAW (27)

nor does it wish to realize an improved value after three generations.

(2) Country. — In the country districts the

long leasehold system is unknown. The ordi¬

nary English farmer usually does not hold a

lease for any fixed term of years, but has

merely a tenancy from year to year determin¬

able by 12 months' notice. As a rule all the farm buildings have been supplied by the land¬

lord. The tendency of modern legislation is to give the agricultural tenant security for the

value of his improvements, but the old law,

which treats whatever is built or planted on

land as an accretion to the land, and therefore the property of the landlord, still governs to a large extent the relationship of landlord and

tenant.

The tie of landlord and tenant in the country districts is, for good and for evil, not merely economic. The landlords are the social mag¬

nates of the countryside. As unpaid magis¬

trates they have had up till within recent years practically a monopoly of the ordinary dispen¬

sation of all minor criminal and some civil

justice. On the other hand, in bad years they are expected by the common opinion of the

countryside to allow and do allow considerable

reductions on the agreed rent. A <(good landlord® is the man who is always ready to aid

his tenants in sundry ways. On well-managed

estates, the system works easily. The system,

however, is one which for its success depends

on the peculiar social conditions which have

hitherto prevailed in rural England, and its

transplantation to Ireland, where these condi¬

tions did not exist, had results disastrous for both countries.

Sporting Rights. — In England the love of

sport has been a prominent characteristic of

the landholding class throughout all history;

it is practically the universal custom for a

landlord to reserve the sporting rights over

agricultural land. If he does not exercise them himself, he lets them to some other person.

Where sporting rights are reserved the tenant

has no right to kill pheasants or partridges, but the Ground Game Act of 1880 empowers the

tenant himself, and one other person authorized by him in writing, to shoot hares and rabbits on his land whether sporting rights are re¬

served or not, and whatever the terms of the

tenancy agreement.

Land and the State; Taxation. — The taxa¬

tion of land is a question that is complicated by some historical anomalies. (1) Land Tax.

— The burden commonly known as Land Tax

represents historically the surviving portion of a general tax in the nature of an income tax imposed both on real and personal estate in

the year 1692; but it has for many years been a mere stereotyped incumbrance redeemable by

the landholder, and charged on the value of the land as in the year 1692. On most urban land the tax has been redeemed. The Finance Act

of 1909-10 (introduced in 1909) effected a

revolution in land taxation and provided for

(1) Duty of 20 per cent on unearned incre¬

ment accruing from land; (2) reversion,

duty of 10 per cent on value of benefit accruing to a lessor on determination of any lease of

land; (3) an ˆundeveloped landˆ duty of a half¬

penny per £ on site value of land not built on or used for any industry other than agriculture

(payable by owner) ; (4) mineral rights duty of 5 per cent on rental value of rights to work minerals and all mineral wayleaves. (2) In¬

come Tax.— Incomes derived from land, i.e.,

the net rent of land, are liable to income tax equally with incomes derived from other

sources. (3) Death Duties.— Before 1894 land

escaped the greater part of the death duties

imposed on personal property, but since the

Finance Act of that year all species of prop¬

erty are in this respect on an equality. (4<) Local Taxation. — On the other hand a man’s

liability to local, as distinct from imperial,

taxation is estimated by the value of the real property (i.e., land and buildings) which he

occupies, no account (in spite of some earlier statutory provisions to the contrary) being

taken of his personal property. On agricul¬

tural land, by an act of Parliament passed in 1896, only half the ordinary rate is paid. But no contribution is made to local taxation in

respect of the capital value of land, or of land which is not occupied, however high may be its value. As a war measure the Budget for 1918—19 introduced a considerable increase in both

direct and indirect taxation.

Other Rights of the State. — The feudal

principle of the ultimate ownership of the

King has produced little or no effect in giving to the state which the King personifies, rights over English land. The modern state has prac¬

tically no mineral rights. The precious metals, gold and silver, which for commercial pur¬

poses are practically not found in Great Bri¬

tain, are in law crown property and can only

be worked under license from the crown. But

all other minerals belong to the tenant in fee simple of the soil who leases or works them

for his own private benefit. The crown lands

in England are small in extent ; ownership by

local authorities is still in its infancy. There is no prairie land to grant to-railway pioneers or new settlers. When land is wanted for the

purpose of some undertaking of a public nature — such-as a railway, waterworks or the site of a post office — it has, as a rule, to be

purchased by the company, or authority concerned, under

statutory machinery, by which the fair value of the land has to be paid, plus 10 per cent com¬

pensation for compulsory sale. In the year

1887 the principle of compulsory acquisition

was, subject to many safeguards, extended to

the acquisition by a local authority of land to be let in very small quantities, called allotments, to agricultural laborers or others for culti¬

vation. The Irish Land Purchase Act of 1903

proceeded on the principle of a loan by the

state to a tenant who wished to purchase his

holding from his landlord, and agreed with

him as to the price. It did not directly involve either public ownership or compulsory ac¬

quisition.

Transfer. — In recent years several attempts,

culminating in the Land Transfer Act 1897,

have been made to induce English landholders

to abandon the present system of private trans¬

fer of land for a system based on a Land

Registry. Under the present system whenever

land is sold or mortgaged, it is necessary for the purchaser or mortgagee to satisfy himself

as to the title by going into all dealings with the land for a period which may be as long as 40 years. This is an expensive process, but it has been endeared by centuries of experience

to English landholders and lawyers. At the

present time, a public Land Registry has been

substituted for the old system only in London.

The principle of the new system is to enter the name of the proprietor of (or rather the. per¬

son entitled to sell) every piece of land on a register and to make land transferable by the

person registered by means of a fresh entry

on the registry, as if it were so much stock in the funds. The extension of this system to the rest of the country is a question of time; but in legal matters time moves slowly.

Trend of the Law. — Recent developments

of the law have in nearly all cases tended to re¬

strict the freedom of the individuals in relation to land. Neither in town nor countrv are land¬

lord and tenant allowed to make what bargain

they choose ; it is assumed that the economic

inferiority of the tenant places him at too

great a disadvantage for it to be possible for him to make a contract fair to himself, and so beneficial to the community. Men are no

longer allowed to settle their land in such a way as to make it unsalable, and the community has asserted the right to dispossess the individual, not only for definite works of a public nature, but in order to provide its poorer members with an interest in the land. It has also compelled land owners in the Metropolis to abandon the

old system of private conveyance and mortgage

for a system which is in a sense public, as it is worked by public officials, and which may

thus be regarded as a kind of reversion to the old method of public transfer. The same sys¬

tem will also in time form a new and more

accurate (Domesday Book) — a purpose which

the provision for a complete valuation of all

the land in the kingdom as at 30 April 1909, under the Finance Act of 1909-10, was designed to effect. Finally, modern legislation has put

an end to the former advantage of land in

respect of taxation and so claimed a larger

share in real property directly for the state.

The simplification of the land laws may be said to be one aspect of this change ; intricacy and subtlety of phrase and interpretation may be

tolerated by a private owner as the price of the liberty of complicated dispositions and of

secrecy, but these niceties are inconsistent with the uniformity which must accompany public

control.

Bibliography. — For more detailed informa¬

tion the reader may be referred to the follow¬

ing works: General Authorities: Joshua Wil¬

liams, Principles of the Law of Real Property) (20th ed. by T. Cyprian Williams, London 1906; the leading textbook on the subject as

a whole) ; Blackstone's Commentaries on the

Laws of England* (1st ed. Oxford 1765) (still

the best literary statement of English Law) ;

Brodrick, (English Land and English Landlords) (London 1881) (a good discussion of

the social and economic aspects) ; Pollock,

Sir F., (The Land Laws) ; (English Citizen

Series) (3d ed., 1896, a compendious statement

of the law intended primarily for laymen) ;

(Reports of the Real Property Commission?

(Parliamentary Papers, London 1829-1833)

(the foundation of the highly important Land

Law legislation of the Reform Bill period) ;

< <rThe Land: the Report of the Land Enquiry

Coiiffilittee,' (2 vols., London 1913-14) (the re¬

port by (he Liberals on which Mr. Lloyd George based his proposals for the breaking up of

large estates, minimum wage for dabarers, etc.,),; Whittaker, Sir Thos. P., (The Ownership,

Tenancy and Taxation of Land: Some Facts.

Fallacies and Proposals thereto * (London

1914); Skrimshire, Samuel, Valuations: A

Textbook* (London 1915) (an admirable sum¬

mary of the law in regard to valuations and

taxation).

History. — Digby, Sir K. E., (History of the

Law of Real Property) (5th ed., Oxford 1897) ; Pollock, Sir F., and

Maitland, F. W., (History of English Law before the Time of Edward

P (2d ed., Cambridge 1898).

Early Institutions. — Seebohm, F., (The Eng¬

lish Village Community) (3d ed., London

1884) ; Vinogradoff, P., Villainage in England> (Oxford 1892) ; also his work, (The

Growth of the Manor) (London, New York

1905) ; Maitland, F. W., (Domesday Book and

Beyond) (Cambridge 1897), and (Township

and Boroughs (Cambridge 1898) ; (The Selden

Society Publications) (1887 and following

years, Quaritch, London).

Some Legal Textbooks. — Coke upon Lyttel—

ton) (15th and 16th century Law of Land; 16th ed., with Hargrave and Butler's Notes 1809) ;

Challis, H. W., (The Law of Real Property>

(2d ed., London 1892) ; Cart on Vendor and

Purchased (7th ed., 1905) ; (Woodfall, Land¬

lord and TenanP (17th ed., by J. M. Lely,

London 1902) ; Theobald, H. S., K. C., (The

Law of Land* (London 1902) ; Ephinstone's

(Introduction to Conveyancing) (5th ed., Lon¬

don 1900) ; (Wolstenholme on the Conveyancing

and Settled Land Acts) (9th ed., by B. L.

Cherry and A. E. Russell, London 1905) ; (El¬

ton on Copyholds) (2d ed., London 1893) ; (The Land Transfer Act, 1875 and 1897* (2d ed., by C. F. Brickdale, London 1905) ; Cootes' (Law

of Mortgages* (7th ed., by S. E. Williams,

London 1904).

J. Fischer Williams,

Fellow of New College, Oxford; Barrister-at-Law.

28. AGRICULTURE.— THE 18TH CEN¬

TURY. Between 1700 and 1815 English agri¬

culture changed its whole character. England

became a great wheat exporting country and

continued so up to 1773. Great agricultural

improvements were carried through, stock

breeding became scientific, waste land was

broken up, large portions of the fens were

drained, big farms with enterprising up-to-date

farmers became the object of every landlord

and the agricultural system which had come

down from Anglo-Saxon days, and which still

prevailed over large parts of England, was

given up. English farming became intensive in

character instead of mainly extensive. The

social effects of the change involved the disap¬

pearance or degradation of the landowning

peasantry or yeoman class. On the other hand

it was only by, means of the great increase in agricultural produce that England was not

starved into submission during the Napoleonic

wars. The changes in agriculture of that cen¬

tury meant ultimately nothing more nor less

than national independence.

One of the main objects of English policy

had been for centuries the encouragement of

agriculture. A sufficient food supply raised at home deprived the enemy of the power of

cutting off supplies from abroad. Moreover

agriculture was considered the best breeding

ground of good soldiers. Wheat also was an

excellent commodity for ships to carry, and the encouragement of corn export formed part of

the Navigation policy of the realm. The great

attention bestowed by successive governments

upon agriculture was the most original part of English policy. Her seamanship she copied

from Holland, her industrial protection from

France ; but while every other country aimed at preventing the export of corn so as to have a sufficient food supply, England deliberately

stimulated export believing that thereby farm¬

ing would be best encouraged.

This policy reached its most complete ex¬

pression in the Corn Bounty Act (1 Wm. and

Mary, c.12) of 1689, by which, when the price of wheat was at or below 48 shillings (and pro-protionately for other grains) a bounty was

given on export.

The result of this law was to attract capital into farming. Men who sunk money in im¬

provements were assured of a price which

should not fall below 48 shillings and under the stimulus of this certainty a great agricultural revolution began. There grew up gradually a

class of capitalist farmers and ˆspirited landlordsˆ who were willing to carry out experi¬

ments. The result was that by 1770 England

not only produced food for a population that

had doubled itself, but was the granary of

Europe.

One of the great improvements of the 18th

century was, for example, the manuring of

land, by which Arthur Young calculated that

three or four hundred thousand acres of waste

were turned into gardens. A revolution in fod¬

der was brought about by the introduction of

turnips and clover, while careful attention to

grass seeds resulted in good hay on which cattle could be kept in condition in winter. Previous to the introduction of winter roots the majority of the beasts had to be killed in the autumn and salted down, while the remainder declined in

weight through sheer starvation. This annual

loss was now averted and a supply of fresh

meat secured all the year around.

It therefore became worth while to improve

the breed of the animals themselves. Bakewell

of Dishley and Coke of Holkham wrought a

revolution in English life with their Leicester and Southdown sheep and Devon cattle. Ani¬

mals were now raised primarily for food instead of for their wool or hides, they were ready for the market sooner and the average size of

cattle increased considerably. Thus a larger

food supply was secured, and the great stock¬

breeders wrought a change the effects of which were as far reaching as those of Watt and Ark¬

wright.

Before however this scientific farming could

become general it had to become known. Roads

were undeveloped, people in one county could

not know what was passing in another, there

was no agricultural newspaper — no machinery

to make this knowledge common property.

Moreover with the inherent conservatism of the

agricultural class it needs something more than mere knowledge to make a farmer change his

ways.

The necessary diffusion of information was

carried out largely by Arthur Young and the

Board of Agriculture, while the stimulus of the great wars and the shortage in the food supply provided a powerful incentive for improvement

by means of high prices. Moreover, the growth

of the iron and coal trade had led to the cut¬

ting of canals, and internal communications of

all kinds were improved. People could get

about; great towns began to grow up, provid¬

ing an ever increasing market, for food stuffs.

It therefore became more and more worth while

to effect improvements, and scientific agriculture became a patriotic hobby. The King himself

wrote articles for agricultural newspapers and

the great agricultural meetings and cattle shows put a spirit of emulation into farmers.

The chief obstacle to betterment lay how¬

ever in the fact that much of the land was

owned by small farmers who simply had not the capital to get good stock, implements, seeds and manures. Moreover, the system of farming

among the peasantry was that of farming in

strips, each man having about thirty strips of land but no two lying together. These strips

were separated from one another by turf balks, and after the hay and corn harvest had been

gathered all the animals were turned indis¬

criminately over the open fields. The system

was most wasteful. It was quite impossible to

adopt improved methods of cultivation on half

acre strips. No winter crops could be grown

because the cattle ranged all over the fields

from September to February. No improvements

in breed could be carried out when good cattle were exposed to the infection of the mangy

village herds with their foot and mouth disease.

No drainage could be attempted since the out¬

fall would be on some neighbor's strip. The

loss of time involved in going from piece to

piece, and in carting little bits of hay and corn from different places, to say nothing of the

waste of numerous footpaths and the endless

disputes over real or fancied encroachments,

made the system one which in the interest of

good farming it was highly desirable to displace.

It was established by the Board of Agriculture that tenants lived comfortably on enclosed land rented at 10s. 6d. ($2.62) an acre who had

starved on open farms at 2s. 6d. (62 cents) an acre and that enclosed land at 20s. ($5) an

acre was cheaper than open land at 8s. ($2).

The famine years of 1795, 1800 and 1801

made the prosperity of agriculture a pressing

national question. Enclosures were pushed on

rapidly, partly by the agreement of the parties concerned, but mainly by private Acts of Par¬

liament. The general result was that the scat¬

tered strips were given up and each farmer

received an equivalent in a compact little hold¬

ing all in one place.

Between 1770 and 1799, 1,375 enclosure bills

were passed, between 1800 and 1819, 1,700.

Altogether it has been calculated that over

2,500,000 acres were affected by the acts prior to 1801.

The result meant better farming, but it also

involved great loss to the peasant and the

laborer. The fees of the commissioners for re¬

distributing the lands, the legal expenses of

getting a private act, the cost of hedging the new farm, all bore hardly on the yeoman. Even when he had survived the actual enclosure he

found it hopeless to compete with the capitalist farmer. The stuff he could raise would not

bring a remunerative price in competition with

that of the large producers. He was moreover

hard hit by the loss of the bye employments of spinning and weaving which were tending to

(29) become more and more factory industries.

Many of the yeomen sold their little farms to large landowners who were only too anxious to

throw them together into big ones in order to realize the high prices during the war period.

Moreover the new men who were making their

money in cotton were glad to buy land for the sake of social position. With an increasing

struggle for existence on the one hand and the prospect of a good sale on the other the small farmers sold their holdings and disappeared.,

Those that held on were so hard hit by the great depression in agriculture after 1815 that they

too were forced to succumb. Hence England

between 1770-1815 became predominantly the

land of the capitalist farmer.

The laborers, too, suffered considerably,

since when the land was enclosed they lost many little perquisites such as turning out a cow

on the waste or gathering fuel. But more im¬

portant than all was the fact that the laborer lost the chance of rising in the world. The

small farmer had ceased practically to exist and the laborers never could hope to get together

capital enough to take a big farm.

But without the improvements of those years

England could not have held out against

Napoleon. She would simply have surrendered

from famine when the Baltic corn was cut off.

The stimulus of the Corn Bounty Act started

the agricultural revolution ; the great wars com¬

pleted it. The result was an enormous advance

in farming but great social distress ; the extinc¬

tion of the peasant proprietor, but the ultimate safety of England.

Bibliography. — Cunningham, W., (Growth

of English Industry and Commerce — Modern

Times) (1903) ; Defoe, D., (Tour Through the

Whole Island of Great Britain) (1724); in¬

quiry into the Reasons for and Against Inclos¬

ing the Open Fields) (1767) ; (General Report

on Enclosures Drawn up by the Board of Agri—

cuiture) (1808) ; Nicholson, J. S., <The History of the English Corn Laws5 (1904) ; Prothero,

R. E., (Pioneers and Progress of English Farm¬

ing5 ; Pennington, W., Reflections on the Vari¬

ous Advantages Resulting from the Draining,

Indorsing and Allotting of Large Commons and

Common Fields> (1769) ; Young, A., (Tour

Through the Southern Counties of England) ;

(Tour Through the North of England5 (1771),

and (The Farmers Letters and the People of

England5 (1768).

Lilian Knowles,

Reader in Economic History , University of

London.

29. AGRICULTURE SINCE THE 18TH

CENTURY. History. — The close of the

18th century saw the English system of

farming fully established, with its charac¬

teristic division of the landed interest into

the three classes of landlord capitalists, ten¬

ant farmers, and laborers. Agricultural im¬

provement had indeed made great strides dur¬

ing the 18th century, and in some parts of the country, as in Norfolk and Herts, the change

from the old open field system to large enclosed farms had already been accomplished, but it was the high prices for food, prevailing at a time when the rapid growth of a manufacturing

population coincided with the Napoleonic wars,

which finally swept away the village-community

style of farming and replaced it by the large tenant holdings as known to-day. The old sys¬

tem, while it supported a good many poor men

on the land, was a very inefficient method of feeding the nation. The first condition of agri¬

cultural improvement was the investment of

capital in the land, and the most economical way of doing it has proved to be to allow the land¬

lord to use his money on the permanent amelior¬

ation of his property, leaving the whole of the tenant's resources free to be employed in his

business of farming. The advantage of this

system lies in the fact that the tenant's capital is kept in a liquid condition; he becomes a man¬

ufacturer of meal and corn, who hires land and buildings as tools in his business. The develop¬

ment of improved breeds of live stock and supe¬

rior strains of crops has been made possible by the existence of a race of tenant farmers with both the means and the temperament to specu¬

late in the development of their industry. The system has of course its drawbacks ; it demands that the landlord should possess capital and

some understanding of the agricultural situa¬

tion ; it lacks flexibility when a great economic change takes place like the fall in prices after 1876; it encourages too conservative a style of farming, for it checks the initiative of tenants by giving small security that they will reap the benefit of any increase in the value of the

farm due to their improvements. Its intense

individuality, from which so much has been

gained in the past, becomes a drawback now

that the farmers of a country are no longer

competing with one another, but have to be

organized to maintain their position in the com¬

mon market of the world.

The agricultural history of the 19th century

in Great Britain may be divided into four

epochs, beginning with the period of inflated

war prices which lasted up to 1816, during which time the great work of enclosing the common

lands and forming large farms was practically

completed. This was also a period of great ac¬

tivity in the improvement of farming ; the foun¬

dations of most of the British breeds of live stock were then laid; machinery began to be

applied to agriculture, and the reclamation of the wastes, practically the creation of good arable soil out of barren sands and intractable clays, proceeded with vigor. The value of marl on

the light sands, and of chalk and lime upon the clays had long been known, but at this time such ameliorations were being carried out wholesale

and with a thoroughness of which the British

iarmer is still reaping the benefit. There fol¬

lowed a period of 20 years of unexampled de¬

pression when the great break in prices, conse¬

quent on the end of the war, was aggravated by a succession of bad seasons. Little by little this depression was removed as the obligations in¬

curred during the time of inflation became void, as the weaker farmers and small holders became squeezed out, and particularly as the consuming population in the manufacturing towns grew in

number and wealth. The 40 years from 1836 to

1876 may be described as the Golden Age of

British farming. The making of the soil by

marling, claying, chalking, etc., went on apace; something like 3,000,000 acres were tile-drained in England alone between 1830 and 1870; simul¬

taneously also science and the industries put

at the service of the farmer nearly all the mod¬

ern range of fertilizers and feeding stuffs —

cakes. The modern breeds of live stock became

clearly defined, and had their herd and flock

books established during this period, and

amongst the best practitioners farming became

a fine art attaining the polish characteristic of a well-kept garden. Rents rose steadily with

the competition for farms among not only the

farming classes but also the tradespeople of the country towns, who saw in agriculture the road to wealth and an easy life; indeed, on the great estates where the tradition was against rack-renting the sound farmers were realizing very

considerable fortunes.

The crowning period of this prosperity was

the time of the Franco-German War of 1870-71.

By 1875 the depression was beginning to make

itself felt. Freights were low and foreign im¬

ports, especially American, of grain, wool,

cheese and butter were beginning to grow rap¬

idly. A run of bad harvests had also set in, culminating in the black year of 1879, when the lowest cereal yields on record, due to continu¬

ous wet weather, coincided with an enormous

crop and corresponding importations from the

United States. From this time the yield of

corn in England ceased to rule its price, which has in the main been set in Chicago. The great change that then came over agriculture would

have been less fatal had its permanent char¬

acter been recognized earlier; as it was, on

very many estates rents were not lowered rapidly enough, with the result that the old tenants

were ruined and new ones could only be at¬

tracted by comparatively enormous reductions.

Up till 1894 the gloom was unrelieved, the

prices of corn and wool dropped year by year, although wages were rising, nor were there

any new factors in sight which promised a

change for the better.

It was the arable land farmers who suffered

the most, particularly the cultivators of heavy land in the eastern counties and the midlands, where the land was expensive to work and

only profitable when wheat and beans made a

good price. This land gradually got laid down

to grass ; much of it went wholly out of cultiva¬

tion for a time and was only reclaimed again

as grass land by a new race of farmers who

got it almost rent free. The western side of

the country, which had always been in the main devoted to grazing and dairying and where rents had .never been excessive, suffered compara¬

tively little, nor did the highly farmed Lothians show the same fall in

rents as the arable lands farther south.

Since 1894 the drop in prices has been ar¬

rested, and an upward turn has manifested it¬

self for nearly all the products of the farmer, meat only excepted. At the same time, a new

race of farmers had grown up, who discovered

methods and openings by which a living may

still be made out of the land. But though the agricultural situation may now be said to be

comparatively stable and even improving, it is

still full of difficulties. The British farmer is now competing with every country that has any

agricultural produce to sell ; the British market is the one open market of the world, and the price of any commodity is fixed by whichever

country has a great surplus crop in that year.

The proximity of the town, while it creates a market for certain products, also increases the farmer's expenses ; in the end the manufactur¬

ing industries set the standard of wages and

draw off the energetic and the able among the laborers. At the same time the farmer has to

conform to the urban standard of life; he has to pay for roads, sanitation and education of a style unknown to his competitors in a primitive country. Again, as a capitalist, he expects a

return for the money he has invested in his

business, whereas his competitors are, in most

cases, content if they extract a living out of their labor, without taking into account the

capital they have accumulated on their small

holdings. Even the proximity to the great pop¬

ulation, which ought to be the saving factor, is nullified by high internal railway rates, which compare unfavorably with the assisted freights

of most competing countries.

During the period we have under review

the British tenant farmer may be credited with two characteristic steps forward; the perfect¬

ing of a system of high farming and the fixing and improvement of a number of races of live

stock. As regards the first matter — high farm¬

ing — three contributing factors may be noticed.

Owing to the changeable climate and the diver¬

sity of the soils the preparation ot the land for crops has always required some nicety in man¬

agement, and the British farmer in virtue of

his long experience became something of an

artist in the treatment of his soil. And though since prices have fallen some of his practices are no longer very remunerative, however de¬

sirable from the point of view of securing the <(best® even if not the most paying crop, yet British farmers are still in the main more skil¬

ful than those in any other country, as far as the actual cultivation of the soil goes. Sec¬

ondly, the British farmer early learnt the value of a good rotation of crops, which should not only provide something to sell, but which

would also furnish a continual supply of food for his stock. The British farmer was the first to ap¬

preciate the possibilities which artificial ma¬

nures put at his disposal ; and the early exporta¬

tions of guano, nitrate of soda, bones, etc.,

were in the main to the United Kingdom : Lie¬

big even denounced England in no measured

terms for her greed and wastefulness in draw¬

ing bones from all other civilized countries, and then squandering the phosphoric acid thus ob¬

tained by letting her sewage run into the sea.

With the more intensive farming, due to better cultivation and the addition of manures, came

improvements in the varieties of seed sown,

mode of progress taken up with great energy

both by individuals and certain firms of seeds¬

men. Though the results are not so note¬

worthy as in the case of live stock, yet most of the heavier yielding varieties, both of corn and of green crops, are of British origin, e.g., the ˆSquarehead® wheats, the ˆChevalier® type

of barley, the ˆdrumhead® cabbage, all of which are widely spread over the world.

The final report on the Census of Produc¬

tion (1913) estimated the agricultural output

of Great Britain at the value of £158,800,000, employing about 1,840,000 persons. The agri¬

cultural output of Ireland was valued at £45,-

574,000, and number of persons employed, about

984,000.

Live Stock. — But the special excellence of

the British farmer has been his success _ in

improving and fixing certain breeds of live

(29) stock, which have now become the standard

breeds all the world over. Up to the middle

of the 18th century there were a number of

types of cattle and sheep to be found in the different districts of the British Isles, as in any other old farming country; but these types were ill-defined and there was no common or

conscious action toward fixing them in any de¬

sirable direction. Robert Bakewell, of Dishley

(1725-1795), working on Leicester sheep and

Longhorn cattle, first showed how a breed could be improved and fixed. Bakewell aimed at an

animal which would mature earlier and would

put on its increase in the most profitable places.

Carrying a type in his mind, he selected a num¬

ber of animals approximating to his ideal and

bred only from them; then by a period of close inbreeding among such of the progeny as con¬

formed to the type, he was able both to ad¬

vance rapidly in the desired direction and also to eliminate a good

deal of the tendency to fall back toward the old unimproved class of ani¬

mal. At the same time it was found that this close inbreeding resulted in sires which had

great power of stamping their character on their offspring, even when the dam is of a different or common strain. Thus Bakewell's Leicester

sheep have been employed to give quality to

almost all the other local races, and there

are nowadays few breeds of sheep in exist¬

ence who do not possess a strain of Leicester blood in them. Bakewell's Longhorns have

not had a like success, but the same principles were applied to the native cattle of Teesdale, the Durhams or <(Shorthorns® by the brothers

Colling, who died in 1820 and 1836, respectively.

Their work, continued by the Booths and by

Bates, resulted in the modern Shorthorns, the

typical beef-producing cattle of the world, with which, in the main, all the newer countries have been stocked.

The same progress was applied to other

local breeds of cattle; the Herefords and the

Devons in England, and the Aberdeen Angus

in Scotland, have in the same way attained

to far more than a local reputation, as also

have several of the breeds of sheep, like the Southdowns or the Lincolns. Notwithstanding

the existence in all old-settled countries of in¬

digenous races, stock of British breeds are to be found all over the continent of Europe,

either kept pure or more generally used for

grading up the local type ; while in the newer countries, which have become the great food

producers of the world, none but breeds of

British origin are to be found, with the excep¬

tion of the Frisian or Holstein cattle, the

Merino sheep and the Percheron horse. Also,

the United Kingdom remains the great foun¬

tain from which these countries find it necessary to replenish their breeding stock, so that the production of pedigree animals of high quality

continues to be one of the most lucrative items in British farming. In 1916 there were in the United Kingdom 2,100,000 horses, 12,412,596

cattle, 28,770,692 sheep, and 3,604,620 pigs.

Agricultural Districts. — Farming has now

become a highly specialized business, showing

great adaptation to the diversities of soil, cli¬

mate and markets in the British Islands. Be¬

ginning with the southeastern counties ; Kent,

Sussex, Surrey, and Hampshire form a fairly

defined area, possessing in general a warm and dry climate. Here, but particularly in Kent,

may be found the greatest development of

market-gardening, fruit growing, hop cultiva¬

tion, and other similar highly intensive forms

of farming. As far as regards the production

of very early crops this district cannot compete with the Channel Islands or Cornwall, but as

main crops the standard green vegetables are

grown in great breadths. This district is also noted for its hardy fruit growing; near South¬

ampton on one hand and later in North Kent

the greater part of the strawberries for London are produced. The best cherries have long been a special feature of East Kent, which country

is also the largest producer of plums, apples, currants, and nuts. East Kent shows without

doubt the best kept orchards in the country.

Hop cultivation is also another leading feature of this district; no other farming industry is carried on so intensively or spends more on

labor during the growth of the crop. The best of the hops march with the fruit in East and Mid Kent, but Sussex is also a large grower,

as also is a belt of rich land stretching from Farnham in Surrey as far as Petersfield in

Hampshire. The district under review has

not perhaps the same reputation for general

farming as it has for fruit and hops; it pos¬

sesses, however, several distinct and valuable

races of stock. The Southdown sheep are na¬

tives of the open chalk downs of Sussex ;

small, fine-wooled, and models of symmetry,

they have been extensively used for improving

the mutton of other breeds and form a great

element in the foundation of such breeds as

the Hampshire and Oxford Downs, the Shropshires and the Suffolks. Kent possesses in the <(Romney Marsh® sheep one of the older breeds

of the country; big, hardy, and long-wooled,

which have lately proved valuable for cross¬

breeding in all parts of the world. The Hamp¬

shire Downs constitute a large framed, rapidly—

growing breed that has been formed from a

local coarse sheep by crossing with the Southdown. It exists in large numbers on the light arable lands of the great chalk area of which Hampshire forms the centre. Sussex also pos¬

sesses a local breed of cattle; a horned, all-red, typically beef-producing breed, which has not

spread greatly beyond its proper borders.

Hampshire passes insensibly into the West

Country — Wiltshire, Dorset, Somerset, Devon,

and Cornwall — a typical stock district, showing less and less arable land toward the west.

This is one of the chief dairying countries,

milk being sent to London ; while Somerset,

in particular, is the original home of the

(<Cheddar® cheese, the typical cheese turned

out nowadays on such a large scale in the

United States and Canada. The cattle are

mainly Shorthorns, though Devon possesses a

dairy breed of its own, the South Hams, which have been raised from the true Devons by an

infusion of Guernsey blood. The true Devons

are an all-red, beef -producing breed, doubtless of common origin with the Sussex, but which

has gone all over the world as among the

thriftiest and most profitable of grazers. The

Dorset horned sheep are characteristic of this

area, a short-wooled, horned breed valuable

for the production of early lambs. Somerset

and Devon are also great apple-growing coun¬

ties, though the fruit does not receive the care

which is to be found in Kent, and much of the product is only useful for cider-making. The

southwest of Cornwall possesses an extremely

mild climate, frosts being few and of no great severity; it has therefore become an important

market-gardening district for the production of

the earlie'r green vegetables and potatoes. The Channel Islands share the same advantages of

climate, and, thanks to the skill and industry of their inhabitants, form perhaps the most pros¬

perous agricultural community in the Kingdom.

The land is divided into small holdings and

is highly rented, but the farming is intensive and the crops valuable. In Jersey early pota¬

toes, followed by green vegetables, form the

staple crops ; in Guernsey there has been a

great development of farming under glass; cu¬

cumbers, tomatoes, grapes, early beans and

flowers being the chief products. Each island

possesses a special, though closely-related, breed of cattle, which by law has been kept pure and unmixed from any foreign blood for more than

a century. These Channel Island breeds repre¬

sent the descendants of an original Celtic race of cattle and are distinguished by the tendency to a yellow skin and black hair ; they are small in frame, and produce large quantities of milk far richer in butter than that of any other

breed. The Jerseys, in particular, have been

largely exported to America as milk and butter producers.

The West Country shades off into the west

Midlands — Gloucester, Hereford and Worces¬

ter, counties growing much hardy fruit and

typical producers of cider. Here also is situ¬

ated the other hop-growing area in the British Islands, the acreage under hops in the valley

of the Teme and its tributaries tending to in¬

crease, while it diminishes in the southeast.

This district is the original home of the Here¬

ford cattle, red with white faces, which have

become one of the great cosmopolitan races,

famous all the world over as hardy stock fat¬

tening readily upon grass.

The Midlands proper are almost wholly

laid down to grass; the broad belt of strong

pastures stretching from Devon to Yorkshire,

forms the great milk and meat-producing area

of England. The cattle are mainly Shorthorns,

as being valuable for both meat and milk, but many Herefords, Galloways and Welsh black

cattle are also found fattening on the richer

pastures. While these Midland pastures largely

send new milk into the great towns, a good

deal of cheese is made, the best known variety being the <(Stilton,® which is as typical of the English soft-curd cheeses as <(Cheddar® is of

the hard curd. Eastward the land comes more

under the plow, Essex, Suffolk, Norfolk and

Lincoln being typical arable counties. Lin¬

coln possesses a large area of ((warp® land com¬

posed entirely of alluvial sediments, and this, of great fertility for all purposes, is very largely given up to the growth of potatoes. On the

strong soils of Essex and Suffolk the best Eng¬

lish wheat is grown, wheat being still a profit¬

able crop in this district; while Suffolk and

Norfolk enjoy a great reputation for the

growth of high-class malting barley. These

counties are still, though not to the same extent as formerly, great centres of stall-feeding of

cattle. Welsh <(Runts,® Shorthorns, and Aber¬

deen Angus stores are brought in and rapidly

fattened on the turnips drawn from the arable

land. Norfolk possesses a native breed in the

Red-Polled cattle, valuable for both their flesh and their milk-producing powers, and which

are rapidly establishing a reputation outside of England. In Suffolk also is to be found a

special breed of heavy horse, the Suffolk Punch, a compact, thickset animal of great value for

farm work. All the lowlying country forms

a fine breeding ground for horses, which is

one of the staple industries of the eastern coun¬

ties. The fen country indeed is the original

home of the typical English ((great» horse, the Shire horse, the most powerful animal of its

kind in the world, particularly adapted to heavy work in cities. Bay, brown, and black are the commonest colors, and the feet and legs are

thickly grown with white hair; the breed prob¬

ably owes its origin to an influx of Flemish

blood into the old English draught horse. Lin¬

coln also possesses the chief of the English

long-wooled races of sheep; heavy, rapid¬

growing animals, with a great fleece of long

slightly lustrous wool. The Lincolns have been

exported in large numbers to Australia, New

Zealand and the Argentine for crossing with

the Merino to yield a sheep equally valuable for both mutton and wool.

Turning to the west again, Wales is a coun¬

try almost wholly in permanent grass ; dairying and the raising of store cattle to be fattened in the midlands and east of England being the prevailing industries. The Welsh black cattle

are good milkers, and, in addition, have long

been esteemed, under the name of ((Welsh

Runts,® as hardy, thrifty grazing cattle, prod¬

ucing beef of high quality. Like all mountain¬

ous countries, Wales has a race of hill sheep, but on the lower lands, and especially in the border counties, the ((Shropshire® breed will

most commonly be seen. The Shropshire sheep

is a short-wooled, small-framed animal, rather

large and hardier than a Southdown, but other¬

wise fulfilling the same purposes, producing

mutton of the highest quality upon grass land

and the lower hill pastures. On the Welsh

borders also is to be found one of the native breeds of hill ponies, very slightly different

from the two other breeds living upon Exmoor

and in the New Forest, but quite distinct from the Shetland ponies, which are doubtless of

Scandinavian origin.

Yorkshire provides perhaps the most varied

farming in England ; on the one hand there is the rich warpland adjoining the Humber, and

the elevated arable sheep-farming land of the

Wolds, then the highly-farmed general-purpose

land of the central plain which merges into the upland sheep walks of the limestone county in

the northeast. Horse breeding, stock raising

and dairying are the mainstays of Yorkshire

farming, and though no breeds of great note

are associated with Yorkshire, except the white Yorkshire pigs and the Cleveland Bay Coach

horse, it should not be forgotten that the origi¬

nal home of the Shorthorn was just as much

the North Riding of Yorkshire as the Durham

Tees-side, with which their names is always

associated.

In the northern counties generally may be

seen some of the best arable farming in Eng¬

land; a four-course rotation is generally fol¬

lowed, the foundation of the whole system be¬

ing a good crop of Swede turnips, part of

which are fed on the land to sheep, part carted off for fattening stock in the yards. Barley

is the money-making crop in the rotation, oats being the other cereal

usually grown. The typ¬

ical cattle of all this district are Shorthorns; in Cumberland, which is more of a grazing coun¬

try, they are of the milking type, the beef

strains predominating in the eastern side. The

sheep are the Cheviot breed for the hill past¬

ures, and the Border Leicester, which was origi¬

nally produced by crossing the Cheviots with

Bakewell's Leicester breed.

Scotland and Ireland. — Crossing the border

in the Lothians of Scotland will be found the most highly-farmed general-purpose arable land

in the British Isles. Here the management of

the land, the utilization of labor-saving ma¬

chinery, and the application of skill to inten¬

sive cultivation, reach a higher pitch than

anywhere else in the world. The cropping is

much the same as that of the other northern

counties, but potatoes form the most remunera¬

tive crop; in the famous Dunbar district they

are often sold standing in the field for $150

(£30) per acre.

The southwest of Scotland is pre-eminently

a grazing district; it is the home of two of the most distinct breeds of cattle, the Ayrshire,

a typical dairy cow, yielding milk particularly suited for cheesemaking, and the Galloway, a

polled black animal, characterized by its great hardiness and the fine quality of its beef. For generations the Galloways, either pure, or in the well-known ˆblue-gray® cross, have been ex¬

ported to be fattened in the Midlands and east of England. The more northern counties of

Scotland, naturally, in the main consist of graz¬

ing land. They have their typical race of

Highland cattle and also carry the Scotch black¬

faced sheep, both slow-maturing hardy breeds,

producing meat of high quality. The eastern

counties, particularly Aberdeen, show some

highly-farmed arable land, noted for the magni¬

tude and high quality of its turnip crops, on which the cattle are stall-fed through the win¬

ter. For this purpose another race of cattle,

now of cosmopolitan distribution, has been

evolved, the polled black Aberdeen-Angus, mas¬

sive animals noted for their rapid growth, sym¬

metry, and quality of flesh.

Irish agriculture is of two classes ; on the

one hand there exists, especially in the west, a great number of small holdings, worked en¬

tirely by the single family, producing potatoes for home consumption

and a little oats for sale, in addition to the milk or butter from a few cows on the rough grazing attached to the hold¬

ing. The farming of these peasant proprietors

is naturally of a primitive character, but the efforts of the Irish Co-operative Organization

Society and later of the Irish Board of Agri¬

culture have, during the last 20 years, done

much to ameliorate the conditions under which

they are working, particularly by the introduc¬

tion of co-operative creameries. The Irish

peasant farmer has quickly learnt to work on

co-operative principles, so that the movement

toward cooperation, headed by Sir Horace

Plunkett, has enormously improved the char¬

acter of Irish butter, a staple article in the Eng¬

lish market, and must have nearly doubled the

returns to the producer. On the other hand,

Ireland possesses large farms of the richest

grazing land on which are bred great numbers

of store cattle of the Shorthorn breed for the English market, as well as light horses of the best strain, wholly or nearly thoroughbred.

The high quality of the pastures give these

animals a foundation of bone and vigor of con¬

stitution which makes them respond freely to

richer conditions in later life.-

Science and Education. — Any survey of British farming for the last century would be incomplete if it did not take some account of the scientific and intellectual resources which have been at the service of the British farmer. Of these the Rothamsted Experiments form the main, practically the only British contribution to the world's stock of agricultural science. The foundation of these field experiments dates back to 1843, in which year J. B. Lawes, a Hertfordshire landowner, obtained the co¬ operation of J. H. Gilbert to carry out experi¬ ments upon field crops upon his own estate. This partnership in investigation lasted for nearly 60 years, the continuity of the work being secured by a Trust founded and endowed by Lawes. The main feature of the Rothamsted investigations has been field experiments with the various farm crops, conducted on a large scale and over a great period of time, and to them the farming community owes its knowledge of the principles of the nutri¬ tion of our domesticated plants. In 1906 the "James Mason® laboratory for agricultural bacteriology was added. Rothamsted was the

forerunner of the many agricultural experi¬

mental stations which have been created in other countries; the first German Station at Mockern

dates from 1852, the first American Station at Middletown, Conn., having been founded in

1875. It is noteworthy that though agricultural research has in every country become the busi¬

ness of the State, Rothamsted remains the only institution of its kind in the British Islands and receives an annual grant from the Development

Fund of £2,850 ($14,250).

From about the same period as the founda¬

tion of the Rothamsted Experiments, dates the

establishment of the Royal Agricultural So¬

ciety, which, by its institution of national agri¬

cultural shows held year by year in different

parts of the country, has done much to foster the improvement of English live stock. For a

long time also this society by its (Journal, > by its appointment of consulting scientific advisers, by undertaking analyses for its members, was a great educational factor in the country, but the work of the society in this direction has of late years been largely taken over by other and

more widespread agencies, while the society has no longer found fresh pioneer work to do but

has more and more confined its energies to its annual show.

Agricultural education in Great Britain was

for a long time restricted to private enterprise, the Royal Agricultural College at Cireneester

being the first, and for a long time, the only institution giving a systematic training in agri¬

cultural science. There were in 1916 21 agri¬

cultural colleges in the United Kingdom, as

well as professional chairs of agriculture in

London, Reading, Bangor, Edinburgh, Cam¬

bridge and Leeds universities. According to

official statistics for 1914, the acreage of arable land in the United Kingdom was : — England,

10,306,000 acres; Wales, 692,000; Scotland,

3,295,000; Ireland, 5,027,000; Isle of Man and

Channel Islands, 93,000. The livestock figures

foˆthe same year showed 1,850,042 horses;

12,184,505 head of cattle; 28,000,000 sheep; and nearly 4,000,000 pigs. Total permanent pastur-27,351,000 acres; other grazing land, 13,000,-

000 acres.

Bibliography. — (Annual Report* on the

Agricultural Returns, etc., in Great Britain ;

Board of Agriculture (London 1906) ; Agricul¬

tural Statistics) for Ireland; Annual Report,*

Department of Agriculture and Technical In¬

struction (Dublin 1905) ; (Report of the Royal Commission on Agriculture) (London 1897) ;

Ireland: Industrial and Agricultural,* De¬

partment of Agriculture and Technical Instruc¬

tion (Dublin 1902) ; Prothero, (Pioneers and

Progress in English Farming* (London 1888) ;

Prothero, (English Agriculture in the Reign of Queen Victoria. * Journal Royal Agricultural

Society, England (1901, p. 1) ; Caird, < English Agriculture in 1850 and 185P (London 1852);

Wallace, (Farm Live Stock of Great Brjtain)

(London 1893); Rew, (British Live Stock in

the Nineteenth Century) ; Trans. Highland and

Agricultural Society (Edinburgh 1901, p. 206) ; Hall, (The Book of the Rothamsted Experiments) (London 1905).

A. D. Hall,

Director of the Rothamsted Agricultural

Station.

30. BRITISH FISHERIES. Sea Fish¬

eries. — The great extent of seaboard in propor¬

tion to the land area of the United Kingdom

Kingdom. In Scotland only 10 per cent of the

regular fishermen were engaged in trawling;

9L i e an(b 29 Per cenb while in England and Wales trawling employed 8 per cent more

hands than all other modes of fishing combined.

1 his table does not include persons engaged in subsidiary occupations dependent upon the

fisheries, such as boat-builders, coopers, box—

makers packers, curers, gutters, net-makers,

etc. These were estimated in Scotland alone in 1913 to number 52,448. If the ratio may be as¬

sumed to be similar in England, Wales and Ire¬

land, the total number of persons, who, before the war, depended for a living on the sea-fish¬

ing industry cannot be far short of a quarter of a million. The total weight and value of

fish (not including salmon) and the value of

shellfish landed in the United Kingdom during

1913 are shown in Table II.

The craft of all kinds employed in the fish¬

ery were registered thus :

Table III — Number and Gross Tonnage of

Fishing Vessels and Boats Registered in

English and Scottish Ports, and the Num¬

ber so Registered in Irish Ports in 1913.

Number Tonnage

England and Wales . 11,376 327,917

Scotland . 8,991 136,905

Ireland . 5 , 093 not recorded

Great changes have been wrought in the

character of the British fishing fleet during the past 25 years owing, first, to the increased apTable I — Estimated Number of Men and Boys Regularly or Occasionally Employed in Different Modes of Sea Fishing in 1913.

Regularly employed

Occasionally employed

Total

employed

In

trawling

(except for

shrimps)

In other

modes of

fishing

Total

In

trawling

(except for

shrimps)

In other

modes of

fishing

Total

England and Wales .

Scotland .

Ireland .

Isle of Man .

Channel Islands .

Total .

19,470

3,090

1,528

105

109

17,972

26,732

6,324

323

395

37,442

29,822

7,852

428

504

1,438

139

7

5,924

4,682

11,023

150

119

7,362

4,682

11,162

150

126

44,804

34,504

19,014

578

630

24,302

51,746

76,048

1,584

21,898

23,482

99,530

combines with the wealth of the surrounding seas to render the fisheries a very important branch of British and Irish industry, as may be seen from Table I compiled from

the returns for 1913 — ‘the last normal year

before the outbreak of the European War,

which, of course, has seriously interfered with the industry, withdrawing very large numbers

of men from peaceful occupation and exposing

those who continue fishing to risk of capture

or destruction of boat and gear.

Table II — Quantity and Value of

plication of steam power to first and second

class boats; and second, to the introduction of internal combustion engines to fishing craft of all sizes.

In Ireland there were 147 motor fishing

boats owned in 1913, viz., 33 exceeding 25 tons burthen, 46 over 10 and not exceeding 25 tons, 30 over 5 and not exceeding 10 tons, and 38

not exceeding five tons.

The equipment of trawlers with wireless

telegraphy dates from 1912, when a series of

Fish, and Value of Shell Fish Declared as Landed in 1913.

Fish (excluding shellfish) Shellfish Total value cwts. £ £ £

England and Wales . 16,152.000 10,009,000 328,000 10,337,000

Scotland . 7,828,350 3,997.717 72,354 4,070,071

Ireland . 676,392 294,625 63,922 359,547

It may be seen from this table, which does not include salmon fisheries, how greatly the crawling industry preponderates in England and Wales as compared with other parts of the

24,656,742 14,301,442 464,276 14,696,618

experiments were undertaken by Messrs. Hell— yers of Hull and the Marconi Company. They were very successful, and previous to the out¬ break of war a considerable number of vessels

had been fitted with the apparatus. One direct result of the substitution of steam for sailing has been to extend the range of

British fish¬

ing vessels far beyond what was formerly pos¬

sible. The North Sea continues to be a most

productive fishing ground. It was there that

trawling with steam power originated from

British ports, and it was some years before

British fishermen lost their monopoly of that

branch of the industry; but steam trawlers

eventually began to issue from all the conti-

Table IV — Return Showing the Relative

and large quantities of mackerel taken in nets are thrown overboard. Thus in September

1904 one boat landed 60 crans of fine mackerel at Kyle of Lochalsh. (A cran of mackerel con¬

tains an average of 400 fish). Forty crans were sold fresh at eight shillings a cran, and 20

crans were thrown away as there was no

means of curing them.

While the local herring fishery is actively

pursued from almost every creek approached

by the fish, powerful boats from Yarmouth,

Proportion of Sailing, Steam and Motor

Boats.

1893 1913

r- ‘ > - ■ - A. ■ ‘ - -> /*“

First-class boats … .

Second-class boats . .

ENGLAND AND WALES

Sailing

. 3,270

. 4,099

Steam

564

2

Motor

0

0

Sailing

1,280

3,603

Steam

2,183

205

Motor

153

194

1895

1913

All classes .

SCOTLAND

Sailing

. * 12,940

Steam

158

Motor

0

Sailing

6,762

Steam

1,661

nental ports in the North Sea, and now they

come from Spain, Portugal, Iceland, Russia and

Italy. Outside the North Sea, powerful steam

trawlers and liners from the eastern ports of

England and Scotland carry on operations in

far distant waters off Iceland and the Faroe,

off the coast of Portugal and Morocco, etc., and earn handsome profits both in the home market

and in foreign ports. The fish so caught and

landed abroad do not figure in the returns

quoted in Table II. <(For instance, one English trawler fishing off the French coast near Brest, in 70 fathoms, took 300 kits of fish which, in the Lisbon market, some 600 miles distant,

realized £444. On the next day the same vessel commenced fishing off Cape Finisterre, in 120

fathoms, and in four days returned to Lisbon

and sold some 200 kits for £378.))*

Steam power, at first only employed in

trawling vessels is becoming annually more

common in drift net and long line fishing;

motor propulsion, as aforesaid, being steadily

on the increase, not only for small boats, but, on the East Coast, to boats of from 20 to 45

feet keel, intended primarily for line fishing, but also used for herring fishing near the coast.

Drift nets are employed for taking herring,

mackerel and pilchard. The relative value of

these fisheries may be estimated from Table V.

Lowestoft, Grinsby, and 10 other principal

English ports, and from Eyemouth, Leith,

Fraserburgh, Buckie and 14 other Scottish

ports seek the fish irrespectively of distance or locality. East coast fishermen generally are

far more enterprising and industrious than

those on the west coast of Great Britain and

Ireland. The reason for this appears to be

connected with ethnology, men of Anglo-Saxon

and Scandinavian blood taking far more readily

to the sea than those of the Celtic race. A

large proportion of the fish landed on the west coast of Britain and in Irish waters are taken by east coast fishermen ; and in those places on the west coast where the local industry is most active, such as. Stornoway in Lewis, Peel in

the Isle of Man and Morecambe Bay in Lan¬

cashire, there is a strong Scandinavian strain

in the population, derived from the long period when these districts remained under Norse

dominion. The British export trade in fish,

both fresh and cured, is very large, as shown in Table VI.

The European War has completely dislo¬

cated this trade. Germany and Russia had

previously been the chief customers for cured

herrings, taking between them about four-fifths

of the whole export, notwithstanding the Ger¬

man import duty of three shillings a barrel and Table V — Total Quantity and Value of Fish Returned as Landed in Ports of the United Kingdom in the Years 1904 and 1913.

Herring .

Mackerel .

Pilchard .

1904

England

and Wales

cwts.

. . 3,199,303

. 518,569

. 175,552

Scotland

cwts.

5,432, 494

16,495

nil

Ireland

cwts.

286,496

502,501

nil

United

Kingdom

cwts.

8,918,293

1,037, 563

175,552

Total

value

£

1,870,219

417,070

47,450

Herring .

Mackerel .

Pilchard .

1913

cwts.

. 7,313,425

. 345,095

. 51,563

cwts.

4,449,323

74,348

nil

cwts.

420,620

7,211

nil

cwts.

12,183,368

426,654

51,563

£

4,573,295

182,864

21,865

The mackerel fishing on both the east and

west coast of Scotland is capable of indefinite expansion if curing stations were established.

Mackerel are regarded with disfavor in many

parts of Scotland as an article of food; fisher¬

men dislike them because they believe, not with¬

out reason, that they drive away the herring,

♦Board of Agriculture and Fisheries, 1904, p. 22.

the Russian of 13 shillings a barrel. The

United States takes the larger part of pickeled mackerel from the Irish fisheries, and pilchards find their principal market in Italy.

It is not a little remarkable that, notwith¬

standing the large exports of fish from the

United Kingdom, there are also very large im¬

ports, to the value in 1913 of £5,030,499, whereof £3,312,958 was for fish, including shellfish and GREAT BRITAIN — BRITISH FISHERIES (30)

turtles, imported from foreign countries, and

£1,717,541 for imports from British possessions

overseas. The value of canned salmon im¬

ported from the United States was £698,018,

an-d from Canada £900,068.

Considerable friction has arisen in the past

between trawlers and line-fishers, owing to the destruction of lines laid upon ground whereon

trawlers work. Parliament considered it un¬

desirable that the more ancient industry of line¬

fishing, often pursued by men of humble means, should be sacrificed to the interest of persons of capital, residing, it might be, far from the fishing grounds. It was also deemed expedient

to protect young and undersized fish from de¬

struction by trawls. Statutory powers accord¬

ingly have been conferred upon the fishery

boards of the three kingdoms to schedule cer¬

tain areas, specially suitable for spawning

ground, within which trawling is prohibited.

But whereas certain of these scheduled areas,

such as the Moray Firth, include water out¬

side the three-mile territorial limit, the juris¬

diction of British courts cannot apply to foreign trawlers working within the prescribed area,

fishing villages on the east coast of Scotland, he observed :

<(Fishing is to be carried out no longer by

more or less independent crews, bound together

by blood relationship or other ties, whose work¬

ing hours were largely regulated by the weather and tides, or their own convenience and neces¬

sities. Yet their whole domestic life was inter¬

woven with the time-honored pursuit. Their

wives and daughters laboriously baited the

hooks and arranged the lines in the baskets for <shooting) ; they gathered the bent grass for

separating the layers of the line, and, with the sons, dug lug-worms or procured the mussels

for bait … Now, active and powerful

vessels, propelled by steam and this more or

less independent of weather, manned by a cap¬

tain responsible to owners or their manager,

a crew bound together only by discipline and

pay, with a fishing apparatus requiring no bait, appeared on the field … Capitalists took

up the question and fitted out powerful ships—

both in England and Scotland, and sent them

into Scottish waters, so that liners met with

most formidable rivals.®*

Table VI — Exports of British Fish in 1913.

Fresh Cured or salted

r r-N

Quantity Value Quantity Value

cwts. £ cwts, £

Herring . ‘… 1.166.598 589,657 8,795,232 5,331,042

Salmon 6,753 63,137 37,101 38,676

Cod ’ ” 41,272 47,227 373 2,023

Mackerel’. . 14,849 16,010 441,983 601,945

Haddock . 47,380 58,598 98,370 79,367

Shellfish .. . 32,177 62,920 33,786 58,368

Other sorts .’ . i . 160,556 378,870 122,341 175,628

Total . 1,469,585 1,216,419 9,529,186 6,287,049

but outside the three-mile limit. Consequently,

fish may be and are taken by foreign trawlers upon ground closed to British trawlers by the

act of their own legislature; the fish so taken may be and, before the war, were landed in

British ports to the intense indignation of the native fisherman. Meanwhile, scientific opinion

is not unanimous upon the question whether

the closure of these areas has any appreciable effect upon the general

stock of fish in the

adjacent seas; but it is undoubtedly favorable

to line fishermen, to whom the prohibition does not apply.

The importance of the fishing industry as a

nursery and reserve of practised seamen can

hardly be overrated in a maritime nation, nor

need it be apprehended that the progressive dis¬

placement of sails and oars by steam and in¬

ternal combustion engines will impair its value in that respect. Any fears that may have been entertained on the subject must have been dis¬

sipated in view of the magnificent service

rendered by thousands of British and Irish

fishermen since the outbreak of the war in

August 1914. Unfortunately, the nature and

extent of that service may never be understood by the general public, nor the^ danger which

these hardy fellows have willingly faced in

exchanging their peaceful industry for the

hazardous duty of mine-sweeping and patrolling

the coast.

Upon the social system of regular fishing

communities the advent of steam and motor

engines has had a considerable effect. So long ago as 1883 Professor

Mackintosh foresaw and

noted the coming change. Writing about the

It should not be understood from this that

the ˆcapitalists® referred to are wealthy lands¬

men speculating in an enterprise wherein they

have, personally no part. It is true that many trawlers and drifters are owned by companies,

but these companies usually consist of men

who have been fishermen, or at least seafaring men, from their boyhood and who have com¬

bined their resources so as to acquire suitable vessels and gear. Immense sums have been

advanced by joint stock banks both to such

companies and to individuals, and the industry

is so profitable that loss on the transaction has very seldom been incurred. If steam has in¬

vaded the province of local fishermen on one

hand, it has brought them advantage on the

other by giving them access to distant markets.

The stern realities of a sea fisherman's life

have imparted gravity to the demeanor of this

class in all parts of the coast. Were it possible to obtain statistics, probably they would prove that the sea-fishers are among the most orderly and law-abiding in the community. The fish¬

wives of Musselburgh and Newhaven have pre¬

served among them what is almost, if not quite, the sole survival of national costume in every¬

day wear. The short, heavy pleated, dark

skirt, the woolen hose and serviceable shoes,

the gaily striped ((bed-gown® or blouse and the coat of thick pilot-cloth, are probably identical in form and material with those worn by the

fish-wˆves who watched Queen Mary landing

at Leith in August 1561. In those days, and

for 300 years later, the fish-wives used to

* • The Resources of the Sea' by Professor Mackintosh (1899).

trudge up daily from the seaports in the Forth to Edinburgh, each with a heavy ˆcreel® of

fish on her back supported by a leathern band across the forehead. They come up by cheap

trains now, but still their picturesque dress and archaic equipment afford a welcome reliet to the uniformity of a modern metropolis and the

by-streets still echo to their hereditary cries of ((Caller Herrin !® ((Caller haddies P <(Caller oo P

(oysters).

Inland Fisheries. — With the exception of

salmon, fresh-water fishes have been turned to

less commercial account in the United Kingdom

than, probably, in any other country of Europe.

As a feed supply they are reckoned of no ac¬

count, save that a considerable revenue, from

£10,000 to £15,000 annually, is derived from the eel fisheries of Ireland.

All fresh water fish except salmon and

trout are classed as <(coarse fish,® and are re¬

garded of no market value ; but in England and Wales an annual close time was provided for

these by the Act of 1878, in the interest solely of anglers, who may be numbered by tens of

thousands in the industrial districts, organized in fishing clubs and taking part in frequent

angling competition.

For salmon there is a statutory annual close

time in all three kingdoms, the minimum dura¬

tion in England and_Wales being 154 days for

nets and 92 days for rods. In Scotland and

Ireland the minimum for nets is 168 days, and in all three kingdoms a weekly close time for nets is fixed, varying from 36 to 48 hours.

There is no weekly close time for rods, except that rodfishing for salmon is illegal in Scot¬

land on Sundays. The annual close time for

trout varies in different districts throughout

the United Kingdom.

In the absence of any statutory obligation

on the owners or lessees of salmon fisheries to render returns of their catches, it is impossible to obtain accurate information as to product

of these fisheries. Through the courtesy of

railway and steamship companies the weight

of salmon carried to market is known approxi¬

mately. Thus taking the average of eight con¬

secutive seasons, it appears that there were

delivered in Billingsgate Market, London, the

number of boxes shown in Table VII, each

box weighing about 100 weight.

Table VII — Average Annual Number of

Boxes of Salmon Delivered in Billingsgate

Market from British and Irish Fisheries

During Eight Years.

English and Welsh . 1,435 boxes

Scottish . 13,117

Irish . 4,262

Total annual average . 18,814 boxes

Facilities of travel in all parts of the United Kingdom have immensely enhanced the value

of angling rights for salmon and trout. The

rents now paid by sportsmen for salmon fishing and, within easy reach of London and other

great cities, for trout-fishing, are such as would have appeared fabulous a couple of generations

ago. Owners of inland and estuarine salmon

fishings have begun to realize that anglers are willing to pay higher rents for their sport than net-fishers can offer for the exercise of their in¬

dustry. The result has been the limitation,

and in many upper waters the abolition, of net-fishing. Nor has this tended to stint the supply of salmon to the market, for the consequence

of admitting more fish to the spawning grounds has been to increase the general stock of

salmon to the advantage of coast and estuarine net fisheries.

Whale Fishing. — There remains to be

noticed an industry of recent introduction into British paters which is classed as a fishery,

although the object of capture is not a fish

Uut a mammal. Previous to the invention by

Captain Svend Foyn in 1865 of 5k bomb-harpoon

to be fired from a small cannon, the mighty

fin-whales — i.e., the blue whale (Baleen optera Sibbaldi) and the rorqual (Balcenoptera niuscu-lus) , both of which abound in the North At¬

lantic, were reckoned too formidable to be

hunted. Now, however, steam whalers armed

with Captain Foyn's guns enable the crews to

attack the most powerful finners and in 1903

fishing stations were established in the Shet¬

land Islands by Norwegian companies. In

1913-14 there were 13 steamers engaged in

the fishing and the total number of whales

taken in the 12 seasons, 1903-14, was 6,272,

the value being estimated at about £627,200.

Two whaling companies have been established

in Ireland, each with two steamers. In 1913

they landed 114 whales, viz., 95 rorqual, 5 blue whales, 13 sperm whales and 1 humpback.

Bibliography. — Aflalo, P. G., (Sea and

Coast Fishing) (1901), dealing with sea-angling

as a sport; Johnstone, James, (British Fisheries, their Administration and Problems) (1905) ;

McIntosh, W. C., F. R. S., (The Resources of

the Sea) (1899) ; (Annual Reports* of the

Board of Agriculture and Fisheries (England),

of the Fishery Board of Scotland and of the

Department of Agriculture and Technical In¬

struction for Ireland; International Fisheries

Exhibition (1884), with much detailed descrip¬

tion of the various modes of fishing and fishing gear; <Report) of the Royal Commission on

Trawling (1878).

Herbert Maxwell, F.R.S., LL.D., D.C.L.,

Lord Lieutenant of Wigtownshire.

31. THE MINING INDUSTRY. When it

is considered that mining enterprise in' Great

Britain and Ireland accounts, at the present

time, for the employment of no less than

1,236,210 persons directly engaged in the produc¬

tion of 354,890,867 tons of minerals estimated

to be worth, at the mines and quarries from

which they are drawn, the sum of £160,112,607, the vastness of the industry, and its effect on the economic life of the country will perhaps

be more fully realized than by the recital of detailed descriptions of

the various branches

of mining. Indeed it may be said that the

wealth of Britain is mainly due to the unique position, mineralogically, that it occupies rela¬

tively to other nations; for no country contains, proportionately to its area, so great or so varied a store of mineral wealth.

Mines in the United Kingdom are usually

treated as coming within one of two categories, viz.,1 metalliferous mines, and2 those which

1 These figures are derived from the ‘ Mines and Quarries Statistics,’ published annually in four parts by the Home Office as a Blue Book, comprising District Statistics, Part I; Labor. Part II: Output, Part III; Colonial and Foreign Statistics, Part IV. The figures are, except where otherwise 276

are governed by the Coal Mines Act, the latter comprising chiefly coal and stratified iron¬

stone mines, and being by far the most exten¬

sive and important section, though a develop¬

ment of later growth, having expanded through

seven centuries to what, as judged by some, is believed to be the zenith of their development.

Of the metalliferous de¬

posits* 2 3 mined in the United Kingdom, the most important are, and have always been, the ores of tin, copper, lead and iron. Native silver has never been worked, and it is doubtful whether it occurs in Britain or Ireland, although Strabo writing about 19 a.d. mentions silver as well as gold as being among its products,4 5 Tacitus also makes reference to it indirectly.6 Gold is very sparsely dis¬ seminated, occurring in min¬ eral veins, found chiefly in Merionethshire6 (North Wales), Lanarkshire (Lead— hills, Scotland) and Corn¬ wall ; and in some alluvial deposits in Sutherlandshire (Scotland) and Wicklow (Ireland).

Probably the earliest min¬ ing on commercial lines in Britain was that of tin. The ˆcassiterides,® 7 whence the Phoenicians obtained their British tin, were, in all prob¬ ability, what are now known as Scilly, the Channel Islands, and, more particularly, Corn¬ wall. The industry is and always has been restricted to Cornwall and, to a very small extent, to the contiguous part of Devon, and as early as 60 b.c. we find Diodorus Sicu¬ lus describing the tin trade of these parts. In the early years of ‘the 19th century (1817) Cornwall was the chief source of production of the world’s supply of tin, now it stands fifth on the list of tin producing countries, contributing only 4.25 per

cent of the total production.

What has been written

of tin is also largely true of copper.

Carew8 said, writing about 1600, that he

oould not find that it was being profitably

worked in the west of England, yet nearly

two centuries later, the production" (dur¬

ing the dicennial period 1766-75) was abnor¬

mally large, and as late as 1888 we find no less FIG. 1 — SHOWING THE FLUCTUATIONS IN THE PRICES OF COPPER, LEAD, TIN AND ZINC IN THE LONDON MARKET FOR EACH YEAR SINCE

1873. (The thick lines show the highest prices and the thin lines the average prices.)

stated, those for the year 1913 — the year before the war.

The figures if taken during war years would not constitute reliable comparisons…

2 Final 4 Report ' of the Royal Commission on Coal Supplies. This commission was appointed in 1903 and published its final report in 1905. .

3 The limited extent of metal mining (exclusive of iron ore) is evidenced by the fact that only 26,406 persons were employed during the year 1913 in producing metaliform minerals other than iron and

minerals commonly designated as “ non-metallic ” such as barytes, gypsum, limestone, oil shale, rocksalt, sandstone, slate, *etc.*

* Book IV, Cap. 279. Clearly some process of extraction of silver from rich silver-lead ore (galena) must have been in vogue.

5 In the life of his father-in-law — ‘ Vita Agricolae.’

Agricola in an oration to his soldiers before the battle, near the Grampians (84 a.d.) exclaims: “ Fert Britannia aurum •i argentum el alia metalla, prelum victoria.” t « ‘ The Occurrence of Gold in Great Britain and Ireland, by J. Malcolm Maclaren, B.Sc., F.G.S., in the * Transactions ‘

of the Institution of Mining Engineers, Vol. xxv, pp. 435—508.

Hence, “ cassiterite,” or oxide of tin, the commonest ore of that metal.

7 4 Tin Deposits of the World,’ by Sydney Fawns, F.G.S.

For a clear statement of the present position of Cornish tin mining, the articles which appeared in the Engineering Sup¬

plement of the ‘ Times ’ (Sept. 27, Oct. 18, 1905) should be consulted. Tin mining, in the strict sense of the term, Prob¬

ably dates from the 11th century, before that time the whole of the tin being derived from “ Stream Works.’ In 1884 the British output of tin ore amounted to 15,117 tons of tin ore (black tin), worth about £40 a ton; the product has year by year decreased, until during 1913 the output was only 8,355

tons, worth about £115 a ton. The price of metallic tin was in 1912, £212,11.0, a ton, the highest recorded price ot English block tin. The average price during 1913 was * Carew, Richard, of Antoine, Survey of Cornwall. .

• William Pryce in his 4 Mineralogia Cornnbiensis gives the output as 264,273 tons of copper ore during this period, averaging in price £6,14.6 per ton.

an authority than the late Mr. D. C. Davies 1#

stating that for their size the British Islands constitute the greatest copper producing country of the world, but the production has greatly

dwindled since the time he wrote. Cornwall

and Anglesea are the chief copper bearing dis¬

tricts in the kingdom, and very remarkable

profits have, in times past, been derived from some of the mines.11

The production of lead far exceeds that of

tin and copper,11 and as in the case of tin and copper, signs of a revival are not wanting, still, it is very doubtful whether this branch of min¬

ing in the United Kingdom will in the near

future attain to a similar state of prosperity as that experienced . about the year 1877. Lead

mining in these islands is of considerable an¬

tiquity; we know that lead ore was mined in

Shropshire in the days of the Emperor Hadrian

from the fact that “pigs® of lead were some

years ago discovered in the refuse heaps of the Roman Gravel Mine in that county, one of

which is preserved in the Geological Museum

in Jermyn street. It may be mentioned of this district that, though possibly the smallest

mineralized area in Europe, it was believed by so great an authority as the late Sir Roderick Murchison13 to be probably unequaled for its

size, in point of wealth in lead ore.

In Shropshire, North Wales, Cornwall, Isle

of Man, and the Pennine Chain are situate the chief lead mining areas of the kingdom. Lead

mining in general had not of late years — until the last year or two — been

very profitably conducted in

the United Kingdom. Though

far from being exhausted, ex¬

cept in few instances, the min¬

eral veins are not of such a

character as to allow of their

being as cheaply exploited as

the richer deposits of Spain,

Australia and some other ex¬

tensive lead-producing coun¬

tries. As these more bounti¬ ful districts become ex¬ hausted, one is justified in as¬ suming that British lead min¬ ing will be more extensively developed.

Fig. 1 shows diagrammati— cally the fluctuations in the prices of copper, lead and zinc in the London market for each year since 1873 to 1913 inclu¬ sive.

The iron ore deposits of Great Britain14 are of two kinds, viz., stratified iron cure — the mines of which come under the control of the Coal Mines Regulation Act — and the “mass® and “veined® deposits of haematite which come within the jurisdiction of the Metalliferous Mines

Act. Cumberland and North

Lancashire which yield an out¬

put of nearly one and a half

million tons, are the source

of the famous red haematite

which chiefly occurs in the form of huge

irregular masses in the carboniferous lime¬

stone and is the richest iron ore of the country, yielding on the average over 50 per cent of

metal. Working one of these masses is prob¬

ably the most extensive iron mine in the world — Hodbarrow mine.18 The other principal iron

producing districts are Cleveland (N. York¬

shire), which accounts for nearly six million

tons annually; Lincolnshire, Northamptonshire

and Leicestershire together supplying nearly six FIG. 2 — SHOWING THE FLUCTUATIONS IN THE PRICES OF COAL AND

ironfor each year since 1873. (The thick lines show the high¬

est prices and the thin lines the average prices.) 10 * A Treatise on Metalliferous Mines and Mining,' p. 125.

Davies instances the fact, drawing his information from Hunt's ' Mineral Statistics of Great Britain and Ireland,' that in the year 1877 there were 101 copper mines at work in the kingdom, producing an aggregate of 79,252 tons of ore, valued at £317,186 7.7; of these mines 65 were in Cornwall. In 1863 the production of copper ore and copper precipitate amounted to upwards of 2 10,000 tons, valued at over a million pounds sterling. The output of copper ore (and copper precipitate) during the year 1913 was only 2,732 tons, valued at the mines at £27,029.

11 Pennant's *Tour in North Wales.* The Parys Mine, in the northern corner of Anglesea, worked for a long time and in a century and a quarter returned profits estimated at over £7,000,000. The copper at present derived from the mines in this district is obtained by precipitation of the cop¬

per in the waters pumped from the mines.

11 The output of lead ore for 1877 was 80,850 tons, valued at £1,123,952, whereas during 1913 it amounted to but 24,282 tons, valued at £293,525. Vide * Mines and Quarries Statistics.'

11 Sir Roderick Murchison, P.R.S., director of the Geologi¬

cal Survey of Great Britain, ' The Silurian System ' (1839, p. 282). He says, " we shall find there are few tracts of given extent in any part of the world which are veined to a greater extent."

14 ' The Iron Ores of Great Britain and Ireland,' by J. D.

Kendall, P.G.S., affords much reliable and valuable informa¬

tion on this subject.

"The output of ore from this mine during 1913 was 396,657 tons.

and a half million tons, the total production be¬

ing nearly 16 million tons annually, valued

at over four and a half millions sterling.18 The Cleveland clay ironstone (carbonate of iron)

is chiefly worked from a bed about 10 feet

thick, in the Middle Lias, containing on the

average about 30 per cent of iron. The ore

from Lincolnshire, Northamptonshire and Lei¬

cestershire is derived from open workings in a bed of brown iron ore in the

Inferior Oolite, and averages

about 33 per cent of metal.

The Scottish ore and that

from North Staffordshire is

largely worked from the

Black Band ironstones (car¬

bonate of iron) in conjunc¬

tion with the coal in the col¬

lieries of those districts and

varies considerably in rich¬

ness of metal.17 Fig. 2 is a

graphic, representation of the

fluctuations in the price of

coal and iron (London mar¬

ket) for each year since 1873

up to and including 1913.

A description of British mining would be incomplete without some reference to the production of slates,18 as in no country are there yielded slates of a quality equal to those of North Wales. The mines proper are mostly in Merionethshire, whereas the quarries are worked in Carnarvonshire, the Penryhn quarry, near Bangor, being the largest open working in the world, the underground workings of the Oakley Slate Quarry Company, Ltd., at Festiniog,

Merionethshire, being the most extensive ‘slate mine.

The output of finished prod¬

ucts from the individual

mines and quarries consti¬

tutes only a part of what is

drawn from the workings, it

being calculated that there is

a loss of about two-thirds in

the ˆdressing** (cutting and

shaping) of the slates..

No description is given, in

this review of the production

of building and other stones,

derived chiefly from quarries, as space does

not permit of allusion to other than the more purely mining part of / the subject.

The chief sources of the mineral wealth of

the United Kingdom are the coal and iron de¬

posits. Of the latter mention has already been made. The former far outweighs in import¬

ance all other branches of mining classed to¬

gether.

Until the year 1899 the United Kingdom

was the largest producer of coal in the world (see Fig. 3) ; it now stands second, the United States having outstripped it in the race for

supremacy in this respect.

When coal first came to be worked in this

country as a merchantable article, authorities

are not agreed. It may have been worked in a desultory and uncertain fashion in very remote

times, but the first substantial mention of coal mining is that contained in the records of Holy-rood and Newbattle Abbeys,18 in which it is

shown that coal was dug on the south shore

of the Firth of Forth in Scotland about 1200

a.d. ; further, we know that coal was imported into London from Newcastle about 1257 a.d.

Indeed, Novacastrians may justly claim the

banks of the Tyne as the nursery of the coal trade, and to the present day the inhabitants

have more than maintained their heritage of

Pnct per metric ton for the United A ingdom

Production of Coat in mo trie ton 3 - Un/ted A ing dorn .. - Uni fed - States of America — * —.. - German y - —

- » Austria-Hungary - — ”” ~

- ~ *• France + + + + + + + + +

14 The figures of 1913 give a total production from all classes of mines and quarries of 15,997,328 tons, valued at £4,543,358. ‘ Mines and Quarries Statistics.’

17 The output of the various kinds of ore may be roughly proportioned as follows: Clay ironstone, 42 per cent of the output; black band, 9 per cent; haematite (red), 12 per cent; brown ore, 34 per cent.

74 The total production of slates during 1913 was 370,756

tons, valued at £926,739. North Wales furnishes most of the slate, roughly speaking, in the proportion of two-thirds from open workings and one-third from mines.

14 For an exhaustive and admirable history of coal mining in Great Britain, the reader cannot be referred to a more interesting and accurate record than the * Annals of Coal Mining and the Coal Trade ’ (2 vols.) by R. L. Galloway.

skill and foresight, for there is no field in which the mining industry rejoices in better manage¬

ment, both in respect of the mining operations themselves and in the conduct of labor affairs, than the Great Northern coal field. The sys¬

tems of <(joint committees® of representatives

of owners and men, and the respective associa¬

tions of mine owners and of the workmen in

Northumberland and Durham have constituted a

pattern to be studied and an example to be

followed by other mining districts, and have

conduced in an eminent degree, to the equitable conduct of the trade and the harmonious rela¬

tions existing between employers and workmen.

There is, perhaps, no trade, excepting the

iron-making industry, more subject to variations of prosperity and depression than coal mining.

It is often remarked that it is the first to prog¬

nosticate a cycle of general depression and the last to recover therefrom. Be that as it may, the words of the old chronicler20 have a

strangely modern ring about them, when read in the light of recent experience. (<Many thou¬

sands of people,® he remarks, <(are employed in this trade of coales : many live by working of them in the pits : many live by conveying them in wagons and waines to the river Tine : many men are employed in conveying coales in keeles from the stathes aboard the ships; one coal

merchant employeth five hundred or a thousand

in his works of coals : yet for all his labour, care and cost, can scarce live by his trade… .

Nay, many of them hath consumed and spent

great estates and dyed beggars.® The con¬

clusion of the whole matter appeared to him

to be that <(their Collieries is wasted and their monies is consumed; this is the uncertainty of mines — a great charge, the profit uncertain.®

It is not proposed to follow the history of

development of the coal trade in detail. The

rate of this expansion and how it has been

affected by various improvements in mining and

facilities of transport are marked in the accom¬

panying diagram, Fig. 4.21

One of the most remarkable characteristics

of the carbonaceous deposits of this kingdom

other than the number of the separate fields and their extensive area is the great variety in the fuel itself. The coal fields may be divided into groups as follows :22

I. English Coal Fields.

Midland Group. — (1) North Staffordshire;

(2) South Staffordshire; (3) Leicestershire;

(4) Warwickshire.

North Midland Group. — (1) Yorkshire;

(2) Derbyshire and Nottinghamshire.

Great Northern Group. — (1) Durham and

Northumberland; (2) Cumberland.

Northwestern Group. — (1) Lancashire and

East Cheshire; (2) Coalbrookdale (or Shrop¬

shire) ; (3) Forest of Wyre.

Western Group. — (1) Bristol and Somerset¬

shire; (2) Forest of Dean.

II. Welsh Coal Fields.

(1) South Wales; (2) Denbighshire and

Flintshire.

III. Scottish Coal Fields.

(1) The Clyde basin; (2) Midlothian and

Haddingtonshire; (3) Fifeshire; (4) Ayrshire;

(5) Lesmahagow; (6) Canonbie.

IV. The Kent Coal Fields.

The development of which has only very

recently been commenced.

V. Irish Coal Fields.

0) Northern Group; (2) Southern Group.

These are of small importance and little

worked.

_ 20 Grey, * Chorographia, or a Survey of Newcastle -upon-Tine, published 1649.

21 After J. B. Simpson, M.I.C.E., vide, Address on the ‘Rise and Progress of Coal Mining ’ (1896), the diagram has been further extended and brought up to date thus: Long tons,

, 2,240 lbs.

In the year 1660, it was estimated by the

Royal Commission on coal (reported 1871)

that the output of coal was . 2,148, 000

And that in 1770 it had risen but little,

being but . 2,612,000

Between 1770 and 1750, however, steam

was applied to draining mines, and gun

powder came to be used at underground

operations, so that it was estimated that

by 1750 the output had advanced consider¬

ably, being for that year . 4,773,828

Later steam was applied to hoisting the

coal up the shafts, and between 1760 and

1800 the development of the canal system

took place, which gave a great impetus to the trade. So that for 1800 the output had in¬

creased to . 10 , 080 , 300

In 1803 coal came to be used for the

manufacture of gas, and in 1815 the safety-

lamp was invented, which would further

assist coal mining. Mr. Samuel Salt com¬

puted the output for 1816 to be .

For 1845 Mr. J. R. McCullock puts the output at .

The introduction of steam in navigation and the development of the railway system took place shortly before and about this time.

The (1871) Royal Commission on Coal, sometimes called the Argyll Commission, the Duke of Argyll being its chairman, calculated that in 1855 the output had risen to the considerable figure of .

27,020,115

34,600,000

64,307,000

The first year of which we have official returns is 1860. The following figures show the increase:

1860.

1865.

1870.

1880.

1890.

1900.

1905.

1910.

1913.

84,042,698

98,150,587

112,875,575

146,969,409

181,614,288

227,084,871

236,111,150

264,433,028

287,430,473

GREAT BRITAIN— -THE INDUSTRIAL REVOLUTION (32)

279

The thickness of the seams worked in the

fields varies from 11 or 12 inches to 30 feet, but the latter is restricted to South Stafford¬

shire ; this seam and the thick coal of Warwick¬

shire being quite exceptionable. Cannel coal in Scotland has been worked, in some instances,

when only six inches thick.

The variation in the character and quality

of the coals within the different fields them¬

selves is remarkable ; for instance, first class coking coal is mined near the banks of the

Tyne, yet only a few miles east of Newcastle

the world-famed Wallsend household coal is

produced, and by far the greater part of fhe

Northumbrian output is exported as steam

coal. Again, coke unrivaled in quality, is made from the coal mined in the western and south¬

western part of Durham, whereas good gas

and very superior house coal is raised from the collieries situate in the central and eastern part of the same county.23 The principal steam coal-producing areas, other than Northumberland,

are South Wales (pre-eminently), and parts of

the Scottish fields — notably that of Fifeshire —to some extent Lancashire, North Staffordshire

and Yorkshire; the other fields chiefly supplying manufacturing, iron smelting, gas and coking

coals. Of all the districts, the variation in

character of coal is most marked in the great South Wales field, in the south and southeast

the seams of the lower shale series are bitu¬

minous in the middle and semi-bituminous,

farther toward the northwest they are what is

technically termed <(dry® (i.e., contains very

small percentage of volatile hydrocarbons) or

steam coal, still further in the same direction they are semi-anthracite (i.e., still drier), and to the northwest and west again they are

anthracites. The seams of the Pennant series,

higher up in the coal measures, follow the same rule in transformation, but have a higher scale of bituminosity in comparison with the seams

below them.24

A factor that must largely affect the future

commercial prosperity of the country, indeed,

is vital to it — is the duration of its iron and coal supplies. The stores of iron ore, owing to the nature of the deposits, cannot be estimated with the same degree of accuracy as is possible in the case of coal, but it may be safely

prophesied that their exhaustion will long pre¬

cede that of coal. Working on the figures

arrived at by the late Royal Commission on

Coal Supplies, the time which would be taken

to exhaust the coal fields at the present rate of output may be taken as about 600 years ;24

whether the present rate of output will be long maintained is, however, somewhat doubtful.

For the last 40 years the average increase in the output has been, roughly, 2l/2 per cent per 22 The extent to which the different fields contribute to the total production may be roughly proportioned as follows: Million tons

Scottish coal fields . 42 §

‘ Northumberland, Cumberland and

Durham . 58J

Lancashire and North Wales . 28

English coal (Yorkshire and North Midlands . 73

fields Midland and Southern (Stafford,

Leicester, Warwick, Gloucester,

Somerset and Kent) . 28

South Wales, including Monmouthshire . .57

Ireland . wts

23 Professor Hull's ' Coal Fields of Great Britain ' (sixth edition) should be consulted by the reader interested in further pursuing this subject.

annum, and that of coal exported 10 per cent

per annum, or put in another way the percent¬

age of output shipped abroad from 1878 to 1912

inclusive has increased from 16.1 to 32.4 and in 1913 it reached the record figure of 34.2, but it is highly improbable, owing to physical reasons, that these rates of increase will be long con¬

tinued. Some districts, indeed, have already

attained their maximum, and decadence has set

in, as for instance in the <(exposed® part of the South Stafford coal field. The developments in

the new coal fields will possibly increase the total output for some years, but the Royal Com¬

mission, just alluded to, <(look forward to a

time, not far distant, when the rate of increase of output will be slower, to be followed by a period of stationary output, and then a gradual decline.® Nor do they hold out any hope that

the resources may be husbanded by the utiliza¬

tion of any other source of power; they are

convinced (<that coal is the only reliable source of power and that there is no real substitute, though there are some sources which may

slightly relieve the demand for coal.®25

Sir R. A. S. Redmayne, K.C.B., M.Sc.

H. M. Chief Inspector of Mines , Late Professor of Mines in the University of Birmingham,

Past President Institution of Mining and

Metallurgy, Member Institute of Civil Engi¬

neers, Fellozv of the Geological Society, etc., *etc.*

32. THE INDUSTRIAL REVOLUTION.

Between the years 1770 and 1840 England be¬

came the workshop of the world. She changed

radically in character; from an agricultural

nation she became primarily a manufacturing one. < She became dependent for her raw materials on foreign nations and on markets abroad for the sale of her goods. Her interna¬ tional position, therefore, was vastly affected and her prosperity became dependent on the state of trade. No less remarkable was the change in the relations of persons. A new middle class of manufacturers arose and the moneyed interest permanently overtopped the landed interest in social importance. Alongside of the employing class grew up the class of factory hands, and the business relations of the two classes had to be settled afresh and not without considerable friction. The industrial revolution involved, therefore, industrial recon¬ struction with all the disintegration and suffer¬ ing that drastic reconstruction always causes.

Not more striking than the alteration in the character of English industry and in English social relations was the remarkable shifting which took place of centres of importance, for suddenly the North sprang into prominence and the South correspondingly declined. In this

24 The annual output of anthracite is nearly 3,000,000

tons, practically derived entirely from this region.

25 ‘ Reports ’ of Royal Commission on Coal Supplies.

Final Report, 1905. The Commissioners computed that there were yet remaining to be worked in the “ proved coal fields, adopting 4,000 feet as the limit of practical depth in working and one foot as the minimum workable thickness, an available quantity of coal equal to 100,914,-

668,167 tons, and that the quantity supposed to exist out¬

side the “ proved ” areas, i.e., in the “ concealed ” fields, would amount to 39,483,000,000 tons. In calculating the period of duration there has not been taken into considera¬

tion the coal existent at a depth below the 4,000 feet limit, which in the “ proved ” coal fields alone is placed at 5,239,-

433,980 tons.

new industrial region huge masses of people

were congregated on certain spots, and the

problem of the large towns arose, with all the sanitary housing and other questions connected

therewith.

Then came the problem of feeding these

agglomerations of people and of getting rid of the goods they made, which questions were

answered by the great revolution in the means

of transport and the changes in the English

fiscal system.

The industrial revolution is generally dated

from the coming of machinery and is usually

connected with the invention by Arkwright of a cotton-spinning machine in 1775 which was

worked by water. It was the applicatmn of

mechanical power to industry that constituted

the novelty, for it was the invention of a sub¬

stitute for man himself.

But events had been preparing for more

than half a century for the introduction of

manufacturing on a large scale in England. In¬

ventors had always been numerous, but the con¬

ditions were present about 1770 which enabled

an inventor to bring his ideas to a successful issue. In the first place there was in the

England of that time an abundance of capital,

owing to the development of the banking sys¬

tem, so that an enterprising man could get

money to try experiments. Arkwright's ma¬

chine is said to have cost $60,000 before it was perfected. Then, too, there was every prospect

of large sales, without which machine production would have been unnecessary. England's mar¬

kets were developing steadily in the 18th cen¬

tury, both at home and abroad. At home the

revolution caused by smelting iron with coal

had given rise to canals to transport the fuel and the result was a general quickening of in¬

tercommunications. New centres rose up and

a greater demand for goods was created. The

export of English goods was steadily rising in value and there was every chance of increasing the sales if goods were cheaper. Moreover in

the 18th century the capitalist employer had

become prominent. There was, therefore, a

class of men trained to production on a large scale. The old mercantile companies with their

rules as to limited sales had lost their power to dictate as to quantities and prices and there was no hindrance on that side to the enterprising

man.

Yet although these forces were all making

for a great change in the methods of industry the England of 1760 was an agricultural coun¬

try. The leading branch of trade was cloth ;

cotton goods and muslins were imported from

India and re-exported; fine cotton goods could

not be made in England as the warp was too

weak and linen had to be used. The iron trade had been threatened with extinction owing to

the lack of timber and was only just beginning to revive when coal could be utilized for smelt¬

ing owing to the invention of the Darbys about 1740; but much remained to be done, and it

was not until Cort's invention of a means of

puddling iron in 1784 that the iron trade made great advances.

In 1760 the Duke of Bridgwater was cutting

the first canal and the turnpike roads were

beginning to facilitate internal travel.

The majority of the workpeople were either

small manufacturers who bought the wool, wove

it, and disposed of the cloth themselves, or

worked on commission for some big-dealer.

Nearly all of them had a by-employment in the shape of a small farm, while the women and

children practically all over England were em¬

ployed in spinning or carding. The incomes of

the day were family earnings. As English cloth had almost a monopoly value the demand was

steady; England grew the bulk of her own wool and was not mainly

dependent on importation

from abroad. The characteristic of the whole

period was stability. If the orders for cloth fell off then the man had his bit of farm to fall back on — ‘the one helped the other. Agriculture was not divorced from industry nor the work¬

man from country employment, nor was there

any marked distinction between town and

country. It is probable that according to our

notions the life was sordid and the standard of comfort low, and there is no reason to think

that the parents were the easiest of taskmasters for the children. But the problem of the un¬

employed was absent, and the domestic work¬

men at all events decidedly preferred the life to that of the factory.

When machinery came it was curiously

enough first of all applied to the languishing trade of cotton. The reason seems to have been that the supply of raw cotten was unlimited,

while England was already on the verge of a

wool famine. Sheep growing had not been

started in Australia and there was no reason

to anticipate that even if machinery came in the output would be largely increased. Moreover

wool being more brittle than cotton it was found at first very difficult to adjust it to the strain of the machine without constant breakages.

Hence wool is affected by machinery much later than cotton. Arkwright, a barber, revolution¬

ized the cotton trade by his water frame, pat¬

ented in 1775, which spun a yarn firm enough

for the warp. Crompton followed this up by

inventing the. mule in 1775 which created the

muslin trade; and Cartwright, a clergyman,

brought out the power loom for weaving which

was first used in 1801. Power spinning in the •woolen trade did not become general till the

first decade of the 19th century.

The effect of the cotton machines was to

create a new trade. The great manufacturing

centres had hitherto been Norwich and Devizes,

but the new machinery needed water power, and

hence the trade settled in the North in country districts where water was available. The first

machines were small and simple; were made of

wood and necessitated a good deal of bending

over by grown-up persons. They could easily

be worked by children, but such labor

was difficult to obtain in the country in large quantities, hence the massing of pauper children in these factories. There seem to have been

grave abuses in the system and a new era was inaugurated by the Health and Morals of Ap¬

prentices Act of 1802 which limited the work¬

ing hours of apprentices to 12 per day.

The problem, however, was altered when

steam came in owing to Watt's invention. It was only substituted gradually for water power,

coming in more and more after 1815 and be¬

coming the prevalent type altogether in 1840.

The important thing now was no longer water

but coal, and to get coal the factories had to settle in the great centres where coal could

easily _ be. brought by canal, as the cost of dragging it over country roads was prohibitive

for cheap production. Hence we get a second

great migration of industry to the towns near

the coal fields. Here child labor was readily

available, and a new Act had to be passed in 1819 to meet the case of children who were not apprentices. As steam became more regularly

applied the machinery got more complicated

and less suitable for children of tender years, and there was a tendency to discontinue them

in certain branches. They were still retained

in the old water mills and the Factory Acts

were never really effective till the invention of the government factory

inspector in 1833.

There were practically no people dispossessed

by machinery in the cotton trade ; instead there were increasing opportunities of employment,

but other trades suffered. The demand for both light woolen and linen goods fell off as cotton was substituted. Still the weavers prospered.

They continued to work up the yarn in their

own homes, and it was not until the dislocation of trade brought about by the Napoleonic wars

that they fell upon evil days. Gradually ma¬

chinery was applied to weaving, and the race

of hand-loom weavers died out amid great

privations.

It was when machinery was applied to wool,

that the real social upheaval came. It destroved the by-employment of spinning throughout

the whole of the country districts, and an elabo¬

rate system of relief from the rates had to be devised to assist people over the crisis. This pauperized the whole of the south of England

and degraded the agricultural laborers as a

class.

The radical change in English life came

that the real social upheaval came. It destroyed the old stability. A man had to follow his

work to the towns and lost his little farm. Even when the factories were situated in the country he had to work regularly and could not take

time off to attend to the garden as he could when working for himself. The regularity of

the life, the tyranny of the factory bell, and the loss of independence were the things of which

the worker most complained. The early fac¬

tories, situated as they were in the country dis¬

tricts, laid the workmen, open to an appalling system of payment in kind called <(truck,® an evil only gradually remedied by a series of

Acts of Parliament beginning in 1831, and ex¬

tended in 1887 and 1896 to all manual workers except domestic servants.

But more important than his dependence on

his treatment by the master was the dependence of the workman on the state of trade. The

sufferings during the Industrial Revolution in

England were especially violent owing to the

Continental System of Napoleon which shut out

English goods from Europe except by smuggling

between 1806-1812, and which was followed by

the rupture with the United States, which cut

off another very important market. After the

peace of 1815 the utter exhaustion of the conti¬

nent made Europe a bad customer, and England,

equipped as she now was for production in bulk, suffered accordingly.

The coming of machinery

would have been a difficult time for any coun¬

try, but the troubles were enormously aggra¬

vated owing to the fluctuations of trade and the depression after the war. English exports de¬

creased in value between 1815 and 182a, and

only began to recover about 1835, and to make a rapid advance in 1840. Nevertheless the in¬

crease in trade when compared with that of

1750 was enormous.

The exports in 1750 were valued at

£12,699,081; in 1880 they were £34,381,617; in

1840, £116,479,678. The imports in 1750 were

£7,772,039; in 1800, £28,257,781 ; in 1840, £67,-

432,964.

The growth in the import of raw cotton is

very striking. In 1751, 2,976,610 pounds were

imported; in 1815, 99,306,343; in 1830, 259,-

856,000. .

The import of wool could not expand till

the Australian wool became available. In 1800

the number of pounds imported was 8,609,000;

in 1840, 49,436,000; in 1857, 127,390,000.

Then the English fiscal system had to be

overhauled to get in cheap raw material, and

the agitation of the manufacturers was success¬

ful in bringing about the free trade era.

During the 19th century the English Parlia¬

ment was mainly occupied in readjusting the

relations of employers and employed, in facili¬

tating the growth of a manufacturing state,

and in abandoning the system which was made

for an agricultural state; while no attempt has been made to preserve any balance between agri¬

culture and industry.

The result of the industrial revolution in

England was, to use the words of an 18th

century writer, “to remove multitudes of people from our natural and fixed basis, land, to the artificial and fluctuating basis, trade.® See also Industrial Revolution.

Bibliography. — Baines, E., ‘History of the

Cotton Manufactures in Great Britain* (1836) ;

Bischoff, J., ‘A Comprehensive History of the

Woolen and Worsted Manufactures* (1842) ;

Cunningham, Dr. Wm., (The Growth of Eng¬

lish Industry and Commerce — Modern Times, *

Part II, Laissez Faire (1903) ; Gaskell, P., ‘The Manufacturing Population of England, Its

Moral, Social and Physical Conditions and the

Changes Which Have Arisen from the Use of

Steam Machinery* (1833), and (Artisans and

Machinery) (1836); Hutchins, B. L.,. and Har¬

rison, A., ‘History of Factory Legislation

(1903); ‘Report on the State of the Woollen

Manufacture of England* (1806) ; ‘Report on

the Employment of Children in Factories)

(1833); ‘Reports from Hand Loom Weavers’

Commissioners) (1839-40) ; Toynbee, A., ‘Lec¬

tures on the Industrial Revolution in England)

(1887) ; Webb, S. and B., ‘The History of

Trade Unionism * (1902).

Lilian Knowles,

Lecturer in Modern Economic History, Univer¬

sity of London.

33. BRITISH TRADE UNIONISM.

English Trade Unionism is an indigenous prod¬

uct, which has remained singularly uninfluenced

by any foreign movements or ideas. Disregard¬

ing the analogous combinations among jour¬

neymen during the Middle Ages, which in Eng¬

land seem to have been usually intermittent

and temporary, and also the mediaeval guilds

of master-craftsmen and merchants — between

which and modern Trade Unionism no actual

affiliation or connection has yet been traced —we may say that Trade Unionism, in the sense

of durable combinations of wage-earners for

the purpose of maintaining or improving, the

conditions of their employment, have existed

continuously from the latter part of the 17th

century. The earliest actual records known to

us of such a combination is that of the woolen workers of the southwest of England, which

is mentioned as existing in 1700, and frequently referred to in Devonshire, Somerset, Wiltshire,

and Gloucestershire throughout the 18th cen¬

tury. The London tailors, too, can be shown

to have been in continuous combination from at least 1720, when an Act of Parliament was

passed to restrain them. Other Trade Unions

known to have existed in the first half of the 18th century were those of the woolcombers,

woolstaplers, and silkweavers. It was, how¬

ever, apparently during the last quarter of the 18th century, when industrial conditions were

being revolutionized in so many trades by the

introduction of machinery, the factory system,

production for export and the use of water or steam power, that Trade Unionism first became

widely prevalent. Since that date, it is notable that the aggregate membership of Trade Unions *

in the United Kingdom has, with a number of

temporary suspensions, persistently increased,

until it now (1917) exceeds 4,000,000; organ¬

ized in 1,100 different societies, possessing funds exceeding £6,000,000. As an institution Trade

Unionism has, during the whole two centuries,

and especially since 1824, when the first legalizing statute was passed, steadily increased in solidity, and continuously improved in its temper toward

society and in the economic character of the

methods employed to gain its end. In all

these respects the improvement during the last

40 years has been most marked. Whatever

may be the casual connection, if any, the his¬

torian cannot but record the fact that the char¬

acter of English Trade Unionism has varied

from decade to decade in close correspondence

with the variations of the treatment which the community accorded to it. , So rapidly and

certainly has an improvement in English Trade

Unionism followed upon measures of legaliza¬

tion and tolerance that were it not that it would seem to palliate inexcusable outrages of past

times, we should be tempted to the epigram

that each generation of citizens and the em¬

ployers in each trade in each generation have

the Trade Unionism that they deserve!

The form which Trade Unionism takes

among the English wage-earners (and we may

ignore for present purposes the Trade Union¬

ism of other classes, such as lawyers, doctors, architects, accountants, surveyors, actuaries,

teachers, etc.), is that of a voluntary associa¬

tion among the persons engaged in a particu¬

lar trade, based upon the payment of weekly

contributions — varying from two pence to two

shillings — to a common fund which is admin¬

istered by an elected executive, bound by an

elaborate code of rules, and controlled by refer¬

endum votes of the entire membership, in such

ways as are believed to promote the objects of the members. These objects are, first and fore¬

most, the maintenance and progressive improve¬

ment of the conditions of employment of the

wage-earners in the trade concerned, including

not only the amount of wages, but also the

method of remuneration, the form of the agree¬

ment, the hours of labor, the sanitation, safety and comfort of the operatives, and all the other conditions, explicit or implicit, of the wage-contract. Auxiliary to this fundamental object,

and always subordinate to it, are the various

ˆfriendly benefits® afforded to members, which

may include maintenance payments to members

out of work, whether from strikes or lockouts, or merely from slackness of trade; sick pay;

funeral benefit on death of member or member's wife; accident benefit; insurance of tools

against loss by fire or otherwise ; legal assist¬

ance to members in litigation especially as re¬

gards compensation for accidents, and so forth.

It is especially in the durability and financial solidity of the association, the multiplicity and amount of their friendly benefits, and the

magnitude of their accumulated funds, that the

principal English Trade Unions surpass those'

of all other countries. There are great Trade

Unions (such as the Amalgamated Society of

Engineers) which habitually enjoy an annual

income of £4 per member; there are others

(such as the Amalgamated Cotton Spinners)

which possess accumulated funds exceeding

£23 per member; there are others, again (such

as the Boilermakers), which disburse on sick

pay and medical attendance alone, more than

£50,000 a year, including no less than £8,000 as salaries to the doctors in their employment.

Among them all, the Trade Unions expend

more than £400,000 annually in pensions of 5

to 12 shillings a week to their aged members, and nearly £120,000 in payment of their funer¬

als ; while a sum varying according to the state of trade from £400,000 to £1,000,000 is annually paid to members out of work, only from one-sixth to two-fifths of this, according to the state of the labor market, being for anything that

can be. called strikes or industrial disputes.

But this strong financial position and these

substantial friendly benefits are confined to the well-known leading Trade Unions. Out of the

1,100 separate trade unions, there are 24 own¬

ing more than £50,000, which together possess

three-eighths of the aggregate total of mem¬

bers and four-fifths of the accumulated funds

of the whole movement.

The fundamental principle of English trade

unionism is the necessity, in modern industrial and social conditions, for the establishment and enforcement of -a common rule, with regard to

the conditions of employment. Without the

enforcement of such a common rule trade

unionists assert that the operation of competi¬

tion is inevitably to degrade the conditions of employment irrespective of the profitableness

of the industry or the wealth of the country as a whole ; eventually forcing down the remunera¬

tion of the. lowest and weakest wage-earner to the very minimum on which he can manage to

exist from day to day (far below the level for healthy subsistence) ; requiring him to labor for excessive hours, and exposing him to unsani¬

tary, dangerous and brutalizing conditions of

employment. Toward such a morass of <(sweating,® demoralizing to the workers themselves,

and economically as well as socially disastrous to the community as a whole, the unrestricted

competition of the labor market is always

forcing out not only the weaker members, but

also through the competition of these, the entire wage-earning class. In confirmation of this

analysis, the English Trade Unionists point to

the state of millions of workers in every in¬
dustrial country, the United States and Japan
affording quite as striking demonstrations as
England and the continent of Europe. Its
essential accuracy is, indeed, now asserted by
the economists of to-day, and mathematically

demonstrated (consult industrial Democracy >
by S. and B. Webb, 1911) ; and accepted in
such measures of modern statesmanship as the
Trade Boards Act (1907), and the minimum
wage legislation of Australasia and the United
States.

Against this persistent tendency of indus¬
trial competition in the labor market, the mod¬
ern economist or statesman establishes, in the
interest of the community as a whole, the
Common Rule of standard minimum conditions,
designed to prevent the wage-earner being sub¬

jected, even with his own consent, to conditions of employment likely to impair his health, un¬

dermine his strength, or demoralize himself or

his family. This is the philosophy of Factory

Legislation, as yet only imperfectly applied in any country, but advancing in all ; as yet re¬

stricted in the main to women and children,

and to their hours and sanitation, but now in¬

creasingly extending to wages and other condi¬

tions, and to adult men. The maintaining, ex¬

tending and enforcing of Factory Legislation

is one of the principal expedients used by

English Trade Unionists (especially the textile

operatives, the coal miners, the railway workers and the shop assistants) for obtaining the pro¬

tection of the Common Rule. Such legislation

has been carried to its fullest extent at present in New Zealand and Australia. (Consult (State

Experiments in Australia and New Zealand)

by W. P. Reeves).

The second expedient used by English Trade

Unionists is that of Collective Bargaining. In¬

stead of each wage-earner making his own

bargain with the individual employer, the Trade Union aims at making common terms for the

operatives as a whole, with the whole of the

employers. Examples of such Collective Bar¬

gains are the <(Working Rules® which govern

the building trades in nearly every English city; the elaborate hierarchy of agreements of the

iron-shipbuilding trade; or the highly evolved

lists of prices of the cotton industry. This

does not mean (as often ignorantly asserted)

that Trade Unionism implies, or that Trade

Unionists desire, that all workers should be

paid alike. The mere fact that a large major¬

ity of the English Trade Unionists (including

the strongest and ablest of them all) absolutely ‘insist on piecework as the very basis of their Collective Bargains, and would instantly strike

against any attempt to introduce wages by the

hour or by the day, proves that equality of

earnings is not their object. What they do aim at is equality in the rate of pay for a given unit of work; though even here their aim is

only to secure for every worker as a minimum

the standard rate for the work done. No ob¬

jection is made to more than the minimum rate being given, provided that this is not done in such a way as to bring other workers below

the minimum. Collective Bargaining, more or

less universal throughout the trade, is now

the prevalent practice in all the principal manu¬

facturing industries of Great Britain and it is, to the economist, a notable fact that it prevails most universally and is most strictly enforced, just in those industries, such as cotton spinning and shipbuilding, in which British industrial

supremacy is most demonstrable.

The third expedient of English Trade Union¬ ism is Mutual Insurance. By bringing to the support of the individual workman, in any time of economical weakness, the aid of ac¬ cumulated funds, he is enabled to stand out against the terms offered by the employer, and wait until better terms are conceded. It is with this object, and not primarily from any compassionate or humanitarian feeling, that English Trade Unionists have so generally united the well-known ((friendly benefits® with their trade combination. The large accumu¬ lated funds of some of the English Trade Unions, amounting sometimes to £25 per head of membership, afford valuable assistance in their Collective Bargaining for better condi¬ tions, by making possible the final arbitrament of the strike. But they do more than that. In small and closely unit trades, where the oper¬ atives are sufficiently self-restrained and intel¬ ligent, what we have called the strike in detail may be an effective weapon. There may even be no overt Trade Unionism. The employer may refuse to recognize the Union, or the law may make corporate

action dangerous. There

may be no attempt to prevent the employer

filling his vacancies. But if the men in the

trade are strongly combined, the employer may

find that he cannot keep any man more than

a week or two. Each man in succession leaves

in silence before he has well settled down to his work, leaving the employer to find out

for himself in what way the conditions which

he is offering offend against the undivulged

Common Rule. Such a strike in detail is out

of the power of any but a small, skilled,

strongly combined, highly intelligent, and rich

Trade Union having an elaborate Mutual Insur¬

ance. But with such a Union experience shows

it to have often been more efficacious in main¬

taining the Common Rule, than the most tur¬

bulent of mass strikes.

During the 20th century the Trade Union

Movement has more and more consciously

striven to assert the right of the workers col¬

lectively, not merely to maintain and defend

their standard of life, but also to exercise

control of the industry in which they live

(consult (The World of Labour, > by G. D. H.

Cole, and (National Guided edited by J. Orage) ; at any rate in so far as concerns the conditions under which they spend their work¬

ing lives.

The English Trade Unions form, with the

analogous associations into which the em¬

ployers in the principal trades are now brigaded, elaborate organizations — based, in the best

cases, on mutual discussions in joint committees, investigation by neutral accountants and the

joint application of principles by the salaried officers of the employers and of the workmen

respectively — for Collective Bargaining, the

settlement of standard piecework lists, scales

of wages, and other general minima of the

conditions of employment to be observed

throughout the trade; for the application of

these formal agreements to the varying cir¬

cumstances of particular districts, particular

establishments, particular branches of work,

and even particular jobs; and also for the re¬

vision of these general agreements and the

settlement by arbitration of the disputes that

from time to time inevitably arise. Within

each establishment there is often a Workshop

Committee or a number of “shop stewards,®

elected by all the men employed, negotiating

with the management. This elaborate machin-

ery for determining, irrespective of the will

or caprice of individual employers or individual operatives, the minimum conditions on which

the whole trade shall work, is most highly

organized in the cotton spinning and manu¬

facturing, coal mining and shipbuilding indus¬

tries, together with some smaller trades, such

as the brassworkers, lacemakers, and composi¬

tors.

The Trade Unions have, however, further

organizations of their own. The local branches

in each town are united for mutual support in Trade Councils, of which there are now over

330. These organizations are of little financial strength, and chiefly of moral support. More

substantial are the great federations, of which the principal one, the General Federation of

Trade Unions, now includes over 140 Trade Unions with 900,000 members, and large ac¬ cumulated funds. This has for its object the mutual support of its constituent unions in in¬ dustrial disputes. Another federal body, the Federation of Engineering and Shipbuilding Trades with 600,000 members (including most of those in the General Federation), has for its principal object, the prevention and settle¬ ment of the disastrous disputes that occasion¬ ally break out between one set of workmen and another as to the “encroachments® by one trade on another, and the proper “demarcation® of their several pieces of work. A third body, the Miners’ Federation, is composed of prac¬ tically all the coal mining Trade Unions, and has, beyond mutual support, principally for its object the obtaining of additional Mines Regu¬ lation Acts, especially the maintenance of the eight-hour law (secured in 1908) and the en¬ forcement of the Coal Mines (minimum wage) Act (secured in 1912). But the Miners’ Feder¬ ation (like some other socalled federations) is more and more becoming a strongly central¬ ized Trade Union, so far as policy and political action is concerned, the federal form being re¬

tained chiefly as a means of securing efficient local organization.

The relative proportion which Trade Unionship members in the United Kingdom bears to

the wage-earners as a whole, is often much mis¬

understood. The four millions of Trade Union¬

ists amount to only one in four of the whole.

What is, however, obscured by the statement is that the vast mass ot the wage-earners belong

to occupations in which Trade Unionism does

not exist, or exists only in rudimentary form

— such, for instance, as the agricultural la¬

borers, the unskilled laborers in urban dis¬

tricts and the domestic servants, or the large numbers who work in one or other form as

independent producers, such as the jobbing

craftsmen, the tin and copper mines, the home¬

working seamstresses, *etc.* Women workers,

generally, including all the factory population, count only 400,000 Trade Unionists out of some six millions of women industrially employed.

A more correct way to estimate the strength of Trade Unionism is to take the proportion of

Trade Union membership, to the adult males

employed at wages in particular industries. In

many cases, such as the boilermakers, the cot¬

ton spinners, the lacemakers and the coal

miners, it would be found that over whole dis¬

tricts of England every operative actually em¬

ployed was a Trade Unionist. In such indus¬

tries, indeed, Trade Unionism is as universally compulsory as citizenship, and is enforced by

as little conscious pressure. It is taken for

granted by every workman, as it is by every

employer. The whole industrial organization

is adjusted to it, with the result that it becomes as imperceptible as the weight of the atmos¬

phere. On the other hand, there are great in¬

dustries, such as the building and engineering

trades, in which, while strong Trade Unions

exist, are whole districts in which a majority of the workmen remain outside the unions, not

caring to pay the weekly dues ; and usually in every town some establishments which employ

indifferently both Unionists and non-Unionists.

To the economist it is significant that it is pre¬

cisely in those industries in which Trade Union¬

ism is virtually universal and compulsory —

among them being particularly cotton spinning

and shipbuilding — that both technical proc¬

esses and the use of machinery have been most advanced, and both industrial efficiency and

financial success have been most conspicuous.

In contrast stand the “sweated® industries, low grade in quality in

their nature, and curiously unstable in their position in the world-market.

In these industries neither Trade Unionism nor

effective Factory Legislation exists.

The most marked characteristic of British

Trade Unionism during the decade 1905-15 was

its increasing attention to Parliamentary action, and the creation of an effective Labor Party.

Political action had, for a whole century, been one of the weapons of Trade Unionism, notably

among the cotton operatives and coal miners ;

and Trade Unions have openly spent money

on electioneering, and have maintained their

own members in Parliament since 1874, at any

rate. An “Independent Labor Party® was

formed in 1893; the Trades Union Congress

took action to reform such a party on a broader basis in 1899; but it was not until the Taff Vale case (a legal decision which made Trade

Unions henceforth liable in damages for any

action of their officers, as if they were corporate bodies, although they were not allowed the

privileges of corporate bodies) that the matter was energetically taken up. At the general

election of 1906 no fewer than 50 candidates

were run by the Labor Party, and 29 of them

were successful. Since that date there has

been continuously in the House of Commons a

separately organized party, in 1916 numbering

40 members, representing “The Labor Party,®

which is itself a federation of trade unions,

trades councils, Socialist societies and coopera¬

tive societies, counting altogether over two

million members. The Labor Party in Parlia¬

ment has obtained the enactment of the Trade

Union Acts, 1906 and 1912, which restored the

Trade Union immunity from litigation affecting

their corporate funds and the Trade Union right to subsidize, political action, both of them im¬

paired by judicial decisions (the Taff Vale

Railway and Osborne cases). The influence

of the Parliamentary Labor Party has been seen also in the quickening of radical policy in

social and economic questions, resulting in the provision of old age pensions, meals for ne¬

cessitous children at school, a legal minimum

wage for sweated trades, the eight hours day

and a legal minimum wage for coal miners, a

more effective “fair wages clause® in all govern¬

ment contracts, labor exchanges to diminish un¬

employment, more drastic progressive taxation

of incomes, and the National Insurance Act, cov¬

ering sickness, maternity, accidents, unemploy¬

ment and permanent disability. Soon after the

outbreak of war in August 1914, when the

Liberal and. Conservative parties united to

form, a Coalition Ministry, the Labor Party

was invited to join as a separate entity, and its leader, Mr. Arthur Henderson, became a

member of the cabinet.

Bibliography. — The principal authorities

are the 1 Annual Reports) of the Board of

Trade (Labor Department) on Trade Union

Statistics, Collective Agreements, Rates of

Wages, and on Strikes and Lockouts, together

with the Annual Reports of the Chief Regis¬

trar of Friendly Societies (those relate only to registered Trade Unions). For the history, con¬

sult (The History of Trade Unionism* by S. and B. Webb (1911 edition), and (as to origins)

also (Industrial Organization in the 16th and

17th Centuries,* by George Unwin (1904). For

an elaborate economic analysis of every form

of Trade Union activity, consult (Industrial

Democracy, * by S. and B. Webb (edition of

1911); also (Methods of Industrial Remunera¬

tion, * by D. L. Schloss; Undustrial Peace, *by L. L. F. R. Price; (The Case for the Factory Acts,* edited by Mrs. Sidney Webb, with pref¬

ace by Mrs. Humphrey Ward. The latest

works of importance are (The World of

Labour,* by G. D. H. Cole (1915) ; and (Trade Unionism,* by C. M. Lloyd- (1915) ; consult also the elaborate details in (The Labour Year

Book) (1916). For the case against Trade

Unionism, from the standpoint of the indi¬

vidualist employer, consult (Trade Unions and

Industry, * by E. A. Pratt.

Sidney and Beatrice Webb,

Joint authors of iThe History of Trade Union¬

ism'* ; (Industrial Democracy'* ; (Problems of

Modern Industry .*

34. THE LABOR MOVEMENT IN

POLITICS. The greatest politician of the

last century, W. E. Gladstone, writing in 1892, expressed the opinion that ((The labor question may be said to have come into public view

simultaneously with the repeal of the Combina¬

tion Laws,** — that is about 1825.

Accepting this authority, we may divide the

100 years that have since elapsed into three

periods, dominated not as might be expected by three but by two ideas. From 1825 to about

1850 labor, when it fought at all, fought under its own flag, and disdained alliance with any

other party. From 1850 to 1900, partly owing to the dominating personality of Mr. Gladstone,

political labor for the most part joined hands with Liberalism. In 1900 the banner of inde¬

pendence was raised once more, and has al¬

ready attracted the greater part of the political forces of the proletariat.

The First Period of Revolt. — Up to 1832

the Government of England was an irregular

oligarchy rather than a democracy. The House

of Commons, which then as now exercised su¬

preme control, was elected in a haphazard fash¬

ion. A few members represented large demo¬

cratic constituencies ; many were elected by

some scores or hundreds of voters; many others were practically nominees of individual landowners or of the Crown. Labor scarcely as¬

pired to political rights; all it asked was relief from coercive legislation and excessive taxa¬

tion. The populace, of course, supported the

reformers of 1820-32, and it was fear of revolu¬

tion which forced the House of Lords to con¬

sent to the passage of the Reform Bill.

Nearly the first work of the reformed Par¬

liament of 1832 was the amendment of the

old Poor Law, which had reduced the agri¬

cultural laborers of southern England almost to the condition of serfs, owned not by individuals, but by their parishes. The abolition in 1834

of the system of indiscriminate outrelief was

intensely unpopular, and this, combined with

the memories of the recent reform agitation,

and with the teachings of Robert Owen (q.v.),

who had promulgated many of the doctrines

of modern Socialism, led to the Chartist move¬

ment, the first distinctively working class polit¬

ical agitation in modern England. See

Chartism.

((The People's Charter,** drafted by Francis

Place, the radical tailor, was issued in 1838.

Its six points were universal (i.e., manhood),

suffrage, election by ballot, payment of mem¬

bers, annual parliaments, equal electoral dis¬

tricts and the abolition of property qualification for members. This purely political program

gathered to itself the whole of the working

class discontent which hitherto had taken other forms. In 1839 the north of England was saved from a revolutionary rising by the ability of Sir Charles Napier; and Chartism was crushed by

the imprisonment of its leaders. It survived

till 1848, when the continental revolutions

fanned it again into flame, but it expired after the failure of a monster meeting at Kensing¬

ton, London, which was to inaugurate the

British revolution. Meanwhile the agitation for

the abolition of the Corn Laws, which was suc¬

cessful in 1846, had attracted to the Liberal

party a great measure of labor support, and

with the disappearance of Chartism, the first

period of revolt terminated.

Labor in Alliance with Liberalism. — The

abolition of the Corn Laws was followed by a

series of years of expanding trade and growing wealth ; the narrow Whig oligarchy was grad¬

ually replaced by a broader Liberalism which

conferred the suffrage on the workmen of the

towns in 1867, and on those of the rural dis¬

tricts in 1884. John Bright (q.v.), the tribune of the people, and Joseph Chamberlain (q.v.),

the idol of radical Birmingham, were the real

leaders of the working classes up to 1886, and Gladstone generally held their allegiance from

1868 till his retirement in 1894. The trade

unions had during this period established them¬

selves as national institutions, and the standing Parliamentary committee of their annual con¬

ference was in constant friendly communication

with Sir William Harcourt (q.v.), Sir Henry

James (now Lord James) (q.v.), A. J. Mun—

della and other leading Liberals. George Odger

was one of the first working-class aspirants to Parliament, but he died before the day of vic¬

tory. In 1874, Thomas Burt (q.v.), the North¬

umberland miner, was elected for Morpeth, a

position he retained until 1918, and his remark¬

able career has been honored in his old age by the high dignity of a seat in the Privy Council.

In the same election another Labor candidate,

Alexander Macdonald, was successful. At first

the Liberals opposed these upstarts; but their

claims were soon admitted, while their harmless 286

respectability and valuable special knowledge

were generally acknowledged. Eleven Trade

Unionists were elected in 1885; in 1886, 9; in 1892, 15; in 1895, 12; 3 more were successful at bye-elections between this date and 1900;

there were 52 in 1906, and only 39 in 1916.

Meanwhile Henry Broadhurst, a stone-mason,

was appointed Parliamentary UnderSecretary

of State for Home Affairs in 1886, and Thomas Burt, the miner, was Parliamentary Secretary

to the Board of Trade from 1892 to 1895.

It may be said that almost all these men

were elected as Liberals. The distinction be¬

tween them and the others of their party was

that they had been manual workers, they had

entered Parliament as nominees of their fellow

workmen, and usually their election expenses

were paid and their maintenance was provided

by the funds of their trade unions. But in

fact the classification, though definite, is not determined by any one factor. Working men

were elected during this period in considerable numbers to town councils, school boards,

county councils and other local governing au¬

thorities, and many were appointed justices of

the peace, that is members of the unpaid courts of first instance.

The New Revolt. — The origin of the re¬

vival of independence in politics dates from

1884, when the modern Socialist movement be¬

gan in England. In this year the Social Demo¬

cratic Federation, founded a short time before

by H. M. Hyndman, became distinctively social¬

ist, and the adhesion to its ranks of William Morris (q.v.), the poet and artist, brought.it

into immediate prominence. Several Socialist

candidates were put in the field at the election of 1885, but they all failed to secure more than a few dozen votes, except John Burns, (q.v.),

who polled 598 votes at Nottingham, but, of

course, was defeated.

From this time onwards the Socialist party

made slow but steady progress. The Fabian

Society, founded also in 1884, devoted itself

to adapting the principles of socialism to Eng¬

lish political conditions, and in 1893 the late J. Keir Hardie (q.v.) (Ayrshire Miners), who

had been elected to Parliament for West Ham,

near London, the year before, founded the In¬

dependent Labor Party, a socialist body whose

object was to promulgate a form of socialism

more acceptable to British trade unionists than the doctrinnaire and revolutionary gospel ac¬

cording, to Marx, which, was then expounded by the Social Democrats.

Here we must turn aside to make one point

clear. The Independent Labor Party (com¬

monly called the I. L. P.) is a small, though influential, socialistic body, which has some 60,-

000 members. It must be carefully distin¬

guished from the Labor Party which is before

all things independent, as well as from the

Labor Party in its wider sense. This impor¬

tant distinction is constantly neglected even in the best-informed London press.

During the 15 years prior to 1899 the Social¬

ist societies kept up a constant agitation for the direct and independent representation of

labor in Parliament, with a certain measure of success. John Burns was elected in 1892 for

Battersea as an independent attached to no

party. Keir Hardie, after his election, carried his independence even further, but lost his seat in 1895, and was not reelected till 1900. But

only one member ever got in on a purely Social¬

ist ticket for a few months in 1910 — Victor Grayson. Meanwhile the trade unions had been

gradually permeated with the new spirit, and

in the autumn of 1899 at their Plymouth con¬

ference, a resolution was carried instructing

their executive to call a conference of trade

unions and Socialist societies in order to form a new body for the promotion of labor represen¬

tation. This conference met in London in Feb¬

ruary 1900, and the Labor Representation Com¬

mittee was then founded with a membership (at

the close of the first year) of 376,000, of whom less than 23,000 were Socialists and the rest

trade unionists.

The new body (which in 1906 altered its

name to the Labor Party) consisted of a federtion of trade unions, trades councils (that is the local organization of trade unionists in each town), and the three Socialist societies, of

which, as previously mentioned, the Independent

Labor Party is one. The Social Democrats,

however, withdrew a year or two later. At the general election of 1900, the Labor Representa¬

tion Committee, as it was then called, put 15

candidates into the field, but it was only a few months old; the Conservative Party, asking a

vote of confidence from the country while the

South African War was in progress, won an

overwhelming victory, and the Labor Party was

not ill-pleased to score two wins, Keir Hardie at Merthyr and Richard Bell (a railway man)

at Derby. During the next five years it won

three sensational bye-elections, but Mr. Bell

dropped out, and at the dissolution the new

party numbered four. Mr. Bell's defection was

due to a change in the policy of the body. It was first formed to create a <(group)} ; it was determined that candidates supported by the

Labor Representation Committee might ally

themselves on other questions with the exist¬

ing parties ; that independence should be limited to labor questions alone. Against this policy

a constant internal struggle went on till the

Newcastle conference of February 1903, when

the extremists won an overwhelming victory,

and thenceforward the watchword was complete

independence of all other political parties.

There are two chief reasons for this policy.

One, of course, is distrust of the Liberal Party which is largely middle-class, controlled by

wealth, and in league with a section of the

aristocracy. It is not necessary to discuss how far this distrust is well founded, because it is undeniable that the Liberal Party, as at present constituted, must consider other interests as

well as those of the workers. The other reason is more cogent. If labor makes any political

alliance it must be with the Liberals. Once

indeed the secretary of the cotton-operatives

was a Tory candidate for Oldham, but he lost

the seat for his party, and he is the only excep¬

tion to the otherwise unbroken rule that labor alliance means alliance with Liberalism. But

very many trade unionists, especially in Lan¬

cashire, are Conservative, or at any rate are

strongly anti-Liberal. In fact it was the acces¬

sion of 103,000 textile operatives that at the Newcastle conference turned the scale de¬

cisively for independence. Five years were

spent in active preparation, and the long-expected election of 1906 found the Labor Party ready for the fight.

Political Labor in 1916.— • Having traced

the history of the participation of Labor in poli¬

tics, we shall conclude with a survey of its

present position, which will reveal an extraor¬

dinary complexity of organization, and a con¬

siderable diversity of ideas.

The most dramatic result of the Liberal

victory in 1906 was the appointment of John

Burns, engineer, socialist, and trade unionist, to a seat in the Cabinet as president of the Local Government Board, which carries with it mem¬

bership of the Privy Council.

The representatives of labor in that Parlia¬

ment belonged to three distinct groups: (1)

The Labor Party proper, the group of 30 men

who sat in opposition to the government, and in complete isolation ; (2) the Miners, of whom

there were 13 (besides one or two in the Labor Party), some of whom were elected as Liberals, some as miners simply, who in a few cases

fought and beat the official Liberal; (3) the

Liberal-Labor men who numbered 11 at the

election, but who had since been reduced to 10

by the retirement of Mr. Broadhurst. The

Miners and the Liberal-Labor men formed a

group within the Liberal Party, and a number

of advanced radicals usually cooperated with

them. Between 1908 and 1910 they all united

with the Labor Party. See Political Parties.

The body holds an annual conference which

has exclusive power to alter rules and deter¬

mine policy. This conference elects the execu¬

tive committee. Since 1914 the Labor Party

has been politically the central Socialist body for Great Britain. Its strength is about 1,500,-

000. The official organ of the party, The Daily Citizen, died of lack of support in 1915.

The political aims of labor &re very in¬

definite. The party itself includes men of di¬

vergent opinions, though to a less extent than the others. About three-quarters of its mem¬

bers are Socialists. The remaining quarter de¬

clines so to label itself, but it has no definite creed, and constant association with men of

strong opinions, who as a rule have studied

political and social problems, makes it to say the least, extremely tolerant of Socialism.

The party was long in favor of Old Age

Pensions, and of the nationalization of railways and of land. It has advocated state provision

of work for the unemployed and of meals for

underfed school children ; and it strongly sup¬

ports free trade, a policy on which all sections of labor are united. The attitude of the Labor Party to the Liberal Government again is con¬

ditioned by various factors. The party exists

by independence, but none the less it was elected largely by Liberal votes.

The Socialist political policy includes the

labor policy above indicated, and goes farther

on the same lines. It advocates the municipal¬

ization of the liquor trade, and more drastic

interference with the evil results of competition, such as long hours and overtime, child labor

and sweating of women's labor; it favors com¬

pulsory arbitration to replace strikes and lock¬

outs ; and a more vigorous extension of the

sphere of municipal and governmental industry.

Some Labor men oppose some of these pro¬

posals. Very few would oppose them all.

At present the prospects of the Labor Party

are bright. Its leaders are united and har¬

monious. Moreover, the party has made a name

for itself; it is a force to be reckoned with; its action is watched, and its intentions dis¬

cussed in advance. In every respect the Labor

Party member has a marked advantage over

his Liberal-Labor rival. On 29 Dec. 1918 com¬

plete returns from the elections for the new House of Commons gave the following results ;

Coalition.

Coalition Unionists . 334

Coalition Liberals . 127

Coalition Labor . 10

Total coalitionists . 471

Other Parties.

Unionists . 46

Asquith Liberals . 37

Labor . 65

National Party . 2

Socialist . 1

Irish Nationalists.: . 7

Sinn Feiners . 73

Independents . 5

Total of other parties . 236

Coalition majority . 235

Coalition majority with 46 Unionists . 327

Grand Total . 707

Prophecy in politics is peculiarly risky, but

it is fairly safe to say that the share of labor in the control of the destinies of the empire will be larger in the future than it has been in the past.

Bibliography. — First and Second Periods. —

The following amongst many may be con¬

sulted: Gammage, (Chartist Movement > (1894) ;

Wallas, (Life of Francis Place) (1898) ; Podmore, (Life of Robert Owen) (1906) ; Broad¬

hurst, (Autobiography* ; Howell, (Labor Lead¬

ers, Labor Legislation, and Labor Movements* ;

and also for both periods books on trade union¬

ism and cooperation.

Third Period. — Webb, Socialism in England) (Sonnenschein 1893) ; Noel, (The Labor

Party: What it is and What it Wants* (Un¬

win 1906) ; Annual Reports of the Labor Party (London) ; Annual Reports of the Trade Union

Congress (London) ; Annual Reports of the

Independent Labor Party (London) ; Publica¬

tions of the Social Democratic Federation

(London) ; Annual Reports of the Fabian So¬

ciety (London).

Edward R. Pease,

A Founder and Secretary of the Fabian Society

— Honorable Secretary since 1914; Trustee

and Member of the Executive of the Labor

Party.

35. THE CO-OPERATIVE MOVE¬

MENT IN GREAT BRITAIN. The earliest

examples of co-operative institutions are the

corn mills and baking societies started in the closing years of the 18th century and the first decade of the 19th as a relief from the millers'

monopoly and the exorbitant price of flour. At Hull, Whitby, Sheerness, Devonport, and sundry

places in Scotland, mills and bakeries were

worked successfully on a ready-money, cost—

price basis, but they had little effect on the sub¬

sequent movement, though Sheerness and a few

other societies still exist. The co-operative idea, as we know it, was evoked in the mind of

Robert Owen by consideration of the antag¬

onism of classes produced by the industrial

revolution with its widespread misery among

the factory operatives. Failing to persuade his fellow manufacturers to follow his example of

humane treatment of his employees, and failing

to obtain efficient factory legislation from the government, he devised the plan of organizing

the workers into self-sufficient communities,

owning and cultivating the land in common

and producing commodities for their own use

or for exchange with other communities. Two

such colonies, at Orbiston in Lanarkshire (1826) and at Ralahine in Ireland (1830-34), nearly

succeeded. His followers, who enthuiastically

adopted his communist doctrines, started, from

1828 onwards, numerous associations for co¬

operative trading, which employed their profits

in setting their members to work at manufac¬

ture on a small scale. To provide a market for the goods so made, Owen in 1832 opened his

Equitable Labor Exchange at Gray's Inn in

London, where persons leaving goods for sale

received in exchange labor-notes based on the

average time of production at sixpence per

hour. In 1830 there were nearly 300 ((Union

Shops® with over 20,000 members, and between

1830 and 1835 seven Co-operative Congresses

were held. But by 1835 the whole movement

collapsed owing to want of legal status, the

divergent interests of the members, and the fail¬

ure of the labor-time principle. The enthusi¬

asm of Owen's followers now overflowed into

the Chartist movement.

The second stage in the history of coopera¬

tion began in 1844 with the founding of the

Rochdale Society of Equitable Pioneers by a

group of Socialists, Chartists and Trade Union¬

ists, who found the motive in the failure of a strike among the flannel weavers. Its objects

were the sale of provisions, etc., the building and buying of houses for members, the employ¬

ment of out-of-work members in manufacture,

the purchase of an estate to be cultivated by members out of work or underpaid, (<to establish a self-supporting home colony of united inter¬

ests,® and to start a temperance hotel. Cash

payment and good quality were principles

shared with the older movement, but the new

departure on which the success of cooperation

was to turn was the surrender of the attempt

to sell at cost price. In lieu thereof Charies Howarth introduced the system of dividing

profits upon purchases, and from that moment

cooperation has never ceased to prosper. This

system took the government of the society out

of the hands of founders or shareholders and

transferred it to the customers, that is to the general co-operative community. The rules for

the organization of a Co-operative Society have remained substantially the same as those of the original Rochdale Society. To quote one ex¬

ample: <(The object of this society is to carry on the trade of dealers in food, fuel, clothes, and other necessaries, and manufacturers of

the same; the trade of general dealers (whole¬

sale and retail) ; including dealings of any de¬

scription with land, and the trade of builders.®

Membership is free to all, and each member

must hold a fixed minimum of one-pound shares, one to five, carrying interest at 4 or 5 per cent.

The maximum investment is £200, and each

member has one vote only, whatever his holding of shares. The quarterly general meeting of

the society is the governing body, but the man¬

agement is in the hands of the committee, gen¬

erally elected for a year, half retiring each six months. The secretary is elected for a year

by the general meeting, but is the servant of the committee, which appoints all the other

officials and workpeople. The shares can be

withdrawn but are not transferable and there¬

fore have never more than their face value.

The business of the store is transacted in the same way and at the same prices as ordinary

shopkeepers, and after interest has been paid

the profits are divided among the customer—

members in proportion to their purchases.

Metal tokens or paper checks registering the

value of each purchase are given to the buyer, and are collected periodically and credited to

him. Non-members are allowed half dividend.

Out of the profits a bonus is sometimes paid to labor and grants made for educational and char¬

itable purposes.

The co-operative movement now grew with

exceeding rapidity. In 1862 the total sales of all the societies of all kinds in the United King¬

dom amounted to £2,333,523; in 1870 to £8,201,-

685; in 1880 to £23,248,314; in 1890 to £43,731,-

669; in 1900 to £81,020,428. In 1914 there were 1,524 retail societies with 3, 096,314 members, a total capital of £64,803,071 ; total sales of £164,-

587,520, and profits of £15,140,960. The obvious advantages of buying in large quantities led to the formation of the North of England Co¬

operative Wholesale Society in 1864 which in

1874 amalgamated with a similar metropolitan

body to form the Co-operative Wholesale Soci¬

ety of England, with headquarters at Manches¬

ter. Only societies can be members and each

member-society must take up one five-pound

share for each 10 of its members, such shares being transferable at par. The general com¬

mittee of 16 sitting at Manchester governs the society with the assistance of two branch com¬

mittees of eight each at Newcastle and London.

The final authority resides in the quarterly

meeting, which, for sake of convenience, is held in three parts at Manchester, Newcastle and

London, each member-society being entitled to

one delegate for each 500 members. Questions

are settled by the total votes at the three meet¬

ings. Goods are sold at slightly over cost price and the profit divided among the purchasing so¬

cieties in proportion to their purchases. The

Scottish Co-operative Wholesale Society, estab¬

lished in 1869, is similarly managed, but the

member-societies have one vote in virtue of

their membership, one vote for the first £1,000

of purchases, and one vote for each additional £2,000. A bonus is paid to employees at the

rate of twice the purchasers' dividend. The

two Wholesale Societies do not compete but act as each other's agents. There are sale depots

at Leeds, Nottingham, Blackburn, Hudders¬

field, Birmingham, Leith, Kilmarnock and Dun¬

dee, and buying agencies in Ireland, Denmark,

Germany, Spain, United States, Canada, *etc.*

Besides buying and selling at wholesale, the

Wholesale Societies carry on a large amount of manufacture — boots and shoes, candles, wool¬

ens, clothing, furniture, brushes, upholstery,

bedding, butter, flour, lard, jam, tobacco and

printing by the English Society; flour, tweeds, blankets, tailoring, shirts, mantles, furniture,

boots and shoes, hosiery, brushes, preserves,

confectionery, tobacco, fish-curing and printing

by the Scottish Society. The two societies own tea plantations in Ceylon, and the Scottish Soci¬

ety purchased a tract of land in Canada for

wheat growing. The English Society conducts

a banking department for the distributive stores.

The Co-operative Newspaper Society is another

federal institution owned by co-operative soci¬

eties. It publishes the Co-operative News, the

weekly organ of the movement. The Co-oper¬

ative Insurance Society is another ((society of societies® doing mainly fire insurance of soci¬

ety buildings, -£22,000,000 of property being so insured. The United Baking Society of Glas¬

gow (capital £130,372), and eight corn mills

(capital £347,071), are also productive societies, federations of ordinary stores. Production to

the amount of several millions sterling is car¬

ried on by ordinary distributive societies, mainly in flour and baking, 19,456 persons being em¬

ployed in production, and much activity is also shown by many societies in building houses to

be sold or leased to members. The total invest¬

ments of the stores in “house property® (includ¬

ing presumably their own buildings) is over

seven millions sterling.

A large section of co-operators has always

held that cooperation, which did not include

a copartnership with labor, was only a mas¬

querade. To the Owenite communities suc¬

ceeded the Redemptionist Societies “for carry¬

ing out the practice of associated labor,® which had a brief life about 1850. The Christian So¬

cialists — Kingsley, Maurice, Ludlow, Neale —

in 1848-52 established some twelve “self-governing workshops® in which the employees were to

supply capital, management and labor. Next in

the early sixties came the (<01dham Coops.,®

joint-stock cotton spinning companies in which

the shares were mainly held by operatives, but they degenerated into ordinary companies. Ef¬

forts at founding manufacturing societies were

persistent, and the wholesale and distributive

societies and trade-unions lost large sums of

money; 275 soceties established before 1880

were extinct in 1882, leaving only eight corn—

mills and 25 other societies. In 1884 the Labor Association was founded to promote productive

societies on the basis of a copartnership of

labor and capital, the workers being entitled of right to a share of profit and being at liberty to invest their savings in shares. The mortal¬

ity among societies continued high despite brisk propaganda — 139 societies disappearing between

1880 and 1898. The Co-operative Production

Federation was started to aid the societies with capital and prevent overlapping. A new branch

of activity is the “Copartnership Tenant’s

Movement® for building and owning houses,

which has established since 1888 many co-oper¬

ative colonies ; there are now eight societies, of which four are active with £82,600 capital. In agriculture there were 906 registered societies

with a capital of £1,031,397; they consist of

farmers and small holders, buy seed and ma¬

nures and sell produce for their members. On

the whole they belong to a different class, from the ordinary working-class societies. Finally,

there is to be mentioned the Co-operative Union, started in 1869, which carries on propaganda

through its district committees and the United

Board formed of representatives of the sec¬

tional boards. It is also the parliamentary or¬

gan of the movement and devotes much labor to organization and education. Its headquarters

are in Manchester. Under its auspices is held

an annual congress of co-operative societies at which matters of interest to the movement are

discussed, but the resolutions carried thereat

have no mandatory force. The Woman's Co¬

operative Guild, started in 1883, has nearly 600

branches and 31,500 members; it has done much

education work among woman members of

stores and has been specially active in organiz¬

ing special stores in very poor districts. Its principal work is devoted to the housing ques¬

tion, anti-credit, divorce law reform and citi¬

zenship campaign. There is also a Woman's

Co-operative Guild in Scotland, which has 174

branches and over 12,500 members. The Inter¬

national Co-operative Alliance for the promo¬

tion of cooperation throughout the world, is a federation of organizations in Great Britain,

Germany, France, Italy, Austria, Hungary,

Switzerland, Belgium, Denmark, Holland, Rus¬

sia, Canada, India, the United States, *etc.* Con¬

gresses are held in different European cities

every two or three years.

Bibliography.— Holyoake, G. J., (History of

Cooperation in.EnglancP (2vols., 1885) ; Jones, Benjamin, 'Co-operative Production (2 vols.,

1894) ; Potter, Beatrice (Mrs. Sidney Webb),

(The Co-operative Movement in Great Britain

(1893) ; (Co-operative Congress Annual Re¬

port ; (Co-operative Wholesale Societies An—

nuaP ; Lovett, William, (Life and Struggles)

(1876); Owen, Robert, (Autobiography)

(1857) ; (An Explanation of the Causes of Dis¬

tress* (1823) ; Podmore, F., (Robert Owen*

(2 vols., 1906) ; Acland, A. H. D., and Jones, B., (Workingmen Co-operators > (1884) ; Holyoake,

G. J., (Rochdale Pioneers* (1893) ; The Co¬

operative News for reports of meetings; Lloyd,

H. D., (Labor Copartnership *(1899) ; Vivian, H., (Co-operative Production (1900) ; (Co-operator's Year Book.*

Henry W. Macrosty,

Lecturer on Economics, School of Economics

and Political Science, University of London ;

Author of (Trusts and the State? etc .

36. BRITISH FACTORY LEGISLA¬

TION. In the year 1784 there raged at Radcliffe, near Manchester, an epidemic fever in

the cotton spinning works, where long hours

of labor and a total absence of sanitation had undermined the strength of the juvenile opera¬

tives. The conditions of work in the Radcliffe mills were not worse than those prevailing

throughout the neighboring industrial district,

in which the new factories were multiplying

fast. The epidemic of fever was but one

among many similar epidemics. But when, at

the request of the Lancashire justices of the

peace, this particular outbreak was investigated by a committee of Manchester doctors, and

when the leading physician among them, Dr.

Thomas Percival, and the chairman of the

Quarter Sessions, Thomas Butterworth Bayley,

persuaded their fellow magistrates that the

gravity and rapid diffusion of the sickness really arose from the ((putrid effluvia® of the “numbers crowded together® in the new mills, and

the “injury done to young, persons through

confinement and too long “continued labor,®

they were close to the discovery of the great device of factory legislation. At once the

Manchester justices, who were not at that date pecuniarily interested in cotton mills, decided

henceforth to refuse to allow the <(indentures

of parish apprentices whereby they shall be

bound to owners of cotton mills and other

works in which children are obliged to work

in the night, or more than 10 hours in the

day.® In 1796 Dr. Percival and his friends

definitely formulated certain resolutions, in

which they again drew attention to the physical and moral evils of excessive hours of labor,

of the unsanitary conditions of the factories

and of night work ; and in which they proposed, <(if other methods appear not likely to effect the purpose,® that Parliament should enact

“a general system of laws for the wise, humane and equal government of all such works.®

Here we have expressly suggested the ex¬

pediency of factory legislation. Within half a

dozen years the first tiny instalment of that

legislation — the “Health and Morals of Ap¬

prentices Act, 1802® — had, at the instance of the greatest mill owner of the time (Sir Robert Peel), passed into law. This experimental

legislation of 1802, expanded by Robert Owen

in 1815 into a general principle of industrial government, and applied in tentative instalments by successive generations of unwilling states¬

men, has spread to every industrial community

in the Old World and the New. Of all

the 19th century inventions in social organ¬

ization, factory legislation is the most widely diffused. The opening of the 20th century

finds it prevailing over a larger area than

the public library or the savings bank; it

is, perhaps, more farreaching if not more

ubiquitous, than even the public elementary

school or the policeman.

It is sometimes said that England has lost

the lead in factory legislation; that New Zea¬

land and several of the Australian states now

outstrip her; and that in one respect or an¬

other France, Germany, Switzerland, and even

Austria, surpass the United Kingdom in the

protection of labor. This is not the place to examine into the accuracy of these assertions.

It is by no means easy to ascertain, even from the laws of a country, exactly what national

minimum it proposes to enforce, in all the

varied circumstances of place and process, age

and sex. Still less easy is it to discover to what extent the law is really obeyed and en¬

forced. Though the policy of a national mini¬

mum is, in the United Kingdom, as yet inade¬

quately embodied in law, and still imperfectly

enforced, yet it may well be that the scope of the factory legislation is, taken as a whole,

and as applied in actual practice, more extensive than that of any other state.

What is often overlooked is that the law

on the subject is in the United Kingdom, not

contained in any single code, or in any one act of Parliament, but has to be collected from

among eight different branches of English law.

There is first the law as to sanitation, which applies to factories as to other places, and is administered by the town council or other

local governing body under the supervision

and, more or less, the control of the Local

Government Board. With this we may name

the law as to education, with its incidental

restrictions on the' employment of children under 14, and as regards certain classes of young

persons even up to 16, enforced by the town

and county council under the supervision of the Board of Education. It is partly in connection with education, too, though partly also in con¬

nection with the prevention of cruelty to chil¬

dren, that the town and county councils are

empowered to make by-laws, subject to the

approval of the Home Office, regulating or pro¬

hibiting the employment of children and young

persons under 16 in certain occupations. The

law regulating the conditions of employment

as such is itself scattered over six distinct series of acts of Parliament, relating respectively to (a) factories and workshops generally, includ¬

ing all manufacturing industries, laundries,

docks and works of engineering; administered

partly by the Home Office itself and partly by the local governing bodies under the Local Gov¬

ernment Board; (b) mines, administered wholly

by the Home Office; (c) retail shops, adminis¬

tered wholly by the local government bodies,

under the Local Government Board; (d) ships,

and (e) railways, both administered wholly by

the Board of Trade; and, finally, (f) the indus¬

tries subjected to the Trade Boards Act (such

as tailoring, boxmaking, chain and nail making, confectionery, etc.), in which a legal minimum

wage is enforced by the Board of Trade.

The principle underlying this mass of com¬

plicated and detailed legislation — a principle which was not consciously present to the mind

of its early advocates, and one which is still only grudgingly admitted — is the establishment

and enforcement of a (<national minimum® in

the circumstances of employment, below which

it is judged to be inexpedient, in the permanent interests of the community as a whole, that any person should be employed. (<The ultimate end

of factory legislation,® approvingly wrote the

Times of 12 June 1874, “is to prescribe con¬

ditions of existence below which population

shall not decline.® This compulsory national

minimum is naturally a rising one. “Every

society is j.udged, and survives,® aptly said

Mr. Asquith in 1901, “according to the material and moral minimum which it prescribes to its

members.®

It would be an interesting and supremely

useful subject for graduate study to discover

what is the national minimum which the vari¬

ous civilized states of the world now actually prescribe, by compulsory law, to the various

grades and classes of citizens, in the different circumstances of their respective employments.

To do this even for the United Kingdom would

require much more than the space here avail¬

able. The student would find that the svs—

tem of regulation which began, in 1802, with

the protection of the tiny class of pauper ap¬

prentices in textile mills, now includes within its scope every manual worker in every manu¬

facturing industry. From sanitation and the

duration of labor, the law has extended to the age of commencing work, protection against

accidents, the fixing of meal times and holi¬

days, the methods of remuneration, and now

also, in coal mining as well as in various low-paid industries, the amount of the wages. The

prescription of national minima is, however, still very far from being either uniform or sys¬

tematic. The various requirements in the way

of sanitation, duration of labor, hours of be¬

ginning and ending, age of commencement, meal

times and holidays, remuneration and protec¬

tion against accidents, often apply, each of

them, to particular industries, particular proc¬

esses, particular ages, particular localities and particular sexes ; partly, of course, because the various detailed prescriptions are, in their very nature, applicable only to this limited extent ; but, more commonly merely on account of the

empirical, and so to speak, accidental character 291

of all our legislation. Speaking generally, we

may say that the policy of the national mini¬

mum has been most completely and efficiently

worked out in the industry to which it was

first applied, mainly cotton spinning and cot¬

ton weaving; and in which — whether post hoc

or propter hoc ■ — England still leads the world; taking industries generally, it has been far

more thoroughly applied to the employment of

women and children than to that of men, in

respect to whom it has only lately begun ; with regard to subjects of

prescription, it is most universal in respect of the cleanliness, ventila¬

tion, temperature and sanitary accommodations

of the work place and the means of escape

from fire; next most in respect of the age of commencement, the maximum working day and

protection against accidents ; whilst with re¬

gard to the enforcement of a national minimum

of subsistence we are, in the United Kingdom,

still in the stage of gradual application to

trade after trade. The policy of a national mini¬

mum secures universal lip homage, so far as it aoplies to children. Yet our young children may lawfully be industrially employed, or even hired out for wages, in all Ireland outside the large cities, if in any industry not coming under

the Factory Acts, at any age, at all hours,

without stint; in Great Britain and the Irish

cities (unless new by-laws have recently been

made) in any such industry at any age, for

any number of hours ; under such by-laws, gen¬

erally only after 11 years of age, and for Uni¬

ted hours, differing from place to place ; in

agriculture not under 12 and in factories or

workshops not under 13, and then only half¬

time unless a minimum educational standard,

prescribed by the local education authority, has been attained ; generally speaking, full, time

after 14; but in some specified industries or

processes not until 16, or even 18. The pre¬

scription of a minimum wage is still illogically confined to the relatively well-paid coalminers, on the one hand, because they were strong

enough to compel Parliament in 1912 to pass

the Coal Mines (Minimum Wage) Act; and

on the other, to certain arbitrarily selected

“sweated trades® brought under the Trade

Boards Act because their operatives were too

weak to stand alone. Still more wanting in

universality and uniformity is the enforcement

of such national minima as the law does pre¬

scribe. The distribution of the task of en¬

forcing the law among over 2,000 independent

local governing bodies, in England, Scotland

and Ireland; the supervision and imperfect con¬

trol exercised over these by four different gov¬

ernment departments in England, besides sev¬

eral others for Scotland and Ireland; and the

very different views which these government

departments take of their duties — to say

nothing of the very different degrees to which they have consciously adapted the root-idea

of factory legislation as above set forth —

necessarily makes the enforcement of the law

extremely uneven. Only in two branches, indeed, that which deals

with “factories® properly so

called, in which women and children are em¬

ployed in connection with mechanical power,

and in coal mining can the law be said to be at all successfully and systematically enforced

from one end of the kingdom to the other.

These happen to be the branches of the law

which are enforced by an official staff, appointed by and solely responsible to, the Home Office

in London.

For the enforcement of the policy of the

national minimum, so far as this is committed

to him, the Home Secretary has at his dis¬

posal, in the Factory Department of the Home

Office, a “Chief Inspector,® a score of specialist and superintending inspectors, and over 160

inspectors and assistant inspectors. This staff

of about 170 men, who are paid from £150

to £1,000 a year, is supplemented by 21

lady inspectors, who receive from £200 to

£550 a year. All the staff are appointed after examination, without regard to politics, and

are permanently employed. These inspectors

are perpetually traveling over the United King¬

dom, covering among them nearly a million

miles annually, and keeping under inspection

more than a quarter of a million distinct fac¬

tories, workshops, warehouses, laundries, docks

and wharves (excluding those employing adult

men only, which are ignored in practice), in

which nearly five millions of persons are em¬

ployed. Their efforts are aided by about 2,000

“certifying surgeons,® who are paid by fees

only. These are doctors in local practice who

give the certificates of health without which,

in certain cases, children cannot be employed.

A similar, but more limited, staff is employed in the inspection of the mines and quarrie .

The tradition of the Home Office in this de¬

partment is that it is the business of the

inspector, not merely to act on complaints, or to make so many visits, but to get the law

enforced. Hence, the inspectors go hither and

thither as they think fit, visiting one factory frequently, another not at all ; acting on any hint or suggestion that they can get of any

illegality being committed and not only not

refusing to act on anonymous communications,

but eagerly welcoming them when nothing bet¬

ter is to be had. Unfortunately, however, the

paucity of the staff allowed to it by the Treas¬

ury, and the curious reluctance of English gov¬

ernment departments to see their functions

expand, has led the Home Office to forego whole fields of industrial employment in which the

enforcement of a national minimum is no less

necessary than those which it inspects. It de¬

liberately omits from its regular inspection not only the work places where men only are em¬

ployed (though these are also subject to the

law in various particulars) — as to this, see

(Life in a Railway Factory, > by Alfred Wil¬

liams (1915) — but also the myriads of “domestic workshops,® in which only members of the

same family are employed, and in which the

worst cases of “sweating® are found. The

sanitation, too, of the workshops (not using

mechanical power), even where women and

children are employed, is, like the whole regu¬

lation of the homeworkers, abandoned, in the

main, to the more perfunctory hands of the

local authorities. On the other hand, it must

be said that the Home Office far surpasses the Board of Trade in the execution of its duty of enforcing the policy of the national minimum.

The scanty inspectorial staff of the Board of

Trade, on whom we have to rely for the. en¬

forcement of the law relating to the conditions of employment in connection with railways and

ships, confines itself practically to. the investi¬

gation of cases actually brought to its notice by responsible specific complaints, or by accidents ; 292

and takes up the attitude that it is not the busi¬

ness of the office, or of its parliamentary chief, to initiate anything. To the student of the fac¬

tory system of the 19th century, the reflection will inevitably occur that, if the Home Office had acted on this principle, we should still have with us the c(white slavery® of the Lancashire cotton mills, denounced by Oastler and Lord

Ashley. The Board of Trade is more efficient

in the administration of the Trade Boards Act, where the wage awards made by the joint boards of employers and employed in each trade are

enforced by a small staff of inspectors who

prosecute employers guilty of the offense of

paying less than the prescribed minimum. But

there is even a lower depth than the Board of Trade. The Local Government Board, the de¬

partment to which Parliament has entrusted the

enforcement of the national minimum of sanita¬

tion takes no action whatever to see that the local governing bodies put into operation the

sanitary provisions of the Factory Acts with

regard to workshops and the residences of

.homeworkers ; and fails even to compel negli¬

gent or recalcitrant local government bodies to put in force the Public

Health Acts. It does

not even make itself aware of the extent to

which the national minimum of sanitation is

being secured in the different localities.

Thus it is that, after a whole century of

experiment in factory legislation' — of experi¬

ment so demonstrably successful that it has con¬

verted the statesmen and the economistˆ of the entire civilized world — the United Kingdom

still contains districts, classes and industries in which there prevail the precise evils from which the cotton operatives of Lancashire and the coal miners of Northumberland suffered a century

ago. The socalled ˆsweated® trades, to which

factory legislation has not yet been effectively applied, remain as they were described by the

select committee of the House of Lords in 1890, regions of learnings barely sufficient to sustain existence ; hours of labor such as to make the lives of the workers periods of almost ceaseless toil; sanitary conditions injurious to the health of the persons employed and dangerous to the

public.® What those who believe in factory

legislation demand, and what the second century of such legislation may bring to us, is the con¬

scious application of the policy of the national minimum to every branch of industrial employ¬

ment; the explicit formulation of this policy in a systematic code, applicable, with only the nec¬

essary technical variations, to every trade in

every part of the Kingdom, and to every worker in such trade, of whatever age or sex; the de¬

liberate prescription, in the interest of the whole community, of the conditions of employment,

whether sanitation or hours, education or sub¬

sistence, below which no individual can be per¬

mitted to be employed ; and the vigilant enforce¬

ment of this minute universal code by the joint activities of the central departments and local governing authorities, each acting, through its

highly organized inspectorate, as a check, not

only upon all who break the law, but also-upon any who should neglect their own part of its

enforcement.

Bibliography. — The best vision of the ad¬

ministration of the Factory Acts in the United Kingdom is afforded by the (Annual Report* of

the Chief Inspector of Factories and Work¬

shops, and the corresponding one of the Chief

Inspector of Mines. For the history and the¬

ory, consult (Robert Owen,* by F. Podmore

(1906); (A History of Factory Legislation, >

by B. L. Hutchins and Amy Harrison (1903)

(with a good bibliography) ; Principles of

Labor Legislation, * by J. R. Commons and J. B.

Andrews (1915) ; (The Prevention of Desti¬

tution^ by Sidney and Beatrice Webb (1911);

(Towards Social Democracy, * by Sidney Webb

(1916) ; (The Case for the Factory Acts,* ed¬

ited by Mrs. Sidney Webb (1901); Socialism

and National Minimum,* by the same (1909);

(Dangerous Trades,* edited by Dr. T. Oliver

(1902), and Occupations,* by the same (1915) ; (Foreign Labor Laws,* by W. F. Willoughby,

(Bulletin of Department of Labor, 1899) ; (Industrial Democracy,* by Sidney and Beatrice

Webb (1911) ; (English Public Health Admin¬

istration, *by B. A. Bannington (1915) ; (The Factory System and the Factory Acts,* by R.

W. Cooke Taylor, Jr. (1894) ; (First Report of the House of Lords Committee on the Sweating

System * (1890) ; (Die Englische Fabrik-inspection, } by Ott Weyer (1888) ; (Life of the Sev¬

enth Earl of Shaftesbury, * by E. Hodder,

(1886) ; (History of the Factory Movement, * by <(Alfred® (S. Kydd) (1857) ; < Second Report

of the Children's Commission (1843) ; Obser¬

vations on the Manufacturing System,) by

Robert Owen (1815).

Sidney and Beatrice Webb,

Joint Authors of cThe History of Trade Union¬

ism p < Industrial Democracy ,* < Problems of

Modern Industry ,* *etc.*

37. THE CHURCH OF ENGLAND.

It is difficult to define the characteristics of the Church of England so as to enable an outsider to understand it. In much that concerns its external form and traditions it is probably the most mediaeval institution in Europe. In much that concerns its religious teaching and life it is more abreast of modern thought than any other religious body. The former character¬ istic may be illustrated by the fact that its property is held in some cases by direct gift of Anglo-Saxon kings, and that many of its institutions are feudal in their origin. Again it differs from any of the Protestant churches of the continent by the fact that it does not express as they do the teaching or influence of one individual reformer. In a very true sense its history has been continuous. It is an institution which has grown and developed with the history of the English people. It has been modified and changed to meet the needs of each age. It . is an institution which has created a theology, not one which is the out¬ come of its theology. It is therefore clear that the Church of England can only be described by its history.

History.— The history of the Church of

England dates from the mission of Augustine

in 597 a.d. This mission was the direct action of the Church of Rome, but almost from the

beginning there were other elements. A large

part of England was as a matter of fact con¬

verted by missionaries from Scotland and Ire¬

land, representatives of the old Celtic Church.

Although the organization introduced by

Augustine and Theodore ultimately prevailed

through the whole island, yet the Church con¬

tained elements and traditions derived from

Celtic sources. Gregory the Great had used

language in his letters to Augustine which im¬

plied that a considerable degree of independent development was to be left to the newly

founded Church, and from the first its rites

and ceremonies differed from the Roman. Dur¬

ing the Anglo-Saxon period there were two

elements in its history. The kings and the

people of England were full of admiration for

the Church of Rome to which they owed

Christianity, but, on the other hand, the Church developed more and more as a national insti¬

tution and its ecclesiastical laws were the work very largely of secular councils, on which the bishops sat. The Norman Conquest brought the

British Isles very much into the swim of

European life, and gradually two opposing cur¬

rents of policy asserted themselves strongly.

On the one side a series of able ecclesiastics aimed at securing the independence and privi¬

leges of the Church and at bringing it into close obedience to the central organization at Rome.

On the other side the national development

tended to assert the insularity and independence of the English state and sovereigns. There was a strong opposition to foreign ecclesiastics, to payments to foreign courts and to the influence of foreign monastic orders. Legislation such

as the Act of Praemunire was introduced, limit¬

ing ecclesiastical authority and in the reign of Henry V the property of alien priories was

confiscated. Throughout the Middle Ages there

is literary evidence of criticism on much con¬

nected with the Church, which reached its head in the work of Wycliffe who combined opposi¬

tion to the monastic body and the Church of

Rome with a good deal which would be called

in the present day Radicalism.

Like the Church of England the history of

the Reformation (q.v.) is a complicated story.

The final result was produced by various in¬

fluences. There was the old national feeling as opposed to the claims of the papal curia ex¬

pressed in the Reformation Acts by the state-*

ment that the realm of England was and al¬

ways had been an Empire; there was the in¬

fluence of the Humanism of Colet, More and

Erasmus, which demanded a Conservative Ref¬

ormation ; there was the popular objection to

the rights and privileges of the clergy ; there was the strong conservative element which has

always been characteristic of the English peo¬

ple and which checked any great tendency to

change; and especially during the reign of Eliza¬

beth there was the influence of the foreign re¬

formers. The result was a Conservative Ref¬

ormation. No attempt was made to sweep

away the Old Church and reconstruct it, either doctrinally or as regards the constitution de

novo. Such changes were made as were found

necessary to express the different influences

which prevailed. This might be shown in vari¬

ous ways and will appear as we proceed

with our account. For example by a statute

law which has never been repealed, the whole

of the canon law which had been accepted in

England before the Reformation is still the law of the Church, except in so far as it is con¬

trary to Act of Parliament. By the time of

Queen Elizabeth's reign the various parties had become clear. It was clearly the aim of the

rulers of the time to unite as many elements

as possible in one national church and the ulti¬

mate reform settlement was based therefore on

a policy of modeling a national church which

should include very varied elements. The re¬

sult of the Reformation was to modify and

reform the existing institutions, not to create a new church in accordance with any system

of doctrine. See Great Britain — The Ref¬

ormation.

Since that time the Church of England has

suffered hardly any change in its formularies or in its constitution; but it has been profoundly changed by the influence of various schools of thought, each of which has interpreted its form¬

ularies in accordance with their convictions.

The close of the reign of Queen Elizabeth, the writings of Hooker, mark the beginning of a

typical theology, and Anglicanism in the modern sense of the term was developed and worked

out by the great divines of the 17th century.

The result of the Commonwealth and of the

Puritan domination was to strengthen the hold

of the English Church on the nation, and at the time of the Restoration a vast majority of the people were attached to it. A very little more statesmanship on the part of the restored

Cavaliers might have almost wiped out Puritan

traditions. At the time of the Restoration the High Church party were the dominant factors

in the Church, but the Roman tendencies of

Charles II, the Roman Catholic position of

James II, the fear of papal influence, and the Non-Jurors schism on the accession of William

weakened its influence. Some of the ablest

members of the High Church party left the

Church at the time of the Non-Jurors' seces¬

sion. High Churchmen were under suspicion

as being opposed to the reigning dynasty, and

in the first half of the 18th century the prevail¬

ing influence was the latitudinarian movement

associated largely with the name of Tillotson.

The Whig ascendency, the suppression of con¬

vocations and the influence of the deistic

literature reduced the spiritual life of the

country to the lowest ebb. The movement for

religious awakening grew up in the Church of

England, but a secularized church was unable

to contain the vigorous spiritual life of Wesleyanism. But though the Wesleyan Society passed

outside the Church, its influence lived within it, and at the close of the 18th and the beginning of the 19th century, the evangelical movement

was strong. All through this period the High

Church party had lived on. The failure of the Stuart succession destroyed all suspicion of

disloyalty, and eventually latitudinarianism and

evangelicalism lost their hold on the country.

High Church influences began to assert them¬

selves again. The religious movement was as¬

sisted by a romantic reaction against the com¬

monplace 18th Century traditions and by the

revival of an idealistic philosophy, and it came to a head in the well-known Oxford Movement,

which is usually supposed to date from the year 1833. The Oxford Movement m its double

aspect of High Church principles and of

ritualism has profoundly changed the religious

life of the whole Anglo-Saxon world. It was

followed rapidly by a broad church reaction,

ahd there has been a tendency of recent years for a new party to arise, combining many of

the elements of both the schools. At the pres¬

ent time the theology of the Church of England is -influenced «by all the different movements we have' described. The Church of England is not

GREAT BRITAIN— THE CHURCH OF ENGLAND (37)

ˆAnglicanism,® but it has created Anglicanism

within the fold of an Establishment. Various

different types of thought prevail and the posi¬

tion can only be understood by looking at the Church as the result of the history we have

described.

General Principles. — The Church claims to

be that portion of the Universal Church of

Christ located in England, a ((true and apostoli¬

cal church teaching the doctrine of the Apos¬

tles.® It acknowledges that to the Crown <(the chief government of all estates of this realm, whether they be ecclesiastical or civil, in all cases doth appertain.® It is established, i.e., it is part of the constitution of the country. It is National; Protestant in so far as denying that the Bishop of Rome has jurisdiction in England and condemning the errors of the Roman

Church ; Catholic as claiming to be a portion

of the Universal Church of Christ. It grounds

itself on Scripture and the three creeds. Its

ministers are bishops, priests and deacons. It

claims to be continuous with the primitive

church.

Constitution and Law. — The constitution of the Church was influenced by two main characteristics. One was a desire to do away with what we believe to be mediaeval corrup¬ tions ; the other to preserve the primitive or¬ ganization of the Church. Naturally also there was a tendency to preserve all the distinctly na¬ tional institutions which were inherited from the past. The orders of the Church of Eng¬ land are bishops, priests and deacons, and it is definitely laid down that the possession of episcopal ordination is necessary for holding office in the Church. The clergy of the Church meet in their own assemblies in Convocation which were originally the meetings of the clergy for taxing themselves at the time when they were immune from general taxation. At the present day, convocations have no legisla¬ tive power except such as is intrusted to them on any special occasion by Parliament, and no change can be made in any law or custom of the Church without the consent of Parliament.

But it was the theory, not perhaps always acted upon, of the Reformation and it has been the

custom since, that Parliament should not legis¬

late for the Church except with the advice of the clergy. Practically the result of this has been that external changes in either form or

constitution of the Church have hardly been

made since the Act of Uniformity of the year

1662. By the common law of the country the

parson or parish priest has a freehold in his cure, and he can only be removed by very

complicated legal processes. . The result of this has been to make the English clergy very in¬

dependent of any authority. The influence of

the bishops as men may be very powerful and

effective but if they wish to support their

opinions or the administration of the law by

any appeal to authority they are hampered at

every turn by a complicated legal system which makes it exceedingly difficult for them, even

in spite of recent changes, to interfere with

acrimonious or refractory clerks. The diffi¬

culties have been increased by the unsatisfac¬

tory character of the Church Courts. It is a

fundamental principle of the English law that

the Sovereign is in all causes, as well ecclesi¬

astical as civil, supreme. The Church has its

own courts and those courts are very largely

secular in character and do not command the

adherence of the clergy, while the Judicial Com¬

mittee of Privy Council which is the final court of appeal in matters ecclesiastical, has not con¬

fined itself to reviewing judgments of courts on the point of view of justice to the individual, but has attempted to legislate by its judgments,, and has not met with anything like universal

acceptance. The position then is that the con¬

stitution of the Church and the Church Courts

has grown up not in obedience to any particu¬

lar theory, but by modifications from time to

time of the traditional system and that it does not at present satisfy the convictions of a large section of the Church.

Establishment. — The position of the Church

of England is that it is established by law and it is part of the constitution of the country.

What exactly this implies has never been clearly defined and there are different sections of

opinion on the subject in the country. The

High Church party claim that the position of

the Church is continuous with that before the

Reformation and that the Church is by consti¬

tutional right free to determine its own teach¬

ing. A party which would be called by their

opponents Erastian would claim that the Church

was entirely subject to the Sovereign and to

the Houses of Parliament. The former would

point out that the Sovereign is rightly supreme in all actions relating to liberty of person and property, that (as shown by many Acts of

Parliament, notably the Scottish Church Act

of 1905), when questions of property are in¬

volved the Civil Courts or Parliament have to

deal with the internal matters of the different religious bodies whether they call themselves

<(Free® or not, and that what the state has done is to accept to a large extent the Church Courts as part of its constitution. The Church of Ire¬

land (Protestant Episcopal) was disestablished

in 1869. An Act of Parliament was passed in

1914 disestablishing the Church of Wales and

Monmouthshire, but the operation of the Act

was postponed until after the termination of

the war.

The Property of the Church. — The prop¬

erty of the Church consists of the following:

(1) Tithes, which are charges upon the land

paid originally to the parochial clergy. The

origin of the institution of the tithes is much debated. It appears to have begun as a volun¬

tary custom from charges made upon the land

by the owners, and these customs and charges

have gradually been recognized by law and be¬

come universal. Up to the time of the Tithe

Commutation Act in 1836 all these payments

were made in kind: by that Act they were com¬

muted into money payments. (2) Landed

Property. The Church has inherited a portion

of the large estates which were in the pos¬

session of the bishops and other ecclesiastical bodies during the Middle Ages. These were

ultimately derived in many cases from a grant

by the. sovereign or of individual landowners.

They include in addition to landed property,

manorial rights and in the County Palatine of

Durham royalty rights. In many cases they

date from a period before the Conquest; for

instance, Farnham Castle has been the property

of the Bishops of .Winchester from the time

of a grant made in Anglo-Saxon times. In

the great majority of cases now the landed

property apart from the Glebe lands of the

parochial clergy is managed by the Ecclesi¬

astical Commissioners and the bishops receive

fixed stipends. (3) Modern Endowments.

These largely consist of money, and are for the most part administered by the Ecclesiastical

Commissioners.

Prayer Book. — The character of the Church

of England is shown very clearly in the Book

of Common Prayer. The Prefaces lay down

that the object throughout was to preserve the old form of services but to fit them to the

altered needs of the time, and in many cases to return to what were looked upon as more

primitive customs. The first edition of the

Prayer Book was issued in 1549, the second in 1552, the third in 1559, the fourth in 1604, and the fifth edition in 1662. The services through¬

out preserve the structure of the pre-Reformation books, but they are shortened and sim¬

plified; some of the finest of the collects were the work of Archbishop Cranmer himself.

Doctrinal Formula. — The doctrinal for¬

mula of the Church of England is the Thirty-nine Articles of 1571, and the belief of the

Church is also to be gathered in the Homilies and Prayer Book. The production of religious

formulae was the leading feature of all sections of the Christian Church during the Reformation

period and amongst all the varied formulae the Articles of the Church of England are con¬

spicuous for their shortness. At one time the

subscription to these Articles was imposed by

the State not only on all the clergy but all sec¬

tions of the laity as the means of qualifying for office, but the tests for the laity have now been entirely done away with and that of the

clergy is limited to a general assent to the

teaching of the Articles. The courts have al¬

ways been very broad in their interpretation of the doctrine of the Church of England. The

clergy undertake to use the Prayer Book and

no other document in public worship except in

so far as allowed by lawful authority and give a general assent to the teaching of the Thirty-nine Articles. Within these limits the fullest

freedom of opinion and expression of opinion

is allowed.

Anglican Theology. — The theology of the

Church of England has had certain special char¬

acteristics. (1) Owing to its connection with

the universities there has always been a

markedly learned character about a section of

its clergy. Clerus Anglicanus stupor mundi was

the verdict of the 17th century, and during that period a number of very learned works were

produced by the Church. It suffered like all

departments of the country by the intellectual

lethargy of the universities in the 18th century.

In the 19th century its character to a large

extent revived. (2) But though a > learned

Church there have always been certain char¬

acteristics to distinguish it from other religious bodies. Its interest has been very largely in

historical and exegetical studies. It has sedu¬

lously eschewed systematic theology. There is

not at the present day an authoritative work

stating the beliefs of the Church of England.

It has been largely concerned with questions of ecclesiastical organization and the special

features which have distinguished it from the

Roman Catholic and Protestant churches.

(3) The most prominent product of its activity has been the creation of that school of theology which might be defined as Anglican. Whereas

Luther and Calvin created Lutheranism and Cal¬

vinism the traditions of Anglicanism, on the

contrary, are the product of the position of the Church of England rather than the creator of it.

Although certain broad principles underlie the

Reformation it would be impossible to say that any one prominent principle prevailed, but the

result of a Conservative Reformation, with

some reference to primitive truth, was to create a body which

preserved historical tradition in

the threefold order of bishops, priests and dea¬

cons, and the customs and rites of the primitive Church and at the same time had largely

abolished mediaeval corruption. The defence of

this position created Anglicanism. A knowl¬

edge of the Eastern Church provided the ex¬

ponents of that system with a very strong weapon and the Oxford Movement (q.v.) finally made

this the dominant note in Anglican theology.

But it must not be thought that it is necessary to hold ˆAnglican® views to be a member of

the Church of England. Within the limits

of the Church are many who would strongly

object to those views. (4) The opportunities

for a liberal position created on the one side by the relations of the Church with the uni¬

versities and on the other side by the free¬

dom of opinion secured by secular courts

created a strong Broad Church movement. As

the modern exposition of Anglicanism dates

from the (Tracts of the Times) so the modern

exposition of the Broad Church theology dates

from (Essays and Reviews. > The aim of the

Broad churchman has always been to keep him¬

self in touch with modern science and modern

criticism. But of recent years there has been a considerable rapproachment between these two

schools and the appearance of (Lux Mundi)

marked a new departure by which the Anglican

school accepted many of the results of modern

criticism and thought which their predecessors

had condemned. (5) Ever since the Wesleyan

movement and the Evangelican movement which

was its accompaniment in the Church of Eng¬

land, there has been a strong Evangelical party within the Church. Its tenets were represented

by Simeon and the Cambridge school of the

early 19th century and it took for many years a lead in philanthropic work and was especially connected with the abolition of the slave trade.

But it has always failed as compared with the other two schools in an intellectual exposition of its system and has never in any great degree influenced the theology of the Church. Outside

all these definite schools it is probable that there is a considerable element in the Church consist¬

ing of those who are by tradition loyal members of the Church of England, who accept its for¬

mularies without attempting to interpret them

very definitely, whose interest in religion is prac¬

tical rather than theoretical, and who are pre¬

pared to accept and work from the point of

view of common sense rather than of elaborate

theological accuracv the system in which they

find themselves.

Doctrinal Teaching. — (1) The English

Church has never accepted the position that the Bible and the Bible only is the authority for its belief. Its definite statement is that whatever is not contained therein or may be proved thereby is not necessary to salvation. But it has al¬

ways recognized that in interpreting the Bible

the traditions of the Church may be used. As

regards the canon of Scripture it occupies a

middle position between the Protestant and

Roman Catholic churches. It accepts the

Apocrypha, though not as a standard of belief, or as authority for faith. (2) The acceptance

of the two Creeds: The Nicene and the

Apostles. This defintely means that its stand¬

ard of belief is the traditional, orthodox teach¬

ing of the Church. It is, howover, slow to ex¬

press a decision, or impose its belief. (3) The acceptance of the two sacraments, of Baptism

and the Lord’s Supper, as generally necessary

to salvation. As regards sacramental teaching

it has always been very wide in its limits. It makes its standard the acceptance of the au¬

thorized service and it has franklv admitted

that while Zwinglianism and the doctrine of

transubstantiation are incompatible with its

formularies, within these limits any form of

eucharistic doctrine is allowed. As regards

other rites and ceremonies it has always made

a very definite distinction between the two

sacraments and others, although its formulas

have occasionally used the term sacrament in

a wider signification. But it lays great stress on confirmation, orders and matrimony, and

allows private absolution and confession, al¬

though it does not make them compulsory. (4)

The acceptance of the threefold ministry of

bishops, priests and deacons. Here again its de¬

mands point to a system rather than to a doc¬

trine. All its clergy must be episcopally or¬

dained, but it does not demand any definite

theory of ordination apart from what is im¬

plied in acceptance of the ordinal. A section of the Church would make the acceptance of the

doctrine of apostolic succession necessary, but

it has never been the teaching of the Church

officially and as a whole.

Negatively the Church condemns emphati¬

cally the system and authority of the Roman

Catholic Church and the infallibility and

supremacy of the Pope. It definitely condemns

also certain doctrines of purgatory, the invoca¬

tion of saints, the sacrifice of the mass, relics, the merits of the saints, and works of superero¬

gation. In relation to the Eastern Church, while differing fundamentally in tone and temper, it

is very nearly in doctrinal harmony, the chief points of distinction being of course the invo¬

cation of saints, the doctrine of the double pro¬

cession, the use of the term transubstantiation, while there is some general hesitation about the acceptance of all the seven councils or the neces¬

sary acceptance of the seven sacraments. As

against the Protestant churches as a whole, it would always avoid accepting the extreme forms

of predestination or justification by faith; it would lay stress on the need of interpreting the Scriptures in accordance with the traditions of the Church ; its would almost universally lay

greater stress on the reality of the sacramental system, and it would maintain episcopacy as an institution against every other form of Church

government whilst condemning the tendency to

disunion which characterizes so many of the

Protestant bodies. To some its mediating atti¬

tude appears to be a mere political compromise between two

incompatible ideals, to its own

members it would seem to be the one

Church which most clearly holds the balance

between the various conflicting aspects of

Christianity.

The Church and the Nation. — The rela¬

tion of the Church of England to the English

nation has been modified very considerably in

the early part of the last century by a series of enactments. Almost all its exclusive privileges

have been gradually taken away. It has no

longer a paramount position in the universities, and membership of the Church of England is no longer necessary for any civil position in the state. Side by side with this there has been

an enormous increase in the population, which

has made the existing ecclesiastical arrange¬

ments quite unfit to cope with the immense mass of new work. Many of the dioceses are ex¬

cessively large and the process of subdivision has not been rapid enough to keep up with the demands. In many districts the clergy and the

Church have been quite inadequate to meet the

spiritual demands of the people. This fact,

combined with the increase in just those sec¬

tions of the populace which were least touched by the influence of the Church of England, has led to a very great increase in Nonconformity.

But this loss of privilege and greater need of work have not been detrimental on the whole to the Church. The various spiritual movements

that we have narrated and the demands of the

day have stirred up an immense amount of vol¬

untary work on the part of the Church. The

old rigid high and dry schools have had to

make way for younger men with yery varied

forms of activity. Methods of religious propa¬

ganda have been borrowed, alike from Non¬

conformist and Roman Catholic sources. The

Church has taken a vigorous interest in edu¬

cational and social topics. Missionary enter¬

prises, always strongly supported by the Low

Church party, have-been exceedingly vigorous.

The exigencies of a Colonial Empire, the spread of commercial activity, have created new de¬

mands and the last hundred years have marked

an immense increase in the religious activity

and the enterprise of the Church. Including the Anglican Church in America the number of

bishops now connected with the Church exceeds

300, and every 10 years the Conference at Lam¬

beth marks the extent and growth of the Angli¬

can Church.

As regards its hold upon the people there

are no trustworthy statistics, but on the upper and upper-middle classes its hold is very strong.

Amongst the working classes the greater ma¬

jority are nominally adherents of the Church of England, but a great deal of the religious life is Nonconformist. As against Nonconformity the

Church of England is little organized for

political activity, and its hold upon the people and its influence are very intangible and inde¬

terminable quantities. Probably, except perhaps

in some of the great centres of the populace, its influence is very much greater than is often imagined.

Statistics. — Accordng to the census of 1911

there were 14,614 ecclesiastical parishes, pre¬

sided over by an incumbent or minister. In

1915 there were about 14,000 incumbents;

15,958 churches with sitting accommodation for

7,316,605; 2,500,000 communicants, and over

3,000,000 children attending Sunday schools. The voluntary offerings to the Church in 191*3-14

amounted to over $41,000,000.

Bibliography. — History. — The best continu¬

ous historv of the Church of England is prob¬

ably (A History of the English Church y in

eight volumes by various writers, edited by the late Very Rev. W. R. W. Stephens and the

Rev. William Hunt. Shorter histories are those by Wakeman, Spencer, Boyd-Carpenter, *etc.*

Canon Law. — (Reports of the Royal Com¬ mission on Ecclesiastical Courts,* published in 1881-433, and Manuals of Church Law, such as Phillimore's Ecclesiastical Law.*

Prayer Book. — Proctor and Frere, (A New History of the Book of Common Prayer) (London).

Doctrinal Formula. — Gibson, Edgar S., (The Thirty-Nine Articles of the Church of Eng¬ landˆ

Much information concerning the Church of England may be found in the (Report of the

Royal Commissioners in Ecclesiastical Disci¬

pline^ bulletin c. 1906, and the annual reports of the Commissioners.

Arthur Cayley Headlam,

Principal of King's College, London, 1908-12;

author of cThe Miracles of the New Testa—

menP (1914).

38. ENGLISH NONCONFORMITY.

Early History — Death of Queen Elizabeth.

— Nonconformity as a definite ecclesiastical

movement in English history may be said to

have had its origin in Elizabeth's reign. But

regarded as a spiritual force appearing now

and again and here and there in the nation, it may be traced back to a much earlier time. All who protested against the prevailing ecclesiasti¬

cal assumptions of the clergy, and who dared to think and act for themselves in matters spirit¬

ual, may be regarded as Nonconformists, and

were called to suffer for their faith. From 1401, when the statute for burning heretics came into force, to 1534, the date of the renunciation of Papal supremacy, no fewer than 111 persons

were burnt at the stake; and from 1534 to 1558, the year Queen Mary died, 337 more were

added to the roll of the protestant martyrs. On the accession of Queen Elizabeth it was hoped

that a better day had dawned for those men of Puritan sort who desired to see the Reforma¬

tion carried still further. But, while breaking with the Papacy as completely as did her father before her, the queen was not prepared to yield to what she regarded as their extreme views in the matter of religious ceremonial. She cared

for order, pomp and appearance in the worship

of the Church as in other things, and her

princely power combined with her indomitable

will made her supreme in ecclesiastical affairs.

Several of the bishops and divines in the early years of her reign had been in close friendship with the continental Reformers and were pre¬

pared to go far in the Puritan direction. But the queen would not hear of it. Bishop Jewell writing to his friend Bullinger at Zurich in 1566

said: <(I wish that all, even the slightest vestiges of Popery might be removed from our Church,

and aGove all from our minds. But the queen

at this time is unable to endure the least alter¬

ation in matters of religion.® Thus began that conflict between the individual conscience and

the power of the state church which has con¬

tinued down to our own time.

The rupture between Elizabeth and the Puri¬

tan party first took open shape on the promul¬

gation of the orders known as (<Advertise—

ments,® which, in 1566, specified the minimum

of ceremonial the State was prepared to tolerate in the services of the

Church. Uniformity was

to begin to be enforced at a given date, and deprivation of benefice was to follow in the case of the clergy after, three months' refusal of

compliance.

The two sides thus having joined issue the

Puritan party became divided, taking different

directions. Many of the ministers conformed,

using only such ceremonial as they were com¬

pelled, submitting to many things they did not approve in the hope of a better time when a

simpler and, as they believed, a more scriptural system, might come to prevail. Others, again,

while remaining in the Church, sought to bring about a radical change in the direction of Pres¬

byterianism, the discipline of which was elab¬

orately organized both in London and the Mid¬

lands, and a literature created which assailed

with more and more of vehemence the existing

establishment. In 1571 Thomas Cartwright,

Lady Margaret Professor of Divinity at Cam¬

bridge, issued two addresses to Parliament

under the title of <(A First® and ((A Second Ad¬

monition,® which were elaborate attacks upon

the Episcopal system and vigorous assertions

of the divine right of the Genevan discipline.

Having exercised this discipline privately for a time they proceeded to bolder measures, setting up their system openly in the parish churches of Northamptonshire and Warwickshire. Event¬

ually, however, this movement was stamped out

by the greater power of the State, and Noncon¬

formity was henceforth to be sought for in

other directions. Some of the Puritans became

actual Separatists from the episcopal system.

Their starting-point in church politv was the

existence of spiritual life, the personal relation of the individual soul to God; and a church

in their view was a community of spiritual

men : <(The kingdom of God,® said they. ((is

not to be begun by whole parishes, but rather of the worthiest, were they never so fewe.®

Taking as their fundamental position that the

Church visible consists of a company and fel¬

lowship of faithful and holy people gathered

in the name of Christ, they went on to main¬

tain that a Church so composed is compe¬

tent for self-government This self-governing

power they further regarded not so much as a

privilege to be enjoyed as a sacred trust to be discharged. The period when these men, who

came to be known as Congregationalists or In¬

dependents, actively promulgated their views

may be roughly stated as between 1570 and 1593.

Their leaders during the first half of this period were Richard Fitz, the pastor of a London

church, and Robert Browne and Robert Har¬

rison who formed a Congregational church in

Norwich in 1580; and the most active pro¬

moters of their principles in the second half of this period were Henry Barrowe and John

Greenwood, who, together with John Penry,

the Welsh martyr, suffered death for their

opinions in 1593.

The penal laws against Nonconformity,

severe before, were made still more severe bv

the Conventicle Act of 1593, which provided

that all persons above 16 years of age being

present at unlawful conventicles, should, on

conviction, be committed to prison, there to re¬

main without bail or mainprise until they made open submission and declaration of conformity

at some church or chapel, or usual place of

common prayer. The offender who refused to

make such public submission within three

months of conviction should be compelled <(to

abjure this realm of England, and all other the Queen's Majesty's dominions forever.8 This

sternly repressive Act explains why during the

10 years previous to the accession of James I so many Nonconformists languished in prison,

while many were banished and many more went

into voluntary exile.

From the Accession of James I to the

Revolution of 1688. — With the death of Eliza¬

beth and the accession of James I the hopes

of the Puritan party once more revived. For

the king had been brought up among Presby¬

terians, had been the pupil of George Buchanan, and a frequent hearer of the disciples of John Knox ; and had even invited Thomas Cart¬

wright, the leader of the English Presbyterians, to a professorship in Scotland. Regarding him,

therefore, as at least not unfavorable to Puritan ideas, they met him on his way to London in 1603

and presented the Millenary Petition, so called, as representing the views of a thousand of the clergy. But again their hopes were destined to disappointment. At the Hampton Court Con¬

ference, held the following January, the king

spoke contemptuously of Presbyterianism and

declared he would either make these church re¬

formers conform themselves or he would harry

them out of the land. The Conference was fol¬

lowed by the Canons of Convocation which

were so constructed as to make it impossible for any man who disagreed with the constitution

and articles of the Church, as set forth in them, to remain honestly among its clergy. The im¬

mediate result was that some 300 ministers

were ejected from their livings. The Noncon¬

formists who had fled to Holland in search of liberty of worship after the Conventicle Act of 1593 were reinforced from time to time by the arrival of others of like mind. Especially mem¬

orable among these were the members of the

little church at Scrooby in Nottinghamshire,

who, under the leadership of William Brewster

and John Robinson, fled to Amsterdam in 1608,

and subsequently settled in Leyden. This was

the church from which, in 1620, the Pilgrim

Fathers of New England crossed the Atlantic

as the founders of Plymouth Colony, the start¬

ing-point of the United States.

The Separatists who remained in England

were subjected to perpetual hardships and per¬

secution on account of their faith. James I

was succeeded bv Charles I, the new king com¬

ine completely under the influence of Arch¬

bishop Laud, who proceeded to great lengths in enforcing conformity to Prayer Book, articles

and canons. While the two opposing forces of

Catholic tradition and Puritan earnestness were

thus contending within the arena of church life, the two opposing forces of absolutism and the

desire for popular government were at the same time at war within the political sphere. The

men who contended for the divine right of

bishops maintained also the theory of absolute

monarchy and the divine right of kings. The

leaders of the Church made the serious mistake of allying its interests with the side hostile to the constitutional liberties of the nation. With a high-spirited people such a course could only have one issue — that of disaster and over¬

throw. The attempt to base the Church on the

subversion of freedom ended in civil war and

the temporary overthrow of the very institu¬

tions the advocates of absolute government

sought to maintain.

After Charles and Laud came the Long Par¬

liament and Cromwell. Two main ideas seem

to have guided Cromwell's ecclesiastical policy

— first, that there should be an established non-episcopal Church, on a broad basis of evangeli¬

cal comprehension, to be endowed and con¬

trolled by the State; and next, that outside

that Church there should be an ample toleration of Dissent, which therefore provided for the

existence of separate congregations. The

Church, as established, recognized no one form

of ecclesiastical organization ; it had no church courts, no church laws or ordinances. Nothing

was said about rites and ceremonies, nothing

even about sacraments. These were left as open questions to be determined by each congregation for itself. All that the commissioner., for each county dealt with was the personal piety and

intellectual fitness of the minister presented by the patron to the living; and the church build¬

ings were regarded as the property of the sev¬

eral parishes.

This loosely organized system came to an

end with the ending of Cromwell's life. When

the strong hand which alone was able to con¬

trol the conflicting forces let loose in a time of civil war, fell powerless, the nation, weary of strife, restored the monarchy and with the

restoration of the monarchy there came back

also the episcopal system of government in the Church. In 1662 the Act of Uniformity cast

out 2,000 of the ministers as being unable to give unfeigned assent and consent to all and

everything contained and prescribed in the Book of Common Prayer. From that hour Noncon¬

formity took definite and permanent shape in

English national life. It defied all attempts to crush it out of existence. The Conventicle Acts of 1664 and 1670 sent thousands of godly peo¬

ple to prison where many of them died in the pestilential jails of the time. Others were

ruined by heavy fines and the spoiling of their goods, but the more Nonconformity was op¬

pressed the more it grew, and at length by the Declaration of Indulgence of 1672 the govern¬

ment was compelled to admit that no fruit had been gained by these forceful courses. Still

after brief respite these forceful courses were resorted to again. Conventicles were again fre¬

quented; spies and informers renewed their dis¬

honored calling and persecution went on its

cruel and iniquitous way so long as the Stuart kings remained on the English throne. Happily

sooner or later tyranny digs its own grave, and when William of Orange landed at Torbay,

5 Nov. 1688, the hour of deliverance had struck.

The persecuted Nonconformists felt that the

tidings were almost too good to be true. Year by year for a long period they observed the

anniversary of their emancipation, exclaiming

ever and again : ((When the Lord turned again

the captivity of Zion we were like them that

dream. The Lord hath done great things for

us whereof we are glad !8

From 1688 to the Present Time. — The

Revolution of 1688 was followed by the Toler¬

ation Act of 1689 which repealed the Penal

Acts and permitted Nonconformists to erect

their own places of worship which were regis¬

tered, and so placed under the protection of the State. To the providing of local habitation for their communities and their principles they ad¬

dressed themselves with considerable energy.

In the quarter of a century which elapsed be-

tween the accession of William III and the

death of Queen Anne, besides manv temporary

structures, some 1,500 permanent places of wor¬

ship were opened and maintained. The political

history of Nonconformity in the 18th century is largely concerned with the endeavor to set aside certain disabilities to which its adherents were still subjected, the Toleration Act notwithstand¬

ing. The Corporation Act of 1661 provided

that no person could be elected as mayor, aiderman, recorder, bailiff, town clerk, or common—

councilman who had not previously taken the

sacrament according to the rites of the Church of England. The Test

Act of 1673, though

aimed mainly at the Roman Catholics, by

widening the scope of the Corporation Act told heavily also against Protestant Nonconformists.

It forbade any person holding office under the Crown, of any nature whatsoever, who could

not produce a certificate to show that he had taken the sacrament at the parish church. Who¬

ever offended against this law was thenceforth

disabled from suing in a court of law, acting as guardian or executor, taking any legacy or deed of gift, or bearing any public office, and was further liable to a penalty of $2,500,

These acts were unaffected by the Act of

Toleration and were naturally felt by the Non¬

conformists to be a serious grievance. The

Occasional Conformity Act of 1711 intensified

this grievance. It provided that any person

holding any civil or military office who should be found in a conventicle, or in any religious meeting of more than 10 persons, other than

one conducted according to the rites of the

Established Church, should forfeit the sum of

£40, and be disabled for the future from holding any public office.

In 1717 an agitation was commenced for the

repeal of these three tyrannical and disabling

acts. A bill for the purpose was introduced into the House of Lords by

Earl Stanhope, and on a second reading was carried by a division of 86

votes against 68; but on going into committee

the clauses relating to the Test and Corporation Acts were withdrawn from the bill and it passed without them. Thus it came about that while

the Occasional Conformity Act was repealed at

that time it was hot till 1828 that a bill for the Repeal of the Test and Corporation Acts re¬

ceived the royal assent.

Still in the interval between 1717 and 1828

several distinct steps were taken in the direction of liberty. In 1742 a dissenter was elected to the office of sheriff of the citv of London, and on his refusal to qualify by taking the sacra¬

ment he was cited to the Court of King's

Bench which decided against his claim to ex¬

emption. The Corporation then passed a by¬

law imposing a fine of $2,000 upon every person who declined to stand for the office after being nominated and a fine of $3,000 upon every per¬

son who, being elected, refused to serve. Again and again dissenters were nominated, and as

they all refused to serve, fines were levied

amounting in six years to more than $75,000,

which went toward the erection of the new

Mansion House. In 1754 it was resolved to

make a stand against this oppressive procedure.

After a lawsuit which was traversed from court to court, and which lasted for 13 years, Lord Mansfield, b v his memorable and scathing judg¬

ment of 1767, f)ut an end to the iniquity for¬

ever.

This gain in the direction of freedom was

followed by another in 1779 when Protestant

Dissenting ministers and schoolmasters were

no longer required to sign the Thirty-nine Ar¬

ticles. In 1812 the Quakers' Oaths, the Con¬

venticle and Five-Mile Acts, which till then had remained on the statute book, were repealed and the Free Churches were placed in respect to

legal protection from disturbance during times

of public worship, on an equality with the Es¬

tablished Church.

The repeal of the Test and Corporation Acts

in 1828 was followed by the great Reform Bill of 1832 which did much to introduce the rule of the middle class in English society. The result was a large accession to the strength of Non¬

conformity, both political and social. Their

influence entered more fully into the stream of the national life. They were found taking active part in Parliament and in municipal councils,

the national universities were thrown open to

them in 1871, and as the result of a recent re¬

ligious census it was found that quite half of the worshipping

population of the country were

in attendance on the Nonconformist churches

of various denominations. It may be well to

add to this historical sketch of the older Non¬

conformity a brief reference to the later born but powerful religious society known as Wes¬

leyan Methodism, which taking its rise in the

18th century, has . gone on developing and

consolidating ever since. Its internal history is largely that of a struggle for greater freedom and an increased representation of the laitv in the government of the Church. Neither Wesley

himself nor the other early leaders in Method¬

ism believed in democratic government in eccle¬

siastical affairs, and continued resistance on

their part to the extension of the lay element in the Conference led to one secession after

another, these separating bodies forming sister

communities. Still while working with more

breadth and democratic freedom they remained

loyal to the doctrines held by the great founder of Methodism and to the ecclesiastical system

he had elaborated. These various offshoots

are known as the Methodist New Connexion,

the Primitive Methodists, the Bible Christians,

the Wesleyan Reform Union, the United

Methodist Free Church and the Independent

Methodist Church. Notwithstanding these suc¬

cessive secessions and some occasional disasters the original Wesleyan Society has shown mar¬

vellous vitality, elasticity and resource. While in 1816 in Great Britain and Ireland there was a membership of 241,319, according to the latest minutes of Conference that membership has

risen to 600,750. If we add to this the number of members belonging to the various branches

of Methodist outside the main body, to the

Foreign Missions, to the French Conference

and to the South African Conference we reach

a total of nearly 2,000,000. For the . due care of this large body they have an ordained min¬

istry of 4,329, besides 40,308 lav preachers.

Passing from Wesleyan Methodism to the

Free Churches generally it may be mentioned

that these various bodies of Christians outside the Established Church have in recent years

entered into a sort of federation without, sacri¬

ficing their separate self-government. This, fed¬

eration is known as the National Council of

the Evangelical Free Churches and consists of

representatives of the local Councils of the Con-300

gregational and Baptist churches, the Methodist

churches, the Presbyterian Church of England,

the Free Episcopal churches (including the

Moravians), the Society of Friends, and such

other evangelical churches as the National

Council may at any time admit. In 1915 there

were in England and Wales (communicants) :

Baptist, 390,183 and 540,145 Sunday school chil¬

dren; Congregationalist, 454,748, and 634,585

children; Presbyterians, 87,667, and 90,521

children; Quakers, 2,836, and 21,407 children;

Church of Christ, 12,535, and 15,893 children;

Moravians, 3,427, and 5,144 children; and other smaller bodies making up a total of 2,136,782

Nonconformist communicants and 3,219,633

Sunday school children ; sitting accommoda¬

tion for over 8,000,000 ; 9,364 ministers and

50,787 lay preachers.

Bibliography. — Early History up . to the

Death of Queen Elisabeth. — The principal au¬

thorities for this period are : (The State Papers, Domestic ; Strype, ‘Memorials* (6 vols.) ;

Annals5 (7 vols.) ; <Lives) of Cranmer, Par¬

ker, Whitgift (reprinted, Oxford 1812-28) ;

(Zurich Letters,* (Parker Society, 4 vols.) ;

Neal, ‘History of the Puritans) ; Marsden,

‘Early Puritans1* ; Child, ‘Church and State

under the Tudors1* ; Dexter, Congregational¬

ism of the Last Three Hundred Years* ; Bur—

rage, ‘The True Story of Robert Browne*

(1906).

From the Accession of James I to the Rev¬

olution of 1688. — (State Papers, Domestic* ;

Gardiner, ‘History of England* ; Barclay, (In¬

ner Life of the Religious Societies of the Com¬

monwealth* ; Waddington’s Congregational

History 1567-1700* ; Stoughton’s Church of

the Commonwealth* (2 vols.), and Church of

the Restoration* (2 vols.) ; Masson’s (Life of Milton* (6 vols.) ; Firth’s ‘Life of Cromwell* ; Calamy’s Nonconformists’ Memorial,* (Pal¬

mer’s edition, 3 vols., 1802).

From 1688 up to the Present Time. — Stan¬

hope’s ‘Reign of Queen Anne* ; Burnett’s (His¬

tory of his Own Time* ; Calamy’s Cwn Life* ; ‘History of the Dissenting Deputies* (1813—14) ; Halley’s (Puritanism in Lancashire*; Wil¬

son’s cHistoiy of the Dissenting Churches* ;

Bogue and Bennett’s (History of the Dis¬

senters* ; Crosby’s (History of the Baptists* ; Taylor, J. J., (A

Retrospect of the Religious

Life in England* ; Skeats's 'History of the Free Churches* (2d ed.) ; Stevens's (History of

Methodism;* Turner, F. Storr, Che Quakers* ;

Bost's 'History of the Bohemian and Moravian

Brethren* ; University Tests Abolition Act, 34

and 35 Viet. c. 26:16, June 1871.

John Brown,

Formerly Chairman of the Congregational

Union of England and Wales, Lyman

Beecher Lecturer at Yale University, author

of ˆHistory of the English Bible * (1911) , *etc.*

39. ENGLISH ROMAN CATHOLICS.

History. — The Roman Catholic Church in Eng¬

land is descended from those who in the reign of Elizabeth refused to accept the Reformation

(q.v.) and remained in communion with the

See of Rome.. Nearly all the English bishops

were included in this number and were deprived of their sees and . stringent laws were made with a view to enforcing conformity with the estab¬

lished religion. Notwithstanding these, how¬

ever, and the fact that they were frequently put into execution, the number of those who ad¬

hered to the Roman Catholic faith was, for a

time, very considerable. No form of ecclesi¬

astical government was instituted at first, as

hopes were entertained of a national reunion

with Rome; but in the meantime, in order to

perpetuate a succession of clergy, several col¬

leges were established on the Continent, in

which also the laity obtained their education.

Chief among these was the college at Douay, in Flanders, founded by Cardinal Allen in 1568.

Others were in Rome, Paris, Saint Omer,

Seville, Valladolid, Lisbon, etc., several owing their origin to the well-known Jesuit, Father

Parsons. Most of these still exist, some on

their original sites, while others, having come to an end during the French Revolution were

refounded in England, for the laws against

Catholic schools had then been relaxed. It

was undoubtedly due to the English colleges

abroad that the Roman Catholics in England

were saved from extinction.

Early in the 17th century, when the hopes of

reunion had become remote, an attempt was

made to form a proper ecclesiastical govern¬

ment for the Roman Catholics ; but it was not until the reign of James

II that affairs were put on a permanent footing. England was then

divided into four “districts** — the Northern,

Western, Midland and London — each under

the government of a bishop called a ((Vicar

Apostolic.** This means the he was, by a kind of legal fiction, bishop of an Asiatic see “tw partibus InfideliumA and he ruled his actual

<(district** with authority delegated directly by the Pope. Thus the first <(Vicar Apostolic**

was nominally Bishop of Chalcedon. A similar

arrangement was made a little later in Scot¬

land. And all the colonies having no ecclesias¬

tical government of their own, were con¬

sidered as belonging to the “London District,**

so that in early days, the Roman Catholics of North America were under the London “Vicar

Apostolic.** The beginnings of the present

American Roman Catholic hierarchy date from

the time of the War of Independence. In

England the government by ((Vicars Apostolic**

continued until the establishment of the hier¬

archy in 1850; in Scotland it lasted until 1878.

After the brief reign of James II new

penal laws were enacted against Catholics and

the time which followed may be considered the

low water mark of Roman Catholicism in

England. The hopes they had placed in the

Stuarts had failed and the outlook seemed1

dark and dreary. There were numerous de-*

fections about that time and hardly any con¬

verts were made to replace them. The only

centres where the Catholic religion . could be regularly practised were the country seats of

the old Catholic families and in London the

chapels of the various Roman Catholic ambas¬

sadors.

Toward the end of the 18th century, how¬

ever, there were signs of better times for them.

The penal laws were mitigated by Parliament

in 1778 and practically abolished by a second

Act in. 1791, after which Catholic chapels began to spring up in many of the larger towns and a certain number of conversions were made.

Roman Catholics were still, however, disquali¬

fied from sitting in either house of Parliament, and were under many other civil disabilities.

These were not formally removed until the Act

of ((Catflolic Emancipation,® obtained by the

agitation of O'Connell and the Irish in 1829.

Three events of later time must be briefly

alluded to, as having had a permanent effect on the state of English Catholics. One was the

French Revolution, which had a double effect.

In the first place, it drove back to England the numerous communities of English monks and

nuns, who had settled abroad during penal

times, and by accustoming the people in Eng¬

land to their presence amongst them, prepared

the way for the rapid multiplication of such

institutions in later times. In the second place, it caused some thousands of French priests to

take refuge in England, where they were re¬

ceived with marked hospitality, and consider¬

able sums both of private and public money

were apportioned to their relief. Most of them indeed returned to France on the signature of

the concordat between Napoleon and the Pope

in 1801 ; but a certain number remained in

England and founded missions or other Catho¬

lic works, some of which still continue. The

second event to be alluded to was the great

immigration of the Irish after the potato famine in 1845-49, which was the chief cause of the

rapid increase of the Catholic congregations at that time and later. The third was the Oxford Movement (q.v.), which though it did not have

such a great effect numerically speaking, never¬

theless brought over men of standing and in¬

fluence who have left a lasting mark on the

Church. The names of Newman, Manning,

Faber, Ward, Oakeley are only some of many

that might be mentioned in this connection.

Present Ecclesiastical Organization. — At

the present day the Roman Catholic Church in

Great Britain is ruled by 26 archbishops and

bishops, who are divided thus : England and

Wales, three archbishops, of whom one is a

cardinal, 13 suffragans and three auxiliary

bishops ; Scotland, two archbishops, one arch¬

bishop coadjutor and four suffragan bishops;

Ireland, four archbishops (one a cardinal), 23

bishops and one bishop auxiliary. The titles

of the English sees were expressly chosen to

be different from those of the Established

Church, though the latter have since adopted

three of the Roman Catholic titles — Liverpool, Birmingham and Southwark. Each diocese has

a chapter, though there are no resident canons ; they are chosen from

among the senior clergy

of the diocese and meet at stated intervals.

There have been four archbishops of West¬

minster — Cardinal Wiseman (1850-65) ; Cardi¬

nal Manning (1865-92); Cardinal Vaughan

(1892-1903) ; and Cardinal Bourne since 1903.

The new cathedral at Westminster was begun

under the direction of Cardinal Vaughan in

1895. It is in the early Christian Byzantine

style, the architect being the late Mr. J. F.

Bentley, who died during its construction in

1902. The number of priests in England and

Wales in 1915 was 3,985, with 1,879 churches,

chapels and establishments; Scotland, 583

priests and 428 churches, chapels, *etc.* ; the num¬

ber of priests in Ireland was given as 3,750.

Roman Catholics in England and Wales are

estimated at 1,900,000; Scotland, about 545,000, and Ireland, according to the 1911 census,

3,242,670.

Since the abrogation of the penal laws more

than a century ago, mission churches have rap¬

idly multiplied throughout the country, and few towns of any importance are now without one.

Some have been built by individual rich Catho¬

lics, and are good specimens of architecture :

for example, the church at Arundel, built by

the Duke of Norfolk in 1873, or that at Cam¬

bridge, built, by Mrs. Lyne Stephens in 1890;

and a certain number of handsome churches

have been built by subscription, a prominent

instance being the Oratory at Brompton,

opened in 1884. Moreover, the influence of the elder Pugin, who was a Roman Catholic, is

largely visible in the churches set up during

the early days of the Gothic revival. Never¬

theless, the large majority of Catholic churches bear evidence of the poverty of that community as a whole, and have been built with the sole view of securing a maximum amount of ac¬

commodation at a minimum of cost.

In their practical working the missions do

not differ much from parishes, though they are not canonically constituted as such. The clergy, being unmarried, live together in a house or

<(Presbytery.® They are supported entirely by

voluntary contributions. For the most part

they lead laborious lives, ministering to the

wants of their people, most of whom belong

to the poorest classes. There is also a

large section of the clergy known as Regu¬

lars, including Jesuits, Benedictines, Domin¬

icans, Franciscans, as well as the modern Redemptorists, Passionists, and other similar con¬

gregations. They commonly live in monas¬

teries or large houses ; but in the present state of England they often find themselves obliged

to undertake the care of missionary churches,

like the secular clergy.

The Laity. — From what has been said, it

will be seen that the Roman Catholic laity be¬

long to three very heterogeneous groups: (1)

The hereditary English Catholic, consisting of

a number of county families, and in some few

districts, such as Lancashire and parts of

Yorkshire, and elsewhere, some of the working

classes; (2) converts, or children of converts, of whom there are usually a certain number in most town missions; and (3) those who are

Irish, or partly Irish, by descent, who form the majority of the congregations, many of them be¬

longing to the poorer classes of the population.

The prejudices of former times are steadily dy¬

ing away, and Roman Catholics in general live

on good terms with their neighbors. They

intermarry to a certain extent, but such ((mixed marriages,® as they are called, are discouraged by the ecclesiastical authorities and a special permission is requisite for each. Many Roman

Catholics may now be found occupying promi¬

nent positions on county councils, boards , of guardians, or other public bodies. In politics, owing to the composite nature of the body, they are divided, almost every shade of political

opinion being represented amongst them ; but

in general it may be said that while the ma¬

jority, including almost all the Irish, sympathize with the Liberal party, many of the upper class hereditary Catholics have in recent years become strong Conservatives. When Catholic interests

are at stake, however, those of all political

views unite on a common platform.

Education.— Very remarkable energy and

perseverance have been shown in providing ele¬

mentary schools for Catholic children, and there is one attached to almost every mission. In

spite of past difficulty and poverty, they have 302

usually been carried on very efficiently. Train¬

ing colleges for the supply of Catholic teachers, both male and female, exist in various parts of the country. There are numerous poor law,

reformatory and industrial schools. In the pro¬

vision of secondary day schools Catholics are

less well off, though there are a certain number of efficient ones in some of the chief towns; but the boarding schools for the upper classes are on a very large scale in proportion to their numbers. The chief

ones — Stonyhurst, Ushaw, Beaumont, Downside, Ampleforth, Old Hall, and others, are all equipped fully up to the standard of modern requirements. Some of them are descended from the English colleges on the Continent which were broken up during the French Revolution; others, as for example Cardinal Newman's school at the Birmingham Oratory, have been founded in more recent times.

Until a few years ago, Roman Catholics were forbidden to attend the National uni¬ versities ; but in 1895, in response to a petition from the laity, the law of the Church was re¬ laxed, and there are now many Catholic under¬ graduates at Oxford and Cambridge. They are scattered in the various colleges, and mix freely in the general life of the university, but there is in each case a centre, where lectures on Catholic subjects are given periodically, and there is a Catholic Debating Society both at Oxford and at Cambridge.

Convents, Charities, *etc.* — One of the fea¬ tures of Roman Catholic life in England dur¬

ing the last 50 years has been the rapid multi¬

plication of convents. In a large number of

cases the nuns devote themselves to the work of education, either in the parish (primary)

schools, or by conducting a secondary school

of their own, either for boarders, or day

scholars, or both. Others work among the poor, or undertake the care of the sick or the aged, or the unfortunate, while a certain number belong

to “enclosed® orders, and give themselves to a life of prayer. Many other homes, orphan¬

ages and “rescue® societies deserve to be enum¬

erated; nor ought we to omit at least a mention of the Catholic Truth Society, for printing and distributing cheap Catholic literature among

the poor, in these days an essential provision for Catholic life.

Bibliography. — For details of the present

state of Roman Catholics, see ‘Catholic Direc¬

tory^ published annually under authority.

The following books may be consulted on

the history of the Roman Catholics in England, from their point of view: Dodd’s ‘Church

History of England* (Dodd’s real name was

Rev. Hugh Tootell. His history was published

1737-42) ; Tierney’s ‘Dodd.* (The notes of

Canon Tierney form a very valuable addition,

and make this practically a new book; but it

breaks off at about 1640, and was never finished.

It was published in 1839-43. Both editions of

Dodd are often met with in second-hand cata¬

logues) ; Lingard's 'History of England) ;

Sander's 'Rise and Growth of the Anglican

Schism) (Lewis's translation [1877], the Latin

original [1585] having run to over 30 editions) ; Challoner's 'Memoirs of Missionary Priests,

1577 to 1664* (1st ed., 1741-42; many times re¬

published) ; Berington's (State and Behaviour

of the English Catholics from the Reformation

to the year 1 780 > (London 1781) ; Butler's

historical Memoirs of English and Scottish

Catholics) ; Milner's Supplementary Memoirs.*

(These two books formed part of a long and

acrimonious controversy on Catholic affairs be¬

tween Bishop Milner, Vicar Apostolic of the

Midland District, and Charles Butler, the dis¬

tinguished lawyer, who on the passing of the

Emancipation Act in 1829 became the first

Roman Catholic K. C. Butler's Memoirs ap¬

peared in 1819, and Bishop Milner wrote to

correct what he considered misrepresentations

of Butler. Both books are still fairly com¬

monly to be found) ; Husenbeth's 'Life of

Milner) (1862) ; Flanagan's history of the

Church in England* (1857) ; Olliver's 'Collectanea) (1857); Ullathorne's history of the

Restoration of the Catholic Hierarchy * (1871) ; Maziere Brady's 'Annals of the Catholic

Hierarchy* (1877) ; Foley's 'Records of the

English Province S. J.* (8 vols., 1877) ; Rec¬

ords of English Catholics) (edited by Knox) ;

Vol. I, 'Douay Diaries> ; II, 'Letters and

Memorials of Cardinal Allen) (1878-82) ;

Amherst's history of Catholic Emancipation *

(1886) ; Morris, 'Catholic England in Modern

Times* (1892) ; 'The Catholic Church During

the Last Two Centuries) (Lord Braye's Prize

Essay 1892) ; Bernard Ward's 'Catholic Loo—

don a Century Ago) (1905); Gillow's 'Bi¬

ographical Dictionary of English Catholics * ;

Wilfrid Ward's 'Life and Times of Cardinal

Wiseman* (1897); Purcell's 'Life of Cardinal

Manning) (1896; a book full of inaccuracies,

but containing much valuable documentary

matter). Bernard Ward, D.D.

Late Bishop of Brentwood, England; formerly

President of Saint Edmund's College, and

Roman Catholic Canon of Westminster ;

author of (A Sequel to Catholic Emancipa¬

tion * (1915).

40. ENGLISH JUDAISM. Historical

Summary. — Though the statements as to the

presence of Jews in Roman and Saxon Eng¬

land are more or less legendary, it is tolerably certain that William I brought a number of

Jews with him from Rouen to England. Under

the Normans, the Jews enjoyed some privileges;

they developed a communal life of culture and

distinction ; but they were practically restricted to financial pursuits as a means of livelihood.

Henry I granted them a charter, but at the

coronation of Richard I serious massacres oc¬

curred in London and elsewhere, especially at

York, where the ordeal of martyrdom was

heroically endured. The "Exchequer of the

Jews® was then founded to preserve the Jews

from some of the effects of such riots and to enable the Crown, as chief partner in the Jewish money-lending business, to secure its share of

the gains. By the middle of the 13th century

the Jews were chattels of the King, and their unpopularity on religious grounds was increased

by the power they gave the King to obtain a

revenue independently of barons and people.

In 1275 the Statutum de Judaismo forbade the

Jews to lend money, and as there was no other function for them in feudal England their ex¬

pulsion followed as a matter of course in 1290.

For the next three and onehalf centuries a few Jews visited England from time to time; Queen

Elizabeth had a Jewish physician. Toward the

middle of the 17th century a number of Marano merchants came to the front in English colonies

and in England itself. These men, who had

escaped the Spanish Inquisition by assuming

an outward garb of Roman Catholicism, now

boldly asserted themselves as Jews, and in 1655

Cromwell, as a result of the Whitehall Con¬

ference of that year, connived at the open re¬

settlement of a Jewish community in England.

But two centuries more were to pass before the English Jews obtained full civil and political

emancipation. In 1753, Pelham prematurely

passed a naturalization bill, which he was forced to repeal next year. The struggle recommenced

in 1830. In the years 1828-29 Protestant Dis¬

senters and Roman Catholics were relieved of

most of their disabilities. But the Jews were

still excluded from Parliament, from member¬

ship of the University of Oxford, and from

degrees and posts of emolument in the Uni¬

versity of Cambridge. Nor could they occupy

high posts in the army or navy. Political eman¬

cipation was won in 1858. In 1870, following

cn the senior wranglership of a Jew, the Uni¬

versity Tests Act conferred full scholastic

rights on the English Jews. In 1858 Baron

Lionel de Rothschild took his seat as a member of the House of Commons, and in 1885, his son, Sir Nathaniel de Rothschild was raised to the

peerage — the first Jew so distinguished. Since 1858, many English Jews have sat in Parlia¬

ment; there has been a Jewish Master of the

Rolls; in 1915 Lord Reading, a Jew, became

Lord Chief Justice of England; and in the

civil, military and diplomatic services a goodly array of Jews has become prominent.

Statistics. — 'In 1290 the number of Jews

who left England amounted to 16,000. At the

Restoration of Charles II there were about 40

Jewish families in London. The increase was

slow in the 17th century, but toward the end

of the 18th century there was a larger immigra¬

tion. Colquhoun estimated the Jewish popula¬

tion of London as 20,000 at the beginning of

the 19th century, which would bring the total

for the British Isles to about 25,000. This esti¬

mate is probably too high, for it is doubtful whether there were more than 60,000 Jews in

the country before the Russian immigration of

1881. Mr. Jacobs calculated that in 1901 there were nearly a quarter of a million Jews in the British Empire, of which number 160,000 were

in the British Isles. In 1915 there were about 245,000 Jews in the United Kingdom, with 200

synagogues.

Organization. — Since the dispersal of the

Jews from Palestine in the first centuries of

the Christian era, the organization of Jewish

communities has been almost invariably on an

independent congregational basis. Each congre¬

gation in the mediaeval period constituted an

independent unit. Sometimes there would be

a combination of these units for certain pur¬

poses, as in the famous council of Four Lands in Poland (c. 1550-1750). In the pre-expul¬

sion period in England, there were officials who bore the title <(Presbyter Judaeorum® and who

were the acknowledged leaders of the whole

Anglo-Jewish community. Such officials were

closely connected with the royal finances in so far as they affected the Jews, and were more

or less responsible for assessments of talliages.

When the Jewish community was re-established

in the 17th century, the old congregational sys¬

tem was restored. There was first the Sephar¬

dim or <(Spanish and Portuguese® Congregation

which for long took the first place in the guid¬

ance of the whole Jewish life of London.

Founded by a body of men distinguished alike

for culture and commercial capacity, this con¬

gregation gave to English public life many a

noble son. They bore a considerable part in

developing Colonial trade. This congregation,

whose present Bevis Marks Synagogue was

consecrated in 1701, was governed by a Mahamad or Council of Elders with an ecclesias¬

tical head or Haham. The Mahamad claimed

and exercised considerable power over all the

individual members. Gradually, however, the

leadership passed into the hands of the Ash¬

kenazim or ˆGerman® Jews. At first each Ger¬

man congregation was completely independent,

and this condition continued with more or less completeness till 1870 when the United Syna¬

gogue was founded. A large number of Metro¬

politan Jewish congregations are constituents

of this united body, but the Sephardim have

maintained their complete independence, and

besides a few German congregations of old

foundation which have remained outside the

union, there was established in 1841 a West

London Synagogue of British Jews which in¬

troduced some ritual reforms and placed itself

(as it still remains) in an independent position.

The increase of foreign Jews had, however, led to the formation, especially since 1880, of a

considerable number of smaller East End con¬

gregations outside the Metropolitan Union.

These were ((federated® in 1887. It is diffi¬

cult to define the exact condition of the

Jewish communal organization at the present

time. The Chief Rabbi is the official head

of the great bulk of the congregations of

the British Empire, but except for statutory

powers conferred over the constituent Syna¬

gogues of the united Synagogues by the act

of 1870, the influence of the Chief Rabbi

depends on the voluntary acceptance of his

jurisdiction by the various congregations. As

to the rest of the communal organization, it

does not differ from that found in other Jewish centres all the world over. The distinctive

mark of Anglo-Jewish arrangements is perhaps

the tendency to centralization. In Germany

and in America there are Rabbis for every sep¬

arate congregation ; in England there are

t(Ministers® who preach and teach rather than

Rabbis who exercise judicial functions. But

there are many indications that the centraliza¬

tion is in process of breaking down. Certainly the organization of the English Jews on its re¬

ligious side is now in a transitional phase. On the other hand, charitable and philanthropic

organization is in a condition of first-rate

efficiency.

The Communal Life. — ■ Cromwell readmit¬

ted the Jews unconditionally, and though the

acquisition of political rights was a slow process, the English Jews were never subjected to re¬

strictions of the Ghetto type. On the other

hand, the fact that emancipation in England was gradual and not sudden gave the. English Jews

a training in civic adaptability which had rather exceptional consequences. The Jew easily as¬

similates, but in England assimilation was not

accompanied with any wide-felt desire to for¬

sake Judaism. The English Jews who have

taken the lead in serving the state have on the whole been identical with the English Jews who have served the synagogue. The Disraeli family

was an exception that proves the rule. But

while English Judaism thus gained in coherence

and stability by the fact that the leadership of the community was in the hands of its chief

men of affairs, the communal life suffered some loss of idealism. English Jews have, indeed,

consistently taken the lead in dealing with

crises in the fate of the Jews of the world, but on the whole, communal life was respectable

rather than brilliant. The institutions which re¬

sulted were, however, striking examples of

practical philanthropy. The Board of Guar¬

dians for the relief of the Jewish poor (founded in 1859) occupies a high place among institu¬

tions of its class. It not only prevents the

Jewish poor from falling on the rates, but it takes an enlightened view of the aims of poor-relief, fostering self-help by a carefully organ¬

ized system of loans and emigration. Another

characteristic institution is the Jews' Free

School (founded 1817). This is probably the

largest school in England, and it has served

the cause of education while at the same time providing a friendly atmosphere for the chil¬

dren of alien parents. Considerable changes

have followed on the increase of foreign Jews.

The whole communal life has been vivified. In

the first place, the presence of these Jews for the first time made evident a passing wave of anti-Semitism which culminated in the futile

Alien Bill. Anti-Semitism has no deep roots in England, but the anti-Alien agitation did un¬

doubtedly rouse the Jews of England to a sense of their responsibilities. Again, the Zionist and Territorial schemes, introduced some of the

previously lacking idealism. The absence of

Jewish Mission deprives the Jews of a powerful driving force. But there is one important

Jewish missionary society — a society of Jews

with a mission to Jews. The Anglo-Jewish As¬

sociation (founded 1871) has, under the en¬

lightened presidency of Mr. C. G. Montefiore,

had its horizon widened partly by the Hirsch

Colonization Scheme which is directed in part

by the Anglo-Jewish Association, and partly by

the revived interest felt in the Jews of" the world in consequence of the propaganda

of Dr. Herzl and Mr. Zangwill. The Rus¬

sian persecutions had considerable influence in

the same direction. The general result has

been that the leadership of the community is

passing from the men of affairs to the idealists, and though there would be serious danger were

this process carried too far, there can be little doubt that the change is on the whole fraught with advantage. As another token of present-day idealism may be instanced the initiation of a literary revival. English Jews have not

played a foremost role in the promotion of

Jewish learning. While the dictionary of Na¬

tional Biography5 was edited for the larger

part by a Jew (Sir Sidney Lee), and the Bri¬

tish Academy was founded by another Jew

(Israel Gollancz), though Jews have filled pro¬

fessorial chairs at the Universities and though there have been two Jewish R. A.'s, the literary performances of Jews in the field of specifically Jewish learning have been insignificant. But

a new spirit is now discernible, or rather the old Jewish spirit has invaded the English

Jewry. Thus, without enumerating the many

institutions which are the just pride of the

community, without detailing the eminent serv¬

ice to the state rendered by English Jews, it may be said generally that the practical spirit which has so long directed the current of Jew¬

ish life is now receiving a long-needed infiltra¬

tion of idealism. In no part of the world is there greater hope for Judaism. Fullest tolera¬

tion is enjoyed and more than toleration, sym¬

pathy. Fullest civic and political rights are

the possession of English Jews. And above all

there is undoubtedly a genuine affection for

Judaism. Official Judaism is not in a thoroughly healthy condition, but there is in the general mass of Jews a sturdy confidence in the re¬

ligion and an immovable hope in its power to

civilize and save sobriety, good citizenship, de¬

votion to the state, and a practical appreciation of all humane virtues are being once more

touched by the fire of enthusiasm. Judaism is

not only a creed and a code, it is a life. In England this principle seems likely to reassert itself. The English Jew is pre-eminently an

Englishman, and he may become at one ana the

same time pre-eminently a Jew.

Bibliography. — Prynne, (A Short Demur¬

rer Against the Jews5 (1655) ; Tovey,. (Anglia Judaica5 (1738) ; Picciotto, Sketches of Anglo-Jewish History5 (1878) ; Publications of the

Anglo-Jewish Historical Exhibition5 (1888) ;

Jacobs, *Jews of Angevin England5 (1893),

and articles (England5 and (London5 in the

(Jewish Encyclopedia5 (1903-04) ; Wolf,

(Menasseh ben Israel's Mission to Cromwell5

(1901); Rigg, (Select Pleas, etc., from the

Rolls of the Exchequer of the Jews5 (1902) ;

transactions of the Jewish Historical Society

of England5 (1894 onwards) ; the (Jewish

Year Book5 (annually from 1896) ; Hyamson,

A., (History of the Jews in England5 (1906).

Israel Abrahams,

Reader in Talmudic and Rabbinic Literature,

University of Cambridge ; author of cJews 5

in (Hutchinson' s History of the Nations 5

(1915).

41. BRITISH EDUCATION. Introduc¬

tory. — For a history of the early days of Brit¬

ish education the hour has not yet come. Even the origin of the two ancient universities re¬

mains obscure. The records of secondary

schools, with very few exceptions, do not begin before the Reformation, though the claim of

King Edward VI to be a patron of education

has been shown to rest rather on having at¬

tached his name to a portion of the older

foundations, of which a considerable number

were destroyed under the Chantry Act of 1547.

Elementary education was a matter too humble

to receive much definite permanent record, and

probably, as in Scotland till recent years, it was frequently given in the same schools in which

the elder children were being prepared for

the universities. Neither taxes nor rates were

levied for education before, the 19th century

(to speak in general terms), and the only

method of maintaining any permanent educa¬

tional institution was by means of endowment.

Considerable sums were devoted to this end in

the reign of Elizabeth, and, after the troubles of the civil wars were over, there was an out¬

burst of endowment in the end of the 17th and beginning of the 18th centuries.

England.

Elementary Education. — Two important

factors in spreading elementary education were

the Society for Promoting Christian Knowl-

edge, founded in 1698, and the Sunday school

movement, crystallized in the foundation of the Sunday School Society in 1785, and represent¬

ing largely the Evangelical Revival of the 18th century.

The educational work of the Society for

Promoting Christian Knowledge was in 1811

transferred to the “National® Society (The

Society for Promoting the Education of the

Poor in the Principles of the Established

Church), which for the time being was devoted

to carrying on schools on the “Madras® moni¬

torial system, as organized by Dr. Andrew

Bell. In 1808 a society, known subsequently as the British and Foreign School Society, was

founded, chiefly by Nonconformists, to estab¬

lish schools on an almost identical system which had been developed by Joseph Lancaster. The

provision of elementary schools in England and

Wales was thus in the beginning almost entirely the work of those connected with religious

bodies, of which the Church of England was

numerically and financially by far the most im¬

portant. These voluntary schools, aided since

1833 by gradually increasing grants from gov¬

ernment, continued to hold the field alone until 1870. Since the introduction of board schools,

supported by rates, at that date, and even since 1902, the voluntary managers have gone on rais¬

ing considerable sums of money, which, how*

ever, of late years, have been devoted chiefly to building and maintaining the fabric of their schools.

The religious difficulty in English elemen¬

tary schools has thus been involved in their

very origin.

It was not till 1833 in the first Reform

Parliament that the State came to their aid. In that year the House of Commons made a

money grant of $100,000, which was apportioned

between the two societies, and it was not till 1839 that the government education department

for directing the administration of the grant

was establishel. The grant was gradually in¬

creased, and between 1850 and 1860 rose from

$725,000 to $1,000,000 for Great Britain. In

1880, it was $12,500,000 for England and Wales only, and now is over $55,000,000 for elemen¬

tary education. The years between 1840 and

1860 were years of great expansion. The

population, which in 1821 had been under 9,000,-

000 in England and Wales, bv 1861 numbered

20,000,000. The government education grants

greatly encouraged the clergy of all denomina¬

tions, and schools sprang up in all directions.

In 1861 the economists took fright, and severe mechanical tests were applied to the system of grants by the “Revised Code.® Payment was

to be made only on the results of individual

examination of every pupil, in reading, writing and arithmetic. Undoubtedly some check was

needed on a system advancing so rapidly and

with teachers so ill prepared as many were for their profession. But the method adopted was

disastrous, and its cramping influence is felt in the traditions which exist to-day, years after

the last relics of this method of payment by re¬

sults have been abolished.

By 1870 it was quite plain that, magnificent

as the efforts of the churches had been, noth¬

ing short of a national local system could pro¬

vide the necessary schools, especially in the

large towns. The Elementary Education Act

of that year enabled boroughs and parishes to

form school boards, with powers (if necessapD

to levy a rate for building and maintaining

schools in addition to the building grants and other grants from the State. The central edu¬

cation department had after due investigation

to declare what school accommodation was

needed in each district. If in any case it were not duly supplied, they might order the forma¬

tion of a school board ; and in case of further default appoint such a school board themselves.

Existing voluntary schools were to receive the

government grant, but no aid from rates. They

might still give such religious instruction as

they thought fit. In the board schools no re¬

ligious catechism or religious formulary dis¬

tinctive of any particular denomination was to

be taught. This regulation is known as the

Cowper-Temple Clause, from the name of the

member who introduced it as an amendment.

Subject to this a school board might give in its schools such religious instruction as it thought fit, or might abstain from giving any. As a

matter of fact, except in some places in Wales, where the religious instruction is given in

Sunday schools, plain Bible lessons are given

by the ordinary teachers in all these schools

with very few exceptions. Any school board

might make by-laws enforcing the compulsory

attendance of children between 5 and 13, sub¬

ject to a conscience clause, and a number of

school boards were established for this purpose only. In 1876 attendance was made compulsory

in all districts by the establishment of school attendance committees where no school boards

existed. The provisions for compulsory attend¬

ance have been strengthened and diversified by

four subsequent acts, and are further compli¬

cated by conflicting Factorv and Workshop

Acts, so that the whole now urgently need con¬

solidation. In 1891 fees were abolished in most schools, a process nearly completed since 1902.

The act of 1870 aroused the most intense

opposition at once from the Church party and

the extreme Nonconformists. The latter were

disappointed of their hopes of a uniform na¬

tional system, the former found themselves in

competition with a rival subsidized by the State.

The greatest activity prevailed on both sides in providing additional schools. Between 1869

and 1876 provision was made in elementary

schools for 1,600,000 additional children, and of these two-thirds were in voluntary schools, to¬

ward the cost of which only one-fifteenth was

paid in government building grants. Educational

enthusiasm was not, however, the sole factor;

in many cases the chief ratepayers realized that they could build and maintain the schools far

more cheaply by voluntary subscriptions than

under the administration of a school board,

and. large corporations such as railway com¬

panies, were willing to contribute to voluntary schools for similar reasons. The voluntary sys¬

tem had proved wholly inadequate in the large

centres of population, but still prevailed in the majority of country villages.

By the end of the century the time was ripe

for further legislation. Secondary education

was in chaos, and it was imperative that it

should be co-ordinated with the elementary sys¬
tem. The development of the latter moreover
was in many places completely at a standstill
and unlikely to be further improved under exist¬
ing conditions. The tendency to local self gov¬
ernment had rapidly increased during the past

few years. In 1888 the Local Government Act
established county councils, and in 1894, by
another act, district and parish councils were
constituted. In 1889 the Technical Instruction
Acts had authorized the county and borough
councils to supply technical instruction, and the vast majority of them were spending for this
purpose the large sums of money handed over
to them in 1890 by the Local Taxation (Cus¬
toms and Excise) Act. They had thus already
some experience as education authorities. On
the other hand, the requirements of the educa¬
tion department (which in 1899 had been reor¬
ganized as the board of education) had been

steadily growing, in accordance with modern

ideas of education, so that the voluntary schools began to find it impossible in most cases to ob¬

tain the money requisite to keep them efficient.

Accordingly in 1902 a fresh Education Act

was passed. By this every county, every county borough (i.e., to speak roughly, city of more

than 50,000 inhabitants), and (for elementary

education) every urban district of over 20,000

inhabitants and every non-county borough of

over 10,000 became local education authorities,

and all school boards were abolished. Each

new authority must appoint, according to a

scheme approved by the board of education, an

education committee, which they are bound to

consult, and to which they may delegate all

powers for education except that of raising

money. The voluntary schools must give their

religious teaching in accordance with the terms of their trust deed (if any), and it is under the control of their managers. They appoint and

dismiss their own teachers, subject to the con¬

sent of the local authority which pays them.

The voluntary managers are responsible for the

upkeep of their buildings, subject to an allow¬

ance from the authority for internal fair wear and tear, but the local

authority is bound to maintain and keep the schools efficient other¬

wise, at its own expense. Each voluntary school is managed by a body of managers, usually six, of whom two-thirds are appointed under the

trust deed, amended by Order if necessary, and one-third by the local authorities. Board

schools are now known as council schools. The

managers are appointed by the local authorities.

In counties two-thirds are appointed by the

county council, and one-third by the local dis¬

trict or parish council. To the managers such

powers are at present delegated as the central local authority thinks fit. London was excepted from this measure but received an analogous

act in the following year.

Unsatisfactory as many of the provisions of

this act were to the politician and to the re¬

ligious controversialist, there can be no doubt that from the point of educational administra¬

tion over the country as a whole, it has brought about great progress, an advance proportion¬

ately almost as great as the act of 1870. Even in those cities where there was already a strong progressive school board, it has concentrated

the powers for higher as well as for elementary education in the hands of one authority, has

materially increased the grant, and has given

considerable powers over the standard of ac¬

commodation and of staffing in the elementary

schools. In the counties moreover it has abol¬

ished the small rural school boards, whose sole object was to reduce expenditure, and has placed in charge an authority which can apply a rea¬

sonably high and uniform standard of efficiency in staffing, in school accommodation, in hy¬

giene, in school material, in school attendance, and even in the small, but important matters of school cleaning and offices.

On the other hand the act of 1902 met with

the most violent antagonism from the enemies

of the voluntary school system. It was urged

with good reason that complete maintenance

from the public funds should be accompanied

by full public control, that no denomination

should be allowed to have instruction in its

tenets given at the public cost, and that in any parish where there is only one school, the chil¬

dren of the minority, who have no alternative

but to attend it, are liable to suffer from a stigma attached to the exercise of the conscience clause. Nonconformist teachers moreover

found it difficult to obtain engagements in

church schools or places in training colleges of which very few are undenominational. The

Church party on the other hand were not un¬

reasonably unwilling to allow only undenomina¬

tional religious instruction to be given in

schools which they had built, largely at their own expense, for denominational instruction,

and claimed a right to have such instruction

for their children.

A complex Education Bill passed the House

of Commons in 1906, but fell through. Another, in 1908, went no further than a second read¬

ing. In 1914 there was approximately one cer¬

tificated teacher to every 49 scholars in England and to every 60 in Wales. Important changes

have been made since 1911 in the training of

teachers. There were 13,093 in training colleges in England and Wales in 1916. In 1914 pro¬

vision was made for feeding poor children in

addition to educating them. During the first

year 39,596,018 meals were supplied to 421,975

children. All pupils undergo medical inspec¬

tion. The total expenditure on elementary

education in England and Wales for 1913-14

amounted to $71,843,970, for 21,498 schools with an average attendance of 5,420,000 scholars.

English Secondary Education. — The best

defense of English secondary schools at any

rate during the past century, is that they have successfully educated a large number of men

of high character and ability who have served

the nation well in political and administrative life, not only in England, but all over the

world. There was, however, till recent years,

nothing that could be called a system. Each

school utilized or abused its endowments and

its opportunities, and the abuses were very

slowly revealed by the inquiry of royal com¬

missions, and still more slowly corrected. Al¬

though inquiries began in 1818 under Broug¬

ham, it was only in the ˆsixties® that the reports of the commissions on the great (<Public

Schools® (nine in number) and on the endowed

schools led to two acts of reform, the Public Schools and the Endowed Schools Acts, and

under these most of the abuses of endowments

have been brought to an end.

But in the leading English <(Public Schools®

(i.e., the leading secondary schools for boys,

and principally for boarders), a considerable

measure of reform had come in early days

from within. The twin names of Arnold and

Rugby are best known, but the Rugby reform

was in part inspired by Winchester, and great

names are not wanting to Eton and Harrow

which with the many glaring defects they pos¬
sessed at that period were relatively efficient.
From Arnold and his successors, Temple and
Percival, influence radiated and few schools
failed to become different, whether by attrac¬
tion or repulsion. Thring at Uppingham,
Vaughan at Harrow, Cotton and Bradley at
Marlborough, Bradley at Haileybury, were
mighty instruments in “changing the face of
education all through the public schools of
England.®

Not only have science and modern languages
been introduced, as well as opportunities for
the arts and manual instruction, but the teach¬
ing of Greek and Latin has to a great extent been remodeled. Physical development, which
was always encouraged in those schools by
games, has been pushed to a degree which now
makes against intellectual interests. Nearly all the socalled first grade

schools are boarding

schools, and consequently the corporate life

gives far greater scope to the influence of mas¬

ters and of boys, and thus to education in the widest sense, than is possible in day schools.

For good or evil, the effects are more marked, and on the credit side must be set that inde¬

pendence and self-reliance which the best

schools produce.

The first chief influence of modern science

on the schools' curricula came from a separate government department founded in 1836 as a

school of design. In 1853 this was reconsti¬

tuted as the department of science and art,

largely by the influence of Prince Albert, and partly as a consequence of the first international exhibition held in London in 1851. This de¬

partment began to hold examinations and make

grants for teaching of science and art, and ulti¬

mately extended its subsidies to schools recog¬

nized by it as "Organized Science Schools,®

in which regular courses of instruction in

science were given. In 1900 the new board of

education absorbed the department of science

and art, and also the education department

dealing with elementary schools. It thus be¬

came the sole central authority, and in 1901 be¬

gan to give grants to approved secondary day

schools with regular courses. It has also in

connection with these grants developed a very

full and valuable system of inspection con¬

ducted by its own staff. In 1902, as already

mentioned, the county and country boroughs

became education authorities, the minor locali¬

ties possessing only concurrent jurisdiction with the counties in higher education. Since 1902

these authorities almost without exception have

made considerable annual grants to the second¬

ary schools in their areas, and a marked im¬

provement is already visible in the efficiency of the schools, and the length of attendance of the pupils. These grants of course are given almost entirely to the smaller schools. The endow¬

ments and fees of the first grade ((Public

Schools® render them independent of such as¬

sistance and consequently of the board of edu¬

cation. In 1914 there were 910 grant-aided

schools, all free to children from the public

elementary schools.

Mixed Schools. — There has been a certain

amount of experiment in this direction, and

prejudice has to a large extent been dispelled, but on the whole the

best English opinion

seems inclined to the view that, other things

being equal, it is preferable to educate girls and boys in separate schools. There are, how¬

ever, many places unable to support two

separate schools, and in these coeducation is

being tried with some success. But there is no likelihood of its ever being tried in the older public schools, where the school age does not

end before 18 or 19, and this precedent will

probably always militate against it in smaller

schools.

Curriculum of Secondary Schools.— So

far as boys' schools are concerned, not very

much liberty is really left to initiate startling reforms. Pupils are prepared for the universi¬

ties, . for civil service, or for army and pro¬

fessional examinations, and it is these which

really prescribe the subjects. In addition to the actual university courses most of the universi¬

ties have followed the example of Oxford and

Cambridge in establishing ((Local Examinations®

and the "Examinations of the Joint Board®

for the benefit of pupils still at school. These tests, especially when joined with inspection,

have done most valuable service.

Other Secondary and Technical Education.

— The science and art department, already

mentioned, held various examinations and gave

grants to classes and prizes to pupils. But it was the Technical Instruction Act of 1889, and still more the Local Taxation (Customs and

Excise) Act of 1890 which encouraged local au¬

thorities to spend money on socalled “technical®

subjects. The list of these subjects finally in¬

cluded, I believe, everything secondary except

the classics. Even Shakespeare is said to have been taught under the head of “Commercial

English.® These powers brought the councils

of counties and boroughs and urban districts

into the field as education authorities, and in addition to their grants to secondary schools

and their scholarship schemes, they did much

to prepare for their future work in secondary

education proper. The chief effect of the limi¬

tation to “technical® instruction was to encour¬

age the teaching of science subjects, which had never before received proper recognition. This

limitation to “technical® instruction was en¬

tirely swept away in 1902, when the local au¬

thorities received power to administer all

higher education as well as elementary. In

the last 25 years a large number of “Institutes,®

“Schools of Art,® and “Technical Schools® have

been built or enlarged. Marked progress has

been made in the education of those persons

who during the day are engaged in trades and

professions. The quality and scope of the

teaching have been considerably improved, and

the chief need at present is to secure the at¬

tendance of lads and girls who are leaving the elementary schools and to induce them to com¬

plete well-arranged courses of not less than

three or four years’ duration. In 1916 there

were 6,097 of these schools.

English Universities. — These may perhaps

most conveniently be divided into two classes,

the old and the new. In no branch of educa¬

tion has there been a more rapid or startling development than here. In 1826 there were

only Oxford and Cambridge, the traces of

whose origin are lost in the early Middle Ages.

In 1916 no less than seven new universities en¬

joy a prosperous existence, while there are

other university colleges which may hereafer

develop into universities themselves.

The New. — Manchester, Liverpool and

Leeds, federated in 1880 as Victoria University, have recently acquired separate charters. Bir¬

mingham, established in 1880 as Mason College,

became a university in 1900. Durham, founded

in 1832, has been constituted more on the lines of Oxford and Cambridge, except for its asso¬

ciation with the college at Newcastle. London,

which received its first charter in 1836, was

afterward for many years merely an examining

body, but at last in 1898 received a new constitu¬

tion enabling it to embrace all the chief institu¬

tions for higher teaching situated in and near the capital, and to distinguish between its in¬

ternal (or taught) and external (or merely ex¬

amined) students. Sheffield University received

its charter in 1905. It is difficult to do justice to the splendid energy and the magnificent gen¬

erosity which has founded and worked most of

these institutions — qualities which can be more easily paralleled among the universities of

America. These institutions are new, they are

efficient, they do well a work which needed do¬

ing. But as the object of educational study,

they are less interesting than the universities of Oxford and Cambridge.

The Old. — It would be hard to explain to a

stranger the way in which Oxford and Cam¬

bridge have in the past entered into the life of the whole country, attracting to themselves not only the sons of men of rank, position and

leisure, but also poor and able lads likely here¬

after to make their way both at home and in the world at large. It is probable that no Cabinet will ever again be composed almost exclusively

of men drawn from these two universities, but

it is equally improbable that any Cabinet will ever lack them altogether. Oxford and Cam¬

bridge supply a very large part of that execu¬

tive civil service to which England owes so

much, and of which so little is heard. In nearly every country parish the squire and the parson can still exchange reminiscences of a university common to them both, for in the past the size of the country and of the population rendered

it possible for two universities to gather to¬

gether, widely speaking, the representatives of

the governing and teaching classes. If these

young men did not always get much learning,

at least they grew from boyhood to manhood in an atmosphere of

discipline and among their

equals. The influence moreover of the beauti¬

ful buildings set in an environment of groves

and lawns and quiet streams, and the associa¬

tion of national history and literature, were a factor in their education which nothing else

could supply. Oxford (<as she lies in the moon¬

light, spreading from her towers the enchant¬

ments of the Middle Ages,® and Cambridge, her

equal and rival, have an influence still reaching deep and wide into the character of the nation.

It must not, however, be supposed that cau¬

tious reforms have not adapted these universi¬

ties to the changing needs of the time. By the beginning of the 19th century examinations were instituted, the best of which have probably done the work possible to examinations as well as

it has ever been done. Royal commissions in the middle of the century, and again in 1877 led to the revision of the mediaeval statutes and to the abolition of many obsolete restrictions and priv¬

ileges. All religious tests were finally abolished in 1873. The time has perhaps come round for

a new inquiry, but the particular methods of

teaching by lectures and by tutorial work are

carried out with a thoroughness and care which it would be difficult to surpass. In the past 50

years nine distinct new courses have been added to the curricula both

for Oxford and Cambridge graduation, besides new subjects for which di¬

plomas are granted. Museums and libraries,

laboratories, institutes and workshops have

been freely erected, and only a lack of money prevents further developments. For it is a

curious feature of their constitution that in both places eight-ninths of the property belongs to

the individual colleges in which the men reside and one-ninth only to the universities them¬

selves.

The Rhodes Bequest. — The most striking

departure of recent years has, however, been

due to a son of Oriel College, Cecil Rhodes,

who bequeathed an income of some $170,000 a

year to be given in 60 scholarships to the Colo¬

nies, 102 to the United States, and 15 to Ger¬

many, all tenable only at Oxford. The result

of this policy it is premature to forecast, but the experiment so far has met with success. Ox¬

ford has welcomed the scholars, and they have

at once found their feet and seem cordially to recognize the distinctive character of the bene¬

fits which the university has to offer without being blind to its limitations.

University Extension. — Besides the direct

work of the universities, old and new, notice

should be taken of their pioneer efforts in de¬

veloping education by means of lectures. This

has proved specially valuable in the development of some half dozen university colleges, of which Reading is the most conspicuous example.

Higher Education of Women. — The edu¬

cation of women has met with many difficulties in England, but except for the refusal of de¬

grees at Oxford and Cambridge, practically all

desired privileges are now everywhere open to

them. In the newer colleges and universities

they are received on the same terms as men, ex¬

cept in certain medical courses. In Cambridge

they have two colleges, in Oxford four and they are admitted to all such teaching as they require and to all examinations. Degrees alone are

withheld and actual membership of the univer¬

sities which would involve a share in their gov¬

ernment. The universities of Birmingham,

Durham, Liverpool, Manchester, Leeds and

Sheffield grant degrees to women ; there are five colleges for women in and near London, and

three in Wales.

Wales.

Introductory. — Of the four quarters of the

United Kingdom, Wales has made the most

rapid progress. In the middle of the 19th cen¬

tury her elementary education had probably the

worst equipment; her secondary schools were

inadequate and inefficient; while in higher edu¬

cation she possessed only the recent foundation of Lampeter, which was then little more than

a theological college.

Elementary. — The Welsh elementary

schools have always been under the administra¬

tion of the English Board, and, considering the inaccessibility of the wilder parts of the coun¬

try, have made at least a proportionate progress.

Nowhere has more difficulty arisen in the ad¬

ministration of the Education Act of 1902, and a section in the Bill of 1906 provided for the es¬

tablishment of a separate Education Department

for Wales. Teachers and schools probably

suffered to some extent, but the future progress GREAT BRITAIN — BRITISH EDUCATION (41) 90 9

\’ ˆ education is in any case assured,

vy ales has the educational advantage of being a bilingual country to a greater extent even than Ireland, and this has long been fully

recognized in her schools.

Secondary. — Wales, while sharing in the educational inquiries and reforms of England, made in 1889 an enormous step in advance. In that year she obtained the Welsh Intermediate Education Act, under which small joint educa¬ tion committees were established in all the coun¬ ties and county boroughs, and by this means an admirable system of county secondary schools for boys and girls was established. In 1897 a Central Welsh Board was created to provide for examination and inspection of the different schools which had been created and organized out of the rates and grants placed at the disposal of the joint education committees.

Universities. — In university teaching Wales in a single generation has rivaled the provision of Scotland. A training college was founded in 1862, and the first university college at Aberystwyth in 1872. In 1883-84 university col¬ leges were established at Cardiff and Bangor, and the annual grant they received from gov¬ ernment was before long extended to Aberyst¬ wyth. In 1893 they were incorporated in the

University of Wales, which has since been ex¬

tended so as to include Lampeter, which, how¬

ever, has the power of giving separate degrees.

Women have been admitted from the beginning

to the Welsh university colleges and the uni¬

versity.

Scotland.

Preliminary. — The history of education in

Scotland accounts for the virtues and most of

the defects in the Scottish system. In the old days the elementary school led direct to the

universities, and the universities were hampered by doing the work of secondary schools. On

the other hand there were few boys of ability and character who could not get the best edu¬

cation in the country, and the sacrifices they made had a large share in the success so many of them ultimately achieved. To-day the path

is easier, the opportunities greater, and the in¬

struction has progressed with the times.

Elementary. — John Knox laid down a

scheme for the establishment of a grammar

school in every town, but most of the funds in¬

tended for the endowment passed into other

hands. In 1696, however, a system of schools

was established by statute, the landowners being bound to provide a schoolhouse, and a salary

for the teacher, in every parish. The salary

was small, and the exceptions numerous, but a

rate-aided system was actually organized, and

owing to the cheapness of the university system, and the frugality of the country, much excellent work was done. The conditions of the teacher

and the method of his appointment were gradu¬

ally improved by statute, though no State aid

was forthcoming till 1833. The first Parliamen¬

tary grants for elementary education applied

equally to Scotland, which was under the Eng¬

lish Board of Education until 1872. In that

year the first education act for Scotland was

passed. In spite of the multiplicity of her reli¬

gious denominations, Scotland was ready to ac¬

cept a universal system of school boards, who

were left entirely free to teach what religious formulae they pleased in their schools. Compul¬

sory attendance between five and thirteen was

enforced throughout the country under a maxi¬

mum penalty amounting to as much as five dol¬

lars, a sum not reached in England until 1900.

A special committee for education for Scotland

was now created, which in 1885 was given a

separate secretary.

In a general sketch it is impossible to point out the numerous small differences between the

Scottish and English systems. Scotland was

earliest to escape from the revised code and

payments by results, uniform curricula and me¬

chanical inspection; first to provide special treat¬

ment for blind and deaf children ; first to secure free education, and to improve her physical

training. A Scot may be pardoned if he sums

up the main results by saying that the outlook is generally more from the education standpoint, the teacher more fervid and better educated,

and the children more eager for knowledge.

The religious difficulty has been entirely

avoided, and that in the chief home of religious controversy. A mention should be made of the

celebrated Dick bequest which in the northern

counties has done much to improve the quality

of the teaching by subsidies to better qualified teachers. This also has materially assisted chil¬

dren from elementary schools ultimately to fit

themselves for a university education. A bill to introduce certain reforms into the organization

of the system and increase the powers of the

school boards, has twice been introduced into

Parliament, but has not yet been passed, though Scotch members now appear fairly agreed on its merits.

Secondary and Higher Education. — In

spite of Knox's comparative failure there were

burgh schools and academies established in

nearly all the burghs by 1866, and the existing endowments, though capable of better use, had

never been greatly abused or misappropriated.

A leaving certificate has been organized with

much success by the Education Department,

which holds the necessary examinations, as

well as inspecting higher class schools. In 1914

there were 19,780 pupils on the rolls.

The science and art teaching formerly con¬

ducted under the auspices of South Kensington

was in 1897 transferred to the charge of the

Scotch Education Department. Technical in¬

struction in the United Kingdom may be said to have had its rise at Glasgow in Anderson's

Institute, but the cheapness of the universities and greater facilities for general education has always prevented much specialization on purely

technical subjects.

Universities. — In no respect has Scotland

fared better than in the number and accessibil¬

ity of her universities. Saint Andrews (1417)

with three colleges, Glasgow (1450), Aberdeen

(1494) with two colleges, and Edinburgh

(1582) afforded every opportunity that the

poorest student could wish. It was necessary to attend lectures, but there was no residence in college, and the long summer vacations were

used by poor students to earn their fees for the winter. The chief reforms which have been'

carried have been to raise the minimum require¬

ments for graduation, to make fees uniform, to admit women, to provide adequate buildings,

and to endow new subjects of instruction. The

greatest liberality has been shown in providing funds for the last two of these purposes, and 310

the universities are now well housed and well

staffed. Mr. Andrew Carnegie in 1901 gave

$10,000,000, the income of which is to be spent equally between the endowment of certain

branches of study and research, and paying the fees of poor students. The latter half of the bequest seems unlikely to benefit the character

of a class which would formerly have found

such assistance unnecessary, but the value of the portion applied to the endowment it would be

difficult to exaggerate.

Ireland.

Introductory. — In Ireland the state of edu¬

cation has been most deplorable, and is still far behind the rest of the kingdom. This is due to poverty, to politics, and to religious bigotry.

The difficulties caused by. bigotry and politics when a Protestant minority was in power in

the earlier half of the 19th century caused those who were responsible for elementary education

to steer a cautious and ineffectual course ; a different set of difficulties due to the same

causes, working through the priesthood and the

politicians, prevent any thorough reform to-day.

And always the grinding poverty of the nation

as a whole has hindered the schools and the

teachers from being brought up at any given

time to the standard which prevailed in English or in Scottish education.

Elementary Education. — Till the end of

the 18th century Catholic schools were illegal, and existed chiefly as <(Hedge Schools.55 Con¬

siderable funds were spent, chiefly in encourag¬

ing proselyting institutions. In 1831, however,

the present system administered by the Board of Commissioners of National Education in Ire¬

land was introduced, and has continued without

any sweeping changes to this day. Elementary

education is controlled by 20 Commissioners.

Their report (Jan. 1915) showed 8,207 schools

with an average of 700,265 pupils, and an aver¬

age daily attendance of 72.6 per cent. Roman

Catholic schools number 4,441, with 389,437

pupils, and 1,553 Protestant schools with 116,969

pupils.

The most hopeful feature in Irish education

in recent years has been the establishment of

the Department of Agriculture and Technical

Instruction, created in 1899, which, beside ad¬

ministering technical instruction, has acted as

the adviser of the National Commissioners with

regard to teaching agriculture and elementary

science in the elementary schools, and in enabling the teachers to obtain instruction in these and kindred subjects. The report of the Belmore

Commission, in 1898, showed the most deplor¬

able backwardness in all modern developments

of primary instruction. Progress is being made, though it will naturally

take years to overcome the neglect and ignorance of ages.

Secondary Education. — The chief agent in secondary education in Ireland, apart from the board which administers the endowments, and before the establishment of the Technical In¬ struction Board, has been the Commissioners of Intermediate Education. In 1878 this board was founded and endowed with five million dollars from the funds of the disestablished Church of Ireland. . In 1890, $250,000 a year were added to this income. The money, how¬ ever, has been awarded on the results of exami¬ nations, and before the system was reorganized in 1902 the whole scheme was one of payment— by-results run mad. In 1913 an act was passed providing for grants, and in 1914 an annual sum of $200,000 was granted by Parliament to¬ ward the salaries of teachers. The Technical Instruction Board is doing most admirable work and is being well seconded by the county coun¬ cils.

University Education.— The Elizabethan

foundation of the University of Dublin and

Trinity College, which practically form one

body, has throughout its career had a marked

success as a Protestant university on the lines of Oxford and Cambridge. Tests were abol¬

ished to a great extent in 1793, and finally in 1873, but the Catholics have never as a body

accepted Trinity as a national institution. The three Queen's colleges, founded in 1845, have

had even less success in this respect, and the Queen's University, in which they were amal¬

gamated, was replaced in 1879 by the Royal

University of Ireland. As Secretary of State

for Ireland, Mr. (now Viscount) Bryce formu¬

lated in 1907 a scheme whereby Trinity College, Queen's College and a new college for Roman

Catholics were to be merged in a new <(University of Dublin,55 but the plan was opposed by the Dublin University Defense Committee and

the Irish bishops on religious grounds. The

British government then proposed to establish

one university in Dublin and another in Belfast, the former for Catholics and the latter for

Protestants, although no religious tests were to be enforced in either. Finally, the National

University of Ireland was founded in Dublin

and the Queen's University of Belfast in 1909.

The former makes a specialty of the Irish lan¬

guage — a compulsory subject of matriculation,

while the. latter grants degrees, exhibitions and scholarships alike to female and male students.

The report for 1914-15 gives approximately 347

teachers and 2,620 students in the Irish univer¬

sities. The number of male students is neces¬

sarily influenced by the war.

Higher Education of Women. — Women

have been admitted to the examinations and de¬

grees of the Royal University from its founda¬

tion, and have since been allowed to attend the lectures of the Queen's colleges. For a long

time Trinity College and the University of Dub¬

lin would not admit them either to lectures, ex¬

aminations, or degrees. The examinations were

conceded first, the lectures followed; and now

women who have been at Oxford and Cam¬

bridge, and require a degree for teaching or

other purposes, obtain it freely at Dublin and Belfast, which thus drive a flourishing business at the expense of their less progressive rivals.

Bibliography.— Sir Henry Craik, <The

State in its Relation to Education ; de Mont¬

morency, J. E. G., (State Intervention in Eng¬

lish Education (1902), and 'Progress of Edu¬

cation in England5 (1904); Alice Zimmern,

(The Renaissance of Girls' Education5 (1898) ;

Balfour, Graham, 'The Educational Systems of

Great Britain and Ireland5 (2d ed. 1903) ;

Leach, A. F., ' English Schools at the Reforma¬

tion5 (1896); Wright, A., (History of Educa¬

tion, etc., in Scotland5 (1898); Monroe, P.,

(Text Book in the History of Education5

(1905), and especially Cubberley, E. P., Sylla¬

bus of Lectures on the History of Education5

(1902). Consult Annual Reports of the Board

of Education, Committee of Council on Educa¬

tion in Scotland and Commissioners of National

Education in Ireland, also Reports of Royal

Commissions, and Special Reports on Educa¬

tional Subjects (Board of Education).

Graham Balfour,

Director of Education to the Staffordshire

County Council ; Author of (Educational Sys¬

tems,* iThe Life of R. L. Stevenson P

42. ENGINEERING IN GREAT BRIT¬

AIN. Engineering as a profession is only par¬

tially organized in Great Britain. To under¬

stand the present state of development a brief historical statement is necessary.

Historical. — On the military side engineer¬

ing is and has been thoroughly organized. For¬

tification and the art of constructing defenses are probably as old as society. The Babylon¬

ians, Greeks and Romans showed skill and

originality in design and construction which has nowhere been surpassed. From the introduction

of the catapult, ballista, and other engines of war amongst the Greeks and Romans mechani¬

cal skill likewise received wide and steady de¬

velopment.

Into Great Britain engineering was probably

first introduced by the Roman invasion and then languished until William the Conqueror brought

with him a large body of engineers who built

the castles, fortresses and strongholds, and made the engines of war for defense and attack. A

«chief engineer® supervised an organization of

trained workmen in the 13th century, and offi¬

cial records of the siege of Calais in 1347 gives a full list of the staff and also of that of the engineers' headquarters at the Tower of London

in 1350. Sir Richard Lee was the most famous

of the engineers who in the reign of Henry

VIII built the English and French coast de¬

fenses. Under Charles II a separate corps of

engineers, commanded by a surveyor-general of

the King's works, was established in Ireland.

As gunpowder, cannon and later muskets

replaced catapult, arquebus and crossbow, me¬

chanical skill and ingenuity made steady

advance until at the present day the manufac¬

ture of war implements and their invention and design have passed to a considerable extent into the hands of civilians. Military engineers are

organized as the Corps of Royal Engineers with their headquarters at Chatham.

The artillery is organized in several corps,

according as service in the fortress, field,

mounted, or on foot, is required. Knowledge

and training in a specialized branch of engineer¬

ing is needed for these services.

Guns and military equipment are manufac¬

tured at the Royal arsenal at Woolwich and at the Royal small arms factories at Enfield and

Birmingham, under army control, and in vari¬

ous factories belonging to civilian firms.

In the navy engineers have steadily in¬

creased in importance as the construction of

ships and their working depended more and

more upon machinery until under the recently

modified regulations it has been arranged that

all naval officers whether navigating, gunnery,

torpedo, or engineering shall for the first years of their training be educated together, speciali¬

zation being left to the later years of their course. Engineer officers will therefore rank

with other officers of equal standing and be

capable of executive command.

On the Civil Side. — The foundation of

English civil engineering may be said to have

been laid by Smeaton (1724-92). He was the

son of an attorney, became a philosophical in¬

strument maker, and subsequently devoted his

attention to a study of windmills, canals (for which he made a tour of the low countries in 1754), and lighthouses. He reconstructed the

Eddystone lighthouse in 1756. He was there¬

fore ((much consulted in regard to engineering

projects, including river navigation, the drain¬

age of the Fens, design of harbors, and the

repair and construction of bridges.®

Smeaton founded in 1771 the <(Society of

Civil Engineers,® the members of which dined

together once a month during the parliamentary

session and discussed subjects of professional

interest. It still exists under the name of

(<The Smeatonian Society of Civil Engineers.®

No records of its discussions have been kept nor published but its foundation shows the earliest step in the direction of organizing the non-mil¬

itary engineers into a profession in Great

Britain.

Partly contemporary with Smeaton was

Tames Watt (1735 to 1829). He was trained as

a mathematical instrument maker, but was pre¬

vented from practicing by the trade as not being fully qualified, and therefore he was granted

three rooms in the University of Glasgow where he carried on experiments resulting in the cre¬

ation of the modern steam engine out of the

crude pumps of the Marquis of Worcester, New¬

comen, Cawley and Savory. His improvements

demanded for their perfect fulfillment mechan¬

ical skill and workmanship far in advance of

the work of the millwrights of his earlier youth.

Out of the millwright he therefore created the manufacturing engineer, and did for the

mechanical side of the profession what Smeaton

had done for the constructive side, and like

Smeaton on the constructive side Watt on the

mechanical side was consulted as an authority

of the first rank on all important matters.

Watt morever had, about 1767-70, a large

practice as a constructive engineer and sur¬

veyor, and prepared plans for a number of

canals and harbors, chiefly in Scotland.

As manufactures increased, partly owing to

the impetus given to them by Watt's inventions, partly as a result of the industrial development at the termination of the Napoleonic wars, the improvement of means of communication and

greater rapidity of transit became of first class importance, and as the roads throughout Great

Britain were at the end of the 18th century in an execrable condition we find attention more

and more concentrated upon the construction

of inland canals and new and improved roads.

The man who more than any other aided in

this improvement was Thomas Telford (1757—

1834), the son of a Dumfriesshire shepherd and in early life trained as a stone mason. After the construction of a house for the Commis¬

sioner of Portsmouth dockyard he became sur¬

veyor of public works for Shropshire and con¬

structed a bridge over the Severn at Montford

in 1792. The construction of the Elsemere

canal in 1793 lead to his being employed in the construction of most of the chief canals in

Great Britain, from the Caledonian . in 1804 to the Birmingham and Liverpool junction in 1825,

as well as the Gotha canal in Sweden in 1810.

He constructed and perfected most of the main

 roads in Scotland, the north of England, and

Wales, involving the erection of the Menai and Conway bridges, besides numerous others of

less magnitude. He also made many continental

roads in Austria, and was also employed in

harbor construction.

He lived a bachelor in London at the Salo¬

pian Coffee House, afterward the Ship Restau¬

rant, and two years after the establishment of the institution of civil engineers in 1818 he

was elected president for life. The meetings

were thereafter held in the Ship Restaurant,

whither the institution removed from the Ken¬

dal Coffee House in Fleet street, its earliest home.

Meanwhile, mechanical road traction, steam

barge, and ship propulsion had advanced with

the advance of the steam engine and with

George Stephenson's triumph at Rainhill in

1829, railway construction had commenced and

was fast monopolizing attention as the most

efficient and rapid means of communication

The names of Brunei, Clarke Russell, Whit¬

worth and a host of others claim recognition in the rapid advance of engineering both at sea and on land which now followed, but enough has

been said to enable a grasp of the rise of the profession and the lines of its gradual devel¬

opment to be realized.

The progress in organization of the profes¬

sion which has since taken place has been due firstly to the commanding position in the pro¬

fession attained by the institution of civil en¬

gineers and secondly to the development and or¬

ganization of engineering scientific education

which has taken place in the technical and uni¬

versity colleges and universities throughout the kingdom.

Institution of Civil Engineers. — This insti¬

tution founded, as already said, in 1818, obtained a royal charter of incorporation in 1828, its

objects being — as described by Tredgold in a statement prepared for the council in applying

for a charter — (<For the general advancement

of mechanical science, and more particularly

for promoting the acquisition of that species of knowledge which constitutes the profession of

a civil engineer, being the art of directing the great sources of power in nature for the use

and convenience of man as the means of pro¬

duction and of traffic in states both for internal and external trade as applied in the construction of roads, bridges, aqueducts, canals, river navi¬

gation, and docks for internal intercourse and

exchange, and in the construction of ports, har¬

bors, moles, breakwaters and lighthouses, and

in the art of navigation by artificial power for the purposes of commerce, and in the construc¬

tion and adaptation of machinery and in the

drainage of cities and towns.®

This is the earliest definition of civil en¬

gineering and the profession of the civil engi¬

neer therefore embraces all non-military engi¬

neers who are laboring to ˆdirect the great

sources of power in nature to the use and con¬

venience of man® whatever be the special corner of this wide field of operations to which any individual member may be devoting himself.

During the earlier years of the institution's

corporate existence the enormous development

in the construction of railways, roads, harbors, docks, drainage and waterworks lead to the

not unnatural predominance of discussion on

questions of special moment to these branches

of the profession in the institution proceedings.

The council was consequently largely recruited

from the men of eminence on the predominating

side and the civil engineer became in public

estimation more and more exclusively identified

with the designer and constructor of such

works.

With the rapid improvements which have

since taken place in machinery and machine

processes and with the revolution which has

been affected in commerce and in the require¬

ments and mode of life of the people, by the less prominent but equally remarkable achievements

of such men as Stephenson, Armstrong, Whit¬

worth, Bessemer and Siemens, the demands for

a greater outlet for the discussion of the me¬

chanical problems of interest on this side of the profession of the civil engineer became more

and more insistent and the opportunities avail¬

able in the existing institution being by many felt to be inadequate, the Institution of Me¬

chanical Engineers was founded in 1847 and

was constituted in 1878 as a registered asso¬

ciation under the Companies Acts.

With the discovery of the means of practi¬

cally utilizing electricity for producing light and transmitting power and the consequent exten¬

sion of its use in all departments of mechanical work a third development took place in 1889,

when the Society of Telegraph-Engineers and

Electricians which had been incorporated under

the Companies Acts in 1883 and from its es¬

tablishment in 1871 had until 1881 been called the Society of Telegraph Engineers again

changed its name to the Institution of Electrical Engineers. Various other societies and insti¬

tutions have been formed at various dates

amongst which may be mentioned the Civil and

Mechanical Engineers' Society, the Society of

Engineers, and the Institution of Junior Engi¬

neers, a very active and progressive institution of which the membership is confined to junior

members of the profession.

The Institution of Civil Engineers is thus

the parent institution, embracing by its consti¬

tution and membership all branches of the pro¬

fession demanding for entry to its roll (a)

practical professional training in works or as an assistant to an engineer; (b) theoretical training as evidence by the passing of its own examina¬

tions held twice a year or by the holding of the degree or diploma of a recognized university or technical college; (c) suitable and strictly de¬

fined qualifications for each of its classes of membership or studentship.

It is recognized as the leading professional

body and membership of its council and occupa¬

tion of its presidential chair to which there is annual election are the most valued of profes¬

sional distinctions. It can to a certain extent guide and control professional conduct within

its own membership but does so with an all-too-sparing hand. To many it appears that the time is ripe for further extensions of professional or¬

ganization and for the application of stricter dis¬

cipline in regard to what may be called, gener¬

ally, professional etiquette, and it is the Institu¬

tion of Civil Engineers which alone has the

constitution and prestige which would enable it to successfully deal with such a development.

Beside this great leading institution are the

Institution of Mechanical Engineers and the

Institution of Electrical Engineers, each repre¬

senting one branch of the profession only, ˆnd GREAT BRITAIN — ENGLISH NEWSPAPERS (43)

demanding professional but not examination

qualifications for membership. Most of the

members of each of these belong also to the

premier institution.

To complete the organization of the profes¬

sion much remains to be done. There is as

yet no state registration enabling the assump¬

tion of the name civil engineer (embracing, as has been shown above, engineers of all

branches) by unqualified and untrained per¬

sons, to be checked and fees and professional

conduct to be regulated by a governing body,

such as the Institution of Civil Engineers, with the help of the other professional institutions, might organize if they had the necessary statu¬

tory powers. The public thus lack the protec¬

tion to which they are entitled against* the em¬

ployment of unqualified advisers whom they

have no sure means of distinguishing from

competent engineers. One difficulty in the way

of this necessary step being taken would prob¬

ably be removed if the popular misconception

of the functions of a civil engineer were

eradicated.

This perhaps is more strongly the case in

the United Kingdom than elsewhere, for there

it has been the custom, where work involving

machinery or engineering construction of any

magnitude was required by those who were not

themselves engineers, to obtain advice as to the best way to obtain the ends in view, and the best engineering designs to employ, from lead¬

ing members of the appropriate branch of the

profession practicing as consultants. There

has thus grown up a body of engineers whose

function is to give this advice and draw up the instructions upon which tenders can be ob¬

tained from engineers who undertake the con¬

struction of the works or machinery involved.

Much misconception has arisen in America and

elsewhere as to the foundation and value of this method. The consultant is in a position of

trust between his non-engineering client and

the manufacturer. By clearly defining the re¬

quirements of his client, after investigating all the conditions of the problem, he enables com¬

peting contractors to estimate their prices upon a fair and uniform basis. On the one hand his duty is to see that his client obtains the best installation and that which most satisfactorily

fulfils the conditions of the problem on rea¬

sonable terms; on the other he sees that no

competing manufacturing or contracting firm

is unfairly handicapped by a misunderstanding

of the problem and by the unfair competition of a rival. Further, his duty is to see that the chosen contractor is not unfairly dealt with

owing to the ignorance of engineering pos¬

sibilities or limitations on the part oi his client.

In this capacity, as arbitrator and adviser,

the highest qualifications of judgment, inde¬

pendence, integrity, and justice are required of the engineer, and it is of the highest importance that the ranks should be kept purged of any who may usurp these functions without the necessary qualifications and bring discredit upon the profession as a whole. Here statu¬ tory powers of control and regulation by a pro¬ fessional body are pre-eminently needed.

Educational Organization. — On this quesˆ tion a brief word must suffice. Engineering schools were first established in London at King's College and University College in the first half of the 19th century. These have been followed by the establishment of other schools in the provinces and in London until a large number now exist in which the scientific bases of engineering are taught in an organized course lasting in general for three years. During that course engineering laboratory training at most schools occupies a large portion of the time. Experimental determinations of the efficiencies of various machines and prime movers work¬ ing under varying conditions, the strength and properties of materials, flow of liquids, etc., are undertaken by the students, and the underlying scientific laws deduced and exemplified.

In some schools engineering manufacturing

processes are also taught and workshop train¬

ing undertaken, but in the United Kingdom it

has generally been held that this branch of

training is best obtained in the factories of

manufacturing firms, and this is the method ad¬

vocated by the Institution of Civil Engineers.

The University of London has an engineer¬

ing faculty and grants degrees in science (en¬

gineering), and the University of Cambridge

has a mechanical science tripos as an avenue

to its degrees in arts.

The provincial universities all grant degrees

in science on the engineering side. Dublin and Liverpool alone grant a degree in engineering.

The principle upon which such “engineering®

as distinct from “science® degrees are generally held to be unsound in Great Britain is that the practical, which is an essential portion of an engineer’s training, can not be rightly regulated or judged by an academic body. A professional

body such as the Institution of Civil Engineers is alone competent to co-ordinate the two por¬

tions of the professional education.

Bibliography. — Brassey (Lord), (The Na¬

val Annual* ; Various Blue Books on Naval

Education and Army Organization; (Narrative

of the Building Eddystone Lighthouse 1791 J ;

(A short narrative of the Genius, Life and

Works of the late W. John Smeaton 1793) ;

Smiles, (Lives of The Engineers) ; Lardner,

(History of the Steam Engine* ; Rankin,

(Steam Engine and other Prime Movers) ; Tel¬

ford, ‘Memoirs* (1838); ‘Transactions* of

the Institution of Civil Engineers, The Institu¬

tion of Mechanical Engineers and The Institu¬

tion of Electrical Engineers ; calendars of the several universities and University and Techni¬

cal Colleges in the. United Kingdom; Engi¬

neering education in the British dominions)

(London 1891) ; (Report by the Committee of

the Institution of Civil Engineers on the Edu¬

cation and Training of Engineering) (1906).

David Sing Capper,

Professor of Engineering, King’s College, Lon¬

don; Appointed Teacher in Civil and, Me¬

chanical Engineering, University of London.

43. ENGLISH NEWSPAPERS. In 1917

there were published in the United Kingdom

2,366 newspapers, distributed as follows : Lon¬

don, 451 ; provinces, 1,458; Wales, 126; Scot¬

landˆ 254; Ireland, 186; in the surrounding

islands, 17. Of these, 147 were daily papers

published in England, 19 in Scotland, 16 in Ire¬

land, eight in Wales, and three in the islands.

There are over 60,000 newspapers in the world, and considerably more than half of them are

printed in the English language; 13,000 alone

belong to the British empire.

Origins,— The beginnings of English jour-

nalism can be traced to the socalled ((news-letters® of the 16th century — hand-written docu¬

ments laboriously compiled by literary employes

for wealthy and titled personages, statesmen

and politicians, who maintained their corre¬

spondents at court, in France, Ireland or else¬

where abroad to keep themselves posted on the

course of events. The British Museum contains

many examples of these news-letters, among

them some copies of the English Mercury, dated 1588, purporting to give first-hand information

about the Spanish Armada. These latter, how¬

ever, have been proved to be forgeries, executed about 1766. Although printing was introduced

in England as early as 1477, the first periodical did not appear till nearly 150 years later. Noth¬

ing could be printed except under the jealous

eye of a censor appointed by the Crown, and

the publication of news was an offense against the State. The vendor or distributor of news

was regarded as a miscreant and punished as

such. Yet this stringency did not prevent the

importation and surreptitious circulation of

corantos, novellas and gazets published in Latin and other languages on the Continent of Eu¬

rope. In May 1622 the government sanctioned

the publication of a weekly periodical dealing

with the German (Thirty Years') war. About

1624 it was proposed to issue an official period¬

ical, but nothing was done in the matter till 1665, when the Oxford Gazette — afterward re¬

named the London Gazette (official) was

founded. That publication has appeared regu¬

larly ever since on Tuesday and Friday even¬

ings. In 1642 a variety of publications ap¬

peared, but these were not entitled to the name of newspapers. The first real English news¬

paper, The Public Intelligencer, established by

Sir Roger L'Estrange, appeared in 1662,

and then only at irregular intervals. It lived about three years. In 1680, under Charles II,

the printing of newspapers and pamphlets was

entirely prohibited, but on the abolition of the press censorship in 1695 regular newspapers

sprang into existence. For the next 130 years

the history of English journalism is that of a perpetual struggle against heavy and arbitrary

imposts, for successive governments retained

the powerful weapon of taxation. A stamp

duty was imposed in 1711 charging a penny (2

cents) per sheet and a halfpenny per half

sheet. The duty was raised to three cents per copy in 1776, four cents in 1789, five cents in 1794, seven cents in 1797 and eight cents in

1815. The tax was reduced again to two cents

(one penny) in 1836, and entirely abolished in 1855. In addition to the stamp duty, a tax

(abolished 1853) had also to be paid on every advertisement which naturally made the news¬

paper an expensive luxury. The price of the

paper rose proportionally with the tax, and dur¬

ing the first half of the 19th century the daily paper cost as much as

seven pence (14 cents).

Hence newsagents used to hire out papers to

different clients at two cents per hour for the first two or three days, and then sell them in the provinces at a reduced rate, by which time the copies were well thumbed and a week old.

The paper duty, another impost — on blank

paper — was finally repealed in 1861 and the

last ((tax on knowledge® removed.

The first English daily paper, The Daily

Courant, appeared in 1702; and the first Sunday papers, The British Gazette and The Daily Mon¬

itor in 1780. The Dublin Newsletter (1685)

was the first Irish newspaper, and the Mercurius Criticus . (1651), a reprint of a London

Mercurius, the first to be printed in Scotland.

Before entering into a description of the

English Press as it exists to-day, mention must be made of some of the hardy — even tough —pioneers of English journalism. Their path

was not so rosy and remunerative as is that of their successors of the 20th century. They suf¬

fered persecutions almost as malicious and cruel as did the religious leaders of the Middle Ages.

Those early editors, writers and publishers spent much of their time in prison; yet even vermin-infested cells and low diet, punishments, heavy fines and personal mutilation failed to repress the ardent disciples of the new art of journal¬

ism. They served their sentences, paid ‘the fines and stood in the public pillory to be pelted

with stale eggs and vegetables. Nevertheless,

they continued to abuse profligate kings and

princes ; they denounced ministers and political jobbery; ventilated the scandals of the aristoc¬

racy, misappropriation of public funds, blunders of generals or admirals, and the maladministra¬

tion of justice. Not infrequently writers on

opposition papers turned their weapons of

satire and invective against each other. Thus

one journal would refer to <(our blubber-headed contemporary the …® ; another to <(that

squirt of filthy water the Daily … ® ; or <(that slop-pail of malice and ignorance the

Weekly …® These are verbatim examples

quoted in The Times of the later 18th and early 19th centuries. But however much they dif¬

fered on the polemics of the day, they were at all times unanimous in defending the freedom

of the press and the right to express their opin¬

ions, no matter how distasteful those opinions

might be to those in high places. It was consid¬

ered an essential of good government in those

days to suppress all criticism against the rulers of the state. In his ideal community, Utopia,1*

Sir Thomas More (d. 1535) considered such

criticism worthy of the death penalty.

Among the early <(stars® of English jour¬

nalism were John Thomas, who was the first to print independent parliamentary news (1641) ;

Samuel Peck, the socalled (<Father of the Eng¬

lish Press,® who first wrote a ((diurnall® of

purely English news about 1650; John Dilling¬

ham invented the leading article or <(editorial,®

one of which landed him in prison in 1645 ;

Henry Walker was Cromwell's (<special re¬

porter® ; he began in business as a hardware

dealer, became an ordained minister, was ex¬

pelled from the church and finished up his

career as the most popular and most unscrup¬

ulous journalist of his day. Quite a number of black sheep made their way into journalism

during the 17th and 18th centuries, men whose

chief stock in -trade consisted of filth, slander, abuse, blasphemy, unctuous adulation and even

incitement to murder. Not a few of them,

either from utter lack of principle or force of circumstance, frequently changed their opinions

and wrote now for, and then against, any prom¬

inent person or public policy. Of such a class was Marchmont Nedham, the last of Crom¬

well's editors, who was hired at $500 per annum to defend the executioners of Charles I. His

Mercurius Politicus was founded in 1650 for

that purpose ; the poet Milton is generally sup¬

posed to have contributed to its columns. John GREAT BRITAIN — ENGLISH NEWSPAPERS (43)

Goodwin, the Nonconformist preacher, de¬

scribed Nedham as (<an infamous unclean per¬

son, next the hangman.® General Monck ap¬

pointed his brother-in-law, Sir Thomas Clarges,

a druggist by trade, to start a party paper.

The editor or ˆauthor® chosen for this publica¬

tion was Henry Muddiman, who is described in

Pepys' (Diary > as <(a good scholar and an arch rogue.® Nevertheless, Muddiman was perhaps

the leading journalist of the century in regard to achievement and influence in those stirring

times. An excellent account of his life is given in the London Times of 10 Sept. 1912. The

notorious Titus Oates also employed a band

of hireling <(scriveners.® Other prominent

newspaper contributors were Daniel Defoe, the

author of (Robinson Crusoe) ; Dean Swift,

Bolingbroke, Henry Fielding, Nathaniel But¬

ter, Steele, Addison, Dr. Johnson, *etc.* To a

later period belong Edmund Burke, Cobbett and

Wilkes, who combined politics with journalism.

It was Burke who made the first attempt to

present the history of the world in an annual periodical in the (Annual Register,* which he

founded in 1759, writing the first two or three volumes almost entirely himself. That inval¬

uable work has appeared regularly now for 158

years ; it is the property of Messrs. Longmans, Green and Company. A shining example of

anonymous English journalism is the collection

of articles known as the (<Junius Letters®

(q.v.), the authorship of which has never been satisfactorily established.

It may be roughly asserted that up to the

dawn of the 19th century journalism in England was generally regarded as a more or less dis¬

reputable profession; with some few honorable

exceptions the writers were either mercenaries

or violent partisans, or else had axes of their own to grind. The first real stimulus in Eng¬

land toward an honest, incorruptible press,

fearless and outspoken regardless of conse¬

quences, was given by The Times (London).

Near the middle of the 19th century it grad—

uallv became more and more a custom for

((the better class® of public men and eminent

writers to contribute to newspapers, expressing

their opinions or publishing reviews. Thack¬

eray reviewed Carlyle's (French Revolution in

The Times (3 Aug. 1837) ; Disraeli (Lord

Beaconsfield) wrote the (Runymede Letters)

anonymously in 1836; Charles Dickens wrote

a powerful letter condemning public executions

(14 Nov. 1849) ; Carlyle wrote on Mazzini and some of Tennyson's poems first appeared in

the same journal, while Cabinet ministers were

not averse from appearing in its columns. In

later years, journalism rose to a high dignity in Great Britain. Its disciples have been desig¬

nated (by Burke) ((The Fourth Estate of the

Realm,® and many have deservedly gained high

honors and distinctions. The late Lord Salis¬

bury, Premier and Foreign Secretary, at one

time wrote editorials on foreign affairs for

The Standard; the father of Lord Halsbury,

late Lord High Chancellor, was the first editor of that paper; the Rt. Hon. Sir Edward

Clarke, K. C., contributed many of the literary reviews for it in the early 60's, while Alfred Austin, the late Poet Laureate, and G. A.

Henty, the well-known writer of boys' stories,

served on the staff for many years. Sir Fred¬

erick Wedmore was the art critic for nearly

40 years and Sir John Foster Fraser its Parlia¬

mentary representative. Earl Curzon, former

viceroy of India, was once a correspondent of

The Times ; Sir William Russell was its re¬

porter in the Crimean War; Lord Sydenham

its military expert; Sir Donald M. Wallace,

K.C.I.E., and Sir Valentine Chirol were suc¬

cessively directors of its foreign department

Lord Milner, formerly High Commissioner for

South Africa, was assistant editor of The Pali Mall Gazette under the late W. T. Stead. The

late Lord Glenesk was proprietor of The Morn¬

ing P ost ; the late Lord Burnham raised

The Daily Telegraph from a moribund concern

to the first rank among London dailies. With

other London and provincial editors, journalists and proprietors who have been decorated purely

in recognition of their journalistic achieve¬

ments, the list could be considerably extended

Particularly interesting is the story of the

Harmsworth brothers, one of whom is now

Lord Northcliffe and the other Lord Rother—

mere. In 1881 Mr. (afterward Sir) George

Newnes founded a penny weekly paper of light

reading named Tit-Bits, which became an in¬

stantaneous success; Mr. Alfred Harmsworth

(Lord Northcliffe) followed seven years later

with a similar publication, Answers, and in

1890 Mr. C. A. (now Sir Arthur) Pearson

founded another journal of the same type,

Pearson's Weekly. All three papers climbed to

enormous circulations, stimulated by competi¬

tions such as (<missing word,® ((limericks® (after¬

ward pronounced illegal) and guessing the

birth rate for London three months in advance.

Prizes as high as $5,000 each were offered, in one competition there were so many correct

answers that Messrs. Harmsworh added several

thousand dollars to enable each winner to col¬

lect 10 shillings and sixpence ($2.50). Sir

George Newnes built up a great publishing

business confining itself to books and maga¬

zines. In 1896 Mr. Harmsworth founded The

Daily Mail, a onecent paper which now claims

a circulation of over a million copies per day ; Mr. Pearson followed in 1900 with the onecent Daily Express, which also quickly found an

enormous circle of readers. In 1904 Mr. Pear¬

son acquired The Standard and its adjunct The

Evening Standard for $1,500,000; the former pa¬

per ceased publication in 1916, a victim of the war; and the latter has passed into other hands.

In 1908, as the result of a lawsuit brought by one of the shareholders, The Times was formed

into a limited company and Lord Northcliffe

secured a controlling interest. Among the

proprietors of that famous paper are numerous

descendants and relatives of the original

founder, John Walter; the fifth in line of suc¬

cession, John Walter the fourth, son of the

last chief proprietor, Arthur Fraser Walter

(d. 1910), is chairman of The Times Publish¬

ing Company. Sir Arthur Pearson, who had

suffered for years with an affliction of the

eyes, is now blind; he has retired from journal¬

ism and dedicates his energies to ameliorating

the condition of soldiers who lost their sight in the European War. The Times is the sec¬

ond oldest London newspaper. It is regarded

— in England at least — as <(the greatest paper in the world.® Certainly no journal bas a more romantic history behind it, or exerted a more

world-wide influence. Founded in 1785 as The

Universal Daily Register by John Walter, a

prosperous coal merchant, its title was changed 316

in 1788 to The Times. For a libel on the

Duke of York, Walter was fined, imprisoned

and condemned to stand in the pillory (1789).

Under John Walter 2d (1776-1847) the paper

rose to the great eminence it has since enjoyed.

Originally printed “logographically® from

wooden blocks. The Times was the first news¬

paper to be printed by steam, in 1814. During the Napoleonic wars John Walter established

his own system of continental couriers and had his own sailing vessels to convey dispatches

across the Channel. He had the first “special

correspondent® at Tilsit in 1807, and sent the first war correspondent, Henry Crabb Robinson,

to the Peninsular War in 1808. Proprietor,

editor and business manager combined, Walter

was fearless of authority, incorruptible and

entirely indifferent to profit or loss; he instilled a wholesome respect for his journal among the

ruling classes, not only in England, but through¬

out Europe. The oldest daily in London is

the Morning Post (1772), which, with the Daily Telegraph (1855) runs the leading paper close

in excellence of style and lavish expenditure

on foreign news. The Daily News (1846) and

the Daily Chronicle (1855) were reduced from

a penny to a halfpenny in 1904, and are widely read by the working classes. In 1906 Mr.

Franklin Thomasson, M.P., started The Tri¬

bune, a magnificent production (daily) which

only existed two years, after $2,000,000 had been sunk in the venture. The evening press of

London consists of the Conservative Pall Mall

Gazette — formerly the property of Mr. W. W.

(later Lord) Astor, of New York; the Evening

Standard, the Globe (1803), Evening News,

the Liberal Westminster Gazette and the Star.

Nearly all of them are published in or close

to Fleet street, perhaps the most interesting

and romantic thoroughfare in the world.

Though just over a quarter of a mile long, it contains offices of all the important papers of the empire, of the United States, China, India, Siam, Russia, Germany, France, *etc.* Fleet

street is haunted by memories of many writers; its history is a history of the personalities of English literature. Not only Dr. Johnson,

Oliver Goldsmith, Charles Lamb, Izaac Walton

and Alexander Pope frequented its old “coffee

houses,® but (<the ghosts of most of our literary men, famous and unknown, are to be found

there,® The great Delane of the Times lived

there; Charles Dickens edited the Daily Nezvs;

Edmund Yates The World, Sir Edwin Arnold

the Daily Telegraph, Henry Labouchere con¬

ducted Truth, Sir F. C. Burnand and now Sir

Owen Seaman Punch, W. T. Stead ran The

Review of Reviews and The Pall Mall, Justin

McCarthy the Morning Star, to say nothing of

the host of anonymous writers, artists, critics and literary adventurers. The fascination of

Fleet street is irresistible; it is strewn with the wreckage of unachieved ambitions and has

provided fortunes and fame for the successful

minority. It is a tradition that once Fleet

street is entered by the predestined journalist, it quickly grips him body and soul, and nothing will shake his faith that success does not await him around the next corner. London is rich

in Sunday and weekly papers. Of the former,

the most prominent are the Observer, Sunday

Times (no connection with the other paper of

that name) ; News of the World, Lloyd's

Weekly (enormous circulation throughout the

British empire) ; Weekly Dispatch, The Referee

and The People. The more sedate weeklies

are the Spectator, the Saturday Review, the

Athenceum, the Academy, and the British

Weekly; the Illustrated London News and the

Graphic have a world-wide reputation as old

established and high-class journals; the Era is devoted to the theatrical and musical profes¬

sions, the Lancet to medicine and surgery;

Vanity Fair to social affairs, literature, sport, etc., and the great humorist, Punch, is too well known to need description. Notes and Queries

(established 1849) is one of the most interest¬

ing journals for scholars; the Sphere, the

Queen, the Tatler and the Bystander are also

excellent illustrated papers (weekly) ; John Bull is a penny weekly of a strong radical type. The sporting fraternity is catered for by the daily Sportsman and Sporting Life ; the liquor inter¬

ests are upheld by the Morning Advertiser,

while Truth devotes its energies to exposing

frauds; it has fought more libel actions than

any other paper in existence, and has won most of them.

The provincial press of Great Britain num¬

bers many influential organs, foremost among

them being the Mancheser Guardian, the Liver¬

pool Post , Birmingham Post, Newcastle Daily

Chronicle, the Scotsman, Freeman's Journal

(Ireland), *etc.* They have enormous circula¬

tions and cover wide districts, besides which

all the London papers are rushed to every part of the United Kingdom by special trains each

morning. It is only during recent years that

British journalism has dropped the veil of

anonymity which hid the identity of writers.

In many cases, of course, it was well known

who wrote certain articles on certain papers.

Thus all the world knew that the Times repre¬

sentative in Paris was the great Blowitz ; that “Dagonet® of the Referee was — and still is —George R. Sims, that “Toby, M. P.,® was Sir

Henry Lucy, *etc.* In one particular respect the British Press differs considerably from the

American. No British paper — or contributor

— would ever think of copyrighting small,

amusing trifles or “specials® regularly written

under a real or assumed name. One very

rarely sees anything marked “copyright® in the

British press; it would have to be something

very important indeed to deserve that distinction, or have been written by some great per¬

sonage, in which case (Kipling frequently) it is, marked, “Copyright in the United States.®

It can be said without fear of contradiction,

that British journalism is on the whole thej

purest institution of its kind in existence. Its devotees with very few exceptions aim to find

out the true state of facts, to report them with fidelity, to apply to them strict and fixed prin¬

ciples of justice, humanity and law; to inform, as far as possible, the very conscience of the nations, and to call down the judgment of the world on what is false, or base, or, tyrannical.

Bibliography. — Andrews, A., (History of

British Journalism from the foundation of the

newspaper press in England to the repeal of

the Stamp Act in 1855) (London 1859) ; Bell, W. G., (Fleet Street in Seven Centuries) (Lon¬

don 1912) ; Bourne, H. R. Fox, (English News¬

papers, Chapters in the History of Tournalism)

(London 1887) ; Chancellor, E. B., (The Annals of Fleet Street: Its Traditions and Associations) (London 1912) ; Dasent, A. I., (John

Thaddcus Delane, Editor of The Timesˆ (Lon¬

don 1908) ; Grant, J., (The Newspaper Press*

(London 1871) ; Hatton, J., journalistic Lon¬

don* (1882) ; Hunt, (The Fourth Estate* (Lon¬

don) ; Lucas, R. J., (Lord Glenesk and the

Morning Post * (New York 1910) ; Pebody,

(English Journalism* (London 1882) ; Plum¬

mer, (The British Newspaper Press) (London

1876) ; (Progress of British Newspapers in the 19th Century* (London 1902) ; Williams, J. B., (A History of English Journalism to the Foun¬

dation of the Gazette * (London 1908) ; Sell’s dictionary of the

World's Press) (London

annually) ; Mitchell's and Willing's Press Di¬

rectories (annual). Consult also The Times of

10 Sept. 1912 (Printing Number). Three

charming novels of Fleet Street life are Philip Gibbs, (The Street of Adventure) and (01iver's

Good Women * ; also Alphonse Courlander's

(Mightier than the Sword. *

Henri F. Klein,

Formerly Librarian of The Times and many

years on editorial staff of The Standard.

44. THE TREND OF THOUGHT AND

LITERATURE IN THE 19TH CENTURY.

General Characteristics. — An almost unprece¬

dented development or expansion of intellectual

energy characterized the opening years of the

19th century in Great Britain. The emancipat¬

ing influences, which had produced the French

Revolution, were then working in England at

their acme of strength, and were generating an intellectual as well as a political and social reformation, which steadily gathered force as

the century grew older. The new tide of

thought found at the outset its loftiest manifes¬

tation in purely imaginative literature. The

mighty revival of imaginative literature, amid

which the century opened, is only comparable

with that of the age of Shakespeare. The

highest intellectual energy of the nation seemed to find, at the beginning of the epoch, its com¬

plete and most congenial expression in the de¬

partments of poetry and fiction. Between the

years 1800 and 1825 the works of Wordsworth,

Shelley, Byron, Coleridge, Keats, Jane Austen

and Sir Walter Scott were the chief triumphs

of the intellectual movement which was clarify¬

ing man's mental vision and remodeling his

aspirations.

After the first quarter of the century the

creative literary activity of England showed

some signs of exhaustion. But the ebbing was

then of short duration. The tide of intellectual energy in the sphere of literary endeavor

quickly rose again. The torch that had been

lighted by Wordsworth and Shelley, Byron and

Scott, Lamb and Coleridge, soon flamed anew

in the hands of Tennyson and Browning, of

Dickens and Thackeray, of Macaulay and

Carlyle, of Ruskin and Matthew Arnold.

With the sixth decade of the century, a radi¬

cal change came over the intellectual horizon of the nation. The intellectual spirit no longer

contributed the whole of its richest sustenance to the field of great imaginative writing. It

long continued to nourish splendid imaginative

effort ; only when the century closed did the

purely imaginative energy, which had flowed on

almost continuously from the first, grow slug¬

gish and tame. But midway throueh the cen¬

tury the intellectual spirit proved fertile enough to produce in new

ond and a very different type of intellectual

fruit. During the last five decades, the intellec¬

tual spirit gave a fresh and unexampled impetus to scientific inquiry and to speculation concern¬

ing the character and capacity of all animate

and inanimate nature. For a generation the

poets and novelists, the critics and historians, divided the honors of intellectual exertion with scientific investigators like Darwin, Wallace,

Huxley and Tyndall, and with philosophers like

John Stuart Mill, Herbert Spencer, Thomas

Hill Green and Leslie Stephen.

When the century was reaching its end, the

spirit of scientific inquiry was producing no

triumphs so heroic as those associated in the

middle years with the names of Darwin and his disciples. But scientific energy was at the close of the epoch still giving notable proofs of

activity, while literary energy was comparatively torpid. In the last half of the period science and pure literature may fairly be credited with having slowly changed their relative places in

the empire of the British intellect. Pure litera¬

ture which held the place of predominance at

the beginning of the era yielded it to science before the end. The mass of available intel¬

lectual energy which had gone at the outset to the making of poetry and fiction, of history and criticism, was ultimately diverted to the

cause of science. In general terms, the gradual and

peaceable succession of science to the throne

which had been occupied by imaginative litera¬

ture may be said to mark the trend of British thought and literature in the 19th century.

Homogeneity of the Imaginative Effort. —

For the purpose of detailed study of the litera¬

ture of the century it might be convenient to divide it into four chronological sections — each corresponding with one quarter of the period.

But there is an essential homogeneity about the whole of the century's literary effort, which

renders chronological division undesirable in a

brief survey. Specious grounds may be urged

for separating the century, in however rapid a general view of its thought and literature, into at least two periods, the one ending and the

other beginning at the accession of Queen Vic¬

toria in 1837. In 1837 the literary giants of the opening years of the century either were dead

or had ceased to write. Among poets, Byron

(1788-1824), Shelley (1792-1822), and Keats

(1795-1821) had passed away. Wordsworth

(1770— 1850) had ceased to be a poetic force, save in the sight of admirers more zealous than discreet. Of writers of fiction, Jane Austen had been dead 20 years and Sir Walter Scott five.

Among essayists whose work conferred on the

literature of the century one of its most dis¬

tinctive charms, Charles Lamb, the genial king

among such literary artificers, did not survive beyond 1834; Hazlitt died in 1830, and although De Quincey and Leigh Hunt lived more than 20

years longer, their best work was done in the pre-Victorian epoch.

But there is no genuine philosophic ground

for detaching the work of these heroes from

that of their successors. The writers of emi¬

nence, who have exclusive right to the epithet Nineteenth Century or Victorian, prove after

allowance has been made for individual idiosyn¬

crasies which in great literature count for much, to belong in spirit to the age of their immediate predecessors. They sought expression for their

thought in forms not essentially different from 318 GREAT BRITAIN — THOUGHT AND LITERATURE 19TH CENTURY (44) those to which their predecessors devoted

energies, and their thought showed no new de¬

parture. It still breathed that faith in the dig¬

nity of mankind, in its inalienable right of ra¬

tional liberty and in the greatness of -the human destiny which was the outcome of the French

Revolutionary spirit, at the same time as it paid respectful homage to surviving tradition of the great art and literature of a more distant past.

Tennyson (1809-92) who shares with Robert

Browning (1812-89) the first place in the poetry of Victorian England, is nearly at all points

Wordsworth's successor. Like Wordsworth he

was in sympathy, through his prime, with the

political and philosophic enlightenment of his

era. It was this which he sought to interpret in his verse. He was a careful observer and a sympathetic expositor of inanimate nature. He

had Wordsworth's command of poetic diction

and melody, and also, it is to be admitted,

Wordsworth's tendency to bathos and common¬

place, in spite of his keen ear and sense of form.

Browning — the twin-peak with Tennyson in the

range of Victorian poetry — presents a stronger individuality. He is less closely allied to the writers who flourished in his early youth. But in many of his most striking characteristics, — in the subtlety of his power of psychological analy¬

sis, in his robust optimism, in the universality and activity of his interest in current life and literature, in his predilection for study of past history and biography, and even in his indiffer¬

ence to the graces of form which degenerated

with him at times into a barbarous grotesque¬

ness — in one or other of these regards Brown¬

ing betrayed kinship with Coleridge, Byron,

Landor and Scott.

Third in the list of those Victorian writers

of the imagination, whose lives wholly belonged to the 19th century, stands Matthew Arnold

(1822-88). As a poet Arnold marched under

the banners of Wordsworth and Shelley; as a

critic in prose he was at some points more

subtle and less sympathetic, and at other points clearer-eyed and less prejudiced than Lamb or

Hazlitt. But the distinctions between Arnold

and the earlier essayists of the century are due not so much to difference of epoch or of innate temperament. They are attributable rather to

the idiosyncrasies that come of accidental di¬

vergences in youthful training and environment.

Arnold's native heritage of genius bore an aca¬

demic impress owing to his association with

Rugby, a great public school of which his father was a distinguished headmaster, and with Ox¬

ford, the University whose traditions and tem¬

per he permanently assimiliated as a young man.

Had Lamb and Hazlitt enjoyed Arnold's youth¬

ful experiences, their style and sentiment are

likely to have worn Arnold's colors. They were at one with each other in their ultimate concept tion that the aesthetic sense was the sense best worth developing in human life and thought.

The three poets whose genius first blossomed

midway through Queen Victoria's reign, Dante

Gabriel Rossetti (1828-82), William Morris

(1834-96) and Algernon Charles Swinburne

(b. 1837), all to some extent inherited and de¬

veloped the tradition of Keats. Rossetti and

Morris were painters as well as poets. The

former was a leader of the pre-Raphaelite move¬

ment, which sought to reproduce in art the

simple beauty which distinguished pictorial ef¬

fort of the early Middle Ages. As poets, Ros¬

setti and his friend Morris sought their affinity in the sphere of mediaeval romance, whence

both Keats and Sir Walter Scott had drawn

with differing motives much inspiration. Ros¬

setti was almost as great a master of the sonnet as his teachers Wordsworth and Keats, and he

and Swinburne improved on Keats's and

Tennyson's aptitude to suggest in metre new

and subtle harmonies of music. Swiaburne, at

the opening of his career, seemed to graft on the sensuous influences of Keats the voluptuous temper of Byron. He cherished the wild as¬

pirations which were bred of the French Rev¬

olution. The poetry of Swinburne's youth

ranks among the century's literary glories. He

alone of his poetic school still survives. But his late work has hardly sustained the promise of his rebellious early years. The unimagina¬

tive spirit of the second half of the century would seem to have discouraged and repressed

his poetic development.

The seventh great master of Victorian liter¬

ature, whose work in spite of the varied aim

may best be classed with literary products of the imagination, was John Ruskin (1819-1900), who

in that field survived all masters of his gen¬

eration, save Swinburne. Ruskin has, like

Rossetti and his friends, some claim to be num¬

bered with the disciples of Keats. He devoted

himself to expounding an aesthetic philosophy,

the germ of which is discernible in Keats's

poetry. He gave a very wide interpretation to

the attributes of beauty, which he identified with excellence in every kind of human endeavor.

In his voluminous writings he sought to define the place that beauty and its manifestation in art ought to fill in human economy. His clarity of style, imaginative insight, and assertive per¬

sonality invested all his literary work with fas¬

cination. But he owes his chief importance in

the history of the 19th century thought and

literature to his masterly interpretation, analysis and application of the aesthetic principles which underlie the most characteristic achievements

of the great writers belonging to the generation that preceded or was coincident with the date

of his own birth.

Fiction and Drama. — In fiction it might ap¬

pear as if the spirit which colored manifesta¬

tions in the early years of the century perished before the later or even the middle years were reached. The centre of gravity may seem at any rate to have shifted somewhat violently between the dates of (Sense and Sensibility,* <Waverly) and ˆVivian Grey) on the one hand, and of

(David Copperfield,* (Adam Bede) or (Vanity

Fair* on the other. Still wider may seem the

interval between <Romola,) (Esmond, ’ and

(Barnaby Rudge,* and (Harry Richmond,*

<Jude the Obscure,* and (Dr. Jekyll and Mr.

Hyde.* But all the masterly fiction of the cen¬

tury aims, through different avenues, at a like goal. It seeks the exact, the vivid, the sympa¬

thetic and for the most part the optimistic rep¬

resentation in narrative of the complexities and perplexities of human life and feeling. Whether the novelist rear his structure on historical re¬

search or on autobiographical experience, on

careful observation of contemporary society, or

on imaginative speculation into human poten—

tialties, his success is due to his power of com¬

bining in his chronicle artistic presentment of facts of experience with sane and practical in¬

terpretation of thought and impulse.

None of the great novelists of the 19th cen¬

tury failed at one or other period of their

careers to emulate Sir Walter Scott's method of seeking in history material through which to

work out their ambitions. Scott concentrated

on the historical novel a mass of learning and a wealth of intuition which no successor in¬

herited. But the spirit which animated his

achievements in the art of fiction lived, albeit in attenuated condition, in the labors of Charles Dickens (1812-70) and William Makepeace

Thackeray (1811-63), of George Eliot (1819—

80) and Robert Louis Stevenson (1850-94).

Thackeray reached the highest point of his

career as an artist in fiction when he produced (Esmond,* a story of the time of Queen Anne.

Dickens in (The Tale of Two Cities) and in

(Barnaby Rudge) brought all the vigor of his

genius to vivify historic episodes of the century preceding his own. George Eliot proved herself

more scholarly and more laborious, and there¬

fore less successful than Dickens or Thackeray, when she sought in Romola to evolve a romance out of the history of the Florentine reforma¬

tion. Robert Louis Stevenson, master of the

most picturesque style among novelists since

Laurence Sterne, made his most sustained bid

for reputation by pursuing in the chronicles of Scotland the historical

trail. The same category embraces the most notable work of lesser lumi¬

naries like Bulwer-Lytton, Charles Kingsley

and Charles Reade, with each of whose names

an historical novel of eminence has to be asso¬

ciated.

Not that the novel of current experience

failed to flourish in increasing luxuriance as

the years of the century grew. The cultivation of fiction which reflected the foibles and aspira¬

tions of contemporary society, absorbed

throughout the epoch literary genius of the most varied and conflicting types. The most con¬

spicuous laborers in this field of endeavor werq, during the early years, Jane Austen and Dis¬

raeli, while their successors included Charlotte Bronte, Dickens, Thackeray, Trollope and

Charles Reade during the middle years of the

century and George Meredith and Thomas

Hardy during the last years. The century's

yield of fiction in all its forms far exceeded in quality and quantity that of any earlier epoch.

The stream was continuously replenished and it

maintained till near the end a level approxi¬

mating to that of the first days. But even in fiction the creative energy failed to intensity as the epoch closed.

The drama was the only field of imaginative

literature in which England of the 19th century failed to secure conspicuous and lasting

triumphs. The standard of excellence which

Shakespeare set in the 16th and early 1 7 th cen¬

turies was not likely to be reached again. But the dramatic productions of the 19th century

proved of smaller value than the efforts of the 17th or 18th century, which, despite their in¬

feriority to Shakespearean drama, maintained a

level of permanent interest. No writer of

comedy in the 19th century is comparable with

Sheridan, not any writer of tragedies with Dryden or Otway. Writers like Browning and

Swinburne, who devoted poetic genius to tragic

or romantic drama, never acquired mastery of

the true dramatic temper which belongs to the

art of the theatre. They proved themselves

capable of fine poetic declamation and were

skilled in the use of poetic language, but their efforts resulted in the production of dramatic

literature for the study rather than of drama for the stage. Bulwer-Lytton, Sheridan Knowles,

Tom Taylor and T. W. Robertson are the only

English playwrights of the early or central years of the 19th century any portion of whose work lived after its original production in the theatre.

Taylor and Knowles essayed romantic drama.

Lytton and the rest won their chief fame in the comedy of manners. But immortality was de¬

nied them. None of these men courted with any effect the muse of tragedy. Such plays of theirs in the vein of comedy or romance as retained

their vogue in a succeeding generation quickly

lost the savor of freshness and seemed to

breathe in a very short space of time an anti¬

quated or a faded atmosphere. Their fame soon

flickered. A chief cause of the failure of drama to attract during the 19th century any substan¬

tial or efficient part of the literary genius of the era doubtless lay in the competing claims of the novel The growing complexity of life and

thought rendered it increasingly difficult to give, in the brief and graphic terms of drama, per¬

manently satisfying expression to the com¬

plexity of current aspiration and speculation.

The art of fiction is freer of conventional re¬

strictions than dramatic art, and gives fuller

scope to endeavor, which seeks to interpret

variegated experience and manifold human

effort.

Carlyle and Macaulay. — The 18th century

not only won its literary triumphs by virtue of the exercise of the imagination in poetry and

romance. Throughout the century history and

criticism, in which the imagination plays a more limited part, were flourishing conspicuously.

Henry Hallam (1777-1859) produced between

1818 and 1837 three solid historical works, which anticipated many of the characteristics of the

new historical school in England. They were

for the most part genuine studies of original au¬

thorities and although they betrayed a whig

political bias were conscientious endeavors to

present the facts fairly. A robust common-sense atoned for the lack of sympathetic im¬

agination or broad philosophical temper. But

Hallam's labors stand apart and lay for the most part outside the main contemporary currents of

intellectual effort. The two representative

practicers of the arts of history and criticism in the 19th century — Carlyle and Macaulay — were

possessed of far greater literary genius th.in

Hallam and exerted a wider influence. Both

were long lived. Their work was well begun

before Queen Victoria commenced to reign ; it

continued long after. Carlyle was born five

years before the end of the 18th century and

died in 1881. Macaulay was born in the first

year of the last century and died in 1859.

Carlyle is one of the most distinctive figures in the whole range of

literary activity in the 19th century with which his life was almost co¬

terminous. He was thoroughly imbued with the

large ideas of man's social perfectibility to which the leaders of the French Revolution gave ex¬

pression in their cry for liberty and fraternity.

But he was at the same time a potent and cen¬

sorious foe of many of the social tendencies

which the French Revolution set in motion. He

warned his contemporaries of the dangers in¬

separable from the leveling spirit of a demo-

 cralic age, with a greater practical effect than any man of letters has compassed before by dint of mere passive penmanship. To Carlyle's es¬

says and lectures may in part be attributed that definite recognition of the limitations inherent in a purely democratic ideal, to which, in the earlier decades of the century, the eyes of the mass of Englishmen seemed closed.

Carlyle's finest literary work was done in the fields of history. He toiled complainingly in

the dry-as-dust repositories of historical learn¬

ing, but he did not take so wide a view of the historian's fiction as the greatest of the British historians, Gibbon, nor were his researches so

exhaustive or so multifarious as the more re¬

cent scientific standard of historical investiga¬

tion prescribes. But by force of a rare im¬

aginative insight into human action and char¬
acter, Carlyle recalled to life a series of epi¬
sodes of the past, with a truth and realism
which no poet or novelist, working with un¬
limited right and power of invention, has ex¬
celled in pith and moment. Carlyle's (French
Revolution) (1837) and portions of his Fred¬
erick the Great > (1858-65) set before the
reader historic episodes with something of the
dramatic intensity of the historical plays of
Shakespeare.

At the same time as Carlyle was working
out his destiny, Macaulay was also making
masterly contributions, of not altogether dis¬
similar calibre, to the literature of the century.
Macaulay's knowledge of books and records
was as great as Carlyle's, if not greater, but his historical achievement remains on a lower
plane. He possessed far less imaginative in¬
tuition. His mental horizon was limited by
temporary conditions of current political con¬
flict. His conception of historic fact was
colored by partisan prepossessions, which,
viewed in relation to the great destinies of

the human race, seem puny, and in a historian, tend to unveracity. Carlyle and even Gibbon

had strong prejudices, but their native senti¬

ment was cast in a lar-ger mold. Their pre¬

conceptions left the historical spirit in the main unclouded.

In style Carlyle and Macaulay were as the

poles asunder. The spasmodic irregularity of

the one has nothing in common with the dis¬

ciplined orderliness of the other. Macaulay's

influence on the English prose style of the cen¬

tury has been far greater and on the whole more beneficial than Carlyle's. Carlyle's style was a bow of Ulysses, which none but himself could

bend. In other hands it became an implement

of burlesque. Macaulay's style which was less

impracticable, inherited and developed many of

the best features of the prose of the 18th cen¬

tury. It was mainly characterized by a direct¬

ness and an emphasis which often grew into

brilliant and stirring eloquence, although it in¬

clined at times to monotonous rigidity, and at times to declamatory violence. It proved a dan¬

gerous style for purposes of servile imitation.

The habit of insistent emphasis is apt to degen¬

erate among the incompetent into bombast. At

the same time the discreet and intelligent as¬

similation of Macaulay's prose tends to clear¬

ness and point without appreciable sacrifice of grace. Toward the end of the century a pass¬

ing reaction set in against the metallic clear¬

ness of Macaulay's diction, and efforts were

made to invest English prose with a subtle

elegance and cloudy preciosity to which it was not naturally adapted. The most remarkable

at such filigree workers in prose was Walter

Pater (1839-94). Another conscious artist in

prose was Robert Louis Stevenson but he was

endowed with a fertile imaginative power which

preserved his style from the vices of pedantry and kept its lucidity intact. Pater devoted

himself to aesthetic criticism which he clothed in a delicate and ornate verbal garb. Pater

often achieved beautiful effects. But the

methods were inseparable from affectations and

conceits, which often render his prose difficult to read with understanding. The irresistible

vogue of Macaulay's prose style ordained that

none should be widely acceptable which failed

at any point in perspicuity. John Ruskin, whose aesthetic criticism covered a wider field than

Pater's, proved, too, that perspicuity in English prose was not incompatible with artistic beauty and pliancy. Affected prose

consequently met

with small encouragement; it was cherished

by coteries and did not color the broad cur¬

rents of the century's literature.

The Scientific Tendency. — The trend of

English literature and thought was profoundly

affected by the scientific and philosophic spirit of inquiry which received a triumphant impulse

from the publication of Charles Darwin's Ori¬

gin of Species by Means of Natural Selection>

in 1859, and from the inception of Herbert

Spencer's (System of Synthetic Philosophy,* in

1862. The earlier literary work of the utilita¬

rians, Jeremy Bentham (1748-1832), David

Ricardo (1772-1823), James Mill (1773-1836),

and above all, John Stuart Mill (1806-73), only indirectly touched the imaginative temper of

the times. The topics which the utilitarians

handled were practical matters of social and

political reform, some of which had been sug¬

gested by the French Revolutionary movement.

The larger conceptions of man's physical or

spiritual destiny were for the most part over¬

looked. The statute book of the realm between

1840 and 1874 reflected the economic principles which the Mills and their disciples disseminated, but neither the great poetry nor indeed the

great fiction, bore, in any appreciable degree, trace of the reforming activities or enthusi¬

asm of the utilitarians. Dickens occasionally

expanded in his novels the practical suggestions of the utilitarians, but it was elsewhere, it was in the literary presentation of universal fea¬

tures of human nature, that he rendered his

most memorable service to literature. The

scientific and philosophic movement gathered

its greatest force in the years which followed the revelations of Darwin and Spencer. Tjien

at length the scientific spirit spread to the na¬

tion's literature and affected the matter as well as the manner. On prose style it exerted an

immediate influence. It insisted with a greater force than Macaulay's example commanded on

perspicuity as the main virtue of expression,

and effectually discountenanced whatever was

subtle, obscure or deliberately affected. One

scientific writer, Thomas Henry Huxley, who

championed and developed the Darwinian doc¬

trine, lived on till 1895. Huxley was gifted

with an exceptional clarity of thought and ex¬

pression, and his range of interest in current affairs secured for his writings a wide general

audience. Huxley's labors may be regarded

as an efficient agent in the national development of plain-speaking prose.

As far as the new scientific spirit affected

pure literature, it may be said to have exerted a hampering effect on imaginative effort. Both

George Eliot and Tennyson in their later work

showed proclivities to philosophic or scientific speculation, which encumbered their imaginative

deliverances with scientific terminology. Till

the end of the epoch scientific or philosophic speculation inclined to divide the allegiance of men who were endowed with poetic genius and

to dissipate their energies. William Morris,

whose poetic gifts enabled him to conquer rich fields of pure romance, devoted most of his

energy of his late life to developing theories of social regeneration which had their root in current scientific and philosophic inquiry.

Not that the scientific tendencies of the cen¬

tury went forward without check. Religion at

times called literature to her aid in order to rally her forces for conflict with science. A

specially vigorous attempt was made in reli¬

gious circles by the Oxford movement, of

which John Henry Newman (1801-90) was the

chief literary leader, to stem at the outset the tide of the scientific advance. Newman was a

great man of letters whose imaginative powers

were combined with great delicacy of style in

both poetry and prose. He made contributions

of lasting value to the literature of the century.

But his reactionary efforts failed to restrain the scientific and philosophic impulse of his era, if they did not by their open definance of scientific progress consolidate the champions of free sci¬

entific speculation, and accelerate their victori¬

ous march. An endeavor to effect, on more

pacific lines, a compromise between the oppos¬

ing forces of science and of the imaginative sen¬

timent of religion was made by leaders of an¬

other school of thought which was known as the Broad-Church. That school of thought had no

greater sympathy with Newman's unbending

conservatism than with the revolutionary inde¬

pendence of scientific and philosophic inquiry.

The Broad-Church leaders, Frederick D.

Maurice and Charles Kingsley, were ready and

voluminous writers. But their theological or

philosophic position was logically unsound, and

they failed permanently to affect the trend of contemporary thought, which finally accepted

the scientific sway beyond risk of relapse.

It was in the field of history, of all depart¬

ments of literature, that the scientific spirit most resolutely planted its standard. Workers

in history grew in number as the century closed.

But only one English historian of the period de¬

liberately persisted in the literary tradition,

which Carlyle and Macaulay had dignified.

James Anthony Froude, who died in 1894, alone

practised history as a branch of great literature.

In his historical work he gave free play to. a natural gift of style and a sense of the pic¬

turesque. He treated accuracy of detail or judi¬

cial impartiality as comparatively of small ac¬

count. For the time being, Froude is the last representative of the great literary school of

historians.

It was in the middle of the century that the scientific spirit invaded the province of history and developed a new view of its aims. Facts

were to be accumulated and arranged so as

to illustrate and explain the evolution of civil-VOL. 13 — 21

ized progress. The scientific method of historical inquiry was first put in practise by Henry

Thomas Buckle (1821-62), whose unfinished

ˆHistory of Civilization'* excited great public

interest. The first volume appeared in 1857, the second and last in

1861.

The substantive value of Buckle's labors proved less than he or his admirers anticipated. The field of observation, which he sought to survey, proved too wide for any one man's capacity. His method depended for its success on mastery of minute detail touching every de¬ partment of human endeavor. The quest of omniscience proved fatal. Many of the general¬ izations, in which Buckle's scheme compelled him to take refuge, were either disputable or were confuted by more specialized research. But though Buckle's historical work failed long to sustain its authority, its influence was perma¬ nent. It encouraged the application of scientific method to historical investigation. It raised the standard of historical accuracy. It promoted specialized research. It encouraged concentra¬ tion of industry in narrow fields of historical inquiry.

Six men, Seeley (1834-95), Lecky (1838— 1903), Freeman (1823-92), Stubbs (1825-1901), Creighton (1843-1901), and Gardiner (1829— 1902), were the most conspicuous representa¬ tives of the tendency to pursue in history the methods of scientific accuracy. The order in

which the names are placed here indicates the progressive ascendancy of specialization in historical research. The six men's modes of work differed in detail among themselves. See¬ ley and Lecky sought to graft a broad phil¬ osophic tone on their historical investigations. Freeman, Stubbs, Creighton and Gardiner rarely suffered their minds to stray from their en¬ deavors to accumulate and to test the facts which illustrated the evolution of politics or political institutions. As a consequence the writings of Seeley and Lecky assimilated a finer literary spirit than those of their asso¬ ciates. While the permanent value of the scientific treatment of history is now admitted, there is risk of repelling students by too severe a presentation of the results of research, and it may be that the new method stands in need of a greater infusion of literary art before its credentials will be accepted universally. Gard¬ iner, the latest of the 19th century historians to pass away (d. 23 Feb. 1902), labored with rare self-denial within a narrow range of English political history, the early and middle years of the 1 7th century. He made small endeavor to cultivate the literary graces.

Another indication of the progress of scien¬

tific method in the province of literature is

found in the energy which has of late years

been applied to textual criticism of standard

authors and to the publication of historic docu¬

ments. The British government has undertaken

the issue of state papers, of the muniments of great families and of official records. Private voluntary societies have cooperated in such

endeavors, and with their aid local archaeology has especially been investigated with an unex¬

ampled thoroughness. Other private literary

societies, like the Early English Text Society, and numerous private publishing firms, follow¬

ing the examples set by the presses of. the

great universities of Oxford and Cambridge,

have placed at the disposal of the public, ac-S22

curate texts of the great literary monuments

of the country. In undertakings like the Dic¬

tionary of National Biography and the Oxford

English Dictionary, efforts have been made to

co-ordinate and codify on a large scale the

hitherto scattered fruits of historical, literary and philological research. All these enter¬

prises are tributes to the ascendancy of scien¬

tific method. They bear testimony to the trend of 19th century thought and literature, which

shows during the last half, decay of the

purely imaginative impulse, and advance of the

purely scientific. But there is nothing in the nature of the present situation to preclude the revival in due time of such imaginative energy, as distinguished the first half of the century.

Scientific and imaginative achievements are

complementary fruits of the intellect. They

need not be mutually exclusive. The future is

likely to bring to light an accommodation of

their respective pretensions to mastery in the

realms of thought. There is small reason why

science and pure literature should not flourish in perfect development side by side.

Bibliography. — (The English Poets,5 ed¬

ited by T. H. Ward (Vol. IV) ; Professor

Saintsbury's <History of 19th Century Litera¬

ture* (1905); Essays by George Brimley

(1858) ; Leslie Stephen's (Hours in a Library) (1874-79), and (The English Utilitarians) (3

vols., 1900) ; Professor Dowden's (Studies in

Literature, 1789— 1877 J (1878) ; Forster's <Life of Dickens5; Professor Saintsbury's (Corrected

Impressions,5 (Essays on Victorian Writers5

(1895), and (History of 19th Century Litera¬

ture5 (1896) ; Macready's (Reminiscence and

Diaries,5 edited by Sir F. Pollock (1875); Sir G. O. Trevelyan's (Life and Letters of Ma¬

caulay5 ; Cotter Morrison's (Macaulay5 in Eng¬

lish Men of Letters Series (1882) ; J. A.

Froude's (Life of Carlyle5 (4 vols., 1882-84) ; A. W. Benn's (History of English Rationalism

in the 19th Century5 (1906) ; J. H. Newman's

(Apologropro Vita Sua5 (1864) ; Dr. John

Hunt's (Religious Thoughts in England in the

19th Century* (1896) ; A. R. Wallace's (Won¬

derful Century* (1898), and (My Life* (1905);

Herbert Spencer's (Autobiography 5 (1904);

Darwin's (Life of Charles Darwin5 ; Herbert

Paul's (Life of Froude5 (1905) ; (A Bibliogra¬

phy of the Historical Works of Dr. Creighton,

Dr. Stubbs, Dr. S. R. Gardiner and Lord Ac¬

ton,5 edited for the Royal Historical Society

by W. A. Shaw, Litt.D. (1903) ; Lord Acton's

(Lectures on Modern History5 (1906).

Sidney Lee, *

Editor of the < Dictionary of National Biog¬

raphy?

45. THE BRITISH NAVY. Over a

thousand years ago Alfred the Great fought

and blockaded the Danes with his fleet of

rowing boats. A thousand years later found

Great Britain the not undisputed mistress of

the seas, fighting and blockading the greatest

militarv and the second strongest naval power

on earth. It is a far cry from the wooden

crallevs of Alfred to the huge, steel and iron floating fortresses of the 20th century. Through¬

out all their innumerable wars, the British

people have never had the truth of Tennyson's

ringing words more forcibly brought home to

them that ((the fleet of England is her allin-all,55 than in the gigantic struggle that broke out in 1914. If one were to ask the question, <(What is the cause of the British Navy?55

the answer could be given in one word —

(lgeography.55 The lives of nations, like those of individuals, are governed rather by acci¬

dental circumstances than by design. The ac¬

cident of her geographical position dictated

that England must either become a maritime

power of the first rank or remain the appanage of some other European state. There could

be no alternative between these two extremes

beyond, perhaps, a political status similar to

that of Holland or of Belgium — an independ¬

ent existence on sufferance ((guaranteed55 by

stronger neighbors and liable to revocation.

In so far as the British people had any opinion on the matter, it was well expressed by the

poet Thomson in 1740:

When Britain first at Heaven's command

Arose from out the azure main,

This was the charter of her land,

And guardian angels sung the strain:

Rule, Britannia ! Britannia rules the waves !

Britons never shall be slaves.

In 56 b.c. Caesar prepared the way for his

invasion of Britain by leading an expedition to the estuary of the Loire, where he destroyed

a great fleet massed by the Veneti to oppose

his progress, and included in that fleet was

a British contingent. In the third century of

our era the Roman emperor Maximianus sent

General Carausius to defend the coasts of

Britain against the activities of Scandinavian

pirates. For that purpose he was provided

with a fleet and invested with the title of

<(Count of the Saxon shore in Britain.55 But

Carausius was a pirate himself. He attacked

the sea-rovers, appropriated their plunder, and

wound up by appointing himself Emperor of

Britain. His imperial status was acknowledged

by Rome after he had defeated the Roman

fleet that was sent to chastise him. He ruled the country well for seven years when he was

murdered in 293 a.d. He made Britain an in¬

dependent state and incidentally became the

((father of the British Navy.55 Some 600 years later King Alfred created an organized per¬

sonnel and built vessels that were longer,

higher and swifter than any others. The

Saxon king Edgar (958-975) possessed a con¬

siderable naval force divided into three squad¬

rons stationed in the North Sea, the Irish

Channel and off the north coast of Scotland.

The warships of that time differed entirely

from merchantmen in type of construction, but

as the art of sailing developed, the two be¬

came interchangeable. All the seas then trav¬

ersed being infested with pirates, it was neces¬

sary for every merchant vessel to be armed

and its crews trained to fight. These ships

formed a vast reserve to the standing naval

forces. William the Conqueror granted cer¬

tain privileges to the Cinque Ports (q.v.) on

condition that they agreed to provide a sne—

cific number of manned and armed vessels when¬

ever needed. King John had some vessels of

his own in addition to the feudal squadrons,

but it took many years before a real national or ((Royal55 navy was created. Henry VII,

who reigned from 1485 to 1509, founded the

national dockyards at Portsmouth and Wool¬

wich and also built the first <(two-decker55 in the British fleet, the Henri Grace a Dieu.

A court jester once remarked that it was

better for a country to be ruled by a queen

than by a king, for in the latter case the in¬

fluence of women would prevail, whereas in

the former the ascendancy of men was sure

to make itself felt. Queen Elizabeth illus¬

trated this maxim in a way never contemplated

by the humorist, for it was in her reign that the foundations of England's maritime great¬

ness and of her world-wide empire were laid.

When she ascended the throne England had not

a single possession outside of Europe. The

English navy was small and inefficient ; con¬

sidered apart from privately owned ships the

Royal Navy can hardly be said to have ex¬

isted at all. England was not then <(a nation of shopkeepers,® but a nation of fishermen.

During Plantagenet times England was no mis¬

tress of the seas, hardly even a maritime state.

Occasionally we find Mediaeval England in war¬

times possessing a considerable fleet, which al¬

ways dwindled away again when peace came.

This decay of the navy frequently recurred.

Then, when a new war broke out, the govern¬

ment would issue a general license to all mer¬

chant ships to act as privateers, and those ships responded by becoming pirates. Henry VIII

laid the foundation of the modern Admiralty

by creating the (<Navy Office.® His navy at

first consisted of but one ship — the Great

Harry — a gaudy conception that resembled a

floating circus. At his death he bequeathed a

fleet of 12,500 tons to his successor. The Span¬

ish navy, however, was at that time the finest in the world, for it owed its importance to the

discoveries in America and was kept in an effi¬

cient state in order to guard those recently

acquired possessions in the west. Religion

and America were the great causes of enmity

between England and Spain. Philip II of

Spain was actuated by a double policy — to

crush the new-born Protestantism and to keep

the newly discovered continent across the At¬

lantic for Spain. In fact, until the Reformation Spain and Portugal had practically divided

the New World between them. ((Never since

the Norman conquest had England counted

so small a territory, never were her fortunes

at so low an ebb as when, in the year 1558, the last of the Tudors assumed the reins of

power.® Elizabeth found able assistants in

the mariners of Devon and Cornwall, who were

always ready for adventure and not over scru¬

pulous whether that spirit was satisfied by

voyages of legitimate commerce or by the ex¬

ploits of illegitimate piracy. But whether

genuine traders or bold buccaneers, there is

no doubt that they were mariners who had

no rivals in seamanship. After the Reforma¬

tion, which was carried out in the spirit and according to the methodsˆof those times, a

terrific energy began to seize the English people.

It seemed as though the way across the ocean

had suddenly been opened in all directions to

English ships. The discovery of America and

the West Indies had opened up new opportu¬

nities for exploration and trade. Three na¬

tions grasped the opportunity — first Spain,

then Portugal, then Holland : England came

last. Spain and Portugal had over 150 years'

start of Great Britain, while both Holland

and France were well in advance of her. But

when that country did enter the lists, it was not only ((Westward Ho ! ® that the British flag was carried at the masthead. British ships at¬

tempted the northeast and northwest passages ;

they sailed the Mediterranean — where English

ships had not been seen since the Crusades.

I hey sailed to America and discovered the

coasts and creeks of the North; they sailed

round the cape to India and China; they at¬

tacked the Spaniard wherever they found him;

they plundered his towns and took his ships.

Commercial enterprise, combined with a love

for adventure and the driving force of political necessity, led the hardy seamen of Elizabeth

to the remotest corners of the world. They

cultivated a creed they called the “Idolatry

of Neptune.® Since those ((spacious days® the

British navy runs like a continuous thread

through almost every event in British history;

in every great crisis it appears as the dominant and decisive factor. These early voyages gave

the English sailors a mastery in the art of

navigation and a contempt of danger, thus

forming a valuable education which has ever

stood their country in good stead.

The navy of Elizabeth, however, was only

the British navy in infancy, and the heroes

themselves were not far removed from buc¬

caneers. Raleigh, Drake, Hawkins and their

contemporaries certainly indulged much in

piracy, yet in the minds of these leaders there was also something beyond the mere lust of

gold. They sincerely believed that, if the Prot¬

estant states were to live and prosper, it was imperative to destroy the overwhelming dread

of the Spanish power. The Reformation had

cut England off from the great powers, and

when she sought for a share in the world's

commerce, it was denied her, with the conse¬

quence that a long and bitter struggle ensued.

Then came the Armada, the great naval ex¬

pedition that was to strike the final blow at Protestantism. This formidable fleet was com¬

posed of over 150 vessels, carrying 8,000 sailors, 20,000 soldiers and 3,160 cannons. The news

of these hostile preparations aroused all the

enthusiasm of England. Her navy, which had

been reduced to 36 ships, was rapidly increased until 197 vessels were ready for sea. Lord

Howard of Effingham was placed in command ;

under him were men whose names were al¬

ready famous in English maritime history —

Drake, Hawkins, Frobisher and others. On 19

July 1588 the Spanish Armada entered the

Channel. After nine days' fighting, and scat¬

tered by the storm, the crippled remnant of

that gigantic fleet was struggling to reach home.

In 1599 was born Robert Blake, the man from

whose career, according to the historian Seeley, the maritime greatness of England dates. Af¬

ter the death of Elizabeth in 1603, James I

attempted to reconcile the Catholic and Protest¬

ant states of Europe, but his efforts failed.

Next came the reign of Charles I with its

rebellion and Civil war, till order was restored by Cromwell, who paid great attention to

strengthening the navy during his protector¬

ship. Then both France and Spain endeav¬

ored to gain the assistance of England in their struggle with each other. Cromwell first

offered to support Spain on certain conditions, including freedom of commerce in the West

Indies and religious liberty for the English

living under Spanish rule. These terms were

rejected, and Cromwell offered England's al¬

liance to France, which was accepted. Again

the navy came into play. Besides exercising its 324

fighting strength, it held the sea routes for the free passage of merchant ships and troop

transports. French and English troops overran

the Spanish Netherlands; Dunkirk surrendered

to the French and was placed in English hands; the Spanish fleets were destroyed by Blake;

Admiral Penn seized Jamaica, and Spain's com¬

mercial monopoly was finally broken. But Eng¬

land's weight had been thrown on the side of

France, then a growing and ambitious power,

destined to become a dangerous rival and Eng¬

land's bitter foe.

The 16th century may be regarded as Eng¬

land's period of preparation and training for

her navy; in the 17th century that fighting arm had grown to such importance and strength

that the island kingdom was already a world

power and had begun colonization on a large

scale in the face of overwhelming odds and

the most strenuous opposition. In 1731 the

original 13 colonies of British North America

were completed. In the East, the English East

India Company had established trading factories

at Surat, Hoogly and Madras by 1739. Char¬

les II had received Bombay from Portugal

in 1661 as a part of the dowry of his wife.

In 1690 Fort William was established, and

round it grew up the town of Calcutta. Bom¬

bay, Madras and Calcutta thus became the

three centres of British trade in India, and it was only her naval power that enabled Eng¬

land to communicate with and hold these quasi

possessions. In the War of the Spanish Suc¬

cession (1702) England had to fear a coalition of France and Spain, and that their fleets

would combine against British commerce. So

the Grand Alliance was reformed. In this

war, lasting 11 years, England took Gibraltar.

By the Treaty of Utrecht (1713) England ac¬

quired from France: Newfoundland, Nova

Scotia, and Hudson's Bay; from Spain: Gib¬

raltar and Minorca. Four years later we find

England, France and Holland forming an alli¬

ance directed against Spain. Philip was deter¬

mined to re-establish the ancient supremacy

of Spain and to recover her lost Italian pos¬

sessions. He reconquered Sardinia and sent a

fleet to attack Sicily. England intervened and

sent a powerful squadron to oppose the Span¬ iards. Although there was no declaration of war an engagement took place, in which the Spanish fleet was annihilated. War was again inevitable. France declared war on Spain a few days after England had done so, 10 Jan. 1719. The French and British destroyed a, large number of Spanish war and merchant ships, and in 11 months Spain sued for peace. Philip V of Spain next formed an alliance with Austria against France and England, one of the objects being to recover Gibraltar and Minorca. This led to a counter-alliance be¬ tween England, France, Prussia, Sweden, Den¬ mark and Holland. Russia joined Spain and Austria. Europe was divided into two hostile camps, and a general war seemed inevitable. For two years peace and war hung in the bal¬ ance, when a Spanish fleet and army suddenly besieged Gibraltar, February 1727. A 12 months' struggle failed to recapture the rock, and peace was again restored.

During the first half of the 18th century

it became increasingly evident that the great

struggle of the immediate future was to be one between England and the Bourbon powers of

France and Spain for colonial and maritime

supremacy. The mightiest effort was yet to

come. It is not to be wondered at that, in

the light of its brilliant achievements, the Brit¬

ish navy had become the darling of the English people; furthermore, it was their one and only bulwark against political extinction. The entire population of the United Kingdom at that time

was hardly more than that of New York City

to-day, and it was frequently difficult to pro¬

vide the necessary men and boys to man the

fleet. The socalled “press gang® was insti¬

tuted to pick up merchant sailors, kidnap suit¬

able recruits and to arrest deserters. Major

and minor poets broke out into songs of the

sea, such as (Hearts of Oak,* (Britannia, the Pride of the Ocean,* (Tom Bowling,* (Rule,

Britannia,* (The Wooden Walls of Old Eng¬

landˆ (Ye Mariners of England,* *etc.* For

good or ill, England was now committed to

a world-wide colonial and naval policy; if her navy failed her, she was lost. The clouds were darkening on the international horizon, and

England prepared for the supreme test. In

India the English and French East India Com¬

panies were preparing to fight for control of

Indian trade and politics ; in America a con¬

test was approaching between the colonists of

New France (Canada) and those of New Eng¬

land; there was rivalry also in the West Indies, and both Spain and France were determined

to exclude England from the trade in their

American possessions. They now concluded a

secret family compact by which they bound

themselves to destroy the influence of England

in the New World. A small, insignificant in¬

cident started the conflagration in 1739. It was the ear of a Captain Jenkins. Since 1716 the

English had been permitted to send an annual

ship to trade with Spanish America. Under

cover of this privilege English traders had en¬

gaged in extensive smuggling operations, and

in consequence the Spanish officials had exer¬

cised their rights of search often with undue

severity. The English merchants and the

Spanish guar dcir-cost as had for many years

been engaged in intermittent hostilities, when

in 1738 Captain Jenkins appeared in Parliament

and told how some seven years previously his

ear — which he produced — had been torn off

by the Spanish naval officer who searched his

ship for contraband. After a long controversy

between government and opposition, war was

declared on Spain 30 Oct. 1739. Admiral Ver¬

non operated in the Caribbean Sea and Com¬

modore Anson was sent round Cape Horn to

attack the Spanish settlements in the Pacific.

In consequence of Vernon's lack of success and Anson's long absence — over four years — the

country soon ceased to take any interest in the war with Spain. British attention was concen¬

trated on defending Maria Theresa against the

attacks of Prussia, France, Spain, Sardinia,

Saxony and Bavaria. She had ascended the

Austrian throne in 1740, when a host of pre¬

tenders — Germans, Italians and Spaniards —

sprang up to dispute her rights.. France sup¬

ported Spain and the. other claimants, there¬

fore England sided with Maria Theresa. But

the war was not confined to Europe. England

fought against the French in Germany, in

North America and in India, besides carrying

on a continuous, naval struggle against both

France and Spain over all the sea routes of

the world. The war lasted nine years, fol¬
lowed by eight years of uneasy peace in Europe.
But the conflict between France and England
in America continued without a break. When
the Seven Years' War broke out (1756) Eng¬
land helped Frederick the Great with money
and pursued her own struggles in Canada and
India. Hawke destroyed the French fleet, Wolfe
stormed Quebec, Montreal surrendered, and
the whole of Canada fell into English hands.
By the Treaty of Paris (1763) England re¬
ceived Canada and Cape Breton Island, certain
West Indian islands and Florida. By this time, also, England's supremacy in India was assured.
Then came the American revolution, and France
agreed to help the colonists. England found
herself at war again with her old enemy; Spain and Holland joined France, and the Northern
powers of Europe formed a league, called the
Armed Neutrality, which was intended to ham¬
per England in her naval war. Now began the

terrific struggle for life. Rodney crushed the

French fleet in the West Indies and Elliot de¬

fended Gibraltar against all the attacks of the Spaniards. The contest lasted six years, and

when peace was made, in 1781, France, Spain

and Holland were crippled and on the verge of bankruptcy, and England emerged stronger than

ever. But she had lost a large part of North America.

Eight years after the war the French Revo¬

lution broke out. Its leaders attempted to sow the seeds of the revolution all over Europe and especially against England in India and Ireland.

France declared war on 1 Feb. 1793. In de¬

fense of the Royalists, Admiral Lord Hood took possession of Toulon harbor, but not having

enough troops he had to retreat before the

young Captain Napoleon Bonaparte. On 1 June

Lord Howe engaged a French fleet. In a few

hours the English had lost 1,200 men and 11

ships crippled; the French lost 12 ships and

7,000 men. The English captured nearly all

the French West Indies, and Nelson took Cor¬

sica. Then Holland also joined France, and

England took Cape Colony, which had been

Dutch for 143 years. The next year Spain

also came in on the side of France, and Eng¬

land again had to fight for her life. In all foreign dockyards preparations were being

made to crush England. A French expedition

sailed to Ireland, reached Bantry Bay, and then went home again. In 1797 England stood alone,

expecting an invasion of her shores. Sir John

Jervis and Commodore Nelson smashed the

Spanish fleet at Saint Vincent; Admiral Duncan

crushed the Dutch fleet off Camperdown and

Nelson annihilated Napoleon's fleet in Aboukir

Bay. Encouraged by England's brilliant naval

victories, Russia, Turkey, Italy and Germany

renewed their struggles to free themselves from Napoleon's domination. England supplied them

with money. In the Mediterranean, Nelson

drove the French out of Naples and the Roman

states; in fact, the. English flag floated for a time over the Capitol at Rome. Europe was

ablaze from end to end; cannon thundered in

the Atlantic, Pacific and the Mediterranean;

Turks and Britons struggled with the French

in Syria and Egypt. After Napoleon's vic¬

tories at Marengo and Hohenlinden, Austria

made peace with France and Great Britain was

left as Napoleon's sole antagonist. At the be¬

ginning of 1801 England was at war with

France, Spain, Holland, Russia, Sweden and Denmark. The most important naval action of the war was Nelson's battle of Copenhagen. After the murder of the Tsar Paul I in 1801 the Armed Neutrality broke up and all were anxious for peace, which was made at Amiens in 1802. England restored all she had taken from France, but kept Trinidad and Ceylon, captured from the Dutch, to whom the Cape Colony was restored.

For three years there was peace, which time Napoleon employed in making gigantic prepara¬ tions for the overthrow of England. In May 1805 he declared war. and the final contest be¬ gan. Five months later came the crushing de¬ feat off Trafalgar, where Nelson, England's greatest admiral, purchased naval supremacy with his life. The closing scene of the drama was played when the curtain fell at Waterloo in 1815. Only 21 years before France, Spain and Holland all possessed powerful navies ; in 1815 these had practically ceased to exist, and those of Spain and Holland have never been

restored. From that time the British navy has

virtually been the water police of the world; it has exterminated piracy and African slave

traffic and maintained what is called the ((Pax Britannica® of the seas. Cradled in hardship

and 300 years of stern fighting not unmixed

with defeats, that navy has been the principal instrument in building and holding together the greatest empire the world has yet seen. Kip¬

ling did not exaggerate when he wrote,

If blood be the price of Admiralty,

Lord God, we ha' paid in full !

It is estimated that Great Britain has spent

approximately $7,500,000,000 on the navy during

a century of peace. That period saw enormous

changes wrought in the construction of fighting ships. Though naval architecture had under¬

gone improvements and vessels had increased

in size, there had been no great alterations in warship design between Armada days and the

introduction of iron shipbuilding. The first

ironclad, the Warrior (1860), fired a shot only two pounds heavier than those of the biggest

guns against the Armada. The Sovereign of

the Seas (1637) was a three-decker of 126

guns; Nelson's flagship at Trafalgar (162 years later) was a three-decker of 100 guns. Nelson's entire fleet of 27 vessels cost about $7,500,000; none of the present British battleships costs less than $11,250,000. Steam power was first intro¬

duced into the British navy in 1822, when the Comet, a wooden paddle steamer of 238 tons

was built at Deptford. Government officials of

those days were strongly opposed to both the

paddle and the screw, although in 1849 there

were 30 screw ships and 70 paddle vessels in the navy. The first battleship built and designed

with screw propeller was the 80-gun Agamem¬

non (1852). The introduction of armor-plating

brought an immediate revolution in naval ord¬

nance. By 1865 rifled guns had been substi¬

tuted for the old smooth-bores throughout the

fleet. From this period dates the ever-rising

competition between stronger armor and more

powerful guns. The heavy breech-loading gun

was introduced in 1881. During the following

25 years naval construction underwent still

further changes. At enormous cost the Ad¬

miralty experimented with new types of ships

and guns. But the most extraordinary innova-

tions adopted by the British navy date from the appointment in 1904 of Admiral Sir John (now

Lord) Fisher to the post of First Sea Lord.

He began with a vigorous reorganization of

his great department, changed the time-honored

strategic disposition of the fleet, and scrapped some 150 ships which he considered useless or

obsolete. His most notable achievement, how¬

ever, was the introduction of the first (<all-big-gun® warship, the Dreadnaught, launched on 10

Feb. 1906. For centuries it had been the custom of naval architects to equip each battleship with guns of different types and calibre. In 1903 an Italian naval engineer, the late General Cuni-berti, published an article in Jane's (Fighting Ships* in which he referred to ((an ideal British battleship® carrying only big guns. Fisher

seized on the idea, and the Dreadnought, built in record time, was the result. The conse¬

quences were of tremendous importance in Brit¬

ish naval history. The appearance of that ship at one stroke made the greatest battleship of

any country entirely obsolete ; and, further¬

more, it rendered the Kiel Canal useless to Ger¬

many even if that country also built vessels of that type. It is stated on execellent authority that Fisher long foresaw the coming struggle

and that he also prognosticated the year 1914

as the year when Germany would be prepared

to challenge Great Britain's navy. He calcu¬

lated it would take Germany till then to widen the canal, an undertaking that was actually com¬

pleted in 1914, shortly before the war broke out, at a cost of $55,000,000. There could be no an¬

swer to the Dreadnought except a vessel of sim¬

ilar type, and the creator of the German navy, Admiral von Tirpitz, had to begin his work over again.

Administration.— - The control of the navy

is vested in the Admiralty, composed of a first lord, six lords commissioners and two secre¬

taries. The present organization dates from

1912. The first lord, who is invariably a civilian and a member of one of the Houses of Parlia¬

ment, represents the navy ill the cabinet and in the legislature. He is responsible for the

general direction and supervision of all business relating to the navy, political and board ques¬

tions, promotions and removals, appointment of

admirals and commanding officers, *etc.* The at¬

tached salary is $25,000. The First Sea Lord is an active, experienced admiral and is responsi¬

ble for making preparations for war; he ad¬

vises on all large questions of naval policy. His salary, like that of the second, third and fourth lords, is $7,500. The Second Sea Lord attends

to the manning and training of the fleet, de¬

tails of complements of ships and establish¬

ments, barracks, education, coastguards, re¬

serves, hospitals and discipline. The Third Sea lord is responsible for machinery, armor, guns, aeroplanes, airships, dockyards, construction,

etc. The Fourth Sea Lord deals with trans¬

port services, including hired auxiliary vessels other than armed cruisers ; coaling, victualing, payments, allowances, pensions, *etc.* The Civil

Lord, who is not a naval man, controls works, buildings, purchases of land, dock police, *etc.*

There is further an additional sea lord, whose duties are chiefly connected with contracts for machinery, salvage, disposal of obsolete ships,

etc. The parliamentary and financial secretary

deals, with all matters of finance, estimates, ex¬

penditure, accounts, purchase of ships, stores,

and payment for hire of auxiliary vessels. The permanent secretary controls the general office

organization of the various departments and

conducts correspondence with foreign naval at¬

taches. The Committee of Imperial Defence

consider questions of imperial defence from the point of view of the navy, army, India and the self-governing states of the empire. Canada,

Australia and New Zealand make direct con¬

tributions to the navy, and the Federated Malay States also provided the cost of a battleship.

Naval Policy. — There has been consider¬

able discussion in recent years as to the disposi¬

tion and use of the navy in time of war. One side contended that the main strength of the

navy should be concentrated in home waters.

The socalled <(Blue Water School,® on the

other hand, maintained that it was the duty of the fleet to be there where a possible enemy's fleet was located, whatever part of the world

that might be. Until recent years Great Britain maintained strong squadrons on the China sta¬

tion and in the Mediterranean. The Anglo-Japanese Agreement enabled Britain to with¬

draw her fleet from the former position, and

the Entente Cordiale with France from the

latter. Since 1905 the main strength of the

British navy has been concentrated in the North Sea and in the Channel, in view of the growing menace of the German navy. Subsequent events

have proved that this last was the better ar¬

rangement, for it enabled the navy to apply an effective blockade of the German coasts the mo¬

ment war was declared. As has happened so

frequently during its long history, the British navy instantly became the predominant factor

in the great struggle. The gigantic armies of

Germany, Austria, France and Russia, number¬

ing a possible 16,000,000 men, hardly aroused so much interest and speculation in the world as

did the 150,000 men who then formed the per¬

sonnel of Britain's fighting fleet. The navy was ready to meet any emergency. Only a few

days before the outbreak of war the king had

reviewed his fleet — or at least half of it. That half consisted of some 260 vessels, the most

powerful fleet ever mustered in British waters.

The day before England declared war Mr.

Winston Spencer Churchill, then First Lord of

the Admiralty, informed his colleagues of the

cabinet that <(the whole sea power of Britain

was in readiness for war.® The Home Fleet

was divided into three units, of wrhich the first was arranged into four battle squadrons includ¬

ing the flagship of the commander-in-chief. The first of these consisted of eight battleships —dreadnoughts and super-dreadnoughts — seven

carrying ten 12-inch guns, and one of

them ten 13.5-inch guns. In the second squad¬

ron were eight super-dreadnoughts, each carry¬

ing ten 13.5-inch guns. The third squadron con¬

sisted of eight vessels of the pre-dreadnought

type, armed with four 12-inch, four 9.2-inch

and ten 6-inch guns. The fourth squadron con¬

tained three dreadnoughts of ten 12-inch guns

each and one pre-dreadnought with four 12-inch and ten 9.2-inch guns. A battle cruiser

squadron of four ships was attached to the

first fleet, three with eight 13.5-inch guns, and one with eight 12-inch guns; the second cruiser squadron of four armored cruisers; the third

cruiser squadron of four cruisers of the Devon¬

shire class ; the fourth cruiser squadron of four vessels of the Monmouth class and one light

cruiser ; the first light cruiser squadron ; a

squadron of six gunboats for mine sweeping;

and four flotillas of destroyers with a flotilla cruiser attached to each. Behind this first line of defense there stood the second fleet of two battle squadrons, one of eight pre-dreadnoughts

and one of six. To these were attached

the fifth and sixth cruiser squadrons, seven

mine-layers, four patrol flotillas of destroyers and torpedo-boats and seven submarine flotillas.

Next behind these came the third line, con¬

sisting of two battle squadrons of comparatively old ships and six cruiser squadrons. In addi¬

tion to this formidable array Great Britain had at the time, in the Mediterranean, three battle cruisers, four armored cruisers, four ordinary

cruisers and a flotilla of 17 destroyers, besides submarines and torpedo-boats. In the Far East

there were one battle ship, two cruisers and

four smaller vessels in the East India squadron.

On the China station there were one battleship, two armored cruisers, two cruisers, a number

of gunboats, eight destroyers, besides sub¬

marines and torpedo-boats. The New Zealand

division contained four cruisers, while the Aus¬

tralian fleet consisted of one battle cruiser, three cruisers, three destroyers and two submarines.

Various cruisers and gunboats were stationed

at the Cape, the west coast of Africa, and the east and west coasts of America; four armored

cruisers and one ordinary cruiser patroled the

Western Atlantic. To the total strength of

Britain must be added two Turkish battleships

at the time building in England, which were

commandeered, and two destroyers purchased

from Chile. The following figures show the

principal classes in 1914:

Super-dreadnoughts…. 14 Armored cruisers . 34

Dreadnoughts . 18 Cruisers . 87

Pre-dreadnoughts . 38 Destroyers . 227

Super-dreadnoughts un-Torpedo-boats . 109

der construction . 3 Submarines . 75

Total . 73 Tctal . 532

The following table, dating to 1 Jan. 1914,

was issued by the British government on 6

March 1914 to show the comparative strength

of the principal naval powers. Battleships and

armored cruisers over 20 years old are omitted: During the first four years of the war the

British navy had tripled its personnel and

doubled its fighting armament. It transported

by water over 13,000,000 men, 2,000,000 horses

and mules, 25,000,000 tons of explosives, 51,-

000,000 tons of oil and coal, and 130,000,000 tons of food and stores.

Bibliography.— Anderson, R. C., < Naval Wars

in the Baltic 1522— 1856) (London 1913) ; Beatson, R., (The Naval and Military Memoirs of Great

Britain 1727— 1783 J (London 1804) ; Brassey's

(Naval Annual5 (Portsmouth) ; Callender, G.

A. R., (Sea Kings of Britain) and (The Life

of Nelson5 (London) ; Colomb, Admiral,

(Naval Warfare) (London) ; Churchill, A. B.

N., (The Command of the Sea: What Is It?)

(London 1915) ; Clowes, Sir W. L., (The Royal Navy5 (7 vols., London 1897-1903) ; Copple-stone, B., (The Secret of the Navy5 (London

1918) ; Corbett, J. S., (England in the Mediter¬

ranean ; (England in the Seven Years' War5 ;

(Drake and the Tudor Navy5 ; (The Successors

of Drake) ; (The Campaign of Trafalgar5 and

(Some Principles of Maritime Strategy) ; (<Ex—

Royal Navy,® (The British Navy from Within

(London 1914) ; Ferraby, H. C., (The Grand

Fleet5 (London 1917) and (The Imperial

British Navy5 (London 1918); Fraser, E.,

(Famous Fighters of the Fleet) (London 1907) ; Hannay, D., (A Short History of the Royal

Navy — 1217— 1815> (London 1898); Hislam,

P. A., (The Navy of To-day5 (New York

1914) and (The Admiralty of the Atlantic5;

Hurd, A., (The British Fleet in the Great War5

(London 1918) ; James, W., (The Naval His¬

tory of Great Britain5 (6 vols., London 1886) ; Jane's (Fighting Ships5 (annual) ; Jane, F. T., (The British Battle Fleet: Its Inception and

Growth Throughout the Centuries5 (London

1914) ; Latymer, Lord, (The Royal Marines5

(London 1915) ; ˆLaughton, J. K., (Nelson and

his Companions in Arms5 (New York 1896);

Laughton, L. G. C., (The British Navy in War5

(London 1915) ; Lean's (Royal Navy List5

(London quarterly) ; Lecky, H. S., (The King's Ships5 (London 1913) ; Leyland, J., (The Royal Navy: Its Influence in English History and in

the Growth of Empire5 (London 1914) and

(The Achievement of the British Navy in the

BUILT.

Great

Britain

France

Russia

Germany

Italy

Austria-

Hungary

United

States

Japan

Battleships .

58

21

8

35

9

14

30

17

Hefense ships, armored ….

10

Rflt.tlp rmisftrs

9

4

1

Cruisers .

47

24

12

9

9

2

17

15

Cm isers , 1 i gh t .

65

8

2

43

14

9

18

19

Torpedo-vessels .

25

3

3

11

2

3

Torpedo-boat. destrovers .

201

80

80

133

30

15

52

51

Tor pp.H o-hoats .

106

153

25

80

94

58

21

33

Submarines .

69

50

25

24

18

6

29

13

580

339

152

328

177

115

179

152

BUILDING.

Battleships .

14

1

10

7

4

6

3

5

2

6

2

3

20

8

6

4

3

1

2

Torpedo-boat destroyers .

36

7

45

12

16

3

8

2

1

27

Submarines .

29

26

18

14(?)

2

5

17

2

101

43

82

41

28

40

33

9

328

GREAT BRITAIN — THE BRITISH ARMY (46)

World War* (New York 1918) ; Mackinder,
H. J., (Britain and the British Seas> (London
1902) ; the four following works by Admiral
Mahan, U. S. N., are specially valuable: (The
Influence of Sea Power upon History) (1890) ;
(The Influence of Sea Power upon the French
Revolution and Empire) (Boston 1892) ; (The
Life of Nelson the Embodiment of British Sea
Power* (1897) and (Types of Naval Officers*
(Boston 1901) ; Mason, F. H., (The Book of
British Ships) (London 1915) ; Maxwell, Sir
H., (A Century of Empire — 1800-1900) (Lon¬
don 1909-12) ; Milford Haven, Marquis of
(formerly First Sea Lord), (The Royal Navy*
(pamphlet, London 1918) ; Nicolas, Sir N. H.,
(The History of the Royal Navy* (London
1847), incomplete, ending at 1422; Oppenheim,
M., (History of the Administration of the
Navy to 1660* (London 1896) ; Protheroe, E.,
(The British Navy: Its Making and Its Meaning) (London 1915) ;
Rawson, E. K., (Twenty
Famous Naval Battles) (London 1900) ; Rob¬
inson, Commander C. N., (The Sea Service*
(London 1891) and (The British Fleet)

0894); (Royal Navy List* (annual): Schom—

berg, Capt. I., (Naval Chronology from the

Time of the Romans) ; Seeley, Sir J. R., (The Expansion of England* (London 1883) ; Sil-burne, P. A., (The Evolution of Sea Power*

(New York 1912) and (The Colonies and Im¬

perial Defence) ; Thursfield, J. R., (Naval Warfare) (London 1913) ; Thursfield and Sir G. S.

Clarke (Lord Sydenham), (The Navy and the

Nation) (London 1897) ; Times (Book of the

Navy* (London 1914) ; Wilkinson, S., (War

and Policy* # (New York 1900) ; Wilson, H. W., Hronclads in Action> ; Wood, Field Marshal

Sir Evelyn, <Our Fighting Services and How

They Made the Empire) (London 1916) ;

Yonge, C. D., <The History of the British Navy from the Earliest Period to the Present Time)

(London 1863).

Henri F. Klein,

Editorial Staff of The Americana.

46. THE BRITISH ARMY. The Regu¬

lar Army. — The British army is in many re¬

spects like the British Constitution. It has

grown, it has not been made. No single idea

has dominated its history, no directing mind

has prescribed its form or defined its functions.

But while the forces, which formed and molded

the British Constitution, and made it from

time to time the reflex of the prevailing opinion of the British people, have exercised a con¬

stant pressure — a pressure which has never

been relaxed — the forces which have produced

the British army of to-day have been inter¬

mittent and irregular. The history of the

British army is a long record of vicissitudes of public favor and public neglect. To a nation

in whose long history the gates of the Temple of Janus have rarely been closed for a decade, each new war has come as a surprise. Every

war, whether it has ended in victory or defeat, has furnished the British people with lessons

which they have vowed to learn and never to

forget, and which they have invariably for¬

gotten before the ink has dried on the peace

preliminaries. Every war has brought with it

good resolutions born of anxiety and alarm,

and every peace has produced the apathy, the

neglect and the self-confidence which are the

outcome of real or fancied security.

It would be unjust, and untrue to historical

teaching, to infer from these facts that the

British are an unwarlike, or, in all their pub¬

lic concerns, an improvident people. The popu¬

lation of the United Kingdom is composed of

warlike races, and in regard to the conduct of public affairs it cannot be said that England

has been behind the rest of the world. But

it is possible to be a warlike without being a military nation, and there can be no doubt that the scientific evolution of a consistent military policy in the United Kingdom has not kept

pace with other branches of national develop¬

ment.

The reason is not far to seek. An insular

position and the immense protection afforded

by a powerful navy have relieved the inhabit¬

ants of the British Islands from the dangers

which ever threaten the great nations of Con¬

tinental Europe whose long land frontiers ex¬

pose them to attack by an ambitious and un¬

friendly neighbor. For nearly 300 years the

people of England have been spared the knowl¬

edge of what war on their own soil actually

means. While from Brest to Moscow, from

Bergen to Gibraltar, every part of Europe has

rung to the tramp of hostile soldiery, and has been the suffering witness of the tragedy of

war, the dwellers in English counties carry

back their immemorial tradition of undisturbed

peace to the day when Oliver Cromwell won

the last great battle fought on English soil on the field of Worcester.

Once, and once only since the creation of

modern firearms did the people of England

come in contact with the realities of war. In 1645 Parliament in conflict with the king found itself confronted by the necessity of fighting, or surrendering to an implacable enemy. Follow¬

ing the custom of the country, the House of

Commons sought at first to meet the emergency

by the aid of amateur soldiers, maintained by

voluntary contributions. But the logic of facts soon convinced them that war cannot be trifled with. The ((New Model® Army was called into

existence by Act of Parliament, funds were

provided by vote of the House of Commons,

compulsory service was imposed when volun¬

teering failed to produce the required number

of men ; and the recalcitrant were hanged.

A Regular Army was called into existence, and

that Regular Army almost immediately became

a (<Standing Army.® It is from the days of

the (<New Model® that the history of the Stand¬

ing Army of England really dates. War on

English soil taught its lessons to a practical people. To the Commonwealth England owes,

not only the establishment of her standing

army, but the actual groundwork of the mili¬

tary institutions of the present day. One of

the most famous regiments of the British army, the Coldstream Guards, came into existence

at this time; and the very establishment of

the modern British cavalry and infantry regi¬

ment is practically what it was made by Oliver Cromwell and the soldiers of his day.

In 1651 the civil war ended. In 1658

Oliver Cromwell died, and a military coup

d'etat placed Charles II on the throne. Never

since that day has a British Parliament legis¬

lated for the army with a knowledge of war

born of experience. A generation grew up

which had forgotten the lessons of Marston

Moor and Worcester. The reaction was

prompt, and its effect far reaching. The army

soon became to be regarded as an evil, scarcely a necessary evil. The soldier soon learnt that the utmost he could expect was toleration. The accession of a foreign king surrounded by

Dutch guards increased that antipathy to the

army, which for the next two centuries marked

the proceedings of Parliament. In 1689 was

passed the first Mutiny Act. The primary ob¬

ject of the act was to confer upon the sovereign the right to punish certain military offences not dealt with by the ordinary law; but the act

contained a section of a totallv different pur¬

port. The words which have become famous

run as follows : ((The raising or keeping of a standing army within the United Kingdom of

Great Britain and Ireland in time of peace, un¬

less it be with the consent of Parliament, is against law."

The law as passed in the time of King

William III is to this day solemnly re-enacted every year by Parliament, and the illegality of maintaining a standing army is palliated by a

special Act of Dispensation for one year only.

This annual performance has become a mean¬

ingless anachronism. The necessity for main¬

taining a standing army in time of peace is

no longer questioned or questionable, and the

army itself has long ceased to be the instru¬

ment of a sovereign, and has become the ser¬

vant of the nation. But the original passage of the act and its renewal by many succeeding

Parliaments is typical of the tone and temper

of the Legislature toward an institution which

is as essential to the safety and welfare of the state as Parliament itself.

The result of this want of sympathy between

Parliament and the army is very noticeable.

The favor of the Legislature, and the funds

which that favor can alone provide, have been

available during periods of crisis and national danger : They have been grudgingly given or

withheld in those intervals of peace which

ought also to be intervals of preparation. As

a result there has been an absence of continu¬

ity, and of deliberate adaptation of means to

ends, which has greatly interfered with the

proper development of the military power of

Great Britain, and have provided her with mili¬

tary institutions which bear upon them, the un¬

mistakable evidence of their having been cre¬

ated at haphazard, altered to meet political

rather than military exigencies, and adapted

to meet a single emergency rather than to deal scientifically with the

work of a world-wide

empire.

Under these circumstances the services

which the regular army of Britain has ren¬

dered are indeed a marvel. In every land and

under every sky, against the highly trained

armies of Europe, against the half disciplined

hosts of Oriental princes, against savage tribes, formidable by reason of their fanaticism, cour¬

age and numbers, the regular army of Britain

has fought with varying fortunes but with never failing tenacity and devotion. There is no soil which does not cover the grave of the British soldier. In the broad valley of the Danube, on the plains of Belgium, on the shores of the

Black Sea, in the passes of Spain, among the

vineyards of France they are to be found. The (<Redcoats" have fought and died on the plains of India, under the walls of the imperial cities of China; on the heights of the Saint Law¬

rence; in the valley of the Hudson; under the ramparts of New Orleans; in South American

cities; before the stockades of the Maori in

New Zealand and in innumerable islands in

every sea. On the great African Continent,

North and South, East and West, from the

Pyramids to Table Mountain ; from the blazing

shores of the Red Sea, to the swamps of the

Gold Coast and the Niger, they have obeyed

orders, and laid down their lives for ((the safety, honor and welfare of their Sovereign and his

Dominions." But they have not died in vain.

If it be true that the tap of the British drum follows the rising sun round the world, it is true also that the planting of the British flag in five continents is largely due to the patient heroism of the British soldier. Rarely com¬

manded by generals of exceptional genius ; al¬

most invariably suffering from the apathy and

neglect of Parliament in peace time, and from

the faulty administration in war which is the

certain result of neglect in time of peace, the British soldier by dint of certain great qualities which he possesses has held his own. To the

regimental officers and to the non-commis¬

sioned officers credit is above all due. They

have been, and still are, the true strength of the British army.

What is the nature of this army which has

suffered and accomplished so much? In its

character and composition it is as unique as the circumstances which have created it. There may

be better armies than the British, there are un¬

doubtedly worse armies, but there is no army

like it. It shares with the army of the United States the peculiarity of being recruited by vol¬

untary enlistment and not by compulsion in any form. It has a further peculiarity which, until recent foreign conquests planted the Stars and

Stripes in the China Seas, distinguished it even from the army of the

United States. Nearly

half of the Regular Army of Britain is main¬

tained on a war footing in time of peace, is maintained in distant lands, and to a large ex¬

tent in tropical or subtropical countries. The population of India is over 315,000,000 and the military force which defends the great Penin¬

sula and keeps the peace from Quetta to Cape

Camorin amounts to 239,730 all told. Of these

75,895 are British soldiers enlisted within the United Kingdom ; the remainder are the troops

of the Indian army, 161,085 natives commanded

by 2,751 officers, of which the superior officers are British. There are also ((Imperial Service”

troops raised by native states and held at the disposal of the government ; they number about

20,000, including a strong force of cavalry;

36,000 reserves of the native army, and close

on 40,000 white volunteers, besides 3,000 re¬

servists.

South Africa, the Mediterranean fortresses

of Gibraltar and Malta, the distant Eastern

Ports of Singapore and Hong Kong, make fur¬

ther demands upon the Regular Army. Ac¬

cording to the regimental establishment of 1913—14 (the last two normal years before the

war) 33,128 British regular troops were serv¬

ing in South Africa and the Colonies. This number, of course, does not include specially enlisted Colonial corps and native troops paid for by the Imperial Exchequer. It is the necessity for maintaining this great force abroad that makes the British army essentially a voluntary army. Conscription for service abroad in time of peace is impossible. The young

soldier cannot endure the climate of India, and a youth enlisted at 18, must perforce remain for two years at home before he becomes physically qualified for foreign service. This fact not only makes it necessary that the service should be voluntary, but that it should be long and that it should greatly exceed the limit of two years which is the term now accepted in the principal conscript armies of the world.

For this voluntary army there are enlisted on an average 38,000 men in a normal year. The total is sometimes exceeded ; there is rarely any difficulty in reaching it. There is no reason why there should be a difficulty. The old prejudice against military service due to

the savage conditions of the soldier's life, his scanty pay, his squalid surroundings, lived long and died hard; indeed it is not altogether dead 3'et. But the life, pay and prospects of the

British soldier at the present day are such as may reasonably attract young men of spirit and ambition.

When the soldier receives his pay every need

has already been provided for. He has been

clothed, fed, housed, doctored and educated;

his general health has been looked after, his

amusements furnished. If he chooses to re¬

main in the service his pay increases with every step in rank; and, if his conduct be good, he may look forward with certainty to retirement

at the age @f 39 with a life pension. Not all the recruits who enter the army are good, nor do

they all become useful soldiers. But the unfit are soon eliminated and the quality of the

special branches, the Royal Engineers, the Royal Artillery, the Cavalry and the Guards is very

high. A British regiment returning from India

after a long tour of service in that country, will bear comparison with any body of fighting men of equal numb rs in the world.

The ordinary period of color service in the

British army varies from six to nine years, but the brigade of guards are enlisted for three

years with the colors, the men having the right to prolong their service to eight years. Sol¬

diers are generally permitted, if their conduct has been good, to

extend their first term of serv¬

ice and to remain with the colors for 12, and in some cases, for 21 years. In addition to the men with the colors there are the men form¬

ing the Army Reserve. The Army Reserve is

an outcome of the great reform accomplished

by Lord Cardwell in 1870. That distinguished

War Minister was the first to divide the sol¬

diers' service into two periods, the first with the colors, the second in the reserve. The

period of service is six years The reservist

is liable to be recalled to his regiment in case of war or national emergency only.

The recruits for the Regular Army are

drawn from all parts of the United Kingdom,

as well as from the colonies.

The Territorial Force. — The British Army

formerly comprised the Regular Army and the

<(Auxiliary Forces,® the latter including the

Militia, the Yeomanry and the Volunteers.

Since 1907 it consists of the "Regular Army®

and the "Territorial Army.® The term "Regular Army® is applied to the regularly embodied troops and the army reserve.

The "Territorial and Reserve Forces Act®

of 1907 abolished the militia as such. Of the 124 militia battalions in the United Kingdom

74 were converted into reserve battalions of

the Regular Army, *viz.* : 66 as 3d battalions of the 66 line regiments (of two battalions each), and 27 as 4th battalions to the same number

of regiments. The Militia Artilley has be¬

come, with the exception of certain Irish bat¬

talions, units of reserve field artillery, and the militia engineer battalions are now turned into reserve siege and railway companies.

All men of reserve units, whether originally

militiamen or directly recruited, are enlisted as “special reservists® of the Regular Army. That

is to say, they are partially trained in time of peace and are available for transfer to the

Regular Army in time of war, if required. The period of initial, or recruit, training is six months for all arms, followed by an annual

training of fifteen days, with the addition of six days’ musketry for the infantry. The 3d

battalions also do the work of regimental de¬

pots, which have been abolished. They are, in

fact, training battalions, supplying material to the battalions of the first line both in peace and war. The 27 fourth or “extra® battalions are

available for service abroad, in event of war, as entire units. The regular field artilley is also provided with training units, one group or “brigade® of three batteries for each of the six field divisions. These units train the special

reservists for the artillery, and are to supply the ammunition columns

on mobilization. Four¬

teen reserve cavalry regiments were also

formed.

The Yeomanry, styled since 1901 “Imperial

Yeomanry,® and the volunteers, have changed

their status. They now form the cavalry and

infantry of the territorial army, which also

comprises a proportionate strength of artillery

(newly created) including horse and field bat¬

teries.

The Territorial Army is intended for home

defense, though over 20,000 officers and men

accepted liability for service abroad in time of war. Men joining the territorial forces are

attested and enlisted instead of simply enrolled.

The age for enlistment is from 17 to 35 and

the period of engagement four years, with the

option of re-engagement for further periods,

not exceeding four years, in each case, up to the age of 40.

Discharge can be obtained at any time by

giving three months’ notice and paying $25, but both notice and payment may be dispensed with

in special cases Training is on “Volunteer

lines,® that is to say, there is no period of con¬

tinuous training for recruits, as in all other national militias, and the annual training is 15

days in camp as a maximum and eight as a min¬

imum. Other drills and rifle practise are car¬

ried out in the men’s own time. Absence from

training, or failure to -complete the necessary number of drills, renders the territorial soldier liable to a fine of $25 or less, according to cir¬

cumstances.

The territorial army consits of 36 regiments

of Yeomanry, 14 horse artillery batteries, 57

“brigades® of field artillery, 14 heavy batteries, 89 companies of garrison artillery, 103 com¬

panies of engineers, a railway battalion, 194

battalions of infantry, 15 cyclist battalions, with departmental troops, medical and other sub¬

sidiary services. The officers, except the divi¬

sional generals and some of the brigadiers and staff officers, are non-professional. A scheme

for the provision of officers by pneans of offi-GREAT BRITAIN — THE BRITISH ARMY (46)

cers (volunteer) training corps has been insti¬

tuted. These training corps are merely the pre¬

existing Volunteer Corps at the Universities

(senior division) and the similar school cadets (junior division).

All ranks of the territorial forces receive

pay when called out, at the same rates as in the Regular Army. A reserve for the terri¬

torial army has been approved. It is open to

all who have served in the territorial army or in the old volunteers for four years, up to the age of 40.

The general officers of commands are re¬

sponsible to the Army Council for the train¬

ing of all the troops in their commands, but the administration of the territorial army is vested in the County Associations, which stand in much the same relation to the territorial forces as the War Office does to the Regular Army.

That is to say, they undertake the raising,

equipment and maintenance of the force. They

are also charged with the care of reservists

and discharged soldiers. Each County Asso¬

ciation has its own budget, the funds being

provided by the War Office on regularly pre¬

pared estimates, based on previous expendi¬

ture under the various approved heads. On

mobilization, the units which are to take the

field (called the field army or <(expeditionary force**), comprising

about four-fifths of the

regular force at home, are brought up to full war strength by the incorporation of the re¬

serves. At the same time the special reservists are called up and fill the 3d and 4th battalions of infantry regiments and other reserve units.

A small proportion of these men at once join

the field army for service with the ammunition columns, *etc.* The remainder will be available,

after further training, to supply losses in the field. The territorial army, also, is to be em¬

bodied whenever mobilization takes place, and is then to undergo a training of six months, after which it is supposed that the force will be ready to meet the enemy in event of an invasion.

It will be observed that, for the first time in the history of the British army, the necessity for creating a secondary reserve (answering

to the Ersatz, or supplementary reserve of con¬

tinental armies, to make good the waste of

war), has been recognized. The formation of

an organized territorial army was also a great step in advance. The territorial army is con¬

fined to England, Scotland and Wales.

Bibliography. — The literature dealing with

the British army in all its aspects is very vol¬

uminous. The following works which bear

upon and illustrate the subjects referred to in the preceding article may be consulted with ad¬

vantage. Fortescue, (A History of the British

Army* (London) ; Scott, {The British Army,

its Origin, Progress and Equipment* (Lon¬

don) ; May, imperial Defence* (London) ;

Ross, Representative Government and War* ;

Wilkinson, (The Brain of the Army*. (Edin¬

burgh) ; Arnold-Forster, (The Army in 1906*

(London) ; Baker, (The Territorial Force*

(London) ; Gwynne, (The Army on Itself*

(London) ; (The Journal of Royal United Serv¬

ice Institution* (London).

Official Publications. — (The Army Annual

Act* ; (The Army Estimates* (annual) ;

(Army Orders* ; ‘General Annual Return of

the British Army*; ‘Annual Report of the In¬

spector of Recruiting* ; Ring’s Regulations

and Orders for the Army*; (The Militia and

Yeomanry Act* ; Regulations for the Militia* ; (The Reserve Forces Act* ; (The Reserve Force

and Militia Act* ; Regulations for the Volun¬

teer Force* (1904) ; Report of the War Offices Reconstruction Committee* (1905) ; Report of

the Royal Commission on the War in South

Africa* (The Elgin Commission).

H. O. Arnold-Forster,

Formerly Secretary to the Admiralty and Sec¬
retary of State for War; Author of ‘ The

Citizen Reader ? (A History of England, *

iIn a Conning Tower? cOur Home Army?

etc.

[Note. — Since the foregoing article was writ¬
ten its distinguished author has passed away
and the British army has undergone such rev¬
olutionary changes (1914-17) as no former
War Minister could ever have imagined.
Shortly after the outbreak of the European
War the government suspended publication of
official details of the army beyond lists of offi¬
cers’ promotions and casualties. Within the
first two years of the war Great Britain had
adopted a system of conscription and raised

an army of 4,000,000 men, trained and fully equipped. This great task was accomplished by the organizing genius of Lord Kitchener (q.v.). On 10 Oct. 1916 its strength was given as over 5,000,000.

The British army is administered by an Army Council consisting of the Secretary of War and six departmental heads of the War Office.: (1) the Chief of the Imperial Staff, who is responsible for drawing up plans of attack and defense, for military training, intel¬ ligence work, and the higher training of offi¬ cers; (2) the Adjutant-General, who deals with recruiting, internal economy, discipline and the medical service; (3) the Quartermaster-Gen¬ eral, who is responsible for equipment, trans¬ port, supply and remounts; (4) the Master— General of the Ordnance, who is responsible for armament and works; (5) the Parliamen¬ tary UnderSecretary of State, who represents the Territorial Army; and (6) the Finance Member. The Inspector-General of the Forces keeps the Army Council informed as to general conditions, state of efficiency, etc., of all branches of the army. The British army has

no commander-in-chief; that office was abol¬

ished in 1904. Lord Roberts (q.v.) was the

last incumbent. A new official — the Inspector-General of the Forces — was then created. The Army Council administers, but does not com¬

mand, the army. The Home Army is divided

into seven commands with a general at the head of each: (1) Aldershot; (2) Southern; (3)

Eastern; (4) Irish; (5ˆ Scottish; (6) North¬

ern; (7) Western. London forms an inde¬

pendent district under a separate commander.

There is also a commander-in-chief in India;

in Egypt (the Sirdar), and in the Mediter¬

ranean (Malta, Cyprus and Gibraltar). Thz

self-governing dominions provide their own

troops and commanders. In the Crown

Colonies and Protectorates the commissioner or

governor is commander-in-chief of the local

forces.

Parliament sanctioned an increase of 2,000,-

000 men between. August and November, 1914;

recruits poured in at the rate of 30,000 per

week, and by 1916 the numbers had reached

close on 4,000,000. On 24 May 1916 a Military Service Bill was brought into operation provid¬

ing for compulsory military service of all men, married and unmarried, between the ages of

18 and 41. A ((Ministry of Munitions® was es¬

tablished 5 June 1915 to take over and control works for the manufacture of war material.

By 1 May in the following year there were

3,493 munition factories under the control of

the Ministry. The Rt. Hon. David Lloyd

George, formerly Chancellor of the Exchequer,

was the first head of the new department.

During the first four years of the war nearly 8,000,000 men had been inducted into the army, while munitions and stores were produced by

94 national arsenals and over 5,000 government

controlled factories, employing over 2,000,000

men and nearly as many women.]

47. BRITISH FOREIGN POLICY IN

EUROPE. For about five centuries after the

fall of the Roman Empire, that is, from the

5th up to the opening of the 11th century,

there was one absorbing issue before Europe.

That issue was whether European civilization

was to continue to exist or not. During that

time the Moslems on the south, the Danes,

Swedes, Goths and Norwegians from the

Cattegat, and eastward the Slavs and Hun¬

garians swarmed round the dissolving limbs of

Christendom, so that Christendom bade fair

to disappear. As Baronius said, ((it was as if Christ slept in the vessel that bore mankind.®

The 10th century brought Europe nearest to

destruction. But about the year 1000 an almost magical change began to operate. Invasion

ceased. Europe was saved. Since that time

external barbarism has often threatened, but

never with overwhelming force.

The next epoch of Europe has lasted from

the 11th century up to our own day and is not yet concluded. Europeans are busy finding a

solution for a problem which has haunted them

for eight centuries. That problem is the re¬

organization of Europe after its almost com¬

plete destruction by the barbarians. To the

most profound minds two wavs of reconstruct¬

ing Europe have presented themselves. The

first was to amalgamate this small continent

under one supreme authority, and to do what

the statesmen of China and of America have

achieved so admirably for China and the

United States. Great prestige has attached to

that solution because the Romans had carried

it out to a large extent already with fair

political results. But the solution has derived its fundamental authority from the fact that

there is a certain amount of reasonableness and utility in the idea of having one sovereignty

to control the peninsula which Europe is.

The chief exponents of this great idea can

easily be named. First, there was the mediae¬

val Papacy which, springing up in the 11th

century, claimed universal sovereignty as a right.

As Pope Gregory VII said at that date, the

Papacy is the Master of Emperors. Then in the 13th century, when the mediaeval Papacy had

fallen, the French monarchy made a similar at¬

tempt. Mathew Pavis, Peter Dubois and Jan—

dun all agreed that France was the new claim¬

ant to universal power. Later Pope Urban, in

1382, pointed out that <(France desires the uni¬

versal monarchy of the world.®

The next successor in the field was the

House of Hapsburg. That family fought for

this idea during two centuries, from the middle of the 15th to the middle of the 17th century.

“Austria’s mission is to rule the world,® was

their motto, and their greatest prince was

Charles V. They came in course of time to

rule both at Vienna and at Madrid. The two

branches of the house were intertwined to¬

gether. Together they fell. The decline of the German branch was registered by the peace of

Westphalia in 1648,. and that of the Spanish

branch by the peace of the Pyrenees in 1659.

The next power which strove to raise from

the ground the broken sceptre of the Caesars was France again, under Louis XIV. Louis inaugu¬

rated their policy in 1661. This dream of

French supremacy in Europe was consistently

pursued by France up to 1815. Its consum¬

mate exponent was Napoleon, who claimed to

be the heir of the Caesars. In the summer of 1808 he attained the nearest to his ambition

when he told Talleyrand that he was now

<(master of Europe.®

After Napoleon had fallen in 1815, Russia

succeeded to his aspirations. In 1812 she had

extinguished the ambitions of Napoleon in the

Russian snow. The last two centuries had been

a route march for her, east as well as west, south as well as north. Her day had come, she thought, but the Crimean War showed her to

be not so strong as she imagined, and since that date, Germany, under Prince Bismarck and

later under William II, has arisen to dispute

the title.

But in spite of all these constantly renewed

ambitions to grip the supremacy of Europe, all aspirants to supreme dominion have failed. No

one has been strong enough to reconstitute the empire of Rome. What force has thwarted this

consummation? It is the force of nationality.

The issue before Europe has been the issue be¬

tween despotism and freedom. Freedom has

won. Europe has chosen to organize herself

into a number of mutually independent nations,

some 20 in number, rather than to place herself in subjection to one supreme authority, whether of Pope or of Emperor.

The definite appearance of the national

spirit, and therefore of nations, may be

dated from the 13th century. At that time

a whole cluster of young nations appeared on

the horizon. Some were powerful, such as

France, or insignificant, such as Austria; some monarchial, such as Castile, or republican, such as Florence ; some Slavonic, such as Poland, or Romance, such as Aragon ; or Teutonic, such as Holland ; some dying like the Arelate, or full of the germs of progress, like Brandenburg, or

precarious, like Hungary. What a bewildering

scene ! What an inextricable task to follow the dance of these atoms for seven centuries up to the present day, as they coalesce and disperse and again amalgamate into the nations which

we know so well !

Enough has been said to make quite plain

what the main history of European politics

really is. It consists of a conflict between two theories of government embodied in men's pas¬

sions. One theory proclaims the advantage of

unity under one authority. The other theory

announces the goodliness of nationality of free¬

dom of a Europe split into many independent

sovereignties. Since the 11th century Europe has been rent by this question. Wars innumera-

ble have been fought over it. Such has been the fearful legacy of ambition left by the Caesars to the barbarians.

Having now indicated the nature of the poli¬ tics of Europe, let us turn to England, this minute speck of an islet off the European coast. What has been her policy as regards this con¬ tinent? Japan, an island similarly situated, has enjoyed an easy time, because China, on the coast opposite, has been the most peaceable neighbor in the world. But England has al¬ ways been faced by powerful and ambitious neighbors. Great Britain had imperatively to determine whether she should side with autoc¬ racy, as represented by the Pope, by the Spanish Armada, by Louis XIV, Napoleon, the Tsar Nicholas, Bismarck and William II; or whether she should side with the force of free¬ dom ever ready to resist these powers. It has been somewhat a hard

choice. England has

often tried to shut her eyes and take no part ; has sometimes taken the side of power and

authority, as James I did in siding with Spain, or as Charles II did in siding with France.

But, on the whole, since the days of William

the Conqueror England has sided with freedom.

For the liberties of Europe ever coincide with the interests of England. Hence it was that

Great Britain opposed the Papacy, and Spain,

and Louis XIV, and Napoleon and the Kaiser.

For this reason Great Britain defended the

integrity of Turkey in 1854 and 1878. To

hold the balance of power in Europe is a con¬

ception deeply rooted in British foreign policy.

It was as familiar to Henry VIII and Wolsey

as to the British government in August 1914.

It is for this reason in part that Britain has ever been the champion of small states, of

Holland and Belgium and Portugal, and

Switzerland, each of which is a bar against

autocracy and a pledge of European freedom.

Hence English ˆperfidiousness,® that is aptitude ever to abandon the company of a too dominant star. Hence the profound and fundamental

in¬

difference to European politics, so long as no power is visibly in the ascendant across the

Channel. Hence, too, the predominant part

which, in all the real crises of European history, England has played. Who but the British

thwarted the Pope, and the Hapsburgs, and

Louis XIV, and Napoleon? That Great Britain

would throw her weight against the strongest

belligerent in any general European war was

a mathematical certainty; she has consistently

followed that policy for centuries, and it is a policy dictated neither by covetousness nor

jealousy, but by the first law of nature — self preservation.

For Americans all this has a good deal of

significance. What is to be the policy of the United States in Europe? The interests of the

United States in Europe are nothing like so

vital and immediate as those of England; but

subject to that consideration, they run on

parallel lines. It can never be the interest of the United States to be faced across the Atlantic fiy an united and amalgamated Europe. For,

first, that would mean the conquest of England; and next, the power thus organized would be a menace to the greatness of the United States.

Just as the United States desires the open door and the balance of power in the Far East, so and for the same reason, she needs a Europe

in which national freedom prevails, rather than a

Europe armed under one authority and dicta—

tress of the world. That consideration is not

yet materialized in the American mind. But

the day will come when it will be materialized and then it will be seen that the identity of the European policy of England and of the United

States constitutes yet another link between the two nations.

George Villiers Peel,

Author of cThe Future of England) (1911) ;

(The Reign of Sir Edward Carson > (1914),

etc.

48. BRITISH FOREIGN POLICY IN

INDIA. There is no space for even a brief

sketch of the marvellous story of the British

wooing and winning of the great peninsula,

which contains nearly one-fifth of the human

race. A glance at the map of India will show that others also wooed, but did not win, and

will indicate that all paid their addresses at three important points on the long coast line, so singularly lacking in harbors. Near Bombay on

the West, the Portuguese still hold the beautiful land of Goa; near Madras on the East, the

French retain Pondicherry, and up the Hooghly

river above Calcutta, the tricolor still flies over the little settlement of Chandernagore. Dutch

and Danes no longer have settlements in India, but these, too, have left their traces. From

Madras, Bombay and Calcutta — isolated and

unconscious — strenuous traders generated the

force, which was in the course of time to

create and consolidate one of the most re¬

markable Empires which the world has ever

seen.

We cannot here dwell on the romantic deeds

of the great builders of the huge fabric, known as British India.

The map will also show that only three-fifths

of the Indian continent are colored red. The

remaining two-fifths belong to the Indian

princes and are not British territory. If the

policy so keenly followed by Lord Dalhousie

had not been arrested by the convulsion known

as the Indian Mutiny, it is possible that a con¬

siderable portion of the territory now belonging to the Indian Feudatories would have passed

by lapse or other causes into British possession.

But happily by the wise grant of the right of adoption to the Indian princes the danger of

further annexation disappeared. It will be

noticed, if reference again be made to the map of India, that the territories of the Indian

princes are widely scattered. There are large

countries belonging to princes, such as the

Nizam of Hyderabad and the Maharaja of

Mysore in the South, and there are vast areas held by groups of chiefs such as the congeries of states known as central India; where the

great Mahratta dynasties hold sway — Rajputana where the Rajput princes rule, and the

large tract in the Punjab where the Sikh

states lie. It is difficult to define the exact relation of the Indian princes to the Crown,

but the King of England and Emperor of

India may in a sense be styled a <(Ruler of

Princes. }) The ties which bind the Indian

princes to the British Crown have been de¬

scribed by Lord Curzon :

<(They are peculiar and significant, and, so

far as I know, they have no parallel in any

 other country of the world. The political sys¬

tem of India is neither Feudalism nor Federa¬

tion ; it is contained in no constitution ; it does not always rest on a treaty and it bears no re¬

semblance to a league. It represents a series

of relationships that have grown up between the Crown and the Indian Princes under widely

differing historical conditions but which in

process of time have gradually conformed to a

single type. The sovereignty of the Crown is

everywhere unchallenged. It has itself laid

down the limitations of its own prerogative.

Conversely, the duties and the service of the

states are implicitly recognized, and as a rule, faithfully discharged.®

The conquest of Upper Burmah, carried out

by Lord Dufferin, was under the circumstances

unavoidable. There have also been changes in

Baluchistan of a political rather than a terri¬

torial nature. But with these exceptions, India, from the time when it passed out of the hands of the company of merchants into the keeping

of the Crown, has remained content with the

frontiers which nature had suggested and Lord

Dalhousie had secured. They are good fron¬

tiers, and enable a comparatively small force of some 230,000 men to keep the peace, internal

and external, of some 300,000,000 people. India has been likened to a ((fortress with the vast moat of the sea on two of her faces and with mountains for her walls on the remainder.®

For the Hindus the (<black water,® as they call the ocean, was protection enough until the

navies came out of the west, while to the north stood the stupendous mountains of the Him¬

alaya. But to the northwest, the frontier, diffi¬

cult and dangerous though it was, admits of

passage, and through the defiles which occur

in the marshes between Peshawar and Quetta

the waves of invasion have often found their

way. And so long as Great Britain holds com¬

mand of the sea, it is only through the north¬

western frontier that India can be threatened.

Since 1857, the year of the Indian Mutiny,

the chief preoccupation of the Viceroys has

been the internal development of the vast and

varied continent, split up into so many distinct countries and peopled by races of extraordinary diversity. The terms ((India® and <(Indian® are too often used with most misleading results, and it would be as safe to predicate anything of

ftIndia® and the <(Indians® on any subject rang¬

ing from politics to weather, as it would be to generalize on Europe and the Europeans. The

only thing in India which is the same and uni¬

versal is the system of government, and many

are of opinion that in this sameness and uni¬

formity there is danger. But uniformity on the whole tends to efficiency and is economical, and since India passed under the direct control of the Crown the exigencies of finances have ren¬

dered strict economy essential. It would be dif¬

ficult to find any part of the world where gov¬

ernment is carried on so cheaply as in India.

Some 1,000 officers of the Indian Civil Service manage the affairs of some 244,000,000 people in British India, and have occasionally an indirect influence on the welfare of the remaining

70,000,000 who live in the territories of the

Indian Princes. British India is divided into

large administrative areas known as Districts,

and in the whole world there is no such work as that of the District Officer. Often isolated from his countrymen he toils day and night for the people committed to his charge. They look

to him for everything and in their own lan¬

guage he is their Mabap — their Mother and

Father. His one idea is that they should not

be harassed or worried whether it be by tyran¬

nous neighbors, by exacting underlings, or by an overzealous government. The District Officer

at his best is rarely seen except by the people away in the villages. Viceroys and distin¬

guished travelers cannot see him at his real

work, but for all that they quickly learn that the good government of India ultimately de¬

pends on the good District Officer. Perhaps the best critics of English administration in India are the French, and they have borne generous

testimony to the system and wonder at the

fewness of the civil servants. As it is in the Civil Service, so it is in the other many effi¬

cient departments of official work: the British officers are few, and their work and respon¬

sibilities are enormous. It is due perhaps to the responsible nature of the work that the

strenuous life prevails in spite of climate and solitude.

Far away from the Districts, from the

canals, railways and forests, where men live

their solitary lives on salaries none too gener¬

ous, there is a military cantonment with a mixed brigade of British and Indian troops. Strong as may be the District Officer and unquestioned as may be his authority among the people, the

knowledge that there are soldiers of the fair

faces and guns within a few hundred miles un¬

doubtedly acts as a sanction and a steadying in¬

fluence on the unruly spirits and latent forces of disorder, ready in every district to spring if there be the least sign of weakness.

The Oriental respects most of the respectable

qualities, but to him the great quality is strength.

There is a word in use throughout India —

Ikbal. If the Ikbal of the Sirkar is good, that is if the prestige of government stands high, all is well. But if it is shaken all the splendid structure which the British have raised in India will also be sorely shaken. It is the knowledge of this prestige and its power, and the sense that it must be inviolate, that brings anxiety and pause to a Viceroy and his government, when

some reform really touching the people or some military operation to quell a turbulent clan on the frontiers is under discussion. In India risks must be run, but caution is the characteristic of the Indian bureaucracy. It is this same knowl¬

edge of prestige and of what is connoted by the loss of it, which has hitherto made for conti¬

nuity of policy, and has kept India out of the arena of party strife in England. Authority,

power, prestige are all summed up in the word Ikbal. That is the word on which the astonish¬

ing miracle — the rule of 300,000,000 by a mere handful of men — rests. Justice, benevolence,

an almost missionary zeal to improve the con¬

dition of the people are mere incidental at¬

tributes. The student will be staggered when

he learns the number of religions, languages,

tribes and castes which exist in India. He will recognize that India is a vast conglomeration of innumerable differences. But he must see the

people before he can realize the gulf which lies between the Sikh and Pathan, the Mahratta and

the Bengali. Lord Curzon explained it in his

speech at the Guild-Hall in 1904: <(We have to 336

 deal in India with races that are as different from, each other as the Esquimau is from the

Spaniard or the Irishman from the Turk; with

creeds that range between the extreme points of the barest animalism on the one hand and the

most exalted metaphysics on the other, and

with standards of life that cover the whole

space between barbarism and civilization.®

It is no easy task to give equal justice to all these varieties of the human race, but the task is fairly faced, and the wise rule of religious tolerance, and the scrupulous respect which is

paid to Indian customs, make possible the gov¬

ernment of India. But though the differences

are great there are solvent forces at work

which may at no very distant date make for

homogeneity in certain localities, and the close of one century and the beginning of another

seems by some curious reason to be the signal for change. Some years ago it was the fashion to suppose that the people of the two great re¬

ligions of India — the Hindus and the Mussul¬

mans — would never work in harmony. It was

similarly supposed that the manly races of the Punjab would never co-operate with the unwar¬

like people of lower Bengal. Undoubtedly

many of the propositions which used to be ac¬

cepted without challenge must be modified.

Railways, travel in Europe, education and a

free press have worked important changes, and

it is plain that the government of the future will have to reckon not with an homogeneous

India, but with an increasing number of edu¬

cated Indians scattered over the continent who

are groping after ideals. It will be the problem of the Indian statesman to find them these

ideals, and to give them some safe scope for

their activities. The progressive Indian realizes that India depends on the British connection.

He wishes to take part in the government of

India, and to enable India to take her place

among the self-respecting nations of the world.

But the progressive Indian — like the ordinary Englishman — will not grasp the radical point, that there is no India and no nation of Indians.

If political power is to come to the educated classes — the microscopic minority of the mil¬

lions, it must first come from small beginnings, from the village and the town. They can¬

not jump at once into the control of an empire.

The progressive Indian is, so far as he can be judged by his conversation and his public

speeches, loyal to the Crown, but unfortunately his organ — practically the whole of the native press — is undoubtedly preaching sedition and

poisoning the mind of the rising generation

against the government. Yet the leaders of

the Progressive party would deplore a con¬

flagration, for they and theirs would be the first to be overwhelmed. It needed no prophet to

point out as did Mountstuart Elpinstone years

ago that bureaucracy and a free press were in¬

compatible, but the problems of finding the ideal for the intellect of India must be grappled

with and the good humored indifference of a

strong government toward a virulent and hos¬

tile press is no longer safe. This somewhat

lengthy but still incomplete preface to the sub¬

ject of ((Foreign Policy in India® is necessary since it is impossible to deal with the Foreign Policy of India as a thing separate and apart from India. Up to the end of the 19th century Indian foreign policy was treated with great ret¬

icence. There may have been some policy,

but it was known to few. But at the beginning of the present century Lord Curzon, Viceroy of India, who believed in taking the people into

his. confidence, departed from the old-fashioned reticence, and in several memorable speeches

formulated the problems of the defence of

India. No one was ever more qualified to ex¬

pound these problems. He had made them his

life study, and his intimate knowledge of the

countries beyond the frontier, acquired by

travel, coupled with his wonderful grasp of

evefy detail of Indian affairs, enabled him to co-ordinate isolated facts and events, and to

establish India's position on the board of

British foreign policy. He pointed out that up to recent years the foreign relations of India were practically confined to her dealings with

Afghanistan and to the designs or movements

of the great Power beyond, and the Foreign

Policy of India had little to do with any other foreign nation. ((Now all that is changed and

events are passing which are gradually draw¬

ing this country, once so isolated and remote, into the vortex of the world's policy, and that will materially affect its future.® Consolidation on the frontiers involved more direct relations with the countries beyond, but more than that.

<(Europe has wakened up, and is beginning to

take a revived interest in Asia. Russia with

her vast territories, her great ambitions, and

her unarrested advance, has been the pioneer

in this movement, and with her or after her

have come her competitors, rivals and allies.

Thus, as all those foreigners arrive upon the

scene and push forward into the vacant spots,

we are slowly having a European situation re¬

created in Asia, with the same figures upon the stage. The great European Powers are also

becoming the great Asiatic Powers. Already

we have Great Britain, Russia, France, Ger¬

many and Turkey; and then, in place of all

the smaller European kingdoms, and princi¬

palities, we have the empires and states of the east — Japan, China, Tibet, Siam, Afghanistan,

Persia, — only a few of them strong and ro¬

bust, the majority containing the seeds of in¬

evitable decay. There lie in these events and

in this renewed contact or collision, as the case may be, between the East and the West, omens

of the greatest significance to this country.®

Again, ((A land frontier 5,700 miles in length, peopled by hundreds of different tribes, most of them inured to religious fanaticism and heredi¬

tary rapine, — a single outbreak at a single point may set entire sections of that frontier ablaze.

Then, beyond it, we are brought into direct con¬

tact with the picturesque but perilous debility of independent, or quasi-independent, Asiatic

states, some of them incurably diseased and

hastening to their fall ; and behind them, again, are the muffled figures of great European

Powers, advancing nearer and nearer and

sometimes finding in these conditions tempta¬

tions to action that is not in strict accordance with the interests which

we are bound to de¬

fend.®

But after all English foreign policy in India

is largely a matter of finance, for it must be based on the contentment of the people. It can be asserted with deliberation that the system of taxation in India is fair and considerate, but there are millions who live on a very slender margin. In normal years when the rains are

favorable there is plenty in the land; but

(49) when the rain fails, and when, later, famine is declared, the numbers who flock to the famine

camps are proof that among the poorer classes

there is little or no reserve. It is, therefore, incumbent on the Viceroy — whose duty is to

keep India safe and contented — to ensure peace on his long land frontier of 5,700 miles. He can engage in no policy of adventure and he cannot lightly undertake even a small expedition, for

he never knows whether a local disturbance may not set the frontier in a blaze for hundreds of miles. He has to consider the revenues and the economic requirements of India, the policing of the provinces, and the obligatory garrisons, and he knows that if his calculations are correct

that he has only a certain amount of force for the extended defence of the Indian Empire.

Those fierce critics of government — the editors of the native press — who write at the safe

harbors where shots have not been fired for

generations, maintain that the military forces

of India are excessive, and they point with some justice to the fact that

during the war in South Africa and the operations in China the garrison of India was seriously depleted. It was a risk, but no Viceroy can hesitate when the British

Empire calls, and the splendid conduct of the

people and princes of India justified the con¬

fidence reposed in them. The army of India is composed of British and native troops. Ex¬

perience demands that the proportion shall -be

one British soldier to two Indian sepoys, and

that the artillery shall be entirely British. The British soldier in India is expensive, the Indian sepoy cheap, perhaps the cheapest and for his

pay the best and most efficient soldier in the world. On the frontier Lord Curzon, chiefly

from political reasons, — the policy of concilia¬

tion instead of exasperation, — offered to the

wild youth of the frontier service in militia

regiments, while many of the greater princes

have voluntarily contributed highly trained

troops for the defence of the empire. These

forces are trained by British officers, and have won high praise on service. But in spite of

India's resources in man power, in spite of the loyal cooperation of the great Feudatories,

the Indian government cannot be expected,

single-handed, to provide for the defence of

what has been truly called the ˆstrategical

frontier® of the British < Empire. India must

look to Great Britain in times of supreme

danger, and in the matter of foreign policy

India is merely an agent of the British govern¬

ment. The Viceroy and his government are

responsible as local agents for Indian territory where it marches with Turkey, Russia, China

and France, for the Persian Gulf, and for re¬

lations with Afghanistan. It is always difficult for men who have been brought up in a school of great tradition to abandon the faith, and

among the traditions which have made this

splendid Indian Empire have been courage, a

belief in the British mission in the East, and undaunted advance. (For Bibliography see

India, Burma, Afghanistan, etc.).

Walter Roper Lawrence,

Formerly Private Secretary to Lord Carzon of

Kedleston, Viceroy of India; afterward

Member of Council of India.

49. BRITISH FOREIGN POLICY IN

AFRICA AND AMERICA. At the outbreak

of the European War the British possessions

in Africa amounted to a total of 2,100,000 square miles. On 5 Nov. 1914 Great Britain declared

war on Turkey, and on 17 December the Turk¬

ish suzerainty over Egypt was ended. By this

stroke Great Britain annexed Egypt, the Sudan

and the Libyan desert, adding a matter of

1,600,000 square miles to the British empire.

These three territories, though administered by

England since 1882 in the case of Egypt and

1898 in that of the Sudan, had never been Brit¬

ish possessions. They stood under Turkish

suzerainty with a native prince (khedive) as

ruler, assisted by a staff of British officials.

France owns 3,866,950 square miles of Africa,

but of this at least 1,500,000 square miles is her share of the great Sahara Desert. Great Britain, on the other hand, holds 3,701,411 square miles, most of it situated in the choicest regions of the Dark Continent. The German African

colonies captured by the Allies during the war are not considered here.

Leaving out of account the Gold Coast

(80,000 square miles), Sierra Leone (31,000

square miles) and Gambia (4,500 square miles),

all situated on the West Coast and ceded to

England by treaties in 1672, 1787 and 1807 re¬

spectively, it has taken Great Britain exactly

100 years to create her gigantic African empire • — from the Treaty of Paris in 1814 to Decem¬

ber 1914. With the signing of that treaty, by which also British Guiana was ceded to her,

Great Britain completed the structure of her

dominions on and about the American Conti¬

nents — Canada, West Indies, Falklands, *etc.*

To return to Africa. It is customary at the

erection of all stately edifices to lay first a foundation and then to proceed with the super¬

structure according to some well-defined plan,

design or policy. A study of British policy in Africa cannot but lead the student to the con¬

clusion that policy — in the sense of (<design® —is an almost negligible quantity. This assertion, however, may not apply so strictly to more re¬

cent years. It seems rather that a concatenation of fortuitous circumstances led or drove Great

Britain into acquiring or annexing huge terri¬

tories than that there existed any inherent de¬

sire to do so. Over and over again we find

successive governments hesitating — almost

trembling — on the brink of some colonial ad¬

venture; a desire to ((cut and run,® and finally pushed by events or individuals into the very

act they dreaded and hoped to avoid. India

was conquered by a private trading company;

Canada dropped into England's lap as the re¬

sult of one battle ; and Australia became British mainly because no one else came along to pick it up; the North American Colonies were estab¬

lished by private enterprise and lost again only through government bungling. The position of

Great Britain in Egypt to-day is due simply to the defection of France in 1882. Both nations

— at the instigation of France — sent warships to Alexandria with the object of crushing the

Arabi Pasha rebellion and of restoring the au¬

thority of the Khedive Tewfik Pasha. At the

eleventh hour France backed out and left the

British fleet to carry out the task alone. British troops crushed the revolt and England was left to face the alternatives of either leaving the country in a state of chaos or remaining to set its affairs — especially the finances — in order.

Only six years before England had become the

ch.ef proprietor of the Suez Canal by the pur¬

chase of the khedive's shares for $20,000,000.

‘L his master stroke, again, was due to private initiative, and not to any intention on part of the government. The late Frederick Green¬

wood, editor of the London Pall Mall Gazette,

was the man who worried Lord Derby and Lord

Beaconsfield to such an extent that the latter sent his secretary late at night to ask Lord

Rothschild to advance the money, and next

morning the shares were British property. The

armed intervention in 1882 was due in a large measure to the correspondence of the late Mr.

C. F. Moberly Bell (q.v.), then Tunes represen¬

tative in Egypt. In both these farreaching

events the government was unwillingly prodded

into activity by private individuals. In South

Africa, again, we observe the gigantic figure of Cecil Rhodes, the founder of Rhodesia, the man who, without any official sanction, dreamed the vision of <(all British, from Cairo to the Cape.®

With the aid of his able lieutenant, Dr. Jameson, he organized and financed the socalled

<(Jameson Raid® into the South African Re¬

public in 1895. Four years later this ill-starred exploit brought on the Boer War, in which it

took Great Britain nearly* three years and 250,-

000 men to achieve what Rhodes and Jameson

hoped to accomplish in a few days with 500

men. After the Majuba Hill disaster of 1881

the British government accepted defeat and

<(scuttled® in alarm, thereby laying up a store of future trouble that

was not ended till 21 years later by the Peace of Vereeniging. Great

Britain had fought expensive wars against the

Kaffirs to save the whites from extinction in

1811, 1818, 1829, 1835, 1846, 1851 and the Zulu War of 1879. She also fought the Matabeles

and Bechuanas, instilled respect for the white

man among the natives, and consummated her

civilizing mission by insuring political stability and peace in that part of the world with the Union of South Africa in 1910. Here, as well

as in the Sudan and on the Slave Coast, where the hand of Great Britain once fell heavily, in¬

flicting painful wounds, that same hand has also known how to heal and uplift after the drastic ordeal of correction. The Mahdi and Khalifa

horrors of the Sudan were swept away in two

days by fire and sword ; in the city where Gor¬

don fell there is now a university for the peo¬

ple; the human sacrifices and blood orgies of

Benin and the slavery atrocities of Ashantee

are now things of the past: peace and industries now reign in their stead.

Already in 1807 negro slavery had been abol¬

ished in England ; in 1833 it was abolished in all British colonies ; in 1843, 12,000,000 slaves were liberated in India; directly after Great Britain assumed a protectorate over Zanzibar in 1890

slavery died out; in 1895 the practise was abol¬

ished in Egypt, formerly a great African slave market. As the late Professor David Ames

Wells wrote in 1896, (<when England has once

put down savagery, that rendered civilization

impossible, her treatment of the subjugated and uncivilized has always been merciful.® That by

this process of civilizing and subjugating, by

administering law and government in ((protectorates,® Great Britain eventually became the

possessor of those territories, was an automatic and inevitable logical conclusion. She had

either to hold them or cast them adrift to

wander under the control of some other power.

In East and Central Africa British policy

may be described as an ˆengineering policy.®

The Uganda Railway from Mombasa to Port

Florence on the Victoria Nyanza; the Cape to

Cairo Railway; the huge bridge over the Vic¬

toria Falls ; the construction of roads and trade routes, buildings and wharves ; the development

of Nyassaland and, in the West, of Nigeria, are all costly and strenuous undertakings from

which not only Africa, but the whole world

must derive incalculable advantage in the

future. A thousand-mile trip down the Nile or

a seven-hundred mile journey from the Indian

Ocean inland on British territory can to-day be made with as much

ease and comfort as a rail¬

road journey from New York to Chicago.

It now remains to examine briefly the trend

of Great Britain's policy in a part of Africa which is not in her possession, namely, Mo¬

rocco. The international controversy over that

country is of recent date, and undoubtedly

played a prominent part in the overture to the European War of 1914. But Morocco was

merely a pawn on the European diplomatic chess board. In March 1905 the German emperor

landed at Tangier to aid the sultan in his de¬

mand for a conference of the Powers to check

the military dispositions of France, which, by

the Anglo-French agreement of 1904, was al¬

lowed a free hand in Morocco in return for

the same privilege being accorded to Great

Britain in Egypt. Germany complained that she

had not been consulted in the matter and de¬

manded certain concessions or, alternatively,

compensation elsewhere. (See Morocco). Ger¬

many's object in raising the dispute was mainly to test the strength of the new-born ((Entente Cordiale®. between France and Great Britain

and to separate them if possible while Russia

had her hands full with the Japanese War. But both at the Algeciras conference in 1906 and

during the Morocco crisis of 1911 Great Britain and France held firmly together, supported even by Italy the ally of Germany and Austria. Up

to this time British policy in Africa had not been antagonistic to the acquisition of territory by Germany on that continent ; but the unre¬

lenting opposition now offered to German claims in Morocco was based on the strong ground of

self-preservation. British statesmen had for

some years realized that, with the rapid growth of her navy, Germany had become an implacable

and jealous enemy of the British Empire. Al¬

ready in 1902 Germany had entered into nego¬

tiations with France to obtain a harbor on the coast of Morocco ; had the attempt proved suc¬

cessful it would have meant a deadly blow at

British sea power. A German fleet stationed

off Morocco would have controlled not only

the route to the Cape, but also the Strait of Gibraltar, thereby cutting off communications

with Egypt and India. In addition, it would

have rendered at least difficult — if not impossi¬

ble — any cooperation between the British

North Sea and Atlantic squadrons and those

stationed in Southern and Eastern waters. It

was no doubt a similar apprehension that

prompted Great Britain to retain possession of

Walfish Bay, situated on the coast of German

Southwest Africa. The German government

had on several occasions endeavored to acquire

the harbor, a proposal consistently vetoed by

Cape Colony.

British policy in America, in so far as there 338

can be said to be any, is one of passivity.

Canada conducts her own affairs without inter¬

ference from the mother country; the West

Indian islands have their governors and local

parliaments, managing their domestic affairs in

a manner suitable to themselves. The same

may be said of British Guiana and the Falkland Islands. These outlying posts of the empire are seldom heard of ; they create neither disturb¬

ance nor sensations, keeping ((the noiseless tenor of their way.®

Henri F. Klein.

Editorial Staff of The Americana.

50. THE FREE TRADE MOVEMENT.

Introduction. — The British are Free Traders

and hold it vital to their interests to maintain Free Trade. They do not,

of course, mean

that the government ought never to take any

toll from traders or lay any taxation whatever upon imported goods. In a modern state it

would be absolutely impossible to support any

such contention. The enormous revenues

which have to be raised to carry on the work of government make indirect taxation an ab¬

solute necessity. The principle upon which the

British Free Trader insists is that any tariff imposed upon goods entering his country shall

be imposed for revenue purposes only. That he

holds is the sole object which the government

must entertain in levying its customs. But it

follows from this that duties ought not to be levied at the ports on goods produced abroad

which are also produced in England. To levy

such duties encourages the consumer to buy the home and untaxed goods rather than the for¬

eign and taxed goods, and so diminishes the

yield of the tax. Needless to say, this, principle is not adopted out of any hostility to homemade products, or from any desire to favor the for¬

eigner. If he thought he could do so without

injury to himself, without loss of revenue or

without diminishing trade generally, the Eng¬

lishman would of course prefer that the goods

made by his fellow-citizens should sell better

than those made by foreigners. One of his ob¬

jections to protective duties (that is, to import duties on articles which are also made at home) is that such duties are not good <(drawing®

taxes. Unless the state levies excise duties

equal in amount to the customs duties, and such excise duties can only be levied profitably in a few instances, the home manufactured goods

which escape taxation are, speaking in a strictly fiscal sense, defrauding the revenue. In other

words, what ought to go into the public purse is going into the pockets of the protected manu¬

facturers. The more efficiently a tax protects, the worse tax it is for the purpose of filling the treasury — the true purpose of all taxation.

It is then, in the opinion of English Free

Traders, neither wise nor in the true interests of the state to interfere with the course of

trade on any other ground than that of produc¬

ing revenue.

The Economic Argument. — It must next

be explained that the Free Trade Englishman

objects to interference with the course of trade, not out of any pedantic feeling in regard to the abstract ˆrights® of the trading part of the

community, but because he believes that such

interference must involve economic waste and

so cause material loss to the nation. He be¬

lieves that to forbid or interfere with exchanges between man and man always results in a dimi¬

nution of national wealth. The English have

adopted during the past 50 years and more, the principle that all exchanges are and must be a mutual benefit. They are transactions which

are twice blest. They bless him that buys as

well as him that sells, and benefit the man who exchanges gold for corn as much as the man

who gives corn for gold. Hence it has become

an essential, nay, an almost instinctive, belief on the part of the great majority of Englishmen

that it is to their interest to stimulate and en¬

courage exchanges in every possible way. They

hold that to reduce the volume of exchanges

must necessarily cause waste. But government

interference with trade by means of customs

duties is bound to reduce the number of ex¬

changes. Therefore they will only allow that

interference in obedience to the imperative

needs of the treasury. They realize that for¬

eign exchanges benefit the individuals of a na¬

tion, and so the nation, quite as much as home exchanges, and feel that as long as exchanges

are being made freely and are increasing, that there can be nothing wrong, at any rate in the commercial condition .of a nation. Only allow

free commercial intercourse, free buying and

free selling and free access to the ports of a country, and its trade, and so its prosperity, will take care of itself. To allow the maximum of

exchanges is to increase the wealth of a na¬

tion. To prevent or lessen exchanges is to

waste its wealth.

The <(Bleeding to Death® Hypothesis. —

Further, English Free Traders hold that there

is no necessity to be anxious as to whether the imports into a country are greater in value than the exports out of it. They hold that the rela¬

tions between the imports and exports must

necessarily adjust and equalize themselves.

Human nature, they contend, has passed an or¬

dinance to the effect that ((he that will not buy, neither shall he sell.® Thus, instead of fearing that imports, even of goods which can be made in England, will reduce the amount of labor,

and so injure home trade, they regard all im¬

ports into Britain as orders for British goods to be produced and paid in exchange for those im¬

ports. Imports are physical orders for goods,

and so for the labor that is employed to make the goods. And they have this advantage : the

payment arrives with the order.

At one time the general British public, it

must be admitted, was not so confident as it is now in regard to the propositions just set forth.

The opponents of Free Trade declared that

Englishmen were living in a fool's paradise

when they supposed that trade could look after itself, and that imports and exports must really be balancing though the statistics seemed to

show that many millions' worth more goods

came into England every year than went out of it. Nobody, they argued, will give something

for nothing, and therefore if your imports ex¬

ceed your exports by, say, a hundred millions a year, you must be paying the difference in some way or other. ((There is only one way in which you can be paying it,® ran the argument, ((and that is by sending away the capital accumulated in years of better trade. In fact you are living on your capital and bleeding to death. Because you have been very rich in the past, the process may take a long time to work out, but some

day you will find that you have no more blood left in your veins, and that you have reached the point of economic extinction.® That line of argument was first used in the ((Fair Trade®

agitation in the years 1882-1885, and was re¬

vived in 1903. The simplest answer is found in the fact that if exchanges do not balance and if the British people have been in truth living on their capital and bleeding to death, they ought by now to be a trebly ruined nation. In the

course of the last 35 years imports have ap¬

parently been so much in excess of exports that the loss in that period must have been nearly £2,000,000,000 of capital. But it is notorious

that we have suffered no such loss. Though

statistics as regards the accumulation of capital, both in home and foreign investments, are by

no means complete or satisfactory, it is manifest that instead of bleeding to death the nation has become more, not less, full blooded from the

capitalist point of view and that the total cap¬

ital, instead of diminishing, has vastly increased in the course of the last quarter of a century.

Instead of having £2,000,000,000 less capital, we have many hundreds of millions more and are

a very much richer people. In other words,

experience has shown that the bleeding to death theory will not bear examination, and that

whether on other grounds or not protection

may be a good thing, free trade is certainly not driving Britain to bankruptcy or reducing her

capital resources. In fact, regarded as a means for increasing and maintaining the material

wealth of the nation. Free Trade must be ad¬

mitted to hold the field.

The Imperial Argument. — Though there is

no doubt a great deal of difference of opinion in regard to the best way in which to maintain and develop the British Empire, the nation is

virtually unanimous on one point. It is for the benefit — moral, political and economic — of the peoples who compose it that the British Empire shall be maintained. It is asserted on the Pro¬

tectionist side, however, that the Empire cannot be maintained under a Free Trade system, and

that unless that system is changed the Empire

will fall. That argument has hitherto not made any impression upon the masses of the British

people. Instead of accepting the formula ((No

Preference, no Empire® they are much more

inclined to accept the opposite dictum, ((No Free Trade, no Empire® and to hold the opinion that the Empire as it exists to-day is the gift of Free Trade. Up to 70 years ago there was a

system of preferential trade within the Empire

almost exactly like that which it is now pro¬

posed to re-establish. On the one hand the

British colonies were required to give a pref¬

erence to British manufactured goods and to

supply their needs in the British market, and

on the other, the British people gave a very

large advantage to the products of the various parts of the British Empire in their markets.

Yet, strange as it may seem, the result of these attempts to interfere with exchanges on political grounds did not produce a greater sense of

loyalty in the inhabitants of the colonies or of better feeling toward the scattered parts of the empire in the United Kingdom. The epoch of

colonial preference was the epoch in which

there grew up in England a school of thought

and a political party which believed that the

connection between the outlying parts of the

empire and the United Kingdom was injurious

to both and that it would be to her advantage if Britain got rid of her colonies and depen¬

dencies as rapidly as possible. Even so im¬

perialistic a statesman as Lord Beaconsfield was affected by these views in middle life. He

actually described the colonies as <(millstones

round our neck® and looked forward to the time when they would all be independent. The

abolition of colonial preference and the adoption of the principle of (<tariff for revenue only®

may be said to have been accomplished by the

end of the first half of the 19th century. It was after 1850 and so in the Free Trade epoch that the strong sentiment in regard to the em¬

pire now existing, both in the colonies and at home grew up. No one now looks forward,

as men constantly looked forward during the

preferential epoch, to the time when the col¬

onies would one by one leave the empire.

This being so, many of the most far-seeing

and the most steadfast imperialists in England

regard Free Trade as essential to the mainte¬

nance of the empire.

A further argument for Free Trade as an

essential condition of empire is to be found in the fact that from the strategic and military

point of view the Empire rests upon sea power, and that sea power in the true sense cannot be possessed by a nation which does not also

pos¬

sess supremacy or something approaching

supremacy in the matter of its mercantile

marine. A great national navy depends upon a

great commercial navy. But a commercial navy

cannot exist without Free Trade. It is the

nations which encourage all who have anything

to sell to come freely to their ports and sell it there without let or hindrance, which most

easily develop a large mercantile marine.

Britain stands first in the world of shipping, not because she has better resources for ship¬

building and not because her population is by

nature more inclined to seafaring than others, but because she is a Free Trade nation. Eng¬

lishmen feel that if they are to keep their

empire they must remain a great shipping

power, and to be a great shipping power they

must maintain Free Trade.

Monopoly and Corruption. — There are

two other factors which operate to make Eng¬

lishmen maintain their present fiscal system.

The first is the dread of monopoly which is

to be found in the British democracy. They

are intensely suspicious of anything in the

nature of Trusts or Combines, or of. allowing

any body of commercial men to be in a position in which they can say <(You must either buy the goods we make, or accept the services which

we offer, or go without.® Dreading intensely

the creation of monopolies, they cling to Free Trade, for they realize that it is almost impos¬

sible to establish a complete monopoly under

their present system. As long as the doors are open and the traders of every nation in the

world are allowed to send what they will to

Britain and dispose of it there freely, the task of creating a monopoly in any of the essential needs of mankind is almost impossible of ac¬

complishment. Another reason which weighs

not less strongly with the British nation is the dread of political corruption. Rightly or

wrongly they believe that there is always a

danger under Protection of corruption entering

political life. It must not be inferred that the British people consider that a proper regard

 for national interests can never be found in

protectionist states. The history of America

shows that plenty of unselfish patriotism is to be found in countries where protection prevails.

The fact, however, remains that the British

people do dread very greatly the introduction

of protectionist conditions into their political life. Further, they dread the direct corruption of the Legislature by the great commercial in¬

terests. They may trust their Members of

Parliament in the abstract but they do not wish to see them exposed to the temptations which

unquestionably exist when enormous pecuniary

interests depend, upon the maintenance of a

Protectionist tariff. Hence, the British democ¬

racy feel that with the maintenance of Free

Trade is bound up a great deal of what they

value most in the political system under which they live. See The British Tariff Movement.

Bibliography. — The main outlines of the

early free trade movement can be found in gen¬

eral histories, such as (The Growth of English Industry and Commerceˆ vol. II, by W. Cun¬

ningham; (History of British Commerceˆ by

Leon Levi. But the real relation of the move¬

ment to English life and progress is best seen in the speeches of the politicians mainly

responsible for the carrying out of ideas into practise. There is ample material of this kind in the <Speeches) of W. Huskisson (1831) ; of Sir Robert Peel (1853) ; in the (Free Trade

Speeches* of Charles Villiers (1883) ; in the

(Life and Speeches of John Bright,* by G. B.

Smith (1881) ; and in the (Life of Richard

Cobden,* by J. Morley (1881) ; the (History of the Anti-Corn-Law League, 5 by H. Prentice

(1853), and the (History of the Free Trade

Movement in England,* by A. Mongredien,

also contain much information as to the earlier period.

Later Works. — (Free Trade and Protection,*

by H. Fawcett (1878) ; and (Free Trade v.

Fair Traded by Sir T. Farrer (1885) ; (The

Free Trade Movement and its Results, * by

G. Armitage-Smith (1903) ; (Elements of the

Fiscal Problem,* by L. G. Chiozza Morey

(1903) ; (The Tariff Problem,* by W. J.

Ashley (1903) ; (The Rise and Decline of the

Free Trade Movement,* by W. Cunningham

(1903) ; (The Return to Protection,* by W.

Smart (1903) ; fundamental Fallacies of Free

Trade,* by L. S. Amery (1908) ; an interesting general view by a disinterested observer is

given in-C. J. Fachs' (The Trade Policy of

Great Britain and Her Colonies,* translated by

H. M. Archibald (1905).

John St. Loe Strachey,

Editor of cThe Spectator* ; author of CA New

Way of Life * (1909), *etc.*

51. THE BRITISH TARIFF MOVE¬

MENT: ITS ORIGIN, THEORY AND

PROSPECTS. « For more penetrating ob¬

servers,)} writes Dr. Schulze-Galvernitz in his able study of the British economic situation,

<(the overwhelming success of the Liberals in

the elections of January 1906, was less sur¬

prising than the number of votes given against Free Traded This is the verdict of the search¬

ing and candid writer whose prepossessions are

all in favor of Free Trade. The remark shows

a genuine anatomical knowledge of British

politics and may be commended to Americans

who wish to penetrate surface impressions on

this subject and desire to grasp the underlying facts. My purpose, so far as the brief space

permits, is to state the facts, to explain their causes and to indicate what seems to be their tendency.

The main fact is that England has ceased

to be a solidly Free Trade nation. In the

General Election of 1906 the Unionists, or Fis¬

cal Reformers, were reduced in the House of

Commons to an unprecedented minority. In

Great Britain they secured less than a quarter of the seats; but the important point was that they obtained nearly 44 per cent, of the National vote. The balance of opinion disclosed at the

polls may be shown in round numbers as fol¬

lows :

BRITISH NATIONAL VOTING JANUARY 1906.

		Per cent.
For Liberals (Free Traders) .	2,600,000 or	48.2
For Unionists (Fiscal Reformers) .	2,350,000 or*	43.5
For Labor Party (Independents) .	450,000 or	8.3
	5,400,000	

The aggregate Liberal (Free Trade) vote

was less than 50 per cent, of the whole, though the pendulum was swinging with very excep¬

tional violence against the previous government

for reasons largely unconnected with the Free

Trade issue.

The Unionist, or Fiscal Reform party,

secured at the first trial of strength, within less than three years from the beginning of Mr.

Chamberlain's tariff campaign, the support of

more than two-fifths of the nation. This is

the surprising fact, as Professor Schulze-Galvernitz perceives. Seventy years after

Adam Smith's ˆWealth of Nations) had ap¬

peared; nearly a quarter of a century after

Huskinson had commenced to reduce the obso¬

lete tariffs raised to an exorbitant height by the desperate revenue necessities of the Napoleonic

wars ; seven years after Cobden had started his violent and masterly agitation against the corn duties, the country was still unconverted to

the Free Trade principle. It was suddenly

moved to throw open its ports by the Irish

famine and the crop failure of a disastrous

season. (<It was the rain,® as Mr. John Morley remarks, <(that rained away the Corn Laws in

1846.®

The predominant fact of recent English poli¬

tics is the rise of the tariff movement. The

history of this fact may be briefly sketched.

Its origins were slow and subconscious. Mr.

Cobden had always dwelt upon the advantage

of an unfettered exchange of cotton for corn.

England would manufacture the cotton and

other things ; America and other countries would grow the corn; there would be an ideal division of labor from the British point of view. Mr.

Cobden promised that if England abolished her

tariffs there would not be a country in the

world within five years but would have followed her example. Seventy years have elapsed; no

country has followed her example. A steady

rise of national tariffs, as elaborate and power¬

ful as the fortifications of Vauban, has domi¬

nated the intervening period. The Far East

has followed the example of the United States

and the European Continent. Great Britain is

only one open island amid the closing markets

of the world. Free Trade, therefore — exchange equally unrestricted on one side and the other 341

 as between two nations transacting — has

never yet prevailed anywhere. It is an un¬

known condition. Even England has not had

it. She has instead the system of free imports by which foreign competition is admitted with¬

out interference to her market, while her own

competition is as far as possible suppressed in foreign markets. That is not a satisfactory

comparison.

Foreign protective tariffs are a disadvan¬

tage to British trade. British free imports are relatively an advantage to foreign trade. The

conditions are unequal. Unequal conditions

in commerce are not good. Free Trade writers

simply restate, without modification of any

kind, the traditional arguments which would

apply to a genuine international system of free exchange, but cannot apply in the same meas¬

ure — and, to a large extent, do not apply

at all — to the state of things prevailing in the total absence of that system.

For *a. prolonged period (1846-75), British

trade expanded with unexampled energy.

Agriculture flourished. The economic con¬

ditions of the world were transformed by the

Californian and Australian gold discoveries;

by railway construction in the United States

and upon the European Continent ; by steam

shipping. But America and Europe alike

were convulsed by great wars. England had

remained at peace and her workshops domi¬

nated all markets. But her memorable period

of uncontested supremacy was over.

In 1878 — exactly a generation after Mr.

Cobden's triumph — a period of commercial

depression reached its depth. Crowds of in¬

dustrial workers were unemployed in the cities.

The old prosperity of British agriculture was

broken and the rural population began rapidly

to diminish. From that moment through

another quarter of a century of trade fluctua¬

tions, the truth of the free import theory was questioned by an increasing number of English

thinkers. Popular distrust, however, preceded

scientific opposition. The ((National Fair

Trade League® was started in July 1881 and

carried on for more than a decade a formidable political agitation, stimulated by some able

controversial literature and a vigorous weekly

paper. This protectionist movement, how¬

ever, failed to find a great leader and died out in the early nineties. Its only chance of suc¬

cess lay in converting one of the great political parties. The Conservative rank and file were

generally predisposed to protection. The Con¬

servative leaders patronized the Fair Trade

movement while the Liberals were in power,

and stifled it when they had obtained office

themselves. Nevertheless, other influences con¬

tinued almost imperceptibly to dissolve Free

Trade conviction throughout the country. The

British Trade Consular Reports became a

serial narrative of the advance of protectionist competition, American and German, in markets

where British manufactured exports had re¬

cently been supreme. The immense progress

of the United States and the new German

Empire showed at last that free imports,

or half-free trade, was not a certain recipe, as¬

suredly not the sole recipe, for commercial

success, and that protection was not necessarily a prevention of progress. There was a gen¬

eral mood of profound anxiety as to the posi¬

tion and prospects of British commerce and a

widespread scepticism as to the theoretical

truth of Free Trade and the practical advan¬

tage of free imports.

All the previous scepticism and mistrust

which had existed upon the question of Free

Trade were crystallized in 1903 when Mr.

Chamberlain created the new fiscal reform

movement. His Birmingham speech on May

15 in that year was one of the dominating

events of English politics. In the limits of

this article it is impossible to trace the history of his agitation. The result has been noticed.

There has been a small schism of very dis¬

tinguished persons. But the Unionist (or “Con¬

servative® or “Imperialist®) party is committed

to some form of tariff policy. The Liberal—

Irish Nationalist-Independent Labor Coalition

is not morally solid against the tariff. Eng¬

land has ceased as a whole to be a Free Trade nation though still containing a great free trade party whose parliamentary predominance rests

upon a comparatively slight majority of popular votes.

We now pass from the history to the theory

of the movement. Free Traders say: (a)

that tariffs restrict trade. The reply is that exports and imports alike are increasing in

every considerable protectionist country. Ger¬

many’s break with the Cobdenite system in

1879 — America’s adoption of what Englishmen

call McKinleyism- — have been followed not by

commercial restriction, but by a greater ex¬

pansion of production, foreign exchanges,

employment, population and wealth than has

taken place in Great Britain during the par¬

allel period. No Free Trade writers grapple

with the fact — few ever notice the fact —

that the fundamental principle of a scientific

tariff is the free importation of raw material, side by side with the taxation of foreign com¬

petitive manufacture. The tariff idea aims at

restricting the least advantageous kind of im¬

ports in order to develop the most profitable

kind. So far from implying restricted trade,

it means, when competently adjusted, the

largest volume of the best exchanges, (b)

That imports must be balanced by exports —

that goods received must be paid for by goods returned — and that as all international ex¬

change will arrange itself in an ideal manner, if you let it alone, the State ought not to in¬

terfere with it. The reply to these statements is that they are to a large extent altogether inaccurate and for the rest are superficial half-truths of a singularly deceptive character. Im¬

ports may or may not be completely paid for

by exports (including shipping freights and

foreign investments). The account may be

cancelled by the transfer of securities. An

excess of imports may remain as invested capi¬

tal, the interest only being returned and the

complete “balancing® being indefinitely de¬

ferred. England, for instance, formerly sent

a steady excess of imports into the United

States. The excess remained for the most part

as British capital invested in America. Amer¬

ica ceasing to be a debtor nation has cancelled a good deal of that British capital by the ex¬

cess of her own exports in recent years. Thus while imports and exports may appear to bal¬

ance more or less all the time, according to

the conventional Free Trade theory, a move¬

ment may be gradually going on under the

surface which actually reverses the position of the two countries concerned; and transfers the

commanding advantage of economic relations

from one country to another. Again, no Free

Trader asserts that like is paid for by like —that the import of foreign manufacture pro¬

duces an equivalent export of home manu¬

facture. A country which formerly exported

raw produce in exchange for finished manufac¬

ture may rise in the social scale and export in its turn finished goods to pay for crude material.

So far as the maxim tells upon the practical

controversy, it tells both ways. Imports and

exports do not balance better under free im¬

ports than under the tariff. America pays for

her imports with her exports and has a prob¬

able margin to spare! America entrenches her

own trade in its position and makes it as diffi¬

cult as possible for foreign competition to dis¬

place it. The English system makes it as easy as possible for foreign manufacture to displace home industry. Under Free Trade the products

of certain industries may pay for the com¬

petitive imports which are steadily weakening

other industries. To sum up, the tendency of

isolated free imports is to undermine the na¬

tional defensive position in trade after trade.

America and Germany under the tariff are

making new conquests in trade after trade.

<rWhere organization becomes necessary,® said

Brunei, <(laissez faire becomes impossible.®

The British tariff movement, however, laid

more stress upon its constructive principles

than upon its replies to the sophistry of Cobdenite syllogisms. It was maintained that the

tariff under British conditions would mean the

maximum increase and the best distribution of

wealth. An isolated free import system implies

the narrowest and least secure market. A

competitive import only enters by displacing the home supply against which it had competed.

There is a gain to some home consumers but

a loss to some producers. The nominally coun¬

terbalancing export follows at the second re¬

move, though meanwhile a net injury to the

productive power of the importing country may

have been inflicted. Home capital may have

been sterilized; home labor displaced. Under

the present conditions free imports actually

restrict British industry to the smallest market and secure foreign competition in the possession of the largest market. America has free sale

within her own market and ours, among 143,-

000,000 of people ; Germany has free sale in

her own territory and equally in the United

Kingdom — a similar double-market of over

100,000,000 of people. England has no free

sale for her goods outside her own home market of 45,000,000 of inhabitants, and does not re¬

serve any advantage to herself even upon her

own soil. The conditions are not equal ; the

inequality means a steady discount upon British national prosperity.

There is also a moral question rather un¬

pleasantly introduced in a manner which can

only be called a little insular. It is said that the tariff would introduce corruption. I do not believe it. In economic controversy it is es¬

pecially desirable to <(clear our minds of cant.®

In spite of free imports, gross frauds are per¬

petrated in English finance and a considerable

amount of petty dishonesty prevails in business.

Human nature is tinctured in the ordinary

way, and to revive the old pose of superior

virtue is a proceeding which appears to be a

little deficient in humor. Corruption in Amer¬

ica, if I judge aright, is due to the concentrated passion of the money-hunt, to the vehemence

of the desire to succeed, and the sheer difficulty of bringing public opinion steadily to bear

upon any one aspect of this evil amid a hetero¬

geneous society in a state of violent material development. Corruption rages in every phase

of expansion and exploitation. The American

habit of making public confession under a

sounding board creates an exaggerated impres¬

sion in Europe where the admitted evil is

popularly believed to be far worse than it is.

My aim has been to show that the tariff move¬

ment in England depends upon a theory of de¬

velopment, not of restriction ; that the politi¬

cal prospects of that movement are good; and

that the real strength of the foundation of the free-import system, national unanimity in sup¬

port of it, has irrevocably disappeared.

Bibliography. — (Reports of the Tariff Com¬

mission (London) ; Ashley, (The? Tariff

Problem) (London) ; Cunningham, (The

Rise and Decline of the Free Trade Move¬

ment (London) ; Garvin, (The Principles of

Constructive Economics) (in (Compatriots

Club Lectures,) London); Bying, Protection:

The Views of a Manufactured (London) ;

(The Coming Reaction: A Brief Survey and

Criticism of the Vices of Our Economic Sys¬

tem,) by Legislator (London) ; Byles, Sir

John Barnard, (Sophisms of Free Trade and

Popular Political Economy Examined, J a new

edition with an introduction and notes by W.

S. Lilly and C. S. Devas (London 1904).

J. L. Garvin,

Editor of (The Observer > (London) ; Author

of' (Tariff or Budget > (1909), *etc.* ; Con¬

tributor to cNew York Tribune * (1916-17).

52. GREAT BRITAIN AND THE

WORLD WAR. The participation of Great

Britain in the World War, in August 1914, has been ascribed to causes so diverse that it seems advisable briefly to describe the chief events

which brought it about, and to leave the reader to form his own conclusions. Geographical

and commercial factors brought the German

Empire, founded in 1871, into rivalry with

Great Britain. The British Isles lie athwart

the path of Germany to the Atlantic, and their emigrants had occupied large portions of the

earth's surface long before the Germans ac¬

quired their first colonies (1884). From that

date to 1914 Germany annexed 1,123,078 square

miles of colonial territory, or at the rate of more than 37,000 square miles a year, without

incurring serious risk of war. Both Gladstone

and Lord Salisbury approved her colonial ex¬

pansion, which proceeded most rapidly in the

years 1884-1900 when she possessed a very

small navy. As the Free Trade policy of the

United Kingdom and its dependencies favored

the growth of Germany's commerce (even after

1879, when she began to penalize British im¬

ports), it is clear that the islanders were not actuated by jealousy of her commercial ex¬

pansion.

That rapid expansion failed to satisfy the

ambitions of Kaiser William II and his people.

Their triumph over Austria in 1866 and

France in 1870 fostered the belief that a more thorough preparation would ensure to them a

far grander future, and they came to regard

themselves as cooped in, while the easy-going

British, the (<decadent® French and the badly

governed Russians had a disproportionate share

of the earth's surface. These views were in¬

culcated by the German Navy League, the

Pan-German League and similar bodies. Party

strifes in England and France and political

corruption in Russia enfeebled these peoples,

while the prestige and power of Germany

steadily rose. She had secured the alliance of Austria in 1879, of Italy in 1882, of the King of Rumania in 1883, and an Entente with

Turkey in 1898. Despite the Franco-Russian

alliance of 1891-94, her position in Europe was supreme. In January 1896 William II an¬

nounced IVeltpolitik to be her paramount aim;

and in 1898 he secured the passing of the first Navy Bill, which, during the fierce Anglopho¬

bia of the Boer War (1899-1902) was sup¬

plemented by a more ambitious Navy Bill

(1900). The new German fleet was not ready

until 1904, otherwise an Anglo-German con¬

flict might have broken out during that war.

In 1901-02 the British government sought to

frame an alliance with Germany, as also with

Japan, chiefly on questions in the Far East.

The Berlin government repelled those ad¬

vances ; but Japan welcomed them and signed

the treaty of 30 Jan. 1902, which ended the

period of England's ((splendid isolation.® Count Reventlow* and other German writers approved

the rejection of British offers of friendship

because the interests of the two empires were

divergent, and Germany could not tie her hands by a treaty which might limit her colonial and naval efforts.

Already German aims were centred on the

Near East. In November 1898, soon after

Kitchener's victory over the Mahdists at

Omdurman, William II visited Constantinople

and Damascus, and at the tomb of Saladin,

solemnly promised ever to befriend the ((300,-

000,000 Moslems® of the world. In 1903 the

results of the visit materialized in the plan of the Bagdad Railway, which assured to its

German promoters large mining and other

rights along its course. Together with its

branch southwards to the Hedjaz and Mecca,

it promised to assure Teutonic supremacy in

Asia Minor, Mesopotamia, Syria and the Sinai—

tic Peninsula, besides facilitating military ac¬

tion against the Suez Canal and on the Persian Gulf. Dr. Paul Rohrbach declared, in a later

edition of his book (Die Bagdadbahn) (1911)

that the railway would enable the Central Em¬

pires and Turkey to attack England in Egypt

with every hope of success. We may note here

the later utterances of German writers of repute.

Professor Hettner, (Die unsere Weltpolitik)

(Berlin 1915), says <(Such a policy [alliance

with Turkey] opens the way to Egypt and

Persia and through the Persian Gulf [where

England's supremacy must be broken] to the

Indian Empire and surrounding lands.® Dr.

Freiherr von Mackay ((Der Vierbund,) Stutt¬

gart 1916) : ((The foremost direction for the

blow to be struck by the new Quadruple Al¬

liance is known. Its point is defined in the

phrase ˆstend-BagdadP It is directed against

Britain's supremacy of the seas and the chain

of naval stations connecting the North Sea

*Reventlow, 'Deutschlands auswartige Politik ' (2d ed., pp. 178, 179.)

with India.® Professor Roloff (<Eine aegyp—

tische Expedition, J Giessen 1915) : ((Even" if the British escape catastrophe in Egypt, their

occupation of that land will bring them little profit and less peace of mind if Turkey

emerges from this war rejuvenated and strong.®

Vela ((Die Zukunft der Tiirkeip Leipzig

1915) : (<The motive which inspired the friend¬

ship with Turkey was identical with that which inspired the acquisition of Heligoland.® Even

in 1903-04 Germany's Oriental policy aroused

alarm in Great Britain and France. Possibly it prompted, certainly it facilitated, the conclusion of their Entente Cordiale in April 1904. The

maintenance of their interests in the East was clearly more important than persistence in out¬

worn jealousies respecting the Newfoundland

fisheries, Siam, Egypt, *etc.* Thus, Germany's

naval and Oriental policy produced what may

be termed the Diplomatic Revolution of the

20th century, the two western powers burying

the hatchet and becoming fast friends. The

German government and press admitted that

that Entente was not directed against Germany ; but the Kaiser soon sought to dissolve it, e.g., by his melodramatic intervention in the Moroc¬

can affair. (See Morocco, History). As his

landing at Tangier and his declaration for the independence of the Sultan of Morocco occur¬

red very soon after the Russian defeat at Muk¬

den, he evidently sought to make capital out

of the weakening of the Franco-Russian com¬

bination. The Morocco question became for

a time a <(Machtfrage® (trial of strength).

Finally it was referred to a General Conference of the Powers at Algeciras (spring of 1906),

at which Germany's highhanded action met

with no support except from her ((brilliant

second,® Austria. Indeed, it helped on an

Entente between those former rivals, Great

Britain and Russia (August 1907) ; for

they, no less than France, were threatened

by the recent development of Austro-German

policy in the East. Russia, after her defeat

by Japan, was in a position of. marked in¬

feriority to the Central empires in respect to armaments. Great Britain and her new friends

had also felt deep concern at the persistent

refusal of Germany, and the general refusal of Austria to listen to proposals of arbitration and limitation of armaments put forward at the

Peace Conferences held at the Hague in 1899

and in June 1907. The first Conference, held

on the invitation of Tsar Nicholas II, had led to no definite result, owing chiefly to the

opposition of Germany; but the other states,

in general, agreed to the principle of those

proposals and most of them have since framed

treaties of arbitration. In the years 1906-07,

Great Britain invited Germany to agree to a

plan for limiting naval construction ; but

despite the retarding of the British naval pro¬

gram during the discussions, the Berlin gov¬

ernment declined to restrict its program.

Equally discouraging was its attitude at the

second Plague Conference. Armament having

dangerously increased since 1899, the repre¬

sentatives of nearly all the sovereign states

there assembled again affirmed the need of

limiting the growth of armies and navies. 1 he Conference also extended the powers of the

Permanent Court of Arbitration, established in

1899, but failed either to found a permanent

Court of Arbitral Justice or to draft a general (52) and uniform

Arbitration Treaty which all states should pledge themselves to adopt. The chief

opposition came from Germany and Austria.

Germany also led the opposition to the British proposal prohibiting the use of drifting mines

at sea. (For the attitude of her military and naval circles toward these conferences see the

section entitled (<Utopian und Intrigen im

Haag® in Reventlow's work already named).

Further efforts by the Cambpell-Bannerman Min¬

istry in London to frame a friendly agreement

with Germany met with failure and the British

naval program of 1909 reflected the widespread

alarm caused by the rapid growth of the Ger¬

man navy. That growth was accelerated by

the German Navy Bill of April 1912 (coincident with a new Army Bill equally alarming to

France and Russia) which provided that, by

the year 1920, the German navy should consist

of 41 battleships, 20 armored cruisers, 40

unarmed cruisers, 144 destroyers, and 71 sub¬

marines. This force, concentrated almost entirely in the North Sea and the Baltic, would consti¬

tute a serious threat both to Great Britain and Russia. Mr. Winston Churchill, First Lord of the Admiralty, had again proposed a <(naval holi¬

day® ; but, his offer being declined, he pointed out in a memorandum to the Canadian govern¬

ment that in 1915 Great Britain would possess

25 dreadnoughts, 2 Lord Nelsons and six battle¬

cruisers, as against 17 dreadnoughts and six

battlecruisers for Germany; and the margin of

safety would thereafter diminish for Great

Britain. This ominous situation became darker

owing to the failure of Lord Haldane (q.v.)

during a visit to Berlin in the spring of 1912, to arrive at a friendly understanding with the German chancellor, except on terms wh:ch

would bind Great Britain to absolute neutrality in nearly every conceivable case. Lord Haldane

could not consent to tie Britain's hands in the rigid way demanded by the German govern¬

ment.

The haughty attitude of Germany in these

questions and in others soon to be noted, caused the more concern because it reflected the force¬

ful doctrines inculcated by Nietzsche, Treitschke and Bernhardi. Nietzsche in his philosophic

extravaganzas scoffed at Christianity for teach¬

ing what he termed a ((slave-morality® ; whereas the <(superman® would resolve to secure power

ever inferiors; and the new (<magistral moral¬

ity® would confer pre-eminence on the nation

which aimed at the heroic life. Alexander the

Great and Napoleon the Great were his heroes;

and his work, though non-political, popularized

the idea of conquest over weaker peoples. Far

more direct was the influence of Treitschke,

whose lectures and writings in 1866-96 pro¬

claimed the praises of the Prussia of Frederick the Great, Bliicher and Bismarck. In turn

Austria, France and England were his bugbears.

Pointing to German triumphs and German effi¬

ciency, he bade his countrymen overthrow the

modern Carthage : ((Our last reckoning, that

with England, will probably be the most tedious and the most difficult.® Then again he glorified war and scorned the ((weary, spiritless and ex¬

hausted ages which have played with the dream

of perpetual peace.® These teachings permeated

German universities (and through them the

schools) with a bellicose and Anglophobe

spirit, which General von Bernhardi accentuated

bv his book ˆGermqnv and the Next War}

‘ r 1 v ‘ tr

(October 1911). Scoffing at pacifists as vision¬

aries, cowards or hypocrites, he bade Germany

realize her true mission by war. ((Might,® so

he wrote, (<is the supreme right; and the dis¬

pute as to what is right is decided by the arbi¬

trament of war. War gives a biologically just

decision.® Again, — (<In certain circumstances

it is not only the right but the moral and politi¬

cal duty of the statesman to bring about a

war.® He regarded Germany's interests as

fundamentally opposed to those of Great

Britain, far less so to those of Russia, and he pronounced the Franco-Russian alliance as of

doubtful solidity. <(Therefore,® he wrote, ((we

must square our account with France if we

wish for a free hand in our international

policy. France must be so completely crushed

that she can never again come across our path.

… Even English attempts at a rapprochement [to Germany] must not blind us to the real

situation. We may at most use them to delay

the necessary and inevitable war until we may

fairly imagine we have some prospect of suc¬

cess.® It is doubtful whether these views were held by the majority of the German people,

even in 1914; but they provided the governing

and influential classes (well organized in the

Leagues above named) with a fighting creed

which at the crisis prevailed over the vaguer

and less exciting creed of the German Progres¬

sives. In Great Britain the definite triumph of the Liberals in the general elections of 1910 ensured a peaceful policy except in case of dire necessity.

Meanwhile the repose of Europe had been disturbed by crises in the Balkans and Morocco. In October 1908 Austria surprised the world by declaring that she annexed Bosnia, which she had occupied as the mandatory of Europe since 1878. Sir Edward Grey on behalf of Great Britain strongly protested against her action; so _ did France and Russia, likewise Serbia, which now lost her outlet seawards ; but Germany stoutly supported Austria ; and the Entente Powers and Serbia gave way (1909). In 1911 the internal crisis in Morocco became acute owing to the spread of anarchy; and when France took measures to protect the ˆspecial interests® which the Algeciras Con¬ vention recognized as hers by right in that land, Germany intervened by sending a cruiser to Agadir (July 1). Sharp tension ensued, especially after the declaration of Great Britain (4 July) that she must be consulted about any new arrangements in Morocco.

This declaration Germany ignored. Accord¬

ingly, on 21 July, Mr. Lloyd George, Chancellor of the Exchequer, publicly stated that Great

Britain would not allow herself to be treated

as ((of no account in the Cabinet of Nations.®

These words aroused heated demands in Ger¬

many for war against Great Britain and France.

The Berlin government, however, kept cool,

bargained dexterously with France and by the

treaty of 4 Nov. 1911 secured some 100,000

square miles of French Kongoland in return

for recognition of the protectorate of France

over Morocco and changes not unfavorable to

German interests in that quarter. Again the

German press indulged in orgies of Anglo¬

phobia and Gallophobia, which the Crown

Prince publicly encouraged. Perhaps a rupture

would then have occurred if German finance

had not been in a critical state and if the en-

larged Kiel-North Sea Canal had not still been uncompleted.

In the autumn of 1912 Turkish misrule in

Macedonia brought Bulgaria, Serbia, Greece

and Montenegro, to a secret agreement ; and,

failing to bend the Ottoman government, they

encountered its hostility in the autumn. The

League soon defeated Turkey, but disputes

about the sharing of Macedonia and East Al¬

bania (fomented from Vienna) led to the

i fratricidal war of 1913, ending in the unsatis¬

factory treaty of Bucharest (10 Aug. 1913),

which left all the Balkans divided and embit¬

tered. The following facts challenge attention

(1) the hostility of Austria to Serbia's efforts to reach the Adriatic, both in 1908 and 1912 ; (2) the subservience of Bulgaria and of the

young Turkish regime to the Central Empires;

(3) the triumph of Austro-German policy,

which aimed at the disruption of the Balkan

League ; (4) the comparative helplessness of

the Entente Powers when opposed to the Cen¬

tral Empires, though these had but slight sup¬

port from Italy (latterly engaged in a war with Turkey) ; (5) the certainty of further trouble in the Balkans owing to internal feuds and the southeastern thrust of the Central Empires, a

thrust aimed primarily against Britain in Egypt but also threatening to the Asiatic interests of France and Russia. It is now known that in

August 1913 Austria applied to Italy for help

in a general attack by the Triple Alliance

(Germany, Austria and Italy) on Serbia; but

Italy refused to share in so wanton an act of aggression. Germany also seems to have dis¬

suaded her overzealous ally, probably because

German armaments and the Kiel Canal were

not completed. In April-June 1913 the German

Chancellor applied to the Reichstag for a new

army bill, adding some 63,000 recruits a year

and bringing the peace strength up to 870,000

men. A special finance bill of a very drastic kind was also introduced to meet the extra

nonrecurring expense of nearly $265,000,000 and

the extra annual cost of nearly $47,500,000, in¬

volved by the proposed changes. The War

Minister added that Germany wanted peace,

but ((if war came, she wanted to win. — The best parry is the lunge ; the best covering force is the offensive.® Despite sharp opposition, both

bills were passed. By midsummer 1914 the

changes had taken effect; the military equip¬

ment was complete, and the Kiel Canal, then

reopened, was available for the largest battle¬

ships.

The murder of Archduke Francis Ferdinand,

heir to the Austrian throne, by two Bosniac

Serbs at Serajevo, on 28 June 1914, is wrapped in mystery. After a strangely long interval,

Austria, on 23 July, accused Serbian officials

of complicity in the crime and proffered de¬

mands incompatible with Serbia's independence.

An acute crisis at once arose; for the Germans and Hungarians of the dual monarchy de¬

manded war with Serbia, "the little brother,®

whom Russia, "the big brother,® was in honor

bound to protect. Faithful to the law-abiding

and pacifist procedure adopted by him in 1908

and 1912-13, Grey at once proposed that Great

Britain and France should moderate the actions

likely to be taken by Russia, while Germany and Italy sought to assuage the anger of Austria.

Thus only could a war be averted, first be¬

tween Austria and Serbia, secondly between

Russia and Austria, thirdly between Germany

and Russia, fourthly between Germany and

France, with danger of involving Belgium and

Great Britain. The two systems of alliances

or Ententes had helped to preserve peace in

1908 and 1913; but, if war began in any quarter, those alliances were likely to make it general — a consideration manifest to every statesman.

The Austrian note of 25 July to the Austrian

Ambassador at Petrograd indicated that, if

Russia drew the sword on behalf of the Serbs, she would meet both Austria and Germany in

arms. Von Tschirsky, German Ambassador at

Vienna, stated that his government was “back¬

ing up® Austria; and this provocative attitude

of the Central Empires was certain to embroil

them with Russia and her ally, France. The

German Chancellor, Bethmann-Hollweg, and

the Foreign Minister, von Jagow, have de¬

clared that they always worked for peace.

Certainly their attitude was more pacific than

that of the Crown Prince, Tschirsky, and the

Kaiser’s military advisers. Possibly they all

hoped to overawe Russia in 1908-09 and 1912-13. If so, they were playing with fire. The

present crisis touched the honor of the Tsar

more closely. He is reported to have said on

25 July, (<We have stood this sort of thing for seven years; this is enough.® France accepted

Grey’s proposal to seek to assuage Russia and

Italy agreed to try and calm her ally, Austria; but on 28 July (the day after the return of

Kaiser Wilhelm to Berlin from a yachting

cruise) Germany refused to entertain Grey’s

proposal ; and on that same day Austria de¬

clared war on Serbia. We may note here two

facts: (1) Italy (conscious of Austria's aggres¬

sive designs on Serbia in 1913), soon declared that she would remain neutral in the war

brought about by the provocative conduct of

her allies; (2) Grey, on 25 July, declined the proposals of Russia and France to declare his

complete solidarity with them in the present

dispute. His refusal has been sharply criti¬

cized; but it proves his extreme caution and his reliance on pacific procedure at that date. Fur¬

ther, his action facilitated the independent and neutral attitude now adopted by Italy. A

warlike attitude adopted by the British govern¬

ment must have compelled Italy to side with

her allies.

After the declaration of war by Austria on

Serbia (with the approval of Germany) events

marched rapidly. Very early on 31 July there

appeared at Vienna the order for a complete

mobilization and this almost certainly preceded

a similar order by Russia on the same day.

But the two empires continued to negotiate and on 1 August seemed not unlikely to reach a

settlement. But on that day the German gov¬

ernment demanded that Russia should demobi¬
lize within 12 hours, otherwise it would mob¬
ilize. (It had already ordered the preliminary
steps known as Kriecfsgefahr) . Compliance
with the German demand would have left Rus¬
sia unready in the face of the complete readi¬
ness of Austria and the almost complete
readiness of Germany. On Russia meeting this
demand with silence, the Kaiser declared war
on Russia late on 1 August. His last note
contained the statement that he “had under¬
taken in common with Great Britain the part
of mediator® between Austria and Russia. This
tribute to the peaceful policy of Sir Edward

(52) Grey is in one respect incorrect. Grey had
requested him merely to restrain Austria and
this he had not done. Germany’s attack on
Russia was certain to embroil France; but the
Kaiser’s declaration of war on France did not
reach Paris until 3 August at 6:45 p.m.

Until then the British government could not
have taken definite action, though Mr. Asquith

had declared the outlook to be <(extremely

graved In fact, the first sign of hostilities in the West came at Berlin on the night of 29 July.

After an imperial council meeting held at Pots¬

dam on that evening, the German Chancellor

asked Sir Edward Goschen, British Ambassador,

whether Great Britain would remain neutral in

case of a European war, if Germany promised

to take no land from France (he would not

pledge himself about the French colonies), and

also to restore the independence of Belgium in case a French menace to that kingdom compelled Germany to invade it. Neither Goschen nor

Grey assented to these (<infamous proposals,®

to use Mr. Asquith's phrase. Discerning danger

for Belgium, Grey on 31 July requested both

Germanyl and France to declare that they

would respect her neutrality, as they had cove¬

nanted to do by the fundamental treaty of 1839.

(See Belgium). France at once agreed; Ger¬

many sent an evasive reply. Accordingly on

1 August Grey informed Prince Lichnowsky,

German Ambassador at London, that ((if there

were a violation of the neutrality of Belgium

by one combatant, while the other respected it, it would be extremely difficult to restrain public opinion in this country.® Lichnowsky then

asked whether Great Britain would remain

neutral if Germany respected the neutrality of

Belgium, but Grey declined to bargain about

a matter on which Germany had pledged her

faith and when Lichnowsky suggested that Ger¬

many might perhaps guarantee the integrity

of France and her colonies, Grey declined to

follow him on a path so different from that

which the German Chancellor had marked out.

Grey resolved to keep his hands free, doubtless because the German government, during the

Haldane interview at Berlin in the spring of

1912, had sought to tie the hands of the British government in all eventualities likely to arise.

Lichnowsky informed the German government

on 1 August that <(Grey returned again and

again to Belgium's neutrality and was of the

opinion that this question would play a great

- art®' — i.e., in deciding British policy.

It is clear, then, that the Asquith cabinet,

:i its meeting on the morning 1 August had

come to no definite decision and was inclined

to wait on public opinion. On Sunday, 2

August, Grey assured M. Paul Cambon, French

Ambassador, of succor from the British fleet

(held in readiness since 27 July) if the German fleet attacked that of France or her coasts.

This promise (conditional on the sanction of

Parliament) resulted from the recent arrange¬

ment whereby the French navy retained its chief strength in the Mediterranean, the British navy concentrating mainly in the North Sea, the

English Channel and the Atlantic. And it is

almost certain that war with German}?- would

sooner or later have arisen from this promise

if Germany had carried matters through accord¬

ing to the plans of her general staff, which im¬

plied the ˆsmashing® of France. But the rup¬

ture came owing to another incident in the

Smashing® policy. Late on 2 August the Ger¬

man government demanded from that of Bel¬

gium permission to send its troops through

that country on the pretext that France had

violated Belgium neutrality. Early on 3

August the Brussels cabinet denied that France

had been guilty of any such act, protested

against the German demand and asserted its

resolve to resist to the uttermost. King Albert also telegraphed to King George, requesting

help from Great Britain as a guarantee of

Belgian neutrality. Thereupon the indecisions

of the British cabinet ended and in the even¬

ing sitting of Parliament on 3 August opinion

(except among a small minority) pronounced

strongly for the maintenance of the British

pledge to Belgium. Grey's ultimatum of 4

August, drawn up in this sense, met with a

decided refusal at Berlin, the Chancellor in

his excitement exclaiming that England was

going to war (<just for a scrap of paper®;

while Zimmermann, Under Foreign Secretary,

said that neither on that night nor on any

night would Germany assent to the British de¬

mand for Germany's withdrawal from Belgium.

This defiant refusal by Germany to desist from the invasion of Belgium (a course still open

to her) led to a state of war with the United Kingdom before midnight of 4 August.

Earlier on that day the Chancellor said to

the Reichstag: <(This is now for us a case of self-defense in time of necessity; and necessity knows no law (stormy applause). Our troops

have occupied Luxemburg (cheers), and have

perhaps set foot on Belgian soil (renewed

cheers). That is against international law.

… The wrong which we are doing we will

try to make good again, as soon as our military goal is reached (cheers).® Strange to say, the German Socialists, with one prominent excep¬

tion, that of Liebknecht, supported the gov¬

ernment ; and the enthusiasm with which the

Reichstag greeted the news of the unprovoked

invasion of Belgium, probably strengthened the

resolve of the German government to proceed

with that invasion, regardless of what Great

Britain might say or do. The Reichstag and

the majority of the Socialist members thereby

made themselves responsible for the wanton

attack upon France and Belgium in the course

of a dispute, which as we have seen, originated in the Balkans and in the Oriental policy of

the Central Empires. But it is equally probable that even if the Reichstag and the Socialists

had opposed a war policy, the German govern¬

ment would have adopted it owing to the im¬

mense advantages which it then possessed over

France and Russia in the matter of equipment

and in general preparedness. After the Im¬

perial Council meeting held at Potsdam on

the evening of 29 July, the policy of Germany pointed to a rupture with both Russia and

France and an invasion of Belgium. The

<(infamous proposals® thereafter made to Sir

E. Goschen were supplemented on 30 July by

Jagow's declaration to Goschen that Germany

must begin her military preparations : <(He re¬

gretted this, as he knew France did not desire war, but it would be a military necessity.®

Everything shows that by 30 July the military

party at Berlin gained the upper hand over

the more peaceful Chancellor and Foreign Min¬

ister — perhaps, we may add, over the Kaiser

also. The unpreparedness of France (mani-

fested during the debates of mid-July at

Paris), the prevalence of strikes in the whole transport service of Russia and the seeming

imminence of civil war in Ireland, presented

a concurrence of opportunities which encour¬

aged the war-party at Berlin to insist on a

swift and crushing blow at Paris, so that

France (in Bernhardi's words) could never

again come across Germany's path. The oc¬

cupation of Belgium and northern France

would also give Germany a vantage ground for

the “inevitable® settlement with the British,

who (in the German program) were to re¬

main distracted by the Irish feuds and labor

troubles, until the day of reckoning arrived.

With Antwerp, Ostend, Calais and Boulogne

in German hands, that reckoning would have

been ominous. But Germany overreached her¬

self. In face of the obvious duty to Belgium, to France and to the British race, the divisions in the British cabinet, in the nation (for a time also in Ireland) vanished and the overbearing

methods adopted by Germany united the once

loose compact of the Entente Powers into

the finest alliance recorded by history.

German writers have blamed their Chancel¬

lor for admitting that their invasion of Belgium was an international crime. Some argue that

the German Empire was not bound by Prussia’s

signature of the Treaty of 1839, though in

other and similar matters it has taken over her obligations. Other writers state that the Glad¬

stone government in making a separate con¬

vention with France and Germany for, pre¬

serving Belgian neutrality in the War of 1870, admitted the lapse of the Treaty of 1839. But the earlier treaty was fundamental to the ex¬

istence of the Belgian state and the Conven¬

tion of 1870 (in Professor Geffsken’s words)

did not impair the original treaty but rather

applied it to the special emergency of the war of that year. Others, again, state that Bel¬

gium's neutrality lapsed because of certain

informal conversations (a word which the Ger¬

man official organ distorted into "conventions®) which two British military attaches at Brussels had with Belgian officials in 1906 and 1912,

with a view to concerting plans for the eventual dispatch of a British expeditionary force for

the defense of Belgium against German in¬

vaders. But such conversations often occur,

especially in lands threatened as Belgium was

in and after 1906 by the new German strategic railways up to her eastern frontier; and such

conversations do not in any way bind the gov¬

ernments concerned. No "convention® was

framed between Great Britain and Belgium,

as German writers assert. Indeed, on both

occasions the Belgian officials stated that Brit¬

ish troops must not be sent without the con¬

sent of Belgium. Britain did not despatch

her ultimatum to Berlin on 4 Aug. 1914 until

after the receipt of Belgium's appeal for aid.

The procedure of both States was correct and

refutes the German claim that Belgium was

Britain's tool since 1906.

Other German publicists have asserted that

the War of 1914 was altogether due to British greed and envy and was a <(trade war® got

up by the modern Carthage, which since 1904,

had sought to encircle Germany and her allies.

Whether England or any other state could

“encircle® a block of territory stretching from the North Sea to the Black Sea, from the

Baltic to the Tyrrhene Sea can be decided by

reference to the map; and a comparison of

the relative freedom of British and German

fiscal policy is also decisive on the question of a “trade war.” That Germany took up arms

to vindicate the “freedom of the seas® against England’s tyranny is now scarcely worth dis¬

cussing. But these and other explanations of

the cause of the war are focused in the fol¬

lowing petition of many German professors and

officials to the Chancellor, dated 20 June 1915: “For the sake of our own existence we must

ruthlessly weaken her (France), both politi¬

cally and otherwise economically and must im¬

prove our military and strategical position with regard to her. For this purpose, in our opinion, it is necessary radically to improve our whole Western front, from Belfort to the coast. Part of the North French Channel-Coast we must

acquire in order to be strategically safer as re¬
gards England and to secure better access to
the ocean.® (After stating that German in¬
terests and honor require the annexation of
Belgium, Poland and the Baltic provinces of
Russia, the petition continues) : “We must
supplant the world-trade of Great Britain.
By her blockade of Germany England has
taught us the art of being a European power
militarily and industrially independent of
others. We must immediately seek to create
for ourselves, apart from the Empire of the
Seas, a continental commercial enceinte as ex¬
tensive as possible. Our friends, Austria-Hun¬
gary and Turkey, will open to us the Balkans
and Asia Minor and thus we shall assure our¬
selves of the Persian Gulf against the claims
of Russia and Great Britain… . We need
liberty of the seas, which was the real cause of the war between England and Germany. To
obtain it we must have Egypt, the connecting
land between British Africa and British Asia
— Egypt, which, with Australia, makes the
Indian Ocean an English sea, which joins up
all the British colonies with the mother coun¬

try, which (as Bismarck said) is the neck of

the British Empire. The Suez Canal will then

be free, and Turkey will regain her ancient

right… . From England, which has been so niggardly in men, we can never demand enough

money, because England raised the whole world

against us with gold.®

This document (published in “Current

History® for October 1915), reveals the views

of German “annexationists® on the origins of

the war and the aims which Germany sought

to pursue. It may finally transpire that that

program (involving the destruction of Serbia

in order to dominate the near East, and the

occupation of Belgium and northern France in

order to compass the ruin of Great Britain)

formed the fundamental cause of the war.

Bibliography. — It is impossible to do more

than indicate the chief accessible books on this subject. German books are not fully known.

Pamphlets are omitted from this list, but the

student should refer to the series published by the Oxford University Press (1914-16). When

not otherwise stated, the place of publication

is London. The ultimate sources at present

lor the Anglo-German conflict are (The British

White Paper) (also included in the Blue Book), <Great Britain and the European Crisis)

(Wyman) and the ˆGerman White Paper) ;

but the (French Yellow Book> and the Bel¬

gian Grey Boole® (parts I and II) contain

documents bearing on the question. All the

official documents on the war are published by His Majesty's government, (Collected Diplo¬

matic Documents relating to the Outbreak of

the European War5 (1915).

List of Books. — Albin, P., (D' Agadir a

Sarajevo) (Paris (1/- 1914) ;■ Allen, J. W.,

'Germany and Europe) (1914) ; Andler,

(Les Origines du Pangermanisme) (2 parts,

Paris 1915) ; Archer, H., 'The Thirteen Days5

(July 23-August 4, Oxford 1915) ; Beck, J.

M., 'The Evidence in the Case) (New York

1915) ; Bernhardi, F. von, ‘Germany and the

Next War5 (trans. 1914) ; Bourdon, G., ‘The

German Enigma5 (trans. 1914) ; Billow, Prince

von, ‘Imperial Germany) (trans., new ed. by

J. W. Headlam 1916) ; Cestre, C., ‘L’Angleterre et la Guerre) (Paris 1915) ; Cheradame,

A., ‘The Pangerman Plot Unmasked) (trans.

1915) ; Cramb, J. A., ‘Germany and England5

(1915); Dawson, W. H., ‘The Evolution of

Modern Germany5 (1914) ; Dernburg, ‘The

Case of Belgium5 ; Frobenius, H., ‘The Ger¬

man Empire’s Hour of Destiny5 (trans. 1914) ;

Headlam, J. W., ‘The History of Twelve Days,

July 24-August 4, 19145 (1915) and ‘The

Issue5 (Constable 1916) ; Kohler, J., ‘Notwehr

und Neutralist5 ; Langenbeck, W., ‘England

Weltmacht in ihrer Entwickelung vom 1 7th

Jahrhundert bis auf unsere Tage5 (1913);

Lecomte et Levi, ‘La Neutralite beige et

l’lnvasion allemande5 (Brussels 1914) ; Morel,

E. D., ‘Morocco in Diplomacy5 (1912) ; Muir,

R., ‘Britain Case against Germany5 (Man¬

chester 1914) ; Murray, G., ‘The Foreign

Policy of Sir E. Grey, 1906-15 5 (Oxford 1915) ; Oliver, F. S., ‘The

German War of 19145

(Documents 1914) and ‘Ordeal by Battle5

(1915) ; Price, M. P, ‘The Diplomatic His¬

tory of the War5 (1914) ; Reventlow, Count

von, ‘Deutschlands auswartige Politik 1888—

19145 (Berlin 1915) ; Roloff, Professor, ‘Eine

segyptische Expedition als Kampfmittel gegen

England5 (Giessen 1915) ; Rose, J. Holland,

‘The Development of the European Nations

1870-19145 (5th ed., 1915) and ‘The Origins of the War5 (Cambridge University Press 2d ed.,

1915) ; Sarolea, C., ‘The Anglo-German Prob¬

lem5 ; Tardieu, A., ‘La France et les Alliances 1871— 19105 (Paris 1910); Thayer, W. R,, ‘Ger¬

many vs. Civilization5 (Boston 1916) ; Ussher,

R. G., ‘Pangermanism5 (Constable 1915) ;

Vandervelde, E., ‘La Belgique envahie et le

Socialisme international5 ; Visscher, C. de,

‘Belgium’s Case: A Judicial Inquiry5 (trans.

Hodder and Stoughton 1915) ; Maxweiler, E.,

‘La Belgique neutre et loyale5 (1915); Weiss,

A., ‘La Violation de la Neutralite beige et

luxemburgeoise5 ; Wittmacht, H., ‘Die Neu¬

tralitat Belgiens5 ; Anon., ‘J’Accuse5 (Lau¬

sanne 1915).

J. Holland Rose,

Author of <The Development of the European

Nations,' *etc.*

53. GREAT BRITAIN, Diplomatic Re¬

lations of the United States with. The

relations of the United States _ with Great

Britain, both by origin and inheritance of the republic and by commercial and neighboring

interests, have always been more important than relations with any other power. In them may

be traced the chief threads of permanent for¬

eign interests of the United States — the fur¬

therance of tradfe and neutrality, terr'torial

adjustment and expansion, exclusion of Euro¬

pean interference in the American continent,

the use and care of fisheries — and various con¬

ditions and incidents affecting these main

interests.

The American Revolution was a protest against arbitrary colonial rule. It was fought chiefly for the rights of Englishmen against the tyranny of a line of German kings who had not yet learned the basis and spirit of Eng¬ lish institutions. Although by its years of strug¬ gle it engendered much bitterness on both sides, it taught valuable lessons, both to the Ameri¬ cans and to the mother country, influencing the development of democracy and the establish¬ ment of better conditions in colonial government.

In negotiations determining the conditions of its independence, the new republic was re¬ markably successful, even against the secret in¬ fluences of France and of Spain. It resisted the claim of England for land east of the Penobscot with which to compensate Loyalists ; and, through the good will of the British gov¬ ernment, obtained the territory between the Appalachians and the Mississippi, from which Spain desired to exclude the United States. It also obtained a generous share in the North¬ eastern fisheries. At the same time it agreed under conditions to recommend to the States restitution of property taken from Loyalists, to forbid further

confiscations and to facilitate the recovery of debts due British citizens from

American citizens.

One of the earliest lessons which the young

republic learned was that it could no longer

obtain the trade and the protection of British fleets enjoyed by Americans as colonists of

England. By the Revolution, fought in part

to secure freedom of access to the West Indies, it really lost former privileges in the British islands.

Recently torn by civil strife and not yet

recovered from the misfortunes which it had

suffered, the United States, with independency

achieved, still found its interests in collision with the British colonial system, and especially with the irritating early British trade policy

based upon the idea of establishing a mutual

dependence between Canada and the British

West Indies by stimulating Canada to furnish

the latter with American products.

New sources of irritation arose. Ten years

after the treaty of 1783, Great Britain, influ¬

enced by Canadian traders with interests in ‘the fur trade of the American Northwest, still

held within the boundaries of the United States a half dozen or more

fortifications and military posts which by the treaty she had agreed to

abandon, still refused to pay the damages for

slaves carried from America at the close of

the Revolution and still delayed to send a min¬

ister to the United States. At the same time, the United States, by neglecting to restore the confiscated estates of the Loyalists of the Revo¬

lution, and unable to assist the collection of the debts of American citizens contracted in

England before the war, furnished an excuse

or pretext for the British delay. For three

years efforts for adjustment of difficulties were made at London by John Adams, succeeded in

1788 by Gouverneur Morris, who in 1791 was

replaced by Pinckney.

The trench treaties of 1778 and 1788 proved

a source of embarrassment and trouble. In Con¬

gress, the followers of Jefferson, whose sympa¬

thy with France was unconcealed, proposed to

close the ports of the United States to British commerce and pushed through the House a bill

which was defeated in the Senate only by the

vote of the Vice-President, and which, if it had been enacted, probably would have precipitated

war.

Realizing the danger of the situation, Presi¬

dent Washington, in order to counteract it,

first planned to send as Minister to England

his Secretary of the Treasury, Alexander Ham¬

ilton, but finding this nomination would prob¬

ably be rejected by the Senate, he selected for the mission Chief Justice John Jay, who suc¬

ceeded in negotiating a treaty which provided

for British evacuation of the frontier posts,

free commercial intercourse across the British—

American border, prohibition of the fitting or

arming of foreign privateers in the ports of

either country for war against the other

country, extradition of criminals and the ap¬

pointment of commissioners to determine

boundary questions, to settle the pre-Revolutionary debts of American citizens and to

assess damages to American commerce from

British privateers. Its chief defect was the

absence of any provision against impressment

of American seamen into the British service.

Although the Jay treaty contained a temporary

agreement (limited to 12 years) concerning

the regulation of other navigation and com¬

mercial intercourse, conditions long remained

unsatisfactory. Trade was hampered until the

War of 1812 by seizure of breadstuff s as con¬

traband, impressment of seamen on the high

seas, blockades of continental and West Indian

ports and other British acts in connection with her policy in the wars against France. Under

the treaty, the question of the identity of the Saint Croix was referred in 1794 to a commis¬

sion of arbitration, which in 1798 reported in favor of the English claim ; but the question as to which of the two branches of the Saint

Croix was the main stream was decided in

favor of the American claim (the Schoodic

branch). Other boundary questions remained

unsettled.

Evidence of friendlier relations soon ap¬

peared. Close cooperation with Great Britain,

warmly favored by Hamilton against Spanish

America in 1798, was proposed more strongly

as a policy by Jefferson in April 1802 in case France should take possession of New Orleans,

and again in 1804-05 in case war with France

and Spain should be necessary to secure the

rightful boundary of Louisiana and indemni¬
fication for spoliations.

From the growth of an American merchant
marine and increasing trade with Europe, in
spite of English war regulations, developed
disagreements and quarrels which finally sought
settlement by the War of 1812. Against the
British Orders in Council, which subjected to
seizure American vessels bound for ports under
French control, American diplomatic represen¬
tations were unavailing and the consequent
sacrificial embargo was doomed to disap¬
pointment.

Another disturbing source of prolonged dis¬
agreement arose in connection with the British

attempt to enforce a British naval draft law
by search for British citizens on American ves¬
sels on the high seas, causing a resistance at all attempts at settlement in the draft treaty of 1806 (which Monroe and Pinckney so re¬
luctantly signed and which Jefferson refused to submit to the Senate). It culminated in the
attack upon the United States ship-of-war

Chesapeake by the British frigate Leopard in

search for British deserters, and in the con¬

sequent American demand for reparation and

apology and closure of ports to all British men-of-war— followed by a retaliatory decree by

the British government prohibiting trade be¬

tween the United States and countries then at

war with England. This source of controversy

was not completely removed until 1870, when

the British Naturalization Act surrendered the

doctrine of indefeasible allegiance.

After various unsuccessful efforts to settle

the difficulty by diplomatic negotiations, partly with a purpose of conquest of Canada as a

means of terminating the evil influence of the British Canadian trade with the Indians of the American Northwest, the United States on 19

June 1812 declared war — a war which was

probably unnecessary and certainly unfortunate

in producing new wounds which required a long

time to heal.

The Treaty of Ghent, containing no allusion

to the pretensions or ostensible causes on which the declaration of war had been founded, and

omitting the article of the treaty of 1783 which had given the British a nominal right to navi¬

gate the Mississippi, applied the principle of

status quo ante helium to other main subjects

of difference. It provided for arbitration of

various matters in dispute, including the estab¬

lishment of the international boundary. It also contained a clause looking toward cooperation

in the suppression of the slave trade — a co¬

operation which, however, was not found prac¬

tical in 1818-20, was not effective under the

later agreement of 1842, but was finally fully realized under a convention of 1862. In 1817,

as a supplement to the peace, an agreement

was negotiated providing for mutual disarma¬

ment on the Lakes, except four small vessels

on each side, thus removing a danger of serious future irritation and collision.

There remained several unsettled questions,

some of which naturally became more import¬

ant by the changes of time. There were also

new sources of irritation resulting from the

war and from economic and political policies.

Among the most important subjects of dis¬

agreement or possible sources of friction were

the ownership of some comparatively worthless

islands in Passamaquoddy Bay, the location of

the northern boundary of Maine and the bound¬

ary through the Lakes, claims for slaves car¬

ried away by British war vessels during the war, other general claims, the use of the fisheries, questions relating to commerce with the British West Indian Islands, the restitution of territory taken during the war and the Northwest

boundary.

Commercial relations as defined by the treaty

of 1815, providing for free commerce between

the ports of the two countries and between the United States and the British colonies in the

East, remained unsatisfactory through a period

characterized by extensive smuggling and re-

taliatory shipping legislation until 1830, when the United States after persistent effort obtained

the privilege of trade with die British West

Indies. The Passamaquoddy question was set¬

tled in 1817 by agreement of two commission¬

ers. Fishing rights were defined by a treaty of 1818, recognizing the right of citizens of the United States to fish ˆforever® along certain

uninhabited coasts of Newfoundland and Lab¬

rador, and granting permission for American

vessels to enter the bays and harbors of the

British possessions for shelter from storm and

for repairs, wood and water. The same treaty

also postponed for 10 years a dangerous dis¬

pute by an agreement for joint occupation of

distant Oregon, which had recently attracted

attention by increase of American interest in

the Pacific after the Lewis and Clark expedi¬

tion and by the British restitution of Astoria in 1818 — an agreement which was renewed

indefinitely in 1827, with provision for ter¬

mination by 12 months' notice of either

party. At the same time Great Britain re¬

nounced her claim to the free navigation of the Mississippi and agreed to the 49th parallel as the international boundary forming the north¬

ern limit of the Louisiana purchase from the

Lake of the Woods to the Rockies. The

boundary through the Lakes was settled in

1822. The claim for slaves carried away, re¬

ferred after 1818 to the Emperor of Russia

and finally terminated by four commissioners

appointed in 1822, was paid by Great Britain

in 1826. The more difficult Northeast boundary

question, first submitted to a commission which hopelessly toiled for five years (1816-21), and later (in 1827) referred to the King of the Netherlands, who in 1831 made a compromise decision which neither country would accept, unfortunately reached an alarming stage in the Maine-New Brunswick controversy of 1838 in the border conflicts known as the Aroostook War and was not settled until 1842.

Notwithstanding unpleasant memories and popular misunderstandings or diversions of criticism, the close of the War of 1812 brought a revival of the policy of earlier statesmen who at the close of the Revolution had seen the importance of British sea power in interna¬ tional affairs. Leaders such as Jefferson recognized that American interests required cordial relations, and even close cooperation or alliance, with the mother nation which still controlled the approaches to foreign intercourse and trade and used its defensive sea power with moderation and fairness. The mutual interest of both in reaching agreements was recognized as a fundamental basis in American foreign and naval policy.

Friendlier feeling was illustrated by the British change of policy in regard to the West Indian trade which after long negotiations and misunderstandings was opened to the United

States in 1830, and by British good offices to secure a peaceable settlement of the Franco-American difficulty of 1834. New sources of

possible collision arose along the international boundary in America. During the Canadian

Rebellion of 1837-38 the frontier line was

threatened with lawless violation of neutrality

which endangered the international peace. After

the capture and destruction of the Caroline,

which had been engaged in carrying supplies to Canadian insurgents, there was a serious danger of intemperate action which was promptly coun¬

teracted by the President who sent General

Scott to preserve order along the border.

Belligerent feeling was increased and aggra¬

vated by the controversy between New Bruns¬

wick and Maine over the disputed boundary

resulting in arrests which threatened armed

collision, but the danger of hostility gradually subsided. A new irritation arose in connection

with the arrest in 1840 of Alexander McLeod,

the Canadian deputy sheriff, who was charged

with a murder in connection with the seizure

of the Caroline. His acquittal in October 1841

decreased international embarrassment and

smoothed the way for the friendly conferences

between Webster and Ashburton who by the

wisdom of diplomacy settled the long-pending

Northeast boundary question by the well-known

treaty which each country at first regarded as a capitulation.

The Webster-Ashburton Treaty proved that,

although small differences may quickly develop

into serious disputes, even the most compli¬

cated international difficulties and hard knots

may be untied through a mutual spirit of for¬

bearance, consideration and conciliation. It was negotiated with a sense of duty which recog¬

nized that the two nations, notwithstanding dif¬

ferences of political systems, were more than

other nations charged with guardianship of con¬

stitutional freedom, first obtained by long

struggles and many battles in the mother

country. Besides terminating the Northeast

boundary dispute, it provided for cooperation

in suppression of the slave trade (for five years or more) by independent squadrons, and con¬

siderably enlarged the list of crimes for which fugitives from justice might be extradited.

Meantime a series of controversies affect¬

ing Anglo-American relations arose in con¬

nection with slavery interests. The claim to the right of visit (or search) without treaty war¬

rant, asserted by the British government in

connection with the suppression of the slave

trade, was a source of controversy until 1858

when it was abandoned. The parliamentary

emancipation act of 1833 for the gradual extin¬

guishment of colonial slavery in seven years,

the consequent British policy of encouraging

emancipation elsewhere, and the activity of the British government and the British navy in

attempts to stop the illegitimate foreign slave trade which usually eluded capture by flying

the American flag, greatly affected public senti¬

ment in the United States. Among other

sources of friction was that arising from the

interstate slave trade by sea in American

vessels from Chesapeake ports to Charleston

or to New Orleans, or from Charleston to New

Orleans, and stopping at the British West In¬

dies ports of the Bahamas where under British

jurisdiction the slaves were set free. The most famous case was that of the Creole (1841)

arising from the mutiny of the slaves who

carried the vessel into Nassau and were dis¬

charged by the British authorities. After 10

years of negotiations concerning the case, it

was finally referred to arbitration resulting in a decision in favor of

the American contention.

The general Anglo-American claims conven¬

tion of 1853, under which it was submitted, also provided for arbitration of other claims of

American citizens resulting in an award in the McLeod case and important decisions regard¬

ing fishery rights.

For nearly two decades before the Ameri¬

can Civil War, American foreign policy relat¬

ing to the Caribbean was largely influenced or dominated by apprehensive fears of American

slaveholders that the safety of slavery in the Southern States might be endangered by the

effects of emancipation in the British West

Indies, through its influence upon neighboring

islands and upon general British policy in the entire region, especially in Cuba. After 1840,

more or less influenced by floating rumors, the United States became somewhat apprehensive

of possible British annexation of Cuba as se¬

curity for Spanish loans held by British sub¬

jects, and issued a warning announcement of

American policy against such a transfer. In

1848 it was watchful of conditions in Yucatan

and along the Nicaraguan Isthmian transit route which invited British interference and occu¬

pation. It was also influenced by complaints

submitted by Venezuela in 1841 and thereafter

concerning British extension in Guiana and emi¬

gration to" Venezuela which caused apprehension

of British design of annexation there. In 1843, the immediate annexation of Texas was urged to counteract British designs against slavery in¬

terests ; and at the same time there was a fear that its annexation might provoke Great Britain to occupy Cuba. Later rumors < of the possi¬

bility of an exchange of Cuba in payment of

Spanish debts or for Gibraltar doubtless in¬

fluenced Polk's negotiations for Cuba in 1848

and thereafter.

In the same decade, the American govern¬

ment also became watchful to prevent possible

sources of Anglo-American conflict in the Pa¬

cific. At the same time, British relations with China opened the way for a successful negotia¬

tion of an American treaty with China in 1844.

Meantime, in 1846, the Oregon boundary ques¬

tion, which was an increasing source of danger¬

ous tension and brief bluster, was settled by the American acceptance of the 49th parallel, but

reserving to the British all of Vancouver Is¬

land — a geographical exception which con¬

tained the germ of another boundary dispute,

finally settled in 1872.

Since 1841, the conditions of international

amity had steadily improved, although certain

sections of the United States were influenced

by Irish limmigrants who nursed traditional

enmity to England, preached the antipathy

aroused after 1842 by the agitations of

O'Connell and the ((Youn_g Ireland Party® and

by subsequent Irish misfortune, _ accepted the

opportunity to become an active factor in

American politics, and were ready to fire a

hemisphere to boil their potatoes.

After the subsidence of the brief bluster

over the Oregon question, and even in the face of threatened complications in Central America,

safe leaders felt the importance of peaceful ad¬

justment based on mutual interests. A tend¬

ency in favor of a change of American foreign policy with a view to closer cooperation with Great Britain appeared about 1850. It was

practically illustrated by the official action of Secretary Clayton in 1849 in authorizing Ban¬

croft to invite Great Britain to accede to the isthmian guarantee assumed by the United

States in the treaty with New Granada, and in entering into negotiations with Bulwer in 1850

for neutrality of a prospective canal across Cen¬

tral America, and also by the official action of both Clayton and Webster in co-operating with

Great Britain and France to secure peace be¬

tween the Dominican Republic and Hayti. An

opposite tendency is shown, however, in Web¬

ster's later action in declining in 1852 to accede to the proposed tripartite arrangement dis¬

claiming designs on Cuba — an idea which was

probably suggested to Lord Malmesbury by the

principle of the Clayton-Bulwer Treaty.

In negotiating the Central American canal

question, Secretary Clayton, practical states¬

man, was actuated largely by a practical pur

pose to avoid a dangerous situation and to

facilitate the completion of a great enterprise.

To secure the withdrawal of Great Britain

from territorial occupation against which

American sentiment was fixed and irreversible

he was willing to share with her jointly the

political control and use of the canal, with a guarantee of neutrality based on the doctrine

of international freedom of transit. The re¬

sult was the famous Clayton-Bulwer Treaty of

1850 which guaranteed the integrity and in¬

dependence of Central American territory and

prepared the way for the extinguishment of

any British claim of sovereignty or protectorate over the Mosquito Indians along the coast of

Nicaragua — a claim which was finally termi¬

nated by the English treaty negotiated by

Wyke with Nicaragua in January 1860.

Unfortunately, however, the canal treaty be¬

came a source of almost endless misunderstand¬

ing and contention. Near the close of

Buchanan's administration, the critically con¬

flicting views in regard to its interpretation

were finally settled by three British treaties

(with Central American powers) which proved

satisfactory to Cass and seemed to vindicate the Monroe Doctrine.

Anglo-American relations in Central America

between 1854 and 1860 were affected and com¬

plicated by the bold designs of William

Walker, America's greatest filibuster, whose

designs for the control of Nicaragua and of

Central America, closely related to the struggle of financiers for the control of the Nicaraguan transit route, were finally terminated by his

capture and execution through English aid in

1860.

Relations in the fifties were also affected by American resentment against certain authorita¬

tive declarations indicating the existence of an Anglo-French ˆunderstanding on policy in two

hemispheres® which was regarded as a threat

against the Monroe Doctrine.

Relations in the Pacific increased in import¬

ance after 1850. In 1854 the United States

negotiated with the king of the Hawaiian

Islands a treaty of annexation which failed of execution largely because of the protest of the British consul, and Americans in the islands

later suspected that British diplomacy was pre¬

paring Hawaii for a British regency at the

death of Kamehameha IV, who became king

in January 1855, with the intention of making this a cotton-growing colony. In 1856, how¬ever, L. D. Evans in the House indicated a basis for Anglo-American cordiality and co¬operation in the Pacific.

In operations to secure friendly treatment in China in the period of confusion resulting from the Taiping rebellion, Great Britain had reason to suspect a larger cooperation of the United States, but the American government declined to act on the recommendation of American diplomatic representatives in China and con¬fined its joint action to friendly concert on points of common interest.

Relations affecting Canada after the termina¬tion of the Northeast and Northwest boundary disputes were largely concerned with questions of fisheries, trade and navigation. The Ameri¬can government, seizing the opportunity offered by the disastrous effect of English commercial

policy since 1846 upon Canada, and by the

condition of affairs in Europe which made

England anxious to avoid difficulty with the

United States and Canada, entered into negotia¬

tions in 1854 for a Canadian reciprocity treaty by which the United States obtained liberal

concessions, including commercial privileges and

the navigation of the Saint Lawrence. The

treaty, however, proved disappointing, partly

because of the increase of Canadian provincial

protective tariffs laid in violation of its spirit through the influence of Lower Canada.

Complication of relations with Canada were

threatened after 1858 by new conditions west of Lake Superior in the Red River region adjoin¬

ing the new State of Minnesota, and also on the Pacific Coast following the discovery of gold

on Frazer River (in 1857) and the consequent

American immigration from California and

Oregon — increasing the importance of Van¬

couver Island and British Columbia, and, in

1859, precipitating the San Juan water boundary dispute.

In 1860, when friendly relations were undis¬

turbed by dangerous questions, the visit of the Prince of Wales, who slept at the White House and planted a tree at the tomb of

Washington, tended to increase kindred and kindly feelings.

The American Civil War furnished many

serious subjects for diplomatic controversy and

negotiation with Great Britain. During the

war several events contributed to the renewal

of suspicion and strained relations. The Amer¬

ican government felt that the British govern¬

ment favored the Confederacy which threatened

the integrity of the American Union, and which through its agents from the latter part of 1863

until near the close of the war endeavored to break the peace of the Canadian frontier. Al¬

though the British manufacturing classes,

represented by Bright, Cobden and Forster,

were opposed to the slavery interests which pre¬

cipitated secession, and felt for the United

States a strong friendship whose expression

was silenced only for the moment bv the Trent affair, the aristocracy and commercial classes

sympathized with the Confederate States and re¬

ferred disrespectfully to the <(Disunited States®

• — and even Gladstone said ((Jefferson Davis has made a nation.® The British neutrality proc¬

lamation of 1861, though probably not in¬

tended to be unfriendly to the American gov¬

ernment at Washington, was unfortunate in the time of its appearance. Actual conflict was seriously threatened by the Trent affair, which, however, was fortunatelv adjusted to the satisfaction of both governments. Other sources of irritation appeared in the use of English ports for the construction and equip¬

ment of Confederate cruisers and in the use of certain British West Indian ports as bases for Confederate blockade runners. After the period of crisis in the middle of 1863, when the French emperor was defeated in attempts made through Confederate sympathizers in Parliament to induce the English government to adopt a policy of joint European recogni¬ tion of the Confederacy, British sympathy for the Confederate insurgents gradually decreased. Near the close of the war the British govern¬ ment feared the growing power of the United States and the activities of Fenians, which caused apprehension of possible attempts to invade British-American possessions. Rela¬ tions were complicated by the Canadian canal

policy which the American government did not

consider liberal enough to justify the continua¬

tion of the Reciprocity Treaty of 1854 — which, therefore, was terminated in 1866 by notice of the previous year.

For several years after the close of the war, several questions which it engendered remained

unadjusted; and meantime there arose new

questions which increased the sources of irrita¬

tion. The clash of interests and the oarade of words produced various psychological changes

in popular sentiment which were not easily con¬

trolled by the two governments ; but gradually

passions subsided, jingoism waned and antago¬

nisms were replaced by conditions of friendly

rivalry and mutual reliance.

In the meantime new conditions on the

Pacific and in the Red River region west of

Lake Superior threatened to complicate Anglo-American relations, already embarrassed by

questions of British neutrality in connection

with Confederate cruisers, and finally induced

the British government and Upper Canada to

take steps to secure confederation and con¬

solidation of the British-American provinces to counteract the danger of American annexation.

Later, following the American acquisition of

Alaska, Anglo-Canadian consolidation policy

took another step in the construction of the

trans-Canadian Railway to the Pacific — to

frustrate American influence in British Colum¬

bia. In 1869-70, after the failure of the Johnson-Clarendon Treaty, and perhaps influenced

by a proposed policy requiring Great Britain

to withdraw from all British-America, the

Irish Fenians threatened to complicate inter¬

national relations by plans to invade Canada.

The Treaty of Washington, resulting from

negotiations after the American government

dropped the flag-withdrawal proposal — negotia¬

tions doubtless hastened and facilitated by the condition of affairs in Europe, where France

was succumbing to the rising power of Ger¬

many — was a great landmark in the adjust¬

ment of international questions. It submitted

to arbitration three disputed questions — Ala¬

bama claims, the San Juan boundary and the

Northeastern fisheries — and it also contained

several other clauses (concerning bonded tran¬

sit, coasting trade, navigation of rivers and

canals), which directly affected subsequent relations. between Canada and the United States,

but it failed to renew the principle of the

Reciprocity Treaty requested by the British—

Canadians.

Meantime, the British doctrine of indefeas¬

ible allegiance, a source of considerable con¬

troversy, especially following the British arrest GREAT BRITAIN — DIPLOMATIC RELATIONS (53)

of naturalized American citizens natives of

Ireland for aiding the Fenian mQvement after

1866, was ended by the British Naturalization

Act of 1870 followed by a naturalization treaty of 13 May 1870, the principle of which had

been settled by a protocol signed at London as early as 9 Oct. 1868.

Although there was a marked improvement

of international feeling, various controversies

continued to arise — especially in regard to the use of canals, the questions of tariffs and reci¬

procity and the transmission of goods in bond.

The complications of threatening relations were

often the result of the necessity of indirect

negotiations of Canadian questions through

the mother country. This condition was reme¬

died in 1887 by a concession of Great Britain allowing Canada a share in negotiation of her

own commercial treaties. In 1890 the Cana¬

dian Dominion government, by its protest, pre¬

vented the execution of the Blaine-Bond reci¬

procity treaty between the United States and

Newfoundland.

A sporadic difficulty concerning extradition,

especially concerning the invalidation of the

treaty agreement of 1842, was finally terminated by an Anglo-American agreement of 1889

which conformed to the British Extradition Act

of 1870, forbidding surrender for political of¬

fenses, and requiring assurances that only the

alleged crime would be charged. The range of

extradition was extended to include criminal

fugitives of all kinds. In 1889 an act of the Canadian Parliament authorized the surrender

of fugitives from justice even in cases not in¬

cluded in treaty arrangements.

Other chief subjects of controversy between

1880 and 1897 were, the Atlantic fisheries,

Bering Sea fur fisheries, control of the pro¬

posed isthmian canal, Pacific islands and the

Venezuelan boundary. For several years the

North Atlantic fisheries threatened to disturb

friendly relations. The fishery agreement of

the Treaty of Washington was terminated in

1885 by a notice of the United States given in 1883. This restored the conditions under the

treaty of 1818 and resulted in the enforcement of irritating Canadian restrictions. The Cana¬

dian authorities desiring to force a renewal of reciprocity which would allow free entry of

Canadian fish into the United States, in 1885

began to seize vessels of American deep sea

fishers, who, although they did not need to fish within the three-mile limit, were obliged to use Canadian harbors. In 1888 the Cleveland ad¬

ministration submitted to the Senate a treaty

on the old reciprocity basis, but it was defeated by the representatives of the American fisher¬

men who, largely because of the discontinuance

of fishing bounties in 1866, were unwilling to admit equal competition. A temporary modus

vivendi of 1888, reached by an international

commission of six, for many years remained

the only basis of the fishing industry in Cana¬

dian waters. The arrangement, although

Premier Bond of Newfoundland proposed to

abrogate it after the failure of the Hay-Bond

Treaty of 1905, was continued by Canada and

by Newfoundland until the question was set¬

tled by the Hague tribunal in 1910.

While struggling for in-shore and harbor

privileges on the Northeast fishing coast, Amer¬

icans assumed a different attitude in Bering

Sea — where Canadians, by indiscriminate fur

seal fishing after the opening of the Canadian Pacific Railway, threatened to deplete the seal herds of the north Pacific. American seizure

of British vessels in 1886, in assertion of a claim to marine jurisdiction over Bering Sea,

resulted in quarrelsome negotiations finally ter¬

minating in a modus vivendi of 1891, and a

special arbitration treaty of 1892 providing for a commission which in 1893 decided against the American claim to jurisdiction but made rec¬

ommendation for police protection of seals, — a recommendation finally realized by treaty ar¬

rangement of 1911 between the United States,

Great Britain, Russia and Japan.

Meantime, after 1880, another source of

dispute arose in connection with the revival of American interest in the interoceanic canal

problem and the assertion of a policy of

American control over such a canal. Both

Secretary Blaine and Secretary Frelinghuysen

raised questions in regard to the Clayton-Bulwer Treaty, to which Lord Granville replied in a series of notes. The discussion closed with¬

out result, but in December 1884 Frelinghuysen

negotiated with Nicaragua a treaty providing

for the construction of a rival canal under

American auspices and American control — a

treaty which was withdrawn by Cleveland who

reverted to the American traditional policy of

a canal under international guarantee.

The revival of interest in Nicaragua pre¬

cipitated a new dispute. In 1894, Great Britain, by invitation of the Mosquitos and against the protests of the United States, landed marines

at Bluefields ; but later, probably recognizing

that she was violating the treaty which she

sought to uphold, she withdrew the marines,

leaving the matter to be settled in 1895 by the submissioin of the Mosquitos to Nicaragua.

In the crisis of 1885-89 in the Samoan Islands, precipitated by German decision to enter the colonial field, Great Britain stood with the United States. In 1891, the United States joined Great Britain in an arbitration fixing the compensation which Portugal should pay for taking possession of the Lourengo Marques Railroad. In accord with priority of American interests in Hawaii, Secretary Bay¬ ard in 1888 refused to join with England and France in a joint guarantee of the Hawaiian government, and in 1892 the proposal for the annexation of the islands was largely deter¬ mined by apprehension of circumstances and opportunity which might result in British occu¬ pation or control.

The British-Venezuelan boundary contro¬ versy, having its origin in the demarcation line of Alexander VI and in the early Dutch settle¬ ments in western Guiana which was ceded to the British in 1814, first arising in 1841 and resulting in an appeal of Venezuela to the United States in 1876, became acute by 1894 —inducing the American government in 1895, act¬ ing under an extreme interpretation of the

Monroe Doctrine, to intervene in favor of full arbitration. When Lord Salisbury refused to

admit the intervention of the United States,

President Cleveland appointed an American

commission to investigate the facts. Later,

after further negotiations, an arbitration was

arranged (2 Feb. 1897) between Great

Britain and Venezuela, resulting in a tribunal

which met at Paris in 1899 and rendered a

decision largely favorable to Great Britain,

but giving Venezuela control of the mouth of

the Orinoco.

In 1898 and thereafter a great and note¬

worthy change was indicated in Anglo-Ameri¬

can relations — a change which was not due

to any formal treaty, or to a change of policy on either side, but to a new understanding re¬

sulting from a quickening of popular sentiment

and a growth of mutual appreciation. In the

Spanish-American War, although the English

government was neutral, the British could not

conceal their sympathy with the objects of the American government nor their satisfaction at

the promptness and completeness of the result.

Diplomatically in a position of (<splendid iso¬

lation,® and facing international danger from

the impending Boer War, she became unusually

cordial to the United States and doubtless

would have greeted with enthusiasm an alli¬

ance either formal or informal.

Anglo-American diplomatic relations since

1898 have been characterized by a spirit of

mutual accommodation and sincere friendli¬

ness, shown in many ways. The British gov¬

ernment promptly accepted the American pol¬

icy of territorial integrity and open door in

China enunciated after American acquisition of

the Philippine Islands. In 1899 it retired from the Samoan Islands to facilitate adjustment of

American and German interests there. In the

negotiations for settlement of more difficult

questions at issue — questions less critical,

however, than those of earlier years — it con¬

tinued a policy of graceful concession.

In 1898, working under new conditions which gave American diplomacy largely in¬ creased importance, Secretary John Hay, re¬ turning from a year's useful experience as Am¬ bassador at London, undertook to achieve a new settlement of Anglo-American disputes in line with the settlements of 1794, 1815-18, 1842 and 1871. Favored by friendly relations which made particularly delicate the question of neu¬ trality during the Boer War, he found that the chief obstacles were the American decision for an interoceanic canal strictly under American control and the British necessity of deferring largely to Canada in the various disputes be¬ tween Canada and the United States.

To secure agreement on the Americo-Canadian questions (12 in number) an international joint high commission was appointed in 1898. It entered into friendly discussions, practically reached an agreement on several subjects, made little progress on others (including reciprocity) and finally split and suffered shipwreck on the Alaskan boundary, on which the Canadian commissioners demanded a settlement before

they would enter into any agreement on other

questions as planned. However, only five of

the 12 questions remain to be settled and most of the existing agreements on the five are

not unsatisfactory. The most exciting ques¬

tion, that of the Alaska boundary, which sud¬

denly became acute in 1898 as a result of the discovery of gold on Yukon, and was tempo¬

rarily adjusted by a modus vivendi in 1899,

was successfully submitted to arbitration in

1903 before a mixed commission of six and

without an umpire. Fishing difficulties be¬

tween the United States and Canada were set¬

tled by an Anglo-American treaty of 1908 pro¬

viding for a permanent international fisheries

commission. The century-old dispute regard¬

ing the Newfoundland fisheries, whose settle¬

ment was attempted in 1902 by the Hay-Bond

draft treaty which was defeated by American—

fishery interests in the American Senate in 1904

(followed by Newfoundland retaliatory legis¬

lation, 1905-06, imposing irritating port regula¬

tions to distress American fishermen) was tem¬

porarily quieted by an annual Anglo-American

modus vivendi and finally settled (under treaty of 1909) by a tribunal composed of the mem¬

bers of the Hague Permanent Court of Arbi¬

tration. Although the decision (in 1910) was

mainly in favor of Newfoundland, its recom¬

mendation pointed the way by which a satisfac¬

tory agreement between the United States and

Great Britain was reached. Sources of future

dispute were lessened by a waterways treaty

of 1909 which provided for the establishment

of an international joint commission to exercise jurisdiction in cases involving the use, obstruc¬

tion or diversion of boundary waters, with au¬

thority to inquire and report concerning other

matters of difference along the frontier or to decide such questions as may be referred to it.

A small remaining international boundary con¬

troversy concerning a small island and some

fishing grounds in Passamaquoddy Bay was

referred by agreement of 1911 to arbitration

by a commission which after considering the

trivial nature of the dispute decided to split the difference. The question of trade relations

reached a crisis in the Canadian rejection of

the reciprocity agreement of 1911, but a better understanding followed the passage of the

American tariff of 1913 which accomplished

some of the objects previously attempted by

reciprocity.

To meet the new conditions required by the

American decision in favor of the construction

of an interoceanic canal by the American

government under American control, Secretary

Hay in 1900 negotiated with Sir Julian Pauncefote a new treaty which, like the Clayton-Bulwer Treaty, was based on the principle of

international neutralization and international

guarantee. In consequence of amendments

by the American Senate, he negotiated (in

1901) the Hay-Pauncefote Treaty which pro¬

vided for the abrogation of the Clayton-Bulwer Treaty of 1850, forbade blockade of

the canal, permitted the United States to main¬

tain necessary military police along the route, and declared the freedom of the canal to

all vessels of all nations observing the rules prescribed for its use, subject only to equitable conditions and charges of traffic. The pro¬

vision as to the charges on traffic became a

subject of controversy after 1912 when Con¬

gress, with a view to decreasing the cost of

transcontinental freight, exempted vessels en¬

gaged in the coast-to-coast trade. Great

Britain protested that the discrimination was

in violation of treaty provision, and finally it was repealed by Congress on recommendation

of President Wilson in 1914 without prejudice

to American rights in the interpretation of the meaning of the treaty.

After the negotiation of the canal treaty, the British government promptly recognized that

American control of the Caribbean was a neces¬

sary corollary of the American construction of

the canal. Partly as a result of new condi¬

tions in the Caribbean and in other parts of

the world, and partly under the compulsion of

the German menace of aggression, Great

Britain concentrated her navy in the English

Channel and the North Sea, and withdrew both

fleets and garrisons from the West Indies,

trusting to the United States the supremacy

and control of the Caribbean region and the

hemisphere — a control largely determined by

and dependent upon the naval balance of power

in European waters. The Monroe Doctrine,

practically accepted by Great Britain, has been removed from the category of disturbing fac¬

tors in Anglo-American relations.

Additional security for future Anglo-Amer¬

ican relations was made in 1908 by the negotia¬

tion and ratification of an Anglo-American

arbitration treaty. A general treaty of arbitra¬

tion to facilitate the settlement of disputes and to further the advancement of the cause of

general peace was negotiated in September

1914 and proclaimed in January 1915.

Preparations for the international celebra¬

tion of the century of Anglo-American peace

after the Treaty of Ghent were interrupted by

the action of Germany in precipitating the

World War. In this war, begun by the brutal

invasion of Belgium and France directed by

the military masters of Germany, the American

government at first maintained a strict neutral¬

ity but, finally, instigated by brutal German at-attacks upon American rights on the sea, decided to co-operate with France and England in a

determined effort to arrest the German

menace to the peace and civilization of the

world. Its decision in favor of close coopera¬

tion with the liberal governments of Great

Britain and her loyal well-governed colonies

against the disturbers of peace and in favor of the brave peoples whose rights were invaded,

turned the tide of battle for peace and civiliza¬

tion. In the final concentrated and successful

effort to drive back rthe merciless foe from in¬

vaded and devastated territories, British and

Americans fought side by side with unselfish

and courageous determination, and in the work

of mercy and preparation for post-bellum

restoration and reconstruction they cooperated

in sacrifice with the single aim to establish

happiness, justice and order, for the common

welfare. The feeling of mutual respect and

cordiality between the two countries has been

strengthened by their conviction of common in¬

terest, and by their practical cooperation in a great international cause.

Bibliography. — Adams, C. F., (Struggle

for neutrality in America 5 (1871) ; Adams,

C. F., transatlantic Historical Solidarity5

(1913) ; Adams, E. D., (British interests and

activities in Texas, 1838-46) (1910) ; Bernard, M., Neutrality of Great Britain) (1870) ; Bige¬

low, John, (Reminiscences of an active life5

(r909); Bigelow, John, (American Policy)

(1914) ; Callahan, J. M., Neutrality of the

American Lakes) (1898) ; Callahan, J. M.,

diplomatic History of the Southern Confederacy> (1901), and < Alaska Purchase and

Americo-Canadian Relations5 (1908) ; Carpen¬

ter, E. J., the American Advance) (1903) ;

Dunning, W. A., the British Empire and the

U. S.5 (1914) ; Egerton, H. E., (British foreign policy in Europe to the end of the 19th centurv>

(1917), and (Foreign relations of the U. S.5 ; Foster, J. W., (A century of American Diplomacy) (1900), and Foster, J. W., diplomatic

Memoirs5 (1909) ; Harris, T. L., the Trent

affair) (1896) ; Hart, A. B., (Foundations of American foreign policy 5 (1901) ; Hart, A. B., the Monroe doctrine: An Interpretation

(1916) ; Hodgins, Thos., (British and American Diplomacy affecting Canada, 1782-1899) (1900) ;

Henderson, J. B., diplomatic Questions)

(1901) ; Lodge, H. C., (One Hundred Years of

Peace5 (1913); Lyman, T., diplomacy of the

U. S.5 (1828) ; Moore, J. B., Unternational

Arbitrations of the U. S.5 (1898) ; Moore, J.

B., digest of International Law5 (1910) ;

Moore, J. B., (Principles of American

diplomacy5 (1918) ; Reeves, J. S., (American

Diplomacy under Tyler and Polk5 (1907) ;

Smith, Edward, (England and America after

Independence 1783— 1872 J (1900) ; Thayer, W.

R., dife and Letters of John Hay5 (1915);

Travis, Ira D., (History of the Clayton-Bulwer treaty5 (1900) ; treaties and Conventions be¬

tween the U. S. and other powers5 ; Trescot,

W. H., (Foreign Policy of the U. SP (1849);

Trescot, W. H., diplomacy of the Revolu¬

tion5 (1852) ; Updyke, F. A., diplomacy of

the War of 18125 (1915) ; Usher, R. G., dan

Americanism5 (1915) ; Wilson, Woodrow,

(History of the American People5 (1902).

James Morton Callahan,

Professor of History and Political Science,

West Virginia University.

GREAT CIRCLE SAILING. A great

circle is a circle or a sphere the centre of which coincides with the centre of the sphere. Thus, the equator, the meridian and the ecliptic cir¬

cles are such agreat circles55 on the globe. Be¬

tween any two points on the surface of a

sphere the shortest distance lies along the arc of a great circle which passes through those

two places. Such a great circle cuts the suc¬

cessive meridians at different angles whenever

the two places are not on the equator or on

different meridians. The point of the curve

nearest the pole is called the “vertex,55 the

point most remote from the rhumb line is

designated as the <(point of maximum separa¬

tion.55 ((Great circle sailing55 is merely a method of * navigating vessels by the arc of a great circle. This method was first mentioned by one John Davis (1594) in a book called (Seaman’s

Secrets.5 It was much elucidated subsequently

— by Townson (1847), by Godfrey (1858), by

Captain Bergen (1880), by Goodwin (1894), and

by Captain Lecky (1903). The great circle

course, as followed by mariners, is that on

which a vessel sails straight for her distant

port, which she would follow if heading for a heavenly body directly overhead. That this

heavenly body is only imaginary does not in the least rob the method of practicability. Of

course difficulties of computation in great circle sailing are numerous, but the invention, of sev¬

eral ingenious devices has greatly minimized

these difficulties. Charts are prepared on what is known as the gnomonic projection, and the

use is made of great circle protractors, the

sphereograph and other instruments. The

gnomonic chart is made by a projection of the earth's surface upon a plane, tangent to the

earth at some point on its surface, taking as the point of sight the centre of the earth. By this construction, all planes cutting great circles on the earth, pass through its centre and cut the plane of projection in straight lines, so that a straight line joining any two points on the chart 356

will be the projected arc of the great circle.

Charts have been constructed in this way by

the hydrographic office of the United States

Navy Department, and greatly facilitate the

work of the navigator.

GREAT-CRESTED FLYCATCHER, a

large flycatcher (Myiarchus crinitus), which is a summer visitor to all parts of temperate North America, and is noted for its shrill, yet musical scream, and for its habit of entwining one or more cast-off snake-skins in its large tree-lodged nest. It is olive-brown above, with an

ashy head surmounted by a tall brownish crest, and the lower parts delicate yellow. Several

other species belong to the southwestern States and Mexico, and are often called crested king¬

birds.

GREAT DANE, a breed of large, smooth—

coated dogs, the modern equivalent of the an¬

cient boar-hound. See Dog.

GREAT DIVIDE, The. <The Great

Divide,5 by William Vaughn Moody, is one of

our most representative American dramas. . It

was first presented on the road under the title of (The Sabine Woman,5 and was rewritten

and renamed when it was produced by Henry

Miller and Margaret Anglin in New York, at

the Princess Theatre, on 3 Oct. 1906. The new title of the piece was symbolical of Mr. Moody's endeavor to depict a strong line between the

moral freedom of Western life and character

and the restrictions of a New England Puritan

conscience. The London production took place

at the Adelphi Theatre, on 25 Sept. 1909, with Mr. Miller in his original role of Stephen

Ghent, and Edith Wynne Matthison in Miss

Anglin's part of Ruth Jordan.

The opening act of (The Great Divide5 is

the most convincing one of the three. It re¬

veals Ruth Jordan as in a state of mind and in a physically susceptive condition for the com¬

ing of Stephen Ghent, who appears before her

with his drunken companions, and barters for

her with a string of gold nuggets. The fact

that the other men leave him alone for gold»is nothing beside the impelling force which moves

Ruth Jordan to go with him from her home.

Impulsively she obeys the call of the wild within her, and for the remainder of the play she

struggles with her New England conscience,

working her fingers to the bone to buy back

from the Mexican that string of gold which

burns in her brain as symbol of her shame,

and struggling with her love for Stephen, which grows from more to more, despite her protest¬

ing. As for Stephen, that night's adventure has changed his whole outlook. on life. Having

obeyed the lawlessness in his nature, he sud¬

denly awakens to a moral law which comes with a great love, such as his grows to be for Ruth Jordan. There is a mean between the self-denial of Ruth and the anarchy of Stephen, and in the course of the play they both find them¬

selves in their love.

Technically, (The Great Divide5 loses much,

first by its change of scene from the West to the East, and second,

because of. the uncon¬

vincing manner in which Ruth resists the true

promptings of her heart. In the second act

she deserts Stephen on purely. Puritanical

grounds, failing to recognize the bigness of the man he had become. It was as though Mr.

Moody selected the line of least resistance,—*

as though running to cover was the only way

in which Ruth, with her New England up¬

bringing, could cleanse her soul. Had she faced Stephen on his own soil, the New England

tenseness would have had a deeper and more

profound effect, and Ruth would have realized

more poignantly the spiritual change that had

come over Stephen. Nevertheless, despite its

drawbacks, (The Great Divide5 is an excellent

example of balance between poetic imagination

and literary feeling for material. And dramat¬

ically, its stage history has been distinctive.

Montrose J. Moses.

GREAT DUKE OF FLORENCE, The,

a drama by Massinger, published in 1635.

GREAT EASTERN, a British iron steam¬

ship, before the Celtic, the largest vessel con¬

structed, built (1854-58) at Milwall, on the

Thames, for the Eastern Steam Navigation

Company, by Scott Russell, from plans by I. K.

Brunei; length, 680 feet; breadth, 82ˆ4, or, in¬

cluding paddle-boxes, 118 feet; height, 58 feet; (70 to top of bulwarks). She had six masts,

five of iron and one of wood, and could spread 7,000 yards of sail, besides having eight engines, divided between her screws and paddles, and

capable of working at 11,000 horse-power. From

the first her career was unfortunate, the launch¬

ing process alone lasting three months and cost¬

ing $300,000. After several unremunerative

trips to New York she was employed first as a troop-ship, and then as a cable-laying ship, for which her size and steadiness specially qualified her. Various attempts were afterward made to

utilize her, but she at last came to be a mere holiday spectacle, and was broken up in 1888.

GREAT ELECTOR, The, a name given

to Friedrich Wilhelm, Elector of Brandenburg,

1640-88, because he was the first of the great leaders who made Prussia the foremost of the

German states.

GREAT EXPECTATIONS (1860-61),

among the last of the novels of Charles Dickens, is one of the less important and widely-read of his works. It marks, however, a reversion to

an earlier type of his fiction, wherein the char¬

acters, rather than any social or institutional reform, are the chief source of interest. It is perhaps freer of any animus of criticism than

any of the novels, except possibly its successors, (Our Mutual Friend5 and (Edwin Drood.5 The

scene is mainly in and near Rochester in Kent and, as always with Dickens, in London. The

story consists mainly in taking the hero, Pip, from about the age of five years, to the time when he becomes settled in early middle life.

In the course of this tale, Pip, after certain not very great hardships of childhood, alleviated by the kindness of his brother-in-law, the large-hearted Joe Gargery, and somewhat complicated

by the mystifying patronage of an eccentric

lady, Miss. Havisham, becomes heir to great

but mysterious expectations. The source of his

sudden prosperity is thought to be Miss Havis¬

ham but it turns out to be a convict whom Pip as a small boy had befriended and who had

escaped from Botany Bay where he had made

a fortune. On the recapture and death of the

latter, Pip's expectations vanish, but he has

meanwhile gained enough by experience and

education to be able to pursue his way success-

fully. The novel is less notable as a coherent and likely story than as a picture of boyhood, and for the presence of typical Dickens char¬

acters of the appealing sort, Joe Gargery, Biddy and others, the somewhat caricatured people

like Wemmick, the Pockets, Wopsle, Pumble—

chook and a large array of grotesques, Jaggers, the lawyer, Provis, the convict, Miss Havisham, Orlick, the superfluous villian, and many more, who are, as usual with Dickens, depicted by

means of habitual acts and sayings. Though

none of these people are as well-known as Pick¬

wick, the Wellers, Uriah Heep, Pecksniff, Mrs.

Gamp and many of the earlier household por¬

traits, the novel remains one of the freest from sentimentality, false pathos and grotesque odd¬

ity that Dickens ever wrote.

William T. Brewster.

GREAT FALLS, Mont., city, county-seat

of Cascade County; on the Missouri River, the

Great Northern, and the Chicago, Milwaukee

and Saint Paul railroads ; 120 miles northeast

of Butte. South and nearby is a great mining

region and north is an agricultural and grazing section. It has large

gold, silver and copper

smelters, and bituminous coal, lead, iron, zinc, gypsum, hematite and sandstone are found in

the vicinity. The excellent water power which

the city possesses is an inducement to manu¬

facturers to establish works in Great Falls. The water power, at medium low water, is equal to over 350,000 horse power, and this, together

with the unusual wealth of minerals, has largely aided the rapid growth of the city. There are a number of falls here; one, Great Falls, gives name to the city. The city's rapid growth has been largely the result of its natural resources.

Its chief manufactures are flour, furniture,

mining and agricultural instruments, wagons,

carriages and woolen goods. Great Falls has a

Carnegie library, a fine city hall, courthouse and seven parks, area 600 acres. The first settle¬

ment was made in 1884, and in 1888 Great

Falls was incorporated. Municipal affairs are

administered by a mayor, elected biennially, and a city council. Minor officials are nominated by the executive and confirmed by the council.

The waterworks are owned and operated by the

city. Pop. (1920) 24,121.

GREAT FISH, or BACKS, RIVER, a

river in Northwest Territories, Dominion of

Canada. It rises in a small lake near the

northern shore of Lake Aylmer, flows in a

northeasterly direction through Lakes. Beechy,

Pelley and Garry, and enters the Arctic Ocean

by a wide estuary. King William Land is near

its mouth. The Great Fish River is 605 miles

in length. Sir George Back, the Artie explorer (1796-1878) explored the river in 1834-35 and

followed it to the ocean. He described Ah-hel—

Dessy, or Parry Falls, on one of the tributaries, as more grand than Niagara in splendor of

effect. Consult Back, (Narrative of the Arctic Land Expedition to the Mouth of the Great

Fish River) (1833-35).

GREAT FISH RIVER, a river in Cape

Colony, South Africa, which rises in the

Sneeuwberg, or Snowy Mountains, and after

a southeasterly course of 230 miles, enters the Indian Ocean at lat. 33° 25′ 5″, and long.

27° 8’, about five miles northeast of Port

Alfred.

GREAT LAKES

GREAT HARRY, the first double-decked

sh-p built in England, and the first British war vessel. It was constructed in 1509, and cost

£14,000. In 1553 an accidental fire destroyed

it.

GREAT HORNED OWL. See Eagle

Owl.

GREAT ISLAND. (1) A small island at

the entrance to Portsmouth Harbor, N. H. It

has a lighthouse 90 feet high. (2) An island in Bass Strait, between Tasmania and Australia;

the largest of the Furneaux islands. It is about 40 miles long and 12 miles broad. Pop. 42,100.

GREAT KANAWHA, name formerly ap¬

plied to the Kanawha River (q.v.).

GREAT KANAWHA, Battle of. See

Point Pleasant.

GREAT KEI, the principal member of the

Kei Islands (q.v.).

GREAT LAKES, the name given to the

chain of lakes on the northern border of the

United States. They include Lakes Superior,

Michigan, Huron, Saint Clair, Erie and On¬

tario; Michigan only lying wholly within the

United States, and no one of the lakes wholly within the territory of the Dominion of Canada.

Their area is about 94,000 square miles ; eleva¬

tion, Lake Superior 600 feet above the sea,

and Lake Ontario 250 feet. The fall of Lake

Superior to Lake Erie is about 40 feet. No

large river flows into the Great Lakes; the

Saint Lawrence River is the outlet. The basin

of the. Great Lakes averages in width about

100 miles north and south of the north and

south shores respectively. The combined coast

lines in the United States have a shore line of about 3,075 miles. These great inland seas

constitute the largest body of fresh water in

the world and their fisheries have an annual

value of about $3,500,000. Like all large bodies of water they affect the climate of the surround¬

ing country. Good farms, extensive forests and

valuable minerals are found along the coasts.

On the southern shore of Lake Superior (q.v.)

are found masses of ore and low mountains ap¬

parently of eruptive origin. The Great Lakes

have been the means of developing to a con¬

siderable extent the Northwest, as they are the main thoroughfares by which the products of

the large farms, the cattle ranches, the mines and the forests have been brought to eastern

markets. Coal and manufactured products of

the east pass over the lakes to western markets.

The line of cities around the Great Lakes have increased in commercial importance and popula¬

tion with great rapidity. Among these lake

ports, all terminals of railroad trunk l nes, are Toledo, Chicago, Cleveland, Milwaukee and

Buffalo. The <(Soo>:> canals connect Lake Su¬

perior with Lakes Michigan and Huron, the

Detroit River makes the connection with Lake

Erie, and the Welland Canal around Niagara

Falls with the Saint Lawrence River, the out¬

let to the Atlantic Ocean. These connect ng

links have undergone great engineering de¬

velopment in the interests of transportation and an enormous traffic and tonnage passes through

them annually. The freighters built to ac¬

commodate the trade in iron ore, coal and

grain, together with elevators and machinery,

represent the greatest development in cargo

handling ever known. The total freight

tonnage passing through the (<Soo* canals in a recent year was 79,718.334 tons; through the

Detroit River 85,376,705 tons valued at $927,-

191,016; and 1,156 vessels, of which 837 were

steamers, used the latter passage. (For canals

connecting the Great Lakes with rivers, see

articles on the respective lakes ; also Bound¬

aries of the United States; Canals; Ship

Canals). Consult Chandler and Lansing.

(Story of the Great Lakes > (New York 1909) ; Johnson, C., (Highways and Byways of the

Great Lakes> (New York 1911) ; Mills, (Our

Inland Seas) (Chicago 1910).

GREAT MEADOWS, Pa., Engagement

at, 28 May 1754; Washington's first fight. When the French built Fort Duquesne (now Pitts¬

burgh), driving off an English force which had begun to fortify the same spot, it was evident that the decisive struggle for mastery of the

American ˆhinterland® was to begin ; and the

commander of the nearest English force, a

Virginia militia officer of 22, named George

Washington, at once sent a messenger to Gov¬

ernor Dinwiddie and wrote letters to the

governors of Pennsylvania and Maryland, urg¬

ing all to send troops and expel the French.

Meantime he set out with his force to build a fort on the Monogahela where Brownsville,

Pa., now stands. Constructing a road as he

went, he halted at the Great Meadows of the

Youghiogheny, a bushy field at the foot of

Laurel Hill — a good camping-place and de¬

fensible position. Hearing from his scouts that the French had learned of the English activity, and sent out a party to engage any English

band they met, he cleared the field of bushes and threw up an intrenchment behind a ravine

crossing the field ; but instead of waiting an attack, took 40 men for a night surprise of the French, guided by Indian allies. It was raining hard, the path was often lost, and he did not reach the French camp till morning. They were

an advance party of 32, sent out to reconnoitre and, hearing of Washington's advance, they had

hidden in a rocky hollow and sent back for

reinforcements, but attempting defense when

surprised, the commandant — Ensign Jumonville

— and nine men were killed, and the rest

captured and taken to the camp at Great

Meadows. Washington lost one killed and

three wounded. The sequel is told under Fort

Necessity.

GREAT NORTHERN RAILWAY

COMPANY. This company had its beginning

in the Minneapolis and Saint Cloud Railroad,

chartered 1 March 1856. Legislative permis¬

sion to change its name was granted in 1869,

but it was not until 18 Sept. 1889 that the road received its present title. On 1 Feb. 1890 the company assumed the operation of the Saint

Paul, Minneapolis and Manitoba Railway, and

subsequently purchased a large proportion of

its stock. On 10 Oct. 1907 the stockholders of the Great Northern authorized the purchase

outright of a large number of subsidiaries oper¬

ating in the territory from Minnesota westward, and which the company had controlled through

stock ownership. A few weeks later the Saint

Paul, Minneapolis and Manitoba Railway also

was brought under absolute ownership. The

system including the mileage owned by the Mon¬

tana Eastern Railway Company and Great Falls

and Teton County Railway Company extends

from Saint Paul northwestward through Min¬

nesota and North Dakota and thence westward

through the northern parts of Montana and

Idaho and through central Washington to

Seattle ; with many ramifications in Minnesota,

Wisconsin, Iowa, North Dakota and South Da¬

kota, Montana, Idaho and Washington and sev¬

eral sections of Canada.

The total mileage operated in 1917 was

8,255.98 miles, of which 7,123.77 miles were

owned by the company and the remainder held

under leases and trackage rights. The operating revenues for the year ended 31 Dec. 1917 were $88,534,163, earned by the transportation of

8,382,035 passengers and 30,650,814 tons of

freight. The passenger travel averaged 79.58

miles at an average charge of 2.374 cents per mile — aggregating in the year 667,036,192 pas¬

senger miles and receipts of $15,836,341. The

freight traffic averaged a haul of 274.03 miles per ton, at an average charge of 0.766 cents

per ton per mile, aggregating in the year

8,399,349,197 tons-miles and receipts of

$64,300,666.

The operating expenses for the year were

$59,243,785. After deducting taxes and uncol¬

lectible income, the net operating income was

$22,987,546. The gross income, including among

minor items, $10,053,942 dividends upon stock

held in other railroads and enterprises was

$35,774,332. Deductions (which include $11,-

077,181 interest on the funded debt) leave a

net income from all sources of $23,021,752. Of this sum $17,462,959 was appropriated for pay¬

ment of dividends; $60,474 to sinking and other reserve funds and $5,385,635 for miscellaneous

purposes. A credit balance of $112,683 was

transferred to profit and loss.

The equipment of the Great Northern on

31 Dec. 1917 consisted of 1,320 locomotives,

with an aggregate tractive capacity of 50,130,000

pounds; 718 passenger coaches (including sleep¬

ing and parlor cars) with a total seating capacity of 43,444 persons; and 57,637 freight cars with a total capacity of 2,187,349 tons. By far the largest item of freight transported was that of ores and metals, amounting to nearly 48 per

cent of the entire body of freight. The second largest item was coal, amounting to 12 per cent, followed by grain, which accounted for 10 per

cent. The operating revenues per mile of road

was $10,756 and the operating expenses $7,198,

making the net operating revenue per mile of

road $3,558.

The entire investment in the road and its

equipment cn 31 Dec. 1917 was $401,790,918.

Other investments of the company amounted

to $243,253,549. The total stock outstanding on the date cited amounted to $249,477,138 ; and

the total long term debt (exclusive of the com¬

pany's liability for the Northern Pacific, Great Northern, Chicago, Burlington and Quincy joint

bonds issued against Chicago, Burlington and

Quincy Railroad stock deposited as collateral)

to $163,430,739. The credit balance of the profit and loss account was $75,339,382.

The Great Northern Railway jointly with

the Northern Pacific Railway Company owns

nearly the entire stock of the Chicago, Burling¬

ton and Quincy Railroad.

Other properties of the company are the

Somers Lumber Company, Chelan Electric

Company, and the Cottonwood Coal Company.

In Canada the company has a proprietary inter-

est in the Brandon, Saskatchewan and Hudson Bay Railway; the Crow's Nest Southern Rail¬ way, the Manitoba Great Northern Railway; the Nelson and Fort Sheppard Railway; the New Westminster Southern Railway; the Red Mountain Railway ; and the Vancouver, Vic¬ toria and Eastern Railway and Navigation Com¬ pany, and owns jointly with the Northern Pacific Railway Company the Midland Railway Company of Manitoba. These lines are oper¬ ated as part of the Great Northern Railway System. The Company also controls, through stock ownership, the following railwav com¬ panies : Watertown and Sioux Falls Railway Company; Duluth Terminal Railway Company; Minneapolis Western Railway; Montana East¬ ern Railway Company; and the Great Falls and Teton County Railway Company.

The lines of this company were taken over for operation by the United States government under proclamation of the President on 28 Dec. 1917. Consult Poor's Manual of Railroads for 1909, 1910 and 1918; and the Interstate Com¬

merce Commission's Reports on Common

Carriers.

GREAT PACIFICATOR, a name given

Henry Clay (q.v.), on account of his efforts to reconcile the conflicting interests of North and South, especially in connection with the

Missouri Compromise.

GREAT PEDEE, a river which has its

rise in the mountains of the northwestern part of North Carol ina, flows south and east across the State, and enters South Carolina at Marl¬

boro County, in the northeastern part of the

State, then flows southeast into Winyaw Bay,

an inlet of the Atlantic. In North Carolina the river is called Yadkin. About where the Little Pedee joins the Great Pedee, and south to its mouth, there are several quite large islands.

The river is nav gable for a distance of about 150 miles from Winyaw Bay.

GREAT PLAINS. The Great Plains

province is that part of the continental slope which expends from the foot of the Rocky

Mountains eastward to the valley of the Mis¬

sissippi, where it merges into the prairies on the north and the low plains adjoining the Gulf Coast and the Mississippi embayment on the

south. The Great Plains present wide areas of

tabular surfaces traversed by broad, shallow

valleys of large rivers, most of which rise in the Rocky Mountains. They are also cut more or

less deeply by the narrower valleys of tributary streams. Smooth surfaces and eastward-slop¬

ing plains are the characteristic features of the province, but in some parts of it there are

buttes, extensive escarpments, and areas of

badlands (q.v.). Sand hills surmount the

plains in some localities, notably in north¬

western Nebraska, where they occupy an area

of several thousand square miles. The region

is made up of soft rocks, sands, clays and

loams, in general spread in thin but extensive beds that slope gently eastward with the slope of the plains and lie on relatively smooth sur¬

faces of the older rocks. The source of these deposits was mainly to the west and the ma¬

terials were deposited layer by layer either by streams on their flood plains or in shallow lakes and, during earlier times, in the sea. The

strata show but few local flexures, as the

region as a whole has been alternately uplifted and depressed but not subjected to folding.

During earlier epochs the surface was even

smoother than at present. Owing to the great

breadth of the plains and their relatively gentle declivity, general erosion has progressed slowly notwithstanding the softness of the formations ; and as at times of freshet many of the rivers bring out of the mountains a larger load of

sediment than they can carry to the Mississippi, they are now locally building up their valleys rather than deepening them.

The Great Plains province as a whole de¬

scends to the east about 10 feet to the mile from altitudes approaching 6,000 feet above the sea at the foot of the Rocky Mountains to

about 1,000 feet near Mississ ppi River. The

altitudes and the rates of slope differ con¬

siderably in different districts, particularly to the north, along the middle course of Mis¬

souri River, where the general level has

been greatly reduced. The Great Plains rise

to an altitude .of 6,200 feet at the foot

of the Rocky Mountains west of Denver,

and maintain this elevation far to the north,

along the foot of the Laramie Mountains. High

altitudes are also attained in Pine Ridge, a

plateau which extends from near the north

end of the Laramie Mountains eastward

through Wyoming, across the northwest cor¬

ner of Nebraska, and for many miles into

southern South Dakota. Pine Ridge marks the

northern margin of the higher part of the

Great Plains and its north side presents cliffs and siteep slopes descending 1,000 feet into the drainage basin of Cheyenne River, one of the

largest branches of the Missouri. From this

basin northward the Great Plains comprise a

succession of other basins with relatively low

intervening divides, which do not attain as high an altitude as in the region to the south.

This northern extension of the Great Plains

is drained by the middle branches of Missouri

River, of which the larger members are Yellow¬

stone, Powder, Little Missouri, Grand, Cannon¬

ball, Moreau, Cheyenne, Bad and White rivers.

On the southern slope of Pine Ridge is

Niobrara River, which rises in the midst of the high plains some distance east of the north

end of the Laramie Mountains. Farther south

are Platte River, with two large branches

heading far back in the Rocky Mounta'ns, and

Arkansas River, both of which cross the plains to the southeast and afford an outlet for the drainage from a large area of mountains and

plains. Between Arkansas and Platte rivers is

Republican River, rising near longitude 105°,

these having an extensive system of local drain¬

age in eastern Kansas and Nebraska. South of

the Arkansas are Cimarron River and numerous

smaller streams that head in the western por¬

tion of the plains.

The sandstones underlying the Great Plains

contain water available for artesian wells and

large flows have been obtained at some locali¬

ties. The other natural resources are lime¬

stones and clay for cement, oil and gas, fullers earth and volcanic ash. To the east where

rainfall is sufficient, agriculture is the most important industry, while the great semi-arid

portion to the west is mostly devoted to cattle raising. Consult Darton, N. H., (Geology and

Underground Resources of the Central Great

Plains (U. S. Geol. Survey, Prof. Paper 32,

1905) ; Johnson, W. D., (The High Plains and

Their Utilization (U. S. Geol. Survey, 21st

Report, Pt. IV, and 22d Report, Pt. IV).

N. H. Darton,

Geologist, United States Geological Survey.

GREAT RIFT VALLEY, a valley ex¬

tending from Palestine in Asia to the southern part of Lake Tanganyika, Central Africa. A

series of rift valleys form the depression, be¬

ginning in the region of the Jordan and the

Dead Sea and extending across the Red Sea

Basin to the strait of Bab-el-Mandeb ; thence

crossing French Somaliland and Abyssinia to

Lake Rudolf in British East Africa. Two

branches become apparent at this point, one

extending on the south to Lake Manyara and

beyond ; and the other reaching westward to

Albert Nyanza, and thence southward to Lake

Tanganyika. This depression contains most of

the Great African Lakes. Traces of lava

sheets, extinct volcanoes and several minor

active ones occur at intervals, but the valley is due to downfaulting of long narrow blocks.

Some of the rock walls in Central Africa rise to a height of 4,000 to 5,000 feet above sea level.

GREAT SALT LAKE, a body of water in

the northwestern part of Utah, the principal

drainage centre of the Great Basin (q.v.) ;

bounded on the east by the Wasatch Moun¬

tains, on the west by the Great Salt Lake

Desert. It is about 4,200 feet above sea-level, 80 miles long and from

20 to 32 miles wide.

Its chief inlets are the Bear, Ogden and Weber, and the Jordan which brings the fresh waters of Lake Utah. Great Salt Lake has no apparent outlet save evaporation. In 1850 the amount of saline matter held in solution was 22.4 per cent, in 1869 only 14.8 per cent. Be¬ tween these dates the amount of water flowing in annually exceeded the evaporation, and the lake increased in area from 1,700 to 2,360 square miles. Since 1869-70 the lake has been receding. One cause of the water diminishing in volume is the amount used for irrigation ; but the amount of water contributed by the inlets has decreased since 1870. At one time Great Salt Lake was much larger than it is now. The bars, cliffs, and beaches formed by the waters of the ancient lake (called Lake Bonneville) are plainly visible along the base of the mountains. Lake Bonneville had an area of 19,800 square miles and a depth of 1,100 feet. Its depth near where the great Mormon Temple now is was about 850 feet. Its dry bed is now occupied by nearly 200,000 people. The waters of Lake Bonneville reached the ocean

through Columbia River. Geological investiga¬

tions show that there have been at least two

moist periods with intervening and subsequent

periods of dryness. A change from the present

dry climate and scant rainfall to a moist climate would result in a great increase in area of the waters in the lakes and rivers and a return to former water areas. Great Salt Lake has

several islands, the largest of which, Antelope, is 18 miles long. No fishes seem to exist, but several species of. insects and brine-shrimps

have been found in the waters ; and water—

fowls in large numbers frequent the shore.

The first mention of Great Salt Lake appeared

in a report made by the Franciscans, in 1776.

Father Escalante and companions seem to have

traveled from Mexico to this region. A report

made also by the Franciscans early in the 17th century mentions the large rivers and lakes

and the mineral wealth of this section. In

1843 Fremont explored and described this

reg'on, and a thorough survey was made in

1849-59 by Howard Stansbury, captain in the

United States Army. (See Utah). Consult

(Jesuit Relations) ; Bancroft, (Utah) ; United

States Reports and Surveys.

GREAT SEAL, the sign affixed to docu¬

ments to denote royal authority. It is affixed on all solemn occasions to all papers expressing the pleasure of the sovereign ; and was first

used by Edward the Confessor. The Lord

Chancellor was at first entrusted with the keep¬

ing of the seal ; but as the duties of the

chancellor multiplied, another office was eventu¬

ally created for the special purpose of perform¬

ing all the duties connected with the seal. In the reign of Elizabeth, the status of the keeper was raised as high as that of chancellor, and in subsequent reigns, the offices of keeper and chancellor were again fused. The last holder

of the independent title being Sir Robert Hen¬

ley (Lord Northington) who succeeded to the

chancellorship on the accession of George III.

There is now one seal used in the Un'ted

Kingdom for sealing writs to summon Parlia¬

ment, for foreign treaties and all public acts of state. This affects Scotland and Ireland

except in grants and writs concerning private

rights in these countries.

GREAT SEAL OF THE CONFED¬

ERACY, The. It is not generally known that

the Confederate States of America possessed

a symbol of sovereignty in the form of a great seal, and its evolution, history and significance is of interest to all citizens of the reunited na¬

tion. When the Confederate government was

The Great Seal of the Confederacy.

founded at Montgomery, Ala., it was early sug¬

gested that a seal be devised, but it took months of fruitless attempts to enact a law establishing a great seal. Several times during the first

years of the fratricidal struggle the representa¬

tives in the Confederate congress introduced

bills looking to the creation of" a symbol of na¬

tionality, but the senators, who were less hope-GREAT SEAL OF THE CONFEDERACY

ful of ultimate triumph over the Union or Fed¬

eral powers, discouraged and voted down these

legislative attempts. But in 1863 the Confed¬

eracy gained new hopes, since foreign powers

gave evidence of concern and sympathy for

the Southern cause, and as a result the follow¬

ing bill passed the senate :

Resolved, by the Senators of the Confederate States of America: That the seal of the Confederate States shall be: In foreground, a confederate soldier in position to charge bayonet; in the middle distance, a woman with a child in front of a church, both with hands uplifted in the attitude of praying: for a background, a homestead in the plains, with mountains in the distance, beneath the meridian sun; the whole surrounded by a wreath composed of the stalks of sugar cane, the rice, the cotton and the tobacco plant —the margin inscribed with the words: “ Seal of the Con¬

federate States of America ” (above) and “ Our Homes and Constitution ” (beneath).

The bill failed to receive the required support in the House, and in a few months the follow¬

ing bill had its origin in the upper branch of the government :

Resolved, by the Senators of the Confederate States of America, That the seal of the Confederate States shall con¬

sist of: An armed youth in classic costume, standing; beneath a woman is clinging. The whole surrounded by a margin of rice, cotton, tobacco and sugar cane. Motto, “ Pro Aris et Focis.” The design surrounded by these words, “ Seal of the Confederate States of America.”

The bill met a like fate, since the represen¬

tatives disapproved of the senatorial proposi¬

tion.

Prior to the spring of 1862 the Congress of

the Confederacy was provincial; the permanent

government was not established until 22 Feb.

(Washington's birthday) 1862; and it was at

the third session of the permanent congress that a bill passed both branches and received the

signature of President Jefferson Davis. The

act reads as follows ;

" No. 4. Joint resolution to establish a seal for the Con¬

federate States: That the seal of the Confederate States shall consist of a device representing an equestrian statue of Washington (after the statue which surmounts his monu¬

ment in the Capitol square at Richmond), surrounded with a wreath composed of the principal agricultural products of the confederacy: cotton, tobacco, sugar cane, corn, wheat and rice — and having around its margin the words: 4 The Confederate States of America; Twenty-second February, Eighteen Hundred and Sixty-two,' with the following motto: * Deo Vindice.' "

The design for a seal was purely the result

of Confederate originality and imagination ; it

was free from heraldic devices and possessed

none of the elements of armorial language.

The meaning of the symbols is clear: Washing¬

ton, a southerner, owned slaves — and God

favors our cause.

The Savannah News of 1 May 1863, says

editorially :

“The confederate congress has at length adopted a great seal which we think is both appropriate and in good taste.

This device and motto will be approved by the good taste and moral sentiment of our people, and now it only remains for congress to adopt an appropriate flag for the confederacy, in order that we may present to the world a symbol as well as the power and substance of a great and glorious nation¬

ality.”

On 20 May 1863, J. P. Benjamin, Secretary

of State of the Confederacy, sent a dispatch to James M. Mason, Commissioner of the Confed¬

eracy to the government of Great Britain, ex¬

pressing the will of Congress with regard to

the proposed seal. Part of the message reads : ((Sir: — Congress has passed a law establishing

a seal for the confederate states. I have con¬

cluded to have the work executed in England,

and request that you will do me the favor to supervise it. You will receive a copy of the

act, and a photograph of Washington’s statue.

The photograph represents the horse as stand¬

ing on a summit of an obelisk, but in the seal the base ought to be the

earth. … It is not de¬

sired that the work be executed bv any but the best artists that can be found, and the difference of expense between poor and fine specimen art

in engraving is too small a matter to be taken into consideration in a work that we fondly

hope will be required for generations yet un¬

born. w Mason's reply says: ((Mr. Wyon (her

majesty's engraver) is to engrave the seal, and he informs me that it will require six weeks

or two months to finish it, as he is very anxious to bestow upon it all the pains so important a work demands. He is executing it in silver,

which offers the advantage of proof against

rust, so often destructive to seals executed in steel. The cost of engraving the seal including the press for working it, will be 80 guineas*

The seal, when completed was brought to Amer¬

ica by Lieutenant Chapman and delivered to

Hon. J. P. Benjamin who, finding it satisfac¬

torily executed, officially accepted the work. It has been thought that the great seal of the

Confederacy was. never officially used; this

proves to be a mistake since the seal was af¬

fixed as a symbol of sovereignty on a large

number of documents which went abroad, and

a few were placed on appointments of govern¬

ment officials of high rank.

It has often been asked what became of the

great seal of the Confederacy and where is

the instrument at present? When the Con*

federate government was forced from Rich¬

mond, causing the surrender of the Confederate

soldiers, many of the southerners seized what

few government tokens were available and

speedily withdrew to the surrounding country

towns. Among the various tokens captured

was the great seal of the Confederacy. One of the clerks of the State department seized it

and disappeared. For a time rumor had it that the seal bearer, fearing longer to carry and

hide the great treasure, threw it into a well and made his escape. This rumor possesses no

truth. The following letter from Col. Tohn T.

Pickett of Confederate fame attests: ((At con¬

siderable trouble and expense I have been so

fortunate as to rescue this interesting memorial (the seal of the confederacy) from oblivion and possibly a vandalic melting pot. It is of pure silver and weighs several pounds.* Theodore

J. Pickett, Esq., son of the famous southern

colonel, Pickett, writes that he is in possession of the original correspondence between his

father and those who had the seal. He has

done much to preserve the history of this relic.

His father shortly before his death contributed it to the War Department at Washington, D. C.

The following letter from the Secretary of War will be of interest : <(The archives of the Con¬

federate government form perhaps the most in¬

teresting set of historical relics in the posses¬

sion of the government. They were at Rich¬

mond and gotten elsewhere and handed over

to the War Department at Washington. They

have been carefully arranged, and are now

packed away from view in two or three rooms

of the big war, navy and state buildings. They are never shown to visitors, and the greatest

care is taken in regard to them. Among these

relics is the seal of the Confederate States of America.* Before the seal was yielded to its

final depository a few electrotype copies were

made in silver, and the illustration in this ar¬

ticle is produced from one of these certified

electros now in the writer's possession. Though the use and purpose of this artistic device was ephemeral, its emblems and motto are of a

character in fullest accord and harmony with

the true spirit of the great nation born at In¬

dependence Hall, Philadelphia; the equestrian

figure of Washington signifies much to the

citizens of this republic, and the motto, <(Deo Vindice,® should inspire all sections of our

country to have a deep and abiding faith in

the government represented by the Stars and

Stripes.

The Department of State of the Confederacy

also had a seal. It consisted of a shield crossed or quartered by a Saint Andrews' or Saltier

cross, blue upon which were blazoned nine

stars (argent). The top quarter had a ship

for commerce; the dexter quarter, cotton; the

sinister quarter, tobacco, and the base quarter, corn. The crest was a rising sun with a glory, above which the words <(Department of State,®

appeared. Below the shield the latin words :

<(Nulla Patnia Amiotae Fidei® and beneath this

motto in large letters ˆConfederate States of

America.®

Bernard J. Cigrand,

Lieutenant United States Navy; author of

iGreat Seal of United States of America > and

(History of United States Flag P

GREAT SEAL OF THE UNITED

STATES. On 4 July 1776 when the Declara¬

tion of Independence had been finally acted

upon, John Hancock, president of the Conti¬

nental Congress, arose and said, ((We now are a nation, and I appoint Benjamin Franklin, John

Adams and Thomas Jefferson a committee to

prepare a device for a Great Seal of the United States of America.® The committee immediately

proceeded to perform its assigned duty and

after six weeks of labor, during which time

many designs were submitted and considered, it

was agreed that the conjoint design of Jefferson be reported to Congress on 10 Aug. 1776. His

device for a Great Seal was very elaborate,

containing on a shield something emblematic

of the several nations from which America was

peopled. Jefferson's report read as follows:

<(The committee to whom was referred on the

Fourth day of July last, the duty of preparing a device for a Great Seal of the United States of America, in Congress assembled, beg leave to report the following description:

“ The Great Seal should on one side have the arms of the United States of America, which arms should be as follows: The shield has six quarters, parti, one, coupe, two. The first or, an enamelled rose, gules, and argent, for England; the second argent, a thistle proper, for Scotland; the third vert, a harp, for Ireland; the fourth azure, a fleur-de-lis, for France; the fifth or, the imperial eagle, sable, for Germany; and the sixth or, the Belgic crowned lion gules, for Holland; pointing out the countries from which the States have been peopled. The shield within a border gules, entwined of 13

escutcheons, argent, linked together by a chain or, each charged with initial sable letters, as follows: (1) N. H., (New Hampshire); (2) Mass., (Massachusetts); (3) R. I., (Rhode Island); (4) Conn., (Connecticut); (5) N. Y., (New York); (6) N. J., (New Jersey); (7) Penn., (Pennsylvania); (8) Del., (Delaware); (9) Md., (Maryland); J10) Va., (Virginia); (11) N. C., (North Carolina); (12) S. C., (South Carolina); (13) Ga., (Georgia); for each of the 13 independent States of America.

“ Supporters, dexter, the Goddess of Liberty, in a corslet of armor, in allusion to the then state of war, and holding in her right hand the spear and cap, and with her left supporting the shield of the States; sinister, the Goddess of Justice, bearing a sword in her right hand, and in her left a balance.

“ Crest, the eye of Providence in a radiant triangle; whose glory extends over the shield and beyond the figures’

motto, * E. Pluribus Unum.’

” Legend round the whole achievement, * Seal of the United States of America, MDCCLXXVI.’

“ On the other side of the said Great Seal should be the following device:

“ Pharaoh sitting in an open chariot, a crown on his head, and a sword

in his right hand, passing through the divided waters of the Red Sea, in pursuit of the Israelites. Rays from a pillar of fire in the cloud, expressive of the divine presence and command, beaming on Moses, who stands on the shore, and extending his hand over the sea, causes it to overthrow Pharaoh.

“ Motto, ‘ Rebellion to Tyrants is Obedience to God.’ ”

Conjoint Devices — Reported by Jefferson.

Without any additional remarks, after having

finished reading, Jefferson quietly took his seat.

Congress referred the report back to the com¬

mittee, asking for an early supplemental report.

It may be interesting to learn how Jefferson

came to make the report and also learn what

Franklin and Adams contributed to the com¬

mittee’s report. A Frenchman, Du Simetiere

by name, had been requested to attend the com¬

mittee meeting, he being the most expert pen—

and-pencil artist in Philadelphia. He took great interest in the American cause ; and his atten¬

tion was early called to the fact that in Amer¬

ica, artists were in demand ; and, in consequence he began painting profiles in black, of distin¬

guished Americans and caricatures of promi¬

nent Englishmen engaged in the war. His

paintings and miniatures had attracted general

attention, which led the committee to engage

him to sketch devices for a Seal. Du Sime¬

tiere proposed a Norman shield divided into six quarterings.

First Quartering symbolized the English inhabitants of this country and placed first upon the shield to indicate that they were a primary factor in the new confederacy. English civilization was planted among the forests of America as early as 1607, in the colony of Virginia.

Second Quartering was intended for Scotland, a thistle in its proper color or an argent field, representing Scotch people as included in our national fold.

Third Quartering, green, with a harp of gold, was to be the respected symbol of Ireland, and was placed upon the shield as a token to the Irish patriots who took an active part in the war for independence.

Fourth Quartering was supposed to do honor to the French people.

Fifth Quartering, in honor of the German settlers was a golden field and upon it the imperial black eagle.

The Sixth Quartering represented the Dutch and a lion in gules was the emblem.

The dexter supporter of the shield was the Goddess of of Liberty, with a Phrygian cap on a staff. The sinister supporter was to typify a continental soldier in uniform, holding in the right hand a hatchet, in the left a gun. As a motto or “ war cry ” the Latin words, “ Bello vel

Pare”

Above the shield an eye of Providence. The border con¬

tained the words: “ The Great Seal of the United States of America.”

Franklin proposed for a Seal, Moses lifting

his wand and dividing the Red Sea, and

Pharaoh and his chariot overwhelmed with the

waters. For a motto well befitting the exist¬

ing circumstances and one that would be a

cherished <(war cry® for future generations he

suggested: (<Rebellion to Tyrants is Obedience

to God.® Franklin’s aim was to depict that

Providence favored slaves and bondsmen, and

destroyed tyrants and usurpers ; and for his

illustration he chose the war between the Israel¬

ites and Egyptians. In modern times the legend on his design began to be used about 1645, and was then used as a ((war cry® by Cromwell’s

party; it was intended to refer to Charles I.

The reinvention has been attributed by some, to Oliver Cromwell, but later research would in¬

dicate that John Bradshaw, president of the

court of judges who tried Charles I, is the

person who gave voice to this expressive motto.

Thomas Jefferson later adopted this motto as

his sentiment on his personal seal. But Jef¬

ferson suggested to the committee that the

Seal contain an obverse and a reverse side : on the former the Children of Israel, led by a

(<cloud® by day and a ((pillar of fire® by night ; on the latter Hengist and Horsa the <(Saxon

Chiefs, from whom we claim the honor of be¬

ing descended, and whose political principles

and form of government we are now about to

assume.®

John Adams' proposal was of a different

character ; he recommended — so the report

tells, ((The choice of Hercules, as engraved by Gribelin in this edition of Lord Shaftesbury.

You notice the hero resting on a club; Virtue pointing to her rugged mountain on one hand,

Du Simetiere's Design of Franklin's Suggestion.

Seal.

and persuading to ascend; and Vice glancing

at her flowery paths of pleasure, wantonly re¬

clining on the ground, displaying the charms

both of her eloquence and person, to seduce him into vice.® Hercules, as the central figure, was to symbolize the young nation ; indicating

strength, valor, perseverance and immortality.

The Goddess of Pleasure, on the sinister side, was to depict all forms of corruption, and

would thoroughly represent a lack of dignity

and respect, or the seven vices — pride, wrath, envy, lust, gluttony, avarice and sloth. The

Goddess of Virtue, on the dexter side, was to be the guide of the young government and as

such would enforce her (<seven cardinal excel¬

lences,® namely, Faith; Hope; Charity; Pru¬

dence; Justice; Fortitude and Temperance.

These few designs were then carefully con¬

sidered by the committee and finally Franklin

suggested that the draughts be placed in Jeffer¬

son's hand and that he select the meritorious

features in all and combine them into a con¬

joint device. This is how it came about that

Jefferson reported to Congress the composite

device for a Great Seal. In this conjoint de¬

sign by Jefferson, we see several new ideas —namely, a goddess of justice, and the 13 shields in the border, representing the colonies,

bound together by 13 links of a chain. He also added the motto, <(E Pluribus Unum,® and his draw¬

ing dated the Seal MDCCLXXVI.

In the spring of 1779, Congress was over¬

joyed at the evacuation of Philadelphia and

Adams' Design.

anon returned to the patriotic city to continue its important work, and again the Continental

Congress began to arrange for a Committee on

Great Seal. On the afternoon of Wednesday

24 March 1779, James Lovell of Massachusetts

addressed the Continental Congress on the

(<Grand Future of the United States,® referring in the course of his speech to the grand triumph of Gates over the British at Saratoga. John

Jay was the presiding officer, and he appointed Mr. Lovell of Massachusetts, with Scott of Vir¬

ginia and Houston of Georgia, as a committee,

requesting that they report within a fortnight.

The committee immediately set to work, but the bulk of the labor fell to the hands of Chairman Lovell, who applied for artistic assistance to Du Simetiere, who had done justice to the devices suggested by the former committee. After a

lapse of some 10 days Lovell showed his device to his coadjutors, who highly approved of the

same, and on the 10 May following the com¬

mittee reported that —

The Seal shall be four inches in diameter; on one side the arms of the United States as follows:

The Shield charged in the field with thirteen diagonal strips, alternately red and white.

Supporters: Dexter, warrior holding a sword; sinister, a figure representing Peace, bearing an olive branch.

The Crest, a radiant constellation of thirteen stars.

The Motto: “ Bello vel Pace.”

The Legend round the achievement. “ Seal of the United States.”

On the Reverse: The Figure of Liberty, seated on a chair, holding the staff and cap.

Motto: “ Semper ”; underneath, “ MDCCLXXVI.”

The report made a favorable impression on

the members. On account of important matters

demanding immediate attention, further con¬

sideration of the Seal was postponed until 17

May, when after a lengthy and heated discus-

Lo veil's Design (Obverse). Lovell's Design (Reverse).

sion, the report was ordered to be recommitted.

The committee to whom was recommitted the

redevising of the proposed Seal, made their re¬

port on Wednesday, 17 May 1780, just one year 364

to the day, when they gave their first report.

The chairman, Mr. Lovell, rose in Congress and read :

The Committee, to whom was referred, on the 17th of March last (1779), the report of a former Committee on the devices of a Great Seal of the United States in Congress assembled, beg leave to report the following description: The Seal to be three inches in diameter, on one side the Arms of the United States as follows: The Shield charged in field azure, with thirteen diagonal stripes, alternate rouge and argent.

Supporters: Dexter, a Warrior holding in hand a bow and arrow. Sinister, a figure representing Peace, bearing the olive branch.

The Motto: " Bello vel Pace Paratus."

The Legend around the achievement: “ The Great Seal of the United States.”

On the Reverse: The figure of Liberty seated on a chair holding a staff and cap.

The Motto: “ Virtute Perennis.” Underneath,

MDCCLXXX.

Much to the surprise of the committee, and

especially Mr. Lovell, the Continental Congress

was hard to please, and contrary to what they had expected, their report was rejected; and

once more the matter of a Seal rested till

months and even years rolled by. Early in

April 1782, John Hanson, then president of the Confederation Congress, briefly addressed that

body on the necessity of a National Seal, and appointed Henry Middleton, Elias Boudinot, and

Edward Rutledge as a committee to prepare a

suitable device. The committee, after a dili¬

gent search for something appropriate, finally

agreed that they report substantially as the com¬

mittee of 1780, and so on 9 May 1782, Chair¬

man Middleton submitted the former designs.

In consequence of Congressional dissatisfaction

the entire previously submitted devices were,

on 13 June 1782 referred to Charles Thomson,

secretary of the Confederation Congress. On 13

June 1782, immediately after his appointment,

he, in the company of Dr. Arthur Lee and Elias Boudinot, set out soliciting designs for the

Seal. They had called on several prominent men of Philadelphia, requesting they should devise

designs, and among those called upon was one,

a young and talented graduate, Will Barton,

A.M., brother of the patriotic Dr. Benjamin

Barton. Young Barton unhesitatingly told

Thomson, that he would diligently comply with

the request, and the three missionaries left,

feeling sure that an appropriate device would

ripen ere the next morn. Barton at once be¬

gan rummaging through his few books on

heraldry, and after remaining up nearly all that night, retired believing that the question of an ideal Seal was solved. Some few days after

Barton submitted the following:

Arms. — Paleways of thirteen pieces, argent and gules; a chief azure; the escutcheon placed on the breast of an American eagle (the baldheaded), displayed proper; holding in his beak a scroll, inscribed with the motto, viz.: “ E Pluribus Unum,”

and in his dexter talon, a palm or an olive branch; in the other a

bundle of thirteen arrows; all proper.

For the Crest. — Over the head of the eagle, which appears above the escutcheon, a glory, or breaking through a cloud, proper, and surrounding thirteen stars, forming a constella¬

tion, argent on an azure field.

In the exergue of the Great Seal,

Jul IV., MDCCLXXVI.

In the margin of the same,

“ Sigil. Mag. Reipub. Confoed. Americ.”

Remarks. — The escutcheon is composed of the chief and pale, the two most honorable ordinaries; the latter represents the several States, all joined in one solid compact entire, supporting a chief, which unites the whole and represents Congress. The motto alludes to the Union. The colors of tinctures of the pales are those used in the flag of the United States. White signifies purity, innocence; red, hardiness and valor. The chief denotes Congress. Blue is the ground of the American uniform, and this color signifies vigilance, per¬

severance, and justice.

The meaning of the crfst is obvious, as is likewise that of the olive branch and arrows.

Mr. Thomson was highly pleased with Bar¬

ton's device, but intimated that the design if anything was too plain, whereupon Barton of-Barton's First Design. Barton's Second Design.

fered to complete another. On 15 June Barton

again called at Thomson's residence where he

found the secretary, Dr. Arthur Lee and Elias

Boudinot awaiting his arrival. After a few mo¬

ments of verbal exchange he handed them a

large drawing with the following description :

A device for an armorial achievement for the Great Seal of the United States of America, in Congress assembled, agreeable to the rules of Heraldry, proposed by William Barton, A.M.

Arms. — Barry of thirteen pieces, argent and gules, on a canton azure, and many stars disposed in a circle of the first; a pale or, surmounted of another, of the third, charged in chief, with an eye surrounded with a glory proper; and in the fess-point an eagle displayed on the summit of a Doric column, 'which rests on the base of the escutcheon, both as the stars.

Crest. — Or an helmet of burnished gold damasked, grated with six bars, and surmounted with a cap of dignity, gules, turned up ermine, a cock armed with gaffs proper.

Supporters. — In the dexter side: the genius of America (represented by a maiden with loose auburn tresses), having on her head a radiated crown of gold encircled with a sky blue fillet, spangled with silver stars, and clothed in a long loose white garment bordered with green. From her right shoulder to her left side a scarf, semee of stars, the tinctures thereof the same as in the canton; and round her waist a purple girdle, fringed or embroidered, argent, with the word " Virtue,"

resting her interior hand on the escutcheon, and holding in the other the proper standard of the United States, having a dove argent perched on the top of it.

On the sinister side: a man in complete armor, his sword-belt azure fringed with gold, his helmet encircled with six bars, and surmounted by a red cap of dignity, two blue plumes; supporting with his dexter hand the escutcheon, and holding in the interior a lance, with the point sanguinated, and upon it a banner displayed, vert; in the fess-point a harp strung with silver, between a star in chief, two fleurs-de-lis in fess, a pair of swords in saltier, in basses, all argent. The tenants of the escutcheon stand on a scroll, on which is the following motto:

“ Deo Favente,”

which alludes to the eye in the arms, meant for the eye of Providence.

Over the crest, in a scroll, this motto:

“ Virtus Sola Invicta.”

After thoroughly discussing the matter they

agreed, that Barton had done exceedingly well,

but they believed the device entirely too elab¬

orate and complex; and also that he had failed to present them with a design of the reverse

side of his proposed Seal. Mr. Barton, how¬

ever, satisfied them that he would abridge the obverse, and furnish a reverse by the next meet¬

ing, which they agreed should be the following night. As per appointment he called 16 June

and presented his new sketches, the description of which is as follows:

OBVERSE SIDE.

Arms: An escutcheon consisting of a blue border, spangled with thirteen white stars, and divided in the centre, GREAT SEAL OF THE UNITED STATES

perpendicularly by a gold bar; on each side of this division, within the blue border; thirteen bars or stripes, alternately white and red, like the American flag, adopted 14 June 1777.

Within the Doric column a gold bar bearing a displayed eagle on its summit.

Crest: A helmet of burnished gold, and engrated with six bars, and surmounted by a red cap of dignity such as dukes wear, with an ermine lining; supporting a displayed cock armed with gaffs, in the sinister talon he held the new ensign of the Confederacy, the stars and stripes — and in the dexter talon a sword, on the point of which was suspended a wreath of laurels. Above the crest this motto: “ In Vindiciam Libertatis.”

Supporters: On the dexter side, the genius of America (represented by a maiden with loose, auburn tresses), having on her head a radiated crown of gold, encircled with a sky-blue fillet, and clothed in a long loose white garment, bordered with green. From her right shoulder to her left side a scarf semee of stars, the tinctures thereof the same as in the shield-border, and around her waist a blue girdle, fringed or em¬

broidered with silver; her sinister hand rested on and sup¬

ported the shield, and upon her dexter hand was perched a dove argent.

The sinister supporter was an ideal or typical American soldier dressed in a uniform peculiar to an American, with a naked sword in the hilt, on his head a felt hat, distinguishing him as an officer, with his dexter hand resting on the escutch¬

eon, and in his sinister a wrapped roll of paper (evidently the Declaration of Independence). The tenants of the escutcheon stand on a scroll on which is the following motto: “ Virtus Sola Invicta.”

The entire is designated as “ Great Seal of the American Confederacy.” He proposed as the reverse, the following: An unfinished pyramid, consisting of ten layers of stone.

[He undoubtedly intended that there should be thirteen.]

In the zenith, the eye of Providence, surrounded with a glory.

Over or about the eye the Latin phrase “ Deo Favente ” —with God’s favor. At the base of the pyramid the word ” Perennis ”; the former motto is the same as on his second design and the latter is taken from the device -of the second committee on the Seal.

Barton’s Third Design Barton’s Fourth Design

(Obverse). (Reverse of third design).

Secretary Thomson decided he would report

the first design of Mr. Barton as the obverse and his fourth design as the reverse, as fol¬

lows :

The Secretary of the United States, in Congress assembled to whom were referred the several reports of committees on the device of a Great Seal to take order reports: That the device for an armorial achievement and reverse of a Great Seal for the United States in Congress assembled, is as follows:

Arms: Paleways of thirteen pieces, argent and gules, a chief azure. The escutcheon on the breast of the American bald eagle, displayed proper, holding in his dexter talon an olive branch and in his sinister, a bundle of thirteen arrows, all proper, and in his beak a scroll, inscribed with this motto: “ E Pluribus Unum.”

For the Crest: Over the head of the eagle, which appears above the escutcheon, a glory, or breaking through a cloud proper, and surrounding thirteen stars, forming a con¬

stellation, argent on an azure field.

Reverse: A pyramid unfinished. In the zenith an eye in a triangle, surrounded with a glory proper. Over the eye these words:

“ Annuit Coeptis.”

On the base of the pyramid the numerical letters MDCCLXXVI., and underneath the following motto:

“ Novus Ordo Seclorum.”

Thomson’s report was adopted on 20 June

1782, and Congress instructed him to have the

design executed in metal. Accompanying the

sketch was the following definition of the Seal ; this is the authentic meaning of our emblem :

Adopted Seal (Reverse). Adopted Seal (Obverse).

Remarks and Explanations: The escutcheon is composed of the chief and pale, the two most honorable ordinaries. The pieces paly, represent the several states all joined in one solid compact entire, supporting a chief which unites the whole and represents Congress. The motto alludes to this Union. The pales in the Arms are kept closely united by the chief, and the chief depends upon that union, and the strength resulting from it for its support to denote the Confederacy of the United States of America, and the preservation of the Union through Congress.

The colors of the pale are those used in the flag of the United States of America; white signifies purity and inno¬

cence; red, hardiness and valor; and blue, the color of the chief, signifies vigilance, perseverance, and justice. The olive-branch and arrows denote the power of Peace and War, which is exclusively vested in Congress. The constellation denotes a new State taking its place and rank .among sovereign powers. The escutcheon is borne on the ,breast of the American eagle, without any other support, to denote that the United States of America ought to rely on their own virtues.

Reverse: The pyramid signifies strength and duration.

The eye over it and the motto, allude to the many and signal interpositions of Providence in favor of the American cause.

The date underneath is that of the _ Declaration of Inde¬

pendence ; and the words under it signify the beginning of the new

American era which commences from that date.

It has been claimed of later years, that we owe the design for our nation's mark, to Sir John Prestwick of England. That this state¬ ment has been made through carelessness and lack of thorough research on the part of our historical writers, can easily be proved ; and in¬ asmuch as we have definite authority to estab¬ lish this proof let us as Americans closely stand by our American patriot, Will Barton, and give him this honor due and preserve his name among the other great benefactors of the Union.

The following letter Secretary Thomson wrote Will Barton a few days after the adoption of the Great Seal, and in it there is all the evi¬ dence possible to refute the claims of the royal¬ ists. It is as follows :

Philadelphia, Penn.

Mr. Will Barton, Sir:

I am much obliged for the perusal of the "Elements of Heraldry" which I now return. I have just dipped into it so far as to be satisfied that it may afford a fund of enter¬

tainment, and may be applied by a State to useful purposes.

I am much obliged for your very valuable present of ‘Fortescue de Laudibus Legum Angliae,” and shall be happy to have it in my power to make a suitable return. _

I enclose you a copy of the device by which you have displayed your skill in heraldic science, and which meets with general approbation.

I am, sir. Your obedient, humble servant,

(Signed) Charles Thomson.

June 24, 1782.

In reference to the above letter Mr. Barton

in after years wrote the following note, which goes to corroborate the statement, that he de¬

signed the present Great Seal of the United

States :

Lancaster, Penn.

In June 1782, when Congress was about to form an armorial device for a Great Seal for the United States, Charles Thomson, Esq., then secretary, with the Hon. Arthur Lee 306

and Elias Boudinot, members of Congress, called on me and consulted me on the occasion. The Great Seal, for which I furnished those gentlemen with devices (as certified by Charles Thomson, Esq.), was adopted by Congress on the 20th of June 1782. Mr. Thomson informed me four days after the design met with general approbation.

(Signed) W. Barton.

Charles Thomson had the obverse side of

the seal cut in brass — the reverse side was never cut or used. Strictly speaking the na¬

tional documents are not sealed as the enact¬

ment calls. The first time the Great Seal was used it was found on a commission dated 16

Sept. 1782, granting full power and authority

to Gen. George Washington for arranging with

the British for exchange of prisoners of war.

This commission is signed by John Hanson,

president of the Confederation Congress, and

countersigned by Charles Thomson, secretary

of the same body; the seal on this document

being impressed upon the parchment, over a

white wafer, fastened by red wax in the upper left hand corner, instead of the lower left hand corner as is now the custom. This document

is in the possession of the State Department and few papers are more carefully stored or more

highly cherished. The seals of many of our

States contain emblems borrowed from the

<(Great Seal.® This is also true of many of the seals of government departments. The historic

and much admired china set of the White House has the Great Seal blazoned upon every piece, —the seal being in heraldic tinctures. The Great Seal of the United States being used very fre¬

quently, its wear of necessity is great and sev¬

eral secretaries of State had it retouched and corrected. Officially the Great Seal has been

changed in Webster's term, in Frelinghuysen's

term and in John Hay's term.

In 1841, during the administration of Presi¬

dent Tyler, it was found by Webster, then Sec¬

retary of State, that the Seal was badly worn and beyond the engraver's power of redemption.

The President then ordered that Webster see

that a new Seal be engraved. The engraver, it seems, found it difficult to engrave the bundle of 13 arrows, and with Webster's advice and

consent agreed that six arrows would suffice.

Second Great Seal — 1841 Present Great Seal.

(Webster's).

In 1885, during the administration of

Chester A. Arthur, Mr. Frelinghuysen, the Sec¬

retary of State, found that the Great Seal was badly worn and beyond restoration. The sec¬

retary consulted Mr. Arthur, who ordered that

a new Seal be executed. This Seal also lacks

the true heraldic significants. In 1903 Secre¬

tary John Hay's attention was called to the

lapses in the execution of the Seal, and Presi¬

dent Roosevelt ordered that a new one be made.

The present Seal is a beautiful emblem and is considered the most artistic <(hand mark® of the nations. See Seal.

Bernard J. Cigrand,

Author of (History of American Emblems A

GREAT SERPENT MOUND. See

Mound Builders and Mounds.

GREAT SLAVE LAKE, a body of water

in the Canadian Northwest Territory, lat. 62°

N., greatest length about 300 miles, greatest

breadth 50 miles. Estimated area, 10,100 square miles. By the Great Slave River it receives the waters of Lake Athabasca; and the outlet is the Mackenzie River which flows into the Arctic

Ocean.

GREAT SLAVE RIVER, in Alberta and

the Northwest Territories, Canada, is the out¬

let of Athabasca Lake and flows into Great

Slave Lake (q.v.), by two mouths, near Fort

Resolution. A number of falls and rapids are

in its upper course, but the descent becomes

more gradual near its mouth. It is navigable

for the greater part of its course. Length

about 300 miles.

GREAT SOUTH BAY, an arm of the

Atlantic Ocean on the southern coast of Suffolk County, Long Island, N. Y. ; 50 miles long, from one and onehalf to five miles wide. Great

South Beach, which is about 35 miles long,

has Fire Island lighthouse on the western ex¬

tremity, and separates the bay from the ocean.

GREAT STONE FACE, one of Haw¬

thorne's short stories relating to the <(01d Man of the Mountain® in the White Mountains, in

(Snow Image and Other Twice Told Tales*

(1852).

GREATHEAD, James Henry, British en¬

gineer and inventor : b. Grahamtown, Cape

Colony, 1844; d. London, 1896. At the age of

15 he went to England, and later pursued his

studies in engineering under P. W. Barlow.

His principal work is in underground railway

systems for city traffic. He designed the sub¬

way near the Tower under the Thames, Lon¬

don (1869); and in 1886 by using the Great—

head shield, succeeded in constructing the tun¬

nels for the city and South London Railway.

Among his private inventions is the Ejector

fire hydrant. He also is responsible for the

introduction of the Hallidie cable system into

England.

GREATHEART, Mr., the guide of Chris¬

tiana and her children to the Celestial City in Bunyan's (Pilgrim's Progress.*

GREATOREX, grat'6-reks, Eliza Pratt,

American artist: b. Manor Hamilton, Ireland,

25 Dec. 1819; d. Paris, 9 Feb. 1897. She

studied art in New York and Paris. Her

work began in landscape painting but pen and

ink work and etching subsequently absorbed

her efforts. In 1868 she was elected associate of the National Academy. In 1870 she visited

Germany and in 1871 published <The Homes

of Oberammergau.) Her principal works are

(Summer Etchings in Colorado) (1873) and

(01d New York from the Battery to Blooming—

dale> (1876).

GREBES, grebz, a well-defined group of

water-bird (Colymbidce or Podicipidce) com¬

prises 25 species, spread over practically the

whole world. The grebes are peculiar in having the legs placed very far back, in their flattened GRECHANINOV — GREECE

tarsi and lobed (not webbed) toes, each digit

being flattened and bordered by an extension

of horny skin. They are expert swimmers and

pre-eminent as divers. They nest in secluded

ponds and bogs, piling up a mass of vegetable matter upon some floating foundation, and de¬

posit chalky white eggs. When the female

leaves the nest she usually covers the eggs over with vegetable matter. The little grebes are

expert swimmers and divers from the time they

are hatched, and in their soft downy plumage

are exceedingly beautiful. During migrations

grebes are found frequently along our rivers

and sea coasts, and are often shot by duck

hunters in the autumn and winter. Though

they have no stiffened tail feathers, and have relatively very small wings, they are able to

fly long distances. The body plumage is soft

and compact, and that of the under surface

is a beautiful silvery white, which makes

“grebe-breasts® a very desirable article in the millinery trade. The best-known species in

eastern North America are the horned grebe

(Colymbus auritus) which has a peculiar ruff

of black and rusty feathers about the head ;

and the pied-billed grebe (Podilymbus podi—

ceps) a rather more heavily built bird with¬

out a ruff and with a thicker and shorter bill.

Both are popularly known as “hell-divers.® In

Europe the common species are the horned

grebe, the great crested grebe (C. cristatus)

and the dabchick (C. fluviatilis) .

GRECHANINOV, gre-cha-m'-nof, Alex¬

ander Tikhonovich, Russian composer : b. Mos¬

cow 1864. He studied under Safanov at the

Moscow Conservatory and at Petrograd under

Rimsky-Korsakov. He is well known for his

sacred compositions in his own country; al¬

though his lyric and instrumental works have

attracted wider notice elsewhere. His works

include two symphonies, two string quartets

and the music to Ostrovsky's (Snegowruchka) ;

Tolstoy's (Tsar Feodor) and (Tsar Boris, > be¬

sides numerous songs and studies for the piano¬

forte. Of special dramatic merit are his two

operas (Dobrinya Nikitich } (1903) and (Soeur

Beatrice> (1912).

GRECIAN ARCHIPELAGO, a group of

islands lying in the 2Egean Sea, many of which are of volcanic origin. Others are composed

entirely of pure white marble, their mountain

elevation having an average height of from

1500-1800 feet. Among the better known of

these islands are Euboea, Chios, Lesbos, Lemnos, Andros, Naxos, 'Samos and Skyros. Rhodes

and Carpathos (Scarpanto) lie at the south¬

east entrance to the sea. Of strategic im¬

portance in all historic times, they again came into prominence when, on 10 April 1917, the

British and French Ministers informed the

Greek government of their intention to create

naval bases at certain points in the Ionian Is¬

lands and the yEgean, and shortly afterwards

the harbor of Arghostolion in Kephallinia was

occupied, this action being the precursor of

many similar ones. See War, European.

GREECE, Ancient, the European penin¬

sula which was bounded on the north by Mace¬

donia and Illyria; on the east and southeast by the yEgean and Myrtoan, and in the west and

southwest by the Ionian seas. Its length from

the borders of Macedonia to Cape Taenarum

was about 262 miles. The name of Grcecia

originated in Italy and was probably derived

from Pelasgian colonists, who, coming from

Epirus to Magna Graecia, in southern Italy and calling themselves Grceci, occasioned the applica¬

tion of this name to all the people who spoke the same language with them. In earlier times, for example, in the time of Homer, Greece

had no general name among the natives. Aris¬

totle was the first Greek to call his countrymen Tpamoi , Greeks. It afterward received the

name of Hellas, and still later, after the country was conquered by the Romans, it was divided

into two provinces : the Peloponnesus being

known as Achaia and the remaining regions

to the north as Macedonia. The Grecian tribes

were so widely dispersed that it is difficult to determine with precision the limits of Greece,

properly so called. The name perhaps is prop¬

erly applied only to the country lying to the south of Macedonia with the adjacent islands;

but it has sometimes been given in a modern

sense by geographers to the whole territory

lying to the south of Mount Hsemus, Mount

Scomius and the Illyrian Alps, or the whole

series of mountains now called the Balkan, so

as to include regions inhabited by some Thra¬

cian, Macedonian and Illyrian tribes. The area

of the mainland of the more limited region to which the name of Hellas is properly confined

is above 55,000 square miles. The whole of

Greece naturally divides itself into three parts: Northern Greece, including Epirus and Thes¬

saly; Central Greece, which comprises what was

known as Hellas ; and the Peloponnesus.

Physical Features. — The first thing which

strikes the eye on looking at a map of Greece is the comparatively great extent of its coast¬

line, formed by numerous gulfs which penetrate

into it in all directions and give it a remarkably broken and rugged appearance. Proceeding

round the coast from the northwest to the north¬

east we are presented in succession with tfhe

Ambracian Gulf (now Gulf of Arta), Corin¬

thian Gulf (the mouth of which is now called

the Gulf of Patras, while the name of Gulf of Corinth is reserved for the inner part of it), the Cyparissian (now Arcadian) Gulf and the

Messenian, Laconian, Argolic, Saronic, Maliac

and Pagasaean gulfs, now called respectively

Koron, Marathon, Nauplia, Athens, Lamia and

Volo. The Corinthian Gulf on the east and the Saronic Gulf on the west which nearly meet at the Isthmus of Corinth divide Greece into a

continental and a peninsula portion, the latter called the Peloponnesus (now Morea). An¬

other striking feature is the mountainous char¬

acter of the interior. The whole country was

bounded on the north by a range of mountains, the western half of which was called Mount

Lingon and the eastern half the Cambunian

Mountains, with Mount Olympus at their eastern

extremity. From about the middle of this range a lofty chain, called Mount Pindus, strikes

southward and runs almost parallel to the east¬

ern and western coasts of Greece. At a point

in this chain called Mount Tymphrestus or Tv—

phrestus (now Mount Velukhi), two chains

proceed in an easterly direction, the northern¬

most of which, Mount Othrys, runs almost due

east and attains at some points a height of

from 7,000 to 8,000 feet, while the southern

one runs rather in a southeasterly direction,

attaining at one point a height of 8,240 feet and terminates at the celebrated pass of Ther-

mopylse. The Cambunian Mountains on the

north, the range of Pindus on the west and

Othrys on the south, enclose the large and

fertile vale of Thessaly, forming the basin of the Peneus (now Salambria), and the ranges of

Othrys and QEta enclose the smaller basin of

the Sperchius (Hellada). Another range of

mountains branches off from Mount CEta and

runs still more to the south. This is the cele¬

brated Parnassus, which, at its highest point, ex¬

ceeds 3,000 feet. The peaks of Cithaeron,

Parnes, Pentelicus and Hymettus lie in the

same direction, but are more distinguished for

their classic celebrity than for their height. The range in which these peaks are found is con¬

tinued to the southeast point of continental

Greece, and the islands of Ceos, Cythnos, Seriphos and Siphnos (now Kea, Thermia, Serpho

and Siphanto) may be regarded as continua¬

tions of it. This range on the south and that of CEta on the north enclose the basin of the Ce-phissus, with Lake Copais (now Topolia). An¬

other chain of mountains strikes southwestward

from the central range of continental Greece

under the names of Corax and Taphiassus.

The chief rivers on the west side of the Pindus chain are the Arachthus (now Arta) and the

Achelous (now Aspropotamo).

The chief feature in the mountain system of

the Peloponnesus is a range or series of ranges forming a circle round the valley of Arcadia in the interior, having a number of branches pro¬

ceeding outward from it in different directions, dividing the rest of the Peloponnesus into sev¬

eral other valleys. The loftiest part of the

montainous circle round Arcadia is that lying

to the north, with the peak of Cyllene (Ziria), 7,789 feet high, at its eastern extremity, and Erymanthus (Olonos), 7,297 feet high, at its

western. The southern part consists rather of

a series of heights than a chain of mountains.

The highest range which branches off from the

circle around Arcadia, and, indeed, the highest range in the Peloponnesus, is Mount Taygetus

(Pentedactylon), which strikes southward, sep¬

arating the ancient divisions of Messenia and

Laconia and terminating in the promontory of

Taenarum (now Cape Matapan). The other

chains are of no importance. The only rivers

in the Peloponnesus of any consequence are the Eurotas (Iri), draining Laconia on the south¬

east; the Pamisus (Pirnatza), draining Messe¬

nia on the southwest; the Alpheus (Ruphia),

draining Arcadia and Elis ; and the Peneus

(Gastuni) draining Elis on the west.

The rock most largely developed in the

mountains of Greece is limestone, which often

assumes the form of the finest marble. Granite and gneiss are found only in the north, in the eastern ramifications of the Pindus. Tertiary

formations prevail in the northeast of the Pelo¬

ponnesus ; and in the northwest, along the

shores of Elis, are considerable tracts of al¬

luvium. Volcanic rocks are not seen on the

mainland, but form considerable masses in some

of the islands. Attica was rich in silver and marble. The quarries of

Pentelicus and the

mines of Laureium were famous. Gold and

serpentine were found in Siphnos ; there was

tin in Ceos and copper near Chalcis in Euboea.

In many of the islands iron abounded.

Divisions. — On the northwest of the main¬

land of Greece was the mountainous region of

Epirus, which was never more than half Greek;

and to the east of that district, separated from it by a chain of Pindus, lay Thessaly, a re¬

gion of fertile plains. To the south, lay a

series of small independent states. Reckoned

from west to east, there were Acarnania, .TEtolia, Doris and Locris, Phocis with Mount Parnas¬

sus, the seat of the Muses and the sacred Del¬

phi, regarded by the Greeks as the navel of the earth; Boeotia, with Helicon, another mountain

sacred to the Muses, and with the cities of

Thebes and Platsea; Megaris, containing the

city of Megara ; and Attica with its capital

Athens, Piraeus, the port of Athens, and the

city of Eleusis, the seat of the mysterious wor¬

ship of Demeter. In the middle of the Pelopon¬

nesus was Arcadia, with the towns of Mantinea, Tegea and

Megalopolis, the last founded

by Epaminondas. In the north lay Sicyon and

Corinth, the latter situated on the isthmus con¬

necting the Peloponnesus with the rest of

Greece; and to the west of that Achaia. To the southwest of Achaia lay the rich province of

Elis, with the plain and sacred grove of Olym¬

pia, celebrated on account of the Olympic games, which were held there every fourth year. To

the south of Elis in the southwest corner of the Peloponnesus, lay the province of Messenia,

with the famous stronghold of Ithome, ((one of the horns of the Peloponnesus,® the fort of

Pylos, and later the capital town of Messene,

founded by Epaminondas 369. Separated from

Messenia by the range of Taygetus was the

province of Laconia, occupying the southeast

corner of the Peloponnesus and containing the

renowned city of Spqrta, long the rival and

ultimately the conqueror of Athens. Lastly, to

the north of Laconia, the east of Arcadia and the south of Sicyon, lay the province of Argolis, with the capital Argos, and the cities of Mycenae and Tiryns, all remarkable for the re¬

mains of gigantic works of masonry, commonly

known as Cyclopean works.

The islands of Greece are partly scattered

over the ZEgean Sea and partly contained in

the Ionian Sea on the southwest of the main¬

land. The Greeks applied the names Cyclades

and Sporades to two groups of islands in the

2Egean, the former name (from kuklos, a cir¬

cle) to those which they believed to form a

circle round the sacred island of Delos, and the latter (from a Greek root meaning scattered,

sporadic) to those which were scattered over

various parts of the sea. Some islands were

sometimes said to be in the one group and some¬

times in the other, and several were sometimes excluded from both. The following, however,

are the principal of those which may most prop¬

erly be considered as belonging to the Cyclades ; Andros, Tenos, Myconos, Naxos (now Naxia),

Paros (celebrated for its marble), Amorgos,

Anaphe, Thera (now Santorin), Pholegandros

(now Polykandro), Sicinos, Ios (now Nio),

Melos, Syros and Gyaros (Jura), Siphnos,

Seriphos, Cythnos and Ceos. The name Spo¬

rades may be applied to all the other islands in the TEgean. The Sporades will thus include

the following islands on the northeast of the

mainland of Greece: Euboea (Negropont), the

largest of all the Greek islands, separated from the continent only by the narrow strait of Euripus and containing the ports of Chalcis and

Eretria; Sciathos, Scopelos, Halonesus (Kili—
dromi), Eudemia (Sarakino) and Scyros; the
following off the coasts of Thrace and Asia

Minor : Lemnos, Thasos, Imbros and Samo—
thrace (in very remote times the seats of a
mysterious religous worship) Lesbos (with the
nourishing and luxurious town of Mitylene),
Chios, Samos, Cos, *etc.* ; and the following in the Saronic Gulf, or between it and the Argolic Gulf: Salamis (now Salamis or Koluri),
Higina, Calauria (Poros), Hydrea (Hydra)
and Pityussa (Spetsse). The islands in the
Ionian Sea are Corcyra (Corfu), celebrated in
the most ancient times for its wealth and cul¬
ture, and at a later period colonized by Cor¬
inthians ; Paxos, Leucas or Leucadia (Santa
Maura), at one time connected with the main¬
land; the “rocky® Ithaca (now vulgarly called
Ithaki), the home of Ulysses; Cephallenia
(Cephalonia), Zacynthus (Zante) and Cythera
(Cerigo), one of the seats of the worship of

the goddess Aphrodite.

Soil, Productions, *Etc.* — Greece was in an¬

cient times more fertile than it is now, which is accounted for by the fact that the forests have been to a large extent cleared away, the springs thus dried up, and the soil deprived of mois¬

ture. The most fertile districts were Thessaly, Boeotia and some parts of the Peloponnesus;

the least fertile Attica and Arcadia. The prin¬

cipal objects of cultivation were the vine and the olive, but flax and the commoner cereals

were also cultivated more or less. Among the

domestic animals were horses, . asses, ‘mules,

oxen, swine, sheep, goats and dogs. Swine

were very numerous everywhere and mules

were much used in the Peloponnesus ; but there were comparatively few horses, as the moun¬

tainous character of the country was not con¬

ducive to their being reared; the best horses of Greece were reared in Thessaly. Bears, boars

and wolves are mentioned among the wild ani¬

mals anciently found in Greece, and it may per¬

haps be inferred from the legend of the Nemean lion that even lions at one time existed in this country. Herodotus, indeed, expressly states

that lions were found between the Nestus in

Thrace and the Achelous in Acarnania.

Climate. — The climate of ancient Greece is

highly commended by ancient Greek writers, as

by Herodotus, Hippocrates and Aristotle, on

which account it seems fair to infer that the malaria which now infests the air in summer

did not then prevail to the same extent, a cir¬

cumstance that is easily accounted for by the

fact that in those times the country was more thickly populated and better cultivated. In re¬

spect of temperature the same differences re¬

sulting from the inequalities of the surface

must have existed then as exist now, long and severe winters being experienced in the high¬

lands of the interior, while the lowlands, ex¬

posed to the sea, enjoyed warm and genial

weather all the year round.

History. — Greece has never at any period

formed a single and independent state. . As

long as it remained independent it was divided into a number of separate states, and during

the only period when it was administered as a single territory it was subject to a foreign

power. A general sketch of the history of an¬

cient Greece must therefore touch only upon

those leading events which belong to the com¬

mon history of the Greek states, or which at

least affected the Greek people as a whole, even although they may

belong more especially to the history of an individual state.

The earliest inhabitants of Greece of whom

anything is known are called bv Greek writers

Pelasgians. The ethnological affinities of these have often been discussed, but the most recent authorities believe that they were an Indo-Germanic or Aryan people. They occupied

Greece before the influx of Ionians, ZEolians

and Dorians. They seem to have been agricul¬

tural in pursuits, dwelt along the fertile valleys, built strong cities, walls of the socalled Cyclo¬

pean masonry, and among their most famous

seats were Dodona in Epirus, Thessaly, Orchomenos in Boeotia, Mycenae in Argoiis, Sicyon,

etc.

In religion they abhorred both polytheism

and anthropomorphism. Their name afterward

became changed to Hellenes and under this

appellation they amalgamated with the Ionians,

the Achaeans, the ZEolians and the Dorians.

The early relations of Greece with the East are perhaps reflected in the legends of Oriental

colonists — Cadmus, Pelops, Cecrops, *etc.* — who settled in Greece in very remote times. The

reality of an early connection between Greece

and the East is established by the fact that the Greeks derived the greater part of their alpha¬

bet from the Phoenicians.

The Hellenes, or Greeks properly so called,

entering the country probably from the north¬

west, subdued and partly displaced the Pelas¬

gians. They are usually represented as having

been divided into four chief tribes — the

ZEolians, occupying the northern parts of Greece (Thessaly, Boeotia, etc.) ; the Dorians, occupying originally only the small region in the neighbor¬

hood of Mount Gita ; the Achaeans, occupying

the greater part of the Peloponnesus; and the

Ionians, occupying the northern strip of the

Peloponnesus and Attica. The middle part of

the Peloponnesus was still mainly inhabited by

a Pelasgic population. The warlike and enter¬

prising character of these Hellenic invaders is evidenced by the poetic legends of their achieve¬

ments in the heroic ages, such as the tale of the Trojan War, of Theseus, of Jason and the Argo¬

nauts, *etc.* From all these we may gather at

least that the Hellenes early distinguished

themselves by building towns, making long voy¬

ages, planting distant settlements and carrying

on foreign wars. As in later times, they were divided into numerous states, each consisting of a single city with the surrounding territory.

These states were governed by kings who were

the heads of the supreme families and who

traced their descent from Zeus. By the side of the kings stood the heads of the other leading families of the state, who in Homer are also

called kings and likewise boasted of a descent from Zeus. In the public market-place (agora),

where all the affairs of the state were trans¬

acted, these subordinate kings gave their opin¬

ions on every subject of deliberation and ad¬

vised the supreme ruler as to the course he

should pursue, but beyond that they had no au¬

thority. Their influence, however, was very

great, especially where the rightful head of the state did not possess the abilities of a ruler.

The distribution of the Hellenic tribes

which we have just indicated is not that which continued throughout the main period of Greek

history. It was entirely altered bv an event

called the Dorian migration, or sometimes the

return of the Heracleids, which is placed by

Thucydides about 80 years after the fall of

Troy and thus about the year 1104 B.C., according to the ordinary system of chronology. Before the great migration several smaller ones had taken

place. One tribe, finding its territory too cir¬

cumscribed, would move to another, expelling

the inhabitants already settled there, who thus found themselves compelled to remove to some

other district, where they treated the original inhabitants in the same way that they had been treated themselves. In this way there arose

a general disturbance, till at last the hardy

Dorian inhabitants of the mountainous region

about Mount CEta began a migration on a

greater scale than had hitherto been attempted, and thus brought about a series of changes

which resulted in an entirely new settlement

of the Greek territory. They first conquered a large part of northern Greece and then entered and subdued the greater part of the Pelopon¬

nesus, driving out or subjugating the Achaeans, as the Achaeans had driven out or subjugated

the Pelasgians. The Dorians are also said to

have invaded Attica, where, however, they were

baffled, according to the legend, by the self—

devotion of Codrus, the king of that territory.

It is said that an oracle had pronounced that in this war whichever side lost its king would be victorious, on which account strict orders were given to the Dorian soldiers to spare the life of the king of enemy. But Codrus disguised

himself in the dress of a common herdsman,

and going into the enemy's camp provoked a

quarrel in which he met his death, on learning which the Dorians despaired of success and

withdrew. In the legend in which this series of events has come down to us the Dorians are

represented as having entered the Peloponnesus

under Temenus, Cresphontes and Aristode—

mus, three descendants of Heracles, who

had come to recover the territory of which their ancestors had been unjustly deprived by Eurystheus. Hence the name of the Return of Heracleids, sometimes given to this event.

The Achaean inhabitants of the Peloponnesus

whom the Dorians found there had a three¬

fold fate. One part of them sought for new

homes and turned their steps toward the part

of the Peloponnesus occupied by the Ionians,

whom they expelled, keeping for themselves

their territory, which hence received the name

of Achaia. Another part voluntarily submitted

to the invaders, who imposed tribute upon them and excluded them from all share in the gov¬

ernment; while a third part resisted to the last and were in the end reduced to the condition of slavery. In Laconia the former received the

name Periceci (dwellers round) and the latter

were called Helots.

The Ionians who were driven out of the

Peloponnesus found at first a refuge among

their kindred in Attica, but when this district did not suffice for all the inhabitants, old and new, large numbers of them left it and founded Ionic colonies on several of the islands of the Aigean Sea and on the middle part of the coast of Asia Minor, where they built 12 cities, which formed an Ionic Confederacy. The principal of

these were Ephesus and Miletus. About the

same time as the Ionians are said to have col¬

onized the middle part of the seaboard of Asia Minor, another body of Greeks, proceeding

from Thessaly and Boeotia, are said to have

founded the ˆEolian colonies on some of the

northern island of the ˆEgean, and on the north¬

ern part of the western coast of Asia Minor.

The ˆolic colonies of Asia Minor also formed

a confederacy of 12 cities, but the number was afterward reduced to 11 by the accession of

Smyrna to the Ionic Confederacy. While

Ionians and ˆEolians thus colonized the middle

and northern islands of the .Tfgean and coasts of Asia, the southern islands and the southern part of the west coast of Asia Minor were in like manner colonized by the Dorian settlers.

The six Doric towns in Asia Minor, along with the island of Rhodes, formed a confederacy

similar to the Ionic and ˆEiolic ones.

In considering the subject of Greek coloniza¬

tion we are brought face to face with the fact that in settling in foreign lands, the Greek races kept distinct from each other. One of the

great keys to an understanding of Greek his¬

tory is a right understanding of the relation

between the two great races of the Greek name, the Dorians and Ionians. The Dorians were

inland mountaineers, the Ionians were of the

seacoast. The former, as represented in the

institutions of Sparta, were a practical and con¬

servative race, living a simple and unimagi¬

native life. Their poetry was the public ode,

accompanied with the dance in the market-place, often carried on under arms. The Ionians were

versatile, imaginative, impressible. They were

devoted to the maritime life, were travelers and fond of welcoming strangers to their cities.

They were traders. Moreover, they were keenly

intellectual and reached the summit of excel¬

lence in art, literature and philosophy. Their

poetry was the epic narrative; and they in¬

vented the drama, in which the Ionian tale of personal adventure was united with the Doric

ode. These two contrasted races between them

swayed the fate of Greece. Their relations were complicated by the different colonies which they established at different points on the Medi¬

terranean and Euxine coasts. In the course of

time new Greek settlements were made on the

coasts of the Hellespont, the Propontis (Sea of Marmora), and the Black Sea by both Dorians

and Ionians. The most important of these were

Byzantium (Constantinople) (Dorian), Sinope

(Ionian), Cerasus (Ionian) and Trapezus

(Trebizonde) (Ionian). Further, there were

flourishing Greek colonies on the coasts of

Thrace and Macedonia; for example, Abdera,

Amphipolis, Olynthus, Potidsea, etc., which were all Ionian ; and the Greek colonies in Lower

Italy were so numerous that the inhabitants of the interior spoke Greek, and the whole region received the name of Greater Greece. The most

famous of the Greek colonies in this quarter

were Tarentum, Sybaris, Croton, Cumae and

Naples. The island of Sicily also came to a

great extent into the hands of the Greeks, who founded on it or enlarged many towns. By far

the largest, most powerful and most highly

cultured of the Greek colonies was the Dorian

colony of Syracuse, founded in the 8th century B.c. On the north coast of Africa the Dorian

colony of Cyrene rivaled in wealth and com¬

merce the city of Carthage; and on the south

coast of Gaul Ionian Massilia (Marseilles)

presented a model of civilized government to the inhabitants of the surrounding districts. All these towns kept up a commerce in the products of the land in.which they were planted. They exerted a most important and beneficent influence on the manners of the neighboring

inhabitants. They preserved the custmns and institutions of their mother city, which they regarded with hhal reverence; but otherwise they were perfectly free and independent.

Although ancient Greece never formed a single state, the various Greek tribes always looked upon themselves as one people, and classed all other nations under the eeneral name of Barbaroi (foreigners). There were four chief bonds of union between the Greek tribes. First and chiefly they had a common language, which, though it had considerable

dialectic peculiarities when spoken by different tribes, was yet understood throughout every

part of Greece and in all the Greek colonies.

Secondly, they had common religious ideas and

institutions, and especially in the oracle of

Delphi (q.v.) they had a common religious

sanctuary, which was held by all the states in equal reverence, and was resorted to from all

parts of Greece, alike by communities and in¬

dividuals, for advice in circumstances of diffi¬

culty, and not unfrequently for indications as to the future. Thirdly, there was a general assem¬

bly of the Greeks called the Amphictyonic

League, in which the whole nation was repre¬

sented by tribes (not by states), and the chief functions of which were to guard the interests of the sanctuary of Delphi, and to see that the wars between the separate states of Greece were not carried on in too merciless a manner. When any of the ordinances of the league were vio¬

lated it was its duty to see that the violators were punished, and to entrust the. infliction of the punishment to some one of its members.

The fourth bond of union between the tribes

of Greece consisted in the four great national festivals or games, the Olympian, Isthmian,

Nemean and Pythian (qq.v.) which were held

at different intervals in four different parts of Greece, in which all Greeks, and none but

Greeks, were allowed to participate, and which

slaves were not allowed even to witness. At

these games contests took place in foot-racing

and chariot-racing, boxing, wrestling and

throwing with the quoit (or discus), and prizes were also awarded for works of art, poems,

dramas, histories, *etc.* The prize was a simple wreath of olive or pine branches, or of parsley; but such a prize brought glory not only on the winner himself, but on his whole family and

kindred, and even on the state to which he

belonged. The victor was welcomed home by a

triumphal procession, and his victory was cele¬

brated in odes sung on the occasion, and some¬

times composed by such poets as Simonides and

Pindar. The Olympic games were the most

celebrated of these festivals. They were held

in the summer once every four years at Olym¬

pia, in Elis ; the month in which they were held was considered as sacred, and during it no acts of hostility were allowed to take place between any of the Greek states. Originally, the only

contest was a foot-race, and so high was the

honor of a victory in this race esteemed, that from that of Coroebus in 776 b.c. the whole of Greece reckoned the time. The year in which

any event happened was styled the first, second, third or fourth year of a certain Olympiad, the name given to the interval elapsing between

each celebration.

The various small states of Greece may be

divided, according to the form of their con¬

stitution, into the two great classes of aristo¬

cratic and democratic. Sparta or Lacedaemon,

the chief town of Laconia and of the Dorians, was the leading aristocratic state; and Athens, the capital of Attica and the chief town of the Ionians, was the leading democratic state; and

as a rule all the Doric states, and subsequently all those under the influence of Sparta, re¬

sembled that city in their constitution ; and all the Ionic states, and those under the influence of Athens, resembled it. These two races are

the only ones that come into prominence during the earlier part of Greek history subsequent to the Doric migration. Sparta is said to have

derived its form of government, and all its in¬

stitutions, near the close of the 9th century b.c., from Lycurgus, who made minute regulations

as to the course of education and the mode of life among the Spartans. He had but one ob¬

ject, that of training the Spartan youth for

war, and developing a hardy and warlike spirit among the people. The immediate results of

this training were seen in the conquests which the Spartans effected over the surrounding

states, especially over the Messenians in the 8th and 7th centuries b.c. Many of the vanquished

Messenians left their native country and

founded the city of Messana in Sicily. Those

who remained were reduced to the condition

of Helots (q.v.).

The constitution of Athens was not orig¬

inally democratical, but monarchical. After¬

ward it became aristocratic, and first received a more or less democratic constitution from Solon at the beginning of the 6th century b.c. This was followed about 50 years later by a despotic monarchy under the celebrated “tyrant® Pisistratus, and his sons, Hippias and Hipparchus,

the last survivor of whom, Hippias, reigned in Athens till 510 B. c. Hipparchus had been

assassinated four years before; and the last

four years of the reign of Hippias were dis¬

tinguished by violence and cruelty. His enemies drove him from Athens, after which the re¬

public was restored in a more purely democratic form than at first.

Hippias found refuge at the court of the

king of Persia, with whose aid he hoped to be able to return and rule once more in Athens.

The Persian monarchy had been established

about 30 or 40 years before by Cyrus the Great, and its sway extended not only over the whole of Persia, Media and Babylonia, but also over

Egypt and Asia Minor. With the rest of this

last-mentioned territory the Greek colonies on

the coast had been brought under the yoke of

this empire, and although they chafed under the foreign dominion, they were kept in subjection

by the native princes or tyrants whom the

Persian monarch imposed on them as governors.

One of the most powerful of these governors

was Histiseus of Miletus, whose behavior had

excited the distrust of Darius, the Persian king, for the latter, on the pretence of rewarding him for a signal service invited him to his court and kept him at Susa in practical captivity. Histiseus secretly incited his relative, Aristagoras of Miletus, to get up a rising among the Greek

colonies of Asia Minor, in the hope that he

might, during the disturbance, find an oppor¬

tunity of returning to his home. The endeavors of Aristagoras were successful ; all the Greek

towns on the coast were soon in arms, and

assistance was asked from the mother country.

Only Athens, which feared lest Darius should

re-establish Histiaeus, and the small Ionian town of Eretria in Euboea, furnished any aid. The

Greeks, in h9 6 b.c., conquered and burned tne town of Sardis, the capital of Asia Minor,

whereupon the rebellion extended over the

whole of Ionia. But the superior forces of the enemy, and the want of union among the in¬

surgents, led in the following year (495) to the loss of a naval battle, and soon after to the destruction of Miletus, the inhabitants of which were partly put to death and partly, made

captives.

Darius now determined to avenge himself

on the Athenians and Eretrians for the part

that they had taken in the rising. In 492 he sent out an expedition against them under his

son-in-law Mardonius, but the Persian fleet was wrecked off the promontory of Mount Athos.

Darius had at the same time despatched heralds to the islands and states of Greece to demand earth and water in token of submission. Most

of the islands and many of the smaller states yielded, but Athens and Sparta indignantly re¬

fused the demand, and even went the length of putting the heralds to death. Enraged at this

insult Darius equipped a second fleet and placed it under the command of Datis and Arta-phernes. But this met with no better fate than the first. The Persians landed on the island

of Euboea, and after destroying Eretria, crossed the Euripus into Attica; but here they were met (490 b.c.) on the plain of Marathon by 10,000

Athenians and 1,000 Plataeans, under Miltiades,

and, although 10 times as numerous, were totally defeated and pursued to their ships. This battle put an end to the second Persian expedition,

but Darius at once began to make preparations

for a third expedition, and this time on a far greater scale than before. In the midst of

these preparations he died, but his son Xerxes, collected an army of 1,700,000 men and a fleet of 1,200 large ships besides a number of smaller ones, crossed the Hellespont in 481 by means of two bridges of boats, and led his army through Thrace, Macedonia and Thessaly,

while his fleet followed the line of coast. Thessaly had sur¬

rendered without a stroke, and Xerxes at once

pursued his march in the direction of Phocis.

But before he could enter this territory he had to make his way through the narrow and diffi¬

cult pass of Thermopylae, and this had previ¬

ously been occupied by 300 Spartans under

Leonidas, along with several thousand allies.

Here Xerxes in vain attempted to force a

passage against a mere handful of Greeks ;

thousands of his troops were slain ; and it was only after Ephialtes had betrayed to the Per¬

sians a footpath which led over the heights of (Eta to the rear of the defenders of the pass, that the Persian king effected his purpose.

Leonidas allowed all the allies to depart while he himself and his 300 Spartans, along with 700

Thespians who voluntarily remained with them,

held out until they were completely annihilated (480 b.c.) .

The way through Phocis and Boeotia was

now open to the Persians, who advanced into

Attica, and laid the city of Athens in ruins, putting to death the small garrison. The women and children belonging to Athens had by this

time, on the advice of Themistodes, been re¬

moved to Salamis, ˆEgina, and Troezen, while

all the men capable of bearing arms served in the fleet. It was to Themistocles that the de¬

liverance of Greece was now chiefly due. The

united tleet of the Greeks had already con¬

tended with success against that of the Persians off the promontory of Artemisium, in Euboea,

and had then saded into the Saronic Gulf,

whither it was followed by the enemy. In this confined arm of the sea, where there was no

room for the manoeuvring of the numerous

ships of the enemy, a decisive battle between

the two fleets took place with the result that Themistocles had anticipated, the total defeat

of the Persians. This battle is known as the

battle of Salamis, from the name of an island in the Saronic Gulf, and was fought in the

same year as Thermopylae (480 b.c.) Xerxes

himself had been an eyewitness of the battle

and at once began a speedy retreat with his land army through Thessaly, Macedonia and Thrace,

a retreat which Themistocles had hastened by

causing the false report to reach Xerxes, that it was the intention of the Greeks to destroy the bridges of boats over the Hellespont.

Xerxes left behind him only 300,000 men in

Thessaly. In the spring of the following year

(479) these advanced into Attica and com¬

pelled the citizens once more to seek refuge in Salamis ; but in the battle of Plataea the Greeks, under the command of Pausanias, obtained so

complete a victory that only 40,000 of the Per¬

sians reached the Hellespont. On the same day

the remnant of the Persian fleet was attacked

and defeated by the Greeks off Mount Mycale,

near Samos on the Ionian coast of Asia.

By the brilliant part which the Athenians

under Themistocles had played against the Per¬

sians, the influence of Athens had greatly in¬

creased throughout Greece; and this was

further strengthened by the fact that the war

against Persia, which still continued, was chiefly conducted by sea, where Athens was much more

powerful than Sparta. From this date then

begins the period of the leadership or hegemony of Athens in Greece, which continued to the

close of the Peloponnesian war, 404 b.c. Athens now exerted her influence to form a confed¬

eracy including the Greek islands and maritime

towns as well as Athens herself, the object of Which was to provide for the continuance of

the war by the payment into a common treasury at Delos of a fixed sum of money, and by

furnishing ships for the same purpose. In this confederacy Athens of course had the lead, and gradually was able to render tributary many of the islands and smaller maritime states. In 469

b.c. the victories won by the Athenians over the Persians was crowned by the double victory of

Cimon, the son of Miltiades, over the fleet and army of the Persians on the river Eurymedon,

in the south of Asia Minor ; and this victory was followed by the Peace of Cimon, which

secured the freedom and independence of all

Greek towns and islands. Shortly after fol¬

lowed the brilliant administration of Pericles,

during which Athens reached the height of her

political grandeur, while at the same time she flourished in trade, in arts, in science and in literature.

The position of Athens, however, soon raised

up a number of enemies. Sparta regarded her

prosperity with jealousy; and the arrogance of

Athens had produced a pretty general feeling

of indignation and hatred. Two hostile con¬

federacies were formed in Greece. At the head

of one of these confederacies was the city of GREECE

Athens, which was joined by all the Ionian

states of Greece, and more or less supported

by the democratic party in every state. At the head of the other confederacy stood Sparta,

which was similarly joined by all the Dorian

states, and supported by the aristocratic party everywhere. At last in 431 war was declared

by Sparta on the complaint of Corinth that

Athens had furnished assistance to the island

of Corcyra in its war against the mother city; and on that of Megara, that the Megarean

ships and merchandise were excluded from all

the ports and markets of Attica.

In the first part of the Peloponnesian War

the Spartans, had considerable successes, while

a great calamity befell the Athenians, who had collected all the inhabitants of the country dis¬

tricts of Attica within the walls of the city; and in consequence a pestilence broke out which

carried off thousands of the inhabitants, and

among them Pericles himself. From this blow,

however, the city soon recovered, and in 425 the early successes of the Spartans in Attica were compensated by the capture of Pylos in Messenia by the Athenian general Demosthenes,

who at the same time succeeded in shutting up 400 Spartans in the small island of Sphacteria, opposite Pylos, where they were ultimately

starved to surrender. The person to whom

the surrender was made was the demagogue

Cleon, who, in consequence of his military suc¬

cesses, obtained the command of an army which

was sent to operate against the Spartan general Brasidas in Thrace. But in 422 he was de¬

feated by Brasidas before the town of Amphipolis, and himself slain, after which the op¬

posite party in Athens got the upper hand, and concluded the peace with Sparta known as the

Peace of Nicias (421 b.c.).

The effect of this peace was to divide the

Spartans and the Corinthians, who had hitherto

been allies. The latter united themselves with

Argos, Elis and some of the Arcadian towns to wrest from Sparta the hegemony of the Pelo¬

ponnesus. In this design they were supported

by Alcibiades, a nephew of Pericles, a man of handsome figure and great personal accomplish¬

ments. The war which was now waged between

Sparta and Corinth with her allies resulted,

however, in favor of the former, whose arms

were victorious at the battle of Mantinea in

418.

Soon after this the Athenians resumed hos¬

tilities, fitting out in 415 b.c. a magnificent army and fleet, under the command of Alcibiades,

Nicias and Lamachus, for the reduction of the

Dorian city of Syracuse in Sicily. This under¬

taking, which renewed the race hatred between

Sparta and Athens, was a complete failure.

Alcibiades was accused in his absence of sev¬

eral offenses against religion and the constitu¬

tion, and deprived of his command. Thirsting

for revenge, he betook himself to Sparta, and

exhorted the city to renew the war with Athens.

By his advice one Spartan army was despatched

to Attica, where it took up such a position as prevented the Athenians from obtaining sup¬

plies from Euboea, while another was sent under Gylippus to assist their kindred in Sicily. These steps were ruinous to Athens. Lamachus fell

in the siege of Syracuse, and the Athenian fleet was totally destroyed. The reinforcements sent

out under Nicias and Demosthenes were de¬

feated (413 b.c.) by the combined Spartan and

Syracusan armies. All the Athenians who

escaped death were made captives and com¬

pelled to work as slaves in the quarries of

Sicily, although it may be mentioned as an inter¬

esting fact that many of these captives ob¬

tained their liberty by being able to recite frag¬

ments of Euripides.

After this disaster many of the allies of

Athens joined the Spartans, who now pressed

on the war with greater energy. The Atheni¬

ans recalled Alcibiades, who returned in 407,

and was received by his fellow-citizens with

enthusiasm as their expected deliverer. A few

months later he was again an exile, having been deprived of the command because one of his

subordinates had lost a naval battle fought off Ephesus in his absence. During the rest of the war the Athenians had only one success, the

naval victory won off the islands of Arginusae over the Spartan Callicratidas in 406. In the

following year (405) the Spartans made them¬

selves masters of the whole of the Athenian

fleet except nine vessels, while the majority of the crews were on shore at ˆEgospotamos on

the Hellespont. The Spartans now easily sub¬

dued the islands and states that still maintained their allegiance to the Athenians, and laid seige to Athens itself. In 404 b.c. the war was ter¬

minated by the Athenians' surrender. Sparta

immediately imposed upon Athens an aristo¬

cratic form of government, placing the supreme

power in the hands of the Thirty Tyrants.

Only a year later, however, (403), Thrasybulus

was able to overthrow this hated rule and re¬

established the democracy.

The fall of Athens resulted in Sparta's lead¬

ership or hegemony in Greece, which lasted till the battle of Leuctra,

371 b.c. The Spartans

now abused their power and speedily roused the hatred and jealousy of the other states. The

Greek states which had up to this time been,

and still continued to be, leaders, had now lost almost entirely their manliness and independent

spirit, and no longer maintained the hereditary war against Persia, but each sought the aid of that power for its own purpose. The Spar¬

tans did indeed send an expedition into Asia

Minor, but it came to nothing; and the states of Greece, the Spartans included, at last, in 387, agreed to the disgraceful Peace of Antalcidas,

by which the whole of the west coast of Asia Minor was ceded to the Persians, and the Greek colonies there thus deprived of the independence that had been secured to them by the Peace of Cimon.

An act of violence committed by a Spartan

general in Thebes in 380 in the end led to the complete downfall of that city. The aristocratic party in Thebes, when the Spartan army hap¬

pened to be in the neighborhood, prevailed upon the general to give his assistance in overthrow¬

ing their opponents and establishing an aristo¬

cratic government. A number of the less prom¬

inent members of the defeated party, among

them Pelopidas, made their escape to Athens,

where they got the support and assistance of the democratic party there. They soon returned in

disguise to their own city, surprised and mur¬

dered the leaders of the aristocratic party, ex¬

pelled the Spartan garrison, and again set up

a democratic government. These circumstances

give a good idea of the fury of party strife which was then general in the Greek cities.

The immediate result of this counter-revolution

in Thebes was a war with Sparta, the heroes

of which were Epaminondas and Pelopidas,

who were then at the head of affairs in Thebes.

In the course of the war the Spartans invaded Bceotia, but were so completely defeated at

Leuctra in 371 b.c. that they never fully re¬

covered from the blow.

With this victory Thebes won hegemony in

Greece, which she maintained during the life¬

time of Epaminondas, whose policy it was to

keep down the power of Sparta by strengthen¬

ing the surrounding states. From him the

Messenians recovered their freedom, and by his

advice the cities of Arcadia formed themselves

into a confederacy, and built the city of Mega¬

lopolis. This policy was at first successful, but in a few years the confederacy began itself to strive after the supremacy, and joined them¬

selves with this object to the Spartans. Epa¬

minondas then invaded the Peloponnesus, but

although the Thebans totally defeated the Spar¬

tans and Arcadians in the battle of Mantinea

(362), yet the victory being won with the

loss of their great general, the Thebans

could no longer boast with justice of su¬

premacy in Greece. Pelopidas had died two

years before.

Two years after the death of Epaminondas,

Philip, the father of Alexander the Great, be¬

came king of Macedonia. He was a man of

great ability as a soldier and a ruler, an ad¬

mirer of the Greek character, and a lover of

Greek art and literature. He perceived, how¬

ever, the weakness of the Greeks, arising from their want of unity, and waited for an oppor¬

tunity of interfering in the affairs of their coun¬

try, with the view of ultimately making him¬

self master of it. An occasion for interference was furnished him by the Sacred War (355-46).

The Phocians having taken possession of some

of the land belonging to the sanctuary of Delphi, the Amphictyonic League condemned them to

pay a fine and restore the land they had taken.

This was refused and the league imposed upon

the Thebans the task of forcing the Phocians

to submit, but in their rocky strongholds the

Phocians were able to resist all the efforts of their assailants, who at last called in the aid of Philip of Macedon. With his help the Phocians

were subdued, they themselves expelled from

the league, and their place given to Philip.

It was not, however, till the Locrian war

(339-38) that Philip acquired a firm hold in

Greece. The Locrians had committed the same

offense as that of the Phocians, and when they likewise refused to pay the fine imposed upon

them by the league, Philip, as one of the mem¬

bers, received the charge of punishing them.

The advance of Philip was at first witnessed

with comparative indifference by the states of

Greece, but when his real designs became ap¬

parent the Athenians, on the advice of Demos¬

thenes, hastily concluded an alliance with the

Thebans, and an army was sent out to oppose

him. The battle of Chaeronea (338) turned out, however, disastrously

for the Greeks, who saw

their whole country laid at the feet of Philip.

But the conqueror treated his new subjects with mildness, wishing to reconcile them to the Mace¬

donian yoke, and to win their cooperation in

his projected invasion of the rotten empire of Persia. He collected a large army, of which

he got himself declared commander-in-chief by

the Amphictyonic League in an assembly held

at Corinth in 337 b.c. ; before he was able to start he was assassinated 336 b.c.

The design of Philip on Persia was taken up

and carried out by his son Alexander the Great, during whose absence Antipater was left behind

as governor of Macedonia and Greece. Soon

after the departure of Alexander, Agis III of

Sparta headed a rising against Antipater. He

was defeated, however, in the battle of Mega¬

lopolis in 330 b.c. and no other attempt was

made by the Greeks to recover their liberty for nearly 100 years. At the close of the wars

which followed the death of Alexander, and

which resulted in the division of his empire,

Greece remained with Macedonia.

The last efforts of the Greeks to recover

their independence proceeded from the Achaeans, who held the northern strip of the Pelo¬

ponnesus. This tribe is frequently mentioned

by Homer as taking a very prominent part in

the Trojan war; but during the historical period of Greece they for the most part kept aloof

from the quarrels of the other states, and did not even furnish assistance in repelling the Per¬

sian invasion. They had taken part, though

reluctantly, in the Peloponnesian war on the

side of Sparta, and had shared in the defeat

of Megalopolis in 330 b.c. In the course of

the first half of the 3d century b.c. several of the Achaean towns expelled the Macedonians,

and revived an ancient confederacy, which was

now known as the Achaean League. About the

middle of this century the league was joined

by the town of Sicyon, the native city of Aratus, who soon after became its leading spirit.

Through his influence it was joined also by

Corinth, and then it began to aim at acquiring the supremacy throughout the Peloponnesus,

and even throughout the whole of Greece, as

well as at delivering Greece from the Mace¬

donian yoke. In following out the first of

these aims Aratus and the league came into

collision with Sparta, which at that time hap¬

pened to be governed in near succession by

two kings, Agis IV (244-240) and Cleomenes

(236-220), who had both something of the old

Lycurgan spirit in them. These, then, naturally looked with jealousy on the efforts of Aratus, and during the reign of Cleomenes a war broke out between Sparta and the Achaean League.

The league was at first worsted, and was only finally successful when Aratus, forgetting the

ultimate end of his efforts in the pursuit of that which he had more immediately in view,

called in the aid of the Macedonians. In the

battle of Sellasia, in 222 b.c., Cleomenes was de¬

feated and compelled to take to flight, and the Macedonians became masters of Sparta. Aratus

died in 213, and his place was taken by Philo-pcemen, <(the last of the Greeks,® who roused

the league once more to vigorous efforts, and

gradually succeeded in making it in some degree independent of Macedonia.

About this time the Romans, who had just

come out victorious from a second war with

Carthage, in which they had had to contend with Hannibal, found an occasion to interfere in the affairs of Greece. Philip V of Macedon had

allied himself during this war with Hannibal,

and, accordingly as soon as the war was con¬

cluded, the Romans sent over Flamininus to

punish him for so doing, and in this war with Philip the Romans were joined by the Achaean

League. Philip was defeated at the battle of

Cynoscephalae in 197 b.c., and was in conse¬

quence obliged to agree to a peace, in which

he recognized the independence of Greece. To

gratify the Greek vanity Flamininus proclaimed

the deliverance of Greece from the Macedon¬

ian yoke at a celebration of the Isthmian games in 196 b.c. ; but the Greeks soon felt that they had only exchanged masters, that they were in

reality, although not in name, as much in sub¬

jection to them as they had ever been to the Macedonians. On this account the ZEtolians,

who had formed a league similar to that of

the Achseans, appealed for assistance against the Romans to Antiochus the Great, king of Syria,

one of the kingdoms which had been formed

out of the empire of Alexander. The appeal

was listened to ; but the help afforded was

useless, for Antiochus was defeated in a bloody battle at Magnesia in Asia Minor in 190 b.c.

The ZEtolians were compelled to pay a money

indemnity, and to sacrifice some of their art

treasures.

By this time the Achaean League was un¬

questionably supreme over all other powers

within Greece, having been joined by all the

states of the Peloponnesus. But the league it¬

self was in reality subject to Rome, the sen¬

ate of which assumed the right of regulating

its proceedings ; and on one occasion, in 168

b.c., on the conclusion of a war waged by the Romans against Macedonia, the former carried

off into Italy 1,000 of the noblest Achaeans, on the pretext that they had furnished assistance

to the Macedonians. Such was the condition

of affairs until 147 B.C., when the league openly resisted a demand made by the Roman senate,

that Sparta, Corinth, Argos, and other cities,

should be separated from it, in consequence

of which a war ensued, which was concluded

in 146 b.c. by the capture of Corinth by the consul Mummius.

The independence of Greece was virtually

gone with the fall of Corinth. From this date the prosperity of her cities rapidly declined,

and the last sparks of the ancient Greek pa¬

triotism and love of independence became extin¬

guished. The various cities still retained, how¬

ever, something of the qualities for which they had been remarkable at the height of their

glory. Athens was still one of the centres of culture, and the cradle of all kinds of new

speculations. Many Athenians left their na¬

tive city and made a livelihood, although they gained little esteem, among the Romans, as

artists and scholars, actors and dancers, poets and wits. The citizens of Sparta continued to

gratify their thirst for warfare as well as their covetousness by serving as mercenaries in for¬

eign armies. Corinth was still the home of

luxury and vice.

From the date above mentioned Greece re¬

mained attached to the Roman empire. On the

division of the Roman empire it fell of course to the eastern or Byzantine half. From 1204 to 1261 it formed a part of the Latin Empire of the East, and was divided into a number of feu¬

dal principalities. In the latter year it was re¬

annexed to the Byzantine empire (q.v.) with

which it remained till it was conquered by the Turks between 1460 and 1473. In 1699 the

Morea was ceded to the Venetians, but was

recovered by the Turks in 1715. (For the his¬

tory of the present kingdom of Greece, see

Greece, Modern).

Cosmogony. — Nowhere did polytheism de¬

velop itself into a brighter and more beautiful system than among the ancient Greeks. It was

this circumstance no doubt that led the Romans, when they became acquainted with the literature and religion of the Greeks, to blend the Greek system with that of the ancient Italians, iden¬

tifying the Greek deities with those of their

own pantheon. In this way the Greek and

Italian deities came to be confounded.

According to the view of the origin of all

things which in course of time grew up among

the Greeks, the universe was in the beginning a formless mass, Chaos (confusion), from which

arose the ˆbroad-bosomed® Earth (Greek, Gaia ,

Ge; Latin, Tellus), the Lower World (Tar¬

tarus), the darkness of Night (Greek, Nux;

Latin, Nox)K the parent of Light, and the

formative principle of Love (Greek, Eros ;

Latin, Amor), all of which were regarded as

independent divinities. From the womb of the

Earth proceeded the Heaven (Greek Ouranos;

Latin, Coclum) and the Ocean, and afterward

the Titans, creatures of superhuman size and

strength, who formed the first dynasty of gods.

The Titans. were succeeded by a more genial

race of divinities endowed with intellectual as well as physical qualities, who subdued the

Titans, and subsequently the Giants, another

race whom the Earth produced after the loss of her first brood. In this second dynasty of gods the supreme ruler was Zeus (Jupiter or Jup-piter), the son of Kronos (Saturn), who after

the subjugation of the Titans and Giants ruled in Olympus over (<the middle air,® while his

brother Pluto reigned over the dark kingdom

of the lower world (Hades, Tartarus, Orcus),

and Poseidon (Neptune), armed with his tri¬

dent, ruled in the sea. Like reverence was paid to Hera (Juno), the sister and wife of Zeus,

and the queen of Heaven, the virgin Pallas

Athene (Minerva), a goddess armed with hel¬

met and shield, and worshipped as the patroness of all intellectual employments and useful inven¬

tions, to the two children of Leto (Latona),

Apollo, the leader of the Muses (hence called

Musagetes) and the protector of the fine arts, and his sister, the chaste huntress Artemis

(Diana), the goddess of the moon, to the

daughter of Zeus, Aphrodite (Venus), the god¬

dess of love, Ares (Mars), the god of war,

Hermes (Mercury), the herald of the gods, and

others besides. In addition to these there was an innumerable host of inferior deities (Nymphs, Nereids, Tritons, Horai, Sirens, Dryads and

Hamadryads, etc.), who presided over woods

and mountains, fields and meadows, rivers and

lakes, the seasons, *etc.* There was also a race of heroes or demigods (Heracles or Hercules,

Perseus, etc.) tracing their origin from Zeus,

and forming a connecting link between gods

and men, while on the other hand the Satyrs

formed a connecting link between the race of

men and the lower animals. According to a

plausible theory, now less generally held than

formerly, these gods and demigods are nothing

else than the personified objects of nature (the Sky or Upper Air, the Sun, the Ocean, the Air in Motion, etc.), and were originally not con¬

ceived as personified, in the strict sense of the term, that is, as clothed in a human form, but simply as the objects themselves, to which the earliest races everywhere attributed a conscious existence like their own, and that the mytholog-376

ical tales relating to these deities and heroes were in their simplest form the natural expres¬

sion of what human beings in their infancy be¬

lieved to be done and felt by the very things which they saw. Such is the theory of Max

Muller, Mr. Cox, and others.

With regard to the inculcation of religious

beliefs and the practice of religious duties

among the Greeks, the most striking thing to

remember is that they had no separate class ap¬

pointed to perform these functions. The priests were in no sense preachers of doctrines, but

merely hierophants or exhibitors of sacred

things, of rites, symbols and images. They

showed how the gods were to be worshipped,

or more usually how a particular god was to be worshipped ; but it was not their office to teach theological doctrine. See Greek Religion ;

Greek Gods; Greek Mythology.

Bibliography. — Bury, J. B., history of

Greece) (London 1900) ; Busolt, (Griechische

Geschichte) (3 vols., Gotha 1893-1904) ; Beloch, (Griechische Geschichte* (3 vols., Strassburg

1893-1904) ; Cox, <History of Greece* (London

1874) ; id., (The Athenian Empire) (1877) ;

(The Greeks and Persians) (ib., 1876) ; Droy—

sen, (Geschichte des Hellenismus> (Gotha

1878) ; Finlay, G., (History of Greece) (7 vols., Oxford 1877) ; Kaerst, (Geschichte des hel-lenistischen Zeitalters) (Leipzig 1901) ; Meyer, (Geschichte des Altertums) (Vols. II-V, Stutt¬

gart 1893-1902) ; Pohlmann, (Grundriss der

griechischen Geschichte nebst Quellenkunde)

(4th ed., Munich 1914) ; Phillipson, interna¬
tional Law and Custom of Ancient Greece and
Rome) (London 1911) ; Zimmern, (Greek Com¬
monwealth Politics and Economics) (Oxford
1911). For works on Greek Religion and Myth¬
ology see bibliography under those titles.

Charles Leonard-Stuart,

Author of cThe Great God Pan ,* *etc.*

GREECE, Modern (Greek Hellas), a king¬
dom in the southeast of Europe, bounded on
the north by Bulgaria, Serbia and Albania
— the Ionian Sea on the west, the Mediter¬
ranean proper on the south, and the ZEgean
Sea on the east and southeast, the Black Sea
and Turkey on the northeast. The mainland
forms two chief portions, united by the narrow Isthmus of Corinth; a northern, called North¬
ern Greece or Livadia, and a southern penin¬
sula, called the Peloponnesus or Morea. By
far the largest of the immediately adjacent
islands is Euboea, only separated from the
mainland of Livadia by the narrow channel of

Euripo. The other islands form several

groups : The northern Sporades on the north¬

east of Euboea including Skiathos, Skopelos,

Khiliodromia, Pelagonisi, Sarakinon or Peris—

teri, and Skyros ; the western Sporades, chiefly in the Gulf of Egina, or between it and the

Gulf of Nauplia, including Hydra, Spetsje,

Poros, Egina, and Salamis or Koluri ; the

Cyclades ; the Ionian Islands, and the great island of Crete the annexation of which by Greece was recognized by the Powers at the close of 1913.

The capital and largest town is Athens.

Physical Features. — See Greece, Ancient.

Divisions, Area and Population. — The ac¬

quisition of new territories by Greece, obtained as the result of the war with Turkey 1912-13, with Bulgaria 1913, and the European War,

have given the country a total area of 41,933

square miles with an estimated total population (1914) of 4,821,300. The new territory is

16,919 square miles in extent. The Powers, in

accordance with the treaties of London and of

Athens, have decided that Greece shall retain

all those yEgean islands which she occupied

during the war, and Greece is in occupation of all the islands. In November 1914, Greece

occupied North Epirus (see Albania) Pop. about 250,000. After the World War Greece occupied Western Thrace and the greater part of Aidin in Asia Minor. The names or de¬ partments into which Greece is divided, with their populations, are as follows :

Departments.

(Old territory) Population

Attica and Boeotia . 407,063

Phthiotis and Phocis . 174 , 5 74

Acarnania and JE tolia . 188,597

Achaia and Elis . 254,728

Argolis and Corinthia… 153,172

Arcadia . 162,324

Laconia . 148,628

Messenia . 218,514

Euboea . 116,903

Cyclades . 130,378

Corfu . 140,757

Cephalonia . 71,235

Zante … . . 42 , 502

Larissa . 197,808

Trikkola . 183,489

Arta . 52,441

(New territory)

Macedonia:

Salonica . 503 , 896

Serres . 132,841

Drama . 174,091

Kosani . 206,287

Fiorina . 133,003

Epirus:

Janina . 245,618

ˆEgean Islands.

Mytilene . 182,167

Chios . 73,830

Samos . 68,949

Canea . 77,159

Heraclion (Candia) . 110,016

Stakia . 25,027

Lasithion . 62,611

Rethymnon . 61 , 339

Total (old territory) . 2 , 643 , 109

Total (new territory) . . 2 , 056 , 832

Total . 4,699.941

Climate. — Generally speaking the climate

resembles that of the other Mediterranean

countries. The elevated portions, however, do

not enjoy the subtropical climate of the rest of the country. There are great extremes of heat

and cold. The sirocco blasts from Africa ren¬

der part of the summer far from enjoyable

and in winter the cold north winds are equally disagreeable. The lowlands have little snow or

frost but in the mountain regions there is much snow, the first falling in October and the last in April. In the western and mountainous sec¬

tion there is considerable rainfall, but in the eastern section excessive droughts prevail, all

the minor streams become dried up, and irri¬

gation is necessary for the growth of farm

crops. The autumn and winter rains are often

excessive, often causing the streams to over¬

flow their channels and laying considerable tracts under water. In this way stagnant pools and

marshes are occasionally formed, which give

rise to intermittent fevers. Compare Greece,

Ancient, Climate.

Vegetation, Agriculture, *etc.* — The culti¬

vated land in Greece has recently been estimated at rather more than 5,563,100 acres. There are besides 5,000,000 acres of pasture land, and

3,000,000 acres of waste land. The draining of GREECE

1 Parthenon, on the Acropolis, Athens

2 Temple of Victory, on the Acropolis, Athens

1 The Academy at Athens

2 The University at Athens

4

GREECE

uiuu.

UUI.

I i iffiHj l i !

(WHPfllM 1

• mi

• in >jj iJi» 1 1

linn!

m:

1 Modern Athens

2 The Piraeus, Athens

.

.

‘

*

GREECE

377

Lake Copais redeems 60,000 acres of land, which the company divides into holdings of from 5 to 50. acres. English agricultural machinery is

being introduced, but still agriculture is in a backward state.

Thessaly is the richest portion of Greece

agriculturally. The condition of the agricul¬

tural population is said to be very satisfactory.

The principal cereal crops are wheat, barley

and maize, but the quantity raised is not suffi¬

cient, and much grain is imported. All the

fruits of the latitude are grown — figs, almonds, oranges, citrons,

melons, *etc.* — in abundance

and of excellent quality, without receiving any great share of attention. The vine also grows

vigorously, and considerable quantities of wine

are made, some of the sorts being of high qual¬

ity. But a much more important product of

Greece, especially on the coasts of the Pelopon¬

nesus, and in the islands of Cephalonia, Zante, Ithaca and Santa Maura, is the Corinthian

grape or currant, the export of which increased in value from $8,238,118 in 1900 to $8,910,000

in 1908; ‘in 1914 the value was $7,939,855.

Another important object of cultivation is the

olive, for which both the soil and the climate are alike favorable. The culture of the mul¬

berry for the rearing of silkworms is carried on to some extent. Some good tobacco is

grown. The forests contain, among other

trees, the oak (Quercus 2Egilops) which yields the valonia of commerce. The breed of cattle

is being improved, and irrigation canals are

being constructed. Asses and mules are more

numerous than horses ; cattle are still compara¬

tively few; and the chief animals from which

dairy produce is obtained are the sheep and the goat. The quantity of wool produced is consid¬

erable, but most of it is of a coarse description.

Manufactures, Trade, Communications,

etc. — The manufactures are limited, but with

all other branches of industry in Greece are

increasing, and are furthered by high duties on imported goods. The employment of the steam-engine in manufacturing industries dates from

about 1868, and is yet only developed to a small extent. Piraeus is the chief industrial centre, having spinning and weaving factories for cot¬

ton, silk and wool, machine-shops, paper-works,

dyeworks, *etc.* Other centres are Syra,

Corinth, Nauplia, Patras, Larissa. Still, cottons and other textiles form by far the most im¬

portant part of the imports of manufactured

goods. Leather manufactures form an im¬

portant branch of industry. . Marble has been

worked from the most ancient period in the

quarries of the island of Paros. In 1871 the

working of the ancient argentiferous lead

mines of Laurion in Attica was resumed with

good success ; and quantities of manganese iron ore and zinc ore are also mined in this district.

Shipbuilding is carried on at various places.

A large part of the foreign shipping of Greece is that which deals with the import of the

manufactures of England, Germany, etc., into

Greece, Turkey and the Levant generally. In

regard to this branch, the peculiar advantages

which the Greeks possess in their knowledge of the languages, and acquaintance with the habits and wants of the people of these countries,

have been greatly in their favor. The chief

ports of Greece are Piraeus (population 73,579, the port of Athens), Syra and Patras (popula¬

tion 37,958). The principal articles of export

are currants (very largely to Britain), wine,

olive-oil, dried figs, raisins, silver, lead, zinc ore and manganese iron ore, tobacco, sponges ; the

principal imports are cereals, coal and cotton

and woolen goods. The imports in 1901 were

$27,773,010; in 1914, the imports were $35,026,-

905 ; the exports, $23,425,375. The greatest

hindrance to the development of Greece is the

want of good roads, which are peculiarly ne¬

cessary in so mountainous a country. Attention, however, has been directed to the supplying of this want, and there are now over 3,000 miles of roads. Among other public works which

have engaged the energies of the Greeks are

the construction and restoration of harbors,

the erection of lighthouses, (the execution of

drainage works, *etc.* In 1883 there were only

58 miles of railways open, but in 1914 about

1,365 miles were open, and 100 were under con¬

struction. A ship canal across the isthmus of

Corinth (four miles) was opened in 1893.

Weights, Measures and Money. — The

French metric system of weights and measures

has been introduced into Greece by the govern¬

ment, but the people still adhere to the old sys¬

tem. In the latter the standard lineal measure was the bike, equal to three-quarters of an Eng¬

lish yard; the standard square measure was the stremma, nearly equal . to .242 of an English

acre; the standard weight was the oke = 2.80

pounds avoirdupois: 44 okes were equal to 1

cantar, or about 124 pounds avoirdupois. The

weights and measures of the metric system are

called royal, to distinguish them from the old weights and measures. In this system the

French measures of length, millimetre, centi¬

metre, decimetre and metre are called respec¬

tively gramma, daktylos, palame and pecheus

(cubit). The kilometre is called a stadion, and the myriametre skoinis. The new or royal

measures of surface are the square pecheus—

the square metre, and the stremma — the are.

The measures of capacity are the kybos, my—

stron, kotylg, litra, and koilon, respectively

equal to the millilitre, centilitre, decilitre, litre and hectolitre. The weights for gold, silver

and precious stones are the kokkos, obolos and drachma, respectively equal to the centigramme,

decigramme and gramme. The commercial unit

of weight is the minaˆ 1,500 drachmas— V/2

kilogramme. The talanton is equal to the

quintal and the tonos equal to the tonneau.

In 1875 Greece entered the monetary league

of which the other members are France, Italy,

Switzerland and Belgium, and all the members

of which have a monetary unit equal to the

franc in value. The name of the Greek unit is the drachma, divided into 100 lepta, nominally

equal to a franc but varying considerably in

value.

Government, Revenue, Debt, and People.

— As settled by the present constitution the

throne is hereditary according to the law of

primogeniture in the family of King George.

The king must be a member of the Greek

Orthodox Church. He attains his majority at

the age of 18. The legislative authority is

vested in a single chamber, called the Boule,

the members of which (proportioned in num¬

ber to the amount of the population) are elect¬

ed for four years by ballot by manhood suf¬

frage. It meets every year on 1 November,

unless called at an earlier date for special busi¬

ness. The executive power is exercised by the

king through a responsible ministry. The Greek

Orthodox Church alone is established, but all

other forms of religion enjoy toleration. The

highest ecclesiastical authority, subject to the king, is vested in a permanent synod, which sits at Athens, and consists of five members ap¬

pointed by the king from the highest digni¬

taries of the Church. There is one metro¬

politan, who has his seat at Athens; and about 80 archbishops and bishops, are presented and

ordained by the synod and confirmed and in¬

vested by the king. Justice is administered, on the basis of the French civil code, by a su¬

preme court (Areios Pag os), which has its

seat at Athens ; five higher courts, one at

Athens, one at Nauplia, one at Patras, one

at Larissa, and one at Corfu; and a number of courts of primary resort (Protodokeia) , in the principal towns. The public revenue, derived

chiefly from direct taxes, customs, stamps, ex¬

cise, monopolies, the rent of national property, etc., was estimated for 1910 at $26,251,204, and the expenditure at $27,277,152. Estimates of

revenue and expenditure for 1915 (including all the new territories), $82,290,670 for the former and $139,703,970 for the latter. Greece has a

very large public debt. In January 1916 the out¬

standing external debt amounted to $231,445,500, besides loans amounting to $21,144,000. A

considerable portion of the debt incurred in

recent years has been in the way of raising

loans for the making of railways. Of the

foreign debt one loan is guaranteed by Great

Britain, France and Russia, which have latterly had to pay the dividends on it. The payment

of the interest on its public debt has long been with Greece a matter of difficulty. Every male Greek on attaining the age of 21 years is liable to military service, his term being two years

with the colors, 10 with the reserve, eight

in the national guard and 10 in the national

guard reserve. The army in 1910 num¬

bered about 23,000 on a peace footing, and the peace establishment for 1915 was about 60,000.

The navy in 1915 had two vessels of 13,000 tons each, one of 10,118, three of 5,000, one of 2,600

tons, 14 destroyers,- six modern torpedo boats, two submarines, *etc.* The population contains

a considerable intermixture of foreign stocks,

among which the Albanese, of Arnauts, are

the most numerous; but the great majority,

though not without some taint in their blood,

are of genuine Greek extraction, and, both in

physical and mental features, bear a marked

resemblance to their celebrated forefathers. < It is true that the degrading bondage to which

they were subjeoted for centuries has sunk

them far below their natural level, and too

often substituted sycophancy and low cunning

for the intellectual superiority which, in earlier and better times, displayed itself in immortal

productions of the chisel and the pen ; but that the original elements of greatness still exist

has been proved by the noble struggles which

they have made for independency.

Education. — The educational system of

Greece, organized in 1834 by George Gennadius,

one of the leaders of the war of independence, is very complete. There are three grades of

schools, the demotic or primary national

schools, the Hellenic or secondary grammar

schools, and the gymnasia, in which, it is as¬

serted, the range and the level of the teaching are much the same as in a German gymnasium

or in the upper parts of our public schools. In all three grades of schools education is gratui¬

tous, and in the primary schools it is compul¬

sory on all children between 5 and 12. There

is a university at Athens, attended by nearly

3,000 students, many of whom come from dis¬

tricts under the rule of the Sultan. Thus far, however, education seems to be actually dif¬

fused among the people only to a limited ex¬

tent, though the numbers that receive a uni¬

versity education are so great that many such

young men find themselves without any proper

sphere of employment and are obliged to adopt

the career of politician and place-hunter. Many of these are now, however, said to be finding better ways of turning their education to ac¬

count through the rapid development of trade

and industry. The national dress of the Greeks resembles the Albanian costume. For the men

it consists of a tight jacket, generally scarlet, a white linen kilt in numerous folds, a bright-colored sash round the waist and embroidered

gaiters ; for the women it consists of a vest or jacket fitting close to the shape and a skirt, on the head a kind of fez or skull-cap_.

History. — From the year 1715 (see pre¬

ceding article) till 1821 the Greeks were subject to the domination of the Turks. In 1770, and

again in 1790, they made attempts at insurrec¬

tion, which, however, were speedily frustrated.

In the early years of the 19th century a secret society was formed for the purpose of effecting their liberation from the galling yoke, and in 1821 they found an opportunity of breaking out into another insurrection, which in the end

proved successful. In that year Ali, the pasha of Janina, revolted against the Sultan Mahmoud

II and secured the aid of the Greeks by prom¬

ising them their independence. The rising of

the Greeks took place on 6 March, under Alex¬

ander Ypsilanti, and on 1 Jan. 1822 they pub¬

lished a declaration of independence. In the

same year Ali was assassinated by the Turks,

but the Greeks nevertheless continued the strug¬

gle that they had begun and in which they were encouraged by the sympathy of nearly all the

nations of Europe. Among the most distin¬

guished of their leaders were Marcos Bozzaris,

Capo d'Istria, Constantine Kanaris, Koloco—

troni, Miaulis, Mavrocordato, Mavromichaelis,

etc. In 1823 they were joined by Lord Byron,

who, during the last year of his life, did all in his power to further their cause by his wealth, as well as by his active efforts on their behalf.

Unfortunately he died in April of the following year. In 1825, the Turks Laving called to their aid Mehemet-Ali, the pasha of Egypt, the lat¬

ter sent his son, Ibrahim Pasha, whose talents secured them the success that they had hitherto been unable to attain. Tripolitza, the capital

of the Morea, was taken, as was also Misso—

longhi, in spite of the valor of the Suliote moun¬

taineers. It was about this time that the Greek patriots received the aid of the English ad¬

miral, Lord Cochrane, who organized their

fleet, and of French officers who instructed their army in the system of European tactics. In

spite of this, however, the Turks continued to triumph everywhere and resisted all tihe pres¬

sure that was put upon them by other Euro¬

pean powers to make concessions. A treaty

was then concluded at London (6 July 1827)

between Britain, France and Russia for the

pacification of Greece, and when the media-

tion of these three powers was declined by the Sultan, their united fleets, under Admiral Cod-rington, attacked and annihilated the Turkish

fleet off Navarino, 20 Oct. 1827. In the begin¬

ning of the following year (1828) Count Capo

d'Istria became president of the state, and later in the same year Ibrahim Pasha was forced to

evacuate Greece. At last, on 3 Feb. 1830, a

protocol of the allied powers declared the in¬

dependence of Greece, which was recognized

by the Porte on 25 April of that year. The new member of the states of Europe received from

the allies a monarchical form of government

and offered the crown to Leopold, Prince of

Saxe-Coburg, and when he refused it, to Otho,

a young prince of Bavaria. The latter accepted the offer and was proclaimed king of the

Hellenes at Nauplia, on 30 Aug. 1832. The

power of the king was at first almost absolute and his arbitrary measures, and more especially the preponderance which he gave to Germans

in the government, soon made him unpopular.

At the same time the finances of the kingdom

were in a very embarrassed condition and a

general uneasiness prevailed. In 1843 a rebel¬

lion took place, after which a constitution was drawn up. But Otho was after that no more

popular than before, and after the outbreak of another rebellion in February 1862, he saw him¬

self compelled to abdicate the throne (24 Octo¬

ber). A provisional government was then set

up at Athens and the National Assembly after

declaring that the throne had been forfeited

by Otho, offered it in succession to Prince Al¬

fred, of England, and Prince William George,

of Denmark. The latter accepted it and 30

March 1863 was proclaimed as King George

I. At the end of that year a constituent assem¬

bly was elected for tlhe purpose of framing a new constitution, and the result of its labors was the constitution which is still in force. In 1864

an addition was made to the small kingdom by

the annexation of the Ionian Islands, which had hitherto formed an independent republic under

the protection of Britain. From the first Greece had been watching for am opportunity of ex¬

tending its frontier northward, so as to in¬

clude the large Greek population in Thessaly

and Epirus. In 1878 the Congress of Berlin

recommended that the northern boundary of

the kingdom be readjusted. Turkey refused to

make any concessions and negotiations were

protracted until in 1881 the Powers accepted

the terms offered by Turkey, by which Greece

received all Thessaly south of the northern

watershed of the Salambria, together with

Larissa and Trikkala and in Epirus the Arta

River was made the boundary, Arta being left to Greece. The Greeks accepted this settlement as the best to be obtained at the time, but began to agitate for the union of Crete, which they regarded as Greek territory. In 1896 a conflict broke out in Crete between the Christians and Mohammedans and Greece made an attempt to annex the island. The Powers interfered, compelling Greece to withdraw and decreeing the autonomy of the island. A war element in Greece now embroiled Greece in a war with Turkey, for which the former was wholly unprepared, and hostilities began in April 1897. Within 31 days the Turks had nut the whole Greek army to flight and threatened an invasion of central Greece. This move was blocked by Russia, who peremptorily demanded

an armistice, which was concluded on 18 May. A treaty of peace was concluded at Constantinople on 4 December, by the terms of which Greece was required to pay an indemnity of $18,000,000 to Turkey, the payment to be supervised by a commission of the mediating Powers, which also engaged to rectify the frontier. In 1898 Turkey was compelled by the Powers to withdraw her forces from Crete and Prince

George of Greece was appointed governor of

the island. The disputes between the Christians and Mohammedans rendered his administration

the reverse of tranquil and he resigned in 1906, when the Powers left the power of appointing

his successor to King George of Greece.

M. Zaimor was appointed High Commissioner

and Greek officers took command of the Cretan

army. When the Young Turks overthrew Ab¬

dul Hamid in 1908 the Cretan Assembly de¬

clared the union of the island with Greece, but the Powers refused to sanction any violation

of the agreement of 1898. When the Balkan

War broke out Cretan delegates were admitted

to the Greek Parliament and in 1913 Crete was ceded to Greece by the Treaty of London.

Greece had meanwhile become embroiled with

her neighbors to the north in connection with

Macedonia, and there was bitter feeling between Greece and Rumania and Bulgaria until 1912.

Turkey had now become greatly weakened

through civil strife and Greece joined in the

coalition against her with Bulgaria, Serbia and Montenegro. The Greek army captured Saloniki and overran southern Macedonia, and her

navy captured several Turkish islands in the

Hfgean, while hindering greatly the movement

of Turkish troops from Asia Minor. King

George was assassinated 18 March 1913 while

on a tour of inspection in Saloniki and was

succeeded by Crown Prince Constantine. The

division of the spoils led to a war between the allies (see Balkan War) and several atrocities were laid to the Greeks. By the Bucharest

Conference Greece received all of Thessaly and

the best parts of Macedonia and Thrace, to¬

gether with part of Epirus. Crete also was

given her and the islands of the ZEgean not

occupied by Italy. Thus Greece in great part

realized her dream of a Greater Greece. At

the outbreak of the great conflict in Europe in 1914 Greece proclaimed a policy of strict

neutrality. For subsequent events involving the

position of Greece in regard to the world con¬

flict and leading to the abdication of King

Constantine see War, European.

Bibliography. — Garnett, L. M. J., (Greece

of the Hellenes) (London 1914) ; Hichens, R.,

(The Near East: Dalmatia, Greece, and Constantinople) (New York 1913) ; Manatt, J. I.,

(ZEgean Days) (London 1913) ; Martin, P. F.,

ˆGreece of the Twentieth Century* (London

1913) ; Moses, G. H., ‘Greece of To-Day*

(Nat. Geographic Mag., Washington 1915) ;

Rhizos Neroulos, Jacovaky, <Cours de litterature grecque moderne* (Geneve 1828) ; Rhizos

Rhankabes, A., (Greece: her Progress, * *etc.*

(New York 1867), and ‘Histoire litteraire de

la grece moderne) (Paris 1877) ; Toynbee, A. J., ‘Greek Policy since 1882) (London 1914).

Charles Leonard-Stuart,

Author of ‘ The Great God Pan ,* *etc.*

GREEK ANTHOLOGY, The. An an¬

thology is a <(collection of flowers.** (The Greek Anthology,) often referred to as the Palatine

Anthology, is a collection of epigrams and

epigrammatic poems, very few of which exceed

12 lines, and more than nine-tenths of which

are written in the alternation of hexameter and pentameter known as the elegiac metre. They

number about 4,100, represent a period of some 1,700 years, and comprise a variety of subject matter as wide as life itself. Their perfection of form and their exceedingly human content

have made them a favorite field for the trans¬

lator, the lover of poetry and the critic of life.

Erasmus, Sir Thomas More, Hugo Grotius,

Thomas Gray, Dr. Johnson, Cowper, Chenier,

Sainte-Beuve, Byron and Longfellow are a few

among those who have found them es¬

pecially attractive. The Greek Anthology

is a growth, the result of selection, con¬

tribution and arrangement by a number of

successive hands. (1) Meleager, a Syrian

of the early 1st century before Christ, made the first collection of importance in his (Wreath, y or ‘Garland. > Besides poems of his own

numbering about a hundred, the (Garland }

contained epigrams by 47 other poets, 33 of

whom belonged to the period of literary clever¬

ness and artificiality (300-146 b.c.) called Alex¬

andrian from the principal seat of learned and literary endeavor during the time. It was

Meleager’s identification, in the Proem of his

collection, of the verses of various poets with various flowers (“lilies® of Anyte, “roses® of

Sappho, etc.) that gave the name ‘Garland* its appropriateness, and suggested the later term

Anthology. (2) Philippus of ‘ Thessalonica,

more than a century afterward, made a com¬

pilation of the epigrammatic poets since

Meleager. (3) Strato of Sardis collected some

hundreds of amatory epigrams, including many

by himself. (4) Agathias, a poet and historian at Constantinople in the time of Justinian (527—565), collected seven books of hitherto unpub¬

lished recent and contemporary epigrams, among

which were his own. The method of classifi¬

cation according to subject — humorous, ama¬

tory, convivial, *etc.* — adopted by him perhaps for the first time, has usually been followed

since. (5) Constantinus Cephalas, probably of

Constantinople about 950, compiled a still more extensive collection, based upon and presumably

incorporating principally those of Meleager and

Agathias, and representing 320 poets. He broke

up the Garland of Meleager, according to a

commentator, and “distributed k under different

heads, viz., the amatory, dedicatory, sepulchral, and illustrative pieces separately, as they are now arranged below in this book.® (6)

Maximus Planudes, monk, theologian, gram¬

marian and rhetorician of the early 14th cen¬

tury, arhbassador from Constantinople to

Venice in 1327, included in a new collection of seven books 397 epigrams not in Cephalas, but

also made many damaging alterations and omis¬

sions. Having superseded and caused to dis¬

appear the anthology of Cephalas, for 112 years from its first printing in Florence in 1484 the collection of Planudes remained the only anthol¬

ogy known. In 1606, however, the discovery

by Salmasius of the famous Palatine Manu¬

script of Cenhalas (so called from its location in the Palatine Library at Heidelberg-) re¬

stored the better collection, which, with the 397

additional epigrams from the Planudean col¬

lection, has formed the material for all subse¬

quent editions. Extracts by Salmasius and

others gave place in 1776 to Brunck's

'Analecta,) which in 1794-1813 were superseded

by Jacobs' complete edition, including also 400

epigrams found in Greek literature at large but ' not in the Anthology, and raising the total to about 4,500. To these might properly be added, if it were desired to make a complete assem¬

blage of this literary form, some 2,000 actual inscriptions of varying artistic value, making a body of epigrammatical literature of about 6,500

specimens.

The best opportunity for acquaintance with

the field of epigram is afforded by Mackail,

'Select Epigrams from the Greek Anthology,*

text, translation, introduction and notes (Lon¬

don 1906) ; translation alone (ib., 1908).

The 'Loeb Classical Library) (New York 1917)

has issued two of five volumes of the complete text and translation by W. R. Paton. Graham

R. Tomson's Selections from the Greek Anthol¬

ogy contains verse translations by Richard Gar¬

nett, Andrew Lang, Goldwin Smith, and others

(London).

A number of noteworthy qualities may be

enumerated as accounting for the interest of

the Anthology. In the first place, it is a re¬

markable example of continuity and homo¬

geneity, in the attitude of a race toward the problem of life. Covering a period which be¬

gins 700 years before Christ and extends 1,000

years into the modern era, its 4,100 miniature poems, together with the 2,400 of kindred char¬

acter found outside its limits, "draw for us in little,® as Mackail says, "a picture of the Greek ideal with all its virtues and all its failings : it may be taken as an epitome, slightly sketched

with a facile hand, of the book of Greek life.®

This may be said with full consciousness of the differences between the Byzantine Greek and

the pagan Greek of the Golden Age. In the

second place, the Anthology is an even more

remarkable example of the persistence of an

ideal of language and form. Throughout the

1,700 years it exhibits the same classical purity of diction, the same overwhelming preference

for the elegiac vehicle, and the same epigram¬

matic qualities. When Planudes was making his

collection, Dante had already written, and

Petrarch, the Renaissance, and New Europe

were at hand. Even allowing that many of the

later epigrams were the product of the clever

artificiality of men who, like the Renaissance

Italian and the modern Greek, took pride in the demonstration by this means of their kinship

with a great past, the Anthology is still a unique example of vitality in literary form. Again, the Anthology represents not only the persistence,

but the perfection, of a literary species. The epigram, originally an actual inscription as its name implies, had by the time of Meleager long been literary also. The great majority of the

epigrams in the Anthology are merely literary,

were never inscribed on monuments and re¬

tained the right to the name bv reason of their greater or lesser conformity with the inscrip-tional ideal. At their worst, they are forced, shallow, artificial and insincere, though rarely lacking in the virtue of form. Taken as a

body, they are not to be ranked with the great examples of Greek literature. “If we might

compare the study of Greek literature to a

journey in some splendid mountain region,®

writes John Addington Symonds, “then we

might say with propriety that from the spark-

ling summits where Aeschylus and Sophocles

and Pindar sit enthroned we turn in our less

strenuous moods to gather the meadow flowers

of Meleager, Palladas, Callimachus.® At their

best, however, they do not suffer from prox¬

imity to the great. They arouse unbounded

admiration as possessing, in the phrase

of Mackail, (<just that high note, that

imaginative touch, which gives them at

once the gravity of an inscription and the

quality of a poem® ; and as realizing the ideal defined by the same critic as follows : <(In brief, then, the epigram in its first intention may be described as a very short poem summing up as

though in a memorial inscription what it is de¬

sired to make permanently memorable in a

single action or situation. It must have the

compression and conciseness of a real inscrip¬

tion, and in proportion to the smallness of its bulk must be highly finished, evenly balanced,

simple and lucid. In literature it holds some¬

thing of the same place as is held in art by an engraved gem.® Those who are not sensitive to

precise, clean cut, chiselled language, neat

phrasing, compression, simplicity, directness,

harmonious versification — in a word, those who do not feel the glow of admiration at the

beauties of conscious literary art, and even at skilful literary craftsmanship when it does not rise to heights of inspiration — will not enjoy the Anthology as it may be enjoyed.

Yet there is a final quality which brings

the Anthology within the range even of readers unacquainted with the Greek tongue and not

especially sensitive to form. This is its hu¬

manity. In this as in other respects, the

Anthology is to be regarded as a single docu¬

ment rather than as the work of hundreds of

hands. The epigram, more than any other

species of Greek literature, tends in the reader's mind to be impersonal. It is not of the views of the poets Theocritus, Meleager, Asclepiades,

Leonidas, or of the poetesses Erinna, Anyte

and Nossis — the most famed of the contribu¬

tors to the Anthology — that we think as we

read, but of the Greek view ; and into an ap¬

preciation of the teeming details in Greek life that went into the making of the Greek view —of the innumerable ordinary and extraordinary

sights,' sounds, thoughts and emotions ex¬

perienced in Greek existence as a whole — we

can hardly enter so well by any other gate as by the Anthology. In it <(we possess,® as

Symonds says, (<an everlasting treasury of

sweet thoughts… . The slight effusions of the minor poets are even nearer to our hearts than the masterpieces of the noblest Greek literature.

They treat with a touching limpidity and sweet¬

ness of the joys and fears and hopes and sor¬

rows that are common to all humanity.®

Grant Showerman,

Professor of Latin Literature, University of

Wisconsin.

GREEK ARCHITECTURE. In the com¬

pass of a brief article it will be necessary to confine our discussion of Greek architecture al¬

most entirely to that of the classic or pre-Chris¬

tian ages. For that of the Christian Greek Em¬

pire consult the title Byzantine Architecture.

We divide our subject into three periods: I,

All that preceded the First Olympiad (to 776

b.c.) ; II, from 776 to 400 b.c. ; III, from 400

b.c. to 200 A.D.

I. First or ZEgean Period. — The monu¬

ments of this period are found chiefly in Crete, Mycenae, Tiryns and Troy, in Euboea and at

Orchomenos in Boeotia, and belong to the pre—

Homeric and Homeric age, to a culture which

was widely spread over the 2Egean islands and

shores, from 2000 b.c. to the Dorian migration of about 1100 b.c. The great palace of Minos

at Cnossus in Crete, beehive-shaped tombs in

Argolis, especially the ((Tholos of Atreus® or

Tomb of Agamemnon at Mycenae, the palaces

and fortifications of Tiryns, Mycenae and Troy, and other like remains, reveal a somewhat

primitive type of architecture, employing at

times enormous stones, but also rubble, wood

and crude brick, with occasional details of ala¬

baster, bronze or terra-cotta and even glass.

No remains of temples have been identified.

Columns were used tapering downward, as in

the Tholos Gate at Mycenae; roofs were of

wood or stone, and the arch was unknown.

This art, first made known by the researches

of Schliemann, Dorpfeld and Evans, declined

and disappeared with the advent of the Dorians about 1100 b.c.

II. Great or Periclean Age. — After 776

b.c. an entirely new architecture appears, the

Doric, whose birthplace and origins are still

uncertain. The earliest recorded temple, that

of Hera at Argos, seems to have been of wood; the next oldest, also of Hera, at Olympia, may have been built as early as 1000 b.c., but no part of its present remains can be dated so far back. At Selinus and at Corinth are ruins of

temples of the 7th century b.c.; they show

fully developed all the chief elements of the

Doric style that persisted for 600 years : the massive Doric column without a base and with

a simple capital, the frieze with its grooved tri¬

glyphs, the simple cornice with its mutules and guttse, the stepped base or crepidoma of the

temple, its windowless enclosure, the cella, con¬

taining the chief hall or naos for the statue of the god, and often behind this a chamber, the opisthodomos ; around the whole a colonnade,

the peristyle, and above the whole a low—

pitched roof of wood, covered with tiles of

terra-cotta or marble — these elements re¬

mained unchanged, though greatly refined in

proportions and execution as the style pro¬

gressed. This progress was already great by

479 b.c., when Athens, become the leader of

the Greek states in the defeat of the. Persian invasion, began upon the Acropolis the erec¬

tion of a group of buildings — the Parthenon, Erechtheum, Propylaea

and temple of Wing¬

less Victory — which exemplified the culmina¬

tion of Greek art. Of the period immediately

preceding this are a number of temples at Se¬

linus, at Paestum in southern Italy, and at

Agrigentum and Segesta in Sicily ; while be¬

tween 480 and 450, the fine temples of Zeus

at Olympia, of Aphsea on the island of ZEgina, and of Heracles (the socalled Theseum) at

Athens were built; the last-named admirably

preserved to our day.

Meanwhile another style, the Ionic, had been

introduced from Asia Minor by the Ionian

Greeks. It employed more slender columns and

lighter proportions than the Doric; the columns stood on molded bases and bore capitals having large spiral volutes; the frieze was without tri¬

glyphs and the cornice without mutules. The

moldings were carved with eggs-and-darts,

beads, leaves or anthemions, and carved orna¬

ment generally took the place of the painted

enrichments of the Doric style. The two styles were used side by side in Athens, and while the superb Parthenon (q.v.) on the Acropolis was

in the Doric style, majestic in its severe beauty, beside it stood the Ionic Erechtheum in chaste elegance, and a short distance to the southwest the tiny Ionic temple of the Wingless Victory.

The imposing gateway to the Acropolis, the

Propylsea, presented Doric fagades to the east

and west, but was divided within into three

aisles by two rows of Ionic columns. The tem¬

ple of Apollo at Bassse (Phigalsea), by Ictinus the architect of the Parthenon, was in like man¬

ner externally of Doric, internally of Ionic de¬

sign.

The Parthenon, with its superb Doric peri¬

style — 8 columns in the end fagade, 17 in

side elevation — and its two internal colonnades of the same order in two stories superposed,

represents the culmination of plastic art in this great age. Measuring over 200 by 100 feet on

the ground, with massive columns 36 feet high, built of purest white marble and brilliant with red, blue and gold in its upper parts (see Polychromy), it was adorned with sculpture of con¬

summate beauty by Phidias (q.v.) and sculp¬

tors under him, and even in ruins to-day of¬

fers a model of unsurpassed perfection of pro¬

portion and execution, while the Propylsea and

the two Ionic temples near it were inferior, if at all, only to the Parthenon in beauty. They testify to the exaltation of the Hellenic spirit after the Persian wars.

III. The Alexandrian Period. — From 400

b.c. to the Macedonian dominion of Alexander

(in 330 b.c.) there was a lull in architectural activity. That dominion brought about a re¬

vival characterized by splendor and elabora¬

tion in place of the earlier reserve and refine¬

ment. The Corinthinian column began to be

used, more slender and richer in ornament than the Ionic, of which, however, it was really a variant rather than a new style. Magnificent

temples were erected, especially in Asia Minor, including two of colossal size — that of Apollo at Didyme near Miletus, and the famous tem¬

ple of Artemis (Diana) at Ephesus, measur¬

ing 342 by 163 feet, one of the ((wonders of the world,® with sculptured columns. The tomb of

Mausolus at Halicarnassus (the Mausoleum)

was another marvelous edifice ; these were all

three of the Ionic order. The Corinthian ap¬

peared in smaller structures, as in the tholos or well-house of .TEsculapius at Epidaurus, Doric

externally, Corinthian internally ; and in the

tiny choragic monument of Lysicrates at

Athens. From the 3d century b.c. we have the

Ionic Propykea at Priene and two Corinthian

gateways at Eleusis ; and in the following cen¬

tury the great Ionic altar at Pergamon.

Shortly after this the colossal temple of Zeus at Athens was begun in the Corinthian order

by a Roman architect, Cossutius, but was not

completed until 300 years later under Hadrian,

who built also the first arched gateway in

Athens and several colonnades. In Asia Minor

and in Macedonia a number of temples, gates

and theatres were built under the Roman do¬

minion in a style rightly called Greco-Roman.

Secular Buildings. — These were few; the

Greek theatre can hardly be called a work of

architecture. (See Theatre). A few colon¬

nades, city gates and walls, the arsenal at the Piraeus, and remains of houses of great sim¬

plicity, and finally the ((Tower of the Winds®

— really a clepsydra or water clock — at

Athens, make up the list, unless we class as

secular the treasure-houses of the different

cities at Delphi, Delos and Olympia, and a few tombs at Xanthus, Mylassa, Antiphellos, *etc.*

At Athens, however, are a number of modern

buildings in the Doric and Ionic style, possess¬

ing much merit, e.g., the Academy, Museum,

Zappeion, *etc.* The ruins of the Odeum of

Herodes Atticus at Athens are Roman rather

than Greek.

Bibliography. — The c Antiquities of Athens> by Stuart and Revett, first published in

London in 1762, has appeared in many edi¬

tions in various languages. Consult Anderson,

W. J., and Spiers, R. P., Architecture of

Greece and Rome) (London 1907) ; Goodyear,

W. H., (Greek Refinements) (New Haven

1913) ; Marquand, A., (Greek Architecture)

(New York 1909) ; d'Ooge, M. L., (The

Acropolis* (London 1909) ; Penrose, C. F., (An Investigation of the Principles of Athenian

Architecture) (London 1888) ; Tarbell, F. B.,

(History of Greek Art* (New York 1902).

Also, Durm, J., (Antike Baukunst* (Darm¬

stadt 1886) ; Chipiez, C., (Histoire critique des ordres grecs) (Paris 1876) ; Perrot, G., and

Chipiez, C., (Histoire de l'art dans l'antiquite*

(Volumes on Greek Art, Paris 1898-1903) ;

and translations of the same in English (Lon¬

don 1906-05).

A. D. F. Hamlin,

Professor of Architecture, Columbia Univer¬

sity.

GREEK ART-PAINTING AND

SCULPTURE. Painting. — Modern students

of Grecian archaeology do not doubt that the

Greeks of different epochs were as success¬

ful in painting of stately and religious sub¬

jects and of painting and drawing in a slighter and more popular way as they were in sculpture ; but this is merely an inference. Absolutely

nothing remains to us of Greek painting of

high class. We can study the figures on Greek painted vases and notice their admirable dis¬

position and the beautiful designs made of

their combinations, and we can note the technical system followed, sometimes by drawing on the

clay with a hard point, sometimes without that help and drawn evidently with the brush alone.

The use of pigment, too, generally black but

sometimes of other colors, can be perfectly

understood; but this is all of the simplest

character, nor can we draw any conclusions at

all about the wall-paintings or panel-paintings

of the Greeks. In the houses of Pompeii there are many wall-paintings which seem to have

had a non-Italian and probably Greek origin,

and furthermore it is known that Pompeii was

a town of Greek settlement and retained much

Grecian influence even under the Roman Em¬

pire. Some portrait heads have been found in

Egypt painted on panel (that is, thin boards)

and these are certainly non-Egyptian ; they may be assumed to be Greek, of the Alexandrian

epoch. In these, however, there is no back¬

ground, no added incident, which might guide

us to a knowledge of Greek design in Graphic

art. Finally, some paintings discovered in

Rome, though belonging to houses of late date, GRECIAN ART

»

-

are altogether Greek in design ; and these may well be reduced copies, or imitations, of famous originals 300 years earlier. None of these

paintings are of great importance. None of

them give us an exalted idea of the painting

which stood for their original impulse. The

statements made by ancient writers with regard

to the paintings of their own time and those

who were then famous as having belonged to

earlier times, are of very little use, because we have no standard with which to compare

their critical remarks, and furthermore because

no one of the books remaining to us from

antiquity seems to be the work of a man

greatly interested in fine art. For this reason the paintings on the vases are worthy of the

most minute examination. The earliest style in

which the subjects represented are at all elaborate are of the undetermined epoch which we call

the Mycenaean. Those vases are rich in patterns of scrolls, bands, zig-zags and spots with, some¬

what rarely, animal forms introduced in bands

and (as in Crete and Cyprus) as a principal

subject and covering a large part of the body of the vase. The painting is generally in

brownish red on a dull yellow ground, which is the natural color of the clay. The famous

Warrior Vase found at Mycenae and now in

the Central Museum at Athens and which we

must suppose to date from 1000 b.c., has much of that grotesque ind'fference to form and

perfect satisfaction with an indication of mean¬

ing which we associate with barbaric art in all ages : the human form is drawn without any

comeliness or grace and without any success in getting control of

gesture ; but the purpose is clear, viz., the displaying of a procession of warriors wearing large helmets, carrying great

shields of the curious kidney shape long after¬

ward associated with certain As atic influences, and carrying spears in the right hand, which

spears have sometimes two heads or what seem

to be heads.

The paintings on pottery which are of the

most interest are those of the period beginning about 600 b.c. and ending about 150 b.c. The

earlier p'eces are, of course, difficult to date even approximately. They represent warriors

engaged in battle, the scene forming a broad

band running around the vase ; lions, bulls and stags arranged again in horizontal bands ;

figures draped in long garments, men as well

as women carrying stringed instruments,

weapons, baskets and the like ; ocasionally a

scene which can be ident'fied, as where Hercules brings the Erymanthian boar to show to his

brother, King Eurystheus, or where Peleus is

about to carry off Thetis from among her at¬

tendant nymphs ; or they represent a feast, with men reclining on couches and others acting as

attendants bringing pitchers and vases to fill

the cup held by the reclining guest. The beauti¬

ful black glaze of the vases is used sometimes as the pigment for the

figures and sometimes to work the background around the figures. These

two styles are known as the black-on-red or

black figure style, the other as the red-on-black or red figure style, and this latter style is known as the later of the two. There is still another form which is generally the latest of

all. In this the black glaze is worked over the whole vase except for a panel or medallion or even a band around the vase, which is left in the red color of the pottery, and upon this

the figures are painted in black. From the 5th century on the drawing is extremely vigorous

and significant. It is grotesque sometimes, as

where the muscles are given excessive promi¬

nence or where the attitude is exaggerated in

the attempt to make it tell the story; but every¬

where the drawing of the outline and the filling in with color shows singular mastery.

In a few cases the drawing itself is faultless ; but in by far the greater number of cases, even of a good time, it is rather the evidently slight and swift work of a man familiar with nature

and with the best traditions of art but not using his whole strength in the slight painting of the earthenware. The use of pigments other than

the black glaze is not very frequent ; but a red somewhat brighter than the color of the clay is used, also a kind of violet, more rarely a green, and in some cases gilding is applied — especially in late and very elaborate work. A small class of vases, identified with the city of Athens, has the body covered with a solid coat of white,

upon which figures are painted in various bright colors ; but this work is perishable.

In close connection with the drawing and

painting applied to pottery is the engraved work on the backs of bronze mirrors, on pieces of

armor, and on cists (cist a). Even as in modern times some of the most elaborate and precious

drawing is that of the engraver working on

copper-plate (though he proposes to take prints on paper from his engraving), so the Grecian

draughtsman put some of his finest work on

those engravings meant for pure decoration.

As we have no free drawing on paper or plaster or wood — nothing that shows how the Greek

drew with a free hand — we can only reason

backward from the firm and resolute setting

down of lines drawn on the resistant material

with the sharp point, and infer the vigor and daring of the more unfettered design.

Sculpture. — Sculpture in its different forms

is, after all, that which Greece has left us

which is most important. We have the marble

reliefs carved upon temples, tombs and the walls of sacred enclosures, and also a great number

of slabs which, when more than two or three

feet in either dimension are generally tomb¬

stones, but which, when small, are frequently

mere records carved upon a boundary stone

or a memorial, or else a votive slab dedicated at the shrine of some divinity. In all of these the propriety and the freedom of design are

wonderful and, in relief sculpture at least, the Greeks have set an example which has never

been equalled since, neither in the actual beauty of the form nor in the intelligence shown in

the composition. The most wonderful of the

low reliefs are those of the famous frieze

which forms the crowning member of the wall

of the Parthenon within the screen of columns, the wall of the naos or cella. The well known fact that this whole composition was painted in bright colors changes at once our ideas as to its decorative effect as a part of the building, but modern students can form no correct idea of the appearance of elaborate sculptures painted

in an artistical fashion because they have never seen anything of the kind. One special reason

why the reliefs are peculiarly important to

modern students is their undoubted originality.

The sculptures found at Phigalia, at Halicar-

masters of tragedy; and Pericles, the states¬

man, the artist and philosopher in govern¬

ment. There were also strange, indecent men,

like Diogenes; and bad or irresponsible men,

like Alcibiades and Cleon. Yet on the whole

the Athenians maintained a norm of good and

beautiful conduct, observing measure in all

things, even while devoting themselves each to

his chosen way of life and communal service;

for the life of the individual was subordinated to the welfare of the state, and found complete realization therein — the state did not, as in modern times, mainly exist for the sake of the individual.

From this wonderful group and succession of

gifted and cultivated men, whose activities

really constituted the essence of Greek civiliza¬

tion, it is customary, following the example of Thucydides and Plutarch, to single out Pericles, leader and conserver of the Athenian polity, as the representative citizen and the type of

Hellenic culture. Grave and reserved, fearless

and eloquent, combining judgment with

imagination, intelligence with sentiment, fore¬

thought with passion, of commanding presence,

endowed, as it seemed to his fellows, with

every physical excellence and power of mind and possessed of the good breeding which is the

crown of virtue, he might well have sat for the character-sketch of the <(Highminded Man®

that is drawn by Aristotle in the (Nico—

machean Ethics.* But for our purposes of

illustration the magnanimous Sophocles may

serve even better. For, first, he is a poet, or <(maker,® par excellence ; and examples of his

work are still intact — while the Periclean state came to a sudden termination. And secondly,

it is easier to compare him with other typical Greeks, since he occupies the place of a golden mean betwixt the religious 2Eschylus, who ((did right® as a dramatist ((without knowing why,®

and the rationalist and realist Euripides, who

drew men ((as they are® ; whereas Sophocles,

as he himself was aware, proceeded aright from correct principles of art as well as correct

sentiments, and, observing men and human life

even more truly than did Euripides, neverthe¬

less properly idealized his characters for the

ends of tragic representation. As in his own

life, so in elaborating his dramas and in the very process of displaying the misfortunes of a self-bliinded CEdipus, he shows how the artistic regulation of impulse leads to success and hap¬

piness. Nor did his fellow-Athenians blunder

in their estimate of him, for in the dramatic contests he secured first prize no fewer than 20

times. Moreover, in the comedy of the (Frogs,*

Aristophanes, with his keen eye for dispropor¬

tion, ridicules 2Eschylus somewhat, and Eurip¬

ides yet more, for departing on this side or that from the golden mean, while he significantly re¬

frains from attempting to distort the work of

Sophocles.

As a typical Greek, Sophocles is religious ;

not, like the Athenians in their later decadence, wtoo religious,® as Saint Paul described them.

He is also many-sided, with a number of

diverse faculties ready for the accomplishment

of both his immediate and his final aim. But

the unity and compactness of structure in his

(CEdipus Rex) or his (Antigone* reflect the

inner unity of spirit in the author. Sophocles knows when to amplify and when to inhibit; he is equally sensitive to broad perspective and to the value of each detail. His vision is steady and comprehensive, as a comparison of the

eighth Psalm, in the Bible, with his chorus on man, in the (Antigone, * will disclose. He has formed a just estimate of the relation between external nature, mankind and the Divine. In the delineation of character he has never been sur¬

passed, yet his plays do not, like those of

Shakespeare, fail to take direct cognizance of

the action of a higher Divine power (not

merely of an impersonal moral law) in the

affairs of men.

But the typical Greek has his limitations.

Although Homer and Sophocles have a sense

of the Divine in relation to human life, they are both polytheistic. Though in both we find

ideal relations between men and women

represented or suggested, and though Athens

and the Parthenon by their very names imply

a lofty conception of womanhood, Greek so¬

ciety' was disfigured by an attitude to homo¬

sexual impulse that often resulted in words and actions at once base and grotesque ; nor should one forget that the leisure of cultivated men

was made possible by the labor of slaves. And though both of these poets attribute human

failure to human blindness of heart rather than to fate or divine prejudice, the Greeks did not in the main identify divine providence with

divine good will, ˆschylus, it is true, may al¬

most be termed monotheistic; and Plato has

been called by the Jews themselves the Greek

Moses, as by English scholars he has on oc¬

casion been styled a Puritan. But ˆLschylus

said that his plays were only morsels from the Homeric banquet, while Plato, in spite of the

criticism passed on the ancient epic poems in

the (Republic,* is heavily indebted to them,

and, closely as he approaches Hebraism or the

modern spirit in his deepest reflections, he still remains a pagan. It was left for the Hebrews

and Christianity definitely to assert a pure

monotheism for transmission to modern times;

to develop the idea of the fatherhood of God; and thus to establish upon a firm foundation the principles governing the relations between

men

and women, women and women, men and men.

Again, the joyous Greek was not the joyful

Christian ; nor was death to him the beginning of life. And again, the mediaeval doctrine of

(<the gentle heart,® from which our modern

conceptions of lady and gentleman -are mainlv

derived, was neither Greek nor Roman. While

these conceptions owe much to classical anti¬

quity, to the Homeric and tragic heroes and

heroines, to the <(Highminded Man® of

Aristotle, to the Virgilian yEneas (who was

borrowed from the Greeks) ; they owe more to

the Provenqal and Italian, and to the Germanic and Celtic, attitude to woman ; at the core they are Christian.

The Greek culture of the most vital period

has been handed down to us by intervening

civilizations. From Greece it passed to Alex¬

andria, and from Alexandria to Rome. Graeco-Roman culture was succeeded and preserved by

that of Byzantium, and then, during the decay

of learning in southern Europe, was preserved

in Ireland and England and in Arabia and

Syria, whence it returned to the Continent in

the later Middle Ages. It has on three oc¬

casions reasserted itself with special force: at Rome under the Emperor Hadrian; in the 13th

century in Europe; and again in Europe be-

ginning with the Italian Renaissance, this last, however, being mainly Latin in character and

but secondarily Greek. Still, if we regard the Renaissance as extending to our own day, we

find a better and better understanding and as¬

similation of Hellenism, until in poets like

Shelley and Goethe we discover an approxima¬

tion to the Greek spirit almost as close as that achieved by the Roman Cicero, Virgil and

Horace. All five are, so to speak, not Greeks proper of the triumphant age, but, like Lucian and Plutarch, late and provincial imitators —who nevertheless have in them something of the original Hellenic genius.

What has Greek culture done for the world?

Shelley in his enthusiastic way exclaims: (<We

are all Greeks. Our laws, our literature, our

religion, our arts, have their root in Greece.

But for Greece, Rome — the instructor, the

conqueror, or the metropolis of our ancestors —would have spread no illumination with her

arms, and we might still have been savages and idolaters; or, what is worse, might have arrived at such a stagnant and miserable state of in¬

stitutions as China and Japan [in 1822] pos¬

sess.® If pressed, Shelley would have to admit that European law was the invention of Rome;

and that, so far as concerns religion, the func¬

tion of the Greeks under the Roman Empire

was that of formulating and transmitting, not

of producing it. The Christian liturgy may

have originated among Christian Greeks ;

ecclesiastical music is essentially Greek; the

most original literary efforts of the early

Christian era, the hymns, were composed, some

in Greek, and some in Latin; and the New

Testament was written in the commercial

Greek (adapted) that had spread during the

supremacy of Athens, and was the general

means of communication for the eastern Medi¬

terranean. For all that, the customary attri¬

bution of intellectual culture to the Greeks,

and religious culture to the Hebrews, is in the main justified — if we remember that the dif¬

ference between the two races is one of degree and emphasis rather than kind, that the Greeks were not unreligious, nor the Hebrews unin¬

tellectual. Strictly considered, the gifts of the two races to civilization cannot be regarded

apart. Thus, as Renan points out, the Hebrews

discovered various literary types as well as the Greeks. And yet we are safe in deeming the

main literary types, and, as Shelley says, the arts in general, a bequest of the Greeks to the world. It was they who provided the models

which have aroused the enthusiasm of man¬

kind ; for the epic and mock-epic, the poems

of Homer; for tragedy, Hischylus and Sopho¬

cles ; for romantic tragedy and tragi-comedy,

Euripides; for political comedy, Aristophanes;

for the character-sketch, the rhetoricians and

Theophrastus ; for domestic comedy, Menan¬

der; for history, Herodotus and Thucydides;

for the dialogue, Plato; for the oration,

Demosthenes; for lyrical poetry, Pindar; for

pastoral, Theocritus. The satire, so far as we know, was another invention of Rome. But

what is often thought to be the peculiar type of modern literature, the prose novel, never¬

theless has its prototypes in the last produc¬

tion of the Greek genius, the romances of

Heliodorus, Achilles Tatius and Longus.

Even our scientific monographs, and the various types of literary criticism, in verse as well as prose, go back to Aristotle and his successors at Alexandria. In the main, Greek art has

given us a conception of orderly structure,

when we have been willing to accept it, pervad¬

ing all human activity and achievement. The

Greek, in his city-state built upon a hill, de¬

veloped a sense for architecture which re¬

appears in every other art and in all domains of life. The words and sentences of his oration

or his drama are arranged like the stones in

each section of his citadel and hill-crowning

temple, and the several parts are fitted together in order due, like the face and divisions of the Parthenon. The nomadic Hebrew originally

dwelt in tents under the stars of the desert.

His architectonic sense is relatively weak.

But his Psalms have expressed the grief and

exultation of mankind; it is he who gave the

final meaning to the Greek Logos, the Word

incarnate and undying; and the Greek words

Christ and Christian take us back not only to Rome and Greece, but, through Rome and

Greece, to Palestine. In any case they lead

us to the Mediterranean sources of all modern

civilization.

Bibliography. — For all special points con¬

nected with Hellenic culture, consult Pauly-Wissowa, (Real-Encyclopadie der Classischen

AltertumswissenschaftP (1894, etc.) ; and

Muller, (Handbuch der Klassischen Altertums—

wissenschafD (1892, etc.). In general, consult

Butcher, (Some Aspects of the Greek Genius)

(1893) ; Cooper, (The Greek Genius and its

Influence) (1917; contains a bibliography);

Moore, (The Religious Thought of the Greeks

from Homer to the Triumph of Christianity)

(1916) ; Rohda, <Psyche) (1903) ; Stobart,

(The Glory that was Greece } (1911) ; Thomp¬

son, (The Greek Tradition) (1915) ; Botsford

and Sihler, (Hellenic Civilization (1915).

Lane Cooper,

Professor of the English Language and Litera¬

ture, Cornell University.

GREEK DRAMA, The. Greek drama

had its origin in immemorial religious observ¬

ances ; and it never became entirely separated from religion. Among all the Greek gods none

appealed to the imagination more vividly than

the youngest — Dionysus, the god of wine.

Greek tragedy was simply a form of worship,

the ritual cult of this god, who made the initiate wise and the ungodly mad. It was Dionysus

that spoke most strongly to the sense and at

the same time to the spirit. The story of his adventures was replete with joy and sorrow.

Under some aspects it was a ((passion,® under

others a triumph, and all the other passion

plays since, even the spectacle at Oberammergau, are in the ancient spirit. One Dionysus after

another has been substituted, but from the first there has been a desire on the part of the

worshipper to realize his god vividly, with

thrilling nearness, to partake of his joys and sorrows and triumphs. But Dionysus was al¬

ways represented as being more nearly akin to

man than the greater deities ; and the burial of the wine in the dark tomb of the jars through the winter symbolized the new awakening of

man himself, the resurrection of the devotees

of the god to a fuller and more joyous life.

But wine was not the only manifestation of the god : oil and wheat were his ; he was the giver of physical joy and excitement, — in short, the 388

god of life. So we find diverse elements in the original drama : Thracian orgies and mysticism, the rustic gayety and joyous intoxication of the Greek peasant, and the religious conception of

certain laws of nature, such as germination and extinction, fructification in its widest aspect, whether in the bursting of the seed-grain lying in the earth, or in the generation of living

creatures. One of the most prominent expo¬

nents of this power was the goat, which was

sacred to Dionysus. From the Greek word for

goat (tragos) and song (ode) our word

“tragedy® is derived. Hence, too, the prom¬

inence given to the phallus in the solemn pro¬

cessions in honor of the god. Certain wood¬

land creatures, with pointed ears, snub noses,

spindle shanks, shaggy hair and goat tails

(satyrs) also belonged to the train of the god.

Tragedy (goat-song), comedy (village-song)

and the satyric afterpiece all have their origin in this early Dionysus worship. Later the

sufferings of other gods were presented at the festivals of the god and finally the representa¬

tion was extended to the heroes and heroines

of the past.

The Beginning of Greek Drama. — The

original element in Greek drama was choral

dance and song. Epic poetry was written in

Ionic, choral poetry in Doric : the Attic genius blended the two into a new poetic form.

Aritistic drama was the creation of Athens.

The cyclic dance and song in honor of Dionysus was called the

dithyramb, which was first raised to a high artistic level by Arion, of Lesbos, who later lived in Corinth. He elaborated the

choral hymn and fixed the number of the chorus at 50. He also gave a distinctive character to the evolutions of the “cyclic® chorus, as it was called, and to the manner of performance.

Arion dressed up the members of this chorus

as satyrs and had them sing of the adventures and sufferings of their leader, Dionysus, who

was described as traversing Asia from India

westward in a triumphant march and establish¬

ing his worship in all the countries through

which he passed. In the dithyramb, as devel¬

oped by Arion, we see the germ of Greek drama.

In his chorus do we find for the first time an at¬

tempt to act, in contradistinction to the simple narration of a story, as in the epic of Homer.

But the acting was not carried beyond the point of impersonation.

Athens and the Drama. — The beginning,

then, was made in Corinth, a city that did much for Greece. But it was in Attica that the next steps were taken. The Athenians were content

to import their ideas as well as their seed corn.

The rocky ground of Attica was not adapted to the growing of wheat, but it was adapted to

the cultivation of the vine and olive; and the preparation for the seed of tragedy; whose home was in the country about the Isthmus, had been going on for centuries in the soil of the Greek nationality. The first artistic Athens was that of Pisistratus, the first literary Athens that, of Solon, in the 6th century, but even this great time was only an earnest of greater things to come, only foreshadowed the unsurpassed

ex¬

cellence in art, architecture and literature soon to be manifested by the Athenians in conse¬

quence of their natural genius, their high intel¬

lectual endowments, their innate love of beauty and symmetry, their training and education, for which a free government gave them every op¬

portunity, the sudden increase in wealth and

power which followed hard upon their success

in the struggle with Persia, and, finally, that great burst of national enthusiasm which suc¬

ceeded the glorious triumph over Oriental pride and the narrow escape from despotism. In no

other soil could the seed of drama come to full fruition. Athens was now no longer an in¬

significant state. -She had suddenly become

strong, and was thoroughly imbued with a sense of her importance and of her measureless possi¬

bilities. Her peculiar location, as well as her great facilities of transportation, made access

to other peoples and to other ideas easy. Poets, artists, statesmen and professors of wisdom

gravitated toward the city which was fast be¬

coming the metropolis of the world. But

Athens remained herself : she was neither ab¬

sorbed nor overwhelmed by the influx of

visitors and foreign residents. The citizens had a passion for the honor and glory of Athens.

No time could have been more favorable for the birth and development of the real drama.

The Attic dialect was a modification of the

Ionic, but was not so effeminate as the parent speech, nor yet so harsh as the Doric ; it was rather a golden mean between the two, as the

Athenian himself was not so crude, rough and

rigid as the Dorian, and, on the other hand, not so flexible and pliant as the soft and effeminate Ionian. The Attic dialect, as developed in

tragedy, became the standard Greek language,

though Doric (which was the dialect employed

in the original choral hymn) was still used in the lyrical parts of tragedy, and Ionic and

Epic forms were introduced into the dialogue

for the purpose of heightening the color and

marking the language more distinctly from

prose.

There was one district in Attica especially in which the worship of Dionysus had a strong

hold on the people. This was the canton Icaria, on the slope of Mount Pentelicus about 12

miles north of Athens. A native of this dis¬

trict, Thespis by name, who lived in the middle of the 6th century, made an important innova¬

tion in the presentation of these embryonic

tragedies : he had certain individual satyrs step out of the chorus at some point of the perform¬

ance and recite verses addressed to other satyrs.

This is no longer mere impersonation, but the

introduction of a new element — real acting.

Dialogue is thus added to epic narration and

choral singing. But the performances were

obviously still very crude. It was not till the seat and centre of tragedy was transferred to

Athens that real progress was made. This oc¬

curred in 534 b.c. The first performance was

given under the patronage of Pisistratus. From

this time the development was rapid.

The drama of Thespis was neither tragedy

nor satyric drama, but the common ancestor

from which both these forms were evolved. To

Pratinas of Phlius (500 b.c.) is ascribed the in¬

vention of satyric drama, as a writer of which he was very famous. The subjects of this

drama, which later was enacted regularly as

an afterpiece to the trilogy, were of a lighter kind. The chorus was the centre of Greek

drama, and as the satyrs were traditionally an idle, rollicking, mischievous race, serious reflec¬

tions were out of place. With its playful cho¬

rus and its comic Silenus the satyr drama was unlike tragedy; but it was also unlike comedy.

The incidents were often grave, and it contained nothing which approached the parody of com¬

edy. The only extant play of this kind is the (Cyclops > of Euripides, the humor of which is quiet and somewhat suppressed. We have little

information about those of Hischylus and Soph¬

ocles, but that little leads us to believe that they contained more horse-play and were rather

coarse. Another famous writer of satyr plays

was Choerilus, who competed with Hfschylus

in 500 b.c.

Innovations. — About this time Phrynichus

of Miletus began his innovations. We know

little about his life and activity, but he was un¬

doubtedly a man of great boldness and orig¬

inality. To him Greek tragedy owed much of

the progress it made before the time of 2Eschylus. He made the bold venture of abandoning

not only the myths connected with Dionysus,

but of abandoning myths altogether, and of

taking for his themes historical events. The

names of two of these have come down to us.

In his (Capture of Miletus) he so affected his audience that the Athenians fined him for re¬

minding them so vividly of their misfortunes.

Later he produced the Phoenician Women. }

This was probably in 476 b.c. His treatment of the subject shows great artistic power. But

even in Phrynichus we have as yet no real

drama. His tragedies must have been little

more than lyric cantatas. Nevertheless, Phry¬

nichus was an innovator and made many im¬

provements. For example, he not only devel¬

oped the music and the dances, but also intro¬

duced for the first time female characters.

These were modest beginnings ; but in art

nothing is small. The next great name is

Hischylus, who may be called the real founder

of tragedy. (See TEschylus). Aristotle

says in his <Poetics) (4, 11-14) : <(The number of actors TEschylus first advanced from one to two ; he abridged the chorus and gave the dia¬

logue the principal role. Sophocles introduced

three actors and stage decorations. Further,

the originally short fables acquired a proper

magnitude, and the number of episodes was in¬

creased-. As tragedy developed from the satyric drama, it was late before it threw off comic

language and assumed its proper dignity.

Iambics displaced trochaic tetrameters; for

originally trochaics were used because tragedy,

like the satyric drama, was composed for danc¬

ing. But when dialogue was introduced, nature

pointed out the appropriate metre; for of all

metres the iambic is the most colloquial.®

A third actor was introduced by Sophocles,

about 468 b.c. He also increased the number

of the chorus from 12 to 15, although in the earlier plays of 2Eschylus there was a much

larger number, as, for example, in his earliest extant tragedy, (The Suppliants. } jEs-ohylus

also wrote his plays in trilogies, that is to say, three plays acted in succession, the second being a sequel to the first, and the third a sequel to the second. With the satyric drama full of

burlesque and ribaldry, which regularly fol¬

lowed the trilogy to relieve the tension of the audience, the combination was called a tetralogy.

Sophocles, however, abandoned the trilogy, and

while he produced three plays acted in succes¬

sion, there seems to have been no nexus be¬

tween them. Sometimes there was a change of

scene in tragedy, and, more rarely, in comedy.

This usual adherence to one place for the ac¬

tion, which was fixed by the presence of the

chorus, was called the “unity of place.® The

rule of “unity of time® was more strictly ob¬

served than in modern drama, though by no

means so strictly as is commonly supposed.

The “unity of action® is of universal application, resting upon the fundamental principle of

dramatic art that every part of a play must con¬

duce to a common end and to the development

of the main theme.

Tragedy. — Most of the subjects of Greek

tragedy are taken from the poems of the Epic

Cycle, and almost all the rest from the legendary history of the heroic age. The scenic appliances were partly invented by 2Eschylus, partly im¬

proved and completed. He paid great attention

to detail. Of the three great tragedians

.ZEschylus was the most practical : he superin¬

tended the performance, the arrangement of

each part, the decoration of the stage. All the machinery requisite for his gigantic productions was carefully studied. Nevertheless, his drama

reached farther than his scenic representation.

The Athenians were born debaters, and the ele¬

vation of this inborn capacity to the higher

ranges of art was the work of 2Eschylus ; he

was practically the creator of the dramatic

dialogue. None of his successors ever equaled

him in inventiveness ; none surpassed him in the variety and artistic arrangement of rhythms.

2Eschylus crystallized the language and devel¬

oped a lofty style; and, with a single exception (the Persians*), he selected his themes ex¬

clusively from the heroic myths. 2Eschylus

really marks a greater advance on Phrynichus in the development of tragedy than Sophocles on

2Eschylus. Henceforth the chorus forms, in a

certain measure, an ideal public, which partici¬

pates in the action as a sympathizing witness.

Though the drama has its origin in religion, its development and perfection is due to art. The

art-form was completely developed by zEschy—

lus. The next great dramatic artist was Soph¬

ocles. The changes attributed to him in the

external economy of the stage are not great :

the temper and tone of tragedy is changed ; the actors are made to play better; the material is narrowed to the compass of a single tragedy;

the characterization becomes sharper; the dia¬

logue moves more briskly; and the action be¬

comes more complicated, the meshes of intrigue

finer. The effects of Sophoclean scenes can

hardly be comprehended to-day: tableaus, full

of horror or pathos, which the noble grace of the actors' movements made more expressive —a calm and simple unfolding of a simple story, constructed with consummate art, each part of

which contributed to the beauty and perfection

of the whole. The chorus still respond to the action, as the strings of one lyre vibrate when those of another are struck ; but the lyre simply reflects, no longer bears the piece. The plot, on the other hand, was developed with the most

exact thoughtfulness. How subtly the plot is

articulated is seen best in Sophocles' Hving

Oedipus. } But it is particularly in dramatic

psychology, in the portrayal of character, that Sophocles marks a distinct advance on TEschylus. Euripides, the third of the great triad, brings his poetry nearer earth, but he does not differ¬

entiate his characters so well as Sophocles.

TEschylus evokes fear, Euripides compassion,

Sophocles both, and in due proportion. If one

can read but one great tragic poet of Greece, he 390

should select Sophocles, who has his inevitable perfection. Theoretically he is the chiefest of the three. He is the one consummate master

of style, versification, melody and vocabulary,

who always maintains a noble Homeric grace,

and never sinks below the calm level of high

art.

The dramatic performances were given at

two yearly festivals, the Lensean, in January,

and the city Dionysia in March. (See Greek

Festivals; Greek Theatre, The). Most of the

villages in Attica had their local festivals in December, called the Rural Dionysia.

Comedy. — Comedy was twin-born with

tragedy, for it sprang from the same worship

of Dionysus ; but it was longer in reaching a high stage of development, so as to be recog¬

nized as a distinct branch of literature. From early times Dionysus was celebrated by revel¬

ers, who sang impromptu songs at his festivals.

Such a band was called a comus, and the song was called a comus-ode , ˆcomedy." This was

first developed by Susarion of Megara. He in¬

troduced his performances into Attica, first at Icaria, the birthplace of tragedy. But the real founder of comedy was Epicharmus of Sicily.

He it was that introduced the plot, or at least developed the rude series of burlesques into a kind of artistic form. The next step was taken at Athens, and the principal poets were Magnes and Chionides. The number of actors was re¬

stricted to three, while the chorus consisted of 24 members — just double the number in early

tragedy. The three greatest comic poets were

Cratinus, Eupolis and Aristophanes. Comedy,

transplanted to Attica, and here developed,

formed after 465 b.c., a component part of

the Dionysiac festival. Its chief object was

to provoke mirth and laughter, but it had also an earnest patriotic purpose. As Jebb says,

<(Comedy is a public commentary on the every¬

day life of Athens, in great things and small.

Politics and society, statesmen and private per¬

sons, are criticised with unsparing freedom.

The satire is unscrupulously personal …

the poet had, as it were, a public charter to speak his whole mind to the citizens… .

The special weapon of old Attic comedy was

its power of holding up a man or a policy to admiration or ridicule before some 20,000 legis¬

lators. ˆ At some point in the play — usually

toward the middle — the chorus faced the spec¬

tators. This was their parabasis , or coming

forward to the house. The leader then ad¬

dressed the audience in the name of the poet, who set forth his views on public affairs or his merits or grievances. In Aristophanes, the

greatest comic poet of the ancient world, there is ((a play of fancy as extravagant as in a mod¬

ern burlesque ; the whole world is turned topsy¬

turvy; gods and mortals alike are whirled

through the motley riot of one great carnival.”

More and more comedy turned its attention

from . ridicule of public men (the license for which was more than once restricted by legal

enactment) to a description of private affairs.

So arose the socalled New Comedy. The

Middle Comedy (390 to 320 b.c.) marked the

neriod of transition from political to purely

social comedy. In this the element of choral

music disappears. The New Comedy (320 to

250 b.c.) was somewhat like our comedy of man¬

ners, or the German Lustspiel. (See Drama).

Consult Donaldson, (The Theatre of the

Greeks } (8th ed., London 1875) ; Flickinger,

(The Greek Theatre and >the Drama) (1918) ;

Haig, (The Tragic Drama of the Greeks J

(Oxford 1896); Hastings, (The Theatre:

a History of its Greek and Latin Origins >

(London 1901).

Joseph E. Harry.

GREEK AND ETRUSCAN POTTERY.

Dr. Schliemann, in his noted excavations

at Hissarlik (ancient Troy), brought forth

in the lowest (oldest) stratum crude black,

handmade, sunbaked pottery. It is supposed

to be about 3,000 years old. The stratification next above this held polished black earthenware with crude raised and incised decoration filled in with white. Some pieces were turned on the wheel ; some vessels have crude human and

animal forms. In the Cyclades (at Thera)

well-executed pottery has been found ; some

turned on the wheel and baked in furnaces,

with decoration in white, red or black. These

date from 2500 to 1600 b.c. The decorative

motifs, quite naturalistic and well-drawn, are

seaweed, cuttlefish, nautilus and other marine

subjects. Other quite recent discoveries on the islands of Rhodes, Crete, Cyprus, in Attica,

Boeotia, etc., give us some knowledge of the

products from about 2000 to 1500 b.c. Crete

evidently was the centre of this remarkable

Bronze Age culture (termed Mycenean Period).

Minoan Period. — Called also Cretan Period.

Excavations made under the ruins of the palace of Knossos (ancient capital of Crete) brought

forth unglazed, handsome pottery with primitive

ornament (scratched lines, punctuations, etc.)

filled in with chalk and line decoration in colors.

These are said to date earlier than 2000 b.c.

Later ware found has light colored ornament

(whorls, angles, etc.) on a ground of black

varnish, also black painting on bare red clay

ground. These pieces show fine technique ;

some are as thin as the finest blown glassware.

They consist of bowls, wine-pots, amphorae,

tableware on <(high supports." Rims are some¬

times waved. Decoration is in red, yellow,

orange and white, on brown or greyish-black

body. The latest pieces appear to date about

1600 b.c. The most remarkable of these ˆpalace"

ware pieces are the funnel-formed, footless

vases; they have decoration of conventional and natural flowers, rosettes, birds, fishes, shellfish, etc., in bright colors on lustrous black ground — an effective contrast. Colors run to yellow-ochre, brick-red, purple-red, milky-white, while

the body is buff color. Most pieces are turned on the wheel. This ware is termed Kamarces,

because first found in a grotto at Kamarces.

The above wares belonged to what has been

classified as the Prehistoric Period.

Corinthian Style. — The earliest of this

archaic Greek pottery shows Egyptian tendency

in decoration, later followed by figures of

animals or the Sphinx taken from the older

Oriental period. Then followed single mytho¬

logical figures with name inscriptions, later

came hunting scenes, dancing groups of nude

males and females (former often Satyrs), a

youth riding or walking alongside a horse, *etc.*

While the main composition of the figures is

painted in black varnish on the red clay body, sometimes white and purple details (dress,

features, etc.) appear, also incised lines indicate muscles, *etc.* White pigment on the red ground

is used for the nude parts of women, for

GREEK VASES

V; Hggf§8 Kv • ■ £

‘ s’. Sk.- ’

‘

; -M. ˆ lir

Sf ‘•jRffl

Mil/

fair •

Courtesy of Metropolitan Museum of Art, New York 1 Black Figure Hydria. Heracles and Triton (350 300 B. C.) 2 White Figure Krater. Subject Dionysos and Satyr (600-500 B. C.) 3 White “ Sepulchral ” Lecythos (450-400 B. C.) u 4 “ Apulian ” Vase. Subject Exchange of Gifts Between Lovers (4th Century B. C.) GREEK VASES

Courtesy of Metropolitan Museum of Art, New York 1 “ Panathenaic ” Amphora (520-500 B. C.) Contest, Side View 2 Same. Athene, Side View

3 Amphora. “ Geometric ” Decoration (7th Century B. C.) 4 Amphora. Late “ Geometric ” Decoration (7th Century B. C.) GREEK VASES

. . ~

Courtesy of Metropolitan Museum of Art, New York 1 Long-stemmed Kylix. Subject Chariot Race (6th Century B. C.) 2 Kylix. Subject Satyrs between Decorative Eyes (6th Century B. C.) 3 “ Eye ” Kylix. Signed “ Psiax ” (520-500 B. C.) GREEK AND ETRUSCAN POTTERY

horses, dogs, *etc.* These pieces are said to date from 650 to 550 b.c. Their popularity soon died out with the competition of the artists of

Athens.

Attic Vases.

Black Figure Period (“Archaic® Style). —

IJntil recent years all the black figure decorated pieces were considered of Attic production and

were termed “Attic vases. ® Later discoveries

of the ware were made in Egypt (Naucratis),

Rhodes, Cyrene, Corinth, thus disspelling the

supposition of Attic monopoly. Copying the

Corinthian methods, the Athenian artists soon

excelled their prototypes and absorbed the en¬

tire export field. Amphorae of the early stage have the designs in panels; favorite motifs

are lotos, palmette, meander and rays, point

upward, from the foot. The chiton (skirt) is

depicted with rigid perpendicular folds; later

the folds take oblique direction (to indicate

motion). The himation (sort of shawl) started

to be worn later and appears over the chiton

on vases. Men’s eyes are large and round,

women’s small and oval, they are not in side

view but stare out entire from faces in profile.

The human extremities taper in an archaic way; figures are unnaturally tall and thin. Perspec¬

tive is missing. Very shallow kylikes decorated with eyes appear in this period. Many Pan¬

athenaic amphorae (prize vases filled with oil

given at the Panathenaic games) are black—

figured; all have Athene on the obverse brand¬

ishing a lance in her right hand, a shield in her left, the nude parts white. Columns on either

side of her are surmounted usually by cocks.

On the reverse side are scenes of the contests : foot-races, chariot-races, the pentathlon, boxing, musical competitions.

Dipylon Vases. — These are so called be¬

cause most of these “geometric® decorated vases were found in the graveyard in front of the

dipylon gate. Their ornament (called “geo¬

metric®) consists of circles, crosses, lines, dots, with beautiful meanders interspersed. Later

aquatic birds, deer and horses appear. The

human form is attempted with archaic thin

waists, angular shoulders, fork-formed legs.

Red Figure Period. — Termed often the

“Beautiful® Style. Attic vases do not show

black figures after about 400 b.c. The decora¬

tion and background then reverse one another

and the body is painted in black varnish while the decoration is left in reserve, thus appearing in the red of the terra-cotta body. Details on the figures, which before had been indicated in white or purple, or by scratching lines disclos¬

ing the body, are done now by fine brush lines in black to bright

yellow. The method gained

in perfection from about 520 to 450 b.c. The

kylix was the first vessel to obtain this new style ornamentation and we find hydriae and

amphorae at that early stage still with black

figures. Both methods in combination appear

on some pieces of the transition period. The

hair on human figures, before given a black

mass, now is first done by engraving through

the black, later by a thin line in reserve. The delineation of the eye changes in this red-figure period. Formerly the eye was given a full-faced detail, with circular pupil, on a face in profile ; by stages the pupil and upper and lower lids assume the normal profile aspect. The

later stage belongs to what has been termed

the “strong® style, as distinguished from the

former “severe® style. A further advance in

depiction, early in the 5th century, is in dis¬

placing the stiff parallel folds of the chiton by waving folds that express the motion of the limbs and, in the artist Euphronios’ day, the

softness or pliability of the clothing is artisti¬

cally expressed by indicating the form beneath

by the direction of the folds of the drapery.

The treatment of the human figure prevailing

up to this period was taken from the Egyptian artists, and portrayed the shoulders and” chest in front view while the rest of the figure was treated in profile. Perspective and foreshorten¬

ing are arrived at in this period. It is the beginning of the “good®

period.

We have, therefore, three stages of develop¬

ment in this “red figure® period. First, the

“archaic® period with its Oriental and Egyptian tendencies and somewhat crude depiction but

adept draughtsmanship; next, the “severe®

period with its human figures in stiffly drawn clothing and disproportioned features; lastly,

the commencement of art refinement in draw¬

ing and technique, as displayed in the “good®

period. The “beautiful® style was in its great¬

est perfection about 450 b.c.

With the acquisition of absolute control and

unexampled dexterity in both technique and

draughtsmanship, comes soon a tendency to

ultra-refinement and over-elaboration of orna¬

ment lacking the former repose and graceful¬

ness ; the treatment becomes “florid.® Compo¬

sition became careless, even coarse. In 413 b.c.

the Athenians were beaten in battle at Syra¬

cuse, in 404 Athens was captured by the Per¬

sians. At some time between 427 and 405 the

production of Attic vases died out. We have

Panathenaic amphorae dated from 376 to 313

b.c., and that white sepulchral lecythi were be¬

ing produced in 392 we know, for Aristophanes

mentions the fact. But excavations at Athens

disclose no painted vases in the tombs dating

from early 6th century to 300 b.c.

The names of these wonderful potter artists

that have come down to us are very few and

there is doubt as to whether some of the names appearing on the vases are signatures ; they

may often be the names of original owners of

■the art pieces. From the fact of frequent

appearance on pieces showing the same crafts¬

manship or other knowledge gained we get

such names as Exekias and Nicosthenes (kylix

painters) ; Andokides and Epictetos (transition

black to red figure periods) ; Euphronios, Brygos, Euthymides (5th century) ; Charinos (red

figure period) ; Hieron (cup painter) ; Duris, *etc.*

South-Italian Vases.

Decadent Period. — After the 4th century

many potter-artists appear to have deserted

Athens and migrated to Greek colonies in the

Crimea and South Italy (Capua, Tarentum,

Paestum, etc.). Their Attic refinement disap¬

pears, but the red-figure technique continues

in this Greco-Italian ware. The aim is at vulgar display rather than art merit, probably cater¬

ing to the tastes of their new patrons. Crowding of motifs (palmettes, wreaths, etc.), extended

use of white in the flesh of females and the ever-present god Eros show decadence. Yellow

appears for hair detail and for features and as shading; purple appears. The backs of the

vases are either devoid of ornament or the

work is done in careless, perfunctory manner.

Some authorities suggest theatrical influence in the extravagance of posture and rich embroid¬

ering of the garments, *etc.* And stage scenes

(tragedy and comedy) are depicted, even the

stage itself is sometimes presented. But scenes of local daily occurrence are the most frequent.

Some of the more ambitious large vases were,

doubtless, designed for funeral use. They are

decorated with pictures of action in the Under-World — groups containing Pluto and Perse¬

phone, Cerberus, the Furies, *etc.* ; some show

tombs or shrines and mourners making offer¬

ings to the dead. We find localities of proven¬

ance can be identified often by distinctive

characteristics. Campania appears to have

had a (<fondness for polychromy" but the exe¬

cution is careless ; the artists in Apulia created some gigantic vases with very ornate handles

for funerals and theatricals with ornament of

great magnificence. At Psestum were the

artists Assteas and Python with their elabor¬

ately detailed groups depicting mythological

scenes, etc., in true Attic style. By the end of the 3d century Grecian tendency gives way

to Roman styles.

Etruscan Vases.

Early Italian Pottery. — In this period title

authorities include wares dating from 1000 b.c.

to 400 b.c., and Walters (British Museum) di¬

vides it into the Villanova and Latium Periods and the Etruscan bucchero and Polledrara

wares. The ((Villanova Period" pieces are cin¬

erary urns of the 10th century b.c. They are

produced in <(rough brown impasto ” or coarsely prepared clay. Simple lines and curves con¬

stitute their decoration ; they are found enclosed in bronze vases of elaborate decoration. Vil¬

lanova (near Bologna) cemeteries disclosed

the best specimens. Date of origin is still a matter of conjecture. Early <(Latium Period”

pottery vases are similar to the former ware in form and body and show thin polished paste.

Advance in culture (about 700 b.c.) brought

inhumation in place of incinerating of the de¬

ceased and imported Greek products are found

in the tombs. Improved technique is shown on

some native pieces and decoration changes from

coarsely incised ((geometrical” to carefully exe¬

cuted spirals, fan patterns, etc., defined in

closely arranged punctures. Some red polished

pieces belong to this ware which have crude

designs (some painted in white) ; there are

large ((caldrons with high mounted stands” and

triangularly pierced bases. ((Etruscan buc¬

chero” ware of the 8th century shows well-developed forms made in carefully refined and

manipulated ceramic clay. Decoration is in¬

cised or engraved and moulded medallions and

figure reliefs are applied. Some figures are

moulded in the round and attached to the rims ; some are caryatid forms acting as supports

for the vases. This ware has lustrous black

polished surface. Some red pieces are supposed

to be an under-baked variety of the above but often show no decoration. Both the red and

the black sometimes show friezes with bands

of relief done by rolling a cylinder having

decoration carved in intaglio. A form fre¬

quently found is a bowl with straight sides on a high support. <(Polledrara" ware (so called

from the place where a large hydria of this

style was found) is placed in the 7th century b.c. These pieces are of reddish brown clay

coated with lustrous black slip. They show

elaborate painted decoration in yellowish white, blue and red.

Bibliography. — Birch, S., (History of An¬

cient Pottery) (London 1858) ; Benndorf, O.,

ˆGriechische und sicilische Vasenbilder5 (Ber¬

lin preface 1868) ; Boettiger, K. A., 'Griechische Vasengemalde5 (Weimar 1797) ; British Mu¬

seum, (A Guide to the First Vase Room5

(London 1879) ; British Museum, (Catalogue

of the Greek and Etruscan Vases5 (4 vols., with descriptive text by B. Walters and C. H. Smith, London 1896) ; Buscher, E., (Griechische Va-senmalerei5 (Munich 1914) ; Christie, J., 'A

Disquisition upon Etruscan Vases5 (London

1806) ; Cook, E. T., (Handbook of the Depart¬

ment of Greek and Roman Antiquities, British

Museum5 (London 1903) ; Dennis, J., (The

Cities and Cemeteries of Etruria5 (2 vols.,

London 1848) ; Dumont, A., ‘Peintures cera—

miques de la Grece propre5 (Paris 1874) ; Fair¬

banks, A., (Athenian Lekythoi5 (New York

1914; Appendix to same, New York 1914) ;

Flasch, A., ‘Die Polychromie der griechischen

Vasenbilder5 (Wurzburg 1875) ; Furtwangler,

A., and Loeschke, G., ‘Mykenische Vasen5

(Berlin 1886) ; Gerhard, F. W. E., ‘Auserlesene griechische Vasenbilder, hauptsachlich etrus-kischen Fundorts5 (3 vols., Berlin 1840-58) ;

Gerhard, E., ‘Etruskische und kampanische

Vasenbilder des Koniglichen Museum zu Berlin5

(Berlin 1843) ; Jolles, A., ‘Aegyptisch-myke—

nische Prunkgefasse5 (Berlin 1908) ; Harrison,

J. E. and McColl, ‘Greek Vase Painting5

(London 1894) ; Hartwig, P., (Die griechischen

Meisterschalen der Bliitezeit des strengen roth—

figurigen Stils5 (Stuttgart 1893) ; Heydemann,

H. G. D., (Griechische Vasenbilder5 (Berlin

1870) ; Hoeber, F., ‘Griechische Vasen5

(Munich 1909); Horner, S., ‘Greek Vases: Historical and Descriptive5 (London 1897) ; Lau, G. T., (Die griechischen Vasen, ihre Formen und Decorationssystem5 (Leipzig 1877 ; trans. of same by E. H. Greenleaf, Boston 1879) ; Poulsen, F., ‘Die Dipylongraber und die Dipylonvasen5 (Leipzig 1905) ; Rayet, O., and Collignon, M., ‘Histoire de la Cera—mique grecque5 (Paris 1888) ; Tarbell, F. B., (History of Greek Art5 (London 1896) ; Treu, G. D. K., ‘Griechische Thongefasser in statuet—ten und Biistenform5 (Berlin 1875) ; Tsountas, C., and Manatt, J. I., ‘The Mycenaean Age5 (London and Cambridge, Mass., 1899) ; Walters, H. B., (Ancient Pottery: Greek, Etruscan and Roman5 (2 vols., London 1905).

Clement W. Coumbe,
Technical Art Expert.

GREEK FESTIVALS. Festivals were a great feature of ancient Grecian life. There

were country festivities in Attica in December, a feast of the wine-press in January, an “All-Souls” festival lasting three days in February, a great (<City Festival55 of Dionysus for five days in March, a festival of first-fruits in May, and the magnificent holiday of Athena for six

days in the July of every fourth year. At

Sparta the greatest festival was the Carneia.

Then there were the great national festivals of Pan-Hellenic interest: at Olympia held in honor of Zeus every four years in Elis; the Pythia, in honor of Apollo at Crissa near Delphi, also GREEK VASES

every fourth year; the Nemea in Argos every

two years; and the Isthmia in honor of Posei¬

don every two years at Corinth. Musical con¬

tests were the chief feature at the Pythia, al¬

though athletic events were also held here as

elsewhere. This festival was celebrated in the

winter in the third year of every Olympiad.

The Nemea were held in the second and fourth

years of every Olympiad, alternately in sum¬

mer and winter. Here also contests in playing

the flute and the lyre and in singing were in¬

cluded. The Isthmia were held in the spring

of the first and in the summer of the third

year of every Olympiad. The visitors brought

their slaves, who carried tents, bedding and

food. Women were not permitted to attend;

and even the slaves who accompanied their mas¬

ters could not see the games. The earliest con¬

test, and the one with which each festival

opened, was the stadion, or short-distance foot¬

race, corresponding roughly to our 220 yard

dash (to be exact 600 Greek feet). Wrestling

and boxing were added later. In the 7th

century chariot racing was introduced, and this was followed by the horse-race and the pankra-tion, which required the use of all the powers of the contestants. The pentathlon (five events) had been introduced earlier. The prize at

Olympia was a crown of wild olive ; at the

Pythia a wreath of laurel; at the Nemea and

the Isthmia a wreath of parsley. See Olym¬

pic Games.

In Attica there were many Holy Days and

Feasts: in August-September the Kronia,

which was originally a rural festival, the Synoi-kia in honor of Athena and Hestia, the Panathenaea, the Heracleia, and the Adonia, cele¬

brated especially by women ; in September—

October the Genesia, a day devoted to the dead, Charisteria, or Thanksgiving for the fall of the Thirty Tyrants; in Oc'tober-November the

Pyanepsia, or Feast of Beans, the Oschophoria

(Grape-bearing race), the Theseia, the Epita—

phia, the Apaturia, at which the babies and the young men were registered in the phratry, or

clan, the Thesmophoria, celebrated by women

in honor of Demeter, the Stenia, the Nesteia (a strict fast), and the Kalligeneia, the festival of the mother of the beautiful child (Persephone) ; in November-December the rural Dionysia and

the Haloia; in December-January the Lensea;

in January-February the Anthesteria, or merry

Feast of Flowers, the Opening of the Wine—

casks, the Feast of Pitchers, the Feast of Pots, the Lesser Mysteries, and the Diasia; in February-March the Greater Dionysia, the chief

feature of which was the dramatic contests;

in March-April the Mounichia, the Aianteia in

memory of Ajax, the Brausonia and the Olym—

pieia ; in April-May the Thargelia, the Delia,

the Kallynteria, at which the little .temple,

Erechtheum, was purified, and the Bendideia in

honor of the Thracian goddess Bendis; and in

May-June the Skira, the Arrephoria and the

Dipolia.

The Panathenaea included contests in ath¬

letics, music and in literary recitation. In the large Mouseion, or ((Hall of SongP was held a public competition in the delivery of passages

of Homer, another in signing to the accompani¬

ment of the harp, and a third in instrumental music on the harp and the flute. The rewards

were prizes in money and a wreath or crown.

GREEK GODS

On another day was an all-night festivity of

song and dance and of torch-races.

The chief day, however, was the day of the

great procession. All the people gathered in

their most brilliant attire in the Cerameicus for the purpose of escorting to the Acropolis a

large and gorgeous saffron robe, embroidered

with legendary exploits of Athena against the

Giants. It was spread as a sail upon the mast of the model of a ship, which was propelled

along the street on wheels, or rollers. The

cavalry in their bright cloaks led the procession ; the winners in the athletic contests, wearing

their crowns and the dignitaries and old men of high repute carrying olive branches, came next ; and the women of the resident aliens, carrying the parasols and the camp-stools of the privi¬

leged. daughters of Athens, brought up the rear.

The procession moved through the public

square, wound through the chief streets to the foot of the Acropolis, ascended through the

Propylaea, and passed on to the older temple,

in front of which a great sacrifice was made.

A. feast followed, and the whole festival closed with a regatta at the harbor-town of Peiraeus.

(For the Dionysiac festival see Greek Thea¬

tre, The; for the Olympic festival see Olym¬

pic Games). Consult Gulick, <The Life of the

Ancient Greeks* (New York 1902) ; Mommsen,

(Die Fest der Stadt Athen im Alterthum*

(Leipzig 1898) ; Tucker, (Life in Ancient

Athens) (New York 1906).

Joseph E. Harry.

GREEK FIRE, a combustible composition

made probably of naphtha, sulphur and nitre,

which was first used in 673 a.d. by the Greeks of the Byzantine Empire against the Saracens.

Its invention has usually been ascribed to Callin-icus of Heliopolis, and to the year 668 a.d. The mixture appears to have been highly inflam¬

mable, and to have been difficult to extinguish ; was poured out, burning, from ladles on be¬

siegers, projected out of tubes to a distance, or shot from balistse, burning on tow tied to ar¬

rows. At Constantinople the process of making

Greek fire was kept a secret for several cen¬

turies ; but the knowledge of its composition

and the use of it, gradually spread to the West.

It was in use for a short time after the inven¬

tion of gunpowder. Combustibles of a similar

kind were used at the siege of Charleston in

1863, composed of sulphur, nitre and lampblack ; and naphtha in shells was also tried.

GREEK GODS, The. Until within the

last half century our earliest knowledge of the gods of Greece was obtained from the Homeric

poems, but the excavations which were inaugu¬

rated at Troy by Schliemann in 1871, and con¬

tinued by him and many others at Mycenae and

at numerous other sites in Greece proper, and

which more recently have been prosecuted in

Crete and on the western coast of Asia Minor, have revealed to us many monuments of the

second and some even of the third millenium

before our era. * These monuments show us that in the second millenium, b.c., the inhabitants of these lands had already conceived of some at

least of their divinities in anthropomorphic

forms; that is to say, they thought of their

gods and represented them in the fashion of

human beings, so that when the Hellenic civili¬

zation of the later period developed, the people

were in many ways in an advanced religious

stage.

On the other hand there survived among the

ancient Greeks to the latest period many primi¬

tive elements, such as the worship of sacred

stones, trees, symbols, *etc.* The monuments of

the Minoan and Mycenean civilizations seem ‘to

give evidence of widespread animal worship and

of the cult of monsters, part man and part

beast. This worship survived in part into the

historic period; probably some of the sacred

animals of later times bear witness to it; even in the 5th century, the god Dionysus was cele¬

brated in song as a divine bull. In agricultural festivals also many primitive rites survived,

such as the widespread phallos worship. There¬

fore Greek religion of < the classical period and through all the centuries to the end of antiq¬

uity contained much that belongs to the lower

strata of religious development side by side

with higher concepts of divinity.

The Origin of the Gods. — As to the origin

of the Greek gods, it is impossible to speak with certainty on many

points. Without question

the worship of natural phenomena, of inanimate

objects, of ancestors, and of sacred animals

and trees all contributed to make up the sum

total, but this list does not exhaust all the factors fwhich entered into Greek religious

thought and expression. To the Greek the

world was filled with a multitude of super¬

human beings who were responsible for all

phenomena. Most of these divinities were

limited and local, but since some were mani¬

fested in every field of activity, man was always in social relations to them; he was obliged to seek their favor, or to propitiate them by offer¬

ings and by prayer. A few gods among the

total attained to a universial character, so that they were worshiped in every part of the

Greek world; but, even so, most of these gods had seats to which their worship was especially attached, as Athena to Athens, or Hera to

Argos.

Their Character and Power. — In the

(Iliad > and (Odyssey* we find a group of gods bound together in an organization similar to

that of the Homeric state. At the head is

Zeus, the father of gods and of men, whose

power far surpasses that of any other divinity, but who, however, is not wholly omnipotent or

omniscent. To him the elements are subject

and his nod makes the universe tremble. He is thu chief of all : he presides over his aristo¬

cratic state like a Homeric king, while the other Olympian divinities make up the council, and

the minor gods form the popular assembly.

With him Apollo and Athena hold the first rank.

Hera, the sister and wife of Zeus, however, be¬

longs in the second with Poseidon, the god of the sea. Ares and Aphrodite represent the two

passions of rage in battle and of sexual love.

Artemis, the sister of Apollo, is of lower rank, as is Hephaestus, the god of fire. Hermes is a kind of upper servant of the great gods, who

executes their commissions ; there are still other divinities of inferior position. ’

Demeter and Dionysus, who are so important

in later centuries, have not yet been admitted to Olympus in the Homeric epics. The god of

the lower world is Hades; he presides in the

realm of the dead, which is conceived to be

beneath the earth.

All these divinities are represented as

stronger, larger, and wiser than mortals ; but

not wholly superior to them, for like them they are subject to the passions of the mind and

body. Their pre-eminence over mortals con¬

sists chiefly in their immortality. This Homeric pantheon seems to have been created in part

by a selection, made from the greater local

divinities, who were universalized by the poet

and given the characters which his art fixed

for all later time. The Homeric poems ac¬

quired such universal influence wherever Greeks

went, that the chief local divinity was assimi¬

lated to one of the Homeric gods and given the characteristics which that divinity possesses in the epics. At Olympia Phidias fashioned his

Zeus after the Homeric description, and at

Athens he represented Athena in the manner

in which the epic bard had made her.

These great epics then represented the gods,

in a sense, in an artificial organization. Hesiod, however, introduces us to a somewhat different

world and to conditions as they really existed.

We find in him many divinities not mentioned

in Homer; and the worship of the dead and

of heroes, which the epic poet passed over, is made much of by the later writer.

It is evident that Zeus was, from an un¬

known period, the most universal of the Greek

gods. The superior position which he occupies

in Homer was still further exalted, until he

became altogether supreme, and even appears as

the all-embracing divinity including all minor

gods, comprehending within himself all divine

powers. Indeed at times the Greeks approached

monotheism. Yet it is necessary to bear in

mind that to the ordinary Greek his local gods were most important, and although he might

recognize a similarity between his divinity and the same divinity in some other place, his at¬

titude remained very much like that of the

Greek peasant to-day toward his local saint.

The greater gods like Zeus and Athena

doubtless absorbed countless numbers of local

divinities, and yet even these gods retained in a way their local habitations to the end of

paganism. Olympus was the home of Zeus

above all other places. The Athenians, at least, regarded Athens as the home of Athena, while

Hera was domiciled in Argos from unknown

antiquity. Apollo had two homes, at Delphi and at Delos; the former was his chief oracular

center from which for centuries his pronounce¬

ments, as interpreted by his priests, influenced affairs to the remotest

borders of the Greek

world; at Delos the god presided over the

ancient religious centre of the ZEgean. Asclepios had his great home at Epidaurus in

Argolis. To this place for centuries the sick

and cripples came to be healed by a vision or a miracle, and in later times by regular thera¬

peutic treatment. A branch was established

on the island of Cos, and early in the 3d cen¬

tury the Romans induced the god to begin the

practice of his art on the island in the

Tiber.

At Eleusis, northwest of Athens, there was

celebrated at an early period an agricultural

festival in honor of Demeter and her daughter.

Out of these agricultural rites, intended to

secure abundant crops through the favor of the goddesses, arose the Eleusian mysteries in which the initiates received assurance of a happv life hereafter. Similar mysteries, presided over by

these two divinities, or by others, existed in GREEK LANGUAGE

many parts of Greece, but none attained to the importance of those at Eleusis.

The heroes formed a class of superhuman beings midway between mortals and the gods, often half-divine by origin; they received celestial honors after death. The most famous of these were Hercules and Theseus, both of whom undertook severe toils for the advan¬ tage of mortals and so conferred lasting benefit on mankind, in return for which they received divinity.

In the Minoan and Mycenean periods it is clear that the spirits of the dead were wor¬ shipped or propitiated by offerings at the tombs; these practices were universal in later Greece. Gifts of wine, milk, and honey were regularly made, and the nearest of kin cele¬ brated anniversary meals in honor of the de¬ ceased. In general the spirits of the dead were regarded as baneful powers rather than beneficient divinities.

With the rise and development of philo¬ sophic thought the enlightened Greeks greatly modified their belief in the gods of the common people, so that in Plato we find something very akin to monotheism. Later philosophies, like the Stoic, provided for a multitude of gods, al¬ though they asserted the supremacy and all—

comprehensive character of the divine prin¬

ciple, so that under the Roman Empire the

educated part of the ancient world held to a

henotheistic view, which, however, did not ex¬

clude an elaborate polytheism ; that is to say, they believed that the divine was one, but that it manifested itself in countless ways and in

countless places, and that for convenience it was allowable to give to these various manifesta¬

tions of the One the names of the many gods

of popular belief. Such views, however, were

limited to the more highly educated, for com¬

mon men continued to believe in a vast number of individual divinities throughout antiquity,

and indeed brought this belief over into Chris¬

tianity. See Greek Mythology ; Greek Re¬

ligion.

Bibliography. — Adam, J., (The Religious

Teachers of Greece) (2d ed., 1909) ; Campbell, L., (Religion in Greek Literature) (1898) ; Fair¬

banks, A., (A Handbook of Greek Religion)

(1910) ; Farnell, L. R., (The Cults of the Greek States* (5 vols., 1896-1907) and (The Higher

Aspects of Greek Religion* (1912) ; Gruppe, O., (Griechische Mythologie und Religionsgeschichte) (2 vols., 1897-1906) ; Moore, C. H.,

(Religious Thought of the Greeks) (1916) ;

Stengel, P.,(Die griechischen Kultusaltertiimer)

(2d ed, 1898).

Clifford H. Moore,

Professor of Latin, Harvard University.

GREEK LANGUAGE. Greek is one of

the Indo-European languages, and in its mod¬

ern form which illustrates fully the analytic

tendency of all modern languages, it is still

spoken by 8 or 10,000,000 Greeks, who inhabit

nearly the same regions as in ancient times.

These included the southern part of the Balkan peninsula, i.e, Greece proper, with Epirus and

parts of Macedonia, the eastern shores of the

.TEgean Sea with all its islands, extensive colo¬

nies on the coasts of the Propontis and Black Sea, the large islands Crete and Cyprus, settle¬

ments, like that of Cyrene, on the northern coast of Africa, colonies in southern Italy ahd Sicily which controlled these regions so fully that

the name Magna Graecia clung to them until

long after they came to form parts of the

Roman empire. Only in the western Mediterra¬

nean has there been any marked decrease, and

this chiefly in mediaeval and modern times, in the numbers of Greek-speaking inhabitants.

The earliest home of the Greeks, the region in which, as far as we can tell, their speech first developed a character of its own, seems to have been in the great plains of the Danube, or

among the mountains of the Balkan ranges.

The homogeneity of the language in sounds,

forms and vocabulary is indicative of a consid¬

erable lapse of time between the period of

breaking off from the parent Aryan or Indo-European stock, and the later splitting up, in successive waves of immigration, into the vari¬

ous small and separate states of Greece with

their individual dialectic peculiarities. These

states were in early times so cut off from one another that a common language could hardly

have developed among them at that early period.

Rather did their mountainous barriers and the

difficulties and dangers of early navigation tend to develop groups that differed from each other in dialect and in race consciousness.

Ancient Greek. — Numerous inscriptions of

the 7th century b.c, written chiefly in an

alphabet derived from Semitic sources, are the

earliest testimony that we have as to the form of the language after it had reached this dialect stage, but references in the early literature show that the Greeks were preceded in their land by various peoples of, as far as we know, autoch¬

thonous Mediterranean stock, who spoke a non—

Indo-European language. Such were the Pelasgi, scattered over many parts of Greece, the Leleges in central Greece and the Cyclades, and the Carians in southwest Asia Minor and the

neighboring islands. These peoples were grad¬

ually absorbed by the invading Greeks, but un¬

doubtedly influenced the language of their

conquerors to a greater or less extent. Proper names ending in -ettos, -issos, -ossos and

-inthos, such as Hymettos, Lycabettos, Cephis—

sos, Gnossos, Corinthos, Parnassos and Parnes,

which seem to have no meaning as Greek

words, and have no cognates in the other Indo-European languages, are probably survivals

from the speech of these older inhabitants. It is truly remarkable and confirmatory to a high degree of our faith in inherited legends, that the mythical tales of racial wanderings and set¬

tlements, handed down by the Greeks in their

legends agree so fully with the evidence derived from linguistic sources. Tribes and cities far

removed in space retain in their speech traces of their early consanguinity. The first wave

from the north that swept into Greece made its way into Attica and Euboea, the northeastern

part of the Peloponnesus and its northern or

(later) Achaean coast. Probably under the

pressure of a later wave of immigrants, the

most venturesome and daring among them,

seemingly chiefly men, made their way by the

Cyclades islands to the central part of western Asia Minor, where, by contact with the Carian

civilization and intermarriage with the women

of the land, that distinctively Ionic dialect and culture arose, which differed so markedly from

the Attic-Ionic tyoe. We find a fairly uniform speech in Miletus, Priene, Ephesus, Chios

and Samos, in the cities of the Ionian Dodecapolis, the Cyclades and Euboea, and in the colo-306

nies founded from Miletus before the 7th

century b.c. The Ionians seem to have bor¬

rowed epic poetry from their northern Greek

neighbors, the iEolians, whose southern colo¬

nies they subdued in the 9th century b.c. In

the Iliad and the Odyssey they added a realistic and finely descriptive element to the imagina¬

tive, vigorously creative gift of the early .TEolian rhapsodists. From Chalcis as well as from Mile¬

tus this Ionicizing influence spread to Chalcidice, Thrace and the Black Sea, to Italy and Sicily, where it was, however, finally forced to yield ground in the 5th century to the Doric. Ionic changed least in the Cyclades and Euboea, where its isolated condition tended to preserve it, and changed most in Athens where a variety of in¬

fluences were brought to bear on it.

A full discussion of the Ionic dialect would

be out of place here, but the following import¬

ant characteristics may be listed: (1) The _ a of the original common Greek becomes v in

Ionic (ddfxog to pdrrjp to p-yrpp) although

in the Attic form of this dialect a is found after ey i , and p. In the earliest Attic Greek, however, even in these cases we have every rea¬

son to believe that the Ionic V prevailed for a considerable time until the influence of the surrounding mainland dialects caused a to be

pronounced; (2) A metathesis of quantity is ob¬

served in words like fiaoikijoQ and the Ionic PacuX-eog, So 7aof to and the genitive Ttp,auv to

Tipeuv, or by synizesis to the dissyllabic tl/llcuv, rip,uv; (3) Two vowels in the interior of a word were very early contracted: rip-aeig, to Tip,agy tyiTieo to yheog to yevovg, etc: (4) The letter F, long preserved in the other dialects in words like F epyov, F oinog, and Foida, disappeared very early in Ionic (800 b.c. or earlier) though the Iliad and Odyssey show clear traces of its use at the time the poems were composed; (5) Instead of an original v/iigy vp.£uv, and v/ie, etc., the Ionic uses the forms vp,elgt vp-uv and vfxdg, on the analogy of adjectives like aliTjdfc; (6) v movable seems to have come in on the analogy of vv (cf. Homeric V£vy where the v is an original third person plural ending extended to the singular) ; (7) The infinitive ending -vat was an Ionic late formation; (8) The Ionic avy perhaps corresponding to the Gothic interrogative particle an replaces ne or kev of the older Greek; (9) npog instead of ttotl and el for al and v were also char¬

acteristic of this dialect.

In the Attic form of the Ionic eoy e was assimi¬

lated to the following O-sound and the vowels

were then contracted to ov , whereas, in other Ionic, eo was contracted to ev. The use of tt for oo was a second peculiarity of the Attic-Ionic (daXarra for ddXacca, tz parru for 7zpdoau)y and the change of v into u first made its appearance in this dialect.

The common Ionic shares with the FEolic the

early loss of the rough breathing.

A contemporary or slightly later wave of

immigrants whom we may call Achaeans, settled

first in the plain of Thessaly and the adjacent regions to the south. Colonists from here, the Argeioi, the Danaoi, and the Achaeoi of Homer, crossed the northern 2Egean and settled in the northwest or JEolian part of Asia Minor,

where they developed the Greek epic. The

heroes of the Iliad, the great god Zeus, geo¬

graphical names like 2Eolis and Olympos, seem

to have been transplanted, along with the

Achaean or .TEolic language, to the new Asiatic abode. In their first home in Greece proper

these invaders learned much from the more

civilized inhabitants by whose wealth in gold,

in raiment, and in cattle they had been origi¬

nally attracted and their language too, as we

might expect, was greatly enriched from this

contact. Homer's word acdfuvdog , a bath-tub,

with its Pelasgic termination (cf. Corinthos),

proves the adoption by the conquerors of the

custom of hot-water bathing, complicated ar¬

rangements for which have been found in the

splendid pre-Greek palaces excavated during

the last few decades in Gnossos and Phaestos

in Crete. The simple houses of these Achaean

Greeks had been in older times constructed of

wood and clay (d6juogy a house, Totxog a mud wall), by builders called renroveg. They now

learned to use the massive Cyclopean masonry

of the natives, and built for themselves, using the indigenous names, houses of many cham¬

bers, Qd.Xap.oL (for the termination cf. the pre-Greek name II epyapog) with a men's living room, peyapov (cf. the Asiatic word M eyapa) . Fort¬

resses, Tzvpyoi (cf. word II epyapog), towers for defense, rvpceig (cf. Tvpar/voi , Etrurians, the robber barons who built their forts on the

Mediterranean coasts against the natives whom

they pillaged), and vaYol, permanent temples of the gods, were now for the first time built by these rude Greeks and along with the new

thing they learned to use the native name. Al¬

most the only one of the old Indo-European

divinities that survives is Zeiig n arr/p. 'H d)gy the daughter of Zeus, Usas duhita Divas, of the Sanscrit, surrenders her divine birthright to

Athana, a local divinity (cf. the pre-Greek

names M vnavcu and U.ipdvay the fountain-god¬

dess Pirene in Corinth). Among more general

influences the change of the common-Greek 5 to V in the Attic-Ionic may have been due to

Pelasgian influence, as also that of tl to cl in 6l6(j)gl and rpLandaLoi , rpiaKCLTioi (cf. enardv).

The old view that Semitic influence played a

large part in the formation of the Greek lan¬

guage has now been given up, for apart from a few words that were imported with the objects

that they named, e.g., xiT&v, a tunic, a linguistic phenomenon that we can parallel in such Eng¬

lish words as caoutchouc and chicle, this in¬

fluence was limited to names of characters in

story and myth that wandered in with the tales themselves.

The names A loXig and AloXelg are unknown

to Homer and seem to have been brought by

later immigrants from inland Thessaly (cf.

Herod., VII, 176). The dialect remains of

Thessaly agree fully with the dialect of Alcaeus and Sappho. Achaea, the northern district of

the Peloponnesus was settled at about the time of the fall of Troy and a mixture of the Ionic and .ZEolic dialects resulted. Into the southern part of Arcadia, Elis and some other parts of the Peloponnesus, the .ZEolians penetrated

carrying with them names like Agamemnon and

Menelaos. Thus is probably to be explained

the fact that the Epic poets regarded these

heroes as indigenous in Southern Greece.

Everywhere except in the mountains of Arcadia

and in the sacred region of the Olympian Zeus in Elis the .ZEolians were forced toward the

end of this second millennuim b.c. to yield to the Dorians who

swarmed down from the

mountainous region west and northwest of

Thessaly, gradually driving the Achaeans be¬

fore them. In Crete, too, which the Achaeans

had invaded, the Dorians later gained the

upper hand and imposed their dialect. Only

in the central part of Crete do we find in

words like ovvpa and the article oi, in the

prepositions tv and ne6ay traces of the old

Achaean dialect. In Cyprus, however, the dia¬

lect inscriptions show this Achaean character

more clearly persisting, though the alphabet in which they are written is entirely different

from any Greek alphabet of which we know.

We have then the HColic of Middle Thessaly,

that of Asia Minor, that of Bceotia, where it was strongly tinged with Doric, that of Arcadia and that of Cyprus. Common to these are the

following peculiarities: (1) The change of

common Greek ap, pa into op , po\ GTpordg from (TTpardg, jSpoxvQ irom (Spaxvc, (2) ov for ava\ ovedyxe for av£$r/ice ; (3) btxo, dexorog, exorbv for bkxay dexarog, exarov ; (4) airv for citt6] (5) neiau, nelaat for Tticu, reioai] aTnrdaai = a7vor£iaai] (6) The words

xvpepva-rag for xvˆepvyryg, nrdTug for n67iLg\ davxva for datyva ; (7) The contract verbs in -£u, -au and bo appear as -pi verbs; (8) Endings -yv and -dyv form infinitives of the aorist passive; (9) The demon¬

strative pronouns ove and ovi (ovv in Arcadian and Cyprian); (10) The particle k,e (Doric K.ay Ionic av) ; (11) 7r edd for pera of the Ionic and Doric. In the three northern dialects we find double nasals and liquids arising out of -ap-y -av-y -vo-y -ho-, *etc.*

eppi, GTeHai, etc., the dative ending -eooty a perfect participle in -uv (yeybvuv, yeyovovrog) and perhaps yivvpai for ytyvopai . In the two southern dialects we find cog for rig, a genitive in -av for the mascu¬

lines of the first declension, ovv for ode (see above), an infinitive in -£v (< pepev), iv for kv, nog for noriy nag for Kat and -xperyg in proper names for -xparyg The latter group we may assume came from the

Spercheios valley, while the former was

originally settled in the Peneios valley in

Thessaly. Toward the end of the second mil¬

lennium b.c., from their mountain fastnesses

in northern Epirus, Illyria and upper Mace¬

donia the Dorians began to spread out toward

the east and south into Thessaly and the rest of Greece. From the tribe which was chiefly

instrumental in subduing the Peloponnesus the

Greeks gave the name Dorian to the whole

group of invaders whose speech, as Heinrich

Ludolf Ahrens ((De dialecto Dorica,) 1843)

recognized, is closely related to the dialects of Epirus, Acarnania, zEtolia, Locris, Phocis and

Delphi. The Boeotians (the name comes from

the mountain B olov in northern Epirus) came

into Thessaly first, and then driven on by the Thesprotian Thessalians at their heels (cf.

Herod., VII, 176), they came into Phocis and

Boeotia, where mingling with Achaean .Eolians,

they formed the Boeotians of historic times.

The later Dorian hordes settled on the northern shores of the Corinthian Gulf and then by way of Naupactus passed over into Peloponnesus.

Herodotus (VIII, 73) tells us that of the seven peoples of Peloponnesus, three — the Arcadians, the Ionians of Cynuria and the Achaeans — were autochthonous, while the Lemnians in

Triphylia, the Dryopians in the .Argolid and

the Dorians and Hfolians were invaders. In

Elis we find certain ˆEolian-Locrian. peculiari¬

ties of speech, a third declension dative ending in -oig (n a'idoig, (pepbvroig), an open pronuncia¬

tion of £ as a before p (cf. .the. English clerk as ((clark): >) which justify us in distinguishing a west and an east Doric. Ahrens' distinction of a Doris severior and a Doris rnitior later

philologists tend to explain as a chronological breaking down of the older, harsher Doric in

contrast with the other dialects. In the

former, spoken in Laconia, Tarentum, Heracleia, Crete and Cyrene the genitive singular

ending of the second declension is while

y and « are found in compensative lengthen¬

ing yp't from iopi, irnrug from imrovg, while else¬

where Attic-Ionic forms are found in these cases.

The Dorians like the Achseans held to the

original a of the common Greek and to F; the end¬

ings -tl and -vtl remained unchanged, (didun, he gives; pepovri , they bring) ; the article in the nomi¬

native plural has its Indo-European form rot and rat ; the oldest form of the second personal pro¬

noun rv (Latin, tu; Sanskrit ta) was kept, and ryvogy was used for xelvog or xyvog (exelvog); the older future, the socalled Doric future, (e.g.

<pEv$”£opaL) is also noteworthy; the ending in the first person plural -peg (cf. Latin -mus) is also a more original ending. Among innovations or new

formations may be mentioned na for xe and ya for ye; nparog (from npbarog) for npurog; the contrac¬

tions of a--ey a- -y, in interior of words, to y\ /3aai?ii(F)og for (iaaiteog \ -agat and -U;ai in aorist infinitive endings for -aaai and -i<Jai (axevaˆai).

Extant Greek literature begins with the

Homeric poems. These are, however, to be re¬

garded as the culmination, about 1000 b.c., of several centuries of development in the metrical use first of iEolic and then of Ionic Greek.

The Iliad and the Odyssey so completely domi¬

nated the imagination of the Greeks every¬

where, becoming as it were their Holy Book,

recording the beginnings of their race, that its influence, like that of King James’ translation of the Bible, was exerted on all subsequent

Greek literature. Particularly in the early cen¬

turies, not literature alone but the historical work of Herodotus and the medical treatises of an Hippocrates were written in Ionic Greek,

because this was the first dialect to develop a literary form. In the homes of the tyrants of the islands of the Hi.gean the ˆEolian love

poetry of Alcaeus and Sappho arose in the 7th and 6th centuries b.c., and in this dialect with the natural conservatism of literature such

poetry continued to be written. Later, in the

5th and 4th centuries b.c., the pre-eminent

greatness of Attic prose writers like Thucy¬

dides, Plato and Demosthenes and of poets

like Hfschylus, Sophocles, Euripides, Aris¬

tophanes and Menander gave Attic Greek a

predominance that has always persisted. The

solemn choral poetry of the Dorians, especially adopted to musical utterance by its broader

Doric vocalization, and its quaint archaic

forms, was used by Attic poets in the choruses of tragedy and by Stesichorus, Pindar and

Simonides in those lyrics in which they chanted the praises of great athletes and kings.

Through his vast military projects and under¬

takings Alexander the Great spread the Attic

dialect in a modified form over all the world that he subdued, and it is from this dialect, corrupted not infrequently by the introduction

of words and forms from other dialects, that

the xoivy diahexrog or, as it is more commonly called, the noivy arose. In this language the

New Testament was written, and thousands

upon thousands of papyri, contemporary with

the New Testament, and discovered only in the

last few decades, have contributed to give us a clear conception of this wide spread lingua

franca, that was found wherever Greeks and

Greek civilization penetrated. From this form

of the language Modern Greek has been directly evolved. The scholars of the last century who

imagined that they saw in the language of to¬

day full and clear traces of the Homeric Ionic or of the ZEolic dialect were palpably and

provably wrong. Only in the peculiar dialect

of a few Zaconian villages of Sparta or in

scattered words and phrases in Crete, Cyprus,

Cappadocia or the coast towns of the Black

Sea, do we find any traces and these the most meagre of the older Greek dialects. Before

passing to a consideration of this modern form of the language, which is of special interest to Americans because of the recent growth in

Greek immigration into the country, it remains

to speak of some of the most important gen¬

eral characteristics of Attic Greek, the most

highly developed form of the language. Into

the relation of Greek with the other Indo-European languages from the point of view

either of phonetics or vocabulary it is unneces¬

sary to go deeply. (See the articles on Grimm's Law, Philology, Sanskrit, etc.). Words like

7raTT/pf father; pyryp, mother; dvyaryp, daugh¬

ter; dvo, two; rpelc, three; six, Foivog, wine; F epyov, work, show sufficiently that the basis of the language is the same as that of Celtic, Latin, German, Russian, *etc.* Greek had 24 letters,

apart from an earlier digamma, F, (= = w or v), koppa ? , akin to our q, and san //? , an s sound of some sort, which, except as numeral signs,

had disappeared from the Attic Greek at an

early period.

A a

alpha

IT v

nu

B (3

beta

3 f

xi

r y

gamma

0 o

omicron

A 6

delta

n tv

pi

E e

epsilon.

p P

rho

z C

zeta

2 (Tf

sigma

H y

eta !

T r

tau

e e

theta |

Y v

upsilon

i i

iota

$ (j >

phi

K K

kappa

X X

chi

A A

lambda

‘P ip

psi

M p

mu

ft 0)

omega

These letters may be thus classified:

1 0 vowels, a a, t y, i i , o o, v v

12 diphthongs at, av , ei, tv, oi , ov , at, av , yt, yv, ul, u.v, in which the two vowels must at first have had their original values, but coalesc¬

ing under one expulsion of the breath, and

therefore forming one syllable. These sounds

were later modified in the dialects in different ways and in Modern Greek (by an increasing

emphasis on the final vowel) eq oi, vi, and yt came to be pronounced like t, while y and v also came to have the same pronunciation.

Labial consonants tt (3 <j>.

Palatal consonants k y x.

Lingual consonants t 6 0.

These consonants, thus arranged in ˆclasses,®

by the place of their origin, as lip sounds, pala¬

tal (or guttural) sounds, or tongue and teeth

sounds, may also be arranged in “orders,® ttkt forming smooth or surd sounds, 3 y 4 forming

sonants or voiced sounds, while <PxO were

originally ttkt plus an aspiration,, like ph in uphill, kh in bake-house, and th in pot-hook.

These sounds at an early date became the spi¬

rants f, ch (as in the German lachen or the

Scotch loch), and the Anglo-Saxon and Eng—

glish th.

The spirants o and C.

The liquids A and p.

The nasals p, v and an n palatal (n) = ng.

Double consonants£=K, y or x + a andV’ = 7r, (3 or <p + o (£ a sonant or voiced spirant was originally a double consonant arising from Sa

or ad). For a more complete discussion of the Greek alphabet, its origin, its growth, the vary¬

ing dialectic forms of the letters, the two Attic alphabets, see Alphabet.

That fresh vigor which has always charac¬

terized the Greek mind, that vividness of sense conception that caused the Greeks at so early a period in their history to seek expression in

art, architecture and music, could not fail to show itself in their language making it confess¬

edly the most perfect vehicle for the expression of thought that has ever existed. At or near the beginning of sentences the Greek, by the use of some little particle, enclitic or post-positive, often showed the very mood of his mind, his

pre-existent attitude, toward the thought that

he was to utter. The written word thus speaks with the spontaneous vivacity that a French¬

man's shrug of shoulder or play of feature or bodily pose so vividly conveys. Distinctions so fine that they elude exact and idiomatic rendi¬

tion except by oral translation, in which em¬

phasis and shade of meaning may be com¬

municated to the hearer by voice and facial ex¬

pression, are by the use of particles like y*f toi , TTcp, ovv and dy set before the eyes

of the reader in black and white. Another

thing that contributes largely to the clearness and conciseness of the language is its richness in verb-forms. A middle voice expressed the

warmth of personal interest or advantage in an act; the optative mood, missing in the Latin

language, expressed future relations and desires a shade more vaguely and remotely than did

the subjunctive or future indicative; in the

subordinate moods and in the infinitive we find a clear distinction made between present and

aorist, a distinction not of time, however, for these moods are naturally future (or, as in the case of the infinitive, devoid of any time idea whatsoever) but of the nature of the act as

habitual or repeated, or as simply occurring

once. Thus “He wishes to write good letters

habitually® is expressed by the present infini¬

tive, while <(He wishes to write a good letter®

is expressed by the aorist infinitive. “Honor

thy father and thy mother® and <(Bow down

to Naaman® are respectively present and aorist

imperatives. This distinction has been fully

preserved in Modern Greek and is one of the

most convincing proofs that the spirit of the

ancient Greek language has never died. The

existence of present, future, aorist and perfect infinitives and participles permits a nicety of expression that hardly any other language can

equal. The fact that the infinitive, apart from the distinction above mentioned, which charac¬

terizes. the nature of the action rather than its time, is an indeclinable neuter noun and can

(especially when used with the article to denote its case) be used with surprising clearness as subject or . object, or predicate, in cognate or object relations with adjectives, verbs and prep¬

ositions, and absolutely in an accusative of

specification construction, makes it one of the GREEK LANGUAGE

most flexible elements of the Greek language.

The early discrimination of a definite article

(here, too, we note the relative poverty of the Latin) from an original demonstrative pronoun

greatly increased the usefulness of both infini¬

tive and participle, for modifiers of the verb idea in both could be placed between article and noun in such a way as to show their relation most clearly. This gave a definiteness of appli¬

cation to all adnominal words and phrases that were attributive to nouns or to adjectives that were used as nouns. To the existence of a

definite article is due the fact that Greek is more like English than Latin, for it permits,

nay, compels an order of words that is logical and straightforward.

Modern Greek. — The Modern Greek lan¬

guage is a direct survival from the Ancient

Greek, its surprising conservation of forms and vocabulary being due in part to the isolation of Greece from the currents of European progress,

and to the conservative influence exerted by

the Orthodox Greek Church upon the higher and

literary forms of the language. Such changes

in pronunciation, morphology and syntax as

characterize the present form of the language

may nearly all in their inception be traced back to the time of Christ. The language had ac¬

quired its present form, in all essential char¬

acteristics, as early as the 9th or 10th century a.d. To western scholars who, in reading

Ancient Greek, use the Erasmian pronuncia¬

tion, a supposed approximation to the pro¬

nunciation of the 5th century b.c., the spoken language of to-day is unfortunately absolutely

unintelligible owing to the following facts : The vowels v, 1 and v , and the diphthongs tt, oi , vi and y are, by what is technically known as iotacism, all pronounced like the i in machine ; the

diphthong ai is pronounced like t (i. e., as the e in met) ; the v of the ancient diphthongs tv and av (this does not apply to ov which equals our oo in boot) is pronounced v before sonants

(including vowels) and / before other sounds;

£vayye?uov = evangelion, and tlevQtpia = elef—

theria ; the distinction between the ancient long and short vowels has entirely disappeared, an

intermediate sound being uttered, which is,

however, slightly lengthened under the in¬

fluence of the accent, (e. g., o — unaccented is like the ou in ought and o — accented like the aw in brawny) ; (i is pronounced as v, and <5 like th in (<this,)) except where the ancient pronuncia¬

tion has been preserved by a preceding p or v respectively. Thus avdpa , man, is still pro¬

nounced ((andra,)) but is necessarily spelled, ex¬

cept in the puristic and literary language, avrpa ; (so too devrpov , a tree) ; b and d in foreign words are represented by pit and vr, (e. g., Lord Byron = A 6pvr Mnaipojv), combinations which are pro¬

nounced mb and nd when they occur in native

Greek words, e.g., navra = panda ; before e and i sounds y is pronounced as a palatal voiced

spirant, as in the German “Ja,® while elsewhere it has a guttural voiced spirant sound (like the g in the “goo-goo® of an infant) ; p is slightly trilled or, (and this applies also to \p,v>) slightly mouille; the distinction between rough and

smooth breathings disappeared more than 2,000

years ago. Ancient accent which was probably a differentiation in pitch, perhaps combined with

a stressing of the syllable accented, gradually gave way, in the early centuries of the Christian era to a pure stress accent which is, however.

except in northern Greece weaker than that

of German and English. In consequence of

this change and of the loss of all distinctions of quantity, the circumflex, acute and grave

accents are pronounced alike, though the con¬

ventional written accent is preserved. The syl¬

lable anciently accented still bears the

stress, except where this is influenced

by the loss of distinction between long and

short vowels. To foreigners one of the most

puzzling features of Modern Greek is the very

marked difference between the spoken and

the written languages. Diglossy of vocabulary

and diglossy of pronunciation exist in almost

every language, but the influence of the learned Greek Cora'is in the early 19th century, and the desire of the Greeks to resurrect the ancient

language at the time when Greece was freed

from Turkish domination, resulted in a diglossy of forms and syntax — a diglossy of

grammar — from which Greece has suffered

ever since. Those who love the spontaneity

and naturalness of ancient Greek find much that has been written in the last century frigid and artificial. Fortunately the large number of

younger writers who believe that literature must be in the spoken language of the people, is

gradually affecting the language of the platform, press and schoolroom. The following changes

from the grammar of Ancient Greek are com¬

mon to both the colloquial and the literary lan¬

guages : The ancient optative, rarely used even in New Testament Greek, has now entirely dis¬

appeared, and the present subjunctive is distin¬

guished from the present indicative only when

printed, both forms being pronounced alike.

The infinitive has been replaced by vd (a short, ened Iva) with the subjunctive (e.g., StTuv vd vnayu-I wish to go) ; the ancient Iva clauses being rendered by did vat «for to.® In the indicative we find the ancient forms fairly well preserved in the present, imperfect and aorist, but the

future is expressed by da (shortened from 6'tku va) with the present subjunctive, for a continued or habitual act, and with the aorist subjunctive to express a simple occurrence of the act. An¬

cient second aorists and aorists of the liquid form (e.g., laretla) have been preserved almost perfectly, proving the continuity of the

modern with the ancient language. The perfect,

pluperfect and future perfect tenses as in

other analytic languages, are formed by making

use of tx^> (have), txu ypdi'V, ^ Xa ypd'i'y, 6a $XU yparpy, I have, had and shall have written.

This change, precursors of which are found in

Herodotus, Sophocles, etc., is less obtruded on our notice from the fact that the aorist is often used where English uses perfect tenses. In

the nouns the dative case has given way to the accusative with various prepositions tig = = to, did — for, pt (a shortened perd) — with. The ancient ov is now expressed by dev (from

ovdev); the relative pronoun is d dnolog, and the interrogative is i rolog; ((why® is diari and “because® didn; “iP is, under all circumstances t av or av and the particle av of the apodosis has disappeared. Shortened forms of avrov (rovf rf/g , Tov,Tvvf etc.), areused as conjunctive pronouns and these as well as pov and aov (e)pi and at are used as enclitics when unemphatic ; plural forms pdg and acig have been formed from (t)p£ and at (adg from at being based on the supposed analogy of (T/)pag from (t)p£). In spite of these changes the general appearance of the literary Greek of to-400

day is startlingly similar to that of ancient

Greek. Chaucer’s English is farther removed

from the speech of to-day than is this literary Greek from the language of Xenophon and Aris¬

totle. In the popular language the morphological changes have been far greater. An extended

use of diminutive and other suffixes, and a

tendency to cut off initial vowels when unac¬

cented, have produced changes like: tew, lion,

to teovrapi ; oppa, eye, to oppanov, and then to pan (where the root brr has entirely disap¬

peared; ogng, snake, to (oQidiov). The

nouns of the third declension have gone over

into the first, the masculine having a nomina¬

tive in -ag (cf. Ancient Greek raping) yeirovag , a neighbor (anc. ydrw), and a genitive in -a, while the feminines have - a in the nominative and -ag in the genitive, V yvvalna, rfjg yvvaUcag.

Nouns like rco/ag, (3pboigy naraoracig have vir¬

tually become r rote], (3pva?/ and naraaracrj , though they are often spelled rcbte, fip'vm and naraaraoL, in order to preserve the ancient root.

Certain phonetic laws, regularly operative,

further disguise ancient words: <pro)xog for

7 rruˆbg, Kotyro for k.ottto), yiotyvpt for yecfrvpa, noptyr/

for nopytyr/, (Spicm*) for evpionu, *3yacvu for £n(3a'ivio, api(j)V7jTog for avapidprjrog , aSeptydg for adetyog, v'vtyT) for vvptyr* will serve to illustrate changes, which seem extremely violent, but are easily classified and borne in mind.

The Greeks completely Hellenize foreign

words, Turkish touphek, a gun, forming tovˆeki, a gun, Tov(j)£Ktˆ(i), to shoot; rovcpEKia , a shot. A few Italian words, dating back in some cases

to Latin times, exist in the language (e.g. rropra, a door; cuala, steps; gttlti (hospitium , a house) but such foreign words do not seriously im¬

pair the genuinely Greek character of the

language.

Bibliography. — Ancient Greek : Apart

from small but extremely useful grammars by

Hadley-Alien, Goodwin (of which a new edition

is in preparation), Babbitt and J. Thompson

(London 1902), the following more comprehen¬

sive works should be mentioned : Kiihner,

(Griechische Grammatik) (re-edited by Blass

and Gerth, 1890-1900) ; Brugmann, K., (Griechische Grammatik* (3d ed., 1900) ; Meyer, Gus¬

tav, (Griechische Grammatik) (3d ed., 1896).

W. W. Goodwin, B. L. Gildersleeve, with C. W.

E. Miller and F. E. Thompson, have in recent

years treated of the syntax of classical Greek.

From the point ©f view of comparative philology the Greek language has been most comprehen¬

sively dealt with by Brugmann, K. and Del—

bruck, B., (Grundriss der vergleichenden

Grammatik der indogermanischen Sprachen) ;

Kretschmer, P., (Einleitung in die Geschichte

der Griechischen Sprache) ; Giles, P., (A Short Manual of Comparative Philology for Classical

Students. > Herbert Weir Smyth (Ionic), C. D.

Buck, R. Meister, O. Hoffman have gathered

together and discussed material dealing with

the Greek dialects. Later phases of the lan¬

guage are treated in the following: Thumb, A., (Die griechische Spraehe in Zeitalter des Hellenismus) (1901); Thackeray, H. St. J., (A

Grammar of the Old Testament in Greek) ;

Moulton, J. H., CA Grammar of New Testament

Greek* (3d ed., 1906) ; Jannaris, A. N., (An

Historical Greek Grammar, chiefly of the Attic

Dialect, as written and spoken from Classical

Antiquity down to the Present Time* (1901).

Modern Greek : The modern language is

handled briefly by Carl Weid, (Praktisches

Lehrbuch der Neugriechischen Volksprache,*

and more fully by Vincent and Dickson, (A

Handbook to Modern Greek) (London 1899).

G. N. Hatzidakis, (Einleitung in die neugriechische Grammatik,* and A. Thumb, (Handbuch der neugriechischen Volkssprache) (trans¬

lated by S. Angus, Edinburgh 1912), treat more scientifically of the relation between ancient and modern Greek.

Carroll N. Brown, Ph.D.

GREEK LAW. The unity of Greek law is

seen in the laws of inheritance and adoption, in the laws of commerce and contract and in the

publicity given to legal agreements. There are

incidental illustrations of Athenian laws in

Plato's <Laws) and in Aristotle's <Politics) ;

but no systematic collection of Greek laws has been handed down to

us. The Constitution

of Athens* gives an account of the jurisdiction of the public officials and of the machinery of the law courts.

In Homer there is no word for law. Dike

means a <(way pointed out,® the ((course which usage prescribes.® Themis signifies (<what has

been laid down,® a particular decision, a

(<doom® ; the plural themistes connotes a body

of such precedents, <(rules of right.® Written

laws came much later.

Lycurgus (about 884 b.c.) is said to have

given Sparta her laws ; but these were unwrit¬

ten. Laws were first reduced to writing in the 7th century by the Epizephyrian Locrians in

Italy (663 b.c.). Legislation in Crete is repre¬

sented by the laws of Gortyn, made known by

the discovery of an inscription in 1884. In

Athens the tribunals of homicide were con¬

sidered very ancient (Isocrates, Panegyr. 40).

The king-archon decided cases connected with

religious observances. In the middle of the

7th century the three archons were increased

to nine; six of these were called Thesmothetce, who superintended the judicial system. The

first code was drawn up by Draco (621 b.c.).

It distinguished carefully between different

kinds of homicide. The lawgiver, Solon (594

b.c.) , being elected archon, canceled all debts and mortgages on the person of the debtor and prohibited such slavery in the future. The

power of voting in the law courts made the

people masters of the Constitution. . Permission to execute a will was first given by the laws of Solon. Cleisthenes (508) introduced the law

of ostracism. In the next century commission¬

ers (Syngrapbeis) were appointed to draw up

laws to submit to the assembly. The law court was called dikasterion. The public executioners

were known as the ((Eleven.® The chief archon

presided in cases connected with the family

property of citizens; the king-archon in cases

of impiety and homicide ; the polemarch in cases affecting the Metics, or resident aliens.

The largest and most important courts were

the Heliastic. Practically all cases of import¬

ance, except murder and homicide, were tried

before these tribunals. The jurors were chosen

every year and formed a body called the

Helicea, presided over by the Thesmothetce (the six junior archons). The whole number of

jurors was 6,000 in the 5th century, later 5,000.

Of these the number sitting in any particular

case varied from 200 to 2,500. There were 10

courtrooms. Each juror was given a staff

bearing the color of the court — distinguished GREEK-LETTER SOCIETIES AND COLLEGE FRATERNITIES

by the painted lintel — into which he was to go.

This staff he exchanged at the door for a

counter which he showed at the end of the day and received his fee of tihree obols. Law suits were divided into public and private. The

plaintiff summoned the defendant, in the pres¬

ence of witnesses, to appear before the magis¬

trate, and named the day of trial. The suit

was lodged by the presentation of a written

indictment to the presiding officer. The de¬

fendant's answer also had to be in writing.

Both sides brought forward their evidence,

which was reduced to writing and sealed in a

box to be kept until the day of trial, at which the clerk read both the charge and the answer.

The plaintiff then made his speech, and was

followed by the defendant. There were no

"lawyers.® Witnesses testified as they were

called upon by the speakers during their ad¬

dresses to the jury. Each side was permitted

to question the opponent, who was obliged by

law to answer; but there was no cross-examina¬

tion of witnesses. The witness merely acknowl¬

edged that the testimony was his, after it had been read by the clerk. After the speeches of the contestants the case went to the jury, who proceeded to vote without retiring from the

courtroom. At first the ballots were mussel

shells, but later they consisted of bronze discs with an axis running through the centre and

extending on each side. Each juryman re¬

ceived two of these ballots, the axis in one of which was solid (acquittal), in the other, per¬

forated (condemnation). The juror held the

ballots in such a way that bystanders could not observe how he was voting. Into a bronze urn

he cast the ballot recording his verdict, and

into a wooden urn the other. In this way a

secret vote was assured. The magistrate then

counted the ballots and the verdict was an¬

nounced by a herald. In case of a tie the

defendant won. If the plaintiff in a public

suit did not secure one-fifth of the votes he was fined 1,000 drachmae. It was the jury's

business to decide (after hearing proposals

from both sides) what the penalty should be —ordinarily a money fine. Imprisonment was

rare; but a man might be kept in jail until he paid his fine ; and he might be imprisoned

while awaiting trial, unless he could give se¬

curity. Persons condemned to death were kept

in confinement until execution. Even murderers

might go at large until the day of trial arrived, for if a murderer escaped to another country

the state felt that it was rid of a pollution without expense. But the laws of another state did not protect an exile, and he was at the

mercy of any man. Hence banishment was one

of the severest punishments that could be in¬

flicted on criminals. Confiscation of property

was a frequent penalty; and this carried with

it a partial or total loss of the rights of

citizenship. Joseph E. Harry.

GREEK-LETTER SOCIETIES AND

COLLEGE FRATERNITIES are found in

nearly all leading educational institutions, par¬

ticularly the great universities in the United

States. Branches of the various societies are

known as “chapters,® and are found in nearly

every college as well as in every large city in the country. No society has more than one

chapter in any one college. While these soci¬

eties are secret in character there is seldom any vol. U— 26

over-emphasis of ritual or mystery in their

conduct, the protection of meetings, constitu¬

tion and mottoes and the inviolability of the

society's building or "hall,® being all the secrecy involved. The Greek alphabet is generally used

in naming a fraternity or a chapter. There are three types of badges worn by members, the

name badge, monogram badge and symbol

badge.

The oldest of these literary and social

brotherhoods was established as early - as 1776

and, continued the sole society of its kind for 50 years. There were in 1915 society build¬

ings of the American college fraternities 772

in number and valued at $14,326,915. That in¬

cluded men's, women's, professional, local men's and local women's fraternities, in all 123 soci¬

eties, with a total membership of 471,354 and

with 2,854 active chapters in the United States.

It has become quite the practice for students

of a particular -fraternity to reside together

during their college course in their "chapter®

house. Princeton is the only prominent college

in the country where the fraternal society is

prohibited, and the fact that all the other lead¬

ing institutions permit these organizations to

exist affords strong presumption that they are

regarded with favor, and that their influence is for good rather than for evil.

Phi Beta Kappa. — This, the oldest organiza¬

tion, is composed of 71 college chapters, and

was founded 5 Dec. 1776, at William and Mary

College, Williamsburg, Va. A chapter was

formed at Yale, in New Haven, in December

1779, and soon after at Harvard, Dartmouth,

Bowdoin and Amherst. The national council

meets triennially. The badge of the society is a golden key.

Kappa Alpha. — Founded in 1825 at Old

Union College by four members of the Phi

Beta Kappa. It likewise had a golden key as

a badge design. The first branch of this soci¬

ety was established at Williams College. The

society had 9,281 members in 1915.

Sigma Phi. — Founded at Union College,

Schenectady, N. Y., 4 March 1827, the society

established branches at Hamilton, Williams,

Hobart, Lehigh, Cornell and the universities of Michigan and Vermont. It had a membership

of 2,929 in 1915. The badge of the society is of the monogram type ; the colors are light blue and white. Among its members have been numbered Elihu Root, Andrew D. White and John H. Post.

Delta Phi. — Founded at Union College, 17 Nov. 1827, this society established branches at Columbia, Rutgers, Harvard, Johns Hopkins, Cornell and other colleges. The badge is in the form of a Maltese cross; colors blue and white. The fraternity had in 1917 more than 4,440 members.

Alpha Delta Phi. — Founded at Hamilton College, Clinton, N. Y., in 1832, the society established chapters in 29 other colleges and had a membership of 12,260 in 1915. There were 19 houses owned by the society and 24 active chapters. The badge is of green and white, with the star and crescent as symbols.

Psi Upsilon. — Founded at Union College, 24 Nov. 1833, this society had four of its orig¬ inal founders still living in 1902. The mem-

bership of the organization was (1915) 13,117,

with 24 chapters in various colleges. The badge is of gold, diamond-shaped; colors garnet and

gold.

Delta Upsilon. — Founded at Williams Col¬

lege in 1834, and had in 1915 chapters in 42

colleges and universities, w.ffh a membership

of 13,209. It is an open, non-secret organiza¬

tion and owns 28 chapter houses.

Beta Theta Pi. — Founded at Miami Uni¬

versity, Oxford, Ohio, in 1839, this was the

pioneer society of the Middle West. It had a

membership of 20,992 in 1915, with 77 active

chapters. The badge is an eight-sided shield;

the colors are light pink and blue.

Chi Psi. — Founded at Union College, in

1841, this was the first Eastern society to es¬

tablish chapters in the West, extending its or¬

ganization to the universities of Michigan and Minnesota. It had a membership in 1915 of 5,749 with 18 active chapters. • The society is more secret than most of its fellows. The badge is a jeweled monogram.

Delta Kappa Epsilon. — Founded at Yale College, New Haven, Conn., 22 June 1844, by 15 members of the junior class. The society established 53 chapters and had a membership in 1915 of 18,923 — the second strongest nu¬ merically of college fraternities.

Zeta Psi. — Founded at the New York Uni¬ versity, 1 June 1847, this society established 34 chapters, and had a membership in 1915 of 8,177. The badge is a monogram; the color white, with which each chapter blends its col¬ lege colors.

Delta Psi. — Founded at Columbia College, New York, in January 1847; had seven chap¬ ters and a membership of 4,001 in 1915. The badge of the society is a Saint Anthony cross, bearing a shield of blue enamel.

Theta Delta Chi. — Founded like several of

its predecessors at Union College, this society was organized in 1848; had (1915) 29 chapters

and 7,058 members. The badge is a mono¬

gram ; the colors black, white and blue.

Phi Gamma Delta. — Founded at Jefferson

College, Canonsburg, Pa., in May 1848, this

society had 58 chapters and 15,362 members in

1915. The badge is a diamond-shaped shield

on a field of black, bound by a golden cord ; the color royal purple.

Phi Delta Theta. — Founded at Miami Uni¬

versity, Oxford, Ohio, 26 Dec. 1848, this

society had 78 chapters and 20,016 members in

1915. The badge is a shield, bearing a scroll; the fraternity colors are argent and azure.

Phi Kappa Sigma. — Founded at the Uni¬

versity of Pennsylvania, 16 Aug. 1850; number

of chapters 29 and membership 5,471 in 1915.

The badge is a gold Maltese cross, with a skull and crossbone centre ; the colors are old gold and black.

Phi Kappa Psi. — Founded at Jefferson Col¬

lege, Canonsburg, Pa., 19 Feb. 1852; member¬

ship 14,176 in 1915. The badge is a shield of gold; the colors pink and lavender.

Sigma Chi. — Founded at Miami University,

Oxford, Ohio, 20 June 1855; organized 68 chap¬

ters with 14,678 members. The badge is a

cross of gold and white enamel ; the colors are blue and gold.

Sigma Alpha Epsilon. — Founded at the

University of Alabama in 1856; organized 78

chapters; (1915) 16,948 members.

Alpha Tau Omega. — Founded at_ the Vir¬

ginia Military Institute, 11 Sept. 1865; organ¬

ized 60 chapters; had a membership of 11,854

in 1915.

Kappa Sigma. — Founded at the University

of Virginia in 1867 ; established 82 chapters ; had 13,654 in 1915. The badge is a crescent

and star; the colors old gold, maroon and blue.

Sigma Nu. — Founded at the Virginia Mili¬

tary Institute, 1 Jan. 1869; organized 72 chap¬

ters; a membership of 11,719. The badge is

designed after that of the Legion of Honor of France; the colors are black, white and gold.

Phi Sigma Kappa. — Founded at the Massa¬

chusetts Agricultural College, 15 March 1873;

organized 28 chapters still active ; owned nine chapter houses, valued at $188,000; member¬

ship 4,083 in 1915. The colors of the society are silver and magenta.

Among the Greek-letter societies of women

are the Alpha Chi Omega, Alpha Phi, Delta

Delta Delta, Delta Gamma, Kappa Alpha Theta,

Kappa Kappa Gamma and Pi Beta Phi. The

Alpha Phi was founded in 1872; had 18 chap¬

ters and 2,954 members in 1915. The Delta

Delta Delta was founded in 1888; had 52 chap¬

ters in 1915 with a membership of 4,560.

The largest membership among the women's

college societies, 8,162, is reported by Pi Beta Phi, founded in 1867. The largest investment

in or outlay upon houses made by any of the

Women's Greek-letter societies prior to 1915

was $125,250 by Kappa Kappa Gamma, founded

in 1870 and owning nine chapter houses in 1916.

Most famous and distinguished among all

college or university secret societies are un¬

doubtedly ˆScroll and Key® and <(Skull and

Bones.® These are both senior class organiza¬

tions in the academical (or strictly ((college®) department of Yale University; in each the

active membership is limited to 15 seniors ;

during 75 years they have been generous rivals for supremacy; no chapter of either exists

elsewhere.

GREEK LITERATURE. Ancient Greek

literature because of its originality, spontaneity and intrinsic value and interest, deserves the

closest study. In spite of the very severe

losses' which it has unfortunately sustained

there is extant a very considerable body of the literature representing the various fields of lit¬

erary activity. The influence of Greek liter¬

ature on Latin literature was enormous, while

the indebtedness of English literature, espe¬

cially poetry, to the Greek is profound.

Ancient Greek literature may be divided into

five great ages or periods: (1) The Age of Epic Poetry (from the beginning to the 7th or the

beginning of the 6th century B.C.). (II) The

Age of Lyric Poetry (the 7th, 6th and part of the 5th centuries b.c.). (Ill) The Attic Period (c. 475-300 b.c.) . (IV) The Alexandrian Age

(from c. 300 b.c. until the Roman Conquest, 146

b.c.) . (V) The Graeco-Roman Age (from 146

b.c. to Justinian, 527 a.d.). To these may be added the Byzantine Period (from 527 a.d to

the Fall of Constantinople in 1453 a.d.).

I. The Age of Epic Poetry. — Greek litera¬

ture, and European as well, begins with the

Homeric poems, the <Iliad) (q.v.) and the

KAPPA ALPHA

ALPHA DELTA PHI

PHI KAPPA SIGMA

TAU BETA PI

CHI PSI

ALPHA PHI

PHI DELTA THETA

DELTA TAU

DELTA PSI

SIGMA PHI

PHI GAMMA

DELTA

DELTA KAPPA EPSILON

KAPPA ALPHA

SKULL AND BONES

3ˆ

333

DELTA GAMMA

THETA DELTA CHI

KAPPA KAPPA GAMMA

SIGMA NU

CLIO

KAPPA ALPHA THETA

DELTA PHI

PHI NU THETA

BETA THE

SIGMA CHI

ZETA PSI

SIGMA ALPHA

EPSILON

PHI BETA KAPPA

PST UPSILON

CHI PHI

ALPHA SIGMA CIII

SCROLL

PHI KAPPA PSI

WOLF'S HEAD

COPYRIGHT, 1913, BY F. E. WRIGHT.

FRATERNITY BADGES OF COLLEGES AND SOCIETIES

GREEK LITERATURE

403

c Odyssey 5 (q.v.). The origin, date and author¬

ship of these two eternally famous epic poems

were vexed questions in the Alexandrian Age

and are still subjects of vigorous contention at the present time. We may say, very briefly and rather dogmatically, that the <Uiad) and

(Odyssey) were in their perfected form by the

end of the 8th century b.c. ; that they probably originated in Asia Minor, in Ionia, although

subjected to some .Eolic influences; that they

may have been the products of the same poetic school, and, as some scholars now maintain,

may have been composed by one poet, the tradi¬

tional Homer. Certainly these two great epics

in dactylic hexameters, handed down to us in

the Epic-Ionic dialect, were the culmination,

and not the beginning, of an epoch of literary activity. In them we can discern early legends, hymns and folksongs, e.g., the marriage-song

(hymenceus) and the dirge (threnos) ; and, in particular, the songs celebrating the deeds of

heroes, themes which form the nucleus of the

later epic. The <Iliad,) divided by the Alexan¬

drian scholars into 24 books, tells the story of the great Greek hero Achilles at the siege of Ilium and of his wrath; the (Odyssey,5 also in 24 books, narrates the exciting adventures and

delayed home-coming of the intrepid Odysseus

of Ithaca. The virtues of the Homeric style

are admirably characterized by Matthew Ar¬

nold: it is rapid; plain in thought; plain in dic¬

tion; and noble. The Homeric poems are the

greatest of the world's epic poems. Their influ¬

ence on Greek Literature, and Greek thought

and ideals in succeeding centuries, is incalcu¬

lable.

Later than the <Iliad) and <Odyssey) there

arose an Epic Cycle (the. Cyclic Poems), no

longer extant, which comprised such epic poems

as the <Cypria,) the ˆ Little Iliad,) the (Sack of Ilium, > the (Nostoi,) *etc.* For convenience we

must discuss at this point the ˆHomeric Hymns5

although they are much later than the Homeric

poems. They are really preludes, for the most

part, to epic recitations, composed and recited by bards in praise of the gods. These poems.

34 in number, in hexameter verse with consid¬

erable Homeric coloring, date mostly from the

end of the 8th to the beginning of the 5th cen¬

turies b.c. Several of the (Homeric Hymns5

are of some length, interest and poetic value, e.g., the Hymn to the Delian and Pythian

Apollo (546 lines) and the Hymns to Hermes,

Aphrodite, Demeter and Dionysus. (Consult

Shelley's charming versions in English). Much

/ater than Homer, but also falsely attributed to him by antiquity, are the two sportive epics, the (Margites> and the <Batrachomyomachia)

(Battle of the Frogs and Mice). Of the latter we have some 300 lines.

The second great name in Greek Literature

is that of Hesiod of Ascra, a little village in Bceotia. In date he is, perhaps, of the early part of the 8th century. Although Hesiod is

numbered among the Epic poets and employed

the dactylic hexameter with many Homeric tags

and reminiscences he is really of the didactic and gnomic school. His extant writings are the (Works and Days,5 a sort of farmer's almanac

and calendar with useful precepts on husbandry, navigation and advice on life and behavior in

general, and the (Theogony,5 which sketches the origin of the universe and the relationship of the gods. The (Shield of Heracles5 is undoubt¬

edly spurious. These Hesiodic poems, although

of no great poetical merit generally speaking,

had very considerable influence on later Greek

thought and religion. The (Works and Days,5

indeed, served Virgil as model for his Geor¬

gies5 (q.v.).

II. The Age of Lyric Poetry. — Strictly

speaking Lyric poetry should designate poetry

sung to the lyre only, but the term lyric is rather loosely used to include elegiac and iam¬

bic as well as melic (i.e., sung) poetry. Lyric poetry was the outcome of that turbulent period in Greek history which was characterized by

social upheaval in many states in connection

with the establishment of the successive polit¬

ical stages of oligarchy, tyranny and democracy, an age when men were more widely informed

and were thinking for themselves. While lyric

poetry flourished throughout the Greek world

generally, and was composed by poets in the three chief dialects (Eolic, Doric and Ionic), it had its origin in Ionia. Elegy, strictly speaking,

may be defined as mournful poetry, i.e., the

funeral dirge sung to the accompaniment of the flute, but the term is applied to any poetry of a reflective, emotional character in the elegiac distich. This couplet consists of a dactylic

hexameter followed by a dactylic pentameter

(socalled). Elegy early lost its exclusively

funereal character and was used for martial

poetry by Callinus of Ephesus (first half of the 7th century b.c.) and by Tyrtaeus (c. 640 b.c.) at Sparta. It was first used for the expression of love by Mimnermus of Smyrna (c. 620 b.c.)

who thus was the father of the erotic elegy, a literary form popular among the poets of the

Alexandrian Age, who, in turn, inspired the

Roman elegists, e.g., Catullus, Ovid, Propertius and Tibullus. Theognis of Megara (c. 540 b.c.) is the chief exemplar of the gnomic, or moral, elegy. Of his writings some 1,400 lines are ex¬

tant. Solon (c. 600 b.c.) , the great Athenian lawgiver, used the elegy for political moralizings ; Xenophanes employed it for philosophical

teachings. The master of the funereal elegy is Simonides of Ceos who is famous for his com¬

memorative epitaphs on the Greek heroes who

fell in the Persian Wars.

Iambic poetry, contemporaneous with elegy,

was “invented,55 as the Greeks said, or rather perfected, by Archilochus of Paros (c. 660

B.c.) , as a weapon of satire and invective.

Semonides of Amorgos (c. 640 b.c.) and Hip—

ponax of Ephesus (c. 540 B.c.) (who invented

the choliambic or skazon) likewise employed

the iambus for satire. But both the iambic and trochaic meters were used for purposes other

than satire.

While iambic and elegiac poetry might be

merely recited or declaimed, melic verse (lyric poetry proper) of necessity was sung to musical accompaniment. It was of two forms, monodic,

of Eolic origin, for one voice, or choral, as developed by the Dorians, for a chorus. The

monodic melic, whose first representative was

Terpander (c. 675 b.c.), is known to us through the poetry of Sappho, Alcaeus and Anacreon.

The fragments of the verse of the poetess

Sappho of Lesbos, (c. 600 b.c.), tantal’izingly scanty, reveal poetic gifts of marvelous power

and remarkable emotional intensity. Alcaeus,

likewise of Lesbos, poet of love and of war,

together with his contemporary Sappho, in¬

spired much of the poetry of Horace in senti-

ment and form (e.g., the Alcaic and Sapphic

stanzas). Anacreon of Teos (c. 530 b.c.), poet of pleasure, was an Ionian. His name is

largely known to students of English poetry

because of the spurious and much later (Ana—

creontea) which long passed for genuine. (See

Odes of Anacreon and consult the pleasing

versions of Byron). The Dorian choral lyric

is represented by the scanty, but interesting,

fragments of the melic poetry of Aleman (c.

650 b.c.) who lived at Sparta, of Stesichorus of Sicily (c. 620 B.c.), of Ibycus of Rhegium (c.

550 B.c.) and Simonides of Ceos (480 B.c.), an Ionian, who was renowned not only for his ele¬

gies, as previously mentioned, but for his love-lyrics, dirges, epinikia and encomia. Greatest

of all the Greek lyric poets, however, is Pindar of Thebes (c. 470 B.c.). While he won fame

in all branches of melic poetry his chief renown was in epinikia, i.e., odes celebrating the victors in the four great Greek games. Of these mag¬

nificent odes we have no less than 44. They

are splendid in imagery and diction, bold in

conception and lofty in style. Of this same period is Bacchylides of Ceos, nephew of Simonides, a lyric poet of distinction, but infe¬ rior to Pindar.

III. The Attic Period (475-300 B.C.). —

In the Attic Period, in the 5th and 4th centuries B.c., the Greek genius revealed itself in all its splendor in magnificent achievements, especially in literature and art. In Athens, democracy and universal enlightenment stimulated remark¬ able literary activity in varied forms. In poetry, the drama, both tragedy and comedy, flourished. In prose, crude literary beginnings were rapidly succeeded by complete mastery in history, in rhetoric and in philosophy.

A. The Drama. — The origin of Greek trag¬ edy is an open question at present writing. Some scholars find the origin in the ritual per¬ formed by the chorus worshipping dead heroes at the tomb; others, in the ritual which cele¬ brated the annual death and rebirth of vegeta¬ tion that was a feature of the cult of Dionysus.

The traditional view, however, is that tragedy

developed from the dithyramb, a choral lyric

of Dorian origin (first perfected by Arion, c.

600 B.c.) sung and danced at festivals by a cho¬

rus of 50 men or boys in honor of Dionysus, the wine-god. As this chorus was sometimes

dressed as satyrs (goat-like followers of Pan)

their song was called tragoedia (goat-song).

Thespis of Icaria in Attica (in the middle of the 6th century b.c.) took the next step in the de¬

velopment of tragedy by stepping out from the

chorus of satyrs and addressing verses to them.

Here we have the germ of the drama. Com¬

plete development came with the introduction of a second actor by .TEschylus, and a third by

Sophocles, together with the reduction of the

satyr chorus from 50 to 12 by ˆEschylus, and to 15 by Sophocles and his successors. Tragedy

was indebted to Homer and the epic cycle for

subject-matter, the iambic verse perfected by

Archilochus being substituted in the dialogue

for the epic dactylic hexameter, and to lyric

poetry for the choral element.

Of the 70 tragedies said to have been written by Tischylus (525-456 b.c.) only seven are ex¬

tant. In chronological order they are : (The

Suppliants, ' the (Persians,' the (Seven against Thebes,' the (Prometheus Bound' (q.v.), and

the (Oresteia' (q.v.), the last named being the only surviving trilogy, comprising the Aga¬

memnon,' the (ChoephorP and the (Eumenides.'

The Persians' is of special interest as it is the only extant Greek tragedy with the story taken from contemporary history. It tells of the de¬

feat of the Persians under Xerxes and contains a stirring account of the battle of Salamis. The Prometheus Bound,' portraying the awful pun¬

ishment of the benefactor of human-kind, that

hero who stole fire from heaven as a boon to man, is a magnificent poetic drama. In the

trilogy of the (Oresteia,' the (Agamemnon,'

perhaps the greatest Greek tragedy in poetic

merit, tells the story of the return home of the victorious hero Agamemnon from Troy and his

foul murder at the hands of his wife, Clytemnestra, and her paramour, ˆEgisthus. .riSschylus is a tragic poet of great imagination, lofty

style and profound religious feeling.

Sophocles (c. 496-406 b.c.), the second of the great tragedians of Athens, is also represented by seven extant tragedies. These are the

Antigone' (q.v.), (Ajax,' <CEdipus Tyrannus' (q.v.), ˆrachiniae,' (Electra,' (Phi—

loctetes' and <GEdipus at Colonus.' In the

impressive tragedy (Antigone' the heroine,

Antigone, suffers a martyr's death because she

gives holy rites of burial to her brother Poly-neices in defiance of the edict of Creon, King of Thebes. In the (Ajax,' the hero of that name, defeated in the contest for Achilles' armor,

slays himself and is grudgingly awarded hon¬

orable burial. The lGEdipus Tyrannus,' the

greatest Greek tragedy in plot construction, was Aristotle's model play. The (Trachiniae' is in¬

teresting to moderns in that it, like the An¬

tigone, contains the theme of love. The Plec¬

tra,' a drama of revenge, has the same theme

as the Phoephori' of Pschylus. It tells of

the return from exile of Orestes and the slay¬

ing of Clytemnestra and yEgisthus by Orestes,

abetted by his sister, Electra. Of the three

great Athenian tragedians Sophocles is perhaps

most typically Greek. In plot, in delineation

of character and in style he is well-nigh fault¬

less. He is a literary artist and the embodi¬

ment of the Hellenic ideal, the golden mean.

Of Euripides (480-406 b.c.) no less than 19

tragedies survive. Only a few of the greatest

may here be mentioned: the (Alcestis' (q.v.), a story of a wife's devotion and sacrifice; the

(Trojan Woman,' a pathetic and graphic por¬

trayal of _ scenes following the fall of Troy.

The Uphigenia among the Taurians,' an ex¬

cellent and appealing play with happy ending,

and the (Medea' (q.v.), a moving story of the dread revenge inflicted by the Colchian sorcer¬

ess upon her faithless husband, Jason. Although Euripides lived in the same century as Sopho¬

cles and 2Eschylus he seems to belong to a

later age for he was a radical and distinctly ahead of his own generation in thought and

method. In his plays we find religious scep¬

ticism . and note the influence of the new

rhetoric. Euripides was a realist and, as the

ancient tradition asserts, painted men as they

are, while Sophocles painted them as they

should be. On the technical side his innova¬

tions were: a formal prologue, and the dens ex machina. While Euripides is inferior to EEschy-lus in creative poetic ability, and does not

equal Sophocles as a literary artist, he is a GREEK LITERATURE

playwright of first-rate ability, and as a

lyricist rises at times to lofty height. Further¬

more, of the Greek tragedians his influence has been the greatest on succeeding ages for he

served as model for Roman tragedy and the

French classical drama.

Comedy came to development a little later than tragedy. Like tragedy it had its origin among the Dorians and in the worship of the god, Dionysus, but the germ of it is to be found in the phallic songs and satire of the rustic festivals. In Greek comedy there are three periods : Old Comedy to c. 390 b.c. ; Middle Comedy, c. 390-320 b.c.; and the New Comedy, after 320 b.c. Old comedy is characterized by personal and political satire and abuse. Its great representative is Aristophanes (born c. 448 b.c.) of whom 11 comedies are extant. Of especial interest is the (Clouds,* which is de¬ voted to a humorous, although caustic and un¬ deserved attack upon Socrates. In the <Frogs) (q.v.), Euripides, despised by Aristophanes, is the butt. Other comedies are: ‘Acharnians,* ˆKnights,* <Wasps,) (Peace, > <Birds,) (q.v.), ˆysistrata,* <Thesmophoriazusae) (Ecclesi— azusse) and <Plutus.) The Middle comedy, a period of transition, is represented only by scanty fragments. The New comedy, ˆmirror of human life,® is a comedy of manners, a de¬ lineation of stock characters in society. The

famous and popular master in the field of the new comedy is Menander (342-291 B.c.) who

was known to us until recently only through

the medium of scanty fragments, and the come¬

dies of the Latin writers, Plautus and Terence.

But in 1905, in Egypt, there were discovered

large portions of four of his plays.

B. Historical Prose. — As compared with verse

Greek prose was of slow development. If we

disregard early Ionian chroniclers and compilers whose writings, devoid of any charm of style

are lost, the first important name is that of Herodotus (5th century, B.c.), the ((Father of

History.® His fascinating <History) (in nine

books, written in the Ionic dialect) tells the story of the growth of Persia and her wars

with Greece. The chronicle is enlivened by

many entertaining anecdotes. The style, while

loose in structure and parenthetical, has great charm and lucidity. Herodotus is not a crit¬

ical or scientific historian in the modern sense of the term, but his work, properly estimated, is of very great value.

Thucydides, in his (History of the Pelo¬

ponnesian War,* in eight books, has a different conception of the historian's task. A contem¬

porary of, and participant in, the long struggle for supremacy between

Athens and Sparta, he

strives to give an accurate account not only of the actual events of the war but also of their causes. His style is rather austere,, and shows strongly the influence of the rhetorical tenden¬

cies which were potent at the time.. Prominent in his work are the speeches,. of which the most famous is the (Funeral Oration* of Pericles in Book II. Of great interest, too, is the account of the illfated Sicilian Expedition and the

description of the ravages of the plague in

Athens.

The third and last historian of the Attic

Period is Xenophon (born about 431 b.c.) the

author of the (Hellenica* and (Anabasis* (q.v.) In the <Hellenica,) a work of no great inspira¬

tion, the narration of Hellenic affairs is con¬

tinued from the conclusion of Thucydides' his¬

tory down to the battle of Mantinea (362 b.c.).

The (Anabasis } is a work of permanent value

by reason of the interest of the subject-matter and the freshness of its style. It tells the

story of the march inland into Asia of the

10,000 Greek mercenaries under Cyrus, the

young Persian prince; of the death of Cyrus;

of the vigorous leadership of Xenophon, who

accompanied the expedition, and their adven¬

turous, but successful, trip home. Xenophon's

(Memorabilia* or Recollections of Socrates

pictures the Master on the personal side. Minor essays are also extant.

C. Rhetoric and Oratory. — Two factors con¬

tributed to the development of oratory and

stylistic Greek prose : The Sicilian rhetoric and the influence of the teachings of the Sophists (e.g., Protagoras and Prodicus) the majority of whom came from Ionia. The first handbooks

of formal rhetoric were written by Corax and

Teisias, and their pupil, Gorgias, who made

popular the ornate, antithetical style, by his

captivating speeches and teaching throughout

Greece. Athens of the latter half of the 5th

century, and in ‘the 4th, took the keenest in¬

terest in public-speaking and rhetoric. Of the

many Attic orators of this period a list of the ten greatest was drawn up in the famous

<Canon) by Alexandrian critics. These orators

are as follows: Antiphon (c. 480-411 b.c.),

rugged and austere in style, all of whose 15

speeches are concerned with murder causes.

Andocides (born about 440), an ((amateur,® has

three . speeches extant of which the most in¬

teresting is the (On the Mysteries. * Lysias, a metic (resident-alien) at Athens, adopted the

profession of writer of speeches for litigants.

Thirty-four speeches are extant under his name.

Of these the (Against Eratosthenes) was spoken

by Lysias himself. He is regarded as a master of the Attic idiom, and is noted for clearness and vividness of style and is particularly es¬

teemed for his skill in delineation of character.

Isocrates (436-338) will always hold a prom¬

inent place in the history of rhetoric. He was a Sophist, in the best sense of the term, and con¬

ducted an influential school in Athens for over 50 years. He taught rhetoric as a <(philosophy®

and defended it as an effective preparation for life. Because of temperamental defects he was

not a public speaker but devoted himself to the composition of pamphlets, or discourses, in

which teaching he aimed to make contributions

of permanent value. Of especial interest are

the (Panegyricus) (his masterpiece, 380 b.c.),

in which he expounds his cherished political

idea, viz., the subjugation of Asia by a united Hellas, the (Panathenaicus* and the (Philip. J

His theory of culture is elucidated in the

(Against the Sophists * and the (On the Anti—

dosis.* In style, Isocrates is smooth: his periods are lengthy and flowing. The influence of

Isocrates has been very great upon subsequent

Greek writers, upon Cicero, and upon modern

literary prose. Isaeus specialized in the writing of speeches involving will-cases and of these

discourses 11 are extant. Demosthenes (384-322) is by far the greatest ancient orator and a master of all the oratorical virtues. In the (01ynthiacs) and the ‘Philippics* Demosthenes

vigorously opposed the growing power of Macedon and urged, largely in vain, lethargic Athens to more active resistance to Philip.
Demos-406

thenes* masterpiece is the famous speech (On

the Crown > (see Oration on the Crown),

in which Demosthenes successfully defends his

whole public career and shows himself worthy

of the golden crown of honor which was pro¬

posed by Ctesiphon and opposed by his rival,

ˆschines. The superlative virtues of Demos¬

thenes as orator and statesman are attested by the unanimous praise of ancient and modern

critics. The remaining four orators of the

Canon of the Ten are: ˆEschines, defeated rival of Demosthenes ; Lycurgus, the great Athenian

statesman and financier; Hypereides, and

Deinarchus.

D. Philosophy. — The fourth and last sphere

of literary activity in the Attic period is that of philosophical prose. Here there are but

two writers of commanding eminence, Plato and

Aristotle. With the nhilosophical views and

doctrines of these world-famous thinkers we are not here concerned. We shall merely sketch

their literary achievements. Plato (c. 427-347

B.c.) , founder of the Academy, is regarded by many critics as the greatest master of Greek

prose style. His beautiful prose is often akin to poetry and reveals a literary artist of vivid imagination, inimitable charm, and keenest wit.

In Plato's (Dialogues) we have a comprehen¬

sive exposition of the ethical views of his

teacher, Socrates who left no writings. Per¬

haps the best known of the works of Plato is the (Republic> (q.v.), which is an inquiry into the nature of justice and a description of an ideal state founded on this virtue. Of peculiar interest is the series of dialogues concerned with the last days and death of Socrates, namely, the (EuthyphroP the (Apology0 (Socrates' speech

in his own defence when on trial for his life), the <Crito,) and the <Phaedo) (on the immor¬

tality of the soul).

Under the name of Aristotle (384-322 b.c.),

Plato's pupil, an incredibly large collection of writings has come down to us. It is probable

that some of these works were written by his

pupils, perhaps on the basis of lecture-notes.

Aristotle was a profound thinker and investi¬

gator and followed the most varied interests;

his treatises, therefore, are concerned with di¬

verse subjects. Students of literature and the

drama are especially interested in the Rhetoric'

(the art of Persuasion) and the <Poetics) (a

treatise on the poetic art (q.v.). Aristotle's

style has little charm ; it is scientific prose which at times is easily intelligible and then again in¬

volves difficulty of interpretation largely through the technical terminology.

IV. The Alexandrian Age (c. 300 B.C.-

146 B.C.). — After the 4th century b.c. Athens no longer occupied the supreme position in

literature and the arts. Alexander's conquests

were not only followed by Athenian political

decline but Hellenic culture was spread widely

throughout Asia and Egypt and gave the im¬

pulse to the founding and rapid growth of new Greek cities. Alexandria, founded by the Mace¬

donian conqueror in 332 b.c. became a centre of learning with a Museum and large library which attracted numerous scholars, teachers, and

students. Grammar and lexicography were

much studied. Editions of selected classic

writers of previous centuries, with comment¬

aries, were industriously produced by such

learned scholars as Zenodotus, Aristophanes of

Byzantium, and Aristarchus, all of whom won

fame, particularly in the study of the Homeric poems. But in general it may be said that the creative age was over. Erudition, scholarship

and literary industry flourished during the

Alexandrian Age but there were few works of

great originality such as had almost been the

rule during the Attic Period. A brilliant ex¬

ception is Theocritus (3d century b.c.), who

lived in Sicily, Alexandria and Cos. He was

the founder of pastoral poetry and his charming bucolic idyls have enjoyed great popularity and have ever profoundly influenced poetry of this

type, as, for example, Virgil in his (Bucolics >

(Eclogues) and numerous English poets, e.g.,

Tennyson. The names of Bion of Smyrna

(contemporary of Theocritus) with his la¬

ment for Adonis, J and of Moschus (c. 140 b.c.), author of the lament for Bion) and (EuropaP

are generally coupled with that of Theocritus,

a greater master in poetry of this genre. Other poets of the age are the erudite Alexandrian

Callimachus (c. 260 b.c.), composer of hymns,

elegies and epigrams, and Apollonius of Rhodes, author of the epic poem, the (ArgonauticaP a

source for Virgil. In this period likewise we

may place the <Mimes) of Herondas, and the

astronomical verses of Aratus. The excellent

history of Polybius (c. 150 b.c.) is a valuable source of information particularly for the first Punic War. See Idyls of Theocritus, Bion

and Moschus.

V. The Graeco-Roman Age (146 B.C.-527

A.D.). — In any sketch of Greek literature no

hard and fast line can be drawn between the

Alexandrian and Roman Ages. Literary ac¬

tivity continued to flourish without any break

throughout the Greek world under Roman sway

or, rather let us say, throughout the politically supreme Roman Empire which was dominated

by Greek culture. The one great original

genius of this age is Lucian (2d century a.d.), the pioneer and master in a new field, the

romance. Born in Syria, he traveled and

studied widely, residing for a time in Athens.

Lucian is rhetorician, satirist, sceptic and wit, all in one. Very famous are the satiric Dia¬

logues (Of the DeadP (Of the GodsP and

(Of the SeaP and his (True History,* a

model much imitated by writers of extravagant

fiction ever since Lucian's day. In the province of biography, Plutarch (1st century a.d.) won

fame by his (Parallel Lives) and (MoralsP

Worthy of mention are the <Geography> of

Strabo (1st century b.c.), the guidebook of

Pausanias (2d century a.d.), a < work of great

value for a knowledge of Greek monuments

and topography ; the general history of Diodorus Siculus ; the excellent literary criticism of

Dionysius of Halicarnassus (1st century b.c.),

and pseudo-Longinus; the Roman histories of

Appian-and Dio Cassius ; the historical treatise on Alexander of Arrian; the (History of the

Jews) of Josephus; the useful miscellany, the

< Deipnosophistse) of Athenseus (c. 200 a.d.) ;

the compilations of Stobaeus; the medical

works of Galen, and the notable < Meditations)

(q.v.) of the great Stoic Emperor, Marcus

Aurelius Antoninus (131-180 a.d.). The be¬

ginnings of the novel should also be noted in the romances of Longus, Heliodorus, and

Achilles Tatius.

The brief outline of this period should not

be concluded without a few words concerning

the Greek Anthologies or Collections of epi¬

grams, beginning with Meleager (c. 60 b.c.),

and the much later and enlarged collections of Agathias (6th century a.d.) ; the (Palatine

Anthology > of Cephalas (10th century a.d.),

and the cPlanudean Anthology* (14th century

a.d.) . In these large collections we possess several thousand short poems or epigrams (in

the Greek sense of the term), largely in the

elegiac meter, dating from 700 b.c. to 1000 a.d.

Many of these little poems treating of love, life, death, fate, etc., are charming; some have

genuine inspiration.

The Byzantine Period to the Fall of Con¬

stantinople (527-1453 A.D.). — By the desig¬

nation Byzantine we mean the long period of

many centuries during which Byzantium (Con¬

stantinople) was the centre of Greek culture

in the East. The language which was the

medium of expression of this culture was still Greek; the civilization was naturally much influ¬

enced by Rome. In literature there was great

productivity but it is, on the whole, lacking in originality and has little interest for the modern world except for the theologian, the historian, or the specialist. The field is enormous and can be but briefly surveyed here. In the early part of the Byzantine period theology held a domi¬

nant position in intellectual interest. The mass of theological literature is great and includes such writings as the works of the famous

scholars, Eusebius, Synesius, Basil, Gregory of

Nyssa and Gregory of Nazianzus, and Saint

Chrysostom. These Christian Fathers, many of

whom are of the 4th century a.d., might, with greater chronological accuracy, be placed in the Graeco-Roman period, but in their influence

and interests they are rather Byzantine. John

of Damascus (8th century a.d.) and Photius

(9th century a.d.) must also be mentioned

among the prominent theologians whose writ¬

ings and teachings were influential. Second in

importance in this age is historical writing.

This province is represented by Procopius, who

wrote of the times of Justinian; Agathias (6th century) ; Nicephorus Briennius, and his wife

Anna Comnena (11th century a.d.). Among

the compilers, or chroniclers, who have handed

down accounts of the Byzantine Empire, are

Theophanes, Georgius Monachus, and John

Zonaras. Philosophy, lacking a congenial en¬

vironment, did not flourish during this period.

Rhetoric was industriously cultivated but the

voluminous literary output is of indescribable

aridity and dreariness. (Consult Walz, (Rhetores Graeci,* 9 vols.). Of especial value to modern students are the numerous stupid, but often

extremely helpful, compilations, commentaries,

lexicons, etc., which are based upon, or are

explanatory of, the ancient classical writers.

We possess, for example, the Lexica of Suidas, Photius, and the (Etymologicum Magnum*;

the (Scholia* (explanatory notes) of Eustathius on Homer; and the commentaries of Tzetzes,

of Moschopulus, and Thomas. Magister. Of

decided importance is the (Bibliotheca) or (Mu—

riobiblon) of Photius, patriarch of Constan¬

tinople (9th century a.d.). In this work he

has handed down to us abstracts and critiques

of some 280 ancient books. Since many of

these works are now lost these synopses are

of value. Unfortunately Photius neglects

poetry and over-emphasizes the theological

writers. The best poetry of the Byzantine

period is to be found in the Greek (Anthology.) An account of this great collection of short

poems has already been given. For a scholarly

and detailed treatment of this whole Byzantine

era in literature the reader should consult

Krumbacher, (Geschichte der byzantinischen

Litteratur* (Munich 1897). See Byzantine

Literature.

Bibliography.— Croiset, A. and M., < Manuel

d'histoire de la litterature grecque) (Paris

1896-1900), probably the best work on the

subject in any language; Christ-Schmid, (Geschichte d. griech. Litteratur* (Munich 1908-13), a very useful handbook; Wright, W.

C., (A Short History of Greek Literature >

(New York 1907), with serviceable special

bibliographies; Murray, G., (History of An¬

cient Greek Literature/ (1897) ; Capps, E.,

(Homer to Theocritus) (New York 1901), a

good introduction especially for the student

ignorant of Greek.

La Rue Van Hook,

Associate Professor of Classical Philology,

Columbia U niversity.

GREEK MUSIC, the theory and practice

of melody and harmonics among the ancient

inhabitants of Hellas. The subject of Greek

music is an obscure and difficult one, but there are enough data extant to afford us a general idea of the Greek musical scale, of the use of instruments, and employment of the voice in

solo and chorus among the Greeks. The earliest notion of music was derived from the necessity of keeping time in the dance. This at first

would be effected by merely clapping the hands.

The use of instruments of percussion would

follow, and the drum and cymbal came into use.

The cymbal originated in Egypt, and reached

Greece as a permanent element in the practice

of music. The rustle of the wind through the

reeds, sometimes with a shrill whistling vibra¬

tion, suggested the application of the human

breath to hollow pipes, and what is still called the Pan's pipes was invented. Wind instru¬

ments of various kinds came afterwards into

vogue, the flute, and the double flute were em¬

ployed, and seem generally to have been blown

as accompaniments to the elegy and the love

song. These pipes were of various kinds and

were considered as good accompaniments to

the recitations of the poet, as well as for regu¬

lation of movement in a dance. They were

employed in the ceremonies of the mysteries,

and Plato speaks of an often recurring thought as resembling ((the sound of the flute in the ear of the mystic.**

Instrumental music attained its highest de¬

velopment in the invention of the lyre. The

Egyptians attributed this invention to their god Thoth. In Greece Hermes is celebrated as the

inventor of the lyre, which became henceforth

the instrument of the epic poet and the rhapsode or reciter. It had originally four strings, which it is said were suggested by the tendons stretched over the shell of a tortoise. The first Greek philosopher to attempt a scientific theory of

musical scales and intervals appears to have

been that profound and versatile man Pythag¬

oras (585 b.c.) . The Greeks did not use the word music in application to the art which we so name. Music to them comprised everything

which the Muses inspired, and even history and astronomy as well as poetry were music. What

we mean by the term was called by the Greeks harmonics, which means the art of fitting, that is, adjusting the intervals in a scale, in the strings of a lyre. The scale of Pythagoras had seven notes, corresponding with the seven strings of his lyre, and he professed to derive his idea of music from the music of the spheres. The

sun revolving round the earth was to him the

chief planet, and was represented by the middle string of the lyre which was considered the key¬

note, corresponding with A in the modern scale.

On one side were strings representing Mercury,

Venus and the Moon, on the other side three

more corresponding with Mars, Jupiter and

Saturn. It is said that Pythagoras discovered

the ratios of the perffect intervals from hearing blacksmiths striking an anvil with hammers of

different weights. Aristoxenus (b.c. 300) dis¬

covered the difference between the major and

minor tones and has been called ((the father of temperament.ˆ Claudius Ptolemy (b.c. 150)

demonstrated the musical axiom which obtains

in modern times that the major tone should be below the minor.

The Greeks had four modes or scales, the

Dorian, the Phrygian, the Lydian, and the Mito-Lydian. The Dorian was set in the key of F

natural, ana the rest were distinguished by

analogous differences.

The ancient Greeks were passionately fond

of music, and elaborate treatises were written

by them on the science and art. They did not understand harmony, and Aristotle (384 b.c.)

speaks of the only chorus singing known as that of men singing a melody an eighth lower than

it was sung by boys, which of course would be unison. Music was employed at Athens by

wandering epic minstrels; it was also common

in religious ceremonies, and to regulate the

movements of the army. It formed part of the

drama. We are told that yEschylus, the father

of tragedy, composed the music for his own dramas and that Sophocles accompanied on the lyre the performance of one of his plays. Ex¬ amples of ancient Greek music have been pre¬ served. One fragment contains 6 lines of a chorus in the <Orestes) of Euripides. Two hymns to Apollo, composed in the 2d cen¬ tury b.c., prize winners in musical contests, were discovered at Delphi in 1893 and have been published in modern form by Novello of London and New York. In 1899 a concert of ancient Greek music was given at Bremen, Ger¬ many, and examples are frequently included in programs of historical music. (See Mode; Tem¬ perament). Consult Ambros, (Geschichte der Musik) (Leipzig 1888) ; Crusius, O., (Die delphischen Hymen 5 (Gottingen 1894) ; Gevaert, (La musique de l'antiquite) (Ghent 1875), a standard work ; (La melopee) (1895-96) ; Jan, K. von, (Musici Scriptores5 (Leipzig 1895) ; Johnson, (Musical Pitch and the Measurement of Intervals among the Ancient Greeks) (Bal¬ timore 1896) ; Monro, (The Modes of Ancient Greek Music * (Oxford 1894) ; Reinach and

Weil (in the Bulletin de Correspondence Hellen -

ique, Paris 1894 — 95) ; Romagnoli, E., (L'a musica greca) (Rome 1905).

Charles Leonard-Stuart,

Editorial Staff of The Americana.

GREEK MYTHOLOGY. Mythology in¬

cludes both those explanations which the im¬

agination of man, primitive or civilized, has

devised to account for natural phenomena and

for the relations between the various parts of the universe, and also a wide range of other

tales, probably invented solely to please the

narrator and his audience. Both classes of

stories frequently deal with powers superior

to man so that in ordinary speech, mythology

is generally understood to mean tales with

regard to superhuman beings.

It is natural for man to refer whatever he

thinks strange or marvelous to beings more

powerful than himself, who have a superior

control over both animate and inanimate

worlds; between these two realms, however,

simple man knows no distinction ; all nature

is animate to him. In classical antiquity, as

in modern times, many theories and explana¬

tions of the origin of myths wTere offered.

Since myths are often of immemorial antiq¬

uity, and therefore may contain many ele¬

ments which seem crude and repulsive to men

of an enlightened age, it frequently comes to

pass that the rude tales about the gods are felt to conflict with the more advanced religious

beliefs, so that it is necessary to explain the myths in some reconciling fashion, or to reject them altogether ; the latter course is not easy, for nothing is more deeply rooted in the minds of a people than its mythology. In the 6th

century b.c. the bolder thinkers among the

Greeks began openly to protest against the epic stories concerning the gods. Xenophanes of Col¬

ophon (fl. 540-500 b.c.) declared that ((Homer

and Hesiod have imputed to the gods all that

is shame among men.® On the other hand de¬

fenders of the poets, like Theagnes of Rhegium (fl. c. 525 b.c.) , maintained that there was a deeper meaning in their works than that which

lay on the surface ; that the gods represented elements of nature or mental powers of man.

So Athene was wisdom; Ares, folly; Hermes,

reason; Leto, forgetfulness; Apollo, fire; Pose¬

idon, water; Hera, air; and so forth. Thus

arose the school of allegorical interpretation,

which has had an influence down to the present time. At the end of the 4th century before our era, Euhemerus offered a rationalizing explana¬

tion of myths in his (Sacred History,* where

he set forth the view that the gods were only mortals who by their deeds had won high

renown.

Views of Scholars. — Among modern mythologists three schools deserve mention ; the philo¬

logical, the animistic, and the anthropological

or historical schools. The leader of the philo¬

logical school was Max Muller, who sought by

a comparative study of the Indo-European

languages to determine the original meaning

of the names of the gods, and so to arrive at a knowledge of their original functions. This

method failed, in part because it is impossible in many cases to find etymologies upon which

scholars agree, and above all because, even if general agreement were attained, the etymolo¬

gies would prove nothing. The myths have had

too long a life, and have suffered too many

accretions and modifications, to yield their

meaning to etymology.

Herbert Spencer and E. Taylor were

the chief exponents of the animistic views, ac¬

cording to which man endows each phenomenon

with personality, with an anima, which is its

cause, and attributes to the phenomena of na¬

ture activities which properly belong to men

or to animals. All religion, according to Seen-GREEK MYTHOLOGY

cer, begins with the worship of ghosts. There

is undoubtedly much truth in the views of the animistic school, but on the whole their explana¬

tions are inadequate and incomplete.

The anthropological or historical school is

the least ambitious, for it appreciates the im¬

possibility of detecting in detail the varied im¬

pulses to which myths owe their births ; but

it recognizes that human minds, at any given

stage of racial development, operate in very

much the same ways, so that we find among

peoples all over the world myths so similar that an earlier generation insisted that there must

have been prehistoric borrowing even between

very remote races. Some myths undoubtedly

had their origin in the worship of dead an¬

cestors, others in attempts to explain natural

phenomena or social institutions, still others in ritual. Again many, if not most, myths have

been recast, provided with new details, and

variously manipulated at an advanced stage of

civilization, as by the Greek poets and by even historians as well ; finally many myths defy

classification or satisfactory explanation.

The Myths of the Greeks. — Few peoples

have given us a mythology so rich as that of the Greeks. For convenience we may distin¬

guish between their cosmological myths, myths

relating to superhuman beings of every grade,

and tales of the after-world.

The earliest extant Greek literature shows

that a long period of myth-making had pre¬

ceded it. In Homer there is no elaborate cos¬

mogony, because such did not suit the purpose

of the poet, but it is evident that cosmological stories were familiar to him. Hesiod, on the

other hand, offers an explanation of the der¬

ivation of the world from Chaos, and knows

two dynasties, those of Uranus and Cronos,

which had preceded that of Zeus. Literary

fragments show us that there were many other

cosmogonies, notably those of the Orphics.

There were many myths of the creation, of

plants, of animals, and of man; explanations

of the origin of the arts and practices of civil¬

ized society, as in the tale of Prometheus;

attempts to account for the origin of evil, as in the story of Pandora's fatal curiosity; and tales of the degeneration of the inhabitants of the world, the most famous of which is that

set forth in Hesiod's account of The Five Ages, ranging from the Age of Gold through the

Silver, the Bronze, and the Age of Heroes, to the present wicked Age of Iron. The Greeks,

like many other peoples, had also a story of

the great deluge, in which all perished save

one mortal pair by whom the world was re¬

peopled.

The myths of the greater gods often tell

of their birth, rearing, relations, and charac¬

teristics in detailed fashion. In Homer Olym¬

pus, the home of the divinities of the upper air, is organized like an aristocratic mortal city,

with Zeus as supreme king, his sister and con¬

sort, Hera, being far inferior to her lord in power. Zeus himself was

the aboriginal god

of the Hellenic stocks and universally regarded as the supreme divinity; although in the Ho¬

meric epics he is sometimes cheated and de¬

ceived by the other gods, still his supremacy

is not questioned. Originally he seems to have been the bright sky, and therefore the god

who controls all meteorological phenomena. It

is impossible even to touch on the numerous

myths that were told of him. He undoubtedly

absorbed into himself numerous local divinities, so that in many parts of Greek lands the birth¬

place of Zeus was pointed out. In the most

common version he was the son of Cronus

and Rhea, who brought forth Zeus in the island of Crete, where, during his infancy, he was

protected from his father by his attendants, the Couretes. His moral nature contained most

complete contradictions; wholly faithless him¬

self, he was also the god who guarded morals, protected oaths, humbled the proud, and pun¬

ished evil doers. His supremacy was such that

at times Greek religion rose almost to mono¬

theism, although the step was never completely

taken.

Hera likewise was a Pan-Hellenic divinity,

but it is difficult to determine her original

nature. In Homer she is represented as a good deal of a scold and, we may suspect, she was regarded somewhat as a comic figure ; but in

general the marriage relations between Zeus

and Hera were good, as far as the goddess was concerned. Her powers were occasionally ex¬

erted in directing the phenomena of nature, but she was pre-eminently the protectress of

women.

Athena, the virgin goddess, was regarded as

the embodiment of wisdom. She was also a

valiant fighter on the field of battle. The myth told how she sprang fully armed from the

head of her father Zeus, and this tale furnished the central motif of the east pediment of the Parthenon. In her functions she was above all

the goddess of practical life, presiding over

handicraft of every sort.

Apollo, in the Homeric epics, is the god of

archery and of music; but in the later period he was primarily the divinity of prophecy, with his chief seat at Delphi. He also had a shrine of great antiquity on the island of Delos, where, it was said, his mother, Leto, had given him

birth. He also practised the healing art, but

was second in this to Asclepios, whom post-Homeric legends made his son.

Apollo's sister, Artemis, was his counterpart

in many ways, but far less prominent. She

was a huntress, a goddess of all wild life, and she also practised the art of healing; women

in childbirth were especially under her pro¬

tection.

Ares, the god of war, was probably in his

origin, a Thracian divinity. He is the embodi¬

ment of the wild rage of battle, and as such is represented by Homer as bawling and bluster¬

ing, a character which he never lost in later story.

Aphrodite was the goddess of sexual love,

whether legitimate or not. She had irresistible power over gods and men alike. Wedded to

Hephestus, she herself had slight regard for

her marriage vows, but had many amours, the

most famous being those with Ares and with

Anchises, the father of the hero of the ˆHfneid.*

There can be little doubt that Aphrodite came

to Greek lands at some remote period from

Phoenicia, for many of her functions and at¬

tributes were identical with those of Astarte

or Ishtar. Aphrodite's attendant son, Eros, is

not mentioned in Homer, but in Hesiod he ap¬

pears associated with her, although he is there regarded as of independent origin.

The god of fire was Hephestos, the handi¬

craftsman of Olympus, who wrought many

wondrous works for gods and favored princes.

He was the teacher of the Cyclops and the pat¬

ron of smiths. He appears somewhat as the

butt of the other Olympians, apparently because of his lameness. This affliction was due, ac¬

cording to one account, to the hasty act of his father Zeus, who in a fit of anger, seized him by the foot and threw him out of heaven. An¬

other, perhaps older, tradition made him the

illegitimate son of Hera, who believing him a

weakling cast him out at his birth.

Poseidon, the brother of Zeus, had as his

realm the sea and all other waters. As lord of the ocean he was also supporter of the earth, which he rocked by stirring his element. He

was furthermore the creator of the first horse and hence the patron of horses and of horse¬

manship.

Hermes is the herald and messenger of the

gods in the Homeric epics. For example he car¬

ries from Zeus to Calypso the order to let

Ulysses go, and he escorts Priam safely to the Greek camp that he may ransom Hector's body.

He also conducts the shades of the dead to

Hades or brings them back to earth. Many

myths deal with his character as the patron of thieves and the giver of wealth. It is said that in his earliest infancy he invented the lyre,

which he presented to Apollo in atonement for

the theft of 50 cattle. In his function as herald he became the god of oratory, and indeed of

all speech ; as protector of high roads, he was the god of the traveler and merchant; and he

was also patron of athletic contests.

Hades, the second brother of Zeus, presided

over the realm of the dead, but his cult never obtained any great prominence in Greece, and

few tales were told of him in post-Homeric

legends. Persephone became his bride.

Dionysus was the god of all life, especially

of plant life. In Homer he has not yet been

admitted to Olympus, but many myths are re¬

ferred to showing the opposition which was

offered to the establishment of his worship. In fact this god was of Thracian or Phrygian

origin and only gradually made his way into

Greece, being first domiciled at Athens possibly as late as the 8th century b.c. In a common

myth Dionysus appears as the son of Zeus and

a mortal, Semele. At his birth his mother was consumed by lightning but the babe was sewn

into the thigh of Zeus, whence he was reborn

to be reared by the nymphs on Mount Nisa.

The functions of this divinity were varied. As a god of vegetation, under the name of Zagreus, he was said to have been torn in pieces by the Titans and then to have been revived; thus he became by his rebirth a warrant of human im¬

mortality, and as such played an important role in the Orphic religion. The spread of the wor¬

ship of Dionysus across the seas is celebrated by the legend that Tyrrhenian pirates once

seized the young god and attempted to bear

him away in their ships, but he burst his bonds and, when his captors refused to believe him

a god for the miracles he worked, he changed

them all into dolphins. A later series of

myths told of his travels to India. Out of the songs and dances in honor of Dionysus devel¬

oped the dithyramb and both tragedy and

comedy.

Dcmeter was principally the goddess of the

tilled soil and especially the giver of grain to men ; and since well being and good social order depend on agricultural prosperity, she became

the giver of wealth and of laws. Persephone,

who was obviously a parallel to Demeter, in

mytih was the latter's daughter and was stolen away by Hades to be his bride. Demeter wan¬

dered in the guise of an old woman over the

earth mourning until she came to Eleusis, where she was kindly received by the king's daughters and established as nurse to the king's son.

When she was discovered in her attempts to

make the child immortal by repeated baptisms

of fire, she revealed herself and ordered a tem¬

ple to be bulit in her honor. Yet in her sorrow over her daughter she kept back the gifts of

earth, so that men began to die, until Zeus com¬

manded Hades to allow Persephone to return

for two-thirds of the year to her mother.

Then Demeter established her rites, the Eleusinian mysteries, which developed from an agri¬

cultural festival into one of the most potent

Greek religious festivals.

Asclepios, the god of healing, in the epics

is a mortal, but apparently he was originally a chthonic divinity possessing general oracular

powers. The centre of his worship seems to have been Thessaly, whence his cult spread over Greek lands. Coming into conflict with Apollo at Delphi he became in myth the son of that god. In course of time his functions became specialized, and his shrines at Epidaurus and on the island of Cos became for centuries miracle centres to which great numbers of people resorted that they might sleep within the sacred precincts and in a vision learn the means by which their diseases could be cured, or that they might receive the benefit of a miracle directly.

Besides these greater gods there was a multitude of lesser divinities of sky, air, earth and water, not to speak of abstract gods, of whom mythology has much to tell; but it is impossible here to enter into this field.

There are also two great groups of historic myths which furnished many elements for epic and dramatic poetry — the Trojan and the Theban Cycles; the former concerns the fortunes of Troy from the time when King Dardanus established himself in the land where his descendant Ilos founded Ilium, through the causes and the course of the Trojan War to

the return of the Greek heroes to their homes.

The tale of Thebes deals with the fortunes of the house of Labdacus, with the stories of King CEdipus, the Seven against Thebes, and the

Epigonoi. Other famous cycles deal with the

labors of Heracles, the adventures of Theseus,

the voyage of the Argo after the Golden Fleece and with the histories of Minos, king of Crete, and his sons, and of lesser heroes.

Greek mythology had far less to say of the

lower world than of the upper. The realm of

the dead was generally placed beneath the earth where Hades reigned with Queen Persephone.

In Homer this other world is represented as a cheerless, unsubstantial place for all, where

there is no system of rewards or punishments,

save for three offenders who had sinned ex¬

cessively against the gods; but in later litera¬

ture we find the joys of Elysium and the tor¬

tures of Tartarus fully developed and used for moral purposes. Hesiod and Pindar give us the

earliest references to the Islands of the Blest where those who have divine blood in their

veins, or those who have remained true to the GREEK PHILOSOPHY

highest ideals throughout their lives, are to find eternal happiness.

There were tales also of descents to Hades

by the living: The most famous were the de¬

scent of Orpheus to recover his lost Eurydice, and that of Heracles who carried off the watch¬

dog, Cerberus. Both these were celebrated in

literature and art. See Greek Gods ; Greek

Religion.

Bibliography. — Fox, W. S., (The Mythol¬

ogy of all Races) (I, Greek and Roman, 1916) ; Gruppe, O., (Griechische Mythologie und Religionsgeschichte) (2 vols., 1897, 1906) ; Preller, 'Griechische Mythologie) (I, 4th ed., by Robert, 1894; II, 3d ed., by Plew, 1872) ; Roscher, W., (Ausfiihrliches Lexikon der griechischen und

romischen Mythylogie) (A-Tan, 1884-).

Clifford H. Moore,

Professor of Latin, Harvard University.

GREEK PHILOSOPHY, the various

speculations of the ancient Greeks with regard

to the origin of things. This is but a partial description of the intellectual efforts made by the keen and powerful minds of the ancient

world to solve those problems which science

nowadays is so eagerly investigating. The ori¬

gin of Greek philosophy was the gradual dis¬

belief that had seized men's minds as to the

truth of the ancient poetical cosmogonies and

antique mythologies of religion. Faith was

dead and reason had awakened. In the 7th cen¬

tury before our era, in the flourishing city of Miletus, capital of the Ionian colony, the first Greek philosopher propounded the question

which is still being put, What is the basic sub¬

stratum of all phenomena? In our own days

Huxley called it protoplasm ; Herbert Spencer

said it was force. Thales of Miletus (636 b.c.) declared it was water, which to him seemed to permeate and give life to all things. Thales

was the first of the Greek physicists, or ma¬

terialists, and was considered one of the Seven Wise Men of Greece. He was the founder of

the Ionian School of Philosophy. He was suc¬

ceeded in the long line of philosophical inquir¬

ers by Anaximenes (529 b.c.) : who looking for the first element, the first cause, found it in air.

Air was universal and must be the parent of all things. It was the breath of life and must

therefore be the source of it. Diogenes of Ap-pollonia (460 b.c.) fixed upon a higher notion as the first cause of things. He saw the ruling race of mankind prevailed over nature by their intelligence. He decided that intelligence was

the cause and foundation of all things. In

these speculations as to the nature of the uni¬

verse and its origin we come upon two remark¬

able men, Anaximander of Miletus (610 b.c.)

and Pythagoras, who invented the word philoso¬

phy. The former taught that all existence

came from the infinite — a vague term, which

did not mean the infinite intelligence but the infinite existence. Pythagoras said that num¬

ber was the first thing, from which all else pro¬

ceeded — a metaphysical abstraction, which al¬

most defies analysis. Aristotle says the Pytha¬

goreans <(taught that number was the beginning

of things, the cause of their material existence, and of their modifications and different states."

The school of Eleatics is chiefly represented

by the poet Xenophanes (620 b.c.). His philo¬

sophic creed is thus described by Aristotle :

<(Casting his eyes upward at the immensity of

heaven, he declared that The One was God."

Reason and imagination led this thinker to be¬

come at once a Monotheist and a Pantheist.

Parmenides who was born (536 b.c.) at Elea, a city which gave its name to Eleatics, was the first to make the great distinction between truth and opinion, between the deductions of reason

and the impression of sense. He made being

the basis of things, for non-being was impossible — a discovery which at that stage in philosoph¬

ical speculation was of great importance. Zeno, another Eleatic, born 500 b.c., who was the in¬

ventor of logic, was persecuted and put to death for free-thinking and was a follower and dis¬

ciple of Parmenides. Plato says that the mas¬

ter proved the existence of the one ; the disciple established the non-existence of the many. He

preserved his master's distinction between truth and opinion. ((Your senses," he would say, ((tell you that there are many things existing; reason avers that there is but one."

A contemporary of Zeno was a man who be¬

gan at Ephesus those speculations as to the

origin of the universe to which as preliminary he added a theory on the origin of knowledge.

This was Heraclitus (503 b.c.). He was a dis¬

ciple of Xenophanes and taught that fire is the origin of everything, and there is no existence, but only change ; things cannot be said to be, but only to be becoming; processes and not

states formed the mode of existence. We can¬

not know or name anything with truth, for

as we look at it, it changes, and is something different from what we thought it.

Anaxagoras came from Clazomense to Athens

just when the age of Pericles was dawning; he had indeed Pericles, Euripides and Socrates as

his pupils. He attacked the patriotic religion

of the proud city and was banished to Lampsa—

cus. He thought that all sense — knowledge —

was delusive until corrected by reason. He be¬

lieved that intelligence was the creative and reg¬

ulating influence of the universe. Things as

they are were brought about by the concourse of infinite atoms; but these atoms were of all sorts, and that like was united to like in an infinite series of movement and combination; gold by

the union of gold atoms that had existed from eternity, fires from fire atoms, air from atoms of air. These atoms were the famous homceo-merise spoken of and condemned by Aristotle.

Empedocles (444 b.c.) was of the great city of Agrigentum ; in his views of knowledge he be¬

longed to the Eleatics and maintained that the senses were fallible, while reason was a sure

guide to truth. He was a poet and declaimed

against anthropomorphic ideas of deity. He

gathered in one the doctrines of the Ionian

physicists declaring the primary elements were

four, namely, earth, air, fire and water. Love was the formative principle of things, hate the dissolver and destroyer. One was harmony, the

other discord, and God is the One, ((a sphere fixed in the bosom of harmony, rejoicing in

calm rest.”

Democritus of Abdera (460 b.c.) was a rich

man who entertained Xerxes at his house. He

went one step further than Anaxagoras and al¬

most entered the circle of our modern science

by teaching the atomic theory, namely that

everything in the world is the result of a for¬

tuitous concourse of atoms, all of the same sub¬

stance, but making various things through the

various forms they take in uniting. Color,

sweetness, cold, are the result not of substances essentially differing; all is form.

All attempts had so far failed to solve the

problems of the material world and of human

knowledge. Many theories were put forth, none

were universially accepted, although they were

each discussed. This brought the Sophists on

to the stage of philosophy — men who taught

the arts of discussion, not of investigation. One of the greatest of them was Protagoras. He

was a disciple of Democritus and taught that

opinion was everything, ((Man, the individual

man, each for himself, is the measure of all

things.® The Sophists were the first skeptics,

but a new epoch rose with Socrates (469 b.c.).

He was the most remarkable man in all the

Greek world; for his love of disputation he

was classed by some with the Sophists, for his ridicule of traditional views in religion and

physics, he was condemned to death — yet he

succeeded in substituting morals for physics as as the subject of philosophy. He first gave to philosophical methods the definition and the

inductive argument, or reasoning by analogy.

One of his disciples, Aristippus of Cyrene,

while he followed the method of his master,

founded the Cyrenaic school which taught that

pleasure was the criterion of the true : Socrates had taught that the good as judged by the indi¬

vidual conscience was that criterion. Then fol¬

lowed the Cynics, under Antisthenes who went

to the opposite extreme to Aristippus, who be¬

came an ostentatious ascetic, and in this was fol¬

lowed by Diogenes of Sinope, who made his

home in a cask or tun, and tried to set the ex¬

ample of a rugged virtue, which is misanthropic, but triumphant over bodily appetite. It was left to Plato to exhibit the complete adoption and

application of the Socratic method. He believed that in each man resided the power of detecting the truth, from having seen the perfection of

things, in an ideal world during a previous

state of existence; he could judge of the good and the beautiful here from his memory of what their perfect archetypes were. His voluminous

writings enable us to judge both of his ethical and political system, but they both fail in prac¬

ticality. His most famous pupil was Aristotle

(384 b.c.) , a man of encyclopedic mind, the first scientific observer, the inventor of the syllogism.

Plato was an idealist and a rationalist ; Aris¬

totle a materialist and an empiric. The one

trusted to reason, the other to experience.

Aristotle always argued against the ideal the¬

ory of his master and deduced his conclusions

from things as he saw them. He invented

grammar as well as logic and was in himself an epitome of the philosophic learning of his

predecessors. But by reasoning from experi¬

ence he had opened the way for the skeptics, of whom the first was Pyrrho, who taught that

there is no criterion of truth. Phenomena are

mere appearances, how can we prove they are

anything else? This was what in modern times

is called agnosticism, for we cannot prove and therefore cannot know the truth of anything

we see. But after this suicide of philosophy in the school of Pyrrho, she revived again as a

moral mentor in the person of Epicurus, of

Sanios (342 b.c.). He taught the highest good

is pleasure; this is the moral end of existence.

He was controverted by the Stoics. Zeno was

their leader, a man of stern unbending charac¬

ter and abstemious life, whose aim was to show that virtue consisted in manhood and manhood

in the power to endure hardness and to despise the body. Skepticism, indifference, sensuality

and epicurean softness were not to be com¬

bated by the vague dreams of Plato or the cum¬

brous system of Aristotle. The Stoic attempted

to meet the growing decadence by an exactly

opposite self-denial and impassive reserve. But

Stoicism was egotistic; its aim was the repres¬

sion of feeling, it was apathy, death in life. The last struggle of Greek philosophy to dominate

the mind of society was witnessed in the rise of the New Platonists and their New Academy.

Carneades (213. b.c.) was their most illustrious representative, and he was the type of a school that took up the doctrines of Plato, expanded

and enlarged them until the time when Chris¬

tianity appeared and faith, not reason, as in

the old days 700 years before, dominated the

world of opinion. See Philosophy, History of.

Bibliography. — Bender, (Mythologie und

Metaphysik) (Stuttgart 1899) ; Benn, (The

Philosophy of Greece' (London 1898) ; Bran¬

dis, (Geschichte den Entwickelungen der griechischen Philosophic' (Berlin 1864) ; Burnet,

(Early Greek Philosophy' (2d ed., London

1908) ; Erdmann, (History of Philosophy'

(Eng. trans., London 1890) ; Windelband,

(Geschichte der antiken Philosophic' (3d ed.,

Munich 1912) ; Gomperz, (Greek Thinkers'

(4 vols., New York 1901-11) ; Zeller, (Grundriss der Geschichte der griecheschen Philoso¬

phic' (9th ed., Leipzig 1908) ; (Die Philosophic der Griechen in ihrer geschichtlichen Entwickelung' (4th ed., Leipzig 1909).

GREEK RELIGION. The ideas of a per¬

fect god. revelation, creeds, dogmas, conscience, divine love, etc., were not present in the Greek religion. The Greeks believed in a personal

god, who was interested in the welfare of cer¬

tain men, and these men longed for the protec¬

tion and sympathy of that god, to whom they

prayed and sacrificed. Shrines of these various deities were everywhere. Religious practices

were numerous ; but religion rested lightly on

men's shoulders. Religious rites and festivals

were most frequently occasions of joy.

Zeus was the father, the paternal ruler. The

other gods were mere ministers in the divine

government of the world. To the Greeks, man

was like god, and god like man. So they could enter into definite relations with their gods;

they recognized that communion underlies wor¬

ship. The myths about the gods were believed

to be true — at least by the vast majority —just as sincerely as a modern Christian child be¬

lieves in Santa Claus. But the myth was never an article of creed; it was kept free from the in¬

fluence of theology. Greek religion as such was guiltless of system and wholly devoid of method.

For worship the gods had definite shrines

where they had specific names. Religion and

morality were separate and distinct, though they tended later to become united. The god of

each shrine was treated as if he were independ¬

ent of the other gods. There were as many re¬

ligions as cities; and the cult of a city made no appeal to an outsider. Each god was worshipped independently — as if the other gods did not

exist, Just as in some Catholic countries one

saint is worshipped while others are apparently forgotten. The temples and shrines were su¬

pervised by the state; priests were appointed

and temples built by the people as a whole ; and religious law was administered in courts estab¬

lished and maintained by the authority of the

state. Greek religion remained to the end an

untheological religion; the only authority for

ritual was the tradition of each particular shrine, handed down from remote antiquity. From the

interchange of ideas there arose two types of

sacrifice, one a joyous festival in honor of the god, the other a solemn rite to appease an angry deity. But everybody was free to think of the gods as he chose. The comic poet, Aris¬

tophanes, could make fun of them — that was

immaterial so long as the public worship con¬

tinued undisturbed.

Greek Worship. — The Greeks did not wor¬

ship physical objects. Zeus was father of gods and men; rain came from Zeus; the thunder¬

bolt was his weapon; his home was in Olym¬

pus. Dionysus was the god of wine, Posei¬

don of the sea. Nevertheless, Dionysus was a

human god, visiting one place after another;

Poseidon was a lover of horses and fond of

the battlefield; Apollo was the prophet who re¬

vealed to men the divine will, and he was the great musician, the

healer of disease and the

god of shepherds ; Aphrodite was the most hu¬

man of all the gods, the spirit in whom was

manifested human love as a fundamental prin¬

ciple of the universe. The joy of the spring

is poetry for us; for the Greek it was the joy of that community of nature of which he himself

was a part. The religion of the Greeks was not a worship of nature, but a worship of spirits in na¬

ture. The gods differed from man only in degree.

In Homer they exhibit the same passions as

men: Love, hate, jealousy, revenge, guile;

they are greater only in might. Leto is the

mother proud of her children, Hera the

queenly wife, Persephone the gentle daughter;

Poseidon granted safety to sailors; Athena and

Hephaestus taught men the arts and crafts;

Demeter showed them how to cultivate grain.

The relation of the gods to each other was

similar to the relation which exists between

members of a council. That the gods belonged

in the same society with men working together

toward a common goal — this was the concep¬

tion of the Greeks regarding the principle of

divine government in the world. And there

were evolutions and revolutions among the gods

as among men; earth had its counterpart in

heaven. …

The Gods and Men. — Our religion is much

more profound than the Greek; but the latter

was much broader than ours, for it peopled the glens of the mountains and the waves of the

sea with an overflowing life human in its forms.

Greek religion embodied in art all that stirs

the religious feelings of men: the ocean and

the river, the rock and the forest, the sun in its splendor, the moon in its gentle romance;

and this religious feeling was with the Greek

all the time, not merely at church service,

prayer-meeting or revivals. The symposium

began and ended with prayer. Even gymnastic

contests and horse-racing came within the pale

of religion. Every side of man found expres¬

sion in religion. Political assemblies began

with worship. Marriage and the rearing of

children were under the protection of the gods.

If men wanted bread, they worshipped Demeter;

if wine, Dionysus; health, Asclepios ; care for sheep, Apollo, Pan or Hermes. If they de¬

sired to know the future, they consulted oracles.

The bringing of votive offerings to the gods

was in the same spirit as the bringing of trib¬

ute to human rulers. The procession at the

festivals was like the triumphal procession

with which all students of history are familiar.

The use of the common meal as a form of wor¬

ship is not unlike the Lord's Supper, although it was not the sacredness of food that was em¬

phasized so much as the vital bond of union

between the god and his worshippers.

When a colony was to be founded, the god

at Delphi would be consulted; unfavorable

omens would delay a battle ; the sick looked to divine guidance for a cure ; a sneeze showed

the approval of the gods in some undertaking;

a dream would deter or encourage.

The gods sometimes revealed themselves to

men; but (<not to all men do the gods appear visibly*^ GOdyssey^ III, 375 f). Zeus and

Hera, however, remain on Olympus. Iris and

Hermes are messengers to men ; Apollo and

Athena appear occasionally to carry out their

plans or the plans of Zeus. When the gods

appear in visible presence to men, they usually assume the guise of some particular individual.

Thus Aphrodite takes on the form of an old

woman on one occasion, Poseidon of Calchas,

Athena of Mentor GOdysseyG-Sometimes

the gods came directly to earth in propria per¬

sona: Aphrodite in the <Iliad,) is wounded by

Diomedes, Ares dazed by a blow from Athena.

Learning the Will of the Gods. — Signs of

nature were more important than those ob¬

tained by divination. In the (Iliad, J thunder revealed the will of Zeus. Lightning on the

right indicated the favor of the king of gods.

An eclipse of the moon so affected Nicias that he would not withdraw his army before Syra¬

cuse. At Athens the assembly would adjourn

if rain signified that Zeus was unpropitious.

Only the superstitious, however, paid much at¬

tention to such signs. The science of astrology had practically no adherents in Greece. In

Homer, the chief method of learning the will

of the gods was the observance of the flight of birds: The eagle of Zeus, the hawk of Apollo, the heron flying in the night. Prometheus

claimed that he taught men divination ; ((The

animosities, consortings and attachments of

birds; and the smooth surface of the viscera

and what hue the gall must have for the gods'

pleasure and the mottled symmetry of the liver lobe ; and the thigh bones, in fat enwrapped,

and the long chine I burned and initiated mor¬

tals into the mysteries of an occult art.-0 (ZEschylus, (Prometheus, > 492 ff.).

The eagle, the vulture and the crow were

particularly significant. In the later and

greater days of Greece omens from birds be¬

came less important. The chance word, too,

was often regarded as a sign. In sacrifice, if the victim comes unwillinglv to the altar, if the viscera are deformed or discolored, if the fire does not burn properly, the gods are displeased. .

If an animal dies on the way to the altar, some terrible calamity impends.ˆ The character of the liver was considered most significant.

" Hephaestus's flame

Shone not from out the offering; but there oozed Upon the ashes, trickling from the bones,

A moisture, and it smouldered, and it spat,

And, io ! the gall was scattered to the air.

And forth from out the fat that wrapped them round The thigh bones fell.” (Sophocles, ‘ Antigone, 1006 f.) 414

GREEK RELIGION

The position of the seer in the army was

only less important than that of the general.

Dreams that come through the gates of ivory

are deceitful, those that pass through the gates of polished horn are true. Achilles dreamed

that Patroclus urged the burial of his body. In Homer dreams are sent by the greater gods di¬

rectly. In Homer, too, the seer is a man in¬

spired by the gods. It is the favor of the god that usually grants this gift. The seer’s chief task is to interpret signs, dreams and omens.

In later times, the presence of the seer in the army was important, because some official in¬

terpreter of the divine will lent greater sanc¬

tion. According to Homer, the divine gift runs in families. The kind of inspiration known

as “possessed by the god® was recognized, but

found small place in actual practice. The

“Chresmologist,® who possessed a collection of

ancient oracles which it was his business to in¬

terpret, played the part of the prophet. Some¬

times these collections belonged to the state.

The seat of the chief oracles were Dodona,

Ammon, Branchidse, Colophon, Lebadeia, Oro—

pus, and chief of all, Delphi. At Dodona the

signs were from the rustling leaves of the sa¬

cred oak. At Delphi the priestess sat on a tri¬

pod and breathed the exhalations issuing from

a chasm beneath till the god inspired her to

answer the question. After bathing in the

water of Castalia and drinking from the spring Cassotis, she chewed leaves of the laurel and

mounted the tripod. An official put the question to the raving priestess and then transcribed her answer in hexameter verse, returning it sealed

to the person who was consulting the oracle.

Over 200 answers have been preserved, but the

authenticity of most of them may be doubted.

Herodotus, however, quotes about 50. Many

of the answers were vague, sometimes suscep¬

tible of opposite meanings, but in general they stood for progress in ethics and religion. The church fathers contended that the inspiration

of the Pythian priestess was real, but the work¬

ing of evil spirits. Van Dale (1700) explained the oracles as the result of deception deliber¬

ately practiced by the priests. But the Greeks would not have submitted to such deliberate

imposition for so many centuries. The priests

seem to have been inspired by high ideals and a genuine desire for the welfare oj Greece. Ac¬

tual corruption was seldom proved, and, when

discovered, was punished by the Delphians

themselves. Delphi was the “Vatican of an¬

tiquity,® a holy city, “a centre of moral teach¬

ing and an authoritative guide in matters of

politics as well as in matters of religion.®

Belief and Worship. — Mountain tops sug¬

gested the presence of Zeus ; caverns, gods

from the world below. The gods of Homer

dwell on Olympus; but each deity had also a

favorite spot on earth. A dense grove might

be the dwelling place of a god. In the early period the god was worshipped beside the altar in the open air ; later the deity had an abode (the temple). Certain properties, from which

an income was derived, belonged to the god.

He owned and leased houses, factories, sheep,

poultry or rights in fishing. The management

and collection of rentals was in the hands of the priest. There were 200 shrines in Athens

alone. Athena was worshipped at each of her

various seats in a different aspect of her nature.

The temple was not a place for congregational

worship. Some symbol or image marked the god's presence. The statue itself was not worshipped, but the god himself. To remove forcibly an innocent person from the altar to which he had fled for refuge was sacrilege.

The Greeks had no Sabbath days ; but in each state were religious festivals which were celebrated at regular intervals. The Athenians set aside more than 50 days each year for the worship of the gods. Certain days in each month were sacred to some particular deity.

The priest was not a holy man, nor was it requisite that he should have a special educa¬ tion for his office. Physical perfection was necessary to please the god. Sometimes the right to a priesthood was sold to the highest bidder.

In Athens, the priest was often selected by lot. No elaborate consecration was necessary.

The Greeks prayed to the gods, for "from the gods came all good things.® A prayer was offered when the youths entered the athletic contests or went hunting, and especially when

they set out for war. The farmer prayed when

he began to plow. Pericles is said never to

have begun an oration without a prayer that

he might “utter no unfitting wrord.® Women gen¬

erally prayed to Demeter and Persephone. The

votive offering was a gift in acknowledgment

of some blessing. In later times it was either a thank-offering or the payment of a vow.

Men healed from sickness would express their

gratitude by dedicating an image to Asclepios ; the victor in a contest by dedicating the wreath he had won, or a statue. The temple of Apollo on the island of Delos possessed 1,600 vessels of gold and silver that had been dedicated as votive offerings.

For a propitiatory sacrifice a black animal

was ordinarily selected. Its head was bent to

the earth, the throat cut, and the blood allowed to soak into the ground. No libations were

poured.

In the Eleusinian Mysteries was taught the

belief in a real life after death. “Thrice

blessed they of men who see these mystic rites before they go to Hades’ realm® (Sophocles).

All Greeks believed in the continued existence

of the soul; but those initiated into the

Eleusinian mysteries felt that they would have

the favor of Persephone, queen of the lower world. These mysteries were probably the most important form of worship in ancient Greece.

The Greeks conceived the word as the re¬ sult of a development, in which the more com¬ plex forms grew out of simpler forms. The gods themselves were descended from Heaven and Earth. Zeus was the god of the family. The stranger and the suppliant were under his protection. Hera, his wife, as goddess of marriage, was worshipped by women with initiative rites. Athena was the goddess of war. Under the name of Ergane she endowed women with skill in weaving and embroidering. The olive was her best gift to the Athenians. At the Panathenaeic festival slhe was represented as the patron goddess of Athens, of its martial glory, its technical skill in manufacture and its political wisdom. Athena and Athens, the goddess and the city, were practically one. The man who died in battle for the city died in the service of the goddess. Unless one bears in mind the power which the city exercised over the imagination of the citizen, the most im-

portant strain in Greek religion and religious

art will not be recognized. Apollo, the embodi¬

ment of youth, was worshipped by boys on ar¬

riving at maturity. The Delphic Appollo was

patron of prophecy, music and the healing art.

To Artemis women prayed for help in child¬

birth. She was the only god to whom wild beasts were ever sacrificed. Hunters prayed for her

blessing. Of all the sea gods, Poseidon was

the only one who had a seat in the Olympian

council. The usual victim at his altar was the bull. The rearing of horses was his special

care. The heavenly bodies were not worshipped

in Greece, except in Rhodes the sun (Helios)

was the chief deity. Demeter, originally

ˆmother-earth,® was primarily the goddess of

grain. In the Eleusinian worship she and her

daughter Persephone, were also goddesses of

souls. Dionysus was the god of wine, and

also of returning vegetation. Hermes was the

god of flocks. His worship was especially

prominent in Arcadia, where he was born, and

in Thrace. He was also the god of trade and

of gain ; and he was the guide of souls to

Hades. Pan the son of Hermes, was another

Arcadian god of shepherds and goatherds. He

himself had goats' legs and beard. His haunts

were the crags and wooded glens, and he loved the springs and the nymphs that haunted them,

as well as the dances and music of the goat¬

herd. After the <(panic® terror, by which Pan

aided the Athenians at Marathon and Salamis,

he was worshipped in a grotto on the north¬

western side of the Acropolis. Aphrodite was

honored as the goddess of human love and of

marriage. To her women prayed for all fem¬

inine charms. Ares was the god of war,

Hephaestus the god of fire and the smith's art; Prometheus was honored in Attica with He-phaetus as the giver of fire and of civilization made possible by this gift. Hestia was wor¬

shipped in every household as the goddess of

the home and of family life. Asclepios,

Apollo's son, was the god of healing. Eileithyia presided over childbirth. Persephone was the

gentle daughter of Demeter, Artemis the virgin

loving the wildness of nature. (For Dionysus

see Greek Drama). Each god is prominent as

a personality because he personifies clearly

some human relation. The principle of beauty

largely determined Greek thought as to the

character of the gods. ((The unity and the

symmetry of their personality, the graciousness

of their nature, the kindly spirit of their rela¬

tions to each other and to men are a reflection of that aesthetic ideal which was so dominant

in Greek life.® The Greek did not judge

human life by stern moral standards. With

all its joyousness a strong undercurrent of

sadness runs through Greek literature. Death

is hateful. Evil is man's worst enemy. The

((soul® is simply what goes to Hades. In

Homer it is a shadow, a form without sub¬

stance, but in later Greek the soul is often

regarded as immortal. The souls of the dead,

having power to bless or curse, are worshipped.

Odysseus visits Hades (Odyssey XI) and he

sees the souls coming and going in troops,

flitting about and squeaking like bats. When

they drink the blood of the sacrifice, they re¬

gain consciousness. The Athenian point of

view is higher. Socrates believes that death

is either a dreamless sleep or the introduction of the soul to a higher

form of life. Athletic games were held in honor of the dead in early times. The body must not be neglected. In

war the victors bury their enemies as well as their friends. Both interment and cremation

were practiced from early times. Objects

used by the dead were placed beside the corpse.

The mourners held a memorial banquet at

which the soul of the dead was conceived to be present as host. Hades was the (<Unseen® god.

His house was dark and gloomy. The <(Islands

of the Blest® appear first in the (Odyssey. >

Hades' realm was ,a counterpart of the realm

of Zeus, a shadowy copy of life on earth.

In Homer the Erinyes enforced the right

of strangers and guarded the rights of the first¬

born. . Later they were especially the avengers of crime against the family.

Orphic theology, based on Hesiod and his

successors, taught the essential unity of the

gods and the presence of the divine nature in the human soul. The initiations were rites

adopted from Crete and Phrygia. Eating the

raw flesh of a bull symbolized the union of

the worshipper's soul with the god of all life.

Clay and pitch were used to absorb the taint

of evil from the body.' All contact with death was forbidden — hence the practice of absten¬

tion from animal food. Beans were tabooed,

woolen garments not worn. But all these rules

of avoidance never developed into a real

asceticism. In many 'places the practices con¬

tinued until Greek religion yielded to Christi¬

anity.

Pythagoras taught that the soul was the

antithesis of the body, and that the soul re¬

turned to the gods as the ultimate goal.

Temperance, purity, truth, were the expres¬

sion of social demands, not the outgrowth of

religion. But morality and religion came into

close contact at many points, especially in the minds of some great thinkers ; but in the minds of the people they never blended.

The state directed and controlled religion.

Religion and the State. — Where the re¬

ligious unit was larger than the political unit, a new unit was formed to carry on the inter¬

state worship. There was no <(church® apart

from the family, tribe, nation or amphictyony.

This checked individualism in religion. Piety

was a civic duty. The sense of personal sin,

faith in a god who cares for the individual,

love for a god, these could not develop under such conditions. Religion could not be a selfish matter, for it benefited the state, not the indi¬

vidual — a religion valid all the time, not simply on Sunday. There was no bible, no theology,

no preachers. Sound morality was a social

rather than a religious virtue. The priest was not a clergyman ; he had no parish, no duty to impart moral instruction — in short, he was a public officer. Celibacy, as a rule, was not re¬

quired of either sex. The priests had seryants who were paid by the state, or from endow¬

ments, to sweep the temple, act as beadles,

make proclamations or play flute accompani¬

ments. A burnt sacrifice is made at an altar

outside the building. In the country an altar

could be built of turf or rough stones.

In the city it was of marble. If in front of a temple, the statue on the inside looks toward

the altar on the outside. The participants in

the sacrifice approach in festal attire. They

wear wreaths on their heads. A brand is taken from the fire and dipped in water with which

the company is sprinkled. Prayers are then

offered with uplifted head and hands. Some¬

times an ode specially composed for the occa¬

sion is chanted. The victim is then led to the altar. If it does not struggle back, the sign is good. Barley-grains are scattered on its head,

and then the throat cut so that the blood spurts into the flame, whereupon the company raise a

jubliant cry. Then the animal is deftly skinned and carved, and the thigh-bones* covered with

fat, are burned in the fire, so that the savor mounts to Heaven. The rest of the meat be¬

comes a feast for the participants. The sacri¬

fice is. accompanied by music from the flute,

while prognostications are drawn from the way

in which the fire and smoke ascend, and also

from an examination of the entrails of the

victim.

The state did not go out of its way to in¬

quire into one's private beliefs ; but one must not meddle with the beliefs of his neighbors

by preaching atheism or new divinities, nor

damage sacred property, nor behave in an un¬

seemly way at religious ceremonies. The

charges against Protagoras and Socrates were

only a use of legal machinery to get rid of

men whose conduct and influence had ren¬

dered them unpopular and seemed to threaten

the character of the community.

Apollo, rather than Zeus, was governor of

Ofympus. The only real discipline submitted

to even momentarily by all the gods in Greece emanated from Delphi. As Dyer says ((The

Gods of Greece*), <(Zeus was a king among

gods, who reigned but governed not. His

Premier was the Delphic god.® The truth of

this statement is reflected throughout the

<Eumenedes) of ZEschylus and the (King

CEdipus of Sophocles. (For the religion of

the tragic poets see ZEschylus, Sophocles,

Euripides). Apollo is the highest ideal of

character in the Greek pantheon. The purer

aspects of Greek ritual have a counterpart in

the most holy Christian places. ((It was no

fanciful parallel which the Christian author of <Christus patiens* drew between the yearly

passion and yearly resurrection of Dionysus in

ancient ritual and that passion and resur¬

rection which Christians yearly celebrate to¬

day® (Dyer). See Greek Gods; Greek Myth¬

ology. Joseph E. Harry.

GREEK SOCIAL LIFE. The Athenian

did not turn night into day, but rose at dawn and went early to bed. He made his calls im¬

mediately after he took his first meal, which

was literally a <(breakfast,® and nothing more, consisting of a few mouthfuls of bread dipped

in wine. At noonday he took a substantial, but not an elaborate meal, for the Athenian was

not a glutton. His dress was simple, although

all did not dress exactly in the same style or color. There was little change of fashion either for men or women through all Greek history.

The male attire consisted of two articles —

tunic and mantle. These were oblong, of

woolen material (generally), draped around the

body. One or both were worn according to

taste, occupation, or the weather. Some wore

white, others purple, red, green or black.

Yellow was reserved for the women. Often

these tunics and mantles were adorned with

colored borders, embroidery or stripes. Hats

were practically unknown, for they were un¬

necessary, except when a journey was to be

undertaken, when a cap or a hat with a brim

was worn. The head was well protected by a

fine covering of hair, and, we may rest assured, there were fewer baldheads than in modern

times. In the house the men went barefoot,

or wore slippers ; outside each could do as he liked. Socrates regularly went barefoot, even

in winter. The simplest foot covering was the

sandal, which was nothing more than a leather

sole held to the foot by a strap, which passed between the big toe and the next and was

fastened to other straps running along the

foot and down the heel. But the hunter and

the traveler wore boots.

When the Athenian went out in the morn¬

ing, he usually carried a cane, and wore at

least one seal ring, which was-for both use

and ornament. If he could afford it, he was

accompanied by two slaves, to carry his belong¬

ings or to run errands. If he was poor, he

had to be content with one slave. When he

met an acquaintance, he did not bow and shake hands, for to do the former was considered

beneath his dignity as a citizen of a free repub¬

lic, while the latter was reserved for making

solemn pledges, or as a demonstrative welcome

after a long separation. The usual greeting

was <(Hail !® or “Glad to see you,® or (<I hope you are well.®

The first place visited was usually the agora, or market. Here the Athenian ladies who

could afford to stay at home never appeared.

The buying was done by the husband or by

slaves. Poor women, however, stood behind

the stalls dealing chiefly in bread, figs, vege¬

tables and flowers. The Athenians did not

eat much meat, but they had a preference for

fish, and the fishmarket was generally crowded

when a fresh catch came in. The marketing

time was from 9 till 12. During business

hours every sociable Athenian spent some of

his time in the agora. Often the business that called them there was to employ a professional caterer for a dinner they proposed to give.

After this duty was performed each citizen

might visit his banker; and between 10 and 11

he would be ready for a turn in the colonnades, or a visit to the barber shop, or the perfumer’s shop, or he might even repair to the shoe¬

maker’s, where he knew he would be sure to

meet some friends with whom he could discuss

the latest news, political quest’ons, or even

purely abstract questions, for, as Saint Paul

said, the Athenian spent his time in trying to find out some new thing.

The barber trimmed his hair or beard, let

him look at himself in a bronze mirror, and

then gave him a manicure — for the Athenians

were extremely fastidious about the appearance

of their hands, as well as the hair and beard.

The hair was never cut short, nor allowed to

grow long. A closely cropped head was a sure

sign of a slave, or a professional athlete, or mayhap a Stoic or Cynic, who tried to flout

fashion and public opinion. Sometimes the

professional philosopher would wear a long

and untrimmed beard for the same reason.

Shaving was unusual down to the Macedonian

conquest, but no Greek ever wore simply a

moustache without a beard. This was a mark

of barbarism. The razor used was in shape

somewhat like the moon just before it is half full.

From the barber shop your Athenian goes

home to lunch. He has no watch to tell him

the time of day, but he was accustomed tc>

gauge the time by the sun far better than we„

Besides, there was no hurry, for a few minutes late or early made no difference. There was

a public sun-dial ; and in the better houses a large hour glass filled with water instead of

sand. There was no formality about social

intercourse. If an Athenian happened to meet

a friend on his way home, he would extend an oral invitation to come to the dinner he pro¬

posed to give that evening or the next ; or he would send a slave to carry, not a written note, but a verbal invitation. His dejeuner was

taken under the covered portico of the court.

Then he rested a while, and perhaps read a

book; but he did not sleep. Refreshed, he

would walk to one of the three public gym¬

nasia : The Lyceum, Cynosarges or Academy.

The gymnasia were open only to men over 18.

If he was too old to engage in the exercises, he might look on, or devote himself to discus¬

sion with his comrades. There was an abun¬

dance of disputants, jests, sarcastic wit, story telling and sociable conversation. After spend¬

ing a couple of hours here he would take a

bath. Public baths were near every gymnasium.

His slave would have his oil-flask and flesh—

scraper ready for him after the bath, for

every Athenian anointed himself with olive

oil, mixed with perfume, and scraped his body

with a strigil. When he reached home, he

finds that everything is ready for the dinner.

His wife and daughters' will not put in appear¬

ance; they must remain in the gynaeconitis, or women's apartment, for the company is com¬

posed of men, whose conversation is above the

women's comprehension. The dinner is for

social enjoyment — the food is a secondary

consideration. The Athenian had a special

abhorrence of ˆswinishness® ; his dinner had

to be replete with wit, wisdom, jest, anecdote; the main thing was lively society, conversation, mutual entertainment. Couches were brought

in for the diners to recline on. These ordi¬

narily accommodated two guests. No objec¬

tions were raised by the host to a friend's

bringing an intimate acquaintance along un¬

invited. This practice, so impractical in mod¬

ern times, brought no trouble or inconvenience

to an Athenian host, for there was no long

table with a limited supply of chairs, no knives and forks, and the

quantity of food mattered

little. When the guests entered, slaves removed their sandals and poured scented water or

wine over their feet, whereupon the diners

reclined on their left side. Then servants poured water over their hands. Small tables were

brought in, one of which was placed before

each couch. The food was taken up by the

fingers, which were assisted by pieces of

hollowed out bread when soft food or gravies

had to be dealt with. There were no napkins,

in lieu of which the fingers were wiped by

pieces of soft bread. These scraps were then

thrown to the dogs. There was no carpet on

the floor. Shells, bones and peelings were

thrown down and swept out by the servants

later. The first half of the dinner consisted

of substantial : fish, birds, eels, but very little meat (beef, lamb, pork) and vegetables. Water

was then carried around for the guests to wash their hands, the tables taken out, the floor

swept, and a song sung to the accompaniment

of flutes. After a libation had been poured to the good genius the real symposium began.

New tables were brought in. On these were

fruits, salted almonds, cheese and salt. Another libation is now poured, after which the guests proceed to elect a symposiarch or president,

who determines how much wine is to be drunk,

and what the mixture shall be. Usually this

was two parts water to one of wine. They had no tea or coffee, only water and wine to drink.

Decided disapproval was cast upon drunkenness.

Moderation was the Greek motto. After the

slaves mix the wine in a handsome bowl, they

dip it out in beautiful jugs, or pitchers, and pour it out into handsome goblets with which

each guest is supplied. Adventitious aids to

the entertainment such as flute girls, dancing

girls, buffoons and acrobats, were usually dis¬

carded for conversation pure and simple. But

the lyre would be passed around and each guest would be expected to sing some famous song

from Euripides, or Simonides, or Anacreon. At

the tables are keen wits, quick at repartee, eager for debate, always ready to support some

thesis, even though it be a whimsical paradox.

Riddles, conundrums and catch questions were

always popular. There were no after dinner

speeches.

The Athenian maintained, theoretically, that

the place for woman was inside the house ; but in practice the matron enjoyed more liberty;

she was not kept a prisoner. In her youth her training was directed toward domestic duties.

She learned to spin, sew, weave and embroider, as well as cooking and the management of the

household. As a child she had her toys, her

dolls of painted clay or wax, with movable

legs and arms. Her little brothers play with

her till she is seven years old. She is not

allowed to see men, even when she grows up.

If she has no father, her nearest male kins¬

man, if a bachelor and not a full brother, has the first claim to marry her. Equality of

pecuniary position is sought on both sides.

The men felt that marriage was a burden, so

distasteful that they did not enter into it till after they were 30, whereas the girls usually

married very young. But marriage was felt

to be a duty, to himself that he might have

children to bury him and to pay due honors to his body in the tomb, and a duty to the state, that he might leave children to support it and to worship the gods. The first ceremony of mar¬

riage was the betrothal. The girl need not be present, for it was a contract pure and simple, with which she had nothing to do. As soon

as a dowry was agreed upon, the girl was

(<given away® in the presence of witnesses.

There was no church at all in our sense of the word. The only wedding

ceremony was the

ˆbringing home® of the bride, which might be

regarded as the actual wedding. If the wife

was divorced, the dowry had to be given back.

When she died, it reverted to her nearest of

kin. Weddings were usually celebrated in the

winter and the time of the full moon was pre¬

ferred. As a token of farewell to the old life, the girl dedicated her girdle, her toys or a

lock of hair to Artemis or to a local nymph.

Both the bride and the bridegroom on their

wedding day bathed in water brought from

some spring of special sanctity. The bride's

dress was of some light color. The guests rece ved a cake made of . sesame seeds pounded

and roasted and mixed with honey. The bride's

father offered sacrifice, taking care to remove the gall of the victim, that no bitterness might enter the lives of the bride and groom. At the banquet the women were permitted to be pres¬

ent, but they sat at separate tables. The bride was given to the groom by her mother, and

she was led to the chariot to be taken to her new home. Relatives and

guests followed in

procession, accompanied by flute and lyre

players. The mother followed the chariot,

holding up the nuptial torches. The door of

the groom's house was specially decorated and

on their arrival they were showered with con¬

fetti by the groom's mother. The bride ate a

quince at the threshold, and then she was led to the bridal chamber, while her friends sang

epithalamia, or wedding-hymns, outside the

door.

Joseph E. Harry.

GREEK THEATRE, The. The Greeks

did not turn night into day as we do in the 20th century. Rising at early dawn the whole

city thronged to the sacred precinct to witness the performance of not only one play but of

three, and not only for one day but for three days in succession.

The theatre at Athens had a happy location.

Shielded from the north wind by the Acropolis

it was so situated that the afternoon breeze

from the Saronic Gulf blew directly into the

faces of the audience. The occasion was the

great festival of Dionysus, and the time March, when everybody longed to be out of doors.

The seating capacity of the theatre — though

not the largest in Greece — was 17,000 or more.

The ˆbuilding® was as far removed from mag¬

nificence as Shakespeare's theatre from the

Grand Opera House in Paris; there were no

plush chairs, no boxes, but merely seats of wood (later of stone), without backs, except in the front row. The audience wore festal attire. A

myrtle wreath sufficed to designate the capacity in which the spectator was present as a par¬

ticipant in the festival.

The Audience. — As the sun was hot and

there was no awning, or canopy, the men wore

broad-rimmed hats. The array of smart and

fashionable dresses so conspicuous in a modern

theatre was wholly absent. Thousands had to

be contented with a threadbare tunic. All the

resident Athenians were in attendance, even

boys and slaves ; strangers, too, were present, either as official guests or as interested spec¬

tators. The tickets were purchased at one of

the offices in the city at six cents apiece. The state made a special appropriation for thousands of the poor: their tickets of admission were

purchased with money from the public treasury.

The 67 seats in the front row contained in¬

scriptions indicating to what honored occupant

they belonged : priests, the nine archons, the

judges, foreign ambassadors and soldier's or¬

phans. In the centre of this row was a marble chair with arms. This was the seat of the

priest of Dionysus. The people were his

guests. In the early period he would send boys with baskets containing food and wine to dis¬

tribute among his guests. But later the audi¬

ence grew too large, since the population in¬

creased rapidly, and visitors came more and

more from the islands and from the mainland.

Consequently, the people brought their lunches

with them ; a loaf of bread, a few onions and some garlic bulbs. Sometimes wine was fur¬

nished at the expense of the choregus. Though

the audience was large and composed of various classes, it was extremely critical. They ap¬

plauded by shouting and by clapping, if the

performance was good : they did not hesitate

to give loud expression to their feelings, or re¬

frain from sheading tears, at the pathetic parts; but if the acting was bad, if an actor broke down, or mispronounced a word, they were

quick to express their disapprobation by hissing, hooting, or even standing upon their seats. If an actor fell far below their expectation, a

disturbance might arise: missiles were hurled,

a fine imposed, or even corporal punishment

inflicted.

The Actors. — Directly in front of the

lowest seats, was a circular orchestra, over 60

feet in diameter, originally of beaten earth, but later paved with polygonal stones. In the cen¬

tre of this was the thymele, or altar of the god, on the steps of which the flute-player took his seat. Back of the orchestra was a wall, about 10 feet high, with columns which could repre¬

sent the facade of a palace or the front of a temple. At this point, in the earliest period, was erected a booth, which was originally used as a dressing room. This was called skene

(tent), scene. Later the term was applied to

the whole congeries of buildings, and later

still to the stage itself ; sometimes to the wall back of the stage. The actors and the chorus

performed their respective parts on the com¬

mon level of the orchestra, the narrow stage

back of and above the orchestra being reserved for the appearance of the gods. There was

probably no curtain. Aristotle thought it a

mistake to try to produce tragical effects by

elaborate machinery. The scenery in the time

of 2Eschylus was probably as simple as that in a performance of a Shakespearian drama by the

Ben Greet players. But in the Hellenistic age

Greek enginery made transformations that

would beggar the most gigantic efforts of

modern times. From the time of Alexander the

Great every important Greek town had its

theatre. There was a great appeal to the imag¬

ination. But movable _ scenery was abundant :

altars, monuments, cliffs, household utensils.

The two entrances (on the sides) were called

parodoi. Through these the chorus, the reti¬

nues (and sometimes the actors) made their

appearance. The word for actor is hypocrites.

In the classical age the number did not exceed three for any play, with the possible exception of the (CEdipus Coloneus> of Sophocles; and

they were always men, even for the feminine

roles. Hence a change of costume for the vari¬

ous parts was necessary. The traditional view is that the actors wore masks in the 5th century; but this has been assailed by some scholars.

Later the wearing of masks is unquestionable.

There were more than 27 famous actors before

the time of Alexander. Some of them became

celebrated as orators, statesmen or ambassadors.

No disrepute attached to the profession, as at Rome. The actor's remuneration was an affair

of the state. All financial arrangements were made by the archon, who assigned each role.

Musical Instruments. — The musical instrument was something like our clarionet, and was soft in tone, sustaining rather than interfering with the voice. The Athenians were exceedingly fastidious in matters of pronunciation. The voice had to be loud, but also clear and full of feeling and expression, and the articulation distinct. There were no prompters. The movements of the body were very expressive. The leader of the chorus (coryphaeus) recited the anapests of the parodos and exodus, and the anapaestic verse in general, declaimed the iambic trimeter of ordinary dialogue, and sang the kommoi (odes of wild lament). All the stasima (choral songs in the orchestra) were danced. In the strophe the chorus danced to the right, in the antistrophe to the left; but in the epodos they stood still. The groups of scenes between two stasima were called episodes. The dance consisted merely in graceful movements of the body, though each kind of drama had its

peculiar style : in the satyric afterpiece the dance was rapid, tumultuous, farcical.

Costumes. — The costumes of the actors were as characteristic of the Greek drama as the shape and arrangement of the theatre itself. In tragedy the dress was conventional, but in comedy that of ordinary life. The tunic was long, loose and full, with sleeves to the waist and richly embroidered with vertical and hor¬ izontal stripes. Around the tunic a high girdle richly ornamented was worn. The colors were usually bright, but also grey, green, blue and black. Under the tunic was some kind of pad¬ ding to increase the size of the actor. The outer garment was called himation, which was of two varieties, rectangular and semicircular. They were splendidly embroidered in gold. Weapons were carried and garlands worn. The staff is frequently mentioned. Under the actor's shoes (cothurni) were high square painted soles, though this is now disputed in some quarters. The musicians wore long robes and garlands.

The Drama. — A Greek drama differed in

many ways from a modern play. In the first

place, it was oratorical, rather than conversa¬

tional, statuesque rather than picturesque. To¬

day a play presents a scene in a drawing-room ; the characters talk as in ordinary life and seem to be oblivious of the presence of the audience; and in their endeavor to become realistic they lower their voices to such an extent that they are frequently not heard by the audience. In

Athens the actor spoke in a louder voice and

out toward the audience. Facial expressions,

which mean so much in a modern theatre, were

out of the question (even if masks were not

worn), for the actor was so far removed from

the majority of the spectators; yet there was

some compensation in the clearness with which

the voice carried in an auditorium of such

splendid acoustic properties, in the expressive

movements of the body, and in the ideal beauty and heroic solemnity which were impressed on

the characters and on the play as a whole. The color and cut of the hair was always significant; auburn hair meant beauty; curly hair, strength; black hair, sorrow ; and red hair, rascality.

The Greeks were southerners, and southern¬

ers are more highly endowed with dramatic

talent than northern nations. The Greek was

nearer nature than we ; he did not try to sup¬

press his emotions ; his bank of imagination was almost inexhaustible; he felt the same agony,

the same ecstasy that children feel, and he had the same plenitude of belief. Tears would

start unbidden to his eyes, as he listened to the portrayal of the grief of Demeter separated from her daughter, or of Antigone dragged

away to be entombed in a living grave. So the theatre exercised a great influence in forming

the lives and characters of the people. The

literary quality of the Greek dramas was so

high that it has never been excelled, and so

they formed in the hearers a power of acute

observation and of sane literary judgment, and

coming at such long intervals, in an age when the attention was not distracted by the hasty

reading of newspapers, they left an extraor¬

dinarily deep and lasting impression. See Greek Drama. Joseph E. Harry.

GREELEY, Horace, American journalist:

b. Amherst, N. H., 3 Feb. 1811; d. Pleasantville, N. Y., 29 Nov. 1872. More than 40 years after his death, Horace Greeley's name remains at

the head of the roll of American journalists.

Successors in the primacy of current discussion may surpass him, as doubtless some of them

already have, in consistency and learning, but

hardly in the chief essentials of a journalistic style ; others may exert a more salutary influ¬

ence, if not so personally diffused; but in the respect of high ideals, courage, intellectual force and personal magnetism, the qualities which impel a man of letters to be also a man of action, Horace Greeley was of heroic mold. He was no

pop-gun journalist firing from a sky-sanctum,

but a face-to-face champion in the arena of

public affairs, laying about him with pen and

speech like an ancient Bayard with his sword.

The battles he fought for humanity, and the

blows he gave and received, have made him for all time the epic figure of the American press.

Born in rural New Hampshire, of English

and Scotch-Irish descent, he epitomized his

heritage and his attainment in the dedication of his autobiography ((To our American boys, who,

born in poverty, cradled in obscurity and early called from school to rugged labor, are seeking to convert obstacle into opportunity, and wrest achievement from difficulty.® Though physi¬

cally a weak child, his intellect was strong, and when near his tenth year his father removed to Vermont, the boy took with him the reputation

of a mental prodigy; so, with little schooling and much reading, he was thought when 14 to

be a fit apprentice to a printer, setting forth four years later as a journeyman. His parents

had moved to western Pennsylvania, and he fol¬

lowed ; but after a desultory practice of his art he came to the metropolis on 17 Aug.

1831, with $10 in his pocket, and so rustic in dress and manners as to

fall under suspicion of being a runaway apprentice. Later in life, at

least, his face and his figure would have lent distinction to the utmost elegance of style ; but his dress was so careless even after the long period of comparative poverty was passed, that

the peculiarity became one of his distinguishing features as a public character; and to the last there were friends of little discernment who

thought this eccentricity was studied affectation : but manifestly his dress, like his unkempt hand¬

writing was the unconscious expression of a

spirit so concentrated on the intellectual in¬

terests of its life as to be oblivious to mere appearances.

After 18 months of dubious success in New

York as a journeyman, in his 21st year, he

joined a friend in setting up a modest printing-office, which on 22 March 1834, issued the New Yorker, a literary weekly in the general style of Willis' Mirror, under the firm name of H.

Greeley & Company. For four years the young

printer showed his editorial aptitude to such

good effect that in 1838 he was asked to con¬

duct the Jeffersoniati, a Whig campaign paper.

This was so effective that in 1840 he was en¬

couraged to edit and publish the Log-Cabin , a weekly which gained a circulation of 80,000,

brought him a reputation as a political writer, and active participation in politics with the

Whig leaders, Governor Seward and Thurlow

Weed. It contributed much to the election of

General Harrison, but very little to the purse of the ambitious editor. On 10 April of the

following year, 1841, he issued the first num¬

ber of the New York Tribune, as a Whig

daily of independent spirit. He was still editing the New Yorker and the Log-Cabin, both of

which were soon discontinued, the Weekly Tri¬

bune in a way taking their place. Though the

New Yorker had brought him literary reputa¬

tion, it had not been profitable, because of un¬

collectible bills which at the end amounted to $10,000. Still, at the outset of the Tribune he was able to count $2,000 to his credit in cash and material. He was then 30 years of age,

and for 30 years thereafter the paper grew

steadily in circulation, influence and profit, until, a few weeks after his death, a sale of the ma¬

jority interest indicated that the <(goodwill® of the Tribune, aside from its material and real

estate, was held to be worth about a million

dollars. The Greeley interest was then small,

since he had parted with most of it to sustain his generous methods of giving and lending.

He had a great capacity for literary work,

and when absent for travel or business was a

copious contributor to his paper. To his rather delicate physical habit was perhaps due his dis¬

taste for all stimulants, alcoholic or otherwise, and his adherence through life to the vegetarian doctrines of Dr. Graham ; another follower of

the latter being his wife, Mary Young Cheney,

also a writer, whom he married in 1836. His

moderate advocacy of temperance in food and

drink, coupled with his then unorthodox denial

of eternal punishment, helped to identify him

in the public minds with most of the ((isms® of the time, including Fourierism and spiritualism ; when in fact his mind and his paper were

merely open to free inquiry, and were active in exposing vagaries of opinion wherever mani¬

fested. Protection to American industry, and

abolitionism, were the only varieties which he

accepted without qualification; and while the

pro-slavery party detested him as a danger¬

ous agitator, it is possible at this day even from their point of view to admire the moderation,

the candor and the gentle humanity of his

treatment of the slavery question. In all issues concerning the practical affairs of life, like

marriage and divorce, he was guided by rare

common-sense, and usually his arguments were

scholarly and moderate ; but in matters of per¬

sonal controversy he was distinctly human,

uniting with a taste for the intellectual fray a command of facts, and a force and pungency

of presentation, which never seem admirable in

an opponent.

He was in great demand as a lecturer and as

a speaker at agricultural fairs, his addresses al¬

ways being distinguished by a desire to be help¬

ful to working humanity and by elevated

motives. Though not a jester, genial humor

and intellectual exchange were characteristic of his social intercourse. His books, with one or two exceptions, were collections of his addresses and newspaper articles. His first book, (Hints

Toward Reforms, } appeared in 1850, and was

followed by (Glances at Europe) (1851) ; (A

History of the Struggle for Slavery Extension

or Restriction (1856) ; (The Overland Journey

to California > (1859) ; (An Address on Success in Business) (1867) ; (Recollections of a Busy Life,* formed on a series of articles in the

New York Ledger (1869) ; < Essays Designed

to Elucidate the Science of Political Economv)

(1870) ; (Letters from Texas and the Lower

Mississippi, and an Address to the Farmers of

Texas) (1871) ; (What I Know of Farming*

(1871) ; and (The American Conflict,) written

as a book, the first volume appearing in 1864

and the second in 1867. This work on the

Civil War is remarkable, when considered in the light of his purpose to show <(the inevitable se¬

quence whereby ideas proved the germ of

events® ; but it was hastily prepared, and while strikingly accurate in a large sense, will not bear scrutiny in some of the minor details of war history.

Neither his political friends, nor his party,

nor the causes he espoused, could hold him to a course of partisan loyalty contrary to his own convictions of right and duty. As a member of the Seward-Weed-Greeley (<triumvirate,® he

was often a thorn in the flesh of the senior members; his letter of 11 Nov. 1854, dissolving (<the political firm,® being one of the frankest documents in the history of American politics.

During the Civil VVar he occasionally embar¬

rassed Mr. Lincoln's administration by what

seemed then to be untimely cries of ((On to

Richmond !® immediate emancipation, and peace.

On the whole, his influence for the Union cause was powerful ; but when, the war being over, he advocated general amnesty, and finally as an

object lesson went on the bail bond of Jefferson Davis, he lost the support of a large body of his most ardent anti-slavery admirers. The clamor

against him called forth a characteristic de¬

fiance in his letter to members of the Union

League Club, who were seeking to discipline

him. Having further alienated the Republican

party by his general attitude in <(reconstruction® matters, he became the logical candidate

for the Presidency, in 1872, of the Democrats

at Baltimore and the Liberal Republicans at

Cincinnati, in opposition to a second term for General Grant. Though personally he made a

brilliant canvass, the influences at work in his favor were inharmonious and disintegrating,

and the result was a most humiliating defeat.

This he appeared to bear with mental buoyancy, despite the affliction of his wife's death, which occurred a week before the election, he having left the stump in September to watch unremit¬

tingly at her bedside. On 6 November, the day after his defeat, he resumed the editorship of the Tribune, which six months before he had

relinquished to Whitelaw Reid. Thereafter he

contributed to only four issues of the paper, for the strain of his domestic and political mis¬

fortunes had aggravated his tendency to in¬

somnia ; on the 12th he fell seriously ill, and °n the 29th he

succumbed to inflammation of

the brain. The last few months of his eventful career supplied most of the elements essential

to a Greek tragedy. On 23 December, the

7 ribune having been reorganized, with Mr.

Reid in permanent control, there first appeared at the head of the editorial page the line

<(Founded by Horace Greeley,® as a memorial

to the great journalist and reformer. A bronze statute was erected in the portal of the new

Tribune office, and another statue in the angle made by Broadway and Sixth Avenue, appro¬

priately named ((Greeley Square,® after the man who was second to no other citizen in establish¬

ing the intellectual ascendancy of the metropolis.

Clarence Clough Buel.

GREELEY, Colo., city, county-seat of

Weld County; on the Cache la Poudre River,

the Union P., the C. and S., and D. L. and

N. W. railroads; about 50 miles north of Den¬

ver. The place was settled in 1870 by the

(<Greeley Colony® (named after Horace Gree¬

ley), made up mainly of New England people.

By irrigation they have made of the almost

barren region an excellent agricultural country.

It is the seat of a State normal school. The chief manufactures are flour and beet-sugar.

Its trade is in its manufactured articles, also sheep, cattle, grain and vegetables. Pop. 10,883.

GREELY, Adolphus Washington, Ameri¬

can Arctic explorer: b. Newburyport, Mass., 27

March 1844. After receiving a high school edu¬

cation he enlisted as a private in the 19th

Massachusetts Volunteer Infantry, serving in

the Civil War from 1861 to 1865. He entered

the regular army in 1867 as second lieutenant

and was appointed to the signal service. In

1881 he was put in command of an Arctic ex¬

pedition, organized to carry out the plan of

establishing circumpolar stations in accordance

with the recommendations of the International

Geographical Congress held at Hamburg in

1879. The exploring party made their head¬

quarters for two years at Discovery Harbor,

Grinnell Land. In an expedition made by a de¬

tailed party, the highest point north attained

up to that date, 83° 24', was reached. Grinnell Land was crossed to the western polar ocean,

and other discoveries made. The relief expedi¬

tions of 1882 and 1883 failing to reach him he retreated by boat to

Cape Sabine with great

difficulty, and during the winter of 1883 lost, through cold and famine, all but seven of his party of 25. Meanwhile Com. Winfield S.

Schley had been despatched on a relief expedi¬

tion, and in June 1884 rescued them at Cape

Sabine. From his services to geographical

science Lieutenant Greely -was awarded the

Founder's Medal of the Royal Geographical So¬

ciety, and the Roquette Medal by the Societe

de Geographic of Paris. He was promoted cap¬

tain in the United States army, in 1887 became chief signal officer, with the rank of brigadier-general, the first enlisted man and volunteer to reach that grade in the regular army. Under

his command the 'telegraphic systems, line, cable and wireless, of Porto Rico, Cuba, the Philip¬

pine Islands and Alaska were developed and

extended. In 1906 he was promoted major-

general, when he ended the Ute campaign with¬

out bloodshed, and the same year conducted the relief of 400,000 earthquake sufferers in San

Francisco without the occurrence of a single

death. He retired 27 March 1908. He is one

of the three American members of the Inter¬

national Colonial Institute. He has many

times represented the United States abroad, the last -time as military ambassador at the corona¬

tion of George V. Consult Greely, (Three

Years of Arctic Service* (1886) ; report of the Lady Franklin Bay Expedition (1892) and

many other publications; Schley, <The Rescue

of Greely * (1885).

GREEN, Alice Sophia Amelia (Stopford),

English historian : b. Kells, Ireland, 1849. She was privately educated. In 1877 she was mar¬

ried to John Richard Green (q.v.) the historian.

She edited his (Conquest of England) (1883),

prepared a revised edition (1888) and, with

Miss K. Norgate, a finely illustrated edition

(1892) of the (Short History of the English

Peopled Her original works are (Henry IP

(1888) ; (Town Life in the Fifteenth Century) (1894) ; (The Making of Ireland and its Undoing) (1908); Urish Nationality* (1911);

(The Old Irish World* (1912) ; Woman's

Place in the World of Letters) (1913).

GREEN, Andrew Haswell, American

lawyer: b. Worcester, Mass., 6 Oct. 1820; d.

13 Nov. 1903. He studied law, practised his

profession in New York, and was there presi¬

dent of the board of commissioners of educa¬

tion, and comptroller (1871-76). In the latter

capacity he re-established the municipal credit, seriously impaired by the embezzlements of the

Tweed ring. He originated in 1868 the plan

for Greater New York, executed in 1897, and

also devised the plan for the consolidation of the Astor, Lenox and Tilden foundations as

the New York Public Library. He also as¬

sisted in establishing the American Museum of

Natural History and the Metropolitan Museum

of Art, and founded and became president of

the New York Zoological Society. He was shot

by Cornelius M. Williams, a negro, pronounced

insane. It developed that he lost his life

through resembance to another against whom

the assassin had a supposed grievance.

GREEN, Anna Katharine (Mrs. Charles

Rohlfs), American author: b. Brooklyn, N. Y.,

11 Nov. 1846. She graduated from Ripley Fe¬

male College in 1867 ; but it was not until 1878

that she published her first novel, (The Leaven¬

worth Case,* which immediately became im¬

mensely popular. In 1884 she married Charles

Rohlfs, an actor, who had been for some years with Booth and other tragedians. In 1889 he

and his wife planned together furniture for

their house. This developed into a style new

and distinctive in furniture in both form and

ornamental design, which became known as the

(<Rohlfs furniture.® Mrs. Rohlfs continued

turning out novels with wonderful rapidity; and all of them met with the favor of the special reading public to which she addressed herself.

These are excellent detective stories in which

the author shows a genius for plot and intricate situations. The characters are often untrue to

life, but they are made to move along with such rapidity that these minor considerations are for¬

gotten or not noticed by the uncritical public, 422

which forms most of Mrs. Rohlfs' readers. Her

long list of published works includes (Agatha

Webb) ; (Behind Closed Doors) (1888); (A

Circular Study1 ; (Cynthia Wakeham's Money) ;

(A Difficult Problem and other Stories) ; (The Doctor, his Wife and the Clock) (1895) ; doc¬

tor Izard) ; (Forsaken Inn) (1890) ; (The Hand and the Ring1 (1883); (Lost Man's Lane) ;

(Marked Personal 1 (1893) ; (A Matter of Mil¬

lions r; (The Mill Mystery1; (Miss Hard, an

Enigma1 ; (The Old Stone House and Other

Stories1 ; (One of my Sons1 ; (Seven to

Twelve1 ; (X. Y. and Z.1 ; (A Strange Disap¬

pearance1 ; (The Sword of Damocles1 ; (That

Affair Next Door1 (1897) ; (The Amethyst

Box1 ; (The House in the Mist1 (1905) ; (The

Millionaire Baby1 (1905) ; (The Woman in the

Alcove1 (1906); (The Chief Legatee1 (1907);

(The Mayor's Wife1 (1907); (The Filigree

Ball1 (1908) ; (Three Thousand Dollars1

(1909) ; (The House of the Whispering Pines1

(1910) ; Hnitials Only1 (1911) ; (Masterpieces

of Mystery1 (1912): (Dark Hollow1 (1914);

(The Golden Slipper and other Problems for

Violet Strange1 (1915) ; (The Mystery of the

Hasty Arrow1 (1917). Mrs. Rohlfs has also

written a drama (Risifi's Daughter1 ; a book of verse, (The Defense of the Bridge, and Other

Poems,1 and has contributed to the moving

picture stage. In this latter field one of her scenarios, a serial, (Who is Number One?1 was

very prominently billed in 1917. (The Leaven¬

worth Case1 and several of her other stories

have been dramatized and others have been

turned into scenarios.

GREEN, Ashbel, American Presbyterian

clergyman: b. 6 July 1762; d. 19 May 1848. He was graduated from the College of New Jersey

(now Princeton University) in 1783, and ap¬

pointed tutor and subsequently professor of

mathematics and natural philosophy in that in¬

stitution, which latter position he held for a year and a half. In 1786 he was licensed to

preach and took up ministerial work in Phila¬

delphia. From 1792 to 1800 he was chaplain to Congress, and in 1809 took a prominent part in forming the Philadelphia Bible. Society, the

earliest institution of the kind in the United States. He drafted the constitution of the

Princeton Theological Seminary, of which he

was one of the originators, and in 1812 was

elected president of Princeton College. In

1822 he resigned this office and returned to

Philadelphia to edit the Christian Advocate, a

religious monthly. For half a century he was

one of the leading men in the Presbyterian

Church. Among his many writings are dis¬

course Delivered in the College of New Jersey, with a History of the College1 (1822) ; (History of Presbyterian Missions1 ; (Lectures on the

Shorter Catechism.1

GREEN, Bartholomew, American pub¬

lisher: b. Cambridge, Mass., 1666; d. 1732. He published the first

newspaper that appeared in

the American colonies, and succeeded to. his

father's business at Cambridge, extended it at

Boston, where the office of the Boston News

Letter was situated. The proprietor and editor

was John Campbell, postmaster of Boston. He

eventually bought in the paper, which became

notable for outspokenness on topics of religion and politics.

GREEN, Beriah, American abolitionist :

b. New York State, 1794; d. 1874. He was

educated at Middlebury College, Vermont, be¬

came professor of sacred literature in Western

Reserve College in 1821, but was compelled to

resign in a few months through the opposition

aroused by his anti-slavery views. Jde was for many years president of the Oneida Institute,

Ohio. He was a great friend of William Lloyd

Garrison, and exerted a wide influence in aboli¬

tionist circles. Among his writings are 'History of the Quakers1 (1823).

GREEN, Duff, American politician and

journalist: b. Woodford County, Ky., 1791; d.

Dalton, Ga., 1875. He served with the Kentucky militia in the War of 1812; after the admission of Missouri as a State was appointed State

Senator (1823), and became editor and pro¬

prietor of the Saint Louis Enquirer. In 1825

he removed to Washington, D. C., where he

purchased the United States Telegraph. This

became the administration organ, and Green

rose to high favor with President Jackson.

He was a member of the “Kitchen Cabinet.11

After the rupture between Calhoun and Jackson,

the Telegraph as the organ of the nullificationists bitterly attacked Jackson. After some years spent in Europe he returned to the United

States (1844) and edited a short-lived news¬

paper in New York. During the latter years of his life he was actively engaged in promoting

the development of the South, and was one of

the founders of the town of Dalton, Ga.

GREEN, Hetty Howland Robinson,

American financier: b. New Bedford, Mass., 21

Nov. 1835; d. 3 July 1916. She was the richest woman in America and probably the boldest

and ablest woman financier of her time. Al¬

though she had an interest in nearly every large corporation and important enterprise in the

world, she managed personally her own prop¬

erty in stocks, bonds, and real estate in Chicago, New York and elsewhere.

GREEN, John Richard, English historian :

b. Oxford, 12 Dec. 1837 ; d. Mentone, France,

7 March 1883. He was graduated in 1859 from

Jesus College, Oxford, where, since the study

of modern history had not yet taken any con¬

siderable place in the university, the officers failed of sympathy with his preference for Mat¬

thew Paris to the classics. In 1860 he was or¬

dained a deacon and became curate of Saint

Barnabas, London, in 1863 was appointed to

Holy Trinity, Hoxton, and in 1866 to Saint

Philip's, Stepney. Failing health and increas¬

ingly liberal views caused him to withdraw

from clerical life, and from 1869 he was li¬

brarian at Lambeth. His first literary work of importance consisted of articles, especially brief essays on historical subjects, in the Saturday

Review. In 1874,- after having been twice re¬

written, his (Short History of the English Peo¬

ple1 appeared. This work unified English his¬

tory as no other had yet done. <(What Ma¬

caulay had done for a period of English his¬

tory,11 says Creighton, "Green did for it as a whole.11 Green's purpose was to exhibit the

development of popular life by a description of the leading manifestations of social progress.

The book was skilful in arrangement and

artistic in style, and met with an instant and large success. The author expanded it into his GREEN

(Hisiory of English People) (1877-80), not only to secure greater fullness but also to defend

views merely stated in the smaller work. He

then attempted a history for scholars, of which but two parts were published — (The Making

of England) (1882), which extends from

Britain as left by the Romans to the consolida¬

tion under Egbert, and secured his fame as a

critical historian, particularly through his

method of employing archaeology for the pur¬

poses of history; and (The Conquest of Eng¬

land) (1883), which continued the narrative to

the arrival of the Normans. Green's influence

on historical studies in England was very great, and his (Short History> and (History) still

hold a foremost rank. The Oxford Historical

Society and the (English Historical Review)

were originally suggested by him ; and he

also published (Stray Studies in England

and Italy) (1876), a reprint of early papers; (Readings from English History) (1879), a

series of extracts; (A Short Geography of the

British Isles) (1880) ; and an edition of Addi¬

son's <Essays) (1881). His <Letters) were pub¬

lished in 1901. He is understood to have been the original of Mrs. Humphrey Ward's (Robert

Elsmere.) Consult Bryce, (Studies in Contem¬

porary Biography> (1903).

GREEN, Joseph Reynolds, English bot¬

anist: b. Stowmarket, Suffolk, 1860; d. 1914.

He was educated at Trinity College, Cambridge,

and became in 1887 professor of botany to the Pharmaceutical Society of Great Britain, a post which he held until 1907. In 1895 he was

chosen Fellow of the Royal Society and in

1902 of Downing College, Cambridge. His re¬

searches in physiological botany are his most

important work. His publications include

(Manual of Botany) (1895) ; (The Soluble Fer¬

ments and Fermentation) (1899) ; Hntroduction to Vegetable Physiology) (1900)j Primer

of Botany) (1910) ; (History of Botany from

1860-1900) (1910).

GREEN, Mary Anne Everett, Eng¬

lish historian: b. Sheffield, 1818; d. 1895. Her work is distinguished by its conscientious in¬

dustry. She wrote under her maiden name,

Wood. She married George Pycock Green, an

artist, in 1845 ; and worked in the Public Rec¬

ord office until 1885. Her publications include (Lives of the Princesses of England) (6 vols., 1849-55) ; Petters of Royal Ladies) (1846) ;

and numerous editions of the diaries and letters of persons of note; and (Elizabeth, Electress

Palatine and Queen of Bohemia) (1909).

GREEN, Norvin, American capitalist : b.

New Albany, Ind., 1818; d. 1893. He was grad¬

uated from the University of Louisville in

1840 with the degree of M.D., and practised

until 1853. He served in the Kentucky legis¬

lature in 1849, 1850 and 1868. In 1854 he en¬

tered the telegraph business and soon became

prominent as president of the Southwestern

Telegraph Company. In this capacity he co¬

ordinated the work of six leading telegraph

companies, which eventually led to the forma¬

tion of the Western Union Telegraph Company

in 1866. Green became one of its vice-presi¬

dents, and was chosen president in 1878. He

was also head of the Louisville, Cincinnati and Lexington Railroad (1870-73) and president of

the American Institute of Electrical Engineers

(1884-86).

GREEN, Samuel Swett, American librarian :

b. Worcester, Mass., 1837 ; d. - . He was

graduated at Harvard in 1858 and received a

degree also from the Divinity School in 1864.

He was librarian of the Worcester Free Library from 1871-1909, when he retired. He served as

trustee of that institution from 1867-71. In 1890

he was appointed a member of the Free Public

Library Commission of Massachusetts. He was one of the founders of the American Library Association ; its first vice-president and presi¬ dent in 1891. In 1893 he presided over the World's Congress of Librarians. He was also a member of various educational and library or¬ ganizations. His publications include libraries and Schools) (1883); (Library Aids) (1883); (The Public Library Movement in the United States, 1853-93) (1913), and numerous papers and articles on subjects in library economy and history.

GREEN, Seth, American pisciculturist: b. Irondequoit, N. Y., 19 March 1817; d. Rochester, N. Y., 20 Aug. 1888. He learned the natural history necessary for his profession from ob¬ servation and private reading, and began his life's work by the artificial hatching of trout roe. He was looked upon as the leading expert in this department of fish culture, but his first great triumph in new fields came with his suc¬ cess in the reproduction of shad. The Seth Green shad-hatching box was invented in 1867, and, although it has been superseded, by this device shad culture was first demonstrated to be possible and its inventor must be looked upon as the pioneer in this difficult department of pisciculture. The

Connecticut River was re¬

stocked by means of this invention. In 1868

he was made fish commissioner for the State of New York, and the following year undertook

the artificial reproduction of whitefish. He

was successful in his experiments, and was

acknowledged as one of the fathers of fish

culture in the United States. From 1870 until

his death he was superintendent of the State

hatchery at Caledonia, N. Y.

GREEN, Thomas Hill, English philosopher:

b. Birkin, Yorkshire, 7 April 1836; d. Oxford, 15 March 1882. He was educated at Rugby and

Oxford; was elected Fellow at Balliol in 1862, the first lay tutor on that foundation (1867), and in 1878 Whyte professor of moral philoso¬

phy in the university. His principal work as a philosopher was the foundation of the socalled Neo-Hegelian School. He is supposed to have

been taken by Mrs. Ward as a model for her

Mr. Gray in (Robert Elsmere) ; but the resem¬

blance is by no means complete, as Mr. Gray's work is undoubtedly, as he appears in (Robert Elsmere,) rather that of a destructive literary critic than a constructive philosopher. His

works include Untroduction to Hume's Treatise

of Human Nature) (1874), and Prolegomena

to Ethics) (1883).

GREEN, Valentine, English engraver: b.

Salford, Oxfordshire, 1739; d. London, 1813.

He received instruction from Robert Hancock

at Worcester. In 1765 he took up his residence in London, and soon became well known for his excellent mezzotints. As engraver to the king,

he was permitted to copy the pictures at the

gallery of Diisseldorf and had succeeded in

making some two dozen plates, when the siege

of that city by the French was undertaken.

He left about 400 plates, after Reynolds, Rom¬

ney, Gainsborough and others. His antiquarian

and historical studies gained him fellowships

in the Society of Antiquaries and the Royal

Society. He was assisted in much of his work

by his son, Rupert. Consult his (Life5 by

Whitman (London 1902).

GREEN, William Henry, American Pres¬

byterian theologian: b. Groveville, N. J., 1825; d. 1900. He studied at Lafayette College and

at Princeton Theological Seminary. For a few

years he remained at the seminary in the capac¬

ity of instructor in Hebrew; and from 1849-51

served as pastor of the Central Presbyterian

Church of Philadelphia. He resigned this post

in order to fill the chair of biblical and Oriental literature at Princeton Seminary. He refused

to accept the presidency of that institution, al¬

though he was officially recognized as its head.

He was also the chairman of the Old Testament Revision Company. His publications include

<A Grammar of the Hebrew Language5 (1861) ;

<The Pentateuch Vindicated from the Asper¬

sions of Bishop Colenso) (1863) ; (A Hebrew

Chrestomathy5 (1865) ; (The Argument of the

Book of Job Unfolded) (1874) ; (Moses and

the Prophets) (1883); ‘Hebrew Feasts>

(1885) ; ‘The Higher Criticism of the Penta¬

teuch5 (1895) ; ‘The Unity of the Book of

Genesis5 (1895) ; ‘A General Introduction to

the Old Testament5 (2 vols., 1898-99).

GREEN, a color found in the spectrum be¬

tween the blue and the yellow. See Color ;

Color in Plants; Coloring Matters; Coal—

Tar Colors.

GREEN BAY, Wis., city and county-seat

of Brown County, situated at the head or south¬

ern point of the bay of the same name, and at the mouth of the Fox River, on the Chicago

and Northwestern, Chicago, Milwaukee and

Saint Paul, the Green Bay and Western rail¬

roads. Green Bay has an extensive commerce.

Fifty-seven passenger trains arrive daily over

the four railroads entering the city. An ex¬

tensive lake traffic is also carried on, the harbor, through government appropriations, having been

made accessible to the largest vessels upon the Great Lakes. Coal constitutes the largest single import, Green Bay being an advantageous dis¬

tributing point. The largest export by way of

the lakes is grain, although much lumber has

hitherto been shipped out. The city is pro¬

vided with a complete electric railway system,

including an interurban line up the Fox River

valley to Kaukauna, where a junction is made

with another electric line passing through Ap¬

pleton, Neenah, Oshkosh and Fond du Lac. A

light and power plant furnishes gas for lighting and heating and electricity for light and power, many electric motors now being in use.

There

are a number of manufacturing plants — 3 large breweries, 3 paper mills and 1 sulphite mill,

2 large saw mills, 3 planing mills, 2 very large canning factories, 1 glove factory, 3 pure milk factories, 5 machine shops, 2 candy factories

1 pickle factory, 1 coffin factory, 1 carriage fac¬

tory, 1 cornice factory, largest hard coal docks on the lakes, 1 grass rug factory, 1 multiplier machine factory, 2 flour mills, 2 knitting and mackinac factories. Several jobbing and whole¬

sale concerns do a large business, the most im¬

portant being grocery, hardware, crockery, and

saddlery and harness. An extensive fish¬

shipping business is also carried on. Water is supplied from artesian wells by a private com¬

pany. Green Bay has a number of fine public

buildings, the Kellogg library and three branch libraries, the Federal buildings. Saint Joseph's Academy, three hospitals and just outside the

city limits the State Reformatory. The public

school system has two high schools and 13 ward schools, employing 106 teachers, one continua¬

tion school, two open-air schools and one school for the deaf. There are also several parish

schools, graded in the same manner as the

public schools. There are many fine church

buildings, and all the leading religious denom¬

inations are represented in the city. Green Bay, the oldest town in Wisconsin, was first visited in 1634 by Jean Nicollet, who had been

sent by Champlain, governor of New France, to find

the rumored short route to China. The site

was a favorable one for an Indian village as

well as a landing place for explorers and mis¬

sionaries. It is known that Marquette, Joliet,

Allouez and Tonti spent considerable time here.

The town was therefore settled by the French,

who impressed their character upon it for over 200 years, although it fell into the hands of the English at the close of the French and Indian War in 1763. In 1816 the Americans estab¬

lished a fort on the opposite side of the river, known as Fort Howard, around which a pros¬

perous town of the same name grew up. In

1895 Fort Howard was annexed to Green Bay.

The administration of the city is by commission form of government, mayor and two councilmen, elected for six-year terms. Assessed valu¬

ation : Lots, exclusive of buildings, $16,740,275 ; farm lands, $890,605 ; personal property, $4,803,-

570; bank stock, $1,191,900; total, $23,626,350.

Pop. (1920) 31,017.

GREEN BAY, an arm of Lake Michigan,

on the southwestern coast of the upper penin¬

sula of Michigan and the eastern coast of Wis¬

consin. It is 120 miles long, from 10 to 20

miles wide, has an average depth of about 100

feet. Fox River, the outlet of Lake Winne¬

bago, enters the bay at its head, at the city of Green Bay. The bay is navigable for the larg¬

est lake steamers. The largest cities on the

bay are Green Bay and Marinette, in Wisconsin, and MenoYninee and Escanaba in Michigan. At

its mouth lie several islands including Martin's Island, Washington Island and Summer Island.

GREEN COVE SPRINGS, Fla ., town,

county-seat of Clay County; on the Saint John's River, the Atlantic Coast Line Railroad. It

contains a warm sulphur spring noted for its

medicinal properties, and has a public library

and courthouse. The trade is chiefly in fruits, vegetables and lumber. The water works and

electric-light plant are the property of the city.

The town is governed on the Commission sys¬

tem. Pop. 2,287.

GREEN CROSS NURSES, an auxiliary

of the Home Defense League, organized in

April 1917 by Mrs. Arthur J. Hanford of New

York, with the objects of knitting and making

garments to be turned over to the Red Cross,

and of watching over the families of men

drafted from the league. The members of the

organization attend lectures to learn the ele¬

ments of practical hygiene and emergency

nursing. ((They do not expect to take the place of trained nurses, but have been taught to look GREEN EBONY— GREEN RIVER 425

after a patient until medical* help arrives.® The nurses adopted a white uniform with a green

cross on the sleeve, and a white flag with a green cross as their emblem.

GREEN EBONY, the name of the wood

of Jacaranda ovalifolia, a South American tree

of the genus Bignonia. The wood is very hard

and of an olive green color, and produces an

olive green, greenish yellow or brown color in dyeing. The flowers are elaborate and panicled.

The species Biya ebenus is exported in large

quantites from West India.

GREEN GLASS. See Glass, Varieties

of.

GREEN ISLAND, N. Y., village of Al¬

bany County, on an island in the Hudson River opposite Troy, on the Delaware and Hudson

and the New York Central and Hudson River

railroads. It is connected with Watervliet and

Troy by bridges; and has iron manufactories,

machine shops and railroad car shops. Pop.

4,737.

GREEN MANURING, the agricultural

practice of plowing under crops while succulent in order that they may enrich the surface layer by their decay. It is of ancient origin and wide popularity, especially in mild climates ; less in tropical than it should be. The objects gained are the opening of the soil and especially the sub-soil by the roots of deep feeding plants ; the raising of plant food from the lower strata to the surface layer and the saving of available plant food in the surface layer, material that would leach away beyond the reach of shallow-rooted plants ; the addition of humus to the soil by the decay of the plants ; and, with certain crops, the addition of nitrogenous foods ob¬

tained from the air. As the plants decay they also act upon insoluble plant food in the soil and make it available. Strictly speaking, the last three functions are those of a green manure

proper, while the others pertain to what are

known as cover crops. The same crops, how¬

ever, are often used for both purposes. Green

manures and cover crops belong to two classes : (1) shallow-rooted plants such as rye, buck¬

wheat, mustard, rape, etc., which are especially useful on hard and poor soils open the way for more exacting crops; (2) deep-rooted plants

such as clover, cow-pea, velvet bean, vetch and other leguminous plants which are still further useful because of their power of obtaining

nitrogen from the air. See Clover; Fertilizers; Leguminosˆe; Root; Soil and articles on the

crops mentioned.

GREEN MONKEYS, three similar spe¬

cies of small African monkeys, often seen in

menageries, and representing the genus Cercopithecus, may properly be called green monkeys

because of the prevailing tint of their fur. The one most commonly seen is C. sabaeus, the size of a cat, and remarkable for its unbroken

silence. The vervet (C. lalandi) is small, gray¬

ish green, reddish white on the cheeks, throat and underparts, while the face, paws and end of the tail are jet black. It is common all over South Africa, where no other species of its

large genus are found. The grivet (C . grisc—

oviridis) is speckled olive-green, with a whitish forehead, chin and rump ; it dwells in Abyssinia and ‘is umt numerous. All these monkeys, at

least when young, are exceedingly docile and

good-natured in captivity.

GREEN MOUNTAIN BOYS, the regi¬

ments of Vermont settlers raised to defend the New Hampshire grantees against the efforts of

New York to oust them or collect quit-rents,

and later for service in the Revolution. See

Allen, Ethan.

GREEN MOUNTAIN STATE, a popular

name for the State of Vermont, from its being crossed by the Green Mountains. See Green

Mountains ; Vermont.

GREEN MOUNTAINS, a range belong¬

ing to the Appalachian system properly extend¬

ing from near Long Island Sound through the

western part of Connecticut and Massachusetts,

into Vermont and Canada. In the State of

Vermont the range is known as Green Moun¬

tains; but south, in Massachusetts and Connec¬

ticut, it is called by the names Berkshire Hills, Taconic Mountains and Hoosac Mountains

The peaks of this range, oneT3TtEe oldest in

North America, have been worn down by

erosion and weathering until in many places

they have become low, round hills. Their

greatest elevation is in Vermont; Mounts Kill—

ington, Mansfield, Camels Hump, Lincoln and

Jay being the highest. Summit, a hamlet in the town of Mount Holly, in Rutland County, is

the highest point crossed by a railroad. Some

of the best building stone in the country is ob¬

tained from the Green Mountains. Granite and

marble exist in large quantities. Slate abounds, and copper and manganese are found in several

places. The range forms the divide between

the basin of the Connecticut on the east and

the Lake Champlain and Hudson River basins

on the west. The rivers arising in the Green

Mountains are short streams, but their water¬

power is abundant. In the fertile valleys are

rich farms, and sheep and cattle are raised on the uplands. The hemlock, spruce, pine and

other evergreens which form striking parts of

the forests, have given the name to this range.

Hard wood trees and sugar maple are found on

both the east and west slopes of the mountains.

The beauty of the scenery and the climate make the Green Mountains a place much frequented

in summer by tourists.

GREEN RIVER, Ky., has its rise in Lin¬

coln County, flows south and west to Adair

County; west, a very irregular course, to Butler County; then northwest to the Ohio River

which it enters a few miles above Evansville,

Ind. It is about 350 miles long, and is navigable for small steamers for a distance of about 200

miles frofn the Ohio; but for a part of this dis¬

tance artificial means have been used to make

it navigable. In Edmonson County this river

passes within 80 feet of the mouth of Mam¬

moth Cave. The subterranean stream called

Echo River, which is seen in connection with

the Mammoth Cave, flows into Green River.

GREEN RIVER, in Utah, has its rise in

the western part of Wyoming, flows south and

east into Colorado, south and west into Utah,

then in a southern direction to the southeastern part of the State where it unites with the Grand to form the Colorado River. Major Powell

(q.v.) and other explorers have passed through

several of the remarkable canons of this river.

Its length is about 700 miles.

GREEN SNAKE, in the United States, a

very slender, agile, harmless, grass-green, yel¬

low-bellied serpent (Liopeltis vernalis), which

is not only common in grassy places but in

bushes, its color concealing it well in both

places. It feeds mainly on insects. Several

poisonous serpents of the far East, are called ((green snakes® by English-speaking residents on account of their color.

GREEN SPRINGS, Va., Battle of, 6 July

1781. Lafayette, reinforced by Steuben, was

pressing close on Cornwallis' rear down York

peninsula; and the advance-guard under Wayne

came unexpectedly upon an entire division of

the British at Green Springs, on the James

River. Immediate retreat meaning destruction,

he charged them so fiercely that Cornwallis,

thinking the entire American army was upon

him, merely repelled the assaulting party and

drew off his men, while Wayne retreated in the other direction. The American loss was 145.

GREEN VITRIOL. See Copperas.

GREENAWAY, Kate, English artist: b.

London, 1846; d. there, 8 Nov. 1901. She studied at Heatherley's, South Kensington, and the

Slade School, and first exhibited in 1868 at the Dudley Gallery. For many years her work

regularly appeared in the exhibitions of the

Water Color Society and the Academy. Her

illustrations were widely published and popular

in the United States as well as in Great Britain.

She became especially famous for her pictures

of child life, characterized by individuality of design, skilful coloring and humorous touches.

Her books include (A Painting Book for Boys

and Girls* and (Kate Greenaway Birthday

Book.-*

GREENBACK-LABOR PARTY, or

NATIONAL PARTY. The workingmen dur¬

ing the ((panic years® (4874-78) increasingly

resorted to political activity to right their griev¬

ances, and in Ohio in 1877 began to call their local organization the (<National Party.® In

Massachusetts and Pennsylvania they fused

with the Greenback Party (q.v.). On 22 Feb.

1878, at Toledo, Ohio, they held a convention

which organized the fusion as the <(National

Party® ; but the popular name for it was the

old fusion name ((Greenback-Labor.® Their

platform was the Greenback one, with planks

against prison contract labor and in favor of

legislation for shorter hours. The new organ¬

ization awakened hopes in the hopeless minor¬

ities in several States where the majority, Re¬

publican or Democratic, could not be over¬

turned ; and they organized fusions with it,

which raised it at once to a popular,, vote (ap¬

parently) of over 1,000,000, and elected 14 Con¬

gressmen. In the close States each old party

kept its own vote, with a slight falling off to the new one. The party proper elected but two representatives, five of the 14 being really Re¬

publicans and seven Democrats. In 1880 (9-10

June) it held a national convention at Chicago, and nominated James B. Weaver of Iowa, and

B. J. Chambers of Texas, for President and

Vice-President; Chambers declined, but no sub¬

stitute was nominated. The platform had all

the old planks in substance, and new ones

against Chinese immigration, land-grants to rail¬

roads, and favors to corporations and bond¬

holders, and in favor of sanitary regulations

for manufactories. The fusions had largely

disappeared, and the popular vote sunk to 306,-

867, and the Congressmen to eight; four from

Missouri, two from Maine, one from New York

and one from Texas. It retained its organiza¬

tion till 1884, when it fused with the Anti—

Monopoly Party (q.v.) and nominated Benjamin

F. Butler for the Presidency, polling in all

175,380 votes. It then practically disappeared.

Consult Usher, (The Greenback Movement*

(1911).

GREENBACK PARTY, a political party

in the United States that favored an increase

in the greenback* or paper currency, to be ex¬

changeable for interest paying bonds. Though

commonly bearing this name, its own choice

(1874-76) was Independent Party. The pros¬

perity of western agriculture during the War,

due largely to the heavy government purchases

and the payability of mortgages in depreciated

paper, was attributed by a large section there to the plentifulness of the paper by itself ; hence, when hard times had succeeded, it was believed that a fresh inflation of greenbacks would re¬

produce the same conditions. The chief ob¬

stacle to this was thought to be the eastern

banking interests, which, having bought govern¬

ment bonds in greenbacks, had obtained the act of 1869 making them payable in coin whether

so specified or not ; and should have been forced to take what they gave, the more since paper

was now at par and their bonds were not taxed.

By 1868 the Ohio Democrats, led by George

H. Pendleton, were insisting on the payment in greenbacks of all bonds not specifically payable in coin, as the 5-20's ; this was called the <(Ohio Idea.® Western Democratic conventions placed

this plank in their platforms for three or four years, but the nomination of Greeley put an

end to that in 1872. The revival of greenback-ism is often attributed to the silver demonetiza¬

tion act of 1873; but in fact silver was above par at that time, the act drew no general atten¬

tion, and but for the later fall in silver prob¬

ably never would have done so. The real cause was the bringing forward of the Resumption

Act, passed 14 Jan. 1875, to take effect 1879.

On 25 Nov. 1874 a Greenback convention was

held to protest against it, and adopted three

resolutions — (1) that all bank and corporation currency, should be withdrawn; (2) that no

currency be allowed except government paper

<(based on the faith and resources of the na¬

tion,® and exchangeable on demand for 3.65

per cent bonds; (3) that coin should be paid

only for interest on the national debt, and for that part of the principal which promised it,

Several Democratic conventions indorsed these ;

but in 1876 the prospect of the hard-money

Tilden being the next Presidential candidate,

led the party to form an organization of its

own. At a convention at Indianapolis, 17 May,

they nominated Peter Cooper of New York

and Newton Booth of California for President

and Vice-President; Booth declined, and Sam¬

uel F. Carv of Ohio was substituted. The plat¬

form, besides the three points above, demanded

the repeal of the Resumption Act. The ticket

polled 81,737 votes, over half of them in Michi¬

gan, Illinois, Indiana, Iowa and Kansas. In

the State elections the next year the party

polled 187,095 votes, but the main strength

continued to be in the West. The next year

it was absorbed in the Greenback-Labor Party

(q-v.).

GREENBACKS (as printed on the back

in green ink), the current name, from the first of the legal-tender notes first issued by the

government during the Civil War. (See Debt,

National). The authorizing act was signed

by Lincoln 25 Feb. 1862; it was the first ever passed by Congress making anything but coin

legal tender, and nearly all the Democrats and many Republicans declared it unconstitutional.

But war necessities were too exigent, and the

bill authorized $150,000,000 of the notes, not

receivable for import dues nor payable by the

government as interest on its obligations. On

11 June 1862 and 3 March 1863 further issues

were authorized; and on 3 Jan. 1864 they

reached their maximum amount of $449,338,902.

The great inflation, the uncertain fortunes of

the War, and the belief that even if victorious the United States neither could nor would pay

its enormous debt at face value, but would re¬

pudiate or scale it, combined to depreciate the value of the notes; throughout 1864 they were

worth on an average only about 45 cents on

the dollar, and on one day, 11 July, when

Early was threatening Washington, they drop¬

ped in panic to about 35 cents — or as currently expressed, the <(premium on gold® was 285.

The legal tender acts had always been under¬

stood to be temporary war measures only, and

a choice of evils ; the secretary of the treasury (McCulloch) in his report for 1865, expressed

the opinion that they ought not to be in force a day longer than was necessary to prepare

for a return to the gold standard. The House

passed a resolution of cordial concurrence, 144

to 6; and on 12 March 1866 both houses agreed on a reducing act, by which on 31 Dec. 1867 the volume of greenbacks stood at $356,000,000. But the demoralization of economic sentiment and

judgment wrought by them, which afterward

issued in the Greenback party, was already at

work ; many attributed the prosperity of the time to the currency inflation and even in Congress a majority had determined to make the paper

currency a permanent feature of our finance. On 4 Feb. 1868 any further reduction was prohib¬

ited and the volume stood at this mark till

October 1872, when it began to increase, amount¬

ing on 15 Jan. 1874 to $372,979,815. On 20 June 1874 the maximum was fixed at $382,000,000.

Meantime a test case had been made up to try the question of their constitutionality (Hepburn v. Griswold) and in 1869 the Supreme Court,

by five to three, headed by Chief-Justice Chase, decided against them. The fiercest political op¬

position was roused by this, however, and it

became a party question. The Supreme Court,

in May 1871, reversed its decision by one ma¬

jority. This experience has led the Supreme

Court to be excessively cautious about taking

jurisdiction in any case where strong political feeling is involved. The question of legal

tender has become unimportant in recent years.

See Gold Standard Bill.

GREENBRIER, any of various prickly

vines of the genus Stnilax (q.v.), commonly

the catbrier (S. rotundifolia) , which grows all over the eastern half of. the United States and is especially abundant in the Southern Alleghanies, where it designates various mountain—

ranges, streams, *etc.*

GREENBRIER MOUNTAINS, a range

of mountains in the eastern part of West Vir¬

ginia, lying west of the main part of the

Alleghanies and parallel to the Greenbrier

River (q.v.). Their average height is about

2,000 feet, the highest point being about 3,500

feet.

GREENBRIER RIVER, a river of West

Virginia, rising in the Rich Mountains, Ran¬

dolph County, flowing southwest into New

River; length 150 miles.

GREENBRIER WHITE SULPHUR

SPRINGS, W. Va, the name sometimes given

the White Sulphur Springs in the Greenbrier

Mountains to distinguish them from less i

ˆortant cnrinrrs of similar character. Scj

White Sulphur Springs, W. Va.

GREENCASTLE, Ind., city and county-seat of Putnam County, on the Cleveland, Cin¬

cinnati, Chicago and Saint Louis, the Louisville, and Vandalia line railroads; the Terre Haute

traction line with trains both east and west

every hour, for passengers and express and

four fast freight trains each day to Indianapolis and Terre-Haute. Greencastle is the seat of De Pauw University. The city has lumber-mills,

cabinet works, making kitchen cabinets and like furniture, factories of lightning rods, pumps

and tinplate, a well-equipped apple packing

plant, two large stone crushing plants. Green¬

castle has an excellent public school system,

many churches and fine library building con¬

taining 7,000 volumes. The city is governed

by a mayor and a municipal council elected

every four years. A privately owned water

plant furnishes an ample supply of excellent

water, gas is supplied by an artificial gas plant and an electric plant furnishes light and indus¬

trial power. Greencastle was settled in 1822

and incorporated in 1849. Pop. 3,790.

GREENE, Aella, American journalist and

poet; b. Chester, Mass., 1838; d. Springfield,

Mass., 1903. He was author of Rhymes of

Yankee-Land) ; (Into the Sunshine> (1881);

(Stanza and SequeP (1884); fathered from

Life.>

GREENE, Albert Gorton, American law¬

yer and poet: b. Providence, R. I., 10 Feb. 1802; d. Cleveland, Ohio, 4 Jan. 1868. Graduated from Brown University 1820, he was admitted to the

bar in 1823; in 1832 became clerk of the town and of the municipal court of Providence, and

in 1858 judge of the court. From 1867 he was in Cleveland, Ohio. He was at one time presi¬

dent of the Rhode Island Historical Society,

was a founder of the Providence Athenaeum, be¬

gan the Harris collection of American verse

(now at Brown University), ana wrote some

well-known poems, such as (01d Grimes) and

(The Baron's Last Banquets

GREENE, Charles Wilson, American pro¬

fessor of physiology and pharmacology: b.

Crawford County, Indiana, 12 Aug. 1866. He

studied at De Pauw, Leland Stanford and

Johns Hopkins universities, receiving his Ph.D.

from the last-named institution in 1898. He in¬

structed in geography at De Pauw Normal

School (1889-90) ; in physiology at Leland

Stanford (1898-1900) ; and has been professor

physiology and pharmacology' at the University

of Missouri since 1900. He conducted im¬

portant investigations for the United States

Bureau of Fisheries (1910-11). He is the au¬

thor of Experimental Pharmacology) (3d ed.

1909); (Textbook of Pharmacology* (1914).

As editor, he has published (Kirke's Handbook

of Physiology 5 (8th American ed., 1914).

GREENE, Christopher, American soldier :

b. Warwick, R. I., 1737; d. Westchester County, N. Y., 13 May 1781. He was among the first

to take the field on the American side after the engagements at Lexington and Concord. Sub¬

sequently, as colonel of a Rhode Island regi¬

ment, he participated in the campaign in Can¬

ada under Arnold. In 1777, while in command

at Fort Mercer at Red Bank, on the Delaware,

he sustained an attack from a large force of

Hessians under Colonel Donop, who were re¬

pulsed with great slaughter. For these services a sword was voted him by Congress, and a

monument commemorative of the battle and of

the valor of the American commander was

erected in the neighborhood of Fort Mercer in

1829.

GREENE, Daniel Crosby, American Con¬

gregational missionary: b. Roxbury, Mass.,

1843; d. 1913. He was educated at Dartmouth

College; and after serving as a private in the Civil War, went to Japan in 1869 as a mission¬

ary. After living at Kobe (1870-74) ; Yoko¬

hama (1874-80), and acting as professor of

Old Testament exegesis at Kioto (1881-87), he

became a member of the Yokohama New

Testament translation committee. On return¬

ing to the United States, he delivered a course of lectures at Harvard University. He was

editor of (The Christian Movement in Japan’

(3d. ed., 1907) • Ritter’s history of the Prot- .

estant Missions in Japan5 (1898) ; and wrote

(Chinese New Testament Prepared for Japan¬

ese Readers) (1878), and (Course of Study for

Students of Japanese Language> (1903).

GREENE, Edward Lee, American botan¬

ist : b. Hopkinton, R. I., 20 Aug. 1843; d. Wash¬

ington, D. C., 10 Nov. 1915. After studying at Albion College, Wisconsin, he took orders in

the Protestant Episcopal Church (1871) ; but in 1885 entered the Church of Rome. He was

professor of botany at the Roman Catholic Uni¬

versity in Washington from 1895 to 1904. In

the latter year he became associate in botany at the Smithsonian Institution. In 1893 he was

president of the International Congress of

Botanists, assembled in connection with the

World's Columbian Exposition at Chicago. He

published Ullustrations of West American

Oaks) (1890) ; (Flora Franciscana) (1891) ;

(Pittonia) (1890) ; (Leaflets of Botanical Ob¬

servation5 (1903) ; an autobiography, (Roads to Rome in America5 (1909) ; besides numerous

contributions to taxonomy in various serial

publications.

GREENE, Edwin, English song composer:

b. 1857 ; d. Cheltenham, Eng., 10 Aug. 1915. He was author of (Sing Me to Sleep,5 which has

been translated into every European and many

other foreign languages and reached a sale of

over 2.000,000 copies. He composed numer¬

ous other songs, was an entirely self-taught

musician, and had been an invalid for the last 20 years of his life.

GREENE, Francis Vinton, American sol¬

dier: b. Providence, R. I., 27 June 1850; d. New York, 15 May 1921. He was graduated at West

Point in 1870. In 1876 he was made military

attache at Saint Petersburg and remained

at the headquarters of the Russian army

during the Russo-Turkish War (1877-78).

in the course of which he was twice decorated for bravery. Obtaining his captaincy in 1883 he was three years later appointed instructor in

military engineering at West Point, but left

the service to join the Barber Asphalt Company, and was oresident of the National Asphalt

Company when the trust went into the hands of receivers. He entered the National Guard in

1889 on the staff of Gen. Louis Fitzgerald and was elected colonel of the Seventy-first regiment in 1892. In the Spanish-American War he was

commissioned major-general of volunteers and

served principals in the Philippines. In 1902

he was appointed police commissioner of New

York. He wrote (The Russian Army and

its Campaign in Turkey5 (1879) ; cArmy Life

in Russia5 (1880); (The MississippP (1882);

(Life of General Nathanael Greene5, (1893) ;

(The Revolutionary War and the Military

Policy of the United States5 (1911).

GREENE, George Sears, American civil

engineer and soldier: b. Warwick, R. I., 6 May 1801 ; d. Morristown, N. J., 28 Jan. 1899. He was graduated at West Point in 1823 and was

for several years one of the professors there, but in 1836 adopted civil engineering as a pro¬

fession, after sending in his resignation as an officer in the United States army. He was en¬

gaged subsequently in railway construction in

many eastern States, and in 1856 the Croton

Aqueduct Department of New York city com¬

missioned him to execute several important

works. He designed and constructed the reser¬

voir in Central Park, widened High Bridge, and built a water tower and reservior at its western extremity. At the beginning of the Civil War

he took command of the Sixtieth New York

Volunteers, and was put in command of a bri¬

gade at Cedar Mountain and a division at Antietam. He took part in many other important

events of the war and was severely wounded in an engagement near Chattanooga, in 1863. In

1866 he retired from the army and the following year was appointed commissioner and chief en¬

gineer of the Croton Aqueduct Department, and

in 1871 was called to Washington, D. C., as

chief engineer of public works. During his

three years' incumbency of that office he planned the sewer system of the national capital.

GREENE, George Washington, American

historian : b. East Greenwich, R. I., 8 April

1811 ; d. there, 2 Feb. 1883. He was a grandson of Gen. Nathanael Greene (q.v.) of Revolu¬

tionary fame. After study in Brown Univer¬

sity, he traveled extensively in Europe, was

United States consul at Rome in 1839—45, and

from 1848 until his resignation in 1852 was pro¬

fessor of modern languages at Brown Univer¬

sity. He was appointed non-resident professor

of history at Cornell in 1872. His publications include several historical works, such as his¬

torical View of the American Revolution5

(1865); (Life of Nathanael Greene5 (1867-71),

(The German Element in the War of American

Independence5 (1876), and a ˆhort History of

Rhode Island5 (1877).

GREENE, Homer, American author and

lawyer: b. Ariel, Pa., 10 Jan. 1853. He was

graduated from Union College in 1876, from the Albany Law School in 1878, was admitted to the bar in 1879, and has since been in practice at Honesdale, Pa. In Pennsylvania politics he has

been active as a Republican. He has contrib-

uted much verse and prose to the magazines

and published (The Blind Brother } (1887) ;

ˆBurnham Breaker) (1887) ; (Coal and the

Coal Mines 5 (1889) ; ˆhe Riverpark Rebel¬

lion* (1892); (A Tale of a Tow-path*;

(Pickett's Gap* (1902) ; (A Lincoln Conscript)

(1909) ; (Handicapped, the Story of a White—

haired Boy) (1915). He is the author of the

much-quoted poem (What My Lover Said,*

and other popular verse.

GREENE, Nathanael, American soldier:

b. Patawomut, Warwick County, R. I., 7 Aug.

1742; d. Mulberry Grove, Ga., 19 June 1786.

His father, a leading preacher among the

Quakers, was the owner of an anchor forge and a grist mill. He was brought up as a Quaker, and trained from childhood to work on the

farm and at the forge. Resolute perseverance

in the midst of many obstacles gave him in the course of time a more than ordinary familiarity with ancient and English history, geometry, law and moral and political science. In 1770 he was chosen a member of the general assembly for

Coventry, whither he had removed to take

charge of another forge; and from that time

continued to take an active part in public

affairs. He was one of the first to engage in the military exercises which prepared the way

for resistance to the encroachments of the

mother country, and this open renunciation of

the principles of his sect was promptly followed by formal excommunication. In 1774 he joined

the Kentish guards as a private; in July of the same year was married to Catharine Littlefield

of Block Island, and in 1775 was appointed by the general assembly to command as brigadier-general the Rhode Island contingent to the

army before Boston. He joined his command

at Roxbury on 3 June and from that time re¬

mained in active service without a day's fur¬

lough till the final disbandment of the army in 1783. At Boston his brigade was distinguished

by its discipline, and after the evacuation he was entrusted with the defense of Long Is¬

land. He distinguished himself in the battle

of Harlem Heights, later commanded a portion

of Washington's army near Fort Washington

on the Hudson, and in September he was made

major-general and appointed to the command

in New Jersey. At Trenton he led the division with which Washington marched in person, and,

with Knox, was for following up the advantages of that brilliant surprise by advancing directly upon the other detachments of the enemy. He

took an equal part in the battle of Princeton, and was entrusted by Washington during the

winter with a confidential communication to

Congress. At the Brandywine he commanded a

division, and by a rapid march and successful

stand preserved the army from utter destruc¬

tion. At Germantown he commanded the left

wing which penetrated into the village. On 2

March 1778, he accepted the office of quarter¬

master-general, which he held till August 1780, fulfilling its arduous and complicated duties in such a manner as to call forth from Washing¬

ton when he left it the declaration <(that the States have had in you, in my opinion, an able, upright and diligent servant.® On 23 June 1780 he checked with two brigades and a small body of militia the advance of a corps of 5,000 of the enemy in the brilliant battle of Springfield. He was in command of the army during Washing¬

ton's visit to Hartford in September 1780, when Arnold's conspiracy was discovered, and sat as

president of the court of inquiry upon Major

Andre. In October of the same year, he was

appointed to the command of the Southern

army, which he found on his arrival, in Decem¬

ber, in a state of utter disorganization and want.

He soon advanced to a well-chosen camp on the banks of the Pedee, and began a series of

operations which in less than a year stripped

the enemy of nearlv all their hard-won con¬

quests in the two Carolinas and Georgia, and

shut them up within the narrow limits of

Charleston and its immediate neighborhood.

Among the events of this active year were the battle of the Cowpens, won by General Morgan

at the opening of the campaign; a brilliant re¬

treat from the Catawba to the Dan; the battle of Guilford Court House in which he lost the field, but gained the end for which he fought ; the

pursuit of Cornwallis to the Deep River ; the

daring advance into South Carolina ; the battle of Hobkirk's Hill, a second defeat followed by the results of victory; the siege of Fort Ninety-six, raised by the advance of Lord Rawdon,

but followed by the immediate evacuation of

the post and the retreat of the enemy toward

the west ; the drawn battle of Eutaw Springs,

and the advance upon Dorchester, spoken of

by Washington as another ((proof of the

peculiar abilities® of General Greene. Congress

presented him with a medal for services in the battle of Eutaw Springs, and North and South

Carolina and Georgia made him valuable grants

of property. He removed to the estate of Mul¬

berry Grove, on the Savannah River, Georgia,

where he died of sunstroke. Consult G. W.

Greene, (Life of Nathanael Greene) (1867-71) ;

F. V. Greene, (General Nathanael Greene,*

(in (Great Commanders,* 1893) ; McCrady,

(History of South Carolina in the Revolution

(1902).

GREENE, Nathaniel, American journalist:

b. Boscawen, N. H., 20 May 1797; d. Boston,

Mass., 29 Nov. 1877. At 12 he entered the

office of the New Hampshire Patriot , published at Concord, and at 15 became editor of the

Concord Gazette. After editing papers at Ports¬

mouth, N. H.', and Haverhill, Mass., he re¬

moved to Boston, where he established a new

Democratic paper known as the Boston States¬

man, and published semi-weekly, its first appear¬

ance being on 6 Feb. 1821. During the adminis¬

tration of J. Q. Adams it was opposed to the almost unanimous sentiment of the city and

State ; but in 1829, when the general govern¬

ment passed into the hands of the Democratic

party, President Jackson appointed Greene post¬

master of Boston. He held the office for 12

years without interruption, and, although re¬

moved in 1841, was reappointed to it by Presi¬

dent Tyler in 1844, and held it until 1849. In 1836 he translated a (History of Italy* from the Italian of Sforzozi, which was followed by the translation of two volumes of (Tales from the

German* (1837). In 1843 he published (Tales

and Sketches from the French, German and

Italian.)

GREENE, Robert, English writer : b. Nor¬

wich, 1558?; d. London, 3 Sept. 1592. The

greater part of his career is conjectured from his more or less autobiographical novels and

pamphlets. He entered Saint John's College,

Cambridge, in 1575, and took his B.A. in 1578, 430

Already in his college years, perhaps earlier,

he had entered heartily into the dissipation for which he was notorious, though perhaps his

own record of himself and that left by his

enemy Gabriel Harvey, may both be exagger¬

ated. Upon leaving college he seems to have

traveled extensively abroad, learning, from his

own account, far more evil than good. Shortly

after his return to England he heard a sermon in Saint Andrew's church, Norwich, which

strongly moved him to repentance, but he soon

recovered his usual recklessness. The incident,

however true, is characteristic of him ; his ex¬

cesses alternated with highly emotional con¬

fessions of penitence, which were probably quite sincere. The original fineness of his spirit was little harmed by his wild courses; his writing throughout is remarkably pure-minded. In

1580 'Mamilia,* his first novel, was registered; it was published three years later. It seems

that he was then studying medicine at Cam¬

bridge, where he took his M.A. in 1583.

Within two years afterward he married a

woman of good family. After their one child

was born, Greene deserted her and gave him¬

self up to a wild life in London. It has been pointed out that the character of the patient, deserted wife recurs through his writings, as

though the woman he had wronged was always

in his mind.

Greene's first occupation in London was the

writing of prose romances, varying between

the type of Sidney's (Arcadia) and Lyly's

ˆuphues.* His success in this kind of writing

was immediate. He had a better narrative

faculty than either Sidney or Lyly, and in

addition to an unusual facility in composition

he had something of the journalist's skill in

finding the interest of the moment. Before 1590

he had written (Penelope's Web,* (Euphues,

his Censure to Philautus,* <Alcida,) (Greene's

Metamorphosis, > (Perimedes the Blacksmith,*

'Orpharion,* (Pandosto,* (The Spanish Mas—

querado,* <Menaphon) and (Tullies Love.* He

had also made many good friends. Nash he

had known before; now he met Lodge, and

probably Marlowe. But at the same time he

was living a strangely profligate life, among

thieves and outcasts, his special comrade being their chief, Ball, who ended his career at Ty¬

burn. Ball's sister was Greene's mistress, the

mother of his son Fortunatus.

In 1590 appeared (The Cobbler of Canter¬

bury, } a collection of six coarse tales, ascribed to Greene. Greene repudiated the book in a

pamphlet, (Greene's Apology,* announcing his

intention to write no more such romances as

might make him seem the likely author of (The Cobbler.* As further expressions of this char¬

acteristic repentant mood appeared in the same

year his (Mourning Garment* and (Never Too

Late,* and in 1591 (Farewell to FollieP Within the next year he wrote his five pamphlets on

<(cosenage® or ˆconey-catching® — descriptions of

the lives and methods of thieves and cutpurses; for his material he drew on his own experi¬

ence and observation, and the pamphlets present pictures of astonishing realism. His old com¬

panions, whom he had now turned on, are said

to have tried to kill him.

In a satire on the social evils of the times, (A Quip for an Upstart Courtier * (1592),

Greene took occasion to insult Gabriel Harvey

and his two brothers, one of whom, Richard,

in a pamphlet on the Martin Marprelate Con¬

troversy, had spoken harshly of Greene and his friends. The wrath of the Harveys was turned

upon Greene, and pursued him even after his

death, in Gabriel Harvey's (Four Letters and

Certain Sonnets especially touching Robert

Greene) — a cruel account of Greene and of his last hours.

The first play of Greene's, according to the

most recent scholarship, was (Alphonsus,* about

1591, an imitation of Marlowe's <Tamburlaine) ;

the second was probably the (Looking Glass for London and England, * in which some of the

material of the ˆconey-catching®, pamphlets is

reflected. Before 1592 he had written the Or¬

lando FuriosoP (Friar Bacon and Friar Bun—

gayP and (James IV of Scotland, * probably in

that order.

At the end of the year 1592 Greene fell ill, and with death at hand his better nature reas¬

serted itself. On his deathbed he wrote or com¬

pleted his (Groatsworth of Wit Bought with a

Million of Repentence) and (The Repentence

of Robert GreeneP which were published shortly

after his death. His affecting letter to his wife, whom he now remembered ; the pathetic squalor

of his death scene in the shoemaker's house ; his ironical request to be crowned with bays — com¬

plete one of the romances of literary biography.

Greene is an important figure in the history

of the English novel, drama and lyric. His

amorous romances are in the Euphuistic style

and their subject matter is Arcadian; but

Greene's vital interest in life at first hand and his humor tend to humanize the artificial man¬

ner and to bring the content of the stories out of the pastoral glamour into a natural world.

The pastoral habit of beauty is perilously near shipwreck in the passage in <Menaphon> where

the shepherd and his jealous mistress, Pesana,

begin to quarrel with true rustic energy and

frankness; and the same genius for realism

found its opportunity in the later <(coney-catching® pamphlets, which, though formless, prac¬

tically have the interest of the picaresque tale.

The delicacy of his feminine characters, how¬

ever, proves Greene's sympathy with the courtly world of beauty that his realistic power helped to supplant.

Greene's dramatic work, with the exception

of (Friar Bacon and Friar Bungay> and (James

IV of Scotland,* is unimportant, but in the

first of these better known plays he is clearly a forerunner of Shakespeare ; as in the ro¬

mances he represents a transition from the ser¬

ious drama, religious or heroic, to a realistic mingling of moods and themes ; and his country folk belong to England, not to Arcadia.

His real fame rests on the lyrics in the

romances. These songs, like those in the (Ar¬

cadiaˆ all highly wrought, are quite without

Sidney's pedantry; they are at times stately, as in ((Doron's Description of Samela,® or pathetic, as in <(Sephestia's Song to Her Child,® or met¬

rically ingenious, as in Menaphon's song, "Some Say Love® ; but they all have a certain silvery music, a tone of dignity without heaviness,

which in its peculiar quality is found only in Greene. Lodge's lyrics are the only examples

that can be compared with his. In Rosalind'

the famous (<Love in My Bosom Like a Bee® is perhaps smoother than anything in Greene ; and

"Rosalind's Description® is the best example

of Lodge's rich, pictorial coloring. But Lodge's GREENE — GREENHOUSE

art, though finer, is less directly human than Greene, whose lyrics, like the account of his

career, stir one with a sense of the actual man.

Bibliography. — The best complete edition is

that by Grosart, (The Huth Library* ; the best edition of the plays and poems is that by Churton Collins (1905). For biography and criti¬

cism consult 'Introductions* to above and the

work by T. H. Dickinson (1909).

John Erskine,

Professor of English, Columbia University.

GREENE, Samuel Dana, American naval

commander: b. Cumberland, Md., 11 Feb. 1840;

d. Portsmouth, N. H., 11 Dec. 1884. Gradu¬

ated at the Naval Academy in 1859, he volun¬

teered in January 1862 to serve as executive

officer of the Monitor , whose capabilities were then untested, and during the engagement of

the Monitor with the Confederate ram Merrimac in Hampton Roads, he commanded the

vessel on account of an accident to Captain

Worden, his superior. After the war he was a

professor at the Naval Academy for 10 years.

GREENE, Sarah Pratt McLean, Amer¬

ican novelist: b. Simsbury, Conn., 3 July 1856.

She was educated at Mount Holyoke, Mass.,

and for several years taught school in Plymouth, Mass. In 1887 she was married to F. L. Greene.

She has published (Cape Cod Folks) ; ‘Tow—

head, the Story of a GirP (1884) ; ‘Lastchance Junction) (1889) ; ‘Leon Pontifex* (1897) ;

‘The Moral Imbeciles) (1898); (Vesty of the

Basins* (1900); ‘Flood Tide> (1901); Wins¬

low Plain> (1902) ; ‘Deacon Lysander> (1904) ; ‘Power Lot* (1907), and numerous short stor¬

ies in Harper’s Magazine.

GREENE, William Batchelder, American

author : b. Haverhill, Mass., 1797 ; d. 1877. He received his education at West Point, served

in the Florida War and then prepared himself

for the Unitarian ministry at the Harvard Di¬

vinity School. He rose to the rank of briga¬

dier general of volunteers during the Civil War, resigning in 1862. He wrote (The Sovereignty

of the People) (1863) ; ‘Transcendentalism*

(1870); (Theory of Calculus) (1870); Social¬

istic, Communistic, Mutualistic and Financial

Fragments) (1875).

GREENFIELD, Ind., city, county-seat of

Hancock County, on the Pittsburgh, Cincinnati,

Chicago and Saint Louis Railroad, 20 miles east of Indianapolis. It has foundries, machine

shops and manufactures of bricks, jars, bottles, glass, paper, stoves, *etc.* It has a fine high school building and a public library. Green¬

field was incorporated in 1876. The govern¬

ment is vested in a council and mayor elected for a term of four years. The waterworks and

electric-lighting plants are owned by the city.

It is the birthplace of James Whitcomb Riley

(q.v.). Pop. 4.448.

GREENFIELD, Mass., town, county-seat

of Franklin County; on the Connecticut River,

the Boston and Maine Railroad; about 34 miles

north of Springfield. Greenfield was once . a

part of Deerfield, but in 1738 it petitioned for a separation which was not granted until 1743.

Greenfield and vicinity has many famous his¬

toric associations. The massacre of Deerfield

occurred in the winter of 1704. The town has

fine public schools, libraries and parks and it is the centre of trade for Franklin County

towns. Assessed valuation, $14,000,000; savings

bank deposits, $10,000,000; trust company and

national bank with $3,000,000 deposits. The

chief manufactures are machinery, cutlery,

paper, boxes, woodenware, bricks, toys, chil¬

dren's carriages. Pop. (1920) 15,462.

GREENFIELD, Ohio, a city of Highland

County, on Paint Creek, 75 miles northeast of

Cincinnati, on the Baltimore and Ohio, South¬

western and the Detroit, Toledo and Ironton

railroads. The principal manufactures are

sweat collar pads for horses, show cases, cans of various kinds and woodenware novelties.

It received its charter in 1850, about 50 years after its foundation. It has a high school

building and is governed by mayor and city

council. Pop. 4,500.

GREENFINCH, or GREENLINNET,

one of the most common and beautiful of

European finches (Ligurinus chloris). The

general color of the male is olive-green; pri¬

maries grayish-black, with bright yellow edges;

under parts yellow; female brownish. Al¬

though its song is uninteresting it is a favorite cage-bird in Germany. In Texas a greenish

towhee bunting is locally called “green-finch.**

GREENHALGE, Frederick Thomas,

American statesman: b. Clitheroe, England,

1842; d. Boston, 1896. When he was quite

young his parents emigrated to the United

States and after studying for a few years at

Harvard University he joined the Commissary

Department of the Federal Army at Newbern,

N. C. On his return north he studied law and was admitted to the bar in 1865. In 1879 he

became mayor of Lowell and served for two

terms. He sat in the Massachusetts House of

Representatives in 1884 and became a United

States Congressman in 1888. His last office

was that of governor of Massachusetts, which

he held from 1894-96. Consult Nesmith, ‘The

Life and Works of Frederick Greenhalge*

(Boston 1897).

GREENHILL, Sir George, English math¬

ematician and physicist : b. 1847. He was pro¬

fessor of mathematics in Artillery College,

Woolwich; a member of the Aeronautical com¬

mittee and associate member of the ordnance

committee. He has published differential

and Integral Calculus with Applications >

(1885); applications of the Elliptic Function >

(1892) ; ‘Hydrostatics* (1894) ; ‘Notes on

Dynamics* (1908); ‘Report 19, Theory of a

Stream Line with Application to an Aeroplane*

(1910) ; ‘Dynamics of Mechanical Flight*

(1912) ; ‘Report 146, Gyroscopic Theory*

(1914).

GREENHOUSE. In America the term

greenhouse is loosely applied to all glass struc¬

tures, except cold frames and hot beds, in

which plants are grown. In Great Britain it

is almost limited to those buildings in which

living plants that do not demand high temper¬

ature are stored or grown. Etymologically and

as originally used the. word included all struc¬

tures, even storage “pits,** in which plants were placed to be kept alive or protected during

winter without the intention that they should

grow.

The modern greenhouse is the product of a

long evolution from two sources. It appears

to have started on the one hand as a window

garden in the human residence, the first step

toward the greenhouse as now known being

an enlargement of the glass area. Next came

the extension of the window into an oriel or a (<bay.® When the glass roof was added the

greenhouse may be said to have fairly begun

its pedigree. The other line of descent traces its course back to the European practice of

growing fruit trees and vines against brick or stone walls, partly as a protection against incle¬

ment weather and partly because such walls

absorb sun heat and thus help to hasten or

insure the maturity or higher quality of the

fruit. As far back as the 16th century this

was a popular practice upon the estates of the wealthy. In 1699 Nicholas Facio Duilhier, a

mathematician, wrote a book entitled (Fruit

Walls Improved J in which he contended that

by tilting the walls at right angles to the sun the heat would be increased. In 1724, however, Stephen Switzer proved and wrote that such

walls gave no better results than ordinary

perpendicular ones. Over some of the walls

at Belvoir Castle glass sash were placed in

front of the walls and over the vines as extra protection. Heating flues were built behind

the walls to supply additional warmth. The

success of this experiment led Switzer to build walls with glass fronts

three and onehalf feet away as described and pictured in (The Prac¬

tical Fruit Gardener) (1731). Switzer's claim

that the introduction of these structures led to improvement of glassing and forcing grapes

is more than supported by Johnson, who writes

((History of Gardening*) that the use of such

walls <(led to the first erection of a regular forcing structure of which we have an ac¬

count.® From the covered wall the first step

toward a ((greenhouse® was the <(lean-to® and

from that by many gradations to the modern

forms.

In America improvements in greenhouse

construction began to appear about 1800. This

was mainly due to the necessity of better caring for the plants imported from foreign countries

by John Bartram and his followers, to the

improvements in heating appliances and to the

general betterment of architecture. However,

in the light of the present these improvements are crude, cumbersome and even ludicrous ; for

instance, the device described and illustrated

by Loudon ((Treatise on Several Improvements

Recently Made in Hot Houses,) 1805), whereby

fresh air was to be forced into the greenhouse by means of a bellows!

The principal types of greenhouses may be

described according to their function as fol¬

lows : The conservatory, in which plants that

have been grown elsewhere (generally in other

greenhouses) are brought for display when they

have reached perfection ; the forcing house in

which plants, especially certain vegetables are

grown out of their normal season ; the warmhouse, or as known in England the <(stovehouse,® in which tropical and other heat-loving plants are grown ; and the propagating-house,

in which plants are grown from seeds, cuttings, layers, grafts, *etc.* The term <(stovehouse® is

derived from the original practise of heating

such a structure by means of a brick stove.

Hence it applies to the warmest part of the

greenhouse. In America the term warmhouse

is in general use though among foreign—

trained gardeners the term ((stove® used alone

is frequently heard.

Greenhouses may also be classified accord¬

ing to their forms of which the following are the most popular: The lean-to, which consists

of one low and one high wall with one slope

of glass connecting them; the even-span, which

consists of walls of even height and two roofs of equal length and slope; uneven span, in

which the walls may be of unequal height but

one of the roofs of both different length and different pitch from the other; the curvilinear, in which the walls are of equal height, the roofs of even pitch but curved more or less. The

first three are all used in commercial structures, the last, because expensive to erect and main¬

tain, only for the pleasure of the owners.

As now constructed commercial greenhouses

are built upon severely plain and simple lines.

Dimensions vary considerably, but common

ranges vary from 10 to 80 or more feet wide, 50 to 500 feet long and five to seven feet high at the walls inside. Great stress is laid upon the slope of the glass so as to take advantage of the inclination of the sun at various times of the year.

Until the closing quarter of the last cen¬

tury wood was extensively used for the frame¬

work, walls and many other parts of green¬

houses. Objections to it are that in roof parts it is so bulky that it casts too heavy shade in walls and trenches, it quickly decays because

of the excessive moisture and that for this rea¬

son it demands frequent repair and renewal.

Objections to metal in roofs are its excessive contraction and expansion with changes of

temperature and the consequent breakage of

glass. Most modern greenhouses therefore

combine concrete, brick or stone walls with

metal posts, beams and purlins with wooden

rafters upon which the glass rests. The most

favored because most durable woods are South¬

ern States cypress and California redwood. To

increase durability, toˆ lessen damage to glass and leakage into the interior, houses are gen¬

erally built nowadays singly, that is, with an alley between rather than attached from end

to end. This plan also favors drainage and con¬

venience in filling the houses with soil or in emptying them. Thus the increased cost of

walls is offset by the reduced cost of mainte¬

nance. Where greenhouses are built <(ridge—

and-furrow® style the gutters are generally made of metal and warmed from below by hot water

or steam pipes to melt the snow and ice quickly and thus reduce or prevent leakage and damage.

Great care is exercised by greenhouse

builders in selecting glass for the roof. Three qualities are sought for; least obstruction to

sunlight, strength to withstand wind, storm

and especially hail and freedom from defects

that tend to form lenses and thus burn the

foliage of plants grown beneath. Clear white

single thick glass, while it allows 60 to 70 per cent of light to pass through is too frail to be safe. It is also dulled by exposure to the air.

Common green glass (so called because green

in cross section) allows only 52 to 55 per cent light passage, but it does not readily tarnish.

Double thick green glass permits 50 to 52 per cent 9f light to pass. Because double thick

glass is stronger and because its chemical form¬

ation is such that it is little affected by the atmosphere it is considered best for green¬

house roofs.

The visible defects such as astones, bubbles

GREENHOUSE FLOWERING PLANTS

. Blue Passion-flower (P. ccerulea). 2. Pomegranate, with opened fruit and flower. 3. An Orchid (Cattleya). 4. Abutilon (A. insigne). 5. Monkshood (Tropaflium).

6. Anthurium (A. scherzerianum). 7. Begonia (B. bolivensis). 8. Pitcairnia (P. furfuracea). 9. Ladies' Slipper (Cypripedium venustum).

-

and blisters® are popularly believed to produce burning; but this is erroneous. J. C. Blair in 1895, after careful experiment, proved this a

fallacy. (Bulletin 95, Cornell University Ag¬

ricultural Experiment Station), Bubbles and

blisters are generally thinner in the centre than at the circumference, hence they form concave,

not convex, lenses and thus they actually spread the light rays instead of focusing them. While <(knots® and (<sand stones® may be convex lenses their foci are almost invariably very close to the glass — a few inches — hence they are pow¬

erless to damage plants several feet below. The real cause of burning damage is the prismatic

or lens-like effect due to variation in thickness in the pane as a whole or in large part thus focusing the light rays at 5 to 30 or more

feet below the glass. Such defects may be

found in all grades of glass, domestic or for¬

eign alike. They can rarely be detected by the eye but may be easily discovered by testing in sunlight or by a micrometer caliper.

Ample ventilation is essential to success in

growing greenhouse crops. Usually about one-tenth of the roof is arranged to be opened at the top. It is generally desirable also to have ventilation at the sides, more especially for

summer use when fresh air is especially needed not only for the health of the plants but for the comfort of the workmen. It is highly desirable in large houses to provide ventilators on each side of the ridge, each set opening by independ¬

ent apparatus. This will allow of ventilating

on the lea side during stormy or windy weather.

It is also well to have separate lifting apparatus for each 75 or 100 linear feet of ventilators, not only to make for ease of manipulation but to allow of ventilating one part independently

of the others. Preference is given to the plan of hingeing the

ventilators to the ridge pole

so as to open from their lower sides, rather

than to the plan of hingeing them below so

as to open at the peak. By the former method the air enters with less draft and rain and snow are kept out better than by the latter plan.

Five systems of heating greenhouses have

been in use. The oldest and simplest is the

flue. Except in the propagation of sweet potato plants and in very small places where fuel and labor are cheap it has given place to one of the other four. Hot water under low pressure or

in the open tank system is still used in small establishments such as private conservatories;

water under high pressure or in practically

closed circuits, as in larger but not the largest commercial places ; low pressure steam or the

so called vacuum or vapor system, more or less adaptable to any sized establishment; and high

pressure steam, most popular in the very large greenhouse ventures. Low pressure hot water

employs large cast iron pipes (<leaded® at the joints. It is too cumbersome and too limited

in its adaptability for commercial practices.

In the other three systems smaller sized wrought iron pipes are screwed together and carried

wherever desired beneath or above the benches.

All three of these systems when properly in¬

stalled give good results. Which one shall

be chosen is largely a matter of individual

establishment and personal requirement. The

open tank hot water system is more elastic

than the others in its adaptability to general lay-outs and in the ease with which it may

be managed. Once started, its operation is

practically automatic for periods of 6 to 10

hours without attention. High pressure water

and the steam systems demand much more con¬

stant attention because the temperatures rise

and fall far more quickly.

While the principles of greenhouse con¬

struction have been made the study of skilled

engineers and architects who confine their ef¬

forts to this class of work greenhouse manage¬

ment has from the beginning until the present

been almost wholly by rule of thumb. Thus

progress has been slower than had fundamental

principles been understood and applied. These

principles naturally divide themselves into two

groups: those that apply to the plants them¬

selves and those that apply to the management

of the greenhouse.

Among those principles of the former group

the following are perhaps the more important:

(1) Every species of plant has its own season of flowering. Most failures to secure flowers

are due to ignorance or disregard of this prin¬

ciple. By knowing the natural season of bloom

and by supplying conditions as nearly natural

as possible to the plant, success is almost sure to follow. The number of plants that can be

made to blossom at abnormal times are few

as compared with the whole number of species

grown in greenhouses. (2) Most plants need

a period of rest. This natural demand is due

to the natural upbringing of each, due usually to the approach of weather too cold, too hot

or too dry for the plant to continue action.

Plants that do not need such rest are the ex¬

ception, not the rule. (3) Most of the plant's growth should have been made before bloom

should be expected. In other words the vege¬

table cycle must be complete or at least far

advanced before the reproductive one should

be looked for. _ (4) A check in vegetative

growth, without impairment of health, induces

blooming and fruitfulness. To illustrate: by

frequent shifting of plants from smaller to

larger flower pots the blooming time may be

delayed; but by stopping the shifting when the plants have attained the desired size flowers

will soon appear. Once started into bloom

plant food may be given as freely as the plant may need it. (5) The plant's habitat is a

reliable index of the treatment needed. The

more nearly the grower can imitate the natural home of the plant the more likely is he to

succeed. (6) The best method of propagation

must be learned for each species; usually, how¬

ever, quicker results and sturdier plants will

develop from cuttings than from seeds.

Among those principles that relate to the

greenhouse the following take lead: (1) As

nearly as possible conditions in the greenhouse should imitate a natural day — light full and continuous, temperature waxing toward and

waning from midday with a minimum night

registration of 10 to 15 degrees below the shade maximum during the day. (2) Each plant

must receive individual attention. Space is too costly to slight anything. (3) Prevent damage

by foes — insects, fungi, bacteria, worms, *etc.*

Preventive sanitation favors success. (4) High

temperature and ample water make for rapid,

sappy growth. Hence greater care is needed to

prevent injury to the plants. Disease is more

likely to attack such plants than those grown

under lower temperature and with less water.

(5) In cloudy weather plants naturally grow

slowly. Therefore in the greenhouse reduce

heat and water and give more ventilation. (6)

Water only when the plants need watering, but

water copiously then. An occasional drench is far better than a frequent dribble because it wets the whole of the soil and the plants get some good of it. This they do not get when only

the surface is moistened. (7) Water in the

greenhouse as the temperature rises, never as it falls. Watering tends to cool the plants and

the atmosphere, hence may work damage when

the temperature is declining. (8) Water early

enough in the day so the foliage will be dry before evening. (9) Water little if any in dull and muggy weather. (10) Use soil well sup¬

plied with sand and vegetable matter. These

materials tend to counteract the puddling effect of watering soils in which there is clay. (11) Ventilate both to lower temperature and reduce

moisture in the greenhouse. This is more im¬

portant than the admission of Afresh® air,

enough of which enters through cracks and

doors. (12) When admitting air avoid drafts

especially of cold air. Hence have ventilators

as far from the plants as possible and allow

the air to enter through numerous small open¬

ings rather than fewer large ones. (13) Pro¬

vide shade in summer to reduce both heat and

light. This will tend to prevent spindly de¬

velopment of the plants.

Bibliography. — Dean, (System of Green¬

house Heating) (1901); Hatfield, (Greenhouses

for Amateur _ Growers5 (1898); Herendeen,

Competition in Greenhouse Heating) (13 es¬

says, 1893), and (Greenhouse Management

(1898) ; Rexford, (The Amateur's Greenhouse)

(1900); Taft, greenhouse Construction

(1893); Wright, (Greenhouses, their Con¬

struction and Equipment (1917).

M. G. Kains,

Horticultural Consultant.

GREENHOUSE INSECTS. Plants cul¬

tivated under glass are as subject to insect dep¬

redations as are those growing in the garden

and orchard, unless the greatest care is exer¬

cised. In addition to many species of foreign

origin, such as numerous kinds of scale-insects (q.v.) and aphides . which are constantly being

imported with exotic plants, we have native in¬

sects firmly established as indoor pests. One of the commonest and most destructive is the

black scale (Lecanium olece), which is also a pest of importance in groves of citrus fruits

and olives. The related hemispherical scale

(Lecanium hemisphcericum) is still more dis¬

tinctively a greenhouse pest; and several in¬

jurious orchard scales and mealy bugs (q.v.)

are likely at any time to become so, but all may be controlled by fumigation with hydro¬

cyanic-acid gas. The “white fly® (q.v.), which

name, as used by florists, covers a number of species of Aleyrodes, is to be similarly treated.

Many plants grown artificially are attacked

also by omnivorous greenhouse pests, such as

the red spider (Tetranychus telarius) and the greenhouse leaf-tyer, and by general field and

garden pests such as cutworms, wireworms

and white grubs. The greenhouse leaf-tyer

(Phlyctcenia rubigalis) is less affected by fumi¬

gation than most insects, and, with other cater¬

pillars, can be successfully controlled only by hand-picking, clipping off and destroying the

affected leaves, and by spraying with arsenical mixtures.

Roses are peculiarly subject to insect injury,

and there are several specific indoor rose pests, such as Fuller's rose beetle (Aramiges fallen), which also attacks azaleas, begonias, lilies, prim¬

rose, geranium, canna and others. It appears

to be nearly immune to insecticides in the adult condition ; one must, therefore, employ hand

methods, collecting and destroying the beetles,

preferably in November and December, when

they congregate on various plants. Injured

plants should be pulled out, and the larvae about them destroyed with kerosene emulsion or bi¬

sulphide of carbon. Numerous leaf-rollers, bed—

worms and leaf-tyers (qq.v.) are very injuri¬

ous to the rose, by eating into the buds just before blossoming. Roses are seriously in¬

jured at times by gall-flies and by the rose-scale (Aulacaspis rosce), and other scale insects.

Violets cultivated under glass are much in¬

jured by insect pests, principally by the black or brown aphis (Rhopalosiphon violce), violet

gall-fly (Diplosis violicola), violet saw-fly

(Emphytus canadensis) , and the red spider,

and greenhouse leaf-tyer. The black aphis is

still restricted and dependent on commerce for

carriage from one greenhouse to another, but

has caused losses of thousands of dollars to

single firms. It may be controlled by fumiga¬

tion with hydrocyanic-acid gas, which also de¬

stroys the saw-fly and the gall-fly (properly a gall-gnat, q.v.) which attacks the leaves while they are young, the larva or maggot developing in folds, incorrectly termed “galls.® Tobacco

preparations and bubach insect-powder are also

useful against these minute pests.

GREENLAND. The most northerly of the

Arctic colonies of Denmark, a country unique

in several respects. It is the largest known

island, after the island continent of Australia, the most northerly land of the earth, the only ice-capped region occupied by man, and has the northernmost settlements of the world.

Area and Physiography. — Its area is not

accurately known, but probably approximates

750,000 square miles, estimates varying from

512,000 to 825,000. It extends over 1,600 miles north and south, from Cape Farewell in latitude 59° 45’ N. to Cape Jesup, about 83° 35’ N.

latitude, and about 900 miles in width from east to west near the 78th parallel. The country is a high plateau, generally ranging from 2,000 to 6,000 feet in elevation, while the dividing cen¬

tral crest varies from 5,000 to 9,000 feet. It is covered, except at the very edge of the sur¬

rounding seas, by an unbroken ice-cap of glacier, known usually as the inland-ice, which averages a thickness of a thousand feet or more. Here

and there above the surface of the ice-cap

emerge ice-free peaks, among which the highest

recorded are Tiningertok, near Cape Farewell,

7,340 feet; Petermann, near Franz Josef fiord,

about 8,500 feet; and Forel, near the centre of South Greenland, 9,050 feet. The continuity of

the inland-ice has been determined by the jour¬

neys and crossings of Nordenskiold, 1870 and

1883; Jensen, 1879; Peary, 1886 and 1892; Nan¬

sen, 1888; Garde, 1892; Mylius-Erichsen, 1902;

Quervain, 1913; and Koch, 1913. Vast ice—

streams flow continuously from the inland-ice

into the adjacent seas, largely through the

fiords, of which Greenland presents the most

extensive and most remarkable system in the

world. These fiords number hundreds in all,

have very deep water and penetrate the country GREENLAND

far inland. The diverging fiords of Scoresby

Sound terminate 163 miles from the ocean. The

most important fiords on the southeast coast are Franz Josef and King Oscar; on the north¬

east Danmark; on the southwest, Godthaab,

Uininak, Jacobshaven, Torsukatak and Inglefield ; and on the northwest facing the Arctic Ocean, Peterman, Sherard, Osborn and De Long

At intermediate points between the fiords the

inland-ice flows directly into the sea at hun¬

dreds of places. On the east coast Garde dis¬

covered more than 200 such streams, where the

precipitous sea-face of the glacier was more

than a mile wide. In Kane Sea, on the north¬

west, Humboldt glacier presents some 60 miles

of sea-front. The only ice-free regions are

coast lowlands and the outlying islands. Such

spaces rarely exceed 50 miles in width between sea and ice, and usually are barren wastes.

Climate. — The temperatures are arctic,

frosts occurring occasionally over the whole

country in midsummer. Summer temperatures

vary little from Cape Farewell to the Arctic

Ocean, but the absence of the sun — lasting

four months in the extreme north — causes

larger differences in winter. The three warmest and coldest months show average temperatures

as follows: Ivigtut, 61° N., summer, 48, win¬

ter, 21 degrees ; Godthaad, 64° N., 39 and 12

degrees; Upernivik, 73° N., 38 and — 4 degrees; Thank God Harbor, 82° N. (deduced from Fort

Conger) summer, 35, winter, — 37 degrees.

Icebergs. — The great fiords have very deep

water, long shore-lines, and precipitous sides,

often sheer and at times as high as 4,000 feet.

Such conditions facilitate the detachment, or

calving, of great bergs from the parent mass.

Many thousands of icebergs are thus formed

each year, the larger number on the east coast, where, however, the set of the Spitzbergen cur¬

rent keeps most of them stationary. Others are carried by prevailing currents around Cape

Farewell, and thence north into Melville Bay.

From these waters the icebergs are finally sent south by the current along the west water, and thus furnish the great ice fields of the Atlantic, off Labrador and Newfoundland. The most

astonishing of the iceberg producers are the

Torsukatak and Jacobshaven fiords of south¬

western Greenland. The latter fiord was es¬

timated by Rink (author of (Danish Greenland*)

to have an average daily outflow of between

8,000,000 and 15,000,000 cubic meters of ice.

Icebergs as long as 10 miles or more have been reported from Melville Bay, with heights of

other bergs ranging from 50 to 250 feet above the water. Unlike the adjacent island, Iceland, Greenland has no volcanoes. Geysers are also

absent, the hottest springs being those on

Anortok Island, in extreme south Greenland,

60° 29’ N. latitude, where the highest tempera¬

ture of the water is 108 degrees.

Fauna and Flora. — The animal and plant

life of Greenland pertain rather to American

than to European forms. The reindeer, white

hare, Arctic fox, ermine and polar bear are

generally distributed, while the wolf and musk¬

ox are seen occasionally in northern Greenland.

Hagerup, a Danish ornithologist, records 139

species of birds in Greenland, of which only

61 species are denizens of the country. Gunnar Anderson places the Greenlandish floral species

at 286, only 60 per cent of the recorded species of Iceland.

Agriculture and Industries — Short sum¬

mers and severe climate forbid agriculture, ex¬

cept in gardens of Danish officials, where are raised with difficulty carrots, lettuce and tur¬

nips. The only industries are the domestic cur¬

ing of skins and rendering of oil from the sea-game killed by the natives.

Government. — Danish authority was for¬

merly limited to the southern portions of Green¬

land. In 1917, however, the United States

ceded, in part payment for the Danish West

Indies, its right to any and all parts of Green¬

land acquired through discovery or temporary

occupation. Under this treaty Denmark now

dominates all Greenland. Its royal officers con¬

trol the administration, religion and education

of the native population. Greenland is divided

for administration into the North and the South Inspectorates, each being governed by a Royal

Inspector appointed by the King of Denmark.

Besides exercising magisterial powers, the In¬

spectors supervise the agents of the Royal

Greenland Trade Commission, the Danish and

the Moravian missions, and subserve the in¬

terests of the Eskimo. The outcome of this

efficient administration has been extraordinarily successful. The Danish Eskimo form one of

the few subject races that have passed under

the domination of civilized nations without suf¬

fering decadence and' gradual extinction. In

late years the field of administration has been considerably extended through the inclusion

under Danish control of the widely separated

Eskimo of the Angmagsalik district, in 65° 37'

North latitude, on the east coast, and of the Etah natives between the parallels of 76 and

78 degrees on the west coast. The future wel¬

fare of these isolated communities is thus

assured.

Home government exists among the Eskimo

in the form of municipal councils, which are

organized under the regulations formulated in

1872 by the Danish Minister of Home Affairs.

The local priest presides, and in the proportion of one to 120 natives Eskimo members are elected from the providers (skilled hunters). They

adjust minor offenses and relieve distress

among the old and suffering through distribu¬

tion of the Greenland Fund, which is formed by allotment of 20 per cent of all sums paid for domestic produce by the Royal Greenland Trade

Commission. The capital of the North Green¬

land Inspectorate is Godhaven, on Disco Island, the chief settlement in the colony, and that of the South Inspectorate, Godthaab.

Religion and Education. — The Minister

of Public Worship of Denmark appoints and

pays the officials of the Danish Mission, while the Moravian Mission is maintained by chari¬

table contributions. Religion and education are

efficiently fostered by these devoted mission¬

aries.

Literature. — Eskimo is the prevalent speech.

For more than 60 years considerable native

literature has been published in Greenland,

written and printed locally in the dialect. While the publications pertain largely to biblical sub¬

jects, hymns, psalms and catechisms, yet they

include biography, travel, stories, etc., of popu¬

lar interest. They are often illustrated litho¬

graphically by native artists. Since 1861 an

Eskimo periodical has been issued at somewhat

irregular intervals.

Commerce and Industry. — The monopoly

of the Royal Greenland Trade Commission has existed since 1774. It controls all trade and fixes the price of both domestic products and imported articles. No foreigner can reside in the country, or trade with its inhabitants, ex¬ cept by special permission. Greenland . is divided into trade districts, each under a chief administrator — often called governor — with assistants at selected outposts. In 1914 there were exported products to the value of about $260,000. Seal skins and oils formed 70 per cent of the values, and salted fish 12 per cent. The imports from Denmark that year were mostly provisions and clothing, valued at about $140,000. The largest output of cryolite in the world is that of Ivigtut, which is controlled by an American Company under license. In 1915, 4,569 tons of cryolite, valued at $10,000, were shipped to the United States. Other minerals are found in uneconomical deposits. Coal of inferior quality is visible in many places, but is rarely used for fuel (peat being more eco¬ nomical) owing to difficulty of transporta¬ tion.

Population. — Except a few hundred Danish

officials, the population is entirely Eskimo,

whose origin is unknown. The inhabited

litorals are Danish Greenland, along the south¬

west coast between Cape Farewell and

Tasiausak, 78.6° N. latitude; the Angmagsalik

district, at the Arctic circle, east coast ; and the Smith Sound coast, between Cape York and

Etah. The Eskimo have increased steadily

since 1840 when they numbered 8,128. By the

last census, 1 Oct. 1911, the population regis¬

tered 13,459, distributed as follows : North

Inspectorate, 102 Europeans, 5,858 Eskimos ;

South Inspectorate, 280 Europeans, 6,652

Eskimos; Angmagsalik, 10 Europeans, 431

Eskimos.. These Eskimos live by seal-hunting,

are religious and educated. The isolated Etah

natives, not included above, number about 250.

History and Exploration. — Greenland was

discovered in the latter part of the 10th cen¬

tury by the Norsemen, who settled the extreme

southern portions. The colonies vanished,

their fate being one of the mysteries of history.

In the course of the search for a Northwest

Passage the island was rediscovered, and its

west coasts were followed from Cape Farewell

to Hakluit Island, Smith Sound, by the voyages of John Davis, 1585-88, and of William Baffin, 1616. Hudson sighted the east coast in his voy¬

age of 1607, and occasionally it was seen by

whalers. Greenland again passed out of his¬

tory until 1721, when the foundation of Danish Greenland was laid through the appointment

by the King of Denmark of Hans Egede, a

Lutheran, as a missionary. His settlement at

Godthaab eventually led to the Moravian and

Danish Missions, to the initiation of the Royal Trade, and to the establishment of colonial

overnment. The exploration of the west coast

as been completed by expeditions during the

past 70 years as follows : Inglefield, 1852, to 78°

28’ N.; Kane, 1853-55, to 80° 35’ N. ; Hall,

1870-71, to 82° 9’ N.; Nares, 1876, to 82° 20’

N. ; Greely, 1882, to 83° 24’ N. ; Peary, 1902, to about 83° 35’, and thence southeast to about

83° N. The exploration of the east coast was

due to the Scoresbys, father and son, who re¬

constructed the cartography of east Greenland

by their explorations between latitudes 69° 30’

and 74° N. in 1817-22.

Apart from Scoresby’s preliminary work,

the east coast has been explored as follows :

Graah, 1829, from Cape Farewell to 65° N. ;

Holm and Knutsen 1884, to 66° N. ; Amdrup,

1898-1900, to 69° N. ; Ryder, 1892, 69° to 70°

27' N.; Koldewey, 1870, 70° to 77° N. ; Mylius-Erichsen, 1907, to 82° S' N. ; Koch, 1907, to 83°

N. By filling in the 300 miles of unknown

coast, Mylius-Erichsen and Koch completed the

coast survey of the great island of Greenland.

Bibliography. — (The Meddelelser om Grnland (54 vols., Copenhagen, 1876-1917) present

in full the remarkable work of Danish explora¬

tion and research, covering all phases of knowl¬

edge performed by more than 60 expeditions,

in which 150 scientists participated. Baffin,

Woyages of W. Baffin 161 2—22 > (London

1881) ; Carstensen, A. R., Two Summers in

Greenland5 (ib. 1890) ; Egede, description of

Greenland5 (London 1745) ; Crantz, (History

of Greenland> (2 vols., London 1820) ; Rink,

(Danish Greenland) (London 1877) ; Norden—

skjold, <Grnland) (Leipzig 1886) ; (Arctic

Manual5 and (Arctic Papers for the Arctic Ex¬

pedition of 1875 } (by Royal Geographical So¬

ciety, London 1875) ; Inglefield, (Summer

Search for Sir John Franklin5 (London 1853) ;

Hayes, (The Land of Desolation) (ib. 1871) ;

Kane, (Arctic Explorations> (Philadelphia

1856) ; (Manual of the Natural History, Geo¬

logy, and Physics of Greenland and Adjacent

Regions) (ib. 1875) ; Heer, (Flora Fossilia

Grnlandica) (7 vols., Zurich 1883) ; Greely,

(Three Years of Arctic Service> (New York

1885) ; Nansen, (First Crossing of Greenland5

(London 1886) ; Peary, dorthward over the

Great Ice5 (New York 1898) ; Greely, hand¬

book of Polar Discoveries5 (Boston 1910) ;

Rasmussen, <People of the Polar North5 (Phil¬

adelphia 1908) ; Nansen, (In Northern Mists5

(2 vols., New York 1911) ; Mikkelsen, (Lost in the Arctic5 (London 1913).

GREENLAND WHALE, or BOWHEAD,

the larger and more restricted of the <(right55

or whalebone whales of the genus Balcena (B .

mysticetus) , which is absolutely confined to the arctic region, reports of its occurrence on

other coasts originating in mistaking for it the almost cosmopolitan southern right whale. It

grows occasionally to a length of 70 feet, but is usually considerably less ; and is black, ex¬

cept a white patch on the under side of the

jaw. This whale may yield 275 barrels of oil, and 3,000 pounds of whalebone. It has become

comparatively rare through constant pursuit.

Its general habits agree with those of its family (Balanida) , for which see Whale.

GREENLEAF, Charles Ravenscroft,

American physician and soldier : b. Carlisle,

Pa., 1838; d. 1911. He was graduated at the

Ohio State Medical College and served in the

Civil War. He rose to the rank of assistant

surgeon-general in 1896, was retired in 1902

and .appointed brigadier-general in 1904. He

saw service in the Spanish American War in

Cuba and Porto Rico in the capacity of chief

field surgeon ; and in 1900 he accompanied

Generals Otis and MacArthur as chief surgeon

of the Division of the Philippines. He was

also professor of public and military hygiene at the University of California for a short time.

His publications include (Manual for Medical

Officers5 ; (Epitome of Examination of Re-

cruits) and (A System of Personal Identifica¬

tion > (in Buck's (Handbook).

GREENLEAF, Simon, American jurist:

b. Newburyport, Mass., 5 Dec. 1783; d. Cam¬

bridge, Mass., 6 Oct. 1853. He commenced the

practice of law in 1806 at Standish, afterward practising at Gray and Portland. He was a

reporter of the Supreme Court 1820-32 ; pro¬

fessor of law at Harvard University 1833-48,

succeeding Judge Story in the Dean professor¬

ship in 1846; and upon his resignation in 1848

was made professor emeritus. Beside nine

volumes of reports of the Maine Supreme

Court proceedings he published (Treatise on

the Law of Evidence) (1842-53) ; Principles of Freemasonry) (1820) ; Examination of the

Testimony of the Four Evangelists by the

Rules of Evidence, as administered in Courts

of Justice, with an Account of the Trial of

Jesus > (1846). He also edited Cruise's (Di¬

gest of the Laws of England respecting Real

Property* (1849-50).

GREENLINGS, a family (Hexagram -

midce) of coast-fishes allied to the rose-fishes, many species of which occur abundantly from

northern California to Bering Sea, including

several excellent and of local importance as

food-fishes. They are brilliant in color, yellow and green being prominent; are carnivorous;

and seek their food among kelp and about

rocks.

GREENMAN, Milton Jay, American

anatomist: b. North East, Pa., 1866. He was

graduated at the University of Pennsylvania in

1892 and became an instructor in biology there (1889-92) and lecturer on physiology (1892-93).

From 1893-1905 he served as assistant director

of the Wistar Institute of Anatomy at Phila¬

delphia, becoming director in the last-named

year. He was chairman of the board of di¬

rectors of the Committee on Provision for

Feeble-Minded and a member of the board of

directors of the Marine Biological Laboratory

at Woods Hole, Mass.

GREENOCK, gren'ok, Scotland, in Ren¬

frewshire, on the south shore of the Firth of Clyde, 22j4 miles by rail west-northwest of

Glasgow. The Watt Institution contains a mar¬

ble statue of Watt by Chantrey. The harbor

works date from 1707 and have cost upward

of $7,500,000. Shipbuilding has been carried on since 1760; sugar refining began in 1765 and

there are also manufactures of steam-engines,

anchors and chain cables, ropes, sailcloth, paper, wool and worsted, *etc.* Besides being the birth¬

place of James Watt (q.v.), famous because of

his work on steam-engines, of Spence the

mathematician and of Principal Caird, it has

memories of Rob Roy, John Wilson and Galt,

and contains the grave of Burns' <(Highland

Mary." Pop. about 70,000.

GREENOCKITE, or CADMIUM

BLENDE, a native sulphide of cadmium, hav¬

ing the formula CdS, and crystallizing in hemi-morphic forms belonging to the hexagonal

system. It is transparent, or nearly so, and

yellow, with a vitreous or resinous lustre. It turns carmine when heated in a closed tube,

returning to its original color upon cooling;

and it dissolves in hydrochloric acid, with

liberation of sulphuretted hydrogen. Greenoc—

kite is brittle and has -a hardness of from 3 to 3.5, and a specific gravity of about 5.0. In the United States it is found in Marion County,

Ark., in the zinc-bearing districts of south¬

western Missouri and in a zinc mine in Lehigh County, Pa.

GREENOUGH, George Bellas, English

geologist: b. London, 1778; d. 1855. He studied at Saint Peter's College, Cambridge, at Gottin¬

gen and at Freiburg, where Werner was his

teacher. In 1807 he became a Fellow of the

Royal Society, and assisted in founding the

Geological Society of London in 1807. He was

the first president of this organization (181 1—17) and served again in 1818 and 1833. He

represented Gatton in Parliament from 1807 to

1812. Among his publications are (A Critical

Examination of the First Principles of Geol¬

ogy) (1819) ; (Geological Map of England and Wales> (2d ed., 1839), and (Geological Map of

India> (1854).

GREENOUGH, Horatio, American sculp¬

tor: b. Boston, 6 Sept. 1805; d. Somerville,

Mass., 18 Dec. 1852. When he entered Harvard

at 16 he had already modeled in clay and at¬

tempted sculpture. A French sculptor named

Binon, resident in Boston, was his first master.

During his college career he enjoyed the friend¬

ship and advice of Washington Allston and pro¬

duced the design from which the present Bunker Hill monument was erected. He was graduated

in 1825 and went to Rome with letters to Thorwaldsen. He returned to Boston in 1826, and

after modeling busts of John Quincy Adams,

Chief Justice Marshall and others, again went

to Italy and established his studio in Florence.

His first commission was from James Fenimore

Cooper, for whom he executed his (Chanting

Cherubs,* suggested by a portion of one of

Raphael's pictures. This was the first orig¬

inal group from the chisel of an American

sculptor. To Cooper, also, he was indebted

for the commission from Congress to execute

his colossal statute of Washington, finished in 1843, after many years' labor, and now in the national capital. During this time he executed, among other original works, the fedora,* the

(Angel Abdiel,* and the (Venus Victrix* (Gal¬

lery Of the Boston Athenaeum). He went to

Paris to model the bust of Lafayette. In 1851

he returned to the United States to superin¬

tend placing in its destination in Washington

his group of the (Rescue,* in which the triumph of civilization is symbolized. Many vexatious

delays prevented the arrival of the work from

Italy, and Greenough, unaccustomed by long

absence to the turmoil of American life and the variations of the American climate, was at¬

tacked by brain fever soon after he had com¬

menced. in Boston, a course of lectures on art.

He published a volume of <Essays) on art

topics. Consult Tuckerman, (Memorial of

Horatio Greenough* (New York 1853).

GREENOUGH, James Bradstreet, Ameri¬

can Latin scholar : b. Portland, Me., 1833 ; d.

Cambridge, Mass., 11 Oct. 1901. He was grad¬

uated from Harvard College in 1856, for some

time practised law in Michigan, in 1865 was

appointed tutor in Latin at Harvard, in 1874

assistant professor of Latin and in 1883 pro¬

fessor. In 1872 he began at Harvard a course

in Sanskrit and comparative philology, and until 1880, when a chair of Sanskrit was founded,

gave instruction in those subjects. He became

widely known through a series of Latin text¬

books, particularly a (Latin Grammar,* pre¬

pared in collaboration with J. H. Allen, and

wrote also a (Special Vocabulary to Virgil *

verse in both Latin and English, and, with G.

L. Kittredge, (Words and Their Ways in Eng¬

lish Speech* (1901). He was one of the founders of the Society for the Collegiate Instruction of Women, which helped to found Radcliffe Col¬

lege. Professor Greenough was the first chair¬

man of the academic board of Radcliffe College.

Several papers by him on etymology and Latin

syntax appeared in (Harvard Studies.* For a

full account of his life and a complete list of his works consult G. L. Kittredge in (Harvard Studies* (XIV, Cambridge 1903).

GREENPORT, N. Y., village of Suffolk

County, on the eastern end of Long Island, on the Long Island Railroad, 90 miles east of

Brooklyn. It has an excellent harbor and ship¬

yards, and the chief industries are fishing and shipbuilding. It is also a popular summer

resort. The Eastern Long Island Hospital is

situated here and there is a high school. It

was first settled in 1831 and was incorporated in 1868. The water plant and lighting works

are municipally owned. Pop. 3,089.

GREENS, POT-HERBS. Any plant whose

foliage and succulent stems are prepared for

the table by boiling. The former term is less applied to the plants themselves than to the dish prepared from them; the latter is often applied to the living plants, but rarely to the culinary preparation. Greens are eminently a spring

dish ; by proper management they may be ob¬

tained long before spring-sown vegetables grow

from seed planted out of doors, thus arriving at a time when the appet'te is jaded with the usual winter vegetables. Comparatively few (for ex¬

ample, basella and New Zealand spinach) are

useful during the hot summer months, but then

other vegetables and many fruits take their

place. Some (for example, mustard, witloof)

are obtainable in the autumn, and a few (kale, endive) even during winter.

In general these plants should all be grown

upon rich, moist, well-drained, friable, loamy

soil, since upon such they grow quickly, to a large size, and remain succulent and edible

longer than upon poorer or drier soils. A soil containing abundant available nitrogenous plant

food is particularly desirable. The ground

should be thoroughly prepared by deep plowing

or digging and the surface made as fine as pos¬

sible by harrowing or raking. For earliest crops of such hardy plants as spinach and corn salad, the seed may be sown in autumn, and, where the winters are severe, and especially if snowless, protected with a mulch of marsh hay or other

material free from weed seeds. They may also

be sown as early in the spring as the ground can be worked. Tender plants such as basella,

and those that require a high temperature for

the germination of their seeds, for instance,

purslane, should be sown only after the ground becomes warm. Beyond keeping the surface of

the soil loose and free from weeds, the crops need practically no further care. To be best

appreciated, greens should be gathered while

very succulent and within as few minutes of

meal time as are possible to wash and cook

them. Since most of them occupy the ground

for only a few weeks in earliest spring, they are usually planted by market gardeners between

the rows of other slower growing crops or as

precursors to the main crop.

Besides the cultivated pot-herbs (in America

a rather small list) there are several scores of plants known most widely as weeds. Several

of these are superior in some ways to the culti¬

vated kinds. There is no reason why they

should not be cultivated; indeed, they de¬

serve cultivation. When to be grown in the

garden and when seed cannot be purchased,

seed should be selected from those plants that most nearly meet the intending grower's ideal.

Probably the best known and most frequently

used weeds or wild plants are the following,

several of which are more or less cultivated : Lamb's quarters or Goosefoot (Chenopodium

album) , Pigweed (Amaranthus , various spe¬

cies), Pokeweed (Phytolacca americana) ,

Marsh marigold, ((Cowslip Greens** (Caltha

palustris), Mustard (Brassica , various species), Dock (Rumex , various species), Quinoa (Che¬

nopodium quinoa), Sorrel (Oxalis , various spe¬

cies), Purslane (Portulaca oleracea), Plantain

(Plantago , various species), Chicory (Cichor -

turn intybus), Cress (Cardamine , Spilanthes,

Barbarea, Senebiera, Gynandropsis, Radicula —

various species in each genus), Peppergrass

(Lepidium , various species), Mercury or mar—

kery (Chenopodium bonus-henricus) , Nettle

(Urticn , various species), Winter purslane

(Montia perfoliata) , Rocket salad {Eruca

eruca), Salad-burnet (Sanguisorba sanguis—

orba).

Of the cultivated pot-herbs the following

are probably the best known and the most

widely cultivated : Spinach, corn salad, chard,

borage, dandelion, collards, mustard, kale, orach, marigold, basella, chicory, endive, nasturtium.

Unheaded cabbage and cauliflower, young beets

and turnips, whole or only the leaves, and rape are frequently used also.

GREENSAND, in geology, the name given

to two series of Cretaceous formation, the

Upper and Lower Greensand. The Upper

Greensand is a subdivision of the Upper Cre¬

taceous rocks, and is situated immediately below the chalk marl, and just above the Gault. The beds of which it is composed have in them

green particles of a mineral called glauconite, mixed with sand, the mixture being known as

greensand, from which the formations take

their name. (See Glauconite). Among the

fossils peculiar to it are various ammonites,

two pterodontas, two species of fusus, *etc.*

Some are of opinion that the socalled Upper

Greensand from which these fossils came is

itself Gault. The Lower Greensand is a series

of beds constituting the Lower Cretaceous rocks and the lowest member of the Cretaceous group.

It is called in Europe Neocomian, a name

adopted by Lyell, he considering the term green¬

sand peculiarly inapplicable, as in the district where these strata were first observed sand of a green color was rather the exception. As for¬

mation names, the terms are now little used in America.

GREENSBORO, Ala., town, county-seat of

Hale County; on a branch of the Southern

Railroad, about 72 miles southwest of Birming¬

ham. It was settled in 1816 and is in a cotton¬

growing section. The chief industries are the

cultivation of cotton and corn. It is the seat of Greensboro Female Academy and of the

Southern University. The latter was estab¬

lished by the Methodist Episcopal Church,

South, and was opened in 1859. Pop. 2,048.

GREENSBORO, Ga., city, county-seat of

Greene County; on the Georgia Railroad, 70

miles west of Augusta. It is the trade centre for a thriving agricultural region, and it has a large creamery, a cotton-mill, cotton-gin and a cottonseed-oil mill. Pop. 2,120.

GREENSBORO, N. C., capital of Guilford

County, on the main line of the Southern Rail¬

way, 288 miles southwest of Washington, D. C.

The city was named in honor of General Greene, commander of the continental army in the battle of Guilford Court House 15 March 1781. The

battle-ground is preserved as a park. Educa¬

tional institutions are the State Normal and

Industrial College and Greensboro College for

Women, combined enrollment 1,000. There are

also three colleges for colored youths : The

Agricultural and Technical, maintained by the

State ; Bennett, maintained by the Freedman's

Aid Society, and the Lutheran, supported by

the Lutheran Church. Greensboro has 75 fac¬

tories, employing 6,000 people. The chief in¬

dustry is the manufacture of cotton goods.

Pop. 19,000; including the immediate suburbs,

over 30,000.

GREENSBURG, Ind., city and county-seat

of Decatur County ; on the Cleveland, Cincinnati and Saint Louis Railroad; 64 miles from Cin¬

cinnati, 46 miles from Indianapolis and 70 miles from Louisville, Ky. Nearby are large stone-quarries ; it is surrounded by a good agricul¬

tural region and is supplied with natural gas.

The city has a Carnegie Library and the State Odd Fellows Home. Its chief manufactures

are flour, furniture and screen wire. Pop. 5,420.

GREENSBURG, Pa., borough, county-seat

of Westmoreland County; on the Pennsylvania

Railroad; 31 miles east-southeast of Pittsburgh.

It is in a coalmining, coking and natural gas region ; and contains a steam-heating apparatus

factory, steel works, glass works, nut and bolt works, engine works, brick works and flour

mills, and has three National banks. It is the seat of Saint Joseph's Academy. In Hanna's

Town, which was near the present Greensburg,

was held (1773) the first regularly organized

court of justice west of the Alleghany Moun¬

tains. Hanna's Town was destroyed by the

Indians in 1782. Pop. (1920) 15,033.

GREENSHANK, a large species of sand¬

piper (Totanus glottis) breeding in the northern parts of the Old World, and migrating far

southward. Several allied species of similar

habits occur in America, of which the greater

and lesser yellowlegs (q.v.) are familiar to

gunners.

GREENSPOND, Newfoundland, a port of

entry and sealing station on an island of the same name in the north of Bonavista Bay. Pop.

1,300.

GREENSTONE, formerly a granular rock,

consisting of hornblende and imperfectly crys¬

tallized feldspar, the feldspar being more abund¬

ant than in basalt, and the grains or crystals of the two minerals more distinct from each other.

It was called, also dolorite. Sir Charles Lyell included under the term greenstone those rocks

in which augite was sustituted for hornblende,

the (<olorite)) of some writers, and those in

which albite replaced common feldspar. This

was sometimes termed andesite. The term is

now used the same as diorite, which is an essen¬

tially crystalline granular admixture of triclinic feldspar and hornblende. It is not now held to be the equivalent of dolorite. In geology, vol¬

canic rock, occurring in dykes, tabular masses, *etc.*

GREENVILLE, Ala., city, county-seat of

Butler County; on the Louisville and Nashville

Railroad; about 77 miles northeast of Mobile.

Its chief manufactures are lumber and furni¬

ture; it has cotton-gins, an oil mill, a fertilizer factory and a red-cedar factory, and its trade consists orincipally in cotton and lumber. Pop.

3,477.

GREENVILLE, Ill., city, county-seat of

Bond County; on the Vandalia Railroad, about

42 miles east of Alton. It is the seat of Green¬

ville College, under the auspices of the Free

Methodist Church, and contains a Carnegie

Library. The chief manufactures are flour,

lumber, wagons, and carriages, bricks, gloves,

lodge emblems, and in addition to its manufac¬

tured articles, it has considerable trade in coal, from the coal-fields of the vicinity, and in the agricultural products of the surrounding coun¬

try. Pop. 3,178.

GREENVILLE, Mich., city in Montcalm

County, on the Flat River; the Grand Trunk

and the Pere Marquette railroads; about 42

miles northeast of Grand Rapids. Its chief

manufactures are lumber, flour, agricultural and lumbering implements, stove fixtures, motor

boats, gas engines, refrigerators and furniture.

Its trade is in its own manufactured products

and in the agricultural products of the sur¬

rounding country. The waterworks are munic¬

ipally owned. Pop. 4,045.

GREENVILLE, Miss., city and county-seat of Washington County; on the Mississippi

River, the Southern and the Yazoo and Missis¬

sippi Valley railroads; about 139 miles south of Memphis. It contains several large cotton com¬

presses, and cottonseed-oil-, saw-, and planing-mills, a national bank, and has steamboat con¬

nection with all important ports on the river, and a large cotton trade. It contains a public library, sanitarium, the King's Daughters Home

and several parks and playgrounds. The water¬

works and sewage system are owned by the city.

Pop. (1920) 11,560.

GREENVILLE, Ohio, city and county-seat

of Darke County, on Greenville Creek, 95 miles west of Columbus, 95 miles east of Indianapolis; 85 miles north of Cincinnati. Railroads are

The Cincinnati Northern; Dayton and Union;

Pittsburgh, Cincinnati, Chicago and Saint Louis, and Ohio Electric. It is noted as the site of Anthony Wayne's treaty with the Indians, 3

Aug. 1795. In the early part of the 19th century Tecumseh (q v.) lived here, in a little Indian village. Greenville is a centre of tobacco-han¬

dling industries; has a stove-factory, knitting

mills, machine works and one of the largest

creameries in the United States. Pop. 8,000.

GREENVILLE, Pa., borough in Mercer

County; on the Shenango River, the Erie, the

Pennsylvania, and the Bessemer and Lake Erie

railroads ; about 52 miles southeast of Erie, 12

hours from New York, 10 hours from Chicago.

The Shenango furnishes an abundance of good

waterpower. The chief industrial interests are

flour-mills, saw-and planing-mills, foundries,

machine-shops, railroad-shops, carriage and

wagon works, steel car works, sand plants,

machinery for oil-wells and coalmining. The

coal and oil fields and the stone-quarries in the vicinity add to the industries of the town. The trade of the town is considerable, as it is the commercial centre of a large section of Mercer County and places nearby in Ohio. Greenville

is the seat of Thiel College, opened in 1870

under the auspices of the Lutheran Church.

Pop. 8.978.

GREENVILLE, N. C, town and county-

seat of Pitt County, on the Tar River and on the Norfolk Southern and Atlantic Coast rail¬

roads. It is the centre of trade for the region in tobacco, cotton and corn. The chief manu¬

factures consist of tobacco, cotton, veneer, oil and buggies. The town operates its own water¬

works and electric light plant. Pop. (1920) 5,772.

GREENVILLE, S. C, city and county-seat

of Greenville County ; on the main line of the Southern Railway from Washington to New

Orleans ; Charleston and Greenville Division,

Southern Railway; Atlantic Coast Line Rail¬

way; Greenville and Western Railway, and

Piedmont and Northern Electric lines. It is an important textile centre, having 20 textile mills in the county. Other industries are foundries,

lumber mills, flour mills, cigar factories, *etc.*

It is the seat of Furman University (Bap¬

tist), college for men, Greenville Woman's

College (Baptist), college for women, and two

business colleges. Population within city limits 23,000, including suburban villages 43,000.

GREENVILLE, Tex., city and county-seat

of Hunt County; on the Saint Louis South¬

western, the Texas Midland and the Mssouri,

Kansas and Texas railroads; about 235 miles

north of Houston and 51 miles northeast of

Dallas. Greenville was settled in 1844 and in¬

corporated in 1875. It is situated in an agri¬

cultural and stock-raising section. The chief

industrial interests are connected with cotton

and live stock. It has cotton-compresses, cot¬

tonseed-oil mills, flour mills, machine-shops,

stock-yards and brickyards. It is the trade

centre for a large extent of country and has a large cotton trade. It is the seat of Burleson College, under the auspices of the Baptist

Church, of Wesley College (Methodist) and of

Holiness University. Greenville was one of the

sixteen cities of Texas which, by 1911, had com¬

mission government. The electric-light plant, waterworks and sewage systems are owned and operated by the city. Pop. (1920) 12,384.

GREENVILLE (Ohio), Treaty of, 7 Aug. 1795. A treaty between the United States and all the Northwestern Indian tribes; the former represented by Anthony Wayne, who had de¬ feated the Indians in the campaign of 1794, especially at the battle of the Fallen Timbers (q.v.). A full delegation was present from every hostile tribe, the whole numbering 1,130. They surrendered to the whites all southern Ohio and southeastern Indiana, with lands around Fort Wayne, Fort Defiance, Detroit. Michillimackinac, and the French towns, and 150,000 acres near the Falls of the Ohio (Louis¬ ville) which had been allotted to George Rogers Clark and his soldiers. The United States ac¬ knowledged the Indian title to the remaining territory, and agreed to pay annuities of $9,500 in all to the tribes. All prisoners on both sides were restored. This peace secured quiet to the borders for 15 years. But the guaranty of the lands to the Indians enabled the British to use the latter to desolate the borders in the War of 1812; and after the war (see Treaty

of

Ghent) Great Britain attempted to make this

treaty boundary a permanent one, forbidding

United States settlement beyond it. See Green¬

ville, Ohio.

GREENWALD, Emanuel, American theo¬

logian: b. near Frederick, Md., 1811; d. Lan¬

caster, Pa., 1885. He was educated privately;

and after being licensed by the Lutheran

Synod of Maryland in 1831, received a call to New Philadelphia, Ohio. Here for 20 years

he worked to organize the Lutherans of the

Middle West. Later he became pastor at

Columbus, Ohio, Easton, Pa. and Lancaster,

Pa. He served for many years as editor of

the Lutheran Review of which he was also

founder; was president of the oldest Lutheran

Synod in the United States, the Pennsylvania

Ministerium, from 1873-77, and of the Lutheran

Diet 1878. He wrote (The Lutheran Reformation) (1867) ; (The Foreign Mission Work of

Louis Harms) (1868); (Sprinkling, the True

Mode of Baptism* (1876) ; (The True Church:

Its Way of Justification and its Holy Com¬

munion * (1876) ; ˆRomanism and the Reformation) (1880), besides several children's books.

GREENWAY, Thomas, Canadian states¬

man: b. England, 1838; d. 30 Oct. 1908. In

1844 he went with his father to Ontario. He

took up land in Manitoba, and in 1887 became

the Liberal leader of the opposition and Prime Minister in the provincial government 1888-90.

He secured the abrogation of the obnoxious

"monopoly® clause in the charter of the Cana¬

dian Pacific Railway ; and during his term

passed measures abolishing the use of French

as an official language and the separate school system of the province.

GREENWEED. See Dyeweed.

GREENWICH, Conn., town in Fairfield

County, on Long Island Sound, the New York,

New Haven and Hartford Railroad, about 28

miles northeast of New York. The town was

founded in 1640, as a part of the province of New York, and remained within the jurisdic¬

tion of the Dutch colony from 1642 to 1650,

when, by agreement between the English and

Dutch, it became a part of Connecticut. In

order to preserve the charm of its country life, it has retained the old form of town meeting

government, with three selectmen as agents, as

it was over 250 years ago, except in the central part of the town, where a borough government,

a warden and six burgesses, have charges of

affairs. There are six residential centres

within its area of 80 square miles ; namely,

Byram Shore, Belle Haven, Greenwich village,

Riverside, Sound Beach and Round Hill. It is

the seat of Greenwich Academy, Brunswick

School and Rosemary Hall. Pop. 22,123. Con¬

sult Mead, (History of the Town of Greenwich. >

GREENWICH, gren'ij, England, metro¬

politan and parliamentary borough of London,

in Kent, on the south bank of the Thames, five miles from Saint Paul's cathedral, area, 3,852

acres. It is celebrated for its national institu¬

tions, among which are Greenwich Royal Ob¬

servatory (q.v.), and Greenwich Hospital (q.v.)

the latter occupying the site of a royal palace.

Among educational institutions, the Royal Hos¬

pital School for boys who may enter the navy, and the Blue-Coat School, are liberally en¬

dowed. Shipbuilding and engineering are

among the staple industries. Blackwell Tun¬

nel and Greenwich Tunnel give passenger com¬

munication with the north bank of the river.

Greenwich was the location of the celebrated

Whitebait Dinner, held annuallv by the ministry of the day, but abolished in 1894 and the Ship Tavern, in which it was held, was closed in

1908. General James Wolfe, the hero of

Quebec, was buried in the family vault in the parish church of Saint Alfrege. The borough

returns one member to the House of Commons.

Pop. 95,968. Consult Howarth, (Greenwich ’

(1886).

GREENWICH HOSPITAL, formerly a

home for disabled sailors, now a royal naval

college, situated at Greenwich, England. The

present buildings are on the site of an ancient royal palace, in which were born Henry VIII,

Queen Mary and Queen Elizabeth. The palace

was razed by Charles II, and during his reign part of the present structure was erected.

Under William and Mary it was converted into

a hospital for seamen. It was formally opened

in 1705. Many other buildings were added in

the century following. Its endowments were

increased through bequests and also by for¬

feited estates. About 2,500 old and disabled

seamen were boarded there, while over 5,000

outpensioners, as they were called, received aid from its funds. In 1865 a pension act was

passed under the terms of which such seamen

as were willing to quit the institution received liberal pensions. In 1869 their leaving was

made compulsory, all funds being then con¬

verted into pensions and the buildings were

prepared to accommodate students of the Royal

Naval College. A school for the sons of sea¬

men is still maintained from the funds, the

income from which at present exceeds $1,000,000.

Consult Fraser, Greenwich Royal HospitaP

(London 1910).

GREENWICH OBSERVATORY, the

most important public observatory in England,

located at Greenwich (q.v.) on the prime

meridian in lat. + 51° 28′ 38.4″ N. It was estab¬

lished by King Charles II in 1675, for the pur¬

pose of promoting navigation and astronomy.

The direction of the observatory is under the

charge of the Astronomer-Royal, who is as¬

sisted by eight astronomers and a staff of

computers. The chief instruments employed

are a meridian circle, having a circle six feet in diameter and an eight-inch telescope ; and an eight-inch altazimuth, both by Sims ; LasseH's

two foot reflector; and Grubb's 28-unch re¬

fractor, 13-inch, 26-inch and 9-inch photo¬

graphic refractors; the last two having been

presented bv Sir H. Thompson. The standard

motor clock is also located here, which, by

electrical connection, controls a system of

clocks throughout the United Kingdom. The

department of magnetics and meteorology was

established in 1838, since when valuable ob¬

servations have been made in this field.

.Since 1750. all observations made have been

strictly recorded, the annual publications be¬

ginning in 1836. Separate volumes are de=

voted to Star Catalogues and the Reductions of Lunar and Planet Observations. The principal

efforts of the observatory have been devoted to determining the positions of the stars, planets and sun, the accurate following of the course

of the moon and the daily recording of sun

spots.

The first Astronomer-Royal was John

Flamsteed (1675-1719). He was followed by

Edmund Halley (1720-42). Under James

Bradley (1742-62) the science of modern

stellar astronomy was established. George

Airy (1835-81) brought the work of the ob¬

servatory to its present state of efficiency.

GREENWOOD, Frederick, British journalist: b. London, 1830; d. 1909. After several early novels, the best of which was (Margaret Denzil's History, ' he became editor of the

Queen (1861-63) and of the Cornhitl Maga¬

zine (1864-68). With George Smith he es¬

tablished the Pall Mall Gazette in 1865, and

was its editor until 1880, during which time the paper was a powerful Conservative organ.

Later he was editor of Saint James's Gazette,

and the Anti-Jacobin (1891-92). His other

publications, in addition to numerous magazine

and newspaper articles include (Louis Napoleon

Bonaparte) (1853) ; (The Lover's Lexicon'

(1893), and ‘Imagination in Dreams and their

Study’ (1894).

GREENWOOD, Grace. See Lippincott,

Sarah Jane (Clarke).

GREENWOOD, Miss., city and county-seat of Leflore County, on the Yazoo River

and on the Southern and Yazoo and Mississippi

Valley railroads, about 90 miles north of Jackson. There are oil mills, planing mills, cotton compresses, wagon, furniture and ice factories,

and bottling works. It carries on an extensive trade and is important as a shipping centre.

The principal buildings are the Carnegie

Library, courthouse, schools and the Elk’s

Home. The city owns and operates its water¬

works and electric-light plant. Since 1915, the commission form of government has been in

effect. Pop. 5,836.

GREENWOOD, S. C., city and county-seat of Greenwood County, on the Seaboard

Air, the Piedmont and Northern, the Southern

and the Charleston and West Carolina railroads.

The Lander Female College, the Bailey Mili¬

tary Institute, the Brewer Normal School

for negroes and the Connie Maxwell Orphanage

are located here. The chief manufactures are

cottonseed oil, cotton, spools, bobbins, lumber

and overalls. The waterworks, electricity plant

and sewage system are owned by the munic¬

ipality. Pop. (1920) 7,793.

GREENWOOD CEMETERY, N. Y., the

principal burial place of New York and neigh¬

borhood, in South Brooklyn, near Gowanus

Bay; area 475 acres. It occupies a picturesnue site, and is laid out so handsomely as to make it almost without a rival in the world. From

its heights the waters of New York Bay may

be seen on the one hand, and the broad expanse of the Atlantic on the other. There are 20

miles of roadway and more than 25 miles of

footpaths. Many distinguished men and women

are buried here. The main gateway is adorned

with four magnificent sculptures in alto relievo , representing four scenes in the resurrection.

The number of interments exceed 350,000.

GREENWOOD LAKE, a body of water

in Orange County, N. Y. and Passaic County,

N. J., 50 miles northwest of Jersey City. Its length is about six miles and its width a little more than half a mile. The village of Green¬

wood is situated at the northern end.

GREER, David Hummell, American clergy¬

man : b. Wheeling, W. Va., 20 March 1844; d.

New York City, 19 May 1919. He was gradu¬

ated from Washington College, Washington,

Pa., in 1862, and studied theology in the Episco¬

pal Seminary at Gambier, Ohio. From Brown

University and Kenyon College he received the

titles Doctor of Divinity and Doctor of Laws.

His first ministry was at Covington, Ky. ;

from there he was transferred to Clarksburg,

W. Va., and in 1871 he was called to Grace

Church, Providence, R. I. In 1885, Dr. Greer

became rector of Saint Bartholomew's Parish,

New York City. In 1890 he established the

Saint Bartholomew's Parish House, at 42d

street and Third avenue, at a cost of $400,000, built largely through the liberality of Cornelius Vanderbilt. This parish house embraces a wide

field of charitable, missionary and educational

work. In 1903 Dr. Greer was elected coadjutor

to Bishop Potter of the New York Episcopal

diocese. He had previously declined three bish¬

oprics, that of coadjutor-bishop of Rhode

Island, bishop of Pennsylvania and bishop of

Massachusetts to succeed Phillips Brooks.

Upon Bishop Potter's death in 1908 Dr. Greer

became bishop. He published (The Historic

ChrisU (1890) ; (From Things to GocP (1893) ; (The Preacher and His Place* (1895) ;

(Visions* (1898).

GREER, James Augustin, American rear-admiral : b. Cincinnati, Ohio, 28 Feb. 1833 ; d.

Washington, D. C., 17 June 1904. Entering

the navy in 1848, he was promoted lieutenant

in 1855, and was on board the San Jacinto

when that vessel intercepted the English steamer T rent, on which were Mason and Slidell, the

Confederate Commissioners. He commanded

the ironclad Benton in the fleet that passed

the Vicksburg batteries ; and in 1873 was in

command of the Tigress in its search of the

polar sea for the Polaris. He became rear-admiral in 1892 and was retired in 1895.

GREET, Ben, English manager-actor. He

was educated at the Royal Naval School, New

Cross. His principal achievement has been the

production of Shakespeare's plays out of doors

using stage properties similar to those of the original presentations. He has also played in

(Everyman,* a 1 5 th century morality play,

with which he toured the United States in 1902.

Since then he has been widely known as the

principal of the Ben Greet Touring Companies

and of a training school for the stage. Some

of his leading roles are Malvolio, Dogberry, Sir Peter Teazle, Benedick, Triplet, Tony Lump¬

kin, Friar Laurence, Hamlet, Touchstone and

Dromio.

GREGARINE, a parasitic sporozoan (see

Sporozoa) dwelling in the intestines of many

insects, crawfishes and other arthropods.

GREGG, David, American clergyman : b.

Pittsburgh, Pa., 25 March 1845; d. 11 Oct. 1919.

He was graduated at Washington and Jefferson

College in 1865. He has been pastor in several places, and since 1889 has preached in Lafayette Avenue Presbyterian Church, Brooklyn, N.

Y.

Since 1909 he has been president emeritus and

lecturer extraordinary of the same church.

He is editor of Our Banner and among his

many published volumes may be mentioned :

(Makers of the American Republic) (1896);

(Ideal Young Men and Women* (1897) ; (Facts

that Call for Faith) (1898) ; (Things of Northfield and Other Things*. (1899) ; (New Epistles from Old Lands* (1900) ; (The Dictum of Rea¬

son on Man's Immortality* (1902) ; (Between

the Testaments* (1907) ; (The Master as a

Preacher,* translated into Greek (1909); Pul¬

piteers of the Nineteenth Century.*

GREGG, David McMurtie, American sol¬

dier: b. Huntington, Pa., 10 April 1833; d. 7

Aug. 1916. He was graduated from the United

States Military Academy in 1855; and after serv¬

ing in various Indian campaigns, was appointed

colonel of the Eighth Pennsylvania cavalry vol¬

unteers. At the beginning of the Civil War, he was appointed brigadier-general of volunteers

and commanded several cavalry divisions. In

1864 his services in the great battles of the first year of the war won him the brevet of major-general of volunteers. Later he succeeded to the command of all of the cavalry of the Potomac; resigning in 1865. In 1874 he served as United States consul at Prague, Bohemia; and

became

auditor-general of Pennsylvania in 1891. He is

the author of (Second Cavalry Division of the Army of the Potomac in the Gettysburg Cam¬

paign* (1907).

GREGG, John Irvin, American soldfer :

b. Bellefonte, Pa., 1826; d. 1892. In the Mexi¬

can War, he attained the rank of captain in

1847. He served in the Civil War as captain of the Third Cavalry and of the Sixth and was

appointed colonel of the 16th Pennsylvania

cavalry in 1862. In the battles of Gettysburg

and Cold Harbor he was placed in command

of a brigade of cavalry of the Army of the

Potomac. He was awarded successively the

titles of major-general of volunteers, brigadier-general in the regular army, colonel of the

Eighth cavalry and retired in 1879.

GREGG, Josiah, American traveler, trader

and writer: b. Overton County, Tenn., 19 July

1806; d. Clear Lake, Cal., 25 Feb. 1850. His

father was of Scotch-Irish extraction and his

mother was of Pennsylvania German stock.

His parents migrated to Illinois in 1809 and to Missouri three years

later, settling in the

Boone's Lick country. Of the education of

Josiah Gregg, but little is known, though his

writings bear evidence of a knowledge of the

classics and an acquaintance with mathematics

and astronomy. He was believed to have

studied medicine but probably never practised

that profession. At the age of 25 he became

interested in the overland trade between the

frontier of Missouri and the Mexican prov¬

inces. As the result of his experiences and ob¬

servations during the course of his journeys

across the Great Plains, he wrote a book which was published in two volumes, in 1845, entitled ˆCommerce of the Prairies, or the Journal of

a Santa Fe Trader, During Eight Expeditions

across the Great Western Prairies and a Resi¬

dence of Nearly Nine Years in Northern

Mexico.* This work has ever since been recog¬

nized and accepted as the most authoritative

treatise concerning the overland trade between

the Missouri River and the Rio Grande during

the two decades preceding the Mexican War, in¬

cluding accurate descriptions of the geography,

topography, climate and resources of the dif¬

ferent parts of the country through which he

traveled, accounts of the Indian tribes and their manners, customs and habits of living. During

the war with Mexico, he accompanied the ex¬

pedition of Col. A. W. Doniphan as a news¬

paper correspondent. In 1849, he went to Cali¬

fornia, where he was employed in the service

of the government. He was reported to have

left the manuscript of an unpublished volume,

entitled (Rovings Abroad,* but if so it disap¬

peared soon after his death and so was lost to the world. Gregg's (Commerce of the Prairies)

was reprinted in Reuben Gold Thwaites, < Early Western Travels. > Consult Connelley, William

E., Doniphan's Expedition and the Conquest

of New Mexico and California,* especially the

supplemental notes.

GREGG, William, Canadian Presbyterian

clergyman and educator: b. Donegal, Ireland,

1817; d. Toronto, 1902. He studied at the uni¬

versities of Glasgow and Edinburgh and in

1846 emigrated to Canada as a missionary. In

1847 he became a minister of the Free Presby¬

terian Church and held several pastorates in

Ontario. In 1864 he became a lecturer at Knox College, Toronto, where he succeeded to the

professorship of apologetics, holding that office from 1892 to 1895 when he retired. He wrote

(Book of Prayer for Family Worship) and

(A History of the Presbyterian Church in the

Dominion of Canada * (1885).

GREGOIRE, gra-gwar, Henri, Count,

French churchman and statesman: b. 4 Dec.

1750; d. Paris, 28 May 1831. In 1789, while cure of Embermenil, in the district of Nancy, he was sent by the clergy of Lorraine as their repre¬

sentative to the states-general. As one of the secretaries of the constituent assembly he joined the extreme democratic section, and in the con¬

vention voted for the condemnation, though not

for the death, of the king. Although extreme

in his democratic opinions, he was an unflinch¬

ing Jansenist. He was a member of the council of Five Hundred, of the corps legislatif, and of the senate (1801). On the conclusion of the

concordat he resigned his bishopric of Blois.

He voted against the establishment of the Im¬

perial government, and alone in the senate

resisted the restoration of titles of nobility. He himself afterward accepted the title of count,

but in the senate always opposed Napoleon, and in 1814 was one of the first to vote for his de¬

position. He left numerous works, among

them (Ruines de Port RoyaP (1801) ; (Essai

Historique sur les Libertes de l'Eglise Galli—

cane) ; (Historic des Sectes Religieuses depuis le Commencement de ce Siecle* ; (Annales de

la Religion* (1795-1803).

GREGORAS, Nicephorus, a priest of Con¬

stantinople : b. 1295 ; d. 1359. He was re¬

sponsible for a proposed reformation of the

calendar which closely approximated the

Gregorian. His name appears in various theo¬

logical controversies. His history of the

Byzantine Empire from 1204 to 1359 is pub¬

lished in Migne, (Patrologia Graeca* (Vols.

CXLVIII and CXLIX, Paris 1854-66).

GREGORIAN CHANT (Latin, cantus gre—

goriamis, cantus planus, cantus firmus\ Italian

canto fermo ; French, chant gregorien, plain—

chant; German, gregorianischer Chorgl) is as

old as the Church itself. As an integral part of the liturgy, music has its origin in the cele¬

bration of the Last Supper. According to the

evangelists, Matthew and Mark, after the con¬

secration and breaking of bread, our Lord and

the apostles sang a hymn, which is commonly

accepted to have been the “Great HalleP* of the Jewish passover celebration, that is, the Psalms, cxii-cxvii (Douai version), inclusive. The first Christian communities of Jerusalem in Pales¬

tine and Antioch in Syria were founded by

newly converted Jews. Consequently it is more

than probable that, although the converts from

paganism were soon in the majority, melodies

in use in the temple and in the synagogues con¬

tinued to be sung at their religious meetings.

This hypothesis is all the more reasonable be¬

cause the recruits from paganism could offer

nothing either in the way of poetry or music

which would have been acceptable to the new

cult. As to how the chant came to Rome and

concerning its early development, archaeology

has so far been unable to ascertain any definite information. Conjecture and probability are

the most we have to go by. Without doubt

Greek music, which was known to the Romans,

as was every other form of Hellenic culture, had its influence on the formation of the Christian worship music. It is certain also that there was a constant development and that singing played

an ever greater role in the early liturgy. There were hardly any religious functions of which

the singing of psalms, responsories and hymns

did not form a part. From the fruitful soil of the early Church sprang with great exuberance

a new hymnology, which in turn, as its logical complement, was translated into melodies.

Many of the latter were spontaneous improvisa¬

tions, the children of ardent hearts and imagina¬

tions illumined by the new light. At first the whole religious community participated in the

singing, but as the liturgy became more elab¬

orate and the assemblies more numerous, this

participation on the part of all the faithful had to be restricted to certain portions of the serv¬

ice. Other more particular parts were per¬

formed by the Primicerius, Praecentor or Mon¬

itor, who also had general charge of the sing¬

ing and whose office it was to see that the faith¬

ful were well prepared for their allotted task.

After emerging from the catacombs at the be¬

ginning of the 4th century the Church dis¬

played its ever-growing vitality in the unfolding of her liturgy and the increasing splendor of her cult. At this period the chants used must

have been numerous and varied. Popes and bishops

fostered the liturgical music in every manner.

Pope Sylvester (314) and Hilarius (461)

founded schools for its cultivation. Saint Am¬

brose, Archbishop of Milan (397), took a step

which was of greater importance than anything

which had been done up to that time. He gave system and order to the melodies and chants in use in his archdiocese by giving them a theoretic basis. This he accomplished by adopting four

modes or scales, each one of which had as its initial one of the four notes of the Tetrachord 444

(sequence of four notes), D, E, F, G. The

four modes adopted by Saint Ambrose were

consequently: (a) (Dorian) D, E,F, G, a, b,c,

d; (b) (Phrygian) E,F, G, a, b,c, d, e; (c) (Lydian) F, G, a, b,c, d, e,f, (d) Mixo-Lydiari), G, a, b,c, d, e,f, g. All the melodies and chants used had some one of these modes

for their foundation. Saint Ambrose originated

the custom of singing hymns and psalms antiph—

onally.

When 200 years later, Gregory the Great, the

man who gave the music of the Church its

permanent character and from whom it is

named, ascended the papal throne, the number

of feasts and consequently of liturgical chants had increased to such an extent that the four modes fixed by Ambrose were no longer suffi¬

cient. Many of the new melodies did not belong to any one of the scales enumerated above. They had grown beyond' the original frame. As

Gregory partly reformed and, at least in out¬

line, gave shape to the ecclesiastical year as we now know it, he was compelled also to re¬

arrange existing chants, reject inferior ones,

adapt old ones to new texts and add new ones of his own creation. In order to carry out this vast plan be found it necessary to enlarge the tonal system then in use. He retained the four Ambrosian modes, which were henceforth desig¬

nated as the authentic modes, and added thereto four more which he called plagal. Gregory

formed the new modes by transposing the last

four notes of the existing — authentic — scales an octave lower, so that each plagel mode be¬

gan a fourth below the authentic from which it sprang. Thus the tonal system as completed

by Saint Gregory was as follows:

chants for the numerous offices was called

l((antiphonarium cantorum.ˆ It was deposited

near the altar of Saint Peter so as to convey that the pontiff wished it to be considered as the norm for the whole Christian world.

In order to gain an insight into and an ap¬

preciation of the nature and character of the

Gregorian melodies, it will be well to examine a little more closely the tonal material out of which they are constructed. We will notice

that all the scales are diatonic, that is to say that each one has five whole tones or steps and two half-steps or semi-tones; furthermore that

the half-steps or semi-tones occur in a different place in each scale, according to what the initial note happens to be, and, finally that only one of them has a leading tone or half-step between

the seventh step and the octave or repetition of the initial note. It is these three features which differentiate the Gregorian modes so markedly

from our modern scales and which give them

that impersonal and objective character so mar¬

velously suited to the purpose they serve,

namely, that of expressing the ideas and senti¬

ments conveyed by the sacred texts. In other

words, these modes, or tonalities, lend them¬

selves to the expression of a mental attitude of objectivity as against the modern scales which, on account of their chromatic character, are

more pliable vehicles for conveying the emotions springing from subjectivism and introspection.

If we remember, in addition to the general char¬

acter of the Gregorian, or Church modes — as

they are often called — the rule which permits the use of six intervals only in the formation of Gregorian melodies, namely: the major and

minor second, the major and minor third, the

Authentic Modes Plagal Modes

I DOPMRf JZ Z/YPO-DOP/AN

1 - PF”

- er - ˆ - 17 -

- F - ˆ ˆ - TT∼ ‘

l-V F „ a ° - ˆ -

a a -G —

V £? - -O’

nW Phrygian

ZZ ZZYPO -P/iRYG/AN

■ . . n ” 1 II

frvi F - ˆ — n — <S>P — -

- F - zxr-H o

V OS2 °

L- -~-7ri by-*– *1

V LYO/A/V ZZ ZZypo-Zyo/an

fit - * & . - » . <p-t

I-L /)

rn r 75 7D

TD ■

U/ rj —

fjW *V*A’O -zL YQ/AA/ ˆ 0 vm/iypo -M/XO-L YD/ A#

r-1/ jn

As f n rj

• (O rz £3

Fy) r > cj ˆ

V—— -

L— — gy firf Li

[N. B. — The letters F and D in the above diagram stand respectively for final and dominant. The final is the tone on which a melody finds repose, or a satisfactory ending. As will be observed, the final for any given authentic mode and its derived plagal are identical. The dominant is that tone which occurs oftenest or predominates in any melody.]

Four more modes were added to these in

later centuries, but they are not different in essence from the eight named above. By means

of various signs — dots, strokes, bars or hooks, collectively called neums — all of which had a conventional meaning, and which were placed

over and alongside the words of the texts, Saint Gregory indicated the melodies to which these

texts were to be sung. The book containing the perfect fourth and the perfect fifth, we realize that this tonal system is better adapted for the expression of reverence, humiliy, peace and

joy, whereas the modern chromatic system is

more suited for the expression of passion and

dramatic conflict.

Saint Gregory used every means at his com¬

mand to propagate the chant and have it uni¬

versally adopted. He established schools for

its proper interpretation. At one of these he is said to have taught in person. Missionaries

who were sent from Rome into foreign lands

took with them a copy of the antiphonarium,

and, of course, a knowledge of how the melo¬

dies it contained should be sung. Thus, Saint

Augustine brought the melodies to England at

the command of Saint Gregory himself. The

great pope's successors continued the process of propaganda during the following centuries. In

the 8th century Saint Boniface introduced the

chant in Germany, and by him several ((scholae canto rumˆ were established on German soil.

Through Pepin and after him through Charle¬

magne, it found its way into Gaul and into

the whole territory under the emperor's sway.

It is held by many historians that the origi¬

nal chant was, in the main, syllabic, that is to say, that only one note was sung to each syl¬

lable and that only the word <(alleluj a)J was ever extended over several notes. Be that as it may, it is certain that it gradually developed into a melismatic system, syllables being often ex¬

tended over smaller and greater groups of notes.

From the time of Saint Gregory until the ad¬

vent of Guido d'Arezzo (995-1050?) the primi¬

tive means of determining the melody, the

neums described above, remained in use. As

has been pointed out, these signs were intended to assist the memory of the singers in repro¬

ducing the melodies which they had learned by

oral transmission. It is not to be wondered at that, in the course of time, many of the melo¬

dies were altered and modified in the many

places where they were in use. There were fre¬

quent variations and modifications due to local habits, different temperaments, but above all, to the insufficiency of the means employed to indi¬

cate with precision the form of the melodies.

Careless copyists and finally the arbitrariness and caprice of singers in the various countries led to confusion. Before the time of Guido

d'Arezzo, attempts had been made to fix with

more precision the intervals of the melodics.

He found in use two lines, a red and a yellow one, drawn across the page. Upon the red line was placed the F, and C was put upon the yel¬

low one. Above, below and between these two

lines the neums were written. By placing a

black line between the two already existing and adding another above or below these three as

the ambitus or range of the melody might re¬

quire, Guido created the four line staff which has been used ever since for the chant, and

made it possible to indicate precisely the form of a melody for all time to come. Guido and

his pupils transcribed the existing chants into the new system of notation. Copies of these

transcriptions found their way into the cathe¬

drals and monasteries of many countries where

they took the place of the books formerly in

use. Though the neums as a system at nota¬

tion were superseded by the more precise in¬

vention of Guido, they continued nevertheless to be employed to indicate the manner of interpre¬

tation : Although Guido's invention was epoch—

making and of incalculable importance in the

history of music, it must not be inferred that it was at once universally adopted. Neums as

a means of notation continued in use in many

places and institutions far into the 13th cen¬

tury. Nor must we imagine that because of the introduction of the new system of notation no

further modifications of the chant took place.

As new saints were canonized and new feasts

instituted by the Church, offices and chants were necessarily created. Then the growing skill of

professional singers gave rise, especially in the Alleluja following the gradual, to improvisa¬

tions, elaborations and displays of virtuosity

which often exceeded the limits of good taste

and appropriateness.

As the melodies comprising ecclesiastical

music grew out of the sacred texts and were

never performed without being wedded to these

texts, it is but natural to assume that the

melodic construction partook of the rhythmical

form of the texts.. Especially must this have

been the case when the chant was still largely syllabic. Some maintain that the ancient chant

had a definite — artificial — rhythm, as in our modern music, in contradistinction to the nat¬

ural, or that dictated by the rhythm of the

text. Whatever the prevailing-rhythm was at

the beginning of the 10th century, it was now to undergo a gradual change. The monk Hucbald invented the organum or diaphony, that is, the practice of having a second voice sing the melody a fifth above or a fourth below the origi¬

nal, or add to the fifth also the octave, the first voice meantime maintaining the original melody.

By this step Hucbald paved the way for the

polyphony which was soon to develop and find

its culmination in the wonderful creations of

Palestrina and his school in the 16th century.

Sulzer in his (Allgemeine Theorie der Kunste,*

in the article on harmony, points out that

polyphony was latent in the unison singing of

the Gregorian melodies by old and young, men

and boys, each class of voice, soprano, alto,

tenor, baritone and bass, having a different pitch.

Hucbald's system of parallel motion of fifths

and octaves was soon succeeded by attempts at

contrary motion, and counterpart as we know

it, that is, point against point (or note against note) was born. To the Gregorian melody

which now became <(cantus firmus,® that is, un¬

changeable melody, were added one or more

others. In giving birth to the new system and continuing to be its foundation and the souice whence polyphony drew its life and being, the

Gregorian chant lost its most distinguishing

characteristic, that is, its natural rhythm. The themes taken from the chant and used by con¬

trapuntists as <(canti fermi® were forced into the rhythmical straight-jacket. Each note of the

cantus firmus had now to assume a definite value in order that the added melodies simultaneously sung might harmonize with it. Polyphony, or

the new school of music, increased in favor very rapidly to the detriment of the old chant. In¬

strumental music, which was gradually develop¬

ing, also had a* deteriorating influence on the execution and cultivation of the ancient music

of the Church. Counterpoint in many instances

lost its original purpose and degenerated into

artificiality. Composers used it to display their skill rather than to give expression to the ideas and emotions latent in and suggested by the

text to which it was wedded. A reform move¬

ment toward primitive simplicity set in toward

the end of the 15th and the beginning of the 16th century. The Council of Trent enacted

laws concerning the abuses that had crept into the chant as well as against the extravagances which the display of skill for its own sake had 446

brought about and which in fact almost caused

the total exclusion of figured music from the

Church. In a brief dated 25 Oct. 1577, Pope

Gregory XIII directs Giovanni Perluigi Pales¬

trina and Annibale Zoilo (Palestrina was at the time director of the papal choir and Zoilo a

member of the same) to revise the chants con¬

tained in the “Antiphonaria,® “Gradualia,® and

“Psalteria,® and “eliminate® therefrom “all bar¬

barisms, obscure passages, contradictions and

superfluous additions which, through the igno¬

rance, neglect, and also through the malice of composers, copyists and singers, have crept into these books.® A pupil of Palestrina, Giovanni

Guidetti, had, a few years previously, edited the various chants for the celebrant contained in the Missal, which had been newly revised by a com¬

mission of cardinals appointed for this purpose after the Tridentine Council. Palestrina, Zoilo

and Guidetti in their labors of revision acted upon the principle which had been lost sight of for a time, but which was now generally ac¬

cepted by musicians in Rome, “that the words

of the texts should be sung to the notes as they ought to be spoken or declaimed without notes.®

This principle in its application brought into

universal use the three different kinds of note-values : the longa, the brevis and the semi—

brevis. The work of revision, of the Graduale

only, which was continued and completed after

Palestrina’s death (2 Feb. 1594) by Felice

Amerio and Francesco Suriano involved many

excisions and abbreviations ; reduced many

chants which had been elaborately melismatic

to a syllabic form. This revised edition derived its name “editio medicea,® from the fact that

it was printed by the “stamperia® or press of that name established in Rome by Cardinal

Ferdinand de Medici. The Congregation of

Sacred Rites, in 1595, appointed Giovanni

Maria Nanino, Giovanni Andrea Dragoni, Luca

Marenzio and Fulgentio Valesio to edit, in ac¬

cordance with the principles stated above, the

(Pontificate RomanumP The revised books

were now printed and published with the appro¬

bation of Pope Paul V (1605-21) and that

of the prefect of the Congregation of Sacred

Rites. This approbation did not carry with it

the prohibition of the use of the old, more elab¬

orate, now called traditional, versions of the

chant. No doubt because of the latitude thus

permitted, the abbreviated version did not make fnuch headway outside of the papal territory.

Besides this, monody (solo singing) and the

theatrical style in general came into vogue in Italy at the beginning of the 17th century. It took such a hold of public taste that even the works of Palestrina and the masters of his

school were temporarily forgotten for the trashy and trivial products which now, had the upper

hand. This being the case with regard to the

polyphonic style, it was natural that the austere, chaste and simple Gregorian melodies should

suffer even greater neglect. While in Italy and in some other parts of the world the chant was for a time neglected, there were countries, such as France, Belgium, Spain and the Catholic

parts of Holland where it never ceased to be

cultivated according either to the traditional or the abbreviated

version. Many different edi¬

tions came into use, notably in France, where

many dioceses had their own versions. Toward

the middle of the 19th century the plan enter¬

tained by Gregory XIII, Clement VIII and

Paul V, of having uniformity for the whole

Catholic world in everything pertaining to the

liturgy, including the chant, was revived with

new vigor. Pope Pius IX, in 1868, appointed

a commission to whom he entrusted the task

of editing, in accordance with existing require¬

ments, the “editio medicea,® which Pius IX and his successor, Leo XIII, repeatedly declared to be the official version of the Gregorian chant for the whole Church, and archaeologists — not¬

ably the Benedictines of Solesmes, A. Dechev-rens, S.]., of Paris, the Belgian savant, G. A.

Gevaerts, Dr. Peter Wagner of Freiburg, Switz¬

erland, and others — made exhaustive studies of the manuscripts dating from the 9th century

(the oldest so far discovered) up to the Renais¬

sance. The results of these studies induced

Pius X, to appoint (1904) a commission for

the purpose of preparing the “editio vaticana,®

embodying the fruits of the researches and

labors of learned men for many years past.

Whatever may be the differences between this

latest version and the many that have gone be¬

fore, they in no sense change the essential

character of the chant. This character has its root primarily in the nature of the scales ©r modes used, as has been shown above, and, sec¬

ondly, in the intervals in the construction of the melodies. As has been pointed out, the melo¬

dies sprang from the sacred texts of the liturgy: they were their complement and splendor. The

Church has always declared the chant to be her own music par excellence. Other forms of

music which she admits in her cult, the Pales¬

trina, or polyphonic, and the modern styles, are to be judged as to their fitness in the light of the Gregorian chant, which is. the norm and

standard of excellence because it best expresses the attitude of prayer.

Bibliography. — Some of the works on the

Gregorian chant which may be profitably con¬

sulted are Haberl, (Magister Choralis) ; Kienle, <Choral-Schule) ; Gietmann, <Kunstlehre) (Vol.

Ill) ; Kornmiiller, (Lexikon der Kirchlichen

TonkunsC ; Gevaert, (La Melopee Antique dans

le Chant de l'£glise Latine) ; the Benedictines of Solesmes, 'Paleographie Musicale) ; Dechev-rens, (fitudes de Science Musicale.5

Joseph Otten.

GREGORIAN LITURGY, the ritual

which Pope Gregory I introduced after 590 in

the Roman Catholic Church in the administra¬

tion of the Eucharist, as exhibited in the book entitled ˆregorianum Sacramentarium.) St.

Gregory made a new arrangement of the liturgy

of Gelasius, which was previously in use, ex¬

punging. from it what seemed to him useless

and adding a very few new prayers. The cele¬

bration of the mass is still essentially the same as it was then.

GREGORIAN MASS. Pope Gregory I

(590-604) wrought many reforms in the Lit¬

urgy of the Church. There is still much con¬

troversy, however, as to the extent of his re¬

forms of the Mass. It is agreed that to the

Canon he added “diesque nostros in tua pace

disponas, atque ab aeterna damnatione nos

eripi, et in electorum tuorum jubeas grege

numerari.® He also caused the Pater Noster

to be recited in the Canon before the breaking of the Host, deeming it unsuitable that the

Canon, the work of an unknown scholar, should

be said over the oblation instead of the prayer which the Redeemer himself composed. The Alleluia also might now be chanted after the Gradual outside of Paschal time ; the chas¬ uble was forbidden to subdeacons ; and deacons might not sing any portion of the Mass other than the Gospel. There have been a few minor changes since Gregory's time but the Mass is to-day practically as Gregory left it at the be- . ginning of the 7th century. See Gregorian Chant; Mass.

GREGORIANUS, Roman jurist of the 3d century who compiled the Codex Gregorianus on which the later Codex Justianus was supposedly based. Consult Sohm, (Institutes of Roman Law) (trans. by Ledlie, 2d ed., Ox¬ ford 1901).

GREGOROVIUS, greg-o-ro'vi-us, Ferdi¬

nand, German historian and poet: b. Neiden—

burg, East Prussia, 1821 ; d. Munich, 1891. He received his education at Konigsberg and then

spent several years in Italy, where he wrote

(Wanderjahre in Italien) (1857-77). Further

travels carried him into Gree.ce, Turkey, Egypt and Syria. He divided his last years between

Rome and Munich. His historical and descrip¬

tive works are very numerous. Among the

latter are (Corsica) (3d ed., 1878, trans. into English); (Figuren; Geschichte, Leben und

Scenerie aus Italien) (1856) ; (Siciliana >

(1860) ; (Lateinische Sommer) (1863) ; (Die

Insel CaprP (1868, 3d ed., 1897); (Von

Ravenna bis Mentana) (1871) ; (Apulische

Landschaften) (1877). Predominant among

his historical studies are those of Roman his¬

tory, chiefly: (Geschichte des romischen

Kaisers Hadrian } ; several works on mediaeval

Italy; (Die Grabdenkmaler der Papste) (2d ed.,

1881) ; (Die Geschichte der Stadt Rom in

Mittelalter) (8 vols. 1859-72, English trans. by Hamilton, 1894-1900 ; Italian trans., 1874-76) ; (Lucrezia Borgia) (3d ed., 1875) ; (Urban VIII im Widerspruch zu Spanien und dem KaiseU

(1879) ; (Una Pianta di Roma delineata da

Leonardo da Besozzo Milanese) (1883). On the

culture of Greece he wrote (Kleine Schriften

zur Geschichte und Kultur) (1887-92) ; (Athenais, Geschichte einer byzantinischen KaiserirP

(1882) ; (Geschichte der Stadt Athen im Mittelalter) (2d ed., 1889). Besides these he

published several poetical, dramatic and critical works including (Werdomar und Wladislaw)

(1845); (Goethe's Wilhelm Meister in seinen

sozialistischen Elementen) (1849) ; (Die Polen

und Magyarenlieder) (1849) ; (Der Tod des

Tiberius } (1851), a tragedy; 'Euphorion* (6th

ed., 1891), an epic of Pompeii; (Gedichte)

(1892). He edited (Brief e Alexanders von

Humboldt an seinen Bruder Wilhelm > (1880).

His letters to Hermann von Thile were edited

in 1894. Consult Miinz, (Ferd. Gregorovius

und seine Briefe an Grafin LovatellP (Berlin

1896).

GREGORY, Saint, of Armenia, surnamed

The Illuminator (Gregor Lusavoritch), the

apostle and patron saint of Armenia: b. Valar—

shabad, Armenia, about 257; d. in the wilder¬

ness of Upper Armenia, 332 or shortly there¬

after. Modern Armenians venerate as a liter¬

ary heritage of the Illuminator a collection of discourses and epistles belonging probably to a time subsequent to 450. The chief source for

the life of Gregory and one of the most famous works of Armenian literature is the work of

Agathangelos, honored among the Armenians

as the first historian of their nation. The

author no doubt takes his name from the fact

that he brings the (<glad tidings® of the intro¬

duction of Christianity into Armenia. He

claims to have written his book bv order of

King Trdat (Tiridates) III, not from earlier

accounts, but as an eyewitness of the events

described. The Armenian text itself does not

go back beyond about 450, although it preserves fragments of two older writings. Really his¬

torical details, worthy of credence, are unfor¬

tunately put side by side with legendary cir¬

cumstances, unworthy of belief. It seems that

Gregory, while an infant, was conveyed by a

Christian nurse from Armenia to Caesarea in

Cappadocia to escape being slain with his

family for the crime of his father, a Parthian named Anak, who had assassinated Chosrov I,

king of Armenia. When he reached manhood

he married a Christian lady of Caesarea, who

after bearing him two sons retired to a monas¬

tery. Thereupon Gregory entered the services

of Chosrov's son, Tiridates III, who, with the help of the Romans, had

recovered his father's throne. Tiridates imprisoned him for 14 years

in a deep pit, for refusing to perform an act of idolatrous worship, whereupon the tyrant

was punished by a horrible temper and his

people were plagued. Gregory cured both, con¬

verting the king to Christianity. About 302

Gregory was consecrated bishop and catholicos

of Armenia by Leontius of Caesarea. Tiridates

established Christianity as the national religion of Armenia as Constantine did several years

later for the Roman Empire. In 331 Gregory

retired into solitude and died shortly there¬

after. The Armenians, the Syrians and the

Byzantine Church keep his feast on 30 Septem¬

ber; 1 October is his feast in the Roman calen¬

dar. Consult Davidson, Lionel, (Gregorius (7),

St., The Uluminator) (in Smith and Wace,

(A Dictionary of Christian Biography,) Vol.

II, London 1880) ; Bardenhewer, Otto, (Les

Peres de 1'fLglise: leur Vie et leurs Oeuvres) (tome 3, Paris 1899) ; Chevalier, Ulysse, (Bio-Bibliographie) (Paris 1905).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GREGORY, Saint, of Nazianzus, known

as Theologus (((The Theologian® or <(The

Divine®) : b. Arianzus, near Nazianzus, a

little city in southwestern Cappadociaˆ about

325 ; d. there about 389 or 390. Receiving the seeds of a truly Christian education from his

mother, Nonna, he attended in turn the most

celebrated schools of his time. From Caesarea

in Cappadocia he went to Caesarea in Palestine, thence to Alexandria and finally to Athens,

where his friend, Saint Basil of Caesarea (q.v.), was not slow in joining him. Gregory ap¬

parently stayed in Athens longer than his friend and possibly gave lectures on oratory there,

but when about 30 years of age he returned to his native land to be baptized. Thenceforth he divided his life between Arianzus and the

monastic retreat of Basil in Pontus. Gregory's

life presents the unusual picture of alternate re¬

tirement and activity, like the ebb and flow of the sea. It was only the insistence of his

friends and his own conscience which dragged

him forth from the longed for solitude and

silence of contemplation and forced him to

takt a vigorous part in the struggles and trials of the Church. Filial love and zeal for ortho¬

doxy brought him forth from his retreat first

in 360 or 361 as a messenger of peace to his compatriots. His father, also named Gregory,

who was bishop of Nazianzus (329-374),

through weakness or misunderstanding had

subscribed (359) to the semi-Arian formula of

Rimini, bringing upon himself the opposition

of the faithful. The son's happy intervention

resulted in a solemn profession of faith by the elder Gregory, at whose hands he was ordained

priest somewhat in spite of himself on Christ¬

mas Day, 361. After a brief sojourn with

Basil in Pontus, Gregory returned to aid his

father in the administration of his see. It was not long before Basil constrained his friend to accept the newly created bishopric of Sasima,

although it is doubtful whether Gregory ever

set foot in that little town. At any rate, in 372, yielding to his father's solicitations, Gregory decided to relieve him somewhat of the burden

of his episcopal charge, and, when his father

died in 374, soon to be followed by the pious Nonna, he was not slow to console his broken

heart by resigning the administration of the

Church at Nazianzus and returning to the con¬

templative life at Seleucia. His younger

brother, Caesarius, and his sister, Gorgonia, had preceded their parents to the grave by several years (369) and there remained to be added

but the death of his best friend, Basil (37 9), to confirm Gregory in his resolution to bid the world a lasting farewell. Nevertheless he was

not destined to enjoy the repose he so longingly desired. Arianism under Valens had gained

headway in a part of the empire, and the

Catholics at Constantinople, despoiled of their

churches, felt themselves upon the very verge

of utter ruination. They appealed to Gregory,

who could not resist the hope of re-establishing the true faith in the capital of the east. Noth¬

ing arrested his zeal and his marvelous elo¬

quence triumphed over all. When Theodosius

entered the city in 380, the faithful demanded as their bishop the restorer of orthodoxy, but Gregory, although consecrated as such, insisted

upon awaiting the outcome of the Second

Ecumenical Council of Constantinople, finally

resigning his charge and returning in June 381

to Nazianzus, which had been without a head

since the death of the elder Gregory. For two years he administered the Church there and

about 383 retired to the vicinity of Arianzus, his birthplace, where he died in the austere

practice of Christian asceticism. Gregory's

works may be divided into three groups : dis¬

courses, letters and poems. Of the discourses

(which constitute the largest group) 47 are ex¬

tant, and of these the most important and

famous are those (27-31) pronounced at Con¬

stantinople in defense of the mystery of the

Trinity, which, because of their solid doctrine and vigorous exposition, have been called the

(Theological Discourses) and won for Gregory

the title formerly appropriated only to Saint

John. The rest of the discourses are on various subjects. There are 243 letters attributed to-Gregory, the vast majority of which belong to

the days of his retirement at Arianzus (383-389) and give an intimate picture of the life of the author or of his friends and parents. This

same period also saw the majority of his

poems, which very often are little more than

versified prose, although some of his elegiac

efforts seem to possess real poetic feeling.

The longest of his poems, (De Vita Sua,} is

one of the most valuable sources of informa¬

tion concerning the details of his life. Gre¬

gory's complete works appear in Migne's

(Patrologia GraecaP The Eastern Church cele¬

brates 25 and 30 January in his honor and the Western Church 9 May.

Bibliography. — Watkins, Henry W., Grego¬

rius (14) Nazianzenus) (in Smith and Wace,

(A Dictionary of Christian Biography,* Vol.

II, London 1880) ; Ulmann, C., Gregorius von

Nazianz, der Theologe) (2d ed., Gotha 1867) ;

Benoit, A., (Saint Gregoire de Nazianze: sa

vie, ses ceuvres, et son epoque* (Paris 1885) ; Montaut, Louis, (Revue critique de quelques

questions historiques se rapportant a Saint

Gregoire de Nazianze et a son siecle* (1879) ; Chevalier, Ulysse, (Bio-Bibliographie) (Paris

1905).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GREGORY, Saint of Neocaesarea,

known as Thaumaturgus (o Oauparoupyog, The

Wonder-Worker) : b. Neocaesarea in Pontus,

about 210; d. there about 270. Originally bear¬

ing the name of Theodorus, he grew up in his native city in a thoroughly pagan atmosphere.

On the advice of his Latin tutor, he decided to devote himself to the study of law and, for

that purpose, to proceed with his brother,

Athenodorus, to the famous schools at Beirut

in Phoenicia. However, the naming of their

brother-in-law as assessor to the Roman gov¬

ernor of Palestine took them as far as Caesarea, where they were so charmed by the personality

and teaching of Origen that they abandoned

their original plan and became wholeheartedly

attached to their admired instructor. The latter cleverly won over these distinguished pupils to the study of the Holy Scriptures and thereby,

little by little, to the Christian faith. The first meeting of the youthful Gregory with Origen

probably took place in 231. His studies under

the illustrious scholar continued until 238 or

239, perhaps with the exception of the years

235 to 237 or 238, namely during the persecu¬

tion of Maximinus Thrax, when it is said that Origen sought refuge in Cappadocia and his

disciple at Alexandria. In 238 or 239 Gregory

said farewell to Origen and to Caesarea in a pub¬

lic discourse entitled (Panegyricus in OrigenemP

in which he gives thanks to Origen and shows a sincere enthusiasm for sacred science. Some

of the chapters of this discourse have a great historical value. In 240 Gregory was elevated

by Phaedimus, bishop of Amasea and Metropoli¬

tan of Pontus, to the newly created episcopal

see of his native city, although there were at the outset only 17 Christians in this jurisdic¬

tion. Information concerning the labors of the

bishop is obtainable chiefly from the biography by Saint Gregory of Nyssa (q.v.) which is

somewhat beclouded by legends and is especially uncertain in its chronology. The biographer

states that, before entering upon his duties as bishop, Gregory retired into solitude. One

night, in an apparition of the Blessed Virgin

Mary and Saint John, he was given a formula

of faith, a brief but none the less clear and precise explanation of the dogma of the Trin¬

ity, which obtained a very great authority

thereafter. Similar to this is the Exposition

of the Faith* now generally attributed to

Gregory. The divers miracles which won for

him the title of ˆwonder-worker® are related

at length by Gregory of Nyssa and it is certain that his influence was potent and his renown

more than ordinary. In 265, he took part, to¬

gether with his brother, who likewise held an

episcopal see in Pontus, in the great synod of Antioch against Paul of Samosata and perhaps

also in the synod held in 269 at the same place against the same heresiarch. Besides the

<Panegyricus) mentioned above, Gregorv is the

author also of an (Epistola Canonica) addressed to a bishop in Pontus and treating of the dif¬

ferent questions raised on the occasion of the Gothic incursions in Asia Minor (253-258) ;

(Metaphrasis in Ecclesiasten,* which is only

a free paraphrase of the Greek text; (Dialogus cum Aeliano,* .apparently lost; and many other

apocryphal writings. Critics have been unani¬

mous in attributing to Gregory the (Tractatus

ad Theopompum* on the divine passibility and

impassibility, written in the form of a dialogue and treating of the question whether divine im¬

passibility necessarily supposes that God is in¬

different to everything done among men.

Gregory's complete works, including the frag¬

ments attributed to him, have been published in Migne's (Patrologia Graeca,* and an English

translation of most of them in the (Ante—

Nicene Fathers.) His feast in the Roman

Churchy is observed 17 November.

Bibliography. — Reynolds, Henry R., (Grego¬
rius (3), surnamed Thaumaturgus) (in Smith
and Wace, (A Dictionary of Christian Bioe—
raph3ˆP Vol. II, London 1880) ; Ryssel, V.,
(Gregorius Thaumaturgus, sein Leben und seine
Schriften) (Leipzig 1880) ; Bardenhewer, Otto,
(Les Peres de l'Eglise: leurs Vies et leurs
Oeuvres) (tome 1, Paris 1898) ; Chevalier,
Ulysse, <Bio-Bibliographie) (Paris 1905).

Herbert F. Wright,

Sometime of the Department of Latin , The
Catholic University of America.

GREGORY, Saint, of Nyssa: b. about 335
or 336; d. after 395 or 396. He was a younger brother of Saint Basil of Caesarea (q.v.), who, it seems, had charge of his education. While
holding the office of lector in the Church he yielded to the attractions of the world and be¬
came a professor of belles-lettres, preferring
<(the name of rhetorician to that of Christian.®
But the lively representations of his friends
and especially of his namesake of Nazianzus,
persuaded him to return to his first vocation.

After retiring into seclusion for a short time, he allowed himself in 371 to be consecrated by his brother Basil and became bishop of Nyssa,

a small town in Cappadocia, continuing to live with his wife, Theosebeia, although as with a

sister. The hatred of the Arians awaited him

in his new field and after a few vears of bitter struggle he was deposed about 375 by an Arian synod convoked by the governor of Pontus.

The death of the Emperor Valens in 378

brought about a change in the political situation of the Church and Gregory returned from exile

to Nyssa in triumph, fn the fall of 379 he

assisted in the Council of Antioch in opposing the Meletian schism, and two years later en-vol. 13 — 29

joyed a very important role in the second gen¬

eral council at Constantinople. During the in¬

terval he had traveled extensively in fulfilment of a commission which he had received from

the Antioch Council ((to visit and reform the

Church in Arabia.® It is after his last trip to Constantinople in 394 that Gregory's name dis¬

appears from history and it is probable that his death followed shortly thereafter. Gregory

has few rivals in the 4th century to compare

with his fecundity and depth of knowledge.

Most of his works are exegetical, as (On the

Creation of Man* ; (The Work of the Six

Days) ; <The Defence of the Hexaemeron* ;

(On the Witch of Endor* ; 2 books on the

Psalms, 8 homilies on Ecclesiastes, 15 homilies on the Canticle of Canticles, 5 homilies on the Lord's Prayer, and 8 homilies on the Beatitudes.

In the field of metaphysics and theology, the

works of Gregory merit particular attention,

as (Against Eunomius* ; (Against Apollinaris* ; (Grand Catechism* ; (Against Tritheism* ; (On

Faith) ; (Dialogue with Macrina) (his sister),

and others. An _ ascetic spirit animates three little works dealing with the meaning of the

Christian name and the purpose of Christian

life, and another work (On Virginity,* which

gives the principles of right living. Gregory's discourses reflect the style of the time, although they do not contain the eloquence of his name¬

sake of Nazianzus. Chief among these dis¬

courses are the funeral orations on his brother, Basil, and Meletius and his panegyric on Greg¬

ory of Neocaesarea (q.v.). Only 26 letters of

Gregory have come down to us. His writings

are best collected in Migne's (Patrologia

Graeca.* His feast in the Western Church is

observed 9 March.

Bibliography.— Venables, Edmund, <Gregorius (15) Nyssenus) (in Smith and Wace, (A

Dictionary of Christian Biography, * Vol. II,

London 1880) ; Rupp, J., (Gregors, des Bischofs von Nvssa, Leben und Meinungen) (Leipzig

1834) ; Bardenhewer, Otto, (Les Peres de

l'Eglise; leurs Vies et leurs Oeuvres) (tome 2, Paris 1898) ; Chevalier, Utysse, (Bio-Bibliographie) (Paris 1905).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GREGORY, Saint, of Tours (originally

called Georgius Florentius), historian of the

Franks: b. Arverni, the modern Clermont-Fer¬

rand, France, 30 Nov. 538 or 539; d. Tours,

17 Nov. 593, or 594. He belonged to one of

those families which called themselves sena¬

torial and which formed the aristocracy of

Gaul. After his father's death he was piously

taught by his parental uncle, Saint Gallus,

bishop of Clermont, and the priest Avitus, who succeeded to that see. Being of very poor

health, he made a pilgrimage to Tours in 563

in the hope of curing a serious illness on the tomb of Saint Martin and his hopes were real¬

ized. In 573, while at the court of Sigebert I, king of Austrasia, he received the news of his election to the see of Tours by the clergy and people of that city who had had an opportunity to recognize his worth from his 10 years' sojourn in their midst as a pilgrim. Venantius Fortunatus celebrated his elevation in a congratu¬

latory poem, whose praises were fully justified by subsequent events. As a pastor of souls

Gregory was devoted to his flock and, in spite 450

of the perils and difficulties of the times, he was prudent as well as courageous in protecting the city of Tours, which at that time was the religious centre of Gaul. He successfully op¬

posed Chilperic, and, after the latter's death in 584, he enjoyed one of the principal roles in the Frankish empire under Guntram, and espe¬

cially under Childebert II, whose particular con¬

fidence he possessed. Though an active par¬

ticipant in the political and civil life of his times, Gregory did not cease to be an earnest and fecund writer. Besides the 10 books of

his (Historia Francorum,' which won for him

the merited appellation, <(the Herodotus of the Franks,® he is the author also of seven books of (Miracles,' a book on the lives of the

Fathers, a commentary on the Psalter, a book

on ecclesiastical offices and two other theologi¬

cal works. In the preface to his (History '

the author states his intention of transmitting to posterity the knowledge of contemporaneous

events. So beginning with the fifth 'book

his (History' is in reality a series of memoirs.

The first book begins with the creation of the world and glides rapidly over the centuries up to the death of Saint Martin (397). The sec¬

ond book contains the history of the Church

and of barbarism in Gaul; the largest place

herein is devoted to the founder of the Frank¬

ish monarchy, Clovis. The third book stops at

the death of Theodebert I (548) and the fourth at the death of Sigebert I (575), bringing in some of the author's own recollections. The

fifth and sixth cover the years 575 to 584 and the remaining four books retrace in detail the years 584 to 585 with a brief summary of the other years up to 591. Gregory is entirely him¬

self when he comes to tell of the events of his own time and he does not forget to mention

the part which he took in them. As an his¬

torian Gregory merits great confidence and

esteem, but he is not an historian in the modern sense of the word. He does not study the

connection between events nor analyze their

causes, but contents himself with recording and describing that which he knew so well. Apart

from the local color and the lives of prominent persons, the natural simplicity and naivete of

the author give to his work a charm and an

attraction which more than compensate for

the weaknesses of his plan and execution and

the defects in his style. Moreover, because of the impossibility of duplicating the material in other sources, it has been said that the (Historia Francorum' is <(one of the most precious of all historical

literature.® Gregory's complete works have been published in Migne's (Patrologia Latina.' The best edition of his (His¬

tory } is in the (Monumenta Germanise

Historical

Bibliography. — Buchanan, Thomas R.,

(Gregorius (32) Turonensis) (in Smith and

Wace, (A Dictionary of Christian Biography,'

Vol. II, London 1880) ; Lobell, J. W., (Gregor von Tours und seine Zeit) (2d ed., Leipzig

1869) ; Bonnet, Max, (Le Latin de Gregoire de Tours' (Paris 1890) ; Chevalier, Ulysse, (Bio-Bibliographie' (Paris 1905).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GREGORY I, Saint, Pope (590-604), surnamed <(the Great": b. Rome, about 540; d.

there, 12 March 604. Being the son of a

wealthy patrician, he naturally embraced a po¬

litical career and was named prsetor of Rome

by the Emperor Justin II. The charm of power

and terrestrial grandeur seems to have stifled in the soul of the young man the first attractions to the religious life, but he finally heeded the

call of grace, sold the goods of his great in¬

heritance and applied the proceeds to the alle¬

viation of the poor and the founding of seven monasteries, six in Sicily and the seventh in

Rome, on the present Monte Coelio in the house wherein he was born. In this monastery he be¬

came a monk of the Benedictine rule and ob¬

served it with such austerity that his health, not delicate, was ruined and his life threatened. In the years that followed he always longed for

the cloister and the return of those happy days.

The Pope soon removed him from his cell to

name him one of the seven cardinal deacons

(regionarii) and shortly afterward Pelagius II entrusted to him the difficult and honorable

charge of apocrisiarius or nuncio to the Em¬

peror Tiberius at Constantinople. Upon the

completion of this mission he re-entered his

monastery where soon after he was chosen ab¬

bot. The sight of some young Anglo-Saxons

in the slave-market inspired in him the idea of setting sail for England and taking to that peo¬

ple the benefits of Christianity and of civiliza¬

tion. He had already, with the approval of

the Pope, left Rome in secret, when a riot con¬

strained Pelagius II to recall by courier the

benefactor of the city and the idol of the Roman people. Pelagius died in 590 and the unanimous votes of the senate, the clergy and the people immediately raised Gregory to the pontifical

chair. He spared nothing to escape it. But

since the Emperor of the East, Maurice, had

confirmed the election, the people conducted

him in triumph to Saint Peter's and he was

consecrated 3 Sept. 590. At this time Italy was the prey of floods, pestilence and famine ; the Lombards were plundering with fire and sword ;

the ecclesiastical province of Milan persisted

in schism which the condemnation of the

Three Chapters had evoked ; the schism of Photius and of Michael Cerularius was already

casting its shadow ; and the civilized world

seemed upset to its very foundation. Few

popes or rulers have united in an equal meas¬

ure charity and grace with firmness and energy.

No Pope perhaps had a more sublime concep¬

tion of his mission or more completely realized that conception. Gregory displayed great zeal

for the conversion of heretics, the advancement of monachism and the rigid enforcement of

celibacy among the clergy; and there was noth¬

ing in which the Church was concerned that he deemed too small to lie beyond the sphere of

his personal interest and action. Although the

Patriarch of Constantinople, John the Faster,

took the arrogant title of <(ecumenical patri¬

arch,® Gregory, though disputing that title, con¬

tented himself humbly with that of ((servant of the servants of God.® To him is accredited the foundation of the temporal sovereignty of the

Holy See and the power of the popes in the

Middle Ages, although he never failed to show

proper respect for the emperor. The well-known work of Gregory is the conversion of

that England whose apostle he had failed to

be and to which he had sent Augustine, the fu¬

ture Archbishop of Canterbury, together with

40 other monks of Monte Coelio. He lived to

see the complete success of this enterprise. In his last years, Gregory was almost constantly

confined to bed by sickness and could scarcely raise up to celebrate the Holy Sacrifice on

great feast days. He, who is acknowledged tc

have been one of the greatest of all the suc¬

cessors of Saint Peter, died 12 March 604, and the anniversary of his death is celebrated as a duplex feast in the Latin Church. Nothing

proclaims more vividly the genius of Gregory

and reflects more faithfully his activity than

his (Registrum epistolarumP a collection of his official correspondence, of which 848 letters in all are extant. From these one gets as it were a birdseye view of the statesman, the talent of the

administrator and the indefatigable zeal of the bishop. The best edition of this work is

that of Ewald and Hartmann in the (Monumenta Germanise Historical The duties of the

sacred ministry is explained in the celebrated

Giber regulse pastoralis,* written about 591.

and dedicated to John, Archbishop of Ravenna,

who had reproached the Pope with having tried

to avoid the supreme dignity by flight. Greg¬

ory justifies himself by the example of Saint

Gregory of Nazianzus and Saint Chrysostom

noting the grandeur and difficulties of the pas¬

toral ministry. The book contains four parts :

the first outlines the conditions requisite for the priesthood; the second depicts the life of the true pastor; the third (the largest and most important part) traces the rules of preaching;

and the fourth (a single chapter) invites the

pastor to enter into himself every day. The

book had an extraordinary success, was trans¬

lated into Greek by Anastasius II, Patriarch or Antioch, and into West-Saxon by King Alfred

the Great (901). King Alfred's version has

been edited by H. Sweet (London 1871) in the

Publications of the Early English Text

Society.* About equally successful were the

four books of (Dialogues,* dating from the

years 593-94 and treating of the life and mira¬

cles of the holy persons of Italy, including es¬

pecially Saint Benedict, and' the survival oi the soul after death. This work was copied and

translated and spread throughout the world.

Extracts of this work appear in the <Monumenta Germanise Historical Another import¬

ant work was Pxpositio in librum Job sive

Moralium libri XXXV, * begun during the nun¬

ciature at Constantinople and finished after he became Pope ; this involves a threefold plan :

a literal or historical explanation, a mystical explanation and a moral explanation. Besides

these, Gregory composed 22 homilies on Ezechiel in two books, 40 homilies on the Gospels in two books, the Gregorian Sacramentary, and

in all probability eight or nine hymns. Many

other works are attributed to *him, which are

probably spurious. The ancient tradition which

reserves to Gregory the honor of having defi¬

nitely fixed the liturgical chant, (Cantus Gregorianus,* seems indisputable. (See Gregorian

Chant). Gregory is represented in art with a

dove above his head, due to the well-known

story of Peter the Deacon that a dove rested

on his head when he was composing the homi¬

lies on Ezechiel. The complete works of Greg¬

ory have been reprinted in Migne's (Patrologia

Latina) and translations of selected letters and the book on pastoral

care are in the (Nicene

and Post-Nicene Fathers.)

Bibliography. — Saint Gregory of Tours,

(Historia Francorum* (Bk. X) ; Giber Pontifi—

calis,* (2 vols., ed. L. Duchesne, Paris 1886-92) ; a life of Gregory written by a monk of Whitby (ed., F. A. Gasquet, Westminster 1904) ; lives by Paul the Deacon and John the Deacon; Chevalier, Ulysse, Gio-Bibliographie* (Paris

1905); Dudden, F. H., Gregory the Great:

His Place in History and in Thought* (2 vols., London 1905) ; Lau, G. J. Th., Gregor I des

Grosse* (Leipzig 1845) ; Barmby, James, Gre¬

gorius (51) P (in Smith and Wace's (A Dic¬

tionary of Christian Biography,* Vol II, Lon¬

don 1880) ; Mann, H. K, Gives of the Popes

in the Early Middle Ages* (Vol. I, London

1902); Snow, A., (Saint Gregory the Great:

His Work and His Spirit J (London 1892).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GREGORY II, Saint, Pope (715-731) :

b. Rome, year unknown ; d. there, 10 Feb. 731.

He is said to have been educated in the Lateran palace under Pope Sergius I and a Benedictine

monk. After reaching the diaconate, he was

chosen by his predecessor, Pope Constantine I,

to accompany him to Constantinople, where he

displayed his learning and ability by satisfac¬

torily answering certain questions put to him

by the emperor, Justinian II. It was not long after Gregory's elevation (19 May 715) before

he began to exhibit his great missionary zeal

toward Germany. The conversion and subjec¬

tion to the Roman see of the German races by the English missionary, Saint Winfrid, or Boni¬

face, as he was afterward called, may be at¬

tributed in great measure to Gregory's approval and encouragement. It was during Gregory's

reign also that the iconoclastic controversy com¬

menced between the pope and the emperor,

Leo III, known as the Isaurian or the Icono¬

clast. The popes at this period were still sub¬

jects of the Eastern emperors, coming directly

under the emperor's representatives, the exarchs of Ravenna. In 726 Leo published his first

iconoclastic edict which forbade the worship of images by genuflexions and the like and ordered them placed high on the walls of the church.

A second edict in 730 provided for the absolute destruction of all

images and the whitewashing

of the walls of the church. A long series of insurrections and plots, some of which were

directed against the Pope's life, followed, in¬

volving especially the Lombards under Luit—

prand, who seems to have played fast and loose with both sides. Despite all provocation, Greg¬

ory never swerved in his loyalty to the em¬

peror, as is evidenced, for example, by the

fact that, when Ravenna fell into the hands of the Lombards, about 727, it was partly by the Pope's exertions that Ravenna was saved to the Byzantine Empire for a year or two longer.

However, Gregory was in duty bound to oppose

all efforts to destroy an article of faith. From tfie two famous letters of condemnation sent

by him to Leo it is evident that the independent temporal authority of the popes, which in fact began with Gregory, was consciously felt by

him. Gregory is also noted for the restoration of churches ruined by the Lombard ravages and

the re-establishment of neglected monasteries,

particularly Monte Cassino. His biographers

say that he was pure of life and resolute in 452

GREGORY III

GREGORY VI

will. About 15 or 16 of his letters are extant.

His feast in the Roman calendar is 13 February.

Bibliography. — The earlier writers are Anastasius Bibliothecarius, Paulus Diaconus, Bede and Theophanes ; the letters of Saint Boniface are important for that side of Greg¬ ory's life; Mann, Horace K., (Lives of the Popes in the Early Middle Ages) (London 1902) ; Barmby, James, (Gregorius (52) IP (in Smith and VVace, (A Dictionary of Chris¬ tian Biography,) Vol. II, London 1880) ; Che¬ valier, Ulysse, (Bio-Bibliographie > (Paris 1905).

Herbert F. Wright,

Sometime of the Department of Latin, The Catholic University of America.

GREGORY III, Saint, Pope (731-741): b. Syria, year unknown; d. Rome, November or December 741. He succeeded Gregory II in March 731, having been elected by accla¬ mation while attending the obsequies of his oredecessor, whose policies he continued during

his entire reign. He remonstrated with the

emperor, Leo III, only to have his emissaries

mistreated. As a result two synods were suc¬

cessively (731 and 733) held in Rome, in which the iconoclastic heresy was condemned. Like

his predecessor, Gregory gave support and

encouragement to Saint Boniface, whose efforts

to propagate the Catholic faith among the

German nations were meeting with great suc¬

cess. It was from this Gregory that Boniface

received the pallium. The encroachments of

the Lombards in Italy had now become so for¬

midable that Gregory sent in success'on two

embassies to Charles Martel, the second of

which promised the leader of the Franks the

title of Patrician and Consul of Rome in re¬

turn for his help against the Lombards. Char¬

les thereupon sent two emissaries to Rome

and after their arrival the Lombards withdrew

their troops and ceased from hostilities. The

death of Charles, which was followed shortly

after by that of Gregory, prevented any further immediate results. It is significant, however,

that in this way the first step was taken toward the transference of Rome politically from the

suzerainty of the Eastern emperors to that of

the Frankish rulers of the West. Gregory's

biographers say that he was well versed in

Latin and Greek and the Holy Scriptures as

well as p'ous and charitable. November 28 is

his feast in the Roman calendar. Consult

works mentioned under Gregory II ; Barmby,

James, Gregorius (53) IIP (in Smith and

Wace, (A Dictionary of Christian Biography, >

Vol. II, London 1880).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GREGORY IV, Pope (827-844) : b. Rome;

d. 25 Jan. 844. He was renowned for his

learning and piety and through the influence

of the Roman nobility was elected successor to Valentinus late in the year 827. Because of

a dispute with Louis the Pious, it was not until March 828 that Gregory assumed the active

duties of Pontiff. Gregory's reign was troubled with the quarrels between Lothair and Louis

the Pious. Gregory favored Lothair at first

but the latter's treachery soon made the Pope

attach his fortunes to the old Emperor Louis.

After the latter's death Lothair became em¬

peror, but was soon after defeated at Fontenay (Fontenoy-en-Puisaye). The Saracens men¬

aced Italy, occupied Sicily and to safeguard

Rome Gregory fortified Ostia. He repaired

aqueducts and churches, nominated Saint Ans—

char first archbishop of Hamburg and legate to the Danes, Swedes and Slavs. Gregory gave

the pallium to the archbishops of Salsburg, Can¬

terbury and Grado. During his pontificate the

observance of the feast of All Saints was made general. Consult Mann, (Lives of the ˆopes

in the Early Middle Ages) (Vol. II).

GREGORY V, Pope (996-999) : b. about

970; d. 4 Feb. 999; sometimes styled Bruno of Carinthia. He was nephew of the emperor

Otto III and through his influence was chosen

first German Pope, and at the age of 26 suc¬

ceeded John XV in 996. He crowned his rela¬

tive Otto emperor on 21 May 996 and during

his entire reign was in absolute concord with

his imperial uncle. In the absence from Rome

of the latter, Crescentius set up an antipope, John Philagathus, an Italo-Greek, as John XVI.

Gregory threatened Robert, king of France,

with excommunication if he did not repudiate Bertha, whom he had married, although related to him within the forbidden degrees. Robert yielded at length. On the return of Otto to Rome, the antipope was publicly degraded and deported to Germany. Crescentius was hanged. Gregory bestowed his own pallium on Arch¬ bishop Aelfric of Canterbury. This Pope died suddenly and there was a suspicion of foul play. Consult Mann, (Lives of the Popes) (Vol. IV).

GREGORY V, ecumenical patriarch of the Greek Church : b. Dimitzana, Arcadia, Greece, 1739; d. Constantinople, 1821. His original name was Georgios Angelopulus, and he took his ecclesiastical name on entering the monas¬ tery on Mount Athos, where he received his theological training. He was appointed arch¬ bishop of Smyrna in 1784 and patriarch of Constantinople in 1795. When the French in¬ vaded Egypt in 1798, the national spirit of Greece was aroused by hopes of deliverance from the Turk'sh yoke. Suspicions of conspir¬ acy fell upon Gregory and the Turks clamored

for his head. Sultan Selim therefore banished

him to Athos, but he was soon afterward

reinstated in his see. In 1821 the Greeks of the Morea revolted and 21 March banishment was

proclaimed against all who took part in the

rebellion. Gregory had been put in charge of

the family of Prince Murusi, who without the

patriarch's connivance had been permitted to

escape by the Russian ambassador. On Easter

morning, 22 April 1821, by command of the

sultan Gregory with three bishops and eight of the clergy were hanged in front of the basilica.

Three days later the Jews threw his body into the sea, where if was recovered by Greek sailors and carried to Odessa. The Greeks looked

upon their murdered archbishop as a martyr,

his bones were placed by the government in the cathedral at Athens and his statue was raised

in front of the university. Among his writings is a translation of Saint Paul's epistles into modern Greek, with a commentary.

GREGORY VI, Pope (1045-1046) : date of

birth unknown; d. 1047. As John Gratian, arch¬

priest of Saint Johns, he was renowned for

learning. In 1045, Benedict IX, a libertine,

wished to marry and, going to Gratian, offered GREGORY VII

to resign the papacy for a large sum of money.

Gratian, in all good faith, wishing to rid the Church of such an unworthy head, paid the

stated sum to Benedict and became pontiff in

his stead as Gregory VI. His reign was trou¬

bled, however, by the machinations of the anti¬

pope Sylvester III (John of Sabina) and by

Benedict IX, who soon wished to re-establish

himself as head of the Church. Nevertheless,

Gregory did much to bring about civil and re¬

ligious order by force of arms, by letters and by councils. Henry III was invited by some

members of the clergy and laity to come to

Italy and restore order. Late in 1046 he ar¬

rived and was met by Gregory, who at the

emperor's request summoned a council to meet

at Sutri. Sylvester's claim was denied, he was condemned as a usurper and sentenced to im¬

prisonment for life in a monastery. Benedict's

claim was denied as he had voluntarily resigned the Papacy. Gregory, upon being informed that

by paying Benedict for the Papacy he had been guilty of simony, voluntarily resigned, and

with his chaplain Hildebrand (afterwards Greg¬

ory VII, q.v.) accompanied Henry to Ger¬

many, where he died soon afterward. Consult

Mann, (Lives of the Popes) (Vol. V).

GREGORY VII, Saint, Pope (1073-1085) :

b. Soana, a little village in Tuscany, between 1020 and 1025 : d. Salerno, 25 May 1085. Little is known of his family or early life except that he was of humble origin, but his name, Hilde¬

brand or Hellebrand, seems to point to a Ger¬

manic origin. At an early age he went to Rome to be educated at a monastery, where he prob¬

ably first imbibed the lofty principles of Church reform he afterward advocated. It was here

that he made his religious profession as a Bene¬

dictine monk. When John Gratian became

Pope as Gregory VI, Hildebrand became his

chaplain, though but in minor orders, and fol¬

lowed him into exile across the Alps when his title to the papacy was questioned as simoniacal.

Hildebrand remained with him at Cologne until

his death in 1047, when he withdrew to Cluny, where he resided for more than a year. When

Bruno, bishop of Toul, was nominated Pope by

the emperor and diet in 1048, Hildebrand ac¬

companied him to Rome, having persuaded him

to lay aside the insignia of his office until he should be canonically elected by the clergy and people of Rome. This was Hildebrand's first

step toward the emancipation of the Church

from secular control. Leo IX (Bruno) created

him a cardinal subdeacon and also appointed

him administrator of the Patrimony of Saint

Peter. In this position he gave prompt evidence of his extraordinary administrative ability. In

1054 Hildebrand was sent to France as papal

legate to examine the cause of Berengarius and while he was still at Tours Leo IX died. He

was suggested as Leo's successor, but, hasten¬

ing to Germany and interceding with the em¬

peror, he managed to have Gebhard, bishop of

Eichstadt, nominated, and the latter was con¬

secrated Pope as Victor II in 1055. Hildebrand's influence continued to increase under the pontifi¬

cates of Victor II (1055-57), Stephen X (1057—58), Nicholas II (1059-61) and Alexander II

(1061-73). The two most important transac¬

tions of Nicholas' pontificate — the celebrated election decree, by which the power of choosing the Pope was vested in the college of cardinals (a decree which with but few modifications re¬

mains in force to-day), and the alliance with

the Normans — were in large measure the

achievement of Hildebrand. Nicholas raised

Hildebrand to the archdiaconate of the Holy

Roman Church and his successor, Alexander,

made him chancellor of the Apostolic See.

Alexander died 21 April 1073 and on the fol¬

lowing day Hildebrand was unanimously elect¬

ed Pope by the cardinals, with the due consent of the Roman clergy and people, which at that time was necessary. However, he deferred

his

consecration until the emperor had approved

the election and, after having been ordained to the priesthood, he was consecrated as Gregory

VII, 29 June 1073. It was with great reluctance he undertook the great burden, a task whose

difficulties no one understood better than he

after his close connection with the papacy for 24

years. At the time of his accession, the whole world was given up to wickedness which had

even invaded the Church in the form of

simony and clerical incontinence. Gregory was

prompt in making every effort to stamp out

these vices, which were the natural result of

the right of investiture exercised by temporal

princes. Gregory's relations with the young

Henry IV were at first very harmonious, the

latter even writing to the Pope acknowledging

his past misdeeds, especially in violation of the rights of the Church. In 1074 Gregory started

his reform of the clergy by passing decrees

against simony and incontinence, a measure

which called forth violent opposition through¬

out Italy, Germany and France. In Germany

particularly indignation was aroused and the

greater number of bishops received their in¬

structions with manifest indifference ; some

openly defied the Pope. In France the storm

was scarcely less vehement. Gregory, how¬

ever, did not hesitate to follow up his decrees by sending legates into all quarters, fully em¬

powered to depose immoral and simoniacal

clerics. In 1075 another decree was passed for¬

bidding the clergy, under penalty of forfeiting their offices, from receiving investiture of any ecclesiastical dignity from the hands of a lay¬

man, and at the same time forbidding the laity, under penalty of excommunication, to attempt

the exercise of investiture of the clergy. In

keeping with this decree, Gregory deposed the

simoniacal prelates appointed by Henry. The

latter refused to obey this decree, and Gregory, in 1076, issued a new decree summoning the

emperor before a council at Rome, to defend

himself. Henry then caused a sentence of dep¬

osition to be passed against the Pope by a Ger¬

man council assembled at Worms. The Pope,

in return, excommunicated the emperor and all

his ecclesiastical supporters, and released all his subjects from their oath of allegiance. Aban¬

doned by his own partisans and to escape being deposed by the Pope, Henry fled across the Alps in the dead of winter to Italy, where he sub¬

mitted at Canossa (1077) to a humiliating pen¬

ance. Mindful of Henry's former faithlessness,

Gregory compelled him to wait three days at the gate to the castle in the garb of a penitent be¬

fore he received and absolved him. All this did not change Henry's conduct, so that the Ger¬

man princes elected Rudolph of Suahia to suc¬

ceed him and in 1080 Gregory renewed the sen¬

tence of excommunication against him, because

of a threat to create an antipope. Henry car¬

ried his threat into effect by causing the Pope to be deposed by the Council of Brixen and by selecting Guibert, the excommunicated simoniacal archbishop of Ravenna, as Pope under the

name of Clement III. After Rudolph's death,

Henry marched on Rome and after three years

finally forced his way into the city in 1084.

Gregory had retired to the castle of Saint An¬

gelo, where he refused Henry's overtures and

remained a virtual prisoner. Guibert was con¬

secrated Pope and thereupon crowned Henry

emperor. Gregory was liberated by Robert

Guiscard, Duke of Normandy, but was com¬

pelled to flee Rome because of the excesses of his Norman allies. He withdrew to Monte Cassino and later to Salerno, where he died in the following year. Gregory's character was ar¬

dent and unyielding. In the pursuit of his ends in guarding the liberties of the Church he

spared neither friend nor foe. He carried out

his ecclesiastical reforms with unbending rigor.

He vigorously prosecuted those of the clergy

who broke the law of celebacy, and in his re¬

lations wth the emperors vindicated the spiritual authority of the Church as independent of the

secular power. He was the first Pope to at¬

tempt to depose a temporal prince. This and

his rigorous zeal for reform may account for

the fact that few men have been more differ¬

ently judged by their contemporaries and by

posterity than he. By his enemies he has been represented as an ambitious man, who aimed at

universal dominion, both civil and ecclesiastical, reckless of the means of attaining his object.

His great idea was to purify the Church and

through its agency to reform and civilize soci¬

ety, and his acts were just such as the condi¬

tion of the times required for the attainment of these two great purposes. The chief fault of

his critics is that they have judged his conduct by the ideas of the present day instead of by the conditions of the times in which he lived.

One need only read his correspondence to learn that it all breathes far higher motives than that of worldly ambition. The key to his entire

character may be found in the last words at¬

tributed to him: (<I have loved justice, I hate iniquity, therefore I die in exile.® Gregory VII was beatified by Gregory XIII in 1584 and can¬

onized by Benedict XIII in 1728. The anni¬

versary of his death is a duplex feast in the Roman calendar. Gregory's letters, which treat

of the principles and practice of Church govern¬

ment are to be found in Mansi and Horoy (see list below).

Bibliography. — Barry, (The Papal Mon¬

archy } (New York 1902) ; Bowden, (The Life

and Pontificate of Gregory VIP (2 vols., Lon¬

don 1840) ; Dularc, (Gregoire VII et la re¬

forme de l'Eglise au XIe siecle) (Paris 1889).; Horoy, (S. Gregorii VII epistolae et diplomata ; accedunt vita ejusdem pontificis et appendices

amplissirrue veterum et recentium monumenta,

perplurima Gregorii apologetica, complectentes)

(2 vols., Paris 1877) ; Mann, (The Lives of the Popes in the Early Middle Ages) (Vol. V, Lon¬

don and Saint Louis 1909) ; Mansi, (Sacrorum

Conciliorum nova et amplissima collectˆ

(Florence 1759) ; Voigt, Hildebrand, als Papst

Gregorious VII, und sein Zeitalter, aus den

Quellen bearbeiteP (2d ed,, 2 vols., Weimar

1846; French trans., with introd. and notes, by Jager, 4th ed., Paris

1854) ; Watterich, (Pontificum Romanorum vitae ab exeunte saeculo IX

ad finem saeculi XIII, ab aequalibus conscriptae) (2 vols., Braunsberg 1864) ; Chevalier, (Bio-bibliographie> (Paris 1905).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GREGORY VIII (Alberto di Morra),

Pope (1187) : b. Benevento, about 1100; d. Pisa, 17 Dec. 1187. He received a good education,

entered a monastery and was made cardinal in

1155 by Adrian IV. He was sent to England

by Alexander III to report the circumstances

surrounding the murder of Saint Thomas a

Becket. Alberto was of a gentle and mild dis¬

position and after his elevation to the Papacy tried to effect a reconciliation with Barbarossa.

Just previous to his election the Holy Land fell under the complete sway of the Moslems and

the new Pope exhorted the Christian princes to undertake a new crusade for the reconquest of

the holy places. This Pope absolved Henry II

of England for the murder of Becket. Consult

Nadig, (Gregoro VIII 57 tagiges PontifikaP

(Basle 1890),

GREGORY IX (Ugolino, Count of Segni), Pope (1227-1241) : b. Anagni, about 1145; d. Rome, 22 Aug. 1241. He was educated at

Paris and Bologna and in 1298 was created car¬

dinal-deacon of Sant' Eustachio. In 1207 he

was sent as papal legate to Germany and ac¬

complished a similar mission two years later.

During the pontificate of Honorius III Ugolino

was despached on several diplomatic missions

to northern Italy and in 1221 was commissioned to preach a crusade. On 19 March 1227 Cardi¬

nal Ugolino was elected to the Papacy and as¬

sumed the name of Gregory IX. The principal

events of his pontificate were the various inci¬

dents of his contest with the great emperor

Frederick II, whom he four times excommuni¬

cated, absolving his subjects from their alle¬

giance, and proclaiming a crusade against him.

Gregory was worsted in this conflict and from

1228 to 1230 was a fugitive at Perugia. Peace with Frederick was concluded 1-3 Sept. 1230. It was not a lasting peace, however ; in 1237, an¬

gered by the actions of Frederick, Gregory

formed an alliance with the Tuscans, Umbrians

and Lombards and a gigantic struggle between

the empire and papacy was soon being waged.

Gregory IX was a great friend of the mendi¬

cant orders. He canonized Saint Francis of

Assisi, one of the glories of the Church. Greg¬

ory also aspired to heal the breach with the

Eastern Church and initiated negotiations to

bring about that object. The obstinacy of the

Greeks rendered his efforts futile. Perhaps his greatest achievement was the collection of the

papal decretals, completed in 1234. Consult (The Catholic Encyclopedia > (New York 1914) ;

(Vita Gregorii IX) (in Muratori, (Rerum Itali—

carum Scriptores,* Milan 1728) ; Balan, (Storia di Gregorio IX e dei sui tempi* (3 vols., Mo¬

dena 1872-73).

GREGORY X (Teobaldo Visconti), Pope

(1271-1276): b. Piacenza, 1210; d. Arezzo, 10

Jan. 1276. He was for some time in the service of Cardinal Jacobo; was made archdeacon of

Liege and accompanied Ottoboni to England.

After the death of Clement IV, in 1268, the

Holy See was vacant for nearly three years,

the cardinals being divided into two national

groups, French and Italian. Teobaldo Visconti,

at the time of his election (1 Sept. 1271) was not even a priest and was at Acre with Prince Edward of England, on a pilgrimage to the

Holy Land. He returned home, entering Rome

13 March 1272; was ordained priest on the 19th and consecrated Pope on the 27th. He at once

set about the establishment of peace between

Christian rulers and summoned a general coun¬

cil to meet at Lyons 1 May 1274. Gregory rec¬

ognized Rudolf of Hapsburg as emperor, thus

setting aside the claims of numerous rivals of Rudolf. Gregory caused great sums to be col¬

lected for a crusade, which, however, was not

carried out.. (See Lyons, Councils of). Con¬

sult Bonucci, Hstoria del pontefice Gregorio X}

(Rome 1711) ; and Hefele, (Konzilienge—

schichte> (Vol. VI).

GREGORY XI (Pierre Roger de Beau¬

fort), Pope (1370-1378) : b. Maumont Castle,

near Limoges, 1331 ; d. Rome, 27 March 1378.

His uncle, Clement VI, granted him several

benefices and made him cardinal in 1348. He

studied at Perugia and became deeply learned

in canon law and theology. On 30 Dec. 1370

he was elected Pope at Avignon in succession

to Urban V ; was ordained priest on 4 Jan. 1371

and crowned Pope as Gregory XI on the fol¬

lowing day. He tried to effect a union with the Eastern Church ; executed several reforms and

undertook a crusade. His pontificate was trou¬

bled with the state of affairs in Italy. Gregory made war on Duke Bernabo, Visconti of Milan,

and with the aid of the emperor, the king of Hungary, the Queen of Naples and the Eng¬

lishman, John Hawkwood, compelled Bernabo

to sue for peace in 1374. Florence was laid

under interdict and its inhabitants outlawed be¬

cause of its having instigated revolts in the

Papal States. Saint Catherine of Siena was

sent to Gregory to intercede for the Floren¬

tines. Saint Catherine induced Gregory to

abandon Avignon and remove to Rome, and on

17 Jan. 1377 he entered the city. Gregory was the last Pope of French nationality. He was a learned man and full of zeal, though not free from nepotism. Consult Drane, (History of

Saint Catherine of Siena) (New York 1899).

GREGORY XII (Angelo Corrario, now

Correr), Pope (1406-1415) : b. Venice, 1327; d.

Reconati, 18 Oct. 1417. In 1380 he became bishop of Castello, in 1390 titular patriarch of Con¬

stantinople. In 1405 he was elevated to the car-dinalate. On 30 Nov. 1406 he was chosen to

succeed Innocent VII and assumed the name

of Gregory XII. The antipope Benedict XIII

was at this time installed at Avignon and Greg¬

ory agreed to resign if Benedict would do like¬

wise. Both Gregory and Benedict wavered and

gave indications that they were unwilling to

lay aside the tiara. As a result some of Greg¬

ory's cardinals met with the cardinals of Bene¬

dict and agreed to convene a general council at Pisa at which both pontiffs should be deposed.

The council deposed Gregory on 5 June 1409

and elected Alexander V. Gregory was still

recognized by many princes. On 4 July 1415 at a session of the Council of Constance Gregory, through his proxy, resigned the papacy, and by the cardinals he was made bishop of Porto and perpetual legate at Ancona. Consult Salembier,

(The Great Schism of the West* (New York

1907).

GREGORY XIII (Ugo Buoncompagno),

Pope (1572-1585): b. Bologna, 7 Jan. 1502; d.

Rome, 10 April 1585. He studied law at the

University of Bologna, receiving the doctorate

in both laws in 1530, and afterwards taught

jurisprudence there for some years. He was

the recipient of various eccleciastical appoint¬

ments from Paul III, Julius III and Paul IV in succession. The latter sent Gregory as his con¬

fidential deputy to the Council of Trent, where he had been in 1545 as one of Paul Ill's jurists.

On his return thence he was created cardinal

priest in 1564 and on the death of Pius V was elected pope on 13 May 1572. Although his

youth had not been spotless, he realized the

responsibilities of his high position and was

active in church reforms, pledging himself to

carry into execution the decrees of the Council of Trent, and was extremely zealous in the

promotion and improvement of education. He

founded numerous colleges and seminaries at

Rome and elsewhere, even as far away as Japan, and put most of them under the direction of

the Jesuits, whose rapid spread during his

pontificate was greatly due to his encourage¬

ment and financial assistance. Gregory's name,

however, is especially associated with the re¬

formation of the Julian calendar (see Calen¬

dar) which was the result of long consideration and was introduced in most Catholic countries

by the bull of 24 Feb. 1582. Under his care was published also a new and greatly improved

critical edition of the (Corpus Juris Canonici,*

a project which had been inaugurated by Pius

IV shortly after the conclusion of the council of Trent. Gregory's efforts to secure religious liberty for Catholics in England, partly through expeditions to Ireland, were without avail, al¬

though he was strongly supported by Philip II

of Spain. The large sums of money expended

by Gregory in his many benefactions reduced

the papal treasury to such an extent that he felt constrained to confiscate various castles and

properties in the papal dominions upon one

pretext or another, thereby producing a state of unrest and disfavor which finally led to blood¬

shed and banditry only suppressed by Gregory's

successor, Sixtus V. Gregory has been the

object of severe criticism for his celebration

in Rome of the horrible massacre of the Hugue¬

nots on Saint Bartholomew's Day in 1572. It

must be remembered, however, that even if he

was at that time aware of the circumstances of the massacre (which is not at all evident), he did not rejoice at the bloodshed, but at the

suppression of a rebellion against the state as well as the Church. Contemporaries relate that

he even shed tears when he learned of the

massacre.

Bibliography. — Ciappi, (Compendio dell'
attioni e santa vita di Gregorio XIIP (Rome
1591); Palatius, ˆGesta Pontificum RomanonurP
(Venice 1688) ; Maffei,. (Annales Gregorii XIIP
(Rome 1742) ; Brosch, Moritz, (Geschichte des
Kirchenstaates) (Vol I, Gotha 1880) ; von
Ranke, Leopold, (Die romischen Papste5 (Eng.
trans. by Foster, (The History of the Popes, >
Vol. I, London 1906).

Herbert F. Wright.

Sometime of the Department of Latin, The
Catholic University of America,

GREGORY XIV (Niccolo Sfondrati),
Pope (1590-1591) : b. Somma, near Milan, 11
Feb. 1535; d. Rome, 15 Oct. 1591. He was edu¬
cated at Perugia and Padua and in 1560 was
made bishop of Cremona. He was present at the Council of Trent, 1561-63, and was elevated to the cprdinalate in 1583. On 5 Dec. 1590

he was elected Pope in succession to Urban VII. He

was a companion of Charles Borromeo and a

friend of Philip Neri, both since enrolled in

the canon of saints. Gregory was very pious

and upright, but was little versed in statecraft.

He opposed Henry of Navarre and assisted the

French League in its efforts to depose the

French king. In all this he was the uncon¬

scious tool of Philip II of Spain. On 18 April 1591 Gregory ordered that reparation wherever

possible be made to the Indians of the Philip¬

pines by the Spaniards and that all Indian

slaves in those islands be set free at once. Con¬

sult Ranke, 'History of the Popes5 (London

1906).

GREGORY XV (Alessandro Ludovisi),

Pope (1621-1623) : b. Bologna, 9 or 15 Jan. 1554; d. Rome, 8 July 1623. He was educated by the Jesuits at Rome and also at the University of Bologna. He was made judge of the capitol by

Gregory XIII; was made archbishop of Bo¬

logna by Paul V in 1612 and created cardinal in 1616. On 9 Feb. 1621 he was chosen successor

to Paul V. He promulgated a new regulation

concerning papal elections and introduced a se¬

cret ballot. In 1622 he established the Congregatio de Propaganda Fide, having charge of

missions all over the world. In the same year he canonized Ignatius of Loyola and Francis

Xavier, both of the Jesuit order, also Philip

Neri and Theresa, and the Spanish plowman,

Isidore. During the Thirty Years' War Greg¬

ory supported the emperor and aided the king

of Poland in his struggle with the Turks. His relations with England were more friendly than

had been those of his predecessors and through¬

out Europe a general leniency toward Catholics

was noticeable during his pontificate. Consult

'The Catholic Encyclopedia) (New York 1914) ;

and Ranke, 'History of the Popes5 (London

1906).

GREGORY XVI (Bartolommeo Alberto

Cappellari), Pope (1831-1846) : b. Belluno, in

Venetian territory, 18 Sept. 1765; d. Rome, 1

June 1846. At the age of 18 he entered the

Camaldolese order, taking the name Mauro,

and in 1787 he was ordained priest. In 1799

he published a work against the Italian Jansenists entitled (I1 Trionfo della Santa Sede,5

which ran through several editions in Italy and was translated into several other European

languages. In this book he upheld the infalli¬

bility of the pope and his temporal sovereignty.

After receiving a number of ecclesiastical ap¬

pointments, including the office of Vicar-General of his order, he was created cardinal by Leo

XII on 21 March 1825, and shortly after was

made prefect of the Congregation of Propa¬

ganda, a position which was in effect Minister of Foreign Affairs. As Prefect of Propaganda,

he was entrusted with the adjustment of a

concordat regarding the interests of the Belgian Catholics and the Dutch Protestants in 1827

and with negotiations with the Sultan looking

toward the emancipation of the Armenian

Catholics in 1829. On 2 Feb. 1831, after a con¬

clave lasting 64 days, he was unexpectedly

elected Pope to succeed Pius VIII. Being a

firm believer in autocracy, Gregory was opposed to even a minimum of democratic progress,

as were most of the rulers of his time. His

rule was a period of no ordinary interest and difficulty in the relations of the Vatican with the temporal powers of Christendom and per¬

haps he was not fully able to cope with these problems. In his public life, Gregory was very active in his conduct of affairs, although he

left the papal treasury in difficulties by his bad financial administration. This was due in part

to his liberal patronage of architecture, engin¬

eering, literature and art. In his private life,'

he was noted for his piety and his simplicity.

Bibliography. — Hergenrother, J., Cardinal,

‘Der Kirchenstaat seit der franzosischen Revo¬

lution5 (Freiburg 1860) ; Bernasconi, A. M.,

(Acta Gregorii Papae XVI5 (Rome 1901 et

seq.) ; Cambridge Modern History5 (Vol X,

Cambridge 1907) ; Wiseman, N., Cardinal,

(Recollections of the Last Four Popes and of

Rome in their Times5 (London 1858) ; Sylvain,

‘Gregoire XVI et son Pontificat5 (Lille 1889).

Herbert F. Wright,

Sometime of the Department of Latin, The

Catholic University of America.

GREGORY, Benjamin, English clergyman :

b. 1820; d. 1900. He received his education at Woodhouse Grove School ; was ordained a

minister in the Weslyan Methodist church in

1840; in 1869 became one of the connectional

editors, and from 1880-83 sole editor of the

church. He published (The Holy Catholic

Church, The Communion of the Saints5

(1873) ; ‘The Thorough Business-Man, Memoir

of Walter Powell5 (1872) ; (Side-Lights on the Conflicts of Methodism5 (1899).

GREGORY, Caspar Rene, American theo¬

logian : b. Philadelphia, 9 Nov. 1846; d. France, 9 April 1917. He was the son of Henry Duval

Gregory (1819-97) the American classical

educator; his great-grandfather was a French

soldier named Gregoire who had settled in

Santo Domingo about the middle of the 18th

century. On graduating from the University

of Pennsylvania in 1864 Gregory taught for

three years at a classical academy in Philadel¬

phia of which his father was principal 1845—

72. Meanwhile he studied at the reformed Pres¬

byterian theological seminary in that city and

later at Princeton theological seminary, whence

he was graduated in 1873. Here he assisted in the production of Professor Hodges’ Syste¬

matic Theology,5 revising manuscripts and

proof. In 1873 he went to Europe, visiting

England, Germany and Switzerland, continu¬

ing his studies in Leipzig, where he received

his Ph.D. degree and settled as pastor of the American chapel,

1878-79. In 1884 he was

attached to the theological faculty of the

University of Leipzig, becoming successively

privat-docent, professor extraordinary, and

ordinary honorary professor. During 1883 he

traveled through Europe visiting libraries and

universities to study Greek New Testament

manuscripts; on the same quest he later visited Greece, Mount Athos and Constantinople.

On the outbreak of the European War in 1914

Gregory, who had then been domiciled in Ger¬

many about 40 years, volunteered as a private

in the German army. He celebrated his 70th

birthday at the front on 9 Nov. 1916, when he was promoted to sergeant-major. On 9 April

1917 he was killed by a shell splinter which

penetrated the room where he was lying with a crushed leg caused by falling from his horse.

Gregory's contributions to theology were con¬

siderable, and numerous honors were conferred

on him. During 1898 and 1901, and again in

1911—12 he made a lecturing tour through the United States and Canada. In 1876 he be¬came assistant editor of Leipzig Theologische Literatur-Zeitnng. He was elected to the chair of New Testament Greek in Johns Hopkins University in 1885, but declined the appoint¬ment. In 1891 he became a member of the American Philosophical Society and received the degree of D.Th. at Leipzig in 1893. He translated Luthardt's (Origin of the Fourth Gospel5 into English and published (Les cahiers des mss. grecs) (1885) ; Prolegomena to Tischendorf's (Novum Testamentum Grsece) ; (Textkritik des neuen Testaments) (1900-09) ; {The Writings of Charles Weslsey5 (1910) ; (Vorschlage fiir eine kritische Ausgabe des neuen Testaments5 (1911).

GREGORY, Daniel Seelye, American clergyman and editor: b. Carmel, N. Y., 1832; d. 1915. He studied at Princeton College and Princeton Theological Seminary. After teach¬ing rhetoric at Princeton, and serving as pas¬tor in several places, he became professor of metaphysics and logic at Wooster University

in 1871. In 1875 he was appointed professor

of English literature at this institution, a posi¬

tion which he left in 1878 in order to accept the presidency of Lake Forest University where

he remained for eight years. He was manag¬

ing editor of the (Standard Dictionary5 (1890-94) ; editor of the Homiletic Review (1895—

1904) ; and managing editor of the (Bible

Student and Teacher5 (1904). He is the au¬

thor of (Christian Ethics5 (1875) ; <Why Four

Gospels?5 (1877) ; (The Tests of Philosophic

Systems5 (1886) ; (The Church in America

and its Baptisms of Fire5 (with S. B. Halliday, 1896) ; (The Crime of* Christendom5 (1900) ;

< Bible League, Prime No. I5 (1904) ; Con¬

structive Studies in John, the Gospel for the

Christian5 (1909).

GREGORY, Eliot, American painter and

author: b. New York, 13 Oct. 1854; d. New

York, 1 June 1915. He studied at Yale, ob¬

tained his education in art at Rome, and at

Paris as a pupil of Cabanel and Carolus-Duran, and exhibited both sculpture and painting at the salon. His pictures include genre works and

portraits, among the latter being those of Ad¬

miral Baldwin, Ada Rehan and August Bel¬

mont. Other well-known canvases by him are

(The Soubrette5 (1883) ; (Coquetterie5 (1884),

and Children.5 He was a chevalier of the

Legion of Honor and a director of the Metro¬

politan Opera Company and was a founder of

the New Theatre, New York. His books, pub¬

lished under the pseudonym <(An Idler,55 are

(Idler Papers5 : (Worldly Wavs and Bv-Ways*

(1898); and (The Ways of Men5 (1900), con¬

taining satirical observations on American life, especially that of plutocratic society.

GREGORY, Elisha Hall, American sur¬

geon : b. Logan Co., Ky., 1824 ; d. 1906. He received his doctor's degree from the medical

college at the Uniyersity of Saint Louis, prac¬

tised at Saint Louis ; and became professor of surgery at the Saint Louis Medical College,

Washington University, 1851. He was elected

president of the State Board of Health of

Missouri, of the Saint Louis Medical Society,

of the State Medical Association of Missouri

and of the American Medical Association

(1887).

GREGORY, Francis Hoyt, American

admiral: b. Norwalk, Conn., 1789; d. 1866. He

was appointed midshipman in the United States

navy in 1809, and during the War of 1812

was attached to the command of Commodore

Chauncey on Lake Ontario. He was captured

by the English in 1814 and confined till the

close of hostilities. He saw service in repress¬

ing the Algerine pirates (1815-16) and the

buccaneers of the West Indies (1821-23) ; took part in the Mexican War and commanded the

African squadron (1849-52). He retired with

the rank of rear-admiral in 1862.

GREGORY, Herbert Ernest, American

geologist: b. Middleville, Mich., 1869. After

studying at Yale University, where he received

his Ph.D. in 1899, he taught biology, physical geography and physiography there and suc¬

ceeded to the chair of geology in 1904. He

was appointed geologist on the United States

Geological Survey; served as associate editor

of the American Journal of Science; and was

one of the authors of (Physical and Commer¬

cial Geography5 (1910). His geological re¬

searches relate chiefly to the State of Connec¬

ticut.

GREGORY, Isabelle Augusta, Lady, Irish

authoress. She is the youngest daughter of

Dudley Persse of Roxborough, County Galway,

and in 1881 married Sir William Gregory, for¬

merly member of Parliament for County Gal¬

way and for Dublin, and Governor of Ceylon.

He died in 1892. Lady Gregory edited his let¬

ters two years later, and subsequently launched upon a literary career. In 1898 appeared (Mr.

Gregory's Letter-Box, } an edition of the letters of William Gregory, her husband's grandfather,

who had been undersecretary of State for

Ireland. About this time the movement which

came to be known as the Irish Literary Revival (q.v.) held the attention of all those who were interested in national literary history. Through her friendship with William Butler Yeats

(q.v.), Lady Gregory became deeply engrossed in this movement and soon occupied a conspicu¬

ous place in its promotion. Her first important contributions were her translations of (Cuchu-lain of Muirtemne5 (1902), and (Gods and

Fighting Men,5 in which she displayed that rare felicity in translation and keen sympathy with

her subject which became the distinguishing

characteristics of her later work. It was in

connection with the Irish Literary Theatre

(now the Abbey Theatre, Dublin) that Lady

Gregory's best talents were displayed. Her

lively dramatic sense and ability to render flu¬

ently the quaint turns of the Anglo-Irish idiom, combined with her rare judgment and mana¬

gerial ability were important factors in making the venture permanent. The story of the per¬

sons interested and of the struggle of the

theatre to maintain itself is told in her (Our Irish Theatre5 (1913). She rendered constant

assistance to Yeats, collaborating with him in

(The Unicorn and Other Plays) ; and also, if

George Moore's testimony can be accepted, in

(Kathleen ni Houlihan) and (A Pot of Broths

Besides these, she has made striking adapta¬

tions in the idiom from Moliere, under the title (The Kiltartan Moliere* (1910) ; from Sudermann's (Teja* (1908), and from Goldoni's

(Mirandolina) (1910). Her other works com¬

prise folk tales, essays and plays, among which may be noted (Ideals in Ireland,* a series of articles by prominent Irish authors, of which she was the editor (1901) ; (Poets and Dreamers >

(1903) ; (The Book of Saints and Wonders)

(1907) ; (The Kiltartan Wonder Book> (1910) ;

(Seven Short Plays) (1910) ; (The Image)

(1910); (Irish Folk History Plays) (1912);

(The Kiltartan History Book1* (1912) ; (New

Comedies) (1913) ; (The Rising of the

Moon* (1915) ; (The Golden Apple* (1916) ;

and (Visions and Beliefs* (1916). In 1911-12,

and again in 1913, she visited the United States with the Irish Players and was enthusiastically received. Consult Weygandt, (Irish Plays and

Playwrights* (Boston 1913) ; and Moore,

George, Mail and Farewell* (New York 1911—

13).

GREGORY, James, Scottish mathematician:

b. Aberdeen, 1638; d. 1675. He received his

education at Marischal College, Aberdeen, and

in 1661 invented the reflecting telescope. A

description of this is contained in his (Optica Promota* (1663). Several years later he re¬

sumed his studies at Padua. He became a

member of the Royal Society at London ; pro¬

fessor of mathematics at Saint Andrews

(1669), and at the University of Edinburgh

(1674). His other works are (Vera Circuli et

Hyperbolae Quadratura* (1667) ; (Geometries

Pars Universalis* (1668) ; (Exercitationes Geo¬
metries* (1668).

GREGORY, James, Scottish physician: b.
Aberdeen, 1753; d. 1821. He was the son of
John Gregory (q.v.). He was educated at
Edinburgh, at Christ Church, Oxford and at
various universities on the continent. He be¬
came professor of medicine at Edinburgh 1776,
lecturer at the Royal Infirmary, and professor
of medical practice at Edinburgh (1790). He
was distinguished as a practitioner and lecturer and took part in the various controversies of
the period. His violent opposition to the
granting of greater freedom to the medical fac¬
ulty at Edinburgh incurred the displeasure of
that institution and he was finally suspended.
Among his publications are (De Morbis Coeli
Mutatione Melendis* (1774); (Conspectr.s
Medicinse Theoreticae* (2 vols., 1780-82) ; the¬
ory of the Moods of Verbs* (1790) ; Philo¬
sophical and Literary Essays* (1792) ; Memo¬
rial to the Managers of the Royal Infirmary*
(1780) ; historical Memoirs of the Medical
War in Edinburgh in the Years 1785-86-87* ;

(Epigrams and Poems* (1810).

GREGORY, John, Scottish physician : b.

Aberdeen, 1724; d. 1773. He was the grandson

of the mathematician James Gregory (q.v.).

After receiving his degree from King's College, Aberdeen, he studied further at Edinburgh and

Leyden. From 1 746 — 49 he was professor of

philosophy at King's College ; and of the prac¬

tice of physic at Edinburgh 1766. His col¬

lected works were printed at Edinburgh 1788.

GREGORY, Olinthus Gilbert, English

mathematician: b. Yaxley, Huntingdonshire,

1774; d. 1841. From 1807-1838 he was profes¬

sor at the Royal Military Academy, Woolwich.

His experiments in sound velocity were most

valuable. He was editor of the Gentleman's

Diary (1802-19) ; Ladies' Diary (1819-45).

Others of his publications include papers on

mechanics and astronomy; ˆLetters on the

Evidences of the Christian Religion* (1815) ;

Memoirs of John Mason Good* (1828) ; and

(Robert Hall* (1833).

GREGORY, Robert, English clergyman :

b. 1819; d. 1911. He studied at Corpus Christi College, Oxford, and from 1843-53 was curate

at Bisley, Panton, Wragby, and was rector of

Saint Mary the Less at Lambeth (1853-73). In

1868 he was appointed canon of Saint Paul's

Cathedral, becoming dean in 1891. He was au¬

thor of (A History of Elementary Education*

(1895) ; (Lectures at Saint Paul's* ; and an

(Autobiography* which was edited by W. H.

Hutton (London 1912).

GREGORY, Stephen Strong, American

lawyer: b. Unadilla, N. Y., 1849. He studied at the University of Wisconsin, receiving his LL.B.

in 1871. After several years of law practice at Madison, Wis., he acted as special counsel for the city of Chicago before the Supreme Court

of the United States in the Lake Front Case.

He also defended the conspiracy case against

Eugene V. Debs. He was elected president of

the Chicago Bar Association (1900) ; of the

Illinois State Bar Association (1904) ; and of the American Bar Association (1911).

GREGORY, Thomas Watt, Attorney-

General of the United States : b. Crawfords—

ville, Miss., 6 Nov. 1861. He was graduated

from the Southwestern Presbyterian University

at Clarksville, Tenn., and from the University

of Texas. He practised at Austin, Texas, and

was counsel for that State in anti-trust proceed¬

ings. He was appointed special Assistant At¬

torney-General of the United States in charge

of the investigation and prosecution of the New York, New Haven and Hartford Railroad Com¬

pany in 1913; and in 1914 succeeded to the office of Attorney-General.

GREGORY, Order of Saint, a papal order

established in 1831 under Gregory XVI. It

was awarded originally for distinguished de¬

fense of the Roman Church, but now is granted for any meritorious work.

GREGR, gre'gr', Eduard, Czech politician :

b. Brezhard 1829; d. 1907. He received a medi¬

cal education at Prague, and with his brother

Julius (q.v.) took an active share in the pro¬

gressive national party. He was also one of the founders of the Young Czech party of whose

policies he was a brilliant leader. He sat in the Bohemian Diet in 1861, and in the Imperial Reichsrat in 1883.

GREGR, Julius, Czech politician : b. Brez¬

hard, 1831 ; d. 1896. He was the brother of

Eduard Gregr (q.v.). After receiving his edu¬

cation at Prague, he entered politics as an ar¬

dent nationalist. He served in the Bohemian

Diet for nearlv 35 years where he resisted en¬

croachments on the autonomy of Bohemia with

all the power of his pen and legislative ability.

He founded the Young Czech partv which was

opposed to the Old Czech feudalist interests,

and resigned from the Austrian Reichsrat in

1880 because of this hostility. With Reiger and Palacky, he established the nationalist Czech

paper Narodoni Listy in 1861.

GREIF, grlf, Martin, German dramatist

and poet: b. Speyer, 1839; d. 1911. After study¬

ing at Munich, he began his literary work which includes lyric poetry of enduring quality and

several dramas of indifferent success. He wrote many of his works under the pseudonym

Friederich Hermann Frey. His poems include.

<Gedichte) (1868) ; (Neue Lieder und Maren)

(1902) ; his dramas are (Nero) (1877) ;

(Marino FalierP (1879) ; <Konradin) (1889) ;

(Ludwig der Bayer* (1891) ; (Francesca da

Rimini* (1892) ; (Agnes Bernauer) (1894) ;

(Hans Sachs* (1894) ; (General York) (1899) ; (Schillers Demetrius) (1901).

GREIFSWALD, grifs-valt, Pomerania,

capital of the district of Greifswald on the

Ryck River, 18 miles southeast of Stralsund.

The most interesting ancient buildings are the

church of Saint Nicholas, a fine example of

mediaeval architecture, the town hall and

some of the university structures. Of the mod¬

ern buildings are the gymnasium, the dairy

school and the geographical and scientific

museum. The university dates from 1456 and

comprises the faculties of theology, jurisprud¬

ence, medicine and philosophy. In 1914-15,

there were 98 teachers and 1,109 students. Its extensive library contains some 250,000 volumes, and many historical manuscripts ; the old Croy

tapestry, on which is depicted a scene in the life of Luther; and numerous valuable an¬

tiquities, some of them antedating the Christian era. In connection with the university are

botanical gardens and zoological museums. The

chief manufactories are railway shops, machine

works, foundries, electrical works, shipbuilding

yards and chain works. Fishing is extensively

carried on, and the trade is mostly in grain, wood and dried fish. The town was admitted

to the Hanseatic League in the 13th century. It became Swedish property _ in _ 1631 and was

finally captured by Prussia in 1815. Pop.

25,000.

GREIN, grin, Christian Wilhelm Michael,

German philologist: b. Willingshausen, Hesse,

1825 ; d. Hanover, 1877. He studied at Mar¬

burg and Jena. The elector of Hesse appointed

him keeper of the archives at Cassel in 1865.

GREIZ, grits, capital of the principality of

Reuss, Germany, on the White Elster River,

50 miles south of Leipzig. The river divides

the old town from the new. Picturesque build¬

ings are the old castle, the prince's residence and the Rathaus. There is also a gymnasium,

a realgymnasium, a textile school and a sem¬

inary. About half of the population works in

the textile mills which are very extensive and constitute the chief industry of the city. Pop.

23,000.

GRELL, Eduard August, German organist :

b. Berlin, 1800; d. 1886. He studied with Kaufmann, Ritschl and Zelter. In 1817 he became

director of the Singakademie, a post which he

held for 20 years. He also was court organist, instructed the cathedral choir; and taught the

students at the Academy in composition. His

works are largely sacred vocal compositions.

They include an oratorio (Die Israeliten in der Wiiste* ; a mass in 16 parts; and various organ and choral pieces.

GRENADA, Miss., city and county-seat of

Grenada County, 98 miles south of Memphis,

Tenn., on the Illinois Central and the Yazoo

and Mississippi Valley railroads. Its govern¬

ment is bv mayor and council. Grenada Col¬

lege (for women) is located here. The chief

manufactories are cottonseed-oil mills and a

brick plant. The municipality owns and oper¬

ates its electric-light and water plant. Pop.

about 3,000.

GRENADA, gren-a'da, and GRENA¬

DINES, islands of the West Indies. Grenada

is the most southern of the Caribbean chain,

and may be characterized as the most British

and the most beautiful of all the British An¬

tilles. Its length is 18 miles, its width 7, and its area 133 square miles. Lofty volcanic

craters rise high above fertile and well-watered valleys. The volcanic character of the island is perhaps more marked, and is certainly regarded

by geologists as being more recent than that of the northern Caribbees. A lake two miles in

circumference lies among the mountains just

mentioned, at an altitude of 3,200 feet. Saint George's, the capital, has a good harbor, a fort, pretty houses and churches, excellent schools,

roads, waterworks, *etc.* The chief product is

cocoa. Pop. 71,082 of which four-fifths are

negro peasants. The Grenadines are long, low

islands ((of quaint forms and euphonious

names,® lying between Grenada and Saint Vin¬

cent. The largest of those connected politically with Grenada is

Carriacou, the area of which

is 6,913 acres and population 6,836.

GRENADE, gre-nad', a small hollow ball,

cylinder, or cube, of metal, glass, or paper,

about two and onehalf inches in diameter,

which is filled with some explosive, and burst by means of a fuse when it falls among the

enemy. Until about the end of the 17th cen¬

tury trained soldiers called grenadiers threw

grenades by the hand. Grenades have been de¬

livered from mortars, to repel the close attacks of besiegers sheltering themselves under the

besieged walls. This is in anticipation of the modern trenchmortar. They have been found

useful also in repelling boat attacks. Grenades were one of the earliest forms of explosive

projectiles.

Grenades have again come into military use

in the 20th century. Crude bombs made on the

spot were employed in the Russo-Japanese War

and during the first months of the Great War.

A popular form consisted of a jam tin filled

with broken iron, with a stick of tri-nitro—

toluol in the middle, set off by a fuse. Another much used form was the ˆhair-brush,® in

which the explosive and iron were bound to a

board not unlike the back of a brush, in order to obtain greater convenience in throwing.

These were soon superseded by more elaborate

devices, among which the best known is the

Mills bomb. This consists of an oval casing,

deeply scored to secure better fragmentation,

filled with high explosive, and set off by a

detonator five seconds after the handle grasped in the palm of the hand is released. This

handle is safely secured by a fastening until

immediately before the bomb is thrown. Gren¬

adiers form perhaps the most numerous single

class of soldiers in a modern company of in¬

fantry.

For ranges greater than those which can be

reached by a hand grenade, a rifle grenade is employed. This fastens on an ordinary rifle

barrel, and is cylindrical in shape, being scored in a manner like that of a hand grenade. It is projected either by the explosion of a blank

cartridge, or by the blast from the muzzle of a gun firing an ordinary ball cartridge. Hand-grenades are in use at the present time as fire extinguishers, chemicals being used to fill hol¬

low glass balls, which are thrown into a burn¬

ing mass. Many hotels, hospitals and public

buildings are equipped with hand-grenades.

GRENADIER, properly, a soldier who car¬

ried and hurled grenades; in general, a member of a company attached to a regiment or bat¬

talion, taking part on the flanks, also the mem¬

ber of a special regiment or corps. In modern armies the term has been revived and each in¬

fantry company now includes rifle grenadiers.

In the great war of the nations hand grenades again came into fashion but were hurled by

infantry not specially designated as grenadiers.

GRENADIER, a fish family (Macruridee)

which frequents the deeper parts of the ocean.

Although allied to the cods, very few species

are edible. Their life at great depths has de¬

veloped their eyes greatly as in the case of

other deep-sea fishes. On this account they are often termed pop-eyes or onion fish. They are

well known to fishermen as they are noted

destroyers of bait. Among the genera of this

family are the Macrurus rupestris, common in

the North Atlantic Coast of America, the Bathy-gadus, Chalinura, Corphyaenoides, Ccelorhynchus,

Hymenocephalus and Steindachneria.

GRENFELL, Bernard Pyne, English

scholar: b. Birmingham, 16 Dec. 1869. He was

educated at Queen's College, Oxford, becoming

fellow in the University of Oxford (1894-95)

and fellow of Queen's College in 1894. Since

that date he has been engaged in discovering

and editing of Greek papyri, and his valuable

studies have won for him the degrees of Hon.

Ph.D. from Konigsberg, Hon. Litt.D. from Dub¬

lin, Hon.D.Jur. from Graz, and the Drexel

medal from the University of Pennsylvania.

Since 1916 he has been professor of papyrology at Oxford. With Hunt, he made some import¬

ant discoveries at Oxyrhynchus (Behnesa) in

1896-97, and again in 1905 et seq. Among

these are the <Logia) of Jesus, fragments of

Menander's (Colax and Perinthia,* of Cal¬

limachus' <ˆEtia) and Sophocles' UchneutaeP

With the collaboration of Hunt he edited (The

Oxyrhynchus Papyri* (9 vols., 1897-1912) ;

(Menander's Georgos) (1898); (The Amherst

Papyri* (1900-01); (The Tebtunis Papyri*

(1902, 1906), excavations for the University of California; the (Hibek Papyri* (1906); and

with Hunt and Hogarth (Fayum Towns and

their Papyri* (1900).

GRENFELL, Francis Wallace, 1st Baron

of Kilvey, English soldier: b. London, 1841.

He studied at Cambridge University. Enlist¬

ing in the 60th Rifles in 1859, he served in the Kaffir War (1878) ; the Zulu War (1879) ; was quartermaster-general in the Transvaal (1881 —82) ; joined the Egyptian expedition (1882) ;

the Nile expedition (1884) ; the Sirdar

Egyptian army (1885-92) ; was placed in com¬

mand at Suakim (1889), and at Toski in the

same year; was inspector-general of auxiliary

forces (1894-97); in command of the Egyptian

forces (1897-98) and was appointed governor

and commander-in-chief of Malta (1899-1903).

From 1903-04 he was at the head of the 4th

army corps; from 1904-08 was commander-in¬

chief in Ireland and was made field marshal

in 1908.

GRENFELL, George, English missionary

and African explorer: b. Sancreed, near Pen¬

zance, England, 21 Aug. 1848; d. Basoko,

Kongo Free State, 1 July 1906. He was ap¬

prenticed to a Birmingham hardware firm and

there lost an eye. He was converted to Bap¬

tism at the age of 15 and in 1874 went to the Cameroons to work as a missionary under

Alfred Saker. He explored the Yabrang and

Sanaga rivers during the following two years.

In 1877 he moved to Victoria in the Came¬

roons and continued his river exploration. He

climbed Mt. Mongo ma Loba in 1878, and in the same year was transferred to the lower Kongo,

where he cooperated with the Rev. T. J.

Comber. They pushed on to the Makuta

country, but the ch ef Ntolela forbade them to go further. In 1881 Grenfell and Comber es¬

tablished a chain of mission stations up to

Stanley Pool on the Kongo. In 1884 he sur¬

veyed the Kongo up to 0° N. 18° E., and in

the same year launched a river steam vessel,

the Peace, with which he explored the Kwa,

Kwango, Kasai, Mubangi, Ruki, Ikelemba, and

Rupi. He continued his explorations the fol¬

lowing year, and made a careful study of the

Bakuba and Bakete tribes. He published his

observations in the periodicals of the Royal

Geographical Society, winning the founder's

medal in 1887. In 1891 he was made a chevalier of the Belgian order of Leopold, and became

Belgian plenipotentiary to Portugal for the

settlement of the Lundo boundary question.

For his services, he received the Belgian order of the Lion and the Portuguese Order of

Christ. From 1893 to 1900 his headquarters

was at Bolobo. By the end of 1902 he had ex¬

plored the Aruwimi river. The next three

years were spent at a mission station at

Yalemba near the confluence of the Kongo and

the Aruwimi. Toward the end of his life he

was greatly dissatisfied with the Belgian ad¬

ministration, and made futile protests to King

Leopold. Consult Dickens, (Grenfell of the

Congo* (London 1910) ; Hawker, <Life of

George GrenfelP (ib. 1909) ; Johnston, (George

Grenfell and the Congo * (London 1908).

GRENFELL, Helen Loring, American

sociologist : b. Valparaiso, Chile. She was

graduated at the New York State Normal Col¬

lege at Albany, N. Y., and at the University

of Denver. In 1889 she married Edwin I.

Grenfell. She served for three terms as county superintendent of schools in Gilpin County,

Colorado; and for the same number of terms

as State superintendent of public instruction

of Colorado (1899-1905). From 1909-14 she

was commissioner of the State Penitentiary and

Reformatory. In her government of the schools

she inaugurated the system of increasing school revenues by leasing State lands for that pur¬

pose. Under her direct'on the school laws

were revised and annotated. For 14 years she

directed the work of the Colorado Equal

Suffrage Association in the capacity of vice-president.

GRENFELL, Wilfred Thomason, mis¬

sionary and explorer: b. Parkgate, Cheshire,

Eng., 28 Feb. 1865. He was 'educated at Marl¬

borough and Oxford University, of which he

is a graduate. He was house doctor for Sir

Frederick Treves at the London Hospital, came

to Labrador in 1892 as superintendent of the

Labrador medical mission of the Royal Na¬

tional Mission to Deep Sea Fishermen, to

which he has since devoted his life. His liter¬

ary works include (Adrift on a Pack of Ice) ; (The Harvest of the Sea* ; (Labrador: the

Country and the People) ; Down North on the

Labrador) ; (The Adventure of Life.*

GRENOBLE, gre-no'bl', France, capital of

the Department of Isere, 80 miles from Lyons,

a fortress of the first class, on the Isere River.

The fortresses of Rabot and La Bastille are

located here. The city has both an ancient and modern section, the latter possessing a fine

Renaissance Palais de Justice, the cathedral of Notre Dame (12th century), an extensive

library, a museum and art gallery, and the

university. This last institution dates from

1339 and has faculties of law, sciences and

letters. Other educational institutions are the

schools of medicine, the electrical institute,

artillery institute, theological schools, mil.tary, trade and art schools. Gloves are produced in

great quantity, also leather dyestuffs, metal ware, silks, liquors and cement. Trade is carried on in cheese, grain and wood. Grenoble has

been

identified with the ancient Cularo of the

Allobroges. It was captured by. the Burgund¬

ians in the 5th century, and was the capital of Dauphine until the middle of the 15th century.

It is also known as the birthplace of Condillac, Stendhal Barnave and Casimir Perier. Pop.

77,500.

GRENVILLE, George, English statesman :

b. 1712; d. 13 Nov. 1770. He became treasurer of the navy in 1754, secretary of state for the northern department in 1762, and first lord of the treasury and chancellor of the exchequer in April 1763. In 1765 the Commons accepted his

scheme for stamp-duties to be lev'ed in the

American colonies, which was one of the proxi¬

mate causes of the American War of Inde¬

pendence. In 1766 he defended the stamp act

in Parliament; in 1769 opposed the expulsion

of W Ikes 'from the House of Commons, and

in 1770 brought in the Controverted Elections

Bill, which was passed. He was able, hard¬

working and honest but narrow-minded and

obstinate and wanting in tact and foresight.

(The Grenville Papers,* edited by W. J. Smith

(1852-53), contain interesting information on

the politics of his day.

GRENVILLE, Sir Richard, English naval officer: b. about 1541; d. September 1591. In 1585 he commanded a fleet of seven vessels in¬ tended to aid in the colonization of Virginia. His most brilliant exploit occurred in 1591, when he attempted to cut his way through a Spanish fleet of 53 ships. His ship while be¬ calmed was attacked by 15 of the largest Span¬ ish vessels. Not till after 15 hours of battle and when only 20 out of his 150 men were left alive did he strike his colors. He died from wounds received in the engagement. It is

upon this incident that Tennyson has founded his spirited ballad, <The Revenge.*

GRENVILLE, William Wyndham, Lord: b. 25 Oct. 1759; d. Dropmore, Buckinghamshire, 12 Jan. 1834. He was the youngest son of George Grenville (q.v.). He was educated at Christ Church, Oxford, and then entered Lincoln's Inn, where he studied law. He was elected to the House of Commons in 1782 and

served as secretary to his eldest brother who

was Lord Lieutenant of Ireland. After oc¬

cupying the post of paymaster-general of the

army in 1783, he was sent by William Pitt in 1787 to Holland, where he bent his energies

toward effecting the Triple Alliance of 1788.

On his return to England, the House of Com¬

mons elected him as its speaker. Grenville

held this office for barely a year when he ac¬

cepted that of secretary of state for the home department. In 1790 he was elevated to the

peerage as Baron Grenville. Under Pitt's

ministry he became foreign secretary (1709—

1801), resigning with Pitt on the occasion of

the break over the Catholic Emanicipation Act.

In the <c All Talents Ministry® he became pre¬

mier and was instrumental in securing the bill which abolished slave trade. He was appointed

chancellor of the University of Oxford 1809.

He published (Essay on the Supposed Advan¬

tages of a Sinking Fund* (1828). Consult

Adams, (The Influence of Grenville on Pitt's

Foreign Policy* (Washington 1904).

GRENVILLE ACT, 6 April 1764. An act

passed by the English Parliament on the pro¬

posal of George Grenville, a member of Lord

Bute's ministry. Its purpose was more effect¬

ively to protect English trade and manufactures from foreign competition, to raise better reve¬

nues from the colon'es. It was based on the

act of 1733, which, to protect the British West India sugar industry, laid prohibitory duties on the import of French West India sugar and mo¬

lasses into the colonies, and which, if enforced, would have ruined New England's commerce.

The new act made the duty on molasses a heavy revenue one instead ; increased the duty on

sugar, and laid new duties on wines ; decreased the drawbacks on foreign articles exported to

America; imposed regulations on manufac¬

turers, and attempted to enforce the Navigation Acts more thoroughly; and prohibited all trade

between the colon1 es and the French islands

Saint Pierre and Miquelon.

GRESHAM, Sir Thomas, English finan¬

cier: b. 1519; d. 1579. After studying at Gonville Hall, Cambridge, he became an apprentice

to his uncle, Sir John Gresham, a merchant,

where his special aptitude for business soon

manifested itself. He became a member of the

Mercers' Company (1543) and in 1551 was ap¬

pointed king's factor at Antwerp. In this

capacity he managed all financial relations with the merchants of Flanders for England, and

was especially active in securing bullion for

his country. His religion (Protestant) made

him unacceptable in Mary's reign, but Elizabeth restored him to service. Gresham made a

journey to Spain to secure bullion in 1554; was knighted in 1559 and sent as Ambassador to

Netherlands. His private banking and trading

enterprises made him one of the wealthiest

men in the Kingdom. He established the Royal

Exchange in London. On his death, much of

his money went to philanthropic foundations,

and to the establishment of Gresham College.

(See Gresham's Law). Consult Burgon, <Life

and Times of Sir Thomas Gresham) (London

1839).

GRESHAM, Walter Quinton, American

jurist and statesman: b. near Lanesville, Har¬

rison County, Ind., 17 March 1832; d. Washing¬

ton, D. C., 28 May 1895. His family originated in Kentucky, from which State his grandfather

had removed to Indiana. There his father met

with success as a farmer, and also exercised

the art of cabinet-making. He was elected

sheriff and was murdered in the performance

of his duties. The son was educated at the

local school, and the State University, Bloom—

ingdale, Ind. After leaving the latter he went to Corydon, Ind., and began the study of law, while filling the office of deputy clerk (1854).

In 1860 he was elected to the State legislature.

When the Civil War broke out he was commis¬

sioned in the Federal service as lieutenant-colonel of the 38th Indiana regiment. He was

promoted under Grant, and at Vicksburg had

charge of a brigade with the rank of brigadier-general of volunteers. He joined Sherman's

forces in the expedition against Atlanta, Ga.,

where he commanded the 4th division of

the 17th Army Corps. At Leggetts Hill, in

January 1864, he was severely wounded and

disabled from service, and in the following

year was retired as major-general of volunteers.

He chose as his home New Albany, Ind., and

began an active life as law practitioner. In

1866 he was put forward by his friends as

Republican candidate for Congress, but was de¬

feated at the polls, and for the two following years resided in New York, as the financial

agent of his State. His next field of activity was as a jurist, for in 1869 President Grant

appointed him judge of the United States Cir¬

cuit Court for Indiana. He had previously

declined an appointment as collector of customs at New Orleans, which would have necessitated

his removal from Indiana. He had also de¬

clined the position offered him as district attor¬

ney. But his great abilities and high character had pointed him out as fitted for some im¬

portant employment, and in 1882 no surprise

was felt, but rather general expectation was

satisfied when he received an appointment to

the cabinet with the portfolio of postmaster-general (1882). Upon his recommendation Con¬

gress passed an act excluding all lottery matter from the United States mails. In 1884 he was

called to the secretaryship of the treasury, in the discharge of whose duties he would doubt¬

less have increased his reputation as a financier, had he not been appointed a few months later

as United States circuit judge for the 7th judi¬

cial district. He made himself conspicuous as

favoring the third term of his old friend Gen¬

eral Grant (1880). His own name had been put

forward with some enthusiasm as presidential candidate in 1884, and again in 1888. There were many who thought that he had good claims to be invested with the office of the chief magistrate. Subsequently he changed his convictions on the most important question of the hour, and ranged himself on the side of views of tariff legislation with which the Re¬ publican party had no sympathy. The Populists,

however, looked upon him with favor as his judicial decisions had in many cases been to their advantage. Had he consented, they would have nominated him for the presidency at the national convention of that party held at Omaha, Neb., in July 1892. He declined the honor and made a public statement announcing his purpose of supporting Grover Cleveland's nomination. He was afterward named by President Cleveland as Secretary of State.

GRESHAM'S LAW, a principle in finance and political economy formulated about the middle of the 16th century by Sir Thomas

Gresham, founder of the London Royal Ex¬

change. It may be thus stated and expounded.

Bad money drives out good money from the

circulation. The good coin of full weight and

purity in circulation with worn, light or de¬

preciated coins, will be hoarded or used for

exportation, where it will buy more abroad than the worn out coins, which will be left to pass as counters at home. This law is still a living principle, and especially applicable in contro¬

verting the position of those who wish the

United States, single-handed, to issue a cur¬

rency of the double standard. Gresham's law

only applies where there is a general tendency to export money.

GRESSET, gres'sa', Jean Baptiste Louis,

French poet and dramatist: b. Amiens, 29 Aug.

1709; d. there, 16 June 1777. At an early age he entered the Jesuit ranks and was sent to

the College Louis le Grand at Paris. He then

accepted the post of instructor at a Jesuit Col¬

lege at Rouen, where in 1734 he published his poem, (Vert, VerC a most amusing tale of a

parrot whose unseemly language shocks the

gentle little nuns to whom it is sent. The inti¬

mate picture of the life of the convent com¬

prises the chief interest of the poem. The story offended the Jesuits and Gresset fled to Paris, where he published several poems : (La Chartreuse) ; (Careme impromptu) ; (Lutrin vivanC

and (Les OmbresP The extremely worldly tone

of these caused his expulsion from the order

and he took up his residence in Paris. Several dramas followed: (Ldouard III, J a tragedy

(1740); (Sidneip a comedy (1745); (Le

MechantP the most popular of all, a comedy in verse. Gresset became a member of the Acad¬

emy in 1748, but shortly afterward retired to

Amiens where he deeply repented of his world¬

liness.

GRESWELL, William Henry, English

Anglican clergyman and author. He was edu¬

cated at Oxford and has been rector of Dod—

ington, Somerset, from 1888. As a writer he is known by (Our South African Empire* (1885) ;

'Imperial Federation (1887) ; (History of the

Canadian Dominion* (1890) ; (Geography of

the Canadian Dominion (1891) ; 'Geography

of Africa South of Zambesi* (1892) ; 'The

British Colonies and Their Industries> (1893) ; 'Growth and Administration of the British

Colonies) (1897) ; 'The Land of Quantock)

(1903) ; 'The Forests and Deerparks of Somer¬

set *(1905) ; 'Chapters on Glastonbury Abbey*

(1909).

GRETCH, Nikolai Ivanovitch, Russian

author: b. Saint Petersburg, 1787; d. 1867. He was of a Bohemian family, and was sent to

study of law. His natural proclivities, however, GRETNA — GREVILLE

led him to undertake the study of literature, and he became professor of Russian literature at the School of Saint Peter (1809-13), and again at

a gymnasium. He then entered politics in the

department of the interior and later in the

department of finance. In connection with this

work he toured the continent. In 1812 he be¬

came editor of Syn Otecestva , a conservative

paper, and in 1825 associate editor of the Sever¬

naia Pcela. His books comprise a handbook of

Russian literature (1819-22), a Russian gram¬

mar (2d ed., 1830) ; two novels, two books of travel and memoirs (1886). His complete

works were published at Saint Petersburg 1855.

Consult Waliszewski, K., (History of Russian

Literature) (New York 1900).

GRETNA, La., town, capital of Jefferson

Parish; on the Mississippi River and the South¬

ern Pacific railroad and other lines ; opposite New Orleans. A number of the Mississippi

River packet lines take on and discharge ship¬

ments at Gretna. It was founded in 1835, and

has many of the advantages of a suburb of

New Orleans. It manufactures cottonsed oil

fertilizers and soap and its trade is chiefly in cottonseed oil. Pop. about 7,197.

GRETNA GREEN, or GRAITNEY,

Scotland, village in Dumfriesshire, on the Sol¬

way Frith, eight miles north of Carlisle. After the abolition of the Fleet marriages under

Hardwicke's Act in 1754, Gretna became noto¬

rious as the place of celebration of the mar¬

riages of runaway couples from England. In

England publication of banns and the presence

of a priest at the ceremony were necessary, but to conclude a lawful marriage in Scotland it

was then only necessary for an unmarried

couple to go before witnesses and declare them¬

selves man and wife. The Anglican marriage

service was usually read at these marriages by a pseudo-priest, said to be the blacksmith of

the village, who has become in consequence a

historical character in fiction. As many as 200

irregular marriages have been thus contracted

in a twelvemonth. Gretna Green marriages are

now at an end, in consequence of a statute

which enacts that no irregular marriage con¬

tracted in Scotland shall be valid, unless one of the parties resides in Scotland, or has done so for 21 days next preceding such marriage. Pop.

of parish 1,212.

GRETRY, gra'tre', Andre Ernest Modeste,

French composer: b. Liege, 8 Feb. 1741; d.

Ermenonville, 24 Sept. 1813. After completing

his studies at Rome he settled at Paris and

there his reputation was made. He was the

most prolific composer of his age. He produced forty comic operas, most of which with the ex¬

ception perhaps of (RaouP and (Richard Coeur

de Lion) are now forgotten. His <Memoiries)

1796, and his life by Gregoir and Brenet give the main incidents of his career.

GREUZE, grez, Jean Baptiste, French

painter: b. Tournus, Burgundy, 21 Aug. 1725 ;

d. Paris, 4 March 1805. He studied painting

at Lyons and Paris and attracted notice by his earliest pictures, (A Father Explaining the

Bible to His Children5 and (The Blind Man

Cheated5 and in 1755 was admitted . by the

academy. He visited Rome, and desiring to

rank as a historical painter, chose classical sub¬

jects, in which he failed, and ultimately re¬

turned to his former style of genre, (The Girl Crying over Her Dead Bird5 ; (The Good

Mother5 ; (The Bad Boy Punished,5 and the

like. He died in great poverty due to his own improvidence. He was a fine colorist, but great success was due mainly to his choice of sub¬

jects. At the Pourtalis sale of 1865, his (La jeune fille a l'agneau5 was sold for 1,000,200

francs ($200,000). He represented a reaction

against the artificiality of the age, and a re¬

turn to nature, though he himself was still

hampered by the spirit of his century. The

Metropolitan Museum, New York, contains his

(Girl Winding Wool.5 Consult Dilke, (French

Painters of the Eighteenth Century5 (London

1899); Normand, (Jean Baptiste Greuze5

(Paris 1892) ; Rivers, (Greuze and his Models5

(London 1912).

GREVILLE, Charles Cavendish Fulke,

English diarist: b. 2 April 1794; d. 18 Jan. 1865.

He was educated at Eton and Christ Church,

Oxford, but left before he completed his course in order to become a private secretary to Earl Bathurst. He was next appointed to the sine¬

cure office of Secretary of Jamaica, and in

1821 became clerk of the council, a post which he held for 40 years. His period of service ex¬

tended through the reigns of three sovereigns.

The experiences with which he met are recorded with great insight and care in his (Diary. 5 This book was entrusted to his friend Henry Reeve

with the request that it be published after

Greville's death ; and accordingly three volumes covering the reigns of George IV and William

IV appeared in 1875. The record is a faithful account of political causes and has proved of in¬

valuable worth in the study of the century.

The volumes covering the early reign of Vic¬

toria were published at a later date. Greville was also the author of an anonymous work on

the (Past and Present Policy of England and

Ireland5 advocating the payment of the Roman

Catholic clergy (1845). His diaries have been

collected under the title (Greville Memoirs:

Journal of the Reigns of George IV, William

IV and Queen Victoria5 (8 vols., London

1896). There is a biographical sketch in the

preface to the first edition by Henry Reeve.

GREVILLE, Sir Fulke, 1st Lord Brooke,

English poet and courtier : b. Beauchamp Court, Warwickshire, 1554; d. 1628. He studied at

Jesus College, Cambridge, and then went to the court of Elizabeth in 1597. Sir Philip Sidney

whose friendship with Greville began in their

early school days at Shrewsbury, entered the

court at the same time. Greville toured the

continent where he was well received and then

took service with Henry IV in Normandy. He

sat in Parliament during four sessions between

1592-1620; was treasurer of the navy (1598) ;

became Life-secretary for Wales (1603). In

1621 he was elevated to the peerage as Baron

Brooke. Most of his literary work was pub¬

lished posthumously. His poems include (The

Tragedie of Mustapha5 (1609) ; (A Treatie of

Humane Learning5 ; (An Inquisition upon Fame

and Honour5 ; (A Treatie of Warres5 ; (The

Tragedie of Alaham5 and (Ccelica,5 all of

which were published in 1633. His best-known

work is his (The Life of the Renowned Sir

Philip Sidney5 (1652; reprint Oxford 1907).

His collected works were edited by Grosart in

the (Fuller Worthies Library5 (1870).

GREVILLE, Henry. See Durand, Alice

Mary.

GREVY, gra've', Francois Paul Jules,

French statesman: b. Mountsous- Vaudrey,

Jura, 15 Aug. 1807; d. 9 Sept. 1891. He studied law in Paris, and became prominent as the de¬

fender of republican political prisoners. In

1848 he was returned to the Constituent Assem¬

bly, where his ability as a speaker soon made him distinguished. After the coup d'etat he re¬

tired from politics, but in 1869 again entered the Assembly as deputy for the Jura. In Febru¬

ary 1871 he was elected president of the Na¬

tional Assembly, and reelected in 1876, 1877 and 1879. When Marshal MacMahon resigned in 1879 Grevy was elected president of the re¬ public for seven years. In December 1885 he was elected president for a second term of seven years, but, hampered by ministerial com¬ plications, resigned in December 1887.

GREW, Nehemiah, English physician and botanist: b. Mancetter Parish 1641; d. 1712. He studied at Cambridge University and received his M.D. from Leyden in 1671. He was elected secretary of the Royal Society in 1677. His principal work has been in the study of the anatomy and physiology of plants and vege¬ tables. Among his works are (The Anatomy of Vegetables Begun, with a General Account of Vegetation Grounded Thereon* (1672) ; (The Comparative Anatomy of Trunks) (1675) ; (A Discourse of the Colors of Plants* (1677) ; (Cosmologia Sacra, or a Discourse of the Universe) (1701). He was also editor of Phil¬ osophical Transactions) (1678-79), and wrote some minor papers on human anatomy and the uses of salts found in waters. A genus of

trees was named in his honor Grewia.

GREY, Albert Henry George, 4th Earl,

English statesman: b. Howick, Northumberland,

England, 28 Nov. 1851. His grandfather, the

second earl, was prime minister of England,

and influential in securing the passage of the Reform Bill of 1832. The present earl was

graduated from Trinity College, Cambridge; in

1880 he was elected to Parliament as a Liberal, and supported Gladstone in the House until

1886 when the Liberals declared in favor of

home rule. He then became a Liberal Unionist,

but lost his seat in Parliament. In 1894, as his uncle died childless, he succeeded to the estate and title. He was a personal friend of Cecil

Rhodes, was one of the promoters of the Brit¬

ish South Africa Company, and in 1896-97

served as administrator of Rhodesia. As an

executor of the Rhodes will, he is now one of the trustees of the scholarship fund. He has

been an active worker in reform movements,

especially in the cause of cooperation and of temperance. On his estate he has organized a

co-operative system which has worked success¬

fully; and in 1901 he organized a system for

the management of public houses in the inter¬

ests of the public, known as the Public House Trust. From 1904-11 he

was governor-general

of Canada.

GREY, Charles, 1st Earl Grey, English

general: b. Howick 1729; d. 1807. In 1748 he

became an ensign in the English army, and was aide-de-camp to Ferdinand of Brunswick dur¬

ing the Seven Years' War. He served in

America during the Revolution and became

major-general in Howe's army 1778. In 1782

he was appointed lieutenant-general and given

charge of the British army in America. In

1793 he led an expedition against the revolted West Indies. He commanded the southern dis¬

trict against the threatened invasion of Napo¬

leon, and after the peace of Amiens was ele¬

vated to the peerage as Baron Grey of Alnwick; in 1806 becoming Earl Grey and Baron Howick.

GREY, Sir Edward. See Grey of Fallo—

don, Viscount.

GREY, Sir George, British colonial gov¬

ernor and statesman : b. Lisbon, 14 April 1812 ; d. London, 20 Sept. 1898. He was the son of

Lieutenant-Colonel Grey of the 30th Foot Guards. After receiving his training at Sand¬ hurst Military College, he was commissioned in 1829, becoming lieutenant in 1833 and captain in 1839. In 1836 he undertook the exploration of northwest Australia for the Royal Geo¬ graphical Society, and in the following year traveled over the Swan River district. Two years later he was appointed governor-resident at Albany; and after a short service in that capacity, returned to London. He was imme¬ diately detailed to South Australia as governor. His vigorous rule restored peace and prosper¬ ity to the region and autonomy followed. After eight years of governorship, Grey was knighted and transferred to Cape Colony. Here his administration was characterized by the same firm policies and the same independent interpretation of the interests of the colonists. His attempts to federate South Africa dis¬ pleased the Colonial Office and he was sent back again to New Zealand, a post of increased difficulties and hardships. In 1867 he was re¬ called to England, where his attempts to enter politics met with little success. A pension of £1,000 was awarded him five years later on which he retired near Auckland with the in¬

tention of withdrawing from politics altogether

and devoting himself to scholarly pursuits.

But in 1875 he was invited to accept the office of superintendent of the province of Auckland ; sat later in the New Zealand House of Repre¬

sentatives and rose to the premiership. His

ministry ended in 1879; and his advocacy of

the reform franchise at the Sydney convention

was his last active work in the politics of the country whose interests had absorbed the best

energies and efforts of his life. In 1894 he

returned to London where until his death he

enjoyed some small degree of royal favor.

His extensive library was donated partly to

Cape Town and partly to Auckland. A statue

has been erected to his memory at Cape Town.

He wrote (Journals of Discovery in Australia*

(1841) ; Polynesian Mythology* (1855) ; Pro¬

verbial Sayings of the Ancestors of the New

Zealand Race* (1858). Consult Rees, W. L.

and L., (The Life and Times of Sir George

Grey) (London 1892) ; Henderson, G. C., (Sir

George Grey> (ib. 1907); Collier, T., <Sir

George Grey> (1909).

GREY, Henry George, 3d Earl. English

statesman: b. Howick, Northumberland, 28

Dec. 1802; d. 9 Oct. 1894. He was educated at the University of Cambridge and after 1807

was known as Viscount Howick. He was

elected to Parliament in 1826 as a Whig, sitting for Northumberland after 1831. In 1830 he

became undersecretary for the colonies in his

father's Cabinet. He was one of the leaders of the colonial reformers and in 1834 resigned be¬

cause slave emancipation was made gradual in¬

stead of immediate in the British West India

colonies. When the Melbourne ministry came

into power in 1835 he was given the portfolio of Secretary of War. He inaugurated several

administrative reforms, particularly in con¬

nection with the Indian troops. He resigned

his Cabinet post in 1839, because of dissatis¬

faction with the views of his colleagues on

colonial questions. About 1841 he became a

pronounced advocate of a free trade policy and his speeches and writings on this question did much to bring the Whigs to accept his policy.

Becoming third Earl Grey in 1845 he took his

seat in the Lords that year, and soon became

Whig leader there. Lord John Russell offered

Grey a Cabinet post in 1845 but the latter ob¬

jected to Palmerston as a colleague. Within a

few months, however, he became colonial

secretary in a Cabinet which included Lord

Palmerston. His colonial administration was

most progressive ; he first recognized the right of the colonies to be governed for their own

benefit rather than in the interest of the home land ; to this end he granted them large

measures of self-government, and introduced

free trade measures between them and Great

Britain and Ireland. Other projects of his in

the colonies were less successful and in 1852 he resigned with his colleagues. After this he

never held office, but he closely followed all public questions and was a vigilant critic of the measures of both great parties. He opposed

Gladstone's Home Rule policy. His published

works include (The Colonial Policy of Lord

John Russell's Administration > (2 vols., 1853) ; Parliamentary Government (1858); (Free

Trade with France* (1881); Hreland: The

Causes of its Present Position* (1888) ; (The

Commercial Policy of British Colonies and

the McKinley Tariff* (1892). He edited Cor¬

respondence of Charles, Second Earl Grey with

William IV* (1867).

GREY, Lady Jane, English princess : b.

Bradgate, Leicestershire, 1537; d. Tower Hill,

London, 12 Feb. 1554. She was the daughter

of Henry Grey, marquis of Dorset, afterwards

duke of Suffolk. She displayed much precocity

of talent, and possessed an acquaintance with

the classic and oriental tongues, as well as

Fiench and Italian. She was married to Lord

Guildford Dudley, fourth son of the Duke of

Northumberland, in May 1553. Edward VI

was induced at his death, 6 July 1553, to settle on her the succession to the Crown. The

council endeavored to keep his death secret with a view to securing the persons of the prin¬

cesses Mary and Elizabeth. Mary was ap¬

praised of their design and wrote expressing

her surprise that she had not been advised of her brother's death, and commanded them on

their allegiance to proclaim her title. The coun¬

cil replied exhorting her to be quiet and obe¬

dient, and proclaimed Lady Jane on the 10th.

On the approach of Mary the Council, unsup¬

ported in their usurpation, meanly deserted their victim Lady Jane and joined in proclaiming

Mary queen on the 19th; the 20th Lady Jane

was confined to the Tower. On 14 November

she and her husband were arraigned and pleaded guilty of high treason, and they might have

been permitted to expiate their imprudence by

a temporary confinement but for the ill-ad¬

vised insurrection under Sir Thomas Wyatt, in

which the Duke of Suffolk, Lady Jane's father, participated. The suppression of this rebellion

was followed by their execution.

GREY OF FALLODON, 1st Viscount,

better known as Sir Edward Grey; English

statesman: b. London, 25 April 1862. His

father, Colonel George H. Grey (d. 1874) served in the Crimea and in the Indian mutiny; his

mother was the daughter of Lieut.-Col. Charles

Pearson and his grandfather the well-known

statesman Sir George Grey, a nephew of Earl

Grey, the great Whig leader and reformer. On

the death of his grandfather he succeeded to

the baronetcy and became ((Sir Edward.® Three

years later he was elected Liberal M.P. for

Berwick-on-Tweed, which constituency he rep¬

resented for 31 years, till his elevation to the peerage in 1916. When Gladstone became

Premier for the fourth and last time in 1892, he appointed Sir Edward underSecretary for

Foreign Affairs. Lord Rosebery was the

Foreign Secretary, and as by virtue of his title he necessarily sat in the House of Lords, it

fell to the undersecretary to represent the

foreign. office in the Commons — a delicate and responsible task. During the short-lived Rose¬

bery administration (1894-95), Sir Edward con¬

tinued in his post under Lord Kimberley. The

foreign policy pursued by Lord Rosebery

marked a profound change in British political

history. Hitherto there had been two distinctly different policies, according to whether the Con¬

servatives or the Liberals were in power — that of the former being invariably energetic and

strong; of the latter, vacillating and unreliable.

Lord Rosebery had twice succeeded Lord

Salisbury as Foreign Secretary (1886 and 1892), and on each occasion continued the policy of

his conservative predecessor. Thus it may be

said that Sir Edward Grey studied diplomacy

under these two excellent masters, diametrically opposed on perhaps

every question of the day

excepting only that of British, relations with

other countries. After the resignation of the

Rosebery Cabinet in 1895 the Liberals ˆwan¬

dered in the wilderness® for 10 years until the resignation of Mr. Balfour in December 1905,

when Sir Edward Grey became Secretarv of

State for Foreign Affairs in the Campbell-Ban¬

nerman administration. Long regarded as a

man of ˆinfinite possibilities in the future® by his colleagues, his accession was marked by no little curiosity and speculation in the chan¬

celleries of Europe. The government was cer¬

tainly <(Liberal® in the widest sense of the word — even radical, socialistic, revolutionary. By

far the bulk of the government's overwhelming

majority was of the <(little Englander® or anti¬

imperialist type, imbued with <(millennium®

theories born of the Tsar's peace proposals of 1898. Reduction in naval and military ex¬

penditure was an important item in their pro¬

gram. The extreme section, indeed, favored

gradual disarmament, since democracy was now

supposed to be firmly established in the world and the Russo-Japanese War was regarded as

the last conflict among the great nations. The vision of the new Utopia had hypnotized not

only the rank and file, but almost the entire Cabinet, with two notable

exceptions : Mr.

Asquith, then Chancellor of the Exchequer and

Sir Edward Grey. They were regarded by

the conservative element of British opinion as

the stabilizing forces of the government.

Neither was a dreamer nor an idealist; each

was practical and businesslike.

Sir Edward Grey took up the threads of

British foreign policy at an epochal moment.

The policy of (<splendid isolation® was dead;

from his predecessor, Lord Lansdowne, he in¬

herited the Anglo-Japanese Alliance and the

<(Entente Cordiale® with France, which latter

he strengthened by concluding the Anglo-Russian agreement (31 Aug. 1907), thus completing

that triple bond to which German opinion

sought to ascrabe the origin of the European

War.. The German Emperor's pilgrimage to

Tangier in 1905 had already raised the spectre of war; the subsequent

conference at Algeciras

and the Agadir incident were generally recog¬

nized as German attempts to break up the coali¬

tion. Certain elements in the British Cabinet

were suspected of <(truckling® to Germany at

the expense of France; Sir Edward, happily,

stood firm and impervious to the promptings

of his colleagues and the radical press. It is to his credit also that he aimed at securing an

American alliance by means of an unlimited

arbitration treaty, but failed. His statesman¬

ship during the Balkan Wars (1912-13) con¬

tributed in large measure to avert a general

European conflagration; he handled the deli¬

cate negotiations with tact and strength.

During the first seven years of Sir Edward's

tenure of the Foreign Office it was perhaps

unfortunate that Germany was represented in

London by Count Metternich, a diplomat of

the subtle calibre of the greater Metternich and Talleyrand, with a strong tincture of Bismarck.

It was inevitable that the direct and simple

manner of the British Minister should have

been misunderstood by a mind of a totally dif¬

ferent texture; that transparent sincerity and

plain words were regarded as nothing but a

cunning disguise. In 1912 Count Metternich

was transferred to Constantinople, changing

places with Baron Marshall von Bieberstein,

who died almost before he had begun his work

in London. He was followed by Prince Lichnowsky, a cultured diplomat almost English in

manner and frankness of purpose. Subsequent

events proved, however, that he was not in the confidence of his own government. It seemed

at the time England and Germany were success¬

fully co-operating during the Balkan Wars, that the danger-point between the two nations had

passed, and Sir Edward Grey was clearly mov¬

ing with strong hope towards an understanding

with Germany. That his efforts were directed

toward the impossible has been amply testified

by the torrent of literature which the diplomatic history of Europe has produced since 1899. One of the most instructive works on the subject,

(Problems of Power, > by W. Morton Fuller¬

ton, was published in 1912, and reveals a re¬

markably ˆintelligent anticipation of events be¬

fore they happen.®

Throughout the course of the grave period

immediately preceding the late war Sir Edward

Grey strove more earnestly than perhaps any

other man in Europe to preserve peace. When

he handed the seal of his office over to Mr.

Balfour in December 1916, he was the last of

all the European ante-bellum foreign ministers

to pass from the stage. King George had car-‘

ferred an earldom upon him in recognition of

his 11 years’ service at the Foreign Office, but Sir Edward requested that the honor be re¬

duced to a viscountship. Not the least of his services to the empire was the remarkable in¬

novation he introduced at the Imperial Con¬

ference in 1911, on which occasion he addressed the assembled Colonial representatives with a

detailed account of the situation in foreign

affairs. This step had a farreaching effect;

the mother country had called a family council that drew closer the ties of kindred and com¬

mon interests. A competent English observer

described Sir Edward as being (<wholly insular

in his tastes, almost unknown in society, much more devoted to fishing than to politics,® and that <(the transparent honesty of his aims, his entire freedom from artifice … give him a certain isolation and authority that are unique.®

In 1919 Viscount Grey was sent on a special

mission to the United States. He returned to

England in January 1920.

GREY FRIARS, a name given some of the

Franciscans on account of their grey habits.

GREYHOUND, a long, tall, slender hound,

the standard features of which are described

under Dog. It hunts by sight, is fitted for the swiftest running and leaping, and is used in

the sport of coursing (q.v.). In the United

States greyhounds are kept mainly as pets ; yet in the West are used in chase of jack-rabbits, prong-horn antelopes and coyotes. Few horses

are able to keep up with them, even in a level country, and on an irregular surface they dis¬

tance horses easily. The modern thin, smooth¬

haired type, to which the name is now popu¬

larly restricted, is a development from a form which arose in western Asia before the Chris¬

tian era, and was adopted and esteemed in Syria, Egypt and Rome, during the classic period. It

was taken west with the Romans in their con¬

quest of Europe, and later became the favorite dog of the nobility, an accompaniment of fal¬

conry. At that time black, or black-and-white

were the approved colors. There seems to have

been little essential change of form or qualities during this prolonged history, and literature and art abound in commemoration of the dog's grace, kindliness and exploits in the field. > There

arose at an early time a diminutive variety not half the size of its namesake (about 7 pounds in weight) fragile, delicate, and of no use save as an ornamental pet, which is now known as the

Italian greyhound. It is of almost any whole

color — black, mouse-grey, fawn or rarely white.

Besides these satin-coated <(long-dogs,® others

arose in the colder parts of Europe which dif¬

fered from the greyhound only in having a

(<rough,® that is long-haired, coat. These are

the Irish wolfhounds (see Wolfhound), the

Scotch stag or deerhound, and the Russian wolf¬

hound or psovie (see Borzoi).

GREYLOCK, Mount, Mass., the highest

point in the State. It is situated in Berkshire County, five miles southwest of North Adams.

It reaches a height of 3,505 feet. The State has purchased 14,000 acres on the upper part of the mountain for a park reservation.

GREYMOUTH, New Zealand, seaport

town of South Islands in Grey County at the

mouth of Grey River. It is 100 miles north¬

west of Christchurch and 190 miles southwest

of Nelson. It carries on a considerable trade

in coal and gold for the mines of the district.

There are also saw mills and brick yards. Pop.

5,500.

GREYSON, gra'zon', Emile, Belgian edu¬

cator and author : d. Brussells, 1892. His prin¬

cipal works are (Fiamma Colonna> (1857) ;

(Les recits d'un Flamand) (1859) ; (Sites

ardennais) (1860-62) ; (Les magots de Teiers)

(1863); (Aventures en Flandre) (1882);

(Entre bourgeois) (1883) ; (Les aberrations de Maxime sur l'education' (1888) ; (Hier —aujourd'hiu* (1890). He was appointed di¬

rector of higher and intermediate instruction

and contributed many papers on the subject of

education to the Revue de I'Intruction Publique.

GREYTOWN, old name San Juan de

Nicaragua, destroyed in 1854 by the United

States. (For the general situation, see Clayton-Bulwer Treaty). In May 1854 the captain

of an American steamship had a quarrel with a negro, and shot him dead ; the mayor of the city ordered him arrested, and the passengers on the ship, as well as Solon Borland, the United

States Minister to Nicaragua, took the captain's part and resisted the arrest. The native in¬

habitants were indigant and mobbed Borland,

whereupon the United States war-vessel Cyane,

Commander Hollins, was sent to exact repara¬

tion. Hollins espoused the cause of an Ameri¬

can transit company who were making exces¬

sive claims, and ordered the mayor to pay them at once; on their refusal he bombarded and

burnt the place. This outrage embroiled the

United States with Great Britain.

GREYWACKE. See Graywacke.

GRIBBEL, John C., American manufac¬

turer : b. Hudson City, N. J., 29 March 1858.

He was educated at the college of the city of New York, and for some years was connected

with the Importers and Traders' National Bank

and the Leather Manufacturers' National Bank

in Philadelphia. In 1883-90 he was the New

York agent of Harris, Griffin and Company,

manufacturers of gas meters. In Jhe latter

year he was admitted to partnership in John J.

Griffin and Company and has been proprietor

of the business under this name since 1892. In 1913 he became joint owner of the Philadelphia Public Ledger. He is on the executive board

of several public service corporations and

banks, and is president of the Union League

Club of Philadelphia. > He has made a valuable collection of American Colonial historical

documents and autograph letters, English and

French engravings of the 17th and 18th cen¬

turies, and rare books of the 15th, 16th, 17th and 18th centuries.

. GRIBBLE, a small boring isopod (Limnoria

lignorum) common on the sea coasts. It is

very common in California, and there as else¬

where it does extensive damage to piers and

wharves by boring into the submerged wood,

on which it feeds.

GRIBEAUVAL, gre'bo'val', Jean Baptiste

Vaquette de, French military engineer: b.

Amiens, 1715; d. 1789. He became a member

of the Royal artillery in 1732; an officer in the engineer corps (1735), and captain (1752). He

served with Austria in the Seven Years' War,

in which he rendered distinguished services at

the seige of Glatz and the defense of Schweid-nitz. Taken prisoner, he was released and

raised to the rank of lieutenant field marshal.

On returning to France his chief efforts were

occupied with the standardization of artillery

weapons and the reform of artillery tactics

which added so much to the success of

Napoleon.

GRIBOYEDOV, gre”bo-yed’of, Alexander

Sergeyevich, Russian dramatic writer : b. Mos¬

cow, 4 Jan. 1795; d. 30 Jan. 1829. In his

parental home he studied music and modern

languages. He also was very fond of reading

comedies. At the age of 15 he went to the

university, accompanied by a tutor whose duty

it was to prevent his association with persons of low rank. He studied law but was allowed

to frequent also all other faculties where dis¬

tinguished professors were lecturing. He had

the good fortune in making friendship with

Professor Buie who took a deep interest in

him, broadened his horizon and, above all

things, developed in him a strong love for

dramatic poetry. He read Plautus, Terence

and other Latin comic writers and finished with Moliere and the later comical writers of France.

In 1816 he was attached to the Ministry of

Foreign Affairs and thus made excellent con¬

nections in Saint Petersburg society. After hav¬

ing made a translation from French and other

literatures he wrote a comedy, (The Student'

in which he derided, not without extravagant

caricature, the affectations of sentimentality

and romanticism. In his (Gorya ot uma'

((Woes of WiU) he shows remarkable astute¬

ness, liveliness, facility in versification and

energetic dialogue. He was just beginning

another comedy when he accepted the post of

second in the duel between Sheremetev and

Zaradovski on account of which he almost lost

his diplomatic position. The misunderstand¬

ings grew worse and he himself was on the

point of fighting in a fresh duel when his

mother used all her influence with the Secretary of State for Foreign Affairs and caused her

son's transfer as secretary of the Imperial Em¬

bassy to Teheran. In Persia he studied the

Arabian and Persian languages as also the

dramatic works written in those languages. In

1821 he was sent to Tiflis to report on the war that had broken out between Persia and Turkey

and on his way to that city he fractured his arm. This accident was the cause of his im¬

mediate transfer to the Foreign office at Saint Petersburg. During that time he wrote only

insignificant verses and lost confidence in his dramatic ability. In 1828 he was appointed resi¬

dent minister to the Persian Court. There he

met his old friend Prince Chavchevaze whose

daughter he married. On 30 Jan. 1829 a mob

of about 100,000 Persians, headed by Griboye¬

dov's personal enemy Alayar-Khan, attacked

the Russian legation. Griboyedov fell mortally

wounded while defending the embassy entrance

against the fanatics.

GRIDLEY, Charles Vernon, American

naval officer: b. Logansport, Ind., 24 Nov. 1845; d. Kobe, Japan, 5 June 1898. A graduaL (1863) of the United States Naval Academy, he served

during the Civil War in the West Gulf block¬

ading squadron, subsequent to the war was on

various ships, and in 1875-79 was stationed at the Naval Academy. He was navigation of¬

ficer in the Boston Navy Yard in 1882-84, was lighthouse inspector in 1887-91 and 1895-97, in 468

1897 attained the rank of captain and was ap¬

pointed to the command of the Olympia, then

flagship of the Asiatic squadron. This vessel

he commanded in the battle of Manila Bay 1

May 1898.

GRIDLEY, Richard, American soldier: b.

Boston, Mass., 3 Jan. 1711 ; d. Stoughton, Mass., 20 June 1796. He served in the British army

as lieutenant-colonel of engineers under Pep¬

pered at the capture of Louisburg in 1745 ; as chief engineer and colonel of infantry in 1755; took part in the expedition to Crown Point

under Winslow in 1756; under Amherst in

1758; and under Wolfe at Quebec in 1759. He

was appointed chief engineer and commander

of the artillery of the American army upon the outbreak of the Revolution, constructed the

fortifications on Breed’s Hill before the battle of Bunker Hill, and later fortified Dorchester

Heights. He was commissioned major-general

by Congress on 20 Sept. 1775, and commanded

the Continental artillery till November of that year.

GRIEG, greg, Edvard, Norwegian com¬

poser: b. Bergen, 15 June 1843; d. there, 4

Sept. 1907. His great-grandfather, Alexander

Greig, was a Scotchman who emigrated to Nor¬

way after the battle of Culloden (1745) and

changed his name to Grieg. Edvard's father

was British consul at Bergen ; he married the

Norwegian Gesine Judith Hagerup, a descend¬

ant of Kjeld Stub; from her, Edvard inherited

his musical gifts; she was a good musician and gave him lessons. By the advice of Ole Bull,

Edvard was sent to the Leipzig Conservatory

at the age of 15; he remained there three years, studying with Plaidy, Wenzel, Moscheles, E. F.

Richter, Hauptmann, Reinecke. Their lessons,

and the music he for the most part heard and studied, impressed a German stamp on his mind, which characterizes his first compositions. His

studies were interrupted by an illness, a severe case of pleurisy, which destroyed one of his

lungs and left his health impaired for life. On his return to the North he came under the in¬

fluence of three Scandinavian musicians : the

composer Gade, who gave him many useful

hints ; Ole Bull, an ardent musical patriot, who made him familiar with the charming folk-tunes

of Norway, which he played so entrancingly ;

and Richard Nordraak, who encouraged him in

his natural inclination to get out of the mael¬

strom of German music and steer into the

fjords of Norway. From 1866 to 1873 he lived

at Christiania, conducting the Philharmonic

concerts and giving lessons. He also gave sub¬

scription concerts, with the aid of his cousin, Nina Hagerup, whom he married on 11 June

1867 ; she was an excellent vocalist, whose art was a great aid in winning favor for his songs.

In 1868 Liszt accidentally came across Grieg's

first violin sonata (Op. 8), and was so much

impressed by the evidence of creative power it gave that he invited him to come and spend

some time in his studio. It was in consequence of this flattering letter that the Norwegian gov¬

ernment gave Grieg a sum of money which en¬

abled him to visit Rome. There he repeatedly

met Liszt, who became more and more im¬

pressed by the boldness and the national traits of his genius; he urged him to perserve in his original course and not to let critics intimidate him.

In 1874 Henrik Ibsen asked Grieg to write

the music for a stage version of his (Peer

GyntP The offer was accepted and the play

was produced, with much success, in 1876. It

is often given in Scandinavian cities; elsewhere it has not succeeded because of its untheatrical, fantastic character and its grotesque local color¬

ing; but the music, arranged for the concert

hall in the form of two suites, soon made Grieg one of the most popular composers in all

countries. In the same year that Ibsen invited him to compose the music for (Peer Gynt, > the Norwegian government honored him with an

annuity of 1,600 crowns for life. This relieved him of the drudgery of teaching and enabled

him to devote most of his time to composing.

For several years he lived at Lofthus, on the Hardanger Fjord. At Bergen, 1880-82, he con¬

ducted a musical society called the (Harmon—

ienP In 1885 he built the elegant villa Trold-haugen, overlooking the fjord, about eight

kilometers from Bergen; there he lived till his death. After his fame was well established,

about 1880, he left his home frequently for

concert tours in Germany, France and England.

Everywhere he was acclaimed as one of the

most individual and enchanting of pianists (he

played only his own pieces), and usually all the seats for his concerts were sold long before

their dates. Sometimes he conducted his

orchestral compositions. (<How he managed to

inspire the band as he did and get such nervous thrilling bursts and such charming sentiment

out of them I don't know,® wrote Sir George

Grove in 1888. In 1893 a writer in the Paris Figaro said : <(Among the most famous living

musicians there is none I know of whose popu¬

larity equals, with us, that of M. Grieg.® In 1899, Colonne invited him to Paris to conduct

a Grieg concert; but it was just after the ver¬

dict in the Dreyfus case, which had made

Grieg so indignant that he refused the invita¬

tion. When it was repeated four years later, he accepted. There was a tremendous crowd ;

cries of <(apologize, you have insulted France!®

were heard; but the vast majority was with

him, and the concert proved one of his biggest triumphs.

Grieg did for Norway what Chopin did for

Poland, Liszt for Hungary, Dvorak for Bo¬

hemia ; he created a new national art. This

great achievement, unfortunately, stood in the

way of the full recognition of his superlative genius. It is still commonly assumed that he

did little more than transplant to his garden

the wild flowers of Norwegian folk-music,

whereas, in truth, ninety-five hundredths of his music is absolutely his own. He ranks with

Schubert and Chopin both as a melodist and a

harmonist. His persistent ill-health prevented

him from writing operas and symphonies; most

of his works are songs and short pianoforte

pieces. The songs, 125 in number, are of

striking originality and depth of feeling. The

equally numerous short pieces for piano (in¬

cluding 66 <(lyric pieces® in one vol.) are as idiomatic as Chopin's. There are also five

sonatas : one for piano alone, three with violin, one with 'cello, beside a string quartete. The orchestral list includes: Overture, (In the

Autumn* ; (Holberg) suite; two (Peer Gynt)

suites; (Sigurd Jorsalfar) ; arrangements of

Grieg songs and Norwegian dances. Choral

works: (At the Cloister Gate) ; ˆandsighting* ; GRIEPENKERL — GRIFFENFELDT

Olaf Trygvason.1* (BerglioD is a poem for

declamation, with orchestra. The only books

on Grieg and his works are by Schjelderup, in Norwegian, and by the author of this article, in English. The latter contains a list of pam¬

phlets and magazine articles on Grieg.

Henry T. Finck,

Musical Critic, New York Evening Post.

GRIEPENKERL, gre'pen-kerl, Chris¬

tian, German painter : b. Oldenburg, 1839. He

studied at Vienna under Rahl with whom he

was closely connected in his work. He assisted him in the paintings at the Opera House at

Vienna and completed several works left un¬

finished at the death of Rahl. (CEdipusLed by

Antigone) was his first independent work.

Others are the decorations in the Houses of

Parliament ; the designs of the frescoes at the Academy of Science at Athens and some por¬

traits. He became professor at the Vienna

Academy in 1874.

GRIER, grer, William Nicholson, Ameri¬

can soldier: b. Pennsylvania, 1812; d. 1885. He was graduated at West Point (1835), and after

service in the Indian campaigns in the west

and in the Mexican War, received the rank of

major-general. In the Civil War he rose to the lieutenant-colonelcy of the' First Cavalry

(1862), and was brevetted brigadier-general in

1865. He became colonel of the Third Cavalry

in 1866 and retired in 1870.

GRIERSON, grer ‘son, Benjamin Henry,

American soldier: b. Pittsburgh, Pa., 1826; d. 1911. He was major in the Sixth Illinois Cav¬ alry, became colonel in 1863. His raid from La Grange, Tenn., to Baton Rouge was one of the spectacular feats of that year. The rank of major-general of volunteers was conferred on him in 1865 and in the following year he became colonel of the Tenth United States Cavalry in the Southwest. In 1867 he was bre¬ vetted major-general and also brigadier-general, with which rank he retired in 1890.

GRIERSON, Sir George Abraham, Irish

Oriental scholar: b. Glengeary County, 7 Jan. 1851. He received his education at Trinity College, Dublin, and took advanced degrees from Dublin University, Halle and Calcutta University. In 1873 he became a member of the Indian Civil Service and rendered import¬

ant service to that country. From 1898 to 1902

he was in * charge of the linguistic survey of India (published in 9 vols., 1903-08). His pub¬

lications include (Handbook of the Kaithi Char¬

acter ; (Grammar and Chrestomathy of the

Maithili Language) ; (Seven Grammars of the

Bihar Dialects-* ; (Bihar Peasant Life* ; (The

Modern Vernacular Literature of Hindustan> ;

(The Satsaiya of BiharP ; (Essays on the

Kashmiri Grammar ; (The Pisaca Languages

of Northwestern IndiaC

GRIERSON, Sir Robert, Scottish laird:

b. about 1655; d. 1733. For his effective per¬

secutions of the Covenanters he was appointed

justice at the military court at Kirkcudbright

(1681). James II elevated him to the peerage

as baronet and pensioned him. The fall of his patron rendered him unpopular and he was

arrested many times. He is the supposed pro¬

totype of Sir Robert Redgauntlet in Scott's

'Redgauntlet.*

GRIESBACH, Johann Jakob, a noted Ger¬

man New Testament scholar, biblical critic and

theologian : b. Butzbach in Hesse-Darmstadt, 4

Jan. 1745; d. Jena, 24 March 1812. He was

educated at Frankfort-on-the-Main ; later stud¬

ied theology at Tubingen, Halle and Leipzig;

during 1769-70 traveled extensively in England,

France and Holland; in 1771 became docent

and in 1773 professor extraordinary in theology at Halle; and from 1775 till his death was

professor ordinary at Jena. Griesbach's most

important work — to which he devoted the best years of his life— - was the collecting and classi¬

fying of the ancient manuscripts and versions

of the Greek text of the New Testament. His

critical researches, the result of which appeared in his edition of the Greek New Testament

(Halle, 1775-77) one of the first ever printed, are valuable and in the main correct. It was he who first divided the authorities for the text of the Greek New Testament into the three

great families — Alexandrine, Latin or West¬

ern, and Byzantine or Eastern.

GRIESINGER, gre'zing-er, Karl Theodor,

German author : b. Kirnbach, Baden, 1809 ; d.

1884. He studied at the Protestant Theological

Seminary at Tubingen and became editor of a

radical journal, his utterances in which incurred the censure of the government. He was ac¬

cordingly imprisoned for two years. Shortly

after his release he went to the United States, where he remained for five years. His impres¬

sions of the country are contained in (Lebende Bilder aus Amerika) (1858) ; (Emigranten-gesch:chten) (1858) ; (Die alte Brauerei, oder

Kriminalmysterien von New York1* (3 vols.,

1859) ; (Land und Leute in America1* (2d ed., 1863). The most important of his works on

German life is his (Die Maitressenwirtschaft

in Deutschland im I7ten und 18ten JahrhunderC

(1874). His collected works were published

in six volumes (1843-44).

GRIFFENFELDT, Count Peder Schu¬

macher, Danish statesman: b. Copenhagen,

1635; d. Trondhjem, 12 March 1699. He was

the son of a Danish merchant. His precocity

in his studies manifested itself at an early age, and after receiving a liberal education in his native city, he spent eight years on the con¬

tinent, studying at Germany, Netherlands, Eng¬

land, France and Spain. Everywhere he made

acute observations on the politics of the vari¬

ous countries and by contrasting these with

the government of his native state, began to

shape the policies which determined his course.

He returned to Denmark in 1662 and set about

gaining the favor of Frederick III. Two pur¬

poses animated his zeal — personal ambition

and the desire to place Denmark in the ascend¬

ancy. In 1663 he was appointed royal librarian and two years later became secretary to the

king. On the death of the monarch he suc¬

ceeded in maintaining the same confidential re¬

lation with Christian V, under whom he rose

rapidly in power. In 1670 he became privy

councillor; was raised to the peerage as Count of Griffenfeldt and finally became imperial

chancellor. In this capacity he employed every

means in his power toward rendering the gov¬

ernment efficient both in its internal organiza¬

tion and its commercial relations. He advo¬

cated treaties with Sweden and France in order 470

to maintain peaceful relations with these

countries and avoid war. But this policy

brought down on him the odium of a number

of the ruling class of Denmark, which increased in proport:on to his rising power. As a result of a conspiracy on the part of his enemies, he was suddenly arrested in 1676 and tried for

treason and bribery. He was found guilty and

condemned to death, but the sentence was later changed to life imprisonment.

GRIFFIN, Charles, American soldier: b.

Licking County, Ohio, 1826; d. Galveston,

Texas, 5 Sept. 1867. He was graduated at West Point (1847) and served through the Mexican

War. In the Civil War he commanded the 5th

artillery at the first battle of Bull Run, and on 6 May 1864 was brevetted lieutenant-colonel in

recognition of gallant and meritorious services

in the field. He was one of the commissioners to carry out the condition agreed upon by Gen¬

erals Grant and Lee.

GRIFFIN, Gerald, Irish novelist: b. Lim¬

erick, Ireland, 12 Dec. 1803; d. Cork, 12 June 1840. He will be longest remembered for his

novel <The Collegians> (1829), upon which

Boucicault's popular play, (The Colleen BawnJ

is founded. Griffin was a poet as well as a

writer of tales and the author of various lyrics popular with his countrymen.

GRIFFIN, Sir Lepel Henry, English

diplomatist: b. Watford, 20 July 1838; d. Lon¬

don, 9 Mar. 1908. He entered the Bengal Civil Service, in 1860. He was a tactful and success¬

ful administrator, and superintended the nego¬

tiations at Cabul which resulted in the return to the throne of Afghanistan of Abdur-Rahman.

In 1885 he was envoy extraordinary to Peking.

He was one of the founders of the Asiatic

Quarterly Review. He has written (The Punjab

Chiefs) (1865) ; (The Rajahs of the Punjab)

(1870) ; (The Great Republic (1884), written

in a spirit of great hostility to the United

States.

GRIFFIN, Martin Joseph, Canadian jour¬

nalist and librarian: b. Saint Johns, Newfound¬

land, 1847. He received his education at Saint Mary's College, Halifax, Nova Scotia, and

practised law there for a time. From 1868-74

he was editor of the Halifax Express. After

serving for two years as representative of the Toronto Mail at Ottawa, he became its editor-in-chief in 1881. He held this post until 1885, when he was appointed parliamentary librarian

at Ottawa. He gained prestige also as a literary critic.

GRIFFIN, Simon Goodell, American

soldier and statesman: b. Nelson, N. H., 1824; d. 1902. He sat in the New Hampshire State

legislature in 1860. When the Civil War broke

out he was appointed colonel of the First

Brigade, Second Division, Ninth Army Corps,

and took part in the siege of Vicksburg and

the Mississippi campaign. In the battle of the Wilderness he was in command of the Second

Brigade, Second Division, and was active at

Spottsylvania. In 1864 he became brigadier-general of volunteers, and major-general of

volunteers in 1865. On his return to his native State he settled at Keene and was elected five times to the New Hampshire legislature, being

chosen speaker for the last two terms.

GRIFFIN, Walter Burley, American archi¬

tect : b. Maywood, Ill., 1876. He studied at the University of Illinois and at the Massachusetts Institute of Technology, and began his career

as a landscape architect. His principal achieve¬

ment has been the plan for Canberra, the new

capital of Australia. He was given charge of

the execution of this work in 1913.

GRIFFIN, Ga., city and county-seat of

Spalding County, on the Southern and the

Central of Georgia railroads. It is the centre of a cotton and fruit region, the chief fruits being grapes and peaches. The city contains

cotton-mills, a foundry and furniture factories ; wine is also manufactured, and the manufacture

of Turkish towels is extensive. The State Agri¬

cultural Experiment Station is located in the

vicinity; and also a test farm of the Central of Georgia Railroad. The city owns and operates

the electric-lighting plant and the water works.

Pop. (1920) 8,240.

GRIFFIN, or GRYPHON, in mythology,

a fabulous animal, usually represented with the body and legs of a lion and the head and wings of an eagle, signifying the union of strength

and agility. Figures of griffins are frequently used as ornaments in works of art. It is em¬

ployed as an emblem of vigilance, the animals

being supposed to be the guardians of mines

and hidden treasures. Figures of it are met

with in tombs and sepulchral lamps, as guarding the remains of the deceased.

GRIFFIS, William Elliot, American cler¬

gyman and author: b. Philadelphia, 17 Sept.

1843. He served with the 44th Pennsylvania

regiment in the Civil War, and then entered

Rutgers College, where he was graduated jn

1869. In 1870 he went to Japan to organize

schools after American methods in the province

of Echizen, where he made a study of the

Japanese feudal system, of which he is the only living witness from interior residence. On the

fall of the feudal system and the unification of the empire he was appointed professor of physi¬

cal sciences in the Imperial University 1872-74, introducing technical education in the govern¬

ment schools. In 1874 he returned to the United States, where he was graduated from the Union

Theological Seminary in 1877, and became

pastor of the First Reformed Church in Sche¬

nectady, N. Y., 1877-86, of the Shawmut Con¬

gregational Church, Boston, 1886-93, and of the First Congregational Church of Ithaca, N. Y.,

1893-1903. From 1903 he turned his attention

wholly to literary work with the idea of helping to a better understanding the Oriental and

Occidental civilizations. An authority on Japan, he also studied the Dutch origins of America

and the influence of the Dutch in the formation of the United States. In 1905 he received the decoration of the Order of the Rising Sun from the Emperor of Japan. He has written (The

Mikado's Empire5 (1876) ; Japanese Fairy

World5 (1880) ; (Asiatic History: China, Corea, and Japan5 (1881); (Corea — the Hermit Na¬

tion5 (1882) ; (Corea, Without and Within5

(1885) ; (Matthew Calbraith Perry5 (1887) ;

(The Lily Among Thorns5 (1889) ; (Honda, the

Samurai5 (1890) ; (Sir William Johnson and

the Six Nations5 (1891); (Japan — in History.

Folklore, and Art5 (1892); (Brave Little Hol¬

land and What She Taught Us5 (1894) ; (The

Religions of Japan5 (1895) ; <Townsend Harris

■—■First American Envoy in Japan) (1895) ;

Romance of Discovery* (1897) ; ‘Romance of

American Colonization (1898) ; (Romance of

Conquest* (1899) ; (The Pilgrims in Their

Three Homes) (1898) ; ‘The Students’ Motley)

(1898) ; ‘The American in Holland) (1899);

‘America in the East) (1899) : (Verbeck of

Japan* (1900) ; (The Pathfinders of the Revo¬

lution* (1900) ; (In the Mikado’s Service)

(1901) ; ‘A Maker of the New Orient> (1902) ; ‘Young People’s History of Holland) (1903) ;

‘Dux Christus, an Outline Study of Japan

(1904) ; ‘The Japanese Nation in Evolution

(1907); ‘The Firefly’s Lovers* (1908); ‘The

Story of New Netherland* (1909) ; ‘China’s

Story in Myth, Legend, Art, and Annals)

(1910) ; ‘The Unmannerly Tiger and Other

Corean Tales> (1911) ; ‘Belgium, the Land of

Art* (1912) ; ‘A Modern Pioneer in Korea)

(1912) ; ‘Hepburn of Japan (1913) ; ‘The

House We Live in (1914); ‘The Mikado —

Institution and Person (1915) ; ‘Millard Fill¬

more — Constructive Statesman (1915) ;

‘Dutch Fairy Tales for Young Folks) (1918).

GRIFFITH, Francis Llewellyn, English

Egyptologist: b. Brighton, 1862. He was grad¬

uated at Queen’s College, Oxford, and with

Mr. Flinders Petrie and M. Naville spent sev¬

eral years in archaeological work in Egypt. He was appointed assistant in the British Museum

(1888-96) ; assistant professor of Egyptology

at University College, London (1892-1901);

lecturer at the University of Manchester (1896—1908), and has been reader in Egyptology at

Oxford since 1901. In 1910 he went to Nubia,

where he superintended the Oxford archaeo¬

logical investigations. He is the author of

‘The Inscriptions of Siut and Der Rifeh)

(1889) ; ‘Hieratic Papyri from Kahun and

Gujrob* (1898) ; ‘Stories of the High Priests of Memphis *(1900) ; ‘Demotic Magical Papyri*

(with Sir Herbert Thompson, 1904-09) ; ‘Cata¬

logue of Demotic Papyri in the Rylands Library) (1909) ; ‘Meroitic Inscriptions) (1911-12) ; ‘The Nubian Texts of the Christian

Period* (1913).

GRIFFITH, Ralph Thomas Hotchkin,

English scholar and educator: b. Corsley,

Wiltshire, 1826; d. 1906. He received his edu¬

cation at Queen’s College, Oxford, then went

to India, where he was principal of Benares

College (1863-78) ; and Director of Public In¬

struction of the Northwest Provinces (1878—

85). Among his works are ‘Specimens of Old

Indian Poetry* (1852) ; ‘The Birth of the War God) (1853); ‘Idylls from the . Sanskrit*

0866) ; ‘The Ramayan of Valmiki* (1895) ;

‘Yusuf and Zulaikha) (1882) ; ‘The Hymns of

the Rig Veda, Metrically Translated into Eng¬

lish (4 vols., 1889-92) ; ‘The Sama Veda)

(1893) ;. ‘The Atharva Veda* (1895-96) ; ‘The

Texts of the White Yajur Veda* (1899).

GRIFFITH, Sir Richard John, Irish geol¬

ogist and civil engineer: b. Dublin, 1784 ; d. 1878.

He was educated at London and at Edinburgh,

and in 1809 investigated the bogs of Ireland for the government. He was appointed professor

of geology and mining engineering for the

Royal Dublin Society in 1812. From 1822 to

1830 he was supervisor of extensive road im¬

provements in Ireland and also served as com¬

missioner of valuation (1827-68). The most

important of his publications was the ‘Geo¬

logical Map of Ireland) (1815; and again in

1836 and 1855). Others are ‘Outline of the

Geology of Ireland* (1838) ; ‘Fossils of the

Mountain Limestone of Ireland* (1842) ; and,

with F. McCoy, ‘A Synopsis of the Characters

of the Carboniferous Limestone Fossils of Ireland) (1844) ; and ‘A Synopsis of the Silurian Fossils of Ireland) (1846).

GRIFFITH, Robert Stanislaus, American

naval engineer: b. Frederickburg, Va., 27 Sept.

1857. He was graduated at Annapolis, and

entered the United States navy. He saw service in the Spanish-American War, and in 1903 be¬

came fleet engineer of the European squadron.

In the following year he occupied a similar posi¬

tion with the North Atlantic fleet. In 1913

he was appointed engineerin-chief of the

United States navy, with the rank of rear-admiral. In the same year he became president

of the American Society of Naval Engineers.

Columbia University conferred on him the de¬

gree of Doctor of Science in 1915.

GRIFFITHS, David, American botanist:

b. Aberystwith, Wales, 16 Aug. 1867. His

family emigrated to the United States and

Griffiths was sent to the Agricultural College

at Brookings, S. D. He continued his studies

at Columbia University, taught in the South

Dakota schools (1889-98), became professor of

botany at the University of Arizona (1900-01),

agrostologist (1901-07) and was appointed agri¬

culturist in the United States Department of

Agriculture in 1907. Of his works on agricul¬

ture the most important are the bulletins issued for the Department on forage and range con¬

ditions in the Western States and a monograph

on the Sordariacece of North America.

GRIFFITHS, Ernest Howard, English

scientist: b. Brecon, 15 June 1851. He was educated at Owens College, Manchester, and Sidney Sussex College, Cambridge. Since 1901 he has been principal and professor of experi¬ mental philosophy at University College of South Wales and Monmouthshire, Cardiff. In 1907 he was awarded the Hughes gold medal by the Royal Society for his contributions to the study of exact physical measurements. His publications include ‘The Thermal Measure¬ ment of Energy> (1901) and numerous papers on the subjects of heat and electricity.

GRIFFON, or BASSETT-GRIFFFON,

a large, grayish-red field-dog, combining the qualities of both pointer and setter, but having a thick, hard coat, enabling it to work readily in thickets and rough country. It originated in Germany at the end of the 19th century.

GRIGGS, Edward Howard, American author and lecturer : b. Owatonna, Minn., 9 Jan. 1868. In 1889 he was graduated from Indiana University (A.M., 1890), where he was instructor in English literature in 1889-91 and professor of literature in 1892-93. He also

studied at the University of Berlin. At Leland Stanford he was assistant professor of ethics

1891-92, and professor of ethics 1893-97, and

head of the department of ethics and education in 1897-98. After 1899 he became author and

lecturer, giving university extension courses in all parts of the United States and Canada. He is president of the department of philosophy at the Brooklyn Institute of Arts and Sciences.

He has published 'The New Humanism)

(1900) ; CA Book of Meditations) (1902) ;

(Moral Education) (1904) ; (The Use of the

Margin) (1906) ; (Human Equipment* (1908) ;

(The Philosophy of Plato) (1910); (Human

Progress) (1912) ; (The Philosophy of Art*

(1913) ; (Self-Culture Through the Vocation*

(1914) ; friendship, Love, and Marriage)

(1915) ; (The Soul of Democracy* (1918) ; also 12 handbooks to cours2s of lectures and guides for study clubs.

GRIGGS, John William, American lawyer :

b. Newton, N. J., 10 July 1849. He was grad¬

uated at Lafayette College in 1868, and was

admitted to the bar in 1871, practising in Pater¬

son, N. J. He was a member of the New Jersey general assembly, 1876-77 ; a state senator,

1882-88; and president of the state senate in

1886. He became governor of New Jersey

1 Jan. 1896, resigning 31 Jan. 1898 to become Attorney-General in President McKinley's Cab¬

inet. Ue resigned in April 1901 to become

member of the Permanent Court of Arbitration

at The Hague.

GRIGNARD, gre'nyar', French chemist:

b. Cherbourg, 1871. He received his education

at the fLcole Normale at Cluny and at the Uni¬

versity of Lyons. His principal research has

been in the study of synthetic chemistry, for

which he was awarded half of the Nobel prize

in chemistry in 1912. In 1905 he delivered lec¬

tures in chemistry at Besangon; taught at

Lyons (1906-09), becoming professor at Nancy

in 1910. His writings have appeared in various chemical journals. See Grignard's Reagents.

GRIGNARD'S REAGENTS. When an

alkyl kaloid, such as methyl iodide, CHsI, is

added to dry magnesium powder suspended in

an ether such as ordinary ethyl ether (GJDiO,

a very reactive compound, known as a grignard

reagent (after V. Grignard, who discovered

them in 1900 under the direction of Professor

Barbier) is formed. In the case just discussed, it appears to have the structural formula at¬

tributed to it by Baeyer, *viz.*

C2H3 MgCH8

\ /

O

/ \

GH3 I

with tetravalent oxygen. The Grignard re¬

agents are invaluable in organic synthesis on ac¬

count of the number and variety of constructive reactions into which they enter. For example,

they enable us to form tertiary alcohols from

petones as follows :

CH3.CO.CH3 + (CkH5)2OBr.MgC2H3—

CH3 GHs

\ /

(GH5)X) + C

/ \

CH3 O.MgBr.

CH3 gh5

\ /

c +H20 =

/ \

CH3 O.MgBr.

CH3 GH5

\ /

C +Br.Mg.OH.

/ \

ch3 oh

Again, we can form tertiary alcohols from acid chlorides.

CH3.CO.Cl + 2CH3.Mg.LO.(C2H5)2— (C2H5)20 +

(CH3)3C.O.MgI + MgICl.

A closely similar reaction takes place with or¬

ganic esters. Secondary alcohols can be made

from aldehydes and Grignard reagents : *e.g.*

CH3.CHO + C2H5.Mg.I.O. (GH£)2 =

CH.OMgI + (GHs).0.

C,HS /CH0MgI + H!° =

£?? y CH.OH + Mg.I.OH.

Fatty acids may be prepared from Grignard reagents and carbon dioxide.

CnHjn + 1 .Mg.I.O. (C2H3)2 + C02 = =

C*H2n + i.CO.OMgI + (C2H3)20

2CnHm4-i .CO.OMgI + H2S04 =

2CnHm + 1.CO.OH + MgI2 + MgS04

Hydrocarbons may be built up by Grignard reactions.

R.Mg.Br.O. (C2H5) 2 + BrR — RR' + MgBr2 + (GH3)20.

Bromo-derivatives may be transformed into corresponding iodo-compounds.

RBr R.Mg.Br.O. (C2H5)2 RI

Mg I2

Aromatic Grignard compounds exist, and react much like their aliphatic analogues. Among the organic Grignard reactions is that by which benzaldehyde is prepared from ethyl orthoformate.

GH3.Mg.Br.O.(C2H5)2 + CH(OGH5)3 =

(C2H3)iO + Mg.Br.O.GHr) + GH5.CH(OC2H3)1

CoH3.CH. (0GH5)2 + H20 =

C6H5.CHO + 2GH5OH

Ketones may be synthesised from nitriles

R.CN + R'Mg.LO.(C2H3)2 =

(C2H5)20 + RR'C: NMgl.

RR'C:NMgI + 2H20 =

R.CO.R' + NH2 + I.Mg.OH.

In 1904 Baeyer showed that the Grignard re¬

agents were formed with greater ease if the

magnesium had been previously heated with

iodine. After the completion of the Grignard

reaction, the mixture is poured into acidulated water, and the product is purified by distillation or crystallization.

GRIGOROVITCH, gre-go-ro'vTch, Dmitri

Vasilyevitch, Russian artist, novelist and his¬

torian of art j b. 19 March 1822, at the village of Nikolskoye in the province of Simbrisk, on

the Volga; d. 1900. His father was a retired

hussar of the Great Katharine's time. His

mother was the daughter of a French emigre,

named De Barmont. When the boy was seven

years old, his parents went to the father's es¬

tate at Dumbino, not far from the city of Tula.

After the custom of landed proprietors his edu¬

cation was entrusted to governesses and tutors, until he was ten, when he was sent by his

mother, then a widow, to Moscow, where he at¬

tended a boarding-school kept by an Italian of artistic tendencies. There he learned several

foreign languages. When he was 14 he went to

Petersburg and studied with the famous engi¬

neer, Kostomarof, who fitted him to enter the

Mikhailovsky Engineering School. But his

heart was not in that career and after a rather unhappy year he entered the Art Academy

where he was instructed by the great artist,

Tamarinsky. His first inclination to painting

had been stimulated when he was a child by his discovery among his

mother's possessions of a

portfolio of drawings and he had early mani¬

fested a considerable talent for sketching. He

made good progress and when he had finished

his studies he was engaged to furnish various

articles for Leontof's Encyclopedic Lexicon. >

He also contributed to Plyeshar's (One Hun¬

dred and One Tales and Forty-Forties of Anecdotes) a number of translations and original

stories. He made the acquaintance of Nikolai

Ivanovitch Gryetch and the famous poet, Nekrasof, both contributors to Kray evsky's Literary Gazette and he contributed to that brilliant pe¬

riodical a number of short stories. In 1846 he left Petersburg and settled in the country, where he continued his literary activities, contributing to the Annals of the Fatherland (Otyetchesven -

nuiya Zapiski) and to the Contemporary

(Sovremennik). In these appeared his best-known stories (Anton Goryemka,* (The Land¬

less Peasant (<Bobuil)), (Brief Richcs)

((Nyedolgoye Bogatsvo*), (Four Years*

((Chetuirye Vremenyi godaˆ, (The Fishermen) ((Ruibaki)), (*The Emigrants) (cPeres—

yelentsuP) and others. In 1858, while at the

very height of his successful literary career he was suddenly called to the Ministry of the

Marine and spent a year in the Mediterranean

on the cruiser Retvisdn. He utilized this ex¬

perience in a series of sketches published under the title (Korabl Retvizan,* with a subtitle, (A Year in Europe and in European Waters. * This

practically closed his literary activities. In

1863 he became secretary of the Society for the Encouragement of Artists and for many years

he devoted his energies to this worthy object.

His works of fiction make a series of eight vol¬

umes. Several others are devoted to his arti¬

cles on the (History and Theory of Art.*

Nathan Haskell Dole.

GRIJALVA, gre-hal'va, Juan de, Spanish

navigator, the discoverer of Mexico : b. Cuellar in Old Castile, 1489 or 1490; d. Nicaragua, 21

Jan. 1527. He was intrusted by his uncle, Don Diego Velasquez, the first governor of Cuba,

with the command of a fleet of four vessels,

which, on 1 May 1518, sailed from Saint Jago

de Cuba, to complete the discoveries which

Fernandez de Cordova had made in Yucatan

the year preceding. Rounding the peninsula

of Yucatan, he extended his explorations as

far as the province of Panuco, giving his name and that of his companion, Alvarado, after¬

ward famous in the expedition of Cortes, to

two rivers on the coast. His communication

with the Aztecs was friendly, and so profitable that he was enabled to send back one of the

ships well freighted with gold, jewels and

other treasures, the acquisition of which was

cne of the main objects of the expedition. On his return to Cuba he found an expedition

organizing for the conquest of Mexico, with

Cortes at the head, and was received by Velas¬

quez with reproaches for having neglected to

plant colonies on the coast. Grijalva, a man of integrity and prudence, had, however, acted

strictly in conformity with his instructions and against his own judgment. In the latter part

of his life he settled in Nicaragua, and was slain in an outbreak of the Indians in the valley of Ulancho. Consult the Hakluyt Society's edition

of Diaz del Castillo's (True History of the

Conquest of New Spain) (4 vols., 1908-12).

GRILLET, gre'ya', Jean, French Jesuit

explorer : b. about 1630 ; d. about 1676. He was superior of a Jesuit mission at Cayenne. After the English occupation of Guiana (1666), he was sent on a tour of exploration into the interior of that country. With Father Franqois Becha¬

mel, he succeeded in penetrating the hitherto un¬

explored country of the Acoquas, about 600

miles southwest of Cayenne. On their return

to the mission, the two fathers published an ac¬

count of their journey under the title (Journal du voyage qu'ont fait les peres Jean Grillet et Frangois Bechamel dans la Guyane, l'an 1674, >

which was later embodied in Gomberville, de¬

lation de la riviere des Amazons> (1679-80)

and again in Roger, (Voyage around the

World) (Amsterdam 1716).

GRILLPARZER, gnl'partser, Franz, Aus¬

trian poet and dramatist: b. Vienna, 15 Jan.

1791; d. there, 21 Jan. 1872. His early educa¬

tion was conducted in a desultory fashion ; in 1807 he began the study of jurisprudence at the University of Vienna, but his father's death in 1809 leaving the family in needy circumstances, Franz was oblized to become a private tutor.

In 1813 he was appointed to a post in the court library, but as it involved no remuneration he abandoned it after a short time and became a

clerk in the revenue administration of Lower

Austria. In 1818 he was appointed poet to the Holburg Theatre and also became connected

with the department of the exchequer in the

same year. He was made director of the

archives of that department in 1832 and retired in 1856. He regarded his official positions

merely as a means of maintaining his inde¬

pendence while furthering his literary career.

Upon his retirement he received the title of

Hofrat.

His literary career began with the tragedy

of (Blanca von Castilien) in 1807-09, a close imitation of Schiller's Eon Carlos.* It was

followed by (Spartacus) and (Alfred der

Grossed but Grillparzer remained unknown to

literary fame until 1817, when Eie Ahnfrau*

was first presented. It was a great suc¬

cess in Austria and Germany, but the fact that the critics at once placed the author in the

same category with Milliner and Houwald

greatly annoyed Grillparzer, who disliked being

rated as a Mate-dramatist.® The year 1818 saw

the production of (Sappho,* a veritable classic after the manner of the (Tasso* of Goethe and in which the poet first showed his true genius.

Eas goldene Vliess* appeared in 1821. One of

the greatest trilogies in German literature, it was not a great success on the stage, due, the author claimed, to the pernicious influence of

Metternich. In 1823 he completed his historical tragedy, (Konig Ottokars Gliick und Ende, * but difficulties with the censor prevented its pro¬

duction until 1825. It portrayed the fall of

Ottokar of Bohemia in his struggle with

Rudolph of Hapsburg. Tn 1828 Grillparzer

brought out another historical tragedy (Ein

treuer Diener seines Herrn, * written two years previously. It was rather too didactic for the period and was coolly received. A sad period

now intervened in the poet's life. A visit to Goethe at Weimar about this time led him to

contrast the intellectual freedom of Saxony

with the narrow, obscurantist policy of Metternich at Vienna, where he himself was constantly embroiled with the public authorities. To this

must be added his hopeless love for Katharina

Frohlich. Feeling that all happiness was denied him, the poet shrank from marriage although

seemingly his love was requited. His despair

was expressed in (Tristia ex Ponto) (1835).

In 1831 he finished his greatest drama, (Des

Meeres und der Liebe Wellen,* a new version

of the story of Hero and Leander, and perhaps the greatest of German love-tragedies. (Der

Traum, ein Leben} was completed in 1834; it

is the author's technical masterpiece and has

been called <(the Austrian (Faust. } }) It was followed in 1838 by the comedy, (Weh dem, der liigt, > which was not well received.

Thereafter the author was disheartened and turned away

from the theatre for ever. He visited Paris

and London in 1836 and the near East in 1843.

The revolution of 1848 came too late to arouse him from his pessimistic outlook on life. True, his plays were reinstated in Vienna and honors were showered upon him, his 80th birthday be¬

ing celebrated as a national holiday, but he held aloof from the theatre. At his death he left

three tragedies among his papers. These are

(Die Judin von Toledo-* ; (Ein Bruderzwist im

Hause Habsburg) and <Libussa.) It was not

until almost a full quarter of a century after his death that his countrymen realized that he

was a dramatist and poet of first rank, and the connecting link between Goethe, Lessing and

Schiller and the moderns. Consult Ehrhard,

(Franz Grillparzer: Te theatre en Autriche>

(Paris 1900) ; Friedmann, (I1 dramma tedesco

del nostro secolo) (Vol. Ill, Milan 1893) ;

Lange, (Grillparzer, sein Leben, Dichten und

Denken) (Giitersloh 1894) ; Littrow-Bischoff,

(Aus dem personlichen Verkehr mit Franz

Grillparzer) (Vienna 1873) ; Sittenberger,

(Grillparzer* (Berlin 1903) ; Traube, c Grillparzers Lebensgeschichte) (Stuttgart 1884) ;

and Saur, Hntroduction to Grillparzer's Works)

(ib. 1892). See Sappho.

GRILSE, a young salmon (q.v.).

GRIMALDI, gre-mal'de, Guelph family of

Genoa and Italy, princes of Monaco until the

middle of the 18th century. The most dis¬

tinguished members were Rainerio, who as

admiral of France, rendered important service

to Philip the Fair in 1304 in the battle against Guy of Flanders. Antonio, also a naval com¬

mander. After several successful encounters

with the Catalans, he was defeated in 1353 by the Venetian and Araganese fleets near Sar¬

dinia. Domenico, a naval officer and prelate.

He was appointed Cardinal and Vice-Legate

of Avignon. Geronimo, a cardinal: b. 1579;

d. 1685. His reforms of the clergy, and his

philanthropic measures were the main features

of his vigorous policy. The male line of the

family died out in 1731 and the name of

Grimaldi was added to that of the ruling house of Monaco, Goyon-Matignon. Consult De

Jolan, (Histoire et genealogie des Grimaldi >

(Nice 1900).

GRIMALDI, Francesco Maria, Italian

physicist: b. Bologna, 2 April 1613; d. Bologna, 28 Dec. 1663. In 1632 he became a Jesuit, and for 25 years taught literature in Jesuit colleges.

His chief interest, however, was in natural sci¬

ence. He experimented on falling bodies and

undertook geodetic surveys. He made a chart

of the moon, and we owe to him much of the

lunar nomenclature. He discovered the dif¬

fraction of light, interference, and the disper¬

sion induced by a prism. He conjectured that

light was immaterial in nature. He wrote

(Physicomathesis de Lumine, Coloribus, et

Eride, Aliisque Annexis> (Bologna 1665), pub¬

lished posthumously.

GRIMALDI, Giovanni Francesco, II

Bolognese, Italian architect and painter: b. Bo¬

logna, 1600; d. Rome, 1680. He was a relative of the Caracci and a pupil of Albani. Settling at Rome, he became architect and painter to

Pope Paul V and his successors. About 1648

he was employed by Cardinal Mazarin at

Paris in the planning of several buildings and in painting frescoes for the Louvre. Among

his works ars some landscapes (Colonna Gal¬

lery, Rome), a series of Old Testament scenes

(Quirinal, Rome) ; other landscapes at the Na¬

tional Library, Paris, at the Louvre, the Vati¬

can and a number at the Imperial Gallery,

Vienna. He also made some admirable etch¬

ings of his own landscapes as well as of the paintings of Titan and the Caracci. He was

twice chosen president of the Academy of

Saint Luke at Rome.

GRIMALDI, Joseph, English clown: b.

London, 18 Dec. 1779; d. London, 31 May

1837. He was the son of an Italian actor and performed on the stage from the age of two

years until his retirement in 1828. Sadler's

Wells was the scene of most of his perform¬

ances. His best role was in the pantomime of

((Mother Goose, }) first produced in 1806. Con¬

sult (Memoirs of Joseph GrimaldP (ed. by

Charles Dickens, New York 1838).

GRIMES, Bryan, Confederate soldier: b.

Pitt County, N. C., 1828; d. there, 1880. After studying at the University of North Carolina,

he was chosen a member of the Raleigh con¬

vention which framed the Ordinance of Se¬

cession (1861). Enlisting in the Confederate

service, he became major of the Fourth North

Carolina Regiment. He rendered important

service at Fair Oaks and in the campaign in

Maryland, commanding the Fifth Brigade of

Jackson's army. He was also active at Chancellorsville, Gettysburg, and in the Shenandoah

Valley campaign. In 1865, he was commis¬

sioned major general, and retired to his estate in North Carolina, where he engaged in plant¬

ing. Here he met death at the hands of an

assassin.

GRIMES, James Wilson, American poli¬

tician and legislator : b. Deering, Hillsboro

County, N. H., 20 Oct. 1816; d. Burlington, la., 7 Feb. 1872. He was graduated at Dartmouth

College (1836), and went west, where he be¬

gan the practice of the law, was appointed sec¬

retary of a commission instituted to negotiate

the transfer of lands from the Sac and Fox

Indians, and after the organization of Iowa

Territory in 1838, he was elected to its legis¬
lature. He was elected governor of Iowa in
1854, and after completing his term, was sent
to Congress as a Republican Senator. He ˆ
voted for the acquittal of President Johnson
at his impeachment trial.

GRIMKE, grim'ke, Archibald Henry,
American lawyer : b. near Charleston, S. C., 17
Aug. 1849. He was graduated from Lincoln
University in 1870, from the Harvard Law
School in 1874, and in 1883-85 was editor of
the <Hub,) a Boston newspaper. In 1891-92
he was a special writer for the Boston Herald a#nd Traveller, and in 1894-98 United States
consul at Santo Domingo. He is president of
the American Negro Academy; president of the
Frederick Douglass Memorial and Historical
Association; vice-president of the National As¬
sociation for the Advancement of Colored Peo¬
ple and trustee of the < Estate of Emmeline
Cushing for the education of colored people,
member of the Authors' League of America.

His writings include a (Life of William Lloyd

Garrison) (1891), a (Life of Charles Sumner 5

(1892), and numerous contributions in periodi¬

cals, dealing chiefly with various questions per¬

taining to the American negro.

GRIMKE, Thomas Smith, American law¬

yer and scholar: b. Charleston, S. C, 26 Sept.

1786; d. near Columbus, Ohio, 12 Oct. 1834. He was graduated at Yale College in 1807, studied law at Charleston and rose to eminence at the bar and in the politics of his State. He became widely known by his addresses in behalf of

peace, religion and literature. An early and

prominent advocate of the American Peace So¬

ciety, he held the opinion that even defensive warfare is wicked. Though a superior classi¬

cal scholar, he maintained that neither the

classics nor mathematics should enter into any

scheme of general education in this country.

In some of his pamphlets he introduced a new

system of orthography of the English language.

A volume of his addresses was published at

New Haven in 1831.

GRIMKE SISTERS, The, Sarah Moore,

and Angelina Emily: b. Charleston, S. C.,

1792 and 1805; d. Hyde Park, near Boston, 1873 and 1879. They were sisters of Thomas Smith Grimke (q.v.). They liberated their slaves, removed to Philadelphia, entered the So¬ ciety of Friends, and became known in connec¬ tion with the Anti-slavery movement. They went to New York in 1836 and in the year fol¬ lowing to Boston ; were leaders in the Ameri¬ can Anti-Slavery Society, and appeared as plat¬ form speakers on slavery. In 1854 they estab¬ lished a successful coeducational academy at Eagleswood (near Perth Amboy), N. J. Sarah lectured also on woman's rights. Angelina wrote (An Appeal to the Christian Women of the South5 ; Sarah an (Epistle to the Clergy of the Southern States.5

GRIMM, Friedrich Melchior, Baron von, French author: b. Ratisbon, 26 Dec. 1723; d. Gotha, 19 Dec. 1807. Having completed his studies at Leipzig he accompanied the young Count de Schonberg to Paris. Here he became reader to the Crown Prince of Saxe-Gotha, but the situation was not remunerative, and Grimm was in straightened circumstances when

lie became acquainted with Rousseau. The latter introduced, him to Diderot, Baron Holbach,

Madame d'Epinay, and other distinguished per¬

sons, and he soon became a general favorite.

His connection with the Encyclopedists, and his intellectual gifts and versatility of mind, soon opened to him a brilliant career. He became

secretary to the Duke of Orleans, and began to write his literary bulletins for several German princes, containing the ablest analysis of all the more important French works. It is believed

that in these works he was assisted by the

Abbe Raynal and Diderot. In 1776 he was raised by the Duke of Gotha to the rank of baron, and appointed Minister Plenipotentiary at the

French court. On the outbreak of the French

Revolution he withdrew to Gotha, and in 1795

the Empress of Russia appointed him her

Minister Plenipotentiary at Hamburg. In ill-health, he returned to Gotha, where he died.

His (Correspondance litteraire, philosophique et

critique5 was published after his death. A sup¬

plement is the (Correspondance inedite Grimm

et Diderot5 (Paris 1829), containing a complete history of French literature from 1753 to 1790, and remarkable for brilliant and piquant criti¬

cism. Consult the edition of Grimm's works by

Tourneux (16 vols., Paris 1877-82), Georges, K.

A., (Friedrich Melchior Grimm5 (Leipzig

1904) ; Sainte-Beuve, (Etudes sur Grimm5

(Paris 1854) ; id., (Causeries du lundi5 (Vol.

VII, ib. 1857-62).

GRIMM, Hermann, German author : b.

Cassel, 1828; d. Berlin, 1901. He was the son of Wilhelm Karl Grimm (q.v.), and was sent

to Berlin and then to Bonn for his education.

He succeeded to the professorship of art his¬

tory at Berlin University in 1872. Besides his critical and historical works, among which the

most important are his (Das Leben Michel¬

angelos5 (2 vols., 1860-63), and (Goethe,5 he

wrote some poems (Traum und Erwachen5

(1854); a tragedy, (Demetrius5 ; and a novel

(fJberwendliche Machte5 (3 vols., 1867). See

Michelangelo, Life of.

GRIMM, Jakob Ludwig, German philolo¬

gist: b. Hanau, Hesse-Cassel, 4 Jan. 1785; d.

Berlin, 20 Sept. 1863. He studied philology and law at Marburg, and later studied many sub¬

jects at Paris under Savigny. He returned to

Germany in 1805 and for a time was employed

in the office of the Minister of War at Cassel.

In 1806 he became librarian to Jerome Bona¬

parte, king of Westphalia, and from 1816 to

1829 occupied the post of second librarian at

Cassel. From 1830 to 1837 he resided at Gottin¬

gen as professor and librarian, lecturing on the German language, literature and legal antiqui¬

ties. Having, with six other professors, re¬

sisted the unconstitutional encroachments of

the king of Hanover, he was banished, and

after his retirement to Cassel, he was, in 1841, called to Berlin as a professor and member of the Academv of Sciences. He sat in the Na¬

tional Assembly of 1848, and in that of Gotha in 1849. From that time till his death, he oc¬

cupied himself only with his various publica¬

tions. He wrote on German mythology, Ger¬

man legal antiquities, the history of the German language, and published old German poems, *etc.*

His two greatest works, both unfinished,

are his (Deutsche Grammatik5 (1819-37), and

his (Deutsches Worterbuch5 commenced in

1852, in conjunction with his brother Wilhelm

(q.v.), and gradually completed by eminent

scholars. He also published in company with

his brother, the (Kinder und Hausmarchen,*

one of the most popular collections of juvenile fairy tales. His (Deutsche Rechtsaltertiimer)

(1828; 4th ed. 1899) ; and (Deutsche Mythologie> (1835), are authoritative on mediaeval

traditions, literatures and social customs. Other important works by him are (Geschichte der

deutschen SpracheJ (1848 ; 4th ed., 1880) ;

(Ueber den Urspung der Sprache) (1851) ;

'Gammer Grethel's Fairy Tales) (1862) ;

(Kleinere Schriftend a collection of his essays and other articles (8 vols., 1864-90). Consult

Duncker, (Die Briider Grimm > (Kassel 1884) ;

Francke <Die Briider Grimm: ihr Leben und

Wirken in gemeinfasslicher Weise dargestellt) (Dresden 1899) ; Scherer, (Jacob Grimm)

(Berlin 1885) ; Tonnelat, (Les freres Grimm,

leur oeuvre de jeunesse) (Paris 1912) ; (Les

contes des freres Grimm, etude sur la composi¬

tion et le style du recueil des Kinder-und

Hausmarchen) (ib., 1912).

GRIMM, Wilhelm Karl, German philolo¬

gist: b. Hanau, 24 Feb. 1786; d. > Cassel, 16

Dec. 1859. He was the companion in study of

his brother, Jakob Grimm (q.v.), at the Ly¬

ceum of Cassel, the University of Marburg,

and again at Gottingen, where in 1830 he was

appointed under-librarian and supernumerary

professor of philosophy. He joined his brother

in the protest against the King of Hanover,

shared his exile, and also his call to Berlin.

There they labored together, and were com¬

monly known at the Brothers Grimm. Under

that name also they have a certain immortality in the affections of the civilized world. His

earliest independent work was a German trans¬

lation of the Danish <Kcempe-Viser) (1811-13). He edited many old German texts and

collaborated with his brother Jakob in several

of his works. His own most important book is

(Die deutsche HeldensaPre) 0867) ; (Kleinere

Schriften) (1881-86); (Altdanische Helden—

lieder) (1811-13), a translation; (Altdeutsche

Gesprache) (Berlin 1851) ; (Friedank) (1834;

2d ed., I860) ; <Ruolandslied> (1838) ; (Athis und Prophilias) (1846). See Grimm, Jakob L.,

and consult authorities there referred to ; also Steig, <Goethe and die Briider Grimm* (Berlin

1892).

GRIMMA, Saxony, town on the left bank

of the Mulde; on the Dobeln-Dresden Railroad,

19 miles southeast of Leipzig. The principal

buildings are the old castle dating from the

12th, the town hall from the 15th, and the

Catholic church from the 13th centuries; the

old Fiirstenschule, founded in 1550 on the site of the old Augustinian monastery and moved

to a new building in 1892; the teachers' sem¬

inary; the brewers' school and commercial

school. A point of historical interest in the

neighborhood is the convent of Nimbschen

which once sheltered Luther's wife, Katharina

von Bora. . Important manufactures of leather,

gloves, vehicles, paper are carried on, and there are also large iron works, machine shops and

dyeworks. Pop. 11.500. Consult Fraustadt,

(Grimmenser Stammbuch > (Grimma 1900).

GRIMMELSHAUSEN, grim'mels-how-sen,

Hans Jakob Kristoffel von, German novelist:

b. Gelnhausen, about 1625 ; d. Renchen, 17 Aug.

1676. At an early age he appears to have been present in the Thirty Years' War, and on his

return entered the service of the bishop of

Strassburg, Franz Egon von Fiirstenberg. His

appointment to the post of magistrate at Ren¬

chen gave him the opportunity of developing

his literary proclivities. In 1668 appeared his (Der abenteuerliche

Simplicissimus, Teutsch,

das ist ; Aie Beschreibung des Lebens eines

seltsamen Vaganten, genannt Melchior Stern—

fels von Fuchsheim.* It is a tale of adventure, remarkable for the vivid descriptions of the

Thirty Years' War. Its style shows the marked

influence of the Spanish picaresque novel and

is highly colored by the military experiences of the author. Against the staid literature of the century in Germany, <Simplicissimus) stands

out in bold relief. In the same vein Grimmel—

shausen wrote (Simplicianische Schriften: Die

Erzbetrugerin und Lanstortzerin Couraschelicbe

Vogelnest* (about 1669) ; (Der seltsame

Springinsfeld) (1670) ; (Das wunderbarliche

Vogelnest* (1672) ; (Dietwalt und Amelinde*

(1670), a group of satirical studies of the times; and ˆJoseph, > a novel based on the biblical

narrative. The (Simplicissimus) has been edited

by A. von Keller (in (Bibliotek des litterari—

schen Vereinsˆ (4 vols., Stuttgart 1852-62) ;

by H. Kurz (in (Deutschen Bibliotek,* Vols.

III-VI, Leipzig 1863-64) ; by von Tittman (in

(Deutsche Dichter des I7ten Jahrhunderts,*

Vols. VII, VIII, X and XI, Leipzig 1877).

GRIMM'S LAW is the name given to the

rule which regulates the Lautverschiebung , or

permutation of certain primitive consonants,

which takes place in the Teutonic languages.

The law, as finally formulated by Jakob Grimm, is that if the same roots or words exist in San¬

skrit, Greek and generally in Latin, Celtic, Let-tic and Slavonic, and also in Gothic, English, Dutch and other Low German dialects on the

one hand, and in Old High German on the

other, the following correspondences are to be

expected: (1) Gothic has a soft mute, and High German a hard mute, in place of the corres¬

ponding aspirate in Sanskrit and Greek; (2)

Gothic has a hard mute, and High German an

aspirate, in place of the corresponding soft

mute in Sanskrit and Greek; (3) Gothic has an aspirate, and High German a soft mute, in place of the corresponding hard mute in Sanskrit and Greek. Thus, a primitive tli becomes d in Low German, and t in High German, as in the words //mgater, daughter, tochter. A primitive d be¬

comes t in Low German, and z in High Ger¬

man, as in duo, /wo, £wie ; or dens, tooth, zzhn ; or decern, ton, zeYm. A primitive t becomes th in Low German, and d in High German, as in

t res, three, drei; or tu, thou, du; or tonuis, thin, dunn. Similar changes affect the labials and

gutturals, as in pe cus, fee, -z/ieh; >*ater, father, z*ater; /agus, &eech, fuocha; and in oculus,

eghe (“eye*), auˆre; qu is, who, wer; or fc/iortus, garden, &orto. The normal changes are set

forth in the following table :

Labials Dentals Gutturals

Greek, etc . p b ph t d th k g kh

Gothic etc . f p b th t d (h) “ k g

Old High German . . b (v) f p d z t g(h)ch k The credit of the discovery of the Laid —verschiebung is not wholly due to Jakob Grimm.

Ihre and Rask had discovered, as early as 1818, the law of the transmutation of consonants in

Greek and Gothic, while Grimm, in the second

edition of his ˆDeutsche Grammatik) which ap¬

peared in 1822, added the corresponding changes in Old High German, and formulated the law

as it now stands.

Grimm’s Law may be interfered with by the

action of other laws, especially by the position of the accent, as formulated in Verner’s Law

(q.v.). Thus f rater is accented on the first syl¬

lable and pater on the second, consequently,

though we have brother and father in English,

we find brnder and voter in High German. The

accent in pater has interfered with the regular action of the Lautverschiebung , and prevented

the normal change of t to d from taking place.

Thus Grimm's Law may be defined as the

statement of certain phonetic facts which happen invariably unless they are interfered with by

other facts. The great use of Grimm's Law, in addition to the identification of words in differ¬

ent languages, is* in the detection of loan

words. Any etymology which violates Grimm's

Law, as qualified by other phonetic laws, must be rejected unless it can be explained as a loan word. The causes which brought about the

changes formulated in Grimm's Law are ob¬

scure. They are probably due to the settle¬

ment of Low German conquerors in central and

southern Germany. Consult Douse, (Grimm's

Law: a Study of Lautvershiebung* (1876);

Max Muller, (Lectures on the Study of Lan¬

guage* (2d series, lecture v, 1864) ; Morris,

(Historical Outlines of English Accidence)

(Chap. 2, 1872).

GRIMSBY, Ontario, Canada, village of Lin¬

coln County, on Lake Ontario and on the

Grand Trunk Railway. The chief occupations

are the manufacture of stoves, electrical fittings, canning and wood planing. Fruit is extensively

raised in the vicinity. Pop. 1,700.

GRIMSBY, Great, England, seaport of

Lincolnshire, also a municipal, county and

parliamentary borough, on the south shore and

near the mouth of the Humber River. It is

situated 20 miles southeast of Hull and 155

miles east northeast of London, on the Great

Northern and Great Central railways. The

principal buildings are the old church of Saint James, the town hall, the exchange, the gram¬

mar school dating from the 16th century, the

theatre, library, technical school, the Harbor

of Refuge for sailors and fishermen, the public gardens donated by the Duke of York in 1894

and the docks and customs house. It is as a

seaport that Grimsby is famous. Its extensive

docks and harbors, including those at Imming—

ham, built by the Great Central Railway, cover an area of some 360 acres. Besides being an

outlet for internal trade, Grimsby is also a

centre of commerce with Holland, Sweden,

Denmark and Germany. The chief exports are

woolen goods and yarns, machinery, coal and

fuel. It imports butter, wool, timber, foodstuffs, cotton, meat, sugar and bacon. Fishing is by

far the most important of the occupations of

the town, more than 500 steam trawlers being

thus engaged. Other industries are shipbuild¬

ing, brewing, tann'ng and the production of

soil fertilizers. The government is by mayor,

12 aldermen and 36 councillors. Grimsby is

first mentioned in tradition as the place where the Danes landed when they first invaded

Britain. It received its first charter from King John in 1201 ; this was renewed by Henry III

(1227, 1271) and James II (1688). Shipping at

Grimsby amounted to 1,679,000 tons (1915).

Pop. 77,554. Consult Shaw, (01d Grimsby)

(Grimsby 1897).

GRIMSEL (grim'zel) PASS. A mountain

pass in the Bernese Alps, leading from Meir—

ingen, canton of Bern, to Obergesteln, canton

of Valais. It was in this pass that the French repulsed the Austrians in 1799.

GRIMSTON (Walter Hunter). See Ken¬

dal, William Hunter; Kendal, Margaret

Brunton Robertson.

GRIMTHORPE, Edmund Beckett Deni¬

son, Lord, English barrister and author: b.

Carlton Hall, ˆNottinghamshire, England, 12

May 1816; d. 29 April 1905. He took much

interest in architecture and designed many

churches and houses, but he will be longest re¬

membered for his restorations and rebuildings

at Saint Albans Cathedral, works which were

carried out at his own expense, but from their iconoclastic character met with almost universal disapproval from architects and excited much

discussion both in England and America. His

works include (Origin of the Laws of Nature*

(1879) ; (A Book on Building> (2d ed., 1880) ; (Should the Revised New Testament be Au¬

thorized?* (1882); (Astronomy Without Mathematics> (7th ed., 1883) ; (Treatise on Clocks, Watches and Bells) (7th ed., 1883).

GRINDAL, Edmund, English ecclesiastic :

b. near Bees, Cumberland, 1519; d. 6 July 1583.

He received his Master's degree from Cam¬

bridge in 1541 and three years later was or¬

dained deacon in the Anglican church. From

1548-49 he was proctor and Lady Margaret

preacher at Pembroke Hall. On the promo¬

tion of Ridley to the Bishopric of London,

Grindal was made his private chaplain, per¬

forming the same office for Edward VI. He

was also appointed prebendary of Westminster.

After the death of the monarch he journeyed

on the Continent, stopping at Strassburg and

Frankfurt, where he distinguished himself in

his efforts to unite the theories of Cox and

Knox. The powers of judgment he manifested

and the reputation he acquired secured for him on his return to England the office of Bishop of London. Although a staunch Anglican, he

preferred the more lenient method of concili¬

ation to .persecut'on as an effective means for unifying the English church. This policy when

applied to the Puritans of the see displeased

contemporary prelates and Grindal was accord¬

ingly transferred to the Archbishopric of York

in 1570. Here the principal non-conformists

were Roman Catholics toward whom Gr'ndal

had manifested a more active hostility. In

1575 he succeeded Matthew Parker as Arch¬

bishop of Canterbury. But it was not long

before his lenient measures and attempts to

conciliate non-conformists brought down on

him the wrath of Elizabeth, who demanded a

speedy and thorough submission of all sects to the royal pleasure. Since Grindal fa led to

comply with her rigorous demands, she had

him suspended from his jurisdictional functions

(1577) and requested his resignation. Upon

his refusal, he was kept from active service for five years, when he apologized and was rein¬

stated. Consult Strype, (Life of GrindaP

(London 1710) ; and, for his writings, the

Parker Society Publications (1853).

GRINDELIA, a plant genus of the Com¬

posite family, including about 50 species, indi¬

genous to the United States, Mexico, Central

and South America. Some are biennial, others

perennial ; nearly all bear yellow flowers. Be¬

cause of the gum exuded by several species they are popularly known as gumweeds or tarweeds.

Grind elia squarrosa and G. robusta contain

resin, grindeline and a volatile oil, and are used to a limited extent in medicine because of their diuretic properties. The oil is also used as

an embrocation in cases of poisoning from ivy.

GRINDELWALD, grin'del-valt, Switzer¬

land, a valley in Canton Bern, famous as a

resort for both summer and winter tourists.

A railway connects the town with Interlaken,

which is 12 miles distant. A tributary of the Aar River flows through the valley. Glaciers

cover the highest points. The valley is situ¬

ated at 3,402 feet above sea level. Pop. of the village, 3,468.

GRINDING, a mechanical process in which

the desired results are produced by frictional

abrasion. The term includes also polishing,

buffing and lapping. This process is of exten¬

sive use in various mechanical arts, as in grind¬

ing corn, ores and colors, in which cases the object is to reduce the materials to a fine

powder ; or in grinding the metals, glass and

other hard substances for the purpose of giv¬

ing them a certain shape, figure, or polish, or a sharp cutting edge. In the first case the

grinding is effected by passing the material be¬

tween rough stones, as in the common flour¬

mill (see Flour) or by a heavy stone or iron cylinder revolving upon a smooth plate.

Chicory, chocolate, plumbago for pencils and a

variety of other substances are ground by pairs of iron or stone rollers revolving on a slab in such a manner that they not only merely roll

but also rub on the surface of the slab. A

knife or scraper follows one roller and precedes the other, scooping the paste into the position required to come fairly under the roller which follows it. Colors are ground in small quan¬

tities with a muller and slab. The muller is a heavy piece of stone of conical shape, and

which rests its base on the slab and is grasped by the hands ; the color is mixed to a pasty consistence with the desired medium of oil or

water, and rubbed between the two surfaces

until smooth and impalpable. The grinding

of cutlery and tools is effected by means of the grindstone ; glass lenses and metal specula are ground to shape with emery-powder laid on a

metal tool. Ornamental glass is ground into

facets or otherwise by means of stones and lap-wheels. Diamonds and other precious stones

are cut or ground with diamond dust embedded

in soft iron. Large flat surfaces are obtained by first working two pieces of the material

nearly flat and then laying the one upon the

other and grinding their surfaces together with sharp sand, emery or other cutting powder.

Plate-glass is flattened in this way; also sur¬

faces of cast-iron, where accurate fitting is re¬

quired. Sockets and other bearings which re¬

quire to be fitted with great nicety are usually finished by being ground together with a fine

abrasive. For brass or bell-metal pumice-stone

is employed in such cases, as emery is apt to embed itself in the metal and give it a perma¬

nent abrading action on the bearings. Dry

grinding is the term applied to the grinding of steel with dry grindstones. The points of

needles and forks are produced by this means,

also the finishing of steel pens and the surface of gun barrels. The men and women engaged

on this kind of work suffer painfully from

irritation of the throat and nostrils caused by the fine, dust-like particles that fly off from the work and float in the air. These difficulties have been mitigated in recent years by the use of mouthpieces of damp cloth, and the provi¬

sion of air-blasts to dispose of the dust. The tools which are most commonly employed in

grinding are the wheel, the disc and the lap.

They may be made either of natural abrasive

material, as the grindstone and whetstone, or

built up out of crushed abrasives, either natural or artificial, molded into the desired shape with a bond. The wheel has an advantage over the

disc, in that the cutting surface moves at a

uniform speed, which can be suited exactly to

the work in hand: with the disc, the outer edge moves fastest, and the section at the central

part very much slower. Grindstones are run

generally so that the cutting face moves at a speed of from 500 to 600 feet per minute for grinding axes and carpenters' tools, and from

800 to 1,000 feet peripheral speed for machin¬

ists' tools. For grinding cutlery, speeds of

2,500 to 4,500 feet per minute are not uncom¬

mon. Molded grinding wheels are usually run

so as to give their peripheral surface a speed of 5,000 to 7,000 feet per minute. A small

wheel must obviously make more revolutions

than a large one to give an equal cutting effect.

For fast cutting, a soft wheel of comparatively coarse grain is used, and is run at a lower

speed: in the case of soft steel it is sometimes run as slow as 25 feet per minute. Too high

a speed for the work in hand will cause the

wheel to glaze, and then to heat. This heat

is imparted to the work, and softens it, lead¬

ing to irregular cutting. Moreover, a glazed

wheel is likely to be applied with increased

pressure to secure the cut required, and this, with the heating, tends to distortion. It is

customary in grinding to use some liquid to

increase the efficiency of the tool, and so to reduce the time of operation. Water is used

on the common grindstone. With other

abrasives various liquids are employed — lard

oil, machine oil, kerosene, gasoline, turpentine, alcohol, soda water, *etc.*

In disc grinding the abrasive is commonly

glued on cloth discs, and these are attached

with cement to the face of the metal disc—

wheels of the machine. For the finer-grained

abrasives paper backing is frequently employed.

The speed of a disc grinder is designated by

that of the circle at three-fourths of the radius of the revolving disc — outside of this, of

course the speed is greater, inside the speed is less. The customary speed for the three-quarter radius ranges from 4,000 to 7,000 feet per min¬

ute, according to the work — the slower speeds for wood finishing, the highest for very soft

materials, such as artificial rubber, the metals taking the intermediate speeds.

Lapping is a grinding operation between the

technical grinding and polishing, and is per-

formed either by wheel-shaped or disc laps.

The lap is a piece of soft metal, usually lead into the surface of wh ch has been pressed,

usually by rolling, a very fine abrasive, as,

for example, diamond dust. After the machine

work has been brought by the ordinary methods

of grinding to a finish within a few thousandths of an inch, the exact dimension is secured by the lap. The operation is employed chiefly in

the accurate finishing of the interior of bores, as for delicate bearings.

Polishing wheels are often of wood covered

with leather to which the abrasive is affixed

with glue, or they may be made up wheels of

solid leather, canvas, or linen discs clamped

together. Felt and paper are also used in the same way for special purposes. Wheels for

polishing irregular surfaces are made with the

outer part pliable so as to follow into cavities readily. Buffing wheels are usually made of

cloth, and the abrasive material is applied to them in a mixture of tallow or grease paste.

Sand-jet grinding is a remarkable process, in

which abrasion is effected by the percussion of small hard particles on a plain surface. Sharp silicious sand, varying in hardness and fineness according to the kind of work to be done, is employed in most cases. This sand is impelled

by a blast of steam or of air. A hole 1ˆ4 inch in diameter by l]/2 deep, has been bored through a solid piece of corundum (the hardest mineral known except the diamond) in 25 minutes by

sand driven with steam-power at 300 pounds

pressure on the square inch. A diamond has

been sensibly reduced in weight, and a topaz

altogether dissipated by a sand-jet in one min¬

ute. These results are obtained by causing a

sand-stream to mix with a steam jet. The

sand passes through a central tube, and the

steam through an annular tube which surrounds

it; a kind of suction acts at the end of the con¬

centric tubes, which draws the sand into the

steam jet, and both dash with great force

against the stone or other substance to be acted upon, which is placed at about an inch from

the mouth of the tube. By the use of flexible jointed connecting tubes the jet can be turned in any direction, and grooves, moldings, letters, etc., can be produced instead of merely straight cuts or cavities. By using an air jet instead of steam, and varying the pressure, a design

can be engraved on glass, the parts not to be acted upon being covered with the pattern, made of paper, lace, india-rubber or oil paint. See Abrasives.

Consult Brown & Sharpe Manufacturing

Company's Construction and Use of Universal

Grinding Machines' and Cylindrical Grinding)

(Providence, R. I. 1914) ; Colvin, F. H. and

Stanley, F. A., (American Machinist Grinding

Book) (New York 1912) ; Guest, J. J. Crinding Machinery' (London 1915) ; Hamilton, D.

T. and Jones, F. D., (Advanced Grinding Practice) (New York 1915) ; Woodworth, J. V.,

Crinding and Lapping' (New York 1907).

GRINDLEY, Harry Sands, American

chemist: b. Champaign, Ill., 13 April 1864. He studied at the University of Illinois and. at Har¬

vard. From 1888-89 he was assistant in chem¬

istry at the Illinois Agricultural Experiment

Station, and after serving as assistant professor in chemistry at the University of Illinois, became in 1904 professor of general chemistry and di¬

rector of the chemical laboratory there. Since

1907 he has been professor of animal nutrition.

He was appointed director of the investiga¬

tions of saltpetre in meat (1907-10) ; member of the Pellagra Commission of Illinois and a mem¬

ber of the commission for the study of problems relating to human nutrition. His principal re¬

searches have been along the lines of animal

chemistry and nutrition, to which study he has contributed numerous bulletins, reports and

articles.

GRINDSTONE, a coarse circular stone erected on a spindle, used for grinding other hard substances, such as steel, glass, stones, *etc.* They are made generally of siliceous sandstone or manufactured of emery. Carborundum has been found most effective in jewel and glass grinding. Machinery is used to turn the grind¬ stones in the manufacture of cutlery. See Mineral Production of the United States.

GRINDSTONE ISLAND. (1) A small island lying off the southeastern coast of New Brunswick, Canada, at the head of the Bay of Fundy. It has a number of sandstone quar¬ ries, from which a fine quality of sandstone is exported, chiefly to the United States, for the manufacture of grindstones. (2) One of the most important of the Magdalen Islands, be¬ longing to Quebec, in the gulf of Saint Law¬ rence, northeast of New Brunswick.

GRINGOIRE, gran'gwar', or GRIN— GORE, Pierre, French author : b. Caen, about 1480; d. about 1538. His first works were di¬ dactic allegories and mysteries, several of which were produced under commission. At

Paris he became a member of the society of

((Enfans sans Souci," an association of littera¬

teurs, actors and good-fellows. Gringoire's

facility and wit soon won him the leadership of this band, with the title of <(Prince des Sots."

In his plays are reflected the manners and cus¬

toms of the times and his hearty burlesque of leaders and political systems brought him to the front as a popular dramatist. Among the best

of his plays are (Le chasteau de labour ' (1499) ; (Les folles entreprises' (1510) ; (La chasse du cerf des cerfs,' a religious poetical satire; (Le mystere de Saint-Louis' (1525) ; and, best-known of all, (Jeu du Prince des Sots et

Mere Sotte) ridiculing Julius II. From 1518

until his death, he held the office of herald at the court of Lorraine, and used his pen in the support of the orthodox church. His works

were edited at Paris (1858; with additions,

1877). Consult Badel, (Pierre Gringoire, poete

frangais' (Nancy 1893) ; Oulmont, (La poesie

morale politique et dramatique a la veille de la Renaissance, Pierre Gringore) (Paris 1911).

GRINNELL, George Bird, American

writer and ornithologist: b. Brooklyn, N. Y.,

20 Sept. 1849. He received the degree of A.B.

at Yale in 1870, and Ph.D. 1880. He was as¬

sistant in osteology in the Peabody Museum,

New Haven, Conn., 1874-80; was an editor of

Forest and Stream 1876-1911, and its president

from 1879 to 1911. He is a student of Amer¬

ican ethnology, and has written about 20 vol¬

umes chiefly on Indians and the early West

Among these are ‘Pawnee Hero Stories and

Folk Tales’ (1889) ; ‘Blackfoot Lodge Tales’

(1892); (Story of the Indian’ (1895); (The

Indians of To-day’ (1900-10); ‘The Fighting

Cheyennes > (1915). He founded the Audubon

Society in 1886; was appointed copimissioner

to treat with the Blackfoot and Belknap In¬

dians for the sale of a portion of their lands 1895 ; and in 1900 set on foot efforts to establish the Glacier National Park in northwestern Mon¬

tana, which was done in 1910. In 1911 retired from active newspaper work. He is a fellow

and member of scientific societies and attached to the American Museum of Natural History.

GRINNELL, Henry, American patron of

arctic exploration: b. New Bedford, Mass.,

1799; d. New York, 30 June 1874. In 1828 he

settled in New York and amassed a fortune in

business as a shipowner. This gave him an

opportunity to fit out at his own expense the ship which in 1850 sailed from New York in

search of Franklin. He also bore a large part of the expense of Kane's arctic voyage (1853-55), as well as of the later American expedi¬

tion under the command of Hayes and Hall.

In recognition of his services to geographical

science the American Geographical Society

elected him their president and the coast which stretches to the north of Smith Sound was

named Grinnell Land.

GRINNELL, Josiah Bushnell, American

clergyman and politician: b. New Haven, Vt.,

22 Dec. 1821 ; d. Marshalltown, Iowa, 31 March 1891. After studying at Auburn Theological

Seminary, he entered the Presbyterian ministry

and held pastorates successively at Union Vil¬

lage, N. Y., Washington, D. C., and New York.

In 1854 he founded the Congregational Church

in Grinnell, Iowa, a town named for him, and

preached there several years. Later he became

known as a wool grower, sat in the Iowa senate 1856-60, and in Congress as a Republican 1863-67. He frequently aided fugitive slaves and at one time a reward was offered for his head on this account by slaveholders. He gave much

assistance to Grinnell University, of which he

was president, and laid out five Iowa towns.

He was the author of (The Home of the Bad¬

gers) (1845) ; (Cattle Industries of the United States> (1884).

GRINNELL, Iowa, city in Poweshiek

County; on the Chicago, Rock Island and Paci¬

fic, and the Minneapolis and Saint Louis Rail¬

roads; 115 miles west by north of Davenport.

It is the principal trade centre for the county, and manufactures flour, automobiles, washing

machines, aeroplanes, liquid soap, gaiters and

leggings, carriages, gloves, and some farming—

implements. It is the seat of Grinnell College, founded in 1848 and under the auspices of the Congregational Church. It contains a Carnegie

library. In 1882 the city was nearly swept

away by a cyclone. The government is vested

in a mayor, elected for two years, and a city council. The waterworks are owned by the

city. Grinnell was settled in 1854, incorpo¬

rated in 1865 and received its city charter in 1882. Pop. 5,362.

GRINNELL, formerly IOWA COLLEGE,

Grinnell, Iowa, a coeducational institution

founded in 1847 under the auspices of the Con¬

gregational Church. Since 1909 the title of

Grinnell College has been definitely adopted to avoid confusion with the names of Iowa State

University and Iowa State College. Admission

is non-sectarian. The faculty numbers 57 ; the

annual attendance of students is over 800; tui¬

tion fees are $100; living expenses $250. The

total productive funds amount to $1,268,199;

annual income, including tuition fees and inci¬

dental charges is $227,786. The library contains over 54,000 volumes. The graduates since

organization number 2,000.

GRINNELL LAND, a large tract of land

in the Arctic Ocean, separated from Greenland

by Kennedy and Robeson channels. The north¬

ern part of the explored portion is called

Grant Land and the southern part Ellesmere

Land. The coast is irregular, and the interior is hilly. The climate of the valleys is mild in summer; in many places there is no snow for

several weeks, and vegetation grows rapidly.

The fox, wolf, musk-ox, ermine, and hare are

found in quite large numbers. Lieutenant De

Haven, an American, in charge of the Grinnell

expedition in search of Sir John Franklin, first saw this land 22 Sept. 1850 and named it after Henry. Grinnell (q.v.). Eight months later it

was visited by Captain Penny of the British

vessel, Lady Franklin. He not knowing of the

previous visit called the country Prince Albert Land. A British expedition under Nares vis¬

ited it 25 years after De Haven, Greely in 1881, Lockwood in 1882, and Peary in 1898-99. Con¬

sult Sverdrup, (New Land: Four Years in the

Arctic Region> (1904).

GRIPE. (1) A brake applied to the wheel

of a crane or derrick; it generally consists of an iron hoop under the control of a lever, and is drawn closely around the wheel to check its motion. (2) As a nautical term: (a) The

fore-foot of a ship, on to which the stem is fas¬

tened ; the forward end of the keel. It is scarfed to the stem piece and false keel, and is secured by a horseshoe or ring to the stem, (b) A

broad plait of rope or bars of iron, with lan¬

yard rings and claws, passing over a large boat, and by which it is secured to the ring bolts of the deck, (c) Qne of a pair of bands pass¬

ing round a boat near the stem and stern when suspended from the davits, to prevent the boat from swinging about.

GRIPPE. See Influenza.

GRIQU ALAND (gre'kwa-land) EAST, a

district of Cape Colony, Africa, lying south

of Natal, between Pondoland and Basutoland;

area 7,594 square miles. The capital is Kok—

stad. Pop. about 153,000.

GRIQUALAND WEST, a district of Cape

Colony, Africa, bounded north by Bechuanaland, east by the Orange Free States, south

by Orange River, and west by Orange River

and Bechuanaland ; area, 15,197 square miles.

It is situated at an elevation of from 3,000 to 4,000 feet, and is noted for its diamond fields which in 1870 began to attract people from

other countries. The country was then claimed

by the Orange Free State and by Waterboer,

the Griqua chief. In 1871 Waterboer ceded all

his rights to the British government, and in

1876 the Orange Free State relinquished all

claim for the sum of about $440,000. In 1880

Griqualand West was incorporated as a part

of Cape Colony. The chief centre of the dia¬

mond mining industry is Kimberley (q.v.),

the capital. Other towns are De Beers, Beaconsfield, Barkly and Douglas.

GRIQUAS, gre'kwaz, inhabitants of East

and West Griqualand, South Africa. They

were led by their chiefs, Waterboer and Kok, from the southern part of Cape Province to their present location during the 19th century. Racially, they are a mixture of Dutch and Hottentot peoples.

GRISAR, gre'zar, Hartmann, Catholic his¬ torian : b. Coblenz, Germany, 1845. He re¬ ceived his education at Munster and Innsbruck. He was ordained to the priesthood in the So¬ ciety of Jesus in 1868, and taught theology at Innsbruck. His great work on mediaeval his¬ tory (Geschichte Roms und der Papste im Mittel-Alter) (1900) has been translated into Italian, French and English. Other works are (Das Mittel Alter einst und jetzP (1902) and <Luther) (1911-12, Eng. trans. 1913).

GRISCOM, Clement Acton, American financier: b. Philadelphia, 1841; d. 1912. He began his career as clerk in the shipping con¬

cern of Peter Wright and Sons, and rose

eventually to be supervisor and general manager of the International Navigation Company. He

was one of the organizers of the International Mercantile Marine Company, of which he was

president until 1904, and chairman of the board of directors until 1908. He was also a director in the United States Steel Corporation, and the Pennsylvania Railroad Company.

GRISCOM, John, American educator: b.

Hancock's Bridge, Salem County, N. J., 27

Sept. 1774; d. Burlington, N. J., 26 Feb. 1852.

After pursuing his studies at the Friends' Acad¬

emy in Philadelphia, established by William

Penn, he took charge of the Friends' monthly

meeting school in Burlington, with which he

was connected 13 years. In 1807 he removed to New York and began there a career of 25 years as a teacher. In connection with his school he lectured on chemistry with much success. He

took a prominent part in the formation of the Society for the Prevention of Pauperism (1817), of which he prepared the constitution and an

elaborate first report on the causes and reme¬

dies of pauperism. He was an organizer of

the Rutgers Medical College, in which he oc¬

cupied the chair of chemistry and natural phi¬

losophy, and after the suspension of the college was widely known as a general lecturer on those subjects. Horace Mann quoted him as one of

the eight educational authorities for the changes which Mann planned to introduce into the

Massachusetts school system.

GRISCOM, Lloyd Carpenter, American

foreign minister: b. Riverton, N. J., 1872. Af¬

ter studying at the University of Pennsylvania

and at the New York Law School, he became

attached in the capacity of secretary to the

United States Embassy in England. Three

years after his return, he was elected district-attorney of New York (1897). In the' Spanish-American War he rose to the rank of assistant quartermaster. On the cessation of hostilities,

he resumed foreign service in the capacity of

secretary at Constantinople and Charge d'Affaires. In 1901 he was appointed Minister to

Persia; in 1902, Minister to Japan; in 1906,

Ambassador to Brazil, and in 1907 Ambassador

to Italy. In 1911 he resumed his law practice in New York city with the firm Beekman,

Menken and Griscom.

GRISEBACH, gre'ze-baH, August Hein¬

rich Rudolph, German botanist : b. Hanover

1814; d. 1879. After studying at Gottingen and Berlin, he became in 1847, full professor at the first mentioned university. He travelled in

tropical America, and was appointed director

of the botanical garden at Gottingen in 1875.

Among his works are (Spicilegium Florae

Rumelic3e) (2 vols., 1843-45) ; ‘Systematische

Untersuchungen fiber die Vegetation der

Karaiben’ (1857); ‘Flora of the British West

Indian Islands > (1859-64) ; (Die Vegetation der Erde nach ihrer klimatischen Anordnung) (2d

ed„ 1884).

GRISEBACH, Eduard, German author: b.

Gottingsen, 1845; d. 1906. He was the son of

August Heinrich Grisebach (q.v.) and received

his education at the university in his native

city. Entering diplomatic service of Germany,

he was chosen to represent that country succes¬

sively at Smyrna, Bucharest, Saint Petersburg,

Milan and Haiti. His poems were collected in

(Der neue Ta’nnhauserC which was followed

by ‘Tannhauser in RomP His works on Chinese

literature are (Die treulose Witive) ; (Kim-Ku—

Ki-Kuan : Neue und alte Novellen der Chin—

esischen Tausendundeine NachP (1880) ; (Chi—

nesische Novellen } (1884). Other literary

productions are his editions of Schopenhauer,

and his works on German literature among

which are (Die deutsche Litteratur seit 1 770 > ; and (Das Goethische Zeitalter der deutschen

Dichtung) (1891).

GRISELDA, the heroine of mediaeval

Italian legends, probably of Provengal origin.

In spite of her humble birth, she attracts

Walter, marquis of Saluzzo, who marries her.

The action of the tale is motivated by the story of Griselda's superiority to all the trials im¬

posed on her love. Boccaccio recites the nar¬

rative in the (Decameron) (about 1350) and on

this source Petrarch founded the tale in his

Latin letter (1373). It was popularized in

many forms subsequently, notably in the drama

(Mystere de Griseldis, marquises de Saluces,*

produced at Paris in 1393, by Chaucer in Can¬

terbury Tales) ; and in (The Pleasant Comedie

of Patient GrisselP (1599) by Dekke'r, Chettle

and Haughton (1603). The story also furnished

the theme for ballads and poems and was

adapted often in the German, particularly by

Hans Sachs (1546). It is found as well in the legends of other European countries. (The

History of Patient Grisel 1619 J was edited by Wheatley (London 1885). The course of the

story in German and French literatures is traced in Widmann, (Griseldis in der deutschen

Literatur des XIX Jahrhunderts) (Tfibingen

1905) ; and in Schuster, (Griseldis in der

franzbsischen LiteratuD (ib. 1909). ‘The bal¬

lads may be found in Delonej”, (Garland of

Good WilP (1685).

GRISI, gre’ze, Giulia, Italian soprano : b.

Milan, 1811; d. Berlin, 29 Nov. 1869. She was one of a talented musical family and had a

most successful career as dramatic soprano for

30 years. London and Paris were the scenes

of her greatest triumphs. She toured America

in 1854 with Mario, tenor vocalist, whom she

married after divorcing her first husband,

Count Melcy.

GRIS-NEZ, gre’-na, Cape, lighthouse

station of France, in the Department of Pas—

de-Calais, 21 miles southeast of Dover, Eng¬

land, between Calais and Boulogne.

GRISON, or HURON, a weasel-shaped

mammal indigenous to Central and South

America, having a body about 12 inches long

and a tail of equal length. It is gray above the top of the head, back and tail, and is black beneath. When attacked or brought to bay it

gives off a foetid odor similar to that of a skunk. It dwells in rocky clefts, hollow stumps, or holes in the ground.

GRISONS, gre-zon' (German, Graubiinden

or Biin den), the largest canton of Switzerland; 90 miles east and west, with a total area of 2,753 square miles. It is a mountainous coun¬

try, more than 20 Alpine peaks being above

9,000 feet. The population in 1910 was

118,246. The valleys are generally narrow,

Upper and Lower Engadine are the broadest.

The famous Saint Gotthard tunnel crosses the

Alps at the western end of Grisons. It is the home of many famous glaciers, as Todi, Medels, R'hinewald, Bernina, Albula and Silvretta, all

lying at elevations above 10,000 feet. The

sources of the river Rhine are here, with the valleys of the Upper Rhine, the Middle Rhine

and the Hinter Rhine. The famous Inn River

also rises in Grisons, flowing northeasterly to the Black Sea. While the Rhine and its trib¬

utaries flow' northward, some smaller streams

drain into the Adriatic. The scenery is of un¬

surpassed grandeur. Roadways for vehicles

have been built through many mountain passes,

as San Bernardino, Lukmanier, Spliigen, Septimer, Oberalp, etc., all at over 6,000 feet eleva¬

tion. Among the noted mineral springs fre¬

quented by summer visitors are San Bernadino,

Saint Moritz, Schulz, Fideris and Le Prese.

The territory was formerly known as the

canton of Raetia, but by the Napoleonic Act of Mediation in 1803 it became the canton of

Grisons in the Swiss confederation. There are

a large number of small lakes. Snow rests on

the mountains until the last of May and some¬

times into late July, but the climate of the

valleys is warm or temperate nearly all the

year. Agriculture in the valleys and the raising of cattle and sheep on the mountain sides are the chief occupations. Consult Andrea, (Das

Burgell* (1901) ; Heierli, (Urgeschichte Grau—

bundens mit Anschluss der Romerzeit) (1903).

See Switzerland.

GRISWOLD, Alexander Viets, American

Protestant Episcopal bishop: b. Simsbury,

Hartford County, Conn., 22 April 1766; d.

Boston, Mass., 15 Feb. 1843. After studying

for the ministry he was ordained in 1795. He

was rector of Saint Michael's Church, Bristol,

R. I., 1804-30 and of Saint Peter's, Salem, Mass., 1830-35. When what was known as the eastern

diocese of the Episcopal Church was organized

he was consecrated its first bishop in 1811. He published (The Reformation and the Apostolic

Office* (1843). Consult Stone, (Memoirs of

Bishop Griswold* (1844).

GRISWOLD, John Augustus, American

manufacturer: b. Nassau, Rensselaer County,

N. Y., 1822; d. 1872. At Troy, N. Y.. he was active successively in the hardware, drug and

iron trades, and established the Albany and

Rensselaer Iron and Steel Company. He was

a leader in the introduction of Bessemer steel manufacture into the United States, and with

C. H. Delamater built the Monitor of Civil

War fame. He was active in raising troops for the war against Secession, and the Griswold

Light Cavalry were named after him. In 1855

he was elected mayor of Troy, in 1863 a

Democratic representative in Congress, and

subsequently was twice reelected as a Republi¬

can. In 1868 he was nominated for the govern¬

orship of New York, but defeated by the

Democratic nominee, J. T. Hoffman.

GRISWOLD, Matthew, American jurist:

b. Lyme, Conn., 25 March 1714; d. there, 28

April 1799. He studied law and was admitted

to the bar in 1743. He became a member of

the general assembly in 1751, and member of

the governor's council in 1759. While in this

relation, he was a champion of the rights of

the colonies, and opposed the Stamp Act. Be¬

sides being lieutenant-governor of Connecticut

1771-84, he was governor 1784—85 and became

judge of the supreme court in 1769. He also

presided over the convention which ratified the Federal constitution in January 1788.

GRISWOLD, Putnam, American bass

singer: b. Minneapolis, Minn., 1875; d. 26 Feb.

1914. He studied with Randegger at London;

with Bouhy at Paris, with Stockhausen at

Frankfort; and with Emerich at Berlin. His

principal roles were in Wagnerian Opera, in

which he starred at the Berlin Opera and at

the Metropolitan in New York City. For his

splendid renderings he was decorated by the

Emperor Wilhelm on two occasions.

GRISWOLD, Roger, American politician:

b. Lyme, Conn., 21 May 1762; d. Norwich,

* Conn., 25 Oct. 1812. He was graduated from

Yale College in 1780, and afterward studied

and entered on the practice of law. He was a member of Congress, 1795-1805, and became

judge of the Connecticut supreme court in 1807.

President Adams offered him the portfolio of

Secretary of War in 1801, but he declined. He was lieutenant-governor of his native State,

1809—1 1, and governor 1811-13. He did not

live to finish his term of office. He was a son of Matthew Griswold (q.v.).

GRISWOLD, Rufus Wilmot, American

author and compiler : b. Benson, Rutland

County, Vt, 15 Feb. 1815; d. in New York, 21

Aug. 1857. He was apprenticed to the printing

trade, but afterward studied divinity and be¬

came a preacher in the Baptist church. He

soon became associated in the editorship of

literary periodicals in Boston, New York and

Philadelphia, among which were the New

Yorker, Brother Jonathan and the New World.

In 1842-43 he edited Graham's Magazine in

Philadelphia, to which he attracted contribu¬

tions from some of the best writers in the

country, and in 1850 projected the International Magcizine published in New York, and edited

by him till April 1852. The works by which

he is chiefly known are collections of specimens from _ American authors, accompanied by

memoirs and critical remarks. His work in

this field did much to encourage young writers and to stimulate interest in American litera¬

ture. His published works include (Poets and

Poetry of America1* (1842) ; (Prose Writers of America) (1846) ; (Female Poets of America)

(1849) ; (Sacred Poets of England and Amer¬

ica* (1849) ; (Poets and Poetry of England in the Nineteenth Century* (4th ed. 1854); Curi¬

osities in American Literature* ; (Washington

and the Generals of the American Revolution,*

with Simms, Ingraham and others (1847) ;

'Napoleon and the Marshals of the Empire,*

with Wallace. (1847): (Republican Court, or

American Society in the Days of Washington*

(1854). He edited the first American edition of the prose works of Milton (1845), and was

one of the editors of the works of Edgar A.

Poe, his 'Memoir* to which aroused much con¬

troversy. His correspondence, published by his

son, W. M. Griswold, (Cambridge, Mass., 1898)

is of importance in the history of American

literature.

GRISWOLD, Conn., town in New London

County; on the New York, New Haven and

Hartford Railroad, 10 miles northeast of Nor¬

wich. Agriculture and dairying are the chief

occupations of the neighborhood. Pop. 4,250.

GRISWOLDVILLE, Battle of. When

General Sherman marched from Atlanta to the

sea, his right wing, commanded by General

Howard, was under instructions to threaten

Macon and strike the Savannah Railroad at

Gordon, about 20 miles east. Upon his arrival at Clinton, the cavalry advance made a demonstra¬

tion on Macon, and 21 Nov. 1864, his entire

cavalry force took up an advanced position cov¬

ering all the roads to Macon, and that day and the next all the troops and trains were closed up toward Gordon, except C. R. Woods' division,

which was directed to take up a strong position on the Irwinton road and demonstrate on Macon

and Griswoldville, eight miles east. The demon¬

stration was made on the 22d by Walcutt's

brigade of 1,513 men and two guns, in co¬

operation with Kilpatrick's cavalry on the dif¬

ferent roads. Some of Kilpatrick's cavalry

were in advance of Walcutt and were fiercely

attacked by Wheeler; but with Walcutt's as¬

sistance Wheeler was driven from the field, and followed by Walcutt beyond Griswoldville.

Walcutt was then recalled to a position a little east of Griswoldville, where two miles in ad¬

vance of his position, he formed line along a slight rise of ground, with his flanks well pro¬

tected by swampy ground, and with an open

field in front. Kilpatrick's cavalry was on

either flank. Walcutt had scarcely thrown up

a rail barricade, in view of another attack of Wheeler's cavalry, when he was fiercely as¬

sailed by infantry. That morning, under Gen¬

eral Hardee's order, Gen. G. W. Smith, in

command of a considerable body of Georgia

militia that had been concentrated at Macon,

directed General Phillips, with a division of in¬

fantry and a battery, to march from Macon to

Gordon and take trains for Augusta. Phillips

had been instructed to halt before reaching

Griswoldville and wait for further orders, and

was cautioned not to engage an enemy if met,

but to fall back to the fortifications at Macon.

But when he heard of Walcutt's position he

moved through Griswoldville and, with more

courage than discretion, threw his four brigades against Walcutt, at the same time opening de¬

structively with his artillery. At 2 o'clock,

in three compact lines, his militia charged to within 75 yards of Walcutt's line, and were re¬

pulsed. The assaults were repeated in front

and on both flanks, and continued until sunset, when, everywhere repulsed, he abandoned the

field, leaving his dead and wounded. During

the action Walcutt was severely wounded by a

piece of shell. The Union loss was 13 killed, 69 wounded, and 2 missing. The Confederate

loss was 51 killed and 472 wounded. Consult

‘Official Records* (Vol. XLIV) ; Cox, ‘The

March to the Sea) ; the Century Company’s

‘Battles and Leaders of the Civil’ War> (Vol.

IV).

GRIVET. See Green Monkeys.

GRIZZLY BEAR. See Bear.

GROAT (from Dutch groot, great), any

large or thick coin of the Middle Ages in Eu¬

rope. It was usually made of silver and

varied greatly in value from time to time. In England it appeared in 1351 and was once

worth fourpence. The German word “groschen**

is of the same origin. In the second half of the 14th century the groat was coined in Scotland; and in the 15th century in Ireland.

gr6ben, gre’ben, Otto Friedrich von

der, German author: b. Prussia, 1657; d. 1728.

He traveled in Italy, the Orient and Western

Africa, where he founded Fort Grossfriedrichs—

burg on the coast of Guinea. He served as

major-general in the wars of Poland and

Venice against the Turks. His publications in¬

clude ‘Orientalische Reisebeschreibung …

nach Guinea und der Verrichtung zu Morea*

(1694); and ‘Eine Geschichte des Lebens und

der Liebe von Bergonnen und der tugendhafte

Areta* (Dantzig 1700).

GROBER, gre’ber, Gustav, German

scholar and author: b. Leipzig, 1844; d. 1911.

He received his education at Leipzig, taught at Zurich (1871-74), and later became professor

at Breslau and the University of Strassburg.

His principal work has been in romance liter¬

ature and linguistics. In the interests of this study he edited ‘Zeitschrift fiir romanische

Philologie) (1877) and ‘Grundniss der roman—

ischen Philologie* (2d ed., Vol. I, Strassburg

1904—06). Among his other works are ‘Die

handschriftlichen Gestaltungen der Chanson de

Geste von Fierabras) (1869) ; ‘Die altfranzosi—

chen Romanzen und Pastourellen) (Zurich

1872) ; ‘Carmina Clericorum* (7th ed., 1890) ; ‘Abriss der franzosischen Litteratur des Mittelalters) (1897).

GROCYN, gro’sin, William, English

classicist: b. Wiltshire, about 1446; d. 1519.

He was trained for the church at Winchester

College and at New College, Oxford, where he

received a fellowship in 1467. After occupying

several pastorates, he became prebendary at

Lincoln Cathedral (1485). In 1488 he under¬

took a journey to Italy, where he spent several years in the study of classic languages and

literature under Chalcondylas and Poliziano.

On his return in 1491 he was appointed lecturer at Exeter College, and later taught Greek at

Oxford. He numbered among his friends,

More, Linacre, Colet and Erasmus. The only

surviving literary fragments of Grocyn are a

few lines of verse about a lady who threw a

snowball at him, and a letter to Aldus Manu—

tius at the beginning of Linacre’s translation

of Proclus’s ‘Sphaera* (Venice 1499). Consult

Burrows, ‘Collectanea* (Oxford Historical

Society, Vol. II, 1890).

GRODEK, Galicia, town about 20 miles southwest of Lemberg, containing several large tanneries. Flax and wheat are grown exten¬ sively in the neighborhood and are important items in the trade of the town. In 1914 the

town was occupied by the Russians during their advance in Galicia but was liberated the fol¬ lowing summer when the German general von Mackensen reconquered Galicia. Pop. 79,592, chiefly German colonists, including also some Jews.

GRODNO, grod'no', a government of Poland, area 14,896 square miles, mostly forest and swamp, with a population of 2,048,- 200. The capital, bearing the same name, is an important fortress on

the River Niemen and

was formerly a Polish capital. Situated about

160 miles. northeast of Warsaw, the town had

a population before the war of 63,000. It was built in the 12th century, was sacked by the

Mongols in 1241 and again by the Teutonic

Knights in 1284 and 1391. The treaty providing for the second partition of Poland was signed

here in 1793, reducing the old kingdom to one-third of its original size. The western portion, including Thorn and Danzig, fell to Prussia.

The town is poorly built, its industries consist mainly of silk, linen and woolen manufactures,

and small arms factories. The principal build¬

ing is a palace built by Alexander III. During the first year of the European War Poland was the scene of terrific fighting between Russians and Germans. After the fall of Warsaw,

Ivangorod, Novo Georgievsk and Kovno in

August 1915 the Russian army was in retreat

through Kovno, Grodno and Bialystok. Olita

was evacuated and Grodno, the last of the Nie¬

men fortresses, became the point of a salient

too dangerous for the Russians to hold. The

Germans stormed the western works on 1 Sept.

1915, and three days later they were in posses¬

sion of the town and fortress, taking 2,000

prisoners. See War, European — Eastern

Front.

GROEN VAN PRINSTERER, groon van

prin'star-ar, Guillaume, Dutch historian: b.

Voorburg, 21 Aug. 1801 ; d. The Hague, 19

May 1876. After studying at Leyden he be¬

came secretary to King William I of Holland

and leader of the anti-revolutionary party of

the House of Deputies, where he was active

from 1840 to 1865. His most important work

is his edition of (Archives, ou correspondance de la Maison d' Orange-Nassau) (12 vols, 1835-61). Others are (Handboek der geschiedenis

van het Vaderland) (1841-46); (Bijdrage tot

de herziening der grondwet in nederlandschen

zin5 (1840) ; (Ongeloof en revolutie) (2d ed., 1868) ; (De Nederlander5 (1850-55) ; (La

Prusse et les Pays-Bas5 (1867) ; and (Maurice et Barnevelt) (1875). Consult Vos, (Groen van

Prinsterer en zijn tijd) (2 vols., Dordrecht

1886-91).

GROESBECK, groos'bek, William Slo—

comb, American politician: b. New York, 1815;

d. 1897. He was graduated from Miami Un¬

iversity, Oxford, Ohio, in 1835, studied law

and began practice at Cincinnati. In 1851 he

was a member of the Ohio State constitutional

convention, and in 1852 a member of the com¬

mission appointed for the codification of the

State laws.. From 1857 to 1859 he was a Demo¬

cratic representative in Congress, member of

the Peace Congress in 1861, delegate to the

Union national convention in Philadelphia in

1866, in 1872 was nominated for the presidency by the Liberal Republicans but met no recog¬

nition in the ensuing campaign, and in 1878

was United States delegate to the International Monetary Congress at Paris. He defended An¬

drew Johnson in the latter's impeachment trial

(1868).

GROGAN, Ewart Scott, British military

officer: b. Winchester, 1874. After receiving

his education at Jesus College, Cambridge, he

went to Africa (1895-97) and served in the

second Matabele War. From 1897-1900 he

journeyed across Africa with Arthur Sharp. He

rose to the rank of captain of the Fourth

Royal Munster Fusiliers. An account of his

African travels was jpublished under the title

(From Cape to Cairo5 (1900). He wrote also

(The Economic Calculus) (1909); tariff: the

Workers' Charter, 5 besides numerous shorter

articles on his travels which carried him to

Australasia, the countries of the South Pacific and of North and South America.

GROIN, the region where the front of the

thigh joins the body. The abdominal muscles

end below in a strong tendon which makes a

fold across the front of the bony pelvis. The large nerves, arteries and veins pass through

folds of this ligament, and portions of the ab¬

dominal contents in case of rupture pass into

the scrotum or form a tumorous swelling in the groin.

GROLIER DE SERVIERES, gro'lya' de

sar-vyar', Viscount d'Aguisy, French book—

collector: b. Lyons, 1479; d. Paris, 1565. He

spent several years in Italy in the foreign dip¬

lomatic service of France. In 1537 he became

treasurer for Francis I. During his life he col¬

lected some 3,000 volumes, many of them rare

and curious works. This library was sold at

the end of the 18th century, the National Li¬

brary at Paris possessing a considerable number.

The Grolier Club (q.v.) of New York, a so¬

ciety of bibliophiles, has been named in his

honor. He also promoted the art of artistic

bookbinding.

GROLIER CLUB, an association of book—

lovers, established in New York city, 1884. It takes name_ from Jean Grolier de Servieres

(q.v.), and its purpose is the promotion of the study of literature, book-collecting and the art of bookmaking. It maintains a clubhouse, and

a rare library; and has edited and published

numerous valuable bibliographical and histor¬

ical works.

GROLL, Albert Lorey, American painter:

b. New York, 1866. He studied at Munich un¬

der Gy si sand Loefftz. Most of his work has been of landscape of the western country of

the United States. Among the best of them

are (No Man's Land5 (Corcoran Gallery, Wash¬

ing011) ; California Redwoods5 (Brooklyn In¬

stitute) ; (Acoma Valley, New Mexico5 (Na¬

tional Gallery, Washington). He has won

several prizes for his paintings, and was elected a member of the National Academy in 1910.

GROMWELL, a plant genus (Lithosper -

naum) of the Boraginaceae family, comprising

about 40 species of which about 10 are found

in the temperate regions of the United States.

These plants were formerly in great repute as

medicinal plants but at present are of little

use, except those species which have perennial

roots from which a red dye is extracted.

GRONINGEN, the most northerly province

of the Kingdom of the Netherlands, bounded

north by the North Sea, east by Hanover,

south by the province of Drenthe, and west by Friesland. Its area is 896 square miles. It

is watered by the Hunse, navigable for large

vessels from the town of Groningen to its

mouth in the Lauwers Zee, and by other small

streams, and by lakes and numerous canals. Its surface is flat, protected against the sea on the north by dykes. The soil principally alluvium,

forms excellent arable land. The north of the

province contains the best soil, and is one of the most densely peopled districts of the kingdom.

Much of the land towards the southeast is

marshy, and lies in pasturage, which supports

a fine breed of cattle, and great numbers of

highly valued horses and sheep. Farming and

grazing are the chief pursuits of the people ; fishing, commerce, and trade also are carried on, and some manufactures. Shipbuilding is ex¬

tensive and much butter is exported. The

people are almost entirely of the Frisian race, and belong to the Reformed Church. Pop. 336,-

741. The capital is Groningen (q.v.).

GRONINGEN, Holland, an important town

and capital of the province of the same name, at the confluence of the Aa and the Hunse,

22 miles west of Dollart Bay. It is an im¬

portant railway centre and is traversed by num¬

erous canals crossed by 18 bridges. The great

market-place is 662 feet long and 389 feet

broad, and contains the beautiful Gothic church of Saint Martin's, with a tower 343 feet high.

The university, founded in 1614, is housed in a splendid group of buildings, erected since 1906.

The port is connected by canals with Dollart

Bay and with the Lauwers Zee and the Zuyder

Zee. The ancient walls and ramparts have been

converted into promenades. Industrial estab¬

lishments include sugar and textile factories,

gold and silver ware, cigar and tobacco fac¬

tories, shipyards, paper mills, *etc.* In 1040 the town was granted to the Bishop of Utrecht;

in 1282 it became a member of the Hanseatic

League; was captured by Maurice of Nassau

and became part of the United Netherlands in

1594. Pop. 78,276.

GRONLUND, gron'liind, Lawrence, Amer¬

ican socialist : b. Denmark, 1847 ; d. 1899.

He studied in the University of Copenhagen,

in 1867 came to the United States, practised law for a time, but became a writer and speaker

on socialism. Among his publications are (The

Coming Revolution > (1880), a .forecast, of the peaceful change which he believed might be

effected by a national organization operating in every community; (£a Ira,> a rehabilitation of

Danton (1888); and (The New Economy>

(1898).

GRONNA, Asle J., American politician:

b. Elkader, Clayton County, Iowa, 10 Dec. 1858.

After engaging in farming and banking in the

Dakotas for many years, he was elected to the Territorial Legislature of North Dakota in 1889.

He sat in Congress from 1905-11, in which

year he was chosen to fill the vacancy in the United States Senate left by the death of

Martin N. Johnson. He was reelected for the

term 1915-21.

GRONOVIUS, gro-no'vi-us (properly Gro—

nov, gre/nov), the name of several Dutch clas¬

sical scholars: (1) Johann Friedrich: b. Ham¬

burg, 8 Sept. 1611 ; d. Leyden, 28 Dec. 1671.

He studied at Leipzig and Jena, and law at

Altdorf, was appointed professor of history

and eloquence at Deventer (1642), and, after the death of Heinius, succeeded him as professor

of belles-lettres at Leyden (1658). His edi¬

tions of Livy, Statius, Justin, Tacitus, Aulus

Gellius, Phaedrus, Seneca, Sallust, Cicero, Ter¬

ence, Pliny and Plautus, <Observationes)

(1639), and edition of Hugo Grotius' work,

(De Jure Belli et Pacis) (1642) are justly

valued on account of the notes. (2) Jakob,

son of the preceding: b. Deventer, 1645; d. Ley¬

den, 21 Oct. 1716. He studied at Deventer and Leyden, and published, in 1676, an edition of

Polybius, which met with great favor. He

received from the Grand Duke of Tuscany a

professorship at Pisa, which he relinquished in 1679 to become professor of Greek literature

and history at Leyden. This learned critic

edited Tacitus, Polybius, Herodotus, Pomponius

Mela, Cicero, Ammianus Marcellinus and other

classical writers, and compiled the valuable

(Thesaurus Antiquitatum GnecarunP (1698—

1702). He also promoted the publication of

the collections of Grsevius. He was a violent

controversialist.

GROOS, gros, Karl, German psychologist :

b. Heidelberg, 1861. After receiving his degree from Heidelberg he taught at Giessen, Basel,

and was appointed professor at Tubingen. His

principal studies have been made in child psy¬

chology. His (Spiele der Tiere) (1896) and

(Die Spiele der Menschen) have been translated

into English under the titles (The Play of Animals) and (The Play of Man,* with a preface

by Baldwin. Other works are (Die reine Vernunftwissenschaft* (1889) ; <Einleitung in die Aesthetik> (1892) ; (Der asthetische Genuss> (1902) ; (Das Seelenleben des Kindes) (1903) ; (Die Befreiung der Seele) (1909) ; (Der Lebenswert des Spieles) (1910).

GROOT, gro-t, GROETE, or GROOTE, Gerhard or Gerardus, founder of the Brothers of the Common Life (q.v.) : b. Deventer, 1340; d. there, 20 Aug. 1384. Educated at Paris, he there became a teacher, later took deacon's orders and was successful as a traveling preacher. He advocated general reading of the Scriptures, assembled a company for the preparation of copies of the Bible and thus be¬ gan the formation of the Brothers of the Com¬ mon Life. To this order, which obtained papal sanction in 1418, belonged Thomas a Kempis (q.v.). Groot was the author of several works.

GROOT, Jan Jakob Maria de, Dutch Orientalist: b. Schiedam, 1854. He studied at Leyden and then embarked for the Dutch col¬ onies in the capacity of Chinese interpreter. On his return he was appointed professor of

Chinese at Leyden and in 1911 at Berlin. His publications include (The Religious System of China) (1892-1910) and (Religion in China) (1913).

GROS, gro, Antoine-Jean, Baron, French historical painter: b. Paris, 16 March 1771; d. near Paris, 26 June 1835. At 14 he became a pupil of David, and in 1794 left Paris for Rome. His means, however, were not sufficient for the journey, and he had to depend on what he could earn as a portrait-painter in the vari¬ ous towns he passed through. At Genoa, in 1796, he was drawn for the French army, and

soon became a staff-officer. Josephine, after¬ ward empress of France, saw and admired sev¬ eral portraits bv the young officer, and he was called upon to paint that of Bonaparte. The result was a picture rep¬ resenting Napoleon leading his troops over

the bridge of Areola. In 1804 he pro¬

duced his (Peste de Taffa,* considered by

many to be his masterpiece. He painted the

(Bataille d'Aboukir) (1806) ; (Bataille d'Eylau) (1808) ; (La Prise de Madrid, > <Wagram,) and (La Bataille des Pyramides) (1810). In 1816 he was made member of the Institute and profes¬

sor in the Ecole des Beaux-Arts and became

officer of the Legion of Honor in 1828. In

France his chief work is considered by some

to be the cupola of Saint Genevieve at Paris, exhibiting the saint protecting the throne of

France, represented by Clovis, Charlemagne,

Saint Louis and Louis XVIII. This picture

covers an immense space, and is correct in

design but defective in color and expression.

The art st received for it 100,000 francs and the title of baron. The rise of the romantic school bore away from him the tide of popularity, and his last work (Hercule et Diomede, > was a

failure. Adverse criticisms upon it brought on

a fit of despondency and he drowned himself

in the Seine. His art bridges the chasm be¬

tween the class'cism of David and the art of

the Romantic school. He was the first to take up historical subjects in preference to classic subjects. His best works are in the Louvre

and the Museum of Versailles. His (Francis I

and Charles V at St. Denis, y now in the Louvre, he considered his best work in color. A great number of his portraits in the Versailles gallery are characteristic and powerful ; notable among

them are those of Massena, Lasalle and

Fournier-Sarlovese. Consult Chesneau. (Les

chefs d'£cole) (Paris 1883) ; Delacroix in the Revue des Deux Mondes (1848) ; Delestre,

(Jean Gros) (Paris 1867) ; and other biogra¬

phies by Tripier le Franc (1880), Dargenty

(1887) and Lemonnier (1912ˆ.

GROS VENTRES, gro vantr (Fr. big

bellies®). (1) The Minnetari or Hidatsa In¬

dians, on the Missouri River. (2) A band of

the Arapaho, who separated from the main body

about 1800: the name was a misunderstanding

of their own term, which meant ((hungry men®

or "beggars.® After conflicts with the Sioux,

and being plundered by the Crows, whom they

had joined, they settled among the Blackfeet

near Milk River about 1824; prospered, and

were very hostile to the whites. About 1830

they had some 400 lodges and 3,000 souls. But about 1866 they were decimated by the measles, and thus weakened, received a terrible defeat

from the Piegans ; reduced to about 1,300 by

smallpox, in 1870, they were plundered and

many killed by the Sioux. Later they were

joined by the main body of Arapaho and Chey¬

ennes. They are now settled among the Blackfeet in Montana.

GROSART, Alexander Balloch, Scottish

editor: b. Stirling, Scotland, 18 June 1827; d.

1899. He studied at Edinburgh University and

received ordination in the Presbyterian Church.

In 1856 he was minister at Kinross, and after several years at Liverpool (1865-69) was called to the pastorate at Blackburn, Lancashire,

where he remained until his resignation in

1892. His principal achievement was the edit¬

ing and reprinting of many old Elizabethan

and post-Elizabethan authors. These include

a series of Puritan writers such as Richard

Sibbes, Thomas Brooks, Herbert Palmer and

R:chard Gilpin. From 1868 to 1876 he pub¬

lished the (Fuller Worthies' Library,* then

began the (Chertsey Worthies' Library,* which

he completed in 1881. (The Huth Library*

followed. Among the authors whom he pre¬

sented to his subscribers were Thomas Fuller,

Sir John Davies, Fulke Greville, Henry

Vaughan, Andrew Marvell, George Herbert,

Richard Crashaw, John Donne, Sir Philip Sid¬

ney, Cowley, Henry More, John Davies, Dr.

J. Beaumont, Robert Greene, Thomas Nash,

Gabriel Harvey, the prose extracts of Thomas

Dekker and Edmund Spenser. English litera¬

ture owes him a great debt for having un¬

earthed and preserved for study much valuable

literary material.

GROSBEAK, gros'bek, any of various

birds whose beaks seem disproportionately large.

They are mainly finches such as the hawfinch

and bullfinch in Europe, and their relatives in the Orient. Bird-dealers call <(grosbeaks® a

great number of African, Asiatic and American

line cage-birds, some of which are weaver-birds, or tanagers, *etc.* The term is more exactly

given to certain North American fringilline

birds with big swollen bills, such as the cardinal (q.v.), the evening grosbeak (q.v.), and the

p'ne, blue, rose-breasted and black-headed gros¬

beaks. The pine grosbeak (Pinicola enucleator) is a greenish yellow finch which dwells ex¬

clusively in the coniferous forests of northern Europe and America, and is only seen in the

United States when forced southward by hard

winters ; it feeds on the seeds of the pine,

spruce, etc., wrenching open the cones with its powerful beak. The

blue grosbeak (Guiraca

ccerulea) is a large, richly blue southern and western bird, nearly related to the indigo-finch, which makes its nest in a bush, and lays pale blue eggs, wholly unmarked. The rose-breasted

and black-headed grosbeaks represent the genus

Zamelodia, the former (Z. ludoviciana) in the

Eastern States, and the latter (Z. melanoceph—

ala) in the Rocky Mountain region. Both

are birds of brushy places, making large, rude nests in bushes and laying greenish, heavily

marked eggs; and in the breeding-season both

are among the loudest and most brilliant of

American song-birds. As in nearly all the gros¬

beaks the females of these species are inconspicuous. in brown tints, while the males are

dressed in gay colors. The male rose-breasted

has the head, neck and upper parts mostly

black, with the rump, wings, tail and abdomen, white; while the breast and lining of the bend of the wing are exquisite rose-red, which the

bird is fond of displaying. The male black¬

head has a wholly black head and upper parts, set off by a collar and other marks of dull

orange, which color also suffuses the whole

lower parts.

GROSCHEN. See Groat.

GROSE, Francis, English antiquarian: b.

Middlesex, 1731 ; d. Dublin, 1791. He received a good education and was trained for draughts¬

man. He first secured a position in the College of Heralds, and later became paymaster in the

Hampshire militia. Having squandered his

patrimony by his generous and careless habits,

he found himself left to his own resources to gain a living. Accordingly, he revived his in¬

terest in antiquities and began to publish the results of his study and research. Besides

these serious works, his publications include

several humorous travesties. For Grose was

above all a popular fellow, with an abundance

of wit, good humor and generosity. He was the author of ‘Antiquities of England and Wales)

(1773) ; (Antiquities of Scotland) (2 vols.,

1789-91) ; Antiquities of Ireland) (2 vols.,

1791) ; (A Treatise on Ancient Armour and

Weapons) (1785-89) ; (Military Antiquities >

(2 vols., 1786-88) ; ‘A Classical Dictionary of the Vulgar Tongue5 (1785) ; ‘Advice to

Officers of the British Army5 (1782) ; (Rules for Drawing Caricatures) (1788) ; ‘The

Grumbler5 (1791).

GROSE, George Richmond, American

Methodist Episcopal clergyman : b. Nicholas

County, W. Va., 1869. He studied at the

Ohio Wesleyan University and at the Boston

University School of Theology, receiving the

degree of D.D. from the first-named institu¬

tion in 1908. He was pastor at Leicester, Mass.

(1894—99) ; at Jamaica Plain, Boston (1897-1900) ; Newton, Mass. (1900-05) ; Lynn (1905—

OS), and of Grace Church, Baltimore (1908-13). He has been president of De Pauw Uni¬

versity since 1913, and lectured at Johns Hop¬

kins University from 1910-13. He has pub¬

lished (The Outlook for Religion5 (1913) ;

‘Religion and the Mind5 (1915).

GROSE, William, American soldier and

politician : b. Dayton, Ohio, 1812 ; d. 1900. He resigned his position as judge of the Court of Common Pleas in 1861 to recruit and take com¬

mand of the 36th Indiana regiment of infantry, and commanded a brigade in the battles of

Murfreesboro, Chickamauga and Chattanooga. He was commissioned a brigadier-general 30 July 1864 and at the battle of Nashville, 15 and 16 Dec. 1864, he commanded the Third brigade in General Thomas' army. In 1865 he was brevetted major-general of volunteers. He was State senator from 1879 to 1883.

GROSEILLERS, Medard Chouart, Sieur de, Franco-American trader and explorer: b. Charly-Saint Cyr, near Meaux, 1621 ; d. about 1684. He came to Canada and soon earned the reputation of an intrepid explorer. He was a brother-in-law of the equally famous Radisson. The two formed an expedition and set out for Lake Nipissing in 1658 and spent the winter at Green Bay. Before the spring of 1659 their Indian guides led them across what is now Wisconsin as far as the upper Mississippi thus discovering the great Northwest. Late in the spring they continued their westward Journey between the Mississippi and the Missouri, visited the Sioux, and learned of the Crees and other tribes to the westward and even of the Spaniards to the far south. To just what point this westward journey lay is to-day a matter of conjecture. Their journey homeward to Quebec

was beset with many dangers, the Iroquois be¬

ing on the warpath. A second trip to the

Northwest was made in 1661 for fur-trading

purposes. Difficulties with the governor of New France led to the fining and imprisonment of

Groseillers on his return in 1663.' Groseillers went to France to seek reparation, but nothing was done. He hurried back to Three Rivers

in 1664, thence with Radisson he took secret

passage to Isle Percee, where he had been told a ship would be sent from La Rochelle. Dis¬

gusted with the treatment accorded them, they

resolved to leave the country and departed for Port Royal, Nova Scotia. Groseillers and his

brother-in-law are next heard of in Boston try¬

ing to get a ship for an expedition to Hudson's Bay. On a voyage to England they were set

upon by a Dutch cruiser, were captured and

landed in Spain. In 1666 they reached London,

and in 1667 were received at Windsor by King

Charles. After much delay Prince Rupert

financed another expedition for the intrepid

Frenchmen, and a year, 1668-69, was spent on

a trading expedition. The success of the voyage brought about the formation of a fur company

which in 1670 was chartered as the Hudson's

Bay Company. After being accused of double¬

dealing Groseillers retired for a time to Three Rivers, but was soon summoned by Radisson

to join an expedition of private French interests to the Hayes ˚iver in 1681-82. His latter days were embittered by the jealousy of other trad¬

ers and by numerous lawsuits. His petition to

the French court for redress of his wrongs was ignored and at length he gave up the struggle and retired to Three Rivers.

GROSS, gros, Charles, American historian:

b. Troy, N. Y., 10 Feb. 1857; d. 1909. After graduating from Williams College in 1878, he

pursued his studies at Gottingen, and was en¬

gaged in literary work in England 1884— 87.

In 1888 he was made instructor and professor

of history at Harvard University. A frequent

contributor to the American Historical Review

and other historical journals, he has published ‘Gilda Mercatoria5 (1883); ‘The Exchequer of

the Jews of England in the Middle Ages5

(1887); (The Gild Merchant5 (1890); ‘Select

Cases from the Coroner’s Rolls5 (1896);

‘Bibliography of British Municipal History5

(1897); ‘Sources and Literature of English

History5 (1900) ; ‘The Court of Piepowder5

(1906). In addition he has translated Lavisse’s ‘Political History of Europe5 (1891) ; Kayser-ling’s ‘Christopher Columbus5 (1893).

GROSS, Ferdinand, Austrian journalist

and author : b. Vienna, 1849 ; d. 1900. After

studying at Vienna, he undertook journalistic

work and became in 1879 the editor of the

Frankfurter Zeitung. He resigned this post in

1881, to become editor of the Wiener Frenden—

blatt, in which capacity he remained five years.

He also edited the Wiener Mode. His pub¬

lished works include essays and sketches col¬

lected under the titles ‘Kleine Munze5 (1878) ; ‘Oberammergau Passionsbriefe5 (1880) ; ‘Mjt

dem Bleistif t 5 (1881) ; ‘Aus der Bucherei5

(1883); ‘Blatter im Winde5 (1884); ‘Literarische Modelle5 (1887) ; ‘Goethes Werther in

Frankreich5 (1888); ‘In Lachen und Lacheln’

(1898) ; ‘Von der leichten Seite5 (1900) ; and several dramas, ‘Die neuen Journalisten5 (with

Max Nordau 1880); ‘Der erste Brief5 (1883).

GROSS, Samuel D., American physician

and surgeon: b. Northampton County, Pa., 8

July 1805; d. 6 May 1884. He was graduated

from Tefferson Medical College, Philadelphia,

in 1828, and began the practice of medicine

in Philadelphia, devoting his leisure to study

and to the translation of French and German

medical works. His first original work was a

treatise on the ‘Diseases and Injuries of the

Bones and Joints) (1830), in which occurs the

first account of the use of adhesive plaster as a means of extension in the treatment of frac¬

tures. In 1835 he became professor of patholog¬

ical anatomy in the medical department of the

Cincinnati college, where he delivered the first systematic course of lectures on morbid anatomy that had ever been given in this country, and composed the first systematic treatise upon the subject ever published in the United States,

‘Elements of Pathological Anatomy } (1839).

In 1840 he became professor of surgery in the University of Louisville, from 1850 to 1856 in the University of New York and in Jefferson

Medical College from 1856 to 1884. He was

president of the American Medical Association

and the American Surgical Association in 1868

and 1880, respectively. Besides the works al¬

ready mentioned, he was th; author of a

monograph on ‘Wounds of the Intestines)

(1843) ; ‘Diseases, Injuries and Malformations

of the Urinary Organs) (1851) ; ‘Foreign

Bodies in the Air Passages) (1854); ‘System

of Surgery, Pathological, Diagnostic, Thera¬

peutic and Operative5 (2 vols., 1859; 6th ed., 1884).

GROSS, William Hickley, American arch¬

bishop : b. Baltimore, Md., 1837 ; d. 1898.

After receiving his training at Saint Joseph’s

College, he was ordained in the Redemptorist

order (1857). In 1871 he became superior of

the order. In 1873 he succeeded to the bishop¬

ric at Savannah, Ga., and 11 years later was

appointed archbishop of Oregon.

GROSSCUP, Peter Stenger, American

lawyer: b. Ashland, Ohio, 15 Feb. 1852. He

was graduated at Wittenberg College in 1872

and two years later completed the course at the Boston Law School. He began practising in

his native town where he also served in the

capacity of city solicitor for six years. From 1892-99 he wras United States District Judge

for the northern district of Illinois, in which year he accepted the office of judge of the

United States. Circuit Court of Appeals for

the seventh circuit, maintaining this position

until 1905. Of this court he became presiding

judge in 1905, resigning in 1911; since when

he has resumed his law practice at Chicago.

GROSSE, Julius Waldemar, German poet,

dramatist and novelist: b. Erfurt, Prussia, 25

April 1828; d. 1902. After obtaining his edu¬

cation at Halle he studied law, painting and

then turned to poetry; later he entered the field of journalism, for 16 years (1854-70), being

associated with the Neue Miinchener Zeitung

(afterward known as the Bayrische Zeitung),

and in 1870 becoming secretary of the Schiller-Stiftung, at Weimar. His writings are various,

including novels, dramas, epics, songs and bal¬

lads, the most important of which are his war songs ‘Wider Frankreisch5 (1870) ; ‘Das Volk-ramslied) (1889) ; ‘Gundel von Konigssee5

and ‘Das Madchen von Capri,) all epic poems;

‘Pesach Pardel5 (1871) ; ‘Hilpah und Shalum5

and ‘Der Wasunger Not5 (1872), comic epics;

the dramas, ‘Tiberius) (1875) and ‘Fortunat5

(1895) ; the novels ‘Ein Revolutionar” (2d ed., 1871) and ‘Tante Carldora) and several tales

and romances, among which is ‘Die Novellen

des Architekten) (1896).

GROSSE ISLE, Canada, a small island in

the Saint Lawrence River, 30 miles south of

Quebec. It is about two and onehalf miles

long and one mile wide and is used as the

quarantine station for the province.

GROSSENHAIN, gros'sen-hin, Germany,

a town in Saxony, on the Roder River, 20 miles northwest of Dresden. The principal industries

include the manufacture of silks, woolens,

machinery, cigars, leather, cut glass, copper and zinc utensils, lumber, bricks, soap and garden¬

ing. There is also a trade school, a library, a public park and a gymnasium. Pop. 12,250.

GROSSETESTE, Robert, English Roman

Catholic prelate : b. Stradbrook, Suffolk, about 1175 ; d. Buckden, 9 Oct. 1253. He studied law, physics and theology at Oxford and Paris and

upon his return to England attained an enviable reputation as a theologian, so much so that in 1214 he became archdeacon of Wifts and in

1224 received the directorate of theology and

became first rector scholarum of the Franciscan school at Oxford. In 1232 he took up the cause of the Jews against the king, defending them

with great vigor and in 1235 was elected bishop of Lincoln, whereupon he undertook to make

radical changes in his diocese and eliminate

some of the many abuses prevalent there, the

result of which was that though he was pos¬

sessed of great force of character, his high

temper and lack of tact and diplomacy led him into innumerable controversies. The most fa¬

mous of_ these was with Pope Innocent IV,

who, desiring to fill the lucrative positions in the church with Italians and Provencals, in

1253 sent the bishop a request that he appoint his (the Pope's) nephew to the first vacant

canonry in the cathedral of Lincoln. This

Grosseteste flatly refused to do, and, as his

clergy stood by him in his fight against this abuse, the matter was finally dropped and it is mainly upon this incident that his fame rests.

He was, though, a man of great scholarly at¬

tainments, Hebrew, Latin, Greek, French,

mathematics, medicine and music being num¬

bered among them, beside which he was one of

the most learned preachers of his time and a

voluminous writer. Consult Perry, 'Life5

(London 1871); Luard (editor), 'Roberti

Grosseteste > Episcopi quondam Lincolniensis

Epistolae5 (in the Rolls Series, 1862).

GROSSETO, gros-sa'to, Italy, a town of

Tuscany, capital of the province of Grosseto,

90 miles south-southeast of Pisa with which

it is connected by rail. The cathedral dates

from 1294; the restorations were begun in

1855. It is built of red and white marble and belongs to the Italian Gothic style of architec¬

ture. The citadel is fortified. Points of in¬

terest are the collection of Etruscan antiquities in the Municipio and the ruins of the town of Rusellse, an old Etruscan city. The chief occu¬

pations are trading in cattle, lumber, grain and horses and the manufacture of agricultural

implements. Grosseto has been the seat of a

bishropic since 1138. Pop. about 3,000.

GROSSI, gros'se, Tommaso, Italian poet

and novelist : b. Belluno, on the Lake of Como, 20 Jan. 1791 ; d. Milan, 10 Oct. 1853. He studied law at Pavia and settled in Milan, where he

passed the remainder of his life as a notary, but his political ideas prevented his rise in his profession. His first attempt at poetry was 'La

Principe,' written in the Milanese dialect and

this was followed in 1816 by two shorter poems, (La Fuggitivia> and (La Pioggia d'Oro,* and

in 1820 by Uldegonda,* a romance in verse.

This poem became popular and set the fashion

for that style of writing, the success which it attained encouraging him to write (I Lombardi

alia Prima Crociata) in 1826, a poem remark¬

able for its patriotic sentiment. Despite the fact that Manzoni gives praise to this last poem in his novel (I promessi sposP and that the cost of printing was defrayed by a generous subscrip¬

tion, it was soon forgotten. This did not dis¬

hearten him, however, and in 1834 he published his (Marco Visconti,* which at once excited

public approval and became the pioneer of the

historical novel in Italy. His only other work of note was <Ulrico e Lida,* published in 1837.

GROSSMITH, George, English actor: b.

9 Dec. 1847; d. 1912. After doing journalistic work for several years he abandoned that pro¬

fession in 1870 for the stage. His chief roles have been in Gilbert and Sullivan operas. He

toured Great Britain and the United States in

1889 and retired in 1891. His works include

several hundred songs and humorous sketches

and two books (The Reminiscences of a Society

Clown) (1888) and (The Diary of a Nobody)

(with his brother, Weedon).

GROSSO, gro'so, Matto, Brazil (q.v.), a

western central state bordering on Bolivia,

Argentina and Paraguay. It has an area of

532,500 square miles and an estimated pop¬

ulation of 137,000. Capital, Cuyaba (q.v.).

GROSVENOR, gro've-ner, Edwin Augus¬

tus, American educator and author: b. New—

burvport, Mass., 30 Aug. 1845. He was gradu¬

ated at Amherst College in 1867 and at Andover Theological Seminary in 1872, was professor

of history at Robert College, Constantinople,

in 1873-90, and of European history at Amherst College in 1892-99. In 1899 he was appointed to the newly established chair of modern govern¬

ments and their administration and of modern

government and international law after 1901.

He was also in Smith College as professor of

history in 1892-94. His publications include

translations from the French of Victor Duruy's

(Modern Times * (1894) and (General History)

(1898); (Andronike,* from modern Greek;

(The Hippodrome of Constantinople) (1889) ;

Constantinople* (1895) ; (The Permanence of

the Greek Type* (1897) and (Contemporary

History* (1899), extending from 1848 to the

present time. He edited ((Reference History of

the World** in Webster's (International Diction¬

ary* (1909).

GROSVENOR, Gilbert Hovey, American

editor: b. Constantinople, Turkey, 28 Oct. 1875.

He was graduated from Robert College at

Constantinople (1890) and then studied at Wor¬

cester Academy and Amherst College. After

teaching for a year he was appointed assistant editor of the National Geographic Magazine,

of which he became managing editor (1901)

and editor (1903). He has been a director of

the National Geographic Society since 1899. He

is the author of (The Explorations of the 19th Century* (in the annual report of the secre¬

tary of the Smithsonian Institute, 1900) ; a

historical sketch of Peary's exploration of the North Pole (1910) ; (Young Russia* (1914) ;

'See America* (1916). He is also editor of

(Scenes from Every Land* (1907, 1909, 1912)

and associate editor of Proceedings of the

Eighth International Geographic Congress*

(1905), and Scientific Report of the Ziegler

Polar Expedition of 1905-06.*

GROT, grot, Nikolai Yakovlevitch, Rus¬

sian philosopher : b. Saint Petersburg, 1852 ; d.

1898. He studied at the university of his native city and became professor of philosophy at

Xiezhin in 1873. From 1883 he occupied a

similar position at Odessa and likewise at Mos¬

cow* from 1886. He was editor of the journal

called V op rosy Filosofii (1894-96). He wrote

both in French and Russian and his works in¬

clude (Nouvelle classification des sentiments*

(1878); (La causalite et la conservation de

l'energie* (1890) ; (Dreams as a Subject for

Scientific Analysis* (1878) ; Psychology of

the Feelings* (1880) ; (A Criticism on the Con¬

ception of Free Will* (1889) ; (Turning Points in the Development of the New Philosophy*

(1894).

GROT, Yakob Karlovitch, Russian philol¬

ogist: b. Saint Petersburg, 1812; d. 1893. From 1841—53 he was professor of Russian history

at Helsingfors and subsequently at the Alex¬

ander Lyceum at Saint Petersburg. His works

include Philosophical Investigations* (12 vols.,

1885) ; and editions of the works of Derzhavin (9 vols., 1864-80) ; (The Correspondence of

Catharine II with Grimm* (1884) ; and the

Pussian Lexicon of the Academy of Saint

Petersburg* (2 vols., 1891-92).

GROTE, George, English historical writer:

b. Clayhill, Kent, 17 Nov. 1794; d. London, 18

June 1871. After having studied at the Charterhouse, in 1809, he became a clerk in his father's banking house. He kept on with his studies,

particularly with philosophy, and his liberal

trend of thought gradually drew him into poli¬

tics. He had written and spoken much in favor of the Reform Bill which was passed in 1832

and in that year he was elected to the House of Commons from London, which seat he continu¬

ously occupied until 1841. During all these

years he had steadily worked upon his (History of Greece,* the idea of which was suggested to him by the spirit of partiality displayed in Mitford's (History of Greece* and which he had

severely criticised in an article in the West¬

minster Review (April 1826). He had as early

as 1823 devoted himself to the study of Greek history, for a sympathetic interpretation of

which his extreme liberality made him admirably suited, and though to a certain extent the spirit of democracy is evident in the (History of

Greece,* yet the facts are placed before the

reader with the idea that he will form his own conclusion. His private and public duties had

prohibited literary work and it was not until

he retired that he completed the first two vol¬

umes which appeared in 1845, the last volume

of the set, the twelfth, appearing in 1856. Grote also wrote (Plato and the Other Companions of

Socrates* (3 vols., 1865) ; c Minor Works*

(edited by Alexander Bain, London 1873) and

(Aristotle,* which he left unfinished (2 vols., 1872). He had taken an active interest in edu¬

cational matters, in 1860 becoming vice-chancel¬

lor of the London University and in 1869 pres¬

ident of the University College, and also was

elected a trustee of the British Museum. Con¬

sult Grote, Mrs., (Memoirs) (London 1873) ;

Bain, Alexander, Character and Writings of

G. G rote, 5 prefixed to his (Minor Works5 (Lon¬

don 1873).

GROTEFEND, gro'te-fent, Georg Fried¬

rich, German archaeologist and philologist : b.

Munden, near Cassel, Prussia, 9 June 1775; d.

Hanover, 15 Dec. 1853. He received his early

education at Hanover and Ilf eld, and com¬

pleted his studies at the University of Got¬

tingen (1795-97). He became prorector and

later conrector of the gymnasium at Frankfort-on-the-Main (1803-21), and for nearly 30 years

(1821-49) was director of the lyceum at Han¬

over. His research in the field of Latin philol¬

ogy was of great value, but his importance is chiefly due to the fact that he first deciphered the old Persian inscriptions of Persepolis, pre¬

senting the results of his labors in a paper

before the Academy of Science at Gottingen,

4 Sept. 1802. Chief among his publications are (Rudimenta linguae Umbricae5 (1835-38); (Neue

Beitrage zur Erlauterung der babylonischen

Keiliuschrift5 (1840) ; <Zur Geographic und

Geschichte von alt-Italien5 (1840-42) ; (Rudimenta Linguae Oscae (1839), *etc.*

GROTESQUE, in architecture, a fantastic

ornament formed by exaggerated lines and

fanciful groupings of animate and inanimate

objects. It was found in the old Roman

grottoes and revived during the Renaissance,

when it became very popular.

GROTH, grot, Klaus, German poet : b.

Heide, Prussia, 24 April 1819; d. Kiel, 1 June 1899. He was educated at the secondary school

at Tondern, and then taught at a girl's school at Heide. After a few years of ill-health,

which he spent in retirement, Groth resumed his studies at Kiel (1853), and three years later re¬

ceived the degree of Ph.D. from the university at Bonn. In 1858 he instructed in the German

language and literature at Kiel, where he was

appointed professor in 1866. His works are

written in. the. Low-German or Platt-Deutsch ;

and it is in his effective use of this language for literary purposes that his chief contribu¬

tion to German literature lies. His works are

genuine folk-literature, sincere and sympathetic

in their interpretation of the life they represent.

They include (Quickborn, Volksleben in platt—

deutschen Gedichten Ditmarscher Mundart5

(1852; 25th ed., 1900, trans. into High German by Hoffmann, 1856) ; Wertelln5 (1855—59, 3d

ed., 1881), which is a collection of stories;

(Hundert Blatter5 (1854), poems in High Ger¬

man; (Voer de Goern5 (1858); and (Ut min

Jungsparadies5 (1876). His collected works

were published at Kiel (4 vols., 1893). His

memoirs were edited by E. Wolff (1891). Con¬

sult Eggers, K., (Klaus Groth und die platt—

deutsche Dichtung5 (Berlin 1885) ; Siercks,

(Klaus Groth, sein Leben und seine Werke5

(Kiel 1899).

GROTH, Paul Heinrich von, German

mineralogist: b. Magdeburg, 23 June 1843. He

studied at the Freiberg Mining School and

later at Berlin, and taught at both of these

schools. In 1872, he was appointed professor

of mineralogy at Strassburg; and in 1883 at

Munich, where he was also given charge of the state mineralogical museum. His special con¬

tribution to his subject has been in the study of crystals. He was the founder and editor

for many years of Zeitschrift fur Krystallographie und Mineralogie. His published

works include (Tabellarische Uebersicht der

Mineralien nach ihren krystallographisch—

chemischen Beziehungen geordnet5 (1898) ;

(Physikalische Krystallographie5 (1895) ;

(Grundniss der Edelsteinkunde5 (1887) ;

(Chemische Krystallographie5 (1906); (The

Optical Properties of Crystals5 (trans. by B. H.

Jackson 1910).

GROTIUS, gro'chi-us, or De Groot, Hugo,

Dutch scholar and statesman : b. Delft, 10 April 1583; d. Rostock, 28 Aug. 1645. He was a pupil of Joseph Scaliger at the University of Leyden, conducted his first lawsuit in his 17th year; and in his 24th was appointed advocate-general. In

1613 he became syndic, or pensionary, of Rot¬

terdam. In 1615 he was sent to England in

order to arrange the difficulties arising from the claims of the English to exclude his countrymen from the Greenland whale-fishery. He declared

himself on the side of Barneveldt (q.v.) in the struggle between the Remonstrants and their

opponents, and was sentenced to imprisonment

for life in the fortress of Loevenstein. He

succeeded in escaping by concealing himself in

a chest, and after wandering about for some

time in the Catholic Netherlands escaped to

France, where Louis XIII gave him a pension

of 3,000 livres, withdrawn in 1631. He re¬

turned to Holland, but through the machinations of enemies was condemned to perpetual banish¬

ment. He later went to Hamburg, and in 1634

to Stockholm, where he was appointed coun¬

sellor of state and Ambassador to the French

court, in which post he remained for 10 years.

On his return to Sweden by way of Holland he met. in Amsterdam

with a distinguished re¬

ception. Most of his enemies were dead, and

his countrymen repented of having banished the

man who was the honor of his native land.

With the talents of the most able statesman,

Grotius united deep and extensive learning. He

was a profound theologian, excellent in exege¬

sis, his ˆCommentary on the New Testament5

being still esteemed; a distinguished scholar,

an acute philosopher and jurist and a judicious historian. His writings have had a decisive

influence on the formation of a sound taste and on the diffusion of an enlightened and liberal manner of thinking in affairs of science. As

a critic and philologist he seizes the genius of an author with sagacity, illustrates briefly and pertinently and amends the text with facility

and success. His metrical translations from the Greek are executed with the spirit of a poet.

Among the modern Latin poets he holds one of

the first places and he also tried his powers in Dutch verse. But the philosophy of jurispru¬

dence has been especially promoted by his great work on natural and national law, (De Jure Belli et Pads,5 which represented the study of 20

years and laid the foundation of the new science of international law ; besides which he wrote

ˆnnales et Historic de Rebus Belgicis5

(1657) ; (Annotationes in Vetus Testamentum5

(1644) ; ˆnnotationes in Novum Testamen¬

tum5 (1641—46) ; (De Veritate Religionis Chris-tianae5 (1627). As an awakener of the con¬

science of humanity, Grotius' writings have had profound influence on American jurisprudence

and diplomacy. This was acknowledged, es-

pecially at the first International Peace Con¬

gress, held at The Hague in 1899. The presi¬

dent of the American delegation, Andrew D.

White, laid upon the tomb of Grotius, in the

Great Church at Delft, a silver-gilt metal

wreath, in the name of the government of the

United States. By invitation of the city au¬

thorities, a banquet was tendered in honor of

the Americans. Still more has Grotius in¬

fluenced the New England theology, his gov¬

ernmental theory of the Atonement being that

which dominated the American pulpits for a

century or more; the modified Calvinism of

Andover, championed by Jonathan Edwards,

Bellamy, Edmunds and Park, being opposed to

the purer Calvinism of Princeton and New

Brunswick. A superb statue of Grotius, by

Stvackee, stands in the public square in Delft.

In the pavement are wrought, in white letters, his motto (<Let each one walk with God.® Con¬

sult Bertens, H., (Hugo de Groot en zijn

rechtsphilosophie) (Tilburg 1905) ; Butler,

(Life of Hugo Grotius) (London 1826) ;

Creuzer, (Luther and Hugo Grotius) (Heidel¬

berg 1846) ; De Vries, (Huig de Groot en

Maria van Reigersbergen) (Amsterdam

1827) ; Vreeland, (Hugo Grotius, the Father of the Modern Science of International Law>

(New York 1917) ; White, Andrew D., (Seven

Great Statesmen in the Warfare of Humanity

with Unreason> (ib. 1910).

GROTON, Conn., town in New London

County, on the Thames River, the New York,

New Haven and Hartford Railroad; opposite

New London. In 1637 Captain Mason stormed

the fortress held by the Pequots, and many

lives were lost, both white .and Indians. A

more disastrous fight occurred here 6 Sept.

1781, when 800 British troops under Benedict

Arnold attacked Fort Griswold (q.v.), which

was garrisoned by 150 soldiers. The Americans

heroically resisted, but were overwhelmed by

numbers, and Arnold and his force entering the fort butchered 85 men and wounded 65. Soon

after 35 of the 65 died from the effects of their wounds. This battle is known in history as the <(Massacre of Fort Griswold.® The site is now

a State reservation, with a fine monument in

commemoration of the defenders. Groton con¬

tains shipbuilding yards, several manufactories

and the Bill Memorial Library. The govern¬

ment is regulated by annual town meetings.

The waterworks and electric-light plants are

municipally owned. Pop. 4,236. Consult Burgess,

(Historic Groton* (Moosup, Conn., 1909);

Caulkins, (The Stone Records of Groton*

(1903); (History of New London County*;

(Magazine of American History,* Vol. VII

(New York 1880) ; (The Massacre of Fort

Griswold.*

GROTTAGLIE, grot-ta'lya, Italy, a city in

the province of Lecce, 12 miles northeast of

Taranto. The principal industries are the

quarrying of clay and chalk, and the manu¬
facture of pottery and leather goods. . There
is also considerable trade in oil, wine and
fruit. Pop. (commune) about 12,000.

GROTTGER, grot-gar, Arthur von, Polish

painter: b. Ottyniovitz, 1837; d. 1867. He re¬
ceived his education at Lemberg, Cracow and
Vienna. His pictures are mainly historical and
are imbued with a profound feeling for his
country's tragic condition. .They, include sev¬

eral cycles (Warsaw > (1861) ; (Poland > (1863) ; Lithuania* (1863).

GROUCHY, groo'she, Emmanuel, Mar¬
quis de, French marshal: b. Paris, 23 Oct. 1766; d. Saint Etienne, 29 May 1847. He acquired
distinction in the revolutionary armies and in
the campaign of 1800 fought in the army of
the Rhine under Moreau, and rendered im¬
portant service at the battle of Hohenlinden.
In the war with Prussia in 1806, and with
Russia in 1807, he acquired new fame and was
sent to the army of Italy under Prince Eu¬

gene. At the battle of Wagram his masterly

manoeuvres contributed greatly to the victory.

On the restoration he was banished, but al¬

lowed to return in 1815. On Napoleon's re¬

turn from Elba he immediately joined him, was

made a marshal and obtained first the com¬

mand of the army of the Alps, and then the

command of the cavalry in the grand army.

After the battle of Ligny he was sent on the following day with 34,000 men and 100 cannon

to follow the retreat of the Prussian army

under Bliicher. While he here on the 18th en¬

gaged with Thielemann, Napoleon gave battle

at Waterloo, the disastrous issue of which has been sometimes laid to Grouchy's charge, from

having failed to observe how three divisions of the Prussian army were advancing to Waterloo

to take Napoleon in flank and rear, while

Thielemann alone remained at Wavres. Again

banished, he came to the United States, where

he lived five years, but was permitted to return in 1821. After the July Revolution he was elect¬

ed to the Chamber of Deputies by the depart¬

ment of Allier, supported the new dynasty and

was appointed in 1831 marshal, and in 1832 a

peer. His memoirs were published 1873-74.

GROUND BEETLES, the family Carabi—

dce, predatory beetles of various sizes and ap¬

pearance. It contains upwards of 1,200 de¬

scribed species, nearly all of nocturnal habit, and, consequently, dark, mostly black in color.

Some species, however, are metallic green or

blue, or beautifully variegated. The family con¬

tains many beneficial species, which roam fields, meadows and gardens, destroying many injuri¬

ous pests. They fly freely at night and seek

concealment in the daytime under stones and

logs and in other convenient hiding-places.

Most species are terrestrial, but a few forms, such as species of Calosoma, known as ((caterpillar-hunters,® climb the trunks of trees in

search of noxious caterpillars which they de¬

stroy. A remarkable genus is that of the bom¬

bardier beetles (q.v.). A very few are occa¬

sionally injurious, among them Agonodefus

pallipes, which burrows into newly-planted

seeds of corn ; and two species of Harpalus

which are destructive to strawberries. These

latter insects are interesting because of their dual habit of being carnivorous as well as herbiv¬

orous. They attack, in the beetle stage, the

seeds of Ambrosia, and also eat insects of

various kinds. In form the species vary greatly ; the antennae are inserted behind the base of

mandibles under a frontal ridge ; maxillae with the outer lobe palpiform usually bi-articulate,

while the inner lobe is usually curved acute and ciliate with spines. The epimera and episterna

of the phothorax are usually distinct; the three anterior segments of the abdomen, usually six,

rarely seven or eight, in number, are connate.

The legs are slender, formed for running;

anterior and middle coxae globular, posterior

ones dilated internally, and the tarsi are five-jointed. They are runners and do not fly,

the hind wings being often absent. The larvae

are found in much the same situation as the

adult beetles, and are generally oblong, broad, with the terminal ring around with two horny

hooks or longer filaments and with a single

false leg beneath.

GROUND-CHERRY, herbaceous plants of

the potato family, constituting the genus

Physalis, scattered through most of the world.

About 35 species are natives of the United

States, and some are known as <(tomato straw¬

berries,® and are cultivated for the sake of their berry-like fruit, which is hidden within a per¬

sistent balloon-like calyx.

GROUND CUCKOO, a coucal (q.v.).

GROUND-DOVE, any of various species

of pigeons which live mainly on the ground

and seek their food there. The name is es¬

pecially given to the genus ColumbagalHna,

small birds of the warmer parts of America, of which one gentle and familiar species (C. pas-serina) is well known in the South Atlantic

States, along the coast. The bronze-wing pi¬

geons of Australia and the large pigeons of the genus Goura (q.v.) are also so called.

GROUND HOG, the name applied in the

United States to the marmot or woodchuck

(qq. v.).

GROUND HORNBILL. See Hornbill.

GROUND IVY, a familiar European labi¬

ate plant (Glechonia hederacea) , allied to mint, writh a creeping stem and purple flowers. The

leaves are crenate-reniform and the flowers are in threes. It was formerly employed to flavor

ale and also medicinally.

GROUND-NUT, a climbing plant (Apios

apios) of the bean family, which puts out

dense clusters of dull purple flowers after most other plants have stopped blooming; these are

velvety within and sweetly fragrant. The tuber¬

ous rootstock is edible, whence the name.

GROUND RENT. (1) A rent reserved to

himself and heirs by the grantor of an estate in land in fee simple out of the land granted.

(2) Rent paid, usually on a lease for a term of years, for the right to occupy and build upon land. In Roman law ground rent was annual

rent paid by the lessee of a perpetual lease of building land. In England ground rents were

part of the feudal system, and this form of

tenure is continued in that country to-day in the sense of a fixed rent paid for the use of land for a period of years, with the right to make improvements thereon. In a modified form it

exists also in Scotland, where it is known as (<ground annual.®

In the United States pure ground rent, in the sense of definition (1) above, exists mainly in Pennsylvania, although the manor lease, for¬

merly quite common in New York State, comes

well within this definition, inasmuch as in this form of tenure a fee simple estate is conveyed to the grantee. The rent paid under .a lease for a term of years renewable forever as it exists in Maryland, as well as the rent under the per¬

petual lease of Georgia, is properly termed

ground rent. In Pennsylvania, a ground rent,

being a hereditament, descends to the grantor's heirs, whereas in Maryland and other parts of

the United States the leasehold is treated as

personal property. This form of tenure is

found elsewhere, to a limited extent, in other parts of the United States, mainly in Ohio and Louisiana. In the latter State the contract,

to constitute a valid ground rent, must convey the property in perpetuity and the rent reserved must be a charge upon the land itself. As

ground rent is usually fixed for a long period of years, the difference between this form of rent and economic rent is often necessarily very

large. See Rent.

GROUND-SLOTHS, a family (Megar

theriid<z) of extinct edentates (Gravigrada) re¬

lated to the modern sloths but of terrestrial

habits, and in some genera of gigantic size.

They are of special interest because some sur¬

vived into the human period. They have a gen¬

eralized structure, exhibiting the head and teeth of a sloth, associated with the vertebrae, limbs and tail of an ant-eater. They were chiefly

South American, but spread as far north as the western United States in the Pliocene and

Pleistocene epochs, and did not become extinct

until very recent times. Megatherium is the

most prominent and familiarly known genus.

Its largest species, M. americanum, almost

equaled an elephant in size, but was much longer and lower in stature, owing to the shortness of its extraordinarily heavy limbs ; some skeletons exceeds 20 feet in length. The head was very

small, especially as to brain-cavity, and the lower jaws projected in a spout-like extension imply¬

ing some kind of proboscis. The tail was thick and heavy and probably useful as an aid to

support when the great beast reared up ;

and the hind feet had two great claws each,

which seem to be the only defensive weapon

possessed. ((The entire structure of the ex¬

tremities,® according to Von Zittel, ((proves that the gigantic sloth could move over the ground

but slowly and clumsily; on the other hand the fore limbs served as grasping organs, and were presumably employed to bend down and break

off twigs and branches, and even to uproot

whole trees, while the weight of the body was supported on the hind limbs and tail.® The

skin of the megatheres had no bony armor,

and was probably covered with long hair.

The allied genera Lestodon, Mylodon,

Glossotherium, Scelidotherium and Megalonyx,

were all of smaller size and their members

seem to have been very abundant all over South America during the Pleistocene epoch. Megaloc-nus is a genus of a primitive character peculiar to Cuba. The genus Gryptotherium is of pecu¬

liar interest as perhaps the last survivor of the great extinct Pleistocene fauna. The dis¬

covery of part of the hide of one of these ani¬

mals, half buried in dry dust, in a cave at Last Hope Inlet, Patagonia, showed that their skin

was thick, studded with small embedded bony

nodules, and thickly covered with long, coarse, yellowish-brown hair, as well preserved as are

the feathers of the moas in New Zealand. The

skin, says the discoverer, Dr. Moreno of Buenos Aires, shows patches of red color, suggesting of course blood-stains; and when small bits were

chemically analyzed they yielded serum and the

substances of glue. In view of this it seems

impossible to believe that the skin can be of any great age, for bacteria would have finished their work upon the serum and gelatine long ago. An GROUND-SNAKE — GROUPS

equally fresh-looking skull was found, as if in a small stone enclosure, and wounded in such

a way as only man could have inflicted; and

there are legends among the Indians that such

creatures were known to their ancestors. Dr.

ˆMoreno is of the opinion, from evidences found in this cave and elsewhere, that these animals had been domesticated by man, but to what

extent and for what purposes is unknown.

Consult Scott, (History of Land Mammals)

(New York 1913).

GROUND-SNAKE, one of the little, bur¬

rowing worm-shaped snakes of the genus Car—

phophiops, which abound in tropical America.

One species (C. amcenus) is numerous under

stones and logs in the Southern States, and is glistening chestnut in color above and salmon-yellow beneath. A larger, more purplish species (C. vermis) is called Aground-worm® in

Louisiana. These snakes are perfectly harmless

and are the least specialized of the Colubridce.

GROUND SQUIRREL. See Squirrel.

GROUND WATER, that water which ex¬

ists underground in the pores of the rock. It is the source of all wells and springs. Most

of it comes from rainfall which has soaked

into the soil and is known as meteoric water.

A smaller part is given off by molten rocks as they cool and is called magmatic water. The

latter is believed to be very important in the formation of ore deposits. Another part is be¬

lieved to have been enclosed in the pores of

the sediments as they were laid down on the

sea bottom and represents what may be called

fossil sea water. This is known as connate

water. Deep-seated magmatic waters are also

called juvenile waters and surface or meteoric

waters are sometimes called vadose. See Ar¬

tesian Wells; Ore Deposits; Water Supply;

Wells ; and the section in Geology devoted to Ground Water.

GROUP INSURANCE. This is the ap¬

plication of life, health and accident insurance to the employees of one concern, as a rule not less than 100 in number, the employer paying

the premiums. The plan is an outgrowth of the interest of employers in the welfare of their

employees, arising largely from a persuasion

that it pays from a purely business standpoint to guard the worker and his dependents against the hazards of injury, sickness and death. Be¬

ginning with the use of the regular life policies and dealing direcly with the employer, at the

end of 1912 the larger companies of the United States had covered about 10,000 lives to the ex¬

tent of about $13,000,000. By the ending of

1917 about half a million lives were covered to the extent of a quarter of a billion of dollars.

Banks, railroads and mercantile houses, as well as factories, have availed themselves of this

form of protection. With the increasing in¬

terest in social or welfare insurance, as already embodied in the workmen's compensation pro¬

visions now legalized in two-thirds of the

States of the United States, the future will

witness a large use of this new plan for health and accident as well as life insurance. The

cost is much reduced by reason of the elimi¬

nation of medical examination and the other

usual acquisition expenses. A marked result

already developed and highly satisfactory to em¬

ployers who have adopted group insurance is

the improved morale and stability of their work¬

ing force. The laws of a number of States

have already been modified to recognize and

encourage this development of insurance.

GROUPERS (Anglicized form of Spanish

name aGarrupa®). Tropical and semi-tropical

sea-bass of the genera Epinephelus, Promicrops,

Mycteroperca and their allies. All are valuable food-fishes and most of them of large size,

bright coloration and high quality as game—

fishes. About a dozen species enter the waters of the Southern States or California, the most common along the Atlantic Coast being the

red grouper (E . morio), called ACherna® and

by many other local names. It is a large fish (20 to 40 pounds), is particularly abundant on the west coast of Florida, keeps near the bottom and is a voracious carnivore, consuming large

quantities of small fishes, as well as crabs, *etc.*

It is a favorite with market-fishermen, because it bears so well the hardships of transportation.

The yellow-finned grouper or rockfish (M .

venenosa) ; yellow grouper (M . olfax) ; and black grouper of the Florida Keys (M. bonaci), are also large and important ; while another

black grouper (Promicrops) is the famous jewfish (q.v.) of sportsmen. Several other species are elsewhere described under particular names

as Cabrilla, Mero, *etc.* Consult (American

Food and Game Fishes, > by Jordan and Evermann (New York 1902).

GROUPS, Theory of. Everywhere in

mathematics are encountered systems of opera¬

tions, possessing definite laws of combination.

Thus, two geometric motions compound into a

single motion, two algebraic transformations

into a single transformation, under laws as

definite as the primordial 2 X 2 of arithmetic but otherwise capable of infinite variety of sim¬

plicity and intricacy. Consider, for example,

the 12 rotations of a regular tetrahedron into itself. Any two of these

rotations compound

into a third one among them, easily identified on a model. By a simple convention, these vari¬

ous combinations can be registered in algebraic form. The several rotations may be designated

by the marks, a, b, c, .*…; the symbol ab may indicate that a is followed by b, and at the same time designate their resultant effect. This resultant ab is called the product of a and b in the order written; it is itself one of the 12

rotations, say c, and we write a b = c. It is an instructive exercise to tabulate the products of two or more of the 12 rotations, identifving

each product with one of the 12 original rota¬

tions. It is possible to express all the 12 rota¬

tions as products of two of them, say of the rotation a through 120 degrees about an axis

through one of the four vertices of the

tetrahedron and the rotation b through 180

degrees about an axis joining the middle

points of two opposite edges. It may be

noted that the products ab and ba are here not the same rotation : a and b are not commutative as in ordinary algebra. On the other hand

aa, which is a rotation through 240 degrees

about the axis of a, is conveniently denoted by a2; a3 and b2, both of which restore every point to its initial position, may appropriated be

equated to 1 (identitv), which is included

among the 12 rotations. The three rotations

b i, b*, b3 about the (trirectangular) axes joining the middle points of opnosite edges of the

tetrahedron will be found to be commutative;

in fact b\bz — b->bi = b3, bib3 — bib* = bi, b3bi —bib* = *b9; (bd = bf = b32 = 1).

The tetrahedral rotations furnished a simple

instance of an algebra of operations. Any sys¬

tem of operations possesses such an algebra, of greater or less extent. And, as many different systems of operations, taken from widely sepa¬

rated mathematical fields, often present one and the same algebra, these algebras are worthy of study by themselves, as generalizing and unify¬

ing instruments. Since each algebra is com¬

pletely defined by the laws of combination of

the symbols a, b, c, we may abstract the

idea of operation entirely and deal with the

pure algebra. This position having been

reached, it is inevitable to the mathematical

mind to reverse the order of thought and to

devise algebras a priori, leaving their concrete interpretation for secondary consideration. In

constructing such algebras, choice among the

infinite possibilities will be dominated by the two principles of generality and usefulness.

The two qualities are combined in high degree

in the algebra of groups.

Definition of Group. — A system of symbols,

or elements, a, b, c, _ (finite or infinite in number), conceived as capable of multiplication

with each other, is said to form a group if the following conditions are fulfilled :

(1) The product of any two elements of

the system is a third element of the system.

(2) The multiplication is associative.

(ab) c~a(bc) , (but not necessarily commu¬

tative: ab and ba need not be equal).

(3) Equalities ab = ab ‘ or ab = ab require

b—b’ or a = a, respectively.

The order of a group is the number n of its elements. A group is briefly called finite or

infinite, according as its order is finite or

infinite.

The defining conditions (1) — (3), classic in

their simplicity, possess a most extraordinary

fecundity. From them alone proceed, by pure

logical deduction, the vast and intricate systems which make up the algebra of groups.

As a primary deduction it may be noted that

every finite group G contains one and only one element, identity (denoted by 1), such that for every element x of G lx = xl = x. A proper

power xm of any element x of G is equal to this element 1 ; the lowest exponent m for which

this is true is called the order of x; every power of x is equal to one of the m powers, x, x2, x?, ... , x m — 1, 1. The inverse x — 1 of x is defined by x — lx = 1 = x™ — xx, whence by (3) x—1 = = xm—1; then x~2 = (x2) — 1 = xm~2, *etc.* The analogy to ordinary algebra (of mth roots of

unity) is here perfect. These elementary prin¬

ciples may be illustrated by reference to the

tetrahedral group G of order 12 above.

An infinite group does not necessarily con¬

tain the element 1 nor the inverse elements.

Thus all the motions of a point along a line in one direction form an infinite group, but this does not contain the reverse motions nor the

case of no motion. The prevailing tendency is, however, to restrict the name group to systems which contain the inverse of their elements, and consequently the element 1.

A part of the elements of a group G, taken

by themselves, may form a group H, which is

then called a subgroup of G. Thus the powers

of any element x of G form a cyclical group H

which is either G itself or a subgroup of G.

The tetrahedral group has a subgroup of order

4 composed of bi, b3, b3 and identity. The order h of a subgroup H of G is always a divisor of the order g of G. If pi, where p is a prime number, is a divisor of g, G has one or more subgroups of order p\ and the total number of these subgroups is of the form kp + 1, where k is an integer. If pa is the highest power of p that divides g, kp + 1 is also a divisor of g.

These theorems of Sylow and Frobenius are of

great assistance in the analysis of groups of

finite order. Thus a group of order pq, where p and q are prime numbers, has a single sub¬

group of order p; it has also a single subgroup of order q, unless p is of the form kq~\~ 1. Thus the order 15 = 5.3 presents only one case, while the order 21 =7.3 presents two. For a further

example, the icosahedral group of rotations,

which is of order 60, contains subgroups of

orders, 2, 4, 3, 5, and also 6 and 10. The 15

lines joining middle points of opposite edges of the icosahedron form five sets of trirectangular axes, each of which sets is converted into itself by a tetrahedral group contained as subgroup in the icosahedral group. There are no subgroups

of orders 15, 20, or 30 present.

Isomorphism and Transformation. — Groups

which have the same algebra are called isomor¬

phic. Written in the same symbols, isomorphic

groups are by definition identical. But in the practice the isomorphism requires to be detected, being veiled under dissimilarity of notation.

Once detected among groups derived perhaps

from quite different mathematical fields, iso¬

morphism constitutes the unifying principle al¬

ready mentioned. For example, the tetrahedral

group is isomorphic with the group of 12 sub¬

stitutions (rearrangements) which it produces

among the four vertices of the tetrahedron; and the icosahedron group is isomorphic with the

corresponding group of substitutions of the five trirectangular axis systems mentioned above.

These isomorphisms contribute materially to the

theory of equations of degrees four and five.

One instance of isomorphism is expressible

by a universal formula. Let G be any group,

with elements a, b, c, … , and let t be any ele¬

ment whatever capable of combination with

a, b, c, … , under conditions (1) — (3) ; then the elements a’ — t— xat, b’ = t~lbt, c’ = t — 1ct, . ..

form a group G’ (t~lGt), and this group G’

is isomorphic with G. For if ab = c, for exam¬

ple, then a'b' = t-lat-t —lbt = t — labt — t—lct —c , so that not only a', b', c' form a group, but the algebra of this group is identical with that of G. The process of deriving G' from G is

called transformation of G by t; G' is called the transform of G by t. All transforms of a group G (by t, s, ...) are isomorphic with G

and with each other.

Transformation has a very simple concrete

significance. Suppose that G is a group of

operations, a, b, c, ... performed on a field of objects A, and that t converts A into a second field of objects B; then t ~ 1Gt, i.e., t reversed, followed by G, followed by t, produces among

the objects B an effect precisely parallel to that produced by G on the corresponding objects A.

For example, if A is a plane, G a group of

operations in A, t a projecffon of A on a second plane B , then t — lGt is the projection of the group G on B. Or again, if G is a group of

rotations about an axis A, and t a rotation

which moves A into the position B, then t— xGt is a second group of rotations, precisely similar to G, performed about the new axis B. In gen¬

eral, transformation in the present sense is the concomitant, for operations, of transformations

in the ordinary sense as affecting objects.

Group Analysis. — If G is any group and H

any subgroup of G, all the transforms of H

with respect to the elements of G are contained in G. These transforms are called the conju¬

gates of H in G. Thus the subgroups of order 3 of the tetrahedral group are conjugate in that group. A noteworthy general example is that

of the subgroups of order pa (a a maximum)

of a group G ; these kp + 1 subgroups are

always conjugate. The number of conjugates

of any subgroup H of G is a divisor of the

order of G. In the important case where its

conjugates all coincide, H is an invariant sub¬

group of G. Every group G has two invariant

subgroups, itself and the identical operation.

If it has no other invariant subgroups, G is

simple; otherwise G is compound. Thus the

four rotations 1, bi, 6a, b8 of the tetrahedral group form an invariant subgroup, this being

in fact the only subgroup of order 4, of the tetrahedral group.

A maximum invariant subgroup H of G is

not contained in any larger invariant subgroup

of G. A principal series of composition of G

consists of G and a series of subgroups, H, I, J, … , 1 of G, each of which is a maximum invariant subgroup of the preceding one. The

ratios of the orders g, h, i, j, … 1 of these subgroups is a principal series of factors of

composition of G. Apart from their order of

succession, these factors of composition remain

the same for every principal series of composi¬

tion of G. They play an important part in the theory of algebraic equations.

Every compound group G is reducible to a

sequence of simple groups, whose orders are the factors of composition of G. Only simple

groups present new problems. The chief

problem of the pure theory of groups is there¬

fore the determination of all simple groups.

This problem awaits solution. All groups of

prime order are simple. Simple groups of com¬

posite order are of rare occurrence, the only

cases below order 2000 being one group for each of the orders 60, 168, 360, 504, 660, 1092. The number of different prime factors in the order of a simple group not of prime order is at least three, and the total number of prime factors is at least six (orders 60, 168, 660, 1092 being the only exceptions). No simple groups of odd or¬

der have as yet been found. Several series of orders of simple groups are known, for example, 3ˆ«!(w > 4), %pn(p™— 1), (p > 3), *etc.*

A group whose elements are commutative is

called an abelian group. Every subgroup and

every element of an abelian group is invariant.

The factors of composition are here the prime

factors of the order.

Example of Group Construction.— Let a

and b be two elements of prime orders p and q (ap= 1=bQ) and subject to the further con¬

dition b~1ab—ai. We find successively b~xa2b

— b~lab'b — 1ab=ai-ai—a2i, b~xa3b=a3i … .

b — laib = an ; b — 2ai b2 = b *l (b xaib) b —b* xanb = an2, b — 3aib3 = an3, … , b ~ %>£$=£

ank, …, b — < QaJbQ (= laJ\) =aj=an9. Hence iQ

— l(mod. p). If p — lis not divisible by q, i must be 1, b — 1 ab = a, ab = ba, that is, a and b are commutative, and their various products ab

form an abelian group of order pq. (This group consists of the powers of one element, say ab) .

But if q divides p — 1, the congruence A = 1

has roots i different from 1. Any one of these roots i having been chosen, the conditions av=

1 =bQ, b— xab = a* are consistent and lead again to a group of order pq composed of the distinct products aˆbl; the last group is non-abelian.

For p~ 3, <? = 2, the second group presents the multiplication table

1

1

a

a 1

b

ab

a2b

a

a

a 2

1

ab

a2b

b

a 2

a2

1

a

a2b

b

ab

b

b

a2b

ab

1

a2

a

ab

ab

b

a2b

a

1

a2

a2b

a2b

ab

b

a2

a

1

Substitution Groups. — The permutations or

substitutions of n given letters xlf x2, .

xn form a group (the symmetric group)

of order n !. The order of any group of

substitutions of n letters is a divisor of

n !. An individual substitution is written

in cycles: thus (xi x2 x8) (x4 x5 x0 x2) , or sim¬

ply (123) (4 56 7), signifies that xix2xs

are to be replaced by x2 x8 Xi, and x4 xs x6 xr by x 5 Xo x 7 x4. Every finite group is express¬

ible as (isomorphic with) a substitution group.

Thus in the case of the group of order 6 above, if we denote the elements 1, a, a2, b, ab, afb for convenience by x4, x2, . xe, the six lines of the table are obtained from the first line by the six substitutions 1, (123) (456), (132) (465),

(14) (26) (35), (15) (24) (36), (16) (25) (34), which form a substitution group isomorphic

with the original group.

Those substitutions of n letters Xi, xi, ...

xn which leave a given function of xi, x2, ...

Xn unchanged in form, form a group. Thus the

function i — X\x2 + xsx4 is unchanged by the eight substitutions Gi : 1, (12), (34), (12) (34), (13) (24), (14) (23), (1324), (1423). The sub¬

stitution t : (23) converts <pi into <p2= =. XiX3 +

x2x4 and transforms the group Gi of <j>i into the group Giˆt—‘Git: 1, (13), (24), (13) (24),

(12) (34), (14) (23), (1234), (1432) of fc.

Interesting examples of substitution groups

may also be obtained by determining those sub¬

stitutions of n letters Xi, x2, ... , xn which trans¬

form, the substitution (12... n) into its powers.

If n is a prime number, the order of this (meta-cyclic) group is n(n — 1).

For further discussion of substitution groups

see the article Galois Theory of Equations.

Groups of Linear Transformations. — All

the linear transformations of a complex vari¬

able zy zr = (az + ?) (yz -f-3), for which aS — /?y 4= 0, form a group. For two of

them in succession evidently amount to a third linear transformation. Thus S:z'=\/z and

T:z'—l — z give ST :z'—l — \/ ^={z — l)/.sr, TS:

£'=1/(1 — z). The group of all linear trans¬

formations of z is both infinite and continuous.

If a, y, d are restricted to integral values, the resulting group is still infinite but discontin¬

uous. The modular group is subject to the still further condition a6 — fty =1 ; this is the

group connecting the values of the ratio w of the two periods ,w2 of the elliptic integral u =

/ (4 z3—g2z—gt) — hdz.

There exist only a finite number of non-isomorphic types of finite groups of linear trans¬

formations of z. If z is represented on a spher¬

ical surface, every rotation of the sphere pro¬

duces a linear transformation of z. Those ro¬

tations of the sphere which convert into itself a regular solid inscribed in the sphere, or a regular polygon of n sides inscribed in a great circle (equator), form a group. These groups

are of orders 60 (icosahedron, dodecahedron),

24 (octahedron, cube), 12 (tetrahedron), 2 n

(dihedron), n (cyclical). They give all the

non-isomorphic types of finite groups of linear transformations of z. The octohedral group is

also isomorphic with the symmetric substitution

group of four letters, the tetrahedral and icosahedral groups with (alternating) substitution

groups of four and five letters, respectively.

A simple example of a (dihedral) group of

order 6 is generated by the transformations

S :z'—l/z and T :z'~ 1 — z above.

The linear transformations of z written in

homogeneous form z'i ■— azi + /Jz2, z\ = yzi -f 6zi furnish homogeneous linear groups. Increas¬

ing the number of variables, we arrive at the general homogeneous linear groups Zi = auZi

T Oi j Zi -f- … . T On Zn, Zi! = CLn Z\ -f-CLii Zt -p … . -fi CLmZn , … .Zn' = OniZi -p CLnzZi -p … .

4-annZn identified, for example, with project¬

ive geometry. Curves, surfaces, etc., frequently have linear transformations into themselves,

these always forming a group. Thus a plane

cubic curve has in general such a group of order 216. Linear congruence groups should also be

mentioned. An example is the simple group of

order — 1) (p > >3) composed of the lin¬

ear transformation z' = (a z + /3) / (y z -p 3) when a, B, 7, 3, z', z are integers taken mod. p.

Continuous Groups. — These are groups of

transformations involving continuous para¬

meters, such as the entire group of linear trans¬

formations of z, or the entire group of motions in a plane or in space. The theory of these

groups, which has been extensivelv developed

by So.phus Lie and his followers since 1870, has important applications to geometry, and es¬

pecially to the theory of differential equations.

Historical. — The theory of groups was orig¬

inally developed by Galois, Cauchy and their

successors under the particular guise of substi¬

tution groups. It was with Sylow's memoir in

the (Mathematische Annalen,5 Vol. V (1872)

that the theory began to assume its independent abstract form. Among those who contributed

to this movement are Cayley, Klein, Dyck and

others. But it is to Frobenius, above all others, that we owe the great developments of the pure theory which have been accomplished in the last 25 years. The theory of group characteristics,

recently created by Frobenius, is destined to

produce brilliant results in the near future.

Other historical elements are traceable in

the accompanying bibliography.

Bibliography. — Burnside, (Theory of

Groups 5 (1897, second edition 1911) ; Cayley,

* American Journal of Mathematics5 (1878);

Dickson, (Linear Groups5 (1901) ; (Theory of

Equations5 (1903) ; Easton, Constructive De¬

velopment of Group Theory, with a Bibliog¬

raphy5 (1902); Frobenius, (Sitzungsberichte5

of the Berlin Academy (1895 et seq.) ; Jordan, (Traite des substitutions5 (1871) ; Klein, Uko-saeder5 (1884); Netto, Cubstitutionentheorie5

(1882); Serret, (Algebre superieure5 (1866);

Sylow, (Mathematische Annalen5 (1872) ;

Weber, (Algebra5 (1899).

Frank Nelson Cole,

Professor of Mathematics, Columbia Univer¬

sity.

GROUSE, a family (Tetraonidce) of galli¬

naceous game birds with feathered feet or tarsi, inhabitants of the northern hemisphere. In

North America our best-known species is the

ruffed grouse (Bonasa umbellus) ; the ((partridge55 of New England and the ˆpheasant55 of

the Middle States. This bird, in one or other of its races, ranges all across the continent

from Canada to Washington and southward in

the higher ground, and is one of our best es¬

teemed game birds. The rumbling drumming

of the male is a familiar sound in the woods in early spring, and is effected by rapidly beating the wings against the body. On the prairies of the Central and Western States are several varie¬

ties of pinnated grouse or prairie chickens

(q.v.). In the Northwest occur the blue or

dusky grouse (Dendragapus obscurus) and the

sage grouse, the largest on this continent. In Canada and the northernmost part of the

United States occurs the Canada grouse or

<(spruce partridge55 (canadensis) with the allied Franklin's grouse (C. franklini) in the northern Rocky Mountains. The species to which the

name grouse was originally applied, namely, the red grouse or moorfowl {Lag opus scoticus) of

England, is the only bird absolutely restricted to the British Isles. It is plentiful in suitable parts of Wales and northern England, but is

especially numerous in the highlands of Scot¬

land, wThere it is bred and preserved on moor¬

lands of great extent, large areas of which are kept barren of other occupation for this pur¬

pose. This, then, is the bird wdiose shooting, permitted for a period following the 12th of

August, attracts so large numbers of sportsmen

annually to Scotland for the ((grouse-shooting.55

The sport may be followed in the ordinary

method of shooting on the wing over dogs; but in many places is conducted as a battue.

Grousemoors are owned and rented in large

numbers, and have a status similar to that of deer-forests (q.v.). This grouse is a ptarmi¬

gan, other species of which exist in the Arctic regions. (See Ptarmigan). Other European

grouse of importance are the blackcock and

capercailzie (q.v.). Among works dealing es¬

pecially with grouse and grouse-shooting are

Lloyd, Tame Birds and Wildfowl of Sweden

and Norway* (London 1867) ; the volumes on

(Shooting5 in the (Badminton Library5 (Lon¬

don 1889) ; Alfalo, (Sport in Europe5 (Lon¬

don 1901) ; Sandys and Van Dyke, (Upland

Game Birds5 (in the Sportsman’s Library, New

York 1902) ; Coues, (Birds of the Northwest5

(Washington 1874) ; Malcolm and Maxwell,

(Grouse and Grouse Moors5 (1910).

GROUSSET, groo' sa', Paschal, French

politician b. Corte, Corsica, 1844; d. 1909. He was associate editor of La Marseillaise, a radi¬

cal paper which strongly opposed the govern¬

ment; and this association subjected Grousset

to repeated fines and imprisonments. For his

share in the uprising of March 1871, he was

deported to New Caledonia. Escaping to Eng¬

land, he became London correspondent of Le

Temps for a few years. On his return to

GROUSE

1 Prairie Hen (Tympanuchus Americanus)

2 Blackcock (Tetrao urogallus)

3 Moor-hen or Ptarmigan (Lagopus albus) in winter dress 4 Scotch Red Grouse (Lagopus scoticus)

5 Ruffed Grouse (Bonasa umbellus)

6 Hybrid between Blackcock and Capercailae

GROVE — GROWING CROPS

497

Paris Grousset re-entered politics and sat in

the Chamber of Deputies in 1893, 1898, 1902

and 1906, representing the Socialist party. He

also edited U Education Physique, a journal

devoted to the promotion of athletics and

physical culture. His nublications include

political, autobiographical and travel sketches : ‘Le bilan de l’annee 1868) ; (La conspiration du general Malet) ; (Les origines d’une dynastie,

le coup d’etat de Brumaire an VHP (1869) ;

(Les condamnes politiques en Nouvelle Cale—

donie) (with Jourde, 1876) ; (La vie partout)

(1884—88); and translations of Stevenson,

Mayne Reid and other English authors.

GROVE, Sir George, English engineer,

author and musical critic: b. Clapham, near

London, 13 Aug. 1820; d. Sydenham, 28 May

1900. After completing his studies in the gram¬

mar schools of Clapham, he learned civil engi¬

neering, and for two years worked in Napier's

factory near Glasgow. In 1841 he went to the

West Indies, erecting in that year the Morant

Point lighthouse in Jamaica, and in 1845 the

Gibb's Hill light in Bermuda. He was ap¬

pointed secretary to the Society of Arts in

1849, and in 1852 to the Crystal Palace. While in the latter position he exerted all his influence toward giving the music-loving public the best

music obtainable, and endeavoring especially to

create a taste for the compositions of Beethoven and of the German Romantic School. From

1868-83 he was editor of Macmillan's Maga¬

zine, and from 1878-89 edited the famous

(Dictionary of Music and Musicians. } In

1883 he was made the first director of the

Royal College of Music, at the same time being knighted, and in 1894 was made a Commander

of the Bath. He contributed to Smith's dic¬

tionary of the Bible) (1864), and to Stanley's 'Sinai and Palestine) (1865). Consult 'Life

and Letters,* by Graves (1903).

GROVE, Sir William Robert, English

physicist: b. Swansea, 11 July 1811; d. London, 1 Aug. 1896. He was graduated at Oxford in

1832, began the practice of law in 1835, but

eventually applied himself to the study of

physics. He was elected professor of experi¬

mental philosophy to the London Institution

184CM7, and received the Royal medal from

the Royal Society for his paper on the ‘Gas

Voltaic Battery.) Returning to the law he

was knighted and made a judge of the High

Court of Justice. He was one of the first to grasp the law of the “conservation of force.®

He is the author of ‘The Correlation of Physi¬

cal Forces * (1846).

GROVE CITY, Pa., borough in Mercer

County, on the Pittsburgh, Bessemer and Lake

Erie Railroad, 58 miles north of Pittsburgh.

It contains a Carnegie library, a branch of the George Junior Republic and an Odd Fellows’

Home. It is the seat of the Grove City College, a coeducational school opened in 1884. The

chief manufactures are carriages, brooms, gas—

engines, foundry products, motor trucks and

machinery. The waterworks and electric-light¬

ing plant are owned by the borough. Pop.

(1920) 4,944.

GROVE CITY COLLEGE, a non-sec¬

tarian coeducational institution founded at

Grove City, Pa., in 1884. The faculty numbers

31 ; the annual attendance of students reaches

1,015; the tuition fees are $87; living expenses vol. 13 — 32

range from $45 to $66. The productive funds

are $81,802; total income including tuition and incidental charges $66,335. The college colors

are crimson. There are over 13,000 volumes in

the library. The number of graduates since

organization is 1550.

GROVER, Lafayette, American politician :

b. Bethel, Me., 29 Nov. 1823; d. 1911. He was educated at Bowdoin College and was admitted

to the bar in Philadelphia in 1850, and settled in Salem, Ore., in 1851, where he became promi¬

nent in his profession and was made prosecut¬

ing attorney of the second judicial district and auditor of public accounts. In 1853 he was

elected to the territorial legislature, serving

there three years and being speaker in his last term (1856). He fought in the Indian wars in

1853 and 1855-56, and was later made United

States commissioner to audit spoliation claims.

In 1857 he was a member of the Oregon Con¬

stitutional Convention, and when Oregon was admitted as a State he was member of Con¬ gress (1858-59). He was chairman of the Democratic State committee (1866-70) ; served as governor of the State 1870-77, and was United States senator 1877-83. He was active in urging legislation to exclude Chinese from the United States. In 1886 he was elected to the Oregon house of representatives.

GROVETON, Va., Battle of. See Bull Run, Second Battle of.

GROW, Galusha Aaron, American states¬ man: b. Ashford (now Eastford), Windham County, Conn., 31 Aug. 1823; d. Glenwood, Pa., 31 March 1907. He was graduated from Am¬ herst College in 1844, was admitted to the bar of Susquehanna County, Pa., in 1847, was elected to Congress in 1850 and was six times re¬ elected. During his first three terms he was a Free-Soil Democrat, during the last three a Re¬ publican. He was chairman of the Committee on the Territories in the 34th and 36th Con¬ gresses and speaker of the 37th Congress, whose five-weeks' session of 4 July-6 Aug. 1861 largely defined the government attitude toward the Con¬

federacy and voted $500,000,000 for war pur¬

poses. He introduced the Homestead bill (see

Homestead Laws) into the House, fought for

it 10 years, finally obtained its enactment and signed it as speaker. In 1879 he declined the mission to Russia, in 1894 was elected from

Pennsylvania as congressman-at-large, and was

successively reelected to the 54th, 55th, 56th and 57th Congresses. His plurality in 1896 was 297,446, the largest given up to that time in any State of the United States to a candidate for any office. He was also a delegate to the national Republican conventions of 1864, 1884

and 1892, and chairman of the Pennsylvania

State Republican committee in 1868. In 1871-76

he was the president of the International and

Great Northern Railway Company of Texas.

His long record of conspicuous service is almost unparalleled in the political annals of the United States.

GROWING CROPS, Legal Status of.

The farmer is frequently called upon to decide which products of his farm are real estate and part of the land and which may become personal property to be dealt with without regard to

the ownership of the land. This division of

the products of a farm involves the rights of 498

GROWTH

purchasers, tenants and mortgagees, also credi¬

tors, heirs, executors, *etc.* A general rule may be given to the effect that growing crops follow the title to the -soil in which they are rooted (Wootton v. White, 90 Md. 64; Jones v. Adams, 37 Ore. 473). When both belong to the same

owner growing crops are a part of the land

(Bagley v. Columbus So. R.R., 98 Ga. 626).

If the land is sold growing crops pass by deed to the purchaser unless expressly reserved at

the time of sale (Crews v. Pendleton, 1 Leigh 297; Gibbons v. Dillingham, 10 Ark. 9; Coman

v. Thompson, 47 Mich. 22; Turner v. Cool, 23

Ind. 56). In case of a mortgage foreclosure

sale, ungarnered crops pass to the purchaser of the land but those harvested before the sale is confirmed do not (Reilly v. Carter, 75 Miss.

798). Again in the case of a mortgage fore¬

closure sale, ungarnered crops pass to the pur¬

chaser even if there has been a previous sale or mortgage of the crop by the farmer to an¬

other party (Wootton v. White, 90 Md. 64;

Jones v. Adams, 37 Ore. 473). The grant of

a right to gather growing fruit may not be en¬

forced against a new owner of the land unless it be in writing and recorded after the manner of a deed (Taylor v. Millard, 118 N. Y. 244).

In an action for ejectment the successful plain¬

tiff secures title to the growing crops on the land recovered by the decree (McGinnis v.

Fernandes, 135 Ill. 69).

There are two classes of crops; those which

grow without special care or cultivation, fructus naturales, and those which result from

special cultivation, sowing, planting, etc., fructus industriales. The first, or natural products, such as timber, grass, etc., always remain part and parcel of the soil, and therefore, real estate, and do not become personal property until they are detached (Le Barron v. Babcock, 122 N. Y.

153). The industrial products, crops in the

usual sense, oats, rye, potatoes, etc., are termed emblements, being the annual produce from

seed sown — produced by labor and not spon¬

taneously (Cottle v. Spitzer, 65 Cal. 456). Em¬

blements are not real estate, but personal prop¬

erty (Westbrook v. Eager, 16 N. J. L. 81).

They may be sold orally, as real estate may not be (Garth v. Caldwell, 72 Mo. 622). Before

harvesting they are transferable like chattels

(Harris v. Frink, 49 N. Y. 24; Delaney v. Root, 99 Mass. 548). As personal property, they

belong to the tenant, not the landlord, and on the death of the owner of the land, pass to

the administrator instead of the heir (State v.

Crook, 132 N. C. 1053). In some States grow¬

ing grain unreaped is classified as personal prop¬

erty. All crops become personal property when

severed from the soil (Jones v. Adams, 37 Ore.

473). When a farm L leased at a fixed rent,

the crops grown and harvested during the term

of the tenancy belong to the tenant. Difficulty arises, however, when the lease has expired, or the tenancy is terminated. State laws differ

greatly here ; in Michigan, if a farm is surren¬

dered to the landlord while a crop is growing the tenant loses all right to the crop (Smith v.

Sprague, 119 Mich. 148); in Delaware and

Pennsylvania, the tenant in similar circum¬

stances is entitled to the crop sown during the tenancy but not maturing until after the term

has expired. Some States grant the landlord

a lien for rent upon the crops grown upon

leased land (Butt v. Ellett, 19 Wall. 544). A lien for rent attaches to the crops when the

rent is payable in produce as well as when it is payable entirely in money. The purchaser of

a crop from a tenant takes it subject to the landlord's lien, when such a lien is granted

(Beck v. Minnesota & W. Grain Co., 131 Iowa

62). Other complications arise when crops

are grown on shares. A partnership is not

constituted by such an agreement between the

owner of the land and a tenant. Owner and

tenant of a farm leased for a term of years

upon an agreement to divide the produce equally are tenants in common of the crops (Aiken

v. Smith, 21 Vt. 172). If no special time for division of the crop is

fixed, such a division is due when the crop is harvested and overdue after a reasonable time has elapsed since it was harvested. The principles enunciated above are

very general and there exist great differences

in the legislation of the several States on the subject. Other branches of legal rules touch

the subject at several points, i.e., legislation in regard to real and personal property, mortgages, liens, *etc.* (qq.v.). Consult Green, J. B., (Law for the American Farmer,5 and Willis, H. E.,

(The Farmers' Manual of Law.5

GROWTH, increase in size or volume. It

may be divided into inorganic and organic

growth. As an example of the former is the

increase in size of minerals. Inorganic growth

is not always process and hence inorganic

growth is really a misnomer. Living beings or

organisms grow by adding to the substances

(protoplasm, etc.) forming their bodies similar

matters as food, which are digested, assimilated and thus taken into the body of the plant or animal by interstitial deposit. Organic growth

is thus fundamentally a physico-chemical proc¬

ess, a sort of synthesis of structuralized ex¬

perience occurring in the growth mechanism.

The result of this absorption of food is that the body increases in size, that is, grows. All

growth is attended by movement ; and growth—

movements are, as Verworn states, common to

all living bodies, but they take place so slowly that they can scarcely be followed wfith the eye.

Growth goes on more freely and the size of the body increases most rapidly in those organisms

in which the body presents a large raying sur¬

face, in distinction from the microscopic bodies of the one-celled plants or animals. The sim¬

plest phenomenon of growth is seen in cells,

wLich during growth rapidly multiply by self¬

division, wdiich causes the increase in volume in the embryo.

The physical agents or factors in the growth

of plants and animals are abundance of food,

together w'ith the influences exerted by heat,

light and other forms of energy. During

growth the simple molecule of living proteid

continually attracts elements to itself from the food (Hatschek).

Food and Chemical Agents. — As digestion

and assimilation are chemical processes, they

require certain materials to wrork with. These

are called food. The elements which constitute

food and which occur in protoplasm and flesh

are carbon, oxygen, nitrogen, lime, phosphorus,

potassium, sodium, chlorine, magnesium, sul¬

phur, silicon and iron. All or any of these

enter the body in various combinations, each

playing a definite part in growth. Phosphorus

is especially abundant in the tissues of embryos ; potassium appears to be of great importance in GROWTH AND DEVELOPMENT OF THE HUMAN BEING

imbibition, while iron is essential in the early processes of cell-division. Besides these inor¬

ganic substances, organic food, as flesh or

vegetables, are essential to the growth of ani¬

mals. Water is also essential and embryos de¬

velop most rapidly in moist places or in water.

Light . — Without light there would be no

growth, indeed no life. Light may retard or

hasten growth, under different circumstances.

Young growing plants and embryos of animals

need to be protected from too direct sunlight.

Temperature. — Organisms need sufficient

heat in order to grow. The requisite amount

for normal, maximum growth is called the

optimum temperature, for at such a degree of

warmth growth takes place faster than at any

other. If the temperature be lowered, the rate of growth gradually diminishes ; if the tem¬

perature be raised too much above the opti¬

mum, the rate of growth diminishes more

rapidly. Excess of cold dwarfs both plants

and animals.

Space and Movement. — If too much

crowded, plants become slender and weak;

snails become dwarfed if reared in too small

vessels ; mankind when confined to too narrow

quarters in large cities tend to become under¬

sized, from not having sufficient space and good air to live in ; small trout live in small brooks and large ones in larger streams. All organisms need room to move or at least to grow.

Heredity. — Besides the factors already

mentioned heredity has its share as an agent.

Growth, development and reproduction are now

in the plant and animal world proceeding as it were in grooves, or along more or less definite paths, in accordance with long established laws or relations, and the mechanism of growth is

subject to heredity. Heredity is only thus an¬

other term for past experience of the race.

Growth and Longevity. — The elephant and

whale attain a colossal size because thev grow throughout life and live

long. The large size

of man as compared with many other mammals

is due to the fact that he grows for a longer period; while many mammals get their growth

in one, two or three years, man does not stop growing until he is 30.

It is to he observed that individual growth

is not only dependent upon a suitable amount

of food, but on proper environment and favor¬

able conditions of life, and all these agencies also are the primary factors of organic life. It is the changes in the conditions of life, coupled with heredity and selection, that have caused the evolution of the world of plants and animals.

Thus we see that the fundamental causes of the evolution of species are the same as those which determine the growth of any individual organ¬

ism ; we by no means understand all the phe¬

nomena of simple growth ; there are unex¬

plained laws and causes, as there are in general evolution; both in this respect are of a piece and are similar in their nature and results. The origin of species is as natural a process as the growth of the individual, and both in many

respects are alike inexplicable by the science of the present day.

GROWTH AND DEVELOPMENT OF

THE HUMAN BEING. In this article

growth refers to an increase in size, and de¬

velopment to an increase in capacity. The body begins in a microscopic cell, and passes through the various stages of birth,

growth, develop¬

ment, decline, and death.

The life of an individual may be studied in

various periods, the embryonic and foetal (which do not concern us at this time) and those of infancy, childhood, youth, maturity and old age.

The above division is convenient, but not physi¬

ologically exact. The various periods are not

sharply limited. From birth to maturity, with

a gradual increase in size of various organs,

there are progressive modifications of func¬

tions. Toward old age, decline begins and the

modifications retrogress.

The Period of Infancy is variously limited

by different writers, extending from birth to the end of the fourth, fifth, or even the seventh year, the last considered by law as the begin¬

ning of responsible life* Probably the best lim¬

itation is from birth to the end of the first dentition, about the end of the second year. At birth, connection with the mother suddenly

ceases, and a newT existence begins with the

first inspiration. Then the vegetative functions, digestion, circulation, respiration, secretion, ex¬

cretion and assimilation, are soon established.

The infant performs all the functions of adult life except reproduction and volition. But in

order to have them at their best they should be intelligently supervised by the parents. The

young baby is the most helpless and dependent

of all creatures. The care it receives influences its future life. With no care it must perish.

The period of infancy is characterized by

frailty, active nutrition, rapid growth, and com¬

mencing development. It is especially prone

to convulsions from improper food, or from

high body temperature, whatever the cause, to

rickets and scurvy from improper nourishment,

to spasmodic affections such as false croup, to hydrocephalus, meningitis, whooping cough,

diphtheria, diarrhoea, bronchitis, pneumonia,

and to the eruptive diseases, measles, chicken—

pox and scarlet fever.

The rate of infantile mortality is very high.

From one-fourth to onehalf of the children

born in our large cities die within the first year ; in small towns and in the country the rate is much lower Many of the new-born are en¬

feebled by vices of formation, such as cyanosis, spina bifida, hydrocephalus, or meningocele, by

an hereditary syphilitic, scrofulous or tuber¬

culous taint, or by chronic affections in the

mother. All infants are exposed to the risks

of an improper dietary, impure air and the ex¬

tremes of heat and cold.

The bones of the infant are very vascular,

quite elastic, have but little firmness, and their epiphyses are cartilaginous. They are there¬

fore readily inflamed, as in scurvy, may be dis¬

torted by pressure, or incompletely broken by

apparently slight injuries, or the epiphyses may be separated by such injuries. To forcibly lift a young child by one arm is always dangerous.

The skull at birth is not fully ossified and can be readily compressed. The anterior fontanelle

begins to close about the 9th month and is usu¬

ally closed about the 18th. Depression of this fontanelle is one of the evidences of general

debility. Premature closure of the skull is a

cause of epilepsy or idiotism. The vertebral

column is straight, lacking the curves of later life, and is quite flexible, but this flexibility 500

tends to backward, forward or lateral distor¬

tions of the spine, as the result of rickets, in¬

flammation (caries) of the vertebrae, or of sit¬

ting, standing or reclining in strained positions.

Allowing infants (especially feeble ones) to sit, stand or walk too early

tends to produce bow¬

legs and knock knees, as well as spinal deform¬

ities. It is many weeks before a baby can hold up its head. Even by the 12th week it is not properly balanced. It may be at the 16th. The first attempt to sit is about the 16th week, and sitting is accomplished about the 40th. About

the 38th week, the child attempts to stand, and should be able to stand alone by the 11th or 12th month, and to walk unaided by the 15th or 1 7th month. Some children never creep. If they do,

the attempt is made about the ninth month.

The muscles of an infant are soft and not

capable of great effort. Not till after the sixth month are they felt firm and resisting. To

develop them the clothing should be loose, and the child, in a nude state, should at times be allowed free play of them. To swathe the feet and limbs in bandages <(to make the child

straight® is hurtful.

The abdomen and chest (in its lower por¬

tion) are prominent, due to the very large liver, the small pelvis and the distention of the

stomach by food, and to large size of the heart and lungs. All of these organs must have free movement, in order to carry on their important functions. Tight bandaging of chest or abdomen

hampers movement and compresses important

blood vessels. The size and weight of the heart of the new-born explains the rapid growth of

the body and those organs in most direct com¬

munication with the heart, especially the brain.

The small size and the vertical position of the stomach account for the ease with which infants throw up their food when the stomach is dis¬

tended. Repeated acts of vomiting are inju¬

rious. The practice of jolting babies tends to produce vomiting. Each child must be studied

by itself as to its powers of digestion, and what is the proper food for each. The substitution of artificial feeding for maternal nursing and the indiscriminate use of baby foods are responsible for much sickness and many deaths. But nat¬

ural feeding is not always possible, owing to the dictates of fashion or the poor health of mother or child.

The nervous system of infants is very ex¬

citable, especially toward the end of the first year, and is out of proportion with the slow

development of the inhibitory centres. Convul¬

sions and spasmodic affections are therefore

readily produced by various causes, such as un¬

digested food, eruptive fevers, impure air,

fright or excessive heat. Most of the move¬

ments and actions of early infancy are reflex, such as stretching, crowing and sighing, for

example. About the fourth month evidences of

will power appear and gradually increase.

Good habits, as to regular times for feeding,

sleep, etc., can often be inculcated at this early age, or even before, to the advantage of both mother and child. The brain is relatively large at birth and grows rapidly up to the seventh

year, and after that time more slowly.

During this formative period care should

be observed not to excite the brain unduly,

else nervous disorders may result. Repeatedly

urging a young child to (<show off® is, to say the least, very unwise.

The senses of taste and smell seem to be

partially developed at birth. After the third

month the quick closure of the eyes on the

approach of an object seems to indicate the es¬

tablishment of true vision. A very bright light may be appreciated by the second or third day, or may be followed by the eyes, if moved slowly, after the sixth week. It is usually weeks before there are associated movements and convergence

of the eyes. The eyes of the new-born fre¬

quently move independently of each other, pro¬

ducing ˆsquint,® but squinting in the course of a severe disease is a bad sign. As to colors, yellow, red, pure white, gray and black, in the order named, are said to be the first recognized, gradually after the sixth month.

All children are born deaf, but may notice

sharp sounds six hours after birth, though usu¬

ally not until a number of days. Toward the

end of the first year the infant begins to imitate vocal sounds in its attempt to speak.

The circulation of blood is very rapid ; the

blood vessels are large and thin. Congestions,

inflammations and haemorrhages, therefore, are

quite common. The pulse is irritable and

slight causes disturb its rate and sometimes its regularity. The rate in the new-born is 130-140, during the first year 105-150 per minute, during the second 110-120, then gradually di¬

minishes until at the fifth year it is about 90; from the 7th to the 14th year 80-90, and after¬

ward 70-80. The respirations of the new-born

are from 30 to 50 per minute, and at the end of the first year from 25 to 35. The breathing of healthy children is noiseless and through

the nose. The habit of mouth breathing,

usually caused by enlarged tonsils and by ade¬

noid growths, is productive of deafness, change in facial expression and distortion of the chest (pigeon breast). The relatively small size of

the pharynx, larynx and trachea frequently

cause throat affections to be serious ailments

in infants.

The average, temperature of the infant is

100° F.,.but it is. subject to many fluctuations.

It is raised by ingestion of food, struggling, crying,, etc., and lowered by sleep, inactivity and insufficient food. Sponging with cool water or

oiling the skin will frequently lower a high

body temperature, which, if unchecked, might

cause convulsions.

In man there are two sets of teeth. The

first or temporary teeth are 20 in number, 10 in each jaw. The first tooth appears about the

seventh month, the last about the 24th month.

The dangers of dentition are much exaggerated.

Well-nourished children of healthy parents

cut their teeth earlier, easier and more

regularly than do feeble children. If the first tooth is not cut before the 14th month there

is some serious defect. About the sixth year

(and before the temporary teeth are shed) the

jaws contain all the temporary teeth and all the rudimentary permanent teeth except the wisdom

teeth. At birth, when the teeth have not ap¬

peared and in old age when they have disap¬

peared the lower jaw is obtuse. During the

growth of the teeth, the lower jaw increases in depth and length. To admit of these changes,

the temporary as well as the permanent teeth

should be taken care of and filled if need be.

Food requiring mastication should not be given

until there are several teeth. The permanent

teeth are 32 in number, 16 in each jaw. The

first one appears about the sixth year, the last from the 18th to the 24th or later. The thymus gland appears in the new-born, attains its full size by the end of the second year, then gradu¬

ally diminishes until at puberty it has almost dis¬

appeared. It is supposed to be one of the

sources of the red blood corpuscles.

For the first few months of life tears and

perspiration are rare. After three months they

are freer. In rachitic infants perspiration is

often profuse. Up to the end of the first year the sebaceous glands are very active, especially upon the scalp. The saliva and pancreatic juice are small in amount until about the third month and therefore starchy foods cannot safely be

given to young infants. The gastric secretion

at birth can as a rule readily digest the casein of mother's milk, but has difficulty in disposing of other food. Mucus in the infantile intestines is copious, often ferments and may neutralize

the feebly alkaline intestinal juices, and the pan¬

creatic juice and saliva.

Both the small and large intestine are com¬

paratively long, and digestion and peristaltic

action are rapid. These facts, together with the small size of the stomach and the rapid growth of the body, require that the young

baby be fed every two or three hours. The great length of the sigmoid flexure of the colon impedes the

passage of faeces and induces constipation,

which should be relieved by light laxative medi¬

cines or, better still, by change in the diet.

The lymphatic glands are numerous and

large in the infant and the communication be¬

tween them and the general system is more

marked than at any other period of life. They are readily congested and enlarged in affections of the throat, scalp, etc., and in scrofulous and syphilitic ailments.

The average weight of the male new-born

child is 7 lbs. 11 oz. ; of the female 7 lbs. 4 oz.

For the first few days there is a loss in weight, then the weight gradually increases. Generally

it is doubled by the 5th month and trebled by the 12th in breast-fed infants ; in handfed,

later. Usually a healthy child gains 20 lbs. in weight and 10 inches in height in first two years of life; in the third year four pounds and four inches. During next six years there is an an¬

nual increase of four pounds and two or three inches; after the 10th year about eight pounds a year. About the ninth year in girls and the 11th in boys there is a diminution in the

rate of growth, and at puberty (13th year in

girls and 16th in boys) the activity of growth is the greatest. Between 12 and 15 girls grow heavier and taller than boys, but at 15 the boys again lead and maintain it through life.

Growth usually continues to about the. age of

25 in males and there may be a slight increase for 5 or 10 years afterward. Girls usually

attain adult stature at about 21 years. Weight usually increases in the male and frequently in the female to the 50th or 60th year, due to an accumulation of fat.

The Period of Childhood may be said to

extend from the end of the second year to

puberty or youth. By the end of infancy the

anterior fontanelle is closed, the temporary

teeth are cut and the child is beginning to talk and walk, to use judgment and memory and to

display independence. Childhood is character¬

ized by active growth and development of the

body and mind. Arrest of growth and loss of

weight indicate malnutrition. On the other

hand, while a very thin baby is abnormal, a very fat child or youth is, as a rule, one whose nutri¬

tion is at fault, or whose diet is too rich or generous.

The preparation of boys and girls for the

duties and responsibilities of manhood and

womanhood requires especially that their brains, muscles and digestive apparatus shall be strong.

Nerve force must be stored not dissipated and

coddling is wrong. Their nervous systems are

normally very active and sensitive to impres¬

sions, hence nervous disorders and exhaustion

are readily induced by overstimulation of the

brain, through excitement, too much study, *etc.*

Physical and mental training must go together.

A vigorous child is almost constantly in mo¬

tion, either at work or play, and this is as it should be. The same amount of exercise would

exhaust an adult. It is well understood that

systematic muscular exercise besides hardening

the muscles improves the mental strength, that

well-developed children take a higher rank in

school than those of the same age less devel¬

oped. Abundant out-of-door exercise also de¬

velops the co-ordinating power of muscles and

the special senses, induces a greater respiratory range, better oxidation and an increased power

of the heart. Thus nutrition is stimulated and a symmetrical development obtained. And this

is just as necessary for girls as for boys. Chil¬

dren need sleep oftener and longer than adults.

A healthy young baby sleeps nearly two-thirds

of the time and a healthy child of seven will often sleep quietly for 12 hours or more. Dis¬

turbed sleep and sleeping with the mouth open

indicate some nervous gastric or intestinal dis¬

turbance or the presence of enlarged tonsils.

After the first few years of life the special senses seem to acquire an acuteness more

marked than in later life when the perceptions are associated with more complex mental proc¬

esses. Children require much food and the

diet should be nutritious, but overloading the

stomach, especially with sweets and fruit, may

excite general convulsions, vomiting, diarrhoea

and alarming fever. A vigorous, healthy boy

often eats, and may require about as much food as the average man. A variable appetite or the habit of eating mainly one class of foods is

indicative of innutrition. A properly mixed

diet is necessary for health. Sugar (candy,

etc.), valuable in reasonable amount, should

not be eaten in such quantity as to interfere with the appetite for regular meals. Children,

especially those who eat but little sugar, should be taught to eat fat. In childhood the lym¬

phatic system is still active, the glands readily enlarge as the result of irritation or of general disease, especially scrofula. The respiration in early childhood as in infancy is mainly dia¬

phragmatic — the abdomen moves freely. The

temperature normally is about 100° F._ A sud¬

den high temperature is much less significant

than in the adult, so also is an increase in the rapidity of the pulse. Young children lose heat readily from the surface of the body, and are

susceptible therefore to (<taking cold® when in¬

sufficiently clad. The line should be carefully drawn between overdressing and the ˆharden-502

ing® process, and woolen garments except in the hottest weather are advisable.

Owing to the large amount of food con¬

sumed and the detritus resulting from the activ¬

ities of the body — a free discharge of waste by the skin, kidneys and bowels should be facili¬

tated by frequent bathing, the drinking of con¬

siderable pure water and the use of fruit, gra¬

ham bread and green vegetables.

The stomach in children is straighter and

more vertical than in adults, but less so than in infants. Vomiting is still easily produced.

The small intestine is relatively much longer

than in adults, due to the fact that much nour¬

ishment is to be digested.

Children are susceptible to nervous disorders

such as chorea and certain forms of paralysis, and to whooping cough, mumps, measles, infan¬

tile paralysis or poliomyelitis, etc., which last are often classed as <(children's diseases.®

Spinal deformities are readily induced. Cer¬

tain diseases, such as tuberculosis, are likely to affect a large number of organs at the same time. The recuperative power of a normally

healthy child is very great, even in severe dis¬

eases.

The mortality of young children in general

is enormous but decreases with age. It is

greatest among those whose hygienic conditions

are bad, who suffer from poor or insufficient

food, impure air, *etc.* Diphtheria, scarlatina,

measles, croup, pneumonia and intestinal dis¬

orders are the chief causes of death.

The Period of Youth, Adolescence or

Puberty, is that period of life between child¬

hood and maturity; in law, ((that period from

14 in males and 12 in females till 21 years of age.® It occurs earlier in hot climates than in cold, is hastened by luxurious living and habits of idleness and is retarded by severe labor,

hardship, privation and ill health. It is that pe¬

riod when the individual becomes fitted for re¬

production by the development of the sexual or¬

gans. The voice is unsettled, due to a rapid

general enlargement of the laryngeal cartilages

and a lengthening of the vocal cords. Hair ap¬

pears in the pubic region, in the axillae and on the face in the male. In the female particularly, fat is rapidly deposited in the subcutaneous cel¬

lular tissue of the breast and extremities, adding to the comeliness of the form. The function of menstruation is established, preceded in a vary¬

ing degree by headache, backache, physical and

mental lassitude, palpitation, bleeding from the nose, nervous irritability and hysteria. Sexual

maturity is evidenced by awakened sensibilities

toward individuals, of the opposite sex, of at¬

traction, of repulsion or of timidity and shy¬

ness. In youth there is a pronounced develop¬

ment of the limbs, an increase in the size of the chest and a diminution in the size of the head and abdomen. The spine now forms a double

curve, and the pelvis widens especially in the female. Mental faculties mature. A girl be¬

comes a woman earlier than the boy a man.

Inasmuch as the rapid nutritive changes are

prone to be attended by more or less, grave dis¬

turbances of the nervous functions, it is essen¬

tial, in order to have a sound mind in a sound body (that is, health), to carefully regulate

physical and still more, mental exertion. The

habit of self-control must be encouraged, and

exaggerated language discouraged. School du¬

ties should not be imposed beyond, or even up to the limit of, tolerance of the individual, and social functions should not interfere with an

abundance of sleep and outdoor exercise, else

the result will be a wreck of the nervous sys¬

tem, and prolonged nervous and muscular pros¬

tration. Recklessness as to the laws of health are responsible for much of the sickness at this period of life. Purity of thought and action are great safeguards against the temptations which

beset growing youth, which if yielded, to

impair or destroy both mind and body. Animal

impulses are to be subordinated to aspirations

of the mind. The continued fevers such as ty¬

phoid, severe inflammations, as pneumonia and

acute rheumatism, tuberculosis and heart affec¬

tions are the principal diseases of youth. Scar¬

let fever, measles and other eruptive diseases

may affect the individual, but not commonly.

Alcoholism is a dangerous condition, easily

acquired. Neurotic conditions, especially in the female, too frequently occur.

The Period of Maturity begins at about the

end of the 21st year, and exten s in men to about the 60th, when the

power of reproduction wanes, and in women to about 40 or 45, when

the menopause occurs ; the breasts and repro¬

ductive organs diminish and ovulation ceases.

In women, at this time (as in the onset of pu¬

berty), the organic functions may be irregular; dyspepsia, palpitation, sweating, vertigo, neu¬

ralgia, irritability and melancholy may occur.

The ((change of life® is in reality therefore at¬

tended with a severe nervous shock. Manhood

and womanhood begin when the individual has

reached the full stature, when the skeleton is firmly ossified, the jaw is square, the chest fully expanded, and the limbs well developed. Grad¬

ually from this time onward in most instances, fat begins to accumulate, especially upon the

abdomen, toward the end of maturity.

Popularly it is believed that man is in the

<(prime. of life® from 35 to 50, but there are many instances of farmers, professional and

business men and women being successful and

at active work and in good health at 60 or more.

The fact is, that the ability to do hard work, mental or physical, at an advanced age, depends upon habits of industry and method, and upon

the care of the health which have been incul¬

cated in earlier life and are continued into and through adult life.

Gradually as adult life advances, the inclina¬

tion and sometimes the power for active exer¬

cise fails. These are evils to be guarded against.

Outdoor games, horse-back riding, and vigor¬

ous walking, for example, may be pursued ad¬

vantageously as a rule to 45 or 50 years of age.

At about this time degenerative changes occur

in the body and care is necessary that the heart and blood vessels be not overstrained. During

the prime of life the body enjoys a maximum

of vigor and power of endurance, and there is reason to believe that this is also true of the mind. But the self-consciousness of power that

the individual possesses is frequently a menace, for it induces him to struggle for wealth or

fame in the turmoil and bustle of modern life, to neglect recreation, to resort to alcoholics and other stimulants to keep up his energy, and to indulge in general high living. It is especially true at this time of life that no one should work up to the full measure of his ability. Such

work is dangerous and has been responsible for the ˆbreaking down® of the health and the death of many otherwise intelligent persons. The

principal diseases of adult life are alcoholism, gout, cancer, urinary and venereal diseases,

rheumatism, pneumonia, tuberculosis, affections

of the brain and nervous system, of the heart and blood vessels and of

the digestive system.

The Period of Old Age or Senility usually

commences about the 60th year and is charac¬

terized by a waning of the vital powers and by atrophic and degenerative changes, the natural

consequences of decay. While death frequently

results from local accidents of the brain and

nervous system (apoplexy, sclerosis, etc.) and

of the heart, blood vessels and urinary organs irredeemably damaged in the course of decay,

it is normally but the ending of a natural life, and not a pathological fact as in earlier life.

The stature of the old is less, the shoulders rounded, bones are more fragile, the cartilages are hardened, the lower jaw resembles that of

the infant, the chin is prominent, the skin is wrinkled owing to the absorption of fat, and

loses its elasticity, the teeth decay and fall out, urination is frequently difficult, the respirations and heart beats are reduced in frequency, the

arteries have a tendency to ossify, the veins to dilate. The muscles fail in their tension, the voice becomes a <(childish treble,® the digestion is weakened, the eye no longer sees clearly and hearing is dulled. The mind may preserve its

freshness for a long time. Usually the senses

fail first, next the faculties of memory, reason and volition. Toward the close of life the

organic or vegetative phenomena prevail. The

natural death occurs when the breath becomes

fainter and fainter and the heart beats are

weaker and fitful — and then gradually cease.

Old people require an abundance of sleep.

They need also to be kept warm, for heat is

generated in them in smaller amount than in

robust health. Hence they are easily chilled.

Food should be plain, largely liquid and that

most easily digested. Exercise in the open

air every day is desirable but it should be gentle in character. With these precautions old age

may be made comfortable. See Adolescence;

Child Study; Children, Diseases of; Old

Age, Diseases of.

GRUB, the larva of an insect, especially of

a beetle or fly. In reference to cattle it usually means the maggot of a flesh-fly or warble. See Bot-fly; Larva.

GRUB STREET, London, an old street

near Moorfields, now known as Milton street,

which was formerly inhabited by literary hack¬

writers. The adjective ((grubstreet® has come

to be applied, since the 17th century, as a term of disparagement to all sorts of needy and

uninspired litterateurs.

GRUBB, Sir Howard, Irish optician and

telescope-maker: b. Dublin, 28 July 1844. The

largest telescope of his construction is the 27-inch of the Vienna Observatory. He was the

first to suggest a movable floor for an observ¬

atory dome, which has been adopted in the

dome of the great 36-inch telescope of the Lick Observatorv. He was knighted in 1887, and

since 1913 has been scientific adviser to the

Commissioners of Irish Lights.

GRUBB, Thomas, Irish inventor of astro¬

nomical instruments: b. Kilkenny, Ireland, 1800; d. 1878. Among his principal inventions were

the Melbourne Observatory reflector for

photographing the moon, and various telescopes

at the leading observatories. Greenwich Ob¬

servatory uses several of his instruments. In

1864 Grubb was elected Fellow of the Royal

Society ; in 1870 of the Royal Astronomical So¬

ciety; and he was also a member of the Royal Irish Society. His publications ha re appeared

in the journals of these organizations.

GRUBEL, Johann Konrad, German poet :

b. Nuremberg, 3 June 1736; d. there, 8 March

1809. He was a saddler and harness—

maker, and passed his youth in privation; but

he possessed genuine poetic gifts, as shown in the pictures he has given of the lives and man¬

ners of his countrymen in the three volumes of (Poems in the Nuremberg Dialect5 (1802). An¬

other volume appeared in 1808.

GRUBER, Hermann, Austrian clergyman

and author: b. Kuf stein, Austrian Tyrol, 5

Feb. 1851. He was educated in the State Gym¬

nasium and Stella Matutina College, Feldkirch,

and at Jesuit scholasticates in Germany, Hol¬

land, Austria and England. In 1868 he entered

the Society of Jesus, was professor at Feld¬

kirch in 1874-76 and was ordained to the priest¬

hood in 1879. In 1881 he was appointed pro¬

fessor of philosophy in the Jesuit scholasticate at Lyons, which in that year was removed to

Mold, Cheshire, England. From 1882 to 1899

he was employed in parochial and literary work in Belgium, Germany, Austria, and in 1899 was

stationed at Stella Matutina College, Feld¬

kirch. In 1896-97 he was one of the chief

instruments in bringing about the exposure of

Leo Taxil. He is an ardent opponent of free¬

masonry and compiled reports for the Anti—

masonic Congress at Paris in 1909. His publi¬

cations include (Auguste Comte, Begriinder

des Positivismus> (1889; French trans. 1891;

Italian, 1893; Polish, 1898) ; (Der Positivismus>

(1891; French trans. 1893; Italian, 1896); (Leo Taxils Palladismus-Roman) (3 parts, 1897-98) ;

(Betrug als Ende eines Betrugs) (1897) ;

(Einigungsbestrebungen und innere Kampfe in

der deutschen Freimauerei seit 1866) (1898) ;

(Mazzini, Freimauerei und Weltrevolution>

(1901; Italian trans. 1902). He contributed to

Herder, <Kirchenlexikon) ; (Staatslexikon der

Gorres-Gesellschaft5 and the (Catholic Ency¬

clopedia^ *etc.*

GRUBER, gr<?‘ber, Johann Gottfried, Ger¬

man author : b. Naumburg, on the Saale, 29 Nov.

1774; d. 7 Aug. 1851. He studied at Leipzig,

and in 1811 was appointed professor at the Uni¬

versity of Wittenberg, and in 1815 professor of philosophy at Halle. His chief work was that

of editing, first with Ersch, and after his death, alone, the first section of the (Universal. Ency¬

clopaedia^ His independent works include

(Herder’s Characteristic5 (1805) ; (History of the Human Race5

(1805) ; and Lives of Wieland (1815-16), and Klopstock (1832) ; he also edited (Wieland's Complete Works5 (1818-28).

GRUGRU, the grub or larva of Calandra

Palmarum, an insect of the family Rhynco—

phorae, inhabiting Guiana and other tropical

parts of America. The fully developed insect

reaches a length of about an inch and a half.

The grub is of grayish white about two inches long and onehalf inch in diameter and makes

its home in the Cabbage Palm, feeding on the

soft parts. It is a choice morsel of food for both Indians and whites and is prepared by

roasting. To procure them it is necessary for

a man to climb the palm and cut them out of the wood near the crown of the tree.

GRUGRU PALM NUT, th e nut of cer¬

tain West Indian and South American palms

{Acrocomia lasiopatha and A. sclerocarpa) .

The nut is not much larger than an apricot and contains a hard pith and an edible pulp. Oil

is extracted from the piths and is known com¬

mercially as Mocaya oil.

GRUld, groo'ich, Sava, Serbian statesman :

b. Kolare, 1840. He fought during the Serbian

War with Turkey (1876), and rose to be Min¬

ister of War during the Russo-Turkish War of

1877. He also acted as first Serbian Minister

to Bulgaria in the same year ; after which he returned to Belgrade and played an important

role in the politics of his country. Gruic was repeatedly elected to the office of Premier, was Ambassador at Constantinople (1889-93 and

1900-03), and again Premier (1903-04). The

formation of the Balkan alliance called forth

his best diplomatic efforts.

GRUMBKOW, gromp'ko, Friederich Wil¬

helm von, Prussian general: b. Berlin, 1678;

d. 1739. After studying at Utrecht and Leyden, he entered the military and diolomatic service

and rose to be head of the War Department of Prussia under Frederick William I. His

vigorous internal policies did much to strengthen the status of the army and the civil govern¬

ment.

GRUMENTUM, Italy, an ancient Luca—

nian town, 33 miles south of Potentia. It was situated according to Holste on the right bank of the Agri River, onehalf mile south of Saponara. On this site were discovered ruins of an amphitheatre, a theatre, thermae and a portico, dating from the 1st century b.c. Historically

Grumentum is interesting as the scene of the

defeat of Hanno, the Carthaginian general (215

b.c.) and as the headquarters of Hannibal (207

b.c.) . Later, a Roman colony settled there,

probably in the time of Sulla.

GRUN, Hans Baldung. See Baldung,

Hans.

GRUNBERG, Germany, capital of the

circle of Griinberg in the Prussian province of Silesia; on a tributary of the Oder, 15 miles east of Giessen. It is surrounded by vineyards, and large quantities of wine are made here and in the vicinity. There are manufactories of

cloth, thread, carpets, glass, rope, twine, paper, brandy, machinery, bridge materials. Lignite is

mined in the district. Pop. 23,168.

GRUND, gront, Franz Friedrich Alexan¬

der, German engineer : b. Heinrichau, Silesia,

1814; d. 1892. He studied at Breslau and Ber¬

lin, and then entered the government engineer¬

ing service. He was first appointed as inspector of hydraulic engineering in the Rhine Province ; and then became a member of the

Prussian

Ministry in the capacity of advisory counsellor.

Among his principal achievements are the plans

for the canal connecting the Rhine and the

Meuse, the harbors at Emmerich, at Oberlahn—

stein, and the widening of the harbor at the

confluence of the Ruhr and the Rhine.

GRUNDTVIG, groont'vig, Nikolai Fred¬

eric Severin, Danish theologian, historian and

poet: b. Udby, island of Seeland, 8 Sept. 1783; d. Copenhagen, 2 Sept. 1872. He was educated

at the University of Copenhagen, and in 1822

went to Copenhagen as chaplain. He made a

fierce attack on the rationalism of the time in his (The Answer of the Church> (1825), a re¬

ply to Professor Clausen, and for the violent

expression of opinion in this work was severely censured and resigned his position. For a time he devoted himself to literary work, and

through his writings exercised a great influence on the religious and political thought of Den¬

mark. In 1839 he became pastor at the hospital church of Vartow, Copenhagen, and held that

position till his death, being made a bishop in 1861. He was for a time a member of the Dan¬

ish diet, and took an active part against Ger¬

many and German influence. His most im¬

portant work is (Northern Mythology* ; he also wrote a number of poems, among them some

very popular national songs, and translated

(Beowulf.)

GRUNDTVIG, Svend Hersleb, .Danish

philologist: b. Copenhagen, 9 Sept. 1824; d.

there, 14 July 1883. He was the son of the

preceding, and like his father, became very

much interested in the study of the folk lore and language of his native country. He taught

at the University of Copenhagen in 1863, and

three years later succeeded to the chair of Scan¬

dinavian philology there. He translated Eng¬

lish and Scottish ballads (1842-46), but his

greatest contribution to literature was his (Danmarks gamle Folkeviser* (1853T83).

GRUNDY, Felix, American jurist: b.

Berkeley County, Va., 11 Sept. 1777; d. Nash¬

ville, Tenn., 19 Dec. 1840. Studying law he was admitted to practice in 1798, and soon acquired a high reputation as an advocate in criminal

cases. He was a member of the Tennessee leg¬

islature 1799—1806, and in the latter year was appointed one of the judges of the supreme

court of errors and appeals. In 1811 he was

elected representative to Congress, and re¬

elected in 1813. In 1829, and again in 1833, he was elected to the Senate of the United Stales, where he was among the most prominent of

the supporters of President Jackson. In 1838

President Van Buren appointed him Attorney-General of the United States; but in 1840 he

resigned that office, and was reelected to the Senate.

GRUNDY, Sydney, English dramatist: b.

Manchester, 23 March 1848; d. 4 July 1914. He was called to the bar in 1869 and practised till 1876, but afterward became known at home, and

in the United States, as a successful playwright.

GRUNDY, Mrs., a personage constantly

appealed to in the phrase, (But what will Mrs.

Grundy say?* in Morton's play, < Speed the

Plough* (1800), but who never appears among

the dramatis persona ?. The phrase has now

come to stand for the judgment of society in

general upon actions or conduct.

GRUNER, groo'ner, Justus von, Prussian

politician: b. Osnabruck, 1777; d. 1820. After

studying law at Holland and Gottingen, he be¬

came president of the police department at

Berlin. The efficient service which he rendered there won for him the appointment of head of

the entire police force of Prussia. He resigned after the Franco-Prussian Alliance was made

and went to Prague where he organized the

national defense system of Germany. He was

governor-general of Berg in 1814; chief of

police at Paris during the allies' occupation,

and Prussian ambassador to Switzerland from

1816 until his death.

GRUNER, Wilhelm Heinrich, German

engraver : b. Dresden, 1801 ; d. there, 1882. He studied under Klingen and Kruger at Dresden

and under Longhi and Anderloni at Milan. He

spent several years at Rome (1837-41) and at

London (1842-56). On his return to Dresden

he became director of the Cabinet of Engrav¬

ing, which office he held until his death.

His principal engravings consist of those after the mosaics of the Chigi Chapel (1839) ; deco¬

rations of the Garden Pavilion of Buckingham

Palace) (1846) ; and (Specimens of Ornamental

Art* (1850); (Cathedral of Orvieto* (1858);

<Luini's Decorations of Santa Maria delle

Grazie, Milan > (1859-60) ; (Das grime Gewolbe

zu Dresden > (1862) ; (Terra-Cotta Architecture of Northern Italy) (1867) ; and several separate engravings after Raphael and Overbeck.

GRUNEWALD, Matthaus, German painter:

b. probably in Frankfort; settled in Aschaffenburg, where he was employed by the Archbishop

Albrecht of Mayence. He seems to have died

about the year 1530, and to have been, after

Diirer and Holbein, the greatest German painter of the period, though but little of his life is known. His most important work is an altarpiece of six panels, which was executed for the church of Saint Maurice and Mary Magdalene

at Halle, but afterwards transferred to the

church of Saints Peter and Alexander at

Aschaffenburg. It is now in the Munich Gal¬

lery. The centre picture represents the don—

version of Saint Maurice by Saint Erasmus) ;

and the wings contain the figures of Saint

Lazarus, Saint Mar}" Magdalene, Saint Martha,

Saint Chrysostom and Saint Valentinian.

There is another work in the church of Our

Lady at Halle, of which the centre picture, rep¬

resenting the (Virgin in Glory,) the inner sides, and perhaps the outer sides, are assigned to

Griinewald. A (Rosary } in the chapel of

Saint Anthony in the cathedral of Bamberg,

and the wings of altarpieces at Heilsbronn, in Franconia, and at Annaberg, Saxony, are also

assigned to this master.

GRUNHAGEN, Kolmar, German his¬

torian: b. Trebmitz, 1828; d. 1911. He studied at Jena, Berlin and Breslau. In 1855 he taught history at Breslau ; from 1866-1901 was pro¬

fessor there and was in charge of the govern¬

mental archives for a number of years. His

publications include (Breslau miter den Piasten als deutsches Gemeinwesen) (1861) ; (Friedrich

der Grosse und die Breslauer, 1 740—41 > (1864) ; (Die Hussiten Kampfe der Schlesier) (1872);

(‘Geschichte Schlesiens) (1884-86) ; (Schlesien

unter Friedrich dem Grossen) (1890-92).

GRUNT, or CROAKER, a drumfish (q.v.).

GRUPPE, groop’pe, Otto Friedrich, Ger¬

man scholar: b. Danzig, 1804; d. 1876. He re¬

ceived his education at Berlin and then fol¬

lowed the profession of journalist. In 1835 he became editor of the Preussische Staatszeitung

and in 1842 became a member of the Ministry

of Education. Two years later he succeeded

to a chair of philosophy at Berlin. Besides

several philosophical works <Antaus) (1831) ;

(Wendepunkt der Philosophic in 19ten Jahr—

hunderP (1834) ; (Gegenwart und Zukunft der

Philosophic in Deutschland* (1855) he is the

author also of classical studies: <Ariadne)

(1834) ; (Die romische Elegie) (1838) ; <Minos) (1859); and (/2Eakus) (1872); and several po¬

etical, dramatic and critical works.

GRUSCHA, groo'sha, Anton Joseph, Ro¬

man Catholic prelate : b. Vienna, 1820; d. 1911.

He was ordained in 1843 and eight years later became professor of religion in the Theresi-anum. He was preacher at Saint Stephen's

(Vienna) in 1855; Privy Chamberlain to the

Pope (1858) ; canon of Saint Stephen's (1871) ; Apostolic Field Vicar of the Army and Bishop

in partibus of Karrha (1878) ; and eventually

became Archbishop of Vienna (1890) and

Cardinal in the following year. He published

(Handbuch der katholischen Religionslehre fur

hohere Lehranstalten* (1851).

GRUSON, groo'son, Hermann, German

inventor and manufacturer : b. Magdeburg,

13 March 1821; d. 1895. He studied at Berlin; became chief engineer of the Wohlert machine

shops in Berlin in 1851, and in 1854 went to Buckau as director of the Hamburg-Mecklenburg steamship company. There he estab¬

lished a shipyard of his own and built a

small iron foundry, where he invented a

process of chilled cast iron, which was

much used in the manufacture of machin¬

ery, as well as for armor. His establishment

consequently grew rapidly, and in 1886 was in¬

corporated, manufacturing armor for most of

the states of Europe. Gruson was manager of

the company until July 1891, when he retired

and devoted himself mostly to study and ex¬

periments in physics. In 1*893 the works were

sold to Krupp.

GRUTER, gru'ter, or, GRUYTERE, Jan,

Belgian scholar: b. Antwerp, 1560; d. Heidel¬ berg. 1627. He was educated at Cambridge and Leyden and became professor of history at Heidelberg in 1592. As librarian at that uni¬ versity he was in charge of the Palatine col¬ lection of books, which were removed to Rome to avoid destruction when the city was be¬ sieged b.y Tilly (1622). His publications in¬ clude (Lampas sive Fax Artium Liberalium* (16th century essays, 7 vols., Frankfort 1602— 34) ; Hnscriptiones Antiquse Totius Orbis RomanorunP (2 vols., Heidelberg 1603, and again 7 vols., 1707, with an index by Joseph Scaliger).

GRUTLI, or RUTLI, Switzerland, a tract of meadow land in Canton Uri, on the western shore of the Lake of Uri. It is famous as the place where the revolt against Austria was first planned. It is preserved as a national park and contains a monument erected in 1884 to honor the event of Switzerland's emancipation.

GRUTZNER, griits'ner, Eduard, German painter ; b. Gross Karlowitz, Schlesien, Ger¬ many, 26 May 1846. He began the study of

art without a master, and his talent having been recognized by the architect, Hirschberg, he was taken by the latter to Munich 1864. He was

there admitted to the school of Piloty. He

first appeared before the public as a humorous painter, Shakespeare's Falstaff being his favor¬

ite subject. He is, however, known all over the 506

world for his pictures of monks, in the cellar, tailor's shop, kitchen, *etc.* Well-known also is his (Mephistopheles Behind the Scenes in the

Dressing Room of a Ballet Dancer. > Other

works of note are (The Drinker and the Devil, >

(Convent Peace) and (Don Quixote) in the

Pinakotheck; (The Convent Library,* at Dres¬

den; (The Convent Kitchen,* at Konigsberg,

and series of cartoons entitled (Falstaffiade,*

in the Breslau and other museums.

GRUYERE, grii-yar', Switzerland, district

of Canton Fribourg in the Sarine valley. The

capital is Bulle, which contains an interesting old castle, dating from the 13th century. The

principal industries are cattle raising, agricul¬

ture and cheesemaking. Pop. of Bulle, 3,500;

of district, about 25,000.

GRUYˆRES, Switzerland, a town in the

district of Gruyere, 16 miles southwest of Fri¬

bourg, on the left bank of the Sarine. It was the seat of the counts of Gruyere, whose old

castle, dating from the 10th century, still stands.

Pop. 1,500.

GRYLLIDiE, gril'i-de, a family, the crick¬

ets, of saltatorial orthopterous insects, distin¬

guished from the grasshoppers and locusts by

the fact that the tarsi are three-jointed and the ovipositor, when exserted, is spear-shaped ; the wings, when present, fit closely to the body.

The family includes three types: (1) the true

crickets, such as the common field cricket, or the hearth cricket of Europe, which are of the genus Gryllus ; (2) the burrowing, curiously

modified mole-crickets (q.v.) ; (3) the tree-crickets, pale-colored nocturnal forms, which

lay their eggs in the twigs of different plants and which sometimes are so abundant that by

their egg-laying alone they do considerable dam¬

age to vineyards and to raspberry and black¬

berry plantations. The black field-crickets, of

which the commonest American species is

Anabrus simplex, inhabit burrows in the ground

and come abroad to feed on grass and herbage

at night and sometimes in daylight. They de¬

posit eggs in the ground in the autumn, but

these do not hatch until the following spring.

GRYPHIUS, Andreas (Greif), German

poet: b. Grossglogau, Silesia, 11 Oct. 1616; d.

16 July 1664. He was left an orphan at an

early age and received his classical training

at Fraustadt. He became tutor in the family

of the jurist, Georg von Schonborn, who recog¬

nized Gryphius' talents, conferred on him the

diploma of master of philosophy and a patent

of nobility. After his patron's death, in 1637, Gryphius went to continue his studies at Leyden, where he remained until 1643. He traveled

throughout Europe until 1647 when he settled

at Fraustadt. Here he began his dramatic

work and in 1650 was made syndic of Glogau.

His comedies (Absurda Comica, oder Herr

Peter Squentz) (J663) ; (Die Geliebte Dorn—

rose* (1660) are his best works. He also wrote five tragedies: (Leo Armenius) (1646) ; Car¬

olus Stuardus) (1649) ; (Katharine von Geor—

gien) (1657) ; (Cardenio und Celinde* (1657) ; <Papinianus) (1663). He also wrote several

lyrics which reflect the melancholy of his early years. Consult Mannheimer, V., (Die Lyrik

des Andreas Gryphius) (Berlin 1904) and

Hermann, J., (Uber Andreas Gryphius) (Leip¬

zig 1851).

GRYPHON. See Griffin.

GUACHARO, gwa-cha'ro, OIL BIRD, or

FAT BIRD, a remarkable South American bird

(Steatornis Caripensis) , the only surviving

member of the Steatornithidae. They are noc¬

turnal in habits, have a strong bill and are

frugivorous. They are about as large as the

crow and closely resemble the nightjars in

plumage, which is brownish gray with small

black streaks and dots. They spend the day

in deep and dark caverns, where great numbers

congregate and make their nests. Humboldt

gives an interesting account in his (Personal

Narrative* of a visit to the great Guacharo

cavern in the valley of Caripe, near Cumana.

This cavern is visited once a year for the sake of the fat of the young birds, which soon after being hatched become almost a mass of fat,

and which are slaughtered in great numbers,

and their fat melted and stored for use as

butter or oil. The clarified fat is half liquid, transparent, inodorous and

will keep for a year without becoming rancid. Consult Newton,

dictionary of Birds) (New York 1893-96).

GUADALAJARA, gwa-da-la-ha'ra, Mex¬

ico, capital of the State of Jalisco, and second only in population and importance to the city

of Mexico, from which it is 380 miles distant by the line of the Mexican Central Railway.

Its altitude above sea-level is 3,600 feet. The city possesses a great advantage in the nearby Falls of Juanacatlan which supply electric

power for its industries, street railway and

lighting. In recent years Guadalajara has be¬

come a very important mining centre or head¬

quarters for a district in which are many valu¬

able properties, now being developed. Guada¬

lajara is noted for its beautiful pottery and

skillfully wrought <(retratos** or figures in clay, and its drawn work. In the immediate vicinity

is an inexhaustible deposit of clay the elastic qualities and pleasing color of which especially adapt it to the two purposes first above men¬

tioned. Among other industries are manufac¬

tories of cotton goods, twine and cordage, paper and leather articles. The hospitals include a

Civil Hospital for both sexes, a Military Hos¬

pital, the Hospital of the Sacred Heart, for

women, the Hospital Guadalupano, also for

women, and the Beata Margarita Hospital and

Santissimo Trinidad Hospital for men. The

city's educational facilities include a college of law, a college of medicine, a normal school, a young ladies' seminary, a lyceum, a high school, and a number of primary schools. The cathe¬

dral, or most notable church of the city, is one of the grandest in the Republic, architecturally and in its dimensions, decorations and ornamen¬

tation. The penitentiary of the state, an im¬

posing structure, is located here, as also the various other public institutions. Located in

the city are two public libraries, — the State Library, with over 50,000 volumes, — and the

Seminary Library of 24,000 volumes ; an Indus¬

trial Museum, a theatre, and the Governor's

Palace. The principal public parks, some of

which are exceptionally beautiful, are the

Alameda, Plaza de Armas, Botanical Garden,

Alcalde Park and the Calzada de San Pedro.

The banking facilities are supplied by the Bank of Jalisco, the Guadalajara Banking Company,

and branches or agencies of the National Bank, and the Bank of London and Mexico, of

Mexico City ; the Bank of Aguascalientes, and

the Central Bank, of Mexico City. Pop. 119,-

468.

GUADALAJARA, Spain, capital of the

province of the same name, 35 miles east north¬

east of Madrid on the Madrid Saragossa Rail¬

way. It is on the left bank of the Henares

River. It is a very old town, datine from

Roman times, when it was known as Orriaca

or Caraca. A Roman bridge and aqueduct still

survive. Other interesting ancient structures

are the palaces of the Mendozas ; their

mausoleum ; several churches, including the

famous old one of San Franciso, and the town

and provincial halls. There is also a college

of engineers, housed in a building erected in the 18th century by Philip V for a cloth factory.

Guadalajara was captured by the Moors in 714

but was retaken by Castile in 1081. The chief industries are the manufacture of woolen goods, bricks, soap and leather. Trading is carried on in salt and agricultural products. Pop. of

the district, 214,141 ; of the town, 12,250.

guadalcAzar, gwa-dal-ka'sar, Mexico,

a town in San Luis Potosi province, 45 miles

northeast of San Luis Potose. It is the

centre of a quicksilver mining district. Pop.

7,500.

GUADALQUIVIR, ga”dal-ke’ver, Spain, a

river of the southern part, second in im¬

portance to the Ebro. It takes its rise between the Sierra de Cazorla and Sierra del Pozo in

the eastern part of the province of Jaen, at a height of 4,475 feet above sea-level. It flows southwest, and is joined by the Guadianamenor

and Guadalimar, and later by the Jenil. After

a course of about 355 miles it empties into the Atlantic Ocean. It drains a wide level area

for the most part. Two islands, Isla Mayor

and Isla Menor are located in the river below Seville. At its mouth are the great marshes,

Las Marismas. The full stream of the river

continues at all seasons, the supply coming

from the winter rains and, in the summer, from the melting snows from the Sierra Nevadas.

There are numerous towns along its course, and the two important cities of Cordova and Seville.

It is navigable as far as Seville to ships of 1,200 tons.

GUADALOUPE-HIDALGO, ga-da-loo’-

pa-e-dal’-go, a town in the federal district of the United States of Mexico, three miles north of the city of Mexico. The treaty of peace

be¬

tween the United States and Mexico was signed

here 2 Feb. 1848.

GUADALUPE-HIDALGO, Treaty of,

2 Feb. 1848; the treaty which closed the Mexi¬

can War. While the war was in progress, Polk

sent Nicholas P. Trist of Virginia, then chief clerk of the State Department, to negotiate a

treaty of peace; the conditions to include the cession of Upper and Lower California and

New Mexico and the Rio Grande for boundary

between Mexico and the United States. Trist

went to Scott's headquarters, an armistice was

arranged, and in August 1847 the three Mexi¬

can commissioners and Trist met and exchanged

proposals. The former would not yield to such

terms, demanded the Nueces as the boundary

(giving them Corpus Christi and a large tri¬

angle at the south), and offered much less

other territory. T rist was recalled, but re¬

mained at headquarters; Santa Anna declared

that he was tricked in the proposals, war opera¬

tions went on, and the city of Mexico was

captured not long after. In January 1847

negotiations were resumed, Trist still acting as principal, and the treaty above was agreed on.

The Senate, however, refused to accept it, and insisted on harsher terms; Mexico was forced

to accept them, and the Senate ratified the

treaty 10 March. Formal proclamation was

made 4 July 1848. The land cession was of

Upper California and New Mexico, and the

Rio Grande was made the boundary. The

United States paid Mexico $15,000,000, and

assumed $3,250,000 pf claims made by United

States citizens against Mexico prior to the

treaty, besides any claims to which under the

conventions of 1839 and 1843 Mexico was ad¬

judged liable. Of the 252 claims put in under this treaty, 182 were finally allowed. See

Mexican War.

GUADALUPE RIVER, Texas. Its source

is in Kerr County, whence it flows in a south¬

easterly direction into San Antonio Bay. It is joined by the San

Antonio River about 20

miles from its mouth, where it also divides.

The total length is about 250 miles. The prin¬

cipal towns along its banks are New Braunfels, Seguin, Gonzales, Cuero and Victoria, which

marks the extent of the river's navigability to steamers.

GUADELOUPE, ga-da-loop' (Fr. gwad—

loop), West Indies, an island (or twin-islands, strictly speaking) of the inner chain of the

Caribbees. (See Antilles). It lies in lat. 15°

N. and long. 61° W. and, with its dependencies, has an area of 688 square miles. A strait

divides it into two parts, called Basse-Terre and GrandeTerre. The former is very mountain¬

ous, and its volcanic character was manifested

most impressively by the eruption of La

Soufriere in 1797 and the disastrous earth¬

quake in 1843. The eastern division, or GrandeTerre, on the contrary, is a calcareous plain, which at no point attains an elevation of more than 450 feet. The mean temperature of

Guadeloupe is 78° F., the maximum being 101°

and the minimum 61°. Of the total area 32

per cent is under cultivation. The cultivated

portion is divided among the important crops as follows : Sugar cane, 49 per cent ; provisions for local consumption, 28 per cent; coffee, lO1/^

per cent; cocoa, 7 per cent; and the remaining S]/2 per cent is given over to vanilla, lime trees, *etc.* The soil is fertile, and the rain fall is usually sufficient for the needs of the crops.

The dependencies referred to above are the ad¬

jacent islands Marie Galante, Les Saintes,

Desirade, Saint Barthelmy and Saint Martin.

The chief products are sugar, coffee of the fin¬

est quality, rum, vanilla and cocoa. In 1917

the total trade of Guadeloupe amounted to $17,-

000,000 an increase of 94 per cent over 1912, and 31 per cent over 1916; the value of the exports was $9,454,550; imports from the United States

amounted to $7,625,662, the chief items being,

flour, rice, breadstuffs, fish, oil, vegetables, cement, fertilizers, *etc.* Revenues approximate

$934,000 (or 4,670,290 francs in the local bud¬

get of 1915) ; expenditures, including the ap¬

propriations made by France from time to

time, are somewhat in excess of that sum.

Guadeloupe is a department of France, repre¬

sented in the French chambers by one senator

and two deputies.- Its local interests are di-

rected by a governor and a general legislative assembly of 30 members. There are 114 ele¬

mentary schools, with 14,226 pupils, one lycee, with 301 pupils and a secondary school for

girls, with 130 pupils (statistics of 1913-14).

The chief seaport, Pointe-a-Pitre (22,664 in¬

habitants), is situated on the eastern side of Basse-Terre. Several times its buildings have

been destroyed or severely damaged by earth¬

quakes. Le Moule, the principal town of

GrandeTerre, resembles Pointe-a-Pitre in size

and situation. There is a fortnightlv passenger service between France and Colon, Panama, the

steamers of this service call on the outward and homeward voyages at the ports of Basse-Terre

and Pointe-a-Pitre. A small steamer also

makes monthly trips between Martinique,

Guadeloupe, Saint Thomas, Porto Rico, Haiti

and Santo Domingo. There is also a fort¬

nightly service between Gaudaloupe and New

York. There is a wireless telegraph station at Pointe-a-Pitre. After the discovery, Gaudeloupe belonged to Spain until 1635 ; in that

year it was taken by the French; in 1794 Eng¬

land seized it, freed the slaves, and retained possession until 1802 ; then it passed again into French hands, together with Martinique, Eng¬

land taking Saint Lucia in exchange; the

restoration of slavery by the French was re¬

sisted by the negroes, and was attended with

great suffering and loss of life; for a brief period in 1810 England once more held Guade¬

loupe, but returned it to France; emancipation

was declared in 1848. Total population 212,-

430 (3,460 French born and 12,306 foreigners).

Consult <Annuaire de la Gaudeloupe et

Dependences5 (Basse-Terre).

GUADET, gwa'da', Marguerite Elie,

French revolutionist: b. Saint Lmilion, 20 July 1758; d. Bordeaux, 1794. He studied law and

in 1790 became administrator of the Gironde

and was appointed to the Legislative Assembly

in the following year, representing the Giron¬

dists. A staunch supporter of the constitution

of that year, he opposed all measures attack¬

ing it, and through his vehement espousal of

the Girondist cause came to be president of

the assembly. While he was serving in this

capacity, the uprising of the 10th of August

occurred. Guadet was reelected to the con¬

vention of 1792, and cast his vote at the trial of Louis XVI for an appeal to the people and the death sentence. When the Girondist party

was overthrown, Guadet's career came to an

end. He managed to evade the warrant issued

for his arrest for a time, but was finally

captured at his hiding place at Saint fimilion and guillotined at Bordeaux. Consult Guadet,

J., (Les Girondins5 (Paris 1889).

GUADIANA, gwa-the-a'na, a river of Spain

and Portugal, which rises in the plateau of New Castile, flows first northwest, then circuitously southwest into and across Estremadura, and on

reaching Badajoz turns southwest and forms

part of the boundary between Spain and Portu¬

gal. Entering Portugal it flows past Monsaraz,

Moura, and Serpa, to Mertola, again forms the

boundary between the two kingdoms, and falls

into the Atlantic between Castro Marim on the

Portuguese, and Ayamonte on the Spanish side.

Its course is about 515 miles, of which only 35

are navigable. Its chief tributaries are the

Gigiiela, Bullaque, Valdehornos and Rubial on

the right, and the Azuel and Jabalon on the left.

GUADIX, ga-des', Spain, a city on the river

of the same name in the province of Granada

35 miles northeast of Granada. There is an

interesting old Moorish castle and a cathedral.

Guadix is also the seat of a bishop. The chief industries are the manufacture of brandy, pot¬

tery, building materials, hemp and hats ; and

trade in cotton and corn. Pop. about 14,000.

GUADUAS, ga-doo'as, Colombia, city in

the department of Cundinamarca, 53 miles

northwest of Bogota. The town dates from

the early 17th century, when a mission was es¬

tablished1 there by a monk. The principal

manufactures are leather goods and hats.

Coffee, sugar and asphalt are produced in the

neighborhood. Pop. about 9,000, chiefly In¬

dians or half-breeds.

GUAGUA, gwa'gwa, Philippines, a pueblo

of the province of Pampanga, island of Luzon,

on one of the main channels of the Pampanga

delta, three miles southwest of Bacolor. It is the port for Bacolor, has steamboat communi¬

cation with Manila, and has an extensive busi¬

ness in groceries and drugs. Pop. 11,028.

GUAIACOL, a distillate of the creosote of

beechwood, also known as Methyl Pyrocatechin.

It contains about 75 per cent of creosote, for which it is much used as a substitute for the treatment of phthisis. Its chemical formula is

GTL.OH.OCHs. It is partly soluble in water,

and freely so in alcohol and oils. It is oily in appearance and resembles creosote in odor and

taste. Its compounds are used also in the treat¬

ment of phthisis.

GUAIACUM, gwi'a'kum, a genus of trees

of the family Zygophyllacea , natives of tropi¬

cal America, remarkable for the hardness and

heaviness of their wood, known as lignum

vita or Brazil-wood; also the peculiar resinous product of the common species (G . officinale).

This is a tree 30 or 40 feet high, usually growing with a crooked trunk and knotty branches. The

wood and resin have been obtained chiefly from Cuba, Jamaica and Santo Domingo, but the

tree is becoming scarce there. Guaiacum-wood

is remarkable for the direction of its fibres, each layer of which crosses the preceding

diagonally. It sinks in water. It is much

valued and used for pulleys, casters, mortars,

bowling balls and other purposes requiring an

extremely firm and durable wood. It is pale

yellow on the outside but blackish brown near

the heart, where it abounds in resin. Stimula¬

tive and other medicinal properties reside in

the bark, leaves and resin of this tree.

GUAIRA, La, la gwa-e'ra, Venezuela, a

seaport on the Caribbean Sea, eight miles in a direct line (23 miles by rail) north of Caracas, of which it is the port. Moreover it is the chief port of the republic. It is situated on a narrow coast strip between high mountains and the sea, and has an unhealthful climate. There are

modern harbor works including a breakwater,

and a considerable export and import trade is

carried on. The town dates from an ancient

Spanish settlement in 1588. In 1903 the port

was blockaded by British and German fleets

to enforce a settlement of commercial claims.

The British-built and owned La-Guaira-

Caracas railway accomplishes the climb over

gradients of 1 in 27 to the head of the pass at 3,200 feet, whence it descends 200 feet to the city. The chief feature of the line is the

small radius of the curves; and as the line

climbs higher up into the gorge the train is

sometimes only a few feet from the edge of

precipices with a vertical drop of a thousand

feet. There is (it has been said) only one

dangerous part of the line, but that extends

from La Guaira to Caracas. Pop. about 9,000;

mean annual temperature 84.5° F.

GUAL, gwal, Pedro, South American pa¬

triot: b. Caracas, 31 Jan. 1784; d. Guayaquil, Ecuador, 6 May 1862. He was graduated from

the University of Caracas; joined the patriots in 1810, and was elected as a member of the legis¬

lature in 1811. In 1812, when the Republicans

surrendered, he escaped to New York, but in a few years returned, was made governor of

Cartagena, and later sent as Ambassador to

the United States. He was admitted to the bar in Washington, and began the practice of law,

but in 1816 joined Bolivar, was made governor

of some of the conquered provinces, and

was for a time Minister of Finance and Foreign A.ffairs. In 1858 he joined the revolt against Monagas, and was made president of the pro¬

visional government ; in 1859 he was elected

vice-president of Venezuela, and in 1860 be¬

came president, but resigned the next year,

retiring to private life.

GUALEGUAY, gwa-la-gwl', Argentina,

South America, city in the province of Entre

Rios ; also a navigable river, the least impor¬

tant of the triad of rivers that give the name (Entre Rios meaning
<(between rivers®) to this

province, noted for its output of cattle

products. Consult (Argentine Year Book)

(Buenos Aires 1916).

GUALEGUAYCHU, gwa-la-gwi-choo',

Argentina, South America, city in the province

of Entre Rios, on the Gualeguaychu River, 12

miles from its confluence with the Uruguay.

Its chief industries are connected with the rais¬

ing and shipping of cattle and wheat, the

preparation of beef extracts, *etc.* It has a

library and a school and in 1917 had about

16,000 inhabitants.

GUAM, gwam or goo-am', or GUAJAN,

gwa-han', one of the Ladrone Islands (other¬

wise known as the Mariana Archipelago), the

southernmost and largest, and the only one

with much population; east of the Philippines;

occupied by the United States in 1898. It lies in lat. 13° 26’ N. and long. 144° 43’ E. ; is 32

miles long by 4 to 10 wide, and about 210

square miles in area; high and precipitous on

the eastern side, and forming a low plateau

in the northern part, but mountainous in the

south. About half the soil is arable, but only about 30,000 acres cultivated. Except for the

native clearings, most of it is thick and pathless jungle. Some of the trees are valuable hard¬

woods for shipbuilding or ornamental cabinet¬

work; others are useful for food, as the coco¬

nut (the finest here of all the tropics), pine¬

apple, breadfruit, sour-sop and custard-apple,

etc.; the hau (Hibiscus tilaceum) makes strong cordage, not affected by water; the pandanus’

long leaves are braided into mats and hats ; and the ylang-ylang is famous for perfume. Rice,

sugar, tobacco, hemp, coffee, cacao, bananas,

melons, etc., have been introduced and are

cultivated. The only native mammals are rats,

flying foxes, and bats ; but the deer and wild goat, of European origin, have thriven plenti¬

fully, and cows and pigs are raised. In 1915

there were about 6,000 head of cattle in¬

cluding 900 water buffaloes. There are no

snakes ; there are centipedes and scorpions, but none dangerous. The climate is very rainy, but mild except in midsummer, when the conflict

of trade-winds produces a dead calm, oppres¬

sive heat, and storms, with some hurricanes

As recently as 6 July 1918, the island was swept by a typhoon, which destroyed the crops and

rendered half the inhabitants destitute and

homeless. Earthquakes are frequent. The is¬

land is volcanic, with bordering coral reefs.

The east side has but two good harbors, Pago

and Tarofofo ; the latter is the only one, except San Luis d'Apra on the west, which is safe for vessels all the year round. The total number

of inhabitants (in 1920) was 13,275. The

number of natives alone was given in 1913 as

12,448; the latter being Chamorros with a mix¬

ture of Tagal and Malay, and some Anglo-Saxons from whaling ships, producing half-breeds with copper skins and light hair. They

are nearly all in the villages; those with ranches build rough huts on them, where the family

spend part of the time. Agana (San Ignacio

de Agana), the seat of government and the

most important town, is a neat place with

houses half of stone and half of wood or bam¬

boo, and contains about 7,000 people. Its best port is Apra (above), on a deep bay formed

by a peninsula ; its own harbor being dangerous in a storm from the anchors dragging on the

coral bottom, and the landing bad from break¬

ing reefs. There is a mission school, endowed

in the 17th century by Maria Ana, queen of

Philip IV of Spain. The total number of

pupils registered in all the schools was given in 1916 as 1,970. The governor of Guam (an

officer of the navy of the United States) is

the military commandant of the island and com¬

mandant of the naval station. As chief of

the (<Naval Government of the Island of Guam,®

he combines executive with legislative powers.

There is an Island Court for the trial of both civil and criminal cases and a Court of Ap¬

peals. Imports into the island amounted to

$293,564 in the year ending 30 June 1915, and exports to $33,349. The official currency has

been, since 1 July 1909, that of the United

S tates

Bibliography.— Griffin, A. P. C., (A List of

Books, with References to Periodicals, on

Samoa and Guam) (Washington 1901) ; Rich¬

ard, B. H., (The Question of Guam* (Milit .

Historian and Economist, Cambridge, Mass.

1916) ; Safford, W. E., (Our Smallest Posses¬

sion — GuanP (Nat. Geog. Magazine, Wash¬

ington 1905); United States: Guam Survey

Board: (Report of the Board to the Secretary

of the Navy* (Washington 1902) ; White, D.,

(The Capture of Guam) (Overland Monthly,

Vol. XXXV, San Francisco 1900).

GUAN, gwan, a gallinaceous bird of the

family Cracidce, genus Penelope, characterized

by the front of the throat being naked and

wattled; specifically P. cristata. It is about 30

inches long, nearly half of which is due to the 510

tail. The color is a shining reddish-green, with rump and belly chestnut, neck and chest white-spotted, and the feet and throat red; the female is of a more reddish tint, with the crest, neck and mantle bordered with white. Though the

guans have most of the habits of the curassow (q.v.), they are far less gregarious, noisy and restless. They take to trees when alarmed,

roost there at night and often make their nests among the branches. They inhabit the Ameri¬

can tropics, one species, the chacalaca (Ortalis vetula), ranging into Texas. Guans have long

been domesticated in South America.

GUANABACOA, gwa-na-ba-ko'a, Cuba,

town well situated on high ground near the city of Havana. The number of its inhabitants

shown by the United States War Department

census of 1899 was 13,963 (that is, 8,232 native white; 1,091 foreign white; 2,173 negro; 2,408

mixed; and 61 Chinese). The total population

is 10,500.

GUANAHANI, gwa-na-a-ne. See Cat

Island.

GUANAJAY, gwa-na-hi', Cuba, town in

the northeastern part of the province of Pinar del Rio, about 20 miles west of Havana. It is situated in a hill region of much salubrity, and is a popular health resort. Here is the terminus of the Havana and Guanajay Railroad. Pop.

about 7,000.

GUANAJUATO, gwa-na-hoo-a'to, Mexico,

a state bounded by the states of San Luis

Potosi, Queretaro, Michoacan and Jalisco.

Area 11,370 square miles. The principal cordil¬

leras traversing the state are the Sierra Gorda, in the northeast, and the Sierra de Guanajuato in the centre, which are formed by the junction of the Codorniches, San Antonio and Santa

Rosa mountain ranges. In the south and west

are the valleys of San Judas, San Felipe and

Santiago, and the fertile plain of El Bajo.

Rivers are the Lerma, with its affluents the

Laja and the Turbio, the Irapuato and a num¬

ber of smaller streams. There are many min¬

eral springs, and one lake, 37 1-3 square miles in extent, called the lake of blood (Yuririapun-daro). Five mining districts merit special men¬

tion ; namely, the Sierra Gorda, Allende, Santa Cruz, Guanajuato and Leon, the principal mines

being those which produce silver and gold, sil¬

ver, mercury or cinnabar, tin, iron, lead or ar¬

gentiferous lead, and copper or argentiferous

copper. (See statistics given in connection with the city of Guanajuato). The climate, except in the higher parts of the mountain ranges, is not unfavorable (mean annual temperature about

70°). The rainy season extends from the mid¬

dle of May until the beginning of July. Dur¬

ing those months the rainfall is heavy in the valleys, but only moderate in the mountains.

Pop. 1,085,681.

GUANAJUATO, Mexico, capital of the

state of the same name. Elevation 6,200 feet

above the sea. Distance from the city of Mex¬

ico 165 miles, and 1,000 miles by the Mexican Central Railway from the United States border

at El Paso, Texas. It is situated in the heart of the Guanajuato mountains, in a picturesque

ravine, six miles from the main line of the above named railway and overlooking a rich and beau¬

tiful region, and it is surrounded and honey¬

combed by mines hundreds of years old, which

have produced unknown millions of precious

metals and are still productive. Mining began

here 500 years ago, devoloping, as it proceeded, some of the richest deposits ever discovered.

Over $600,000,000 of gold and silver have been mined under and in the immediate vicinity of

the city, fully two-thirds of which was gold.

The buildings of the business centre are quite commodious and imposing and are very sub¬

stantial, unlimited quantities of very superior

building stone being immediately at hand.

Among the prominent public buildings are the

Government Palace, or State House, in which

the legislature holds its sessions and the state officers have their offices, and the opera house or theatre, a magnificent stone structure copied from the Grand Opera House of Paris. In a

remote part of the city are the famous Cata¬

combs, wherein are stored the mummified re¬

mains of some 30 or 40 human beings represent¬

ing both sexes, and several tons of human

skulls and bones. At the opposite extremity of the city is the great dam

of modern construc¬

tion which contains the community's water sup¬

ply. Another notable structure is the principal church of the city, built of the peculiar colored stone or marble which exists in great quantities in the immediate vicinity. It is surmounted by a dome of large proportions and exceptional

beauty. There are several other churches, the

ancient Mint, the State College, the Market de la Reforma and the Castle of Granaditis. There is a street railway, and a thorough system of electric lighting. The bank of Guanajuato and

branches of the National bank and the bank of London and Mexico compose the financial insti¬

tutions of the city. There are a State College and a Normal School for young women; two

museums, — one connected with the State Col¬

lege and devoted to natural history and miner¬

alogy, and the other devoted to <(Antiquities, Minerals and Precious Objects.® Two public

libraries contain over 13,000 volumes. In 1905

the city was flooded and much valuable prop¬

erty destroyed. Pop. 35,682.

GUANARE, gwa-na'ra, Venezuela, city,

capital of the State of Zamora, near the Guana-rito River, about 220 miles southwest of Cara¬

cas. Coffee and sugarcane are some of the

chief agricultural productions; but the city is the centre of an extensive cattle trade. Pop.

about 11,500.

GUANCHES, gwan'chas, GUANCHOS,

GUANCHIS (from Guan, a person, and

Chinet, Teneriffe; or from Berber acxes, a son or young man), the inhabitants of the Canary

Islands who are said to have called themselves Guanchinet, a term which the Spaniards cor¬

rupted into Guanches. The name seems to have

been applied only to the inhabitants of Tene¬

riffe ; but it became the general designation in use by the Spaniards for the inhabitants of all the islands. The word Guanches is, therefore,

used ifi two senses, the original inhabitants of the Canary Islands and the people living on them when they first attracted the attention of the civilized races of Europe and Africa. The lan¬

guage of the Canary Islands is one tongue

divided into many dialects which contain a con¬

siderable .admixture of foreign words. The

people of the various islands composing the

Canary group present quite different appear¬

ances. On some islands they are tall, fair-

haired and handsome; on others they are

darker and shorter and considerably different

in features. On the various islands of the

group there are. different customs, habits, modes of living and development of arts and indus¬

tries. Spanish reports show that on some islands custom permitted the women to have several

husbands ; on others polygamy was the rule ;

on still others monogamy. On some islands the

inhabitants lived in caves, on others the priests, nobles and chiefs inhabited very substantial

buildings of wood, stone or cement. Some

tribes worshiped their chief gods on the moun¬

tain tops, others built stone shrines, while still others erected temples of stone or wood. All

this would seem to indicate a mixture of races or the imposition of outside influence, or both.

But the general mythological ideas of the in¬

habitants of all the islands seem to have been very similar. They all appear to have believed in a very powerful deity, variously designated

the <(sustainer of earth and sky,® the <(preserver of the world,® the ˆpreserver of men,® (<the sustainer of life.® In different localities he had different names, which were often but trans¬

lations of the same designation, as Abord,

Alcorac, Alcoran, Acharnan, Eraoranam. To

him and to the other Guanches deities there was dedicated an extensive and powerful priesthood

whose influence seems to have been extended

over all the affairs of the nation. In the

Greater Canaries the priesthood seems to have

been of as great or greater influence than the chief ruler ; and there they alone had the power to confer the honors of knighthood or the rank of nobility. It is evident, therefore, that the high priest, at least, must have been chosen from the ranks of the nobles or of royalty. When

the people of the main islands came into con¬

tact with people from the mainland of Europe

and Africa this religious system had become

highly organized ; and it seems to have held

in its grasp the political affairs of the people and to have possessed stone oratories and

temples, though there is every reason to believe that the masses of the people were for the most part cave-dwellers, while the ruling class occu¬

pied dwellings of some pretentions. In other

parts of the islands, however, the people all

lived together in villages and possessed con¬

siderable community life. The variety of cus¬

toms and modes of clothing were as noticeable

in different islands as the other distinctions

already mentioned. In some islands the natives

went practically naked; on others they dressed

in skins; while on others they appear to have understood the art of weaving and to have

taken considerable pride in dressing themselves

elaborately. In one respect, however, they

were all more or less alike. They had numer¬

ous flocks and they grew different kinds of

grain including barley and wheat. On some of the islands fruit was also cultivated, notably figs. The inhabitants of Canaries living along the coast were given to fishing; but they were not sailors and all their fishing exertions were confined to the shore.

The society of the Canary Islands seems to have run all the gamut from slavery to that of an entrenched nobility and priesthood and absolute rulers, back of whom was a very com¬ plicated mythology forming part of the govern¬ mental machinery of the classes. On some islands the chief ruler seems to have been abso¬ lute; on others the chiefs and nobles had a council which acted as a check on the power of the ruler; while on the more primitive of the islands the people were broken up into numerous petty tribes without any unity or any over-lord having command over more than his own tribe.

The origin of the Guanches has long been and is still a much disputed question. It is even uncertain whether the people found on

the islands when they first came under the

notice of the continental races were the de¬

scendants of the original races who have left

traces of their life and long residence there.

The evidence in hand, however, would seem to

show that they were a very mixed race, long

in possession of the islands and frequently acted and reacted upon by the maritime races of

Europe and Africa. Some investigators have

maintained that the original race of the Canaries was the Cro-Magnon, similar in every respect

to the early inhabitants of southwestern Europe at the end of the Magdalenian epoch.

Bibliography. — Berthelot, S., (Antiquites

canariennes) (Paris 1839) ; (Histoire naturelle

des iles Canaries) (in collaboration with Baker Webb, Paris 1839) ; Broca, P., (Revue d'antro-pologie) (1874) ; Chil y Naranjo, (Estudios

historicos, climatolicos y patologicos de las

Islas Canarias) (Las Palmas 1876-89) ; (De la

pluralite des races humaines de l'archipel

Canarien> (Paris 1878) ; Espinosa, Alonso de,

(The Guanches of Tenerife) (Hakluyt Society,

Markham's translation, 1907) ; Faidherbe,

(Quelque, mots sur l'ethnologie de l'archipel

Canarien) (Paris 1875) ; Luschan, (Anhang

fiber eine Schadelsammlung von den Canarischen

Inseln) ; Meyer, H., (Die Insel Tenerife)

(Leipzig 1896) ; Sergi, (The Mediterranean

Race* (London 1901) ; Verneau, (Sur les

Semites aux iles Canaries) ; (Sur les anciens

habitants de la Islata Grande Canarie) (Paris

1881) ; (Une mission scientifique dans l'archipel canarien) (Paris 1887) ; (Cinc annees de sejour aux iles Canaries) (Paris 1891) ; Virchow,

(Schadel mit Carionecrosis del Sagittalgegend)

(1896).

GUANES, gwa-nas', or GUANE, Cuba,

town in the province of Pinar del Rio, about

10 miles from the sea and 120 miles southwest of Havana. The District Court holds its ses¬

sions here. The trade in the products of the

surrounding country, lumber, tobacco and cattle, is extensive. Pop. about 1,400.

GUANIDIN, a basic organic substance,

having the empiric formula CHBN3 and the con¬

stitutional formula H. :C(NH2)2. It may be

prepared by heating an alcoholic solution of

cyanamide and ammonium chloride to 212° F.

Guanidin is a crystalline, deliquescent substance, with strongly alkaline properties, and it absorbs carbon dioxide from the air. It

forms numer¬

ous salts, and urea is evolved in many of its reactions. In fact, it is this close relation with urea that gives guanidin its chief interest, many authorities holding the opinion that guanidin is an intermediate product in the formation of

urea from proteid bodies, in the normal physio¬

logical chemistry of the body.

GUANIN, gwa'nm, C6H5N50, a yellowish-white, amorphous substance, which derives its

name from being a constituent of guano; but it also forms the chief constituent of the excre-512

ment of spiders, has been found attached to the scales of fishes, and seems to be a normal con¬

stituent of the mammalian liver and pancreas.

Its structural formula is

NH - CO

H*NC

C - NH

N - C - N

\

CH

/

With regard to its occurrence in guano, as it has not been found in the recent excrement of sea-birds, there is every reason to believe that it is formed by slow oxidation (from atmos¬

pheric action) of uric acid, much as uric acid can be made to yield urea and oxalic acid.

And in the pancreas and liver it probably rep¬

resents one of those transitory stages of dis¬

integrated nitrogenous tissue which are finally

excreted by the kidneys in the more highly

oxidized form of urea. Guanin is a base, but

also forms salts with metals, and combines with salts. When heated with hydrochloric acid and

potassium chlorate it is oxidized to carbon di¬

oxide, guanidin and parabanic acid.

GUANO, gwa'no (Spanish guano huano,

from Peruvian huanu, dung), is the name for

deposits of the partially decomposed and dry

excrementitious matter of birds, especially sea¬

birds, as those that frequent coast islands. It is highly valued as a fertilizer. Deposits from sea-birds are found wherever there is good

feeding-ground in the neighborhood of un¬

frequented islands and rocky cliffs. All the

notable guano deposits exist in the hottest and driest parts of the

tropics, as on the islands of the South Pacific Ocean. The most important

of all were the deposits on the Chincha Islands off the coast of Peru, which for years yielded a considerable revenue, but were exhausted.

The guano there was from 60 to 100 feet in

thickness, and was entirely due to the droppings, accumulated for many ages, of the innumerable

sea-birds which make these islands their rest¬

ing-place and breeding-ground. The excrement

rapidly dries by exposure to the sun in a region where the rainfall is slight, and thus the soluble salts of which guano to a great extent consists are retained. Peruvian guano is the best known, but in Patagonia, various points of Bolivia.

Mexico. Chile, Malden Island and numerous

other Pacific islands new deposits have been

opened up as the older were exhausted.

Guano varies extremely in composition, even

in the same deposit considerable differences will be found; and deposits from different localities show great difference in chemical content. Some consist mainly of phosphate of calcium and

other fixed salts, while others contain much

volatile matter, with a large proportion of am¬

monia. Peruvian guano is a very light, dry,

non-cohesive, pale-yellow powder, with a char¬

acteristic ammoniacal odor, and sometimes con¬

tains lumps, made up of different salts. It is a very complex mixture, containing the urate of

ammonium, the oxalates of ammonium and cal¬

cium, the phosphates of sodium, ammonium,

calcium and magnesium, the sulphates of potas¬

sium, sodium and ammonium, the chlorides of

sodium and ammonium, and the carbonate of

calcium. There is always some moisture, or¬

ganic matter of different kinds, sand from the rock on which the deposit lies, and this is an impediment to marketing. The ingredients

which are especially prized are the ammoniacal

salts, the phosphoric acid, in combination with the alkalies and alkaline earths, and the alkalies themselves, particularly the potash. It is the

remarkable abundance of these constituents and

their fine intermixture which caused Peruvian

guano to be so much esteemed as a manure.

The deposits often contained almost all the

inorganic matter required by a plant, and that in a highly available form, so that it was one of the best of all fertilizing agents for different crops. As the supply became reduced, however,

it was found to be very irregular in composition.

Its use as a manure was known to the native

Peruvians centuries ago, but no attention was

paid to the accounts by modern travelers of its wonderful efficacy until A. von Humboldt took

some to Europe, in 1804, and had it analyzed.

It was not exported on a large scale till about 1850, and from that time the quantity sent to foreign countries, including large shipments

to

the United States, was very great, but the scien¬

tific study of fertilizers and utilization of local materials has much reduced the demand, and

the supply is also much diminished.

As a substitute for ordinary guano, what is

known as fish-guano has been in use for a con¬

siderable number of years. This consists essen¬

tially of fish and fish offal dried and powdered.

In the case of oily fish, such as herrings, it is customary to extract as much of the oil as

possible before the operation of powdering;

and it will thus be understood that different

kinds of fish differ greatly as regards their value for manurial purposes. But all sorts of fish-guano contain a large percentage of ammonia

and phosphate of lime, and are thus valuable as fertilizers (q.v.). Consult Coker, fisheries and Guano Industry of PervP (in Bureau of Fish¬

eries Bull. 8, Pt. 1, 1908).

GUANTA, gwan-ta', Venezuela, a modern

seaport on the north coast, in the state of

Bermudez, 12 miles west of Barcelona by rail.

guantAnamo, gwan-tana-mo, Cuba,

town in the province of Oriente, situated near the head of the most important harbor east of the city of Santiago on the southern coast.

Its surroundings were favorably known before

1898, for the beauty of the groves of limetrees and lemon-trees, the coffee plantations and the residences of wealthy planters, who made the

heights overlooking the bay a favorite place

of resort. Since the Spanish-American War,

Guantanamo Bay has been famous as the scene

of certain military operations. On 19 May 1898

an unsuccessful attempt to cut the cable in the bay was made by the Saint Louis and the

W ompatuck. On 10 June a force of 600 ma¬

rines landed from the transport Panther on

the eastern shore of Guantanamo Bay and

undertook to make the outer harbor a secure

place for the use of American vessels when

coaling or as a rendezvous and a refuge in

stormy weather. The marines established their

camp (((Camp McCalla”) on a small hill, where

they sustained the attacks of the Spanish troops for several days ; and the courage and endur¬

ance displayed at this time must be regarded

as memorable features of the war The Marble-

head and Texas lent assistance, the latter on 12 June sending 40 marines with two automatic guns. In the course of that week the camp was protected by earthworks ; other warships arrived and shelled the thickets in which the Spaniards were concealed, the forts and the town ; the garrison was strengthened by ac¬ cessions of bluejackets and Cuban insurgents familiar with the country; and thus, when ten days had passed, the outer harbor was prac¬ tically in the possession of the American forces.

In July 1901 the American government chose a site on this bay for one of the naval stations in Cuba. In 1903 land on both sides of the entrance was leased from the Cuban govern¬ ment, and the chief naval base of the United States in the West Indies was developed there (1904-16). The number of inhabitants of the town of Guantanamo, according to the United States War Department census of 1899, was 7,137. The -total population of the district in 1914 was given as 51,036.

GUAPORE, gwa-po-ra', or ITENEZ, a

South American river which rises in the Sierra Aguapehi, in the state of Matto Grosso, Brazil, flows south, nearly parallel to the Jauru, passes the town of Matto Grosso, whence it is navi¬

gable downward for light draught vessels, then

with a northwesterly trend forms part of the

boundary between Brazil and Bolivia, and finally after a course of over 960 miles, unites with the Mamore to form the Madeira.

GUARANA, gwa-ra'na, a dried paste con¬

sisting chiefly of the crushed or pounded seeds of Paullinia sorbilis, a climbing shrub, native of South America. The seeds are obtained largely

from the cultivated plants, and in South Amer¬

ica guarana is used much as tea or coffee is used in other countries. It is the staple drink of millions of people. Guarana is found in the drug market in the form of flattened cakes or cylinders of a dark reddish-brown color and

showing on fracture numerous coarse angular

fragments of seeds. The taste is astringent and somewhat bitter, becoming sweet on chewing.

Guarana contains 4 to 5 per cent of caffeine, making it twice as strong as coffee. Its action, however, resembles more closely that of tea be¬

cause of the high percentage of tannic acid it contains. In medicine it has been used in the treatment of sick-headache.

GUARANA-BREAD, the seeds of the

Paullinia sorbilis (a South American tree),

pounded, made into cakes and dried in the sun.

It is extensively used in Brazil and other parts of South America as a stimulant and restor¬

ative, and as a material for making a refreshing beverage. The active principle of guaranine is

said to be identical with theine or caffeine

(q.v.) ; and no known substance yields it so

abundantly. Other species of Paullinia possess

poisonous properties.

GUARANIES, gwa'ra-nez, a numerous

family of Indians inhabiting the greater part

of the Rio de la Plata region, Paraguay, and

a very cons derable region in Brazil. They

reach westward to the foothills of the Andes.

The Guaranies are divided into small tribal

bands each of which has its own tribal leader.

In addition to this vast extension of tribes of the same great family ethnologists are inclined to the view that numerous tribes of Argentina

are also of the same origin as the Guaranies.

At the time of the conquest the Guaranies were very much less civilized than the tribes by which they were surrounded. They lived by hunting

and on wild fruits, roots and vegetables, and

went practically naked. Their customs were

apparently very simple; but they were great

lovers of their homes wh'ch they defended

stubbornly and bravely against the Spanish and

Portuguese invaders. They seem to have lived

in villages and to have been of a very social nature. The Jesuit missionaries visited them

and succeeded in gaining a strong influence

over many of their villages, among which they

introduced European arts and industries, which

very considerably improved their social condi¬

tion. Long wars and epidemic diseases have

reduced to a comparatively small population

this once numerous family of Indians. How¬

ever the mixed race that sprang from the

Guaranies and the Spaniards is of consider¬

able extent and of importance in the industrial life of Brazil. A mestizo race, a cross between negroes and Guaranies is also found to-day in

parts of Bolivia, in Panama, in Argent'na, in

the State of Rio Grande do Sul (Brazil) and

in Paraguay. For the most part this large

mestizo population speak the native Indian

tongue. Owing to the work of the mission¬

aries, the language of the Guaranies is one of the best known of the native tongues of South America. Guarani is considerably mixed with

Spanish or Portuguese words, or both, and, in

this form, is the speech of a great part of the rural districts of

Paraguay.

Bibliography. — Aragon, Alonso de, (Vocabulario de la lengua guaranP (Madrid 1624) ; Bernal, Padre, (Catecismo en castellano y en

guaranP (Buenos Aires 1800) ; Insorralde,

Padre, <Araporu) (Madrid 1759) ; Montoya,

Antonio Ruiz de, (Vocabulario de la lengua

guaranP ; Ruiz, Padre Antonio, (Arte y Vocabulario de la Lengua GuaranP (Madrid

1639) ; Tapugay (Explicacion del Catecesmˆ

en guaranP ; (Manuale ad usum patrum So—

cietatis Jesu Parroquial, en espanol y guarani > ; (Sermones y ejemplos en la lengua guaranP ;

Velazquez, Padre, (Diccionario GuaranP (Ma¬

drid 1624).

GUARANTY, or GUARANTEE, a con¬

tract or undertaking by which one agrees to

answer legally for the default of another. One who undertakes such a contract is called a

guarantor. In Great Britain and in some juris¬

dictions of the United States, the word <(guarantor® is used with a broader signification than in other jurisdxtions, generally being nearly or quite equivalent to the word ˆsurety.® Usually

a guaranty relates to the payment of money or its collectibility or the genuineness of an obli¬

gation, and is a collateral undertaking. Guar¬

anty has been treated as a branch of suretyship.

Ordinarily the contract of a guarantor is dis¬

tinguished from that of a surety, in that the former is a distinct from that of his principal, whereas the contract of a surety is made jo:ntly and at the same time as his principal. Further¬

more, it has been held that the guarantor be¬

comes liable only by the happening of a con¬

tingency after the contract is made, whereas the surety is liable from the time of the signing of such contract. The guarantor, according to

some authorities, agrees only to pay on notice if 514

his principal cannot, whereas a surety agrees to pay if his principal does not. On the other

hand, some authorities hold that the difference between the contract of a guarantor and the

contract of a surety is shadowy, and what is

called by some courts a contract of guaranty is called by others a contract of suretyship.

Guaranty, although like warranty a collateral

undertaking, must not be confused with that

term, a warranty being merely an undertaking

that a certain fact is as represented. Ordinarily contracts both of guaranty and suretyship must

be evidenced by a written memorandum to

comply with the provisions of the statute of

frauds, both being undertakings to answer for

the default of another. A contract of guar¬

anty, to be valid, must be for a suffic:ent legal consideration. Failure of consideration is a

good defense by the guarantor. Fraud prac¬

tised on the guarantor by the principal is no defense to a contract of this nature unless the creditor has participated therein. The same

rules of construct'on apply to contracts of

guaranty as to other contracts, the apparent intent'on of the parties, as gathered from the

contract, being the controlling factor. Usually

the default of the principal alone does not fix the liability of the guarantor, but the creditor must use reasonable efforts to collect the debt of the principal, and upon failure to do so

must give the guarantor due notice. See Con¬

tract; Surety; Warranty.

Edward F. Donovan.

GUARANTY INSURANCE. The so-

called casualty or miscellaneous lines of insur¬

ance cover a variety of guaranty business, such as guarantee!ng the fidelity of persons in places of trust, guaranteeing surety bonds and under¬

takings required in actions or proceedings,

guaranteeing the legality of public bond issues and guaranteeing merchants in giving credit.

The term guaranty insurance is specifically ap¬

plicable, however, to the business of about

JO corporations separately organized at the pres¬

ent time in the United States, with an aggre¬

gate capital of over $30,000,000, net surplus of over $35,000,000 and a yearly income of over

$15,000000, according to the latest reports, de¬

voted to the guaranteeing of real estate titles and of bonds and mortgages on real estate.

This line of insurance has been particularly

useful where a subdivision of large tracts of

land has taken place in the West and latterly in the real estate developments that have occurred in or adjoining large cities. Title and mortgage guaranty insurances . have also become an es¬

sential element to investment in real estate,

especially where trust funds are concerned, as

all uncertainty as to these securities is thereby eliminated without the delay and expense in¬

cident to repeated searches. The business of

this class of companies is almost entirely local to their domiciles and involves an extensive

accumulation of real estate records. The pur¬

chase and sale of real estate and of mortgages is carried on inc: dentally or in connection with associated companies.

GUARAUNO, gwa-rou'no, tribe of Indians

of South America who inhabit the delta of the Orinoco, Venezuela.

GUARD, National. See Militia.

GUARDAFUI CAPE. See Cape Guarda-

FUI.

GUARDI, gwar'de, Francesco, Italian

painter: b. Venice, 1712; d. there, 1793. He was a pupil and follower of Canaletto; his work

shows less exactness in detail than his master's, but is superior in use of color. His paintings are mostly of scenes in Venice; they include

(Procession of the Doge) ; (Fete of Corpus

DominP ; (Grand Hall of the Palazzo Ducale)

(in the Louvre, Paris) ; (Church and Piazza of San Marco) (National Gallery, London) ; and

(The Rialto } (Metropolitan Museum, New

York).

GUARDIA, gwar'dya, Tomas, Costa Rican

president : b. Bagaces, Guanacaste, 1832 ; d.

1882. Entering the army, he saw service against the Walker filibuster (1855) and became

colonel. From 1866-69 he was governor of

Alajuela. A successful revolt against Jiminez

brought about the installation of Carranza as

temporary president and raised Guardia to the

command of the army (1870). In the same

year Guardia succeeded to the presidency, an

office which he -held until his death.

GUARDIAGRELE, gwar-de-a-gra'la, Italy,

city in Chieti province, not far from the

Adriatic and 18 miles from Ortona, with which

it is connected by rail. The agricultural prod¬

ucts of the neighborhood include grain and

olives. Iron and magnesia are also found in

the mineral springs nearby. Pop. of the com¬

mune, about 10,000.

GUARDIAN, in law, one having legal

charge of the person or property or both of

another who is incompetent to act for himself, as an insane person or an infant. The term

more usually is applied to one who has legal

charge of the affairs of another who is less

than 21 years of age. The most usual classes

of guardians to-day are those appointed by the courts or by the parents, including testamentary guardians and judicial guardians. Among the

latter class are guardians ad litem, who are

appointed by the courts to defend a particular suit brought against an infant. Both in Eng¬

land and the United States a father has the

right to appoint a guardian in his will for his minor children, and such guardianship con¬

tinues until the ward reaches the age of 21

years. The courts of equity have jurisdiction

over such guardians, and they may be required

to account at intervals to show that they are properly administering the property of their

wards.

By statutes in England, particularly those of

1886, 1891 and 1908, some sweeping changes

have been made in the law of guardians. The

statute of 1886, for instance, abrogated the old rule that the father had the sole right to the control of the custody and tuition of his

children until they were 21 years of age, and gave the mother almost equal powers, among

others the right to appoint a guardian to act after her death. _ Such guardian can act even if the father survives the mother provided it be proved that he is not fitted to be sole guardian.

Other changes were made also, such as award¬

ing custody of the children to the innocent

party in a divorce suit at the discretion of the court, custody of the children in case of

abandonment by one of the parents, *etc.*

In England, guardians not appointed by a

court cannot be removed by judicial process,

but such is not usually the case in most states in this country.

GUARDIAN ANGEL, an angel who

watches over a particular individual. It is the general belief, in the Roman Catholic and

Greek churches that every man has a guardian

angel who defends him from evil, suggests good thoughts and wise counsels, and helps him in

prayer. This belief is based on the words of

Christ in Matt, xviii, 10: ((Their angels do

always behold the face of my Father which is

in heaven® ; the fathers of the church strongly inculcate it, and in the lives of the saints in¬

stances are given of the active interference of guardian angels. The belief is shared by some

Anglican high churchmen. The Roman Catholic

Church celebrates the Feast of Guardian

Angels on 2 October. See also Guardian

Spirit.

GUARDIAN SPIRIT, a spirit that watches

over the welfare of an individual, a household or a community. The belief in such a being

finds expression in some form in all primitive religions, and in many

which have reached a

higher stage of development. The Australian

aborigine believes that when a warrior kills his first foe the spirit of the slain enters the body of the slayer and becomes his guardian; in Tas¬

mania a native has been heard to ascribe his

deliverance from danger to the watchful care

of his deceased father's spirit ; and the most important religious rite of a North American

Indian is to enlist the services of a patron

genius. The same belief in guardian spirits

obtains in Africa, Asia and among the Indians

of South America, as it did formerly among

the Aryans of Northern Europe. Greeks and

Romans believed that each individual was

under the special protection of a spirit who

prompted him to good deeds, warned him

against danger and guided him through life.

Gradually there also arose a belief in an evil spirit who was at constant war with the good

spirit and instigated every evil deed. These

spirits were called dcemons in Greece and genii in Rome. The Romans also believed that the

spirit of the founder of each family was the

guardian spirit (the Lar) of the family and

worshipped the lares with special rites. The

ancestor worship among the Chinese and

Japanese seems to have had a similar origin.

The penates, on the other hand, were the house¬

hold gods. For the Christian form of the be¬

lief see Guardian Angel.

GUARDS. A guard, in the primary sense,

is one who watches or protects a person or per¬

sons, a place, property, etc., against loss, danger, or harm; as a bodyguard, a prison-guard, *etc.*

Bodyguards have been an inseparable accom¬

paniment of monarchy from the earliest ages;

the Assyrian and Persian kings employed them,

and the corps of ((Argyraspides,® or silver—

shields were selected. by Alexander out of the

bravest men of his army. The Roman em¬

perors had their Praetorian guard. Napoleon I,

first created a small troop of bodyguards, with the title of Guides, while he was yet only gen¬

eral, in his first Italian campaign. From this arose by degrees, the great institution of the Imperial Guard, consolidated in 1804, which 10

years later comprised 102,708 men, and after be¬

ing disbanded by Louis XVIII, in 1815, was

restored by Napoleon III, in 1854. It consists of infantry, cavalry and artillery. In England, the guards, otherwise called household troops,

consist of two regiments of Life Guards, the

royal regiment of Horse Guards, and five regi¬

ments of Foot Guards : the Coldstream, Scots,

Grenadier, Welsh and Irish. Many of the

European sovereigns before the French Revolu¬

tion had small corps of foreign troops which

served in this capacity. Thus the French had,

in former times, the Guard of Scottish Archers, and at a later period, a body of Swiss guards, called the Cent Suisses. The Cent-Gardes

formed by Napoleon III, are founded upon the

latter. The Pope no longer retains his Swiss

guards. In Prussia there long existed both in¬

fantry and cavalry of the guard, and the Rus¬

sian Imperial Guard formed an entire corps

d'armee 50,000 strong.

In general military use the term guard is of

various distinct applications and denotes func¬

tions of great importance. It means a sentry

on duty, and also a body of soldiers assigned, under the proper officer or officers, to the duty of guarding or protecting a camp, post or any place where military control is established.

Company and regimental details for guard duty

are made according to circumstances — the

number of men required or available, etc., —

rank of officers being also regarded as far as convenient. Guard-mounting or inspection and

review before the old guard is relieved, is a ceremony of much detail and is usually carried out with strict military observance.

GUARINI, gwa-re'ne, Camillo-Guarino,

Italian monk, author and architect : b. Modena, 1624; d. Milan, 1683. Besides being an excel¬

lent mathematician and architect, Guarini was

also learned in literature and philosophy, which he taught at Messina. In 1641 he became archi¬

tect to the Duke of Savoy, and under his

patronage executed the plans for numerous

buildings. Examples of his work are at

Modena, Vienna, Prague, Lisbon, Verona and

Paris. Among these may be mentioned the

palace of the Duke of Savoy; the church of

Saint Philip Neri; of Maria d'Etling (Prague)

and Santa Marie della Providenza, Lisbon.

He wrote (Disegni d'architettura civile ed

ecclesiastica) (1668); and (Leges temporum

et planetarunP (1678). Consult Milizia, (Lives

of Celebrated Architects, Ancient and Modern*

(trans. by Cresy, 2 vols., London 1826).

GUARINI, Giovanni Battista, Italian poet :

b. Ferrara, 10 Dec. 1537; d. Venice, 1612. He studied in the

universities of Pisa, Padua and Ferrara and was appointed to the chair of lit¬

erature in the latter, and soon published some sonnets which obtained great popularity. At

the age of 30, he accepted service at the court of Ferrara and was intrusted by Duke Alfonso

II with various diplomatic missions. He with¬

drew from the court about 1587. Having re¬

sided successively in Savoy, Mantua, Florence

and Urbino, he returned to his native Ferrara.

An irascible sensitiveness, joined to an exag¬

gerated estimate of his personal dignity, neu¬

tralized many qualities both brilliant and solid, which seemed to fit Guarini exactly for a court career. To these defects, in part, may be at¬

tributed the frequent mortifications which

tracked him through life. As a poet, he is re¬

markable for refined grace of language and

sweetness of sentiment, while his defects are

occasional artificiality, a too constant recur¬

rence of antithetical imagery, and an affected

dallying with his ideas. His chief work, (I1

Pastor Fido,> is regarded in Italy as a stand¬

ard of elegant pastoral composition. The writer designed it as a tragio-comic pastoral, its first dramatic representation was in honor of the

nuptials of the Duke of Savoy and Catherine

of Austria in 1585. It ran through 40 editions during Guarini's life and was translated into

most modern languages. Its superb and per¬

fect diction is flooded with sensuousness. Car¬

dinal Bellarmine told Guarini that he had done more harm to Christianity by his blandishments

in poetry than Luther by his heresies in theol¬

ogy. Tasso and Guarini have been frequently

compared; the two poets were literary friends

and reciprocal admirers, though rivals in love.

Guarini's varied writings, including sonnets,

comedies, satires and political treatises, were

published at Ferrara (4 vols., 1737). Consult

Everett, W., Htalian Poets since Dante> (New

York 1904) ; Rossi, V., (B. Guarini e II pastor fido) (Turin 1886) ; Sanctis, F. de, (Storia

della letteratura italiana) (Vol. II, Naples

1903) ; Saviotti, A., (Guariniana, eccP (Pesaro 1888) ; Shelley, M. W., (Lives of the Most

Eminent Literary and Scientific Men of Italy)

(Vol. II, London 1835). See II Pastor Fido.

GUARINO DA VERONA, Italian classi¬

cist: b. Verona, 1370; d. Ferrara, 1460. He was educated at Constantinople, where he came

under the influence of Chrysoloras who taught

him Greek. Returning to Italy with some

Greek manuscript he had collected,, he taught

at Verona, Venice and Florence, and later at

Ferrara. He also acted as interpreter at the

Council of Ferrara. His chief contributions

to classical study are his translations of Strabo some of Plutarch's ˆivesP commentaries on

Aristotle, Cicero, Persius, Juvenal and Martial, and a Greek grammar based on the work of

Chrysoloras. Consult Sandys, (A History of

Classical Scholarship) (Vol. II, Cambridge

1908).

GUARNERI, gwar-na're, or GUARNE—

RIUS, a family of Cremona renowned for the

manufacture of violins. The best-known mem¬

bers of the family were: (1) Andreas, b. 1630; d. 1698, who learned the trade with Stradivarius from Nicolo Amati ; (2) Giusseppe, b. 1666; d.

1739, his son who succeeded his father, but

modelled his violins after Stradivarius; (3)

Pietro, b. 1695, son of Giuseppe ; (4) Pietro

Giovanni, b. 1655, son of Andreas, settled at

Mantua, where he manufactured instruments

varying from those of his father in several particulars; (5) Giuseppe Antonio, the most renowned of all, b. 1687 ; d. about 1745. He was called ((del Gesu® from the inscription I. H. S. on his labels. He copied Gaspar di Salo in the style of construction, making his instruments heavier and richer in tone than those of Stradivarius. See Violin. Consult Petherick, H., (Joseph Guarnerius, his Work and his Master* (London 1906).

GUASA, gwa'sa, or WARSAW, a name given in the Gulf of Mexico and West Indian region to various large groupers (sea bass), especially the jewfish (q.v.). ˆWarsaw® is an anglicized form of the Spanish word. See Groupers.

GUASCO, gwas'ko, Alexandre, French jurist and author: b. Bastia, Corsica, 7 Dec. 1853. He has for many years been engaged in

the practice of law at Bastia and Paris. He is secretary of the Society for the Propagation of the Faith, is knight of the Order of Saint Syl¬ vester, of the Holy Sepulchre, and of the Order of Saint Gregory. His

works include Condi¬

tion des etrangers* ; (Les origines et l'histoire de 1'Oeuvre de la Propagation de la FoiP He

collaborated in Piolet (Missions catholiques,* to which he contributed (Les Etats-UnisP (Haitip

(Guyane frangaise,* C'Amerique et ses habi—

tantsP (Les anciennes missions daus 1' Amerique du SudP He is a contributor to (The

Catholic Encyclopedia,* La Revue de la Revolu¬

tion, Revue des questions diplomatiques et

colonials, Revue generale de droit international public.

GUASTALLA, gwa-stal'la, Italy, a city in

the province of Reggio, 18 miles north of the city of that name on the Po River. There are railroad connections with Parma and Mantua.

The points of interest are the old fortifications dating from the 16th century and the cathedral from the 10th. The Lombards founded the

city in the 7th century. It was the scene of a council called by Paschal II, (1106). After

changing hands several times, it became a pos¬

session of the Gonzaga family (1539), and was

made a duchy in 1621. In 1748 it was given to the Duke of Parma, and in 1796 became a part of the Casalpine Republic. In 1847 it was an¬

nexed to Modena. Guastala is the seat of a

bishopric. The chief industries are the manu¬

facture of cheese and wine and the principal

buildings are the school of music, municipal

theatre, public library, gymnasium and the statue of Ferdinand I, by Leoni. Pop. town 2,700;

commune 11,900.

GUATEMALA, a republic in Central

America, bounded on the north by Mexico,

British Honduras and the Bay of Honduras, on

the east and southeast by the Gulf of Amatique, Honduras and Salvador ; on the south and southwest by the Pacific Ocean; and on the

west by Mexico. Its area is estimated at 48,290

square miles; its territory extending from lat.

13° 42’ to 17° 49’ N., and from long. 88° 10’ to 92° 30’ W.

The mountains of Guatemala are commonly

referred to as <(Cordillera of the Andes,®

(<Guatemalan Andes,® or simply ((Andes,® though there is no< propriety in those names. The

Andes terminate in northern Colombia, and

have no genetic connection with the mountains

of Central America. The latter (so far as the great _ continental ranges are concerned), are

also in their geologic history totally distinct from the Rocky Mountain system, or North

American Cordilleras, which terminate in south¬

ern Mexico. If the trends of the Andean and

Rocky Mountain systems were protracted from

their termini (in 70° W. and 97° W., respec¬

tively), they would not connect with each other, but would pass the latitude of Guatemala in

parallel lines nearly 2,000 miles apart. The

Guatemalan mountains belong to the Antillean

system, which lies between the termini just re¬

ferred to. Its ranges, composed of folded sedimentaries, in eastern Guatemala have an east—

and-west trend. But the ranges near the Pacific coast of the republic, crossing the western ends of the Antillean corrugations diagonally, or

with a northwesLand-southeast trend, form a

part of the volcanic chain which extends along GUATEMALA

the entire western coast of Central America,

and is continued in Mexico. The Sierra Madre

is the principal range of the west and south.

In the central and eastern districts are the

Sierra de Chama, Sierra de las Minas, Sierra

de Santa Cruz and the Sierra de Copan, the last named on the frontier of Honduras. The high¬

est points of the Cordillera are given as :

Tajumulco (12,600 feet), Tacana (12,400 feet),

both in the southwest; Acatenango (11,100

feet), south-central; and the Volcan de Fuego

(11,400 feet), also south-central.

Among the Guatemalan rivers emptying into

the Gulf of Mexico are: the Usumacinta, on the Mexican frontier, and the Cuilco and Salequa,

which are also tributaries of Mexican streams.

The following empty either into the Gulf of

Honduras or Izabal Lake (Golfo Dulce) : the

Montagua, Rio Hondo, the Dulce, the Belice,

the Sarstoon and the Polochic. Those which

flow into the Pacific are : Rio de los Esclavos, Rio de Paz, the Michatoya, Guacalate, Coyelate, Patulul, Nagualate, Samala, Tilapa, Naranjo

and Suchiate. Steamship navigation has been

established on the Dulce and Polochic rivers ;

seven or eight of the others are navigable for small boats. The most important lakes are :

Atitlan and Izabal (both navigated by steam¬

ers), Peten, Amatitlan, Ayarza and Giiija (on

the frontier of Salvador). Ports on the Carib¬

bean side of the republic are: Puerto Barrios, Livingston and Santo Tomas, the first two being ports of entry and delivery, while the last is a ((minor port,® at which importation and expor¬

tation are restricted to certain articles. On the Pacific coast the most important ports are : San Jose, 74ˆ4 miles from Guatemala City; Champerico and Ocos — all ports of entry and de¬

livery, provided with iron piers, *etc.*

The lowlands of the Pacific and Atlantic

coasts are torrid; interior table-lands, at an alti¬

tude of 2,000 to 5,000 feet, have an agreeable climate ; and the high districts, where the eleva¬

tion is more than 5,000 feet, are decidedly cool.

The larger towns are built in the temperate or cool zones. The rainy season, beginning in

May, lasts until October in the interior, but

sometimes until December, on the coast. De¬

cember and January are the coldest months;

March and April the hottest. Snow sometimes

falls (in December or January) on the uplands

of the cool zone.

The rich soil and varying climatic conditions

favor a wide range of products in the vegetable kingdom ; no systematic classification of these, however, has yet been made. The extent of the forest land, which abounds in mahogany, is es¬

timated at 1,300,000 acres. The fauna and avi¬

fauna resemble those of Costa Rica in general.

Deer are quite numerous. Tapir, honey-bear,

armadillo, wild pig, cougar and jaguar, are

found throughout Central America. The over¬

abundance of insect life is particularly note¬

worthy.

Gold and silver are found near Montagua

River and elsewhere; salt in the departments of Alta Verapaz and Santa Rosa. Other minerals

are : coal, lignite, manganese, lead, tin, cinna¬

bar, copper, kaolin, opals, slate, alum, antimony, marble, alabaster, sulphur, ochre, asbestos,

plumbago, chalk and bitumen. A belt of coun¬ try extending from the coast range of moun¬ tains on the western frontier, near the Pacific, across the Sierra Madre to the coast range of the Caribbean slope, is essentially a mineral ter¬ ritory, in which there has been comparatively little systematic exploiting or prospecting.

History. — Pedro de Alvarado, one of the lieutenants of Cortes, 1523-24 conquered the country, and on 25 July 1524 proclaimed the sovereignty of Spain at Almolonga, the native town which was afterward to be known as Santiago de los Caballeros. After the conquest all of the territory now divided among the Cen¬ tral American countries was included in the Captain-generalcy of Guatemala. Independence of Spanish rule was proclaimed 15 Sept. 1821. Annexation to the Mexican empire under Itur— bide followed (5 Jan. 1822). An assembly of representative citizens of Guatemala and the other Central American provinces on 1 July 1823 declared the whole country to be independent, with reference to Mexico, Spain and all other nations, <(whether of the Old or of the New World.® Accordingly the United Provinces of

Central America came into existence. Guate¬

mala seceded from this union 17 April 1839.

The name Republica de Guatemala was assumed

21 March 1847. Between 1839 and 1851 there

was a series of bitter struggles with Salvador for supremacy, fortune favoring the smaller re¬

public. But in the year last mentioned Guate¬

mala began to be successful, and, under the

leadership of Rafael Carrera (president until

1856, and subsequently life-president or dicta¬

tor), carried the war into Salvador (1863) and regained the controlling position in Central

America. Carrera appointed his own successor

and died in 1865. The next significant admin¬

istration was that of Gen. Justo Rufino Barrios, who was put into office by the Liberals, after their onslaught upon the Jesuits. Barillas was

elected to the presidency in 1886. In 1890 and 1891 the progress of the country was checked

by epidemics of cholera and smallpox. On 15

March 1892 Jose Maria Reina Barrios was in¬

augurated as president, and by a decree of the National Assembly (30 Aug. 1897) his term

was extended to 15 March 1902, in direct viola¬

tion of the constitution, which was proclaimed

in 1879 and modified in 1885, 1887 and 1889.

He was assassinated 8 Feb. 1898. Senor Manuel

Estrada Cabrera was proclaimed acting presi¬

dent, and received the support of the army.

An insurrection begun under General Castillo's

leadership 28 July was put down, but only to be quickly followed by another revolutionary move¬

ment. Insurgent forces commanded by Morales

offered a stubborn resistance in the southwest, until Morales was captured. When peace had

been restored, Cabrera was the only candidate

for the presidency, and his election was an¬

nounced 25 Sept. 1898. In the following year

the government of Guatemala made a proposi¬

tion which was equivalent to repudiation of a

part of its foreign debt, but yielded to Ger¬

many's protest, or threat, to use force and

withdrew the suggestion. Earthquakes which

occurred in April 1902 caused great damage in

several districts. Amatitlan, Mazatenango, San

Marcos, Solola and San Felipe suffered severely, and Quezaltenango, in importance the second

city of the republic, was totally destroyed. An eruption of the volcano Santa Maria followed

on 24 October, and there were outbursts from

new craters in November. Several thousand

persons lost their lives through these disasters, and the injury to property (plantations, build-518

ings, machinery and cattle) has been estimated

at $5,000,000 to $10,000,000. A convention be¬

tween the United States and Guatemala relat¬

ing to the tenure and disposition of real and personal property was signed 27 Aug. 1901, and ratifications exchanged at Guatemala 16 Sept.

1902. A revolt in 1906, under the leadership of General Barillas, spread to the other Central

American countries. The governments of the

United States and Mexico interposed. An ar¬

mistice (19 July) served not only to restore

order for the time being, but also paved the

way for the Central American Peace Conference

held at Washington in 1907. In 1910 Cabrera's

third complete term as President began. In

1913 Great Britain sent a warship to Guatemala and demanded settlement of claims. The

country without a navy appealed to the United

States, and an agreement was made in regard to the debt. In 1915 a boundary treaty was signed with Honduras. In 1917 Cabrera was reelected

President for the ensuing six years. Guate¬

mala was the first of the Central American na¬

tions to sever diplomatic relations with Ger¬

many in connection with the European War and

to place the ports and railways of the country at the disposition of the United States for the common defense. Guatemala city was de¬

stroyed by earthquake in December 1917.

Government and Education. — The legisla¬

tive power is vested in the National Assembly

(a single house), whose members (deputies)

number one for every 20,000 inhabitants, and are elected for four years by popular vote. The

executive power is vested in a president, elected for six years by direct vote of the people. The administration is carried on under the president, by ((six secretaries of state,® each of whom has charge of a separate department (ministerio) .

These departments are: Government and Jus¬

tice, Foreign Relations, Public Instruction, Pro¬

motion of Public Welfare (Fomento) , Treas¬

ury and Public Credit and War. The council

of state is an advisory board, of which five

members are chosen by the assembly and four,

in addition to the Cabinet, appointed by the

President.

The <(Political head® (Jefe Politico) of each department of the republic is appointed by the president, whose authority he exercises in pro¬

vincial matters. The local officials locally

elected are: the Alcaldes (one or more for each municipal district) and the Rcgidores or mem¬

bers of the municipal council (Alcalde and Reg-idor correspond respectively to mayor and aiderman) .

The Supreme Court of justice consists of a

chief justice and four associates, elected by the people. There are six courts of appeal, each

consisting of a chief justice and two associates, also elected by the people. Courts of the first instance are 29 in number. Their judges are

selected by the president among the candidates

approved by the chief justice of the Supreme

Court.

Public instruction, supported by the govern¬

ment, is secular and gratuitous ; primary in¬

struction is obligatory; free education is

guaranteed by the constitution. The chief in¬

stitutions for secondary education in Guatemala

are the Central National Institute for Boys,

with an enrollment in 1913 of 553 pupils; the Central National Institute for Girls, with 385

pupils; the National Institute and Normal

School Annex for Boys, at Chiqumula, with 274

pupils; and a similar school for girls in the same city, with an enrollment of 80 pupils; the National Institute for Boys and Practical and

Commercial School Annex at Quezaltenango,

with 40 pupils. The national library contains

30,000 volumes and many valuable unpublished

documents. Other libraries accessible to the

public are those of the professional schools,

the Supreme Court, national institute for men

and academy of teachers. Public libraries are

maintained in the larger towns. The national

printing office at the capital is regarded as one of the best establishments of its kind in Latin America. More than 30 daily papers and other

periodicals are published in the country. The

constitution guarantees liberty of conscience.

The government recognizes no creed. The pre¬

vailing religion is Roman Catholicism.

Agriculture, Commerce and Industries. —

Coffee grows in the regions between 1,000 and

6,000 feet above the sea-level. The districts

best suited for growing coffee are Antigua,

Barberena, Costa Chuva, Alta Verapaz, Costa

Cuca, Costa Grande, Pochuta and Tumbador.

The total production for the 1916-17 season was 80,000,000 pounds valued at from $10,000,000 to $12,000,000 gold. The average yield per acre

was approximately 800 to 830 pounds, the total area under coffee cultivation being 98,800 acres.

Germans own and control between 50 and 60

per cent of the coffee plantations ; only a very small proportion represents American invest¬

ments. In 1915 the United States took 66 per

cent of the crop, and between 75 and 80 per

cent the year following, the remainder going

to the Scandinavian countries. Sugar cane

grows between sea-level and 5,000 feet. In

1915, 30,000,000 pounds of sugar were produced, an increase of 20 per cent over the crop of

1914. The bulk of this production was ex¬

ported to the United States and British Colum¬

bia. Cacao grows in the lowlands or those

regions having an altitude of less than 3,000

feet. Tobacco and wheat are also produced in

large quantities. Corn or maize and beans or

frijoles form almost exclusively the daily food of nearly three-fourths of the people of

Guatemala. The production of corn is suf¬

ficient for local consumption, amounting to

600,000,000 pounds, a yield of 1,300 to 1,800

pounds per acre annually. Of beans the an¬

nual production is about 180,000,000 pounds.

Stock-raising has been encouraged in the de¬

partments of Izabal, Zacapa, Peten and Alta

Verapaz, by decrees authorizing the political

chiefs of those departments to make grants of land to persons who establish ranches. Money premiums have been offered to cultivators of india rubber, cacao, sarsaparilla and hemp ; grants of land to those who engage in the cultivation of wheat and bananas. Proprietors of large cotton or tobacco plantations, and reliable day laborers on large plantations of coffee, sugar cane, bananas or cacao, are ex¬ empted from military service. No tax of any kind is levied for 10 years upon plantations of hemp, flax, ramie, cotton, grapes and several other products. The chicle industry is growing fast, particularly in Peten. In

1915, 7,238 quintals, valued at $231,624, were exported.

In 1916, the total imports of Guatemala amounted to $6,725,601, and the total exports

to $10,618,176, making the total foreign trade

equal to $17,343,777. During the year ending

July 1917, the United States exported goods to the amount of $5,228,325, and imported $8,668,-

573 ; the United Kingdom imported $86,087,

and exported $1,056,795; France exported

$149,515; Spain, $75,365 ; and other countries,

$215,601. The Netherlands imported $947,042;

Sweden, $245,183; Honduras, $97,619; Germany,

$91,658, and other countries, $482,014. The

value of the coffee exported is about 80 per cent of the total value of the country's exports.

During 1915, Guatemala manufactured 11,893,-

456 bottles of aguardiente, or brandy, valued ap¬

proximately at $1,200,000 United States gold,

and imported wines, liquors and beer to the

value of $125,583 United States gold.

The great increase of trade with the United

States is due largely to the European War.

Coffee constituted the chief article of ship¬

ment, the value being $6,301,337, followed by

bananas, valued at $1,035,427, and hides, over

$500,000. Of the imports the share of the

United States was $5,228,897, or 77.74 per cent of the total. The chief imports from the United States were cotton goods valued at $952,086,

flour amounting to $612,809. The United

States supplied also 93 per cent of the manu¬

factures of iron, copper, tin and lead and their compounds ; 95 per cent of the industrial and

agricultural machinery, and all of the railway

material.

For the partial supply of local needs a num¬

ber of small manufacturing establishments are

maintained, the chief products being coarse

textiles, hats, leather, shoes, pottery, cement

tiles, cigars, musical instruments, furniture,

agricultural implements and liquors. The salt

industry is important on the Pacific coast and there are salt mines in Huehuetenango and

Verapaz. In 1915 the production amounted to

12,880,000 pounds.

Communication. — Steamers of the coast¬

wise service between San Francisco and

Panama make regular calls at San Jose, Ocos

and Champerico. From New York to Puerto

Barrios, passengers and freight are carried by

two steamship lines. The steamers of the

American Fruit Company ply between New

Orleans and Puerto Barrios. The Central

Railway, the first line built in Guatemala, was completed in 1882 to connect the port of San

Jose with Guatemala City. In 1904 the Guate¬

mala Railway Company was incorporated under

the laws of the State of New Jersey; and in

1912, this latter concern affected a union of the principal railways of the Republic, the Central, the Occidental and the. Ocos railroads, under

the title of the International Railways of Cen¬

tral America. Under this consolidation, the

Occidental is considered as a separate road, a majority of the stock of which is in the hands of the new corporation. The International

Railways, which have a total length of 520

miles include the line from Puerto Barrios on

the Atlantic, to San Jose on the Pacific (270.5

miles) ; that from Santa Maria to Mazatenango

(63 miles) ; that from Mazatenango to Puerto

Champerico (42 miles) ; the branch to San

Telipe (9 miles) ; that from Ocos (port) on

the Pacific by way of Ayutta (on the National Railways of Mexico) to Vado Ancho (51

miles) ; that from La Union, on the Pacific to Lempa River (84 miles). Several other

branches are projected or actually under con¬

struction. By the railway concessions the gov¬

ernment of Guatemala has the right to pur¬

chase the property at an arbitrary price in some cases, while in others the lines revert to the nation without any payment at the end of a cer¬

tain time. There are some short private in¬

dustrial lines which are not in the hands of the management of the International Railways,

which is closely allied to the corporation which controls the United Fruit Company. The latter

has made of Puerto Barrios a good modern

port. The Pacific ports of the republic are

still mere open roadsteads with very irregular

steamship service. The republic had in actual

operation in 1916 about 4,300 miles of telegraph and telephone wires, with over 333 offices and stations.

Finances. — The foreign debt is held mainly

in England and Germany, and interest on it

is already about 18 years in arrears; the total public debt being approximately $17,600,000

gold, of which about $12,000,000 (including ar¬

rears of interest) is the present amount of

the foreign debt. The public revenues are de¬

rived chiefly from duties on imports and an

export tax on coffee. The budget for 1915-16

was estimated at 60,082,640 pesos paper, or a lit¬

tle more than $3,000,000. In 1916 the republic sustained its foreign

credit by an advance pay¬

ment of 4 per cent on the English debt.

Guatemala has nominally the silver standard.

The present currency, however, is inconvertible

paper, which although it circulates freely in

the republic, has no fixed value in relation to gold or foreign exchange. The silver peso,

divided into 100 centavos and weighing 25

grammes of silver, .900 fine, or say 22.500

grammes fine silver, was adopted in 1870 as the monetary unit. It is in reality the unit of

account. At present, practically no gold or

silver coins circulate. The principal banks —

all located in Guatemala City — are the Banco Americano de Guatemala, Banco de Guatemala

and Banco Internacional.

Guatemala is administratively divided into

22 departments. The total area of the republic is estimated at 48,290 square miles and the popu¬

lation in 1916 was estimated at 2,119,165. The departments, with their capitals and the popu¬

lations of the latter, are as follows :

Population

30,770

8,408

10,608

3,749

12,562

1,671

11,914

12,343

90,000

10,279

1,978

12,246

11,023

32,000

6,327

10,150

6,036

3,062

7,627

6,970

28,310

11,964

department

Alta Verapaz. . ,

Amatitlan .

Baja Verapaz . .

Chimaltenango .

Chiquimula

El Pet6n . .

El Quiche .

Esquintla .

Guatemala

Huehuetenango

Izabal .

Jalapa . .

Jutiapa . .

Quezaltenango .

Retalhuleu

Sacatepequez. . ,

San Marcos

Santa Rosa

Solola .

Suchitepequez. .

Totonicapam …

Zacapa .

Capital

Coban .

Amatitlan .

Salamd .

Chimaltenango .

Chiquimula ….

Flores .

Santa Cruz ….

Esquintla .

Guatemala City

Huehuetenango .

Livingston .

Jalapa .

Jutiapa .

Quezaltenango .

Retalhuleu ….

Antigua .

San Marcos… .

Cuajiniquilapa .

Solold .

Mazatenango . .

Totonicapam . . ,

Zacapa .

Full-blooded Indians are much more numerous in Guatemala than in other Central American countries ; in fact they, with the Indians of mixed blood, ladinos and mestizos, make up the bulk of the population. The natural increase among these people is indicated in the report of the secretary of public works for 1901, which shows 66,728 births in that year against 35,618 deaths, a gain of 31,110 persons. The total number of inhabitants in 1916 was given as 2,119,165.

Bibliography. — Alvarado, P. de, (Documents Antiquos : copia de dos Cartas de don Pedro de Alvarado5 (Guatemala 1913) ; Cosby, J. T., <Latin American Monetary Systems and Exchange Conditions) (New York 1915) ; Brigham, T., (The Land of the QuetzaP (London 1887) ; Donville-Fife, C. W., Guatemala and the States of Central America) (London 1913) ; Habel, S., (The Sculptures of Santa

Lucia Cosumalwhuapa in Guatemala5 (Wash¬

ington 1878) ; Hewett, E. L., Two Seasons'

Work in Guatemala5 (Archceol . Inst, of Amer¬

ica Bull., Norwood, Mass., 1911) ; Keane, A. H., (Central and South America5 (London 1911) ;

Mjaudslay, A. C. and A. P., (A Glimpse of

Guatemala5 (London 1899) ; (Munro, D. G.,

(The Five Republics of Central America5

(New York 1918) ; Niederlein, G., (The Re¬

public of Guatemala5 (Philadelphia 1898) ;

Pan American Union, (Guatemala5 (Washing¬

ton 1915) and (Latin America5 (Washington

1916) ; Sands, W. F., (Mysterious Temples of

the Jungle: the Prehistoric Ruins of Guate¬

mala5 (National Geog. Mag., Washington

1913) ; Squier, E. G., (The States of Central America5 (New York 1858).

GUAVA, gwa'va, the name of several trop¬

ical plants of the myrtle family which yield de¬

licious fruits. The common guava (Psidium

quajava) is a low bush tree, bearing fragrant white flowers on solitary axillary stalks, from each of which develops a fruit larger than a

hen's egg, roundish or pear-shaped, smooth,

yellow; the rind thin and brittle; the pulp

firm, full of bony seeds, aromatic and sweet.

The jelly or preserve made from it is highly

esteemed, and pleasantly mingles tartness with

sweetness. The rind is stewed with milk, and

is also made into marmalade. This fruit is

rather astringent than laxative. Guava buds,

boiled with barley and licorice, make a useful astringent drink in diarrhoea. This guava is

now naturalized in all the warmer parts of the world, and in many, especially Ceylon, has run wild. The common guava and the Cattley or

strawberry guava (P . cattleianum) are grown

extensively in Florida and southern California.

Several other species are cultivated ; as the

mountain guava of the West Indies (P . mon—

tanum) and the marangaba, a dwarf species

(P. pygmceum) of Brazil, with fruit no larger

than gooseberries. See Guayabo.

GUAVIARE, gwa-ve-a'ra, or GUAYA—

BERO, gwl-a-ba'ro, a river of Colombia,

South America, which rises in the Cordillera

Oriental near Bogota, flows eastward for 750

miles, forms the boundary between the depart¬

ments of Cundinamarca and Cauca, and joins

the Orinoco near San Fernando de Otabapo.

It is navigable for nearly 500 miles.

GUAVO, any of various trees of the

mimosa family and genus Inga, growing in

Costa Rica and other parts of Central America.

Their leaves have six to eight leaflets and the flowers are very conspicuous by reason of their long feathery, white filaments. The fruit is a huge pod, varying in shape but usually flat,

like that of the lima bean ; in one species it is 2 inches wide and 12 inches or more long. The beans of some species, especially Inga edulis,

are embedded in a sweet white pulp that has

a pleasant taste and is commonly eaten by

children. These trees are good nitrifiers.

GUAYABO, gwi-ya'bo, the tree (Psidium

guajava, family Myrtaceae) from whose fruit

guava jelly is made. The guayabo of Costa

Rica grows to 25 or more feet in height, often in groves and resembles in growth and habit

of branching, a neglected old apple-tree. The

outer layers of the bark peel off and curl up lengthwise of the stem into tight rolls, and

there gradually drop off, the result of which is that this tree remains free of epiphytic plants.

Its fruit is cherry-like in shape, growing in

groups of three, ripens in mid-autumn and is

used mainly for making guava jelly and other

sweetmeats. Although eaten cooked, as a rule,

it is very good raw when ripe, but rarely

reaches perfection because so many birds and

other animals are fond of it. It is usually

gathered and cooked while still green.

GUAYAMA, gwl-a'ma, Porto Rico, town

in the department of Guayama, near the port

of Arroyo and the southeastern corner of the

island. The surrounding region is very fertile.

Pop. 8,321.

GUAYAQUIL, gwl-a-kel', Ecuador, a sea¬

port city, the capital of the province of Guayas, on the river Guayaquil, 25 miles above its mouth in the Gulf of Guayaquil, on the Pacific Ocean.

The site is low and unhealthful, but the sanitary conditions have been improved by a modern

system of waterworks and of drainage. Other

modern improvements include street railways,

gas-lighting and telephone service, while a rail¬

road connects with the interior. The chief

buildings are the custom house, town hall, a

college, technical school and the cathedral. Ves¬

sels of 18 feet draught reach the town, and the river and its tributary, the Daule, are navigable for smaller vessels, a considerable distance

above the town. The export trade averages

$6,500,000 annually, cocoa representing nearly

five-sixths, the rest being, coffee, ivory-nuts, rubber, hides and specie. Cottons, hardware

and other manufactured articles are imported.

The industrial establishments include steam saw¬

mills, foundries, machine-shops, ice factories

and a large brewery. The town was founded

25 July 1531, on Saint James' day, whence its official title Santiago de Guayaquil. It has had an eventful history, being attacked by pirates, Dutch, French and English, and suffering from

disastrous conflagrations, on the last occasion

in 1896. Pop. about 55,000.

GUAYAQUIL, a gulf of the Pacific, in the

republic of Ecuador. It has a wide entrance,

narrowing as it extends inland, and receiving at its head the Guayas River, wh:ch has at the

city of Guayaquil a depth sufficient to admit

the vessels of the Pac'fic Steam Navigation

Company and other lines engaged in West

Coast passenger and freight service. In this

gulf and lying between the city and the Pacific Ocean is the island of Puna.

GUAYAQUILLITE, gwi-a-ke'let, a fossil

resin found in extensive quantities near Guaya¬

quil, Ecuador, where it has formed part of the commerce of the country for centuries. In

pre-Columbian times it was offered to the gods on certain set occasions each year. It is of a pale yellow color and can be easy pulverized.

GUAYAS, gwi'yas, South America, a river

of Ecuador. It rises in the western Andes,

flows southwest draining a basin of some 15,000

square miles and empties into the Gulf of

Guayaquil.

GUAYMAS, gwl'mas, Mexico, city in the

State of Sonora. It is situated on the Gulf of California, and owes its importance to its har¬

bor, its railway connections and to the proximity of the valuable mining and grazing regions in

the northwestern part of the republ.c. Exports

are gold, silver, hides, *etc.* Pop. about 9,000

in 1917.

GUAYRA (gwi-ra') FALLS, Brazil and

Paraguay, a cascade of the Parana River, on

the boundary between the countries mentioned ;

the result of a contraction of the river-bed

from a width of 4,470 yards into a narrow

gorge, 65 yards wide, the waters making a

plunge of 56 feet. (<These falls, situated in the midst of a desolate region, far from human

habitation, and rendered almost inaccessible by

virgin forests, rapids, and other obstacles, have been visited by very few, though they are said to form one of the grandest spectacles in the world. The volume of water which passes

over them is twice that of Niagara.® Consult

<Paraguay) (2d ed. revised by J. S. Decoud,

Washington, Government Printing Office 1902).

GUAYULE, gwa-yoo'la, or HUAYULE,

rubber obtained from a shrub (Parthenium ar—

gentatum) of the family Compositae, common

in Mexico. This shrub seldom exceeds three

feet in height, has lanceolate leaves and gray bark on stem and twigs. It grows in New

Mexico and Texas, but is of commercial im¬

portance only in the Mexican states of Coahuila, Chihuahua, Durango, San Luis Potosi and Za¬

catecas. To obtain the rubber the entire plant is dried and the rubber

extracted from bark

and wood by patented processes. The plant is

now grown artificially as the nature supply

was insufficient to meet the demands of com¬

merce. The Mexican crop in normal years is

about 10,000,000 pounds and forms the basis

of a great industry. Consult Lloyd, (Guayule, a Rubber Plant of the Chihuahuan Desert* (Car¬

negie Institute, Washington 1911).

GUAZUMA, gwa-soo'ma, a genus of shrubs

or small trees, native of Mexico, Central Amer¬

ica and some of the West Indies, the leaves of which are used extensively as fodder for cattle and more especially for horses and mules. It

very much resembles the elm in general appear¬

ance, bears a tuberculated fruit and fibrous

roots that yield a strong and excellent fiber.

It has been naturalized in Europe and India.

GUBAT, goo'bat, Philippines, a pueblo of

the province of Sorsogon, Luzon, on the east

coast of the Bay of Gubat, 11 miles southeast of the provincial capital Sorsogon. The waters

of the bay were formerly infested by pirates,

who terrorized the surrounding region. Pop.

about 16,000.

GUBBIO, goo'be-o, Italy, city in the prov¬

ince of Perugia, Umbria, 70 miles east-south¬

east of Arezzo and 23 miles north-northeast

of Perugia. Gubbio is a quaint mediaeval town, straggling up the side of the hill, some 1,700

miles above sea-level. It contains several fine old buildings : the Palazzo dei Consoli, dating from the 14th century; the Residenza Munici¬

pal (formerly the Palazzo della Podesta)

which contains the Eugubine Tablets and some

excellent specimens of Umbrian paintings, fur¬

niture and majolicas; the Palazzo Ducale, the

ancient residence of the Dukes of Urbino; the

Palazzo Beni ; and the Palazzo Accoramboni.

The churches include the cathedral of Saint

Mariano e Jacopa, Saint Francesco and Saint

Maria Nuova and Saint Pietro. It is an epis¬

copal city, and became a possession of the Pope in 1624. The procession of the Ceri is held

here annually on 15 May in honor of Saint

Ubaldo, who, as bishop, saved it from siege

by Frederick I. The chief manufactures are

linen and silk. Trade is carried on in cattle, grain, wine and oil. Gubbio has been famous

for its majolicas ever since Giorgio Andreoli

perfected their manufacture. It is also the

birthplace of Oderisio, a miniature painter, and of several lesser artists whose works are found in the various churches. Pop. of town, about

6,000; of commune 27,500.

GUBEN, goo'ben, Germany, a town in

Brandenburg, at the junction of the Lubis and

the Neisse rivers, 28 miles south-southeast of

Frankfort-am-Oder, having railway connec¬

tions with Breslau, Halle and Forst. The chief industries are dyeing, tanning, hat, cloth, paper, cardboard and wool manufacture; and there is

trade in fruit, vegetables and wine. It fell

into the hands of Prussia in 1815. Pop. 38,600.

GUBERNATIS, goo-ber-na'tes, Angelo de,

Italian Orientalist: b. Turin, 7 April 1840; d.

1913. He was educated at the University of

Turin, and went to Berlin in 1862 to study phi¬

lology. He was appointed professor of Sans¬

krit in the Instituto degli Studi Superiori, Flor¬

ence. Owing to Socialistic tendencies he re¬

signed, changed his views again and was reap¬

pointed in 1867. He went to the University

of Rome in 1867. The Zoological Mythology >

(1872) brought him international fame. He

founded the Italian Asiatic Society in 1886

and wrote much in various departments.

Among his works are (The First Twenty

Hymns of the Rig-Veda) (1865) ; (Death of

Cato> (1863), a metrical drama; (King Nala,*

an Indo-Brahmin play; Gabriel,* a novel and

(Dictionnaire International des Ecrivams du

Tour* ; (Dizionario degli artisti italiani viventi*

(1889-92); (Storia universale della letteratura

dai primi tempi e presso tutti i popoli civili fino ai nostri giomi, con florilegi da ogni letteratura) (1882-85). He founded and edited sev¬

eral periodicals La letteratura civile (1889);

JtaHa letteraria (1862); La CivVtd italiana

(1865) ; Rivista orientate (1867-68) ; Rivista <

europea (1869-76) ; Bolletino italiano degli studi orientaH (1876 et seq.) ; Revue Internationale

(1883-87). He also directed the Giornale della

societd asiatica italiana after 1887.

GUDDEN, goc/den, Bernhard von, German

physician : b. Cleves, 1824 ; d. 1886. He studied at Bonn. Berlin and Halle, where he under¬

took special work in the care of the insane.

After rendering important medical service at

the asylums at Siegburg, Illenau, and Wurz¬

burg, he became professor of psychiatry at

Zurich (1869) ; at Munich, three years later;

and was ennobled in. 1875. In that year he was appointed physician in charge of the mad King

Louis II, and ended his life by his efforts

to save the king from drowning in Starnber—

gersee. His publications include (Beitrage zur

Lehre von d£r Scabies> (2d ed. 1863) ; (Ex—

perimentaluntersuchungen iiber Schadelwachs—

tum' (1878). His posthumous papers were

edited by Grashey. Gudden was also one of

the editors of (Archiv fur Psychiatrie und

Nervenkrankheiten> (1868 et seq.).

GUDEMAN, Alfred, American philologist:

b. Atlanta, Ga., 26 Aug. 1862. He studied at

Columbia University, and then took his doc¬

tor's degree at the University of Berlin. On

his return to the United States he became

professor of Greek and Latin at Johns Hop¬

kins (1890-93) ; University of Pennsylvania

(1893-1902); Cornell (1902-04). > Since 1904

he has been at Munich, engaged in important

philological work on the (Thesauraus Linguae

Latinae.' His published works include editions

of (Tacitus,> (Agricola,' <Germania,) (Dialogus de Oratoribus) and Sallust's (Catalina.'

He also wrote (History of Classical Philology) (1902) ; (The Sources of Plutarch's Life of

Cicero' (1902) ; (Grundniss der Geschichte der

Klassischen Philologie' (2d ed. 1909) ; (Imagines Philologorum,' ,a series of sketches of

famous classical scholars (1910) and contrib¬

uted many articles to Johnson's Encyclopaedia,'

Pauly-Wissowa's (Realcncyclopedie' and to

various journals and periodicals.

GUDEMANN, Moritz, Austrian scholar:

b. Hildesheim, Germany, 19 Feb. 1835. Called

first to Magdeburg (1862) and then to Vienna

in 1866, in the latter city he developed his

literary activity in connection with his work as rabbi. He directed his attention chiefly toward the history of Jewish education and culture,

one of the few authorities in that rich field, for his style, learning, and accuracy. His

chief books in this department are (Jewish

Education during the Spanish-Arabian Period'

(1873) ; (History of Education and Culture of the Western Jews' (3 vols., 1880-88) ; (Sources for the History of Instruction and Education

among the German Jews' (1894).

GUDGEON, guj'on, a small European

fresh-water fish (Gobio fluviatilis) of the carp family. It swims in shoals, and affords great

sport to anglers from its greediness in seizing upon any bait presented. Its name has there¬

fore come to mean a person easily <(fooled"

to his hurt.

GUDRUN, goo-droon', a Middle High Ger¬

man folk epic composed by an unknown poet

in Bavaria or Austria about 1210. It is a com¬

panion piece to the Eihelungenlied,' of which

it is an evident imitation, as is shown, among other things, by the form of the strophe, which is only a variant of the Nibelungen strophe,

having five accents in the last half of the

fourth line instead of four. Just as the <Ni-

belungenlied' has been called a German Iliad,

so the (Gudrun' may be considered a German

Odyssey, not only because of its happy ending, but because of the many combats and adven¬

tures on the sea and adjacent shores. In this respect the poem occupies a unique position

in German literature. In marked contrast to

English, German poetry has rarely concerned

itself with the sea. The (Gudrun,' however,

reflects the desperate battles of early Teutonic times between the Vikings and the Danes along

the shores and islands of the North Sea.

Like the (Nibelungenlied' the (Gudrun' is

based on earlier ballads which have been

welded into one long epic of over 6800 lines.

It stands in close relation to minstrel epics

like (Duke Ernst' and (King Rother,' as it

introduces features taken from the orient, and

describes a journey for a bride. It portrays

the adventures of three generations of the same family, and may therefore be divided into

three distinct parts, each of which is based on a separate saga. The first relates the story

of Hagen of Ireland who was carried away

as a child by a gigantic bird and dropped on a desert island where he grew up with three

princesses who had been abducted in a similar

manner. Finally they are rescued by a passing

ship and returned to Ireland, where Hagen

marries Hilde, the fairest of the three maids.

This part is probably original with the author of the poem, and is a mixture of motifs taken from various minstrels and courtly epics. The

second part tells the story of Hilde, the daugh¬

ter of Hagen, an old saga related by Snorri

Sturleson, the author of the <Edda,' and the

subject of a Danish ballad. It describes how

Hetel, the king, of the Hegelings sends Wate

and other warriors disguised as merchants to

obtain for him the hand of Hilde, the daugh¬

ter of Hagen, who had refused all suitors and had hanged the messengers. By selling their

wares under price and by the entrancing sing¬

ing of the minstrel Horand they lure the prin¬

cess on board one of their ships and carry

her away before her parents' eyes. Hagen pur¬

sues them as soon as his leaky ships can be

made ready and a fierce fight ensues upon the strand of Hetel's land. Hetel is wounded by

, Hagen and the latter by Wate. Hilde intercedes for the life of her father, who now consents

to her .marriage with Hetel. The third part

deals with the adventures of Gudrun, again the theme of a separate ballad and to a certain

extent a repetition and extension of the Hilde saga. It relates that two children, Ortwin,

a son, and Gudrun, a daughter, are born to

Hetel and Hilde. So great is Gudrun's beauty

that several warriors sue for her hand. Sieg¬

fried of Morland, and Hartmut, son of King

Ludwig of Normandy, are rejected and depart.

A third, Herwig of Seeland, is likewise re¬

fused, but he attacks Hetel's castle and by his bravery succeeds in winning the heart of Gud¬

run and becomes engaged to her. When Sieg¬

fried learns this, he attacks Herwig's land.

Hetel and Herwig set sail to defend it. While they are absent, Hartmut and his father de¬

scend on Hetel's land and abduct Gudrun and

her maidens. Called home by messengers,

Hetel and Herwig pursue and overtake the

abductors upon an island where they are rest¬

ing. A fierce battle ensues in which Hetel

falls by Ludwig's sword. The Normans escape

in the darkness with Gudrun ; and when she

refuses to marry Hartmut, she is treated with

great cruelty by his mother Gerlind and is

made to perform the most menial tasks. For

13 years she endures this life, sustained by

her love for Herwig. One morning when wash¬

ing clothes on the seashore, barefoot in the

snow, she and the faithful Hildeburg see a

bark approaching, bearing two men. These

prove to be Gudrun's brother Ortwin and her

lover Herwig. After a touching reconciliation

the young men depart and next morning at¬

tack Hartmut's castle. In the battle that fol¬

lows Ludwig is killed by Herwig, Hartmut and

80 knights are taken prisoners, and all others are slain. Wate forces an entrance to the

castle and kills even the children in the cradle that they may not live to grow up to harm them.

He beheads Gerlind with his sword, but

spares the life of Hartmut's sister Ortrun, who had been kind to Gudrun. Their mission ac¬

complished, the warriors return to Hegelingen,

where Gudrun is joyfully received by Hilde.

The old feud is peacefully settled by the

marriage of Ortwin to Ortun and of Hartmut

to Hildeburg. Siegfried marries Herwig's

sister and Herwig is happily united to Gudrun.

The Gudrun is to-day* ranked next to the

(Nibelungenlied) but it is much less virile and dramatic and much more lyrical and romantic

than the latter. In both poems the main char¬

acter is a woman, but whereas Kriemhild plays

an active part in the vengeance visited upon her brothers for the murder of Siegfried, Gudrun

is the type of the passive, untutored woman

of an earlier age, patiently enduring all hard¬

ships, unswerving in her fidelity to her lover through weary months and years. For some

reason the poem was not very popular during

the Middle Ages and has been preserved for us only in one late manuscript, the so called

Ambras Ms. containing several Middle High

German epics, compiled at the instance of

Emperor Maximilian at the beginning of the

16th century. It was discovered in 1817, but

excited little or no attention at first. Not till 1837 did an edition in Middle High German

appear. The best editions are those of Martin

(1873; 2d ed. 1902); Bartsch (4th ed., Halle

1880) ; Piper (1895) ; Kiirschner's (National—

LiteraturL F. Panzer has written on the

sources : (Ueber Sage und Dichtung der Hilde—

Gundrun Sage> (Halle 1901). Good German

translations have been made by Simrock (1893) ; Klee (1878); L. Freytag (1888); Lagerlotz

(1900) and an English rendering by M. P.

Nichols (Boston 1889). Full English bibliog¬

raphy will be found in F. E. Sandbach, (The Nibelungenlied and Gudrun in England and America) (London 1904). It has been made the theme of several German dramas, none of any importance. Consult Siegmund Benedict <Die Gudrunsage in der neueren deutschen Literatur) (Rostock 1902).

Daniel B. Shumway,

Professor of German Philology, University of Pennsylvania.

GUEBERS, ge'berz, also GHEBERS, GABERS, GHAVERS, GEBIRS (Turkish Ghaur or Ghiaur, infidel, generally but probably wrongly derived from the Arabic kafir), a name applied by Mohammedans to the adherents of

the ancient religion of Zoroaster, who reside in Persia. They originally were subjected by the Mohammedans to much cruelty, but are now permitted a great degree of religious freedom. Those who fled to India are known as Parsis (q.v.). ^

GUEBRIANT, ga'bre'an', Jean Baptiste

Budes, Count de, French marshal: b. Plessis—

Budes, Bretagne, 1602; d. Rottweil, Swabia,

1643. He saw service first in Holland and later was placed in charge of the French troops

which were sent to the assistance of Germany

(1639). At the head of the allied troops he

defeated the Imperial forces at Wolfenbiittel

(1641) and at Kempen in the succeeding year.

Here he was raised to the rank of marshal.

While conducting the siege of Rottweil in

Swabia, he lost his life. Consult Le Laboureur, (Histoire du mareschal de GuebrianC (1656).

GUELDER (gel'der) ROSE, or SNOW¬

BALL, a cultivated variety of the Viburnum

opulus, or water elder, of the order Capri—

foliacece. In the European wild form, the in¬

florescence is a dense cyme whose outer flowers are barren and enlarged, but in the cultivated form all the flowers are neuter and conse¬

quently the plant can never set seed. A yellow dye is obtained from it, and the wood is some¬

times employed in making tobacco-pipes and

other articles.

GUELDERS, gel'derz, or GUELDER—

LAND. See Gelderland; Netherlands.

GUELL Y RENTE, goo-ely' e ran-ta',

Jose, Cuban author : b. Havana, Cuba, 14 Sept

1818; d. Madrid, 20 Dec. 1884. He studied law in Havana and Barcelona and practised his pro¬

fession in his native city. In 1848 he went to Spain where he married Josepha de Bourbon,

sister of the king. Besides several novels he

published (Philippe II, et Don Carlos devant

l'histoire) (1878), and other works.

GUELPH, gwelf, Canada, city and county-

&.eat of Wellington County, Ontario; on the

river Speed, and on the Grand Trunk and Ca¬

nadian Pacific Railways, 48 miles west of

Toronto; founded by John Galt, the Scottish

novelist (q.v.), in 1827. The river affords

abundant water power and the city, in a rich

agricultural and cattle-raising district, enjoys

a large trade. It is an inland port of entry and is the seat of a United States consulate. A fat stock show is held annually in December. It

has paper box, large flour, saw and planing-mills, and manufactories of foundry products,

machinery, pipe and tubing, musical instru¬

ments, sewing machines, agricultural imple¬

ments, woolen goods, carpets, furniture, car¬

riages, leather, soap, boots and shoes, *etc.* Good building stone is quarried in the vicinity.

There are eight public parks. The city owns

and operates its electric light, gas and power, its waterworks and street railway and also owns the Guelph Junction railway. It is the seat of the Ontario Agricultural College (q.v.) and of

the Macdonald Institute of Domestic Science.

Pop. 15,175.

GUELPHS, or GUELF& and GHIBEL—

LINES, names of rival political parties in Italy during the Middle Ages. The words are of

German origin, derived respectively from Welf,

the name of a princely family in Bavaria (from 524

which is descended the royal Brunswick line

and the line of Este), and Waiblingen, the name of a castle in Wiirtemberg belonging to Conrad of Hohenstaufen, the German emperor. In

the great battle of Weinsberg, 1140, the

war-cry of the partisans of Conrad was

aHie Waiblingen, that of the adherents

of the Duke of Saxony (of the house

of Welf) was (<Hie Welf.® Some years after

when the effort was made by the popes and

various states and princely houses of Italy,

among them the house of Este, to consolidate

opposition to the emperor, the two German

words, changed to Guelfo, Guelfi (plus), and

Ghibellino, Ghibellini, were adopted as party

designations by the Italians. At first and for a long time after the assumption of these names by the great parties in Italy, Guelf and Ghibelline, did really designate two opposing national policies — the policy of the dependence of the several states of the Peninsula on the empire, and the policy of Italian independence of Ger¬

many, and of resistance to imperial absolutism.

The states of northern and of central Italy were divided in their allegiance and they were con¬

tinually passing from one side to the other, but they were predominantly Ghibelline ; the states

of southern Italy were always Guelf. The popes were the mainstay of the Guelf party and thus were the assertors of the policy of Italian in¬

dependence and home rule. As usual with party

designations, ˆGuelf® and ˆGhibelline® con¬

tinued in use as the names of factions in no wise concerned with the question of imperialism.

See Italy — History of Middle Ages.

GUELPHS, Order of, frequently styled

the GUELPHIC ORDER, an order of knight¬

hood instituted for the kingdom of Hanover in

1815 by the prince-regent of England and Han¬ over, afterward George IV, of England, and conferred by the kings of Hanover until the absorption of that kingdom by Prussia in 1866.

GUEMAL, gwa'mal, either of two species of small Andean deer (Cervus chilensis or C. antis ensis) , whose antlers have only one fork¬ ing — a long brow-tine projecting straight for¬ ward; which have tusks in the upper jaws in both sexes; and whose fawns are not spotted.

GUEMEZ D,E HORCASITAS, gwa'math da or-ka'se-tas, Juan Francisco Conde de Re¬ villa Gigedo, Spanish military officer : b. Oviedo 1682; d. 1768. For his effective service at the siege of Gibraltar and at Oran he was appointed held marshal. Later he became governor of Cuba (1734) and Viceroy of New Spain (1746). It was under his rule that the fortifications of Vera Cruz and Acapulco were constructed. On his return to Spain (1755) he was made captain general of the army and president of the war council.

GUEMEZ, Pacheco De Padilla Horca-

sitas, pa-cha'ko da pa-de'lya, Juan Vincente,

Conde de Revilla Gigedo, Spanish provincial

governor: b. Havana, 1740; d. 1799. At the

siege of Gibraltar he was lieutenant-colonel of the Spanish Guards and rendered important

service. From 1789-94 he was Viceroy of New

Spain, where he proved himself a most able

administrator of internal affairs.. After he had been superseded, he became director of the

artillery of the Spanish army.

GUENON, a group of African monkeys of

the family Cercopithecus, and including several

species. They are very small and being hardy

and easily tamed are well represented in zoo¬

logical parks and menageries. They are also

the type found with organ grinders and in gen¬

eral the pet monkeys found all over the world.

In their native haunts they live in trees and great numbers usually inhabit the same district, the family being gregarious.

GUERARD, garar', Adolphe, French engi¬

neer: b. Vosges, 1841 After receiving his edu¬

cation at the Lcole des Ponts et Chaussees, he entered the army

engineering corps. He exe¬

cuted a number of important commissions for

the French government, including the canal con¬

necting the port of Saint Louis with the mouth of the Rhone ; various improvements on the

Rhone channel ; and the the harbor at Mar¬

seilles. Representing France, he was a member

of the International Commission for bettering

the sanitation at Cairo (1892) ; of the Interna¬

tional Consulting Commission of the Suez

Canal Company (1895) ; of the Consulting

Board of Engineers of the Isthmian Canal

Commission (1906).

GUERCINO DA CENTO, gwer-cheno

da chen'to, Italian painter: b. Cento, duchy of Ferrara, 1580; d. Bologna, 1666. His proper

name was Giovanni Francesco Barbieri, and

he was called Guercino from a squint in his

eyes. In 1621, having already acquired renown

as a painter, he was invited by Pope Gregory

XV, to Rome, but the premature death of this

pontiff induced him to return to his native town two years after. About 1642 he went to Bo¬

logna, where Count Aldovrandi received him in

his palace and entertained him with the most

magnificent hospitality. Guercino adopted three

different manners of painting, the first in imi¬

tation of Caravaggio, which being very dark, he quitted for that of the Caraccis, and latterly for a style still more light and sketchy; but his middle style is his best. He painted over 250

altarpieces and large historical works, beside

frescoes. His chief pictures are at Rome. The

most celebrated is that of the (Martyrdom of

Saint Petronilla) which has been copied in mo¬

saic to adorn one of the panels in Saint Peter's between the (Transfiguration* by Raphael, and

the (Communion of Saint Jerome,* by Domeni—

chino. His other chief pictures include a (Saint Anthony) at Padua; an (Annunciation at

Milan; (Saint Peter) at Modena; (Cephalus and Procris,* and a scene from the (Pastor Fido >

in the Dresden gallery; the (Parting of Priam and Hector) at Marseilles. The galleries of

Bologna, Florence and Paris, besides some of

those of England and Germany, also possess

specimens of this master.

GUEREZA, ger'e-za, or GUERZA,

ger'za, (Coldbus guerza), an Abyssinian mon¬

key remarkable for its beauty. Short, glossy,

jet-black fur covers its limbs, back and head, while a long fringe of silky white hair depends from the flanks. It frequents lofty trees and

is much sought for the sake of its valuable fur.

GUERICKE, ga'rik-e, Otto von, German

scientist: b. Magdeburg, 20 Nov. 1602: d. Ham¬

burg, 11 May 1686. He studied law at Leipzig, Helmstadt and Jena, and then took up mathe¬

matics and mechanics at Leiden. After travel-

ing in France and England, he returned to his native city and was elected mayor in 1646. His studies of Galileo and Pascal to which he de¬

voted his spare time aroused his interest in the subject of the weight of air and the creation of a vacuum. After several attempts, he finally succeeded in creating a vacuum by means of a

copper globe fitted with a pump and stop clock.

This was effective in pumping out air as well as water, and was the first air pump. The fame

of this experiment reached the ears of the Em¬

peror Ferdinand IV, who summoned Guericke

to the court for a demonstration. The experi¬

ment was performed with two copper hemi¬

spheres and came to be known as the (<Magdeburg Hemispheres.ˆ He also began some re¬

searches in electricity using a rolling ball of sulphur to create friction. The .results of his study were published in his (De Vacuo Spaiio}

(Amsterdam 1672). Consult Hoffmann, F. W.,

(Otto von Guericke) (Magdeburg 1874).

GUERIN, ga-ran, Eugenie de, French

writer: b. Cayla, Languedoc, 1805; d. 31 May

1848. She was a sister of G. M. Guerin (q.v.) and much of her life was devoted to taking

care of him. Her journals and Letters, } of

which an English translation appeared (1865—

66), have been widely read in America, both for their charm of style and their devotional spirit.

Consult Parr, (Maurice and Eugenie de Guerin*

(1870).

GUERIN, Georges Maurice, French poet:

b. Languedoc, 4 Aug. 1810; d. Paris, 19 July

1839. He was for a time a member of a reli¬

gious house in Brittany, but in 1833 went to

Paris and taught in the College Stanislas. His verse has been greatly admired by critical read¬

ers. Sainte Beuve in 1860 edited his <Reliquae) with critical notice, and the poet forms the sub¬

ject also of one of Matthew Arnold's (Essays

in Criticism* (1865). Consult Parr, < Maurice

and Eugenie de Guerin* (1870).

GUERIN, Jules, American artist: b. Saint

Louis, Mo., 1866. He was a pupil of Benjamin

Constant and of Jean Paul Laurens in Paris.

He was elected a member of the National Insti¬

tute of Arts and Letters and has received sev¬

eral awards in recent years. He is regarded as one of the leading mural decorators in the

United States. He executed the artistic map

decorations in the waiting room of the Penn¬

sylvania Station, New York, and had entire

charge of the decorations for the Panama—

Pacific Exposition of 1915 at San Francisco.

In 1916 he received the commission for decorat¬

ing the new Lincoln Memorial in Washington,

D. C.

GUERIN, Pierre Narcisse, Baron, French

artist: b. Paris, 13 May 1744; d. Rome, 6 July 1833. He studied under Jean Baptiste Regnault, and early showed great promise. His

first prominent picture was (Return of Marcus

Sextus* which was received with great acclaim

by his contemporaries. This was followed by

< Grave of Amyntas* (1800) ; < Phaedra and

Hippolytus) (Louvre 1802) ; (Cephalus and

Aurora* (1802) ; (Bonaparte and the Rebels of Cairo* (Versailles 1802) ; ‘Pyrrhus and Andro-mache) ; ‘Tineas and Dido* (1813) ; ‘Clytemnestra* (1817) in the Louvre. In 1822, Guerin, his*best pictorial work done, became director

of the Lcole de Rome. Six years later he was raised to the nobility with the title of Baron, but did not remain long at Paris, because of his

failing health. He was the recipient of many

honors, becoming a member of the Academy

(1815) ; of the Order of Saint Michel (1819) ; and Officer of the Legion of Honor (1832).

His most famous pupils were Delacroix and

Gericault. Guerin’s work was dignified, re¬

strained and of high dramatic interest.

GUERNSEY, gern’ze, the second largest

and the westernmost of the Channel Islands

(q.v.), 46 miles southwest of Cherbourg,

France, and 69 miles from Start Point, Devon¬

shire, England. It is triangular in form, nine miles long and from three to five miles broad.

The picturesque south coast is lofty and abrupt, the island sloping towards the north, which is low and level. Guernsey is noted for its

healthful climate, for the fertility of its soil, for its horticultural and floricultural products grown chiefly under glass and for its magnificent breed of cattle. The chief towns are Saint Peter Port (q.v.), the capital, and Saint Sampson, the latter with an important export

trade in blue granite.

With the adjacent islands of Sark, Alderney,

Herm and Jethow, Guernsey forms an auton¬

omous bailiwick. Its area is 19 square miles

and the number of inhabitants, including out¬

lying small islands, about 45,000.

GUEROULT, ga'roo', Adolphe, French

journalist: b. Radepont, 1810; d. 1872. He first wrote articles for the Journal des Debats in

support of the economic principles advanced by

Saint Simon. He was correspondent for this

paper in Italy later. In 1842 the French gov¬

ernment appointed him consul at Mazatlan,

Mexico, and five years later at Jassy, Rou—

mania. From 1848-57 he pursued the profession

of journalist at Paris and was editor of La

Presse. Under his direction a new democratic

paper was established in 1859, under the title L'Obinion Nationale. He sat in the Corps

Legislativ 1863-70. His sympathies were with

the republic and popular rights and he cast his vote for the abolition of the monarchy in 1870.

He was author of 'Lettres sur l'Espagne)

(1838) ; 'De la question coloniale) (1842) ; 'La politique de la Prusse) (1866) ; (Discours

prononces au Corps legislatif* (1866) ; (La

Republique en France) (1871).

GUERRAZZI, Francesco Domenico, Ital¬

ian statesman and author : b. Leghorn, 12 Aug.

1804; d. 25 Sept. 1873. He was educated for

the legal profession, won reputation among his

countrymen by his political fictions, said to have had immense influence on contemporary Ital¬

ian events by their patriotic enthusiasm and abhorence of despotism. Guerrazzi's own words

are, ((he wrote a book when impotent to fight a battle.** He became acquainted with Mazzini,

and was several times imprisoned for his writ¬

ings in behalf of Young Italy. In 1848 he en¬

tered the Tuscan ministry and when the grand

duke fled the following year Guerrazzi, Mazzini and Montanelli formed a triumvirate, and sub¬

sequently Guerrazzi became dictator. He was

imprisoned for three years after the restoration.

His defense entitled 'Apologia della vita politica di F. D. GuerrazzP is a masterpiece.

After his release from prison he was allowed

to select Corsica as his place of exile. Political changes brought about his release and in 1862

and 1865 he was a member of the Turin Par¬

liament. His chief works of fiction are ‘L’As-

scdio di Firenze,* a fine historical novel treat¬

ing of the downfall of the Republic of Flor¬

ence; (La Battaglia di Benevento,* remarkable

for exquisite expression; cBeatrice CencP;

Isabella Orsini) ; (L’Asino) ; and various other writings, which have run through innumerable

editions and translations. Consult his (Memorie) (Florence 1848) ; Bosio, (Opere, Vita

di Guerrazzi* (Milan 1877) ; Vismara, (Biblio—

grafia di Guerrazzi) (ib., 1880) ; Fenini, (Guerrazzi, studi critici* (ib. 1873) and (Lettre di F. D. Guerrazzi,* edited by Carducci (Leg¬

horn 1883).

GUERRERO, ga-ra’ro, Mexico, a state

bounded by the states of Michoacan, Morelos

and Mexico on the north, Puebla on the north¬

east, Oaxaca on the east and southeast, and

by the Pacific Ocean on the southwest. Its area is given as 24,996 square miles. It is moun¬

tainous throughout almost its entire extent, the northern section being occupied by the spurs

of the ranges of Morelos and Mexico, and the

southern by the Sierra Madre del Sur. Be¬

tween these two sections runs the Mexcala or

Balsas River, to which all the streams of the state are tributary. The principal lakes are

Pazahualco, Chantengo, San Marcos and Nexpa.

The Pacific Coast line is low and sandy, and has excellent harbors. The bay of Acapulco, the

chief port, is deep and spacious. The mineral

resources of the state have been as yet very im¬

perfectly developed. Gold, silver, lead, mercury, iron, coal, sulphur, marble, granite, opals, to¬

pazes, and diamonds are mentioned among its

products. The climate is unhealthy. On the

coast the heat (from 95° to 96.80° F.) and rain¬

fall are both excessive; and in the belt above 6,500 feet, the cold is sometimes severe. Fevers, leprosy and affections of the respiratory and

digestive organs are the prevailing diseases.

The annual value of the agricultural products

is about $2,200,000, and the total value of live stock is estimated at $3,000,000. Manufactures

are limited to sugarcane products, mescal

wine, palm-oil, cotton fabrics and leather.

Plans for a number of railways have been

made, but have not been carried out. There

are, however, telegraph and telephone lines,

and a few wagon roads. Steamers of the

Pacific Mail and the Mexican International Company touch at Acapulco. The state is di¬ vided into 14 districts : La Union, Mina, Alar¬ con, Hidalgo, Alvarez, Zaragoza, Morelos, Abasolo, Allende, Tabares (chief town Acapulco de Juarez, with population of 5,780), Galena, Chilpancingo (principal town and cap¬ ital of the state Chilpancingo de los Bravos, with population of 7,994), and Guerrero. Total population of the state 594,278 in 1910; some¬ what more than 620,000 in 1917 (est.).

GUERRIERE, The. See Constitution, The.

GUERRILLA, ge-ril'la, one of a band of irregular soldiers, organized independently of a regular army and government, and not re¬ sponsible to any constituted authority. The name originated in the Spanish war for inde¬ pendence (1808-14), when the term guerrillas was applied to the bands of Spanish peasants, organized to harass the French armies that then occupied Spain. Guerrilla warfare was carried on to some extent during the Revolution and

to a considerable degree in the Civil War, by southern sympathizers. Some of these irregu¬

lars, as Mosby's command, were very efficient

fighters. (See Mosby). During the war for

the liberation of Cuba, guerrilla bands of

Cuban patriots were common. The irregular

bodies of Filipinos were properly guerrillas,

as well as those of Villa and many maurauding Mexican bands. The Hague Conference of

1899 defined the position of such troops in war¬

fare, and these were again the subject of

ˆrulings** in 1907. Of course no guerrilla band could be expected to pay much attention to

the decisions of a peace conference when ig¬

nored by some of the most powerful nations.

GUERRINI, gwe-re'ne, Olindo, Italian

poet : b. Sant' Aberto, 1845. He received his

education at Turin and Bologna, where he was

trained for the law. But literary pursuits were more to his liking and became librarian at the University Library at Bologna. Under the pen-name of Lorenzo Stechetti, he wrote (Postuma,

Canzioniere di Lorenzo Stechetti } (1877) ;

Tolemica* (1878) ; (Canti populari romagnolP

(1880); <Brandelli) (1884); and with Ricci,

(I1 libro dei colorP (1887). He is the leading exponent of the ˆverisU school of Italian

poetry. Of his more recent works are (Rime

di Lorenzo StechettP (1903); and <Rime di

Argia StolenfiP

GUESCLIN, Bertrand du. See Du Gues-

CLIN.

GUESDE, ged, Jules Basile, French social¬

ist : b. Paris, 11 Nov. 1845. For some time he was employed as translator, but he soon aban¬

doned this field and threw himself into the

fight of the Republicans against the empire.

He collaborated with Herault in the latter's

La Liberte, and subsequently established the

Droits de I'Homme at Montpellier. In July

1870 he was sentenced to six months in prison because of his radical writings. In June 1871

he was again convicted because of his articles in favor of the Commune and sentenced to five years' imprisonment. He fled to Switzerland

where he published his (Livre rouge de la jus¬

tice ruraleP From Switzerland he went to

Italy but was expelled from the latter country in 1872. He did not

return to France until

1876 and soon after founded the radical weekly L'Egalite, in which he began ithe active Social¬

ist propaganda to which he has ever since de¬

voted himself. In 1878 he was condemned to

six month's imprisonment for persisting, con¬

trary to the orders of the chief-of-police, in holding a Socialist convention in Paris.

Wdth splendid oratorical powers M. Guesde

has been an effective propagandist of collectiv¬

ism throughout France, holding numerous re¬

unions of Socialists and wage-earners in Rou—

baix, Rheims, Saint-Quentin, Montlugon,

Nantes, Lyon, Bordeaux, Montpellier and other

cities. In 1880, in collaboration with Karl

Marx, Lngels and Paul Lafargue he submit¬

ted to the several labor unions and congresses an economic and political programme which

was adopted by the Labor Party at the National Labor Congress at Havre. The Socialist group

was soon broken up into two parties, one

strictly Marxian and refusing all compromise

with a bourgeois government, led by Gue»de,

the other, which was willing to compromise on

social legislation and other matters, known as

the Possibilists. There was constant bickering

between the two factions and when Millerand

accepted a Cabinet post Guesde determined to

have him expelled from the Socialist party. He succeeded in doing so at the Amsterdam So¬

cialist Congress of 1904, the Congress affirming Guesde's stand that a Socialist may not partici¬

pate in a bourgeois government. The Unified

Socialist party was formed soon after and in

1914 elected 100 members to the Chambre. In

1893 Guesde was elected Deputy from Lille

and was reelected regularly thereafter. After

the outbreak of the war in 1914 Guesde for the first time in his career dropped somewhat his

uncompromising attitude toward the govern¬

ment and denounced Germany as the arch-en¬

emy of Europe, and scoring the Socialists of

Germany as traitors to the cause of labor, So¬

cialism and liberty. In Viviani's Cabinet M.

Guesde served as minister without portfolio.

Consult Hunter, Robert, Socialists at Work*

(New York 1908) and Sehapiro, J. S., (The

Drift in French Politics } (in American Polit¬

ical Science Review, Baltimore, August 1913).

GUEST, Edwin, English antiquarian and

scholar : b. 1800 ; d. 1880. He was graduated

at Gonville and Caius College, Cambridge,

where he was appointed fellow in 1824 and

chancellor in 1854. After practising law for a few years, he abandoned the bar for the more

congenial pursuit of antiquarian and philological research. His (History of English Rhythms)

(2 vols. 1838) has great merit; and his studies of the antiquities of Great Britain, published

posthumously by Dr. Stubbs under the title

(Origines Celtics* (1883) brought together

much original material. He became a fellovi

of the Royal Society and an honorary member

of the Antiquarian Society.

GUESS, George. See Sequoyah.

GUEST, John, American naval commodore :

b. Missouri, 1821 ; d. Portsmouth, 1879. He

began his career in the navy at the age of 16, becoming captain in 1866. He served in the

Mexican War, in the troubles with China (1854).

When the Civil War broke out, he was placed

in command of the Owasco, and later com¬

manded the Leigh and Itasca at Fort Fisher.

He became commodore in 1873, and was in

charge of the Portsmouth Navy Yard until his

death.

GUEST-BEES, a large genus (Nomad a) of

little bees of both Europe and America, which

lay their eggs in the nests of burrowing bees of the genera Andrena and Halictus, where the

young share the food gathered for the young

of their hosts, and the adults live harmoniously together, — apparently a case of partnership

rather than of parasitism. Compare Cuckoo—

Bee.

GUEUX, Les, la ga, or The Beggars, the

name assumed by the members of the nobility

and their adherents who resisted the tyranny

of Philip II of Spain over the Netherlands

(1566). Led by Count Louis of Nassau and

Count Hendrik of Brederode, they banded to¬

gether under a compact called ftThe Com¬

promise® to oppose in every way the enforcing

of the decrees of the Council of Trent. They

finally gained a hearing at the court of

Margaret, Duchess of Parma, where the ap¬

pellation ffles gueux® was first applied to them.

They took It up and assumed as insignia of

their cause, the beggar's wallet and bowl. In

spite of repeated suppression, the cause of the party persisted. In 1569, a new group of Gueux appeared. They were called (<sea-beggars® be¬

cause they had been granted privileges on the

ocean by the Prince of Orange, who openly

opposed the despotism of Spain. Under the

leadership of daring Count William de la

Marck, they conducted a series of piratical ex¬

ploits, which culminated in the capture of Brill, 1 April 1572, and the capture of Flushing shortly afterward, and thus launched the War for

Dutch Independence. Consult Kervyn de Let—

tenhove, (Les huguenots et les gueux) (6 vols., Brussels 1882-85) ; Jurien de la Graviere, (Les gueux de mer' (in Revue des Deux Mondes,

Paris 1891-92).

GUEVARA, Antonio de, Spanish chron¬

icler: b. Treceno, about 1490; d. 1545. His

youthful years were passed at the court of Isa¬

bella; in 1528 he became a Franciscan and trav¬

eled abroad with Charles V. He was succes¬

sively court preacher, historiographer, bishop of Guadix and bishop of Mondonedo. In 1529 ap¬

peared his (Reloj de principesP purported to

be an autobiography of Marcus Aurelius. It

was soon translated into the principal languages of Europe and was long very popular. It is

now difficult to understand or even assign a

reason for this popularity, as the work is af¬

fected in style and full of moralizings. Other works from Guevara are (Decada de los Cesares) (1539) and (Epistolas familiares>

(1539-45) ; and (Libro de los inventores del

mareaU (1539). Consult <Biblioteca de autores espanoles) (Vols. XIII and LXV, Mad¬

rid 1850-73) and Galvez, (Guevara in England) (Weimar 1910).

GUEVARA, gwa-va'ra, Luis Velez De,

Spanish lawyer and author: b. Lcija, 1 Aug.

1579; d. Madrid, 10 Nov. 1644. He studied law at the University of Osuna and practised his

profession for a time. At the court of Philip IV, he was a great favorite and was appointed chamberlain. He was a prolific author, the

number of his plays amounting to some 400,

only one-fifth of which have survived. Of

these the best are the tragedies (Reinar

despues de morirP (Mas para el Rey que la

sangre) ; and the comedies (La Luna de la

Sierra> and (E1 Diablo esta esta en CantillanaP

His literary fame, however, rests on his (E1

Diablo cojuelo) (1641), on which Le Sage

based his (Diable boiteuxP The works of

Guevara were edited by Adolfo Bonilla y San

Martin (Madrid 1910).

GUGGENHEIM, Benjamin, American

capitalist : b. 1855 ; d. 1912. In 1875, he went to Denver where he superintended the mining

interests of his father, and later, the smelting plant at Pueblo, Colorado. Returning east, he

was placed in charge of the smelting works at Perth Amboy, N. J. ; and in 1903 established

the International Steam Pump Company at

Milwaukee, becoming president in 1909. He

was also one of the owners of the American

Smelting and Refining Company. He lost his

life in the Titanic disaster.

GUIANA, ge-a'na, the name often employed

to designate that tract of country in South

America bounded by the Atlantic Ocean, the

GUIANA

Amazon River and its branch, the Rio Negro,

the Orinco River and the Cassiquiare. It lies

between lat. 8° 40’ N. and lat. 3° 30’ S., be¬

tween long. 50° and 68° W. The western dis¬

tricts belong to Venezuela; the southern and

eastern districts to Brazil. The three European colonies, the British, Dutch and French Guianas (together forming <(Guiana)) in the restricted

sense), extend from the seacoast to the

frontiers of those republics.

The first settlements on the northern coast

lay much farther toward the west, and ex¬

ploration and colonization east of the Orinoco

began when European adventurers continued

in this new field their search for Eldorado.

Spanish and Portuguese expeditions into Guiana

during the 16th century were very numerous,

but always disastrous. The English under¬

took its conquest, believing, in the words of Sir Walter Raleigh, <(that whatever prince shall

possess it, that prince shall be lord of more gold, and of a more

beautiful empire, and

of more cities and people, than either the

king of Spain or the great Turk.® Capt.

Laurens Keymis, sent by Raleigh in 1596 to ex¬

plore the region, reported that <(the like occasion seldom happeneth in many ages.® In the articles, Dabaiba and Eldorado, it is shown that the

birthplace of the Eldorado myth was the region now known as Colombia, and that the time of

its birth was near the beginning of the 16th

century; but in the course of 100 years the site of Eldorado was transferred to central Guiana,

and Schomburgk asserts that the possibility of

its existence in that locality continued to occupy the imagination and attention of adventurers

until the close of the 18th century. Humboldt

was the first to prove that a lake <(like unto Mare Caspium,® as Raleigh described it, no

longer existed, and it was erased from the

maps ; Schomburgk identified the locality where

it was sought with the small lake Amucu near

an Indian village named Pirara. Raleigh led

several armaments from England with the hope

of conquering the golden capital. When these

undertakings ended in disappointment, Captain

Keymis committed suicide, and Raleigh (<paid

the forfeit of his illusions with his life upon the scaffold.® Dutch traders, who arrived about 1580, settled on the Pomeroon and

Essequibo

rivers; and after the establishment of the Dutch West India Company land on the Berbice River

was granted to van Peere. The Pomeroon

colony was abandoned owing to attacks by the

English in 1666 and by French privateers. In

1740 English planters from the West Indies

established themselves on the Essequibo, as a

result of the ((open door® policy adopted by the Dutch with respect to that region alone. Next, the overflow of immigration settled in the Demerara district; and in 1781 all three colonies, Essequibo, Demerara and Berbice, were taken

by the British. Recaptured before the year was out by the French (who were then allies of the Netherlands), they were again taken by the

British in 1796. The peace of Amiens restored

the original status; but English troops inter¬

posed once more, and the colonies were ceded

to Great Britain by the treaties of 1814-15.

They were united in 1831, forming British

Guiana.

In the region east of Berbice, a few English

people attempted to form a colony at the vil¬

lage of Paramaribo (1626), but abandoned the

project. Ten years afterward the French in¬

vested Paramaribo, but relinquished it, pro¬

ceeded to Cayenne, and there founded what is

now known as French Guiana. In 1652 a body

of English settlers again arrived at the Coma

River, and succeeded in establishing themselves.

This colony was granted in 1662 by Charles II, to Lord Willoughby, who changed the name

Coma River into Surryham, in honor of the

Earl of Surrey. Hence we have <(Surinam,® the

name often used instead of Dutch Guiana. The

British crown bought the colony from the heirs of Lord Willoughby, but it passed into the

hands of the Dutch about the time when

Holland gave up the attempt to keep New Am¬

sterdam, now New York. The statement often

repeated, that Surinam was ((exchanged® for

New Amsterdam is incorrect.

1. British Guiana is situated approxi¬

mately between lat. 1° and 8° 40’ N. It is

bonded on the north and northeast by the

Atlantic Ocean, on the east by Dutch Guiana,

on the south by Brazil, and on the west by

Brazil and Venezuela. Its area is 89,480 square miles. The old settlements of Essequibo, Ber¬

bice and Demerara form counties with the

same names. Of these, Demerarq contains The

capital of the colony (see Georgetown) ; Esse¬

quibo, the town of Bartica, the point of de¬

parture for miners going to the gold-fields; and the capital of Berbice County is New Am¬

sterdam. One of the chief points on the new

boundary line with Venezuela, Mount Roraima,

is an immense sandstone mass rising with per¬

pendicular sides 2,000 feet above the slopes

(themselves 6,000 feet above sea-level) which

form its base. Some of the neighboring moun¬

tains resemble it in form, but are less imposing.

Midway between this group and the Atlantic

coast is the Imataca range, extending east-southeast to the confluence of the Cuyuni and

Essequibo. The latter with its tributaries

drains nearly the whole interior of the colony; the Demerara, though much smaller, is more

important, because it flows through the region

which has become the centre of population ;

the Corentyne is the boundary between British

and Dutch Guiana.

Geology and Mineral Resources. — The

original sea beach is found far inland, where

it now appears as long stretches of white sand reefs, the sand being

derived from a barrier of primary, volcanic and metamorphic rocks,

which impedes the navigation of the rivers.

The strip between this barrier and the ocean

front — composed of layers of soft mud, clay, sand, broken shells and decomposed vegetable

matter — is really an enormous mud-flat, about

100 feet in depth, and covered with a rich, heavy loam, and in places, with a kind of peat called pegass. The whole interior of the country, be¬

tween the agricultural coast-strip and the range culminating in Roraima, is an auriferous region.

The gold is commonly found in combination

with silver. Quartz-mines have been worked in

upper Demerara, but placer-mines in the beds

of former streams or the channels of existing

ones are more usual. Other mineral products

are iron, sapphires, diamonds, mercury, gar¬

nets, antimony and plumbago. A sandstone for¬

mation characterizes the southwest, from

Mount Roraima to the Potaro and Essequibo

rivers, thence extending eastward across the

Demerara, Berbice and Corentyne. The sand-

stone is interbedded with volcanic rocks. In

many parts of the colony there are red, yellow and blue clays; and fine white clay, suitable for the manufacture of porcelain, is also found.

Soil and Climate. — The surface of the coast

alluvium is so fertile that alternation of crops is not required ; it is, however, very heavy and hard to cultivate. The thermometer ranges

generally from 76° to 86° F., with little differ¬

ence in this respect between day and night.

The rainfall, in some years 130 inches, in others is not more than 70 inches. The year is divided into two rainy seasons (November-February

and May-July), and two dry seasons. Neither

destructive earthquakes nor hurricanes occur.

There has been only one serious outbreak of

yellow fever during 50 years. Death rate of

the colony about 35 per 1,000.

Flora and Fauna. — Characteristic forest

products are exceedingly hard and heavy woods.

The greenheart, mora and wallaba are valuable

for building; the simaruba, letter-wood and

crabwood, for making furniture, *etc.* Vegeta¬

tion in Guiana is remarkable on account of the altitude of the trees and the great size of leaves and flowers. The gigantic water-lily, Victoria

Regia, is very common. Some of the orchids

form large masses, with flower-stems 12 feet

high. Common mammals are sloths, deer, ant—

eaters, tapirs, armadillos, peccaries, jaguars,

cavies and ring-tail monkeys. Monkeys belong

to two families which are entirely confined to this region, and bats develop here their most

extraordinary specializations. In some parts of

the forest vampires are (<ready to suck the foot or even the cheek of the unwary traveler.® The manatee (vulgo ((mermaid)) or <(water-mamma®), inhabiting some of the large rivers,

and coming to the surface at intervals to breathe or to graze on the plants which line the banks, owes its popular designations to the circum¬

stance that it suckles its young at the breast.

The representative families of birds are, with

few exceptions, peculiar to this region, the list of such birds including greenlets, tanagers,

hang-nests, sugarbirds, tree-creepers, manakins

and cotingas. Alligators and boa constrictors

both attain to great size in this region ; iguanas and smaller kinds of lizards are numerous.

Among the insects, the variety of genera and

species can, it is thought, scarcely be equaled in any other part of the world. Uncommon

brilliance of coloring is characteristic of both the birds and the insects.

Agriculture. — About 169,520 acres are under

cultivation, or, say, one acre out of. every 50

available for the purpose, and of this amount

73,100 acres are in sugar plantations, and

47,050 acres under rice.

Commerce, Shipping, Railways, *etc.* — The

chief imports (1914) were flour and textiles;

chief exports, sugar, raw gold, rum, rice, balata and diamonds. Registered vessels numbered

59, comprising 41 sailing vessels and 18 steamers.

Total tonnage entered and cleared, in 1914 was 1,039,582. There are 97ˆ miles of railways, 315

or 316 miles of good roads, and a limited num¬

ber of miles of the large canals used for navi¬

gation. Smaller canals, to carry off superfluous water from the plantations, intersect each other in every direction. The heavy rainfall and the flatness of the coast region oblige the nlanters to maintain these canals to provide drainage,

and by means of the larger draining trenches

the sugar canes are taken to the mills in punts.

There are 73 post offices, 46 telegraph offices, nine traveling post offices, about 559 miles of telegraphs and cables, and telephone services

in Georgetown and New Amsterdam.

Money and Banking. — British gold and sil¬

ver are used. There are 25 saving banks, with 21,266 depositors, and two banks with note cir¬

culation.

Government. — The governor is assisted in

executive and administrative matters by an

advisory council, composed of three colonists

and three officials, all appointed by the king of England; in legislative matters by the Court of Policy (seven officials beside the governor, and eight elective members, chosen from inhabitants

by constituency of voters qualified bv income or property), and a combined court containing, be¬

side the above, six financial representatives.

The governor has a casting vote, and can decide any question against the votes of the represent¬

ative members. The colonists are in the ma¬

jority, however, in the combined court, which

votes the taxes and public expenditures.

Finances. — Total revenue for the year 1914 —

15 was £586,598, derived mainly from customs,

licenses, duty on rum, and royalty on gold.

Public expenditures in the same year amounted

to £622,025.

Population, Schools and Judiciary. — The

census of 1891 showed: Negroes, 115,588; East

Indians (Hindu coolies), 105,465; aboriginal

Indians, about 17,463; Portuguese from Ma¬

deira, 12,166; whites of other nationalities,

4,558; Chinese, 3,433; mixed races, etc., 29,376.

The total number of inhabitants 1 Jan. 1915

was about 310,000. In 1914-15 the schools

sharing in the government's annual grant

(£31,871) were 228 in number.. There are three judges, and, in the several districts, a number of magistrates. The criminal law is based on

that of England ; in civil cases the Roman—

Dutch law is applied, with certain modifications.

History (including the boundary dispute

with Venezuela). — Prohibition of the slave

trade checked the agricultural development of

the colony, and emancipation of the slaves

(1838) ruined many planters, the freed negroes

demanding higher wages than the planters could

afford to pay. This crisis led to the introduc¬

tion of large numbers of laborers from Ma¬

deira, the East Indies, China, and Malta. Im¬

migrants of a different class began to arrive

about 1886 in consequence of the rediscovery of gold; but serious difficulties arose precisely on account of the enhancement in the value

of the auriferous regions, some of the most promising

of which were located in the territory west of the Essequibo claimed by both Venezuela and

Great Britain. The inland limits of the Span¬

ish (afterward Venezuelan), the British, the

Dutch, the French, and the Portuguese (after¬

ward Brazilian) Guianas were undetermined.

In 1841 Schomburgk surveyed the boundary

line of British Guiana for the British govern¬

ment, and made two maps ; the second or re¬

vised map placing the boundary with Vene¬

zuela much farther toward the west than the

first. Subsequently Venezuela and Great Bri¬

tain agreed not to encroach upon the territory in dispute, pending a settlement of the boundary question, but both countries offended against

the spirit of this compact. The proposal for

arbitration in 1887 was met by England's

prompt refusal to admit any doubt as to her

title to the lands east of the revised Schomburgk line, and, a little later, by the establish¬

ment of British posts, and the declaration that the region drained by the Barima River was

hers by right. It is necessary to bear in mind that if England had accepted the views of

Venezuela and Brazil as to the boundaries of

British Guiana, that colony would have dis¬

appeared from the map. Brazil claimed all but

about 12,000 square miles; Venezuela nearly

the whole of the old Essequibo colony, the

Pomeroon and the unsettled interior districts.

When President Cleveland, in 1895, called to

the attention of the British government the

bearing of the Monroe doctrine upon the ques¬

tion at issue, his suggestion was at first not ac¬

cepted. His message to Congress went much

farther. It advised Congress that a commission

should be appointed for the determination of

the true boundary, and declared in effect that any attempt to extend British territory beyond

the true boundary should be resisted by the

United States, by force, if necessary. It was a threat of war. Pursuant to the act of Con¬

gress 21 Dec. 1895, a commission was appointed 1 Jan. 1896. But before their report was sub¬

mitted a treaty providing for the reference of the matter to a tribunal of arbitration had been signed at Washington (2 Feb. 1897). Arbi¬

trators were Chief Justice Fuller and Justice

Brewer of United States Supreme Court; Lord Herschell (and, after his death, Lord Russell of Killowen), and Justice Sir R. H. Collins; and as president, Professor Martens. The tri¬ bunal met at Paris in 1899. The award, given 3 October, determined the boundary nearly in correspondence with the second or revised Schomburgk line, assigning to Great Britain a region about 60,000 square miles in area which Venezuela had claimed. On the other hand, Point Barima, at the principal mouth of the Orinoco, and certain gold-fields near the headwaters of the Cuyuni, were awarded to Venezuela. The territory of British Guiana, thus defined, extends along the seacoast to Point Playa, and includes the whole valley of the Barima and that of the Cuyuni east of the Wenamu — the larger part, though probably not the best part, of the mining region.

2. Dutch Guiana or Surinam is bounded on the north by the Atlantic Ocean, on the east by French Guiana, on the south by Brazil, and on the west by British Guiana. It ex¬ tends from lat. 2° to 6° N., and from long.

53° 50’ to 58° 20’ W. Area 46,072 square miles.

The political divisions are districts, 13 in num¬

ber, and communes ; the capital, Paramaribo,

has (1 Jan. 1915) 35,530 inhabitants. Chief

products are cacao, sugar, coffee, bananas, rice, maize, rum, molasses, balata, and gold (output

918,595 grammes in 1914). The mining experi¬

ence of this colony resembles that of British

Guiana : gold has been sought hitherto in beds of streams, etc., but is now being taken also from mines which require crushing machinery.

Imports regularly exceeded in value the colony’s exports during many years, but from 1910-14,

inclusive, the balance of trade has been as

regularly favorable. Executive authority is

vested in a governor. The representative as¬

sembly, called the Colonial States, is composed of members chosen for six years by a limited

number of electors. The council consists of

five members, including the governor himself

as president, and represents the sovereign.

The revenues of the colony fall short of the

expenditures. The military force is about as

follows: Garrison, 20 officers and 351 men;

militia, 27 officers and 411 men; and civic

guard, 59 officers and 1,061 men. There are

a few guard ships and vessels of the royal

navy. The number of inhabitants 1 Jan. 1915

was 85,536, beside the forest-dwellers. Edu¬

cational institutions are : A normal school ;

schools maintained by the Moravian Brethren

and the Roman Catholics ; private schools, with 4,822 pupils ; and public schools, with 3,594

pupils. The judicial system comprises a court

of justice (all the officers appointed by the

queen), two circuit, and three cantonal courts.

Slavery was abolished 1 July 1863, but the au¬

thorities imposed the conditions that for 10

years the emancipated negroes should remain

upon the plantations of the districts in which they had formerly lived, and should perform

the same kind of work for wages that they

had been accustomed to while in bondage.

After 1 July 1873, the importation of laborers to replace the freedmen became a matter of

life and death in Surinam as in the neighboring colonies, for agriculture was almost ruined. In¬

teresting in this connection are the following

figures: At the beginning of 1915 there were

among the inhabitants 16,995 Hindus, 10,847

Mohammedans, 9,571 members of the Reformed

and Lutheran churches, 25,862 Moravian Breth¬

ren, 18,178 Roman Catholics and 837 Jews.

3. French Guiana, lying between the Atlan¬

tic Ocean, Brazil, and Dutch Guiana, has an

area of about 32,000 square miles. Besides

Cayenne, capital of the colony, and its only

port (population, according to the latest census, 13,527), there are 14 communes. Mineral pro¬

ductions are gold (105,600 ounces in 1914), sil¬

ver, marble, phosphates, and iron. Agricultural

productions are varied (including sugarcane,

cocoa, coffee, rice, indigo, tobacco, maize, and manioc), but laborers are few, and the area

under cultivation is small, and the total value of the crops insignificant. The value of exports js less than that of the imports. For example, in 1913, the last normal year before the Eu¬

ropean War, the imports were valued at 10,-

775,916 francs and the exports at 10,215,129

francs. Colonial interests are entrusted to a

governor and privy council of five members,

and one deputy represents the colony in the

French Parliament. There is also an assembly

called the Council-General, composed of 16

members. Revenue and expenditures for 1914

were each estimated at 3,838,836 francs; but

the cost of maintaining the penal establishment is borne by the French republic. Between 150

and 160 French soldiers are kept in the colony.

The total population, including convicts and

Indians, was given as 32,908 in 1901. It had

increased to 50,000, approximately, in 1916.

Cayenne has a superior court, court of first

instance, and two justices of the peace; a col¬

lege, a library, and a museum ; in the entire colony there are 31 primary and seven con¬

gregational schools.

From the first, the French undertaking in

Guiana has been unsuccessful. On 11 Dec. 1653, GUIB — GUICCIARDINI

the survivors of the original colony abandoned

the fort and sailed away, after suffering from hunger and disease. A new company formed

for the colonization of Cayenne in 1663 was

scarcely able to hold its own against hostile

neighbors in Brazil. The deportation of politi¬

cal prisoners to Guiana at the end of the 18th century completed the ruin which Portuguese

attacks had begun ; for the exiles ascribed the death of their companions to the climate ; and French Guiana was completely discredited in the eyes of the world. In January 1809, the colony surrendered to the Portuguese and English. It

was restored to France by the treaties of

1814-15. Since 1855 it has been used as a penal settlement. In 1902 the number of convicts in

residence there was 10,075, including 240 women.

At the beginning of 1915 the number was 8,693.

The boundaries with Brazil were determined 1

Dec. 1900, by the Swiss court of arbitration.

Bibliography. — (Black Monday: Destruc¬

tive Fire in Georgetown > (Demerara 1914) ;

Coudreau, H. A., (Etudes sur les Guayanes et

l'Amazone* (Paris 1886) ; Raleigh, W., (An

Original Letter of Sir Walter Raleigh [or

Rawleigh, according to that signature] Con¬

taining a Full Account of his Tempestuous

Voyage to Guiana) (Antiquarian Society of

London, Archceologia, Vol. XVI, p. 188, Lon¬

don 1812), and (Newes of Sir Walter Rauleigh,

with the True Description of Guiana) (Lon¬

don 1618 — repr. Washington 1844); Rodway,

J., (Guiana: British, Dutch, and French* (New

York 1912) ; Schomburgk, R. H., (A Descrip¬

tion of British Guiana) (London 1840), (Reisen

in Britisch-Guiana in den Jahren 1840-44>

(Leipzig 1847-48) ; Tripot, J., (La Guayane>

(Paris 1910) ; Van Cappelle, H., (Au Travers

des Forets Vierges de la Guyane Plollandaise*

(Baarn and Paris 1905) ; Wijnaendts Francken,

C. J., (Door . West-Indie : Antillen, Panama,

Venezuela, British Guvana, Suriname) (Haar¬

lem 1915).

Marrion Wilcox.

GUIB, a bush antelope of South East Africa

(Tragelaphus scriptus). It is about the size

of a goat and varies greatly in color. From the special dark markings which are common to

other types also it is called <(harnessed buck;®

It hides in the dense undergrowth of the region from Abyssinia to near the Cape, usually ad¬

jacent to the great streams.

GUIBERT OF NOGENT, geW ov nˆ-

zhan', French ecclesiastic and historian: b.

Clermont-en-Beauvoisis, 1053; d. about 1124.

He studied theology under Anselm of Bee

(Saint Anselm) and became chief abbot at

Notre Dame de Nogent in 1104. His works in¬

clude a history of the first crusade (Gesta Dei per Francos) (1110) ; an autobiography (De

vita sua sive monodiarurn,* which is valuable

chiefly for its local color; a criticism of saints and relic worship, (De pignoribus sanctorum * ; and numerous minor comments on books of the

Bible, homilies, *etc.* His writings were first

edited by D'Archery (1 vol., Paris 1651), and

were republished in Migne, (Patrologia Latina)

(Vols. clvi and clxxxiv). Consult Monod, B.,

(Le moine Guibert et son temps> (Paris 1905) ; and Bourgin, C., (Guibert de Nogent, histoire

de sa vie> (Paris 1907).

GUIBERT, or WIBERT, Antipope of

Ravenna : b. near Clermont, about 1025 ; d.

Civita Castellana, September 1100. He was ap¬

pointed chancellor and imperial vicar in Italy, in which capacity he presided over the synod at

Basel (1061). In 1073 he became Archbishop

of Vienna and attached himself to the imperial party. His differences with Gregory VII, caused the excommunication of Guibert in 1078. But

the emperor, refusing to accept the decisions of Gregory, had him deposed and caused Guibert

to be elected Pope. In 1084 the city of Rome was conquered by the imperial forces and Gui¬

bert was enthroned in the Lateran as Clement

III. As long as the protection of the imperial party maintained, he held

sway at Rome, against the succeeding rival popes Victor III, and

Urban II, until he was forced to evacuate Rome by the crusaders in 1097. After futile attempts to regain his possessions and his prestige, he was finally conquered by Paschal II. Consult

Gregorovius, F., (Rome in the Middle Ages>

(Vol. IV, Eng. trans. by G. W. Hamilton, Lon¬

don 1900-02) ; Kohncke, O., (Wibert von Ravenna) (Leipzig 1888).

GUIBORD CASE. The Institut Canadien,

founded in Montreal in 1844 with literary and

scientific objects, brought itself under the ban of Bishop Bourget (q.v.) on account of the al¬

leged irreligious tendencies of certain of the

bocks in its library. In particular, the society's Wear Book) for 1868 was condemned by the

bishop, and his sentence was ratified by the

Congregation of the Index. The bishop warned

his diocesans that any Roman Catholic who

should keep the condemned pamphlet and con¬

tinue his connection with the institute would be refused the sacrament of the Church even at

the moment of death. Joseph Guibord, a fore¬

man printer of Montreal and a prominent mem¬

ber of the institute, died on 18 Nov. 1869, with¬

out having made such submission, his corpse

was denied burial in that part of tlie cemetery of Notre Dame des Neiges set apart for burials made with the rites of the Church, and inter¬

ment in the first instance took place in the Prot¬

estant cemetery. A lengthy lawsuit to enforce

Guibord's rights of sepulture then ensued which became a cause celebre. The case passed from

court to court, and finally came before the

Queen's Privy Council in London, when judg¬

ment was given, in November 1874, that the

corpse must be buried, without a funeral mass, in consecrated ground. The first attempt to re¬

move the body from the Protestant cemetery to

Notre Dame des Neiges was frustrated by the

threatening demeanor of a mob, and final inter¬

ment in that cemetery was made 16 Nov. 1875,

exactly six years after Guibord's death.

GUICCIARDINI, gwe-char-dene, Fran¬

cesco, Italian historian: b. Florence, 6 March

1483 ; d. there, 23 May 1540. He studied at Pa¬

dua and became an advocate and professor of

law at Florence. In 1512 he was appointed Am¬

bassador to the court of Ferdinand the Catholic of Spain. At a later period he was invited by Leo X, to his court and entrusted with the gov¬

ernment of Modena and Reggio. This office

he discharged also under Adrian VI, to the

general satisfaction; and afterward, when Cle¬

ment VII, (de' Medici) ascended the papal chair, Guicciardini was sent as lieutenant of the Pope to Romagna. He contributed here to the pub¬

lic good by restoring civil order, constructing roads, erecting public buildings and founding

useful institutions. Having been appointed lieu-

tenant-general of the Pope, he, in 1521, defended Parma when besieged by the French. In 1534

he began his great work Ustoria d'Italia)

(1561-64) extending from 1490 to 1534. In 1537

he contributed greatly to the elevation of Cosmo de Medici to the office of grand-duke, but when later he attempted to impose constitutional limi¬

tations upon the grand-ducal power, he lost his influence. The (History J was translated into

English by Goddard and the translation pub¬

lished between 1753 and 1761. The reader of

Guicciardini is sometimes offended by a want

of method and his statements cannot always be

depended on as derived from the best sources.

GUICCIARDINI, Francesco, Count, Ital¬

ian statesman : b. 1851; d. 1915. After studying at the University of

Pisa, he entered politics in 1882 as a member of the Lower House. Two

years later he was appointed General Secretary

for Agriculture, Commerce and Trade. In

Rudini's Cabinet (1896-97) he field the office of Minister of Agriculture; from 1909-10 he was

Minister of Foreign Affairs in Sonnino's Cabi¬

net. He was also a member of the House of

Deputies for a number of years and Vice-Presi¬

dent of that body several times.

GUICCIOLI, gwe-cho'le, Teresa, Count¬

ess : b. 1801 ; d. 1873. She was the daughter of Count Gamba of Ravenna and was married to

Count Guiccioli when she was 16 and he 60

years of age. Later she married the Marquis

de Boissy (1851). From 1819-22 she was an in¬

timate acquaintance of Lord Byron and wrote

(Lord Byron, juge par les temoins de sa vie)

(1868, Eng. trans. 1869).

GUICHARD, ge'shar', Karl Gottlieb, or

Quintus Icilius, German military officer and

historian: b. Magdeburg, 1724; d. Potsdam,

1775. He received training for the Church, but abandoned it for the

more congenial pursuit of historical study. He finally enlisted in the

service of the Dutch army and fought there for a year. In 1757 he published his first work on ancient history of military affairs under the

title (Memoires militaires sur les Grecs et les Romains.* On his return to his native coun¬

try, he fought in the army of Duke Ferdinand

of Brunswick, who later recommended him to

Frederick the Great. The king being pleased

with Guichard's talents, retained him in his serv¬

ice. The story concerning the conferring of

the official name of ((Quintus Icilius® upon Guichard is told as follows: In the course of con¬

versation, the king, referring to the battle of Pharsalus, mentioned the part taken by a cen¬

turion named Quintus Icilius. Guichard cor¬

rected him by producing the text of Polybius

which confirmed the fact that the name of the man in question was Quintus Ccccitius. The

king then answered, <(Then your name shall be

Quintus Icilius.® And it was by this name that Guichard henceforth became known in the Prus¬

sian army. He rose to the rank of major, lieu¬

tenant-colonel and finally colonel 1773. In that year he published his (Memoires critiques et

historiques sur plusieurs points d'antiquites militaires.* Consult Carlyle, T., Frederick the

Great) (London 1858-65).

GUIDE-BIRDS, or HONEY-GUIDES,

certain small, mainly black and yellow birds, al¬

lied to the barbets and constituting a genus in¬

habiting the tropical regions of the Old World, which have the curious habit of attracting the attention of men and of honey-loving quad¬

rupeds to bees' nests, profiting by the disturb¬

ance which follows. They are fond of bees,

grubs and honey, but cannot often get them

without assistance; sometimes, also, they show

equal zeal in leading a person to a snake, leopard or something else which has attracted their

notice. Although the genus is. known in India

and Malaya, it is in South Africa that its traits are most noticeable and the books of travelers and explorers there abound in accounts of its

guiding habits. Sir John Kirk contributed the

following exact description of the work of In¬

dicator minor to the (Ibis) (1864) :

((The honey-guide is found in forests, and

often far from water, even during the dry

season. On observing a man it comes flutter¬

ing from branch to branch in the neighboring

trees, calling attention. If this be responded

to as the natives do by whistling and starting to their feet, the bird will go in a certain di¬

rection and remain at a little distance, hopping from one tree to another. On being followed

it goes further; and so it will guide the way to a nest of bees. When this is reached, it

flies about, but no longer guides ; and then

some knowledge is needed to discover the nest, even when pointed out to within a few trees.

I have known this bird, if the man after tak¬

ing up the direction for a little then turns

away, to come back and offer to point out an¬

other nest in a different part. But if it does not know of two nests, it will remain behind.

The difficulty is, that it will point to tame bees in a bark-hive as readily as to those in the for¬

est. This is natural, as the bee is the same; the bark-hive, ˆusinga* as it is named, being

simply fastened up in a tree and left for the bees to come to. The object the bird has in

view is clearly the young bees. It will guide to nests having no honey and seems equally de¬

lighted if the comb containing the grub be torn out when it is seen picking at it.®

GUIDES, in military affairs, persons drawn

from the country in which an army is en¬

camped to lead troops in niglit operations or

through a strange country; also non-commis¬

sioned officers or other enlisted men who take positions to mark the pivots, marches, forma¬

tions and alignments in modern tactics. When

civilians are drawn from a hostile population,

and have probably only a pecuniary interest in serving well, their conduct is always watched

with the utmost jealousy, death being the pun¬

ishment for the least lack of trustworthiness.

The absence of large-scale maps, previous to

1800, made the employment of guides almost

essential and guide officers were specially

trained by most of the armies of Europe. With the advent of adequate surveys and large-scale

military maps the need for guides disappeared

in great part and they are now seldom heard

of.

GUIDI, gwe'de, Carlo Alessandro, Italian

poet: b. Pavia, 1650; d. Frascati, 1712. He

played an important part in the founding of the <(L'Arcadia® Academy at Rome, and did much

to restore the vigor and dignity of Italian lyric poetry. A certain restraint and conventionality

is characteristic of his work. His chief patrons were Rancuccio II, duke of Parma, who was

the first to appreciate his poems ; and Christina, 1 Guide-bird (Indicator sparrmanni) 3 Guinea Hens (Numida cristata and N. meleagris) 2 Garden Warblers (Sylvia curruca and S. rufa) 4 European Golden Oriole (Oriolus galbula) 5 Grakle (Eulabes religiosa)

queen of Sweden, for whom he wrote the pas¬
toral drama (Endymion) (1685). Other worlds
are the tragedy (Amalasunta in Italy,* the
drama (Daphne,* and the poetical version of
the six homilies of Pope Clement XI. His
rhymes were published at Parma in 1681, the
best of the collection being the (Alla Fortuna,*
a lyric of singular charm. Consult Capsoni, G., (Alessandro Guidi) (Pavia 1897).

GUIDI, Ignazio, Italian scholar: b. Rome,
1844. In 1878 he was appointed professor of
Semitic languages at the University of Rome,
and is known principally for his editions and
translations of Semitic fragments and texts, in Arabic, Coptic, Ethiopic and Amharic lan¬
guages. His researches led him to the conclu¬
sion that the Semitic peoples came originally
from the lower Euphrates.

GUIDICCIONI, gwe-de-chd'ne, Giovanni,

Italian poet and ecclesiastic: b. Lucca, 1480; d.

Macerata, 1541. He became bishop of Fossom—

brone, and was later elected president of Ro¬

magna. He wrote poems in dignified and ele¬

gant and simple style, patriotism and love being the central themes. His complete works were

published in 1718; and again at Genoa (1749) ; Bergamo (1753) and Florence (1878). In 1865

his (Lettere inedite) appeared. Consult Minu—

toli, C., (Opere di Monsignor G. Guidiccioni*

(Florence 1867).

GUIDO D'AREZZO, gwe'do-da-rets'o, or

GUIDO ARETINO. See Aretixo, Guido.

GUIDO DELLE COLONNE, kol-6'ne,

Italian poet who lived in the 13th century. His principal work was a (Historia Trojana.* based

on Dictys and Dares, which was translated into English, French and Italian and proved to be a great source for plots for the literature of those countries. He was also the author of several

romantic poems in Italian. The origin of Chau¬

cers tale of (Troilus and Cressida) is found in Guido's <Historia*>

GUIDO OF LUSIGNAN. See Guy of

Lusignan.

GUIDO RENI. See Reni, Guido.

GUIDO OF SIENA, the supposed name of

an Italian painter, whose existence is a subject of great controversy in Italian art. Nothing is known of him except from an inscription on

the picture of the (Virgin and Child Enthroned*

in the church of Saint Domenico at Siena

which is signed <(Guido de Senis** with the date *1221.® If this is authentic, then it is to this Guido, and not to Cimabue that the distinction of having revived the painter's art belongs.

According to Crowe and Cavalcaselle, how¬

ever, the date should be read <(1281,** since the superiority of execution of the heads indicates a more highly developed art than that produced in 1221. Douglas's theory is that the heads have

been repainted at a later date. Milanesi attrib¬

utes the painting to Guido Graziani. Other pic¬

tures assigned to him are the (Virgin and Child) at the Academy at Siena and a (Madonna * at

the church of Saint Bernardino at Siena. Con¬

sult Milanesi, (Della vera eta di Guido) (Siena 1859) ; Crowe and Cavalcaselle, (History of

Painting in Italy > (Vol. I, London 1893).

GUIDON, gi'don, a small flag or pennon for

guiding troops, especially a swallow-tailed flag, such as is carried by a regiment of cavalry or mounted artillery. In the United States cavalrv the regimental guidon is half red and half

white, dividing at the fork. The red above has •U. S » in white. The white is below and has the letter of the company in red. The fly is three feet five inches to the end of the tail ; the head is 27 inches. The lance is nine feet long including spear and ferrule. The engi¬

neer's corps has a triangular, scarlet guidon.

GUIENNE, ge-en, or GUYENNE, ancient

Aquitania (q.v.), a former southwestern prov¬

ince of France, now divided into the depart¬

ments of Gironde, Lot, Lot-et-Garonne, Dor¬

dogne, Aveyron and part of Landes and of

Tarn-et-Garonne The capital was Bordeaux.

GUIEYESSE, ge-as', Pierre Paul, French

engineer and Egyptologist : b. Lorient, 1841 ; d.

1914. He studied at Lorient and at the ficole Polytechnique, and began his career in the ma¬

rine hydrographical engineering corps. In 1870

he became a chevalier of the Legion of Honor, and four years later began to instruct in me¬

chanics at the Lcole Polytechnique, in which

capacity he served for 19 years. He also was

a profound student of Egyptology, on which he

lectured at the College de France 1886-87. From 1890-1910 he was a member of the Chamber of

Deputies; Colonial Minister (1895—96) and rep—

represented New Caledonia in the Superior

Council of the colonies (1903-06).

GUIGNARD, gi-nyar', Jean Louis Leon,

French botanist: b. Mont-sous-Vaudrey (Jura),

13 April 1853. He is director of the Higher

School of Pharmacy and member of the Insti¬

tute, Paris; member of the council of higher

education and director of the Botanical Gar¬

dens of Lyon. He has written extensively on

botany and other scientific subjects; but most

of his work has appeared in scientific journals.

GUIGNES, gen, Joseph de, French Ori¬

ental scholar: b. Pontoise, 19 Oct. 1721 ; d. Paris, 1800. He was admitted to the Royal Society

of London in 1752, and to the French Academy

of Inscriptions two years later. In 1758 he suc¬

ceeded to the chair of Syriac at the College de France His fame rests on his (L'Histoire gen¬

erate des Huns, Turcs, Mongols, et autres Tartares occidentaux) (1756-58).

GUIJA, gwe'ha, a lake about 25 miles long

in the republics of Guatemala and San Salvador, in Central America. It is in a volcanic region and contains two small volcanic islands.

GUIKOWAR, gfk'war, GAIKOWAR,

GAEKWAR, etc., the native title of the Mahratta prince, ruler of the province of Baroda

(q.v.) in British India. The guikowar was of

great importance in the 18th and 19th centuries, being hereditary commander of the Mahratta

army. The military organization was so strong

that about 1750 they were the ruling power in western and central India. (See Mahrattas

and India). For many years the Guikowar of

Baroda was feared by the people of the smaller states, and his troops boasted that they had

watered their horses in every river in India.

The great Guikowars were Pilaji (1721), Da—

maji (1732), Anand Rao (1800), Sayaji Rao

(1819). The ruling Guikowar in 1874 was tried

for attempting to poison the British resident

and was deposed. After 1800 British influences

increased and in 1802 the native Guikowar was

deprived of most of his authority though the

title still remains, and Sayajo Rao (b. 1862), the present potentate under the style of Maha¬

raja Guikowar of Baroda, made a tour of the

United States in 1906.

GUILBERT, gil'bar', Yvette, Parisian

singer : b. Paris, 1869. She trained for the

stage under Landrol and made her debut at

Les Bouffes de Nord. As a singer of comic

songs, she was most popular at the leading cafe chantants and theatres of Paris. She toured

England and Germany and visited the United

States in 1895-96; again in the following year, and also in 1917-18. She sang ballads of the

Latin Quartier at first, but later her repertoire consisted of historical songs and ballads which she rendered in costume in the dramatic style, impersonating the various characters with great

charm. In 1895 she married Dr. M. Schiller.

She is also the author of two novels, *La ve-dette) and (Les demi-vieilles) (1902).

GUILD, Curtis, American journalist: b.

Boston, Mass., 1827; d. 1911. After several

years reporting for the Boston Journal, he

became one of the owners of the Boston Trav¬

eller and in 1859 established the Boston Daily C ommercial Bulletin, of which he became the

editor. He published (Over the Ocean >

(1867); (Aboard Again* (1873); (Britons and

Muscovites) (1888) ; (A Chat About Celebri—

ties1* ; (From Sunrise to Sunset) (verse).

GUILD, Curtis, Jr., American journalist

and politician: b. Boston, Mass., 2 Feb. 1860; d.

6 April 1915. He was graduated at Harvard in

1881 as class orator, and entered the employ of the Commercial Bulletin of Boston, conducted

by his father, Curtis Guild (q.v.). He inter¬

ested himself at once in local politics, was Re¬

publican delegate-at-large to the Saint Louis

convention in 1896; and active in securing the gold plank in the national platform. In the

following campaign he made a political tour of 10 States. He was appointed brigadier-general

of Massachusetts militia and inspector-general

of rifle practice by Governor Roger Wolcott.

At the outbreak of the Spanish War he was

appointed lieutenant-colonel and inspector-gen¬

eral, United States Army, serving in the Seventh Army corps under Gen. Fitzhugh Lee. In 1900

he accompanied Theodore Roosevelt on a tour

of political speaking through the West. In

1902 he became sole owner of the Commercial

Bulletin. He was elected, 4 Nov. 1902, lieuten¬

ant-governor of Massachusetts, with John L.

Bates, governor-elect ; and was inaugurated 10

Jan. 1903. In 1905, 1906 and 1907 he was elected governor. President Taft appointed him Special

Ambassador to the Mexican Centennial in 1910,

and in the same year he was appointed Ambas¬

sador to Russia. He resigned the latter post in 1913.

GUILD, Reuben Aldridge, American li¬

brarian and author: b. West Dedham, Mass., 4

May 1822; d. 1899. His published works in¬

clude (Biographical Introduction to the Writ¬

ings of Roger Williams) (1866) ; (History of

Brown University with Illustrative Documents*

(1867) ; (Chaplain Smith and the Baptists*

(1885).

GUILD, a fraternity, society or company,

formerly active in commerce and mechanics.

Guilds played an important part in public affairs in the Middle Agee. The Romans had various

mechanical fraternities, but these seem to have been merely religious and political societies ;

’while the associations of workmen in the arse¬

nals that existed under the empire were regular hereditary castes, enjoying certain privileges

and bound to certain duties. In Italy, the cradle of the class of free citizens in the Middle Ages, and particularly in the Lombard cities, those

connecting links between the ancient and mod¬

ern civilization, some remains of these Roman

institutions, or recollections of them, probably contributed to revive the guilds, which naturally presented themselves as an excellent means of

supporting the citizens against the nobility by uniting them into powerful bodies. It is cer¬

tain that small societies existed as early as the 8th century, which appear later to have been in the possession of important political privileges.

In the 9th century they appeared in England,

and in time the kings granted the members cer¬

tain privileges and immunities. When the ad¬

vantages of these associations became known

and felt they rapidly increased ; and in the

struggles of the citizens and the nobility the principal resistance against the latter was made by the corporations. As soon as the citizens

acquired an influence on the administration the guilds became the basis of the municipal consti¬

tutions, and everyone who wished to participate in the municipal* government was obliged to be¬

come the member of a guild. Guilds in Ger¬

many possessed no political importance before

the 13th century. At this time they acquired

the right of bearing arms for the defense of

their own interests, and when a struggle arose between them and the citizens belonging to an¬

cient families the guilds were victorious and be¬

came so powerful that even persons of <(free

occupations® joined these associations as the

allodial possessors of land sometimes placed

themselves under feudal lords. The by-laws of

the German guilds contained regulations as to

the training of apprentices, the practice of one's trade in different towns as a journeyman and

the requirements of a master. Thus was laid

the foundation of that excellent workmanship

that characterized the Germans in later years.

This was the real birth of what is now termed trades unionism. At an early period these

workmen's associations met with opposition, but

the opposition was not at first directed against them on account of the obstacles they threw in the way of commercial intercourse, and the

other evil consequences of their monopoly, but

simply on account of their political influence.

In the 18th century several edicts were made in Germany against the abuses of the guilds, and

at different dates in the 19th century freedom was granted in most of the states of Germany

to all to practise any trade without being ad¬

mitted into a guild. In Austria this was done in 1860, and in 1868 it was done for all the states of the North German Confederation.

In Great Britain the societies of mechanics

were important principally in a political respect, on account of their connection with the demo¬

cratic element of the constitution. These soci¬

eties originated at the time of the development of the importance of the cities. In the towns where they long existed they had an important

influence in the election of representatives and in the municipal administration. These guilds,

in England, had no legal right to prevent any man from exercising what trade he pleased.

The only restriction on the exercise of trades GUILDER — GUILFORD COURT HOUSE

was the statute of Elizabeth, requiring seven

years' apprenticeship. The guilds of the city

of London (among the oldest of which are the

weavers, founded in 1164; the. par sh clerks, in 1232 ; the saddlers, in 1280 ; the fishmongers, in 1284; the goldsmiths, in 1327; the skinners, in 1327 ; and the grocers, in 1345) are still very important corporations, still continuing to fulfil the chief object for which they were founded —that of giving relief to poor and destitute mem¬

bers, and also having in many cases the man¬

agement of vast funds bequeathed for benevo¬

lent purposes by persons who selected one or

other of the guilds as trustees. Sometimes

these funds are bequeathed for specific pur¬

poses, which the guilds, as trustees, are of

course bound to carry out ; but in other cases, where they are available for general purposes,

the guilds have usually shown great discretion

in the manner in wh'ch they have employed

them. Besides the secular guilds or mechanics'

associations there were from a very early

period, in Great Britain, religious guilds, re¬

sembling the religious societies of modern times, and many of these became rich and powerful

institutions. From the time of Henry II, all

such guilds were required to have a charter

from the Crown. In 1388 a return to these

guilds was ordered to be made, and it was then found that that of Corpus Christi, York, num¬

bered 14,800 members. Some of the most ob¬

jectionable features of the ancient guilds have aga'n been developed by some of the trades

unions, their modern representatives.

In France guild privileges were sold by the

state from the 10th century till the revolution of 1789, and the position of the artisan had

come to be a most pitiable one ; but at that date every restriction on the exercise of any

trade was removed. This was done also at a

later period in Belgium, Holland, Italy, Sweden (1846) and Denmark (1862). The development

of machinery in the 18th century tended to

break up trade up trade guilds in all European countries. The workmen unwisely fought the

introduction of machinery that reduced hand

labor, and employers naturally secured outside

workers and were able to manufacture and sell

at a lower price. Many and bitter and bloody

were the riots over the new methods and mach'nery, but in the end the power of the old guilds largely declined until machinery came

to be generally accepted. Then came the mod¬

ern labor movement. An account of the suc¬

cessors of the guild movements in America will be found under Labor Unions. See also Trade

Unions for the modern European history of

guilds.

GUILDER, a silver coin of Holland worth

about 40 cents ; formerly a gold coin. See

Florin.

GUILDFORD, England, town and county-seat of Surrey on the Wey River 29 miles

southwest of London and on the London and

South Western, the London, Brighton and

South Coast and the South Eastern and Chat¬

ham railways. The principal buildings are the

ruins of a Norman castle; the old church of

Saint Mary, dating from Norman times; the

churches of Saint Nicholas and the Holy

Trinity; the town hall; county-hall; Abbot's

Hospdal (1619); County Hospital (1866), and

the Royal Free Grammar School founded in

1509. The chief industries are iron foundries

and breweries and flour mills. A considerable

trade is carried on in grain. Guildford is gov¬

erned by a mayor, aldermen and councillors,

and owns its waterworks and markets. Fairs

are held for trade in cattle. It is a very old town, having been one of Alfred's possession,

and was given in turn to his son Ethelwald. It became a borough in 1131, and county seat in

1885. Pop. 23,000.

GUILDHALL, the usual designation in

England for the mediaeval city halls, the most famous of which is the London Guildhall, King

Street, Cheapside, first built in 1411, all but de¬

stroyed in the fire of 1666 and rebuilt in 1669.

The fagade dates from 1789. The great hall

used for the famous city feasts, the election of city officers and members of Parliament, and

for the public meeting of the livery and free¬

men, is 153 feet long, 48 feet broad and 55 feet high. It is decorated by statues of various

celebrities, and in the common council room

there is a collection of valuable paintings.

GUILDS. See Corporations, History of;

Corporations, Legal.

GUILFORD, Earl of. See North, Fred¬

erick.

GUILFORD, Conn., town and borough of

New Haven County, on Long Island Sound,

and on the New York, New Haven and Hart¬

ford Railway, 18 miles east of New Haven. It

was settled as Menunkatuck by English colonists in 1639, and one of the ancient stone buildings of that date is now used as a State museum.

Guilford received its present name in 1643 when it was made a part of the New Haven Colony.

It was incorporated in 1815 and in 1826 Madi¬

son was set off as a separate township. The

regicides Goffe and Whalley are said to have

come to Guilford in 1660 to surrender to

William Leete, then governor of New Haven

Colony, and to have been secreted for a time in the governor's cellar. Farming, canning, iron

working and some woolen manufactures are

the. chief industries. Halleck the poet was a

native and resident of Guilford. Pop. of town

and borough 3,001 ; of town, 1,612. Consult

Smith, R. O., (History of Guilford) (Albany

1877), and New England Magazine, new series,

Vol. I, (Boston 1884).

GUILFORD (gil'ford) COLLEGE, N. C.,

town of Guilford County, on a branch of the

Southern Railroad, six miles west of Greens¬

boro. It was incorporated in 1895 and derives

its name from Guilford College, a coeducational establishment controlled by the Friends, and

founded here in 1837. The income of the col¬

lege is $38,500, and it has a library of over 6,000

volumes. There is a Carnegie library and the

town is the centre of a farming and dairying

region. Pop. about 300.

GUILFORD COURT HOUSE, Battle of,

15 March 1781 ; in results one of the decisive battles of the Revolution. Cornwallis at Hills¬

boro proclaimed that he had conquered North

Carolina, and called on the well-disposed to rally around him ; Greene, awaiting reinforcements

near the Virginia border, perceived the neces¬

sity of showing the patriots they were not

abandoned, and advanced across the Dan.

After some days of fencing and recruiting,

Greene halted for battle at Guilford Court

House. He had about 4,400 men, but 3,000 were militia; and of his Continental regulars, only

the Virginians and the First Maryland were

veterans, the Second being new. Cornwallis

had 2,213 trained troops. Greene posted his

first militia line in an open field, to thin the British front before giving way; the second in a wood 300 yards back ; the regulars on a rise 400 yards to the rear, near the court house.

Their front was convex: the Virginians on the

right, then in succession Singleton's artillery, Gunby and Howard's First Maryland and Ford's

Second Maryland on the left. Lee's Legion

and Campbell's riflemen guarded the left flank; William Washington's cavalry, Lynch's rifles,

and the remnant of the Delaware regiment, the

right flank. The British routed th first

militia after it fired one or two volleys;

but only drove the second from the wood after an obstinate and

murderous combat. Ad¬

vancing against the hill, their left was riddled by a withering fire, and then broken by a bay¬

onet charge of the First Maryland; but their

right crushed the second and captured two

cannon. The first faced about and checked it;

Washington in turn pierced the British line

and retook the pieces. The first steadily

crowded back their opponents with the bayonet ; and Cornwallis only stayed the tide of defeat

by ordering his artillery to open on the Mary¬

landers through his own ranks, checking the

pursuit at heavy loss to himself. Reforming,

the British moved forward and with double

the number of real troops, carried the hill and held it against every assault. Toward evening

Greene after five hours' coinflict withdrew,

leaving his artillery on the field because the horses were killed. The American loss was 79

killed and 184 wounded and about 1,000 militia dispersed to their homes. Cornwallis lost 93

killed, 413 wounded, and 26 missing — 532 in all, or a quarter of his entire force. He announced a victory to Parliament, but Fox declared that ((another such victory would destroy the British army® ; and, in fact, Cornwallis had to fall

back on Wilmington, abandoning his hold on

the Carolinas, except two or three places on

the coast, and shortly going to Virginia and

capture.

GUILLAUME, gwT-yom’, Eugene, French

sculptor: b. Montbard, France, 4 July 1822; d.

Rome, Italy, 28 Feb. 1905. He opened his first studio at Dijon, and subsequently became a

pupil of Pradier at Paris. In 1845 he carried off the Grand Prix de Rome. It was during

studies at Rome that he manifested that mastery of the human form which appears in his

(Reaper, J which he modeled at Rome. It was

subsequently cast in bronze, and is now in the Luxembourg. In 1852 he produced in marble

the sitting figure of Anacreon with the dove of Venus. He was, however, less successful in

ideal creations than in portrait busts. His

statues of Napoleon I, as lieutenant of artillery and as emperor, his bust portraits of Arch¬

bishop Darboy, of F. Baloz, Ferry and Thiers

are characteristic and dignified, but he is per¬

haps best known for his sculptures on the

facade of the New Opera House, Paris (1869) ; (The Fount of Poetry* (1873) ; (Aopheus*

(1878); (Two Hermes) ; LAnacrcon with

Eros) ; and (Sappho with Eros and Andro¬

mache^ He was the designer of the medals

given at the expositions of 1867 and 1878.

GUILLAUME LE BRETON, bre'ton,

poet and historian, b. 1159; d. about 1227. He attended the University of Paris ; and on leav¬

ing there he became attached to the court of

Philippe-Auguste as chaplain to the prince;

by whom he was used to negotiate very deli¬

cate matters at Rome. He was also entrusted

with the education of the king's son. A poem

in 12 books entitled the ˆhilippiade* (1222-24), is of very considerable historical interest, be¬

cause the author, who wrote it three times

between 1214 and 1226, had evidently made an

exhaustive study of his subject and he has

handled his material with very considerable

skill. Another of his longer poems, entitled

(Karlotis) (which is mentioned in the (Philippiade*) was dedicated to the young prince of whose education he had charge; but this has

unfortunately been lost. In the (Philippiade)

are interesting and valuable details of man¬

ners and customs of the times; information

concerning military matters, all presented by

the hand of a master chronicler and learned

historian who had had the advantage of the

best education afforded in his day. He also

wrote a continuation of the Chronicle of

Rigord which had been continued down to 1207 ; but his interest in

his work caused him to ex¬

tend it. There are numerous manuscripts of

the works of Guillaume le Breton, which is a

proof of their popularity.

GUILLAUME DE LORRIS, lo-re\

French poet: b. Lorris, about 1215; d. about

1240. Nothing is known of him except that he

was the author of part of the (Roman de la

Rose.* He is said to have written the first 4,000

lines to which Jean de Meun added, in a differ¬

ent style, 18,000 more lines. (See Romance of

the Rose). Consult Langlois. E., (Origines et

sources du Roman de la Rose* (Paris 1891);

Jarry, L., (Guillaume de Lorris et le testament d' Alphonse de Poitiers * (1881).

GUILLAUME DE NANGIS, French

writer and chronicler: b. about 1250; d. June

1300. He was a monk at Saint-Denis, where he

became keeper of the archives in 1285 ; and he succeeded in making more of them and giving

them more of life and interest than any of his predecessors had done. His existing literary

work is quite extensive and of very consider¬

able interest and historical value. He restored and completed the Latin annals in the monas¬

tery, wrote a (Biographie de Saint Louis* ;

another of ‘Philippe le Hardi* ; (A Latin

Chronicle) (1292-93), and a ‘Chronique Uni—

verselle) (1297). His French chroinicle was

subsequent to his death, continued bv other

writers ; but none of these writers have equaled Guillaume de Nangis in literary sLde or inter¬

esting presentment of subject and selection of

material. Nor have any of them left matter

so interesting from the historical point of view.

Consult Delaborde ; Delisle, L. ; and Lacurne

de Saint Palaye, in all of whose complete works are to be found estimates of the work of

Guillaume de Nangis and information of an

interesting nature concerning him.

GUILLAUME D’ORANGE, o-ranzh’,

popularly known as ((short-nose,** because he

had lost part of his nose in battle, a semi-legend¬

ary, semi-historical character, who gives the title to a large cycle of legends of the chivalric and troubadour class which cluster round the

Orange family. He is also known as Guil¬

laume Fierabrace and Saint Guillaume de Gellone. The extensive cycle of chansons de geste of which he is the dominant figure consist of 18 distinct branches, comprising in all about

120,000 verses. These dvisions are as follows,

according to their poetical titles: (1) (Garin de Montglane5 ; (2) (Girart de Viane) ; (3) (Aimeri de Narbonne) ; (4) (Enfance Guillaume5 ;

(5) (Le Courronement Looys5 ; (6) (Le Char—

roi de Nimes5 ; (7) (La Prise d'Orange5 ; (8) (Beuve de Comarchis5 ; (9) (Guibert d'Auder-nas5 ; (10) (La Mort d'Aimeri de Narbonne5 ;

(11) (Les Enfances Vivien5 ; (12) (La Bataille d'Aleschans5 ; (13) (Le Moniage Guillaume5;

(14) (Rainouart5 ; (15) (La Bataille de

Loquifer5 ; (16) (Le Moniage Rainouart5 ; (17) (Renier5 ; (18) (Foulque de Candie.5 Although

a native of the south, Guillaume d'Orange was

a staunch supporter of the French king,

Charlemagne, who had appointed him governor

of Toulouse. This created for him many ene¬

mies throughout the Provincal countries; but he confronted them all and got the name of being a terrible enemy and an invincible warrior and leader. Hence it was quite natural that he

should have become the hero of legend and

story in an age when man worshipped the bold

and the chivalrous. Among his other deeds

which gave lustre to his name was his heroic

part in the crusade set on foot by Louis, son of Charlemagne. During this military expedi¬

tion Guillaume was the standard bearer, a posi¬

tion which gave an excellent opportunity to dis¬

play his prowess. The Aimeri whose name ap¬

pears in two of the foregoing legend titles,

was, according to the legends themselves, the

father of Guillaume. By him Guillaume was

sent to the court of Charlemagne, he defeated a strong body of Saracens on the way. He ar¬

rived at. Saint-Denis in time to witness the

coronation of the emperor, by whom he was

knighted for his youthful exploits. After h:s

many adventures and heroic exploits which fill

to overflowing a long life Guillaume founded

the monastery of Gellone; and some time after¬

wards he retired from the world into the mon¬

astery of Saint-Guillaume du Desert not far

from Montpellier. Later on he came forth

from his retreat to defend Paris “from the

infidels.55 David-like, he battled with the mon¬

strous giant Isore and overcame him. When

the fear of the invasion was over he returned once more to his ecclesiastical retreat, there to end his days in the sanctity of the Church.

Other Orange Stories existed in the Mid¬

dle Ages, probably in considerable numbers,

since various of the incidents forming the bases of the Guillaume d'Orange titles given above,

are treated in different ways in other lan¬

guages which, we know, habitually borrowed

from the French throughout this period. Of

these the most noted is the unfinished or

mutilated poem, (Guillaume d'Orange,5 written

in German by Wolfram von Eschenbach. Ac¬

cording to this poem, Guillaume, the eldest of the sons of Aimeri, Count of Narbonne, eloped

with the handsome young wife of Tybald, King

of Arabia, and took her into the dominions of the French king. Tybald followed him with an

immense host. Guillaume gathered together an

army of 20,000 and faced the forces near Or¬

ange. The battle that followed was fierce; and no quarter was asked or given o4i either side.

Defeated and most of his most trusty warriors

slain, Guillaume fled to his castle, a very

strongly-fortified place near Ki'burg. Followed

there by Tybald, he fled to the court of the French king, who had married one of his sis¬

ters. There he obtained a second army through

the influence of his sister, the queen, and his father, who was at the court. Accompanied

by the latter he set. out for .Kiburg once more, where he arrived just in time to prevent its

falling into the hands of Tybald after a long siege and stout resistance. Pursuing the re¬

treating Saracens, who had taken to flight on

his approach, Guillaume came up with them on

the seashore, where a second terrific battle re¬

sulted in the complete destruction of the

enemy and the death of Tybald.

Among the various other versions of this

story is one by the troubadour Bertrand, which bears the title (Diane et Aimeri,5 which also varies much from the versions given above.

That these Guillaume d'Orange poems are older

than the form in which they have come down

to us seems more than probable, and that they must have had a powerful influence on the

times in which they were popular seems cer¬

tain. They are therefore of special interest as constituting one of the original foundations of French literature. They are also of special

historical and antiquarian value owing to the

vivid and truthful pictures they contain of the times in which they were composed and their

reflection of those of an earlier age. Their

relation to the knightly and chivalric romances is also an interesting subject which has not

received all the attention it apparently deserves.

GUILLAUME DE PALERME, pa-larm',

hero of an old French romance of the same

name. An English version under the title

(William of Palerne5 was written in the 14th

century. It tells the story of a poor fellow

named Guillaume, who, falling in love with the daughter of the Roman Emperor, elopes with

her from her father's court. They hide in the woods disguised as bears and are cared for

by the were-wolf Alfonso, who has been trans¬

formed by his stepmother. Alfonso is a

Spanish prince, and proves to be the brother of Guillaume. In return for Alfonso's kind hospi¬

tality, Guillaume restores his kingdom, over¬

throwing the king and the cruel stepmother,

whereupon the charm is broken and Alfonso re¬

sumes his natural shape.

GUILLAUMET, ge'yo-'ma', Gustave

Achille, French artist: b. Paris, 1840; d. 1887.

He pursued his studies at the Ecole des Beaux Arts, working under Picot and Barrias. In

1863 he was awarded the Grand Prix de Rome.

His principal works are scenes in Algeria,

where he traveled for a few. years. Among

these are (Evening Prayer in the Desert*

(1863); (Laghouat5 • (The Seguia Ravine near

Biskra5 ; (The Dogs of Douar5 ; and (The

Famine.5 He published (Tableaux algeriens,5

a series of articles on his own works.

GUILLEMIN, german, Amedee Victor,

French scientist: b. Pierre, Saone et Loire,

1826; d. 1893. After studying at Paris, he

taught mathematics and wrote a number of

scientific works including (Les mondes, causeries astronomiques5 (1861); ‘Simple explication des

chemins de fer5 (1862); (Le ciel5 (1864); (La

bine5 (1865); ‘Elements de cosmographie5

(1866) ; (Les phenomenes de la physique*

(1867) ; (Les applications de la physique aux

sciences) (1873) ; (Les cometes* (1874) ; (Le

son) (1876) ; (Les etoiles* (1877) ; (Les

nebleuses) (1880); (Le monde physique* (5

vols., 1880-85), and (Petite encyclopedic popu—

laire) (12 vols., 1886-91).

GUILLEMIN, Jacques Antoine, French

botanist: b. Pouilly-sur-Saone, Cote d'Or, 1796; d. 1842. He studied at Dijon and Geneva, and

then instructed in botany at Paris, where he

became professor of botany at the horticultural institute in 1830. In 1838 he undertook an in¬

vestigation of the tea plantations of Brazil for the government, in order to determine the

feasibility of raising tea in France. . His writ¬

ings appeared in the various publications of

botanical and scientific societies ; and he is

also author of (Recherches sur le pollen)

(1825) ; (leones Lithographicae Plantarum Aus—

traliae Rariorum Decades Duae* (1832) ; ˆCon¬

siderations sur l'amertume des vegetaux'

(1832).

GUILLOTIN, ge-yo-tan', Joseph Ignace,

French physician: b. Saintes, 28 May 1738; d.

1814. After studying at a Jesuit college, he

served his novitiate in the order, and taught

at the Jesuit college at Bordeaux. Soon after

he began practising medicine at Paris. When

the Revolution broke out, he became one of its ardent supporters, and it was his suggestion

that all capital punishment be inflicted by use of a machine. The Terror adopted the instru¬

ment later and it became known by the name of its proposer. (See Guillotine). Guillotin was

chosen secretary of the National Assembly in

1790, and then retired. On the failure of the Revolution, he returned to Paris and again took up his practice.

GUILLOTINE, giro-ten, a machine for

beheading, so called from Dr. Joseph Ignace

Guillotin, and introduced during the French

Revolution. It consists of two posts united at the top by a cross beam and furnished with

grooves, in which a bro'ad steel blade heavily weighted with lead descends by the impetus of

its own weight on the neck of the criminal, fas¬

tened to a plank beneath. The certainty and

speed with which this instrument separates the

head from the 'body gives it an advantage over the axe or sword wielded by the hand. Ma¬

chines of a similar description have been in use among many nations. In Italy, from the 13th

century, it was the privilege of the nobility to suffer capital

punishment by an instrument

called the mannaia, closely resembling the guil¬

lotine. In Germany, likewise, during the Mid¬

dle Ages, a mechanism resembling the guillo¬

tine was made use of, though the blade did not fall upon but was thrust through the neck of the criminal. There was formerly employed in

Great Britain, also, and more especially in Scot¬

land, an instrument of decapitation called the

ˆmaiden,® said to have been introduced by Re¬

gent Morton, who himself afterward suffered

by it. It differed from the guillotine in this, that while the blade of the guillotine falls upon the neck of the criminal, in the maiden, the

blade is fixed with its edge upward, and the

neck of the criminal is forced down upon it by the fall of a heavy weight. Such an apparatus was also knoAvn and used at an early period in France. The Dutch likewise formerly made use

of a decapitating machine.

Dr. Guillotin was not the inventor of the

beheading machine which bears his name, and

had only a secondary share in its introduction into France. As a member of the constitutional assembly he proposed to that body to abolish all class distinctions in the method of inflicting

capital punishments, and with that view to have some instrument invented which might do the

work more quickly and certainly than the hand

of the headsman. The establishment of a new

penal code having now become the subject of

deliberation, a vote for a uniform system of

capital punishment was, on the motion of

Dr. Guillotin, passed on 21 Dec. 1780, with a recommendation that the least painful method

of inflicting it should be adopted. It was not till 1792, however, that this special machine was selected after a report from Dr. Ant. Louis,

secretary to the College of Surgeons. The guil¬

lotine was first erected in the Place de Greve at Paris, and the first execution performed by it on 25 April 1792, on a highwayman. Shortly

afterward, in remembrance of Guillotin's origi¬

nal proposition, it received the name of (<guillotine,** both popularly and in official language, and it was introduced wherever the penal code

of France has been adopted.

GUILMANT, gel-man, Felix Alexandre,

French organist: b. Boulogne, 1837; d. Meudon,

1911. His father was an organist, and the boy first studied under him. Later he had Lemmons

and Carulli for his teachers, and at an early age, manifested particular aptitude and brilliance.

At the age of 16 he received an appointment

as organist of Saint Joseph's church. In 1857

he became choir master at Saint Nicholas

church ; in 1871 he occupied a similar position at La Trinite, and was

appointed Chevalier of the Legion of Honor in 1893. Three years later

he became professor of the organ at the con¬

servatory at Paris. Guilmant made successful

tours on the continent and in the United States.

He composed (Belsazar,* a lyric scena; a sym¬

phony for organ and orchestra, a number of

organ sonatas and several vocal pieces.

GUILT, GUILTY. Guilt signifies a crime,

offense or the state of being tainted with crime.

Guilty signifies . justly chargeable with crime.

Guijty, in law, is the form of verdict given by a jury in criminal cases when the crime

charged ‘has been found proved. In England

and the United States there are only two ver¬

dicts which can be given in such cases — guilty or not guilty; but a third or intermediate ver¬

dict mav be given in Scotland — ((not proven,®

which, though in reality a verdict of «not

guilty® (and so entered on record), yet is al¬

lowed to be given by juries when they are not satisfied that sufficient legal evidence has been given, but nevertheless consider there was some foundation for the charge, or at least some

ground for suspicion. It has been objected to, this Scotch verdict, that it leaves a stigma on the party; nevertheless, it is firmly adopted in the law and practice of Scotland.

GUIMARAES, or GUIMAR2ENS, ge”-

mar-rinsh, Portugal, a town in the district of Braga, Province of Minho, 35 miles northeast

of Oporto on the Oporto-Corunna Railway.

There are several interesting old buildings, in-GUIMARDS — GUINEA-WORM

chiding the birthplace of Alphonso, the first

king of Portugal; the font where he was bap¬

tized in the Church of Santa Maria de Oliviera; the Church of Sao Domingoes, which dates

from the 12th century and the town hall, a

structure in the combined Moorish and Gothic

style. The chief manufactures are cutlery,

linen, leather, preserved fruits, textiles and

paper. There is also considerable trade in

wine and farm produce. The prehistoric Iberian

town of Citania is not far off; and there are also hot sulphur springs at Taipas, which the

Roman called (Aquae Levae.® Pop. 9,000.

guimarAs, ge-ma-ras’, Philippines, an

island 23*4 miles long bv 10*4 miles wide, lying west of Negros and south of Panay, forming

with Panay the strait of Iloilo, and with Negros the strait of Guimaras, 6*4 miles wide. The

cast coast is mountainous, the west coast, open and fertile; an excellent road follows the en¬

tire coast, except for a distance of 10 miles, and the most important towns are on this road. The products include rice, corn, cotton and tobacco, and there are important fishing interests.

GUIMBAL, gem-bal', Philippines, a pueblo

of the province of Iloilo, island of Panay, sit¬

uated on the southeast coast, 17 miles east of the town of Iloilo. Pop. about 8,000 in 1917.

GUINAAN, ge na'an, a Malay tribe of the

Philippines, inhabiting the watershed of the

Rio Abra and the Rio Grande de Cagayan, is¬

land of Luzon, and the neighboring region of

Isabela and Abra. They are a heathen, head¬

hunting tribe and have a distinct language.

GUINEA, a maritime region of western

equatorial Africa, extending from the neigh¬

borhood of the Senegal to the vicinity of Cape Negro. This vast region forms the coasts of

the Mandingoes, Ashanti, Dahomey, Benin, Biafra, Loango, Kongo, Angola and Benguela, con¬

necting with the Atlantic distant territories by means of its rivers, especially the Senegal, the Gambia, the Niger, the Coanza, the Zaire or

Kongo, and the old Calabar. Politically the re¬

gion is divided into the French colony of Sene¬

gal, English settlements on the Gambia, the

republic of Liberia, the Gold, Ivory and Slave coasts, the Kameroons, the Portuguese settle¬

ments, the Kongo, Gaboon and the Spanish set¬

tlements.

GUINEA, gin'e, an English gold coin, first

issued in 1663 ; by a proclamation issued 22 Dec.

1717, the guinea was declared current at 2D.

sterling. Its true value, as derived from the

market values of gold and silver at that time was 2C R. 8 d., about $4.96. It has not been coined since 1817, when the sovereign supplanted it,

but the fashion still prevails of quoting prices of some things in guineas and subscriptions are frequently recorded in the same denomination.

GUINEA, Gulf of, that portion of the At¬

lantic on the coast of Africa, between Capes

Lopez and Palmas. Two of its arms are the

bights of Benin and Biafra. The Niger flows

into this gulf south of the bight of Benin. A number of small streams enter from French

Kongo and Kamerun. It contains a number of

islands, chief of which are Saint Thomas,

Fernando Po and Prince's Island. The gulf

has two currents, one setting eastward into the bights of Biafra and Benin and the other com¬

ing from the south ; they meet in the bight of Biafra arid unite in one stream which gradually expands as it flows northwest, then west and

southwest.

GUINEA-CORN, a name given to durra,

Sorghum vulgar e, cultivated in the United

States under the name of broom-corn. See

Durra; Broom-corn.

GUINEA-FOWLS, a family of gallina¬

ceous birds (Numididce) allied to the pheasants and turkeys, natives of Africa and Madagas¬

car. Twenty-three species are known, the most

familiar being the common guinea-fowl of our

poultry yard (Numida meleagris) . This bird

ranges in a wild state from Senegambia to the Niger River and is found also on the Cape

Verde Islands. It is supposed to have been first brought to Europe by Portuguese explorers in

the 16th century; but these fowls were domes¬

ticated in Rome during the classic period. Of

the other species the vulturine guinea-fowl

(A cry Ilium vulturinum) is one of the hand¬

somest, being striped with brilliant blue ; while the black guinea (

Phasidus niger) and the

turkey-like guinea (Agelastes meleagrides) are

peculiar in possessing spurs.

GUINEA-GRASS, a kind of grass (Pani -

cum maximum), often 6 to 10 feet in height,

a native of western Africa, which has been

naturalized in Florida, Central America, South

America and the West Indies, and is largely

cultivated for fodder.

GUINEA PEPPER, specifically the grains

of the plant Amomum meleguetta, but also a

general term for the seeds of different plants because of their peppery nature. Thus the

seeds of the shrub Xylopia cethiopica is so

called, although it is often termed Ethiopian

pepper. In the 18th century the trade in these ˆgrains® was thriving in West Africa, but the

introduction of Eastern peppers killed the trade in West Africa.

GUINEA-PIG, a small, variable domesti¬

cated race of an uncertain South American

species of cavy (see Cavy), bred in all parts of the world as a children's pet. It is about six inches long and exists in several races, some

short-haired, others with long, curiously ruffled hair. The colors are

greatly varied, white,

black and a mixture in quaint pattern of white and tan being preferred. It is a restless, grunt¬

ing little creature, showing a small amount of intelligence, but gentle and amusing. It feeds

on vegetables, bread, parsley, lettuce, etc., and is exceedingly cleanly in its habits. It begins to breed when five or six months old, the period of gestation being from 9 to 10 weeks, and the litters averaging four to five ; and this extreme fecundity seems to be its only means of defense against extinction. The name is probably a

corruption of “Guiana-pig,® referring to its

native home and its pig-like form and grunting.

English children call them ˆcavies.® They are

bred by fanciers for show purposes and clubs

exist for the improvement of standard breeds;

and they are also in much demand as subjects

of experiment in medical and bacteriological

laboratories. Consult Crandall, (Pets) (New

York 1918).

GUINEA-WORM, a nematode worm (Filaria medinensis) , the female of which may be three feet long, and as thick as a knitting-needle. It is a parasite in the feet and toes of 540

residents of the East Indies and African coast, forming abscesses beneath the skin in which

the worm is coiled up. It produces the disease known to the Greeks as dracontiasis, and one

of those now called filariasis. To extract the worm it must be slowly wound upon a roll of

paper, a little at a time, care being taken not to break the worm, as if a portion is left in the abscess, the young will develop and be scattered under the skin. Although formerly confirmed

to the Old World, the guinea-worm has recently been found in the tropics of America, but is

very rarely seen in northern parts.

GUINES, gwe'nas, Cuba, town in the prov¬

ince of Havana, 30 miles southeast of the city of Havana. It is the centre of a large plan¬

tation district, and is connected with Havana by a railroad dating from 1838, and electric cars.

Giiines was originally a large estate, and was gradually built up, receiving its charter in 1814.

A fire destroyed it in 1817, when it was rebuilt.

The cathedral dates from 1850. Pop. 8,200.

GUINEVERE, gwin'e-ver, the wife of

King Arthur in the Arthurian legends (qv).

In the first accounts of the Arthurian court,

she plays a very unimportant part, and her

character is not clearly portrayed. It is in the 13th century that the personality of the queen and the story of her love for Lancelot are first developed. The most vivid and powerful

picture of Guinevere is that given by Tennyson in the (Idylls of the

King,* in which her sin¬

ful love foi Lancelot is made the real cause of the downfall of the Round Table and Arthur's

kingdom.

GUINEY, Louise Imogen, American poet:

b. Boston, 7 Jan. 1861 ; d. London, 2 Nov. 1920.

Graduated at Elmhurst Academy, Providence,

she studied afterward under private tutors, and lived abroad many vears. She besran to write

for publication in 1880 and was a frequent con¬

tributor to The Pilot, Boston. Her published

works include (Songs at the Start* (1884) ;

<The White Sail and Other Poems) (1887) ; (A

Roadside Harp* (1893); (Martyr's Idyl and

Shorter Poems * (1899) ; and in prose she

also published (Goose-Quill Papers) (1885) ;

(Brownies and Bogies* ; (Monsieur Henri*

(1892); (A Little English Gallery*; (Lovers'

Saint Ruths*; (Patrins* (1897); (The Secret

of Fougereuse* ; (England and Yesterday*

(1898); (Hurrel Froude* (1904); (Robert

Emmet — His Rebellion and His Romance*

(1904) ; (The Blessed Edmund Campion*

(1908), *etc.* She edited an edition of Mangan and of Matthew Arnold, and was joint

author with Mrs. Spofford and Alice Brown of

(Three Heroines of English Romance* (1894).

GUINGAMP, gan-gan, France, town and

capital of Cotes-du-Nord, an arrondissement in

the northwest. The town is situated on the

Trieux River, 20 miles west northwest of Saint-Brieuc. It contains a famous old church dat¬

ing from the 14th century where annual ((pardons** are granted to pilgrims. Other points

of interest are the old fountain, the ruins of. the ducal castle and of the town walls, the religious college, the mathematical schools and the

museum. The chief industries are the manu¬

facture of flour, leather goods and ginghams.

Trade is carried on in cattle and agricultural products.

GUINICELLI, gwe-ne-chel'le, Guido, Ital¬

ian poet: b. Bologna, about 1240; d. 1276. He is called by Dante the father of Italian poets.

He suffered exile with the Glubellines, and

died expatriated. Only seven of his canzoni

and five sonnets have survived, the most

famous of which is (The Gentle Heart,* ad¬

mirably translated by D. G. Rossetti. The

poems are marked by deep tender emotion and

thoughtfulness, the mood which is exemplified

by Dante in his (Vita Nuova.* Guinicelli's

works are published in Mannucci, (Manuale

della letteratura del primo secolo della lingua italiana* (Florence 1843). Consult Rosetti,

D. G., (Dante and His Circle* (London 1874).

GUINNESS, Sir Benjamin Lee, Irish

philanthropist: b. 1 Nov. 1798; d. 19 May 1868.

He was a member of the great Dublin brewing

firm which bears his name, and is one of the largest in the world. He was elected lord

mayor of Dublin in 1851, was member or Parlia¬

ment for the city 1865-68, and created a baronet in 1867. He restored Saint Patrick's Cathedral, .

Dublin, at a cost of $700,000. His business

in 1886 was placed in the control of a limited liability company, employing 3,000 persons and

having a capital of £6,000,000.

GUINNESS, Sir Edward Cecil, Irish phi¬

lanthropist: b. 10 Nov. 1847. He was the son of Sir B. L. Guinness (q.v.). In 1891 he became

Baron Iveagh. He gave $1,250,000 for the pur¬

pose of erecting sanitary dwellings for working people at a low rent. Of this sum $1,000,000

was to be given to London, and the remainder

to Dublin. The income obtained on the capital

is to be employed in the same fashion.

GUINOBATAN, ge-no-baTan, Philippine

Islands, a town in the province of Albay,

Luzon, on the Inaya River, 9 miles northwest

of Albay. It is the centre of a hemp-growing

district. Pop. 20,000.

GUIRAUD, ge-ro', Ernest, French com¬

poser: b. New Orleans, La., 26 June 1837; d.

Paris, 6 May 1892. He was the son of a com¬

poser who had won the Grand Prix de Rome in

1827, and was first educated by his father.

Later he went to Paris to study at the Con¬

servatoire, where he was also awarded the

Grand Prix for his opera (Bajaget et le joueur de flute* (1859). From 1870-71 he served in the Franco-Prussian War, and five years later be¬

came professor of composition at the Conserva¬

toire at Paris. Among his other works are

(Sylvie* (1864); <Le Kobold* (1870);

(Madame Turlupin* (1872) ; (Piccolino*

(1876) ; (Galante Aventure* (1882) and

(Gretna Green,* a ballet (1873). (Brunhilde*

an opera, was left unfinished, and was com¬

pleted under the title (Fredegonde* by Saint—

Saens (1895). He published also several com¬

positions for orchestras, a high mass and a

treatise on instrumentation.

GUIRIOR, ge're-or, Manuel Marques de,

Spanish provincial governor : b. Aoiz de Ugarte, Navarra 1708; d. 1788. At the age of 25 he

joined the navy, and finally rose to the rank of chief of squadron (1769). Two years later

he set sail for New Granada in the capacity of viceroy and in the same year he was appointed president of the Audiencia of Sante Fe. His

government was efficient and did much to pro¬

mote the industries of those provinces. In 1776

he .undertook the office of Viceroy of Peru,

remaining there until 1780 when he was re¬

moved. He returned to Spain, where he spent

the rest of his life. He published memoirs of his rule in New Granada and in Peru, which are preserved in Garcia y Garcia, J. A., (Relaciones de los Vierreyes del Nuevo Reino de Granada)

(New York 1869), and in Lorente, S.,

(Relaciones de los Virreyes y Audiencias Peru*

(Lima 1867-72).

GUISBOROUGH, giz'bru, England, town

in the North Riding of Yorkshire, in the parlia¬

mentary division of Cleveland, 10 miles east

southeast of Middlesborough on the NorthEastern Railway. The principal buildings are

the church of Saint Nicholas; the town hall;

the grammar school, founded in 1561 ; and the

ruins of an Augustinian priory dating from the 12th century, in which Robert Bruce, grand¬

father of King Robert Bruce is buried. The

principal industry is iron and steel founding,

the supply coming from the neighboring mines.

Pop. 7,050.

GUISCARD, ges'kar, Robert. See Rob¬

ert Guiscard.

GUISCARD, Roger. See Roger I.

GUISE (gii-ez or gez) FAMILY, The,

French ducal house, a branch of the family of Lorraine. The founder was Claude, a younger

son of Rene II, Duke of Lorraine, who in 1506

became naturalized in France, and in 1513 mar¬

ried Antoinette de Bourbon, the daughter of the Count of Vendome. In his favor the county of

Guise (one of his numerous possessions in

France) was erected in 1528 by Francis I, into a duchy. He died in 1550, leaving five daugh¬

ters (the oldest of whom, Marie, married

James V, of Scotland, and was the mother

of Mary, Queen of Scots) and six sons —

Frangois, who succeeded him in the duchy of

Guise and his other dignities; Charles (usually known as Cardinal of Lorraine), Louis (Car¬

dinal of Guise), Claude, Francois, and Rene,

all persons of note. The family acquired great political importance on the accession of Francis II, who was married to Mary, Queen of Scots.

Frangois, the second Duke of Guise, was assas¬

sinated in 1563, and left three sons, Henri who inherited his father's titles ; Louis, Cardinal of Lorraine and Archbishop of Rheims (both nut

to death in 1588 on the command of Henry III) ; and Charles, Duke of Mayenne. Henri, third

Duke of Guise, was succeeded by his son

Charles, who died in Italy in 1640, and was suc¬

ceeded by his second son Henri. Henri died

without issue in 1664, when he left the title to his nephew, Louis Joseph, Duke of Joyeuse and

Angouleme. His son and successor, Frangois

Joseph, died in 1671, leaving only one son, who died at the age of five in 1675, when the direct line of the house of Guise became extinct. In 1704, the title was revived for the house of

Conde.

GUISE, France, a town in the department

of Aisne, on the Oise, 25 miles by rail north¬

east of Saint Quentin. It is an ancient city, mentioned as early as 1050, and has interesting remains of the 16th century castle of the famous Dukes of Guise. The town is noted for the

ironworks of Dequereme et Cie founded by

Jean Baptiste Andre Godin, and conducted on a

profit-sharing plan. The workmen are pro¬

vided with dwellings on the associated plan ;

the first portion of the familistere was erected by Godin in 1859-60 at a cost of $400,000. In connection with the workman's colony is a

pha'anstcre, or common dwelling-house accom¬

modating 400 families, a theatre, library and

reading-room, schools, nursery, covered play¬

grounds, and a co-operative store. It was burnt by the English under John of Hainault in 1339, but the castle withstood the siege. In the

onrush of the German troops on Paris at the

beginning of the Great European War, the town

fell into the hands of the invaders.

GUISLAIN, A. M. See Limmander de

Nieuwenhowe.

GUITAR, a stringed musical instrument,

with an oval body, and a neck like that of the violin. The modern or Spanish guitar has six

strings, the three highest of gut, the three low¬

est of silk covered with fine wire, and tuned to the E in the second space of the bass staff, A, its fourth, and the treble D, G, B and E.

The intermediate intervals are produced by

bringing the strings, by the pressure of the

fingers of the left hand, into contact with the frets fixed on the keyboard, while those of the right pluck or twitch the strings. The Spaniards are supposed to be the inventors of the guitar, and it is most widely used in Spain, though its use is quite general in other countries.

GUITEAU, ge-to', Charles Julius, Ameri¬

can assassin: b. about 1840; d. Washington,

D. C., 30 June 1882. He became a lawyer in

Chicago, and in 1880, after the election of

James A. Garfield to the presidency, went to

Washington, presumably to secure the office of

United States consul at Marseilles, but did not succeed. Owing to this and the fact that the

ne\y President was opposed to the Stalwarts, led by Roscoe Conkling, Guiteau became greatly in¬

censed. On 2 July 1881, he shot the President in the waiting room of the Baltimore and

Potomac Railroad station in Washington; and

on 19 September the President died from the

effect of his wound. Letters taken from

Guiteau after his arrest showed that he had

planned to ˆremove** the President. He wras

indicted for murder on 7 October, was found

guilty on 25 Jan. 1882 after a sensational trial in which insanity was the only plea offered for the defense, and was hanged in the District

of Columbia jail, on 30 June following. See

Garfield, James A.

GUITRY, ge-tre', Lucien Germain, French

actor : b. Paris, 1850. After spending line

years in Russia, at the Theatre Michael, Petrograd, he became prominent in the Paris

theatres. In 1900 he became manager of the

Porte Saint Martin, and of the Varietes in the following year. Shortly afterward he became

stage director of the Comedie Frangaise and

director of the Renaissance where he scored

great success. His chief roles were in modern

problem plays, in which his reputat'on is un¬

equalled in the French conteniporarv theatre.

Among his best interpretations are (L'Assom—

moir) ; (La Veine) ; <L'Adversaire) ; (Le

Mannequin d'Osier> ; (La Griffe) : (Le

Voleur) ; Sampson*; <L'Emigre) and (Chante—

clerP

GUITTONE D'AREZZO, gwe-to'na da-ret'so, Italian poet: b. near Arezzo, about 1230; 542

d. about 1294. Little is known of his life, ex¬

cept that he joined a religious brotherhood and founded the monastery Degli Angeli at Florence

in 1293. His first poems are lyric love verses, but the later ones assume a didactic form, the subject matter being religion or politics. Some letters of his were published in 1745. His

works have been edited by Valeriani, (Rime di

Fra Guittone d'Arezzo) (Florence 1828, and

again in 1867). Consult Romanelli, (Di Guit¬

tone e delle sue opere) (Campobasso 1875).

GUIUAN, ge'wan, Philippines, a pueblo of

Samar, on the extreme south coast, 78 miles

southeast of Catbalogan, having a good harbor.

On the edge of a reef near the town are sev¬

eral sulphur springs, which, though covered by

the sea at high tide, are never brackish. Pop.

about 12,000.

GUIZOT, gwe'zo', Elizabeth Charlotte

Pauline, French authoress: b. Paris, 1773;

d. 1827. She was the first wife of Francois

Guizot, and an author of considerable repute.

In 1800 appeared her novel (Les contradictions.) Shortly afterward she became literary and artis¬

tic editor for Le Publiciste, and published her contributions to this journal in 1802 under the title (Essais de litterature et de morale. y When she was forced to discontinue these essays be¬

cause of illness, Guizot kept up the work anon¬

ymously. They were married in 1812. Her

later publications include (Les enfants) (1813) ; (Le journal d' une mere* (1813) ; (L'Ecolier,

ou Raoul et Victor) (1821) ; (Nouveaux contes

a l'usage de la jeunesse) (1823); Education

domestique ou Lettres de famille sur l'education) (1826). She also assisted her husband in his historical research. Several volumes of her critical writings were published posthumously

by Guizot. Consult Sainte-Beuve, (Portraits

des femmes * (Paris 1884).

GUIZOT, ge-zo, Frangois Pierre Guil¬

laume, French historian and statesman: b.

Nimes, 4 Oct. 1787; d. Valricher, near Paris, 13

Sept. 1874. His father, a lawyer, having in 1794

perished by the guillotine, his mother and her three sons retired to Geneva, where Frangois

was gratuitously educated at the gymnasium.

In 1805 he commenced the study of law at

Paris, but gradually drifted into the literary

profession. In 1812 he married Mile, de Meu—

lan, a contributor to the Publiciste, and became professor of history at the Sorbonne. On the

fall of the empire he obtained several public

offices, such as councillor of state, and director-general of the departmental and communal ad¬

ministration. In 1816 he published <Du gou—

vernement representatif et de l'etat actuel de la France,* and (Essai sur l'instruction publique.*

In 1820 the Due de Berry was assassinated, and Guizot's party fell before an ultra-royalist reac¬

tion. In 1825 he lost his chair on account of the political character of his lectures, but regained it in 1828. In 1829 he again became councillor of state, and after the July revolution was ap¬

pointed minister of the interior, but resigned in 1831. After the death of Perier, Guizot, along with Thiers and DeBroglie, formed a coalition

ministry and rendered great service as minister of public instruction. He became ambassador

at the British court in 1840, and next year was the real head of the government of which Soult was the nominal chief. He retained the office

of minister of foreign affairs until 1848 and

during that period opposed all measures of re¬

form. After the fall of Louis Philippe, Guizot escaped, fled to England, and though he re¬

turned the next year he henceforth practically

retired from public life. Born of a Calvinist

family, he always remained a stern Protestant

of the orthodox type, although he zealously

supported the temporal authority of the pope,

and had no sympathy with the aspirations of

democracy. Among his numerous works may

be mentioned: (Histoire de la civilisation en

France) (1830) ; (Histoire generale de la civil¬

isation en Europe) (1828) ; (Histoire de la civil¬

isation de'Angleterre) (1827); (Washington* ;

(Discours sur la revolution d'Angleterre) ;

(Meditations et etudes morales *; (Guillaume le Conquerant* ; (Memoires pour servir a 1'histoire de mon temps * (1858-68) ; (Meditations sur

l'etat actuel de la religion Chretienne* (1865) ; (Melanges biographiques et litteraires* ; (Histoire de France racontee a mes petits enfants*

(1870) ; *etc.*

GUJARAT, guzh-rat, or GUZERAT,

India, a region bordering on the Arabian Sea,

comprising part of the northern section of the presidency of Bombay

and some native states.

Area of the whole, about 70,000 square miles ; pop. about 11,000,000.

GUJARATI LANGUAGE AND LIT¬

ERATURE. Gujarati is the language spoken

in Gujarat, India, the northern maritime prov¬

ince of the Bombay Presidency, and in Baroda

and neighboring states. It is spoken by about

11,000,000. It is descended from Prakrit, and

is an intermediate language between the Sau—

rasti and Sauraseni. It has borrowed from

Arabic, Persian and Sanskrit, but not exten¬

sively, and has no important dialects, although there is considerable variation in the language as spoken by the educated and illiterate classes.

The alphabet is a modified form of the old

Devanagari Sanskrit script. It possesses a

great body of literature, beginning with the

works of Narsingh Meta, who flourished in

the 15th century of the Christian era. Another great name in its literature is that of Rewa

Sankar, who translated the (Mababharata.*

Bardic chronicles are numerous, but in modern

times the literature follows closely English

models, _ and comprises a goodly number of

translations from the latter tongue. Consult

Taylor, G. P., (The Students' Gujarati Gram¬

mar (2d ed., Bombay 1908) ; Tisdall, W. St. C,,

(Simplified Grammar of the Gujarati Lan¬

guage* (London 1892) ; Narmada, Sankar,

(Narma-kos,* a dictionary (Surat 1873) ;

Kharbhari's <Dictionary) (Ahmedabad 1899).

GULBARGA, India, an ancient city of

Hyderabad, on an affluent of the Kistna River, 70 miles southeast of Sholapur and 110 miles

west of Hyderabad. The principal points of

interest are the ruins of the palaces and tombs of the Bahmani kings who made their capital

there (1347-1422). The mosque of Jama Mas—

jid, built after the mosque at Cordova, Spain, dates from the 13th century, and is unique in that it is entirely covered. It occupies an area of about 38,000 square feet. Other buildings are the public offices, barracks, bazaar and jail.

The Great India Peninsula Railway has made

Gulbarga a centre of trade for the locality.

Cotton-spinning and weaving are important in¬

dustries. Pop. 35,000.

GULBRANSON, Ellen, Swedish soprano :

b. Stockholm, 1863. She studied at her native

city and then under Marchesi in Paris. Appear¬

ing at first on the concert stage, she soon won fame in opera, her first star role being that of Brunhilda in Wagnerian opera. For many

years she was the leading dramatic soprano at

the Swedish capital, but went to Berlin in 1900.

She married Hans Gulbranson, a Norwegian

officer, in 1890.

GULDEN, gol'den, a gold coin once current

in the Netherlands. Its value was different at various times.

GULES, gulz, in heraldry, the color red.

When engraved, the gules was represented by

perpendicular lines.

GULF OF SAINT LAWRENCE. See

Saint Lawrence, Gulf of.

GULF-STREAM. See Currents, Marine.

GULFPORT, Miss., city in Harrison

County, on the Gulf of Mexico, and the Gulf

and Ship Island and the Louisville and Nash¬

ville railroads. Gulfport has grown within a

short time from a seacoast hamlet to a thriving city. The keynote of its success is the fact that it has one of the best harbors on the Gulf of Mexico. The harbor is accessible to large ves¬

sels and there is an extensive trade in lumber, naval stores and cotton. Prominent among its

public buildings is the <(Great Southern® hotel, which is widely known as a winter resort

for. Northerners and as a summer resort for

the people of the South, especially those of

New Orleans. It is situated d.rectly on the

shore and is undoubtedly the finest resort hotel between Tampa and New Orleans. Other

prominent buildings are Gulf Coast Military

Academy, the postoffice building, the county

courthouse and those of the First National bank and of the Gulf and Ship Island railroad. The latter is used for the offices of the company.

The First National bank is now the largest bank in the State of Mississippi, having a capital of $250,000. The most important manufacturing

plants are oil and fertilizer factories, the Gulf¬

port Packing Company and the shops of the

Gulf and Ship Island railroad. There are, also, numerous other concerns, such as iron found¬

ries, fertilizer works, cottonseed-oil mills, can¬

ning factories, roller, saw and planing mills and wood-working plants. The commission form of

government was adopted in 1912. Pop. 8,157.

GULFWEED, a genus (Sargassum) of

seaweeds of the family Eucacece, which grow in deep water along all warm coasts, and becoming easily detached, are found floating in immense

quantities in the middle of all oceans, where

they accumulate in vast eddies, as it were, of the oceanic currents. The North Atlantic spe¬

cies (Y. bacciferum) is the best known, and

takes its popular name from its presence in long yellow lines in the Gulf Stream; and its specific name from the berry-like appearance of its air-vessels. The frond is very long, and is fur¬

nished with distinct, stalked, nerved “leaves®

and simple axillary stalked air-vessels ; and its structure approaches that of the higher plants.

Where the Gulf Stream is deflected from the

banks of Newfoundland eastward, and sends off

its more southern branch toward the Azores, is situated the Sargasso Sea, <(that great bank of weeds, which so vividly occupied the imagination of Christopher Columbus, and which Oviedo

calls the seaweed meadows® (Humboldt). The

quantity of floating seaweed is often such as to impede the progress of ships. Multitudes of

small marine animals accompany it, with fishes

ready to prey on them, constituting a distinct and considerable fauna. The gulfweed is eaten

in China, and in other parts of the East also it is used in salads and as a pickle.

GULICK, John Thomas, American clergy¬
man: b. Kauai, Hawaii, 13 March 1832. “He
was graduated at Williams College in 1856,
studied theology at the Union Theological
Seminary, went to China as a missionary, and
subsequently to Japan. He is a well-known
writer on topics relating to evolution and
natural history. He contributed to the
(JournaP of the Linnsean Society of London:
‘The Diversity of Evolution under One Set of
External Conditions* (1872) ; (Divergent Evo¬
lution Through Cumulative Segregation
(1887); Untensive Segregation (1889); and
other monographs.

GULICK, Luther Halsey, American
author and educator : b. Honolulu, H. I., 4
Dec. 1865 ; d. South Casco, Me., 13 Aug. 1918.
He studied at Oberlin College ; at the Sargent School of Physical Training at Harvard, and
received a physician’s degree from the Medi¬
cal College at New York University in 1899.
From 1887-1900 he superintended the physical
training department of the Y. M. C. A. Training School at Springfield,

Mass., and resigned in

order to become principal of the Pratt Institute High School in the last mentioned year. Three

years later he was placed in charge of the physi¬

cal training in the public schools of New York city, and from 1908-13 was director of the

department of child hygiene of the Russell Sage Foundation. Dr. Gulick was president of

various societies interested in physical train¬

ing, such as the American Physical Education

Association (1903-06) ; of the Public School

Physical Trinity Society (1905-08) ; the Play¬

ground Association of America (1906-09), and

the Camp Fire Girls of America (since 1913).

He was also editor of magazines devoted to

this subject including Physical Education (1891—96); Association Outlook (1897-1900); Ameri¬

can Physical Education Review (1901—03) and

the Gulick Hygiene Series. His works include

‘Physical Measurements and How They Are

Used* (1889) ; ‘Physical Education by Muscu¬

lar Exercise> (1904) ; ‘The Efficient Life)

(1907), a book which attracted much notice;

‘Mind and Work> (1908) ; ‘The Healthful Art

of Dancing) (1910). Jointly, he was author of

‘Medical Inspection of Schools) (1907).

GULL, Sir William Withey, English

physician: b. Colchester, 31 Dec. 1816; d. Lon¬

don, 29 Jan. 1890. He was the son of a barge-owner and through the kindness of friends re¬

ceived an education in medicine. He became

lecturer in medicine at Guy's Hospital in 1843, and assistant physician in 1851. Five years

later he was appointed physician. From 1847-50

he was professor of physiology at the Royal In¬

stitution and was honored by election to the

Royal College of Physicians in 1848. For his

services to the Prince of Wales he was created a baronet (1872). As a clinical physician, he

was among the most noted of his time. His

writings were published from time to time in

the 'Reports5 of Guy's Hospital.

GULLIVER'S TRAVELS. < Gulliver's

Travels, 5 or more fully, 'The Travels of

Lemuel Gulliver, 5 was published late in 1726, during the last visit of

the author, Jonathan

Swift (1667-1745) to England. It was im¬

mediately popular and has since its publica¬

tion enjoyed the reputation of being at once

a popular child's book and the best known

satire in the English language. Swift may have had the idea in mind as early as the days of the Scriblerus' Club and he definitely refers

to it in a famous letter to Pope, dated 29 Sept.

1725: "I like the scheme of our meeting after distresses and dispersions, but the chief end I propose to myself in all my labors is, to vex the world rather than divert it. … I have ever hated all nations, professions and communities;

and all my love is toward individuals, … But principally I hate and detest that animal called man; although I heartily love John, Peter,

Thomas and so forth.® Swift succeeded in

vexing only a very few individuals ; on the con¬

trary, he diverted the world exceedingly, for

the simple reason that individuals laughed at

his wit and presumably felt themselves to be

excluded from his general satire.

The story, which concerns itself with voy¬

ages to very strange lands, is divided into four books : First, Lilliput, the land of the pigmies ; second, Brobdingnag, the land of the giants ;

third, the various lands of Laputa and Balni—

barbi, the land of mathematicians, projectors

and cranks, Glubbdubdrib, the land of ma¬

gicians, Luggnagg, the land of the Strulabrugs, and Japan; and fourth, the land of the

Houyhnhnms, or the humane horses.

In the first of these books, Swift describes a highly organized civilization of pigmies, one-twelfth the height of ordinary men. Aside

from this pleasing device, Swift makes the

Lilliputians the means of satire by representing these small creatures as possessed of the same political systems, motives, vanities and so forth, as normal men, which in such small people are essentially ridiculous. He causes readers to

laugh at their antics for much the same reason as grown-ups are apt to laugh at the imitative ways of children or apes. In particular, Swift satirizes the court intrigues of his own time.

In the person of Flimnap he lampoons Sir Robert Walpole, and in the famous faction of the Big-End;ans he satirizes English political parties.

In the second book, the position is reversed.

The attractive, diminutive Gulliver, one-twelfth

the height of the giants, having been found and exploited as an object of curiosity by his

peasant master, comes into the hands of the

king, who proceeds to ask Gulliver all manner

of questions regarding European politics and

society. Gulliver's answers, which he affects

to make more favorable to his "noble and most beloved country® than truth strictly allows, are nevertheless severely criticized by the king, who comes to the conclusion that the Europeans

are <(the most pernicious race of little odious vermin that nature ever suffered to crawl upon the surface of the earth.® The chief point

of ratire lies in the comment that a large generous mind might make upon the civilization to which we are accustomed. To a less degree it lies in the magnification of certain disagreeable human

qualities. As the gist of the first book might lie in the exclamation, ®What a vain little thing is man® ! so that of the second book might

answer the exclamation, (<How small minded is

man® !

The miscellaneous third book, which deals

with special abuses of various kinds, satirizes pedantr}-, projecting, absurd affectations, etc., and, in the famous passage of the Struldbrugs, the conventional fear which people have of

death and their desire to live eternally on the earth. The various occupations of man are

treated as absurd and irrational, but it must be noted that Swift does not always draw the line clearly between legitimate occupations and the

extravagances into which these may sometimes

run.

The fourth book goes beyond the others in

that human beings are made not merely small

or large or the possessors of peculiar contriv¬

ances, but are actually distorted into the very disagreeable creatures known as Yahoos, whose

deformities and uncouth ways are treated with¬

out reticence. Man is represented as a beast

of very unattractive kind, the good qualities of courtesy, intelligence and mercy residing in his masters, the horses. It may be observed in gen¬

eral that Swift's satire, starting with consider¬

able geniality, becomes more and more bitter

as the narrative proceeds and at the end is

quite unrestrained.

Owing largely to this growing bitterness, the

last books are certainly far less popular ˆnd

attractive than the two earlier books. More¬

over, the graphic narrative of the two earlier books is probably more interesting. They re¬

count events with great straightforwardness

and simplicity. Details are very carefully

worked out to scale and are sufficiently numer¬

ous and concrete to constitute one of the best pieces of narrative that we have in English. As an example of straightforward, sample, vigorous

narrative, (Gulliver's Travels5 stands with

'Robinson Crusoe,5 'Pilgrim's Progress,5 and

a very few other books. In addition to this,

the story, like the others that have been men¬

tioned, contains an interesting view of human

life, though one vastly different and entirely

satirical in tone.

Generally speaking, Swift's satire might be

called the satire of position, especially in the first two books. That is to say, Swift does not depend upon burlesque, parody, on pure wit

or allegory as often as in 'The Battle of the Books5 and 'A Tale of a Tub,5 but on straight narrative, in which, however, he steps aside

from ordinary conceptions in order to make

those conceptions appear in a different light.

The best example of this is to be found in chap¬

ters sjx and seven in the voyage to Brobding¬

nag, in which the king of the giants pursues

the spirited but apologetic Gulliver from posi¬

tion to position up to a situation of great irony.

The most successful short life of Swift is

that of the late Sir Leslie Stephen in the Eng¬

lish Men of Letters5 ; compare also the shorter sketch in the dictionary of National Biog¬

raphy.5 The best longer life is that of Sir

Henry Craik 1882. Good cheap modern editions

of 'Gulliver5 are in 'Everyman's Library5 and

the 'Bohn Library.5

William T Brewster,

Professor of English, Columbia University.

HERRING GULL {Larus Argentatus)

GULLS, a large group of sea-birds found

throughout the world and constituting, together

with the terns (q.v.), skinners (q.v.), and skuas or jaeger-gulls, the family Laridce (q.v.). Some 53 species of gulls are known, ranging in size from that of a pigeon to that of a goose. The prevailing color is pure white below and pearl gray above, while some species have a gray or blackish head, and a few are dull gray all over.

The young birds of all species are dusky during the first year. They walk with tolerable ease, and swim well, but are incapable of diving.

They keep much on the wing, and their flight

is rapid, strong and long sustained, even in

heavy gales. In sitting they contract their necks and rest on one foot. They nest along the shores in the grass, on rocky cliffs or rarely in small trees, forming the nest of dry grass, sedges,

etc., and invariably in colonies, creating a great uproar when their nesting-grounds are visited.

The wild characteristic note is, in the bigger species, harsh and querulous, in the smaller a <(laughing® or screaming; the lesser skuas give vent to a curious mewing cry and the great skuas to a similar but deeper sound. At the breeding-quarters the utterances are naturally more agi¬

tated and shrill, and the parents hang excitedly above a visitor's head. ((The food,® says Evans, <(consists mainly of fish, mollusks, crustaceans, and worms, but is varied in the stronger forms by small mammals, young birds and eggs ; the

great black-backed gull undoubtedly attacks

lambs and weakly ewes ; carrion is not uncom¬

monly devoured ; and Larus maculipennis acts

as a scavenger at Buenos Aires, besides clear¬

ing the country of grasshoppers, and robbing

the Cayenne lapwing of its insect booty. Skuas give chase to their smaller kin, and force them to disgorge the fishes they have just caught,

while even solan geese are sometimes victimized; Larus scopulinus, moreover, which robs the

oyster-catcher of New Zealand, is a further in¬

stance of parasitic habits. Insects and their

larvae, turnips, berries and grain are also eaten by these omnivorous but useful creatures.®

Most gulls are migratory and scatter far

along the coasts during fall and winter in search of food. On the eastern coast of the United

States are five species. The large herring-gull (Lancs argentatus) breeds on the coast of Maine and winters to the southward, being abundant

about all harbors and along tidal rivers from

October to April. Associated with them are

sometimes seen the larger black-backed gull

(L. marinus). In summer are present the

smaller black-headed or laughing gull (L. atri—

cilla) which nests plentifully on the salt marshes of the Middle and Southern States. The Bona¬

parte's and ring-billed gulls (L. Philadelphia

and L. dclawarensis) breed on our northern

coasts. In the interior Franklin's gull (L. frank -

Uni) inhabits the lake shores and marshes of

the upper Mississippi Valley; while on the Pa¬

cific coast occur several other species. In the arctic regions the most abundant gull is the

great Burgomaster (L, glaucus), one of the

largest species, which wanders some distance

southward in winter. Two other species peculiar to the far north are the pure white ivory gull (Pagophila alha) and Ross's rosy gull (Rhodos -

tcthia rosea). The latter is one of the rarest of birds and one of the most beautiful, the

whole under surface being suffused with pink

and the neck surrounded by a dainty collar of gray. It has been seen in numbers only by

the arctic explorers Murdoch and Nansen. The

Kittiwake (Rissa tridactyla) is another species of circumpolar distribution, peculiar in lacking the hind toe. Several of these species are

known on the coasts of Europe or Asia ; and

the gulls of other parts of the world present little that is peculiar. Large areas of coastal beaches and islands formerly inhabited by gulls in various parts of the world, but especially

along the eastern coast of the United States,

have been wholly depopulated of these beautiful and useful birds by the incessant robbery of

their nests for the sake of the eggs — which are conical in form, and

white or greenish,

heavily blotched with purple and brown in color — or for the sake of their plumage to be used in millinery trimmings. Protective laws now

prevent this waste of life. Consult Evans,

<Birds> (1900); Coues, (Birds of the North¬

west (1874) ; Baird, Brewer and Ridgway,

(North American Water Birds) (1884); Newton,

A., (A Dictionary of Birds* (London 1896).

GULLSTRAND, gool'strant, Allvar, Swed¬

ish optician: b. Landskrona, Sweden, 5 June

1862. His father was chief physician of Lands¬

krona. He was educated at Upsala, Vienna

and the Carolinian institute of Stockholm, re¬

ceiving honorary degrees from Upsala, Jena

and Dublin. In 1911 he received the Nobel

prize for medicine. Dr. Gullstrand is a mem¬

ber of the medical societies of several countries and has published (Allgemeine Theorie der

monochromatischen Aberrationen und ihre

nachsten Ergebnisse fur die Ophthalmology

(1900); (Die reelle optische Abbildung) (1906);

(Die optische Abbildung in heterogenen Medien

und die Dioptrik der Kristallinse des Menschen) (1908) ; (Einfiihrung in die Methoden der

Dioptrik des Auges des Menschen> (1911) ;

(Das Allgemeine optische Abbildungssystem*

(1915). He has contributed articles to the

encyclopedia, (Nordisk Familjebok,* and to

Helmholtz's '■Handbuch der physiologischen

Optik> (1910).

GULS HORNEBOOKE, The, a book by

Thomas Dekker (q.v.), written in 1609. Its

chief interest lies in the fact that it gives a vivid picture of the life of the socalled (<gull®

or dandy of the period. It is said to be based on Dedekind's ˆrobinius.* Consult McKer-row, R. B., (The Gull's Hornbook> (London

1904).

GUM ARABIC, a gum of the Acacia

arahica, which grows in India and Arabia.

Gum arabic can be obtained also from other

acacias. Gum arabic occurs in transparent

white tears, which are often colored yellow or brown by impurities ; it cracks on exposure to the air on the surface ; it is brittle, and has a bland, mucilaginous taste. It dissolves in water, and the solution gives a precipitate of arabin on the addition of hydrochloric acid. Gum

arabic contains about 70 per cent of arabin,

2CeHio05+H20, and 17 per cent of water; the

rest consists of potash and lime, which are

combined with the arabin.

GUM-BOIL, an abscess in the gurn caused

by inflammation, generally the result of tooth¬

ache or of the presence of decayed teeth. The carious tooth or stump, if the inflammation pro-546

ceeds from this cause, should be removed.

When matter has formed it should be evacuated

by a free incision, and the mouth should be

frequently washed with tincture of myrrh and

water. See Dentistry; Teeth.

GUM-RESINS are complex mixtures ob¬

tained from plants. They contain both a gum,

which is soluble in water, and a resin, which dissolves in spirit. There are usually present

in addition essential oil, coloring and extractive matter, and a variety of impurities. The gum-resins have frequently a strong and characteris¬

tic taste and smell. They are solid, opaque and brittle. The common gum-resins are aloes,

ammoniacum, asafoetida, euphorbium, galbanum,

gamboge, myrrh, olibanum, opoponax, saga—

penum and scammony.

GUM-TREES, a name for several different

trees: (1) those of the Australasian genus

Eucalyptus { q.v.) ; (2) in the. United States, the pepperidge or tupelo, various species of

which are called black, sour, cotton-gum, *etc.*

(see Tupelo) ; (3) the Liquidambar (q.v.).

GUMBEL, Karl Wilhelm von, Baron,

German geologist : b. Dannenfels, 1823 ; d. 18

June 1898. He received his education at

Munich and Heidelberg, and later conducted

investigations of the coal mines at Saint Ing—

bert. In 1851 he became chief geologist of the Geological Survey of Bavaria ; in 1863, honor¬

ary professor of geognosy and surveying at

Munich; and in 1879, director of the Bavarian

mining department. He published a geological

map of Bavaria in 1856, together with a descrip¬

tion under the title (Geognostische Beschreibung des Konigreichs Bayern) (1861, 1868,

1879). In the study of paleontology, Dr.

Giimbel did some important research on the

fauna of the Trias, and the Foraminifera. He

also discovered two minerals which have been

named for him, giimbelite, a fibrous mineral

composed of hydrous silicate of alumina ; and

guembelina, a petrified corralin. He was ele¬

vated to the nobility in 1902. Besides his geological reports above mentioned, he wrote (Anleitung zu wissenschaftlichen Beobach— tungen auf Alpenreisen) (1879-82).

GUMBINNEN, goom-bin'nen, Prussia, the capital of a government with an area of 6,125 square miles. The town is on the Pissa, 22 miles by rail southwest of Edytkuhnen on the Russian frontier. It is comparatively modern, its municipal charter dating from 1 722. There are manufactures of woolens and linens, leather, machinery, castings, forgings, furniture, bricks, lumber, dairy stuffs, yeast and spirits, and a trade in cattle and agricultural produce. Pop. 14,540, mostly the descendants of Protestant exiles from Salzburg.

GUMBO. See Hibiscus; Okra.

GUMILLA, goo-mel'lya, Jose, Spanish mis¬ sionary: b. Barcelona, 1690; d. 1758. Entering the Jesuit Order, he went to South America in 1714, and became superior of the missions on the Orinoco. On his return to Spain he be¬ came head of the College of Cartagena (1734). In 1738 he held a similar office at the Univer¬

sity at Madrid. While in South America he

made studies of the flora and fauna and wrote a work descriptive of the country of the Ori¬

noco called (E1 Orinoco ilustrado y defendido)

(1745).

GUMMA, gum'a, a tumorous deposit that

occurs in the tertiary stage of syphilis (q.v.).

It affects most frequently the bones, cartilages, skin and periosteum. They are made up of a

hard connective tissue which tends to undergo

softening, causing destruction of the part and

deep ulceration if near the surface. The peri¬

osteum of the cranial bones is particularly liable to be affected, causing dangerous pressure on

the brain.

GUMMERE, gum'ar-e, Francis Barton,

American philologist and author: b. Burlington,

N. J., 1855. He studied at Haverford and at

Harvard and then went to Germany where he

took courses at Leipzig, Berlin, Strassburg and Freiburg. On his return to the United States

he became professor of English at Haverford

College (1887). In 1905 he was chosen presi¬

dent of the Modern Language Association of America and in 1913 became a member of the National Institute of Arts and Letters. He is likewise a member of other scholarly societies. Among his publications are (The Anglo-Saxon Metaphor) (1881) ; (Handoook of Poetics) (1885) ; (Germanic Origins > (1892) ; (01d Eng¬ lish Ballads> (1894) ; (The Beginnings of Poetry) (1901); (The Popular Ballad* (1907); (The Oldest English Epic> (1909) ; (Democracy and Poetry) (1911).

GUMMERSBACH, goom'mers-pah, Prus¬ sia, capital of the province of Westphalia, 30 miles northeast of Cologne. There are impor¬ tant manufactureres of cardigan jackets, car¬ pets, woolens, papers, machinery, electrical wares and boilers. There are stone quarries in the vicinity. Pop. 16,000.

GUMMING, or GUMOSIS. See Plants,

Diseases of.

GUMPLOWICZ, goom-plo'vich, Ludwig,

Austrian sociologist : b. Cracow, 1838 ; d. 1909.

After pursuing his studies at Cracow and Vi¬

enna, he entered the teaching profession and

became professor in the University of Graz in

1882. He wrote several important works on the

subjects of political economy and social science.

They include (Philosophisches Staatsrecht*

(1877) ; (Verwaltungslehre) (1882) ; (Der Ras—

senkampP (1883 and again in 1909) ; (Grundriss der Sociologie) (1885, 1909) ; (Das oster-reichische Staatsrecht* (1891) ; (Sociologie und Politik) (1892); (Die sociologische Staatsidee*

(1892) ; (Geschichte der Staatstheorien> (1905) ; <Das allgemeine Staatsrecht* (3d ed. 1907).

GUMRI. See Alexandropol.

GUMS', various mucilaginous substances,

generally obtainable from the sap of trees. They are soluble either in cold water or in alcohol.

Many aromatic products such as are employed

in making perfumes and incense are to* be

classed as gums. Gum Arabic is the best known among such products. It is obtained from the

Senegal Acacia in Western Africa. There are

no less than eight or nine varieties of this gum.

Gum tragacanth comes from the Astragalus

gummifer, in western Asia. Cherry-tree gum,

whose name tells its origin, is used for stiffen¬

ing felt, as in hat making. There are some

gums which might perhaps more properly be

classed as resins, and are sometimes styled gum-resins ; many of which are used in medicine.

GUNTI, gun’te, a river of northern India.

It takes its rise in a small lake or depression in

the Pilibhit district of the United Provinces.

Its course is tortuous but its general direction is southeast for about 500 miles. It joins the

Ganges river about 20 miles below Benares.

Lucknow and Jaunpur are the principal towns

along its course, and it is navigable for vessels of 17 tons as far as Lucknow. At Jaunpur

there is a bridge of 16 arches dating from the 16th century. Gunti is also the name of a small river of eastern Bengal and Assam in the Tippera district.

GUN, a strongly-constructed metal tube,

from which destructive projectiles are expelled

by the gradually increasing -pressure of gas

evolved from fired gunpowder or other explo¬

sive. The term comprehends every description

of firearm, from cannons, mortars and other

heavy pieces of ordnance, to the fowling-piece, rifle and pocket-pistol. See Arms; Artillery;

FireArms ; Guns.

GUN-FIRE. See Gunnery.

GUNBOAT, a term originally applied to

small craft mounting usually a single gun and

employed exclusively in the defense of coasts

and rivers. Experiences in the Crimean War

suggested the extension of the use of gunboats to offensive warfare.

In the United States the gunboat figured to

a very considerable extent in coast and lake

warfare in our first two wars. They were first used on the Delaware River, in 1775-76 and

drove the British frigate Reliance out of the

roads. In December 1807 there were 69 of

them in United States service, and the Congress ordered 188 more built, as an auxiliary to the embargo declared a few days later, making 257

in all. Improved ordnance has made them

valueless, and they had a bad effect on the

service, but there was strong opinion in their favor at the time, and they did good service in the War of 1812. The theory was that these

movable batteries could act in water where large vessels could not,

could be concentrated against the latter so as to afford as large an armament, yet present only a number of small targets,

while their antagonist presented only one large one ; that shots aimed too high would do no

harm to gunboats, but would injure masts and

rigging of frigates; that loss of rudder and sail¬

ing gear, the most crippling of accidents to a ship, could not happen to the gunboats, propelled and steered by sweeps ; that nearness to the

water level gave the guns more accurate aim;

and that 75 gunboats could be built for the cost of one 36-gun frigate. On the other hand the

instability and unseaworthiness of the gunboat

greatly limited its sphere of usefulness. In

most countries the gunboat has been superseded

by modern torpedo-boats and destroyers except

for use in rivers.

Old gunboats have been converted into

mother ships for submarines, airplanes and

other small craft.

GUN-CARRIAGE, or GUNMOUNT¬

ING. See Artillery ; Fortification ; Ord¬

nance.

GUNCKEL, John E., philanthropist: b.

Germantown, Ohio, 14 Aug. 1846; d. Toledo,

Ohio, 15 Aug. 1915. His parents were pioneers

in the town in which he lived. After attending public school a few years he completed his edu¬

cation at Oberlin College. Mr. Gunckel went to Toledo, Ohio, in 1878 where he engaged in the railroad business; from ticket agent he was pro¬

moted to traveling passenger agent, and served

in that capacity for twenty years. During his

railroad career he came in contact with many

newsboys in whom he evinced a deep interest,

and in 1893 he organized the (<Toledo Newsboys Association® of which he was the president

till his death. He also organized and was

president of the ((National Newsboys Associa¬

tion,® with branches in more than a hundred

cities. The city of Toledo, Ohio, owes much to the life of Mr. Gunckel, and his philanthropic work will ever be a monument to his memory.

At Woodland Cemetery an impressive memorial

in pyramid form, composed of pebbles and

stones collected by newsboys and friends from

all parts of the globe, marks his resting place.

GUNCOTTON is the name originally as¬

signed to the material produced by Schoenbein,

of Basle, Switzerland, in 1845 by treating cotton with a mixture of strong nitric and sulphuric

acids. The discovery that starch, woody fibre,

and similar substances give rise to the forma¬

tion of highly combustible bodies when acted

upon by concentrated nitric acid is attributed to Braconnot in 1832, and he styled the bodies so produced generically xyloidine. Six years later

Pelouze took up this subject and extended his

investigations to the behavior of cotton, paper and vegetable substances generally, and later

Dumas prepared from paper by this means the

substance which he called nitramidine. No

practical result followed these observations until the discovery by Schoenbein of the advantages

which followed the use of the acid mixture; a discovery which was also independently made by

Boettger, of Frankfort, in 1847 and by Knop, of Hanover, and Taylor, of England, in 1847. The

discovery aroused the liveliest expectations

which were stimulated by the facts that the ex¬

plosive was much more powerful than gun¬

powder and that when used as a propellant it

gave little or no smoke. Experiments and tests were begun shortly after with the new explosive in Germany, France, Austria, England, Russia,

and the United States with a view of utilizing it as a substitute for gunpowder in guns. Unfortu¬

nately the material, as manufactured, was found to be not only so irregular in action that it was likely at any time to burst the piece, but also so unstable as to give rise to numerous accidents so that, especially after the serious and, at the time, inexplicable explosions at

Vincennes and

Bouchet in France, and Faversham in England,

the experiments were discontinued except in

Austria, where Baron von Lenk gave the matter

close and long-continued study and came to the conclusion that the grave defects noted were

not inherent in the material, but were due to the imperfect and irregular methods of manu¬

facture, the failure to purify the cotton before treatment with the acid, and the failure to

purify the guncotton and free it completely

from acids after treatment. Following these

convictions he improved the method of manu¬

facture to such an extent that in 1862 the Aus¬

trian army had 30 batteries provided with gun¬

cotton cartridges made up by twisting the fibre into yarns which were braided together, but the spontaneous explosions at the magazine at Sim¬

mering in 1862 and at Steinfeld in 1865, together with the fact that the guncotton cartridges still 048

gave at unexpected times abnormal pressures

led to its further use in Austria being inter¬

dicted.

Von Lenk's process of manufacture was pat¬

ented in England in 1862 and the Prentice

Brothers began manufacturing under this pro¬

cess in 1864. In 1865 Abel patented an improve¬

ment of the process which was so successful in use that it gave guncotton a prominent and

permanent place among explosive substances,

and this process is followed to-day. The cotton when treated with the acid is in the fibrous con¬

dition which so well characterizes it, and under the microscope these fibres are seen to be hol¬

low so that each is really a capillary or hair-like tube. Von Lenk had shown that cotton con¬

tains not only cellulose as the main component of its structure but that there were smaller and variable quantities of other substances naturally present besides foreign bodies accidentally pres¬

ent, and that it was necessary to get the cellu¬

lose in a pure and dry condition before treating it with acid. He, too, with others, had proved that the purity, strength and proportions of the acids used and the time and temperature of

immersion of the cotton in the acid mixture

affected very materially the character of the

substance produced, while it was essential that every trace of free acid should be removed from the product, since a most minute quantity of

sulphuric acid acts continuously and cumula¬

tively on the guncotton and causes a progres¬

sively increasing rate of decomposition. Yet

von Lenk and all others up to this time pro¬

duced the guncotton in the same long staple

form as the cotton from which it was made. It was evident to Abel's mind that as the dry cot¬

ton was immersed in the acid mixture the capil¬

lary tubes, of which it was composed, would

suck up the liquid acid and retain it with such force and in such a manner as to make its re¬

moval by wringing, or washing with or in water or by neutralization with alkalies, extremely

difficult and uncertain, and to remedy this Abel proposed to pulp the guncotton through which

the fibres would be cut into such short lengths that the acids could be completely and readily removed from the interiors of the tubes while

furthermore this pulped material could by mold¬

ing and pressure be shaped into any desired

forms and dimensions.

Abel's process for the manufacture of mili¬

tary guncotton was as follows : The cotton used was what is known as <(cop® or weaver's waste, which is the tangled clippings from the spinning room of a cotton mill ; the thready form of

this material being preferred to the fluffy form of the unworked cotton. This was first hand¬

picked to remove the larger foreign bodies

present and to open out after baling. It was

then boiled in 200-pound lots in caustic soda

solution to remove grease, oils and the incrusting substances on the fibres, then wrung

out in a centrifugal wringer and dried in a

heated closet. It was then put through a cot¬

ton picker to open up the fibre and remove for¬

eign bodies which had been overlooked in the

hand-picking, and was then dried in a second

closet at 225° F. until it contained not over one half per cent of moisture, when it was stored in small lots in hermetically sealed metal vessels to cool. It was then dipped in lots of one pound each in 150 pounds of acids, consisting of one part by weight of nitric acid, 1.5 specific

gravity, to three parts by weight of sulphuric acid, 1.845 specific gravity, contained in q

large iron trough about which cold water cir¬

culated so as to maintain a temperature of 70°

F. throughout the dipping. The cotton was

plunged rapidly under the acid, allowed to

remain immersed for 10 minutes, removed to

a shelf above the acid dipping trough, where

it was squeezed to remove the excess of acid, and then at once transferred to a two-gallon

crock made of acid-proof earthenware. As

transferred to this digestion crock the cot¬

ton carried with it from 10 to 12 pounds of the acid mixture, and by pressing the mass down in the crock with an iron tool, the cotton was

forced to the bottom and covered with a layer of the acid mixture which was squeezed from it.

The crock was then covered and placed in a

wooden trough where it was partly surrounded

with cool water, which was kept in constant

circulation, and where it was allowed to remain, so that the cotton could ˆdigest* the acid, for 24

hours. Then the contents were thrown into a

steel centrifugal wringer by which the greater

part of the acid was removed. The guncotton

was then thrown into a tub holding 800 gallons of water through which a large stream of

water was continually flowing and in which a

large paddle-wheel was in revolution so as to

very quickly brine the acid guncotton into con¬

tact with so large a volume of cold water as to prevent its becoming heated. The guncotton

was then boiled twice for eight hours each in a diluted solution of soda, wrung out and washed with fresh water and put in the pulper. This

was an ordinary <(beater,® ˆrag-engine,® or

<(Hollander,® such as is used in the paper¬

making industry, and the guncotton, suspended

in water, was subjected to the action of the

machine for two days in charges of from 300

to 350 pounds, where, by the shearing action of the knives, the fibres were cut into short lengths and the guncotton was reduced to the fineness

of cornmeal, and mixed into a pulp with the

water present. This was drawn into a large

tank, known as the poacher, where the

powdered guncotton was allowed to settle and

the supernatant water drawn off. Fresh water

was added and, by means of a revolving paddle in the poacher, the guncotton was mixed with it and washed by it, and this washing was re¬

peated six or seven times until the chemical

test of a sample showed that the acid had been completely removed. Then It was treated with

a solution of lime containing a small quantity of caustic soda and also of precipitated chalk, and the mass was ready for molding.

The pot nitration system devised by von

Lenk and developed by Abel, as described

above, has now been replaced (1) bv the centri¬

fugal method wherein the nitration is carried

on in large iron centrifuges so that after the “digestion® has gone on for a sufficient time

the major part of the “spent® acid is run off and the residue, down to V/2 parts for every

part of cotton, is wrung out by the rotation of the centrifuge, and (2) by the Nathan and

Thomson displacement process which makes use

of shallow earthenware pans, set on pedestals,

and provided with pipes through which to in¬

troduce the nitrating acids and remove the spent acids. The bottoms of the pans are conical and these bottoms are covered with removable per¬

forated plates, the nitrating acid is then run in, GUNCOTTON

the dried cotton dipped into it, and when the entire charge has been dipped it is covered

with a perforated plate, whose upper surface is then slowly covered with cool water. (<Digestion" is then allowed to proceed for the desired length of time and when completed, the waste

acid cocks below the pans are opened to drain off the ((spent" acid and cold water is at the same time run in through the top plates to dis¬

place the last of the acid and wash the gun¬

cotton.

As shown above the first use to which gun¬

cotton was put was as a propellent in guns, and Abel devised means for making powder grains

from the pulped guncotton, but he soon pointed out the advantages which it possessed, when

compressed, for use in military and naval mines and torpedoes and for engineering operations in times of war, and these are the chief uses to which it has been put. To compress it the alka¬

line solution from the poacher, containing the

finely divided guncotton in suspension, was

pumped up to a stuff-chest, which is a cylin¬

drical tank containing a vertical shaft armed

with paddle-blades which, by revolving, keeps

the guncotton in suspension. From here, by

means of a wagon, the pulp was run into a

hydraulic press where it was subjected to a

pressure of 100 pounds to the square inch and thereby molded into blocks. These blocks were

then transferred to another press where they

were subjected to a pressure of from 6,000 to 6,800 pounds to the square inch. As made at

the United States naval torpedo stations the

blocks from the molding press were prismatic,

with the vertical edges chamfered, 2.8 inches in diameter by 5% to 5ˆ4 inches high, with a cir¬

cular hole J4 inch in diameter, produced by

a mandrel in the press, running vertically

through the centre of the prism. After final

pressing the blocks were 2.9 inches in diameter by 2 inches high, the hole remaining practically unchanged, and they still contained from 12 to 16 per cent of water, though as sent out into the service as ((wet guncotton" they were soaked in water until they contained 35 per cent. In the final press bv means of steel dies, inscriptions in letters and figures, such as the place and date of manufacture and factory lot, were placed

upon each block.

In the fibrous condition guncotton appears

like the cotton from which it is made, but it has a harsher feel and it becomes electrified by friction when dry. When dry if rubbed in the

dark it becomes phosphorescent. Under the

miscroscope by polarized light it exhibits colors, while cotton is colorless. Pure guncotton is

without order or taste and is insoluble in water.

The gravimetric density before pulping is 0.1,

after pulping 0.3, and after compression from

1.0 to 1.3, but by excessive pressure it has been raised to 1.4. The real specific gravity of gun¬

cotton is 1.5. When dry, compressed guncotton

is detonated by inserting a detonator in the hole in the block and firing it. Wet guncotton is

detonated by the detonation of a block of dry guncotton fired in contact with it. The violence of the explosion #of guncotton when thus de¬

tonated is comparable with, if not superior to, that of nitroglycerin. Dry guncotton may be

set on fire and, when compressed, it burns so slowly in the open that the fire may be extin¬

guished by pouring water upon. it. Wet gun¬

cotton, thoroughly saturated with water, can

be shaped by a tool without taking fire or ex¬

ploding. In forming the cylindrical and conical charges for the torpedoes thrown from the

pneumatic guns of the United States steamship

Vesuvius at Santiago, the prismatic blocks

above described were sawn with a band saw,

turned in a lathe and cut with chisels as wood is treated, but care was used to keep the blocks and dust wet throughout the process.

Pure cotton is composed of cellulose having

a formula which chemists believe to be some

multiple of CsHioCb. When it is acted upon

by nitric acid or mixtures of nitric with sul¬

phuric acid, under the proper conditions, cellu¬

lose nitrates are produced through, it is be¬

lieved, the replacement of hydrogen atoms in

the molecule by NCh groups, thus forming

esters or organic salts. Views differ as to the number of cellulose nitrates existing but, fol¬

lowing Vieille, who is the most widely accepted authority on this point, taking the formula of cellulose as C24H40O20 we may have the follow¬

ing:

CELLULOSE NITRATES

Per cent of

nitrogen

Weight ob¬

tained from

100 parts of

cellulose

Cellulose endecanitrate .

13.47

176.4

Cellulose decanitrate .

12.75

169.4

Cellulose enneanitrate .

11.96

162.5

Cellulose octonitrate .

11. 11

155.7

Cellulose heptanitrate .

10.18

148.6

Cellulose hexanitrate .

9.15

141 . 7

Cellulose pentanitrate .

8.02

134.7

Cellulose tetranitrate .

6.76

127.8

There are probably existing also isomers of

many of the nitrates given in the table. Fol¬

lowing their differences in composition these

different cellulose nitrates have different prop¬

erties especially as regards their solubility in organic solvents. Thus all except the endecanitrate, if properly made, are soluble at ordinary temperatures in a mixture of one volume of

alcohol and two volumes of ether. Such cellu¬

lose nitrates are called pyroxyline, nitrocotton, soluble guncotton , and collodion . cotton or

guncotton. The decanitrate is also called pyro—

cellulose. All the cellulose nitrates are by some called nitrocellulose. The material produced

by the Abel process described above is partly

soluble, but mostly insoluble in the ether-alcohol mixture, and to this material the name gun¬

cotton or better military guncotton is applied.

In addition to guncotton, the cellulose nitrates, are used in the manufacture of smokeless

powder, explosive gelatine, pyroxylin plastics,

pyroxylin varnishes, photographic films and

collodion. For smokeless powders and ex¬

plosive gelatine the deca-and enneanitrates are most largely used. For varnishes, collodion

and photographic films the octonffrate is gen¬

erally employed. And the heptanitrate, which

is of low nitration, is preferred for the pyroxylin plastics. This last nitrate may be made by

dipping one pound of pure dry cotton or tissue paper in 100 pounds of a mixture of 66 parts of sulphuric acid, 17 parts of nitric acid and 17

parts of water, and continuing the immersion at 30° C. for 20 to 30 minutes. The acid is then wrung out and the nitrate washed and neutral¬

ized. The higher nitrates are made by using

stronger acids, longer exposures and higher

temperatures. In making pyroxyline varnishes,

which are largely used in coating metals, artifi¬

cial leather and in waterproofing, the pyroxylin is dissolved in ethyl acetate, amyl acetate and similar organic solvents.

Collodion, which is used in surgery, is made

by placing 30 grams of pyroxylin in a suitable bottle, pouring upon it 750 cubic centimetres of ether, corking the bottle and allowing the

whole to stand 15 minutes. Two hundred and

fifty cubic centimetres of alcohol are then

added and the bottle shaken until the pyroxylin is dissolved. On allowing to stand the solution becomes clear, and if poured upon a

flesh wound the solvents evaporate and a continuous film

of pyroxylin is formed which protects the

wound from the air and which also, by con¬

tracting as it dries, brings the edges of the wound together. Substances such as cantha-rides, tannic acid and the like, by which to

produce blistering, styptic and other effects,

may be added to the collodion. See Ex¬

plosives.

Bibliography. — Marshall, A., ‘Explosives,

Their Manufacture, Properties, Tests and History) (Philadelphia 1915) ; Martin G. and Bar¬

bour, W., industrial Nitrogen Compounds and

Explosives) (New York 1915) ; Munroe, C. E.,

‘Lectures on Chemistry and Explosives)

(Newport, R. I., 1888) ; Worden, E. C., Nitro¬

cellulose Industry) (New York 1911).

Charles E. Munroe,

The George Washington University, Washing¬

ton, D. C.

GUNDULICH, Ivan, goon’doo-litch, e-van’,

Illyrian poet: b. Ragusa, 1588; d. 1638. As son of a nobleman his education was most care¬

fully conducted from the earliest childhood by

Jesuits and humanists. Later he studied juris¬

prudence and became president of the Ragusan

Republic. As a very young man he became ac¬

quainted with Italian and Latin literatures

and started his literary career with a good

translation in Croatian of Tasso's 'Gerusa—

lemme Liberata,* Preti's 'L'amante timido) and

other works. He also wrote original lyric

verses imitating slavishly his Italian masters, but his remarkable and original poem in three long cantos, (The Tears of the Prodigal Son,* at¬

tracted general attention. He wrote also sev¬

eral dramas of which <Dubravka) is by far the best. But his fame in Slav literature is due

mostly to his masterpiece 'Osman,* a heroic

epic poem in 20 cantos, of which two have been lost. It is a glorification of the triumph of the Cross over the Crescent, the story of which is founded on the battle at Khotin (1621) won

from the Turks by the Polish King Vladislav in which Sultan Osman perished. The poem ex¬

cels in beauty of language, harmony, wealth of rhyme, variety of meter, picturesque descrip¬

tions of battlefields and depth of. psychologic analysis. It was first published in 1826 and

since then has been frequently issued. The

Serbians, Croatians and Slovenians see in

' Osman * a prophecy of the complete emancipa¬

tion of the Christians from the Ottoman yoke.

The lyric part of the poem is undoubtedly the most remarkable production in South Slavic lit¬

erature. In 1893 a magnificent monument was

erected by the Ragusans in the centre of . the poet's native town. There are several editions

of his works, the most complete of which is that produced by the South-Slav Academy of Sci¬

ence and Arts ('Stari pisci hrvatski,* Vol. IX).

Consult Appending (Vita di G. Condola* (Gundulich) (Ragusa 1828) ; Jansen, (Gundulich)

(Goteborg 1900) ; Makowcj, 'Beitrage zu den

Quellen des 'Osman** (in Archiv fur slavische

Philologie, Vol. XXVI, Brunswick 1904).

GUNN, Mrs. iEneas (Jennie Gunn),

Australian author: b. Melbourne, 5 June 1879.

She was educated at the University of Mel¬

bourne. In 1901 she married A. J. Gunn, after having taught school for three years, and went with him to the Northern Territory where they

resided at the Elsey Cattle Station until the

death of her husband there in 1903. She re¬

turned to Melbourne and began literary work

with the 'Little Black Princess) in 1905. This story deals with the life in the Elsey Station and treats entertainingly of the manners and

customs of the natives. This and (We of the

Never Never) abound in pathos and humor off¬

set with rich local color. There is little pre¬

tense of plot in these stories but the mastery of detail they show and the ability to march the characters and events hand in hand make Mrs.

Gunn's work well worth while.

GUNN, iEneas James, Australian writer :

b. in Australia; d. in the Northern Territory, March 1903. He was the son of the Rev. Peter Gunn, first Gaelic minister in Melbourne. He

was well known in Melbourne as a versatile

writer and a contributor to magazines and news¬

papers. In 1901 he married and moved to

Elsey Cattle Station in the Northern Territory

where he died two years later. While there he wrote descriptive sketches for the Melbourne

papers; and these gave his wife the idea which made her, a few years later, under the name of Jennie Gunn, one of the most popular writers

of Australia.

GUNNER'S QUADRANT, an instrument

at present used only as a test for artillery

sights, but formerly employed by artillery of¬

ficers to determine the elevation or depression of a gun or mortar. It is made of a graduated quarter of a circle of sheet-brass, with a ra¬

dius of six inches, fastened to a 22-inch straight brass bar. A spirit-level is attached to an arm at its middle and the movable end is fitted with a clamp-screw.

GUNNERY is the science and art of

handling guns, the object being to inflict the maximum destructive effect upon the enemy in

personnel, material and morale (i.e., troops and ship's crews ; protective works, ships, guns, war materials and supplies ; and mental condition as regards zeal, energy, hopeful and confident com¬

bativeness, etc.). It consists of interior and

exterior ballistics, gun strategy and tactics and the training of officers and men by means of

instruction, drill and target practice. Interior ballistics are concerned with the developments

within the bore of the gun ; exterior ballistics, with the behavior of the projectile after it

leaves the gun. Gun ' strategy defines what

should be done to secure the best results. Gun tactics are the methods of carrying out gun

strategy. The scientific study, of interior ballis¬

tics has for its ultimate object the development of the highest practicable muzzle velocity in a gun which fires a projectile of the greatest prac¬

ticable weight (for the calibre of gun) and

largest practicable bursting charge. It investi¬

gates the problem of attaining these ends with-GUNNERY

out undue strain on the gun, without undue

weight of gun, *etc.* Exterior ballistics follow

the projectile from the muzzle of the gun to its point of rest or explosion, examining the veloc¬

ity and trajectory of the projectile and the

forces which produce changes in either. We

thus endeavor to solve the problem of where

and when a projectile of a given size, shape, weight and velocity of translation and rotation will strike under the action of the forces which effect its movement. Interior ballistics show

that a high velocity requires high initial gas pressure in the gun and the maintenance of as high a pressure as practicable for the greatest practicable distance in the bore. The limita¬

tions imposed by the present state of powder

and gun development are, among others, an

initial pressure of about 16 tons per square inch, a length of (heavy) gun of about 50 calibres, and a powder gas which is not unduly erosive.

Higher pressures could be used, but with exist¬

ing powders the increased amount of heat and

erosion thereby produced would be inadmissible.

Longer guns can be built; but after reaching 50

calibres the increase of accelerating force due to additional length is so small and the growth

in weight (required to give necessary stiffness and accuracy) is so rapid that greater efficiency is obtained by employing the same weight in

building a gun of larger calibre and less relative length. The present high velocities have been

rendered possible by the use of slow-burning

powders which are not entirely turned into gas until after the projectile has moved some dis¬

tance from its seat. The maximum pressure is

thus kept down and the sustained pressure aug¬

mented. In howitzers and mortars, velocity and

range are sacrificed to obtain a large calibre extra-heavy projectile with a very light gun.

Were it not for the force of gravity and

the various effects of the air, a projectile would, upon leaving the muzzle of a gun, proceed with a uniform velocity in a straight line. In the sketch, let OZ be that line. The projectile

reaches A in one second, B in two seconds, C

in three and D in four, if OA = AB = BC = CD.

If the projectile were fired in a vacuum where it was acted upon by the force of gravity but by no other disturbing forces, it would at the end of one second be at a instead of A, Aa. being 16.08 feet, the distance an object will fall in one second under the influence of gravity. At the

end of two seconds it would be at b, in three seconds at c and in four seconds at d. The

curve O abed is a parabola with the axis verti¬

cal. If the firing takes place in air in the ordi¬

nary way the path of the projectile (i.e., its trajectory) will be still further modified. In¬

stead of having a constant velocity and reach¬

ing A, B, C, etc., the velocity is steadily de¬

creasing so that at the end of one second (if gravity did not act) it would only reach some point A' ; at the end of two seconds, B', *etc.*

Gravity drops it to a' b\ etc., in which

Aa— A'a' = B'6 — B *etc.* The curve Oab'c'hd'

is the trajectory in air, the point d' being imag¬

inary. The following table gives a comparison

of the ranges in air and the theoretical ranges in a vacuum where the velocity of the projec¬

tile, measured in a direction parallel to the axis of the gun, remains constant. The muzzle ve¬

locity in all cases is 1,700 feet per second.

ANGLE OF ELEVATION.

1° 04' .

2° 15' .

3° 35' .

5° 04' .

6° 50' .

8° 42' .

In addition to checking the velocity of the

projectile by direct pressure and friction, the air acts upon it in other ways. It tends to move it in the direction in which the air currents are

moving and, in conjunction with the rotation of the projectile, causes a certain amount of deflec¬

tion due to gyroscopic action which is called

drift. As this gyroscopic action is almost

exactly constant for any particular gun and

velocity of projectile it results in an angular error which is allowed for in primary ad¬

justment of the gunsights. This is effected

by inclining the rear bar-sight to the left

or inclining the axis of the telescope sight.

Other irregular lateral deflections or errors

are corrected by a sliding leaf on the rear

sight bar, or on the telescope bar or set¬

ting device. Vertical or range errors are cor¬

rected by increasing or decreasing the angle

of elevation. Gun-fire is commonly divided into two classes, direct and high-angle. In direct

fire the elevation is small, the trajectory very slightly curved, and the projectile strikes from a lateral direction. This is the ordinary method of shooting. In high-angle fire, advantage is

taken of the fact that, with a given muzzle

velocity, a projectile will have its greatest range when the gun is elevated at an angle of slightly more than 45 degrees above the horizontal. This enables a short gun to fire a heavy projectile at a low velocity to a comparatively long distance.

The range may be varied by changing the ele¬

vation or the weight of the charge. High—

powered guns (muzzle velocity 2,500 feet per

second or greater) are usually fired at angles of elevation of less than 15 degrees, but greater elevations are beginning to be common. The

term curved fire is sometimes applied to firing at angles between 15 degrees and 30 degrees

and high-angle fire to elevations of 30 degrees or above. To render a gun effective, it must

possess (a) safety, (b) accuracy, (c) destruc¬

tive power, (d) adequate speed of fire. Abso¬

lute safety is impossible, but accidents should be rare and only of the kind that it is impossible to wholly provide against. A reputation of

unsafeness tends to demoralize the men who

handle the gun. The greatest sources of danger in a modern gun are (a) premature explosion

of the charge, (b) explosion of the projectile in the bore, (c) jamming of the projectile in the Striking

velocity

in air,

feet.

1,531

1,383

1,258

1,161

1,087

1,028

Range

in air,

yards.

1,000

2,000

3,000

4,000

5,000

6,000

Range

in vacuo,

yards.

1,115

2,350

3,737

5,277

7,007

8,975

bore, (d) hang-fire, (e) weakness of breech

mechanism. Accuracy is of course imperative,

as an inaccurate gun is useless except at very short range. In a field gun the principal causes of inaccuracy are: (1) variations in the angle of sight, (2) drift (due to gyroscopic action of the projectile), (3) wind, (4) jump, (5) axis

of trunnions not horizontal, (6) variations in

the velocity of the projectile due to inequalities of powder, (7) error in supposed range, (8)

personal errors of the gun-pointer, (9) varying conditions of the atmosphere as regards height

of barometer, temperature, heat-waves, hygro—

metric conditions, (10) effect of strong or de¬

fective light on the sights or on the objective.

Guns mounted on board ship are affected by

these causes and by (11) horizontal movement

of the ship and of the enemy — changes of

course and speed, and (12) rolling and pitching of the ship. Field guns are frequently directed at targets beyond intervening objects and in

that case they have difficulty in (13) pointing in the correct direction, and (14) a jarring of the sights by the shock of discharge which may throw them temporarily out of adjustment. The

combined effect of these errors may be con¬

siderable. Some of them permit of partial in¬

dependent correction. The total remaining

error is overcome by observing the fall of the projectiles. On board ship, this is effected by spotters at the masthead; on shore, by range

observers in kite-balloons or airplanes. The

sights are readjusted by the information so

derived and this readjustment is made as often as necessary. In order to make spotting easier and more certain the guns on large ships are

fired in salvos (usually half or all of the guns which will bear). Observation of the fall of

projectiles on land is usually more difficult than at sea except by the forces which have com¬

mand of the air, or are strongest in the air.

Whichever side has a marked superiority in

air power possesses a great advantage in fire

control and gun efficiency.

Fire control includes the direction, range,

grouping and speed of fire; the selection of the target, of the guns to be used, when they are to be used; and control of the character of the ammunition employed. The chief fire-control

officer of a ship is in constant communication with the captain ; the chief fire-control officer of a group of guns or batteries on shore keeps in close touch with the commanding officer of

the group, as changes in target or character of fire are of frequent occurrence — shifts from

ordinary shell to gas shell and then to shrapnel being sometimes made in a single minute. Each

subdivision of a group of guns, if likely to be assigned a separate target or different ammu¬

nition, or if the guns of the subdivision are of a different calibre or type, or at some distance from the rest of the group, must have its own fire-control officer, who gets general instruc¬

tions from the chief fire control. Small-arm

fire from muskets or machine guns is usually

controlled by the commanding officer of the

infantry unit to which they belong or near

which they are located. The present character

and arrangement of the battery of recent battle¬

ships is based upon the fundamental principle

of strategy wh;ch requires the greatest con¬

centration of gunpower :n the least practicable space, but the reform was largely brought about by tactical difficulties connected with the fire-control of guns of several calibres. These

difficulties are too complex for full description here but were connected with the fact that guns of different calibres have different

maximum

ranges, different danger spaces at practically all ranges, and must often be directed at different targets. This involved a serious complication

in fire control. The strategical arguments for

the all-big-gun battleship backed by tactical ones forced the adoption of the principle. Since the maximum weight of fire can only be obtained

on the broadside, the fullest development of

broadside fire led to placing all turrets on the central fore-and-aft line, while good bow-fire

and stern-fire were obtained by raising two

turrets so they could fire over others. The

difficulties of fire control were thus reduced to their lowest terms while the gunpower of the

ship was enormously increased. Another stra¬

tegic gain was the augmented gunpower of

the line of battle of the fleet for each thou¬

sand yards of its length, in ships of recent type, the gunpower per thousand yards of the line

of battle is 500 per cent greater than for ships of the Connecticut class and is accompanied

with an increase of speed of more than four

knots, much greater range of guns, superior

accuracy at all ranges beyond a few thousand

yards and enormously greater destructive effect

of the projectiles.

In land operations, artillery fire is designed

to: (a) check the enemy's advance by (1) in¬

terposing a barrage or curtain of fire between his front and his objective or by (2) fire di¬

rected at his advancing troops; (b) prevent the advancing of the enemy's reinforcements by

interposing a barrage between his fighting line and his reserves or supporting troops; (c) de¬

stroy the enemy's stores or interrupt his sup¬

plies ; (d) destroy his field works, trenches, and gun-emplacements or render them untenable or

useless; (e) clear the ground of the enemy's

obstructions in preparation for advance or

assault; (f) to lower the morale or resisting

power of the enemy by very heavy bombard¬

ment, use of gas, etc.; (g) to deceive the enemy as to the true objective but incidentally to

inflict all possible damage.

While field guns of about 3-inch calibre have

the widest range of usefulness in attack and

defense, large guns (up to 12-inch calibre) of great power and long range are often of great service, and heavy howitzers (up to 20-inch,

but especially of 8-to 12-inch) are indispen¬

sable. Concealment of the positions of heavy

guns is more important than any form of pro¬

tection and where practicable they are fre¬

quently moved, some being placed on railway

cars. Concealment from airplane observation

is sought by covering with brush or light un—

noticeable screens, or by painting the gun and mount in a way to render its identification

difficult.

Trench mortars are very light pieces de¬

signed to throw heavy charges (25 to 200

pounds) of high explosive a distance of a few hundred feet and are very useful when the

enemy's trenches and other works are near your own. Most trench mortars are of three-or

four-inch calibre but a few are much larger.

The propulsive force is compressed air or a

small charge of powder. In place of these

mortars, simple catapults, with long arms oper¬

ated by compressing some sort of spring, have

been used with considerable success at very

short distances. To obtain high efficiency of

operation, the gun-layers, gun-pointers, sight—

setters, trainers and all other men attached to a gun or battery must be highly trained. Those

who sight the guns must have a preliminary

training of months to get the best results. And only a few men have the keenness of vision,

steadiness of nerve and quickness of decision,

which are required for gun-pointers of the first class. The character of the work required in

the army and the navy is very different, that of naval gun-layers being much more difficult,

because the gun itself is on a moving platform which rolls and pitches. This makes it neces¬

sary to have two men, one (the trainer) who

trains the piece and keeps it in the vertical plane of the target and one (the pointer) who elevates the gun and fires. A third man (the

sight-setter) keeps the angle of elevation (be¬

tween the line of sight and the axis of the

bore) adjusted in accordance with instructions.

Gun-pointers are trained by a progressive sys¬

tem which begins with aiming a gun at a very small point. The next step is the use of an

instrument which records the point aimed at.

This is followed by sub-calibre practice in which a piece of small calibre is clamped to the large gun. The sights of the large gun are used but it is the small one which is fired. Sub-calibre practice lends itself to many variations, the

methods in use in different navies and armies

being alike only in principle. Full-calibre tar¬

get practice follows sub-calibre work and battle-practice (in which the

conditions of battle are simulated) complete the training. Hardly less

important than the foregoing is the training of the ammunition supply details; in modern field

fighting, upon a thorough organization and

efficiency of the supply train depends the win¬

ning or losing of the battle. See articles on Guns; Ballistics; Projectiles, *etc.*

Bibliography. — Consult (Textbook on

Naval Ordnance) (Annapolis 1914) ; Bethell's

(Modern Guns and Gunnery > (Woolwich 1910) ;

(Modern Artillery in the Field) (New York,

1911) ; Lissak's <Ordnance and Gunnery* (New

York 1907) ; Proceedings of the United States

Naval Institute* (Annapolis, Md.) ; Journal of

the United States Artillery (Ft. Monroe, Va.),

and Field Artillery Journal (Washington,

D. C.).

Lewis Sayre Van Duzer,

Captain in the United States Navy; ex-Secretary of the United States Naval Institute.

GUNNISON, John W., American army

officer and explorer: b. Goshen, N. H., 11 Nov.

1812; d. near Sevier Lake, Utah, 26 Oct. 1853.

Attended an academy at Hopkinton, N. H.,

finishing his course in December 1832. On 7

July 1838 he was graduated from the United

States Military Academy and became second

lieutenant, Second Artillery, topographical

engineer; he was made first lieutenant 9 July

1848; and captain 3 March 1853. He served in

the Florida War of 1837-38 as ordnance officer.

He was with the Cherokee Nation 1838, while

transferring the Indians to the West, and on

improvement of Savannah and Saint Mary's

rivers, Georgia, 1840-41 ; on survey of Lake

Michigan, 1841-42, and of Northwestern lakes,

1842-49. He was engaged for nearly 10 years

in surveying the Northwestern lakes and in the improvement of harbors, and in 1849-51 was

associated with Capt. Howard Stansbury in

making maps of the Great Salt Lake region,

drawing up an able report on his work ; was

engaged in 1846, on exploration of Utah and

1849-51 in a survey of Great Salt Lake, Utah; in 1851-53 survey of Northwestern lakes. In

1853, he had charge of the expedition and survey of the central route for a railway from the

Mississippi River to the Pacific. On 3 M.arch

1853, he was appointed captain of topographical engineers for 14 years of continuous service.

While engaged in the last-named survey he was

killed 26 Oct. 1853, near Sevier Lake, Utah,

with seven of his exploring party by a band of Mormons and Paiute Indians. This was the

first corps of engineers sent by the government to explore the route for Pacific railroads. The scheme was considered visionary at first, then

possible and finally accomplished, the benefits

being nation wide.

GUNNISON, Royal Arch, judge: b. Bing¬

hamton, N. Y., 24 June 1873; d. 15 June 1918.

He was graduated from the Binghamton High

School and from the law department of Cornell

University. After admission to the New York

bar in 1897 he became a United States referee in bankruptcy for Broome, Chenango and Dela¬

ware counties, 1898-1904, and United States

district judge, first division of the District of Alaska, 1904-09. He engaged in the private

practice of law at Juneau after 1909 and was

non-resident lecturer on bankruptcy at the Cor¬

nell College of Law after 1901. Besides his

membership in the New York State Bar Asso¬

ciation, he was secretary-treasurer of the Na¬

tional Association of United States Referees on Bankruptcy during the years 1900-05.

GUNNISON, a river of Colorado formed

at Altamont by the junction of the Taylor and East rivers, flows southwesterly to Gunnison,

near Cimarron, enters the Grand Canon of the

Gunnison 15 miles long and continuing in a

northwesterly direction past Delta, unites with

the Grand River at Grand Junction after a

course of nearly 200 miles. See Uncomphragre

Valley Project.

GUNNY, a jute (see Jute) cloth, also a bag

or sack. Gunny-bags are very largely exported

from India to various parts of the world.

American cotton is largely packed in these.

They can be manufactured at a low price, hence the great demand for them. The name gunny

is applied to the cloth as well as to the made-up bags. About 1850 the peasant hand-looms of

Lower Bengal met both the home and the for¬

eign demand for Indian-made gunny-bags — in¬

deed the making of these was then the great

domestic industry of that portion of India.

At the present time the number made at the

great steam-factories, of which there are now 23 in India, far exceeds what is produced by hand-looms. For example, in one year 82,779,-207 gunny-bags were exported from India, of which only 5,000,000 were woven by hand.

GUNPOWDER, an explosive substance formed by mixing saltpeter, charcoal and sul¬phur together. The mixture may vary in com¬position between quite wide limits and yet pos¬sess explosive properties ; but the proportions

adopted by the United States governmental au¬thorities arc saltpeter, 75 per cent; charcoal, 15 per cent, and sulphur, 10 per cent. The salt¬peter used is the India saltpeter or nitre, which is known to chemists as potassium nitrate, and although found native as an incrustation on the soil in India it is to-day largely made from Chile saltpeter, or sodium nitrate, by reacting on the latter wTith potassium nitrate. It is care¬fully purified, finely ground and thoroughly dried for use, in the manufacture of gunpowder.

The charcoal most suitable for gunpowder is

that variety which is mostly readily ignited,

most quickly burned and gives the least quan¬

tity of ash. Such charcoal is produced from

dogwood, willow or alder, by heating the air—

dried woods in closed iron cylinders or retorts out of contact with air so that they undergo

destructive distillation and leave the charcoal

as a residue, this method of manufacture hav¬

ing been invented in England by Bishop Land—

lolf and adopted in that country in 1797. The dogwood, which is really the alder-buckthorn,

Rhamnus Frangula, is cut when one inch in

diameter; the willow and alder when four

inches ; though these dimensions vary in prac¬

tice. The wood is cut in the spring when in

full sap, stripped of its bark and seasoned by an exposure of two to three years; the dog¬

wood being stacked under shelter, but the other woods in the open so that the rain may wash

the sap from the wood and the sun's rays and the air may destroy the spiral cells. The char¬

ring is effected by fires outside the retorts or by passing superheated steam or hot carbon

dioxide gas through the retorts. The char¬

acter and yield of the charcoal produced varies with the temperature to which the wood is

exposed and the time of exposure. When the

wood is heated to 290° C. red charcoal is

formed; when heated to 350° C. or above, black charcoal is produced. When the heating is done quickly the yield of charcoal is much larger

than when the heating is slow. Red charcoal is much more easily ignited and burns faster than black charcoal. Charcoal for the manufacture

of gunpowder is ground to a fine powder by

rotation in a drum with a quantity of brass or bronze balls. Sulphur of commerce is purified

for use in this manufacture by fusion and dis¬

tillation ; being eventually obtained in the form of roll brimstone, which is then crushed to a fine powder by heavy rollers. It must be free from sulphuric and sulphurous acids, as well

as solid impurities, and should consist entirely of that modification of sulphur which is com¬

pletely soluble in carbon disulphide.

The dry, finely ground and sifted saltpeter,

charcoal and sulphur are weighed into the mix¬

ing machine, which consists of a gun-metal

drum arranged to make 40 revolutions a minute

and provided with hollow bearings through

which a shaft is passed which carries 44 arms or fliers of such length as to just clear the interior surface of the drum. This shaft re¬

volves in an opposite direction to and with

twice the speed of the drum. After the ingre¬

dients are put in the drum the mixing is car¬

ried on for five minutes and then the mixture goes to the

incorporating or wheel mill. The

process of incorporation is of the greatest im¬

portance in this manufacture. It consists in the long continued grinding together of the ingre¬

dients in order to mix them so intimately that the product appears to the naked eye as a

homogeneous mass, for, unless this be done,

complete reaction between the components of

the powder by combustion cannot be expected.

The finished gunpowder depends tor its excel¬

lence largely upon the completeness and thoi—

oughness of the incorporation. The incorpo¬

rating mill consists of a circular bed of iron or stone on which the mixture is placed. A ver¬

tical shaft rising through the centre of this

bed carries a horizontal one, on the two ends of which heavy stone or iron wheels, called

edge runners, are hung. These wheels rotate

about the horizontal shaft and, as the vertical shaft revolves, they travel at the same time in a circle around the bed so that, at the points on the bed where the edge runners touch, the

motions of rotation and translation are con¬

verted into a twisting motion, like that of a muller, and the material beneath is thus over¬

turned and very intimately mixed. The edge

runners weight from three to seven tons, are

from four to seven feet in diameter and are

so movable on the spindle that they can accom¬

modate themselves to varying thicknesses of

powder on the bed. One of the edge runners

is a little nearer the vertical shaft than the other, so that they travel in different paths and they are followed by a scraper which throws

toward the centre of the bed the material that has been forced to the exterior by the edge

runners. To incorporate, 50 pounds of the

mixture are spread out on the mill-bed and

slightly moistened and the wheels are set in

motion. If the wheels are of stone weighing

3*/2 tons and making 7j4 revolutions per minute, the incorporation is completed in 3*4 hours.

If the wheels are of iron weighing four tons

and making eight revolutions per minute, 2*4

hours are required for cannon powder. The

operator does not remain constantly in the mill, but goes in occasionally to wet the charge,

from 2 to 10 pints of water being used in

accordance with the weather. The chief dan¬

ger from accidental explosions during the man¬

ufacture of gunpowder is found in the incor¬

porating mills ; fortunately there is less ex¬

plosive material here at any time than there is at any other part of the works. To render the damage done by an explosion as slight as pos¬

sible, the buildings in which these operations

are conducted are built with a strong frame¬

work covered with light boards, or else with

three sides of stone and the fourth and roof

of light wood, so that when an explosion oc¬

curs the framework or the stone walls remain.

These mills are usually built in groups, and to prevent an explosion in one being communi¬

cated to the others, each is provided with a

drenching apparatus which automatically wets

and protects the charges in the mills adjacent to the one which is blown up. The communi¬

cation of fire or explosion is also arrested bv means of barricades built about the mills which consist of masonry filled with earth, or simple earth mounds or sometimes wooden structures

built in the shape of a letter A.

When the incorporation is completed the

mill cake, as the mixture is now called, is re¬

moved from the bed and runners by means of a copper chisel and wooden mallet. It is partly

in the form of a compact cake and partly fine meal and in this condition it is put into the press. This is a powerful hydraulic press with GUNPOWDER

a rectangular box which is divided into com¬

partments of the desired width by means of

copper or gun-metal plates. When the spaces

between the plates have been filled with mill

cake, pressure is applied which causes the parti¬

cles to cohere, and the gunpowder is taken

from the press in sheets having an area equal to that of the plates and a thickness dependent on the width of the filling space, the amount of the pressure applied and the duration of its application. Sometimes the press plates are

corrugated like waffle irons, as for instance, in the manufacture of waffle and of hexagonal

powders, and sometimes they are replaced by

a press block filled with molds in each of which a separate grain is pressed, as in the manu¬

facture of cocoa or prismatic powder. The

operation of pressing is a most important one, since the density of the finished powder de¬

pends upon it and, as it is markedly affected by even slight changes in atmospheric conditions,

it is a very nice one.

The press cake passes to the corning or

granulating machine, where it is cut into grains.

This machine consists of a hopper into which

the charge is fed, an elevating band, an endless revolving table, four pairs of rollers and sev¬

eral sets of screens for sorting the grains ac¬

cording to size into boxes placed to receive

each different size. The rollers, which are of gun-metal, are corrugated or provided with

teeth, the upper two being coarser than the

lower, and they are adjusted to the size of

grain required. When the hopper has been

emptied a clutch is relieved which stops the

machine and at the same time rings a bell

which notifies the operator of the fact for, as the machine is self-feeding, the workmen are

not obliged to be present while it is at work.

The grains are now freed from dust by pass¬

ing through horizontal cylindrical sieves such

as are used in flour-mills and they are then

glazed by rotation in wooden barrels where, by the friction of the grains against each other, their angles are rounded off and a hard polished surface is imparted to them whereby they be¬

come better able to bear transportation and are less likely to absorb moisture. Sometimes the

grains are coated with graphite which is put

in the glazing barrel with them. Though but

four ounces of graphite are used to 1,200

pounds of gunpowder it is considered objec¬

tionable for use with fine grain regulation

powder as it delays ignition and fouls the

piece, yet it improves powder to be used in

fixed ammunition, in that it enables the grains to readily pack close together. As more dust

is formed during the glazing process the grains are again put through the dusting reels and

are then exposed for a day in the drying house to a temperature of from 125° to 130° F. The finished powder is packed in 1-pound tins or

25-pound kegs, though other sized packages are

produced to some extent. According to the

size or form or structure of the grains gun¬

powder is known as mealed powder, superfine,

designated by the mark F.F.G.; fine grain,

F.G.; large or coarse grain, L.G. ; large grain for rides, R.L.G.; mammoth, pebble, pellet,

cubical, hexagonal, sphere-hexagonal, waffle,

Fossano or progressive, and cocoa or brown

prismatic powder. Mealed powder is in the

form of dust and is used for driving fuses for ammunition and in pyrotechny. Fossano or

progressive powder is formed by pressing mill

cake to a density of 1.79, then breaking this press cake into one-eighth to one-quarter inch

grains, mixing these grains with a prescribed

quantity of fine grain powder, pressing this

mixture to a mean density of 1.76 and breaking this press cake into grains about two and onehalf inches square by one and three-quarter

inches thick. By this means a grain of varying density was obtained which burned progres¬

sively. This feature was introduced into pow¬

der-making by Prof. R. Ogden Doremus of

New York, but was developed in Europe.

Cocoa or brown prismatic powder is the final

stage of development of the compressed per¬

forated grain invented by General Rodman of

the United States army. In experimenting with

the 15-inch and 20-inch smooth-bore guns in¬

vented by him, General Rodman found that he

could reduce the initial pressures, while secur¬

ing the desired velocities, by using perforated discs of compressed powder which were of a

diameter equal to the calibre of the gun and

between one and two inches in thickness. He

styled this charge a ((perforated cake cartridgeˆ

and in his Properties of Metals for Cannon

and Qualities of Cannon Powder, > published

in Boston, Mass., 1861, he mathematically dem¬

onstrated that at the beginning such discs pre¬

sented the minimum of free surface to com¬

bustion but as the powder burned there was

a constant enlargement of the perforations,

whereby the area of surface exposed to com¬

bustion was constantly increased and that

therefore the volume of evolved gases in¬

creased as the volume of the chamber, due to

the travel of the projectile, increased, in con¬

sequence of which the pressure was more uni¬

formly distributed along the bore than it had

been with the granulated powders hitherto em¬

ployed. Owing to difficulties in manufacture

ana use, Rodman later found it convenient to

build up his charges with perforated hexagonal

prisms of comparatively small size. The Civil

War prevented the further development of this

novel idea in powder-making in this country

at that time, but a Russian military commis¬

sion, which visited the United States during

the Civil War, was so impressed by what Rodman had accomplished, that on its recommenda¬

tion the manufacture was taken up and carried

on in Russia on an extensive scale, and it soon spread to other countries. About 1880 Ger¬

many adopted cocoa powder, which was a

brown prismatic powder with a single canal,

the grains having the form of an hexagonal

prism, one inch in height by 1.36 inches in

diameter and a density of 1.86. This powder,

however, differed from ordinary gunpowder

both in the kind of charcoal used and in the proportions of the components. The charcoal

was underburned or red charcoal made from

rye straw, and the composition was saltpeter

80 50 per cent, charcoal 16.00 per cent, sulphur 2.50 per cent and moisture 1 per cent. Cocoa

powder was so successful for use in modern

high-powered rifle guns that it was sought

for by all military nations and the want was

met in this country by substituting for the rye straw charcoal red charcoal from wood and

carbohydrates, such as sugar, and this brown

prismatic powder was used in our modern large

calibre guns until displaced by smokeless

powder.

Although very great cart' is exercised in the

manufacture of gunpowder, yet there are so

many opportunities for variations to occur in

each of the many steps of the process that even the best powder-makers cannot regularly pro¬

duce powder that will always give the same

pressure and velocity in the same gun. Since,

in order to ensure accuracy of fire, the suc¬

cessive powder charges used must possess the

same ballistic properties this result is secured by proving a number of factory runs by firing trials and then mixing these together in the

proportions required to produce the desired re¬

sult. This process is called blending. It was

practised by Benvenuto Cellini and has been

in vogue ever since.

Good black gunpowder should have a per¬

fectly uniform slate color and it should show

no difference in color when crushed. If it is bluish or quite black it contains too much char¬

coal or is too damp, while the presence of

bright points of bluish-white spots indicates

that the saltpeter has effloresced. If the pow¬

der soils the hand or a sheet of paper when

run over them it contains too much moisture

or else meal powder. On pressing the powder

in the hand it should not crackle or be easily crushed and when crushed the grains should

not fall at once to dust, but should first split into angular fragments. Three different den¬

sities are determined for gunpowder, each of

which furnishes valuable information. These

are the gravimetric density which is the weight of a unit volume of powder grains including

the air between and enclosed in them; the rela¬

tive density, which is the weight of a unit

volume of powder grains excluding the air be¬

tween them but including that contained in the pores of the grains ; and the absolute specific gravity, which is the weight of the powder ex¬

clusive of all air.

Since smokeless gunpowder has been per¬

fected and adopted for use in guns of all cali¬

bres it has to a large extent superseded black gunpowder; yet the production of black gun¬

powder bids fair to continue for many years to come, because in ordnance it is necessary to use a priming charge of it with which to fire the smokeless gunpowder; because smokeless pow¬

der cannot be efficiently substituted for black gunpowder in the older forms of small arms

that are widely scattered over the country; be¬

cause black powder is most suitable for use in fuses and in pyrotechny; and because smoke¬

less powder is too expensive and inferior for

use in saluting.

Gunpowder was formerly used in blasting

as well as for a propellent, but usually a special mixture containing as little as 60 per cent of saltpeter was prepared for this purpose. In

1857 Lamotte Dupont of Wilmington, Del., in¬

vented blasting powder which differs from gun¬

powder chiefly in that Chile saltpeter is used in place of India saltpeter. Though crude ma¬

terials are used and less care is taken the

methods pursued for its manufacture are in

general similar to those used for gunpowder.

Bibliography. — Anderson, W., (Sketch of the Mode of Manufacturing Gunpowder at the Ishapoor Mills, BengaP (London 1862) ; Berthelot, M., (Les compositions incendiaries dans l'antiquite et au moyen age. Le feu gre— gois et les origines de la poudre a canon) (Paris 1891) ; Braun, K., (A Short Historical

Sketch of Gunpowder,) trans. from German by J. P. Wisser (New York 1883) ; Desortiaux, E., (La poudre, les corps explosifs et la pyro-technie) (Paris 1878) ; Guttman, O., (Monumenta Pulveris PyriP (London 1906) ; Meyer, M., (Handbuch der Geschichte der Feuer— Waffentechnik) (Berlin 1836) ; Munroe, C. E., and Chatard, T. M., (Chemicals and Allied Products) (Bulletin 210 of Twelfth United States Census, Washington 1902) ; Rodman, T.]., Experiments on Metal for Cannon and Qualities of Cannon Powder) (Boston 1861) ; von Romocki, S. J., (Geschichte der Sprengs— toffchemie, der Sprengtechnik und des Torpe— dowesens bis zum Beginn der neuesten ZeiP (Berlin 1895) ; du Theil, F. J. G. L, Eiber ignium ad comburendos hostes auctore Marco Graeco* ; (Publie d'apres deux manuscrits de la bibliotheque

nationale* (Paris 1804).

Charles E. Munroe,

The George Washington University, Washing¬

ton, D. C.

GUNPOWDER PLOT, a famous con¬

spiracy formed in England in 1604 by Robert

Catesby, and a small band of other Roman

Catholics, who, goaded into excitement by the

penal laws directed against their faith and its professors, aimed to blow up the Houses of

Parliament by gunpowder 5 Nov. 1605. An

anonymous letter of warning, sent to Lord

Monteagle, led to the discovery of the plot,

and the various conspirators were arrested and

executed. Among those put to death was Guy

Fawkes, who had been caught on the threshold

leading to the vault below the House of Lords with matches ready to fire the train. Since

1605 all places are annually searched at the

opening of Parliament. The day was there¬

after held as a festival in the Established

Church of England up to the reign of Edward

VII, the special services for the day annexed

to the Prayer Book being then abolished.

Consult Gardiner, (What the Gunpowder Plot

Was* (1897); Gerard's contemporary ac¬

counts; Jardini, (Narrative of the Gunpowder

Plot> (1857) ; Jones, M. W., (The Gunpowder

Plot\(1909).

GUNS, or KOSZEG, ke'seg, Hungary, a

town in the county of Vas, on the river Guns, 11 miles northwest of Steinamanger, with

which it is connected by rail. The principal

buildings are the castle of the princes of

Eszterhazy, with huge fortifications; the

church, two convents, a gymnasium and a mili¬

tary school. It became a municipal town in

1328 and a free royal town in 1648. There is trade in flour, fruit and wine. Pop. 8,500.

GUNS, History and Development. The

early history of guns is involved in the mists of legend, doubt and conjecture. Their evo¬

lution necessarily followed the development of

gunpowder from the point of its ascertained

capabilities as a propellant. According to reli¬

able^ testimony, incendiary compositions pos¬

sessing some explosive force were in use thou¬

sands of years before the Christian era.

Rockets, using an explosive closely resembling

gunpowder, were used by the Chinese 1.000 to

2,000 years b.c. ; and others carrying blazing arrows were employed in the time of Alexan¬

der the Great. Greek fire, a fiercely burning

incendiary composition, was used by the naval

vessels of the Eastern Empire from the 7th

CANNON

Fig 5

14 ’-‘CENTURY-GUN WITH SHI ELD

CEHHOTANA AMBULATORIA

14- ‘» CENTURY

F.&. <5

EuBGVv CD BPM3ARDC

AN EARLY MORTAR

C LOSE 0

Fig. 8 F ig.S

PRUSSIAN BREECH LOADING

MECHANISM - I9r” CENTURY

16 CENTURY MORTAR

WITH SIGHTING GUAGE AND

STONE BALLS

CERBOTAN

Of 14T CENTURY

Fig. 7

A GERMAN BREECH LOADER

!6« CENTURY

OLD ITALIAN FIELD PIECE OF THE

15 T« CENTURY

ft MORTAR OF THE

TURY

Fi&. 12

ER ■ M PROVED f 0 P, M EARLY 19W CENTURY

Century onward and did much to defend it

against the Turks and Italian states. Its com¬

position seems to have varied or else the name was often applied to substances which were not justly entitled to the designation. The various compounds passing under the name were com¬

posed of pitch, oil, salt, charcoal, sulphur and other substances. The pitch was an inflam¬

mable resin; the oil in many cases was un¬

doubtedly crude petroleum or crude naphtha;

the salt of the real Greek fire was probably

crude nitrate of potash or soda. Sulphur ap¬

pears as an ingredient in Chinese powder and

in some compositions made in Italy, but

whether it was an ingredient of genuine Greek

fire is uncertain.

In the course of time, as the use of Greek

fire became extended and its composition im¬

proved, tubes were placed in the bows of the

war galleys and the flaming material discharged through them upon the deck of the enemy

when the vessels were in contact favorable to

this operation. In the later types ‘of tubes at least, the charge was placed in a brass cup or charging piece, resembling a beer stein, which

was inserted in the inboard end of the tube. It is a significant fact that the earliest guns (.ex¬

cept hand-guns) of which we have cognizance

were loaded in the same way, the powder

charge being held in a charging-piece of the

beer stein pattern. Marcus Graecus, in his

work (a.d. 846) entitled (Incipit Liber Ignium

a Marco Graeco prescriptus, cujus virtus et

efficacia est ad comburendum hostes, tarn in

mari, quam in terra, > describes several methods of making and launching fire upon an enemy,

among them the following : — one pound of live sulphur, two of charcoal of willow, six of

saltpeter, reduced to fine powder in a marble

mortar and mixed together; a certain quantity

is to be put in a long, narrow and well-com¬

pacted cover and then discharged into the air.

Apparently, the (<cover” is a rocket tube. There is a receipt for gunpowder in the library of the Escorial which was written about 1250. It is

believed that about this time the Arabs or

Moors made hand grenades or bombs and fired

small balls from tubes carried in the hand or attached to lance-heads.

Mr. Joseph Ander¬

son, a former secretary of the Scottish Society of Antiquaries, states that large cannon were

used in Europe in siege operations as early as the beginning of the 14th century but gives no details as to size of the pieces or to the places where used. The first English record of guns

is a picture and description of a vase-shaped

hand gun for firing an arrow; its date is 1326.

In the same year the Florentine government

appropriated money for the manufacture of

guns which were intended for the defense of

the city. In 1327, ((crakys of war" were used by Edward III, in his campaign against the

Scots. No description of these weapons is ex¬

tant. <(Crakys" were used by the French in

1338 and in the same year cannon are referred to in English docflments. In 1339, cannon were used by the English at the siege of Cambrai ; and Froissart alludes to their use in 1340. At this time experiments were being . made at

Tournay with long, pointed projectiles. This

was not the wonderful innovation it might

appear to be at first glance, for round stone balls had not long been in use and bundles of arrows were still fired from many light pieces.

About the same time . the . Duke of Brunswick substituted lead bullets for the small stone balls previously used in his artillery. There is very little doubt that the British used cannon or

large hand guns (metal tubes 12 to 18 inches

long, one and five-tenths to two inches in di¬

ameter secured to the end of an iron rod) at the battle of Crecy in 1346. Edward III, in

1347, used hand guns or very small cannon at

the siege of Calais; their power and size can be judged from the fact that the daily allow¬

ance of powder for each gun was about three

ounces and the daily supply of projectiles for 20 guns was 204 lead shot and 12 pieces of lead.

During the period 1250-1350 a.d. the history

of maritime affairs is most unsatisfactory. The Venetians, Genoese, Turks, Moors, Greeks

(Eastern Empire) fought many battles but the

use of guns is not mentioned in the accounts

of them. If cannon were used they contributed

little to the result. We may, therefore, con¬

clude that any which may have been employed

were weak and ineffective. In the year 1350,

. however, in a sea fight between the Moorish naval forces of Tunis and Seville, cannon played a leading part; and soon afterward are found

on all war vessels. In 1372, short guns of a calibre of several inches were used by the

French galleys at the battle of Rhodes. Dur¬

ing the latter half of the 14th century the new weapons grew rapidly in size, especially those

used for siege and defensive purposes. While

the smaller ones continued to be made as breech¬

loaders for 200 years more, guns of large size were almost invariably designed for muzzle¬

loading. These pieces were at first built up of iron staves arranged around the bore in one or two concentric layers, welded together, and

banded with iron rings shrunk on. In some

pieces these were a considerable distance apart,; but in most of them the rings were close to¬

gether. Such are the Dulle Griete and Mons

Meg, guns of the period that are still in exist¬

ence. The former is sometimes called the

<(great bombard of Ghent" where it was built

about 1382 and where it is still preserved as one of the city's chief treasures. It is 16 feet 5

inches long, weighs about 13 tons, and fired a granite ball of 700 pounds. The diameter of the bore is 25 inches. In rear of this is the slightly conical powder chamber, 10 inches in diameter

at the front end and six inches at the rear. The part of the gun containing the chamber is

smaller than the front part of the gun and

is believed to form a separate section screwed to the other. The Mons Meg in Edinburgh

Castle is of very similar design but smaller,

having a calibre of 20 inches and firing

a granite shot of 330 pounds. About the

end of the 14th century or early in the 15th, machine (i.e., multiple-tube) guns began to ap¬

pear. In Germany they were called ((death—

organs” and were made of a number of barrels

placed side by side; Weigel mentions one which had 33 barrels or “pipes.” While most of the

large pieces of the 13th and 14th centuries were built up of iron bars and rings, cast bronze

guns grew steadily in favor. The first one of which we have information was cast at Augs¬

burg in 1378. During the early part of the 14th century many others appeared. In 1451 Ma¬

homet II. cast some verv large bronze pieces for the attack on Constantinople. The size of the

first three is not exactly known as the descrip-558

tions are inaccurate and confusing. One is

said to have had a calibre of 25 inches and to have fired a stone ball of more than 600 pounds weight; the other two were nearly as large.

They were, therefore, about the size of the

Dulle Griete. Much larger guns of similar

pattern were afterward installed in the defenses of the Dardanelles. They fired stone shot of

1,100 pounds and had a calibre of about 30

inches.

Guns of widely diverse types appeared in the

15th century. Mortars of three or four calibres length and long breech-loading guns of 60

calibres were used side by side. The charges of powder used in each were ridiculously small

though the powder chambers of muzzle-loading

bombards were of such size as to indicate a low density of loading — probably to facilitate com¬

bustion of the charge as the powder used in

the guns of the 14th and 15th centuries was

usually of very inferior quality. The ingre¬

dients were often impure, imperfectly prepared,

and, being commonly mixed on the spot, were

unevenly combined. The proportions used •

varied within wide limits. Sometimes they

were one part saltpeter, one part charcoal,' one part of sulphur. Even when the designed pro¬

portions were correct, the ingredients were

measured by guess and mixed without care:

Each substance was supposed to be carefully

powdered in a mortar so that the resulting

product was of the same consistency. The term

ˆserpentine® was applied to these socalled

<(mealed® powders and, after granulation became

common, to any mealed powder. The granula¬

tion of early powders was effected by mixing

the ingredients in a moist condition and then

drying. The grains were irregular in size and

shape but all were small. Granulated or

<(corned® powder, as it was first called, came slowly into use during the 15th century, being employed in some hand-guns as early as 1429

at least. In charges of some size it burned

more rapidly than the closely packed (<meal® or <(serpentine® powder and was not much used

in large cannon until they had been increased

in strength and both gun and powder adopted

to each other. Spherical cast-iron, cast-brass

and cast-lead shot were used to some extent in guns of moderate or small calibre before the

projection of arrows and bundles of arrows or

stones were given up. Stone shot continued in

use in very large guns until the 17th century when the construction of pieces of excessive

calibre was abandoned. Cast-iron shot came

into general use for medium and small calibres about 1450 and by 1500 had displaced stone

entirely in guns of that character. Incendiary

shell fired from mortars soon became explosive

shell, but it was not until late in the 17th cen¬

tury that they were made self-igniting — that is, ignited by the flame of discharge. Bundles of

bullets, bolts and metal fragments of all sorts, pieces of chain, iron ‘bars and the like were fired from long or short guns whenever they

seemed likely to prove effective. As an ade¬

quate quantity of such material was not always at hand, bar-shot, double-headed shot, chain-shot, case-shot, grape, etc., were designed and made a part of the projectile supply for large guns.

The very heavy pieces of the 14th and 15th

centuries were fired from positions on the

ground. Some rested in heavy wooden cradles

that could be wedged up at the muzzle end to increase the elevation ; while the recoil was

taken by timbers braced against short piles or stakes driven into the earth. By the end of

the 14th century the cradle of some of the

lighter siege pieces was mounted on wheels and they began to be employed in ordinary field

operations. In the 15th century, the cradle

was separated from the carriage frame and trail and fitted with an axle directly above the axle of the wheels. The rear end of the cradle

passed between two upright timbers on the

trail and was held at the desired elevation by a pin passing through the timbers and the

cradle-end. In the 16th century, trunnions were cast on the gun and the cradle discarded. By

this time mobile artillery had become an im¬

portant part of all armies. Bad roads and soft ground emphasized the necessity for lightness

in field guns, heavy pieces being necessarily

left behind in a rapid advance or retreat.

The tendency toward decreased weight cul¬

minated in the kalter or ˆleather® gun of

Gustavus Adolphus. This consisted of a cyl¬

inder of copper banded with iron and wound

with rawhide rope. It was a feeble piece of

artillery but it could accompany mounted

troops and could be loaded and fired two or

three times as fast as the musket of that day.

Increasing knowledge of the metallurgy of iron

led, in the 16th century, to the production of cast-iron guns though bronze guns continued

to be made, especially for field service, during the next 300 years. The advent of cast-iron was accompanied by a change from

breech to muzzle loading, a general reduction

in calibre and weight, and an increase of muz¬

zle velocity and gunpower. In the 16th and

17th centuries a few rifled cannon and small

arms were made, but difficulties with the pro¬

jectiles and the change to muzzle-loading

caused the attempts at rifling to be given up.

The growing power of guns and greater

regularity of range due to better powder led to a desire for more accurate pointing, especially in elevation. Adequate lateral direction could

be effected by sighting along the <(line of metal®

or median line of the top of the piece and

this was further facilitated by notches cut on the upper side of the muzzle or breech. But

the elevation could not be so easily deter¬

mined until, about 1550, Tartaglia devised the

<(gunner's quadrant.® This consisted of a de¬

vice resembling a carpenter's square on which

was secured the graduated quadrant of a circle.

The centre of this quadrant was at the angle

of the square where the end of a plumb line

was secured. The long arm of the square was

inserted in the bore and as the gun rose in

elevation the angle was shown by the plumb

line and quadrant. About 1600 a dispart sight

was used for short ranges. This consisted of a block set on the muzzle, the notch in the top of the block being at the same distance from

the axis of the bore as the notch in the base¬

ring of the gun-breech. During the 17th cen¬

tury guns commenced to take on a more defi¬

nite form. Pieces of great size and calibre

were given up. Classification was attempted.

Although many names were applied to guns of

different size, ordnance was beginning to be

designated by type and weight of the solid iron GUNS

shot which it fired. Four types of cannon

were now in use in British naval vessels — (a) culverins, long slender

guns; (b) cannons of

battery, shorter and stockier pieces; (c) pet—

rieros, guns firing stone balls with rather small charges; (d) small pieces with various names

such as minion, saker, falcon, falconet, *etc.*

Each type was made in three lengths, extraor¬

dinary, ordinary and bastard; thus, extraor¬

dinary culverins were 39 to 41 calibres in

length ; ordinary, 32 ; bastard, 26 to 28. Land guns were similarly named and classed but

they also included the mortar and the trabuccho (which differed from the mortar only in having the trunnions at the breech end instead of in the middle. Whole culverins fired shot of 40

to 60 pounds or more ; culverins, 20 to 35

pounds; demi-culverins, 14 to 18; whole cannon, 70 to 120 pounds; cannon, 30 to 50; demi-cannon, 20 to 28; quarter-cannon, 16 to 18; saker, or quarter culverin, 8 to 12; falcon or half

saker, 5 to 7 ; falconet, 2 to 4; rabinet, or smeriglio, V? to 1.

In the 17th century, naval guns were gradu¬

ally reduced to two types; long (18 to 25 cali¬

bres in length), and short (about 15 calibres).

Near the end of the century, carronades be¬

gan to be used, particularly for upper deck

guns. They were very short (5 or 6 calibres)

and light, but fired large projectiles — of course with low velocity. Naval actions were usually

fought at such very short ranges that a gun

of this type was often exceedingly efficient.

The heaviest naval guns were 42-pounders, but

few -pieces larger than the 32-pounders were

carried and these by ships of the line.

The gun-carriages were constructed with

heavy wooden sides called brackets joined by

similar flat timbers called transoms — the

whole supported on wooden trucks 6 to 10

inches in-diameter. The trunnions of the gun

rested in trunnion sockets in the tops of the brackets. At the end of the 17th century,

land guns for seacoast fortifications were simi¬

lar to the long naval pieces. Field guns were of three principal types, cannon (15 to 25

calibres long), howitzers (8 to 10 calibres)

and mortars (3 to 5 calibres). During the 18th century many important improvements were

made in ordnance and gunnery. About 1739

the French devised the plan of casting the gun solid and boring it out. This added nothing to the strength but much improved the accuracy.

In 1742, Benjamin Robins, an English mathe¬

matician and military engineer, published his

work entitled (New Principles of Gunnery)

which revolutionized ordnance and gunnery and’

founded the science of ballistics. In conduct¬

ing his researches Robins invented the ballistic pendulum, determined the path of projectiles

in the air and investigated the air-pressure

against them. He pointed out the desirability

of rifling guns and expressed in strong terms

the advantages which would accrue to any

nation which would first succeed in arming

itself with efficient weapons of this type.

Between 1765 and 1780, General Gribauval

drastically reorganized the French artillery,

separating the field, siege and fortress services ; organized siege trains; made the 12-pounder

the heaviest field piece and reduced the weight of all field guns and carriages ; and adopted

the howitzer and mortar for field and siege

purposes. Gribauval's work laid the foundation

for Napoleon's success. Among other great

improvements, Gribauval introduced tangent

sights, elevating screws and canister or case

shot innovations that were not generally

adopted in other services for nearly half a cen¬

tury. In 1782, Sir Charles Douglass fitted flint locks on the guns of the ship he commanded

but as they were unsatisfactory in windy

weather they were not exclusively adopted in

the British navy for many years. At the

beginning of the 19th century, aside from

notches on the muzzle and basering, gunsights

were not common. Dispart sights were sup¬

plied but it does not appear that they were

regarded as very useful. In 1801, gun sights

allowing for range were proposed to Nelson.

He said he would be glad to examine them but hoped that he would always get near enough

to the enemy to render sights unnecessary.

They were not fitted to his guns and for lack of them, a few days later, the British were

unable to carry on a successful long range

battle with the forts at Elsinore.

In 1807, an English clergyman by the name

of Forsyth discovered a percussion composition

but its importance was evidently unappreciated

for it did not come into general use for a

quarter of a century. The British navy adopted improved gun sights slowly and reluctantly

until after the War of 1812. Nor does it appear that they were officially adopted in the navy

of the United States. But it has been stated

that many American officers devised sights of

improved pattern which they used on their own

guns with great success. If these statements

are correct, the general superiority of American naval gunnery in the War of 1812 is readily

accounted for, as well as the occasional equality or inferiority to the gunnery of the British.

After the close of the Napoleonic wars and

of the War of 1812, the occurrences and inci¬

dents of those wars were closely studied and

the advantages of large guns over small ones

became more appreciated. Attention was di¬

rected to improved sighting; to gun-locks; to

mounts for guns of all kinds; to improved

design of guns ; to the production of better gun¬

powder, *etc.* The people at large, however,

were weary of war and of matters pertaining

to war and the adoption of the new ideas pro¬

ceeded slowly. In 1821, General Paixhans, an

artillery officer of the French army, published his celebrated work entitled the (Nouvelle

Arme} in which he laid down the following

propositions: (1) (<Of all the improvements

tending to increase the effect of naval artillery that which will give incomparably the greatest

power will be the abandonment of solid shot

and the substitution therefor of hollow shell

charged with powder to explode them® ; (2)

((although increase of power, by increase of

calibre, has progressed for a long time, the

maximum increase of power has not yet been

attained®; (3) <(although simplification by re¬

duction of the number of calibres has prog¬

ressed for a long time, unity of system has not yet been attained, but this unity of system will result from the attainment of the maximum

power.® In other words, he advocated the use

of a single calibre of guns for each ship and that of the largest size practicable, and a sub¬

stitution of shell for solid shot. His ideas

were not fully carried out until the appearance of the Monitor in the American Civil War and

the principle of a single calibre was not defi¬

nitely adopted until the general acceptance of

the all-big-gun type of battleship in 1905. The first large shell guns made from Paixhans'

designs were completed about 1824. Though

shell had been used in land guns of short length for several centuries, smashing or penetrating

power was not sought and the walls of such

projectiles were comparatively thin. Paix¬

hans' shells were of a new type suited to the new conditions. The shell gun made its way

slowly but steadily and other improvements

followed in its train. In 1828 percussion locks were fitted to the guns of the U.S.S. Vandalia, but the violent recoil of the hammer prevented their general adoption in the United States

navy until 1842, when Hidden patented his lock with a slotted pivot which permitted the ham¬

mer to be drawn clear of the vent as soon

as it struck its blow. The French produced an efficient percussion lock about 1832, but the

British continued to use the flint-lock until

1845 when they adopted a modification of Hid¬

den's. In the meantime, Colonel Jure of the

French artillery brought out his improved gunsights in which the front sight remained fixed while the rear one was adjustable for any

given range.

General Paixhans had predicted that the

adoption of the shell gun would force the

application of armor to ships' sides. When the shell-gun idea had become settled, he therefore proposed (1841) plans for armored ships and

further predicted that the adoption of armor

would force the use of rifled guns. The first armored vessels were finished in 1854 and in

the same year the French completed several

6.5-inch cast-iron rifles. These were tried out in actual service in the Crimean War and were so much superior in range, destructive power

and general efficiency to the old smooth-bores

that rifled guns were at once adopted not only by the French navy but by the navies of all

the European powers ; and experiments with

rifled guns for land service of all kinds were soon undertaken. The difficulty of loading

via the muzzle tight-fitting projectiles possessed of adequate means of effecting rotation re¬

newed the attempt to solve the problem of

breech-loading. In 1845, Cavalli, in Italy, and in 1846, Wahrendorff, in Austria, brought out

sliding-wedge breech-blocks of much merit and

they would probably have been developed to

success had the breech-loading rifle then been

generally regarded as inevitably the gun of

the future. The Wahrendorff design was

practically identical with that adopted and still used by Krupp. The result of the breech¬

loading experiments, 1855-60, resulted in the

satisfactory development of the sliding wedge

system by Krupp in 1860-61 and the interrupted screw system by the French about the same

time. The latter was originally an American

invention which the French improved and both

the French and Krupp systems were rendered

practicable by the use of the Broadwell ring

which was invented by an American officer of

that name.

The increased powder charges and pressures in rifled guns — especially the breech-loaders — - and in smooth-bore guns which attempted to compete with them led to strains which ordi nary cast-iron guns were unable to withstand. Rodman introduced improved methods of cast¬ ing and a slower burning powder, but the real solution was found to be in built up guns —first of wrought iron or cast-steel and eventu¬ ally of forged steel. The stresses upon the various layers of metal about the bore of a gun are nearly in proportion to the square of the distance of the layer from the axis of the bore. The outer part of a thick homogeneous tube would therefore be but slightly affected when the inner part would be strained beyond the breaking point. Layers of varying strength and elasticity were therefore necessary. Further strength was given by shrinking the outer tubes, jackets, and hoops upon the inner ones. This placed the latter in a state of initial com¬ pression so that they were not strained at all until considerable stress was felt by the outer layers. Wire-winding of guns was suggested by Dr. Woodbridge, an American ordnance engi¬

neer, in the early days of built-up guns but

the principle was not developed to a practical solution for many decades. The cast-iron

smooth-bore shell gun reached the culmination

of its development during the Civil War under

conditions which rendered its use not unduly

inefficient compared with the rifle. And it

was retained in the American navy for nearly

20 years after it was obsolete because of

the parsimony of Congress in naval and military affairs combined with undue admiration for

its performances in the war. The next step

in gun development after the adoption of

rifling was the increase of velocity due to im¬

proved powder. The combustion of the powder

in common use was so rapid that the gas pres¬

sure in the gun reached its maximum before

the projectile started to move and then fell

so quickly as to be almost negligible, so far as propulsive effort was concerned, when the shell reached the muzzle. About 1856, Major Rodman of the United States Army developed his

system of making slow-burning gunpowder by

which the maximum pressure was kept within

bounds while the average pressure was consid¬

erably augmented. But the black powder of

that day could only be controlled within narrow limits. About 1880, a slower burning powder

made from incompletely charred wood came

into use. From its color it was known as

brown or cocoa powder. It ignited readily but

burned slowly so that with a given maximum

pressure the sustained pressure was much great¬

er. To efficiently use the new powder longer

guns were necessary and the length jumped

from about 20 to 30 and 35 calibres.

In 1881 was initiated a movement which led

to most important changes in the construction

of the breech mechanism of guns and the means and methods of loading. Up to this time no

great effort had been made to accelerate the

speed of loading and the time wasted, even in operating small pieces, was absurd. Toward

the end of 1881 the British Admiralty adver¬

tised for designs of a gun that should fulfill the following requirements: weight of gun and

mount not to exceed 10 hundredweight (1,120

pounds) ; projectile to weigh 6 pounds and

have a muzzle velocity of at least 1,800 feet per second; projectile and powder to be made

up in one cartridge; service of the gun to

require not more than three men ; under the

foregoing conditions the gun to be capable of

firing at least 12 aimed shots per minute.

About the same time the French Minister of

Marine invited proposals for a 3-pounder gun

which was required to fulfill the same relative conditions. In answer to these proposals the

first rapid-fire guns were produced. Mr. B. B.

Hotchkiss, an American ordnance engineer and

manufacturer who had established an ordnance

factory in Paris about 1870, brought out a series of guns — one, three, and six pounders. While his guns were accepted by nearly all foreign

navies, his first order was from the United

States navy which had just laid down the first ships of its modern fleet. Mr. Nordenfeldt

brought out very similar guns in England.

The six and three pounder guns called for by

the British and French navies were intended

for use against torpedo boats which were then

small and weak. The success of these guns led to an extension of the principle to larger cali¬

bres, but it was somje years before the breech mechanisms of guns larger than the 4-inch

were satisfactory. Every form of breech clo¬

sure in which the operation had been acceler¬

ated was styled rapid-fire by its makers, but

in 1887. Numerous other types appeared al¬

most at once, a large proportion of which con¬

tained nitroglycerin as the principal ingredient.

The erosive effect of the nitroglycerin powders caused such rapid destruction of the rifling

that the proportion of nitroglycerin was stead¬

ily reduced, until most modern powders contain

only a small percentage of it or are made solely from guncotton. As the manufacture of

smokeless powder progressed, guns were ex¬

tended until a length of 50 calibres was reached in large pieces and 60 or even 80 in small ones.

The limit was not due to the inability to con¬

trol the rate of combustion of the powder but to the fact that in a length of more than 50

calibres adequate stiffness or rigidity of the

gun entails a weight that can be more profit¬

ably employed in a gun of larger calibre and

less relative length (i. e., expressed in calibres of the bore).

In the decade of 1890-1900 much attention

was paid to the question of strengthening guns by winding them with steel-wire of very high

grade. The process was brought to reasonable

perfection by using wire of ribbon form or of some special section laid on with the proper

increasing tension. Guns which are wire-

... r - “V” 1 - c -

tsm

BOB

7K*Tt ˆ i . — =■ - , - . -

H CnAMBCK

80 RL “ - -

_ _ «’

Section of Built-up Gun.

the term was finally restricted to guns in which the breech was opened by the simple throw of

a lever. At first, the charge and projectile

were made up in a single cartridge but in cali¬

bres above 5-inch this was found impracticable

and after 1897 the charges for guns of calibres exceeding 5-inch were as a rule not even cased.

While the breech-mechanism of guns of 8-inch

calibre and over was not adapted to easy opera¬

tion by a simple hand lever, the speed of open¬

ing and closing the breech and of loading was relatively as much increased as in small guns.

In 1884 the average time required to load a

12-inch gun was four minutes ; in 1914, for

naval guns it was not more than 20 seconds.

The automatic principle which is so success¬

ful in machine guns has been applied to pieces of greater calibre but without success in those larger than the one-pounder. Semi-automatic

guns of three-inch calibre are, however, now

common. In these the force of recoil is util¬

ized to open the breech and eject the empty

cartridge case, the closing of the breech being effected by inserting the cartridge smartly so

that it trips a pawl on the breech-plug which is then closed by a spring compressed during

recoil. The next step in augmenting the power

of guns was due to the production of smoke¬

less gunpowder. Its smokeless feature is

highly desirable, but an equally or more im¬

portant gain is the facility by which the rate of combustion can be controlled. Between

1865 and 1870, Schultze in Germany and Von

Lenk in Austria developed smokeless powders

from nitrated cellulose, but they were not suc¬

cessful in adapting them for use in large guns.

But about 1885, M. Vieille, a French ordnance

engineer, produced a satisfactory powder from

‘olloided guncotton which the French adopted

wrapped are unquestionably stronger in a cir¬

cumferential direction than those built up with steel hoops, but the wire wrapping makes it

difficult to secure adequate longitudinal rigidity in pieces of 35 calibres or more. As guns built up without wire wrapping are able to with¬

stand initial pressures of 20 tons per square

inch with a good margin of safety, as pressures of more than 17 tons caused too much erosion, and as wire-wound guns lacked rigidity (and

therefore accuracy) unless very heavy, wire¬

winding has not come into general favor, hav¬

ing been adopted only by Great Britain. Since

1900 the improvements in gunnery methods,

range-finding, the ˆspotting of hits,® etc., have greatly extended the effective battle range.

This in turn has had a marked effect on the

maximum calibre of a ship’s guns. Since the

accuracy, range and destructive power of guns

increase with the calibre, it is manifest that as soon as range-finding

and spotting are able to determine the fall of shot beyond the effective range of existing guns, a larger calibre is de¬

manded and larger ships must be built, if neces¬

sary, to carry the new weapons. We have now

reached 16-inch (possibly 18-inch) guns and

42,000-ton battleships and there is no con¬

vincing reason to believe that these are ulti¬

mate limits.

Coˆst-defense guns have followed the same

lines of development as the naval. Mobile

artillery and land guns for interior fortifica¬

tions and siege operations have advanced on

lines of their own. At the outbreak of war in 1914 the standard field piece in all armies was of about 3-inch calibre. The developments of

recent years have been connected with the

adaptation of heavy. guns of all kinds to field work, increase in size and use of howitzers

and mortars, improvements in gunmounts, am¬

munition and ammunition supply. The appli¬
cation of rapid-fire mechanism to field guns
was of little value until the recoil was con¬
trolled so that the gun would not be thrown
out of line by every shot. This was achieved
by means of long recoil cylinders and a spade (a sharp projection for entering the ground)
on the trail, while slight variations of direc¬
tion were corrected by fitting the gun-cradle
on a pivot or slide to give a train of 6° to 10°.
In the Boer War the British found much use
for long-range guns of four to six inches in
calibre, and in the Russo-Japan War the
Japanese used 11-inch howitzers with great
success in the investment and reduction of
Port Arthur. These were heavy, coast-defense
pieces and were moved with much difficulty
from one concrete emplacement to another.
After the conclusion of the war the Germans
began experiments with large mortars of light
construction designed for use in siege work
and operations against fortifications of all
kinds. In this they were followed by the Aus¬
trians and French and in a small way by the
other powers. On many of these the carriage

and transporting trucks had a ring of broad

flat pedals separately pivoted to the rim ; on others the caterpillar belt was tried. High-explosive shells were brought into general use

about 1900 and great improvements were made

in shrapnel, particularly as regards the ease

of setting the fuse and certainty of its opera¬

tion. Before passing to a more extended con¬

sideration of existing land and naval ordnance, the question of erosion of the bore may prop¬

erly be examined as it is common to guns of

all kinds. It is due to several causes, but so far as large guns are concerned it depends

chiefly upon (a) the temperature developed

in the gun, (b) the chemical constitution of

the powder gas, and (c) the character of the

gun-tube. It is effected by (1) chemical action on the metal of the gun, (2) mechanical rub¬

bing of the bore by the projectile, and (3) the cutting effect of gas moving with high velocity.

When the charge explodes the temperature

evolved is very high, possibly 2,500° C. for

nitrocellulose and 3,000° C. for nitroglycerin,

the actual maximum temperature of the gases

depending upon the rapidity of combustion, the

density of loading, loss of heat by conduction and radiation through the gun walls and the

increase in volume (due to movement of the

projectile) of chamber and bore before the

instant of maximum pressure. The whole in¬

terior of the bore behind the projectile is ex¬

posed to this heat which tends to burn out the carbon from the steel and soften it. The sur¬

face of the metal is oxidized, but if the film of oxide is not removed it protects the metal beneath. As the projectile moves forward its

rotating band wipes the bore (especially the

tops of the lands in the rifling) perfectly clean and so exposes it to renewed chemical action at each shot. In the course of time the combined chemical and mechanical action washes away

the lands at the rear end. Before the projectile starts — especially after the lands are much

worn — a certain amount of gas escapes around it and causes irregular pitting, grooving and

cutting, but this in large guns is almost imma¬

terial compared to the washing away of the

lands. Relative to the amount of carbon,

hydrogen and nitrogen in its composition,

nitroglycerin contains much more oxygen than

nitrocellulose. This not only produces a

higher temperature, but also furnishes a greater amount of oxygen to act on the metal of the

gun. Powders containing nitroglycerin are

therefore much more erosive than those made

of pure nitrocellulose and the latter are be¬

coming more and more common. Cup discs

on the bases, of projectiles have comparatively little effect on erosion, but they materially

assist in preserving the muzzle velocity of pro¬

jectiles fired from guns in which the lands are much worn.

The number of rounds which can be fired

from a large gun before it needs relining

varies within wide limits. It depends upon (a) the speed with which the rounds were fired,

(b) pressure and temperature in the gun, (c)

character of the metal of the bore, (d) chem¬

ical composition of the powder, (e) means to

keep up the velocity in worn guns, (f) opinion of the users of the gun ‘as to when its powrer has been reduced beyond tolerance. All these

factors are variable. In the case of 12-inch

guns with velocities of 2,800 feet per second ; using projectiles of about 850 pounds and pure nitrocellulose powder; fired not more than six

or eight times in onehalf hour (the rounds

may all be fired in three or four minutes if time for cooling occurs afterward) ; if cup

gas-checks are used on the projectile; if

slightly greater powder charges are used as

the wear increases ; and if the metal of the

bore is of the best and most resistant type ; then the number of rounds which they may be

fired without the loss of more than two or

three hundred feet of muzzle velocity is per¬

haps 150 to 200. Fifty to 75 rounds • fired

rapidly in battle might give the same destruc¬

tive results. When the guns are condemned

for inaccuracy the tube is removed and a new

one inserted. This lining tube extends for

about half the length of the bore from the

powder chamber toward the muzzle and the

cost of dismounting, relining, and remounting

the gun is about 25 per cent of the cost of a new piece. To avoid delay reserve guns re¬

place those which are removed from ships for

relining. The life of larger or smaller calibres vary nearly in the proportion of the cube of

the diameter of the bore. Thus, a 6-inch can

fire about eight times as many shots as a 12-inch with the same loss of accuracy. But this rule is no. more than a general guide as the length of time a high speed of fire is maintained is a most decisive factor in the result. Guns using powders containing nitroglycerin have a

shorter life than those using nitrocellulose.

If the nitroglycerin, content is 25 per cent the number' of rounds is at least 25 per cent less than is possible in a similar gun using a pure nitrocellulose powder. If the muzzle velocity

of the projectile is cut from 2,800 to 2,500 feet the per second, the length of life of the piece is extended 15 to 25 per cent, depending upon the character of its use.

Lewis Sayre Van Duzer,

Captain in the United States Navy; ex-Secretary of the United States Naval Institute.

GUNS, Land. — These are usually classed

as (a) seacoast artillery, (b) siege artillery, GUNS, LAND

(c) field artillery; as regards type they are

divided into (1) long guns or guns, (2)

howitzers, (3) mortars, (4) mountain guns,

howitzers or mortars, (5) aircraft guns, (6)

anti-aircraft guns, (7) trench pieces, (8) ma¬

chine guns. Seacoast guns and some other

guns on fixed or railway mounts are long —

40 to SO calibres. Siege guns are usually

shorter — 20 to 30 calibres. Field guns are

commonly of about 30 calibres, though the

standard French piece of 75-millimeters is 35

calibres and the German only 27.3. Howitzers

are 6 to 12 calibres in length ; mortars, 3 to 5. But longer howitzers have been built and

some pieces 6 to 8 calibres long are officially designated as mortars. An old distinction

between the mortar and the howitzer was that

the former was set at a fixed angle of eleva¬

tion and the range varied by increase or de¬

crease of the powder charge. But even in those days mortars were often fitted with an elevating rack on the breech and howitzer charges were increased or decreased for very long or very short ranges. When mortars and howitzers became breech-loading the dividing line between them ceased to exist. The aver¬ age modern mortar has a maximum muzzle velocity of less than 900 feet per second and the average howitzer of more than 1,100.

Mountain or pack artillery is designed for quick mounting and dismounting and for trans¬ portation on the backs of mules or horses. The heavier guns and howitzers for mountain or pack service are usually in twp, parts screwed together. Anti-aircraft gtfns are nearly all of moderate calibre, but very long and of high muzzle velocity; their marked peculiarities are the high-angle mounting- — usually susceptible of easy traverse or train j —and a special form of sight. Naval anti-air¬ craft guns are commonly fitted with prismatic sights which enable the gun-layer to stand erect when aiming. Some land guns are so fitted.

The objection to such sights is the difficulty of picking up the target unless they have a

“finder® attached to them. Trench artillery

consists of small weak mortars or howitzers

for throwing large charges of high explosive

into the enemy’s trenches or positions. They

are often mere tubes of copper or wood using

compressed air or even springs as a projecting force. Machine guns are commonly classed as

an infantry weapon and not included in the

term artillery. Nearly all use the same cart¬

ridge as the troops with which they are operat¬

ing. Very small portable 1-pounder guns are

used to some extent by infantry and machine

gun units against concrete shelters and stone

or brick dwellings protecting enemy forces,

especially machine gun detachments. They re¬

semble closely the old short 1-pounder rapid-fire gun, but are somewhat lighter.

Coast Artillery. — Seacoast artillery is de¬

signed to protect harbors, naval bases, mine

fields, etc., against the attack of ships. The modern method of emplacement is to spread

the guns over a considerable area while con¬

necting them by supply and control lines so

that their operation is nearly as simple as if grouped in the old-style fortifications. Such

an arrangement of many powerful guns makes

their destruction by an attacking fleet impossi¬

ble and adds greatly to the difficulty of re¬

ducing the fortress group by land siege opera¬

tions. A very large percentage of existing

seacoast guns are mounted on disappearing

carriages; howitzers and mortars are placed

in gun-pits where they are wholly concealed

from lateral view. The use of airplanes in

reconnaisance and “spotting® the fall of pro¬

jectiles has modified the designs for new coast works and it is believed that in future many

of the guns, large and small, will be mounted on rails and moved to constantly changing

positions. Parapets will still be retained in

certain places, but much reliance will be placed on trees, bushes and other means of conceal¬

ment. Centres of ammunition supply for each

group of guns will doubtless be well protected and concealed as far as possible. Ammunition

supply roads (for motor trucks) and railways

will be given such curves and concealment as

to make their destruction difficult and doubt¬

less provision for rapid repair will be made.

Guns for the protection of mine fields must be located where needed, the design of emplace¬

ments, roads or tracks depending upon the re¬

quirements of the particular case. Strong,

properly designed land fortifications cannot be

destroyed by ships of the most powerful class, even if the latter are very numerous. They

can, however, as has been repeatedly demon¬

strated in the present Great War, be demolished by a sufficiently intense high angle fire from very large guns.

Siege Guns. — In all the protracted sieges

of the past two centuries the operations began with light weapons that were slowly supple¬

mented by heavy guns mounted in fixed emplace¬

ments or moved with difficulty. In the reduction of Port Arthur, the Japanese made most import¬

ant use of large howitzers. These were coast-defense guns and set up on a series of con¬

crete emplacements as the line advanced. Ger¬

man study of the war operations led to their

development of heavy howitzers which could

be moved almost as fast as 6-inch siege guns.

The first of these had a calibre of 8.27 inches and larger sizes (9.45 and 11.02-inch) were

soon evolved. The larger calibres were orig¬

inally designed to be installed on timber and

concrete beds, but the ˆcentipede wheels, in

which broad flat treads are pivoted to the rim of the ordinary wheel, so increased the bearing surface that specially constructed beds

became

unnecessary except in soft ground. These

wheels greatly simplified transportation of the

guns, the 11.02-inch piece being carried on two vehicles on which the maximum load was

20,000 pounds. Type guns of 16.5 and 23.5

inches were built by Krupp, but it does not

appear that they were adopted for regular

service, though a few of the 16.5-inch pattern were hastily constructed just before the out¬

break of war for the reduction of the Belgian and French forts. Having fully settled on the

types of guns and mounts the Germans built

large numbers of 8.26 and 11. 02-inch pieces

and accumulated vast quantities of ammuni¬

tion for the offensive operations which were to be undertaken whenever excuse and opportu¬

nity offered. Austria followed the German

lead and provided herself with guns and am¬

munition in similar quantities. The Skoda

Company (Austrian) developed a 12-inch

howitzer of great power and mobility which

has been much admired and praised, many

critics seem to regard it as satisfactorily re-564

placing the 11-inch and 16.5-mch types. Slowly

and reluctantly the French provided themselves

with the new mobile weapons, but, fearing

trouble with the heavy transporting loads

adopted by Germany, they cut the weight car¬

ried by each vehicle to eleven or twelve thou¬

sand pounds. Moreover, the French guns were

completely dismounted and when set up for

use were installed on an iron and concrete,

or an iron, concrete and timber base, while the German guns were fired from their transport¬

ing mounts like field guns. Whether the

French are now using guns with the broad,

flat, pivoted treads on the wheel rims has not been divulged, but reports indicate that the

Italians have some of this type. The German

and Austrian guns are somewhat longer than

the French; indeed, the French call their pieces mortars, though they are apparently at least

six or seven calibres long.

The British had very few guns of this type

when the war broke out, but began to supple¬

ment their stock of heavy artillery by placing a for some distance. The simple bar sights in

common use were thrown off the target at

every shot. Usually the gun had to be run to the front a considerable distance before loading and re-aiming. Training was effected by small

ropes hitched to the trail by which it was

hauled to the right or left. This condition of affairs was permitted to continue because no

great amount of time which could be saved was lost. When a charge of black powder was

fired the gun position was usually enveloped in a great cloud of smoke that did not clear away for several seconds unless there was some

breeze. In the. meantime the gun was run to

the front again. In the navy, hydraulic recoil cylinders began to be much used in the decade following the Civil War. In 1882 the rapid-fire gun was adopted and the speed of opera¬

tion of the breech mechanism in all calibres in¬

creased steadily but took a great jump ahead

with the advent of smokeless powder (1887).

Sights and sighting began to improve rapidly

soon after the use of smokeless powder became

French 75-millimeter Field Gun.

Firing the first round — after the first round the gun layers sit on seats beside the breech. The first round sets the spades on the trail and brake shoes. (From The Engineer, London).

large number of naval guns on field and rail¬

way mounts. Many 6-inch, 7.5-inch. 9.2-inch

and 12-inch guns were thus brought into field

service and their great range introduced a new element into the fighting. Railway mounting,

camouflage and other forms of concealment

made concentration of attack on such pieces

very difficult while their fire drove the enemy's reserves farther to the rear.

Field Guns. — The field gun in most com¬

mon use in the armies of all nations has a

calibre approximating three inches, none but

the British differing more than .05 of an inch from that size. The most powerful of these is the French 75-millimeter. It is considerably

the longest, has the highest muzzle velocity and the heaviest projectile. Notwithstanding its

excellencies it is the oldest of all and was the prototype and model for every field piece now

in use. Previous to the advent of this piece, mounts had changed but little for nearly a cen¬

tury except that steel had replaced wood in the trail and cheeks. The force of recoil was al¬

lowed to drive the gun and mount to the rear common. Army authorities moved more

slowly. In 1891, General Wille of the German

army published the (Field Gun of the Future'

and in 1892 General Langlois of the French

army brought out his great work (Field Artil¬

lery in Connection with the other Arms.' Both

these officers laid down the requirements of a modern field gun and pointed out their advan¬

tages. Artillery officers were conservative,

however, and it was five years before Colonel

Deport's gun was adopted in the French army

and several years more before other nations

fully accepted the innovation. The most vital

of the changes made in modern field artillery

consists in keeping the gun in position during recoil. This was effected by fitting a lip (called the spade) on the under side of the trail, also wheel brakes, shoes and spikes, and by soften¬

ing the shock of discharge by means of a long recoil cylinder. If the spade is sunk firmly

into the ground and the wheels braked (some¬

times fitted with shoes and spikes in very soft or hard ground) the gun is kept very closely

on the target. The recoil cylinder is nearly as GUNS, LAND

long as the gun. It is similar in principle to the naval recoil cylinder but relatively longer.

During recoil the piston presses against liquid (water and glycerine) which is allowed to escape past it in channels that decrease in depth toward the rear. The gun is returned to the firing posi¬

tion by counter-repoil springs or air-pressure

or both. By keeping the mount in position dur¬

ing recoil the gun layers can remain at the

sights and receive some protection by shields

attached to the mount. While the mount is

held quite firmly there is more or less move¬

ment. The slight change in elevation can be

corrected at the sights, but any error in train would involve resetting the spade of a rigid

mount ; to avoid this, the gun can be given a volved until the correct range shows against

the zero mark, the rear end of the quadrant

arm is raised through the corresponding angle.

If the target is at the same height as the gun, the breech of the latter is now lowered until the spirit level shows the quadrant arm to be horizontal. If the target is above the gun, the angle its elevation subtends must be provided

for. This is done by raising the short arm

carrying the spirit level through the angle

(called the angle of sight). The breech is thus lowered through an angle equal to the sum of

the angles of elevation and sight.

The independent line of sight is designed

to increase the speed of sight setting. It is obtained through different means by different

Krupp 21 C. M. Howitzer on Field Mount. (From The Engineer, London) train of 3° or 4” each way on its mount with¬

out disturbing the trail or wheels. Improve¬

ment in the sighting apparatus became possible

in the new mounts and was rapidly introduced.

In modern field artillery fire the target is rarely visible to the gun layer as the pieces are usually placed behind some sort of parapet, bank, rise of ground or screen over which they fire.

Until quite recently the elevation of field guns was effected by means of some form of gun¬

ner's quadrant located on the right side and

operated by a sight-setter seated beside it.

The quadrant arm on pieces of that type is

pivoted at its front end; at its rear end it is geared to a drum on which are marked the

ranges ; on its side is pivoted a shorter arm carrying a spirit level. When the drum is re¬

designers. As devised by Colonel Deport and

fitted to the French 75-millimeter piece, inde¬

pendence is secured by inserting an interme¬

diate carriage between the gun-sleeve and

mount and on this are placed the means of giv¬

ing direction to the gun. For indirect fire, the intermediate carriage is always kept level and

the gun is raised to an angle above this equal to the algebraic sum of the angles of signt and

elevation. For direct laying the intermediate

carriage may be raised or lowered through the

angle of sight by aiming through the sight and elevating or depressing the muzzle until the

line of sight passes through the target. When

using the independent line of sight, the setting of the sight remains unchanged, no matter how

often or how much the elevation of the gun is 566

altered, since the sight is mounted on the in¬

termediate carriage which is always kept level.

This method of obtaining an independent line

of sight was used with marked success in the

Great European War. No country but France

had adopted it in 1914 but since that time nearly all new guns of the Entente Allies are fitted with it. Krupp achieved the same result (fixity of the line of sight irrespective of the move¬

ments of the gun) by gearing the sight (which is attached to the gun-sleeve) in such a man¬

ner that the sight rises in its socket as the breech is lowered, and vice-versa. Since in

indirect fire the target cannot be seen, the gun must be pointed at some visible object whose

angular divergence from the direction of the

target is known or obtained by rapid triangula¬

tion or otherwise. This requires the sight to

be capable of revolution in the horizontal plane.

Sights possessing this capability are called

goniometric, a simple goniometric sight being

one pivoted on a circular graduated base plate which is kept level and usually fitted with a separate deflection scale. The sight itself is gen-

pack animals could not go. Guns and ammuni¬

tion were hoisted up precipitous slopes to points that could only be reached by trained mountain climbers. Trench artillery has a most im¬

portant use but it lacks definiteness as regards design. Much of it has been hastily extem¬

porized, even the ancient tjallista being again brought into use. The French, who compress

air for the counter-recoil cylinders their field guns, are using compressed air for projecting

high explosive charges from their trench

pieces. Trench mortars are used for throw¬

ing gas shell, illuminating shell, etc., on points inside the ordinary field of artillery concentra¬

tion. Trench artillery is set up wherever it

can be conveniently worked, usually in small

excavated emplacements in rear of the first—

line trenches, and is operated by the infantry units which surround it.

Aircraft Guns. — Aircraft guns are in the

infancy of their development. Light scouting

and combat planes use machine guns of small-arm calibre almost exclusively but a peculiar,

non-recoil piece has been tried with some suc-

K upp 4.7 inch Heavy Field Gun. (From Th Engineer, London) erally some form of telescope. Heavv field

guns of 3.3 to 4.7 inches calibre were built in considerable numbers

before and during the

great World War, but they have been over¬

shadowed by the large howitzers which have

to a considerable extent replaced them.

Horse artillery differs from field artillery in lightness and mobilitv. When cavalry was the

principal scouting arm, horse artillery was de¬

signed for accompanying a reconnaissance in

force by mounted troops. In the recent great

war, horse artillery had no special oppor¬

tunity to show its importance or lack of im¬

portance. Horse artillery guns have, as a rule, the same calibre as the light field artillery but the guns are shorter and weaker and the pro¬

jectiles are commonly of less weight. Horse

artillery howitzers have about the same weight

as horse artillery guns, hut of course have

greater calibre. On the Austro-Italian front

mountain artillery has had full opportunity to

earn its name. But heavier guns than those

commonly classed as mountain pieces have there

been liberally employed in places where even

cess. This gun consists of a rifle barrel for the projectile extending to the front and a smooth bore barrel for the balancing charge extending

to the rear. The latter consists of fine shot of lead or steel. When the

gun is fired the

projectile is driven out with a muzzle velocity of about 1,000 feet per second and the balancing charge of shot driven to the rear. The strain on the mount is trifling even with a three-inch gun.

Six-inch guns of this type have been built for large bombing and battle planes and for dirigi¬

bles. The range of the gun is very great owing to the altitude at which it is fired but the ac¬

curacy is of course moderate. In tractor planes, at a target directly ahead, the machine gun

must be fired through the axis of the propeller or between the blades. In the latter case, the operating mechanism of the gun is geared to

the propeller shaft and permits firing only when the propeller blades are clear. In some battle¬

planes the machine guns are operated in pairs, giving a double weight of fire by a single

operator.

Anti-Aircraft Guns. — Anti-aircraft guns

Light Field Guns of Fourteen Nations Engaged in the World War of 1914.

(Data chiefly derived from Colonel Bethell's 'Modern Guns and Gunnery,' corrected to 1913) GUNS, LAND

0) D

＋J＋JQ

;5＜x

..

43 v*

x®

V-O’

O’ ^

CN CN

• oo

noo

＞o ^

CL

,0^0

tZ) CN Tl＜

<J2ig^B.8«33^ggt>’

COO

ro

4

OC ^

ID r* r#

f<5 -

cn$

— o

O

ir> O O

aoOCi’N . iOio

°;2ir)‘0‘0 throes

Jc> -?s - -

- W

I ‘O (U

CO

oo’

CN Tt

■cf E <

00 00 00 °0^

2alvoos g

03 . _

‘55 < 2

3 -O’

>©

O 10 fo O M

• .MON

ro — 1 1-~ -cn

co th

. cn

m ~ 00

cn vo

tn

CN CO

*1’

.©ˆSpˆSˆo,

O*

l”V-

(H

<L>

Tjt *0

00 _ -s

IˆIO-tOO r|

X

o

t/J

CO

3 .

!/3 ˆ ©

3 —O’

o

co ˆ oo

Q\

-fO

. Tt< <N

rn (N

co ro

ˆ <N rf<∼

p<3’*0”ˆ ,r«o

_r2ˆ fS<ˆ ts’Z3 . o

0 th rr Tt-

10

O ■‘T O 03

ol*

>

\o£ioo£”3

10 VO

• ID

CN

G 10

aj o

CXO\

d

°;^SUoo

CN

> 00

’ -CN

vO rt

^ O CN

^ CN

CN CO

CO

co

, ˆ r, 00 •>, co

$i©x>

~co“ O

o3 X

-*-> Ov

*0

lO

‘-.(Ntˆ OO

°ˆUOON

• CO

. u-00

C/3 o o

. CO 00

ˆ CN CO

r\ in 0) in

rf k, (N*ˆ rf

CO CO VO

CN |_

“t co O

NOOh O’

cn - <u

^ Q

-*-> a .

ctf *3 <0 cO

8*1S

00

O O’ CN CO O’

• •C.‘OCO

CO 0”0 -CN

CN — <

• O’ 00

CQ 00 SO

-“O

w

CN CO

＜0

• rli: ˆ

*$a)’°S＜v

ˆ oH C＞

’ ˆ T＋(ˆ O

CN CN

00 00

(N(Nˆ

O »— < rvi TT • a) ˆ

ˆTllv0-o g-g SJ

ˆ °s > (3

sO

••si”!

•rˆ < D m

+ J.S .

3 cs < ;g

‘U -3 S

COˆOOO

80v

LO CN

CN - -CO

. CN O

CQ 00 •

^ T*H

^ CN Tf

(-> ^ ri

sO

. t*’

03 j3

CNCN3-o P’3 >

3< 0

ˆw>o

>.

E ®

o T-

o

CO 10

O CO 00 CN CN

. . in 10 Tf

co f-00 -cs

CS rl

CN SO

S.‘ON

ˆ O’

<M co

O

.Sˆ-i’CLˆcn .

H

O w -SSIOCJ.

CN

OOCN

co CO 10

00

so 00

CN O SO SO

$

o

O

o •

a ^ ^

i«2

o

10 O >0 10

Os -h 10 10 O

• CO C”. *CN

CN »h

. O’

cn-u-

. -C O’

CN CN

w

o

vo IS

LO(JTfM-3coto < Nro«^’

oEJa.

1-.

4)

O .‘S

00 43

ct. O ‘fco c

CO *g

cn

CN

g .§

|<T

Ph 00

00 O’

10 O CO 31

O’ O O co

co * -co

CN «- < »—

. O’ Tj«

Cfi O -c} <

. VC3 ˆ

W CN Tf

C O

Olrcs-Oˆ ..0

ˆ 10 10 CN ˆ

tT CN

CN CN Cˆ.

CN

CN

‘HCOvj’

CO -

■ < *

CN ^

^ O

O

.2

SS°

3 ‘-v

CQ

CN CO

stsOO

00

. 00 rf

03 sO so

ˆ <N 00

cn

CN CO

_ co — . co ˆ

O -H ˆ CO < g CA ˆ ˆ Oj ˆ P 04

00 00 o

CO CO s©

(-.

4)

oc •a

CN O pv, S

COOOTjv^ c

co - r;

co TJ

C/3

3 vo

.2 0

or, o >

’3 ,-

m

a

•r vo

iso

C/3 O’

3 *- <

< 3

vo O

o. ˆ vrso

• O ˆ SO so

CN CO * CN

O -cf

o-. -r so

ˆ CN 00

CN CO

n 10 o *r. ˆp-CNOO® ■!$« S.

©©”-<

Tt< ˆ \0

■cf CL 1-,

CN VO 0.0

O’ O’ ˆ 00

CN ‘ O

oOˆtˆio

. <D 00 vO

ro

►CN

: CN (N

CN rf

OhSjIˆPh

1/!(/,nO,OIsˆ 43CO

10

*

COO o

co co sO

o

10

CN * CTj J—

00 —1 t* 03 cfl

SO CO sO O’ > OP3

W

u

H

W

z

p

o

tb

o

</)

J

H

•<

H

W

Q

v 3 Xi

JJ33

‘E cfl

P o

oo

C

• r-*

60

C

•

1/1

o

c

CVJ

ft

S c|> :

a°l^

o

>> - c 1/5

.« >>0 .a

CJ bfi-O u

%£ t

♦- £ w fl ™ fll

- C > a >

+ J‘4223’o

b ˆ xi N N 4) l,

X h£) bp N N 43 o

g S 1

. o

3 C C C 3 32

0 3 3 3 3 3’°

OOOOOO

. o

■y’ft

x.‘ls

^ D (/)

‘ > 0 >

X > - + -»

b£)^

53 < d

. < 3 H

43 ^

bo u

cfl 4) R .H

C 3 3 o

oJ.S 5 .

n J2 O Jh

v be o

X3 X)

3 3 . rt

rt CCS 03 g

CC3g

t/3

O

<D

ˆ r4

bo S

C/5

<D

<D

rt

“d

<D

t/2

C/5

<D

P,

E

o

o

>.

w.

B.S

E rrl

|H

o

03

bfi

.s<

W. 43

ft 4>

43 bo

P 3

ti o

w _, bcX

032 03 03

3 03 03

_T CJ) b? V

5 flC°3

.2® ff+j o

*^x) ? o 3

n.S ^ ?”*

43 -x B.xsE’S

£§

• rO

• c

• a

d t_

■s s

£x

. w . c«

• n ＞’ O

‘ E O

:-xx 3

C/5

° ^ o;

^ 0＋j-

＜2 T3 3

43 43 43‘

3 3

XX

b u

rt 43

3 3

O o

bo be

ca rt

3 S

• rH ‘ v*

o ft’^3

. o

- ca® o c f’ 2 S’b

S’S 43 43 S ^ ^X

g*g EE . 43OTW

r3 03.

cx n o:

3 — 43 ‘

*t*i rt

03 ＋5 43 jj? 03 •

03 X X X n

E bo p 3 43 43 E

£g I §.£> rt

? 3

. <D

5ˆ

. 4ˆ 4-»

d d’bo

OOi/5

S 0 J> vrz ˆ

ˆ D > > O 2 O d)

• C d ri L) 2 r4 r;

.5 u C o; orr

_ o Q ˆ

’S‘0‘0‘43 x S’ 03

X £ S S 4) 4; 03

2 ft ft ft — ˆ o

43 rt ca cfl x x ˆ

.; b V, b MMc

XXXXwh 9

cˆwcJ3cnWffiP2

3

. „ „ 3

• 3 2 E

: e e I

• E E c4

• a a!

• M-l

Soo°

c3 03 03 03

C T3 X) T3

C 3 3 3

3 3 3

w O O O

W.

<D

C/5 .

E

‘•E 3

x|c

.2P 3 ˆ

<D

& >:e

ˆ-V ˆ -*X •

V d V)

ˆ1ˆ3

Eox a b®

g p, 3.S2

Vj ‘ 3 ®2 03

ft 3 * ” 3 j-«

ft o cn o 43

3 “ 3 “X

‘ — ˆ d •- < c« d

t?OC5S

Many new models of field guns were developed during the World War. All are said to have independent line of sight and capability of high elevation.

Ammunition notes: The French high explosive shell weighs 11.68 pounds; muzzle velocity, 2,050 f.s.; wagons containing it weigh about 335 lbs. jless than those loaded with shrapnel. German battery storage wagons carry six rounds of high explosive shell and the light ammunition column 103 rounds of shell or shrapnel; this is additional to the figures given.

United States batteries carry four rounds on the gun carriage which are included in the total. U stands for universal shell; description given in the text. The details of the new United States field gun have not been published. The date at the top of each column is the year in which the piece was adopted.

are of many kinds and sizes. The great ma¬

jority of the guns are of about three-inch calibre but automatic one-pounders and three-pounders

have been built, and four, five and six-inch

guns are used. The projectiles are mostly

shrapnel or time-fuse shell of special type which break up into many small fragments when they

explode. Guns on fixed mounts like those on

board ship and in the permanent defenses of

London and Paris are mostly mounted on high

pedestals. Split-trail mounts are used for field service but ordinary field guns are made avail¬

able by dropping the trail in a pit. Improve¬

ment in anti-aircraft guns and mounts (power,

range, speed of fire, sights, care of handling etc.), in projectiles, in range and speed deter¬

mination, in ˆspotting® of shrapnel bursts, and in general fire control has so greatly augumented their efficiency that bombing planes over Lon¬

don and Paris are forced to altitudes of more than 10,000 feet.

Machine Guns. — Machine guns are of many

types ; all now in use are automatic. Heavy,

water-cooled guns are preferred for service in

which weight is unobjectionable as they have a much longer life with prolonged fire. But for

guns to accompany infantry advance or retire¬

ment, light air-cooled guns are desired. Nearly Coventry Ordnance Works Machine Gun (on high angle mounting). (From the Naval Annual).

all light machine guns are operated by gas

pressure acting against a piston or lever. As

far as practicable the line of movement of the mechanism should be parallel to the axis of the bore and as near it as possible in order not to throw the gun off the target. Many of the

heavier machine-guns are operated by the re¬

coil of the breech-block and are variations of the Maxim. The latest machine gun is the

Browning, which has been adopted by the

United States army. The heavy type is water-cooled and operated by the recoil of the breech block on the Maxim principle. It weighs 34.5

pounds. Stripped of its water-jacket and ar¬

ranged for airplane duty it weighs 22.5 pounds.

Many light air-cooled machine guns are fitted

with shoulder pieces or stocks and are practi¬

cally automatic rifles. The light Browning gun

is a piece of this character. It resembles a

rifle externally and is frequently styled an

automatic rifle. It weighs 15 pounds and can

fire 350 shots at maximum speed without over¬

heating or injury. The ordinary magazine —

loaded like a clip — contains 20 cartridges

which can be fired in two and onehalf seconds.

The larger magazine holds 40 cartridges. The

mechanism is arranged with a cut-off that per¬

mits a single shot to be fired with each touch of the finger on the trigger. Machine guns have played a most important part in the present

war and automatic rifles may play a still more important one if they can be produced in suffi¬

cient quantities.

Ammunition. — The ammunition used by

heavy field and siege guns consists principally of high-explosive shell, but shrapnel, universal

shell, illuminating shell and poison gas shell are also used. Light field guns use all these but chiefly fire shrapnel and universal shell. The

latter is a combination of shrapnel and high

explosive shell. The cylindrical part of the

shell is much like a shrapnel and explodes like one. The ogival with its high explosive con¬

tents continues on and explodes on impact. Illu¬

minating shell contain a flaming composition

which may be used for lighting up a target

area. Poison gas shell are designed to dis¬

seminate gases which are deadly poisonous,

dangerous to life, or hurtful in some way. The part played by artillery in the present great

war has been a most important one. The heavy

guns have shown the futility of permanent forti¬

fications while the lighter field and machine-guns have mowed down infantry in the open

with a precision and completeness never hitherto approached. The successes obtained have been

due to airplane reconnaissance, mapping and

ˆspotting® ; to the large calibres of the heavy guns with the resulting power and range ; to

the vast numbers of guns of all sizes ; to the limitless ammunition supply; and to improve¬

ments in guns and fire-control.

Lewis Sayre Van Duzer,

Captain in the United States Navy, ex-Secretary of the United States Naval Institute.

GUNS, Naval. Naval guns of the present

day vary in calibre from 1.46 to 18 inches and are mostly 45 to 50 calibres in length. The

muzzle velocity in the great majority is about 2,800 feet per second, though many very heavy

guns have less on account of excessive erosion.

The weight of the projectile is about half the cube of the calibre expressed in inches. Thus

the cube of 12 is 1,728, and the prejectile weighs 850. pounds ; the cube of 10 to 1,000, and the projectile weighs 500 pounds. The weight

of the powder charge is from 33 to 45 per cent of that of the projectile, depending upon the character of the powder (pure nitrocellulose or part

nitroglycerin) and the designed muzzle velocity.

From 1880 to 1905 the battery of a naval ves¬

sel was composed of guns of several calibres.

But as fire-control of ship's batteries became

more closely studied the folly of such a lack of system became glaringly evident. The

present rule is two calibres — one for the main battery and one for subsidiary purposes. For

battleships and battle cruisers the most efficient primary battery is 8 to 12 guns in four turrets on the midship fore-and-aft line, the second

(from the bow) turret being high enough

to fire over the first and the third high enough to fire over the fourth. This arrange¬

ment permits half the battery to fire in

all directions from ahead to 45 degrees

abaft the beam, and the other half to fire

in all directions from astern to 45 degrees

forward of the beam, while every heavy gun

may be fired on either beam from bow to

GUNS

1 Twelve-inch Breech Loading Rifle, Coast Defense Mounting 2 Six-inch Rapid-fire, Breech Loading Rifle GUNS

Copyright by Committee on Public Information

1 Browning Machine Rifle, model of 1918, air-cooled, familiarly called the “ light Browning rifle.” This rifle weighs 15

pounds, may be fired from shoulder or hip, in bursts of 20 rounds, or by single shots; will fire 20 continuous shots in 2 1/2

seconds

2 Browning Machine Gun, model of 1918, water-cooled, familiarly called the “ Browning heavy machine gun.” This gun is fed from a belt of 250 rounds of cartridges. In the government test 39,500 shots were fired without break. The gun weighs 34 1/2 pounds, with water jacket filled GUNS, NAVAL

quarter. This is the American system and has

been so widely copied in foreign navies as to have become well-nigh universal. A corollary

to this principle would be that a vessel should carry at least eight guns of the largest size her displacement permits. This applies to light cruisers as well as battleships and battle¬

cruisers if the forward and after guns are

mounted in pairs on the centre line, otherwise six is the most efficient number — one forward, one aft, two each side.

In battleships and battlecruisers the

secondary battery is not intended for use in

action with other large vessels but as a defense against torpedo craft — destroyers and sub¬

marines. It is therefore numerous, most modern

battleships and battlecruisers carrying 18 to 24

guns of five to six-inch calibre. These have

the highest possible velocity consistent with

moderate erosive action in order to give a flat trajectory so that slight errors in range may not result in too many misses at the distance at

which torpedo-craft can easily operate. The

secondary battery of recent light cruisers is al¬

most negligible and is chiefly designed for

training purposes and exceptional use against

troops or light boats when operating near the

shore. Modern naval gunnery may be said to

have been founded by Rear-admiral (then Cap¬

tain) Sir Percy Scott of the British navy about 1900. It began with the systematic training of the gun-pointers and evolved the modern sys¬

tems of fire-control of the battery. Adequate

control of the mixed battery of guns was

found impracticable and although this was not

the sole or only strong argument for the change to a one-calibre battery it was, added to the others, decisive. Up to this time (1903-05) the 12-inch gun was regarded as indisputably the best size for the large guns of battleships. But with better fire-control and improved shooting the

battle range grew rapidly until it reached a

point at which the power of a 12-inch gun was not all that could be desired. Not only was

the energy remaining in the projectile of a 12-inch too small to pierce the thick armor of

existing battleships at great ranges but the ac¬

curacy was less than that of a larger gun be¬

cause the greater the calibre of a gun the less is the effect of air resistance on the projectile and the less the reduction in velocity and

danger space.

In view of these facts Great Britain in¬

creased the calibre of her heavy naval guns to 13.5 inches; the United States, Japan and Aus¬

tria followed with 14 inches ; two or three years later Great Britain raised it to 15 inches, the United States to 16, and now it is said that the latest British vessels carry or will carry guns of 18-inch calibre. The muzzle velocity of all these new weapons is less than that of the 50-calibre 12-inch guns, but the remaining velocity at 25,000 yards is considerably greater and the destructive effect is enormously more, for the

weight of a 16-inch shell is more than 2,000

pounds and that of an 18-inch nearlv 3,000. The new British t(Hush, Hush® battleship or battle¬

cruisers, on which the 18-inch guns are said

to be mounted, are apparently the natural out¬

come of existing conditions. They are re¬

ported as long, fast, of comparatively low free¬

board except at the bow and stern and to have little armor except on the turrets and decks.

Coventry Ordnance Works 6-inch Power-worked Mounting (Naval). With Electro-hydraulic Control. (From the Naval Annual).

The general design of heavy naval guns has

not been materially altered in more than a de¬

cade — not very greatly in three. The principal changes are due to improvements in metallurgy

and mechanical processes. The steel for the

different parts is of higher grade (increased

tensile and elastic strength) and its qualities are more uniform and dependable. Nickel-steel (averaging 3 per cent nickel, 0.4 carbon, 0.7 manganese, 0.27 silicon) is used where

practicable in those parts requiring a high

elastic strength. The net result of better ma¬

terial and improved mechanical processes is a

lighter, stronger and stiffer gun. British naval guns are wire-wound, and other nations which

buy their guns in England use weapons of this type. The wire is of ribbon form and laid on with increasing tension in each layer. In some designs the wirewrapping extends from breech

to muzzle — in others, over the rear half of the gun only. It is usually applied outside the jacket and the first layer of hoops and an outside

jacket or casing is shrunk on over it. The wire has more than double the strength of the steel in the hoops of an ordinary built-up gun and gives great transverse strength but as the gas pres¬

sure is held down by the erosive action to 16

or 17 tons per square inch, the strength of the ordinary method of construction is ample and

that type of piece is likely to prevail, as long as wire-wound guns lack longitudinal strength

and rigidity. This lack of rigidity causes the muzzle to droop and <(whip® when the gun is

fired and slightly decreases the accuracy of fire.

The normal naval gun consists of a central

tube extending from the face of the muzzle to the forward end of the screw-box. Over the

powder chamber the bore is enlarged 10 to 20

per cent. At the ends of the powder chamber

are its front and*rear slopes. Beyond the front slope is another conical surface called the shell¬

centering slope, at the front end of which the bore reaches the diameter of the bottoms of the grooves; then comes the compression slope in

which the lahd.ˆ rise to their full height In the length of a few Inches. The grooves start with*

put twist, or with very little, hut this gradually increases until, near the muzzle, it reaches a itch of one turn in a length of 25 to 30 calibres, n some guns a second. tube of the same length is shrunk over the first. Over the rear end of the tube or tubes is shrunk the jacket. This

extends to the rear beyond the tube far enough to form the screw-box and to the front to a

point at which the gas pressure has fallen well below the maximum ; the total length is about

20 calibres. In guns with a single tube a long tapered chase hoop extends from the muzzle to

the jacket, the front end of which it receives in a recess and so overlaps. Over the jacket

and part of the chase hoop are one or more

layers of short hoops, exceptional strength being required only over the powder chamber and

a few inches beyond. Guns of 12-inch calibre

and larger are usually fitted with liners to

facilitate repair when the bore is eroded be¬

yond tolerance. As the erosion in the front

part of the bore is slight and unimportant, the liner usually extends from the front slope of

the powder chamber for a distance of not more than 15 or 20 calibres. The liner is about half the thickness of the tube and is made of special steel, not readily oxidizable and with a high

elastic limit.

Breech Mechanisms. — The breech mechan¬

ism of large naval guns is of two general

types, the interrupted screw which is used by

most navies and the sliding wedge which is a

feature of Krupp guns and is used by Germany

and some lesser powers which buy their guns

from Krupp. In its early simple form the in¬

terrupted screw breech-block consisted of a

short cylinder of steel with a heavy screw—

thread cut on its outer surface. This screw

thread is cut away over each alternate sector

of 60 degrees and the thread of the screw-box in the gun, into which the plug fits, is similarly treated. This arrangement makes it

possible to insert the plug nearly to its seat in a single longitudinal movement, the lands of

the plug sliding in the grooves of the screw-box; then, with one-sixth of a turn the plug

is screwed into place. In recent types the shape of the plug has been modified, some being

slightly coned, others given a partial globular shape. In the Welin type, the threads are cut on successive segments which are increased in

diameter slightly more than the height of the

threads on the preceding one. This enables

three-fourths or more of the plug to be

threaded and requires but two narrow blanks in the screw-box. The result is a shorter, stronger plug which is more rapidly operated. The

Welin type of breech closure is used in all

United States naval guns. In Krupp guns the

jacket is extended to the rear about two calibres beyond the end of the powder chamber. In this projection a longitudinal hole is formed

through which the charge and projectile are in¬

serted. Close to the breech face of the tube a transverse slot is cut, cylindrical on the rear side, plane on the front. In this slot slides a very slightly tapered breech-block that is

drawn to one side during the loading operation and forced into place to close the breech.

To prevent the escape of the powder gas

to the rear (around the plug and through the

screw-box) several devices have, been and are

still employed — the Broadwell ring, the

cup gas check and the t)e Bange gas check. The Broadwell ring is a disc of L = shaped section,

the angle of the L being at the periphery. The base of the L rests against the face of the

breech-plug, the shank against the walls of the plug-chamber. The pressure forces the lips of

the L against the plug and chamber walls thus cutting off the passage of gas. The cup gas-check differs from the Broadwell ring only in

being permanently secured to the front face of the breech-plug. The obturator of the

De Bange gas check is a ring or annular pad

of fibre and suet covered with canvass. A

mushroom shaped piece of metal has a stalk

which passes through the obturator pad and

the axis of the plug, at the rear end of which it is held by large nuts. The pad thus lies be¬

tween the mushroom head and the front face

of the breech-plug proper and when the gases

of explosion press upon the mushroom the pad

is squeezed out against the chamber walls and

forms a perfectly tight joint against the escape of gas. The charges of large guns are ignited by electric, percussion or combination (electric and percussion) primers. These are fired in

locks secured to the rear end of the mush¬

room stem through which the vent passes. In

Krupp guns the locks are on the face of the

sliding block. The common form of primer

is a brass case about 0.25 inches in diameter and 1.5 inches long, filled with priming com¬

position. One of the principal factors in the

rapid loading of modern guns is the improve¬

ment in the mechanism for opening and closing

the breech. In all rapid fire guns the opening is effected in a second or less by the simple throw of a lever. In the interrupted screw

type the first part of the lever movement

operates a worm or toe which revolves the

breech-plug and the second part of the move¬

ment retracts it and turns it clear of the

breech. The mechanisms used in large guns of

of United States navy are the Fletcher and

Vickers-Maxim. The three-pounder and six—

pounder semi-automatic guns are fitted with the Hotchkiss vertically sliding breech block; the

three-inch, which also has semi-automatic action, has a modified Fletcher mechanism.

In United States guns of more than seven—

inch calibre the plug is operated on the Fletcher system, but instead of using a light lever the rotation and retraction are effected by turning a crank. In some recent installations, heavy

springs (compressed during recoil) are em¬

ployed to facilitate the opening and closing

movements. By the use of these springs, the .

operation of a large plug is made almost as

quick and easy as that of a seven or seven and onehalf inch — the largest of the true rapid fire guns in any navy. ‘ To prevent injury to the threads of the screw-box, all guns with a screw breech are fitted with a loading tray that covers the lands on the lower side of the screw-box

sufficiently to prevent the projectile from strik¬

ing or rubbing them during the operation of

loading. In guns of 6-inch calibre or less the loading tray is placed by hand or automatically.

In large guns it is usually hinged on one side of the breech and operated bv a lever.

The mounts: of recent heavy naval guns are

controlled by hydraulic or electric power or a combination of the two. The sleeve or slide

in which the. gun recoils is pivoted below the GUNS, NAVAL

CALIBRE OF

GUN (INCHES)

Length of gun

(calibres)

Weight of gun

(tons)

Weight of shell

(lbs.)

Muzzle velocity

of projectile

(ft. sec.)

Muzzle energy

of projectile

(ft. tons)

Austria:

14.96 .

45

79.3

1,477

2,979

91,103

14 .

45

69.0

1,212

2,979

69,976

12 .

45

53.5

992

2,625

47,400

9.45 .

45

27.1

474

2,625

22,910

7.48 .

42

12.1

198

2,625

10,025

5.9 .

50

7.1

100.3

2,887

‘ 5,760

4.72 .

40

2.1

52.4

*

*

3.94 .

50

1.9

30.4

2,952

1,840

France:

13.38 .

45

66

1,190.5

2,675

65 , 345

12.0 .

50

*66

970

2,870

55,180

10.8 .

45

35.1

562.2

2,675

27,880

9.45 .

50

30.0

485.0

2,870

27,590

7.63 .

45

15.0

189.6

3,035

14,520

6.46 .

45

8.1

114.6

2,940

6,940

5.45 .

50

*

77.2

*

*

3.94 .

55

2.2

35.3

*2,625

*

Germany:

15.0 .

45

82.5

1,675.5

*2,920

*99,000

12.0 .

50

52.2

859.8

*3,080

*56,485

11.02 .

50

40.4

661 . 4

3,080

43,725

9.45 .

40

25.2

418.9

2,765

22,215

8.26 .

45

15.2

275.6

2,940

16,410

6.7 .

40

7.5

154.3

2,785

8,275

5.9 .

45

5.0

101.4

2,920

5,990

4.13 .

40

1.7

35.2

2,755

1,860

Great Britain:

18.0 .

*40

*

*3 , 000

*2 , 300

*

15.0 .

40

85.0

1,920

2,360

74,130

13.5 .

45

76.0

1,250

2,700

63,190

12.0 .

50

66.0

850

3,000

53,400

10.0 .

45

32.5

500

2,800

27,200

9.2 .

50

28.0

380

3,000

23 , 000

7.5 .

50

16.0

200

3,000

12,500

6.0 .

50

8.7

100

3,000

6,200

4.0 .

50

2.0

31

3,000

1,930

Italy:

*1,900

15.0 .

46

97.0

2,500

*82 , 340

12.0 .

46

57.6

920

2,820

49,375

10.0 .

45

36.2

500

2,800

27,180

8.0 .

45

18.0

250

2,845

14,000

‘ 7.5 .

45

14.0

200

2,900

11,500

4.7 .

50

3.3

50

3,000

2,800

Japan:

14.0 .

45

80.2

1,400

2,615

66,385

12.0 .

50

66.7

850

3,000

53,045

10.0 .

50

38.2

500

3,000

31,200

8.0 .

45

18.5

250

2,430

10,650

6.0 .

50

8.7

100

3,000

6,240

4.7 .

50

3.3

45

3,000

2,810

United States:

16.0 .

50

*

*2 , 100

*2 . 800

*

14.0 .

45

63.4

1,400

2,600

65 , 606

12.0 .

50

56.1

870

2 , 950

52,483

8.0 .

45

18.7

260

2,750

13,360

7.0 .

45

12.7

165

2,700

8,338

6.0 .

50

8.6

105

2,800

5,707

5.0 .

51

4.6

50

3,150

3,439

4.0 .

50

2.6

33

3,000

2,058

Note. — These tables include all the high-powered guns of large calibre placed on board ship 1910-1914. Such details of later guns of the United States and allies as have been given out for publication since 1914 are added. Details of recent Austrian and German guns are derived from various sources and are regarded as approximately reliable except as regards muzzle velocity and muzzle energy, which are believed to be much over estimated. It is doubtful if either the Austrian or German navies are using muzzle velocities in excess of 2,800 f.s. An asterisk (*) indicates that the figures are unknown or approximate only.

salvo. The opening and closing of the breech

and handling of the charge and projectile are

so far assisted by quick working mechanism as

to approach automatic working and the loading

interval is cut to 20 seconds or less for guns of largest size.

Lewis Sayre Van Duzer,

Captain in the United States Navy, ex-Secretary of the United States Naval Institute.

Table of Naval Guns

Breech open. (From rear).

gun port in such a manner as to permit of

high elevation (20° to 30°) with a very small port opening. When three guns are installed

Breech closed, ready to revolve plug and lock it.

(From rear).

Breech closed and locked. (From rear).

United States Navy 5-in. Breech Mechanism.

(From Textbook on Naval Ordnance, by permission of United States Naval Institute).

in one turret, arrangemnt is made for the cen¬

tral gun to be fired a small fraction of a second later than the others if all are be fired in one W -}XL j.'.

|m m) jp'l •"

'll

ffittA/iJ/iy femr

GUNS, Strategy. See Gunnery.

GUNSAULUS, gun-sal'lus, Frank Wake—

ley, American clergyman: b. Chesterville, Ohio,

1 Jan. 1856; d. Chicago, 17 March 1921. Gradu¬

ated at Ohio Wesleyan University in 1875, he

was ordained to the Methodist ministry, but be¬

came a Congregationalist. He was pastor of

Congregational churches at Columbus, Ohio

(1879-81), Netwonville, Mass. (1881-85), and

Baltimore, Md. (1885-87). In 1887 he became

pastor of Plymouth Church, Chicago, and from

1899 of the Central Church of that city. After 1893 he was president of the Armour In¬

stitute of Technology, Chicago. He became

widely known as a preacher and lectured on

(Savonarola' and (John Hampden.' In 1908

he received the degree of D.D. from the Ohio

Wesleyan University and LL.D. from Marietta

College. He published: (Monk and Kmight)

(1891); (Phidias' (1893); Gladstone' (1898);

(The Man of Galilee) (1899) ; ˆaths to Power'

(1905) ; (Higher Ministries of Recent English

Poetry' (1907) ; (The Ministry and the

Spiritual Life' (1913) ; *etc.*

GUNSHOT WOUND. The chief causes

of wounds in modern warfare are small-arms

bullets, shrapnel balls, fragments of shell, and grenades. Rifle bullets are of a roughly conical shape, and are generally made with a lead core and a German silver or steel jacket. They

have, besides their motion of progress, a very rapid motion of rotation, due to the fact that they are fired from a rifled barrel, and a move¬

ment of oscillation, which is especially well de¬

veloped in the sharply pointed bullets used by the United States, France, Germany and Tur¬

key. The oscillatory movement is strongest

at the beginning of the course of the bullet, so that up to about 550 yards the bullet has a

quasi-explosive action, lacerating and com¬

minuting all tissues in its path. It breaks into pieces, and the jacket and core 'become

separated. Beyond 550 yards the bullet will

normally make a clean hole where it hits, and a clean, but larger hole of exit. However, if it hits a bone, it still tends to shatter and splinter it. At extreme ranges, the bullet has rather a bruising than a perforating action. A bullet which hits the ground and ricochets will probably be deformed and will almost cer¬

tainly hit side on, or even rear on. It further¬

more often sends a shower of sand and gravel

as secondary projectiles. The result is a large lacerated wound which will in all probability be infected by fragments of clothing carried in

ahead of the projectile. On the other hand a

bullet striking point on will generally cause a wound either entirely aseptic or so slightly

septic that the tissues can take care of the

germs introduced without any aid. Further¬

more, while the wound of a bullet striking point on will often be confined to the destruction of tissue in the path of the bullet, a ricochet

wound will contain a large amount of dis¬

organized tissue forming an excellent nidus for pyogenic and pathogenic infection. Shrapnel

consists of a casing containing closely packed

lead balls and a small explosive charge set off by a time fuse. The velocity of these balls is low oompared to that of a rifle bullet, and

their size is considerably greater. Accordingly

the wound which they make is less clean cut

than that of a rifle bullet, and the surrounding tissues are bruised and crushed. Infection by

clothing is also highly probable. The modern

high explosive shell is a case of steel which is completely disrupted by the explosion of the

contained charge of high explosive. The vio¬

lence of this disruption may cause severe in¬

jury or even death without any externally

visible lesion. The proximate cause of the

injury in such cases is the sudden disturbance of the pressure within the tissues, which often engenders internal hemmorrhages in the vital

organs. Wounds from shell fragments bear a

general similarity to those from deformed rifle bullets in the lacerating character of the injury and the almost invariable presence of infection.

They gain an added seriousness from the fact

that the shell fragments are often much larger than a bullet and that a large number of frag¬

ments are likely to cause wounds at the same

time. Wounds caused by. hand and rifle

grenades, trenchmortar and airplane bombs, etc., bear a general similarity to shell wounds. The infection of war wounds is of two sorts —pyogenic and pathogenic. The pyogenic bac¬

teria are those familiar in civil practice. The two chief pathogenic bacteria are Bacillus

tetani and B. perfringens. Both are anaerobic,

and their frequent occurrence in the wounds

of the Great War is due to richly manured

nature of the Flanders soil. B. tetani is

the germ of lockjaw, while B. per¬

fringens causes the socalled gas gangrene.

As has been said, it is anaerobic, and it is char¬

acterized by the extraordinary preference it

shows for dead and dying tissue. For this rea¬

son it is most frequently and virulently found in wounds where there has been extensive dis¬

organization of tissue. In these wounds it

causes gangrene, putrefaction, intense fetor, and the subcutaneous generation of an inflammable

gas. It frequently runs a frightfully rapid

course, often causing death in a day or two by its rapid progress and

by the poisons which it pours into the blood. In such cases an im¬

mediate high amputation, leaving the end of

the stump freely exposed to the air, offers the only hope. In less rapid cases, where the blood supply of the injured limb is still fairly good, more local measures offer promise. These

methods consist in the removal of diseased tis¬

sue, the free aeration of the wound, and its

subsequent irrigation with a solution of chloride of lime, or with a hypertonic or isotonic salt solution. These latter methods are also effec¬

tive against pyogenic bacteria. Tetanus is

treated by preventive doses of antitoxin. The

great injury caused to bones in war wounds

has caused especial attention to be devoted to the facilitation of their repair. The extensive comminution commonly found is likely to cause

great deformity in healing. It also renders

effective immobilization by any kind of splint

exceedingly difficult. For these reasons great

use is made of various appliances which depend on the extension of the limb by weights and

springs rather than on rigid supports. The

use of plates attached to the bones is generally discountenanced on account of the additional

injury thereby caused to the bone circulation.

Bone fragments are conserved as far as pos¬

sible as nuclei for callus formation. In cases where an irreplaceable loss of bone has occurred, grafting is frequently employed. Wounds of

the viscera are fatal in an enormously smaller Gunter — Gunther

percentage of cases nowadays than in former

times, when a perforation of the intestines was practically equivalent to a death-warrant. The

antiseptic and aseptic methods of modern sur¬

gery are very often successful. Head wounds,

which are especially frequent in trench warfare, are often much more serious than they appear

on the surface. What seems to be a mere

graze of the scalp and skull may involve the

fracture and depression of the lower table.

The blood vessels and nerves are frequently in¬

volved in gunshot wounds. The* high velocity

of modern projectiles, together with their small size, has made especially frequent the forma¬

tion of false aneurisms of various types from

wounds of arteries and veins. These are gen¬

erally treated by ligation, provided there is an adequate collateral circulation. Nerve wounds

are very slow in healing, for they only heal by the growth of new axis-cylinders into the

distal part of the cut nerve. However, surgical methods make this regeneration possible even

where a considerable part of the nerve is lost.

Electrical method is often used later. The ques¬

tion whether a projectile should be left in a wound or not depends on whether the wound is

infected, and on whether the .projectile causes pain and irritation or not. Often the removal

of a tolerated foreign body in a healed wound will waken a latent infection into renewed

activity, and cause serious results. Consult

Groves, E. W. H., (Gunshot Injuries of Bones)

(London 1915) ; Penhallow, D. P., (Military

Surgery> (London 1916) ; Stevenson, W. -F.,

(Wounds in War> (New York 1898).

GUNTER, Edmund, English mathema¬

tician: b. Hertfordshire, 1581; d. London, 10

Dec. 1626. After studying at Westminster

School and at Christ Church, Oxford, he took

the divinity degree. However, the study of

mathematics was more congenial to him, and

he gave up all thought of a career in the church in order to devote his time to that work. In , 1619, he became professor of astronomy at

Gresham College, London, where he continued

until his death. Several important inventions

bear his name : Gunter's chain, an instrument

used in surveying; Gunter's line, a logarithmic ruler, which is of great value in the practical application of logarithms ; Gunter's quadrant,

a portable instrument for ascertaining the

hour of the day, the sun's azimuth, *etc.* ; and Gunter's scale, an

instrument for solving prob¬

lems in navigation. To him also has been

attributed the discovery that the declination

of the magnetic needle is subject to variation.

Gunter's discoveries are described in (Sector,

Cross-Staff, Bow, Quadrant and Other Instru—

mentsP He published also (New Projection

of the Sphere) (1623) ; (Canon Triangulorum,

or Table of Artificial Lines and Tangents)

(1620). In 1624 his collected works were pub¬

lished.

GUNTHER, or GUNTHERUS, German

theologian and poet of the 12th century. After acting in the capacity of tutor to Prince Kon¬

rad, son of Frederick Barbarossa, he entered

the Cisterian Convent of Paris in Alsace. His

surviving works consist of the Latin epic en¬

titled ˆigurinus,* and a fragment dedicated

to Frederick Barbarossa of a Latin epic (Soli—

mariusP The former describes the deeds of

Frederick in Italy and is of great value as a description of the life of that era. Consult

Pannenborg, A., (Der Verfasser des Ligurinus)

(Gottingen 1883).

GUNTHER, Albert Charles Lewis Got—

hilf, English zoologist: b. Esslingen, 1830; d.

1914. After studying at the universities of

Tubingen, Berlin and Bonn, he received an

appointment as assistant in the zoological de¬

partment of the British Museum 1856. He be¬

came director in 1875 and remained in that

capacity until his retirement in 1895. From

1875-76 he was president of the Royal Society ; and from 1898-1901, of the Linnean Society.

He was editor and founder of the (Record of

Zoological Literature^ in 1864, and coeditor of the Annals and Magazine oi Natural History.

Among his publications are (Medizinische

Zoologie) (1858); Catalogue of the Batrachia Salientia and Fishes in the British

Museum* (10 vols., 1858-70) ; (The Gigantic

Land-Tortoises, Living and Extinct* (1877) ;

(Introduction to the Study of Fishes) (1880) ; (Fische der Siidsee) (1873-1910) ; (Reptiles and Batrachians of Central America) (1885-1902).

GUNTHER, Anton, Catholic theologian :

b. Lindenau, Bohemia, 17 Nov. 1783; d. Vienna, 24 Feb. 1863. He was educated in law, but

abandoned that profession in order to enter

the priesthood (1820). He devoted his life work to the reconciling of reason and religion, basing his conclusions on subjective reasoning. His

ideas on the subject are set forth in his (Vorschule zur spekulativen Theologie des positiven

Christentums* (1828), and in (Der letzte Sym—

boliker) (1834). To the younger students of

Catholicism, Gunther's ideas made an effective

appeal, and he gained a considerable following.

His attempts to apply the philosophic method

to the study of his religion antagonized the

scholastic element in the church, and his books were frequently and bitterly opposed, and

finally placed on the index of forbidden litera¬

ture. . His works were collected and published at Vienna in 1882. Consult the biography by

Knoodt (Vienna 1881).

GUNTHER, Archibald Clavering, Amer¬

ican novelist and dramatist : b. Liverpool, Eng¬

land, 25 Oct. 1847; d. New York, 23 Feb. 1907.

While he was quite young his parents went to

California. There he studied engineering in

the State University. For six years he worked

as a mining engineer; then for three years

(1875-78) he was a stockbroker in San Fran¬

cisco. In the meantime he had been devoting

his spare time to literature. Finally he decided to go to New York and try his luck there. But he did not find the publishers anxious to pub¬

lish his novels. (Mr. Barnes of New York)

went the rounds of practically all of them.

Finally, on its publication in 1887, it met with almost instant and unexpected success, out¬

selling all other novels of the year. This was followed in 1888 by (Mr. Potter of Texas,*

which met with similar success. From this on

Gunther kept busy turning out novel after

novel, interspersed with a play now and then ; and he succeeded in retaining his popularity

with a large class of his readers until his death.

From a literary point of view Gunther's novels are not of a very high class ; but they are rich in situation and rapid movement of plot. His

characters though inclining more to be types

than real creations, display a certain originality and freshness which are inviting. Gunther was

one of the first of American writers to sound the national note. In this he has been followed by many imitators, most of whom have im¬

proved on his English, but few of whom have

equalled him in the rapid movement of his

characters. His novels include, in addition to

those already mentioned, (That Frenchman5

(1889) ; (Miss Nobody of Nowhere) (1890) ;

(Baron Montez of Panama and Paris) (1893) ;

(Jack Curzon5 (1898) ; (Adrienne de Portalis)

(1900); (A Manufacturer's Daughter5 (1901);

Ply Japanese Prince5 (1904) ; (Madame Tour—

aine5 (1905) ; (A Prince in the Garret5 (1905) ; (Dr. Burton5 (1906). Among his dramas are

(Courage5 ; Prince Karl5 ; (The Deacon's

Daughter5 ; (Mr. Barnes of New York5 and

(Mr. Potter of Texas.5 Of his dramas, the

two last mentioned and (Prince Karl5 were the most successful.

GUNTHER, Johann Christian, German

poet : b. Striegau, Lower Silesia, 8 April 1695 ; d. Jena, 15 March 1723. Pie was intended for

the profession of physician by his father, but proved unadapted to that study and abandoned

it for literature. His poem on the Peace of

Passarowitz (1718) brought him into promi¬

nence and he was recommended by Mencke to

Frederick of Saxony (Augustus II, king of

Poland). But his dissolute habits failed to gain him the patronage of that monarch and he

wasted away the few remaining years of his

life in dissipation. His works are characterized by a flowing lyric quality, unconventionality,

cleverness and sparkling wd, sometimes dimmed

by bad taste and vulgar joking. His collected

poems appeared at Breslau in four volumes

(1723-35). They are also preserved in Tittman,

(Deutsche Dichter des 17ten Jahrhunderts5

(Leipzig 1874) and by Fulda in Kfirschner's

Peutsche Nationalliteratur5 (Vol. XXXVIII,

1883). Consult Kalbeck, M., (Neue Beitrage

zur Biographie des Dichters C. Gunther 5 (Bres¬

lau 1879) ; Litzmann, (Zur Textkritik und Bio¬

graphie Johann Christian Gunther 5 (Frankfort

1880).

GUNTHER, Johann Heinrich Friedrich,

German veterinary surgeon: b. Kelbra, 1794;

d. Hanover, 1858. He received his education at Jena and Berlin, and specialized in the study

of contractures. In 1847 he became director

of the veterinary college at Hanover, which

office he held until his death. Together with

his son he made important studies in the dental diseases of animals, which were published under the title of (t)ber gesunde und kranke Zahne

des Pferdes,5 an appendix to (Die Beurteil—

ungeslehre des Pferdes5 (1859). He also wrote

some important treatises on pulmonary diseases

of animals. Among his other works may be

mentioned Pehrbrech der praktischen Veteri—

nargebrurtshilfe5 (1830) ; (Das Gangwerk der

Pferde5 (1845) ; Pupinenbau5 (1857).

GUNTHER, Karl Wilhelm Adalbert, Ger¬

man veterinary doctor, son of the preceding:

b. Hanover, 1822; d. there, 1896. After study¬

ing at Berlin he taught in the veterinary school at Hanover and succeeded his father as di¬

rector in 1870. Besides the work which he

undertook with h;s father, Gunther published

(Topographische Myologie des Pferdes5 (1866);

Pie Wutkrankheit der Hunde5 (1880) ; (Das

Kapaunen rote Hahne5 (1890) ; (Studien fiber

das Kehlkopfpfeifen der Pferde5 (1894).

GtJNTHER, gfin'ter, Siegmund, German

geographer and mathematician: b. Nuremberg,

6 Feb. 1848. Educated at several German uni¬

versities he became professor of geography and

later prorector in the School of Technology at Munich in 1886. He has made valuable con¬

tributions to the history of mathematics and to the history of geography. Among his many

valuable professional works may be named

Pehrbuch der Determinatentheorie5 (1875) ;

(Untersuchungen zur Geschichte der mathematischen Wissenschaften5 (1876) ; Per Einfluss der Himmelskorper auf Witterungsver—

haltnisse5 (1876; 2d ed., 1884) ; (Grundlehren

der mathematischen Geographic und Astrono—

mie5 (1878; 3d ed., 1893) ; (Die Lehre von den gewbhnlichen und verallgmeierten Hyperbel-funktionen5 (1881) ; (Parabolische Logarithmen

und para'bolische Trigonometric5 (1882) ;

(Lehrbuch der Geophysik und physikalischen

Geographic5 (1884-85) ; Pie Meteorologie

ihrem neuesten Standpunkt gemass dargestellt5

(1889) ; Pehrbuch der physikalischen Geog¬

raphic5 (1891) ;• (Das geschichtliche Element

beim Mathematischen Unterricht5 (1893).

GUNTHER VON ANDERNACH, an'-

der-natt, German physician : b. Andernach,

Prussia, 1487; d. 1574. After studying at

Utrecht and Marburg he became professor of

Greek at Louvain. Soon after he entered the

University of Paris and pursued the study of

medicine. Upon completing this course, he was

appointed physician to Francis I. Religious per¬

secution forced him to seek refuge .at Strassburg where he established a large practice and won considerable recognition. He is the author

of a treatise on anatomy in Latin entitled

(Anatomicarum Institutionum Libri Quattour5

(1536).

GUNTON, George, American economist: b.

England, 8 Sept. 1847; d. 11 Sept. 1919. He

came to the United States in 1874 and until 1880

was a writer on economic subjects. He then

turned his attention to sociological and eco¬

nomic work, and in 1890 became president of

the Institute of Social Economics and editor of the Social Economist, which in 1896 became

Gunton's Magazine. In 1899 he became inter¬

national examiner and director of the economic

and sociological work of the Young Men's

Christian Association of North America. His

publications include (Wealth and Progress5

(1887); Principles of Social Economics5

(1891) ; (Trusts and the Public5 (1899) ; Out¬

lines of Political Science5 (1900) ; Outlines of Social Economics5 (1900), and several mono¬

graphs on economic subjects.

GUNTOWN, Battle of. After General

Forrest's capture of Fort Pillow, 12 April 1864, General Sturgis was ordered to march from

Memphis to intercept him, but before the expe¬

dition got fairly under way it was ascertained that Forrest had fallen back to northern Mis¬

sissippi. On 1 June Sturgis started from

White's Station, near Memphis, with about

5.500 infantry and artillery, under Colonel McM-llan, and 3,400 cavalry, under General Grier¬

son, to defeat Forrest and prevent his inter¬

ference with Sherman's advance on Atlanta.

Mov.rig southward, Sturgis reached Ripley, 80

miles from Memphis, on the 8th and on the 10th struck the Mobile and Ohio Railroad near Gun-town, Miss., where Grierson, in advance with

the cavalry, met Forrest's cavalry near Brice's Crossroads and became immediately engaged.

Sturgis, who was six miles in rear with the

infantry, moved on the double-quick, followed

by a train of 250 wagons and, coming to where Grierson was engaged, without giving his ex¬

hausted men a moment's rest and badjy hand¬

ling them threw them into the fight. In three hours' time Forrest routed him, drove him

from the field in confusion, captured prisoners, guns and wagons, and closely pursued him to

near Ripley. There, early on the morning of

the 11th, his rear guard, taking advantage of a small stream, after a sharp fight checked For¬

rest, and Sturgis continued his retreat to Mem¬

phis, having lost 23 officers and 594 men killed and wounded, L623 prisoners, 14 guns and his

entire train of 250 wagons, with 10 days' rations and a large supply of ammunition. Forrest's

engaging force did not exceed 4,000 men; his

loss was 492 killed and wounded. Consult

(Official Records > (Vol. XXXIX).

GURA, goo'ra, Eugen, German operatic

star: b. Pressern, 1842; d. Bavaria, 26 Aug.

1906. He studied painting at Vienna and

Munich, but later devoted himself to music,

studying at the conservatory at Munich. He

starred principally in Wagnerian opera and

later on the concert stage. Gura sang at Bres¬

lau, Leipzig, Hamburg and London, and was

a member of the Munich Opera from 1883 until

his retirement in 1902. In 1906 his autobigraphy appeared at Leipzig under the title (Erinner-ungen aus meinem Leben.)

GURJUN (ger'jun) BALSAM, or WOOD

OIL, the juice or liquid of the Dipterccece

which grows in the Andaman Islands. It re¬

sembles copaiba balsam, and has at various

times been sold as such. Its chief use in the East is as a varnish for boats and for prevent¬

ing the attacks of ants on timber. It was used for the checking and alleviating of leprosy by the late Father Damien among the lepers of

Molokai, in Hawaii.

GURKHAS, goor'kaz. See Ghurkas.

GURKO, goor'ko, Ossip Vladimirovitch,

Russian soldier: b. 15 Nov. 1828; d. 28 Jan. 1901. He took part as captain in the Crimean War and as lieutenant-general commanded the Russian advance-corps which at the beginning of the war with Turkey crossed the Danube and seized Tirnova (July 1877). In the same year he captured Gorny Dubnik and Telish, and on 15-17 Jan. 1878 defeated Suleiman Pasha at Philippopolis. He was governor-general of Saint Petersburg in 1879-80, of Poland in 1883-94, and in 1894 was retired with field-mar¬ shal's rank. He was among the foremost Rus¬ sian generals of recent times.

GURLITT, goor'lit, Cornelius, German composer: b. Altona, 1820; d. 1901. After studying composition with Reinecke (the elder), and later with Weyse at Copenhagen, he became in 1864, organist of the Hauptkirche in his native city. He served as musical direc¬ tor of the army during the Schleswig-Holstein campaign and was appointed royal director of

music in 1874. Gurlitt's ■ compositions for the pianoforte are the best known of his works,

which include also pieces for the violin, 'cello, vocal duets, string quartets and several operas and operettas.

GURLT, goorlt, Ernest Friedrich, German

veterinary doctor: b. Drenktau, 1794; d. 1882.

He was educated at Breslau ; became instructor

at Berlin in the Department of Veterinary

Surgery (1826-70), and director of the techni¬

cal department there (1862-82). His principal

research concerned the anatomy and deformi¬

ties of domestic animals. Among his publica¬

tions are (Handbuch der vergleichenden Anatomie der Haussaugetiere) (1821; 7th ed. 1890) ; (Lehrbuch der pathologischen Anatomie der

Haussaugetiere) (1831-32, and again 1849) ;

and ˆAnatomy of the Horse) (Eng. trans. by

J. Willimott, 1833).

GURLT, Ernst Julius, German physician :

b. Berlin, 1825 ; d. 1899. He studied at Berlin and became professor there in 1862. His pub¬

lications include works on medical statistics

and on surgery. Among them are (Handbuch

der Lehre von den Knochenbriichen (2 vols.,

1862-64) ; (Leitfaden fur Operationsiibungen

am Kadaver) (1862) ; (Zur Geschichte der

internationalen und freiwilligen Krankenpflege

im Kreig) (1873) ; (Die Geenkresektionen

Nach Schussverletzungen) (1879) ; (Geschichte

der Chirurgie und ihre Ausiibung) (3 vols.,

.1898). He was also editor of Kriegerheil,

the journal of the German Red Cross Associa¬

tion (1867-98), and (Biographische Lexikon

der hervorragenden Aertze aller zeiten und

Volker) (6 vols., 1884—88).

GURNARDS, ger'nardz, a family of teleost

fishes (Triglidce) occurring in all warmer seas, resembling somewhat the sculpins in the rough

spiny bones of the skull, but differing in having the body regularly scaled or covered with bony plates. The fantastic sea-robins (Prionotus)

are common representatives on our coasts.

Closely allied are the flying-gurnards (family

C e plialacanthidce) of the warmer seas, in which the pectoral fins are very long, enabling the

fish to flutter a short distance in the air.

GURNER, Ross Sterling, American ar¬

tist: b. Westport, N. Y., 29 June 1847; d.

Nassau, Bahamas, 12 Feb. 1915. He was edu¬ cated at Dickenson Seminary, Williamsport, Pa. He was one of the head draughtsmen in the United States Patent Office 1874-76, when he resigned* and went to Europe to study painting in Munich, Venice, Florence and Rome, and upon his return, settled in Boston. He was instructor in water colors at the Mas¬ sachusetts Institute of Technology for 30 years, and at the Boston Normal Art School for five years. He was one of the directors of the Boston Public School Art League in 1898, and was the originator of the movement for school room decoration. He wrote (On the Use of Water Colors) (1886); (Art for the Eye School Room Decoration) (1898). He was a member of the board of aldermen of Salem in 1894. He was at one time on the board of government of the Boston Art Club, and of the Boston Art Students Association. Some of Mr. Gurner's notable works were (A Small Court, Mexico); (E1 Tardin Modesto); <A Painted Ship); (The Flying Dutchman);

(A Bermuda Wedding0 ; (The Golden Galleon' ;

(The Rover) ; (Le Soliel Royal' ; (The Three

Decker' ; he was awarded the silver medal for water colors, Pan-American Exposition, Buf¬

falo, 1901; and Evans prize A. W. C. S. 1908; First prize, Water Color Society, New York,

1898. First silver medal, Mechanics Fair, Bos¬

ton, 1890.

GURNEY, Edmund, English philosopher:

b. Hersham, 1847 ; d. Brighton, 1888. He was

graduated at Trinity College, Cambridge, with

high honors and studied music for many years.

On this subject he wrote the (Power of

Sound' (1880). Later he studied medicine at

Cambridge, but never practised. The subject

of psychial experience had long interested him

and he now began his researches in that field.

To this vague topic of the supernormal he ap¬

plied the exact methods of science and suc¬

ceeded in arousing enough interest in the study to establish the Society for Psychical Research.

Gurney's experiments in hypnotism and telep¬ athy were published in the Proceedings of that organization. In spite of all misinter¬ pretations of his theories, his work at least served to indicate that the subject of the psychical was worthy of rational analysis.. He published also (Tertium Quid' (2 vols., 1&87), a collection of essays.

GURNEY, ger'ni, Sir Goldsworthy, Eng¬ lish inventor: b. Cornwall, England, 1793; d. 1875. He built a steam carriage in 1827, and was the first to devise and use the high-' pressure steam-jet in locomotion. He invented the oxyhydrogen blowpipe, and the Drummond light.

GURNEY, Joseph John, English Quaker philanthropist: b. Earlham Hall, near Norwich, England, 2 Aug. 1788; d. there, 4 Jan. 1847. He was a banker in Norwich and in 1818 be¬ came a preacher in the Society of Friends, and the same year accompanied his sister, Mrs.

Elizabeth Fry (q.v.), on her tour to Scotland, having warmly taken up the benevolent cause

to which she had devoted herself — the ameli¬

oration of the condition of prisoners. In 1827

the two made a journey to Ireland with the

same object, and in 1837 Gurney visited the

United States and Canada, where he was ab¬

sent for nearly three years. He went with

Mrs. Fry in 1841 to Holland, Belgium and Ger¬

many, and in 1842-44 visited France and Swit¬

zerland. The object of these journeys was to

reform prison management, and effect the abo¬

lition of slavery in the French ˆcolonies, for which purpose he had interviews with Louis

Philippe and M. Guizot. He was the author of

(Notes on Prisons and Prison Discipline'

(1819); Observations on the Religious Pecu¬

liarities of the Society of Friends' (1824) ;

(Essays on the Evidences, Doctrines and Prac¬

tical Operation of Christianity' (1827) ; ˆVin¬

ter in the West Indies Described in Familiar

Letters to Henry Clay of Kentucky' (1840).

GUROWSKI, goo-rof'ske, Adam de,

Count, a Polish scholar and author: b. Kalisz, 10 Sept. 1805 ; d. Washington, D. C., 4 May

1866. In early life he was a leading Polish

patriot, and an instigator of the revolution of 1830. Later he became an advocate of Pan¬

slavism and was employed in Russia. In 1841

he left the latter country and in 1849 came to the United States, and from 1861 to 1863 was a translator in the State Department at Wash¬

ington. Among his works, several of which

were written in French and German, are

Civilization and Russia' (1840) ; (Panslav—

ism' (1848) ; (Russia as It Is' (1854) ; (The Turkish Question' (1854); (America and

Europe' (1857); (My Diary: Notes on the

Civil War' (1862-66).

GURU, goo'roo, among the Hindus, a spir¬

itual preceptor, to whom is entrusted the reli¬

gious training of youths and the performance

of religious rites for those boys who have not attained the age requisite for participation in these ceremonies. In some instances the guru

has also temporal authority, as among the

Sikhs.

GURWOOD, John, British soldier: b. 1790;

d. 1845. He served in Wellington's army, was

wounded at Cuidad Rodrigo (1812), and later

became brigade-major of the Guards' cavalry.

He was wounded again at Waterloo and later

was raised to the rank of lieutenant-colonel,

and was brevetted colonel in 1841. As private

secretary to the Duke of Wellington he was

commissioned to the task of collecting the

<(Wellington Despatches," which are most val¬

uable in the study of the history of the period.

For this work he received an annuity of i2 00

from the government.

GUSMAO, goos'ma-5, Bartholemeu Lourengo de, aeronaut : b. Santos, Brazil, 1685 ; d.

Toledo, 19 Nov. 1724. He studied theology at

the University of Coimbra in Portugal. He

had a passion for the physical sciences, and in 1708 began the construction of an aeronautical

device. On 8 Aug. 1709 he launched it from

the tower of the Casa da India at Lisbon, in the presence of the king, John V. We have no detailed information either as to the nature of the mechanism employed, which was said to

involve, beside the action of the wind, electric and magnetic forces, nor as to the results of the experiment. As a prize for his invention,

he was raised to the rank of canon, and re¬

ceived a benefice of 600,000 reis. He then de¬

voted himself to shipbuilding and historical re¬

search. In 1724 he left Portugal because he had been suspected of sorcery. Besides several ser¬

mons he published (Varios Modos de esgotar

sem gente as naus que fazem agua' (Lisbon

1710).

GUSSENBAUER, gu'sen-bow'er, Karl,

Austrian surgeon: b. Carinthia, 1842; d. 1903.

After studying at Vienna, he occupied the chair of Surgery at Liege (1875) ; three years later he was appointed to a similar post at Prague

and in 1894 at Vienna. His researches were

principally in the surgery of the larynx, partial resection of the intestines and artificial bone severance. The invention of the first service¬

able artificial larynx is due to his work. He wrote several treatises on surgery, including

(Die traumatischen Verletzungen' (1880) ;

(Sephthamie, Pyohamie, und Pyo-Sephthamie'

(1882) ; (Beitrag zur Extirpation von Becken—

knochengeschwiilsten' (1891).

GUSSFELDT, Paul, powl giis'felt, German

'explorer: b. Berlin, 14 Oct. 1840. He studied science and mathematics between 1859 and 1865

in Berlin, Heidelberg, Giessen and Bonn. The

'German African Company sent him out on an

expedition in 1872 to explore the Loango coast.

He was shipwrecked near Freetown, Liberia,

(14 Jan. 1873), and landed at the mouth of the Kongo. He established a coast station but

owing to the loss of equipment was unable to

proceed into the interior and returned to Ger¬

many in 1875. He has given an account of

this expedition in the work (The Loango Ex¬

pedition } (1879), which he wrote in collabora¬

tion with his fellow travelers Falkenstein and

Pechuel-Loesche. In 1876 he explored the

Arabian Desert, and in September 1882 he vis¬

ited South America. Among the Andes he

discovered a vast area of glaciers, in Ion. 34°

30' S. He climbed the highest peak of the

volcanic range of the Andes (21 Feb. 1882)

and reached the edge of the crater of Maipo,

and during April and May of the same year

explored the lofty plateaus of Bolivia. He

was appointed professor of physical geography

in the seminary for Oriental languages in Ber¬

lin. He has1 published (In den Hochalpen)

(1893) ; (Reise in den Anden von Chile und

Argentinien) (1887) ; (Der Mont Blanc)

(1894) ; (Kaiser Wilhelm's II Reisen nach

Norwegen in den Jahren 1889-9 2> (2d ed.,

1892).

GUSTAFSON, Gabriel Adolf, Swedish

archaeologist: b. Visby, 1853; d. 1915. After

studying at the university at Upsala, he became connected with the Antiquarian Museum there.

In 1900, .he succeeded to the chair of archaeologv at the University of Christiania, and in the same year was appointed director of the Archaeologi¬

cal Museum there. His researches in Viking

remains, are his most important work. His

restoration of the Viking ship discovered at

Oseberg is especially noteworthy. Gustafson

was elected a member of the Royal Academy

in 1903, and published in 1906 (Norges Oldtid/

which is a valuable source for the studv of the archaeology of Scandinavia.

GUSTAVUS (gus-ta'vus) I (commonly

called Gustavus Vasa), king of Sweden: b.

Lindholmen, 12 May 1496; d. Stockholm, 29

Sept. 1560. He studied at the University of

Upsala, and entered the-service of Sten Sture the younger, administrator of the kingdom, in

1514. Sweden had, by the union of Calmar,

become subject with Norway to the crown of

Denmark. The country was at this time di¬

vided into two parties. There was a Danish

party headed by the Archbishop of Upsala, and

a Swedish party, which upheld the independence

of the country, headed by the administrator

whom it had raised to power. Gustavus fought

with distinction under Sture against the Danes

in 1517 and 1518. He was one of six hostages sent by Sture as guarantee of the safety of

King Christian II,. but effected his escape and reached Liibeck in 1519. After wandering

about for some time as a proscribed fugitive he took refuge in the mines of Dalecarlia, where

he worked as a common laborer. After vari¬

ous adventures he attempted open resistance.

Christian II was crowned at Stockholm on 4

Nov. 1520. On the 8th the leaders of the

Swedish party, among whom was Gustavus'

father, who had been invited to the coronation, were executed. By the beginning of 1521 Gusta¬

vus had raised a considerable force, driven the Danes from several positions, and excited a

general insurrection in Dalecarlia. In April he defeated the Danes at Westeraas; in July he

seized Upsala, and in August was named ad—

vot. U““37

ministrator of the kingdom by the states which had assembled at Wadstena. On 6 June 1523

he was elected king by the Diet of Strengnas.

In 1527 he obtained the exclusion of the bishops from the senate and effected their subjection to the civil power. He now openly professed

Lutheranism, and was crowned by the Protes¬

tant archbishop of Upsala on 12 Jan. 1528. The Lutheran religion was formally established at

a diet held at Orebro in 1529. In 1544 the

states assembled at Westeraas declared the

kingdom hereditary in his house. A war broke

out with Russia in 1555, which was concluded

by the Peace of Moscow, 2 April 1557. Con¬

sult Alberg, /Gustavus Vasa and His Times)

(1882) ; Watson, (The Swedish Revolution

under Gustavus Vasa) (1889).

GUSTAVUS II (Gustavus Adolphus),

king of Sweden, grandson of Gustavus Vasa:

b. Stockholm, 9 Dec. 1594; d. Liitzen, Saxony, 16 Nov. 1632. He was trained to war under

experienced generals, and at 16 took his place in the state council.

Charles IX, the father of Gustavus, had been declared king to the ex¬ clusion of his nephew Sigismund, who, on ac¬ cepting the crown of Poland during his father's lifetime, had abjured the Protestant religion.

On the death of Charles, Gustavus succeeded him, with the consent of the states, as king— elect. Sweden was at this time at war with Denmark, and Gustavus was in command of the army. He chose for his chancellor and first councillor Axel Oxenstiern, a man 10 years his senior, and already eminent for his ability, who eventually proved himself to be one of the greatest of European statesmen. The war with Denmark was concluded through the mediation of England in 1613. A new enterprise at this time presented itself to the ambition of Gus¬ tavus — the throne of Russia was vacant and contested. A party favordd the election of Charles Philip, the brother of Gustavus, and was supported by a Swedish invasion under General de la Gartie, who had penetrated to Novgorod; while the Poles, who had also in¬ vaded Russia, had reached Moscow. Michael Romanoff was, however, elected czar. Gustavus took a personal share in the Russian war, which continued for about four years after

this election, and had made considerable con¬

quests in Livonia and the neighboring provinces when peace was concluded at Stolbova in 1617.

In 1620 he married Eleanora, sister of the

elector of Brandenburg. The war with Russia

was followed by war with Poland, which lasted

nine years, and was concluded on advantageous

terms for Gustavus by a six-years' truce in

September 1629. He had made important con¬

quests, which he was allowed to retain, in East Prussia.

His attention was now diverted from north¬

ern wars by the affairs of Germany. The op¬

pression of the Protestants by Ferdinand II

excited his sympathy. He was alarmed by the

progress of Wallenstein, which threatened to

extend the empire to the Baltic, and by leagu¬

ing himself with the Protestants of Germany he might hope for easier and more extensive con¬

quests than by struggling single-handed against

the northern powers.. He named his daughter

Christina heiress to the throne, embarked for

Germany in May 1630, and landed with an army

of 13,000 men in the island of Usedom on the coast of Pomerania. After repeatedly defeat-578

ing the imperial generals and conquering a

great part of German)-, he was killed in the bat¬

tle of Liilzen. Gustavus differed from some

other great commanders in preferring a small

well-ordered army to a large one, asserting that all over 40,000 men were an encumbrance. His

character made him beloved by his soldiers, and he was served with a devotion which enabled

him to effect great things with small means.

The effects of the discipline he imparted to the Swedish army, and the prestige of success de¬

rived from his victories, were felt long

after his death. His body was taken to Sweden.

Consult Wives* by Dodge (1896) ; Droyson

(1879); Fletcher (1891); Noel (4905); John¬

ston, C. H. L., (Famous • Cavalry Leaders1*

(1908) ; and Cambridge Modern History (Vol.

IV, 1907). See Thirty Years' War.

GUSTAVUS III, king of Sweden: b.

Stockholm, 24 Jan. 1746; d. there, 29 March

1792. He was the eldest son of Adolphus

Frederick, Duke of Holstein, who had been

called to the Swedish Crown in 1743, and

succeeded his father on 12 Feb. 1771. He found the country divided between two aristocratic

factions, the adherents of France and Russia,

known respectively as the Hats and Caps. He

resolved to give the country a new constitution and to increase the power of the Crown. He

instituted a new military order of Vasa in order to gain the goodwill of the officers, and ef¬

fected his_ purpose by means of a sham revolt, which enabled him to assemble troops, where¬

with he surrounded the assembly of the states-general and forced them to accept his constitu¬

tion, which, as it only circumscribed the privi¬

leges of the nobility, was generally popular.

In 1788, when war had broken out with Russia, the nobles revenged themselves by inducing the

states-general to refuse him supplies. The

fidelity of the Dalecarlians enabled him to re¬

pulse the enemy. To free himself from the

hostility of the nobles he determined on another coup d'etat, which he executed on 3 April 1789, by causing the leaders of the opposition to be arrested and then passing a law extending the

royal prerogative. Lie concluded peace with

Russia by the Treaty of Varela in August 1790.

The Swedes were opposed to an alliance with

Russia, and a diet which Gustavus assembled

at Gefle for the purpose of procuring supplies, though surrounded with troops, proved so re¬

fractory that he was obliged to dismiss it. The nobles long before this had formed a conspiracy against him and resolved on his death. Three

of them took an oath to murder him, and drew lots which should carry out their intention.

The lot fell on Captain Ankarstrom, who shot

the king in the back at a masquerade given at the opera house at Stockholm, 16 March 1792.

Gustavus was distinguished as an author. Con¬

sult Bain, (Gustavus III and his Contempo¬

raries * (1895).

GUSTAVUS IV (Adolphus), king of

Sweden: b. 1 Nov. 1778; d. Saint Gall, Switzer¬

land, 7 Feb. 1837. He succeeded on the death

of his father, Gustavus III, and on assuming

power showed that he had inherited his father's hatred of the principles of the French Revolu¬

tion, which he carried to the extent of fanati¬

cism. In 1803 he made a journey to Germany

to promote a union of the German princes

against Napoleon. He was at Karlsruhe when

the Duke D'Enghien was seized, and sent his

aide-de-camp to Paris to protest against that

act of violence. After the Peace of Tilsit he exposed himself to a war with Russia while he was at war with France, by refusing to join the continental blockade and opening his ports to

England; and in 1808 he quarreled with Eng¬

land, his only ally. His internal policy was as bad as his external. His subjects were op¬

pressed with taxes to support his wars, and

had in return the humiliation of finding Pomer¬

ania in the possession of France, and Finland in that of Russia. A conspiracy was formed

against him ; he was deposed, and the Diet by a decree of 10 May 1809 declared his family

forever incapable of succeeding to the crown:

of Sweden. His uncle, the Duke of Suder-:

mania, was proclaimed king under the title

of Charles XIII, and in the following year

adopted as his successor, Bernadotte, prince of Pontecorvo. Gustavus died in poverty. He

took the title of Colonel Gustafson, and has

left, among other writings, (Memoirs of Colonel Gustafson* (1823). Consult Kleinschmidt,

(Die Irrfahrten Gustavus IV Adolf von

Schweden) (1888) ; Elkan, (An Exiled King:

Gustaf Adolph IV of Sweden* (Eng. trans.,

1913).

GUSTAVUS (Gustav) V, king of Sweden:

b. Dottningholm, 16 June 1858. He is the son

of King Oscar II and Queen Sophia . Wilhel—

mina. After studying at Upsala, he made a—

tour of Europe, and on his return, joined the army (1875). In 1892 he became lieutenant-general. In 1881 he married Victoria, daugh¬

ter of Friedrich Wilhelm, Grand Duke of

Baden, and Princess Louise of Prussia — Gus¬

tavus succeeded to the throne of Sweden on 8

Dec. 1907. Five sons were born to Gustav;

the Crown Prince, Gustav Adolph (11 Nov.

1882) was married to Princess Margaret

Victoria, daughter of Prince Arthur, Duke of

Connaught, in 1905. For an account of the

reign of Gustavus V and his policies see

Sweden, History.

GUSTROW, giLstro1, Germany, a town in

the grand duchy of Mecklenburg-Schwerin on

the Nebel River, 20 miles south of Rostock on the railroad route from Liibeck to Stettin.

There is an old castle dating from the 16th

century; a paiish church of the same era, con¬

taining some fine altarpieces by Flemish

painters ; a 16th century town hall ; a cathedral of the 13th century, with a large square tower.

The gymnasium was established also in the 16th century. The music hall and theatre are

modern buildings. The principal industries

are the manufacture of machines, iron found¬

ing, the production of saws, bricks, beer, soap, sugar, mattresses and dyes. Trade is carried

on in wool, butter, cheese, cattle and grain. A fair is held annually. Giistrow was founded

in the 12th century, and, as the capital of the Wend district, was the seat of the princes of Wend. In the 16th and 17th century, the

dukes of Mecklenburg-Gustrow had their

residence there. Pop. 17,805.

GUTCHKOFF, gootdh'kov, Alexander

Ivanovitch, Russian politician : b. Moscow,

1862. He was educated in Moscow and abroad,'

became a justice of the peace at 27 and in 1891

took an active part in combating the great

famine in the government of Nizhni Novgorod.

He next made a journey through Asia Minor

and Manchuria. In the South African War of

1899 he joined the Boer army and was wounded

in action. Returning to Russia he was elected

a city councillor for Moscow and appointed a

bank director. For a time he fought with the

Macedonian revolutionaries against the Turks,

and in the Russo-Japanese War acted as di¬

rector of the Russian Red Cross organization.

Captured by the Japanese at the battle of

Mukden, he was soon released in an exchange

of prisoners. As a member of the Duma,

Gutchkoff was one of the chief founders of

the Octobrist Party in 1905 and violently de¬

nounced the incompetence of the various grand

dukes who held high positions merely on ac¬

count of their relationship to the Imperial

family. In the 1907 elections 153 Octobrists

were returned to the Duma and Gutchkoff, their leader, became the real master of the Assembly.

See Russia — History; Revolution.

GUTENBERG, goo'tenberg, Johannes or

Henne, German inventor of printing with

movable types : b. Mainz, about 1400 ; d. there, 23

Feb. 1468. Little or nothing is known of his

early life. In 1434 he was living in Strassburg and in 1436 entered into a contract with one

Andreas Dryzehn or Dritzehn and others, bind¬

ing himself to teach them all his secret and

wonderful arts, and to employ them for their

common advantage. The death of Dryzehn,

which happened about the end of 1438, broke

off the undertaking of the company. About

1448 he returned to Mainz and soon formed a

copartnership with Johann Fust or Faust, a

rich goldsmith who furnished money to estab¬

lish a press, in which the Latin Bible was first printed. This, the Mazarin Bible, begun about

1450 and finished about 1455, is the first book known to have been printed with movable

types. After some years this connection was

dissolved. Fust had made large advances,

which Gutenberg was now called upon to repay;

and as he either could not or would not do it, the subject was carried before the tribunals.

The result was that Fust retained the press,

which he improved, and continued to use in

company with Peter Schoffer of Gernsheim.

By the patronage of a counsellor of Mainz,

Conrad Hummer, Gutenberg was again enabled

to establish a press the following year, from

which there issued the fine <Catholicon) of

1460, and also the (Lctters of Indulgence) of

1454 and 1455. Gutenberg's name does not ap¬

pear in any production of his press, nor do

his friends and patrons mention him in con¬

nection with the invention of printing. Consult Van der Linde, <Gutenberg) (1878), and (Geschichte der Erfindung der BuchdruckerkunsD

(1886) ; Hessel, (Gutenberg: Was He the In¬

ventor of Printing?) (1882) ; <Haarlem the

Birthplace of Printing not Menlz) (1887);

Gordon Duff, (Early Printed Books > (1893).

GUTHE, goo'te, Karl Eugen, American

scientist: b. Hanover, Germany, 5 March 1866;

d. 10 Sept. 1915. After studying at Strassburg, Berlin and Marburg, he emigrated to the

United States in 1892. He instructed in physics at the University of Michigan and then re¬

moved to Iowa State College. In 1909 he be¬

came professor of physics at M chigan and dean of the graduate department in 1912. His pub¬

lications include * Manual of Physical Measure¬

ments } (1902); laboratory Exercises with

Primary and Storage Cells) (1903); (Textbook

of Physics) (1908); 'College Physics) (1911,

with J. O. Reed), and definitions in Physics)

(1913).

GUTHRIE, guth'ri, George Wilkins,

American ambassador: b. Pittsburgh, Pa., 5

Sept. 1848; d. Tokio, Japan, 8 March 1917.

After studying at the Western University of

Pennsylvania and at George Washington Uni¬

versity he practised law at Pittsburgh. From

1906-09 he was mayor of that city and in

1913 was appointed Ambassador Extraordi¬

nary and Plenipotentiary to Japan by Presi¬

dent Wilson, in which capacity he served until his death. Guthrie was awarded honorary de¬

grees by the University of Pittsburgh and

Trinity College.

GUTHRIE, James, American lawyer: b.

near Bardstown, Ky., 1792; d. 1869. After

studying at the Bardstown Academy, he secured

a position with a trading firm operating on the Mississippi. Later he studied law and practised in his native city. In 1820 he moved to Louis¬

ville, where he had been appointed attorney for the Commonwealth. He sat in the State legis¬

lature for 15 years, serving in the senate for the last six years of that period. Guthrie re¬

ceived the appointment of president of the

State Constitutional Convention in 1849; and

in the cabinet of President Franklin Pierce was Secretary of the Treasury. His efforts con¬

tributed much to Kentucky's decision to stand

by the Union. At the Democratic Convention

of 1864 Guthrie was a delegate, and from

1865 to 1868 he was a member of the United

States Senate.

GUTHRIE, Sir James, Scottish painter.;

b. Greenock, near Edinburgh, 10 June 1859. He

received his education at Glasgow University

and then undertook the study of painting. He

went first to Edinburgh and then to London,

where he came under the influence of John

Pettie; next he studied at Paris. After gaining recognition for his paintings on the Continent, he returned to Scotland, where, in 1892, he was elected a member of the Royal Scottish Acad¬

emy. Guthrie's early pictures were of land¬

scape and genre, characterized by thick and

heavy coloring. However, about 1890 he aban¬

doned these subjects and painted portraits ex¬

clusively, and his coloring, while vivid, became lighter. In 1902 he succeeded Sir George Reid

as president of the Royal Scottish Academy,

and in the following year was knighted. The

University of Glasgow conferred on him the

degree of LL.D. in 1906 and Edinburgh likewise in 1913. Of his early works the most note¬

worthy are ‘The Gipsy Fires are Burning, for

Daylight is Past and Gone* (1882) ; ‘Midsummer) (Edinburgh Museum) ; (Funeral Service

in the Scottish Highlands) (Glasgow Gallery) ;

<Schoolmates) (Ghent Gallery). His best por¬

traits include those of Charles Barrie (Museum

of Victoria, Australia) ; his own mother, Mr.

R. Garroway, Major Hotchkiss, Mrs. Fergus

and Professor Jack. There are several of his

works in the Carnegie Institute, Pittsburgh.

Consult Caw, ‘Scottish Painting, Past and Pres¬

ent J (Edinburgh 1908).

GUTHRIE, Samuel, American chemist:

b. Brimfield, Mass., 1782; d. 1848. He studied 580

at the University of Pennsylvania and served

in the medical corps of the army in the War of 1812, in the capacity of examining surgeon. To him is attributed the invention of the first suc¬

cessful percussion powder; the discovery of

chloric ether (1831) ; the invention of a process for the conversion of potato starch into sugar, and also the punch-lock musket.

GUTHRIE, Thomas, Scottish clergyman

and philanthropist: b. Brechin, Forfarshire, 12

July 1803; d. Saint Leonards, Sussex, 24 Feb.

1873. He was educated at the University of

Edinburgh and was licensed as a preacher in

connection with the Church of Scotland in 1825.

He was appointed minister of Arbirlot in 1830

and accepted a call to Old Greyfriars, Edin¬

burgh, in 1837, where his eloquent and arrestive preaching and broad sympathies made him popu¬

lar with all classes. In 1840 he was translated to Saint John's parish in the same city. In 1843

the Disruption took place and Guthrie was active with Chalmers and Candlish in organizing the

Free Church, becoming minister of Free Saint

John's, Edinburgh. The work with which his

name is chiefly identified out of Scotland was the establishment of ragged schools, of which

he was the earliest advocate. He was also a

pioneer in the total abstinence movement in

Scotland. On retiring from the ministry in

1864 he was editor of The Sunday Magazine till his death. Among his published works are 'The

Gospel in EzekieP (1855) ; (A Plea for Ragged Schools1* (1847) ; 'The City: its Sins and Sor¬

row's* (1857); 'Autobiography* (1874-75).

Consult Smeaton, (Thomas Guthrie) (1900).

GUTHRIE, Thomas Anstey (((F. Anstey**) , English humorist: b. Kensington, Lon¬

don, 8 Aug. 1856. He was graduated from

Cambridge in 1875 and called to the bar in 1880, but never practised and has devoted himself to authorship, his books having been extremely

popular both at home and in the United States.

He is the author of ‘Vice Versa) (1882) ; ‘The Giant’s Robe) (1883) ; (The Black Poodle)

(1884) ; (The Tinted Venus* (1885) ; (A Fal¬

len Idol > (1886); (The Pariah) (1889); ‘Tour¬

malin’s Time Cheques1* (1890); ‘Voces Populi*

(1890) ; ‘Puppets at Large1* (1897) ; ‘Love

Among the Lions) (1898) ; ‘The Brass Bottle)

(1900) ; ‘A Bayard From BengaP (1902) ;

‘Salted Almonds1* (1906) ; ‘Percy and Others*

(1915) ; ‘In Brief Authority* (1915).

GUTHRIE, William B., American edu¬

cator. He was educated at Lenox College,

Hopkinton, Iowa, at Iowa University, Columbia

University, the University of Berlin and the

School of Law, Paris. He became manager of

the Riverside Settlement House, New York, and

special lecturer at New York University. He

was departmental editor of Charities and the

Commons. For many years he has been con¬

nected with the College of the City of New

York, being at present associate professor of

political science. He is a member of the Ameri¬

can Political Science Association, the Society of International Law, *etc.* He has written ‘Hous¬

ing Problem in German Cities) ; ‘History of

Socialism before the French Revolution ;

‘Brief History of the American People > and

contributions to encyclopedias and journals.

GUTHRIE, William Norman, American

clergyman, educator and author: b. Dundee,

Scotland, 4 May 1868. He was graduated at

the University of the South 1889 (A.M., 1891).

He became assistant professor of modern lan¬

guages in the University of the South 1889—90 ; and professor of modern languages, Kenyon

College, 1892-93; was ordained to the Protestant Episcopal ministry 1893 ; missionary in charge,

Christ Church, Kennedy Heights, 1893-94; as¬

sistant rector, Church of the Advent, Cincinnati, 1894-96 and lecturer on comparative literature,

University of Cincinnati, 1898-1900. He was

rector of the church of Resurrection, Fern

Bank, Ohio, 1899—1903 ; Christ Church, Alameda,

Cal., 1903-08 and professor of general literature and director University Extension Department,

University of the South, 1908-10; rector Saint

Mark's in the Bouwerie, New York, since 1910.

Director Cincinnati Conferences, Art and

Literature 1900-03 ; professorial lecturer in

general literature, University of Chicago, 1909.

Author 'Love Conquereth) (1890) ; 'Modern

Poet Prophets * ; 'Essays Critical and Inter¬

pretative* (1897-99) ; 'To Kindle the Yule Log) (1899) ; 'Songs of American Destiny* (1900) ;

'The Old Hemlock* (1901) ; 'The Christ of

the Ages in Words of Holy Writ* (1903);

'Orpheus To-day, Saint Francis of the

Trees and Other Verse* (1907) ; 'The Vital

Study of Literature* (1911); 'Beyond Disillu¬

sion*, a dramatic study of modern marriage;

'Uncle Sam and Old World Conquerors*, a

patriotic satire (1916) ; 'The Gospel of Osiris*

(1916) ; 'Leaves of the Greater Bible* (1917).

He was editor of the Forensic Quarterly 1909-10; Dramatic Quarterly 1910-11, *etc.*

GUTHRIE, Okla., once capital of the terri¬

tory of Oklahoma and the county-seat of

Logan County, on the Cottonwood River and on

the Atchison, Topeka and Santa Fe, the Chicago, Rock Island and Pacific, the Oklahoma Eastern,

the Missouri, Kansas and Texas, and Fort

Smith and Western Denver, Enid and Gulf

and the Saint Louis, El Reno and Southern

railways. Guthrie has a very large trade, and

is especially noted as a wholesale distributing centre. It has planing, cotton, flour and cotton¬

seed oil mills, furniture and carriage factories, foundry and machine shops, broom works, plow

factory, creamery, railroad repair shops, novelty works, bookbindery, *etc.* Guthrie's chief build¬

ings are the capitol, Federal court and post

office building, the city hall, the Scottish Rite temple, Carnegie library and the Federal prison.

The Carnegie library (costing $25,000) is a

noteworthy institution. The city possesses an

excellent public school system, including a high school and a $50,000 county high school. The

Methodist University is centrally located here;

on a height overlooking the city on the west is Saint Joseph's Academy and many private

schools add to the city's educational facilities.

Guthrie is on a sound financial basis. Out of 25 representative cities scattered throughout the United States, including the principal cities

of Oklahoma, there are but four where the per

capita cost of city government, not taking into account outlays for interest and public im¬

provements, are less than that of Guthrie. The city's operating expenses under the present form of government have been reduced 50 per cent in the last four years. The city is under the com¬

mission form of government, the board con¬

sisting of three commissions: mayor and com-

missioner of accounts and finance, commissioner

of public utilities, commissioner of public

safety. The chief of police and all other city officers are chosen by the people. The city has electric lighting and owns and operates its own waterworks, has 21 miles of paved streets, large natural gas plant and a new municipal bath

house. Guthrie dates its existence from the

opening of the Territory in 1889, and it was

made the capital city one year later, in 1890.

The city has had a rapid development. Its rival, Oklahoma City, about 30 miles south, is the

State capital. Pop. 12,000.

gutiSrrez, goo-tyar-ras, Santos, Co¬

lombian President: b. Cocui, Boyaca, 1820; d.

1872. He was educated for the legal profes¬

sion and began practising in 1839. After hold¬

ing a number of minor offices, he supported the Liberals in the Revolution of 1859-63, and by

his effective generalship contributed largely to the success of his party. He became succes¬

sively member of the national Congress, gov¬

ernor of Boyaca, national senator, Minister of

Foreign Relations and finally succeeded to the

Presidency in 1868. He retired from political

activity in 1870.

GUTIERREZ DE LARA, Bernardo,

Mexican patriot: b. Quanajuato, 1778; d. San

Antonio, Bejar, 15 March 1814. When

Hidalgo and Allende, after the defeat of Cal¬

deron in 1811, were on their way to the United States to reorganize their forces, Gutierrez met them early in March and offered his services.

He was appointed colonel and sent to Wash¬

ington, where he arrived in August. His mis¬

sion was not recognized and he went to New

Orleans, where he gathered a force of 450 men.

He marched to Texas in February 1812, cap¬

tured the town of Nacogdoches and the presidio of Trinidad, and a few days afterward the Bay of Espiritu Santo, where he found

important

stores of ammunition and provisions. The

Spanish governor of New Leon and Texas be¬

sieged Gutierrez in Trinidad, but after four

months the latter made a sally and broke

through the enemy's lines. In August of the

same year he defeated the Royalists at Rossillo, capturing all their artillery, and shortly after¬

ward gained other victories, making him the

master of New Leon and Texas. But Alvarez

de Toledo, who had been appointed commis¬

sioner to Washington, entered there into secret transactions with the Spanish government, and

also instigated Gutierrez's forces to demand

the execution of the governor of Leon and

Texas. When their commander, in a moment

of weakness, submitted, Alvarez appeared in his camp with accusations, and brought about a

mutiny, which deposed Gutierrez and put Al¬

varez in his stead. Gutierrez was patriot

enough not to abandon the army in the hour of need, as Arredondo was approaching with large

forces to subdue the patriots. The revolutionary army was defeated and Gutierrez perished in

the battle.

GUTNIC, goot'nik, or GUTNISH, a dia¬

lect spoken by the inhabitants of the island of Gotland in the Baltic Sea. It belongs to the

East Norse group of languages, and is known

from the runes of the 7th to the 16th centuries.

It is also preserved in several 14th century

manuscripts.

GUTSMUTHS, goots'moots, Johann Kris—

toph Friedrich, German educator: b. Quedlin—

burg, 9 Aug. 1759; d. Schnepfenthal, 21 May

1839. After receiving training at the University of Halle, he subsequently taught geography and

gymnastics at Salzmann's school at Schnepfen¬

thal where he remained from 1785 until his death.

Gutsmuths was a pioneer in the pedagogy of

gymnastics, on which subject he wrote (Gymnastik fur die Jugend) (1793) ; (Spiele zur

Uebung und Erholung des Korpers und Geistes

fur die Jugend) (1796), which was translated

into all European tongues. He contributed

valuable studies to the method of teaching

geography also, embodied in his book (Handbuch der Geographic J (1810). From 1800-20,

he edited a library of pedagogy, to which he

contributed a number of volumes, under the title (Bibliothek fur Padagogik, Schulwesen, und die

gesammte padogogische Literatur Deutsch—

landsP

GUTTA, gut'ta, in architecture, a decora¬

tion used to ornament the lower surface of

the mutules of the Doric cornice, or the tri¬

glyphs of a Doric frieze. They are either cylin¬

drical in shape, or like the frustum of a

cone. They are evidently a survival of the

wooden nails which were used in the construc¬

tion of timber Doric edifices, but were also used in early times in stone construction as orna¬

ments.

GUTTA PERCHA, per'ka, a substance

which has been known generally and used in

Western countries only since about 1845, though travelers and residents in the East were ac¬

quainted with it long before, and had seen

various articles made of it, but without knowing the nature of the material. The commercial

article is made from the inspissated milky juice of several large trees belonging to the order

Sapotaceaz, the principal being^ Isonandra gutta, and is obtained by felling the large and old trees, cutting off rings of bark at intervals along the stem, collecting the juice which issues, and con¬

centrating by evaporation, if necessary. The re¬

sult of this terribly wasteful process is, that the gutta percha tree has been exterminated from

various districts in which it was formerly

abundant. The tree is found in the Malayan

Peninsula, and in some of the neighboring

islands, in great numbers and of very large size; but if these trees be also cut down, instead of the juice being tapped by incisions (a method

which has now come into use), gutta percha

will become one of the rarest of substances.

The crude substance is gray or reddish, and

is mixed with fragments of bark, leaves and

other impurities, from which it is separated by washing with cold and then with warm water.

This softens the gutta percha, and the impurities can be easily picked out. When pure it has a brown color; at the ordinary temperature it is hard and tough, and in not too thick pieces is flexible like leather. It is elastic only to a very slight extent, and cannot be beaten out. It has little or no adhesion for other bodies, but its own cohesiveness is remarkable, a thin strip

of it bearing a very considerable weight. When warmed it gradually softens and then can be

drawn into fine fibres, rolled into sheets or

molded. For the latter purpose it is admirably adapted, as when warm and soft it takes the

finest impressions, which it retains after it has 582

become cold and hard. When heated to a suf¬

ficiently high temperature in the air it catches fire, and burns with a bright flame ; heated in close vessels it gives off oily hydrocarbons and an acid liquor, so that gutta percha seems to consist mainly of carbon and hydrogen, with

some oxygen, while nitrogen is absent, or pres¬

ent only in very minute quantities. Attempts

have been made to resolve gutta percha into

proximate constituents, and accordingly three

substances extracted from it have been de¬

scribed. These are named respectively gutta,

which is the chief constituent, and when pure

is white and opaque ; alban, a white oxygenated crystalline substance ; and fluavil, also oxygen¬

ated, and of a yellow color. These two are

said to be formed from the first by oxidation, but there is a considerable diversity of opinion on the nature of these bodies. Ordinary gutta

percha is insoluble in water, partially in alcohol and ether, readily and completely in chloroform, turpentine, benzol, bisulphide of carbon and

naphtha. It is also dissolved to a slight ex¬

tent by oils. It is not attacked by solutions of alkalis, nor by hydrofluoric acid; but it is

acted on by sulphuric, nitric and hydrochloric

acids — being darkened in color, oxidized, ren¬

dered brittle or altogether disintegrated — and by chlorine, which transforms it into a white

substance like ivory. It is also affected by the oxygen of the air, especially in light, becoming brittle, resinous and acid; it combines with sul¬

phur and, like caoutchouc, can be vulcanized,

being then often popularly miscalled hard rub¬

ber. It may also be mixed with caoutchouc in

a soft, elastic composition. Gutta percha is

employed for a great variety of purposes, es¬

pecially for insulating electric wires, being in¬

valuable for submarine telegraph cables because

it is not affected by water, is very pliant and forms a uniform and close-fitting coating to the wires. It is much prized for making certain

kinds of surgical instruments, and in sheets for surgical dressing, and is used for making water-pipes and tubes of various kinds, hose, buttons, dental plates, golf ball covers, overshoes,

buckets, picture-frames and many other articles

in general use. The United States importation

and consumption was about 1,600 tons in 1916,

and the quantity tends to increase. Consult

Pearson, (Crude Rubber and Compound Ingredients> (1909) ; McIntosh, Hndia Rubber

and Gutta Percha } (1910).

GUTTENBERG, gut'en-berg, N. J., a town

in Hudson County, on the Hudson River, 10

miles northeast of Jersey City. The chief in¬

dustries are stone quarrying, lard refining and the manufacture of embroidery and pearl but¬

tons. Pop. (1920) 6ˆ26.

GUTTER, in architecture, a horizontal channel constructed to conduct water from buildings or roads. On Greek buildings, the gutters were carved in the cornice stones, and the contents discharged to the ground through gargoyles, carved at intervals in the cornice. The Greek gutter prevailed in Roman build¬ ings, but there were also gutters of cemented tiles. In mediaeval architecture, gutters are found mainly on church structures, — the chan¬ nel being constructed along the top of the wall, and the water being emptied by means of gar¬ goyles on the buttresses. Lead pipes conduct¬ ing the water to the ground began to appear in England about the 14th century. They were square and ornamental. In modern buildings, gutters are made of some kind of metal, and in large stone structures the stone gutters are metal-lined.

GUTZKOW, guts'ko, Karl, German drama¬ tist and novelist: b. Berlin, 17 March 1811; d. Sachsenhausen, near Frankfort, 16 Dec. 1878. He is best known in German literature by rea¬ son of his connection with the group of writ¬

ers known as “Jung-Deutschland.® He was

born of an extremely poor family, not proleta¬

rian, but of the lowest and most menial branch of state employees. His father had become

pietistic and puritanical in his outlook and de¬

mands, and Gutzkow’s later agnosticism is

probably a reaction against the excessive reli¬

giosity of his early surroundings. In 1829 he

matriculated at the University of Berlin, under the faculty of philosophy. News of the 1830

July Revolution at Paris moved him deeply. The general atmosphere of radicalism pervading

Europe at that time, and perhaps more specifi¬

cally, a reading of the (Life of Jesus, } by D. F.

Strauss (q.v.), influenced Gutzkow in the com¬

position of his first novel, (Wally die Zwei—

flerin) (1835), which exalts the agnosticism

and emancipated views of the heroine, Wally.

There are incorporated in this book many

ideas that Gutzkow had recently absorbed from

French writers, notably Saint-Simon (q.v.),

particularly the latter’s theory of the emanci¬

pation of the flesh. For a decade (1839-49),

Gutzkow turned his attention to the German

drama, which had declined rather sadly, in the hands of commercial exploiters and romantic

book-drama traditions, to a very subordinate

position; while only one of his dramatic works has permanent value (the tragedy (Uriel

Acosta)), Gutzkow really made the German

drama once more a dignified and living insti¬

tution, dealing with subjects of interest to the people and treating them with dramaturgic

skill. UJriel Acosta) (1846) is still one of the most popular German plays. Gutzkow had

treated the same theme in a short story, (Der Sadducaer von Amsterdam f (1833). The hero,

a young Portuguese Jew living in Holland, is

excommunicated by the synagogue for having

written a book of heresy. His love of the

truth prevents him, in spite of his strong affec¬

tion for his friends and brethren, from recant¬

ing, and he commits suicide. Unlike (Uriel

Acosta, J the other good plays of Gutzkow are

all in prose.

In turning his attention to the novel, Gutz¬

kow was actuated by the desire to produce

works that were modern not only in theme but

also in treatment, and characterized by an ac¬

ceptance of the latest achievements in philos¬

ophy and social psychology. He sets up the

following three principles as a guide for the

novelist: (1) No longer is the novel to give

a merely consecutive presentation of the events in the life of an individual hero; there is to be a simultaneous development of numerous per¬

sons, groups and classes, so that the total im¬

pression will be that of an organic society, and not merely an exaggerated notion of the im¬

portance of certain individuals; (2) ˆHeroes**

in the old sense of the word are to be dis¬

carded ; simple and sublime motives do not

move them ; they must have complexity and

doubt and uncertain interrelations with other

persons; (3) the writer must subordinate all

the persons and events of his work to a domi¬

nant idea that must govern the whole ((<ideal

unity®), and must correlate all the persons and motives with this idea, thus producing a uni¬

fied and coherent story (((real unity®). In the pursuit of these principles, Gutzkow turned out two enormous novels, (Die Ritter vom Geiste1*

(1850-51, abridged ed., 1869), and (Der Zau—

berer vom Rom > (1858-61, abridged ed., 1872).

The former is a study of a revolutionary

movement, a sort of ideal organization, which

is to assist its members, with the aid of a free press and of a guarantee of work, in the re¬

birth of Germany affer the revolution. The

latter is an attack on the growing power of the Catholic Church. Both are confusing in the

immensity of their details, and uninviting to

the reader, as novels in nine volumes are not to the taste of the present day.

Gutzkow was essentially a journalist, a dis¬

seminator of the opinions of others, and the

lot of the journalist, with its distracting lack of concentration and unity of purpose, was his to a fatal degree. He fell into a condition of persecutory mania (1861-78), in the course

of which he made fruitless attempts to settle

down in various parts of Germany, finally com¬

mitting suicide at Sachsenhausen. His other

works are the dramas, (Richard Savage)

(1839) ; (Wullenweber) (1848) ; (Zopf und

SchwerG (1844) ; (Das Urbild des Tartuffe5

(1844) ; (Der KonigsleutnanG (1849) ; the

critical writings (Brief e eines Narren an eine Narrin} (1832) ; (Zur Philosophic der Geschichte) (1835) ; (Ueber Goethe im Wende—

punkte zweier Jahrhunderte) (1855); (Die Zeit—

genossen, ihre Schicksale, ihre Tendenzen, ihre

grossen Charaktere) (1836-37).

Jacob Wittmer Hartmann,

Assistant Professor of German Language and

Literature , The College of the City of Neiv

York.

GUTZLAFF, gutsHaf, Karl Friedrich

August, German missionary: b. Pyritz,

Pomerania, 8 July 1803; d. Hongkong, 9 Aug.

1851. After studying at Halle and at the mis¬

sionary school at Berlin, he went to Batavia,

Java, under the auspices of the Netherlands

Missionary Society in 1826. Two years later

he went to Singapore independently ; and from

there to Siam, where he prepared a Siamese

translation of the Bible. From 1829-31 he was

occupied with the publication of a dictionary of Cochin Chinese. In these labors he was as¬

sisted by his wife who died in the last named year. Giitzlaff went next to Macao and then

to Hongkong, where he continued to preach,

and also translated the Bible into Chinese.

During the same time he published a magazine

and a number of books on practical subjects

in Chinese. In 1835 he was appointed joint

Chinese secretary to the English commission

and rendered important service in the Anglo—

Chinese negotiations in 1842. In 1844 he es¬

tablished a school for the training of Chinese missionaries, which was most successful in its

work. Giitzlaff was untiring and zealous in his missionary as well as in his scholarly labors, and stands out prominently among the early

pioneers of Christian workers and interpreters

of the Orient. Besides the works already men¬

tioned, he published (Journal of Three Voy¬

ages along the Coast of China in 1831, 1832 and 1833 } (London 1834) ; (Sketch of Chinese His¬

tory, Ancient and Modern > (2 vols., London

1834); (China Opened) (ib. 1838; Ge rman ed., Stuttgart 1847) ; (Life of Taon-Kwang,

Late Emperor of China) (1851, German ed.

at Leipzig 1852). He also stimulated much

interest in Chinese affairs by his addresses

in Europe, and inspired a number of able

men to continue his work. The library at

Munich contains a complete collection of his

writings in Chinese.

GUY, Thomas, English philanthropist:

founder of Guy's Hospital, London: b. about

1645; d. 27 Dec. 1724. His principal income

arose from the disreputable purchase of sea¬

men's prize tickets in Queen Anne's War, and

from his dealings in South Sea stock in 1720.

By these speculations, aided by most penurious

habits, he amassed a fortune of nearly half a million pounds sterling. It was said of him

that he almost starved his bookbinders, and

wgave but a few farthings to the poor in his lifetime.® Lie, however, assisted his poor rela¬

tions, and was liberal in setting up deserving young men in business. He spent upward of

$1,000,000 in building and endowing his hospi¬

tal in Southwark. He also erected almshouses

at Tamworth, furnished three wards of Saint

Thomas' Hospital, and benefited Christ's Hos¬

pital and various other charities. He was

member of Parliament for Tamworth 1695—

1707.

GUY OF LUSIGNAN, loo'ze'nyan, king

of Jerusalem and Cyprus: b. Poitou; d. Cy¬

prus 1194. He married Sibylla, daughter of

Amaury, king of Jerusalem, and after the death of Baldwin V, her son by her first marriage,

succeeded to the throne of the kingdom. In

1187 he was defeated by Saladin's forces at

Tiberias and taken prisoner, but was soon re¬

leased. When Sibylla died in 1190, Conrad be¬

came king of Jerusalem and Guy re-engaged in

the battles against the Moslems and was later

appointed king of Cyprus by Richard I (1192).

GUY MANNERING, a novel by Sir Wal¬

ter Scott. It was the second of his novels,

appearing anonymously in 1815, seven months

after AVaverleyP It is said to have been the

result of six weeks' work, and by some critics is thought to show the marks of haste. Its

time is the middle of the 18th century, its scene chiefly Scotland. There are fewer than two-score characters in (Guy ManneringC and the

plot is not very complicated. Meg Merrilies,

and Dominie Sampson, the uncouth, honest

pedant, are the only great creations it contains.

GUY OF WARWICK, a metrical romance

belonging to that Anglo-Danish cycle from

which the Norman trouveres drew so much

material. The earliest existing manuscripts of

this romance are in French, though it is sup¬

posed to have been written by Walter of Exe¬

ter, a Cornish Franciscan. It consists of about 12.000 verses, iambic measure, arranged in

rhymed couplets.

GUYAU, ge'yw Jean Marie, French phi¬

losopher: b. Laval, 28 Oct. 1854; d. Menton, 31

March 1888. He was the son of Alfred Fouillee (q.v.). He was educated by his uncle, and 584

displayed such remarkable precocity, that at

the age of 19 he was crowned by the Academy

of Moral Sciences for his (Memoire sur la

morale utilitaire depuis Epicure jusqu'a l'Ecole anglaiseP In the following year he was ap¬

pointed teacher in philosophy at the Lycee Con-dorcct, but was forced by ill-health to abandon the undertaking. He spent his remaining years

in producing various works on philosophy,

among which the most important are a trans¬

lation under the title (Manuel d'Epictete)

(Paris 1875) ; (La Morale d'Epicure et ses rapports avec les doctrines contemporaines) (1878); (La Morale anglaise contemporaine) (1879); (Vers. d'un philosophe) (1881); (Esquisse d'une morale sans obligation in sanctions> (1885) ; (Les Problemes d'Esthe— tique contemporaine) (1884) ; (L'Irreligion de l'avenir) (1887) ; (L'Art au point du vue sociologique) (1889) ; Education et Heredite) (1889); (La Genese de l'idee du Temps> (1890). He also published several books on education, and contributed to the Revue des Deux Mondes and Revue philosophique. The philosophy of Guyau is distinguished by its in¬ tensely sociological point of view. Art, philos¬ ophy, science, religion, beauty, education, ethics — all these derive their value from their social necessity only. Consult Fouillee, (La Morale, l'Art et la Religion d'apres Guyan) (Paris 1889).

GUYON, Jeanne-Marie Bouvier de la Motte, zhan ma-re boo-ve-a de la m5t ge-on, Madame, French mystic: the introducer in France of the system of Quietism: b. Montar—

gis, 13 April 1648; d. Blois, 9 June 1717. At the age of 16 she was married to Jacques

Guyon, after whose death in 1676 the tendency

to mystic enthusiasm which had characterized

her younger years again acquired ascendency.

She published numerous works, such as (Le

Cantique des Cantiques interprets selon le Sens Mystique) (1685) ; (Poesies Spirituelles)

(1685); (Discours Chretiens et Spirituels)

(1716) ; *etc.* At last the archbishop of Paris thought it necessary to take steps against the spread of Madame Guyon's mystical doctrines,

and through his influence she was shut up in

the convent of the Visitation, but afterward re¬

leased at the instigation of Madame Maintenon,

who herself became for a time a convert to the new doctrines, and allowed Madame Guyon to

preach in the seminary of Saint Cyr, where she made a convert and disciple of Fenelon. A

commission of ecclesiastics, chief among whom

was Bossuet, now sat in judgment, and the

doctrines of Madame Guyon were condemned

(1695). This led to her being imprisoned for

some years, latterly in the Bastille, whence she was liberated in 1702. The rest of her life was spent in retirement and in works of charity.

Consult Upham, (Life, Religious Opinions and

Experiences of Madame Guyon* (1870) ; Guerrier, (Madame Guyon, sa vie, sa doctrine, son

influence> (1881).

GUYOT, ge'o, Arnold, American geog¬

rapher: b. Boudevilliers, Neuchatel, Switzerland, 28 Sept. 1807 ; d. Princeton, N. J., 8 Feb. 1884.

He was educated at Chaux-de-Fonds, and

then at the College de Neuchatek In 1825 he

went to Germany, and resided in Karlsruhe

where he met Louis Agassiz. Thence he

moved to Stuttgart, where he studied at the

gymnasium, returning to Neuchatel in 1827.

He determined to enter the ministry and started for Berlin to attend lectures at the university.

While pursuing his studies he also attended

lectures on philosophy and natural science.

His leisure was spent in collecting shells and plants and from Humbolt he received an en¬

tree to the Berlin botanical garden. In 1835

he received the degree of Ph.D. from Berlin,

and spent the ensuing four years as a tutor in Paris. In 1838 he visited the Swiss glaciers

and communicated the results of his six weeks'

investigation to the Geological Society of

France. He was the first to point out the

laminated structure of ice in the glaciers. In 1839 he became the colleague of Agassiz as

professor of history and physical geography at

the College of Neuchatel. The suspension of

the institution in 1848 caused Guyot to emigrate to America, where he settled in Cambridge.

He delivered a course of lectures at the Lowell Institute which were afterward published as

(Earth and Man* (Boston 1853). The Massa¬

chusetts board of education retained his

services as lecturer on geography and methods

of instruction to the normal schools and

teachers' institutes. He was occupied with

this work until his appointment, in 1854, to

the chair of physical geography and geology at Princeton, which he retained until his death.

He was also for several years lecturer on phys¬

ical geography in the State Normal School in

Trenton, N. J., and from 1861 to 1866 lecturer in the Princeton Theological Seminary. He

also gave courses in the Union Theological

Seminary, New York, and at Columbia College.

He founded the museum at Princeton, many of

the specimens of which are from his own col¬

lections. His scientific work in the United

States included the perfection of plans for a

national system of meteorological observations.

Most of these were conducted under the

auspices of the Smithsonian Institution. The

selection and establishment of numerous

meteorological stations in New York and

Massachusetts were confided to him. He was a

member of many American and foreign scien¬

tific societies. He prepared a series of geog¬

raphies and wall maps in 1866-75, for which he was awarded a medal at Vienna in 1873. He

was one of the editors of ˆJohnson's New Uni¬

versal Cyclop3edia) ; wrote memoirs of Carl

Ritter (I860) ; James H. Coffin (1875) and

Louis Agassiz (1883) ; also (Treatise on Physi¬

cal Geography* (1873). Consult memoir by

J. A. Dana in (Biographical Memoirs of the

National Academy of Sciences* (Washington

1886).

GUYOT, Yves, ev, French publicist: b.

Dinan, France, 6 Sept. 1848. He began his

studies at Rennes, and early interested himself in social and economic problems of international importance. He took part in the revolution of

4 Sept. 1870, which, after the surrender of

Sedan, established the third republic. He is

an ardent reformer, but not a socialist, a free trader and member of the Cobden Club. In

1885 he was elected to the French Parliament,

and from 1889-92 made Minister of Public

Works. He was from 1892-1903 editor of the

Siecle, a Liberal paper of a staid, old-fashioned style. In 1909 he became editor of the Journal des Economistes, and of UAgence Economique

et Financiere in 1911. He took a prominent

part in the defense of Dreyfus, and waged a

successful war for the abolition of the con¬

tinental sugar bounties. Among his writings

may be noted (La Tyrannie Socialiste) (1893) ; cLes Principes de ’89 et le Socialisme) (1894) ; (L’Economie de 1’EfforD (1896) ; (Le Bilan de

l’Eglise) (1901) ; and (La Question des Sucres >

(1901); (La Comedie protectioniste) (1905);

(La gestion par 1’fstat et ses Municipality

(1913); (L’industrie et les industriels) (1914); (La Guerre, ses causes et ses consequences)

(1915).

GUYSBOROUGH, giz’bur’o, Canada, sea¬

port town and capital of Guysborough County,

Nova Scotia, on Chedabucto Bay, 60 miles east-southeast of Pictou. The harbor is large and

well equipped. The principal occupations are

fishing and lumber, carriage and barrel manu¬

facture. The town dates from 1783. Pop.

1,220.

GUYTON DE MORVEAU, ge'ton' de

mor'vo'. Louis Bernard, Baron, French chem¬

ist: b. Dijon, 4 Jan. 1737; d. Paris, 2 Jan. 1816.

He studied law at the university in his native city, and then became advocate-general in the

Parlement there in 1751, holding this office un¬

til 1782. His natural inclinations were toward

the study of science, and to this he devoted

his leisure. After retiring from his legal office, he began to publish those researches in chem¬

istry by which he is best known. In May 1782, there appeared his essay on a system of re¬

formed chemical nomenclature, which was later

developed into (Methode d'une nomenclature

chimique) (1787). In this work he was as¬

sisted by Lavoisier, Berthollet and Fourcroy,

and it gained immediate popularity among

scientists. He contributed the articles on chem¬

istry to the (Encyclopedia methodique) (1792).

In 1791, he was again active in politics, becom¬

ing a member of the legislative assembly; a

member of the National Convention in 1792,

and again in 1795, retiring two years later.

He also taught at the Ecole Polytechnique,

which he had helped to establish, and in 1798

was provisional director of that institution.

From 1800-14, he was master of the mint,

where he was active in perfecting the use of

the decimal system. The French government

elevated him to the peerage in 1811, with the rank of baron. Other publications by him

include (Discours publiques et eloges) (1775—

82) ; (Traite des moyens de desinfecter l'air) (1801) ; and with Maret and Durande, Ele¬

ments de chymie theorique et pratique* (1776—

77).

GUZERAT, guz-e-rat'. See Gujarat.

GUZMAN, gooth'man, Gasparo de. See

Olivarez, Count.

GUZMAN BLANCO, Antonio. See

Blanco, Antonio Guzman.

GUZMAN DE ALFARACHE, da al'fa-

ra-cha. The earliest extensive novel of roguery is the Spanish fiction (Guzman de Alfarache,* published in its first instalment in 1599, and, in its second, in 1605. Mateo Aleman, the author, was a government official inspired by

the success of an amusing story, (Lazarillo

de Tonnes,* which had been issued anon¬

ymously in 1554. (Lazarillo* had set forth

ironically the adventures of a little rascal in the service of several masters, each of whom he tricks and satirizes. Aleman, adopting this de¬

vice, developed the character of the roguish

hero and greatly widened his field of adventure.

Like Lazarillo, Guzman is a picaro of illegiti¬

mate birth who describes with jaunty humor

his progress through the world as innkeeper's

boy, mendicant, scullion, apothecary's appren¬

tice, mock gentleman, soldier and buffoon to a cardinal. He passes from Spain to Italy, lives among the infamous beggars of Rome, and

officiates as master of intrigues for the French ambassador in that city. In the ((Second

Part® of the novel he wanders to Florence,

Siena and Bologna, cheating and being cheated,

before returning to Spain, where various es¬

capades lead to his confinement in the galleys.

The story concludes with his release, as a re¬

ward for having revealed a plot concocted by

his fellow convicts. Before the appearance of

this (<Second Part® a certain Juan Marti of

Valencia, writing under the pseudonym Mateo

Luxan de Sayavedra, had issued a spurious

sequel to Aleman's novel, carrying Guzman

through a similar picaresque Odyssey but chok¬

ing the narrative with moral digressions. Ale¬

man had moralized, also, and provided roman¬

tic relief from his ultra-realistic scenes by in¬

serting serious or sentimental tales in the

Italian style; but it was his gift of humorous observation that rendered popular his work.

A contemporary affirms that by 1605, 26 editions had appeared. While thousands of copies were

circulating in Spain, (Guzman de Alfarache>

was translated into French, Italian, German,

English, Dutch, and even Latin. No other

Spanish fiction save (Don Quixote) has exerted

so wide an influence. The English reader may

consult the translations of James Mabbe (1622), A. O'Connor (1812), J. H. Brady (1821), and

E. Lowdell (1883), as well as discussions of

this novel and its kind in F. W. Chandler's

(Romances of Roguery) (1899) and F. De

Haan's (Outline of the History of the Novela

Picaresca in Spain* (1903).

Frank W. Chandler.

GUZMAn EL BUENO. To a dramatist

who manifested but mediocre powers in his

other works is due the best scenic rendition of the tradition of Guzman el Bueno. The early

chronicles have much to tell us about the un¬

swerving loyalty of this doughty old Spanish

warrior, who fought as a freelance amone the

Moors and later became an able lieutenant of

his liege lord, Sancho IV (1284-95), for whom

he held the important fortress of Tarifa, after Sancho had wrested it from the Moors. Of

these an army came over from Africa and,

abetting the designs of King Sancho's treacher¬

ous brother, Don Juan, laid siege to the strong¬

hold. Summoned by Don Juan to surrender

the place, Guzman refused and persisted in his refusal, despite the threat of Don Juan to slay Guzman's son, who was in his power. Ac¬

cording to chronicle and legend, the agonized

father not only allowed his loved child to be murdered before his eyes, rather than betray his trust, but he even cast his own dagger from the walls to the recreant Don Juan, requesting him to have at least the decency to kill the youth with an honest man's weapon.

Two noted Spanish men of letters had

treated this moving story before Antonio Gil y 586

Zarate (1796-1861), for Nicolas Fernandez

de Moratin had based upon it his drama,

<Guzman el Bueno) (1777), which remains

relatively true to the chronicle account, and

Quintana (1772-1857) had made it the subject

of one of the historical essays in his (Vidas de los Espaholes celebres.* The tragedy of the

Elder Moratin lacks the spirit which informs

the soul-gripping (Guzman el Bueno } (c. 1843) of Gil y Zarate, who does not hesitate to

modify the historical and legendary data

in certain details, which, as changed by

him, lend dramatic intensity to the plot

and emphasize its great conflict of love and

duty and the triumph of this latter force

over all other considerations. Even while Gil y Zarate preserves the heroic coloring of the an¬

cient legend, he succeeds in making his per¬

sonages living creatures, and he invests his

noble verse play with all naturalness of char¬

acter and action.

J. D. M. Ford.

GWALIOR, gwa'le-or, India, a Mahratta

state, forming part of the Central India Agency.

It is of irregular form, about 420 miles long from northeast to southwest, and has an area

of 25,041 square miles. The main portion form¬

ing the Gwalior assistant agency lies between

Rajputana and the United Provinces; other

portions are contained in the Indor Residency,

and the Bhopal, West Malwa, Bhopawar and

Guna assistant agencies, between the Central

Provinces and Rajputana. The surface is

mostly undulating, with a general slope to the north, where it comprises a part of the great plain of the river Jamna. In the south, portions of it are traversed by the Vindhya Mountains.

The Chamba partly bounds it on the northwest.

Other Gwalior rivers are the Sind, Betwah and

Dussam, tributaries to the Jamna with their

affluents, having mostly a northern course.

South of the mountains the Narbada carries part of the drainage to the west. The soil is gen¬

erally of high fertility. Opium-poppy is an im¬

portant staple of culture, and an abundance of corn and oleaginous plants, sugarcane, barley

and peas on the dry lands in winter, and cotton and tobacco are raised. The population are

mostly Mahrattas, but include also Bhils, Minos and Coolies, numerous Brahmans, a few Raj¬

puts and a peculiar sect of Mohammedans

called Bhoras, who are supposed to be of Jewish origin. The chief towns are Gwalior (the cap¬

ital, also called Lashkar), Ujjain and Mandesur.

The state, which has a population of over

3,000,000, was founded after the successes ob¬

tained by the Mahrattas over the Mogul forces

in 1738, by Sindhia, a chief who raised himself from obscurity by his own merits. He died in

1754. In 1781 Madaji Sindhia negotiated a peace between the British and the Mahrattas, and

having introduced European discipline and tac¬

tics into his army, possessed himself of Delhi, Agra and the person of the Mogul emperor,

in whose name he subsequently acted. He was

the most powerful member of the Mahratta

confederacy. His successor, Dowlat Rao Sind¬

hia, was defeated by Wellington at Assave, and at Delhi and Laswari by Lord Lake. After his

death in 1827 the state became disorganized,

and order was only restored after the battles of Maharajpur and Pennair (1843), in which the

British troops were victorious. The state was

then constituted subsidiary to the British gov¬

ernment. At that time the subsequent chief,

Ali Jah Jaiaji Rao Sindhia. was a minor. He

was loyal during the mutiny of 1857. In 1877

he was made a G.C.B., and in 1878 was in¬

vested with the Star of India. At his death in 1886 he was succeeded by his son Madho Rao.

GWINNETT, Button, American patriot,

one of the signers of the Declaration of In¬

dependence: b. England, about 1732; d. Georgia, 27 May 1777. He emigrated from Bristol to

America in 1770, purchased a tract of land on Saint Catharine's Island, Georgia, and devoted

himself to agriculture. He became conspicuous

in 1775 by his maintenance of the colonial

rights, was elected a representative to Con¬

gress in February 1776, and reelected

for the following year, and in 1777 be¬

came president of the provincial council,

the highest station in Georgia. He planned

a military expedition against East Florida,

which he refused to entrust to his rival, Gen¬

eral McIntosh, whose official rank entitled him to command it, and which resulted disastrously.

This event, aggravated by other disturbances,

led to a duel between him and McIntosh, in

which he was mortally wounded. Consult

Dwight, (Lives of the Signers* (1895).

GWYNIAD, gwin'i-ad, a fish of the genus

Coregonus, or Whitefish (q.v.).

GWYNN, Eleanor, commonly NELL

GWYNN, English actress : b. Hereford, Eng¬

land, 2 Feb. 1650; d. London, 13 Nov. 1687.

She was at first an orange girl and also gained her bread by singing from tavern to tavern.

She became the mistress of Hart and Lacy, the actors, before going in her 16th year upon the stage, where she distinguished herself in light comedy. About 1667 she became the mistress

of Lord Buckhurst, who surrendered her to

the king. She caused much embarrassment to

the Duchess of Portsmouth, who deemed her¬

self too refined for such a rival. It is said that in her elevation she showed her gratitude to

Dryden, who had patronized her in her poverty; and, unlike the other mistresses, was faithful

to her royal lover. King Charles' dying re¬

quest to his brother, the Duke of York, was,

<(Let not poor Nelly starve.® From her are

sprung the dukes of Saint Albans.

GYGES, jl'jez, king of Lydia, founder of

the third dynasty (Mermnadce), reigned about

687 to 657 b.c. According to Herodotus, Kng

"Candaules® (q.v.) (the Lydian king, Sadyattes), boasted of his queen's beauty to Gyges and

surreptitiously introduced him into her cham¬

ber to convince himself. Indignant at the im¬

propriety, the queen sent for Gyges on the

following day and gave him the choice of

murdering her husband the king and marrying

her or of being himself murdered. Not un¬

naturally Gyges chose the former alternative,

and with the aid of his magic ring, which ren¬

dered its wearer invisible, he was enabled to

enter the king's chamber unseen and to slay

him. Plato says that Gyges was originally a

shepherd and that he found the enchanted ring

on the body of a man discovered inside a

brazen horse. Another version of the story

runs that Gyges, a court favorite of Candaules, was the son of Dascylus, an exiled noble,' and that the king had sent him to escort his royal GYLIPPUS — GYMNASIA AND REALGYMNASIA

fiancee from her home in Mysia. Gyges fell

in love with the lady on the way to Lydia ; she complained to Candaules, who decided to punish Gyges with death. The latter, however, murdered the king the night before his own execution was to take place ; he seized the throne and married the queen. He built up a powerful kingdom and engaged in wars of conquest, being finally killed in battle.

In classic myth Gyges was a son of Coelus and Terra (Heaven and Earth), a hundred¬ handed giant who made war on the gods, was slain by Hercules and eternally punished in Tartarus. With reference to Gyges, the king of Lydia, consult Geltzer, H., (Das Zeitalter des Gyges } (1875) ; Herodotus; Radet, M. A., (La Lydie et le monde grec au temps de Merm— nades5 (Paris 1893); Schubert, R., (Geschichte der Konige von Lydien) (Leipzig 1884).

GYLIPPUS, ji-lip'pus, Spartan general of the 5th century b.c. His father was Clean— dridas, a Spartan who had been exiled on charges of bribery. He was appointed general

of the Syracusan forces against the Athenians

in 414 b.c., and was successful in accomplishing their defeat in the following year. Commis¬

sioned to return with the booty to Sparta he

appropriated a vast portion of it for his own use. For this crime he was banished and

ended his days in exile. The story is told in Plutarch, (Nicias) (19, 21, 27, 28) ; in Dio¬

dorus (XIII, 7, 8, 28-32) and Thucydides

(VII).

GYLLEMBOURG-EHRENSVARD, yul'-

leb-boor-y'aren-svard, Thomasine Christine,

nee Buntzen, Danish novelist : b. Copenhagen,

1773; d. there, 2 July 1856. In 1790 she mar¬

ried Peter Andreas Heiberg, an author of con¬

siderable repute. A son was born to them,

Johan Ludvig Heiberg. Obtaining a di¬

vorce from her husband in 1800, she married

Baron K. F. Ehrensvard, a political exile, who adopted the family name of Gyllembourg. On

his death in 1815 she took up her residence at Kiel where her son had obtained a professor¬

ship. She returned with him to Copenhagen

and at the age of 53 began her literary career.

Her first work, (The Polonius Family, ; ap¬

peared in the newspaper Flyvende Post, of

which her son was editor. In this paper were published also (The Magic Ring> (1828) and (En Hverdags historieP Others of her novels are cNew Stories) (1835-36) ; (Near and Far) (1843) ; (The Cross Waysˆ (1844), and (Two Generations } (1845). Her collected works were published in 12 volumes (1849-51). Consult Heiberg, J. L., (Peter Andreas Heiberg og Thomasine Gyllembourg) (Copenhagen 1882).

GYLLENBORG, yuTlen-bor-y', Karl,
Count, Swedish statesman: b. Stockholm, 1679; d. 1746. Entering upon a military career, he saw service in the Polish War and was later attached to the legation at London in the capacity of secretary. Appointed Minister Plenipotentiary in 1715, he became involved in the conspiracy to reinstate the Stuarts and suffered imprisonment for several months. In 1723 he became councillor of state and in 1738 Prime Minister. At his instigation the "Hattparti® or "Hat Party® was established, a political faction which launched the war with Russia, and was thus responsible for the loss

of Viborg (1741-43). Gyllenborg was also

chancellor of the University of Lund (1728) and of Upsala (1739). His published works include a volume of poems ; a comedy, which was the first to be published in the Swedish language; and ‘Letters Relating to a Design to Raise a Rebellion on his Majesty’s Do¬ minions, to be supported by a force from SwedeiP (English and French editions 1717).

. GYMKHANA, jim-ka’na, a term of Hindu origin, presumably derived from Gend-khana, that is, ball-house, and associated by Anglo— Indian soldiers and civilians with “gym® or gymnasium, whence its introduction into the English language. It is applied to a building or grounds arranged for athletic recreation, and signifies also the open air meetings for athletic and other mixed sporting events, in¬ cluding horse racing, which are the annual features of almost every military cantonment throughout India.

are schools in Germany which correspond in general to the grammar school in England and the lycee in France. The term was derived from the Greek “gymnasium,® which was orig¬ inally applied to an exercising ground in Athens. Here teachers gathered and gave instruction between the hours devoted to physical exercises and sports, and thus the term became associated with and came to mean an institution of learning.

This use of the term did not prevail among the Romans, but was revived during the Re¬ naissance in Italy, and from there passed into the Netherlands and Germany during the 15th century. In 1538 John Sturm founded at Strassburg the school which became the model of the modern German gymnasium. In 1812 a Prussian regulation ordered that all schools which had the right to send their students to the university should bear the name of gym¬ nasia. This practice has now been followed in almost all German states, in Austria and in Russia.

The gymnasium organized by Sturm was the

kind of school in which classical studies pre¬

dominated. This classical character the gym¬

nasium has not lost up to the present time.

To enter the gymnasium a pupil must be

nine years of age and must have had three

years' previous training in reading, writing and arithmetic. These three years are usually had

in what is known as vorschulen or preparatory

schools and almost all the gymnasia have such

schools connected with them.

The course of study in the gymnasium now

covers a period of nine years in which the low¬

est class is designated the sixth, the next in order being the fifth, fourth, lower third, upper third, lower second, upper second, lower first

and upper first.

The subjects of instruction include religion,

German and history stories, Latin, Greek,

French, history, geography, arithmetic, mathe¬

matics, natural history, writing and numbers.

The realgymnasium is an outgrowth of the

classical gymnasium and came in answer to a

demand for more modern languages and sci¬

ence. In the realgymnasium, therefore, Eng¬

lish takes the place of Greek and more science is given than in the gymnasium proper.

An institution known as the pro-gymnasium

is like the gymnasium, but has only the six

lower classes. A student who finishes it then

goes to the gymnasium proper for his last three years.

The demand for ˆpractical® or Vocationalˆ

instruction has had as little influence on the gymnasium in Germany as it has had on the

classical high schools in America, or the gram¬

mar schools in England. The demand for such

instruction has been met by the realgymnasium

and by the establishment of numerous technical

schools.

A student who finishes his gymnasium course

passes an examination for graduation and then

is admitted to the university. At this time he is about 18 years of age. It is sometimes

stated that he is about two years ahead of the American student of the same age. This is,

however, a somewhat difficult statement to

prove, because the bases of comparison are not the same.

Bibliography. — Russell, J. E., <German

Higher Schools > (1910) ; Lexis, W., *A Gen¬

eral View of the History and Organization of

Public Education in the German Empire y

(1904) ; Sadler, M. E., (English Special Re¬

ports on Educational Subjects) (Vol. IX),

Education in Germany) (1902) ; Hughes, R. E.,

(The Making of Citizens> (Chap. 10), (The

Secondary School System of Germany* ; Ker—

schensteiner, G., (A Comparison of Public Edu¬

cation in Germany and in the United States)

(Bulletin of the United States Bureau of Edu¬

cation).

James Sullivan,

New York State Historian.

GYMNASIUM (ancient gymnasia). The

term ˆgymnasium** was originally applied by

the Greeks to the exercise ground or public

training school for men over the age of 18.

It consisted of spacious grounds partly planted, but embracing open spaces for a variety of

athletic games and contests. The whole

space was surrounded by terraces, colonnades

and rooms for punching the sack, anointing,

bathing and dressing, and was ornamented by

statuary of gods and heroes. As the instructors in the gymnasia had to be paid, the places

were patronized principally by the well-to-do.

The young men engaged vigorously in the

athletic games and exercises while the older

men were spectators or critics, or perhaps par¬

ticipants in the discussions and lectures that

formed an important part of the activities of

the place. From the original gymnasium of

the Greeks several modern institutions have

taken names as well as educational methods.

From the suburban gymnasium called the

Academy (q.v.) where Plato started his dis¬

cussion forum and courses of free lectures,

came the modern academy; from another gym¬

nasium called the Lyceum, in which Aristotle

established his lectures, we have the French

lycee and the English and American lyceum.

The Germans emphasizing the intellectual side

of the Greek institution use the term <(gymnasium® to designate their classical secondary

school ; while the English-speaking peoples

with greater propriety have adopted the Greek

word to name the modern institution for phys¬

ical culture and development.

GYMNASTICS, History of. The devel¬

opment of gymnastics began in an early period

of Grecian and Roman history. Systematic

exercise received the stamp of approbation

from the most eminent educators of ancient

times and has the endorsement of all teachers

to-day. Such exercise has had its periods of

decline in popularity, due to the development of professionalism, stimulated by the conferring of extravagant honors and rewards which caused

the ranks of the athletes to be filled by a pro¬

fessional class of low extraction, who made

their art a trade. But through these periods

of decline there have been those who have kept in mind the true value and aim of regularly

and systematically conducted exercises; and

these advocates have outlived and lived down

these evils. So that we find that the scientifi¬

cally conducted gymnastics have never entirely

lost their hold upon educators and those inter¬

ested in the betterment of mankind.

Modern gymnastics differ considerably from

the exercises of the ancients, which at first con¬

sisted of athletic feats performed by each indi¬

vidual according to his own notion, and were

encouraged among the youth as combining

amusement with exercise. They were at length

reduced to a system which, in Greece, formed a prominent feature in the state regulations for

education. In fact the period for gymnastics

was equal to the time spent on art and music combined. Public games were consecrated to

the gods and were conducted with the greatest

ceremony. The earliest mention we can find of

gymnastic sports is in Homer's (Iliad, * Book

II, and again in Book XXIII, when Achilles

instituted games in honor of Patroclus and

distributed prizes to the victors for boxing and wrestling. Plato tells us that just before the time of Hippocrates gymnastics were made a

part of medical study, because they were suited to counteract the effects of indolence and luxu¬

rious feeding, and that at length they became a state matter reduced to a system and superin¬

tended by state officers. The first public gym¬

nasia were built by the Lacedaemonians. These

were imitated at Athens, where, in one called

the Academy, Plato instructed his pupils, and

in another, the Lyceum, Aristotle taught. These buildings were superintended by a chief officer.

The athletics were in charge of a director, and medical officers were in attendance to prescribe the kind and extent of exercise. Baths were at¬

tached to the gymnasia, and a hot bath, fol¬

lowed by a cold plunge, was recommended.

Plato and Aristotle considered that no republic could be deemed perfect in which gymnasia,

as part of the national establishment, were

neglected.

The Spartans were the most rigid in exact¬

ing for their youth a gymnastic training; even the girls were expected to be good gymnasts.

The exercises for pupils in the gymnasia con¬

sisted of a sort of tumbling, war-dances, run¬

ning — for both sexes — leaping, climbing ropes ; of jumping or springing from the knees, with

weights attached to the body, maintaining the

equilibrium while jumping on slippery skins

filled with wine; and of wrestling for the

throw. Riding, driving, swimming, rowing and

swinging supplemented the indoor work.

During the Middle Ages the knightly amuse¬

ment of the tournament absorbed nearly every

other sport except foot-racing and wrestling, so that gymnastics fell into disuse till Basedow

(q.v.) in 1776, at his institution in Dessau,

tin ted bodily exercises with other instruction.

1 his example was followed by Salzmann at his institute and, from this small commencement,

the practice gradually extended. In the latter

part of the 17th century gymnastics were ex¬

tensively introduced into Prussian schools by

Guts Muths, who wrote several works on the

subject. In 1810 the system was still more

widely spread by Jahn, who is regarded as the founder of the present Turnverein (q.v.).

Prussia at that time was impatient under Na¬

poleonic rule, and Jahn conceived the idea of

bringing together the young men for the prac¬

tice of gymnastic exercises, and, at the same

time, indoctrinating them with patriotic senti¬

ments which might be made available to expel

the French from Germany. The Prussian gov¬

ernment favored the plan and in 1811 a public gymnastic school, or Turnplatz, was opened at

Berlin, and was quickly imitated all over the

country. In 1813 the citizens were called to

arms against the French and Jahn himself

commanded a battalion of Lutzow's volunteers.

When, however, there was no longer any rea¬

son to dread the French, the government of

Prussia, regarding the meeting of patriotic

young men as a means of spreading liberal

ideas, closed the gymnastic schools and Jahn

was imprisoned. In other countries, however,

the system introduced by Jahn was eminently

successful, especially in England, Switzerland,

Portugal and Denmark. It was first introduced

into female education under the name of calis¬

thenics when systematic exercises were added

to hoop-trundling, skipping-ropes, etc., and to

riding, archery and other healthy outdoor exer¬

cises practised among young women.

The masculine sports of cricket, football,

quoits, boxing, wrestling, leaping, foot-racing,

etc., have been for centuries enjoyed by the

boys of England in the playgrounds attached to the schools. In 1848 the political condition of Europe enabled the Turnverein to be reor¬

ganized and the German emigration to the

United States has brought these institutions

with it. The first society was formed in New

York. The organization, as first established,

was confined to the practice of bodily exercises, but soon assumed a higher scope. Libraries

were collected, schools established, a newspaper (Turnzeitung) founded, and various arrange¬

ments were made for the diffusion of useful

knowledge and for mental culture as well as

physical training. Much credit must be given

to Ling for his efforts to develop educational gymnastics. He has many followers, and his

publication on Educational and Curative Gym¬

nastics } has much merit. Ling has been

severely criticized by English writers for his

claims to originality. They go so far as to say that he simply used the works of authors of

his time and of an earlier period, and took his holus-bonus from Dr. Francis Fuller in the

(Medicina Gymnastica.* The first edition was

published in 1728, and it ran through eight

others. It is also claimed that he borrowed in its entirety, without acknowledgment, the work

of one John Pough, <A Physiological, Theoretic

and Practical Treatise on the Utility of the

Science of Muscular Exercise for Restoring the

Power of the Limbs, > with such mater als and German gymnast:cs as had previously found

their way through Denmark and Sweden.

Through the exertions of such men as Salz¬

mann, Jahn and others, together with certain

English authorities as Fuller, Pough, Croft,

Clias, Thomas and John Graham, it was not

difficult to establish a system. In fact Salzmann's gymnastics for youth needs only what

Pough supplies to give all that Ling calls his system which is only adapted to beginners. The quality of the Ling exercises is stilted and there is little scope for variety. The fact is, the sys¬

tem sticks too closely to automatic movements,

which undoubtedly produce precise and studied

monotony in drill.

Turning now to the Dio Lewis period, we

see that it marks an epoch in the introduction of an American system of physical training

formed in a small measure upon the Swedish

and largely upon the German system. This sys¬

tem incorporated free-arm exercises, the use of dumb-bells, clubs, rings, wands, together with

what was then called the Pangymnastikon, but

which was nothing more or less than a pair of flying rings equipped with a pair of detachable stirrups from which swinging, jumping and

stretching exercises were performed. Dio

Lewis' work took up the matter of the school—

desk, criticized the faulty position of the ordi¬

nary desk and the poor schoolroom ventila¬

tion. In 1861 the Normal Institute for Physi¬

cal Education was incorporated and located in

Boston. Its directors included many of the

most distinguished educators of New England,

and its departments of anatomy, physiology and

hygiene were in charge of able teachers. Dr.

Dio Lewis gave the work in gymnastics. The

aim of the institute was and is to furnish com¬

petent advocates and teachers of physical

training.

Next follows the work of Dr. Sargent, with

his American system of gymnastics. Dr. Sar¬

gent was born in Maine. He was fond, of all

kinds of outdoor sports and physical exercise,

and joined a gymnasium club while attending

high school ; but as he had to work out of

school hours to support his family, he could only attend to his exercising at odd moments as

time permitted. On one occasion he broke a

piece of apparatus and was expelled from the

club. Piqued and aroused, he improvised an

apparatus of his own in a barn. Shortly after¬

ward the club gave a display and, after the

members had finished, Sargent and a friend

came forward and easily surpassed the athletic

fe&ts performed by the others. This event is

said to have been the direct cause that led Dud¬

ley Sargent to become an ardent physical edu¬

cator. He was graduated from high school in

1867, was invited to become teacher of gymnas¬

tics in Bowdoin College in 1869, and entered the college as a freshman in the regular course and conducted the physical work. In an endeavor to arouse the faculty and the public to the neces¬

sity for physical training, he was successful to the extent that, in 1871, gymnastics became a

part of the regular curriculum and Mr. Sargent, though a student only 22 years of age, was

placed at the head of the department, and filled the position with

credit. About this time he

brought out his system of chest-weights. In 1872

he accepted a position as director of the Yale College gymnasium, and for three years had

charge of both Yale and Bowdoin, spending

part time in each place. It was while at Yale that he fully developed the (<individual apparatusˆ for which he is so well known. At the solicitation of friends he went to New York and started a gymnasium on Fifth Avenue, which

at once sprang into popularity. In 1879 he ac¬

cepted the appointment of director of the Hemenway Gymnasium and assistant professor of

physical training at Harvard University. This

promotion of the department of physical train¬

ing to a rank equal to the scholastic departments of the university was a great stride forward,

and stamped the new system with the mark of

public approval. To Dr. Sargent is the credit

due for the invention of the chest-weight, the intercostal machine, quarter-circles, leg and

finger machine, and other appliances to the num¬

ber of 30 or more. He also elaborated a system of anthropometric measurements which enable

an examiner to ascertain at once the physical

condition of a student, and which guided a

director in prescribing proper exercises for the development of deficient parts. Dr. Sargent be¬

lieves in special work for individuals, and will not allow a man or woman to go into the gym¬

nasium and take the drills and work with the

apparatus indiscriminately. Health, harmony

and symmetry are the results aimed at.

About the same time, physical training was

taken up by and introduced into the Young

Men's Christian Association, whose local gym¬

nasia have done much to give the work a moral tone. We owe a great deal to such men as R.

J. Roberts of Boston, whose name has been as¬

sociated with the advancement of physical edu¬

cation since 1875, and whose dumb-bell drill

and book of exercises has long been a standard in the association's work. The organization of

the physical work under the auspices of the

Young Men's Christian Associations has been

practically responsible for the systematization

of the American system of gymnastics, and for

the establishment of a universal nomenclature

of gymnastics. Among those who have done

most for physical training along educational

lines, may be mentioned Dr. Hartwell of Boston, Dr. Gulick of New York and Dr. Seaver of Yale.

To-day, practically, all private schools have

a well-equipped gymnasium under the direction

of a man who has had special training in the application of exercise, the theory and practice of gymnastics, and who is, in many cases ˆ a

medical graduate. Systematic progressive

courses of work are conducted, which aim to

develop and strengthen, to give co-ordination

and grace, and to make the individual self—

reliant and resourceful. The equipment re¬

quired to obtain this result is necessarily exten¬

sive, consisting of a gymnasium, say 50 X 100

feet, with clear floor space, high-vaulted roof, a fine system of ventilation, and with every

variety of apparatus which the ingenuity of the specialists, and the energy and resourcefulness

of the manufacturers, can provide. The equip¬

ment consists of light apparatus — dumb-bells,

Indian clubs, bar-bells, wands ; heavy apparatus — German horse, parallel bars (suspended and

floor), horizontal bars (high and low), buck,

flying rings, traveling rings, horizontal and

vertical ladfler, climbing ropes, rope ladders,

spring-boards, beat-boards, floor-mats, wrestling

and tumbling mats, Swedish stahl bars, booms,

serpentine ladder and balance-beams; as well

as special apparatus — chest-weights, intercostals, quarter-circle, chest-expander, traveling

parallels, wrist-machine, long inclined plane,

sculling-machine, paddling-machine, leg-ma¬

chine, neck-machine, bicycle-trainer and so on

through an almost endless variety. No plant

is complete without its swimming-tank, varying

in size from 15 X 45 up; its shower-baths,

needle-baths, tub-baths ; and some have steam—

rooms and massage-tables. An indoor running

track is an almost indispensable adjunct to all well-equipped gymnasia ; and there should also

be the equipment for indoor athletics during

the winter months. Provision for indoor

games is also essential' — basket-ball, baseball

and ring-hockey. Each school has adjacent

athletic grounds with tennis-courts, quarter—

mile track, football and baseball fields and golf course. See Physical Training.

The college physical departments surpass

those of the preparatory schools only in size

and extent of equipment. Harvard University

probably excels all others in point of variety of equipment for special work. The summer work

in the public parks and school playgrounds

must also be noted. These out-of-door gymnasia

are equipped with extensive apparatus for all

outdoor work. Preparatory school work in

gymnastics is, by general consent, made to con¬

sist of a system of corrective, body-building

exercises, made up of free-arm work and light

calisthenics in the lower grades, followed by

heavier calisthenics, dumb-bells, clubs and

wands, light apparatus, intermediate and ad¬

vanced apparatus, boxing, wrestling and fenc¬

ing, interspersed with periods for recreative

games, competitions and contests of skill and

strength.

Bibliography. — Alexander, (Modern .Gym¬

nastic Exercises) (1890) ; Stebbins, helsarte

System of Expression (1892) ; Posse, (Special

Kinesology of Educational Gymnastics) (Bos¬

ton 1894) ; Ravenstein, (VolksturnbucfP

(1894) ; Broesike, (Der Menschliche Korper,

mit besonderer Berucksichtigung des Turnens)

(1894) ; Jones, A. K., Classified Gymnasium

Exercises* (Springfield, Mass., 1899) ; Maclaren, (A System of Physical Education (3d

ed., London 1895) ; (Syllabus of Physical Exer¬

cises for Public Elementary Schools) (ib.

1909) ; Maul, (Der Turnunterricht in Mad—

schenschulen* (3d ed., Karlsruhe 1909) ; id.,

(Anleitung fur den Turnunterricht in Knaben—

schulen (3 parts, ib. 1910) ; Nutzhorn and

Knudsen, (Legemsvelser for Pigeskolen)

(Copenhagen 1913) ; Nissen, 'Rational Home

Gymnastics for the Well and the Sick) (1898) ; Puritz, 'Codebook of Gymnastic Exercises*

(Hanover and London, many editions) ; 'Leitfaden fiir das Modchenturnen in den preussischen Schulen (Berlin 1913) ; Sargent, hand¬

book of Developing Exercises) (Cambridge,

Mass., 1899) ; id., health, Strength and

Power* (New York 1904 ; 2d ed., 1914) ; Torngren, 'Larobok i Gymnastik) (Stockholm

1905) ; haandbok i Gymnastik) (2d ed.,

Copenhagen 1901) ; haandbok i Gymnastik

for Armeen och Flottan* (Stockholm 1902);

Posse, 'The Special Kinesiology of Educational

Gymnastics* (Boston 1894) ; Stecher (ed.), 'A

TextBook of the German-American System of

Gymnastics* (ib. 1896).

GYMNOCLADUS, genus of trees of the natural order Leguminosce, suborder Cccsal— piniece. G. Canadensis is found in Canada and over a great part of the United States, attain¬ ing a height of from 50 to 60 feet, with branches remarkable for upright direction, and an exceedingly rough bark which comes off in slips. The leaves of the trees when young are very large, three feet long and bipinnatc. The tree is called Chicot in Canada, and sometimes Stump Tree, from its dead appearance in win¬ ter, and the absence of buds. It is also called the Kentucky Coffee Tree, because the seeds were formerly roasted and ground as coffee in Kentucky. The wood is used by cabinet-mak¬ ers and carpenters.

GYMNODONTS, a family of fishes in which the jaws are covered with a substance resembling ivory, arranged in small plates rep¬ resenting united teeth. The family includes the sunfishes, globefishes, porcupine fishes, *etc.*

GYMNOPHIONA, jim-no-fi o-na. Sec

Cecilian.

GYMNO SOPHISTS (Gk. yVflVOOO(j)l(7T /h’,

from yvgvog , gymnos, naked, and croˆcrrA’,

sophistes, sage), the name applied by the

Greeks to those ascetic Hindu philosophers who

sought to free the mind from all obstacles to philosophic contemplation by abstention from

food and clothing. They were also called Hy—

lobioi by the Greeks on account of their life in the forest. Their Sanskrit appellation, Vana-prasthas has the same significance. They are

mentioned by Plato, by Diogenes Laertius and

by Strabo, who divides them into Brahmans,

and Sarmans, of which only the first, he says, observed the distinctions of caste with all strict¬

ness. The gymnosophists in ancient India filled the place now occupied by yogis and fakirs.

GYMNOSPERM, j im’nosperm, a plant

with a naked seed. Among the gymnosperms

are the cycads, gingkos, conifers and Gnetacece.

The last group has numerous representatives,

among them an extraordinary tree or plant of

West Africa (W elwitschia mirabilis), the stem

of which, looking like a huge wood-fungus,

may, when mature, be a little over a foot high but several feet across. It bears but two

leaves, the cotyledons, which sometimes grow

to be five or six feet long and two or three feet wide, ultimately splitting into strips. The plant is said to live over. 100 years.

GYMNOTUS, jim-nd'tus. See Electric

Fishes.

GYMPIE, gTm'pi, Australia, town of March

County, Queensland, 107 miles north of Bris¬

bane, with which it is connected by rail. There are mines in the neighborhood for gold, silver, copper, antimony and bismuth. The coal mines

are as yet not developed. Pop. 12,500.

GYNAECOLOGY, in medicine and surgery,

the science which treats of the physical organ¬

ization of women and of the diseases peculiar

to them.

GYNAECUM, jin'e-se'um', apartments in a

Greek house set aside for the use of the

women. ˆGynaecontis® was the word used by

Procopius to designate the space reserved for

women in the Eastern Church.

GYOMA, dyo'ma, Hungary, town in the

county of Bekes, on the Koros R'VC-\ 115 miles east-southeast of Budapest, with which it is

connected by rail. It is the centre of an agri¬

cultural district, and markets grain, fruit, cattle and sheep. Wine, bricks and cereals are the

principal manufactures. Pop. 17,700.

GYBnGYOS, dyen'dyesh, Hungary, town

in the county of Hcvcs on the river of

Gyongyos,. 60 miles northeast of Budapest.

The principal buildings are the gymnasium, the

Franciscan monastery, and the hospital, erected

under the auspices of the Sisters of Mercy.

There is extensive trade in grain and cattle,

and there, are also important manufactures of

bricks, wine and copper goods. The mineral

springs in the neighborhood are of great medic¬

inal value. Pop. 18,500.

GYOR, dyer, or RAAB, a town in Hun¬

gary. See Raab.

GYP, pseudonym of Sibylle Gabriellf. Ma¬

rie Antoinette de Riquetti de Mirabeau,

Comtesse de Martel de Janville. See Mar¬

tel de Janville.

GYPSIES, jip'siz (from Egyptians, the

name by which they were known in the English

statutes), a race of wandering tribes scattered over all the civilized countries of the world, but more especially over western Asia, Europe

and northern Africa. They are called by the

French Bohemiens, from the belief that they

were Hussites driven from their country. In

Switzerland, the Netherlands and the Black

Forest they go under the names of Heiden

(Pagans) ; in North Germany, Denmark and

Sweden they are called Tater (Tartars). The

name they most frequently nass under in Ger¬

many is Zigeuner, which is not unlike the Italian Zingaro or Zingano, the Spanish Zingaro or

Gitano, the Hungarian Cigany, the Turkish

Tschinganeh. They call themselves Rom,

whence Romani, or Romany, the name of their

language. The number of gipsies in Europe is

roughly set at perhaps 750,000. Of this number about 200,000 are in Rumania ; 95,000 in Austria-Hungary; 120,000 in European Turkey; 40,000

in Spain; 40,000 spread over Germany, France

and Italy; 18,000 in Great Britain; and the re¬

mainder scattered over other countries. The

main body of their language is the same

throughout Europe, and has a close affinity

with the dialects of Hindustan, though it is

mixed with a great number of words and ex¬

pressions borrowed from the races among

whom they have sojourned. The gypsies are

distinct from the people among whom they

dwell, especially in their bodily appearance as a race and in their language. They are slight

and agile in frame, though sometimes tall of

stature. Their skin is tawny, or olive-colored, their eyes large, dark and brilliant. They have long hair, raven-black and sometimes ringletted.

The mouth of the gypsy is small and finely

shaped, and the teeth of pearly whiteness.

Scientific men have come to the conclusion that these wanderers are neither of European nor

of African origin, but are a remnant of some

obscure Indian tribe. This ethnological con¬

clusion is borne out by the fact that their

language is undoubtedly derived from the

Sanskrit, although intermingled with Oriental

terms and inflections appear words of Greek,

Slavic, Rumanian, Magyar, German, French

and English origin.

Organized gypsy bands first appeared in

Europe at the beginning of the 1 5th century,

and in Italy their number in 1422 was computed at 14,000. Five years later they made their

first appearance in Paris, saying that they were Chxdstians of Lower Egypt, driven to take refuge in Europe from the Saracens, and had recently

left Bohemia. They professed to be perform¬

ing a penance imposed upon them bv Pope

Martin V, who, after hearing their confessions

of sins committed during their travels, had or¬

dered them to wander over the earth for seven years without taking rest on beds. They were

permitted to settle outside the city of Paris; but when they began to practise palmistry and

fortune-telling the archbishop had them driven

away, and excommunicated the vast number of

citizens who had consulted them. Other bands

succeeded the 120 gypsies who first made their appearance in Paris; these latter had crossed

the Channel for England. They were great

thieves and in every European country they

visited were regarded with disfavor. In vain

laws were passed against them. Francis I of

France ordered them to leave the country on

pain of being sent to the galleys without trial.

The States-General of Orleans condemned them

to perpetual banishment. In the middle of the

15th. century Pope Pius II cites them as thieves from the Caucasus. In 1492 Spain exiled them

and renewed the decree 100 years later. Eliza¬

beth of England followed Henry VIII in ut¬

tering a proclamation against them. In Scot¬

land they were sheltered and protected, and

John Faw, Lord and Earl of Little Egypt, was

empowered by royal writ to exercise authority

over his gypsy subjects. Germany tried to

eliminate them, and Maria Theresa, in 1768,

undertook to settle them as peasants on the

land. This attempt was not successful, but

Joseph II by severe measures induced many of

them to settle, practise trades and have their children educated. They are less a vagrant

class than formerly. This is due largely to

the stricter policing of the rural districts, and the increase of intelligence among the peasantry, and among the gypsies themselves.

See Gypsy

Language, Gypsy Religion and Folklore.

Bibliography. — Black, (A Gypsy Bibliography) (London 1913) ; Barrow, (The Zincali,

or an Account of the Gypsies of Spain } (Lon¬

don 1861) ; Breithaupt, (Die Zigeuner und der

deutsche StaaC (Wurzburg 1907) ; Callot,

(Les Bohemiens) {Journal of the Gypsv Lore

Society, Liverpool 1907) ; Colocci, (Gli ZingarP

(Turin 1889) ; De Goeje, (Bijdrage tot de

Geschiedenis der Zigeuners) (Amsterdam

1875) ; Drylund, (Tatere og Natimandsfolk i

Danmark) (Copenhagen 1872) ; Dumbarton,

(Gypsy Life in the Mysore Jungle) (London

1902) ; Grellmann, (Die Zigeuner) (Dessau

1783) ; Groome, ˆavengroˆ (London 1889) ;

Leland, (The English Gypsies and their Language) (London 1874) ; Miklosich, (Ueber die

Mundarten und die Wanderungen der

Zigeuner Europas1* (Vienna 1880) ; Paspati,

(Etudes sur les Tchinghianes ou Bohemiens

de l'Empire OttomaiP (Constantinople 1870) ;

Polek, (Die Zigeuner in der Buckowina)

(Czernowitz 1908) ; Pott, (Die Zigeuner in

Europa und Asien) (Halle 1845) ; Simson, (A

History of the Gypsies* (New York 1878).

GYPSOPHILA, jip-so-fi-la (Baby's

Breath). A genus of European and Asiatic

annual and perennial herbs of the family

A'.cinacccc. They are highly valued and widely

planted for their small flowers which, being

upon branched stems, give a pleasing effect to bouquets and a mist-like grace to flower-borders. They are of simplest culture upon

somewhat dry soils, especially among rocks and

in sunny situations. The perennial species are

hardy. Six or more species and a few varie¬

ties are cultivated in American gardens and

greenhouses.

GYPSUM (also known as GYP), a native

hydrated sulphate of calcium, having the

formula CaSCh + 2H20 ; the water of crystal¬

lization being the only thing that differentiates it, chemically, from the orthorhombic mineral

anhydrite. Gypsum is usually colorless or

white. It crystallizes in the monoclinic system, contact twins and penetration twins being very

common; and it also occurs in massive forms.

The pure crystals have a hardness of from 1.5

to 2.0, and a specific gravity of about 2.32.

Gypsum is an exceedingly abundant substance,

and is met with in many parts of the earth,

and in a variety of forms. When found in the form of clear, transparent crystals, it is known as selenite ; when the mineral is finely fibrous, and the fibres are parallel to one another so as to form a mass with a pearly opalescence, the mineral is called satin spar; when it occurs in uniform, fine-grained, translucent masses, it

is known as alabaster; and when it occurs in

large beds of massive rock, often mixed with

clay, calcium carbonate and other impurities, it constitutes the earthy gypsum, or rock gypsum,

of commerce. The mineral is often found as¬

sociated with salt (q.v.) and is believed to have been formed in the same manner by evaporation

of lakes in arid regions. Extensive beds of the mineral are known in western United States in

the socalled red beds (q.v.) of Permian and

Triassic (qq.v.) Age. It also occurs in the

salina (q.v.) beds of New York. Gypsum is

soluble in from 400 to 500 parts of water at ordinary temperatures, but it dissolves more

freely in hydrochloric acid. When heated, it

loses part of its water of crystallization, though it retains the power of recombining with water to form a hard, non-crystalline mass, if the

temperature to which it is exposed does not ex¬

ceed 500° F. It is this property of recombining with water which gives to dehydrated gypsum

much of its industrial value. # (See Plaster of Paris). When heated with charcoal, gypsum

is converted into calcium sulphide, which dis¬

solves readily in dilute acids, with evolution of sulphuretted hydrogen gas. In this way the

sparingly soluble sulphate of calcium may be

converted into the soluble chloride or nitrate of calcium. Gypsum, when pulverized, is used as

a fertilizer, its efficiency in this respect being apparently due in large measure to the fact that it facilitates the decomposition of rocks con¬

taining alkaline silicates. The production of

gvpsum in the LTnited States in 1914 was 2,-

476,465 short tons, valued at $6,895,989. New

York, Iowa, Michigan, Ohio, Texas and Okla¬

homa were the principal producing States,

ranking in the order given. The United States

ranks second in the world's production of

gypsum, France being first, and Canada third.

See Mineral Production in the United

States.

GYPSY. See Gypsies.

GYPSY LANGUAGE, a tongue spoken by

a wandering race scattered over Europe, Si¬

beria and most of western Asia, Egypt, north¬

ern Africa, most of the countries of the Amer¬

ican continent and parts of Australia, India

and China. It is not known definitely when

the gypsies began to flood into Europe ; but it was probably at a date earlier than history has recorded, since the many modifications of their tongue, customs and folklore would seem to

indicate this. They were early known as Aztigan, from which term is derived their German

name Sigeuner (Italian Zingari, Spanish Gitano) ; but the meaning of the term is un¬

known. It seems not to have been used by the gypsies themselves. Some writers contend that

the gypsies, under the name Komodromoi, were

known to the West as early as the 6th century, while others maintain that they did not appear in Europe and western Asia until the 14th cen¬

tury. The derivation of the name Aztigan has

been the subject of much discussion, with

little to support the various theories advanced.

Some have contended that it is of the same

origin as the Mexican word Aztec, that is, that it is from the Nahuat language, and that the

gypsy belongs to the great Nahuat family.

This derivation is based on the purely acciden¬

tal resemblance of ˆAztec® and Aztigan. Other

writers have derived the word from the Per¬

sian ˆchang,® a harp, or stringed instrument

similar to the zither, or from the Persian

(<zang,® meaning black. Still others have seen in Aztigan the Athinganoi, the Melki-Zedekite

sect of Asia Minor. Numerous other deriva¬

tions of the name Aztigan have been advanced,

all more or less fanciful and unsupported by

satisfactory authority. The gypsies call them¬

selves Rom (feminine Romini) in Europe; but

it is in no way certain that this is the name they bore when they first came out of Asia.

In fact it is almost certain it was not; for they appear to. have been early known as <(Ciam® in Italy and the adjacent islands. Their first his¬

torical movement seems to have been out of

Hungary into western and southern Europe.

It is not at all certain that at this early period they were as nomadic as they soon afterward

became. At any rate the treatment they re¬

ceived in Europe tended to make them wan¬

derers, for they seem to have been wanted no¬

where. They were murdered wholesale, en¬

slaved, legislated aeainst, treated as heathen

and outcasts, denied the rights of the Christian Church, and driven from one country to an¬

other, exile being forced upon them under pain of death. From the British Isles to Russia;

from Germany to Italy they were ever in fear

of being literally crucified, hanged or burned

This naturally confirmed them, as a race, in

their wanderings and made them tenacious of

their language, customs, folklore and religious

beliefs and superstitions. Christianity, which

gave them neither sympathy nor tolerance,

naturally obtained little or no hold upon them.

But while they thus retained their racial and

tribal life, they naturally gathered, to them¬

selves many of the customs and considerable of the vocabulary of the countries through which

they passed; so that it is often difficult to tell whether many of the words in use in. the gypsy language to-day are of European origin or have vol. 13 — 38

been handed down from their ancient tongue.

This is all the more difficult since the gypsy language, which has been the subject of much

discussion and investigation; is now generally

admitted to be of Indo-European origin and to

be a sister tongue of the Germanic, the Slave, the Celtic and the Greek and Roman tongues.

Men like Pott and Miklosich, who made an ex¬

haustive and scientific study of the gypsy lan¬

guage, have come to the conclusion, based upon incontestable evidence, that it must have been, at one time, a more or less distinct tongue

spoken by an extensive homogeneous race ; and

that it has ever exhibited strong independent

family characteristics such as could only have

been developed by a comparatively pure race.

But more recent studies have shown, by the

comparison of the gypsy language as now

spoken in various parts of Europe and Asia,

that it has undergone very fundamental changes

in the course of the nomadic life of the race.

In the meantime the languages of India have

passed through many changes, as have also the

Indo-European tongues in Europe. The task

of determining the origin of the gypsy lan¬

guage is, therefore, so formidable that it ap¬

pears, with our present knowledge of the sub¬

ject, impossible. But the studies already under¬

taken have proved, for a certainty, its Indian origin. This does not necessarily mean that

the gypsies were originally from India; but it does mean that they speak a tongue similar to the Sanskrit, from whatever part of the earth

came the races who first spoke it, whether from India, central or western Asia or some other

part of the continent.

It is probable that much light will yet be shed on the obscure wanderings of the gypsies

through a more detailed study of their lan¬

guage and a comparison of its many dialects

and the words it has borrowed from other

tongues during these wanderings. These dia¬

lects and additions to the language should help to fix the date of the gypsies in various coun¬

tries ; for it is now known that the gypsy

tongue has carried many Greek, Latin, Hunga¬

rian and Germanic words almost unchanged for

long periods of time. Persian and Rumanian

words primitive in form also exist in the gypsy speech; and it is probable that further investi¬

gation and comparative study will show that

gypsy words have been gathered from still

other more primitive forms of speech. The

gypsy language has, therefore, since the middle of the 19th century, when students of languages first began to pay attention to it, become of very considerable importance in the compara¬

tive study of the languages of Europe and

southern and western Asia.

Romany, as the gypsy language is called,

consists of 14 distinct dialects in Europe alone, which show among themselves as much vari¬

ation as exists in Spanish and Portuguese or

Italian, for example. This means that gener¬

ally a gypsy who speaks one dialect cannot

understand a gypsy who speaks another dialect.

Of all these dialects, the freest from foreign influence appears to be those of Hungary, Tur¬

key and the Balkan states. As the gypsies

moved westward their language gathered more

and more foreign words on the way. Thus

the dialects of Spain, France, the British Isles and America have gathered more foreign addi¬

tions and lost more of the grammatical forms

of the earlier tongue and have thus become

noticeably corrupted. All these dialects, how¬

ever corrupted they may be, exhibit Romany

as a tongue rich in ,both vowel sounds and con¬

sonants and still possessed of inflections. The nouns have eight cases. There is a regular

masculine ending for the article which is

nearly always ˆo.® The pronouns are also de¬

clined and have the same number of cases as

the nouns; and the verbs are conjugated with

many and complex forms which make the ac¬

quirement of the language difficult. This diffi¬

culty is increased owing to the fact that there are many irregular verb and other forms in

Romany. The wanderings of the gypsies have

also affected the structure, inflections and other forms of their language so that a very consid¬

erable difference in grammatical structure ex¬

ists between the dialects of the British Isles and those of eastern and southern Europe and

western Asia, for example. In the latter

countries the older grammatical forms still per¬

sist while in England they have largely broken down. This makes the study of Romany still

more difficult and calls for as much compara¬

tive investigation as does the comparative phi¬

lology of the Romance tongues. This work is

being done by a considerable body of enthusias¬

tic students, the works of the more important

of which are given in the following reference

list.

Bibliography. — (List of Works in the New

York Public Library Relating to Gypsies) (New

York 1906) ; Journal of the Gypsy-Lore So¬

ciety, 1st series (Edinburgh 1888-92) ; 2d series (Liverpool 1907 et seq.) ; Black, (A Gypsy

Bibliography > (London 1913). Consult also

Baudrimont, A., (Voc.abulaire de la langue des

Bohemiens habitant les pays basques frangais)

(Bordeaux 1862) ; Borrow, G., (Romano Lavo—

Lil, Word-Book of the Romany [English dia¬

lect]) (London 1905); Decourdemanche,

(Grammaire du Tchingane) (Paris 1908) ;

Finck, F. N., (Lehrbuch des Dialekts der deutschen Zigeuner) (Marburg 1903) ; Graff under,

(Ueber die Sprache der Zigeuneffi (Erfurt

1835) ; Jesina, (Romani-Cib oder die Zigeuner—

Sprache) (Leipzig 1886) ; Kalina, (La langue

des Tziganes slovaques) (Posen 1882) ; Leland,

C. G., (The English Gypsies and their Language) (London 1874) ; Paspati, A. G., (Etudes sur les Tchinghanes, ou Bohemiens de l'empire

Ottoman J with grammar, vocabulary, tales

and French glossary (Constantinople 1870) ;

Prince, (The English Romany-Jargon of the

American Roads) in the Journal of the Ameri¬

can Oriental Society, Vol. XXVIII (New

Haven 1907) ; Rebolledo, T., (A Chipi-calli, la lengua gitana : diccionario gitano-espanoP

(Granada 1900) ; Smart, B. C., and Crofton,

H. J., (The Dialect of the English Gypsies)

(2d ed., London 1875).

John Hubert Cornyn,

Editorial Staff of The Americana.

GYPSY MOTH (Porthetria dispar L.). a

destructive insect pest in Europe, introduced

into the United States in 1869 by a naturalist who was carrying on experimental work with

insects. Later in the season some of the cater¬

pillars escaped and the species established it¬

self. The female moth deposits a cluster con¬

taining A00 eggs or more, which she covers

with buff-colored hair. Most of the egg clus¬

ters are laid during the month of July and

hatch about the time the leaves begin to ap¬

pear the following spring. They are deposited

on the underside of branches of trees, on tree trunks, under loose bark, or in cavities in the trunks or branches, and are sometimes placed

on stones or rubbish and in a variety of situa¬

tions where they are concealed from view. As

the female moth does not fly, egg-clusters are seldom found far from the food-plant upon

which the caterpillars developed. The newly—

hatched larvae feed on the opening leaves, mak¬

ing small perforations. They grow rapidly and

become full-fed early in July. During this

period they molt five or six times, and as they increase in size a larger proportion of the foliage is eaten, so that trees are sometimes entirely stripped. When full-grown the caterpillars shed

their skin and transform to pupae, in which stage they remain for about 10 days, after which the adult insects emerge. The female moth meas¬

ures about two inches across the wings, is of a yellowish-white color, with black markings on

the outer edges of the wings. The male is con¬

siderably smaller, and of a brown color with

similar black markings. The most favored

food-plants of the gypsy moth are the apple,

the different species of oak, gray birch, alder and willow, but in cases of bad infestation all deciduous trees are injured, with the exception of ash. The moth does enormous injury to

tree-growth. There are few insect enemies of

the gypsy moth native to New England that

cause any noticeable benefit in reducing its

numbers. The enemies which have been estab¬

lished by the Bureau of Entomology and are at present destroying the largest number of gypsy-moth caterpillars and pupse are a Calosoma bee¬

tle (Calosoma sycoplianta) ; a tachinid fly

(Compsilura concinnata) , and a species of

Apanteles (Apanteles lacteicolor) . These

have served greatly to reduce the numbers of

the moth in many badly-infested areas, and,

when established in large numbers in the in¬

fested territory of New England, the gypsy

moth will be a very minor destructive factor.

Meanwhile hand and mechanical methods of

fighting the pest must be continued. These in¬

clude the collection of egg masses, the destruc¬

tion of caterpillars under burlap bands placed

about the trunks of trees and spraying with

arsenate of lead or other arsenical poisons.

Creosote, to which a small amount of lamp¬

black has been added, has been applied with a brush with good results to the egg-clusters be¬

tween 1 August and 1 April. Tanglefoot bands

are also used on tree trunks after the bark

has been scraped so that the sticky material

can be applied evenly in a thin layer with a paddle. This effectively prevents the cater¬

pillars from ascending the trees. Consult

(Farmers' Bulletin 564} (Washington, 29 Jan.

1914).

GYPSY RELIGION AND FOLKLORE.

The gypsy religion, which was originally the

old pantheistic conception of the Indo-European

tribes, has been so extensively and continuously modified in the course of the centuries of

wanderings of the gypsy tribes in many lands

that the ancient belief, as a religious system, has disappeared, leaving behind it many curious superstitions, beliefs and practices. The gypsy, being a constant and persistent wanderer, has

erected no churches, elaborated no system of

religion, associated himself, as a race, with no special form of religious belief. In England

he is nominally Protestant; in most Catholic

countries where he has long resided he has con¬

formed, in a manner, to Catholicism ; among

the Mohammedans he generally subscribes to

the creed of Islam; in Russia and Greece he

bows to the tenets of the Greek Church. But

everywhere he carries with him more than an

echo of the rich, imaginative faith of his Indian ancestors. It is this perhaps more than any¬

thing else that binds him to his nomadic life and renders him a factor apart from the life in which he lives. Amulets, charms, nature spirits and mysterious forces, unknowable and inex¬

plicable, form a part of his life. Dreams,

omens, signs and the planets exercise, he be¬

lieves, a constant influence over his being and his actions. His isolation, racially, from the

people of the nations among which he resides,

his illiteracy, his traditionary lore of very con¬

siderable extent and his tenaciousness of tribal customs and practices have continued to mark

the gypsy as distinctly as the Jew has been

marked, throughout the many centuries during

which he, too, has been a wanderer from his

native land. Naturally where gypsies live to¬

gether in large numbers, as in Transylvania,

these characteristics are more strongly marked.

Here mythology, folklore and curious supersti¬

tions, survivals of the very distant past of the race, are abundant, imaginative and varied.

Here that attitude of the gypsy toward life and religion is much more pagan than Christian.

Yet even here these ancient religious beliefs

and social customs and superstitions are

strongly influenced by Christianity. The gypsy's religious attitude has ever been so hard to

understand that he has been accused of having

not only no specific religion but no religious sense. This is not a true view, however. The

gypsy's religion, as has' been already pointed out, varies according to the country in which he

lives ; the influences to which he has been sub¬

jected; the length of time that these influences have been exerted; the

extent of the body of

gypsies living together and their tendency to

become less nomadic. In England, for in¬

stance, the gypsy belief may be said to be

Christianity fantastically trapped out with the

survivals of an elaborate nature worship. In

Austria and Asia the gypsy nature worship has

put on the trappings of Christianity but has

assimilated little of its spiritual force or its attitude toward life.

The fortune telling and crude astrology of

the gypsy are survivals of his tribal religion for the fortune teller is but the modern form of the ancient oracle. In many countries the gypsy

still governs his actions by omens and he is

even given to reading the signs of nature. He is much of a fatalist and luck and unluck are his constant companions. Palmistry is an <(artw that he has handed down for unknown cen¬

turies, from father to son, or rather from

mother to daughter. The gypsy woman may

and does read fortunes to flatter those who try, through her medium, to look into the future.

This is but an exhibition of the dishonesty and deceitfulness so often shown . by the race.

Even though she knows she is not keeping

faith with her office and profession, she. still firmly believes in the science of palmistry

which she has been taught to read; though it is not always to her interest to interpret as she reads. With her ancestors palmistry was a

religious rite ; and even to-day it is used very much ffi the ancient sense, to forecast the

horoscope of a child and the luck of persons

going into new ventures or entering into new

relationships in life, as marriage, for instance.

Curious gypsy religious rites and supersti¬

tions survive in connection with the marked

events in life, as birth, marriage, puberty,

sickness and death, all of which seem to have had a very primitive origin. Many of these

practices still .survive among even small com¬

munities of gypsies who have long been sub¬

jected to modern civilization and Christianity

and who have apparently forgotten the faith of their Asiatic ancestors.

Folklore. — Among the gypsy tribes there

exists a vast body of folklore rich in variety, imagery and invention. The gypsy mythology

and folktales are curiously suggestive of the

primitive Indo-European folklore to which

they are first cousins. Fairies, tree-spirits,

water-demons, good-people, wind-men, witches

of the air, giants, fire-spirits, ghosts, super¬

natural people, dwellers within the earth, pig¬

mies, kindly disposed helpers like the brownies constitute the more active dramatic personnel

of these tales, which are still told around the gypsy camp fire more or less as they were 2,000

years ago except in so far as they have been modified by the exigencies of the modern life

of the tribes. Their stage is as broad as the mind of man. It includes the sky and the great starry region above (for the two are separated in gypsy lore) where the stars s*dl hold do¬

minion as they did in the ancient days before the knowledge of physical and natural sciences

had come to disturb the mind of the Indo-Eu¬

ropean and to change his point of view with

respect to the universe. It embraces the earth-surface, the waters of the rivers, the lakes

and the sea lying between the great cloud-land and the dark under regions. Throughout all

these regions wander the spirits created by

gypsy fancy as freely as the supernatural char¬

acters of an Arabian tale. Supernatural power,

magic spells, charms and fetiches form ordinary parts of most gypsy tales which delight in deal¬

ing with the supernatural. The gypsy lives

still in the age of animism. To him everything in nature is alive (where he is living under his normal conditions and in true gypsy communi¬

ties). He believes in numerous beings whose

goodwill it is to his interest to win. Therefore his tales often deal with the terrible power of witches; and other evil-disposed spirits that

accompany certain animals are also favorites

with the. gypsy folk. These are outwitted bv

charm, incantations and other supernatural

powers in which appears the miraculous efficacy of the Christian cross, often transformed into

the trident of the Hindu God Shiva, the De¬

stroyer, the third member of the Hindu trinity.

Consequently in gypsy tales of this sort, the

cross frequently figures in associations very far from Christian in spirit, for it is pictured as a destroyer as well as a preserver. Sometimes

the gypsy hero goes forth to meet his enemies in terrible conflict armed only with the cross; and the destruction he accomplishes by means

of its miraculous power recalls, in a more than suggestive manner, the ravages of Shiva the

Terrible, the giver and taker of life. In gypsy tales, too, figure dreams, omens, charms, amu¬

lets, curiously yet vividly and realistically as¬

sociated incantations and mysterious occult

powers. From the under-world also cofne tales

strongly reminiscent of ancient Greek, Roman,

Persian and Germanic myths. Some of the

gypsy tales are very similar to those told by the peasants of Russia ; and the spirit that per¬

vades the gypsy relation is more that of Russia than that of the Western world which may in¬

dicate that the gypsy is more closely related to the Slav than to the more western Indo-Eu¬

ropean races. See Gypsies ; Gypsy Language.

Bibliography. — Dumbarton, (Gypsy Life in

the Mysore Jungle) (London 1902) ; Groome,

(Gypsy Folktales } (London 1899) ; Katada,

(Contes gitanos) (Logrono 1907) ; Liszt, (Des

Bohemiens et de leur musique en Hongrie)

(Leipzig 1881) ; Von Wlislocki, (Vom wan—

dernden Zigeunervolke) (Hamburg 1890) ;

'Volksglaube und religioser Brauch der

ZigeuneD (Munster 1891) ; (Aus dem inneren

Leben der Zigeuner) (Berlin 1892). Also con¬

sult list of works in the New York Public Li¬

brary relating to gypsies (New York 1906) ;

Journal of the Gypsy Lore Society (Edinburgh

1888-92; and Liverpool 1907).

John Hubert Cornyn,

Editorial Staff of The Americana.

GYRATION, Radius of. The energy re¬

quired to set a body in rotation in any given manner depends on the arrangement of the mass

of matter to be rotated. Thus, a mass made

into a ring like a wheel with very light spokes requires the expenditure of more energy in

order to set it to rotate once per second on its axis than would be required if the same

amount of matter were made into a uniform

circular plate of the same radius. The energy

required to set any given body in rotation with a given angular velocity about any given axis

depends, in fact, on the ((moment of inertia®

of the given body about that axis ; and the mass of the body being given, the moment of inertia depends on the way in which the mass is dis¬

posed about the axis of rotation. The radius

of gyration about a given axis is the distance from that axis at which the whole of the matter of the given body might be concentrated with¬

out altering the moment of inertia. The mo¬

ment of inertia and radius of gyration for any given body about any given axis may be cal¬

culated mathematically; the moment of inertia

of a body is /A 2d V, where p is the density V

and r the distance of a variable point from the axis, and the radius of gyration is

where M is the mass of the body. The two

magnitudes are evidently of great importance

in the theorv of rotating bodies.

GYRFALCON. See Jerfalcon.

GYRO-COMPASS. Gyroscopic compasses

are of two types, known as the single-gyro

type and the two-gvro or twin-gyro type. In

either type, the directive force is obtained en¬

tirely from the rotation of the earth and does not depend even in the slightest degree upon

the earth's magnetism. This directive force

depends upon the angular movement of the

earth only, and it not affected by the linear velocity of the compass through space. Both

types make use of the two fundamental prin¬

ciples of the gyroscope, namely, the tendency

of a gyroscope to maintain its plane of rota¬

tion in space and the phenomenon known as

precession.

In the single-gyro type, a single gyroscope

is mounted with three degrees of freedom but

one of these degrees of freedom is restrained

by gravity in such a manner that the gyroscope is made to take up a position with its axis

lying in the plane of the earth's axis and with its direction of rotation the same as that of the earth. Owing to the very large angular move¬

ments of the ship due to rolling and pitching as compared to the very slow angular move¬

ment of the earth, it is necessary to provide means in the form of an auxiliary gyroscope

or gyroscopes to neutralize the effect of these movements of the ship.

In the twin-gyro type, we have two gyro¬

scopes mounted with their axes parallel to each other and spinning in opposite directions.

These gyroscopes are so controlled that they

assist each other in seeking the meridian while the effects due to rolling and pitching of the ship are neutralized.

GYROMANCY, the process of divination

by walking around in a circle.

GYROSCOPE, ji'ro-skop (from the

Greek guros, a circuit, skopeo, I see), scientifi¬

cally, any freely suspended rotating body; tech¬

nically an instrument making use mechanically

°f forces developed by rotation and the compo¬

sition of rotations. The gyroscope is simply a manifestation of the laws of inertia. Its inven¬

tion is ascribed to Jean Bernard Leon Foucault (1819-68), whose famous experiments with

pendulum and gyroscope proved and measured

the diurnal motion of the earth. The applica¬

tion of the gyroscopic principle, however, was

made many years previously to Foucault's ex¬

periments, and the instrument in some of its

forms originated probably in Germany or

h ranee, toward the end of the 18th century.

A form of the instrument is popular as a toy, in the familiar gyroscopic top.

The construction of the gyroscope is such

that the axis of rotation can be made to point to some star in the sky. Then, as the heavy

disc whirls round, it is found that the axis

continues to point to the moving star, though, in consequence of this, apparently altering its direction relatively to bodies on the earth. If, again, the axis be pointed to the celestial pole, which is fixed, no alteration in its position

relative to bodies on the earth takes place.

The following lucid exposition of the prin¬

ciples governing the action of the gyroscope is given by Dr. S. Tolver Preston in an article

on (The Mechanics of the Gyroscope) repro¬

duced from ˆTechnics® in the Scientific Ameri¬

can Supplement of 8 Oct. 1904:

((According to the Newtonian system of dynamics. (a system which is now universally

recognized and accepted), the velocity of a

particle can only be increased in any given

direction by the application of a force acting in that direction ; conversely, its velocity in a GYROSCOPE

given direction can only be diminished by the

application of a force acting in an opposite

direction. The magnitude of the applied force

is proportional to the rate of increase or de¬

crease of the velocity of that particle.

<(Let us suppose that a series of equally heavy particles are arranged around the circumfer¬

ence of the circle in Fig. 1. These particles may be supposed to be rigidly connected one

with another, the whole being connected by

massless spokes, with an axle passing through

C, the centre of the circle; this axle being at right angles to the plane of the paper. This

arrangement constitutes an ideal flywheel and

may be considered typical of an ordinary gyro¬

scope disc.

“Let the flywheel be set in rotation in the

direction indicated by the arrow. The prob¬

lem before us is to determine the nature of the forces which must be applied to the rotating

flywheel in order to deviate the axis of rota¬

tion. Let us suppose that the flywheel, while

still rotating at a uniform velocity about its axle, is constrained in addition to turn about the line A B, at right angles to the axle. Look¬

ing in the direction A B, let the flywheel turn about that line in a clockwise direction, so that the side L moves downward through the plane

of the paper, while the side R moves upward

through the same plane. The particles at e

and p being, at the given instant, on the axis of rotation A B, will possess no velocity of

rotation about that axis. So far as it con¬

cerns other particles, their velocities of rotation about A B will be proportional to their per¬

pendicular distances from that line. Sixteen

equidistant particles on the circumference of

the circle have been indicated. The rotational

velocities of these particles, about the lino

A B, will be proportional to the respective

perpendiculars let fall on A B.

(<In a certain interval of time the disc will complete a revolution about its axle. In one-sixteenth- of this interval of time, the particle, a will move round the circle so as to attain the position previously occupied by the particle b.

In doing so, the particle a will acquire the

velocity previously possessed by the particle b, i.e., its velocity about the axis A B will be diminished, since b is nearer than a to the axis A B. The diminution of velocity will of course be proportional to a D, where b D is a line drawn from b perpendicular to C a. But since

the velocity of the particle a, in a direction passing vertically downward through the plane

of the paper, is diminished as the particle moves from a to b, this particle must have been acted upon by a force directed vertically upward

through the plane of the paper, and propor¬

tional to a D. This force is indicated by a

small circle containing a dot at its centre. The dot indicates the po-nted end of an arrow sup¬

posed to be directed vertically upward through

the paper ; while the diameter of the small

circle is drawn proportional to a D, or to the magnitude of the force.

((While the particle a moved to b, the par¬

ticle b moved to c. In this time the velocity of the particle b, perpendicular to the plane of the paper, must have been diminished by an

amount proportional to b E. A small circle

containing a dot at its centre, and of a diameter proportional to b, E, indicates the magnitude and direction of the force which must have heen

applied to the particle as it moved from b to c.

<(The force which acted on the particle c as

it moved to d, and that which acted on the par¬

ticle d as it moved to e, are represented in a similar manner.

<(Owing to the rotation about the line A B,

all particles on the right-hand side of the disc are moving upward through the plane of the

paper ; thus it follows that the particle e, in moving to the position f, must have acquired a velocity, directed vertically upward through the paper, proportional to G f. It must, therefore, have been acted upon by a force, proportional

to G f, directed vertically upward through the paper. The forces acting on the particles f, g, h, can be determined in a similar manner.

((It is obvious that the velocity of the parti¬

cle k, directed upward through the plane of

the paper, is diminished as that particle moves to the position previously occupied by the par¬

ticle /. Consequently, it must have been acted upon by a force, of which the magnitude is de¬

termined in the manner previously explained,

acting downward through the plane of the

paper. A circle, of which the diameter is pro¬

portional to this force, while the cross at its centre represents the feathered end of an arrow directed downward through the paper, indicates

the magnitude and direction of the force acting on the particle k as it moved to /. The forces acting on the particles, l, m, n, p, q, r, s, are

de¬

termined similarly, and represented by circles

containing crosses, to indicate that the forces act downward through the plane of the paper.

((A glance at Fig. 1 shows that all forces

acting on the part of the flywheel above the

line a k, are directed upward through the plane of the paper; while all forces acting on the

part of the flywheel below the line a k, are directed downward through the plane of the

paper. All the forces acting above the line

a k might be replaced by a single resultant

force, acting upward through the. paper at some-598

point on the line C e ; while all the forces act¬

ing below the line a k might be replaced by a single resultant acting downward through the

paper at some point i*n the line C p. These two resultant forces, acting parallel to each other, but in opposite directions, constitute a couple, and produce a torque or turning moment about

the line a k. Thus, in order to turn the re¬

volving flywheel about the diameter e p, we

must apply a torque which, if it acted on the stationary flywheel, would turn it about the per¬

pendicular diameter a k. Conversely, if we

apply a torque tending to turn the flywheel

about a diameter a k, it will turn, not about a k (as might have been expected), but about

the perpendicular diameter e p.

<(The torque necessary to deflect the flywheel

might be produced by forces acting directly

upon it, as for instance, by blowing air on the upper half of the flywheel from the back, and on the lower half from the front. Gener¬

ally, however, it is more convenient to act

on the axle, the end above the plane of the

paper being urged in the direction C B, while the end below the plane of the paper is urged by an equal force, in the direction C A.

((Some further points should be noted. Any

force acting to the right of the line A B is equal, both in magnitude and direction, to a

corresponding force acting to the left of the

same line. Consequently as the flywheel turns

about the axis A B, no work will be performed by the forces producing this rotation. This

follows from the circumstance that whereas

one force acts in the direction of motion (so far as relates to rotation about the axis A B) the other equal force is opposed to that motion.

((The actual behavior of a gyroscope can now

be easily understood. The flywheel a a (Fig.

2) having been set in rapid rotation in the di¬

rection indicated by the arrow r, the frame

carrying it is supported from a projection n

at one end, on a pivot o. Instead of falling to the ground, as it would do if it were not ro¬

tating, the gyroscope remains with its axis b z horizontal ; but the axis turns in a horizontal plane about the point of support o, in the direc¬

tion indicated by the arrow s. The torque pro¬

duced by the pull of gravity is easily seen to be that required to turn the flywheel a a about a vertical diameter in the direction mentioned.

The fact that the flywheel, besides rotating

about a vertical axis, also revolves in a circle about the point o as centre, is merely due to the circumstance that, under the conditions of

the experiment, the rotation cannot occur with¬

out the revolution.

((It is instructive to consider the same prob¬

lem from a somewhat different standpoint. We

have already determined the nature of the ap¬

plied forces required to turn the ideal rotating flywheel (Fig. 1) about the axis A B, in a

clockwise direction when viewed from A. We

found that a torque must be applied which

tends to urge the end of the axle above the

plane of the paper in the direction C B, and the opposite end of the axle in the direction C A. It will now be proved that the reaction of the rotating flywheel, when it turns as above, about the axis A B, produces

a torque which

tends to urge the end of the axle above the

plane of the paper in the direction C A, and the other end of the axle in the direction 0 B.

((Under the given conditions, the component

velocities, downward through .the plane of the

paper, of the particles a, b, c, d, are all being diminished; and the consequent reactions tend

to turn the axle in a clockwise direction, about the line k a, when viewed from the side k.

The component velocities, upward through the

plane of the paper, of the particles e, f, g, h, are all being increased, and the consequent re¬

actions tend to turn the axle in the same direc¬

tion. It is easily seen that the reactions due to the alterations in the velocities of the particles k, l, m, n, p, q, r, s, all tend to' turn the axle of the flywheel in the same direction. Thus

the torque due to the reaction of the rotating flywheel when turning about the axis A B, is

of the character specified above.

((The precise way in which the gyroscope

(Fig. 2) acts can now be readily followed.

When the frame carrying the rotating flywheel

a a is first supported on the pivot o, the initial tendency is for the whole to descend toward

the earth, under the action of gravity. But the pivot o prevents the end b of the axle from de¬

scending, so that an incipient rotation about a horizontal diameter commences. The reaction

due to this rotation produces a torque which

tends to turn the flywheel about a vertical diam¬

eter in the direction of the arrow j. As the flywheel is free to turn in this direction, it at once commences to do so, and in so doing

generates a reacting torque opposing the in¬

cipient rotation produced by gravity. The ac¬

tion of gravity being opposed, the rate. of (in¬

cipient) descent of the flywheel is diminished; but so long as descent continues, a torque acting in the direction of the arrow .f. will be produced, Fig. 2. ,

and this will increase the velocity of turning, thus increasing the torque which opposes the

descent of the flywheel under the action of

gravity. The flywheel, finally, acquires a rota¬

tional velocity in the direction of the arrow s, which produces a reacting torque just equal

and opposite to that due to the pull of gravity.

If friction were entirely absent, the flywheel

would then cease to descend, and would con¬

tinue to turn at a uniform rate in the direc¬

tion of the arrow s. In this process, the work performed is that due to the incipient descent of the flywheel; this work is just sufficient to supply -the kinetic energy due to the rotation of GZOWSKI

the flywheel and its supporting framework

about the axis o. When the permanent condi¬

tion outlined above has been attained, no further work is done in the absence of friction. If

there is friction between the supporting lug n, and the pivot o, the gyroscope will slowly

descend, at such a rate that the work per¬

formed by gravity is just equal to that needed to overcome the frictional drag.

"In the absence of friction, it is obvious that the gyroscope turns about o as centre merely

by virtue of its own inertia, after the final state has been reached ; in this respect the

motion resembles that of a planet around the

sun. The torque due to gravity, though neces¬

sary, only serves the purpose of neutralizing the reacting torque which the turning of the fly¬

wheel about a vertical diameter produces.®

From the foregoing it is seen that gyroscopic

action depends upon four dominant factors :

(1) the moment of inertia of the rotating

flywheel — that is, its diameter multiplied by its weight as distributed relatively to its axis of rotation; (2) its freedom to incline its axis

of rotation in two directions; (3) the velocity with which the axis is

thus inclined; (4) the velocity with which the flywheel is rotating.®

Mr. C. M. Brownall also, in a treatise on

(The Gyroscope, an Explanation without Math¬

ematicsˆ published in the Scientific American

Supplement of 10 Aug. 1907, summarizes the

action of the gyroscope force as follows :

((I. The gyroscopic force always acts at right angles to the plane of motion of the axis,

neither accelerating nor retarding it and only

tending to change its direction. The gyroscopic force is of the nature of a couple, and can only be balanced by an equal couple.

(<II. The gyroscopic force is greater, other

things being equal, as the velocity of motion of the axis is greater, as the velocity of rotation of the wheel is greater, as the mass of the

wheel is greater and as this mass is more dis¬

tantly situated as regards the centre of the

wheel.® .

Practical application of the gyroscope dates

back to 1744 when it was used to provide an

artificial horizon for mariners at sea. Aside

from its use as a fixed reference plane in

clinometers and recorders, the gyroscope has

been utilized in two contrary directions: (1) To produce motion in a suspended body at rest ;

and (2) to control the motion or the direction of motion of moving bodies. In the former

field the most notable results have been in

rolling a ship which is aground on a bar, so as to loosen it and permit its easier release ; and its adaptation to ice-breaking vessels so

as to cause them to roll, thus adding enormously to their effectiveness. In the latter field the gyroscope was applied first to controlling the

tendency of torpedoes to wander, and to hold

it constant to the direction in which it was

aimed. The next application, and One of the

most importance, was the development of the

gyro-compass, an instrument far more reliable

and accurate than the old magnetic compass

with all its errors and deviations, and with

the further advantage that it gives true north bearing, and not that of the wandering mag¬

netic pole. This instrument is now used in

many of the naval vessels throughout the world.

The next application was to prevent the rolling of ships, thus increasing the comfort of those on board, and, in the case of naval vessels,

providing a level gun platform, which is

of the greatest advantage in securing a larger number of hits. As all rolling of ships is the result of successive wave increments, the gyro¬

scopic stabilizers need only be large enough to counteract each of

these increments as it

arrives, and even for large ships the stabilizing gyroscope weighs only about 1 per cent of the displacement. This mechanism has been suc¬

cessfully applied to various type and sizes of vessels ranging from 100 to 10,000 tons. The

aeroplane stabilizer is another adaptation of the greatest importance, hardly yet emerged from

the experimental stage, but already recognized

as of great potentiality. The gyro-cars and

gyro-automobiles have not achieved commer¬

cial importance, their advantages being more

than counterbalanced by operative difficulties.

(See ˆEroplanes; Gyro-Compass; Monorail

Systems; Steamships; Torpedo). Consult

Chatley, H., Practical Gyrostatic Balancing >

(London 1912) ; Cordeiro, F. J. B., (The Gyroscope) (New York 1913) ; Crabtree, H., Spin¬

ning Tops and Gyroscopic Motion) (London

1914); Johnson, V. E., (The Gyroscope: An

Experimental Study* (London 1911) ; Worth¬

ington, A. M., (Dynamics of Rotation) (Lon¬

don 1899).

GZOWSKI, gzhov'ski, Sir Casimlr Stanis¬

laus, Canadian engineer : b. Saint Petersburg,

Russia, 1813; d. Canada, 1898. He studied mili¬

tary engineering at Kremnitz, and joined the

army. However, his sympathies with the Polish

patriots soon caused him to abandon this

post, in order to enlist his services in their cause. For this, he was banished, and came

to the United States in 1833. Here he taught

various subjects, studied law at Pittsfield, Mass., and later practised in Pennsylvania. In 1841

he removed to Toronto, where he had secured

a position in the department of public works,

resuming his original profession. In the fol¬

lowing year he was appointed superintending

engineer of roads and harbors in western On¬

tario. From 1850 to 1853 he was in charge of Montreal Harbor, and chief engineer of the

Saint Lawrence and Atlantic Railway Com¬

pany. After several years as partner in a rail¬

way firm, he was entrusted with the construc¬

tion of the International Bridge across the

Niagara River (1871), and also presented plans

for the enlargement of the Welland Canal and

the Baie Verte Canal. In the military service

Gzowski was elevated to the rank of colonel

in 1879, and was president of the Rifle Asso¬

ciation of the Dominion of Canada. He was

also the first president of the Society of Cana¬

dian Civil Engineers, and was created a knight in 1890.

H

HTHE eighth letter of the English and

other alphabets derived from the

alphabet of the Latins. It was bor¬

rowed by the Latins from the alpha¬

bet of the Greeks, and in early Greek repre¬

sented an aspirate consonant sound, but in the Greek of classical times it stands for the pro¬

longed vowel sound of e, as omega (stands

for the prolonged sound of omicron (o). The

H is evidently a character borrowed from the

Phoenician alphabet, where its form was /3 and its sound guttural aspirate, like that of the cor¬

responding Hebrew letter cheth or like ch in

German and in Scotch. In Greek, after H was

adopted as a vowel sign, the aspirate was re¬

presented by ‘ or (either prefixed to a letter (*o) or written above it (o) : it was previous to this change that H was introduced into the Latin alphabet. It is probable that in early

Latin this letter, occurring between two vowels, as in nihil, mihi, traho, veho, represented a

guttural sound, as the h in nihil and mihi does still in the Italian pronounciation of Latin.

But evidence exists that in the classical usage of ancient Latin speech initial h was of little account and was ((silent® as in modern Italian

and French: this is certain as regards the pro¬

nunciation of the vulgar; and that even the

educated often ˆdropped the h's® we know from

the fact that in ancient monuments we find

Hannibal and Annibal, Hadria and Adria, herus

and erus, haruspex and aruspex.

In Anglo-Saxon and earliest English speech

h represents a guttural aspirate like German

and Scotch ch in ach, loch; for example, in

niht (night), thoht (thought) the h stood for

the same sound as ch in the German words

nacht, gedacht. In the earliest English speech

h was prefixed to l, n, and r, to represent a guttural aspirate which is now entirely lost ;

examples, hlaf (loaf), hnecca (neck) bring

(ring) : the initial guttural in such words has been dropped. Thus in the names of the early

Frankish kings Hlodowig became Ludovicus

and Louis, and Hlothar became Lothair. The

original guttural h in old High German hros

is completely eliminated in the modern Ger¬

man ross, but is represented by the aspirate h in Old English hors (horse). The h after w

in many words as wharf, what, when, etc.,

represents an initial aspirate in Old English

hwarf, hwaet, hwaenne, etc., and is still so

pronounced.

H is added to various consonants to form

digraphs for representation of various sounds,

for example, ch as in chin, sh as in shy, gh as in gherkin, th as in thin, then ; or even to represent sounds for which there is already a

proper consonant in the alphabet, for example

ph and gh for the sound of f (philter, rough), ch for the sound of k (chyle) ; in very many cases the digraph gh is employed simply as

a memorial of an ancient etymology, as in

plough, and not seldom for no discernible pur¬

pose at all, as in ghost; the form rh usually occurs in words of Greek origin, and recalls

the Greek etymology (rhapsody), but again it

is employed to suggest false Greek etymology

(rhyme).

H. H. See Jackson, Helen Maria Fiske

Hunt.

HAAG, hag, J. Carl, German-British

painter: b. Erlangen, Bavaria, 1820; d. Oberwesel, Germany, 1915. After studying at

Nuremberg, Munich and Rome, he became

court painter to the Duke of Saxe-Coburg and

Gotha. In 1847 he moved to England where

he devoted himself to water color painting. In 1853 he became a member of the Royal Society

of Painters in Water Colors. He traveled a'lso in the East, the Balkans and among the Bed¬

ouins, and his pictures of these countries and peoples gained him a considerable reputation.

They are careful in drawing and remarkable

in their brilliant color effects. His studies of the Holy Land are also noteworthy. Haag

was painter to Queen Victoria for a few years during which time he accompanied the queen

on her travels to Scotland. At the age of

82 he retired to the Red Tower at Oberwesel

on the Rhine where he passed his remaining

years.

HAAKON, ha/kon', the name of several

Norwegian rulers: (1) Haakon the Good,

son of Harald Haarfager. He was brought up

by Athelstane of England, and trained in the

Christian religion. In 933, on the death of his father, he set out with a fleet which had been furnished by Athelstane to conquer his half-brother, Eric, who had usurped the throne.

The expedition was successful and Haakon

established himself as king, reigning from about 934 to 961. His efforts to introduce Christian¬

ity into his kingdom were not thoroughly suc¬

cessful. Haakon was killed in the battle of

Fitje in 961. (2) Haakon Magnusson ruled

about 1093-95. (3) Haakon Herdebred ruled

from 1147-62. (4) Haakon Haakonsson, or

Haakon IV, named ((The Old® : b. 1204 ; d. 1263.

He was the grandson of Sverre, and the son

of Haakon IJI (king 1202-04). The principal

events of his reign were the expeditions against the Hebrides and the submission of Iceland

and Greenland (1262). (5) Haakon Magnus¬

son ((the Younger,® son of Magnus Erikson,

king of Norway and Sweden. He became king

of Norway in 1343, his father acting as regent until Haakon became of age. From 1362-63

he was ruler of Sweden, and his marriage to

Margaret, Princess of Denmark, was one of the

first steps toward the conciliation of the three kingdoms of Scandinavia.

HAAKON VII, king of Norway: b. 3 Aug.

1872. He is the second son (named Karl) of

Frederick, king of Denmark. On 26 Oct. 1905

the union between Sweden and Norway was

formally dissolved, and on 18 November of the

same year Crown Prince Karl of Denmark

was elected king of Norway by the Storting.

The coronation took place at Trondhjem in

June 1906. In 1896, he married Princess Maud,

daughter of Edward VII of England. Their

son and heir was born 2 July 1903, and was

named Olaf.

HAANEL, ha'nel, Eugene, American

physicist and mineralogist : b. Breslau, Germany, 1841. After studying in Germany, he emigrated

to the United States in 1856, and later took

part in the Civil War on the Federal side. In 1864 he was professor of modern languages

at Adrian College, and in the succeeding year

at Hillsdale College. From 1868-72, he held

the chair of natural science at Albion College, Michigan ; of physics and mineralogy at Vic¬

toria University, Coburg, Canada, from 1872—

89 ; and subsequently of physics at Syracuse

University, until 1901. In 1908 he was ap¬

pointed director of mines for Canada, and in

1909 became vice-president of the American

Institute of Chemical Engineers. His prin¬

cipal researches have been made along the lines of the electro-thermic processes in iron-ore

smelting, and of the use of peat as fuel. Among his publications are (Report on Experiments

Made at Sault Sainte Marie in the Smelting

of Canadian Iron Ores by Electro-Thermic

Processes } (1907) ; and Experience in the Use of Peat Fuel from the Government Plant at

Alfred, Ont.> (1911).

HAARLEM, har'lem, Holland, the capital

of the province of North Holland, 11 miles by rail west of Amsterdam, and five miles from

the North Sea. The city is intersected by ca¬

nals bordered by tree-lined avenues, and com¬

municates with the Zuyder Zee by the Spaarne

and the Ij. Its chief municipal building is

the town hall, a 17th century palace of the

counts of Holland, containing a library, art and historical collections. In Haarlem wood a fa¬

vorite pleasure resort is the pavilion housing

the Society for the Promotion of Industry,

and containing the colonial and industrial mu¬

seums. Chief among numerous educational in¬

stitutions is the Teyler Museum, for the study of theology, natural science and the fine arts, The finest ecclesiastical structure is Saint Bavo's or the Groote Kerk, a 15th century late Gothic basilica, one of the largest churches in Hol¬

land, noted for its tower 260 feet high, and

its large organ. Haarlem was important com¬

mercially as early as the 12th century, and al¬

though its manufacturing industries have de¬

clined, has cotton-mills, linen bleacheries, type foundries, tram and railway. carriage works,

breweries, and a great trade in the cultivation of bulbs, *etc.* The oldest printing office in Holland is located here. The town suffered during the

revolt of the peasantry in 1492 and was deprived of its privileges by Albert of Saxony. During

the war of independence it sustained a siege of seven months (1572-73) by the Spaniards, and

capitulated only after a display of the noblest heroism and courage. It was retaken by the

Prince of Orange in 1577. Pop. 70,491.

HAARLEM LAKE (Dutch, Haarlemmer

Meer), a district in the province of North

Holland. In former times it was a lake, one

of four smaller bodies of water which were

united by successive inundations into one large lake. The area covered increased to some

45,000 acres. In 1836 a storm caused a serious overflow, threatening Amsterdam and Leyden,

and the government authorities, who had hith¬

erto neglected various proposals for the drain¬

age of the lake, began the work in May 1839.

By 1853, 42,096 acres had been reclaimed. The

soil is fertile, and contains profitable salt springs also. Pop. about 20,000.

HAASE, ha' ze, Friedrich, German actor:

b. Berlin, 1 Nov. 1827; d. 1911. He was the

son of the valet of Friedrich Wilhelm IV,

who had him educated for the stage. He

studied under Ludwig Tieck and appeared for

the first time at Weimar in 1846. He acted at the leading theatres of German cities as well as in Saint Petersburg (1860-66), and the United

States (1869, and again in 1882-83). He was

manager of the court theatre at Coburg, of

the Stadt Theatre at Leipzig (1870-76), and

was thereafter a zealous supporter of the

Deutsches Theatre at Berlin. His principal

roles were in high comedy, for which his aris¬

tocratic bearing especially suited him. Among

them may be mentioned his parts in Gutzkow's

EonigsleutnantP in which he played Count

Thorane ; the elder Klingsberg in (Die beiden

Klingsberg) ; Chevalier Rocheferrier in (Eine

Partie Piquet* ; Richelieu in the play of the same name; and the prince in (Der geheime Agent.* He wrote (Ungeschichte Briefe* and (Was ich erlebte, 1846-1898) (Berlin 1898). Consult Simon, Eriedrich Haase) (Berlin 1898).

HAASE, Heinrich Gottlob Friedrich Christian, German scholar : b. Madgeburg, Prussia, 1808; d. Breslau, 1867. He received his education at Halle, Qriefswald and Berlin, and studied also in the libraries of Paris, Hei¬ delberg, Strassburg and Bern. In 1840 he be¬ came professor of philology at the University of Breslau, and remained at that institution until his death, serving also as one of the directors of the Philological Seminary there from 1851. In addition to his splendid work as a teacher, Haase is well known for his scholarly editions of the classics and his philological treatises, among which are his editions of Xenophon's 'A aaedai/xovifiv itokiTua: (1833) ; of Thucydides (1840, with a Latin translation; ; of Velleius Paterculus (1858) ; of Seneca, the philosopher (2d ed., 1872, still unequalled) ; and Tacitus (1855, with a splendid introduction in Latin). His (Vorlesungen fiber

lateinische Sprachwissenschaft* (1847-80) was

edited posthumously by F. A. Eckstein and H.

Peter. Consult Bursian, C., (Geschichte der

klassischen Philologie in Deutschland* (1883) ;

Fickert, G., Eriderici Haasii memoria) (1868) ; Sandys, (A History of Classical Scholarship)

(Vol. Ill, Cambridge 1908).

HAAST, hast, Sir Johann Francis Julius

von, German-British geologist: b. Bonn, Ger¬

many, 1 May 1824; d. Wellington, New Zea¬

land, 15 Aug. 1887. He studied at Bonn, and

went in 1858 to New Zealand on a tour of

exploration. Here he was employed by the

government of the colonies to conduct investiga¬

tions of the geological phenomena of the dis¬

trict with the purpose of locating mineral re¬

sources, *etc.* He discovered gold and coal de¬

posits in Nelson. Canterbury province ap¬

pointed him surveyor-general of the interior,

which office he held from 1861-71. He pre¬

pared important geological and topographical

maps of those districts, for which he was

awarded the gold medal of the Royal Geo¬

graphical Society. As founder and director of

the Canterbury Museum at Christchurch he

succeeded in gathering together a most valuable collection. He also occupied the chair of

geology at Canterbury College. The gigantic

extinct birds, Dinornis and Palapteryx were

discovered by him in his researches in New

Zealand. In 1867 he was elected Fellow of

the Royal Society and was knighted in 1887.

He published (Geology of the Provinces of

Canterbury and Westland, N. Z.* (1879).

HABAKKUK, Book of. The question of

authorship is puzzling. The book can hardly

be by a single author. But there is a great

diversity in the opinions concerning the details of authorship. The views that seem most

probable are here indicated.

The first portion of the book consists of

i, 2-11. In this the prophet first cries to Yahweh for judgment upon the wicked, i, 2-4.

The answer of Yahweh in 5-11 says that he is raising up an instrument of punishment upon

the wicked, the Chaldeans, expressly named in

verse 6, who are then described. The refer¬

ence to the Chaldeans fixes the time of this

portion with much definiteness. It is after the Chaldeans have become a prominent power,

doubtless after the battle of Carchemish in

605, in which the Chaldeans established their

supremacy over the Egyptians. The wicked re¬

ferred to in 2-A are then the people of Judah, particularly the king and court. The time is

soon after 605, and must have been before 597, when the punishment actually descended upon

Judah. The whole treatment shows that the

Chaldeans are considered a new power which

Yahweh raises up, verse 6, which sets itself

in opposition to the kings and princes of the earth, verse 10.

Beginning with i, 12 the parties concerned

are in a different relation. The wicked here,

verse 13, are not the same as in verse 4;

they are the instrument of correction, verse

12, as the Chaldeans were in 5-11, and the

prophet protests against the excess of correction which they are inflicting. The nation here in

mind, also, is not a new power, but has a long career of -violence, i, 15; ii, 8. The nation in mind is not named, but the natural supposition is that it refers to the chief oppressive nation, the Chaldeans, and was written toward the end

of the Babylonian exile, about 550. There seems no reason to doubt that the most of i, 12-ii, 20

is by a single author, with the date just

indicated. The third malediction, ii, 12—14, is made up of quotations, not entirely verbatim,

from Micah, Jeremiah and Isaiah. This is out

of accord with the style of the remainder of

this portion, and doubtless marks this as a later addition, with which goes the preceding verse,

11, which introduces this malediction. The au¬

thor of this portion writes it as a supplement to the earlier oracle. There, the Chaldeans had been introduced as the instrument of punish¬

ment on Judah; here the author, under the later conditions, protests against the excess of this punishment, and calls for punishment upon the

Chaldeans. This is the thought of i, 12-17.

Yahweh gives the assurance, in ii, 1—5, that the righteous shall live, and the oppressing nation shall be visited with the maledictions which fol¬

low. Of these there are five, of which the

third, as already indicated, is probably a later addition. These maledictions are pronounced

upon the Chaldeans for their oppressive vio¬

lence, 6b-8, their evil gain at the expense of other peoples, 9-11, the

cruelty and crime by

which their cities were built, 12-14, their bar¬

barous delight in reducing other nations to help¬

lessness, 15-17, and their senseless idolatry, 19-20, 18 being a later prosaic addition.

Chapter iii is entirely distinct from the re¬

mainder of the book. This is a psalm, similar to those in the book of Psalms. It bears a

title like those found in Psalms. This title

shows that it was in the Director's Psalter, one of the larger and more prominent of the smaller collections which preceded the present book of

Psalms. The Director's Psalter was probably

compiled in the early Greek period. This

psalm seems to have been of postexilic com¬

position. It seems clear that neither author of the earlier part of the book had anything to

do with this psalm. It probably bore the title in the Director's Psalter which attributes it to Habakkuk, which led an editor to attach it to this book. Presumably the author of the first

part of chapter i, was Habakkuk. The psalm

is one of great poetic vigor and imaginative

fire. It depicts a theophany, Yahweh coming

to judgment. The psalm has no specific points

of contact with the rest of the book, it is much more general in its nature.

Bibliography. — Davidson, A. B., (Nahum,

Habakkuk and Zephaniah* ((Cambridge Bible,*

Cambridge 1896) ; Driver, S. R., (The Minor

Prophets) ((Century Bible,* Edinburgh 1906);

Smith, G. A., (The Book of the Twelve Prophets) (Expositor's Bible,* Vol. II, 1898);

Ward, W. H., (Habakkuk* ((International

Critical Commentary, > New York 1911).

George Ricker Berry,

Professor of Old Testament Interpretation and

Semitic Languages, Colgate University.

HABBERTON, John, American author:

b. Brooklyn, N. Y., 24 Feb. 1842. At first a printer he subsequently served in the Federal

army, and later undertook editorial work in

New York. His best-known book, Eelen's

Babies* (1876), attained great popularity both

in America and in Europe. He has published

also (The Barton Experiment* (1877) ; (Other

People's Children) (1877) ; (The Worst Boy in

Town) (1880) ; (Who was Paul Grayson ?*

(1881); a humorous Eife of Washington*

(1883); (One Tramp* (1884); (Brueton's

Bayou* (1886) ; (The Chautauquans* (189D ;

(A Lonely Lover* (1893) ; (The Tiger and the

Insect* (1902) ; (The Bowsham Puzzle* ;

(Country Luck* ; Eittle Guzzy* ; (Caleb

Wright* ; (When Boys Were Men* ; (Budge

and Toddie* (1909). His only drama, (Deacon

Crankett,* was performed more than 500 times.

HABEAS CORPUS. The provision of

Magna Oiarta, guaranteeing every freeman

from being • "taken or imprisoned .. , „ but-by HABEAS CORPUS

lawful judgment of his peers of the law of the land,® is merely declaratory of an immemorial

right. From the earliest times it was the

privilege of persons accused to go at large

pending trial and judgment, on giving surety,

and this privilege had been regularized by

William the Conqueror, through the institution

of ((f rank-pledge,® whereby groups of 10 men

in every shire hundred became hostages for

each other's good conduct, and for the appear¬

ance of either to answer any charge that might be laid to him. The vague but great powers

anciently enjoyed by sheriffs, and their ill-de¬

fined discretion, enabled these officers to hold persons on suspicion, without commitment and

without bail, to remedy which abuses various

writs were invented and issued by the chancery office commanding the production of prisoners

thus detained. One of these, the writ de homino replegiando, was applied also to cases where

persons were not held by any official authority, much as the writ of habeas corpus is nowadays employed in cases where the right of a parent or guardian, or an institution, to the custody of a child or ward is in dispute. But the power of the superior courts to bail in criminal actions, even for high treason, has never been ques¬

tioned; and in these and other cases involving a restraint of liberty the writ of habeas corpus answered all purposes in a. simpler and more

direct way than any other writ. The Courts

of Common Pleas and Exchequer originally

had to issue the writ under the fiction that the person requiring it was privileged, or was to

be sued in the court from which it was issued; but the Lord Chancellor and the judges of the King's Bench issued the same without circum¬

locution from the beginning of English legal

history. The promise made by King John in

the Great Charter — ((we will sell to no man, we will not deny nor delay to any man, either right or justice — ® would not have been ex¬

acted, however, without cause ; and the most

probable reason would have been sales, denials

and delays of justice and right, which the sov¬

ereign for himself and his successors agreed

should never thereafter occur again. That the

promise has always been kept it would be unveracious to assert. To be sure, <(the king can do no wrong,® but his judges, ministers and

privy councils can.

In earlier practice the writ of habeas corpus

had several uses; i.e, to remove a defendant

and the record of his case from the jurisdic¬

tion of an inferior to a superior court, or to remove a prisoner to be tried from his place

of confinement into the jurisdiction where the

alleged crime was committed. These and some

other variations of the writ have become obso¬

lete; though the writ of habeas corpus ad testi¬

ficandum is still frequently resorted to for the purpose of bringing into court a prisoner in

custody whose testimony as a witness is de¬

sired. When the great (<writ of right® is spoken of, the office of which is to give security to all persons from unlawful detention and restraint

of liberty, the term habeas corpus is used with¬

out adjectival appendices. The writ is issued

on the petition of a person in custody,; .or of one who claims to be the rightful custodian of a person unlawfully held by another. It re¬

quires the officer or other individual, charged with unlawfully detaining a person, to produce

tt-literally to have the body of —t that person, be fore the judge issuing the writ, immediately,

so. that, the ground of detention may be in¬

quired into and the person held in confinement may be released without delay if unlawfully de¬

tained. If the petitioner be in custody of an officer of the law and the latter have a warrant, specifying a lawful reason for the arrest, de¬

tention and commitment of the prisoner, the

matter ends there. The merits of the case

cannot be inquired .into on the return of the writ and the most the judge can do is to bail the petitioner if he considers it a bailable case.

It was due to a total disability to understand the difference between law and royal prerogative in a little matter like freedom of locomotion

that a distant successor of King John completely lost his head. It is true, that Charles I was ill-advised and badly served by subservient

judges. The warden of the Fleet prison had

made returns to writs of habeas corpus, stating that the prisoners, in whose behalf they had

been obtained, were confined by warrant of the privy council, and committed by special com¬

mand of the king. Though counsel for the

prisoners insisted that the council was bound to assign a sufficient cause of commitment, just

as any petty magistrate would be, the judges

decided that the royal mandate was warrant

enough for any arrest and detention. This de¬

cision destroyed every constitutional and statu¬

tory guaranty of liberty from Magna Charta

down. It raised an uproar, which ended in rev¬

olution, the trial and decapitation of Charles I and the establishment of the Commonwealth

under Cromwell. The king meanwhile had been

forced to consent to the Petition of Right,

sometimes called the first Habeas Corpus Act;

but this was made nugatory to a great extent

by the refusal of the judges to issue the writ during vacation, so that between terms of court prisoners committed unlawfully and without

bail had no remedy.

Not until after the Restoration was the

famous Habeas Corpus Act passed — (31 Car.

II, chap. 2). This act was carried in

the House of Lords by an artifice. ((Lords

Gray and Norreys were named to be

tellers. Lord Norreys, being a man subject

to vapors, was not at all attentive, so, a very fat lord coming in, Lord Gray counted him for 10, as a jest at first; but seeing Lord Norreys had not observed it, he went on with this mis-reckoning of 10, so it was reported to the

house and declared that they who were for the bill were the majority, though it indeed went

to the other side.® — Bishop Burnett, (History

of his Own Times) (Oxford ed., i833). The

act provides that any person committed to prison <(for any crime, unless for treason or felony

plainly expressed in the warrant of commitment,®

may obtain a writ of habeas corpus from the

Lord Chancellor or any judge of the common

law courts, in vacation or in term time. Judges refusing to issue the writ are penalized; and

jailers who fail to exhibit the warrant of

commitment to a prisoner or his counsel on

demand, or who shift prisoners from their

custody to that of another officer, are subject to fine and disqualification from office. A return t6 the writ must be made in three days (or in not' more than 20 days, if the distance of the place of confinement from the court be great).

Upon the, return of the writ the judge is re-quiredAo admit the - prisoner to bail. Prisoners

committed on charges of treason or felony, if

not bailed, may insist upon being tried at the next assizes, and if not tried at the second

assizes following commitment they must be dis¬

charged. To provide for cases where persons

are not held in custody on criminal charges,

but are restrained of liberty in any other man¬

ner, imprisonment for debt excepted, the

statute of 56 Geo. Ill was passed.

The American Habeas Corpus Acts closely

follow the English statutes. Imprisonment

for debt has been almost everywhere abol¬

ished, however, and even fraudulent debtors are discharged (<on the limits,® that is to say they may give bail not to remove from the county.

The Constitution of the United States declares

that the ((privilege of the writ of habeas corpus shall not be suspended, unless, when in cases of rebellion or invasion, the public safety may re¬

quire it.® During the Civil War the President

authorized General Scott to suspend the privi¬

lege when in his judgment it seemed necessary

to do so; but Chief Justice Taney, who had

issued a writ which the general refused to

obey, uttered the opinion that the power of sus¬

pension resided solely in Congress. Judicial

and professional opinion appears to concur in

this view ; but the Act of Congress of 3 March 1863 authorized the President to suspend the

writ; and this delegated power was exercised

not only by Lincoln during the war, but by

Grant during the reconstruction period in 1871.

By Act of Congress 24 Sept. 1789, it was pro¬

vided that writs of habeas corpus should be

issued by Federal judges only in cases where

prisoners are in custody (<by color of the au¬

thority of the United States,® or are committed for trial, or are required as witnesses to testify, in a Federal court. The Act of 2 March 1833

extended this power so that the writ might

issue for prisoners held for violation of the

Constitution, or of a treaty of the United

States, even when in the custody of the au¬

thorities or the courts of a State. The Act

of 29 Aug. 1842, gives to the Federal courts

and judges exclusive power to issue the writ

when the prisoner is the subject of a foreign power, held for an act done under a

commission from his government, and a

question of international law is involved.

The State courts are precluded from issuing

the writ in the cases mentioned. See High

Treason. Stephen Pfeil.

HABER, ha'ber, Fritz, German chemist:

b. Breslau, 1868. After studying at Berlin,

Heidelberg and Charlottenburg, he taught

chemistry, becoming professor at the technical

high school at Karlsruhe in 1911. Later he

became professor of physical chemistry and

director of chemical investigations at the Uni¬

versity of Berlin. His principal contribution

to practical chemistry has been his discovery

(with Dr. Carl Bosch) of the synthetic process of manufacturing ammonia. He has contribu¬

ted many articles to technical journals on am¬

monia, and is the author of (Grundniss der

technischen Elektrochemie) (1898) ; ˆThermo—

dynamik technische Gasreaktionen* (1905, Eng.

trans. by A. B. Lamb, under the title of (Ther-modvnamics of Technical Gas Reactions)

(1908).

HABERL, ha'berl, Franz Xaver, Catholic

musician : b. Oberellenbach, Lower Bavaria,

1840; d. 1910. Ordained to the priesthood in

1862, he was appointed conductor of music at

the cathedral at Passau, and musical director

of the Catholic seminary there. From 1867—

70, he served as organist of the cathedral of Santa Maria dell' Anima at Rome, and was

at Ratisbon from 1871-82. The School for

Church Music was established by him in 1875,

and under his able managership soon rose to great prominence. He was editor-in-chief of the works of Palestrina (32 vols., 1894), and from 1880 was editor of the magazine Musica Sacra. In 1879 he established a Palestrina So¬ ciety. Among his published works are ˆagis¬ ter Choralis) (1865, translated into all Euro¬ pean tongues) ; (Cacilien KalendaU (1876-85); (Psalterium VespertinunP (8th ed., 1901) ; (Bibliographischer und thematischer Musik— katalog des papstlichem Kapellarchivs im Va— tikan zu Rom) (1888). Haberl was one of the leading modern composers and organists of sacred music.

HABERSTICH, Samuel. See Bitter,

Arthur.

HABINGTON, William, English poet: b. Hendlip Hall, 4 Nov. 1605; d. 30 Nov. 1654. Of Roman Catholic parentage, he was sent to the college of Saint Omer, but declining to be¬ come a Jesuit, he went to Paris where he

married Lucy, the second daughter of Baron

Powys. To her he wrote a series of poems

entitled <Castara) in which he praises the virtues of his lady in lavish terms. The poems are

pompous and rhetorical, but of fine lyric quality and of high moral tone. He also wrote several elegies on the death of George Talbot (1635) ; (Historie of Edward the Fourth) (1640) ; a

tragi-comedy, (The Queene of Arragon) (1640)

and Observations upon History } (1641).

Consult Arber, E., <English Reprints) (1870) ;

and Ward, (English Poets) (Vol. II, London

1880-83). <Castara) was edited by Charles

Elton (1812).

HABIT AS A PSYCHOLOGICAL

PHENOMENON. It is difficult to overesti¬

mate the importance of habit in our everyday

life and the part that must be assigned to it in the explanation of both thought and action.

In the adult practically no act is independent of habit. Few social phenomena can be under¬

stood without taking the common habits of

the individuals into consideration. Habit frees

the individual from the need of constant thought and enables him to devote himself to the gen¬

eral ends to be attained and to the acquisi¬

tion of new skill. Habit in others makes it

possible to rely upon the action of one's fellows and to forecast the social events of days to

come. All business depends upon knowledge

of the set of habits in the men with whom one deals.

All complex acts depend upon earlier formed

habits which co-ordinate the different move¬

ments to the accomplishment of a single end.

In learning to drive a car one must at first think of each act, of each lever to be moved, of each movement of the steering wheel. Af¬

ter learning is complete one merely decides to turn and the steering gear is adjusted by sight of the road to be taken. One decides to stop and the clutch is released and the brakes are applied as parts of a single movement and with¬

out other thought. The more complicated move-

ments learned in infancy, such as speech, de¬

pend in the same way upon groups of habits.

Speaking a word requires the simultaneous or

suitably successive activity of a large number of muscles in many different combinations. Were

it necessary to think of each movement or of

each element in the movement and adjust its

response in strength and time to the whole,

accurate speech would be impossible. One may

assert with confidence that no one of the ap¬

parently simple acts could be executed were it not for the mass of habits at the individual's command.

In its wider effects habit holds mankind as

a whole and the individual in particular to a regular routine, to consistent lines of conduct.

Hours of labor and of recreation, hours of

sleep and time of waking, are all determined

by habits which, it is true, are broken from

time to time but hold in general for all. So firmly set is this daily rhythm of habits that when the community desires to adapt itself

better to the setting or the rising of the sun, ii turns the clock forward or back rather than break the connection that has been established

between the position of the hands of the clock and the actions of its members. Very many

of the more important social functions, the ac¬

ceptance of the results of an election in a well ordered democracy, or obedience to the com¬

mand of a monarch or of the military author¬

ities in an autocracy, are matters of habit. Only a great common emotion, great pain or stress

of other kind can break the habits sufficiently for disobedience or disorder to be even con¬

sidered. It is in this sense that habit is the great conservative force that

makes orderly govern¬

ment possible, that keeps each individual in

society in his place and to his allotted task.

In the social whole as in the individual the

formation of habit saves thought and prevents

confusion. The well-drilled soldier or mili¬

tary unit needs no time to agree upon a course of action or even to decide to carry out a

suggested plan. Earlier drill has fused all into a single unit responsive to any signal or com¬

mand and capable of adjusting the acts of each to those of all the others. Fire-drills and all similar training of masses to respond to antici¬

pated signals rob the critical moments of the

uncertain, hesitating, and even contradictory

movements which constitute such a large part

of the disturbing emotion, and the actual danger in great accidents. Frequent repetition makes

possible calm, effective action in almost any

emergency. The fully prepared man has a habit

ready for each situation, a response for each

stimulus. Few men have such comprehensive

habits, but each has habits which adapt him to his own profession and to the general demands

of life. One can frequently determine the pro¬

fession to which an individual belongs by ob¬

servation of his habits. Much of the action that we call moral is determined in the last analysis by habit. The honest man does not think whether he shall or shall not return a purse that he finds. The honest act is a mat¬ ter of course. Habits also distinguish the in¬ dividual as well-bred or ill-bred. The boor cannot acquire good manners from reading or from personal directions. Only slowly acquired habits can work the change and these must ordinarily be acquired early in life.

For an explanation of habit we must turn

to the nervous system. Before knowledge of the nervous system was so fully developed analogies for habit were found in many simple physical and biological phenomena. Change in tendencies as a result of action characterizes practically all things, particularly animate be¬ ings. Streams change their channels when some

trickle finds a new course ; <(as the twig is bent so the tree is inclined® ; a scar once

formed will persist through all the changes in tissue due to new growth. In this metaphorical sense habit is a universal law of nature. Now we place the permanent effects of learning upon which habit

depends in the nervous system.

In simplest terms all action of a higher animal is due to a nervous impulse which starts in

some sensory stimulation and finds its way

through the nervous system to some muscle.

The nervous units that intervene are simple

living cells or neurones each with two proc¬

esses extending in opposite directions. One

of the filaments of a sensory neurone extends

to a sense organ, the other inward to come

into contact with other neurones. The last

unit in the link has a process extending to a muscle. In the simplest case a filament of a

sensory neurone may come into contact with

a filament from a motor neurone and an im¬

pulse pass from one directly to the other and produce the movement. Usually if not always

the sensory neurone is in contact with several motor neurones and in that case the impulse

will pass to the motor neurone which is least separated from it, at the point of contact which offers the least-resistance. Certain of these

points of connection offer little resistance at birth and the reflexes or first acts will follow that path. After birth new connections are

constantly formed and old connections come

through use to offer a diminished resistance.

It is this opening of new pathways that con¬

stitutes the formation of habits. In all more

complicated acts more than two neurones are involved but that does not change the prin¬ ciple. Habits are formed when the connections between the sensory and motor neurones have been developed. It is at the points of con¬ nection between neurones that the action wears a path, in terms of the older metaphorical con¬ nections. As a result of frequent use the sen¬ sory stimulus that has become associated with the movement will always call out that move¬ ment.

In the formation of the habits the first move¬ ments are tentative and apparently succeed only by chance. The child and animal both learn to make the first movement by a process of trial and error. The impulse from the sensory impression may be pictured as spreading more or less at random through the nervous system, and calling out one response after another. The movements that are not successful or do not give pleasant responses are not repeated, those which are successful are repeated until the habit is formed and the given situation always excites the same movement. After the

separate movements have been learned so that

they can be made consciously they may be

combined into larger units by habits. There

is some trial and error in learning to combine them at this stage. The boy makes many false

starts when he first attempts to tie a cravat and the whole requires much time and constant

rare. With repetition less and less thought is 606

required until in the adult the whole operation is carried out without effort and finally even without awareness of the separate movements.

In the continuous or compound act one element

of the movement is excited by the sensations

that come from the preceding element. In

walking, the stimulus to one movement comes

from the preceding movement; in tying the

cravat completion of one movement arouses the

next. When hesitation comes and the sensation

from one movement is lost before the next

starts, one must go back to the beginning be¬

fore the following one can be made. In the

final automatic stage thinking of what is to be done is a hindrance rather than a help as it emphasizes impressions and ideas that are not

necessary to start the movements. After one

movement has been learned or has become

habitual it is linked with others to constitute a larger whole. Where at first a number of

stimuli or acts of consciousness are needed to start the separate later elements one will evoke an entire series. A man starts to dress and one garment after another is put on without thought.

One cue-is sufficient to carry out the whole process. This leaves the man free to attend to other matters. Sometimes a wrong element will

be introduced by habit. The absent-minded

man may undress and go to bed when he. starts to dress for dinner, but mistakes of this sort are sufficiently infrequent to make habit an

advantage rather than a hindrance — in fact

habit is indispensable.

Granted the supreme importance of habit

for the individual and for society it is essential that right rules be followed to develop suitable habits. First, one must appreciate the immense

importance of habit, that every act leaves its mark upon the nervous system, and that these

marks in the long run make the man. _When a

habit is recognized as good every occasion pos¬

sible should be utilized for executing the acts that are to make the habit. Especially is it

necessary that no exception be permitted, no

set of circumstances that demand the act

should be allowed to pass without its perform¬

ance. Each time a partly established habit is

permitted to lapse, — each time some other re¬

sponse is made when it should have been,— the habit is weakened. In actions that are likely

to prove valuable in moments of stress it is

well according to James to make an effort to

do the disagreeable at times to keep alive the capacity for doing the unpleasant when it shall be necessary. Little acts of self-denial are

recommended to maintain the moral tone, just

as a little unnecessary exercise is needed to

keep the muscles of the sedentary worker ready for an emergency and to maintain the physical

health. In. general it is important for all de¬

velopment to choose good habits and to check

the bad. Gradually through repetition a stock

of habits will be acquired that constitute a large part of what is ordinarily regarded as the man and will determine his manners, his morals, as well as his efficiency. Consult Carpenter, Wil¬

liam Benjamin, (Mental Physiology5 (Chap.

VIII, 1874) ; James, William, (Habit, 5 also

Principles of Psychology) (Vol. I, chap, iv,

New York 1890) ; Hering, Ewald, (On Mem¬

ory5 (4th ed., 1913).

Walter B. Pillsbury,

Professor of Psychology, University of Michi¬

gan.

HACHETTE, a'shet, Jean Nicholas

Pierre, French mathematician: b. Mezieres, 6

May 1769; d. Paris, 16 Jan. 1834. He was

educated at Charleville and at Rheims and be¬

came draughtsman in the school of engineering

at Mezieres in 1788. He subsequently taught

hydrography at the College of Collioure and

Port Vendre. In 1794 he became professor of

descriptive geometry at the newly founded

ficole Polytechnique, where he taught until

1816, when he was removed for political rea¬

sons. He was professor at the ficole Normale

until his death. Hachette's election to the

Royal Society was delayed until after the Rev¬

olution (1831). His researches in descriptive

geometry in its practical applications have had an important effect on the development of

French mechanical efficiency. His works in¬

clude (Deux Supplements a la geometrie de¬

scriptive de monge5 (1811 and 1818) ; (Traite

elementaire des machines5 (1809 and 1828) ;

Programme d'un cours de physique5 (1809) ;

(Elements de geometrie a trois dimensions5

(1817) ; Applications de geometrie descriptive5

(1817); Correspondence sur l'Ecole Polytech¬

nique5 (1804—15). His publications in the lead¬

ing scientific periodicals are numerous. For

a bibliography of his publications consult Cat¬

alogue of Scientific Papers of the Royal Society of London5 (Vol. Ill, London 1869) ; and also Arago, F., Ceuvres5 (Vol. Ill, Paris 1855) and Silvestre, (Notice sur J. N. P. Hachette5

(Bruxelles 1836).

HACHETTE, Jeanne Laine, French hero¬

ine : b. about 1454. Her origin remains in ob¬

scurity. She seems, however, to have been the

daughter of an army officer named Fourquet.

Her fame rests on one incident of her life which was marked by distinguished heroism. Charles

the Bold of Burgundy invaded France in 1472,

and laid siege to Beauvais. After several un¬

successful attempts, one of the besieging army

climbed the ramparts and planted the Burgun¬

dian flag there. Jeanne Laine rushed up behind him and felled him with a blow of her

hatchet. The courage of the assailants was

considerably dampened and because of the delay

caused thereby the city of Beauvais received

reinforcements and was saved. The king of

France, Louis XI, rewarded Jeanne by marry¬

ing her to the man of her choice, Colin Pilon, and by exempting her and her descendants from

taxes, and granting the people of the town

numerous other favors. He also established the

annual Procession of the Assault5 in which

the women of Beauvais march on Saint Anga—

dreme's day, bearing the flag captured by Jeanne.

In 1651 a statue was erected to the memory of Jeanne at Beauvais. Consult Vallat, (Jeanne

Hachette5 (Abbeville 1898).

HACHETTE, Louis Christophe Fran¬

cois, French publisher: b. Rethel, Ardennes, 5

May 1800; d. 31 July 1864. Intending to pre¬

pare himself for the profession of teaching, he attended a normal school ; but after three years'

study, he was dismissed because of political

reasons, and then undertook the study of law

in 1822. Four years later, he entered the pub¬

lishing business, establishing a house for the

publication of works to improve the educa¬

tion and culture of his country. He soon gained a world-wide reputation for the splendid char¬

acter and fine quality of his editions. They

include the various French and ancient classics, dictionaries, scientific works, reference libraries, guidebooks, *etc.* He also founded the weekly

Journal pour Tons in 1855, which soon gained a wide popularity. Hachette was also known for

his social service work and his advocacy of

the international literary copyright.

HACHIOJI, ha'che-o'je, Japan, town on

the island of Nippon, 23 miles from Tokio,

with which it is connected by rail. Silk manu¬

facture is the most important industry. Pop.

35,000.

HACKBERRY, American trees of the

elm family and genus Celtis f growing in dry or wet woods throughout the eastern and southern

United States and Canada and southward to

Mexico. They are small or middle-sized, with

the aspect of an elm. The fruit (a globular

drupe) is sweet and edible, as large as the bird-cherry, and ripening in autumn. Several species are known. The trees are sometimes referred to as sugar-berry or nettle-tree. The soft, coarse-grained yellow wood is of little value. They are affected by the same insects that in¬ jure the elm (q.v.).

HACKEL, Ernst H. See Haeckel.

HACKENSACK, N. J., city and county-seat of Bergen County, on the Hackensack River, and on the New York, Susquehanna and Western, and Erie railroads, 16 miles from New York. It is a residential city, but has brick, silk, jewelry, wall paper and other manu¬ facturing interests. It has a public library, high school, hospital, gas and electric light, waterworks, electric street railways connecting with surrounding towns and cities and with New York, and an assessed property valuation of over $5,000,000. Hackensack was settled by the Dutch about 1640, and in 1678, a Huguenot settlement was established nearby, and during the Revolution was occupied in turn by the British and American armies. It was incorpo¬ rated in 1868. The government is administered

by a board of commissioners elected for three

years. Pop. (1920) 17,667.

HACKER, Arthur, English artist: b. Lon¬

don, 25 Sept. 1858. He studied at Saint John's College, London, was a pupil in art of the

Royal Academy and of Leon Bonnet at Paris

(1880-81), was elected a royal academician in

1910, and has painted, besides many portraits,

(Pelagia and Philammon5 ; (By the Waters of

Babylon5; (Christ and the Magdalen5; (Annunciation) ; (The Cloud) ; ˆStudies of Lon¬

don. }

HACKER, Francis, English Puritan sol¬

dier: d. 1660. During the Civil War in Eng¬

land, he supported Cromwell, and was the officer in charge of the execution of King Charles I.

His name was affixed to the executioner's order.

In the Scottish War, he also supported Crom¬

well, and in the Cromwellian Parliament held

office for Leicestershire. With the overthrow

of Cromwell, Hacker was condemned bv the

royalist partv and was hanged 19 Oct. 1660.

HACKETT, Horatio Balch, American

Baptist clergyman and educator: b. Salisbury,

Mass., 27 Dec. 1808; d. Rochester, N. Y., 2

Nov. 1875. He was professor of biblical litera¬

ture at Newton (Mass.) Theological Seminary

1839-70, and of Greek at Rochester Theological

Seminary, from the latter date. He was one of the committee of New Testament revision, and

with Ezra Abbot (q.v.) edited the American

edition of Smith's (Bible Dictionary5 (1868-70).

His chief work was a Commentary on Acts)

(1851) ; and he also wrote (Memorials of Chris¬

tian Men in the War5 (1864) ; (Tour in the

Holy Land) (1866), *etc.*

HACKETT, James Henry, American

actor: b. New York, 15 March 1800; d. Jamaica, L. I., 28 Dec. 1871. He went on the stage in 1826 and was particularly successful in imper¬

sonating Yankees and Westerners, but was best

known by his Falstaff, which he played first

about 1832. He was widely popular in the

United States as well as in England. He man¬

aged several theatres at different times and ac¬

quired a fortune. He published (Notes and

Comments on Shakespeare) (1863). Consult

Ireland, (Actors and Actresses of Great Britain and the United States)

(New York 1886).

HACKETT, James Keteltas, American

actor: b. Wolfe Island, Ontario, Canada, 6 Sept.

1869. He is the son of J. H. Hackett (q.v.).

He was graduated from the College of the City of New York in 1891, made his debut in 1892, became leading man of the Lyceum, New York,

in 1896, and appeared in <The Prisoner of

Zenda,5 (Rupert of Hentzau,5 (The Pride of

Jennico,5 (Don Csesar's Return5 and (The

.Crisis.5

HACKETTSTOWN, N. J, town in War¬

ren County, on the Musconetcong River and on

the Delaware, Lackawanna and Western Rail¬

road and the Morris Canal, about 59 miles from New York city and 50 miles west of Newark.

It is about 800 feet above the sea and within half a mile of the highest point in the State.

Its chief manufactures are silk goods, em¬

broidery, leather, carriages and wagons, and

agricultural implements. The waterworks are

owned and operated by the town and the supply comes from springs on Schooley's Mountain,

distant from the town about two and onehalf

miles. It is the seat of the Centenary Collegiate*

Institute, under the auspices of the Methodist

Episcopal Conference of Newark. It contains

a public library, and a State fish hatchery is located here. Pop. 2,936.

HACKLANDER, Friedrich Wilhelm von,

fred'-rih vil'helm fon hak'len-der, German

novelist and writer of comedies: b. Burtscheid, near Aix-la-Chapelle, Prussia, 1 Nov. 1816; d.

Leoni, near Munich, 6 July 1877. After serving for a time in the Prussian artillery he began a literary career with (Pictures of Soldier Life5

(1841), followed by { Soldier Life in Peace5

(1844). Other works of this period were da¬

guerreotypes5 (1842) ; and (Pilgrimage to

Mecca.5 In 1849 he went to Italy, where he

was present with Radetzky's army during the

campaign in Piedmont, and afterward published

(Soldier Life in War5 (1849-50). Among the

best of his longer novels are (Trade and Traf¬

fic5 ; (Eugene Still f ried 5 (1852); and (Anonymous Histories5 (1851). His best comedies

are the (Secret Agent5 (1850), translated into

several European languages, and (Magnetic

Cures5 (1851). With Zoller, in 1885, he started the illustrated weekly Over Land and Sea.

HACKLEY, Charles Henry, American

capitalist: b. Michigan City, Ind., 3 Jan. 1837; d. Muskegon, Mich., 10 Feb. 1905. In 1856 he

went to Muskegon, Mich., and worked in a

lumber-mill as laborer and foreman; then at¬

tended a commercial school and was given a

position as bookkeeper and later came to be

partner with a mill firm. In 1880 he founded

the firm of which he was the head and which

became one of the most important in the State; he was also interested in many other industries.

He was a member of the board of education

and was elected regent of the University of

Michigan, but declined the office. He made

large gifts to the city of Muskegon. In 1888

he gave a public library, which he endowed in 1891 ; in 1889 he had a park made in a central part of the city in which he erected a soldiers'

and sailors' monument and other statues ; in

1891 he built and endowed a manual training

school; in 1901 he provided for the erection of a hospital with a training school for nurses, and erected a statue of McKinley, the first

statue of the late President to be unveiled. The total value of his gifts was $1,389,525.

HACKMANN, Heinrich Friedrich, Ger¬ man Oriental scholar: b. Osnabruck, 1864. After studying at Leipzig and Gottingen, he lectured at Gottingen (1890-94), became pastor of a German church at Shanghai (1894-1901) and spent several years in Asiatic travel. He then became pastor of the Denmark Hill Church, London (1904—10), and for the next three years was engaged in missionary work in Asia. On his return in 1913, he became pro¬ fessor of the history of religion at the Univer¬ sity of Amsterdam. He published Won Omi bis Bhamo) (1905; 2d ed., 1907); (Missionsar— beit in China einst und jetzt) (1906) ; (Bud— dhismus) (1905; Eng. trans. 1910); (Welt des Ostens> (1912), translated into English as (A German Scholar in the EasD (1914).

HACKMATACK, hak'ma-tak, the Ameri¬ can larch. See Larch.

HACKNEY, England, a metropolitan and

parliamentary borough in the northeast of Lon¬

don, three miles north-northeast of Saint Paul's.

Area, 3,288 acres. It has a fine modern town

hall. Hackney was formerly noted for its

boarding-schools for young ladies. It has

manufactories of chemicals, india rubber, *etc.* ; and had formerly extensive silk-mills. The

borough returns three members to Parliament.

Pop. 222,533. Consult Robinson, (History and

Antiquities of Hackney ˆ (1842).

HACKNEY CARRIAGE or COACH, a

four-wheeled enclosed vehicle drawn by two

horses and seating four persons exclusive of

the driver. They are usually let out for hire.

The carriage derives its name from Hackney

(q.v.).

HADAD, the name of an ancient Syrian

deity, and also of several persons in the Old Testament. The divinity to whom it is applied

is the storm god, known also as Ramman, Bir

and Dadda. The ((Adad):> of Babylonia and As¬

syria has been identified with this god. The

name is also found in compounds, such as

Hadad Rimmon, Hadadezer and Ben Hadad

(son of Hadad), the name assumed bv various

Syrian kings.

HADAMARD, a'da'mar', Jacques Salo¬

mon, French mathematician: b. Versailles

1865. In 1892 he received his doctorate from

the Lcole Normale, and five years later became professor at Bordeaux. He subsequently was

professor at the College de France and the

Rcole Polytechnique. His principal contribu¬

tions to mathematics have 'been in the study of the theory of numbers, the theory of functions, the integration of differential equations of

mathematics and physics and on functional cal¬

culus. Beside numerous articles in scientific

magazines, he has published (Legons de geo¬

metric elementaireˆ (2 vols., 1898-1901) ;

<Legons sur la propagation des ondes et les

equations de l'hydrodynamique* (1903) ; (Legons

sur le calcul des variations) (1910).

HADDINGTON, Scotland, royal and mu¬

nicipal burg and county-seat of Haddington¬

shire. It is situated on the Tyne, 18 miles east of Edinburgh with which it is connected by the North British Railway. The chief points of in¬

terest are the birthplace of John Knox; the

chapel of Saint Martin ; Saint Mary's Church,

dating from the 13th century, which contains a memorial to Jane Baillie Welsh, the wife of

Carlyle; the fine county buildings, town hall

and Knox Memorial Institute. Haddington is

the birthplace of King Alexander II (1198);

John Brown, a dissenting divine (1722-87),

Samuel Smiles, Edward Irving and Jane Baillie

Welsh.

The principal industries are the manufac¬

ture of woolens, beer, leather and agricultural implements. Its grain markets are extensive,

ranking second in Scotland. Haddington be¬

came a royal burg in the 11th century and it has received charters from succeeding kings. It

was destroyed by fire in 1216 and again in 1244, and was later the scene of numerous struggles

with the French. The neighborhood is rich in

historic associations. Pop. 4,200.

HADDINGTONSHIRE, or EAST LO¬

THIAN, Scotland, a county in the southeastern

part, bounded on the north by the Firth of

Forth, on the northeast by the North Sea, on

the east and south by Berwickshire and on the west by Edinburghshire. It covers an area

of 281 square miles and has a sea coast of 41

miles. The chief river is the Tyne, which

traverses the county in a northeasterly direction, emptying into the sea at Tyningham. It is a

rich grain district and raises other agricultural products extensively also. Forests cover about

one-sixteenth of the area. Other industries are coal mining, stone quarrying and manufac¬

tures. of farm implements and woolens and

brewing. The capital is Haddington (q.v.) ;

other important towns are Dunbar, North Ber¬

wick and Prestonpans. Haddingtonshire was

settled originally by the Celts, and became part of Scotland in 1018, under Malcom II. Pop

42,939.

HADDOCK, a fish (M el anogr animus cegle—

finus) of the same family (Gadidce) as the cod and much resembling it in general appearance.

From the cod it may be easily distinguished by the black lateral line and suprapectoral blotches and the swollen bones of the shoulder girdle.

The haddock scarcely exceeds a weight of 15

pounds, and is usually about three or four pounds.

It is restricted in its range to the north Atlantic.

The food is extremely varied, consisting of

every kind of bottom-living invertebrate.

Spawning occurs in late winter and early spring, according to locality, and the eggs are essen¬

tially like those of the cod. Haddock associate HADDON— HADLEY

with cod on the Banks, but the principal Amer¬

ican fisheries are in Massachusetts Bay, on

the Nantucket shoals and other points off south¬

eastern New England, where immense numbers

are taken on trawl and hand lines, especially

during the summer. Philadelphia and Boston

furnish the best markets for fresh haddock, but the demand from the interior is constantly

growing. Though considerable quantities are

salted at Provincetown, the haddock when so

prepared is much inferior to the cod. The

Scotch method of drying and smoking pro¬

duces the much superior ((Finnan Haddies55 and

is largely practised at Portland and Boston.

HADDON, Alfred Cort, English ethnol¬

ogist : b. London, 24 May 1855. After studying at Christ College, Cambridge, he became in 1880

professor of zoology in the Dublin Royal Col¬

lege of Science, where he remained until 1901.

In that year he became Fellow at Christ Col¬

lege. From 1900-09 he was Cambridge lec¬

turer in ethnology, and from 1904-09 lectured

on the same subject at the University of Lon¬

don. He is a member of various ethnological

and antiquarian societies. Among his publica¬

tions are ‘Introduction to Embryology5;

‘Evolution in Art5 (1895) ; ‘Study of Man)

(1897) ; ‘Head Hunters, Black, White and

Brown5 (1901) ; ‘Magic and Fetishism5 (1906) ; ‘The Races of Man and their Distribution5

(1909) ; ‘History of Anthropology5 (1910),

with Quiggin ; ‘The Wanderings of Peoples5

(1912).

HADDON HALL, an old English baronial

mansion, the seat successively of Avenells, Ver¬

nons and the Rutland family, stands on a slope overlooking the Wye in Derbyshire, 23 miles

north-northwest of Derby. The styles of archi¬

tecture range from Norman to the 16th century.

Reference is made to it in Scott’s ‘Peveril of the Peak.5 Although it is

not inhabited it is in fine condition and remarkable as one of the

most interesting extant examples of the country house of a great landowner in the late Middle Ages.

HADDONFIELD, N. J., borough of Cam¬

den County, five miles southeast of Camden, on the West Jersey and Seashore Railroad. Ban¬

croft Training School and the Shepherd's Home

are located here, and contains a public library, Hopkins Park and Lake. It is a popular

residential suburb of Philadelphia. . Its indus¬

tries are mainly agricultural ; and it has also manufactures of stoves, tinware, pottery,

watchcases, *etc.* The commission form of gov¬

ernment was inaugurated in 1913. Pop. 5,646.

HADE. See Fault.

HADEN, Sir Francis Seymour, English

etcher and surgeon: b. London, 16 Sept. 1818;

d. Woodcote Manor, Hampshire, 1 June 1910.

He studied at the Sorbonne and in the Pans

and Grenoble medical schools and practised as

a surgeon from 1847 to 1887. The ^'Etched

Work of F. S. Haden5 contains 185 plates

by him and still others have been pub¬

lished in ‘Etudes a l’Eau Forte5 (1865—

66). His work as an etcher is noted for

both vigor and breadth. He was president of

the Society of Painter Etchers, was knighted

in 1894 and wrote ‘Etched Work of Rem¬

brandt5 (1879-80); ‘About Etching) (1881).

HADES, ha’dez, the Greek name of a god,

in large measure corresponding to the Roman

Pluto, who reigned over the infernal regions.

Both Greeks and Romans supposed the infernal

regions to be in the centre of the earth. To enter these, the river Styx had to be crossed by the dead in the wherry of Charon. If, by any chance, the body lay unburied, the shade was

detained 100 years on the bank of the Styx

before crossing. The Greek word Hades is

rendered in the authorized version by the am¬

biguous term hell (q.v). Expressions, most of

them obviously figurative, used of Hades, rep¬

resent it as subterranean ; as having gates with keys in the hand of Christ, and as having, in a portion of it, souls in torment.

ha6is, or in Arabic plural, Ahadis, nar¬

ratives or traditions, which relate to the

Prophet Mohammed, and are not found in the

Koran. There are numerous collections of these

floating traditions, anecdotes and legends. A

search for such data was first undertaken by

Abdul Malik ibn Juraisch (d. 722 a.d.). Others consider that the collection of Imam Malik (d.

801) is the earliest extant. The following six Hadis collections are considered by the Sunnite Moslems to be canonical scriptures: 1. The

Hadis of Mohammed Ismail al Buchari (d.

878). 2. Of Muslim ibn ul Hajaj (d. 883). 3.

Of Abu Isa Mohammed al Tirmisi (d. 901).

4. Abu Daud al Sajistani (d. 897). 5. Of Abu Abd ur Rahman al Nasai (d. 925). 6. Of Abu

Abdallah Mohammed Ibn Waiah (d. 895),

None of these have ever been printed.

HADLEY, Arthur Twining, American

educator: b. New Haven, Conn., 23 April 1856.

A son of James Hadley (q.v.), he was gradu¬

ated from Yale in 1876, and took graduate

studies in political science at Yale and the Uni¬

versity of Berlin. In 1879-83 he was a tutor at Yale, and during that time wrote for several

journals, including the Railway Gazette and the Financial Chronicle. He was commissioner of

labor statistics for Connecticut (1885-87), and

was in 1885 a witness before the Cullom State committee which

prepared the Interstate Com¬

merce Law. In 1886 he became professor of

political science at Yale, and in 1899-1921 was president of the university. He was presi¬

dent of the American Economic Associa¬

tion for two years. In 1885 he published ‘Rail¬

road Transportation: Its History and Laws,5

which is everywhere recognized as one of the

chief authorities on the subject and has been

translated into French and Russian; his other

works include ‘Report on the Labor Question5

(1885); ‘Economics, an Account of the Rela¬

tions between Private Property and Public Wel¬

fare5 (1896), presenting the theories of political economy in accordance with the most modern

research and thought; ‘The Education of the

American Citizen5 (1901); ‘Freedom and

Responsibility5 (1903) ; ‘Baccalaureate Ad¬

dresses5 (1907) ; ‘Standards of Public Morality5

(1907) ; ‘Some Influences in Modern Philo¬

sophic Thought5 (1913) ; ‘Undercurrents in

American Politics5 (1915). He also acted as

chairman of the Railroad Securities Commis¬

sion, which was appointed under the Act of

Congress of June 1910 and published its ‘ Report >

in 1911. In all his books he has endeavored to utilize the results of economic and political his¬

tory as a basis for a working system of ethics 610

for a democracy like that of the United States.

His writings show him to be not only a

scholar, but also a man of affairs well

acquainted with the business world, and in this regard he is one of the best representatives of the modern type of university presidents.

HADLEY, Henry K., American composer:

b. Somerville, Mass., 1871. He was a pupil of S. A. Emery and G. W. Chadwick in Boston,

studied also in Vienna, and in 1895 returned to the United States and was appointed instructor

in music at Saint Paul's School, Garden City,

L. I. His symphony, (The Four Seasons, 5 re¬

ceived the prizes given bv the Paderewski Fund and the New England Conservatory of Boston.

His works further include a rhapsody for

orchestra, (The Culprit Fay,5 which won the

prize offered by the Natiqnal Federation of

Musical Clubs; two symphonic poems, <Salome)

and (Lucifer5 ; three symphonies; three over¬

tures; a cantata; two serious operas, <Safie,)

produced in Mayence, and (Izora, Daughter of

Montezuma5 ; four comic operettas, a string

quartette and 150 songs and piano compositions

and church music complete the list. From 1907

to 1909 he was Kapellmeister in the opera house in Mayence. During these years he conducted

his works in the principal cities of Europe. In 1909 he accepted the position of conductor of

the Seattle Symphony Orchestra, and in 1911

became conductor of the San Francisco Sym¬

phony, which position he held for four sea¬

sons. During the years since his return to

America he has conducted his own works in

Chicago, Boston, New York, London and

Philadelphia. In 1912 he wrote the music for

(The Atonement of Pan.5

HADLEY, James, American philologist :

b. Fairfield, N. Y„ 30 March 1821; d. New

Haven, Conn., 14 Nov. 1872. When a boy he

suffered an injury to his knee, which de¬

veloped seriously and crippled him for life. He was graduated from Yale in 1842, took gradu¬

ate studies in mathematics and also a theological course. In 1844 he was tutor at Middlebury

College, Vermont, and in 1845 became a tutor

at Yale. In 1848 he became assistant professor of Greek there, and in 1851 professor of Greek.

He was familiar not only with Greek, Latin and the chief modern languages, but also with He¬

brew, Arabic, Armenian, Gaelic, Irish, San¬

skrit, Gothic and Old English, and won a high reputation as a linguist distinguished for exact¬

ness and thoroughness in detail, united with

breadth of view ; he also was successful and

influential as a teacher. He published a (Greek Grammar5 (1861), based on Curtius, and wrote

the <(Brief History of the English Language55

in the 1864 edition of Webster's dictionary5;

after his death, his (Introduction to Roman

Law5 (1873) and (Philological and Critical

Essays5 (1873) were published.

HADLEY, John, English mathematician

and astronomer: b. 1682; d. 14 Feb. 1743. He

became a Fellow of the Royal Society in 1717, and was the inventor of Hadley's quadrant (see Sextant) and of a reflecting telescope (1723).

The credit of having invented the sextant is

claimed for Hadley, Godfrey and Newton, but

each seems, nevertheless, to have made his own discovery independently. Hadley described his

instrument, which he called an <(octant,55 to the Royal Society in May 1731.

HADLEY, Mass., town, which includes sev¬

eral villages, in Hampshire County, on the

Connecticut River and on the Boston and Maine

Railroad, three miles northeast of Northampton

and four miles southwest of Amherst. It was

settled in 1659, and was first called Norwottack; but in 1661, when it was incorporated, it was given the name Hadley, from Hadley in Eng¬

land. William Goffe and his father-in-law,

Whalley, who fled from England to America in

1660, and who lived for a time near New Haven, sought concealment in Hadley, in 1664, where

Goffe died in 1679. According to tradition,

when Hadley was at one time attacked by In¬

dians and the people were called from the

meeting-house, they stood helpless until Goffe,

appearing, took the lead and repelled the enemy.

Hadley is an agricultural region, and its in¬

dustries are chiefly connected with farm prod¬

ucts. Brooms and broom tools are manu¬

factured and there are two public libraries.

The town is governed by annual meetings of

the citizens. Pop. 1,999. Consult Judd, his¬

tory of Hadley5 (Northampton 1905).

HADRAMAUT, ha-dra-mat', Arabia, the

name given to the coast region from Aden to

Cape Ras-al-Hadd. It consists of a plateau,

parted from a mountain chain, the barrier of

the interior desert, by a complex of valleys.

Area, 100,000 square miles. Commerce, agri¬

culture, cattle-breeding and the chase are the

chief occupations. The climate is dry but

healthy. Pop. 500,000.

HADRIAN, ha'drT-an (Publius ˆElius

Hadrianus), Roman emperor: b. Rome, 24

Jan. 76; d. Baiae, 10 July 138. For his ardor in the study of Greek he earned the nickname

of Graeculus. A nephew of Trajan, he was

adopted by that emperor, fought under him

against the Dacians with some glory, and having been entrusted with the prefecture of the East and the command of the Roman armies in the

East early in 117 when Trajan left the field, Hadrian, upon Trajan's death later in the same year, was made emperor by his soldiers. He

quickly realized that he could make no forcible head against the simultaneous attacks of the

Parthians and, in Dacia and Moesia, of bar¬

barian foes, to say nothing of revolt in Syria and Egypt. With the true insight of a diplomat he foresaw that the extreme East must be either surrendered voluntarily or lost and chose the

former alternative as the least costly. Hence

he gave up Armenia, Mesopotamia and Assyria,

all comparatively new Roman provinces, to the

Parthian power, and withdrew the Roman

eagles to the west of the Euphrates. In 119,

for the purpose of becoming acquainted with

the state of the provinces, he began his cele¬

brated journey, which he is said to have per¬

formed chiefly on foot, marching bareheaded

20 miles a day and sharing cheerfully the hard fare of the humblest soldier. He visited Gaul, Germany, Britain — where he built the famous

wall extending from the Solway to the Tyne —

Spain, Mauritania, Egypt, Asia Minor and

Greece, whence he returned to Rome after his

circuit of the empire in 126 to 127 a.d., and re¬

ceived the title of ((Pater Patriae.55 Hadrian

spent the years 132 and 133 in Athens, which

city he adorned with splendid and costly build¬

ings. After once more visiting Syria and crush¬

ing a desperate Jewish revolt, he returned to

Italy and spent the last years of his life at Rome and his villa. During his reign the army was vigorously disciplined and reorganized.

As a civil ruler he merits high praise for the just and comprehensive view he appears to have taken of his duties as a sovereign. Hence to

him is attributed, more than to any other, the consolidation of the monarchical system of

Rome. Hadrian also divided Italy into four

parts under four consuls, to whom was en¬

trusted the administration of justice. Hadrian

had a passion for building: his most splendid

edifices were a famous villa at Tibur (now

Tivoli), and in Rome the Aelian bridge, built

in 136 and now styled the Pont Sant' Angelo.

This bridge leads to the emperor's splendid

mausoleum, the Moles Hadriani. He likewise

laid the foundation of several cities, the most important of which was Adrianopolis. He was

a lover of the fine arts and set a high value on Greek literature. No fragment of ancient lit¬

erature has been more famous than the verses

attributed to the dying Hadrian :

Animula vagula, blandula

Hospes comesque corporis

Quae nunc abibis in loca

Pallidula, rigida, nudula,

Nec ut soles dabis jocos?

David Johnston, in his translations, Literal and Free, of the Dying Hadrian's Address to his SouP (1877), gives no fewer than 116 trans¬ lations of all degrees of excellence. Among well-known writers, Byron, Prior, Pope and Merivale have attempted renderings. Consult Gregorovius, (Der Kaiser Hadrian} (1884; Eng. trans., 1898) ; Durr, (Die Reisen des Kaisers Hadrian) (1884); and the Life of the Em¬ peror Hadrian,* by Spartianus (1908).

HADRIAN'S WALL, a wall in the north of England, between Solway and the Tyne, called also the Roman Wall and the Wall of Severus. Before Agricola advanced into Scot¬ land he established forts between the estuary of the Tyne and the Solway Firth, to protect him from attack in his rear. He adopted the same precaution before leaving the Lowlands of Scotland for the Highlands, placing encamp¬ ments between the firths of Forth and Clyde. Afterward walls were constructed on these two lines. On the English side of the Border is

a stone wall with a ditch on its north side. At¬

tached to it are stationary camps, mile-castles and turrets for the accommodation of the sol¬

diery who manned it. To the south of the

stone wall is a series of ramparts generally

called the vallum. This fortification consists

of three aggers or mounds and a ditch. The

military way along which the soldiery moved

lies between the murus or stone wall and the

vallum. The wall was not intended as a mere

fence to block out the Caledonians, but as a line of military strategy. Hadrian is now generally

believed to have been the builder of the whole structure. Severus, however, repaired it before

he advanced into Scotland. Agricola came to

Britain in 78 a.d. Hadrian came toward the

close of 119 a.d. Severus died in 211 a.d. Con¬

siderable portions of Hadrian's Wall yet re¬

main. In two places the wall stands nine feet high. Consult Bruce, Collingwood, (The Roman

WalP (1851); and (Handbook to the Roman

WalP (1863) ; Neilson, <Per Lineam VallP

(1891) ; and (An Account of the Roman Antiq¬

uities Preserved in the Museum at Chesters,

Northumberland) (1903).

HADROSAURUS, had-ro-sa'rus, or TRA—

CHODON, a genus of duck-billed dinosaurs

of the Cretaceous rocks of North America.

HAECKEL, hek'el, Ernst, German zoolo¬

gist: b. Potsdam, 16 Feb. 1834; d. Jena, Ger¬

many, 9 Aug. 1919. After the usual gym¬

nasium course, he at first devoted himself

to botany at the University of Berlin, but ow¬

ing to his father's wishes took up the study of medicine at Wurzburg, where he enjoyed the

guidance of Virchow and Kolliker. Returning

to Berlin in 1854, he took courses with the

great physiologist Johannes Muller, who ex¬

erted a lasting influence on him and turned his attention to zoology, and after several addi¬

tional semesters at Wurzburg, he received the

degree of M.D. in Berlin in 1857. After a very brief attempt at practising medicine he defi¬

nitely abandoned this profession for zoology

and during a study trip to Messina laid the

foundation of his scientific career by an inten¬

sive investigation of radiolaria. In 1861 he

obtained permission to lecture at the Univer¬

sity of Jena and was soon appointed assistant

professor of zoology. A monograph on the

radiolaria published the following year estab¬

lished his professional reputation. It was here that Haeckel first clearly expressed his ad¬

vocacy of Darwinian principles, of which he

henceforth became the most ardent defender

among German scientists. In the beginning

his championship found expression in a two—

volume work, (Generelle Morphologie der

Organismen,* which appeared in 1866 and has

kept its place as one of the classics of philo¬

sophical zoology. Owing to the extremely

technical character of this chef-d'oeuvre, its im¬

mediate effect even upon specialists was slight.

Two years later, accordingly, Haeckel summed

up the essential elements of evolutionary

philosophy in a more popular volume on

(Naturliche Schopfungsgeschichte* (translated

into English as (History of Creation*). A cor¬

responding work dealing specifically with the

descent of man appeared in 1874 under the title (Anthropogenie) (English translation Evolu¬

tion of Man*). The frankly antitheological

point of view assumed in these writings drew

upon Haeckel the anathemas of the Church,

while his daring hypotheses as to the develop¬

ment of animal types elicited the vigorous

criticism of many sober colleagues and in¬

volved him in bitter controversies, notably with his one-time teacher and friend, Virchow

(1877). On the other hand, his powerful per¬

sonality won over new adherents to Darwinism

and stimulated a host of young zoologists, of

whom some, like Oskar Hertwig and Max Verworn, have attained world-wide fame. While

Haeckel's popular books were being issued in

, ever-increasing editions, he continued his con¬

tributions to science by monographs on the

medusae, siphonophora, sponges and other low

organisms, and elaborated a new monumental

work on the radiolaria for the British Chal¬

lenger expedition. These years of strenuous

activity were diversified with excursions to

Madeira, Egypt, Algeria, Ceylon and other re¬

mote regions. His technical labors ceased with

the (Systematische Phylogenie) (1894-96).

From this time on Haeckel stands forth ex-

clusively as a leader of intellectual radicalism, seeking converts to his philosophy of ˆmonism,®

;which is designed to unify the most general

teachings of science and take the place of re¬

ligion in the world-view of modern man. The

manifesto of this creed was published in 1899

under the title of (Die WeltratseP (English

translation (The Riddles of the Universeˆ. Its

unexampled success led to many new editions

and indicated how well adapted its tenets were to the aspirations of the free-thinking masses.

The uncompromising rejection of a personal

God, immortality and the freedom of the will

again roused the hostility of conservative

writers, while even philosophers free from

theological bias were shocked bv Haeckel's un¬

academic treatment of metaphysical problems.

The charge of materialism often advanced in

this connection is nevertheless only partly war¬

ranted. As Wundt points out, Haeckel's think¬

ing often suggests Spinoza and Leibnitz, and it may be added is not without a mysticism of

its own. As a supplement to (The Riddles of

the Universe } Haeckel wrote a volume on (Die

LebenswundeU (English translation: (The

Miracles of LifeU, which was issued in 1914.

He continued to lecture and write popular

essays on zoological and philosophical subjects

and founded the Monists' League (((Monisten—

bund®), of which he was honorary president. On the occasion of his 80th birthday he received a title of nobilit}', having some years previously been made a Privy Councillor. The outbreak of

the European War found him in the ranks of

patriotic Germans, and his thoughts on the in¬

ternational situation were collected under the

caption (Eternity > (1916).

Among specialists Haeckel's reputation has

suffered on account of his obstinacv, which

for example led him to cling to the be¬

lief in the inheritance of acquired char¬

acters, and also from his excessive fondness

for hypotheses. Nevertheless many of

these have proved extremely fertile and

promoted the development of modern zoology.

Over and above the many special con¬

tributions which science owes him must be

reckoned a great number of significant con¬

cepts which he first introduced into biological thinking. He was also an innovator in making

experimental investigations in zoology, though

he was unable to appreciate the later evolution of experimental methods. His essays in phi¬

losophy cannot be fairly judged from the

metaphysician's level but must be understood as the strivings for a unified world-view of an

unusually artistic temperament estranged from

the traditional creeds. Haeckel's unique posi¬

tion in the history of modern thought lies in the extraordinary effectiveness of his propa¬

ganda as an apostle of intellectual liberalism.

For biographical data consult Wilhelm Bolsche,

(Ernst Haeckel > (Leipzig 1900), and the two

anniversary volumes (Was wir Ernst Haeckel

verdanken,* Heinrich Schmidt, editor (Leipzig

1914).

Robert H. Lowie,

American Museum of Natural History.

HEMATEMESIS, he-ma-tem'e-sTs, vomit¬

ing blood from the stomach, or oesophagus.

It may result from alcoholism, poisoning or

cirrhosis of the liver. It is more frequent in later life than hemoptysis (q.v.) but may occur in the acute perforating ulcers of the stomach in young women. It is frequently associated

with cancer, but it results also from external violence.

HEMATIN, or HEMATIN. See Hemo¬

globin.

HEMATOXYLIN, he-ma-tox'o-lin (Go

HuOe), the coloring matter of logwood, or

Hcematoxylon Campechianum, obtained from the

extract by allowing it to stand some days in con¬

tact with ether, decanting, removing the ether, and adding water. Hematoxylin gradually de¬

posits, and the crystals by pressure and recrys¬

tallization from water containing a little ammo¬

nium sulphite can be got nearly colorless.

Combined with three molecules of water jt

forms dimetric, with one of water trimetric

crystals. The crystals are large, transparent

and brilliant, and have a sweet taste. Hsema—

toxylin dissolves sparingly in water, but it is taken up very freely by solution of borax, by hypo-sulphite of sodium, phosphate of sodium

and some other salts. It is also soluble in

ether and in alcohol. By acids it is not read¬

ily affected, but it reacts at once with alkalis, forming colored solutions, and with metallic

oxides forming precipitates of various colors.

By joint action of air and bases hematoxylin

is oxidized and becomes transformed into

hematein.

HEMATURIA. See Hematuria.

HEMOFLAGELLATA, a goup of flagel-

lata Protozoa parastic in the blood of ver¬

tebrates. The majority of these forms belong

to the Trypanosomatidce, or trypanosomes,

which have come to be recognized as among

the most serious disease-producing Protozoa.

Evans in 1880 found them in horses in India

afflicted with surra; Bruce in 1894 discovered

Trypanosoma gambiense from human blood, grouped

around a single red corpuscle in the centre.

(After Dutton).

another species to be the cause of nagana in

South African cattle and horses, and finally in 1898 Nepveu identified one in human blood.

Rediscovered in 1901 in a European afflicted

with intermittent fever, Dutton named it

Trypanosoma gambiense, and a year later Castellani demonstrated its occurrence in sleeping

sickness with which its causal relation has been abundantly demonstrated since then.

The Trypanosoma is spindle-shaped, with

one (in other species rarely two) terminal

flagella and a lateral, undulating membrane, the HAEMOGLOBIN — HAFIZ

thickened margin of which is continuous with

the flagellum. The nucleus usually lies near

the centre of the body; a smaller body, known as the kinetonucleus or blepharoplast lies at

the root of the flagellum near the anterior end of the organism. The complex life cycle has

only been partially elucidated; it involves alter¬

nation of hosts and probably also metagenesis.

Transfer from one host to another is effected

by a bloodsucking invertebrate, usually a fly.

In the common species this is a Glossina or

tse-tse fly, in which certain stages of the life history are completed. While generally dis¬

persed by the circulatory system when intro¬

duced into the vertebrate host by the bite of the fly, these parasites are more abundant in

the spleen, bone marrow and kidneys, in the

capillaries of which multiplication proceeds

most rapidly.

The effects on the vertebrate host are vari¬

able. In the natural or true host has been

developed a tolerance that shows itself in the small number of trypanosomes present and in

the absence of serious effects. On the other

hand, in casual hosts which are not adapted to their attacks, serious effects follow the intro¬

duction of trypanosomes. In man and the

domestic animals introduced into new regions

they evoke destructive epidemics such as have

carried off cattle in Africa, or horses and mules in the Philippines. The wide spread and ter¬

rible ravages of sleeping sickness in man in

central Africa is a conspicuous illustration of the same phenomenon. In each case some

native animal in which the parasite is unknown or unnoticed serves as the reservoir of the

disease, from which it is transmitted to the

new host by t'he attacks of biting flies also native to the region.

Henry B. Ward.

HAEMOGLOBIN. See Hemoglobin.

HAEMOPHILIA. See Hemophilia.

HAEMOPTYSIS. See Hemoptysis.

HAEMORRHOIDS. See Hemorrhoids.

HAFIZ, Persia's greatest lyric poet and

one of the renowned lyrists of the world: b.

about 1325; d. about 1389. For nearly six

centuries the Odes of Hafiz have received uni¬

versal acknowledgment as masterpieces in the

lyric vein. Hafiz was a natiye of southern

Persia, having been born in the city of Shiraz about the year 1325 a.d. The same city had pro-ducd also his famous predecessor Sa'di (q.v.),

While the Persian name Hafiz is really only a title meaning <(gifted with a good memory,® as bestowed upon him as a pupil who knew the

whole Koran by heart, it has clung to him by fame instead of his real name which was in

full Muhammad ad-Din, or ((Mohammed, the

Sun of Religion.®

Gifts such as Hafiz showed early in youth

soon won literary patronage. Persian notables made him their friend and became also his benefactors. A theological institution was even founded in his honor with a professional chair for him to hold. The impression, how¬ ever, seems to be well founded that his sever¬ ance from this post was ultimately due to his freedom of thought and perhaps to a too liberal manner of life, together with his out¬ spoken contempt for the hypocrisy that was characteristic of some of the Mohammedan priests of his time.

The poetic talents of Hafiz could never have long waited for full recognition even outside of Persia. He received a princely invitation from one of the Bahmanid dynasty in India to grace his court in Hindustan. The story of the acceptance by Hafiz, and of the fearful attack of seasickness which made him turn back from the journey, and of the graceful ode which he wrote to his would-be royal patron as an apol¬ ogy for not being able to fulfil the obligations of his acceptance, are facts recorded in connec¬ tion with his life. The poetic career of Hafiz is therefore wholly confined to Persia.

Hafiz, lived to a fairly ripe old age, and

allusion is made in his lyric verses to sons born from his marriage. The date of his death is

not altogether certainˆ but it appears to have been about the year 1389 a.d. In the environs of his beloved city of Shiraz lie his remains in an enclosed tomb that is still a place of pil¬

grimage, including visits as tributes from lov¬

ers of poetry in the West.

Estimates of Hafiz and his Odes may be

summarized somewhat as follows : The burden

of his lyric verses is love and wine, the night¬

ingale and the rose. Regarding the interpre¬

tation of these tender effusions, so full of pas¬

sion, there is considerable difference of opin¬

ion, particularly in the Occident. Hafiz is fre¬

quently spoken of as ((the Persian Anacreon® ;

and there is no doubt that there is much that is anacreontic in his poetry. At the same time due weight must be given to the Oriental inter¬

pretation of the Odes of the Sufi mystics as

being symbolic and allegorical expressions of

Divine Love couched in terms of human pas¬

sion. On the whole it may be said that the in¬

terpretation which is probably nearest the truth is the one that holds the mean between these

two extremes, esoteric and exoteric, in seeking to understand the poetry of so human and so

ideal a master of lyric song as was Hafiz. See Odes.

Bibliography. — The best available edition

of the text of Hafiz's poems is by H. Brockhaus (Leipzig 1854—56). The most valuable and

complete translation, with commentary,

is that by H. Wilberforce Clark, (The

Diwan-i Hafiz5 (London 1891). There are

translations of many of the odes in various

languages, and Hafiz has influenced the

poets of many lands (cf. H. Ethe, (Neuper—

sische Litteratur,) pp. 303-305). Among English

versions of selections may be mentioned those

found in H. Bicknell, <Hafiz) (London 1875) ;

S. Robinson, (Persian Poetry for English

Readers) (pp. 384-507, London 1883) ; J. H.

McCarthy, (Ghazals of Hafiz5 (New York

1893) ; Bell, (Poems from the Divan of Hafiz) (London 1897) ; W. Leaf, (Versions from

Hafiz5 (London 1898) ; and especially in the

work of J. Payne, (Hafiz5 (1901). On Hafiz

in general consult also I. Pizzi, (Storia

della poesia persiana5 (I. 302-347, Turin

1894) ; P. Horn, (Geschichte der persischen

Litteratur5 (pp. 114-122, Leipzig 1901) ; F. Veit, (Platens Nachbildungen aus dem Diwan des

Hafiz5 (Berlin 1908) ; and for a popular

sketch of Hafiz consult C. Field, (Persian

Literature5 (pp. 213-229, London 1914).

A. V. Williams Jackson,

Professor of Indo-Iranian Languages, Colum¬

bia University.

HAG-FISH, any of various eel-like crea¬

tures of the class of Cyclostomi (q.v.). They

are eel-like in shape, lack all paired fins, have a suctorial mouth, without jaws; a single nos¬

tril at the tip of the head and either one

(Myxine) or from 6 to 14 (Polistotrema) gill-openings along the sides of the body. Around

the mouth are eight barbels, and the nostril

connects with the cavity of the mouth. The

skin contains numerous mucus-glands and also

numerous pockets of ˆthread-cells,® the proto¬

plasm of which is converted into long threads, which, when discharged, unwind and, together

with the mucus, form a jelly-like mass protect¬

ing the animal. The eggs are large, oval in

shape and enclosed in a horny case provided

with hooks on each end by which they are an¬

chored to sea weed, etc., on the bottom. Where abundant the hag-fishes are among the greatest

pests of the fishermen. They attach them¬

selves to other fishes in the neighborhood of

the gills or on the eyes, and thence work them¬

selves rapidly into the interior of the body, de¬

vouring the viscera, muscles, etc., so that there remains <(a living hulk of head, skin and

bones.® The California hag-fishes (Polisto¬

trema stouti) will devour a fish of 10 or 15

pounds in a single night, and it is believed

that they enter the fishes after they are taken in the nets. The hag-fish of the Eastern coast (Myxine glutinosa) ranges north of Cape Cod,

and in the European seas, south to the English Channel. Other species occur in other parts

of the world.

HAGAR, ha'gar, an Egyptian handmaid in

Abraham's house. She was presented by her

mistress, Sarah, to Abraham, in order that Abra¬

ham might not die without descendants, Sarah herself being barren. Hagar bore Ishmael; but Sarah soon became jealous of her, and treated her severely. When Sarah bore Isaac, Hagar was sent away by Abraham, who, the Bible informs us, had received a divine order to dis¬ miss her. She suffered much distress in the desert, but was relieved by an angel, and mar¬ ried her son to an Egyptian woman.

HAGEDORN, Hermann, American au¬ thor: b. New York, 18 July 1882. He was graduated at Harvard in 1907, studied at the University of Berlin 1907-08 and at Columbia 1908-09. In 1909-11 he was instructor in Eng¬ lish at Harvard. He has written several one-act plays produced by the Harvard Dramatic Club and at other colleges ; also lyrics for Peter¬ borough pageant 1910, and an adaptation of (The Witch,5 produced at the New Theatre, New York 1910. He has published (The Silver Blade,5 a play in verse (1907) ; (The Woman of Corinth) (1908); (A Troop of the Guard and Other Poems) (1909) ; (The Horse Thieves, 5 one-act comedy (1909) ; (Poems and Ballads >

0911); (Faces in the Dawn,* a novel (1914);

(Makers of Madness,5 a play (1914) ; (The

Heart of Youth and Other Poems) (1916);

(You are the Hope of the World) (1917), ad¬

dressed to the boys and girls of America; (The Boy's Life of Theodore Roosevelt5 (1918) ; and a translation of Kleist's <Prinz von Homburg5

for <German Classics of the 19th and 20th

Centuries5 (1913).

HAGEN, Gotthilf, got'hilf ha'gen, German

hydraulic engineer: b. Konigsberg, Prussia, 3

March 1797; d. Berlin, 3 Feb. 1884. He studied at the University of Konigsberg; in 1816 ob¬

served at Kulm the total eclipse of the sun, but later turned his attention from astronomy to en¬

gineering, and from 1831 to 1849 was professor of hydraulic engineering in the School of Engi¬

neering. The naval harbor of Wilhelmshafen,

one of the strongest on the German Ocean, was built from his designs. In 1869 he became

director of the Prussian building department.

His most important work is his (Handbuch der

Wasserbaukunst5 (1841-65), besides which he

published numerous other volumes, including

(Die Kanalisierung der obern Saar5 (1866),

and (Untersuchungen fiber die gleichformige

Bewegung des Wassers5 (1876).

HAGEN, Theodor, ta‘6-dor, German

painter : b. Dfisseldorf, 24 May 1842. He be¬

came known through his landscapes of the

Eifel Mountains and Westphalia, in 1871 was

appointed professor in the Weimar Art School,

of which he was also director from 1877. In 1881

he resigned both posts and returned to Dfissel¬

dorf. He obtained a gold medal at the Berlin

exposition of 1891. Among his works, distin¬

guished by their forceful drawing and excel¬

lence of aerial perspective, are (The Kanderthal in Switzerland5 ; (Sunset in the Siegenthal5 ; ˆSpring Weather5 ; (Swiss Landscape, with the

Saint Gothard Pass5 ; (Town on the Lower

Rhine — Evening5; (The Fleet.5

HAGENBECK, hagen-bek, Karl, German

zoologist and dealer in wild animals: b. Ham¬

burg, 10 June 1844; d. there, 14 April 1913.

His father, a fish dealer, commenced a trade

in live animals about 1852, which he handed

over to his son Karl in 1866. The latter de¬

veloped the business to enormous dimensions,

sending out great expeditions to Africa, India, Asia and South America to capture wild ani¬

mals. Every year four or five vessels reached

Hamburg laden with the spoils of the chase.

From 1875 he began exhibiting collections of

natives of little-known countries, together with their huts, domestic utensils and fauna. The

first exhibit was a troupe of Laplanders with

a herd of reindeer; then followed tribes of

Nubians, Eskimos, etc., showing them all over

Europe. He brought over 1,000 animals to the

Chicago Exposition in 1893, and has since

brought vast zoological concerns to London

and Paris. He greatly improved the methods

of capture and maintenance of animals, care¬

fully studied their nature and needs, and was

finally able, to provide trained lions, tigers and elephants ready for menagerie performances.

He introduced <(happy family® groups of the

most incongruous companions in one cage —

polar bears, tigers, lions, dogs, cats, rabbits and mice, all living — or at least performing — to¬

gether with a trainer in their midst. In 1902

Hagenbeck purchased a large piece of land at

Stellingen, near Hamburg, where he built an

animal park on entirely novel lines, eliminat¬

ing cages and barriers by substituting impassable pits around the rocks, jungle or other habitats where the animals roam about in an apparently

natural state. He also started an ostrich farm, and succeeded by degrees in acclimatizing this

bird in the cold region of Hamburg. An am¬

bitious plan commenced some years before his

death was a lifelike and life-size reproduc¬

tion of prehistoric monsters, whose gigantic and hideous shapes may be seen to«-day peacefully

<(browsing)5 in the artificial morasses and wood¬

lands of the Tiergarten. Hagenbeck's sister,

Christiane, has conducted (since 1873) an in¬

dependent business in birds, handling some

50,000 heads annually. Like her brother, she

also sends expeditions to Brazil, Madagascar

and other parts for the capture of birds. Con¬

sult biographies of Hagenbeck by Leutemann

(Leipzig 1887) and Fischer (1896).

HAGERSTOWN, Md., city and county-seat of Washington County, on Antietam Creek,

and on the Baltimore and Ohio, the Cumber¬

land Valley, the Norfolk and Western and the

Western Maryland railroads. Here are exten¬

sive manufactures of knit goods, bicycles, ma¬

chinery, steam engines, lumber, flour, silk, pipe organs, cigars, matches, furniture, automobiles,

ice, fertilizer, spokes, bent wood, boilers, *etc.*

It is the trade centre of western Maryland and contains a courthouse, high school, Bacon's

School for boys and girls, Kee Mar College for women, the Washington County Free Library,

a hospital, electric light and street railways, three national banks and an assessed property

valuation of $7,000,000. In the neighborhood

are Fort Frederick and the battlefields of An¬

tietam and Gettysburg. It was settled about

1740 and was at first named Elizabethtown. It

was incorporated in 1791. It was used as a base of operations during the Civil War. Pop. 28,066.

HAGGADAH, ha-ga'da, one of two rab¬

binical biblical interpretations forming the Mid¬

rash (q.v.).

HAGGAI, hag'i, the 10th of the minor

prophets, and first of those who prophesied after the captivity. He was born in Babylon, and

joined the first band of exiles who, on the issue of the decree of Cyrus (536 b.c.) returned to their own land. He was buried among the

priests at Jerusalem, as belonging to the family of Aaron. See Haggai, Book of.

HAGGAI, Book of. In connection with

the work of Haggai it is desirable to notice the historical situation just preceding. The precise events are difficult to trace with certainty, be¬

cause the data are principally from the work of the Chronicler and are evidently not entirely

historical. The accounts as given are as fol¬

lows : Cyrus, king of Persia, in the first year after his conquest of Babylonia, 537, issued a decree permitting the return of the Jews and

the rebuilding of the temple; this is given partly in 2 Chron. xxxvi, 22-23 and fully in Ezra i, 1-4.

The return soon after this is told in Ezra i, 5-11. A list of those returning, with their num¬

ber, 42,360, is given in Ezra ii. The subsequent events, principally building the altar and lay¬

ing the foundation of the temple, are told in Ezra iii-iv. It is probable, being in accord with the general policy of Cyrus, that he issued such a decree as is mentioned. But the list of those returning is a later list; it is probable that those returning at first were a much smaller

number, with others returning later. But the

total number of those returning in the early

years is probably much less than that given

in Ezra, this being in accord with the situa¬

tion as depicted in Haggai and Zechariah. The

altar was probably built ; it is shown to be stand¬

ing by Haggai ii, 14. Nothing in Haggai and

Zechariah indicates that the building of the

temple was actually begun, which is, therefore, extremely doubtful. If begun, the progress was

so small as to be negligible.

The work of Haggai was entirely during the

year 520. He found the people in Palestine

feeble and discouraged, lax in their religious

observances. It is probable that the utterly dis¬

organized condition of the Persian Empire at

the beginning of the reign of Darius was a

prominent consideration which led Haggai to

think it a favorable time for the activity of the Jews; he anticipated no serious danger of in¬

terference by the Persians. His message was

one of admonition and encouragement to the

Jews, exhorting them to build the temple. His

arguments are principally that their present lack of prosperity is due to their unfaithfulness in religious matters, and that the building of the temple and faithfulness in worship will bring

prosperity. Verses 20-23 (Chap, ii) have ref¬

erence to the governor, Zerubbabel, of Davidic

descent, and should probably be understood as

predicting for him a career as the Messianic

king, a prediction, if so, which was not fulfilled.

The work of Haggai was a practical one, and succeeded in inspiring the Jews to undertake the building of the temple. The thought of the book is such as is familiar from other prophets. It is characterized by the usual pro¬ phetic attitude of strong faith in Yahweh and confidence in his care for the nation, and pre¬ sents vividly the future plans which Yahweh has for them.

All the sermons of the book are precisely dated. It is probable that the book was not written by Haggai himself but by one of his disciples.. This is principally because the prophet is always described in the third person. But the account is given with so much definite¬ ness that it must have been written very soon after 520. The book is generally considered to be practically a unit.

Bibliography. — Driver, S. R., (The Minor Prophets5 ((Century Bible5, Edinburgh 1906); Mitchell, H. G., (Haggai and Zechariah 5 ((In¬ ternational Critical Commentary,5 New York 1912) ; Perowne, T. T., (Haggai and Zechariah5

((Cambridge Bible,5 Cambridge 1897).

George Ricker Berry,

Professor of Old Testament Interpretation and

Semitic Languages , Colgate University.

HAGGARD, hag'ard, Andrew Charles

Parker, English novelist : b. Bradenham Hall,

Norfolk, 7 Feb. 1854. He is a brother of H. R.

Haggard (q.v.) and besides serving with dis¬

tinction in the English army has published

(Dodo and P ; (Polyglot Poems5 ; (Under

Crescent and Star5 ; <Love Rules the Camp,5

and other books.

HAGGARD, Sir Henry Rider, English

novelist: b. Bradenham Hall, Norfolk, England,

22 June 1856. At 19 he went as secretary to

Natal, and served on the staff of Theophilus

Shepstone during his mission to the Transvaal

in 1877. In 1884 he was admitted to the bar of Lincoln's Inn, but has devoted his time mainly to authorship and agriculture. His novels of

South African life have attained a wide popu¬

larity both at home and in the United States.

Among his works are (Cetewayo and His

White Neighbors5 (1882) ; (Dawn5 (1884) ;

<The Witch's Head5 (1885); (King Solomon's

Mines5 (1886) ; (Jess5 (1887) ; (She5 (1887) ; (Allan Quatermain5 (1887) ; (Colonel Quar-616

itch, V.CP (1888); <Cleopatra) (1889); 'Beatrice) (1890); ' Montezuma's Daughter) (1894);

'Doctor Therne> (1898); 'Lysbeth> (1901);

'Rural England* (1902) ; 'A Gardener's Year)

(1905); 'The Poor and the Land> (1905);

'Benito) (1906) ; 'Fair Margaret* (1907) ; 'The Ghost Kings) (1908) ; 'Morning Star) (1910) ;

'Queen Sheba's Ring* (1910) ; 'Rural Denmark

and Its Lessons) (1911) ; 'Red Eve) (1911) ;

'Child of Storm* (1913) ; 'The Wanderer's

Necklace) (1914) ; 'The Holy Flower) (1915) ;

'Finished) (1917) ; 'Love EternaP (1918). He

was knighted in 1912.

HAGIOGRAPHA, ha-jl-og'ra-fa, a Greek

word, signifying sacred writings, first introduced by Epiphanius as the rendering of the Hebrew

word Ketubirvu = =z writings. The third and last great division of the Old Testament books, the others being Torah (the Law) and Nebiim (the

Prophets). The threefold division is alluded

to in the New Testament, the several parts being described as “the law® or “Moses,® “the Proph¬

ets,® and “the Psalms® (Luke xxiii, 44). In

this passage the Psalms are the Hagiographa.

When the division is twofold, the Law and the Prophets, the Hagiographa are merged in the

second category (Matt. v,, 17; xi, 13). In our present Hebrew Bibles the Hagiographa con¬

sist of 13 books thus arranged : Psalms,

Proverbs, Job, Song of Solomon, Ruth, Lamen¬

tations, Ecclesiastes, Esther, Daniel, Ezra, Nehemiah and 1 and 2 Chronicles, but the list is otherwise drawn up by many authorities. The

Talmud places Ruth first. Consult ‘Jewish

Encyclopedia) (1907) ; Mullen, T., ‘The Canon

of the Old Testament* (New York 1893).

HAGONOY, ha-go-noi’, Philippines, a

pueblo of the province of Bulacan, island of

Luzon, on the Grande de la Pampagna River,

about three miles from Manila Bay, seven miles southwest of Malolos. Lake Hagonoy is partly

within the precincts of the town; this lake dries up in the summer season, so that the lake bed can be cultivated. Pop. 20,100.

HAGOOD, Johnson, American soldier: b.

Barnwell, S. C., 21 Feb. 1829; d. there, 4 Jan.

1898. At the beginning of the Civil War he

entered the Confederate army and in 1862 be¬

came a brigadier-general. He fought against

Gillmore at the siege of Charleston (1863), and was commander of Battery Wagner. With his

brigade he participated in the battle of Cold

Harbor, and subsequently was in the trenches at Petersburg. He took part also in the opera¬

tions north of the James after the surrender of Fort Harrison, and commanded Bragg's rear

guard at Fort Fisher.

HAGUE, hag, Arnold, American geologist :

b. Boston, 3 Dec. 1840; d. 14 May 1917. He

was graduated at Yale (1863) ; studied three

years at the universities of Gottingen and

Heidelberg, and in 1867 was appointed assist¬

ant geologist on the United States geological

exploration of the 40th parallel. Among

his published works are 'The Volcanoes

of California, Oregon and Washington Territory) (1883) ; 'The Volcanic Rocks of the

Great Basin) (1884) ; 'The Volcanic Rocks of

Salvador* (1886) ; ‘Crystallization in the

Igneous Rocks of Washoe, Nevada) (1892);

‘Eureka district, Nevada, with atlas) (1892);

‘Geology of the Yellowstone National Park*

(1899); ‘Early Tertiary Volcanoes of the

Absaroka Range* (1899) ; ‘Atlas of the Yellow¬

stone National Park* (1904) ; ‘Origin of the

Thermal Waters of the Yellowstone National

Park* (Presidential address, Geological Society

of America 1911).

HAGUE, The (Dutch hage, hedge; Graven -

hage, count’s hedge), Holland, court capital of the country, the commercial capitals being Am¬

sterdam and Rotterdam. It lies 33 miles south¬

west from Amsterdam, about 15 miles north¬

west of Rotterdam, within 3 miles of the sea.

It is the residence of the sovereign and of the foreign ambassadors, and the seat of the States-General of the Netherlands, and of the principal part of the central administration of the king¬

dom. Among the most important structures are

the royal palace, in the Nordeinde; the palace of the Prince of Orange; the palace of Prince Frederick of the Netherlands; the Binnenhof, a

large irregular building, founded in 1249, and

containing the hall of assembly of the States-General, and various government offices ; the

provincial government-house, a large roomy

edifice; the town-hall; the Ministry of Justice; the municipal museum, containing pictures and

antiquities ; the royal library, containing 500,000

volumes, besides valuable collections of medals

and cameos ; a cannon foundry, one of the lar¬

gest and most conspicuous buildings in the town ; colonial office; war office; the national monu¬

ment, erected to commemorate the restoration

in 1813 of Dutch independence. There are many

other monuments to attract attention, particu¬

larly the equestrian statue of William I of

Orange, in front of the royal palace, and the figure of Spinoza, placed opposite the house in which he lived, *etc.* The royal collection of

pictures, in the Mauritshuis, embraces a picture gallery chiefly confined to Dutch masters. The

parks, gardens, markets and suburbs of the

city are famous for their beauty and interest.

The special educational facilities of the city are excellent, and there are good public schools.

There are also many learned societies, among

which may be mentioned The Hague Society

for the Defense of the Christian Religion, the Witte Society, the Physics Society and the

Netherland-India Institute. The Hague is not

a manufacturing or commercial city, its chief

revenues being derived from the court, the

nobility and the throngs of foreigners who visit the city and Scheveningen, the famous watering

place on the coast to which an excellent road and five tramways lead from The Hague.

The origin of The Hague may be traced to

the building of a hunting seat of the counts

of Holland at this point; the origin of its pros¬

perity to its selection as a princely residence in 1250. It was the birthplace of William II,

Prince of Orange, and William III, Prince of

Orange and king of England. Here were held

the International Peace Congress of 1907 and

the First Peace Conference, called by invitation of the tsar of Russia. As one result of that Conference (18 May to . 29 July 1899) a

Permanent Court of Arbitration was estab¬

lished. (See Hague Court, The). Pop.

(including Scheveningen) about 300,000.

HAGUE COURT, The, a permanent tri¬

bunal for international arbitration established

as a result of The International Peace Confer¬

ence, held in May, June and July 1899 at The HAGUE COURT

Hague, the governmental seat of the Nether¬

lands.

The Hague International Peace Conference

was one of the most important events which

marked the close of the 19th century, and has been justly styled ((the first great parliament of Man.® The Conference assembled in response

to a rescript issued by Tsar Nicholas II of

Russia, 24 Aug. 1898, inviting to a conference all governments with representatives accredited

to the Imperial Court. The Conference was to

occupy itself with the great problem of univer¬

sal peace, especially through the international

diminution of armaments by land and sea, and

the prevention of armed conflicts by pacific

diplomatic procedure. The invitation was ac¬

cepted by all the governments to whom it was

tendered, and the first meeting for the Confer¬

ence was fixed for 18 May 1899 at The Hague, — the capital of the Netherlands being selected, as stated by the Russian Minister of Foreign

Affairs, because <(His Imperial Majestry con¬

sidered it advisable that the Conference should not sit in the capital of one of the Great Powers where so many political interests centre that

might impede the progress of a work in which

all the countries are equally interested.® The

Conference was held at the celebrated Huis ten Bosch — House in the

Wood — the members

assembling in the historically decorated Orange

Hall. Each nation was represented by promi¬

nent diplomats, jurists, men of affairs, soldiers and sailors, the representatives of the United

States being Ambassador Andrew D. White,

Minister Newel, General Crozier of the army,

Captain Mahan of the navy, Seth Low, mayor

of New York, and F. W. Holls of the New

York bar. The president of the Conference

was Baron de Staal of the Russian delegation.

Three committees were formed to deal re¬

spectively with disarmament, regulations in

warfare, and mediation and arbitration. The

final act of the Conference, signed 29 July 1899, comprised three conventions or treaties embody¬

ing the results arrived at by the committees.

The first a'nd most important was the Conven¬

tion for the Peaceful Adjustment of Interna¬

tional Differences by the permanent institution

of a Court of Arbitration in the midst of the independent powers, accessible to all. The

second convention dealt with the laws and

usages of war on land, and the third convention provided for the adaptation to naval warfare

of the principles of the Geneva Convention of

1864. Regulations also prohibited the throwing

of projectiles and explosives from balloons; the use of projectiles intended solely to diffuse

deleterious and asphyxiating gases (this was

not accepted by the United States and Great

Britain) ; and the use of soft expansive bullets.

The last two conventions embodied the wisest

and most humane principles of military conduct

resulting from a study and discussion of these matters during the half-century preceding, and

which had their first codification in the ((Instructions for Guidance of the Armies of the

United States® issued at the beginning of the

Civil War.

The Convention for the Peaceful Adjust¬

ment of International Differences, however, was

the crowning work of the Conference, and was a source of much gratification to the advocates of international arbitration, as bringing to fruition a sentiment which for centuries had hoped for

the establishment by the nations of the earth of some permanent form of congress or court,

which should be vested with functions to ensure the preservation of peace and to deliver the

world from the strife and’ carnage with which

it had been afflicted in all the past ages.

During the last decade of the 19th century

peace advocates had been persistent in their

advocacy of a permanent court of arbitration.

In 1894, at its meeting in Holland, the Inter¬

parliamentary Union, a voluntary organization

of members of the national legislative bodies

of the nations, adopted a declaration in favor of a permanent court of arbitration; and in 1896

resolutions to the same effect were unanimously adopted in the United States at the annual

Mohawk Conference on international arbitra¬

tion, and by the New York State Bar Associa¬

tion, the latter presenting to the President of the United States a memorial setting forth a perma¬

nent tribunal as the essential feature of any

general scheme of arbitration. The honor of

presenting such a proposition in The Hague

Conference fell to Lord Pauncefote, chairman

of the British delegation; Germany was antago¬

nistic, but the sentiment was so strongly in its favor that the German delegates were induced

to withdraw their objection, and provision was

made for its consummation. The fourth divi¬

sion of the Convention in 47 articles provides for the creation of the court, defines its juris¬

diction and the principles which are to guide

it, specifies the manner in which its members

are chosen, the rules governing its procedure,

its awards and other necessary details. The

Convention provides that each of the 26 signa¬

tory powers shall appoint for a term of six

years as members of the Permanent Court not

more than four persons ((of recognized compe¬

tence in questions of international law, enjoying the highest moral reputation.® These persons

constitute a Permanent Court of Arbitration,

accessible at all times and acting in accordance with the prescribed rules of procedure ; they

do not, however, sit as a collective body, but when two or more nations have a case to sub¬

mit to arbitration, they select by mutual agree¬

ment one, three or five members, who will act as the tribunal to try the case. Thus it happens some members of the court may never be called upon to discharge the functions of a judge.

Also, although The Hague is designated as a

place where the court shall hold its sessions, another place may be designated by agreement

of the litigant parties. Under the presidency

of the Dutch Minister of Foreign Affairs, the

diplomatic agents of the signatory powers, in

residence at The Hague, constitute a permanent

council which serves as the office of the Perma¬

nent Court of Arbitration. The first cases ad¬

judged by the court were the Pious Fund Claim between Mexico and the United States in 1902,

and the difficulties of Venezuela with the

United States and various European nations in

1903.

For the erection of a Temple of Peace to

house a comprehensive library of international

law and to include a courtroom that can be

used as a meeting place for the Permanent

Court of Arbitration, Andrew Carneerie on 25

April 1903 donated the sum of $1,500,000 to be administered by the government of the Nether¬

lands as trustee for the other signatory powers of The Hague Convention of 29 July 1899.

The temple was designed by the French archi¬

tect L. M. Cordonnier.

Decisions Rendered. — On 14 Oct. 1902 —

In the matter of the case of the Pious Fund of the Californias between

the United States and
Mexico.

On 22 Feb. 1904 — Respecting the prefer¬
ential claims of the creditor nations of Vene¬
zuela under the protocols of 7 May 1903.

On 22 May 1905 — In the difference between
France, Germany and Great Britain on the one
hand, and Japan on the other, respecting leases held in perpetuity.

On 22 May 1909 — In the matter of the Casa¬
blanca dispute between France and Germany.

On 8 Aug. 1909 — In the matter of the dis¬
pute between Great Britain and France, respect¬
ing the right of certain Muscat Dhows to fly
the French flag.

On 23 Oct. 1909 — Respecting the maritime
boundary between Norway and Sweden.

On 7 Sept. 1910 — In the North Atlantic
Fisheries case between the United States and

Great Britain.

On 25 Oct. 1910 — In the Orinoco steamship

case between the United States and Venezuela.

On 24 Feb. 1911 — In the ˆSavarkar® case

between Great Britain and France.

On 3 May 1912 — Claim of the Canevaro

Brothers.

When the war in Europe began there were

two cases pending before The Hague Court;

in 1915 three were pending.

The members of the Permanent Court rep¬

resenting the United States, as shown by the list corrected to 1 Jan. 1921, were Judge George

Gray, ex-Secretary Straus, ex-Secretary Elihu

Root and John Bassett Moore.

Consult Foster, Arbitration and The Hague

Court) (1904) ; Holls, (The Peace Conference

at The Hague) (1900); Hicks, (Equality of

States and Hague Conferences* (1908) ; Scott,

(Hague Peace Conferences) (1909) ; Higgins,

(Hague Peace Conferences) (1909); Lynch,

(Peace Problems) (1911) ; Gulick, S. L., (The

Fight for Peace) (New York 1915).

HAHN, han, August, German Protestant

theologian : b. Grossosterhausen, Saxony, 27

March 1792; d. Breslau, 13 May 1863. He

studied at Leipzig, and was appointed in 1819

professor extraordinary of theology at Konigsberg. In 1826 he became professor of theology

at Leipzig, and in 1833 was called to Breslau, and in 1844 became general superintendent of

the province of Silesia. Among his best-known works are his Hebrew Bible (1831) and

his (Bibliothek der Symbole und Glaubensiegeln

der Apostolisch-Katholischen Kirche) (1842;

2d ed,, 1878).

HAHNEMANN, ha'ne-man, Samuel Chris¬

tian Friedrich, German physician; founder of

the homoeopathic system : b. Meissen, 10 April 1755; d. Paris, 2 July 1843. . In 1775 he went to Leipzig, where, against his father's will, he studied medicine, and found the means chiefly

by the translation of English medical works.

At a later period he went to Vienna, and after some years he returned and completed his

studies at Erlangen. He afterward practised

medicine at various places, but gave it up for a time, until, in 1789, by the translation of Cul¬

len's (Materia Medical he was led to adopt

a new method of cure. His system was fully

explained in his <Organon der rationellen Heil—

kunde* (1810). In 1820 the government pro¬

hibited him from dispensing medicines, and

thereby, from his inability to have them pre¬

pared by druggists, obliged him to give up his practice. Duke Ferdinand of Anhalt-Kothen,

however, gave him an asylum at Kothen, and

conferred upon him the title of Hofrath. Here

he remained till 1833, when he proceeded to

Paris, where he hoped to find a wider sphere

for his operations. The result equaled his ex¬

pectations ; and a royal decree issued in 1835

authorized him to practise Homoeopathy.

Among his works should be named (Dictionary

of Materia Medica,* his (Essays on Poisoning

by Arsenic, and on the Effects of Coffee,* and his treatise on (Chronic Affections.) Consult

his (Life and Letters,* edited by Bradford

(1895). See Homoeopathy.

HAIDA, hi'da, the native name for the

Indians of Queen Charlotte Islands, in British

Columbia and the southern end of Prince of

Wales Island, in Alaska. The family name is

generally given as Skittagetan. The Haida are

very closely related physically and linguisti¬

cally to the Tlingit and Tsimshian, and the three peoples are frequently grouped together. Juan

Perez, a Spanish ensign who visited the Queen

Charlotte Islands in 1774, is the first to men¬

tion these regions and their people. Two other Spanish explorers had visited the islands by

1786. The following year Captain Dixon spent

six weeks in exploring them and gave them

their present name in honor of his ship, the

Queen Charlotte. The fur trade was soon

established on the Pacific coast and the Indians enlisted in its ranks of fur hunters and traders at which they proved very adept. But the

change in the lives of the Indians, disease,

especially smallpox, and immorality rapidly

reduced their numbers and their moral stam¬

ina. The Haida who were further advanced

in civilization than most of the west coast

tribes of the United States, were just civilized enough to conform to the ways of the white

traders without having sufficient knowledge to

resist the evils that the advance guard of white civilization brought with it The Haida were

good seamen and skilful fishermen. Their oc¬

cupation in this direction was extended, on the coming of the whites to the Pacific coast of

Canada. At Skidegate, the Haida have long

been employed in catching dog-fish and in the

work of extracting the oil from the same,

which is done in the town on a large scale.

During the summer many Haida Indians work

in the salmon canneries on the mainland, which have also become a very extensive part of the Pacific coast industry. The Haida and the lin¬

guistically closely related tribes have taken

naturally to the ways of the white men and

have known, at the same time, how to turn

many of their own aboriginal activities to ac¬

count. They were, when first discovered,

builders of fine sea-worthy boats; and they

still continue to be among the successful boat-builders of the British Columbia coast. These

they sell far up and down the coast and up the navigable streams, to their Indian neighbors

and frequently to white traders, hunters, ex¬

plorers and settlers. These boats are generally made of cedar or spruce. Practically all the

Haida are at least nominally Christians as the H AID ARAB AD — HAIG

result of the missions that have been estab¬
lished among them for many years. The
Haidas have long had the reputation of being
the most civilized of all the Indians of the
Pacific coast and they have always been noted
for their skill as carvers, canoe-builders, paint¬
ers, decorators and house-builders ; and they
still exercise these trades. Haida-carved ob¬
jects of wood and slate are well known to all the British Columbia and South Alaska in¬
habitants and to the visitors and tourists to
these countries and they form no inconsider¬
able part of the demonstrations of Haida civil¬
ization in most Indian exhibits. The Haidas
are very keen traders and property possession
is on a firm base among them. When they
first became known to the Europeans the Haida
constructed fine and presentable dwellings of
wood, with handsome carved totem poles and
other ornamental features. Their canoes,
which are made of cedar trunks, were often
of size sufficient to carry half a hundred men; and with them they

venture into the stormiest

weathers of the Pacific or carried their goods up the inland rivers and streams. The houses

of the Haida were among the most noticeable

structures of the aborigines of the United

States and Canada. Built of planks and

boards, made with stone tools, they often pre¬

sented a striking appearance both on account

of their size and the ornate, carved adornment presented by many of them. The most notice¬

able' feature of their houses, which were gen¬

erally carefully painted outside, was a tall,

carved totem pole which rose from the middle of one of the gable ends. Sometimes a house pos¬

sessed several of these poles, all of which were elaborately carved. In this case they also ap¬

peared on the front of the edifice. These

totem poles are still used by many of the

Haida, especially in Alaska. The Haida were

not only among the most intelligent trading

nations of North American Indians, but they

were held in respect by all the neighboring

races and tribes as skilful warriors to be seri¬

ously reckoned with in any contest. . On ac¬

count of this general respect in which they

were held, the Haida had great influence over

the neighboring tribes ; and this influence was often made use of by the Hudson's Bay Com¬

pany and by independent traders to secure their ends in the' Pacific coast countries. It has been claimed that the Haida believed in reincarna¬

tion, though to what extent and under what

conditions do not seem to have been fully as¬

certained. In fact some of the best known in¬

vestigators of Haida life, beliefs, customs and mythological and legendary lore appear to be

none too trustworthy. Some of them are not

even inclined to trust one another. This is un¬

fortunate, since there is no Indian people north of Mexico more worthy of careful study and

trustworthy presentation than the Haida, who

erected mortuary posts to their dead and buried their deceased priests and chiefs in tombs con¬

sisting of wooden houses, generally in full view of the ocean or the water front. The Haida of Alaska are generally known as Kaigani or

Ketshade. In 1841 the. population of the Haida was over 8,000, according to an estimate made

by John Work. Since then the Haida have di¬

minished very considerably through the inroads

of disease and dissipation and the breaking up of the old tribal life, The latter led to irreg¬

ular marriage relations between the tribal

women and the white traders and trappers in

the Haida country. Many of the Haida have

become regular and formal citizens, especially

those of mixed blood; and have often, in this way, been lost sight of as members of the vari¬

ous Haida communities. In fact Haida In¬

dians are often found far from their own rec¬

ognized land limits, and not infrequently as

far north as northern Alaska, or the Mackenzie River country in Canada. Therefore the pres¬

ent estimate of 1,000 as the probable number

of Haida, is, in all probability, considerably

short of the mark, especially if those of mixed blood are taken into consideration. Consult

Swanton, (Haid Texts) (New York) ; Eth¬

nology of the Haida> (New York 1909) ;

(Haida Songs) (Leyden 1912).

John Hubert Cornyn,

Editorial Staff of The Americana.

HAIDARABAD, hi-da-ra-bad. See Hyde¬

rabad.

HAIG, Sir Douglas, British soldier, com¬

mander-in-chief of the British Expedition¬

ary Forces in France and Flanders: b. 19

June 1861. The youngest son of Mr. John

Haig, of Cameronbridge, Fife, Scotland, he

was educated at Clifton College and Oxford

University. He passed the Staff College at

Camberley and joined the 7th Hussars in 1885.

He saw his first active service under Kitchener in the Nile Expedition of 1899. For merito¬

rious conduct in the battles of. Atbara and

Omdurman he was mentioned in dispatches

and promoted to major. His previous steps

were — lieutenant, 1885; captain, 1891. In the South African War (1899-1902) he earned

great distinction as a cavalry leader, serving

throughout the whole of that arduous cam¬

paign both on the staff and in command of

columns. As deputy-assistant-adjutant-general

he was present at nearly every important ac¬

tion, including the battles of Elandslaagte,

Rietfontein, the relief of Kimberley, . Paarde—

berg and Diamond Hill. He was thrice men¬

tioned in dispatches, established a reputation

for dash and courage and held the record for

rapidity of promotion among officers in the

cavalry branch of the service. He was also

chief of staff to Sir John French, and espe¬

cially distinguished himself in the fighting

round Colesberg.

After the war he rose to colonel; major-general in 1904, and later, inspector-general of cavalry in India. From 1907 to 1909 he was

director of staff duties at army headquarters,

and in 1909 returned to India as chief of staff.

In 1910 he became lieutenant-general and in

1912 received the honor of being appointed

colonel (i.e., commander) of the 17th Lancers,

the ((Death or Glory Boys,® one of the most

historic and <(crack):> regiments in the British army, dating back to 1759.

From 1912 to the outbreak of the war in

1914, Sir Douglas was general officer commanding-in-chief at Aldershot. He accompanied

Field-Marshal Sir John (now. Viscount)

French and the first small expeditionary, force as commander of the First Army Corps, in that feverish struggle when every available ship was crammed with troops and rushed across, the

Channel to the aid of France and Belgium.

Every nerve and sinew was strained to check

the German avalanche. It is now no secret

that in those dark days of the early stages of the war, when the fate of the Allies hung in the balance, the imperturbable confidence and

cheerful optimism of Lieutenant-General Haig

exerted a stimulating influence over the British troops. <(When our officers wore long and

solemn faces clouded with gloom,® wrote an

eyewitness, <(it was a holy inspiration to look at Haig. Never for a moment, in the blackest

hour, did his faith in our ultimate success

waver.® He played a chief part in the most

hotly-contested battles of the campaign- — at

the first Ypres, at Neuve Chapelle, at Festubert and at Loos. A scientific soldier after the most modern plan, chary of speech, bold in de¬

sign and resolute in execution, he raised the

first army under his command to a foremost

place among the British forces. He had the

confidence of his men and earned the admira¬

tion of all who worked with him. In his

dispatches Sir John French frequently paid

glowing tribute to Haig's able and determined

leadership. When the former asked to be re¬

lieved of his command after 16 months of

severe and incessant strain, it was almost a

foregone conclusion that Haig would succeed

him. His appointment as commander-in-chief

was announced 15 Dec. 1916, and two weeks

later he was created field-marshal.

Among the numerous honors that have been

conferred upon him are — K.C.V.O., 1909; C.B., 1900;K.C.I.E, 1911; K.C.B., 1913; G.C.B, 1915;

G.C.V.O., 1916; Grand Cross of the Legion of

Honor; Grand Cross of the Order of Leopold

(Belgium) ; Grand Cross, Saint Maurice and

Saint Lazarus (Italy) ; Obilitch Medal and

Order of Danilo (Montengro). At the time

of his high appointment he was a young man,

too, as modern generals go — only 55 — the

youngest, except the French General Gouraud,

of all the great army chiefs in the West. Sir Douglas married, in 1905, the Hon. Dorothy

Vivian, daughter of the 3d Lord Vivian. In

1907 he published (Cavalry Studies.) In 1919

he was created First Earl Haig of Bemersyde.

See War, European; Festubert; Marne;

Mons; Neuve Chapelle; Somme; Ypres, *etc.*

HAIL, small masses of ice or frozen rain

falling from the clouds in showers or storms,

varying in their form, being either angular,

pyramidal or stellated ; as well as in their con¬

sistency, being sometimes as hard as ice and

sometimes as soft as snow. The theory that the formation of hail is dependent on the presence of whirlwind phenomena in the upper atmos¬

phere, has gained considerable acceptance. The

formation of the alternate coatings of ice and snow is, on this theory, produced by a series of vortical ascents and descents to and from an upper snow region and a lower region where

the temperature is rather higher.

HAIL COLUMBIA, a national song of

the United States. The words written during

a period of great political excitement in 1798, by Judge Joseph Hopkinson, were set to the'

melody of the President's March,* composed

the same year in honor of President Washing¬

ton, by Pfyles, orchestral leader at the John

Street Theatre, New York. The composition

first sung at a theatrical benefit attained great popularity, and on account of its patriotic senti¬

ments has become a representative national song.

HAIL MARY, AVE MARIA, or AN¬

GELICAL SALUTATION, a prayer consist¬

ing of three parts : the first, the words by which the angel addressed the Blessed Virgin (Luke

i, 24) with the word Mary after ((Hail® ; the second, the words by which Elizabeth addressed

Mary (Luke i, 42), to which has been added the word Jesus; the third, the words: ((Holy Mary, Mother of God, pray for us sinners now and at the hour of our death — Amen.® The name,

<(Angelical Salutation,® comes from the first

part of the prayer, which is the salutation of the angel. The first and second parts, taken

from the Bible, were in use in their present form in early times; but the words of the third part were varied until the 16th century when the

present form was approved and adopted by Pope

Pius V. The prayer is in general use among

Roman Catholics and is found in many Angli¬

can books of devotion.

HAILES, Lord. See Dalrymple, Sir

David.

HAILE YBURY, Canada, the capital of

the Temiskaming district of Ontario, on Lake

Temiskaming, 107 miles north of North Bay on

the Temiskaming and Northern Ontario Rail¬

way. It is in a good farming district ; saw

milling and lumbering are the chief industries; and it is the seat of a Roman Catholic cathedral.

Cobalt and New Liskeard are connected by

electric railway. Pop. 3,874.

HAILEYBURY COLLEGE, England, an

institution at Hailey, near Hertford, 20 miles

north of London, founded by the East India

Company in 1806, as a training school for ad¬

mittance to the service of the company. It

attained a high reputation, and numbered among

its former pupils the most distinguished names

connected with the Indian administration of the 19th century and among its teachers such names as Malthus, Sir James Stephen and Sir James

Mackintosh. After the Indian Mutiny of 1857-58, and the government reorganization of the

Indian Civil Service, the college was closed for four years. It was reopened under a royal

charter in 1862 as a public school, and while maintaining many, of the traditions of its fa¬

mous predecessor is no longer an Indian Service training ground. Handsome modern buildings

have been added to the old college quadrangle, built in 1809; the surrounding grounds cover

over 100 acres. Consult Lowell, (Colonial Civil Service) (1900); Monier-Williams, (Memorials

of Old Haileybury College) (1894) ; and for

the new school, Milford, (Haileybury College,

Past and Present* (1909).

HAILMANN, hal'man, William Nicholas,

American educator: b. Glarus, Switzerland, 20

Oct. 1836. He was educated in the gymnasium

at Zurich ; studied in Medical College, Louisville, Ky. (Hon. A.M. University of Louisville 1864;

Ph.D. Ohio University 1885). He became teacher

of natural science in the Louisville high schools 1856-65 ; director of the German and English

Academy 1865-73; director of the German and

English Academy, Milwaukee, 1873-78; director

of the German-American Seminary, Detroit,

1878-83; superintendent of public schools La—

porte, Ind., 1883-94; national superintendent of Indian schools, 1894-98. He was superintend¬

ent of instruction, Dayton, Ohio, 1898-1903 and head of the department of psychology, Chicago

\

FIELD-MARSHAL SIR DOUGLAS HAIG

Commander-in-Chief of the British Expeditionary Forces in France and Flanders (1915

HAIR

Normal School, 1904—09; head of department of

education at the Normal Training School,

Cleveland, Ohio, 1909-15, when he retired to

Pasadena, Cal. Among his writings are Out¬

lines of a System of Object-teaching) (1866) ; ‘History of Pedagogy) (1870) ; ‘Kindergarten

Culture } (1872) ; ‘The Law of Childhood >

(1878) ; ‘Primary Methods) (1887) ; ‘Applica¬

tion of Psychology to Teaching) (1887) ;

‘Froebel’s Education of Man > (1890); ‘The

English Language } (1902). He edited Erzie—

hungsblaetter (1870-83) ; Kindergarten Messen¬

ger and New Education (1876-84). From 1883-94 he was one of the chief contributors of the National Educators’ Association in the interest

of the kindergarten and other features of the

new education.

HAIR, strictly speaking, the peculiar epi¬

dermal covering of the body in mammals, al¬

though by analogy the term is loosely applied

elsewhere, as to the setae of annelids, the slender modified spines of caterpillars, *etc.* Hair is

present in every mammal, although the amount

may be greatly reduced so that in certain whales it occurs only in the foetal stage, in others is limited to two bristles on the lips. The struc¬

ture is best understood by following the develop-Fig. 1. — Section Through the Earliest Stage of Hair Formation.

E, epidermis, showing in m, the Malpighian layer, the elongation of the cells; d, derma, with proliferation of cells to form the papilla shown in Fig. 2.

ment. In the earliest stage (Fig. 1) there is merely a thickening of the Malpighian layer of the epidermis (see Skin) at the point where

the hair is to be found. This thickening in¬

creases in amount, and thus forms a solid plug (Fig. 2) which projects into the underlying

derma. At the same time the cells, which are

scanty in most parts of the derma, become

abundant beneath the ingrowing plug, and form

the basis of the future papilla. Next a ring—

shaped pit appears on the outer surface of the plug and gradually becomes deeper, cutting the

epidermis into two parts, an outer root-sheath

and an inner rod-like part, the hair itself, while the pit forms the follicle (see Fig. 3). The

papilla grows into the base, bearing blood-ves¬

sels, while the Malpighian layer at this point forms the tissue from which the hair grows. In the hair itself several parts are recognized — a central pithy axis, the medulla; next, a layer of cells, the cortex, and outside this, forming the outer surface of the hair, the cuticle. Farther down in the follicle is the inner root-sheath, formed of two layers of

cells known respectively by the names of the two anatomists, Henle and Huxley, who first described them. The Mal¬

pighian cells, at the base of the follicle, divide continually, and the new cells thus formed are pushed outward and are transformed into the

hair. From this it will be seen that the hair is not a secretion but is composed of cornified

cells. It is also apparent that the hair is not hollow.

Fig. 2. — Second Stage in Hair Formation.

The epidermis, E, has now formed a solid plug extending down into the derma; the papilla, P, has begun to form at the apex of the epidermal ingrowth.

The differences between the different kinds

of hair are largely those of shape and of the amount of the various parts present. Thus in

many animals two kinds of hair occur, longer

Fig. 3. — Diagrammatic Section of Hair and Hair Follicle.

bv, blood vessel; c, cortex; cl, cuticle; e, epidermis*

/, follicle: he, Henle's layer; hu, Huxley's layer {he and hu making up the inner root-sheath); m, medulla; n, nerve, os, outer root-sheath; s, sebaceous gland; sm, Malpighian layer of epidermis.

and coarser hair on the outside, and beneath

this a closer and softer under-fur. The coarser hairs may be enlarged into bristles, or still more 622

enlarged to form spines, like those of the porcu¬

pines and hedgehogs. Again the hairs may be¬

come united to each other, the result being the formation of scales like those of the pangolins or horns like those of the rhinoceros. In some cases the hair is perfectly straight, again it may be curly. The straight hairs are circular in

section, the curly are flattened, the amount of curl being proportional to the amount of flatten¬

ing. Certain hairs (wool of sheep, etc.) have

the property of felting. This depends upon the scale-like projections of the cells of the cuticular layer. The color of the hair is due to the pres¬

ence of pigments belonging to the group of

melanins.

Several accessory structures (Fig. 5) are

connected with the hair : sebaceous glands which empty an oily substance into the follicle to keep the hair in a moist, soft condition ; nerves which are distributed to the wall of the follicle and thus render the hairs to a certain extent organs of touch, as in the whiskers (vibrissa) of cats; and muscles for the erection of the hair

(erectorespilce) . This erection may be to in¬

crease the warmth of the body by entangling a.

layer of air among the hairs, or it may have the purpose of protection against injury, either by terrifying some enemy or by affording a loose

envelope around the body some distance from

the flesh. Usually the hair is shed (molted)

at regular intervals, but there are exceptions, as in the mane and tail of horses, as well as in the case of man. The hair is not scattered irregu¬

larly over the body but occurs with more or less regular arrangement. In the early embryos it

is not uncommon to find it distributed in regu-the back of an embryo

cat (after Maurer).

Fig. 5.' — A Hair.

Vertical section

of skin, showing

hair - follicle and

related parts: a,

epidermis; b, hair;

c, haii -bulb; d, d,

oil-glands; e, fat—

cells.

lar lines (Fig. 4). Later the lines become

broken up into groups of hairs, the arrangement being characteristic of the species, but without any broad morphological significance. It should

be noted. that although hair and pinfeathers

closely resemble each other in general appear¬

ance they are very distinct structures, hair origi¬

nating in a thickening of the epidermis, while feathers (q.v.) like scales are dermal in origin.

Most of the literature relating to the hair is in German. Consult general works in physiology

and zoology, and the writings of Maurer, Meig—

erle, Weber and Poulton, Quarterly Journal of

Microscopical Science (Vol. XXXVI, 1894).

HAIR-DRESSING. The head has ever

been considered the noblest member of man,

containing the brain which controls his actions.

Hence the adornment of the head is a function dating from prehistoric times and reaching still to the least civilized aborigines of every country.

Fig. 1. — Ancient Assyrian Fig. 2. — Ancient Greek style style according to statuary. (from Athenian vase).

Thus we find the ancient Assyrians, Persians

and Egyptians curled the hair and beard and Re¬

placed baldness with wigs. They anointed the

hair, dyed it and adorned it with bands, ribbons, fillets and ornaments of precious or base metal.

The Jews wore a thick head of hair and bald¬

ness engendered disgrace and suspicion of

leprosy, but the consecrated, priestly Levites

shaved their heads. Later the Jews looked

upon long hair as a sign of effeminacy, and only those under a vow allowed their hair to grow

long, though the women held long hair in es¬

teem, curling and plaiting it. Combs are not

mentioned in the Old Testament though other

peoples were acquainted with them. The Greeks

cut their hair rather short and curled it in small ringlets, but the children wore it long till with youth, assuming the position of ephebe (18

years old) they cut the hair short, sacrificing it to some god, usually Apollo. But the men of

Sparta wore long hair while the boys' hair was short. It was universalˆ the custom, as a sign of mourning, to allow the hair to grow long or let it hang down disheveled. Slaves were not

allowed to wear long hair. Greek women parted

their hair in the centre of the crown, carried it downward over both temples frequently in

waves, bringing it toward the back and either

fastening it together over the parting or wear¬

ing it on the back of the head in a tuft or knot.

Usually, when the hair was so arranged it was covered by a wind of cloth, hood-like, or en¬

closed in a gold knotted net. The maiden cut

off her hair before the wedding. Anacreon

makes it apoear that while blonde hair was

preferred, black hair stood in high esteem. The custom of wearing

false hair in Greece was

derived from Asia. Athens gives us the first

hair-dresser we know of ; the curlers of hair

were sufficiently numerous to form a special

industry. According to Varro, the Romans

used to let the hair grow long until 300 b.c.

when P. Ticinius Mena brought the first ((ton—

sorˆ from Sicily to Rome; in Cicero's day both young dandies and sober-minded statesmen

walked around in their perfume-anointed,

built-up curls. Women's hair decoration, from

the Augustan period, took on greater dimen¬

sions and more complicated forms. The pile of

plaits and curls of the wearer's head not

sufficing, false hair, preferably blonde, was

added. This latter was obtained from the con¬

quered Germanic race.

The Celts, in northern Europe, bound their

hair up behind the head, and this long coarse blonde hair was

considered as a sign of honor and dignity, while the Celts and Germans con¬

sidered the short cut hair represented servitude or a penalty of disgrace for breach of Ger¬

manic laws. The same hirsute conditions pre¬

vailed among the Franks. But Charles the

Great and the Carolingians wore their hair

short, while the Saxons, who had for centuries worn the hair and beard cut short, from the 9th century wore the hair hanging down over the

shoulders or bound up and fastened with a

pin. By the 11th century their hair still hung down over the shoulders but was cut short on

the forehead, also crimped and curled. The

women continued to wear their hair falling loose or held together in a chapelle ; in England and France the hair was bound up by ribbons into

one or two cues that fell over the shoulders

from the back. The 14th and 15th centuries

brought forth the most divergent conditions in

hair-dressing fashions; men of station wore

short hair for a while, later they allowed it'

to grow hanging down, sometimes curled. From

the middle of the 14th century the women still wore long hair but in styles of head coverings or coifs in changing fashions. The cutting of

men's hair quite short was introduced by Charles IV in France but does not appear to have be¬

come general till end of the 15th century;

women, however, persisted in binding it at the neck and covering it with a hood. The soldiery cut their hair just as short as possible. In the Renaissance period the men combed their hair

over the forehead and cut it off short. Louis XIII (17th century) wore a wig to cover his

baldness ; it was an elaborate curled affair. But when Louis XIV, on account of his small

stature, started to wear high heels and a tower¬

ing curled wig, the style spread from king to courtiers and the upper classes. The short-cropped Puritans (<(round-headsw) of Crom¬

well, in England were fighting long-curled (<roy~

alists.0 the while. The tall, curled wig was

introduced into England when Charles II re¬

turned from his French exile on the Restoration Fig. 6. — Three-cornered hat and wig, 1470.

(1660). By this time wig powdering became

general. If the women wore no wigs, neverthe¬

less they built up their hair into towering

heights at great expenditure of time and labor ; on festive occasions some ladies had to permit the over-worked hair-dresser to do the elaborate hirsute creation the night before and the mis¬

tresses of the sumptuous tresses were obliged

to spend the night seated in chairs to avoid

mussing the delicate structure. The French

Revolution changed all that, sumptuous royal

fashions fell into disrepute, also the wig, the men wearing, for the

most part, short hair,

which has remained largely the case ever since.

In England a tax was laid on wigs ip 1795,

amounting to a guinea a year ; it raised as

much as £20,000 one year, but it was

repealed in 1860. The bag-wig prevailed in

England, made to hold up the back-hair during

the 18th century, but all wigs disappeared about 1810, except with the legal fraternity. But

during the latter part of the 18th century the women retained elaborate toilets, adopting the

style of the ladies of ancient Rome for a while and surrounding the forehead with little curls

while the rest of the hair was fastened together 624

on the neck or hanged down in a chignon.

For a little while the ladies wore their hair short (a la Titus), a fashion that was renewed about 1890 for a little while. Next came the

fashion of having the curls hang down in the

neck (a 1' enfant) as long hair came into its own again. It was next tied up and brought

into the widest possible plaits which rested,

Fig. 7. — Coiffure a la frigate, Marie Antoinette period (end 18th century).

wreath-like, on the head, while on either side a veritable forest of curls adorned the temples.

Giant combs of delicate workmanship towered

above and diamonds, pearls, flowers, etc., were interspersed in groups. During the transition

to simplicity Greek styles of hair-dressing were attempted but the hair-dresser prevailed and

Fig. 8. — French bag-wig (end 18th century).

wrought his most extravagant styles, without

distinctive character or regular form, however.

Immense chignons and beaver-tails alternated

with apparently tumbled about hair and forests

of curls. But, like with women's costume, the

fashions in hair-dressing were subjected to

rapid changes, generally running to opposite

extremes, often grotesque.

We find much greater stability in the hair¬

dressing styles of the nations outside of Eu¬

rope. With the children of nature of Africa,

Asia, the Americas and Australia, we find its

men attempting to look ferocious by letting

their hair hang down like manes or with gfeat erections of plaits held

together with oil or

clay. The women wear their hair frequently

short or plaited or rolled up in a lump. The Arab women divide their hair into innumerable

plaits into which they interweave gold threads, strings of pearls, ribbons, etc., and cover it with a light turban. The Arab men wear their

hair short. The Chinese shave the head ex¬

cept on the crown from which they allow a

long cue to grow. The Japanese shave the

head in front and wear short hair at the back and sides. The women comb back the hair

from all sides and bring it up in a cluster on the top of the head, then decorate it in a most elaborate manner with big combs and long

needles, flowers, *etc.* With both the latter

nations European fashions are being adopted to

the gradual exclusion of ancient customs.

Among the Turks and Persians it is the custom to shave the head in part, while the women

wear their hair in long plaits that they lengthen with silk ones of like color.

Bibliography. — Bremer, Walter E. E. F., (Die

Haartracht des Mannes in archaischgriechische

ZeiD (Giessen 1911) ; Bysterveld, (Album de

coiffures historiques) (Paris 1863-65) ; Falke,

(Haar und Bart der Deutschen) (in Anzeiger

des Germanischen Museums, 1858) ; Krause,

(Plotina, oder die Kostiime des Haupthaars

bei den Volkern der Alten Welt) (Leipzig

1858) ; Lacroix, P., (Histoire de la coiffure, de la barbe et des cheveux postiches> (in Le livre d'or des metiers, Paris 1851) ; Villermont,

Marie, Comtesse de, (Histoire de la coiffure

feminine) (Paris 1892) ; Voigt, B. B., (Das

Haar als Schmuck, oder Handbuch der Frisir—

kunst, nach Billaret und Normanden) (Ilmenau

1829) ; Wilken, (Ueber das Haaropfers und

einige andere Trauerbrauche bei den Volkern

Indonesians) (in Revue Coloniale, 1887).

HAIR DYE, any preparation for coloring

the human hair more or less permanently,

usually applied to darken gray hair, but some¬

times because a person is not pleased with the natural color. Men often dye their moustaches,

which are apt to be a little higher in color than the hair, or more sandy. Women both dye and

bleach their hair, which is assumed to enhance their beauty. Hair dyeing has been practised

from the earliest times, and two general classes of dyes are used: (1) Those based on the

mineral salts, as mercury, lead, bismuth and

silver; of these nitrate of silver is the most common. (2) Those based on a vegetable stain,

as walnut or henna. The latter are harmless,

but all the metallic dyes appear to injure the hair. Perhaps the least objectionable of' the

metallic hair dyes is made from sulphate of

iron, in the proportion of 10 grains to an

ounce of glycerine and a pint of water. This

may be applied with a brush once a day, and

each application gives the hair a deeper shade of brown, until a brown-black is attained. It

will color the skin as well as the hair, hence must be applied with care. Nearly all hair

dyes will also tan the skin, and it is common to apply first some form of grease on the skin to prevent any dye from adhering. Pulped walnut

skins make an excellent dark brown dye, and

they can be put up with either alcohol or cot¬

tonseed oil, with a trace of perfume. An in¬

fusion of henna leaves in alcohol makes a

satisfactory brown dye, which can be darkened

by adding a little ammonia. In applying

nitrate of silver dye, it is first desirable to soak the hair in a solution of sulphite of potassium, and the stronger the solution the darker will

be the resultant dye. The solution of nitrate

of silver is added while the hair is still wet with the potassium ; the

result is claimed to be quite permanent. A simple method of slightly dark¬

ening the eyebrows or moustache is to use a

lead comb daily, which gradually darkens the

hair. To lighten the hair peroxide of hydrogen is used, giving a socalled gold tinge, and pro¬

ducing artificial blonde hair, or a ((peroxide

blonde.® The dyeing of false hair is much

easier than dyeing on the human head, and a

greater variety of dyes may be used. Any

dye suitable for cotton or wool can be utilized.

A solution of logwood in warm lime-water is

commonly used for brown dye; but the hair

should first be well washed in alum water. To remove hair dye stains from the hands, wash¬

ing with a bleaching powder is recommended,

followed by an alcohol wash. Nitrate of silver stains may be removed by applying a weak

solution of sulphydrate of ammonia.

HAIR MANUFACTURES. Hair enters

into the manufacture of many civilized con¬

veniences. It is the most useful material for

brushes, and the stiff bristles of the pig go into tooth-brushes, clothes-brushes, etc., while softer brushes, as for hats, painting in oils, etc., often call for softer hair. For special purposes the artist uses brushes of skunk's hair, camel's

hair and sable. The once famous camel's-hair

shawls are now seldom seen, and the haircloth

shirts of the monks and the still more ancient sackcloth of biblical times remain only in a

historical sense. But the public does wear a

great deal of hair worked into felt goods, es¬

pecially hats, cheap overcoats, blankets and the like. The hair of rabbits, dogs, goats and

woodchucks is valued for such purposes, but

the cow and steer yield the most. Cowhair and waste hair of any kind are also freely used in certain roofing materials, and as a binding

material for the plasterer. The tail hair of

cattle often does duty for the more valuable

horsehair which may be woven into such

beautiful and durable cloth, once popular as a furniture covering, but now reserved for more

utilitarian purposes. The stiffening of gar¬

ments is frequently of horsehair cloth which is called haircloth, though it has a cotton warp ; also the screening cloths used in expressing

various oils, and for retaining the solid matter of the cider press. Excellent fishing lines are made of braided horsehair. Power looms are

made on purpose for weaving the horsehair.

Camel's hair is also woven on the loom, and the long silky hair of the yak, .the wild ox of

Tibet, makes a beautiful fabric and also a

coarse lace. Goat hair, pig hair, barbers'

sweepings, and any convenient waste hair is

utilized for stuffing cushions in upholstery.

Many mattresses are supposed to be made of

horsehair, but this is so valuable that other hair is introduced, and also various imitations that should be called fibres. (For*the uses of wool, which is really the most common hair, see

Wool). The handling and making over of

human hair is a considerable industry, most of it being for false hair of one sort or another.

For many years the peasant girls of southern

France, and also of Belgium and Switzerland,

gave up many of their locks and tresses for

making switches and curls for their less favored sisters in other lands. The greater the length and the more golden the color the better the

price obtained for them. Beautiful hair more

than five feet in length has found its way into the beauty parlors of the great cities of the Western world. The shorter hair offered for

sale is more commonly picked out from

women's combings that have been saved and

combed out. These are valued for curls,

frizzes, false fronts, puffs, wigs, *etc.* They

require to be carefully selected, shaped and

dyed. (See Hair Dye). The toupee, favored by

many ˆbaldheads,® is usually made up from the best of the long stock recovered by the barber, which is purchased, woven into shape and dyed

to order.

The United States census classifies as hair

work all factories that clean, bleach, curl and dye human hair, also that of the horse, camel, yak and Angora goat, the latter being termed

mohair. The hair of the yak and goat works

up well in theatrical wigs, false beards, *etc.*

This portion of the hair industry of the United States (1914 census) occupies 205 factories,

with a total capital of $2,543,000, and 1,193

wage earners, utilizing materials of the value of t $1,529,000, and producing $3,335,000 value an¬

nually. Sixty per cent of this industry is in New York State, and 59 per cent in New York

city. The hair cloth branch of the industry in¬

cludes only 19 establishments and 595 em¬

ployees, yet its gross product is two-thirds as large and its capitalization larger than the hair work branch. With materials valued at $1,-

635,000, the gross product is $2,395,000, on a capital of $2,945,000. Fifteen of the 19 fac¬

tories are located in Pennsylvania.

HAIR PENCIL, in painting, a fine brush

made of the hairs of the camel, sable, badger, squirrel, marten, raccoon, goat, *etc.* The

various sizes require the quills of the crow,

pigeon, goose, turkey or swan. Hair pencils

are used by artists in water colors, and in other very fine work.

HAIR-TAIL. See Scabbard-fish.

HAIRLESS DOGS. Several races of do¬

mestic dogs are bred in the warmer parts of

the world, whose skins are nearly hairless. In China and Farther India a_ large dog of this

description, called polygar, is used in hunting.

Central Africa has a breed resembling a small

black greyhound. A hairless dog is found

mummified in prehistoric Peruvian tombs, and

others were formerly prevalent in the West

Indies, or are still known in Mexico. These

have been cultivated by fanciers in the United States, and constitute a recognized show class.

They are small and terrier-like, brownish or

bluish-black, wrinkled, and have only a few

straggling hairs on the body, with sometimes a tuft on the head.

HAIRWORM, or HAIR SNAKE, a

nematode so named because of its supposed

origin from a horse hair that has fallen into water. See Gordiacea.

HAITI, a republic comprising the western

portion of the island of Santo Domingo or

Haiti. Its area is 10,200 square miles, between one-third and four-elevenths of the total area

of the island, the central and eastern portions of which are held by the Dominican Republic.

Adjacent islands subject to the Republic of

Haiti are : La Gonave, commanding the ap¬

proach by water to the capital; Tortuga Island, near Port de Paix, and Vache or La Vache,

near Aux Cayes. The ports, besides that of

the capital, Port-au-Prince, are Port de Paix,

Cape Haitien, Gonaives, Saint Marc, Petit

Goave, Jeremie, Miragoane, Aux Cayes,

Jacmel, and Aquin. Rivers are the Artibonite,

navigable for 100 miles, the Trois Rivieres and the Grand Anse. The largest lake is Etang

Saumatre, 22 miles long and 60 miles wide.

The climate, which in the highlands is tem¬

perate, but in the lowlands tropical, even more so than that of the Dominican Republic, favors the development of a varied and extensive flora.

The fauna, on the other hand, is limited here as in many other parts of the West Indies.

History. — At the time of the discovery of

the north coast, 6 Dec. 1492, the island was divided into five states or cacicats. Thus dis¬ united, the aboriginal inhabitants were rather easily conquered, rapidly exterminated. The natives could not stand the hard work imposed on them by the Spaniards who began the importation of African slaves.

In 1630, French buccaneers and freebooters undertook the conquest of what became Saint • Domingtie. From the intercourse between white and black resulted in Saint Domingue an intermediary class of mulattoes most of whom were free people without any political rights. They at first did not resent this.

In 1789 the freedmen who had accumulated wealth asked for equality of political rights which the Assemblee Nationale granted them. But the French landlords or (<colons® objected and a hard struggle began. The ˆcolons® called the English to their help. At the end of the year 1793, the latter took possession of a part of the island which seemed lost to France, being occupied partly by Spaniards, partly by English, when Toussaint l'Ouverture espoused the cause of France. This extraordinary man,

who, up to 40 years age, had been a slave,

succeeded in ridding the country of the

Spaniards and English. The French govern¬

ment rewarded him by appointing him major-general and governor of the island. Later on,

Napoleon I, who thought that Toussaint

TOuverture was too powerful, appointed Gen¬

eral Leclerc governor of the colony, and sent a formidable army to reduce the authority of

TOuverture. The latter, after a few skir¬

mishes, surrendered and retired on one of his

properties. Leclerc caused him to be arrested

and deported to France in June 1802. The

colored people took up arms against French

domination in September 1802 under the leader¬

ship of General Dessalines; and by the end of 1803, Rochambeau, who on the death of General

Leclerc had taken command of the French

army, was hard pressed in the city of Cape

Haytien by black troops, and compelled to

capitulate. On 1 Jan. 1804 Haiti proclaimed its independence, with General Dessalines as ruler.

Slavery was abolished. In 1822 the Spanish

part of the island came under the administra¬

tion of Haiti: but in 1844 it seceded and es¬

tablished an independent government, known

to-day as the Dominican Republic (q.v.).

In Haiti, the record for the 67 years next

following is little more than one long series

of revolutions and usurpations, often mere con¬

tests between representatives of the mulatto and black elements. At the end of that period, dur¬

ing the turbulent administrations of Lecomte,

Tancrede and Oreste, prominence was given

to demands for payment of arrears of the re¬

public's foreign debt; and arrangements for the arbitration of French claims had actually been

concluded when the government was over¬

thrown by Theodore and Zamor (1914). The

latter made himself president for a short time, until he was forcibly dispossessed by the former.

On 7 Jan. 1915 a revolt against President Theo¬

dore occurred. Again, in April and July,

revolution, the massacre of political prisoners

and the murder of President Guillaume, Theo¬

dore's successor, made necessary the landing of American marines to restore order. Continued

revolutionary uprisings led to more active in¬

tervention, and on 16 Sept. 1915 a treaty was signed which provided for the establishment of

a receivership of customs and supervision of

Haitian finances, for a term of 10 years, under control of the United States, and the formation of a native constabulary commanded by Amer¬

ican officers. Sudre Dartiguenave was elected

President of the republic toward the end of

1915; and with the support of the United States government, his administration proved peaceful

and progressive.

The constitution dates from 9 Oct. 1889.

The National Assembly embraces two bodies,

the Chamber of Representatives and the Sen¬

ate, the former consisting of 99 members,

elected by the people for three years, and the latter of 39 members chosen for terms of six

years by the representatives from lists supplied by the President of the republic and a board

of electors. The President, elected by the Na¬

tional Assembly for a term of seven years, can¬

not be reelected except after an interval of at least one term. His cabinet comprises six

members, the secretaries of Foreign Relations,

of War and Navy, of Interior and General

Police, of Finance and Commerce, of Justice

and Public Instruction, of Public Works and

Agriculture. The judiciary includes the

Supreme Court, the <(Tribunal de Cassation® •

and a number of district and municipal courts.

National Activities. — Primary education is,

by law, compulsory and free. The number of

registered pupils in the five departments of

the republic in 1914 was 46,018. There are over 400 secular schools ; a school of agriculture and domestic science for girls ; several public

lycees; schools of. medicine and law; and pri¬

vate schools receiving allowances from the gov¬

ernment. French is the language of Haiti,

though the country people speak a patois called (<creole.® The prevailing religion is Roman

Catholicism. There is an archbishop and three

bishops, and every commune has at least one

priest. The papacy maintains a legate at

Port-au-Prince, and Haiti has a minister ac¬

credited to the Holy See. Freedom of con¬

science is, however, guaranteed in the republic.

About $1,000,000 annually is allotted by the

government to public instruction.

The most important products of Haiti are

Main Street, Port-Au-Prince

\

coffee, cacao, cotton, Campeachy wood, lignum—

vitae and fust.c. The mineral resources are un¬

developed. Deposits of gold, iron, copper, sil¬

ver, nickel, antimony, tin, sulphur, kaolin, gyp¬

sum and a large variety of stone and soft coal are among those that have been definitely lo¬

cated. Copper is worked to some extent and

concessions have been granted for the mining

of coal, iron and other minerals. The manu¬

facture of articles for the home market gives

employment to a relatively small number of the inhabitants.

Principal exports in the year 1914 were :

Coffee, 78,512,559 pounds; cacao, 6,688,084

pounds; cotton, 3,121,839 pounds; cottonseed,

5,369,175 pounds; logwood (Campeachy

wood), 54,618,800 pounds; fustic (yellow

wood), 55,000 pounds; lignum vitae, 3,090,020

pounds ; honey, 1,264,690 pounds. The value of

foreign commerce in that year was $18,928,351,

imports, $7,612,792, and exports, $11,315,559 est.

The distribution of foreign trade was given as follows : United States, imports $6,381,688 and

exports $1,000,000; France, imports $345,190

and exports $5,000,000; Great Britain, imports

$409,811 and exports $800,000; Germany, im¬

ports $338,004 and exports $4,200,000. Imports

from the United States into Haiti in 1916 were more than 130 per cent greater than in the

preceding year. In 1915 they amounted to $3,-

806,672 and in 1916 to $8,775,694, an increase of $4,968,392. This gain is due largely to con¬

tinued peace throughout the country, which has

enabled the people to work and be paid for

their labor.

Haiti has 70 miles of railways. These in¬

clude the line running from Cape Haitien to

Grand Riviere, 15 miles; that connecting Port-au-Prince with Lake Etang Saumatre 28

miles, and the Port-au-Prince and Leoganes

Railroad, 22 miles. Port-au-Prince has five

miles of tramway. Regular service from New

York and from Southern ports is supplied by

three steamship lines. There is also steamship

service between Haiti and Cuba. In 1880 Haiti became a member of the International Union. There are now 30 post offices in the republic. The extent of telegraph lines is about 124 miles.

Finance and Population. — (The national debt (excluding the currency debt) amounted to $25,982,181 gold on 1 July 1914; the cur¬ rency debt to $13,534,812 in the paper money, nickel and the floating debt. The revenue, derived almost exclusively from duties on exports and imports paid in American gold, amounted in the fiscal year 1914—15 to 4,980,146 and 4,959,386 paper gourdes (value of gourde $0.33 in 1915; average for five years about 20 cents). More than onehalf of the expenditure is for the public debt. The mone¬ tary system has as its basis, theoretically, the gourde, which, in gold, would have the value of $0,965, currency of the United States. But no gold coins were ever minted, and the actual currency is paper which fluctuates in value and is irredeemable.

The number of inhabitants, according to an estimate for 1917, is about 2,030,000; and the population of the

capital, Port-au-Prince, was

given as 100,000; Cape Haitien 30,000 ; Les Cayes 12,000; Gonawes 13,000; Port de Paix 10,000.

Residing in the republic are about 500 white

foreigners (Haitian citizens only can own real

estate) ; otherwise the population consists of

blacks and mulattoes, the former about 90 per

cent of the total.

Bibliography. — Ardouin, E., (Etudes sur

lhistoire de Haiti* (Port-au-Prince 1888);

Aspinall, A. E., (The Pocket Guide to the

West Indies> (Chicago and New York 1914) ;

Aubin, E., (En Haiti* (Paris 1910) ; Bureau

of the American Republics (now Pan Ameri¬

can Union), (Haiti > (Washington 1892) ; Har¬

vey, W. W., (Sketches of Hayti from the Ex¬

pulsion of the French* (London 1827) ; Hill,

R. T., (Cuba and Porto Rico with the Other

Islands of the West Indies* (New York 1898) ; Leger, J. N., <Haiti, her History and her De¬

tractors* (New York and Washington 1907) ;

Mackenzie, C. (Notes on Haiti* (London

1830) ; Pan American Union, (Haiti* (Wash¬

ington 1915) and (Latin America* (Washing¬

ton 1916) ; Pritchard, H., (Where Black Rules

White* (London 1900) ; Saint John, S., (Haiti

or the Black Republic* (London 1884) ; Stew¬

ard, T. G., (The Haitian Revolution, 1791 to

1804* (New York 1914) ; Tippenhauer, L. G.,

(Die Insel Haiti* (Leipzig 1893) ; Vibert, P., (La Republique d'Haiti* (Paris 1895) ; Vincent, S. , (La Republique d'Haiti* (Bruxelles 1910)!

Marrion Wilcox.

HAITI, Diplomatic Relations of the Uni¬

ted States with. Haiti, founded by ex-slaves

who revolted against their masters and confis¬

cated their property, began its nationality as an international outcast and was long regarded

with disfavor by the great powers which had

neighboring territory. Against its early strug¬

gle for independence from French control, the

American government recognized the French

arretes of 1802-06 prohibiting trade with His¬

paniola ports, occupied by the blacks, and in 1806

and 1807 assisted in enforcing them by acts of Congress forbidding intercourse with every

part of the island not in actual possession of the French government.

Although it was prac¬
tically independent by 1804, it was not recog¬
nized by France until 1838. Although for its
continued independence the American Monroe
Doctrine is largely responsible, the American
government, influenced by slavery interests,
hesitated in 1825-26 to participate in the Pan¬
ama Congress because Haiti was invited, and
withheld formal recognition of the Haitian
government until 1862.

Twice before 1860 the American govern¬
ment found it necessary to resort to informal
diplomatic relations. In 1832 the Jaokson ad¬
ministration sought through a naval officer to
procure the abolition of Haitian discriminating
duties which operated against American com¬
merce. In 1851, acting on invitation of the
Dominican Republic for joint mediation of the
United States, France and Great Britain to se¬
cure peace with Haiti, the Fillmore administra¬
tion sent a special agent to co-operate with the representatives of
France and Great Britain in
a remonstrance against Haiti with a view to
possible joint intervention to cause the Haitian government to stop the

war and recognize the

independence of the Dominican Republic.

American diplomatic relations, after recog¬

nition of Haiti in 1862, as indicated by the pub¬

lished correspondence, largely consisted in the

consideration of insurrections (local and gen-

eral) and changes of government, unjust

treatment of foreigners, arrests and imprison¬

ments of American citizens, the right of asylum for fugitives or refugees, blockade of ports,

martial law, political and financial conditions

resulting from anarchy and Haitian interfer¬

ence in Dominican affairs. During the Amer¬

ican Civil War, Secretary Seward succeeded

in leasing the harbor of Mole Saint Nicholas

from Haiti as a naval station. In 1865, when

the government of Haiti requested the British

government to concur in guaranteeing the neu¬

trality of the peninsula of Samana, Seward in¬

formed the British Minister that the United

States by long-settled policy was disinclined

to political alliances with foreign states in re¬

gard to subjects outside the range of necessary and immediate domestic legislation, and must

refrain from making such a guarantee while

disclaiming all purpose or desire to disturb the peace and security of Haiti.

Early in 1870, the American government

learning that the President of Haiti during

pending American negotiations with the Do¬

minican government had aided General Cabral

in a revolution against the Dominican govern¬

ment, notified the Haitian government that any

military movement against the Dominican Re¬

public would be considered as an hostile act

against the United States. It sent Admiral

Poor via Port au Prince to use force to pre¬

vent interference. Late in the same year on

complaint of the Dominican government that

the Haitian government was furnishing war

materials to Dominican insurgents, the Ameri¬

can government again warned the Haitian gov¬

ernment. In 1877 it instructed the American

Minister to Haiti to urge that the Haitian legis¬

lature should not repudiate the contracts or en¬

gagements of the preceding legislature.

In 1884, by protocol the Pelletier claims

case which arose in 1861 was submitted to an

arbitrator. An award made in 1885 against

Haiti was rejected by the American govern¬

ment on the ground that it was unjust.

In 1882-84 the United States declined to

entertain proposals of the President of Haiti

for cession of a naval station. In 1884, learn¬

ing that Haiti contemplated a transfer of ter¬

ritory to France, the American government in¬

formed the French government that such acqui¬

sition of Haitian territory would conflict with the Monroe Doctrine. France denied any in¬

tention of acquisition. Soon thereafter the

American government made a similar statement

to England. In 1888, _ Secretary Bayard re¬

ferring to the rumors in Haiti regarding the

efforts of the French representatives to induce France to declare a protectorate or annexation

and at the same time considering the possibili¬

ties of the French government being asked to

undertake the completion of the Panama Canal

instructed the American Minister at Paris again to take the opportunity by explicit language,

without referring to affairs in Panama, to re¬

call the American traditional policy of which

France had been informed 25 years before and

also at the commencement of work upon the

Panama Canal by the French company in

1884-85.

In 1891, the American government sent a

special naval commissioner to Haiti with a

fleet to endeavor in cooperation with the

American Minister to obtain a lease of Mole

Saint Nicholas as a naval station, but the

proposals were declined.

In 1894 the American government objected

to Haitian discrimination in favor of sailing

vessels ; and in 1897 and 1898 it protested

against acts involving discrimination against

American citizens in Haiti.

In December 1897, when German vessels

threatened to shell the public buildings at Port au Prince unless the Haitian government ac¬

ceded to its demands, resulting from the arrest and imprisonment of a German liveryman, the

American Minister in Haiti urged the applica¬

tion of the Monroe Doctrine and the Haitian

government applied for a treaty arrangement

which practically would have established an

American protectorate ; but Secretary Sherman,

opposed to a policy of establishing protectorates over neighbors, urged Mr. Powell not to pro¬

ceed on the hypothesis that the United States

had a duty to protect neighbors against their

responsibilities. In 1900 when the German

Minister suggested the establishment through

act of the foreign powers of an independent

tribunal at Haiti to try foreign litigations not triable in the Haitian tribunal, Secretary Hay

declined to approve the proposed measure in¬

terfering with the sovereign right of Haiti but suggested independent friendly representation

to the Haitian government in regard to the

defects in the administration of justice.

After the Franco-Haitian commercial treaty

of 1900, reducing tonnage dues paid by French

sailing vessels and duties on merchandise

landed from French steamers, the American

government promptly insisted that under the

treaty of 1864 no higher duties could be col¬

lected on American vessels than were collected

on the vessels of the most favored nation.

By the logic of events the American gov¬

ernment was forced to accept larger responsi¬

bilities in Haiti. In 1912, it exercised an in¬

fluence to prevent war between Haiti and the

Dominican Republic. In 1914, as a result of

continuous insurrectionary activity and con¬

sequent threatening clouds of international

trouble, it undertook to secure supervisory con¬

trol of the Haitian finances. In July 1915 in order to terminate an increasing reign of terror it landed marines to protect the legations, took possession of the fort, supervised the election, put naval paymasters in charge of the customs

houses and finally completed negotiations for

a convention establishing a fiscal and constabu¬

lary protectorate.

The new American responsibility in Ha:ti —

whose government is an engine without a fly¬

wheel, threatening its own destruction by its

own energy — is far greater than that assumed over other weak governments in the Caribbean

region, and may raise problems far different

from those of the other territories in which the American government exercises supervisory

control.

James M. Callahan,

Professor of History and Political Science,

University of West Virginia.

HAKE, Thomas Gordon, English poet and

physician: b. Leeds, 10 March 1809; d. London, 11 Jan. 1895. He took his medical degree at

Glasgow University in 1831, and practised his

profession in East Anglia, later becoming the

physician and friend of Dante Gabriel Rossetti.

His poetry is thoroughly original, but very

subtly philosophical. His works include

(Poetic Lucubrations> (1828); (Vates: A

Prose Epic) (1839); (Madeline with Other

Poems* (1871) ; (New Symbols * (1876) ;

(Maiden Ecstasy,* verse (1880); (The Serpent

Play, a Divine Pastoral *(1883) ; (Memoirs of Eighty Years* (1892).

HAKES, fishes of the family Gadidce and

chiefly of the genera Phycis and Merluccius,

distinguishable from the cod and haddock by

having only two dorsal fins. Phycis has a chin barbel and filamentous ventral fins, both of

which are lacking in Merluccius. The squirrel—

hake (Phycis chuss) and white hake (P . ten¬

uis), both also called ling or codling, are

common bottom fish on our Atlantic coast from

Virginia northward. The silver hake or whit¬

ing (Merluccius bilinearis) has a similar range, but is less common in shallow waters and leads a roving life in search of herrings and other smaller fishes. Various other species occur in

the north Atlantic and Pacific oceans. The

hake fishery is of considerable extent, and the product is salted and sold chiefly as boneless cod. The dried air-bladders are utilized in the manufacture of isinglass.

HAKIM, ha-kern', a Turkish word, signify¬

ing lord and frequently in the Koran applied

to Allah, God, as in the Greek and English

versions of the Jewish Scriptures the word

Lord is used for Jehovah. It is now-a-days

especially given as a title of honor to the im¬

perial physician of the sultan, who is Hakim

bashi, that is to say, the chief of the physicians, always a Turk; whilst the physicians in the

seraglio under him are western Europeans,

Greeks and Jews.

HAKLUYT, hak'loot, Richard, English

geographer: b. about 1553; d. London, 23 Nov.

1616. He entered Christ Church College, Ox¬

ford, in 1570, and became so eminent for his

acquaintance with cosmography that he was

appointed public lecturer on that science. In

1582 he published a small collection of voyages and discoveries, forming the basis of a subse¬

quent work on a larger scale. In 1584-88 he

was in Paris as chaplain to Sir Edward Staf¬

ford. On his return he published (in 1589)

his famous collection of (The Principal Navi¬

gations, Voyages, and Discoveries of the Eng¬

lish Nation, made by Sea, or over Land, within the Compass of these 1500 Years. * The first

volume of a new edition of his great work was published in 1598, the

second and third in 1599

and 1600. In 1602 he became prebendary, and

in 1603 archdeacon, of Westminster, and next

year he was appointed a chaplain of the Savoy.

He was interred in Westminster Abbey. He

published several other geographical works,

among them (Virginia Richly Valued, etc.*

(1609), a translation from the Portuguese. An

edition of his chief work appeared in 16 vol¬

umes (1885-90). The manuscript papers of

Hakluyt were used by Purchas in his (Pil¬

grims.* ‘

HAKLUYT SOCIETY, of Great Britain,

organized in December 1846, for the purpose of printing and distributing among its members

rare volumes on voyages and travels, and geo¬

graphical records. Between 1847 and 1915

fully 170 volumes were issued under the edito¬

rial supervision of eminent authorities. Among

these publications were Select Letters of Co¬

lumbus* (1849): Raleigh, (Guiana* (1848);

and (Danish Arctic Expedition* (1897) ; and

five editions of Hakluyt’s (Voyages* (12 vols., 1903-05) ; and

Purchas's (Hakluytus Post¬

humous; or Purchas His Pilgrimes* (20 vols.,

1905-07).

HAKON JARL. Oehlenschlager, after

reading Snorre's 'Heimskringla,* during a stay

in Halle in 1805, wrote (Hakon Jarl,* his

famous tragedy, in six weeks. The theme is

the conflict between Paganism and Christianity.

The characters, especially that of Earl Hakon,

are described in masterly fashion by Snorre,

who gives us the tense, dramatic scenes. This

rich historical material supports most appro¬

priately the fine, poetical structure of the dram¬

atist, and serves to give the principal character the true stamp of human greatness. In the

character of Hakon, the author wished to do

full justice to the strength of the heathen ideal, and yet arouse sympathy for the victorious faith and strong personality of King Olaf. It was

Oehlenschlager's conviction that the best thing

to do for Danish poetry was to give new life to the literature of the Eddas and the Sagas, and that he could do it. After the production of this tragedy, in 1808, all agreed with him.

It is true that the rhetorical eloquence of

Hakon does not fit the heroes of saga times,

when swords spoke the most and the loudest,

and that the saga heroes as depicted by Bjornson and Ibsen are much more true to life. But we are impressed by the beauty, the poetical

power and wealth of (Hakon Jarl,* as it pic¬

tures the conflict between Paganism and

Christianity, between Hakon and Olaf. It was

a great advance beyond any historical drama

produced before in Scandinavian literature.

There is an English translation by J. C. Lind-berg, University Studies (Nebraska).

Gisle Bothne.

HALAKAH, ha-la'ka (from Heb. "| S n ,

halak, to go), the legal part of Hebrew tradi¬

tion. The term is used to connote all the laws, both civil and religious, which derive their

sanction from custom rather than from the

sacred Scriptures. ((Midrash halakah** is the

term used to cover the disputations, interpreta¬

tions, etc., concerning the legal part of the

Scriptures. At first handed down orally, the

laws came to be written, and were modified and improved by successive editors and commen¬

tators.

HALBE, hal'be, Max, German dramatist:

b. Guettland, near Danzig, 4 Oct. 1865, of an old family of peasants who had immigrated

two centuries earlier from Westphalia. He

attended the gymnasium at Marienburg, and

the universities of Heidelberg (where he

studied law, 1883), Munich (1884), and Berlin

(1885-87), where he studied history and Ger¬

manic philology. In both the latter cities he

became acquainted with the leaders of the new

naturalistic movement in German literature,

and was associated with the Freie Biihne (Free Stage) Movement in 1889.. He was strongly

influenced by the association with, and the

works of Johannes Schlaf and Arno Holz

(q.v.), and in the spring of 1890 wrote the

play (Freic Libbe5 (Free Love). He mar¬

ried the same year. Halbe was not entirely

in accord with the Freie Biihne, and with

consistent naturalism (see Hauptmann, Ger¬

hart), as the latter deviated considerably from his own tendencies. Accordingly it was diffi¬

cult for him to place <Eisgang) (1892) and

<Jugend) (1893) on the stage, although the

latter did have a performance on the Freie

Volksbuhne in 1892. (Jugend5 was especially

difficult to place ; famous theatre managers in Berlin (L'Arronge, Barnay, Blumenthal) re¬

fused it, but Lautenburg accepted and per¬

formed it with great success in 1893. Theatre¬

goers considered Halbe as having displaced

Hauptmann in the primacy of contemporary

German drama. But the theatrical public of

Berlin is very fickle and requires a succession of favorable impressions, and when Halbe's

next play, the comedy (Der Amerikafahrer5

((The Tourist in America5), made the impres¬

sion of being witless, his reputation rapidly

declined. Constant laments were uttered by

critics, as to his failure to fulfill the promise of his early work. Halbe decided to* absent

himself from the hothouse atmosphere of liter¬

ature in the capital, and settled in the country at Kreuzlingen, on Lake Constance, in 1894.

In 1895 he settled in Munich, where he again

began to write; the dramas (Lebenswende5 and

(Mutter Erde5 (the latter and (Jugend'> are his most famous works) and the (<novelle55 (Frau

Mesek) are of this period. In 1895, together

with Ruederer, Halbe founded the Intimate

Theatre at Munich in which writers and poets

appeared on the stage. Among the other mem¬

bers of this circle were Hartleben, Hirschfeld, Wedekind, Gumppenberg, Karl Hauptmann,

Ludwig Thoma and Count Keyserling. A com¬

plete list of his dramas includes (Ein Empor—

kommling5 (1889) ; (Freie Liebe) (1890, later

called (Ein Verhaltnis,5 1895) ; <Eisgang)

(1892); (Jugend) (1893); (Der Amerikafahrer) (1894) ; (Lebenswende5 (1896) ; (Mutter

Erde5 (1897); (Der Eroberer5 (1898); (Die

Hcimatlosen) (1899) ; (Das Tausendjahrige

Reich) (1899); (Hans Rosenhagen) (1901);

(Walpurgistag) (1902) ; (Der Strom) (1903) ;

(Die Insel der Seligen5 (1905) ; (Das wahre

Gesicht5 (1907); (Blaue Berge5 (1909); (Der

Ring des Gauklers5 (1912). Of (Mutter

Erde,5 a translation into English, (Mother

Earth,5 appeared in (German Classics) (Vol.

XX, New York 1914). Consult Eisner, Rich¬

ard, (Moderne Dramatik in kritischer Beleuch—

tung) (Berlin 1908) ; Stern, Adolf, (Studien

zur Literatur der Gegenwart5 (Berlin 1905) ;

Glaser, J., (Max Halbe) (in Nord und Siid,

1889).

Jacob Wittmer Hartmann.

HALBIG, Johann, yo'han hal'big, German

sculptor: b. Donnersdorf, Lower Franconia, 13

July 1814; d. Munich, 29 Aug. 1882. He

studied at the Munich Academy, and elsewhere,

finally establishing himself at Munich, where he became a professor in the Polytechnic School

in 1845. His most important work is the quad¬

riga with four colossal lions for the triumphal gateway, Munich. He also executed the Platen

memorial at Ansbach, the bronze statue of

Fraunhofer at Munich, the Emancipation5

group in New York, the 'Crucifixion5 group

for Oberammergau, and numerous busts.

HALDANE, James Alexander, Scottish

clergyman and author: b. Dundee, 14 July

1768; d. Edinburgh, 8 Feb. 1851. He studied

at Edinburgh University, and in 1785 became

a midshipman and spent nine years on the sea.

Settling at Edinburgh he began to devote him¬

self to religious work, and as an independent

lay preacher toured Scotland. In 1797 he

founded the Society for Propagating the Gospel

at Home, whose efforts took the form of lay

preaching and tract distribution. Two years

later, with his brother, Robert Haldane (q.v.), he established the first Congregational church

in Scotland, of which he was the first pastor.

In 1801 he became preacher at the tabernacle at Leith Walk. His conformation to Baptist

theories in 1808 involved him in serious contro¬

versies. He published many treatises of con¬

troversial literature, notably against the Rev.

William Jones, a Baptist minister; against the

Walkerites; Erskine of Linlathen ; the Bap¬

tist Midland Association; and against Doc¬

tors Ward and Jenkyn. Of a more literary

character are his (Journal of a Tour to the

North) ; (Early Instruction Commended in a

Narrative of Catherine Haldane, with an Ad¬

dress to Parents on the Importance of Reli¬

gionˆ. (Views of the Social Worship of the

First Churches 5 (1805) ; ‘The Doctrine and

Duty of Self-Examination5 (1806) ; and ‘An

Exposition of the Epistle to the Galatians5

(1848). He was also editor of the Scripture

Magazine. Consult the ‘Life5 by Alexander

Haldane (London 1852).

HALDANE, Robert, Scottish preacher :

b. London, 28 Feb. 1764; d. Edinburgh, 12 Dec.

1842. He was the brother of James Alexander

Haldane (q.v.), and was likewise sent to Edin-‘

burgh to study. His fondness for the sea

caused his stay at the university to be very

short. He entered the naval service in 1780,

remaining for three years, when he returned,

resumed his studies at Edinburgh and finally

settled down at his estate in Airthrey. At first he took a deep interest in political reform, and was greatly inspired by the French Revolution.

Religious interests soon began to predominate

in his life. Accordingly, he advanced a proj¬

ect for missionary work in India which was

turned down by the East India Company. He

therefore decided to do missionary work in

Scotland. He assisted his brother in founding

the Congregational church at Edinburgh, es¬

tablished tabernacles, provided for the educa¬

tion of prospective pastors; put forth a scheme for educating some African children in Eng¬

land ; and was exceedingly active in stimulating religious interest in Scotland. His adoption of Baptist views alienated his former

coreligionists, and he went abroad to work on the Continent.

For a number of years he was active in Swit¬

zerland and southern France, and in 1817 carried on his evangelistic work at Montauban. In 1819

he returned to his native land. He participated in several controversies and wrote (The Evi¬

dence and Authority of Divine Revelation5

(1816) ; (The Books of the Old and New Testa¬

ment Proved to be Canonical5 (1830) ; Exposi¬

tion of Romans5 (1835). His life has been

written by Alexander Haldane (1852).

HALDANE OF CLOAN, 1st Viscount,

British lawyer and statesman : b. Perthshire,

30 July 1856. Richard Burdon Haldane was

educated at Edinburgh Academy and the uni¬

versities of Edinburgh and Gottingen. Before

he went abroad to continue his studies he had taken his M.A. degree and 1st class honors in philosophy • he had won the Gray Scholarship,

the Ferguson Scholarship of the four Scottish

universities and the Bruce of Grangehill medal.

At Gottingen he studied metaphysics under

Professor Lotze. Returning to England, he

took up law, was called to the Chancery Bar in 1879, became queen's counsel in 1890, and a

bencher of Lincoln's Inn in 1893. His political career began in 1885, when he was elected

Liberal M.P. for Haddingtonshire, Scotland.

Mr. Haldane had to wait nearly 21 years be¬

fore his services could be rewarded with an

office, and then he directly stepped into one of the most important positions under the Crown,

namely, Secretary of State for War, to which

he was nominated by the new Premier, Sir

Henry Campbell-Bannerman, in December 1905.

Considerable surprise was expressed at the

choice of a lawyer and philosopher to take over the administration of the army, which, for some inscrutable reason, had long been reputed an

inefficient and neglected organization. The in¬

efficiency referred to did not lie with the

soldiers, whether regulars or volunteers, but

with the civilian heads of the War Office; so rampant and notorious, indeed, was this evil

that ((War Office® and <(Muddle® were popu¬

larly regarded as synonymous terms. Promi¬

nent British soldiers, politicians, civilians and newspapers had for manv years vainly clamored

for a strong and efficient army, pointing to

Britain’s modern wars as painful examples of

(<muddling through,® the army being in no case prepared for the task expected of it. So far

as the regulars were concerned, there was no

finer body of professional soldiers in any coun¬

try, for* the men were encouraged to remain

and serve 21 years and retire on pensions in¬

stead of, as is especially the custom with the rank and file of conscript armies, returning to civil life on completing their short obligatory active service. Outside of the regulars, Great

Britain possessed a civilian army of about

250,000 young men, ˆvolunteers,® who did their

soldiering in such time as they could spare

from their work. They paid their own expenses

and received little or no assistance from the

government; their officers were for the most

part retired regulars, but there was no official minimum of drill. Together with the yeo¬

manry they constituted a peace army, ill—

suited and ill-equipped for war. No practical

steps were taken to utilize this valuable ma¬

terial till Mr. Haldane became Secretary for

War. Yet the volunteers were, on occasion,

more than <(Saturday Afternoon Soldiers® — as

they were often derisively termed. Large num¬

bers offered their services and fought in the

Egyptian and South African wars. Mr. Hal¬

dane set himself to reorganize the whole force by co-ordinating the volunteers, militia and

yeomanry with the regulars. In 1907 he in¬

troduced the Territorial Forces Act, f(by. which all the volunteers were changed into territorials or second-line troops, drilled, administered and financed by the army authorities.. The loose,

haphazard system of ˆmembership® was re¬

placed by a four-years' enlistment, and cavalry and artillery were added — which the old

regime lacked. Curiously enough, while many

military and civil personages bestowed praise

upon the scheme and labored with the county

associations to make it a success, there were

not a few who condemned the innovation and

prophesied its failure. Even the veteran Lord

Roberts assailed it as being only a half-measure, totally inadequate for a great emergency —which he foretold years before 1914. The

critics were right in their way; on behalf of the War Minister it must be acknowledged, how¬

ever, that he did the best that was possible with the material at his hands — under voluntary en¬

listment. He also initiated the ((Qfficers Train¬

ing Corps® from the university cadets; he made the general staff a power in the army and

throughout the empire; he perfected the expedi¬

tionary force and backed it with a special re¬

serve; above all, he restored public confidence in the War Office. In 1911 he was created Vis¬

count, and in 1912 he succeeded Lord Loreburn

as Lord High Chancellor of England, thus

crowning a legal career which began with his

call to the bar 36 years earlier. Although he was the object of much criticism as War Min¬

ister, Lord Haldane's high judicial qualifications were indisputable. After the outbreak of the Eu¬

ropean War a strong volume of public opinion

turned against him. Yeprs before he had com¬

mitted the indiscretion of describing Germany

as his ˆspiritual home,® and had on numerous

occasions publicly lauded German philosophy,

education and national efficiency. Moreover, he

had been a personal friend of the Kaiser;

he . had made numerous official and unofficial visits to Berlin, and had acted as the British agent in negotiations with the German govern¬

ment relating to the ((Naval Holiday® scheme.

Almost amusing was the torrent of abuse poured upon Lord Haldane in certain sections of the

British press for his alleged pro-Germanism,

while simultaneously the German press abused

him still more violently as a ((treacherous

friend.® On the formation of Mr. Asquith's

Coalition Cabinet in May 1915 Lord Haldane

resigned his office and was decorated with the Order of Merit by the king. He published

(Essays in Philosophical CriticisnP ; (Life of

Adam Smith) ; a translation (with Mr. Kemp)

of Schopenhauer's (World as Will and Idea) ;

Education and Empire) ; (The Pathway to

Reality.* See Great Britain — Army.

HALDEMAN, hal'de-man, Samuel Steh—

man, American naturalist : b. Locust Grove,

Pa., 12 Aug. 1812; d. Chickies, Pa., 10 Sept.

1880. He was educated at Dickinson College,

Pa., was professor of natural sciences at the

University of Pennsylvania in 1851-55; and of

comparative philology there 1869-80. He pub¬

lished (Fresh Water Univalve Mollusca of the

United States* (1840) ; (Zoological Contributions> (1842-43) ; (Elements of Latin Pro¬

nunciation (1851) ; (Affixes in Their Origin

and Application (1865) ; Pennsylvania Dutch)

(1872) ; (Outlines of Etymology) (1877) ;

(Analytic Orthography* (1858), *etc.*

HALDIMAND, Sir Frederick, Swiss

soldier in the English service : b. Canton of

Neuchatel, Switzerland, October 1718; d. Yver—

dun, Switzerland, 5 June 1791. He served in

the army of Sardinia and later became a mem¬

ber of the Swiss guard at The Hague, and was there stationed when with Henry Bouquet (q.v.)

he enlisted in 1756 in the British army for serv¬

ice in America. He organized, largely from

Pennsylvania, a regiment composed of Swiss,

Germans ana others and known as the (<Royal

Americans,55 and became its commander. In

1759 he won distinction by his successful de¬

fense of Oswego against the attack of 4,000

French and Indians, and in 1767-78 held the

chief command in Florida. From 1778 to 1786

he was governor-in-chief of Canada, severely

repressed Canadian sympathy with the Revolu¬

tion and rendered conspicuous service in the

settlement of the Loyalist refugees. His val¬

uable official correspondence is in the possession of the British Museum and copies are in the

Dominion archives at Ottawa. Consult Mc—

Ilwraith, (Sir Frederick Haldimand) (1904).

HALE, Edward Everett, American Uni¬

tarian clergyman and author : b. Boston, Mass., 3 April 1822; d. 10 June 1909. His father was Nathan Hale (q.v.), the first editor of tlhe

Boston Daily Advertiser, and the son was

educated at the Boston Latin School and Har¬

vard College. Later he studied theology and

was pastor of the Church of the Unity, Wor¬

cester, Mass., 1846-56. He then became pastor

of the South Congregational Society in Boston,

a Unitarian Church, and was its pastor emeritus from 1901 until his* demise. In the Unitarian

body he was long one of its foremost men, of a radical rather than a conservative type,

while yet strongly loyal to the Unitarian faith.

As a preacher he was > always popular, and

his talents for organization bore fruit in such humanitarian societies as the Harry Wadsworth

Clubs, King's Daughters, Look Up Legions,

and others. For several years he edited Old

and New, a magazine afterward merged in

Scribner's Monthly, and edited Lend a Hand,

a journal of organized charity, since 1886. After his retirement from active pastoral work he was active in various denominational and other re¬

ligious and social enterprises, and lectured at frequent intervals. His 80th birthday was cele¬

brated by a gathering in Symphony Hall, Boston, composed of representative persons from all

denominations in his native city, as well as of civic and State officials, assembled to testify to the regard in which he was held, irrespective of creed or race. To Americans in general, how¬

ever, he is best known as an author, and in spite of his countless clerical labors he was one of the most voluminous of American writers. Much of

his work was from necessity ephemeral in its

nature, but when he had consciously wrought

with an artistic end in view his level of attain-

ˆpnf was verv high. His short story, (The Man Without a Country,5 has long been accounted

an American classic, and even more skilful

in construction and perfect in finish was (My

Double and How he Undid Me5; (In His

Name5 has been almost equally popular. In

extravaganza like (The Brick Moon,5 such an

absolute air of verisimilitude is preserved that the absurdest conceptions of the tale appear

more than half credible. (The Man Without

a Country5 was indeed accepted as a record

of fact by many readers on its first appear¬

ance in 1863, although the theme is in its con¬

ception most improbable, and its author was

obliged to state at a later date that it had no foundation in fact. The

list of his published

works is a long one, including nearly 70 titles, and besides those already named may be cited

(Margaret Percival in America5 (1850) ; (Ele¬

ments of Christian Doctrine5 (1860) ; (If, Yes, and Perhaps5 (1868); (Sybaris and Other

Homes5 (1869); (The Ingham Papers5 (1869);

*His Level Best and Other Stories5 (1872) ;

c Philip Nolan's Friends5 (1876); (The For¬

tunes of Rachel5 (1884); (Boys' Heroes5

(1886); (Life of George Washington Studied

Anew5 (1887) ; (They Saw a Great Light5

(1889) ; (The Story of Christopher Columbus5

(1891) ; (The Story of Massachusetts5 (1891) ; <The New Harry and Lucy5 (1892) ; (East

and West or the New Ohio5 (1892) ; (A New

England Boyhood5 (1893); (Fifty Years:

Poems5 (1893) ; (If Jesus Came to Boston5

(1894); (Susan's Escort5 (1895); (Historic

Boston5 (1898) ; (Lowell and His Friends5

(1899) ; (Memories of a Hundred Years5

(1900). With his sister Susan Hale he wrote

a series of travel books entitled (Family

Flights through France, Germany, etc.,5 and he

also edited numerous volumes from (The

Rosary5 (1848) to (Unpublished Essays of

Emerson5 (1895). See Man Without a Coun¬

try, The.

HALE, Edward Everett, Jr., American

author and educator, son of Edward Everett

Hale (q.v.) : b. Boston, 18 Feb. 1863. He was graduated at Harvard University in 1883 and

subsequently studied at the University of Halle, from which he received the degree of D.Ph. in 1892. In 1886-90 he was instructor and assist¬

ant professor of English at Cornell University; in 1890-92, while abroad, held the Harris Fel¬

lowship of Harvard University, and in 1892-95

was professor of English at the University of

Iowa. Since 1895 he has been professor at

Union College, Schenectady, N. Y., first of.

rhetoric and later of English. Professor Hale

has edited a number of school and college

texts and from 1893 to 1917 was a contributor to the Dial. He is a contributor to the Ency¬

clopedia Americana5 and is author of Con¬

structive Rhetoric5 (1896) ; (James Russell

Lowell5 (1899) ; (Dramatists of To-Day5

(1905, 6th ed., 1911); <William H. Seward5

(1910) ; and (Life and Letters of Edward

Everett Hale5 (1917).

HALE, Eugene, American politician : b.

Turner, Oxford County, Me., 9 June 1836;

d. Washington, D. C., 27 Oct., 1918. After

study of law he was admitted to the bar

in 1857, began practice at Ellsworth, Me., and was a member of the Maine legislature in 1867, 1868 and 1880. In 1868 he was elected repre¬

sentative to Congress, and in that capacity

served until 1878, acting on the committee on

appropriations, and during his last term being

chairman of the Republican congressional com¬

mittee. In 1868, 1876 and 1880 he was a dele¬

gate to the Republican national conventions of

those years, in 1874 was offered the post of

postmaster-general and in 1877 that of secretary of the navy, but declined both. He was a

member of Grant's commission appointed for

canvass of the Louisiana presidential vote in

1876. He succeeded Hannibal Hamlin in the

United States Senate in 1881, and was re¬

elected in 1887, 1893, 1899, 1905, and 1909. He retired in 1911 after serving as majority leader of the Senate. In the Senate he became known

as a Republican leader, interesting as a speaker and skilful in matters of legislative routine.

Courtesy of the Booklovers Magazine

Copyright by Davis & Sanborn

EDWARD EVERETT HALE

HALE, George Ellery, American astron¬
omer: b. Chicago, 29 June 1S68. He was
graduated at the Massachusetts Institute of
Technology in 1890; studied at Harvard Col¬
lege Observatory, 1889-90; University of Berlin, winter, 1893-94 ; (honorary Sc.D. University
of Pittsburgh 1897, Yale 1905, Victoria Uni¬
versity, Manchester, 1907, Oxford 1909, Cam¬
bridge 1911; LL.D. Beloit 1904, University of
California 1912; honorarv Ph.D. Berlin 1910).
He was director of the Kenwood Astrophysical
Observatory, 1890-96; associate professor of
astrophysics, 1892-97, professor, 1897-1905, and
director of \erkes Observatory, 1895-1905 ; is

now director of the Solar Observatory of the

Carnegie Institution of Washington at Mount

\ ilson, Cal. He is the inventor of the spectro-heliograph, an instrument for photographing

the solar prominences and other solar phe¬

nomena. His principal scientific researches

have been made in solar and stellar spectro¬

scopy. He was joint editor of Astronomy and

Astrophysics, 1892-95, and the Astrophysical

Journal since 1895. He has written many

papers on the sun, stellar spectroscopy, etc.,

and was awarded the Janssen Medal, Paris

Academy of Sciences, 1894; the Rumford

Medal, 1902; the Draper Medal, 1903; Gold

Medal. Royal Astronomical Society, 1904; and

the Bruce Medal, 1916. He is foreign mem¬

ber of the Royal Society of London, Accad—

emia dei Lincei, Rome ; Amsterdam Academy

of Sciences; corresponding member of the Institut de France; honorary member of the

Vienna Academy of Sciences; foreign associate

of the Royal Astronomical Society; honorary

member of the Royal Society, Upsala, and many

others.

HALE, Horatio, American ethnologist: b. Newport, X. H., 3 May 1817; d. Qinton, On¬ tario, 29 Dec. 1896. He was a son of Sarah J. Hale (q.v.). He was graduated from Harvard in 1837 and the next year was appointed philolo¬ gist to the government exploring expedition under Captain Wilkes, and was thus enabled to study the languages of the Pacific Islands, North and South America, Australia, and Africa. The results of his observations were published in Ethnography and Philology (1846). He then studied law, was admitted to the Chicago bar. and removing to Canada in 1855 practised law at Qinton. His other works are 'Indian Migrations as Evidenced by Language1 (1883) ; 'The Iroquois Book of Rites* (1883 » ; 'A Report on Blackfoot Tribes* (1885 >. He was classed among the foremost philologists of his time and was a member of learned societies at home and abroad.

HALE. Irving. American soldier and elec¬ trician : b. North Bloomfield, X. Y., 28 Aug. 1861. He removed with his parents to Color¬

ado in 1865, crossing the plains by wagon and team, the family making their first settlement

at Central City, where the boy attended the

public school of which his father was principal.

Later the family removed to Denver, where he

attended the high school, graduating in June

1877, the youngest and highest in his class. He entered United States Military Academy. West

Point, 1880, and was graduated in 1884, first

in his class. He was assigned to the Corps

of Engineers. In 1888 he took part in the Divi¬

sion of Atlantic Rifle Competition, winning

first gold and first skirmish medals. That

year he was sent to the United States Military Academy as instructor in civil and military'

engineering. On 1 April 1890, he resigned from the army and has since been connected with

the Edison General Electric Company, later the

General Electric Company, and is manager of

the Rocky Mountain District (six States),

with headquarters at Denver. He served with

the National Guard of Colorado as lieutenant-colonel, colonel and brigadier-general. At the

outbreak of the Spanish-American War he was

commissioned colonel of the First Colorado

Infantry, Lnited States \ olunteers, was pro¬

moted brigadier-general <(for gallant and dis¬

tinguished services, *etc.* … in the captur¬

ing of Manila, 13 Aug. 1898,® recommended for

promotion to major-general by brevet for agal—

lant and meritorious services throughout the

campaign against Filipine insurgents from 4

February to 5 July, 1899: particularly for skill, zeal and courage in conducting the operations

of his brigade in the movements from Malolos

to Calumpit, Island of Luzon, 23 to 27 April

1899.® On 1 Oct. 1899 he was honorably dis¬

charged from the Volunteer Service. He re¬

ceived the honorary degree of Electrical Engi¬

neer from the Colorado State School of Mines

in 1897, and that of LL.D. from the University of Colorado in 1899. He is a member of

various military and scientific societies and has written papers and delivered lectures on many

scientific subjects.

HALE, John Parker, American legislator

and diplomat : b. Rochester, X. H., 31 March

1806; d. Dover, X. H., 19 Nov. 1873. After

graduation from Bowdoin in 1827 and studv of

the law at Rochester and Dover, he was ad¬

mitted to the bar in 1830. in 1832 was elected a Democratic

representative in the State legis¬

lature, and in 1834—11 was United States Dis¬

trict Attorney. In 1842 he was elected to Con¬

gress, where, though remaining a Democrat, he

stoutly opposed the ®gag-rule® which sought

the exclusion of anti-slavery petitions. He was renominated; but previous to the election the

annexation of Texas was made a plank of the

Democratic platform, and the State legislature

of New Hampshire directed its congressmen

and senators to support the measure. Hale in

a public statement refused to do this and the Democratic State Convention was then reas¬

sembled and his name stricken from the ticket.

Hale ran as an independent Democrat, but no

candidate received a majority. In 1846, after

a spirited canvass known as the ((Hale storm

of 1845,® he was elected to the lower house of the legislature, and became its speaker. In 1847

he was elected to the United States Senate,

where he was the first, and, until joined by

Salmon P. Chase in 1849. the only avowed anti-slavery member. He was an orator of fine

abilities, and besides opposing the slave system, secured laws abolishing flogging and grog-ration in the navy. He was nominated for

president by the Free-Soil Democrats in 1852,

and received 157,685 votes. In 1855 he was

elected to the Senate for the four years of the unexpired term of C. G. Atherton, deceased,

and in 1858 for a full tenn. During the Civil War he supported the Lincoln administration.

He was United States minister to Spain in

1865-69.

HALE, Ledyard Park, American lawyer :

b. Canton, Saint Lawrence County, N. Y., 17

May 1854. He received his education at Saint

Lawrence University and at the University of

Wisconsin. From 1882-88 he was assistant dis¬

trict attorney of Saint Lawrence County, be¬

coming district attorney in 1894. In 1903 he

was elected county judge, which office he held until 1908, since when he has been counsel to the Public Service Commission of the second

district. From 1907-08 he served as commis¬

sioner of the State Board of Charities under

Governor Hughes.

HALE, Lucretia Peabody, American

author, sister of E. E. Hale (q.v.) : b. Boston, Mass., 2 Sept. 1820; d.

there 12 June 1900. She was very popular as a writer for young people, and in addition to (The Lord's Supper and Its Observance) (1866) ; (The Service of Sorrow)

(1867) ; (The Wolf at the Door) in the (No

Name Series5 (1877), she published for young

readers (The Peterkin Papers5 (1882) ; and

(The Last of the Peterkins5 (1886). She also

wrote (The New Harry and Lucy5 (with E. E.

Hale). She will be longest remembered as the

creator of the Peterkin Family, who have be¬

come widely recognized types of character.

HALE, Sir Matthew, English jurist: b.

Alderley, Gloucestershire. 1 Nov. 1609; d. there, 25 Dec. 1676. He was educated at Oxford and

Lincoln's Inn, and is said to have studied 16

hours daily, extending his researches to natural philosophy, mathematics, history and divinity,

as well as the sciences more immediately con¬

nected with his profession. He was a most

prodigious worker for many years laying out

for himself a schedule covering 16 hours daily.

He was called to the bar before the commence¬

ment of the civil war-and in the conflict of parties which took place his moderation, ac¬

companied as it was by personal integrity and

skill in his profession, secured him the esteem of both royalists and

parliamentarians in his

own time. In 1654 he became a judge of the

Common-bench (the former King's-bench) , in

which station he displayed firmness of prin¬

ciple sufficient to give offense to the Protector.

He was a member of the Parliament which re¬

stored Charles II, and one of the members most active in passing the Act of Indemnity. In

1660 he was knighted, and made chief baron of the Court of Exchequer. He was the last Eng¬

lish judge who sanctioned the conviction of cul¬

prits for witchcraft. He was raised to the chief-justiceship of the King's-bench in 1671. After

his death appeared his (History of the Pleas

of the Crown5 ; (Jurisdiction of the Lords'

House5 ; and (The History of the Common Law

of England.5 He also wrote several works on

scientific and religious subjects.

HALE, Nathan, American revolutionary

officer: b. Coventry, Conn., 6 June 1755; d. New York, 22 Sept. 1776. He was graduated at Yale in 1773, and engaged as a teacher, first at East Haddam, and afterward at New London. His

parents intended him for the ministry; but on

the Lexington alarm in 1775 he wrote to his

father, in a Connecticut regiment, saying ((that a sense of duty urged him to sacrifice every

thing for his country,55 and soon after entered the army as lieutenant (1775) and in a few

months was promoted to be captain (1776).

While with the troops near Boston he was vig¬

ilant and faithful in every point of duty; and according to a tradition of doubtful authenticity, in September 1776, when in New York, he, with an associate, planned and effected the capture

of a British sloop laden with provisions, taking her at midnight from under the guns of the

man-of-war Asia, and distributing her prize

goods to the American soldiers. After the re¬

treat of the army from Long Island, when it

was all-important to understand the plans of

the enemy, Washington applied for a discreet

and practised officer to enter the enemy's lines and procure intelligence, and Hale volunteered

for the service. He passed in -the disguise of a Dutch schoolmaster to the British camp and

made full drawings and memoranda of all the

desired information, but on his return was

apprehended and taken before Howe, by whom

he was ordered to execution the next morning.

He was denied a Bible and the aid of a

clergyman; and was hanged, saying with his last breath : <(I only regret that I have but one life to lose for my country.55 A statue of Hale by Macmonnies is in City Hall Park, New York,

and one by Gerhardt in Hartford, Conn. Con¬

sult the (Life5 by Johnston (1901) ; Holloway, (Nathan Hale, the Martyr Hero5 (1899) ; Part¬

ridge, (Nathan Hale, the Ideal Patriot5 (1902).

HALE, Nathan, American journalist: b.

West Hampton, Mass., 16 Aug. 1784; d. Brook¬

line, Mass., 9. Feb. 1863. He was a nephew of the patriot Nathan Hale (q.v.) and father of

Edward Everett Hale (q.v.). He was gradu¬

ated from Williams College in 1804, and after

studying law was admitted to the Boston bar

in 1810, in 1811-14 was editor of the Boston

Weekly Messenger, and in 1814 purchased and

became editor of the Advertiser, established in 1813 and the first New England daily. At first Federalist in politics, the Advertiser became

successively Whig and Republican and was at

all times very influential. In 1820 it opposed the Missouri bill, in 1854 the Kansas-Nebraska

bill, and it was the first newspaper to advocate the settlement of Kansas by <(Free-Soil55 colo¬

nists. Hale was a founder of the North Amer¬

ican Review (1815), served at various times in both houses of the Massachusetts legislature,

published a series of stereotyped maps after a method invented by himself (1830), and wrote

pamphlets on topics of internal improvement.

HALE, Philip, American music critic : b.

Norwich, Vt., 5 March 1854. Graduated from

Yale in 1876, he was admitted to the bar in

Albany (1879), studied music under Dudley

Buck and later in Europe with Haupt, Bargiel

and Guilmant (1885-87), and was organist suc¬

cessively of Saint Peter's, Albany (1879-82),

Saint John's, Troy (1887-89), and the First Uni¬

tarian Society of Roxbury, Mass. (1889-1905).

In 1889-97 he contributed music criticism to the Boston press, (1891-1903) _ was critic of the

Journal, in 1897 became editor of the Musical

Record, and in 1901 of the Musical World.

He has been dramatic and music critic of the

Boston Herald since 1903, editor of the Boston Symphony Program Books since 1901. He is

known as one of the most discriminating and

interesting of American writers on musical sub¬

jects.

HALE, Salma, American politician : b. Al—

stead, Cheshire County, N. H., 7 March 1787,;

d. Somerville, Mass., 19 Nov. 1866. He was

early apprenticed to a printer of Walpole, N. H., in 1805 became editor of the Political Ob¬

server, a Republican journal of Walpole, held

various local offices, and in 1828 and 1844 was a member of the New Hampshire house of rep¬

resentatives, and in 1824 and 1845 of the State senate. In 1845 he was appointed secretary of

the commission for the determination of the

Northeastern boundary line of the United States.

He was elected to Congress in 1816 as a Repub¬

lican (Democratic) representative, but declined

a re-election. His (History of the United

States' (1821) won a prize of $400 and a gold medal, offered by the American Academy of

Belles-Lettres, and appeared in many subse¬

quent editions. He published also (The Admin¬

istration of J. Q. Adams' (1826) ; and (Annals of the Town of Keene' (1826).

HALE, Sarah Josepha Bell, American

author and editor: b. Newport, N. H., 24 Oct.

1788; d. Philadelphia, 30 April 1879. Her hus¬

band dying in 1822 leaving her with five small children, she supported her family by literary

work. She was editor of the Boston Ladies'

Magazine 1828-37, and when in 1837 this was

consolidated with Godey's Lady's Book, pub¬

lished in Philadelphia, she became editor of the latter also, continuing in the position for 40

years. She retired from literary life in 1877.

Her efforts in behalf of the Bunker Hill Monu¬

ment fund, her interest in seamen, in foreign

missions and in the higher education of women, were untiring and successful. For many years

she advocated the keeping of Thanksgiving

Day as a national festival, as it had been ob¬

served since 1864, when President Lincoln

adopted her suggestion. Her most enduring

publication is (Woman's Record; or Sketches

of All Distinguished Women) (New York

1874).

HALE, William Bayard, American writer :

b. Richmond, Ind., 6 April 1869. He was gradu¬

ated from Harvard and the Episcopal Theolog¬

ical School (Cambridge, Mass.), and was rector

at Middleborough, Mass., 1892-99, and subse¬

quently at Ardmore, Pa., retiring from the min¬

istry in 1901. He has published (The Making

of the American Constitution ; (The Eternal

Teacher' (1895) ; (The New Obedience)

(1898); (Phillips Brooks'; (A Week in the

White House with Theodore Roosevelt' (1908) ;

(Woodrow Wilson — the Story of His Life)

(1912) ; (American Rights and British Preten¬

sions on the Seas' (1915). As an editor he

served on the Cosmopolitan (1900), Philadel¬

phia Public Ledger (1903-07), New York

Times, as an editor of the supplement of Book Reviews (1906-08). Then he went to Paris

for the New York Times, and later was on the staff of World's Work.

HALE, William Thomas, American writer:

b. Liberty, Tenn., 1 Feb. 1857. He practised

law for several years, and has since been con¬

nected editorially with Saint Louis, Nashville,

Memphis and Knoxville dailies; is a frequent

contributor to magazines; and his writings for

the newspaper press would fill many volumes.

A number of his lyrics have been given musical settings by prominent composers. He has pub¬

lished (Poems and Dialect Pieces' (1894) ;

(Showers and Sunshine,' verse (1896) ; (The

Backward Trail: Stories of the Indians and

Tennessee Pioneers' (1899) ; cAn Autumn Lane

and Other Poems' (1899) ; (Great Southerners' (1900) ; (4rue Stories of Jamestown, Virginia' (1907); *A History of Tennessee and Tennes¬ seans,' (8 vols., 1914); <A History of De Kalb County, Tennessee' (1915).

HALES, Alfred Arthur Greenwood, Aus¬ tralian novelist and journalist: b. Kent Town, Adelaide, 20 July 1870. He was special cor¬ respondent during the South African War for the London Daily News and he served as an officer in the insurgent army in Macedonia against the Turks in 1903. His articles on Macedonia published in the London press were translated into Bulgarian and used as a text¬ book by order of the Minister of Education. He was also correspondent for the Daily News during the first part of the Russo-Japanese War. He is known in Australia, England, United States, Canada and South Africa as a lecturer. In addition to much material which appeared in newspapers and magazines and

consisted of songs, poems and short stories, he has written on mining, agriculture and the prob¬

lems connected therewith. He has been upon

nearly all the well-known mining fields of the world. In the investigation and study of min¬

ing, pastoral and agricultural problems and

possibilities, he spent three years in South

Africa alone. Among his numerous published

works are (McGlusky' ; (Camp Fire Sketches' ;

(Campaign Picture'; (Driscoll King of Scouts' ; (Jair the Apostate'; (Angel Jim'; (Molly

Micheldene' ; c Little Blue Pigeon' ; (The

Watcher on the Tower' ; (The Viking Strain' ; (Poems and Ballads' ; (The Wanderings of a

Simple Child' ; (Maid Molly' ; (A Lindsay of

the Dale'; (The Great Betrayal'; (McGlusky

the Reformer' ; (Peter Jackson,' and ˆorozia'

Among his numerous dramas and short plays

are (The Warrior Priest' ; (The Last Man

Out' ; (A Wrecker of Hearts' ; (The Crimson

Passion Flower'; (The Surprise Packet';

(Foiled bv a Woman' ; ˆhe Jakaroo' ; (May

Yohe' ; (A Woman Worth Sinning for' ; (The

Career of McGlusky' (1917); (McGlusky's

Great Adventure' (1917)..

HALl£VY, Jacques Francois Fromental

Elie, zhak fran-swa fro-mon-tal a-le a-la-ve,

French composer: b. of Jewish parentage, Paris, 27 May 1799; d. Nice, France, 17 March 1862.

He studied counterpoint under Cherubini for

five years, and in 1819 was sent to Italy to fin¬

ish his education. The first of his pieces per¬

formed was *a little comic opera, (L'artisan,'

given at the Theatre Feydau, in 1827. His

chef-d'oeuvre , (La Juive,' appeared in 1835 and rapidly obtained a European celebrity, and has

been frequently sung in the United States.

Among his other works are (L'Eclair' ; (Guido

et Ginevra' ; (La Reine de Chypre' ; (Le Val d'Andorre' ; (La Fee aux Roses.' The melo¬

dies of Halevy are always soft and flowing, the harmony correct and pleasing; but his works

display on the whole more talent than genius.

Consult the (Life' by Leon Halevy (1863).

HALEVY, Joseph, zho-zef, French Orien¬

talist and traveler: b. Adrianople, Turkey, 15

Dec. 1827. He traveled in Abyssinia ; and for

the Academie des Inscriptions he traversed

Yemen, where he obtained copies of not less than 686 inscriptions, largely Himyarctic and SaUean.

He was appointed assistant librarian of the Asi¬

atic Society and adjunct-professor of Ethiopic

in the ficole des Hautes Etudes. Well known

also as a biblical critic and Assyriologist, he founded (1893) the (Revue Semitique d'Epi-graphie et d'Histoire Ancienne,5 and published

numerous works, including (Archaeologic Mis¬

sion to Yemen> (1872); ˆJourney to Nedjran)

(1873) ; 'Sabaean Studies5 (1875) ; (The Origin of Babylonian Civilization5 (1876); Miscel¬

lany of Criticism and History Regarding Se¬

mitic Peoples) (1883); (Summary of Assyrio—

Babylonian Signs and Inscriptions) (1912).

HALfSVY, Ludovic, lii-do-vek, French

dramatist and novelist: b. Paris, France, 1 Jan.

1834; d. there, 8 May 1908. He was unsuccess¬

ful at first, but finally worked his way into public favor, especially after associating his pen with that of Henri Meilhac. In collaboration

with the latter, he wrote many of the librettos of Offenbach's most brilliant and satiric oper¬

ettas, including (The Perichole,5 (The Brig¬

ands, 5 the 'Belle Helene, 5 and (The Grand

Duchess of Gerolstein.5 Several serious libret¬

tos of high excellence are from the same hands, including that for Bizet's 'Carmen.5 In spoken

drama, (Frou-Frou) and 'Tricoche and Caco—

let) are among the most popular plays the two dramatists produced together. In 1881 he

ceased writing for the stage, and turned to fic¬

tion. 'L'Abbe Constantin,5 the first of his nov¬

els, is also the most popular, and opened to him the French Academy in 1884. It was for more

than one season the French story of the day.

It is a charming story, full of fresh air and sun, simply and skilfully told. It presented a view of American character and temperament

not usual in French fiction; and irreproachable in its moral tone, has become a sort of classic for American schools and colleges. 'La Famille Cardinal 5 (The Cardinal Family) and

(Crichette) are studies in fiction of aspects of Parisian life. (Notes and Souvenirs) embody

observations during the Prussian invasion of

1871. They are interesting, as giving faithful

pictures of the temper of the people during

those days. Among his short stories, 'Un

Mariage d'Amour) (A Marriage for Love) is

one of the best. The complete dramatic works

of Halevy and Meilhac appeared in eight vol¬

umes (1900-02). Consult d'Almeras, H.,

(Avant la Gloire; leurs debuts5 (Paris 1903);

and Matthews, (French Dramatists of the Nine¬

teenth Century5 (3d ed., New York 1901).

HALF BLOOD, in law, the relationship

of persons born of the same father but not of the same mother, which is called a consanguinean relation ; or of those born of the same mother but not of the same father, which is

termed uterine. In the succession to real or

landed property a kinsman of the half blood

inherits next after a kinsman of the whole

blood in the same degree, and after the issue of such kinsman when the common ancestor is

a male, but next after the common ancestor

when such ancestor is a female. So that

brothers consanguinean inherit next. after the

sisters of the whole blood and their issue; and brothers uterine inherit next after the mother.

HALF-BREEDS, (1) the children of

parents of different races ; a term usually con¬

fined to whites and American Indians. The

rise of independent half-breed tribes is ((the

first step toward the evolution of a distinct

race? (2) A term derisively applied to cer¬

tain Republicans of New York who in 1881 sup¬

ported the administration of President Garfield

in opposing the party candidate for the gov¬

ernorship of the State.

HALF-CASTE, a person born of a Euro¬

pean father and a Hindu or Mohammedan

mother, or more rarely of a Hindu or Moham¬

medan father and a European mother; an East

Indian.

HALF-CROWN, a British silver coin of

the value of two shillings and sixpence (60

cents).

HALF-DOLLAR, a silver coin of the

United States of the value of 50 cents. Au¬

thorized in April 1792, its coinage at a weight of 208 grains was begun in 1794; its issue was suspended from 1798 to 1800 inclusive and in

1816. In 1853 its weight was reduced to 192

grains. The half-dollar is legal tender to the amount of $10.

HALF-EAGLE, a gold coin of the United

States of the value of $5, so called from

the national emblematic bird which figures

upon the reverse. Authorized in 1792 the coin¬

age was begun in July 1795.

HALF-KING, the name given by the Eng¬

lish to a Seneca Indian, chieftain of an Ohio tribe, who accompanied Washington during his

expeditions in 1753-54, and was present at the defeat of the French at Great Meadows.

HALF MOON, the name of the vessel com¬

missioned by the Dutch East India Company in

1609, and commanded by Henry Hudson for a

voyage of exploration in search of a Northwest Passage. In this ship he entered New York

Bay and explored the river which bears his

name.

HALF-TONES. See Photo-engraving.

HALF-WAY COVENANT, a concession

in church requirements made by the New Eng¬

land Synod convened at Northampton in 1657,

whereby persons who had been baptized in their infancy, who assented to the doctrines of faith, entered into covenant with the Church, and led decent and respectable lives, were admitted to

the privileges and prerogatives of church-mem¬

bership with the exception of the Lord's Sup¬

per, although they might give no evidence of

conversion and had neither the ability nor the willingness to make profession of religious ex¬

perience. This “half-way covenant, 55 as it

came to be called, aroused bitter controversy

which did not die out until the 19th century ; among its most strenuous opponents were Jona¬

than Edwards and his followers. The conten¬

tion is ‘baseless that it entailed certain civil privileges in relation to the State franchise, its chief aim being to admit children to baptism

and to transmit to them the same degree of

church membership as their parents enjoyed.

Consult Walker, ‘Creeds and Platforms of Con¬

gregationalism5 (1893).

HALIBURTON, hal’i-ber-ton, Thomas

Chandler, Canadian historian and humorist : b

Windsor, Nova Scotia, December 1796; d. Isle—

worth, near London, 27 Aug. 1865. He prac¬

tised law in Halifax, was raised to the bench in 1829, and in 1841 became judge of the Su¬

preme Court of Nova Scotia, but resigned in

1856 and went to live in England. His first

work was a ‘Historical and Statistical Account

The Vessel in which Henry Hudson Sailed up the River which Bears His Name HALIFAX, N. S

‘ • ’ < « r

■ •££*? : i

Wt V < ; ‘ i

■♦Tli1 ■

gpt*^ ? II P

Rjyjffi

: l

iji JKV

1^1

1

1 City of Halifax from the Citadel

2 IMorth West Arm

of Nova Scotia) (1829). In 1835 he con¬

tributed a series of letters to a Halifax news¬

paper under the pseudonym of ((Sam Slick,®

clock-peddler. These were published with con¬

siderable alterations and additions in a collected form in 1837 under the title of (The Clock-maker, or Sayings and Doings of Samuel Slick

of Slickville, > and their humor, genial satire and sparkling aphorisms won them immediate

popularity. A second series followed in 1838,

and a third in 1840. In (The Attache, or Sam Slick in England,* his hero is represented as

attache, of the American embassy at the court

of Saint James, and again appears in (Sam

Slick's Traits of American Humor* (1852).

Haliburton, as the creator of ((Sam Slick,®

may claim to be the founder of the school of American humor, and he was the first to use

the American dialect as the medium of litera¬

ture. In 1859 Haliburton was elected member

of Parliament for Launceston.

HALIBUT, the largest of the flat fishes

(Hippoglossus hippoglossus) , and one of the

most important and highly prized food-fishes. It occurs in all northern waters, south to France, New York and San Francisco. It reaches a

weight of 400 pounds — one is recorded as

taken on the coast of Sweden reaching 720

pounds — and is characterized by having the

eyes on the right side, the ventral fins and

mouth symmetrical and the lateral line arched

in front. It is dark brown on the right side and white on the left or lower side. It was

formerly very abundant along the whole eastern

coast of the United States, at times proving a nuisance from its numbers to the cod-fishers.

It has gradually become scarcer, and at the

same time the appreciation of it as a food-fish has increased, so that the halibut fishers have gone farther and farther for it until now a good proportion of the catch comes from the waters around Iceland. The value of the catch

in New England in 1916 was $103,754; and for

Canada $468,493. On the Pacific Coast — where

three varieties are found — the halibut industry ranks next in importance to the salmon, and

the catch brought into American ports was

valued (1916) at $2,050,709. A second species,

the Greenland halibut (Reinhardtius hippo—

glosoides) , occurs in the Arctic Atlantic, but is not very common. It is

yellowish brown

and has a straight lateral line. In the trade this is not distinguished from the common

species. Halibut are taken with hook and line

(or trawls) using fresh fish (herring, etc.)

for bait.

HALICARNASSUS, Greek city of Caria,

Asia Minor, on the north shore of the Ceramic Gulf. Originally settled by a colony from

Troezen, it was one of the cities of the Dorian Hexapolis. However, the Ionians soon gained

the upper hand in the population, and the city was forced to withdraw from its early alle¬

giance. The citadel of Halicarnassus was at

Salmacis, a Carian city, not far distant. Pass¬

ing under Persian rule, it participated in the naval attacks of Xerxes. Later, it succeeded in freeing itself from the Persians; became a

member of the Athenian League for a while;

was reconquered by Persia and became a free

city and capital of Caria in the 4th cen¬

tury. Here was erected the tomb of Mausolus,

about 325 b.c., which was unearthed and revealed many interesting relics. (See Mausoleum).

Salmacis did not yield to Alexander the Great, although he succeeded in demolishing the town

proper. Halicarnassus is known also as the

birthplace of the Greek historians Herodotus

and Dionysius. In the 15th century it was fortified by the Knights of Saint John, who named it Petronion, whence was derived its present name Budrun. Interesting ruins of the old city have been uncovered.

HALICZ, hal'itch, a town in Galicia, on the right bank of the Dniester, 70 miles by rail southeast of Lemberg; population, over 5,000. During the European War Halicz was the scene of much severe fighting on ac¬ count of its strategic importance as the key to Lemberg. The Russians seized it in August 1914; on 1 March 1915 the Austrians were de¬ feated here in a pitched battle, but succeeded in recapturing the town on 28 June 1915, during the great Austro-German offensive. A Rus¬ sian attack failed in 1916, but on 1 July 1917 General Brussilov opened a great offensive in Galicia — Russia's last effort in the war — and regained possession of Halicz on 10 July.

Meanwhile wholesale demoralization spread among the Russian troops ; those ordered to at¬ tack assembled instead in meetings to discuss whether or not they should obey orders. On 22 July the army was retreating to the East

and Halicz, so long struggled for, was given

up again. See War, European.

HALIFAX, Charles Montague, 1st Earl

of, English politician: b. Horton, Northamp¬

tonshire, 16 April 1661 ; d. 19 May 1715. He

first attracted notice by his verses on the death of Charles II; and in 1687, in conjunction with Matthew Prior, wrote (The Town and Country

Moused a parody on Dryden's (Hind and Pan¬

ther.* He was a member of the Convention

Parliament of 1689 and supported the claim of

William III to the crown. He became a lord

of the treasury in March 1692 ; in 1694 was

made Chancellor of the Exchequer; in 1695

carried out the much needed recoinage, ap¬

pointing Newton warden of the mint; and in

1696 he devised the system of exchequer bills.

His administration was distinguished by the

adoption of the funding system, and by the es¬

tablishment of the Bank of England. In 1700

he was raised to the peerage, under the title of Baron Halifax. In the reign of Anne he

remained out of office, but he actively exerted himself to promote the union with Scotland,

andr the Hanoverian succession. He was First

Lord of the Treasury on the accession of George I, who created him an earl, and bestowed on

him the Order of the Garter. The <Life and

Miscellaneous Works of Lord Halifax) were

published in 1715, and his poems were included in the edition of (English Poets) by Dr. John¬

son.

HALIFAX, Canada, capital of the province

of Nova Scotia and county-seat of Halifax

County, a city and port of entry beautifully

situated on Halifax Harbor on the Atlantic

seaboard in lat. 44° 39’ N. and long. 63° 3 1’ W.

Topography. — The harbor, originally known

as Chebucto, ((chief of havens,® is one of the finest in the world. It is 16 miles long from north to south, with an average width of a

mile; has an average tide of four to six feet; is ice-free; and is practically all deep water.

It terminates in Bedford Basin, a beautiful

sheet of water four miles wide, affording 10

square miles of safe anchorage. The North West Arm, a narrow, deep harbor three miles long and from one-quarter to onehalf mile wide, with wooded banks, on the west of the city, is a charming bay, much utilized for pleasure purposes ; on its banks are many villa residences of the wealthier Haligonians. The harbor can be entered day or night at any sea¬ son of the year by vessels of any size. The distance from Halifax to Fastnet Rock (Ire¬ land) is 2,162 miles, or 600 miles less than from New York, and the transatlantic passage is accordingly one day shorter from Halifax than from New York.

Railways, Shipping, *etc.* — Halifax is the ocean terminus of the Canadian government railways, and through it of the Canadian Pacific, the Canadian Northern and the National Trans¬ continental railways. Branch lines of these roads radiate to various parts of the province. Halifax was the home of Samuel Cunard, the founder of the Cunard Line, and the early packets of that line made Halifax a port of call; now steamship lines run to Prince Ed¬

ward Island, Quebec, Newfoundland, Saint

Pierre, Boston, New York, Mexico, Bermuda

and the West Indies, and various ports in Great Britain and the Continent. When the Saint

Lawrence freezes, Halifax, as the chief winter

port of Canada, is the natural terminus of the mail and fast passenger Atlantic liners. Hali¬

fax is also the nearest North American port to most of the South American countries and to

South Africa. It is also an important cable

centre. In 1914 the shipping tonnage entering

the port was 3,901,094. A United States consul-general is resident in Halifax. Under con¬

struction in 1916 by the Canadian government

are comprehensive national ocean terminals to

cost $35,000,000, occupying one and onehalf

miles waterfront, covering 200 acres of land and 60 acres of water, providing 27 standard steam¬

ship berths. They will comprise when com¬

pleted a bulkhead landing quay 2,006 feet long and five concrete piers, faced with granite, 1,250

feet long and 320 to 360 feet wide, with a

minimum depth at low water of 45 feet. There

will be also two grain elevators and a union

passenger depot. All railway lines converge at

these terminals, affording transportation facili¬

ties not surpassed at any port. These terminals are within 20 minutes steaming of the open

Atlantic Ocean. These terminals are in addi¬

tion to the present government terminals fur¬

ther up the harbor, giving berthing accom¬

modation for 10 Atlantic liners; the newest of these is of concrete and cost $1,250,000. Hali¬

fax is the chief fortress and naval station in Canada. The harbor and approaches are pro¬

tected by many modern forts and batteries. On

account of its fortifications it has been called the <(Cronstadt of America,® and bv Kipling

ftThe Warden of the Honor of the North.® The

naval dockyard covers 14 acres with a water

frontage of 2,700 feet. Halifax has also a

graving dock 600 feet long, 102 feet wide, with 30 feet of water on the sill ; and in connection therewith a steel ship repairing plant. There

is also a marine, railway and a grain elevator.

On account of its proximity to the coal mines of Pictou and Cape Breton it is a favorite

bunkering port.

Municipal Conditions, etc.— In its earlier

days Halifax was mainly a military and naval

entrepot, but has become more and more a

commercial city. It has always been a prom¬

inent banking centre, and is the home of two of the largest chartered banks of the Dominion,

the Bank of Nova Scotia and the Royal Bank

of Canada; it is the wealthiest per capita city of Canada. Dartmouth, on the opposite shore

of the harbor, practically a suburb of Halifax, has a population of 6,000. The city is built on the western side of the harbor for about five and onehalf miles, and is on a hill which is crowned by an elaborate but antiquated citadel.

The streets are regularly laid out, are paved

and electric-lighted and have electric tramways.

The older public buildings and the commercial

portion of the city are built chiefly of freestone, and the houses of wood. The most notable

structures include Government House, the offi¬

cial residence of the lieutenant-governor, the

Province Building, the seat of the legislature, Saint Paul's Church, the oldest Protestant

church edifice in British North America, Dalhousie University buildings, the Anglican and

Roman Catholic cathedrals, the Technical Col¬

lege, city hall, court house, post office, cus¬

toms house, admiralty house, Wellington bar¬

racks, armories, many banks, several hospitals

and other charitable institutions. The beautiful Public Gardens, covering 17 acres, and the

natural park at Point Pleasant are especially

noteworthy. Halifax has a moderate, equable

climate with an average summer temperature

of 66°. It is the residence of the Roman

Catholic archbishop of Halifax, and the Church

of England bishop of Nova Scotia. It is noted for its educational and philanthropic institu¬

tions, chief among which are the non-sectarian

Dalhousie University (q.v.) with faculties of

arts and sciences, law, medicine and dentistry

and a department of pharmacy; the Pine Hill

Presbyterian Theological College; the Roman

Catholic Saint Mary's College, doing prepara¬

tory and elementary college work; the Nova

Scotia Technical College, supported by the pro¬

vincial government, giving the final two years of engineering courses (the first two years' work

being given in Dalhousie and other colleges),

and being the centre of the government trade,

mining and technological classes and night

schools of great value and high excellence ; the Royal Naval College of the Dominion for the

training of midshipmen and seamen for the

Canadian navy; Halifax Ladies' College (pre¬

paratory) _ and Conservatory of Music, the latter in affiliation with Dalhousie University; two

convent schools and several high schools ; the

Victoria School of Art and Design; and a free public library. The School for the Deaf and

the School for the Blind are noted for the ex¬

cellence of their methods, and are the only ones in eastern Canada and

have pupils from all

over the Dominion and Newfoundland. The

Victoria General Hospital and the Nova Scotia

Hospital for the Insane are supported by the

provincial government and have training

schools for nurses.

Commerce. — The chief occupations of the

inhabitants are commerce, manufacturing and

in the businesses associated with the fisheries, transportation and shipping. The city has con¬

siderable West Indian trade, exporting lumber,

fish, flour and other agricultural products, and HALIFAX COMMISSION — HALL

importing sugar, rum, molasses, fruits and

other subtropical products; much of the com¬

merce of the province is carried on through

Halifax. The principal manufactures are

wooden cars and car and other iron and brass

castings, machinery, boilers, agricultural im¬

plements, skates, nuts and bolts, nails, paints, gunpowder, cordage, leather, boots and shoes,

clothing, soap, cotton and woolen goods, wood¬

work and woodenware, tar and products, ferti¬

lizers, chocolates, spices, biscuits, aerated waters.

There are two large sugar refineries, a molasses refinery and several distilleries and breweries, also several large fish-curing and packing and

cold-storage establishments, sending their prod¬

ucts to the United States, the West Indies,

South America and the Mediterranean. In

1915 its manufactures, including fish and

fish products, were valued at $20,730,000; ex¬

ports, $32,175,231 ; imports, $10,712,585; customs receipts, $2,488,106; bank clearings, $104,414,589.

History and Government. — In 1749 the

British government sent out an expedition under the Hon. Edward Cornwallis to settle upon the

strategic position now called Halifax, so

named bv Cornwallis in honor of Lord Halifax,

president of the Commissioners of Trade and

Plantations. The following year it was made

the capital of Nova Scotia, then including New Brunswick and Prince Edward Island, in place

of Annapolis Royal; in 1817 it was declared a free port; in 1842 it was incorporated as a city.

It is governed by a mayor, elected annually,

and four controllers and a council of 12 mem¬

bers holding office for two years. The city and county send two members to the Dominion

House of Commons and five to the provincial

legislature. A fine tower erected in 1912 on the shores of-the North West Arm commemorates

the fact that Nova Scotia had the first repre¬

sentative government of any portion of the

empire, this privilege being granted in 1758.

On 6 Dec. 1917 as the result of an explosion and conflagration, caused by the collision of

two ships, one carrying a cargo of war muni¬

tions, the north end of the city and Dartmouth on the east side of the harbor were devastated.

From the North Street Railway station as far

north as Africville to Bedford Basin, an area

of about two and onehalf square miles was

totally destroyed by the explosion and fires

which followed. A blizzard the next day im¬

peded the work of salvage; 1,158 dead bodies

were recovered from the ruins, of which 854

were identified and 304 unidentified; 4,000 per¬

sons were seriously injured; 20,000 were ren¬

dered homeless; while the total property loss

was estimated at $50,000,000. The damage to

government, military, naval, provincial, civic, in¬

dustrial, institutional and church property was

half of the amount. The Dominion govern¬

ment made an appropriation of $1,000,000 for

immediate relief ; a relief fund of $25,000,000

was raised for necessary work; and clearing

and reconstruction operations were at once

instituted.

A. Stanley Mackenzie,

President of Dalhousie University.

HALIFAX COMMISSION, the designa¬

tion for the commission of representatives of

Great Britain and the United States which met

at Halifax, Nova Scotia, in 1877, to determine the amount of compensation to be paid by the

United States for the privileges which under

the provisions of the fisheries treaty of 1871 be¬

tween the two countries had allowed the fisher¬

men of the United States to take fish along the shores of Canada and Newfoundland. The

great value of the British fishing waters was

admitted and the sum of $5,500,000 was

awarded Great Britain. The 10-vear treaty

which went into operation in 1873 was ter¬

minated by the United States government in

1885, and an attempt to renew it by the Cham¬

berlain-Bayard Treaty in 1888 was frustrated by the rejection of the United States Senate. A modus vivendi, _ however, was arranged for, which the Dominion Parliament enacted as a law in 1890.

HALIFAX PLATFORM, the program enunciated in 1907 by Mr. R. L. (now Sir Robert) Borden as leader of the Liberal-Con¬ servative opposition in Canada. It declared for provincial autonomy, civil service and Senate reform, the enforcement of purity in election contests, the placing of government railways under an independent commission, the creation of a public utilities commission, moderate pro¬ tection and preferential trade within the empire.

HALITE, the mineralogical name for native common salt, rock salt or sodium chloride, NaCl. Halite crystallizes in the isometric system, usu¬ ally in cubes. It has a hardness of 2.5, and a specific gravity of 2.135 when pure, though it often occurs mixed with calcium sulphate and with the chlorides of calcium and magnesium, the specific gravity being modified accordingly.

Halite is usually colorless or white, though it is sometimes colored by impurities. Its refractive

index for yellow sodium light is 1.5442, and

transparent crystals of it are used somewhat in the manufacture of prisms and lenses, since the mineral is far more transparent than glass to the infra-red rays of the spectrum. Tyndall made

extensive use of it in this way, for example, in his researches on radiant heat. Consult his

Contributions to Molecular Physics in the

Domain of Radiant Heat.5 See Salt; Sodium.

HALL, Alexander Wilford, American

editor and author: b. Bath, N. Y., 18 Aug. 1819; d. 1902. He became known as an evangelist

especially through attacks on Universalist doc¬

trine and the theory of evolution presented by Darwin, Huxley and Haeckel. In 1881 he es¬

tablished The Microcosm, and in 1893 became

president of the Society for Philosophical Re¬

search. In 1891 he was elected Fellow of the

Philosophical Society of Great Britain. His

works include (Universalism Against Itself 5 ;

(The Problem of Human Life5 ; (The Im¬

mortality of the Soul5 ; and (The Hygienic

Secret of Health.5

HALL, Anna Maria Fielding, British

novelist: b. Dublin, Ireland, 6 Jan. 1800; d.

East Moulsey, Surrey, England, 30 Jan. 1881.

In her 15th year she went to London, where she was married to the well-known writer, S. C.

Hall (q.v.). She published (Sketches of Irish

Character5 (1829); (The Buccaneer5 (1832);

(Tales of a Woman's Trials5 (1835) ; (Saint

Pierre, the Refugee,5 a burletta ; (Uncle Horace5

(1837) ; (Lights and Shadows of Irish Life5

(1838): (Marian5 (1839); (Midsummer Eve5

(1843) ; (The Whiteboy5 (1845), *etc.* Besides

assisting her husband in writing (Ireland: its Scenery, etc.5 (1841-43) and other works, she

assisted in the establishment of a hospital for consumptives and the Nightingale Fund, which

resulted in the endowment of a training-school

for nurses.

HALL, Arthur Crawshay Alliston, Ameri¬

can Protestant Episcopal bishop ; b. Binfield,

Berkshire, England, 12 April 1847. He was

graduated from Christ Church, Oxford, in 1869,

took orders, entered the Society of Saint John the Evangelist (Cowley Fathers), in 1874 be¬

came assistant minister of the church of the

Advent, Boston, and from 1882 to 1891 was

there minister of the mission church of Saint

John the Evangelist. In 1894 he was conse¬

crated bishop of Vermont, after release from

the Cowley order. His publications include

(Confession and the Lambeth Conference>

(1879); (Meditations on the Creed) (1880);

(Meditations on the Collects) (1887) ; breach¬

ing a Pastoral Care* ; (Christian Unity* ; (The Doctrine of the Church) and other doctrinal

and devotional works.

HALL, Asaph, American astronomer : b.

Goshen, Litchfield County, Conn., 15 Oct. 1829; d. Annapolis, Md., 22 Nov. 1907. After private study he attended Central College, McGraw-ville, N. Y., in 1854-55 was for a term a pupil of Francis Brunnow at the University of Mich¬

igan, taught at Shalersville, Ohio, and later was appointed assistant to Bond in the Harvard

Observatory. He became assistant in the Naval

Observatory at Washington in 1862, and in 1863

professor of mathematics in the navy, with rela¬

tive rank of captain. He continued in the

government service until 1891, when he was

retired on account of age, with relative rank of captain. While at the Naval Observatory, he

was dispatched on several expeditions, includ¬

ing those for observation of solar eclipses to Bering Strait in 1869, to Sicily in 1870 and to Colorado in 1878. He was also in charge of the American party sent to observe the transit of

Venus at Vladivostock, Siberia, in 1874, and

chief astronomer of the expedition to San

Antonio, Tex., for the transit of 1882. Among

his many discoveries the most important is that of the moons of Mars (August 1877), which he

named Deimos and Phobos, and whose orbits

he calculated. Among his later work is a

valuable study of double stars. In 1895-1901 he was professor of astronomy at Harvard. He

received the Lalande prize of the French Acad¬

emy of Sciences in 1878, its Arago medal in

1895, and the gold medal of the Royal Astro¬

nomical Society in 1879. In 1902 he was presi¬

dent of the American Association for the Ad¬

vancement of Science.

HALL, Basil, British naval officer and

writer: b. Edinburgh, 31 Dec. 1788; d. Ports¬

mouth, England, 11 Sept. 1844. He entered the

navy in 1802, and accompanied Lord Amherst's

expedition to China in 1815, a trip which sup¬

plied him with the materials of his first work, (A Voyage of Discovery to the West Coast of

Corea, and the great Loo Choo Island in the

Japan Sea.* This work, first published in 1818, had a very extensive circulation. In 1827 he

made a tour in Canada and the United States,

and published his (Travels in North America)

(1829), a work which excited much adverse

criticism in the United States by reason of its outspoken and somewhat supercilious comments

and observations. (Fragments of Voyages and

Travels) appeared in 1831-33, and was followed

by (Schloss Hainfield, or a Winter in Styria*

and (Patchwork) (1841).

HALL, Bolton, American lawyer and lec¬

turer: b. Ireland 1854. A son of Rev. Dr. John Hall (q.v.), he was graduated from Princeton in 1875, and from Columbia Law School in 1888,

became known as a writer and lecturer in con¬

nection with various reforms, and has been

identified with the University extension move¬

ment. Among the causes advocated by him are

the cultivation of vacant lots by the unemployed, and the restoration of the land to the people.

In 1916 he established the Free Acres Associa¬

tion, a settlement organized to demonstrate the practicability of the Single Tax. His publica¬

tions include (Things as They Are* (1899) ;

(Free America) (1903) ; (Monkey Shines*

(1904) ; (Three Acres and Liberty) (1907) ;

(The Garden Yard) (1909) ; fWhat Tolstoi

Taught* (1911); <The Gift of Sleep> (1911);

(The Mastery of Grief* (1912) ; (Thrift*

(1916).

HALL, Charles Cuthbert, American

Presbyterian clergyman: b. New York, 3 Sept.

1852; d. New York, 25 March 1908. He was

graduated from Williams College in 1872,

studied theology at the Union Theological

Seminary 1872-73, and at the Presbyterian Col¬

lege in London and the Free Church College,

Edinburgh. He was pastor of the Presby¬

terian Church, Newburg, N. Y., 1875-77, and of the First Presbyterian Church, Brooklyn, N. Y., 1877-97. In 1897 he was elected president of

Union Theological Seminary. He published

Unto His Marvellous Light* (1891) ; (Does

God Send Trouble?* (1894) ; (The Children,

the Church and the Communion) (1895) ; (The

Gospel of the Divine Sacrifice) (1896) ; (Christ and the Human Race) (1906) ; (Christ and the Soul> (1909).

HALL, Charles Francis, American Arctic

explorer: b. Rochester, N. H., in 1821; d.

Thank God Harbor, Greenland, 8 Nov. 1871.

Becoming interested in the fate of the Franklin expedition, he devoted his leisure to gathering information about Arctic America, and made

two search expeditions, in 1860-62 and 1864—69, living alone among the Eskimo, and bringing

back relics of the Franklin expedition and the supposed bones of one of Franklin's company.

Natives whom he encountered in 1869 near the

southern shore of King William Land gave him

a report of the fate of 79 of the 105 who

perished by starvation in that region. He thus contributed much to the details of the ex¬

pedition's final history. In 1871 he sailed in command of the government ship Polaris , on an expedition to the North Pole. On 29 August he reached 82° 11' N., at that date the highest

north latitude ever reached. Then turning

south he went into winter quarters at Thank

God Harbor, Greenland (81° 38' N.). Here

he was taken suddenly ill and died. Over his

grave a grateful epitaph was placed by the

British polar expedition in 1876. His compan¬

ions left Thank God Harbor in August, 1872,

but in October, through the ice-anchor slipping, 19 men were left with

stores on a floe, and only after five months of severe suffering were they rescued by a sealer off the Labrador coast in the following April. The Polaris drifted to the coast of Greenland, at a point not far south of ASAPH HALL

Late Professor of Astronomy, Harvard University

HALL

64i

Smith Sound, and thence in the spring the party set out in boats and was rescued by the Scotch whaler Ravenscraig, off Cape York. Among

the valuable results of Hall's work were the

exploration of Kennedy Channel, the discovery

of Robeson Channel and Hall Basin, and the

extension of Greenland and Grinnell Land 1ˆ2°

N. Hall was less a scientist than a fearless and resourceful explorer. He published (Arctic

Researches, and Life among the Esquimaux)

(1864) ; and mainly from his papers was com¬

piled the (Narrative of the Second Arctic Expe¬

dition (1879). Consult Davis, (Polaris North

Pole Expedition (1876).

HALL, Chester Moor, English inventor:

b. Leigh, Essex, England, 9 Dec. 1703 ; d. Sutton, Essex, 17 March

1771. He was a large landowner in Essex, and convinced from study of the human eye that achromatic lenses were pos¬ sible, he discovered two varieties of suitable glass in 1729, and in 1733 made several tele¬ scopes later declared by experts to be achro¬ matic. Indifferent to his claims of priority, he did not appear at the trial of Dollond v. Champ-ness. Later his invention of the achromatic telescope in the year 1733 was adjudged by Lord Mansfield conclusively proved.

HALL, Christopher Newman, English Congregationalist clergyman : b. Maidstone, England, 22 May 1816; d. London, 18 Feb. 1902. He was educated at Highbury College and or¬ dained in 1842, his first charge being at Hull. In 1854 he was made pastor of Surrey Chapel, Blackfriars road, London, from which place he moved with his congregation into Christ Church, Westminster Bridge road, erected mainly through his exertions, and of which he became pastor emeritus in 1892. During the Civil War he did much by tongue and pen to give his countrymen correct ideas of the nature of the struggle in the United States. In 1865 he visited this country and again in 1873 when he delivered lectures in the principal cities. He was the author of (Plain Truths Plainly Put)

(1861) ; (From Liverpool to Saint Louis)

(1870); (Prayer; Its Reasonableness and Effi¬

cacy J (1883) ; (Gethsemane; or Leaves of Heal¬

ing from the Garden of Grief > (1891) ; (Newman Hall, an Autobiography 5 (1898) ; and of

a famous tract (Come to Jesus* (1840), of

which millions of copies have been issued, *etc.*

HALL Fitzeaward, American philologist :

b. Troy, N. Y., 21 March 1825 ; d. Marlesford, England, 1 Feb. 1901. He was obliged to leave Harvard in 1846, just before he would have

graduated, and went to India, where he spent

many years, made a thorough study of its

tongues and contributed to its local journals

original translations and original articles. In

1850 he became tutor, in 1853 professor, in the government college at Benares; in 1855 was

transferred to Ajmere as inspector of schools

for Ajmere and Maiwara ; and in 1856 to a like post in the Central Provinces. In 1860 he was granted a degree of D.C.L. by Oxford. In

1862-79 he was professor of Sanskrit, Hin¬

dustani and Indian jurisprudence in King's

College, London; in 1864 became examiner in

Hindustani and Hindu to the Civil Service Com¬

mission; in 1880 examiner in Sanskrit to suc¬

ceed Max Muller; and in 1887 also examiner

in English. He was the first American to edit a Sanskrit text — (The Atmabodha, with its

Commentary, and the Tattvabodha* (1852).

He prepared also an edition of the (Vishnu—

purana,* containing numerous quotations from

manuscripts owned by him ; and editions of

many other Sanskrit books. His collection of

1,000 Oriental manuscripts and 1,000 works on

special subjects he gave to Harvard. He wrote

(Modern English* (1873), (Doctor Indoctus>

(1880), and other works on English philology,

and contributed to the (New Oxford Diction¬

ary. }

HALL, Florence Marion Howe, American

author and lecturer: b. Boston, 25 Aug. 1845.

She is a daughter of Julia Ward Howe (q.v.).

Prominent in the women's club movement, she

became vice-president of the General Federation

of Women's Clubs, and chairman of the educa¬

tional department of the New Jersey State Fed¬

eration of Women's Clubs. In 1893-1900 she was president of the New Jersey Women's Suffrage

Association. Her writings include (Social Customs> (1887) ; (The Correct Thing) (1888) ;

(Handbook of Hospitality) (1910) ; (The

A. B. C. of Correct Speech> (1916). She was

an honorary vice-regent of the D. A. R. in

1914. She has delivered many lectures for the

Woman Suffrage party.

HALL, Francis Joseph, American Episco¬

pal theologian : b. Ashtabula, Ohio, 24 Dec. 1857.

He was graduated from Racine College, Wis¬

consin, and the Western Theological Seminary,

Chicago, and was instructor and professor of

dogmatic theology in the Western Theological

Seminary from 1886 to 1913, becoming pro¬

fessor of dogmatic theology in the General

Theological Seminary, New York, that year.

He has published three volumes of (Theological

Outlines) (1892-95; 2d ed. in 1905 and 1915);

historical Position of the Episcopal Church*

(1896) ; (The Kenotic Theory* (1898) ; (In¬

troduction to Dogmatic Theology* (1907);

(Authority Ecclesiastical and BiblicaP (1908) ; (The Being and Attributes of God) (1909) ;

(Evolution and the FalP (1910) ; (The Trinity*

(1910); (Creation and Man> (1912); <The

Incarnation* (1915) ; (The Passion and Exalta¬

tion of Christ* (1918).

HALL, Gertrude, American writer : b. Bos¬

ton, 8 Sept. 1863; d. 24 Sept. 1915. She was educated in Florence. She wrote (Far from To-Day^ a collection of short stories; (Allegretto,*

a book of verse; (Foam on the Sea, and Other Tales) ; (The Hundred and Other Stories)

(1898;) (The Age of Fairy Gold,* verse

(1899) ; (April's Sowing) (1900) ; (The Wag¬

nerian Romances* (1910) ; (The Unknown Quan¬

tity * (1910) ; (The Truth about Camilla>

(1913) ; and translations of Rostand's (Cyrano

de Bergerac) and <Chantecler) ; and (Poems) of Paul Verlaine. Her work, both in verse and

prose, is distinctively original.

HALL, Gordon, American missionary at

Bombay : b. Tolland, Mass., 8 April 1784; d.

Bombay, 20 March 1826. He was graduated at

Williams College in 1808 and having studied

theology, offered himself as a missionary to the American Board of Commissioners for Foreign

Missions. Ordained at Salem in February 1812,

he sailed the same month for Calcutta and ar¬

riving at Bombay in 1813, spent 13 years in mis¬

sionary labors. No missionary in western India

has been more respected among the Brahmins

and higher classes than he. Beside publishing

several missionary tracts he revised the Mahratta New Testament.

HALL, Granville Stanley, American psy¬

chologist and college president : b. Ashfield,

Mass., 6 May 1845. He was graduated from

Williams College in 1867, studied also at Ber¬

lin, Bonn, Heidelberg and Leipzig, was profes¬

sor of psychology in Antioch College (Ohio) in 1872-76, and lecturer on psychology at Harvard

and Williams in 1880-81. From 1881 to 1888 he was professor of psychology in the Johns Hop¬

kins University; and in 1888 became president

of Clark University, then newly founded at

Worcester, Mass., and professor of psychology

in the institution. He soon became known as

an authority on education and a leader in the ((new psychology.55 In 1892 he was president

of the American Psychological Associa¬

tion. He founded and edited the Peda¬

gogical Seminary, the American Journal of

Psychology and the Journal of Race Develop¬

ment (after 1910). He published (Aspects

of German Culture> (1881) ; (Hints Toward a

Select and Descriptive Bibliography of Educa¬

tion with Mansfield (1886) ; (Methods of

Teaching History5 ; (How to Teach Reading) ;

(The Contents of Children's Minds on Enter¬

ing School5 (1894) ; <Adolescence) (2 vols.,

1904); (Youth: Its Education and Regimen

(1906) ; (Educational Problems) (2 vols.,

1911) ; (Jesus, the Christ, in the Light of Psy¬

chology0 (1917). Consult Partridge, G. E.,

(Genetic Philosophy of Education: An Epitome

of the Published Writings of G. Stanley HalP

(New York 1912).

HALL, Isaac Hollister, American Oriental

scholar: b. Norwalk, Conn., 12 Dec. 1837; d.

Mount Vernon, N. Y., 2 July 1896. Graduated

from Hamilton College in 1859, he was there

tutor until 1863; in 1865 was graduated from

the Columbia Law School and until 1875 was a

practitioner in New York. In 1875-77 he was

professor in the Syrian Protestant College at

Beirut, and later at Cyprus aided General di

Cesnola, then United States consul, in the ar¬

rangement of the Cypriote collection now in

the Metropolitan Museum of New York. (Con¬

sult Scribner's Magazine, June 1880). From

1884 until his death he was curator of sculpture and archaeology in the Metropolitan Museum.

He also lectured on New Testament Greek at

the Johns Hopkins University; published (1884)

an account, with facsimile pages, of the Syrian manuscripts of the Gospels, Acts and the larger part of the Epistles, discovered by him (1876) at Beirut; and compiled a (Critical Bibliography of the Greek New Testament5 (1884).

HALL, Sir James, English geologist and

chemist: b. 1761; d. Edinburgh, 23 June 1832.

Early interested in geological questions, he made the acquaintance of James Hutton (q.v.) and'

Playfair, and himself states that he came to

adopt Hutton's system after three years of al¬

most daily discussion with its founder. In the examination of this

system, whose leading prin¬

ciple explains the conformation of the earth's

crust by the action of constant natural changes, he traveled in Scotland, the Alps, Italy and

Sicily. Hall was the first geologist directly to apply chemical laboratory tests to the hypotheses of geology, but published no results of his work in this field until after the death (1797) of Hutton, who objected to Hall's judgment of the vast operations of nature through (<having

kindled a fire and looked into the bottom of a little crucible.® He invented a machine for the regulation of high temperatures, and in 1807-12

represented the borough of Michael (or Mitch¬

ell), Cornwall, in Parliament.

HALL, James, American lawyer and au¬

thor: b. Philadelphia, 19 Aug. 1793; d. near

Cincinnati, Ohio, 5 July 1868. He served in the army 1812—18, and subsequently studying law

became judge of the Circuit Court of Illinois, and also State treasurer. In 1833 he took up

his residence in Cincinnati, and devoted himself to banking and literature. His chief works are (Legends of the West5 ; (Harpe's Head, a Leg¬

end of Kentucky5 (1833); (Sketches of the

West5 (1835) ; (Tales of the Border5 (1835) ; (Notes on the Western States5 (1838) ; his¬

tory of the Indian Tribes5 (1838-44) with

McKenney; (The Wilderness and the War¬

path5 (1845) ; (Romance of Western History5

(1859).

HALL, James, American geologist and

palaeontologist : b. Hingham, Mass., 12 Sept.

1811; d. near Bethlehem, N. H., 7 Aug. 189&

He studied at the Rensselaer Polytechnic

School for six years, and was subsequently pro¬

fessor of geology there, and in 1837 was ap¬

pointed to a position on the New York Geo¬

logical Survey. In 1855 he was appointed State geologist of Iowa. In 1850 he was elected by

the Royal Geographical Society of London one

of its 50 foreign members, and in 1858 received the Wollaston Medal from that scientific body.

In 1856 he was president of the American Asso¬

ciation for the Advancement of Science, and in 1889 was president of the Geological Society of America. He was a distinguished member of

many scientific societies at home and abroad and was held in the highest esteem for his attain¬

ments in geology and palaeontology. Among his

publications may be named (Geology of New

York5 (1843) ; (Palaeontology of New York5

(\8A7 et seq.) ; (Graptolites of the Quebec Group5

(1865) ; as well as parts of the Geological Re¬

ports of Iowa (1858-59) ; and also of Wiscon¬

sin (1862).

HALL, John, American Presbyterian cler¬

gyman : b. near Armagh, Ireland, 31 July 1829; d. Bangor, County Down, Ireland, 17 Sept. 1898.

He was educated at Belfast College and after

holding several pastorates in Ireland, in 1867

became pastor of the Fifth Avenue Presbyterian

Church, New York. He was chancellor of the

University of the City of New York 1882-90,

and was also trustee of Princeton University,

Union Theological Seminary and of Wellesley

College. He was noted for his simple eloquence and impressive sincerity and was one of the

most prominent clergymen in his denomination.

He wrote (Family Prayers for Four Weeks5

(1868); (Papers for Home Reading5 (1871);

(Questions of the Day5 (1873) ; (God's Word

through Preaching5 (1875) ; (Foundation-Stones

for Young Builders5 (1879) ; (A Christian

Home: how to Make and how to Maintain It5

(1883); (Light Unto My Path5 (1895).

HALL, John M., American railroad presi¬

dent: b. Willimantic, Conn., 16 Oct. 1841; d.

New Haven, Conn., 27 Jan. 1905. He was

graduated from Yale in 1866 and from the

Columbia Law School in 1868. He took up the

practice of law in his native town and became HALL

a judge of the Superior Court in 1889, resigning in 1893ˆ to become vice-president of the New

York, New Haven and Hartford Railroad Com¬

pany. On the death of President Clark in 1899, Judge Hall succeeded him as president.

HALL, Joseph, English prelate: b. near

Ashby-de-la-Zouch, Leicestershire, 1 July 1574;

d. near Norwich, 8 Sept. 1656. While yet in col¬

lege he published his (VirgidemiarumP a series of poetical satires, remarkable for elegant and energetic versification, strong and lively color¬

ing and masterly traces of genuine humor.

Having taken orders he obtained the rectory of Halsted, near Bury Saint Edmunds, where he

published a very popular work, (A Century of

Meditations.5 In 1616 he became dean of Wor¬

cester, and was raised to the see of Exeter in 1627. After the open rupture between the king

and parliament, while conciliatory to the Puri¬

tans, he came forward in defense of the liturgy and discipline of the Church, against the views which the leading Non-Conformists had

pub¬

lished, in a treatise called, after the initials of the names of its authors, (Smectymnuus.5 In the end of 1641 Bishop Hall was translated from

the see of Exeter to that of Norwich, but was later imprisoned in the Tower with the other

prelates who had protested against their ex¬

pulsion from the House of Peers. In 1643 he

was specially named in the ordinance passed

for sequestering what were called ((notorious

delinquents® and his cathedral was desecrated

and wrecked. His last 10 years were spent in

retirement. His prose works edited by Philip

Wynter were published in 1863. Among the

latter, the best known and most popular is his (ContemplationsP which still finds many

readers. Consult (LifeP by Lewis (1886).

HALL, Lyman, American patriot: b. Wal¬

lingford, Conn., 12 April 1724; d. Burke County, Ga., 19 Oct. 1790. He was graduated from

Yale in 1747, studied medicine and began prac¬

tice in Wallingford, Conn., but finally settled near Sunbury, Ga., where he became a leading

physician. The settlers in this locality were

from New England, and on the outbreak of

trouble with England, they with Hall as leader took active part in the rebellion, though Georgia was slow in joining the patriot cause. Hall was sent by them as a representative to the Con¬

tinental Congress, where he was admitted by a

unanimous vote and took part in all debates,

but did not vote when the vote was taken by

colonies, until Georgia was represented as a

colony. In 1776 it was so represented and

Hall continued a member of the Congress till

1780, being one of those who signed the Declara¬

tion of Independence. He was elected governor

of Georgia in 1783, and in an energetic ad¬

ministration of one year he did much to repair the damage done by the war, established land

offices and schools, and then retired from public life. Consult Dwight, (Signers of the Declara¬

tion and an article, (Lyman HalP (in the

Magazine of American History, XXV, 35).

HALL, Marshall, English physician and

physiologist: b. Basford, near Nottingham, 18

Feb. 1790; d. Brighton, England, 11 Aug. 1857.

In 1812 he took his degree in medicine at the University of Edinburgh. In 1817 he com¬

menced practice at Nottingham, and shortly af¬

ter rose to eminence. In 1826 he settled in Lon¬

don, where he carried on a most successful

practice. He paid especial attention to the

symptoms of illness; in 1817 published diag¬

noses of Diseases, 5 and in 1824 his (Medical Essays) appeared. His (Essay on the Circula¬

tion of the Blood) (1831) contained an account of his . discoveiy of the socalled <(caudal

heart® in the tail of the eel. The more im¬

portant of his other writings are Rectures on

the Nervous System and its Diseases) (1836) ;

(Theory and Practice of Medicine) (1837);

(Theory of Convulsive Diseases) (1848). His

services to the cause of humanity were numer¬

ous and valuable, and among these one of the

most widely known is the method which he in¬

vented of restoring suspended respiration, now

generally adopted in the case of persons

partially drowned. It is known as the

((Marshall Hall Method.®

HALL, Robert, English Baptist clergyman :

b. Arnesby, Leicestershire, England, 2 May

1764; d. Bristol, England, 21 Feb. 1831. He

studied at the Baptist College at Bristol and

King's College, Aberdeen, and entered the Bap¬

tist ministry, becoming in a few years not only the most prominent minister in his denomina¬

tion but one of the very foremost of English

pulpit orators. He was also widely known as a master of prose style, his most noted writings being (Apology for the Freedom of the Press>

(1793) ; (Modern Infidelity) (1800) ; Reflec¬

tions on War5 (1802). He was subject to at¬

tacks of insanity, but in spite of this misfor¬

tune accomplished a vast amount of intellectual work and was a tireless student. His com¬

plete works in six volumes reached an 11th

edition in 1853.

HALL, Robert, Australian naturalist : b.

Lai Lai, Victoria, 1867. He was educated at

the universities of Melbourne and Tasmania.

In 1897 he accompanied the consul for Norway,

in the capacity of naturalist, to Kerguelen Is¬

land. He also went to the headwaters of the

Lena River, 2,500 miles. He was probably the

first English-speaking naturalist to do so. There he collected a great number of specimens of

birds and insects, which are now in the Tring Museum. He became curator of the Tasmanian

Museum and the Botanical Gardens, Hobart,

1907, and secretary of the Royal Society of

Tasmania, a position he resigned in 1913.

Among his published works are (The Useful

Birds of Southern Australia) ; (Glimpses of

Southern Australian Bird Life5 ; (Nature

Studies in Australia5 ; (Insectivorous Birds of Victoria.5

HALL, Robert Henry, American soldier:

b. Detroit, Mich., 15 Nov. 1837; d. Washington, D. C., 29 Dec. 1914. He was educated at West Point and served in the Federal army during

the Civil War, and was in command of a

brigade during the war in the Philippines. He

became a brigadier-general in the United States army in 1901 and retired 15 Nov. 1901. He

published Register of the United States Army

1789-985 ; (History of the Flag of the United States5 ; (History of United States Infantry

Tactics5; (History of Fort Dearborn5; Re¬

view of Works of United States History.5

HALL, Ruth, American novelist: b. Scho¬

harie, N. Y., 10 April 1858. Besides more or

less journalistic work she has written (In the Brave Days of Old5 (1898) ; (The Boys of

Scrooby5 (1899) ; (The Black Gown,5 a novel

of colonial Albany (1900) ; <The Downrenter's

Son,* a novel of the anti-rent troubles in New York State (1902); (The Golden Arrow*

(1901) ; (The Pine Grove House* (1903).

HALL, Samuel Carter, English miscella¬

neous writer: b. Topsham, Devonshire, Eng¬

land, 9 May 1800; d. 16 March 1889. For over 40 years he was the editor of the Art Journal, which he founded in 1839. With his wife

(Anna Maria) (q.v.) he published (Ireland, its Scenery and Character* (1841-^43) ; Rook of

Royalty* (1838); (A Woman's Story* (1857);

(The Book of the Thames* (1859) ; (A Com¬

panion to Killarney* (1878); and others. His

separate works were (A Book of Memories* ;

Rook of British Ballads* ; Raronial Halls* ;

Retrospect of a Long Life* (1883).

HALL, Thomas Cuming, American Pres¬

byterian theologian : b. Armagh, Ireland, 25

Sept. 1858. He was graduated at Princeton

University in 1879 and from Union Theological

Seminary in 1882, and studied at Berlin and

Gottingen in 1882-83. He was ordained in the

latter year and held pastorates at Omaha, Neb.

(1883-86), and Chicago (1886-97), and in 1898

became professor of Christian ethics at Union

Seminary. In 1914 he was chosen to be Roose¬

velt professor at the University of Berlin dur¬

ing 1915-16. He was decorated with the Order

of the Crown by the Emperor of Germany. He

has written (The Power of an Endless Life*

(1893) ; (The Social Significance of the Evan¬

gelical Revival in England* (1899) ; (The Sy¬

noptic Gospels* (1900); <John Hall, Pastor and

Preacher: A Biography by his Son* (1901);

(Social Solutions in the Light of Christian

Ethics* (1910) ; (The History of Ethics within Organized Christianity* (1910) ; historical

Setting of the Early Gospel* (1912) ; Religion and Life* (1913).

HALL OF FAME, a memorial to famous

Americans, at the New York University. In

March 1900 the institution received a gift of

$100,000, afterward increased to $250,000, from

a donor, whose name was withheld, for the

erection and completion on University Heights,

a beautiful site in upper New York overlook¬

ing the valleys of the Harlem and the Hudson, of a building to be

called (<The Hall of Fame for Great Americans.** A structure was erected

in the form of a terrace with superimposed

colonnade 600 feet long connecting the Univer¬

sity Hall of Philosophy with the Hall of Lan¬

guages. On the ground floor is a museum 200

feet long by 40 feet wide, consisting of a corri¬

dor and six halls to contain mementoes of the names that are inscribed above. The colonnade

has provision for 150 panels, each 2 feet by 8, each to bear the name of a famous American.

Only persons who shall have been dead 10 or

more years are eligible to be chosen. Fifteen

classes of citizens are recommended for con¬

sideration : Authors and editors, business men, educators, inventors, missionaries and explorers, philanthropists and reformers, preachers and

theologians, scientists, engineers and architects, lawyers and judges, musicians, painters and

sculptors, physicians and surgeons, rulers and

statesmen, soldiers and sailors, distinguished

men and women outside the above classes.

Fifty names were to be inscribed on the tablets at the beginning in 1900, and five additional

names every fifth year thereafter, unt/il the

year 2000, when the 150 inscriptions will be

completed. In case of failure to fill all the panels allotted, the

vacancies are to be filled in a following year. In February 1904 the plan was announced of a Hall of Fame for Women

near the former, with places for 50 tablets.

The rules prescribed that the council of the

university should invite nominations from the

public. Every nomination seconded by a mem¬

ber of the university senate should be sub¬

mitted to an electorate of 100 eminent citizens selected by the council. In October 1900 the

university senate received the ballots of the

electors. Of the 100 judges selected 97 voted.

The number of names which had been sub¬

mitted to them was 252. Of these each judge

returned a vote for 50. The rule required that no candidate receiving less than 51 votes could be accepted. The returns showed that but 29

candidates received the required number and

were chosen.

The 29 candidates elected on the first ballot

(1900) and the number of votes received were

as follows: George Washington, 97; Abra¬

ham Lincoln, 96; Daniel Webster, 96; Benja¬

min Franklin, 94; Ulysses S. Grant, 92; John

Marshall, 91; Thomas Jefferson, 90; Ralph

Waldo Emerson, 87 ; Henry Wadsworth Long¬

fellow, 85; Robert Fulton, 85; Washington

Irving, 83; Jonathan Edwards, 81; Samuel F.

B. Morse, 80; David Glasgow Farragut, 79;

Henry Clay, 74; Nathaniel Hawthorne, 73;

George Peabody, 72; Robert E. Lee, 69; Peter

Cooper, 69; Eli Whitney, 67; John James

Audubon, 67 ; Horace Mann, 67 ; Henry Ward

Beecher, 66; James Kent, 65; Joseph Story,

64; John Adams, 61; William Ellery Channing,

58; Gilbert Stuart, 52; Asa Gray, 51. The

names of Bryant, Poe and Cooper were cer¬

tain of election later. Lowell was not yet

dead 10 years, so was not eligible. Bryant

failed by 3 votes, Greeley by 5, Motley by 9.

The most animated discussion was provoked by

the selection of Robert E. Lee. The vote for

him was not sectional, however, only a minority of the electors being Southern men.

In October 1905, under the rules, the university senate received the ballots of 95 electors out of 101 appointed. Of these only 85 undertook

to consider the names of women. A majority

of 51 was demanded, but in the case of the

names of women, a majority of only 47. The

following persons were elected: John Quincy

Adams, 59; James Russell Lowell, 58; William

Tecumseh Sherman, 58; James Madison, 56;

John Greenleaf Whittier, 53; Mary Lyon, 58;

Emma Willard, 50; Maria Mitchell, 48; to the

hall, for foreign-born Americans the three fol¬

lowing were chosen: Alexander Hamilton, 88;

Louis Agassiz, 83; John Paul Jones, 54.

Among the names which received less than a

majority vote in the 1905 election were those

of Oliver Wendell Holmes, 48; Phillips Brooks,

48; Bryant, Parkman and Motley, 46 each; Poe

and Cooper, 43 each; Bancroft and Greeley, 39

each; Nathaniel Greene and Mark Hopkins, 38

each; Joseph Henry, 32; Rufus Choate, 31.

The hall was dedicated 30 May 1901, when 25

or more national associations each unveiled

one of the bronze tablets in the colonnade. On 30 May 1907, the 11 new tablets were unveiled, orations being delivered by the governors of

New York and Massachusetts.

The third quinquennial election was held in

1910, when 11 new names were again added

to as many tablets. They brought the total

number to 51. Ninety-seven out of a possible

100 votes were cast by the board of electors, the number required to elect being, as in 1905.

51. The ballots of one professor of history, one publicist and one chief justice on the board of electors were not received. The persons se¬

lected were: Harriet Beecher Stowe, 71; Oliver

Wendell Holmes, 69; Edgar Allan Poe, 69;

James Fennimore Cooper, 62; Phillips Brooks,

60; William Cullen Bryant, 59; Frances E. Wil¬

lard, 56; Andrew Jackson, 53; George Ban¬

croft, 53; John Lothrop Motley, 51; and to the hall for foreign-born Americans was chosen

Roger Williams, 64. Those failing of election

by less than 10 votes were : Samuel Adams, 41

votes; Daniel Boone, 42; Patrick Henry, 44;

Mark Hopkins, 45; Francis Parkman, 45;

Charlotte Saunders Cushman, 45 ; Lucretia

Mott, 41 ; Martha Washington, 43. There were

211 nominees. The fourth quinquennial elec¬

tion in 1915 secured the ballots of 97 electors, when nine names were admitted. The persons

selected were: Alexander Hamilton, 70; Mark

Hopkins, 69; Francis Parkman, 68; Elias Howe,

61 ; Joseph Henry, 56; Rufus Choate, 52; Daniel Boone, 52; Charlotte Cushman, 53. Of these

Hamilton and Agassiz had been elected in 1905

to the separate hall proposed for famous

Americans of foreign birth. When the Constitu¬

tion was amended in 1914, to do away with the distinction between native-born and foreign-born, it was required that the four foreign-born, already chosen, be reelected in competition

with the native-born put in nomination. Hamil¬

ton and Agassiz were approved. In 1920 there

were approved Samuel L. Clemens, James B.

Eads, Patrick Henry, William T. G. Morton,

Augustus Saint-Gaudens, Roger Williams, and

Alice Freeman Palmer. In 1915 the hall re¬

ceived $37,000 toward its funds.

HALL MARKS, or PLATE MARKS,

are symbols or marks placed on gold and silver plate for the purpose of showing its degree of purity, the place of manufacture, *etc.* In most European countries the stamping of plate is a

1478 to

1498 — Lorn-

1696 to 1716 —

HI

bardic.

caps, double

Court hand.

cusps.

1498 to 1518 —

Black letter, small.

1518 to 1538

► Lombardic, capitals.

P 1538 to 1558 — Roman

and other caps.

1558 to 1578 —

Black letter, small.

frrwl 1578 to 1598 —

(ilj Roman, capitals.

1 1598 to 1618 Lom-

1T>| bardic, capitals, external cusps.

fg]l618 to 1638 —

Italian, small.

1638 to 1658 —

Court hand.

1658 to 1678 —

Black letter, capitals.

1678 to 1696 —

Black letter, small.

in

crown with figures denoting the number of

carats fine. For silver it is in England a lion passant, with figures ; in Ireland a harp crowned ; in Edinburgh a thistle ; and in Glasgow a lion

rampant. (3) The hall mark of the district offices, which are in London, York, Exeter, Chester, Newcastle, Birmingham, Sheffield, Edinburgh, Glasgow, and Dublin. (4) The date mark, consisting of a letter, changed every year. (5) The duty mark, the head of the sovereign, indicating that the duty has been paid.

The foregoing table shows specimens of the different alphabets used by the Goldsmiths' Company of London as date-letters from 1478; variety in the shape of the shields being also used as a further distinction :

The accompanying figure shows a Birming¬ ham silver plate-mark. (1) The maker's ini-. tials ; (2) the stan¬ dard mark; (3) the

1716 to 1736 -

Roman, capitals.

1736 to 1756 —

Roman, small.

1756 to 1776 —

Black letter capitals.

1776 to 1796 —

Roman, small.

1796 to 1816-

Roman, capitals.

1816 to 1836

Roman, small.

1836 to 1856 —

Black letter, capitals.

1856 to 1876—

Black letter, small. [IjJ

1876 to 1896— PjTVi

Roman, capitals.

1896 to 1916 —

Roman, small.

matter of legal regulation. In England, Scot¬

land and Ireland the marks are five in number — (1) The maker's mark or initials. (2) The

assay mark. In the case of gold this is a

hall mark of Birmingham; (4) the duty mark;

(5) the date letter for the year 1889.

HALL OF ODIN, a tradition among the

Scandinavian peoples, which tells of the rocks

from which the Berserkers, when tired of life, flung themselves into the sea; so named be¬

cause they were regarded as the portals of the Scandinavian Valhalla.

HALLAM, hal'am, Arthur Henry, English

essayist: b. London, 1 Feb. 1811; d. Vienna, 15

Sept. 1833. He was a son of Henry Hallam

(q.v.), and was graduated in 1832 from Trinity College, Cambridge, entered the Inner Temple

and later the office of a conveyancer of Lin¬

coln's Inn ; and died suddenly during a visit to the Continent. At Cambridge he met Alfred

Tennyson, whose (In Memoriam,* through

which he is best known, employs his sudden

and untimely death as a basis for the exposition of a poet's philosophy. His (Remains in Prose

and Verse) (1834), largely justify the high

hopes entertained for him, especially in the

critique of Rossetti's (Disquisizione sullo spirito anti-papaleC and the essay on Cicero. A

most affecting (Memoir > was printed by

his father for private circulation ; but

Tennyson's (In MemorianP is his enduring

monument.

HALLAM, Henry, English historian : b.

Windsor, 9 July 1777; d. Penshurst, Kent, 21

Jan. 1859. He was educated at Oxford, and in

1818 made his appearance as an author by his

(View of the State of Europe during the Middle Ages,* which at once established his reputation and is acknowledged as a standard work. His

next work, the Constitutional History of Eng¬

land* (1827), is justly regarded as a model at once of laborious research and scrupulous im¬

partiality — an impartiality so scrupulous that

his readers are perplexed to discover to which side his judgment inclines. His (Introduction

to the Literature of Europe) (1837-39), if it

could not add to his reputation, certainly did not detract from it. His eldest son, Arthur

Henry (q.v.), died in early manhood.

HALLBERG-BROICH, Theodor Maria

Hubert, Reich sfreiherr von, German military

officer and author: b. Jiilich, 1768; d. 1862.

He entered the army of the Elector of Ba¬

varia ; traveled extensively in Europe and west¬

ern Asia, penetrating as far as Persia and

after the conquest of Germany became so ob¬

noxious to the French that he was imprisoned

for eight months in Paris. After his release

he set about recruiting an army in the Rhine—

Maas district and on 6 Jan 1814 crossed the

Rhine at Coblenz at the head of an army of

30,000. His works include (Reise durch Skan—

dinavien) (1818) ; (Reise durch Italien) (1830) ; (Frankreich und Algier) (1837) ; (Reise nach

dem Orient) (2 vols, 1839) ; (Reise durch England) (1841) ; (Deutschland, Russland, Kau—

kasus, Persien5 (2 vols, 1844) He frequently

employed the pseudonym of Eremit von .Gaut—

ing. Consult Gif tel, <Leben des preussischen

Generals Freiherrn von Hallberg-Broich) (Ber¬

lin 1863)

HALL hal-la, Sir Charles, Anglo-Ger¬

man pianist: b. Hagen, Westphalia, 11 April

1819; d. Manchester, England, 25 Oct. 1895. He studied first at Darmstadt, and afterward at

Paris, where his reputation was established by

his concerts of classical music. But the Revo¬

lution of 1848 sent him to England, and he made his home in Manchester. There he established

in 1857 a series of subscription orchestral con¬

certs which did much to raise the popular stand¬

ard of musical taste by familiarizing the British public with the great masters of classical music.

The orchestra which he conducted some 40

years was the most finely trained body of

musicians in the United Kingdom. He was

knighted in 1888, and married the same year

the famous violinist, Madame Norman-Neruda.

‘ hall£, Lady Wilhelmine Neruda, violin

virtuosa: b. Briinn, Austria, 21 March 1840;

d. 15 April 1911. The daughter of a cathe¬

dral organist, she was trained by her

father and the violin teacher Jansa, making her first appearance in Vienna in 1846 as an ((infant prodigy.® In 1848 she played in London and

subsequently spent several years in France, Ger¬

many and Russia. She married a Swedish

musician named Norman in 1864, and adopted

the name of Madame Norman-Neruda. She

spent most of her time in England, playing

mainly at the recitals of Sir Charles Halle,

whom she married in 1888.

HALLˆ, hal'le, or HALLE AN DER

SAALE, an-der-za'le, Germany, a town and

important railway junction of six lines, in

Prussian Saxony, about 20 miles northwest of

Leipzig, on the river Saale and a cluster of

small islands. It consists of the mediaeval town with narrow, crooked streets and ancient dwell¬

ings, separated by boulevards on the site of the old ramparts, form extensive and handsome

suburbs. Among notable public buildings are

the restored mediaeval Rathaus ; the <(Red

Tower® in the market place, a 15th century

clock-tower; the decaying Moritzburg, formerly

a citadel and archiepiscopal residence; the mod¬

ern Gothic Ratskeller; the extensive buildings

of the university (q.v.) ; a deaf and dumb asy¬

lum ; a lunatic asylum ; the 12th century Moritz-kirche with fine wood carvings ; the 16th cen¬

tury Protestant cathedral ; and the 16th century Gothic Church of the Virgin, with four towers

and noted for its handsome interior. In the

suburb of Glaucha the Waisenhaus, (<orphan

house,® institution founded by the Reverend

Francke about 1693 forms a small town in itself.

Besides the orphan asylum it includes different grade schools, attended by between 3,000 and

4,000 pupils ; a printing and publishing estab¬

lishment; and a laboratory where medicines are

prepared and sold. The trade and manufac¬

tures of Halle are extensive. The latter include starch, beet-root sugar, chemicals, oil, machin¬

ery, printing and publishing, besides the cele¬

brated ancient salt works. The salt workers

form a distinctive colony with special exemp¬

tions and privileges and are known as ((Hal—

loren.® The chief public utilities are munici¬

pally owned. Halle is mentioned as Halla as

early as 806; in the 12th century it had de¬

veloped considerable trade, and in the next two centuries was an important member of the

Hanseatic League. In 1806 it was taken by the French; in 1813 it was annexed to Prussia.

Pop. 180,834, mainly Evangelicals, Roman

Catholics numbering nearly 9,000.

HALLE, University of, Germany, a cele¬

brated institution founded in 1694 by King Fred¬

erick I in the interests of the jurist Thomasius, when he was followed to Halle by several

students after his retirement from Leipzig

owing to the envy of his fellow professors. It attained a high degree of prosperity, but owing to its strong Prussian proclivities was sup¬

pressed by Napoleon in 1806 and in 1813. It was re-established in 1815 and in 1817 was united

with the University of Wittenberg. Its build¬

ings, which are very extensive, especially those accommodating the medical faculty, date from

1832. There are faculties of theology, law,

medicine and philosophy. From its foundation

Halle was recognized as one of the principal

schools of Protestant theology, and has num¬

bered among its professors some of the most

eminent names of Germany. Connected with

the university is an ever-increasing library of over 270,000 volumes and MSS. ; a medical and

surgical clinical institute ; a maternity hospital ; an observatory; a theological and normal sem¬

inary; and a botanical garden; especial atten¬

tion is devoted to agriculture. In 1913-14 the university had nearly 3,000 students.

HALLECK, hal'ek, Fitz-Greene, American

poet: b. Guilford, Conn., 8 July 1790; d. there, 19 Nov. 1867. At 18 he became a clerk in a

New York bank, in which employment he re¬

mained for 20 years. For a long period after

this he was the confidential agent of John

Jacob Astor, and was named by him one of the original trustees of the

Astor Library. In 1849

he retired to his native town. He wrote verses in his boyhood, but these early effusions were excluded from the collected editions of his

poems. In 1819 he assisted Joseph Rodman

Drake (q.v.) in the humorous series of

‘Croaker* papers, contributed to the New York

Evening Post. Drake’s death in the succeeding

year was commemorated by Halleck in a most

touching poem. In 1819 was published Halleck’s longest poem, < Fanny, > a satire, in the measure of Byron’s (Don Juan,* on the fash¬

ions, follies and public characters of the day.

From the variety and pungency of the local and personal allusions it enjoyed a great but fleeting popularity. In 1827 he published an edition of his poems in one volume, two of the best in

the collection, (Alnwick Castle* and <Burns,)

having been suggested by scenes and incidents

of foreign travel. This edition also included

the spirited lyric, (Marco Bozzaris,* by which he will probably be longest kept in mind. Con-HALLECK

suit Wilson, (Life and Letters of Fitz-Greene

Halleck) (1869).

HALLECK, Henry Wager, American sol¬

dier : b. Westernville, N. Y., 16 Jan. 1815; d.

Louisville, Ky., 9 Jan. 1872. He was graduated at the United States Military Academy in 1839; was assistant professor of engineering at West

Point; was assistant to the Board of Engineers at Washington 184CM1, and in 1841-46 assist¬

ant engineer in the repair of the New York

harbor fortifications. In the Mexican War he

was on the Pacific Coast, and in 1847-49 was

secretary of state for California under the mili¬

tary governments of Generals Mason and Riley.

In 1849 he was a member of the California

Constitutional Convention and of the committee

which drafted the constitution of that State.

After service as inspector and engineer of

lighthouses (1852-54) and as engineer of the

board for fortifications on the Pacific Coast

(1853-54), he resigned from the service in 1854, and practised law in San Francisco. In 1855

he was president of the Pacific and Atlantic

Railroad and in 1856-61 director-general of the Almaden quicksilver mines. On the outbreak of

the Civil War he re-entered the army, and in

November 1861, was appointed commander of

the Department of the Missouri, then in a state of thorough disorganization. Lie quickly re¬

duced the department to order, outlined the

Western campaign of 1862, directed this cam¬

paign in person from 11 April, and took Corinth, with its 15 miles of entrenchments, on 30 May.

In July he became general-in-chief of the armies of the United States; and henceforth directed

from Washington the movements of the generals

in the field, till, in March 1864, he was superseded by General Grant. Halleck was chief of staff

till 1865, commanded the military division of

the James in 1865, that of the Pacific, 1865-69, and that of the South from 1869 until his death.

He wrote a work on (The Elements of Mili¬

tary Art and Science1* (1846), largely used as a manual in the Civil War; bitumen* (1841);

(A Collection of Mining Laws of Spain and

Mexico* (1859) ; (International Law, or Rules

Regulating the Intercourse of States in Peace

and War* (1861; abgd. ed., 1886) and other

volumes.

HALLECK, Reuben Post, American edu¬

cator: b. Rocky Point, L. I., 8 Feb. 1859. He was graduated from Yale in 1881, was instructor in the Male High School, Louisville, Ky., 1883-96, and principal from the latter date. He has published Psychology and Psychic Culture*

(1895) ; (The Education of the Central Nervous System* (1896); (History of English Litera¬

ture* (1900) ; History of American Literature*

(1911); (New English Literature* (1913); and

(with Barbour) (Readings from Literature*

(1915).

HALLELUJAH, hal-e-loo'ya, HALLE—

LUIA, or ALLELUIA (Hebrew), Praise

ye the Lord** ; an expression which occurs often in the Psalms, and which was retained when the Bible was translated into the various languages, probably on account of its full and fine sound, which, together with its simple and solemn

meaning, so proper for public religious services, has rendered it a favorite of musical com¬

posers. The Roman Catholic Church does not

allow it to be sung on the Sundays during Lent, on account of the mournful solemnity of the

season; in that communion it is not sung again before Easter. It is no longer sung in masses for the dead as formerly. In the time of Augus¬

tine the African Church used this doxology only from Easter to the feast of Pentecost. The

Greeks made an earlier or more common use

of the Hallelujah than the Latin Church. The

Jews call the Psalms cxiii-cxvii, the Great

Hallelujah, because they celebrate the particular mercies of God toward the Jews, and they are

sung on the feast of the Passover, and on the feast of Tabernacles.

HALLER, Albrecht von, al'breHt fon

hal'ler, Swiss anatomist, botanist and poet : b.

Bern, 16 Oct. 1708; d. there, 17 Dec. 1777. Hav¬

ing chosen the medical profession, he went to

the University of Tubingen, where he studied

comparative anatomy under Duvernoy; and in

1725 removed to Leyden, then the first medical school in Europe. After extensive travels in

England and France, he went to Basel in 1728

to study mathematics under Bernoulli. Here

he first imbibed a taste for botany and composed his poem Pie Alpen,* followed by various ethi¬

cal epistles and other pieces, which gave him a reputation in Germany. In 1729 he returned to

his native city, became in 1736 professor of

anatomy, surgery and botany, in the newly—

founded University of Gottingen, and through

his influence the university was enriched with a botanical garden, an anatomical theatre, a school for midwifery and a college of surgery. In

1747 appeared the first edition of his (Primse Lineae Physiologiae,* which was long used as a textbook in schools of medicine. In 1752 he

first advanced his opinions on the properties

of sensibility and irritability as existing in the nervous and muscular fibres of animal bodies

— doctrines which attracted much attention,

and excited great controversies in the medical

world. Disagreements with his colleagues in¬

duced him to return, in 1753, to Bern where

he was elected a member of the sovereign coun¬

cil, and soon obtained by lot one of its magis¬

tracies. In 1758 he became director of the public salt-works at Bex and Aigle, and in the course of his superintendence introduced many im¬

provements in the manufacture of salt. His

later published works include (Elementa Phy¬

siologiae Corporis Humani* (1757-66) ; (Bibli¬

otheca Botanica* (1771); (Bibliotheca Anatomica* (1774) ; (Bibliotheca Chirurgica* (1774);

(Bibliotheca Medicinae Practicae* (1776-88).

Haller is considered one of the greatest Ger¬

man poets of the 18th century. His philo¬

sophical and descriptive poems display depth of thought and richness of imagination. His

(Elegiac Poems* (Die elegischen Gedichte) are

still frequently republished in Germany. He

wrote in prose three philosophico-political

romances — (Usong,* (Alfred the Great,* and

(Fabius and Cato* — designed to exhibit the

respective advantages of different forms of

government. Consult the (Life* by Frey

(1879).

HALLETT, Benjamin Franklin, American

statesman: b. Barnstable, Mass., 2 Dec. 1797 ;

d. Boston, 30 Sept. 1862. Graduated from Brown University in 1816, he studied law, was admitted to the bar, and was connected with the Providence (R. I.) press, but later went to Boston, and there became editor of the Boston Advocate , the official mouthpiece of the Anti-

Masonic party. From 1827 to 1831 he edited the Boston Daily Advertiser, which he made extremely unpopular through his vigorous enun¬ ciation of his views on Masonry, temperance and emancipation. He afterward became a Democrat and an influential factor in his party. For years he was chairman of its national com¬ mittee, and it was he who drafted the Cincin¬ nati platform of 1856. President Pierce, whose nomination he had helped to secure, appointed him United States district attorney in 1853.

HALLETTSVILLE, Tex., city, county-seat of Lavaca County, on the Lavaca River

and San Antonio and Aransas Pass Railroad,

about 100 miles southwest of Houston. It is in an agricultural and stock-raising region, and

special attention is given to cotton and cattle.

It has a cottonseed-oil mill and a number of cot¬

ton-gins. Large shipments are made each year

of livestock, cotton and cottonseed oil. Elec¬

tricity and water plants are municipally owned.

Pop. (1920) 1,444.

HALLEY, hal'i, Edmund, English mathe¬

matician and astronomer : b. Haggerston, near

London, 8 Nov. 1656; d. Greenwich, 14 Jan.

1742. He was educated at Queen's College,

Oxford. Before he was 19 he published (A

Direct and Geometrical Method of Finding the

Aphelia and Eccentricity of Planets,5 which

supplied a defect in the Keplerian theory of

planetary motion. By some observations on a

spot which appeared on the sun's disc in July and August 1676, he established the certainty

of the motion of the sun round its own axis.

On 21 August, the same year, he fixed the longi¬

tude of the Cape of Good Hope by his observa¬

tion of the occultation of Mars by the moon.

In 1679 he published (Catalogus Stellarum Aus—

tralium,5 and in 1683 his (Theory of the Varia¬

tion of the Magnetical Compass,) in which he

endeavors to account for that phenomenon by

the supposition of the whole globe of the earth being one great magnet, having four circulating magnetical poles or points of attraction. For

the purpose of making further observations rel¬

ative to the variation of the compass he set

sail on a voyage in 1699, and having traversed both hemispheres arrived in England in Sep¬

tember 1700. The spot at Saint Helena where

he erected a tent for making astronomical ob¬

servations is still called Halley's Mount. As

the result of his researches he published a

general chart, showing at one view the variation of the compass in all those seas with which

English navigators were acquainted. He was

next employed to observe the course of the

tides in the English Channel, with the longi¬

tudes and latitudes of the principal headlands, in consequence of which he published a large

map of the Channel. In 1703 he was elected

Savilian professor of geometry at Oxford, and

in 1721 he received the appointment of astron¬

omer-royal at Greenwich, where he afterward

resided, devoting his time to completing the

theory of the motion of the moon. In the

same year he began his observations, and for

the space of 18 years scarcely ever missed

taking a meridian view of the moon when the

weather was not unfavorable. In 1752 ap¬

peared his (Astronomical Tables) ; and he was the author of a great number of papers in the Philosophical Transactions.5 For the comet

called by his name, see Comet.

HALLIWELL-PHILLIPPS, hal'i-welf trips, James Orchard, English antiquary and

Shakespearean scholar : b. Chelsea, London, 21

June 1820; d. Hollingbury Copse, near Brighton, 3 Jan. 1889. He was educated at Cambridge.

In 1839 he was elected Fellow of the Royal and Antiquarian societies. Gradually he came to

concentrate his studies on Shakespeare alone,

and more particularly on the facts of the poet's life, discrediting the internal evidence of the plays and sonnets, and devoting his attention to a minute and patient study of local tradition

and the records of 32 towns besides Stratford.

The successive editions of his (Outlines of the Life of Shakespeare) (1848 ; 8th ed., 1889) re¬

corded the growing results of his discoveries.

Apart from Shakespeare, his (Nursery Rhymes

and Nursery Tales of England) (1845), and

(Dictionary of Archaic and Provincial Words5

(1847; 6th ed., 1868) will keep his name from being forgotten. His magnificent folio edition

of the (Works of Shakespeare,5 probably the

richest storehouse extant of Shakespearean crit¬

icism (1853-65), was published at a price pro¬

hibitive to most students. To the Smithsonian

Institution he gave (1852) a collection of ac¬

counts, inventories and bills illustrative of the history of prices current in the years 1650-1750.

His principal Shakespearean collections went to

the United States.

HALLOCK, Charles, American journalist

b. New York, 13 March 1834; d. 2 Dec. 1917.

He was graduated from Amherst in 1854, was

editor of the New Haven Register in 1855-56, of the New York Journal of Commerce in 1856-61, of the Saint John (N. B.) Telegraph and

Courier in 1863-65. In 1873 he founded Forest

and Stream and in 1896-97 was editor of the

Northwestern Field and Stream. In 1874 he

founded the International Society for the Pro¬

tection of Game and in 1875 formulated uni¬

form game laws. He founded the town of

Hallock, Minn., in 1880. He has done field¬

work and collecting for the Smithsonian Institu¬

tion since 1860, and published numerous works,

such as (The Fishing Tourist5 (1873) ; (Camp

Life in Florida) (1876) ; (Vacation Rambles in Michigan5 (1877) ; (Dog Fanciers' Directory5

(1886); (Our New Alaska5 (1886); (The

Salmon Fisher5 (1890) ; (Luminous Bodies Here

and Hereafter5 (1906) ; (Hallock Ancestry5

(1906); (Peerless Alaska5 (1908), and many

pamphlets, monographs and articles on natural

history, sport and other subjects. He was a

son of Gerard Hallock (q.v.).

HALLOCK, Gerard, American journalist;

b. Pittsfield, Mass., 18 March 1800; d. New

Haven, Conn., 4 Jan. 1866. He was graduated

from Williams College in 1819, in 1824 founded the Boston Telegraph (united with the Re¬

corder in 1825), in 1827 purchased a part in¬

terest in the New York Observer, and in 1828

became associated with David Hale on the

Journal of Commerce. A leader in journalis¬

tic enterprise, he started (1833) a pony-express between Philadelphia and New York, and oper¬

ated the Evening Edition, a schooner which met incoming ships at Sandy Hook and brought

foreign news. A pro-slavery man, he was a

founder of the Southern Aid Society (1854), intended to succeed the American Home Mis¬ sionary Society when the latter refused sup¬ port to slaveholding congregations. In 1861

the Journal of Commerce was forbidden the use of the United States mails, and Hallock thereupon sold his interest, and never after¬ ward wrote for the press. He was a founder of the Associated Press.

HALLOWE'EN, hal -c > -en', or HAL¬ LOW-EVEN, the evening of 31 October, so called as being the eve or vigil of All Hallows, or festival of All Saints, which falls on 1 No¬ vember. It is associated in the popular imagi¬ nation with the prevalence of supernatural in¬ fluences, and is clearly a relic of pagan times. In the north of England, hallowe'en is known as Nutcrack Night. In Scotland the ceremo¬ nies of the eve were formerly regarded in a

highly superstitious light, and Burns' Hal¬

lowe'en } gives a humorous and richly imagi¬

native presentment of the usual ceremonies as

practised in Scottish rural districts in his day.

The principal object of curiosity in consulting the future was to discover who should be the

partner in life. Popular belief ascribed to chil¬

dren born on hallowe'en the faculty of perceiv¬

ing and holding converse with supernatural

beings.

HALLOWELL, Richard Price, American

author and wool merchant : b. Philadelphia, 16

Dec. 1835; d. Medford, Mass., 5 Jan. 1904. He was prominent in the abolition movement, was

appointed by Governor Andrew of Massachu¬

setts special agent to recruit negro regiments, and subsequently was vice-president of the

New England Woman Suffrage Association.

He published (The Quaker Invasion of Massachusetts) (1883), *etc.*

HALLOWELL, Me., city in Kennebec

County, on the Kennebec River, and on the

Maine Central Railroad, two miles south of

Augusta and four miles north of Gardiner.

The first permanent settlement was made in

1754. It was incorporated as a township in

1771, and chartered as a city 29 Aug. 1850.

At the time of its becoming a chartered city it included within its limits Chelsea, Manchester

and Farmingdale. The city is governed by a

mayor and a council of seven members elected

annually. The waterworks are operated by

the city. The industries of the city include

granite works, shoe manufactories, glue works,

cotton goods, machinery, *etc.* The Hubbard

Free Library and the Maine State Industrial

School for Girls are public institutions. Pop.

3,000.

HALLOYSITE. A clay-like aluminum

silicate resembling kalonite but amorphous and

containing larger but variable proportions of

water. Probable composition, ALChSiOˆHaO.

Mostly white but some is brown or pink. It is a source of aluminum and used for manufac¬

ture of pottery. It is mined at Sulphur Springs, Dekalb County, Ala., and occurs at Steven¬

son and near Celera in that State. Also in

California and is mined near Mono Lake. Has

been mined at various places in Georgia, not¬

ably in Dade County. See Clay.

HALLSTATT EPOCH, a name taken

from the necropolis of Hallstatt, Upper Aus¬

tria, not far from Salzburg, and applied to that culture in Europe — parts of Germany, France,

Italy and in Switzerland, Bohemia, *etc.* — dis¬

tinguished as the last bronze and first iron

stage, dating back at least as far as 1000 B.c.

According to some ethnologists in the eastern

highlands of the Alps this culture Was of a

higher evolution than that of a partially Orien¬

tal cast in the west during the Neolithic epoch.

HALLSTROM, Ivar, e'var hel'strem,

Swedish composer: b. Stockholm, 5 June 1826;

d. there, 11 April 1901. He studied law at

Upsala, then turned his attention to music, in 1861-72 was director of the institute founded

by Lindblad, and from 1881 instructor to the

Royal Opera. His works include the operas

Hen Bergagna > ((The Mountain King,*

1874) ; and <Neaga) (libretto by Carmen Sylva, 1885) ; cantatas, numerous songs, and an

UdyP for orchestra, chorus and solo voices,

for which he received (1860) a prize from the Stockholm Musical

Union.

HALLSTROM, Per, Swedish short-story

writer: b. Stockholm, 29 Sept. 1866. Pursued

courses at the Higher Technical School in his

native city (1883-87), and spent three years in America (1887-90), where he seems to have

come in contact chiefly with the poorer classes, with whom a number of the short stories writ¬

ten after his return to Sweden deal. He held a position in the Stockholm post office from 1890

to 1897, but has been devoting his time since then to travel and to writing. He published

his (Lyrics and Phantasies> in 1891 ; then two volumes of short stories, (Vilsna Faglar)

((Birds Astray, > 1894), from which are

taken two stories that have been translated

into English ((Doctor Braun,) The Neiv Re¬

view, New York, November 1913, and (Sym¬

posium,) in The American-Scandinavian Re¬

view, New York, November 1913) and (Pur—

pur} QPurpleP 1895); (Resboken) ((A Book

of TraveP 1898) ; (Thanatos) (1900). He is

also the author of a rather delicate comedy of modern social life, HrotikonP His work is

all of it smooth and elegant, pessimistic, but artistic in the extreme. In addition to the

two short stories mentioned only two others

may be found in English, in the files of the New York Call for 1914: (From Out of the

Dark) and (A Letter to My Uncle. }

Jacob Wittmer Hartmann.

HALLUCINATIONS, are morbid condi¬

tions of mind in which the patient is conscious of a perception without any impression having

been made on the external organs of sense.

Hallucinations are to be distinguished from de¬

lusions, for in these there are real sensations, though they are erroneously interpreted. All

the senses are not equally subject to hallucina¬

tions; the most frequent are those of hearing; next, according to many, come those of sight,

smell, touch and taste; and hallucinations of

several senses may exist simultaneously in the

same individual. They may also be complicated

with certain delusions. Often even the hallu¬

cination of one sense is confirmed by the de¬

lusion of another, so that it is neither possible nor necessary always to distinguish hallucina¬

tions from delusions. The simplest form of

hallucinations of hearing is the tingling of the ears ; but the striking of clocks, the sounds of musical instruments and of the human voice are often heard, and in these instances, as in those of the perturbations of

the other senses, there must be a diseased sensorium, though there should be no structural derangement of the nerves. Hallucinations are not confined to those whose mental faculties have been alien¬ ated, but occasionally assail and torment even

the sane. The second Earl Grey was haunted by a gory head, but he could dismiss it at will. Swedenborg had a similar faculty ; and Bernadotte, king of Sweden, was besieged in his rides by a woman in a red cloak, being perfectly conscious of the hallucination under which he labored. Lord Brougham proposed that the existence of hallucinations should be established as an authoritative test for the existence of in¬ sanity; but, as will have been seen, this would be no test at all. The proportion of the hallu¬ cinations of the various senses has been by some tabulated thus: — hearing, 49; vision, 48; taste, 8; touch, 3; smell, 1. All are more fre¬ quent in mania than in monomania, and in mania errors of vision are more numerous than

those of hearing. There is a growing convic¬ tion that many socalled hallucinations and de¬ lusions are not really such, but due to an ab¬ normal ability of the sufferer to sense vibra¬ tions far above the normal. The study of clair¬ voyance and clairaudience indicates that a considerable number of individuals do sense things above the mass of mankind. A study of theosophy and the theory of the astral plane is very interesting in this connection. Consult Parish, hallucinations and Ulusions) (1901) ; Podmore, (Studies in Psychological Research (1897). See Apparitions ; Dreams ; Ghosts ; Insanity.

HALLUX VALGUS, a deformity of the great toe consisting of a turning of the toe toward its neighbor, with a marked enlarge¬ ment of the head of the bone. The synovial sac on the inner side of the toe is often chronically inflamed from constant pressure, forming a bunion. Advanced cases may require the ex¬ cision of the bony outgrowths, but early cases may be relieved by a properly adjusted shoe.

HALMAHERA, hal-ma-ha'ra. See Gi-

LOLO.

HALM, Friedrich, pseudonym for Eligius

Franz Joseph Freiherr von Mimch-Belling—

hausen (q.v.), Austrian dramatist and short-story writer.

HALO, a luminous circle, the result of light

refracted from minute bodies, which is seen

under various conditions, the most common

being colored circles around the sun and moon.

They are subject to variation in form, double

and triple circles being seen, concentric or

superposed in a pattern, and sometimes accom¬

panied by arcs and spokelike radii. The corona, sun-dog, mock-moon, parhelion, etc., are of

this character. The typical solar or lunar halo is reddish in the inner edge, and violet on the outer circumference, but when there is a double halo this coloring is reversed in the larger one, exhibiting diffraction. Sun and moon halos

are mainly attributed to minute ice-crystals in the earth's atmosphere, but may be due to

other interference with light. A thorough

study of the diffraction of light is essential to a full understanding of the phenomena. Halos

are seen at fixed distances from the sun, 22

and 46 degrees, respectively, while corona are at variable distances. See Light; Corona; Par¬

helion ; Sun.

The halo of art, also called nimbus, is a

disc or approximately circular display of light around the head in a painting, usually of the Christ, the Virgin Mary or a saint. Occasion¬

ally it takes the form of light rays extending from the head. Again at times it encircles an entire figure, usually in an ellipse, and is then commonly called aureole, a more appropriate

name, as it is undoubtedly an effort to ex¬

press the aura of the subject of the picture, such aura being assumed to be luminous in one of saintly character. (See Aureola). The halo

was early adopted by painters of sacred sub¬

jects, and adorns the paintings of a vast number of figures in cathedral windows. Consult Cher-rill, (The Theory of Halos and Parheliaˆ ;

United States Weather Bureau Bull. 12 (1895) ; Monthly Weather Review (Washington, D. C.).

HALOGEN, hal'oˆjen, in chemistry, an ele¬

ment, or inorganic radical, which unites directly with a metal to produce electrorogative saline

compounds. The term is usually confined to the elements flourine, chlorine, bromine and iodine, and the compound known as cyanogen. Their

hydrides are colorless, fuming gases, easily

soluble in water, with a strong acid reaction.

HALOPHYTES, hal'6-fits, plants which

thrive in salt marshes in soil rich in salt, alum, *etc.* When burned these yield barilla or soda-ash, as Salsola (saltwort), Salicornia and

Chenopodium. See Beach-plants and Desert

Plants.

HALPINE, Charles Graham, American

soldier and author : b. Oldcastle, County Meath, Ireland, 20 Nov. 1829; d. New York, 3 Aug.

1868. After study at Trinity College, Dublin,

he came to Boston, Mass., in 1851, was there

assistant editor of the Post, and with B. P.

Shillaber began the Carpet Bag, an un¬

successful humorous periodical. Later Wash¬

ington correspondent of the New York Times,

he then went to New York, where he was con¬

nected with the Herald, and wrote much

matter for magazines. Upon the outbreak of

the Civil War he enlisted in the 69th New

York Volunteer Infantry, and was afterward

on the staff of General Hunter as assistant

adjutant-general, of General Halleck with the

rank of colonel. In 1864 he resigned from the service and was brevetted brigadier-general of

volunteers. He was best known for his bur¬

lesque verses, written in the character of an

Irish private, ((Miles O'Reilly,® over which

pseudonym they appeared. (Life and Adven¬

tures, Songs, Services and Speeches > was pub¬

lished in 1864, and his complete (Poetical

Works > in 1869.

HALS, hals, Frans, Dutch painter, the

founder of the Dutch genre school : b. Antwerp, about 1584; d. Haarlem, 7 Sept. 1666. When

young he went to Haarlem, where he studied

painting under Karel van Mander, and he was

one of the civic guard, director of an art school and chief of the painters' guild. His first dated work is a portrait belonging to the year 1613, his next, the (Banquet of the Officers of the Haarlem Corps of Arquebusiers of Saint

George) (1616), one of the earliest pictures be¬

longing to the Dutch school of genre painting, of which Hals is sometimes regarded as the

founder. He executed (The Jolly Trio,*

(Herring Vender* and (Fool Playing a Lute,*

and seems to have found in genre painting a

scope and a possibility of humor much to his

taste. He executed also many single-figure

pieces, as (The Laughing Cavalier,) and (Hille Bobbe) (National Gallery, Berlin; replica in the HALSEY — HAM-BEETLE

Metropolitan Museum), and numerous por¬

traits, all of high value artistically. ((Franz Hals," says James Northcote, R. A., ((was a

great painter; for truth of character, indeed, he was the greatest painter that ever existed. He made no beauties; his portraits are people such as we meet every day in the streets." Adrian

van Ostade, Wouwerman, and Adrian Brouwer

were among his pupils. He is said to have been improvident in his habits, and latterly received a pension from the municipality of Haarlem.

His brother Dirk, d. Haarlem, May 1656, and

his son, Frans Hals, the Younger, b. about

1620; d. about 1669, were also excellent painters.

Consult biographies by Davies (1902), Moes

(1909) and Peladan (1912).

HALSEY. Francis Whiting, American au¬

thor : b. Unadilla, N. Y., 15 Oct. 1851; d. New York, 24 Nov. 1919. Fie was graduated at Cor¬

nell University in 1873. He was on the New

York Tribune staff 1875-80, and on the New

\ork Times 1880-1902, edited the Times Satur¬

day Review from its first number 15 Oct. 1896

until 1902. He was literary adviser of D. Ap¬

pleton and Company 1902-05, and of the Funk

and Wagnalls Company after 1905. He lectured

before New York and New Jersey historical

societies and at the Columbia and Princeton uni¬

versities. He published (Two Months Abroad5

(1878) ; (The Old New York Frontier) (1901) ; (Virginia Isabel Forbes,5 memoir of his wife

(1900); (Our Literary Deluge) (1902); (The

Pioneers of Unadilla Village) (1902) ; bio¬

graphical and historical introduction to Mrs.

Rowson's (Charlotte Temple) (1905) ; historical

introduction and foot notes to Richard Smith's

(Tour of Four Great Rivers5 (1906). He is

editor of (American Authors and Their Homes)

(1901) ; (Authors of Our Day in Their Homes) (1902) ; (Women Authors of Our Day in Their

Homes5 (1903); (Of The Making of a Book)

(1904) ; (The World's Famous Orations,5 with

W. J. Bryan (10 vols., 1906) ; (The Best of the World's Classics) (10 vols., 1907) ; (Great

Epochs in American History5 (10 vols., 1912) ; (Seeing Europe with Famous Authors) (10

vols., 1914) ; (Balfour, Viviani and Joffre, Their Speeches in America5 (1917).

HALSTED, George Bruce, American

mathematician: b. Newark, N. J., 25 Nov. 1853.

He was graduated from Princeton in 1875 and

from 1884 to 1903 was professor of mathematics in the University of Texas. He was professor

of mathematics at Kenyon College, Ohio, 1903—

06; and at Colorado State Teachers College

1906-12. He was awarded a fellowship by the

Royal Astronomical Society of London. He

devoted himself to the dissemination of a knowl¬

edge of non-Euclidean geometry and to this

end published translations of Bolyai (1891),

Lobachevsky (1891), Saccheri (1894) and

Poincare (1906, 1913). He wrote on mathe¬

matics, philosophy and formal logic for a num¬

ber of scientific magazines, was a collaborator in preparing (The Century Dictionary and

Cyclopedia,5 and has published (Mensuration5

(1881); (Elements of Geometry5 (1885);

(Elementary Synthetic Geometry5 (1892) ;

(Pure Projective Geometry5 (1895) ; National

Geometry5 (1904) ; (Geometrie rationale5

(Paris 1912) ; (On the Foundation and Technic

of Arithmetic5 (1912); and 90 books and

memoirs cited in (Bibliography of Non-Eucli¬

dean Geometry,5 by D. M. Y. Sommerville

(London 1911).

HALSTEAD, Murat, American journalist:

b. Ross, Butler County, Ohio, 2 Sept. 1829 ; d.

Cincinnati, Ohio, 2 July 1908. At 18 he began writing for newspapers, studied at Farmers'

College, near Cincinnati, and did local news¬

paper reporting on several Cincinnati papers.

In 1853 he became manager of a department

on the Cincinnati Commercial. The follow¬

ing year he acquired a necuniary interest in

the paper, which began rapidly to increase in

circulation and influence. The Commercial

combining with the Gazette, its rival, the Cin¬

cinnati Commercial-Gazette became the recog¬

nized organ of the Ohio Republicans. In 1890

he removed to Brooklyn, N. Y., where he

edited the Standard Union. Later he was a

contributor to magazines and as a special cor¬

respondent went to the Philippines during the

Spanish-American War. He wrote (The

Story of Cuba5 ; (Life of William McKinley5 ;

(The Story of the Philippines5; (History of

American Expansion5 ; (Life of Admiral

Dewey5 ; (The Boer and British War5 ; (The

War Between Russia and Japan5 (1905), *etc.*

HAM, one of the three sons of Noah, from

whom the earth after the Deluge was peopled.

He is first mentioned between the other two —Shem, Ham and Japheth; but afterward is ex¬

pressly designated the younger son of Noah,

that is, relatively to the other two. He had

four sons — Cush, Mizraim, Phut and Canaan.

The three first traveled southward, and from

them chiefly sprang the tribes that peopled the African continent, as Canaan became the father

of the tribes that principally occupied the terri¬

tory of Phoenicia and Palestine. Ham is also

used as a designation of Egypt, probably on

account of its population having sprung from

a son of Ham, and the name Ammon, by which

the chief god of the northern Africans was

often called and worshipped, may very likely

derive its origin from the same source.

HAM, the joint which unites the thigh and

the leg of an animal, but more generally under¬

stood to mean the cured thigh of the hog.

Ham-curing is now an important branch of

business, especially in Great Britain and Amer¬

ica, and the details of the process are generally the same everywhere. The meat is first well

rubbed with salt, and a few days after it is rubbed again with a mixture of salt, saltpetre and sugar, though sometimes the saltpetre is omitted. After lying in the tub for 8 or 10 days it is ready for drying. Wet-salting re¬ quires three weeks and dry-salting four. The smoking of hams is carried on in smokehouses, the meat being hung as high as possible and subjected to the smoke of a fire kindled on the ground-flat, and which ascends through holes in the flooring. The process of smoking is for the most part carried on in winter, the fire being kept in a smouldering state for five or six weeks. Wood is used in preference to coal in the process of smoking. See Pork.

HAM-BEETLE, or PAPER-WORM, a small clerid beetle (Necrobia rufipes), some¬ times a pest of considerable importance be¬ cause of the occurrence of its larvae or ((worms," the paper-like cocoons and beetles on hams in such numbers as to render them un¬ merchantable. Its injuries are generally con-

fined to the exterior and are due to carelessness in packing and to the cracking of the ham

coverings. This is one of three cosmopolitan

species of the same genus, all of which are

carnivorous scavengers.

HAM-FLY, a name of the cheese-fly (q.v.),

due to the occasional appearance of its maggots or ˆskippers” in the fatty exterior portions of preserved hams.

HAMA, ha’ma, or HAMAH, Syria, the

Biblical Hamatit, a very ancient city, on the

El-Asi (Orontes), 110 miles northeast of Da¬

mascus. It is surrounded by gardens and has

narrow, crooked streets, with houses built of

timber and sun-dried bricks. There are manu¬

factures of yarn and coarse woolens, and a

general domestic caravan trade. Hamath is

frequently mentioned in Old Testament history

as in conflict with the Assyrians ; first as early as 854 b.c. After the Graeco-Macedonian con¬

quest it became known as Epiphania. In 639

it was captured by the Moslems. Abdulfeda,

the Arabian geographer, was Prince of Hama

from 1310-31. In 1812 Burckhardt here discov¬

ered the four Hittite stones, the inscriptions of which are still undeciphered. Pop. 45,000.

HAMADRYAD, ham'a-drl-ad. (1) A

baboon. (2) The king-cobra (Naja bungarus) ,

one of the Oriental cobras, found from south¬

ern India to China and the Philippines, and

closely allied in structure, markings and habits to the cobra di capello, but much larger,

reaching the length sometimes of 13 feet, mak¬

ing it the longest of venomous serpents. It is also the most fierce in disposition, but fortu¬

nately is nowhere common and feeds wholly on

other snakes. Consult Fayrer, (Thanatophidia

of India > (1874).

HAMADRYADS, in Greek mythology, the

eight daughters of Hamadryas. They received

their names from trees and are the same as

the Dryads (q.v.). They were conceived to

inhabit each a particular tree, with which they were born and with which they perished.

HAMAMELIS. See Witch Hazel.

HAMAN, ha'man, a minister of the Persian

king Ahasuerus. Because Mordecai the Jew

refused to pay him homage, he resolved on

the destruction of all the Jews in the Persian monarchy. By falsehood and intrigue he suc¬

ceeded in obtaining a decree for this purpose; but Esther, the Jewish consort of Ahasuerus,

interposed for their deliverance and Haman

was hanged on the very gibbet he had caused

to be prepared for Mordecai. His history is

given in the book of Esther.

HAMATH, ha'math. See Hama.

HAMBLIN, Joseph Eldridge, American

soldier: b. Yarmouth, Mass., 1828; d. New

York, 3 July 1870. Not long after the com¬

mencement of the Civil War he became adjutant

of the 5th New York, later was transferred to the 65th, whose commander he soon became,

and with which he part'cipated in Sheridan's

victorious movements in the Shenandoah. For

services at Cedar Creek he was brevetted

brigadier-general and was mustered out in 1866

with full rank of brigadier and brevet of

major-general. Subsequently he was active in

the affairs of the New York State National

Guard.

HAMBURG

HAMBLIN, Thomas Sowerby, American

actor : b. Pentonville, near London, England,

14 May 1800; d. New York, 8 Jan. 1853. He

was early a member of the corps of the Sad¬

ler's Wells and Drury Lane theatres, was a

tragedian at Bath, Brighton and Dublin, came

to the United States in 1825, appeared at the Park Theatre, New York, and acted in leading

American cities. He was manager of several

New York theatres, and among his roles were

those of Macbeth, Hamlet, Othello, Rolla,

Pierre, Virginius and Coriolanus. He was es¬

teemed second only to Forrest and the elder

Booth, and made the standard drama a feature

of his management, under which the Bowery

Theatre saw its historic days.

HAMBURG, ham'berg (Ger. ham'boorg),

Germany, one of the constituent states of the

empire, officially named Freie und Hanse—

Stadt Hamburg. Its area is 157.18 square miles, of which 30 square miles are comprised in the city of Hamburg. The greater portion lies on

the lower Elbe between Schleswig-Holstein on

the north and Hanover on the south. It is

divided into five parts — the metropolitan dis¬

trict and four demains, viz., the Geestlande,

Bergedorf, Marschlande and Ritzebiittel, with

Cuxhaven. It includes also several islands in

the Elbe, Moorburg (within Hanover) and

other small enclaves within Hanover, and the

island of Neuwerk in the North Sea. Under

its constitution the state of Hamburg is a re¬

public. The present constitution came into

force in 1861 ; revised, 1879, 1906 and 1920. The government is entrusted, in common, to two

chambers of representatives, the Senate and

the Burgerschaft, or House of Burgesses. The

Senate, which exercises chiefly, but not entirely, the executive power, is composed of 18 mem¬

bers, onehalf of whom must have studied law

or finance, while seven of the remainder must

be merchants. The members of the Senate are

elected for life by the House of Burgesses;

but a senator may retire at the end of six

years. A first and second burgomaster, chosen

annually by ballot, preside at the sessions of the Senate. No burgomaster can be in office

longer than two years, and no member of the

Senate may hold any other public office. The

Burgerschaft consists of 160 members, 80 of

whom are elected by ballot by all taxpaying

citizens. Of the remainder, 40 are chosen by

ballot, by the owners of house property, while the other 40 are chosen by ballot by burgesses who are or have been members of the Senate

or of the House of Burgesses or members of

various guilds, corporations or courts of jus¬

tice. All members of the lower house are

chosen for six years, in such a manner that

every three years new elections take place for onehalf the number. In all matters of legis¬

lation, except taxation, the Senate has a veto; and, in case of a constitutional conflict, recourse is had to an assembly of arbitrators, chosen from both houses ; also to the Supreme Court of the empire at Leipzig. The jurisdiction of the

Free Port was restricted on 1 Jan. 1882 to the city and port and in 1888 the whole of the city except the actual port and the warehouses con¬

nected with it was incorporated in the Zollverein. A small area at Cuxhaven is still out¬

side the Zollverein. For 1915 the ordinary

revenue was $41,106,480 and expenditure, $67,-

534,300. For 1918 the budget estimated revenue

is placed at $49,475,510 and expenditure at

$60,451,125. Direct taxes amount to nearly half the whole revenue, and next to that the pro¬

ceeds of domains, quays, railways, *etc.* Expend¬

iture for the debt totaled $16,971,625 in 1918

and for education, $7,017,150 was spent in 1915, but only $3,964,763 in 1917. The public debt

on 1 Jan. 1914 was $210,560,355. The population in 1880 was 453,869 and on 1 Dec. 1910 was

1,014,664. In 1912 the four domains outside

the city had a population of 88,610 and the city 986,804. In 1910 there were 28,675 foreigners;

also there were 930,071 Protestants (91.66

per cent), 51,036 Roman Catholics (5.03 per

cent), 3,942 other Christians (0.39 per cent),

19,472 Jews (1.92 per cent) and 10,143 of other persuasions (1.00 per cent). In 1913 there were 249 public elementary schools with 3,911 teach¬

ers and 122,364 pupils ; 20 higher state schools with 12,155 pupils and 78 private schools with 20,096 pupils. The principal towns of the state outside the city of Hamburg are Bergedorf

(14,907), Cuxhaven (14,888) and Ritzebiittel

(3,140).

The city was founded by Charlemagne, who,

between 808 and 811, built a citadel and a

church on the heights between the Elbe and the east bank of the Alster as a bulwark against

the neighboring pagan Slavs. In 831 it became

an episcopal see. It was frequently devastated

by Danes and Slavs, but in the 12th century

had become an important commercial city, and

in 1241 and 1249 combined with Liibeck and

Bremen in forming the Hanseatic League. It

was declared an imperial city by Maximilian in 1510, but was not formally acknowledged until

1618. During the Thirty Years' War its popu¬

lation and prosperity increased owing to the

immunity of its position, and in the following century extensive commercial relations with

North America were developed. In 1810 it

was incorporated in the French Empire as the

capital of the department of the Mouths of

the Elbe, but was occupied by the Russians in 1813. They were driven out by the French

under Davoust, two months later, and the city

underwent severe financial spoliation at the

hands of the conqueror and extensive depopu¬

lation. In 1815 it became an independent state of the German federation, forming with Liibeck, Bremen and Frankfort, the curia of the free

cities. Its trade and importance have increased ever since. In 1871 it united with the German Empire as a free city-state; but did not join the Zollverein or German Customs Union until

1888. Consult the works referred to under the

city of Llamburg.

HAMBURG, Germany, a free city of

northwestern Germany. The city occupies 30

square miles of the state of Hamburg's total

area of 157.18 square miles. The city is the

greatest commercial port on the European con¬

tinent, the chief of the three Hanse towns and the seat of the upper Hanseatic court. It is

situated at the junction of the Alster and the Bille, on the right bank of the northern branch of the Elbe, about 93 miles from the North

Sea and 178 miles by rail from Berlin. With

its connecting suburbs, Altona and Ottensen,

it has a river frontage of over five miles. The river is spanned by two fine bridges and there are numerous bridges across the canals which

intersect the east and lower part of the city in all directions, and across the Alster which flows through the city and forms two orna¬

mental pieces of water, the Aussen-Alster and

the Binnen-Alster or Alster-Bassin. The latter

is surrounded by fine quays, the Alter Jungfernstieg and the Neuer Jungfernstieg, lined

with handsome residences, hotels and stores,

and constituting the chief thoroughfare in the

city. The harbor accommodation is extensive ;

the principal quays along the Elbe where the

ocean steamships lie are the Kaiser-Quai and

the Sandthor-Quai. The boulevards or Anlagen

occupy the site of the ancient encircling walls, removed since 1815. The modern portion of the

city, rebuilt since the destructive fire of 1842

in a magnificent and expensive style, is in strik¬

ing contrast to the older lowlying portion, with its back streets, bordered by warehouses, and

the meaner class of dwelling-houses. The most

important public buildings are the Exchange,

a noble edifice consisting chiefly of a magnifi¬

cent hall surrounded by a fine colonnade and

containing a large commercial library of over

120,000 volumes, the modern Rathaus in Renais¬

sance style, and the Deutsches Schauspielhaus.

Among ecclesiastical structures are the 19th

century Gothic church of Saint Nicholas with

a tower and spire 473 feet high ; the 18th cen¬

tury Renaissance church of Saint Michael's,

with a spire 426 feet high; the 15th century

church of Saint Catherine's, the 14th century

church of Saint James and a fine Jewish syna¬

gogue. Besides the numerous private and pub¬

lic schools the educational institutions include the Johanneum institution, founded in 1528,

containing a college, museums and the city's

extensive library; the Kunsthalle with a large

art collection ; and zoological and botanical gar¬

dens, *etc.* Among its public monuments note¬

worthy are the statue of Lessing by Schafer;

the monument to the sons of Hamburg who

fell in the war with France in 1870, by Schil¬

ling; and the Hansa fountain. Among the

many charitable and benevolent institutions are

well-endowed hospitals, orphan and insane

asylums, and there is also an organized system of municipal poor relief. The sewerage sys¬

tem has been modernized and the general sani¬

tary conditions improved, especially since the

severe choleraic epidemic of 1892. The munic¬

ipal waterworks, dating from 1531, have been

added to at various dates and a modern filtering plant installed since 1893; garbage is burned

in municipal crematories; the streets are well

paved and are kept very clean ; municipal bath and wash houses are maintained; food adul¬

teration is keenly looked after ; the gas and

electric-lighting plants are civic property, and a large revenue is obtained from the electric

street railroads, which are operated by private companies, paying

state subventions.

The importance of Hamburg is due to its

great marine commerce, which has been facili¬

tated by the engineering enterprises of the in¬

habitants in deepening the bed of the river, cut¬

ting canals and s;nce 1890 in the construction at Cuxhaven, at the mouth of the river, of enor¬

mous docks. The dock and harbor facilities

are the most complete in the world. Seven

railroad lines enter the city, which is connected also by rivers and canals with nearly all parts of the German Empire. In 1913 14,054 vessels

with a net tonnage of 13,141,362 tons entered, and 13,745 with a net tonnage of 10,324,437

cleared the port. The exports by sea in 1913

amounted to $966,225,000 ; the imports by sea

in the same year were approximately $1,179,-

050,000. Raw materials, foodstuffs, especially

coffee, yarn, tobacco, wine and manufactured articles are the chief imports ; the principal exports are coffee, sugar, cotton, ironware, hosiery, machinery, paper and tobacco. Sea¬ going vessels (exclusive of fishing vessels), above 17.65 registered tons, belonging to Ham¬ burg in 1913 numbered 1,434 of 1,797,508 tons, with 35,702 in the crews. The city's manufac¬ turing interests, though large, are less import¬ ant, including shipbuilding, iron-founding, to¬ bacco and cigar making, sugar refining, dis¬ tilleries, breweries, flour-milling, furniture, pianos and musical instruments, optical ap¬ paratus, leather, ivory articles and numerous other domestic industries. The banking, ex¬ change and marine assurance business of Hamburg has been on an extensive scale since the establishment of the Hamburg giro-bank in 1619, and is one of the most important in the world.

Insurance is compulsory for every house¬ holder and there is a municipal employment bureau and a municipal pawnshop established in 1650. The population of the city is second to that of Berlin in the German Empire; in

1910 it was 986,804. See Harbors, Docks and

Breakwaters.

Bibliography. — Baedeker, (Northern Germany) (14th ed., Leipzig 1904) ; Clapp, E. J., (The Port of Hamburg5 (New Haven 1911) ;

Feldtmann, (Geschichte Hamburgs und Altonas5

(Hamburg 1902)); (Gallois, (Geschichte der

Stadt Hamburg5 (3 vols., Hamburg 1867) ;

King, W., (Three Free Cities5 (London 1914) ;

Linde, R., (Die Niederelbe5 (4th ed., Bielefeld 1913) ; Melle, W. von, (Das hamburgische

Staatsrecht5 (Hamburg 1891) ; Seelig, G.,

(Hamburgisches Staatsrecht auf geschichtlicher

Grundlage5 (Hamburg 1902) ; Wichmann,

(Hamburgische Geschichte in Darstellungen

aus alter und neurer Zeit5 (ib. 1889) ; Wohl—

mann, Adolf, (Aus drei Jahrhunderten der

hamburgische Geschichte 1648-18885 (ib. 1897) ;

Zimmern, Helen, (The Hansa Towns,5 in Story

of the Nation's Series (London 1889).

HAMBURG, Bank of. Established 1619,

10 years later than the Bank of Amsterdam

and on the same plan, both of them following

the matured organization of the Bank of Venice, which latter was indebted to the experience of the Greek and Roman banks of

antiquity. As

this view appears to be questioned by Blanqui

((History of Political Economy,5 ed. 1880, p.

323), it will perhaps be sufficient to cite Beck¬

mann ((History of Inventions,5 ed. 1846, II, p.

4, seq.) who recalls the tabernae argentariae, or mensae nummulariae of the Romans, or ((banking houses, into which the state and the wealthy classes caused their revenues to be paid and

upon which they gave to their creditors orders (cheques, or bills of exchange), for the pay¬

ment of their claims in money… . Similar banking houses arose in the Italian states about the year 1377. They were called apothecae seu

casanae generis.55 All of these banks were char¬

tered by the Papal government, the first by

Pope Sixtus IV of a bank or lending-house at

Savona, near Genoa, in 1472. The attempt to

destroy Lorenzo di Medici by preaching a

violent crusade against the Jewish community

of Italy, both belong to the history of banking and are given at some length by Beckmann.

See Amsterdam, Bank of; Venice, Bank of.

HAMBURG FOWLS. See Poultry.

HAMID, Abdul, Sultan of Turkey: d. Con¬

stantinople, 10 Feb. 1918. See Abdui Hamid

II.

HAMILCAR, ha-mil'kar, a name of com¬

mon occurrence at Carthage, and borne by sev¬

eral of its most distinguished citizens, among

whom the chief was Hamilcar Barca ((<light—

ning55) : b. Carthage; d. Spain, 228 b.c. He was the father of the celebrated Hannibal. While

a young man he was appointed to the command

of the Carthaginian forces in Sicily, in the 18th year of the First Punic War, 247 b.c. He estab¬

lished himself with his whole army on Mount

Hercte (now Monte Pellegrino), where he not

only succeeded in maintaining his ground, but

sent out squadrons to plunder the coasts of

Sicily and Italy. In 244 he quitted his strong position, and, landing at the foot of Mount

Eryx, converted the town of that name into a

fortified camp for his army. For two years

he defied all the efforts of the Romans to dis¬

lodge him;, but the Carthaginian admiral,

Hanno, having been totally defeated off the

ZEgate Islands, 241 b.c., he reluctantly consented to withdraw from Sicily. His inability to per¬

form the promises, which to keep them in

obedience he had made to his mercenary troops

brought about their revolt after returning from Sicily, and as. they were joined by almost all the native Africans Carthage was brought to the brink of ruin. The incapacity of Hanno, who

had been entrusted with the suppression of the revolt, led all parties to concur in the appoint¬

ment of Hamilcar. He defeated the enemy

with great slaughter, reduced their towns to

subjection, and after several alternations of

fortune, and the appointment of Hanno to a

share in the command, the war was brought to

a successful close, 238 b. c. Hamilcar now pro¬

jected the formation of a new empire in Spain, to be a source of strength to Carthage, and

the point whence hostilities might be renewed

against Rome. This policy was ably prosecuted

after, his death by Hasdrubal and Hannibal.

Hamilcar penetrated into the heart of the

country, reduced some cities and tribes and

acquired vast wealth. He passed nine years in

Spain, and fell in a battle against the Vettones.

HAMILTON, Alexander, American states¬

man and soldier: b. Charles Town, in the

island of Nevis, W. I., 11 Jan. 1757; d. New York, 12 July 1804. His mother, Rachel Fau-cette (Fawcett) of Huguenot descent, the

daughter of a French physician, unhappily

married to John Michel Levine, a Danish land

proprietor of Saint Croix, left him to live with James Hamilton, a Scotch merchant at Saint

Christopher, and by the latter had two sons,

Alexander and James. On the father's side

they were grandsons of Elizabeth, daughter of

Sir R. Pollock, and of Alexander Hamilton of

Grange Lanarkshire, Scotland. In 1759 Le¬

vine secured a divorce, but his wife was for¬

bidden to remarry. Hamilton's father was

unfortunate in his business ventures, and hav¬

ing become a bankrupt it was necessary for

V?

✓

Alexander, at the age of 12 years, to earn his own living. He secured a position as clerk in the countinghouse of Nicholas Cruger of Saint

Croix. His <(genius for affairs® was soon ap¬

parent, and after two years we find him en¬

trusted with the full management of the busi¬

ness. But ambition for something more than

a commercial career had already taken hold of

the young man's mind, and he began to write

for the local press. A very strong and vivid

description of a West Indian hurricane, which

had devastated the islands, attracted general

attention and aroused the lad's friends to pro¬

vide the necessary funds to enable him to come to America to complete his education. He ar¬

rived at Boston in 1772, and was put in a school at Elizabethtown, N. J., where he industriously prepared himself for college, and in 1774 he

entered King's College (now Columbia Univer¬

sity), and made a brilliant record as a student.

The friction between England and the Amer¬

ican colonies was constantly growing more seri¬

ous, and after studying the question and being convinced that the colonists were right, Hamil¬

ton began the advocacy of their cause in a

speech at a public meeting, 6 July 1774. The

meeting assembled to discuss the calling of a

general congress and was held in the fields

(now City Hall Park), He also published two

pamphlets, asserting the colonists' position in

relation to the Crown and to Parliament, and

justifying their appeal to arms. The pamph¬

lets were at first thought to be productions of well-known leaders, and when their authorship

became known it gave Hamilton a national

reputation. Hamilton now turned his atten¬

tion to preparation for military service in the Revolution. He secured a. commission as cap¬

tain of the first Continental artillery company and entered the patriot service in March 1776.

His natural aptitude for organization and com¬

mand soon made the company a model of disci¬

pline and efficiency. He participated in the

battles of Long Island, White Plains, Trenton

and Princeton, and won the commendation of

his superiors for his skill and courage. On 1

March 1777 Hamilton was appointed lieutenant-colonel and aide-de-camp on the staff of Wash¬

ington, whose entire confidence he secured, be¬

coming the general's confidential secretary. He

took an active part in his chief's battles, as¬

sisted in planning campaigns and in devising

means for the support of the army, and was

entrusted with the important and delicate mis¬

sion of going to Albany to obtain troops from General Gates (who had previously been or¬

dered to send troops to Washington and had

failed to do so) — a duty which Hamilton per¬

formed with skill and success. It was while

on this mission that he first met Elizabeth

Schuyler, the daughter of Gen. Philip Schuyler

of New York, whom he afterward married

(14 Dec. 1780). Having received a reprimand

from Washington for a supposed delay he took

offense and resigned from the staff 16 Feb.

1781. He had no intention, however, of re¬

signing from the Continental Army,, and be¬

coming the head of an infantry regiment, he

took part in the siege of Yorktown, heading a storming party and capturing one of the strong¬

est British redoubts. The war was now prac¬

tically ended, and there being no further oppor¬

tunity for success in the army, Hamilton re¬

turned to civil life. He was but 24 years old and by his natural abilities and capacity for

leadership he had attained a foremost place

among the great men of his day.

The activity of Hamilton's mind is seen in

the fact that while still in active military serv¬

ice he found time to study the great questions of government and finance. In a letter to

James Duane he clearly set forth his views on the Constitution, that : ((Congress should have

complete sovereignty in all that relates to war, peace, trade, finance, and to the management of foreign affairs.® A letter to Morris on the

establishment of a national bank induced him

to offer Hamilton the place of receiver-general of continental taxes,

which he accepted and

originated a new system of national taxation.

The receiver's office did not prove congenial,

and he was relieved of its duties by his election to the Continental Congress from New York

I Oct. 1782. Congress proved a disappoint¬

ment. Such were the deplorable conditions

then prevailing, the looseness of the Constitu¬

tion and the financial chaos of the government, that Hamilton's efforts to carry through re¬

forms utterly failed. He resigned from Con¬

gress in 1783 and returned to the practice of law in New York, where his melodious voice,

dignified deportment and unanswerable logic of

reasoning, soon placed him in the highest rank of his profession.

The condition of the States at this time is

graphically depicted by Senator Lodge in his

<Life of Hamilton) : <(Divided among them¬

selves, with no army, no navy, no cohesion,

floundering wilfully and helplessly in a sea of unpaid debts and broken promises, bankrupt in

money and reputation alike.® To secure some

relief the Annapolis Convention (q.v.) was held II Sept. 1786, five States only being represented — New York, New Jersey, Pennsylvania, Dela¬

ware and Virginia. Hamilton was one of the

delegates from New York. This convention

adopted an address, drafted by Hamilton, recit¬

ing the intolerable conditions and calling for a convention to meet the following May in Phila¬

delphia to form a Federal Constitution. (See

Constitution, Framing of the). Upon his re¬

turn to New York he was elected to the State legislature which convened in January 1787,

and began a fight to induce the State to send delegates to the Philadelphia convention. In

this he succeeded, and three delegates were ap¬

pointed, of which Hamilton was one ; but the

other two were Anti-Federalists, bitterly op¬

posed to Hamilton's idea of a strong general

government. When the convention met the

vote of his own State was cast against him on every question; the Anti-Federalists withdrew

from the convention, leaving New York with¬

out a vote. Hamilton, however, presented his

views of a plan of government to the conven¬

tion — an artistocratic republic, with a presi¬

dent and senators chosen for life, and the

State governors appointed by the Federal gov¬

ernment. After the presentation of this plan,

which found no support in the convention,

Hamilton withdrew, only returning to engage

in the final debates, and at the close he heartily embraced the work of the convention and

signed the Constitution as actually adopted.

The Constitution was still to be ratified by the States. New York was opposed to its adoption.

There were numerous internal strifes and jeal¬

ousies, but with great power and determination

Hamilton combated and won over all oppo¬

nents in the legislature, and by his essays in the Federalist , assisted by Madison and Jay,

he successfully fought the great battle for the Constitution, winning a hostile majority to its support. Of these essays George William Cur¬

tis declared they ((gave birth to American con¬

stitutional law, which was thus placed above

arbitrary construction and brought into the do¬

main of legal truth.®

Washington was inaugurated President in

April 1789. In September 1789 Congress passed

an act establishing a Treasury Department, and

Washington at once made Hamilton the first Secretary of the Treasury. His creative, con¬structive and practical mind was now con¬fronted with the problem of giving to his coun¬try a workable system of national administra¬tion. With a master's hand he organized the Treasury Department; reduced the confused finances to order; provided for a funded sys¬tem and a sound system of national taxation; induced Congress to assume the State debts ; authorized methods for the establishing of a national bank and a mint, the raising and col¬lection of internal revenue, the management of the public lands and the purchase of West Point by the government. In 1791 his Report on Industry and Commerce appeared, wherein he discussed with profound ability and clear¬ness the economic problems of his time, and inaugurated, in a very moderate way, the pro¬tective tariff system. His methods to strengthen the national government were vigorously op¬posed by those antagonistic to centralization, chief among whom was Thomas Jelferson (q.v.), and the controversies that then divided parties have been continued by the rival polit¬

ical parties to the present. Engrossed as he was with the home affairs of the government, Hamilton was nevertheless a deep student of foreign relations and advocated a position of strict neutrality on the part of the American government with regard to the difficulties of nations. He ably sustained Washington in his proclamation of strict neutrality between France and England, both in the Cabinet and in the public press, and when M. Genet, the Ambassador of the French Republic, tried to in¬ volve this country in a war with England, Ham¬ ilton was vigorous in his condemnation. It was at this time that Jefferson, then Secretary of State, took sides with Editor Freneau of the Philadelphia National Gazette, in his criti¬ cism of the administration and especially of the Treasury Department. Hamilton replied and the controversy became typical of the two great po¬ litical parties — the Federalists and the Repub¬ licans. Jefferson's position in the Cabinet was most uncomfortable and he resigned 1 Jan. 1794. In 1794 the Whisky Insurrection (q.v.) occurred in Pennsylvania in opposition to the excise laws passed by Congress. Hamilton ad¬ vised a vigorous policy and when troops were

sent by Washington against the insurgents,

Hamilton accompanied them and the ˆrebellion®

quickly faded away.

Desiring to give more attention to his pri¬

vate interests Hamilton resigned from the Cab¬

inet 31 Jan. 1795. He declined the office of

Chief Justice of the United States Supreme

Court and returned to his law practice in New York city where he was at once acknowledged

the leader of the bar. But he still continued to take an active interest in political affairs. In 1794 Chief Justice John Jay (q.v.) was nom¬

inated by Washington as envoy extraordinary

to negotiate a commercial treaty with Great

Britain. With Lord Granville a treaty was

drawn up known as Jay's Treaty (q.v.), the

terms of which were so hard and unjust that

when the treaty was published there was a vio¬

lent outburst of indignation. Hamilton, how¬

ever, in a series pf essays signed ˆCami'llus,®

defended the treaty as the best obtainable and after a severe struggle in Congress it was rati¬

fied. Washington thoroughly appreciated the

judgment and genius of Hamilton, often con¬

sulted him on important matters, and received

much help from him in the preparation of his

messages and speeches. The <(Farewell Ad¬

dress would have been less perfect as a com¬

position,® says Renwick, (<had it not passed

through the hands of Hamilton.® Hamilton

had supported John Adams (q.v.) for the

Presidency, but Adams was jealous of the

power and influence of Hamilton over mem¬

bers of the Cabinet, and made war upon him,

expelling his friends from office and assailing him personally. Hamilton blamed Adams for

the loss of the elections in New York State, and denounced him bitterly.. Adams was renom¬

inated in 1800 for the Presidency, but he was beaten by Jefferson, and the Federalist party

never won another election. Owing to a de¬

fective clause in the Constitution (see Jefferson-Burr Imbroglio) the election was thrown

into the House of Representatives, Jefferson and Burr having received an equal number of votes.

Hamilton exerted his great influence with the

Federalists and Jefferson was elected. In 1804

the Federalists nominated Aaron Burr (q.v.)

for governor of the State of New York. The

contest was a bitter one and again Hamilton

was instrumental, in Burr's defeat, and the

latter challenged him to a duel on the ground of an alleged insult.

Under the idea that the continuance of his personal influence and the

peculiar condition in which the affairs of the country were at the time demanded his accept¬

ance of the challenge, he consented to meet

Burr, and the duel was fought at Weehawken,

N. J., 11 July 1804. Hamilton was wounded

and died the following day, universally mourned by his countrymen. Four sons and four daugh¬

ters were born to Hamilton ; his widow survived him for 50 years, dying at the age of 97. Both are buried in Trinity churchyard, New York

city.

American history presents no more striking

character than Alexander Hamilton. He was

not popular, nor did he strive after popularity, but his memory and achievements are imper¬

ishable. He lived for the public good. Elo¬

quent and refined, able and brilliant, the em¬

bodiment of devotion, integrity and courage,

he has left as deep a mark upon our political institutions as any other statesman America has produced. For his writings, etc., consult Ford, W., (Bibliotheca Hamiltonia) (1886) ; Lodge,

H. C., (Works of Alexander Hamilton (9 vols.,

New York 1885-86; 12 vols., ib. 1904) ; and for his life, Atherton, G., (The Conqueror* (New

York 1902) ; ib., (A Few of Hamilton's Letters) (New York 1903) ; Choate, J. H., (Abraham

Lincoln and Other Addresses) (New York

1910) ; Culbertson, S. W., (Alexander Hamil¬

ton (New Haven 1911) ; Fox, F. T., (A Study

in Alexander Hamilton > (New York 1911) ;

Hamilton, A. M., (The Intimate Life of Alex_—

ander Hamilton) (New York 1910) ; his son

Hamilton, J. C., (History of the Republic of

the United States as Traced in the Writings

of Alexander Hamilton and his Contemporaries> (7 vols., New York 1857-64; 4th ed.,

7 vols., Boston 1879) ; the same author's un¬

finished to 1787 (Life of Alexander Hamilton^

(2 vols., New York 1836-40) ; Lodge, H. C„

(Alexander Hamilton) in American Statesmen

Series (Boston 1882) ; Morse, J. T., (Life of Alexander Hamilton (2 vols., Boston 1876) ;

Oliver, F. S., (An Essay on American Union

(London 1906) ; Shea, G., (Life and Epoch of

Alexander Hamilton (New York 1879).

George Edwin Rines.

HAMILTON, Allan McLane, physician:

b. Brooklyn, N. Y., 6 Oct. 1848; d. 23 Nov. 1919.

He was graduated M.D. at the College of Phy¬

sicians and Surgeons, Columbia in 1870, and

gained distinction as a specialist and author

on nervous diseases. He testified as government expert in the trial of Guiteau, assassin of Presi¬

dent Garfield. In 1900-03 he was professor of

mental diseases at Cornell University Medical

College. Besides numerous contributions to med¬

ical journals, his published works include (Clini¬

cal Therapeutics } (1873) ; (Nervous Diseases >

(1878) ; (Medical Jurisprudence > (1883) ; (A System of Legal Medicine* (1894) ; (Railway

and Other Accidents, etc.* (1904) ; Untimate

Life of Alexander Hamilton) (1911); Recol¬

lections of an AlienisD (1916).

HAMILTON, Andrew, American lawyer:

b. Scotland, about 1676; d. Philadelphia, 4 Aug.

1741. His early career is unknown. He was

for a time called Trent, and it is not certain at what period he took the name of Hamilton.

About 1697 he appeared in Accomac County,

Va., where he opened a classical school. In

1716 he went to Philadelphia, the next year

became attorney-general of Pennsylvania. From

1721 to 1724 he was in the provincial council and in 1727 was elected from Bucks County

to the provincial assembly, continuing to hold

his seat, with a year's exception, until 1739, and in 1729 was speaker. He is best known

for his gratuitous defense of John Peter Zenger, a New York printer, who was charged with libel in publishing in a newspaper owned by

him statements regarding the interference by

the governor with the process of the law courts.

Hamilton's defense was based on the truth of

the statements in the alleged libel. He was

successful, was granted the freedom of New

York, and, having thereby secured a freer dis¬

cussion of public officers, was termed by Morris the <(day-star of the Revolution,** He became

judge of the Vice-Admiralty Court of Pennsyl¬

vania in 1737.

HAMILTON, Anthony, Count, English

courtier and man of letters : b. probably Ros—

crea, Tipperary, Ireland, 1646 ; d. Saint Germain-en-Laye, France, 6 Aug. 1720. He was de¬

scended from a younger branch of the family

of the dukes of Hamilton in Scotland. His

parents were Catholic and Royalists and re¬

moved to France after the death of Charles I

and young Hamilton became domiciliated there.

He, however, made frequent visits to England

in the reign of Charles II. His sister was mar¬

ried to Count Grammont. On the ruin of the

royal cause he accompanied James to France,

where he passed the rest of his life. Hamilton is chiefly known as an author by his (Memoirs of Count Grammont, * a lively and spirited pro¬

duction, exhibiting a free and, in the general outline, a faithful delineation of the voluptuous court of Charles II. It is an admirable chron¬

icle of the frivolous life of the French and

English courts of that time. His other works

are (Poems) and (Fairy Tales, * which, as well as the (Memoirs,* are in French, and are really masterpieces of grace and sprightliness.

HAMILTON, Edward John, American

educator: b. Belfast, Ireland, 29 Nov. 1834; d 21 Nov. 1918. Graduated at Hanover College,

Indiana, 1853; Princeton Theological Seminary

1858; he was professor of mental philosophy at Hanover College in 1868479; professor of logic

and of ethics in Princeton University 1882-83;

and of philosophy at Hamilton College, Clinton, N. Y., in 1883—91. From 1895-1900 he was pro¬

fessor of philosophy in the State University of Washington. He is the author of what is

known as (Perceptionalism* (a system of meta¬

physical philosophy), and has published (A

New Analysis of Fundamental Morals) (1870) ;

(The Human Mind) (1883) ; (The Modalist*

(1883) ; (The Perceptionalist or Mental Science) (1899) ; (The Moral Law or the Theory and

Practice of Duty* (1902) ; also (after three

years' residence in Germany) (Perzeptional—

ismus und Modalismus eine Erkenntnisstheorie*

(1911) ; and (Erkennen und Schliessen, eine

theoretische Logik) (1912) ; (Essays on Theo¬

logical Questions) (1916).

HAMILTON, Frank Hastings, American

surgeon: b. Wilmington, Vt., 10 Sept. 1813; d.

New York, 11 Aug. 1886. He was graduated

from the medical department of the University

of Pennsylvania in 1833 ; in 1861 went to the war as surgeon of the 31st New York Vol¬

unteers, was made brigade surgeon after the

battle of Bull Run and surgeon of General

Keyes' corps in 1862. A year later he became

medical inspector of the United States army.

He was one of the founders of Bellevue Hos¬

pital Medical College in 1861, and was professor of surgery there till he resigned in 1875. Dr.

Hamilton was associated with Drs. Agnew and

Bliss in the care of President Garfield. He

wrote on the principles and practice of surgery three works, regarded as standard on the sub¬

jects treated, (Treatise on Fractures and Dis¬

locations* (1860) ; (Practical Treatise on Mili¬

tary Surgery* (1861) ; and (The Principles and Practice of Surgery) (1872).

HAMILTON, Franklin Elmer Ellsworth,

American Methodist Episcopal clergyman: b.

Pleasant Valley, Ohio, 9 Aug. 1866; d. 4 May

1918. After studying at Harvard College, he be¬

came professor of Latin and Greek at Chatta¬

nooga University, but decided to take up theo¬

logical studies instead of pursuing the profession of teaching. Accordingly, he studied at the Bos¬

ton University School of Theology in 1892, and at Berlin and Paris for three years. In 1892 he

joined the New England conference, and held

several pastorates. From 1905-06 he was en¬

gaged in studying missions, for which purpose

he toured the world. He attended the general

conferences of 1908 and 1912, and was also a member of the Ecumenical Methodist confer¬ ence of 1911. In 1908 he succeeded Bishop McCabe as chancellor of the American Univer¬ sity at Washington. In connection with the Epworth League, he was president of the New England branch in 1902-04, and vice-president of the World League 1908-12. He wrote (The Cup of Fire) ; (Why the Pilgrim Fathers Came to America) ; (The 250th Anniversary of the Founding of Harvard College) ; (Lodestar and Compassˆ

PIAMILTON, Gail. See Dodge, Mary Abigail.

HAMILTON, Gavin, Scottish painter: b. Lanark, Scotland, 1730; d. Rome, Italy, 1797.

Sent when very young to Rome, he there de¬

voted himself during the remainder of his life to historic painting. One of his greatest works was his Pomer,* consisting of a series of

pictures representing scenes taken from the

UliadP He published in 1773 (Schola Picturae

ItaliaeP composed of a number of fine engrav¬

ings by Cunego, making part of the collection of Piranesi; he there traces the different styles

from Leonardo da Vinci to the Carraccis; all

the drawings were made by Hamilton, and this

admirable collection now forms one of the prin¬

cipal treasures in the first libraries in Europe.

He spent the latter part of his life in conducting archaeological excavations in various localities

near Rome.

HAMILTON, Lord George Francis, Eng¬

lish politician : b. Brighton, 1845. He was a Con¬

servative member of Parliament for Middlesex

in 1868-85, for Ealing division in 1885-1906; in 1874-78 was UnderSecretary of State for India, and in 1878-80 vice-president of the Council.

In 1885-86, and again in 1886-92 he was First Lord of the Admiralty, and from 1895 until his resignation in 1903 was Secretary of State for India. He was chairman of the Royal Commis¬

sion upon Poor Law and Unemployment, 1905-09.

HAMILTON, Sir Ian Standish Mon-

teith, British general: b. Corfu, 16 Tan.

1853 of Scottish parents. Educated at Welling¬

ton College, he entered the army in 1873 as

lieutenant; served in the Afghan War, 1878—

80; Boer War, 1881; became captain 1882;

served with the Nile expedition in 1884—85 and promoted major; in 1886-87 he accompanied the

Burmese expedition and rose to lieutenant-colonel; became colonel in 1891; served with

the Chitral relief force in 1895, and commanded a brigade in the Tirah campaign 1897-98. On

his return home he acted as commandant at

Hythe for about a year when the South African War broke out. Colonel Hamilton was ((ordered

south, }) first as chief of staff in Natal, then placed in command of a mounted infantry divi¬

sion as major-general. He was barely 47 years

old when Lord Roberts trusted him with the

command of that part of the main army which

entailed most responsibility and independence.

The veteran commander-in-chief recognized

two great merits in Hamilton: an eye for lay

of country which amounted almost to genius

and a capacity for pushing on and imposing his will upon the enemy instead of waiting for them to develop their plans. He was also at all

times willing to take responsibility, run risks and stake a budding reputation on the venture, a quality too rarely found among officers.

Three months after the close of the war Ham¬

ilton was promoted lieutenant-general (1902),

and full general in 1907. In the Russo-Japanese War 1904-05 he served as British attache with

the Japanese army in Manchuria. His experi¬

ences of that campaign are recorded in (A

Staff Officer's Scrap Book' (2 vols., London

1905), a work displaying not only a mastery of military technique, but a high literary style and a keen sense of humor. In 1910 General Ham¬

ilton was appointed commander-in-chief in the

Mediterranean and inspector-general of Oversea

forces, which post he held at the outbreak of the European War in 1914. For nearly 40 years he

had served with distinction in every British war; he held a great number of medals and had been wounded frequently. In India he had practi¬

cally lost the use of his left arm by the pre¬

mature bursting of a shell ; another time a

shell splinter hit him in the face; bullets found their billets in him on numerous occasions, and in South Africa he was thrown from his horse

and broke his collar bone. After the naval at¬

tack on the Dardanelles had proved a failure

without the cooperation of land troops, the

British expeditionary force to the Gallipoli

Peninsula was placed under the command of

General Hamilton (1915). The disastrous end¬

ing to that campaign was in no wise due to the officer in command, but to the delay and mis¬

calculations of the higher authorities. Besides

his British orders, General Hamilton holds

Japanese, Spanish, Russian and German decora¬

tions, and is a grand officer of the Legion of Honor. See War, European : Dardanelles ;

Gallipoli Peninsula.

HAMILTON, James, English educator:

b. near London, 1769; d. Dublin, 31 Oct. 1831.

He established language schools in Great

Britain, France, United States and Canada.

Having done considerable business in Germany

and France, he became impressed with the in¬

adequate language textbooks of that time. He

came to America in 1815, establishing schools in Baltimore, Salem Mass., and New York city.

Later he established one in Montreal. Returning to London in 1823, he met with phenomenal suc¬

cess there. In Manchester he published Prin¬

ciples, Practices and Results of the Hamiltonian System > (1829). Later he established a print¬

ing and publishing house in Edinburgh. His

method consisted in giving the pupils literal

printed interlineal translations, following the

idiom of the originals, and there was no attempt to teach the grammar

until after the phrase¬

ology was largely mastered. He created a sen¬

sation in London in 1823 by having his daughter Sophia G. Hamilton, aged four, give a lesson in Greek on a public stage. He issued textbooks

in a dozen languages and himself largely mas¬

tered 17. In Baltimore his system was attacked by the local college, from which he had drawn away pupils, and he defended his method so

vigorously that the college students left in a body and came to his Hamilton Institute.

HAMILTON, James, American statesman :

b. Charleston, S. C., 8 May 1786; d. at sea, 15

Nov. 1857. He was educated for the bar, but

entered the army and served with credit as a

major in the Canadian campaign of 1812. At

the end of the war he resumed the practice

of law in Charleston. For several successive

years Hamilton was chosen mayor, or, as it was then termed, intendant of Charleston. To his

vigilance and activity was chiefly due the de¬

tection of a formidable conspiracy in 1822

among the negro population, led by Denmark

Vesey, a free mulatto from Haiti. In the same year he was elected to the State legislature, and was also chosen a representative in Congress,

of which he soon became a prominent and

popular member. He became noted for intense

and energetic opposition to the protective sys¬

tem, and favored direct taxation, regarding all indirect processes for raising revenue as frauds upon the people, and as disparaging to the

popular intellect, as well as popular morals. He quitted Congress to become governor of South

Carolina in 1830, at a period when the State

had resolved upon nullifying the tariff laws of the Federal government. On the settlement of

this question by Clay's compromise, Hamilton

retired from public life for a time. Later he became interested in the cause of Texas, to

which he devoted his personal services, and a

large portion of his private fortune. In 1841, while Texas was an independent republic, he

was her Minister to England and France, where

he procured the recognition of her independ¬

ence. On the death of Calhoun in 1852, he was appointed his successor in the United States

Senate, but declined the office.

HAMILTON, John Church, American

biographer and historian, son of Alexander

Hamilton (q.v.): b. Philadelphia 1792; d. 1882.

Besides editing his father's works (1851), he

wrote (Memoirs and Life of Alexander Hamil¬

ton (1834-40) ; (History of the Republic (4th

ed., 1879) ; (The Prairie Province* (1876) ;

(Sketches of Travel. *

HAMILTON, John Taylor, American Mo¬

ravian clergyman : b. Antigua, W. I., 30 April 1859. He was graduated from the Moravian

College, Bethlehem, Pa., in 1875, and from the Moravian Theological Seminary there in 1877.

He was pastor of the Second Moravian Church,

Philadelphia, 1881-86, and resident professor

at the Moravian College and Theological Sem¬

inary from 1886 to 1903, in 1901 receiving the degree of doctor of divinity from Lafayette

College, Easton, Pa. In 1903 he was elected

American member of the Mission Board of the

Moravian Church and a bishop of the Mo¬

ravian Church in 1905. Since 1903 he has

served as a member of the Mission Board and

since 1914 as president of the general executive board of the Moravian Church, in Herrnhut,

Saxony. He has published (History of the

Moravian Church in the United States* (1895) ; (A History of the Moravian Church during the

18th and 19th Centuries) (1900) ; (A History of Moravian Missions* (1900) ; (Twentv Years of Pioneer Missions in Nyasaland* (1912).

HAMILTON, John William, American Methodist Episcopal clergyman: b. Weston, Va., 18 March 1845. He was graduated at Mount Union College, Ohio, in 1865, and from the Bos¬ ton School of Theology in 1871. He held pas¬ torates in Somerville, Mass., and Boston 1870-92. From 1892 to 1900 he was editor of the Chris¬ tian Educator and secretary of the Freedman's Aid and Southern Education Society. He was a member of the general conferences of 1884, 1888. 1892, 1896 and 1900. He was elected bishop in 1900 In 1898 he was fraternal dele¬

gate to the Wesleyan conferences of English and Ireland, and in 1912 was American preacher at the dedication of the Wesleyan central build¬ ing, London, England. He has published (Memorial of Jesse Lee and the Old Elm > (1875) ; (Lives of the Methodist Bishops) (1883); (People's Church Pulpit) (1884);

(American Fraternal Greetings) (1899) ; Gor¬

don Battelle — Preacher, Statesman, Soldier*

(1916).

HAMILTON, Kate Waterman, American

novelist: b. Schenectady, N. Y., 12 Nov. 1841.

Since 1870 she has lived in Bloomington, Ill.

She is the author of (We Three) ; (Vagabond

and Victor* (1879) ; (Rachel's Share of the

Road) (1882); (Tangles and Corners) (1882);

(The King's SeaP (1887); (The Parson's

Proxy) (1896) ; (The Kinkaid Venture) (1900) ; (How Donald Kept FaitfP (1900), *etc.*

HAMILTON, Patrick, Scottish reformer

and martyr: b. probably Glasgow about 1504; d.

Saint Andrews, 29 Feb. 1528. Adopting during

a short residence on the Continent, the prin¬

ciples of the Retormation, when he settled at

Saint Andrews in 1523 he naturally cherished

his new convictions, and in 1526 announced them with a decision that attracted the notice of

Archbishop Beaton, who proceeded to have

him formally summoned and put on trial.

Hamilton had meanwhile fled to Germany,

where an intimacy formed with Luther and

Melanchthon deepened his convictions, and after

an absence of six months he returned to Scot¬

land. He openly preached in the neighborhood

of Linlithgow, and Beaton under pretense of

a friendly conference contrived to allure him

to Saint Andrews in January 1528. The early

stages of the conference were marked by a

conciliatory spirit, but he was led into damaging avowals of opinion, and the result of his trial, on the last day of February, was that he was convicted of divers heresies and delivered over for punishment to the secular power, by which

he was condemned the same day. In the after¬

noon he was hurried to the stake in front of the gate of Saint Salvador's College, his mar¬

tyrdom, in the 24th year of his age, having done more to extend the principles of the Reforma¬

tion in Scotland than his life could have done.

Consult <Life) by Lorimer (1857).

HAMILTON, Schuyler, American soldier:

b. New York, 25 July 1822; d. there, 18 March 1903. He was a son of J. C. Hamilton (q.v.)

and a grandson of Alexander Hamilton (q.v.).

He was graduated from West Point in 1841 and

served in the Mexican War and in the Civil

War also, becoming a major-general of volun¬

teers in 1862. He was subsequently hydrographic engineer to the department of docks.

In 1854 he published (A History of the Ameri¬

can Flag,* and in 1877 (Our National Flag, the Stars and Stripes, Its History in a Century,*

delivered as an address before the New York

Historical Society in June of that year.

HAMILTON, Sir William, Scottish meta¬

physician : b. Glasgow, 8 March 1788; d. Edin¬

burgh, 6 May 1856. Having studied with dis¬

tinction at Glasgow, in 1807 he entered Balliol College, Oxford, where he gained first-class

honors, and in 1813 he was admitted to the

Scottish bar. His taste lay in a different direc¬

tion, and while he diligently applied himself to almost every branch of literature, mental phi-660

losophy became his favorite study. He was ap¬

pointed professor of civil history in the Univer¬

sity of Edinburgh in 1821, and in 1826 became a contributor to the Edinburgh Review, en¬

riching it with a series of articles afterward published in collected form, with large addi¬

tions, as (Discussions on Philosophy and Liter¬

ature, Education, and University Reform.5 Of

these the most celebrated was his (Critique of Cousin's Cours de Philosophies in which was

developed that philosopher's doctrine of the

unconditioned. Many of these contributions

were translated into the leading European lan¬

guages and attracted much attention from Con¬

tinental speculators in philosophy. In 1836 he

became professor of logic and metaphysics in

Edinburgh University. His zeal and ability in

discharging its duties were rewarded by the

number of ardent students whom he gathered

around him. The fame of the Scottish school

of metaphysicians, which had begun to wane,

was gradually re-established; and his influence

would have been felt to even a higher degree

had he not been struck with paralysis in 1844, from which he never recovered so far as to

undertake the full duties of his position. His mind, however, retained its vigor, and he en¬

deavored to carry out literary designs he had

previously formed. In 1846 he published an

annotated edition of the works of Thomas Reid, and in 1854 the commencement of a similar edi¬

tion of the works of Dugald Stewart. His lec¬

tures were published in 1859-61, under the ed¬

itorship of Mansel and Veitch. His views are

chiefly expounded in the (Discussions 5 and in the <Dissertations) appended to his edition of

Reid, and are attacked in Mill's Examination.5

Consult Veitch, (Memoir of Hamilton) (1869) ;

(Hamilton: the Man and His Philosophy

(1883) ; Seth, (Scottish Philosophy) (1890) :

English Philosophies and Schools of Philos¬

ophy5 (1912).

HAMILTON, Sir William Rowan, Irish

mathematician : b. Dublin, 3 Aug. 1805 ; d. there, 2 Sept. 1865. He knew Greek and Latin when

only six, and before he had completed his 14th year had made himself acquainted with 13 lan¬

guages, among which were Arabic, Persian,

Hindustani, Sanskrit and Syriac. When 10

years old he began the study of mathematics,

and at 17 presented a paper to Brinkley, the

Irish astronomer-royal, which exhibited such a

profound knowledge of mathematics that the

latter declared the author of it to be already the first mathematician of his age. In 1827, the

chair of astronomy in Trinity College, as well as the post of astronomer-royal of Ireland, be¬

coming vacant, Hamilton obtained both appoint¬

ments, though then only in his 23d year. His

life henceforth was exclusively devoted to ab¬

struse studies. He was knighted in 1835 ; in

1837 was elected president of the Royal Irish

Academy, and was an honorary or correspond¬

ing member of the principal scientific academies of Europe and America. In 1828 his (Theory of Systems of Rays5 was published. In this his

celebrated prediction, on theoretical grounds,

of the existence of conical refraction of a ray of light was given to the world. Reasoning on the properties of light, he came to the conclu¬

sion that under certain circumstances a ray,

instead of being refracted in the ordinary way, should split up into a cone of rays; a phenome¬

non afterward proved experimentally by Lloyd

to take place under proper conditions. In 1834

his (General Method in Dynamics5 was pub¬

lished. In this work and that on (Systems of Rays5 the whole of any dynamical problem is

made to depend on a single function and its

differential coefficients. Another important

treatise of his is (Algebra looked on as the

Science of Pure Time.5 He published also

(Memoirs on Discontinuous Functions, or Equa¬

tions of the Fifth Degree,5 *etc.* But the foun¬

dation on which his fame most securely rests

is the discovery or invention of the calculus of quaternions, an instrument of extraordinary

power in the solution of intricate problems in mathematics and physics. His Eectures on

Quaternions5 appeared in 1853, and in 1866 a

posthumous work on the same subject entitled

Elements of Quaternions.5 Consult Eife of

Sir William Rowan Hamilton,5 by Graves

(1883-89), with an addendum (1892) ; also

biographies by Monck (1881) ; Shirling (1865) ; and John Veitch (1869); and Seth, Ecottish

Philosophy5 (1890).

HAMILTON, Bermuda, a seaport town,

the capital of the Islands on Great Bermuda,

Long or Hamilton Island. It has a fine land¬

locked harbor. Founded in 1790.

HAMILTON, N. Y., a village of Madison

County, 29 miles southwest of Utica, on the

New York, Ohio and Western Railroad. It is

the seat of Colgate University (q.v.). It is

in a good agricultural region, contains a lumber yard and canning factory, and has a stone

quarry, from which the stone for the construc¬

tion of most of the university has been taken.

Hamilton was first settled in 1792, was separated from the township of Paris in 1795, and named in honor of Alexander Hamilton; the village

was incorporated April 1816; in 1895 a fire

destroyed the business portion of the town, in which the village records were lost. Later in

the same year waterworks and an electric¬

lighting plant were established, which are owned and operated by the town. In 1903 a free li¬

brary was opened by the Library Association,

and it is intended to make it a public library supported by the village corporation. Pop.

1,689.

HAMILTON, Ohio, city and county-seat

of Butler County, on the Great Miami River,

the Miami and Erie Canal, the Pennsylvania,

Cincinnati, Hamilton and Dayton, Cincinnati,

Indianapolis and Western, Erie, Grand Rapids

and Indiana railroads, 25 miles north of Cin¬

cinnati and 31 miles south of Dayton. The

city was founded by Gen. Arthur St. Clair,

who established Fort Hamilton in 1791, naming

it after Gen. Alexander Hamilton. The fort

was again occupied by Gen. Anthony Wayne

as a base of his successful expedition which

opened up the Northwest Territory in 1793.

Hamilton was incorporated as a town in 1810.

Its industrial interests are vary large and im¬

portant. There are 130 manufacturing enter—

rises, of which several are the largest of their ind in the world. The principal lines of

manufacture are machinery, machine tools, pa¬

per, safes and bank vaults, engines, sugar mill machinery, paper mill machinery, woolens and

felts, coke, pig iron, store and bank fixtures, in¬

terior marble, woodenware, cans, stoves, cast¬

ings, flour, agricultural machinery. The city

has a large trade in farm products with the

surrounding territory. Hamilton is the first

city in the world to own its own waterworks,

gas plant and electric plant. The government

is vested in a mayor, director of public safety and director of public service and a city council of nine, three of whom are elected at large.

Pop. 40,100.

HAMILTON, Ontario, Canada, city and

capital of Wentworth County, situated on

the shores of Burlington Bay at the western

extremity of Lake Ontario, 40 miles from

ioronto, 42 miles from Niagara Falls and

70 miles northwest of Buffalo. It was laid

out and settled in 1813 by George Hamil-v

ton, and is built on a plateau of slightly ele¬

vated ground extending around the front of

a hilly range from Niagara Falls. Ham¬

ilton is connected with a large system of

Canadian and American railways, — the Cana¬

dian Pacific, Grand Trunk, Toronto, Hamilton

and Buffalo, the Michigan Central, the New

York Central and the Lehigh Valley and Wa¬

bash railways. Hamilton's geographical posi¬

tion at the head of Lake Ontario, with its fine harbor, affords the best shipping facilities to the Northwest Provinces and European markets

by water, while her railway facilities are not excelled by any city in the Dominion. She has also become the radius for three electric rail¬

way systems. Electric power is obtained from

Decew Falls and from Niagara, and natural

gas from Welland. Hamilton is one of the chief manufacturing cities in Canada and is in the

centre of a fine fruit-growing district. It

manufactures agricultural implements, auto¬

mobiles, air brakes and electrical supplies, belt¬

ing, boots and shoes, carriages, tobacco, cloth¬

ing, drugs, elevators, emery wheels, engine

packing, fertilizers, furnaces, gasoline engines, harness, glue, mats, paints, pottery, soaps, sil¬

verware, nails, vinegar, mattresses, washing

machines and musical instruments. Its manu¬

factures considerably more than doubled be¬

tween 1900 and 1910. It is the seat of a Roman Catholic and Anglican bishoprics, has a provin¬

cial normal college, two fine public recreation grounds in Dundurn and Victoria parks, and

a racecourse. The city returns two members

to the Dominion Parliament, and two to the

provincial legislature. It is the seat of a

United States consulate. Pop. 100,000.

HAMILTON COLLEGE, an institution located at Clinton, Oneida County, N. Y. ; founded by Samuel Kirkland, a Congregational missionary, in 1793, as an academy for both white and Indian children. The school was not opened until 1798, although Gen. Frederick William von Steuben laid the cornerstone in 1794. Lack of funds prevented the completion sooner, and to the untiring efforts of its founder was due, in a great measure, the success of the undertaking. It was first called Hamilton Oneida Academy, so named in honor of Alex¬ ander Hamilton, one of its original trustees, who was also a benefactor. In 1812 it was chartered by the board of regents of the Uni¬ versity of the State of New York as Hamilton College. The school has grown steadily in facilities, keeping well abreast of the times. Two courses are offered: the Latin-Scientific and the Classical. It has fine scientific collec¬ tions, the Litchfield astronomical observatory and well-equipped laboratories, but has never

attempted to give any highly specialized instruc¬ tion. However, it is one of the most repre¬ sentative of the smaller colleges in the United States and counts many

prominent men amongst

its alumni. The college has at its disposal

2 fellowships, 90 scholarships, 4 prize scholar¬

ships and a number of valuable prizes. The

campus, nearly 100 acres, has many notable

improvements, gifts from graduates. In 1920—

21 there were connected with the school 27

professors and instructors, and 296 students.

The library contained over 70,000 volumes. Its

productive funds amounted to $1,200,000 and its total income was $86,625. Its presidents include Azel Backus 1812-16; Henry Davis 1817-33;

S. E. Dwight 1833-35; Joseph Penney 1835-39;

Simeon North 1839-57 ; S. W. Fisher 1858-66;

S. G. Brown 1867-81 ; Henry Darling 1881-91 *

M. W. Stryker 1892-1917; F. C. Ferry 1918- .

A history of Hamilton College is given in

the consecutive biographies of its presidents in (National Cyclopaedia of American Biography)

(Vol. VII, p. 404, New York 1897). Consult

Allison, C. E., (A Historical Sketch of Hamil¬

ton College* (Yonkers 1889) ; Davis, H., (A

Narrative of the Embarrassments and Decline

of Hamilton College) (Clinton 1833) ; Hamilton

College, (A Memorial of the Semi-Centennial

Celebration of the Founding of Hamilton Col¬
lege* (Utica 1862) ; id., (Annual Catalogue)
(Clinton) ; Powell, E. P., (New England's
First College out of New England* (in New
England Magazine, N. S. Vol. XX, p. 449, Bos¬
ton 1899) ; Root, W., (Hamilton Oneida Acad¬
emy in 1794) (in Magazine of American His¬
tory, Vol. XVIII, p. 396, New York 1887) ;
Schuyler, M., Architecture of American Col¬
leges* (in Architectural Record, Vol. XXX, p.
554, New York 1911) ; Scollard, C., (Rose of
an Hundred Years; Hamilton College 1812—
1912 J (Clinton 1912) ; Sherwood, S., (The Uni¬
versity of the State of New York* (in the
United States Education Bureau, Circular of
Information, No. 3, Washington 1900).

HAMILTON INLET, formerly Invuk—
toke or Esquimaux Bay, Labrador (q.v.), the
estuary of the Hamilton or Grand River and
the largest of the many fiords or inlets indent¬
ing the Labrador Coast. It is located in
lat. 54° 30' N., is about 150 miles long and has an average width of 14 miles and a maximum
width of about 25 miles. The surrounding

country is high and rocky, possessing, however, extensive forests. The Hamilton, Northwest

and Kenamon rivers drain into Hamilton Inlet.

Together with other parts of Labrador it has

been the cause of frequent boundary disputes

between Newfoundland and the province of

Quebec. It was apparently first visited in 1500

by Corte-Real, a Portuguese navigator, redis¬

covered in 1586 by John Davis and then left

alone for a long time. In 1777 the English

first entered the inlet. Trading posts had

previously been established by the French, but

were abandoned later. The first English trad¬

ing post was established in 1785 by a Quebec

firm, and in 1837 the Hudson's Bay Company

(q.v.) established a trading post, Rigolet, on

its north shore which is still being maintained.

Its present name was given to it in 1821 by

Capt. W. Martin in honor of the governor of

Newfoundland of that day, Sir Charles Hamil¬

ton. It was first surveyed in 1860 by Sir L.

McClintock of the Imperial Survey; since then

it has been visited frequently by explorers

and is gradually gaining in development and

importance. Consult Gosling, W. G., (Labra¬

dor : Its Discovery, etc.-* (London 1910);

Grenfell, W. T., and others, (Labrador, the

Country and the People) (New York 1913) ;

Low, A. P., (Report on Explorations in the

Labrador Peninsula, etc., 1892-95 > (Ottawa

1896) ; McLean, T., (Notes of a 25 Years'

Service in the Hudson's Bay Territory) (2 vols., London 1849) ;
Packard, A. S., (The Labrador

Coast) (New York 1891) ; Townsend, C. W.,

(Along the Labrador Coast) (Boston 1907) ;

Uebe, R., <Labrador) (in Angcwandte Geog¬

raphic, Ser. Ill, Part 9, Halle 1909).

HAMILTON, Mount. See Lick Observa¬

tory.

HAMILTON SERIES, a series of rocks,

also known as the Erian, including the Hamil¬

ton and Marcellus stages and constituting the

Middle Devonian. The name is from the town

of Hamilton, 29 miles south of Utica, N. Y.,

where the series is typically developed. It

consists there of shales and sandstones with

a few beds of limestones, the most prominent

being the topmost member of the series. The

Hamilton, like the other Devonian formations,

was laid down along the Atlantic shores of

what was then the American continent and in

a great interior sea, sedimentation being heav¬

iest in a northeast gulf of this sea. The sea extended from eastern New York to western

Iowa. In the west the series is largely cal¬

careous. The series is about 1,500 feet thick

in eastern New York and reaches a maximum

of 2,000 to 5,000 in Monroe County, Pa. It

rapidly thins westward. Outside of the inte¬

rior basin rocks of Hamilton Age have been

determined in the Gaspe region of Canada

and in the Mackenzie River Valley in Northwest Territory. See Devonian.

HAMILTON STAGE, the upper division

of the Hamilton series of rocks, consists chiefly of shaly sandstone and fine shales with a few thin seams of limestone. In Ulster, Albany,

and Greene counties, N. Y., the thick-bedded

shales are known as North River flagstone, and are quarried on the Hudson River near Kings¬

ton, Saugerties and Coxsackie. Some of the

thicker layers of these flagstones are known

as bluestone.

HAMITES, ham'its (descendants of Ham),

the name given to several races in North Africa, who are regarded as of kindred origin and speak allied tongues. They include the ancient Egyp¬

tians and their modern descendants, the Copts,

the Berbers, Tuaregs, Kabyles, the Gallas, Falashas, Somali, Dankali, *etc.*

HAMLET. No other play of Shakespeare's

offers so many complex and interesting prob¬

lems as ˆamletP Critics of the text find in

the variations between the first quarto (1603), the second quarto (1604) and the first folio

(1623) some baffling questions of textual criti¬

cism. The second quarto, <(newly printed and

enlarged to almost as much againe as it was,*

is so different from the first as to suggest a thoroughgoing revision of the entire play.

It is evident that the story of Hamlet, first told by Saxo Grammaticus in the 13th cen¬

tury and reproduced in Belleforest's (Histoires

Tragiques) as the (<Hystorie of Hamblet* in

1570, appealed strongly to the dramatists and

the public of the Elizabethan Age. There was

an old play on the subject, written by Thomas Kyd or some other contemporary, that was

cither worked over by Shakespeare or formed

the basis of the first quarto. It is probable that the first quarto was surreptitiously taken from the play as acted rather than as written by Shakespeare. It is more certain that Shakes¬

peare, having given the public a typical revenge play, of a somewhat melodramatic type, saw

the possibilities of a much greater play, and

wrote the Hamlet that we have in the second

quarto. In this revised form we still have

traces of the Elizabethan Hamlet, who in his

revenge and his madness was a very different

figure from the character that has fascinated

the modern mind. Some scenes that are now

considered tragic were then humorous. The

transformation of Hamlet from the crude out¬

lines of the Danish story or the early play into his greatest character, and of a typical play

of a somewhat sensational type into one of the greatest dramas of the world's literature, is

one of Shakespeare's supreme achievements.

Whatever may be said of other characters

in the play, or of the play as a dramatic whole, the character of Hamlet himself is undoubtedly

the greatest creation of Shakespeare. He has

some of the ˆmyriad-mindedness* of his creator.

The humor of Falstaff, the melancholy of Mac¬

beth, the penetrating insight into human nature displayed by Iago, the winsomeness of Prince

Hal, the intense passion of King Lear — all

of these are to be found in Hamlet, and thereto is added an outlook into the infinite, a compre¬

hension of the burden of the mystery of all

this unintelligible world that is distinctly his own. He can outjest the grave-diggers, catch

the conscience of the king, outwit Rosencrantz

and Guildenstern, talk to Osric in his own euphuistic language, open up the heart of a

friend to Ho'ratio, and then, left to himself, he can voyage on strange seas of thought alone.

There is scarcely a phase of life in which he is not interested : he discusses philosophy with Horatio, and with the players he indulges in

reminiscences of the theatre and in a discussion of the laws of dramatic art and the principles of dramatic criticism. The fact is he is a

genius with something of the irresistible full¬

ness of life characteristic of the Renaissance.

The interpretation of this character and espe¬

cially of the nature of the tragedy to which

his career leads is one of the baffling problems of criticism. The theory that he was really

insane at times is untenable. To all attempts

to read his character Hamlet seems to say:

((Why, look you now, how unworthy a thing

you make of me! You would play upon me;

you would seem to know my stops ; you would

pluck out the heart of my mystery; you would

sound me from my lowest note to the top of

my compass* Different types of people find

themselves reflected in his words and actions.

Coleridge saw in him his own vacillating,

over-reflective nature ; Goethe exclaimed as he

thought of his tendency to subordinate action

to thought, ((Hamlet is Germany !* So he ap¬

pears in different roles as the philosopher, the dreamer, the procrastinator and the cold-hearted misanthrope. A lack of certitude of

belief may be the explanation of his inability HAMLET CASE — HAMLIN

to lay hold of any plan with calm resolved

energy. This emphasis upon his limitations or

defects should not prevent the reader from see¬

ing that he is called upon to perform an almost impossible task. The time is out of joint;

there is a world of confusion and disorder

about him ; there is no way for him to act

without being suspected as a traitor and an

assassin. The truth probably lies between these two theories, his personal characteristics and

his external environment reacting upon each

other in such a way as to produce fatal con¬

sequences. The mystery of his suffering and

of that of other characters, notably Ophelia,

remains unsolved.

A very interesting study is that of the con¬

trasts to be found in <Hamlet) ■ — the contrasts between characters and scenes. The characters

of Hamlet and Laertes are sharply contrasted:

each has lost his father under deplorable cir¬

cumstances ; one is impulsive and rash, the other reflective and calculating. Hamlet and Horatio

are devoted to each other and yet so different — one restless, confused and almost dazed, the other evenly balanced, well poised, steady. The contrast between Hamlet's humor and melan¬

choly, each relieving and making more im¬

pressive the other, is a dramatic effect. The

bringing together in one scene of the grave¬

diggers and the mourners over the dead body

of Ophelia is a violation of the canons of clas¬

sical dramatic art, but it is true to life.

There is an undercurrent of fatalism in

(Hamlet) that reminds one of a Greek tragedy

more than does any other play of Shakespeare.

The well-known words, ((There is a divinity

that shapes our ends, rough hew them how we

will,® are the keynote of the play. Hamlet

loses control of the plot by killing Polonius, and henceforth Fate has complete charge of

affairs. The king has an idea that ((a divinity doth hedge a king,® but in the last two acts he gradually brings upon himself the vengeance

that Hamlet could not accomplish. Somehow

— if not in the way Hamlet had planned —

his father's murder is avenged and the queen

suffers for her frailty of mind and heart. At the end we are not comforted by intimations of immortality, but are held in the grip of inex¬

orable law. <(The rest is silence.®

Edwin Mims,

Professor of English, Vanderbilt University.

HAMLET CASE, the designation of the

first recorded action in 1850 under the Fugitive Slave Law (q.v.) of that year. It is named

after Hamlet, a free negro with a family, who was surrendered after a cursory examination,

as a fugitive slave of Mary Brown of Balti¬

more. He had been arrested by a deputy United States marshal in New York, and the whole

circumstances of the case so aroused public

opinion that Hamlet was finally redeemed.

HAMLEY, Sir Edward Bruce, English

general: b. Bodmin, Cornwall, 27 April 1824;

d. London, 12 Aug. 1893. Entering the army in 1843, he served through the Crimean War, was

professor of military history at Sandhurst

1859-64, and commandant there 1870-77 ; and

division commander in the Egyptian War of

1882. His ˆOperations of War5 (1866) is a

recognized textbook for military examinations.

Among his other publications are rThe Story

of the Campaign C- (4855), • a narrative of the Crimean War; (Wellington's Career) (1860);

(Voltaire5 (1877) ; (The War in the Crimea)

(1891). He was also the author of a popular

novel, Wady Lee's Widowhood, 5 and the ad¬

mirable sketch entitled (Shakespeare's Funeral.5

HAMLIN, Alfred Dwight Foster, Ameri¬

can architect: b. Constantinople, Turkey, 5

Sept. 1855, a son of Cyrus Hamlin (q.v.). He

was graduated from Amherst in 1875, studied

architecture in the Massachusetts Institute of

Technology in 1876-77 and at the Beaux Arts

of Paris in 1878-81. Since 1883 he has been con¬

nected with the school of architecture of Co¬

lumbia University, as special assistant, adjunct professor and (1903-12) executive head; now

professor of history and architecture. He has

contributed to many periodicals and encyclo¬

pedias; author of (A History of Architecture5

(1896) ; (European and Japanese Gardens,) in

collaboration (1902) ; and (Cyrus Hamlin, Mis¬

sionary5 (1903).

HAMLIN, Augustus Choate, American

surgeon : b. Columbia, Me., 28 Aug. 1829 ; d.

Bangor, Me., 19 Nov. 1905. He was graduated

from Bowdoin in 1851, from the Harvard Med¬

ical School in 1855, was appointed assistant

surgeon to the 2d Maine Infantry in 1861, and from 1863 until mustered out in 1865, lieuten¬

ant-colonel and medical inspector, United

States army. Subsequent to the war he prac¬

tised in Bangor, of which he was twice mayor, and in 1882-86 was surgeon-general of Maine.

Among his works are (Martyria5 (1866) ; (The

Tourmaline5 (1873) ; (Leisure Hours among

the Gems5 (1884) ; and treatises on transfu¬

sion5 (1868) ; tetanus5 (1868) ; and (The

Transmission of Disease5 (1870).

HAMLIN, Cyrus, American missionary :

b. Waterford, Me., 5 Tan. 1811; d. 8 Aug. 1900.

He was graduated from Bowdoin College in

1834 and from Bangor Theological Seminary in

1837 ; and was missionary of the American

Board of Missions in Turkey 1837-59. From

1860 to 1876 he was president of Robert Col¬

lege, established after long controversy with the Turkish government. In this position he did

much in molding the character of modern Bul¬

garian leaders and producing autonomy for Bul¬

garia. Returning to the United States in 1877

he became a professor in the Theological Sem¬

inary in Bangor; and was president of Middlebury College, Vermont, 1880-85. Some of his

works are in the Armenian language ; those in

English include c Among the Turks5 (1877) ;

and (My Life and Times5 (1893).

HAMLIN, Hannibal, American statesman :

b. Paris Hill, Oxford County, Me., 27 Aug.

1809; d. Bangor, Me., 4 July 1891. Though pre¬

pared for college, he did not enter, but became the editor of The Jeffersonian, a weekly of Paris, Me. ; studied law, was admitted to the bar in 1833, and began practice at Hampden, Me. He

was active in Democratic politics, was elected

to the lower branch of the State legislature in 1835, served by re-election until 1840, and was speaker in 1837, 1839 and 1840. Nominated for

Congress in 1840, he was defeated by the Whig candidate, but in 1842 was elected, and in

1844 reelected. Chosen for the Senate in 1848

to fill a vacancy, he was again elected in 1851, but in 1856 resigned his seat to accept the gov¬

ernorship of Maine, to which he had been

elected as a Republican. In less than a month, 664

however, he re-entered the Senate for a full

term. In 1860 he was elected Vice-President

on the ticket with Lincoln, and in 1861-65 was president of the Senate. He was thereafter

successively collector of the port of Boston

(1865-66), United States senator (1869-81),

and Minister to Spain (1881-83). Hamlin's

separation from his party was due to his strong anti-slavery convictions. During the absence

from the House of David Wilmot, he intro¬

duced the bill now known as the <(Wilmot pro¬

viso,® and obtained its passage in the House

by 115 to 106. As Vice-President he was a

highly-valued counsellor of Lincoln. Consult

Hamlin, C. E., (Life and Times of Hannibal

Hamlin 5 (1899).

HAMLINE, Leonidas Lent, American

Methodist bishop : b. Burlington, Conn., 10 May 1797 ; d. Mount Pleasant, Iowa, 23 March 1865.

He was educated for the ministry, but after¬

ward studied law, was admitted to the bar at

Lancaster, Ohio, was licensed to preach by the Methodist Church and was a traveling minister

in the Ohio Conference. When in 1844 the

Methodist Church divided on the slavery ques¬

tion, he was one of the members of the Gen¬

eral Conference and drafted the plan for the

separation of the Northern and Southern

branches. He was a bishop from 1844 to 1852,

Iwhen he was retired at his own request. His

<Works) were edited by F. G. Hibbard (1869).

Hamline University of Minnesota (q.v.) was

named in his honor.

HAMLINE UNIVERSITY, a coeduca¬

tional institution at Hamline, Minn., between

Minneapolis and Saint Paul. The school was

established under the auspices of the Methodist Episcopal Church, at Redwing, Minn., but it

was closed in 1869. In 1880 it was reopened

at Hamline. In 1917 there were connected with

the school 26 professors and instructors in the college of liberal arts and about 400 students.

There were 15,000 volumes in the library and

the endowment was $800,000.

HAMMER, a tool for driving nails or

wedges and for beating malleable materials.

(See Mallet). There are hand hammers,

steam hammers and electric hammers. The or¬

dinary hammer of to-day is essentially an

American product. Exactly when the ham¬

mer came into use is not told in history, but it is certain that some rude form of the in¬

strument must have been used in the earliest

days of handicraft. Of the hammers made in

America to-day there is no end. There is the

little tack hammer which weighs only a few

ounces and is indispensable in house, store or factory. Then there is the 20-and 30-ton ham¬

mer, driven by steam and used for making im¬

mense forgings. The numberless effects which

are due to its remarkable force of impact have made the hammer a necessity in all trades. Im¬

mense manufactories, employing thousands of

men, are grinding year in and year out making hammers, while 10 times as many wholesale

houses are busy putting the product on the mar¬

ket. The industry has advanced to such a stage that many general hardware firms in the Uni¬

ted States have thrown out the hammer, leav¬

ing it to the houses that deal in tools exclu¬

sively.

Hammers are made in a variety of shapes,

the most in demand being the claw hammer.

This and the shoemaker's hammer have re¬

tained their shapes for hundreds of years. One gold beating firm relies on them entirely. The sheets or leaves of gold are hammered to such exceeding thinness that 250,000 are required to make up the thickness of an inch. Another odd product of the hammer factory is the butcher's hammer, used for killing cattle. It is capable when properly wielded of carrying a very heavy blow. Then there are the stonecutter's ham¬

mer, the carpet-layer's hammer, the wood-carv¬

er's mallet and the plumber's odd implement.

All of these have a good sale in the markets of the world, because they possess a (<something® which users cannot find duplicated in

the output of other countries.

HAMMER-HEAD SHARKS, sharks of

the genus Zygcena, in which the head pro¬

trudes on either side into a 'broad lobe, so that the whole has somewhat the appearance of a

double-headed hammer; the eyes on the outer

ends of the lobes. Five species are known, two of which (Z . tiburo and Z. malleus) occur in the warm American seas, and the latter reaches a length of 15 feet or more.

HAMMER-PURGSTALL, Joseph, yo'-

zef ham'mer-poorg'stal, Freiherr von, Aus¬

trian Orientalist: b. Gratz, Styria, 9 June 1774; d. Vienna, 24 Nov. 1856. In 1799 he accom¬

panied, as interpreter to Constantinople, the in¬

ternuncio Freiherr von Herbert, who afterward

entrusted him with a mission to Egypt, where

he collected various antiquities and manu¬

scripts for the Imperial Library. In 1810 on

the occasion of the marriage of Napoleon with

Maria Louisa of Austria, he accompanied the

latter to Paris, where he became intimate with Sylvestre de Sacy and other Orientalists. In

1817 he was appointed imperial councillor at the court of Austria, where he also held the post of interpreter. In 1835 he received the title of Freiherr. Among his numerous literary works

may be mentioned Constitution and Adminis¬

tration of the Ottoman Empire) (1815-16);

Constantinople and the Bosporus) (1821) ;

(History of the Ottoman Empire) (1835-36) ;

(History of the Assassins5 ; (History of the

Golden Horde in the Kiptehak5 ; (History of the Ilkhans5 ; (History of Persian Eloquence5 ;

'History of Turkish Poetry5 (1836-38) ; his¬

tory of Arabic Literature) (1850-57) ; besides numerous translations from Oriental authors

and contributions to various periodicals.

HAMMERSMITH, London, a metropol¬

itan and parliamentary borough of London,

situated on the left bank of the Thames, six

miles west-southwest of Saint Paul's. Area,

2,286 acres. It is a great residential centre, especially favored by artists. Saint Paul's

School, founded in 1509, close by Saint Paul's Church and the successor of an older institu¬

tion dating from the 12th century, was re¬

moved here in 1883, and is one of the most im¬

portant public schools of England. Within the

borough is situated the Roman Catholic ceme¬

tery of Kensal Green. Kelmscott House, for

many years the residence of William Morris,

and which gave its name to his well-known pub¬

lications, is within the borough. The borough

returns one member to Parliament. Pop.

121,521.

HAMMOND, James Henry, American

politician : b. Newberry, S. C.,. 15 Nov. 1807; d.

Beach Island, S. C, 13 Nov. 1864. He studied

law, was admitted to the bar in 1828 and in

1830 became the editor of a political journal in Columbia, which maintained the doctrine of

State rights and advocated nullification in re¬

spect to the tariff act of Congress. He entered zealously into the nullification contest which

then divided the State, and took an active part in organizing the military force which South

Carolina raised in 1833 to resist the Federal

government. He was elected to Congress, and

took his seat in 1835, but declined a re-election on account of ill-health. In 1841 he was elected general of brigade, and in 1842 governor of

South Carolina. While governor he published

in 1844 a letter to the Free Church of Glasgow on slavery in the United States, and in 1845 two others in reply to an anti-slavery circular issued by Thomas Clarkson, the English abolitionist.

These, in connection with other essays on the

same subject, were published in 1853, in a vol¬

ume entitled (The Pro-Slavery Argument. > In

November 1857 he was elected to the United

States Senate, remaining there till 1860.

HAMMOND, John Hays, American min¬

ing engineer: b. San Francisco, 31 March 1855.

He was graduated from the Sheffield Scientific

School of Yale in 1876, studied at the Royal

School of Mines, Freiburg, Saxony, and became

an expert on the United States Geological Sur¬

vey and mineral census, with the duty of ex¬

amining gold mines in California. In 1882 he

was appointed superintendent of silver mines in Sonora, Mexico, but later was again in Cali¬

fornia as consulting engineer at mines in Grass Valley, and as consulting engineer to the Union Iron Works at San Francisco, and to the

Southern and Central Pacific Railwav com¬

panies. In the capacity of consulting engineer

he visited many portions of North and South

America and Mexico. In 1893 he went to South

Africa as consulting engineer to the mining com¬

panies operated there by Barnato Brothers of

London. He was associated with Cecil Rhodes

in the latter's numerous mining interests and

consulting engineer to the Randsfontein Estates

Gold Mining Company, the British South Af¬

rican Company (chartered) and the Consoli¬

dated Gold Fields Company. He was one of the

four leaders in the reform movement in the

Transvaal and for his connection with the well-known Jameson raid, with which, however, he

did not sympathize, was sentenced to death by

the Boers. This sentence was later commuted to 15 years' imprisonment and then to the payment of a fine of $125,000. He resides in New York, with offices there and in London, and is general manager and consulting engineer of the

Guggenheim Exploration Company, one of the

largest mining companies in the world. His

reputation as a mining, expert is world wide.

He declined a nomination for the Vice-Presi¬

dency in 1908. He was president of the Amer¬

ican Institute of Mining Engineers in 1907-08,

served as special Ambassador from the United

States at the coronation of George V of Eng¬

land in 1911.

HAMMOND, Samuel, American soldier:

b. Richmond County, Va., 21 Sept. 1757 ; d.

Horse Creek, near Augusta, Ga., 11 Sept. 1842.

His impulses led him, while a mere boy, to

volunteer in the wars of the Virginia frontier with the Indians, where he is said to have

greatly distinguished himself; and to have ac¬

quired that skill in stratagem which marked his subsequent military performances. In 1775 he

raised a company and took part in the battle

of Longbridge; and in 1779 he was at the battle of Stono Ferry, S. C. After the fall of Charles¬

ton he kept the field with a small cavalry force, pursuing the active partisan warfare which

alone maintained the Revolutionary cause in

South Carolina. He subsequently settled in

Georgia; in 1802 was elected to Congress from

Georgia; in 1805 was appointed by Jefferson to the civil and military command of upper

Louisiana; and in 1824 removed to South Caro¬

lina, where he became surveyor-general of the

State in 1827 and secretary of state in 1831.

HAMMOND, William Alexander, Amer¬

ican surgeon: b. Annapolis, Md., 28 Aug. 1828; d. Washington, D. C., 5 Jan. 1900. He was

graduated from the University of the City of

New York in 1848; and entering the United

States army in 1849 as assistant surgeon, be¬

came surgeon-general in April 1862. After the

Civil War he practised his profession in New

York for some years and in his later life took to writing fiction. Among his publications are

included ‘Military Hygiene* (1863) ; (Sleep and Its Nervous Derangements) (1869) ; (Diseases

of the Nervous System* (1871) ; (Neurological

Contributions,* etc., and the novels, (Robert

Severne* ; (A Strong-Minded Woman) ; (A

Son of Perdition) ; (Doctor Grattan) (1884) ;

(Mr. Oldmixon,* *etc.*

HAMMOND, Ind., was first organized as

a town in 1883 and in 1884 became a city.

It is located in the extreme northwest corner

of Indiana, bordering over seven miles upon

the Indiana-Illinois State line and two miles on Lake Michigan. It is immediately connected

with the city of Chicago, and is bounded on the east and northeast with the cities of East Chi¬

cago and Whiting, Ind. First a packing-house

town, the location of the Hammond Company,

numerous other industries have taken its place

— such as steel works, railway car and locomo¬

tive works, railway appliances, distilling, *etc.*

The F. S. Betz Company, manufacturers of sur¬

gical instruments, is the largest of the kind in the world. The W. B. Conkey Printing and

Publishing Company is the largest printing and

publishing establishment in the United States

outside of the government printing office at

Washington. The Grand Calumet River passes

through the city. This stream is navigable and empties into Lake Michigan at South Chicago,

Ill. Both sides of the river are lined with in¬

dustries of various kinds. The Indiana Harbor

Canal connects the river with Lake Michigan,

thus affording a harbor on Lake Michigan in

Indiana, as well as at the mouth of the river in Illinois. One of the chief distinctions

of Hammond is its railroad facilities, hav¬

ing 14 trunk lines and three belt lines. Each of the belt lines connects with every railroad running in and out of Chicago. There are

three interurban lines connecting the city with Chicago, Whiting, East Chicago, Indiana Har¬

bor, Gary and other cities in northern Indiana.

The city is rapidly developing its banking

and financial interests. It is the location of the Lake Superior Court,

which is one of general

jurisdiction. Hammond has five beautiful parks

and an admirably equipped public library, excel¬

lent public schools, in addition to Catholic and 066

Protestant establishments, and is well supplied

with churches. It is governed by a mayor and

council. Pop. (1920) 36,004.

HAMMONDSPORT, N. Y., town in Steu¬

ben County, on the Erie and the New York,

Ohio and Western railroads, about 55 miles

southeast of Rochester and 50 miles southwest

of Auburn. The town is in a fertile agricultural section, noted especially for the large number

of vineyards. The chief manufactures are mo¬

tors, aeroplanes, fruit-boxes, flour, cigars, bar¬

rels, wire hoods and baskets. Hammondsport

has a large trade in grapes and other fruits. It contains a high school and several other good

public buildings. Pop. 417.

HAMMONTON, N. J., town in Atlantic

County ; on the Philadelphia and Reading and

the Camden and A. railroads ; about 27

miles southeast of Camden and 28 miles north¬

west of Atlantic City. It is situated in a region noted for its rich farms and abundance of fruit.

The chief manufactures are shoes and cigars;

but it is the trade centre for the northeastern part of the county, and from Hammonton a

large amount of small fruits are shipped to

New York and other cities. The sewerage sys¬

tem and waterworks are municipally owned.

Pop. (1920) 6,417.

HAMMURABI, ham-moo-ra'be, The Code

of, instituted by Hammurabi, king of Babylon,

about 2200 b.c. is a thousand years older than the Mosaic Age; older than the laws of either Manu, or Moses. It is engraved on a pillar of black diorite, eight feet high, which was finally unearthed, January 1902, in the acropolis mound at Susa. The obverse of the column is sur¬

mounted by a bas-relief which represents the

god Bel, the lawgiver, before whom the king

stands to receive the law. The inscription which covers this stately monolith is the longest Bab¬

ylonian record ever discovered. It contained

originally about 3,000 lines of writing,

divided into 49 columns ; but five col¬

umns on the front have been erased by some

Elamite king, probably Sutruk Naknunti, who

served the stele of Naram-Sin in a similar man¬

ner. The writing is a very beautiful type of the best archaic script, a kind of black-letter cunei¬

form, long used by kings for royal inscriptions.

The code is divided into about 280 clauses and opens with the words, ((Law and justice I es¬

tablished in the land, I made happy the human race in those days.®

Character of the Code. — The code shows a

most careful and systematic order, beginning

with witchcraft, which connects it with a reli¬

gious code; it passes through all grades of social and domestic life, ending with a scale of official wages for all classes of workmen, even the low¬

est in the scale. Hammurabi's laws of witch¬

craft preserve the ((ordeal of water.®

(<If a man has placed an enchantment upon a

man, and has not justified himself, he upon

whom the enchantment is placed to the Holy

River (Euphrates) shall go; into the Holy

River he shall plunge. If the Holy River holds (drowns) him he who enchanted him shall take

his house. If on the contrary, the man is safe and thus is innocent, the wizard loses his life and his house.®

The same ordeal was applied to a wife for

unfaithfulness or extravagance, or to a wine—

seller who sold drink too cheap.

The three essential features of the code may

be clearly defined. First it is based on personal responsibility and the jus talionis. Thus: (<If any one destroys another's eye, his own eye

shall be destroyed. If any one breaks another's bone, his own bone shall be broken. If any one knocks out the tooth of his equal, his own

tooth shall be knocked out.® Next the belief in the sanctity of the oath before God, as in the Hebrew code, and also the absolute necessity of written evidence in all legal matters, as became a nation of scribes. Judgments in the law courts required a <(sealed® document; an agent must

take and give receipts for all money or goods entrusted to him; bonded goods required a de¬

posit note. One of the most interesting series of clauses relates to officers or constables em¬

ployed on active service ; the estate of such a person could be entrusted to management, could

not be sold or mortgaged, but must be cared

for by a deputy, or three years' absence and neg¬

lect entailed forfeiture. Substituted service was not allowed. As might be expected in a land so rich in cultivation, the agricultural laws are

most explicit. Land must be cultivated, and if neglected the owner had to pay the same as

neighboring land. Damage to crop by storm

excused the payment of interest on loan. There are very stringent laws as to the tending of the irrigation canals and ditches, and any damage to adjacent land by neglect had to be made good.

The commercial laws are extremely important,

as showing a highly developed system. Notice¬

able are the clauses relating to agents or ped¬

dlers, commercial travelers of the period.

<(If on the road on his business, the enemy

have caused him to lose the property he bore, the agent by the name of God shall swear and he shall be quit. If a merchant gives goods to an agent to trade with, the agent shall write down the money he shall take, and the mer¬

chant he shall render the agent a sealed (re¬

ceipt) for the money he gave to the merchant.®

Monetary Transactions. — Money for which

no receipt was taken not to be included in

the accounts. In case of dispute all witnesses and documents must be produced. Among the

commercial laws are some of much interest at

the. present time relating to licensed premises.

It is curious to note that all wine merchants were females.

((If riotous persons assemble in the house of

a wine merchant and those riotous persons she

seizes not and drives to the palace that wine merchant shall be put to death.®

Curious, too, is the following, which seems

to reflect the Hebrew Nazarite law: ((No votary or women residing in the cloister may open a

wine shop or enter one for drink on pain of

being burned.®

In the code's domestic legislation, the most

striking feature is the high position and legal protection extended to women. If a man causes

a votary or the wife of a man <(to have the finger (of scorn) pointed at her and has not

justified himself® he is to be branded on the forehead.

To justify herself from scandal a woman

could claim the ordeal of pluneing in the sacred river. The mere formula of marriage ((taking

to wife® was not sufficient, for <(if a man mar¬

ried a woman and executed not her deeds that

woman is no wife.® Divorce law is most fully

given -r-a childless woman could be divorced.

If divorced without cause the husband must

allow alimony and custody of her children, and a portion of the estate equal to a son, and the woman was free to marry. The woman could

get a divorce, but must justify her right to do so. Thus we read :

<(If the wife of a man who dwells in the

house of that man has set her face to go forth, and has acted the fool, and wasted his house, and impoverished his house, they shall call her to account. If the husband shall say, I put her away, he shall put her away. She shall go

her way; for her divorce he shall give her noth¬

ing.®

If the husband insisted, such a wife could be drowned. There is, however, a kindlier tone in the law as to a sick wife. ((If a man has mar¬

ried a wife and sickness has seized her, he may take a second wife, but the sick wife he shall not put away ; in the home she shall dwell ; as long as she lives he shall sustain her.®

Laws of Property. — The laws of property

are most full and based on a most equitable

system, one clause relates to the remarriage of a widow with young children and might be

present-day law :

((If a widow whose children are young has

set her face to enter into the house of another, without the consent of the judge she shall not enter. When she enters into the house of an¬

other, the judge shall inquire regarding the

house of her former husband to that

woman and her future husband he shall

entrust and cause them to deposit a

deed. They shall keep the house and rear

the little ones, but furniture for money they

shall not sell. A purchaser that has bought any furniture from the children of the widow shall forfeit his money and return the property to its owner.®

Here we have all the essential features of

the modern ward in chancery. In the conclusion of this code Hammurabi repeatedly calls him¬

self ((King of Righteousness,® as did his con¬

temporary Melchisedek of Jerusalem, and en¬

joins upon all of his successors upon the throne to observe this code and its laws. Consult

Cook, S. A., (The Laws of Moses and the Code of Hammurabi5 (London 1903); Davies, (The

Codes of Hammurabi and Moses) (Cincinnati

1905) ; Harper, R. F., (The Code of Ham¬

murabi5 (Chicago 1904) ; Johns/ Babylonian and

Assyrian Laws, Contracts and Letters15 (Edin¬

burgh 1904) ; Lyon, (The Structure of the Ham¬

murabi Code5 in Journal of the American

Oriental Society (Vol. XXV, Boston 1904) ;

Rogers, (Cuneiform Parallels to the Old Testa¬

ment5 (New York 1912).

HAMON, Jean Louis, zhori loo-e a-mon,

French genre artist: b. Plouha, Cotes-du-Nord,

France, 5 May 1821 ; d. Saint Raphael, Var,

France, 29 May 1874. His work though not

strong exhibits grace in drawing and is full

of tenderness and charm. His most important

work in the United States is (Among the

Flowers,5 to be seen in the New York Metro¬

politan Museum.

HAMPDEN, John, English statesman : b.

London 1594; d. Thame, Oxfordshire, 24 June

1643. He was educated at Oxford and, possess¬

ing an ample estate, led for several years the usual career of country gentlemen. He was

cousin-german, by the mother s side, to Oliver Cromwell. He entered Parliament in the be¬

ginning of Charles I's reign as member for

Grampound, and continued to sit in the House

of Commons three times in succession as mem¬

ber for Wendover, and finally for Bucks. He

was interested (1632) in the founding of Con¬

necticut. In 1636 his resistance to Charles' de¬

mand for ship-money made him the argument

of all tongues, especially as it was after the decision of the judges in favor of the king's right to levy ship-money, that Hampden refused

to pay it. Being prosecuted in the Court of

Exchequer, he himself, aided by counsel, ar¬

gued the case against the Crown lawyers for

12 days before the 12 judges, and al¬

though it was decided against him by seven

of them to five, the victory, as far as regarded public opinion, was his. From this time he re¬

ceived the title of the ((patriot Hampden.®

Henceforward he took a prominent part in the

great contest between the Crown and the Par¬

liament, and was one of the five members

whom the king, in 1642, attempted, in person,

to seize in the House of Commons. When

civil war broke out Hampden acted with his

usual decision, took command of a regiment in

the Parliamentary army, under the Earl of

Essex. Prince Rupert having appeared near

Thame, in Oxfordshire, Hampden joined a few

cavalry that were rallied in haste, and in the skirmish that followed on Chalgrove Field re¬

ceived a wound which proved fatal six days

after its infliction. His death was a great sub¬

ject of rejoicing to the royal party, and of grief to his own. His character and conduct, from

first to last, evince his conscientiousness, and he took his rank by acclamation on the

one side, and tacitly on the other, high in the list of English patriots. Consult Clarendon's

{ History of the Great Rebellion5 ; Nugent,

(Memorials of John Hampden5 (1831), with

Macaulay's essay on the same; Forster, (Life

of Hampden5 (1837) ; Gardiner, (History of

the Great Civil War5 (Vol. I, 1880).

HAMPDEN, Renn Dickson, English An¬

glican bishop: b. Barbadoes, W. I., 29 March

1793; d. London, England, 23 April 1868.

Although a man of moderate abilities both as

philosopher and theologian, it was his fortune

to precipitate one of the most notable contro¬

versies in the English Church. As Bampton

lecturer for 1832 he lectured on (The Scholas¬

tic Philosophy Considered in its Relation to

Christian Theology,5 which brought upon him

the charge of Arianism, and when he became

regius professor of divinity at Oxford, in 1836, opposition to the appointment was very bitter

and widespread. He was accused of heresy

and the leading men in the Anglican Church

took sides in a war of books and pamphlets. In 1847 he was nominated by Lord John Russell

for the see of Hereford and the strife of 10

years previous was renewed in organized fashion, many bishops uniting in remonstrance and the dean of Hereford openly resisting. He was nevertheless consecrated in March 1848, and his episcopate of 20 years was quiet, un¬ eventful and useful, the echoes of the great controversy having ceased long before his death.

HAMPDEN, Maine, town in Penobscot County, on the Penobscot River, about five miles southwest of Bangor, The chief manu-

factures are flour and lumber. There is an extensive river trade, chiefly in lumber and food products. The town is one of the oldest in the State, and recently it has grown steadily in industries and population. Pop. 2,380.

HAMPDEN-SIDNEY COLLEGE, at

Hampden-Sidney, in Prince Edward County,

Va. The school was founded by the pres¬

bytery of Hanover, in 1776, and in 1783 was

incorporated by the legislature of Virginia.

The land was donated by Peter Johnston, but

the acreage has been increased by gifts and

purchases, and the college now owns 250 acres.

Among the incorporators were Patrick Henry,

James Madison, Nathaniel Venable, Paul Car¬

rington, William Cabell, Sr., and many other

famous Virginians. Rev. John Blair Smith, the

first president of Union College, New York,

had previously been president of Hampden-Sidney College, also Rev. Archibald Alex¬

ander, the founder of Princeton Theolog¬

ical Seminary. It grants the degrees of bach¬

elor of arts, bachelor of science, bachelor of literature and master of arts. In 1916 there

were 118 students in attendance. The library

contains 25,000 volumes. The college has an

unusual number of alumni who are serving

with marked distinction in political, religious

and educational fields, and in educational work.

HAMPSTEAD, hamp-sted, England, a

metropolitan and parliamentary borough of

London, four miles northwest of Saint Paul's.

Area, 2,265 acres. It is a favorite residential quarter, having associations in this regard with the elder Pitt, Constable and Romney (the ar¬

tists), Bishop Butler, Sir Richard Steele and

Keats. Hampstead Heath, the most popular of

London's open spaces, has been left in its nat¬

ural condition, and is noted for its beauty and attractiveness. Over 100,000 persons have been

known to visit it on the Autumn Bank holiday.

The borough returns one member to Parlia¬

ment. Pop. 85,495. Consult Baine, (Records of

Hampstead5 (1890) ; Howitt, 'Northern

Heights5 (1869); Park, (Hampstead) (1814);

White, (Sweet Hampstead5 (1901-04).

HAMPTON, Wade, American general: b.

South Carolina, 1754; d. Columbia, S. C., 4

Feb. 1835. During the Revolutionary War he

served under Sumter and Marion. He was a

Democratic representative in Congress from

South Carolina 1795-97, and again from 1803 to 1805. In 1809 he was promoted to be brigadier-general, subsequently was stationed in command

at New Orleans, was superseded; in 1813 he

was raised to the rank of major-general and ap¬

pointed to command the force stationed at Nor¬

folk, whence he was shortly afterward ordered

to the northern frontier and placed in command of the army on Lake Champlain, with directions to threaten Montreal. The attack on Montreal,

for which 12,000 men had been concentrated near Lake Champlain, was frustrated by Hampton's

unwillingness to co-operate with his colleague,

General Wilkinson, with whom he had been

long at enmity. Hampton resigned his con—

mission 6 April 1814, and passed the rest of

his life in agricultural pursuits. . He was con¬

sidered the wealthiest planter in the United

States, and was reputed to be the owner of

3,000 slaves.

HAMPTON, Wade, American soldier: b.

Columbia, S. C., 28 March 1818; d. there, 11

April 1902. He was graduated from the Uni¬

versity of South Carolina, studied law but never practised, managed extensive plantations in

South Carolina and Mississippi, served in both

houses of the State legislature, but, as a Union Democrat, was not popular among South Caro¬

linians. At the beginning of the Civil War,

he formed and equipped at his own expense the command of cavalry,

infantry and artillery

known as ((Hampton's legion.55 With this he

won distinction at the first Bull Run and at

Seven Pines, where half his troops were killed and himself severely wounded. Having been

made brigadier-general of cavalry and assigned

to J. E. B. Stuart's command, he took part in Lee's advance northward (1863), was prominent

at Gettysburg, and later brilliantly opposed

Sheridan's progress in the Shenandoah Valley.

Pie attained the rank of lieutenant-general in

1864, and was placed in command of Lee's en¬

tire cavalry forces. In 1865 he commanded J. E.

Johnston's cavalry and endeavored to prevent

Sherman's northward advance from Savannah.

After the war he was an active reconstruction¬

ist; in 1876 was nominated as the Democratic

candidate for governor, and, after a contest re¬

garding the election with D. H. Chamberlain,

the Republican nominee, served until 1878, when he entered the United States Senate. He was

in the Senate until 1891, and in 1893-97 was

United States commissioner of railroads. Con¬

sult Wells, (Hampton and Reconstruction5

(1907).

HAMPTON, Iowa, city, county-seat of

Franklin County; on the Chicago, Great West¬

ern and the Iowa Central railroads, about 29

miles by rail south of Mason City and 60 miles north by west of Marshalltown. It is situated

in an agricultural and stock-raising region. The chief industrial establishments are cigar fac¬

tories and aluminum works ; and its principal

trade, in addition to the manufactured articles, is in grain, tobacco, live stock and horses. The waterworks are municipally owned. Pop. 3,025.

HAMPTON (formerly Hampton CourtHouse), S. C, village, county-seat of Hampton

County; on a branch of the Atlantic Coast

Line and the Hampton and Branchville rail¬

roads, about 67 miles southeast of Augusta.

The village is in the yellow pine section, but cotton, sweet potatoes and Indian corn are the staple products of the surrounding farm lands.

Its chief manufactured article is lumber. Pop.

748.

HAMPTON, Va., town, county-seat of

Elizabeth City County; on the north shore of

Hampton Roads ; on the Chesapeake and Ohio

Railroad, about two and a half miles from

Fortress Monroe and 15 miles north by west

from Norfolk. In the last of the 16th and first of the 17th centuries the Indian village Kiquotan occupied the site of the present town of Hamp¬

ton. John Smith and Lord Delaware mention

(1608-10) the peaceful friendly Indians of

Kiquotan, the hunters and fishermen; but be¬

fore 1610 there were whites living along the

shore and in this Indian village, which retained its Indian name for some time after it became a white settlement. In the first session of the Virginia house of burgesses or colonial legis¬

lature (1619), the borough of Hampton was

represented. In the. War of 1812 the town was attacked by the British and a large part was

burned. In 1861 it was again burned by the

Confederates. The church of Saint John,

Protestant Episcopal, built 1660, is still in good repair. Hampton contains a National Soldiers'

Home; a National Cemetery which contains

3,323 graves of soldiero, 600 of them of unknown dead. It is the seat of Hampton Normal and

Agricultural Institute (q.v.). It has some

manufactures ; brick, fish-oil and canned crabs.

It has considerable trade in fish, especially

oysters, and in fruits and vegetables. It has

excellent steamship and bathing facilities and

is a popular resort. Pop. (1920) 6,138.

HAMPTON COURT, England, a royal

palace situated near Hampton, a village of

Middlesex, 15 miles southwest of London. The

palace is about one mile from the village. The original edifice consisted of five quadrangles, of which two remain ; it was built by Cardinal

Wolsey in 1525, and presented in 1526 to Henry VIII by whom it was subsequently enlarged,

and who formed around it a royal park or

chase, which he enclosed and stocked with deer.

A third quadrangle was added by Sir C. Wren

for William III, who laid out the gardens and park in Dutch style. Hampton Court contains

many valuable pictures by Holbein, Lely, Kneller, West, *etc.* The gardens comprise about

44 acres, and contain a famous “maze® and

“wilderness.® Hampton Court was inhabited by

successive monarchs and their families until the reign of George II. Suites of apartments in

Hampton Court palace are now set apart for

persons of rank in reduced circumstances. The

state apartments, picture gallery, gardens and

home park are open to the public. In 1886 the palace suffered considerable damage by fire.

HAMPTON COURT CONFERENCE, a

meeting at Hampton Court (q.v.), on the 14th,

1 5th and 16th of January 1604, which was con¬

vened on the petition of the Puritan ministers to King James I for moderation and tolerance

on religious questions. By the composition of

the conference, — on the episcopal side being the archbishop of Canterbury, eight bishops, five

deans and two doctors, and on the Puritan side only four representatives, — the king sufficiently indicated his attitude toward the aims of the

Puritans, and the proceedings consisted chiefly

of adulation of James on the part of the epis¬

copal party, and lecturing of the Puritan mem¬

bers by King James. A few alterations were

made in the Prayer Book, and a new version of the Bible was agreed upon, the result being the authorized version of 1611.

HAMPTON NORMAL AND AGRI¬

CULTURAL INSTITUTE, a school for

negroes and Indians, opened in 1868, in Hamp¬

ton, Va., under the auspices of the American

Missionary Association. It was chartered by

the State in 1870. The school is owned and

controlled by a private corporation, adminis¬

tered by 17 trustees. The charter gives the

trustees power to choose their own successors,

and to hold property without taxation to the

amount of $800,000. In 1875 the general as¬

sembly of Virginia passed an act giving the

institute one-third of the agricultural college

land-grant of Virginia (see Colleges, Land—

Grant) amounting to 100,000 acres, which was

sold for $95,000 and which pays regular annual interest. The school was first opened in an old barracks (used during the Civil War), with

two teachers and 15 pupils. It now owns 188

acres on Hampton River, upon which have been

erected dormitories, a library, classroom build¬

ings, a church, gymnasium, saw and planing-mill, shops, hospital, domestic-science school,

trade school — in all numbering 60 buildings.

The institute owns also a stock farm of 600

acres, about five miles from the school. The

farm land, and tlˆe workshops where trades

are taught, furnish occupation for the boys and young men. The girls are instructed and em¬

ployed in sewing and cooking classes, in all the domestic work of the school, and wherever pos¬

sible learning trades side by side with the boys.

In 1896 the Armstrong , and Slater Memorial

Trade School was opened. (See Negro, Educa¬

tion of the). In this school is taught the

theory and practice of blacksmithing, carpentry, house painting, tailoring and general repairing.

The pupils are taught also mechanical, civil,

electrical, and mining engineering. On the

farms they are taught how to care for stock,

how to raise different crops, and the theory and practice of farming in general. The students

are charged $10 a month for board, which is

largely paid in labor. They are expected to

provide their own books and clothing, and for

the tuitions, buildings, furniture and the imple¬

ments used on the farms and in the shops the school is dependent on the charity of the

country. In 1878, 15 Indians, who had been

prisoners of war at Saint Augustine, Fla., and in charge of Capt. R. H. Pratt, were admitted as students. Since then the Indian department

has increased steadily, the pupils being chiefly from the Sioux tribe, of whom two-thirds make

a fair or good record. The young men of the

school are organized into six military com¬

panies, all forming one battalion. This places

the young men under military discipline. The

Southern Workman, a monthly school periodi¬

cal, is edited, printed and managed by the

pupils with only a general supervision by one

of the teachers. The vacation is from June to October for all except the

pupils in the in¬

dustrial departments, which continue work all

the year. During the regular long vacation a

large number of the colored teachers of the

South assemble here for a summer school. For

the past 10 years the average attendance at

these summer schools has been nearly 500. The

students number about 1,800, more than half of whom are teaching in the colored schools of

the South. In 1917 the number of pupils in

Hampton Institute was about 1,400, about 90

per cent of whom were in the industrial and

preparatory departments, the remainder in the

college department. The faculty, instructors

and officers numbered 133. The library con¬

tains about 37,000 volumes. Many of the gradu¬

ates are engaged in farming or working at

trades ; some are teaching. Booker T. Wash¬

ington (q.v.), of the class of 1875, is the

most noted graduate. Hampton's endowments

amount to about $2,750,000. The annual in¬

come is about $290,000, and comes from the

government Indian funds, the Slater and Pea¬

body funds, the State land-grant and agricul¬

tural funds and from private donations.

HAMPTON ROADS, Va., a broad, deep channel which connects the estuary of the James River with Chesapeake Bay; really a part of the estuary which is at the mouths of ero

the James, Elizabeth and Nansemond rivers. Some of the good harbors along the shore are Norfolk and Portsmouth on the south; Hamp¬ ton, on the Hampton Creek, an arm of the Hampton Roads, on the north. At the entrance are Forts Monroe and Wool. On the north side of the entrance is Thimble Shoal light. A large number of railroads have terminals on Hampton Roads, especially, at Norfolk. This estuary, or channel, is considered of great mili¬ tary importance. During the Civil War its advantages as a military station were demon¬ strated. On Hampton Roads occurred the battle of Hampton Roads (q.v.), the first en¬ gagement between ironclads.

HAMPTON ROADS, Battle of. Hamp¬

ton Roads was the rendezvous of several im¬

portant naval and military expeditions during

the war, and the scene of two memorable en¬

counters. On 8 March 1862 the Confederate

ram Merrimac (or Virginia) left her anchorage

at Norfolk, 12 miles from Fort Montroe,

steamed down Elizabeth River and, with her

consorts, five in number, attacked the Union

fleet of five vessels in the Roads, destroying the Congress and Cumberland, which lost over 250

men, and then retired to the mouth of Elizabeth River. Next morning the Merrimac returned

to the Roads to complete the destruction of the Union fleet, but was met by the Monitor, which had arrived the night before from New York,

and a novel naval battle ensued, resulting in

the return of the Merrimac to Norfolk and the saving of the remainder of the Union fleet. See Monitor and Merrimac.

HAMPTON ROADS CONFERENCE,

an informal conference held 3 Feb. 1865, be¬

tween President Lincoln and Secretary of State

Seward, representing the United States govern¬

ment, and Vice-President Alexander H.

Stephens, Senator Robert M. T. Hunter and

Assistant Secretary of War John A. Campbell,

representing the Confederate States. The meet¬

ing took place on board the River Queen, near Fort Monroe, and its object was the arrange¬

ment of a peace between the North and South.

The originator of this conference was Francis

P. Blair (q.v.) who thought a combination of

North and South against Maximilian in Mexico,

in enforcement of the Monroe Doctrine, would

bring in peace by a diversion. President

Lincoln refused to join the conference except¬

ing with a view to the restoration of union,

and on the understanding that the Emancipa¬

tion Proclamation was to stand without quali¬

fication. He disapproved of a joint action

against the French in Mexico. The conference

lasted for four hours, but broke up without

reaching any definite conclusion.

HAMSTRING. See Anatomy; Muscles.

HAMSUN, Knut, Norwegian novelist: b.

Loni, 4 Aug. 1860. He spent a number of

years in the United States, earning a living in the most difficult and unhealthy occupations,

which caused him to return to Christiania in

1888 with very unfavorable impressions of

America. His experiences in America were the

foundation for a very savage attack on Ameri¬

can institutions and manners (Fra Amerikas

Aandsliv) ((American Spiritual Life,* 1889),

as well as for his first powerful novel, (Sult) ((Hunger,> 1888). His novels include:

(Mysterier) (1892); (Redaktor Lynge* (1893);

(Ny Jord) (English translation, (Shallow Soil,*

New York 1914); (Pan> (1894); fiesta'

(1897); (Victoria* (1898); (Munken Vendt)

(1902). He has also written plays and a book

of travel in the Caucasus. A collected edition of his works appeared at Christiania in 1899.

HAN-YANG, han-yang'. See Hankow.

HANAFORD, Phebe Ann Coffin, Ameri¬

can Universalist minister: b. Nantucket, Mass.,

6 May 1829. In 1849 she was married to J. H.

Hanaford, a teacher. She was the first woman

ordained to the ministry in New England and

since her ordination in 1868 has held pastorates in Hingham and Waltham, Mass., New Haven,

Conn., and Jersey City. She has been indus¬

trious as a writer, among her many published

works being (Life of Abraham Lincoln) ; (Life

of George Peabody* ; (Lucretia the Quakeress> ; (Leonette, or Truth Sought and Found) ; (The

Best of Books and its History) ; (Frank Nelson, the Runaway Boy) ; (The Soldier's Daughter) ;

(Field, Gunboat and HospitaP ; (Women of

the Century) ; (From Shore to Shore and Other Poems, * *etc.*

HANCOCK, JOHN, American statesman :

b. Braintree, Mass., 23 Jan. 1737; d. Quincy,

Mass., 8 Oct. 1793. He was graduated at Har¬

vard College in 1754, but shortly after entered the counting house of an uncle, on whose death in 1764 he received a fortune of £80,000. After 1766 he was several times elected to the Massa¬

chusetts General Court. It was the seizure of

his sloop, the Liberty, that occasioned the riot in 1768, when the royal commissioners of cus¬

toms narrowly escaped with their lives. After

the socalled ((Boston massacre,** in 1770, he

was a member of the committee to demand of

the royal governor the removal of the troops

from the city, and at the funeral of the slain delivered an address which greatly offended the governor, who now endeavored to seize the per¬

sons of Hancock and Samuel Adams. Both

were members of the Provincial Congress at

Concord, and later of that at Cambridge, and

Hancock was president of each. This arrest is

said to have been one of the objects of the

expedition to Concord which led to the first

battle of the Revolution after which Gage

offered pardon to all the rebels except these

two, ((whose offences,** he added, (<are of too fla¬

gitious a nature to admit of any other consider¬

ation but that of condign punishment.® In 1775

Hancock was chosen president of the Conti¬

nental Congress, and in 1776 signed the Decla¬

ration of Independence. He resigned from the

presidency in 1777 but was a member of the

Congress until 1780 and again in 1785-86.

With rank of major-general, he commanded

the Massachusetts forces in the Rhode Is¬

land expedition, in 1780 was a member of the

Massachusetts Constitutional Convention, and

under that constitution was in 1780 chosen first governor. To this office, with an interval of

two years (1785-87) he was annually reelected

till his death. His last important office was as president of the convention in 1788 on the

adoption of the Federal Constitution. Han¬

cock was a man of strong common sense and

great decision of character, of polished man¬

ners, easy address, affable, liberal and chari¬

table. His personal vanity and his jealousy

were at times Conspicuous, but he was a sincere patriot and of much ability. John Adams said

of him : (<He was by no means a contemptible

scholar or orator. Compared with Washington,

General Lincoln or Knox, he was learned.®

Consult Brown, A. E.. (john Hancock: his

Book' (1898) ; Sears, (John Hancock the Pic¬

turesque Patriot > (1912).

HANCOCK, Winfield Scott, American sol¬

dier: b. Montgomery Square, Pa., 14 Feb. 1824; d. Governor's Island, New York Harbor, 9 Feb.

1886. He was graduated from the United

States Military Academy in 1844, and after fron¬

tier service in the Sixth Infantry, fought with credit in the Mexican War, was successively

regimental adjutant and quartermaster in 1848—

55, and briefly assistant adjutant-general to the Department of the

West. Appointed assistant

quartermaster with rank of captain in 1855, he was stationed at Fort Myers, Fla., during the

Seminole disturbances, and in 1857-58 was in

Kansas, whence, after service in the border

troubles, he was ordered successively to Utah

and California. In 1859-61 he was chief quar¬

termaster of the southern district of California, with headquarters at Los Angeles. At the be¬

ginning of the Civil War he was commissioned

brigadier-general of volunteers, and assigned

to the command of a brigade in Smith's divis;on, Fourth corps, Army of the Potomac. He

distinguished himself at Williamsburg and dur¬

ing the second day's fight at Antietam (17

Sept. 1862) was placed in command of the

First division, Second army corps. Promoted

major-general, United States Volunteers (No¬

vember 1862), he commanded his division at

Fredericksburg in the attack on Marye's

Heights, on which occasion he lost 2,013 from

a total of 5,006 troops. He largely saved the day at Chancellorsville (2-4 May 1863) and

shortly afterward was assigned to the command

of the Second corps. In July 1863 he was

ordered by Meade to proceed to the field of

Gettysburg, take command and report whether

battle should'- be given at that point. He re¬

ported Gettysburg as the suitable place for the ensuing battle, reorganized the Federal lines,

on 2 July commanded the left wing and on the next day the left centre, against which was

directed a Confederate charge in the course of which the Second corps lost about 4,000 killed and wounded out of less than 10,000 troops,

and Hancock was shot from his horse. In

1866 he was appointed major-general, United

States army, in 1866-68 commanded succes¬

sively the departments of Missouri and of

Texas and Louisiana, in 1868-69 the military

division of the Atlantic, in 1869-72 the Depart¬

ment of Dakota. He was again assigned to the

division of the Atlantic in 1872. In 1880 he

was Democratic candidate for the Presidency,

but was defeated, largely on the tariff issue, by Garfield by a vote of 4,454,416 to 4,444,952.

He was a brilliant leader, known as ((Hancock

the Superb® — ((the most conspicuous figure,®

says Grant, ((of all the general officers who did not exercise a separate command.® Consult

the <Life,> by Walker (1894).

HANCOCK, Mich., city in Houghton

County; on Lake Portage, and on the Duluth,

S. S. & A. Railroad; opposite Houghton (q.v.).

Although the northern part of Michigan and

this region had been explored by missionaries

in the 17th century, the first permanent settle¬

ment was made in Hancock in 1859 and the

village was incorporated in 1863. Incorporated

as a c.ty in 1903. It is situated in a section rich in minerals, the Lake Superior copper belt.

The Quincy Mining Company is also located

there; the Calumet and the Hecla copper mines

are nearby and the city has foundries, machine-shops, smelters, stamp-mills, lumber and brick

yards. Hancock has two banks, with a com¬

bined capital of $350,000. The Detroit North¬

ern Michigan Building and Loan Association

has its main offices in Hancock. An overall

factory and a furniture plant are new additions.

A ship-canal to Lake Superior brings a large

portion of the lake traffic to and from Duluth and Superior through the (<short cut,® by way

of Hancock. It is the seat of a Finnish col¬

lege. The government is vested in a mayor,

whose term of office is one year, and a city council who are elected by the people. The city owns and operates the waterworks. Pop. 8,981.

HANCOCK, N. Y., village in Delaware County, at the confluence of the two branches of the Delaware River, on the Erie and the New York, Ont. and Western railroads. There are in the vicinity bluestone quarries which add to the industrial wealth of the village; the other industrial establishments being flour mills, tanneries, a wood-alcohol factory and large refinery, a charcoal mill for the prepara¬ tion of charcoal in all its forms and lumber yards. An excellent high school is located here. The village is a trade centre for an extensive agricultural region ; it has good shipping facili¬ ties and electric power. Pop. (1920) 1,326.

HANCOCK, Mount, a peak of the Big Game Range, in the southern part of the Yel¬ lowstone National Park, on the boundary be¬ tween the Park and Wyoming. It is on the western border of Two Ocean Plateau, a por¬ tion of the continental divide. The Snake River (q.v.) has its rise on the east side of Mount Hancock, flows north by west, then south by west around and almost circling the mountain. Mount Hancock is 10,235 feet in height.

HAND, Edward, American revolutionary

soldier: b. Clyduff, King's County, Ireland, 31

Dec. 1744; d. Rockford, Lancaster County, Pa.,

3 Sept. 1802. In 1774 he came to America as

surgeon's mate in the 18th Royal Irish regiment, but he later resigned and entered medical

practice in Pennsylvania. At the outbreak of

the Revolutionary War he became a lieutenant-colonel in Gen. William Thompson's brigade,

participated in the siege of Boston and in

1 777 was appointed brigadier-general. In 1778

he succeeded General Stark in the command at

Albany and later took part in General Sul¬

livan's expedition against the Iroquois. He sat in Congress in 1784-85 and signed the Pennsyl¬

vania constitution in 1790.

HAND. The human hand is composed of

27 bones, namely, eight bones of the carpus or wrist arranged in two rows of four each, the

row next the forearm containing the scaphoid,

the semi-lunar, the cuneiform and the pisiform, and that next the metacarpus, the trapezium,

the trapezoid, the os magnum and the unci¬

form. The metacarpus consists of the five

bones which form the palm, the first being that of the thumb, the others that of the fingers in 672

succession. Lastly, the fingers proper contain

14 bones called phalanges, of which the thumb

has but two, all the other digits having three each. These bones are jointed so as to admit

of a variety of movements, the most char¬

acteristic being those by which the hand is

flexed backward, forward and sideways, and

by which the thumb and fingers are moved in

different ways.

The chief muscles which determine these

movements are the ˆflexors,® which pass down

the forearm, are attached by tendons to the

phalanges of the fingers and serve to flex or bend the fingers ; and the ˆextensors® for ex¬

tending the fingers. There are two muscles

which flex all the fingers except the thumb.

The thumb has a separate long and short flexor There is a common extensor for the fingeis

wh:ch passes down the back of the forearm

and divides at the wrist into four tendons, one for each finger, each being attached to all three phalanges. The forefinger and little finger

have, in addition, each an extensor of its own, and the thumb has both a short and a long

extensor. The tendons of the muscles of the hand are interlaced and bound together by bands and aponeurotic fibres, and from this results a more or less complete unity of action.

It is sometimes difficult to make a movement with a single finger without the others taking part in it, as in executing instrumental music, for instance ; but practice gives to these move¬ ments perfect independence.

Of all the movements of the hand the op¬ position of the thumb to the other fingers, alone or united, especially characterizes the human hand. This action of the thumb results from its length, from the first metacarpal bone not being placed on the same plane as the other four, as is the case in the monkey, and from the action of a muscle — the long flexor of the thumb —peculiar to the human hand. This muscle com¬ pletes the action of the other motor of the thumb and permits man to hold a pen, a graver or a needle; it gives to his hand the dexterity necessary in the execution of the most delicate work. Properly speaking then, the hand, with its highly specialized muscles, belongs to man alone. It cannot be considered, as in the ape, as a normal organ of locomotion. It is essen¬ tially the organ of touch and prehension. It molds itself to a body to ascertain its form; it comes to the aid of the eye in completing or rectifying its impressions. The functions of touch devolve principally on its anterior or

palmar face, the nervous papillae abounding

specially at the ends of the fingers. A layer of adipose tissue very close in texture protects, without lessening its power or its delicacy, the network of muscles, vessels and nerves with

which this remarkable organ is equipped.

HANDBALL, a popular game of ball, the

bare hand only being used. The game is in¬

digenous to Ireland, but has been transplanted

to America, where are the most expert players.

Two or four men can play, one or two on a

side. As far as is known the game of handball came to the United States about 1840, and has since become one of the sports under the regu¬

lations of the Amateur Athletic Union. The

game consists of scoring the ball against a

single back wall, with a lined-out space of 60

feet in front, or in an enclosed court of that length, 25 feet wide, and 30 feet walls. The

ball coming from the wall (when played in the open) must fall between these two lines to be in play. The game is simply to strike the ball on the rebound with the hand. Consult Spald¬

ing's (Official Handball Guided

HANDEL, George Frederick (properly

Georg Friedrich Haendel), English composer:

b. Halle, Saxony, 23 Feb. 1685; d. London, 20

April 1759. His father, intending him for the

law, discouraged the strong passion which he

evinced early in life for music. But although

forbidden the use of musical instruments, he

contrived to hide a small clavichord in a gar¬

ret, where he amused himself during the night

after the rest of the family had retired, and made such progress that, when at seven he ac¬

companied his father to the court of Saxe—

Weissenfels, he played on the church organ

with such power and effect that the Duke, who accidentally witnessed his performance, used

his influence successfully with the father to

permit him to follow his inclination. He was

accordingly placed under Zachau, organist of

the cathedral, and was soon so far advanced in the practical part of the science as to officiate as deputy to his instructor. At 14 he went to Berlin, where the opera under the direction of Buononcini qnd Attilio was then in a very

flourishing condition. Attilio became his teacher and friend. In 1703 he went to Hamburg, and

procured an engagement in the orchestra at the opera there. On 30 Dec. 1704, he brought out

his first opera, <Almira) ; in the February fol¬

lowing, this was succeeded by his <Nero> and

subsequently by <Florindo) and (Daphne. } He

then went to Italy, where he composed the

operas <Rodrigo) and Agrippina,* and the first

form of the serenade (Acis and Galatea.* On

his return to Germany in 1710 he entered the

service of the Elector of Hanover, afterward

George I of England, as chapelmaster ; but

having received invitations to visit London, he set out for England, where he arrived at the

end of 1710. On the occasion of his first visit to England he composed the opera ‘RinaldoP

He soon returned to Hanover, but at the end

of two years again received permission to visit England. At the time of his arrival in London the negotiations for the Peace of Utrecht were just about to be concluded, and Handel was

invited by Queen Anne to compose a (Te

Deum> and <Jubilate) in celebration of the

peace. But this act was so distasteful to the Elector of Hanover that Handel did not ven¬

ture to return, and remained in England on an income of £200 a year allowed him by the

queen. He was, in consequence, on the acces¬

sion of his royal patron to the throne of Great Britain in 1714, in much disgrace, till Baron

Kielmannseck restored him to favor. From

1715-18 Handel resided with the Earl of Bur¬

lington, and then quitted that nobleman for the service of the Duke of Chandos, who retained

him as chapelmaster to the splendid choir es¬

tablished at his seat at Cannons. For the serv¬

ice of this magnificent chapel Handel pro¬

duced those anthems and organ fugues which

alone would have been sufficient to immortalize him. When the Royal Academy of Music was

instituted by some of the leading noblemen of

England, Handel, whose fame had now reached

its height, was placed at its head; and this, for HANDICAPPING — HANDWRITING

a short period, may be considered as the most splendid era of music in England. The warmth

of his own temper, however, excited by the

arrogance and caprice of some of his principal Italian singers, caused many violent quarrels;

and public opinion becoming enlisted in favor

of his opponents, and especially of his rival, the musician Buononcini, his popularity waned

somewhat and the academy was dissolved

(1728). Handel then started a new operatic

company. But a rival company to his was

ˆafterward started, and the result was that much money was lost by both. The operas which he

had composed up to this date (1735), from the institution of the Academy of Music, were

<Radamisto) ; (Ottone) ; (Giulio Cesare) ; (Flo-ridante) ; <Flavio) ; (Tamerlano) ; (Rodelindo) ; Alessandro-* ; (Scipione) ; (RicardoP; (Tolo-meo) ; (Siroev; <Lotario) ; <Parthenope) ; (Po-ro) ; <Orlando) ; ˆosarme*; Ariadne*;

(Ezio) ; <Ariodante) ; and <Alcina.) Among

other works should be mentioned his first'English oratorio, (Esther,* and his delightful pas¬

toral (Acis and Galatea.* In 1736 his famous

setting of Dryden's ode, Alexander's Feast,)

was performed with brilliant success. His last

opera was performed in 1741. Handel had by

this time begun to devote himself chiefly to

music of a serious nature, especially the orato¬

rio. The approval which his first works of

this kind (Esther, } (Deborah) (1723), Atha—

lia) (1733), had met with encouraged him to

new efforts ; and he produced in succession

(Saul,* (Israel in Egypt, *and (The Messiah.*

The last-mentioned, his chief work, was

brought out at Dublin in 1742. This sublime

composition had been composed the previous

year in the incredibly short period of 23 days.

When Handel returned to London his oratorios

were received at Covent Garden Theatre with

the greatest approbation by overflowing audi¬

ences — (The Messiah* in particular increased

yearly in reputation. Before it was given,

however, a new oratorio, (Samson,* was pro¬

duced (1743), and there next followed (Joseph

and his Brethren) (1744), (Belshazzar* (1745),

(Judas Maccabaeus* (1747), <Joshua> (1748),

(Solomon) (1749) and <Jephthah) (1752).

Some time before his death he was afflicted by nearly total blindness ; but he continued not

only to perform in public but even to compose.

His own air, however, (Total Eclipse, * from

the oratorio of (Samson, * is said always to

have affected and agitated him extremely after

the loss of his sight.

Handel's habits of life were regular; his

appetites were coarse, his person large and un¬

gainly, his manners rough and his temper even

violent; but his heart was humane, and his dis¬

position liberal. His musical powers can hardly be estimated too highly. In boldness and

strength of style, and in the combination of

vigor, spirit and invention in his instrumental compositions he has never been surpassed. His

choruses have a grandeur and sublimity which

have hardly been equaled. Yet a singular fact

in regard to him as a musician is that in some of his works he shows himself as an unscrupu¬

lous plagiarist — a fact of which various expla¬

nations and palliations have been attempted.

He was buried in Westminster Abbey, where a

monument by Roubiliac was erected to his

memory. Consult (Lives* bv Chrvsander

(1858—67) ; and Rockstro (1883) ; Whitting-

ham, (Life and Works of Handel * (1882) ;

Rolland, R., (HandeI* ; Streatfield, R. A.,

(Handel } (London 1909) ; the articles in the (Dictionary of National Biography) and Grove's

dictionary of Music. *

HANDICAPPING, a term used in racing:

The allowance of time, distance or weight

made to the inferior competitors in a race with the object of bringing all as nearly as possible to an equality; the extra weight imposed on a superior horse in order to reduce his chance of winning to an equality with that of an inferior animal. The handicap is framed in accordance

with the known previous performances of the

competitors, and in horse-racing also with re¬

gard to the sex and age of the animals engaged.

The principle is the same in other contests, as in billiards a superior player is handicapped by having to allow his inferior competitor a start of a certain number of points.

HANDIES (han'diz) PEAK, in the south¬

eastern part of Colorado, in the San Juan

Range ; about 12 miles northeast of Silverton.

Rich deposits of silver ore are found in all

the mountains of this vicinity; the range is

known as the <(Silver San Juan.® The altitude

of Handies Peak is about 14,000 feet.

HANDWRITING, Expert Analysis of.

A mental image may be made either consciously

and with attention to every detail, or with vary¬

ing degrees of consciousness amounting in some

cases to almost complete automatism, but it

must in any case be largely influenced by the machine which produces it. No matter what

care may be employed to make two objects

alike, a sufficiently minute inspection will always discern differences between them. It is from

this fact we are able to distinguish a particu¬

lar tone of a bell, a particular face, *etc.* All things, and notably those which owe their exist¬

ence to organic life, are resultants of very com¬

plex forces acting simultaneously or in sequence, and in comparing similar resultants it is ever found that quantitative or qualitative differences of the constituent forces employed in fashion¬

ing them have occasioned differences in the

objects themselves. Thˆse differences may be

indiscernible to the casual view, but will never fail to reveal themselves to an examination

sufficiently searching.

The factors employed in making marks may

be roughly divided into : A, the model in the mind which it is the intention to reproduce ; and B, the mechanism by which the act is to be ac¬

complished. Under the latter head there is to

consider not only the permanent structure of

the individual, which necessarily limits his per¬

formance, but also the manner of employing

this structure, which becomes a habit, and the fluctuations, due to disease, drugs, variations of mood, increasing age, etc., in the motor im¬

pulses controlling it.

The basis of any sound judgment on the au¬

thorship of designs such as pictures or hand¬

writings depends upon the recognition of sorts

of differences; which it is essential to dis¬

tinguish from each other. In general, designs

by different authors differ in kind, while those of the same author differ in degree. The

methods for distinguishing these two sorts of

differences will be more particularly treated

hereafter.

The general subject of the study of those

characteristics which distinguish each hand¬

writing from every other has been called Gram—

mapheny; the study of methods for detecting

frauds relating to handwriting either in imi¬

tating, altering or suppressing a record, is called Plassopheny ; and the general study of the

records of human thought, including their

forms, their purport and the tools and materials by means of which they are produced is called Bibliotics.

Ever since the more or less permanent rec¬

ords of human thought have had a value they

have been the objects of falsification. It is not known to how great an extent this may have

been practised in the hieroglyphic and ideo¬

graphic carvings on stone, but doubtless inter¬

polations were frequent in recording the deeds

of their kings, and the sculptors imitated each other's style with a

view of bettering their own ; or each other's peculiarities to convey false im¬

pressions as to the narrator.

But with the introduction of writing in pig¬

ments on parchment and papyrus the greater

facility with which alterations and erasures

could be made immediately attracted the atten¬

tion of the unscrupulous. According to his¬

torians the Greeks, Romans, Egyptians, As¬

syrians and others practised garbling and

forgery by erasing, resurfacing and bleaching

manuscripts to change their purport, or give

false impressions of their age and authorship.

These depredations, then as now, were chiefly

made upon manuscripts of persons absent or,

more commonly, deceased; whole compositions

which they never saw being ascribed to them.

As an example may be cited the interpolation in the text of Josephus with which Eusebius has

been charged. A host of epistles, papal de¬

crees, productions of the Fathers and dogmat¬

ical treatises were in early times altered, erased in part, and falsified from the original text, sometimes by learned and reverend scholars for

the greater glory of the Church, and sometimes by obscure copyists from ignorance, or trifling incentives. Erasmus declared he knew of but

a single important old manuscript which was

not tainted by this kind of fraud. The methods of effacing the writing of a parchment multi¬

plied in proportion to the increase of manu¬

scripts and the cost of parchment. The prac¬

tice of using such effaced parchments for other writings was common in the time of Cicero, as a letter from him to Trebatius testifies. Such writings were called palimpsests ; and the cus¬

tom of producing them gave dangerous ex¬

perience to perpetrators of fraud in the art of effacing written characters by mechanical and

chemical means. Plutarch speaks of this

practice as one well known. As the price of

parchment rose it began to be the habit in the early libraries to efface the letters from parch¬

ments “of little value® in order to replace them by more valuable compositions. Dangerous as

was such a rule at any time it became fatal to learning when the choice was in the hands of

those who were inflamed against their adver¬

saries in controversy, and against all “pagans,®

in which class almost all the great authors of our classics were included, and willing to sacri¬

fice the choicest thoughts of the Greeks and

Romans in favor of the fanatical dissertations

of those they were pleased to call the “faithful.®

When the Caliph Omar put an end to the

manufacture and sale of papyrus he caused a

wholesale destruction of the writings in the

libraries throughout the world. Many scholars

believe that the world thus lost great stores of classical literature, the exact magnitude of

which can never be ascertained or even

estimated. (Consult Gustave Itasse, (Le Faux

devant l'histoire,* etc., from which much of

the preceding is taken). According to Adolphe

Bertillon (Revue Scien. 25, 4 Ser. Vol. VIII, 18 Dec. 1897) the first recorded student of

bibliotics was Frangois Demelle in 1609, and the first writer on the subject one Raveneau (1656).

In his treatise the latter deplores the lack of science of his colleagues, which however did

not prevent their landing him in jail for forgery.

The methods employed in judging the au¬

thorship of handwriting by these and almost

all later writers on the subject are the same as those relied upon by connoisseurs of paint¬

ing. They deal exclusively with the pictorial

and apparent peculiarities, and the undefined

effect these produce upon the mind. The

most daring of these methods is the socalled

"Graphology,® described in a pamphlet of the

Abbe Michon in 1880, which has many con¬

scientious supporters and partial government

rec<pgnition in Germany and France. This

curious study has for its object the revelation of the character and peculiarities of a writer by his handwriting. It would lead to too long a digression should the various claims of the

advocates of graphology be reviewed. It must

suffice here to say that some of these, not con¬

tent with finding in the manuscript of an un¬

known writer personal peculiarities which he al¬

ready possesses, have imagined they could de¬

tect the lurking tendencies to virtuous or vicious deeds such as self-sacrifice, kleptomania, mur¬

der, etc., which he has never developed. These are deduced from the pen habits which they

think they detect in the writing: such as de¬

liberation, precipitancy, economy of paper or

of effect, etc., *etc.* M. Bertillon thinks “To

the public no proof is so decisive as that of personal identification of individuality, yet how many mistakes are made?® He believes with

the exception of the advance in photography the art of handwriting judgment is just where

Raveneau left it in the reign of Louis XIV.

He forgets the aid he himself has rendered to the art of differentiating and identifying hand¬

writing by the application of his anthropometrical measures for the identification of crimi¬

nals. The former art without such methods is

in precisely the state in which Bertillon found the latter before his

demonstration that exact

measurements of different parts of the body

and the relation to each other of the results of such measurements entirely removed the chance

of error in identification, whereas there have

been many instances of mistaken identity, or

denial of identity by a wife or other near rela¬

tive of the person in question. The history of this minute branch of research resembles that

of other and larger branches. Subjective im¬

pressions such as those supplied by the feelings, indicating supposed relative amounts or inten¬

sities of emotions or sensibility, which were the only guides to the pioneers of inductive re¬

search, gave way to exact methods by employ¬

ment of instruments of precision recording facts in intelligible units, in estimating, for example, degrees of acidity, pitch of sounds, height of temperatures, intensity of lights. One after the HANDWRITING

other the old subjects of research were fur¬

nished with these unequivocal means of record¬

ing phenomena, and all the new subjects were

required to find such means or forfeit recogni¬

tion. Thus through mathematics astronomy,

already in the van of exact sciences, was en¬

abled to make enormous enlargements of our

view of the universe in the last two centuries, and even those objects of research which

seemed to defy such treatment were provided

with mathematical methods. Psychology be¬

came a science admitting experimentation of

which the results can be expressed in units, and chemistry is becoming as loyal a subject of that science of relation — mathematics — as its sis¬

ters, physics and mechanics.

The purpose of the investigation of a hand¬

writing will determine the kind of examination

that is made. If the object be to ascertain

whether a particular signature has been legiti—

niately placed as an authentification of a writ¬

ing, it is necessary to scrutinize the paper on which it is written for evidence of scratching, erasing or other tampering; the ink for

peculiarities of constitution which may be in¬

consistent with its use at that time and in that place. The question of superposition of lines

may show that the writing it validates was

made after the signature. In numerous crimi¬

nal trials each of these and of many other un¬

mentioned demonstrable facts have at once

stamped documents as fraudulent and obviated

the necessity of the more particular study of

the character of the writing. (Thus a water¬

mark in a paper on which was written a state¬

ment bearing date 1868 represented the Ger¬

man Eagle which was not adopted till after

1870, and this of course showed the whole in¬

strument to be a fraud. A similar conclusion is forced in the case of traced characters purport¬

ing to have been written before Hofmann's dis¬

covery of the aniline colors yet demonstrably

produced by aniline ink). The value of a sig¬

nature as authenticating a contract is forfeited if it is clear that parts of the body of the docu¬

ment were written after the signature was writ¬

ten. These and other problems in the domain

of plassopheny are too numerous to treat in

this place ana attention will be directed ex¬

clusively to the grounds for deciding two speci¬

mens of writing to be by the same or by dif¬

ferent hands.

The first and most obvious method is to

compare their respective features : large or fine writing; perfect or imperfect shaping of the

letters; slant or angle of the stems and tails of letters with the line of writing; peculiarities (of which there are always a number) in the

forms of individual letters or in the manner of connecting or grouping them; alterations in

pressure producing shading in certain direc¬

tions, and many other similar details. These

peculiarities are pictorial. In all genuine writ¬

ing they arise from the limitations of the writer, first in forming a mental picture of what he

wants to produce, and secondly in producing it.

Any one of these peculiarities can be easily

imitated by another, and indeed all the visible details together can be drawn or traced by a

skilful artist, yet in the latter case not without revealing to one using a magnifying glass that the lines have been slowly and carefully drawn and not dashed off with ease. Even if words

are photographed or traced from an original

and afterward inked, an ordinary magnifying

glass will show a difference in the pen marks from the current facility of the original writer.

The careful study of such details constituted

the entire basis of judgment of the expert till within recent years, and usually they will

suffice ; for though the forger should know all the minute peculiarities which are disclosed to the patient study of a handwriting, yet he could not reproduce many of them without betraying

in the result a painstaking, labored use of the pen which would excite suspicion. Where the

same word or signature occurs twice or more

in a . document the forger must avoid exact

repetition of all the minutiae and at the same time not make such deviations as are inconsist¬

ent with the habits of the writer. The most important of these habits for purposes of identification are not pictorial nor immediately apparent to the eye.

Proportions. — Among the most important kinds of characteristics which insensibly influence the judgment in forming a conclusion as to identity of authorship of two specimens of handwriting are the proportions between certain parts of a letter, or word, or group of these, which often occur together. Especially is this the case with a signature, which is written so frequently that the act becomes almost

Fig. 1. — Composites of genuine signatures.

Fig. 2. — Forgeries of the above signatures.

automatic and therefore one in which the peculiarities due to the hand and arm making it, and to the brain furnishing the pattern, are most prominent because without the interference of voluntary effort. The result in fact resembles typewriting where the defects in the

levers and type-faces of a typewriting machine

can be detected; but with this difference that in handwriting they are still recognizable even when from lack of space or other causes the

signature is written smaller or larger than usual.

In such cases there is found a greater con¬

formity to the established relations of parts of the signature than any foreign hand could make without a pantograph or other artificial aid.

These proportions of parts may be detected

either individually by carefully noted measure¬

ments, or by composite photographs of genuine

signatures. Each method has some advantages

over the other. In employing composite photog¬

raphy one attains to an ideal signature be¬

cause all the possible characteristics of relation 676

in every signature have been introduced, but on the other hand by this means only a form has been evolved — a graphic average — which must then be made the standard for comparison.

In the case of the method by actual measure¬

ments although only a small fraction of the total number of relations is noted, yet these are in numerical form and can be averaged and the

results compared directly.

The principle on which the method by in¬

vestigation of proportions of parts rests is that the spaces between various distinctive points of a signature bear numerical relations to each

other, and to the heights of certain letters,

which are constant within comparatively narrow

limits whether the signature be written small or large.

The following illustration (Fig. 3) represents

a small part of a letter written with pen and ink and photographed at an enlargement of 30

diameters :

Fig. 3. — The points a show the widest and b the nar¬

rowest parts of the ink lines. It is to be noted that the maxima and minima of the two margins are not always opposite to each other, but show a tendency to oscillate about a horizontal line so that the a' s and b's of one margin will be observed alternately above and below such line in following the ink mark downward, while those of the other margin will be found in opposite phase. This is made clearer by the white lines uniting the a's and b's of the opposite margins. This can be accounted for by the simultaneous operation of lateral and vertical movements which are not coincident in period.

Tremograms. — Another valuable individ¬

uality in writings executed by means of pen and ink are the irregularities observed in the mar¬

gins of the lines when examined under a suffi¬

ciently high pow.er of the microscope (about 120

diameters). How far this examination will en¬

able one to identify an individual is not yet known, but it has been

established that there

are characters in the general disposition, num¬

ber, arrangement ,and position of these serra¬

tions, which remain comparatively constant in

the writings of the same individual with differ¬

ent pens, ink and paper, and under different

mental and physical conditions, and which

therefore cannot have other source than peculiar motions imparted to the writing instrument and

writing fluid by the writer.

Inks. — Tables for the de¬

termination of the character

of inks by qualitative chemical

tests have been published by

Robertson, Hofmann , and

others. To the same end

t special devices have been made

to solve questions relating to

the composition of inks with¬

out affecting the document or

writing fluid : Doremus by

means of the spectroscope,

1 Frazer through absorption of

light admitted to and re¬
flected by the ink through
colored prisms. Sharpies has

Fig. 4. — A trac¬
ing by camera lucida of the mar¬
gins of an ink
line drawn by a
pen fixed to a
ruling machine. It
is enlarged 60 di¬
ameters. There is
an absence of the
irregularities al¬
ways found in
the margins of
ink lines made by
the human hand.

shown that an otherwise invisible record may
be made visible through shorter or longer ex¬
posure to the sensitive plate of the photo¬

graphic camera, *etc.*

Bibliography. — Chabot, (The Handwriting of Junius Professionally Investigated,* with a preface and collateral evidence, by the Hon. Edward Twisleton (1871) ; Cross & Bevan, (A TextBook of Paper-Making) (1888) ; S. Weir Mitchell, M. D., (Mary Reynolds: a Case of Double Consciousness) with a letter on the handwritings peculiar to each of the two states by Persifor Frazer). Transactions of the College of Physicians of Philadelphia (April 4, 1888) ; Galton, (Decipherment of Blurred Finger-Prints) (1893); Persifor Frazer, <Bibliotics or the Study of Documents) (1894);

Fig. 5. — Camera lucida tracings of the margins of two ink lines by the same hand made at an interval of 52 days. The similarity of character of the serrations in both is noticeable.

G77

Hagan, (Disputed Handwriting) (1894); Bertillon, ‘La comparaison des ecritures et l’identification graphique) (Revue Scientifique, 18

Dec. 1897 and 1 Jan. 1898) ; Itasse, (Le faux devant 1 histoire, devant la science, et devant la loi) (1898) ; Persifor Frazer, (Des faux en ecriture et de l’ecriture. Traduit par M. L.

Vossion et *Mme.* H. Bouett) (1899); Minovici,

(Les faux en ecriture et la photographic au

service de la justice) ; Ames, (Forgery, its De¬

tection and Illustration* (1900).

Persifor Frazer,

Doctenr es-Sciences Natnrelles Univ. de France.

HANDY ANDY, a novel by Samuel Lover,

published in 1842. It is a broadly humorous

tale of life among the Irish gentry and peas¬

antry in the first half of the 19th century.

HANFORD, Cal., city and county-seat of

Kings County; on the Southern Pacific and

Santa Fe railroads, about 30 miles southeast of Fresno, and 250 miles

south of San Francisco.

It was first settled in 1871 and was made a city in 1891. Its chief industries are agriculture,

fruits, raisins and livestock. It has also flour and planing mills, milk condensing factory,

butter and cheese factories, etc., and is a dis¬

tributing centre for food products and clothing sent to mining sections in the vicinity. The

city government is by a board of trustees, the board choosing its own chairman. The city

has a Carnegie library and sanitaria. Pop.

(1920) 5,888.

HANFSTANGL, Franz, frants hanf'-

stengl, German lithographer: b. Rain, Germany,

1804; d. 1877. He studied art at the Munich

Academy, and in 1826 went to Dresden where

he began his series of lithographic copies of

pictures in the Dresden Gallery, which he com¬

pleted in 1852. He later returned to Munich,

leaving his establishment at Dresden to his

brothers Hans and Max. During the latter part

of his life he devoted himself to photography

and kindred processes. His son Edgar suc¬

ceeded him in the business in 1868. The im¬

portant periodical Die Kanst unserer Zeit is

published by his firm.

HANG-CHOW, hang'chou', China, the

capital of the province of Che-kiang, on a plain at the southern terminus of the Imperial Canal, and within two miles of the head of the estuary of the Tsien-tang River, about 50 miles from

the open sea, and nearly 100 miles southwest of Shanghai. It is a strongly fortified city of

oblong form, surrounded with high well-built

walls about 12 miles in circuit, enclosing many large vacant spaces. The streets are paved and moderately clean, and there are numerous

triumphal arches, monuments to great men and

gorgeous Buddhist temples. The stores and

warehouses are noted for their size and the

quantity and quality of the goods displayed.

More than 100,000 persons are employed in silk manufactures, and among other industries are.

the weaving of cotton, manufacture of tapes¬

tries, carving in ivory, the making of lacquered ware, fans and screens, *etc.* The houses gen¬

erally are one story high. A large portion of the inhabitants reside in the suburbs, and in

boats on the waters around them. The gov¬

ernor-general of Che-kiang and Fe-kien resides

in this city, and also the governor of the

province. With their courts and troops, in addi¬

tion to the great trade passing through, and its activity as a centre of

literary and ecclesiastical life, Hang-Chow is one of the most important

and richest cities in China. The river, opposite the city, is about four miles broad at high-water, and is crowded with vessels of all de¬

scriptions, being the channel by which vast

quantities of merchandise are received from

and exported to the southern provinces. The

extensive lake of Si-hou, ((West Lake,® close by the city, is celebrated for its natural and arti¬

ficial beauties. Chapu, the seaport of Hang-Chow, is 20 miles down the river. Hang-Chow

is the celebrated ((Kinsai or Kinsay® of Marco Polo — the capital, in his time, of southern

China. No chapter in Marco Polo's narrative

is of greater interest than the pages devoted to this city, which appears to have been then to the Chinese what New York is now to Ameri¬

cans. It was captured by the Taiping rebels

in 1861, and deserted by all its rich or respect¬

able inhabitants. A disciplined force of Chi¬

nese, under the command of French officers,

united with the Imperialist troops, recaptured

the city on 31 March 1864. By the Treaty of

Shimonoseki (1895) it was opened to foreign

trade the following year; and a district of about 300 acres has been set apart for a foreign settle¬

ment, but Shanghai sustains to it the relation of agent or middleman, receiving both exports

and imports — to be either distributed through¬

out the world or merely forwarded to Hang¬

chow consignees. Pop. 600,000.

HANGING, a form of capital punishment

inflicted under the common law ; also a mode

of death sometimes lawlessly visited upon a

person, or occurring from accident, or by sui¬

cide. In cases of hanging, death seldom results from pure asphyxia, but is usually in some de¬

gree owing to apoplexy and injury to the spinal cord. In attempted suicide, bleeding from the

jugular vein and artificial respiration may be

tried for resuscitation. In difficulty of inducing artificial respiration, laryngotomy and trache¬

otomy should be performed, and the lungs in¬

flated through the opening in the neck. In

judicial hanging, the noose ought to be so ad¬

justed as to produce immediate dislocation of

the spinal column, death in that case being in¬

stantaneous. In a number of States electro¬

cution as capital punishment is substituted for hanging. While death by hanging or other

means is the usual punishment for first degree murder, in many States it is also inflicted for rape and arson of the first degree. In several American States infliction of the death penalty is forbidden by law. Hanging, drawing and

quartering were once the punishment of treason

in England. See Capital Punishment.

HANGING ROCK, Battle of, fought

6 Aug. 1780. It occurred on Hanging Rock

Creek, S. G, between Colonel Sumter's Ameri¬

cans, some 800 in number, and about as many

Loyalists commanded by Major Carden. After

driving back the Loyalists, the Americans, be¬

coming disorganized while plundering the

enemy's camp, were in turn put to flight. The American loss is unknown; that of the Loyalists, in killed, wounded and missing, is recorded as 269. Consult Lossing, (Field-Book of the

American Revolution. >

HANGING VALLEY, a tributary that

enters its main or trunk valley by means of a 678

fall or rapid, that is, with discordant junction.

Hanging valleys may be produced by a variety

of causes, but the most important is believed

to be overdeepening of the main valley by

glacial erosion. They are conspicuous features

of mountain landscapes in glaciated regions.

The famous falls of Yosemite Valley are from

hanging tributaries.

HANKOW, han-kow' («Mouth of the

Han®), China, a city and river-port in the

province of Hu-peh, at the junction of the Han with the Yang-tse (Yangtsze or Yangtze)

River, 600 miles above the mouth of the

Yang-tse, which is navigable for large vessels

up to the town. On the opposite bank of the

Han is Hanyang, on the other side of the

Yang-tse is Wuchang, the three together form¬

ing one immense city (for such it is virtually and in the estimation of many of the inhab¬

itants). In addition there is a large floating population, the Han being densely crowded

with junks for about half a mile above its

mouth. In 1857 the city was almost totally de¬

stroyed by the Taipings. The port was opened

to foreign trade by the Treaty of Tientsin,

ratified in 1860; and soon became the chief

emporium for the tea trade of the central

provinces. Revolutionists in 1911 attacked and

set fire to the city ; in 1912 they captured it and made it the provisional capital. A conces¬

sion of about 90 acres of land apart from

Chinese jurisdiction is laid out like an Eng¬

lish town. The residents of the British conces¬

sion are formed into a municipality, with a

council empowered to levy taxes. There are

also German, French and Russian settlements.

The foreign trade of this port is well described by the consul-general of the United States

who writes (15 July 1916) that Hankow is a

flourishing city with many modern conveniences

and with a trade passing through the maritime

customs valued at $113,940,933 in 1915, exclusive of treasure and coins, which amounted to $20,-

957,909 — the foreign trade being equal to that of the port of Baltimore in 1914. Imports

from foreign countries and Hongkong in 1915

were valued at $17,088,093 and from other Chi¬

nese ports, $15,757,526, showing a reduction in the imports of more than $10,000,000 occasioned by the European War. A statement of the di¬

rect trade of the port of Hankow with foreign countries in 1914 and 1915 derived from the

maritime customs returns shows, for the former

year, imports from Belgium valued at $1,624,-

*151; from British India $1,863,497; from Dutch East Indies $1,416,507 ; from Germany $1,159,-

046; from Great Britain $3,138,921; from

Hongkong $2,329,116; from Japan (including

Taiwan) $9,406,170; from the United States

(including Hawaii) $2,936,400. In 1915 we find imports from the United States (including Hawaii) $2,637,262; British India $1,980,275; Dutch East Indies $1,331,106; Great Britain $1,706,269; Hongkong $1 ,778,703 ; Japan (in¬ cluding Taiwan) $7,297,795. We omit the countries the imports from which amounted to less than $1,000,000. Belgium and Germany disappeared entirely from the list. The chief article of export is tea (valued at $17,917,665 in 1915). An estimate of the population of the city in the larger sense is 1,321,280; of Hankow alone and in the narrower sense, about 830,000.

HANNA, Edward J., American Roman Catholic archbishop: b. Rochester, N. Y., 21 July 1860. He was educated at the Rochester Free Academy, the College of the Propa¬ ganda, Rome, and he afterward worked at the University of Cambridge, England, and the University of Munich. He was ordained to the priesthood of the Roman Catholic Church in 1885 ; made doctor of divinity in 1886 and immediately afterward

was appointed teacher

at the Propaganda, Rome, and remained there

one year. From 1893 to 1912 he was professor

of theology at Saint Bernard's Seminary,

Rochester, N. Y. On 22 Oct. 1912 Pope Pius X

appointed Dr. Hanna auxiliary bishop of San

Francisco and on 4 Dec. 1912 he was conse¬

crated titular bishop of Titoplis and immedi¬

ately took up his duties of auxiliary bishop.

On 1 June 1915 he was appointed archbishop

of San Francisco in succession to the late Dr.

Riordan and on 16 Sept. 1913 Governor John¬

son appointed him commissioner of immigra¬

tion for the State of California.

HANNA, Marcus Alonzo, American poli¬

tician : b. New Lisbon, Ohio, 24 Sept. 1837 ; d.

15 Feb. 1904. In 1852 his family moved to

Cleveland, where he was educated in the public schools and he also took a year's course1 of

study in Western Reserve University. He left

college to enter the grocery trade with his

father, and later had entire control of the busi¬

ness. In 1867 he became a partner with his

father-in-law in the firm of Rhodes and Com¬

pany, engaged in handling coal and iron ; he

soon mastered the details of the business,

greatly extended the work of his firm and was the first to build steel steamships for the lake trade. In 1877 he became the controlling part¬

ner of the firm, the name of which was

changed to M. A. Hanna and Company, and

acquired' large interests in lake navigation. He also was for a time manager of a theatre, and president of the Union National Bank of

Cleveland, and of the Cleveland City Railway

Company. In 1880 he organized a business

men's political club, and from that time was

active in politics. In 1884 he was sent as a delegate to the Republican National Conven¬

tion, and in the next convention (1888) was

John Sherman's political manager. He first

gained a national reputation, when he obtained

the nomination of McKinley for President at

the Convention of 1896, and as chairman of the Republican National Committee conducted the

Presidential campaign, which resulted in a large plurality for McKinley. In this campaign he

adopted the methods which had made him suc¬

cessful in business, studying the situation and its needs, and carefully attending to details.

In 1897 he was appointed United States sena¬

tor to succeed Sherman, who resigned before

the completion of his term of six years. In

1898 he was elected to a full term, and in 1904

reelected, but died before taking his seat. In 1900 he again conducted the Presidential cam¬

paign. As a large employer of labor, Senator

Hanna had a number of questions to settle with his own employees, and as a rule won their

respect and confidence by his fairness and wil¬

lingness to listen to their claims. He was a

firm believer in arbitration between labor and

capital, and was active in the organization, in 1901, of the National Civic Federation, a non-HANNAH — HANNIBAL

partisan organization formed to consider such

topics as trusts, tariffs, taxation, etc., becom¬

ing its president, and a member of a perma¬

nent committee appointed to consider and settle labor disputes.

HANNAH, one of the wives of Elkanah

and the mother of the prophet Samuel. Her

story is told in 1st and 2d Samuel.

HANNAY, David, English journalist: b.

London, 25 Dec. 1853. He was educated at

Saint Peter's College, Westminster and for

some time was British vice-consul at Barcelona.

Entering journalism he was successively con¬

nected with the Pall Mall Gazette, the Satur¬

day Review, and Saint James' Gazette. He is

also the author of several historical works,

including 'Short History of the Royal Navy*

(1898); 'Life of Admiral Blake* (1888);

(Rodney) (1891); Wife of Captain Marryat*

(1889); Wife of Smollett* (1888); Won

Emilio Castelar* (in Wublic Men of To-Day

Series, * 1896) ; 'The Later Renaissance) (in

'Periods of European Literature, * 1898) ;

Whips and Men* (1908); Wavy and Sea

Power) (1913); (Porhrio Diaz* (1918).

HANNAY, James, Canadian historian and

journalist: b. Richibucto, N. B., 22 April 1842; d. 12 Jan. 1910. After many years of editorial work upon influential Canadian and American

journals, he became official reporter of the New Brunswick provincial parliament. Among his

works are 'History of Acadia* (1879) ; 'His¬

tory of the Loyalists) (1893); 'The Story of

the Queen's Rangers) (1883) ; TSir Leonard

Tilley) (1897) ; 'History of the War of 1812) ; 'New Brunswick: Its Resources and Advan¬

tages) (1902).

HANNAY, James Owen (“George A. Birmingham**), Irish clergyman and novelist: b. Belfast, 16 July 1865. He was educated at Temple Grove, East Sheen, Haileybury, Eng¬ land, and at Trinity College, Dublin. He re¬ ceived priest’s orders in the Church of Ire¬ land in 1889 ; was curate of Delgany, County Wicklow, and from 1892 to 1913 was rector of Westport, County Mayo. In 1901-02 Dr. Hannay was Donellan lecturer at Dublin Uni¬ versity and from 1905 to 1915 was member of the General Synod of the Church of Ireland. In 1912 he was appointed canon of Saint Patrick’s Cathedral, Dublin, and in 1916 re¬ ceived the temporary appointment of chaplain to the forces. Canon Hannay has gained liter¬ ary fame through his novels which are keen analyses of contemporary Irish life. His numerous works include ‘The Spirit and Origin of Christian Monasticism) ; ‘The Wis¬ dom of the Desert* ; ‘The Seething Pot) (1905; 1912); ‘Hyacinth* (1906); ‘Talages’

Lovers*; ‘The Red Hand of Ulster) (1912);

‘Northern Iron) (1913) ; ‘The Adventures of

Dr. Whitty) (1913) ; ‘The Search Party)

(1913) ; ‘The Lost Tribes) (1914) ; ‘From

Connaught to Chicago* (1914) ; ‘Minnie’s

Bishop and other Stories) (1915) ; ‘Gossamer*

(1915). Other works are ‘The Lighter Side

of Irish Life> (1912); ‘The Major’s Niece*

(1912); ‘Spanish Gold) (1911); ‘Irishmen

All* (1913) ; the plays ‘General John Regan,) (produced in New York 1913) and ‘Eleanor’s

Enterprise* (produced 1911).

HANNELE. Hauptmann’s dream play,

‘Hanneles Himmelfahrt* (‘Hannele’s Ascen—

sionQ was first played 14 Nov. 1893 at the

Royal Theatre in Berlin and won for its au¬

thor the Grillparzer prize, but failed to obtain the Kaiser’s sanction for the Schiller prize.

Driven by the brutality of a drunken foster

father to despair, the orphaned Hannele, a

child of 14, throws herself into the vil¬

lage pond on a cold winter’s night, - thinking that she is obeying the call of the Lord Jesus.

Rescued, she is put to bed in the poorhouse,

where in her delirium she gives utterance to

fancies never uttered and her love for the only person who had ever been good to her, the

village school-teacher. These fancies, in which

the fairy tales of Cinderella and other chil¬

dren's lore are mingled with biblical stories,

are boldly but poetically put upon the stage in scenes that alternately dissolve from imagina¬

tion into reality before the spectator until the poor child dies. Along with the angels, appear her dead mother, and the teacher Gottwald is

transformed into the figure of Christ. In this Hauptmann was unquestionably influenced by

Fritz von Uhde's wonderful conceptions of

biblical scenes. Hence the accusations of

blasphemy showered upon him until the de¬

fense of acknowledged religious leaders and

writers gradually silenced the outcry. Then

the play was attacked for its social-democratic tendencies, while its romantic imagery raised

up the accusation of treason to naturalism, for which Hauptmann had stood. True, his first

dramas had portrayed the anguish and misery

of the human soul predominantly, but with

'Hannele) he commences to stress the human

"longing for heaven® of which that "Weltweh**

is the root, retaining the rest of the technique of naturalism.

Editions: Gerhart Hauptmann's 'Hannele, *

Berlin 1894 (really 1893) ; title later changed to ‘Hannele’s Himmelfahrt* (Berlin 1906, 15th

ed.). Consult Emil Sulger-Gebing, ‘Gerhart

Hauptmann) (Leipzig 1909, chap. 5). There

are English translations by Charles H. Meltzer

(New York 1908) ; G. S. Bryan (Boston

1909) ; and William Archer (London 1894).

Carl E. Eggert.

HANNIBAL, Carthaginian soldier: b. 247

b.c. ; d. probably 183 b.c. He was the son of Hamilcar Barca (q.v.) and at the age of nine

his father made him swear at the altar eter¬

nal hatred to the Romans. He was a witness

of his father’s achievements in Spain; but Ham¬

ilcar having fallen in battle in Lusitania, in 228

b.c., and his son-in-law Hasdrubal having been

appointed to succeed him, Hannibal returned

home. At 22 he returned to the army at the

request of Hasdrubal. The soldiers perceived

in him the spirit of Hamilcar, and in three cam¬

paigns his talents and his courage were so con¬

spicuous that the army, on the murder of Has¬

drubal in 221, conferred on him the chief com¬

mand by acclamation. In 219 b.c. he laid siege to Saguntum, a town which had concluded an

alliance with Rome. In eight months Sagun¬

tum fell. The Romans, alarmed by this, sent

ambassadors to Carthage to demand that Han¬

nibal should be delivered up. The demand

being refused, they declared war. Hannihal

raised a powerful force, and conceived the de¬

sign of attacking the Romans in Italy. After

providing for the security of Africa, and hay¬

ing left his brother Hasdrubal with an army in Spain, he began his march with 90,000 foot-soldiers, 40 elephants and 12,000 horsemen,

traversed Gaul in the depth of winter with in¬

credible rapidity, and reached the foot of the Alps. In nine days he crossed these mountains, probably by the pass leading over the Little

Saint Bernard. The conquest of the Taurini—

ans and -the capture of their chief city encour¬

aged the people of Cisalpine Gaul to join him.

These auxiliaries would have been still more

numerous had not Publius Scipio approached

at the head of a Roman army, which had

landed at Pisa. On the banks of the Ticinus

the armies engaged, and a charge of the Numidian horse left Hannibal master of the field (218 b.c.) Scipio avoided a second battle, and retreated beyond the Trebia, leaving the strong town of Clastidium in the enemy's hands.

Meanwhile Sempronius arrived with a second

army, but Hannibal soon provoked his impetu¬

ous adversary to an engagement, dispersed an

ambuscade near the Trebia and surrounded

and destroyed the Roman forces. The Romans

lost their camp and 26,000 men. Hannibal now

retired to winter quarters among his allies in Cisalpine Gaul ; and at the opening of the next campaign (217) found two new armies await¬

ing his approach in the passes of the Apen¬

nines. He determined to engage them sepa¬

rately, and destroy Flaminius before the arrival of his colleague. He deceived him, therefore,

by feigned marches, crossed the Apennines and

traversed the Clusian marsh. He then em¬

ployed every means to compel Flaminius to a

battle. He Wasted the whole country; feigned

a march to Rome ; but suddenly formed an

ambush in a narrow pass surrounded by almost

inaccessible rocks. Flaminius, who followed

him, was immediately attacked. A bloody en¬

gagement took place near the Lake Trasimenus.

Assailed on every side, the Roman legions were cut in pieces.

Hannibal now armed his soldiers in the Roman manner and marched into

Apulia, spreading terror -wherever he ap¬

proached. Rome, in consternation, entrusted

her safety to Fabius Maximus, the dictator,

who determined to exhaust by delav the

strength of the Carthaginians. He attacked

Hannibal with his own weapons, and hung upon

him everywhere without attempting to overtake

him, convinced that the Carthaginians could not long hold a desolated territory. Hannibal

marched into the plains of Capua, with the de¬

sign of separating the terrified cities from

their alliance with the Romans, and drawing

down Fabius from the mountains. But sud¬

denly he found himself in the same toils in

which Flaminius had perished. Shut up be¬

tween the rocks of Formiae, the sands of Liternum and impassable marshes, he was indebted

for his safety to a stratagem. Having col¬

lected a thousand oxen, and fastened burning

torches to their horns, he drove the animals at midnight into the defiles guarded by the Ro¬

mans. Panic-struck at the terrible sight, the

Romans abandoned the heights, and Hannibal

forced his way through their ranks. Minutius

Felix, master of the horse, was then made col¬

league of Fabius in the dictatorship. Eager for combat, he fell into an ambush at Geronium,

and would have perished but for the aid of

Fabius. After this campaign the other Roman

generals seemed unwilling to trust anything to

chance, and imitated the delay of Fabius. Han¬

nibal saw his army slowly wasting away, when

the new consul, Terentius Varro, an inexpe¬

rienced and presumptuous man, took the com¬

mand of the legions. Hannibal had occupied

Cannae, and reduced the Romans to the neces¬

sity of risking an engagement (216). ZEmilius

Paulus, the colleague of Varro, wished to put

off the battle, but Varro chose the day of his command, and directed the attack. The Roman

army was destroyed, and Hannibal now

marched to Capua, which immediately opened

its gates. In 215 b.c. Hannibal sustained, at the hands of Marcellus, a repulse before Nola —the first check which he had received in the

open field — but in 212 b.c. made an important acquisition in the capture of Tarentum.

Capua, however, was invested by two consular

armies, and was on the point of-surrendering.

Hannibal marched to Rome, and encamped in

sight of the capitol, 211 b.c.; but the Romans were not thus to be discouraged; Capua fell.

This success gave the Romans a decided supe¬

riority, and nearly all the people of Italy de¬

clared in their favor. Held in check by the

consul, Claudius Nero, Hannibal could not ef¬

fect a union with his brother Hasdrubal, who

had set out from Spain with reinforcements,

but after having passed the Apennines was at¬

tacked and defeated by Nero on the Metaurus

in 207 b.c. Hasdrubal fell, and his bloody

head was thrown into the camp of Hannibal.

The latter then retired to Bruttium, where, sur¬

rounded with difficulties, he yet maintained the contest with inferior forces against victorious

armies. But Scipio now carried the war into

Africa, and Hannibal was recalled to defend

his country. He reluctantly embarked his troops, and in 203 b.c. left the country which for

16 years he had held in spite of all the efforts of Rome. He landed at Leptis, gained over a

part of the Numidians, and encamped at

Adrumetum. Scipio took several cities, and

reduced the inhabitants to slavery. Pressed by

his countrymen to come to a decisive engage¬

ment, Hannibal met Scipio at Zama, and was

defeated with 20,000 loss. Peace was concluded in 201 b.c. Hannibal, accused by his enemies of stirring up Antiochus the Great to war against the Romans, went to Ephesus, to the court of Antiochus. In the ensuing struggle with Rome, Antiochus was signally defeated, and obliged to conclude a pea-ce, one of the terms of which was that Hannibal should be delivered up. Hannibal, again obliged to flee, went to the court of Prusias, king of Bithynia. Prusias, to whom the Senate had sent ambassa¬ dors to demand the person of Hannibal, was on the point of complying with the requisition, when Hannibal prevented the disgrace by swal¬ lowing poison, which he always carried about in his ring.

HANNIBAL, Mo., the metropolis of north¬ east Missouri, is located in Marion County, about 120 miles northwest of Saint Louis. Hannibal has excellent railroad facilities — the Missouri, Kansas and Texas system; the Chicago, Burlington and Quincy; the Wabash and the Saint Louis and Hannibal railroads. Hannibal was formerly a large lumber market

and when this industry moved northward the

city lost in population until 1900, when a cam-HANNINGTON — HANOVER

paign was started to secure factories for the

city. Hannibal increased in population between

1900 and 1910 45 per cent and in manufactur¬

ing 237 per cent. The chief products of the

Hannibal factories are cement, lime, stoves,

car wheels, flour, shoes, *etc.* Hannibal is con¬

nected with Illinois by a steel bridge which is used by the railroads and for vehicles. The

city has a free library; splendid school system, 18 grade schools, one high school and two

parochial schools ; two hospitals ; a Y. M.

C. A. ; a $100,000 city hall, and other fine pub¬

lic buildings. It has a municipal electric-light and power plant wh ch has been one of the

most successful in the United States. The

rates are lower than in any city in the Mississ ppi Valley, and two years ago the water plant was purchased by the city. The city govern¬

ment is composed of a mayor and two aider—

men from each of the six wards of the city.

Pop. (1920) 18,950.

HANNINGTON, James, English clergy¬

man, first bishop of Eastern Equatorial Africa: b. Hurstpierpoint, England, 1847 ; d. near Lake Victoria Nyanza 1885. After studying at Ox¬

ford he was ordained in the Established Church and then undertook missionary work. In 1882

he was at Uganda, but enfeebled health forced

h m to return to England. In 1884 he was ap¬

pointed to the bishopric of Eastern Equatorial

Africa, but in spite of his superhuman efforts to establish friendship with the natives, he was murdered soon after his arrival at the interior.

His journals were publ'shed at London in 1888.

Consult Berry, (Bishop Hannington) (New

York 1908).

HANNO, han'o, or ANNO, German

mediaeval prelate: b. not earlier than 1000; d.

Siegberg, near Bonn, 1075. The emperor, Henry

III made him his chancellor and presented him

to the archbishopric of Cologne, to which he

was consecrated in 1056. After the death of

Henry III, Hanno made himself master of the

person of Henry Ill's young son, Henry IV

and secured for himself the administration of

the emp're (1062). His energetic government

and his holy life, his paternal care for his see, his zealous reformation

of monasteries and

foundation of churches, gained him the char¬

acter of a saint. The hymn in his praise is by some thought to have been written soon after

his death; by others about 1183. It is one of the most mportant monuments of the early

German national literature. The best version

of it is to be found in Mullenhoff and Scherer's (Denkmaler deutscher Poesie und Prosa)

(1864).

HANNUKAH. See Befana.

HANOTAUX, (Albert Auguste) Gabriel,

al-bar o-giist ga-bre-el a-no-to, French poli¬

tician: b. Beaurevoir, Aisne, 19 Nov. 1853. He chose for himself the profession of the law,

took a scientific course in the Ecole des Chartes and afterward became a teacher in the

Ecole des Llautes Etudes. In 1879 he received

an appo ntment in the French foreign office; in 1881 became a member of the Cabinet and was

sent to Constantinople as Ambassador in 1885.

From 1886 to 1889 he was Republican deputy

and in May 1894 received the portfolio of

foreign affairs in the second Dupuy Cabinet,

remaining in office until October 1895. He held the same office in the Meline ministry 1896-98

and was an ardent supporter of the policy cul¬

minating in the Franco-Russian alliance. He

became a member of the Academy in 1897. He

has published (Les Villes Retrouvees) (1880);

(Origines de l'institution des intendants des

provinces } (1884) ; (Henri Martin sa vie ses

oeuvres, son temps) (1885) ; (Etudes historiques sur le XAIe et le XVIIe siecle en france)

(1886) ; (Histoire du cardinal de Richelieu >

(1893) ; (La France et la royaute avant Richelieu) (1898) ; (La Seine et les quais, promen¬

ades d'un bibliophile* (1901) ; (Du choix d une carriere; (1902); < Souvenirs de *Mme.* Maintenonˆ 1902) ; (La jeunesse de Balzac) (1904); (Histoire de la France contemporaine) (1909) ;

(La France vivante en Amerique du NorcP

(1913) ; (La paix Latine> ; (Fachoda * ; (Jeanne d'ArcP *etc.*

HANOVER, Germany, the northwestern—

most province of Prussia, prior to 1866 an inde¬

pendent kingdom. It borders on the North Sea

and has an area of 14,862 square miles. In the south the Harz Mountains attain an altitude of over 3,000 feet ; the rest of the country is an alluvial plain with a gentle slope to the sea.

The Elbe on the northeast boundary, the Ems,

and the Weser, with its tributaries, the Leine and Aller, are the principal rivers. Coal and

lignite, rock salt, iron, copper, zinc, silver, min¬

eral oil and gold are found in the mountainous districts, and there are large peat beds in the north. The coast is low and as in Holland is protected by dykes from the incursions of the

sea. There are only two lakes of considerable

size, the Dummersee and the Steinhinder Zee.

Over one-th.rd of the area is arable land, pro¬

ducing large quantities of grain and flax.

Clover and tobacco are also grown and the

sugar-beet industry is acquiring large propor¬

tions. The keeping of bees is generally prac¬

tised on the moors, and a breed of superior

cattle is raised along the marshy coast land.

Forests of hardwood and pine, extensively used

in smelting, occupy one-sixth of the surface.

The manufactures are extensive and include

shipbuilding, iron goods, machinery, woolens,

linens, cottons, leather, paper, beet-root sugar, beer, spirits and numerous domestic commodi¬

ties. Hanover has over 2,000 miles of railroads, numerous canals and an extensive traffic is

carried on at its several ports, among which

are Geestemiinde, Emden and Harburg, al¬

though practically its chief port is the free city and port of Bremen (q.v.). The capital is

Hanover (q.v.). For administrative purposes,

the province is divided into the six districts of Hanover, Hildesheim,

Luneburg, Stade, Osnabriick and Aurich. The highest court is in Celle. The province sends 36 members to the Prussian Chamber of Deputies, 10 to the Upper House and 19 to the German Reichstag. Edu¬ cation is compulsory and free; chief of the higher institutions of learning is Gottingen Uni¬ versity. There were 3,624 public grammar schools in 1915 with 8,586 teachers and 470,465 pupils. There were 103 secondary schools with 28,971 pupils. There are a mining academy situated at Clausthal, a building school in Nienburg and a forestry school at Miinden, a technical high school in Hanover, five naviga¬ tion schools and several agricultural institutions. There are two large libraries, one at Gottingen 682

University and the Royal at Hanover. The majority of the inhabitants are Lutheran Prot¬ estants. Roman Catholics inhabiting Hildesheim and Osnabriick constitute about one-seventh of the population. Hanover was long connected with the Brunswick family, a scion of which, Ernest Augustus, in 1692 became the first Elector of Hanover. He married the

daughter of the Elector Palatine, granddaughter of James I and niece of Charles I of England. He was succeeded in 1698 by his son, George Louis, who in accordance with the Act of Settlement (q.v.) became George I, king of England, at the death of Queen Anne in 1714. The connection with England continued during four reigns, and in 1814 the Congress of Vienna raised Hanover to the rank of a kingdom, George IV and William IV thus being kings of Great Britain and of Hanover. On the accession of Queen Victoria, however, by the Salic law, the Hanoverian crown passed to the nearest male heir, Ernest Augustus, Duke of Cumberland, and at his death in 1851 to his son, George V. In 1866 Hanover sided with Austria in the Austro-Prussian contest; the capital was occupied by Prussian troops; the king lost his throne, his estates were sequestrated and Hanover was annexed to the Prussian dominions. George V, who died in 1878, and his son, Ernest Augustus, Duke of Cumberland, went into exile rather than recognize the act of annexation. A long protest against annexation was continued in the Reichstag by

the Hanoverian deputies ; finally in 1892 Ernest Augustus renounced his claims and in 1913 the

two houses of Guelph and Hohenzollern were

reconciled and Ernest Augustus, son of the

Duke of Cumberland, married Victoria Louise,

daughter of Kaiser Wilhelm II. Consult Ford,

(Hanover and Prussia) (New York 1903) ;

Grotefend, (Geschichte der Verfassung des

Konigreichs Hannover, 1814-48) (Hanover

1857) ; Guthe, (Die Lande Braunschweig und

Hannover > (Hanover 1888) ; Havemann, (Geschichte der Lande Braunschweig und Liineburg> (Gottingen 1853-57) ; Kocher, (Geschichte

von Hannover und Braunschweig, 1648— 1 714>

(Leipzig 1896) ; Meding, (Memoiren zur Zeit—

geschichte) (ib. 1884) ; Meyer, (Die Provinz

Hannover } (Hanover 1888); Sybel, (Die

Begriindung des deutschen Reichs durch Wil¬

helm P (Munich 1893; Eng. trans., New York

1890-92) ; Ward, (Great Britain and Hanover*

(Oxford 1899). Pop. 2,942,436.

HANOVER, Mass. (1) Village in the

town of Hanover in Plymouth County, on a

branch of the New York, New Haven and

Hartford Railroad, about 10 miles east by

north from Brockton and 25 miles southeast

of Boston. It is the seat of Hanover Academy.

It is situated in an agricultural region and the chief industries are connected with agricultural products. Its chief manufactures are tacks

and nails. (2) The town of Hanover contains

several villages and the chief manufactures are shoes, nails, tacks and dairy products. Pop.

of the village is about 420; of the town, 2,575.

HANOVER, N. H., town in Grafton

County, on the Connecticut River and on the

Boston and Maine Railroad, about 72 miles

northwest of Concord. It is situated in an

agricultural region and its. industries are con¬

nected chiefly with farm products and lumber¬

ing. It is a summer resort, but is known

principally as a college town, being the seat

of Dartmouth College (q.v.). It contains also

the Mary Hitchcock Memorial Hospital. Pop.

2,075.

HANOVER, Pa., borough in York County;

on the Western Maryland and the Pennsylvania

railroads, about 32 miles south of Harrisburg.

It was settled about 1729 and incorporated in

1815. It is in a rich agricultural section of the State, and nearby are iron-ore mines. The

chief manufactures are shoes, machine-shop

products, cigars, gloves, flavin, auto truck

bodies, wire cloth, furniture, heels and inner—

soles, silk and cordage. Hanover is the com¬

mercial centre of a considerable part of York

County; the trade is largely in agricultural and dairy products, the manufactures of the bor¬

ough, and in live stock. The government is

vested in a burgess and borough council. Pop.

(1920) 8,864.

HANOVER, Prussia, the capital of a prov¬

ince, and formerly of the kingdom of Hanover,

in an extensive plain northeast of and dom¬

inated by Mount Linden, at the confluence of

the Ihme with the Leine, 44 miles by rail west by north of Brunswick. It is the twelfth city of Germany in size and the seventh in Prussia.

It consists of an old town, intersected by the Leine, and of various modern suburbs. The

old town is unattractive, but the new quarters are regular and well built. The principal fea¬

tures are the Markt Church, of antique appear¬

ance ; the Kreutz Church ; Schloss Church, a

handsome structure, with an altarpiece by

Cranach, and some curious relics collected by

Henry the Lion ; several handsome modern

churches; the palace (1636-40, rebuilt since

1817), later a royal Prussian residence; the

former palace of King Ernest Augustus (in

government occupancy) ; the Royal Library ; the museum of art and science; the restored town-house (1439-55) ; the new town-house (formerly

palace of George V) ; the Kestner Museum of

Antiquities ; the provincial assembly house ; the Franco-German War monument; the Waterloo

monument ; various schools, among which is the

technical high-school, a remodeled building of

great extent, formerly the Welfens-chloss (palace of the Guelphs), and the Schloss-Herrenhausen,

formerly a royal residence. It is popular as an educational centre for foreigners, who are at¬

tracted thither by the purity of the spoken

language here and by the quiet charm of the

city. There is also a veterinary high school,

several teachers' training schools, several lyceums and military and industrial schools. The

Royal Library contains over 200,000 volumes

and a valuable collection of manuscripts. In

the municipal library there are also several

valuable manuscripts. The museums and vari¬

ous collections contain a great selection of

antiques of all kinds. As capital of the prov¬

ince the city is the seat of the presidency and the higher courts. The city government is

vested in a director, a syndic, an executive

board of 17 magistrates and a municipal council of 24 members. The city has attained some in¬

dustrial importance since the improvement and

development in its railway connections. Trade

and industries are important, the latter including railway works, oilcloth, bridge works, pianos,

asphalt, leather, machinery, iron castings, cot¬

ton, linen, tobacco, lacquered wares, lamps,

glass, chemicals, etc., breweries and distilleries, i he city has electric street railroads.

Hanover is first mentioned in 1163. It

joined the Hanseatic League in 1481, and re¬

ceived the Reformation in 1533. It became the

residence of the dukes of Brunswick-Luneburg,

and the capital of the principality in 1636. In 1714, however, the Elector of Hanover became

king of England as George I and until the

death of William IV in 1837 Hanover was a

provincial town of little importance. In 1866

the kingdom was absorbed by Prussia, and since 1890 the city has held the positions of a royal residence and capital. Sir William Herschel,

the two Schlegels and Iffland were born here.

The city has grown and prospered under Prus¬

sian rule. Consult Hartmann, (Geschichte der

Residenz-stadt Hannover) (Hildesheim 1886) ;

Hirschfeld, cHannovers Grossindustrie und

GrosshandeP (1891); Hoppe, (Geschichte der

Stadt Hannover > (Hanover 1845). Pop. 302,-

375.

HANOVER, Pa., Cavalry Action at.

During the Gettysburg campaign General

Stuart, commanding the Confederate cavalry,

was ordered by General Lee to observe the

movements of the Army of the Potomac and

harass its rear should it attempt to follow the Confederate army and pass into Maryland.

Leaving two brigades south of the Potomac, to

guard the passes of the Blue Ridge, Stuart,

with the rest of his command, crossed the Poto¬

mac at Seneca Creek, 20 miles north of Wash¬

ington, on the night of 27 June 1863 and, learn¬

ing that Hooker had crossed the river, marched north by way of Rockville, captured a train of 125 wagons and 400 prisoners between Rock¬

ville and Washington, struck the Baltimore and

Ohio Railroad at Sykesville and Hood's Mills,

and, ascertaining that the Union army was

marching from Frederick northward, en¬

deavored to get ahead of it, reaching West¬

minster at 5 p.m. of the 29th, where he struck a squadron of the First Delaware Cavalry, which

offered a stubborn resistance, but was finally

dispersed, and Stuart, continuing his march,

bivouacked at Union Mills, about midway be¬

tween Westminster and Littlestown. Hearing

that Union cavalry was at Littlestown, and that Early was on the Susquehanna, he marched by

crossroads for Hanover, on the morning of the

30th and, at 10 o'clock, his head of column

reached that place, 16 miles east of Gettysburg, and attacked the rear and flank of Kilpatrick's cavalry division, as it was passing through the town from Frederick and Littlestown, in ad¬

vance of Meade's central column. His first

attack threw the rear of Farnsworth's brigade

into confusion, but Farnsworth rallied his men, Custer's brigade was recalled and thrown into

action and, after two hours' fighting in and

around the town, Stuart was driven back on

the Littlestown road, having lost nearly 100

men. Kilpatrick reports his own loss at 59

killed and wounded, and 123 missing. _

Stuart was now in a perilous position; he

had thrust himself unwittingly between Kil¬

patrick's cavalry and Meade's main body;

Gregg's cavalry division was moving north on

his right, but he extricated himself by march¬

ing all night over a circuitous route through

Jefferson to join Early at York. The latter,

however, was on his way to Gettysburg, and

Stuart passed almost within sight of him, with¬

out knowing it. Finding that Early was not

at York, Stuart continued his march to Carlisle, hoping to find Lee's main body there, but found the place occupied by Union troops, and heard

that Lee was concentrating at Gettysburg, where by marching night and day, he joined him in the afternoon of 2 July. See Gettysburg, Cam¬

paign and Battle of.

HANOVER, Treaty of, an alliance be¬

tween England, France and Prussia, made in

September 1725, for the purpose of mutual as¬

sistance, in opposition to that between Austria and Spain.

HANOVER COLLEGE, at Hanover, Ind.;

founded in 1827, under the auspices of the Pres¬

byterian Church, as Planover Academy. It was

chartered . as a college in 1833. Women have

been admitted since 1880. The regular depart¬

ments are letters, arts, science, law, philosophy and education. No charges are made for tui¬

tion. The college reports an average of 20 in¬

structors, 312 students and about 25,000 volumes in the library. The endowment fund is over

$300,000, and the annual income is about $20,000.

HANOVER COURT HOUSE, Engage¬

ment Near. On 21 May 1862 General Mc¬

Clellan had marched the Army of the Potomac

up the York Peninsula to the banks ‘ of the

Chickahominy, 7 to 12 miles distant from Rich¬

mond. On the 26th he heard that R. H.

Anderson’s Confederate brigade and Stuart’s

cavalry were near Fredericksburg, and that

another body, Branch’s brigade, was in the

vicinity of Hanover Court House, 17 miles

north of Richmond, to his right and rear.

These bodies threatened his communications,

and were in position to reinforce Jackson, in

the Shenandoah Valley, or to oppose McDowell,

whose advance was then eight miles south of

Fredericksburg. Gen. Fitz-John Porter was

ordered to clear the enemy from these positions and destroy the bridges over the South Anna

and Pamunkey rivers. Warren's small brigade

had been already detailed to destroy the bridges, had destroyed all means of communication over

the Pamunkey as far as Hanover Court House,

and was then posted at Old Church. On the

morning of the 27th Warren moved toward

the courthouse, on a road running parallel to

the Pamunkey. Porter left New Bridge at 7

a.m. with Morell's division and Emory's cavalry brigade and, marching by way of Mechanics-ville northward toward the courthouse, about

noon his cavalry and the Twenty-fifth New

York Infantry encountered a portion of

Branch's brigade, supporting two pieces of

artillery, attempting to hold the road leading to the courthouse. A Union battery was brought

up and Butterfield's brigade deployed, which

charged and drove the Confederates from the

field, capturing one gun. A part of the Twenty-fifth New York was captured bv the Con¬

federates. Supposing that the Confederates

had all retreated in the direction of Hanover

Court House, Porter pursued, the cavalry,

under Emory, and the Seventeenth New York,

overtaking and capturing a large number of the Twenty-eighth North Carolina. Upon nearing

the junction of the Ashland and the court¬

house roads, a oart of Martindale's brigade was sent toward Ashland to guard that flank against 684

an approach from Richmond and to destroy the

railroad running to that city. Near Peake's

Station Martindale ran into Branch's brigade,

was immediately attacked, and was driven back

some distance. When Porter, whose advance

had reached Hanover Court House, heard that

Martindale had been attacked, he faced about

his entire column, reached Martindale, struck

Branch on his left and rear, and routed him.

Branch retreated to Ashland and formed a

junction with Anderson's brigade, which had

fallen back from McDowell's front. After

destroying the railroad in several places and

opening the way for McDowell's advance from Fredericksburg, Porter returned to his old camps on the night of the 29th. The Union loss in the engagement of the 27th was 62 killed, 223 wounded and 70 missing. The Con¬ federate loss was 73 killed, 192 wounded and 730 prisoners, of whom about 150 were also wounded. Consult (Official Records) (Vol. XI) ; Webb, (The Peninsula) ; (McClellan's

Own Story) ; Allan, cThe Army of Northern Virginia) ; The Century Company's (Battles and Leaders of the Civil War} (Vol. II).

HANSA, or HANSE. See Hanseatic League.

HANSABUND (Ger. for <(Hanseatic League, w named in imitation of the famous mediaeval organization of that name (q.v). A league of powerful German industrial and ship¬ ping magnates, created with the purpose of representing the interests of trade and industry. It was founded 12 June 1909 at Berlin at a

meeting of the Central League of German

Bankers and the Central League of German

Industrials. One of its objects is the preven¬

tion of a one-sided preference for agrarian in¬

terests in the German national policy, which

was evidenced in a number of declarations is¬

sued in the course of the war of 1914-18.

HANSEATIC (han-se-at'ik) LEAGUE,

HANSA, or HANSE, a confederacy of cer¬

tain cities of northern Germany for mutual

protection, especially in matters of commerce ;

for the extension of trade, and of rights and immunities received from sovereigns, and which

had suffered curtailment. The union was

formed in the 13th century, at a time when sea and land swarmed with pirates and robbers, and German trade, no longer guarded by the privi¬

leges of armed attendants, was exposed to many dangers, while the government had degenerated

into a power for extorting taxes without giving protection.

The first alliances known to have been con¬

cluded are those between Hamburg and Liibeck

(1241 and 1255) to keep open the road across

Holstein connecting the North Sea with the

Baltic, and between Liibeck, Rostock and

Weimar in 1259 for defending themselves against the pirates. About the same time a similar

league was concluded between the Westphalian

towns, Munster, Dortmund, Soest and Lipp—

stadt. When a wider union came to be formed

for like purposes, the name of Hansa , signify¬

ing a league, which was at first applied to any such confederacy, survived exclusively as the

name of that influential league. During its

most flourishing period it embraced 90 towns,

scattered over the whole length and breadth of Germany, including Holland. Its organization

was very loose, the towns of which it was made up being at first divided into three and, after the 16th century, into four provinces, each with a chief town. These divisions had, however,

little more than a geographical significance.

The town of Liibeck, which already held an

important rank, from the fact that it was the highest court of appeal for all those towns

which were governed by the Liibeck law, was

recognized as the chief town of the league.

Here assembled the deputies of the other Hanse towns to deliberate on the affairs of the con¬

federacy; the decrees of the Diet had no effect unless they received the sanction of the separate towns.

In the 14th century the league everywhere

attained a high political importance, and gave

rise to the development of that commercial

policy which has since become intimately con¬

nected with all political relations, but of which the sovereigns of that time had little idea.

Kings and princes were, in reality, more de¬

pendent on the league than it was on them. The extensive carrying trade of the Hanseatic

League was a great source of wealth, and at

length there was no mart in Europe which was

not gradually drawn within the circle of its

influence. England, Denmark and Flanders con¬

cluded treaties with the league for the exten¬

sion of their commerce. It undertook to pro¬

vide for the security of commerce on the Baltic and North seas. In the country under its

immediate influence it constructed canals, and

introduced a uniform system of weights and

measures.

But the prosperity of the Hanse towns was

naturally dependent on the continuance of the

circumstances which gave rise to it, and when

circumstances changed the league was destined

to decline. When the routes by land and sea

were no longer insecure ; when princes learned

the advantages of trade to their own states, and turned their attention to the formation of a

naval force of their own, and the encouragement of navigation; when the inland members of the

confederation perceived that the great seaport

towns had a separate interest of their own, and used them principally to promote their own

ends; then the dissolution of the Hanseatic

League was evidently approaching. There re¬

mained at last as active members of it only

Hamburg, Liineburg, Liibeck and the towns in

the neighborhood (Wismar, Rostock, Greifswald, Stralsund), whose interests were identi¬

fied with those of Liibeck. The league existed no longer as a political power, but merely as a loose association of towns for commercial

purposes.

In England, during the reign of Queen Eliza¬

beth, the league lost its privileges by its refusal to grant complete reciprocity. About 1614 there remained only 14 towns which contributed to

the support of the league and had a voice in the management of its affairs. These were

Liibeck, Wismar, Rostock, Stralsund, Greifswald, Stettin, Danzig, Magdeburg, Brunswick.

Hildesheim, Liineburg, Hamburg, Bremen and

Cologne. The Thirty Years' War, which de¬

stroyed the prosperity of the German towns

generally, gave the death-blow to the league. At the diet of 1629 it was entrusted to the cities of Liibeck, Bremen and Hamburg to consult for

its general interests, and in 1630 these towns concluded among themselves a closer union,

which was renewed in 1641. After the Peace

of Westphalia (1648) repeated but vain attempts were made to bring the league together again,

and a last diet was held in 1669. Hamburg,

Liibeck and Bremen still retain their independ¬

ence, and now form separate constituents of the German Empire. Consult in English, Zimmern,

‘The Hansa Towns) (1889) ; and in German,

the exhaustive series of works published be¬

tween 1872 and 1910.

HANSEL UND GRETEL, a fairy opera

in three acts by Engelbert Humperdinck, li¬

bretto by A. Wette, first presented in Germany in 1893 and in New York on 8 Oct. 1895. The characters are — Peter, a poor broom-maker;

Gertrude, his wife; Hansel and Gretel, their

children; the Witch, who eats children; Sand¬

man, the Sleepy Fairy and Dewman, the Dawn

Fairy, with other children, angels and peasants.

Based on the Babes in the Wood story, the

opera opens with the two children being sent

into the woods for strawberries and losing their way. Sandman sings them to sleep and fairies-and angels guard them. In the forest lives the old witch in a gingerbread house, into which

she entices children and bakes them into ginger¬

bread. On awakening, Hansel and Gretel ap¬

proach the magic house and are lured inside.

Being bidden to enter the oven to see if the cakes are baked, Gretel asks the witch to show her how to get in. The Witch bends over the

oven and Hansel and Gretel push her in and

slam the door. She is burnt to ashes, the

charm is broken and a long row of children

stand revealed when the gingerbread crust falls off them.

HANSEN, han'sen, Gerhard Henrik Ar—

mauer, distinguished Norwegian physician:

b. Bergen, Norway, 1841 ; d. 1912. He was edu¬

cated during boyhood in the cathedral schools

of his native city, afterward entered upon the study of medicine and was eventually ap¬

pointed resident physician in the Rigs Hos¬

pital of Christiania. He was afterward gov¬

ernment medical officer for the Lofoten fisheries, but did not reach the field of his fame until he was appointed in 1868 to the post of assist¬

ant physician at the Bergen Leper Hospital, of which Danielsson was director. From this

time forth he devoted himself to the study of leprosy, and following the lines laid down by

Virchow, traveled from one to another uni¬

versity of Europe, continuing his investigations.

On his return to Norway the Medical Society

of Christiania voted a sum of money to pay

the expenses of his further researches. He

at last was enabled to demonstrate the fact

that leprosy was contagious. Continuing his

investigations he discovered at last the leprosy bacillus in unstained preparations. Later it was stained and became known as Hansen's bacillus

(1873). He was not successful in employing

the bacillus for purposes of inoculation with a preventive object; but on the basis of his con¬

tagion theory, legislation has been enabled to

check to a considerable extent the spread of

the disease throughout Norway and elsewhere.

His excellent work received tardy but generous

recognition at the International Leper Congress

of 1909 at Bergen.

HANSEN, Niels Ebbesen, horticulturist

and plant breeder: b. Ribe, Denmark, 4 Jan.

1866, and migrated with his parents to the

United States in 1873. He graduated from the

Iowa Slate College of Agriculture in 1887. He

followed practical horticulture and nursery

work from 1888 to 1891, when he was made as¬

sistant professor of horticulture in the Iowa

State College, a position which he held until

he was made professor of horticulture in the

South Dakota Agricultural College, and horti¬

culturist of the South Dakota Agricultural

Experiment Station, in 1895. In 1894, he spent four months in studying horticulture in eight

different European countries. In 1897-98, he

spent 10 months in an agricultural and horti¬

cultural exploration of Russia, Siberia, Turke¬

stan and western China, for the United States

Department of Agriculture, during the course

of which he collected many seeds and plants of economic importance for introduction into the

United States. In 1906, he made a similar tour under the same auspices through parts of Lapland, Finland, Russia, Siberia, Manchuria and

Japan, and again, in 1908-09, when he spent nine months in exploring Siberia, Mongolia, Turke¬

stan, Transcaucasia and northern Africa. He

is the originator of a number of varieties of new fruits, including several hybrid plums of

unusual hardiness and excellence, and he is

known as the introducer of the Turkestan and

Siberian alfalfas, which endure the extremely

low temperatures of the northern portions of

the Great Plains region. In addition to writing numerous bulletins and papers on horticultural

topics, he has published two books, namely,

‘Handbook of Fruit-Culture and Tree-Planting) (in Danish Norwegian), 1890, and ‘Sys¬

tematic Pomology) (with Prof. J. L. Budd,

1903).

HANSOM, or HANSOM CAB. See

Carriage.

HANSON, Alexander Coutee, American

journalist and politician: b. Maryland, 1786; d.

1819. After being graduated at Saint John’s

College, Annapolis, he adopted journalism as a

profession, and in 1812 his office was wrecked by a mob on account of an article attacking the

Madison administration which appeared in the

Federal Republican, of which he was editor.

He was elected to the lower house of Congress in 1813, and from 1817 until his death had a seat in the Senate.

HANUS, Paul Henry, American educator:

b. Hermsdorf-unter-dem-Kynast, Prussia, 14

March 1855. He came to the United States in

childhood, was educated at the University of

Michigan, B. S., 1878 and has been professor of the history and art of teaching at Harvard from 1891. He was chairman of the Massachusetts

State Commission on Industrial Education from

1906 to 1909. He has been a member of the

State Board of Education since 1909. He is

a trustee of Wellesley College, and chairman of the Boston vocation bureau (a philanthropy for

studying and organizing vocational guidance).

In 1911-12 he was director of the educational

aspects of the school inquiry undertaken by the board of estimate and apportionment of the

City of New York. He received the degree of

LL.D. from the University of Colorado in 1906.

He has published ‘Elements of Determinants’

(1886) ; ‘Geometry in the Public School’

(1893); ‘Educational Aims and Educational

Values’ (1899.); ‘A Modern School’ (1904);

‘Beginnings in Industrial Education and Other

Educational Discussions’ (1908); ‘School Ef-

ficiency* (1913) ; and editor of the School Ef¬
ficiency Series (13 volumes). He is a con¬
tributor to educational and other periodicals.

HAPGOOD, Isabel Florence, American
author and translator: b. Boston, Mass., 21 Nov.
1850. She has written (The Epic Songs of
Russia) (1886); (Russian Rambles* (1895);
(A Survey of Russian Literature) (1902) ; (A
Service Book of the Holy Orthodox Catholic
(Greco-Russian) Church) (1906), etc., and is
widely known by her translations from the
Russian of Tolstoy, Gogol, Sergyenko, Gorky,
Turgenev, etc., and she has also made important translations from the French, Italian and
Spanish.

HAPGOOD, Norman, American journal¬
ist : b. Chicago, 28 March 1868. He was gradu¬
ated from Harvard in 1890, and the Harvard
Law School in 1893, and has since become well known as a keen,

discriminating essayist and

dramatic critic. He was United States Minister

to Denmark from February to December 1919.

He has published (Literary Statesmen and Oth¬

ers* (1897); (Daniel Webster* (1899); (Abraham Lincoln 5 ; Undustry and Progress) (1911).

HAPSBURG, haps'berg (Ger. haps'boorg)

(properly Habsburg), former imperial house of

Austria-Hungary, so named from the ancestral

castle in the canton of Aargau, Switzerland, on the right bank of the Aar. The castle was

built in the 11th century by Bishop Werner, a descendant of Ethico I, a Count of Alemannia,

in the 7th century. It stands on the Wiipels—

berg, a steep rocky situation, whence the name Habichtsburg (Hawk's Castle). The proprie¬

tors of Hapsburg became at a later period counts of Hapsburg and gradually extended their terri¬

tories. Werner II, who died in 1096, is said

to have been the first to assume the title. After the death, about 1232, of Rudolph II, the fourth in succession from Werner II, the family di¬

vided into two branches, the founder of one

of which was Albert IV, and that of the other Rudolph III. The latter is known as the Hapsburg-Lauffenburg line, which became extinct in

the direct male line in 1408. A younger son of Rudolph, called Eberhard, founded the Kyburg

branch of the Hapsburg-Lauffenburg line, which

did not become extinct till 1415 and Godfrey,

a grandson of Rudolph, who settled in England

in the 13th century, there became the founder

of the Fielding family, to which the Earls of Denbigh belong, and of which the novelist Field¬

ing was a member. The line descended from

Albert IV is that to which the historical celeb¬

rity of the house is almost entirely due. In

1273 Rudolph, the son of Albert IV, was chosen emperor of Germany or Holy Roman emperor.

He is the founder of the reigning house of Aus¬

tria, which is of the line of Hapsburg-Lorraine.

From Rudolph to Charles VI the Austrian monarchs were of the Hapsburg male line. Maria

Theresa, who succeeded Charles VI, married

Francis Stephen of Lorraine, who in 1745 was

chosen emperor of Germany. Francis II the

third emperor of Germany of the line of Haps¬

burg-Lorraine, was the last who bore that title till the establishment of the new empire, the last of the socalled <(Holy Roman Emperors.** He

changed it in 1806 for that of emperor of Aus¬

tria, and the late imperial house of Austria

continued to reoresent that line. From the

Emperor Rudolph was also descended a Spanish

dynasty which began with the Emperor Charles

V (Charles I of Spain), and terminated with

Charles II in 1700. Consult Steed, H. W., (The Hapsburg Monarchy* (1913).

HARADA TASUKU, hah-rah'-dah tah'-

soo-koo, Japanese editor, educator, Congrega¬

tional pastor and preacher, and president of the Doshisha (one endeavor) University of Kioto,

Japan: b. November 1863 at Kumamoto. After

study in his native city, the Theological School in Kioto and Yale Divinity School, traveled in Europe in 1891 and 1910; president of the

Christian Endeavor Union of Japan 1893-1906;

special lecturer in English in India under the auspices of the Y. M. C. A. ; inaugurated presi¬

dent of the Doshisha 1907; lectured at Yale

and in Hartford Theological Seminary, 1909.

Received degrees LL.D. from Edinburgh Uni¬

versity, and D.D. from Amherst College. Pastor

in Tokio, Kioto and Kobe. Author of works

in Japanese, and (The Faith of Japan,* New

York 1914.

HARAFORAS, or ALFURESE, names

applied in Celebes, the Moluccas, Mindinao, and the adjacent islands to certain native tribes,

particularly of the interior, which differ from the Malays, and have

been thought to be per¬

haps pre-Malayan aborigines.

HARAKIRI, har'a-kir'e, or SEPPUKU,

a mode of inflicting death upon themselves

formerly permissible in Japan to criminals of

the Samurai or two-sworded class as more

honorable than public execution. It consists in cutting open the body so as to disembowel it, by means of a wound made with one sword

perpendicularly down the front and another

with the other sword horizontally. Till recent

times Japanese of the two-sworded class who

had been guilty of any crime frequently resorted to this mode of killing themselves before their guilt had been proved, and it was regarded as honorable in them to do so, indicating a strong sense of shame. Sometimes they were com¬

manded to put themselves to death in this man¬

ner. The system became obsolete before the

middle of the 19th century; but examples still occur as expressions of loyalty, as the suicide of General Nogi and his wife on the death of the late emperor; and of the choice of death

rather than capture, as in the committing of

harakiri by the officers of a Japanese troop¬

ship at Vladivostok during the Russo-Japanese

War. Consult Mitford, (Tales of Old Japan*

(3d ed., 1876) ; Chamberlain, (Things Japanese*

(1891), and Longford, (Evolution of New

Japan* (1913).

HARALD. See Harold.

HARAN (Assyrian Kharranu, road), the

name of a district of northern Mesopotamia

and of a town situated therein, on the stream called Jullab, southeast of Edessa. The name

is probably derived from the fact that at this town the trade-routes from Media, Assyria and

Babylonia met to proceed along the same high¬

way to the coast of Cilicia. Haran is men¬

tioned in the Old Testament in Gen. xi, 31-32, and Ezekiel xxvii, 23. To the Assyrians it was a strategic post of great importance. In the in¬

scriptions references to it appear as early as the reign of Tiglath-pileser I (about 1100 b.c.).

An extensive commerce centred here. To the

Greeks and Romans it was known as Carrae

(Gk. adppat or x&Pa) • Crassus, the Roman

commander, was here defeated and slain by

the Parthians during his Eastern expedition (53

b c.) , and Caracalla assassinated by the soldiery of Macrinus (217 a.d.). It was of importance

even in the time of Arab supremacy, but the

geographer and historian Abulfeda ‘(d. 1331)

speaks of it as in ruins in his day. It was the seat of an episcopal see in the 4th century. It gave its name to a semi-pagan sect, of obscure origin and tenets, known as the Harranians,

located there in the 9th century. Consult Metz, (Geschichte der Stadt Harran5 (1892).

HARAR, or ADARI, a Semitic dialect

spoken in the Abyssinian province of Harar

(q.v.). It includes some Hamitic words. For

an account of it, consult an article by Pratorius in the (Zeitschrift der Deutschen Morgenland-ischen Gesellschaft,5 Vol. XXIII (1869).

HARAR, HARRAR, or ADARI, capital

of the province of Harar in eastern Abyssinia, south of the Gulf of Aden, about 180 miles

from the coast, with which it has rail connec¬

tion. It is situated at an elevation of 5,500

feet above the level of the sea. The surround¬

ing district is very fertile and produces chiefly coffee. Cotton is also a large crop, and excel¬

lent in quality. There is a brisk trade in gum’

ivory and fruits. Harar was formerly the cap¬

ital of a small, independent country, ruled by an emir. In 1876 it became a dependency of

Egypt, and later was under Italian protectorate.

After the Italian defeat at Adowa in 1896, it passed with the province to Abyssinia. Its first European visitor was Sir Richard F. Burton,

who obtained admission there as an Arab in

1855, and described it in his (First Footsteps in East Africa, or An Exploration of Harar5

(1856). Pop. about 50,000. Consult further

the bulletin de l'Etat Major-General de

l'Armee Egyptienne5 (1876) ; and Paulitschke,

(Harar: Forschungsreise nach den Somal-und

Gallalandern5 (1888).

HARAR, HARRARI, or HARRUR, the

most easterly of the Abyssinian provinces;

bounded on the east and north by British and

French Somaliland, and on the south and

southeast by British East Africa and Italian

Somaliland. The country is a table-land, with

a maximum elevation of nearly 11,000 feet.

Previous to the insurrection of the Mad Mullah (q.v.) it was a part of the Egyptian Sudan.

It was captured by Italy in 1891, but after the severe defeat of the Italian forces by the Abyssinians at Adowa 1 March 1896 it passed to

Abyssinia. The foreign trade of Abyssinia is

conducted largely through Harar.

HARAUCOURT, Edmond, French poet and novelist: b. Bourmont (Haute-Marne), 18 Oct. 1857. His first work appeared in 1883 and was entitled (La legende des sexes, poems hysteriques.5 A collection of his verses was published in 1891. He also published <Amis) (1887) ; <Shylock) (1889) ; (Don Juan> (1898) ; (Jean Bart5 (1900); (Les Benoit* (1905); (La Peur) (1907) ; (Trumaille et Pelisson) (1908).

HARBAUGH, Henry, American clergy¬ man of the German Reformed Church in America : b. near Waynesborough, Pa., 28 Oct. 1817; d. Mercersburg, Pa., 28 Dec. 1857. He studied at Franklin and Marshall College (Mercersburg) and at the Mercersburg Semi¬ nary, was ordained in 1843, and in 1843-64 held pastorates successively at Lewisburg, Lancaster and Lebanon, Pa. In 1864 he was appointed professor of theology in the Mercersburg Semi¬ nary. He was one of the leading exponents of the “Mercersburg theology* (q.v.), and be¬ longed to the high-church school of his de¬

nomination. From 1850 to 1866 he was editor

of the Guardian, and in 1866-67 of the Mer¬

cersburg Review. Besides a collection of

poems in the “Pennsylvania Dutch* dialect, he

published Hleaven5 (1848); a (Life of

Michael Schlatter) (1857) ; (Christological

Theology * (1864), and other works.

HARBEN, William Nathaniel, American

novelist: b. Dalton, Ga., 5 July 1858; d. 7 Aug.

1919. He was on the editorial staff of The

Youth’s Companion, 1891-93. He left college

before graduation and went into the mercantile

business in the South for himself. He re¬

mained in the business till 1888 when he gave it up to follow literature as a profession. Under the advice of Mr. W. D. Howells he confined

his literary studies chiefly to Georgian character and scene for the last years of his life. He was a member of the Authors Club of New York,

and of the National Institute of Arts and Let¬

ters. He contributed many short stories to

magazines and his published novels are (White

Marie5 (1889) ; (Almost Persuaded5 (1890) ;

(A Mute Confessor5 (1892) ; (The Land of the

Changing Sun5 (1894) ; (From Clue to

Climax5 (1896) ; (The Caruthers Affair5

(1898); (The North Walk Mystery5 (1899);

(Northern Georgia Sketches5 (1900) ; ˆThe

Woman Who Trusted5 (1901) ; (Westerfelt5

(1901); (Abner Daniel5 (1902); (The Sub¬

stitute5 (1903) ; (The Georgians5 (1904) ;

(Pole Baker) (1905); (Ann Boyd‘5 (1906);

(Mam’ Lindy5 (1907) ; (Gilbert Neal5 (1908) ;

(The Redemption of Kenneth Galt5 (1909) :

(Dixie Hart5 (1910) ; (Jane Dawson5 (1911) ;

<Paul Rundel5 (1912); (The Desired Woman5

(1913); (The New Clarion5 (1914); (The

(The Triumph) (1917) ; (The Hills of Refuge5

(1918).

HARBIN, Manchuria, a city on the Sun¬

gari River at the point where the Manchurian

branch of the Trans-Siberian Railway crosses

that stream. The Chinese eastern branch of

the railway, running to Dalny (Talienwan)

(q.v.) and Port Arthur (q.v.), begins here.

Prior to the Russian occupation in 1900 (see

Manchuria), Harbin was a small Chinese vil¬

lage. On account of its geographical and

strategical position it was chosen as a military centre, and very quickly it became also head¬

quarters for railway and governmental affairs.

Commerce and manufacture have also greatly

developed, although not originally considered in the promotion of Harbin; and here more than

elsewhere Russia gradually asserted its inten¬

tion of becoming an active industrial force in the Orient. Every system of protection that

could be devised has been employed by the gov¬

ernment to advance its commercial prestige.

Harbin consists of the old town, three miles

distant from the central depot; Prestin, the

river town, the present commercial portion ; and the administration town, about the railway.

Only Russian and Chinese are allowed to hold

land, construct buildings or enter any perma¬

nent enterprise. The territory for many miles

surrounding has been secured so as to make it 688

impossible for any foreign interest or influence to obtain a foothold or profit near to the city.

The principal railway engineer is the chief ad¬

ministrative official. A census of 1903 showed a population of 60,000 exclusive of soldiery ; of these all but 700 were Russians. The imports

into Harbin in 1914 were valued at $13,447,458

and in 1915 at $9,410,725. The ‘total exports in the same years

amounted to $9,831,460 and

$5,598,457, respectively. Coal and coke, fruit

and vegetables, clothing materials, boots and

shoes, oils, tobacco and railway supplies form

the bulk of the imports. Live stock, beans,

grain, eggs, fish and fishery products, ground

nuts, meats and hides are the chief articles of export. Harbin has 19 steam-power bean-oil

mills, two sugar refineries and large timber and coal interests. There are four distilleries and a candle factory. About 4,952 vessels of

1,508,179 tons entered and cleared the harbor in 1915, exclusive of 15,735 Chinese junks of

259,339 tons.

HARBOR GRACE, Newfoundland, a port

of entry on Conception Bay, 27 miles west by

north of Saint John's, 84 miles by rail. It

has a large but exposed harbor, with an inner secure port and a patent slip. It is the see of a Roman Catholic diocese with a handsome

cathedral and convent. Its commerce is second

to that of Saint John's. Pop. 4,279.

HARBOR SEAL, or HAIR-SEAL, the

common small seal (Phoca vitulina) , once com¬

mon on both sides of the North Atlantic down

to Virginia in the United States, but now only occasionally seen south of Cape Cod. They

are still numerous in the Saint Lawrence. See

Seal.

HARBOR SPRINGS, Mich, village,

county-seat of Emmet County, on Little Trav¬

erse Bay, an arm of Lake Michigan, and on

the Grand Rapids and Illinois Railroad. The

landlocked harbor is much used by lumber ves¬

sels. The village is in a part of the State

where the large forests make lumbering the

chief industry. The chief manufactures are

flour and lumber. The cool climate in sum¬

mer makes Harbor Springs a favorite resort

during July and August. The electric lighting

and waterworks are municipally owned. Pop.

1,805.

HARBORS, DOCKS AND BREAK¬

WATERS. The principal purpose of a com¬

mercial harbor is to furnish a means for trans¬

ferring freight from the interior to seagoing

carriers. The harbor affording the cheapest

and most expeditious shipping facilities at¬

tracts the greatest patronage, as it is the facility for readily discharging cargoes and reloading,

rather than the size of the harbor, that attracts shipowners. By the erection of a breakwater,

the dredging of a creek or river and the con¬

struction of modern docks provided with rail¬

road tracks leading to the water edge and

equipped with the latest facilities and mechan¬

isms for loading and unloading, one city gains an advantage over another that has a better

natural harbor, wherein however a modern

system has not been installed.

The world's largest cities are primarily those

that have important water communication, and,

while this feature is generally viewed as merely an adjunct to a city's commerce, it is in reality of prime importance to its progress. Those

cities that neglect their waterways fall behind in growth and prestige, while those that im¬

prove their harbor facilities usually forge ahead with rapid strides. The question of harbor

improvements is therefore a vital one and

deserves the most careful consideration of

those in authority, and the support-of every

class of citizens. Cities that have natural ad¬

vantages must keep their equipment up to date, while those with limited natural facilities may overcome their disadvantages, and, by well-planned improvements, rise to positions of in¬

ternational fame — as many European cities have done in recent years — entering into successful competition with older and better known ports.

In the making of improvements the true purposes and reasons for harbors should be kept in view — whether for commercial, refuge or fishery purposes, or a combination of any two, or all. To be successful, the improvements planned should be considered not alone from an engineering but from every other standpoint.

The elements of the commerce of an inland city consists of freight handled by inland carriers — such as railroads, river steamers, canal boats and other forms of transportation — as likewise coastwise and overseas freight, in addition to the products of its own industries. The incoming freight is destined for four principal purposes : immediate transshipment, storage for later shipment, material for the city's industries or wares for local consumption. The facilities of the city should, therefore, be planned to the end that the freight for each

of these purposes shall be handled in a different manner. Freight for immed'ate transshipment,

transferring from cars to vessels or vice-versa, should be handled on piers equipped with rail¬

road tracks and loading and unloading devices,

so that cargoes may be transferred with as

little intervention of manual labor as possible, and in a minimum of time. Such piers need

not be in close proximity to the business dis¬

trict of the city; any point in the harbor that may readily be reached by' a railroad will

answer the purpose. A ship that receives part

of its cargo from railroad cars may also, at

the same time, take on freight from a canal

boat, the transshipping piers — when placed

near canal and railroad freight terminals —

being thus enabled to serve a double purpose.

Freight intended to be stored in the city

for future shipment should be placed in ele¬

vators or storage warehouses accessible to both rail and water transportation, but preferably

away from the business district of the city.

Particular care should be taken to avoid the

placing of terminals and storage warehouses

in such location as to necessitate the trucking of freight across the city.

Freight intended as material for manufac¬
ture in the factories of the city should, when¬
ever possible, be delivered by rail or water
direct, and the finished product should be re¬
moved in the same manner. The advantages
of rail connections are appreciated by manu¬
facturers who, wherever possible, have a spur
or switch extended into their yards. The
value of canals, however, is not so well under¬
stood, although a system of canals proves of

HARBORS AND DOCKS

1

2

Harbor at Rotterdam

Concrete Dry Dock

. Holland, showing Dock and Machinery for coaling seagoing vessels 3 Docks, Storehouses and Manufacturing Buildings, Bush Terminal, Brooklyn, New York HARBORS AND DOCKS

mmmsmm

\

.JpW j

pBBsk,

HARBOR OF HAMBURG, GERMANY

1 Electric Operated Elevator for coaling ocean-going vessels 2 Dock and Fairway with mooring posts

the greatest utility in a manufacturing district, parrcularly for products of a bulky nature.

Freight intended for local consumption

should be distributed to the various points of destination in the most direct manner possible.

The principle to be followed in handling the

freight of a city is to effect final delivery, as nearly as possible, without breaking bulk and

with the least expenditure of time and labor.

The use of the truck is an expensive method

and a public nuisance, and should be avoided

or minimized.

Seaports, as well as inland harbors, may

greatly increase their commerce by improving

their harbor facilities. For example, Frankfort-on-the-Main borrowed $18,000,000, of

which $6,000,000 was spent in acquiring land

and $12,000,000 in the making of improvements.

An area of 110 acres was excavated and a very prosperous river port was thus created. The

increased earnings from these improvements

enabled the city to liquidate this debt in a few years. The river traffic, encouraged by the

harbor improvements, served to develop new

industries ; 720 acres were reserved for factory sites that were disposed of at a profit; the city now derives large revenues from the under¬

taking, while the industry, commerce and pros¬

perity of the community has been increased.

The port of Hamburg, which is 65 miles from

the sea, is almost entirely a constructed port.

Sixty years ago the channel of the Elbe had

a depth of but 15 feet at high tide; to-day, as a result of continuous dredging, it has a depth of about 40 feet. The harbor is a great net¬

work of piers, basins and channels, dredged

out of the lowlands, but affording unlimited

docking facilities. In equipment and conveni¬

ence, this harbor is the equal of any in the world, and the sum of $150,000,000 approxi¬

mately has been spent in its development.

In addition to the harbor at Hamburg, two

other ports — among the greatest on the con¬

tinent — those of Antwerp and Rotterdam, are

largely of an artificial nature. In fact, although Rotterdam is a very ancient city, it never be¬

came of commercial consequence until it de¬

veloped its harbor.

The importance of harbor facilities in Eng¬

land was early realized in the construction of a number of ports having extensive improve¬

ments, although London, its most important

city, has contented itself with existing condi¬

tions, and consequently has not advanced in

comparison with certain other cities less favor¬

ably situated. Liverpool has spent $200,000,000, Manchester and Newcastle, $85,000,000, and

Glasgow, $44,000,000. Manchester, in order to

free herself from Liverpool tolls, built a canal 35 miles long, and from 290 to 370 feet wide at the top, and from 120 to 170 feet wide at the bottom, and 25 feet deep. This improvement,

which was completed in 1893, furnished an out¬

let to the sea and added enormously to the

city's commercial importance.

An American city that has profited greatly

by harbor improvements is Buffalo, which had

in fact, no harbor at all. But the erection of a breakwater, however, has overcome its natural disadvantages, and it is now, in point of tonnage, the 10th port of the world. Boston, on the

other hand, with a splendid natural harbor, has failed to extend its facilities, and the increase vol. i3 — 44

in the size of vessels has been such that many cannot now enter this port — -a condition that

could have been avoided had Boston deepened

her channels. Another city, Baltimore, since

the big fire, has spent $6,500,000 on dock and pier improvements, which has assisted ma¬

terially in maintaining her maritime trade.

The Pacific coast ports are showing con¬

siderable activity in the development of harbor facilities. Los Angeles, by a consolidation with Wilmington and San Pedro, will have a shore

front 22ˆ2 miles long. The city has spent

$3,000,000, and the three boroughs, during the

next 10 years, will spend $1,000,000 per year

on harbor improvements. The State of Cali¬

fornia is spending $10,000,000 on the extension of the State-owned docks at San Francisco,

and Oakland is spending $3,500,000 on strictly

municipal docks. The State will also spend

$1,500,000 for State-owned docks at San Diego.

This activity in the improvement of Pacific

coast harbors has been mainly influenced by

the opening of the Panama Canal (q.v.) which

will prove an important factor in the develop¬

ment of the Western States, and, in fact, the entire country.

Notable among New York's harbor im¬

provements are the Chelsea Docks, while an¬

other dock of 1,000 feet in length is at pres¬

ent under construction. An interesting feature

in the harbor facilities of this city is the Bush Terminal System, consisting of seven piers,

each 1,400 feet in length. These piers are

equipped with railroad tracks leading from the

piers to a series of 125 warehouses and a

dozen reinforced concrete factory buildings of

immense size, housing some 275 different

manufacturing concerns. The system includes

also a spacious yard with 25 miles of tracks, capable of accommodating 1,000 railroad cars,

and a number of locomotives, floats, lighters

and tow-boats. The economy and convenience

in thus being able to quickly load and unload cars and vessels may be readily realized.

As has been indicated, in harbor improve¬

ments, one of the chief features is to arrange the docks so that railroad cars may be run

alongside the vessels, permitting freight to be quickly transferred. This is best accomplished

by the modern form of cranes, and great

economies are effected when such apparatus is

properly designed. In certain harbors the

engineering arrangements are such that vessels

may be loaded from two or three tracks simul¬

taneously, and two or three cranes may take

cargo from one hatchway without interfering

with each other. The very latest and best

machinery, however, should be adopted, as

great advances have recently been made in this field, and the difference between modern and

antiquated equipment will be of appreciable

importance in the commerce of the port.

Hamburg — where advantage has been taken

of the latest developments in harbor engineer¬

ing— has thus a great advantage over New

York, where very few piers are laid with tracks, and where not a single pier is equipped with

loading and unloading cranes, and the truck¬

man— in all his glory — charges for small lots as much in many cases as the amount charged

for long railroad hauls.

In 1911 Hamburg possessed 130,000 lineal

feet of quays for ocean liners, more than

5,000,000 square feet of sheds, and 805 cranes for loading and unloading ocean and river

vessels. The docks of Hamburg vary in length

from 2,500 to 3,500 feet in length and traveling cranes are run on both sides of the piers.

Some five or six ocean-going steamers can

lay alongside each of these docks. The fair¬

way between the docks is some 750 feet in

width, so that, between the rows of ships on

either side of the docks, a row of ships may be made fast to the mooring post in the middle of the fairway, discharging cargoes into light¬

ers, for which purpose floating cranes are at

hand. One of the principal piers has a length of some 5,000 feet, thus showing what modern

ternal repairs of ships. These dry-docks are

owned by shipbuilding companies, as they must

necessarily be associated with such establish¬

ments as can furnish skilled workmen and the

requisite materials and machinery for doing the work. The dry-docks or basins are provided

with gates for the ingress and egress of vessels, and, after the vessel is lodged within and prop¬

erly supported, all water is drained out, pre¬

senting the entire contour of the ship for in¬

spection and repairs.

There are two types of dry-docks — floating

and stationary. The former is made of steel

or wood, and is designed to permit of being

towed from harbor to harbor. The latter, as a Fig. 1. — Shows a typical arrangement for unloading machinery, such as is installed on the new docks at Hamburg, Bre¬

men and many other European harbors.

Fig. 2. — Illustrates the arrangement for unloading machinery, as installed in connection with existing docks in several Continental and South American harbors. It will be noticed that in Fig. 1 the cranes overspan the railroad tracks at the sides of the dock-superstructure, while in Fig. 2 the cranes overspan the dock-superstructure itself.

engineering has accomplished in the way of

harbor improvements under conditions that at

the outset were most unfavorable.

In 1912 the port of Hamburg cleared in

imports and exports 25,000,000 tons, valued at

over $2,000,000,000. The tonnage was 2,000,000

in excess of 1911. The three ports of London

cleared in exports and imports $150,000,000 less than Hamburg. One of the reasons for Ham¬

burg's predominance is that it is a free port, goods being warehoused without customs duties

being levied.

Docks.

Prominent harbors are equipped with dry-docks or basins for the purpose of making ex¬

rule, is excavated into the shore, after which the floor is laid and the three walls erected of either wood construction or masonry — brick, granite or concrete. Heavy masonry walls,

however, are the most popular, as they are

better adapted for withstanding the inward

pressure of the earth filling.

In the following are given data concerning

some of America's foremost dry-docks. The

most important governmental navy yard is lo¬

cated at Brooklyn, N. Y., where the largest

ships can be built and entirely overhauled.

Here are four dry-docks : two of wood con¬

struction, measuring 491 and 658.9 feet over all in length, respectively, and two of granite, 302.2

feet and 571 feet in length. The yard is well HARBORS, DOCKS AND BREAKWATERS

equipped with every class of modern machinery.

In addition to this, several important private

shipbuilding and repairing companies having

stationary and floating docks are located on

the littoral of New York city, both on the

North and the East rivers.

The governmental navy yard in Massachu¬

setts Bay at Boston has, besides an old granite dry-dock, built in 1827, a modern concrete dock of 750 feet in length with 30 feet of water on the sills. Another system is that of Philadel¬

phia, where there are several navy shipyards

having notable dock facilities. An early con¬

structed dry-dock at the League Island navy

yard is 491 feet long and has 25.5 feet of water on the sill. A later dry-dock built of concrete and granite has an overall length of 739.5 feet

and 30 feet of water on the sill. The Cramp

shipyard, known the world over as the place

where the greatest number of United States bat¬

tleships have been built, has some of the most notable dry-docks, both of timber and concrete

construction, and is well equipped for the con-hydraulic lift with a capacity of 4,750 tons, and a length of 446 feet, with two other large grav¬

ing docks, one 420 feet long, with 28 feet of water on the sill, and the other 700 feet long, with 30 feet of water on the sill. The naval station of California is situated at Mare Island.

It possesses two docks, the one being 510.5

feet in length, and the other 739.5 feet. The former is of granite, while the latter is of

granite and concrete. Another dry-dock is that

of the Puget Sound Naval Station, Port Or¬

chard, Washington. This is a timber-con¬

structed dock of 460 feet in length, with 30

feet of water on the sill.

There are of course a large number of ship¬

building concerns on inland waterways that

possess divers kinds of docking facilities for

ships. For instance: the Buffalo Dry Dock

Company is equipped to build ships of from

4,000 to 5,000 tons. It has four docks with

overall length of 305 feet, 358 feet, 381 feet and 478 feet, respectively, while the widths at the top are 38 feet, 43 feet, 45 feet

and 84 feet, H/aA !V/\t£R L ere/ 6 9. 90

Soft filling

Soft Mud

Fig. 3. — Shows a cross-section of the dock and basin walls at Barry, Wales. This was built of large blocks of mountain lime¬

stone, faced with hard red sandstone, and later the walls were backed with various layers of hard and soft fillings, as indicated in the drawing.

struction and repair of ships. Across the

river, at Camden, is located the immense plant of the New York Shipbuilding . Company,

equipped with strictly modern facilities for the construction and repair of vessels of any size.

At Newport News, Va ., is located the New¬

port News Shipbuilding and Dry Dock Com¬

pany. The facilities of this concern are such

that it is able to undertake the construction or repair of any class of ship, mercantile or naval.

Among its equipment are two Simpson dry-docks, 610 and 827 feet in length, capable of docking vessels up to 64 feet beam.

The United States Naval Station at Algiers,

in the vicinity of New Orleans, possesses a

steel floating dock of 525 feet in length, there being in addition at New Orleans under private ownership two floating docks of 200 feet and

300 feet in length, respectively. These two

floating docks may be used together, giving a

length, on the keel blocks, of 487 feet.

On the Pacific Coast there is the California

Dry Dock Company, at San Francisco, having

a masonry dock of 490 feet in length, and a

depth of water 23 feet above the sill. The

Union Iron Works in the same city has a steel respectively. The depth of the water corre¬

sponding above the still is 11, 14, 12.5 and 60

feet.

As a rule most harbors are unsightly in ap¬

pearance. However, within the past generation

many cities, to overcome this unsightliness,

have spent large sums of money to beautify or improve the general appearance of their harbor

approaches by the construction of quay walls,

sea gates, recreation piers and parking.

Breakwaters.

The most important work and the most fun¬

damental feature in connection with artificial

sheltering or refuge harbors, and roadsteads is the breakwater intended, as its name indicates, to break up and disperse heavy seas, thereby

preventing the destruction of beaches and har¬

bors and ensuring a haven for seacraft. They

must be of great strength and stability.

When we realize that the force of the waves

is beyond calculation, and that it is impossible to say what will be their size and pressure at a given time or location — it being known that those produced by great storms attain a height of 30 feet, with a pressure per square foot of 692

from 6,000 to 7,000 pounds — we shall then

comprehend the need of breakwaters, as like¬

wise the difficulties in their construction.

Some are constructed of timber, secured or

anchored in sections, with openings permitting

possibility of giving away. To avoid this dan¬

ger, the modern engineer has endeavored to so

construct that there will be no direct force.

The best practice to-day involves making or

finding a rock support for a mass of rubble,

Fig. 4. — Shows across section of a typical quay wall, that of Rouen, France. The lower section of the quay wall was built inside watertight caissons with removable sides. It was sunk on top of wooden foundation piles which were cut off 25 feet below coping. The wall is designed to support a load of five tons per square foot. The lower section of the wall is of concrete, the upper of rubble masonry faced with brick. Tie tods connect the quay wall with anchor blocks a short distance away. For a distance of 200 feet the back of the wall is filled in. The cost of this construc¬

tion per lineal foot was $180.

the water to go through, thus breaking the

force of the wave. But the more usual con¬

struction is to build the breakwater solidly of rubble, of concrete, of stone or of some com¬

bination of these materials. The most feasible

method is by the use of rubble, or irregular

stone, which is sunk in the water and adjusts itself through the action of the waves. Con¬

stant additions bring its mass to or above the surface, when its sloping sides are capped with solid masonry so adapted as to best resist the play of the waves.

so constituted that when one stone washes away another slips into its place. The face of the rubble mound is inclined to the end of divert¬

ing the waves to one side or cause them to

spend their force upward. A concrete cover¬

ing of the rubble mass may be formed by an¬

choring metal piles through the rubble and

throwing in concrete in bags.

While breakwaters generally run at a slight

angle practically parallel to the shore, there is another type of the same known as training

jetties that extend at right angles with the

r 1

,1 “

Sea S/c/e

Me a/7 Sea lere/

3

P. K7

Fig. 5.— Shows a cross section of a breakwater at Colon, Panama. It is 11,322 feet long, and was constructed at a cost per lineal foot of $500. The entire construction is of, quarry-run stone varying in weight up to 115 tons each The weight is 340 tons per lineal foot.

It has been found that the solid masonry

constructed type of breakwater, of which the

most notable example is to be found at Cher¬

bourg, France, receives the force of the waves without diverting it, with the ever-constant

shore. An excellent example of this latter is

the series of jetties at Lido outlet channel.

The length of the northeast jetty is 11,926 feet, while the southwest jetty is 10,551 feet in

length. The distance between the outer paral-

A = Fragments 6 lbs. to 2 carts. D~ Natural Blocks of over 4 Tons B- Natural Blocks 2cwts. to 26 civts. £* Artifica! ” S3 Tons C- ‘ ” 26 * ” 4 tons.

Fig. 6. — Shows the breakwater at Marseilles, France, which is constructed of spalls and refuse, while the upper and outer layers are of natural and artificial blocks varying in weight up to 33 tons each. This breakwater was constructed at a cost of $615 per lineal foot.

-O’ A

f^Ock <?r’&n/a/r> H/t~h rSann

T?- fiat ura I Blocks OjC S/O,&.£0 Tons

3-Tfrf/jC/c/al Blocks 0/ Tons’

Lerel

Fig. 7. — Shows another typical breakwater, that of Cherbourg, France. It is 3,750 feet in length and was built at a cost per lineal foot of $435. This breakwater is constructed of rubble and natural and artificial stone blocks weighing up to 100 tons each.

CS4

HARBY — HARCOURT

lei sections is 2,970 feet. These jetties are

very similar in construction to the Malamocco

jetties at Venice, shown in Fig. 8. These last consist of two jetties, also, the northern one having a length of 6,962 feet, and the southern 3,137 feet. The distance between them is 1,545

feet. The bases are of rubble. The width at

the top is 28 feet. The superstructure — 6

feet 6 inches high and 13 feet 1 inch wide

— is built up of masonry with an inner core

of rubble. The Malamocco jetties cost ap¬

proximately $1,600,000, and their yearly main¬

tenance amounts to $3,200. The average veloc¬

ity of the ebb current at ordinary tide through the channel is two feet

per second.

In the waters of the United States are

crib breakwater, 2,803 feet in length, with a

light at its northerly end, the opening between this and the new breakwater forming a ˆSouth®

harbor entrance, while the opening between the

stone breakwater and the old breakwater is

known as the ˆmiddle® harbor entrance. The

longer extension of the new breakwater is of

the rubble, stone-capped type, while the shorter extension is of timber crib construction for the purpose of allowing vessels to moor alongside

of it in the harbor. The new breakwater is

located in the open waters of Lake Erie, paral¬

lel with the shore, 1,500 feet from the pierhead line, and in 30 feet of water; its construction occupied six or seven years, at a cost of

$2,200,000.

yVAL_

£S TABL !SH£D_ HA RBm OR J-JJiJZ.

U > fAKW£i

Fig. 9. — Breakwater at Buffalo, N. Y.

many breakwaters — certain of them evidencing

the highest form of engineering skill. They

are the result of modern commercial necessity

that is being recognized more day by day.

Perhaps the most important is that of Buffalo

(Fig. 9) — a city whose natural harbor was

comparatively insignificant — completed in

1903. With a geographical and waterway sit¬

uation through which centred • the great com¬

merce between the East and the West, Buffalo

was without adequate facilities for handling

the freight and cargoes of the great trunk lines and the Great Lakes shipping, but through engi¬

neering, by her great system of breakwaters,

has overcome this disadvantage, and, as has

been noted elsewhere in this chapter, stands

tenth as regards tonnage handled among the

world's ports.

Prior to 1903 there already existed two

breakwaters at the port of Buffalo — one, the <(north® breakwater, of concrete, 2,200 feet in length, with a light at its southerly end; and the other, or ˆold® breakwater, extending par¬

allel, with a light at its northerly end opposite to the light mentioned on the north breakwater.

The length of the old breakwater is 7,608 feet.

Between the two lights is the harbor entrance.

The new breakwater, or that of 1903, is lo¬

cated south of the old breakwater, being of

concrete construction for 7,261 feet, and con¬

necting with a timber and concrete construc¬

tion of 2,739 feet, having a light at its south¬

erly end. Parallel and to the west is a timber In the following table are given additional

dimensions and most typical modern break¬

waters.

Location

Length,

feet

Height

Base

Cost

Plymouth, England

5,100

55

380

$7,500,000

Portland, England.

6,400

73

345

4,192,000

Alexandria, Egypt.

9,675

40

100

10,000,000

Cherbourg, France.

12,178

73

320

13,372,000

Holyhead, England

7,860

72

408

6,425,000

San Pedro, Cal ….

8,500

62

180

2,900,000

Sandy Bay, Mass. .

9,200

72

205

6,828,000

Frank Koester,

Consulting Engineer, New York.

HARBY, Levi Charles, American naval

officer; b. Georgetown, S. C., 21 Sept. 1793; d.

Galveston, Tex., 3 Dec. 1870. While a mid¬

shipman in the United States navy in 1812, he was taken prisoner and confined in Dartmoor

Prison, England, until the end of the war. He served under General Jackson in the Creek war, and participated in the Texas struggle for in¬

dependence and the confl ct with Mexico. Sub¬

sequently he fought in South America under

Bolivar. On the secession of South Carolina,

he resigned his comrmssion in the United States service and joined the Confederate forces as

commander of the fleet at Sabine Pass.

HARCOURT, har'koort, Sir William

George Granville Venables Vernon, English

statesman: b. York, 14 Oct. 1827; d. Nuneham,

Oxfordshire, 1 Oct. 1904. He was the second

son of the Rev. William Vernon Harcourt,

canon of York, and was graduated at Trinity

College, Cambridge, with high honors in 1851,

receiving the degree of M.A. He then studied

law, being called to the bar in 1854, and in 1866 he became queen's counsel. In 1859

he stood for the Kirkcaldy Burghs as an

Independent Liberal, but was narrowly de¬

feated. During these years he wrote largely

for the Saturday Review and other journals,

and in 1861 began to attract attention by a

series of letters on international law and kin¬

dred subjects contributed to The Times over

the signature of (<Historicus.):> These were

continued intermittently till 1876. In the early years he dealt with the problems arising out of the American Civil War. His aim was to deny

belligerent rights to the Confederates, and he

strongly influenced public opinion in favor of

the North. A series of these letters was pub¬

lished under the title <(American Neutrality.®

In 1868 he entered Parliament as Liberal mem¬

ber for Oxford, serving his constituents till

1880, when he was defeated for re-election. He was, however, selected to represent Derby and

continued in that position until 1895, when,

having been defeated at the general election, he found a seat in West Monmouthshire. In 1869

he was elected Whewell professor of interna¬

tional law at Cambridge. He was appointed

solicitor-general in 1873, but held the office only three months, and in the same year was

knighted by the queen. Although he had not

supported Mr. Gladstone during his retirement

from power, yet upon that statesman's return

to the office of Prime Minister in 1880, he was appointed Secretary of State for the home de¬

partment, continuing in that capacity until the Liberal party went out of power in 1885.

During this Parliament his name became

famous through his connection with the

Ground Game Act (1880), the Arms (Ireland)

Act (1881), and the Explosives Act (1883), the last one being pushed through all its stages in the shortest time on record. He was also con¬

spicuous for his attacks on the Nationalist

leaders ; but on the conversion of Gladstone to Home Rule he followed his leader in yielding

to the Irish demands. In 1884 his bill for uni¬

fying the municipal administration of London

was introduced. Upon the return of the

Liberals to power in 1886 he was made Chan¬

cellor of the Exchequer, holding that position

only a short time as the fortunes of politics again took him from office. He offered strenuous op¬

position to the cession of Heligoland to Ger¬

many. Again in 1892 he was made Chancellor

of the Exchequer, acting as such until 1895.

It was during this term, in 1894, that he intro¬

duced and carried his famous budget, in which

the income tax became more graduated and the

((death duties® on real and personal property

were equalized, and imposed on an ascending

scale. Upon Gladstone's retirement in 1894,

Harcourt was looked upon as his successor,

but Queen Victoria on her own initiative sent

for Lord Rosebery and asked him to form a

government. Sir William then became leader

of the Liberals in the House of Commons, and

ii became evident that he and the new Prime

Minister did not agree as to party policy, and, though their differences were from time to

time patched up, it was clear in his defeat at Derby in 1895 that the party was divided on

many issues, and the effect was then seen of

Sir William's Local Veto Bill, not only in the utter rout of the Liberals, but in the setback given to temperance legislation. From 1895 to

1900 he represented West Monmouthshire in

the House of Commons, but the task of leader¬

ship of the Liberal party became particularly

onerous because of the tendency of the various sections to break away from control. In the

session of 1896, against the overwhelming

Unionist majority, he scored several successes,

but was. severely criticised by his own party for concurring in the majority report of the special committee, of which he was a member, ap¬

pointed in 1897 to investigate the Jamieson Raid and the British South Africa Company. The

internal dissensions in the Cabinet became more marked as time went on, and the divided coun¬

sels manifest among the leaders of the Liberals led to his decision to retire from the leadership of the party on the floor of the House of Com¬

mons, and in 1898 with John Morley he retired from active work and thereafter sat as a pri¬

vate member. As a private, member, he no

longer restrained his attacks on the govern¬

ment, paying not the least deference to Liberal imperialism. He actively opposed the govern¬

ment's policy with regard to the sinking fund, their attitude in the negotiations with the Trans¬

vaal, and the financing of the South African

War, and throughout the war he lost no oppor¬

tunity in criticising the South African develop¬

ments. In 1898-1900 he became prominent, both

on the platform and in his letters to The Times, in advocating active measures against ritualistc practices in the Church of England. The gen¬

eral election of 1900 found him full of fight, favoring the official Liberal program as dis¬

tinct from that of the imperialist section which favored the return of Lord Rosebery to the

leadership. In his last years he opposed with

characteristic energy Chamberlain's tariff re¬

form proposals. Sir William was a Liberal

after the type of Cobden and Gladstone, and

viewed with intense dislike the policy of ex¬

pansion and imperialistic adventure that became

popular with an influential section of his party in his late years. He was great as a parlia¬

mentary gladiator. Though his speeches were

in the main carefully prepared and delivered

from copious notes in reply he was very effec¬

tive, a hard hitter, who was always brimful of witty and telling phrases, and on occasion, the master of a prose style at once flexible and

sinuous. Sir William Harcourt married in 1859

Lady Therese Lewis, widow of Sir George

Cornwall Lewis, and daughter of T. H. Lister,

and again in 1876 Mrs. Elizabeth Ives, widow

of J. P. Ives, and daughter of John Lothrop

Motley, the historian, and at one time United

States Minister in London. His son Lewis by

his first wife was Colonial Secretary in tin

Asquith Cabinet, 1910-15, Commissioner of

Works in the coalition ministry 1915-16, and

was raised to the peerage on the accession of Lloyd George to power in December 1916.

HARD LABOR, in law, compulsory work,

mechanical or other, sometimes judicially im¬

posed upon criminals in addition to imprison¬

ment or other punishment. It is a provision of statute law both in this country and Great

Britain. Its first English adoption was secured through the demand for some adequate penalty

in cases where penal servitude and transporta¬

tion were for any reason inexpedient. In the

United States the punishment of hard labor

(which, however, is generally looked upon by

humanitarians and sanitarians as being rather

a healthful and merciful privilege) can only be imposed by a court on the authority of statute, the mode of applying the punishment being in

some cases prescribed by State or Federal laws, and in others left to prison regulation.

HARDECANUTE, har-de-ka-nut', HAR—

DICANUTE or HARDY CANUTE, king

of England and Denmark; son of Canute the

Great (q.v.) : b. about 1017; d. 8 June 1042.

At the time of his father's death in 1035 he was in Denmark, where he was immediately

recognized as king. His half-brother, Harold,

however, who happened to be in England at

the time, laid claim to the throne of that part of their father's dominions. For a time the

mother of Hardecanute succeeded in holding

Wessex in his name, while Mercia and North¬

umbria were held by Harold, such an allotment

having been made by a witenagemote held at

Oxford. Hardecanute was about to make an

armed descent upon England, when Harold

died (1040), and his brother peacefully suc¬

ceeded him. He reigned till 1042, but his reign was not marked by any important event. He

left the government almost entirely in the hands of his mother and the powerful Earl Godwin

(q.v.), wThile he gave himself up to feasts and carousals.

HARDEE, William Joseph, military offi¬

cer: b. Savannah, Ga., 10 Oct. 1815; d. Wytheville, Va., 6 Nov. 1873. He was graduated at

West Point in 1838; served with distinction in the Mexican War; and in the Civil War en¬

tered the Confederate army with the rank of

colonel. He commanded a corps at Shiloh ;

and was promoted lieutenant-general in 1862.

At Perryville he commanded the left wing of

the Confederate army, and in December 1864

defended Savannah against General Sherman

HARDEN, Maximilian (Felix Ernst),

German publicist: b. Berlin, 20 Oct. 1861. He

was the son of a Jewish merchant named Witkowski, and was educated at the French Gym¬

nasium, at Berlin. He first attracted attention by essays of a literary character, published in the periodicals Die Nation, Gegenwart, Frank¬

furter Zeitung, and still more by those of a

political and social character, written for the Gegenwart under the pseudonym of ˆApostata.®

In October 1892, Harden founded Die Zukunft,

a weekly periodical, which was successful from

the beginning. Harden succeeds in assuming,

on most public questions, an attitude of isola¬

tion, intensified by a lack of consideration for other persons, and strengthened by a wide and

aptly-applied erudition, together with unusual

powers of formulation. The latter are some¬

times handicapped by more or less obscure al¬

lusions, particularly to persons and incidents in those portions of the Old Testament that are

less widely read. Harden has frequently taken

positions that were unpopular; he undertook to

champion Bismarck after the latter's dismissal

by William II ; he criticized Caprivi severely

when he was Chancellor, and his attacks on the social evils of Berlin were charged as muck-rˆihing. In 1890 he wag sentenced to six months'

captivity in a fortress for lese majeste. He

acquired a universal reputation by his attacks, in 1907, on Prince Philip von Eulenburg and

other friends of Emperor William II, all of

whom he accused of abnormal and perverse

tendencies, and of the perpetration of immoral

acts. Chiefly, however, he objected to their

forming a sort of camarilla around the em¬

peror and isolating him from the nation. He

maintained that they prevented the emperor,

in 1905 and 1906, from assuming a more vigor¬

ous policy in the dispute then in progress be¬

tween his country and France and England

over the Morocco question, and that they in¬

fluenced him to make concessions to France

that were injurious to the national dignity and the vital interests of the German Empire. The

scandal Harden thus called forth resulted in

the exposure of certain immoral practices by

several persons of the imperial court, and in

the disgrace of a number of intimate personal

friends of the emperor/ One of the latter,

Aide-de-Camp General Count Kuno von Moltke

took legal action against Harden. After a sen¬

sational trial, the latter was acquitted by a

lower court at Berlin. But the incident had

aroused so much interest through its revela¬

tions, that the Socialists began to use it as material for their attacks on the government

of William II. Accordingly, the imperial

prosecutor for Berlin himself inaugurated pro¬

ceedings against Harden before the Court of

Correction, and, after a trial conducted chiefly behind closed doors, obtained a sentence against Harden of four months' imprisonment for def¬

amation of character. Most of the witnesses

who had inculpated von Moltke in the first

trial withdrew or altered their testimony in

the second, in order to obviate a scandal, in accordance with an understanding with the

authorities. It was later maintained that Har¬

den had simply been the tool of Holstein

(q.v.) and other members of the anti-French

party in the Moroccan affair.

After the outbreak of the European War,

Harden and his weekly Die Zukunft continued

to assume a consistently critical character, re¬

peatedly championing the actions of Germany's

opponents to the detriment of the German gov¬

ernment. Especially after the entrance of the

United States into the war, Harden often called attention to the idealistic motives of the Ameri¬

can government and people, designating the

American nation as a <(great storehouse of ideal¬

ism, }) and assuring German bureaucracy, that it was guilty of a serious error in underestimating the naval and military powers of the new enemy.

Frequently his expressions in this connection

caused a suppression of the offending numbers

of the Zukunft ; thus, the number of 24 Aug.

1918 was suppressed because it contained an

article by Harden on the expulsion of Count

Lichnowsky (q.v.) from the Prussian upper

house, for having written the socalled (<Lichnowsky Memoir.® In general, Harden wrote,

in these attacks on the Prussian government

•and on German imperialism, from the stand¬

point of the Liberal Democrat, who wished to

see, a businesslike, efficient, but not monarchic or bureaucratic, regime established in Germany.

To this extent he may be considered a national reformer, but not a revolutionist. His attitude toward the Russian Revolution, after the

November 1917 egup cTetgt, was that of bitter

hostility. His published works are ‘Apostata*

(2 vols. of essays, Berlin 1892) ; (Theater und Literatur) (essays, Berlin 1896) ; (Kampfgenosse Sudermann) (Berlin 1903) ; (Kopfe> (2 vols.

of character studies, including one on Rocke¬

feller, Berlin 1910-11 ; 2d ed., 1912) ; (Prozesse) (“Famous Trials,® essays, Berlin 1913). Con¬

sult autobiographical sketch in Zukunft (10

Oct. 1903) ; Bahr, Hermann, (Maximilian Har¬

den) (in Nenes Wiener Taqeblatt, 13 Nov.

1904).

Jacob Wittmer Hartmann,

Assistant Professor of the German Language

and Literature, The College of the City, of

New York.

HARDEN, William, American historian:

b. Savannah, Ga., 11 Nov. 1844. He left his

studies in the schools of Savannah to join the Confederate army, serving throughout the Civil

War in the 54th Georgia infantry and in the

signal corps. After the war he studied law

and was admitted to the bar in 1873. He was

assistant librarian of the Georgia Historical

Society from 1866 to 1869, when on 5 August

he was appointed librarian, a position he still occupies. He has been librarian of the

Savannah public library from its beginning in

1903. He has been a member of the board of

managers of Telfair Academy of Arts and

Sciences since 1882, and custodian since 1894;

organizer and secretary of the Georgia So¬

ciety of the Sons of the Revolution since 1891 ; and was a Democratic member of the Georgia

house of representatives from 1900-04. Has

written much on historical subjects in maga¬

zines and journals and has published ‘A His¬

tory of Savannah and South Georgia> (1913).

HARDEN-HICKEY, James Aloysius,

American writer and adventurer: b. San Fran¬

cisco, 1854; d. El Paso, Tex., 10 Feb. 1898.

According to some accounts he was born in

France and descended from an old Catholic

Royalist family of Irish origin, whose ances¬

tors had emigrated to France with the Stuarts.

He received his education at the Jesuit College of Namur, Belgium, the French Military

Academy of Saint Cyr, and at Leipzig. In

Paris (1878) he founded Le Triboulet, a

satirical journal that frequently brought him

into collision with prominent people and the

authorities owing to his violent attacks against the Republican government. _ After passing

through a number of libel actions — for which he had to pay dearly — and fighting a series of duels, Harden-Hickey was expelled from

France in 1880 by decree of the Minister of the Interior. He had adopted or inherited — it is not clear which — the title of “baron,® and was celebrated as a skilful fencer. About 1889,

while making a trip round the world in a sailing vessel, he touched at the island of Trinidad, a desolate, uninhabited little rock in the South

Atlantic, 700 miles from Rio de Janeiro.. Re¬

turning to the United States, he married a

daughter of John H. Flagler, the Standard Oil

magnate, in 1891. In 1894 he set into operation a scheme to found a principality on Trinidad,

and adopted the title of “James I, Prince of

Trinidad.® In January 1895, however, a

British warship called at the island and rean¬

nexed it to the British Empire, to which it

had once belonged. Protestations raised by the

Brazilian government led to the island being

handed over to Brazil in 1896. Harden-Hickey

met his death by an overdose of a drug with —it is supposed — suicidal intention. He was an accomplished linguist and wrote most of his

works in French, among them being ‘Sam—

piers) ; ‘Memoires d’un gommeux* ; ‘Pres du

gouffre*; (Un Amour Vendeen) ; (Aventures

merveilleuses de Nabuchodonosor NosebreakeU

(Bernard de VentadoU ; and ‘Euthanasia, } an

essay on suicide. See Trinidad, or Ascenao.

HARDENBERG, Friedrich Leopold,

Freiherr von, better known as “Novalis®

{Latin, new land, from the name of a family

estate) , German author and hymnologist : b.

Oberwiederstedt, Prussian Saxony, 2 May 1772;

d. Weissenfels, 25 March 1801. With the

Schlegels and Tieck, he was one of the founders of the German Romantic School, of which his

hymns and fragmentary novels are character¬

istic products. Idealistic, and based on dis¬

tinctive views of philosophy, mathematics, art

and the sciences they contain a singular mix¬

ture of imagination, sensibility, religion and

mysticism, tinged by gentle and amiable enthusi¬

asm. But due to his early death from con¬

sumption, they do not form a compact philos—

phy of life. The best of his hymns (Though

all to Thee were faithless^ 'If only He is

mine) and 'Hymn to Night) are beautiful,

breathing a feeling of isolation and melancholy as to the ultimate attainment of actual good

in the world, which was caused, doubtless,

by the death of his betrothed, Sophie von Kuhn in 1797, and by his state of health which pre¬

vented the consummation of a second engage¬

ment in marriage. This is perhaps best exem¬

plified in 'Die Lehrlinge zu Sais) in which

immortalizing as the "Meister® Werner, his

instructor in geology at Freiburg, he theorizes the secret of life as "the fulfilled longing of a loving heart.® The best of his prose writings

which Carlyle recommended for "perusal and

reperusal® is the unfinished novel 'Heinrich

von Ofterdingen) in which the quest of the

“blue flower,® the symbol of Romanticism, is

a poetical allegory marked by excellent narra¬

tive, interspersed with beautiful verse. Hardenberg’s parents were Moravians, which

probably accounted for his mystic religious

tendencies. At Jena, Leipzig, Wittenberg and

Tennstadt he was thoroughly grounded in

mathematics, natural science, philosophy and

law, and became distinguished for his poetical

talents. Becoming auditor of the government

salt-works in Weissenfels of which his father

was director, he later studied geology at the

mining academy of Freiberg, Saxony. He was

appointed “Amtshauptmann® magistrate in

Thuringia in 1800, but death the following year ended a career full of high promise. His works, collected by the Schlegels, were issued in two volumes, and several times re-edited, appeared

with a third volume in 1846. Recent editions are Meisner, C., and Wille, B., (1898) ; Heilbron, E., (3 vols., 1901) ; Minor, J., (3 vols., Jena 1907) ; Boelsche (4 vols., Leipzig 1908) ; Schmidt, J..

‘Heinrich von Ofterdingen) (published sepa¬

rately 1876) ; Raich, J. M., ‘Novalis’ Corre¬

spondence* (1880). Consult Carlyle, T.,

‘Novalis) (in ‘Critical and Miscellaneous

Essays,* Edinburgh ed., New York 1903) ; Mae¬

terlinck, M., ‘Novalis) (in ‘On Emerson and

Other Essays,* New York 1912) ; Haym, R.,

(Friedrich von Hardenberg* (2d ed., Gotha 1883); Busse, C., (Novalis' Lyrik > (1898); Bing, J., (Friedrich von Hardenberg) (Berlin 1901); Heilbron, E., (Novalis der Romantiker) (Berlin 1901) ; Huch, R., (Die Romantik) (4th ed., Leipzig 1911).

HARDENBERG, har'den-berk, Karl Au¬ gust, Prince, Prussian diplomat and Chancel¬ lor: b. Essenrode, Hanover, 31 May 1750; d. Genoa, Italy, 26 Nov. 1822. To his efforts with those of Baron Stein, Prussia owes her widespread plan of social and political reor¬ ganization, the reform of the military system, the overthrow of socalled feudalistic rights, the uplift of the peasantry, the spread of edu¬ cation and the opening of the civil service to all classes. He had studied at Leipzig and Got¬ tingen, acquired early knowledge of political

government at Regensburg, Vienna and Berlin,

and traveled in France, Holland and England.

He married the Countess Reventlow; in 1778

became privy councillor; and went to England,

where his wife's intrigue with the Prince of

Wales marred his career, and caused his res¬

ignation from the Hanoverian service. From

1782-87 he served the Duke of Brunswick, be¬

coming president of the council of state ; in

1790 was appointed to administer the margra—

vate of Ansbach and Bayreuth, and the fol¬

lowing year when it wras incorporated with

Prussia, King Frederick II made him Minister

of State and Cabinet member. During the

Napoleonic wars he was prominent in the man¬

agement of public affairs ; in 1804 became first Prussian Minister, and incurred the displeasure

of Napoleon who insisted on his dismissal in

the Treaty of Tilsit. In 1810, however, after

the resignation of Stein, he was appointed Prus¬

sian Chancellor, and began that series of re¬

forms with which his name is inseparably linked in Prussian history by the War of Liberation.

He was a signatory to the first peace of Paris, 30 May 1814, and received the title of prince, 3 June 1814. He visited England with the allied sovereigns and was the chief representative of

Prussia at the Congress of Vienna 1814-15, where, however, he was not equal to the di¬ plomacy of Metternich and, weakening to reac¬ tionary measures, sank in public favor. In 1822 he went to Italy to attend the Congress of Verona and shortly after its close died suddenly at Genoa. Withheld for half a cen¬ tury, his (Memoirs, 1801—07 } were edited by Ranke and published with a biographical intro¬ duction. Consult Ranke, L. von, (Denwiirdig— keiten des Fiirsten von Hardenberg) (5 vols., Leipzig 1877) ; Klose, (Leben Karl Augusts, Fiirsten von Hardenberg) (Halle 1807) ; Meier, E., (Die Reform der Verwaltungsorganisation unter Stein und Hardenberg) (Leipzig 1881) ; Meyer, C, (Hardenberg und seine Verwaltung der Furstentiimer Ansbach und Bayreuth > (Breslau 1892) ; Koser, (Die Neuordnung des preussischen archivwesens durch die Staatskanz— ler Fiirsten v. Hardenberg) (Leipzig 1904) ; See¬ ley, J. R., (Life and Times of Stein) (London 1879).

HARDHACK, or STEEPLE-BUSH, an

erect species of American Spircea (S. tomen—

tosa), common in pastures and low grounds,

and celebrated for its astringent properties,

which cause it to be used medicinally. It is

distinguishable by the dense woolly tomentum,

which covers its stem and the underside of its leaves; and bears in late summer (<a compact,

steeple-shaped panicle of peach-blow pink.®

HARDIE, James Allen, American soldier:

b. New York, 5 May 1823; d. Washington, D. C., 14 Dec. 1876. He was graduated from the

United States Military Academy in 1843, en¬

tered the artillery, during the Civil War served on the staffs successively of Generals McClellan and Burnside, was judge-advocate-general of

the Army of the Potomac on Hooker's staff,

became brigadier-general of volunteers in 1862,

and inspector-general with rank of colonel in

1864. He was brevetted major-general, United

States army, in 1865 His writings are largely

confined to military reports.

HARDIE, James Keir, British politician

and labor leader: b. Scotland, 1856; d. Glasgow, 26 Sept. 1915. He worked in a coal mine as

a boy till 1880, when he was elected secretary of the Lanarkshire Miners' Union. From that

period he devoted himself to political and labor agitation. Entirely self-educated, he possessed

a ready flow of language — not infrequently of the violent demagogue type. He made his first

attempt for Parliament as a Labor candidate

in 1888, but was defeated. In 1892 he was re¬

turned for West Ham, and made his first

arrival at the House in circumstances which

led to police intervention. He lost his seat in 1895, but returned in 1900 for Merthyr Tydvil, which he represented (with another member)

till his death. He was one of the founders of the Independent Labor Party in 1892, of which

he was chairman for many years. He was

proprietor and editor of The Labor Leader

from 1887 to 1903. In 1906, when the Labor

party became a distinct group in the House,

he was elected its first chairman. He visited

India in 1907 and created considerable disturb¬

ance with his inflammatory speeches. Hardie

traveled the British colonies and the United

States on lecturing tours. He was the most

extreme of British politicians; his gloomy views on the state of society placed him among a

minority during most of his stormy political

life. Though his socialistic principles never

found much sympathy even among his own

following, he performed valuable service to the cause of labor.

HARDIE, Robert Gordon, American por¬

trait painter: b. Brattleboro, Vt., 29 March 1854; d. Brattleboro, Vt., 9 Jan. 1904. He studied

drawing at the Cooper Union Institute, the

Academy of Designs' and the Art Students'

League, N. Y., and at Paris became a pupil of Gerome. He exhibited' at the Salon in 1880 and following years, and in 1882 studied under Cabanel. A picture of his appeared at the Exhibi¬

tion of the National Academy of Design in 1888, and he exhibited a portrait of his wife at the World's Columbian Exposition in 1893.

HARDING, Chester, American portrait

painter: b. Conway, Mass., 1 Sept. 1792; d. Bos¬

ton, 1 April 1866. As an artist he was self-taught, his trade being that of a turner. He

fought as a soldier in the War of 1812, and

found employment on his discharge as a sign—

painter in Pittsburgh, Pa. Crossing the ocean

he became a favorite portrait painter in London and found patronage among the royal family.

His Portrait of Daniel Webster) is owned by

the New \ork Bar Association, while his Por¬

trait of John Randolph ; is in the Corcoran

Gallery, Washington.

HARDING, Warren Gamaliel, 29th Presi¬

dent of the United States : b. on a farm near Blooming Grove (then Corsica), Morrow

County, Ohio, 2 Nov. 1865. The first of Mr.

.Hardings paternal ancestors to come to Amer¬

ica was Robert Harding, who settled in Connec¬

ticut sometime prior to 1650. From the Con¬

necticut line of Robert Harding came Capt.

Stephen Harding, whose son, Abraham Hard¬

ing, was the father of Amos Harding. The lat¬

ter reared a family of 14 sons, one of whom, George Tyron Harding, was the father of

Charles Alexander Harding. The latter left but

one son, George Tyron Harding (2nd), the

father of President Harding.

As a boy, the future President enjoyed but

few, if any, luxuries. His parents were in mod¬

est circumstances. He attended the district

school in winter and in the summer worked on

his father s farm or sought employment in the village. In his early teens he worked in a saw¬

mill and as a laborer with the construction force of the Toledo and Ohio Central Railroad. In

fact he turned his hand to whatever odd jobs the days brought forth. In the district school he

had showm more than ordinary ability and he

wanted to continue his studies.

In 1879 he entered the now defunct Ohio

Central College at Iberia where he was a stu¬

dent until 1882. His scholarship record was

good. Of great importance, because of the fact that it aided him in choosing a career which not only brought him fortune but also aided mate¬

rially in placing him in the highest office in the land, was his appointment to the editorship of the college paper.

Having, while editor of his college publica¬

tion, acquired a fondness for printer's ink, Mr.

Harding, upon leaving college, entered the

printing trades. He learned to set type by hand and thereafter, upon the introduction of the lino¬

type, learned to operate that machine. He be¬

came, also, a practical pressman. From the

composing and press rooms, he turned to re—

portorial and editorial work on the Marion

(Ohio) Daily Star. It was not long before he

decided that he wanted to own the *paper and in 1884 he purchased it. Adopting a constructive

and fearless journalistic policy he soon made

the Star a newspaper of great influence. Many

years after purchasing it, when it had been

made a profitable business, he organized the

Harding Publishing Company, wflth himself as

president, and distributed shares of stock

among his employees. The wisdom of this

move is shown by the fact that Mr. Plarding's paper has never experienced any labor

troubles.

While demonstrating his ability as a news¬

paper publisher, Mr. Harding also proved that

he was an exceptionally able business man. Va¬

rious enterprises elected him a member of their directorates. The list includes the Marion

County Bank, the Marion Lumber Company,

the Marion County Telephone Company and the

Marion Home Building and Loan Association.

During the time that he was increasing his

business connections from year to year, Mr.

Harding also maintained an interest in political matters which finally resulted in his being

drawn into active participation in public af¬

fairs. The fearlessness of his editorials al¬

ready had attracted wide attention. He was

elected a member of the Ohio State senate and served from 190CU04. He soon demonstrated

his ability as a debater and lawmaker. The re¬

sult was his election as lieutenant-governor of Ohio for the term 1904—06. In 1910 he was

the candidate of the Republican party for gov¬

ernor but party quarrels brought about his de¬

feat. He threatened at this time to abandon

politics but in 1912 he was again in the political arena actively supporting President William H.

Taft for renomination and re-election.

In 1914 Mr. Harding announced his candi¬

dacy for the nomination for United States sen¬

ator and at the primary election — the first held in Ohio — defeated Joseph Benson Foraker who

had been one of Ohio's representatives in the

upper branch of Congress for many years. His

election followed in November when he re¬

ceived a plurality over his Democratic oppo¬

nent of 102,373 votes.

Upon taking his seat in the Senate, Mr.

Harding was quick to win the esteem of his col¬

leagues. His good judgment, sound common

sense, breadth of toleration and deliberate and judicial manner soon marked him for leader¬

ship. In 1919-20 he served as chairman of the Committee on the Philippines. His most im¬

portant assignment, however, was to the Com¬

mittee on Foreign Relations and to the Commit¬

tee on Commerce. He also served as a mem¬

ber of the committees on Territories, Pacific

Islands and Porto Rico, Public Health and

Quarantine, Standards, Weights and Measures,

and Expenditures in the Treasury Department.

Mr. Harding made three trips abroad, de¬

voting much time to the study of European

governments and their economic problems. As

a member of the Foreign Relations Committee

during 1919-20, Mr. Harding took a prominent

part in the consideration of the Peace Treaty of Versailles. There the senator from Ohio held

firm to the doctrine of an America free, strong, untrammeled and supreme in her individualism.

He could not accept the involvements which he

felt would come to the United States through

membership in the League of Nations as sub¬

mitted in the Treaty presented to the Senate by President Wilson. In voting for the declara¬

tion of war on Germany, he explained in the

Senate 4 April 1917 — ■ <(I want it known to the people of my state and to the nation that I am voting for war to-night for the maintenance of just American rights, which is the first essen¬

tial to the preservation of the soul of this re¬

public.® Mr. Harding's every public utterance

has been based upon nationalism and American¬

ism.

Mr. Harding's record in the Senate thrust

him forward as one of the strongest candidates for the Presidency in 1920. The Republican Na¬

tional Convention met at Chicago.8 June 1920.

Nominations for the Presidency began on the

11th when four ballots were taken; one on the 12th, on the 10th ballot, Mr. Harding was

chosen to head the party's ticket, receiving 692ˆ2

votes to 156 for his nearest competitor, Maj.-

Gen. Leonard Wood. In his speech of ac¬

ceptance, 22 July 1920, Senator Harding prom¬

ised ((a formal and effective peace as quickly as 700

a Republican ‘Congress can pass its declaration for a Republican Executive to sign.®

The compaigning that followed was fought

mainly with America’s entrance into the League

of Nations; a new deal in foreign relations,

economy in government expenditures and post¬

war reconstruction as the issues. At the polls in November Mr. Harding received the largest

plurality ever given a Presidential candidate.

The total popular vote was: Harding, 16,138,-

914; Cox, 9,142,438. The electoral vote stood;

Harding, 404; Cox, 127.

On 4 March 1921, Mr. Harding was inau¬

gurated President and on 22 March issued a call for an extra session of the Congress on 11 April.

The new President’s Cabinet appointments met

with general favor, especially his designation of former Governor Charles E. Hughes, of New

York, as Secretary of State. Mr. Harding

also won great praise by his appointment, on 30

June 1921, of former President William H.

Taft as Chief Justice of the Supreme Court of the United States to succeed the late Edward

Douglass White. Another appointment which

met with almost universal approval was that of Brig.-Gen. Charles G. Dawes, of Chicago, as

director of the Bureau of the Budget, under

the National Budget Act, approved 10 June

1921.

President Harding had been in office but a

short while when he demonstrated a freedom

from control which astonished those who had

predicted that he would be dominated by the

Senate. He showed a willingness to listen to

advice but at the same time gave proof of his determination to conduct the affairs of the na¬

tion in accordance with his own ideas as to what is best for America and Americans.

Early in the summer of 1921, the new Presi¬

dent extended an invitation to the governments

of Great Britain, France, Italy, Japan and China to send representatives to a conference to be

held at Washington for the purpose of discuss¬

ing disarmament and Pacific questions. All of

the powers accepted his invitation and 11 Nov.

1921 (Armistice Day) was fixed as the date

for the convention to assemble.

HARDNESS, Scale of. In mineralogy,

the hardness of a mineral is estimated by ob¬

serving which of certain standard minerals will scratch a smooth surface of the given mineral, and which will not. On Mohs' scale (which is

usually adopted), 10 such standard minerals

are selected for the establishment of the scale, their hardness being arbitrarily defined as 1, 2, 3, etc., up to 10. The minerals that are com¬

monly used for this purpose are as follows :

1. Talc.

2. Gypsum.

3. Calcite.

4. Fluorite.

5. Apatite.

6. Feldspar

7. Quartz.

8. Topaz.

9. Sapphire.

10. Diamond.

A mineral which will neither scratch apatite

nor be scratched by it, for example, has a hard¬

ness of precisely 5 ; and the same may be said of one which will both scratch apatite and be scratched by it. A mineral which feldspar will scratch but apatite will not has a hardness in¬

termediate between 5 and 6. The decimal ex¬

pressing the precise degree of hardness in such a case must be assigned by guess ; but there is little use in attempting to determine a hardness more closely than to the nearest half-degree on the scale given above. The hardness of metals

is measured in a totally different way, by test¬

ing the impression made by a steel ball under a determined pressure.

HARDT, Ernst, German dramatist and

novelist : b. Graudenz, 9 May 1876, and was first destined for a military career. He found this

little to his taste, however, and in 1892 left the Cadet School at

Lichterfelde. He has

lived in Greece (1893-94), Spain and Portugal

(1896-97), part of the time earning a living as a teacher of German. He became theatrical

critic of the Dresdncr Zeitiing in 1898, later moving to Berlin and finally settling at Weimar.

His best-known work is the tragedy (Tantris

der Narr,5 the subject of which is the Tristan (q.v.) story, and which gained for him the

V olks-S chiller Prize in 1908. A translation of this play into English, under the title (Tristan the Jester, 5 appeared in (German Classics5

(Vol. XX, New York 1914). His short stories

are of delicate tone and fine feeling, and he is also known as an excellent translator. His

works are (Der Kampf urns Rosenrote,5 drama

(1903) ; (Aus den Tagen des Knaben,5 poems

(1904); (An den Toren des Lebens,5 short

stories (1904) ; (Ninon von Lenclos,5 drama

(1905) ; (Tantris der Narr,5 drama (1907) ;

‘Gudrun,5 tragedy (1911) ; (Schirin und Ger—

traude,5 comedy (1912). Consult Eisner, R.,

(Hardt’s Tantris der Narr5 (Leipzig 1908) ;

Pompecki, B., < Ernst Hardt5 (Leipzig 1908).

HARDWARE, generic term which now in¬

cludes in its technical and commercial significa¬

tion a great variety of articles made of copper, aluminum, brass,

bronze, iron or steel. These

articles of their very nature defy classification, since they comprise tools used by a variety of tradesmen such as carpenters, machinists, lock¬

smiths, gunsmiths, saddlers, carriage-body build¬

ers, etc., and also the materials and fittings used by them. There exists, however, the gen¬

eral classification of builders', carpenters' and housekeepers' hardware. In the early days of

the industry the term was much more restricted than at present, and included little more than the few fittings required in house construction, such as hinges, latches, *etc.* It now includes such

articles as refrigerators, ice-cream freezers and other kitchen utensils, also sporting goods, such as guns, rifles, pistols, athletic supplies and cutlery. Hardware manufacture in the United

States has kept pace with the general progress of the country. Beginning in the crudest way with the manufacture of handmade implements and

depending almost entirely upon importation from

the Old World it has grown by giant strides,

more especially since the end of the Civil War, and in many instances because of the protection afforded by the tariff, until to-day American

hardware is practically independent of the for¬

eign. American manufacturers have been origi¬

nal in their ideas and methods and have adapted themselves to the necessities of their environ¬

ment, not slavishly following the copies of Old World tools, being guided solely by common sense and necessity. The steady substitution of ma¬

chinery for hand labor has been the most potent cause of the great excellence attained by Ameri¬

can hardware over its Old World competitors.

WARREN G. HARDING

Twenty-ninth President of the United States

HARDWARE INDUSTRY IN AMERICA

701

HARDWARE INDUSTRY IN AMER¬

ICA. From its small beginnings in the early

years of the last century, when only the crudest implements were made at the village forge, this industry has attained an important place in our manufactures. It being to a large extent, the

business of a new country because of the great amount of building, its development in the

United States has kept pace with the country's growth, although it has been to some extent

adversely affected by the substitution of steel and concrete for wood in construction work.

In a country so diversified as to soil and

climate, there is a necessity for great diversity of hardware, and the goods used in the dif¬

ferent parts of the country invariably reflect the nature and temper of the people. The South is much more conservative than the North and

clings longer to old-fashioned articles of well-known reputation some

time after they have

been superseded in the North by more modern

things. Because of the comparative poverty of

the South in the past, and the fact that the negro is the principal laborer, the demand until lately has been rather for price than for quality.

Again, in the extreme East very much the same conditions prevail, owing to the natural economy of the people and their extreme conservatism.

The West — by which is also meant the South¬

west and the Northwest — is a great consumer

of hardware, and within its bounds are the

great distributing hardware centres.

The steady and rapid destruction of the

forests has had a farreaching effect upon the hardware business, and one that in many cases

is destined to alter permanently the use and

nature of many hardware implements. In the

beginning the country had to be cleared of for¬

ests, which created an enormous demand for all edge tools and stimulated the ingenuity of the manufacturers to produce articles fitted for the different needs — not alone for the different

sections of the country, but also for the various kinds of wood. Now that the white pine for¬

ests have practically been destroyed, it is neces¬

sary to have edge tools that are more and more adapted for use of the hard woods which are

still fairly abundant ; and the question also pre¬

sents itself to the manufacturers as to how

long it will be possible to keep up the present production of such items as axes and cross-cut saws, in view of the fact that the forests are steadily disappearing.

It is impossible within the limit of this ar¬

ticle to do more than briefly mention some of the leading branches of the hardware business and

tell in a few words of their nature and history.

Wire Industry. — One of the most prom¬

inent to-day is that of the wire industry, be¬

cause it ramifies and affects almost every part of the hardware business. It early felt the

impetus of the advantages offered by the Besse¬

mer steel process, since it was possible to pro¬

duce in wire made from steel many items

which could not be drawn from wrought-iron.

It is difficult to state with exactness — because of the connection with other branches of iron

and steel manufacture — but there is probably

invested in wire manufacture more than $200,-

000,000. The United States Special Census of

Manufactures in 1914 reported the number of

establishments making wire to be 54, employing

$64,013,668 capital and 17,600 wage earners who received annually

in wages $11,020,729. The

cost of materials used amounted to $56,424,494, and the value of the product was $81,841,012.'

These figures are exclusive of the wire-work

industry, which includes wire fencing: many of

the larger concerns make the wire which is

afterward worked up into form. Few things

have been of greater interest than the story of barbed wire and its enormous growth since its

introduction. It is probably the cheapest fenc¬

ing ever placed upon the market, and exactly

met the demands of the new country where

thousands of acres had to be fenced in at a

time. It is still a product of great tonnage, but its place is being slowly but surely taken by the woven-wire fencing which, though higher in

price, is more effective and is better suited

now for the country, which is gradually being

cut up into smaller farms. The enormous

volume of barbed-wire used in military de¬

fenses during the late war was in large part

made in specially equipped establishments which

are likely to disappear as such and develop

other industries. No statistics as to these

factories are available.

> Nail Industry. — The nail industry is a con¬

spicuous example of the chance and changes in

manufacture, for in the beginning the iron cut nail, first as made by hand and afterward by

machinery, had behind it the prestige of cen¬

turies, and seemed to be enduring as an article of everyday use. It was found, however, that

with the growth of the Bessemer steel business, the steel cut nail could be made cheaper, al¬

though it was not in any way a better article.

Its place, in turn, is being taken by the wire nail, wh:ch is much more comprehensive in

its uses than the steel cut nail, though the latter style prevails in certain sections and for cer¬

tain purposes, but the decline of the steel cut nail is as marked in its way as the rapid in¬

crease in the use of the wire nail. See Nails.

Tacks. — The kindred industry is that of

tacks, but it has been seriously hurt by the

expansion of the wire nail, since it is possible to make the latter in many forms and sizes that are substitutes for tacks. This industry was

founded in Taunton about 85 years ago, and

for a great number of years was practically

confined to New England. It sprpad gradually

westward to Pittsburgh ; there it almost died out, and has since taken some hold further west in Cleveland and Chicago. Owing to the encroach¬

ment of the wire nail it has declined rather

than advanced, and the number of manufac¬

turers has greatly decreased. The product is

not large — probably not more than 15,000 tons per annum.

Farming Tools. — The making of farming

tools and what are known technically as <(steel goods® is one of the most important industries in the hardware line, since with these tools the crops are cultivated and gathered. The steady

progress of the American manufacturer has

been in the direction of producing items which were light, strong and handsome in appear¬

ance. The diversity of soil and climate mean

great diversities of various items used in cul¬

tivating the ground, and the •number grows each year. The business does not keep pace with the growth of the country owing to the steadily in¬

creasing use of labor-saving machinery. The

mower and the reaper have taken the place of

the snath, the cradle and the scythe — the corn binder of the corn knife; and the corn planter and the cultivator have gradually diminished

the use of hoes. The amount of capital in¬

vested is not exactly known, but does not prob¬

ably exceed $3,000,000. The absolute import¬

ance of these tools to the country is rather

striking contrasted with the small annual out¬

put in dollars and cents. See Farm Machinery.

Builders' Hardware. — The builders' hard¬

ware business is often considered the centre of the hardware trade, because of its great import¬

ance as related to the hardware industry as a whole. Builders' hardware is an exceedingly

comprehensive term and does not admit of

exact definition. It is ordinarily used in refer¬

ence to locks (see Locks) and trim and to all the various items which find employment in the building of a house. It is a business of im¬

mense complexity and has a most interesting

history. It began far back in New Haven and

New Britain, Conn., as early as 1834, and the first goods were naturally crude and rough.

Shortly, however, the ingenuity of the Amer¬

ican manufacturer produced a new article in

the shape of the cast-iron lock, thus departing entirely from the wrought lock, which was for¬

merly known to England, Germany and France.

The cheapness of the cast-iron lock and its

actual efficiency soon caused it to displace the foreign article. Since that time, the sheet steel lock has been made in this country, but in a much smaller and more condensed form than

the wrought lock of Europe.

Builders' hardware has a most interesting

history since it is in part the story of the devel¬

opment of taste in America. The Centennial

Exposition of 1876 did much to educate the

people of this country in the way of good taste and high artistic ideals. There gradually came

a demand for thines of daily use which should have beauty as well as utility and particularly of late years this feeling has spread to locks and trim and all forms of builders' hardware,

with increasing emphasis. The leading manu¬

facturers have innumerable designs which are

suitable for the different schools of architec¬

ture, such as Gothic, Renaissance and Colo¬

nial, or any of the variations of the standard schools. All high-grade builders' hardware is

now got up .in shape and design to match ap¬

propriately not alone the building, but each

separate room where the rooms are finished and ornamented differently. It is, therefore, largely a thing of ornament as well as of use and the ingenuity of the manufacturer and the salesman

has been taxed to keep pace with the demands

of the consumer for novelty and appropriate¬

ness. The annual production is probably some¬

thing like a matter of $25,000,000 in value. The finest grades of hardware are still made largely in the East, principally in Connecticut, but the business is slowly but steadily drifting west in keeping with the general trend of hardware

manufacture.

Shovels. — The first shovels in this country were produced as far back as 1776 by Capt. John Ames, who made them by hand in compe¬ tition with the English article. The business then established was carried on for the suc¬ ceeding 27 years, and constituted the nucleus of the present large concern of the Oliver Ames & Sons corporation, whose headquarters are in Northeastern, Mass. Mr. Oliver Ames,

the son of Capt. John Ames, established in 1803 a shovel plant where he soon produced shovels that were superior to those imported from Eng¬ land. In 1797 Thomas Rowland commenced the manufacture of shovels at Cheltenham, Pa., and this plant has been in continuous operation ever since. Business gradually crept westward and is now spread over the country as far west as the Mississippi River. By 1854 there were about 80,000 dozen shovels produced annually, but with the growth of the country this product has been largely increased until the annual out¬ put is now about 600,000 dozen. As with all other hand tools, the demand for shovels has

been seriously affected by the introduction and improvement of labor-saving machinery — such

as the steam shovel, the coal and ore conveyor and other mechanical devices for loading and

unloading. It is interesting to note that the

original machinery for making shovels has not

been greatly improved upon so far as the actual efficiency is concerned, although the variety of shovels has been greatly increased to meet the wants and tastes of the different parts of the country. It is difficult to approximate with any reasonable degree of accuracy the amount in¬

vested in this business, but it is in the neighbor¬

hood of $4,700,000.

Saws. — There are few things more diffi¬

cult to make than saws, and they have been

the subject of study of some of the most

talented and ingenious manufacturers of the

country. They were manufactured as far back

as 1806 in Philadelphia, though in a very small way. In 1820 a factory was established in

Bristol, Conn., by Irenus and Rollin Atkins,

Rollin Atkins being the father of E. C. Atkins, the founder of E. C. Atkins & Company, of

Indianapolis, who now have one of the largest

saw plants of the world. It was necessary to

import the first saw makers from England.

In 1840 Henry Disston, an Englishman by birth, really made the great beginning of the saw-making industry in Philadelphia, and soon produced saws that had no equal in the world. It was only a short time before the Disston saws drove out the English brand entirely from this country, and to-day this firm have not only achieved a world-wide reputation for merit but send their products all over the globe. The annual output of all saws amounts to be¬ tween $10,000,000 and $12,000,000, and there is about that amount of capital invested in the business. The tonnage of steel used in the manufacture of saws varies from 15,000 to 20,000 tons per annum.

American saws, particularly hand saws, are pre-eminent in America and have no equal abroad. Outside of the Disston factory there are several very large and prominent makers, among them E. C. Atkins & Company of In¬ dianapolis, Ind., and the Simonds Manufactur¬ ing Company, who make their headquarters at Fitchburg, Mass. The saw business has been notable because of the genius shown by the

manufacturers, and in this respect Henry

Disston is pre-eminent. There are probably

something like between 5,000 and 6,000 people

employed permanently in the business. See

Saws and Sawing.

Axes — Axes have always been among the

most important items in the hardware business

because of the great need of them in felling the forests with which the country was covered in

the early days. They are of innumerable sizes

and shapes to suit the needs of the lumbermen and the users. The production has not in¬

creased of late years, due not only to the de¬

forestation of the country, but also to the fact that the place of axes is being largely taken by cross-cut saws. The annual output is some¬

where between 350,000 and 400,000 dozen. As

in other lines of business, there have been great consolidations, so that a few large concerns

have taken the place of innumerable small

ones. 1 he use of natural gas has had a most important effect on the manufacture of axes,

since with it a very much superior tool can

be made, and it is also of great advantage in tempering. It is noticed in regard to the mat¬

ter of tempering — a thing of vital necessity in all edge tools — that practically there has been no improvement in this regard for several cen¬

turies. Not alone did many of the implements

of the ancients equal in temper the best that can be produced now-a-days, but in many

cases they were much superior. The difficulty

seems to lie in the fact that tempering is purely a thing of experiment and not of scientific de¬

velopment, the reason for it not being known,

nor why some metals can be tempered and

others cannot. In the beginning axes were

originally made by hand as were all the other hardware implements, but later the tendency

developed to establish small factories on avail¬

able water powers throughout the country, as

at Pittsburgh, Pa., Lewistown, Pa., East Doug¬

las, Mass., and Collinsville, Conn. With the

enormous demand for the goods, this industry

soon outgrew its ˆleading strings® and estab¬

lished itself at more ava lable locations.

Edge Tools — The item of edge tools is a

very large one, and, next to builders' hardware, probably the most important in the whole range of hardware proper. It embraces

practically

everything with a cutting edge such as hatchets, chisels, drawing knives, planes and the like, and space forbids any attempt at more than gener¬

alities. It is interesting to note that on such small items as chisels, drawing-knives, adzes

and hatchets, the advance within a period of

1,000 years has been rather in attractiveness of form and appearance than in actual adaptability or merit. Some tools dug up from the Roman

camp of Salzburg are, so far as adaptability

goes, quite equal to any that are made up now-a-days. The simplicity of the articles mentioned has largely rendered them incapable of any

great improvement. In the more complicated

lines such as planes and the like there have been very great changes and improvements, and the

plane industry, particularly, is one of enormous proportions. The manufacturers who have at¬

tained a reputation in edge tools have done

so purely on the score of merit and because of the fact that each manufacturer made only one

particular line, no one thus having a complete line of edge tools of uniform excellence, design and efficiency ; and one of the great causes of the demand for American hardware abroad —particularly since the Spanish War — has been

the fact of the assembling of a complete line of high grade tools under one brand, so that

the foreigner realized that anything that bore

that particular trade-mark could be depended

upon as being uniform in quality and efficiency.

Among the somewhat lesser items in the tool

line have been the interesting developments in

auger bits of innumerable designs and patterns, with varying adaptability for different kinds of work. See Tools.

Files. — There are few things of greater

importance to the hardware dealer than files,

and the story of the development of the file

industry is interesting. They are articles which have to be made with the greatest care and go through a great number of processes before

they reach perfection and are fitted for use.

The five leading operations requisite are forg¬

ing, annealing, grindng, cutting and hardening.

They were formerly made entirely by hand, and

even to this day there still exists among a few the preference for the handmade file. The

history of the business really dates from the

practical use of a machine to cut files, patent for which to all intents and purposes was first issued to William Nicholson in 1816. There

are records of file-cutting machines in France

as far back as 1699, and several since that time up to the 19th century, but none of them ap¬

parently of any practical value. The first really important attempt to manufacture files was soon after 1350 at Ramapo, N. Y., a company being

organized under the name of the American File

Company, with large capital. The life of the

attempt was short, however, and the business

was soon discontinued. Various attempts were

made shortly after that — both in this country and England — to manufacture files by machin¬

ery, and none of them had any extended expenence.

About 1863, Mr. William T. Nicholson, of

Providence, R. I., gave the matter of file cut¬

ting by machinery his personal thought and

attent'on. He had long training as a mechanic

and practical experience in the finest branches of machinery. At that time the great source of supply of files for this country was the hand¬

made files of England, and the story of at¬

tempts to cut files by machinery had been one of sunken capital, ruined hopes and dismal

failures. From this beginning grew the great

present firm of the Nicholson File Company,

which largely dominates the file trade in this country and has an enormous export business.

They have produced better and cheaper files

than it is possible to cut by hand, and have carried the business apparently to the point of perfection. The importation of files has fallen to about $75,000 per annum, while the total out¬

put of American files does not fall short of

$6,000,000, and is represented by total invest¬

ments of approximately $12,000,000. See Files

and Filemaking.

Rasps. — Few things have been more marked

than the determination of the Amer.can manu¬

facturer to produce successfully a machine-cut

horse rasp. It followed a long way in the wake of the machine-cut file, and after many discour¬

agements — the principal difficulty being to

overcome the inveterate prejudice of the black¬

smith. To-day hand-cut horse rasps are a thing of the past.

Bolts and Nuts. — The manufacture of bolts

and nuts dates as far back as 1798, a patent for screw machinery at that time being issued to

David Wilkinson, a celebrated mechanic of

Rhode Island. There were various other pat¬

ents granted and these gradually developed in

later years into the present slotters, threaders, 704

pointers and tapers. By slow growth and by

innumerable inventions and improvements this

industry has attained its present enormous pro¬

portions and is represented to-day by more than 100 establishments, which manufacture all of the various kinds and styles of bolts, the yearly

product being something like 1,000,000,000 bolts, valued at nearly $25,000,000.

Screws. — The manufacture of screws — or,

as they are technically known, wood screws —

is one of the important developments of this

country, though the demand does not keep

pace with the growth of the country owing to

the continued substitution of steel for iron, and consequently of bolts and rivets for screws.

Screw machinery is of the highest type of auto¬

matic efficiency and almost equals human intel¬

ligence in its working. Patents for various de¬

vices on screw machinery date back into the

latter part of the 18th century, and innumerable patents have have been issued since that time.

The real beginning of successful manufacture

was in 1838 when the Eagle Screw Company

was incorporated in Providence, R. I., the lead¬

ing spirit being Mr. William G. Angel. In

1846 Mr. Angel finally perfected the machine

for making what is known as the gimlet point

on a screw — • up to that time it had a blunt point. From this time dates the prosperity and growth of his company, which grew into the

present American Screw Company. There are

now some 13 large concerns engaged in the

manufacture of screws and scattered from New

England to the Mississippi River. See

Screws.

Tin Plate. — The tin plate and sheet iron

industry has kept pace with the general growth of the iron industry all over the country, and has been greatly fostered by a protective tariff since the time of what has been known as the McKinley Bill. Its production in this country

has grown at an enormous rate, as may be

seen from the statement that in 1892 there were only about 18,000 tons of tin plate produced in this country as against about 1,026,983 tons in 1914. The industry is chiefly represented by

what are known as black sheets, tin plates, and terne plates — all of which have now become

integral parts of the hardware business. See

Tin Plate.

Tinware. — Among the lines which were

originally independent, but which have prac¬

tically become now incorporated with the hard¬

ware business, is that of the tinware industry in all its various ramifications. The retail

hardware shop has practically absorbed the

tinners' shop, and because the fact that hand¬

made tinware is fast being supplanted by the

product of the stamping company, the hardware

retailer has gone into the handling of tinware in all shapes and

varieties.

Enameled Ware. — Coincident with this is

the development of what is known as enameled

ware, being a coatiug on the sheet steel in place of the tinning. I't is of all colors and varieties and has grown to be a business of great im¬

portance. It illustrates distinctly the general

desire of the people for something more taste¬

ful and artistic in appearance than the old-fashioned tinware.

Mechanics' Tools. — The American manu¬

facturer has shown to great advantage in the

manufacture of high grade mechanics' tools for

exceedingly fine measurements. In this respect

the Brown & Sharpe Manufacturing Company,

of Providence, R. 1., occupy a commanding po¬

sition and their products to-day are sought for all over the world where exceeding accuracy is necessary. As an example, the micrometer

caliper will measure with absolute accuracy the 250,000th part of an inch. For an attainment of such results, the finest tools made by any other nation cannot be compared with those of

America.

Cutlery. — Few things are more interesting

than the history of cutlery-making in the United States, as it has

suffered many ((ups and

downs, w not alone from various foreign com¬

petition, but from the difficulty of procuring

sufficiently skilled labor to produce the proper article. The manufacture of scissors and

shears — which are always treated as a part of the cutlery business — has been unique in the fact that it was a Yankee genius who first

solved the problem of welding a high grade

steel blade to a soft casting of iron backing made to fit the hand, this being the invention of Seth Boyden in 1826. The actual manufac¬

ture of shears in this country seems to have

been commenced by R. Heinisch in 1825 at

Elizabethport, N. J. This was followed by

others until at present the American shears

have been so developed and improved as to

be far ahead of any in the world. Prior to 1832

table cutlery was imported very largely from

England. From that year American manufac¬

turers began in a small way to produce these

goods and by 1865 they had practically taken

the business unto themselves. There is a large export trade business in table cutlery owing to the superior quality of the goods made in this country.

The making of pocket cutlery is one of the

most interesting things connected with the hard¬

ware business in America. It was started at

Lakeville, Conn., by the Holley Manufacturing

Company about 1845. The total annual capacity

was probably less than $50,000. The business

was gradually extended in a small way and

finally a co-operative colony was established at Walden, N. Y., and since then this line of

American industry has largely centred in the

two States of New York and Connecticut. In¬

numerable factories have been started and have

failed, largely owing to the lack of foresight on the part of the manufacturers in attempting to compete with the cheap labor of Europe in pro¬

ducing goods cheap in quality and finish as

they were in price. The co-operative colony

spoken of grew by slow degrees and economical

management, having the advantage of large

waterpower at Walden, until they finally be¬

came one of the leading makers, not alone of

this country but of the world, and were enabled to show at the Louisiana Purchase Exposition

products superior to those made abroad, for

which they received the highest award. It

is an interesting case of development in the way of quality and of merit by patience and skill.

In 1914 there were 32 makers of pocket knives in the United States, with an annual produc¬

tion valued at over $4,000,000. The number of

establishments making other cutlery and edge

tools numbered 252 with a total capital of $35,-

666,000 and employing 16,561 wage-earners.

The annual output was valued at $25,541,000, of whioh $8,186,000 represented cost of ‘ materials, and $9,076,000 wages. For a discussion of this subject as it relates to the metropolis, consult Pratt, E. E., (The Hardware Industry in New

‘Vork City1 (Hardware Dealers’ Magazine , 1913, pp. 1211 seq.). (See Cutlery).

HARDWICK, Charles, English Church

historian : b. Slingsby, near York, 22 Sept. 1821 ; d. near Toulouse, France, 18 Aug. 1859. After

studying at Saint John’s College and Catherine’s Plall, Cambridge, he became Fellow at the

latter place, select preacher at Cambridge

(1850), preacher at the Chapel Royal, White¬

hall (1851), and professor of divinity at

Queen’s College, Birmingham (1853). Two

years later he became lecturer on divinity at

King’s College, Cambridge, and in the following year was elected to a seat in the newly-estab¬

lished council of the senate. In 1859 he was

appointed archdeacon of Ely, but was killed

shortly afterward in a fall while in the Pyrenees.

He was the author of several noteworthy wrorks on Church history, including (History of the

Articles of Religion) (1851) ; (History of the Christian Church, Middle Age1 (1853) ; (A

History of the Christian Church During the

Reformation1 (1856) ; (Christ and Other Mas¬

ters1 (1855-59; 2d ed., 1863), containing a

memoir by F. Procter.

HARDWICK, Thomas William, Ameri¬

can public official : b. Thomasville, Ga., 9 Dec.

1872. He was graduated at Mercer University

in 1892 ; studied law at the Lumpkin Law

School, University of Georgia; and was ad¬

mitted to the bar in 1893. He established his practice at Sandersville, Ga., was prosecuting

attorney of Washington County in 1895-97 and

member of the Georgia house of representa¬

tives from 1898 to 1901. From 1903 to 1915 he was member of the National House of Repre¬

sentatives from the 10th Georgia District. On

2 Sept. 1914 he was nominated by the State

Democratic convention of Georgia to fill the

unexpired term of the late Senator A. O.

Bacon, and was elected to the United States

Senate on 3 Nov. 1914 for the term ending

3 March 1919.

HARDY, Arthur Sherburne, American

diplomat and novelist: b. Andover, Mass., 13

Aug. 1847. After a single year at Amherst

College he entered West Point Military Acad¬

emy, graduating in 1869. He became a second

lieutenant in the 3d Artillery regiment, saw

some service during 1869 and 1870, and then

resigned to become a professor of civil en¬

gineering at Iowa College for a brief time. In 1874 he went to Paris to take a course in scien¬

tific bridge-building and road-constructing, re¬

turning to take a professorship in that line

of instruction at the Chandler Scientific School, connected with Dartmouth College. He as¬

sumed a similar professorship at Dartmouth

College in 1878. This position (in con¬

nection with which he published ‘Elements

of Quaternions> (1881), followed by his

translation of (Argand’s Imaginary Quan¬

tities,) by his own Analytical Geometry) ;

and ‘Elements of the Calculus) ; ‘Imaginary

Quantities) ; and ‘Methods in Topographical

Surveying1) he held until 1893, when he became editor of The Cosmopolitan Magazine. He was

United States Minister to Persia, 1897-99, and

Envoy Extraordinary and Minister Plenipoten¬

tiary to Greece Rumania and Serbia, 1899-1901 ; to Switzerland, 1901-03, and to Spain since 30

Jan. 1903. His works include ‘But Yet a

Woman1 (1883); (The Wind of Destiny)

(1886) ; (Passe Rose1 (1889) ; ‘Songs of Two,>

poems (1900); ‘Life and Letters of Joseph

Hardy Neesima) (1891); ‘His Daughter First1

(1903); ‘Aurelie1 (1912); ‘Diane and Her

Friends1 (1914).

HARDY, Edward John, English author

and clergyman: b. Armagh, Ireland, 7 May

1849. He took orders in the Anglican Church,

became an army chaplain, in 1903 was stationed at Hongkong and in 1905 in Egypt. He is

known the world over as the author of ‘How

to be Happy though Married > (1884), which

has been translated into many languages. Other

works by him are ‘Manners Makyth Man1

(1885) ; ‘Faint yet Pursuing1 (1886) ; ‘Uncle

John’s Talks with his Nephews11 (1886) ; ‘The

Five Talents of Woman1 (1888) ; ‘The Love

Affairs of Some Famous Men1 (1897); ‘Mr.

Thomas Atkins) (1900); Concerning Mar¬

riage1 (1901) ; ‘Love, Courtship and Marriage1

(1902); ‘Pen Portraits of our Soldiers1 (1902); ‘Love Rules the World1 (1905) ; ‘John China¬

man at Home1 (1905); ‘How to be Happy

though Civil1 (1909) ; ‘The Unvarying East1

(1912) ; ‘The British Soldier, His Courage and Humor1 (1915).

HARDY, Iza Duffus, English novelist,

daughter of Sir Thomas Hardy, the English

historian. Among her numerous novels are

‘Glencairn1 ; ‘Only a Love Story1 ; ‘A Broken Faith1 ; ‘The Love that He Passed By1 ; ‘A

Woman’s Loyalty1 ; ‘The Lesser Evil1 ; ‘Man,

Woman, and Fate1 ; ‘A Butterfly1 ; ‘The Silent Watchers,1 etc., and two volumes of transat¬

lantic reminiscences, ‘Between Two Oceans1

(1884), and ‘Oranges and Alligators: Sketches

of South Florida Life1 (1886).

HAxˆDY, Thomas, English novelist: b.

Upper Bockhampton, near Dorchester, Dorset¬

shire, 2 June 1840. The Hardys descend from

Thomas Hardv of Melcombe Regis (d. 1599),

who was a scion of the old Jersey family of

Le Hardy. He was educated at local schools

and at 16 was articled to an ecclesiastical

architect in Dorchester. In 1863 he gained the prize medal of the Institute of British Archi¬

tects with an essay on “Colored Brick and

Terra-Cotta Architecture.11 His special studies,

apart from his profession, were the Greek and

Roman classics, and that these exercised a

strong influence on his mind may be seen from his literary work. He had written several

poems before his first published article, “How

I Built Myself a House,11 appeared in Chambers’

Journal (18 March 1865). He afterward wrote

a novel of a revolutionary and anti-social type which fell into the hands of George Meredith

as publisher’s reader, who advised him to adopt, on his first introduction to the public, “a gentler guise.11 Mr. Hardy thereupon suppressed this

novel and in 1871 made his first essay in fiction before the public (anonymously) with ‘Des¬

perate Remedies1 (1871). It was followed in

1872 by ‘Under the Greenwood Tree1 (also

published anonymously), a beautiful idyll the

rustics in which are depicted with a quaint

and compelling humor; and by ‘A Pair of Blue

Eyes1 in 1873. ‘Far From the Madding Crowd1

(1874), which appeared in serial form unsigned

in Cornhill Magazine, first established his fame, and was by many attributed to George Eliot.

His other works in order of publication are

‘The Hand of Ethelberta) (1876) ; (The Re¬

turn of the Native) (1878) ; (The Trumpet—

Major5 (1880); ‘A Laodicean) (1881); (Two

on a Tower) (1882), first published in the At¬

lantic Monthly; (The Mayor of Casterbridge)

(1886), a powerful and tragic story; (The

Woodlanders5 (1887); (Wessex Tales5 (1888);

‘A Group of Noble Dames5 (1891); ‘Tess of

the D’Urbervilles5 (1891), a study of origi¬

nal womanhood on the rack of misfortune ;

‘The Well-Beloved5 (1892); ‘Life’s Little

Ironies5 (1894) ; ‘Jude, the Obscure5 (1895),

which first appeared serially in Harper’s Maga¬

zine , a depressing book remarkable for its

minute depiction of sensuality, and in which

the quaint bumpkins who act the part of chorus in Hardy's other tragedies are unrepresented;

'The Well-Beloved5 (1897) ; 'Wessex Poems5

(1898) ; 'Poems of the Past and Present5

(1902) ; 'The Dynasts,5 a drama (in three

parts, 1904, 1906, 1908), in which the author

interprets the Napoleonic era, in 19 acts and

130 scenes; 'Time's Laughing-stocks and Other

Verses5 (1909); 'A Changed Man5 (1913);

'Satires of Circumstance5 (1914).

Thomas Hardy is the literary interpreter

of Wessex (the land of the West Saxons),

but specifically of his native Dorsetshire, which was within its area. The localities of his

novels can be readily identified ; a map has been published which assigns to each novel the locali¬

ties of its various parts. The vanishing types of the rural life of Dorsetshire — farm hands, shepherds, woodlanders, carriers, *etc.* — people

his works, and to future ages will be seen as he saw them. They depict the struggles of

individuals against the blind natural forces

that control the world, and by whom they find themselves crushed and broken. In 'Tess of

the D'Urbervilles5 he has shown how cruelly

the conventions of the world may react on and bring to ruin a life that under natural condi¬

tions should have been one of happiness. In

‘Jude, the Obscure,5 the study of dual per¬

sonality is revealed with gripping if somewhat

sordid realism ; the lower nature constantly

dragging down the higher. His treatment of

the sexual instinct increased in frankness in

the later of his great novels, the two just cited.

He knows the peasantry as no other English

novelist has ever known them ; their patience

and impassiveness under misforttme, their

grandeur in “the endurance of dooms55 ; and,

without slavishly reproducing it, their dialect

becomes in his hands a medium, racy of the

soil, and impregnated with the salt of an en¬

gaging and suggestive humor. He knows nature

in all its moods, but is most at home in its: more sombre aspects, as when describing the

bleak wastes of Egdon Heath. His language

is almost severe in its simplicity, self-repression and freedom from exaggeration. His works,

full of humor though they are, yet leave the

reader with a deep sense of the sadness of the human lot, and have been described as “an

austere descant upon the dust and ashes of

things, the cruelty of lust, the fragility of

love.55 He was awarded the Order of Merit in

1910. Consult Child, ‘Thomas Hardy5 (New

York 1916) ; Johnson, ‘The Art of Thomas

Hardy5 (London 1895) ; Macdonell, ‘Thomas

Hardy5 (ib. 1894) ; Sherren, ‘The Wessex of

Romance5 (new ed., ib. 1908) ; Windle, ‘The

Wessex of Thomas Hardy5 (ib. 1901). See Far

From the Madding Crowd; The Return of

the Native; Tess of the D’Urbervilles.

HARE, Augustus John Cuthbert, English

descriptive writer : b. Rome, Italy, 13 March

1834; d. Saint Leonards, 22 Jan. 1903. His life was spent mainly in travel, on descriptions of which his fame chiefly rests. Among his many

works may be cited ‘A Winter in Mentone5

(1862) ; ‘Walks in Rome5 (1871) ; ‘Wanderings

in Spain5 (1873) ; ‘Memorials of a Quiet Life5

(1872-76) ; ‘Days near Rome5 (1875); ‘Walks

in London5 (1878) ; ‘Days near Paris5 (1887) ; ‘Sussex5 (1894). His autobiography was pub¬

lished in six volumes (1896-1900).

HARE, Sir John (John Fairs), English

actor: b. London, 16 May 1844. He made his

first appearance in Liverpool in 1866, then going to London played at the Prince of Wales

Theatre, and later was manager successively of

the Court, the Saint James, the Garrick and

the Globe theatres. He became distinguished

as a comedian, and visited the United States,

playing in the chief cities. The plays he has^

brought out include ‘A Scrap of Paper5 ; ‘Still*

Waters Run Deep5 ; ‘A Bachelor’s Romance5 ;

‘The Profligate5 ; ‘The Notorious Mrs. Ebb—

smith5 ; and ‘Gay Lord Quex.5 He was

knighted in 1907. Consult Pefnberton, ‘John

Hare, Comedian5 (1895) ; Winter, ‘The Wallet

of Time5 (2 vols., 1913).

HARE, John Innes Clarke, American

jurist: b. Philadelphia, 17 Oct. 1817; d. 1905.

Graduated from the University of Pennsyl¬

vania in 1834, he was admitted to the bar in 1841, was successively associate and presiding

judge of the Philadelphia District Court (1851—75), and in 1875-95 presiding judge of the Court of Common Pleas. He was also for a time

professor of the institutes of law in the Uni¬

versity of Pennsylvania, and published ‘Amer¬

ican Leading Cases5 (1847, with Wallis) ; ‘The Law of Contracts5

(1887) ; ‘American Constitu¬

tional Law5 (1889); 11 volumes of chancery

reports and other works.

HARE, Julius Charles, English theologian:

b. Valdagno, Italy, 13 Sept. 1795; d. Hurstmonceaux, England, 23 Jan. 1855. He entered

Trinity College, Cambridge, in 1812, and became Fellow and tutor there in 1818. Ordained in

1826, he became rector of Hurstmonceaux in

1832, where he remained for the rest of his

life. He was appointed archdeacon of Lewes,

and chaplain to the queen in 1840. He was

of the Broadchurch party, and was prominent

because of his liberality of thought and his

scholarship. His publications include ‘Guesses

at the Truth by Two Brothers5 (1827); ‘The

Mission of the Comforter, with Notes5 (1846),

containing an able defense of Luther; ‘The Vic¬

tory of Faith5 (1840) ; ‘The Contest with

Rome5 (1841). With Bishop Thirlwall he

translated Niebuhr’s ‘History of Rome5 (1828—

32) ; and wrote the text for Konig’s illustrated life of Luther. His ‘Charges5 appeared post¬

humously (1856).

HARE, Robert, American scientist : b.

Philadelphia, 17 Jan. 1781 ; d. there, 15 May

18d8. As a boy he worked in his father's

brewery, studied chemistry privately and in 1818

became professor of chemistry in William and

Mary College, and professor of chemistry in

the University of Pennsylvania until 1847. He

will be longest remembered for his discovery

of the oxyhydrogen blowpipe to which he gave

the name (<hydrostatic blowpipe.® For this in¬

vention he was awarded the Rumford medal

of the American Academy of Arts and Sciences.

He also invented the valve-cock, the calorimeter and a process for denarcolizing laudanum. He

improved the manufacture of potassium;

extracted sugar from the sweet potato; and

was the first to use mercury as a cathode in industrial and analytical operations. Hare also

demonstrated that foggy air is not a conductor of electricity, that platinum could be rendered molten and easily worked, and constructed the

first electric furnace. The Smithsonian Insti¬

tution placed him on its roll as its first honorary member, and his collection of chemical and

physical apparatus is there preserved. He

wrote (Brief View of the Resources of the

United States*. (1810) ; (Chemical Apparatus

and Manipulations* (1836) ; (Memoir on the

Explosiveness of Nitre) ; and many other pa¬

pers on scientific subjects. Consult Smith,

Edward F., (The Life of Robert Hare* (Phila¬

delphia 1917).

HARE, William Hobart, American Prot¬

estant Episcopal bishop: b. Princeton, N. J., 17

May 1838; d. 25 Oct. 1909. He studied at the University of Pennsylvania, was ordained priest

in 1862, was minister of Saint Luke's, Saint

Paul's (Chestnut Hill) and other churches of

Philadelphia, and in 1873 was consecrated mis¬

sionary bishop of Niobrara. In 1883 his dio¬

cese, having been enlarged so that its limits

were identical with those of the Territory of

South Dakota, was renamed that of South Da¬

kota. He became known as an authority on the

Indian question, and wrote pamphlets on mis¬

sion work in the western United States. Con¬

sult Howe, (Life and Labors of Bishop Hare*

(1911).

HAREBELL, or BLUEBELL, a familiar

species of bell-wort (Campanula rotundifolia) ,

common throughout the northern parts of the

whole northern hemisphere (see Bluebell;

Campanula), growing in dry and hilly pastures,

on waysides and open lands generally. It is,

however, rare in America south of Canada, al¬

though other species are to be found here. It is perennial, with a slender stem 6 to 14 inches high, bearing a loose raceme of a few drooping flowers, on very slender stalks; the flowers,

generally bright blue, but sometimes white, bell¬

shaped and about half an inch long, appear in summer and autumn. The juice of the

flowers yields a fine blue color, and may be

used as ink.

HAREL, Paul, pol a-rel, French innkeeper—

poet : b. Echauffour (Orne), 1854. He became

landlord of the ((Croix Saint-Andre,® an inn at Echauffour, and within a modest range of sub¬

ject wrote picturesque verses in an excellent

lyric style. He was elected to the Caen Acad¬

emy, and on the recommendation of Sully—

Prudhomme received a prize from the Academie Franqaise. Among his works are <Sous

les Pommiers> (1879) ; (Rimes de Broche et

d'Epee* (1883); <Aux Champs) (1886)* and

JL'HerbageiV a three-act poetic drama (1891) ;

Les Dyspeptiques) (1908).

HARELIP. A deformity of the upper lip,

j9e. ,to son?e Prenatal influences, causing it to divide vertically on either or both sides of the middle line.. Sometimes a cleft palate accom¬

panies harelip. The affliction is susceptible to treatment, but a slight operation, a few months after birth, is commonly necessary. The palate, however, should not be operated upon before

the age of four or five. Treatment of the cleft palate, when present, may be given simultane¬

ously with that of the lip deformity. See

Cleft Palate.

HAREM, or HAREEM' (Ar. ®the pro¬

hibited®), is used by Mussulmans to signify the women's apartments in a household establish¬

ment, forbidden to every man except the hus¬

band and near relations. The practice of erect¬

ing and maintaining a separate apartment for

the women of a well-to-do household dates back to early times in Chaldea. The Egyptian palaces followed with the most elegantly equipped con¬

structions for the harem. The Scriptures, the

Odyssey and various ancient chronicles all refer to the harems. The Persians, Babylonians,

Hindus, Arabs, Siamese and ancient Peruvians

all maintained harems. But it is the Turkish

harems of which most has been written. The

women of the harem may consist simply of a

wife and her attendants, or there may be sev¬

eral wives and an indefinite number of concu¬

bines or female slaves, with black eunuchs, *etc.*

The management of the establishment is gen¬

erally entirely in the hands of the females. The greatest harem is that of the sultan of Turkey.

The women of the imperial harem are all slaves, generally Circassians or Georgians. Their life

is spent in bathing, dressing, walking in the

gardens, witnessing the voluptuous dances per¬

formed by their slaves, *etc.* The women of

other Turks enjoy the society of their friends at the baths or in each other's houses, and

appear in public accompanied by slaves and

eunuchs ; but the women of the sultan's harem

have none of these privileges. It is of course only the richer Moslems who can maintain

harems ; the poorer classes have generally but

one wife. Consult Harvey, (Turkish Harems

and Circassian Homes) (1871); Lane, <*Manners and Customs of the Modern Egyptians>

(1871) ; Loti, Pierre, (Les Desenchantees*

(1906) ; Van Sommer and Zwener, (Our Mos¬

lem Sisters) (1907).

HARES. In the United States the names

hare and rabbit are used indiscriminately for

various species of rodents of the family Lepori-d(B. Hare is the generic term, while rabbit is applied properly to single short-legged European species of essentially burrowing habits whose

naked blind and helpless young are nurtured in underground nests (see Rabbit). None of the

native American species have these character¬

istics. The second pair of upper incisors are

small, non-functional and placed directly be¬

hind the large gnawing teeth, a peculiarity which distinguishes the hares and a few allied forms from all other rodents. The ears are always

large, the tail short, bushy and upturned, the forelimbs short and five-toed, the hind ones

long and four-toed and the soles of the feet

densely hairy. Hares are exclusively vegetarian.

They are extremely timid, alert and have keen

senses. They move with peculiar erratic leaps

and with great speed for short distances and

walk with a peculiar shuffling gait by placing the entire sole of the hind foot on the ground.

A favorite attitude is that of resting on the haunches with the head erect ; but the forelimbs lack altogether the prehensile powers of the

squirrels. None of them are arboreal or

aquatic. The older catalogues enumerate from

20 to 30 species from all parts of the world except Australasia, but chiefly belonging to

the northern hemisphere. With a very few

exceptions all the hares are included in the

single genus Lepus.

The gray rabbit, wood rabbit or cottontail

(L. floridaniis or L. sylvaticus) is very plentiful throughout eastern North America north to

Ontario. It frequents thickets and brier patches on the borders of woods, multiplying excessively in the more thickly settled regions and replacing the more retiring varying hare. All kinds of

succulent herbage, bark, berries and buds, the

latter especially in winter, form the rabbit's food which it seeks to a large extent along regularly established runways, not infrequently leading to the farmer's truck-patch. Although it does not

itself burrow, the cottontail frequently escapes its pursuers by retreating into the holes of

woodchucks, skunks, etc., in this respect and

some others resembling the true European rab¬

bit more closely than any other American

species. Several broods of four to six young

are raised each year. At birth they are blind and helpless, and are protected in a nest built in a depression in the ground of dried grass

or weeds lined with the rabbit's own fur, with which they are covered when left alone by the mother.

The varying hare or white rabbit (L. ameri—

canns) is a larger species with longer hind

legs, taking its name from the alternating brown and white color of summer and winter respect¬

ively, a change which is less complete south¬

ward. The white winter coat is produced, on

the approach of snowy weather, by an actual

disappearance of the brown pigment in the hairs.

The brown coat in spring is resumed by the

molting of the old white hairs and the growing of a new brown coat. In one or other of its varieties this hare ranges from Virginia north¬

ward to Hudson Bay and is common in the

hemlock forests northward. This is a typical

hare, which depends for its safety from foxes, lynxes, weasels, hawks, owls and numerous

other enemies solely upon its quick senses and great speed, aided by the concealing effect of its white fur in winter. It never enters bur¬

rows, but lives by day and night with no other shelter than that afforded by thickets. Feeding chiefly by night it travels along regular

runways used in common by several individuals, a fact

which is sometimes taken advantage of by

foxes and other enemies to compass their de¬

struction. A favorite winter food is the bark

and buds of the birch tree. Scarcely any nest is formed for the young, which are fully active a short time after birth. A somewhat similar

species is the polar hare (L. arcticus), a pure white species of high northern latitudes.

These hares are the principal resources for

food of all the northern carnivores, especiallv the foxes, martens and lynx. They are much

subject to intestinal diseases, which at intervals of about seven years reduce their numbers al¬

most to extinction and this has a very serious effect on the fur-bearing animals and the

market receipts of their pelts, and on the native Indians of the far north.

The jack-rabbit or prairie hare (L. cam—

pestris) is representative of a group of large, long-legged, big-eared hares that inhabit the

Western plains and whose lives are spent

mostly (<on the jump.® For short distances they are perhaps the swiftest quadrupeds known.

Their lives are spent among the bushes, upon

twigs of which they feed, and where their

young are dropped and within a short time

required to shift for themselves. In cultivated districts the jack-rabbits

increase enormously

and become great pests. As a consequence

they are much hunted, not only with dog and

gun and snare, as are the Eastern species, but by the organization of extensive ˆdrives,®

which result in the destruction of thousands,

the bodies of which are shipped to the markets.

Coursing them with greyhounds after the Eng¬

lish fashion (see Coursing) is an exciting and favorite sport. Their fur is extensively utilized for making felt hats.

The marsh hare (L. palustris) and water

hare (L. aquations), of the southern Atlantic

seaboard and the Mississippi Valley respect¬

ively, are rather short-legged species, which

differ from the others' in the readiness with

which they will enter water.

In Europe the common hare (L . timidus),

the mountain hare (L. variabilis), from which

the domestic races have been derived, are the

principal species. Consult Coues and Allen,

(Monographs of the Rodentia) (Washington

1877) ; Stone and Cram, (American Animals)

(New York 1902) ; Ingersoll, (Life of Mammals> (New York 1906).

HARGRAVES, har'gravz, Edward Ham¬

mond, English discoverer of the gold-fields of

Australia: b. Gosport, England, 1816; d. Sydney,.

New South Wales, 29 Oct. 1891. When 18 he

settled in Australia, but attracted to California in 1849, he there tried his luck as gold-digger, and detecting a similarity in the geological for¬

mation of California and Australia, inferred

that gold would be found in the latter. On his return to the island continent he established

the correctness of his surmise by finding gold on the west slopes of the Blue Hills in New

South Wales in 1851. He was appointed com¬

missioner of Crownlands, and received from the

government of New South Wales a reward of

$50,000. In 1855 he published Australia and

Its Goldfields^

HARGREAVES, har 'grevz, James, Eng¬

lish inventor: b. Standhill, near Blackburn,

Lancashire; d. Nottingham, England, April

1778. In 1760 he invented a machine consisting of a revolving cylinder with cards or combs

set round it as a substitute for the hand-cards formerly in use in combing out cotton. Some

years after this he invented the spinning-jenny, by which he was able to spin with several

spindles at once. With his new machines he

succeeded in turning out a much greater amount of yarn than his neighbors, which excited their jealousy, and they accordingly broke into his

dwelling and destroyed his machine. In con¬

sequence of repeated persecution of this kind

Hargreaves removed in 1768 to Nottingham,

and in 1770 obtained a patent for his invention.

Here, however, he reaped scarcely any more

benefit from it than before. After refusing

£3,000 offered him by a private company for his patent, this was declared invalid on the ground that he had sold several of the machines before taking out the patent. For the rest of his life he carried on business as a cotton manufacturer in partnership with Mr. James. The only public recognition this invention ever obtained was

in the form of a bounty of £250 granted by Sir Robert Peel, nearly 70 years after Hargreaves'

death, to his last surviving daughter.

HARING, Wilhelm, vil'helm ha'ring,

"Alexis Wilibald," German historical novelist:

b. Breslau, 29 June 1798; d. Arnstadt, 16 Dec.

1871. His work was suggested by the (Waverly Novels' and in fact, his first two important works, (Walladmor) and (Avalon Castle,' pur¬

ported to be translations from Scott. His works are historical tales of Prussia, with Frederick the Great for hero : among these may be cited <Cabanis) ; (The False Waldemar) ; (Peace is

the First Civic Duty.' He was very fertile in plot and incident, but his style is mannered; the tales are still popular, however, from their

patriotic fervor.

HARIVANSA, ha-ri-van'sha, a Sanskrit

epic poem, later than the Mahabharata (q.v.),

to which it forms a sort of sequel or epilogue.

It has been translated into French by Langlois (1834).

HARK, Joseph Maximilian, Moravian

clergyman: b. Philadelphia, 4 June 1849.

Graduated from the Moravian College and

Theological Seminary in Bethlehem, Pa., he

entered the Moravian ministry and was success

sively pastor of Moravian churches in Lebanon,

Philadelphia and Lancaster,- Pa. Since 1893 he

has been principal of the Moravian Seminary

at Bethlehem, Pa., the oldest girls' boarding

school in America. He has been a frequent

contributor to The Outlook and other period¬

icals, and has published (The Unity of the Truth in Christianity and Evolution. ’

HARKNESS, Albert, American Latinist: b. Menden, Mass., 6 Oct. 1822; d. Providence, R. I., 26 May 1907. He was graduated from Brown University in 1842, and in 1855 was ap¬ pointed professor of Greek in that institution. He was a founder of the American Philological Association, and its president in 1875-76. In 1884 he was elected director of the American School of Classical Studies at Athens, Greece. His best-known works were a series of Latin textbooks widely used and of much influence; including a first book, readers, a manual of prose composition, editions of Caesar, Cicero and Sallust, and an excellent (Latin Grammar’ (1881); revised and enlarged as (A Complete Latin Grammar’ (1898).

HARKNESS, William, American astron¬ omer: b. Ecclefechan, Scotland, 17 Dec. 1837; d. 1903. He was graduated from Rochester University in 1858, studied medicine, was a sur¬

geon in the Federal army for a time, in 1862-65

was an aid in the United States Naval Observa¬

tory, and during the total eclipse of 7 Aug. 1869

discovered the line K. 1474 of the solar corona.

He is best known for his theory of the focal curve of achromatic telescopes, and for his in¬

vention of the spherometer caliper, the most

nearly accurate device for the measurement of

the inequalities of pivots in astronomical in¬

struments. In ‘ 1894-99 he was astronomical

director of the Naval Observatory, and in 1899

was retired with relative rank of rear-admiral.

He published (The Solar Parallax’ (1891).

HARLAN, har’lan, James, American legis¬

lator: b. Clarke County, Ill., 25 Aug. 1820; d.

Mount Pleasant, Iowa, 5 Oct. 1899. He was

graduated at Asbury (now De Pauw) Univer¬

sity (Indiana) in 1845, in 1853 was elected

president of Iowa Wesleyan University, in 1855—65 served as United States senator, in 1865-66

was Secretary of the Interior, and then served a third term (1866-72) in the Senate. He was a

close associate of Abraham Lincoln, and his

daughter Mary married Robert T. Lincoln

(q.v.). Subsequently he was editor of the

Washington Chronicle and in 1882-85 presiding

judge of the Court of Commissioners of Ala¬

bama claims.

HARLAN, John, American physician, Ori¬

ental adventurer and ruler: b. Philadelphia.

Dr. Harlan sailed from Boston in 1825 as sur¬

geon-apothecary of an East India merchant

ship. On arriving in India he found an urgent demand for surgeons to proceed to the first

British Burmese campaign. He served through

that war, and returned to India. His useful¬

ness being no longer required by the British,

much to his chagrin, he went up-country and

attached himself to the court of Ranjit Singh, the independent Sikh king of the Punjab. Dr.

Harlan soon rose high in Ranjit Singh's favor, and in 1827, was appointed governor of the

province of Gujarat, which, with his capital city at Ahmedabad, he ruled until 1836. Over some

dispute with Ranjit Singh he resigned that

office, and went to Cabul where, as one of the ministers of Dost Mohammed, Amir of

Afghanistan, on the outbreak of the war be¬

tween Afghanistan and Great Britain, Dr. Har¬

lan applied for the position of commander-in¬

chief of the Afghan army, but it was bestowed upon Ackbar Khan, the Amir's son, Dost Mo¬

hammed supposing Harlan to be an Englishman

and being distrustful. Though disappointed,

Dr. Harlan remained to give the Afghans mili¬

tary advice which, had it been accepted, would have seriously threatened the British force ad¬

vancing by way of the Bolan Pass. Dr. Har¬

lan again returned to India, where he became

the friend and confidant of Sir Henry Law¬

rence, high commissioner of the Punjab.

Much of momentous importance to the future

of British interests in India was then trans¬

piring, and Dr. Harlan, tired of the duplicity of native rulers, rendered valuable advice. He is

described as having been "a handsome man of

fine presence." Dr. Harlan finally returned to

the United States and took up his residence in New York, where he was a conspicuous figure

in the late forties. He died about 1850. He

was the only American to become a ruler in

India and the first to visit Afghanistan. Con¬

sult Ireland, J. B., <From Wall Street to Kash¬

mir' (pp. 46-47, New York 1859).

HARLAN, John Marshall, American

jurist : b. Boyle County, Ky., 1 Tune 1833 ; d. 1911.

He . was graduated from Centre College, Ken¬

tucky, studied law at Transvlvania University,

and entering upon the practice of his profession at Frankfort, became countv judge in 1858 and

was Whig candidate for Congress in 1859, but

was not elected. In the Civil War he served in the Union army as colonel of a Kentucky regi¬

ment, and in 1863-66 was attorney-general of

his State. He was Republican nominee for

governor in 1871 and 1875, but was defeated on both occasions. In the Republican National

Convention of 1872 his name was presented by

the Kentucky delegation for the nomination for

Vice-President of the United States. In 1877 he was appointed a member of the commission to

investigate the troubles in Louisiana : and in

November of that same year he was appointed

associate justice of the United States Supreme

Court, of which he is considered one of the

most able and independent members. He sup¬

ported the constitutionality of the income tax

clause of the Wilson Tariff Bill. In 1893 he

was a member of the Bering Sea Tribunal of

Arbitration.

HARLAN, Iowa, city, county-seat of Shelby

County, on the West Nishnabotna River, the

Chicago, Rock Island and Pacific, the Chicago

and Northwestern railroads, about 90 miles west of Des Moines. The chief manufactures are

foundry products, agricultural implements, flour, bricks, gasoline engines and furniture. Its ship¬

ping trade is in agricultural products and the manufactures of the city. It is the seat of the Western Iowa Vocational College. Pop. 2,831.

HARLAND, har'land, Henry, pseudonym

"Sidney Luska.® Anglo-American novelist: b.

Saint Petersburg, Russia, 1 March 1861 ; d.

San Remo, Italy, 21 Dec. 1905. He was edu¬

cated at Harvard and after being in the surro¬

gate's office in New York 1883-36 removed to

London, where he edited the <Yellow Book.*

He published (As It Was Written) (1885), a

musician's story; (Mrs. Peixada) (1886) ; (The

Land of Love> (1887) ; (My Uncle Florimond*

(1888); (The Yoke of the Thorah> (1887);

(Mr. Sonnenschein's Inheritance) (1888); (A Latin-Quarter Courtship) ; (Comedies and Errors* (1898); Cardinal's Snuff-box) (1900); (My Friend Prospero* (1904), etc., books which have been extensively circulated in both America and England.

HARLAND, Marion. See Terhune, Mary Virginia.

HARLECH, har'leH, Wales, an ancient town, the former capital of Merionethshire, sit¬ uated on the coast, 10 miles north of Barmouth. On a steep hill overlooking the sea is the castle, which held out for the Lancastrians in the Wars of the Roses and later for Charles I. The < March of the Men of Harlech) commemorates its capture by the Yorkists in 1468.

HARLEM, a part of Manhattan Island, in New York city above 106th street, between the East and Harlem rivers and Eighth avenue. It was anciently Neuw Haarlem and later Haarlem, then Harlem, a town of Westchester County, but is now incorporated in New York city. The extension of the elevated railway and subway systems caused

it to become thickly set¬

tled as a residential quarter, while its business activities, both commercial and manufacturing,

likewise greatly increased, and since 1900 it may be regarded as solidly built up. Its main thor¬

oughfare is 125th street, which is occupied

throughout its extent with retail establishments of various kinds. Crosstown car lines run on

125th and 116th streets. Between 124th street

on the north, 120th street on the south and

Madison and Mount Morris avenues on the

east and west, respectively, lies Mount Morns

Park, the centre of the old village. The name is now a local designation for all of Manhattan borough north and east of Central Park. The

site of the battle of Harlem Heights has been located as about where the Barnard College

buildings of Columbia University now stand.

Here a small force of Americans repulsed the

British. Consult Irving, Knickerbocker's His¬

tory of New York* ; Johnston, (The Bank of

Harlem Heights) (1897) ; Pierce, (New Har¬

lem } (1904).

HARLEM HEIGHTS, Battle of, in the

American Revolution. After the battle of Kip's

Bay (q.v.) the American troops had been with¬

drawn to the upper part of Manhattan Island

at Harlem Heights. On 16 Sept. 1776 an ad¬

vance guard of British attacked a detachment

of troops under Col. Thomas Knowlton, sup—

iported by troops under Maj. Andrew Leitch.

The Americans repulsed the British and were

recalled from the pursuit with difficulty, but in the battle both Knowlton and Leitch were mor¬

tally wounded. The British loss was 70 killed

and 200 wounded ; the Americans lost 80 killed and wounded. Howe remained inactive for a

month, then attacking Washington at White

Plains (q.v.) and later capturing Fort Wash¬

ington (q.v.). Consult accounts by H. P.

Johnston, W. R. Shepherd and E. C. Benedict;

Johnston, (Campaign of 1776 > (pp. 246-262) ;

Carrington, (Battles of the Revolution (pp.

228-231) ; Lamb, Martha J., (City of New York) (Vol. II, pp. 128-132).
•

HARLEM RIVER, the name given to the

tidal channel north of the island of Manhattan, which separates the boroughs of Manhattan and

the Bronx, in New York city. The Harlem is

connected with the Hudson River by Spuyten

Duyvil Creek and extends south by east about

seven miles to East River. Randall's Island is at its entrance to East River. In 1895 a ship-canal was opened which connects the Hudson

and the Harlem south of the Spuyten Duyvil

channel. A number of bridges span the Harlem,

the finest being High Bridge, an aqueduct

bridge, and Washington Bridge, which crosses

the river a little north of a point opposite Fort Washington on the Hudson. Along the western

shore is the excellent roadway called the Speed¬

way, and on the same side of the river are the polo and ball grounds, the High Bridge Park

and a number of fine public and private

buildings.

HARLEQUIN, har'le-kin or-kwm (French,

arlequin, Italian arlecchino) , a word of doubt¬

ful origin but probably from old French Hel~

lequin, Herlequin, the name of a demon figur¬

ing in mediaeval legends ; this again is supposed to be of German origin, its elements corre¬

sponding to English "hell® and "kin.® Ricco—

boni conjectures ((History of the Italian The—

atreU that the dress of the harlequins is. no other than the centunculus of the old Roman

mi'mi or mimes , who were players in ridiculous pieces or ' farces of a loose character. The

character of the ancient harlequin was a mix¬

ture of extravagant buffoonery with great bodily

agility. But in the middle of the 16th century his character was essentially changed. He be¬

came a simple, ignorant servant, who tries very hard to be witty, even at the expense of being malicious. He is a chameleon, who assumes all

colors and can be made, in the hands of a

skilful actor, the principal character on the

stage. He must excel in extempore sallies.

This account applies more particularly to the

Italian harlequin. The gallant, obsequious

French harlequin is an entirely national mask.

In the vaudeville theatre he is silent, with a black half-mask and reminds one throughout the

representation of the grace and agility of the cat. In Great Britain, in the Christmas panto¬

mimes, he became a lover and a magician ; and in exchange for the gift of language, of which he has been deprived, he has been invested

with a wonder-working wand. With this wand

he protects his mistress, the columbine, against the clown and pantaloon, who pursue and en¬

deavor to capture her, until the pursuit is

brought to a termination by a good fairy. The harlequin wears a tight dress of bright colors and glittering with spangles. Consult <A His¬

tory of Pantomimes * (1901).

HARLEQUIN CABBAGE-BUG. See

Cabbage-insects.

HARLEQUIN DUCK. See Duck.

HARLEQUIN SNAKE. See Coral

Snake.

HARLEY, Robert, 1st Earl of Oxford,

English statesmen : b. London, 5 Dec. 1661 ; d.

21 May 1724. After the accession of Anne he

and his colleague, Saint John, afterward Lord

Bolingbroke, became leaders of the Tories. The

former was chosen speaker of the House of

Commons in 1702 and was chief Secretary of

State 1704-08. After the fall of Marlborough

Harley became Chancellor of the Exchequer in

1710 and next year was created Earl of Oxford.

He and Bolingbroke secured the Treaty of

Utrecht (1713), but afterward quarreled. Early

in the reign of George I he was impeached of high treason on the ground of his alleged

Jacobite intrigues, and was kept in the Tower

for two years, but owing to the inability of the Peers and the Commons to agree about the

mode of procedure, was acquitted. His patron¬

age was extended to Swift, Pope and other

literary men, and he made a valuable collection of books and MSS., which latter are preserved

in the British Museum, where they form the

(Bibliotheca Harleiana. > Those which have been printed constitute the (Harleian Mjscellany.*

HARLOW, har'lo, George Henry, Eng¬

lish painter: b. London, 10 June 1787; d. there, 4 Feb. 1819. After studying under other mas¬

ters, he entered the studio of Sir Thomas Law¬

rence who used to employ him to deaden color.

In 1818 he visited Rome, where he astonished

the artists there by completing an effective copy of the (Transfiguration } of Raphael in 18 days.

He gained the friendship of Canova, who pro¬

cured his election as a member of the Academy of Saint Luke. His best orig'nal works are two designs from Shakespeare, 'Hubert and Prince

Arthur> and the <Trial of Queen Catharine.*

The principal characters in the latter are por¬

traits of members of the Kemble family; and

the figure of Queen Catharine is a likeness of Mrs. Siddons (q.v.). He was eminent as a

portrait painter, and his portrait of Fuseli is regarded as a work of

great merit.

HARLOWE, Clarissa, a novel published

by Samuel Richardson in 1748. The story is

told by means of letters, and while somewhat

prolix for modern taste, is an accurate record of many of the manners and ideals of the 18th century.

HARMALINE and HARMINE, two al¬

kaloids which occur, probably in the form of

phosphates, in the seed-coatings of the harmel

or Syrian rue (Peganum harmala), a plant

growing in the Mediterranean region and in

southern Asia. The seeds are extracted with

dilute acetic or sulphuric acid, and the hydro¬

chlorides of the two alkaloids are precipitated by the addition of common salt. The precipitate is washed with salt solution, and afterward with

water, in which the hydrochlorides dissolve.

The filtrate is clarified by animal charcoal and heated to 140° F., after which ammonia is

added. Harmine is precipitated first, and by

the continued addition of ammonia the harmaline is thrown down subsequently. Har¬

mine has the formula C13H12N2O. It is practi¬

cally insoluble in ether, and is but slightly

soluble in water. It dissolves in alcohol, from which it crystallizes in

colorless monoclinic

prisms, melting at 495° F. Harmaline is the

hydride of harmine, and has the formula

$C_{13}H_{14}N_2O$. It is somewhat soluble in water,

ether and cold alcohol, and dissolves freely in hot alcohol. It crystallizes from solution in

alcohol in the form of octahedra belonging to

the trimetric system, and melts at about 460° F.

The salts of harmine are mostly colorless, while those of harmaline are yellow ; and the salts of both of these bases exhibit marked fluorescence.

The name harmaline is also applied to the

coloring matter now more commonly known

as fuchsine.

HARMATTAN, har-mat'an, a land-wind,

very dry and hot, blowing upon the coast of

Africa between Cape Verde, in lat. 14° 43' N., and Cape Lopez, lat. 0° 36' S., during December, January and February. It is generally attended

by a peculiar haze, through which the sun shines red. This haze has been analyzed as consisting of minute diatomaceous dust gathered from the

interior, and the microscopic fragments of

shells injure vegetation and injuriously affect

man, drying up the eyes, the mouth, etc., even peeling off the skin. On the other hand, it tends to terminate fever and dysentery, and to miti¬

gate cutaneous diseases. When not bearing this

shell-dust the wind is often cool and dry. See Simoon.

HARMODIUS (har-mo'di-us) and ARIS—

TOGITON, a-ris-to-jl'ton, two Athenian youths

who in 514 b.c. killed Hipparchus, the younger brother of the tyrant Hippias, partly because of an insult offered to the sister of Harmodius,

and partly with a view to the overthrow of the Pisistratidae. Harmodius was slain by the

soldiers of Hipparchus, while Aristogiton fled,

but was afterward taken and executed. Sub¬

sequently they came to be regarded as patriotic martyrs, and received divine honors from the

Athenians, and had statues raised to their

memory. 'They were strongly attached to each

other, and are sculptured in a group in the

Museo Nazionale, Naples.

HARMON, Daniel Williams, fur trader: b.

Vermont, 1778; d. 1845. He entered the service of the NorthWest Company in 1800, and spent

the succeeding 19 years in the far west of

British North America. He returned to the East in 1819, bringing with him the diary of his long sojourn, which was published in the succeeding year. He is notable as the first white man to grow crops west of the Rocky Mountains.

HARMON, Judson, American jurist: b. Hamilton County, Ohio, 3 Feb. 1846. He was graduated at Denison University 1866, and at the Cincinnati Law School LL.B. in 1869. Deni¬ son in 1891 gave him the honorary degree of LL.D. He practised law in Wyoming, Ohio, and was elected mayor of that city, filling the office 1875-76. From the mayor's office he passed to the bench of the Court of Common Pleas, serving as one of the judges of that court 1876-78 when he was succeeded by William Howard Taft, Republican. His record in the lower court gained for him a seat on the bench of the Superior Court of Cincinnati where he served 1878-99, and on his resignation he was succeeded by Judge Taft. When President Cleveland, on 10 June 1895, appointed Attorney-General Olney his Secretary of State, his choice to fill the vacancy was Judge Harmon. He served as president of the Ohio Bar Asso¬

ciation 1897-98. The University of Cincinnati

in 1896 offered him the chair of law which he accepted and has since held. On 3 Nov. 1908

he was elected governor of Ohio and served

until 1913. He was a candidate for the Demo¬

cratic nomination for the Presidency of the

United States at Baltimore in 1912 and re¬

ceived 148 votes on the first ballot.

HARMONIC ANALYSIS, The. «The

Harmonic Analysis® is the name first given by

Thomson and Tait in their (Natural Philosophy} to a method extensively and fruitfully

employed in investigations in many branches of

mathematical physics, and first used by Daniel

Bernouilli and Euler in the middle of the

18th century in studying the musical vibra¬

tions of a stretched elastic string.

From the physical side it is described by J.

Clerk Maxwell as ((a method by which the solu¬

tion of an actual problem may be obtained as

the sum or resultant of a number of terms,

each of which is a solution of a particular case of the problem.® The method is applicable to

physical problems where the actual complicated

state under investigation can be regarded as due to the superposition of a number of simpler

states that can coexist without interfering with one another.

For example, in dealing with the small oscil¬

lations of a musical string it is known that the string is capable of sounding a variety of socalled pure notes, known as the fundamental

note, the first harmonic or octave of the funda¬

mental note, and the higher harmonics of the

fundamental note, and that the forms of vibra¬

tion giving these various notes may coexist, so that the string may be sounding at once its

fundamental note and its various harmonics and

thus be giving a note quite distinguishable from its pure fundamental note though of the same

pitch. If we are dealing with the problem of

the motion of a string sounding such a com¬

plicated note, the harmonic analysis enables us to obtain and to express its solution as a sum of the terms expressing the motions which

separately would give the separate pure notes

actually present.

From the mathematical side the problems to

which the harmonic analysis is applicable are

those in which it is necessary to find a solution of a homogeneous linear differential equation

which shall satisfy a set of given initial or boundary conditions sufficiently numerous to

make the problem determinate. It is well known that if a solution of such a differential equation has been obtained, it may be multiplied by any constant and will still be a solution ; and that if several solutions have been obtained, their

sum will be a solution. In using the harmonic analysis we attempt by a skilful use of these two principles to so combine simple particular

solutions of the differential equation involved

in the problem as to form a solution of the

equation which satisfies all the given conditions.

This usually makes it necessary to analyze some one of the given conditions into a sum or series of simpler socalled harmonic terms, or in other words to develop some function of one of the

independent variables, or of a set of the inde¬

pendent variables into a series whose terms are of specified form.

For instance, suppose a harp-string of length

l initially distorted into a curve whose equa¬

tion referred to the position of equilibrium of the string as the X-axis and to one end of the string as origin is y = f(x), and then released, and that it is required to solve the problem of the subsequent motion of the string, the initial displacement being small.

Here we have to solve the differential equa¬

tion

d2y _ 2 d*y

dt 2 ~a dx 2’

(I)

subject to the conditions y = 0 when ;r = 0; y = 0

dy

when * = /; — = 0 when 1 = 0; y = f(x) when

UH). It is known and is easily verified that

y = sin fix cos a,3t is a particular solution of (I) if (3 is any constant. If we take ,3 = — — , where i

. mTvx mxat

sin — — cos — - —

is a solution of (I) which satisfies our first three conditions; and so is

. xx xat . . 2xx 2 xat

y = a\ sin — cos — + a2 sin —

m is any whole number, y

cos

L

. 3xx 3rr at

T a3 sm — j— cos — - [- . .

/

/

(1)

where au a2, a3, … are any constants When t— 0 (1) reduces to

y = 0i sin — + at sm -j - f-a3 sin - - f … (2) and if we can choose au a2, etc., so that the series in (2) is equal to f(x) for all values of x between 0 and l, (1) becomes our required

solution. This calls for the development of

/ O) into a Trigonometric Series of somewhat

peculiar form known as a Fourier's Series, and when that is accomplished our solution is com¬

plete.

Fourier's Series. — It was first shown by

Fourier in his researches into the Conduction

of Heat in 1812 that under certain very general conditions concerning the continuity of f

m = bo + b, COS - + bz cos —

2 C C

+ b3 cos - h • • •

G

.TCX . 2 TTX . 37TX

+ an sin - f-a2 sin — - - a3 sin - - . . (3) C C C

where am

and

bm, —

1 Cc n . mK* J

— I / (x) sin ~y~ dxy

/ c yhity

— j f (x) cos — <ijc.

— c

for all values of x between — c and c.

If f(—x) = — f(x), that is, if f(x) is an

odd function. (3) reduces to

f(x) = a i sin - [- a2 sin — + a3 sin - b …,(4) C C G

where

dm

C f (x) sin dx.

If /(— .r) — f(x), that is, if f(x) is an even function, (3) reduces to

x 1 , | , 2xx

f(x) —— 0a + b 1 cos - h 02 cos -

Z C G

where

bm =

I u 3lTx I

+ b3 cos - h

c

\ rmrx ,

j cos - dx.

(5)

If the development need hold good merely

for values of x between 0 and c, any one of the forms given above may be employed.

Harmonic Functions. — Laplace's Equation,

a2 v , a2 v , a2 v

■ ” . o *

0,

(II)

dx1 ‘ dy2 ‘ dz2

in the numerous forms it assumes in different

systems of co-ordinates plays a larger part in the various branches of mathematical physics

than any other differential equation, and the

harmonic analysis is required in a large propor¬

tion of the physical problems that obey the

■law it expresses.

A function which together with its first

space derivatives is continuous within a speci¬

fied region and which satisfies Laplace’s equa¬

tion at every point within the region is said to be harmonic in the region in question.

The form to which a harmonic function re¬

duces on one of the level surfaces of the appro¬

priate co-ordinate system is called a Surface

Harmonic.

Zonal Harmonics. — The coefficient of zm

in the development of (1 — 2ˆz + z2) - i in as¬

cending powers of z, where fx = cos 0, is rep¬

resented by Pm(fx) and is called a Surface

Zonal Harmonic of the mth degree, or a Le¬

gendre's Coefficient or Legendrian.

It can be shown that V = rm Pm(cos 6) and

F = — — jPmfcos 0) are particular solutions of

spherical co-ordinates,

rm-H

Laplace's

equation in

rd2(r V)

dr 2

+

1

(si!1 6 st)

sin 6

dd

+

1

sin20 d<f>2

/TTTN

— =0. (Ill)

They are called Solid Zonal Harmonics. The

first form is harmonic within the sphere whose centre is at the origin of co-ordinates and whose radius is unity, and the second form is harmonic in all space outside of that sphere. They are appropriate functions to use in solving problems where a solution of (III) is required, if it is evident from, considerations of symmetry that

the solution is independent of the co-ordinate

f

. . 1 -3-5 • … (2m—

Pm{ffi)= - . -

1 2*3* … m

1)

fim —

m(m — 1)

2(2m — 1)

. m(m — 1) (m — 2) (m — 3)

“j - \ A fry - TT7X - — - fX™ - 4

fim-

whence

P0(j*) = l,

Pi < Ji) = P*

PM

PM

2 *4* (2m— 1) (2m— 3)

PM = *i(5/x3—3/x),

:i(35ˆ4_30ˆ + 3),

:i(63/i5_70//3+ 15//).

A very important property of the Surface Zonal Harmonic Pm(g) which follows readily from its

definition is Pm{ 1) = 1. That is, the function reduces to unity at all points on the polar

axis.

If, in a problem where V must satisfy La¬

place's Equation and there is symmetry about

the polar axis, the value of V on the axis is represented by a convergent series a0 + aiz -f-a2£2+ ... , z being the distance of the point from the origin, then the series formed by

writing rˆPm(cos 0) instead of zm in the given series gives the value of V at any point in

space at which the new series is convergent.

If the value of V on the axis is represented by a convergent series

4. aJ ' _L

z1 + z* + z» +

then

the series formed from the given series by re-1 . 1

placing

by

- Pm (cos 0) gives the

zm - f i ” rm +

value of V at any point in space at which the new series is convergent.

For instance, if a charge M of statical elec¬

tricity be placed on a conductor in the form of a thin circular disc of radius a, it is known that the charge will so distribute itself that the surface density cr at any point of the disc at the distance ˆ from its centre will be

M

o= - 7” .

4fX7T \/ <J2 -

If the axis of the disc is taken as the polar axis, the value of the Potential Function V due to the charge, at a point of the axis at the dis-

, ˆ M Ixr- — aA

tance x from the centre is V= — cos — 1 - ; — I •

2 a \x 2 + av

This can be developed into the series

M

a

M

or

a

Hence

7T X , OC3 _

2 a 3a3 5a5

a

x

a

a°

xi

3x3 + 5x5 7 a7 +

if x < a ,

if x > a.

V =

M

a

— ~ Pi (cos d) + \ - P3 (cos 0)

2 a 3 a3

1 r5

i -J p0 (cos d) + .

5 a6

if r < a, and ˆ < 2’

714

HARMONIC ANALYSIS

and

T. M\a 1 a3 . 1 a6 _ . …

V = ˆ[r∼ iˆP‘ (COS $) + 5 r5 P< (COS d) ∼ ■ ‘ ■ j if r > a.

If, in a problem where V must satisfy La¬

place’s Equation and there is symmetry about

an axis, the value of V on the surface of the sphere r = a is given and can be expressed as

a sum or as a series of Surface Zonal Har¬

monics, the value of V at a point not on the sphere will be obtained by replacing the Surface Zonal Harmonics by the appropriate Solid

Zonal Harmonics.

To take a very simple example: If a charge

of electricity is placed on a spherical conductor of radius a, it is known that it will so distribute itself that all points on the surface will

be at the same potential

M

a

MM .

Now — = — P0 (cos 0) and is a Surface Zonal a a

Harmonic. Hence any point at the distance r

from the centre of the conductor is at potential r < a, and at potential

M r°-n , M

- P0 (cos 0) or — if

a a° a

M a _ , M ..

- P0 (cos 0) or — if r > a.

a r r

If the value of V on the surface of the sphere had been less simple, say V = F(6) —/(cos 0) f((i) , then /(ju) would have had to be expressed in the form doPo(p) + diPi(fJ-) a2P2(p) + …

before we could have used the simple method

illustrated above. This can be done by the aid of the formula

f(l*) = a0Po(fi) + aiPi(fJ.) + a2P2(p) + a3P3(fi) + … , where am— ~)n y-J' f(x)Pm(x)dx, the de¬

velopment in question holding good when — l<i /x <1

For instance, let onehalf of the surface of

a homogeneous sphere be kept at the tempera¬

ture zero and the other half at the temperature 1 ; to find the stationary temperature u of any internal point. Here f(fi) = 1, 0<ˆ<ˆ 1, and

f{fi) = 0,' — l</ˆ< 0. Consequently

dm —

*2w*4-_lj ˆ pm(*)dxj

-JlPm(x)dX.

2 m ~b

Letting m— 0, 1,2,…, successively, and using

the corresponding values 1, x, |(3x2 — 1) etc., of Pm(x) , we get do = 5, di — f, d2 = 0, d2 = — I -5, a4 = 0, as = -Bi‘ i • • • and f(/i) = §P0(ˆ) + f Pi(fi) - 1-hPsM + -TPh-lPˆ) - • • •

If a is the radius of the sphere, the required temperature

3 r

1 r 3

u= = =-^ + 4 ~Pl(<cos ^ o • P*(cos d)

8 2 a3

+ !i.i

12 2

3 r

4 a

7ˆP5(cos 9)… .

Tables giving the numerical values of the

Surface Zonal Harmonics have been computed

and are accessible, and by their aid numerical results can be obtained in such problems as those we have been considering as readily as if we

were using simple trigonometric functions. The

following is such a table carried only to three places.

Table I. — Surface Zonal Harmonics.

0

Pi (cos 0)

P2(cos 0)

P 3 (COS 0)

P 4(cos 0)

Ps(cos 0)

0°

1.C00

1.000

1.000

1.000

1.000

10

.985

.955

.911

.853

.784

20

.940

.824

.665

.475

.272

30

.866

.625

.325

.023

— .223

40

.766

.380

— .025

— .319

—.420

50

.643

.120

— .300

—.428

— .254

60

.500

— . 125

— .438

— .289

.090

70

.342

—.324

—.413

— .004

.328

80

.174

—.455

— .247

.266

.281

90

.000

— .500

.000

.375

.000

Legendrians were first used by the Legendre

in a paper published in 1785 on the attraction of solids of revolution.

Laplace's Coefficients. — Pm(cos y), where

cos y = cos 6 cos 0i + sin 0, sin 0i cos (<p — <t> 0 , and is the angle made by the radius vector with a fixed line through the origin whose direction is

given by the angles 0i and is called a La¬

place's Coefficient or Laplacian, the fixed line being called the Axis and its intersection with the unit sphere the Pole of the Laplacian. A

Surface Zonal Harmonic Pm (cos 0) is merely

a Laplacian whose axis coincides with the axis of co-ordinates. r^Pw^cosy) and - —rm +i

Pm (cos y)

are solutions of Laplace's Equation (III).

The first is harmonic within and the second

without the unit sphere.

Laplacians may be used in problems symmet¬

rical about an axis if the axis does not coin¬

cide with the axis of co-ordinates just as

Zonal Harmonics are used when the problem

is symmetrical about the polar axis.

Laplacians were first used by Laplace, in one of the most remarkable memoirs ever written, in determining the attraction of a Spheroid. The paper in question was published in 1782.

Spherical Harmonics. — A Surface Spherical Harmonic of the wth degree Ym may be most simply defined as the function obtained by dividing a rational, integral, homogeneous, algebraic polynomial of the mth degree in x, y, z with satisfies Laplace's Equation (I), by m

rm, that is, by (x2 + y2 -f z2)2. For example, - (x-t-y + z),— (x24-xy-fy2), — (2x» — 3xy = — 3xz2) 7 V*

are Surface Spherical Harmonics of the first degree, of the second degree and of the third degree, respectively.

It is clear that rmYm satisfies Laplace's Equation. The same thing can be shown of

— r-rr . The first is harmonic within, the second Tm-- Y m

without, the unit sphere. They are known as

Solid Spherical Harmonics.

It is clear that if the value of V on the sur¬

face of a sphere whose centre is the origin can be expressed as a sum of terms each of which is a surface Spherical Harmonic, its value at

any point not on the surface is the sum of the appropriate corresponding Solid Spherical Har¬

monics.

HARMONIC ANALYSIS

715

It. can be shown by transforming from

spherical to rectangular co-ordinates that the

Surface Zonal Harmonic Pm(ji) or Pm(cos 0)

and the Laplacian P w(cos y) are Surface

Spherical Harmonics, and by the reverse trans¬

formation that the general Surface Spherical

Harmonic Ym can be formulated as

Ym, = AoP m(Y)

[An cos n<}> -j-Bn sin n<p) sinnd ˆ

m

+ 2

n= 1

dfJ-n

A function given arbitrarily on the surface

of the unit sphere, i.e., a function of 0 and <p if expressed as a function of cos 0 and

can be developed into a series of Surface

Spherical Harmonics by the formulas

w— co n — m

f (f*> 0)= = ^ ^ A0,mP m(B) + 2

m=0 { m=1

(. An,m COS n <j>

+ Bn, m sin n(f>) sin^ 0

dnP mif1)

d/J-n

Ao,m = — ˆ — j d(p j f(fa <P) Pm(f*)dfa

2tt (m + w) !

2m T%1 (m — n) !

dn,

771

ˆ ˆ ˆ (q 0) cos sin?* 0 dp

dfan

2k (m + w) !

2m + 1 (m — w) !

-6n,

771

r-Cl s, ˆ ■ • adnpm(n) ,

= 1 i</> I (q 0) sm sm« 0 — - d/J-

J 0 J — 1 (Lfin

The following theorems concerning the inte¬
gration of Spherical Harmonics are important.
We give them without proof.

The integral of the product of two Surface
Spherical Harmonics Ym Yn of different de¬
grees taken over the surface of the unit sphere is equal to zero.

The integral over the surface of the unit
sphere, of the product of a Surface Spherical
Harmonic by a Laplacian of the same degree,
4.7 r

multiplied by the value the Spherical

2m + 1

Harmonic assumes at the Pole of the Laplacian.

These theorems enable us to solve many

problems in the theory of Gravitation and the

theory of Electrostatics by direct integration.

Bessel's Functions. — A Bessel's Function or

Surface Cylindrical Harmonic of the nth order

Jn(x) may be defined as the coefficient of zn in the development of «A2 + z) into an ascend¬

ing Power Series in z. It can be shown that

V = cosh (/uz) (A cos nQ + B sin n$)Jn(pr) and

V= sinh Os) (A cos n<p -f B sin n<f)Jn(pr)t

where is any constant, are solutions of La¬

place's Equation in Cylindrical Co-ordinates

d2V , ±dV , _

dr2 r dr r2

1 d2V j d2V Q

dp

dz2

(IV)

and is convergent for all values of x.

dJo(x)

Ji(x) = —

dx

Important properties are given by the for¬

mulas

“x

xJ0{x)dx = xJi(x)

_ o

and

/:

/:

{ *Jo(x) [2dx = M \ Jo(x)* | -M Ji(x) I *], A K=

and the following formulas for development in

Cylindrical Harmonic Series, the development

holding good for values of r between o and a.

fir) = 2AkJoM,

where fa is a root of the transcendental equation in fa J0(Ba) = 0, or of Jx (jm) = 0, or of fiajˆa) — hJoQia) = 0,

and

2 fa

«2[{T0(ˆ)12+]/i(ˆk«)[2]J jfir)JoMdr.

For the important case where f (r)=l,

AH=ˆa{ j J0(ft„a) J = + j Jˆa) } *] J,K<Z)-

As an example in the use of Bessel's Func¬

tions let us find the stationary temperature of any point (r, z) in a homogeneous cylinder of radius a and altitude b if the convex surface and one base are kept at the temperature zero and the other base at the temperature 1.

Here we seek a solution V of equation (IV)

which reduces to zero when £—0, and when

r — a, and to 1 when z—b. By the aid of

the formulas above this is easily formed and is 2 sinh (faz) r . .

Jo(far)

V

faaJi(faa) sinh (fab)

2

+

+

sinh (ja2z)

fa*aJi(faa) sinh (fa2b)

2 sinh (faz)

Joifa?)

Jo(far) +

fJ3ttJi(faa) sinh (fab)

If numerical results are desired, tables for Jo(x) and Ji(x) are needed. Such tables have been computed and are accessible. We give here a small three-place one,

Table II. — Bessel's Functions.

X

Jo(x)

Ji(x)

X

Jo(x)

Ji(x)

0.0

1.000

0.000

5.0

—.178

—.328

0.5

.938

.242

5.5

—.007

— .341

1.0

.765

.440

6.0

.151

—.277

1.5

.512

.558

6.5

.260

—.154

2.0

.224

.577

7.0

.300

—.005

2.5

—.048

.497

7.5

.266

.135

3.0

—.260

.339

8.0

.172

.235

3.5

— .380

.137

8.5

.042

.273

4.0

— .397

— .066

9.0

—.090

.245

4.5

—.320

— .231

9.5

—.194

.161

5.0

— . 178

— .328

10.0

— .246

.044

Table III. — Roots of Bessel’s Functions.

of Z.

j / \ *i* _ F *i* _

J o\X) i 22 ‘ T- ■ 42 . 22 ■ 6 5

are Jo(x)

when the

n

xn for Jo(xn)∼0

xn for Ji(xn)＝0

the Axis

t

2.405

3 . 832

2 . .

«■ 5.520

7.016

3… .

8.654

Bessel's Functions of the zeroth order were

first used successfully in the Harmonic Analy¬

sis by Fourier in 1812, in dealing with the flow of heat in a right circular cylinder.

Other more complicated Harmonic Functions

are Lame's Functions or Ellipsoidal Harmonics,

Conal Harmonics, Toroidal Harmonics, *etc.*

Each set is adapted to dealing with Laplace's

Equation expressed in a suitable system of

Curvilinear Co-ordinates.

Bibliography. — For general treatises on the

Harmonic Analysis and on the Harmonic

Functions the reader is referred to Heine,

(Handbuch der Kugelfunktionen) (2d ed.,

1878) ; Todhunter, (The Functions of Laplace,

Lame and Bessel > (1875) ; Thomson and Tait,

(Natural Philosophy* (Appendix B, 1879) ;

Ferrers, (Spherical Harmonics) (1881) ; Byerly, Courier's Series, and Spherical Har¬

monics* (1895) ; Gray and Matthews, (Bessel's

Functions) (1895). An excellent account of

the history of the subject with detailed refer¬

ences to the early papers, memoirs and other

publications, prepared by Prof. M. Bocher, will be found at the end of Byerly's above-men¬

tioned treatise. For the contemporary litera¬

ture consult the recent volumes of the (Jahrbuch iiber die Fortschritte der Mathematik* under

the heading Kugelfunktionen und verwandte

Funktionen. Consult also the (Enzyklopadie

der Mathematischen Wissenschaften.*

William E. Byerly,

Professor of Mathematics , Harvard University.

HARMONIC SERIES. See Series.

HARMONICA, a musical instrument in¬

vented by Benjamin Franklin in 1762. It is

formed of a number of glasses of water, and

is played by touching them with the dampened

finger. The less the quantity of water, the

lower the tone of the scale. The name is also applied to a small wind instrument, or mouth-organ, which has a series of holes to conduct the breath to free reeds, like those of an ac¬

cordion.

also are produced; and although some of the

harmonics are suppressed by modifying cir¬

cumstances, some are always present. There

is a regular succession of intervals in which the harmonics naturally accompany a fundamental

sound, which is represented in the following

scale of vibrations: 1, 2, 3, 4, 5, 6, 7, *etc.* These also are the intervals which produce the succes¬

sive chords in harmony, although the natural

harmonics when produced further go beyond

the range of harmony which human ears can

recognize or musical instruments produce at the will of the performer. (See illustration). 1

is the interval of the octave; 2 is the fifth ; 3 rs the fourth; 4 is the major third; 5 the minor third; from 6 to 7 is already beyond the range of production on a keyed instrument, but is

recognized by musicians as the complement of

a four-part simple chord, and is represented

approximately on the pianoforte, by E flat, for example, for the key of F.

A musical tone, then, is always complex, but

the harmony which attends it is not always the same. The different

structure of different in¬

struments suppresses now some, now others, of

the succession of harmonics, and a different

body of tone is thus produced, distinguishing a note in one instrument from the same n@te in

another. Hence the distinctive construction of

the pianoforte in which dissonant harmonics

are suppressed, and on the other hand, the use in the organ of mutation and mixture stops —the thirteenths and fifteenths — whereby the

consonant harmonics of a given tone are much

emphasized. Again, many of the higher har¬

monics are strongly dissonant both with the

fundamental tone and with each other, whence

arises the discordant quality of such instru~

ments for instance as the cymbals. Harmonics

are also called “overtones,® and all the primary and secondary tones constituting an actual tone are frequently termed “partials® or ((partial

tones,® the fundamental tone being the first

partial, and the harmonics, the upper partials.

See Harmony.

HARMONICON, a chemical apparatus

consisting of an open glass tube, the air in

which may be made to give a sound resembling

a musical note, when held over burning hydro¬

gen. The note depends upon the size of the

flame and the length of the tube.

HARMONICS, the accessory or collateral

sounds accompanying the primary, fundamental

or predominant note of any string, pipe or

other sonorous body, and

constituting in varying de¬

grees what in English is

known as “quality,® in

French as <(timbre® and

in German as “Klang—

farbe.® No purely simple

sound — one whose vibra—

23 tions are all in the same

period — is producible. When a sound is pro¬

duced by the vibration of an open string, the whole string vibrates as a unity, giving rise to a tone called the fundamental. The string, how¬

ever, further divided into various sections,

which vibrate separately and more rapidlv and

produce sounds — the harmonics — differing

from the fundamental, bait bearing certain

fixed proportions to it. By whatever vibrating

body a musical sound i& evoked harmonics

HARMONICS, Spherical. See Har¬

monic Analysis.

HARMONIES OF ECONOMICS. The

theory that individual interests consciously pur¬

sued as such are naturally harmonious was early suggested by many writers, but it was first

definitely stated by Henry C. Carey in America and Frederic Bastiat in France, two writers

whose works appeared within a year of each

other, and whose conflicting claims to original¬

ity have never been satisfactorily decided.

They sharply antagonize the English school,

especially as represented by Ricards and Malthus. The most important of those conclusions to which exception is taken are summed up by

Bastiat in his (Harmonies Lconomiques*

(1850). (1) The Theory of Value. While claim¬

ing that value originates in labor, they had

agreed in attributing value to natural agents, in¬

cluding land, on which no labor had been ex¬

pended. These goods, which had cost nothing,

were none the less appropriated and made to

command for their owners the labor of other

men. This was characterized by Bastiat as

“evident injustice.® (2) The Ricardian Theory

of Rent, according to which the price of the

products of the soil is determined by the labor needed to produce them on the least productive HARMONIES ˆCONOMIQUES — HARMONY

soils in cultivation. The excess produced on

the more productive soils goes to the landowner as rent and increases in absolute and

relative amount as the poorer lands are called into cultivation. The result of this law is

stated thus: ((Increasing opulence for men of

leisure; increasing misery for men of toil; in a word, foreordained inequality.® (3) The

Malthusian Theory of Population. Population

tends to increase more rapidly than subsistence, and this tendency, so disastrous to wellbeing, can be counteracted only by self-control, which (<no one thinks of,® or by vice, misery, war, pestilence, famine, *etc.* The conclusion of this law is stated as. <(inevitable pauperism.® Against these Bastiat undertakes to prove that value is due wholly to labor, or more exactly to services rendered to one person by another, that natural agents as such are not and cannot be appro¬

priated ; that land values represent only the

labor which would be necessary with present

methods to bring land from a wild to a produc¬

tive state, that the return to capital increases absolutely but decreases relatively as capital is increased in amount, that the return to labor

increases both relatively and absolutely as capi¬

tal increases, that ((other things being equal, the increasing density of population is matched by an increasing facility of production.® This

<(theory of harmony® promises increasing pros¬

perity to all the factors of production on one condition on which Bastiat insists — namely,

liberty. Since self-interest when pursued ever

so eagerly, or with ever so great an indifference to other men's interests, works good to all, all interference with its action is necessarily det¬

rimental. The state should absolutely limit

its function to the maintenance of justice. _ Laws restricting the exchange of commodities or

otherwise interfering _ with industrial liberty

under pretext of securing harmony of interests

are not only destructive to that harmony which can only coexist with liberty, but they are a violation of natural right. Bastiat is, of course, a champion of the doctrine of laissez-faire.

The wide divergence of Bastiat's theory of

harmony and the facts of life suggests the

fundamental fallacy of his system. It rests

upon a false theory of nature. Carey in <Harmony of Interests5 (1849) agrees with Bastiat,

but unlike the Frenchman, he made use of

arguments from real life. He advocated state

intervention and became an expounder of the

doctrine of protection. Neither writer has had

disciples of note, though extensive use has of course been made of their arguments. Consult

Ingram, (History of Political Economy5;

Walker, (Land and Its Rent5 ; Bohm-Bawerk,

‘Capital and Interest5 ; and Lassalle, (Bastiat, Schulze von Delitzsch.5

HARMONIES ECONOMIQUES. See

Harmonies of Economics.

HARMONISTS, also called Rappists and

Economites, a religious-socialistic community

founded in 1787 by George Rapp (1757-1847),

a German of Wiirttemberg. The peaceable and

spiritual tenets of the organization aroused an¬

tagonism and persecution, and in 1803 they emi¬

grated to America, settling in the Connoquenes—

sing Valley, where the Harmony Society was

established on a working basis. By 1805

houses, churches, mills and manufactories had

been built, and the settlement had a population of 750 persons. In 1815 they removed to Posey County, Ind., where they founded New Har¬

mony (q.v.) ; 10 years later, however, they re¬

turned to Pennsylvania, and built the township

of Economy, in Beaver County, on the Ohio, 20

miles north of Pittsburgh. In 1832, a German

adventurer, Bernhard Muller, settling among

them, caused dissensions and a split in the so¬

ciety; a separation and apportionment of the

property was agreed upon, and 250 members re¬

tired. They held all property in common, be¬

lieved in the second coming of Christ, the near advent of the millennium and practised celibacy.

As a result of the latter condition, the member¬

ship in 1902 was reduced to eight, and the valu¬

able estate will pass finally into the hands of the last survivor. Consult Hinds, (American

Communities5 (1902); Nordhoff, (The Com¬

munistic Societies of the United States5 (1874).

HARMONIUM, a modern musical instru¬

ment which produces sounds resembling those

of the organ. The invention is ascribed to

Alexandre Debain of Paris; but he has at the

most merely the credit of perfecting an instru¬

ment previously known, called the orgne expres—

sif, a kind of organ furnished with an appara¬

tus of free vibrating reeds, intended to increase or diminish the intensity and volume of the

sound, by regulating the pressure of the wind, by the aid of which the

sounds were produced.

The instrument has a keyboard like that of a

piano, and when one of the keys is pressed

down a valve is opened, which allows the wind from the bellows to rush through one of the

wind-boxes and act on the vibrator. There are

also several stops, like organ stops, by means of which the performer can direct the stream of

wind into the wind-boxes, which produce a

flute, clarinet or any other sound, according to the number of stops which the instrument pos¬

sesses. Such is the harmonium which was

patented by Debain in 1840, but since that time various other improvements of more or less

value have been made. The chief of these are the addition of a knee action, which either serves as an expression stop, or brings all the stops of the instrument into play at once, and what is called the percussion action, the invention of

Kaufmann of Dresden, which consists in the

application of a small hammer, which strikes

the vibrator as soon as the key is pressed down, and thus aids the action of the wind.

HARMONY, David Buttz, Rear-Admiral,

United States navy: b. Easton, Pa., 3

Sept. 1832; d. Washington 2 Nov. 1917.

He was graduated at the United States

Naval College, and at the age of 85 was

the oldest graduate living. From acting

midshipman in 1847 he rose through the

ranks to that of rear-admiral in 1889. He was executive officer of the Iroquoisat in the early stage of the Civil War, taking part in the bom¬

bardment and passage of forts Jackson and

Saint Philip; Chalmette batteries; capture of

New Orleans, Vicksburg and Charleston. With

the West blockading squadron he commanded

the Tahoma and Sebago, and was present at

the capture of Mobile. After the war he com¬

manded several ships, including the old Kear—

sarge and Portsmouth, served at the New York

navy yard 1865-67 and again 1869-72; was

chief of the Naval Bureau of Yards and

Docks and chairman of the Lighthouse Board.

He was commander-in-chief of the Asiatic

station 1892-93, and was retired 26 June

1893.

HARMONY. Harmony is the branch of

musical theory which treats of the simultaneous combination of tones into chords and the suc¬

cessive interlinking of chords. It may appro¬

priately be styled the grammar of music.

The traditional presentation of the subject

begins with an explanation of intervals. An

interval is formed whenever two tones are

simultaneously combined. Thus C and the

adjoining D make an interval of a second,

C and E of a third. When three tones are

combined we have a triad. Normally a triad

consists of the fundamental tone together with

its third and fifth. C E G is an example. Every tone in the scale has its triad, as is shown in the whole notes of the illustration (which is here confined to the major scale).

A

i

J

-4

. Q-

17 -

— r~

- -

O

o

o -Z1

-y - 1 —

—y —

o

o

o

O

<2 1

o

o”～

o

O 1

o

■ o

1

L^r — ^ —

o

5U&-

Don/-

CHORD

CHORD

TON/C

Don/ -

RANT

OF

OF

TRIAD

RANT

TRIAD

SIXTH

SIXTH

TRIAD

AND

FOURTH

The most important triads are those on the first, fourth and fifth degrees. They are designated

respectively as the tonic, subdominant and dom¬

inant triads. At the end of the example there are three different forms of the same chord,

the difference depending on the tone which

occupies the lowest position. The third last is the chord in its fundamental form, the next is the chord of the ®sixth,® the last the chord of the ((sixth and fourth.® The upper voices, too, like the lowest, may be shifted about, as well as spread apart (open position), but there are no special names for the resulting chord-forma¬

tions. By adding another third above the high¬

est tone of the normal triad (quarter notes of the example), we obtain a chord of the seventh.

Every triad in the scale has its corresponding chord of the seventh, but the most important

is that which is built on the dominant, and which is consequently styled the dominant chord of

the seventh. The addition of still further notes gives rise to chords of the 9th, 11th and 13th.

These, however, are not recognized by all

theorists as independent formations.

The fundamental chords adduced may be

subjected to numerous alterations and modifica¬

tions. One or more tones may be raised or low¬

ered chromatically, thus giving rise to ((altered®

chords. Foreign elements may be introduced

into the chords or interspersed between them.

There may be suspensions and anticipations,

passing and changing notes, pedal points and

stationary voices. A suspension is a tone which hangs over, or is ((suspended,® from a previous chord. An anticipation is one which reaches

forward into the next chord. Changing notes

are foreign notes entering abruptly into a har¬

mony, like unprepared suspensions ; passing

notes fill in the spaces between successive har¬

monic tones. Pedal points are sustained or re¬

curring tones in the bass accompanying decided

changes of harmony above, stationary voices

are the same thing when the sustained tones are in the upper parts. Modulation, finallv, refers to the transition from one key to another, and completes the basic operations on which har¬

monic progressions depend.

irf

) -

*

— t— T—

o

1

r*～]

- -1 j J D n

f 5

■p A

*

p

-a-

1 F

— © -

— o -

-

-

—

-re - P -

7 r

~rs -

o

-p

-f F-

J r”

V ■ i

O

D

. 1

o

–

1 —T 1

1 ‘

11

O

d

ˆ . . i

SUSPENSION ANTIC/PA TION PASSING NOTES CHANGING NOTES

As to the particular rules governing har¬

monic progressions, it is of course impossible

to go into their details, involving — as it would — a great number of illustrative, examples. Suf¬

fice it to have pointed out the nature of the material involved. The system in which this

material comes to view, and which we have just sketched, is admirably neat and clear, and has served its purpose well. It must not be sup¬

posed, however, that it is the only conceivable system, or that others have not been proposed.

Riemann, for example, has worked out one

which is certainly original, even though it may not win our complete

assent. In the ordinary

system harmonies are conceived as built up

from below, the lowest tone serving as gener¬

ator of the others. This seems to be in agree¬

ment with natural laws. For according to

acoustics, the two upper tones of the major

triad and the three upper tones of the dominant seventh chord are contained in the lowest tone as partials. Riemann follows the ordinary prac¬

tice with reference to major chords, but when

he comes to the minor he reverses it, i. e., “he builds them downward from above. Acoustic¬

ally he bases his procedure on the supposed ex¬

istence of ((undertones.® With reference to his classification of harmonies, likewise, he deviates widely from the ordinary view. Thus he re¬

gards the triad on the seventh degree of the

scale (B in our example), as an abbreviated

dominant seventh chord, with the lowest tone

(G) missing. And he considers the chord of

the sixth and fourth as a fundamenal or first-position triad, with a suspension in the two

upper voices. Alfred Day likewise admits ellip¬

tical chords, e. g., in the case of the seventh chord on the second degree of the scale (D in our example). He conceives this as a chord

of the 11th, with the lower B and G omitted.

Another interesting idea of his is that accord¬

ing to which some chords have double roots,

which is tantamount to saying that they are

composed of fragments of two chords. A valu¬

able suggestion, indeed, of which — strange to say — little use has been made. The combina¬

tion of parts into new wholes is a phenomenon to be observed everywhere. Thus the centaur

combines the head and chest of a man with the lower parts of a horse; the word <(shan't® is composed of portions of the words <(shall® and <(not.® What more natural, accordingly, than

that music, with its wealth of material, should make use of similar abbreviations and combina¬

tions? It would be out of place, however, to

follow up this suggestion, as the function of

the present review is to give a summary of ex¬

isting opinions, rather than to develop new

ones.

Historically, both the practice and theory of

harmony are of comparatively recent develop¬

ment. The simple chords which make up the

bulk of ordinary modern music were preceded

by something far more complicated. After be¬

ing confined from time immemorial to the pro¬

gression of a single voice, music, from the 9th century on, began to spread out into the simul¬

taneous movement of several parts, the result

finally being the complicated tissue of poly¬

phonic music which we meet with in the Neth¬

erlands and Italy previous to the 17th century.

Not until this time do the chance harmonies of simultaneously progressing voices become con¬

solidated into single, block-like chords. The

first premeditated use of chords in the modern sense seems to have been made by the founders of opera, who lived about the year 1600, and

especially by Monteverde, who stands out as

one of the most gifted of this enthusiastic group of men. Theoretically the rules of harmony

were first laid down by Rameau in his ((Traite de l'Harmonie,® published in the year 1722. It was Rameau who deduced the chords which

were the object of his research from the over¬

tones of their root-notes. Tartini, on the other hand, invoked the socalled ˆcombinational®

tones for the elaboration of his theories. Not until the time of Helmholtz was the true sig¬

nificance of these discoveries brought to light and given a scientific foundation. Like all other branches of knowledge, harmony has been un¬

dergoing changes with the lapse of time and

transformation of musical taste. No art is

subject to such variations as music in what is considered novel and beautiful. Hence its the¬

ory, likewise, has been subject to corresponding fluctuations. To give but a single example, the parallel progression of fifths and octaves,

which in the earliest days of harmonic devel¬

opment was the rule, was later forbidden as a deadly offense against the canons of good taste, and remained so for many centuries. Of late,

however, this rule has lost much of its rigor, and parallel fifths and octaves are now used

again with comparative freedom. Here, as in

other arts, the genius of great creative minds has fashioned new modes of expression, and

traditional formulas have been powerless to re¬

sist. Hence harmony is a fluid branch of the¬

ory ; and while some of its rules, based on

scientific laws of sound, may remain constant,

others will be transformed so as to agree with the varying practice of great musicians.

Albert Gehring,

Author of (The Basis of Musical Pleasure *etc.*

HARMONY OF THE SPHERES, a

hypothesis of Pythagoras and his school, ac¬

cording to which the motions of the heavenly

bodies produced a music imperceptible by the ears of mortals. He supposed these motions to conform to certain fixed laws, which could be expressed in numbers, corresponding to the numbers which give the harmony of sounds.

HARMOTOME, har'mo-tom, a mineral of the zeolite family; a hydrous silicate of alumi¬ num and barium, invariably occurring in twin crystals of various colors from white to red— brown.

HARMSWORTH, Alfred Charles Wil¬ liam. See Northcliffe, 1st Baron.

HARNACK, har'nak, Adolf, German theo¬ logian : b. Dorpat, Russia, 7 May 1851. He be¬ gan his studies in his native town in 1869 and in 1874 took up his residence at Leipzig, was made professor extraordinary there in 1876, and professor of theology, first at Giessen in 1879, and eventually at Berlin 1889. In 1890 he was made a member of the Academy of Sci¬ ences, Berlin. He has been a prolific writer, both in theology and church history. The dis¬ tinctive notes of his teaching, — freedom in

criticism, distrust of speculative theology and

acceptance of Christianity as a life rather than as a system of dogma, — have aroused violent

opposition among conservative theologians, but

their influence has penetrated far beyond the

bounds of Germany. Among his works are

(Die Ueberlieferung und der Bestand der

altchristlichen LitteratuH (1893) ; <Texte und

UntersuchungeiP (1882-94) ; < Martin Luther'

(1901); (Das MonchtunP (1881); ˆeschichte*

(1893) ; (Chronologie der altchristlichen Litteratur Cis Eusebius) (1904) ; (Das Wesen des Christentums) (1900) ; (Das Apostolische

Glaubensbekentniss> (1897) ; (Die Mission und

Ausbreitung des Christentaums) (1902) ;

(Essays on the Social GospeP (1907); (Bible

Readings in the Early Church) (1912).

HARNESSED ANTELOPES. See Bush—

buck.

HARNETT, Cornelius, American states¬

man : b. England, 20 April 1723; d. North Caro¬

lina, 1781. He came in early life to America, and was one of the earliest to denounce the

Stamp Act and kindred measures. In 1770-71 he

was representative of Wilmington, N. C., in the provincial assembly,

and chairman of the most

important committees of that body. In 1772

he was appointed, with Robert Howe and

Maurice Moore, to prepare a remonstrance

against the appointment, by the royal governor

Martin, of commissioners to fix the southern

boundary of the province. Josiah Quincy, who

visited him in 1773, called him ((the Samuel

Adams of North Carolina® ; and, as the Revo¬

lution approached, he was its master spirit

throughout the Cape Fear region. He was

elected to the Provincial Congress in 1775, and drew up the instructions to the North Carolina delegates in the Continental Congress. When

in 1776 Sir Henry Clinton appeared with a

British fleet off Cape Fear, Harnett and Howe

were excepted, as arch-rebels, from the terms

of a general pardon. As member of the Con¬

tinental Congress he signed the Articles of Con¬

federation. When in 1780-81 the British held

possession of the country around Cape Fear,

Harnett was made prisoner, and died while a

captive.

HARNEY, John Hopkins, American

journalist: b. Bourbon County, Ky., 1806; d. 1867. He was educated at Oxford University, Ohio, became professor of mathematics at the University of Indiana and at Hanover College, and was president of a college at Louisville, Ky. He was for a number of years editor of the Louisville Democrat, a paper which took a radical attitude during the Civil War.

HARNEY, William Selby, American soldier: b. Haysboro, Tenn., 27 Aug. 1800; d. 9 May 1889. He entered the army in 1818; served as colonel in the Mexican War and was brevetted brigadier-general for gallantry at Cerro Gordo, and promoted to that rank in

1858. While commanding the Department of

Oregon, in 1859 he took possession of the island of San Juan, which was claimed by the Eng¬

lish government. He was in consequence re-

called. He retired in 1863 and was brevetted

major-general in 1865.

HARNEY'S PEAK, the highest point of

the Black Hills, South Dakota, named in honor

of Gen. W. S. Harney; height 7,242 feet.

HARO ISLANDS. See San Juan Islands.

HAROLD I, surnamed Harefoot, king of

England : d. Oxford, 17 March 1040. He suc¬

ceeded his father Canute in 1035, notwithstand¬

ing a previous agreement that the sovereignty

of England should descend to the issue of

Canute by his second wife, the Norman Prin¬

cess Emma. Hardecanute, who was about to

invade England at the time of Harold's death,

dug up his body and beheaded it. Consult

Freeman, (The Norman Conquest* (Vol. I).

HAROLD II, king of England, second son

of Godwin, Earl of Kent : b. about 1022 ; d.

Senlac, near Hastings, Sussex, 14 Oct. 1066.

On his father's death in 1053 he succeeded him in the earldom of Wessex and other great

offices, and upon the death of Edward the

Confessor, 5 Jan. 1066, who had named him

his successor, he was chosen king by the nobles, notwithstanding the claim of Edgar Atheling,

or the asserted bequest of Edward in favor of William, Duke of Normandy. The latter called

upon him to resign the crown, and upon his

refusal prepared for invasion. He also insti¬

gated Harold's brother, Tostig, to invade the

northern coasts of England in conjunction with

the king of Norway. The united fleet of these chiefs sailed up the Humber and landed a

numerous body of men, who defeated the op¬

posing forces of the earl of Northumberland

and Mercia; but at Stamford Bridge, on the

river Derwent, in Yorkshire, were totally routed by Harold, whose brother Tostig fell in the

battle. A day or two later he heard of the

landing of the Duke of Normandy at Pevensey,

in Sussex. Hastening southward with all the

troops he could muster, a general engagement

ensued at Senlac, near Hastings, in which

Harold was slain with an arrow, and the crown of England was passed to William. (See

Senlac). Consult Freeman, (The Norman Con¬

quest (Vols. II and III) ; Tennyson, Harold)

(1876).

HAROLD, or HARALD I, surnamed

Haarfager (Fair-haired), king of Norway, son

of Halfdan the Black: d. Tronjhem, 933. He

succeeded to the throne in 860. While he re¬

duced the lesser kings he left them with the

title jarl, the administration of their territories and the third part of their income ; but many of them emigrated and founded Norwegian col¬

onies. Hrlof or Rollo emigrated to Neustria

(France). Others, with their followers, estab¬

lished themselves in Iceland, the Shetland Isles, the Faroes and the Orkneys, then uninhabited.

When Harold found that the emigrants often

extended their incursions into his dominions he embarked with a naval force to subdue them,

conquered the Orkneys, etc., and returned.

HAROLD, or HARALD III, surnamed

Haardrada, king of Norway: d. Stamford

Bridge, England. 25 Sept. 1066. The date of his birth is unknown. During a great part of his

youth and prime he served in the Imperial

bodyguard at Byzanthim. returning to Norway

about 1045. He persuaded his nephew Magnus

to divide the supreme power with him, in

return for a share of his treasures, and two

years later (1047) his nephew died, when he

himself became sole king of Norway. In 1066

he joined Tostig, the brother of Harold II

(q.v.) of England, in an invasion of that

country, having been promised half of it in

case of success ; but he was slain at the battle of Stamford Bridge.

HAROUN-AL-RASHID. See Harun-al-

Rashid.

HARP, the oldest of stringed instruments.

The Bible mentions Jubal as the inventor. It

has been used by all nations in one form or

another. The modern instrument is nearly tri¬

angular and the strings are extended from the

upper part to one of the sides. It stands erect, and is played with both hands, the strings be¬

ing struck or pulled with both fingers and

thumbs. The improvements which have ren¬

dered the modern harp an efficient musical in¬

strument are due to Sebastian Erard, who in

1794 took out a patent for a harp with seven pedals, and again in 1808 for a double-action

harp with the same number of pedals, each of

which effects two changes in the pitch of the strings. The harp thus constructed contains

43 strings tuned according to the diatonic scale, every eighth string being a replicate in another octave of the one counted from. Various im¬

provements over Erard's harp were made dur¬

ing the 19th century.

HARP, or SADDLEBACK, SEAL. See

Seals.

HARP-SHELL, a genus (Harpa) of gas—

teropodous mollusks of the whelk family

{Buccinidce) , having the last whorl of the shell large, and covered with numerous sharp smooth

ribs, resembling the strings of a harp. The foot is large, and there is no operculum. These

shells are elegantly marked, and much prized

for their beauty. Nine species are known, all

of them tropical, and living in deep water, on soft, sandy or muddy bottoms.

HARPER, Ida Husted, American journal¬

ist and author: b. near Brookville, Ind. She

attended the University of Indiana for two

years ; also Leland Stanford University two

years; entered journalism when about 18, con¬

ducted a woman's department in the Terre

Haute Saturday Evening Mail and in the

Firemen's Magazine , and was a contributor

to many papers, including the Cleveland Leader, San Francisco Chronicle, and Washington Post.

She was managing editor of the Terre Haute

Daily News, for a year, has written for the

McClure syndicate, Harper's Bazar, and was .

for five years on the editorial staff of

the New York Sun. She was a member of

the International Congress of Women in

London in 1899, and was appointed chairman

of the international press committee for a

five years' term. She prepared the Indiana

State monograph for the World's Fair at Chi¬

cago under the title Organized Work of In¬

diana Women,* and has written (Life and

Work of Susan B. Anthony * (1898) and < His¬

tory of Woman Suffrage to the Close of the

Nineteenth Century) (1901).

HARPER, Robert Francis, American

Assvriologist : b. New Concord, Ohio, 1864; d.

1914. He received his education at the Uni¬

versity of Chicago, and took his doctor's de-

gree at Leipzig in 1886. He then instructed at Yale (1886-88, and 1889-91), after which he

became associate professor of Semitic languages

and literatures at the University of Chicago,

succeeding to a full professorship in 1900. Dr.

Harper made several trips to Assyria and Baby¬

lonia for the University of Pennsylvania

(1888-89) ; for the British Museum (1891-92) ; and from 1903-06 to Babylonia, as director of

an expedition. From 1908-09, he succeeded to

the directorship of the American School for

Oriental Study and Research in Palestine. He

was appointed curator of the Haskell Oriental

Museum (1900), and editor of the American

Journal of Semitic Languages (1907). He was

likewise associate editor of the Biblical World, and of the American Journal of Theology. His

publications include (Assyrian and Babylonian

Letters Belonging to the Kouyunjik Collections

of the British Museum* (1892-1913) ; Baby¬

lonian and Assyrian Literature) (1901) ; (The

Code of Hammurabi* (1904).

HARPER, Robert Goodloe, American law¬

yer and statesman : b. near Fredericksburg,

Va., 1765; d. Baltimore, Md., 15 Jan. 1825. In his 15th year young Harper joined a troop of

horse, and under General Greene served during

the latter part of the Southern Revolutionary

campaign. He was graduated from Princeton

College in 1785, while there acting for a time as tutor to lower classes. Sailing from Phila¬

delphia for Charleston, with the intention of

studying law, he arrived at his destination

nearly penniless, but was assisted by the father of a former pupil, who

obtained a position for him in a lawyer's office. In one year he was qualified to practise, and soon established a

reputation, and became well known by a series

of newspaper articles on the proposed change

in the State constitution of South Carolina. He was soon after elected to the State legislature, and in 1794 to the National Congress. In this position he showed marked ability, supported

the administrations of Washington and John

Adams, and was regarded as one of the leaders of the Federal party. On the election of

Thomas Jefferson as President in 1801 he re¬

tired from Congress, and resumed the practice

of his profession in Baltimore. At the Mary¬

land bar he attained great eminence, at the

period too of its highest renown. He was asso¬

ciated with Joseph Hopkinson as counsel for

Judge Chase of the United States Supreme

Court, when under impeachment. In 1815 he

was elected United States senator from Mary¬

land.

HARPER, William Rainey, American col¬

lege president and Hebrew scholar: b. New

Concord, Ohio, 26 July 1856; d. Chicago, Ill., 10

Jan. 1906. He was graduated at Muskingum

College in 1870; was professor of Hebrew at

the Baptist Union Theological Seminary, Chi¬

cago, in 1879-86; and of Semitic languages in

the graduate faculty of Yale. From 1889 he was also professor of biblical literature. He was

principal of the Chautauqua College of Liberal

Arts in 1885-91, and in 1891 was appointed di¬

rector of the Chautauqua system. In 1891 he

was chosen first president of the new Uni¬

versity of Chicago, where he was also head of the department of Semitic languages and litera¬

ture. He was a founder and editor of He—

bracia and the Hebrew Student; was an editor

of three of the publications of the University of Chicago — the Biblical World, the American

Journal of Theology, and the American Journal

of Semitic Languages and Literature. His ad¬

ministration was noted for its rapid develop¬

ment of the facilities of the university. Among his works are ˆElements of Hebrew* (2d ed.,

1890); (Hebrew Method and Manual * (1885),

and (Elements of Hebrew Syntax) (1888), (Thc

Trend in Higher Education) (1905) ; (The

Priestly Element in the Old Testament (1905).

HARPER, William Saint John, American

artist: b. Rhinebeck, N. Y., 8 Sept. 1851; d. 4

Nov. 1910. He studied painting at the National Academy of Design, New York, and afterward

became pupil of Munkacsy and Bonnat at Paris.

He did much successful work both as a painter and book illustrator.

HARPER'S FERRY, W. Va., is situated

in Jefferson County, 55 miles northwest of

Washington, at the eastern extremity of West

Virginia, on the Baltimore and Ohio Railroad.

It is at the confluence of the Potomac and

Shenandoah rivers, where the former breaks

through the Blue Ridge, presenting one of the

most picturesque scenes in America. Attracted

by its fine waterpower, Washington, in 1796,

chose it as a site for a United States arsenal and armory, and up to 1860 $1,800,000 had been

expended for land and improvements. Here

10,000 muskets were made annually, and over

75,000 small arms were usually in store. It is the seat of Storer College and of a normal

school for colored pupils. A severe flood of

the Shenandoah in October 1878 created serious

damage to the village of Harper's Ferry. Pop.

766.

Harper's Ferry got its name because Robert

Harper settled there about 1747, and established a ferry across the Potomac. The place came

into great prominence in 1859 through the acts of John Brown (q.v.), and was the scene of

noteworthy military events during the Civil

War. When Virginia seceded, Harper's Ferry

was held by Lieut. Roger Jones, with 45 men.

On the night of 18 April 1861 a large body of Virginia militia, hastily assembled from the

surrounding country, appeared before the place.

Jones set fire to the arsenal, destroyed as much public property as possible and retreated across the Potomac to Hagerstown, Md., and thence

to Carlisle, Pa. The Virginia militia occupied

the place, and troops were hastened to it from other States of the Confederacy. The Con¬

federate government attached much importance

to the place as a strategical point, but it was abandoned by Gen. J. E. Johnston, 15 June 1861, when he heard that General Patterson, march¬

ing from Chambersburg, Pa., was threatening

to cross the Potomac at Williamsport. The

place was then occupied by the National forces.

When General Lee invaded Maryland early in

September 1862, Harper's Ferry was held by

Col. Dixon S. Miles-with a large garrison, and there were strong outposts at Winchester and

Martinsburg. Lee supposed that his presence

at Frederick, Md., would cause the evacuation

of Harper's Ferry and its outposts, and thus

open his communications by way of Shenan¬

doah Valley, but as it was still held by the National forces it became a necessity to dislodge them. On the morning of 10 September he set

three columns in motion from Frederick to sur-

round the place and capture its entire garrison.

General Jackson, with 14 brigades, marched

rapidly over the South Mountain, crossed the

Potomac at Williamsport on the 11th, drove

the garrison from Martinsburg into Harper's

Ferry, and appeared before Bolivar Heights

on the 13th, thus investing the place from the west. General McLaws, with 10 brigades,

marched through Brownsville Gap, and, after a

severe engagement with Col. Thomas H. Ford

on the 12th and 13th, drove him from Mary¬

land Heights and into Harper's Ferry. Gen¬

eral Walker, with his division, crossed the

Potomac at Point of Rocks, 12 miles below

Harper's Ferry, and on the 13th seized Lou¬

doun Heights beyond the Shenandoah. Miles

was now completely surrounded, the Confeder¬

ates occupying high ground, commanding his

position. Artillery fire was opened from all

these points on the 14th, and late in the after¬

noon Jackson moved upon Bolivar Heights,

drove in Miles' skirmish lines and gained an

advantageous position on the left of the Union line. During the night 1,500 Union cavalry

crossed from Harper's Ferry to the Maryland

side and escaped. During the same night Jackson crossed 10 guns to the right bank of the Shenandoah and established them on a plateau

at the foot of Loudoun Heights, enfilading

Miles' entire position on Bolivar Heights.

Early on the 15th the Confederate guns on

Maryland Heights, Loudoun Heights and in

front of Bolivar Heights opened fire, which was responded to for more than an hour, but the

direct and plunging flank-fire from the Con¬

federate batteries partially silenced the Union

guns and created some disorder in the Union

ranks. Jackson had advanced his lines to within 150 yards of the

Union works on Bolivar

Heights, and was about to assault, when Miles

ordered a white flag displayed on his works and directed Gen. Julius White to arrange terms of capitulation, soon after which Miles was mor¬

tally wounded by a shell from a battery that

had not seen the white flag. The Union loss

during the siege was 44 killed and 173 wounded, and the number of prisoners surrendered and

paroled 12,520. The Confederates captured 70

guns, 13,000 small arms, 200 wagons and a large amount of quartermaster and commissary

stores. The Confederate loss was 41 killed and 247 wounded, the greater part of whom were

lost in the engagement on Maryland Heights.

The Confederates abandoned Harper's Ferry on

the 20th, and it was again occupied by the

Union forces on the 22d. Consult (Official

Records) (Vol. II and XIX) ; Allan, *Army of

Northern Virginia in 1862 } ; the Century Com¬

pany's (Battles and Leaders of the Civil War*

(Vols. I and II).

E. A. Carman.

HARPIES (Greek, Harpuiai, swift rob¬

bers), the goddesses of storms. Their ages,

appearance, names and number are so variously

given by the poets that it is difficult to say anything definite concerning them. In the

Homeric poems they are represented as person¬

ified stormwinds. The later poets and artists

vied with each other in depicting them under

the most hideous forms. One has given them

the head of a fowl, with wings and a body cov¬

ered with feathers, human arms with claws, a

white breast and human legs which terminate

in the feet of a fowl. Others have given them the face of a young woman with the ears of a bear. See Furies.

HARPIGNIES, Henri Joseph, on-re zho-zef ar-pen-ye, French landscapist: b. Valen¬

ciennes, 28 July 1819; d. Saint Prive, 28 Aug.

1916. He studied at Paris with Achard, first

exhibited at the Salon of 1853, and in 1861 at¬

tracted attention by his (Edge of a Wood be¬

side the AllierP His landscapes, done with

equal success in oils or water-colors, evince a skilfulness of drawing and a coloristic truth¬

fulness marred only occasionally by a harsh¬

ness in matters of technique. His works in¬

clude (View of Capri, J (Le Saut du Loup,*

(Banks of the Rhone) (Metropolitan Museum,

N. Y.) ; (Garden of the Villa Medici,) (Le Pont Neuf,* and (The Hour of the Wild Goose.)

HARPSICHORD, a stringed instrument

formerly in use, in appearance and construction similar to a grand pianoforte. In the front the keys were disposed, the long ones being the

naturals, and the short ones the sharps and

flats. This instrument, called by the Italians

clavicembalo , by the French clavecin , was an

improvement upon the clavichord, which was

borrowed from the harp. Both are now super¬

seded by the pianoforte. Consult Galpin's (01d

English Instruments> (1911). See Pianoforte.

HARPSWELL, Me., a township including

the post village of Harpswell Centre, and com¬

prising a peninsula and some islands in Casco

Bay, 14 miles east of Portland. It has agricul¬

tural interests andL grist-mills, but is chiefly noted as a summer resort. Pop. 1,650.

HARPUR, Robert, American educator:

b. Ballybay, County Monaghan, Ireland, 25 Jan.

1 733; d. Harpursville, N. Y., 1825. His moth¬

er's father fought in the battle of the Boyne and left Scotland to enjoy religious freedom.

His father was a man of means and intelligence and a rigid Presbyterian. The son graduated

at Glasgow University and, finding his faculty

for public address unequal to the demands of

preaching, turned to the work of teaching in

the grammar school of Newry. He shortly set

out for America and arrived at New York 1

Sept. 1761. Within a few days he engaged

himself to teach mathematics and physics in

the recently chartered king's (later Columbia)

College, and after a time also became libra¬

rian. Remembering his oppressed neighbors at

home, he undertook to secure land grants for

them and by his assistance one entire parish,

with their pastor, Dr. Thomas Clark, immi¬

grated and founded the town of Salem, N. Y.

In the Revolution Professor Harpur cast in his lot with the patriots, becoming a deputy to the 3d and 4th Provincial Congresses and a mem¬

ber of the new State assembly from 1777 to

1784, and also acting as a commissioner for de¬

tecting and defeating conspiracies for Dutchess

County. He served likewise as deputy secre¬

tary of state under the first two incumbents

of the office, John Morin Scott and his son,

Lewis Allaire Scott, and later, covering the

years 1778-95; and in the capacity of secretary to the State Land Board was probably sponsor

for the military townships of central New

York, whose classical names have ever since

been the subject of criticism and wonder.

Poughkeepsie now became his residence until

the close of the war, when he returned with

the State government to New York city. On

the creation of the Board of Regents to con¬

trol State educational interests, Professor Harpur was made a member and served as its first secretary. In 1795, at the age of 62, he re¬

signed his public posts and, turning from the

habits and associations of a lifetime, took up the career of a pioneer in the wilderness of

Broome County, where he had acquired a tract

of 15,360 acres in what is now Colesville town¬

ship. Here for 30 years he encouraged settle¬

ment by his generosity and won a wide repute

for his counsel and philanthropy.

HARRADEN, Beatrice, English novelist:

b. Hampstead, London, 24 Jan. 1864. Her first

novel, (Ships that Pass in the Night> (1893), was instantly successful. It has been followed

by (In Varying Moods) (1894); (Hilda Strafford) (1897) ; (The Fowler > (1899) ; Catha¬

rine FrenshanP (1903) ; (The Scholar's

Daughter) (1906) ; <Interplay) (1908) ; (Out

of the Wreck I Rise1* (1912).

HARRIMAN, Edward Henry, financier

and railroad director: b. Hempstead, L. I., 25

Feb. 1848; d. 9 Sept. 1909. He was the son of the Rev. Orlando Harriman, rector of Saint

George's Episcopal Church, Hempstead, and

was educated at Trinity School, New York

City. He commenced commercial life at the

age of 14 as a broker's clerk in New York, and at 22 became a member of the New York

Stock Exchange. He founded the banking and

brokerage firm of Harriman and Company in

1872 and prospered in speculation. Associated

with Mr. Stuyvesant Fish he became inter¬

ested in American railways and in 1883 be¬

gan a succession of operations connected with

the Illinois Central Railroad, the Union Paci¬

fic, the Central and Southern Pacific railways

and the Oregon Railroad and Navigation Com¬

pany which gave him control of the traffic

from Chicago to the Pacific Coast He re¬

ceived a severe check from James J. Hill in

1901 when he sought to gain control of the

Northern Pacific, and also from Thomas F.

Ryan when he attempted to dominate the

Equitable Life Assurance Society, of which he

was a trustee; part of its funds had been used in the fight with James J. Hill and one of the most serious financial crises in the history of Wall Street ensued.

An investigation of the Harriman lines in

1906 by the Interstate Commerce Commission,

however, revealed Harriman as the ruler of

the American railroad world ; this was accen¬

tuated in 1907 when he forced his former as¬

sociate, Stuyvesant Fish, out of the presiden¬

tial chair of the Illinois Central. Keen and

unscrupulous, his methods all bent on success

were savagely criticized, but resulted in bet¬

ter public railway service. A comparatively

sudden failure in health led to his death. To his wife he bequeathed the whole of his enor¬

mous fortune valued at from $200,000,000 to $600,000,000.

HARRIMAN, Tenn., city in Roane County, on the Emory River, the Southern, the Tennessee Central and the Queen and Chattanooga railroads, about 78 miles north¬east of Chattanooga, and 37 miles west of Knoxville. It was founded in 1890 and re¬ceived its city charter in 1891. The charter was revised in 1899. It is situated in an agri¬cultural region which contains rich deposits of coal and of iron ore, and some timber land. Its chief manufactures are foundry and machine shop products, leather, farm imple¬ments, iron, flour, lumber, cotton goods and fur¬niture. It is the seat of an industrial school for colored children and of the American Uni¬versity, established in 1893. Its trade in agri¬cultural and mining products and in its own manufactured articles is rapidly increasing. The waterworks and electric-light plant are owned and operated by the city. Pop. 4,019.

HARRIMAN ALASKA EXPEDITION,

an American scientific and artistic expedition

which visited the southern coast of Alaska dur¬

ing the summer of 1899. The party was organ¬

ized by Edward H. Harriman, and consisted of

the members of his own family, a few friends

and 50 men eminent for scientific and literary attainments, who made good use of their op¬

portunities in investigating the geography, geol¬

ogy, glacial phenomena and fauna and flora

of the region visited.

The results were over 300 species and sub¬

species of animals and plants, records of ob¬

servations of 22 ˆliving® glaciers, those which discharge icebergs directly into the sea, and of 100 “dead® glaciers, those whose fronts do not reach the sea. A new chart was made of the

part of the coast explored. (See Harriman

Fiord). Some of the new animal species found

are two of foxes, five species and sub-species of shrews, five of hares, one crab, a shrimp

and 25 sea-worms. One of the sea-worms is

about six feet long and of a deeo vermilion

color; another about the same size is blood-red with a white head. In no other part of the

world have been found sea-worms of such

varied and striking forms and colors. Among

the plants found were a large number of new

species and sub-species. Each department of

science was represented by one or more experts who made critical observations and accurate re¬

ports. Consult (Reports of the Harriman

Alaska Expedition ; (The World's Work)

(1900) ; (Discoveries in our Arctic Region.*

HARRIMAN FIORD, on the southern

coast of Alaska, at about lat. 61° N. and long.

145° W., is an arm of Prince William Sound,

15 miles in length. This fiord was discovered

by the Harriman Alaska Expedition (q.v.), in

1899. It is full of glaciers of every description, waterfalls and forests.

HARRINGTON, Mark Walrod, Ameri¬

can astronomer : b. in Sycamore, Ill., 18 Aug.

1848. He was educated at the University of

Michigan and later in Leipzig, and in 1870-71

assisted in the United States Coast and Geodetic Survey of Alaska. He was professor of as¬

tronomy and director of the observatory at the University of Michigan, 1879-91. In 1884 he

established the American Meteorological Jour¬

nal and was its managing editor until 1892.

In 1891 he became chief of the Weather Bureau at Washington, D. C., which post he held till 1895, and was president of the Washington

State University 1895-97. He is the author of

(About the Weather* (1899).

HARRIOT, Thomas, English mathema¬

tician: b. Oxford, 1560; d. London, 2 July 162L

He entered Saint Mary's Hall, Oxford, and was

graduated in 1580. In 1585 he was sent by Sir Walter Raleigh as surveyor on the Grenville ex-Jjedition to Virginia, and on his return he pub-ished an account of Virginia, later printed in Hakluyt's WoyagesP He gained the favor of

the Earl of Northumberland, who gave him an

annual pension, and thereafter devoted himself

entirely to mathematical and scientific research.

His chief work, (Artis Analyticae Praxis ad

Equationes Algebraicas Resolvendas,) published

in 1631, embodied the most important results

of his mathematical work. He practically gave

to algebra its modern form, improving the

notation, being the first to equate all the terms of an equation to zero, and announcing the

principle that every equation has as many roots as its dimension. He also did important work

in astronomy. Consult the biography by Stevens

(1909); and the (Harriot Papers,) edited by

Rigaud (1831). See Algebra, History of the

Elements of.

HARRIS, Amanda Bartlett, American

writer: b. Warner, N. H., 15 Aug. 1824; d. 13

Jan. 1917. She was a popular writer of juve¬

nile fiction, including (How We Went Bird-Nest¬

ing) (1880) : (Wild Flowers and Where They

Grow) (1882) ; Coor-Yard Folks, and a Win¬

ter Garden) (1883) ; (Pleasant Authors for

Young Folks) (1884) ; (01d School Days)

(1886) ; (American Authors for Young Folks)

(1887) ; (The Luck of EdenhalP (1888), *etc.*

HARRIS, Frederic Robert, American en¬

gineer and naval officer: b. New York, 10 April 1875. In 1896 he was graduated at the Stevens Institute of Technology, Hoboken, N. J.,

served as engineer for various companies in¬

terested in waterfront improvements on the

Atlantic Coast from 1896 to 1903, when he en¬

tered the naval service as member of the Naval Corps of Civil Engineers. He was made lieu¬

tenant in 1907 and lieutenant-commander in

1913. He served as principal assistant on con¬

struction at the new navy yard and dry-dock at Charleston, S. C. ; was in charge of construc¬

tion of the naval station at Guantanamo, Cuba, in 1906-07, assistant to the chief of the Bureau of Yards and Docks, Washington, 1907-09, and

head of the department of public works at the Brooklyn navy yard in 1909—15, when he en¬

tered on similar duties at the Philadelphia yard.

In 1917 he was raised to the rank of rear-admiral.

HARRIS, George, American college presi¬

dent : b. East Machias, Me., 1844. He was

graduated at Amherst 1866; and at Andover

Theological Seminary 1869. After taking sev¬

eral pastoral charges he became professor of

Christian theology at Andover 1883, from which

position he passed in 1899 to the presidency of Amherst. He resigned this position in 1911.

He was one of the editors of the Andover Re¬

view, 1884-93. Among his works are (Moral

Evolution) (1896) ; inequality and Progress)

(1897); (A Century's Change in Religion)

(1914).

HARRIS, Joel Chandler, American jour¬

nalist and author: b. Eatonton, Ga., 8 Dec. 1848; d. Atlanta, Ga., 3 July 1908. He began his

career as a printer's apprentice on the Forsyth (Ga.) Countryman and was on the staff of the

Savannah Daily News, 1871-76. He was con¬

nected with the Atlanta Constitution for 25

years. The series of <(Uncle Remus® sketches

and songs which gave him an international rep¬

utation were first printed in the Constitution.

His published books include (The FolkLore

of the Old Plantation) (1880); (Nights With

Uncle Remus) (1883).; (Mingo and Other

Sketches) (1883); (Daddy Jake, the Runaway)

(1889); (Free Joe and Other Stories) (1887) ;

(Balaam and His Master) (1890) ; (Mr. Rabbit

at Home) (1895) ; (The Story of Aaron) (1896) ; (Stories of Georgia History) (1897) ; (Sister

Jane,) a novel (1897) ; (Minervy Ann} (1899) ; (On the Wing of Occasion) (1900) ; (The Mak¬

ing of a Statesman) ; (A Little Union Scout) ; (Told by Uncle Remus) (1905) ; (Uncle Remus

and Br'er Rabbit) 1907, *etc.* He created a

literature from his observation of the planta¬

tion negro and his stories, which is a distinct addition to folklore, and a valuable side light on the character of the old-time Southern

negroes, and country life in Georgia. Consult

Harris, Julia Collier, (Life and Letters of Joel Chandler Harris) (New York 1918).

HARRIS, Merriam Colbert, American

Methodist missionary: b. Beallsville, Ohio, 9

July 1846; d. Tokio, Japan, 10 May 1921. Vet¬

eran of the Civil War, in the 12th Ohio Cavalry.

Missionary of the Methodist Episcopal Church

in Japan, 1872-86, and superintendent of the

Japanese Mission in San Francisco, in Hawaii

and the Pacific Coast 1886-94; bishop of Japan and Korea 1904-15. His incessant philanthropic

labors have been recognized by the emperor of

Japan, who awarded a decoration of the Sacred

Treasure, 3d class. Author of (One Hundred

Years of Missions,) Christianity in Japan)

and (Japanese Proverbs.) His wife, Flora

Lydia Best (d. September 1909), besides writ¬

ing on Japanese themes, translated the 10th

century classic, (Tosa Niki) ((Diary or Log of Journey from Tosa to Kyoto) (1891).

HARRIS, Miriam Coles, American novel¬

ist; b. Dosoris, L. I., 7 July 1834. She was married to Sidney S. Harris in 1864 and has

since lived in New York. She wrote Rut¬

ledge) (I860) ; (The Sutherlands) (1862),

both widely read, and among later and

almost equally popular works of hers are (A

Perfect Adonis) (1875) ; <Missy) (1880) ; and

(An Utter Failure) (1891) ; <The Tents of

Wickedness) (1907).

HARRIS, Samuel, American theologian :

b. East Machias, Me., 14 June 1814; d. Litch¬

field, Conn., 25 June 1899. He was graduated

from Bowaoin College and from Andover

Theological Seminary. He was a teacher for a

time and held Congregationalist pastorates in

Conway, Mass., 1841-51. In 1855 he was ap¬

pointed professor of systematic theology in

Bangor Seminary; was president of Bowdoin

1867-71 ; and then became professor of sys¬

tematic theology in the Yale Divinity School.

His writings include (Zaccheus or the Scriptural Plan of Benevolence) ; (Kingdom of Christ on

Earth) (1874) ; (Philosophical Basis of Theism) (1883) ; (Self-Revelation of God) (1887) ;

Cod, Creator and Lord of A1P (1897).

HARRIS, Thaddeus William, American

entomologist: b. Dorchester, Mass., 12 Nov.

1795; d. Cambridge, Mass., 16 Jan. 1856. He

was graduated at Harvard College in 1815,

studied medicine and practised his profession in Milton, Mass., until appointed librarian of Har-HARRIS — HARRISBURG

vard in 1831. This position he occupied until

his death. Early in life he exhibited a fond¬

ness for natural history, and though plodding

alone, attained to a scientific eminence which

secured for him the fellowship of all the prin¬

cipal learned societies of America, and of many abroad. For several years he gave instruction

in botany and general natural history in the col¬

lege, and originated the Harvard Natural His¬

tory Society for the students. He was chiefly

distinguished, however, as an entomologist, and

has been surpassed as such by no one in the

United States. He was one of the founders of

the Massachusetts Horticultural Society. In

1837 he was appointed one of the commissioners for a zoological and botanical survey of Massa¬

chusetts, the result of which was his Sys¬

tematic Catalogue of the Insects of Massachusetts) (1832), in which 2,350 species are

enumerated. He also published (A Treatise on

some of the Insects of New England which are

Injurious to Vegetation) (1842), a work of per¬

manent value.

HARRIS, Thomas Lake, American social¬

istic and religious reformer: b. Fenny Strat¬

ford, England, 15 May 1823. He accompanied

his father to the United States in childhood,

was for a time a Universalist pastor, and

founded an (Independent Christian Society' in

1850; but became a lecturer upon spiritualism.

He lectured abroad in 1858, and on his return to the United States organized the society of

the ((Brotherhood of the New Life.® This was

established at Wassaic, Dutchess County, N. Y., 1861—67, but removed to Brockton, Chautauqua

County, N. Y., in the last-named year. Its

nature was co-operative rather than communis¬

tic, and farming and industrial occupations

were engaged in by his followers, numbering at one time about 2,000 in the United States and Great Britain, among them Lady Oliphant and her son, the well-known writer, Laurence Oliphant (q.v.). Harris removed to California in 1887, and retired to private life in 1895, re¬ siding in New York city. He published many works in prose and poetry, among which are <Wisdom of Angels) (1856) ; (Arcana of Chris¬ tianity* (1857); (Modern Spiritualism' (1860); <God's Breath in Man' (1891). Consult Allen, (T. L. Harris, The Seer' (1897).

HARRIS, Townsend, American merchant and diplomatist, of Welsh descent and of Rev¬ olutionary stock, the youngest of five children : b. Sandy Hill, N. Y., 4 Oct. 1804; d. New York city, 25 Feb. 1878. . He received his edu¬ cation at the village school and academy. From 1817 to 1848 he was in business in New York city, continuing his self-culture by con¬ tinuous and critical reading of the best litera¬ ture, learning also the French, Spanish and Italian languages; was member of the board of education and in 1846-47 its president. He was the practical founder

of the New York Free

Academy, now the College of the City of New

York, and in many ways was a typically useful citizen. He never married. In 1848 he went

to California and during the following six

years made trading voyages to China and the

Dutch and English Indies, becoming thor¬

oughly acquainted with the manifold Oriental

varieties of human nature. He acted for a time as American vice-consul at Ningpo. He was

appointed consul-general to Japan and on the

United States steamship San Jacinto arrived at

Shimoda, his future dwelling place (and now

noted for its stone quarries), where the flag

of the United States was hoisted 4 Sept.

1856. From the first Mr. Harris spoke the truth as against the constant deceit and prevarication of the corrupt officials of the Yedo Shogunate, demanding the courtesies due to an accredited

envoy of a civilized power and refusing to de¬

liver the President's letter to any one but the Shogun in Yedo and to him personally. Un¬

backed by a single ship or man, and with his secretary only, after prolonged negotiations

lasting 18 months, he made a triumphal progress to Yedo, and standing erect received personal

audience of the Shogun in the palace. Then

began four months' instruction of these polit¬

ical hermits in the methods of modern inter¬

national law and procedure. He concluded the

treaty and received the promise of signature

by the Premier, without regard to anything hap¬

pening in China. Nevertheless the arrival of

Commodore Tatnall with two American men-of-war, bringing news of the humiliation of the Chinese emperor and court, undoubtedly had

its influence on the Japanese. Mr. Harris urged the importance of having the treaty signed

without a moment's delay, and the Premier Ii

dispatched commissioners to affix their signa¬

tures, and soon after an embassy to the United States, for which reason, chiefly, Ii was assas¬

sinated in Yedo, 23 March 1860. The Harris

treaty secured the right of trade, residence and of missionary operations and teachings. He was

buried in Greenwood Cemetery, Brooklyn, N. Y.

One of the important buildings of the College

of the City of New York, the ((Townsend

Harris Hall," is named after him. In Japan,

the name of no foreigner is more highly

honored. In 1918, the cornerstone of a monu¬

ment in his honor was laid at Kanagawa. Mr.

Harris has always been very highly thought of

by the Japanese, and is still the subject of much praise and appreciative writings by Japanese

authors. His journals with comment and biog¬

raphy were published in 1896.

William Elliot Griffis,

Author of (Townsend Harris, First American

Envoy in Japan.y

HARRIS, William Torrey, American edu¬

cator and metaphysician: b. North Killingly,

Conn., 10 Sept. 1835; d. Providence, R. I.,

5 Nov. 1909. He studied at Yale in the class of 1858, and after teaching in the Saint Louis public schools, 1857-67, was superintendent of

the schools of that city 1867-80. While in

Saint Louis he founded in 1867 the Journal of Speculative Philosophy. He removed to Con¬

cord, Mass., in 1880 and aided in founding the Concord School of Philosophy at which he lec¬

tured on metaphysical themes. From 1889 to

1906 he was United States Commissioner of

Education. He has edited Appleton's School

Reader and Appleton's Educational Series and

is the author of (Hegel's Logic: a Critical Ex¬

position' (1890); <The Spiritual Sense of

Dante's Divina Commedia' (1891); Untroduction to the Study of Philosophy' ; Psychologic

Foundations of Education.'

HARRISBURG, Pa., city of the third

class, capital of the State and county-seat of Dauphin County, on the Susquehanna River

and the Northern Central, Pennsylvania, Cum-

berland Valley and Philadelphia and Reading

railroads; siiuated 106 miles northwest of

Philadelphia, has been for many years an im¬

portant railroad, agricultural, industrial and

commercial centre. During the decade from

1902 to 1912 its citizens took up in earnest the matters of municipal improvement. The city's

rapid strides along every line of activity in this matter were phenomenal and its growth into a

model city was so extensive and successful as

to attract general attention throughout the

country.

History. — The site selected for his future

city by the founder, John Harris, was on the

Susquehanna River at a point where the river

is nearly a mile in width and where the two

great trails, the southern and western, inter¬

sected each other as they trended from the

north and east. The county of which Harris¬

burg afterward became the county-seat, Dau¬

phin, adopted its name from the title of the

eldest son of the King of France (for the time being Louis XVI) and the name of the city in some of its earliest records being called Louisburg; France at that time being uppermost in

the affections of the people in consequence of its friendliness and efficient aid rendered to

the colonies in the days of their extremity.

The original town was laid out in 1785 and was incorporated into a borough in 1791. John

Harris, the elder, was an adventurous English

trader who built the first house here in 1726 and secured a grant of 800 acres of land. His son John, the founder of the town, established a

ferry here in 1753 and the place was known for man}ˆ years as Harris' Ferry. The town of Har¬

risburg became the capital of the State in 1812

and was chartered as a city in 1861. The Har¬

risburg Conference, famous in American politi¬

cal history, was held here in 1788 and Harrison and Tyler were nominated here in 1839.

Topography. — High hills and higher moun¬

tain ranges surround the city and the interven¬

ing valleys are made up of rich rolling farm

lands intersected by many streams of varying

width. The Susquehanna river-front is

spanned by four attractive bridges, two for

railroads and two for vehicles and pedestrians.

From various elevated points in the city

glimpses can be had of the magnificent stone

arch bridge of the Pennsylvania Railroad at

Rockville, said to be the longest four-track

stone bridge in the world.

Commerce and Industry. — Harrisburg is a

city of first importance in its iron, steel, lumber and railroad interests, the roundhouses and re¬

pair shops of the Pennsylvania Railroad are lo¬

cated here and give employment to thousands of workmen. There are extensive manufactories

of machinery, malt liquors, boilers, castings,

brooms, cars, coaches, tanned leather, lumber,

cotton goods, beds, mattresses, coffins, silk goods and a number of rolling-mills, tin mills, blast furnaces, nail-works, typewriter works and boot

and shoe factories. The city has one morning

and two evening daily newspapers and many

weekly and monthly publications.

Public Buildings and Activities. — The

State capitol building, erected a few years ago at a cost exceeding $13,000,000, is the chief at¬

traction among the public buildings. The main

capitol building is constructed of steel and

brick with facings of marble and granite. The

style of architecture is composite. It stands

upon an elevation and from whichever direction

approached presents an imposing appearance.

The main entrance to the grounds is from State street, facing due west, and is by way of a

wide stone stairway broadening at the top into an esplanade with fountains at either side. In the centre, overlooking the entrance, stands the equestrian statue, in bronze, of Gen. John F.

Hartranft, facing the Dauphin County soldiers'

monument to the memory of those who fell in

the Civil War. On either side of the main

entrance to the building, the Barnard groups

of statuary complete and harmonize a strong

ensemble. The interior of the building is well worth a visit. The decorations are the produc¬

tion of the highest art and are symbolical of the growth of civilization in America and the

history of Pennsylvania. The State Library

at the capitol. founded in 1790. contains over 100,000 volumes. The park which surrounds

the capitol buildings is being enlarged and sys¬

tematic steps are being taken for its future

improvement. Among other places of interest

in the city are the State arsenal, the courthouse, the Pennsylvania State lunatic hospital, the ex¬

ecutive mansion and the post office. The Penn—

Harris Hotel, the new hotel erected by the

citizens under the auspices of the Chamber of

Commerce, was formally opened 1 Jan. 1919.

The educational institutions include the central high school, the technical high school, the

Harrisburg Academy, Saint Genevieve's Acad¬

emy and a young ladies' seminary. There are

many charitable institutions, among the oldest

of which are the Home for the Friendless and

the Children's Industrial Home, the Harrisburg

and other hospitals. The Chamber of Com¬

merce and Civic Club are virile bodies and in active service.

Transportation. — Harrisburg has long been

the centre of the Pennsylvania, Philadelphia and Reading, Cumberland Valley and Northern Cen¬

tral railroads. It also has in operation one of the most extensive electric street railway sys¬

tems in the United States. The suburban rail¬

way service, both trolley and steam, is excel¬

lent, and has greatly aided in building up this outlying residential section of the city.

Churches. — Harrisburg has had for years

the reputation of being <(a Church-going Com¬

munity.® There are within the limits of the

city 83 churches and permanent church organiza¬

tions. These are divided among 14 regular sec¬

tarian organizations as follows: Presbvterian

11; Methodist Episcopal 11; Lutheran 12; Ban—

tist 8; Roman Catholic 6; Church of God 5;

United Brethren in Christ 5; Protestant Epis¬

copal 4; Reformed 4; Jewish 3; Zion Baptist 3; African Methodist Episcopal 3; United Evan¬

gelical 2; Brethren in Christ, Christian and Mis¬

sionary Alliance, Christian Science, Disciples of Christ, Seventh Day Adventists and Salvation

Army, each 1. Harrisburg is the seat of a

Roman Catholic bishop.

Municipal* Administration. — Under the

act of assembly, approved 27 June 1913, in gov¬

erning cities of the third class in Pennsylvania, the form of the government was changed to

the commission form. The legislative, execu¬

tive and administrative powers are vested in

the city council, composed of the mayor and

four councilmen, elected at large on a non¬

partisan ticket, the mayor for four years and

the councilmen for two years, with no re-

striction as to re-election. All legislative pow¬

ers are exercised by the city council, the mayor, by virtue of his office, being president. The ex¬

ecutive and administrative powers and author¬

ity are distributed into and among the following five departments: Department of public af¬

fairs, department of accounts and finance, de¬

partment of public safety, department of

streets and public improvements, department of

parks and public property.

The city council determines the powers and

duties to be performed and assigns them to the appropriate department. The mayor is desig¬

nated as the superintendent of the department

of public affairs, and the council at its first regular meeting after its election designates by

majority vote one councilman to be superin¬

tendent of each of the remaining departments

and has the power to change such designation

whenever it appears that the public service

would be benefited thereby. The councilman

chosen as the superintendent of the department

of accounts and finance becomes the vice-presi¬

dent of the city council and acting mayor dur¬

ing the absence or inability of the mayor to act, exercising all the rights and powers of the

mayor. The council has the power of appoint¬

ment and dismissal of all the employees and

subordinate officers of the city, as well as the fixing of salaries and terms, except those fixed by the act of assembly and those appointments

regulated by civil service. The following offi¬

cers whose terms are fixed by law are elected by a majority vote of the council: City solici¬

tor, city engineer, city treasurer, city clerk and city assessor. In addition to the above officers, the council has the power to create any office, public board or department which they may

deem necessary for the good government and

interests of the city. The schools are governed by a board of control or directors who are

elected by a vote of the citizens.

Banks and Finance. — Harrisburg has four

national banks and a dozen other banking insti¬

tutions, trust companies and building and loan

associations. The assessed real estate (1918)

is $62,000,000 ; the tax rate is constantly chang¬

ing; the municipal income amounts to $875,000.

The principal items of expense are : Fire de¬

partment, $48,500; water department, $108,500;

street lighting, $68,800; police department, $105,-

700; highway department, $172,200.

Municipal Improvements. — As before

stated, Harrisburg, through the progressiveness

rnd enterprise of her citizens in the decade

from 1902 to 1912, brought about results which won for her the sobriquet of ((Model City.®

These results are best shown by the following

brief survey of the principal of her improve¬

ments as they stand at present, and the most

particularly striking of these are her parks,

briefly described as follows : Total acreage of parks, about 1,000. Paxtang park, 18 acres, an amusement park; Reservoir park, 88 acres, con¬

tains the city reservoir, which gives a lake set¬

ting to the park. The scenic view from the ele¬

vations in this park is the best that can be had from any point ; Capitol park, 16 acres, con¬

tains the State capitol buildings, the equestrian statue of General and Governor John Frederick

Hartranft, and the Mexican monument men¬

tioned elsewhere; Harris park. 4 acres; river

front from Paxton street to Mulberry street;

Lincoln park, 2 acres, river front from Mul¬

berry to Market streets; Promenade park, 3/t

acres, river front from Market to State streets ; D. W. Gross park, 2 acres, river front from

water house to Herr street. These four parks

extend along the banks of the Susquehanna

River for over a mile and are being further ex¬

tended at each end. Island park, 18 acres, site of filter plant, and public playground and ath¬

letic grounds ; 12th street playgrounds, 8 acres, devoted to the use of children; Wildwood park, 666 acres, with large lake, boating in summer

and skating in winter; boulevard or parkway,

146 acres, along streams and through beauti¬

ful ravines and meadows.

Paved Streets. — Total amount of paving,

1 Jan. 1918, 76.93 miles; total length of mac¬

adamized highways, 1 Jan. 1918, 9.06 miles;

total length of earth and gravel highways, 1

Jan. 1918, 43.70 miles. It will be understood

that this satisfactory result in the matter of street paving received its impetus from the

movement in 1902. The city has more than 90

miles of sewers.

Population. — The population of Harrisburg

under the census of (1910) was 64,186. The

1920 census showed a population of 75,917.

Consult Morgan, (Annals of Harrisburg, }

revised by F. M. Black (1906).

Benjamin M. Nead,

President of the Historical Society of Dauphin

County; and Member of the Harrisburg

Chamber of Commerce.

HARRISBURG CONVENTION, a meet¬

ing called by the anti-Federalists of Pennsyl¬

vania to be held at Harrisburg, Pa., on 3 Sept.

1788 for the purpose of deliberating regarding

the new Federal Constitution. Although the

meeting was well attended and adopted resolu¬

tions carrying 12 amendments to the Federal

Constitution, to be presented for action to the Pennsylvania legislature in form of a petition, it was abortive inasmuch as even this petition was never formally presented. Another meet¬

ing, known by the same name, was the assembly convened in 1828 at Harrisburg, Pa., by the pro¬

tectionist faction of the New England and Mid¬

dle States, consequent on the rejection of the high tariff ((Woolen

Bill® in the Senate, by the casting vote of the Vice-President. The forci¬

ble presentation of the cause of protection, and the demand of the convention for an increased

duty on several manufactured articles, resulted

in the passage of the high tariff bill of 1828.

Consult Ford, P. L., (The Origin, Purpose

and Result of the Harrisburg Convention of

1788> (Brooklyn 1890).

HARRISON, Benjamin, American states¬

man : b. Berkeley, Va., about 1740; d. April 1791.

While a very young man he was elected to the house of burgesses of which he was twice

speaker, and in 1773 was chosen a member of

the committee which united the colonies against Great Britain. He was a member of the Con¬

tinental Congress, 1774-77, being a member of

many important committees, especially in con¬

nection with the conduct of the War of the

Revolution, and on 4 July 1776, reported, as

chairman. of the committee of the whole House,

the Declaration of Independence, of which he

was one of the signers. He was opposed to

the ratification of the Federal Constitution, but after its adoption supported the national gov¬

ernment. Upon his return to Virginia he was

immediately reelected to the house of burgesses and served as its speaker until 1782. From

1872-85 he was governor of Virginia. His

brother, Charles, was a noted general in the

American army during the Revolution, his son,

William Henry Harrison (q.v.), became ninth

President of the United States, and his great-grandson and namesake, Benjamin Harrison

(q.v.), 23d President of the United States.

Consult Lossing, B. J., (Biographical Sketches

of the Signers of the Declaration of American

Independence, etcP (New York 1854) ; Sander¬

son, J., (Biography of the Signers of the Dec¬

laration of Indcpendence) (revised ed., Phila¬

delphia 1865) ; Spark, J., ed., (The Diplomatic Correspondence of the American Revolution,

etcP (12 vols., Boston 1829-30) ; United States Continental Congress, (Journals of the Con¬

tinental Congress, 1774-77* (W. C. Ford, ed.,

Vols. I-IX, Washington 1904-07).

HARRISON, Benjamin, 23d President of

the United States: b. North Bend, Ohio, 20

Aug. 1833; d. Indianapolis, Ind., 13 March 1901.

He was a great-grandson of Benjamin Harrison,

signer of the Declaration of Independence (q.v.), and grandson of William Henry Harrison, ninth

President (q.v.). He was graduated from

Miami University (Oxford, Ohio) in 1852,

studied law in Cincinnati, was admitted to the bar in 1853 and in 1854 began in Indianapolis the practise of his profession. In 1860 he was elected reporter of the Supreme Court of the

State. At the time of his election to the

Presidency (1888) he was one of the foremost

leaders of the State bar. At the outbreak of

the Civil War he assisted in recruiting the 70th regiment of Indiana Volunteers, of which he

became colonel (August 1862). He was an

exceedingly efficient commander. For some

time he was detailed to guard railways in the West; and in the campaign from Chattanooga

to Atlanta the regiment was in the 20th Army

corps, the commander of which was Gen.

Joseph Hooker. Harrison commanded a bri¬

gade at Peach Tree Creek, where he served

with especial distinction, and also at Nashville.

He was present at Johnston's surrender at Dur¬

ham Station, N. C., in 1865, was brevetted brig¬

adier-general for his services in command of the brigade, and in June of that year was mustered out. The Supreme Court of Indiana had de¬

clared that Harrison by his enlistment vacated

his office of reporter, and a Democrat was

elected by default to fill that office for the un¬

expired term. At the election of 1864 Harrison, while still in the field, was rechosen. In 1867

he refused a renomination, and recommenced

his legal practice, in which he was largely

retained in both the Federal and State courts.

In 1876 he became, on the retirement of the

original candidate, the Republican candidate for the governorship, and though he ran about

2,000 votes ahead of his ticket, he was defeated by a Democratic plurality of 3,000. He was

appointed a member of the Mississippi River

commission in 1879, and in 1880 was chairman

of the Indiana delegation in the Republican

National Convention. At that convention, where

he cast nearly the entire vote of the-State for Garfield, he was himself mentioned in connec¬

tion with the Presidency. From 1881 to 1887

he was in the United States Senate, in which

he took rank as a prominent debater. He op¬

posed Cleveland's vetoes of the pension bills.

urged increase in the navy and civil-service re¬

form, and as chairman of the Committee on Ter¬

ritories demanded the admission as States of

North and South Dakota, Montana, Washing¬

ton and Idaho. In 1884 he was a delegate to

the Republican National Convention. At the

convention of 1888 (Chicago, Ill.) he was pre¬

sented by the solid Indiana delegation as a can¬

didate for the nomination to the Presidency;

and on the eighth ballot he received the nom¬

ination by a vote of 544. The campaign was a vigorous one, and Harrison made many excel¬

lent speeches. He was elected, receiving in the electoral college 233 ballots to 168 for Grover Cleveland. His administration was broadly

characterized by a firm defense of American

interests in foreign affairs and a general pro¬

motion of industry and governmental effective¬

ness. During this time the 55th Congress

passed the tariff act known as the McKinley

Law ; the reciprocity system was introduced ; the new navy was extended ; civil-service reform

was promoted; and the Pan-American Congress

with representatives from all Central and South American countries was held at Washington in

the winter of 1889-90. The Bering Sea arbi¬

tration respecting the seal fisheries was also or¬

ganized between Great Britain and the United

States. The Samoan difficulties were adjusted;

and the Chile affair, concerned with an attack on American sailors either connived at or per¬

mitted by Chilean authorities, was promptly and satisfactorily settled by enforced reparation on the part of Chile. At the Minneapolis conven¬

tion of 1892 Harrison was renominated without

serious opposition. He was a second time op¬

posed by Cleveland, and his defeat by 276 elec¬

toral votes to 145 was an occasion for some

surprise. Upon his retirement from office, he

returned to the practice of law, and in 1893-94

delivered a course of lectures on constitutional law at Stanford University. In 1899 he ap¬

peared as counsel for Venezuela in the Anglo—

Venezuelan Boundary Arbitration Commission.

He was appointed a member for the United

States of the Peace Conference held at The

Hague in 1899, and became one of the Interna¬

tional Board of Arbitration. He wrote (This

Country of Ours* (1897). A complete collec¬

tion of his public addresses from 1888 to 1892

was edited by Hedges (1892). A posthumous

collection of articles, (Views of an Ex-Presi¬

dent, * was published in 1901. Consult the

campaign life by Lew Wallace (1888), and Wil¬

son (editor), (The Presidents of the United

States * (1894).

George Edwin Rines.

HARRISON, Burton Norville, American

lawyer: b. New Orleans, 1836; d. Washington,

D. C., 29 March 1904. He was graduated from

Yale in 1859, shortly afterward became profes¬

sor of mathematics and astronomy in the Uni¬

versity of Mississippi, and at the outbreak of the Civil War was appointed private secretary

to Jefferson Davis, President of the Confederate States. Captured with Davis, he remained in

imprisonment until January 1866, when his re¬

lease was effected by the intervention of F. P.

Blair and President Johnson. Subsequent to

the war he followed the law in the North with much success.

HARRISON, Mrs. Burton. See Harri¬

son, Constance Cary.

BENJAMIN HARRISON

Twenty-third President of the United States

WILLIAM HENRY HARRISON

Ninth President of the United States

HARRISON, Carter Henry, American

politician : b. Elk Hill, Fayette County, Ky.,

15 Feb. 1825 ; assassinated, Chicago, 28 Oct. 1893.

He was graduated from Yale in 1845, from the

Transylvania University Law School (Lexing¬

ton* *n 1ˆ55, and in the latter year was also admitted to the bar and removed to Chicago.

There he invested in real estate, in 1869 was defeated as a candidate for State senator on

the Democratic ticket, but in 1871 was elected county commissioner of Cook County, and in

1874 was sent to Congress from the second Illi¬

nois district, and in 1876 reelected. In 1879

he was elected mayor of Chicago, and again

in 1881, 1883, 1885 and 1893. He was also an unsuccessful independent candidate in 1891. In

1891 he purchased the Chicago Times, in the

direction of which he was active until his elec¬

tion as mayor in 1893. In several instances his mayoralty contests assumed national interest,

particularly so that of 1893 — the “World’s Fair year® — when the success of the great exposition was thought to depend much upon the occupant

of the mayor’s chair. He was opposed by the

united Citizens’ and Republican forces and by

nearly the entire press of Chicago, but after

a vigorous campaign of public meetings was

elected by more than 21,000 majority. He wrote (A Race with the Sun) ; and ‘A Summer

Outing.)

HARRISON, Carter Henry, American

politician : b. Chicago, 23 April 1860. He is

son of the preceding. He graduated from Saint

Ignatius College. Chicago, in 1881, and from

the Yale Law School in 1884. He practised

law in Chicago, was later engaged in the real estate business, and in 1891 became editor of

the Chicago Times, a position which he held

for two years. He has been active in Chicago

politics as a Democrat, and has been five times elected mavor of the city, in 1897, 1899, 1901, 1903 and 1905.

HARRISON, Constance Cary, American

novelist and miscellaneous writer : b. Vaucluse, Va., 25 April 1846. She was married in 1867

to Burton N. Harrison (q.v.) and has since

lived in New York. She is one of the most

popular of American authors and among her

published books are (Woman's Handiwork in

Modern Homes' (1881); (Old-Fashioned Fairy -

Book> (1884); (Bar Harbor Days) (1887);

(The Anglomaniacs) (1887) ; (Sweet Bells Out

of Tune) (1893) ; (An Errant \Yooing> (1895) ; (A Bachelor Maid' (1894) ; (A Son of the Old Dominion) (1897) ; 'A Merry Maid of Arcady'

(1897); (Good Americans) (1898); 'A Prin¬

cess of the Hills > (1901) ; a play, 'The Unwel¬

come Mrs. Hatch' (1901); transplanted

Daughters) (1909) ; Recollections, Grave and

Gay' (1911).

HARRISON, Frederic, English philoso¬

pher and historian: b. London, 18 Oct. 1831.

He was educated at Oxford, and was called

to the bar at Lincoln's Inn in 1858. From 1877—89 he was professor of jurisprudence and in¬

ternational law at the Inns of Court. He is

the chief living exponent in England of Posi¬

tivism, and was president of the English Posi¬

tivist Committee, 1880-1905. He is a master of English style, and his literary judgments com¬

mand the fullest respect despite the fact that he has written on a wide range of subjects.

Among his publications are (The Meaning of

History) (1862); (Social Statics) (1875); ‘The

Present and the Future) (1880) ; ‘The Choice

of Books’ (1886) ; (Oliver Cromwell ’ (1886) ; ‘Memories and Thoughts’ (1906); (The Creed

of a Layman’ (1907) ; (My Alpine Jubilee’

(1908); ‘Autobiographic Memoirs’ (1911);

‘Among My Books’ (1912) ; ‘The Positive

Evolution of Religion’ (1912) ; (The German

Peril’ (1915).

HARRISON, Gabriel, American author

and artist : b. Philadelphia, 25 March 1825 ; d.

Brooklyn, N. Y., 15 Dec. 1902. He began life

as a photographer and an actor and in 1845

supported Charles Keane at the Park Theatre,

New York, and later taught elocution and wrote dramatic and art criticism. He opened the

Park Theatre in Brooklyn in 1863. Among

his works are ‘Life of John Howard Payne’

(1873) ; dramatization of (The Scarlet Letter’

(1878), *etc.* Much of his leisure was given to art, and he was an amateur painter of no mean ability. He did much to assist the progress of the free art schools in Brooklyn.

HARRISON, James Albert, American

philologist : b. Pass Christian, Miss., 21 Aug.

1848; d. 1911. He was graduated at the Uni¬

versity of Pennsylvania in 1868; and has since been professor of Latin and modern languages

at Randolph-Macon College, Va., 1871-76; of

English and modern languages at Washington

and Lee University 1876-95, and of English and romance languages at the University of Vir¬

ginia. He was a prominent member of the

American Philological Association and the

founder and editor of the 'Library of Anglo-Saxon Poetry'.' Among his works are 'Group

of Poets and Their Haunts' (1881) ; 'Story

of Greece' (1885) ; 'Dictionary of Anglo-Saxon Poetry0 with Baskerville (1886), *etc.*

He was on the editorial staff of both the Cen¬

tury and Standard Dictionaries.

HARRISON, Joseph, American engineer:

b. Philadelphia, 20 Sept. 1810; d. there, 27

March 1874. In 1834 he began the construc¬

tion of locomotives, and in 1840 designed for

the Reading Railway' an engine which was

copied and introduced into Russia with such

success that he was invited to Russia, and

there with two other American engineers con¬

cluded a contract with the Russian government

to build the rolling-stock and locomotives of

the Saint Petersburg and Moscow Railway*. He

executed also other important contracts with

that government, and in 1852 returned to the

United States, where he subsequentlyr patented

a safety-boiler and received both the gold and silver Rumford medals from the American

Academy of Arts and Sciences. In 1869 he

published a folio containing his autobiography,

incidents of his Russian experience and his

poem, 'The Ironworker and King Solomon.'

Another valuable work from his pen is 'The

Locomotive Engine' (1872).

HARRISON, Lovell Berge, American ar¬

tist : b. Philadelphia, 28 Oct. 1854. He studied with Alexander Cabanel in Paris, became

known for his landscapes, especially; snow—

scenes, and obtained medals at the Paris Salon of 1887 and the Columbian Exposition (1893).

His works include 'Friends, or Foes?'; 'A

Waif from the Sea' ; Calling Home the

Cows' ; and 'November,' purchased by the

French government for the Marseilles Mu¬

seum; (The Flatiron Building in a Blizzardˆ

(Fifth Avenue at Twilights

HARRISON, Mary St. Leger (((Lucas

Malet"), English novelist: b. Eversley, Hamp¬

shire. She is a daughter of Charles Kingsley

(q.v.), and was married to Rev. William Har¬

rison, rector of Clovelly, who died in 1897. She inherits the talent of the Kingsleys and her

novels published under the pseudonym of

(<Lucas Malet" have been as widely popular in

America as they are in England. They are

marked by vigorous characterization and skil¬

ful construction, and include (Colonel Ender—

by's Wife> (1885) ; (The Wages of Sin,* a

notably strong tale (1891) ; (The Carissitna)

(1896) ; (The Gateless Barrier) (1900) ; (Sir

Richard Calmady) (1901) ; <The Far Horizon)

(1906) ; (The Golden Galleon* (1910) ;

(Adrian Savage* (1911) ; (Wisdom of Da—

maris) (1915).

HARRISON, Thomas Alexander, Amer¬

ican painter: b. Philadelphia, 17 Jan. 1853. He is a brother of Lovell Berge Harrison, and

studied painting under Gerome in the ficole

des Beaux Arts at Paris, and first exhibited in the Salon of 1881. He was awarded the gold

medal by the Pennsylvania Academy of Fine

Arts in 1894 and elected an associate of the

National Academy in 1898. His best-known

works are (Coast of BrittamB ; (Little Slave*,; (The SeaShored He has exhibited in many

of the finest galleries and collections of both hemispheres.

HARRISON, Thomas Skelton, American

diplomat and manufacturer: b. Philadelphia, 19

Sept. 1837 ; d. 3 May 1919. He was educated at the Classical Academy of John W. Faries, and

at business colleges. He was acting paymaster

of the United States navy from 1861 to 1864,

and member of the firm of Harrison Bros, and

Company from 1864 to 1897. In the latter

year he was appointed diplomatic agent and

consul-general to Egypt. He has been promi¬

nent in political reform movements in Phila¬

delphia, and was member of the Committee of

100. He is member of many historical and

antiquarian societies ; was twice decorated by

Khedive of Egypt, last time with grand cordon

of the Imperial Order of Medjidia.

HARRISON, William Henry, 9th Presi¬

dent of the United States: b. Berkeley, Charles County, Va., 9 Feb. 1773; d. Washington, D. C., 4 April 1841. He studied at Hampden and

S'dney College, later pursued a course in med¬

icine, and was about to be graduated as a prac¬

titioner, when the sudden death of his father

gave him the liberty to disengage himself from a profession for which he had no natural bent nor aptitude. He received from Washington

a commission in the army, and was soon on his way to Cincinnati, making the journey from

Philadelphia to Pittsburgh on foot, to join the regiment to which he had been assigned. He

arrived at Fort Washington just after the de¬

feat of General St. Clair's army. His first

military service was to command a company of

20 men as an escort for a train of pack-horses to Fort Hamilton, a military post on the west bank of the Big Miami River from which the

seat of Butler County was named. In 1793 he

joined the new legion under Gen. Anthony

Wayne who made him an aide-de-camp, and in

December of that year he took part in the

expedition which repossessed General St. Clair's field of battle, and erected thereon Fort Re¬

covery. He participated in all the engagements

with the Indians and their British allies during this campaign, and displayed conspicuous gal¬

lantry at the battle of Fallen Timbers. Shortly after the close of this campaign Harrison was

advanced to the rank of captain and placed in command of Fort Washington. The position

was largely a confidential one. The conduct

of the Spaniards on the Mississippi was exas¬

perating. French citizens and agents were en¬

gaged in exciting the people of Kentucky into a war with the Spanish of Louisiana with the

object of embroiling our government with

Spain and of forcing it into a league with

France. Captain Harrison was instructed to

prevent the passage down the river of boats

laden with military stores belonging to the

French agents. The English posts on the

northern frontier, which had been held so long in violation of good faith, were now evacuated by t'he English in obedience to the Jay Treaty of 1794; the new garrison and supplies were

sent to Fort Washington and forwarded thence

through the wilderness under the supervision

of the commandant of that post. In the spring of 1798 Harrison resigned his commission in

the army and settled on a tract of land at

North Bend about 16 miles from Cincinnati,

but was immediately appointed by President

John Adams as secretary of the Northwest

Territory under Gen. Arthur St. Clair as gov¬

ernor. A year later he resigned this position

to take his seat in Congress as the first dele¬

gate from the Territory. Up to this time the

public lands had been sold in such vast tracts that none but men of wealth could buy them.

Harrison secured the division of the land into small tracts and made it possible for the poor man to obtain a homestead. During that ses¬

sion of Congress a part of the Northwest Ter¬

ritory was formed into the Territory of In¬

diana. It included the present States of In¬

diana, Illinois, Michigan, Wisconsin and a part of Minnesota, and contained a civilized popu¬

lation of nearly 5,000 souls. Harrison was

appointed its first governor by President

Adams, and so satisfactory was his adminis¬

tration that he was successively reappointed by President Jefferson and President Madison. He

was also made superintendent of Indian affairs.

Governor Harrison organized the new govern¬

ment at Vincennes. Many difficult questions

demanded his attention, but the most difficult

and delicate was the restless and finally hostile attitude of the savages under the leadership

of Tecumseh, and the preaching of Tecumseh's

brother, ((the Prophet." The beginning of open

warfare by the Indians was averted many

times by his calmness and courage. He made

in all 13 treaties with the Indians, and se¬

cured the cession from several tribes of more

than 3,000,000 acres of land on the Wabash

and White rivers. Tecumseh condemned these

treaties on the ground that the land belonged to all of the Indians, and that a single tribe could not give a legal title without the consent of every other tribe. Harrison invited Tecumseh

to Vincennes for a conference, and directed

that he should bring with him not more than

30 warriors; but he came with 400 completely

armed. There were many evidences that

treachery was intended, and but for the con¬

ciliatory methods of the governor, the coun¬

cil would have terminated in bloodshed.

Nothing was accomplished by this interview,

nor by a second in the following summer.

Meanwhile, frequent depredations by the In¬

dians made it evident that conciliatory meas¬

ures could no longer be employed, and on 26

Sept. 1811, Harrison set out with 900 men to

punish them. On 6 November, when the army

was within a short distance of Tippecanoe, it

was met by messengers demanding a parley.

A council was agreed upon for the next day,

but at 4 o'clock on the following morning, the treacherous savages fiercely attacked the camp

of Harrison in an endeavor to take it by sur¬

prise. The fighting continued till daylight when the Indians were routed with great loss. In

the War of 1812 Harrison was appointed to

the chief command of the Northwest, and given

a major-general's commission. He urged upon

the - government the importance of creating a

navy on the Lakes. That advice was heeded,

and the splendid achievement of Commodore Perry on 10 Sept. 1813 was made possible by the military sagacity of this accomplished soldier. Six days after Perry's victory General Harrison embarked his artillery and supplies for a descent on Canada. The British general, Proctor, burned the fort and navy—yard at Malden and retreated, closely pursued by Harrison who overtook him and his Indian allies led by Tecumseh near the river Thames. Within five minutes almost the whole British force was captured, and shortly afterward the Indians were completely routed, and their leader, Tecumseh, was slain. The battle of the' Thames and Perry's victory ended the war in Upper Canada, and gave the United States undisputed possession of the Great Lakes, excepting Lake Ontario.

The years between the War of 1812 and the presidential campaign of 1840 Harrison devoted in part to the service of his country and in part to the life of a country gentleman. He was in turn a member of Congress, State senator in the general assembly of Ohio, presidential elector, United States senator from

Ohio and Minister to the United States of

Colombia. In 1829 he retired to his farm at

North Bend. In December 1839 he was nom¬

inated by the National Whig convention for

the Presidency of the United States, with John Tyler of Virginia for Vice-President. The cam¬

paign which followed was one of the most

exciting in the history of the country. Political mass meetings and processions were introduced

for the first time, and party watchwords and

emblems were employed with telling effect.

That canvass has commonly been called the

((log cabin and hard cider campaign.® The east¬

ern end of General Harrison's house at North

Bend consisted of a log cabin covered with

clapboards, and his table was reputed to be

well supplied with good cider, instead of wines.

Log cabins and hard cider thus became party

emblems typifying republican simplicity.

((Tippecanoe and Tyler too® was shouted and

sung and emblazoned from one end of the

country to the other. Nothing could stem the

tide of wonderful popular enthusiasm for the

hero of Tippecanoe and the Thames. Van

Buren, the Democratic candidate, received only

60 electoral votes out of 294. The death of the President occurred only 31 days after his inau¬

guration. Consult Bostwick in Wilson's Presi¬

dents of the United States) (1894) ; Wiley, E., and Rines, I. E., (The United States) (New

York 1916).

George Edwin Rines.

HARRISON, Ark., town, county-seat of

Boone County, on the Saint Louis & N. A.

Railroad, about 120 miles northwest of Little

Rock. It is in the lead and zinc section, and its industries are chiefly connected with mining.

Considerable fruit is grown in the vicinity, and it has flour-milling and dairy interests. It is the seat of a collegiate and normal institute

for women. The United States government

building cost about $80,000. Pop. (1920) 3,477.

HARRISON, N. J., city in Hudson

County, on the Passaic River, the Pennsylvania

and the Erie railroads. It is a suburb of New¬

ark, and a substation of the Newark postoffice, but has an independent municipal government.

It was settled in 1668 and incorporated in 1873.

The charter of 1873 is still in force, and by it the government is vested

in a common council

elected by wards. The chief manufactures are

wire-cloth, marine-engines, steel, machinery,

tubes, refrigerators, ink, cutlery and leather. The water-plant is owned and operated by the city.

Pop. (1920) 15,721.

HARRISON, Ohio, village in the town¬

ship of Harrison, Hamilton County, on the

boundary between Ohio and Indiana, and on

the Cleveland, C., C. & Saint L. Railroad, 23

miles by rail west-northwest of Cincinnati.

The village situated on the north bank of the Whitewater River, a tributary of the Great

Miami, in a fertile farming section, has manu¬

factures of furniture, sashes, blinds, brushes,

bricks, shoes, a corn-drill factory, a cannery

and lumber, flour and roller mills. Its public buildings include a high school and six

churches. Pop. 1,368.

HARRISONBURG, Va., town, county-seat of Rockingham County, on the Chesa¬

peake & W., the Southern and the Baltimore

& Ohio railroads, about 100 miles northwest

of Richmond. It is in the Shenandoah Valley,

and is surrounded by a rich agricultural coun¬
try. Its chief manufactures are flour, staves,
saw and planing mill products, foundry and
machine shop products and pottery. It is the
trade centre for the greater part of the county.
The town owns and operates the waterworks
and electric-lighting systems. Pop. (1920) 5,875.

PIARRISONBURG, Engagement Near.
Harrisonburg, Va., on the Great Valley Turn¬
pike, 22 miles north of Staunton, and 122
miles northwest of Richmond, was the scene
of many stirring events in the Civil War. The place was occupied by General Banks late in
April 1862, and abandoned when Jackson forced
Banks down the valley in May. When Jackson
in turn was forced up the valley by the com¬
bined armies of McDowell and Fremont, he
abandoned the main valley, moving from Har¬
risonburg to Cross Keys and Port Republic,
his rear-guard, two regiments of Virginia cav¬
alry, under Gen. Turner Ashby, hhlting about
two miles southeast of Harrisonburg. On 6

June 1862 Colonel Wyndham, with the First

New Jersey Cavalry and a battalion of the

Fourth New York, moving from Harrisonburg,

attacked Ashby and was defeated and followed

to within one mile of the town, with the loss of several men killed and wounded, and about

60 taken prisoners, including Wyndham him¬

self. General Bayard then pushed forward

with cavalry and infantry and Ashby fell back

and called for infantry support. Jackson sent

him Stuart's brigade — First Maryland, Forty—

fourth, Fifty-second and Fifty-eighth Virginia.

A few miles beyond Harrisonburg Bayard at¬

tacked with the Pennsylvania <(Bucktails>5

under command of Lieut.-Col. T. L. Kane, and

in the engagement Ashby was killed, and Kane

was wounded and captured. While this was

happening on the right, the Sixteenth Ohio In¬

fantry and First Pennsylvania Cavalry, on the

left, drove in the Confederate skirmish-line,

without loss on either side. As soon as the

wounded could be removed the Confederates

fell back in the direction of Port Republic, and the Union forces retired to Harrisonburg. The

Union loss in the engagement was 65 killed,

wounded and missing. The Confederate loss,

including Ashby, was 18 killed, 50 wounded

and 3 missing. Consult (Official Records)

(Vol. XII).

E. A. Carman.

HARRISONVILLE, Mo., city, county-seat

of Cass County, on the Missouri, K. & T.,

and the Missouri P. railroads, about 30 miles

southeast of Kansas City. It is situated in an agricultural and stock-raising region and the

trade and manufactures are connected chiefly

with the products of the surrounding farms.

The shipping consists mostly of grain, live¬

stock, lumber and dairy products. The electric¬

lighting plant is municipally owned. Pop. 2,073.

HARRISSE, har-es', Henri, American

critic, bibliographer and historian: b. Paris,

1830, of Russian-Hebrew parentage; d. 1910.

He became a citizen of the United States, and for several years practised law in New York.

He has published (Bibliotheca Americana

Vetustissima,5 embracing works published

1492-1551 (1866) ; (Christopher Columbus 5

(1884-85) ; Holm and Sebastian Cabot) (1883) ; (The Discovery of North America5 ; (The

Cortes ReaP (1883); (Discoveryof Newfoundland) (1900). Consult (Life> by Cordier

(1912).

HARRODSBURG, Ky., city, county-seat

of Mercer County, on a branch of the South¬

ern Railroad, about 45 miles southwest of Lex¬

ington and 58 miles southeast of Louisville.

It is the oldest permanent settlement in the

State, and was founded by James Harrod in

1774. Two years later Kentucky was incor¬

porated as one of the counties of Virginia and Harrodsburg was made the county-seat. Stock-raising and farming are the principal occupa¬

tions in the surrounding country. It has flour and planing mills, a distillery, brickyard and

ice factory. The climate, scenery and the

Greenville Springs nearby make it a pleasure

and health resort. It is the seat of Beaumont College, an institution for women, opened in

1894. It is governed by a commission ; water

and lighting services are municipally owned.

Pop. 3,765.

HARROW SCHOOL, England, an aca¬

demic institution situated at Harrow-on-the—

Hill, a town of Middlesex, 12 miles northwest

of London. It is one of the famous public

schools of England and was founded by John

Lyon in 1571. The original red brick schoolhouse, now the Fourth Form School, was built

1608-15. New buildings were added in 1819

and since, the chief of these being the Vaughan Memorial Library (1863), and the semicircular

speech-room (1877). The school was primarily

intended to afford free education to 30 poor

boys of the parish ; but provision was also made for the admission of <(so many foreigners as

the place can conveniently contain.® The age

of admission is 12 to 14; and there are six

entrance scholarships of from $150 to $400 per annum, offered every Easter. The most valu¬

able learning scholarships are Baring's three

of $500 » year for five years to Hertford Col¬

lege, Oxford. Among the distinguished alumni

of Harrow are Dr. Parr, Theodore Hook,

Sheridan, Byron, Palmerston, Anthony Trol¬

lope and Cardinal Manning. Under the Public

Schools Act of 1868 the governing body com¬

prises six members, elected respectively by the Lord Chancellor, the universities of Oxford,

Cambridge and London, the Royal Society and

the undermasters.

HART, Albert Bushnell, American edu¬

cator and historian: b. Clarksville, Pa., 1 July 1854. He was graduated at Harvard in 1880,

subsequently becoming professor of history and

then of government there. He was joint ed¬

itor of the Harvard Graduates' Magazine, 1894—

1902; of the American Historical Review,

1895-1909. He was president of the American

Historical Association in 1909, and of the

American Political Science Association in 1912.

He has written (Introduction to the Study of

Federal Government5 (1890) ; (Epoch Maps)

(1891) ; (Formation of the Union) (1892) ;

Practical Essays on American Government5

(1893) pStudies in American Education 5 (1895) ; (Guide to the Study of American History,5

with Edward Channing (1897) ; (Salmon Port¬

land Chase) (1899) ; foundations of Ameri¬

can Foreign Policy 5 (1901) ; (Actual Govern¬

ment (1903) ; (Essentials of American History) (1905) ; (Slavery and

Abolition) (1906) ; (National Ideals Historically Traced) (1907) ;

(Southern South5 (1911) ; (War in Europe5

(1914) ; (Monroe Doctrine5 (1915) ; Na¬

tional Progress5 (1917) ; (School History of

the United States5 (1918). He has edited

(Epochs of American History5 (3 vols., 1891—

96) ; (American History Told by Contempo¬

raries5 (4 vols., 1898-1901), *etc.* He was ap¬

pointed exchange professor of Harvard with

the University of Berlin in 1915.

HART, Ernest A., English physician and

editor: b. London, 26 June 1835; d. London, 7

Jan. 1898. He chose medicine as his profes¬

sion, and made the diseases of the eye his

speciality with much success. He found time

to coedit the Lancet (1858), and to edit the

British Medical Journal (1866). Surgeon at

the West London and later at Saint Mary's

Hospital, he became dean at the medical school attached to the latter and wrote numerous

valuable papers, society and hospital reports.

In the field of sanitary legislation, his influence was very helpful; he originated many plans to

reform public evils, being associated with vari¬

ous movements for 30 years to promote the

national health. He was severe in his exposure of medical shams and was editing a series of

biographies (Masters of Medicine) on his death.

He wrote (The Mosaic Code5 (1877), an ex¬

position of its sanitation laws.

HART, James McDougal, American

painter: b. Kilmarnock, Scotland, 10 May

1828; d. 1901. He came to the United States

in 1831, and studied art under his brother

William (q.v.), and at Diisseldorf in the studio of Schirmer (1851). He was elected a mem¬

ber of the National Academy in T859, and de¬

voted himself principally to American forest

scenery with a preference for autumnal effects.

His (Landscape with Cattle> is in the New

York Metropolitan Museum, and his best-known pictures are vOn the Croton) ; (Morning

in the Adirondacks> and (Oaks in Autumn. >

HART, James Morgan, American philol¬

ogist: b. Princeton, N. J., 2 Nov. 1839; d. 18

April 1916. He was graduated from Prince¬

ton in 1860, studied in Gottingen and took

the degree of A.M. from Princeton in 1863.

He was professor of modern languages

at Cornell (1868-72) ; professor of modern

languages and English literature in the Univer¬

sity of Cincinnati (1876-90) ; returning to Cor¬

nell as professor of English in 1890. He re¬

tired as professor emeritus in 1907. He

wrote (German Universities) (1874) ; Sylla¬

bus of Anglo-Saxon Literature) (18/8) ;

(Handbook of English Composition (1895) ;

(Essentials of Prose Composition (1902) ;

Standard English Speech in Outline) (1907);

has revised and edited his father's (Manual of Composition and Rhetoric) (1897) ; and has

edited four volumes of German Classics- —

(Herman and Dorothea5 (1875) ; ˆiccolomini5

(1875) ; (Prose Selections5 from Goethe

(1876) ; (Faust Part I5 (1878) ; De Quincey's, (The English Mail Coach,5 (Joan of Arc5

(1893) ; also a translation of Franz Dingel—

stedt's novel (The Amazon5 (1868) ; and (Cave

on Colour,5 from the French.

HART, Joel T., American sculptor : b.

Clarke County, Ky., about 1810; d. Florence,

Italy, 2 March 1877. He was of humble parent¬

age, and in 1830 entered a stonecutter's estab¬

lishment in Lexington. He was induced to at¬

tempt modeling busts in clay, and among others, General Jackson and Cassius M. Clay (q.v.)

sat to him, the latter giving him his first com¬

mission for a bust in marble. This when com¬

pleted proved so satisfactory that Hart was

commissioned to execute a marble statue of

Henry Clay. He began this, but various de¬

lays prevented its completion, and it was not set up in Richmond, Va., till 1859. Other im¬

portant works by Hart are (Woman Triumph¬

ant5 in the courthouse, Louisville, Ky., and (I1

Penseroso.5 He was particularly well known

for his portrait busts.

HART, John, American patriot : b. Hope—

well, N. J. ; d. there, at an advanced age, 1780.

Frequently elected to the colonial assembly he

was prominent especially in the legislation for local improvements. In 1774 he was chosen to

the general Congress at Philadelphia, where he

was noted for his sound judgment and inflexible determination ; was reelected in the two fol¬

lowing years, and was one of the signers of

the Declaration of Independence. New Jersey

was soon invaded by the British army, his es¬

tate devastated and special exertions were

made to take him prisoner. The capture of the Hessians by Washington permitted his return

home.

HART, Sir Robert, inspector-general of

the Chinese imperial customs : b. Millburn,

County Armagh, Ireland, 1835; d. 21 Sept. 1911 ; He was educated at Taunton Wesleyan School,

and graduated at Queen's College, Belfast. He

entered the British consular service in China in 1854, was appointed inspector-general of cus¬

toms in 1863, making only three visits to

Europe between that date and 1902. During

the Boxer outbreak in 1900, he underwent the

siege in the British legation at Peking. His

prolonged residence in China enabled him to

look at things from . the Chinese standpoint,

which he embodied in his remarkable work,

(These From the Land of Sinim5 (1901). In

1906 the action of the Chinese government in making appointments which would have placed him in a subordinate position was followed by his resignation. Honors were from time to time bestowed upon him by both the Chinese and the British governments. He possessed in a singular degree the confidence of the Chinese authorities, his high integrity making him an ideal administrator.

HART, Samuel, American Episcopal clergy¬ man: b. Saybrook, Conn., 4 June 1845; d. 25 Feb. 1917. He was graduated from Trinity Col¬ lege in 1866, and was ordained priest of the Episcopal Church in 1870. He was at Trinity College as assistant professor of mathematics (1870-73), professor of mathematics (1873-83) and professor of Latin (1883-99). In 1899 he became vice-dean and professor of doctrinal theology and liturgies at Berkeley Divinity School; and in 1908 he was elected dean. In 1874 he was appointed registrar of the diocese of Connecticut, in 1886 custodian of the Standard Prayer Book of the Episcopal Church of the United States, in 1892 secretary of the House of Bishops and in 1896 historiographer of the

Church. He was president of the Connecticut

Historical Society and a member of several

other learned societies, including the American

Antiquarian Society, the American Oriental

Society and the Society of Biblical Literature

and Exegesis. He was editor of (Satires of

Juvenal,5 ’ (Satires of Persius5 and Bishop Sea-bury’s (Communion Office,5 and author of a

volume on the American Prayer Book, of

<Faith and the Faith5 (Bohlen Lectures 1914),

and of (The Witness of the Church5 (Paddoch

Lectures 1916).

HART, Thomas Norton, American mer¬

chant and politician: b. North Reading, Mass.,

20 Jan. 1829. He entered business in Boston

as partner in a mercantile firm, later founding a firm under the name of Hart, Taylor & Co.

When he withdrew from this business he be¬

came president of the Mount Vernon National

Bank, and was connected with many eleemosy¬

nary institutions. He has also been active in

politics, was a member of the common council

and of the board of aldermen ; was nominated

for mayor of Boston in 1887 and 1888, but

defeated at the election ; was, however, elected in 1889, 1890, 1900 and 1901, and was post¬

master of Boston in 1891-93.

HART, William, American painter: b.

Paisley, Scotland, 31 March 1823 ; d. Mount

Vernon, N. Y., 17 June 1894. Emigrating with

his parents to the United States in 1831, he

settled in Albany, and was at first apprenticed to a firm of coachmakers, in Troy, by whom

he was employed to paint the panels of coaches.

He subsequently painted landscapes, portraits

and even window shades. In 1848 he became

a regular exhibitor at the National Academy

of Design, of which in 1858 he was elected as academician. He was president of the Ameri¬

can Water Color Society 1870-73. He was a

brother of James McDougal Hart (q.v.).

HART, a hunting term, applied to the male,

or stag, of the red deer after it has completed its full antlers at the age

of six or seven years.

HARTBEEST, hart'best, one of the large

African antelopes of the genus Bubalus, specif¬

ically the caama (B . cama), formerly exces¬

sively numerous on the South African plains.

They have long narrowing heads, doubly curved,

ringed horns, cow-like tails and usually are of a grayish or reddish color, with decided markings on the face, especially in the bontebok (B . py-gargiis), blesbok (B . albifrons) and sassaby (B.

lunata). All were noted for swiftness. Other

very distinctive species are the konzi, tora, kori-gum and hunter's antelope. Most of these have

become greatly diminished in numbers since

about 1870.

HARTE, Francis Bret, American novel¬

ist and poet : b. Albany, N. Y., 25 Aug. 1839 ; d.

Aldershot, England, 6 May 1902. In 1854 he

went to California, attracted there by the gold excitement. He was first a teacher at Sonora,

then tried mining, in which he was unsuccess¬

ful. He next entered a printing office, and in 1857 was compositor on the San Francisco

Golden Era. At that time he began to write

short sketches, which appeared in the Golden

Era, and soon attracted attention ; he was in¬

vited to join the staff of the Californian, to which he contributed a series of clever parodies on famous contemporary writers of fiction, later published as (Condensed Novels.5 In 1864 he

was appointed secretary to the United States

branch mint ; in 1868 became editor of the

Overland Monthly, for which he wrote ‘The

Luck of Roaring Camp5 and others of his most

successful stories of frontier life. In 1871 he went to New York and became a regular con¬

tributor to the Atlantic Monthly. In 1878 he

was appointed United States consul in Crefeld,

Germany, and in 1880 received the consulship

at Glasgow, Scotland. In 1885 his tenure of

office as consul came to an end and he settled in London, devoting his whole time to literary work. He was a prolific writer and continued

for the most part to deal with California themes.

Among his shorter stories the following may be mentioned: higgles5 ; ‘The Outcasts of Poker

Flat5; <M’Liss5 (1872); ‘The Twins of Table

Mountain5 (1879) ; ‘An Heiress of Red Dog5

(1879); (Flip5 (1882); ‘On the Frontier5

(1884) ; ‘Bv Shore and Sedge5 (1885) ; ‘ Devil s Ford5 (1887) ; ‘A Phyllis of the Sierras,5 and ‘A Drift from Redwood Camp5 (1888) ; (The

Heritage of Dedlow Marsh5 (1889) ; ‘A Sappho

of Green Springs5 (1891) ; (The Bell-Ringer of Angel’s5 (1894) ; (A Protege of Jack Hamlin’s5

(1894); barker's Luck5 (1896); (Tales of

Trail and Town5 (1898) ; 'Stories in Light and Shadow5 (1898) ; (Mr. Jack Hamlin's Media¬

tion5 (1899) ; and 'From Sand Hill to Pine5

(1900), a collection of short stories. His longer stories and novels include 'Tales of the

Argonauts5 (1875); 'Gabriel Conroy5 (1876);

'Thankful Blossom: A Romance of the

Jerseys5 (1877) ; 'In the Carquinez Woods5

(1883); 'Maruja5 (1885); 'Snowbound at

Eagle's5 (1886) ; 'The Crusade of the Excelsior5

(1887); 'Cressy5 (1889); 'A Waif of the

Plains5 (1890); 'A Ward of the Golden Gate5

(1890) ; 'A First Family of Tasajara5 (1892) ; 'Colonel Starbottle's Client and Some Other

People5 (1892); 'Clarence5 (1895) , dealing with incidents in the American Civil War; 'In a Hol¬

low of the Hills5 (1895) ; and 'Three Partners5

1897). He also wrote much verse comprised

in volumes entitled 'Poems5 (1871) ; 'East and West Poems5 (1871) ; 'Echoes of the Foot-Hills5 (1874) ; and 'Some Later Verses5

(1898). See Tales of the Argonauts.

In estimating Harte's work it must be re¬

membered that it was his rare good fortune to break new ground and to become the first

literary interpreter of a life which with its

primitive breadth and freedom, its striking con¬

trasts of circumstance and character, offered

singular opportunities to the novelist. That he ever did anything quite so good as his first

group of stories and poems cannot be said, for his later volumes are marked, as a whole, by the repetition of well-worn motives and by declin¬

ing spontaneity and power. Still, the average

quality of his output remained high. Among

qualities of his work those which perhaps most constantly impress the critical reader are his

dramatic instinct, his keen insight into charac¬

ter, his broad sympathy and his subtle and

pervasive humor. Dealing for the most part

with large, strongly marked, elemental types,

as these develop and express themselves under

conditions which give free play to instinct and passion, he does not indulge in lengthy analy¬

ses or detailed descriptions. His men and

women are sketched with a few strokes and

left to work out their own personalities in

speech and deed; and yet, such is the skill with which this is accomplished that they stand out before us as creatures of real flesh and blood.

He did not purposely soften the shadows in his pictures; the sin and wretchedness of frontier

life are frankly portrayed; none the less, there can be little doubt that consciously or uncon¬

sciously he contrived to throw an idealizing

glamour over the mine and tv camp and that

many of his most lifelike and successful char¬

acters are wrought in the imagination, though

out of the stuff of fact. But it is here that we touch upon what is perhaps one of the finest

qualities of his work — a quality not to be sepa¬

rated from his tendency toward idealization.

Though he dwelt habitually upon life's unex¬

plained and inexplicable tragic complexities, he nevertheless suffused his stories with an atmos¬

phere of charity, clear, sweet and wholesome.

Consult Kozlay, 'Stories, Poems and Other Un¬

collected Writings of Bret Harte5 (1914) ; Merwin, 'Life of Bret Harte5 (1911).

George Edwin Rines.

BRET HARTE

The State Capitol and Soldiers and Sailors' Memorial Bridge and Arch, in Bushnell Park HARTFORD

HARTFORD

HARTFORD, Conn., State capital, seat of

Hartford County, port of entry, head of navi¬

gation on Connecticut River, 60 miles by water from Long Island Sound. Its steam railroad

lines, all owned by the New York, New Haven

& Hartford system, run in seven directions,

making it the greatest inland railroad centre in the Atlantic States save two. By the main line it is 110 miles to New York and 124 to Boston (a midway position which has enhanced its

business, social and cultural development), 36 to New Haven, 26 to Springfield, Mass.; by the old New York & New England lines, on the High¬

land Division 110 to Fishkill on the Hudson and 90 to Providence, R. I., and via Willimantic

117 to Boston ; the Valley Division skirts the river nearly to its mouth (44) ; the Connecticut Central runs to Springfield by the east side of the river; the Central New England to Pough¬

keepsie (109) and beyond to Erie and Lehigh

connections. Its electric suburban lines, mostly under the same ownership (as is the city sys¬

tem), extend without change to Springfield (a

line each side of the river), Rockville (17) ; Middletown (16) ; and Bristol, via New Britain (21) ; besides Unionville (13) ; Rainbow (12) ; and South Glastonbury (10) ; and a line to

Norwich (about 38) is under construction.

Permanent pop. (1920) 138,036.

Hartford lies on the west bank of the river

(which divides it from East Hartford), on roll¬

ing ground. The first real hills are the Talcott Mountain Range, half a dozen miles west; but

the elevations of Prospect avenue in the west¬

ern part of the city and Fairfield avenue in the southern afford a superb view across the entire Connecticut Valley, some 20 miles wide. It

extends about five and onehalf miles north

and south to Windsor and Wethersfield lines,

by three and onehalf west to West Llartford

line, about 18 square miles in all ; the town and city are conterminous. It is divided about equally by the little Park River, which joins

the Connecticut just south of the centre and

is crossed by many bridges, whose dams afford

large water power, and through whose bed

runs the great main sewer into the Connecticut.

The chief business street is Main, the original highway to Windsor and Wethersfield, follow¬

ing the river line along the first high ground, the banks of old being widely overflowed in the spring freshets; next State, east from Main to the steamer landing with the chief tobacco and other wholesale warehouses, opening at Main

into a wide flare — formerly the market square for country produce teams, now containing the

central trolley station — and paralleled on the south with Central Row, a block long; between

them lying the old State House (later till re¬

cently the city hall) with the postoffice building in the rear ; then Asylum opposite State, running west past the railroad station, and

Pearl parallel opposite Central Row, joining Asylum at its foot by Ford; and Pratt parallel for a block on

the north as far as Trumbull, western parallel to Main, from Park River to North Main,

whose section from Pearl to Pratt is of rising importance; Church next north of Pratt, just

widened 10 feet, is fast assuming business con¬

sequence.

It is a place of remarkable beauty in busi¬

ness and public structures, parks and (relatively to its size) unmatched extent of handsome

residential streets. Of the latter, with some

handsome places on Wethersfield avenue (the

chief, Samuel Colt's of firearms fame, is now by his widow's legacy a home for old ladies), the most distinguished are Washington street with

its magnificent arch of old elms ; western Asy¬

lum avenue and correspondent Farmington

avenue, with Woodland across the end; and

Prospect avenue (north) — the West Hartford

boundary, and long built up only on that side to escape Hartford taxes, a reason now obsolete — the most coveted street for new social mag¬

nates. Woodland for many years held that

position, and the square from it to Forest be¬

tween the avenues was the pinnacle of social

desire; aided by the fact that Mark Twain,

Harriet Beecher Stowe, Gen. J. R. Hawley,

Charles Dudley Warner and William Gillette

had each a house on Forest or the avenue near by. (The costliest place in the city, the granite ˆpalace® of J. P. Morgan's relatives, the Good¬

wins, is at Woodland and Asylum; but their

and other landholdings north left few vacant

sites). This position has now been transferred

to the section west of Park River beyond Wood¬

land to Prospect avenue, with handsome places

extending well into West Hartford; though the

edges of Keney Park are drawing in a good

class, and there are very many other fine streets and individual dwellings.

The Connecticut is spanned by a superb

granite bridge at Morgan street, finished in

1907, the largest in mass of any purely stone bridge in the world, and one of the greatest

masses of cut stone of any kind. It has nine spans, and is 1,192.5 feet long, 82 feet wide (London Bridge is 42) with a clear roadway

of 80 feet including 10-foot sidewalks, and its arches 45 feet above mean low water, with

foundations 50 feet below. All above water is

dressed and carved in graceful forms. Its cost was about $1,600,000 by itself ; but attendant

improvements, including a broad boulevard to

State street along the river front, raised it to nearly $3,000,000.

The park system contains above 1,300 acres;

there are seven chief with lesser ones, lying in every quarter. The oldest is Bushnell Park (from the great preacher Horace Bushnell who secured

its creation), in the heart of the city, 48ˆ2

acres ; continued south on a sharp rise by the grounds of the State Capitol, where were for¬

merly the buildings of Trinity College. The

largest is Keney Park (formerly Ten-mile

Woods), purchased, prepared and maintained

from the bequest of Henry Keney, in the ex¬

treme north, extending into Windsor, contain¬

ing 663.4 acres. It is managed by private

trustees, and is the only one in which automo¬

biles are limited. Next is Goodwin Park in

the extreme south, some 200 acres, bought at a generously low figure from Francis Goodwin,

Esq. Elizabeth Park in the extreme west,

largely in West Hartford, of 100 acres, the

bequest (with a maintenance fund) of Charles

M. Pond in memory of his wife, is the most

beautiful in flowers and trees, and is the nursery for the other parks. Pope Park southwest of

the centre, in the chief manufacturing district, is mainly the gift of the late Col. Albert A.

Pope of bicycle fame, and has 92 acres, 19 being city additions. Colt Park, 106 acres, was the

bequest of Mrs. Samuel Colt, and extends down

to the neighborhood of the great firearms

works. Riverside Park, 80 acres, is a recla-

mation and beautifying of the formerly squalid

river-front north from the stone bridge to the New York and New England Railroad bridge,

and was laid out by the late Frederick Law

Olmsted, a native of the city. The last two are most useful, being the only practicable resorts for the poor thousands near the river, and are the chief city playgrounds for active games.

Rocky Ridge Park, 28 acres, is the long narrow strip of the old stone quarry (for street paving) next the bluff at and north of Trinity College, overlooking Zion street and Parkville. There

are several smaller squares and spaces : one of a block, Sigourney Square in the west, is on the site of the old poor-farm pesthouse graveyard,

shunned for building purposes, and has trans¬

formed the whole character of its neighboring

residence section.

The city has a remarkable number of hand¬

some and architecturally notable buildings.

Foremost is the State Capitol, of white marble, towering over Bushnell Park; the handsomest

in the country except the one at Albany, and

architecturally surpassing that in many ways.

It was completed in January 1880, at a cost of $2, 534,024.46; land and other expenses made the total $3,342,550.73. The general plan was of

13th century Gothic, but modern needs forced

very many changes in this. Each side is an indi¬

vidual and separately beautiful design; and the interior is as notable as the exterior. Its ex¬

treme length is 295 feet 8 inches ; depth of

centre part, 189 feet 4 inches; depth of wings, 111 feet 8 inches; height from ground line to top of crowning figure, 256 feet 6 inches. It is fireproof, the only fireproof capitol in exist¬

ence. It is still more curiously distinguished as being the only considerable public building in

America built within the appropriation. The

State Library and Supreme Court, formerly in

the Capitol, have been moved since 1910 into a new and splendid building just south, costing

$1,375,500; of granite, Italian Renaissance style, fireproof throughout (the only one of its kind), 294 feet 8 inches frontage on Capitol avenue,

and 137 feet 6 inches deep, the main entrance 90 feet back from the curb with a well-kept

lawn. The State Arsenal and Armory, finished

1909, is the finest in the United States : of Mohegan granite, 325x275 and 166 feet high,

occupying one and three-quarters acres, its drill-room holding 12,000 people. It is on virtually the west part of Bushnell Park across the Park River, near Broad street. East of the Capitol, on Trinity street, is the handsome white granite building of the Orient Fire Insurance Com¬

pany. Trinity College has fine buildings

on high ground in the south part, designed to form a quadrangle.

The south central section of Main street on

the east side is rapidly developing into one of the handsomest and most artistic street ranges

in the country. To the old nucleus of the

Etna Life Insurance Company's white granite

structure (formerly the Charter Oak Life's, but now elevated by four more stories), and across an alley next south the Wadsworth Atheneum's

dark-brown, castellated and towered building

designed by Ithiel Town, have been added on

the north of the former, first the nobly beauti¬

ful white granite home of the .Etna (Fire) In¬

surance Company; then the immense gray sky¬

scraper of the Travelers Insurance Company,

21 stories high including a large tower, the

largest business structure in the city; on the south of the Atheneum, the small but elegant

memorial of Mrs. Samuel Colt, of Quincy

granite and thus lighter colored than its neigh¬

bor, joined to the latter without break and con¬

tinued so by the white marble Morgan Memorial, extending through to Prospect street, erected

by J. Pierpont Morgan (of Hartford birth) for

a memorial to his father Junius Spencer Mor¬

gan, the eminent banker. A 65-foot way was

reserved south of the Morgan Memorial

grounds, and next have since come the new

municipal buildings, handsome classic structures

of white granite. Going north, the city hall

(old State House), completed May 1796, is of

double interest, architecturally and historically; it was designed by Charles Bulfinch, the archi¬

tect of the United States Capitol, and the

famous Hartford Convention of 1814 (q.v.)

was held here. The postoffice in its rear, of white granite, is a Mullins creation of the

Grant era. Opposite this on State street is the tall handsome building of the First National

Bank. The red sandstone Cheney Building

well north on Main Street, put up as a monu¬

ment by the great silk firm, was designed by

Henry H. Richardson (q.v.), the most original

and influential of American architects. On the

corner of Main and Pearl is the deep office

building of the Connecticut Mutual Life Insur¬

ance Company, and down Pearl a short distance

are the Phoenix Mutual Life and the National

Fire on the south, and the Security Company

and the Connecticut General on the north, with the Hartford Fire just beyond at Pearl and

Trumbull. The Hartford Life is at Asylum and

Ann. The Rossia has a very handsome new

structure at Farmington and Broad, next to the high school and theological seminary. Of the in¬

dividual bank buildings, the most impressive

are the Hartford-Etna's 11-story, on the north

corner of Main and Asylum; the First National

as above; the Phoenix. Main just south of

Asylum; and the Society for Savings on Pratt

street. There are many other attractive busi¬

ness and public structures. The three leading

hotels are the Allyn (Asylum and Trumbull),

the Heublein (facing Bushnell Park at Mul¬

berry and Wells) and the Bond (Asylum near

High). Of several handsome church buildings,

Saint Joseph's Cathedral (Roman Catholic), on

Farmington avenue near Sigourney street, is

most striking; it is 26x178 feet and 93 feet high, with two heavy towers intended to be crowned

with spires. Of the others, Christ Church

(Protestant Episcopal) at Church and Main,

with its superbly equipped new parish house ;

Saint Patrick's (Roman Catholic) at Church

and Ann, the church of the Good Shepherd or

Colt Memorial (Protestant Episcopal) on

Wyllys, Trinity (Protestant Episcopal) on

Sigourney, Immanuel (Congregational, formerly

the Pearl Street) at Farmington and Gillette,

and the Church of the Redeemer (Universalist) on Asylum avenue east of the School for

the Deaf, call for 'special notice architecturally.

The Center Church (Congregational), Main

south of Pearl, is of the highest interest histori¬

cally, as housing the oldest church society in the city, reaching back to its beginning.

Of the city monuments, the three most

prominent for artistic effect are the Soldiers'

Memorial Arch, forming a gateway into Bush¬

nell Park across the Park River south of Pearl HARTFORD

and Ford; the endlessly satisfying Corning

fountain in that park, a gift from John J.

Corning of New York — a bronze with sym¬

bolical Indian figures, the work of J. M. Rhind ; and the modified exedra in Colt Park, crowned

by the statue of Colonel Colt. It has also

statues of Israel Putnam, by J. Q. A. Ward —an eight-foot bronze with granite pedestal,

given by J. P. Allyn in 1874; and Horace

Wells of Hartford (the discoverer of an¬

aesthesia) by Truman H. Bartlett, erected by

State and city in 1875. The city has also two statues of Nathan Hale: one in the Capitol, by Karl Gerhardt, the other in front of the Wads¬

worth Atheneum, by E. S. Woods. One of the

bridges across the river into Bushneil Park,

that from Mulberry street, is the gift of George E. Hoadley, Esq., in memory of his grand¬

father, Jeremiah Hoadley; it is of red granite and excellent workmanship. On North Main

street is a clock tower with chimes, erected

from the bequest of Henry Keney, the giver of the great park.

The educational institutions are of high

grade and distinction. At their head stands

Trinity. College (q.v.) ; Episcopal in origin and headship, but wholly non-sectarian in teaching

and with a singularly able corps of instructors.

The Hartford High School, on Hopkins and

Asylum just west of the railroad station, with some 2,500 pupils, stands in the foremost rank and is the most completely equipped in the

country. Its main building is 426 feet long

with an average of 50 feet wide, and cost in buildings, land and

equipment $598,500; but in

1911-15 land was bought through to Broad

street and buildings erected for a supplementary technical high school, which cost $689,529.88,

has a gymnasium and assembly hall , and seats 1.500 pupils. Pupils from surrounding towns

are admitted on payment. The city schools are

on the district system, despite many attempts

at the polls to consolidate them; but the taxes for their support are equalized by reapporti.onment. There are nine districts, with 20 build¬

ings altogether. The school outlays are about

$750,000 a $ear. There are also three com¬

mercial colleges or schools, and a commercial

high school at Saint Joseph's Convent; four

parochial Roman Catholic schools, with some

2.500 pupils, besides a convent school for Polish children. Hartford has also a theological semi¬

nary, the Hartford Theological Seminarv on

Broad street, managed by the Pastoral Union

(Congregational) of Connecticut, with an affil¬

iated School of Religious Pedagogy, once fa¬

mous at East Windsor; a Roman Catholic semi¬

nary for training priests, Saint Thomas' on

Collins near Woodland; and a missionary col¬

lege and seminary of the Fathers of La

Salette.

Religiously, Hartford is the seat of a Ro¬

man Catholic and a Protestant Episcopal bishop.

There are about 70 church societies, of which

the Congregational (11), for a century the only one, Roman Catholic (10), Baptist (9), Episco¬

pal (10), Methodist (7), and Hebrew (7 svna—

gogues), are the chief denominations. The

Connecticut Missionary Society has its head

office here. There are 10 convents.: four of the Sisters of Mercy (mother house in the State,

established 1853), two of the Sisters of Saint Joseph, two of the Sisters of the Holv Ghost, one of the Sisters of the Good Shepherd and

one of the Felician Sisters of Saint Francis

(Polish).

Its charitable and related institutions are re¬

nowned. It was the earliest seat of attempts

to instruct the United States deaf and dumb,

through Thomas Gallaudet and Laurent

Clerc; and the School for the Deaf, for¬

merly Deaf and Dumb Asylum, carries

on the work in buildings on Asylum and

Garden. The Retreat for the Insane (now re¬

named Hartford Retreat), on Washington

street, has endowments which reduce its

charges to patients. The Hartford Hospital

on South Hudson, Saint Francis' Hospital at

Collins and Woodland (R.C., but open to out¬

side paying patients), the Hartford Orphan

Asylum, the Watkinson Farm School, the

Young Men's Christian Assoc'ation, the City

Mission and Open Hearth, the Hartford Social

Settlement, the Old People's Home, Mrs. Colt's

munificently endowed home for old ladies, and

various other refuges for the aged and indigent, are only part of its overflowing charities. One of the most useful is the Woman's Christian

Association establishment on Church street,

affectionately known among its friends as (<the Home,® for girls' lodging and board, with two

buildings, one lately finished; it is managed so as to earn its expenses but make no profit, and place is given to working girls at the lowest rate consistent with this. Saint Elizabeth'.'

Home, R. C., Main opposite Park, does the

same service for its class. The Connecticut

Humane Society has also its head office in

Hartford.

The library facilities of the city are extraor¬

dinary; and having been gathered by several

different institutions for very diverse func¬

tions, are far more varied in contents and util¬

ity than if collected by any single one. There are 12 public or class libraries, all cordially helpful to the investigator, containing toward

three-quarters of a million volumes, and fully

four times as many pamphlets and manuscripts.

Two of these, the Hartford Free Public and

the Case Memorial, are circulating libraries;

the others reference only. In the Wadsworth

Atheneum are housed the Hartford Free Pub¬

lic Library, with about 125,000 volumes ; the

Watkinson Library, with nearly 100,000 and

some thousands of pamphlets (the only collec¬

tions of art books of any extent are in these two) ; and the Connecticut Historical Society,

with some 40,000 volumes and as many pamph¬

lets and about 50,000 manuscripts, its great field being New England and adjacent genealogy and

local history. The library of Trinity College,

towards 90,000, is strong in the demand by nearly a century of professors for the latest textbooks for their classes in many fields. The Case

Memorial Library (endowed by the late Newton

Case), in the Theological Seminary, has about

108,000 volumes and above 60,000 pamphlets;

and is rich not only in its necessary specialty (includ ng Oriental and other ˆmissionary® lan¬

guages for its training work), but in English

literature, sociology, mediaeval history, church

music and other related ’subjects. The. School

of Religious Pedagogy has also a considerable

library of its own. The State Library has not only an immense collection (close on 200,000

volumes and toward 1,000,000 pamphlets) of

public documents, legal reports and digests,

State and other laws, Hansard’s parliamentary

debates (the one set in the city), and a good general reference library, but above 1,000,000

manuscripts, and is the authorized State deposi¬

tary of all local records in the State not

needed for current use in their localities. It and Trinity are also official depositaries of all United States government publications. The

Hartford County Bar Association’s library in

the County Court House (Trumbull and Allyn),

the lawyers’ working library, has above 10,000

volumes. The Hartford County Medical As¬

sociation, in the Hunt Memorial building on

Prospect street (across the street from the

Atheneum Annex, which contains the ch ldren's

department of the Public Library), is building

up a strong medical library from a large recent endowment. Two church libraries also have

notable gatherings of great service to both

clergy and outside users: that in Saint Joseph's Cathedral of Catholic works especially, and the (Sunday School) Teachers' Library in the

Center Church parish house, on Gold street,

a large and well-chosen collection of high

grade, very different from its old congeners.

The High School has a good library.

The Wadsworth Atheneum is a peculiar in¬

stitution. It is a board of trustees holding the buildings and grounds so named, and including

the control and management of the Colt and

the Morgan Memorial buildings, already men¬

tioned; in addition, it houses in its buildings the three libraries just specified; and it is also a collector and exhibitor of art objects and

museum contents of all kinds. These collec¬

tions it now places wholly in the Morgan Me¬

morial, which contains not only the late J. P.

Morgan's matchless set of tapestries, the finest in America, his splendid collection of Dresden

and Meissen porcelains, old faience and other

art works, the magnificent illustrated catalogues of h's art treasures, his sets of Gould's Birds and Curtis' North American Indians, and other

rare and valuable articles, but all the Atheneum's gallery of pictures, gifts and loans of the same, beautiful collections of pottery, silver¬

ware, bric-a-brac of all sorts, coins, etc., and also of minerals, birds and eggs, and other

matters of natural history. It has also lately come into possession of the late J. Coolidge

Hill's fine collection of medals and badges, with his library of literature on them deposited in the Watkinson Library. Mrs. Colt's memorial

has collections of firearms illustrating the devel¬

opment of the Colt revolver, and of art objects.

Both these are connected with the old Athe¬

neum building by passages on two floors, form¬

ing one unbroken interior as exterior. The

Connecticut Historical Society has also an in¬

teresting and valuable collection of colonel

and Indian relics.

Hartford, as the head of navigation and

therefore distributing point for the Connecticut Valley, early gained an importance as a centre of wholesale trade which it has never lost ; to accommodate this, the Hartford Bank, then

the fifth and now (as Hartford-2Etna) the

fourth oldest in the country, was organized

in 1792. But its largest importance is now

as one of the leading insurance centres

in the world, and second in the United

States. This business ‘seemingly originated

in marine insurance on its West India

cargoes, and later added fire insurance, which

speedily far overshadowed its mate. After

tentative efforts in the 1790’s, it became per¬

manently established in 1803 as marine, and

in 1810 as fire, in the Hartford Fire Insurance Company, followed in 1819 by the ALtna. Life

insurance was begun in 1846 by the Connecticut Mutual; accident in 1864 by the Travelers;

steam boiler in 1866 by the Hartford Steam

Boiler; employers’ liability in the early 90’s by the Travelers; and livestock in 1866 and 1867

by companies which abandoned it forever in 1868.

The loans of these insurance companies, espe¬

cially the life with their vast reserves, not re¬

stricted in investment by law as are those of New York, have been one of the greatest

agencies in developing the West, amounting to

billions of dollars. There are now six*

independent fire companies, the Hartford

(largest in the United States), JEtna,

Phoenix (also owning the Connecticut Fire but

letting it operate separately), National, Stand¬

ard and Hartford County Mutual, besides the

United States branches of several foreign com¬

panies ; six life companies, the Connecticut

Mutual, 2Etna Life, Phoenix Mutual, Travelers

(life branch), Connecticut General and Hart¬

ford; three accident companies, the Travelers,

.Etna (department of Etna Life), and Hart¬

ford (branch of Hartford Fire) ; two general

indemnity companies, branches of the Travelers

and Hartford Fire ; and the original and largest steam-boiler insurance company of the United

States, the Hartford. There are 11 banks of

discount, four of them national banks ; five

trust companies ; one State bank, and five sav¬

ings banks — one (the Society for Savings or

((Pratt Street Bank)}) the oldest in Connecticut, chartered 1819, and by far the largest.

The manufacturing interests are extremely

heavy and varied, leading the world in several important lines : there are about 150 incorpo¬

rated manufacturing companies in the city.

The famous Colt works make all kinds of fire¬

arms, including machine guns, and also a great range of machinery for making special ma¬

chines and tools, a line of work which engages other powerful Hartford companies; two

of the foremost typewriters, the Underwood

and Royal, have their works here, and in

amount and value of product it heads the

world, as it does in horseshoe nails and leather belting; it has the largest drop-forging plant in America, if not in the world; it is very promi¬

nent in electric machinery, screws, machine tools and chucks, cyclometers, steam-boilers and en¬

gines, knitting and book-sewing machines, blow¬

ers, steam turbines, coil pipes, plumbers' and

railway supplies, and other heavy metal arti¬

cles ; and manufactures also church organs,

rubber goods, pottery, furniture, carriages, har¬

ness, knit goods and many other things. It

ha* also one of the largest printing houses in New England, The Case, Lockwood & Brainard

Printing Company, which has manufactured

many famous works ; three daily papers, the

Courant (morning, Rep.), the oldest newspaper

in the country (founded 1764), Times (evening,

Dem.) and Post (evening, Rep.) ; and many

regular or casual business and other publica¬

tions.

The mayor holds office for two years, and

the . city government is of the regular two-

chambered form. The assessed valuation of

property is about $145,000,000, making it per

capita one of the richest cities in the United States — toward $1,200 per head. The tax rate is something over two cents on the dollar, vary¬

ing with the district school tax.

1 he first white settlement of Hartford was

by the Dutch in 1633, at the junction of the Park and Connecticut, still called Dutch Point

(although the original point is out in the Con¬

necticut). They built there a fort called the

<(House of Hope® (commemorated by Huys—

hope avenue). (For the settlement of the

Newtown men in 1635-36, and the adoption of

the first written constitution of modern times, whence Hartford is called the (<b.rthplace of

American democracy,® see Connecticut). Hart¬

ford was first named Newtown, changed to the

present name in honor of its minister Samuel

Stone's English birthplace. From here in 1637

sailed the expedition of 90 men under John

Mason which heavily crippled and caused the

ultimate destruction of the Pequots, the tribe of recent Indian invaders who had dispossessed

the original Indian holders and terrorized the

other Connecticut Indians, and who were mak¬

ing Connecticut untenable for civilized settlers.

This campaign made possible Connecticut as it

stands, and probably in any form. The Dutch

were ejected from their fort in 1654; they had never really made a settlement. (For the at¬

tempt of Andros to seize the charter, in 1687, see Charter Oak). In 1701 Hartford became

joint capital with New Haven. In the Revolu¬

tion, Hartford, as the head of the one rich store of supplies which the British could not seize, became of prime importance ; the second com¬

missary-general of the United States army,

Jeremiah Wadsworth, was a Hartford mer¬

chant. Governor Trumbull (Washington's

<(Brother Jonathan®), much of the time in

Hartford, was also a strong reliance of Wash¬

ington, who came to Connecticut to consult him ; and in 1780 Washington and Rochambeau

planned the Yorktown campaign here. The

Hartford Convention (q.v.) of 1814. sat here.

In 1873 Hartford became the sole capital of the State. From its original limits have been cut

off the towns of West Hartford, East ‘Hart¬

ford and Manchester (the latter directly from

East Hartford).

Its native and adopted citizens have made

the city one of the intellectual glories of New England. It was the birthplace of Noah Web¬

ster (West Hartford was cut from Hartford).

Frederick Law Olmsted, John Fiske and

Edmund Clarence Stedman, and others of less

note but of high merit; it had the services of Joel Barlow, George D. Prentice, John G.

Whittier and others — after the Revolution, so

brilliant a group of Connecticut authors and

professional men gathered here or made it their literary headquarters that they were known all

over the country as the ((Hartford Wits®

(q.v.), and are still remembered by the name;

it was the long or permanent residence of Har¬

riet Beecher Stowe, Mark Twain, Charles Dud¬

ley Warner and Horace Bushnell, besides John

Trumbull the poet, Lydia H. Sigourney,

and the remarkable Stonington Trumbull family

— James Hammond, the antiquarian, Indian

scholar and librarian, Gurdon the nature

painter, and Annie (Mrs. Slosson) the story—

writer and entomologist. In the musical field,

Dudley Buck, the distinguished composer, was

born here; and Henry C. Work of Middletown,

the second greatest of American song-wrights,

lived much here and died here. In the business world, J. Pjerpont Morgan was born here, his

father, Junius S. Morgan (by parentage and

associations really a Hartford man himself),

began his great business career as a Hartford

dry-goods merchant, and Edwin D. Morgan, the

war governor of New York, began his as a

Hartford wholesale grocer and provision mer¬

chant.

Forrest Morgan,

Assistant Librarian , Watkinson Library.

HARTFORD, Mich., village of Hartford

Township, Van Buren County, 15 miles west of

Paw Paw on the Paw Paw River, and 17 miles

northeast of Benton Harbor, on the Chicago

and M. L. S. Railroad. It has a graded school and five churches. It carries on a considerable traffic in agricultural produce and stock, has

grain elevators, flour, saw-and planing-mills, canneries, electric-light plant, *etc.* Pop. 1,351.

HARTFORD, Vt., town of Windsor County, on the White River, about one mile above its junction with the Connecticut River, and 60 miles south of Montpelier, on the Central Vermont and Woodstock railroads. It has many mills and manufactories and three public libraries. Pop. 4,179.

HARTFORD CITY, Ind., city, county-seat of Blackford County, on the Pittsburgh, C., C. and Saint L. and the Lake E. and Western railroads, about 45 miles southwest of Fort Wayne, and 60 miles northeast of Indianapolis. The natural resources which contribute to the industrial and commercial interests are the products from the surrounding agricultural country, the natural gas supply and the oil fields. The city owns and operates the waterworks. Pop. 6,187.

HARTFORD CONVENTION, of 1814;

a gathering of New England Federalists to dis¬

cuss measures for securing New England in¬

terests against the South and West, especially

in relation to the War of 1812. The convention opposed the war on several grounds — the vital objection being that it was destroying all Amer¬

ican commerce in order to punish Great Britain for crippling a part of it. It was believed by the delegates that the agricultural States were sacrificing New England, whose life-blood was

commerce, from ignorance mingled with sec¬

tional malice (see Embargo). All through the

war, the New England Federalists, impover¬

ished and excluded from the national councils,

harassed and hampered the government in con¬

ducting it ; the government retorted by leaving the whole section to its fate; the British in¬

flamed the discord by exempting the New Eng¬

land coast from blockade, and the government

countered by laying a new embargo which did

the same work. All the New England States

and New York were swept by the Federalists

on this issue. In November 1813 the governor

of Vermont recalled a brigade of militia

from garrison duty; the government

threatened prosecution, the Massachusetts

legislature threatened to use the State

power to support him. In the autumn of

1814 the destruction of New England industries

had become intolerable; the coast was unde¬

fended, the British were occupying that of

eastern Maine, and Congress was proposing a

conscription so severe as to enlist minors with¬

out the consent of their parents; whereupon

the Connecticut legislature ordered the governor to call a special session to protect its citizens if the measure were adopted. On 18 October

the Massachusetts legislature proposed a con¬

vention of the New England States, to take ac¬

tion <(not repugnant to their obligations as

members of the Union,® and (<lay the founda¬

tion of a radical reform in the national com¬

pact® through a future national convention.

Connecticut and Rhode Island accepted the

proposal with similar qualification; New Hamp¬

shire was divided politically, and Vermont was

excited over Macdonough's victory at Platts—

burg, but certain counties sent delegates. The war was a growing and alarming failure. Eng¬ land was demanding the renunciation of the whole Northwest as the price of peace; national bonds were at 25 per cent discount. The gov¬ ernment sent a regular army officer to oversee the convention and use force if it attempted disunion; deputed secret agents to see if it was true that there was a plot to make New England an English grand duchy under a prince of the blood; and appointed the succeed¬ ing 12th of January a national fastday. The convention met at Hartford, Conn., 15 Dec. 1814, with 12 delegates from Massachusetts, 7 from Connecticut, 4 from Rhode Island, 2 from New Hampshire and 1 from Vermont, — 26 in all. George Cabot of Massachusetts was chosen president, and Theodore Dwight of Connecticut secretary. A secret session of three weeks was held and a report to the New England legislatures prepared. On 5 Jan. 1815 the convention adjourned. The report stated the before-mentioned grievances, and charged the government with making naturalizations too easy and with

destroying the balance of sections by forming

new States at will out of the Western territory; but denied any present intention to dissolve the Union. It was proposed that Congress should

confide the defense of each State to the State itself, and return a share of its taxes for the purpose ; and recommended seven changes in

the Constitution, namely, abolition of the three-fifths slave representation, the requirement of a two-thirds vote for the admission of new

States, the limitation of embargoes to 60 days, the requirement of a two-thirds vote to sanction the prohibition of commercial intercourse, or to declare war or hostilities, except in case of in¬

vasion ; the exclusion of naturalized foreigners from civil offices or a seat in Congress, and prohibition of a President's re-election. They

proposed also that two Presidents in succession should never be elected from the same State.

They also recommended that another conven¬

tion should be held at Boston the following

June if affairs did not mend or the amendments were rejected. The Massachusetts and Con¬

necticut legislatures adopted the report and

sent commissioners to Washington ; but before

they arrived a satisfactory peace was made, all disasters forgotten in the blaze of the battle of New Orleans, and the promoters of the con¬

vention detested as traitors preparing to secede.

They were in fact killed for public life. But in 1819 Cabot deposited the journal of the con¬

vention with the Massachusetts secretary of

state as a permanent testimony that nothing

treasonable was attempted; in 1833 Dwight

wrote its history. Consult Cabot's (Life and

Letters,* ed. by Lodge (1877).

HARTFORD FERN. See Filicales (2),

under Ferns and Fern Allies.

HARTFORD THEOLOGICAL SEMI¬

NARY, an institution founded in 1834 for the

education of Congregational preachers, at East

Windsor Hill, Conn. It was formerly called

the Theological Institute of Connecticut, and

took its present name on its removal to Hart¬

ford in 1865. Its control is vested in a board of trustees elected by the Pastoral Union, an

association of 200 ministers who have sub¬

scribed to the creed of the Union. The aim of the institution is to train ministers for pastoral work on the broadest lines of intellectual and spiritual life. The Hartford School of Reli¬

gious Pedagogy was affiliated with the seminary in 1902. The Kennedy School of Missions is

another affiliated work. The Case Memorial

Library has also been added to the institution.

A bi-monthly Bulletin is issued by the semi¬

nary.

HARTFORD WITS, the name admiringly given by the cultivated circles of the United States to a group of Connecticut professional men and literary aspirants, who lived in Hart¬ ford or met there for converse and collabora¬ tion, from shortly after the Revolution till to¬ ward 1800. The exact composition of the group is not uniformly agreed upon ; but the unquestioned members were Richard Alsop (perhaps its leading spirit and the most prolific contributor to its joint efforts), Joel Barlow, Theodore Dwight, Lemuel Hopkins and David Humphreys. Benjamin Trumbull, the historian, is sometimes added. Most of them were Yale men; all were strong Federalists, like nearly all cultivated New Englanders of the time; and their writings had little of pure literature compared with envenomed politics. The very name of their <(Anarchiad,® modeled on the English ((Rolliad,® and like it a joint political satire in heroic verse, expresses its purpose.

Another collaboration was the <(Echo,® a set of satires, burlesques and parodies mostly in the same form, written 1791-95, and published in a volume in 1807. ((The Political Green¬ house® was another.

HARTINGTON, Spencer Compton Cav¬

endish, Marquis of. See Devonshire, Spen¬

cer Compton, Duke of.

HARTINGTON, Neb., city, county-seat of

Cedar County, on Bow Creek, and on the Chi¬

cago, St. P. and O. Railroad, about 42 miles

west by north of Sioux City, Iowa, and 18

miles south by east of Yankton, S. D. It is in a fertile agricultural region and is the commer¬

cial centre of Cedar County. Pop. 1,467.

HARTLEBEN, Otto Erich, German

dramatist and short-storv writer; b. at Clausthal in the Harz Mountains, 3 June 1864; d. at Salo on Lago di Garda, 11 Feb. 1905. He re¬

ceived a regular middle-class education, pro¬

ceeding, after the completion of his gymnasium

course, to the universities of Leipzig and Ber¬

lin for the study of law (1886-89), became a

<(Referendar® at the <(Kammergericht® at Ber¬

lin in 1889 and was assigned to various small judicial positions at Stolberg and Magdeburg,

giving up this calling in 1891 to become a free-HARTLEPOOLS — HARTMANN

lance in literature, with his home at Berlin.

His life was so full of exertions of every sort that he had a nervous breakdown in 1900 and

had to go to a sanatorium, after being dis¬

charged from which he settled on Lago di

Garda, where he died of heart-failure induced

by a previous haemorrhage. In the movement

known in Germany as ((Die Moderne,ˆ Hartleben was the most ingratiating and pleasing styl¬

ist, presenting, in his short stories, accounts that are full of wit, humor and satire ; the

best of these are (Die Geschichte vom abgeriss-nenen Knopf > (1893, dramatized as (Die

Lore*), and (Der gastfreie Pastor) (1895).

Two of his dramas have held the stage for

years: the comedy (Die sittliche Forderung)

(1898) and the tragedy (with excellent milieu

treatment) (Rosenmontag) (1900; 1 7 th ed.,

1907). His plays lack energy and grandeur but

have much irony, good humor and mood-paint¬

ing, which is also the case with his lyric poems.

(Consult Pollard, Percival, (Masks and Min¬

strelsˆ Boston 1911). His other works are

<Studententagebuch) (poems 1885-86) ; (Hanna

Jagert* (comedy 1893) ; (Ein Ehrenwort*

(drama 1894) ; <Meine Verse* (poems 1895) ;

(Ein wahrhaft guter Mensch) (comedy 1899) ;

ˆusgewahlte Werke* (in 3 vols.. ed. with

Introd. by F. F. Heitmiiller, Berlin 1909).

Jacob Wittmer Hartmann.

HARTLEPOOLS, England, a port and

parliamentary borough of Durham County,

comprising the towns of Hartlepool (or East

Hartlepool), pop. 22,700, and West Hartlepool,

pop. 62,600. Situated on the North Sea and

separated by Hartlepool Bay, 18 miles south¬

east of Durham, they have stations on the

North Eastern Railway, 247 miles northwest of

London. The harbor was important as early

as the 12th century, and the towns officially

regarded as one port have an extensive coal

trade, iron-shipbuilding, marine engineering,

cement manufacture and sea fisheries. The

ships entering and leaving the harbor annually

have an average aggregate tonnage of 1,226,000, and the export trade in coal amounts to over

946,500 tons, valued at $5,482,000. East Hartle¬

pool is the ancient town, West Hartlepool the

modern. During the European War a German

squadron bombarded the port in 1914. Total

pop. 85,300.

HARTLEY, Jonathan Scott, American

sculptor: b. Albany, N. Y., 23 Sept. 1845 ; d.

1912. After spending several years in studying

art in England, Rome and Paris, he established himself in New York where he was professor

of anatomy in the schools of the Art Students'

League, 1878-84, and president of the league,

1879-80. Among important works by him are

(King Rene's Daughter* ; (The Whirlwind* ;

the Miles Morgan statue at Springfield, Mass. ; Daguerre monument, Washington, D. C. ; Erics¬

son monument, New York ; statue of Alfred The

Great, for Appellate Court building, New York

(1900) ; statue of Thomas K. Beecher, Elmira,

N. Y. (1901) ; (Fisherman's Luck* and (Cradle of Pan,* completed just before his death.

HARTMANN, hart'man, Karl Robert

Edouard von: b. Berlin, 23 Feb. 1842; d. 6 June 1906. He was educated for the army, but an

injury to his knee compelled him to leave the service in 1865. He then began the study of

philosophy, and for many years lived the retired life of a student. His most important publica¬

tions are (The Philosophy of the Unconscious)

(1869); (The Phenomenology of the Moral

Consciousness* (1879) ; (The Religious Con¬

sciousness of Mankind in the Stages of Its De¬

velopment (1881); and (The Religion of the

Spirit (1882). Among his other works are

(Critical Grounds of Transcendental Realism*;

(The Crisis of Christianity in Modern Theol¬

ogy* (1880) ; (Judaism in the Present and the Future* (1885) ; ˆotze's Philosophy) (1888) ;

(The Ghost Theory in Spiritism* (1891) ;

(The Fundamental Social Questions) (1894);

and many other works on society, religion, *etc.*

Von Hartmann's philosophy is called by its

author a transcendental realism, because in it

he professes to reach by means of induction

from the broadest possible basis of experience

a knowledge of that which lies beyond experi¬

ence. A certain portion of consciousness,

namely, sense-perception, begins, changes and

ends without our consent and often in direct

opposition to our desires. Sense-perception,

then, cannot be adequately explained from the

ego alone, and the existence of things outside experience must be posited. Moreover, since

they act upon consciousness and do so in dif¬

ferent ways at different times, they must have those qualities assigned to them which would

make such action possible. Casuality is thus

made the link that connects the subjective

world of ideas with the objective world of

things. An examination of the rest of experi¬

ence, especially such phenomena as instinct,

voluntary motion, sexual love, artistic produc¬

tion and the like, makes it evident that will and idea, unconscious but teleological, are

everywhere operative, and that the underlying

force is one and not many. This thing-in-itself may be called the Unconscious. It has two equally original attributes, namely, will and

idea. Hegel and Schopenhauer (qq.v.) were

both wrong in making one of these subordinate

to the other; on the contrary, neither can act alone, and neither is the result of the other.

The will is illogical and causes the existence, the Das of the world ; the idea, though not con¬

scious, is logical, and determines the essence, the Was. The endless and vain striving of the will necessitates the great preponderance of suf¬

fering in the universe, which could not well be more wretched than it is. Nevertheless, it

must be characterized as the best possible

world, for both nature and history are con¬

stantly developing in the manner best adapted

to the world-end; and by means of increasing

consciousness the idea, , instead of prolonging

suffering to eternity, provides a refuge from the evils of existence in non-existence.

The original state of the Unconscious is one

of potentiality, in which by pure chance the will begins to strive. In

the transition state, called that of the empty will, there is no definite end ; and to avoid the unhappiness of aimless desire the will realizes the ideas already potentially present and the Unconscious becomes actual.

The existence of the universe is the result,

then, of the illogical will, but its characteristics and laws are all due to the idea and are, there¬

fore, logical. The history of the world is that given by natural science, and particular em¬

phasis is laid upon the Darwinian theory of

evolution (q.v.). Man is developed from the

animal, and with the appearance of the first

human being the deliverance of the world is in sight, for only in man does consciousness

reach such height and complexity as to act in¬

dependently of the will. As consciousness de¬

velops, there is a constantly growing recogni¬

tion of the fact that deliverance must lie in a return to the original state of non-willing, which means the non-existence of all individuals and

the potentiality of the Unconscious.

The one foundation for ethics is pessimism,

for no other view of life recognizes that evil necessarily belongs to existence and can cease

only with existence itself. The essential feature of the morality built upon this basis is the

realization that all is one and that, while every attempt to gain happiness is illusory, yet before deliverance is possible, all forms of the illusion must appear and be tried to the utmost. Even

he who recognizes the vanity of life best serves the highest aims by giving himself up to the

illusion, and living as eagerly as if he thought life good. It is only through the constant at¬

tempt to gain happiness that men can learn the desirability of nothingness ; and when this

knowledge has become universal, or at least

general, deliverance will come and the world

will cease. No better proof of the rational

nature of the universe is needed than that af¬

forded by the different ways in which men have hoped to find happiness and so have been led

unconsciously to work for the final goal. The

first of these is the hope of good in the present, the confidence in the pleasures of this world, such as was felt by the Greeks. This is fol¬

lowed by the Christian transference of happi¬

ness to another and better life, to which in turn succeeds the illusion that looks for happiness in progress, and dreams of a future made worth

while by the achievements of science. All alike are empty promises, and known as such in the

final stage, which sees all human desires as

equally vain and the only good in the peace of Nirvana.

The relation between philosophy and religion

lies in their common recognition of an underly¬

ing unity, which transcends all the apparent

differences and divisions due to individual phe¬

nomena. Many changes must take place in the

existing religions before they will be suited to modern conditions, and the resulting religion

of the future will be a concrete monism.

The Philosophy of the Unconscious has been

the subject of many different estimates, but is regarded as having less intrinsic than historical value. Its influence upon other thinkers was

especially marked during the years following

its first appearance, but at present that influence has much decreased.

Bibliography. — Drews, (Eduard von Hart¬

mann's Philosophic und der Materialismus in

der Modern Kultur) (Leipzig 1890) ; id., (E.

von Hartmann's Philosophisches System*

(1902); Schneidewin, (Lichtstrahlen aus

Edouard von Hartmanns sanuntlichen Wer—

ken) ; Koeber, (Das philosophische System

Eduard von Hartmanns* ; Plumacher, (Der

Kampf urns Unbewusste) (2d ed., Leipzig

1890) ; Sully, Pessimism5 (London 1891).

Consult also Erdmann, (History of Philosophy,*

and Falckenberg, (History of Modern Phi¬

losophy. *

Grace Neal Dolson,

Professor of Philosophy, Wells College.

HARTMANN, Moritz, Austrian poet and

novelist: b. Duschnik, Bohemia, 15 Oct. 1821; d.

Vienna, 13 May 1872. He was educated at

Prague and Vienna and taught in Vienna till

1844, when he left the country on account of his political liberalism. Upon his return to Austria he was imprisoned but released by the Revolu¬

tion of March 1848. He sat in the Frankfort

Parliament of 1848 but fled from Vienna to es¬

cape imprisonment and took part in the <(Rump

Parliament® at Stuttgart. From 1849-68 he was

in voluntary exile in foreign countries ; was

Paris correspondent of the Kolnische Zeitung

and represented it in Crimea during the Russo-Turkish War; in 1860 lectured on German his¬

tory and letters in the Academy at Geneva ; and in 1865 became one of the editors of the Nene Freie Presse. He wrote (Kelch und Schwert*

(1845) ; (Neure Gedichte* (1847) ; (Reimchron—

ik des Pfaffen Marizius* (1849) ; (Der Krieg um den Wald* (1850) ; <Schatten) H851) ; (Adam and Eve) (1851); (Tagebuch aus der Provence und Languedoc) (1853) ; (Brief e aus Irland) ; (Der Gefangene von Chillon) (1863); (Die letzen Tage eines Konigs* (1866) ; (Nach der Natur* (1866) ; (Die Diomanten der Bar— onin) (1868), *etc.* His select poems were edited in 1874 and his works in 1873-74 (10 vols.).

HARTRANFT, har'tranft, Chester David,

American educator; b. Frederick Township, Pa., 15 Oct. 1839: d. 30 Dec. 1914. He was graduated at the University of Pennsylvania in 1861 and at the New Brunswick Theological Seminary in 1864; was pastor of the Dutch Reformed church at South Bushwick, N. Y., in 1864-66, and of that in New Brunswick, N. J., in 1866-78. In 1879 he was appointed professor of ecclesiastical history at the Hartford Theo¬ logical Seminary; in 1888 was elected its presi¬ dent, and held the chair of Biblical theology 1892-97 and of ecclesiastical dogmatics from 1897 to 1903. He resigned the presidency in

1903 to engage in literary work in Germany.

He was at one time president of the Conserva¬

tory of Music at New Brunswick, N. J.

HARTRANFT, John Frederick, Amer¬

ican soldier: b. New Hanover, Pa., 16 Dec.

1830; d. Norristown, Pa., 17 Oct. 1889. He was graduated at Union College in 1853, and in 1859

was admitted to the bar. At the outbreak of

the Civil War he organized the 51st Pennsyl¬

vania regiment, was made its colonel and with

it participated in Burnside's expedition to North Carolina (1862). He also commanded the regi¬

ment in a charge at Antietam, and at Fredericks¬

burg. In March 1865, he commanded a division

of the Ninth corps in their assault on Fort Stead¬

man, and was brevetted major-general. He was

elected auditor-general of Pennsylvania in 1865, and reelected in 1868. From 1872 to 1878 he

was governor of Pennsylvania, and thoroughly

reorganized the Pennsylvania militia, which

from 1879 he commanded, with rank of major-general.

HART'S-HORN, the horn of the common

stag and its decomposition products. The sub¬

stances derived from the horns were the volatile liquor, salt and oil,

and the ash which remains when the horns are calcined in the air. The

fluid portions are got by destructive distillation in a convenient still, and are separated, the salt mechanically, and the others, after washing with HARTSUFF — HARTZELL

water, by repeated rectification either alone or with quicklime, by which the more volatile por¬

tions are got free from the tarry matter and

heavier oils. The salt which is formed in this operation is ammonic carbonate, which in part

condenses the neck of the retort, in part is

washed over by the aqueous vapor into the

receiver ; and when the ammonia is got pure

from the distillate and is condensed in water it constitutes the spirit of hart's-horn. The vola¬

tile alkali or spirit of hart's-horn is now no longer obtained from that source, except in

special circumstances ; the ammonia of com¬

merce is now obtained from gas-liquor, from

blast-furnaces or from other sources.

HARTSUFF, George Lucas, American

soldier : b. Tyre, Seneca County, N. Y., 28 May 1830; d. New York, 16 May 1874. He was grad¬

uated from West Point in 1852, entered the

artillery, was on duty on the frontier and in Florida in the Civil War,

became assistant adju¬

tant-general, with rank of captain, in 1861, and major in 1862. Later appointed major-general

of: volunteers, he was one of the board for re¬

vision of the rules and articles of war and the preparation of a code for the government of the armies in the field. He was mustered out of

the volunteer service in 1865, and in 1871 was retired from the regular army with rank of

lieutenant-colonel and brevet major-general.

HARTSVILLE, Engagements at. Hartsville, Tenn., on the north bank of the Cumber¬

land River, about 35 miles northeast of Nash¬

ville, is an important crossing and connected by good roads with Lebanon on the south and

Gallatin on the northwest. In August 1862 Gen.

John H. Morgan, with his Confederate com¬

mand, was operating north of the river and

Gen. R. W. Johnson, with a cavalry command,

was sent to drive him back. Johnson, approach¬

ing on the Gallatin road, attacked Morgan 21

August, near Hartsville, and was defeated with

a loss of 80 killed and wounded, and 75 prison¬

ers. On 6 Dec. 1862 Hartsville was held by

Col. A. B. Moore, with a Union force of three regiments of infantry, a regiment and a com¬

pany of cavalry, and a section of artillery, in all about 2,100 men. Morgan had been instructed

by General Bragg to operate on General Rosecrans' lines of communication in rear of Nash¬

ville and, learning that Moore was isolated, with no supports near, resolved to capture him.

While two infantry brigades of Cheatham's

division and Wheeler's cavalry demonstrated on

Nashville, Morgan, with four regiments and a

battalion of cavalry, two regiments of infantry and a battery, set out from Baird's Mills, 25

miles south of Hartsville, on the morning of

6 Dec. 1862, marched through Lebanon, crossed

the Cumberland below Hartsville, during the

night, disposed his forces so as to cut off

Moore's retreat on the roads leading to Gallatin and Castalian, posts occupied by other Union

commands, and early in the morning of 7

December, closed in on the Union camp, sur¬

prised it, attacked the troops, who were being hastily drawn up to receive him and, after a

stubborn fight of an hour and a half, defeated and captured the entire command. Col. John

M. Harlan, in command of a small Union bri¬

gade at Castalian Sorings, nine miles away, hear¬

ing the noise of battle, marched to Hartsville and attacked Morgan's rear-guard as it was

recrossing the river, recapturing some of the

wagons taken. The Union loss was 58 killed,

204 wounded and 1,834 captured and missing.

The Confederate loss was 21 killed, 104

wounded and 10 missing. Consult Official

Records) (Vol. XX).

HARTT, Charles Frederick, American

geologist: b. Fredericton, N. B,, 23 Aug. 1840; d. Rio de Janeiro, Brazil, 18 March 1878. He

was a pupil of Agassiz in the Museum of Com¬

parative Anatomy at Harvard, and accompanied

the great naturalist as geologist of a Brazilian expedition (1865). During this expedition he

explored the coast from Bahia to Rio, made

extensive zoological collections and by his re¬

searches made himself a leading authority on

the natural history of South America. In 1875

he was appointed chief of the geological surveys of the empire of Brazil. He was also from

1876 director of the National Museum at Rio,

where are deposited his collections, the most

complete of South American geology in exist¬

ence. He published (Geology and Physical

Geography of BraziP (1870), and Contribu¬

tions to the Geology and Physical Geography

of the Lower Amazon) (1874). Consult Hay,

(The Scientific Work of Prof. Charles Fred¬

erick HartP (1899).

HARTWELL, Ga., town and county-seat

of Hart County, the terminal of a branch of the Southern Railway, 100 miles northeast-east of

Atlanta. Its educational institutions include a

high school. There are cotton, flouring and

sawmills, and a fruit cannery. Pop. 2,323.

HARTWELL, Ohio, village of Hamilton

County, eight miles north of Cincinnati, on the Cincinnati, Hamilton and Dayton and on the

Cleveland, Chicago and Cincinnati railroads.

It has manufactures of wagons and carriages

and a general retail and agricultural trade.

Pop. 2,823.

HARTY, Jeremiah J., American Catholic

prelate: b. Saint Louis 1853. He was grad¬

uated from the Saint Louis University in 1872, and took a theological course at Saint Vincent's College, Gape Girardeau, Mo. He was or¬

dained priest in 1878, and appointed assistant

pastor of Saint Bridget's parish in Saint Louis, holding this position until 1888, when he was

commissioned to build the church and organize

the parish of Saint Leo in the same city. His organizing work has been most successful. In

1903 he was appointed archbishop of Manila,

and in 1916 was translated to Omaha, Neb.

HARTZELL, harts'el, Joseph Crane,

American Methodist Episcopal bishop: b. near

Moline, Ill., 1 June 1842. He was graduated

at Ohio Wesleyan University in 1865, and from

Garrett Biblical' Institute in 1868. He was or¬

dained to the ministry in 1866, and held pastor¬

ates successively at Pekin, Ill., 1868-69, New

Orleans 1870-73. In the latter year he founded and became editor of the Southwestern Chris¬

tian Advocated He was assistant secretary of

the Southern Education Society 1882-88, and

corresponding secretary 1888-96. In the latter

year he was elected and consecrated bishop for Africa, in which capacity he served for 20 years, retiring by age limit 1 June 1916. He founded several important mission centres in Central,

East and West Africa, chiefly among the black

races, having, besides the support of the Metho-744

dist Episcopal Church, the cooperation of

several governments and distinguished states¬

men, including Earl Grey and Cecil Rhodes.

He founded also missionary work in North

Africa extending from Morocco to Tripoli

among the Mohammedans with the cooperation

of the French government. He is vice-president

of the World's Sunday School Association and

chairman of the committee on the work in Mos¬

lem lands, member of the Board of Foreign

Missions and of the executive committee of

the Freedmen's Aid Society having charge of

large educational interests in the Southern

States. He is a frequent contributor to the

religious and secular press and the author of

several important publications, including a re¬

port upon the moral condition of Moslem child¬

hood. He is also well known as a preacher and lecturer. He was made Knight Commander of

the Order for the Redemption of Africa by the republic of Liberia.

HARTZENBUSCH, harts'en-boosh, Juan

Eugenio, Spanish dramatist, critic and poet :

b. Madrid, 6 Sept. 1806; d. there, 2 August

1880. His father was German and his mother

Spanish. His father intended him for the

Church and the boy spent his earlier years in a Jesuit college where he

received a good classi¬

cal education and conceived a love for Spanish literature. He early began writing poems and

set himself to study dramatic literature. But

his father losing his reason in 1823, young

Hartzenbusch resorted to the trade of carpen¬

ter, which he had learned from his parent, to meet expenses. He continued his studies as

best he could and made translations into Span¬

ish from French and Italian dramatists. The

death of his father in 1830 left him with his hands free. In 1831 he wrote two dramas

based on classical models, neither of which re¬

ceived any attention from the public. So he

determined to seek a more popular medium.

This he found in sentiment, love and human

interest keyed to the age in which he lived, and embodied in (Los amantes de Teruel,5 which

was presented at the Teatro Principal in Ma¬

drid, in 1837. It was notably successful and

placed the author among the popular drama¬

tists of Spain. The appearance, the fol¬

lowing year, of (Dona Mencia> increased

the reputation of the young author. The

latter, inferior to (Los amantes de TerueP

in almost every respect, owed its popularity to certain political principles presented in it and to the brilliancy of many parts. Its

weakness

consists in a lack of coherency in the plot and the indistinctiveness of the character delinea¬

tion. (Alfonso el Casto) (1841); (Juan de las vinas) (1844) ; and (La Jura en Santa Gadea5

(1845) are all dramas that received the

approbation of the public and increased still

more the author's reputation and placing him

among the foremost dramatists of his century.

His national popularity had gained for him,

in 1844, the position of chief clerk in the

National Library, which suited his literary in¬

clinations, since it gave him a certain amount of leisure and the opportunity to search for

literary material, especially for the construc¬

tion of his dramas. The success of (La Madre

de Pelayo> (1846), coupled with the fame

brought the author by his previous dramas,

led to his election to the Spanish Academy in 1847. In 1862 Hartzenbusch became head of

the National Library, a post he held for 13

years, when he retired owing to ill health.

One of the most noted literary figures of

the 19th century, Hartzenbusch was active in

almost every field of literary endeavor. Be¬

ginning the translation of foreign plays into

Spanish at the age of 15, he continued the work of translation or adaptation for years, thus

enriching the field of the Spanish stage. Be¬

coming dramatic critic in 1842, he did much for several years to improve the native drama and

to free it from binding and harmful traditions of past dramatic endeavors. Had he given all

his time to the writing of dramas he might

have been one of the most productive drama¬

tists of Spain. But he liked to vary his liter¬

ary work; for he had much of the antiquarian

in his composition. His editions or prefaces

thereto of the works of famous Spanish writ¬

ers, published in the Rivadeneira Library of

Spanish authors, display a wealth of knowl¬

edge and a rare critical ability possessed by

few Spanish literary critics. These cover 10

volumes and include the dramatic works of

Tirso de Molino, Calderon, Alarcon and Lope

de Vega. Hartzenbusch's dramatic works in¬

clude 34 translations of foreign dramas, 10

dramas recast and 25 original dramatic pro¬

ductions. Among the most notable of these are, in addition to those already mentioned,

(Honoria) (1843) ; *La Ley de Raza5 (1852) ;

(Vida por houra) (1852), all symbolical

dramas; (Las hijas de Gracian Ramirez5

(1831) ; and (E1 infante de Don Fernando y el Antequera5 (1836), two unsuccessful historical

dramas; (La visionaria5 (1840); and (La Coja

y el Encojido5 (1843), two character dramas;

(Derechos Postumos5 (1856); and (La hija de

Cervantes5 (1861), both curtain raisers. There

are numerous editions of Hartzenbusch's works,

one of the best being that of the Coleccion de escritores case llanos (Madrid 1877, et seq.).

Consult Fernandez-Guerra, (Austores dramat—

icas. contemporaneos5 (Madrid) ; Pineyro,

Enrique, (E1 Romanticismo en Espana.5

HARUN-AL-RASHID, ha -roon'al-rash'id,

or HAROUN-AL-RASHID, caliph of Bag¬

dad: b. Rhey, near Teherah, about 765 a.d. ; d.

Tus, 2 April 809. (See Caliph). The popular

fame of this caliph is by the (Arabian Nights'

Entertainments5 (q.v.), in which Harun, his

wife, Zobeide, his vizier, Giaffar, and his chief eunuch, Mesrur, are frequent and conspicuous

characters. He was the fifth caliph of the

dynasty of the Abbassides, and the most power¬

ful monarch of his race. In 786 he succeeded

his older brother, Hadi, who had vainly at¬

tempted to exclude him from the throne, and

by his conquests and vigorous internal adminis¬

tration raised the caliphate of Bagdad to its

greatest splendor, and made his reign esteemed

the golden era of the Mohammedan nations.

His favorite ministers were Yahia and his son

Giaffar, or Jaafar, of the ancient Persian family of the Barmecides, whose ancestors had for

many generations been hereditary priests at

the fire temple of Balkh, and who now rapidly exalted the family to the highest dignities under the caliphate. In war he was successful against the Byzantines. His empire at its greatest ex-HARUSPICES — HARVARD UNIVERSITY

tended from Tunis in North Africa to Trans—

oxania. He was despotic and in his later years became suspicious of all around him. He exe¬

cuted his vizier and near relatives, which with other unreasonable acts caused general dis¬

order and rebellion in his realm. He fell a

victim to apoplexy while endeavoring to crush

the rebels. Consult Palmer, (Haroun-al—

RashidP

HARUSPICES. See Aruspices.

HARVARD, John, American clergyman,

founder of Harvard University: b. England,

probably in Middlesex, 1607 ; d. Charlestown,

Mass., 24 Sept. 1638. He was entered as a

pensioner at the University of Cambridge in

1628, was graduated B.A. in 1631-32, and M.A.

in 1635, and having emigrated to America was

made a freeman of the colony of Massachusetts, 2 Nov. 1637. The following year, as appears

from the town records, a portion of land was

set off for him in Charlestown, where he exer¬

cised the ministry. In April 1638, he was ap¬

pointed one of a committee ((to consider of some things tending toward a body of laws.® These

are the only particulars known of his life. His property at his death was worth about £1,600,

onehalf of which he gave for the erection of the institution which bears his name; but part of this bequest, it is said, was diverted from its original purpose. He also left to the college a library of more than 300 volumes, indicating in their selection the taste and skill of a scholar.

A monument to his memory was erected in the

burial ground of Charlestown by the alumni of

the university, and inaugurated with an address by Edward Everett, 26 Sept. 1828. See Harvard

University.

HARVARD, Ill., a city and important rail¬

way junction in Chemung Township, McHenry

County, at the intersection of three divisions

of the Chicago and Northern Railroad, 63 miles northwest of Chicago. It has city waterworks,

railroad repair shops, a malthouse and brewery, manufactures of agricultural implements,

wagons and carriages and grist and woolen

mills. Pop. 3,294.

HARVARD UNIVERSITY, the oldest in¬

stitution of learning in the United States, was founded in Cambridge, Mass., in 1636. At a

meeting of the General Court of the colony of Massachusetts Bay, convened on 8 September,

six years after its first settlement, it was voted to give £400 toward a <(schoale or colledge,®

for the purpose of educating the <(English and Indian youth in knowledge and Godliness.® The

ensuing year 12 of the eminent men of the

colony, including John Winthrop and John

Cotton, were authorized ((to take order for a

college at New Towne.® The name Cambridge

was adopted soon afterward in recognition of

the English university where many of the

colonists had been educated. In 1638 John

Harvard, a young Non-Conformist minister,

died in Charlestown, leaving to the college £750

and his entire library of 300 volumes. The

institution was opened soon after and was

named Harvard in honor of its first benefactor.

In 1637 the first building was erected. The

first president was Rev. Henry Dunster, who

was elected in 1640. The first graduating class was in 1642, and consisted of nine members.

This same year a change was made in the gov¬

ernment of the college; a board of trustees was created, the members of which were the gov¬

ernor, the deputy governor, the teaching elders of the ((5 next adjoining towns® — Boston, Cam¬

bridge, Charlestown, Dorchester and Roxbury

— the magistrates and the president of the col¬

lege. The college was established as a corpora¬

tion in 1650, with power of control over the edu¬

cational and financial concerns of the institution.

The members of the corporation were the pres¬

ident, the treasurer and five fellows. In 1657

the corporation charter was changed so that the overseers had practically no control over the

internal management of the college, although a

final appeal might be made to them if necessary.

Now there were two governing bodies; the over¬

seers and the corporation, at times working in harmony and again antagonistic to each other.

In 1780 the board of overseers consisted of the governor, lieutenant-governor, senate and coun¬

cil of the Commonwealth, the president of the

college and the ministers of the Congregationalist churches of the <(six adjoining towns® al¬

ready mentioned. In 1810 a further change was

made in the board of overseers, and instead of the senate and the ministers of certain churches, there were substituted 15 Congregationalist min¬

isters, 15 laymen, the president of the senate and the speaker of the house, all to be inhab¬

itants of the State. The members constituting

the senate were restored as overseers in 1814.

A still further broadening of the spirit of the board was shown by the act of 1834, but not

ratified until 1843, when clergymen of all de¬

nominations were made eligible for membership

to the board, and in 1851 an act was passed in which no mention was made of clergymen, but

the clause that made only inhabitants of the

State eligible was retained. It was not until 1880

that Harvard was freed from all sectional lines, and non-residents of the State of Massachusetts became eligible for membership to the board of overseers.

During the 17th century Harvard had to con¬

tend with serious obstacles, many of which

had their origin in religious differences or shades of differences; but the desire to give the youth of Massachusetts an opportunity to learn the

things taught to their fathers in the schools of Europe never faltered. It required heroic cour¬

age then to persevere in such a work, which at present seems a comparatively easy task. The

religious controversies continued even after do¬

nations and endowments had come to the aid

of the institution and had made its success seem almost certain. Under the presidency of Rev.

Increase Mather, the college was placed under

the control of the Calvinists (1692), but in 1707

the liberals gained the ascendency. An Eng¬

lish merchant, Thomas Hollis, in 1721, founded

a chair of divinity, and directed that no re¬

ligious test should be given to the candidate

for the professorship. The gift was refused by the overseers, but the corporation urged its

acceptance, and the latter finally prevailed.

However, the first candidate for a professorship was really subjected to a religious test, for a confession of faith on various disputed points

was exacted of him. The religious contro¬

versies were carried so far that at one time

there, was a strong effort made by the orthodox friends of learning to found another college in the colony; but Governor Bernard refused

them

a charter.

In 1764 the college met with a serious loss

by fire; the first Harvard Hall, containing the library and apparatus, was entirely destroyed,

but the loss was repaired to some extent by

the generous aid of the Colonies. Harvard

was loyal to the American cause during the

Revolutionary period ; even going so far in

the readjustment of its financial affairs as to suffer considerable loss. The alumni and stu¬

dents have ever been patriotic, ready to contrib¬

ute their best to the needs of their country. The fine building, Memorial Hall, was erected by the alumni in memory of their dead who fell in

the Civil War. Harvard has always followed

a conservative course when parties were agi¬

tating questions of government.

Between 1636 and 1782 Harvard College con¬

ferred only the degrees of bachelor and master of arts, but in 1780 the term university was ap¬

plied to it in the constitution of the State of Massachusetts. The class of 1768 evidently gave some attention to dress, as they voted to wear homespun at their graduating exercises, al¬

though their action on the matter is often

quoted to prove their democratic simplicity. In 1782 and 1783 three professorships of medicine

were established, and the first degree of bachelor of medicine was conferred in 1788. In 1810 the lectures in medicine were transferred to Boston, and there the first medical college was built.

The law school was established in 1817, and it has the distinction of being the earliest school of law in the country connected with a univer¬

sity and authorized to confer degrees in law.

The divinity school was a gradual outgrowth

of the college; the Hollis professorship of di¬

vinity, which has been mentioned, was estab¬

lished in 1721, but the divinity faculty was not formally organized until 1819. It is now unde¬

nominational, no assent to the special doctrines of any sect or denomination of Christianity

being required of any instructor or student.

The schools of medicine, law and divinity are

the three oldest additions to the college proper, and it was decided that such an institution, hav¬

ing four schools and several departments, justi¬

fied the title university.

In about 1822, a number of the friends of education and of the institution thought the time had come when further changes should be made in the work required of the students. George Ticknor (q.v.), professor in the depart¬ ment of modern languages, urged that some division of studies should be made whereby students might be permitted to pursue special courses or specialize on certain subjects. A committee, with Joseph Story as chairman, was appointed to investigate the wisdom of such a change, and how best to meet the needs of the students. The committee reported (1824) the advisability of instituting two lines of study —the one a course necessary for a degree, the other a scientific and mechanical course for those not intending to take degrees, but who de¬ sired to fit themselves for certain departments of work. The departure from old customs as recommended by the committee was opposed by many, but in 1825 changes were made and the special students were admitted. Professor Ticknor and later his successor, Henry W. Longfellow, introduced to some extent elective courses in the department of modern lan¬ guages, but not until a number of years later did these courses become

popular in other

departments.

Charles William Eliot (q.v.) was elected

president in 1869. At this time the departments were almost independent schools, to which no

entrance examinations were required, but the

students were largely from classical preparatory schools, the majority of which were located in New England. The college required certain

courses, and all demanded good work and a

high degree of scholarship before graduation.

In four years practically a reorganization had

been made, the departments had been correlated

and individual work had been given recognition.

In 1909, Dr. Eliot retired and was succeeded by Dr. Abbott Lawrence Lowell, formerly profes¬

sor of the science of government at the university.

To Harvard much credit is due for the con¬

servative manner in which it has dealt with the question of higher education of women. The

Society for the Collegiate Instruction of

Women was the name of an organization which

began the work (1869) of providing ways and

means for giving young women an opportunity

to obtain a collegiate education. The name of

the organization was changed, in 1894, by the

General Court of Massachusetts to that of Radcliffe College (q.v.). Systematic collegiate in¬

struction is now given in this college, under the professors and teachers of Harvard University.

The requirements are the same as for admission to the university.

The various schools and departments of

Harvard University now comprise: (1) Har¬

vard College and the Graduate School, estab¬

lished in 1872 for students making orig'nal re¬

search. In 1916 there were in attendance 3,017

students under the faculty of arts and science.

Of this number 598 were in the graduate school and were engaged in original research. For the students of this school who are engaged in

original investigations there is available a num¬

ber of fellowships, at present 41, which are

from $400 to $1,200. The Edward Austin Fel¬

lowship and the Austin Teaching Fellowship

are given only to resident graduate students,

Some of the fellowships may be given to per¬

sons pursuing their studies in other parts of

the country or abroad : but non-resident ap¬

pointments are given only to persons who have

been resident students in some department of

the university. (2) The law school has been

mentioned. The attendance in 1916 was 788.

(3) The divinity school, already noticed, has

an attendance of 64. (4) The medical school,

founded in 1782, and the dental school, estab¬

lished in 1867, were united in 1899 and are in charge of the faculty of medicine. The school

is located in Boston. The attendance in 1918

was, in the medical school, 387 ; in the dental school, 271. The new buildings erected since

1903 for the accommodation of the medical de¬

partments are second to none other in the

world. There are seven separate buildings ; the central structure and two of the side pavil ons are provided for by the gift of $1 000,000 from J. Pierpont Morgan and $1,000,000 from other

friends. The site comprises 26 acres, in Brook¬

line, about three miles from the main buildings of the university in Cambridge. (5) The Grad¬

uate School of Business Admin' stration, found¬

ed in 1908, had an enrolment of 190 in 1916.

(6) The Bussey Institute, a school of agricul¬

ture and horticulture, was established in 1 870 in accordance with the will of Benjamin Bussey.

THE YARD, HARVARD UNIVERSITY

Showing University, Gray's, Matthew's, Massachusetts, and Harvard Halls HARVEST BUG

It is at Jamaica Plain, in the southwestern part of Boston. (7) The Arnold Arboretum, estab¬

lished in 1872, is devoted to sc entitle research in forestry, dendrology and arboriculture. • It was founded under the will of James Arnold.

It is practically a large park containing about 220 acres, and is located in West Roxbury.

(8) The astronomical observatory was estab¬

lished in 1843 by means of a public subscription.

The Sears Tier was built in 1846 and two years later Edward Bromfield Phillips bequeathed to

the university the sum of $100,000 for the obser¬

vatory; this early bequest has since been sup¬

plemented by man}'- others, so that the observa¬

tory now has an endowment of about $900,000.

It has a director and four other professors and 40 assistants. A branch station is established

on a mountain 8,000 feet high, near Arequipa,

Peru. The annals of the observatory fill about 50 volumes. Among the more important in¬

struments are the 15-inch and 6-inch equatorial telescopes, the 8-inch transit-circle, the 11-inch Draper photographic telescope, the 8-inch photo¬

graphic telescope and the meridian photometer.

A special grant has recently been made by the Carnegie Institution for the study of the col¬

lection of photographs at the Harvard Obser¬

vatory. The amount of material, including

photographs and photographic charts of the

sky that has been collected in this department, requires a special building for its accommoda¬

tion. (9) The university library, including the libraries of the schools and departments, con¬

tains about 1,181,635 volumes and 701,358 pam¬

phlets. (10) The Gray Herbarium, so named

because it contains the herbarium of Asa Gray

(q.v.), presented to the university in 1864.

(11) The university museum is made up of the

following collections : the Peabody Museum of

American Archaeology and Ethnology ; the

Museum of Comparative Zoology, established

in 1859 by private subscription, State aid and the collection of Louis Agassiz, and valuable

gifts from his son ; the Mineralogical Museum,

established in 1890-91 ; the Semitic Museum,

completed in 1902; the William Hayes Fogg Art

Museum, completed in 1895 ; and the Germanic

Museum, established in 1902. (12) The botani¬

cal garden, established in 1809, covers about

seven acres and contains thousands of plants

for scientific study.

Great credit is due Harvard for its leader¬

ship in the movement to better the teaching of the English language and literature in the

schools of the country. Harvard mentioned the

subject in its catalogue of 1865-66; an an¬

nouncement was made in the catalogue of 1869-70 that <(Students would be examined, as early as possible after their admission, in English.®

In 1874, for the first time, every applicant for admission to Harvard was required to present

English composition. The report of the com¬

mittee who visited the preparatory schools to

ascertain what they were doing with the subject of English, the discussions by educators on the ((new demand of Harvard,® the progress of the

movement, the grand results, all now are parts of the (<History of Education® of America.

The university summer school gives short

courses of study under the charge of a commit¬

tee of the faculty of arts and sciences, and is held in the college buildings during the sum¬

mer vacation. The school is popular and has

had a large attendance each year. In 1910 the students numbered

about 700. Athletics are

provided for — two fields of 24 acres each and the Hemenway gymnasium furnish opportuni¬

ties for physical training. The stadium erected on Soldiers' Field has a seating capacity of

about 30,000. It is shaped like the letter <(U,®

with the open space toward the Charles River.

It is of steel and concrete construction. The

mezzanine floor under the seats, the promenade

above the seats, the stairs, the perfect arrange¬

ment of all the parts make this stadium a model of construction. It was built under the aus¬

pices of the class of 79. A club house, called the Harvard Union, was donated by Henry Lee

Higg'nson in 1901. The Phillips Brooks house

is used for religious meetings. In 1903 Har¬

vard received a valuable collection of plaster

replicas of Germanic art; a number of them

were given by Emperor William II of Ger¬

many. Among them is a replica of the eques¬

trian statue of the Great Elector by Schulter, one of Frederick the Great, by Schadow, a cast of the golden gate of the cathedral of Freiburg, the bronze door of Hildesheim Cathedral, on

which is the Biblical story of Creation, the wood screen of Naumburg Cathedral and several

other reproductions of great value.

In 1915 the Widener Memorial Library was

completed. This building was erected by Mrs.

George D. Widener of Philadelphia in memory

of her son, Harry Elkins Widener, a graduate

of Harvard in the class of 1907, who lost his life with the sinking of the Titanic.

In 1920, the number of members of the cor¬

poration was 7; of overseers, 30; of professors and instructors, tutors and assistants, 786; of students in all the schools and departments,

5,273. In 1915 the invested funds of the uni¬

versity amounted to $28,177,578; the annual in¬

come was $3,032,999, and bequests and gifts

amounted to $1,220,021. Harvard has had 23

presidents, including the present incumbent,

Abbott Lawrence Lowell. There are 13

periodicals which represents the interests of

the university as a whole, and of special schools and departments.

Bibliography. — Quincy, (The History of

Harvard University 5 ; Thayer, (Historical

Sketch of Harvard University5 ; Hill, (Harvard

College by an Oxonian5 ; Peabody, (Harvard

Graduates Whom I Have Known5 ; Bush, his¬

tory of Harvard5 ; Eliot, (A Sketch of the

History of Harvard University5 ; Thayer, /His¬

tory of Middlesex County.5

HARVEST BUG or MITE. See Mites.

HARVEST-FISH. See Butterfish.

HARVEST-FLY. A cicada (q.v.).

HARVEST-MOON, the full moon nearest

to the autumnal equinox, when the earth's

satellite, almost full, rises for several nights in succession close to the same hour. This phe¬

nomenon is less plainly seen in the United

States than in higher latitudes, and is not met with in the tropics. It is due to the fact that at the time of the autumnal equinox the full

moon, being exactly opposite the sun, is in that part of her orbit which makes a small angle

with the horizon at the point of moon rise.

HARVEST MOUSE. See Mouse.

HARVESTMAN, or HARVEST SPIDER.

See Daddy-longlegs.

HARVEY, George Brinton McClellan,

American publ'sher and editor: b. Peacham,

Vt., 16 Feb. 1864. After a secondary education, he became a reporter successively for the

Springfield (Mass.) Republican, the Chicago

News and the New York World; was for a

time managing editor of the World and later a constructor and president of various electric

railways. He was for a time president of the

reorganized house of Harper & Brothers, but

purchased and became editor of the North

American Review in 1899. In 1921 President

Harding made him Ambassador to Great Britain.

He published (Women) (1908) ; (The Power of

Tolerance) (1911).

HARVEY, Sir John, British army officer

and administrator: b. 1778; d. 1852. During the War of 1812 he was deputy adjutant-general of

the army in Canada, defeated the Americans at

Stoney Creek and took part in the battle of

Lundy's Lane and Chrystler's Farm. He was

aide-de-camp to the Duke of Wellington in

1815 and was present at the battle of Waterloo.

From 1837-41 he was lieutenant-governor of

New Brunswick, and his firm and tactful han¬

dling of the socalled <(Aroostook War, in 1838-39, on the borders of Maine and New Bruns¬

wick, did much to avert an actual conflict.

From 1841 — 46 he was governor of Newfound¬

land and lieutenant-governor of Nova Scotia,

1846-52.

HARVEY, Moses, Newfoundland his¬

torian: b. Armagh, Ireland, 25 March 1820; d.

Saint John's, Newfoundland, 3 Sept. 1901. He

was graduated at Queen's College, Belfast, in

1840; was pastor of the Free Presbyterian

Church, Saint John's, Newfoundland, 1852-78,

when he retired from the ministry and devoted

himself to literary and scientific studies.

Among his works are Newfoundland, the Old¬

est British Colony) (1883) ; (TextBook of

Newfoundland History, J *etc.*

HARVEY, William, English physician : b.

Folkestone, 1 Apri-1 1578; d. London, 3 June

1657 ; he was graduated at the University of Cambridge in 1593 and later at Padua. He is famous as the discoverer of the circulation of the blood.

HARVEY, William Hope, American au¬ thor: b. Buffalo, Putnam County, W. Va., 16 Aug. 1851. He was educated at Marshall Col¬ lege (W. Va.) and practised law in 1871-84. He appeared as an author under the pseudonym ˆCoin® in (Coin's Financial School* (1894), in advocacy of bimetallism as a currency stand¬ ard. Other works by him are (A Tale of Two Nations> (1894) ; (Coin's Financial School Up to Date) (1895) ; (Coin on Money, Trusts and Imperialism) (1899). In 1900 made his home in the Ozark Mountains in Arkansas, founding the village and settlement of Monte Ne. In 1915 he wrote the book entitled (The Remedy,* which has become the prospectus of an educa¬ tional organization with a national committee promoting its teachings, of which committee Mr. Harvey has been made chairman.

HARVEY, Ill., city in Cook County, on the Cleveland, Chicago, Cincinnati and Sa nt Louis, Big Four, Grand Trunk

and the Illinois Central railroads, 19 miles south of Chicago. It was founded in 1891 and incorporated in 1892.

Among first cities in State to adopt commission form of government. Its proximity to Chicago gives it the advantages of a residential city and its railroad facilities are an aid in the de¬velopment of its manufactories. Some of the chief industrial establishments are railroad sup¬ply shops, an automobile factory, motor-truck factory, gas-stove factories, steel-car factory, foundry equipment factory, electric-machinery factory, automobile-engine factory, whiting factory, machine shops in which are manufac¬tured ditching and mining machinery. The trade is principally in its manufactures and agricul¬tural products. Pop. 9,220.

HARVEYED ARMOR PLATE. See

Armor Plate; Steel.

HARWOOD, Andrew Allen, American

naval officer: b. Settle, Pa., 1802; d. Marion, Mass., 28 Aug. 1884. He was a great-grandson

of Benjamin Franklin (q.v.). In 1818 he en¬

tered the navy and served in the suppressing of the slave trade and piracy in the West Indies; in 1835-37 was with the Mediterranean squad¬

ron ; in 1848 was given the command of the

Cumberland, and in 1855 promoted to the rank

of captain. In 1862 he was appointed chief of the Bureau of Ordnance and Hydrography; in

1863 he was made commandant of the Wash¬

ington navy yard and Potomac flotilla, having

the rank of commodore, and retired in 1869

with the rank of rear-admiral. He published

(Law and Practice of United States Navy

Courts-Martial * (1867), and (Summary

Courts-Martial.)

HARZ (harts) MOUNTAIN (Ger.

Harzgebirgc') , the northernmost mountain

range of Germany, extending about 60 miles

through Prussia, Brunswick and Anhalt, be¬

tween the rivers Weser and Elbe, and occupy¬

ing an area of about 786 square miles. The

range, composed chiefly of Devonian and

Lower Carboniferous formations, broken

through with granite, is divided into the Upper and Lower Harz, with average elevations of

2,100 and 1,000 feet, respectively, the maximum altitude, 3,745 feet, being reached in the Brocken (q.v.). Woods and fine pastures abound; sil¬

ver, iron, lead, copper and zinc are mined, and marble, alabaster and granite quarried. Trav¬

ersed by fine roads and accessible by railroads, the range is a favorite touring ground, its in¬

terest enhanced by the traditions and weird

legends which had their birth in this romantic region.

HASAN, ha'san, and HUSAIN, hu'sen,

also written Hassan and Hosein, brothers, the

eldest of the three sons of Fatimah, daughter

of Mohammed, and Ali (q.v.), c6usin and

adopted son — as well as son-in-law — of the Prophet. Hasan and Husain were born in a.d.

625 and 626 respectively. After the death of

his father (Ali) in 661, Hassan was proclaimed caliph by the Arabians. But he was a faint¬

hearted, poor-spirited creature, entirely differ¬

ent from his valiant father and masterful

grandfather. Ali's powerful rival, Moawiya,

now determined to assert his title to the whole Moslem empire. Already recognized as caliph

in Syria and Egypt, he gathered an army and

marched against Kufa to oust Hasan. The

latter, however, nicknamed (<The Divorcer,**

was more intent on varying the composition of

his ever-changing harem than on the business

of public life and military enterprise. After a brief and inglorious reign of six months Hasan resigned the caliphate to Moawiya, and retired

with his household and his brother to Medina.

Here Hasan died by poison (a.d. 670) adminis¬

tered by one of his wives, who had been bribed with promises to commit this act by Yezid, son of Moawiya. Yezid succeeded his father (680)

as the second caliph of the Ommiad dynasty

(q.v.). Meanwhile, Husain had married a

Persian princess and had attracted a large fol¬

lowing among the Shiites (q.v.), in opposition

to the Sunni sect. He refused to acknowledge

Yezid as the lawful caliph, and, yielding to

the desires of his adherents, he started on his journey from Medina to Kufa, the seat of

Moslem government. He was accompanied by

his family and relatives, including women and

children, to the number of 80. Promises of

support came from Kufa and other districts if

he would appear in the city and claim his

rights. Arrived on the plain of Kerbala on the confines of Irak, where Kufa is situated, the

party of Husain, now strengthened by a num¬

ber of Bedouins, was surrounded by an army

of 80,000 horse. Seeing their cause hopeless,

the Bedouins withdrew, and in the general

slaughter that ensued Husain was killed, to¬

gether with his two sons, six brothers (sons of Ali), two sons of Hasan and six descendants

of Abu Talib (father of Ali). The women

and children, and a load of 70 trunkless heads, were carried into the city. A thrill of horror and grief ran through the Moslem empire.

Yezid disclaimed responsibility and received the sister of Husain and her two little sons with every mark of honor. The tragic scene was

repeated in every household and served to

strengthen the lineage of Ali. To the present

day, at each recurring anniversary of the trag¬

edy, which happened 10 Oct. 680 (Anno Hegira

61), the Moslems of every land observe the

death of Husain by vociferous lamentations,

beating their breasts and crying, <(Ya Hasan !

Ya Hosein P A passion play, based on the sub¬

ject, is now a recognized religious ceremonial

among millions of Mohammedans. In India

the celebration is known as the ((Hobson-Job—

son,® an Anglo-Saxon mutilation of ((Hasan—

Husain,® probablv invented by soldiers. (See

Caliphate; Mohammed; Ommiads). Consult

Muir, W., (Life of Mohammed) and (The Cali¬

phate > (London).

HASCALL, Milo Smith, American soldier :

b. Le Roy, Genesee County, N. Y., 5 Aug. 1829; d. Oak Park, Ill., 30 Aug. 1904. He was grad¬

uated from West Point in 1852, resigned from

the army, practised law in Indiana, entered the Federal army as a private at the outbreak of

the Civil War, rose to the grade of brigadier-general of volunteers, . distinguished himself

at the battle of Stone River, where he saved the day; was present at the siege of Atlanta, and resigned his commission in 1864. Subsequently

he was a banker at Goshen, Ind., and a real

estate dealer in Chicago.

HASDRUBAL, has'droo-bal, Carthaginian

general. He was the son of Hamilcar Barca,

and brother of Hannibal (q.v.), and on the

departure of the latter for Italy, 218 b.c., was left in command of the army in Spain. Hanno,

who had charge of the province north of the

Iberus, was defeated and dispossessed by Cn.

Scipio before Hasdrubal could come to his aid.

Scipio, reinforced by his brother, now crossed

the Iberus, and in 216 defeated Hasdrubal near that river. The Carthaginians then sent a

force, intended for the assistance of Hannibal, to the relief of Hasdrubal under the command

of his brother Mago. In 212 Cn. Scipio was

defeated and killed by the Carthaginians. Pub¬

lius Scipio was sent into Spain in 211, and after seizing New Carthage defeated Hasdrubal in

his camp at Bsecula in 209. Hasdrubal, with¬

drawing to the northern provinces, determined

to proceed to Italy, leaving his colleagues, Has¬

drubal, the son of Gisco, and Mago, to make

head against Scipio. He crossed the Alps in

207, accompanied by Gallic allies, and descended into Italy, and sent messengers to concert a

junction with Hannibal in Umbria, but his dis¬

patches fell into the hands of the consul,

Claudius Nero, who joined his colleague, M.

Livius, at Sena, and forced Hasdrubal to give

battle on the right bank of the Metaurus.

Being outnumbered, and ill-supported by his

Gallic allies, he was defeated, after an obsti¬ nate engagement, in which both sides suffered severely. When he saw the battle irretrievably lost he rushed into the midst of the enemy, and perished fighting sword in hand. Nero hastened back to Apulia, and is said to have announced to Hannibal the defeat of his brother by causing Hasdrubal's head to be thrown into his camp, 207 b.c.

HASHIMOTO SANAI, hah-shee-mo-to sah'-nigh, the Mazzini of Japan: b. Fukui, 18 June 1834; d. Yedo, 7 Oct. 1859. At a time when Japan was a hermit nation and men's ideas were local and narrow, and while they were violently opposed to foreign trade and intercourse, this man advocated both, urging also the importation and employment of Amer¬ ican teachers. In vision and argument he stood where Japanese men of light and leading stand to-day. Son of a physician in Fukui (q.v.), he was a brilliant student in the classics and in Dutch, going also to the large cities to seek out famous teachers. He welcomed Yokoi (q.v.) to Fukui and began an academy with a Euro¬ pean curriculum. He had great plans for Japan as a world power, through internal re¬

generation, proposing national government in a

unified nation with ministries or boards of ad¬

ministration, and the Mikado in supreme power

— the reality of to-day. For these opinions,

backed by action in Kioto, he was seized by the Yedo police, his house was searched, papers

were examined, and he was taken to Yedo and

beheaded. His voluminous writings, in lucid

and vivifying style, were published in Tokio

in 1907. Posthumous honors from the em¬

peror have been heaped upon his memory, sev¬

eral biographies written and the 50th anniver¬

sary of his death was in 1909 celebrated nation¬

ally. His brother Tsunetsuna, court physician

and president of the Red Cross Society in

Japan, died in 1908. Consult Brinkley, <A His¬

tory of the Japanese People) (1915).

HASHISH, hesh'esh, an Eastern narcotic

preparation, made from the tops and tender

parts of the cultivated hemp, the variety known as Cannabis Indica being chiefly employed.

The resin picked from the hemp is kneaded to¬

gether, or sometimes the drug is obtained by

decoction or infusion of the leaves. The resin 750

is taken in the form of pills or pellets, and the leaves are chewed, or smoked in conjunction

with tobacco. It is called bhang in India,

where it is mixed with sugar and eaten as con¬

fectionery. It is as powerful as opium and

produces intoxication and hallucinations ; some¬

times transporting the hashish-eater into an

ecstasy, or lulling him into somnolency or tor¬

por. Its after-effects are not so depressing as those of opium and it is often prescribed medic¬

inally as a soporific or anti-spasmodic.

HASKELL INSTITUTE. See Indian,

Education of.

HASKINS, Charles Homer, American

historical scholar: b. Meadville, Pa., 21 Dec.

1870. He was graduated from the Johns Hop¬

kins University in 1887, studied also at Paris and Berlin, was instructor in history at Johns Hopkins in 1889-90, and in the University of

Wisconsin was successively instructor in his¬

tory (1890-91), assistant professor (1891-92),

and professor of European history (1892—

1902). In 1899-1900 he was a lecturer in his¬

tory at Harvard, and in 1902 was appointed

professor of history there. He became Gurney

professor of history and political science in

1912, and has been dean of the Graduate School of Arts and Sciences, Harvard University,

since 1908. He is member of many learned so¬

cieties. He has published various articles and

special studies on the study and teaching of his¬

tory, mediaeval university life, mediaeval Latin literature, the mediaeval Church, and the his¬

tory of Anglo-Norman institutions, and (The

Normans in European History) (1915).

HASSALL, Arthur, English historian: b.

Bebington, Cheshire, England, 28 Sept. 1853.

He was educated at Oxford, where he has been

at various times since lecturer, tutor and ex¬

aminer. He is one of the recognized authori¬

ties upon European history, his published books including (Life of Bolingbroke) (1889) ;

(Louis XIV5 (1895) ; (Handbook of European

History) (1897) ; (The Balance of Power 1715—

89 5 (1896) ; (Class-Book of English History) (1901) ; (History of France) (1901) ; (The

Tudor Dynasty) (1904) ; (Survey of European

History5 (1906) ; (War and Reform5 (1906) ;

<The Expansion of Great Britain5 (1907) ;

(The Great Rebellion5 (1909) ; (Modern Eu¬

rope5 (1910) ; 'History of British Foreign

Policy) (1912).

HASSAM, Childe, American artist : b. Bos¬

ton, 1859. He studied art in Boston and Paris ; he is a member of Ten American Painters, of

New York, and of the Societe Nationale des

Beaux Arts of Paris. He is one of the fresh¬

est in style and most original of the American impressionists, and has gained medals at Paris, Munich, Chicago and Philadelphia.

HASSELQUIST, has'sel-kwist, Fredrik,

Swedish naturalist: b. Tornevalla, East Goth¬

land, 1722; d. Smyrna, 9 Feb. 1752. In 1741 he went to the University of Upsala, where his

talents and industry drew the attention of Lin¬

naeus. In 1747 he published a dissertation (De Viribus Plantarum.5 Wishing to make re¬

searches on the spot into the natural history of Palestine he spent some time at Jerusalem, and afterward visited other parts of the country.

Returning to Smyrna he brought with him a

collection of plants, minerals, fishes, reptiles, insects and other natural curiosities. The

Swedish queen, Louisa Ulrica, purchased the

whole of Hasselquist's acquisitions, which were

deposited in the castle of Drottningholm. Lin¬

naeus, from the papers and specimens of natural history collected by his pupil, prepared for the press the (Iter Palaestinum, or Travels in Pal¬

estine, with Remarks on its Natural History5

(1757), which has been translated into English

and other European languages.

HASSEN BEN SABBAH, the founder of

the sect of the Assassins (q.v.).

HASSLER EXPEDITION, a scientific

expedition of great importance dispatched by

the United States government. In 1871 the

steamship Hassler was fitted out for coast sur¬

vey and marine exploration. The personnel of

the expedition included Prof. Louis Agassiz

and Mrs. Agassiz; Dr. F. Steindacher,

ichthyologist; Dr. Thomas Hill, botanist;

Count L. F. de Pourtales, Mr. J. A. Allen and others. The party left Boston 4 Dec. 1871

and reached San Francisco, August 1872. Deep-sea dredging was carried on at several points

in the West Indies and South Atlantic. The

glaciers in the neighborhood of the Straits of Magellan were explored. Collections were made

at every point of the voyage ; the results of the expedition have been published by Agassiz,

Lyman and Pourtales, and much valuable

material, zoological, geological and botanical,

deposited in the Museum of Comparative

Zoology, Cambridge.

HASTINGS, has'tingz, Francis Rawdon,

1st Marquis of Hastings and 2d Earl of

Moira, English soldier and statesman : b. 9

Dec. 1754; d. off Naples, 26 Nov. 1826. He

entered the army as an ensign, served in

America during the Revolution, and on 25 April 1781 gained the battle of Hobkirk's Hill, which Lord Cornwallis described as the most splendid

of the war. In 1781 he was elected a member

of the Irish House of Commons, and two years

later he was promoted to the English House of Lords with the title of baron. He was in com¬

mand of a force which sought to aid the royal¬

ists in Brittany in 1793, and in the following year cooperated with the Duke of York in

the Netherlands. In 1812 he was appointed

governor-general of Bengal and commander-in-chief of the forces in India. His adminis¬

tration was distinguished by successful wars

against the Ghurkhas of Nepaul and the Pin—

darees of central India, but in 1821 he resigned because certain charges had been brought

against him in connection with a banking firm

in which he was interested. In 1824 he was

appointed governor of Malta.

HASTINGS, Hugh, American journalist:

b. Albany, N. Y., 1855; d. New York, 28 July 1916. He entered newspaper work on the

Albany Knickerbocker, then owned by his

father. Later he went to New York and was

employed on several dailies. He was regarded

as one of the best political writers in the coun¬

try. In 1915 he became the publisher of the

Cohoes (N. Y.) Republican, after having been

managing editor of the Albany Journal for a

number of years. He was appointed State his¬

torian when the office was created during the

administration of Levi P. Morton in 1895-96,

and held the position until 1907, when he

resigned to become tax commissioner under Mayor McClellan. As State historian he com¬piled many valuable records, notably the mili¬tary record, the ecclesiastical record of the State and the papers of Governors George Clinton and Daniel D. Tompkins.

HASTINGS, James, Scottish clergyman and encyclopedist : b. Huntly, Aberdeenshire. He studied at Aberdeen University and at the Divinity College of the Free Church in Aber¬deen. He was ordained in 1884 and held succes¬sive pastorates at Willison Church, Dundee (1897); Saint Cyrus Church (1901). After 1911 he abandoned active pastoral duties in order to devote himself to literary pursuits, and pub¬lished numerous excellent dictionaries: (The Dictionary of the Bible) (1898-1902) ; dic¬tionary of Christ and the Gospels) (1906-07) ; dictionary of the Bible) in one volume (1908) ; d ctionary of the Apostolic Church* (1915-17). In 1908 he undertook the publication of (Encyclopedia of Religion and Ethics,* of which nine volumes were in print up to 1917,

and in 1910 was commenced his series called

(The Great Texts of the Bible> ; in 1913 a series of (The Greater Men and Women of the Bible)

and (The Great Christian Doctrines,* of which

Volume I, on (Prayer,* appeared in 1915. He

was also founder and editor (1890-1917) of

the Expository Times.

HASTINGS, Warren, English soldier and

administrator : b. Churchill, Oxfordshire, 6 Dec.

1732; d. Daylesford, Warwickshire, 22 Aug.

1818. An uncle in London sent him at 10 years of age to Westminster School. On the death of his uncle he obtained an appointment in the

East India Company's service and arrived at

Bengal in October 1750. He was appointed to

the factory at Coss:nbazar and was taken

prisoner by Surajah Dowlah (1756). On ob¬

taining his freedom he joined Clive, under

whom he served with distinction as a volunteer in his campaign of 1757. In 1758 he was ap-po'nted resident .agent of the company at

Moorshedabad, in which capacity he continued

to act till 1761. It is recorded to his honor that he did not avail himself of the opportunity of making his fortune in the mode then com¬

mon among the servants of the company, by

ˆpresents** (forced) from the native princes.

In 1764 he returned to England, but as a result of a bad investment of

his fortune was com¬

pelled aga'n to ask for employment from the

company; and sailed for India in the spring of 1769. In 1771 the East India Company were

contemplating extensive changes in the govern¬

ment of India. The government of Bengal was

still carried on in the name of the nabob, al¬

though he had become a mere cipher, all his

officers being appointed by the company, and

they cast their eyes upon Warren Hastings, as

a fitt'ng instrument to carry out their policy.

Clive strenuously supported his appointment to

the Calcutta council (1772), with succession as president of the council and governor of Ben¬

gal. He now received instructions from the

directors to deprive of his offices Mohammed

Reza Khan, who had exercised under the com¬

pany the complete control of the revenues and

administration of Bengal, and to br ng him to trial for corruption. Mohammed bore a high

character and he was accused by Nuncomar, a

man of notoriously bad reputation. Shitab Roy,

Dewan of Behar, was subjected to similar

charges. After a protracted inquiry both Mo¬

hammed and Shitab were fully acquitted of

all the charges against them. The object of

these charges — the reorganization of the ju¬

dicial and financial administration of the prov¬

ince under the direct control of the company's officers, had in the meantime been carried out by Hastings to the entire satisfaction of the

directors. Another important step taken by

him was to enter into a treaty with the Nabob of Oude (Treaty of Benares, 7 Sept. 1773), by which he ceded to him the districts of Corah

and Allahabad for 50 lacs of rupees, and

engaged to hire out the company's troops to

him for the reduction of the Rohillas, whose

territory the nabob coveted. By the subsequent

act of 1773, Hastings was appointed first gov¬

ernor-general of India, and a supreme council

was named, of whom three formed a majority

unfavorable to Hastings. The natives were

encouraged to bring charges against him, and

Nuncomar, his old ally, came forward with

various charges of bribery. A Supreme Court

of Justice had been appointed at the same time with the supreme council of Calcutta. The

chief justice, Sir Elijah Impey, its head, was a friend of Hastings. Nuncomar was brought

before this court, charged with forgery, con¬

victed and executed. This stretch of jurisdic¬

tion, which Hastings could easily have pre¬

vented, alienated from him public sympathy in

England. The directors of the company peti¬

tioned the Crown on 8 May 1776 for his re¬

moval from the council. Hastings had deputed

Colonel MacLean, who returned to England in

1776, to insist on certain conditions or tender his resignation. It was accepted and a suc¬

cessor appointed to take his place in the coun¬

cil, 23 Oct. 1776. General Clavering assumed

the title of governor-general, which Hastings

still insisted on retaining, as the change had been made without the conditions he had ap¬

pended to his resignation. The Supreme Court,

which was appealed to, decided in favor of

Hastings. To end a dispute between the coun¬

cil and the Supreme Court of Calcutta, and to bring the chief justice under the influence of the council, Hastings now appointed Sir Elijah

Impey superintendent of the native courts with

a salary of £8,000 a year, an appointment re¬

garded by some as equivalent to a bribe. He

involved himself in disputes with the Madras

government, made demands for a large war

contribution upon the Rajah of Benares, and

when the rajah resisted arrested and deposed

him. He caused the <(begums of Oude® mother

and grandmother of the Nabob of Oude, to

give up extensive estates in land and a large amount of treasure. The House of Commons

had passed a resolution (30 May 1782) requir¬

ing the directors to pursue all legal and effect¬

ual means for his removal. In November 1784

he resigned his post, and in February 1785 left India. In 1786 articles of impeachment were

brought in by Burke against him. The pre¬

liminary forms were gone through from 13 to

14 February, and Burke opened the charges

against him in a speech of three days duration, begun on the 15th. He was supported by Fox,

Sheridan and Grey. Hastings began his de¬

fense on 2 June 1791, and on 17 April 1795

was acquitted by large majorities on all the

charges. His acquittal met with general ap¬

proval. The legal expenses of his trial

amounted to £76,080. The company in 1796 set¬

tled on him an annuity of £4,000 a year for

2 8l/2 years, and lent him £50,000 for 18 years free of interest. He passed the remainder of

his life in retirement. In 1813 he received the degree of LL.D. from the University of Oxford, and in 1814 was created a privy councillor.

Consult (Lives) by Gleig (3 vols., 1841), Lyall (1902), Malleson (1894) and Trotter (1878);

(The Private Life of Warren Hastings, > by

Lanson (1911) ; and betters to His Wife*

(1905) ; Macaulay's (Essay> (distorted in

view) ; and Forrest, (The Administration of

Warren Hastings) (1892).

HASTINGS, Mich., city and county-seat

of Barry County, on the Thornapple River, and

on the Chicago, Kalamazoo and Saginaw and

the Michigan Central railroads, about 38 miles

west by south of Lansing and 32 miles south¬

east of Grand Rapids. The city is in a fertile agricultural region. The chief manufactures

are furniture, pumps, wagons and carr'ages,

hose-reels, car-seats, flour, cigars, felt boots and lumber camp supplies. The principal build¬

ings are the library, the city hall, jail and court¬

house. The city owns and operates the water¬

works. Pop. (1920) 5,132.

HASTINGS, Minn., city and county-seat

of Dakota County on the Mississippi River, at

the mouth of the Vermilion River, and on the

Chicago, Milwaukee and Saint Paul Railroad,

about 15 miles southeast of Saint Paul. Its

chief industrial establishments are breweries, a malthouse, flour-mills, grain-elevators, saw-and planing-mills, sash, door and blind fac¬

tories, carriage and wagon factories, furniture

factories, lumber and brickyards, gas engine

and boat works, file works, sprayers and time—

recorder manufactories. In addition to the

trade in manufactured articles, grain, lumber

and live stock are among the important ship¬

ments. A State insane asylum is situated here, and there are a city hospital and courthouse.

The Mississippi is spanned here by a bridge

which has a spiral approach, so designed in

order to avoid the business section, which is

on the river front. The waterworks are the

property of the city. Pop. (1920) 4,571.

HASTINGS, Neb., city in Adams County,

on the Missouri Pacific, the Burlington and

Quincy, the Saint Joseph and Grand Island and

other railroads, about 25 miles south of Grand Island and 95 miles west of Lincoln. Its first settlers were Eastern people who availed them¬

selves of the benefits of the government

((Homestead Act,® but the city was not incor¬

porated until 1874. It is in a fertile agricul¬

tural section. The chief manufactures are flour, wagons and agricultural implements. The trade

is principally in wheat, corn and live stock. It is the seat of Hastings College, under the

auspices of the Presbyterian Church, and

opened in 1882, and of the State asylum for

chronic insane, and has a fine city hall, three public parks and the Lanning Hospital. The

government is vested in a mayor, who holds

office two years, and in a city council. The

present charter is that of 1891. The city owns and operates the electric-light plan! and the

waterworks. Pop. (1920) 11,647.

HASTINGS, Battle of. See Senlac.

HASTINGS -UPON -HUDSON, N. Y„

village in Westchester County, on the Hudson

River and the New York Central and Hudson

River Railroad, about three miles north of

Yonkers and 20 miles from New York. It is

largely a residential village, but in the vicinity are marble quarries which add to the industrial wealth of the place. It has some manufactures, chiefly chemicals, bricks, dyestuffs, copper-wire cable, sheet and tube copper and brass, asphalt paving bricks and cigars ; it

has a large trade in coal and lumber. It is the seat of the Hast¬ ings Commercial and Collegiate Institute, The New York Orphan Asylum Society and has several churches and good schools. Pop. 5,526.

HASWELL, Charles Haynes, American engineer: b. New York, 22 May 1809; d. 12 May 1907. His practical education as marine and mechanical engineer was learned in a steam-engine factory. In 1836 he was ap¬ pointed chief engineer in the United States navy. He was a member of the boards which designed the Missouri and other steam frigates, including the Mississippi, which was Perry's flagship on the expedition to Japan in 1853. He was in charge during the transition from paddle wheels to screws for propulsion and from wood to iron for hull construction. He left the department in 1850, and superintended the construction of a crib bulkhead at Hart's Island, New York. He built the first practical steam-launch in 1837 and was the first to use zinc to protect the hulls of iron vessels and boilers from the galvanic action of salt water and copper. After 1898 he was the consulting engineer of the board of public improvements in New York city. His published works in¬

clude (The Mechanics' and Engineers' Pocket

Book) (1901) ; (Mechanics' Tables > (1854) ;

(Reminiscences of an Octogenarian) (1895).

HATCH, John Porter, American general :

b. Oswego, N. Y., 29 Jan. 1822; d. 12 April

1901. He was graduated at West Point in 1845

and rose through successive grades to lieuten¬

ant-colonel of cavalry in 1873. He served in

the Mexican War from Palo Alto to the cap¬

ture of the city of Mexico; and in the Civil War was appointed brigadier-general of volun¬

teers in September 1861, and commanded a cav¬

alry brigade in the Shenandoah Valley and

northern Virginia. He was wounded in the

second battle of Bull Run, but recovered and

was in charge of a division in the battle of South Mountain, where he was again wounded

and had two horses killed under him. He sub¬

sequently commanded various districts in the

South; and was brevetted major-general of

volunteers in 1865, and was made colonel of

the Second Cavalry in 1881, and retired in 1886.

HATCH, Rufus, American banker: b.

Wells, York County, Me., 1832; d. 1893. He

began life as clerk in a grocery store, in Rock¬

ford, Ill., in 1854 entered the grain commission business in Chicago and amassed a fortune.

He managed the Chicago and Northwestern

Railroad combination in 1868 but made a finan¬

cial failure in the Northern Pacific collapse of 1883.

HATCH, William Henry, American law¬

yer: b. Georgetown, Ky., 1833; d. 1896. He

was admitted to the bar in 1854 ; served through the Civil War in the Confederate army, and

was a member from Missouri in the United

States House of Representatives from 1879 to

1895. The Hatch Act, which distributed Fed¬

eral aid to agricultural experiment stations in all the States and Territories, was inspired by him.

HATCH ACT, a bill introduced by William

Henry Hatch (q.v.) and approved 2 March

1887, for the purpose of diffusing ((useful and practical . information

on subjects connected

with agriculture and to promote scientific in¬

vestigation and experiment respecting the prin¬

ciples and applications of agricultural science.55

The act further granted the sum of $15,000 a

year to each State for the purpose of estab¬

lishing and maintaining agricultural experiment

stations. This supplemented the government

grants of public lands made 2 July 1862 to each State to provide colleges for teaching agricul¬

ture and the mechanic arts. Subsequent legis¬

lation raised the annual government grants for

each State to $35,000.

HATCHEE, or BIG HATCHEE, a river

which has its rise in the northeastern part of the State of Mississippi, flows north by west

into Tennessee, then northwest and west join¬

ing the Mississippi River about 30 miles in

direct line above Memphis. It is navigable for small steamboats as far as Bolivar, about 100

miles from its mouth, or half its whole length.

The area drained by the Hatchee, about 4,000

square miles, is excellent cotton land.

HATCHER'S RUN (Boydton Road),

Battle of. On 27 Oct. 1864, General Grant, with the intention to extend his lines to the South Side Railroad, and under the belief that the

Confederate works around Petersburg ex¬

tended only to the Boydton road crossing of

Hatcher's Run and were but feebly manned,

moved parts of the Ninth, Fifth and Second

corps, together with Gregg's cavalry division,

in all about 38,000 men, in three columns to the left. General Parke, commanding the Ninth

corps, moving to surprise the right of the Con¬

federate works, found them strongly held and

made no attack. The Fifth corps, on the left

of the Ninth, crossed Hatcher's Run and en¬

deavored to seize the bridge by which the

Boydton road crossed that stream, and was re¬

pulsed. The Second corps and Gregg's cavalry

succeeded in forcing a passage over Hatcher's

Run by the Vaughan road,. and reaching the

Boydton road, moved down it to Burgess' Tav¬

ern, near the bridge over Hatcher's Rim, some

four miles above Armstrong's Mill, where the

infantry was checked. Hancock's Second corps

having effected the passage of Hatcher's Run,

by the Vaughan road, Warren was ordered to

cross Crawford's division of the Fifth corps at Armstrong's Mill and,

sweeping up the right

bank of the stream, endeavor to recross and

assault the Confederate line in the rear, while Griffin's division assaulted in front. Hancock

was advised of the orders given Warren and

authorized to make the attempt to carry the

bridge in his front and gain some high ground beyond. At 4.30 p.m., when Hancock was ex¬

tending his right to connect with Crawford,

and was about to assault the bridge, General

Heth, with. his own division and a part of Mahone s, having crossed Hatcher's Run and pene¬

trated the interval between Hancock and Craw¬

ford, vigorously attacked Hancock's, right and

rear, throwing it into some confusion and cap¬

turing many prisoners, but Heth was finally

repulsed. At about the same time Hampton,

with five cavalry brigades, attacked Hancock's

left and rear and Gregg's cavalry, but was re¬

pulsed. Crawford, who had crossed at Arm¬

strong's Mill, found great difficulty in moving up the bank of Hatcher's Run, and failed to

make connection with Hancock. The object of

the entire movement failed, with Hancock still six miles from the South Side Railroad. The Union troops were withdrawn during the night and, next day, moved back to the line of en¬ trenchments. The Union loss, the greater part of which fell upon the Second corps, was 1,194 killed and wounded, and 564 missing. The Confederate loss is unknown. Consult (Official Records1* (Vol. XLII) ; Humphreys, (The Vir¬ ginia Campaign of 1864-655 ; Walker, <History of the Second Army Corps5 ; The Century Company's (Battles and Leaders of the Civil War5 (Vol. IV).

HATCHER'S RUN (Dabney's Mill and Armstrong's Mill), Battle of. It was on 5 Feb. 1865 that General Grant put in motion an expedition to interrupt the Confederate line of communication by the Boydton road, running through Dinwiddie Court House to Petersburg. Gregg's cavalry division was directed to march early in the morning by way of Ream's Station to Dinwiddie Court House and strike the road; Warren's Fifth corps was to cross Hatcher's Run and support Gregg; General Humphreys, commanding the Second corps, was ordered

with two divisions to the crossing of the

Vaughan road over the Run, and to Arm¬

strong's Mill, to hold these two points and to keep up communication with Warren, four

miles distant, on the one side, and with Miles'

division in the Union entrenchments, three or

four miles distant, on the other side. After

severe skirmishing, Humphreys pushed Motts'

division to the south side of Hatcher's Run and established Smyth's division at Armstrong's

Mill on the north side, about 1,000 yards from the Confederate works, where two brigades

were brought to Smyth's support. At 5 p.m.

parts of A. P. Hill's and Gordon's corps came out of their works and, under cover of the

woods, attacked Smyth, but were repulsed.

Smyth's line was now further strengthened by

Hartranft's division of the Ninth corps and

Wheaton's of the Sixth. Gregg captured some

wagons and prisoners on the Boydton road, and

in the evening fell back to Malone's Bridge on Rowanty Creek, from which he moved up to

the Vaughan road crossing, where he arrived

early in the morning of the sixth, with Warren, who had been ordered to support Humphreys.

About 1 p.m. Warren, with two divisions,

moved along the Vaughan and Dabney's Mill

roads; Gregg, supported by one of Warren's divisions, going down the Vaughan road to Gravelly Run to observe the left. .Gregg was attacked by a part of Pegram's division, but held his ground and. with the support given him by part of Griffin's division,. drove. Pe¬ gram's men back. Warren's leading division (Crawford's) moving on the Dabney's Mill

road, also encountered part of Pegram's divi¬ sion, which was forced back to Dabney's Mill, where Evans' division came to Pegram's sup¬ port, and Crawford in turn was driven back. Three Union brigades were now brought up to Crawford's support and, at the same time, Mahone's division arrived and took position be¬ tween Evans and Pegram, and the whole Con¬ federate line advanced, driving Warren back in great disorder, but some of his men rallied upon Wheaton's division, which had crossed

from the north bank of the stream, and the

Confederates were checked. On the morning

of the seventh Warren made a reconnoissance,

but did not find the enemy in force. The Union works were now extended to Hatcher's Run at

the Vaughan road crossing. The Union loss

was 1,352 killed and wounded, and 187 miss¬

ing. The Confederate loss was about 1,500,

among the killed being Gen. John Pegram.

Consult (Official Records> (Vol. XLVI) ;

Humphreys, ˆhe. Virginia Campaign of 1864—

65 } ; Walker, (History of the Second Army

Corps) ; Powell, (History of the Fifth Army

Corpse

HATCHETTITE, ADIPOCERITE, or

MINERAL ADIPOCERE, a native hydro¬

carbon, probably of the nature of a paraffin, oc¬

curring in certain parts of England and Scot¬

land, mainly in connection with bogs and coal

measures. It is wax-like, and melts at about

115° F. _ The specific gravity of the natural mineral is about 0.61, but after melting the

specific gravity rises to 0.92 or even higher, owing to the elimination of air bubbles. Hat-chettite is without odor, and when fresh it is commonly translucent and yellowish. Upon

exposure, however, it blackens and becomes

opaque.

HATCHTE RIVER, or DAVIS' BRIDGE,

Battle of. After General Van Dorn's defeat

at Corinth, Miss., 4 Oct. 1862, he retreated and bivouacked for the night at Chewalla. Early on the morning of the fifth he continued his retreat on Pocahontas, but when his advance had

crossed Hatchie River, at Davis' Bridge, he was met by General Hurlbut's division, which had

been sent by General Grant from Bolivar, Tenn., to Pocahontas to intercept his retreat. Van

Dorn's advance was driven back across the

bridge, his main body came up, and General

Ord, who had arrived on the field from Jackson, took command of Hurlbut's division and

attacked Van Dorn vigorously. A severe en¬

gagement ensued, in which Ord was severely

wounded, and Hurlbut resumed command of

the Union troops. Van Dorn, not closely fol¬

lowed from Corinth by Rosecrans, who was 12

miles away, held his position before Hurlbut

the greater part of the day and, cut off from his route through Pocahontas, continued his re¬

treat on the east bank of the Hatchie for six miles to Crum's Mill, where he crossed his army on a bridge during the night and continued his retreat to Ripley and thence to Holly Springs.

Rosecrans followed as far as Ripley, when

Grant ordered him to return to Corinth and

Hurlbut to Bolivar. See Corinth, Advance

on and Battle of.

HATCHMENT (a corruption of achieve¬

ment, coat of arms), a funeral esrntcheon, the arms of a deceased person within a black

lozenge-shaped frame meant to be placed on the front of his home where it remained for a

year, and was then taken down and placed in

the church. If the deceased was unmarried or a widower or widow, the whole field of the es¬

cutcheon is black. In the hatchment of a mar¬

ried person the arms of husband and wife are

impaled, and only that part is black which ad¬

joins the side of it occupied by the arms of the deceased. Thus, in the hatchment of a husband

the dexter side is black, the sinister white ; in that of the wife the reverse. In a bishop's

hatchment his arms being impaled with that of

the see, those of the see have a white back¬

ground. When the deceased is the last of his

race a skull is set above the shield in place of a crest.

HATFIELD, James Taft, American Ger¬

man scholar: b. Brooklyn, N. Y., 15 June 1862.

He was graduated from the Northwestern Uni¬

versity in 1883; from the Johns Hopkins Uni¬

versity in 1890; was appointed professor of

German language and literature at Northwestern

in 1890. During the Spanish-American War he

served from seaman to chief yeoman on board

the cruiser Yale. His publications include Ger¬

man Lyrics and Ballads) (1900) ; (From Broom

to Heather) (1903) ; editions of Freytag's (Ritt-meister von Alt-Rosen) ; Goethe's (Hermann

und Dorothea) and <Egmont) ; (Gedichte von

Wilhelm Miiller) (complete critical ed., Berlin

1906) and various articles and monographs on

subjects of German literature.

HATHAWAY, Anne, the wife of Shake¬

speare. See Shakespeare.

HATHOR. See Athor.

HATS AND HAT MAKING. It is diffi¬

cult to state just when hats were first worn, but it is a fact that fur-felt hats now form part of the attire of civilized man the world over.

There is no record as to when or where the first hat was made. We find head covering in one

form or another in vogue in the earliest times referred to in history. The first modern hat,

as we now know this article of men's wear, was made in Paris about 1404 by a Swiss manu¬

facturer, but it was not until 49 years after¬

ward that the French adopted any sort of a

head covering. Charles XII, upon his entry in

triumph into the city of Rouen in 1453, wore

a huge hat made of fur, lined with red velvet, from which protruded a great feather. With

royalty as its sponsor the hat at once became a necessary detail of man's wardrobe. The hat

is distinguished from the cap or bonnet by its continuous brim. It has been traced back to

the ((petasus® of ancient Greece, just as the cap has been regarded as the descendant of the

brimless ˆPileus,® also a form of Grecian head attire. These articles, as far as we know, were made almost exclusively of felt.

Felt hats became popular in England during

the Norman occupation. In Queen Elizabeth's

reign great beaver hats, usually black, were the favorite among the nobility, and they remained

in vogue for more than 300 years. About the

middle of the 17th century an effort was made to encourage this industry in America. In 1662

the assembly of Virginia, to stimulate activity among the colonists, offered, by special enact¬

ment, to give 10 pounds of tobacco for every

good wool or fur hat produced in that colony

from materials taken from animals native

thereto. Hats were then made by hand, and no

effort of any consequence was made to improve

the primitive conditions until 1820, when the

energy of the American inventor produced the

first labor-saving machine. Improvement now

followed improvement, each one, in its way,

tending to economize the cost of making.

In 1810 the silk hat appeared. It was made

by hand, and failed in its purpose to supplant the tiled beaver. It was not until 1830 that the silk plush hat was manufactured upon a paying

basis.

In 1849 the soft felt hat made its bow in the United States. Its sponsor was the famous

Hungarian patriot, Kossuth, who visited Amer¬

ica in that year. He was given tremendous re¬

ceptions everywhere, and won the heart of the

great American republic. His great hat seemed

to be typical of the vigorous character of the man, and it was not surprising that the <(Kos-sutlU became a general favorite. From that time the soft hat has steadily gained friends, and to¬

day in many sections it is a predominant type.

While the industry in this country, prior to

the Civil War, kept pace with progress in other lines, it was not able to hat the heads of thou¬

sands of Americans, and the foreign manufac¬

turer found the States a very profitable terri¬

tory. But to-day America has become a great

exporter of hats. This foreign trade is con¬

trolled by the cities of New York and Phila¬

delphia, where the finest grades of hats in the world are made. The other well-known hat

centres in America are Orange and Newark,

N. J., Danbury, Bethel and Norwalk, Conn.,

Brooklyn, N. Y., and Reading, Pa.

The kinds of hats now made are so numerous

as to be almost beyond the possibility of listing.

There are, however, three principal classifica¬

tions : the felt hat, which includes the soft and the stiff or derby shape, the silk hat and the straw hat. All other kinds are but variations

in some way of these three.

Felt Hats. — The principal material of which

felt hats are made is the fur of the European rabbit or cony and of the European hares.

The finer grades are made of the fur of the

South American nutria, and a limited quantity

from the fur of the Canadian beaver, mink

and muskrat. For some fine hats mixtures of

these furs are made.

The quality of the felt when finished de¬

pends upon many seemingly insignificant de¬

tails, and these begin to have their effect in the condition of the fur itself at the time it

reaches the market. The method by which the

animal was killed, the time which elapsed be¬

fore it was skinned, the conditions of tem¬

perature and humidity in which the skin was

kept before reaching the hat maker — all these have their effect upon the appearance and qual¬

ity of the finished hat. Other particulars which affect the strength and character of the felt

eventually produced are the lengths and diam¬

eters of the individual fibres of fur used and the part of the pelt from which they are

taken.

The first process to which the fur is sub¬

mitted is known as “carroting,® a chemical

cleansing with a solution of nitrate of mercury.

This has the effect of opening the upper edges of the nested rings of which true fur is com¬

posed, leaving a sort of serrated texture which permits the interlocking of the fibres under the influence of moisture and pressure into a true felt. This preliminary treatment of the fur

is generally carried out in a socalled <(fur fac¬

tory, w the prepared fur after being sheared

close to the skin being delivered to the nut

maker for the separation of such of the fibre as. is suitable for his purpose, the remainder being returned to the fur factory to be used

in other ways. At the hat factory the various furs are mixed in established proportions and

thrown into a mechanical mixer in which the

teeth on swiftly revolving wheels tear the

fibres apart f rom one another. The fluffy mass is then put into a blowing machine in which

currents of air at varying velocities deposit the fibres of different weights on different travel¬

ing belts, which in turn carry them to other

revolving toothed separators, until the in¬

termixture is as complete as nossible. The

mixed and blown fur is then divided by weigh¬

ing into portions, each suitable for the making of one hat. One such portion is taken by the operator of the forming machine who spreads

it upon an apron which feeds into one end of a boxed-in machine. At the farther end of

the box there is a large perforated cone of

sheet copper, revolving rapidly over a funnel,

under which there is a powerful suction fan at work. As the attendant carefully feeds the

fur to the machine in the proper quantity it is carried by the apron toward the cone. The

suction of air attracts this fur and causes it to adhere to the surface of the cone. This con¬

tinues until the cone is covered with a sufficient quantity of fur to make the hat. The whole

operation requires only two or three minutes.

As soon as the cone has accumulated the neces¬

sary fur a wet cloth is thrown over it, and

a second cone, larger in dimension, is placed

over that. Both are immersed in a tank of hot water for a few moments. This is the first

stage of the felting. It causes the adhesion of the various fibres. The operator slips this

conical body from the cone. It is now a cone of fur about three feet in height and six feet around the base, and one-eighth of an inch in thickness.

Sizing, as the felting is termed, is the next process. The body, which has just been re¬

moved from the cone, is placed in a sizing ket¬

tle, where it is shrunk in hot water. Continu¬

ous kneading and rolling further reduces it in size. It still retains its cone shape, but it is now firmly felted. Care as well as skill is re¬

quired to ensure the even shrinking and the

uniform distribution of the fur. Failure in

any detail will cause streaks and weak spots in the finished article. The hat is now ready for dyeing. It is immersed in a great color vat

and dyed to meet the prevailing fashion. Great improvements have been made in this detail

during the past few years. The old wood color¬

ings have been discarded, and coal-tar products are now used because they have been found

more serviceable and increase the durability of the hat. Up to this point the manufacturing of stiff and soft hats has been along similar lines, but from this time on different methods are

used. After dyeing the next step is to stiffen the hat slightly by the application of “water

stiff, >) a weak solution of shellac. The brim receives a much stronger stiffening. The body

is now beginning to assume a definite form.

It is stretched, blocked and pulled, and, with the aid of hot water, steam and ingenious

machinery, it is given stability of shape and

form. The rough surface must now be cut off.

This operation requires great care. If too much of the fur is removed all the previous skilled manipulation becomes valueless and the hat is

ruined. This operation is known as <(pouncing.® It was formerly accomplished with a

great deal of hand labor. It is now dorve by a machine and emery

paper. This machine is a

great time saver, and greatly facilitates the pro¬

duction of the plant. The crown is next given its shape, as demanded by the style. It is stretched over wooden blocks, ironed and re-ironed, then

dried. It is next placed in an oven and heated and then placed in a steel mold into which

it is pressed evenly and firmly by a rubber bag through which water is being pumped. The

cool water sets the felt in the shape of the mold. It must then be carefully pounced by

hand and steamed to tighten the felt. The

brim must be treated exactly the same way, al¬

though it is* not given shape at this time. Only men of skill and experience can engage in this portion of the work. There is a knack about

pouncing by hand that can be acquired only by experience.

The hat is next flanged, or, rather, the brim is given its shape. The brim is placed upon a flange of metal or wood so as not to affect the crown. The entire hat resting on the flange is then placed under a huge receptacle containing

heated sand and having on the under side a

heavy cotton fabric, which comes in direct con¬

tact with the felt. After remaining in this posi¬

tion for several minutes the brim of the hat

has its correct shape and trimming is in order.

The turning up and edging each play an im¬

portant part in the final process of shaping. In trimming artistic

treatment is a necessity. Care must be taken in attaching the bands and bind¬

ings to preserve the neatness as well as the

character of the design. The insertion of the

sweat leather must be carefully done. All

these and other details add greatly to the ap¬

pearance and durability of the finished product.

The stiffening of the derby, better known as

<(the stiff hat,® because of the character of the felting, is an interesting process. The hat body is impregnated with a solution of shellac and

alcohol of given density. This substance is

carefully worked into the heart of the body,

and as a result the felting attains a condition of firmness. The hat is then placed on a wooden

block, is immersed in hot water and is given

the proper proportion and shape before the

final pressing. At the conclusion of this opera¬

tion the superfluous gum is cleared away by a soda bath. When dry the hat is rigid through¬

out. It is then placed in an oven and kept

there until it becomes pliable. A mold, to

which tremendous pressure is given by mechani¬

cal or hydraulic means, completes the pressing

after the derby has been pounced or finished.

The pouncing of a derby is done upon a lathe.

It is placed on a wooden block similar to the molds used in pressing. Should the operator

cut off too much of the surface fur, thus

destroying the nap, the stiffening will be ex¬

posed and the work of the skilled men who pre¬

ceded him loses its value. The binding is then put around the brim. Curling or shaping of the brim is done usually with a press, but in the finer grades of hats it is done by hand with a variety of small tools, heat, steam, deftness of fingers and a good eye. The work of some

of the experts who develop the stiff hat brims by the eye is little less than marvelous. The trimming, etc., of stiff hats require even greater care than in the case of soft hats.

Silk Hats. — The body of a silk hat is made

up of several layers of cotton fabric cemented together with a solution of shellac in alcohol.

It is formed on a block by the pressure of hot irons, and the rim is formed upon a flange on the bottom of the block, and cemented to the

body. The whole is then coated with the

shellac solution and covered with a specially

made silk plush. The cover and the body are

unified by hot ironing. The silk is polished

with velvet brushes, and the rim is bound and the linings put in. The final process is giving the curl to the rim, and this is done in a heated press where the hat remains until it is cold.

Panama Hats. — The socalled Panama hats

are made in Ecuador, and in a few localities in Colombia and Peru. The material used is the

immature unopened leaves of the screw pine

(Carludovica palmata). These are slit into

shreds of varying degrees of fineness with a

very sharp knife, the shreds being left at¬

tached to the stem and forming a bunch of 25

to 35 <(straws® of from 18 to 20 inches in

length. The hats are woven upon a block, the

finest of them being of the texture of fine linen, and requiring months to complete. These are

not often exported and bring locally the equiva¬

lent of $100 each. Practically all the ((Panama hats® in the American market are made in

Peru. Before the war a very good imitation

was made in Germany from imported Peruvian

fibre.

Straw Hats are made from straw braids

imported from Italy, China and Japan. The

finest grades are raised in Tuscany, Italy,

where the soil and climate are the most favor¬

able for this industry. The grain sown is a

variety of wheat, and the straw is cut when

the grain is in the <(milk® stage. The straw is bleached in sunshine and dew, and then whitened with sulphur fumes. The upper and finer

parts of the straw are plaited into braids from one-eighth of an inch to nine-thirty seconds of an inch in width, the braids being of from

9 to 13 strands, and 82 to 131 feet in length.

These are known as Leghorn braids. The

lower and coarser parts of the straw are plaited into widths of one-quarter to onehalf of an

inch, and are of from five to seven strands..

These are known as Milan braids. In making

the hats the braids are lapped and sewed by

machinery. In some of the finer grades they

are sewed edge to edge by hand. The plateaux

of sewn straw are sized with a waterproof gum and shaped in powerful presses.

Other hats are made of hemp from the

Philippines and Japan. The ˆNeapolitan® or

horsehair hats are made in Switzerland. Chip

hats are made of shreds of poplar or willow,

sometimes plaited into braids, and coated with

colored varnishes. The socalled (<wool-felt®

hats are of wool, which, however, does not

felt, and the fibres are held together with

cementing substances. Many other hats and

caps are made of woolen or cotton cloth or

other fabrics, generally stiffened more or less with shellac.

Production. — The United States census of

manufactures for 1914 showed a total of 983

hat factories in the United States, not including those which made sewed hats and caps out of

woolen cloth. These latter were included

among the factories making woolen goods, and

their output cannot be separated for a clear

report.

The felt hat industry was concentrated in

Philadelphia, Danbury, Conn., Newark, N. J.,

New York city and . Orange, N. J. It was car¬

ried on in 224 factories employing 21,318 hands, and an aggregate capital of $39,401,429. The

year's output was valued at $37,349,744, of

which $20,402,686 was the value added by

manufacture.

The straw hat industry occupied 149 fac¬

tories, the larger percentage being in New

York city. They employed 9,483 hands and a

combined capital amounting to $12,588,754. The value of the year's production was $25,443,-501, of which $11,357,715 was the value added by manufacture.

The wool-felt hat industry occupied 30 factories and the year's output was valued at $1,904,484. Other hats and caps not included above were made in 580 factories, the larger percentages being, at and near New York and Philadelphia. Their combined product for the census year was valued at $18,593,221. Con¬ sult Manchester, H. H., (Sixty Centuries of Hat Making) (New York 1915) ; Mills, D. C., (The Twentieth Century Hat Factory* (Dan¬ bury, Conn., 1910) ; Smith, W., (Chemistry of Hat Manufacture) (London 1906).

HATTERAS, Cape. See Cape Hatteras.

HATTERAS INLET, Capture of. In the

forenoon of 26 Aug. 1861, a Union fleet of seven vessels carrying 143 guns, under com¬ mand of Flag-officer Silas H. Stringham, and

three transports, carrying 930 men and a light battery, under command of General Butler, set

sail from Hampton Roads. Next afternoon the

fleet arrived off Hatteras Inlet, the entrance to Pamlico Sound, which was guarded by Forts

Hatteras and Clark, built by North Carolina on the south end of Hatteras Island, and mounting respectively 25 and 5 heavy guns. The forts,

which were garrisoned by over 700 men, were

under command of Major Andrews. At 10 a. m.

of the 28th Stringham began the bombardment

of the forts, and a little later about 300 troops, with two howitzers, were landed on the island

above the forts. Fort Clark was silenced be¬

fore noon, the greater part of its garrison re¬

treating to Fort Hatteras, some escaping from

the island by boats. At night the fleet withdrew, but renewed the attack upon Fort Hatteras

early in the morning of the 29th, drove the

gunners from their guns to the shelter of the bomb-proofs, and before noon the fort sur¬

rendered, after a loss of 30 killed and wounded.

The Union loss was one wounded. Stringham

and Butler returned to Hampton Roads, leav¬

ing three vessels as a sea-force and detach¬

ments of the Ninth and Twentieth New York

and the Union coastguard, under Col. R. C.

Hawkins, to garrison the captured forts. The

immediate results of the expedition were the

capture of the two strong forts with their

garrisons of 715 men, 31 heavy guns, 1,000 stand of arms and the possession of the best sea en¬

trance to the inland waters of North Carolina.

Consult The Century Company's (Battles and

Leaders of the Civil War* (Vol. I) ; Maclay,

(History of the .Navy* (Vol. II).

HATTI-SHERIFF, hat'te-sha-ref, the

Turkish name of an edict signed by the sultan, who subscribes it usually with these words : <(Let my order be executed according to its form and import.® These words are usually edged wilh

gold, or otherwise ornamented. An order given

in this way is irrevocable. The firman of

18 Feb. 1856, called usually Hatti humayun,

(<exalted writing,® is the constitutional charter of the Turkish Empire. It is a long document, undivided into articles, and prescribing various reforms administrative and financial, etc., but

its chief importance consists in its explicit recog¬

nition of the principle of religious liberty, al¬

ready admitted by the hatti of Gulhana, 3 Nov.

1839.

HATTIESBURG, hat'iz-berg, Miss., city

and county-seat of Forrest County, on the Leaf River, on the Gulf and

Ship Island, New

Orleans and North Eastern, Mobile, Jackson and Kansas City and Mississippi Central

railroads, 70 miles north of Gulfport, 90 miles southeast of Jackson. Hattiesburg is the trade

centre of a large, fertile agricultural region in which an excellent quality of cotton is exten¬

sively cultivated. It is also a large trade centre for yellow yam potatoes and. general truck

growing. The entire section is experiencing

rapid agricultural development and especially

along live stock lines. The industries are grow¬

ing rapidly and the good railroad facilities mean good markets. Located in the very heart of

the yellow pine belt, and its chief industrial establishments are sawmills, planing mills, cot¬

tonseed oil mill, cotton compress, foundries,

machine shops, boiler works, brickyards, wood

reduction plant, railroad shops, ice, electric-light and power plant. The city has three banks, a large number of public buildings, the Missis¬

sippi Normal College and the Mississippi

Woman's College. Pop. (1920) 13,270.

HATTO, hat'td, the name of two arch¬

bishops of Mainz, both somewhat conspicuous

in the history of Germany. The first was

chosen archbishop of Mainz in 891, d. 913. The second Hatto (d. 970) was a monk of the

monastery of Fulda, and succeeded the cele¬

brated Rabanus Maurus as abbot of the monas¬

tery of Saint Boniface about the year 942, and in 968 was raised to the see of Mainz, and con¬

tinued one of the chief advisers of the em¬

peror. Of his after-life and of his personal

character most opposite accounts have been

given. By some he is represented as an upright and successful administrator; by others as a

selfish and hard-hearted oppressor of the poor ; and the strange legend of his being devoured

by rats, which Southey has perpetuated in his

well-known ballad, is represented as an evidence of the estimate that .was popularly formed re¬

garding him. It is quite possible that this legend is of much later date, and that its real origin is to be traced to the equivocal designation of the tower on the Rhine, Mausethurm, near

Bingen, which has been selected as the scene of the occurrence. Mausethurm, <(Mouse-tower,®

is possibly only a corrupted . form of Mauth

Thurm, ((Toll-tower,® a sufficiently descriptive

name; but the modified form of the word might readily suggest a legend of mice or rats.. The date at which the Mausethurm was built is un-758

known, and it is far from certain that it is not much later than the time of Hatto. See Baring-Gould, (Curious Mytlhs of the Middle Ages)

(1869) ; Max Beheim, (Die Mausethurmsage-*

(1888).

HATTON, Sir Christopher, English states¬

man : b. at Holdenby, Northamptonshire, about

1540; d. 1591. Lord chancellor of England, a

favorite of Queen Elizabeth; was entered a

gentleman commoner at Saint Mary Hall, Ox¬

ford, but removed, without taking a degree, to the Inner Temple in 1560. He was introduced

at court some time previous to the middle of

the year 1564, and it is said Queen Elizabeth was so much struck with his graceful person

and dancing that an introduction to her favor

was the result, and gained him the name of

<(the dancing chancellor.® He was a furious

enemy of the Jesuits, and did not hesitate to accuse Parry, their defender in Parliament, and secure his execution. He was elected a member

of Parliament in 1571, became captain of the

Queen's Guard in 1572, vice-chamberlain and a

privy councillor in 1577, lord chancellor in 1587.

He was one of the commissioners for the trial of Mary Queen of Scots, in 1586. His artful

speech to the unhappy queen, <(If you are inno¬

cent you have nothing to fear ; but by seeking to avoid a trial you stain your reputation by an everlasting blot,® is . supposed to have been

mainly influential in inducing her to submit to trial. Spenser, whose patron he was, dedicated

to him (The Faerie Queen. > Consult the

<Memoirs) by Nicolas (1847).

HATTON, Frank, American journalist: b.

Cambridge, Ohio, 28 April 1846; d. Washington,

D. C., 30 April 1894. He learned the newspaper business with his father, who was editor of the Cadiz (Ohio) Republican. He served through

the Civil War in the Army of the Cumberland,

being commissioned and was subsequently part¬

ner with Robert J. Burdette (q.v.) in the pro¬

prietorship of the Burlington Hawkeye. He was

Assistant Postmaster-General (1881-84) ; Post¬

master-General (1884-85), the youngest Cabinet

member since Alexander Hamilton; editor of

Chicago Mail (1884—88); and editor of the

Washington Post (1888-94).

HATTON, John Liptrot, English com¬

poser : b. Liverpool, 12 Oct. 1809 ; d. Margate, Kent, 20 Sept. 1886. Removing to London in

1832 he became famous for his many operas,

cantatas, overtures, entr'actes, etc., and was

musical director of the Princess Theatre 1853—

59. He is now, however, remembered chiefly

for his admirable settings of English songs, of which he wrote 300, such as (Good-bye, Sweet¬

heart,) (The Tar's Song,* (The Bait,* (Simon

the Cellared and the part song (When Evening's Twilight, > *etc.*

HATTON, Joseph, English journalist,

novelist and playwright: b. Andover, 3 Feb.

1841 ; d. London, 31 July 1907. Beginning jour¬

nalism on the Derbyshire Times, he went to

London, where he edited the Gentleman's Maga¬

zine (1868-74) ; and became a newspaper corre¬

spondent for the New York Times and other

journals. Among his numerous novels are

<Clytie) (1874) ; (Queen of Bohemia* (1877) ;

<John Needham's Double) (1885), dramatized

for E. S. Willard; (By Order of the Czar,* a novel of Russian life; (Princess Mazaroff* ;

(Under the Great SeaP ; (When Greek Meets

Greek, } a novel of the French Revolution suc¬

cessfully dramatized; (When Rogues Fall Out*

(1899). Among his miscellaneous publications

the best known are journalistic London) ; (To-day in America* ; (The New Ceylon* ; (01d

Lamps and New) ; while among his plays may

be cited a version of (The Scarlet Letter) suc¬

cessfully acted in tlhe United States; (The

Prince and the Pauper* ; (Liz* ; and (A Daugh¬

ter of France.*

HAUBERK, ha/berk. The term hauberk

generally refers to a coat-of-mail. More

broadly, it has been applied to other defensive body armor of coat form; several authorities,

including Ashdown, use this term synony¬

mously with the early body defense of leather, usually reinforced with metal studs (mostly

called brigandines) , and copied from the an¬

cient jazeran. It has also been used for the

trellised body defense or the coat with leather Fifteenth Century Hauberk.

scales worn over chain armor, middle of the

13th century. The chain-armor hauberk was

used by the Vikings (Norsemen) in the 10th

century, but much earlier in the East and in

southern Europe. Trajan's Column (44 a.d.)

shows some such armor, and the Latin lorica

catenata (literally coat of chain armor) doubt¬

less refers to this chain hauberk. By the 14th century the plain body cover under the plate

armor (see Plate Armor) frequently receives

the appellation hauberk.

Originally sleeveless, the chain armor hau¬

berk soon had short sleeves, and, by the time of William Rufus, king of England (1056-1100), the hauberk sleeves reached to the

wrists. By the end of the 12th century the

hauberk extended over the fingers. A short

chain armor body defense was known as

haubergeon. See Chain Armor.

HAUFF, howf, Wilhelm, German historical

and satirical novelist and poet: b. Stuttgart, 29

Nov. 1802 ; d. Stuttgart, 18 Nov. 1827. He be¬

gan attending the monastery school at Blau—

beuren in 1818, later (1820) the seminary at

Tubingen, where he pursued studies in theology

and. philosophy, as he was preparing for the

ministry. From 1824 to 1826 he was a tutor in the home of General Baron von Hiigel at

Stuttgart, traveled in France and Plolland in

1826 and became editor of the Stuttgart Mor—

genblatt in 1827, dying the same year. In

spite of the small period afforded by his short HAULTAIN — HAUPT

life for literary work, he was already a well-known writer in his own lifetime, for his activ¬

ities in the Hiigel household seem to have al¬

lowed him much leisure, all of which he de¬

voted to literature. His rising prosperity had

also led him to enter into what promised to be a very happy marriage, which he was destined,

however, to enjoy but eight months. His dis¬

position was that of childish good cheer, har¬

monious and content, and this is the impres¬

sion also of his stories and style : easy, flowing, not profound, clear as to action, difficult to understand only when his great carelessness in

the construction of sentences gets the upper

hand. He produced one long historical novel,

(Lichtenstein, > in 1826, which is a distinct appli¬

cation to the Reformation period and to Wiirttemberg, of Sir Walter Scott's methods as used with the various periods of Scottish history

and the Scottish countryside. His short

stories include (Der Mann in Mond} (satirical

romance), (Die Bettlerin vom Pont des Arts/

(Jud Siiss,L cDas Bild des Kaisers/ (Die letz—

ten Ritter von Marienburg/ (Die Sangerin/

and a number of fairy-tale accounts, forming

a collection included in the framework of (Die Karawane) ((Kalif Storch/ (Das Gespen-sterschifP), and others ((Zwerg Nase/ (Das

steinerne Herz*). Many of these stories deal

very satisfactorily with subjects taken from

modern life and may be considered in this con¬

nection as continuing the similar activity of

Tieck (q.v.). (Der Mann in Mond} is now

considered to be a satiric romance, in that it is supposed to pursue the purpose of ridiculing the enervated and morally offensive narrations

of one of Hauff's contemporaries, H. Clauren,

by producing an imitation of the language, the use of epithets and the general cloying sweet¬

ness of the latter's literary method. Hauff

also produced a number of imaginative satiri¬

cal sketches, (Mitteilungen aus den Memoiren

des Satan* ; (Fantasien im Bremer Ratskeller) ; and lyrical poems of real power, (Morgenrot,

Morgenrot, leuchtest mir zum friihen Tod/

<Steh' ich in finstrer Mitternacht* His works

were issued in various editions: (Samtliche

Schriften/ 36 vols. (Stuttgart 1830-31) ; 10

vols. (Stuttgart 1837, 21st ed., 1891) ; ed. by Adolf Stern (Berlin 1878) ; latest collected edi¬

tion by Bong (Berlin 1908, 6 vols. in 1). See Lichtenstein.

Consult biographies by G. Schwab (Stutt¬

gart 1830) and H. Fischer (Stuttgart 1886) ;

Koch, G., (Claurens Einfluss auf Hauff) (Euphorion, IV, p. 804) ; Schuster, Max, (Der

geschichtliche Kern von Hauffs Lichtenstein*

(Stuttgart 1904) ; Drescher, M., /Die Quellen

zu Hauffs Lichtenstein (Leipz:g 1905) ;

Thompson, Garrett W., (Wilhelm Hauff's Spe¬

cific Relation to Walter Scott) (Modern Lan¬

guage Publications, Cambridge, Mass., 1911).

Jacob Wittmer Hartmann,

Assistant Professor of the German Language

and Literature , The College of the City of

New York.

HAULTAIN, ha'tain', Sir Frederick Wil¬

liam Gordon, Canadian statesman, adminis¬

trator and jurist: b. Woolwich, England, .25

Nov. 1857. He graduated at Toronto .University

in 1879, and was called to the bar in Ontario 1882. He was nominated a member of the

Northwest Council in 1887, a member of the

Advisory Council 1888-95, and premier of the

Northwest Territories 1897-1905. He took

a conspicuous part in obtaining for the terri¬

tories full provincial status. Lie also occupied the post of superintendent of education from

1892-1905. He was appointed chief justice of Saskatchewan in 1912.

HAUPT, howpt, Herman, American engi¬ neer: b. Philadelphia, Pa., 26 March 1817; d. 14 Dec. 1905. He was graduated at West Point in 1855, but became a civil engineer, and joined the staff engaged on the public works of Penn¬ sylvania. For three years he was professor of civil engineering and mathematics in Pennsyl¬ vania College but in 1847 became consulting engineer of the Philadelphia Railroad. He was afterward chief engineer of the Hoosac Tunnel and during the Civil War chief of the United States Bureau of Military Railroads. The Royal Polytechnic Society of Great Britain gave him its highest prize for the drilling machine which he invented, and he first made practicable the transportation and distribution of oil from the well side. He wrote (Hints on Bridge Building) (1840) ; (General Theoiy of Bridge Construction* (1852) ; (A Consideration of the Plans Pro¬ posed for the Improvement of the Ohio River) (1855); < Military Bridges* (1864).

HAUPT, Lewis Muhlenberg, American engineer: b. Gettysburg, Pa., 21 March 1844. He was educated at Harvard and West Point. From 1872 to 1892 he was professor of civil engineering in the University of Pennsylvania, and for the year ending 1886 edited the Engi¬ neering Register. From 1897 to 1902 he was a member of the Nicaraguan and the Isthmian Canal commissions. His published works in¬ clude (Working Drawings and How to Make and Use Them) (1881) ; (Canals and Their Economic Relation to Transportation * (1890) ; (A Move for Better Roads* (1891); (The Transportation Crisis) ; (The Nation and the Waterways*; c Mississippi River Problems> ; (The New York Entrance/ and many other pamphlets and contributions to engineering. He is the inventor of the ((Reaction Break¬ water® for creating channels through ocean bars.

HAUPT, Paul, American Assyriologist : b. Gorlitz, Germany, 25 Nov. 1858. He was grad¬

uated at the Gymnasium Augustum, Gorlitz, in

1876; studied in Leipzig and Berlin, and set¬

tled in Gottingen where in 1883 he was ap¬

pointed extraordinary professor of Assyriology.

In the autumn of the same year he accepted the chair of Semitic languages at Johns Hopkins

University, Baltimore, Md., but until 1889 con¬

tinued to lecture part of the year at Gottingen.

He projected and continued to edit the socalled Polychrome Bible. (See. Bible, Polychrome).

Among his many writings in periodical,

pamphlet and book form, the most important

volumes are (Das babylonische Nimrod-Epo.s*

(1891); <Akkadische und sumerische Keil—

schrifttexte) (1882); (Sumerische Familien—

gesetze) (1883) ; Prolegomena to a Compar¬

ative Assyrian Grammar* (1888); also critical

texts with notes of <Canticles) (1902) ; (Koheleth) (1905); ‘Ecclesiastes* (1905) ‘Nahum*

(1907); <Esther) (1908); (Micah> (1910);

(Biblische Liebeslieder) (1907) ; <(Die

Schlacht von Taanach® in Studien … Well—

hausen gewldmct (1914). He became in 1881

a coeditor of the Beitrdge zur Assyriologie

und semitischen Sprachwissenschaft, published

at Leipzig. He was United States delegate to

the Oriental Congresses of 1899, 1905, 1908,

1912, and delegate to the International Con¬

gress of Americanists at Stuttgart in 1904, and Vienna in 1908.

HAUPTMANN, Gerhart, German drama¬

tist: b. Salzbrunn, Silesia, 15 Nov. 1862. While his family was comparatively well-to-do, they

were of lowly origin, and still preserved the

tradition of the uprisings of the linen-weavers of Silesia, which had attracted universal atten¬

tion in the forties of the 19th century, and ap¬

pear to have been the precursors of the un¬

successful German Revolution of 1848. Ger¬

hart, as well as his two brothers, Karl (q.v.) and Georg, was permeated at an early age with artistic tendencies, which led them to undertake the most varied studies and travels, and pre¬

vented them from finding a permanent liveli¬

hood until comparatively late in life. A tem¬

porary impoverishment of the family led Ger¬

hart to try farming for a time, which he pur¬

sued under the direction of a relative at Jauer (Silesia). Here he became acquainted with the

sudden wealth of the Silesian peasants who had discovered that their lands held treasures of

coal and oil, and with the disastrous and de¬

moralizing effects of such sudden wealth on

minds untrained in its intelligent application.

Later he took up sculpture (1880-82) at the

Art Academy of Breslau, where he learned to

know the life and temptations of the artist. A pronounced bias toward sociology and the

natural sciences led him to enter the University of Jena as an auditor (he had not the neces¬

sary gymnasium training to be matriculated as

a regular student), where he absorbed his first radical views through the medium of science,

only later to apply them in the realm of poetry.

His first work is an epic, Byronic in versification as well as in spirit, embodying the impressions of a long Italian tour in 1883, <Promethidenlos) (The Lot of a Promethean, 1885), full of re¬

bellious and acrimonious arraignment of the

injustice of modern society, uttered by Selin

(Hauptmann), <(who has peered into the terrible abyss of the wretchedness of our time, and

perishes through excess of compassion and the

overflow of his desire to rescue.® He made few other attempts in verse, outside of the drama, although he did pen some mildly patriotic poems in 1914 and 1915, which he would probably not consider to be among his best productions.

His importance in the literature of Europe

is in his dramas. He was not well acquainted

with the world's dramatic literature (except

Goethe and Schiller, for whom his worship was

boundless) before the production of his early

works, and it is to this fact that they may owe a certain formlessness, a lack of constructive

skill within the acts and an invariably incon¬

clusive termination of the play. But these

qualities may also be the result of a dogma

learned (1889) from Arno Holz (q.v.), which

required that the naturalism of the dramatist

should be consistent and complete, ((der konse—

quente Naturalismus.® Hauptmann's first play

presents these qualities in form so striking

((Vor Sonnenaufgangˆ before Sunrise, 1889),

that it aroused an immediate artistic battle in German literary circles, of which he remained

for a long time the chief subject of dispute.

It portrays the depravity of a family of suddenly enriched Silesian peasants, among whom alco¬

holism and incest are rampant, unrelieved ex¬

cept by the innocence of the heroine (Helene,

a member of the stricken family) and the

theoretical socialism of the hero, who is also permeated to saturation with doctrines of he¬

redity and moral responsibility. Hauptmann

was for a number of years a member of the

German Social-Democratic party and an elector

(ˆWahlmann®) for the party. In the same year

Sudermann (q.v.) had his first play, ˆieEhre5

(Honor), performed in Berlin, and although the

two men are altogether different in substance

and technique, they and the year 1889 are fre¬

quently associated in the popular mind as rep¬

resenting the beginnings of the naturalistic

movement in German literature. Hauptmann's

next play, (Die Weber } (he also wrote an

earlier version, entirely in the Silesian dialect, (De Waber,} 1892) is the best known of all his works, and is in many ways illustrative of his purpose and method. It is a presentation of

the sufferings and the revolt of the Silesian

linen-weaver under a merciless form of capital¬

istic exploitation, written with a care in natural¬

istic detail that is reminiscent of Zola (whose influence on Hauptmann is unquestionable), and

a preciseness in rendering dialect phonetics that recalls the similar efforts of G. B. Shaw in

(Captain Brassbound's Conversion and (Pyg¬

malionˆ A separate dramatis persona is

given for each act, although some of the char¬

acters run through several acts, in order to con¬

vince the reader that there is to be no attempt at individual heroes or at a rounded, satisfy¬

ing plot. The hero is the mob, the desperate

exploited population. In spite of the impersonal nature of the treatment, Hauptmann is not so

detached as to conceal his great sympathy for

suffering and his desire to present it simply

and without adornment. This play has met with

great success in foreign countries, especially in America. Like most of Hauptmann's works, it

is in prose. (Der Biberpelz* (The Beaver Coat, 1893), a comedy of low life, besides being an excellent indictment of some of the features

of an officious Prussian bureaucracy, is by

many considered to be the best comedy in Ger¬

man literature since (Der zerbrochene Krug)

(1808) of Kleist (q.v.). In 1913 Hauptmann

aroused the displeasure of official circles by his unpatriotic treatment of the centenary of the

struggle for liberation (1813) in (Ein Festspiel in deutschen ReimenP which presents a sym¬

pathetic picture of the great Napoleon, and a

less sympathetic treatment of Bliicher and

others. Hauptmann's years of activity are as¬

sociated chiefly with Berlin and its suburbs,

where the Hauptmann controversy is still an

important literary conflict; but his extensive

travels brought him into contact with other

civilizations. The literary product of a trip to the United States of America is the novel At¬

lantis* (1912), while (Griechischen Friihling*

(Springtime in Greece, 1908) is a beautiful

rendering of his impressions of Mediterranean

travel. In 1912 he received the Nobel Prize

(q.v.) for literature. English translations of

all his plays and novels are obtainable. (Dramas >

(7 vols., trans. by L. Lewisohn ; New York 1912-18) ; individual novels, no collected edition, by same publisher (Huebsch, N. Y.). Names and

dates of originals: Plays. — (Das FriedensfesC

(1890) ; (Einsame Menschen) (1891) ; Col¬

lege Crampton) (1892) ; (Hanneles Himmelfahrt) (1893) ; (Die versunkenc Glocke,* ˆIon¬

ian GeyerP <Elga,) (Helios) (1896) ; (Das

HirtenliedP (Fuhrmann HenscheP (1898) ;

(Michael Kramer } (1900) ; (Der arme Heinrich) (1902) ; (Rose Bernd* (1903) ; (Und

Pippa tanzt) (1906) ; (Kaiser Karls GeiseP

(1908) ; (Griselda) (1909) ; (Die Ratten)

(1911) ; (Gabriel Schillings FluchP (1912).

Novels and short stories — (Bahnwarter ThieP

(1887) ; (Der AposteP (1890) ; (Der Narr in

Christo* (Emanuel Quint, 1910). Consult

Schlenther, P., (Gerhart Hauptmanns Leben

und Werke) (Berlin 1913) ; Bartels, A., Ger¬

hart PIauptmann> (Berlin 1906) ; Stoeckius, A., (Naturalism in the Recent German Drama)

(New York 1903) ; Benois-Hanappier, L., (Le

drame naturaliste en Allemagne) (Paris 1903) ;

Sulger-Gebing, E., (Gerhart Hauptmann *

(Leipzig 1909) ; Rohr, J., (Gerhart Hauptmanns

dramatisches Schaffen* (Dresden 1912). Sec

Hanneles Himmelfahrt.

Jacob Wittmer Hartmann,

Assistant Professor of the German Language

and Literature, The College of the City of

New York.

HAUPTMANN, howpt'mˆn, Karl, German

novelist, elder brother of Gerhart Hauptmann

(q.v.) : b. Ober-Salzbrunn, Silesia, 11 May

1858. His father was Robert Hauptmann, the

proprietor of a large hotel. Carl's training was more in the domain of the natural sciences

than that of his brother Gerhart, but this has not prevented him from developing a very keen

poetic observation, especially in the rendering

of the atmosphere of an environment, the mi¬

lieu of a story. He attended the University of Jena (1879-83), where he pursued chiefly the

study of biology, Ernst Haeckel being one of

his teachers, and the University of Zurich,

where his attention (1884-89) began to turn

more toward psychology and the abnormal,

under Richard Avenarius and A. Forel. He

moved to Berlin in 1889, later to Schreiberhau (1891), visited the United States as lecturer for the Germanistic Society of America in 1909,

where he delivered lectures and readings from

his own works. His plays occasionally dis¬

play a fine psychology and a faithful presen¬

tation of mood and atmosphere, but have not

been as successful as his novels; he is not to be compared as an artist with his brother Ger¬

hart, however, who is immeasurably his supe¬

rior. Karl's works include (Ephraims Breite)

(1899) ; <Die Bergschmiede) (1901) ; <Mathilde) (1902); (Einhart der Lachler* (1907); and

many others. Consult Borcherdt, H. H.,

(Karl Hauptmann, Er und fiber ihn> (Munich

1911).

HAUPTMANN, Moritz, German musician:

b. Dresden, 13 Oct. 1792; d. Leipzig, 3 Jan. 1868.

He studied at Gotha; was violinist at the court in Dresden in 1812; in 1815-20 was employed as music teacher in the family of a Russian prince; in 1842 he was appointed cantor of the Thomas-schule in Leipzig, and the next year became

professor of counterpoint at the Leipzig con¬

servatory, where he was very successful and

popular as a teacher, and was regarded as the chief theorist of his day. His compositions in¬

clude motettes, an offertory, and sonatas for

violin and piano, and the opera (Mathilde)

(1826). In 1853 he published his (Die Natur

der Harmonik und Metrik,* a very important

theoretical work.

HAURAN, how'ran, a volcanic district of

Syria, corresponding to the ancient Auranitis.

It lies south of Damascus, and east of the

upper Jordan, between lat. 32° 30' and 33° N.

The boundaries have been variously interpreted.

The part called Hauran proper consists of an

elevated plateau and fertile plains in one part and a barren lava plateau in the other. The

mountain of Jebel-Hauran, rising to about

6,000 feet, flanks it on the east. There are

railway connections with Damascus. Expedi¬

tions from Princeton University (1899, 1904

and 1909) have succeeded in uncovering inter¬

esting remains, among which is the Job stone at Sheikh Saad, erected by Rameses II (1310-1244

b.c.) . Excavations show several layers of civiliza¬

tion. Some 300 deserted towns in Hauran con¬

tain remarkably preserved stone houses. Con¬

sult Publications of an American Archaeologi¬

cal Expedition to Syria, 1899-1900) (Leyden

1904-08), and Princeton University Publica¬

tions of Archaeological Expeditions to Syria,

1904-05 and 1909> (Leyden 1908-13).

HAUSA (how'sa) LAND, Africa, a former

important negro kingdom, north of the junc¬

tion of the Benue and Niger rivers. After in¬

ternecine divisions it was succeeded by a

Mohammedan Fulah empire in 1802, and since

1 Jan. 1900 is incorporated in Nigeria. The

name is perpetuated by a negritic race and lan¬

guage distributed far beyond the ancient

Plausa boundaries. The race is distinguished

as able traders and craftsmen, and the language, for its euphony, simplicity and literary adapta¬

bility. A professorship of the language was

established at Cambridge University and a so¬

ciety was formed in London in 1892 for its

study. Consult Robinson, C. H., (Hausaland:

Fifteen Hundred Miles through the Central

Soudan* (London 1896).

HAUSMANNITE, hous'man-It, popularly

known as black manganese, a native Trimanganic

tetroxide, having the formula Mn0.Mn203,

and crystallizing in the tetragonal system, gen¬

erally twins and often fivelings, with octahedral habit. It is brownish black in color, and opaque with a submetallic lustre. It has a hardness of from 5 to 5.5, and a specific gravity of from 4.72 to 4.86. Hausmannite dissolves in hot

hydrochloric acid, with evolution of chlorine

gas. It occurs in Germany, Sweden, Alsace

and elsewhere, usually as fine crystals in con¬

nection with porphyry. It has been obtained

artificially by keeping fused manganese chloride for several hours in an oxidizing atmosphere

saturated with water vapor, and in some other

ways. It was named in honor of the German

metallurgist, J. F. L. Hausmann.

HAUSSMANN, Georges Eugene, zhorzh

e-zhan os-man, Baron, French municipal officer : b. Paris, 27 March 1809; d. there, 11 Jan. 1891.

He studied law, and under Louis Philippe was

sous-prefect of various places. The February

Revolution of 1848 caused the forfeiture of his 762

office, but Louis Napoleon in 1853 made him

prefect of the Seine, and he applied himself to the improvement and adornment of Paris with

such energy that the city became transformed

under his administration. He became senator

in 1857. His memoirs were published 1890-93.

HAUTBOY, ho'boi (French hautbois,

<(high wood,® alluding to its tone); a wooden

wind-instrument of two-foot tone, played with

a double reed. Also an organ stop, consisting

of reed pipes slightly conical, and surmounted

by a bell and cap of eight feet pitch. The tone is thin and soft.

HAUTEFEUILLE, ote'fe'y', Paul Gabriel,

French mineralogist and chemist: b. Etampes

1836; d. Paris 1902. He was director of the

chemical laboratory and teacher of metallurgy

at the place of his birth until 1885, when he was called to the chair of mineralogy in the

University of Paris. He has written exten¬

sively in periodicals and reviews on scientific subjects and is recognized as an authority on

the subjects he has been teaching.

HAUY, Rene Just, re-na zhiist a-ii-e or

a-we, French mineralogist: b. Saint Just, Oise, 28 Feb. 1743; d. 3 June 1822. He was trained for the Church and took priest's orders, but

turned to mineralogy, and acquired a great

reputation by a series of important discoveries.

Among the chief of these is the geometrical

law of crystallization, according to which a

given mineral uniformly contains the same pri¬

mary form as its basis of crystallization. From that time, according to Herschel, mineralogy

first ceased to be ((a mere laborious cataloguing of stones and rubbish.® In 1794 Hauy became

keeper of the cabinet of the School of Mines, and in 1802 professor of mineralogy in the

Museum of Natural History. His works in¬

clude (Traite de Mineralogie> (1801), and

(Traite de Crystallography (1822).

HAUYNITE, ha'wln-lt, or HAUYNE,

ha'wm, a mineral of the sodalite group, occur¬

ring in certain igneous rocks, and notably in the lavas of Mount Vesuvius. It is a silicate and sulphate of sodium, calcium and aluminum, crys¬

tallizing in the isometric system. It is usually translucent with a vitreous lustre, a hardness

of from 5.5 to 6 and a specific gravity of

about 2.45. Hauynite is commonly blue or

green, though red and yellow specimens are

also known. It was named in honor of the

French mineralogist, R. J. Hairy (1742-1822).

HAVANA (Sp. La Habana, la ha-ba'na),

Cuba, its capital and the commercial centre of the West Indies. It occupies nine square miles on the west side of the Bay of Havana on the north coast, one of the noblest harbors in the world, with deep water up to the quays ;

entered by a narrow channel three-eighths

of a mile long, protected by Punta

Castle on the west and Morro Castle

and La Cabana on the east. It is in

two sharply distinct sections. The old city,

the commercial quarter, was built on the small western peninsula dividing the sea from the

harbor, a low plain cut by a small stream

on the west, strengthened by a city wall only torn down a generation ago. It is largely, and was entirely till the American occupation, a

maze of narrow, crooked lanes traversed by

one or two broader streets; the chief of which are the Calle O'Reilly, the main business street, running from the governor's palace to the city wall, and the Calle Obispo (Bishop street).

The new city is on a ring of hills 150 feet high south and west of the old, with the castle of El Principe on the crest, and has a wealth of broad and finely shaded macadamized streets,

drives, promenades, parks, plazas, flower-gar¬

dens, fountains, statues, etc., which make it one of the handsomest cities in the world. There

is no (<West End® in Havana, the houses of

the wealthy being scattered through every part, usually of classic pattern, with an inner court¬

yard or patio surrounded by marble or stucco

columns, containing a garden of tropical vege¬

tation and a central fountain. The handsomest

residence street, next to the new suburb Vedado, is the Cerro, a long thoroughfare running up a hill at the farther end, and bordered by immense old villas in the midst of splendid gardens. The finest drives and promenades are the Malecon,

a new thoroughfare along the waterfront from

Prado to the Vedado, the Prado, a boulevard

with a double row of shade-trees in the middle, running from Punta Castle outside the old wall, and ending in the largest park in the city, Colon Park or Campo Marte, and the Calle de la Reina (Queen street) starting west from this park

and continued as the Paseo de Tacon to the

citadel of El Principe. The Alameda de Paula

along the bay is also a favorite promenade.

Among buildings, the most interesting are

the palace of the old captains-general, facing

the Plaza de Armas near the harbor front, the cathedral, built 1764, and supposed to contain

the ashes of Columbus in an urn till it was

removed to Spain in 1898 (but the San Domin¬

gans claim they have his authentic bones), and the Tacon Theatre, perhaps the largest in the

world. There are several other theatres and

opera-houses, and many clubs, *etc.* The chief

educational institutions are the University of

Havana, founded 1670 by the Dominicans ; the

Jesuit boys' college de Belen,.with a museum,

observatory, a library rich in old Cuban history, *etc.* ; College of American Augustinian Fathers,

founded 1901. Famous among benevolent in¬

stitutions are the Casa de Beneficencia, founded by Las Casas for infants. There are three gen¬

eral hospitals, a great lazaretto for lepers and an insane hospital in the

city and vicinity. Over 100 newspapers, etc., are published in the city.

The water supply of the city was installed

by a Cuban engineer, Albear, some 40 years

ago, and is considered a remarkable specimen

of good workmanship. It comes from the

Vento by an aqueduct 12 miles long, known as

the Canal of Albear. In all other respects the Americans at the conquest found an undescribable state of filth and disease. The city was the prey of yellow fever; the sewers had seldom

been cleaned since they were laid down, and

some of them were choked with generations of

rottenness ; the buildings were pest-holes ; and in that dungeon of horrors, the military hospital, 70 per cent of the inmates died. The United

States forces in their short stay transformed

this reeking home of pestilence into one of the healthiest cities in America. In systematic

order streets were cleaned, repaved, widened ;

squads of cleaners were sent from house to

house, emptying the Augean stables under them,

whitewashing and disinfecting them, and where

they were shanties that were nests of infection, tearing them down ; the hospital was cleaned,

View of Havana from Cabanas

HAVANA

tD31

SI 3

1 Cathedral of Havana

2 Colon Park, Havana

HAVANA

HAVEN

763

disinfected and covered deep with whitewash,

ar-burned into a schoolhouse. New business

st ls were made by widening old lanes ; parks-v cleared up, and a fine seawall along the

oo a to the north was built. The average

dea'hs from yellow fever 1887-98 were 440; in

189u they were 1,262; in 1901, for the first time in its history, only three or four. A Cuban

physician of Irish descent, Dr. Carlos Finlay,

now chief sanitary officer of Havana, was the

originator of the mosquito theory of the yellow fever. General Wood and the American army

surgeons, however, deserve much credit for

making the theory of practical use.

The climate is not severe. The mean annual

temperature is 77° ; the range from hottest to coldest 82° to 71°; the highest record, 100.6°, the lowest 49.6°. The mean rainfall is 54 inches.

Havana is the market of western Cuba, the

head of the island's banking and commercial

interests and the emporium of the West Indies.

Besides being the centre of the island railway system and of a great domestic shipping trade, especially with Santiago, it is the focus of a vast foreign commerce with Spain, France,

England and the United States, regular ocean

lines running weekly to the first three and semi¬

weekly to the latter, besides others to the other West Indies. It has excellent covered wharves

and a capacious dry-dock to aid this. Regia, on the opposite side of the bay, contains the sugar wharves and railway termini. For an analysis

of foreign trade and figures showing its increase in volume and the changes in distribution of

exports and imports, see the article Cuba.

Havana's exports are chiefly of sugar, tobacco, cigars and cigarettes ; the imports, flour, rice, lard and other foods, cotton and metals. Its

manufactures are mainly tobacco products; its

cigar factories, of which there are over 100 of the first rank, are the largest in the world, one covering an entire square. It also manu¬

factures confectionery, perfumes, rum, *etc.* The

new electric street railway system is one of the finest of its kind, with 36 miles of track.

History. — Havana was founded here (trans¬

ferred from an older site) by Diego de Velas¬

quez in 1519, and called by him <(the key of the New World.** Burned by buccaneers, in 1528,

it was rebuilt and made the chief naval station of Spain in this hemisphere, twice sacked in

1555 and 1563, it was a storm centre of wars and piracies for two centuries. In 1762 the

English captured it, but restored it to Spain

the next year. In 1802 it was partly burned,

but under Governor Tacon it was rebuilt from a straw-thatched wooden town to a city of brick

and stone. For its late history, see Cuba.

Pop. 350,000.

HAVANA, Ill., city, county-seat of Mason

County, on the Illinois River and on the Chi¬

cago. Peoria and Saint Louis and the Illinois

Central railroads, about 39 miles northwest of

Springfield. It has some reputation as a sum¬

mer resort. It is situated in an agricultural

region and is the trade centre for a large ex¬

tent of country. The chief manufactures are

flour, agricultural implements, drills, gasoline

engines, cutlery, cooperage and some factory

supplies. Its trade is chiefly in grain, fruit, vegetables and dairy products. The water¬

works are owned and operated by the city.

Pop. 3,614.

HAVAS (a'va) AGENCY, the strongest

and best known of the French news agencies.

It had its origin in a translation bureau estab¬

lished in Paris in 1835 by Charles Havas, for the turning into French of interesting news

from the English and Continental papers, as a

news service for Parisian and other French

publications. See Press Associations; Havas,

Charles.

HAVELOCK, hav'e-lok, Sir Henry, Eng¬

lish soldier: b. Bishop-Wearmouth, near Sun¬

derland, 5 April 1795; d. Dilkusha, India, 24

Nov. 1857. Entering the army, he served with

distinction in the Burmese War (1824-26); in

1829 married, became a Baptist and was dis¬

tinguished during the remainder of his life by his earnest religious zeal. He participated in

the Afghan War and in the defeat of Mo¬

hammed Akbar, 1843. He took part in the

Mahratta War and distinguished himself in the

Sikh War of 1845. He commanded a division

in the Persian War (1856-57) and on the out¬

break of the Indian mutiny was dispatched to

Allahabad in order to support Sir H. Lawrence

at Lucknow and Sir H. Wheeler at Cawnpore.

On arriving at Cawnpore he found that Nana

Sah b had massacred the prisoners. Pursuing

his march to Lucknow, he defeated the rebels

at Bithoor and finally won the battle of Alum-bagh. Having captured Lucknow, Havelock

and Outram were shut up there until relieved

by Sir Colin Campbell, 17 Nov. 1857. He was

raised to the rank of major-general, made a

K. C. B. and (before his death was known)

created a baronet. Consult lives by Brock

(1858) ; Marshman (1890) ; Forbes (1890).

HAVEMEYER, hav-e-mi'er, William

Frederick, American banker: b. 31 March

1850. He received his education in private

schools and entered into commercial business,

and as a successful financier became vice-presi¬

dent and director of the National Bank of

North America and of the Queens County Bank

of Long Island, and took a place in the board of directors of numerous railroad and banking

corporations.

HAVEN, Alice Bradley, American author :

b. Hudson, N. Y., 1828; d. 1863. Her maiden

name was Emily Bradley, and while a school

girb she sent under the pseudonym of <(Alice G.

Lee” many sketches to the Saturday Gazette,

then recently established by Joseph C. Neal in Philadelphia. She was married to Mr. Neal

in 1846, and at his request assumed and re¬

tained the name of Alice. On the death of her husband in 1847 she conducted the Gazette

for several years. She published in 1850 Gos¬

sips of Rivertown, with Sketches in Prose and

Versed and became widely known by her series

of juvenile stories, as (Helen Morton,* Pic¬

tures from the Bible. > (No such Word as

Fail,1* Patient Waiting no Loss,* ‘Contentment

Better than Wealth,* (All’s not Gold that Glit¬

ters,* ‘Out of Debt Out of Danger.* *etc.* In

1853 she was married to Samuel L. Haven.

HAVEN, Erastus Otis, American Metho¬

dist bishop and educator: b. Boston, Mass., 1

Nov. 1820; d. Salem, Ore., 3 Aug. 1881. He

was graduated at the Wesleyan University, Mid¬

dletown, Conn., in 1842, soon after entered the ministry of the Methodist Episcopal Church,

was appointed teacher of natural science in the 764

Amenia Semrnary, N. Y., and in 1845 was

elected principal of that institution. He was

professor of Latin and Greek in the University of Michigan 1854—56; editor of Zion's Herald

1856-63 and sat in the Massachusetts senate

1862-63. He was president of the University

of M.chigan 1863-69 and of Northwestern Uni¬

versity, Evanston, Ill., 1869-72. He was chan¬

cellor of Syracuse University (1874-80) and

was elected bishop in 1880. He published (The

Young Man Advised > (1855) ; (Pillars of

Truths (1866) ; (Rhetoric) (1869). His auto¬

biography, edited by Stratton, appeared in

1883.

HAVEN, Gilbert, American Methodist

b:shop: b. Malden, Mass., 19 Sept. 1821; d.

there, 30 Jan. 1880. He was an able writer and a forceful preacher. In the Civil War he was

the first commissioned chaplain in the Federal

army. He was editor of Zion's Herald 1867-72 and was elected bishop in the latter year.

He published (The Pilgrim's Wallet, or Sketches of Travel in England, France and Germany>

(1865) ; (National Sermons) (1869) ; (Life of

Father Taylor, the Sailor Preacher* (1871) ;

*Our Next-Door Neighbor, or a Winter in

Mexico> (1875), *etc.* Consult the <Life,) by

Prentice (1883), and the Memorials,* edited

by Daniels (1880).

HAVERFORD COLLEGE, Haverford,

Pa., under the auspices of the Society of

Friends, was founded in 1833. It was first

known as Haverford School, but in 1845 it was suspended for the purpose of collecting an

endowment, and in 1856 it was made a college.

It was the first collegiate institute in the United States which was founded and conducted en¬

tirely within the Society of Friends. Others

besides the sons of Friends were admitted as

pupils after 1849. It is well equipped in labor¬

atory requirements and in its library facilities.

The degrees of B.A., B.S. and M.A. are con¬

ferred. It offers 67 scholarships of a total

annual value of $14,600, including four com¬

petitive Corporation scholarships in every class, valued at $300 each. Four Rhodes scholar¬

ships have been held at Oxford, England. The

faculty membership is 25 ; the student registra¬

tion annually is from 170 to 200. The college grounds cover 226 acres, the campus 70 acres,

and with the 17 college build.ngs exceed in

value $2,000,000. The productive endowment

funds aggregate $2,577,574.

HAVERGAL, hav'er-gal, Frances Ridley,

English hymn-writer : b. Astley, Worcestershire,

14 Dec. 1836; d. Swansea, Wales, 3 June 1879.

She was a frequent contributor to Good

Words and the chief English religious peri¬

odicals, and her musical harmonies were praised by the German composer Hiller. Her poems

and hymns were collected in several volumes,

(The M nistry of Song) (1870) being the first.

Her (Poetical Works) (1884) appeared under

the editorship of M. V. G. Havergal. Of her

hymns, which contain her best work and are

found in all collections, the most familiar is <Take My Life and Let It

Be. 5 The (Memoir. >

by her sister (2d ed., 1880), exercised a wide influence in evangelical circles.

HAVERHILL, ha’ver-fl, Mass., city in

Essex County, on the Merrimac River at the

head of navigation, and on the Boston and

Maine Railroad, about 30 miles from Boston.

It is an important centre of street railway traffic, electric lines radiating from it connecting it

with all of the important cities and towns of northeastern Massachusetts and southeastern

New Hampshire. Four highway bridges span

the river, connecting the city respectively with the Bradford district, with Groveland and with

West Newbury. Haverhill, including Bradford,

which was annexed to it 4 Jan. 1897, is 9 miles long and 7l/2 miles wide, and covers an area

of 32 square miles. Bounding the entire

southern length of the original city and sep¬

arating it from its adjunct, Bradford, from

Groveland and from West Newbury, flows the

Merrimac River, navigable from the sea to the

very heart of the city, and affording for

freightage or pleasuring a delightful waterway.

From the river on both sides the land slopes

upward, the lower parts near the river being

occupied for manufacturing and commercial

purposes, the higher lands for residences. Five large lakes — Kenoza, Round Pond, Saltonstall,

Crystal and Chadwick's Pond — lie entirely

within the limits of the city, and with a large artificial lake at Mill Vale, afford an abundant supply of water for all purposes. The eastern

and western parts of the city are known as East Haverhill and West Haverhill, their more

thickly settled parts being respectively Rocks

Village and Ayres Village ; the southern portion, in the Bradford district, is known as Ward

Hill.

Government. — Haverhill was the first city

in the East to adopt the commission form of

government. The administrative heads of the

city are a mayor and four commissioners elected at large regardless of ward lines. The mayor

receives $2,500 a year; the aldermen $1,800 a

year ; each is elected for a two-year term. Each alderman is at the head of a specific department and is responsible for what goes on in his

department. The school board consists of four

members, elected for two-year terms without

regard to politics or ward lines. The adminis¬

trative officer of the board is the superintendent of schools. The water board consists of five

members, each appointed by the city government

for a term of five years ; the park commission consists of five members, each appointed by the city government for a term of five years ; the trustees of the public library, six in number, and the trustees of the Hale Hospital, five in number, hold office for life, vacancies being

filled by tlhe boards of trustees.

Financial. — The assessed valuation of the

city, 1 April 1918. was $47,649,919. The tax

levy for 1918 was $1,038,768.23 ; State tax, $105,-

600; county tax, $74 868.97 ; net bonded debt, 31 Dec. 1917, $1,481,711.37 ; municipal loans,

$1,182,823.95; water loans, $298,887.42.

Manufactures. — According to the latest

available figures for the year 1913, taken by

the State Bureau of Statistics, Haverhill has

316 manufacturing establishments with an ag¬

gregate capital of $17,582,966. The average

number of wage-earners employed is 13,697 and

they receive $8,809,239 in wages. There are

116 shoe manufacturing establishments with an

aggregate capital of $9,467,208 and the value

of the shoes produced is $27,508,440. The

Board of Trade estimates that approximately

22,000,000 pairs of shoes were made in Haver-

hill in 1914. There are 115 concerns in the

hoot and shoe cut stock and finding trade ;

their aggregate capital is $4,014,039 and the value of their products $9,583,640. The Board of

Trade estimates that in 1916 about 17,000 peo¬

ple were employed in wage-earning industries

in Haverhill, 13,000 of these in the shoe manu¬

facturing industries in which they received an

average wage of $673 a year. Haverhill has

built an average of one modern factory a year since 1903, when the Board of Trade erected a factory containing 75,000 square feet of floor

space. Other important industries in Haver¬

hill are the manufacture of hats, woolen goods, box board, wooden and paper boxes, tacks,

nails and machinery.

Schools.— Haverhill has 34 public school

buildings with 242 teachers and 7,350 pupils.

The aggregate value of the school buildings is $1,062,200. There is a splendid high school

building which cost $400,000 and accommodates

1,000 pupils.

Board of Trade. — There are 700 members

in the Board of Trade, which has been organ¬

ized for 25 years and has been an active factor in Haverhill's growth. It blazed the way for

the modern factory building era; collected

$10,000 for a modern lighting system in the

down-town streets ; has brought many indus¬

tries to Haverhill ; has been active in the sup¬

pression of canvassers, and in the development

of retail trade. The board has also inaugu¬

rated through package-car service for local

manufacturers to all the important jobbing and

mercantile centres.

Parks. — There are 27 public parks in the

city. Winnikenni Park, adjacent to Lake Kenoza, is very extensive, diversified and beauti¬

ful, and abounds in delightful drives.

Public Buildings, Institutions, *etc.* — The

Public Library was founded in 1875 by the gen¬

erosity of E. J. M. Hale, whose gifts to it, including a legacy of $100,000, amounted to

more than $175,000. The library contains over

100,000 volumes, with an annual circulation of

nearly 160,000. There are four branch libra¬

ries for the accommodation of the more remote

parts of the city, and 12 loan libraries placed in the district schools. Loan libraries are also

established in connection with each grammar

school, books being sent to and from these

schools each week. The Hale Hospital occu¬

pies a set of buildings of the most modern type and equipment. The Gale City Hospital,

opened in February 1916 with accommodations

for 50 patients, was formerly The Children's

Home and was presented to the city for use

as a hospital by Gen. Stephen Henry Gale.

Haverhill also has a tuberculosis hospital and

a separate contagious isolation hospital. The

Historical Society occupies the ˆButtonwoods,ˆ

a large old mansion house on Water street, for¬

merly the seat of the Saltonstall family, mark¬

ing very closely the site of the first settlement of Haverhill. The Whittier homestead, the

birthplace of the poet, John Greenleaf Whittier (17 Dec. 1807) and the scene of his poem

(Snowbound^ is situated about three miles

from the heart of the city on the Merrimac

road. The house, with the grounds surround¬

ing it, is owned by the Whittier Association,

and it is visited annually by many pilgrims.

The Y. M. C. A. and Y. W. C. A. have com¬

plete and well-equipped buildings, including a

thoroughly equipped gymnasium. The Pentucket Club occupies an elegant mansion, for¬

merly the Duncan residence, nearly a cen¬

tury old, designed by the celebrated architect, Haviland, but harmoniously enlarged to meet

the needs of the social club now occupying it.

Haverhill lodge of Elks own a magnificent

$87,000 home; the Moose have a lodge home

and Division 14, A.. Q. H., owns its own build¬

ing. The local military organization is Com¬

pany F, of Eighth regiment, M. V. M., organ¬

ized in 1869, and attached to the Second

brigade. Among the numerous fraternal and

other organizations may be mentioned seven

Masonic bodies, maintaining a Freemason's

Hall Association, with a capital of $50,000;

eight lodges of Odd Fellows, maintaining an

Odd Fellows' Hall Association, with a capital

of $100,000; Elks, Foresters, G. A. R., Sons of Veterans, Woman's Relief Corps, Red Men,

Daughters of Pocahontas, Knights of Malta,

American Workmen, Knights of Pythias, Pa¬

trons of Husbandry, Royal Arcanum, Moose,

Eagles, Knights of Columbus, Catholic Order

of Foresters, Boot and Shoe Workers' Union,

Shoe Workers' Protective Union, etc., while

two literary clubs, the Monday Evening Club

and the Fortnightly Club, are noteworthy.

History. — The first settlement of Haverhill

was made in 1640-41 by men from Newbury

and Ipswich, the new settlement being known

as Pentucket. In the year 1641 the Rev. John

Ward came from Ipswich to be the

minister and leader of the colonists, and

so pleased were they with his character,

attainments and zeal that they named the place Haverhill from the older Haverhill in Eng¬

land, which was his birthplace. In 1642 title to the tract of land, 14 miles in length, was ob¬

tained by purchase and deed from the Indians,

Passaquo and Saggahew. In 1660 the first pub¬

lic school was established, its teacher, Thomas Wasse, his salary £10 a year. For many years

Haverhill was a frontier town, and suffered

from the forays of the Indians. On 15 March

1697 the savages attacked the house of Thomas

Duston, carrying away his wife, Hannah, her

infant child and her nurse, Mary Neff. The

child was soon killed, but Mrs. Duston, taken

to an island in the Merrimac River above Con¬

cord, N. H., in the night, with the assistance of her nurse and a captive youth, killed ihe

Indians who were guarding her, as they lay

asleep, scalped them, and escaped in a canoe,

carrying the scalps as proof of her deed. A

monument to her in City Hall Park commemo¬

rates her heroism. On 29 Aug. 1708 the In¬

dians made a murderous foray upon the centre

of the town, setting fire to the church and the houses, killing the Rev. Benjamin Rolfe and

15 others, carrying away about 20 captives, but leaving about 30 of their own number dead.

These are the more notable among many In¬

dian attacks upon the place. At the outbreak

of the Revolution Haverhill contributed to the

patriot cause her quota of men, 74 of her sons being engaged in the battle of Bunker Hill.

On 4 Nov. 1789 George Washington visited the

town, remaining over night at Harrod's Javern,

on the site where the city hall now is, and

paying delightful compliments to the town and

its beautiful location. In 1793 a stage coach

line was established between Boston and Haver¬

hill, Mare, 3d. a mile,® running twice a week.

On 6 Sept. 1793 the first newspaper printed

in the town was published. It was called The

Guardian of Freedom, and was issued weekly

at nine shillings a year. In 1794 the first bridge across the river was erected. In 1827 the

Haverhill Academy was opened, one of the

students, John G. Whittier (q.v.), writing an

ode for the dedication. In 1828 the Rocks

Bridge was completed, and in the same year

the steamer Merrimac, the first on the river,

began running between Haverhill and Newburyport. In 1837 the railroad, now the Boston and Maine, was extended from Andover to

Haverhill. In 1842 certain citizens of Haverhill presented to Congress, through John Quincy

Adams (q.v.), the famous petition for the

dissolution of the Union, the object being to

rebuke the Congressional agitators. In the

Civil War Haverhill contributed to the Union

cause about 1,300 men, her first troops leaving for the front on the day when the Massachu¬

setts Sixth was attacked in Baltimore. To

those who fell in that war she erected in 1869

on one of her principal squares a beautiful

soldiers' monument. Haverhill became a city

in 1869. The old place has suffered from sev¬

eral disastrous fires, one in 1775 which de¬

stroyed 17 buildings in the little town; one in 1873, which burned out 35 business houses, and the most disastrous one of 17 Feb. 1882, which burnt out about 300 business firms and de¬

stroyed about $2,000,000 worth of property.

On 6 Nov. 1888 the city hall, built in 1861, was gutted by fire, but it was immediately rebuilt.

The shoe and leather industry of Haverhill

dates back almost to the time of the first settle¬

ment, for in 1643 Job Clement established a

tannery, and at about the same time Andrew

Greeley practised the trade of shoemaker for

the little settlement. In 1818 a special tw'o—

horse wagon was regularly run between Haver¬

hill and Boston for the transportation of shoes, and in 1835 the traffic employed 40 horses and two yoke of oxen. The coming of the railroad

to Haverhill in 1837 furnished a better means

of transportation and gave new impetus to

manufacturing. In 1850 about 50,000 cases of

shoes were sent out; in 1860 about 94,000,

valued at about $3,750,000. The change in 1870

from town government to city government was

coincident with an awakening to new life. Old

residential streets were changed to manufac¬

turing centres, old farms and pastures became

thickly covered with residences, and in manu¬

facturing the city rapidly grew to be one of

the three cities leading in the output of shoes.

To-day fully 10 per cent of the total output

of shoes in the United States and nearly one-fourth of the total number produced in Massa¬

chusetts is made in the Haverhill factories. In 1890 Haverhill celebrated the 250th anniver¬

sary of its settlement amid a great gathering

of distinguished sons and guests, the address

being by the Rev. Samuel H. Duncan, the his¬

torical poem by Dr. John Crowell, and the be¬

loved and distinguished son of the town, the

poet Whittier, sending as a tribute his beauti¬

ful poem, ˆHaverhill.® In 1915 Haverhill ap¬
propriately commemorated her 275th anniver¬
sary.

Population. — The population of Haverhill
(United States census of 1900) was 37,175, an
increase from 27,412 in 1890. A part of this
increase was due to the annexation of Brad¬
ford, the population of which in 1895 was
4,736. The Federal census of 1920 gave Haver¬
hill a population of 53,884.

Albert L. Bartlett.

HAVERHILL, N. H., village, county-seat
of Grafton County, on the Connecticut River
and on the Boston and Maine Railroad, about
90 miles northwest of Concord. The town
contains several villages, the largest of which is Haverhill. The surrounding region is largely devoted to agriculture, but the granite quarries in the vicinity add to the industrial wealth of the village. Some of the manufactures are
flour, lumber, house furnishings, stanchions,
wagons, furniture, whetstones made from the
stone found nearby and dairy products. The

public buildings include the county building, almshouse, hospital and high school. Haver¬ hill was first settled in 1762. Pop. 3,498. Con¬ sult Bittinger, J. A., (History of HaverhilP (Albany 1888).

HAVERS, Clopton, English anatomist and physician: b. 1650; d. 1702. After study at Cambridge he proceeded to Utrecht, where he graduated M.D. in 1685. He established him¬ self as a practising physician in London, and acquired a reputation by his profound studies on bone structure, which are exhaustively sum¬ marized in his (Osteologia Nova) (1691). His name is perpetuated in osteology by the tech¬ nical term ((Haversian canals.® Among his other works are Researches on the Lach¬ rymal Gland> (1691) ; (Survey of the Micro¬ cosm) (1695), and discourse on the Concoc¬ tion of Food1* (1699).

HAVERSCHMIDT, ha'ver-shmit, Fran¬ cis, Dutch poet : b. Leeuwardien 1835 ; d. Schie¬ dam 1894. Educated for the Church, he com¬

pleted his studies at Leyden. He became known

as ((Piet Paaltjens,® the pseudonym under

which he published (Snikken en Grimlachjes)

(1867), a collection of poems, six editions of which were sold in two years. He published

also (Familie en Kennissen> (1876), a collec¬

tion of prose essays.

HAVERSIAN CANALS. See Bone.

HAVERSTRAW, N. Y., village in Rock¬

land County, on the Haverstraw Bay, a part

of the Hudson River, and on the West Shore

and the New Jersey and New York, the New

York, Ontario & Western railroads; about 30

miles north of New York and 35 miles south

of West Point. The first settlement was made

by the Dutch, who established here, about 1710, a trading post. It became a precinct in 1719, but the town was not incorporated until 1854.

A short distance north of the village of Hav¬

erstraw, and near West Haverstraw, is the

((01d Treason House,® the house owned in

Revolutionary days by Thomas H. Smith, and

the place where Arnold and Andre met in Sep¬

tember 1780, and made all arrangements for

the surrender of West Point. Except the ad-

dition of a wing, the house is to-day about as it was when Arnold visited it. From the room

in which the final arrangements were made

may be seen the Hudson and the opposite shore along which Andre journeyed toward Tarry-town. The (<Haverstraw Community® was or¬

ganized in Haverstraw in 1825, but remained

in existence as a community only a few years.

The chief industries of the village are silk

weaving and brickmaking. Other manufac¬

tures are dynamite, baskets and brickmaking

machinery. The village has an excellent high

school and a public library, a hospital for crip¬

pled children and Stony Point Park. Consult

(Smith House at Haverstrawˆ an article in

Magazine of American History (Vol. V, New

York 1881). Pop. 6,000.

HAVESTAD, Bernard, German Jesuit and

mis .ionary: b. Cologne, 1715; d. Munster, 1778.

In 1748 he was sent as a missionary to Chile, where he rapidly learned the native dialect.

He traveled through the lesser known parts

of the country, visiting the Araucanians, the

Cuenches, the Huillichos, the Guaicurus, etc.,

and collected a great mass of interesting in¬

formation on the customs, the natural prod¬

ucts, statistics, etc., of the region. On the ex¬

pulsion of his order in 1768 he was arrested

and conducted to Lima. He escaped death

from shipwreck, and returned to Germany,

where he published (Chilidugu, sive Res

Chilenses> (1777).

HAVET, a'va, Ernest Auguste Eugene,

French scholar and philosopher: b. Paris, 11

April 1813; d. 1889. As a brilliant student, he received several educational appointments, and

in 1840 was called to Paris as professor of

Greek literature on the staff of the normal

school. In 1855 he was appointed professor of

Latin eloquence in the College of France. The

chief of his many learned works is (Christianisme et ses origines) (4 vols., 1871-84).

HAVET, Julien, French historian, son of

Ernest Havet: b. Vitry-sur-Seine, 1853; d.

1893. He received his education at the Ecole

des Chartes and the Ecole des Hautes Etudes.

Afterward he was appointed assistant curator

of the printed book department of the Bibliotheque Nationale. He made important histori¬

cal researches, especially of the Merovingian

and Carolingian periods. He published an edi¬

tion of Gerbert's letters in 1889. Consult the volumes Questions merovingiennes) (1896)

and <Opuscules inedits* ; also the bibliography in 'Melanges Havet) (Paris 1895).

HAVILAND, John, American architect and

engineer: b. England, 15 Dec. 1792; d. Phila¬

delphia, 12 March 1852. He studied architec¬

ture with Elmes in London. Subsequently

went to Russia with a view of entering the

imperial corps of engineers, and in 1816 emi¬

grated to the United States. The Pittsburgh

penitentiary, one of his earliest works, intro¬

duced the radiating form of constructing

prisons, which was extensively adopted in the

United States and in Europe. Among the

principal edifices built after his plans are the halls of justice, better

known as the ((Tombs®

(q.v.), in New York, rebuilt in 1902; the

United States naval asylum in Norfolk, Va. ;

the State penitentiaries of New Jersey, Rhode

Island and Missouri ; the United States mint

and the deaf and dumb asylum in Philadelphia ; the Pennsylvania insane hospital at Harris¬

burg, besides numerous churches.

HAVILAND, William, British soldier: b.

Ireland, 1718; d. 1784. He served in Scotland

during the rebellion of 1745. During the years 1757-58 he fought under Abercrombie at Ticon-deroga, and also under Amherst. In 1760 he

fought his way at the head of 3,400 men

through the French lines at Lake Champlain

to join Murray and Amherst, who were con¬

verging on Montreal. After the capture of

Montreal he served in the West Indies and was present at the reduction of Martinique and the conquest of Havana in 1762. He was made

general in 1783.

HAVILDAR, a non-commissioned officer

in the British Indian army, the highest rank

of its class.

HAVIN, Leonor Joseph, French politician:

b. Paris, 1799; d. 1868. He followed the pro¬

fession of the law, and in 1830 was made jus¬

tice of the peace at Saint-Lo. From 1830 to

1847 Mr. Havin represented department of La

Manche in the Chamber of Deputies. There he

was a prominent leader of the opposition and

took a prominent part in the agitation which

resulted in the February revolution. Never¬

theless, Havin joined the Moderate party in

the memorable National Assembly of 1848-49

and was prominent in all Republican movements

until the coup d'etat of Napoleon when he was ousted from the State Council. He continued,

however, his preachments of liberal and Re¬

publican doctrines in the columns of the news¬

paper, Le Siecle, which he controlled.

HAVLICEK, hav'le-chek, Karel, Bohe¬

mian journalist and litterateur: b. Borova,

whence he was frequently called ftHavel Bo'

rovsky,® 1821 ; d. 1856. Karel was educated at the University of Prague, and for some time

was employed as a teacher in Moscow. About

1848 he returned to Bohemia and became edi¬

tor of the Ndrodni Noviny for two years, after which he edited the Slovan. His liberal articles in the latter displeased the reactionary authori¬

ties of that day and Havlicek was incarcerated at Brixen in the Tirol in 1851. The 'Tyrolese Elegies) date from this period and are a sar¬

castic commentary on the political state of Aus¬

tria at that time. In 1855 Havlicek returned to his native land but survived only a year, dying at Prague in 1856. Among his popular works

are the ballad 'Krai Lavra* ; and the satire

'KFest sv. Vladimira* (1877). He also made

numerous translations from Gogol, Voltaire

and other authors. There are German transla¬

tions of almost all his works. Consult the biog¬

raphy by Tuma (Prague 1883).

HAVRE, Mont., city and county-seat of

Hill County, on the Great Northern Railroad,

80 miles northeast of Fort Benton. The Great

Northern Railroad maintains extensive repair

shops here. The city has also large invest¬

ments in stock-raising, farming and coalmin¬

ing, all of which industries are vigorously car¬

ried on in the vicinity. The city owns the

water-supply system. Pop. (1920) 5,429.

HAVRE, a-vr, Le, France (formerly Le Havre-de-Grace, la-vr-de-gras), an important commercial town and the second seaport of the country, in the department of Seine-In— ferieure, on the north side of the estuary of the Seine, 143 miles by rail northwest of Paris.

The town, comparatively modern, is built of brick or stone, with regular, straight, wide and well-cleaned streets. The public buildings include the church of Notre Dame, in bastard architecture, partly Gothic; the town-house, formerly the governor's palace; the Palais de Justice; the round tower of Francis I; the theatre, arsenal, exchange, library and bar¬ racks. Havre has a large commerce, for which its possesses great advantages. Its harbor is entered by a narrow channel formed by two long jetties stretching from east to west and kept clear by constant dredging. This channel

leads to the outer harbor, an irregular expanse of no great extent, which is left dry at ebb-tide.

Within the avant port are capacious wet-docks,

lined with fine quays, eight miles in extent, and great warehouses. Havre commands the

greater part of the import and export trade of Paris and of the more important towns in the

north of France; importing vast quantities of

colonial and other produce, among which cotton

holds a most important place ; and exporting

articles of French manufacture. The total mari¬

time movement of the port of Havre in 1916

was 17,700 vessels of 8,579,359 tons, compared

with 12,810 vessels of 6,337,275 tons in 1915.

The manufactures consist of paper, starch, lace, oil, refined sugar, cables and other marine cord¬

age, chemicals, glass, sulphuric acid, earthen

and stoneware. There are also breweries, gun

factories and electrical works. From the

building-yards a great number of sailing ves¬

sels and steamers are annually fitted out. In

the 15th century Havre became of importance

to form a new harbor in consequence of the

silting up of that of Harfleur. The project

was conceived and some progress made in it

by Louis XII; but Havre continued l’ttle more

than a fishing village till the time of Francis I, who erected numerous works and at im¬

mense expense gained the greater part of the

present site of the town from the sea. A

citadel was afterward built and Havre, as a

place of strength, became the object of repeated contests between French and English. In

October 1914, after the overrunning of Belgium

by German armies, became the location of the

Belgian government. Pop. 136,159.

HAVRE DE GRACE, hav'er de gras, Md.,

city in Harford County, on the Susquehanna

River, near its entrance into Chesapeake Bay,

and on the Philadelphia, Baltimore and Wash¬

ington and the Baltimore and Ohio railroads,

about 36 miles east-northeast of Baltimore. It

was the south terminus of the defunct Tide¬

water Canal. A small settlement was made here

in about 1670. The chief manufactures are flour, sash, doors and blinds, lumber, boats and

launches and canned fruits. The fisheries,

especially shad and herring, are important. The trade is principally in the manufactured articles, coal and fish. A government fish hatchery is

located on Battery Island. It contains a hospital and a public library. A popular race course is situated here. Pop. 4,374.

HAW, Battle of the, in the Revolution,

21 Feb. 1781. Henry Lee had been commis¬

sioned by Greene to prevent Tory reinforce¬

ments coming to Cornwallis, who had taken

position at Hillsboro, and in the course of the movement attempted to surprise Tarleton.

Tarleton had moved; but hearing that about

400 Tories under Colonel Pyle were on their

way to join him, Lee determined to pass off his own <(legion" as Tarleton's and capture them

all. Forcing two captured British officers to

keep up the deception, he moved forward, with

Pickens' and Oldham's companies following,

and met two young men who had been sent by

Pyle to find Tarleton's camp; he was presented to them as Tarleton, and directed them to have Pyle's men drawn up beside the road while his (<weary veterans" passed — his object being to capture and disarm them all. The plan suc¬

ceeded perfectly t.ll, just as he had taken Pyle's hand, part of the Tories discovered Pickens'

militia and saw the trap, and at once fired on the American rear; the latter poured in a

volley that killed 90 of the enemy at the first fire, and in the melee, despite appeals for

quarter, a great number of the rest were killed and the majority wounded. Pyle escaped badly

hurt, and the rest of the body dispersed un¬

pursued.

feffS 1

.

.

.

■

*

1

Vol. 14, HAWAII TO INDEX

Americana

■

■

\ »;\i >. v,

o..

f -V >

JKtkWtrfH

; ■ ‘ . . » . .

\i

[image]

SSikV’ a

3PP$f

‘< • "5H

J

KiKi

iWil

Se

w ■ 1 1

‘

■

c:

0 – - – - “• —

r >

i

I

1

1

4

|

1

2

1

I

§

i

1

I

I

I

y >

THE

ENCYCLOPEDIA

AMERICANA

jT

z®^«r

VXjVEHSAL

JtffOWLEDGEj

In Thirty Volumes

i) 1

> •

> > >

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK. CHICAGO

I

|

I

I

I

I

I

I

£

i

b

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922 by

The Encyclopedia Americana Corporation

« & *

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 1 8 1922

jgi™. A654 31?

I

AVS I

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XIV

ALLEN, T. GEORGE

Secretary, Haskell Oriental Museum, University of

Chicago

HIEROGLYPHICS

ALLRED, B. HARVEY

Speaker of the Idaho House of Representatives, 1918

IDAHO

ANDERSON, FREDERICK L., A.B., A.M., B.D.

Professor of New Testament Interpretation, New¬ ton Theological Institution, Newton Centre, Mass.

INCARNATION

AYRES, S. G., D.B.

Garrett Biblical Institute

HYMNOLOGY

BALDWIN, CHARLES SEARS, Ph.D.

v Professor of Rhetoric and English Composition, Columbia University

IDEA OF A UNIVERSITY, THE

BARNES, HARRY ELMER, Ph.D.

Professor of History, Clark University, Worcester, Mass.

HISTORY: ITS RISE AND DEVELOP¬ MENT

BELDING, GEORGE R.

Secretary Business Men's League

HOT SPRINGS, ARK.

BOTHNE, GISLE, A.B.

Professor of Scandinavian Languages and Litera¬ ture, University of Minnesota

HOME, THE ICELANDIC LANGUAGE ICELANDIC LITERATURE

BOTSFORD, GEORGE WILLIS, Ph.D.

Late Professor of Ancient History, Columbia Uni¬ versity

HISTORY, ANCIENT

BREWSTER, WILLIAM T., A-M.

Professor of English, Columbia University

HYPATIA, OR NEW FOES WITH AN OLD FACE

BURNHAM, SYLVESTER, D.D., S.T.D.

Formerly Dean of the Seminary Faculty, Colgate University

HIGHER CRITICISM, THE

CAIRNS, WILLIAM B., Ph.D.

Assistant Professor American Literature, University of Wisconsin

HOOSIER SCHOOLMASTER, THE HOUSE OF THE SEVEN GABLES

CALKINS, MARY WHITON, A.B., A.M., LL.D.

Professor of Philosophy and Psychology, Wellesley College .. ,

HOBBES, THOMAS

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

HAWAIIAN ISLANDS, DIPLOMATIC RELATIONS OF THE UNITED STATES WITH

CANFIELD, ARTHUR G., A.M.

Professor of Romance Languages, University of Michigan

HEPTAMERON, THE

CARVER, THOMAS N., Ph.D., LL.D.

Professor of Politics! Economy, Hsrvsrd University

INCOME

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

HYBRIDS IN PLANTS

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature. University of Cincinnati

HEDDA GABLER

COCHRANE, CHARLES H.

Author of “Modern Industrial Progress”

HYDRAULIC

HYDRO-ELECTRIC DEVELOPMENT

COUMBE, CLEMENT W.

Technical Art Expert

HEART IN ART AND SYMBOLISM HELMETS AND HELMS HERCULANEUM

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and .Metaphysics, Cornell Uni¬ versity

IDEALISM

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

HUMPHRY CLINKER

CUTLER, FRANCES W., M.A.

Instructor in English, Vassar College

HYPERION

DARTON, NELSON H.

Geologist, United States Geological Survey

HYDROLOGY

DEBEL, N. H.

Professor of Economics, Goucher College

ILLINOIS, STATE OF

DE GARMO, CHARLES, Ph.D.

Emeritus Professor of Education, Cornell Uni- . . versity; Author of "Herbart and the Herbartians"

HERBART, JOHANN FRIEDRICH

DICKINSON, THOMAS H., Ph.D.

Associate Professor of English, University of Wis¬ consin; Author of "The Temporary Drama of England"

HEROD

Contributors to Volume XIV —Continued

DODGE, CHARLES RICHARD

Textile Fibre Expert

HEMP

DOLSON, GRACE NEAL, Ph.D.

Professor of Philosophy, Wells College

HEDONISM

DRUM, WALTER, S.J., A.B.

Professor of Scripture, Woodstock College, Mary¬ land

IGNATIUS OF ANTIOCH IMMACULATE CONCEPTION INDEX LIBRORUM PROHIBITORUM

DUDLEY, PEMBERTON, M.D., LL.D.

Late Dean of Hahnemann Medical College and Hospital of Philadelphia.

COPELAND, ROYAL S., M.D.

Dean New York Homoeopathic Medical College and Flower Hospital

HOMCEOPATHY

DUNN, WALDO H., Litt.D.

Professor of English Languages and Literature, The College of Wooster

HERBERT, EDWARD, LORD HERBERT OF CHERBURY, AUTOBIOGRAPHY OF

EISERHARDT, EWALD, Ph.D.

Professor of German, University of Rochester

IMMENSEE

HERMANN UND DOROTHEA

ERSKINE, JOHN, Ph.D.

Professor of English, Columbia University

HERBERT, GEORGE HERRICK, ROBERT

ESTES, DAVID FOSTER, D.D.

Professor of New Testament Interpretation, Col¬ gate University

HEBREWS, EPISTLE TO THE FARROW, EDWARD S., C.E.

Major, U. S. A.; Consulting Civil and Military Engi¬ neer

HOSPITALS, FIELD HYGIENE, MILITARY

FINEGAN, THOMAS A., M.A., LL.D.

Superintendent of Public Instruction for the State of Pennsylvania; formerly Deputy Commissioner of Education, State of New York

HEALTH EDUCATION

FOWLER, HENRY THATCHER, Ph.D.

Professor of Biblical Literature and History, Brown University 1

HOSEA, BOOK OF

GALLOWAY, BEVERLY T., B.Agr.Sc., LL.D.

United States Department of Agriculture. Wash- ington, D. C.

HORTICULTURE

GARRATT, JOHN M., M.D.

HIGH-FREQUENCY OSCILLATING CURRENT

GEORGE, JAMES Z.

General Manager, Houston Chamber of Commerce

HOUSTON, TEX.

GRAVES, REV. CHARLES

Hartford, Conn.

HOLY WAR, THE

GREELY, A. W., Ph.D.

Major-General United States Army; Author of “Handbook of Alaska”

ICELAND

HALE, EDWARD EVERETT, JR., Ph.D.

Professor of English, Union College, Schenectady,

HAWTHORNE, NATHANIEL IN MEMORIAM

HANFORD, JAMES H., Ph.D.

Author of “The Greek Tragic Poets,” etc.

HEART OF MID-LOTHIAN, THE

HELLENICS

HESPERIDES

HOLY LIVING AND HOLY DYING

HAMMOND, WILLIAM A., Ph.D.

Sage Professor of Ancient Philosophy, Cornell Uni¬ versity

IMMORTALITY

HARRIS, H. F., M.D.

Georgia State Board of Health

HOOKWORM DISEASE

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor of the German Language and Literature, The College of the City of New York

HEBBEL, FRIEDRICH HEIDENSTAM, VERNER VON HERWEGH, GEORG HESSE, HERMANN HILDEBRANSLIED HOLZAMER, WILHELM IBSEN, HENRIK IBSEN, SIGURD

HAUHART, WILLIAM F., Ph.D.

Assistant Professor of German, University of Mich¬ igan

HIRSCHFELD, GEORG HOFMANNSTHAL, HUGO VON HUCH, RICARDA

HEMELT, FRANCIS J.

y”” h AT r- fi • 11311 uauguage ana Litera-

ton DCh°llC University of America, Washing-

HEROES

HIBBEN, JOHN GRIER, Ph.D., LL.D., L.H.D.

President of Princeton University

IMITATION

HOWE, FREDERIC C„ A.B., A.M., Ph.D.

C°^rkSSi0ner °f Immigration for the Port of New

IMMIGRATION

INGERSOLL, ERNEST

Naturalist and Author

HAWK

HOUSE SPARROW, OR ENGLISH SPARROW HUMMING-BIRDS
IMITATION IN ANIMALS IMMIGRATION, ANIMAL AND VEGE-

Contributors to Volume XIV — Continued

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

HEBREW MUSIC

JELLIFFE, SMITH ELY, M.D., Ph.D.

Professor of Psychiatry, Fordham University, New York

HYDROPHOBIA

HYSTERIA

JORDAN, DAVID STARR, Ph.D., LL.D.

Chancellor Emeritus, Leland Stanford Junior Uni¬ versity

ICHTHYOLOGY

KARPELES, GUSTAV, Ph.D.

Author of “Jewish Literature and other Essays”

HEINE, HEINRICH

KEYSER, CASSIUS J., Ph.D.

Adrain Professor of Mathematics, Columbia Uni¬ versity

HYPERSPACES

KLEIN, HENRI F.

Editorial Staff of The Americana

HUNGARY AND THE WAR

KRAPP, GEORGE PHILIP, Ph.D.

Professor of English, Columbia University

IMAGINARY CONVERSATIONS

LANGWORTHY, C. F., D.Sc., Ph.D.

United States Department of Agriculture

HOME ECONOMICS

LAW, JAMES, M.R.C.V.S.

Director New York State Veterinary College, Cornell University

HORSE, CARE AND DISEASES OF THE

LENNOX, PATRICK J., B.A., Litt.D.

Professor of English Language and Literature, The Catholic University of America

HOLY ROMAN EMPIRE

LITTLEHALES, GEORGE W., C.E.

United States Hydrographic Office

HYDROGRAPHIC OFFICE HYDROGRAPHY

LIVINGSTON, ARTHUR

Professor of Romance Languages, The > University, London, Ontario

IL CORTEGIANO IL PASTOR FIDO

LOWREY, LAWSON G., M.D.

HOSPITAL, PSYCHOPATHIC

MacMECHAN, ARCHIBALD, Ph.D.

Professor of English Language and Literature, Dalhousie College, Halifax

HEROES AND HERO-WORSHIP

MATTHEW, WILLIAM D., Ph.B., Ph.D.

American Museum of Natural History

HORSE, EVOLUTION OF THE

McDonnell, j. b.

Editorial Staff of The Americana

HONDURAS, BRITISH

McLaughlin, john r.

HORSE, THE FRENCH COACH HORSE, MILITARY

MEYERS, HENRY C., JR.

Consulting Engineer

HEATING AND VENTILATION

MILLER, BARNETTE

Instructor in English in Vassar College

HUNT QAMES HENRY) LEIGH

MIMS, EDWIN, Ph.D.

Head of the English Department, Vanderbilt Uni¬ versity

IN THE TENNESSEE MOUNTAINS

MITCHELL, S. C., Ph.D., LL.D.

President of the University of South Carolina

HENRY, PATRICK

MORGAN, THOMAS H., B.S., M.S., Ph.D.

Professor of Experimental Zoology, Columbia Uni¬ versity

HEREDITY

MUNRO, DANA CARLETON, L.H.D.

Professor of History, Princeton University

HISTORY, MEDLEVAL

MtfNSTERBERG, HUGO, Ph.D., LL.D.

Late Professor of Psychology, Harvard University

HISTORY, LOGIC OF

NARDROFF, ERNEST R. VON

Principal of Stuyvesant High School, New York City

HEAT

O'DEA, JOHN

Secretary Ancient Order of Hibernians in America

HIBERNIANS, THE ANCIENT ORDER OF

OSHLAG, J., M.D.

New York City

HEART

HEART, DISEASES OF

NEWELL, FREDERICK H.

Professor of Civil Engineering, University of Illi¬ nois

HYDRAULIC ENGINEERING Western HYDRO-ECONOMICS

PACKARD, ALPHEUS S.

Late Professor of Zoology, Brown University

HONEY-BEE

PALMER, WALTER B.

Formerly Special Agent, Bureau of Foreign and Domestic Commerce

HOSIERY AND KNIT GOODS INDUS¬ TRIES IN THE UNITED STATES

PFEIL, STEPHEN*

Formerly Editor Philadelphia “Press”

HIGH SEA HIGH TREASON HUSBAND AND WIFE

PRATT, EDWARD E., Ph.D.

Chief of Bureau of Foreign and Domestic Com¬ merce, Washington, D. C.

INCOME TAX

ROLFE, JOHN C., A.B., A.M., Ph.D.

Professor of Latin Language and Literature, Uni¬ versity of Pennsylvania

HORACE

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

HUDIBRAS

VAN DOREN, CARL, Ph.D.

Associate Professor of English, Columbia Uni¬ versity

HORSE-SHOE ROBINSON IN THE VALLEY

WALSH, JAMES J., M.D., Ph.D., LL.D., Litt.D., Sc.D.

New York City

HOSPITALS, HISTORY AND CON¬ STRUCTION HOSPITALS, MILITARY HYMNS, LATIN IMITATION OF CHRIST, THE

WARD, HENRY B., Ph.D.

Professor of Zoology, University of Illinois

HOOKWORM, ANATOMY AND LIFE HISTORY

ROYCE, JOSIAH, Ph.D., LL.D.

Late Professor of the History of Philosophy, Harvard University

HEGEL, GEORG WILHELM FRIED¬ RICH

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Author of “ America, Asia and the Pacific ”• Germany: the Welding of a World Power,” etc. ’

HINDUSTANI LANGUAGE AND LIT¬ ERATURE

WEBSTER, ARTHUR GORDON, A.B., Ph.D., LL.D.

Professor of Physics, Clark University

HYDRODYNAMICS

WELD, H. P., Ph.B., Ph.D.

Assistant Professor of Psychology, Cornell Uni¬ versity

IMAGE, PSYCHOLOGICAL IMAGINATION

SHERMAN, STUART P., Ph.D.

Professor of English, University of Illinois

HIND AND THE PANTHER, THE

SHOREY, PAUL, Ph.D., LL.D.

Head of Greek Department, University of Chicago

HOMER

ILIAD

SHOWERMAN, GRANT, Ph.D.

Professor of Latin Literature, University of WiS' consin

HORACE'S SATIRES AND EPISTLES

SINGLETON, ESTHER

Author of "Art in Belgian Galleries," etc.

ILLUSTRATION OF BOOKS IMPRESSIONISM

STILLSON, H. L.

Fraternity Historian

IMPROVED ORDER OF RED MEN

SULLIVAN, JAMES, Ph.D.

Director of Division of Archives and History, State Department of Education, Albany, N. Y.

HIGH SCHOOLS

THAYER, HARVEY W., Ph.D.

Assistant Professor, Department of Modem Lan¬ guages, Princeton University

HEINRICH VON OFTERDINGEN

WELLS, BENJAMIN W., Ph.D.

Author of "Modem French Literature"

HERNANI

WEST, WILLIS MASON, A.M.

Sometime Professor of History and Head of the Department, in the University of Minnesota

HISTORY, MODERN

WIENER, LEO

Professor of Slavic Languages and Literature, Harvard University

HERO OF OUR TIME, A

WILCOX, MARRION, A.M., LL.B.

Co-editor “Encyclopedia of Latin America”

HONDURAS

INCA SEMI-CIVILIZATION

WOLFF, SAMUEL LEE, Ph.D.

Instructor in English, Columbia University

HERO AND LEANDER

YOUNG, MILTON

Lexington, Ky.

HORSE, AMERICAN THOROUGH¬ BRED

YOUNG, STARK, B.A.

Professor of English, Amherst College

HOUSE OF LIFE, THE

- Deceased.

KEY TO PRONUNCIATION.

a

far, father

a

fate, hate

a or a

at, fat

a

air, care

a

ado, sofa

a

a

all, fall

ch

choose, church

e

eel, we

e or e

bed, end

e

her, over: also Fr.

eu, as in neuf ; and oeu, as in boeuf, coeur; Ger. d (or oe), as in okonomie .

n

Span, h, as in canon piii on (pen’yon)

(can’ydn).

ng

mingle, singing

nk

bank, ink

6

no, open

o or 6

not, on

A

o

corn, nor

6

atom, symbol

o

book, look

oi

oil, soil ; also Ger. eu,

as in beutel

6 or oo

fool, rule

e befall, elope

e agent, trident

ff off, trough

g gas, get

gw anguish, guava

h hat, hot

h or h Ger. ch, as in nicht, wacht hw what

I file, ice

i or 1 him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

j gem, genius

kw quaint, quite

n Fr. nasal m or n, as in embon¬

point, Jean, temps

ou or ow allow, bowsprit s satisfy, sauce

sh show, sure

th thick, thin

fh father, thither

u mute, use

uoru but, us u pull, put

ii between u and e, as in Fr. sur,

Ger. Muller

v of, very

y (consonantal) yes, young

z pleasant, rose

zh azure, pleasure

‘(prime) (secondary) accents, to indicate syllabic stress

v. ‘1 ■. A) ‘ jvl O; (

‘

• # o 10 o

4

jor.ur win*# #”* ** v.f* « **xnm ba? .4ˆ a** ■ 70 A, n,

■

. ■

■

rf*

,

nib bff-bi >9*I

.

HAWAII, ha-wi'e, a Territory of \he United States ; geographically, the Hawaiian (formerly Sandwich) Is¬ lands, the northeasternmost group of the Pacific, lying near the northern edge of the tropics (lat. 18° 54′ to 22° 15′ N.; long. 154° 50′ to 160° 30′ W.), 2,100 miles southwest of San Francisco. It consists of eight inhabited islands, viz., Hawaii, Maui, Kahoolawe, Lanai, Molokai, Oahu, Kauai and Niihau besides several rocky islets. They extend from Hawaii on the southeast 390 miles to Kauai on the northwest, and are con¬ tinued in a chain of islets, sand banks and shoals 1,200 miles farther to Midway Island. The total area of the group is 6,454 square miles, of which Hawaii contains nearly two- thirds or 4,015 square miles; the next island, Maui, 728; the third, Oahu (which takes the lead in wealth and population, and contains the capital and chief seaport), 598; and the fourth, Kauai, 547 square miles.

Topography. — The islands are entirely vol¬ canic, consisting in fact of the summits of a gigantic submarine mountain chain rising from the bottom of the ocean, which is three miles deep within 30 to 50 miles from the shores. The volcanic action seems to have moved from northwest to southeast, Kauai being the oldest island.

The last but one, Maui, contains the vast ex¬ tinct crater of Haleakala, which is at its high¬ est point 10,032 feet above sea-level, 20 miles in circumference and 2,000 feet deep; while Hawaii is made up of four volcanic mountains, Mauna Kea (White Mountain), 13,805 feet high, the loftiest peak in the Pacific ; Mauna Loa (Long Mountain), 12,675 feet; Hualalai, 8,273 feet; and Kohala, 5,490 feet high. Of these Hualalai has been dormant since 1801, but Mauna Loa is still active^ at intervals, having an oval summit crater, 9.5 miles in circumfer¬ ence, with nearly vertical inner walls 500 to 600 feet high. Twenty miles to the southwest is the famous crater of Kilauea, eight miles in circumference and 4,000 feet above the sea. It is almost constantly in action.

The windwrard sides of Oahu and Molokai, and the northwest side of Kauai, present prec¬ ipices 2,000 feet in height, while the northeast

slopes of Hawaii and Maui end in bluffs sev¬ eral hundred feet high, furrowed by deep and narrow canyons cut by the streams. ((In West Maui and Kauai may be found valleys that al- most rival Yosemite® (Dutton). Coral reefs

line the greater part of the shores of Kauai, Oahu and the southern shore of Molokai, but are nearly absent from Hawaii and Maui.

The best harbors are found in Oahu at Honolulu, and at Pearl Harbor, seven miles west, but Hilo Bay, Hawaii, only needs a break¬ water to make a commodious harbor. The only rivers worthy of the name are found in the island of Kauai. Several of them were for¬ merly crossed by ferries.

Climate and Rainfall. — The climate of the islands is much cooler than that of other coun¬ tries in the same latitude. This is due not only to the northeast trade winds, which blow 9 or 10 months in the year, but also to the return ocean current from the region of Bering Straits. At sea-level the mean temperature is 73° F., the maximum and minimum being 89° and 52°, respectively. The islands are entirely exempt from the cyclones which so often make havoc in the central and western Pacific. The contrast in climate between the windward and leeward sides of each island is very striking, the northwest slopes being rainy and heavily wooded, while the opposite coast has a warm and dry climate. From the differing eleva¬ tions and exposures there is an extraordinary variety in the rainfall even within narrow limits. Thus the annual rainfall in the district of Hilo, Hawaii, averaged 136 inches in 20 years, from 1880 to 1900, while in Honolulu it averaged 30.9 inches, and at Luakaha, in the valley back of Honolulu, 128.9 inches.

Production and Industries. — The Ha¬ waiian Islands, from the lack of coal and metals, are an agricultural country. There are, however, according to recent statistics, 500 in¬ dustrial establishments in the Territory, em¬ ploying a total of 7,572 persons.

The soil of the islands in general is poor, with the exception of the valleys and some of the coast plains, which are of limited extent. The greater part of the interior consists of rugged, barren mountain sides, extensive tracts covered with lava, and forest land, which needs to be protected for the preservation of the water supply. Extensive tracts of formerly barren land, however, have been made pro¬ ductive by irrigation and the use of fertilizers. On Oahu there are over 200 artesian wells, yielding daily from 250,000,000 to 300,000,000 gallons, and on some plantations pumps are em¬ ployed which raise over 10,000,000 gallons of water a day, and in some places to an

eleva¬ tion of 350 feet.

2

HAWAII

In Kauai electricity generated by water¬ power in the Wainiha Valley is carried 30 miles by wire to run the pumps of the McBryde plantation. Extensive aqueducts have been made in western Kauai, Maui and northern Hawaii, consisting largely of tunnels driven generally through solid rock. Numerous reser¬ voirs have also been formed by damming the canyons. The Planters' Association employs a large staff of experts in chemistry, entomology and scientific agriculture, with the result that the yield of sugar per acre is the highest in the world. The average annual yield is four and one-half tons per acre, but the average for irri¬ gated plantations is six tons to the acre. The total crop for 1914 was over 617,038 tons. Only Java and Cuba have a greater gross product. The power for the sugar mills is obtained en¬ tirely from burning the bagasse or cane refuse. The sugar is so completely extracted from the juice that no molasses is made, the remainder being thrown into fertilizers. The total number of employees on the sugar plantations in 1910 amounted to 44,048, including Japanese, 28,832; Koreans, 1,787 ; Chinese, 2,861 ; Portuguese, 3,752; Filipinos, 2,096; Hawaiians, 1.139; Porto Ricans, 1,941; Russians, 103; Spanish, 579; Americans, 614; others, 344.

The first importation of Chinese took place in 1852. In 1878 their number had risen to 5,916, and in 1886 to 21,000, at which time a strict exclusion act was passed. In 1878 the first Portuguese immigrants arrived from the Azores, and during the next 10 years about 7,000 of these people came to the islands, where they have given great satisfaction as industrious and law-abiding citizens. In 1886 a labor con¬ vention was concluded with Japan and a stream of immigrants set in, which increased the num¬ ber of Japanese in the islands from 116 in 1884, to 24,400 in 1886, and 61,111 in 1900. Porto Ricans were imported in 1901 to the number of about 2,500. Both as laborers and as citizens they have proved to be very unsatisfactory. Beginning with the year 1903, up to 31 Dec. 1905, about 7,000 Koreans arrived in the Ter¬ ritory, who have done well as laborers. In the spring of 1907 several thousand immigrants were imported from Spain and the Azores, with the understanding that they should be given small freeholds of their own by the planters.

The danger of depending upon a single crop has long been recognized, and persistent efforts have been made to develop minor industries.

The culture of rice was commenced in 1860, and it soon became the second crop in importance, amounting to about 15,000 . tons annually of cleaned rice, most of which is consumed in the Territory. The quality of Hawaiian coffee is equal to that of Mocha, but the industry is depressed by the competition of Brazilian and Central American low-grade coffees. The crop in 1910 amounted to about 2,000 tons. The amount exported in 1910 was valued at $330,228. The pineapple canneries in 1909 had an output of 510,000 cases of two dozen cans each. There are several sisal plantations, and two promising rubber plantations. Experiments with tobacco have been successful. The castor oil bean grows wild, but the manufacture of the oil has not yet been profitable. Nearly all the fruits of the tropical and some of the temperate zone grow well in the islands, and the total export

in 1910 of fruit and nuts, not canned, was valued at $1,794,001. The native staff of life is the taro root, or Colocasia, reduced to a paste called poi. There are about 20 stock and sheep ranches, which exported $56,425 worth of wool in 1910. The export of honey and wax amounts to about $40,000 a year.

Commerce. — The total exports in the year ended 30 June 1915 were valued at $62,368,356, of wh!ch amount $62,306,507 must be credited to shipments to the United States. Imports were valued at $26,064,855 ($22,772,632 from the United States). In 1915, vessels numbering 456, of 1,605,925 tons entered, and 436 of 1,574,845 tons cleared at the ports of the islands.

Transportation. — For steamship lines see article on Honolulu. There are 20 steamers and as many schooners engaged in the inter¬ island trade. There are about 307 miles of rail¬ roads on the islands, the principal line being on Oahu, and others on Maui and Hawaii. The principal islands are connected by wireless tele¬ graph, each island being encircled by telephone lines. The trans-Pacific submarine cable laid in 1903 connects the islands with both conti¬ nents.

Finances. — The bonded debt assumed by the United States on annexation was $4,000,000, leaving $951,000 to be paid by the Territory of Hawaii. The debt of the Territory had in¬ creased by 30 June 1910 to $4,079,000. On 1 July 1919 it amounted to $9,194,000. The as¬ sessed valuation of taxable property had in¬ creased by 1 Jan. 1910 to $150,268,467. In 1919 it was $250,524,346. The taxes are 1 per cent on property and 2 per cent on incomes above $1,000 a year. For the year ended 30 June 1919 the receipts of the government were $9,668,728 and its disbursements $7,885,819.

Education. — There is a good free-school system, graded, with compulsory attendance from 6 to 15, with an excellent normal training school, besides industr'al and high schools. The school law requires that the English language shall be the basis and medium of instruction in all schools.

The department is administered by a super¬ intendent and six commissioners, aided by three traveling inspectors.

In 1915 there were 170 pubkc schools with 735 teachers and 28,827 pupils ; 46 private schools with 314 teachers and 7,702 pupils.

The total cost of the government schools was $841,588 for the year ended 30 June 1915. The private schools are mostly endowed, as Oahu College and the Kamehameha Schools, founded by the late Mrs. Bernice Bishop; or managed by missionary boards or religious orders, as Saint Louis College.

Charitable Institutions. — Among these may be mentioned the Lunalilo Home for aged and indigent Hawaiians, the Asylum for the Insane, the numerous hospitals, eight of which are under the Board of Health, but the most im¬ portant is the leper settlement established in 1866 on a peninsula of Molokai, shut off from the rest of the island by a precipice 2,000 feet in height. The number of lepers has decreased from 1,200 to 652. The territorial government provides them comfortable homes, food, cloth¬ ing and medical attendance free of cost, aided by the devoted Franciscan Sisters and the Brothers of the Sacred Heart.

HAWAII.

Estimated population, 215,741

Pop.

55.382 Hawaii .... 2 Kahoolawe

23,744 Kauai .

131 Lanai .

ISLANDS

Pop.

G 9 28,623 Maui. . .

D 5 1,791 Molokai

F 4 208 Niihau .

C 4 81,993 Oahu. . .

B 7 B 5 G 1 A 2

6,745 Hilo .

52,183 Honolulu

Cities

F 10 1,000 Lahaina

.B 2

C 5

JsSfˆtL

>• Kaena Foin

B

21

D

E

22

G

HON

“°*o

1 57

e

156

Kaneilio Pt.

W aianai

Ml

t,»le PoiBl

ˆOahu

< Bay

Barbers Poini

a*oNr „ Zf*Zoˆ’ ■ > * W’.W KokoHead

. .**» MILES ˆ (Kawaihoa Pt.

ˆ V ˆ . I’

«|iˆs ■

!OnB“S

*N T Y

- MOKULUA ISLANDS \Waitnanalo

Manama Island AORiKAiru Island

Rugwiˆ ˆˆMakapuu Pt.

Hanauma Harbor

cV*

•fO”

1«

H

TO

ivIANI1-

10 ■

4,850 I

, 600 ‘

it*

;S1°’

＞N S

HO”

/■

/#/

^ ,v’ V 1 / ^ V

/;4#?

; sv \

＞ v;- . -＞

Ka Leo o Ka Uio

Mo/na Loa r» / i＞882

pi®

4S»

6o.

TO SAUNA CRUZ, MEXICO, 3, SCO U,LE3 TO ACAPULCO. MEXICO, 3,310 Mli[s

lit

TO

:v

T r°*r r°

MOLOKAI

KALAWAO CO.

‘ ,jV’

c*

PA/*AMa,

O. A.

S3 5

•HLES

IjSuht

m

. . ..,

H KamalaVa’

K A 1 Karnakou/ 5” n1,u unakakui ® ,888/ lU) »l“ , L.U 1

f-Lˆ Kamalo Puiioo/ˆferp A’ V sˆo5”* V’*’» KA A I II

4:: . MAUI

W/ ■ .r/Z- ˆKa.a.pali /N . ,

T . ’•» . ’”•■- Cx* Honokawai/-, LAHAINA / \ •‘.’ aF’

ˆ4/ O KALOffj

Awalau Land Kaena Pt% Honopu Pt.

A U V

FIVE NF.KDLES *

120 feet

WANAˆS

Oono|”‘ka

M

o

V*r mNCA AN. .

TWA I

W

Rail

ˆ Honokawai/o LAHAINA

ˆ s’ Lahlina Wail ukuˆ,

.a’*°‘sVL x. / K“

VC :

. .Rahalipalaoa

°Keomuku)L»60i»t. 01o,vala\Mcii.rˆ.

OCamalkaV P*p„?ˆ7rˆA , ■

Pt. >■ Jf.(enkta Crater o(.„„.,.. _ r’ Hano

■% Haiea/9ˆ?T n tob

\Puuneoe €?f PuX 2*11*** \KcanacN

Juˆnr. *” «« aoha t

oWaiakoa l

M AK AW AO ˆ Nahikuo

channel

,y»”

Kuuiki Head Pt.

D Ai.au I.

Mokae Landinˆ ailuo Bay v*o

HAWAII

SCALES

Statute Miles, 21 = 1 Inch.

20 30

\

NEALA IK A HlKB

Kahoolawe

O

V

\

Kilometres, 34 — 1 Inch.

20 30 40_ 50

JP

Rand McNally's 11 x 14 Map of Hawaii. Copyright by Rand McNally & Co.

MakenaV, Vlup/al.ua Kipahuluˆˆ H

Kolokisi 1.* KPuu O|,|10, N Kaupp/ˆMoku an Landing

Lac_c J „io po|nt

-Berouxe'' — Fohaku Eaea Point ˆ Bay . _ capeQ&nn o ˆ anamamoa

- .

<»•

mmiarratiuit Depot s. Fort/1-1-1 ii ? Armstrong v

t

HONOLULU

Statute Mile.

X X V

llonoipu

ˆlahukona

rppC)lf VA ‘-e* V

Landingˆˆ’

llarpr/f; ˆ//X,ˆV.v

- NORTH

.a.“04

s»>°°

■>“6

3arboi”*p MamikbDa Landing ˆ’ˆHALA

• Waipio>ˆtSˆ5°- .soN-ˆ»„ A°<9— -Kawefa Campp^j

7d0°

V\A

K

Le

o“l

point

Lehua ˆEgg IOC5

NilHAU

Puuwai Point A

M

Oku P< int

‘SSt Mt-

Kona Point_yˆ \1,600

AIMEA

O

Yam Bay 1

0*061

Pueo Point *d Crater

Cooks Anchorage Pabau Point’

, Kaumuhonu Bayˆ — ˆ Kawailioa Point

..TTohil

r<

| KAWAIHAUU

KeaTia 9/

ˆKapa]

, Kauai

Hanamaula _ _

O t

Hanatnaulu Bay

\Natciliwili Bay awillwili J

■ˆKawai Point

-, \ / C-t/ Honokaa *1 ˆ c\vO®

r“A Fa.OiloWˆ0ˆ>& o

Keawa

Kihoo Bay , Mahewalu Pojnf Papiha Poini.

Nawili Pointy Makolea Point,

Kawaihae Katpaihat Harbo,

-Kaaha-Pointr Hapuua Bayˆr SO Puako Bays’ Lalanrilo Honofcaope Bays u- n u A I a’ Kaauau ITinCU.Kapalaoa SrlTool k.Bayf Hou’;e.

C

Hanoi

.0 L O A

_Ki61oa’°*V/K8 weHkoa po. nl Koloa Landing

. /!‘W ■ yrˆ‘Vjoˆ

.

r

$

V,

?0

l‘0’to//.

•a

‘-Mm

j*pam.

V .

-,.0

❖

Western Islands

OF

HA WAIL

ON SAME SCALE AS MAltf MAP

T° H0* 0XOAI0 •-■

S S S

ˆ4

s’ ‘Lea

4

\

750°

759°

Ha/o

＞Cˆ＞Hii

Keahole Point Wawahiwaa Point Kaloko Fish Pond

Kaiwi Point ˆ

Hiiaka noho lae Pt.

Kailua Ba\ o«onol

Table/ Land

/ HAMAKUA

po”

Kiholo Bay

NORTH

Hualalai

8,273#fe

KW A

Kamoa Poi; o*uˆ2tgc

Maiirva Loa

13,675

V-

O

Ninole

K a &’ — Z&

> Maunat||a%iˆ i . repeekeooWˆV] ,0 s

u ‘As-CSSi/xB o U T H jfe ˆ ’•

h /‘A w /San i’Nx i paukAiAˆov-

> Table La/dˆ \ H VlToTLSS0

Jdˆ‘AV. w/ *A’X I l>

sc°.

,V.e» 1

Leleiwi Point

v ‘Keikiwahe Point p ˆKeawelcaheka Iˆoir Kealakekua j Palemantj Point)

2fonaunau

Hookenab |

Jtauhuko BayS A

J-irrtistownˆ

Kusani MtˆJfˆIountainview. xreindale\ ,Glenwoo d/r Fahoa

PUN

Vile

nse’

Cape . Kumukahi

Lepeamoa Rock * Kauluoa Point

Ka Lae Paakaii I

I|oopuloat LJ \ Milolii Landing j J

Hanamalo Point s’

/

Sta.

Volcano House’ i/- 1 N

Kilauea^,(W/A

4.040 .

U N r \T

Kapohty?/r,ohQ Iki Landing

Y

o Half Way Ho. [f#PurialuJ^

II a ‘

^Kalapana

Kapapala 0 Pahala o

VV

gap-‘

Keauhou Point

1 Pto

Okoe Landing Ke Au o Kanewaa’

t’.Punalua Landing

Kauna Point

Waiohinu o o _ , Naalehu

uua Pele Q„ .. ./ .

° Kaliuku

D

E

20

G

H

Ka Lae]

Kaalualu

Point

10

755°

11

252 B

HAWAIIAN ISLANDS

3

Population.— The census of 1910 divides the population as follows: Hawaiians, 26,099; Part-Hawaiians, 12,485; Portuguese, 22,294; Americans and other Caucasians, 14,684 , Chinese, 21,698; Japanese, 79,663; other foreign¬ ers (Spanish, Filipinos, etc.), 14,986 ; total, 191,909. Of the islands, Hawaii had 55,382; Oahu (including Honolulu, about 50,000), 82,- 028; Kauai and Niihau, 23,952; Kahoolawe, Lanai, Maui and Molokai, 29,762. The popula¬ tion in 1920 was 255,912.

Government. — The new territorial govern¬ ment was inauguarated at Honolulu 14 June 1900, and the first territorial legislature began its sessions at Honolulu 20 Feb. 1901. The legislature is composed of two houses the senate of 15 members, holding office four years ; and the house of representatives of 30 members, holding office two years. The legislature meets biennially, and sessions are limited to 60 days.

The executive power is lodged in a gov¬ ernor, a secretary, both appointed by the Presi¬ dent, and holding office four years, and the following officials appointed by the governor, by and with the consent of the senate of Hawaii : an attorney-general, treasurer, commis¬ sioner of public lands, commissioner of agri¬ culture and forestry, superintendent of public works, superintendent of public instruction, auditor and deputy surveyor, high sher ff, and members of the boards

of health, public in¬ struction, prison inspectors, etc. They hold office for four years, and must be citizens of

Hawaii. .

The judiciary of the Territory is composed of the Supreme Court with three judges, the Circuit Court and such inferior courts as the legislature may establish. The judges are ap¬ pointed by the President of the United States. Tlie Territory is a Federal judicial district, with a district judge, district attorney and marshal, all appointed by the President. The district judge has all the powers of a circuit judge.

The Territory is represented in Congress by a delegate, who is elected biennially by the

people. .

History.— According to documents in the Spanish archives, the islands were discovered in 1555 by Juan Gaetano, who named Hawaii <(La Mesa.® They were rediscovered by Capt. James Cook in 1778, and named the Sandwich Islands; in 1792 Captain Vancouver visited the islands, and introduced the first cattle and sheep. Kamehameha I, a chief of northern Hawaii, after nine years of war, became master of the whole island in 1791. In 1795 he con¬ quered Maui and Oahu, the decisive battle being fought in Nuuanu Valley back of Honolulu. Having united the group under one strong gov¬ ernment, he died 8 May 1819. His son, Kame¬ hameha II, abolished the ancient tabu system in the following September. The first American missionaries arrived at Kailua, Hawaii, 4 April 1820, and met with remarkable success. The first Catholic missionaries arrived 7 July 1827. In the same year the first written laws were printed The first constitution was proclaimed 8 Oct. 1840. On 25 Feb. 1843, the native gov¬ ernment was compelled by Lord Paulet to make a provisional cession to Great Britain, but its independence was restored 31 July of the same year by Admiral Thomas. 4 he feudal tenure of land was abolished in 1848, and a liberal con¬

stitution was adopted in 1852. The Kame¬ hameha dynasty ended with the death of Kamehameha V, 11 Dec. 1872. Dav:d Kalakaua was elected by the legislature 12 Feb. 1874. In 1876 a reciprocity treaty was ratified with the United States, which assured prosperity to the islands. The king, however, labored to build up a reactionary party, and to restore autocratic government, until he was compelled by the civ¬ ilized element to sign a revision of the consti¬ tution, which limited his powers, in 1887. A Royalist insurrection was put down in

1889. His sister, Liliuokalani, succeeded h'm in 1891, and in January 1893 undertook to abrogate the constitution, and establish an absolute mon¬ archy. Upon this the constitutional party de¬ throned her, and established a provisional gov¬ ernment. During the following year the re¬ public of Hawaii was organized with S B. Dole as President. An annexation treaty was negotiated with President Harrison, which was withdrawn by President Cleveland in April 1893, but brought up again on the accession of President McKinley. After long delays, Hawaii was admitted into the Union by a joint resolu¬ tion passed 7 July 1898. It was finally or¬ ganized as a Territory 14 June 1900, with S. B. Dole as governor, who was succeeded by Geo.

R. Carter 23 Nov. 1903, by Walter F. Frear in 1907 and bv L. E. Pinkham in 1913. Consult Blackman, W. F., (The Making of HawaiP (New York 1899) ; Boyce, W. D,, (The Ha¬ waiian Islands,* etc. (Chicago 1914) ; Dibble,

S. , (A History 'of the Sandwich Islands) (Honolulu 1909); Gerould, K. F., 'Hawaii: Scenes and Impressions) ; Goodrich, J. K, 'The Coming HawaiP (Chicago 1914) ; United States Statutes: ' Bills and Acts Relating to HawaiP (Washington 1900).

W. D. Alexander,

Formerly Surveyor-General Hawaiian Islands.

HAWAIIAN ISLANDS, Diplomatic Re¬ lations of the United States with. Immedi¬ ately following the close of the Revolution, American vessels engaged in the Northwest trade began to stop at the Sandwich Islands, which had been discovered by Captain Cook in 1778. In 1791 Capt. Joseph Ingraham, the mate of the Columbia, returning from a trip around the world via Nootka and Canton, brought with him a native Crown Prince Opye whose visit to New England was the beginning of American friendship with Hawaii. In September of the same year, he re-embarked for the Pacific on the Hope, taking with him Opye who, after .aiding in the discovery of the Marquesis group, ,was returned to his own island home. The Sandwich Islands became the principal place of resort for American trading vessels in the Pacific. In 1811, they were visited by John Jacob Astor who was seeking to engage supplies and men to aid in the fur trade on the North¬ west coast where he founded Astoria in 1812. In 1814 they were visited by Lieutenant Gamble whom Captain Porter had left in command of Madison Island in the Marquesis group after its occupation in the name of the United States

in 1813. . ... ,

In 1820, American influence which was al¬ ready considerable in the islands was increased by the arrival of missionaries from Boston to begin religious and humanitarian work. At the same time the importance of the islands

was recognized by the American government in the appointment (by President Monroe) of John C. Jones as agent there for commerce and seamen.

By 1825 the American government, as a re¬ sult of steadily increasing American interest, recognized the need of the occasional presence of a public force at the islands to prevent de¬ sertions, mutinies and other difficulties, and began to send naval vessels which had already been doing Pacific duty along the west coast of pouth America during the period of the Span¬ ish- American revolts. In 1826, Capt. Thomas Catsby Jones, ordered to the Hawaiian Islands to protect commerce, to relieve the islands of SCnr?en wˆ° ˆacl improperly deserted from whalers, to arrange to prevent future desertions and to secure debts due American citizens, negotiated a treaty .by which the king agreed to permit trade, to aid wrecked vessels, to assist in preventing desertions, and in time of war to protect American ships and citizens in the islands against all enemies. This treaty, though never ratified, was observed as a tacit under¬ standing Unfortunately, however, trade rela¬ tions and other conditions were still unsatis¬ factory, possibly partly as a result of the dis¬ agreement between foreign merchants and the missionaries. Captain Finch, who was sent in the United States ship Vincennes in 1829 to improve relations in the Pacific, saw at Oahu many indications of irregularities in commerce seventy to crews and bad effects of desertion! While assuring the king that the United States desired to preserve his sovereign right and to send war vessels for protection only where native governments failed to protect, he ad¬ vised him to prevent secretion of deserters, to liquidate his debts, to retire from competition in the tavern business, to learn English and to spend his time more usefully. At the same time Consul Jones, referring to the growing importance of the islands, and to the increasing American trade, recommended semi-annual visits of American war vessels to reduce de¬ sertions and mutinies and to punish the guilty

Other sources of dispute arose, including the refusal of the king to allow foreigners to transfer real estate. On these subjects Commo¬ dore E. P. Kennedy of the United States ship Feacock opened negotiations in 1836 but failed to obtain an agreement.

In 1832, J. N. Reynolds, who sailed with the Potomac punitive expedition to the coast of Sumatra and returned via Oahu, reported that crews of whalers, after attempts at mutiny or desertion, became outlaws on the shore, and as a means of controlling the causes of disorder, he recommended in addition to regular visits of war vessels an increase in the number of consuls. In 1834, he and J. Q. Adams also revived and stimulated the project for explorations in the Pacific, proposed for the South Seas as early as 1812 and finally realized in the Wilkes expedition of 1839-43 which stopped twice at Hawaii.

Meantime through the introduction of rench Catholic priests in 1826, and their rein- troduction in 1839, after banishment in 1831 French influence had increased. In 1842 in¬ duced by the arrival of a French vessel with new demands the king invited the United States, England and France to negotiate new treaties for the guarantee of the independence

and neutrality of the island. The American government, seeking no exclusive control or advantage, and desiring only that American rights, should be respected and guarded, and also opposing interference by foreign powers, ad¬ vised the Hawaiian commissioners to begin the diplomatic negotiations in England. In 1843, coincident with American renewal of negotia¬ tions . for acquisition of Mexican territory reaching to the Pacific, occupation of the islands by . a British naval commander (promptly disavowed by the English govern¬ ment) induced the American government to contemplate interference to prevent the con¬ quest of Hawaii by a great European power, and to submit a calm expression of disapproval which doubtless influenced England and France to recognize Hawaiian independence and later to enter into a joint declaration (1845) agreeing never to take possession even under a pro¬ tectorate.

Feeling the need of closer relations, the American government also began the appoint¬ ment ?f diplomatic officials; and in December 1849 doubtless influenced by the acquisition of California, concluded a treaty of friendship, commerce, navigation and extradition

Meantime French and English as well as American diplomatic relations had been un¬ satisfactory. After a French naval vessel re¬ nted to force in 1849 to support the demands of the French consul for

reparation (an action later disavowed by the French government) Secretary Clayton notified France that the United States, because of its relations with the islands, could never with indifference allow them to pass under the dominion or exclusive control of any other power.

In 1851, when the Hawaiian government, apprehensive. of French designs, adopted a pro¬ visional cession of the islands to the United States, the American government through Secretary Webster declined to accept annexa¬ tion still advocating independence — at least until some pressing necessity might give the subject a new aspect or increased importance. However, it instructed the Navy Department to keep, the Pacific armament in a position requisite for the safety of the Hawaiian govern¬ ment. Suggestions of annexation met with more favor two years . later. In September 8 3, Secretary Marcy issued official instruc¬ tions that the United States would not allow other powers to exact special privileges or to establish a protectorate over the island. Later in the same year, while hoping to obtain Lower California by negotiations and stating that con¬ ditions in the islands, and their connection with American industries in which American interests were paramount made American control ap¬ pear inevitable, he sounded the French govern¬ ment on its policy or views in regardˆ to the matter. In 1854,. he authorized, in case of emergency, negotiations for a complete trans- *err°J f .ˆe islands to the United States as a , orf possession; and the Hawaiian king, in the face of warnings from the British and rench consuls agreed to a draft treaty pro- yiding for admission of the islands as a State of the American Union, but died while negotia-

stillSpendinge executIon °f ‘he treaty were

American influence, kept alive through the channels of industry, was especially increased by

interest in the rise of the sugar industry which at the close of the Civil War became the basis of agitation for a treaty of reciprocity. In 1867, such a treaty, more liberal than that of 1855, and regarded as a means of making American influence dominant, and also in line with the policy of future annexation, was negotiated by written invitation of the Hawaiian government but after delayed action was rejected by the American Senate in June 1870.

Meantime, in July 1867, Secretary Seward, indicating that lawful peaceful annexation was more desirable than reciprocity, had authorized the American Minister to sound the Hawaiian government on the subject and confidentially to receive overtures ; but in 1868, seeing the Amer¬ ican mind absorbed with domestic questions, he prudently avoided giving further encourage¬ ment to Hawaiian-American annexation. In 1871, and in 1873, the American government was again asked to accept the opportunity to. annex the islands, and in 1873 Secretary Fish authorized inquiries as to the views of the Hawaiian government concerning the policy and conditions of annexation.

In 1875, to meet the wishes of the California sugar interests, the American government negotiated a favorable reciprocity treaty which granted to the United States certain ex¬ clusive privileges. The principle of this treaty, representing a policy of commercial assimilation and virtually establishing an American pro¬ tectorate, was renewed in 1884 by a treaty (ratified in 1887) giving the United States ex¬ clusive right to enter Pearl Harbor and to es¬ tablish a coaling station there. Secretary Bay¬ ard declined the British proposal for a tri¬ partite Anglo-American-German guarantee of the neutrality of the islands.

After various disturbances and apprehended crises, resulting in an increasing annexation sentiment, in 1893 following the deposition of Queen Liliuokalani, a newly-established pro¬ visional government, aided by the American minister, applied for annexation, and its com¬ missioners negotiated at Washington a treaty of annexation which was submitted to the Senate by President Harrison but later with¬ drawn by President Cleveland pending an in¬ vestigation of the Hawaiian situation.

The refusal of the Cleveland administra¬ tion to accept the results of the revolution of 1893 only delayed the inevitable incorporation of Hawaii, which had been rendered more neces¬ sary by the recent occupation of other islands of the Pacific by Germany and other European powers. The new mid-ocean republic of 1894 favored annexation, and in 1897 negotiated a treaty of annexation which was pending in the Senate at the beginning of the Spanish-Ameri- can War. Soon thereafter, friends of annexa¬ tion introduced a joint resolution of annexa¬ tion, which passed both houses by large majori¬ ties and was signed 7 July 1898, vesting the government in . the President until Congress should pass suitable legislation. Formal ces¬ sion was made on 12 Aug. 1898. An act of 30 April 1900 fully organized the Territory and ex¬ tended provisions of the Constitution and laws of

the United States and conferred American citizenship upon all citizens, including Chinese born or naturalized in the island.

Bibliography. — Allen, A. H„ (Relations between the United States and the Hawaiian

Islands, 1820-93> (Sen. Exec. Doc. 1893) ; Callahan, J. M., cAmerica in the Pacific and the Far East) (1901) ; Foster, J. W., (American Diplomacy in the Orient* (1903) ; Moore, J. B., (Digest of International Law) (1906).

James M. Callahan,

Professor of History and Political Science,

University of West Virginia.

HAWES' SHOP, Cavalry Engagement Near. General Grant had crossed to the south bank of the North Anna, in Virginia, and find¬ ing General Lee too strongly posted to be at¬ tacked, and his own army in a false and criti¬ cal position, he withdrew, on the night of 26 May 1864, to the north bank, and moved down the north bank of the Pamunkey to turn Lee's right. Torbert's and Gregg's divisions of cav¬ alry, under Sheridan, together with the Sixth corps led the advance. Torbert crossed the Pamunkey at Hanover Ferry on, the 27th, after considerable skirmishing in which he took about 60 prisoners, and the two cavalry divisions, supported by Russell's division of in¬ fantry, pushed on to Hanover Town and bivouacked for the night. On the morning of the 28th Sheridan was directed to make a demonstration and discover the enemy's posi¬ tion. _ Gregg's division, advancing on the Me- chanicsville road, encountered the two cavalry divisions of Wade Hampton and Fitzhugh Lee and Butler's South Carolina cavalry brigade about a mile beyond Hawes' Shop. The Con¬ federate cavalry was dismounted and had thrown up a barricade of rails covering the road. Gregg attacked, and there ensued one of the most severe cavalry engagements of the war, which continued several hours, neither side yielding ground. Finally late in the day, Custer's brigade of Torbert's division came up, dismounted, took position in the centre of Gregg's line, formed in close column of attack, the whole line charged and, after a hard strug¬ gle at close quarters, the Confederates were driven from the position and retreated upon their infantry at the Totopotomoy. Gregg's loss was 256 killed and wounded; the entire Union loss was 44 killed and 306 wounded. The Con¬ federate loss is not known. Consult (Official Records) (Vol. XXXVI) ; Humphreys, (The Virginian Campaign of 1864-65* ; The Century Company's <

Battles and Leaders of the Civil War* (Vol. IV).

HAWESVILLE, haz'vil, Ky., city, county- seat of Hancock County, on the Ohio River, and on the Louisville, Henderson and Saint Louis Railroad, about 65 miles above Evans¬ ville, Ind., and 80 miles west by south from Louisville. It is situated in an agricultural and coal-mining region. Its chief manufactures are flour, lumber, hubs and furniture. It has a number of tobacco factories or stemmeries, and its trade is chiefly in tobacco, coal, articles of home manufacture and agricultural products. Pop. (1920) 829.

HAWFINCH, one of the largest of Euro¬ pean finches (Coccothraustes vulgaris), so called in England from the belief that it sub¬ sisted principally on the fruit of the hawthorn. It resembles the chaffinch in color, but is dis¬ tinguished by its enormous beak and larger size. It feeds on all kinds of berries.

6

HAWK

HAWK, any diurnal bird of prey not an eagle or a vulture. As the general character¬ istics of this group have been given under Falconidte, and the use of falcons in sport un¬ der Falconry, the general term ®hawk* will be treated from the point of view of economic re¬ lations. Hawks are found in all parts of the world and number about 450 species. All are of moderate size, and some Old World species are no larger than a robin. All seek their prey by daylight and are endowed with great swift¬ ness of flight, immense clutching power in their talons, hooked and toothed beaks adapted to cutting and tearing flesh and remarkable keen¬ ness of vision. (See Eyesight of Animals). All are exclusively carnivorous and rarely taste anything they have not themselves killed. Hawks show great boldness in attacking ouarry, seeking it as a rule by patiently watch¬ ing from an elevated perch until a prospective victim appears, then pouncing on it; but some search for food in suitable places, flying to and fro in the hope of catching sight of a moving animal, or of scaring one from its hiding- place. When it has been caught by a rapid swoop it is borne away in the talons to be eaten at leisure, or carried to the nestlings.

Most hawks are dressed plainly in browns and whites, with darker markings, although some have bright feathers in their plumage, but none has in either sex ornamental crests or plumes. The sexes always differ in size, the female being the larger, often conspicuously so; and the plumage of the young varies much from that of the adults. They

nest in forest trees, on rock-ledges or on the ground, and usually lay four or five whitish eggs, heavily blotched with brown, red and lavender. A few, as, for example, the duck-hawk (peregrine), and the fish-hawk (q.v.) (osprey), repair and use the same nest many years in succession, but most species get a new mate and make a new nest every season. The voice of most hawks consists of loud screams, and none sings in any proper sense of the word. Hawks, as a rule, are solitary birds, but in the annual migrations (which affect most species) they sometimes travel in considerable flocks. Few are tame¬ able, yet the osprey and the sparrow-hawk are inclined to accept artificial nesting accommoda¬ tions near houses when made welcome.

North America has hawks of all kinds, in¬ cluding about 34 species north of Mexico, rep¬ resenting the families Falconidce, Buteonidce and Pandionidoe. Taking these in systematic order and passing by the southern kites else¬ where described (see Kite), we come to the three species that may properly be termed ˆhen-hawks,® since to these three alone may commonly be attributed the loss of poultry suf¬ fered on farms and in villages.

True Hen-Hawks. — All are small, fierce and powerful, addicted to the capture of birds, wild and tame, although many wild mice and other small mammals, and a few frogs, lizards and insects, are also eaten. The first of them is the sharpshin (Accipiter velox), a summer resident of all North and Central America, and retiring in winter only to the Southern States. It is known as bird-hawk, chicken-hawk, bullet- hawk and sparrow-hawk. Birds constitute nine- tenths of its fare, speaking generally; and it is able to strike down and carry off fully-grown chickens, quails or grouse, as well as small

birds, whose only safety is to make a quick dive into some thick bush. The sharpshin may be known by its small size (length 11 to 13.5 inches, wing-spread about 15 inches) ; long tail, square at the end; slender legs and feet and very long toes. In color it is uniformly bluish-gray or slate-colored, dark on the crown ; under parts white, heavily barred with reddish-brown, except the throat, which is narrowly streaked; wing-quills blackish ; tail with five blackish crossbars and narrowly tipped with white; feet yellow. Immature young, brownish above, streaked white below.

Cooper's hawk, or the blue darter (Accipiter coo peri), is closely similar in color and pro¬ portions, but is nearly a third larger, has stouter feet, and the tail is rounded, not square, at the end, and is indistinctly barred. This spe¬ cies does not go far north but from southern Canada southward is one of the most abundant of American

hawks, and like the sharpshin it retreats in winter only from the more northern border of its range. It is known to farmers and sportsmen as chicken-hawk, quail-hawk, swift-hawk and darter.

The third bird-killer is the goshawk (Astur atricapillus) , which inhabits Canada and north¬ ern Europe, where it has always been one of the favorites of falconers. It is much larger than the others, measuring 22 to 24 inches from bill-tip to tail-end; and when adult is bluish above, crown darker, has a broad whit¬ ish stripe over the eye, the whole under surface finely marked with gray and white, and the long tail crossed by four narrow dark-brown bars. Immature young are dusky brown, mot¬ tled with reddish and buff. This bold northern marauder is variously called blue hen-hawk, blue darter, dove-hawk, etc., but it is rarely seen in the United States except in midwinter.

The three falcons described above are the true ˆhen-hawks® and are unprotected by law. They, and they alone, are responsible for virtu¬ ally all the loss of poultry and game-birds. The description of the methods of the sharpshin given by W. B. Barrows in his admirable (Birds of Michigan> (Lansing 1912) will answer for those of the others:

This is the common “ chicken-hawk ” of the farmers and pr°bably is responsible for most of the loss of small chickens. The bird has a habit of dashing suddenly among the poultry, picking up a small chicken in its claws, and carrying it away so quickly that it is commonly impossible to kill the robber. It is very likely to return the same day or the next, and to repeat its visits indefinitely until killed. Un.ike the buzzard-hawks, the Cooper’s and sharpshin seldom wheel aloft on the lookout for food, but fly swiftly and silently from place to place, flapping the wings rapidly for a few seconds and then gliding noiselessly, always alert and watchful, and ever ready to drop like an arrow on >ome unsuspecting victim.

Two other small falcons, the pigeon-hawk and the sparrow-hawk, catch small birds when their young are in the nest, and need tender food, but the former is so uncommon, and the latter so little addicted to chicken-stealing, that they need not be feared. Both live principally on insects and mice, the beautiful little spar¬ row-hawk being particularly helpful by its con¬ stant pursuit of grasshoppers and crickets. The duck-hawk, or peregrine, is an enemy to game¬ birds and waterfowl, but is now rare and ex¬ tremely shv of humanity.

Beneficial Hawks.— The large hawks so often seen in the country sailing above the fields or perched on some tree at the edges of

the woods belong to the genera Buteo and Archibuteo, and are known as (

Most of these big, slow hawks range across the continent in western varieties ; and in ad¬ dition several species belong exclusively to the plains and mountains of the West, while the southwestern border of the United States is en¬ tered by several subtropical species, some of which range in summer far up the Californian coast. While indignant and undiscriminating farmers and poultrymen are likely to call all or any of these ((hen-hawks,® the mischief of which they are guilty in the nesting-season is so small that it is negligible in comparison with the benefit they render all the year round by their destruction of rabbits, ground-squirrels, gophers, field-mice, grasshoppers, crickets and other injurious creatures that cost the farmer and gardener enormous aggregate loss. No poultry will be sacrificed, even to the bold sharpshin and blue darters when it is housed or brush-sheltered and cared for as good poul¬ try ought to be ; and it is the height of folly to shoot hawks indiscriminately. _ Consult Fisher, (Hawks and Owls of the United States in their Relation to Agriculture > (Washington 1893) ; Forbush, (Useful Birds and their Pro¬ tection (Boston 1907) ; Weed and Dearborn, (Birds in their Relation to Man) (Philadelphia 1903) ; and general works mentioned under Birds.

Ernest Ingersoll.

HAWK-MOTHS, a family of large moths forming the family Sphingidce. They have stout bodies, large heads with prominent eyes, and thick spindle-shaped antennae, ending in a hook. The fore-wings are long, narrow, more or less pointed, and always much longer than the hind-wings. They are insects of rapid flight and dart about in the twilight ; some_ spe¬ cies also during the day. Their caterpillars are hairless, smooth, often green, with trans¬ verse stripes on the sides and nearly always a horn on the back of the second last segment, and always have 10 pro-legs. They are leaf- eaters and often greatly destructive to culti¬ vated plants, the tomato-worm being a prominent example. They change to pupae

either on the surface of the ground or in a cell underground, but make no cocoon. Some of the South American species resemble humming¬ birds so closely, especially when poising before a flower on whirring wings and sucking its nec¬ tar, that they can hardly be distinguished,

and popular belief asserts that the one is transmut- able into the other. A great number of forms exist in all parts of the world, the United States having about 100 species. All are plainly dressed in grays and browns, and one of the most remarkable is the death's-head (q.v.).

HAWKBIT, a genus (Leontodon) of plants of the family Cichoriacece, closely re¬ lated to the dandelion, from which they differ in having feathery pappus. The name is due to the peculiar shape of the lacerations of the leaves. Numerous species are natives of Eu¬ rope and Asia and a few have become natural¬ ized in eastern North America.

HAWKE, Edward, Lord, English sailor: b. London, 1705; d. Sunbury-on-Thames, 17 Oct. 1781. Early in 1720 Hawke entered the navy and was appointed in 1733 to the com¬ mand .of the Wolf. Being promoted to the command of a squadron in 1747 he totally de¬ feated the French fleet off Belle Isle. In 1759 he was sent in pursuit of the Brest fleet, which he came up with in Quiberon Bay and signally defeated (20 November). This is regarded as the naval counterpart of the battle of the Plains of Abraham, by which the fate of the New World was decided. He now received a pen¬ sion of £2,000, and in 1768 became admiral of Great Britain and commander-in-chief of the fleet. From 1766 to 1771 he was First Lord of the Admiralty. In 1776 he was advanced to a seat in the House of Lords by the style of Baron Hawke of Towton. Consult the (Life> by Burrows ; and Mahan, (Types of Naval Of- ficers) (1901).

HAWKESBURY, haks'ber-i, Canada, vil¬ lage in Prescott County, Ontario, on the Ot¬ tawa River, half-way between Montreal and Ottawa, on the Grand Trunk and Canadian Northern railways. It has ferry communica¬ tion with Grenville, across the river. Its chief industrial establishments are paper and pulp mills, flour mills and large saw and planing mills. The largest sulphite paper mill in the British Empire is located here. It has an ex¬ tensive lumber trade. Pop. 4,400.

HAWKING. See Falconry.

HAWKINS, Anthony Hope, English nov¬ elist, known by the pen-name ((Anthony Hope® : b. London, 9 Feb. 1863. He was educated at Balliol College, Oxford, was admitted to the bar of the Middle Temple in 1887 and practised until 1894 on the London and Midland circuit. He contested South Bucks as a Liberal in 1892, but unsuccessfully. In 1894 he achieved a striking literary success with his ˆPrisoner of Zenda,} the scene of which is laid in an imagi¬ nary independent state

of South Germany. Other books of his are (The Dolly Dialogues> (1894), cited as models of keen if somewhat shallow repartee; (The Chronicles of Count Antonio) (1895) ; (Rupert of Hentzau) (1898) ; (The Intrusions of Peggy > (1902) ; (Double Harness) ; (A Servant of the Public > (Tales of Two People) (1907); (The Great Miss

Driver0 (1908); (Second String) (1910); (Miss Maxon Protests,*

(1915).

HAWKINS, Hamilton Smith, American military officer: b. South Carolina, 1834; d. Glen Springs, N. Y., 28 March 1910. He was graduated at the United States Military Acad¬ emy in 1855. He entered the army in 1861, was made captain in the Sixth Infantry in 1863 and brevetted major in October 1865. In 1888 he became commandant at West Point, and in 1894 was promoted colonel. When war was declared against Spain he went to the front as a brigadier-general of volunteers. He led the charge at San Juan, Cuba, 2 July 1898 and was made major-general of volunteers 8 July 1898 and later was made brigadier-general. He was retired 1904.

HAWKINSVILLE, Ga., village, county- seat of Pulaski County on the Ocmulgee River, at the head of navigation, and on the Southern, the Hawkinsville and Florida Southern and other railroads, about 48 miles south of Macon. It is situated in a fertile agricultural region. It has a cotton factory, cotton compresses, cot¬ ton gins, cottonseed-oil mills, barrel factories, carriage and wagon works, fertilizer factory, hardwood mill, a brickyard, etc. Its trade is chiefly in cotton, lumber, naval stores, fruits and vegetaoies. ihe electric-light plant and the waterworks are municipally owned. Pop.

(1920) 2,867.

HAWKSBEARD, perennial composite plants allied to hawkweed, but of the genus Crepis, about 250 species of which are known in the northern hemisphere. Several are Euro¬ pean weeds which have become naturalized in the United States, and there are several native species. The flowers are dandelion-like and yellow or orange.

HAWKSBILL, a great marine turtle (Che- lone imbricata) allied to the green turtle, but which has the plates of the shell overlapping; and

these plates form the tortoise-shell (q.w) of commerce. The flesh is not good for eating, but the eggs are good. The animal inhabits the Indian Ocean, the Pacific and the warmer parts of the Atlantic. This is one of the sea- turtles called “caret,® but that term belongs more properly to the loggerhead. See Turtle.

HAWKWEED, or RATTLESNAKE WEED, a genus (Hieracium) of plants of the family Ciclioriacece, with mostly low hairy stems’ and yellow or orange heads of flowers. One species, the European orange hawkweed (H . aurantiacum) , is frequently cultivated for the sake of its fine orange flowers. The name “hawkweed® in English, and various similar names in use among the peasants of continental Europe, are based on an ancient belief that birds of prey used the juice of the species to strengthen their vision. Several species grow in the United States, where they have been called “rattlesnake weeds® from a popular belief that they were of value in curing the poison of snakes.

HAWK WOOD, Sir John de, English sol¬ dier: b. Hedingham Sibil, Essex; d. Florence, Italy, 17 March 1394. He was styled by Hallam the first distinguished commander who had ap¬ peared in Europe since the destruction of the Roman Empire. It is said that he fought at

Crecy and Poitiers, and for his bravery was knighted by Edward III. However that may be, in 1359 he was the leader of a troop of free lances preying upon France and northern Italy. With this band, the “White Company,® he served the Marquis of Montserrat, later the republic of Pisa, and still later Florence, upon whose side he oftenest fought in the civil dis¬ turbances of Italy. As commander-in-chief he directed the successful war against Milan (1390-92). He was pensioned by the Floren¬ tines and entombed with great ceremony in the Duomo.

HAWLEY, Gideon, American missionary to the Indians : b. Stratford, now Bridgeport, Conn., 11 Nov. 1727; d. Marshpee, Mass., 3 Oct. 1807. He was graduated at Yale College in 1749, and commenced his labors at Stock- bridge in 1752, opening a school at that place, in which he instructed a number of Mohawk, Oneida and Tuscarora families. In 1754, un¬ der the patronage of Sir William Johnson,’ he began a mission among the ’Iroquois, or Six Nations, on the Susquehanna River; but in 1756 was obliged by the disturbances of the French war to leave that region, when he be¬ came a chaplain in the army marching against Crown Point. The campaign being over, he re¬ engaged in his missionary work at Marshpee, where he was installed as pastor in 1758, and there passed the remainder of his life in his benevolent labors.

HAWLEY, Joseph, American statesman: b. Northampton, Mass., 1723; d. 10 March 1788. He was graduated at Yale College, and followed the profession of law at Northampton, in which he rose to eminence. At the time of the dis¬ putes between Great Britain and America, he took a prominent part in advocating the cause of the colonies. “We must fight,® he wrote to the delegates of Massachusetts, “if we cannot otherwise rid ourselves of British taxation. The form of government enacted for us by the British parliament is evil against right, utterly intolerable to every man who has any idea or feeling of right or liberty.® He was several times elected a member of the council, but de¬ clined, preferring to enter the State legislature, of which he was a member 1764-66.

HAWLEY, Joseph Roswell, American politician and legislator : b. Stewartsville, N. C ,

iL?Ct,TT826: d Washi«gton, D. C, 17 March 1905. He was graduated at Hamilton College, Clinton, N. Y., 1847, and began the practice of law at Hartford, Conn., in 1850. The Repub¬ licˆ11 party in Connecticut was organized in the office of the Charter Oak, of which he was the editor. He afterward became editor of the Hartford Evening P ost, the new Republican paper. When the Civil War broke out he recruited the first company of volunteers raised in the State Company A of the First Connec¬ ticut i egiment of which he took command He saw service throughout the whole war and was mustered out in 1866 with the brevet rank of major-general. He was elected governor of Connecticut the same year. He was de- feated for re-election in 1867, and again turned to journalism. He purchased the Hartford Courant and united it with the Press, and made it one of the most influential Republican news¬ papers in the country. He took a leading part in the councils of the Republican party. In

18/2 he was elected to Congress; at the end ol the term, 1879-81, was sent to the United States Senate, to which he was re-elected 1887, 1893 and 1899. He was president of the United States Centennial Committee 1873-76. Four¬ teen days before his death, he was placed on the retired list of the army with the rank of brigadier-general.

HAWORTH, ha’werth, Adrian Hardy, English naturalist: b. Hull, 1767; d. Chelsea, 24 Aug. 1833. He was educated for the law, but did not practice, devoting his time to en¬ tomology and botany. He was the

founder of the Entomological Society of London. The Hull Botanical Gardens were planned by him and laid out under his direction. His collec¬ tions were large and important, and his works are still standard. He wro + e ‘Observations on the Genus Mesembryanthemum > (1794) ; ‘Pro- dromus Lepidopdtrorum Britannicorum) (1802) ; and (Synopsis Plantarum Succulentarum* (1812) ; and many minor papers.

HAWORTH, Joseph, American actor: b. Providence, R. I., 1855; d. 29 Aug. 1903. His first appearance was as a member of Ellsler’s stock company at Cleveland, Ohio, and subse¬ quently he supported Edwin Booth, Lawrence Barrett and John McCullough. From 1883 he toured for several years as a star in ‘The Bells, * (The Leavenworth Case, * ‘Hamlet,* and other productions; in 1896-98 was Macbeth to Mod- jeska’s Lady Macbeth, and later Storm in Caine’s ‘Christian,* Vinicius in Stange’s adap¬ tation of Sienkiewicz’s ‘Quo Vadis,* and Cas¬ sius in the Mansfield presentation of ‘Julius Caesar.*

HAWSER, a manila or wire rope used in mooring or towing boats, etc., over four or three inches in circumference respectively. The name is now usually applied to all large ropes, though formerly it signified ropes “hawser-laid,** that is, with three “plain-laid,** three-stranded ropes laid up left-handed, now usually called a cable-laid rope.

HAWTHORN, or WHITE THORN

(Crates gus oxyacantha) , a small spiny European tree, rising sometimes to the height of 20 to 25 feet, much admired for the beauty of its foli¬ age. The leaves are smooth, shining, more or less deeply lobed, and of a beautiful green color; the flowers are white, sometimes with a reddish tinge disposed in corymbs, and possess an agreeable perfume. The species of Cratce- gus are all shrubs or small trees, spiny, with red fruit resembling in miniature that of the apple, from which plant they are distinguished chiefly by their seeds, and are arranged with it in the family Malacece. In the last 25 years more than a thousand species have been de¬ scribed from North America, but the number of valid species is undoubtedly much lower. When young the hawthorn springs up rapidly, a shoot of a single year being sufficient for a walking-stick. It thus, if well pruned and kept down, quickly grows into a thick and in¬ tricately woven hedge.

HAWTHORNE, ha’thorn, Julian, Amer¬ ican novelist and journalist, son of Nathaniel Hawthorne (q.v.) : b. Boston, Mass., 22 June 1846. He was graduated from Harvard Uni¬ versity in 1867 and afterward studied civil engi¬ neering in Dresden, but soon forsook this oc¬

cupation for literature. His first successful story was ‘Bressant* (1872), the forerunner of a long list of novels, of which may be particu¬ larized ‘Garth* (1875) ; ‘Sebastian Strome* (1884); ‘Archibald Malmaison* (1884); ‘A Fool of Nature* (1896). He has also pub¬ lished ‘Saxon Studies* (1876); and ‘Nathaniel Hawthorne and His Wife* (1885); ‘Confes¬ sions and Criticisms* (1886); ‘American Lit¬ erature* (1891); ‘History of the United States* (1899; 1912); ‘Hawthorne and His Circle*- (1903); ‘The Subterranean Brother¬ hood* (1914), a record of his prison experi¬ ences in Atlanta. His best work suggests more than one element that distinguishes his father’s stories. There is a psychologic accent, the touch of mystery, and the avoidance of the stock properties of romance. See Morton, W. J.

HAWTHORNE, Nathaniel, American novelist: b. Salem, Mass., 4 July 1804; d. Plym¬ outh, N. H., 19 May 1864. The founder of the family in America was William Hathorne (as the name was then spelled), a typical Puri¬ tan and a public man of importance. John, his son, was a judge, one of those presiding over the witchcraft trials. Of Joseph in the next generation little is said, but Daniel, next in descent, followed the sea and commanded a privateer in the Revolution, while his son Nathaniel, father of the romancer, was also a sea captain. This pure New England descent gave a personal character to Hawthorne’s pre¬ sentations of New England life; when he writes of the strictness of the early Puritans, of the forests haunted by Indians, of the mag¬ nificence of the provincial days, of men high in the opinion of their towns-people, of the reaching out to far lands and exotic splendors, he is expressing the stored-up experience of his race. His father died when Nathaniel was but four and the little family lived a secluded life with his mother. He was a handsome boy and quite devoted to reading, by an early accident which for a time prevented outdoor games. His first school was with Dr. Worcester, the lexicographer. In 1818 his mother moved to Raymond, Me., where her brother had bought land, and Hawthorne went to Bowdoin Col¬ lege. He entered college at the age of 17 in the same class with Longfellow. In the class above him was Franklin Pierce, afterward 12th President of the United States. On being grad¬ uated in 1825 Hawthorne determined upon lit¬ erature as a profession, but his first efforts were without success. ‘Fanshawe* was pub¬ lished anonymously in 1828, and shorter tales and sketches were without importance. Little need be said of these earlier years save to note that they were full of reading and observation. In 1836 he edited in Boston the American Magazine for Useful and Entertaining Knowl¬ edge, but gained little from it save an intro¬ duction to ‘The Token,* in which his tales first came to be known. Returning to Salem he lived a very secluded life, seeing almost

no one (rather a family trait), and devoted to his thoughts and imaginations. He was a strong and powerful man, of excellent health and, though silent, cheerful, and a delightful com¬ panion when he chose. But intellectually he

was of a separated and individual type, having his own extravagances and powers and sub¬ mitting to no companionship in influence. In 1837 appeared ‘Twice Told Tales) in book form : in a preface written afterward Haw¬ thorne says that he was at this time <(the ob¬ scurest man of letters in America/® Gradually he began to be more widely received. In 1839 he became engaged to Miss Sophia Peabody, but was not married for some years. In 1838 he was appointed to a place in the Boston cus¬ tom house, but found that he could not ‘easily save time enough for literature and was not very sorry when the change of administration put him out of office. In 1841 was founded the socialistic community at Brook Farm : it seemed to Hawthorne that here was a chance for a union of intellectual and physical work, whereby he might make a suitable home for his future wife. It failed to fulfil his expecta¬ tions and Hawthorne withdrew from the ex¬ periment. In 1842 he was married and moved with his wife to the Old Manse at Concord just above the historic bridge. Here chiefly he wrote the (Mosses of an Old Manse5 (1846). In 1845 he published a second series of ‘Twice Told Tales-* ; in this year also the family moved to Salem, where he had received the appointment of surveyor at the custom house. As before, official work was a hindrance to literature; not till 1849 when he lost his posi¬ tion could he work seriously. He used his new-found leisure in carrying out a theme that had been long in his mind and produced ‘The Scarlet Letter> in 1850. This, the first of his longer novels, was received with enthusiasm and at once gave him a distinct place in litera¬ ture. He now moved to Lenox, Mass., where he began on ‘The House of Seven Gables, > which was published in 1851. He also wrote (A Wonder-Book5 here, which in its way has become as famous as his more important work. In December 1851 he moved to West Newton, and shortly to Concord again, this time to the Wayside. At Newton he wrote (The Blithe- dale Romance. > Having settled himself at Con¬ cord in the summer of 1852, his first literary work was to write the life of his college friend, Franklin Pierce, just nominated for the Presi¬ dency. This done he turned to ‘Tanglewood Tales, 5 a volume not unlike the Bonder- Book. } In 1853 he was named consul to Liver¬ pool : at first he declined the position, but finally resolved to take this opportunity to see something

of Europe. He spent four years in England, and then a year in Italy. As before he could write nothing while an official, and resigned in 1857 to go to Rome, where he passed the winter, and to Florence, where he received suggestions and ideas which gave him

?ocoUiUS ˆor Jiterary work. The summer of 1858 he passed at Redcar, in Yorkshire, where he wrote ‘The Marble Faun.5 In June 1860 he sailed for America, where he returned to the Wayside. For a time he did little literary work : in 1863 he published ‘Our Old Home 5 a series of sketches of English life, and planned a new novel, ‘The Dolliver Romance 5 also called ‘Pansie.5 But though he suffered from no disease his vitality seemed relaxed : some unfortunate accidents had a depressing effect,

and in the midst of a carriage trip into the White Mountains with his old friend, Franklin Pierce, he died suddenly at Plymouth, N. H., early in the morning, 19 May 1864.

The works of Hawthorne consist of novels, short stories, tales for children, sketches of life and travel and some miscellaneous pieces of a biographical or descriptive character. Be¬ sides these there were published after his death extracts from his notebooks. Of his novels ‘The Scarlet Letter * is a story of old New England : it has a powerful moral idea at bot¬ tom, but it is equally strong in its presentation of life and character in the early days of Massachusetts. ‘House of the Seven Gables) presents New England life of a later date: there is more of careful analysis and presenta¬ tion of character and more description of life and manners, but less moral intensity. ‘The Blithedale Romance) is less strong: Hawthorne seems hardly to grasp his subject. It makes the third in what may be called a series of romances presenting the molding currents of New England life: the first showing the fac¬ tors of religion and sin, the second the forces of hereditary good and evil, and the third giv¬ ing a picture of intellectual and emotional fer¬ ment in a society which had come from very different beginnings. ‘Septimius Felton, > fin¬ ished in the main but not published by Haw¬ thorne, is a fantastic story dealing with the idea of immortality. It was put aside by Haw¬ thorne when he began to write (The Dolliver Romance,) of which he completed only the first chapters. (Dr. Grimshaw’s Secret5 (published in 1882) is also not entirely finished. These three books represent a purpose that Haw¬ thorne never carried out. He had presented New England life, with which the life of him¬ self and his ancestry was so indissolubly con¬ nected, in three characteristic phases. He had traced New England history to its source. He now looked back across the ocean to the Eng¬ land he had learned to know, and thought of

oij u/ i j should bridge the gulf between the Old World and the New. But the stories are all incomplete and should be read only by the student. The same thing may be said of ‘Fan- shawe,5 which was published anonymously early in Hawthorne’s life and later withdrawn from circulation. ‘The Marble Faun> presents to us a conception of the Old World at its oldest point It is Hawthorne’s most elaborate work and if every one were familiar with the scenes so discursively described, would probably be more generally considered his best. Like the other novels its motive is based on the problem of evil, but we have not precisely atonement nor retribution, as in his first two novels The story is one of development, a transformation ot the soul through the overcoming of evil Ihe four novels constitute the foundation of Hawthornes literary fame and character, but the collections of short stories do much to develop and complete the structure. They are of various kinds, as follows: (1) Sketches of current life or of history, as ‘Rills from the Town pump>

as (lhe Gray Champion,’ (The Gentle Boy,’ (Tales of the Province House.’ These stories are often illustrative of some idea and so might find place in the next set. (3) Stories based upon some idea, as (Ethan Brand,’ which presents the idea of the unpardonable sin ; (The Minister’s Black Veil,’ the idea of the separation of each soul from its fellows; (Young Goodman Brown,’ the power of doubt in good and evil. These are the most char¬ acteristic of Hawthorne’s short stories ; there are about a dozen of them. (4) Somewhat different are the allegories, as (The Great Stone Face,’ (Rappacini’s Daughter,’ (The Great Carbuncle.’ Here the figures are not examples or types, but symbols, although in no story is the allegory consistent. (5) There are also purely fantastic developments of some idea, as (The New Adam and Eve,’ (The Christmas Banquet,’

tails of circumstance and surroundings. The notebooks give us this also, but the American notebook has also rather a peculiar interest in giving us many of Hawthorne’s first ideas which were afterward worked out into stories and sketches.

One element in Hawthorne’s intellectual make-up was his interest in the observation of life and his power of description of scenes, manners and character. This is to be seen especially, as has been said, in his notebooks and in (Our Old Home,’ and in slightly modi¬ fied form in the sketches noted above. These studies make up a considerable part

of (Twice Told Tales' and (Mosses from an Old Manse,' and represent a side of Hawthorne's genius not always borne in mind. Had this interest been predominant in him we might have had in Hawthorne as great a novelist of our every¬ day life as James or Howells. In the (House of Seven Gables' the power comes into full play: 100 pages hardly complete the descrip¬ tions of the simple occupations of a single un¬ eventful day. In Hawthorne, however, this in¬ terest in the life around him was mingled with a great interest in history, as we may see, not only in the stories of old New England noted above, but in the descriptive passages of (The Scarlet Letter.' Still we have not, even here, the special quality for which we know Haw¬ thorne. Many great realists have written his¬ torical novels, for the same curiosity that ab¬ sorbs one in the affairs of everyday may read¬ ily absorb one in the recreation of the past. In Hawthorne, however, was another element very different. His imagination often furnished him with conceptions having little connection with the actual circumstances of life. The fanciful developments of an idea noted above (5) have almost no relation to fact : they are ((made up out of his own head." They are fantastic enough, but generally they are developments of some moral idea and a still more ideal develop¬ ment of such conceptions was not uncommon in Hawthorne. (Rappacini's Daughter' is an allegory in which the idea is given a wholly imaginary setting, not resembling anything that Hawthorne had ever known from observation. These two elements sometimes appear in Haw¬ thorne's work separate and distinct just as they did in his life: sometimes he secluded him¬ self in his room, going out only after night¬ fall ; sometimes he wandered through the coun¬ try observing life and meeting with everybody. But 'neither of these elements alone produced anything great, probably because for anything great we need the whole man. The true Haw¬ thorne was a combination of these two ele¬ ments, with various others of personal charac¬ ter, and artistic ability that cannot be specified here. The most obvious combination between these two elements, so far as literature is con¬ cerned, between the fact of external life and the idea of inward imagination, is by a symbol. The symbolist sees in everyday facts a presen¬ tation of ideas. Hawthorne wrote a number of tales that are practically allegories: (The Great Stone Face' uses facts with which Haw¬ thorne was familiar, persons and scenes that he knew, for the presentation of a conception of the ideal. His novels, too, are full of symbol-

ism. 'The Scarlet Letter* itself is a symbol and the rich clothing of

Little Pearl, Alice's posies among the Seven Gables, the old musty house itself, are symbols, Zenobia's flower, Hilda's doves. But this is not the highest syn¬ thesis of power, as Hawthorne sometimes felt himself, as when he said of (The Great Stone Face,* that the moral was too plain and mani¬ fest for a work, of art. However much we may delight in symbolism it must be admitted that a symbol that represents an idea only by a fanci¬ ful connection will not bear the seriousness of analysis of which a moral idea must be capable. A scarlet letter A has no real connection with adultery, which begins with A and is a scarlet sin only to such as know certain languages and certain metaphors. So Hawthorne aimed at a higher combination of the powers of which he was quite aware, and found it in figures and situations in which great ideas are implicit. In his finest work we have, not the circum¬ stance before the conception or the conception before the circumstance, as in allegory. We have the idea in the fact, as it is in life, the two inseparable. Hester Prynne's life does not merely present to us the idea that the break¬ ing of a social law makes one a stranger to society with its advantages and disadvantages. Hester is the result of her breaking that law. The story of Donatello is not merely a way of conveying the idea that the soul which con¬ quers evil thereby grows strong in being and life. Donatello himself is such a soul growing and developing. We cannot get the idea with¬ out the fact, nor the fact without the idea. This is the especial power of Hawthorne, the power of presenting truth implicit in life. Add to this his profound preoccupation with the problem of evil in this world, with its appear¬ ance, its disappearance, its metamorphoses, and we have a clue to Hawthorne's greatest works In (The Scarlet Letter, * 'The House of Seven Gables,) (The Marble Faun,* (Ethan Brandy (The Gray Champion,* the ideas cannot be sep¬ arated from the personalities which express them. It is this which constitutes Hawthorne's lasting power in literature. His observation is interesting to those that care for the things that he describes, his fancy amuses, or charms or often stimulates our ideas. His short stories are interesting to a student of literature because they did much to give a definite character to a literary form which has since become of great importance. His novels are exquisite speci¬ mens of what he himself called the romance, in which the figures and scenes are laid in a world a little more poetic than that which makes up our daily surrounding. But Haw¬ thorne's really great power lay in his ability to depict life so that we are made keenly aware of the dominating influence of moral motive and moral law. See House of the Seven Gables ; Marble Faun; Scarlet Letter, The; Twice Told Tales.

_ Bibliography.— For life consult Lathrop, G. P., in the library edition

of Hawthorne; James, Henry (in (English Men of Letters,* London 1880) ; Conway, M. D. (in ‘Great Writers* Series, London 1890). Consult also Lathrop, Rose Hawthorne, < Memorials of Haw¬ thorne* (Boston 1897) ; Curtis, G. W., liter¬

ary and Social Essays* (New York 1894) ; Higginson, T. W., 1 Short Studies of American Authors* (New York 1888) ; Stephen, Leslie, ‘Hours in a Library* (New York 1875) ; Fields, J. T., (Hawthorne* (Boston 1876) ; id., ‘Yesterdays with Authors* (Boston 1871-98) ; Hutton, R. H., (Essays in Literary Criticism* (New York 1892, 1908) ; Woodberry, George E., ‘Hawthorne: How to Know Him.*

Edward Everett Hale, Jr., Professor of English, Union College, Schenec¬ tady, N. Y.

HAWTREY, Charles Henry, English actor-manager and playwright: b. Eton 1858, son Rev. John Hawtrey. He was educated at Eton and Oxford, and became an actor when he was 23 years old His greatest suc¬ cess was in ‘The Private Secretary,* adapted from Von Moser’s ‘Der Bibliothekar,* first produced in Cambridge in 1883. Other plays in which he has been successful are: ‘Jane,* ‘Mr. Martin,* (A Message from Mars* and The Man from Blankley’s.* With the last two plays he several times visited the United States.

SYSTEM OF FORTIFICA- liUJM. A bastion system of fortification in¬ troduced by Baron Francis Nicolas Benoit Haxo, a pi ominent French military engineer, employed by Napoleon, and later commanded at the siege of Antwerp in 1832. Casemated batteries of the system have earthen parapets along their front and are provided with arches mantled with earth. Apertures in front of the guns open into embrasures formed in extension of the parapet at these points. Being open in the rear the free circulation of air obviates the inconvenience of confined smoke.

The siege of this system of fortification is calculated to last 50 days and there are five distinct periods of breaching batteries: (1) Against the reduit of the salient place of arms and the ravelin. (2) Against the reduit of the re-entering place of arms, the coupures and the reduit of ravelin. (3) Against the bas- tionet and the counter-guard. (4) Against the retrenchment. (5) Against the bastion. The front is 360 yards long. The perpendicular is only 40 yards, and the faces 72 yards. The flanks are perpendicular to the lines of defense. The bastions contain interior retrenchments en¬ tirely separated from the rear by a ditch. A chemin-des-rondes surmounts the scarp of the enciente. The tenaille is not revetted and it has flanks that can mount three guns. The main ditch is 20 yards wide. The ravelin is made very salient, with a casemated traverse in cap¬ ital, and coupures cut across its faces. In rear is a reduit of the ordinary outline, and behind is a casemated caponiere of bastionet, the roof of which carries 10 guns. The counterscarp of the mam ditch is produced to within 10 yards of this bastionet, and in front of it slants a glacis, which closes the ditch of the ravelin and. that of the reduit. The bastionet sweeps the interior glacis and co-operates with the flanks of the inner works to impede the construction of the counter-batteries.

The Haxo Casemate is a work built inside the parapet, arched and covered with earth opening in the rear to the terreplein. The guns

are protected from the enemy's fire, and can be entirely hidden by masking the embrasures.

HAY, John Milton, American statesman : b. Salem, Ind., 8 Oct. 1838; d. near Newbury, N. H., 1 July 1905. He was graduated from Brown University in 1858, and soon after leav¬ ing college entered the office

of his uncle, Mil- ton Hay, a former partner of Abraham Lin¬ coln, in Springfield, Ill., to study law. In 1861 he was admitted to the bar, but did not prac¬ tise ; he took an active part in the campaign preceding Lincoln's first election and in 1861 went with Lincoln to Washington as one of the President's private secretaries. During the Civil War period he was also Lincoln's ad¬ jutant and aide-de-camp, and served in the field for some time under Generals Hunter and Gill- more. He was brevetted lieutenant and lieu¬ tenant-colonel.

After the death of Lincoln he went to Paris as secretary of legation, remaining there till 1867, when he returned to the United States. In the summer of the same year he became charge-d'affaires at Vienna. After holding this post for a year, during which he had some op¬ portunities for European travels, he resigned and returned to the United States, but was sent almost immediately to Madrid as first sec¬ retary of legation, where he remained till 1870.

During his service abroad he gained a valu¬ able knowledge not only of the language and literature of the chief European nations, but also of foreign diplomacy and politics. On his return to the United States he took up journal¬ ism, was for a time on the editorial staff of the New York Tribune , and published, mostly in its columns, his (Pike County Ballads. > After about five years of service on the Tribune he married a daughter of Amasa Stone of Cleveland and went to that city to live. He devoted himself mainly to literary work, and occasionally took part in politics, writing and speaking in presidential campaigns. In 1879 he accepted an offer from President Hayes to become first assistant Secretary of State under Mr. Evarts. He held this position till the end of the Hayes administration in March 1881 ; then he took charge of the Tribune during Whitelaw Reid's absence in Europe, and con¬ ducted it with marked success through the try¬ ing period of Garfield's assassination and death. The period 1881-97 was devoted to the business interests of his wife's family, to travel and especially to the writing, with T. G. Nicolay, of their monumental biography of Abraham Lincoln. During these years he also found more leisure to devote to other literary work, the result of which in the form of poems and a few prose articles was published in various magazines.

In March 1897 President McKinley ap¬ pointed him United States Minister to England, and the selection was declared by all without distinction of party to be most suitable. In London he was well received, did much to bring about friendly understanding between England and the United States and to keep relations between the two countries on a most friendly basis during the difficult era of the war with Spain. His London experience was also most valuable training for

the important position to

which he was appointed in August 1898, when he became Secretary of State. Very few of those who had been at the head of the State Department had dealt with so many important questions as Secretary Hay, and probably none had been more thoroughly trained diplomats. At the time of the Boxer outbreak in China he was successful in obtaining justice for the Chinese, and preserving the integrity of the Chinese Empire, in 1899 he directed the United States Ambassadors at London, Berlin and Saint Petersburg to propose that each of these gov¬ ernments make a declaration in favor of the (

Early in life he showed a deep interest in literature, an interest which he maintained from then on. He wrote a number of poems while still at college, among them the class poem which was considered quite above the average. His busy life, however, left com¬ paratively little leisure to devote to literary work and his list of publications, therefore, is not very long. It includes (Pike County

BaUads } (Boston 1871) ; (Castilian Days)

(Boston 1871), one of the best books on Spain in the English language; (The Bread Winners > (published anonymously, New York 1884) ; (Poems) (Boston 1913) ; (The Com¬ plete Poetical Works of John Hay) (Boston 1916). His addresses were published after his death as (Addresses of John Hay* (New York 1906). In collaboration with J. G. Nico- lay (q.v.) he wrote (Abraham Lincoln: A History) (10 vols., New York 1890). It first appeared in serial form in the Century Maga¬ zine and is considered the most comprehensive and authoritative biography of Lincoln. To¬ gether with the same he edited (Complete Works of Abraham Lincoln, etc.* (2 vols., New York 1894). Consult Brown University, Providence, R. I., (The Dedication of the John Hay Library, Nov. 11, 1910 J (Providence 1911); Chapman, A. S., (Boyhood of John Hay* (in Century Magazine, Vol. LXXVIII, (n. s. Vol. LVI), p. 444, New York 1909) ; Howells, W. D., (Hay in Literature) (in North American Review, Vol. CLXXXI, p. 343, New York 1905) ; Hunt, G., (The Department of State of the United States; Its History and Functions) (New Haven 1914) ; Sears, L., (John Hay, Author and Statesman) (New York 1914) ; Stedman, E. C., (John Hay) (in (Poems,) Bos¬ ton 1908) ; Thayer, W. R., (The Life and Letters of John Hay* (2 vols., Boston 1915) ; Ticknor, C., ed., (A Poet in Exile; Early

Let¬ ters of John Hay* (Boston 1910) ; United States, State Department, (History of the De¬ partment of State of the United States, etc.-* (Washington 1901) ; id., (Papers Relating to the Foreign Relations of the United States, etc.* (Washington 1898-1905).

HAY, or FORAGE, the stems and leaves of grasses and other plants cut for fodder and dried in the sun. In haymaking the object of the farmer is to preserve the hay for winter use in the condition most nearly resembling the grass in its natural state. Of the various in¬ gredients which compose grass, those portions which are immediately soluble in water are the most fitted for the purposes of nutrition; and therefore the mowing should be done when the plants contain the largest amount of sugar and other soluble matter. During the latter part of the process of fructification, when the seeds have arrived at maturity, the stem and leaves begin to decay; so that if the grass is not cut when in flower, a great amount of nutriment will be wasted. On the third day after mowing, if the weather is fine, the newly made hay will be ready, for gathering into large windrows for carrying and stacking; but otherwise it will have to be put up into large cocks, and the carrying deferred until the next day. It is not desirable that grass should be too rapidly made into hay under a burning sun, as it is liable to scorch and lose its nutritive value. Great care must also be taken to preserve the hay from dew and rain, as water washes away the soluble salts and other matters, and when in the stack will cause fermentation, which, if excessive, destroys some of the most valuable properties of the hay. Some farmers salt their hay in stacking; others do not. Salt is gener¬ ally commended. A good plan, when the hay harvest has been accompanied by wet weather, is to place a few layers of straw in the stack at intervals to absorb the moisture from the

heating hay. On large farms the spreading out of the hay after it is cut down is performed by a haymaking machine drawn by a horse, which will do the work of 12 or 15 hay¬ makers, and distribute the grass more thinly and evenly as it crosses the field. It is only for the haymaking of the true grasses, how¬ ever, that it is adapted, as clover must not be shaken so violently. To be transported to markets at a distance, hay is now compactly pressed into bales by presses worked by hand or power. In fact baled hay has increased the importance of haymaking, owing to the readi¬ ness with which it can be transported by rail or water. On the Pacific Coast, especially in California, hay cut from alfalfa is very produc¬ tive and profitable, and three or more crops a year are frequently obtained. In the United States 61,691,166 acres of land were utilized in cultivating hay and forage in 1900, the entire crop amounting to 84,011,299 tons, valued at

$484,256,846.

The average value per acre of the hay and forage crop is $8. Included in the above esti¬ mate were 4,759,353 tons of cornstalks which were cut from fields cultivated mainly for the grain. These figures for 1900 show an increase in area since 1889 of 8,742,369 acres, or 16.5 per cent, and in production of 12,420,466 tons or 18.6 per cent.

Of this total area, 6.7 per cent was devoted to clover, 50.7 per cent to tame and cultivated grasses other than clover, 6.3 per cent to grains cut green for hay, 5.1 per cent to forage crops,

3.4 per cent to alfalfa or lucerne, 2.8 per cent to millet and Hungarian grasses, and 25.1 per cent to wild, salt and prairie grasses.

The North Central division contained 57.8 per cent of the total hay and forage acreage of the country, the North Atlantic 21.0 per cent, the Western 11.4 per cent, the South Atlantic

3.5 per cent and the South Central 6.3 per cent.

The rate of increase in area devoted to hay

and forage since 1889 was greatest in the South Central division, being 103.0 per cent. The Western division shows an increase of 91.4 per cent, the South Atlantic of 12.2 per cent and the North Central of 10.7 per cent. The North Atlantic division shows a decrease of 2.2 per cent.

The total value of the hay and forage crop of 1900 averaged $135 per farm. The average yield per acre, exclusively of cornstalks, was 1.28 tons, and the average value per ton $6.11. The average yield per acre of the various classes was as follows : Forage crops, 2.62 tons ;

alfalfa or lucerne, 2.49 tons; millet and Hun¬ garian grasses, 1.64 tons; grains cut green for hay, 1.28 tons; clover, 1.26 tons; tame grasses other than clover, 1.14 tons; and wild, salt and prairie grasses, 1.12 tons.

HAY FEVER, a nervous affection of the mucous membranes of the eyes, nose, mouth, pharynx, larynx, and bronchi, characterized by a profuse flow of secretion from the nose, and of tears from the eyes, and accompanied in some cases by asthma. It is induced by the lodgment on the mucous membranes of the eye, nose and throat of the wind-borne pollen of certain plants. The disease varies in its severity ac¬ cording to certain atmospheric conditions and the amount of

pollen in the air. Occurring at the haying season the disease received its title through that association. The prevalence of

catarrhal symptoms in summer separates it from an ordinary acold in the head® ; while their combination with difficulty of breathing pre¬ vents it being mistaken for spasmodic asthma, in which there is seldom any catarrh. There are three combining causes of this affection, which is largely nervous : First, a predisposing cause in some nervous disease, with a probable lesion in the fourth ventricle of the brain. Second, deformity, such as a deviating septum, in the nasal region. Third, inhalation of a special pollen. Removal to the seashore or the mountains is beneficial in most cases, and a sea voyage, or other complete removal from pollen afflicted regions brings entire release. The succinimide of mercury affords relief in many cases, and arsenic, iodides, bromides, and other nerve specifics benefit others. For the asthma, iodide of potash, 5 grains with 5 minims of tincture of belladonna in syrup of orange-peel should be taken every two hours. Calcium chloride is also very effective where asthmatic symptoms are marked. Inhalations of nitre- paper, stramonium leaves, etc., with wine of coca internally, are also useful.

These remedies are, however, merely pallia¬ tive, and scientific men have been for some time making investigations which may eventually lead to the discovery of a radical cure.

Professor Dunbar, of Hamburg, who has been studying the subject for seven years, is one of those who hold out the hope for curing hay fever by a rational treatment.

According to him, the disease is caused by the pollen of grasses, but not by mechanical irritation. He has extracted from the pollen a protein poison, or toxin, which is insoluble in ether and alcohol, but soluble in water and weak saline solutions, tears, the mucus of the nose and the serum of blood. A solution of this toxin dropped into the eye or nose at once produces the characteristic symptoms of hay fever. The same symptoms in an aggravated form occur when the solution is

injected hypo¬ dermically.

This discovery suggested treatment by the serum method and Dr. Dunbar set to work to produce a curative serum by inoculating animals with pollen toxin, and a serum was eventually obtained which, when dropped into the eye or nose together with pollen toxin, completely pre¬ vented the attack which the latter alone would have caused. In practical use, however, both the serum and the vaccination treatments have failed, and it is now generally admitted that the only completely effective treatment is avoidance of the cause.

Recent investigations have established the fact that hay fever is a distinctly preventable disease. Where there is none of the poisonous pollen the disease does not exist. The fact of prime importance is that only wind-borne pollen produces the disease. The pollen of golden rod, daisies, dandelions, and sunflowers will produce the symptoms if directly inhaled, but at a little distance such plants are harmless : their pollen is too heavy to be carried by the wind. On the other hand it has been found that some pollen travels several miles on the wind, but the farther it goes the more widely it is scattered, and it is rarely in sufficient quantity to produce the disease beyond half a mile from its source. Another established fact of importance is that immunity from the

disease does not imply that the immune person is not inhaling pollen, but simply that he is not inhaling more than his system can resist. It is only when the pernicious toxin of the pollen is assimilated beyond the capacity of resistance that the symptoms appear. After an attack is definitely begun, a much smaller addition of the toxin is sufficient to keep it going. The very wide degree of personal resistance to the pollen toxin explains the susceptibility of some persons and the immunity of others breathing the same pollen and in the same quantities. Unfortu¬ nately an attack of the disease leaves the patient more susceptible than before. Curiously, how¬ ever, farm workers who are continually breath¬ ing pollen do not have hay fever.

The earlier summer cases of hay fever are attributed to the pollen of several of the grasses, and to that of the yellow dock (nimex crispus). The midsummer cases are said to be due to <(careless weed® (amaranthus spinosus) and cocklebur (xanthium Canadense). The much larger proportion of cases of the early autumn are unquestionably due to the pollen of the ragweeds ambrosia trifida and ambrosia elatior. The marsh elder (iva ciliata) is also credited with a share in the scourge. The of¬ ficial experiment of cutting the ragweeds in and about New Orleans in the summer of 1915 re¬ sulted in

shortening the <(season® of hay fever in that city by several weeks. The output of pollen was so reduced within a half-mile dis¬ tance from the city as to render it innocuous except to the most susceptible, and these eventu¬ ally escaped by temporary removal to the centre of the city, beyond the reach of the pollen¬ laden winds.

HAY-PAUNCEFOTE TREATY, signed 18 Nov. 1901, which replaced the Clayton-Bul- wer Treaty (q.v.) as an Anglo-American agree¬ ment of policy regarding an isthmian canal, then supposed to be fixed as across Nicaragua. It was drawn up by John Hay, Secretary of State, and Sir Julian Pauncefote, ambassador from Great Britain. Public feeling for some years had been growing so sore over the Clay- ton-Bulwer Treaty's restriction on the inde¬ pendent action of the United States, that there was grave fear lest Congress might abrogate it by open violence, a great blow to future amicable action. President McKinley voiced the feeling by the declaration, in his annual message for 1898, that the canal had become a national necessity. Fresh negotiations were opened with Great Britain; that country had no wish beyond that of neutralizing the canal, and sent one of her best diplomats with very liberal instructions, to concede whatever did not nullify that essential principle. The draft treaty was sent to the Senate by the President 5 Feb. 1900. It provided that a canal might be constructed by the United States, or under its direction; should be permanently neutralized on the basis of the Suez Canal agreement — to be kept open at all times, either of war or peace, to all vessels, without discrimination, and no fortifications to be constructed commanding the canal or the waters adjacent, and that other powers should be invited to join in this guar¬ anty of neutrality. The provisions excited in¬ tense hostility, and Senator Davis offered an amendment adopted by the committee on foreign affairs, canceling the very features for

which it was drawn up, and which made the spirit of the previous one. It provided that the neutralization clause should not prevent the United States from any measures it thought needful for its own defense or the preservation of order, declared the Clayton-Bulwer Treaty specifically abrogated, and struck out the third clause inviting the concurrence of other powers. In this form it was ratified by the Senate 20 Dec. 1900, but Great Britain refused to accept the transformed treaty, and it expired by limi¬ tation on 5 March 1901. Undiscouraged, the two diplomats set to work on a compromise,

which was signed by them 18 Nov. 1901, sent to the Senate by President Roosevelt, and ratified by them 16 December. The chief dif¬ ferences were in dropping as far as possible all specific guaranties, requirements or prohibi¬ tions, leaving its interpretation and application to the chapter of fate and the certainty that the strong hand would decide in any event. The neutrality of the canal is not guaranteed at all except by the terms of the agreement, the Clay¬ ton-Bulwer Treaty is abrogated by name, and the United States is not forbidden to construct fortifications, nor required to keep the canal open in time of war.

Prior to the opening of the Panama Canal to traffic on 15 Aug. 1914, a controversy with Great Britain respecting the interpretation of the Hay-Pauncefote Treaty had arisen. Under the Panama Canal Act of 1912, passed by Con¬ gress; American vessels engaged in the coast¬ wise trade were to be exempted from canal tolls. Sir Edward Grey, the British Foreign Secretary, lodged a protest against the passing of the measure, and claimed that the act was a discrimination against British and other foreign vessels in contravention of the treaty, and requested that the bill be held in abeyance in the Senate in order that a detailed statement might be sent; but President Taft signed the act on 24 Aug. In the formal protest subse¬ quently lodged (9 Dec.), Sir Edward Grey de¬ clared that (VIII of the Clayton-Bul¬ wer Treaty of 1850, guaranteeing to England the use of the canal on a complete equality with the United States of America” ; and he later (27 Feb. 1913) pressed for arbitration. In the United States the British contention was generally regarded as an attempt to interfere with that country’s sovereign rights to deal with its own commerce, and to use the canal in whatsoever manner it saw fit — though a minority, led by Senator Root, stoutly held that the British objection was based ‘ on solid grounds. All the correspondence on the sub¬ ject had passed before President Wilson came into office. On 5 March 1914 he sent a message to Congress strongly urging the repeal of the exemption. He regarded the exemption as a plain breach of the Hay-Pauncefote Treaty and declared that it was only in the United States that there was any doubt as to its lan¬ guage. He proposed a “voluntary withdrawal from a position everywhere questioned and misunderstood.” In spite of strong opposition, repeal of the exemption was finally accepted’ but not before a proviso had been inserted in the bill expressly reserving to the United States the right to exempt ships in the future.

HAY RIVER, a stream which rises in the Rocky Mountains in Athabasca, Canada, and flows northeast into Great Slave Lake. It is navigable for about 140 miles from its mouth; its entire length is about 360 miles. The two Alexandra Falls (named after Princess Alex¬

andra, now Queen Alexandra of England) are found in the upper course; they average about 250 feet in height and 900 feet in width.

HAY-WORM, the caterpillar of a medium¬ sized pyralid moth (Pyralis cosialis), injurious to clover hay, and to other hay when mixed with clover. Its depredations can be prevented by keeping the hay dry and well ventilated, as the insect preferably breeds in moist or matted material such as is to be found in the lower parts of stacks ; here the hay becomes filled with webbings of the <(worms" and their excre¬ ment, rendering it unfit for feeding. The Webbed material should be burned and the place thoroughly cleaned.

A ° 1 1 * > nd ya-sne, ˆotmt i3.Q3.su, J3p-

anese statesman and diplomat b. Sakura, 1850; vi 10 July 1913. As a boy he lived in

the house of an American missionary to learn English, and later was one of the first students sent by the Japanese government to London, where he studied at the University College School. Entering the civil service on his re¬ turn home he became secretary in the Central government and subsequently governor of Ka- gawa-ken and Hyogo-ken. He served as Vice- Minister in the Foreign Office from 1891 to 1896, when he was appointed Minister at Pe¬ king. In 1898 he was transferred to Saint Pe¬ tersburg (PetrOgrad) and in the following year to London. During the six years he spent in London he was largely responsible for the pro¬ motion of the two treaties between Great Brit¬ ain and Japan in 1902 and 1905, both of which he signed. In 1904 the Japanese legation in London was raised to the dignity of an em¬ bassy and Viscount Hayashi thus became the fiˆst Japanese Ambassador. The rank of count was conferred on him in 1907. He held min¬ isterial portfolios in the Saioryi cabinets in 1911 and 1912. At the farewell banquet given in his honor by the Lord Mayor of London, the Am¬ bassador assured his audience that the Japan¬ ese people firmly intended to maintain the word and spirit of their engagements, and that the sympathy of the British Empire toward Japan was reciprocated to the fullest extent. Count ayashi was the recipient of honorary degrees

?f Oxford and Cambridge. In 1903 he published in English a book entitled For his People, and has also translated into Japanese several English and European classical \ orks on politics and political economy.

HAYDEN, Ferdinand Vendeveer, Amer-

1rFaˆol°gfQj7b- Westfield, Mass., 7 Sept. 1829; d. 22 Dec. 1887 He was graduated from Ober- lm Col ege, Ohio, studied at the Albany Medi-

?sˆSSlege' and1 du™ng the greater part of 1833-62 was employed in surveys in the north-

seˆe1 in the Union army

during the Civil War, and was professor of mineralogy and geology in the University of Pennsylvania 1865-72. In 1867-69 he made a geological survey of Nebraska, and was after¬ ward director of the geological survey of the territories of the United States, until in 1879 the various national surveys were combined ifl

llie geological survey of the United States. Till 1886 he remained at the head of the Montana division. He published many papers, besides numerous and valuable government reports, and was a member of many scientific societies at home and abroad.

HAYDN, ha'dn (Ger. hi'dn), Franz Jo¬ seph, Austrian musical composer : b. Rohrau, on the borders of Hungary and Lower Aus¬ tria, 31 March 1732; d. Vienna, 31 May 1809. He was the son of a traveling wheelwright who was fond of music and taught his 12 children. Young Franz showing exceptional talent, he was trained by his cousin, a schoolmaster at Hainburg, where from six to eight years of age he learned reading, writing, singing by note,, and to play on such instruments as his childish strength would admit of his handling. His voice attracted the notice of the parish priest, who recommended him as a choir-boy to the chapel-master of Saint Stephen's in Vi¬ enna, and at eight Haydn was received into the choir. With the exception of some Latin and much practical music he seems here to have been taught nothing; in the theory and science of the art he received but two lessons from his master in eight years. At last in his 16th year, his voice began to break and he lost his place, but helped by some friends he took up his abode in an attic in the Austrian capital, intend¬ ing to live by his art. At that time the first six sonatas of Emmanuel Bach fell into his hands. (

scattered; but they included 163 pieces for the baryton, an obsolete instrument in size be¬ tween the viola and the violoncello; about 120 symphonies for full orchestra; more than 100 works of chamber music of

the higher forms, and 12 Italian operas performed in his patron's private theatre. Haydn married in 1759 but the union was incompatible and resulted in a separation. On the death of Prince Esterhazy, in 1790, Haydn visited London where the musi¬ cal world received him with the greatest en¬ thusiasm. Oxford University conferred on him the degree of Doctor of Music, and his stay lasted 18 months. Here he produced an opera, (Paris 1909) ; Nohl, L., (Life of Haydn (Chicago 1889) ; Pohl, C. F., (Mozart and Haydn in Lon¬ don* (Vienna 1867) ; id., (Josef Haydn* (2 vols., Leipzig 1875-82).*

HAYES, Augustus Allen, American chem¬ ist : b. Windsor, Vt., 1806; d. Brookline, Mass., 21 June 1882. He began his studies under Dana, and was successful throughout his career in improving the resources of applied chemistry to a remarkable extent. He was the first to extract the alkaloid sanguinarin from the blood root, S anguinaria Canadensis. He also improved the common method of reducing pig to malle¬ able iron and discovered new processes in cop¬ per-smelting. His researches led him also to a new formula for the production of chloroform. He was for many years employed by the State of Massachusetts as assayer.

HAYES, Isaac Israel, American arctic explorer: b. Chester County, Pa., 5 March 1832; d. 17 Dec. 1881. He was graduated in medicine at the University of Pennsylvania in 1852, and began his arctic experiences as surgeon in the second Grinnell expedition sent out under Cap¬ tain Kane in 1853, in search of Franklin. Be¬ coming convinced of tfie existence of an open polar sea, he was enabled to obtain funds for the expedition on which he sailed in the ship United States from Boston in 1860. He had two astronomers on board and according to their observations reached lat. 81° 35′ N., long. 70° 30′ W., the farthest point north hitherto

recorded in any voyage. In 1869 he made a voyage to Greenland: He received gold medals from the geographical societies of Paris and London. His published works comprise (An Arctic Boat Journey> (1860) ; (The Open Polar Sea) (1867) ; (Cast Away in the Cold) (1868) ; and (The Land of Desolation) (1872).

HAYES, Patrick Joseph, American Roman Catholic prelate: b. New York city, 20 Nov. 1867. He was educated at Saint Andrew's parochial school, De La Salle Institute, and in 1888 was graduated at Manhattan College. His theological studies were made at Saint Joseph's Seminary, Troy, and on 8 Sept. 1892 he was ordained to the priesthood. After ordination he

attended the Catholic University, Washing¬ ton, from which he received the degree of D.D. Father Hayes was appointed assistant of Saint Gabriel's, in East 37th street, and for a time served as secretary to Archbishop Farley, who in 1903 made him chancellor of the archdio¬ cese and rector of the newly-founded Cathe¬ dral College. On 28 Oct. 1914 Father Hayes was consecrated titular bishop of Tagaste, be¬ coming also auxiliary bishop of New York. In 1915 he was made permanent rector of Saint Stephen's, New York. In 1917-18 Bishop Hayes was bishop ordinary of all Catholic chap¬ lains of the United States forces. On 27 Feb. 1919 was announced his appointment to the archbishopric of New York in succession to the late Cardinal Farley.

HAYES, Rutherford Birchard, 19th Presi¬ dent of the United States : b. Delaware, Ohio, 4 Oct. 1822; d. Fremont, Ohio, 17 Jan. 1893. He was the third son of Rutherford and Sophia (Birchard) Hayes. His earliest paternal an¬ cestor in America was George Hayes, a Scotch¬ man, who, prior to 1680, settled in Windsor, Conn. ; was married to Sarah Dibble, and in 1698 removed to the Salmon brook district, Simsbury, now in Granby township. In 1817 the family moved to Ohio from Brattleboro, Vt. An uncle took particular interest in young Rutherford, and supplied his eager demand for books. In 1834 he took up the study of Latin and Greek under the direction of Judge Sher¬ man Finch, of Delaware, who had been a tutor at Yale. He continued his studies in the Nor¬ walk (Ohio) Academy, and completed his pre¬ paratory course at Middletown, Conn., under Isaac Webb. At 16 he entered Kenyon College, from which he was graduated in 1842 as the valedictorian of his class. The following year he entered the law school of Harvard Univer¬ sity, where he remained until 1845, at the same time studying French and German and attend¬ ing the lectures of Agassiz on natural science and of Longfellow on literature. He was ad¬ mitted to the Ohio bar at Marietta, 10 May 1845, established himself at Lower Sandusky, now Fremont, and in April 1846 formed a law partnership with Ralfih P. Buckland, then a member of Congress and later a major-general in the Civil War. Early in 1848 his health hav¬ ing failed, he wanted to enlist in the war with Mexico, but he was forbidden to do so bv his physician, and, after trying the climate of New England and of Canada, he spent the follow¬ ing winter in Texas. Returning to Ohio with health fully restored, he settled in Cincinnati in December 1849. In 1856 he was nominated for

the office of common pleas judge, but declined the honor. His public life began two years later, when the office of city solicitor became vacant, and he was elected by the council to complete the unexpired term. In 1859 he was elected to the same office bv the citizens, and he performed his duties with ability until April 1861, when he was defeated for re-election.

A Whig in politics, Hayes had cast his first vote for Henry Clay in 1844, his second for General Taylor in 1848, and his third for Win¬ field Scott in 1852; but having been opposed to slavery from his youth, he joined the Republi¬ can party and supported Fremont with enthu¬ siasm in 1852, and Lincoln in 1860. On 13 April 1861, at a mass-meeting, called in re¬ sponse to President Lincoln's proclamation ask¬ ing for 75,000 troops, he was made chairman of the committee appointed to draw up resolutions expressive of the intense feeling which had now been aroused. Forthwith the members of his literary club organized a military company and he was chosen captain. President Lincoln sent him a commission as colonel of volunteers, but he declined it. Later, 1 June 1861, he accepted a commission from Governor Dennison as major of the 23d Ohio Volunteer Infantry, a body of 900 men, of which W. S. Rosecrans was colonel and Stanley Matthews, lieutenant-colonel. This regiment was ordered into West Virginia, under Gen. George B. McClellan, to aid in driving the Confederates from that section. From 19 Sept. 1861 Major Hayes was judge-advocate of the Department of the Ohio for about two months. During the summer of 1862 his command was transferred to the Army of the Potomac, and participated in the battle of South Mountain, where, though wounded in the arm, he led a charge and held his position at the head of his men. For his conspicuous gallantry on this occasion, he was made colonel of the 23d Regi¬ ment on 24 Oct. 1862. He was detailed from his regiment to act as brigadier-general in com¬ mand of the celebrated Kanawha division ; checked the raid of the Confederate, John Morgan, in July 1863, and aided in preventing his force from re-crossing the Ohio and in com¬ pelling its leader to surrender. He commanded a brigade under General Crook in the spring of 1864, which took part in cutting the principal lines of communication between Richmond and the Southwest, and he led it in storming a for¬ tified position on the crest of Clay's Mountain. Later, still under Crook, he joined Hunter's army in the march against Lynchburg, and covered the retreat in the dangerous passage of the Alleghanies. In the first battle of Win¬ chester, 24 July 1864, Colonel Hayes and Col. James Mulligan were ordered to charge what proved to be a greatly superior force. Mul¬ ligan fell, but Hayes flanked and conducted the retreat of his brigade with great intrepidity and skill, eventually checking the pursuit. At Perry- ville he also served with credit and at the second battle of Winchester, 19 Sept. 1864, per¬ formed an act of signal bravery. Advancing against a battery situated on an eminence, he suddenly came to a deep slough, some 50 yards in width. Nevertheless, he plunged in at once, and,, although his horse sank in the mire, he extricated himself, climbed to the top of the other bank, and, with about 40 who followed, charged the battery and put its defenders to flight. He led a division at Fisher's Hill,*

RUTHERFORD BIRCHARD HAYES

Nineteenth President of the United States

•M ‘

v.

A

**

HAYES

19

22 Sept. 1864, where he gained the enemy’s rear and routed them, capturing several pieces of artillery. A month later, he was engaged at Cedar Creek, where while in retreat he had a horse shot under him and he was slightly wounded in the head. A few days later he was made brigadier-general and on 13 March 1865 was brevetted major-general for his distin¬ guished services at Fisher’s Hill and Cedar Creek. While still in the army, 6 Aug. 1864, he was nominated for Congress from the Second Ohio district. He was elected to the 39th Congress, and he was nominated for governor by the soldiers in the field. In August 1866, he was renominated by acclamation and was elec¬ ted to the 40th Congress by a large majority. In Congress he was appointed chairman of the library committee and succeeded in greatly amending the copyright law, as well as in treb¬ ling the area, contents and usefulness of the Congressional Library. His votes in matters affecting the reconstruction of the South were given with his party ; his first vote was for a resolution affirming the sacredness of the public debt and denouncing every form of repudiation. He sustained the movement for the impeach¬ ment of President Johnson. In 1867 he was nominated for Governor of Ohio by the Re¬ publicans. He was elected with his Republican associates in November. He steadily increased in personal popularity and was re-elected gov¬ ernor in 1869. During his administration he carried out a comprehensive geological survey of Ohio, which was of great advantage in the development of the mineral resources of the State. The State debt was reduced by nearly $3,000,000 and considerable reforms brought about in regard to the debt incurring powers of municipalities. In 1872, he returned to Cincinnati determined to retire from public life, and in 1873 he moved to his old home at Fre¬ mont. In 1875, however, he was nominated governor and was with difficulty induced to accept the nomination. The great issue of the campaign was the money question, which though properly a national issue, had been forced into State politics. There were those who believed and publicly contended

that all that was needed to make money was the stamp of the government of the United States, that it was not necessary to have back of it any intrinsic value. Hayes, however, stood for <(sound money,® and after an active campaign won the election, thus becoming governor of Ohio for the third time.

The Republican State Convention of Ohio named him as its choice for President in the Republican National Convention. When the latter body met, at Cincinnati, 14 Tune 1876, his name was presented, as were the names of other prominent leaders of the party, including that of James G. Blaine. It soon became evi¬ dent that none of the recognized candidates could be nominated and a ((dark horse® was looked for. On the seventh ballot the opposi¬ tion to Mr. Blaine gave Mr. Hayes the nomina¬ tion. The Democratic party nominated Samuel J. Tilden, whose reputation as a reformer brought him the support of many dissatisfied Republicans. The result of the election was a question of long and bitter contest. The elec¬ toral votes of Louisiana, Florida and of South Carolina were in dispute and both sides charged their opponents with fraud. The canvassing

boards of the States in dispute were visited by statesmen of both parties, all blinded in a measure by political prejudice. The governors of the disputed States gave certificates in favor of Mr. Hayes, but other officials gave the same document in favor of Mr. Tilden. At last a commission was appointed to decide which set of papers was legal. This commission con¬ sisted of five Senators, five Representatives and five justices of the Supreme Court. When this plan was agreed to chance favored the Demo¬ crats, owing to the composition of the Supreme Court; but while the commission was being organized, Justice Davis, who was expected to be a member and to favor Mr. Tilden, was elected a Senator and so forced to resign his seat in the Supreme Court. This led to the substitution of Justice Bradley, a strong Re¬ publican, whose vote decided the question, for the commission on every question divided eight to seven. The electoral vote, as decided by the commission was 185 for Hayes and 184 for Tilden. Mr. Hayes was publicly inaugurated 5 March 1877. He at once proceeded to satisfy the Southern States by withdrawing from them the Federal troops and leaving the local gov¬ ernment to the people in the two disputed States then under a dual government. This course, while heartily approved by the Demo¬ crats, was severely criticized by the Republicans, who thus lost the votes of the Southern States. As regards appointment to office, Mr. Hayes' general policy was to respect the views of the advocates of civil service and his appointments were in general very acceptable. Competitive examinations were instituted and applications were considered irrespective of party affilia¬ tions. On 5 May 1877 President Hayes called Congress in extra session, to meet 5 Oct. 1877, to make necessary appropriations for the sup¬ port of the army. In July he suppressed the railroad riots caused by a

strike, on application from the governors of West Virginia, Mary¬ land, Illinois and Pennsylvania, by sending United States troops to the points of disturb¬ ance. In his message to Congress, 3 Dec. 1877, he congratulated the country on the peaceable and prosperous condition of affairs in the Southern States; recommended the payment of government bonds in gold; favored the limited coinage of silver; insisted that the Constitution imposed on the President the sole duty and responsibility of the selection of Federal offi¬ cers and recommended that Congress make a suitable appropriation for the use of the civil service commission ; and recommended the passage of laws to protect the forests on lands of the United States — all of which were dis¬ regarded. He vetoed the <(silver bill,® on the ground that the commercial value of the silver dollar was then less than its nominal value, and that its use in the payment of debts already contracted would be an act of bad faith; the bill was passed over his veto. In his message of 1 Dec. 1879 he congratulated the country on the return to specie payment, and urged upon Congress the suspension of silver coinage, fear¬ ing that the cheaper coin would eventually be the sole standard of value; and recommended the retirement of United States notes with the capacity of legal tender in private contracts. In his message of 6 Dec. 1880 he again urged civil service reform, competitive examinations for applicants for positions, for a law against

political assessments, and suggested that an act be passed "defining the relations of members of Congress with regard to appointments to office by the President,® that the tenure of office act be repealed, etc. Throughout his administra¬ tion his actions gave great offense to the politicians who had placed him in office, and both Houses of Congress were up in arms against a President who insisted upon putting empty campaign promises into practice. They refused to pass the necessary appropriation bills, even the one for the support of the army. When these measures were eventually carried through, attached to them were certain "riders® repealing obnoxious laws. This proceeding President Hayes considered an infringement on his prerogative, so he vetoed the bills, stood firm, and, in the end, won the battle. Owing to this quarrel with the politicians his re-nomina¬ tion was out of the question, and on 4 March 1881, he relinquished his office to President Garfield. At the close of his administration, Mr. Haves returned to private life. His in¬ terest in education was shown by the work done as a member of the boards of trustees of the Ohio Wesleyan University at Delaware and the Ohio State University at Columbus. Hayes' Hall at the latter institution bears his name because of his devotion to the cause of manual training. He was also

president of the John F. Slater Educational Fund and gave much time to its proper distribution. As president of the National Prison Reform Association he did much to educate the public to a more humane way of thinking about the treatment of con¬ victs, many of his public utterances have be¬ come maxims in prison management, and his work along these lines has been exceedingly valuable and permanent in its results. Consult Gladden, (The Great Commoner of Ohio) (Columbus 1893) ; Stoddard, (Hayes, Gar¬ field, and Arthur > (New York 1889) ; Howard, (Life, Public Services, and Select Speeches of Rutherford B. Hayes> (Cincinnati 1876) ; Howells, (Life of R. B. Hayes> (New York 1876) ; Conwell, (Life and Public Services of Governor Hayes) (Philadelphia 1876). Consult also Haworth, (The Disputed Election of 1876> (Cleveland 1906), and Bigelow (editor), bet¬ ters and Literary Memorials of Samuel T. Tilden) (Vol. II, New York 1908).

HAYES RIVER, Canada, called Hill River in the upper part of its course, rises near Lake Winnipeg and for about 300 miles flows north¬ east through Oxford or Holy Lake, Knee Lake and several other lakes, into James Bay, near the mouth of the Nelson River. The largest tributaries are the Shamattawa and the Fox.

HAYESINE, ha'zTn, a hydrous borate of calcium . (CaB407.6H20), occurring as snowy- white, silky flakes, floating in the waters of hot springs in Chile, and also as a flocculent sedi¬ ment on the bottom. It is a somewhat uncertain species and has been regarded as a form of bechilite, but has been identified as ulexite. In the United States, specimens are reported from Bergen Hill, N. J., where it is associated with datolite. (Named in honor of A. A. Hayes (q.v.), an American chemist).

HAYGOOD, Atticus Green, American Methodist bishop: b. Watkinsville, Ga., 19 Nov. 1839; d. Oxford, Ga., 19 Jan 1896. He was educated at Emory College, Ga., of which he

was president 1876-84, becoming in 1890 bishop of the Methodist Episcopal Church South. He wrote (The Monk and the Prince, a study of Savonarola and Lorenzo de Medici; (Our Brother in Black) (1881) ; (Pleas for Progress)*

(1889).

HAYMARKET SQUARE RIOT, a dis¬ turbance resulting in the murder of several policemen in Chicago, 4 May 1886, by a bomb thrown by an anarchist. The labor troubles had long been exploited by the "practical® anarchists (with whom the philosophic anarch¬ ists disclaim connection), who denounced the efforts for shorter hours and better wages as tending

merely to aggravate capitalistic slavery, and urged instead the general seizure of prop¬ erty and the murder of its owners. In Feb¬ ruary 1886 the McCormick Reaper Works had been closed on account of a demand for the ex¬ pulsion of some non-union men, but had re¬ opened. Meantime a great eight-hour strike had left some 50,000 workmen unemployed in the city, and in view of an almost certain conflict with the police, George Engel proposed at a meeting in Bohemian Hall on 2 May, and the meeting indorsed, a plan to blow up the police stations, shoot the emerging police, cut the tele¬ graph wires, fire buildings to engross the serv¬ ice of the fire department and make a general jail delivery, that the prisoners might aid in a social revolution. The next day August Spies and others incited a meeting of the Lumber- shovers' Union, 16,000 or more, principally Ger¬ mans and Bohemians, to assail the McCormick Works in order to furnish an opportunity for carrying out this plan, though the works had no connection with this union. The mob attacked the works with stones and revolvers, but were driven off. No one was fatally injured, but Spies immediately issued a circular headed "Revenge!® asserting that six workingmen had been killed and calling their brethren to arms. He also published a fierce article in his paper, the Arbeiter ZeiHmg, repeating the falsehood and declaring that there had been a "massacre® to terrorize the workingmen, who should have had dynamite bombs instead of stones. In the evening a meeting was held at Greif's Hall, at which Engel's plan was adopted. Spies, Albert R. Parsons, Samuel Fielde and Oscar W. Neebe spoke for a mass-meeting to further the plan above mentioned; at Adolf Fischer's suggestion it was fixed for next evening in Haymarket Square, that the dusk and the room for a great crowd might furnish more confusion and better means of escape. Rudolph Schnaubelt wished to have all socialists in other cities notified, so that there might be a general revolution. The signal was to be "Ruhe® (Peace), which was printed in next afternoon's Arbeiter Zeitung. Meantime Louis Lingg and others worked all day preparing bombs, of which the newspaper office was found to be an arsenal, along with firearms, and with a confederate carried a satchel of them to a place where others helped themselves. The air was full of rumors of intended violence and the mayor (Carter Har¬ rison, Sr.) ordered the police to mix with the meeting and disperse it if incendiary language were used, and 176 policemen were concen¬ trated at the nearest station. Spies and Par¬ sons spoke first, but the mayor was in the crowd and they used mild language, till his

suspicions were lulled and he left. Then Fielde began a frenzied and bloodthirsty harangue, calling for the ˆextermination® of the capital¬ ists. The crowd grew so wild that shortly after 10 the police in four divisions

appeared and covered the street, and while Fielde was speak¬ ing, Captain Ward ordered the crowd to dis¬ perse. Fielde called out ((We are peaceable® (curiously like (LXXVI, p. 117, New York 1904) ; Hill, F. T., (Decisive Battles of Law) (New York 1907) ; Holmes, W., ed. (The Chicago Martyrs, etc. (in Free Society Library, No. 1, San Francisco 1899) ; Russell, C. E., (These Shifting Scenes* (New York 1894) ; Supreme Court of Illinois, North¬ ern Grand Division, (August Spies et al. v. the People, etc.* (Chicago 1887).*

HAYNE, Isaac, American patriot: b. (XII, p. 76, 1867) ; Lee, Henry, (Memoirs of the War in the Southern Depart¬ ment of the United States) (new ed., New York 1869) ; Ramsay, D., (The History of South Carolina, 1670-1808) (Charleston 1809).

HAYNE, Paul Hamilton, American poet: b. Charleston, S. C., 1 Jan. 1830; d. Grovetown, Ga., 6 July 1886. He was a nephew of R. Y. Hayne (q.v.) and was educated at the Charles¬

ton College, studied law and engaged in jour¬ nalism. He served in the Confederate army till forced to resign on account of ill health, and lost nearly all his property through the bombardment of Charleston and the subsequent pillage. With the little left to him he retired to Copse Hill, Grovetown, Ga., where he spent the rest of his life, a partial invalid. His verse is marked by grace and melody and he ranks almost the first among distinctively southern poets. He published (Poems (1855) ; bon¬ nets and Other Poems) (1857) ; (Legends and Lyrics) (1872) ; etc. A complete edition of his poems appeared in 1882.*

HAYNE, Robert Young, American states¬ man : b. Colleton District, S. C., 10 Nov. 1791; d. Asheville, N. C., 24 Sept. 1839. After study¬ ing law he was admitted to the bar in 1812 ; and served in the second war with Great Britain, returning at its close to his practice in Charleston. He was a member of the State legislature 1814-18, and became Speaker, was attorney-general of the State in 1818-22, and a United States senator 1823-32. He vigor¬ ously opposed protection, and in 1832 boldly supported in Congress the doctrine of nullifica¬ tion. Daniel Webster's reply to Hayne upon this theme is classed among the former's ablest speeches. In November 1832 South Carolina adopted an ordinance of nullification, in De¬ cember Hayne was elected governor, and the State prepared to resist the Federal power by force of arms. A compromise, however, was agreed to, and the ordinance was repealed. Hayne was mayor of Charleston in 1834.

HAYNE, William Hamilton, American poet: b. Charleston, S. C., 11 March 1856. He is the son of Paul Hamilton Hayne (q.v.). He received a

*secondary education, from 1879 con¬ tributed extensively to various periodicals, and published (Sylvan Lyrics and Other Verses **

(1892).

HAYNES, hanz, Arthur Edwin, American mathematician: b. Van Buren, N. Y., 23 May 1849; d. 12 March 1915. After graduation from Hillsdale College, Mich., in 1875 became instructor of mathematics and physics there in the same year; and was professor, 1877-90. He held the same position in Michigan Mining Schools in 1890-93, and was assistant professor of mathematics at the University of Minnesota, 1893-96, in its engineering department 1896- 1901, and professor of engineering mathematics 1901-12. He has published (The Desirability of Uniformity in the Use of Mathematical Symbols and Terms) ; etc.

HAYNES, hanz, Elwood, American in¬ ventor : b. Portland, Ind., 14 Oct. 1857. He was graduated at the Worcester Polytechnic Institute in 1881 and in 1884-85 took a post¬ graduate course at the University of Johns Hopkins, Baltimore, Md. He was employed as science teacher at the Eastern Indiana Normal School, Portland, Ind., in 1885-86 and for the following four years was manager of the Port¬ land Natural Gas and Oil Company. From 1890 to 1901 he was field superintendent of the Indiana Natural Gas and Oil Company since 1898. In 1881 he discovered tungsten chrome steel r in 1899 an alloy of nickel and

chromium, and shortly afterward an alloy of cobalt and chromium. The last named alloy was developed by him in 1910 to make it suit¬ able for cutting instruments and the business of its manufacture as a commercial product grew rapidly. In 1893-94 Mr. Haynes designed and constructed a horseless carriage, which is the oldest American automobile in existence and is now on exhibition at the Smithsonian Institution, Washington, D. C. In 1895 he in¬ troduced aluminum in automobile construction and in 1903 invented and constructed the rotary valve gas engine. In 1911 alloys of cobalt, chromium and tungsten, and of cobalt, chro¬ mium and molybdenum were discovered by Mr. Haynes. He is president of the Haynes Stel¬ lite Company which since 1912 has been en¬ gaged in the manufacture of tools from this material. He is a member of the American Chemical Societ}ˆ, the Society of Automobile Engineers and of the Iron and Steel Institute of London, England. In 1912 he was a mem¬ ber of the organizing committee of the Eighth International Congress of Applied Chemistry, at New York and Washington.

HAYNES, John, American colonial gov¬ ernor: b. Old Holt, Essex, England; d. Hart¬ ford, Conn., 1 March 1654. He came with Hooker and his company to Boston in 1633, was soon after chosen assistant, and in 1635 governor of Massachusetts. In 1636 he re¬ moved to Connecticut, being one of the promi¬ nent founders of that colony. In 1639 he was chosen its first governor, and every alternate year afterward, which was as often as the con¬ stitution permitted, till his death. He was one of the five who in 1638 drew up a written con¬ stitution for the colony, which was finished in 1639, the first ever formed in America, and which embodies the main points of all our sub¬ sequent State constitutions, and of the Federal constitution.

HAYS, Isaac, American physician and ed¬ itor: b. Philadelphia, 5 July 1796; d. there, 12 April 1879. He was graduated from the Uni¬ versity of Pennsylvania in 1816 and from its medical school in 1820. In addition to his long service as general practitioner he was for 52 years on the staff of the (American Journal of the Medical Serviced In 1843 he established a monthly, the Medical News, and in 1874 the Monthly ' Abstract of Medical Science. He ed¬ ited (Wilson's American Ornithology5 (1828) ; 'Hoblyn's Dictionary of Medical Terms5 (1846) ; (Lawrence on Diseases of the Eye5 (1847) ; and 'Arnott's Elements of Physics5 (1848). He was president of the Philadelphia Academy of Natural Sciences (1865-69).

HAYS, Willet Martin, American agricul¬ turist and plant breeder: b. Hardin County, Iowa, 19 Oct. 1859. He received his academic education in Oskaloosa College, after which he spent one year in Drake University. He grad- uated from the Iowa State College of Agricul¬ ture in 1885. He was made an assistant in Agriculture in the Iowa State College in 1886, and became associate editor of the Prairie Parmer, at Chicago, in 1887. He then entered the service of the Agricultural College and Ex¬ periment Station of the University of Minne¬ sota, where he was engaged from- 1888 to 1891,

when he resigned to accept a position as pro¬ fessor of agriculture and agriculturist of the experiment station at the North Dakota Agri¬ cultural College. This position he left to accept a similar position at the University of Minne¬ sota, which he held until the end of 1904, when he was appointed assistant secretary of Agri¬ culture at Washington. During the course of his service with the Minnesota Agricultural Ex¬ periment Station, he perfected and published methods of breeding and producing new va¬ rieties of wheat, corn, flax, alfalfa and otfier field crops, which have been adopted and widely used by seed-breeding specialists in this coun¬ try and abroad. He also produced and intro¬ duced several new and valuable varieties of wheat. He organized and served as the secretary of the Minnesota Field Crop Breeders' Association, and was the organizer and

first secretary of the American Breeders' Association and was the editor of its annual report. He is the author of a number of books, including 'Plant Breeding,5 'Variation in Cross-Bred Wheats,5 'Agricultural Indus¬ tries and Home Economics,5 'Breeding Plants and Animals,5 'Education for Country Life,5 'Farm Development,5 and is co-author (with Edward C. Parker) of 'The Cost of Producing Farm Products.5 He served as Assistant Sec¬ retary of Agriculture from January 1905, to March 1913.

HAYS, William Jacob, American painter: b New York, 8 Aug. 1830; d. there, 13 March 1875. He studied art under John Rubens Smith, and his 'Dogs in a Field,5 exhibited in the Academy of Design in 1850, won him the repu¬ tation of an animal painter of remarkable fidel¬ ity to nature and spirit in design. He studied the bison in the upper waters of the Missouri and the deer in Nova Scotia. His 'Bison Bull at Bay5 and 'Herd of Caribou in Nova Scotia5 are characteristic pictures.

HAYS, William Shakespeare, American song-writer and composer: b. Louisville Ky 19 July 1837 ; d. 23 July 1907. In 1857 he be¬ came a reporter for the Louisville Democrat, subsequently was clerk and captain of steam¬ boats on the Ohio and Mississippi, and became editor of the Louisville Courier Journal and Times. He wrote and composed more than 300 songs, among them 'Nora O'Neil,5 'Molly Darling,5 'Write Me a Letter from Home,5 Th? Little Old Cabin5 and 'Shamus O'Brien5; published 'Poems and Songs5 and claimed to be the author of 'Dixie.5 His songs sold very extensively.

HAYS, Kan., city, county-seat of Ellis County; on Big Creek, and on the Union Pa¬ cific Railroad; about 222 miles west of Topeka. It is in a fertile agricultural region. The chief manufactures are flour, dairy products and machinery. It has grain-elevators, flour mills, machine shops, etc., and there are large annual shipments of grain, flour and live stock. It is the seat of a Normal school and of a State agricultural experiment station. The experi¬ ment station is connected with the State Agri¬ cultural College, which owns near Havs 2,000 acres of land. The waterworks are municipally owned. Pop. (1920) 3,165.

HAYTI. See Haiti.

HAYWARD (properly ˆhaw-ward," keeper of the haws or hedges, and still no pronounced, or rather as ˆhoward,11 in country districts ; the family name Howard as well as Hayward is from this), a town officer in old New

England, whose duty was to keep the cattle on the roads from breaking through the hedges or fences into enclosed grounds and to impound them if they did so. The title came to be generic for a cat¬ tle-ward, and the hog-reeve was frequently known as a ((hog howard.11

HAYWARD, Wis., town, county-seat of Sawyer County; on the Namakagon River, and on the Chicago, Saint Paul, Minneapolis and Omaha railroads; about 63 miles by rail south¬ west of Ashland. It is in the vicinity of the lumber region of the State, and the chief in¬ dustry is lumbering. Agriculture is also im¬ portant and it contains a flour and feed mill, a pickle factory, and a creamery. The water system is the property of the town. It has a government Indian school and a public library. Pop. (1920) 1,302.

HAYWOOD, Marshall DeLancey, Amer¬ ican author: b. Raleigh, N. C., 6 March 1871. He was educated at the Raleigh Academy and at Johns Hopkins University. Since 1901 he has served as librarian of the North Carolina Agri¬ cultural and Mechanical College, librarian of the State library at Raleigh and editor of the (Biographical History of North Carolina.) He is a member of numerous historical societies, and has written several books, among them (Governor William Tryon and His Administra¬ tion in the Province of North Carolina) (1903) ; (Freemasonry in North Carolina and Tennessee1 (1906); and (The Mecklenburg Declaration1; (Lives of the Bishops of North Carolina1 (1910) ; (Ballads of Courageous Carolinians1

(1914).

HAZAEL, ha'zeel, king of Damascus, who ruled about 850 b.c. The story of his elevation to the throne according to the prophecy of Elisha is contained in II Kings viii, 7-15. He was successful in his struggle to keep Ramoth- Gilead from his enemies, Joram of Israel and Ahaziah of Judah; and wrested all of the trans- Jordanic provinces of Israel from Joram's suc¬ cessor, Jehu. Hazael's attacks against Judah were abandoned at the presentation of tribute from King Jehoahaz. He was succeeded by his son Benhadad.

HAZARD, Caroline, American college president: b. Peacedale, R. I., 10 June 1856. She was educated in Providence and in Europe, and from 1899 to 1910 was president of Welles¬ ley College, Mass. She received the degrees of M.A. and Litt.D. from the University of Michi¬ gan and Brown University in 1889. She was a granddaughter of R. G. Hazard (q.v.) and published (The Narragansett Friends' Meeting in the 18th Century1 (1899) ; (Thomas Hazard: a Study of Life in Narragansett in the 18th Century1 (1893); (Some Ideals in the Educa¬ tion of Women1 (1900) ; (A Scallop

Shell of Quiet1 (1908) ; (The College Year1 (1910).

HAZARD, Ebenezer, American author: b. Philadelphia, 15 Jan. 1744; d. there, 13 Tune 1817. He was graduated from Princeton in 1762. in 1782-89 was postmaster-general, and from 1791 was in business in Philadelphia, where he as¬ sisted in the establishment of the North Amer¬

ican Insurance Company. He published his¬ torical Collections1 (1792-94) and (Remarks on a Report Concerning Western Indians.1

HAZARD, Rowland Gibson, American manufacturer and philosopher : b. South Kings¬ ton, R. I., 9 Oct. 1801 ; d. Peacedale, R. I., 24 June 1888. He was a successful business man, being long engaged in the woolen manufacture in Peacedale. He also wrote on philosophical subjects; his works including (Language, its Connection with the Constitution and Prospects of Man1 (1836) ; (Essays on the Resources of the United States1 (1864) ; (Causation and

Freedom of Willing1 (1869).

HAZE, a condition of the atmosphere which deadens the blueness of the sky and ob¬ scures the sharp outlines of distant objects. Haze is due to fine dust in the air or to ex¬ treme heat, the latter being known as heat- haze. In certain parts of China the haze is like a thin fog. Extensive forest fires create a smoke-haze, of a dense blue color, which drifts like rain clouds hundreds of miles from the scene of the fire. Volcanic eruptions throw fine dust into the air in enormous quantities, forming a haze which is carried many hundreds of miles. See Dust.

HAZELNUT, or FILBERT, a genus (Corylus) of shrubs and trees of the family Betulacecr, confined to the. northern hemi¬ sphere. The male flowers are in long cylindrical aments or catkins; and the fruit, a nut, is marked at its base with a large cicatrix. The inflorescences of the hazel are developed in the year preceding their appearance; the male flow¬ ers last over the winter, naked; the female inflorescence is enclosed in a bud. In early spring the male catkins elongate and produce an abundance of dry pollen, while the female inflorescences are distinguishable from the leaf buds only by their larger size and projecting red stigmas. The nut is enveloped at the base by a sheath of succulent bracts.

The European hazel (C. avellana), from cul¬ tivation has produced several varieties, differing in the size, shape and flavor of the nuts, which are commonly known under the name of filberts. It grows in all situations and is easily culti¬ vated, but a light and tolerably dry soil is the most suitable. The best nuts come from Spain, where they are baked in large ovens before

export, in order to ensure their preservation. Other species occur in southern Europe and Asia. The American hazel (C . americana) very much resembles the European, but is lower in stature. It is common in most parts of the eastern United States, but has not been culti¬ vated. A second species (C . rostrata) also occurs in eastern North America and a third is found in California.

The oil which is obta:ned from hazelnuts by pressure is little inferior in flavor to that of almonds, and chemists employ it as the basis of fragrant oils artificially prepared and used by perfumers, because it easily combines with and retains odors. In many parts of England hazels are planted in coppices and hedge-rows for sev¬ eral useful purposes, but particularly to be. cut down periodically for charcoal, poles, fishing- rods, etc. In brewing, the dried twigs were used as a substitute for yeast when they were soaked in fermenting liquor. Being extremely tough and flexible, the branches are used for

making hurdles, crates and springles to fasten down thatch. They are formed into spars, handles for implements of husbandry, and when split are bent into hoops for casks. Char¬ coal made from hazel is much in request for forges, and when prepared in a particular man¬ ner is used by painters and engravers to draw their outlines. The roots are used by cabinet¬ makers for veneering; and in Italy the chips of hazel are sometimes put into turbid wine for the purpose of fining it. Finally forked twigs of the European hazel were formerly used by diviners to determine the position of water, gold, etc.

HAZELTINE, hVzel-tin, Mayo William¬ son, American journalist and literary critic: b. Boston, Mass., 24 April 1841 ; d. Atlantic City, N. J., 14 Sept. 1909. He graduated from Har¬ vard, studied also at Oxford, practised law until 1878 and was then appointed literary edi¬ tor of the New York Sun. He became widely known as a critic for his reviews in the Sun, and has published in book form (Chats about Books) (1883) ; (British and American Educa- tion> ; (The American Women in Europe. >

HAZEN, Charles Downer, American col¬ lege professor: b. Barnet, Vt., 17 March 1868. Studied at Dartmouth and the universities of Gottingen, Berlin and Paris, and returned to take his Ph.D. in Johns Hopkins in 1893. He was head of the department of history in Smith College (1894-1914) ; lecturer in Columbia Uni¬ versity (1910-11) and in Johns Hopkins (1915 — 16). He is author of Contemporary American Opinion of the French

Revolution > (1897) ; (01d Northampton (1904) ; (Europe Since 1815 } (1910) ; ˆModern European History**

(1916); < Alsace-Lorraine under German Rule) (1917) ;

HAZEN, John Douglas, Canadian states¬ man : b. Oromocto, N. B., 5 June 1860. He is a graduate of the University of New Bruns¬ wick and was called to the bar in 1883. He represented Saint John city and county in the House of Commons 1891-96; was elected to and became leader of the opposition in the local legislature in 1899, and premier 1908-11. In 1911 he re-entered the House of Commons and in that year was appointed Minister, of Marine and Fisheries in the Borden administration.

HAZEN, William Babcock, American sol¬ dier: b. West Hartford, Vt., 27 Sept. 1830; d. Washington, D. C., 16 Jan. 1887. He was graduated at West Point in 1855, went to the front in the Civil War in command of 41st regiment of Ohio Volunteers, which he him¬ self had recruited in 1861, served actively in Ohio, Kentucky and through the Atlanta cam¬ paign and in Sherman's march through Georgia, and in 1865 took command of the 15th army corps. He observed the Franco-Prussian War on French territory and was at Vienna as mili¬ tary attache to the United States legation dur¬ ing the Turko-Russian War. Appointed chief signal officer in 1880, with the rank of briga¬ dier-general, he employed scientists as ob¬ servers, introduced ((cold-wave® signals and suggested the standard-time meridians at pres¬ ent in use. He published

of Siege Life at Versailles) (1872) ; (Our Bar¬ ren Lands (1875) ; and (A Narrative of Mili¬ tary Career* (1885).*

HAZLETON, ha'zel-ton, Pa., city situated in Luzerne County, on the Pennsylvania and the Lehigh Valley railroads, about 24 miles south of Wilkes-Barre. The city was settled in 1820, incorporated as a borough in 1840 and chartered as a city in 1890. It occupies a pic¬ turesque site at an elevation of 1,700 feet and is popular as a summer resort. It is situated in the anthracite coal region and its industrial interests are largely connected with the mining and shipping of coal. Its chief manufactures are foundry and machine-shop products, car¬ riages, paper boxes, shirts, underwear, lumber, beer, baking-pans, cattle-powder, cigars, coffins and caskets. It has knitting mills, silk mills, three daily and eight weekly newspapers. It contains a State hospital for miners, 30 churches, a city hall, Hazel Park, a summer resort, United Charities Home, three banks, a convent, high school and Saint Gabriel's Acad¬ emy. Hazleton adopted the commission form of government in 1913. Pop. (1920) 32,277.

HAZLITT, haz'lit, William, English critic and essayist: b. Maidstone, Kent,

*10 April 1778; d. Westminster, 18 Sept. 1830. His father, a friend of Benjamin Franklin, was a Unitarian minister, and with his family was in the United States 1783-87, locating at Philadelphia and Boston. In 1793 William became a student in the Unitarian College at Hackney. He devoted more time, however, to literature and art than to theology, and upon leaving college resolved to become a painter. He painted portraits with only tolerable success and finally renounced art, and in 1805 opened his literary career with an essay (On the Principles of Human Action, * in which much metaphysical acumen was displayed. In 1811 he settled in London, deriving his prin¬ cipal support from his contributions of political articles and theatrical and art criticisms to the newspapers, and his occasional lectures and publications. In 1813 he delivered at the Rus¬ sell Institution a course of lectures on ((English Philosophy,® and subsequently delivered courses of lectures on the English poets generally, the comic poets and the Elizabethan poets. Later in life he contributed to the Edinburgh Re¬ view and some smaller magazines. He was a good art critic, but his tendency to prejudice and paradox, and his almost contemptuous re¬ gard for the productions of contemporary genius, render him a less safe authority than his knowl¬ edge and talents would lead us to expect. It is said of him that he never altered an opinion after he had reached the age of 16, and never read any book through after the age of 30. It is as a literary critic and essayist that Hazlitt achieved his chief success. Saintsbury has said that ((long before Sainte-Beuve, Hazlitt had shown a genius for real criticism.® He has probably not been surpassed by any English critic. Yet his recognition, in view of this fact, has been singularly inadequate to his merits. His. judgment was, it is true, often marred by prejudice and by his paradoxes. But in the main it was discriminating and duly apprecia¬ tive. His equipment might not now be thought adequate, but it was almost certainly in most respects superior to that of his Georgian con-*

temporaries. He was able to write interestingly of a wide range of topics. He was bitterly at¬ tacked, after the custom of the times, by writers, particularly journalists, of adverse po¬ litical views. But as a controversialist he was more than the equal of any of these, bold in epigram and invective. His style has been highly praised for its combination of vigor and ease, its rhythm, its clearness and the aptness of its epithets. Not only in critical analysis but as well in narrative and description it is excel¬ lent. Hazlitt lectured in 1818-21 at the Surrey Institute. Northcote states that had he contin¬ ued his art work he would have become a great painter. The best of his essays for the Ex¬ aminer appeared in 1817 under

the title (The Round Tabled The (Spirit of the Age, or Con¬ temporary Portraits,' also a significant work and by some critics considered his best, was published in 1825. Further essays are grouped in 'The Plain Dealer ' and (Sketches and Es¬ says. ' Among other well-known works of Haz¬ litt are Characters of Shakspere's Plays) (1817) ; (A View of the English Stage' (1818); (Lectures on the English Poets) (1818) ; 'Lec- tures on the English Comic Writers) (1819) ; 'Lectures on the Elizabethan Age' (1821) ; (Life of Napoleon Bonaparte) (4 vols., 1828). There is an edition of the

HAZLITT, William Carew, English au¬ thor: b. London, 22 Aug. 1834; d. 8 Sept. 1913. He is a grandson of William Hazlitt (q.v.). He was at first a civil engineer, relinquished that profession for journalism and finally took up that of literature. Among his numerous works are (History of the Venetian Republic' (I860) ; (Memoirs of William Hazlitt' (1867) ; bibliographical Collections and Notes) (1876— 92); Letters of Charles Lamb' (1886); 'Four Generations of a Literary Family' (1897) ; (Leisure Intervals,' poems (1897); Coins of Europe' (1893-97) ; 'Lamb and Hazlitt' (1900) ; < Shakespeare: the Man and His Work' (1908); (Faiths and Folklore' (1905); Come Prose Writings' (1906); (A Roll of Honour'

(1908).

HAZOR, or CHAZOR (Heb., enclosure), the name of several places in ancient Palestine, the best known of which was the seat of Jabin, a Canaanitish king of considerable power, who, with his allies, was defeated by Joshua (Josh, xi, 1-13). Though it recovered and oppressed Israel, it was conquered a second time by Barak (Judges iv) and remained in the possession of Israel until the invasion of Tiglath-pileser. Solomon made it a northern frontier fortress (1 Kings ix, 15). Its site has been variously placed. Consult Hastings' 'Dictionary of the Bible' (1899).

HAZZARD, David, American politician and jurist: b. Broadkiln Neck, Sussex County, Del., 18 May 1781 ; d. 8 July 1864. He served as an ensign in the War of 1812, was elected governor on the American Republican ticket in 1829, and subsequently was State senator and an associate judge. During his administration as governor, a constitutional convention was held at Dover, Del., by which, among various re¬

visions, the governor's term was changed from three to four years. Hazzard was a member of the Constitutional Convention of 1852.

HEAD, Barclay Vincent, English numis¬ matic scholar: b. Ipswich, Suffolk, 2 Jan. 1844; d. 12 June 1914. In 1864 he became an assistant in the British Museum, where in 1893 he was made keeper of the department of coins and medals. He was also appointed joint-editor of the Numismatic

Chronicle. His chief work is the (Historia Nummorum' (1887), a valuable study, and the standard one in its department. Among further publications by him are his¬ tory of the Coinage of Bceotia' (1881), and 'Guide to the Coins of the Ancients' (1881).

HEAD, Sir Edmund Walker, English colo¬ nial administrator and author : b. near Maid¬ stone, Kent, 1805; d. London, 28 Jan. 1868. He was educated at Oriel College, Oxford, became a Fellow of Merton, studied law, was a poor- law commissioner in 1841, and in 1847-54 lieu¬ tenant-governor of New Brunswick. From 1854 to his retirement in 1861 he was governor-in- chief of Canada. During his administration the seigniorial tenures (see Canada — Seign¬ iorial Tenure) and the clergy reserves (see Canada — The Clergy Reserves) were abol¬ ished. He was afterward governor of the Hudson's Bay Company. He was an art critic of some importance, and published a c Hand¬ book of Painting of the German, Dutch, Spanish and French Schools' (1848), and other works. His poetical contributions to Fraser's Maga¬ zine appeared in 1868 in book-form.

HEAD, Sir Francis Bond, English colonial administrator and author: b. near Rochester, Kent, 1 Jan. 1793; d. Croydon, Surrey, 20 July 1875. Educated at Woolwich, he became first lieutenant of engineers in 1811, was at Waterloo and at Fleurus, retired from the army in 1825, and went to South America as a prospector in gold and silver mines. Of some of his experi¬ ences there he gave an account in (Rough Notes of a Journey in the Pampas and Andes' (1828). In 1836 he was appointed lieutenant-governor of Upper Canada. His administration was a decidedly unfortunate one. Unfamiliar with the political status of the country, he op¬ posed the union of the provinces, and en¬ deavored to conduct the government without the assistance of a council. This state of affairs may be regarded as the chief cause for the part taken by Upper Canada in the insur¬ rection of 1837. He was recalled in 1838. His numerous publications include (Bubbles from the Brunnen of Nassau' (1833); 'The De¬ fenceless State of Great Britain' (1850) ; (The Horse and His Rider' (1860); (The Royal Engineer' (1869).

HEAD, Sir George, English writer of travels, etc.: b. Higham Parish, Kent, 1782; d. 1855. He held various posts in the army, and was present at most of the great battles of the Peninsula. In 1814 he proceeded to Canada to be chief of the commissariat of a proposed navy on the Canadian lakes, and subsequently published his experiences in 'Memoirs of an Assistant Commissary-General' and 'Forest Scenes and Incidents in the Wilds of North America.' He was knighted in 1831. He also wrote 'Rome, a Tour of Many Days'; 'A Home Tour Through the Manufacturing Dis¬ tricts of England,' and 'A Tour Through

Various Parts of the United Kingdom* and other works.

HEAD, Natt, American politician : b. Hook- set, N. H., 20 May 1828; d. there, 12 Nov. 1883. He became a railroad and general building con¬ tractor, sat in the State legislatures of 1861 and 1862, was adjutant-general of the State in 1864- 70, and in that capacity published a four-volume military record of New Hampshire during the Civil War. In 1876 and 1877 he was elected to the State senate and in the latter year was its president. He was governor in 1879-80.

HEAD, the anterior or front part of the body of an animal when it is marked off by a difference in size, or by a constriction. The presence or absence of a head was formerly much used as a character in classification. But this line of classification is artificial. The mouth and principal nervous organs are the guides to the anterior end of the body, where the head, when recognizable, is situated. In the protozoa, infusoria and ccelenterates, such as the hydra and corals, there is no nervous ganglion, and the mouth is not surrounded by special structures. In the inferior worms the front, end becomes marked by the presence of ganglia. The so-called head of parasitic animals, such as the tapeworms, is only the end of attachment, but neither mouth nor ganglia exist in it. In the polyzoa, lamp shells, ascidians, and lamellibranch mollusks mouth and ganglia exist, but they are not surrounded by special structures. But in the worms proper, the articulated animals, £he land and fresh-water gasteropods and the cuttlefishes a head proper

Diagram, Illustrating Goethe's

their character; as the brain becomes specialized, so does the brain-case or skull. In man the brain attains its highest development and the head its greatest complexity, the difference between skull and face being now most pro¬ nounced. The vertebrate theory of the skull, first propounded by Goethe, is now accepted to this extent, that the skull or cranium con¬ sists of three vertebrae, which are recognizable in the fish, and that the facial bones are not vertebrae, but developed from cartilage which did not form an original part of the vertebral column. A vertebrae consists of a body or centre, from which two processes arch upward and close in the spinal canal with its contents, the spinal. cord. The posterior cranial vertebrae is the occipital, consisting of a centre, two lat¬ eral pieces, and a superior, the next is the parietal, of which the basisphenoid is the centre, and. the great wings of the sphenoid and the parietals the lateral . arches ; the most

anterior is the frontal, with its centre, the presphenoid, and its. arch, formed by the orbital plates of the sphenoid and the frontals. The centres of the spinal vertebrae are ossifications around a fibro¬ cartilaginous rod, the chorda dorsalis, which ends in the basisphenoid. So far spinal column and skull have a common base; but the spinal vertebrae were preceded by and are in fact modifications of primitive vertebrae, and no rep¬ resentatives of these appear in the development of the skull. It is therefore open to question whether the three divisions just mentioned are really vertebrae, or should not rather be called cranial segments. There is the more reason

Theory of the Vertebrate Head.

NASAL.

Nose.

Ethmoid and Prefrontal.

Vomer.

Upper jaw.

Mouth.

Lower jaw.

FRONTAL.

PARIETAL.

Frontals.

Orbitosphenoids.

Presphenoid.

Eye. Pituitary.

Parietals.

Alisphenoids.

Basisphenoid.

Parasphenoid.

§S

3 o co S

OCCIPITAL.

Ear. Supraoccipital. Exoccipitals.

Basioccipital.

o

> >

K

j Arches. Centra.

is found. That is, the mouth and the anterior nervous ganglia are placed in a segment of the body which, by structure, is different from the rest. Thus in the worms and articulated animals some of the rings or articles of which the body is made up are fused together, the appendages being not walking limbs, but modified into jaws or jawlike organs. Thus the common shore-worms possess a structural head, though it is not apparent. The head is first best defined in the insects. The snail's head has its cavity shut off .by a diaphragm from the rest of the body cavity. The cuttlefishes have, in addition, a re¬ markable cartilaginous box, which like a skull, protects the ganglia and gives support to the muscles. The head of the vertebrated animals presents a regular series of increasing com¬ plexity from the amphioxus upward. In that fish the most anterior part of the nervous cord is lodged in a canal scarcely distinct from that which contains the rest of it. Ascending in the series, it becomes evident that as the anterior nervous mass enlarges, and its ganglia increase in complexity, the anterior vertebrae change

for this that in fishes the basisphenoid and pre¬ sphenoid are represented by a single bone, the parasphenoid, which underlies the skull, but disappears in the higher vertebrates, and that the presphenoid is not properly connected with the chorda dorsalis, but rather belongs to the series of facial bones. The pituitary body which projects from the lower surface of the brain lies in front of the end of the chorda dorsalis: from the latter rod and its surroundings a plate of cartilage passes forward on either side of the pituitary body, and these (the trabecu'ce) , meet¬ ing in front of that body, form the cartilaginous axis around which the vomer, ethmoid, and other facial . bones are developed, while the presphenoid is an ossification in this axis just where the two portions meet in front of the pituitary. The sense organs, the ear and the eye, are,, so to speak, lodged in capsules of bone which are inserted, the ear between the occipital and parietal, the eye

between the pari¬ etal and frontal segments. They are accidental, not essential parts of the cranium. The hyoid apparatus and the lower and upper jaws are

developed from the cartilaginous walls of the embryonic skull, and the jaws come in a sec¬ ondary manner to take part in the composition of the face. (See Respiratory Organs). The increasingly globular form of skull in the verte¬ brates is due to the greater increase of the cerebral hemispheres relatively to that of the base of. the brain and axis of the skull ; hence the brain comes in man to overhang the face. Of course it is to be remembered that while in the vertebrated animals the head is divided by its axis (commencing at the middle line of the upper jaw and passing backward through the basisphenoid to the vertebral centres) into an upper chamber, lodging the brain, and a lower, lodging the first part of the alimentary canal, in the lower animals the cavity is a single one, the oesophagus piercing the nervous system so as to reach the surface of the body, and thus coming to be surrounded by a pair of ganglia above and a pair below, with the fila¬ ments connecting these ganglia. In the verte¬ brate the head is curved downward, the basi¬ sphenoid being the pivot point, so that the mouth is pushed to the lower surface ; in the lower animals the under surface of the body curves upward, so as to carry a part of the nervous system past the mouth toward the upper surface. The eyes and feelers of a crab are in fact modified limbs which are thus car¬ ried upward; the jaws and sense organs of a vertebrate are entirely distinct from the limbs and other appendages of the trunk.

HEAD-HUNTING. See Dyaks.

HEAD MONEY, an immigration tax of 50 cents levied by act of Congress 3 Aug. 1882 on every foreigner brought to the United States. Before the passage of this act the State of New York levied a ' ((head tax® on all immigrants arriving at New York, the funds going to the support of the State board of immigration. A test of the legality of the tax being made in the courts, a decision was rendered that the New York statute was void because it infringed on the prerogatives of national government. Sub¬ sequently the act of Congress imposing the tax was questioned in the United States Supreme Court, and a decision affirming the constitution¬ ality of the law was made. The national act provides that the tax shall be paid by the master or owner of the vessel bringing the immigrants, to the collector of the port, and by him turned over to the treasury of the United States, to be used by the secretary to defray the expenses of regulating

immigration and to relieve im¬ migrants in distress. The tax was increased to $2 per head in 1903, and by act of 20 Feb. 1907, amended 26 March 1910, was again increased to $4 per head. See Immigration.

HEADACHES, or pains in the head, arise from a multiplicity of causes. In general they may be divided into two great groups : Those due to changes in tension within the brain, largely brought about by changes in the blood¬ vessels. Sick headache — so-called congestive headache — or they are really not headaches, but various forms of pain about the head and face — neuralgias of various kinds. Headaches are for the most part of the first variety and are related to changes in the vascularity of the brain structures, which blood-vessel changes result from a complicated series of events. The simplest are the headaches due to blood-vessels'

reactions to infections. These infections may be of various kinds — influenza, measles, typhoid, malaria, etc. The general systemic reaction, as recorded in the. brain structures, serves as a notice to consciousness through pain that some¬ thing is wrong. Quiet is enforced and atten¬ tion intelligently directed toward finding the faulty function. These headaches are usually self-limited. When the infection involves the brain or meningeal structures then various forms of meningitis arise with their own special type of headache. (See Meningitis). Emotional disturbances, however, are the most frequent cause for headaches. Nearly all of the head¬ aches called stomach or intestinal are in reality emotional. The reaction to the emotions — often unconscious, and taking place during the night life even, and often headaches are present on awakening in the morning — is to bring about states of altered pressure within the brain, which are registered as headaches. This form of emotional headache may be thought of as a scapegoat, a bodily carrier for faulty management of unconscious wishes. Similar headaches from pressure of organs within the brain are not infrequent. Thus in growing adolescents, pituitary pressure may cause severe headaches. With enlargement of the sella turcica such headaches may clear up. In certain types of kidney disturbance, severe headaches occur also. Anaemia is mainly the cause here. Poisoning from withheld products healthfully eliminated by the kidneys may also account for some of these. Consult For- scheimer's

HEADLEY, hed'li. Joel Tyler, American historian: b. Walton, N. Y., 30 Dec. 1813; d. Newburg, N. Y., 16 Jan. 1897. Graduated from Union College in 1846, he took a course in theology at the Auburn Seminary, was pastor at Stockbridge, Mass., and in 1846 became as¬ sistant editor of the New York Tribune. In 1856-57 he was secretary of State for New York. His works, written in a popular vein, had great currency in their day, and include (Napoleon and his Marshals) (1846) ; (Wash¬ ington and his Generals> (1847) ; (The Adiron- dacks) (1849), said to be the first book

to ad¬ vocate that region as a health-resort; (Grant and Sherman, their Campaigns and Generals) (1865); (The Great Rebellion) (1864), and other works on that subject.

HEADLEY, Phineas Camp, American Congregational clergyman : b. Walton, N. Y., 24 June 1819; d. Lexington, Mass., 1903. He was a brother of J. T. Headley, the historian (q.v.). He was admitted to practise at the bar in 1847, but studied theology at Auburn Semi¬ nary, held pastorates in various Presbyterian and Congregational churches, and contributed to the New York Observer and Tribune, and many other newspapers and magazines. Among his works are (Women of the Bible) (1850) ; biographies of the Empress Josephine (1851), Kossuth (1852), Lafayette (1853), Mary, Queen of Scots (1856), Ericsson (1863), Far-ragut (1864), and others; (Half-Hours in Bible Lands) (1867) ; (Court and Camp of David) (1868) ; and (Public Men of To-day)

(1882).

HEALTH, Public, Regulation of, super¬ vision, protective and preventive work through-

out the nation, carried on by the United States Public Health Service, a branch of the Treasury Department, under the directorship of a com¬ missioned medical officer, with the title of Surgeon-General. The headquarters is in Washington, D. C. Important achievements of the service are the suppression of yellow fever in the South ; the control of bubonic plague in California, Porto Rico and New Orleans; the discovery of an effective method for the pre¬ vention and treatment of pellagra ; demonstra¬ tions of how malaria may be prevented in practically any locality at a comparativelv small cost; the establishment of a series of trachoma hospitals and the institution of educational measures to combat the spread of trachoma in the Appalachian Mountains ; and the beginning of a nation-wide campaign for the improvement of rural sanitation, which has already resulted in great diminution of disease in the districts where the methods advocated have been ap¬ plied. On the entry of the United States into the European War the service took charge of the sanitation of extra cantonment zones, co¬ operating with, the military and State and local health authorities in bringing about the elimina¬ tion of any insanitary conditions which might threaten the health of the military forces and the civilian population. At the Hygienic Laboratory in Washington, technical studies are carried on, and there also are conducted the tests of

preparations necessary for the enforce¬ ment of the law regulating the sale of biologi¬ cal products in interstate traffic. The Division of Scientific Research supervises field and laboratory investigations of infectious diseases, industrial and school hygiene, rural sanitation, public health administration, coastal waters, shellfish pollution and water supplies and sew¬ age. Field headquarters and laboratories are located at convenient places throughout the country. The Foreign and Insular Quarantine and Immigration Division supervises the 61 quarantine stations in the United States ; 26 stations in the insular stations ; 89 stations for the medical inspection of immigrants ; while, 18 officers are stationed at foreign American consulates to assist in the administration of the quarantine laws and the medical inspec¬ tion of emigrants. The Division of Domestic (Interstate) Quarantine supervises measures for the prevention of the spread of infectious and contagious diseases in interstate traffic and the administration of the interstate quarantine regulations relating to food and drink furnished passengers on common carriers. It also co¬ operates with State and local health authorities in the . suppression and eradication of such epidemic diseases as plague, cholera, yellow fever typhus fever, smallpox and leprosy. The establishment of. a national home for lepers under the administration of the Public Health Service was approved 3 Feb. 1917 and $250,000 appropriated for the purpose.

HEALTH DISTRICT. See District.

HEALTH EDUCATION. Health in¬ struction in connection with the schools was inaugurated under the term medical inspection. The original purpose was not to give instruc¬ tion in health to the children in the schools but to utilize the schools in checking the spread of contagious diseases. The movement was purely voluntary, physicians in leading cities

offering their services without compensation. Probably the first country in the world to re¬ quire action of any kind in the schools of a health character was France. In 1833 that country required the school authorities to keep all schoolhouses in a cleanly condition, and in 1842 provision was made in France by which physicians were required to visit the schools for the purpose of inspecting the children and also to inspect the sanitary conditions of the school buildings.

The next country to give attention to this subject was probably Germany. In 1874 the city of Brussels began the inspection of its school children, and two years later similar action was taken in the cities of Dresden and Leipzig. . Later Weisbaden inaugurated a sys¬ tem of inspection. This city gave the subject greater consideration than had yet been given it either in France or Germany. This city inaugurated a very comprehensive system of physical examination of the school children. The plan required

examination of the eyes, ears, nose, throat, lungs, spine, heart and skin. In the case of boys an examination was also made for hernia. A definite record was made of each child and this record was revised from year to year throughout the child's school life. The. plan required the school authorities to ascertain the height of each child and the weight of each child twice each year and in the case of children who were below normal stand¬ ards, such additional examinations as might be necessary. When physical defects were dis¬ covered in the children, notice was given to the parents and the parents were required to pro¬ vide remedial treatment. The school authori¬ ties provided no treatment whatever for the children.

Other countries instituted a plan of inspec¬ tion of school children, although not as effec¬ tively as France or Germany, as follows : Hun¬ gary, 1877; Norway, 1889 ; Sweden, 1863 ; Cairo, Egypt, 1882; Chili, 1888; Japan, 1898. A very complete and scientific system has been in existence in the Argentina for several years. England took no definite or effective action in connection with the treatment of children in the schools until 1908. In that year a medical inspection law was enacted which made it compulsory upon the school authori¬ ties of England to provide for the medical in¬ spection of all children in attendance upon school.

New York city has the distinction of being the first city in America to inaugurate health inspection of school children. In 1892 that city appointed a medical school inspector. Bos¬ ton, however, two years later instituted a very effective system of medical inspection. Chicago began this line of work in its schools in 1895, and in 1898 Philadelphia followed. The work has gradually expanded until nearly every State in the Union does more or less work in health instruction among the children in its schools, and 36 of the States have mandatory statutes requiring the physical examination of all children. The work is thoroughly organ¬ ized in about 800 of the cities of the country, in many of the smaller villages, and even in the rural districts of several States.

The legal right of school authorities to ap¬ point school physicians, school nurses, etc.,

without direct authority under the statutes has frequently been raised. It is of such vital im¬ portance to this subject that the following es¬ sential features of an opinion of the Supreme Court of Wisconsin upon the point are given here :

“Education of a child means much more than merely communicating to it the contents of textbooks. But, even if the term were to be so limited, some discretion must be used by the teacher in determining the amount of study each child is capable of. The physical and mental powers of the individual are so interdependent that no system of education, although designed solely to develop mentality, would be complete which ignored bodily health. And this is peculiarly true of children whose immaturity renders their mental efforts largely dependent upon physical con¬ ditions. It seems that the school authorities and teachers, coming directly in contact with the children, should have an accurate knowledge of each child’s physical condition, for the benefit of the individual child, for the protection of the other children with reference to communicable diseases and conditions, and to permit an intelligent grading of the pupils. All of these considerations, as well as many others unnecessary to mention, convince us that the conclusions of the learned trial judge were entirely right.” State ex rel. Stoltenberg v. Brown, 112 Minn. 371.

There is one other question in this subject fundamental to the whole plan of health in¬ struction which must be considered. The question is frequently raised as to whether the work which has been done in the schools under the name of medical inspection, physical ex¬ amination, etc., should be under the direction of the health authorities or the school au¬ thorities. At first thought it may be considered desirable to have matters which relate to health under the health authorities. The primary pur¬ pose of this phase of work in the public schools is now being accomplished through the schools to provide better educational advancement for all the children in attendance upon the schools. It is unfortunate that the terminology used in dealing with this subject at the outset was more of a medical character than an educational character. This was due to the fact that the work was first undertaken, as above stated, for the purpose of checking epidemics, etc. In the large cities where this work was first undertaken it was through the health depart¬ ment and in some of such cities the health authorities still continue to supervise such work. The whole trend of thought during the last 10 years, however, and the general policy pursued throughout the country have been to place health instruction under the school authorities and not the health authori¬ ties. About 87 per cent of all the work done in this country in relation to the health of chil¬ dren in the schools is directly under the super¬ vision of the school authorities. The United States Commissioner of Education in his annual report in 1915 said:

“Two gratifying tendencies appear in recent legislative and administrative dealing with medical inspection: The broadening of the scope of medical inspection and the recog¬ nition of the educational department as the proper admin¬ istrative authority. They are interdependent.”

Very recently, by an act of Congress, the control of the health work of the schools of the city of Washington was transferred from the board of health of that city to the board of education. In Boston, the second city in the United States to begin this work, the health authorities were responsible for its supervision. Recently the work in that city was transferred from the health department of the city to the board of education.

It is only recently that the educational

forces of the country as well as the people generally have begun to appreciate the service which may be rendered in the improvement of our economic and social conditions by provid¬ ing thorough and scientific health instruction for every child in the country. The subject of health instruction has not been seriously considered as one of the great problems in the administration of the schools which should be attacked by the State itself. Provision has generally been made for the instruction in physiology and hygiene, in sanitation, etc. Medical inspection has been provided in most of ithe cities and in rural schools. Open-air schools have been established in several of the cities. Physical training has recently come into prominence. Oral hygiene has received only scant attention and the undernourished child has been considered occasionally. Under State authority all of these various phases of health instruction should be co-ordinated and a general program prepared and carried out in detail by all the schools of the State so that the physical development of every child shall receive the same definite consideration that has for years been given to the intellectual de¬ velopment of the child.

A child has no discretion in this country as to whether or not he shall attend school. Neither have the parents of a child discretion in this matter. The American States have very generally declared under mandatory statutes that the interests of the country demand that every boy and girl from 6 to 14 years of age shall be in attendance upon instruction. If suitable instruction is not provided for a child by his parents either at home or in a private school, such child must attend the public school. The State has, therefore, stretched out its strong arm of authority and declared that every child must be in attendance upon school for a certain number of days each year and generally for a period of eight years. If the State imposes this obligation upon the child, is there not the obligation upon the State to see that such child is properly safeguarded in his physical development as well as in his intel¬ lectual development?

The results obtained in all parts of the country through medical inspection, the inves¬ tigations made by leading foundations and other authorities show that more than 50 per cent of all the children enrolled in the schools are below normal physical standards. If all those having defective eyes and

defective teeth were included, the percentage would be much larger. The annual report of the War De¬ partment for the year 1916 shows that approxi¬ mately 133,000 men of military age applied during that year for admission to the United States army. These men may naturally be presumed to have been in good physical condi¬ tion. They were young men of the best physi¬ cal type to be found in the country. They were required, in accordance with army regu¬ lations, to undergo a rigid physical examina¬ tion prescribed by the government. Approxi¬ mately 22,000 of these men were ultimately ac¬ cepted for service in the army and 111,000 were rejected. If the physical standards pre¬ scribed by the government for admission to the army before we entered the World War had been strictly adhered to in creating the army for service in France, less than one-third

of the enrolled men would have been accepted. Thousands of young men were not admitted to the service until they had received treatment and in many cases operations had been per¬ formed to cure physical defects from which they were suffering. After this remedial treat¬ ment these men were admitted to the service. There are also thousands of boys and girls in school who have physical defects which inter¬ fere with their physical and intellectual de¬ velopment. The great function of the school is so to train and develop boys and girls that when they enter into the activities of the social, commercial and industrial life of the nation they shall possess the best equipment possible for efficient service in their own behalf and in behalf of society in general. One of the greatest assets which a girl or boy may possess when leaving school to become a worker and earner is a sound, healthy body. It is as much the function of the school to teach a boy how to care for his body and to see that proper treatment is provided for physi¬ cal defects which interfere with his normal growth and development or with his progress in school work as it is to teach such boy how to read and to cultivate in him a desire for whole¬ some literature. It is for this reason that several of the States have, within the last few years, enacted laws requiring medical inspection and laws requiring physical training in all the schools of the State.

One of the effective agencies in this health movement in the schools is the open-air school. These schools are intended for anaemic chil¬ dren and for those who have a predisposition to tubercular troubles. New York city also has the distinction of having organized the first school of this type. In 1904 the board of education of that city organized an open-air school in connection with the Seaside Home for Children at Coney Island. In the same year a school of this kind was organized in Charlottenburg, a suburb

of Berlin. Other schools were organized thereafter in some of the German cities and one was established in London in 1907. The school at Coney Island has been in continuous operation since it was first opened. In 1908 an open-air school was organized at Providence, R. I. Nearly all the leading cities of America now have established in their school systems an open-air school and additional schools of this type are being estab¬ lished in each city in the expectation that all anaemic children and predisposed tubercular children shall ultimately be afforded the ad¬ vantages offered through this type of school. We have not exact figures on the number of children in the public schools who are tuber¬ cular but reliable estimates show that there are at least 100,000 enrolled in the public schools of this country who are in the incipient stages of tuberculosis and that there are more than 100,000 others who have been so exposed to this disease that they should be excluded from attendance in the regular grades of the schools. These 200,000 children should be segregated and provision made for their care and instruc¬ tion in outdoor or open-air schools. These schools provide the three essentials which are necessary in the proper treatment of tuber¬ cular cases, which are fresh air, rest and proper nourishment. In some cities an entire building is set aside for the tubercular chil¬

dren. In other cities the open-air school is built upon the roof of a school building or in one of the upper corner rooms. A school physician or nurse must be supplied, diet must be furnished and the necessary wraps and clothing must be provided.

The best medical authorities of our time say that many diseases such as rheumatism and infections of various organs including the heart, kidneys, appendix, etc., come from foci of infection. A great proportion of the foci are abscesses at the apices of the roots of teeth or pyorrhea pockets about the teeth. Uncleanliness of the mouth causes the teeth to decay, to be broken down and unfit to properly masticate the food. This results in the food not being broken up into small particles nor mixed with the saliva, the first function of di¬ gestion. The stomach and other organs of the alimentary canal are thus called upon not only to assume a burden, but must also receive more or less decayed food, pus and germs from the decaying teeth. Thus unclean mouth condi¬ tions result in improper assimilation of the food and nutrition of the body and may cause a poisoning or breaking down of the system.

Considering that not more than 15 per cent of the people make any pretense of taking care of the teeth, that fully 80 per cent of all school children have decayed teeth and 20 per cent of them have dental abscesses which are likely to become foci of infection, it is evident that people as a whole have very little conception of the value of proper mouth conditions.

It is strictly an educational problem to bring about a better understanding of Oral Hygiene. No child should leave school who has not been taught to take proper care of his teeth and mouth. No system of health instruction will be effective and complete without a dental clinic.

It is known that in many cities and even in other parts of the country children are sent to school who have not had their breakfast. . It is also know;n that large numbers of children are not provided with the kinds of food which afford the nourishment for the proper physical development and growth of children. This too is a subject which is receiving careful at¬ tention in the best school systems of the coun¬ try, and no general plan of health education will rest upon a sound basis which does not take into consideration instruction in nutrition. When the health examination of a pupil shows that such pupil is under-weight, inquiry will be made to ascertain if the child is also under¬ nourished. The value of food and economy in food should be considered.

On the question of health, the public, the medical profession, the home and the school have not only been too conservative but have been guilty of gross negligence. All of these agencies have possessed false notions of the propriety of the consideration of certain health and physical conditions on which the children of the country should receive sound, direct, discreet, scientific instruction. This failure in the performance of a sacred duty has resulted in shocking conditions which affect the whole social and moral fabric of the nation. The statement is made by reliable authority that the tests made in certain typical States show that of the 10,000,000 men subject to draft, in the enrollment of the War Department, more than

3,000,000 were afflicted with venereal diseases. This condition is a reflection upon our civili¬ zation. There should be great satisfaction and encouragement to those who bear responsibility in this matter in the fact that of the more than 2,000,000 American soldiers serving in France less than 1 per cent was afflicted with these diseases. This fact exemplifies the power and influence of scientific instruction, of publicity and of discipline in dealing with this problem. Surgeon General Gorgas of the United States army recently stated that the army suffers a greater loss in service from its men who have venereal diseases than from its men who are wounded. He further stated that in his judg¬ ment very little success will be achieved in cor¬ recting this evil until the people generally are educated to believe that it is individual action and individual judgment that are finally going to control in establishing proper standards of life in this respect.

All investigations which have been made show that the need for health instruction in rural communities is greater than the need for such instruction in the cities. Dr. Thomas D. Wood, of Columbia University, a leading au¬ thority in this country on the subject of health instruction, makes the following statement :

"It is apparent that, within the last decade, the actual and vaunted physical superiority of country people and children over those living in cities has been reversed, and it is now confidently affirmed that, for the entire population, city dwellers are more healthy than those who dwell in rural districts; city life is more healthy than that of the country. It is just as true, however, and startlingly significant in view of the preceding statements, that most of our best human material for the cities and the nation as well must still come from the country. If rural America is still to be a satis¬ factory nursery for human life, it must be made healthful and attractive. It must furnish a generous fraction of the best of the population and it must provide conditions favor¬ able for the cultivation of the best."

Health instruction should be given in every schoolroom with the same regularity and defi¬ niteness that instruction is given in English or any other subject. The courses of instruction now given in physiology and hygiene should be revised by a competent group of physicians, social hygienists and teachers, and included in the curriculum of every elementary and sec¬ ondary school in the country under the name of health instruction. The examination now improperly called medical inspection or exam¬ ination or physical examination should be called health examination. . Every child should look upon a health examination as a matter of course and not something unusual in school affairs. The child should expect a health ex¬ amination just as he would expect his history or English examination. The term health should be emphasized in every way. .

The present system of medical inspection is generally faulty, inefficient and expensive. It will remain so as long as country physicians are employed on a per capita basis in rural schools and part-time physicians are employed in cities. The great bulk of this work should be done by the class-room teacher. No teacher should be graduated from a State normal school, city training school or a training class who has not been trained in her professional course to do the usual health examination work in our schools. No teacher should be licensed to teach who is not qualified to do that work. Special courses should be provided by each State in every city and in suitable centres in

supervisory districts where all teachers in the service may be trained to do this work of health instruction. What has been said upon health instruction applies to physical training because physical training is a part of and

should be included in health instruction. It is just, as .essential that a person who goes from an institution for the training of teachers, li¬ censed to teach children, shall be educated and trained to give instruction in health matters as it is that such person shall be educated and trained to teach English, numbers, geography or any other subject in. the curriculum. There must, of course, be directors and supervisors of health instruction who shall bear the same relation to health instruction that a supervisor of English or drawing bears to the instruc¬ tion given in such subjects. The directors and supervisors should be trained in our universi¬ ties for this work. The leading universities of the country should organize courses for the training of. men and women for these super¬ visory positions. Many of these institutions are so located that they have the advantage of schools of education, medical colleges, courses for registered nurses, health departments and local school systems in which health instruc¬ tion is given. These various agencies should all be brought into harmonious co-operation so that the schools may have the benefit of their knowledge of and experience in these import¬ ant health problems.

There is no subject which affects more di¬ rectly and more vitally the happiness, the social welfare, the industrial productivity and the moral fibre of the nation than the health of its people. While this problem is one which has its embarrassments, it is nevertheless one to be attacked by the schools. It is the duty and obligation of the leaders of public education in this country to predicate the health work of the schools upon standards which will develop men. and women who are as fit physically for service in. times of peace as the government demands its men shall be in times ot war.

Health instruction must not only be given but when the physical examination of a child reveals a physical defect or disability which 5« an impediment to the normal physical or intel¬ lectual development of such child, the teacher in charge of such child should immediately notify the parent of such defect or disability. It is then the legal or moral obligation of the parent to provide such remedial treatment as the child needs. The effectiveness of health instruction depends upon following up cases which need treatment. Unless such treatment is provided, the health instruction partially fails in accomplishing the great end which is intended. A parent should not be permitted to fail to discharge an obligation of this charac¬ ter to his child. Remedial relief should not be provided by school authorities if a parent is able to provide it. This. phase of public school work, like all other features of public educa¬ tion, should be administered so as to develop self-respect, independence, and a keen sense of personal obligation. These are all elements of the best standard of good citizenship. When it is known to school authorities that a parent is unable financially to provide such treatment as a child requires, the necessary relief should be provided at public expense by the school authorities.

32

HEALTH INSURANCE

The question may be raised as to the legal right of the school authorities of a city to com¬ pel a parent to supply remedial relief to a child who needs treatment and in case of a parent's inability to provide such relief or treatment, the right of the school authorities to supply the same. It is a well-established common-law rule that a parent is lawfully bound to provide for the support of his infant children. In many States the penal law makes it a misdemeanor for a parent to omit wilfully (

It is as essential to the economic and social interests to make health instruction mandatory in all the schools of the State as it is to make the teaching of English in all the schools of the State mandatory. There are certain fun¬ damental principles which should be followed in the

enactment of compulsory health educa¬ tion statutes. • These are as follows :

First: Health education is a school ques¬ tion, and the responsibility for the administra¬ tion of any school proposition should be placed upon the school authorities. Experience has also demonstrated that the administration of any phase of health education, either medical inspection, physical, training,, or otherwise, by any other agency will result in waste of funds, in the duplication of effort, in the loss of time and energy on the part of pupils and teachers, and in the usual embarrassments and conflict of authority incident to a division of responsi¬ bility of the general direction of any one prop¬ osition and will, therefore, result in great in¬ efficiency.

Second : A compulsory school statute of any character will be ineffective unless such statute contains a provision which imposes suitable penalties for the violation of such law or for the failure of the officers who administer the law to . properly enforce it. A compulsory health instruction statute should, therefore, contain provisions similar to a compulsory at¬ tendance statute by imposing a forfeiture of public funds for failure to enforce the law and by providing for the removal of officers who were charged with administering the law, for failure to perform their duty.

Third : School authorities should be given the same power to employ health instructors, directors and supervisors and school nurses which they possess in relation to the employ¬ ment of teachers.

Fourth : The courses of study for the train¬ ing of teachers in public schools must contain adequate provision for instruction in health subjects, and as adequate provision must be made by the State for the training of school nurses, school physicians and other school health workers as is now made for the training of teachers.

Fifth . A State bureau should be maintained in every State department of education which shall give general direction to the health work by providing courses of study, formulating plans _ for the execution of the work, and de¬ veloping public sentiment which shall give ade¬

quate aid and 'support for health instruction in every community of the State.

Thomas E. Finegan,

Superintendent of Public Instruction for the State of Pennsylvania ; formerly Deputy Commissioner of Education, State of New York.

HEALTH INSURANCE. An insurance arrangement for the purpose of

providing in¬ demnity for losses sustained because of sick¬ ness, these losses being largely of two kinds — loss of earning capacity during the duration of the disease and cost of medical and other aid necessary for recovery. It is known through¬ out many countries as sickness insurance (Krankenversicherung, L'assurance maladie), but the term <(health insurance® was popularized in the United States by the British National Health Insurance Act of 1911, and this term was adopted in 1915 in discussions of this sub¬ ject in this country. From the point of view of insurance organization three generic forms of health insurance may be recognized: com¬ mercial health insurance, mutual health insur¬ ance and social health insurance. See Social Insurance.

Commercial health insurance is being sold to an increasing extent by so-called casualty insurance companies in the United States and Great Britain and to some extent on the Con¬ tinent.. It is a comparatively new branch of the private insurance business, grew out of the accident . insurance business and is largely written in connection with accident insurance policies. For many years insurance companies were fearful of writing this business because of the assumed difficulty in avoiding malinger¬ ing. The earlier policies were limited to cer¬ tain specified diseases, but though such limited contracts are still in the market, they are less popular than insurance against disability due to any disease. The benefits under this form consist of weekly payments of a specified amount for a limited number of weeks, 26 weeks or 52 weeks or even a longer time. Sel¬ dom, if ever, do these contracts provide for the furnishing of medical aid or reimbursement for the expenditure for such medical aid.

Mutual Health or Sickness Insurance. — The above described form of commercial health insurance, largely bought by the lower strata of the middle class, occupies only a very small place in the development of health insurance. Mutual health insurance has accom¬ plished very much larger results. Si-nce the continuous possession of good health and the capacity to work is a matter of particularly grave moment to the wage-worker, as compared to other social groups,, it is not surprising to find that in most civilized countries the early efforts toward mutual health insurance were made by wage-workers through their manual aid societies. Informal mutual assistance gradually developed into systematic mutual insurance, and largely against the hazards of sickness. Thus developed the strong ICrankenkassen of the Germanic countries, the Societes de secours mutuels of France and Belgium, the Societa di Mutuo Socc.orso of Italy, the friendly societies of Great Britain and the fraternal orders of the United States. In some countries this develop¬ ment reached very substantial dimensions es¬ pecially during the last 50 years. There' are

millions of members in these societies in France as there were in Great Britain before the in¬ troduction of the National Insurance Act of

1911.

Notwithstanding this substantial growth, some definite limitations are recognized to the usefulness and efficiency of this form of sick¬ ness or health insurance. The need for sˆ k bene¬ fits is- greater as one goes down the economic lad¬ der. It was usually found, however, that be¬ cause of the cost, largely the higher groups of the wage-working class insure while the un¬ skilled, low paid laborer seldom purchases such protection. And because the workmen cannot pay much, the service of these mutual insurance societies is usually meagre and inefficient.

Social health insurance is usually meant even when the shorter term ((health insurance® is used, because of the recognition of the great importance of health for the wage¬ worker or any other person of modest earnings. The social form presupposes some systematic effort of organized society to extend the bene¬ fits of health insurance through appropriate action. Simple regulative legislation has been found to have very little effect and can hardly be expected to have any important effect. It is seldom included under social insurance, un¬ less something more substantial is offered by the state or government — either financial sub¬ sidies, or the compulsory principle or both.

Existing systems of social health insurance may be divided into two groups — voluntary subsidized insurance in five countries (Den¬ mark, Belgium, France, Sweden and Switzer¬ land) and compulsory health insurance, which until now has been legislated in 10 European countries, chronologically arranged as follows : Germany, 1884; Austria, 1888; Hungary, 1891; Luxemburg, 1901; Norway, 1909; Serbia, 1910; Great Britain, 1911; Russia, 1912; Rumania, 1912; Netherlands, 1913. In addition many other countries have compulsory health insur¬ ance systems for specific industrial, groups (particularly mining, railroad and navigation). Compulsory social health insurance has there¬ fore become the predominating form of health insurance for wage-workers.

•Under the subsidized form, it is the effort of the state to stimulate the voluntary co¬ operative efforts through offers of financial aid from the public treasury. These subsidies were very slight in Belgium and France, somewhat higher recently in Sweden and substantial in Switzerland and Denmark; in the latter coun¬ try they represent nearly one-third of the total cost of insurance. The effect of the subsidies in stimulating insurance

is roughly proportionate to the amount of subsidy; Denmark showing the greatest effect, so that nearly 30 per cent of its population is insured.

Compulsory Health Insurance. — It is ar¬ gued in favor of the compulsory method, first introduced on a large national scale in Germany in 1884, that only through compulsion can the neediest and poorest of the wage-workers be brought under and kept under the insur¬ ance system, and moreover that only through compulsory system can a part of the cost of the system be placed upon the employers and industry. The ranid extension of the compul¬ sory type of legislation, especially since 1909, seems to indicate a general conversion to this point of view in Europe. It is understood

that but for the European War, several other countries would have been ready to introduce compulsory health insurance systems, and it is generally recognized that at least as far as health insurance is concerned, the compulsory principle has won among expert students of the problem after 25 or 30 years of experimenta¬ tion in Germanic countries.

Though the 10 compulsory health insurance acts differ considerably in the various details, they agree more or less in certain substantial features. The compulsion is usually made applicable to wage-workers or employed persons within certain income standards. It is not con¬ sidered necessary to include persons in com¬ fortable circumstances ; and persons without an employer are too difficult to keep under the system. For the same or other reasons cer¬ tain wage-groups are omitted. In all the 10 systems the employer is required to contribute a part of the cost, though the exact amount differs from one-third in Germany to one-half in Hungary. The justification for such con¬ tribution from the employer is found partly in the responsibility of industry for a certain por¬ tion of the illness among the employees, partly in the responsibility of industry to pay a living wage to the employee, and the recognition that support during, and care of, sickness must some¬ how come out of the wage, and finally in the consideration that the increased efficiency aris¬ ing from proper care of the employee will more than compensate the employer for the cost.

The state contribution to compulsory health insurance is a comparatively new principle, though it constituted the backbone of the ((sub- sidized voluntary insurance.® Norway made the first effort to include the state subsidy into the compulsory system, but the most important application was found in the British Act of 1911, where the state assumed two-ninths of the total cost, and in addition furnishes various numerous supplementary subsidies, which prob¬ ably make the state subsidy equal to about one-

third of the whole cost.

Benefits. — The benefits furnished by the va¬ rious systems vary in detail, but on the whole follow fairly well-defined standards. The es¬ sential two benefits are a weekly allowance and medical aid. The Holland Act of 1913 is the only one which furnishes no medical aid. The weekly benefit is usually fixed on the terms of a percentage of wages (50 to 66ˆ3 in various acts, 70 in Holland) but the British act deviates from this in establishing a uniform benefit rate of 10 shillings for men and 8 shillings for women. The duration of these weekly benefits is usually determined at 26 weeks, and thus a line of demarcation is drawn between sickness and chronic invalidity and disability. The British act compensates for invalidity as well, but at a different scale, and after the expiration of the ordinary sickness benefit.

The amount and kind of medical aid re¬ quired by the act varies, but in actual practice most of the older systems go beyond the re¬ quirements of the law in this respect, fairly furnishing hospital aid. Drugs, supplies, etc., must be furnished to the sick according to all the acts except that of Holland. There are two additional benefits which are almost as universal as the two essential ones. Under all the 10 acts, maternity benefits of some kind or other are given to the insured working women

who become mothers, and they usually con¬ sist of a special allowance for medical aid, etc. (or such medical and nursing aid in kind) and the regular money benefit for a specified num¬ ber of weeks (from 4 to 12 weeks) provided the mother abstains from work.

Finally all the acts, with the exception of the British, give a modest funeral benefit. Health insurance cannot undertake to solve the finan¬ cial problems arising out of the death of the family's breadwinner, but all the systems recog¬ nize the necessity of meeting' the unexpected funeral expenses at the time when the family is most helpless. In Great Britain this benefit was kept out of the National Insurance Act by the influence, of the large industrial life insur¬ ance companies, whose policies are held in such large numbers by the wage-workers mainly for the purpose of meeting funeral expenses.

There is a general tendency to extend the benefits of health insurance to the dependents of the insured wage-workers especially as far as medical and funeral and the maternity benefits are concerned. That is already required by the acts of. Hungary, Norway and Rumania, and is practised by a good

many large German funds. This is based upon the recognition that- the efficiency of the health insurance system in improving the general health conditions of the community would be seriously limited by ex¬ clusion of the wives and children from the benefits of the improved medical service.

Since the entire method of health insurance has originated in workingmen's mutual benefit societies this has considerably influenced the organization of social health insurance. In most acts a certain variety of organization is permitted. The basic or ideal organization is a ˆlocal® sick insurance fund, limited to a definite locality ; many such funds may, however, exist in the same locality, embracing various industries, or special funds may be organized for employees of individual establishments. These funds are administered according to the requirements of most acts, by joint boards representing employers and employees, accord¬ ing to their respective contributions to the cost. The British system is, however, organized on a very much different basis. The friendly so¬ cieties had been so strong at the time the act was passed, that to them, under a new designa¬ tion, ˆapproved societies,® was left the practical administration of the health insurance system. The essential difference is that these "approved societies® are administered exclusively by their insured without participation of the employers, that these societies are bound by no geographi¬ cal or occupational limits, that the choice be¬ tween any of them is unrestricted. Because of these conditions, it was found impracticable to entrust these, societies . with the administration of medical aid, which is managed bv independ¬ ent local committees. It is generally admitted that the British plan, from an administrative point of view, is not very efficient.

While these 10 acts are compulsory as to their application and as to certain specified benefits, they usually provide for voluntary ex¬ tension. Voluntary members within certain economic groups may be admitted and the numerous autonomous funds may extend the various benefits required by the law, either in time, amount or quality, or may add certain other benefits permitted by the act. This is

possible because of the financial autonomy, since under most acts the numerous funds are permitted to charge their insured and the em¬ ployers as much (within prescribed limits) as is necessary to pay the benefits agreed upon by the representatives of employers and em¬ ployees. Again the British act is an exception to this rule, since the law determines the weekly contributions which cannot be increased by the individual societies, in which the wage-workers are insured.

Growth. — Health insurance is the most de¬ veloped branch of social insurance next to compensation for industrial accidents, and is probably

the largest in actual extent of work done and funds collected and distributed. Probably from 40,000,000 to 50,000,000 wage¬ workers with their families in Europe enjoyed the protection of compulsory health insurance before the war. In 1912 the German system alone had 21,659 funds with 13,217,705 mem¬ bers, an income of 417,600,000 marks ($99,400,- 000) and an expenditure of 395,000,000 marks ($94,000,000). Of this amount $39,400,000 was paid in money benefits of various kinds, $20,- 400,000 for physicians' services, $13,000,000 for drugs, $12,800,000 for hospital treatment and only. $5,140,000, or less than Sl/2 per cent, for administrative expenses.

Movement in the United States.— With the rapid extension of workmen's compensa¬ tion for industrial accidents in 34 States in the brief period of 1911 to 1916, and also for in¬ dustrial diseases in a few States, an object les¬ son in social insurance methods has been given, which quickly developed into a demand for the extension of the same principles and methods to health insurance. In the fall of 1915 the American Association for Labor Legislation issued a tentative draft of a com¬ pulsory. health insurance act, which was intro¬ duced in the spring of 1916 in the legislatures of Massachusetts, New Jersey and New York. These bills failed of passing but led to the appointment of an investigating commission in Massachusetts and a similar commission ap¬ pointed in 1915 in California had specialized in health insurance. The American Medical As¬ sociation, the American Public Health Associa¬ tion, the National Conference of Charities and Correction and many similar organizations, as well as State federations of labor, and national or international labor unions have either formally endorsed or shown an earnest inter¬ est in health insurance. The United States Commission on Industrial Relations made a report in favor of it, and the United States Public Health Service and the United States Department of Labor have come out in sup¬ port of it. The public hearings held in Albany in March 1916, in Boston in March 1916 and again in October 1916 and in San Francisco in November 1916, have demonstrated a very live interest. in, and growing support of, the social health insurance movement. There is little doubt that the United States stand ready to enter upon a policy of health insurance more or less follow^ing various European standards.

Bibliography.— Rubinow, I. M.,

raphy) ; American Medical Association, Social Insurance Pamphlets, 1-7 (1916-17); Health Insurance, Standards and tentative draft of an act,

prepared by the American Association for Labor Legislation, 1916. See also references under Social Insurance.

HEALY, George Peter Alexander, Amer¬ ican painter: b. Boston, 15 July 1813; d. Chi¬ cago, 24 June 1894. He went to Paris about 1836, where he remained several years, alter¬ nating his residence there with occasional visits to the United States. Among works executed by him abroad are portraits of Louis Philippe, Marshal Soult and General Cass. At home he painted Calhoun, Webster, Pierce and other prominent American statesmen. He occasion¬ ally produced large historical pictures, of which (Webster's Reply to Hayne, } illustrating a well-known scene in American legislative his¬ tory, completed in 1851, now hangs in Faneuil Hall in Boston. At the exhibition of Paris in 1855 he exhibited a series of 13 portraits and a large picture representing Franklin urging the claims of the American colonies before Louis XVI, for which he received a medal of the 2d class. Portraits by him of Buchanan and Lin¬ coln are in the Corcoran Gallery at Washing¬ ton.

HEALY, John, Irish Catholic archbishop: b. Ballinafad, County Sligo, Ireland, 14 Nov. 1841 ; d. July 1918. He was educated at Sum- merhill College, Athlone, and at Maynooth Col¬ lege. In 1867 he was ordained to the priesthood, and became successively professor at Summerhill College, curate at Ballygar, County Galway, curate at Grange, County Sligo, and finally pro¬ fessor of theology at Maynooth from 1867 to 1883. He edited the Irish Ecclesiastical Record in 1883-84 and in the latter year was appointed coadjutor to Dr. Duggan, bishop of Clonfert. He succeeded the latter on 15 Aug. 1896 as bishop of Clonfert and in 1903 became arch¬ bishop of Tuam. As bishop of Clonfert he greatly advanced the cause of secondary edu¬ cation by founding a college at Cappatagle in 1892 ; this he subsequently transferred to Esker, Athenry, and in 1901 the college was removed to Ballinasloe. In 1884 Dr. Healy engaged in a controversy with Cardinal Newman on the ex¬ tent of the inspiration of the Bible. He was senator of the late Royal University of Ireland and was senator of the National University of Ireland and member of the governing board of University College, Galway. He was also com¬ missioner for the publication of the Brehon Laws. He published (Ireland's Ancient Schools and Scholars) (1890), the authoritative work in its special field; (Centenary History of May¬ nooth College) (1895); (Record of the Cen¬ tenary Celebrations of Maynooth College J (1896); (Life and Writings of Saint Patrick) (1905); Urish Essays) (1908) and contribu¬ tions to (The Catholic Encyclopedia (1910), the Dublin Review, Irish Monthly and the Irish Ecclesiastical Record.*

HEALY, Timothy Michael, Irish political leader: b. Bantry, County Cork, Ireland, 17 May 1855. He was elected to Parliament for Wexford in 1880,

County Monaghan in 1883, South Londonderry in 1885, North Longford in 1887 and County Louth, North, in 1895. In

*1884 he was called to the Irish bar. He be¬ came known as a leader of the Irish Nation¬ alist party, was a founder of the Dublin Na¬ tional Press (later combined with the Free¬ man's Journal), and was repeatedly in diffi¬ culties because of his public utterances on po¬ litical matters. He made a lecture tour of the United States with Dillon and Parnell in 1880, and in 1881 participated in the Land League convention at Chicago, when $250,000 were con¬ tributed to the Irish cause. The ((Healy Clause** of the Land Act of 1881, providing that no tenant should pay rent on improvements made by him, was introduced by him. He wrote (A Word for Ireland) (1886).*

HEAP, David Porter, American engineer : b. San Stefano, Turkey, 24 March 1843; d. 25 Oct. 1910. He studied at Georgetown College, was graduated from the United States Military Academy in 1864, served in the Civil War with the engineer corps of the Army of the Poto¬ mac and was brevetted captain for his services. In 1895 he attained the grade of lieutenant- colonel of engineers. He was for years em¬ ployed in the construction of fortifications and the improvement of harbors, and in 1881 was military representative of the United States at the Paris congress of electricians. In addition to a (Report on the International Exhibition of Electricity at Paris) (1884), he published (An¬ cient and Modern Light-Houses (1889) ; (Electrical Appliances of the Present Day) ; (Engineer Exhibit, Centennial Exhibition* (1882); and (History of the Application of Electricity to Lighting the Coasts of France**

(1885).

HEARING, one of the five senses, the physical organ of which is the ear See Ear; Acoustics.

HEARN, hern, David William, American Roman Catholic clergyman : b. Boston, Mass., 21 Nov. 1861 ; d. 16 Sept. 1917. He was gradu¬ ated at Boston College in 1880; took post¬ graduate courses in literature, science and philosophy for five years, and theological courses for four; entered the Society of Jesus, and was ordained priest of the Roman Cath¬ olic Church. He was successively professor in Georgetown University, vice-president of Bos¬ ton College and vice-president of the College of Saint Francis Xavier, New York. In 1900 he became president of Saint Francis Xavier. His term as president ceased September 1907, and he was appointed dean of Boston College. In 1909 he became head master of Loyola School and rector of Saint Ignatius Loyola Church, New York. He built and opened in 1914 the Regis High School, the first Roman Catholic free high school. His term of

office ended 27 Sept. 1915, when he was appointed dean of Canisius College, Buffalo, N. Y.

HEARN, Lafcadio, American author : b. Santa Maura (Leucadia), Ionian Islands, 27 June 1850; d. Tokio, Japan, 26 Sept. 1904. His father was an Irish officer, his mother a Greek. Educated in England and France, he came to the United States in 1869, was a jour¬ nalist in Cincinnati and New Orleans, in 1887-89 was at Saint Pierre, Martinique, French West Indies, and in 1890 went to Japan. He became

Japanese subject with the name Yakumo Koizumi, and was appointed lecturer in Eng¬ lish literature at the Imperial University of Tokio. His (Stray Leaves from Strange Lit¬ erature } (1884), and (Some Chinese Ghosts } (1887), were succeeded by (Chita: A Memory of Lost Island > (1889), story of the destruc¬ tion of ((1896); 'Gleanings in Buddha-Fields) (1897) ; (Exotics and Retro¬ spections (1898); and 'Kotto, or Japanese Curios) (1902); (In Ghostly Japan*; (Japan: An Attempt at Interpretation ; and 'Kwaidan* (1904). Consult the 'Life and Letters* (1906) and the 'Japanese Letters) (1911), ed. by Bis- land; the Japanese Appreciation by Noguchi in the Atlantic Monthly (1910); Setsuko Koi¬ zumi (Mrs. Hearn), 'Reminiscences of Laf- cadio Hearn. **

*HEARNE, Samuel, English explorer; b. London, England, 1845; d. 1792. He entered the service of the Hudson's Bay Company, and was sent out to Fort Prince of Wales on Hud¬ son Bay. After two abortive efforts in 1769, he in 1770 set out on his third and successful attempt to discover the Coppermine River, reached its mouth in July 1771, and returned to Fort Prince of Wales in 1772. Two years later he built Cumberland House, on the Sas¬ katchewan. See Tyrrell's edition of his jour¬ ney from Fort Prince of Wales Fort in Hud¬ son's Bay to the Indian Ocean. **

HEARST, Phoebe Apperson, American philanthropist: b. 1842; d. Pleasanton, Cal., 13 April 1919. She was for a time a teacher, and in 1861 married George F. Hearst of California ; William Randolph Hearst is her .son. She was active in charitable and philanthropic enterprises and gave largely, especially to educational in¬ stitutions. In San Francisco she established kindergarten classes for the children of the poor and a manual training school, and organized a number of working girl's clubs. She also gave money to build a National Cathedral School for girls ; made donations to the Ameri¬ can University at Washington; established and gave largely to public libraries in the mining towns of the West; and

maintained a school for mining engineers at the University of Cali¬ fornia. In 1896 she offered to pay the ex¬ penses of an international competition of archi¬ tects to obtain a suitable plan for a campus and buildings for the University of California, and to erect two buildings in accordance with this plan. See California, University of.

HEARST, herst. Sir William Howard,

Canadian statesman : b. Arran township, Bruce County, Ontario, 15 Feb. 1864. He was educated at Collingwood Collegiate Institute and Toronto University. He was called to the bar in 1888 and

began practise at Sault Sainte Marie, where he held a leading place as counsel. He was elected member for Sault Sainte Marie to the provincial legislature in 1908 in the Conservative interest, became Minister of Lands, Forests and Mines in the administration of Sir James Whitney in 1911, and on the death of that statesman in 1914 succeeded him as Premier of Ontario.

*HEARST, William Randolph, American newspaper publisher: b. San Francisco, 1863. Educated at Harvard, on leaving college he t?°k charge of the publishing of the San Fran¬ cisco Examiner, formerly owned by his father. Senator Hearst of California. In 1895 he bought the New York Journal, the name of the morning edition of which he later changed to the Ameri- cow • in 1900 he started the Chicago American ; in 1904 the Boston American and the Los Angeles Examiner. He is also proprietor of the Chicago Examiner, the Atlanta Georgian, the New York Evening Journal, the New York Deutsches J ournal, the Cosmopolitan Magazine , Hearst s Magazine, Good Housekeeping , Har- Pe/s Bazar, Motor Magazine and Motor Boating Magazine. In 1902 he presented the Greek lheatre to the University of California. He represented the 11th Congressional District t irmrˆork) in.the 58th and 59th Congresses, u an<ˆ a£a*n in 1909 he was defeated for e niayor of New York city and in 1906 for governor. Under him so-called "yel- low journalism** throve and the typography of all American newspapers materially changed. He is credited with the invention of the "spread news head.** He is in control of the syndicate known as the International News Service.*

HEART, Anatomy and Functions of the.

The continuity of life depends upon nutrition supplied to the individual organs that together constitute the human body. The nutritive ma¬ terial is the blood ; its equable distribution is accomplished by a central pumping organ known as the heart.

Situation and Anatomical Relation.—

1 his organ is situated in the central and lower part of the thoracic or chest cavity and rests upon the upper convex surface of the diaphragm. It is pear-shaped, with its base directed upwards backwards and toward the right side; while its apex points downward and forward to the left side and strikes the chest wall in the space be¬ tween the fifth and sixth ribs, one to one and a half inches to the right of an imaginary line drawn vertically through the left nipple. The heart is enclosed in a sac called the pericardium. The anatomical relation between the pericar¬ dium and the heart is such as to allow the lat- ter, within its envelope, relatively free motion. This is necessary in order to enable the heart to perform the physiological function of con- trollmg the. circulation. But to maintain this liberal mobility, and at the same time to keep the heart .within its proper boundaries, the peri¬ cardium is secured to its adjacent structures; namely, beneath, to the central tendon of the diaphragm; in front, to the breastbone (ster- nˆm) > laterally, to the sides of the coverings of the lungs facing the pericardium (medias¬ tinal pleura) ; and behind, to the anterior sur¬ face of the food-conducting-tube (oesophagus) and the large wind pipes (trachea and large bronchi).

Dimensions and Structure.— The size of

the heart gradually increases until middle life, from which time it remains practically un¬ changed until old age ; then it gradually di¬ minishes. The average weight of the heart has been calculated to be one one-hundred-and-fif- tieth (1/150) of the weight of the body in the male, and one one-hundred-and-sixtieth (1/160) in the female. The dimensions of the heart in adults are about five inches in length, three and a half inches in its greatest width and two and one-half inches in its extreme thickness. Con¬ sidering the topography of its normal apex and its dimensions and position, it is evident that the major portion of the heart lies to the left of the median line. By virtue of the structure of its component parts the heart is able to di¬ rect and control two currents of blood which differ from each other in their chemical com¬ position, and hence in their functions. One of the currents leaves the heart by one channel and, after traversing a designated distance and performing its function, returns to the heart by another avenue, to leave it again through an¬ other exit ; and ultimately returns to the place where it first left the heart. Because of this uninterruped circuitous course, Harvey in 1628 named it Circulation. This circulation contin¬ ues throughout the life of the individual.

The heart is a hollow, muscular pouch, whose interior is divided by a longitudinal par¬ tition into two cavities, which have no direct communication with each other. From their anatomical position in the chest cavity, these two heart cavities are called, respectively, the right and the left heart. Each of these hearts is in turn subdivided transversely into two compartments ; the upper is called auricle and the lower ventricle. The two chambers of each heart communicate freely with each other ; that is to say, the right auricle with the right ventricle, and the left auricle with the left ven¬ tricle. This is accomplished through openings between them called the auriculo-ventricular openings. These apertures of communication are guarded by valves which are so constructed that they automatically open and close within a given period of time, thereby allowing a stream of blood to pass freely from the auricle to the ventricle, but not in the opposite direction.

The capacity of each chamber of the heart in adults is about three to three and a half ounces. The wall of the heart is composed of three coats. The outer coat is called the epicardium and constitutes one of the component layers of the pericardial sac. The inner surface of the two pericardial layers are required to glide over each other during the movements of the heart. To prevent their undue friction, the sac is provided with a lubricating substance, called lymph or pericardial fluid. The middle coat is actually the muscle of the heart, and is called the myocardium. It is made up of bands and layers of muscular tissue, very in¬ tricately arranged. The accounts of their in¬ terlacement, given by different investigators, vary. It is certain, however, that three dis¬ tinct units can be identified, namely, the fibres of the auricles, those of the ventricles and the auriculo-ventricular bundle of His, so named after its discoverer. The work performed by muscles in general depends upon two properties that they possess, extensibilty and perfect elastic¬ ity. The rhythmic exercise of these two properties by the myocardium creates sufficient kinetic

energy for the propelling of the blood currents. The inner coat, called the endocardium, lines the whole interior of the heart. By its redupli¬ cation, the endocardium forms part of the valves at the auriculo-ventricular and arterial orifices, namely, between the auricles and their respective ventricles and the ventricles and the vessels that emerge from them. Each orifice is encompassed by a strong fibrous ring which serves for the attachment of the, corre¬ sponding auriculo-ventricular muscle and its valve. The rings at the arterial orifices bind the lower margin of the ventricular muscle and its valve. The boundary between the auricles and ventricles is marked by a perceptible groove in which lie the nutrient vessels (coronary ar¬ teries) of the heart substance.

Systems of Control. — The action of the heart's mechanism is subject to the

absolute control of two sets of nerves. These are the cardiac branches of the two nervous systems, the cerebro-spinal and the sympathetic. They pass to the heart and terminate in its wall as ganglionic cells whose filaments in turn are distributed among the muscular fibres of the heart. The action of each of these two systems is antagonistic to that of the other. The sym¬ pathetic system produces acceleration of the heart beats and is therefore called the acceler¬ ator nerve; while the influence of the cerebro¬ spinal system is just the opposite and is named the inhibitor}- nerve, as it checks the augment¬ ing and accelerating action of its opponent.*

Under normal circumstances, there exists an equilibrium in their activity, which results in the rhythmic and steady action of the heart. This consists of the simultaneous contraction of both auricles, termed the auricular systole ; followed, after a slight pause, by a simultaneous contraction of both ventricles, called the ven¬ tricular systole. A general relaxation (dias¬ tole) of the whole heart completes the cardiac cycle. The average duration of a cycle is about eight-tenths of a second, which is divided ap¬ proximately as follows : Auricular systole, one- tenth ; auricular diastole, seven-tenths ; ventric¬ ular systole, three-tenths ; ventricular dias¬ tole, five-tenths ; common pause, four-tenths. The heart rests a little over nine hours out of every 24. During this period of rest, the heart accomplishes for itself what it does for the rest of the body in nearly 14 hours — that is; it feeds itself. This is done by the blood passing through the coronary arteries into the heart, whence the deoxidized blood is returned through the coronary sinus into the right auri¬ cle. The blood that feeds the tissues is called arterial blood. Its color is bright red, and it is carried in vessels known as arteries. (Vessels that carry blood from the heart are known as arteries irrespective of the kind of blood they carry and those bringing the blood to the heart are known as veins). During its travel through the system, the blood gives up its nu¬ tritive elements and becomes dark red in color ; and is then transferred, through the intermedi¬ ary of microscopic vessels called capillaries, into another set of vessels, termed veins. The veins, through an extensive ramification of ves¬ sels throughout the body, collect venous blood, and carry it into the right auricle through two large venous trunks called the superior and in¬ ferior vena cava. During the auricular systole, the venous blood is forced into the right ven-

tricle. When this chamber is filled, the auricu- lo-ventricular bundle of His conveys the im¬ pulse of systolic contraction to the ventricle, and the next phase of the cardiac cycle sets in. During this period the auriculo-ventricular valve (tricuspid on the right side, bicuspid on the left) closes to

prevent regurgitation of the blood into the auricle. The vibrations result¬ ing from the ventricular contraction and the forcible closure of the valves are productive of the first sound of the heart. At this time the intra-ventricular pressure is high. The closed auriculo-ventricular valves at this instant are subjected to this pressure, since they then form the roofs of the ventricles. To prevent their diverging upward into the auricles, the valves are provided with non-elastic cords (chordae tendinae), one end of which is attached to the ventricular wall and the other to the under-sur¬ face of the valve. The contraction of the right ventricle forces the blood into the pulmonary artery, the resistance of which causes the clo¬ sure of the semi-lunar valve guarding its ori¬ fice. The closure gives rise to the second sound of the heart. Immediately thereafter, the ventricle relaxes and the auriculo-ventric¬ ular valve opens ; and the pressure from be¬ hind forces the blood into the lung capillaries, where it becomes oxidized by the absorption of oxygen from the alveoli of the lungs. It is then propelled through the pulmonary veins into the left auricle. This constitutes the pulmonary or lesser circulation.

Governed by identically the same physical laws and accompanied by the same phenomena described in the circulation of the right heart (the same action takes place in the left heart simultaneously with the action in the right heart), the blood which is now arterial is pro¬ pelled from the left auricle into the left ventri¬ cle; from there into the aorta (the largest ar¬ tery in the human body) and traversing the arterial capillary and venous channels, it finally reaches again the right auricle. Thus the greater or systemic circulation is completed.

The systemic circulation controlled by the left heart and the pulmonary circulation con¬ trolled simultaneously by. the right, together constitute the entire function of the heart.

Bibliography. — Bancroft, Frank Watts and Esterly, C. O., (A Case of Physiological Polar¬ ization in the Ascidian Heart) (Berkeley 1903) ; Barker, Lewellys Franklin, (The Clinical Diag¬ nosis of Internal Diseases (New York*

1916)- J. OSHLAG, M.D.

HEART, Diseases of the. The heart is a sensitive register of the condition of the entire human system. When an acute disorder sets in in our body, irrespective of the distance from the heart, and even while the heart itself is en¬ joying absolute integrity, the action of the heart changes almost instantaneously. Whether the lesion is a gouty swelling of the big toe, water around the lungs (pleurisy with effu¬ sion), or an abscess in the middle ear, the heart will at once indicate the disturbance by its ac¬ celerative

action, as it sends an increased force of white blood corpuscles to the seat of the trouble. A decrease in the quantitv of the col¬ oring matter of the blood (Hemoglobin) causing anaemia, or a foreign substance circu¬ lating in the blood, as bile in the case of jaun¬

dice, will at once alter the normal action of the heart.

Structural Deterioration. — Temporary em¬ barrassment of the heart caused by any systemic disturbance does not produce any structural de¬ rangement in its substance. The elimination of the disease or disturbance as the case may be will be followed, as a rule, by the restoration of the heart to its normal state. If, however, the disturbance continues, and the heart is required to labor under abnormal conditions for a long time, the added exertion leaves an unfavorable effect on its structural soundness ; its nutrition becomes impaired, and its working capacity gradually exhausted. These phenomena are due to physical laws of cause and effect, though the cause is often obscure. The gradual prog¬ ress of deterioration of the heart can in very many instances be traced with precision to the diseased organ which causes it, as for example, in diseases of the kidneys.

The function of the kidneys is to separate the urinary constituents from the blood, which, in order to free itself of its effete materials, such as urea, etc., enters the kidneys through the renal arteries. These arteries divide' and subdivide within the substance of the kidneys and finally terminate in collections of capillaries, called glomeruli. The blood is forced into the glomeruli by the heart. In some diseases of the kidneys, as in interstitial nephritis, a permanent destruction of glomeruli takes place, and yet the same quantity of blood as in the normal state of the organ is forced through the remaining capillaries. To accomplish this task a superior force is needed and the heart has to furnish ad¬ ditional energy, the amount of which is in di¬ rect proportion to the number of vessels de¬ stroyed. This additional work of the heart is made possible by a gradual increase in the thickness of the myocardium. But this increase cannot go on indefinitely, and an incompetency of the heart is finally observed in the general circulation. Such sequential cardiac disability invariably sets in, whenever the heart encoun¬ ters abnormal and permanent resistance, irre¬ spective of the cause or place of such resistance.

Among, other extrinsic influences that lead to cardiac inadequacy, there is one wielded by paroxysmal tachicardia (palpitation). In this condition, there is a derangement in the action of the heart without there being any demon¬ strable cardiac disease. The number of beats often reaches to about 250 per minute. This extraordinary labor deprives the heart of its rest and proper nutrition, and eventually leads to its exhaustion. The attacks come on in paroxysms and are probably due to some de¬

rangement in some of the internal organs, which thereupon reflexly produce the pernicious effect upon the heart's mechanism.

Among the cardinal symptoms of exoph¬ thalmic goitre, tachicardia is the most distress¬ ing one ; and if its influence is not checked it ultimately brings about a morbid condition in the heart's mechanism. The exact cause of tachicardia and the pathology (structural changes) that underlie its promulgation are still definitely undetermined. It is however rea¬ sonable to presume that the inhibitory nerve, through some unknown cause, loses its restrain¬ ing influence on the action of the sympathetic nerve.

The morbid change an organ has to undergo because of a disease existing in another part of the body is called a secondary disease, while the original lesion in any of the organs is known as a primary disease. Most diseases of the heart are secondary. The component parts of the heart are affected individually, each dis¬ ease constituting an entity and presenting sali¬ ent symptoms characteristic of the particular part involved. Thus a lesion in the endocar¬ dium, called endocarditis, differs from one of the myocardium, known as myocarditis. But the interrelation between the heart's constitu¬ ents is such that the myocardium is always made to suffer whenever its adjacent structures are affected by disease.

How the Heart is Infected. — It is estab¬ lished beyond doubt that the blood, in all infec¬ tious diseases of known origin, harbors the spe¬ cific organisms of those diseases. Impregnated with these disease-generating microbes, the blood, during its travel through the heart, comes in contact with the endocardium. This constant exposure of the endocardium to these infectious agents renders it an extremely sus¬ ceptible prey to inflammatory processes known as acute endocarditis. The following bacteria have a special predilection for the endocardium and are, therefore, more often prone to excite endocardial trouble : the streptococci, staphy¬ lococci, gonnococci, pneumococci and micrococ¬ cus rheumaticus. The severity of the symp¬ toms, according to which the disease is divided into two classes, namely, simple or mild, and malignant or severe endocarditis, depends upon the virulence of the invading bacteria. The simple form of the disease does not always cause destruction of life directly. The patient usually recovers; but is left with crippled valves which ultimately cause his death ; while the malignant type invariably terminates fatally. The left heart is affected more frequently, prob¬ ably because the blood it carries is relatively rich in oxygen which is essential for microbic growth and activity. The skin and the mucus membranes (the inside lining of the organs) are the

portals through which those microbes gain their entrance into the system. Cases are recorded where insignificant injuries to the skin, such as the prick of a needle, were fol¬ lowed by malignant endocarditis, long after the local wounds had healed. The infections that originate in the mucus membranes and are directly responsible for the subsequent develop¬ ment of acute endocarditis are very numerous. The most prominent of these infections are abscesses in the nose and its adjacent sinuses; some diseases of the larynx and trachea; sup¬ puration in the mouth, such as abscesses around the teeth; diseased tonsils; ulcerations of the lining of the intestines, which constitute the lesions in typhoid fever, in dysentery and in intestinal tuberculosis ; infection of the gall bladder; diseases of the genito-urinary canal such as gonorrhoea, and infections following retention of the afterbirth (placenta) ; all these are perpetrators of that evil — endocarditis.

Although the whole endocardium of the af¬ fected heart-chamber is involved, the valves bear the brunt of the trouble. They lose their superficial layer of cells, called endothelial cells, and the now raw surfaces become covered with white blood corpuscles and fibrin (constituents of the blood). These new elements are known

as vegetations ; and as the disease progresses still other structural changes take place in the valve-substance ; a new growth of fibrous tissue develops, which causes the valve to become thick, distorted and rigid. This new growth has a tendency to contract and thereby causes a diminution in the dimensions of the valve. Its flaps being shortened do not approximate perfectly, when they are required to do so, and the closure of the auriculo-ventricular and arterial orifices is rendered imperfect. At other times, the flaps of the diseased valves become adherent either to their surrounding structures or to one another. The valve is then unable to open freely when it should do so. Thus the structural alterations in the valves render them incapable of properly performing their physiological function ; that is to say, they do not open at the right time, in order to furnish a free passage to the blood current through the designated orifice. This condition is known as obstruction or stenosis of the valve. On the other hand the contracted valves do not per¬ fectly close the orifices which they are made to guard, and, therefore, are unable to prevent a backward flow of the blood. This condition is known as insufficiency of the valve, also as regurgitation, because of the backward flow of the blood.

Obstruction and insufficiency may coexist in the same valve. Insufficiency of the left auric¬ ulo-ventricular valve, known as the bicuspid or mitral, is of the most frequent occurrence among the diseases of the endocardium. The imperfect closure of the orifice during the ven¬ tricular contraction allows a part of the blood from the ventricle to regurgitate into the left auricle which is then receiving its normal blood supply from the pulmonary

veins. The auricle under pressure is now obliged to accommodate twice as much blood forced into its cavity from the two opposite sources. The forcible en¬ counter of the two waves coming from the opposite directions causes them to rebound, producing a vertiginous movement of the blood which gives rise to a blowing sound called car¬ diac murmur. As the murmur occurs during the ventricular systole, it is, therefore, known as a systolic murmur. The auricle, in order to accommodate a larger quantity of blood, must expand its cavity. This expansion is accom¬ plished through the forcible stretching of the auricular wall and is known as dilatation. At this time, the over-distended auricle being forced to overcome the greater amount of re¬ sistance it encounters in propeling the larger quantity of blood from its cavity, must utilize a proportionately greater amount of force. This is made available by a gradual increase in the bulk of the auricular myocardium known as hypertrophy. The left ventricle which is the recipient of the auricular contents is now subjected to the same structural alterations; namely, to dilatation of its cavity and hyper¬ trophy of its wall.

When the evolution of the cardiac changes are in direct proportion to each other, namely, the more dilatation, the more hypertrophy, the heart is said to be in a state of compensation; at which time the disturbance is still confined to the left cardiac chambers.. The great stress thrown on them is not felt in the general cir¬ culation, since the greater quantity of blood the ventricle propels with each systole does

not reach the arterial system, but is forced back into the auricle. But this equilibrium is relatively short lived. The left myocardium becomes exhausted from abnormal activity, and the left ventricle can no longer expedite the blood-current. The stagnation which ensues in the ventricle extends into the impotent auricle, and the whole task of maintaining both the systemic and the pulmonary circulations is thrust on the right ventricle. Compensatory hypertrophy, which develops in the right ven¬ tricle, enables it to perform its double function but for a short time. The extraordinary resist¬ ance it encounters gradually exhausts its myo¬ cardium and phenomena of stagnation sets in. The veins, unable to empty themselves freely, become overdistended, and the watery constitu¬ ent of the blood they contain, transuding through their walls, infiltrate the surrounding tissues and cause oedema (swelling). The stasis in the pulmonary capillaries interfere with the proper oxidation of the blood, and produces the distressing symptom of dyspnea (shortness of breath). The poorly aerated blood becomes bluish in color, giving rise to the third charac¬

teristic symptom of a non-compensated heart, namely, cyanosis (blueness). All the other organs, such as the liver, stomach, spleen, kid¬ neys, etc., are in a state of venous stasis (pas¬ sive congestion). Deprived of proper nutri¬ tion, they become crippled, functionate imper¬ fectly, and often in a perverted manner. To relieve itself and alleviate the difficult situation, the heart utilizes its periods of rest by con¬ verting them into periods of work, often doubl¬ ing the number of beats per minute. This tachicardia, as merely an expression of cardiac distress, differs from the paroxysmal variety, which produces distress.

Medical science when judiciously employed can often restore the decompensated heart ; and the disorganized members of the human economy are again brought into a harmonious state. This is accomplished through the me¬ dium of two groups of remedial agents ; one group exerts its restraining influence upon the action of the sympathetic nerve, while the other group acts directly on the inhibitory nerve by augmenting its power of inhibition.

Stenosis and insufficiency of the other valves of the heart cause that organ to undergo prac¬ tically the same morbid changes as described in mitral insufficiency. There are, however, some modifications which occur during the evo¬ lution of the different pathological conditions. But the ultimate result in the heart itself, the disturbed relations and often the perverted functions which ensue in all the other organs of the body are identically the same.

Bibliography. — Dock, George, (Diseases of the Heart) (Philadelphia 1908) ; Krehl, Lu- dolf, (Die erkrankungen des herzmuskels und die nervosen herzkrankheiten > (Vienna 1913); Neuhof, Selian, (Clinical Cardiology (New York 1917).*

J. OSHLAG, M.D.

HEART IN ART AND SYMBOLISM.

The heart is commonly considered the symbol of Charity. In ecclesiastical lore Pugin says : (

should be of ruby color, as an emblem of the intensity of divine love.® In ecclesiastical art an emblematic device is that termed the "in flamed heart® ; it is in the form of a conven¬ tional heart surmounted by flames. An inflamed heart is frequently placed between the hands of sculptured or painted saints to symbolize, in such cases, their love of God. The inflamed heart symbol is greatly favored by the Jesuits, who frequently represent Jesus Christ holding his robe open and displaying an abnormally large

inflamed heart in the centre of the breast. According to Husenbeth the following saints have a heart as attribute: Francis of Sales has been pictured with the sacred heart of Jesus crowned with thorns above him in glory, or holding a heart in his hand; Saint Augustin has been variously depicted holding an inflamed heart, an arrow or two arrows crosswise in a heart; Saint Catherine of Siena has been rep¬ resented as crowned with thorns, crucifix and inflamed heart, or with a crucifix upon a heart, or holding an inflamed heart; Saint Mary Magdalen of Pazzis has been pictured with an inflamed heart and crown of thorns; Saint Theresa has been depicted with an inflamed heart in her hand; Saint Jane Frances has been represented also holding a heart; Saint Anzano has been pictured carrying a heart and liver. An Egyptian method of interment was that of abstracting the human organs before the process of embalment and placing these separately in vases, termed "canopic® (see Vases). One of the four vases held the heart and lungs and was surmounted by a cover representing a jackal head; it personified Tuamutef (a son of the god Horus) who presided over these two organs. Whether or not traceable to this ancient rite of the Nile dwellers, the fact re¬ mains that during the 12th and 13th centuries the burial of the heart in a separate and dis¬ tant tomb apart from the body of the deceased was a custom frequently carried out. It may have found its impulse in the Crusaders who dying in foreign lands were desirous that their hearts (sometimes supposed to be the seat of the soul) should find final repose on their native soil. The practise of burying parts of the body in different places was forbidden by Pope Boni¬ face VIII (end of 13th century), but Pope Benedict XI, his successor, allowed Philip le Bel to carry out this rite with members of his family. Known heart-burials of exalted per¬ sons are: William of Estonville, archbishop of Rouen, at Rouen Cathedral, 1067; Stephen brother of Alan the Black and Red, at Saint Mary's Abbey, York, 1104; Robert de Arbrissel; founder of the Order of Fontevrault, in a monas¬ tery at Orsan, 1117; Giffard, bishop of Win¬ chester, at Waverly Abbey, 1127; King Henry I, at Saint Mary de Pre, Rouen, 1135; William, 3d Earl of Warren, slain by the Turks in the Holy Land, 1147, had his heart sent to Eng¬ land and deposited in Lewes Priory; King Rich¬ ard I, the Lion-hearted (Ccenr de Lion), of England, had his heart buried in Rouen, body at Fontevrault (Font-Everard), end of 12th cen¬ tury; Louis VIII, at Auvergne, 1226; Henry III, of England, at Fontevrault (body in West¬ minster Abbey), 1272; Philip le Hardi, at Saint Denis (bowels at Narbonne), 1285; Eleanor, mother of Edward I, in choir of Friars Predi¬ cant, London (body in Westminster Abbey), 1290; Eleanor, wife of Edward I, heart in Black

Friars, body in Westminster Abbey, bowels in Lincoln Cathedral, 1296; Edward I, at Jerusa¬ lem, 1307. Robert Bruce, of Scotland, deputed Douglas to bury his heart in Jerusalem, but Douglas was killed in Spain fighting the Moors, and the Bruce heart was found in a silver case fastened to his neck; it was buried in West¬ minster Abbey, 14th century. Louis XII, found heart-burial at La Chapelle d'Orleans, bowels at Les Celestins, 1515; Frangois I, at Haute Bruyere. Other kings having separate heart burials were Henri II, 1559; Frangois II, 1560; Louis XIII, 1643; Emperor Leopold, 1705; Louis XIV, 1715, etc. The list is so long of such heart-burials so far discovered that they have formed complete works. Consult Petti¬ grew, T. J., (Chronicles of the Tombs (Lon¬ don 1878) ; Hartshorn, Miss, (Enshrined Hearts of Warriors and Illustrious People> (London*

1865).

Clement W. Coumbe.

HEART OF MID-LOTHIAN, The. Sir

Walter Scott's novel, published in 1818, takes its title from the Old Tolbooth prison in Edin¬ burgh, the scene of the Porteous riots of 1737, with a description of which the story opens. The narrative involves a varied group of well- drawn figures, English and Scottish, but it is on the family of the uncompromising old Came- ronian, Douce Davie Deans, that Scott dwells with the most loving care, producing a portrait of the Scottish national character which is per¬ haps his very greatest achievement as a novelist.

Effie, the somewhat wayward but not deeply vicious daughter of Davie, has allowed herself to be seduced by George Staunton, alias Robert¬ son, a young Englishman of good birth, dark and turbulent in spirit, but not without virtue, who has led a wild life among the Scottish smugglers. In order to rescue her from prison, where she is awaiting trial for child-murder, Robertson becomes leader of the revengeful mob which broke open the Tolbooth to seize and execute the unpopular Captain Porteous, but Effie, who has the keenest sense of her dis¬ grace, refuses to escape. The real heroine of the story is Jeanie Deans, half-sister of Effie, a plain woman of sterling worth, firm in the Calvinistic faith for which her father has fought and suffered. She is told by Robertson that she can save Effie's life by affirming that her sister had informed her of her condition before the birth of her child. Though she is convinced of Effie's innocence, her conscience will not permit her at the trial to speak aught but the truth. The application of the Scottish statute hinges on this point and Effie is sen¬ tenced. There is but one way left to save her, and Jeanie resolves to take it. Alone and mostly on foot, she journeys, a simple Scottish peasant girl, to

London, to seek a pardon from the king. Escaping, on the way, from the clutches of the terrible Meg Murdockson and her insane daughter, Madge Wildfire, she presents her case in person to the Duke of Argyle and later through his assistance to Queen Caroline, who, moved by Jeanie's simple eloquence, commutes the sentence to banishment. Returning she finds that the good Duke has provided a home for herself and her father and a living for her excellent lover, Butler, on one of his High¬ land estates, and that Effie, on her release, has eloped with Staunton. From this point the

deeper interest of the story slackens. Years pass. Staunton falls heir to a great estate and Effie becomes a lady of fashion. Jeanie, com¬ ing by chance on a copy of the dying confes¬ sion of Meg Murdockson, learns that Effie's child is still alive. Staunton, after tracing him into the hands of the Highland maurauder, Black Donacha, is attacked by the outlaws and slain by the hands of his own son. The latter is sent to Virginia where he meets a violent death. Effie spends some time with her sister and returns to London, carrying with her the sorrow of soul which has always been the pun¬ ishment for her sin.

(The Heart of Mid-Lothian is remarkable among Scott's novels in that the local, histori¬ cal and romantic elements, though present throughout the story, are outweighed in in¬ terest by the true and beautiful portrayal of a simple human personality. Jeanie Deans com¬ mands the deepest affection and admiration of all Scott's characters. Her fortitude, her right¬ eousness, her self-sacrificing loyalty and her indomitable will, combined with the shrewd¬ ness and good sense of the Scottish peasant, make her a heroine of an entirely different stamp from the pale Rowenas of romantic fic¬ tion. Simple and modest as she is, she has the courage, born of love, to surmount all obstacles and to stand unawed before dukes and kings. More after Scott's usual manner but scarcely less memorable is the historical portrait of the Duke of Argyle, that noble friend of Scotland, in whom the love of country and a keen relish for the simple virtues of its inhabitants have not been dimmed by rank and power. For references, consult article Ivanhoe.*

James H. Hanford.

HEART-URCHIN, one of a group of sea-urchins (see Echinoidea) of elongated form and cordate outline from a lateral point of view. The group is best represented by the genus Spatangus, common in Europe, but heart-urchins occur elsewhere, and are known as fossils.

HEARTS-EASE, a violet (q.v.), especially the common yellow violet of Europe, or a pansy.

HEAT. Until the early part of the 19th century, it was generally believed

that heat is a substance devoid of weight (imponderable), and diffused through the mass of bodies. This hypothetical substance was called caloric. Many phenomena seemed to be explained by the as¬ sumption of the existence of caloric, but finally, through the experiments of Davy and Rumford, in which heat was actually created from me¬ chanical energy, the old caloric theory was aban¬ doned. In its place we now have the molecular motion theory. According to this theory heat is nothing but a violent agitation of the mole¬ cules of matter. These molecules are extremely minute, but have a definite size and weight for each definite substance. It has been estimated that a molecule of water has a diameter of about one forty-millionth of an inch. Though mole¬ cules are small in size, their velocity, even at ordinary temperatures, is very great. In air, in which the molecules dart about in straight lines until they encounter other molecules, they at¬ tain a speed of 1,470 feet a second at the freezing temperature. The average length of their path between two encounters — the mean free path — 4s about 1-277,000 inch, and the number of

molecules in a cubic inch of air is 443 million million million. Each molecule experiences about 5,000,000,000 collisions a second.

Expansion of Solids, Liquids and Gases. — The molecules of any substance attract one another with a force called cohesion. It is co¬ hesion that prevents a wire from breaking when it supports a heavy weight. The pressure of the atmosphere also helps to hold the molecules of a body together. Opposed to both of these forces is heat. The effect of the agitation of the molecules is to make them jostle one an¬ other apart. Thus it is that in general an in¬ crease of temperature results in expansion. In solids, in which the cohesion is enormous, the expansion for a given increase of temperature is very slight, especially when the test is made at low temperatures. At higher temperatures, when the molecules have somewhat weakened their mutual hold through having moved further apart, an increase of temperature equal to the previous increase generally results in a somewhat greater expansion. To express such ideas technically we employ the expression co¬ efficient of linear expansion, which means the fraction of its length that a bar expands when heated 1° Centigrade. As the length varies with the temperature, the length at the freezing point, 0° C., is taken as the standard length. Using then this expression, we may say that the coefficient of expansion of a solid gen¬ erally increases with the temperature. The co¬ efficient of linear expansion of a number of sub¬ stances will be found in the following table :

Coefficients

of Linear

Expansion of Solids.

Aluminium .

0.0000222

Pine .

0.0000054

Gold .

0.0000147

Beech .

0.0000026

Wrought iron . . . .

0.0000121

Ash .

0 . 0000095

Cast iron .

0.0000106

Mahoganv. .

0.0000036

Lead .

0.0000271

Vulcanite .

0.0000636

Platinum .

0 . 0000093

Paraffin .

0.0001303

Copper .

Zinc .

0.0000167

0.0000297

Quartz, vitri¬ fied .

0.00000026

Silver .

0.0000192

Ice .

0.0000510

Steel .

0.0000123

Glass tubing . .

0.0000083

German silver . . . Inv^r .

0.0000183

0.00000087

Glass, Jena therm. 59 III

0.0000058

Porcelain . 0 . 000004 1

Two notable cases may be remarked. It is seen from the table that the coefficient for glass is very close to that for platinum. This fact is taken

advantage of in the construction of incandescent electric lamps, and of those scien¬ tific instruments where it is necessary to have a wire pass through glass and leave an air-tight joint. In making the joint, the glass around the hole is softened by heat until it gathers closely around the hot platinum wire. In cool¬ ing, if the coefficient for platinum were higher than that for glass, the platinum would contract more rapidly than the glass and leave a leaky joint. The second case to be noted is that of Guillaume's nickel steel, known as invar. The Coefficient of expansion of this metal is so ex¬ tremely small that it is eminently suited to the construction of clock pendulum rods, of survey¬ ing instruments and of standard scales of length, and to many other purposes in which much expansion now proves an annoyance. Un¬ fortunately the high cost of nickel will pre¬ clude the employment of this wonderful alloy in some cases.

The influence of expansion is seen in rail¬ road tracks. On a cold day 60-foot rails may contract so as to draw apart one-half of an

inch. The cables of the Brooklyn bridge sup¬ port the slightly arched roadway. When they sag down in hot weather through expansion, they tend to make the roadway buckle. This tendency is increased by the expansion of the roadway itself. However, both tendencies were overcome through the foresight of the engi¬ neers, who provided a telescoping joint in the roadway at the middle of the span. The parts of this joint play in and out about a foot. On hot days clock pendulums grow longer, and so the clocks lose time. Glass when suddenly and hence unevenly heated expands more at one point than at another, thus introducing in¬ ternal strains that cause fracture, but vessels made of vitrified quartz, on account of their extremely low expansibility, resist this tendency to crack; they will endure without injury the sudden application of a blowpipe flame.

In liquids the molecules are so far freed from cohesion that they are able to roll around one another and to wander from one position to another. The small remaining cohesion is assisted by the pressure of the atmosphere or by any other pressure to which the liquid may be subjected and so the molecules in the body of the liquid are prevented from flying directly apart. It is on account of this small resistance to expansion that we find liquids very much more expansible than solids. The term coeffi¬ cient of cubical expansion is employed to ex¬ press the degree of expansibility of a liquid. It means the fraction of its volume that a liquid expands when its temperature is raised 1° C. The cubical coefficient of a substance is three times as great as its linear coeffi¬ cient, because we measure the effect of ex¬ pansion in length, breadth and thickness, instead of merely noting the expansion in length. Of course a liquid confined in a tube of unchanging dimension could only expand in length, but the effect in this one direction would be three times as much as it would be if the liquid were allowed to

expand proportionally in all three dimensions.

Coefficient of Cubical Expansion of Liquids

at 20° C.

Ethyl alcohol . 0. 0112 Olive oil . 0.00072

Ether . 0.00165 Petroleum . 0.00095

ytater . 0.00021 Glycerine . 0 00050

Mercury . 0.000182 Aniline . 0.00118

The expansibility of water is strikingly ir¬ regular. Starting at the freezing point water contracts as the temperature rises until at about 4° C. it has assumed its maximum density. A further increase of temperature now causes the water to expand, which it does at an increas¬ ing rate until it begins to boil at 100° C.

Gases surpass even liquids in their expan¬ sibility. Because in gases the molecules are relatively very far apart, cohesion counts for nearly nothing, leaving external pressure as almost the sole force restraining expansion. It appears that the coefficient of expansion of a gas is nearly independent of the external pres¬ sure, for though a greater pressure tends to restrain expansion more, the greater crowding of the molecules resulting from this pressure causes more frequent blows among the mole¬ cules, and makes the expansive force increase

in nearly the same proportion as the external pressure. This law is not perfectly complied with because the molecules in a gas are not quite free from cohesion, especially when much compressed, and because the diameter of the molecule is an appreciable fraction of the dis¬ tance between two molecules. Another law, fulfilled only approximately for the same rea¬ sons, is that all gases have the same coeffi¬ cient of expansion, as will be seen in the fol¬ lowing table, which gives the cubical coefficient referred as a standard to the volume the gas has at 0° C.

Coefficients of Cubical Expansion of Gases at Atmospheric Pressure.

Air . 0.003667 Carbon monoxide 0.003667

Hydrogen . 0.003662 Carbon dioxide . 0.003726

Nitrogen . 0.003668 Sulphur dioxide. 0.003845

Oxygen . 0.003668 ■ *– - – —*

The Convection of Heat. — When the air in contact with a hot stove becomes warmed, it expands and grows lighter than the other air. Owing to unbalanced forces the hot air rises to the ceiling and then spreads out to the walls. It there becomes cooled and therefore contracts and becomes dense. As a result it descends at the walls and finally returns to the stove only to start again on the journey. During this process, called convection , heat is carried by the air from the stove to the most distant parts of the room. Winds consist of convec¬ tion currents in the atmosphere. Some parts of the earth's surface become more highly heated by the sun than others. The air over the hot areas expands and becomes specifically lighter than the surrounding air. The general result is that the hot air is forced to rise, giv¬ ing place to the surrounding cooler air, which blows toward the hot area as a surface wind. The hot air risen aloft spreads away toward the cool regions as an upper wind. Corresponding to the ascent of air over the hot areas is a de¬ scent of air over the cool areas. Much heat is brought from the tropical regions to tem¬ perate regions by regular winds.

Convection phenomena also occur in liquids. A large vessel of water supplied with heat at one side of the bottom becomes through the action of convection currents uniformly heated throughout. Much heat is conveyed from the equator toward the poles by means of the Gulf Stream and other ocean currents. It is prob¬ able, however, that with ocean currents differ¬ ences of temperature have little to do with the motion of the water, but that the motion is caused chiefly by the action of winds that blow with great steadiness in a westerly direction across the equatorial portions of the great oceans. Difference in salinity of the ocean at different latitudes may possibly be a partial cause of the phenomenon.

Thermometry. — Before proceeding further in the discussion of heat phenomena, it will be necessary to describe some of the methods em¬ ployed for measuring temperature or the de¬ gree of hotness of a body. Most commonly the methods depend upon the property of expan¬ sion. In ordinary thermometers the expanding body is either mercury or colored alcohol. The liquid, say mercury, is held in a glass tube hav¬ ing a fine bore and at one end a spherical or

cylindrical bulb, the other end being simply closed. Above the mercury, which fills the bulb and part of the stem, is a space that is free from air and contains only a small amount of mercury vapor. When the thermometer is warmed, the mercury rises in the tube because the cubical expansion of mercury is greater than the cubical expansion of glass. The glass tube is

provided with a scale, sometimes engraved directly on the tube, and sometimes engraved on some other material and mounted at the back of the tube. For a Fahrenheit scale, divi¬ sion number 32 is placed opposite the mercury level when the thermometer is placed in pure crushed melting ice, and division number 212 is placed opposite the mercury level when the thermometer is placed in saturated steam over boiling water. As the temperature of the boil¬ ing point depends upon the atmospheric pres¬ sure, which is ever varying, the standard boil¬ ing point is taken to correspond to the average atmospheric pressure, which is measured by a barometric column of 760 millimetres. The space between these marks, the freezing and boiling points, is divided into 180 equal divi¬ sions, and then divisions equal to these are extended above the boiling point and below the freezing point. For the Centigrade scale, which is generally employed in scientific work, the freezing point on the thermometer is marked 0° and the boiling point 100°. For the Reau¬ mur scale, much used for household purposes in Germany, these points are marked 0° and 80° respectively, and finally for the De Lisle scale, which is used in Russia, the direction of the graduation is reversed, the boiling point being marked 0° and the freezing point + 150°. With this last thermometer, the greater the intensity of the cold the higher the number representing the temperature. Mercury thermometers per¬ mit of the measurement of rather high tem¬ peratures, mercury not boiling until the tem¬ perature of about 357° C. (674.3 F.) is reached. Still higher temperatures with mercury ther¬ mometers may be reached by checking the vaporization of the mercury through the in¬ troduction into the upper part of the tube of a compressed gas, such as nitrogen. With such a thermometer the only limitation is the soften¬ ing of the glass at high heats, and even this trouble is largely lessened by the use of vitrified quartz for the material of the bulb. On the other hand, mercury freezes at about — 39° C. (— 38.2° F.) and so becomes useless for in¬ dicating temperatures lower than this. For these lower temperatures alcohol may be em¬ ployed as the thermometric substance because it resists freezing until temperatures far below any met with in nature are encountered. In addition to this advantage alcohol expands much more rapidly than mercury, thus permit¬ ting a much larger bore for the same length of degree. However, for very high temperatures alcohol is not available, as it boils at the mod¬ erate temperature of 78.3° C. (173° F.).

In practical work thermometry fairly bris¬ tles with errors. For several months after a thermometer is made the bulb gradually shrinks, probably owing to some molecular instability in the glass caused by the excessive heating em¬ ployed in the process of blowing the bulb. This

causes the thermometer to read too high. After each time a thermometer is used for a very high temperature the bulb on cooling fails to contract promptly to the volume proper to the new temperature, and so now the thermometer for a while reads too low; however, prolonged heating at the temperature of boiling mercury tends to put the glass into a more stable state. Also such troubles are much reduced by the use of hard glass instead of soft glass for the bulbs. Errors also arise from the following causes : non-uniformity of the bore ; variations of atmospheric pressure, which cause a yielding of the bulb; failure to have the stem of the thermometer at the same temperature as the bulb ; the hydrostatic pressure on the bulb due to the liquid being tested, especially when the thermometer is sunk to great depths ; a varia¬ tion in the internal pressure of the mercury itself on the bulb when the thermometer is inclined from the vertical position to the hori¬ zontal; a peculiar jerking motion of the mer¬ cury when it ascends a very fine bore ; the fact that equal volumes of the bore marked off on the tube do not represent equal expansions of the mercury, since at high temperatures the volume of the bore indicating a degree has in¬ creased (this is quite distinct from the matter of the relative expansion of glass and mer¬ cury) ; irregularities in the expansion of the glass of the thermometer; and lastly irregular¬ ities in the expansion of the fluid itself, be it mercury, alcohol, air or any other substance. This last source of error is worth much con¬ sideration because two thermometers otherwise perfect but containing different liquids, as alco¬ hol and mercury, fail to agree in their indica¬ tions. Further, we have no right arbitrarily to select any particular fluid as a standard and yet feel that our temperature scale has anything more than an empirical value. It will, how¬ ever, be explained in the last section how a theoretical definition for temperature measure¬ ment can be formulated (the thermodynamic scale), agreeing fairly with ordinary thermom¬ eters, very closely with the hydrogen or nitro¬ gen thermometer, and perfectly free from am¬ biguity.

In the hydrogen thermometer advantage is taken of the increase of pressure of a gas at¬ tending an increase of temperature, the volume of the gas being kept constant. The hydrogen is confined in a glass bulb about two inches in diameter which is connected by a thick-walled capillary tube with the top of one side of a U-shaped apparatus consisting of two vertical glass tubes connected by a rubber hose at their lower ends and partly filled with mercury. When the hydrogen in the bulb is warmed it tends to expand and push the mercury down its side of the U and to cause it to rise on the other side, which is open to the atmosphere. This effect is counteracted by raising the glass tube on the open side, the rubber tubing allow¬ ing this to be done. The extra back pressure of the mercury forces the hydrogen back to its former volume. In measuring the pressure to which the hydrogen at any time is subjected, the difference in level of the mercury columns must have

added to it the length of the baro¬ metric column measured at the time. For each

degree Centigrade added to the temperature, the hydrogen is found to increase in pressure about 1/273 of its pressure measured at 0° C. Similarly for each degree subtracted, the pres¬ sure decreases 1/273 of the pressure at 0° C. If this law held to the limit, we would conclude that at — 273° C. the hydrogen would lose all its pressure, thus indicating the cessation of all molecular motion — a veritable absolute zero of temperature. However, at extremely low tem¬ peratures the perfect working of this law is interfered with through the dominance of cohe¬ sion which reduces unduly the pressure of the hydrogen, and may cause it to assume the liquid or even the solid state. Nevertheless, this limit¬ ing temperature as predicted by the hydrogen thermometer agrees almost exactly with the true absolute zero of the thermodynamic scale referred to above. On this absolute scale the temperature of freezing water is approximately +273° Abs., and temperature of boiling, +373° Abs.

Other methods of measuring temperature depend upon change in the electrical resistance of platinum, and upon the electromotive force created when the juncture of two dissimilar metals, . as platinum and rhodium, is heated. Very high and very low temperatures may be measured by such methods.

Conduction of Heat. — When a sterling silver spoon is placed in a cup of hot tea, the handle of the spoon soon becomes uncomfort¬ ably warm to the hand. Heat has been con¬ ducted through the silver. The molecules in the. bowl of the spoon are the first to have their motion accelerated by contact with the tea.. This extra motion is communicated to their neighbors which in turn pass it on until, step by step, the motion reaches the molecules in the handle. It appears that in some sub¬ stances the character of connection between the molecules is more favorable to conduction than in others. As we might have expected, from the close crowding of the molecules found in solids, that class of bodies furnishes the best conductors; but in gases, in which the molecules are very loosely distributed, we nat¬ urally find the poorest conductors. Liquids as conductors occupy a position intermediate between solids and gases. Metals surpass all other materials in conducting power, silver standing at the very head of the list, wh:le near the foot of the list of solids are found organic materials and mineral substances, es¬ pecially when in the porous or fibrous state, such as horn, leather, magnesia brick, asbestos fibre, sand, cotton wool, cowhair felt and down. Great value is attached to poor conductors of heat. They are called insulators. Bone is used in joining the handles to silver teapots. Our clothes are made of organic material woven so as to leave a multitude of fine pores, a condi¬ tion favorable to insulation and met with in the fur of

animals, and in the feathers of birds. Sawdust and mineral wool for the same reason are made to serve as insulators of heat in the outer casing of ice boxes.

In the following table of conductivities the better conductors have the higher numbers. These numbers, called the coefficient of conduc¬ tivity, indicate, the amount of heat energy meas¬ ured in calories (a calorie is the amount of

heat energy required to raise the temperature of a gram of water 1° C.) conducted from one face to the opposite face of a centimetre cube of the substance when one of the faces is maintained one degree hotter than the other. The amount of heat energy conducted is pro¬ portional to the difference in temperature be¬ tween the opposite faces.

Coefficients of

Conductivity.

Degrees

Cent.

Aluminum at . .

18

0.480

Marble .

0.0050

U

too

0.492

Carborundum,

a

200

0.55

powdered .

0.0005

u

400

0.76

Sand (white, dry)

0.0009

u

600

1.01

Fire brick .

0.0011

Bismuth .

18

0.019

Magnesium car-

U

100

0.016

bonate .

0.00023

Brass .

0

0.225

Glass, soda .

0.0017

Constantan . . .

18

0.054

Cork, ground . . .

0.00015

Copper .

18

0.918

Ice .

0.0057

Iron .

18

0.144

Leather (cowhide)

0.0004

Lead .

18

0.083

Asbestos fibre. .

0.00019

Silver .

18

1.006

Paraffin .

0.00023

Zinc .

18

0.265

Water .

0.00144

Mercury .

18

0.0153

Olive oil .

0.00040

Fir along grain

• • • •

0.00047

Air .

0.000052

Fir across grain. . .

0.00026

Carbon dioxide . .

0.000031

Ebonite .

0.00037

Hydrogen .

0.000327

Slate .

0 0036

Wool .

0.000054

n

Specific

Heat. — In the last section

the ex-

pression <(heat energy® was employed, and the

ˆcalorie,® its unit, was defined. If thin glass vessels containing equal weights at equal tem¬ peratures of different materials, mercury and water

for example, be placed over equal gas flames so as to receive in a given time equal amounts of heat energy (equal numbers of calories), it will be found that the water will require nearly 30 minutes to get as hot as the mercury does in one minute. The water is said to have a greater capacity for heat than the mercury has. Making allowance for the heat capacity of the glass vessels and for radiation and conduction it is found that the heat capacity of mercury is 0.034 that of water. We say that the specific heat of the mercury is 0.034, for water is taken as the standard and to its heat capacity is assigned the value 1.0. The value of the specific heat of a number of solids and liquids is given in the following tables :

Specific

Heat of

Solids.

SUBSTANCE

A

Atomic

weight

b

Specific

heat

C=A XB Atomic heat

Aluminum .

37.1

0.2111

5.72

Bismuth .

208.0

0.0298

6.20

Copper .

63.57

0 0923

5.87

Gold .

197.2

0.0316

6.23

Iron .

55.84

0.1117

6.24

Lead .

207.2

0 . 0308

6.38

Nickel .

58.68

0. 1078

6.32

Platinum .

195.2

0.0316

6.17

Silver .

107.88

0.0559

6.03

Sulphur .

32.06

0.1844

5.91

Tin .

118.7

0.0545

6.07

Zinc .

65.37

0.0927

6.05

Tpp .

0.502

Paraffin .

0.694

G1 a <;wn .

0.161

Wood .

0.687

On art. 7. .

0.187

0.219

OvnQiim .

0.26

Rnhy .

0.20

Bra-SS .

0.093

Specific Heat of Liquids.

Water .

Acetone .

Alcohol, ethyl . .

Benzol .

Bromine .

1.00 Ether . 0.529

0.53 Glycerne . 0.576

0.548 Mercury . 0.0332

0 . 340 Carbon disulphide . 0.24

0.107 Turpentine, sp r'ts . 0.411

In the first table the atomic weights (the weight of the atom as compared with the weight of an atom of hydrogen) of some of the elements in the solid state are also given. The product obtained by multiplying the specific heat by the atomic weight is given in the last column. It will be observed that these products are approximately equal. This equality indicates that if we took as our standard of comparison equal numbers of atoms of a solid

instead of equal weights, all elements in the solid state would have the same heat capacity. It takes about as much heat energy to raise the tem¬ perature of an atom of gold one degree as it does for one atom of aluminum. This law of Dulong and Petit also applies with some degree of approximation to compounds in the solid state — not equal heat capacity for the mole¬ cules, but for the atoms.

In the cases of gases we have two specific heats according as, on the one hand, the gas is confined to constant volume while being heated, or as, on the other hand, the gas is allowed to expand so as to keep the pressure constant. This is shown in the accompanying table, where it will be seen that the specific heat at constant pressure is greater than the specific heat at con¬ stant volume.

Specific Heats of Gases.

SUBSTANCE

Symbol

Constant vol¬ ume equal weights

Constai

su

Equal

weights

nt pres- re

Equal

volumes

Ratio of spe¬ cific heats, equals col.

4 4- col. 3

Air .

. 1692

.2374

.2374

1.403

Mercury vapor. .

Hg

1.666

Argon .

Ar

1.63

Carb. monoxide.

CO

. 1746

.24

.2370

1.403

Oxygen .

o2

. 1542

.2174

.2405

1.41

Hvdrogen .

h2

2.417

3 . 4090

.2359

1.41

Nitrogen .

n2

. 1729

.2438

.2370

1.41

Chlorine .

Cl2

.0913

. 1210

.2962

1.336

Carbon dioxide. .

co2

. 1654

.2169

.3307

1.311

Ether .

C4H10O

.467

.4810

1.2296

1.03

This difference in specific heat in the same gas is due to two causes. When the gas ex¬ pands, not only do the molecules acquire greater kinetic energy, but in pushing each other far¬ ther apart against the attract've force of co¬ hesion, they require a further amount of energy of the potential sort, and in pushing back the restraining pressure of the atmos¬ phere still another large supply of energy is needed. It appears from several independent considerations that in gases far removed from their liquefying points the cohesion effect is exceedingly small, and so we conclude that the excess of specific heat of an expanding gas is almost entirely due to work done on the ex¬ ternal pressure applied to the gas.

In the last column of the table the ratio of the two specific heats of the gases is given. This ratio is found to vary, decreasing from

simple gases like mercury vapor, the molecules of which have single atoms, to complex gases like ether vapor, the molecules of which have 15 atoms. With complex molecules a large part of the energy is internal, much being stored up in the rotating motion of the individual mole¬ cules, and in the relative motion of their atoms, leav'ng the energy of translation of the mole¬ cules and the energy due to the pushing back of the external pressure about the same as for mercury vapor. It follows then that the energy associated with the external pressure is a smaller fraction of the whole energy, and that therefore, as observed, the ratio between the heat energy imparted to an expanding gas and the heat energy imparted to a non-expanding gas must be smaller for such complex mole¬ cules. The value of this ratio is the principal means of judging of the number of atoms in a molecule of an element in the gaseous state.

Before leaving th:s subject it should be re¬ marked that the specific heat of water varies slightly with the temperature, and so it is con¬ venient to take as the value of the calorie one hundredth of the heat energy required to raise the temperature of a gram of water from 0° C. to 100° C.

Latent Heat. — If heat energy be imparted to a mass of ice at the point of melting, the ice w 11 proceed to melt, but will not grow any warmer as it does so. The heat energy thus added without increasing temperature is called latent heat. Latent heat is devoted only to shaking the molecules of ice asunder, not to increasing their speed. Temperature depends upon the energy of motion (kinetic energy) of the molecules ; latent heat only stores

up energy of position (potential energy) of the mole¬ cules, and so does not produce an increase of temperature (this simple statement must be modified in cases of change of polymerization). Again, when water is being boiled, a large amount of heat energy becomes latent. The latent heat of vaporization and of melting for a variety of substances is given below.

Latent Heat of Vaporization.

Calories

Calories

Water .

. . . . 536

Mercury .

62

Acetone .

. ... 126

Carbon disulphide.

90

Ethyl alcohol. . . . ,

. . . . 206

Sulphur .

362

Methyl alcohol . . ,

. . . . 264

Ether .

91

T.tniiid nir

47

Latent Heat

of Melting.

Calories

Calories

Ice .

80.

Silver .

21.07

Sulphur .

9.37

Mercury .

2.82

Paraffin . .

35.10

Iron .

35.

Phosphorus .

Bees'-wax .

5.

Platinum .

27.

42.

Tin .

14.

Zinc .

28.13

Bismuth .

13.

Lead .

5.36

« Copper .

42.

It should be remarked that the latent heat devoted to converting a liquid into vapor, be- s'des increasing the internal potential energy of the molecules, also does work in pushing back the atmosphere, but with water this external work bears a very small ratio to the internal work against cohesion, namely, a little more than one-twelfth.

Heretofore we have supposed the energy for melting or for vaporization to be derived from some external source of heat. It is, however, possible to secure a change of state through the consumption of the heat energy of the body

itself. If water be left in an open vessel it will presently have evaporated entirely away. Dur¬ ing the progress of this vaporization a ther¬ mometer placed either in the water or in the moist air above the water will show a tem¬ perature lower than that of the surrounding air. The reason of this is as follows : At the surface of the liqu'd, with all the irregularities of position and velocity possessed by the mole¬ cules, some of them find opportunity to fly off from the liquid surface. On the average it will be the faster going molecules that spring away first, thus leaving the more slowly going ones behind,, which is the same as saying that the remaining liquid is cooler. Also in going away, the molecules fly against the back pull of co¬ hesion, and so their velocity is checked. Indeed many are entirely stopped and drawn back into the liquid, though others escape quite beyond the range of cohesion of the liquid and diffuse among the molecules of the air. The reduced motion of these escaping molecules causes the low temperature, referred to above, of the vapor. Common illustrations of cold by evap¬ oration are frequently met with. The function of perspiration is a means of regulating the temperature of the human body. In the healthy state when we are overheated the skin becomes very moist, and the evaporation of this moist¬ ure, assisted by a breeze or by fanning, cools the

surface. In disease the proper action of the skin may be interfered with, and becoming dry, may fail through lack of evaporation to provide the normal cooling effect. An exalted temper¬ ature of the body ensues ; in other words, a fever. Certain drugs tend to promote perspi¬ ration and thus reduce the temperature of the patient. Another large factor in the tempera¬ ture regulation of the body is in the water evaporated from the lungs in the process of breathing. The evaporation of ammonia that has been liquefied by pressure furnishes the cold employed in some ice machines. In the case of liquefaction the necessary latent heat may be derived from the body itself. This occurs when a salt is dissolved in water, a process that is generally accompanied by a fall of temperature, though occasionally a rise in temperature is noted. The factors governing the result in such cases are rather complicated. We have to take account of the work done by the solvent in tearing molecules away from the solid lump and in some cases the tearing of these molecules apart into electrically charged parts called ions. On the other hand a certain amount of kinetic energy is furnished by the attraction of the molecules of the dis¬ solving substance by the molecules of the sol¬ vent. According as the back pulls or the forward pulls predominate, will the temperature of the solution tend to be lowered or raised. If much chemical combination takes place between the substance and the solvent, the solution is almost always warmed.

There is another reason why ionization tends to cool and chemical combination tends to warm a body ; it is because of the increase or de¬ crease in the mere number of separate particles. For temperature depends upon the average kinetic energy of the particles or molecules, small particles at a given temperature making up in speed for what they lack in mass. An increase in the number of particles involves,

if no heat is added from the outside, a subdi- v si°n their energy, a smaller average energy, and, hence,, a lower temperature. When par¬ ticles combine, their energies combine also, and so there is. an increase in their average energy and a like increase in their temperature.

The temperature at which melting takes place depends upon external pressure. With a solidlike paraffin, which expands on liquefying, high pressure, which resists expansion, stops melting, until a temperature slightly higher than the ordinary melting point is reached. Paraffin that under ordinary conditions melts at 46.3° C. melts at 49.9° C. when subjected to the addi- t onal pressure of 100 atmospheres. In the case of ice, which contracts on melting, melting is favored by pressure. The addition of one

atmosphere of pressure lowers the melting point of ice by 0.0072° C. This fact ac¬ counts for the slipperiness of ice, especially when being skated upon. The sharp edge of the skate exerts great pressure on the ice be¬ low it, which melts and furn'shes a lubricating film of water. This film of water is cooler than the ice furnishing it, some of the heat of the ice having become latent, and as soon as the skate has passed over, the water imme¬ diately resumes the solid state. This process of freezing again is called, regelation. Regelation is an important factor in glacier motion. The ice as it follows down a tortuous valley is con¬ tinually being cracked. After the settling fol¬ lowing- th's cracking, the great pressure from the upper ice fields melts the ice at the points of contact of opposite sides of a fracture, and the escaping undercooled water freezes again, thus healing the fracture. In this way the glacier appears to follow down the irregulari¬ ties of a valley as would a very viscous mass.

Melting Points.

Deg.

Deg.

Cent.

Cent.

Aluminium .

658

Paraffin . .

52

Antimony .

630

Bees'-wax

63

Bismuth .

270

Ice .

.

0

Cadmium .

321

Silver chloride .

450

Copper .

1083

Fluorspar .

900

Gold .

1063

Potassium nitrate . .

340

Iron, pure .

1530

Salt, common .

800

Iron, cast.

1150

Sunar. crvstals ....

170

Lead .

327

Lead .

. . .30%

Alloy

185

Mercury .

—38.7

Tin .

. ■ .70%

Nickel .

1452

Lead .

.32.0%

Platinum .

1755

Tin .

.15.5%

■ Alloy

96

Ruthenium .

2450

Bismuth. .

.52.5%

Silver .

961

Lead .

.24.9%

Tantalum .

2850

Tin .

.14.2%

■ *Alloy*

65

Tin .

232

Bismuth. .

.50.1%

Tungsten .

3200

Cadmium.

.10.8%

Carbon vaporizes at

3600

Copper. . .

. .60% ’

Brass

900

Sulphur .

114

Zinc .

• -40% j

Saturated and Unsaturated Vapors.—

When a liquid, water for example, is placed in a vacuous enclosure kept at constant temper¬ ature by artificial means, it immediately, begins to evaporate, the vapor presently attaining a maximum density and pressure. . The vapor as well as the space occupied by it is then said to be saturated. Before this maximum pressure was reached the vapor was unsaturated. If the temperature of the whole apparatus be now raised, more water will commence to evaporate, and the vapor will increase in density and pressure before it is again saturated. Had the saturated vapor formed in the first place been shut off from the water surface before raising the temperature, it would not become as dense

as when it had the water evaporating into it, and so we would then pronounce the heated saturated vapor as unsaturated. On the other hand, if a mass of unsaturated water vapor be cooled, the density of the vapor will at a certain tem¬ perature be sufficient to cause saturation. Be¬ low this particular temperature, called the dew-point, some of the moisture will condense. In some cases, however, when there are no nuclei in the form of dust particles, free ions, etc., the vapor may cool appreciably below the dew-point without immediate condensation. The vapor is then said to be supersaturated. The presence of air has only a very small influence on the density and pressure of saturated water vapor in contact with water, especially when the temperature is not high.

When the temperature of water or other volatile liquid is raised so high that the pressure of the saturated vapor becomes as great as that of the atmosphere, bubbles of the vapor begin to form in the body of the liquid. This constitutes the process of boiling. The temperature at which a liquid boils is much influenced by the external pressure. The boiling point is the same as the temperature at which the pressure of the saturated vapor equals the external pressure on the bubble. In the following table these tem¬ peratures with their corresponding pressures are given for water.

Pressure of Water Vapor.

Temperature

Pressure in

Temperature

Pressure

degrees

millimetres

degrees

millimetre

Centigrade

of mercury

Centigrade

centigrade

—60

0.008

50

92.54

—50

0.029

60

149.46

—40

0.094

70

233.79

—30

0.280

80

355.5

—20

0.770

82

385.2

—10

1.947

84

417.1

0

4.579

86

451.1

+5

6.543

88

487.3

10

9.210

90

526.0

15

12.790

92

567.2

20

17.539

94

611.0

25

23.763

96

657.7

30

31.834

98

707.3

35

42.188

99

733.2

40

55.341

100

760.0

45

71.90

101

787.6

Degrees

Pressure in

Degrees

Pressure in

Centigrade

atmospheres

Centigrade

atmospheres

100.

1

198.8

. 15

112.2

H

201.9

16

120.6

2

204.9

17

133.9

3

207.7

18

144.0

4

210.4

19

152.2

5

213.0

20

156.2

6

215.5

21

165.3

7

217.9

22

170.8

8

220.3

23

175.8

9

222.5

24

180.3

10

224.7

25

184.5

11

226.8

26

188.4

12

228.9

27

192.1

13

230.9

28

195.5

14

A saturated vapor in contact with its liquid offers a beautiful instance of dynamic equilib¬ rium. We conceive that molecules are ever leav¬ ing the surface of the water, adding themselves to the vapor. At the same time molecules of the vapor coming near to the liquid surface or plunging into it are caught by the cohesion of the liquid, thus subtracting themselves from the vapor. A less dense vapor would lessen the lat¬ ter process and would allow the vapor to grow denser ; a denser vapor would increase it and

allow the vapor to fall to a state — the saturated state — when the rate of evaporation is just equal to the rate of condensation.

Boiling Points of Liquids.

Hydrogen .

Degrees

Cent.

—252.6

Chloroform .

Degrees

Cent.

61.2

Helium .

—267.

Alcohol, methyl. .

66.

Nitrogen .

—195.

Carbon tetrachlo-

Argon .

—186.1

ride .

76.7

Oxygen .

—182.7

Alcohol, ethyl .

78.

Krypton .

—151.7

Benzol .

80.2

Neon .

—239.

Nitric acid .

86.

Fluorine .

—187.

Water .

100.

Zenon .

—109. 1

Amyl acetate .

150.

Ethylene .

—102.

Aniline .

183.9

Nitrous oxide .

—89.

Sulphuric acid ….

338.

Carbon dioxide sub-

Sulphur .

444.7

limes .

—80.

Mercury .

357.

Chlorine .

—33.6

Sodium .

750.

Ammonia .

—33.5

Zinc .

930.

Sulphur dioxide .

—10. 1

Silver .

1955.

Ether .

34.6

Copper .

2310.

Carbon disulphide. .

46.2

Iron .

2450.

Acetone .

56. 1

Carbon sublimes at

3600.

The degree of moistness of air is expressed by the phrase hygrometric state. The hygro- metric state does not express the density of the water vapor present, but, instead, expresses the quotient obtained by dividing the density of the vapor present by the density of the vapor re¬ quired to saturate the air. If pressures were employed instead of densities in getting the quo¬ tient, substantially the same result would be ob¬ tained. Still another common way of defining hygrometric state is to take the quotient obtained by dividing the pressure of the vapor corre¬ sponding to the dew-point by the pressure of vapor saturated at the temperature of the air, a method closely agreeing with the former ones.

The Critical State. — When the temperature rises, the saturated vapor in contact with its liquid becomes denser, while the liquid it¬ self expands and becomes less dense. If the heating of the liquid and vapor takes place in a strong closed vessel containing not too much or too little of the liquid, after a while a tempera¬ ture is reached at which the saturated vapor be¬ comes as dense as the liquid. At this point they become identical in their physical properties ; the

Critical Temperatures, Pressures and Densities.

Substance

Critical tempera¬ ture in degrees Centigrade

Critical pressure in atmos¬ pheres

Critical density relative to water

Helium .

—268.0 —240.8 —205 . 0 —118.0 —146.0 —141.1 —117.4 —121.0 —95.5

+31.2 130.0

155.4 141.0

35.4

374.0

32.1

9.9

194.4

—62.5

Hydrogen .

14

29

50

35

35.9 52.9′ 50.6

50

73

115

78.9

83.9

75

217.5

49

51.1

35.61

54.3

Neon .

Oxygen .

Nitrogen .

Carbon monoxide .

Argon .

0.604

0.44

Fluorine .

Methane .

Carbon dioxide .

Ammonia .

0.46

Sulphur dioxide .

Chlorine .

0.49

Nitrous oxide .

Water .

Ethane .

0.429

Ethylene .

Ether .

Krypton .

0.262

line of demarcation of liquid and vapor fades away, and the two fluids begin to mix. The tem¬ perature at which this phenomenon occurs is called the critical temperature ; the correspond¬ ing pressure and density are called the critical pressure and critical density, and the liquid is said to be at the critical state. Above the criti¬ cal temperature it is impossible to distinguish between a liquid and its vapor. No matter how great the pressure, a gas or vapor cannot be forced into the state of a liquid that is obviously distinct from the vapor unless the vapor be cooled below the critical temperature.

Radiation. — We have described two methods by which heat energy may

*be transferred from one place to another- — by conduction and by convection. A third method remains to be studied. Hiow does the heat of the sun reach us? By means of waves in the luminiferous ether. Go to a quiet pond in which a piece of wood may be floating. Standing on the shore, vibrate your hand up and down in the water. Waves run from your hand over the surface of the water to the wood and cause it to vi¬ brate up and down. Energy from the hand has been transferred to 'the wood by means of waves. These waves consist of the successive vibration of successive particles of water, each particle receiving energy from behind and pass¬ ing it on to the front. It is much the same with heat waves. The ether, which fills all space, is capable of being set into vibration by vibrating molecules and of handing this vibra¬ tion on step by step in the form of waves. Molecules acted upon by these waves are them¬ selves set into vibration. The vibrating mole¬ cules of the sun generate ether waves, and the ether waves generate vibration of the mole¬ cules of bodies on the earth. These ether waves are called radiant heat. We now have a very wide rang*e of ether waves under ex¬ perimental control. From the large waves generated by electrical oscillations used in wire¬ less telegraphy and sometimes several miles long we may pass by insensible gradations, with only two breaks, to the extremely minute waves which constitute Rontgen's X-rays and the Gamma rays of radium. Dark heat waves, or infra-red rays, ordinary light and ultra¬ violet light belong to the middle of the series. The shortest electrical waves thus far tested are about one-tenth of an inch long, while the length of the longest heat waves is about 1/300 inch. The shortest ultra-violet waves are about 1/300,000 inch long. All ether waves have the same velocity as light, namely, 186,300 miles a second. All may be reflected, refracted, polar¬ ized, diffracted, and made to interfere. They may be absorbed by transmission to a degree depending upon the substance used for trans¬ mission and the particular wave-length of the rays.*

Thermodynamics.— The most cogent reason for discarding the caloric theory of heat is that heat may be generated from that which is not in any sense substance — heat may be derived from mechanical energy. Heat is generated when a brass button is rubbed on the carpet, when a bullet is struck with a hammer, and when two pieces of ice are rubbed together, a process resulting in their melting. The rela-

tion between mechanical energy and the heat energy generated by its consumption was first carefully investigated by J. P. Joule before 1850. One pound calorie of heat energy is ob¬ tained from 1,399 foot-pounds of mechanical energy. That is to say, the energy due to the fall of 1,399

pounds through the distance of a foot is sufficient if transformed into heat to raise the temperature of a pound of water through one degree centigrade. This number of foot-pounds is called the mechanical equiva¬ lent of heat, for it has been found that the process is reversible. When by means of an air-engine or a steam-engine one pound calorie of heat is consumed in generating mechanical energy, 1,399 foot-pounds of the latter are ob¬ tained. The first law of thermodynamics states that when mechanical energy is converted into heat, or when heat is converted into mechan¬ ical energy, the quantity of mechanical energy is equivalent to the quantity of heat energy. The second law of thermodynamics states that it is impossible for a machine without the con¬ sumption of external energy to make heat pass from a body at a low temperature to one at a high temperature. However, when mechanical energy is supplied, such a transfer of energy from a cold body to a hot body becomes possi¬ ble through the use of a "reversible engine A heat engine is (VOL. 14 — 4*

efficient engine, working reversely. The re¬ sult of this combination would be that more heat energy would pass from the cool escape up to the hot source than would pass from the hot source down to the cool escape. In other words, with a self-contained device not employing external energy we would thus suc¬ ceed in making heat pass from a body at a low temperature to a body at a high temperature, which is contrary to the second law of thermo¬ dynamics. The thermodynamic efficiency of a perfectly reversible engine is, then, dependent only upon the two extreme temperatures be¬ tween which it works. In good practical con¬ densing steam engines, which, of course, are only imperfectly reversible, the thermodynamic efficiency may occasionally exceed 20 per cent. This means that 20 per cent of the heat energy supplied to the engine from the boiler is con¬ verted into mechanical energy, the remaining 80 per cent escaping partly, as it should, at the condenser and partly, as it should not, by conduction, radiation, etc. This thermodynamic efficiency may be as much, in a good practical steam-engine, as 70 per cent of the thermody¬ namic efficiency of an ideal engine working between the same boiler temperature and the same condenser temperature.

Using the provisional absolute scale as in¬ dicated by a hydrogen thermometer, experi¬ ment shows that the ideal efficiency, W/H, of a perfectly reversible engine, is roughly repre¬ sented by the following equation in which W stands for the mechanical energy realized, H for the heat (measured in the equivalent foot¬ pounds) leaving the high temperature source, T for the temperature of the source, and T5 for the temperature of the cooler escape.

W T — T1

This suggests a new definition for a tempera¬ ture scale, namely, that numerical values of temperatures be so adjusted as to fulfil exactly the above formula. Since the formula only fixes a ratio between the temperatures T and T1 corresponding to a given efficiency, an in¬ finite number of sets of numerical values for these temperatures could be found to satisfy the formula. But if it be decided that a definite numerical range, say 100 degrees, be comprised between the freezing and boiling points of water, only one set of values become pos¬ sible. This decision makes the value of the freezing point very nearly + 273° Abs., and the value of the boiling point + 373° Abs. Lord Kelvin was the first to propose this thermodynamic scale. Theory shows that its indications would correspond exactly to a ther¬ mometer containing a perfect gas. Hydrogen is not quite a perfect gas, for its molecules at¬ tract each other slightly and they occupy an appreciable fraction of the space holding the gas. Hence there are small deviations of the hydrogen thermometer from the thermody¬ namic scale, especially at low temperatures. In spite of these difficulties much progress in the realization of the thermodynamic scale has been achieved through ingenious mathematical considerations relating to two sets of experi¬ mental observations: those made by Regnault

on the expansion and on the increase of pres¬ sure of hydrogen and other gases when heated, and those made by Joule and Kelvin on the temperature changes suffered by gases in pass¬ ing through a porous plug. Nevertheless, the thermodynamic scale offers us a theoretical ideal which is independent of the thermal prop¬ erties of any particular substance, but is only related in a definite way to a fixed universal law.

When a small amount of heat is transferred from or to a gram of a substance, the heat transferred (measured in calories), divided by the average absolute temperature of the sub¬ stance at the time of the transference is called the change of entropy of the substance. For convenience, the zero of entropy is generally taken to correspond to water at the freezing point and under the normal atmospheric pres¬ sure. It may be shown that when two bodies at different temperatures are placed in con¬ tact and their temperatures become equalized, the average entropy rises, for from the above definition of entropy, the heat leaving the hotter body must reduce its entropy less than it increases the entropy of the cooler body into which the heat enters. Consequently, as temperature equalizations are always going on, the average entropy of the universe is

con¬ stantly rising and tending toward a maximum. At the same time, for the same reason, the availability of the heat energy of the universe to be converted into mechanical energy is tend¬ ing, toward zero, for this availability depends upon difference in temperature of sources and escapes, and is destroyed by temperature equal¬ ization resulting from conduction, radiation and mixing.

Ernest R. von Nardroff,

Principal of Stuyvesant High School, New York City.

HEAT-BALANCE DIAGRAM. See In¬ ternal Combustion Engine.

HEAT ENGINE. See Internal Combus¬ tion Engine.

HEATH, Daniel Collamore, American publisher: b. Salem, Me., 26 Oct. 1843; d. 29 Jan. 1908. He was graduated from Amherst in 1868, became a junior member of the firm of Ginn & Heath, publishers, of Boston, and in 1886 established in Boston the house of D. C. Heath & Company, publishers of textbooks for schools and colleges, with branch offices in New York, Chicago and London.

HEATH, Perry Sanford, American jour¬ nalist and publisher: b. Muncie, Ind., 31 Aug. 1857. He learned the printer's trade, and in 1877 became a newspaper reporter; in 1878 es¬ tablished first daily newspaper at Muncie; in 1881 established first newspaper at Aberdeen,

S D ; was general newspaper correspondent at Y ashington, D. C., 1881-93. He was president, editor and general manager of the Cincinnati Commerciar~Gazette (now Commercial-Tribune), 1894-96. -Was in charge of the literary depart¬ ment of the Republican National Committee in the McKinley campaign 1896. He was First Assistant Postmaster-General 1897-1900, when he developed the present system of free rural

mail delivery. He was secretary to the Repub¬ lican National Committee 1900-04. He pur¬ chased the Salt Lake Tribune (editor and gen¬ eral manager) 1901; established Salt Lake Evening Telegram 1903; disposed of both in 1905. He was incorporator and director of the Salt Lake-Los Angeles Railroad, 1901—03. At present he is an investor in various industrial and commercial enterprises.

HEATH, William, American soldier: b. Roxbury, Mass., 7 March 1737; d. there, 24 Jan. 1814. When the Massachusetts congress in 1774 voted to enroll 12,000 minute men, volunteers from among the militia, Heath, then a farmer in Roxbury, was commissioned as one of the generals. In June 1775 he received the appoint¬ ment of brigadier in the Continental army,

and in August 1776 was created major-general. When the troops moved to New York Heath was stationed in the Highlands near King's Bridge, with orders to throw up fortifications for the defense of that important pass. In 1777 he was transferred to Boston, and the prisoners of Saratoga were entrusted to him. In June 1779 he was again in New York, at the High¬ lands, with four regiments, and was stationed near the Hudson till the close of the war. He was the last surviving major-general of the war. His (Memoirs) (1798) and

HEATHCOCK, HEATH-HEN. See

Blackcock.

HEATHCOTE, Caleb, American merchant: b. Chesterfield, Derbyshire, England, 6 March 1665; d. New York, 28 Feb. 1721. He was suc¬ cessful in a mercantile career in New York from 1692, save for the years 1698-1701, was a councillor of the province, was a petitioner for a license to build Old Trinity, was mayor of New York in 1711-14, and held other posts, among them those of judge of Westchester County; commander-in-chief of the military of the colony ; surveyor-general ; and receiver-gen¬ eral of customs for North America. His letters and dispatches afford interesting glimpses of the history of his time.

HEATHS, or HEATHER, a group of plants, chiefly of the genus Erica, of the family Encacece. The leaves of the heaths are sim¬ ple and entire; their flowers ovoid, cylindrical or even swelled at the base; the anthers of many with horn-like appendages. From 400 to 500 species are known, 12 or 15 of which in¬ habit Europe, and have small flowers, while most of the remainder are natives of South Africa, many of them bearing brilliantly colored flowers, and forming one of the most char¬ acteristic genera of that region of dry plains. The common heath of Europe {Calluna vul¬ garis"), a low shrub, often covers exclusively extensive tracts of dry land, and is used in domestic economy; mixed with oak bark it is employed in tanning; and also, when tender, for fodder. This species forms the <(heather): of British moorlands; but in Scotland are two other species, whose flowers are the <(heather- bells» of Scottish song and story. Many South African species, remarkable for the size and beauty of their flowers, are much cultivated in greenhouses, and have been so improved and*

hybridized that they exhibit a wonderful rich¬ ness of color.

HEATING AND VENTILATION. Gen¬ erally speaking, the methods of

heating build¬ ings may be divided into two general classes — the direct and the indirect system, or a com¬ bination of the two. Heating by means of an open fire, by a stove and by radiators placed in the rooms to be warmed are examples of the former method, while furnace-heating and heat¬ ing by means of a current of air warmed by indirect steam or hot-water coils are examples of the latter method. When a direct radiator is fitted with a connection to the outer air, it is said to be arranged on the direct-indirect principle. Hot water, steam or electricity may be the vehicle used for conveying heat to radiators. Ventilation is only obtained by sup¬ plying air, and in some systems of heating and ventilation the air is made so hot that part of it is available for heating purposes. This is the case in furnace-heating.

It is well known that when two bodies of different temperature exist, heat passes from the warmer to the cooler body until their tem¬ peratures are equal. If a building be of a temperature of 70° F. and the outer air of a lower temperature, heat will be transmitted by the walls, windows and other exposed surfaces, and the temperature of the air in the building will be lowered. It is only by supplying to the building an amount of heat equivalent to that transmitted by the walls and windows that it is possible to maintain the building at constant temperature. If we supply more heat than is transmitted by the walls, the temperature of the room rises.

Heat is measured in units which have as exact a value as a ton of coal or a pound of sugar. British physicists have selected as the unit of heat that quantity which will raise the temperature of one pound of water one degree on the Fahrenheit scale when the water's tem¬ perature is near 39° F. This unit is designated as the British thermal unit. It is known with reasonable accuracy just how many heat-units are transmitted by each square foot of wall, window and other exposed surfaces of the vari¬ ous materials used in building construction, un¬ der such extreme conditions as to building and outside temperature as may exist. With these data and the plans of a building, calculation will show the heat-loss from a building or a room, and the heating-apparatus should be propor¬ tioned to supply th'is amount of heat. Allow¬ ances are made for various conditions that may exist, depending upon the judgment and ex¬ perience of the designer. The heat required can be supplied by radiation from an open fire or from a stove, but this is an unsatisfactory method. Direct radiators supplied with steam or hot water can be placed in a room to furnish the heat necessary, or the heat may be sup¬ plied by hot air from a furnace, or by air heated by indirect radiators supplied with steam or hot water.

Heating by hot air is a slightly more ex¬ pensive method than heating by direct radia¬ tion, for to be effective the air must be taken in from outdoors, sometimes at very low temper¬ ature, and heated above the

temperature of the room to be warmed. If cold air at 40° F. is heated to 100° F., and is supplied to a room at this temperature, it is evident that as soon as

this air is cooled from 100° to 70° no more heat can pass from the air to the room if the tem¬ perature of the latter remains at 70°. Under these conditions only one-half of the heat that has been supplied to the air is available for heat¬ ing the room. . This will tend to show why heating by hot air is more expensive, estimated from the cost of fuel, than the direct system. When the advantages of the air supply that accompanies indirect heating are taken into ac¬ count the increased fuel cost becomes insignifi¬ cant.

Direct heating is usually obtained by steam and hot-water radiators. Although manufac¬ turers have greatly improved the appearance of direct radiators, at best they are unsightly and objectionable from an artistic point of view. This objection may be overcome by concealing the radiators in boxing beneath windows, when the walls of the building are thick enough to permit the boxing to be built in without project¬ ing into the room. A screened opening is pro¬ vided in the front of the boxing near the floor, and one at the top over the radiator, to permit a circulation of air, so that the radiators can be effective.

In residence-heating it is frequently the cus¬ tom to heat the first floor by the indirect method and the upper stories by the direct. When an owner will pay for it, the indirect method is used throughout the building. Such a system is much to be preferred to the direct.

The simplest method of connecting steam- radiators is by the gravity system, and it is usu¬ ally employed unless steam exhausted by en¬ gines is available for heating. This system comprises distributing-mains connecting with the top of the boiler, and with vertical riser- pipes from which horizontal branches lead to the radiators. Usually a return pipe is con¬ nected to the opposite end of the radiators from that at which steam is admitted, this return connecting, through return risers and mains, with the boiler at a point below the water-line. As the steam in the radiators condenses, the resulting condensation flows back by gravity through the return pipes to the boiler. The flow and return pipes are made sufficiently large to ensure a practically uniform pressure through¬ out the system. The system is simplicity itself, as the fire only needs attention. When the boiler is once filled, no more water is required.

It is only recently that the steam exhausted by engines and pumps has been used for heat¬ ing. Before this time steam direct from the boilers was used in direct radiators for heating mills and factories. The radiators consisted

of coils of pipe suspended from the walls or ceilings. Sometimes the condensation was re¬ turned to the boilers by a pump or other device; sometimes it was allowed to go to waste. As the steam exhausted by engines, pumps, etc., contains a very large percentage of the heat that it contained upon entering the engine, some¬ one conceived the idea of utilizing this steam for heating buildings, thereby saving the steam direct from the boilers that would otherwise have to be used. This practice is- now almost universal where exhaust-steam is available, and the saving that it has occasioned is very great. By placing what is known as a back-pressure valve in the exhaust-pipe, sufficient pressure is maintained to cause the exhaust-steam to cir¬ culate through the pipes and radiators of the

lieating-system, the latter being connected to the exhaust-pipe between the engine and the back¬ pressure valve. The condensation that occurs in the heating system can be collected and re¬ turned to the boilers by various methods. Usu¬ ally a pump or similarly acting device is em¬ ployed.

A hot-water system arranged on the gravity- principle has flow and return pipes similar to the gravity-system of steam-heating described. The entire system is filled with water. As the water is warmed in the boilers it becomes lighter in weight per cubic foot, making a difference in pressure between the flow and return pipes and causing a circulation to begin. The water rises in the flow pipes to the radiators and is there cooled. On its return to the boiler the water is again heated, and so the circulation is main¬ tained. . As the difference in weight between the water in the flow and return pipes is very slight, the motive power producing the circula¬ tion is very slight also. Hence the pipes have to be relatively larger than for steam-heating and very carefully connected to avoid excessive friction, which would stop or retard the cir¬ culation. As large pipes are costly, in some large plants heated by hot water, a circulation is brought about by pumps.

Direct steam-radiators emit about 250 Brit¬ ish thermal units per square foot of radiating surface per hour, and hot-water radiators about 180 heat-units per square foot. Consequently about one-third more radiating surface is neces¬ sary with hot water than with steam. The pipes also must be larger, hence the hot-water sys¬ tem is the most expensive in first cost. Hot water, however, is cheaper to operate, for water will circulate with a very low fire and supply the small amount of heat required to warm a building in mild weather.

With direct steam-heat, operating on the gravity system, it is impossible to

vary to any appreciable extent the temperature of steam in a radiator; hence with this system the alterna¬ tive is all the heat the radiator will supply or none at all. This is the principal objection to heating by means of direct steam. Air warmed by the relatively cooler hot-water radiators is thought by some to be more agreeable than air heated by steam-radiators.

With indirect heating the lack of means of regulating the steam-temperature is not of so much moment, for the air-supply can be partly shut off by partly closing a register in mild weather; or else, if the full air-supply is re¬ quired at all times, arrangements can be made for passing part of the air-supply around the indirect radiators, which is called "by-passing" them. Another method is to divide the indirect radiator into independent sections and place some of the sections under the control of a regulator that automatically shuts off the sup¬ ply of steam when the room becomes too warm. The method . of . "by-passing" the radiator, or subdividing it, is used mainly with the fan- system of supplying air.

The cost of indirect hot-water heating is greater than that of indirect heating by steam, as the radiators and pipes must be larger, the same as in direct heating. Hot water is, how¬ ever, cheaper to operate. The principal objec¬ tion to its use in indirect heating is the possi¬ bility of damage to the indirect radiators through the freezing of the water in them in

severe weather, if the circulation should from any cause be arrested.

The direct-indirect system consists of direct radiators connected with the outer air by means of an opening in the building-walls beneath the window-sill, the radiator being set under the window opposite the opening. With this sys¬ tem there is always the possibility of getting too much air when the wind blows strongly. Fur¬ thermore, in situations where the air is smoke¬ laden or dusty, it is not easy to keep the smoke and dust from entering a building supplied with air by this means.

*As has been said, a supply of air may be brought about by the gravity-method or by means of fans. In the gravity-method the heated column of air in the flue is lighter than ri°UtC*00r a*r; *?ence it rises. As in the case of hot-water heating, the motive power is very slight, and it becomes less as the outdoor tem¬ perature increases. For this reason the gravity system is not a positive one, and it cannot be depended upon to supply much air in mild weather. Its use for schoolhouse ventilation is therefore to be deprecated. An important advantage of this system is its simplicity, as no machinery is required with it.*

With the fan-system some type of fan is em¬ ployed to give a positive supply of air. The air is blown over coils, usually steam, and de¬ livered to

the room at a temperature slightly above that of the room, if the air-supply is in¬ tended to ventilate only, or at a higher temper¬ ature if the air-supply is to carry with it the heat necessary to balance that transmitted by

ˆ j ˆ and windows. In the former event the indirect coils act as tempering-coils, being sufficient only to raise the air to about 70° F. u js to furnish heat for warming

the rooms, additional coils, known as supple¬ mentary coils, are provided. These raise the air-temperature from 70° to from 100° to 120° F. Sometimes the supplementary coils are com- bined with the tempering coils, the whole being divided into several independently controlled sections. In some instances the supplementary coils are divided into a number of small coils one being placed at the base of each air-supply flue, and so arranged that, by adjusting dampers controlled by hand or automatically, the tem¬ perature of the air supplied to any room can be regulated independently of that supplied to other rooms. If all of the air is passed through one group of coils, independent regulation of the temperature of the air in the branch ducts and flues is impossible. This independent regula¬ tion can be obtained, however, by the double¬ duct system. The coils are divided into two groups, one for tempering and one for supplying additional heat. AW of the air is passed through the tempering coils, but only part of it through the supplementary coils, the balance "by-passing" the latter coils and flowing through a system of ducts, usually located below the system con¬ veying the air of higher temperature, to the base of the. flues. At the junction of the two ducts a mixing-damper is provided, so arranged as to open in one duct as it closes in the other. By adjusting this damper the air can be mixed to give, the resultant temperature required.

In situations where direct radiators can be used, either exposed or concealed, it is becom¬ ing the practice to provide sufficient heat by means of direct radiation to balance the heat

transmitted by walls, windows, etc., also a sup¬ ply of tempered air for ventilation only. As previously explained, when heat is supplied by means of air, the fuel-cost is greater than with direct heating ; so that a building can be warmed with less coal with the direct than with the indirect system. Furthermore, with the com¬ bined system, heating can be done at night, and at other times when air-supply is not required, at minimum cost. This system is particularly adapted for schoolhouse heating and ventilation.

The withdrawal of impure air from rooms is effected by fans connected to a system of vent- flues extending upward to an attic space, or downward to a cellar or basement, if the latter is more convenient. Another method of accel¬ erating the outflow of air through flues rising to the roof of a building is by the use of as¬ pirating coils. These are simply coils of pipe, or radiators, placed in the vent-flues as low down as possible, the coil heating the air and thus causing it to rise. Theoretically the aspi¬ rating coil is a more expensive method of mov¬ ing air than the mechanical method, as far as fuel-cost is concerned. It is simpler, however, than the fan-system.

Fans are of two general types — the disc or propeller fan, and the centrifugal blower. The former is constructed somewhat like a ship's propeller, and the current of air that it produces is mainly in a direction parallel with the shaft of the fan. The centrifugal blower, as usually de¬ signed, consists of a wrheel with blades, some¬ thing like a ship's paddle-wheel, enclosed in a casing. The air enters at the axis of the fan, and when the fan-wheel is revolved the air is discharged radially to the casing by the action of centrifugal force. Relatively speaking, the propeller-fan will move a large volume of air with small expenditure of power, but the pres¬ sure at which it will deliver air is limited. The centrifugal fan will deliver air under a greater pressure and the power required is therefore greater. In some buildings, where the system is of ducts and flues, is long, and the cross-sec¬ tions are comparatively small, to save space, quite a pressure is required to force the neces¬ sary amount of air through them. For such situations the centrifugal blower is best adapted. When the ducts are short and of ample area, it is best to use the propeller type of fan.

Fans are driven usually by small steam- engines or by electric motors. Sometimes gas- engines have been used with success. Where an engine is used, it is necessary for the boilers to operate under a sufficient pressure to drive the engine, or at least under a higher pressure than is commonly used with the gravity-system of connecting radiators. If the steam exhausted by the engine is condensed in the heating-sys¬ tem, as it usually is, a pump is necessary to re¬ turn the condensation to the boilers. In large office buildings, public buildings, theatres, etc., where a skilled engineman is employed to care for the plant, the use of a pump, an engine, etc., does not present an objection. On the other hand, in the case of schoolhouses, large resi¬ dences, churches, etc., which are apt to be looked after by less skilled attendants, an en¬ gine, pump and other apparatus that must go with them are open to objection. In such cases electric motors can be used if current can be obtained from an electric-supply company. The

entire heating system can then be operated on the simpler gravity system. Of course the cur¬ rent must be paid for, but in many locations its cost will be more than offset by the greater simplicity of the motor-driven system.

One of the most important developments in recent years in connection with ventilation of buildings is the control of humidity in air sup¬ plied for ventilating purposes. One method is to employ an. evaporating pan in which a coil of pipe, containing steam at high temperature, is submerged in water. The high steam tempera¬ ture causes the surrounding water to evaporate and add moisture to the air that is blown over the evaporating pan. An automatic device in the air duct controls the supply of steam to the coil in order that the humidity of the air may be maintained at the desired point.

Another method of adding moisture to air is by means of an air washer which is a large chamber of sheet metal through which the air is passed, with a receptacle for holding water at the bottom. A pump draws water from the bottom of the washer and forces it under pres¬ sure through pipes to nozzles which deliver the water in a finely divided spray over the in¬ terior of the washer. The air is drawn through the washer and comes in direct contact with the spray which not only cleanses the air but adds moisture to it as well. The amount of moisture absorbed can be varied by varying the tem¬ perature of the water by means of a suitable heater, the apparatus also being under auto¬ matic control.

In view of the fact that some of the water is vaporized, an amount of heat is abstracted from the air equal in amount to the latent heat of evaporation of the water. The result is that the air is cooled, due to partial evaporation, in passing through the washer. Air washers of this type are, therefore, used to cool the air and they have been used to a considerable ex¬ tent in certain classes of buildings and manu¬ facturing plants, where air cooling is necessary in hot weather.

It has been found that air cooling is not always satisfactory for the reason that when the air is cooled by means of an air washer, the relative humidity of the air is increased, and air saturated or nearly saturated with moisture is not as pleasant as air at a some¬ what higher temperature where the relative humidity is lower. To overcome this objection air cooling plants have been installed where the cooling is carried to such an extent as to lower the temperature of the air considerably below that desired to maintain in a room, and to such an extent to condense part of the mois¬ ture that air contains in order that heat may be added to the air after cooling so as to obtain, finally, air at a higher temperature than the temperature of air leaving the washer, but with a lower relative humidity. The net result of this operation is to admit to the room or building air at a lower temperature than the outside air and of a relative humidity that is comfortable. The first cost of apparatus neces¬ sary to do this and the cost of operation is considerable, and the expense involved is only justified under special conditions.

Heating by electricity is not done to any great extent, on account of the excessive cost. When coal is burned under a steam-boiler, it is

not uncommon for 60 per cent of the heat in the fuel to be realized in the steam which can be used for heating. If the heat in coal be transformed into electrical energy, and this again transformed into heat, less than 10 per cent of the heat in the fuel will be realized for heating.

Bibliography. — Tredgold, 'The Principles of Warming and Ventilating Public Buildings, Dwelling Houses, etc. ; Hood, 'A Practical Treatise on Warming by Hot Water* ; Peclet, 'Traite de la Chaleur) ; Briggs (and Wolff), 'American Practice in Warming Buildings by Steam* ; Billings, (The Principles of Ventila¬ tion and Heating) ; Mills, (Heat — Its Applica¬ tion to the Warming and Ventilation of Build¬ ingsˆ; Baldwin,. (Steam-Heating) ; (Hot-Water Heating and Fitting* ; Monroe, (Steam-Heat¬ ing and Ventilation ; Carpenter, 'Heating and Ventilation of Buildings.*

Henry C. Meyer, Jr., Consulting Engineer.

HEATON, Augustus George, American artist : b. Philadelphia, Pa., 28 April 1844. He was the first pupil from the United States to study at the Paris Beaux-Arts, where he was trained by Cabanel. Later (1878-80) he was in the studio of Leon Bonnat, and exhibited con¬ siderably at the Salon. Among his paintings are (Washington at Fort Duquesne) ; 'The Recall of Columbus,) engraved on the 50-cent Columbian Exposition stamp of 1893 ; por¬ traits of Bishop Bowman and Paul Tulane; and (Hardships of Emigration, engraved on the 10-cent Omaha Fair stamp. He is the au¬ thor of 'The Heart of David — the Psalmist King) (1900) ; 'Fancies and Thoughts in Verse* (1904), etc.*

HEATON, Sir John Henniker, English postal reformer: b. Rochester, Kent, 1848; d. 8 Sept. 1914. He was for some time prominent in Australian journalism and sat in the House of Commons for Canterbury from 1885 until his death. He carried the Imperial Penny Postage Scheme in 1898; was instrumental in obtaining Anglo-American Penny Postage, which came into force in the same year, as well as telegraph money orders in England, the parcel post between England and France and other postal reforms.

HEATON, John Langdon, American jour¬ nalist : b. Canton, N. Y., 29 Jan. 1860. He was graduated from Saint Lawrence University in 1880, entered journalism as a member of the Brooklyn Times staff in 1881, and in 1897 be¬ came assistant editor of the New York World; now an

editorial writer there. His publica¬ tions are (The Story of Vermont (1889) ; 'Stories of Napoleon) (1895) ; 'The Quilting Bee) (1895); 'The Story of a Page* (1913).*

HEAVEN, in a physical sense, is the azure vault which spreads above us like a hollow hemisphere and appears to rest on the limits of the horizon. Modern astronomy has taught that this blue vault is in fact the immeasur¬ able space in which earth, sun and planets, with the countless host of fixed stars, revolve. The blue color of the heavens is due to the action of minute particles in the air upon the blue rays in sunlight.

In ancient astronomy, heaven denoted a sphere or circular region of the ethereal heaven.

The ancient astronomers assumed as many dif¬ ferent heavens as they observed different celes¬ tial motions. These they supposed to be all solid, thinking they could not otherwise sustain the bodies fixed in them ; and spherical, that being the most proper form for motion. Thus they had seven heavens for the seven planets : the moon, Mercury, Venus, the sun, Mars, Jupiter, and Saturn. The eighth was that of the fixed stars, which was particularly denomi¬ nated the .firmament. Ptolemy adds a ninth heaven, which he calls the primum mobile. But others admitted many more heavens, according as. their different views and hypotheses re¬ quired : Eudoxus supposed 23 ; Regiomontanus 33; and Fracastoro no less than 70.

In theology, this word denotes the upper and nobler region of God's universe, in con¬ trast with the earth, the lower part assigned to men for their habitation. Of the belief in the existence, of some special scene of the pres¬ ence of Deity, the majority of the known religions of the. world bear ample evidence. According to Aristotle all men, whether Greeks or barbarians, had a conception of God ; and all united in placing the residence of the gods in the most elevated regions of the universe. This idea runs through the Persian, Egyptian, Ger¬ man,. Scandinavian, and indeed all the ancient religions in which the belief in a supreme being assumes any other form than the pantheistic; and even though the pantheistic philosophers may have denied that any peculiar locality could be regarded as the peculiar habitation of the Deity, we find that popular belief and wor¬ ship. is evidently grounded upon a contrary opinion. In addition, however, to its being the special seat of the Deity, heaven also denotes the place or the state or condition of blessed spirits and of the souls of just men either im¬ mediately after physical death or at some certain period subsequent to. it. All the religious systems which include . the immortality of the soul in¬ volve, at least in substance, the idea of a future state of happiness as a reward for a virtuous life. The delights of the heavens of the vari¬ ous beliefs and creeds differ greatly in kind. The pleasures of the

classical Elysian fields were to a great extent pleasures of sense; the German warrior believed he would be trans¬ ferred to . a region where he would be able to pursue his old fierce enjoyments; and the American Indian cherished the notion that he quits this world for a happier hunting-ground. Among Christians the general belief is that heaven is the abode of the Most High, the holy angels and the spirits of just men made perfect; that this dwelling-place is eternal, its joys entirely spiritual; it is believed also by many that the just who are free from sin are admitted into heaven immediately after death ; also that the souls of the patriarchs, prophets' and in general the good, were detained, before the new dispensation, in a temporary abode till the coming of the Redeemer. See Immortal¬ ity; also Future Life.

HEAVES, or BROKEN WIND, a disease of the horse generally described as unsound¬ ness of the respiratory organs. The disease is not well understood by veterinarians and the treatment is unsatisfactory. It is generally conceded that the disease is incurable. The characteristic symptoms are labored breathing,

dilated nostrils, bloodshot eyes and dependent belly. Horses with this disease often drop down while at work and succumb to congestion of the lungs, haemorrhage or suffocation, the direct result of the heaves. Upon post-mortem examination the stomach is found distended and to have thinner walls than in the normal horse.

HEAVYSEGE, Charles, Canadian poet : b. Huddersfield, England, 1816; d. Montreal, 1879. He was a cabinetmaker by trade, and in 1853 emigrated to Canada, first working at the bench and later joining the staff of the Montreal Witness. In 1857 he published 'Saul, a drama of great creative power, which has been de¬ scribed as (*

HEBBEL, he'bel, Friedrich, German dram¬ atist: b. Wesselburen (D.thmarschen, Holstein, then belonging to Denmark, now to Prussia), 18 March 1813 ; d. Vienna, 13 Dec. 1863. His father was a stonemason, his mother a washer¬ woman, and the conditions of his early youth at home were those of the most frightful pov¬ erty. The father particularly was much soured by the family's lot, and had gone so far in his pessimism as to look with disfavor upon even the most innocent pleasures of his two boys, whom he was obliged by bitter necessity to regard as his rivals in the consump¬ tion of their scanty meals. ' Already in his earliest years Friedrich showed a remarkable sensitiveness to impressions of artistic and

stylistic character; he tells us, for instance, that such words as Rippe, Knochcn ("rib,® "bone®), by their mere sound aroused his anger, and that he carefully erased them from all his readers and textbooks, while other words, such as Rose, Lilie, Tulpe, produced a voluptuous pleasure in him. His father died when the boy was 14 years old, and Sheriff Mohr undertook to bring him up. This man attracted all the repressed hatred and venom of Hebbel's long years of privations, and, by forcing him to consort at table with the lower servants, developed a snobbish tendency in the boy that later occasionally found rather ugly expression. A reading of Uhland's poem, (Des Sangers Fluch, taught him the essence of poetry, and was the beginning of a long corre¬ spondence, later friendship, between the two men. A number of Hamburg newspaper read¬ ers, having seen some of Hebbel's little poetic contributions to the papers, determined to pro¬ vide him with the means for un.versity study, but their financial aid was so slight that, during his period of preparation, Hebbel was often starving. At this time, while at Hamburg, be¬ gins his friendship for Elise Lensing (1804- 54), a poor seamstress, who became so infatu¬ ated with him that she devoted to him all her earnings, going even so far as to support his mother without his knowledge. His at¬ titude toward her was that of a grateful re¬ cipient, who did not quite understand her affection for him. In 1836 he finally began the study of law at Heidelberg, soon g'ving up both the study and the city and going to Munich in the autumn of the same year. Here,*

while attending the lectures of the philosopher Schelling and the mysticist Gorres, he soon spent the small sums that Elise Lensing and other persons had given him, and found him¬ self once more in dire want. For two and a half years he never had a warm meal. It is not difficult to understand the illnesses of Hebbel's later years after the privations of his youth and early manhood. At Munich he lived in the family of a poor carpenter, whose daughter, Josef a Schwarz, had considerable in¬ fluence on him and probably suggested the theme and the treatment of Hebbel's middle- class tragedy (Maria Magdalena, written years later (1843). His first tragedy was written after his return to Hamburg (1839), on a subject found in the apocryphal book of Judith in the Old Testament, and suggested to him by Giulio Romano's painting in the Munich Pinakothek. (J udith> (1840) is the story of a woman who sets out to perform a great deed for her country, but actually ex¬ ecutes the deed because the victim (Holo- fernes) has won her love and insulted her womanhood. Holof ernes, Nebuchadnezzar's general, is a picturesque tyrant of Asiatic type, impersonating boundless energy, brutality and gloom, and a peculiar tendency to self-torture that is characteristic of many of Hebbel's most powerful masculine characters in other plays. In 1843, through the intercession of the Dan¬ ish poet Oe'hlenschlager, Hebbel, on a visit to Copenhagen, obtained from King*

Christian VIII of Denmark an annual pension of 600 thalers, to run for two years. "Is it not mar¬ velous?® he writes. "Think of Friedrich Heb¬ bel and 1,200 thalers; could you ever have mentioned the two in the same breath?® He visited Paris in 1843 and Rome in 1844. At the former city he was informed that Elise Lensing had lost their little boy, and that she was distracted in consequence. She was eager to marry Hebbel now, for his society at least, but he was determined not to marry her. He did not communicate this decision to her definitely, however, until he had settled down in Vienna (1845 to his death), where he be¬ came acquainted with Christine Enghaus (1817-1910), a famous actress at the Hofburg- theatre, whom he married in 1846, after a heartrending correspondence with Elise. "You surely must understand that my life must either have a larger outlook or come to an end.® His letters and his diaries (the latter are of immense importance in any study of Plebbel; they extend from 1835 to his death) are very illuminating in the information they g've on this period of his life and the mental struggles it covered. (Maria Magdalena> is the story of a girl driven by the worthlessness of a brother, the faithlessness of a lover and the cruel severity of a father to seek her own death. The father's words on hearing of her deed: "The world is a riddle to me,® are a strong arraignment of a generation of parents who impose moral laws upon their children in¬ stead of deriving a system of morality from life. (Herodes und Mariamne (in blank verse) is taken, as the name implies, from the tale contained in Flavius Josephus (q.v.), de¬ picting an episode of the transition from*

ancient paganism and Judaism to later Christian¬ ity. (Agnes Bernauer) (1851) is a prose tragedy of Bavarian history, a pathetic tale of the love of a noble prince and a burgher maiden. (Gyges und sein Ring) (1854) is a gloomy and distorted tragedy based on a tale in Plato taken from Lydian history. The Nibelungen Trilogy (finished I860) has the following sections: (Der gehornte Siegfried,

(Siegfrieds Tod, (Kriemhilds Rachel and deals, like Richard Wagner's famous trilogy, with the old Teutonic legend of Siegfried, but while Wagner's music dramas are based chiefly on the Old Norse version as found in the Eddas, Hebbel's series is taken directly from the Mediaeval German Nibelungenlied (q.v.).*

Hebbel, like many other German creative artists, was also active as a critical philosopher, his best work in this field being contained in (Mein Wort fiber das Drama) (1843), and in the diaries. One of the theories

dominating his artistic production was embodied in his prin¬ ciple that the best conflicts for dramatic treat¬ ment were those symbolizing the great turning points of history, the transition periods be¬ tween great historic epochs. An examination of his titles alone will indicate that he was powerfully attracted to the development of sub¬ jects involving the clash of hostile and incom¬ patible civilizations. He has had an enormous influence over the intellectual life of the cul¬ tured middle class in Germany, but, curiously enough, has been practically ignored in other countries. His gloomy, doctrinaire, sententious manner seem to have excluded him, thus far, from the attention of the Anglo-Saxon com¬ munity. Other works by him are plays :

Jacob Wittmer Hartmann, Assistant. Professor of the German Language and Literature, The College of the City of New York.

HEBE, he'be, according to Greek mythology, the goddess of youth, and the cupbearer on Olympus until replaced by Ganymede. She

was the daughter of Zeus and Hera who gave her as a wife to Heracles, in reward of his achievements. At Rome she was worshipped as Juventas. She is described by some au¬ thorities as a divinity who had it in her power to make old persons young again. In the arts she is represented with the cup in which she presents the nectar, under the figure of a charming young girl, her dress adorned with roses, and wearing a wreath of flowers. An eagle often stands beside her, which she is caressing.

HEBEL, Johann Peter, German poet : b. Basel, 10 May 1760; d. Schwetzingen, 22 Sept. 1826. He received his education at Basel and studied theology at Erlangen ; was made church councillor in 1805 ; director of the Karlsruhe Gymnasium in 1808, and was raised to the prel¬ acy in 1819. He published a series of poems in the Alemannic dialect — (Heidelberg 1831).

HEBER, he'ber, Reginald, English Angli¬ can bishop and poet: b. Malpas, Cheshire, 21 April 1783; d. Trichinopoli, India, 3 April 1826. He was educated at Brasenose College, Oxford; distinguished himself by the English prize poem, (Palestine) ; was elected to a fel¬ lowship in All Souls' College; traveled in Ger¬ many, Russia and the Crimea ; entered holy orders in 1807, and became the incumbent of Hodnet, Shropshire. In 1812 he was appointed prebendary of Saint Asaph, in 1815 Bampton lecturer at Oxford, in 1822 preacher at Lin¬ coln's Inn. From 1822 until his death he was bishop of Calcutta, at that time constituting one very extensive diocese, in all parts of which he traveled to the furtherance of the mission work in progress. He completed the establishment of Bishop's College, Calcutta, be¬ gun by Bishop Middleton. Heber is best known for his hymns, which

include the familiar (From Greenland's Icy Mountains,

(Brightest and Best) and (Holy, Holy, Holy! His poetical works were published in 1841. In prose he wrote (A Life of Bishop Jeremy Taylor* (1822), and (A Journey Through In¬ dia* (1828). Consult the*

HEBER SPRINGS, Ark., town and county- seat of Cleburne County, on the Missouri and North Arkansas Railroad, 80 miles north of Little Rock. It has extensive agricultural, live stock and lumber interests and contains saw mills, cotton gins, sash and door works, a planing mill, etc., a new courthouse, public and high schools, and two banks with resources

amounting to $429,000. The value of its tax¬ able property is estimated at $528,436. The municipal expenditure reaches an average of $4,000 annually. The town enjoys a.considerable reputation as a health resort, having nine mineral and sulphur springs. It is visited by many health-seekers, both in summer and win¬ ter. Pop. (1920) 1,675.

HUBERT, Jacques Rene, zhak re-na a-bar, French journalist and politician: b. Alengon, Orne, 15 Nov. 1755; d. Paris, 24 March 1794. At the beginning of the French Revolution Lemaire published a journal supporting consti¬ tutional principles under the title Pere Du¬ chesne. The Jacobins soon established a rival Pere Duchesne, of which Hebert became editor. The journal owed its success to the cynical virulence with which it advocated the popular cause and abused the court and the monarchy, and soon had the field to itself. He was a member of the Revolutionary Commune that approved the massacres in the prisons in September 1792, was soon after substitute at¬ torney of the commune, and employed all his influence in forwarding a project to establish the authority of the commune on the ruins of the national representation. The Girondists, who were at that period contending against the Mountain, had credit enough to procure the arrest of Hebert 24 May 1793. Again restored to liberty, he assisted with all his power and influence in the proscription of the Brissotins. Their downfall hastened his own. With Chau- mette he established the Feast of Reason, and afterward accused Danton of having vio¬ lated the nature of liberty and the rights of mankind. This terrified both Danton and Robespierre, who suspended their mutual jealousies to accomplish his destruction; and Hebert, with the greater pajt of his associates, was arrested and guillotined.

HEBERT, Louis Philippe, Canadian sculp¬ tor: b. Sainte Sophie d'Halifax,

Quebec, 27 Jan. 1850. He studied for several years in Canada, and later in Paris, where he estab¬ lished his studio. In 1894 he won the Confed¬ eration medal awarded by the Canadian gov¬ ernment. Among his works are historical sub¬ jects executed for public buildings in Quebec, Ottawa and Montreal.

HEBREW ECCLESIASTICAL COS¬ TUME. See Costume, Ecclesiastical.

HEBREW LANGUAGE AND LITERA¬ TURE, the tongue in which the ancient Jews spoke and wrote, and the books produced by that people during their settlement in Pales¬ tine as an independent nation; these latter con¬ stitute the Hebrew Scriptures and are looked upon by the Hebrews as containing the in¬ spired word of God. See Jews and Judaism — Hebrew Language; Jewish Literature; Jewish Philosophical Writers; The Jew in Art, Science and Literature; The Talmud; The Masorah ; The Cabala.

HEBREW MUSIC. From the many Bible references to music, the inference necessarily arises that it filled a large part in the life of the ancient Hebrews. . It is spoken of not only in the service of religion, where it might natu¬ rally have been looked for, but also on the

battlefield, at the harvest feasts and in the home. David, prince of singers, employs it to drive away Saul's melancholy. Elisha prophe¬ sies under its inspiration. The victory at the Red Sea, the return of Saul and David after the battle with the Philstines, all important na¬ tional events are celebrated in song. The de¬ tails of the Temple music, the names, divisions and functions of the singers and instrumental performers are referred to at length. David utilized no less than 4,000 singers in the Temple service, of whom 288 were "skilful® — i.e., virtuosi. Josephus, describing the prepara¬ tions for the dedication of the Temple, speaks of a band and chorus of 200,000 trumpets, 40,000 string instruments and 200,000 singers ; and, even if these figures are liberally dis¬ counted, the number must have been imposing.

Yet, in spite of all that modern research has accomplished in reconstructing the vital facts of Jewish history, very little definite informa¬ tion exists on the subject of Hebrew music. This, in itself, is a strong indication that music was but slightly developed by the Jews. Even among the Greeks, most advanced of the an¬ cient peoples in all that concerned the arts, it had practically no independent existence, but was bound up with poetry and dancing and entirely subservient to their demands. The Greeks spent much effort over the scientific aspects of music and its aesthetic considera¬ tions and their speculations on the subject are preserved in fairly elaborate form ; but there is no trace of any treatise on either the theory or the practise of music among the Hebrews ; not even any suggestion bearing on its use is to

be found in the widely varied laws of _ the Pentateuch. The Bible is bare of . ny real indi¬ cation of its form, nature or mechanics. . All reasonings on the subject are necessarily a priori.

In any discussion of ancient music it must be borne in mind that a different thing is meant than that which the word connotes in its pres¬ ent-day signification. Music, as an art, has the three dimensions of rhythm, melody and harmony; while at the dawn of civilization it was, as one writer has well put it, a "flatland® of two dimensions only, rhythm and melody. So far as scholars have been able to discover, harmony is entirely a modern development. The terminology of the Bible is a stumbling block in the path of students on the subject, who cannot even identify some of the musical instruments named. There are, for example, several Hebrew names which may mean harp, an instrument undoubtedly in use by them, kinnor, nebel, asor, all translated in the Eng¬ lish version of the Psalms as "psaltery.® The ugab, an invention credited to Tubal, is vari¬ ously called "organ® and "pipe.® The one in¬ strument preserved to the present day is the shophar, a curved trumpet, made of the ram's horn, which is still heard in the synagogue on important holy days. It is the shophar which sounded amid the smoke and thunder of Mount Sinai when the Commandments were given to Moses and to its blast the walls of Jericho fell. While the exact facts are lacking, it is es¬ tablished that the Hebrews had instruments in the three modern categories of stringed, wind and percussion instruments. Save as there may have been interludes between the choral singing

and the chanting of the priests, there seems to have been no independent instrumental music; but it almost invariably accompanied the voice and the dance. Hebrew song was probably a unison chant or song-speech, more or iess melodious, but entirely subordinate to th£ text in rhythm andaccent. From the form of much of the verse, it seems to have been, at times, antiphonal. Undoubtedly it was crude and noisy and probably without definite pitch, judged by Occidental standards. Even modern Oriental music sounds so to Western ears.

In his method of intoning prayers, the Or¬ thodox Jew of to-day follows the tradition which has been handed down probably from the remote days of the Temple; but this chanting has very little in common with music. It is, in a sense, rhythmical, but the rhythm is that of the words. It has sequence and variations of tone, but they are based on the syntactical structure of the sentences, not the musical exigencies of melody. .When, at times, this

chanting approaches music in formal semblance, it is an accident due to textual or syntactical impulse. It is always possible, as it is cer¬ tainly plausible, that the plain song of the early Catholic service, which, in the course of the first thousand years of the Christian era, de¬ veloped into a rounded and organized body of chants, appropriate to every branch of religious worship, is the direct descendant of the ritual chant of the synagogue. At all events, the latter could not have been without its influence upon the early members of the Christian clergy.

Although there is no music now extant traceable to the Hebrews of Bible days, a body of music of some size and distinct character has grown up during the past few centuries, which, by long association with the ritual and the home-life of the Jews of all countries, has achieved the right to the title of Hebrew music. Differences may be noted between the music of the Sephardic or Spanish-Portuguese Jews and that of the Ashkenazim or Jews of northern Europe, explainable, in part, however, by dif¬ ferences in environment. . Probably the oldest of Jewish melodies now in use is the famous Kol Nidre, sung on the eve of the Day of Atonement. It has been popularized through Max Bruch's rather free improvisation. The Chanuka hymn, Mo'oz Tsur, the Oz Yoshir, sometimes asserted to be Miriam's song of triumph, the Shir Hama-a-los, accompanying the grace before meals, the Addir Hu, and sev¬ eral other of the Passover songs and the En Keiohenu, are known throughout the entire Jewish world. These, and a number of others, with the original texts, were brought together a few years ago in a Hebrew hymnal by Mrs. Solomon Schechter and Lewis M. Isaacs. A real though recent addition to distinctive Jewish music is the Zionist song Hatikwoh, which is, however, spiritually and atmospherically old.

No account of Hebrew music would be complete without mention of Solomon Sulzer, the foremost name among Jewish cantors. Born in Austria in 1804, he devoted his marked musi¬ cal talent to the service of the synagogue. In a whole-hearted endeavor to reconstruct the music of the Jerusalemic days — a task which his enthusiasm refused to admit was impos¬ sible— he introduced reforms in the ritualistic chanting, which, while sacrificing little of the traditional atmosphere, vhstly improved its

musical value. He arranged and composed a large number of responses and settings of psalms and prayers, the best of which are con¬ tained in a collection called Shir Zion, which have made for themselves a permanent place in the Jewish world.

Lewis M. Isaacs.

HEBREWS, the distinctive name of that branch of the Semitic family which migrated from Mesopotamia into Palestine, thence went to Egypt, and,

after a long period of bondage, reconquered Palestine, and finally settled there. Divided, at a later period into two distinct states, that of Judah and of Israel, they were singly overcome, and led into exile. A portion, chiefly descendants of Judah (Jehudah) re¬ turned, and founded a new empire. From that time all the members of the Mosaic common¬ wealth were known by the name of Jehudins, corrupted into Jews. The word Hebrew has come down to us through the Greek 'E/3paiovg from the Old Testament word 'ibhri, used of the people who claimed a common descent from Abraham, whose ancestor was Eber or Heber (Gen. x, 21). Tbhri itself is derived from 'abhar, to cross over, to wander, and may refer to the nomadic mode of life of this people during its early period. For a continuous sketch of the entire history of this people from the days of Abraham to our own, as well as a brief outline of this language, literature, culture, etc., see Jews and Judaism; Palestine; Semites ; Semitic Languages and Literatures ; Hebrew Music; Zionism.

HEBREWS, one of the canonical books of the New Testament, usually spoken of as <(The Epistle to the Hebrews.)} The fact that it lacks the introductory formula naming author and recipients, to be expected in every ancient letter, has led some to deny that this writing is a letter. But this form may in this case, as often, have been placed on a separate sheet and become lost, or for some other reason have failed to be copied. At any rate many ex¬ pressions show that it really was a letter ad¬ dressed by some individual to a definite group of early Christians. In the King James version it was styled <(The Epistle of Paul the Apostle, » and thus has been perpetuated an early Alex¬ andrian tradition, which later became the uni¬ versal opinion for many centuries. But this view was at first unknown in Rome and the West, where are the earliest traces of the use of this writing, and it differs from the ac¬ knowledged epistles of Paul in both style and thought. The language is here more idiomatic and choice ; clauses and sentences are connected by an array of conjunctions largely different from those used by Paul; instead of his abrupt, almost disconnected course of expres¬ sion, earnest to vehemence, we find in He¬ brews a series of balanced periods, flowing smoothly even when most emphatic and a style abounding in almost artificial devices of rhetoric. There is no less difference in the theological conceptions and their presentation. While not antagonistic to Paul's doctrines, being rather complementary, the doctrinal teachings here are yet variant, as, for example, the teachings as to the divine Sonship of Christ; the nature of faith, and the value of the law of Moses.

HEBRIDES

While the Pauline authorship is now set aside as out of the question by the practically unanimous judgment of critics of every school, there is no general agreement as to who d.d write the book. Clement of Rome and Luke have been urged for no reasons except value¬ less suggestions made by Clement of Alexan¬ dria and his pupil Origen. Harnack has con¬ jectured that it may have been written 'by Pris¬ cilla in association with her husband, Aquila, but this view can satisfy only such as regard it as addressed to Roman Christians. The con¬ jecture of Luther that Apollos was the author has been widely accepted, while the later sug¬ gestion that it was written by Barnabas has met with the approval of many scholars of the highest rank. The latter view has in its favor, to be sure, the only ancient testimony of real weight, that of Tertullian, but it must be allowed that either Barnabas or Apollos would meet all the requirements of the case so far as they are now known, and consequently that the authorship cannot be positively decided.

There is no less uncertainty in naming the persons to whom it was originally addressed. The title prefixed very early, though in all probability not originally, was <(To Hebrews,® and the view that it was addressed to Jewish Christians is nearly universal. Not a few scholars, however, have latefy declared in favor of the view that it was written rather to Gen¬ tile Christians. The decision hinges on the answer to the question whether the danger against which the author warns his readers is relapse into heathenism or relapse into Juda¬ ism. On the one side it is urged that relapse into Judaism could not properly be designated <(apostasy from the living God,® while on the other side it is urged that, while Judaism was in the author's mind good as compared with heathenism, yet its acceptance at cost of a sur¬ render of all that was distinctively Christian might reasonably be styled apostasy. It has certainly seemed to most that the fact that the whole thought of the book is the superiority of Christianity over Judaism proves that the dan¬ ger against which the first readers were warned was relapse into what the author regarded as relatively worthless because an outgrown and outworn stage of divine revelation, and that the opinion that apostasy into heathenism was the readers' danger is only <(an ingenious paradox,® even though <(an amount of ingenuity has been expended in support of this hypothesis, suffi¬ cient to render it plausible.®

To some extent the questions as to place and date depend for their answer upon the conclu¬ sion as to the character of the first readers. If addressed to Hebrew Christians, it is scarcely possible that its date can be later than 68, just before the Jewish War which resulted in the destruction of Jerusalem, and the final removal of the danger of relapse into Judaism, while the fact that it is addressed to a second gen¬ eration of believers and th£ references to the lapse of considerable time make it necessary to set the

date as late as possible. If addressed to Gentile Christians, it might be dated as late as 85 or even 90. But that in any case it is a lst-century production is guaranteed by the use made of it by Clement of Rome before the year 100.

Where the first readers are to be looked for hangs as completely on their character as does the question of date. If Gentile, most would think it probable that they were to be found at Rome, where they may have constituted only a single group of many among the Christians in the city. . If, however, they were really He¬ brews, it is, if not impossible, at any rate less likely that they were at Rome. The reference to <(those from Italy® is ambiguous, but it would seem plausible that Timothy had been imprisoned at Rome rather than that on re¬ lease he should hasten hither. If the core of the book is a warning against Judaism, it would be natural to look for those needing such a warning nearer the Temple than was Rome. While it is generally regarded as improbable that the letter was addressed to the church at Jerusalem, there may have been many commu¬ nities within easy reach of that city where such a group of Christians as these <(Hebrews® could have been found. Syrian Antioch and Jamnia have been named among other places.

The author very fitly styled his work ((a message of appeal.® Such it is throughout. To be sure, the first 10 chapters consist largely of argument skilfully marshaled and stated, but all is to strengthen appeal, and exhortation is constantly inwoven with demonstration. The great theme is the superiority of Christianity over Judaism. While this is developed in many phases, it may be. briefly summed up in saying that in chapters i-vi the stress is laid on the personal superiority of Christ, as compared with angels, Moses, Aaron, and then (vii, 1-x, 18) the superiority of the work of Christ is set forth.. But the .whole is one plea for persist¬ ence in the Christian profession and life, and while the changes of the centuries have made much in this book peculiarly hard to under¬ stand and have robbed other arguments of some of their original force, yet, when under¬ stood, this plea for the value of Christianity remains cogent as well as earnest.

Bibliography.— Consult on this epistle: Bruce, A. B. (1899); Davidson, A. B. (1880); Edwards, T. C. (in Expositor's Bible, > 1888) ; Vaughan, C. J. (1891) ; Westcott, B. F. (1889).

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

HEBRIDES, heb'ri-dez, The, or WEST¬ ERN ISLANDS, Scotland, an archipelago off the west coast, extending from lat. 55° 35′ to 58° 32′ N. ;

the most southern island being Islay, and the most northern, Lewis. The group is politically divided between the shires of Ross and Cromarty, Inverness and Argyll, very nearly in the line of their coincidence with the coasts of the respective counties. They num¬ ber about 500 in all, but many are inconsider¬ able islets and rocks, and only about 100 are inhabited ; area, about 2,812 square miles. They are usually divided into the Outer Hebrides, of which the principal are Lewis and Harris (forming a single island), North Uist, Benbe- cula, South Uist and Barra ; and the Inner Hebrides — Skye, Mull, Islay, Jura, Coll, Rum, Tiree, Colonsay,.etc. The Outer are separated from the Inner, and from the mainland, by a strait or channel called the Minch, which at its narrowest part, between Harris and Syke, is about 12 miles broad. Ross and Cromarty,

Inverness and Argyll are the counties to which they belong.

The climate is mild and salubrious, but vari¬ able, tempestuous and humid. Snow and frost are almost unknown in the smaller islands, and are but little felt in the larger. There is com¬ paratively little wood in the Hebrides, and on many of the islands none at all. In Lewis, Skye, Islay, Mull and several of the other islands, however, both forest and fruit trees have been planted to a considerable extent. Oats and barley are almost the only cereal crops raised. Potatoes are extensively culti¬ vated. Cattle constitute the staple product. The native breed are small but handsome. The breed of horses in also small, but hardy and docile. The native breed of sheep is very small, but Cheviots have been introduced with success. The productive land is partly occu¬ pied as sheep-farms; much of it is held by "crofters,® who occupy holdings usually of a very few acres, sometimes with a right of pasturage in common attached. There are also "cotters® who occupy houses, with or without a patch of ground, on the land of the crofter, the farmer or the landlord, and who are often mere squatters paying no rent. Grouse-moors and deer ranges cover a considerable area. Owing to the minute division of the arable land there is in many places an excess of population. The condition of the crofters and cotters, especially in the Outer Hebrides and Skye, is very de¬ pressed, their dwellings miserable and their liv¬ ing poor, consisting chiefly of potatoes, milk and oats or barley bread, and in bad harvests it is often insufficient in quantity. The fisheries are not developed to the extent they might be. Limestone and slate are the only minerals worked. Whisky is manufactured in Skye, Islay and Mull. Gaelic is still the language of the majority of the inhabitants of the

Hebrides. The Hebrides were the Ebudae of Ptolemy and the Hebudes of Pling. In remote times they were subject to the kings of Norway, but in 1264 were annexed to the crown of Scotland. They were held by various native chieftains, in vassalage to the Scottish monarch ; but sub¬ sequently fell into the hands of one powerful chief, a Macdonald, who in 1346 assumed the title of "Lord of the Isles® and began to exer¬ cise a practically independent rule. The aboli¬ tion of heritable jurisdictions in 1748, which put an end to the system of communal owner¬ ship of the soil as well as to the rule of the chieftains, was not an unmixed blessing; and it was followed by exorbitant rentals and by great emigrations to North America. The potato blight of 1846 caused great hardships to the population. The entire relations between owner and tenant in the Hebrides were made the subject of investigation by a royal com¬ mission in 1884; this was followed by the Crofters Holdings Act of 1886, under which fair rents and fixity of tenure are assured to the crofters, and the hardships of their lot have been considerably mitigated. The inhabitants mostly belong to the United Free (Presby¬ terian) Church, but in some of the islands Catholicism is predominant. Little was known about the Hebrides until the publication of 'Johnson's Journey to the Western Islands of Scotland- (1775). In more recent times Scott s 'Lord of the Isles, > and the charming novels of William Black, have invested them*

with a halo of romance, and the steamers of the Clyde afford ample facilities for tourists who intend visiting the islands. Consult Pen- nent, 'Pour in Scotland and Voyage to the Hebrides) (1774) ; Buchanan, 'The Hebrid Isles > (1883) ; Goodrich-Freer, 'The Outer

Isles) (1902) ; Hartley, 'Wind-Seekers in the Hebrides) (1906).

HEBRON, he'bron (originally Kirjat- harba, now El-Khalil), Palestine, a town of great antiquity, mentioned in the Bible, 18 miles southwest of Jerusalem, 2,830 feet above sea- level. It lies in the narrow valley of Mamre, has narrow streets, high well-built stone houses with flat roofs, extensive covered bazars, with well-furnished shops, exhibiting glass manu¬ factures, consisting of lamps, colored rings, etc., for which the place has long been celebrated. The chief mosque, El-Haram, built around the Cave of Machpelah, from which Christians were rigorously excluded, is esteemed by Moham¬ medans one of their holiest places. Hebron is one of the oldest existing towns, having been built seven years before Zoan (Num. xiii, 22), and it is mentioned prior to Damascus (Gen. xui, 18). It is peculiarly rich in traditional sites. Abraham resided here and acquired the Cave of Machpelah as a sepulchre for Sarah and their descendants. It was taken by Joshua and given as an inheritance to Caleb and made a city or refuge. It was David's royal city for seven years. Here Absalom came to be de¬ clared king. The town was captured by Judas Maccabaeus from the

Edomites, and was stormed by the Romans under Vespasian and burnt down. In 1167 it became a Latin bishopric, and in 1187 it fell into the hands of Saladin. Pop. 22,000 (2,000 Jews).

HEBRON, Neb., city, county-seat of lhayer County, on the Little Blue River, and on the Chicago, R. I. & P. and the Burlington & M. railroads, about 63 miles southwest of Lincoln. It is situated in an excellent agricul¬ tural and stock region. It has a large flour-mill a creamery and a planing-mill. There are five churches, a high school, three banks and three weekly newspapers. The shipments of wheat and live stock are extensive. Electric and sewage plants and waterworks are mu¬ nicipally owned. Pop. 1,778.

HECATiEUS, hek-a-te'us, distinguished Greek historian and geographer: fl. about 3UU b.c. He was a native of Miletus and the son of Hegesander, a member of an ancient and illustrious family. Of his public life the only event of which we have any definite knowledge was the part he took in the in¬ surrection of the Ionians against the Persians. Being well acquainted with the resources of Persia, he vainly attempted to dissuade Aristag- oras, the planner of the revolt, from his un¬ dertaking. Later he went as ambassador to Artaphernes and prevailed on the satrap to win the confidence of the Ionians by lenient treat¬ ment. His two great works were his 'Tour of the Worlds and his 'Genealogies. } The latter is little more than a prose version of the legends already given in versified form. He improved the map of the world made by Anaximander; and his writings were highly esteemed by Herodotus. The fragments of his works were published by Muller (1841-70).

HECATE, hek'a-te, in Greek mythology a goddess whose parentage is variously given. Homer does not mention her. She appears to have been originally a Titan who ruled in heaven, on the earth and in the sea. She could bestow or withhold at pleasure the blessings of wealth, victory and wisdom to mortals, and was the only Titan who retained power under the rule of Zeus. She was subsequently con¬ founded with several other divinities, was the goddess of night and of the lower world, and at length became a mystic goddess having all the magic powers of nature at her command. She was identified with Demeter and Artemis, and was regarded as the mystic Persephone. Magicians and witches prayed particularly for her aid. Sacrifices used to be offered to her on the last day of the month at places where three ways met (whence her epithet T pio ding, or in Latin, Trivia), and these consisted of dogs, honey and black female lambs. Her mysterious festivals were celebrated annually at ZEgina. Her appearance

was frightful. She had three bodies or three heads, and serpents hung hissing around her neck and shoulders.

HECK, Barbara, one of the founders of American Methodism : b. Ballygarry, County Limerick, Ireland, 1734; d. near Augusta, On¬ tario, 1304, She was of a colony of German im¬ migrants in Ireland who were among the first to be influenced by Wesley's preaching. In 1760 she came to America with her husband, Paul Heck, and Philip Embury (q.v.). In 1766 she was very active in the organizing of a Methodist society which met at Embury's house, and she also did much toward the building of the Old John Street Methodist Church. Later she and her family removed to the northern part of New York State, and when the Revolution broke out went to Lower Canada (1774), and later settled in Augusta, near Prescott in Upper Canada, and were the founders of Methodism in that province.

HECKER, Friedrich Karl Franz, German- American soldier: b. Eichtersheim, Baden, 28 Sept. 1811; d. Saint Louis, Mo., 24 March 1881. After studying law in Heidelberg, he abandoned his profession for political life. In 1842 he was elected to the Chamber of Deputies of Baden. On the outbreak of the revolution in Germany in 1848 he endeavored to convert the prelimi¬ nary convention into a permanent republican assembly. Frustrated in this attempt, he put himself at the head of a band of revolutionists, and invaded Baden from the south. He was de¬ feated at Kandern 20 April 1848, and fled to Basel, Switzerland, where he edited a radical newspaper and published his work (Die Volks- erhebung in Baden.) He was refused admis¬ sion to the National Assembly at Frankfort, although twice elected from Thiengen. In 1849 he removed to the United States, and became a farmer near Belleville, Ill. On the outbreak of the Civil War he raised a regiment of Germans, serving in General Fremont's division as colonel ; and afterward for a time commanded a brigade. In his later years he watched with great interest the foundation of the German Empire and its phenomenal growth. He pub¬ lished (Reden und Vorlesungen) (1872) ; (Betrachtungen fiber den Kirchenstreit in Deutschland und die In fallibilitat > (1874).

HECKER, Isaac Thomas, American Ro¬ man Catholic clergyman: b. New York, 18 Dec. 1819; d. there, 22 Dec. 1888. In early life he was a member of the Brook Farm community, near Boston, where for nearly a year he offi¬ ciated as baker for the establishment. In 1845 he became a Roman Catholic ; went to Ger¬ many to study for the priesthood and joined the Redemptorist Fathers in Belgium in 1847. He was ordained priest in London by Cardinal Wiseman in 1849. Returning to New York he founded the order of the Paulists (1858). nearly all converts from Protestantism, and became their superior; established the Catholic World (1865), of which he was editor till his death; and was the founder of the Catholic

Publications Society. An anonymous French version of Elliott's (Life of Father Hecker) led to the noted ˆAmerican® controversy. He wrote (Questions of the SouP (1855) ; (The Church and the Age> (1888), etc. Consult Sedgwick, (Father Hecker) (1900).

HECKEWELDER, hek'e-wel-der, John Gottlieb Ernest, American Moravian mission¬ ary: b. Bedford, England, 12 March 1743; d. Bethlehem, Pa., 21 Jan. 1823. At the age of 12 he came with his father to Pennsylvania. He accompanied Post in 1762 in his expedition to the Indian tribes on the Ohio, and in 1771 took up his residence among them as a missionary. He assisted Putnam in negotiating with the Indians at Vincennes (1792) and Niagara (1793), and also in the negotiations leading to the surrender of the lands granted to the Christian Indians on the Muskingum in 1797. After some 40 years' missionary service, he went to Bethlehem, the principal establishment of the Moravians in America, and there re¬ mained till his death. He wrote several mem¬ oirs upon the Delaware and Mohegan Indians : (Account of the History, etc., of the Indian Nations) (1818) ; (Narrative of the Mission of the United Brethren) (1820). Consult the

HECLA, or- HEKLA, Iceland an isolated volcano in the southwest, about 20 miles from the coast. It is of conical shape, terminating in three perpetually snow-clad peaks, the central and loftiest of which, Heklufjall, is 5,110 feet high. The circumference at the base is about 12 miles. It is composed chiefly of columnar basalt and of lava, mostly covered by stones, scoriae, ashes and other loose volcanic matter. Since the 10th century there are 43 eruptions on record, the most violent occurring in 1157, 1300, 1597, 1636 and 1766. One of the most tremendous occurred in 1783, after which it re¬ mained quiescent till 2 Sept. 1845, when it again became active and continued with little inter¬ mission for 15 months to discharge itself from three craters, its effects being felt as far as the Orkney Islands, 400 miles distant. The last outbreak was in 1878.

HECO, hay'co, Joseph, the first or second naturalized American citizen of Japanese birth, founder of the first newspaper in Japan: b. Kamiya, on the Inland Sea, 1837; d. 1892. In April 1850 with his cousin and nine pilgrims he embarked on a junk, with passenger accom¬ modation for 70 persons, to visit the temple of Kompira in Shikoku. Thence from Marugame they sailed to Miyajima. On a later voyage, in the same year, from Yedo

homeward, a storm arose and they were blown out to sea in the Kuro Shiwo. After drifting 50 days, they were picked up by the captain of the

American bark Auckland, and saw foreigners for the first time. In San Fran¬ cisco, in 1851, he learned the language and some business. Coming to Baltimore, he received education and friendship from Mr. B. C. Sanders, former collector of the Port of San Francisco. In Washington, he saw President Lincoln and was amazed at republican sim¬ plicity. In 1859 he left for Japan and being the only native who could speak English there, was made interpreter for the American con¬ sulate at Yokohama, and in 1867 for the United States steamship Wyoming in the fight at Shimonoseki, in 1868. He established a news¬ paper, the first in Japan, and again visited the United States. For many years he gave invaluable assistance in smoothing the in¬ tercourse between natives and foreigners and was often in danger of his life from hot¬ headed and ignorant patriots. His (Narrative of a Japanese) (edited by James Murdoch, 2 vols., 1892) throws strong lights upon the in¬ terior history of Japan from 1850 to 1865, while giving pen portraits and impressions of Lincoln, Seward, Sumner, Brooks of Merrimac and McDougal of the Wyoming fame.

HECTIC FEVER, a type of fever which is intermittent and is distinguished by an after¬ noon or evening quickening of the pulse, and rise of temperature. The eyes of the patient brighten, his cheeks flush and there is some nervous and cerebral excitement. The fever is succeeded by a profuse perspiration. This af¬ fection is frequently associated with phthisis, abscess, or septicaemia, and is of dangerous sig¬ nificance. It is a symptom of chronic sup¬ puration from some cause, in which the wound is not aseptic or well drained. The rise in tem¬ perature is attributed to a form of blood-poisoning from the absorption of some parts of the products of putrefaction. Treatment must be directed to the disease from which it arises in each case and of which it may be considered a grave symptom.

HECTOR, Mrs. Annie French (((1882); (A Golden Au- tumn) (1897); (1904).

HECTOR, in Homeric narrative, the son of Priam and Hecuba, and the bravest of the Tro¬ jans, whose forces he commanded. His wife was Andromache, the daughter of Aetion. He encountered the Grecian heroes in battle, and often gained advantages over them. By his presence Troy was invincible; but when he had slain Patroclus, the friend of Achilles, the latter, forgetting his dispute with Agamemnon, re¬ sumed his arms to avenge the death of his be¬ loved companion. Pierced by the spear of Achilles, the body of Hector was dragged at the chariot wheels of the conqueror; but after¬ ward, at the command of Zeus, was delivered

to Priam for a ransom, who gave it a solemn burial.

HECUBA, in Greek legend, the second wife of Priam, king of Troy, to whom she bore 19 children including Hector, Paris, Cassandra and Troilus. After the fall of Troy she was given as a slave to Odysseus, and according to one form of the legend, in despair leaped into the Hellespont.

HEDDA GABLER. Ibsen, in (1891) to point the danger and futility of sheer self-assertion. Such a notion is implicit in both plays, although (Hedda GableU seems chiefly a study of character and least of all a drama of ideas. Hedda is an unscrupulous individual¬ ist married to a dull pedant in whose rival for an academic position she finds an earlier lover. This rival is a creative scholar of infirm will who has been reformed by Hedda's school friend, Mrs. Elvsted, and inspired to compose a great work. Hedda is jealous of Mrs. Elvsted, fearful lest Lovborg secure the position for which her husband is contending, and curious to discover how far she can determine the fate of another creature. Accordingly, she exerts her malign influence to spur Lovborg into dissi¬ pation, and, when he fancies himself forever disgraced by misconduct and the loss of his precious manuscript, she provides a pistol with which he may end his life. Lovborg dies, but Hedda, who had not foreseen that the pistol would be recognized as hers, is involved in the scandal. She can escape it only by according her favors to a libertine judge, aware of all the facts in the case, and prepared to profit by his knowledge. Although Hedda is without a moral qualm, she cannot endure public shame or submission to the will of another. She there¬ fore shoots herself with the second pistol of the pair that she had inherited from her father.

Hedda is a female Mephistopheles, without passion, instinctively and deliberately evil, yet cowardly. As heartless as Becky Sharp, she is far more corrupt. She loathes her husband with his pedestrian mind and bourgeois inter¬ ests ; she loathes her condition as a wife and a mother soon-to-be ; and she loathes Mrs. Elvsted as the good angel of Eilert Lovborg. Her prurient curiosity, her morbid dread of scandal, her malevolent delight in burning the manuscript of Lovborg and insidiously suggest¬ ing his suicide, are essential features in this portrait of one of the most disagreeable women of all literature. The play was published in 1890, a year before its first performance in Norway, and was translated into English in 1891 by Edmund Gosse. The authoritative version is that of Gosse and William Archer.

Frank W. Chandler.

. HEDDING, Elijah, American Methodist bishop: b. Dutchess County, N. Y., 7 June 1780; d. Poughkeepsie, N. Y., 9 April 1852. At 19 he entered the Methodist ministry, and was ap¬ pointed successor of Lorenzo Dow. He ex¬ tended his travels to Canada, and preached the Gospel in various

parts. He became a member of the New York annual conference in 1801, and

was made a bishop in 1824. He was instru¬ mental n the establishment of the Zion's Her¬ ald at Boston, the first journal published by the Methodist Church in the United States. Consult the

HEDGE, Frederic Henry, American scholar : b. Cambridge, Mass., 12 Dec. 1805 ; d. there, 21 Aug. 1890. He studied in Germany 1815-23, was later graduated from Harvard and Harvard divinity school, and after holding Uni¬ tarian pastorates in Bangor, Me., Providence, R. I., and Brookline. Mass., was professor of German at Harvard University (1872-81). Deeply read in philosophy, ecclesiastical history, and German literature, he was a finished writer and a much admired orator, and ranked as per¬ haps the foremost German literary scholar in the United States. Among his writings are (Reason in Religion) (1865) ; (The Primeval World of Hebrew Tradition) (1870) ; < Martin Luther and Other Essays) (1888), etc. His (Prose Writers of Germany) (1848) is a stand¬ ard work. He translated poems from the Ger¬ man and wrote numerous hymns for the Unitarian Church.

HEDGE, a fence formed of living trees or shrubs. Hedges are generally composed of one or more of the following plants : Hawthorn, crab, blackthorn, holly, privet, beech, hornbeam, maple, barberry, furze, broom, alder, poplar, willow, yew, box, arbor-vitse, sweet-briar, etc. When there are so many different species to select from, plants may be found suitable for almost all kinds of soil — such as wet or boggy, and dry or sandy; for all situations, whether sheltered or exposed; and for all purposes, such as fences against cattle, or simply as ornaments for garden and pleasure grounds.

HEDGE-SPARROW, a small brown war¬ bler (Accentor modidaris) , with a sweet plain¬ tive song, very common in Europe about gar¬ dens and roadsides in summer. It is not a sparrow at all but nearly related to the Amer¬ ican water-thrushes (Seiurus). In Great Brit¬ ain it goes by many names, as dunnock, etc., and is one of the birds most frequently men¬ tioned in books.

HEDGEHOG, a small insectivorous mam¬ mal of the Old World family Erinaceidce. and especially of the genus Erinacens, characterized by its

coat of stiff spines. The family inhabit temperate Europe and Asia, but are not known on sea-girt islands. The best known of the score of species is the common hedgehog (E . europceus). It has a long nose, the face, sides and rump covered with strong, coarse, yellow¬ ish hair, the back with sharp, strong spines ; and is about nine inches long plus a very short tail. Hedgehogs, as their name indicates, reside under hedges and in thickets, where they turn over the leaves and root in the mould for in¬ sects (especially beetles), snails, lizards, roots, fallen fruit etc.; they are, indeed, omnivorous. The hedgehog, defends itself against attack by rolling itself up, and thus exposing no part of its body that is not furnished with a defense of spines. It may be rendered domestic to a certain degree, and has been employed in Europe to destroy cockroaches, which it pursues with avidity. In the winter, in cold climates, the hedgehog wraps itself in a warm nest, composed of moss, dried hay and leaves, and remains tor¬ pid till the return of spring. The female pro¬

duces four or five young at a birth, which soon become covered with prickles. These animals are sometimes used as food, and are said to be very delicate. The long-eared hedgehog (E. auritns) of the East is smaller than the com¬ mon, and is distinguished by the great size of its ears and shortness of tail. Fossil forms as far back as the Miocene differ little from existing species. No true hedgehogs exist in America; the animals often so called being the very different porcupines (q.v.).

HEDIN, Sven Anders, svin an'derz hi-den', Swedish geographer and explorer: b. Stock¬ holm, 19 Feb. 1865; was educated at Stockholm, Upsala, Berlin and Halle, at the latter univer¬ sity receiving the degree of doctor of philoso¬ phy. In 1885 he began his first journey of ex¬ ploration through Persia and Mesopotamia. In 1890 he went to Persia as a member of King Oscar's embassy to the Shah, and the next year journeyed through Khorassan and Turkestan. In 1893 he set out on a remarkable journey from the Russian frontier to Peking, through Tibet and the Lob-nor region. He arrived at his des¬ tination in 1897, having experienced four years of exciting and harrowing adventures. His second expedition to Central Asia began in 1899. In 1901, writing from Narkhlik, Dr. Hedin tells of finding the ruins of a beautiful Buddhist tem¬ ple, some rare specimens of wood carving and 12 complete letters written in Chinese on paper and marvelously well preserved. He started from Chinese Turkestan in 1906 for the third journey of exploration in Tibet. Duripg two years he covered some 4,000 miles, discovered the sources of the Brahmaputra and the Indus, several mountain ranges and Lake Chunitso. Early in the European War Dr. Hedin visited the German front, where he was granted special facilities for observation. The result was a book entitled (A People in Arms) (Leipzig 1915), in which the author poured out a torrent of vitriolic abuse over Great Britain and of fulsome adulation for everything German. The book

caused considerable amusement amonsr the Allies, particularly the reference to the German Crown Prince, <(tall, slim and royally straight, dressed in a dazzling white tunic and wearing the Iron Cross of the first and second class. . . . Would you like to know what the Ger¬ man Crown Prince eats for supper? Here is the menu. . . Dr. Hedin has made numer¬ ous valuable contributions to geographical literature. His works include (A Journey through Persia and Mesopotamia) (1887) ; (King Oscar's Embassy to the Shah of Persia) (1891) ; (A Journey through Khorassan and Turkestan) (1892) ; (Through Asia) (2 vols., 1898); (Central Asia and Tibet) (1903); (Ad¬ ventures in Tibet) (1904) ; a scientific treatise in German, (The Results to Geographic Science of my Travels in Central Asia) (1900), and

HEDONISM is the name applied to any system of ethics which regards pleasure or happiness as the chief good; as the good, that is, which makes all other goods desirable and to which thev are all means. Not only money, health and the like are valuable merely as sources of happiness, but virtue itself has no better claim to independent worth. In fact, for most hedonists, virtue is the name given

to that kind of action which long experience has shown to conduce to happiness. The most important of the many subdivisions of the theory is that which distinguishes psychological from ethical hedonism. According to the first, pleasure js the inevitable content of every choice. Even in those instances of self-sacri¬ fice which seem the most radical contradiction of such a view, the exception is apparent rather than real. For the martyr, death is preferable to denial. If it were not pleasant to him, he would not and could not choose it. Ethical hedonism, on the other hand, makes the choice of pleasure a duty rather than a fact. The two have sometimes been regarded as incom¬ patible, on the ground that what necessarily regulates choice cannot be exalted into an ideal ; but the frequent inclusion of both in the same system may have a partial justification in the necessity for the rejection of certain pleasures and the acceptance of certain pains, if the great¬ est possible happiness is to be attained in the end.

A second division of the forms of hedonism is that between individual and universal, and is based upon the number of persons whose happiness constitutes the good. Individualistic hedonism regards the happiness of the man concerned as his own chief good, while that of other people is either a matter of indifference to him, or else is of importance merely because it forms one of the elements of his own happi¬ ness. Evidently psychological

hedonism is neces¬ sarily individualistic, although its combina¬ tions with ethical hedonism have often made it present an appearance of universality not strictly compatible with its original assumptions. Although there are plenty of modern instances of individual hedonism, these do not differ in essentials from the classical forms presented by the Cyrenaicism of Aristippus (cr. 435-356 b.c.) and the Epicureanism that sprang from it (Epicurus 342 or 341-270 b.c.). Both Aristippus and Epicurus taught that individual enjoyment was the supreme good, but they differed in their conception of the nature of enjoyment and of the means by which it was to be obtained. Aris¬ tippus advocated seizing the pleasure of the moment, untroubled by regret for the past or dread of the future. Epicurus, while he also preached against fear and regret, maintained that the object of desire was a happy life rather than a succession of pleasant moments, an or¬ ganized whole, not a mere sum. Another dis¬ tinction between the conception of the two is found in the nature of the pleasurable state as described by each. For Aristippus its chief characteristic was excitement; for Epicurus, tranquillity; a difference that undoubtedly was largely responsible for the different means ad¬ vocated by them. The later modifications of both theories show the well-known tendency of hedonism toward pessimism.

Universal hedonism was first brought markedly into notice by the Utilitarians, who found the supreme good, not in each man's own happiness, but in happiness in general, usually expressed by the formula <(the greatest good of the greatest number.55 The moral worth of an action must be judged by the amount of happi¬ ness it will tend to bring about in the long run ; and the consideration of all the different elements of intensity, length of time, certainty, possible complicating pain, and so forth, known

as the hedonistic calculus, is associated with the name of Jeremy Bentham (1748-1832). John Stuart Mill (1806-73), to whose clear and persuasive mode of statement the theory owes much of its popularity, added to it the distinc¬ tion between quality and quantity in pleasure. With the exception of Mill, both ancient and modern hedonists have almost invariably re¬ garded pleasures as differing from one another in quantity alone ; he, on the contrary, main¬ tained that their differences were primarily quali¬ tative, and that quality must be considered in the conception of the chief good. An action is to be judged, not only from the amount, but from the kind of happiness it causes. Mill's view has met with much adverse criticism, based upon the contention that with qualitative dif¬ ferences in pleasure a non-hedonistic criterion has been introduced, which is inconsistent with the initial assumption of hedonism. The adop¬ tion of hedonism by the evolutionists, especially by Spencer, has given it a scientific basis, to which its present currency is partly due. Al¬ though the

end in such systems is preservation, either of the individual or of the species, or of both, yet the actions best adapted to that end are accompanied by pleasure, and the animal to whom useful actions are painful, does not per¬ form them and is in course of time eliminated. Actions found desirable in the history of the race come to have a feeling of obligation at¬ tached to them ; and although at present end and means may to the individual consciousness seem incompatible, yet as man becomes better adapted to his environment, all virtuous, that is, useful, actions will bring pleasure directly as well as indirectly.

As a theory of ultimate value hedonism can, of course, be neither proved nor disproved. Its chief advantages are: (1) It provides a simple and self-consistent account of moral action. (2) It makes possible a closer union between ethics and natural science than that allowed by any other theory, and is able to make use of the constantly growing store of knowledge in biology, anthropology and ethnology. The most important objections brought against it are: (1) It confuses origin with value. (2) In regarding the moral end as constituted by feeling alone, it is psychologically inadequate, and psychologically false in so far as it views pleasure as the exclusive object of choice. See also Ethics; Utilitarianism.

Bibliography.— Wallace, W.,

Grace Neal Dolson, Professor of Philosophy , Wells College.

HEEL-FLY. See Bot-fly.

HEER, har, Oswald, Swiss naturalist: b. Nieder-Utzwyl, Switzerland, 31 Aug. ,1809; d. Lausanne, 27 Sept. 1883. He was educated at the University of Halle; entered the ministry in 1831 ; was privat docent in botany in the Uni¬ versity of Zurich 1834-52, and from 1852 pro¬ fessor of botany at the University and at the

Polytechnicum, and from 1835-83 director of the botanical gardens at Zurich. His most important works were (Flora Tertiaria Helve- tiae) (1854-56) ; (Tertiary Climates in Their Relation to Vegetation) (1860) ; (Die Urwelt der Schweiz) (1865) ; (Flora Fossilis Helvetia5 (1877) ; and, (Flora Fossilis Arctica) (1865-83).

HEEREN, ha'ren, Arnold Hermann Lud¬ wig, German historian and

philologist : b. Ar- bergen, near Bremen, 25 Oct. 1760; d. Gottin¬ gen, 6 March 1842. He was educated at the cathedral school of Bremen and the University of Gottingen; in 1794 was appointed professor of philosophy and in 1801 professor of history at Gottingen. His chief works are (Ideen uber Politik, den Verkehr und den Handel der vornehmsten Volker der alten Welt) (1793-96, 4th ed. 1824-26) ; (Geschichte des Studiums der klassischen Litteratur seit dem Wiederaufleben der Wissenschaften) (1797-1802) ; (Geschichte der Staaten des Alterthums) (1799) ; (Ge- schichte des europaischen Staaten-systems und seiner Colonien) (5th ed. 1830) ; (Versuch einer Entwickelung der Folgen der Kreuzziige5 (1808) and (Vermischte historische Schriften)

(1803-88).

HEERMANS, Forbes, American drama¬ tist : b. Syracuse, N. Y., 25 Oct. 1856. He was graduated from Cornell University in 1878, and is author of the dramas (Love by Induction) (1889) ; (The Silent Witness) (1890) ; (Be- tween Two Foes> (1899) ;• (The Vagabond) (1893) ; (Jess of the Bar Z Ranch) (1896) ; Town the Santa Fe Trail5 ; and the novels (Thirteen Stories of the Far West5 (1887) ; (The Rancho of Heavenly Rest5 (1892) ; (The Investigators5 ; (Beacon Island5 (1907) ; and

HEGEL, ha'gel, Georg Wilhelm Fried¬ rich, German philosopher : b. Stuttgart, 27 Aug. 1770; d. Berlin, 14 Nov. 1831. He attended the gymnasium of his native city, and in 1788 was matriculated at the University of Tubingen, where he studied theology, finishing his course of study in 1793. From 1793 to 1796 he was private tutor in Switzerland, devoting his lei¬ sure, meanwhile, to theological and. historical studies. In 1797 he accepted a private tutor¬ ship in Frankfort and remained there until 1800. During this period he. wrote out the earliest sketch of his philosophical system, and, resolving to devote himself to philosophy, went, in November 1800, to the University of Jena, as privat docent. Here he lectured on philosophy until the troubles which followed the battle of Jena in October, 1806, interrupted for a time his scholarly work. During the years be¬ tween 1800 and 1806 Hegel's philosophical teach¬ ings had assumed a much more highly organized form ; he had published a number of important essays ; and at the moment of the battle of Jena was just completing his first great sys¬ tematic treatise, the (Phanomenologie des Geistes,5 i.e., the Phenomenology of Mind.5 Unable to obtain, for the time, satisfactory opportunity as an academic teacher, . Hegel thereafter passed a year as editor of a journal in Bamberg; and then obtained a position as rector of a gymnasium in Niirnberg,. in J808. He married the daughter of a distinguished Niirnberg family in 1811. Thereafter, while still at Niirnberg, he wrote his most imnortant and finished philosophical treatise, the (Logik,5 vol. 14 — 5*

in the years 1812-16. In 1816 he was appointed to a professorship of philosophy at the Univer¬ sity of Heidelberg. In 1818 he accepted a call to the University of Berlin, where he rapidly won a position of the greatest influence, gath¬ ered about him many hearers and disciples, and became the head of a school of philosophy whose influence upon contemporary German thought was of the greatest. During his life he published, in addition to the works already mentioned, a summary statement of his whole system of philosophy entitled (Encyclopadie der Philosophischen Wissenschaften,5 and a treatise on the Philosophy of Law.5 His lectures on the Philosophy of Religion,5 on the (History of Philosophy,5 on (Histhetics,5 and on the Philosophy of History,5 were published post¬ humously. His complete works, including his letters, fill 19 volumes, which were edited by a group of his friends, in the years immediately following his death (excepting only the letters, which in their definitive edition, were published as Volume XIX of the works by his son, the historian, Karl Hegel, in 1887).

Hegel's philosophical position can only be understood in the light of his relation to Kant. Immanuel Kant (q.v.) (1724-1804) became, by the publication of his (Critique of Pure Rea¬ son,5 in 1781, the leader in the movement of modern German philosophical thought. In an age when the guidance of ((Reason55 was espe¬ cially glorified by all the leading liberal and progressive teachers and parties of the day, Kant undertook a systematic inquiry into the nature, the limits and the scope of the human reason. Previous philosophers, in the 17th and 18th. centuries,, had been especially divided in opinion regarding the question whether experi¬ ence or reason is the source of our knowledge. Kant undertook to reconcile the conflicting views regarding this problem and at the same time to map out, in a systematic way, the whole field which is accessible to human science. His result was, in substance, as follows : Human knowledge depends upon two factors, experi¬ ence and our own intelligence. Both fac¬ tors are equally necessary for knowledge. . Ex¬ perience, when viewed apart from our intel¬ ligence, is a. collection of mere data of sense, which are given, but which, in so far as they are merely given, are meaningless. The data of sense get their coherence solely through the active work of our intelligence. Our intelli¬ gence, whose manner of acting is spontaneous, is indeed awakened to reaction only through sense, and can give us knowledge only with reference to the facts of experience ; but the data of sense get all their form, coherence, structure, meaning, only through the fact that our intelligence is guided in its activity by certain (

world to deal with is due to the fact that in¬ telligence is common to us all, in the same forms.

In consequence, what we know, and what our sciences of experience study, is neither a world of things simply given to us as brute facts from without, nor yet a world of mere sensations. On the contrary, what we know is the world of experience as our active intelli¬ gence inevitably interprets experience. Hence we know, not ((things in themselves,® but "phe¬ nomena,® and not mere <(data® of experience, but experiences as interpreted by the active constructive work of our intelligence.

Meanwhile, our intelligence, upon its higher levels, is indeed not content with this mere interpretation of the contents of sense, but — still in its own spontaneous way — defines ideals of objects and of laws which far tran¬ scend — according . to our own conception — the facts of experience. The "Reason® proper, as distinct from the "Understanding® (that

is, from the intelligence which merely interprets and renders coherent our experience), is the part or aspect of our intelligence which is con¬ cerned with these other and "transcendent® objects. The objects of the ((Reason® proper, are objects which no human experience can reach or exemplify, and which we therefore conceive as lying beyond any possible experi¬ ence. Such objects are God, the human ego itself, in its true nature, the cosmos in its en¬ tirety and the moral law. Such objects we cannot, in any scientific sense, (

We ((know,® then,. "phenomena.® Our "Reason,® meanwhile, gives us <(faith® in cer¬ tain ((Ideas® which relate to the <(transcendent® objects. This faith is not knowledge, but is rationally warranted. It is the office of phil¬ osophy to bring to consciousness the "cate- gories® in terms of which we inevitably inter¬ pret phenomena, and so organize our experience and get our science. It is also the office of philosophy to discover and define the ((Ideas® in terms of which we just as inevitably organ¬ ize our moral conduct and give meaning to our practical life.

So, for Kant, this view of philosophy dif¬ fers from the view of older philosophy in limiting our inquiries to the business of inter¬ preting experience and organizing life. The philosopher then, is above all concerned with the universe, , as. the human Self, that is, as the Self which is, in type, the same in all of us, sees the universe, acknowledges it, and gives to

it, in the form in which we experience its presence, the type of rational coherence. Any world .which is not the world as the Self views it, is unknowable, and is a world of "things in themselves.®

Hegel, in common with the other post- Kantian German idealists, builds upon the basis of this Kantian analysis of knowledge and of

reason. His dependence upon Kant is shown by the very fact of his frequent and persistent criticism of that philosopher's positions. That Hegel's results are in one sense far removed from those of Kant becomes obvious upon a very brief consideration. But that, however much Kant's doctrine is transformed, in Hegel's system, it is still Kant whose views are the principal ones thus transformed, is also cer¬ tain. The relation can be made more explicit by the following statement of the contrast be¬ tween Kant and Hegel :

1. The result of Kant's philosophy is that the accessible world is the world as the rational nature of the human Self requires us to inter¬ pret it. This result lies at the basis of Hegel's doctrine. But Hegel transforms it by dropping out of consideration, the adjective "accessible,® as being superfluous. It is useless to talk of a world of unknowable or inaccessible "things in themselves,® as Kant does. The world of reason is simply the world. There is nothing to know except what the nature of our intelligence requires us to acknowledge. Discover the secret of reason and you have discovered the secret of the universe. This is the first char¬ acteristic thesis of Hegel's idealism. "Behind the curtain which is said to hide the inner nature of things,® says Hegel in the (Phenom¬ enology, > ((there is nothing, unless we ourselves go behind that curtain.®

2. Kant furthermore divides the work of our intelligence between the activity of the "Under- standing,® which interprets special experi¬ ences, and the "Ideas® of that <(Reason,® which "postulates® our relations to ultimate reality. Hegel accepts this distinction as valid within its limits, but not as any absolute distinction. Our intelligence may and often does fix its at¬ tention upon fragments of knowledge. In that case it "abstracts® from the whole meaning of its own life, and thereby becomes ipso facto an "abstract thinking® or "understanding® of this or that object or law. Such abstractions are useful and inevitable. But they are not final. The truth, however, is in Hegel's phrase, simply "the whole.® Only that form of reason therefore which, is concerned with the whole meaning of life is genuinely philosophical. But since this meaning is, after all, our own mean¬ ing, the meaning of the Self, it need not be simply a matter of "Postulates.® It can be known to us.

3. Kant limited our knowledge to "phe¬ nomena.® . But this "limitation® loses its sig¬ nificance if once we see that there are no "things in themselves® to know. The world is for us a world of mere "phenomena® only in so far as we do not grasp the principle of which our experience is the expression. But, for Hegel, this principle is simply the absolute principle

which lies at the basis of our own nature. As this absolute principle is not for¬ eign to the Self the Self can grasp the prin¬ ciple. When it does so, it sees phenomena as the inevitable expression of the meaning of its own life. And then its phenomena become once more "actualities,® as real as any finite facts could be. What we know then is not a mere world of phenomena. It is a world of absolute Truth.

4. Our ethical ideals form, for Kant, a world of their own, which we can never knoiv to be real, but which we can, and must, believe

to be real. This contrast of ideal and real, of knowledge and faith, Hegel believes to be founded only in a historical difference of cer¬ tain stages of our own self-development. Faith, if once brought to a clear self-consciousness, becomes a knowledge as to what the absolute Self is and determines. And this knowledge philosophy can attain. Such a knowledge is ipso facto a knowledge of truth. For all truth is in and of the true Self, i.e. the Absolute.

5. Kant, in trying to define the categories which lie at the basis of our interpretation of the world, had simply accepted those categories which he observed to be in use in our daily thinking, and in science. He treated them as a fixed set of principles. Regarding the origin and the mutual relations of these categories he has no extended theory. The categories are, for him, ultimate facts of our intelligence, de¬ termining its constitution, but of unknown source. Hegel, on the contrary, regards it as one of the principal tasks of philosophy to show why and how we come by just these cate¬ gories which we use in the interpretation of experience, and in the ordering of life. His principal work, the (Logic,) is devoted to such a treatment of the categories. And in fact, since, from Hegel's point of view, the world of "Thought" is the only real world, or, in other words, since the constructions of that absolute process which embodies itself in our thought and in our life are constitutive of all truth, this Logic, which is to show the true genesis and nature of the Categories, takes the place of all that, in the older philosophical systems, had been called Metaphysics. For the theory of the absolute constructive process which expresses itself in our experience and in our thinking is simply the theory of the universe. There is no other world to know than this world which thought constructs, which experience observes, and which constitutes our life and its meaning.

6. For Kant, nothing absolute is knowable. All our knowledge is relative. For Hegel, ab¬ solute knowledge is possible ; for whoever knows the principles that determine the true nature of our thought and of our life, finds these principles, as the expression of the true Self, absolute.

This contrast of the positions of Kant and of Hegel may help to give the Hegelian phil¬ osophy its proper historical setting, without which it inevitably appears to be a presumptu¬ ous attempt to transcend the natural limits of human reason. For Hegel, these limits are not what they seem. That is, they are not absolute limits. For what we have to consider, when we philosophize, is not a foreign world, but is rather the whole truth with regard to the mean¬ ing of the very life which we ourselves are ex¬ periencing and are living.

In his first great work, the (Phanomen- ologie,5 Hegel gave an account of the various successive stages through which the human mind, as it appears in history, passes, in its transition from a naive dependence upon the senses to the stage of philosophical reflection. In his

lower categories are, through an imminent de¬ velopment, transformed into the higher cate¬ gories. In the system of Hegel, as he planned the order of its parts, the aturphilosophie, or Phil¬ osophy of Nature. } The only connected treatment which this portion of the system ever received is the mere compend contained in the second part of Hegel's PncyclopadieP The in the third section of his Pncyclopadieˆ and in his posthumously published lectures, there is a very extended treatment of various parts of this concluding portion of his undertaking. Under the Philosophy of Mind) Hegel in¬ cluded, first the whole range of psychology, and the philosophical theory of the relations be¬ tween nature and mind; secondly, ethics and the philosophical theory of the state; thirdly, philosophical aesthetics, or the theory of the beautiful ; and finally the philosophy of religion.*

The range and general intention of the Hegelian doctrine are thus suggested although, owing to the vast range of his undertaking, this can here be done only in a very inadequate way. Further characteristics of the philosopher are especially (1) his "dialectical method," and (2) his theory of the Absolute.

By the dialectical method Hegel means a procedure of which some of the dialogues of Plato give us classical instances, and which Kant's "Antinomies" as well as Fichte's method of procedure in philosophy had ex¬ emplified, although the systematic use of the method in Hegel's way is due to his own initia¬ tive. Truth, according to Hegel, comes to us, in the first place, through the medium of "im¬ mediate" experience. Without such

experience, we could indeed proceed no further on the way toward insight; and this is the permanent jus¬ tification for "empiricism" in philosophy, if only we observe that this barely immediate ex¬ perience, although indispensable, remains mean¬ ingless unless we transform experience through the activity of our thought. Thought begins by observing that immediate experience, taken merely as it comes, is, so far, not yet intelligible. The first work of our thought is therefore to classify, to divide, to fix upon distinct aspects of facts, to form generalizations and so. to con¬ vert what comes to us as immediate into the abstract form of our various Gedankcn, or con¬ ceptual constructions. This is, so far, the work of "the Understanding." Such work first re¬ sults in our regarding truth as something which, on the one hand, is fixed, universal , and abstract, while, on the other hand, this world of truth also appears to us to be a . world of infinitely various special truths, .which relate now to this and now to that individual thing, or fact, or law. So far as our understanding dwells upon the fixity, the universality, the ab¬ stract generality of its truths, it finds, or end¬ lessly seeks to find unity in the world. But so far as the understanding, even in this very effort to discover unity, singles out now this and now that fact or law, it is. confronted by the variety of the results which it reaches. There results the well-known problem of "the

One and the Many." In consequence, the un¬ derstanding is involved in contradictions which are simply inevitable. In the world of the understanding, "everything is self-contradic¬ tory, }) and is so just because the understanding makes formal consistency the one test of truth, even at the very moment when it expresses its search for truth in the form of an effort (1) to divide what is inseparable, and (2) to substitute abstractions for life.

. The forms which the resulting contradic¬ tions assume are well known in the historv of philosophy. The interest in abstract unity is shown in extreme form in the Eleatic reduc¬ tion of the whole world to a simple One Being, by contrast with which all variety is illusory. The Atomistic thesis, which reduces all the qualitative variety of nature to quantitative differences, the material substance of Descartes, whose only attribute is extension, the sole sub¬ stance of Spinoza, — these are also conseauences of the tendency to understand variety by re¬ ducing it to an abstract and lifeless unity. On the other hand an equally abstract pluralism, in all the earlier stages of philosophical thought, has emphasized variety, with the re¬ sult of making it inconceivable how the facts, when regarded as thus mutually isolated,' could conspire to make a world at all. Views of one type have, by their

very contradictions, led over to views of the opposed type.

The solution of all such difficulties lies in reducing the contradictions to their "ground," which lies in the very "movement" of thought itself. For the truth of such views lies in their synthesis, not in their mere conflict. Such a synthesis is furnished by the discovery that the search for unity and the interest in di¬ versity and variety are but "aspects" or "mo¬ ments" of that life of self-comprehension in which the very nature of reason consists. When thought, by virtue of a deeper reflection upon the contradictions of the understanding, has reached this higher stage of the reason proper, it therefore views the successive op¬ posing views as inevitably one-sided expres¬ sions of different aspects of our rational in¬ terest. Our world is indeed one; and in order to bring this fact to our consciousness, we have, upon the stage of the understanding, to em¬ phasize this very aspect of Being and of the life of our own thought to such an extent as to isolate, by our abstraction, the unity upon which we then dwell, from the very variety of which it is the unity. Now unless we pass through the stage of doing this we should never bring the unity of things to light at all, but should . leave this aspect of the "imme¬ diate" lost in the original obscurity in which, apart from thought, all experience is involved. But so long as we remain upon this stage of abstract reflection, we nevertheless inevitably contradict both experience and ourselves. For experience is of the many, as well as of the unity. And an abstract unity, which is the unity of nothing, is indeed a self-contradiction.

But while our world is indeed also many, and while, in order to bring this aspect of things to light, we must emphasize pluralism, yet the resulting views, taken in their abstrac¬ tion, are as contradictory as are those of mere monism. The many could never co-operate in one world were they not also one.

Thus we cannot reach truth without pass¬

ing through contradictions. For the truth is a synthesis of various points of view. No one of these can be appreciated unless it has first been emphasized. If once emphasized it be¬ comes, however, in its isolation, self-contra¬ dictory, just because it has its truth not in its isolation, but in its relations to the other points of view. But in order to be able to see that these very relations are necessary, and are not merely adventitious and empirical, we must see how the isolated point of view contradicts itself. The sequence of these isolations of special categories (followed by the resulting contradictions, and by the necessary synthesis), constitutes the "dialectic movement of thought," by which the "immediate" experi¬ ence, with which we begin, is transformed into the system of truth, wherein all the elements appear in necessary interrelations to one another. The principle of this

method is what Hegel calls the "Negativity" of thought. The denial, or sublation of imperfect stages of in¬ sight is the only means whereby the perfect stage can be made explicit. This is the prin¬ ciple of the dialectical method.

The Hegelian theory of the Absolute is the correlate of this theory of the process whereby truth is acquired. For the dialectical method is not only a method of acquiring insight ; but, since thought is, in principle, identical with the very life of the universe, the method by which we come to insight is also the very method by which the life of the world is developed. Man is simply the world come to self-consciousness, — the Spirit explicitly aware of its own life. Ihis is the obverse aspect of the thesis that the true Self is the world. Viewed objectively, the Hegelian doctrine accordingly is that the world- ground, or "the Spirit," also called the Abso¬ lute, has a life, or activity, whose forms are expressed in the categories of the (Logic. > This life has first to manifest itself in experi¬ ence as a world of immediate facts. This im¬ mediately given outer world constitutes what we call Nature. Such a world has to exist, and to be found by us, in order that the forms of thought should be, not mere forms, but forms expressed in a concrete and immediate

*Vt.ay' i *n an-^ especially in rational beings, the thought which is everywhere present in nature reaches a still higher expression, which at last becomes identical with our own insight, as this insight developes through the historical evolution of humanity. The entire world-proc¬ ess is therefore the complete expression of a rational spirit, which indeed eternally possesses self-consciousness, but which, when viewed historically, appears to us as attaining such self- consciousness, in individual form, in the re¬ ligious and in the philosophical consciousness of man.*

This must suffice as an outline of Hegel's main thoughts. # Owing to the interest which he had in viewing the entire course of human history as a series of movements determined by the dialectical processes of which all our life, according to him, consists, Hegel took great interest in the philosophy of history. The influence of his school has been, in consequence, of great importance in affecting the spirit of a great number of modern historical inquiries. i he highly ambiguous relations of the Hegelian system to traditional theology proved very momentous for the development of the critical

study of religious dogma, and of religious his¬ tory, during the generation

after his death. While the original Hegelian school ultimately lost its direct influence in Germany, the in¬ direct influence of the Hegelian system still re¬ mains very great, and is especially noticeable in English and American thought since 1865.

Bibliography. — Stirling, (Secret of Hegel > ; Edward Caird, (HegeP in Blackwood's Phil¬ osophical Classics (1883) ; Kuno Fischer, ˆHistory of Modern Philosophy,* (Vol. VIII, trans. into Eng. by T. P. Gordy 1887) ; Rosen- kranz, K., (Georg Wilhelm Friedrich Hegel's Leben* (Berlin 1844) ; Haym, R., (Hegel und seine Zeit) (ib. 1857) ; McTaggart, (A Com¬ mentary on Hegel's Logic> (Cambridge 1901) ; and for brief summaries, the various histories of philosophy by Windelband, Thilly, Hoffding and Weber.*

JOSIAH ROYCE,

Late Professor of the History of Philosophy,

Harvard University.

HEGELER, Wilhelm, popular contempo¬ rary German novelist : b. Varel, Oldenburg, 25 Feb. 1870. He studied law at the universities of Munich, Geneva and Berlin, traveled exten¬ sively, and returned to Munich in 1895 to settle down to literary work. He moved to Berlin in 1897, to Weimar in 1906, where he has lived ever since, engaged in the production, at first, of naturalistic novels dealing with the life of the population along the river Rhine, later, of humorous satires. His stories were at first characterized by a rather sharp and painful naturalism, but later assumed a convincing and powerful realism. Their popularity in Germany is very great, and Hegeler's books have fre¬ quently appeared among the lists of best sellers for certain years (1905, for instance). His more important works include (Sonnige Tage) (novel, Berlin 1898) ; Hngenieur Horstmann) (his best novel, Berlin 1900) ; Pas /Ergernis (his best satirical novel, Berlin 1907).*

HEGIRA, hej'i-ra, HEJRA, or HIJRA,

an Arabic word meaning ((going away,® com¬ monly used to indicate Mohammed's flight from Mecca, in 622 a.d. In 639 Caliph Omar insti¬ tuted a new Moslem calendar, to begin with the first day of the first month of the year in which the flight took place. The Mohammedan year, as a lunar year, is shorter than ours by ten days, 21 hours and 14ˆ seconds. A rough and ready method for finding the year in our calendar corresponding to a given year in the Mohamme¬ dan is to subtract from the latter 1/33 of itself and add .622 to the remainder. To find the precise year and day multiply the year of the Hegira by 970,224, strike off from the product six

decimal figures and add 621.5774; this will give the year of the Christian era ; and the day of the year is got by multiplying the decimal figures by 365.

HEIDELBERG, hi'del'berg, Germany, an old university town in Baden, on the left bank of the Neckar, here spanned by two bridges, 11 miles by rail east-southeast of Mannheim. It stands on a narrow strip between the river and the rock on which the castle is built, and chiefly consists of the Hauptstrasse, the long main street, and less important steeply-sloping cross and parallel street. The neighborhood abounds in ancient remains and is rich in historic and literary associations. The city has an electric

street railway system. The imposing castle, on a height above the town, an immense ivy-clad ruin begun in the 13th century, exhibits elab¬ orate examples of early and late renaissance architecture. It is often called the ((German Alhambra,® and was enlarged at different periods from the 13th to the 18th centuries. It was almost destroyed during the wars with Louis XIV in the 17th century and in 1764 was reduced to its present condition by light¬ ning. Two of its buildings have decorated fagades in Renaissance style — the Friedrichs- Bau and the Otto-Heinrichs-Bau. It contains several princely halls, a great watch tower, large balcony, dungeons, a museum with pictures and historic relics and a terrace from which a magnificent view is obtained. On this terrace is a statue of Victor von Scheffel, unveiled in 1891. In the town itself the principal buildings are the Gothic church of Saint Peter, the Gothic church of the Holy Ghost, the Roman Catholic Church, the university (q.v.), the town-house, the post-office, gymnasium, real- schule and other schools. The manufactures, comparatively unimportant, include cement, tobacco, cigars, fire-extinguishing apparatus, shoddy, mathematical and surgical instruments, leather, etc., and there are also several brew¬ eries. One of the curiosities of the place is the well-known Heidelberg copper tun, kept in the cellar under the castle, and long ranking as the largest wine cask in the world, being 36 feet in length, 26 feet in diameter and capable of holding 49,000 gallons. Heidelberg has fine public walks. The gardens around the castle are well laid out, and at every turn present the finest views of the Neckar and the fertile and richly wooded valley through which it winds to join the Rhine. Behind the town and castle a carriage-road leads by easy ascent to the top of the Konigstuhl, the loftiest hill of the dis¬ trict, from which an extensive view is obtained of surpassing beauty. Heidelberg arose around its 13th century castle and was until 1719 the capital of the Palatinate. It was . long the centre of German Calvinism and gave its name to a famous Calvinistic catechism. The town suffered greatly during the Thirty Years' War. In 1622, 1688 and in 1693 the French captured and pillaged the city. In 1802 it was united to the grand duchy of Baden. Consult Godfrey, E., (Heidelberg: Its Princes and its Palaces (New York 1906) ; and*

Oncken, (Stadt, Schloss und Hochschule Heidelberg) (Heidelberg 1885). Pop. (1910) 56,016.

HEIDELBERG CATECHISM, a re¬ ligious work published at Heidelberg in 1563 by Zachariah Ursinus and Caspar Olevianus for the use of the Reformed Church, and pub¬ lished in the Palatinate. It was approved by the Synod of Dort, and was the model on which the Westminster Assembly framed the Shorter Catechism.

HEIDELBERG MAN. The most primi¬ tive human being known, represented by a jaw found in 1907 by O. Schcetensack at the base of the sands of Mauer near Heidelberg, Germany. The situation of this relic indicates by the association with it in the same deposit of appropriate animal bones, the second inter¬ glacial interval — a long, warm period estimated by Penck to have closed about 200,000 years ago. This jaw is extremely massive, lacks that

frontal protrusion that gives shape to the human chin, and were it not for the unmis¬ takably human teeth, which are excellently pre¬ served, might be taken for that of an anthro¬ poid ape. The teeth are essentially human and show no trace of being intermediate be¬ tween the dentition of the anthropoid apes and man, although not very large and strong. The canines do not project beyond the line of the other teeth, even as much as in the Piltdown skull (q.v.). Seen from above the teeth form a perfect arch, whereas in anthropoid apes the grinding teeth lie in rows parallel to each other. The conclusion is that this jaw represents a race ancestral to the Neanderthal men of Spy, Krapina, etc. — men more primitive, powerful and apelike than they. <(A11 agree," says Os¬ born, ((that Schoetensack's discovery affords us one of the missing links or types in the chain of human development." (See Stone Age). Consult Osborn, H. F., (Men of the Old Stone Age' (New York 1914).

HEIDELBERG UNIVERSITY, Ger¬ many, a renowned institution founded by Elec¬ tor Rupert I in 1386. It was organized by Marsilius von Inghen on the model of the Uni¬ versity of Paris, and at the Reformation, from a Catholic became a Protestant stronghold of learning. It flourished until 1622, when Tilly captured the town and the famous collection of manuscripts known as the Bibliotheca Palatina was removed to Rome. The university de¬ clined and suspended altogether in 1626. It was restored in 1652 and religious tests for professors were removed. The university again suspended in 1693, although instruction was continued at Frankfort in

1694 and at Weinheim in 1698. In 1700 instruction was re¬ sumed at Heidelberg, but the university led a precarious existence until 1802. In 1802 under the administration of the Grand Duke of Baden, a new era was inaugurated and the uni¬ versity rapidly became famous. It is very com¬ plete in its details, and comprises faculties of theology, law, medicine and philosophy; the famous library has over 500,000 volumes and 4,700 MSS. There are 196 professors and in¬ structors, while the average annual attendance of students in all departments is over 2,300. Many of the most famous German scholars have been professors here — Melanchthon, Ursi- nus, Olevianus, Reuchlin, CEcolampadius, Span- heim, Puffendorf, Voss, Schlosser, Creuzer, Gervinus, Paulus, Kuno Fischer, Helmholtz, Bunsen, Bluntschli, etc. The quincentenary of the university was celebrated with elaborate ceremonial in 1886. Consult Buhl, H.,

HEIDELBERG UNIVERSITY, Ohio,

coeducational institution at Tiffin, founded as a college in 1850, under the auspices of the Reformed Church in the United States and re¬ organized as Heidelberg University in 1890. It has departments of theology, liberal arts, commerce, oratory, art and music, and prepar¬ atory and summer schools. It confers the de¬

grees of A.B., B.S., P.B. and B.L. In 1916 it had 38 professors and instructors ; 650 stu¬ dents ; a library of over 25,000 volumes ; the grounds and buildings were valued at $400,000; the productive funds amounted to $360,000, and the income to $40,000.

HEIDENMAUER, hi'dn-mow-er. (1) A name given in Germany to the remains of old German and Roman fortresses and ramparts, some of which still exist, especially at Ottilien- berg, a hill of the Vosges, in Alsace. (2) The title of a novel by James Fenimore Cooper, who laid the scene of his story in the Vosges during the Middle Ages.

HEIDENSTAM, Verner von, Swedish poet and novelist: b. Olshammar, province of Nerike, 6 July 1859. He was at first destined to be a painter, but had to relinquish his studies at the Stockholm Art Academy 'because of ill health, which caused him to undertake extensive travels in southern Europe and the Orient. He was at once greeted as a poet of promise on the publication of his first collection of poems, V allfat och Vandrinasar, 1888, which was fol¬ lowed by a second collection, (Dikter' (Toems') in 1895. His poems and prose work are filled with a great joy of life, sometimes imbued with a love of Swedish history and scenery, particularly its physical aspects, that avoids none of the excesses of chauvinism. (Fran Col di Tenda till Bloxberg' (1888), and (Endymion> (1890) are pictures of travel; (Hans Alienus' (1892) is a long poetic narra¬ tive; (Karolinerna' (2 vols.,

1897-98) a series of historical portraits of King Charles XII of Sweden and his cavaliers. In (Klassizitat und Germanismus' (published in German, Vienna 1901), Heidenstam advocates a sort of artistic exclusiveness, appearing as the champion of the classic spirit, which he considers essentially aristocratic, as opposed to the Germanic atti¬ tude which he considers democratic and rep¬ rehensible. In 1910 a savage controversy was waged in Swedish newspapers between a num¬ ber of Swedish literary men, on the topic of the proletarian "degradation" of literature, the protagonists of the two opposing camps being August Strindberg (q.v.) and Heidenstam. Professors Lidforss and Book also took part. Heidenstam's chief contribution was the pam¬ phlet, directed chiefly against Strindberg, (Pro- letarfilosofians upplosning och fall' (

Jacob Wittmer Hartmann.

HEIFETZ, hl'fets, Jascha, Russian-Jewish violinist: b._ Vilna, Russia, 2 Feb. 1901 (or 20 Jan. according to the Russian calendar). At a very early age he began to play the violin, and entered the Royal School of Music at Vilna when he was but five years old. He was graduated at eight, and went immediately to Petrograd, where he studied under Leopold Auer. His first public appearance was made at the age of five. He gave his first recital at Petrograd, before a large audience, at the age of nine, surprising his hearers by his facility

and unusual genius of interpretation. Subse¬ quently, he was soloist of the Symphony Or¬ chestra at Pavlovsk; and later toured Europe. Coming to the United States, he made his first appearance at New York on 27 Oct. 1917. His audience was instantly charmed by the rare combination of the young violinist's skilful technique, lyrical quality of tone and intellec¬ tual grasp of his compositions. His tours through the United States have met with the warmest praise and commendation every¬ where.

HEIGHTS, Measurement of. See Hyp-

SOMETRY.

HEILPRIN, hil'prin, Angelo, American naturalist: b. Satoralja-Ujhely, Hungary, 31 March 1853; d. New York City, 17 July 1907. He came with his parents to the United States in 1856, but received his education later in Eu¬ rope, making a special study of natural his¬ tory. On his return to America, his scientific ability was speedily recognized and he became successively professor of invertebrate palaeon¬ tology and geology

(1880-1900), and executive curator (1883-91) at the Academy of Natural Sciences, Philadelphia. From 1885 to 1890 he was professor of geology at the Wagner Free Institute. He was for five years president of the Geographical Society of Philadelphia, was leader of the Peary Relief Expedition in 1892, and made a journey of research to investigate the cause of the Mont Pelee (q.v.) disaster in 1902. His published works include Contribu¬ tions to the Tertiary Geology and Palaeontol¬ ogy of the United States) (1884) ; (Town Geol- olgy) ; (The Lesson of the Philadelphian Rocks5 (1885) ; (Geographical and Geological Distribution of Animals) (1887) ; Explora¬ tions on the West Coast of Florida and in the Okeechobee Wilderness> (1887) ; (The Geolog¬ ical Evidence of Evolution5 (1887) ; (The Ani¬ mal Life of our Seashore5 (1888) ; (The Ber¬ muda Islands : a Contribution to the Physical History and Zoology of the Somers Archipel¬ ago5 (1889) ; Principles of Geology5 (1890) ; (The Arctic Problem and Narrative of the Peary Relief Expedition5 (1893) ; (The Earth and Its Story5 (1896) ; (Alaska and the Klon¬ dike5 (1899); (Mont Pelee and the Tragedy of Martinique5 (1903) ; (Tower of Pelee5

(1905).

HEILPRIN, Louis, American scholar: b. Miskolcz, Hungary, 2 July 1851 ; d. 12 Feb. 1912. He was a brother of Angelo Heilprin (q.v.). In 1856 he came to the United States, where he was privately educated, and where he was connected with various works of an encyclo¬ paedic character. He published a valuable (Historical Reference Book5 (1884; 6th ed. 1899) in (The Concise Knowledge Library.5

HEILPRIN, Michael, American author: b. Piobrkow, Russian Poland, 1823; d. New York, 10 May 1888. Carefully educated by his father, in his 20th year he emigrated to Hungary, chafing under Russian conditions. For a time he had a book-store at Miskolcz and was on intimate terms with Kossuth and his party. When the Revolution was quelled, he went to London, there meeting Kossuth, who advised him to go to America. In 1859 he and his

family emigrated to New York, where his liter¬ ary activity was continuous for nearly 30 years. As coeditor of Appleton's < Annual Encyclo¬ pedia5 and reviewer on The Nation, he won a distinct rank for his exact and versatile scholarship, especially in the line of Semitic literature. On the arrival of the Russian Jew¬ ish refugees in 1881-82, he took a prominent part in seeing to their welfare and personally supervised the colonization of many families. His published works include (The Historical Poetry of the Ancient Hebrew,5 (Vols. I and II, 1880) ; (Bibelkritische Notizen. (1893).

HEIMBURG, hlm'boorg, Wilhelmine.

See Behrens, Bertha.

HEINE, hi'ne, Heinrich, German poet: b. Dusseldorf, 13 Dec. 1797 (according to others, 1799) ; d. Paris, France, 17 Feb. 1856. His father, Samson Heine, of Hanover, was a merchant of honorable family which sprang from Buckeburg. He was good-natured but without marked intellectual gifts and of little business ability. The mother, Peira (Betty) van Geldern, came from one of the oldest and most prominent Jewish families on the Rhine. Her father, Gottschalk, was one of the first Jewish physicians . who graduated as Med.D. from a German university; her brother, Joseph, was also a graduate. Her uncle, Simon van Geldern, was a strange, adventurous, enthusi¬ astic man. He journeyed all through Europe, went to Jerusalem and returned from there to Germany after a varied and checkered experi¬ ence. His diary of travel and other writings are still preserved. The fate of this strange relative made a deep impression on the mind of the mature and gifted boy, who first was sent to a private school and then to a lyceum in charge of priests until the year 1814. The greatest influence on his education was exer¬ cised by his intellectually gifted mother, who read Rousseau and Goethe and was an enthu¬ siastic German patriot while his father was just as enthusiastic for Napoleon. Between these contrasts Heine in his youth, swayed con¬ stantly in both directions. The whole life of the poet can be described in one sentence : He was a German who was born of Jewish parents in a Roman Catholic city on the Rhine in the period of Napoleon's supremacy on the one hand and of flourishing romanticism on the other. In these words lies the entire biography of Heine, everything which uplifted and hampered, all his defects and excellences, and all the deep con¬ trasts and dissonances with which his life was filled.

When he left the gynasium, he was ready with his companions to volunteer in the struggle against Napoleon. His first poems glorify Ger¬ man custom and loyalty, German patriotism. But this spirit soon changed, and soon, like so many eminent Germans of the time, he became one of the most enthusiastic supporters of the emperor's heroic figure, whose fame then filled the entire world. His most ardent wish at that time was to study.. But his parents, whose busi¬ ness was already in decline, could not gratify this desire; and even his rich uncle, the cele¬ brated banker, Solomon Heine, in Hamburg, on whose bounty the whole family in reality lived, preferred to have the youth become a clever merchant. So his father in 1815 took him to the

Frankfort Fair (Messe) and placed him there with the banking firm of M. G. Rindskopf. But the position was not long to Harry's taste nor was a grocery more endurable. After a short time he returned to Diisseldorf. The attempt was now made to have him settle in Hamburg, first in his uncle's counting-house and then in an independent concern of his own, which was a branch of his father's business. But he showed little talent as a merchant and in 1818 his firm failed.

In the three gloomy years at Hamburg, how¬ ever, Heine became a poet. Under the pseudo¬ nym <(Sy Freudhold Riesenharf® appeared in those days in a Hamburg magazine his first

In October 1819 he entered the University of Bonn, which had just been reopened. A fresh and stimulating spirit prevailed at this university both among teachers and pupils. Men like August Wilhelm v. Schlegel, who in¬ terested himself very much in the young poet; E. A. Arndt and others, belonged to the teach¬ ing staff. Among the students we find names like Wolfgang Menzel, Hoffmann v. Fallers- leben, Hengstenberg, etc. His special friends were Friedrich Steinmann, J. B. Rousseau and Josef Neunzig. In the vacation, after the first year of study, Heine resided in the little town Beuel, near Bonn, and there he worked on his first tragedy, 'Almansor, the plot of which was. placed in the per od of Moorish decline in Spain. In the poem, however, Heine wished to present a picture of the battles which Judaism in Germany had to endure.*

His choice of Berlin was fortunate for the . young poet. A vigorous intellectual atmos¬ phere prevailed in that era in the Prussian capital. Before everything else he was attracted by the best salon in which Rahel Varnhagen von Ense had her special circle, with a coterie of brilliant spirits. Both she and her husband qu:ckly recognized the poetical power in Heine and admitted him to close intimacy. Her brother, Leopold Robert, who was also a poet, was exceedingly fr'endly to h;m, and his wife Friedricka aroused Heine's enthusiastic adora¬ tion in sonnets and songs. The second coterie which fascinated Herne was a round table of young poets who gathered in Lutter and Weg¬ ener's restaurant, made famous by Ludwig Devrient and E. T. A. Hoffman, which was to become the scene of more than one carouse. These men were Christian Dietr'ch Grabbe Friedrich v. Uechtritz, Karl Kochy, L. Gus- torf and others. A third circle formed the greatest possible contrast to the others and in this, perhaps, Heine felt more at home. It was

a small body of young men who in a time of general apostasy from Judaism, assumed as their task the reform and development of Juda¬ ism which then was regarded as in its decline. At the head of these resolute workers stood Eduard Gans, the celebrated jurist; Moses Moser, a merchant, whom his friend Heine called a living epilogue to Lessing's (Nathan, and Leopold Zunz (q.v.), the immortal founder of that branch of critical research called the science of Judaism. Heine took the deepest in¬ terest, in the labors, hopes and d'sappointments of this society. A monument of his love for the general cause . which was abandoned by them, is embodied in his romance (The Rabbi of Bacharach,* which was then begun but un¬ fortunately remains a torso. In Berlin, too, the university fairly fascinated him. In particular the ph losopher Hegel (q.v.) made a deep im¬ pression on the young poet, whose first poems were issued by a Berlin firm in 1823 and aroused general interest, and he was termed a successor of Byron, the first poet of «Welt- schmerz® in Germany. Varnhagen v. Ense and Karl Immermann, both famous writers of the time, showed special ardor in directing the public's attention to the young poet, the new star on the literary horizon, who was already arousing general comment by his*

After his graduation as doctor of law he re¬ turned to Hamburg. But all his efforts to main¬ tain his hold there or in Berlin were unavailing despite his. baptism. The failure was due either to the prejudices of the time or to other draw¬ backs. So Heine devoted himself wholly to literature. Two years earlier he made a jour¬ ney from Gottingen to the Harz Mountains, in the. course of which he visted Goethe at Weimar, but met a rather cool reception. This journey he now described in his (Harzreise, which had many readers who were delighted ˆ ˆ and fresh tone in which the varied*

and picturesque experiences were narrated. In the years 1826-31 Heine's rank as poet was firmly established. That period forms the crown of his life and activity — his high-water mark of achievement. The four volumes, iSSS?i)lldier> C Pictures of TraveP), published 1820-31, showed h m from an entirely different point of view. His (Buch der Lieder> (

stood the well of German popular poetry, out of whose depths he drew such wealth as no other German poet had accomplished. Goethe and Uhland, Brentano and Wilhelm Miller were not without their influence on the

matter as well as the metrical form of his poems ; yet he was original and his songs aroused a prac¬ tical revolution in the world of German poesy.

*The secret of his originality and of the marvelous influence which he exercised not only on his contemporar'es, but also on every age, lies in the peculiar charm wh ch characterizes these songs, as they sound the tenderest tones of the heart, and then in cutting dissonances shatter the sentimental quality which is at their bas's, thus producing a humorous-poetical effect incomparable in its way. The subjec¬ tivity with which Heine wove his sorrows, whether trivial or serious, in the warp and woof of his verse, was something unheard of in the history of German poetry. There was as little hypocrisy in h s feeling of sorrow (Welt- schmerz) as in that of Lord Byron, but it was truer and deeper, because it was blended with the Jews' sorrow from gray antiquity. His pictures and thoughts, his Oriental sensuousness and his German sensitiveness, all this in its comb nation formed a poetical ensemble _ which was to destroy romanticism, with its fairyland of legends and to construct the poetry of a new age and a new generation. The verse in¬ cluded a mass of new poetical material ; for instance, the description of the sea in the splendid-colored North Sea pictures. In marked contrast was the wonderful effect produced by the form of the poems, which, apparently some¬ what careless, was really intentional and just adapted to elevate the mood. With h s (Book of Songs * Heine became at once the first Ger¬ man poet of his time. His prose writings ex¬ ercised in those days a similar influence. Heine loosened the tongue of the modern man of culture ; he taught him what and why he suffers. In an age which was gloomy, depressed and poor in deeds, he unfurled the banner of free¬ dom and announced to the young generation the dawn of new days which had to come. While much in his (Pictures of Travel * was of transient worth and importance for the his¬ tory of civilization, of permanent value was the blend'ng of humor and sentiment, wit, and earnest reflection, wherein following his great predecessors, men like Laurence Sterne, Jean Paul and others he created an entirely new genre. The modern Feuilleton rest wholly on Heine's prose. The ((Young Germany*1 school wh ch gave the death-stroke to romanticism in the 30's of the past century followed in his steps. His travel picture and sketch remained for decades a model for young German writers after wh'ch to pattern their prose.*

Despite his popularity, however, Heine could never attain a life of entire self-reliance in the conditions of his age. His steady dependence on his rich uncle, who let his nephew feel his power, embittered his stay in Hamburg. Ac¬ cordingly in 1827 he accepted the offer of Cotta, the publisher, to assume the editorship of the Mun ch Political Annals. But he con¬ tinued at this work only one winter; then he undertook a journey to Italy, which he de¬ scribed in his incomparable fashion in his (Pictures of Travel. He expected to receive on his return a professorship at the Munich*

University, which the Bavarian Minister Eduard v. Schenck desired to secure for him from the king; but owing to the intrigues of the clericals all efforts in Heine's behalf were un¬ availing. In 1828 he was recalled from his Italian trip by the news of his father's death — a man whom Heine had most tenderly loved. The following years were occupied in violent attacks on the poet August v. Platen and his followers, whom Heine regarded as his worst foes, besides literary labors and traveling. When the intelligence of the July Revolution in Paris reached him, the poet could no longer endure the home atmosphere, while the powerful Austrian Chancellor, Mettenich, who found re¬ freshing youth <(in the melancholy waters of his lyric,® warned him that he was not entirely secure from persecution. It was on a May day in 1831 when Heine forsook his fatherland, of course of his own accord, but in the firm con¬ viction that sooner or later he would suffer the fate of all those who were leaders of freedom in Germany.

In Paris Heine labored from the very start at the great task of his life — to promote an understanding between the French and the Ger¬ mans. His correspondence in the Augsburgcr Allgemeine Zeitung, his book on (The Ro¬ mantic School, > his contributions to (The His¬ tory of Religion and Philosophy in German, are devoted to this great purpose. The first appeared in 1832 as (French Conditions* ; the others — with literary sketches, reflections on the drama and art, poems, etc., as (Salon) (4 vols., 1832-36). The persecution which the German Diet set in motion against the ((Young Germany® school of writers, leading to the ban against their works, was an act of medievalism which affected the poet deeply. His only compensation was his recognition in his father- land, the esteem in which he was held in France and the love of a beautiful young French¬ woman, Mathilde Creszentia Mirat, whom he married in 1841, after having lived with her many years. Despite many storms and although his wife had no idea of her husband's eminence, the marriage was a happy one. The heavy material burden which she obliged Heine to assume forced him in 1836 to receive from the French government, when Guizot was head of the Ministry, a pension of 4,800 francs — a charity which France at that time bestowed on all prominent fugitives. It is to be understood, however, that Heine incurred thereby no obliga¬ tion to praise or defend the political adminis¬ tration. Nevertheless, later he was violently attacked for this step.*

The death of his rich uncle from whom he received an annual sum of 4,000 francs threw him into a terrible state. He was not mentioned in the will, and anxiety was added lest his cousin Carl Heine would refuse the further pay¬ ment of his stipend unless he would submit his writings to a rigid censure by the family. Vio¬ lent conflicts followed that cost the poet his rest and his health, which last had long been under¬ mined. A severe nervous trouble had tortured him from his youth, and now as added illness came paralysis of the eye. In 1843-44 Heine visited his old mother in

Hamburg. The poeti¬ cal description of his journey in the winter tale (Germany, which appeared in 1846 with his (New Poems,* and the epic poem*

new line of poetical genius; for both these satirical epics are pearls of poesy. Since 1848 Heine was practically chained to his bed of illness — his famous (

On 17 Feb. 1856 he died after much suffer¬ ing. He rests at Montmartre, next to his wife. His grave is adorned with a monument, the work of the sculptor Hasselriis. An artistic memorial was erected by an enthusiastic ad¬ mirer, the late Empress Elizabeth of Austria, at her country palace Achilleion, near Corfu in the Ionian Sea, with its classic memories. The continued efforts, however, made to place a memorial to the poet in his home on the Rhine have so far been fruitless, and have but led to bitterest conflicts between clericals and anti-Semites on the one side and the large body of his admirers on the other. It is not without significance that the Lorelei fountain, which could find no lodgment in Germany, has been placed in New York, the metropolis of the United States, a country where Charles G. Leland's translation of the (Pictures of Travel > appeared in 1855, and where the poet's works have appeared in numerous editions and trans¬ lations. The poet's body of admirers grows from day to day, and with this vast congrega¬ tion of thoughtful men and women in every land the history of literature, judging without prejudice, gladly recognizes Heine as the greatest German lyric poet, after Goethe, and as one who is and will remain among the most illustrious poets in the world's literature.

Bibliography. — Although the first collected edition of Heine's works by A. Strodtmann (22 vols., Hamburg 1861—66) was not brought out until some time after his death, there have been published very many other editions since then. Of these the most important are by G. Karpeles (Hamburg. 1885 and Berlin 1893) and by E. Elster (Leipzig 1887-90). There have been al¬ most innumerable editions of his separate works. A very large number of his poems have been set to music, not only by German composers, but also by composers in many other countries. Almost equally as numerous are the translations of his works into different languages, especially into English and French. Of his collected works the most important translations are (Oeuvres Completes (14 vols., Paris 1852-68) and (The Works of Heinrich Heine* (13 vols., New York 1892-1905). There are also a num¬ ber of English translations of his poems, the most recent and in many respects the best and most careful being that by Louis*

Untermeyer (New York 1917). Both books and magazine articles on Heine's work and life have been

written in vast numbers in many languages. A very careful and exhaustive bibliography of these is to be found in Goedeke, K., (Grundriss der Deutschen Dichtung (Vol. VIII, Dresden 1908) which also contains a very complete list of editions and translations. Consult Amiot, C. G., (Henri Heine et la Guerre Actuelle) (in Revue Hebdomadaire, Vol. VI, p. 214, Paris 1916) ; Arnold, Matthew, (Essays in Criticism* (1st series, New York 1883) ; Bartels, A., (Heinrich Heine* (Dresden 1906) ; Bienenstock, M., (Das Jiidische Element in Heines Werken* (Leipzig 1910) ; Brandes, G., (Main Currents in 19th Century Literature) (6 vols., New York 1906) ; Brauweiler, E., (Heines Prosa> (in Litterarhistorische Gesellschaft Bonn, Schrif- ten N. F., Vol. IX, Berlin 1915) ; Dowden E., (Essays, Modern and Elizabethan (New York 1910) ; Eliot, George, XXIII, Philadelphia 1916) ; Samuel, H. B., XVI, p. 484, Mont¬ real 1917).*

Gustav Karpeles,

Author of (Jewish Literature and other Essays?

HEINEMANN, hi'ne-man, William, Eng¬ lish publisher and author: b. Surbiton, 18 May 1863. He founded the publishing house which bears his name in 1890. He has published under the pen name of (

HEINRICH VON OFTERDINGEN.

This fragmentary romance by Novalis (Fried¬ rich van Hardenberg), written 1799-1800 and published by Tieck after the author's death (1801), is the masterpiece of early German Romanticism, the supreme representation of Romantic thought and feeling. The novel was planned consciously to be both a supplement to Goethe's (Wilhelm Meister) (q.v.) and a ref¬ utation of it; the tendency of (Wilhelm Meister) seemed to the Romanticists to be too prosaic and practical. (Heinrich von Ofter- dingen> was to be the glorification of the poetry of life; poetry and life are actually identical ; poetry is the pathway to all wisdom. Novalis presents his theme in a symbolic tale, which relates the life of an ideal poet : indeed, the whole substance of the story is included in

the two phrases, substantially identical in mean¬ ing: <(Heinrich becomes a poet,® and ((The world becomes a dream.® Various experiences are provided for the shaping of the hero's gifts; the culmination of the first

period is reached in love and grief, these experiences being directly connected with Novalis's love for Sophie von Kuhn and his sorrow at her death.

(Heinrich von Ofterdingen) is divided into two parts : ˆExpectation® and ˆFulfillment,® but pathetically enough the author died leaving the second part a fragment; the continuation, so far as we know it through Novalis's notes and Tieck's account of his friend's plans, presents a strange but fascinating medley of miracle, symbol and mysticism.

In the first chapter of the novel the hero re¬ lated a dream, the vision of the Blue Flower, and the romance consists essentially in the sym¬ bolic quest for this flower, which Heinrich ultimately plucks. Through the influence of (Heinrich von OfterdingeiP the Blue Flower became the symbol of Romantic longing, the realization of the poet's dream, the union of the dream-world and the real world. _ The hero has only his name in common with a legendary poet of the Middle Ages, who appears in a Middle High German poem <(Der Wart- burgkrieg® (((The Wartburg Contest®), and is used by Wagner in (Tannhauser) and elsewhere in modern mediaevalistic literature, as by Lien- hard, Kastropp and others. Translation, Cam¬ bridge, Mass., 1842. For criticism consult Brandes, (Romantic School in Germany; Wernaer, (Romanticism and the Romantic School in Germany* and Haym, (Die Roman- tische Schule.**

Harvey W. Thayer.

HEINTZELMAN, hmt'sel-man, Samuel Peter, American military officer : b. Manheim, Pa., 30 Sept. 1805 ; d. Washington, D. C., 1 May 1880. Graduated at the United States Military Academy 1826, and served during the Mexican War. In 1861 he commanded a division at Bull Run, where he was wounded 21 July. After¬ ward promoted brigadier-general of volunteers, Heintzelman, during the organization of the army in the winter of 1861-62, held command of a division. On the moving of the Army of the Potomac, in March 1862, the 3d Army corps was placed under his command. His corps formed the right wing of Pope's army at the second battle of Bull Run, 30 Aug. 1862. Dur¬ ing the Maryland campaign he commanded the defenses at Washington, and was afterward ap¬ pointed to the command of the Department of Washington, and of the 22d Army corps, which he held during the battles of Chancellorsville and Gettysburg, in May and July 1863. He re¬ tired in 1869, with the rank of major-general.

HEIR (Lat. lucres), in law, one entitled by descent and right of blood to lands, tenements or other hereditaments. Hence -it is an ancient apothegm, that ((God only can make an heir.® An heir is really one who is born or

begotten in lawful wedlock, and on whom the law casts the estate, in lands, tenements or hereditaments immediately on the death of his ancestor. The rights of heirs in the majority of the United States are determined by the principles of the common law unless specially modified by statute. It is a matter of judicial decision that the rights of heirs in the United States are statutory only.

Hence they cannot plead, for instance, that an inheritance tax is unconstitutional. An heir presumptive is one who will be the heir at the death of the owner, as the elder son of a de¬ ceased brother in England, or all the children of a brother in the United States, where the owner has no children ; for they will be heirs if he dies without issue. As an heir presumptive may lose his heirship by a change of circumstances, he does not become an heir apparent so long as this change is legally probable, though physic¬ ally or naturally impossible. Thus the nephew of the owner can never be his heir apparent, however aged or feeble or near to death the owner may be; for in contemplation of law it is always possible that a son may be born to him, who would be an heir apparent, and who would therefore supersede an heir presumptive. An heir apparent is one who must be the heir if he survive the owner, as the eldest son in Great Britain, or all the children in the United States.

HEIRLOOM, in English and Scots law, a chattel, as furniture, which by will, law or the like descends to the heir with the land ; also, any chattel owned by a family for a number of generations. Usually the term includes tables, beds, pans, carts, etc., but it may include orna¬ ments, as jewels. Formerly the term was of more importance than it is to-day. An owner of an heirloom cannot convey it away from the estate, for at his death it goes to the heir or devisee. In popular usage to-day the term is used as synonymous with settled chattels.

HEISS, his, Michael, American Roman Catholic prelate: b. Pfahldorf, Bavaria, 12 April 1818; d. Milwaukee, 26 March 1890. He studied at the University of Munich and at the Catholic seminary at Eichstadt, and was or¬ dained in 1840. In 1843 he came to the United States, and was first assigned to a church in Covington, Ky. ; he next went to Milwaukee as missionary priest and secretary to the bishop. In 1868 he was consecrated as the first bishop of La Crosse, Wis. ; in 1880 he was appointed co¬ adjutor to the archbishop of Milwaukee, with the right of succession, and in 1881 became arch¬ bishop of Milwaukee. He took an important part in American councils, and wras a member of the Vatican Council (1860-70). He wrote (The Four Evangelists, and a treatise on mar¬ riage (in Latin).*

HEISTAND, hi'stand, Henry Olcot Shel¬ don, American soldier : b. near Richwood, Ohio, 30 April 1856. He was graduated from West Point 1878,

and was assigned to 11th United States Infantry as second lieutenant. He was appointed government inspector and instructor Ohio National Guard in 1892, and during the Presidential campaign of 1896 was confidential secretary to McKinley. In 1889 was appointed military commissioner to the Paris Exposition of 1900; while on that duty was promoted lieu¬ tenant-colonel in 1900, and became adjutant- general and chief of staff in the China expedi¬ tion for relief of Peking 1900. Has served as adjutant-general at all important military head¬ quarters, including Manila, San Francisco, New York city and Chicago. He has written (Alaska, Its History and Description (1898) and numerous professional papers and bro¬ chures.*

HEJAZ, he-jaz, or HEDJAZ, Arabia, since November 1916, a kingdom of which Mecca is

the capital. It comprises the former vilayet of Hejaz, extending from Akaba in the north to Asia in the south ; the area is about 96,500 square miles bordering the Red Sea littoral and is a region of desert and oases. There are, however, many populous coastal towns con¬ nected by the Hejaz Railway with terminals at Mecca and Medina. The population numbers about 750,000.

History. — In June 1916 the Grand Sherif El Hussein ibn Ali of Mecca, with his three sons, revolted against the Turkish authorities and within two months was master of the prin¬ cipal towns. On 27 June he proclaimed his independence of Turkey. The first result of the revolution was the opening of the ports on the eastern shore of the Red Sea, which had been closed by Turkey, for trade with the ports of the Entente Allies, particularly those of Egypt on the opposite shore. Early in September the French government, in full accord with the government of Great Britain, dispatched a dele¬ gation of French Moslems to the Grand Sherif of Mecca with the mission of congratulating the new Arabian government on its deliverance from Turkey. It was also the bearer of a substantial sum of money (about 3,000,000 francs) for the purpose of rendering financial aid to the new state. The French government also furnished a vessel for the British and French Moslems in which to resume their annual pilgrimages to Mecca by way of Jedda. Thousands of such pilgrims took advantage of this free service and it proved an important factor in the develop¬ ment of Franco-Arabian relations. When the date of the pilgrimage drew near the Grand Sherif sent out circulars inviting all ((true be¬ lievers® to come to Mecca. Those pilgrims found a new Mecca, a cleaner city and free of the assassins

and robbers of former years. In November 1916 the Grand Sherif assumed the title and office of king at the request of the Ulema and notables of Mecca, approved by the unanimous vote of the people, and has been recognized as king of Hejas by the Allied governments. See Arabia; Mecca; Turkey; War, European. Consult (Current History (New York October 1916) ; Statesman's Year Book> (1918).*

HEJRA, or HIJRA. See Hegira.

HELEN, in Greek legend, the most beauti¬ ful woman of Greece, daughter of Zeus by Leda. By advice of Ulysses her numerous suitors were bound by oath to respect her choice of a husband, and to maintain it even by arms. She chose Menelaus, but was afterward carried off to Troy by Paris, the Trojan War arising from the claim made by Menelaus for the ful¬ filment of the oath. After the death of Paris she married his brother Deiphobus. On the fall of Troy she returned to Sparta with Menelaus, but at his death was driven from the country, and was murdered at Rhodes by the queen of that island.

HELENA, hel'e-na, Saint, the mother of the Emperor Constantine the Great. She was of humble origin, probably the daughter of an innkeeper of Bithynia. She captivated Con- stantius Chlorus, and became his wife; but when Diocletian elevated him to the dignity of Cassar, in 292 a.d., he was compelled to repudiate her. The succession of her son, and the influence she had exercised in educating him as a Christian,

compensated her for previous humiliations, while her piety and zeal for the propagation of Christianity have made her a saint in the Roman Catholic calendar.

HELENA, hel'e-na, or he-le-na, Ark., city and county-seat of Phillips County, on the Mis¬ sissippi River, and on the Saint Louis, Iron Mountain and Southern, the Yazoo and Missis¬ sippi Valley, the Missouri and North Arkansas railroads, and is the terminus of the Arkansas Central, about 75 miles below Memphis and 95 east by south from Little Rock. It has boat communications with all important river-ports. A conflict between the Federal and Confederate forces took place here 4 July 1863. The Union army, about 4,500, was under General Prentiss, the Confederate, about 9,000, under General Holmes. The Confederate loss was about 1,800, including killed, wounded and prisoners. Helena is in an agricultural and lumbering region ; the chief manufactures are lumber, cot¬ tonseed oil and foundry products. It has cot¬ ton-compresses, a shingle-mill, box factories, stave mills, railroad shops, manufactories of chairs, brooms, spokes and handles, brickyards and large lumber-yards. Some of its educa¬ tional institutions are the Jefferson High School and the Sacred Heart Academy;

it has several banks, a public library, a number of fine church buildings. It contains also several monuments to Civil War heroes and the United States district, State, county and municipal courts. Pop. (1920) '9,112.

HELENA, Mont., city and capital of the State and county-seat of Lewis and Clark County, on the Northern Pacific and the Great Northern railroads, about 70 miles north by east of Butte. The city is surrounded on all sides by the Rocky _ Mountains ; on the south and west the mountains are within two miles of the city, while to the north there is a wide val¬ ley between the city and the foothills, and the same condition exists on the east. The city is protected from severe wind storms, and in the winter season there is a difference between its temperature and that of the mountain coun¬ try of from 10 to 20 degrees. The country tributary to Helena is rich in both mineral and agricultural resources. The mines are prin¬ cipally gold-producing, while the products of the farms are cereals and the ordinary vege¬ tables. Also tributary to the city are large areas devoted to the raising of cattle and horses, but this industry is gradually being re¬ placed by diversified farming. Helena is the richest city oer capita not only in Montana but in the entire Rocky Mountain country. It is principally a city of homes; cattlemen, miners and others engaged in industries elsewhere in Montana make it their residence because of its church, school and social attractions.

The original of Helena was <(Last Chance Gulch® ; the town came into existence as a result of discoveries of placer .gold in 1864, by four prospectors, John S. Cowan, John Crab, D. J. Miller and Robert Stanley, who came from Alder Gulch, now Virginia City, in the southern part of the State. On 16 July 1864 they sunk two holes to bed rock and in each they found gold. It was the <(Last Chance® that turned out favorably and that was the name of the camp until Helena was adopted. The news of the find spread; soon there were

*500 men in the camp; such was t*he nucleus of the present capital.*

The educational institutions are the public and parish schools, the Montana Wesleyan Uni¬ versity (Methodist), Mount Saint Charles College, Saint Vincent Academy (Catholic) and the State, city and other libraries. Among the principal buildings are the government build¬ ing, costing $500,000, State Capitol (cost, with the two new wings, $1,100,000), County Court¬

house (cost, $100,000), High School building ($150,000), Saint Helena Cathedral ($400,000), Y. M. C. A. building ($115,000), and seven graded school buildings valued at $250,000. There are also Saint John's Hospital, Saint Peter's Hospital, Saint Joseph's Orphanage, House of the Good Shepherd, several fine churches, Masonic Home and the Odd Fellows' Home. All secret societies are well represented, the leading one being the Masonic fraternity which owns two temples. The city is noted for its clubs, the Montana, Lambs and Elk's being social organizations, and the Helena Com¬ mercial Club one of the most active bodies in the West. On the Missouri River, 12 miles from Helena, are located the great power dams of the Montana Power Company, one being located at Canyon Ferry, one at Hauser Lake and one now in process of construction at Hol- ter. These three dams furnish an aggregate of 110, 000 horse power which is electrically trans¬ mitted to Helena for operating street cars and lighting the city and for manufacturing purposes. Helena is the principal financial centre of the State and has the distinction of having the lar¬ gest per capita bank deposits of any city in the country. It is also one of the mining centres of the State. The principal gold mines now working within three to eight miles of the city are the Franklin, The Scratch Gravel Gold Mining Company. The Eastern Belle Gold- rnining Company in the Scratch Gravel Dis¬ trict, the Carbon Hill Mining and Milling Com¬ pany and the Stem Winder Company in Grass Valley, The Whitlatch Union, The Butte and Helena Whitlatch and the Yellow Boy Mine. The districts tributary to Helena in which min¬ ing is active are the Marysville district, the Rimini district, the Lump ■ Gulch, Clancy, Wickes, Corbin, Radersburg, York, Winston, Hassel and Townsend districts, in all of which are producing mines. In the 20 years after the first discovery of gold $25,000,000 were taken from the ground on which is now located the business part of the city, and it is no un¬ usual thing at the present time, when the foun¬ dation for a new building is being prepared, to strike gold in the excavation. This was the case when the excavation was made for the Placer Hotel four years ago, the contractor for the work securing more than $1,000 from the bed rock on which the foundation is placed.

The government is of the commission form, being vested in a mayor and two councilmen who appoint all subordinate officials. The as¬ sessed property valuation is about $15,000,000. Helena has one of the most extensive orna¬ mental lighting: systems in the State. Leading away in all directions to scenic points is a sys¬ tem of splendidly constructed roads, notable among which are the Le Grande Canyon boule¬ vard and the Transcontinental automobile route over Priest's Pass of the main range of the Rocky Mountains. Helena has been the

capital of Montana since 1869. In that year the capital was removed by popular vote from Virginia City. After Montana was admitted as a State

two elections were held for the perma¬ nent location of the capital and in 1894 Helena was chosen. Its altitude is 4,200 feet. The climate is not severe, the locality having the distinction of possessing the longest season be¬ tween frost and frost of any section of the State. The average temperature in January and February, the two coldest months in the year, is 20 degrees above zero, with little mois¬ ture in the air. In summer the average tem¬ perature is 75 degrees. Pop. (1920) 12,037.

L. M. Rheem.

HELENA, Battle of. Helena, Ark., is on the west bank of the Mississippi River, about 82 miles below Memphis. Since 13 July 1862, when General Curtis arrived there from western Arkansas, it had been occupied by Union troops, and on 4 July 1863 was held by a division of the 13th corps, under General Salomon, and a brigade of cavalry, in all 4,129 effective men, under command of Gen. B. M. Prentiss. The place is surrounded by hills, and those nearest the city were occupied bv strong re¬ doubts; Graveyard Hill in the centre, Fort Righter on the north or right, and Fort H:nd- man on the south or left, were all connected by a line of bastions and rifle-pits, both ends of which rested on the river. In the river lay a gunboat. Toward the middle of June it was determined by the Confederates to take the place, whereby it was hoped to raise the siege of Vicksburg or, if Vicksburg fell, still to keep the river closed. General Holmes was ordered to move from Little Rock with about 7,600 men, Price's and Marmaduke's divisions, Fagan's brigade of infantry and Walker's brigade of cavalry. Holmes bivouacked about four miles from Helena on the evening of 3 July, and at midnight advanced to within a mile of the outer works. The assault was ordered at day¬ light. On the Confederate right Fagan with 1,770 men advanced on Fort Hindman, carried all the outer entrenchments and made a des¬ perate attempt to take the fort, but was repulsed with a loss of over 400 men. On the Confeder¬ ate left Marmaduke's division of infantry and Walker's cavalry brigade, aggregating 2,780 men, attacked Fort Righter and were repulsed. Price, in the centre, with 3,100 men, made a strong assault, carried all the entrenchments in his front, seized Graveyard Hill, and ordered one brigade to move on the town and another to assault Fort Hindman in the rear, but the Union troops checked the advance of the two brigades, and drove them back and. the attacks on the right and left being repulsed, the fire of the forts, rifle-pits and gunboat was concen¬ trated on Price, and at 10.30 a.m. Holmes gave the order to withdraw and led his troops back to Little Rock. The Union loss was 57 killed, 146 wounded and 36 missing; the Confederate loss was 173 killed, 687 wounded and 776 miss¬ ing. Consult (Official Records) (Vol. XXID ; Greene, (The MississippP ; The Century Com¬ pany's ^Battles and Leaders of the Civil War (Vol. III).*

HELENIN, a chemical substance extracted by hot alcohol from the root of the elecampane (Inula helenium). It has the formula CeHsO, and is nearly insoluble in water, but very soluble

in alcohol. The first crystals obtained from the root-extract contain considerable quantities of inula-camphor ; but this may be removed by repeated crystallization from alcohol. Pure helenin crystallizes in white prisms or needles, melting at 232° F.

HELICIDZE, he-Hs'i-de, the family of ter¬ restrial pulmonate mollusks which includes most of the land and many fresh-water snails. See Snails.

HELIGOLAND, hel'i-go-land, or HEL¬ GOLAND, hel'gd-lant (Dan. <(holy land®), a small island and popular sea-bathing resort in the North Sea, belonging to Germany, situated about 40 miles northwest of the mouth of the Elbe. It is about a mile long and one-third of a mile broad, and has an area of about one- quarter of a square mile. It consists of two parts, the Oberland, a flat-topped rock 206 feet high, which after the island was acquired by Germany was made into a great fortress, from which visitors were excluded. The Unterland is a small stretch of shore at its foot. There are two ports, one on the north and one on the south side, and most of the houses stand on the Oberland. The Unterland gives partial shelter to the shipping. Steamboats ply between the island and Hamburg. The principal buildings are the church, lighthouse and a Prussian state biological station for the study of the fauna and flora of the North Sea. The bathing facili¬ ties, which attract so many visitors, are found in a dune or sandbank separated from the main island by a channel about a mile wide. This Sandy Island, as it is called, is slowly being reduced in size by the inroads of the sea. The inhabitants are chiefly employed in fishing, and speak a Friesian dialect. The island has cable communication with Cuxhaven and Wilhelms- haven. Christianity was first preached here by Saint Willibrod in the 7th century. Taken from the Danes in 1807, it was ceded to Great Britain in 1814, but was transferred to Germany in 1890. The island, once much larger than now, has been cut away by action of the waves. The Bight of Heligoland was the scene of a naval engagement between German and British ships on 28 Aug. 1914. The island held a prominent place in German naval strategy. Under the Treaty of Versailles, Germany was forced to dis¬ mantle the Heligoland fortifications. See War, European.

HELIOCENTRIC, he”li-o-sen’trTk, «hav-

ing the sun as centre,® a term applied to the Copernican system, as in opposition to the Ptolemaic system, which was geocentric, that is, ((having the earth as centre® of the solar system. In modern astronomy the word is applied to calculations in which the sun is referred to as centre of the planetary system. Thus the helio¬ centric place of a planet is the position it would occupy at a given time when calculated from a point of view in the centre of the sun.

HELIODORUS, he-li-6-do’rus, the earliest of the Greek writers of romance : b. Emesa, Syria, and lived near the end of the 4th century. He became a believer in the Christian religion, and bishoo of Tricca in Thessalv. His youthful work, (2Ethiopica (that is, 2Ethiopic Affairs), or the Loves of Theagenes and Charicleia, is a tale in poetical prose, with an almost epic tone. It is distinguished by its strict morality from the other Greek romances, and interests the*

reader by the wonderful adventures it recounts. One of the best editions is that of Hirschig in the (Erotici Scriptores) (1856). An English translation by R. Smith appeared in 1855. See 2Ethiopica.

HELIOGABALUS. See Elagabalus.

HELIOGRAPH, a signaling instrument using the direct rays of the sun for the trans¬ mission of orders or information. The essen¬ tial parts of the instrument are the mirror which reflects the light, and a telescope so at¬ tached to the mirror as to direct the reflected ray to the point where it is to be read. When the position of the sun is such that the ray forms an angle greater than 90 degrees at the mirror, a second mirror is introduced to pre¬ vent an undue dispersion of the beam of light/ The instrument is mounted on a tripod with a ball and socket joint, and is accurately set with adjusting screws. The code in common use is the Morse telegraph alphabet of dots and dashes, formed by alternately obscuring and displaying the flash from the mirror. In military use special codes are employed. The heliograph is available only when the sun is shining in a clear sky.

HELIOMETER, an instrument for meas¬ uring small angular distances on the sky, with very high accuracy, particularly the distance of a planet from a nearby star, and the angular distances of neighboring stars from each other. It is from the former kind of measures that until very recently the most accurate determina¬ tion of the distance from the earth to the sun was deduced : from the latter the distances to certain of the stars were determined with a higher accuracy than was possible in any other way. The heliometer of Bouguer is an astronomical telescope provided with two

object- glasses, one of which is movable, and which form two distinct images of the same object, visible through the same eye-glass. A single object-glass cut into two parts, which are rela¬ tively movable by a screw, is always employed now. If, in contemplating a celestial body, the object-glasses are placed so as to bring the images to touch each other, the distance of the centres of the glasses gives the diameter of the image. In this manner the instrument gives, for instance, the difference of the diameter of the sun in perigee and apogee. For many decades the heliometer has stood at the head of all astronomical instruments for the precision of its results, especially in the measurement of the parallaxes of the stars and of the sun. Very recently, however, it has been almost wholly superseded for these purposes by the photographic plate, with which as high, or even a higher, accuracy can be attained with a greatly lessened expenditure of labor.

HELIOPOLIS, he-li-op'6-lis (<(City of the Sun®), Egypt, the On of the Hebrew Scrip¬ tures, on a site now partly occupied by Mata- riah, six miles northeast of Cairo, was one of the most ancient and extensive cities during the reign of the Pharaohs, and so adorned by monu¬ ments as to be esteemed among the first sacred cities of the kingdom. During the flourishing ages of the Egyptian monarchy the priests and scholars acquired and taught all the learning of the Egyptians within the precincts of its temples. Its sacred name was Per-Re (house or city of Re), of which Heliopolis is the

Greek translation. It may be regarded as hav¬ ing been the university of the land of Misraim, and at the time of Strabo, who visited this town 24 b.c., the apartments were still shown in which, four centuries before, Eudoxus and Plato had labored during 13 years to learn the philosophy of Egypt. Solon and Thales were also reputed to have visited its schools. Here Joseph and Mary are said to have rested with the infant Jesus. Near the village stands the Pillar of On. a famous obelisk, supposed to be the oldest monument of the kind existing in Egypt. Its height is 67ˆ4 feet, and its breadth at the base 6 feet. Hieroglyphical characters are sculptured upon it, but are partly illegible. The obelisks known as Cleopatra's Needles, of which one is now in London and the other in Central Park, New York, were originally erected at Heliopolis by Thothmes III. A fierce battle was fought here, 20 March 1800, between the French under Kleber and the Turks, when the latter were defeated. Consult Pauly-Wissowa, (Real-Encyclopadie der classischen Altertums- wissenschaf t) (Vol. VIII, Stuttgart 1913).

HELIORNITHID.7E, he-li-or-nlth'i-de, a family of tropical birds, the fin-foots or sun- birds, placed by some ornithologists among the Cecomorphce, and by others, more probably, with the rails. They are about a foot long, mottled brown and white, with long pointed wings and long stiff tails; and frequent the borders of forest streams and ponds, in which they spend much of their time swimming and diving. They feed on small fish, crustaceans, insects and seeds. The best-known species is Heliornis fulica of southern South America.

HELIOS, he'li-os, in mythology, the god of the sun (Latin, Sol) in the Greek mythol¬ ogy; son of Hyperion and Theia, and brother of Eos (Aurora, the dawn) and Selene (Luna, the moon). He is frequently called by the name of his father. He dwells with Eos in the ocean behind Colchis. From the portals of the morning he rides through the air in an oblique curve to the gates of evening, and after having cooled his horses in the ocean, he drives his chariot into a self-moving golden vessel, made by Hephaestus (Vulcan), which with wonderful rapidity bears him during the night along the northern shore of the ocean back to Colchis, where he bathes his horses in the lake of the Sun, and rests till the dawn of the morning. Other accounts represent him _ as making this nightly passage while slumbering in a golden bed. His horses and chariot are first mentioned in the Homeric hymn on Helios. Among events in the history of Helios the poets relate his contest with Poseidon for the Isthmus of Corinth, his revealing the secret amours of Ares and Aphrodite, and his disclosure to Demeter of Pluto as the ravisher of her daugh¬ ter. This idea of his omniscience seems to have been the reason why he was confounded and identified with Apollo, though they were originally quite distinct. As he was descended from the race of the Titans he is often called Titan. The famous Colossus of Rhodes was a representation of Helios. Consult Fairbanks, (The Mythology of Greece and Rome) (1907).

HELIOSTAT, he'li-6-stat, an instrument designed to reflect the rays of the sun, or the image of a heavenly body steadily in a given

direction notwithstanding their apparent motion relative to the point of observation. It con¬ sists of a mirror mounted on an axis made parallel with the axis of the earth, and caused to rotate toward the west with a velocity equal to the angular velocity of the sun or other body being observed. Several forms of the instru¬ ment have been devised, the best known being Silberman's ; and this too has been variously modified. Aside from its former use in physics, the heliostat has become a valued adjunct to the horizontal telescope, serving to reflect the images of the heavenly bodies into the object glass. (See Telescope). Consult article on the heliostat in Popular Astronomy for Novem¬ ber 1913. An adaptation of this instrument is used in geodetic surveying to keep a point of reference

constantly in view.

HELIOTHERAPY, the treatment of dis¬ ease by the action of sunlight. See Photo¬ therapy.

HELIOTROPE, he'li-6-trop, a genus (He- liotropium) of plants of the borage family, characterized by the undivided ovary pro¬ longed into a style, many of whose species have vanilla-scented blossoms. The one most cul¬ tivated is a small shrub (H . peruvianum), originally South American, which has small fragrant flowers growing compactly in one-sided spikes. Cuttings taken from the young branches grow readily, and come soon into blossom. The heliotropes are natives of warm climates, and very numerous, several growing wild in the United States. Many delightful varieties have been produced as garden and greenhouse flowers.

HELIOTROPE, the bloodstone, is a vari¬ ety of quartz partaking of the character of jasper and of chalcedony. It is of a deep green color, and is covered with red spots like drops of blood. Many fine antique Greek and Roman intaglios and cameos, also seal rings carved in bloodstone, are preserved in the great gem col¬ lections. It is found in Tartary, Persia, Sibe¬ ria, Colorado, Georgia, Oregon and Orange County, N. Y., in the island of Rum, Scotland, and many other places. It received the name heliotrope, or as some of the older writers give it, elitropia, because it was said that if the min¬ eral be put into water contained in a basin rubbed with the juice of the plant heliotrope, and be exposed to the sun, the water will ap¬ pear red and the sun blood-like, as if it was eclipsed.

HELIOTROPISM, he-li-ot'rd-pizm, or PHOTOTROPISM, the influence and effect of sunlight on organisms. When a seedling plant is placed in a transparent vessel of water within reach of the light of a window, the stem and leaves gradually bend toward, and the roots from, the light. The former phenomenon is termed positive, and the latter negative, heliotropism. The shoots and leaves of nearly all plants turn toward the light, and the turn¬ ing of the sunflower toward the sun is familiar to every one. In the case of organs which are positively heliotropic the growth of the side next the light is retarded, and that of the oppo¬ site side increased; the result of these com¬ bined actions is a concavity on the former, and

a convexity on the latter, thus causing a curva¬ ture toward the light. In the case of roots these actions are reversed. That these results are brought about by the action of light is evi¬ dent; the cells on the concave side

become less, while those on the convex side become more, turgid, thus forcing the organ to bend; but the cause of turgescence is unknown.

In animals a similar heliotropism is operative and is plainly manifested in some low forms, as hydra, where it is of great service in their al¬ most automatic food-getting. Heliotropism is closely allied to, and much modified by chemo- tropism (q.v.) and other influences.

HELIOZOA, he"li-6-zo'a, the <(sun animal¬ cules,® an order of rhizopods (q.v.) with or without silicious skeletons, and having slender and radiant pseudopodia, stable and rarely in¬ terlaced. The majority live in fresh water, but some are marine. A common and widespread example is the genus Actinophrys.

HELIUM, a gaseous element, known to be present in the atmosphere and in certain min¬ erals, and, like argon, characterized by chemi¬ cal inertness. It is believed that helium is the final product of the disintegration of radium. It is also the ultimate product of the radio¬ activity of actinium and thorium. The dis¬ covery of helium was a consequence of the dis¬ covery of argon, and on account of the close chemical, physical and historical relations of the two, reference should be made to the article Argon, and to the references there given. Helium was known to exist in the sun many years before it was discovered upon the earth. During a total eclipse of the sun, in 1868, Jannsen observed a brilliant yellow line in the spectrum of the solar chromosphere, very close to the D lines of sodium, and yet not identical with either of them. The new line was assumed to be due to a previously un¬ known element, and in the same year Lockyer proposed the name Hielium® for this hypotheti¬ cal element, from the Greek word "helios,® meaning the sun. No evidence of the existence of helium upon the earth was adduced until 1882, when an Italian scientist named Palmieri announced that he had obtained the spectrum of helium from certain of the lavas given off by Mount Vesuvius. He made no attempt to iso¬ late the new body, however, and while it is quite possible that his observations were cor¬ rect, he can hardly be credited with the actual discovery of helium. No further progress was made in this direction until 1895. When argon had been discovered, and its chemical inertness had been established, Mr. Miers, mineralogist of the British Museum, pointed out that the mineral cleveite had !been shown to contain nitrogen gas, apparently in the free state, and made the suggestion that part of what had been assumed to be nitrogen might in reality prove to be argon. Professor William Ram¬ say examined the gas from this source, and found that while it undoubtedly did contain argon, it also showed a brilliant yellow line, which did not appear to coincide with either of the sodium lines, though it was very close to them. He sent a specimen of the gas to Sir William Crookes for a more careful examina¬

tion, and Crookes promptly reported that the new line was identical with the helium line. It was therefore proved that helium, which had previously not been certainly known except as a constituent of the solar chromosphere, is also a terrestrial element. Subsequent study revealed the presence of helium in brbgerite, urainke, fergusonite and several other minerals. It is given off from cleveite when that mineral is heated to about 400° F. in an exhausted tube, or when the mineral is treated with sulphuric acid, or with acid sulphate of potassium. By the heating process about half the helium con¬ tent is secured; with the acid, all of it. All the minerals which contain any considerable quantities of helium also contain uranium, yttrium or thorium. It is not certainly known whether the helium is chemically combined with the mineral, or whether it is merely occluded by it. The latter supposition would appear to be the more probable, judging from the chemical inertness of the gas, and from the fact (pres¬ ently to be noted) that radium appears to be generating helium continuously. Certain ob¬ servations upon the mineral fergusonite, how¬ ever, appear to give some color to the hypoth¬ esis that the helium is present in a state of chemical combination. As obtained from min¬ erals helium usually contains 10 per cent of nitrogen and a smaller per cent of argon. Helium has also been found among the gases arising from the waters of certain hot springs, notably those of Maizieres, in which the propor¬ tion is 5.34 per cent. It occurs also in the natural gas of Kansas in the proportion of 1.84 per cent.

The presence of helium in the earth's atmos¬ phere was established by means of subjecting the apparently pure argon that had been ob¬ tained from this source to a process of diffu¬ sion through a series of porous partitions of baked clay. Helium, being much lighter than argon, diffuses far more rapidly, and a mixture in which the two gases exist together may be partially separated into its constituents in this manner. The gas is present in the earth's atmos¬ phere in the proportion of 1 volume of helium in 250,000 volumes of air.

Helium, when pure, has a density of only 1.98, that of oxygen being taken as 16. Its atomic weight cannot be directly determined, because helium has not yet been made to com¬ bine with any other substance, although it has been subjected to the same experimental at¬ tempts as were tried in the case of argon (q.v.). The only approach to this was in establishing the fact that zinc vaporized in helium has a vapor density 12 per cent greater than when vaporized in nitrogen under identical condi¬ tions. It has been found, however, that the ratio of the specific heat of the gas at constant pressure to the specific heat at constant volume is about 1.65, and this indicates that helium is a monatomic gas (see Gases, Kinetic Theory of), and that its atomic weight is about 2X1.98 = 3.96; the atomic weight of oxy¬ gen being taken as 16. It therefore has the smallest atomic weight of any of the

known elements except hydrogen. The chemical sym¬ bol He has been assigned to helium, although, as has been already noted, no compounds of it have as yet been obtained.

Dewar thought he had liquefied helium at the

temperature of melting hydrogen (about 436° F. below zero), but this was not confirmed by sub¬ sequent experiments. Success was finally achieved in 1909 by Onnes, using the Linde process. Liquid helium is colorless and very mobile. It has a density of 0.122, being there¬ fore the lightest liquid known. It boils at 4.5° absolute. By evaporating it rapidly a tem¬ perature of — 454° F. has been attained, but the helium did not solidify. Its critical tem¬ perature being nearer to the absolute zero than that of hydrogen, the gas is well adapted for use in thermometers intended for the measure¬ ment of exceedingly low temperatures. It has, in fact, been used for this purpose with success, in studying the properties of hydrogen.

A most remarkable and previously unparal¬ leled fact in connection with helium remains to be recorded. It has been known for some time that helium occurs in cleveite, and in other min¬ erals in which the newly discovered element radium is found ; but whether this was to be re¬ garded as a mere coincidence, or whether it has some actual physical and chemical significance, has been a subject of considerable discussion. The most striking experiment bearing upon this matter is one that is due to Huggins, who caused the radiation from radium to pass through a spectroscope provided with a quartz prism and to fall upon a sensitive photographic plate. Upon developing the plate after a pro¬ longed exposure, he found that cold radium gives a line spectrum when treated in this man¬ ner; and he made the further discovery that nearly all of the lines in the spectrum so ob¬ tained are apparently coincident with lines in the spectrum of helium. The full significance of this fact is not yet known ; but when taken in connection with the observations of Soddy and Ramsay, which indicate that helium occurs in the gaseous emanation that is given off by radium, it is considered by no means impossible that we have here an instance in which one ele¬ ment is being slowly but continuously trans¬ formed into another one. If this inference is corroborated by future experiments, it will throw an altogether new light upon the nature of the chemical elements, and upon their rela¬ tion to one another. The case is the more note¬ worthy, since helium has a smaller atomic weight than any other element

save hydrogen, and radium has a greater atomic weight than any other element save uranium and thorium. Radium, moreover, appears to be metallic in nature, while helium, by its chemical inertness, resembles nitrogen.

Helium is prepared by separating it from its mixture with nitrogen, argon, krypton, etc. Several methods are in use. If atmospheric nitrogen is passed over heated magnesium (with or without lime) the nitrogen is absorbed and the inert gases collected, to be afterward sepa¬ rated. Helium may also be obtained from liquid air by fractional distillation. The method most commonly used is to heat to redness the powder of helium-bearing minerals in a tube of iron or hard glass, having previously ex¬ hausted the air from the apparatus. The gases are collected over mercury. By this process one ounce of cleveite yields about two gallons of helium. The separation of helium from the mixed gases is accomplished by filtering through quartz. At a temperature of 1,850° 'to 2,200° F. quartz is permeable to helium. A

tube of quartz is so arranged in an atmosphere of the mixed gases that it may be heated to the required degree, and at the same time the in¬ terior of this tube is exhausted by an air- pump. Under these conditions the helium passes through the quartz into the tube, from which it may be pumped into a collector. Or the gas mixture is passed into a vacuum tube containing charcoal at the temperature of liquid air. All the gases but neon and helium are con¬ densed, and these are readily separated by the difference of their vapor pressures.

HELIX, he'liks, a spiral, or a thing of spiral form; the advancing curved surface of a thread or a screw is the most familiar illus¬ tration. (1) In anatomy, a prominent and in¬ curved margin surrounding the thinner and larger portion of the pinna in the ear. (2) In architecture, the small volute of a spiraled acanthus stalk under the abacus of a Corinthian column. Of these there are in every perfect capital 16: two at each angle and two meeting under the middle of each face of the abacus. Also the spiral of a staircase winding around a central post. (3) In geometry, a curve of a right line formed on a plane wrapped about a cylinder or a cone. The edge of the path of a screw is a helix, as is also the path described by any point of the surface of the thread when moved in the nut. (4) Any coil, as that of an electromagnet. (5) In zoology, the typical genus of the snail family. See Snails.

HELL as generally understood is the abode of evil spirits ; the infernal regions, where the devil rules supreme, and whither lost or con¬ demned souls go after death to suffer in¬ describable torments and eternal

punishment either for wickedness inherited from the sin of Adam or for more or less serious infractions of the divine law. This region was usually thought of as being beneath the earth, in the darkness of vast underground caverns, or in the region of fire supposed — as seemed to be proved by volcanoes — to underlie the whole earth. The word is often used figuratively to describe any place or state of extreme wicked¬ ness, suffering or misery; as for instance, ((The hells of vice,® <(he (during illness) suffers the torments of hell,® <(poverty is hell.® This ar¬ ticle is concerned only with hell as a purely theological institution.

Hell, in the theological sense, has no place in most primitive religions, nor has heaven. The existence beyond death is almost univer¬ sally thought of as <(something between being and not being.® The Hebrew Sheol and the Greek Hades are good illustrations of this. There was no thought of dividing the future state into separate and distinct conditions of existence. Even so late a writer as the author of Ecclesiastes declares that (

demptive or rigidly retributive in character — did not come suddenly and full-formed into ex¬ istence. It is the product of centuries of think¬ ing on the great problem of reward and pun¬ ishment which, instinctively almost, man associates with human deeds. In the early stages the idea seems to have been that the souls of the dead appeared before the divine tribunal. The souls that could present a sat¬ isfactory record during their earth life were admitted to the presence and abode of the gods, and the souls that could not present such a satisfactory account were cast out not into a place of torment but into an existence more or less deplorable and wretched.

It is not necessary here to discuss the mat¬ ter as it appears in the different religions of the world; for while there are many and sig¬ nificant variations of detail the main features of hell as conceived by Hindu, Persian, Egyp¬ tian, Grecian, Hebrew and Christian theologians are essentially, the same. Several ideas enter into the creation of this place which has al¬ ways loomed large in the Christian as well as other religions. One of the ideas or motives which led to the division of the future state into heaven and hell, a place of reward and a place of punishment, is hinted at in a few Old Testament passages. All the dead, without dis¬ tinction, so it was believed, went down into Sheol. But according to Isaiah xiv the king of Babylon who had exiled and oppressed Israel, and is therefore accounted an enemy of Jehovah and his people shall ((be brought down . . . to the uttermost parts of Sheol.® He was to be thrust into the deeper depths where pre¬ sumably there was greater discomfort. Jehovah would send his enemies into a place

much worse than those who served him. This idea wrought mightily in the lives of these people as it did in the lives of many later generations. These exiled and persecuted worshippers of Jehovah gathered consolation and a new endurance as they saw in the after life their enemies cast down into the bottom-most parts of Sheol while they would be in the upper and brighter and happier part. Other ideas and impulses en¬ tered into this. Instinctively almost a person feels that the ordering- of life is such that a man shall reap what he sows — if he sows wickedness he shall reap all that is bad and hurtful. If he reaps not the oainful conse¬ quences before he dies he will and must in the hereafter. And so there is a diversity of thought as to the purpose of hell in the <(divine economy.® Some have thought of it as the place created by the Deity where He punishes with inconceivable severity, and through all eternity the souls of those who through un¬ belief or by the worship of false or different gods had angered Him. It is the place of divine revenge, untempered, never ending. This has been the idea most generally held among Christians, Catholic and Protestant alike. It is the idea embodied in the Mohammedan's con¬ ception. Slightly different from this is the conception of hell as the place where God pun¬ ishes the soul of man not for unbelief, or failure to believe, or for believing in a wrong or different religion, but for some breach of the moral law. It was onlv natural that the rebgious leaders should seek to turn the un¬ believer and the misbeliever from the error of his way and the evil-doer from his evil-doing

by graphically picturing to them the terrible doom awaiting all who persist in following along wrong paths. The preaching of future punishment has given to the world a remark¬ able and extensive literature and has exerted a tremendous influence upon the life and thought of the people for many centuries.

From the first there has been a wide differ¬ ence of opinion as to the extent and object of the punishment inflicted. Some have argued, basing their arguments on a certain understand¬ ing of a few Scriptural passages,, and on certain theological theories, that the punishment of hell cannot be less than eternal in its duration. The satisfaction of Deity is the only legitimate ob¬ ject of this future punishment. An infinite being could not be satisfied with less. This, whatever the actual sense of the word Sheol as used by the biblical writers, does not appear to have been the view entertained by the early Christian churchmen — Clement, Origen and others. Al¬ though there have always been with the Church men of note who have taken issue with it, the eternity of hell's torments has been generally held and most ardently preached. But, at the present time the idea of punishing a soul eter¬ nally finds a decreasing number of 'believers. During the latter half of the 19th century the civil courts in England decided that a clergyman of the Established Church of England was under no sort of obligation to believe or teach the doc¬ trine of eternal punishment. The Presbyterian Church

during the early years of the present century was much disturbed by a great demand from its own people that the doctrine of the damnation of non-elect infants be eliminated from its confession and the demand was suc¬ cessful. All this is not a denial of future pun¬ ishment but simply a disbelief in the eternal duration of that punishment. Naturally enough the men who nrotested against this punishment being eternal should argue that punishment in hell should be proportioned to the offense and that the object sought should be the redemption or reformation of the sinful soul. This idea stands out prominent in the Persian conception of hell, and the institution of purgatory seems clearly to be an attempt to modify the terrible severity of eternal punishment and square it somewhat with the sentiments of the human heart by providing a future punishment that should purge the soul of its remaining unfit¬ ness to enter heaven. Others press the point a little farther and argue that all future pun¬ ishment must be of a reformative purpose. Hell thus becomes what might be called the final process in the divine plan of salvation. Still others there are who insist that eternal punishment is impossible. The souls that are purged in hell pass up to a higher sphere, those so confirmed in their wickedness that they grow worse there sink to lower levels until they virtually cease to be. This idea still has its advocates. Volumes have been written on the nature of the punishment inflicted. When it was generally believed that the earth was flat, fixed and at the centre of things, it was simple and inevitable to think of souls being tormented with the most frightful of physical tortures. With the definite establishing of modern astronomy <(up to heaven® and Mown to hell® became mere figures of speech, and the old idea of hell's torments necessarily underwent a corresponding change. The present understand-

mg of the structure of the universe has en¬ forced upon man a complete spiritual concep¬ tion of things and so the idea now most gener¬ ally held is that future punishment is essen¬ tially the remorse and misery within the soul. In the words of Milton:

" Which way I fly is hell; myself am hell."

HELL GATE, a narrow part of the East River between Long Island and Manhattan and on the east and west sides of Ward's Island. The passage between Ward's and Randall's Is¬ land is called Little Hell Gate. It was called Helle Gat by the Dutch settlers of New York. The rocks which were in Hell Gate were of such form and so situated as to make navigation dangerous, and the differenceUn the times and heights of the two tides which enter East River increased the dangers. The East River receives at

one extremity the Sound tide and at the other the tide from off Sandy Hook. ((One sailing vessel out of every fifty® was the pro¬ portion damaged seriously when trying to pass through the channel between the reefs. Much had been said and written about the necessity of doing something to remove or at least lessen the dangers of Hell Gate, and officials of the United States navy, Lieutenants Davis and Porter, made a survey of Hell Gate in 1848. They reported the necessity of making the chan¬ nel safe, and suggested the destruction of some of the most dangerous rocks, but nothing was done until the year 1851, when the work of destroying the rocks was begun. The process used was that of surface-blasting introduced by Maillefert. A portion of some of the rocks was removed, but this method of overcoming the dangers to navigation was found practically useless. In 1866 another survey was made by Brevet-Maj.-Gen. John Newton of the United States Engineer Corps, and in 1867 he sub¬ mitted his report, in which he advised the removal of the reefs — the work to be done by blasting, and the drilling of the surface to be made from a fixed platform. Soon after the work of making Hell Gate safely navigable was resumed and placed in charge of John Newton. For the work Newton invented a steam-drilling cupola scow, which served as a transport and a working platform from which the drilling-en¬ gines were operated. The new machine proved satisfactory. A new system of explosion had to be devised in order to protect Ward's and Randall's islands and Astoria. Diamond, Coenties, and Ways reefs were removed, also Pilgrim Rock, before operations were begun on Hallett's Point Reef. The last mentioned was an obstacle to both large and small vessels. The excavations, begun in October 1869, were completed in June 1875. The drilling was com¬ pleted 25 March 1876. The area operated upon was about three acres. The method of ex¬ plosion was most successful. No damage was done to the windows or buildings near it had no perceptible effect on the air, but little on the water, and the underground shock was slight, but was perceptible on Manhattan and the western part of Long Island. The removal of Flood Rock, which was in the middle of Hell Gate, made the navigable capacity of the chan¬ nel more than double. The work of removing this most formidable obstruction was begun 7 June 1875. Lack of funds caused delay, and the explosion did not take place until 10 Oct.*

1885. For the removal of Flood Rock about nine acres were tunneled and drilled; and the aggregate length of the tunnels was 21,670 feet, and of the drill holes, 113,102 feet. The object sought to be gained by removing the rocks and reefs was to make a channel of the uniform depth of 26 feet and of sufficient width for the largest steamers. Dredging which has since been in progress together with the rock re¬ moval by blasting now provide a channel 200 feet in width at the narrowest point and with a depth of 26 feet through Hell Gate. A rail¬ road bridge, with a steel span of 977.5 feet

sup¬ ported on concrete bents was constructed across the East River at Hell Gate in 1914-15.

HELLAS, hel'as, the abode of the Hellenes, was first a town, and afterward, under the name of Phthiotis, a district in Thessaly. The ancients applied this name to the whole of Thessaly. With the spread of the Hellenic people the term embraced a gradually increas¬ ing territory, till it came to denote the whole of Middle Greece, and then the whole of Greece, with its islands and colonies. The Hel¬ lenes received this name in the belief that they were descended from Hellena, a mythical per¬ sonage, a son of Deucalion and Pyrrha, or, ac¬ cording to others, of Zeus and Dorippe, and the father of ZEolus, Dorus and Xuthus, was said to have been king of Phthia. See Greece.

HELLBENDER, a large salamander _(Crypt obranclius alleghaniensis) found chiefly in the streams emptying into the Great Lakes and those draining the western slope of the Appalachian Mountains. The hellbender is an ugly looking but perfectly harmless creature from 18 to 24 inches long; with the head and body much flattened and a prominent wrinkled fold of skin along the sides. Although entirely aquatic, no gills are present in the adult, and only a single pair of smalj pores represents the gill-clefts; the lungs are simple sacs. The limbs are functional, the anterior with four, the posterior with five digits, and the tail is provided with a wide fin. A wide mouth with teeth in both jaws, very small eyes and a slimy skin of a deep mottled brown color are further external characteristics. The giant salamander (Megalobatraclius maximus) of Japan is the only known closely related form. The hell¬ bender is a sluggish animal, active chiefly at night, when its voracity causes great annoy¬ ance to fishermen whose bait and fish it de¬ vours. It is extremely tenacious of life and hibernates, during cold weather. Although very common, its breeding habits are yet unknown.

HELLEBORE, a genus (Hellebonts) of the crowfoot family (Ranuncalacece) , consist¬ ing of perennial erect herbs with scanty, pal-matelv divided leathery leaves and yellowish, greenish or white terminal flowers. They are of interest on account of their poisonous and medical properties. About 10 species are na¬ tives of Europe and Asia, one of which (H . viridis) has become naturalized in the eastern United States. The Christmas rose (H . niger) is the source of the black hellebore of modern pharmacopoeias, but the ancient black hellebore, a famous remedy for insanity, was probably obtained from other species. H. viridis and H. footidus have emetic and purgative proper¬ ties. These plants are closely allied to the aco¬ nites.

White Hellebore is a very different plant, a species (V. album) of the genus Veratrum of the famly Melanthacece, which contains vari¬ ous other poisonous plants. They are pro¬ fusely leaved, tall herbs growing in rich woods, and their roots contain the peculiar alkaloids veratroidin and jervin, to which their poison¬ ous properties are mainly due. Eastern North America has a widespread species in the Indian poke (V. viride), which, like the European species, enters into the pharmacopoeia, while its rootstocks are ground into the powder used as an insecticide. Several other species are natives of the western United States.

HELLENES, hel'enz, a native name for the ancient Greeks.

HELLENICS. Walter Savage Landor's collection entitled (Hellenics) consists of poems on Greek subjects, originally written, for the most part, in Latin. They were trans¬ lated by Landor and published with additions in 1847. The pieces are properly idylls in the sense used of the non-pastoral writings of Theocritus, and it is to these works of the Alexandrine school and to their Roman coun¬ terparts that Landor's poems bear the closest resemblance. Their classicism is invariably softened by a touch of sentiment and romance.

Some of the are brief narra¬ tives or epyllia dealing with mythological or semi-mythological incidents ; others are little dramatic scenes, portraying, for example, an encounter between Menelaus and Helen at the sack of Troy. Among the tales the loveliest is (The Hamadryad,5 which tells of the unhappy love between a forest nymph and the mortal Rhaicos. But it is in the briefer pieces, such as Uphigenia and Agamemnon,5 which re¬ counts the sacrifice of Agamemnon's daughter to Diana, and (Artemidora,5 a classical death¬ bed scene, that Landor is supreme. The stat¬ uesque quality of these little poems places them among the highest examples of purely classic art in English. The charge of coldness often made against Landor does not apply here ; for beneath the atmosphere of calm beauty there is a deep emotion made more poignant by the poet's conscious reticence. Brevity, purity of style and perfection of external form were Landor's ideals. There is little in his poems to catch the popular ear — no striking phrases, for example, or highly-colored pic¬ tures; but for lovers of the classics and to readers of taste and judgment they will al¬ ways have a strong appeal. Consult (Works 5 edited by C. G. Crump, 1891-93; essays by De- Quincey, Saintsbury, DeVere; see bibliography in Cambridge, (History of English Literature5 (Vol. XII).

James H. Hanford.

HELLENISTS, a name given the Jewish colonists who settled in Egypt after the de¬ struction of the kingdom of Judah, about 600 b.c. Their number was increased by the many colonies of Jews planted by Alexander the Great (336 b.c.), and later by Ptolemy Lagus. Under the reign of the Emperor Augustus they numbered to nearly 1,000,000. They laid the foundation of a new epoch of Grseco-Jewish literature, which from its prevailing character, received the name of the Hellenistic. The Alexandrian Jews were the most influential in

developing Hellenizing tendencies, and to them chiefly is to be referred the formation of the peculiar dialect termed the Hellenistic. In their literature the systems of Pythagoras and Plato were strangely combined with those Oriental fantasies which had been reduced to a system in Egypt, and with which the mys¬ tical doctrines of the Gnostics were imbued. The most noted Jewish Hellenistic philosopher was Philo of Alexandria, and the chief of the learned labors of the Alexandrian Jews was the Greek translation of the Old Testament.

HELLESPONT, hel'es-pont. See Dar¬ danelles.

HELLGRAMMITE, hel'gra-mit, the large black aquatic larva of the insect Corydalus (q.v.), much used as bait for black bass and other game fish. It lives in streams, preying upon smaller animals, and just before pupation crawls under large stones, where it can be found at about the same time as the bass are biting. It is also called (

HELM, Israel, Swedish colonist in Amer¬ ica: b. 1615 ; d. 1695. He settled on the Dela¬ ware River, in 1649 ; was collector of customs at Philadelphia 1659, and became a member of Captain Carr's council 1668. He was chief in¬ terpreter between the colonists and Indians and rendered valuable service at the meeting of the New Jersey Indians, Governor Andros and the Swedish authorities, in 1675.

HELMET-SHELL, a large gasteropod of the genus Cassis, family Cassidce. Most of the species inhabit tropical shores, but a few are found on the coast of the Mediterranean. The shells of C. rufa, C. cornuta and C. tuberosa (the queen conch), are the material on which shell cameos are usually sculptured.

HELMETS AND HELMS. Armor for protection of the head. Often the term casque, the French equivalent, is used synony¬ mously for helmet. The fully developed hel¬ met consists of a skull-piece called <(timbre55 or <(bowl55 (a domed piece of metal beaten into a shape closely fitting the back and top of the head) ; the <(crest55 (a projection extending from the forehead to the nape of the neck, similar to a cock's comb) ; a <(visor55

(protect¬ ing the forehead and eyes) containing a slit or cleft,' called the (

Helmets date back, at least, to the ancient Egyptians and Assyrians, when they were made of strong fabric or leather, then metal. The oldest metal helmets extant are Assyrian (8th century b.c.). Homer's heroes wore elaborate bronze helmets with flowing horsehair bushes, chin-straps and plates protecting the neck, ears and cheeks; later the Greeks adopted an im¬ movable visor with ocularium. These helmets had crests of great height and fantastic forms. The ancient Roman helmets, originally of leather (cudo), were soon replaced by bronze (cassis) during the republic. The (

HELMETS

1 Tilting Casque. German (16th Century)

2 Tilting Helmet. French (16th Century)

3 Italian Helmet (1510)

4 Italian Armet a Rondelle (1475-1500)

5 Cabasset. Italian (1550)

6 Burganet. Italian (1525)

7 Burganet. French (1550)

8 Salade-Barbute. Italian (15th Century)

9 " Pig-face " Basinet. German (1400)

10 Morion-Cabasset. Italian (1555-56)

11 Morion. German (1556)

12 Morion. Dutch (late 16th Century)

was later made of bronze and encompassed the entire head, cheeks as well, leaving orbicular eye openings and a nasal projection in the cen¬ tre of the opening.- From about 600 a.d. to about 1000 a.d. the ((Spangenhelm,® a conical or ˆsugar-loaf® headpiece was in vogue. It was made of leather

and reinforced with tri¬ angular plates rivetted at the lower extremity to a metal ring, the apex of each piece meet¬ ing at top in a button. The Norman helmet in William the Conqueror's time (1066) was of conical shape and had a nasal projection. Cheek pieces and neck defenses were next added to the nasal helmet. A cylindrical, or ˆbarrel® shaped, flat-topped <(great helm® or (XIII (17th century). _ Later improve¬ ments in the armet were fluting the <(timbre®

to strengthen it and thereby allowing reduc¬ tion in thickness and weight. Next, the visor has two parts (upper and lower) both working on the same pivot ; crests come next together with betterment of the gorgerin. Out of the armet arose another casque form termed ((bur- gonet® (spelled also burganet, burgonette, etc.); an ((umbril,® or (

Bibliography.— Ashdown, C. H., < British and Foreign Arms and Armour) (London 1909) ; Boyer, J., (Les nouveaux Casques me- talliques de l'Armee frangaise> (in Nature, Paris 1915) ; Dean, Bashford, (Notes on Arms and Armor) (in ˆMetropolitan Museum of Art Handbook, J New York 19161 ; Earles, F. R., (The Evolution of the Medieval Helmet (in Genealogical Magazine, London 1897) ; Hewitt, J., (Ancient Armour and Weapons in Europe> (Oxford 1860) ; Shubert-Soldern, F. von, (Der mittelalterliche Helm und seine Entwickelung> (in Zeitschrift zur historischen Waffenkunde, Leipzig 1909). See also Plate Armor; Chain Armor, etc.*

Clement W. Coumbe.

HELMHOLTZ, helm'holts, Hermann Lud¬ wig Ferdinand von, German scientist: b. Pots¬ dam, 31 Aug. 1821 ; d. Charlottenburg, 8 Sept. 1894. He studied medicine in Berlin, and re¬ ceived the appointment of assistant surgeon in the Charite Hospital there in 1842. Next year he went to Potsdam as a military surgeon, but in 1848 he returned to Berlin to assume the duties of teacher of anatomy at the Academy of Art and assistant in the Anatomical Museum. He was called to the cha:r of physiology at Konigsberg in 1849, and six years later went to Bonn as professor of anatomy and physi¬ ology. In 1858 he was appointed professor of

physiology at Heidelberg, whence he returned in 1S71 to Berlin as professor of physics. In 1888 he was appointed to the post of president of the new Physikalisch-Technische Reichsan- stalt (Imperial Physico-Technical Institute) in Charlottenburg. Helmholtz was distinguished alike in

physical science, in mathematics and in physiology; but his most valuable and most original work was done in those departments of physics which stand in intimate relations with physiology, especially acoustics and optics. In 1851 he invented the opthalmoscope, a most useful device and now in universal use. He developed the electromagnetic theory of light and indicated its possibilities. He invented new apparatus in practical physics. He had an emi¬ nently philosophical mind, and his works are no less valuable for their masterly exposition of the methods of experimental science than for the important results contained in them. His scientific fame was securely established as early as 1847, when he published (fiber die Erhaltung der Kraft (On the Conservation of Energy). This subject was pursued further in (fiber die Wechselwirkungen der Naturkrafte* (On the Interactions of Natural Forces) (1854). His greatest works are the (Handbuch der Physi- ologischen Optik) (Handbook of Physiological Optics) (1856-66) ; and (Die Lehre von den Tonempfindungen) (1862; 5th ed., 1896), trans¬ lated into English by Ellis under the title Sen¬ sations of Tone as a Physiological Basis for the Theory of Music* (1875). A collection of < Vortrage und Reden* reached a fourth edition in 1896, and has been translated into English as (Popular Lectures on Scientific Subjects) (1873-81). An edition of his scientific treatises was published at Leipzig in three volumes (1882-95), and in 1897 his (Lectures on Theo¬ retical Physics* appeared in one volume. In his (Beschreibung eines Augenspiegels) (1851) he described the ophthalmoscope he had recently invented. In 1883 he was ennobled by the Ger¬ man emperor. He visited the United States in 1893, when he was selected an honorary presi¬ dent of the International Congress of Electri¬ cians at the Columbian Exposition, Chicago. He contributed papers to the principal scientific Journals of the world. Consult Hall, G. S., (Founders of Modern Psvchology) (New York 1912) ; Konigsberger, 'Hermann von Helm- holtz) (Leipzig 1902; Eng. trans., Oxford 1906) ; McKendrick, (H. L. F. von Helmholtz* (London 1899) ; Rucker, A. W. (Hermann von Helmholtz * in Fortnightly Review (November 1894) ; and reprinted in the Smithsonian Report of the same year.*

*HELMONT, Jan Baptista van, Flemish physcian and chemist: b. Brussels, 1577; d. near Brussels, 30 Dec. 1644. He devoted his attention to scientific research, and although he put forth some visionary theories on the consti¬ tution of man, and on diseases, made some genuine discoveries in chemistry. He was prob¬ ably the first to introduce the term "gas** into science, and was the earliest observer of the acid reaction of the gastric juice. He published 'Ortus Medicinae* (1648) ; and (Opuscula Med- ica Inaudita* (1644), works which still possess interest for students.*

HELMUTH, William Tod, American

physician: b. Philadelphia, 30 Oct. 1833; d. New

York, 15 May 1902; graduated Homeopathic Medical College, Philadelphia, 1853 ; Hahne¬ mann College, San Francisco, 1866. In 1877 he became professor of surgery and dean of the New York Homeopathic College and Hospital. He was an officer in numerous medical associa¬ tions and a member of the Societe Medicale Homeopathique of France. Among his pub¬ lished works are 'Treatise on Diphtheria) ; (Medical Pomposity; 'System of Surgery*; Scratches of a Surgeon*; (Suprapubic Lithot- omy> ; and some volumes of poetry.*

HELODERMA, he-lo-der'ma. See Gila Monster.

HELOISE, a-lo-ez, or ELOISE. See

Abelard.

HELOTS, he-lots, were the lowest of the four classes into which the population of ancient Sparta was divided. They are gen¬ erally supposed to have been the aboriginal population of the country, and to have been re¬ duced to bondage by their Dorian conquerors, (heir numbers being swelled from time to time by the addition of peoples conquered in war. The name is generally derived from the town of Helos, the inhabitants of which were carried off and reduced to slavery by the Heraclidae about 1000 b.c., though a more probable deriva¬ tion is the Greek helein, to take, making the name signify captives. They were the property of the state, which alone had the disposal of their life and freedom. The state assigned them to certain citizens, by whom they were employed in private labors, though not ex¬ clusively, as the state still exacted certain services from them ; and they were attached to the soil — that is, each citizen received the num¬ ber that belonged to his allotment, without any power to sell or free them. Agriculture and all mechanical arts at Sparta were in the hands of the Helots, since the laws of Lycurgus pro¬ hibited the Spartans from all lucrative occupa¬ tions. But the Helots were also obliged to bear arms for the state, in case of necessity. Their dress, by which they were contemptuously distinguished from the free Spartans, con¬ sisted of sheep's skin and a leather cap of a peculiar shape. They were sometimes liberated for their services or for a sum of money; but they were not admitted to the full dignity of citizenship. In 424 b.c. 2,000 of the Helots, who had conducted themselves with distinguished bravery in war, were treacherously put to death. They several times rose against their masters, but were always and finally reduced.

author : b. near Mocksville, N. C., 27 Dec 1829 • d. Washington, D. C., 9 March 1909. He pub¬ lished in 1857 'The Impending Crisis of the Souths which the Republican party used as a campaign document with great effect against the continuance of slavery. Later works by him are (The Three Americas' Railwav) (1881); 'Nojoque (1867); 'The Negroes in Negroland) (1868) ; 'The Land of Gold**

(1865).

, HELPS, Sir Arthur, English essavist and historian : b. Streatham, 10 July 1813 ; d. London, 7 March 1875. He was educated at Eton and Cambridge; became private secretary to Lord Monteagle as Chancellor of the Exchequer, and

was afterward commissioner of French, Danish and Spanish claims. In 1860 he was appointed clerk of the privy counoil, and held this post till his death. He was created K.C.B. in 1872. As^ an essay'st he was one of the most popular writers of his day, and his historical works had an extended reputation. He possessed very wide and general culture and sound judgment, was painstaking and accurate in details, and in his historical works displayed considerable breadth of view. His principal works are (Thoughts in the Cloister and the Crowd) (1835) ; (Essays Written in the Intervals of Business (1841) ; (Friends in Council* (1847— 57) ; (Conquerors of the New World1* (1848- 52) ; Companions of My Solitude* (1851) ;*

(Spanish Conquest of America (1855—61) ; (Oulita the Serf, a Tragedy* (1858) ; (Realmah* (1869) ; (Casimir Maremma* (1870) ; (Brevia, Short Essays and Aphorisms* (1870) ; (Life of Hernando Cortes and Conquest of Mexico* ;*

(Thoughts upon Government (1871) ; (Social Pressure* (1874).*

HELSINGFORS, hel'smg-fors, important seaport town, capital of Finland, on a. small peninsula in the Gulf of Finland, 180 miles by rail west-northwest of Petrograd. It is de¬ fended by the fortress of Sveaborg about three miles distant, and is the residence of the gov¬ ernor of Finland, the seat of important courts and public offices. The most noteworthy build¬ ings are the governor's residence, senate house, university buildings, the Russian church, the church of Saint Nicholas (Lutheran), the Athenaeum and two modern theatres. Its university, removed from Abo in 1827, has a library of over 190,000 volumes. There are four faculties and about 2,500

students; main¬ tains a hospital, zoological and botanical museums, botanic gardens and an observatory. The town is a popular bathing place, has very many newspapers, of which 40 are in Finnish and about 30 in Swedish. There are manu¬ factories of linen, sail-cloth, tobacco, beer, sugar, liquors, linen, carpets, etc., and an important trade is carried on in agricultural and dairy products with English, German, Russian and Swedish ports. It is the seat of˜a United States consul. It was founded in 1550 by Gus- tavus I of Sweden on a site further inland, removed to its present site in 1640 and was destroyed by the Russians in 1713. It was fortified in 1729 and came into the possession of Russia in 1809. It .was bombarded by the allied fleet for 48 hours during the Crimean War. Consult B rummer, (Historiska anteck- ningar om Helsingfors och Sveaborg (Hel¬ singfors 1874) ; Ehrstrom, (Helsingfors stads historia fran 1640 till Stora Ofrenden* (ib. 1890); id., (Finland in seclet* (ib. 1893) ; Hertzberg, (Helsingfors for tre hundra ar sedan och i vara dagar* (ib. 1888) ; Nordham, P.,*

HELVETIAN REPUBLIC, the designa¬ tion of the republic established in Switzerland by France in 1798. See Switzerland.

HELVETIC CONFESSION, the name of a document drawn up by Martin Bucer in 1536 to settle the controversy between the Lutherans and the Zwinglians ; and also of one drawn up by Bullinger (1566) at the request of Friedrich

III, Elector of the Palatinate, and adopted in Switzerland, the Palatinate, France, Hungary, Poland and Scotland.

HELVETII, hel-ve'shi-I, a former Gallic or Celtic nation, settled between the Rhone and the Rhine, the Jura and the Rhsetian Alps. They were more numerous and warlike than the neighboring Gallic tribes. They first ap¬ pear in history 107 b.c., but were not known to the Romans until the time of Jul'us Caesar, who, as governor of Gaul, prevented their in¬ tended emigration, and after many bloody bat¬ tles, in which even the Helvetian women fought, pressed them back within their frontiers. The story of their meditated irruption into and seizure of southern Gaul is circumstantially re¬ lated in the First Book of the Commentaries of the Roman general, who not only repulsed them with terrible slaughter, but almost exterminated them. Not a third of those who left their homes on this ill-fated expedition ever returned. Helvetia, which was less extensive than the present Switzerland, was divided into four dis¬ tricts, which had an entirely democratical con¬ stitution. Csesar subjected the country to the dominion of the Romans, who established sev¬ eral colonies there. After the death of Nero, the Helvetii, for refusing to acknowledge Vitellius as emperor, were mercilessly punished by Csecina, one of his generals, and thenceforth they

almost disappear as a people.

HELVˆTIUS, el-va-se-us, Claude Adrien,

French metaphysician: b. Paris, January 1715; d. there, 26 Dec. 1771. At the age of 23 he ob¬ tained a lucrative post of farmer-general, where he was distinguished by his mildness and in¬ dulgence from his colleagues, whose base prac¬ tises filled him with indignation. He therefore resigned his office, and purchased the place of maitre d'hotel to the queen. Aspiring after literary fame, he first directed his efforts to mathematics, then attempted to rival the dra¬ matic fame of Voltaire by writing a tragedy. In 1758 he published (De l'esprit, the material¬ ism of which drew upon him many attacks. It was condemned by the doctors of the Sorbonne, and publicly burned in accordance with a de¬ cree of the Parliament of Paris. Helvetius went in 1764 to England, and the year after¬ ward to Germany, where Frederick the Great and other German princes received him with many proofs of esteem. A complete edition of his writings was published at Paris in 1795. Consult Morley, (Diderot and the Encyclope¬ dists* (1878).*

HEMAN.S, Felicia Dorothea Browne,

English poet; b. Liverpool, 25 Sept. 1793; d. near Dublin, Ireland, 16 May 1835. She dis¬ played the bent of her genius when a mere child, and wrote some tolerable poetry in her ninth year. She first appeared as an author, in 1808, in a volume entitled (Early Blossoms, but it was subjected to harsh criticism, which she took very seriously to heart. A second volume, published in 1812, (The Domestic Af¬ fections,* was much more successful. The same year she married Captain Hemans, from whom she was separated in 1818. She then resumed her literary pursuits, made herself acquainted with Latin and modern languages and wrote much in the periodicals of the time. At the suggestion of Reginald Hebcr, afterward bishop*

of Calcutta, she wrote a tragedy entitled (The Vespers of Palermo, which, owing partly to Sir Walter Scott, who wrote an epilogue for it, was favorably received at the Edinburgh theatre, though it had previously, in 1823, proved unsuccessful at Covent Garden. Be¬ fore this time she had added greatly to her popularity by her poems entitled (The Restora¬ tion of the Works of Art to Italy) ; (The Skep- tic> ; (Modern Greece) ; and Dartmoor. * Later works were (Lays of Many Lands) ; (Forest Sanctuary*

; (Records of Woman) ; and (The Songs of the Affections) (1830). She visited Sir Walter Scott at Abbotsford, and Words¬ worth at Rydal Mount, and left with each the impression of a singularly graceful and gifted woman. Her poetry is essentially lyrical and descriptive, and is always sweet, natural and pleasing. In her earlier pieces she was imi¬ tative, but she ultimately asserted her inde¬ pendence, and produced many short poems of great beauty and pathos. Mrs. Hemans had no dramatic power, her effusions being always in¬ tensely subjective. A memoir was published in 1836.

HEMATIN, or HEMATIN. See Hemo¬

globin.

HEMATITE, native sesquioxide of iron, Fe203, a mineral widely distributed, and con¬ stituting a valuable ore of iron. It crystallizes in the rhombohedral system, and also occurs in mass've form, sometimes forming beds of great thickness. It has a hardness of from 5.5 to 6.5, and a specific gravity ranging from 4.9 to 5.3. It is usually dark gray or black in color, the earthy varieties being red. It has a metallic lustre, and is sometimes slightly magnetic, oc¬ casionally even showing magnetic polarity. Hematite occurs in the rocks of every age. The extensive masses that occur in metamorphic rocks are believed to have been deposited, originally, in marshes, undergoing metamorpho¬ sis at the same time as the rocks with which they are now associated. By many it is be¬ lieved that the great beds in the Lake Superior region were laid down in the sea as iron car¬ bonate or silicate, and later weathered to hema¬ tite, after the region became land. Fibrous and columnar forms of the mineral, brownish-red or black in color, are also known, and to these the name ((red hematite® is sometimes applied. In crystalline and metamorphic rocks a variety known as <(specular iron® is met with, which is distinguished by the presence of crystals having a splendid lustre. Hematite occurs in vast quantities in various parts of the United States, notably in upper Michigan, in the Marquette district, and in the Menominee and Gogebic ranges, in northern Wisconsin ; and in Saint Louis County, Minn., in the famous Mesapi Range. Iron Mountain, Missouri, is a hill about 200 feet high, the surface of which consists of loose blocks of hematite, many of which weigh as much as 10 or 20 tons. In 1914, hema¬ tite yielded 91 per cent of the iron ore pro¬ duced in the United States. The name <(hema- tite® is from a Greek word signifying (

An allied mineral, consisting of hydrated ses¬ quioxide of iron and known to mineralogists as limonite, is often popularly called (

HEMATURIA, hem-a-tu'ri-a, the pres¬ ence of blood in the urine, which

points to dis¬ ease of the kidney or bladder. It is a symptom of some gravity. The treatment of the cause will probably remove this affection; in all cases complete rest is very important. See Trematoda.

HEMIANESTHESIA, hem-i-an-es-the'- si-i, loss of sensation on one half of the body, right or left.

HEMIPLEGIA, hem-Lple ji-a (lit. "half a stroke,® that is, of paralysis), paralysis of one side of the body. It is usually caused by haemorrhage in the brain cavity, commonly known as apoplexy; often a local accumulation of serum, or a tumor is the cause. The paralysis falls on the side of the body opposite to the lesion in the pyramids of the brain, un¬ less the lesion occurs below the decussation of brain fibres. The treatment of hemiplegia re¬ quires the services of a physician. It is amenable to timely remedies, and a cure is gen¬ erally obtained after the first attack, if it re¬ sult from apoplexy; but the patient is liable to subsequent attacks.

HEMIPODE. See Button-quail.

HEMIPTERA, he-mip'te-ra, an order of insects. It contains two leading groups, the Homoptera and Heteroptera. In the former the two pairs of wings when present are applied in rest pent-house fashion to the sides of the body. Several families are wingless. Cicadas, plant-lice {Aphis) and the like come here. In the second group the wings, when at rest, placed horizontally across the body, the second pair covered by the upper, which are hemielytra, that is, the basal half is leathery, the distal portion membranous. See Bug.

HEMLOCK POISON, one of various plants. (1) A highly poisonous umbelliferous herb of the genus Coniutn, one species of which is European and the other African. The well- known officinal European one (C. maculatum) has become extensively naturalized as a weed in the United States. It is easily recognized by the wavy, crenate ridges of its short, laterally compressed fruit, and also by the disagreeable mouse-like odor when bruised (see Conium). (2) The water hemlocks or cowbanes of the closely allied genus Cicuta, which is both Euro¬ pean and American. The common American species is C. metadata, which grows in swamps and wet places, and is also dangerously poison¬ ous, especially in its turnip-like cavernous root. See Cicuta.

HEMLOCK, coniferous trees of the genus Tsuga of which two species are recognized, the common northern one (T. canadensis), and a more local one of the southern Alleghanies (T. caroliniana) . The wood is too soft, weak and brittle to be of extensive use as lumber, but the bark is of great importance in tanning. See Fir.

HEMMETER, John Cohnheim, American physician, physiologist and musical author: b. Baltimore, Md., 25 April 1863. He received his early education in the public schools of Balti¬ more, and was graduated at Baltimore City

College. Later he studied at the Royal Gym¬ nasium, Wiesbaden, where he remained six years. Returning to Baltimore he took his de¬ gree of doctor of medicine at the University of Maryland, then entered the Johns Hopkins University, where the degree of doctor of philosophy was conferred on him in 1893. He holds the degree of doctor of science honoris causa from the University of Maryland and of doctor of laws from Saint John's College, Annapolis. Has been consultant to many hos¬ pitals in the city of Baltimore. Holds the position of professor of physiology and clinical professor of medicine and director of the physiologic laboratory of the University of Maryland. He is one of the editors of the Archives for Digestive Diseases published in Berlin ; also associate editor of the Interna¬ tional Contributions to Diseases of Digestion and Metabolism, edited by Prof. Adolf Bickel of Berlin. Dr. Hemmeter is the author of the first complete work in the English language on diseases of the stomach. His work, (Diseases of the Intestines) (2 vols., 1901) is even up to the present time the only complete work on this subject in the English language. He has published 120 various researches and investi¬ gations in American and foreign medical and scientific journals. He is at present engaged in editing a (History of Medicine, a large part of which has already been published in the form of separate journal articles. Two medical advancements of the greatest import¬ ance for which Dr. Hemmeter is well known are his discovery that the X-rays could be used for studying abnormal conditions of the diges¬ tive tract (Boston Medical and Surgical Journal, June 1896), and that it was possible not only to investigate the stomach contents directly by the introduction of tubes, but also to pass tubes into the upper part of the small intestine, called the duodenum. This latter led to a method of treating gastric ulcers and other conditions of the stomach requiring ab¬ solute rest of the organ by introducing a duodenal tube through the stomach into the upper part of the intestine and injecting the food directly into the intestine, skipping the stomach, as it were. It was found that con¬ ditions defying all other treatment healed when the stomach was thus absolutely put to rest. Dr. Hemmeter is also a musical author and has published a cantata for male chorus and full orchestra, entitled 'Hygeia.* One of his most recent works is a (Manual of Physiology* (1912). Being a physiologist as well as a musician, Dr. Hemmeter was singularly fitted to investigate the physiologic and anatomic foundations of piano technique*

and of vocal tone production. He studied the neuro-muscu- lar co-ordinations necessary in piano technique ; also the effect of music on blood pressure and the central conducting paths for tone sensa¬ tions, the object being to place piano technique, as well as vocal tone production, on a physio¬ logic basis. He is a Fellow of the American Association for the Advancement of Science; member of the Physiologic Society of Ger¬ many; one of the presidents at the last Inter¬ national Congress for Physiology held at Groningen, Holland, 1913; member of the Ger¬

man Congress for Internal Medicine; member of the Imperial German Academy of Natural Sciences ; Kaiserlin, Carolin, Leopoldin, Aka-demieder Naturforscherl ; member of the Im¬ perial Association of Austrian Physicians, Vienna; Fellow of the Royal Society of Arts, England, and member of the Accademie di Scienze, Italy.

HEMOGLOBIN, an organic coloring mat¬ ter, which constitutes about nine-tenths of the weight of dried red blood corpuscles, and serves as a carrier of oxygen from the lungs to the general tissues of the body. It is an ex¬ ceedingly complex substance, and its formula is not certainly known. It is a chromoprotein and has an interesting history. Iron is found throughout nature and early became incorporate within living matter as an energy transformer. In order to transform energy, oxygen chiefly and yet not by itself, oxidizes and is thus de¬ stroyed, a peculiar substance being formed which in plants seems to develop with the pro- teid of chlorophyll and in animals into what is called hemoglobin. In the lowest worms and mollusks this iron compound is known. In these low forms it is found as a part of the muscle substance itself. When the blood scheme arose in higher animals it then entered into that fluid as an oxygen carrier. The complex uses .to which it is put lie outside of this article. Zinoffsky gives it as C712H1130N214 S2FeOa45; but this can hardly be regarded as more than a guess. According to many authorities, hemoglo¬ bin is not a definite chemical compound, but a more or less variable mixture of simple sub¬ stances. It gives all the general reactions of the proteids, but, unlike most of the proteids, it may easily be obtained in crystalline form, its crystals commonly occurring in rhombic plates or prisms, varying somewhat in shape, according to the source from which the substance is pre¬ pared. The exceeding physiological importance of hemoglobin depends upon the fact that it readily combines with oxygen to form a very unstable compound known as oxyhemoglobin. The combination takes place as the blood corpuscles containing the hemoglobin pass through the lungs; and the loosely-combined oxygen is given off again as the corpuscles pass through the capillaries, the oxyhemoglobin being thereby again reduced to hemoglobin. Hemo¬ globin also combines with carbon monoxide to form a similar but far more stable substance known as carboxyhemoglobin. In poisoning by the inhalation of coal-gas the carbon monoxide present in the

coal-gas combines with the hemo¬ globin in the lungs, and the carboxyhemoglobin so formed does not break up again. As the absorption of the coal-gas proceeds,ˆ continu¬ ally increasing quantity of hemoglobin is there¬ fore destroyed, so far as its utility as an oxygen- carrier is concerned. In extreme cases of such poisoning, transfusion of blood is resorted to, in order that the patient may have a sufficient supply of hemoglobin to transport the requisite quantity of oxygen from the lungs to the other tissues of the body.

Crystals of hemoglobin have been prepared. Pure hemoglobin has a purplish color, which gradually passes into a scarlet or a yellowish red, as the substance absorbs oxygen and be¬ comes thereby converted into oxyhemoglobin. Carboxyhemoglobin is even more brilliantly red

than oxyhemoglobin. All three of these sub¬ stances exhibit marked absorption spectra when in solution, and very small quantities of them can be easily detected by the spectroscope. It is said that the presence of one part of hemo¬ globin in 10,000 parts of water can be distinctly demonstrated by this means.

When oxyhemoglobin is acted upon by acids or alkalis, or by the gastric juice, it is resolved into a proteid substance and a definite com¬ pound which has the probable formula CgsHtoNs Fe2Oio and is known as hematin. Hematin may be best prepared by extracting blood clot, directly, with hot alcohol to which a small quan¬ tity of sulphuric acid has been added. The ex¬ tract is next agitated with chloroform, which takes up the hematin. The chloroform is -then separated, washed with water to remove the acid, and allowed to evaporate, when the hem¬ atin is deposited in the form of a bluish-black powder. Hematin is a very stable compound, and may be heated to 350° F. without decom¬ position. At higher temperatures it burns with evolution of hydrocyanic acid, leaving an ash composed chiefly of oxide of iron. It is in¬ soluble in water, ether, dilute acids and pure alcohol ; but it dissolves readily in solutions of the caustic alkalies, and in alcohol to which a small quantity of sulphuric acid has been added. Consult Stirling, (Physiology ; Bayliss, (General Physiology) ; Matthews, (Physiological Chemistry.)*

HEMOPHILIA, a congenital inherited disease characterized by a tendency to obstinate bleedings. Women are very rarely affected, but transmission of the disease seems to be from the father through the daughters to the grand¬ sons, and from father to son. The disease usually makes itself evident in

early life, a slight wound being followed by abundant and uncontrollable hemorrhage, whereby the child becomes known as a ˆbleeder.® Besides the lia¬ bility to excessive hemorrhage, these subjects are frequently afflicted with trouble in the joints, probably a chronic inflammation, the result of repeated small hemorrhages. Death is always imminent, as the flow of blood tends to con¬ tinue and is particularly dangerous where large areas of the body are injured. The causes are not completely understood. In some bleeders a calcium deficit is found in the body. This is supposed to influence the nature of the blood¬ vessel wall permitting a transudation of blood. Various salts of calcium are therefore utilized.

HEMOPTYSIS, expelling blood from the lungs, larynx or bronchial tubes by coughing. It may be a symptom of phthisis, but bleeding from the lungs or trachea may result from a number of different disturbances. Profuse bleeding is apt to be phthisical.

HEMORRHAGE. See Bleeding.

HEMORRHOIDS (Greek, haima, blood, and rheo, to flow), literally, a flow of blood. Until the time of Hippocrates this word was used, conformably to its etymology, as synony¬ mous with hemorrhage. It was afterward used in a narrower sense, to indicate the flux of blood at the extremity of the rectum, and in some other cases which were considered analo¬ gous to it ; thus it was applied to the flow of blood from the nostrils, the mouth, the bladder and the uterus. It is at present used to signify

a particular affection of the rectum, although the disease is not always attended with a flux ; in this sense the affection is also called piles. Certain general causes may produce a predis¬ position to this disease ; in some cases, it ap¬ pears to be the effect of a hereditary disposition ; in general, it manifests itself between the period of puberty and old age, although infants and aged people are not entirely exempt from its at¬ tacks. Men are oftener affected than women, in whom it is sometimes produced by local causes. It often shows itself in subjects who pass sud¬ denly from an active to a sedentary life, or from leanness to corpulency. Any circumstance which produces a tendency to pressure on the venous return of blood in the pelvis is to be reckoned as a local cause. The accumulation of fecal matter in the intestines as in habitual con¬ stipation ; efforts to expel urine ; the pressure produced by polypi ; the obstruction of any of the viscera, especially of the liver; worms; use of drastic purges, particularly of aloes ; long continuance in a sitting posture ; riding on horseback; pregnancy ; the accumulation of water by ascites ; — such are some of the ordinary causes of hemorrhoids.

Several varieties of hemorrhoids are dis¬ tinguished. They are known as

external when apparent at the anus ; internal when concealed within the orifice; blind or open, regular or ir¬ regular, active or passive, periodical or anoma¬ lous, etc. There is also a great difference in the quantity of blood discharged ; it is usually inconsiderable, but in some cases is so great as to threaten the life of the subject. The quality, color, etc., of the blood, also differ in different cases. The number, seat and form of the hem¬ orrhoidal tumors likewise present a great variety of appearances. When the disease is purely local it is cured more readily; but in the greatest number of cases it is connected with some other affection, or with the constitution of the sub¬ ject. In these cases, if the piles are not trouble¬ some on account of their size or if the bleeding is not very considerable, cure of the primary affection should be attempted. The best mode of treatment is then to recur to hygienic rather than medicinal influences. The subject should avoid violent exercises, but moderate exercise will be found beneficial. The standing position is to be avoided as much as possible, especially following defecation. The constipation (q.v.) with which the subjects of this disease are liable to be affected should be remedied by hygienic dieting. If the pain is considerable, recourse should be had to sedatives and local application of hot water. If the disease appears under a more severe form, more violent reme¬ dies will become necessary. If the discharge of blood becomes excessive, particular care must be taken to regulate it. If the tumors acquire a considerable volume, surgical operations are necessary. At the present time the operative treatment of persistent hemorrhoids is both safe and efficacious.

*HEMP. The hemp plant proper, or ((com- mon hemp,** is Cannabis sativa, an annual plant belonging to the family Urticacea. The term hemp, however, is used to designate many other kinds of fibre which are in no way related to the common hemp, such as Manila hemp, from a plantain, sisal hemp from an agave, bow string hemp, from a liliaceous plant, and 30 or*

more other kinds. The different kinds of com¬ mon hemps are also specially designated, with prefixes, as Breton hemp, Piedmontese, Rus¬ sian, English, China and Japanese hemps and many others, some of these being trade names, or the names of varieties. The hemp plant proper is a native of that part of Asia which includes China, India and Persia, though, like flax, its culture has been extended to many portions of the world in both temperate and tropical climes. It was used by the Scythians 2,500 years ago, and it was probably known to the Chinese and Europeans many centuries earlier. The Romans used it for sails and cordage, but not until

after the dawn of the Christian era. It grows wild in many parts of China and India, where it is regarded as much for its drug product known as chang or hash¬ eesh as for its fibre. It flourishes on both the east and west coasts of Africa, and has been naturalized in Australia, as well as in several South American countries. In Europe it is cultivated chiefly in France, Italy, Germany and central and southern Russia, and it will grow in Great Britain and Sweden. The plains of Hungary are peculiarly adapted to its culture. It is a favorite textile in China and Japan, the fibre from the last-named country being par¬ ticularly strong and fine, and at the same time better prepared than many European hemps. The plant is an annual, the fibre being pro¬ duced in the bark of the straight stiff stalks or stems, and is therefore a bast fibre. In the experiments of Roxburgh and others, Russian hemp is taken as the standard of comparison for all other fibres. The stems vary from 3 to 20 feet in height, dependent upon the variety and the soil in which grown. The best kinds have a hollow stem, the wood of which breaks down readily when cleaned for the fibre. While hemp is produced commercially in very few localities of the United States, it will thrive from ocean to ocean and from the Gulf to Canada. Its cultivation as a fibre crop is con¬ fined chiefly to Kentucky, Ohio, Indiana, Wis¬ consin and California, though considerable hemp, in past time, has been produced in New York, and to some extent in Tennessee, Illi¬ nois, Nebraska and Minnesota. Lately it has been experimented with in the South, notably in Mississippi and Texas. The bulk of the crop is grown at the present time in Kentucky and California. The 1914 crop was the small¬ est on record ; said to be due to changes in the tariff and in part to the fact that the tobacco crop pays better.

The Kentucky hemp industry is very old, for the fibre was cultivated in the early part of the last century. The annual production, in 1859, reached a total of 75,000 tons, but 20 years later it had fallen off to such an extent that 5,000 tons only were recorded for the entire country. Since that time it has fluctuated be¬ tween 5,000 and 12,000 tons as the total crop of the country, the annual production in 1914 being but 2,000 tons. In that year the total acreage in the United States devoted to hemp growing was about 5,000 acres. Of this Ken¬ tucky had 2,500 acres; Indiana, 1,000 acres; California, 600 acres ; Ohio, 500 acres ; Wiscon¬ sin, 350 acres. The average acre-yields varied

from 1,200 pounds of fibre in California to 600 pounds in Kentucky, and the farm price ranged from four and a half cents to eight cents. In Japan the annual crop is about 10,000 tons, all used in domestic industries; and Japan also imports 15,000 tons annually from India and China. Among the world's hemp producers Russia ranks first and China second.

In its own sphere of usefulness no sub¬ stitute for hemp has been found

satisfactory. American hemp was at one time used to some extent for the rigging of vessels, although its largest use was for bagging. As early as 1824 it was employed in the navy, and efforts were made later by the government toward the production of better grades of hemp by water-retting. The fibre has also been used for twines and for woven fabrics. In late years the demand has been largely for a low grade fibre that could be manufactured into binder twine, but for this purpose it has not been found satisfactory, and the bulk of the binder twine is made from manila and sisal. Very recently there has been a demand for a better grade of fibre, which has resulted in more careful methods, particularly on the Pacific coast, where a fibre has been produced fit for fine twines and cordage. Kentucky and Illinois hemps are coarse, dark in color and are not carefully prepared, which is the reason for the low price of 3ˆ4 to 6 cents against 8 and 12 cents per pound for finer imported hemps. The best hemp comes from Italy, chiefly from the provinces of Bologna and Fer¬ rara, the fibre being very white, very well pre¬ pared and of superior strength. Breton hemp from France is almost as good, but rarely im¬ ported. Russian comes in several grades, some light, but not as light as the Italian, some dark like the native fibre and low in grade. Some good hemp comes from Austria-Hungary, and a trifle from other portions of Europe. Little if any of the Japan fibre reaches this market, though the best Japanese is as good as the Italian. We consume annually less than 10,000 tons, including both the native and imported.

There are many varieties of the hemp plant, four or five having been grown in the United States, though it is said that the bulk of the seed at present sown is the China hemp and a Japanese variety. In California, Japan hemp has yielded 7,000 pounds to the acre at a total cost of $67, and a value of eight cents per pound. Five varieties are cultivated in Europe, a common form reaching a height of five to seven feet; Piedmontese or Bologna, an Italian variety that averages 12 feet in height; China hemp, introduced in 1846; a small hemp found in the valley of the Arno and around Tuscany; and Arabian hemp, cultivated for the resinous principle or drug.

Limestone soils, clayey loams and the al¬ luvial soils of the river bottoms are best adapted to hemp culture, and the seed bed should be almost as carefully prepared as for flax. Generous fertilizing both with stable ma¬ nure and chemical fertilizers is well repaid in quality as well as quantity of crop. One to three bushels of seed are sown per acre broad¬ cast and highly covered. The planting, in Ken¬ tucky, usually begins in April, and the crop

*may be harvested in 100 days. The most ap¬ proved practice is to allow the hemp to lie on the ground, turning it over at intervals, till the leaves drop from the stalks. It is then gath¬ ered into stacks and water-retted during the following winter. Upwards of 300 machines for breaking hemp have been patented, but the Shely Hemp Gin seems to be the only one which has met with popular favor. It requires a crew of 15 men and turns out 1,000 of clean, straight fibre per working hour. For further particulars regarding the culture and preparation of this fibre, see Special Reports Nos. 1, 8 and 11, office of Fibre Investigations of the Department of Agriculture, and Hemp Culture in the United States, Year-books of Agriculture for 1911 and 1913. See also the dictionary of the Economic Products of In¬ dia^*

While some 300 patents have been issued in this country for hemp machines, the bulk of the fibre is extracted by means of the old- fashioned, clumsy wooden ^slat-breaks® that has been employed from time immemorial and without improvement or change. With one of these breaks a Kentucky negro can extract perhaps 150 pounds of fibre in a day. The breaks used in European hemp countries are little better, though they are smaller and less clumsy. The best foreign hemps are water- retted, the stalks dried with great care, often in kilns, and therefore are more evenly pre¬ pared and the fibre soft, strong and light in color — almost white as in the Italian and French hemp. On the contrary most of the American hemps are dew-retted, and are ex¬ posed to alternate freezing and thawing, as the stalks lie on the ground, giving an inferior product, uneven and very dark in color, often a slate gray. Those water-retted bring double the price of the dew- retted. See Cordage; Cordage Industries; Fibre; Flax; Manila Hemp; Ramie; Sisal.

Consult United States Plant Industry Bureau Bulletins 46 and 221, and Moore, B., (A Study of the Past, the Present and the Possibilities of the Hemp Industry in Ken¬ tucky® (Lexington, Ky., 1905) ; United States Foreign and Domestic Commerce Bureau's Special Agents' Series No. 74, (Linen, Jute and Hemp Industries.5

Chas. Richard Dodge.

HEMP-AGRIMONY. See Eupatorium.

HEMP-NETTLE, a genus (Galeopsis) of European plants of the mint family, two species of which have become naturalized as weeds in the eastern United States.

HEMPHILL, James Calvin, American journalist: b. Due West, Abbeville County, S. C, 18 May 1850. He was graduated at Erskine College in his native town in 1870 and entered journalism as editor of the Abbeville (S.

C.) Medium in 1871. In 1880 he joined the staff of the Charleston News and Courier, of which from 1888 to 1910 he was manager and editor. In 1911 he became editor of the Charlotte (N. C.) Observer; joined the ed¬ itorial staff of the New York Times in 1912, and later became Washington correspondent of the Philadelphia Public Ledger. He was Brom¬

ley lecturer on journalism at Yale in 1909-10, and first vice-president of the Associated Press in 1909.

HEMPL, George, American philologist : b. Whitewater, Wis., 6 June 1859. He was grad¬ uated at the universities of Michigan in 1879 and of Jena in 1889, and was appointed in¬ structor in German at Johns Hopkins Univer¬ sity in 1884. After spending three years abroad (1886-89) in study at Gottingen, Tubingen, Strassburg and Berlin, he became junior pro¬ fessor of English in the University of Michi¬ gan, where he has been professor of English philology and general linguistics since 1897. He has been a voluminous writer, and among his technical works may be mentioned Ger¬ man Orthography and Phonology) (1897) ; (German Grammar5 (1901). He was presi¬ dent of the American Philological Association in 1903-04, and assisted in the pronunciations of Pierce's (French Dictionary.5

HEMPSTEAD, N. Y., village, in the town of the same name, in Nassau County, on the Long Island Railroad, about 15 miles east of the borough of Brooklyn, and 10 miles from the ocean. The village was settled in 1643 by people from New England. The Presbyterian Society of Hempstead claim the oldest Presby¬ terian organization in the country, dating their beginning in this village in 1644. The Episco¬ pal church owns a communion service pre¬ sented by Queen Anne. Hempstead is located in a section of Long Island in which there are many summer homes of New Yorkers. It has a public library and two parks, and is the seat of Turner Institute. During the war with Spain an encampment for State troops was lo¬ cated at Hempstead; it was called Camp Black after the then governor of the State. The chief industrial interests are market gardening, farm¬ ing and the manufacturing of cork insoles, phosphates and carriages. The waterworks are municipally owned. Consult Onderdonk, (The Annals of Hempstead, 1643-1832 5 (Hempstead 1878). Pop. (1920) 6,382.

HEMPSTEAD, Tex., town, county-seat of Waller County, on the Houston and Texas Central Railroad, about 50 miles northwest of Houston and 113 miles east by south of Austin. It is situated in a fertile agricultural region, noted for its cotton fields and its vegetable products. It has cottonseed-oil mills, cotton- gins, pickle factories, and its trade is chiefly in cotton, grain, fruits and vegetables. Pop. 1,978.

HEMS, or HOMS, horns (Lat. Emesa), Syria, an ancient city, near the Orontes and the Lake of Homs, 86 miles northeast of Damascus and having railway connections with the coast. Its temple of the sun-god Elagaba- lus was famous, and one of its priests became emperor of Rome, assuming its title, in 218. Here in 272 Zenobia was defeated by Aurelian, and in 1832 the forces of the sultan of Turkey by Ibrahim Pasha. The town is still sur¬ rounded by its ancient walls, now in a ruinous condition, and has the largest and strongest citadel in Syria. It has some manufactures of silk goods and gold ornaments, and a trade in oil and agricultural produce. Pop. 60,000.

HEMSTREET, Charles, American jour¬ nalist and author: b. New York, 20 Sept. 1866. He entered the profession of journalism as a reporter in 1886, and was connected with the City Press Association until 1900, when he re¬ signed to devote himself to literature and his¬ torical research. He has published (Manhat¬ tan (1888) ; (Nooks and Corners of Old New York > (1899);

(1910).

HEN-HAWK, or CHICKEN-HAWK,

any kind of hawk which attacks poultry, or is supposed to do so. Two or three large buzzard- hawks are popularly so called in the eastern United States, and at least two smaller falcons. In the West, and in other parts of the English- speaking world, are other species of the same repute, more or less well deserved. In Eng¬ land the analogue of the American marsh-hawk (q.v.) is known as ˆhen-harrier.® Cer¬ tain owls everywhere kill much poultry where it is not safely housed at night. In North America the best known hen-hawks are the broad-winged, red-tailed and red-shouldered. (See Buzzard). They are comparatiyely harmless to poultry, however, feeding mainly on squirrels, mice, frogs, etc. The broad-wing (Buteo pennsylvanicus) is one of the most familiar of our hawks, breeding numerously in the woods all over the country. It is 16 inches long, with a tail 7 inches, and the wing 11 inches. The upper parts are dull umber-brown, the tail almost black, crossed by two to four pale brown bands; the lower parts are dull rufous brown, nearly unbroken on the breast. It is rather sluggish in temperament, though capable of swift and bold action, and feeds mainly on mice, but will now and then seize young chickens, ducklings, etc. On the whole, as in the case of the other buzzard-hawks, it is of more service than injury to the agriculturist. The real culprits are two small, swift, agile falcons, Cooper's (Accipiter cooperi), and the sharp-shin (A. velox). The forme*- is nearly two feet long, grayish-brown on the upper parts and white below, with the sides and breast barred with dusky red-brown and tail barred with blackish. The sharp-shin has much the same colors, but is little more than half as large, and is further distinguished by the tri¬ angular shape of the tarsus, giving it an edge in front. These bold and active falcons live mainly on birds, and on farms prey largely on chickens and house-sparrows, compensating somewhat for the former by killing the latter. Consult Fisher, (Hawks and Owls of the United States) (Washington 1893).

HENBANE, a dangerous plant (Hyoscya – mus niger) of the family Solanacece, which contains the tobacco, stramonium. and other plants abounding in narcotic poisons. The black henbane (H. niger) is a species of the Mediterranean region, and springs up in waste places throughout Great Britain and rarely in the eastern United States, where it has become naturalized. It is an annual, somewhat bushy, about two feet high, with large sinuate or

sharply lobed, sessile leaves and large dingy yellow flowers with purplish veins. The whole plant is covered with unctuous hairs and has a nauseous smell. The seeds contain in largest quantity the specific alkaloid hyoscyamin, which crystallizes in stellate acicular crystals of a silky lustre. The symptoms of poisoning by henbane are similar to those produced by other narcotic poisons, and the proper treatment is the same as in cases of poisoning by opium. In medicine henbane is employed both externally and internally. The leaves are the part com¬ monly used ; they are gathered and quickly dried when the plant is in full flower. Fomen¬ tations of henbane are applied to painful glandular swellings, parts affected with neu¬ ralgia, etc., and are often found to afford re¬ lief. An extract of henbane is sometimes em¬ ployed instead of belladonna to dilate the pupil of the eye. Tincture and extract of henbane are often administered in cases of annoying cough, spasmodic asthma and other diseases re¬ quiring sedatives and anti-spasmodics. For many cases it has one great advantage over laudanum, in not producing constipation. The other species of henbane possess similar prop¬ erties. The dried stalks of H. albns are used by smoking in Greece to allay toothache.

HENDERSON, Charles Belknap, Ameri¬ can public official: b. San Jose, Cal., 8 June 1873. He studied at the University of the Pacific in 1892 and took a special course in history at Stanford University. In 1895 he was gradu¬ ated at the law school of the University of Michigan and in the following year established his practice at Elko, Nev. For over 10 years he has served as regent, of the University of Nevada. He was appointed member of the United States Senate bv Gov. Emmet D. Boyle, on 4 Jan. 1918, to fill the vacancy caused by the death of Francis G. Newlands. In the Spanish-American War he served as second lieutenant in the 2d United States Volunteer Cavalry.

HENDERSON, Charles Hanford, Ameri¬ can educator and author: b. Philadelphia, 30 Dec. 1861. He was graduated from the Univer¬ sity of Pennsylvania in 1882 ; was lecturer at the Franklin Institute 1883-85, 1885—86 ; Ph.D. at Zurich in 1892; lecturer on education at Har¬ vard 1897-98; and director Pratt Institute, Brooklyn, 1898-99. He founded Marienfeld Summer Camp for Boys and was its head¬ master for 17 years, and was headmaster of the Marienfeld Open-Air School at Lamascand, N.

C., 1914-16. Now engaged in writing and research work. He has published (Elements of Physics5 (1900) ; (Education and the Larger Life) (1902) ; (John Percyfield) (1903) ; (The Children of Good Fortune5 (1905); (The Lighted Lamp5 (1908); (Pay-Day5 (1910); (What is it to be Educated?5 (1914).

HENDERSON, Charles Richmond, Amer¬ ican sociologist: b. Covington, Ind.. 17 Dec. 1848; d. Charleston. S. C., 29 March 1915. He was graduated at the University- of Chicago in 1870 and at Union Theological Seminary in 1873. From 1873 to 1883 he was pastor at Terre Haute, Ind., and from 1883 to 1892 at Detroit. In 1892 he was appointed assistant professor of sociology at Chicago University,

and was afterward advanced to the full pro¬ fessorship. In 1898-99 he was president of the National Conference of Charities, in 1902 presi¬ dent of the National Prison Association and in 1910 of the International Prison Congress. In 1907 he served as secretary of the Illinois Commission on Occupational Diseases. He published (The Development of Doctrine in the Epistles5 (1894); 'The Social Spirit in America) (1896); introduction to the Study of Dependent, Defective and Delinquent Classes) (1893-1901) ; (Social Settlements)

(1897) ; (Social Elements) (1898) ; and edited Abridgment of and Introduction to Edition of Thomas Chalmers' The Christian and Civic Economy of Large Towns) (1900) ; 'Modern Prison Systems5 (1903); 'Modern Methods of Charity5 (1904) ; 'Die Arbeiterversicherung in den Vereinigten Staaten von Nord Amerika5 (1907) ; industrial Insurance in the United States5 (1907) ; (Social Duties from a Chris¬ tian Point of View5 (1909) ; (Education in Re¬ lation to Sex5 (1909) ; Social Programmes of the West5 (1913).

HENDERSON, David Bremner, Ameri¬ can statesman : b. Old Deer, Scotland, 14 March 1840; d. Dubuque, Iowa, 25 Jan. 1906. He was educated in the public schools and Upper Iowa University; in 1861 entered the army as lieu¬ tenant of the 12th Iowa regiment; lost a leg at Corinth (1863), and was discharged from the service. He then became commis¬ sioner of the board of enrolment in the 3d Iowa district, but re-entered the army as colonel in 1864. He studied law and was admitted to the bar in Iowa in 1865, and was United States district attorney in the northern division of Iowa 1869-71. _ He early became prominent in the local politics of his district, and was a delegate to three Republican national conven¬

tions. In 1882 he was elected to the House of Representatives, and was re-elected biennally till 1902. He was for many years one of the leaders of the Republicans in the House, served on the Committee of Appropriations for 10 years and was chairman of the Judiciary Committee and a member of the Committee on Rules in the 54th and 55th Congresses. He assisted Speaker Reed (q.v.) in the making of the <(Reed rules,55 was consistently an advocate of sound money and a strong supporter of Presi¬ dent McKinley's Cuban policy. At the organ¬ ization of the 56th Congress in 1899 he was chosen speaker of the House, and re-elected in 1901 ; he was an impartial presiding officer and took important part in shaping the legisla¬ tion made necessary by the Spanish War and the acquisition of new territory. In 1902 he declined a unanimous renomination from his district, because he could not support the policy of tariff revision then made a prominent issue by Iowa Republicans.

HENDERSON, James Pinckney, Ameri¬ can soldier and politician: b. Lincoln County, N. C., 21 March 1808 d. Washington, D. C, 4 June 1858. He practised law in Mississippi; went to Texas in 1836, and became secretary of state of the Texan Republic 1837-39. In the latter year he was sent as a Minister to England and France to secure the recognition of Texan independence, and went to Washington in 1844 to secure annexation. He was a member of the Texas Constitutional Convention 1845, and the

following year was elected first governor of the State. In 1857 he was appointed senator from Texas as a State Rights Democrat. Hen¬ derson fought in the Mexican War and Con¬ gress gave him a sword for his gallantry.

HENDERSON, Peter, American horti¬ culturist: b. Porthead, Scotland, 1823; d. Jersey City, N. J., 17 Jan. 1890. He came to America in 1843 and opened a seed-store in New York city in 1862. He has been called ((the father of horticulture and ornamental gardening in the United States.55 He published 'Practical Flori¬ culture5 (1867) ; hardening for Profit5 (1866); hardening for Pleasure5 (1875) ; (Garden and Farm Topics5 (1884) ; (How the Farm Pays5

(1884).

HENDERSON, Richard, American pio¬ neer: b. Hanover County, Va., 1734; d. North Carolina, 1785. He studied law and in 1769 was appointed associate justice of the Superior Court of North Carolina. After the adoption of the Declaration of Independence he declined re- election to the bench, in order to participate in the scheme of the Transylvania Land Companv. By this scheme the company organized as a political community

with president, legislature and judges, all the territory lying between the Cumberland River, the Cumberland Mountains and the Kentucky River. The State of Vir¬ ginia annulled the deed of sale of this tract of territory which the Cherokee Indians had given to the Transylvania Land Company, but as a reward for the pioneer work of the company, granted them an area 12 miles square on the Ohio River, below the mouth of the Greene River.

*HENDERSON, William James, American musical critic and author: b. Newark, N. J., 4 Dec, 1855. He was graduated from Princeton College in 1876, and joined the staff of the New York Tribune. Joined the staff of the New York Times January 1883. Became music critic of that paper 1887. Since September 1902, has been music critic of the New York Sun. He was associate editor of 'The Stand¬ ard Dictionary5 (1892-94). He was lecturer on "History of Music55 at New York College of Music, 1889-1903, and on "History of Vocal Art,55 Institute of Musical Art, since 1905. He is a member of National Institute of Arts and Letters, and member of the National Institute of Social Sciences. He served in naval militia of New York as ensign and afterward lieu¬ tenant from 1891 to 1902. Wrote libretto of 'Cyrano,5 opera by Walter Damrosch. He has published (The Story of Music5 (1889) • 'Pre¬ ludes and Studies5 (1891); 'Sea Yarns for Boys5 (1894); 'Afloat with the Flag5 (1895) * 'Elements of Navigation5 (1895); 'The Last Cruise of the Mohawk5 (1897); 'What is Good Music5 (1898); 'How Music Developed5 (1899) ; 'The Orchestra and Orchestral Music5 (1899); 'Richard Wagner5 (1901); 'Pipes and Timbrels5 (1905); 'Modern Musical Drift5 (1906); 'The Art of the Singer5 (1904); 'Some Forerunners of Italian Opera5 (1911)' 'The Soul of a Tenor5 (1912).*

HENDERSON, Ky., city, county-seat of Henderson County, on the Ohio River, here spanned by a magnificent bridge, and on the Illinois Central, the Louisville and Nashville, the Louisville, Henderson and Saint Louis rail¬ roads, about 10 miles below Evansville, Ind.,

and 103 miles, in direct line, southwest of Louis¬ ville. It has regular steamboat connection with Louisville, Evansville, Memphis and other river ports. It is one of the oldest settlements on the Ohio River, but it was not incorporated until 1797. It is situated in a fertile agricultural region, rich in timber and coal. The chief manufactures are cotton and woolen goods, flour, hominy, lumber, box factories, tobacco products, furniture, carriages and wagons, foundry products, car-works and agricultural implements.

Large shipments are made of corn, wheat, fruit and tobacco. It has large coal and lumber yards, grain-elevators, tobacco-stem- meries, fine fairgrounds and Atkinson Park, the area of which is about 100 acres. It has a sanatorium, a Carnegie library and a number of well-built churches and schools. The charter of 1893 provides for a mayor, who holds office four years and is not eligible for re-election, and a common council. The city owns and operates the electric-light and gas plants and the waterworks. Audubon and Edgewood, two adjoining towns, were annexed in 1905. Pop.

12,192.

HENDERSON, N. C., town, county-seat of Vance County, on the Southern and the Sea¬ board Air Line railroads, about 12 miles east of Oxford and 42 miles north of Raleigh. Hen¬ derson was settled in 1820, but was not incor¬ porated until 1842. It is situated in a cotton and tobacco region of the State. The chief industrial establishments are cotton-gins, cot¬ tonseed-oil mills, cotton-mills, knitting-mills, tobacco warehouses, wagon-factories, flour¬ mills, bagging-mills, buggy and automobile fac¬ tories and lumber-yards. Its chief trade is in cotton and tobacco. It is governed by a mayor, elected for two years, and a town council. Pop. (1920) 5,222.

HENDERSON, Tex., town, county-seat of Rusk County, on a branch of the International and Great Northern Railroad, about 122 miles southeast of Dallas and 165 miles north by east from Houston. It is situated in an agricultural section, and the chief industries are connected with agricultural products. Its chief industrial establishments are a foundry, a pottery, saw¬ mill, creamery and cotton-gins. The trade is in manufactured articles, live-stock, cotton and vegetables. It is the seat of a normal college. Pop. (1920) 2,273.

HENDERSONVILLE, N. G, town, county-seat of Henderson County, on the Southern Railway, about 21 miles south of Asheville and 100 miles west of Charlotte. It is situated in a mountainous portion of the State, but in the valleys are fertile farm lands. The chief industrial establishments are a furni¬ ture factory, a tannery, a canning factory, creamery, hosiery mills and a lumber yard. Apples and vegetables are among the agricul¬ tural products shipped to other markets. Hen¬ dersonville has a large number of summer guests owing to the healthfulness of the climate and the beauty of the scenery. It is the seat of the Blue Ridge School for Boys, and contains a Carnegie library and hospital. The water¬ works are the property of the city. Hender¬ sonville is under the commission form of gov¬ ernment. Pop. (1920) 3,720.

HENDRICK, Thomas Augustine, Amer¬ ican Roman Catholic bishop: b. Penn Yan,

N. Y., 29 Oct. 1849 ; d. 29 Nov. 1909. He was educated at Saint John's College, Fordham; Seton Hall College, South Orange, N. J., and Saint Joseph's Seminary, Troy, N. Y. He was ordained to the priesthood in 1873 and became successively assistant at Saint Mary's, Rochester, N. Y. (1873-74) ; rector of Holv Cross Church, Charlotte, N. Y. (1874-77) ; rector of the church at Union Springs, N. Y. (1877-91) ; rector at Aurora and Cayuga, N. Y. (1891-95) ; rector of Saint Bridget's, Rochester (1895 — 1903). In 1903 he was consecrated bishop of Cebu, P. I. He reorganized his diocese and succeeded in putting an end to the Aglipay schism which was rampant there. He took part in numerous congresses of American charitable associations and in 1904 was a dele¬ gate of the United Charities of America to the World's Congress of Charitable Associations, London. He also served as vice-president of the Society for the Prevention of Cruelty to Children and from 1900 to 1904 was regent of the University of the State of New York. He was a frequent contributor of articles on charity and charity organization to newspapers and periodicals.

HENDRICKS, Thomas Andrews, Amer¬ ican politician, 21st Vice-President of the United States : b. near Zanesville, Ohio, 7 Sept. 1819; d. Indianapolis, Ind., 25 Nov. 1885. He was graduated at South Hanover College, Indiana, in 1841 ; studied law and was admitted to the Indiana bar in 1843. In 1845 he was elected to the legislature, and in 1850 and 1852 to Congress. In 1860 he was the Democratic candidate for governor of Indiana, but was defeated. He was a United States senator 1863- 69; and at the Democratic National Convention of 1868 received 132 votes for the Presidential nomination. In the same year he was again de¬ feated for the governorship of Indiana, but in 1872 was elected. In the Democratic National Convention of 1876 he was nominated for the Vice-Presidency, but the ticket, headed by Til- den, was defeated. Hendricks was again nomi¬ nated for the Vice-Presidency in 1884, however, on the ticket with Cleveland, and on this occa¬ sion was elected.

HENDRIE, Sir John Strathearn, Cana¬ dian statesman: b. Hamilton, Ontario, 15 Aug. 1857. He was educated at Hamilton Grammar School and Upper Canada College. He entered the provincial legislature of Ontario in 1902, was minister without portfolio 1905-13, and in the latter year was appointed lieutenant-gov¬ ernor of the province. He was created K.C.M.G. in 1915.

HENDRIX, Eugene Russell, American Methodist bishop : b. Fayette, Mo., 17 May 1847. He was graduated from Wesleyan University, Middletown, Conn., 1867 ; and the Union Theo¬ logical Seminary 1869. Appointed bishop of the Methodist Episcopal Church South, in 1886, he has since made official visits to China, Japan, Korea, Mexico and Brazil. He is the pos¬ sessor of John Wesley's manuscript (JournaP written in America

1736-37. He has written (Around the World) (1878); (Skilled Labor for the Master (1900) ; 'Christ's Table Talk)*

(1908).

HENGIST, heng'gist, Saxon founder of the kingdom of Kent in Great Britain: d. about 488. He and his brother Horsa were re-

nowned among the Saxons for their bodily strength and the antiquity of their family, which derived its origin in a direct line from Odin. In 449 the Britons sued for aid from the Saxons against the inroads of the Scots and Piets. Under command of Hengist and Horsa the Saxons landed at the mouth of the Thames, attacked the enemies of the Britons and defeated them near Stamford in 450 a.d. As soon as they had received reinforcements from home they sought occasion for a quarrel, and uniting with the Scots and Piets they at¬ tacked the Britons, who were forced to flee or submit to the Saxons. Some fled to Armorica (Haute-Bretagne), to which they gave their name. Hengist, who had lost his brother in the battle near Eglesford (now Aylesford) in 455 a.d., founded the kingdom of Kent. He established his residence in Canterbury. By some of our writers Hengist and Horsa are regarded as mythical personages. Consult Bede, (History EccU (1896); Nennius, (His- toria BrittonunP (1844).

HENING'S STATUTES, the first com¬ plete collection of the laws of any American State, including those of its colonial times, those repealed and those dropped in revision. These were the ((Statutes at Large of Virginia, 1619— 1792,)) in 13 volumes, published at Rich¬ mond 1809-23, by William Waller Hening, clerk of the Court of Chancery; Jefferson is said to have suggested the publication. It is highly valued as a historical source.

. HENLEY, William Ernest, English poet, critic and journalist: b. Gloucester, 23 Aug. 1849; d. Woking, 12 July 1903. He entered on a journalistic career in London, and in 1877 be¬ came first editor of the magazine London. He was then editor successively of the Maga¬ zine of Art (1882-86), of the Scots — later the National Observer — (1888-93), and of the New Review (1893-98). His first publication,. (In Hospital: Rhymes and Rhythms) (1888), was inspired bv his own experiences as a patient in Edinburgh Infirmary. Its contents were sub¬ sequently included in (A Book of Verses) (1888). A second volume of poems, (The Song of the Sword, appeared in 1892 (2d ed., as (1898). Later noetical works were (For England's Sake) (1900) ; and (Hawthorn and Lavender and*

Other Verses) (1901). Henley collaborated with Stevenson four plays, beacon Brodie, The Works of Lord Byron (1897) ; (The Poetry of Wilfrid Blunt) (1896) ; and (London Types) (1898), and was editor of a series of (Tudor Translations.) The Cen¬ tenary Burns) (1896-97) is an important work edited by him with the co-operation of T. F. Henderson. The fourth volume contains an elaborate estimate by Henley of Burns as poet and man, published separately in 1898. His critical work appears at its best in (Views and Reviews: Literature) (1890), and (Views and*

Reviews: Painting and Sculpture (1901). Both as poet and critic he was prejudiced and aggressive, but keen, vigorous and often dis¬ tinguished in style. A paper on Stevenson con¬ tributed to the Pall Mall in 1901 aroused much unfavorable comment by its arraignment of Balfour's*

HENLEY-ON-THAMES, England, a historical market-town and municipal borough of Oxfordshire, on the Thames, 35 miles by rail west of London. The town is especially famous for its annual regatta in July, a notable event in the British sporting world. The uni¬ versity boat races are held on the river here, and Americans frequently take part in the various open events. Pop. 6,456.

HENLOPEN. See Cape Henlopen.

HENNA, a shrub (Lawsonia inermis) re¬ sembling the privet, but of the family Lythra- ce

HENNEPIN, en-pan or hen'e-pm, Louis,

French Franciscan missionary and explorer in North America: b. Ath, Belgium, about 1640; d. Utrecht, Holland, about 1706. He entered a convent, and being sent by his superiors to Calais and Dunkirk, the stories he heard from the sailors inspired him with a desire to visit distant countries. At length he embarked for Canada, and arrived at Quebec in 1675. In 1676 he went to the Indian mission at Fort Frontenac, whence he visited the Five Nations and the Dutch settlement at Albany. In 1678 he was attached to La Salle's expedition, and, in company with the Chevalier de Tonty and the Sieur de la Moote, was ordered to sail from Fort Frontenac to Niagara, and there construct a vessel for navigating the Lakes above the falls. This accomplished, La Salle joined the party, and on 7 Aug. 1679 the adventurers be¬ gan their voyage on Lake Erie. They passed through Lakes Erie, Huron and Michigan, to the mouth of the Saint Joseph's River, as¬ cended this in canoes to the portage, carried their frail barks several miles by land to the Kankakee and floated down this stream and the Iroquois to the Illinois, on the banks of which they built Fort Crevecoeur near the present site of Peoria. After a delay of two months at

this place. La Salle returned to Fort Frontenac for supplies,, charging Father Hennepin with a voyage of discovery to the source of the Mis¬ sissippi, which had never been explored above the mouth of the Wisconsin. Accompanied by Picard du Gay and Michael Ako, he set out in a canoe 29 Feb. 1680, followed the Illinois to its mouth and ascended the Mississippi to the Falls of Saint Anthony, which he was the first European to see, and which he named in honor of his patron saint. This was on 30 April.

Arriving at the mouth of the Saint Francis' River, in what is now the State of Minnesota, he traveled by land about 180 miles along its banks, naming it in honor of the founder of his order and visited the Sioux Indians, whom he mentions by the names Issati and Nadouessioux. He stayed with them three months, being, ac¬ cording to his own account, held in captivity, and then, meeting a party of Frenchmen who had come into the country by way of Lake Superior, ieturned with them to Canada, de¬ scending the Mississippi to the Wisconsin, and passing up that river and down the Fox, and so through Green Bay to Lake Michigan. From Quebec he sailed for France, where he pub¬ lished in 1683 his description de la Louisiane nou- vellement decouverte au Sud-Ouest de la Nouvelle-France, etc.P containing the fullest published account of La Salle's first expedition, a history of his second voyage and of Hen¬ nepin's own explorations, with a description of the upper Mississippi. Notwithstanding the writer's vanity and fondness for exaggeration, the work is valuable. He put off his clerical dress in Holland about 1697, but to the end of his life seems to have written himself: Recol¬ lect missionary and apostolic notary.® In 1697, 10 years after La Salle's death, Hennepin pub¬ lished his extraordinary (Nouvelle decouverte d'un tres-grand pays situe dans l'Amerique entre le Nouveau Mexique et la Mer Glaciale, etc., reprinted the next year under the title (Nou- veau voyage dans un pays plus grand que l'Europe, etc.* In this work, which embodies his (Description de la Louisiane, } written anew and enlarged, he claims to have descended to the mouth of the Mississippi, and to have been the first European who floated on that river. He gives a description of the scenery, Indian tribes and distances along the route, with a minuteness which easily gained him credit for veracity, and explained his long silence on this important ooint by saying that he feared the enmity of La Salle, who had ordered him to follow a different course, and who prided him¬ self upon his own claims as the first who de¬ scended the Mississippi to the Gulf of Mexico. Notwithstanding the utter impossibility of recon¬ ciling the dates given in Hennepin's narrative, the story obtained general credence until its*

falseness was exposed by Jared Sparks. (See (Life of La Sailed by Sparks in the (Library of American Biography). Consult Saint- Genois, (Les Voyageurs Beiges du XIII au XIX Siecle* (1867) ; Van Hulet,*

HENNESSEY, William J., Anglo-Amer¬ ican artist: b. Thomastown, County Kilkenny, Ireland, 1837. He was brought to New York when 10 years of age, and became a student of the Academy of Design in 1856. He paints in oil and water colors, with a preference for landscape, and draws in black and white as an illustrator. In 1863 he was elected a National Academician, and since 1870 has lived in Lon¬ don, England.

HENNESSY, John, American Roman Catholic bishop: b. Ireland, 20 Aug. 1825; d. Dubuque, Iowa, 4 March 1900. He came to the

United States in 1847, and pursued his theologi¬ cal studies in Carondelet Seminary, near Saint Louis. After serving several years as a mis¬ sionary in Missouri he became professor in Carondelet Seminary in 1854, and its president in 1857. He was afterward pastor in Saint Joseph, Mo. ; became bishop of Dubuque in 1866 and archbishop in 1893.

HENNESSY, John Joseph, American Roman Catholic bishop: b. County Cork, Ire¬ land, 19 July 1847. He came to America in early life and was graduated at the Christian Brothers' College, Saint Louis, Mo., in 1862. He was ordained priest in 1869; founded the Railroad Men's Benevolent Union 1871 ; estab¬ lished the Ursuline convent, Arcadia, Mo., 1877 ; and edited The Youth's Magazine, Saint Louis, 1880-86. He was consecrated bishop of Wichita, Kan., in November 1888.

HENNINGSEN, Charles Frederick,

American military officer : b. in England, of Swedish parents, 1815 ; d. Washington, D. C., 14 June 1877. He joined the Carlists in Spain in 1834, and later was a follower of Kossuth in the Hungarian Revolution. He went to Nica¬ ragua in 1856, where he distinguished himself in the defense of Granada, and in the victory at Queresma. During the Civil War he served in the Confederate army, becoming a brigadier- general. He directed the construction of the first Minie rifles manufactured in the United States. His publications include (Eastern Eu- rope) ; (Past and Future of Hungary ; (Sixty Years Hence) ; (Personal Recollections of Nica¬ ragua* ; (The White Slaved etc.*

HENRI, hen'ri, Robert, American painter : b. Cincinnati, Ohio, 1865. He began his art studies in his native city and became an instruc¬ tor in the Philadelphia School of Design. He has exhibited in Paris, and his picture

(Snow} was purchased by the French government and hangs in the Luxembourg. While in Paris he gathered round him a group of pupils in his studio, and as a landscape and portrait painter did much to impress younger men with his breadth and vigor of style. While he is a land¬ scape painter of notable attainment, his por¬ traits also are admirable for the power of indi¬ vidualization and the directness which charac¬ terizes them. He was elected a member of the National Academy of Design 1906, the Associa¬ tion of American Painters and Sculptors, and the National Institute of Arts and Letters. Among his best-known paintings are (The Equestrian, Carnegie Art Institute, Pittsburgh; (Young Woman in Black, * Art Institute of Chicago; (Girl with Fan,* Pennsylvania Acad¬ emy, Philadelphia; (Laughing Girl,* Brooklyn Institute Museum; (Spanish Gypsy,* Metropoli¬ tan Museum, New York. Other important works are (The Picador* ; (A Little Gypsy* ; portrait of Mrs. W. R. Clarke (1909) ; (The Fish-Market Man® (1911);* ***Ua Madrilenita) (1912) ; (The Working Man*** *(1913). In 1914 he exhibited several studies of Irish types. Of these (Himself * and (Herself* were shown at the Pennsylvania Academy, where the latter received the medal for the best portrait in the exhibition.*

HENRIETTA, Duchess of Orleans: b. Exeter, 16 June 1644; d. Saint Cloud, France, 30 June 1670. She was the daughter of King

C harles I. Her mother fled with her to France, where she was educated a Roman Catholic. Her marriage with the brother of Louis XIV, Philip of France, Duke of Orleans, was cele¬ brated in March 1661. Louis XIV was desirous of detaching her brother, Charles II, from the triple alliance with Holland and Sweden, in order to accomplish his plan of obtaining pos¬ session of a part of Holland. She went there¬ fore in 1670 with the court to Flanders, and under pretense of visiting her brother, passed over to Dover, where Charles was awaiting her arrival, and there succeeded in obtaining his signature to the secret treaty of Dover. Shortly after her return she died so suddenly as to ex¬ cite the suspicion of her being poisoned. Bos- suet pronounced her funeral oration.

HENRIETTA, Maria, queen of Charles I of England: b. Paris, 25 Nov. 1609; d. Colom- bes, near Paris, 31 Aug. 1669. She was the youngest child of Henry IV of France. Her marriage ceremony was celebrated by proxy at Paris in 1625. On Henrietta's first arrival in England she enjoyed great popularity with her husband's subjects, but her attachment to the Roman Catholic faith, combined with her hau¬ teur and despotic ideas as to divine

right, soon dissipated these favorable prepossessions. Much of Charles' subsequent arbitrary and injudicious procedure may be traced indirectly to the in¬ fluence of his queen. On the breaking out of the civil war Henrietta proceeded to Holland, where she procured money and troops for the assistance of her husband, and afterward joined him at Oxford. She again returned to the Con¬ tinent, and took up her abode in France. Con¬ sult (Lives) by Haynes (1912), and Taylor (1905) ; and Strickland's (Lives of the Queens of England.)

HENRIETTA, Tex., town, county-seat of Clay County, on the Little Wichita River, and on the Missouri, Kansas and Texas, and the Fort Worth and Denver railroads, about 90 miles northwest of Fort Worth and 128 miles north¬ west of Dallas. It is situated in an agricultural and stock-raising region and the building-stone quarries in the vicinity add to the industrial wealth of the town. The chief manufactures are flour and lumber. The town has cotton- gins, grain elevators, lumber-yards and stock- yards. The trade is chiefly in live-stock, grain, flour, lumber, cotton and building-stone. Natural gas is plentiful in the vicinity. The water¬ works are the property of the city. Pop. 2,563.

HENRY I, king of England, surnamed Beauclerc, youngest son of William the Con¬ queror: b. Selby, Yorkshire, 1068; d. Rouen, France, 1 Dec. 1135. He was hunting with Wil¬ liam Rufus in the New Forest when that prince received his mortal wound in 1100, and instantly going to London caused himself to be pro¬ claimed king, to the prejudice of his elder brother Robert, then absent in the Crusade. To reconcile the people to his usurpation Henry issued a charter containing concessions to public liberty, and also performed another popular act by recalling Anselm, archbishop of Canterbury. In November 1100 he married Matilda, daughter of Malcolm III, king of Scotland. This union strengthened his party, when his brother landed an army in 1101, with a view of asserting his claim to the crown. Actual hostilities were pre¬

vented by Anselm, who induced Robert to ac¬ cept a pension; and it was agreed that in the event of the death of either of the brothers without issue, the other should succeed to his dominions. He subsequently invaded Nor¬ mandy, and in 1106 took Robert prisoner and reduced the whole duchy. His usurpation of Normandy involved him in continual war, but although William, son of Robert, escaped out of custody, and was assisted by the king of France, Henry maintained possession of the duchy. His only son William was drowned in 1120 in returning from Normandy, and Henry was stricken with grief. He married his only daughter, Matilda, to the Emperor Henry V, and when she became a widow married her a second time to. Geoffrey Plantagenet, son of the Count of Anjou. Henry was succeeded by Stephen. Consult Davis, (England under Nor¬ mans and

Angevins) (1905); Freeman, his¬ tory of the Norman Conquest (1879); and Norgate, (England under the Angevin Kings*

1887). 6

HENRY II, king of England, the first of the line of the Plantagenets : b. Normandy, 1133; d. Castle of Chinon, near Saumur, France, 6 July 1189. He was the son of Geoffrey, Count of Anjou, and the Empress Matilda, daughter of Henry I. He was invested with the duchy of Normandy, by the consent of his mother, in 1150. The next year he succeeded his father in the possession of Anjou and Maine, and by a marriage with Eleanor of Guienne, just divorced from Louis VII, king of France, annexed that province with Poitou to his other dominions. He succeeded Stephen as king of England in 1154. Although involved with his brother Geof¬ frey, .who attempted to seize Anjou and Maine, and in a temporary dispute with France, he reigned prosperously till the memorable con¬ test with Thomas Becket. Anxious to dom¬ inate the clergy, Henry in 1164 summoned a general council of nobility and prelates at Clarendon, which assembly passed the famous constitutions named from that place, the effect of which was to render the Church and ecclesi¬ astical dignitaries subject to the temporal au¬ thority. (See Clarendon, Constitutions of) After the murder of Becket, Henry receded from his position and restored the Church to its rights. . Before this matter was terminated, Henry, in 1171, undertook an expedition into Ireland, and having left Earl Richard in the post of seneschal of Ireland he returned to England — proceedings so important to the future destinies of both countries having occu¬ pied only a few months. Being an indulgent father, Henry had assigned to each of his four sons a provision out of his extensive territories. The eldest son, Henry, was not only declared heir to England, Normandy, Anjou, Maine and Touraine, but actually crowned in his father's lifetime. On paying a visit to the court of his father-in-law, Louis VII of France, the prince was induced by the French monarch to demand of his father the immediate resignation either of the kingdom of England or of the dukedom of Normandy. This request being refused, he withdrew from his father's court and was openly supported in his claim by Louis. Henry's various gallantries, exemplified in the popular and not altogether unfounded legend of fair Rosamond, or Rosamond Clifford, also em-

broiled him with his queen, Eleanor, who in¬ cited her other sons, Richard

and Geoffrey, to make similar claims. A general invasion of Henry's domimons was in this way concerted, and began in 1173 by an attack on the frontiers of Normandy, but the king presently subdued his opponents and entered into an accommoda¬ tion with his sons on less favorable terms than they had previously rejected. Henry now em¬ ployed himself in regulations and improvements which equally manifest his capacity and love of justice. He partitioned England into four judi¬ ciary districts, appointed itinerant justices to make regular excursions through them, revived trial by jury, discouraged that by combat, and demolished all the newly-erected castles as shelters of violence and anarchy. The turbu¬ lence of his sons still disquieted him ; but Henry, the eldest, was cut off by fever in 1183, and three years after the death of the equally rest¬ less Geoffrey occurred. Philip Augustus, then king of France, however, continued to foment the differences between Henry and his sons, and Richard was again prompted to rebel. A war followed, the event of which was so unfavor¬ able to Henry, that he was at length obliged to agree that Richard should receive an oath of fealty from all his subjects. He also stipulated to pay a sum of money to the French king, and to grant a pardon to all Richard's adherents. The mortification of Henry at these humiliating terms was aggravated to despair when he saw the name of his favorite son, John, at the head of the list of delinquents whom he was required to pardon. Henry II ranks among the greatest kings of England. His wisdom and love of justice were acknowledged by foreign poten¬ tates, who made him arbiter of their differences and regarded him as the first prince of the age. Consult Stubbs, (The Early Plantagenets) (1876) ; Green, Mrs. J. R., (Henry IP (1888) ; Norgate, (England Under the Angevin Kings) (1887) ; Davis, (England Under Normans and Angevins) (1905).

HENRY III, king of England : b. Win¬ chester, 1 Oct. 1207; d. Westminster, 16 Nov. 1272. He was the son of John, whom he suc¬ ceeded in 1216. As Henry approached to man¬ hood he displayed a character wholly unfit for his station. One of his first false steps was to discard his most faithful and able Minister, Hu¬ bert de Burgh. In 1236 Henry married Eleanor of Provence, which increased the dislike wh:ch his subjects already felt toward him; for she brought a train of foreigners to the court and encouraged her husband in extravagant courses which forced him to all kinds of oppressive ex¬ actions to raise money. He received frequent grants of money from Parliament, but always on condition of confirming the Great Charter, which had been extorted from King John. Henry at length raised the national discontent to such a pitch that the nobles rose in rebellion under Simon de Montfort, the Earl of Leicester, the husband of the king's sister; and in 1258 obliged the king to sign a body of resolutions which threw all the legislative and executive power into the hands of an aristocracy of 24 barons, assisted by a lower house consisting

of four knights chosen from each county. By the aid of his son Edward, Henry was gradually re¬ stored to authority; on which Leicester, call¬ ing in Llewellyn, Prince of Wales, involved

the kingdom in a civil war. The power of the barons was by this means partially re¬ stored ; but both parties agreed to abide by the award of Louis IX, king of France. This being favorable to the king, Leicester and th»e barons refused to submit to it, and a battle was fought near Lewes, in which Henry was taken prisoner and the person of Prince Edward also ulti¬ mately secured. A convention provided for the future settlement of the kingdom ; but in the meantime Leicester ruled without control. To him, however, was owing the first example of a genuine House of Commons in England ; for in a Parliament summoned by him in 1265, depu¬ ties from boroughs were sent, as well as knights of shires. Prince Edward at length escaped and, assembling an army, defeated Leicester's son. The decisive battle of Evesham (1265) quickly followed, in which Leicester himself was slain. Replaced upon the throne Henry re¬ mained as futile as ever. He died in the 64th year of his age, and the 56th of his reign, the longest in English history, except those of George III and Victoria. He was succeeded by his son, Edward I. Consult Davis, (England Under Normans and Angevins) ; Norgate, (The Minority of Henry IIP ; Stubbs, Constitutional History of England) ; Tout's (History of Eng¬ land, 1216— 1397> and (Lives of Simon de Mont¬ fort. y

HENRY IV, king of England, first king of the house of Lancaster : b. Bolingbroke, 3 April 1367 ; d. 19 March 1413. He was the eldest son of John of Gaunt, Duke of Lancaster; fourth son of Edward III by the heiress of Edmund, Earl of Lancaster, second son of Henry III. In the reign of Richard II he was made Earl of Derby and Duke of Hereford, and while bearing the latter title appeared in the Parliament of 1398 and preferred an accu¬ sation of treason against Mowbray, Duke of Norfolk. The latter denied the charge and offered to prove his innocence by single combat, which challenge being accepted, the king ap¬ pointed the lists at Coventry; but on the ap¬ pearance of the two champions at the appointed time and place, Richard would not suffer them to proceed. Both were banished the kingdom, Norfolk for life and Hereford for 10 years, shortened by favor to four, with the further privilege of immediately entering upon any in¬ heritance which might accrue to him. On the death of John of Gaunt in 1399 he succeeded to the dukedom of Lancaster, and laid claim, according to agreement, to the great estates at¬ tached to it; but Richard retained possession of the estates. The duke therefore, disregarding the unfinished term of his exile, landed with a small retinue at Ravertspur in Yorkshire, where he was quickly joined by the earls of North¬ umberland and Westmoreland, and soon found himself at the head of 60,000 men. Richard falling into the hands of his enemies, was brought to London by

the duke, who now be¬ gan openly to aim at the crown. A resignation was first obtained from Richard, who was then solemnly deposed in Parliament; and Henry unanimously declared lawful king under the title of Henry IV. The death of Richard soon removed a dangerous rival ; yet a short time only elapsed before the nobles rebelled against the king of their own creation. The first plot, in 1400, was discovered in time to prevent its

success, but an insurrection in Wales, under Owen Glendower, proved more formidable. That chieftain having captured Mortimer, Earl of March, who was descended from Lionel, Duke of Clarence, the second son of Edward III, and therefore the lineal heir to the crown, Henry would not suffer his relation, the Earl of North¬ umberland, to treat for his ransom. He thus offended that powerful nobleman, who, with his son, the famous Hotspur, soon after joined Glendower. The king met the insurgents at Shrewsbury, and a furious battle ensued, 21 July 1403, which ended in the death of Percy and the defeat of his party. A new insurrec¬ tion, headed by the Earl of Nottingham and Scrope, the archbishop of York, broke out in 1405, which was suppressed by the king's th:rd son, Prince John. The archbishop afforded the first example in this kingdom of capital pun¬ ishment inflicted upon a prelate. The rest of this king's reign was comparatively untroubled. Henry was succeeded by his son of the same name. Consult Wylies, (Henry IV) (4 vols., 1894-98) ; Ramsay, (Lancaster and York) (1892) ; Oman's (Political Historv of England, 1377— 1485 5 (1906); and Stubbs, c Constitutional History of England.)

HENRY V, king of England: b. Mon¬ mouth, 19 Aug. 1387 ; d. Vincennes, France, 31 Aug. 1422. He succeeded his father, Henry IV, in 1413. His dissipated youth, and fondness for joviality and low company, gave his father much uneasiness ; but circumstances occurred, even in the midst of his wildness, which showed that better principles were latent in his mind. His conduct when he ascended the throne justified the best expectations. The circumstances of France, torn asunder by the opposing factions of the dukes of Orleans and Burgundy, afforded a tempting opportunity to an ambitious neigh¬ bor, and Henry was easily induced to revive the claims of his predecessors upon that country. He accordingly assembled a great fleet and army and landed near Harfleur, 14 Aug. 1415. He took that town after a siege which so much re¬ duced his army that he was advised to return to England by sea. But Henry determined to march on Calais, and on his way was met on the plain of Agincourt by a French army 10 times as numerous as his own. A battle took place there on 25 October, in which the French host was totally defeated, with a comparatively trifling loss on

the side of the English. In 1417 the liberal grants of the Commons enabled Henry once more to invade France with 25,000 men. By the famous Treaty of Troyes (21 May 1420), Henry engaged to marry the Prin¬ cess Catharine and to leave Charles in posses¬ sion of the crown on condition that it should go to Henry and his heirs at his decease, and be inseparably united to the crown of Eng¬ land. Henry, after espousing Catharine, took possession of Paris and then went over to Eng¬ land to raise recruits for his army. All his great projects seemed about to be realized, when he was attacked by a disease which car¬ ried him off at the age of 34, and in the 10th year of his reign. He was succeeded by his son, Henry VI. Henry V, as the gallant, youth¬ ful and successful conqueror of France, is a favorite name in English history; but he was inferior in wisdom and solid policy to many of his ancestors. Consult Kingsford, < Henry

V) (1911), and Oman, (Political History of England, 1377-1485> (1906).

HENRY VI, king of England: b. Wind¬ sor, 6 Dec. 1421 ; d. London, 21 May 1471. He was crowned at Westminster in November 1429 and at Paris in December 1430. As he was not nine months old at the death of his father, Henry V, John, Duke of Bedford, a brother of the late king, was appointed regent of France; and Humphrey, Duke of Gloucester, another brother of the same, protector of the realm of England, with a council at his side appointed by Parliament. A few weeks after Henry's succession, Charles VI of France died, when, according to the provisions of the Treaty of Troyes, Henry was proclaimed king of France. But the French did not quietly sub¬ mit and a war began, at first favorable to the English, but in the end, after they had been roused to more effectual efforts by the heroism of Joan of Arc (q.v.) (1428-30), resulted in the almost total loss to the English of their possessions in France. In 1453 nothing re¬ mained to them in that country but Calais. In April 1445, Henry married Margaret of Anjou, daughter of Rene of Provence. Two years later the Earl of Suffolk acquired the chief power in the kingdom and was created first marquis and then duke. His government was very unpopular, which caused the people to look to the claim of Richard, Duke of York. The insurrection of Cade followed and the Duke of York was by Parliament declared protector of the kingdom. The York and Lancaster par¬ ties were now in such a state that- the sword only could decide between them; and that course of civil contention commenced, the first bloodshed jn which occurred at Saint Albans in A/lay 1455, and as far as the reign of Henry was concerned, the last in the battle of Tewkes¬ bury in 1471. When the latter took place the king was a prisoner in the Tower, where he soon after died, but whether by a natural or violent death is uncertain. Henry was gentle, pious and well-intentioned, but weak. Eton College reveres Henry as its founder, as does likewise King's College, Cambridge. Consult Gairdner, (ed.), ; Oman ™J'cal

History of England, 1377-1485)

(1 X)6) , and Stubbs, (Constitutional History of England) (Vol. Ill, 1895) ; Vickers, (England in the Later Middle Ages (New York 1914).*

HENRY VII, king of England, first sov¬ ereign of the house of Tudor: b. Wales, 28 Jan. 1457; d. Richmond, Surry, 22 April 1509. He was the son of Edmund, Earl of Richmond, son of Owen Tudor and Catharine of France! widow of Henry V. His mother, Margaret, was the only child of John, Duke of Somerset, grandson of John of Gaunt. After the battle of Tewkesbury he was carried by his uncle, the Earl of Pembroke, to Brittany, to seek refuge in that court from the jealousy of the victori¬ ous house of York. On the usurpation of Richard the young Earl of Richmond was natu¬ rally turned to as the representative of the house of Lancaster. In 1485 Richmond landed at Milford Haven, where he was immediately joined by some leaders of rank, but had only 6,000 men when Richard met him at Bosworth, with an army twice as numerous in appearance ; but the defection of Lord Stanley with his forces, who joined Richmond during the battle,

obtained for the latter a complete victory. Henry was proclaimed king on the field of battle, and his right was subsequently recog¬ nized by Parliament. In 1486 he married Eliza¬ beth, daughter of Edward IV and heiress of the house of York, and thus united the claims of the rival houses of York and Lancaster. The reign of Henry VII was troubled by repeated insurrections. The project of France for an¬ nexing the province of Brittany, by marriage with the heiress, induced Henry to declare war, but his measures were so tardy and parsi¬ monious that the annexation was effected. He then raised large sums on the plea of the necessity for hostilities ; and landing a numer¬ ous army at Calais in 1492, almost immediately accepted a large compensation for peace. The Duchess-dowager of Burgundy, governess of the Low Countries, now advocated the cause of Perkin Warbeck, a youth who gave himself out to be Richard Plantagenet, the younger of the two sons of Edward IV, supposed to have been murdered in the Tower of London, and the justice of his claim has been maintained even by some historians of a recent date. The duchess professed to be satisfied with the proofs of his identity, and acknowledged him as her nephew. He was so far successful as to secure a large following, with which he marched to Taunton; but there his heart failed him and he fled. Captured by Henry he confessed himself an impostor and was sent to the Tower, where he became acquainted with the Earl of War¬ wick and

persuaded him to accompany him in an attempt to escape. They were both retaken and Warwick was recommitted to the Tower and Perkin Warbeck hanged at Tyburn (1499). Soon after the king ordered the Earl of War¬ wick also to be executed. After a long negotia¬ tion he brought about a match between the Infanta Catharine, daughter of Ferdinand of Aragon and of Isabella of Castile, and his eldest son Arthur; and on the death of the latter, in order to retain the dowry of this princess, caused his remaining son Henry to marry the widow by Papal dispensation, an event which, in the sequel, led to a separation from the see of Rome. He married his eldest daughter to James IV, king of Scotland, from which union there ultimately resulted the union of the two crowns. His reign was, upon the whole, beneficial to his country. Being con¬ ducted upon pacific principles it put a period to many disorders and gave an opportunity to the nation to flourish by its internal resources. His policy of depressing the feudal nobility, which proportionably exalted the middle ranks, was highly salutary; and it was especially ad¬ vanced by the statute which allowed the break¬ ing of entails and the alienation of landed es¬ tates. It was under the patronage of Henry VII that John Cabot made his voyage of 1497 and discovered the North American continent. Consult Bacon's (History of Henry VIP (ed. by Lumby, 1881) ; Gairdner's (Henry VIP (1889) ; and (Lives, J by Pollard (1913-14) and Temperley (1914).

HENRY VIII, king of England : b. Green¬ wich, 28 June 1491 ; d. Westminster, 28 Jan. 1547. He succeeded his father, Henry VII, in 1509. His disposition for show and magnifi¬ cence soon squandered the hoards of his pre¬ decessor. James IV, king of Scotland, made

an incursion with a numerous body of troops into England, and was completely defeated and slain at the battle of Flodden Field (1513). Henry, however, granted peace to the queen of Scotland, his sister, and established an influence which rendered his kingdom long secure on that side. The aggrandizement of Cardinal Wolsey now began to give a leading feature to the conduct of Henry, that prelate being ap¬ pointed chancellor in 1515. His favor was now sought by Maximilian I, emperor of Germany, who hoped to secure the support of England against France, and as Wolsey was at first neglected by the French king the German em¬ peror gained his point; but when Maximilian was succeeded by Charles V, hereditary king of Spain as well as emperor of Germany, Francis I, king of France, found it expedient to gain Wolsey, and entered into an amicable correspondence with them. In order to cement this new friendship the two monarchs had an interview near Calais, the magnificence of which gave the place of meeting the denomina¬ tion of the Field of the Cloth of Gold (1520). Notwithstanding these indications, a prospect of the papacy being artfully held out to the cardinal by the young Emperor Charles, his in¬ terest at length gained a preponderance in the English councils. The principles of the

Ref¬ ormation were now making rapid strides. Henry himself wrote a Latin book against the tenets of Luther, which he presented to Pope Leo X, who favored him in return with the title of defender of the faith, a title by which, curiously enough, English sovereigns are still styled. After being married to Catharine for about 18 years, Henry began to feel some scruples as to the validity of the marriage, on the ground that she had previously been his brother's wife, and his scruples were no doubt increased by the fact of his having conceived a passion for Anne Boleyn, one of the queen's maids of honor. He accordingly applied in 1527 to Pope Clement VII for a divorce, and the Pope appointed Cardinals Wolsey and Campeggio to try the case. Wolsey had at first been favorable to the project of a divorce, but when he perceived the desire of Henry to marry Anne Boleyn, fearing that this marriage would result in winning over Henry to the side of the reformers, since Anne Boleyn's friends belonged to that party, he did all in his power to prolong the inquiry, until the commission was at last withdrawn and it was decided by the Pope that the case should be tried at Rome. This procrastination on Wolsey's part led to his own ruin. Henry, disgusted at these delays, eagerly caught at the advice of Thomas Cran-mer (q.v.), afterward archbishop of Canter¬ bury, to refer the case to the universities, from whom he got the decision desired. In May 1533 his marriage with Catharine was declared null, and as he had by that time privately mar¬ ried Anne Boleyn, this second marriage was a few days later declared lawful. As these de¬ cisions were not recognized by the Pope, an act of Parliament was obtained in the follow¬ ing year (1534), setting aside the authority of the chief pontiff in England, which was fol¬ lowed by another in 1535 declaring Henry the supreme head of the Church. Thus was effected the great revolution by which, ip ecclesiastical annals, this reigli is so much distinguished. The birth of a daughter by the new queen produced

a bill for regulating the succession, which set¬ tled it on the issue of this marriage, and de¬ clared the king's daughter by Catharine illegiti¬ mate. But although Henry discarded the au¬ thority of the Roman Catholic Church, he ad¬ hered to its theological tenets. While he executed Bishop Fisher and Sir Thomas More (who had been appointed chancellor after the fall of Wolsey) in 1535, for refusing the oath of supremacy, he displayed an aversion to the principles of the reformers and brought many of them to the stake. Finding that the monks and friars in England were the most direct advo¬ cates of the papal authority, he suppressed the monasteries by

act of Parliament. The fall of Anne Boleyn was, however, unfavorable for a time to the reformers. Henry then married Jane Seymour, and the birth of Prince Edward in 1537 fulfilled his wish for a male heir, al¬ though his joy was abated by the death of the queen. Henry now resolved to marry again, and Thomas Cromwell, a Protestant, who had succeeded More as first minister, recommended Anne of Cleves. The marriage took place in January 1540, and Henry created Cromwell Earl of Essex; but his dislike to his new wife hastened the fall of that minister, who was condemned and executed upon a charge of treason. At the same time Henry procured from the convocation and Parliament a divorce from Anne of Cleves. He then married Catharine Howard, niece to the Duke of Nor¬ folk; but Henry found that his new queen, of whom he was very fond, had proved false, and on further inquiry her conduct before marriage was discovered to have been loose and criminal. She was therefore accused and brought to the block in 1542. In 1543 he married his sixth wife, Catharine Parr, widow of Lord Latimer, a lady of merit, secretly inclined to the Reformation.

Henry was succeeded by his son, Edward VI. The complete union of Wales with Eng¬ land, and the conversion of Ireland into a kingdom, date from the reign of Henry VIII.

Consult Histories of England by Lingard (1854-55) ; Froude (1870) ; and Green (1879 and 1884) ; also Brewer, (History of the Reign of Henry VIII to the Death of Wolsey5 (1884); Dixon, (History of the Church of England from the Abolition of the Roman Jurisdiction 5 (1884-91) ; Froude, (The Divorce of Catharine of AragoiP (1891) ; Gairdner, (The English Church in the 16th Century5 (1902) ; Hume, (The Wives of Henry VHP (1905), and monographs by Creighton (1888), and Pollard (1902). The (Letters and Papers, Foreign and Domestic,5 for his reign, which are the principal sources, were published in 21 volumes, between 1862 and 1910.

HENRY I, king of France: b. 1005; d. Vitri, 4 Aug. 1060. He was the third son of Robert II. He succeeded in 1031. His reign was a continuous series of difficulties with the nobility and with the growing power of the clergy. His younger brother, Robert, led a re¬ volt against him, but this he suppressed with the aid of Duke Robert of Normandy. Consult Lavisse, (Histoire de France5 (Vol. II, 1901).

HENRY II, king of France: b. Saint Gcrmain-en-Laye, 31 March 1519; d. 10 July 1559. He succeeded his father, Francis I, 31 March 1547. He severely persecuted the

Huguenots, and was involved in wars with the Emperor Charles V and Philip II of Spain. The Constable de Montmorency was defeated at Saint Quentin (10 Aug. 1557); the Marshal de Thermes at Gravelines (13 June

1558) ; and the Peace of Cateau-Cambresis (3 April 1559) lost to France most of the advantages previ¬ ously gained. Henry was a monarch of slight capability, despite his regal bearing. Consult Williams, H. N., (Henri II: His Court and Times5 (1911).

HENRY III, king of France: b. Fontaine¬ bleau, 19 Sept. 1551 ; d. by assassination Saint Cloud, 2 Aug. 1589. He was the third son of Henry II. He fought, as Duke of Anjou, against the Huguenots, was elected king of Poland in 1573 and crowned 15 Feb. 1574, but in June 1574 left Poland and succeeded his brother, Charles IX, as king of France. The Peace of Beaulieu (1576), confirmed by the Edict of Poitiers (1577), granted to the Hugue¬ nots so many privileges that the Holy League was formed, seeking openly Catholic supremacy and secretly the elevation of Henry of Guise to the French throne. When all privileges granted to Huguenots were repealed by the Edict of Nemours (1585) war broke out. Henry of Navarre was victor at Coutras, while Henry of Guise drove the king from Paris. The king then caused the murder of Guise and Guise's brother, the cardinal of Lorraine, in conse¬ quence of which the doctors of the Sorbonne absolved the people from obedience to him. He then joined cause with Henry of Navarre, with whom he marched against Paris ; but in camp at Saint Cloud was stabbed by Jacques Clement, a fanatical Dominican, 1 Aug. 1589. Henry III was the last of the branch of Orleans- Angouleme of the stock of the Valois. Con¬ sult Armstrong, (The French Wars of Religion5 (1892), and Freer, (Henri III: His Court and Times5 (1858).

HENRY IV, known as Henry of Na¬ varre, king of France: b. Pau, 13 Dec. 1553; d. 14 May 1610. He was a son of Anthony of Bourbon, Duke of Vendome, and of Jeanne d'Albret, daughter of Henry, king of Navarre, and herself afterward queen of Navarre. Educated by his mother in the Calvinistic faith, he early joined, at her wish, the Protestant army of France, and served under Admiral Coligny. In 1572 he married Margaret of Va¬ lois, sister of Charles IX, and after the mas¬ sacre of Saint Bartholomew, which took place during the festivities in connection with this marriage, adopted the Roman Catholic creed. For the next four years he was compelled to reside in Paris, but 3 Feb. 1576 succeeded in making his escape, and after retracting, at Tours, the abjuration of Calvinism which he had made at Paris, put himself at the head of the Huguenots and took a leading part in all the subsequent religious wars. He occupied a still more important position when, in 1584, the death of the Due d' Anjou, brother of the king (Henry III), made him presumptive heir to the Crown as descended from Robert, Count of Clermont, the sixth son of Louis IX. Re¬ jected by the Roman Catholic party and the League as a heretic, Henry found himself obliged to resort to arms to assert his claims. On 20 Oct. 1587 with an inferior force he de-

feated the army of the League at Coutras. In 1589 he became king through the assassination of Henry III (q.v.), but found innumerable difficulties in establishing his claims. His Protestant religion was brought forward by all the competitors to prejudice the Catholics against him. At the head of the opposite party stood the Duke de Mayenne. Philip II of Spain also claimed the French throne and sent aid to the League. Henry IV defeated his enemies in the celebrated engagement of Ivry (14 March 1590). In consequence of this vic¬ tory Paris was besieged, and Henry IV was upon the point of compelling the citizens to surrender by famine, when the Spanish gen¬ eral, Alexander, Duke of Parma, by a skilful maneuver, obliged him to raise the siege. Con¬ vinced that he should never enjoy quiet pos¬ session of the French throne without profess¬ ing the Catholic faith, Henry at length yielded to the wishes of his friends, was instructed in the doctrines of the Roman Church, and pro¬ fessed the Catholic faith, 23 July 1593, in the church of Saint Denys. He was anointed king at Chartres in 1594, and entered the capi¬ tal amid the acclamations of the people. He quickly brought France entirely into subjec¬ tion, and concluded the war against Spain in 1598 by the Peace of Vervins, to the advan¬ tage of France. The same year was signalized by the granting of the Edict of Nantes, which secured to the Protestants entire religious lib¬ erty and freed them from all political disabili¬ ties. Henry made use of the tranquillity which followed to restore the internal prosperity of his kingdom, and particularly the wasted fi¬ nances. In this design he was so successful, with the aid of his prime minister Sully, that the national debt of 350,000,000 livres was di¬ minished by 125,000,000, and 41,000,000 livres were laid up in the treasury. As Henry was riding through the streets of Paris he was stabbed by the fanatic Ravaillac.

The great benefits which Henry IV be¬ stowed upon France entitle him to the designa¬ tion which he himself assumed at an assembly of the Notables at Rouen in 1596, the Regen¬ erator of France. His benevolent mind, his paternal love for his subjects, his great achieve¬ ments, his heart, always open to truth, though it exposed his own faults, have preseiwed his memory in the hearts of the nation. To the end of his life he had to contend against the governors of provinces, Protestant as well as Catholic, who had rendered themselves almost independent under the last kings of the house of Valois. Many of the acts of his internal government show that, while he aimed at re¬ storing the prosperity of the nation by encour¬ aging agriculture, commerce and manufactur¬ ing industries, he was determined by all means in his power to strengthen the authority of the Crown. In his foreign policy Henry IV re¬ vived the projects of Francis I and Henry II

against the house of Austria, and re-established the influence of France in the Catholic states of Italy. He supported Holland in its revolt against Spain ; allayed the bitterness of feeling between the Lutherans and the Calvinists, and induced them to form the Evangelical Union. Consult Burton, (The Fate of Henry of Na¬

varre) (1911) ; Lacombe, (FIenri IV et sa Poli- tique) (1878) ; Perefisce, (Memoirs of Henri IV} (Eng. trans., 1904) ; Poirson, (Histoire du regne de Henri IVJ (1862-67) ; Willert, (Henry of Navarre and the Huguenots in France) (1893).

HENRY V (of France). See Chambord, Comte de.

HENRY I, emperor of Germany: b. about 876; d. Memleben, 2 July 936. He was the son of Otho I, the Illustrious, Duke of Saxony, who had refused the regal dignity offered him in 912. Henry, on' the death of his father, be¬ came Duke of Saxony and Thuringia. He was chosen king of the Germans by the Franks and Saxons, April 919, at Fritzlar. The surname der Finkler or der Vogler (the Fowler), sometimes applied to him, did not arise until the 12th century, and is based upon the unau- thentic legend that the princes who notified him of election found him at fowling. He subdued Duke Giselbert of Lorraine, and in 924 concluded with the Hungarians a nine- years' treaty of peace, with the condition that he should pay a yearly tribute. This tribute he finally refused (933), whereupon the Hun¬ garians invaded his realm with two large armies which he defeated, the one near Got¬ tingen, the other at Riade (Riethenburg) . In 934 he waged a victorious contest against the Danes. He thoroughly reorganized the German defensive military system, built fortified cities and fortified others. Though he did not tech¬ nically possess the title of emperor, he was the real founder of the mediaeval German empire, and is recognized as a wise ruler and skilful military leader.

HENRY II, the Lame, emperor of Ger¬ many : b. 6 May 973 ; d. Grona, near Gottingen, 13 July 1024. He was the last of the Saxon line, a son of Henry the Quarreler of Bavaria, and great-grandson of the Emperor Henry I. He inherited Bavaria on the death of his father in 995. On' the death of Otho III in the be¬ ginning of 1002 he laid claim to the kingdom, and was crowned at Mainz 7 June. He was for a time busily occupied in wars with Duke Boleslav II of Bohemia, the Margrave Henry of Schweinfurt, and the Margrave Ernest of Austria. In 1004 and 1013 he was obliged to make expeditions to Italy, where Arduin of Ivrea was twice chosen king. Having thor¬ oughly defeated his opponent, he was invested with the imperial insignia at Rome by Pope Benedict VIII, 14 Feb. 1014. His somewhat protracted struggle with Boleslav of Poland ended without any considerable success. At the call of the Pope he fought against the Greeks in lower Italy.

For his zeal in the in¬ terests of the Church he was canonized by Eugenius III in 1146. Consult Cohn,

(1874).

HENRY III, variously surnamed the Old, the Black, and the Pious, emperor of Ger¬ many: b. Osterbeck, Netherlands, 28 Oct. 1017: d. Botfeld, 5 Oct. 1056. He was the second of the house of the Salian Franks, son of the Emperor Conrad II, whom he succeeded in the

imperial dignity 1039. He had already been chosen king in 1026. He weakened the power of the nobles by keeping the great fiefs when they became vacant for himself or members of his family, or by bestowing them upon less powerful nobles than had previously possessed them. He also extended the power of the em¬ pire by forcing the Duke of Bohemia in 1042, and the king of Hungary in 1044, and again in 1047, to accept their dominions as imperial fiefs. His influence was paramount in Italy, espe¬ cially in the south, where the Normans in Apulia and Calabria paid homage to him as their feudal chief. On the occasion of his first visit to Italy (1046) he put an end to the contention between Benedict IX, Sylvester III and Gregory VI for the papacy, causing them all to be deposed, and Suitger, bishop of Bam¬ berg, to be elected in their stead with the title of Clement II. His efforts were now directed toward rooting out the evils which were rife among the clergy, but not less toward securing the permanence of the influence of the empire over the See of Rome. Henry III was not only a powerful ruler, but also a patron of arts and sciences. He founded numerous schools in connection with the monasteries and built the cathedrals of Worms, Mainz and Spiers. Consult Steindorff, (Jahrbucher des deutschen Reichs unter Heinrich IIP (1874—81).

HENRY IV, emperor of Germany: b. 11 Nov. 1050; d. Liege, 7 Aug. 1106. He was the son of Henry III. He was crowned at Aix-la- Chapelle in 1054. His reign was from the first disturbed by contests with his vassals. The Saxons joined with the inhabitants of Thurin¬ gia, drove Henry from Saxony (1073), and de¬ stroyed many of the castles which he had built to overawe the inhabitants. But some churches having been destroyed by the populace, Henry accused the Saxons to the Pope of sacrilege and thus gave him an opportunity to interfere as umpire. The Saxons offered to make every satisfaction; but Henry suddenly invaded their territory with a powerful army, and attacked them 9 June 1075, at Hohenburg, on the Un¬ strut, where they suffered a total defeat. He imprisoned nobles and

ecclesiastics, and aroused the attention of the papacy. Gregory VII (Hildebrand), who had been elevated to the papal chair some years before without the con¬ sent of the imperial court, eagerly seized this opportunity to challenge Henry's usurpation of the power of investing bishops with the spirit¬ ual insignia of office, and in December 1075 presented to the king a list of charges and de¬ manded proofs of obedience to the Church. Henry then' instigated the bishops, assembled by his order at Worms, to renounce their obe¬ dience to the Pope (24 Jan. 1076). Gregory, however, pronounced the sentence of excommu¬ nication against him (22 Feb.), and absolved his subjects from their allegiance, and Henry soon found himself deserted. In this state of affairs he was obliged to go to Italy and make his submission to the Pope. He found Greg¬ ory at Canossa, not far from Reggio, a strong castle belonging to Matilda, countess of Tus¬ cany, whither he had retired for security. Three days successively, in the depth of win¬

ter, Henry appeared in a penitential dress in the court of the castle, before the intercession of Matilda obtained for him an audience of the Pope (28 Jan. 1077), when he was released from the sentence of excommunication only upon submitting to the most humiliating condi¬ tions. Some of the Italian princes, who had long been dissatisfied with Gregory and were desirous of deposing him, gathered round Henry, who was not disposed to fulfil the hard conditions imposed upon him, and offered him their assistance. The German princes, how¬ ever, at the instigation of the Pope, assembled at Forchheim in 1077, and elected Rudolf, Duke of Swabia, king. Henry hastened back to Ger¬ many and overcame his rival, who lost his life in battle at Merseburg in 1080. Gregory again excommunicated Henry; but at the councils of Brixen and Mainz in 1080, the Pope was de¬ clared deposed by the German bishops as a heretic and a sorcerer, and Guibert, archbishop of Ravenna, set up in his place, with the title of Clement III. In 1081 Henry marched into Italy to take vengeance on Gregory, and ap¬ peared at Easter before Rome. He was not able in that year, however, to pursue the siege of the city, which did not fall into his hands till 1084. He was forced by a conspiracy of the majority of the nobles, led by his son, Henry V, to abdicate at Ingelheim 31 Dec. 1105. Consult von Kronan, (Jahrbucher des deutschen Reiches unter Heinrich IV and Heinrich V>

(1890-1909).

HENRY V, emperor of Germany: b. 8 Jan. 1081 ; d. Utrecht, 23 May 1125. He was the son and successor of Henry IV. He was crowned emperor in 1111. His reign was con¬ tinually disturbed by troubles with the papacy. He was excommunicated no less than four times, and finally in the concordat of Worms (23 Sept. 1122) conceded the advantage to the Pope.

He also carried on wars with Flanders, Hungary, and Poland, and with various German nobles. He was the last of the Salic or Frank¬ ish family of emperors, which was succeeded by the Swabian house. Consult von Kronang, (Jahrbucher des deutschen Reichs unter Hein¬ rich IV and Heinrich V> (1890-1909).

HENRY VI, the Cruel, emperor of Ger¬ many: b. 1165; d. Messina, 28 Sept. 1197. He was the son of Frederick I (Barbarossa), was crowned king in 1169, and succeeded his father as emperor in 1190. He was involved in wars in Italy to assure his possessions there. It was during his reign that Richard Cceur de Lion returning from Palestine, was imprisoned by Leopold of Austria and surrendered to the em¬ peror, who exacted a heavy ransom. Consult Toch,_

HENRY VII, of Luxemburg, emperor of Germany: b. 1269; d. Buonconvento, Italy, 24 Aug. 1313. He was son of the Count of Luxem¬ burg, and was chosen king of the Romans, 27 Nov. 1308, and crowned at Aix-la-Chapelle, 6 Jan. 1309. In 1311 he received the iron crown of the Lombards, and 29 June 1312 was crowned emperor at the Lateran. His march into Italy at the head of a Ghibelline army (October 1310) was hailed by Dante, who did homage at some time and place unknown. His sudden

death immediately after reception of the Eu¬ charist led to the unfounded rumor that he had been poisoned.

HENRY, prince of Portugal, surnamed the Navigator: b. 4 March 1394; d. 13 Nov. 1460. He was a grandson of old John of Gaunt; nephew of Henry IV of England; and great- grandson of Edward III. His father, King Joao or John, who formed a close English con¬ nection by marrying Philippa of Lancaster, was the first king of the house of Avitz, under which Portugal, for 200 years, rose to its high¬ est prosperity and power. The career of Portugal in exploration and discovery, due to the genius and devotion of Prince Henry, his biographer characterizes as ((a phenomenon without example in the world's history, result¬ ing from the thought and perseverance of one man.® Prince Henry had become one of the first soldiers of his age when, in 1420, he re¬ fused offers of military command, and under¬ took to direct, at Sagres (the extreme point of land of Europe looking southwest into the At¬ lantic Sea of Darkness), plans of exploration of the unknown seas of the world lying to the west and south. His idea was to overcome the difficulties of the worst part of that im¬

mense world of storms, that lying west of Africa, and thereby get round Africa to the south and sail to India, and China, and the isles beyond India. Every year he sent out two or three caravels ; but his great thought and in¬ domitable perseverance had yielded only < (twelve years of costly failure and disheartening ridi¬ cule,® when, in 1434 the first great success was achieved by Gil Eannes, that of sailing beyond Cape Bojador. Prince Henry made his seat at Sagres, one of the most desolate spots in the world, a school of navigation, a resort for ex¬ plorers and navigators. His contemporary Az- urara says of him : C(Stout of heart and keen of intellect, he was extraordinarily ambitious of achieving great deeds. His self-discipline was unsurpassed ; all his days were spent in hard work, and often he passed the night with¬ out sleep; so that by dint of unflagging industry he conquered what seemed to be impossibili¬ ties to other men. His household formed a training-school for the young nobility of the country.® Consult

HENRY, prince of Prussia (Heinrich Albert Wilhelm) German naval officer: b. Potsdam, 14 Aug. 1862. He is a brother of Emperor William II, and married Princess Irene, daughter of the late Grand Duke Lud¬ wig IV, of Hesse, in 1888. He was educated in the Gymnasium at Kassel (1875-77) and at the Marine Academy (1884-86). He succeeded vice-admiral von Diederichs in command of the German fleet in Chinese waters, in March 1899, became admiral in 1901, chief of the active battleship fleet in 1906. He traveled around the world in 1878-80, and visited the United States in 1882-84, and again in 1902. In January 1902, Emperor William requested that the President's daughter, Alice, should christen the royal yacht then building in the United States. After re¬ ceiving the consent of President Roosevelt, the emperor informed the President that he had ordered his yacht, the Hohenzollern, to be present at the ceremony, and had appointed his

brother, Admiral Prince Henry of Prussia, to represent him on the occasion. The prince arrived in New York city on 23 February and left on 12 March, after receiving many national, municipal and social honors. He traveled in South America in 1914, and at the outbreak of the European War in the same year he held the chief command of the German fleet.

HENRY, surnamed The Lion, Duke of Saxony and Bavaria: b. Ravensburg, 1129; d. Brunswick, 6 Aug. 1195. He was the son of Henry the Proud and the head of the Guelphs. He greatly enlarged his domains, and so in¬ creased in power as finally to become a danger¬ ous rival of the emperor Frederick I, Barba- rossa. His refusal to support Frederick was among the chief causes of the latter's defeat at Legnano (29 May 1176). He was summoned to appear at three Diets, and, having failed to attend was placed under the Imperial ban (1180). Later he was allowed to retain Liine- burg

and Brunswick upon condition of going for three years into exile. He was finally reconciled with Henry VI.

HENRY, Alexander, American traveler: b. New Brunswick, N. J., August 1739; d. Montreal, 4 April 1824. He joined the Cana¬ dian expedition under Amherst against the French (1760) and when peace followed he went to Michilimackinac and engaged in the fur trade. After the massacre of the English by the Indians in that place he, being one of the few survivors, remained a captive among the Ojib- ways at Sault Sainte Marie for 12 months, when he escaped and resumed the fur trade. In the pursuit of this business he traveled between Montreal and the Rocky Mountains, the literary result of which was a remarkable book, (Travel and Adventures in Canada and the Indian Ter¬ ritories between the years 1760 and 1776, } pub¬ lished at New York in 1809. He interested him¬ self in the copper mines on Lake Superior and for many years made an effort to establish a company for their exploitation. Consult Bain's edition of the (Travels and Adventures> (Toronto 1901) ; and Ginnell, (Trails of the Pathfinders5 (1911).

HENRY, Edward Lamson, American painter: b. Charleston, S. C., 12 Tan. 1841: d. 9 May 1919. He studied first at the Philadelphia Academy and in 1860 went to Paris where he studied for three years under Saisse and Cour¬ bet. In 1869 he was elected a member of the National Academy. He frequently revisited Eu¬ rope for the purpose of sketching the scenery, al¬ though his specialty was domestic genre and his¬ tory. In the Albany Historical Society building is one of his most characteristic pictures, which shows his careful grouping of figures, his at¬ tention to detail as well as the stiffness of his drawing and his deficiency in the sense of color which recalls Wilkie, whose swing and move¬ ment he lacks, though he exhibits some of the humor of the Scottish master. The picture re¬ ferred to is a crowded canvas of 63 figures with the title Unitial Excursion of the First Rail¬ way Ever Constructed in New York State.5 Among his historical pictures the best are (Battle of Germantown,5 owned by William Astor; declaration of Independence,5 owned by J. W. Drexel; deception to Lafayette5 ; (The Return of the First Congress5 ; (City Point,

*Grant's Headquarters) ; (In Sight of Home/ and (Waiting for an Answer.**

HENRY, Guy Vernon, American soldier: b. Fort Smith, Indian Territory, 1839; d. Ponce, Porto Rico, 1899. He was graduated at West Point 1861, and went to the front in the Civil War, taking part in four years of the

hardest fighting, from Bull Run to Cold Harbor. At 23 he was commissioned colonel of the 40th Massachusetts volunteers. After the Civil War he was transferred to the 3d cavalry, and in 1874 was in Arizona. He continued his Indian campaign, though severely wounded on one oc¬ casion, and compelled to be invalided. He served through the outbreak of the Sioux in 1890, and was also on service at Porto Rico during the Spanish- American War, where he died of typhoid fever.

HENRY, Joseph, American physicist : b. Albany, N. Y., 17 Dec. 1797 ; d. Washington, D. C., 13 May 1878. He was educated at the Albany Academy, after graduation undertook the study of chemistry, anatomy and physiology with a view to adopting the medical profession. During the years 1824-25, he contributed occa¬ sional scientific papers to the Albany Institute, his especial subjects being chemistry and me¬ chanics, and was appointed assistant engineer on the survey instituted for a road between Lake Erie and the Hudson. In the spring of 1826 he was elected teacher of mathematics and natural philosophy in the Albany Academy and in the latter part of 1827 read a very important paper before the Albany Institute, (On Some Modifi¬ cations of the Electro-Magnetic Apparatus. 5 He made his first public demonstration of his mag¬ netic discoveries in exhibiting before the Insti¬ tute small electro-magnets wound with silk-cov¬ ered wire. These magnets had a greatly multi¬ plied lifting power over any that had yet been known. In this lay the essential point of his first discovery, for he was undoubtedly the ear¬ liest physicist to adopt insulated or silk-covered wire for the magnetic coil, and to employ spool winding for the limb of the magnet. He demon¬ strated also for the first time, by a very intelli¬ gent experiment, the difference of action in a quantity magnet excited by a quantity battery of a single pair, and an intensity magnet with a long fine wire coil excited by an intensity battery of many elements, having their resistances suit¬ ably proportioned. The first of these two forms was not capable of being employed for tele¬ graphic purposes, while the intensity magnets with their attachments could be so applied. The quantity magnets which he exhibited caused a good deal of excitement in the scientific world. Their attractive power was at that time quite unprecedented. One of them had sufficient power to raise as much as 3,500 pounds.

Henry was the first to show that iron could be magnetized at a distance, and to invent a suitable combination of magnet and battery for the production of this result. In 1831 he made this experimental demonstration. He suspended a mile of insulated copper wire round a chamber in the Academy, and so placed a bell at one ex¬ tremity of it that it was struck by the polarized armature of an intensity battery connected with the other extremity. This was the earliest ex¬ ample of the magnetic telegraph, for the gal¬ vanometer or needle had been the principle on

which all preceding experiments had been con¬

ducted. It was not long after that he invented a machine, and finally constructed it, which is recognized as the first electro-magnetic engine with automatic pole-changer. In 1832 after re¬ peated experiments he discovered how to give greater intensity to a magnetic discharge by the induction of a current on itself in a long spiral or helical wire. These progressive steps in mag¬ netic science gained for him an extended reputa¬ tion, and soon after the publication of the last experiment in Silliman's (American Journal of Science) Henry was elected professor of nat¬ ural philosophy in Princeton College. The dis¬ covery of the spiral or helical conductor sug¬ gested to him further experiments, and his extended researches and their results were an¬ nounced by him in a paper published 1834, under the title (On the Influence of a Spiral Conductor in Increasing the Intensity of Electricity from a Galvanic Arrangement of a Single Pair. He supplemented these discoveries by many others, and by his experiments produced electrical com¬ binations which were undoubtedly precursors of later relay and receiving magnets, while his dem¬ onstration of the conditions and range of in¬ duction from electrical currents, and the succes¬ sive orders of induction in the passage of fric¬ tional electricity, as well as his discovery of the oscillatory nature of electricity, paved the way for that great scientific and practical resolution which was to consummate by the genius of Morse and his confreres.*

In 1846 Henry was called to a new sphere of activity, in which he exhibited his usual zeal and enthusiasm. The Smithsonian Institution had just come into existence, and during the formative period of the great museum, he was appointed to be its secretary. The office did not so far engross his attention as to make him neglectful of practical work in science. He found time to investigate the acoustics of pub¬ lic buildings, meteorological changes of the at¬ mosphere and methods for telegraphic trans¬ mission of meteorological observation from all points of the continent. From 1868 up to his death he was president of the National Acad¬ emy of Sciences, and of the Philosophical So¬ ciety of Washington from 1871, when it was first organized.

HENRY, Matthew, English Nonconform-, ist clergyman : b. Broadoak, Flintshire, Wales, 18 Oct. 1662; d. Nantwich, Cheshire, 22 June 1714. In 1686, having qualified himself for the minis¬ try, he began to preach; and in the succeeding year he was settled as pastor to a congregation at Chester, and continued to discharge the duties of his office for 25 years, when he removed to Hackney, Lbndon, where his clerical labors were still more extended. Besides his greatest work, Expositions on the Bible) (1710), he was the author of (A Discourse on Schism ; (A Scrip¬ ture Catechism* ;*

HENRY, O. Nom de plume of William Sydney Porter (q.v.).

HENRY, Patrick, American orator and statesman : b. 29 May 1736, in Hanover County, Va., within a few miles of the birthplace of Henry Clay; d. 6 June 1799, in Charlotte County, Va. His father, John Henry, was a well-educated Scotchman, presiding judge of the Hanover court. He was a cousin of Wil¬ liam Robertson, author of the (History of the Emperor Charles the Fifth. > Another' relative

of his was Henry Brougham, the radical Scotch writer, who became lord chancellor of England. Of Patrick Henry's mother, <(a portly, hand¬ some dame,® a pleasing portrait is left us by William Byrd, of Westover, the genial littera¬ teur of colonial Virginia.

The schools were poor in his neighborhood, and Patrick seems to have profited little by them. From his uncle, the rector of the parish, he gained a rudimentary knowledge of the classics and mathematics. He was a frolicsome and vagrant youth, fond of hunting and frontier life in general. At 18 years of age, and without money or employment, he married Sarah Shel¬ ton, a poor girl of the neighborhood. He kept a store and failed ; he tried farming, and failed ; then he returned to the store, only to fail again. He now turned to law, and spent a few weeks in reading upon that subject. Haying received his license, he began to practise in his native county, while he assisted in the tavern kept by his father-in-law.

In 1763 Henry singled himself out as a born orator by his impassioned plea in ((The Parsons' Cause.® The king had annulled a statute of the Virginia burgesses, which compelled the clergy to accept the depreciated currency of the colony in payment of their annual salaries, in lieu of 16,000 pounds of tobacco as theretofore, a product which was then selling at a high price. Henry startled the court and the countryside by asserting (

Henry became a member of the House of Burgesses in May 1765, just at the time of the arrival of the Stamp Act. Unabashed by his rustic appearance and inexperience in legislative matters, he brought forward a series of resolu¬ tions to the effect ((that the general assembly of this colony have the only sole and exclusive right and power to lay taxes.® In the bloody debate which followed he was ((opposed by Randolph, Bland, Pendleton, Nicholas, Wythe, and all the old members, whose influence in the House till then had been unbroken,® so we learn from Jefferson, then a college student, who was present at the session of the burgesses. In pleading

the injustice of the Stamp Act, Henry used the famous words: (

Henry represented Virginia in the first colo¬

nial Congress, which met at Philadelphia 5 Sept. 1774, when he gave final expression to the feel¬ ing of nationality: ((The distinctions between Virginians, Pennsylvanians, New Yorkers, and New Englanders are no more. I am not a Vir¬ ginian, but an American,® With this speech compare Christopher Gadsden's remark nine years before at the Stamp Act congress in New York: ((There ought to be no New Eng¬ land men, no New Yorkers, known on the continent, but all of us Americans.®

On 23 March 1775, Henry, as a member of the second Virginia convention, which met in Saint John's Church, Richmond, moved that the colony be armed, and again electrified the patriots with his eloquence in support of this radical measure by the oft-quoted utterance : ((Gentlemen may cry peace ! peace ! — but there is no peace ! The war is actually begun ! The next gale that sweeps from the North will bring to our ears the clash of resounding arms ! Our brethren are already in the field ! . . . Is life so dear, or peace so sweet, as to be purchased at the price of chains and slavery? Forbid it. Almighty God ! I know not what course others may take ; but as for me give me liberty, or give me death!® Col. Edward Carrington, listening at a window in the east end of the church, was so transported by the eloquence of Henry, that he exclaimed, <(Let me be buried at this spot,® a wish that was respected at his death in 1810. Such was the universal testimony of those present as to the over¬ mastering effect of Henry's speech at that crisis.

On 5 Aug. 1775, Henry was made com¬ mander-in-chief of the Virginia troops. In May of that year he had made a dash against Lord Dunmore, on account of the governor's secret seizure of some powder belonging to the colony. Deeming himself slighted by the Committee of Public Safety, which acted during the interim as the executive of Virginia, Henry, with some heat, threw up his military commission, 28 Feb.

1776.

Fortunate was it for the colonial cause that Henry was again at liberty to exert his forensic powers in the councils of the State. Represent¬ ing Hanover County in the convention which met at Williamsburg 6 May 1776, he contributed greatly to the constructive work of that cele¬ brated body, notably the motion for a declara¬ tion of American independence and the framing of a constitution for Virginia. Among the con¬ vention papers in the State Library at Richmond were found three endorsed by the clerk, ((Rough Resolutions. Independence.® William Wirt Henry, after

minute comparison of the hand¬ writing of these, concluded that the first was penned by Patrick Henry; the second by Meri¬ wether Smith ; and the third by Edmund Pen¬ dleton ; and that the resolution actually intro¬ duced by Nelson was the one written by Henry. On the other hand, Edmund Randolph, who was a member of the convention, says that the res¬ olution declaring for independence ((was drawn by Pendleton, was offered in convention by Nelson, and was advocated on the floor by Henry.®

On 29 June 1776, the natal day of the com¬ monwealth of Virginia, Patrick Henry was elected governor, took the oath of office 5 July, and served for three annual terms in succession. As governor he commissioned, on 2 Jan. 1778, Col. George Rogers Clark to enlist seven com-

panies of men for the expedition against the British garrisons in the Northwest Territory. After leaving the executive office, Henry settled in Henry County, on an estate of about 10,000 acres, called Leatherwood, where he lived until he became governor for the fourth time, on 30 Nov. 1784. In the Virginia convention of 1788, which was called to ratify the Constitution of the United States, Henry led the opposition on the ground that such a federal government en¬ croached too far upon the rights of the several States. While the arguments of Madison and the influence of Washington happily prevailed on that critical occasion, Henry was a chief agent in securing the amendments which consti¬ tute a bill of rights in the national instrument. His objection to the Constitution was stated concisely in his first speech before the conven¬ tion : <(That this is a consolidated government is demonstrably clear; and the danger of such a government is, to my mind, very striking.

. . . Who authorized them (the framers) to speak the language of we the people, instead of we the States ? States are the characteristics and the soul of a confederation. If the States be not the agents of this compact, it must be one great, consolidated, national government of the people of all the States.® Such was his clear discernment of the real nature of the govern¬ ment established by the Constitution of the United States.

S. C. Mitchell.

HENRY, Thomas William, Australian

journalist and literary man: b. Sydney, Novem¬ ber 1862. He has been continuously in news¬ paper work since 1878. From 1899 to 1903 he was

editor of the Herald; after which he be¬ came editor of the Sunday Morning Herald. His published works include ˆFortunate Days5 (1890); (The Girrel at Birrells5 (London 1896) ; (A Station Courtship5 (1898). Most of his best work is buried in magazines and news¬ papers. He is considered one of the best edi¬ torial writers in Australia.

HENRY, William Arnon, American edu¬ cator: b. Norwalk, Ohio, 16 June 1850. He obtained his early education in the Holbrook Normal School at Lebanon, Ohio; studied at Ohio Wesleyan University from 1867-69, and at Cornell University from 1S76-80, receiving the degree of B. S. Agr. He was appointed professor of botany and agriculture in the University of Wisconsin in 1881, professor of agriculture in 1883, director of the agricultural experiment station in 1887, and in 1891 was made Dean of the College of Agriculture, serving as dean and director until June 1907, when he retired owing to ill health, with the title pro¬ fessor emeritus of agriculture. He wrote (Handbook on Northern Wisconsin5 (1895) ;

(Feeds and Feeding5 (1898; 16th ed., 1916).

HENRY, William Wirt, American his¬ torian and lawyer: b. Red Hill, Va., 14 Feb. 1831; d. 5 Dec. 1900. He was educated at the University of Virginia, and took up the practice of law, later being elected to the legislature for four terms. He preferred, however, historical research to his law practise, and spent much of his time in that pursuit. He was president of the American Historical Association and of the Virginia Historical Society. He is chiefly noted for his (Life, Correspondence, and Speeches of Patrick Henry5 (3 vols., 1890—91) .

HENRY DOCUMENTS, 26 letters of 1809 between John Henry and several British officials — Sir James H. Craig, governor of British North America, his secretary Ryland, and the English foreign secretary Lord Liver¬ pool, with related papers. Tempted by the hos¬ tility of the New England Federalists to the Embargo (q.v.), and the threats of secession by the extremists, Craig sent the adventurer Henry in January 1809 to sound the people as to reunion with Great Britain. Henry remained till June, and sent back the most extravagant reports of the secession feeling, but the British ministry not paying him as he thought fitting, he sold the copies of the letters and other docu¬ ments to the United States government in Feb¬ ruary 1812 for $50,000. Madison used them to hurry forward the War of 1812, by sending them to Congress on March 9 with a special message, in which he accused Great Britain of attempting to dismember the Union by intrigue and annex the North to itself. So far as the New Englanders were concerned, however, the papers contained nothing incriminatory of seces¬ sion movements.

HENRY MOUNTAINS. A group of mountains in the eastern part of Garfield County, Utah, on the west side of the upper part of Grand Canyon of Colorado River. It is about 40 miles long. The principal peaks are mounts Ellen, 11,485 feet, Pennell. 11,330 feet, Hillers, 10,650 feet, Ellsworth, 8,150 feet and Holmes, 7,950 feet. The adjoining area of the High Plateaus ranges in altitude from 4,000 to 6 000 feet. They are noted examples of the form of igneous intrusion known as laccoliths, the mountains consisting of lens-shaped masses of trachyte included in the Cretaceous and Tri- assic sandstones. Consult Gilbert, G. K.,

(Geology of the Henry Mountains5 (United States Geological and Geographical Survey of Rocky Mountain Region, Washington 1880).

HENRY PHIPPS INSTITUTE, The,

for the study, treatment and prevention of tuberculosis, was established in 1903 by Mr. Henry Phipps, of New York, at Third and Pine Streets, Philadelphia. The situation was chosen as being in a section of the city in which tuber¬ culosis was most prevalent, and was made pos¬ sible by a special law permitting the establish¬ ment of the Hospital within the city limits. In February 1910, Mr. Phipps transferred the Institute to the University of Pennsylvania, hav¬ ing previously engaged to erect an appropriate permanent building for its accommodation upon grounds gradually acquired with this in view. The new building, located at Seventh and Lom¬ bard streets, was completed in May 1913. It is a beautiful and commodious edifice and em¬ bodies the most modern ideas of hospital, sana¬ torium and laboratory construction. The Insti¬ tute is the first fully organized and equipped institution of the kind with university connec¬ tion. An entire reorganization of the plan of work has been made by the University. The work is divided into distinct fields of activity, represented by two corresponding departments, the laboratory or research department, and the clinical and sociological department, each under its special director. An advisory council of 14 members has been selected, composed of the most distinguished men of the country in the lines of work carried on by this Institute, who

visit the institution at least once each year. On account of its connection with the Univer¬ sity, the Institute offers facilities for study to the students of the University of Pennsvlvania, especially those of the Medical School. Both by visits to the institution and through the publication of the results of its investigations and research, the Institute has proven valuable both to

students and physicians throughout the country interested in this special work.

HENSCHEL, hen'shel, Sir George, Eng¬ lish composer and concert singer : b. Breslau, 18 Feb. 1850. He began his musical education under the pianist Moscheles, the contrapuntist Richter, and the vocal teacher Gosse in the Conservatory at Leipzig. In 1870 he sang with great success at the Beethoven celebration at Weimar, and toward the end of the same year went to Berlin to complete his studies in musical science and vocalization. He met with a brilliant reception in his professional tour through Cologne, Diisseldorf, and the lower Rhine provinces, and his fame spread over all Germany, Austria, Holland and Russia (1874— 77) . He was received with immense applause in London, and crossing the Atlantic was ap¬ pointed musical director in Boston (1883-85) ; when he returned to London and became teacher of singing in the Royal College of Music (1886-88). He made England his perma¬ nent home, and in 1890 was legally naturalized. He was knighted in 1914 by George V. He wrote among his numerous compositions many songs, operas, chamber music and duets, such as (Wanderlieder' ; (Duette in Kanonform,' (Serbisches LiederspieP ; (Stabat Mater' (1894) ; (Music to Hamlet' (1892) ; and the volume (Personal Recollections of Johannes Brahms,' etc. He married in 1881 Lilian Jane Bailey (d. 1901), a well-known American

singer.

HENSLEY, Sophia Almon, American lecturer and author: b. Nova Scotia, 31 May 1866. She studied in England and Paris, and moved to New York in 1889. She has been in¬ terested in the study of social problems and actively identified with the work of the "Mother's Congress." She has served as presi¬ dent of the Society for the Study of Life in New York City and as vice-president of the New York City Mothers' Club, and lectures frequently. She is author of (Woman's Love- Letters' and (Souls.)

HENSON, Herbert Hensley, English Anglican clergyman: b. London, 8 Nov. 1863. He graduated at Oxford and elected fellow of All Souls College in that university 1884. He was head of the Oxford House at Bethnal Green, 1887-88, canon of Westminster Abbey and rector of Saint Margaret's 1900-12; and Dean of Durham since 1912. He has attracted wide attention as a fresh and powerful preacher by his utterances on topics of social and politi¬ cal interest, and among his published works may be noted (Light and Leaven' (1897) ;

(Cross Bench Views of Current Church Ques¬ tions' (1902) ; (Preaching to the Times' (1903); (Christ and the Nation' (1908); (The Liberty of Prophesying' (1909) ; (Westminster Sermons' (1910); (The Creed in the

Pulpit' (1912) ; (War-Time Sermons' (1915) ; Robert¬ son of Brighton, 1816-53' (1916).

HENSON, Josiah, American negro slave and clergyman: b. Port Tobacco, Md., 1787; d. 1883. His early life was one of great hardship, but he finally escaped to Canada (1828), where he became a Methodist clergyman with a charge at Dresden, Bothwell County, Ontario. He also lectured in the United States. Upon the story of his slave career was based the char¬ acter of Uncle Tom in Harriet Beecher Stowe's (Uncle Tom's Cabin' (1852).

HENTY, George Alfred, English writer of novels and stories for boys: b. Trumpington, Cambridgeshire, 8 Dec. 1832: d. Weymouth, Dorsetshire, 16 Nov. 1902. He was educated at Westminster and Cambridge; he went to the Crimea during the war with Russia, and served there in the purveyor's department of the army. Soon afterward he went to Italv to organize the hospitals of the Italian legion. As special correspondent of the Standard newspaper he went through the Austro-Italian, Franco-Prus- sian and Turco-Servian, Abyssinian, Ashanti campaigns, besides accompanying Garibaldi in the Tyrol. He described two of these cam¬ paigns in the works (The March to Magdala' (1868) and ˆThe March to Coomassie' H874). He wrote eight novels, among which are (A Woman of the Commune' (1895) ; (The Queen's Cup' (1897) ; and (Colonel Thorn- dyke's Secret' (1898) ; but he is much more widely known as the author of a large number of stimulating stories of adventure for boys, many of them based on famous historical events. Among these are (The Young Franc- Tireurs' (1871) ; (The Young Buglers,' a tale of the Peninsular War (1879) ; Un Times of Peril,' a tale of India (1881) ;

(1902).

HEPATICA, a genus of plants, liver- leaf, of the crowfoot family (Ranunculaceee) , closely related to Anemone. The best-known species is H. hepatica, found wild throughout eastern North America as well as in Europe in woods, and widely cultivated for its attractive and fragrant star-like blue, white, or purple- red flowers, which open in early spring. It is, indeed, one of the earliest of American spring flowers. Sometimes even under the snow its buds, well wrapped up in a warm down, lie upon the broad, furry, liver-shaped leaves, awaiting the first warmth to induce them to open. In the southern Alleghanies its leaves are dried and steeped into a medicinal tea. A more southern species is H. acuta.

HEPBURN vs. GRISWOLD, 1869: the great case in which the Supreme Court of the United States decided that the government had no power to make its own notes legal tender; reversed through a change in the constitution of the court in Knox v. Lee and Juilliard v. Greenman. Mrs.

Hepburn of Kentucky had given Henry Griswold a note for 11,250 "dollars," payable 20 Feb. 1862 ; it was not paid when due, and five days subsequently the government passed the act authorizing 8150,000,000 in notes (see Greenbacks), receivable for public and private debts. In 1864 Griswold brought suit

in the chancery court of Louisville for prin¬ cipal and interest ; $12,270 in greenbacks was tendered in settlement, but refused, on the claim that the act did not extend to debts contracted before its passage. The court decided for Mrs. Hepburn; Griswold carried the case to the Kentucky Court of Appeals, which reversed the decision; Mrs. Hepburn carried it to the Supreme Court, which on account of the far- reaching importance of the case, and at the request of the attorney-general, laid it over till 1868, when it was reargued, and finallv decided in the December term 1869. Chief Justice Chase, for five justices against three, decided that the act extended to all debts, contracted as well before as after its passage, and that the question therefore must be whether the gov¬ ernment had the power to make anything but coin a legal tender; that it could not do so, under the Constitution, because at the time of its adoption no money but gold and silver was recognized; that as paper money never rose above coin and almost always fell below it, each particle of depreciation was so much ab¬ stracted from the value understood by the par¬ ties to the contract, and was therefore an un¬ lawful deprivation of private property; that the power of Congress to use (

HEPHAESTUS, he-fes'tus, a god of the ancient Greeks, identified by the Romans with their Vulcanus. He presided over fire, and was the patron of all artists who worked in iron and metals. He was the son of Zeus (Jupiter) and Hera (Juno). Homer says that his mother was so disgusted with the deformities of her son, that she threw him into the sea as soon as born, where he remained for nine years. He afterward returned, but for taking the part of his mother on one occasion against Zeus was thrown down by the latter a second time. He was a whole day in passing from heaven to earth, and fell in the island of Lemnos. He broke his leg by the fall, and ever after re¬ mained lame of one foot. He fixed his resi¬ dence in Lemnos, where he built himself a palace, and raised forges to work metals. The Cyclopes of Sicily were his ministers and at¬ tendants ; and with him they fabricated not only the thunderbolts of Zeus, but also arms for the gods and the most celebrated heroes. His forges were supposed to be under Mount Hltna, in the island of Sicily, as well as in every part of the earth where there were volcanoes. Aphrodite (Venus) was the wife of

Hephaestus. Her infidelity is well known. Her amours with Ares (Mars) were discovered by Phoebus, and exposed to the gods by her own husband. He appears on some monuments with a long beard, disheveled hair, half naked, and a small round cap on his head, while he holds a hammer and pincers in his hand. See Greek Gods.

HEPTAMERON, The. The ˆHeptameron of Marguerite, sister of Frangois I, variously*

called Marguerite d'Angouleme, Marguerite de Valois, or Marguerite de Navarre, is a collec¬ tion of stories modeled on the (Decameron) of Boccaccio. A company of travelers, five gentlemen and five ladies, on their way home from Cauterets, in the Pyrenees, are overtaken by a sudden storm and flood, and take refuge in a hospitable monastery till the impassable roads may be repaired. To while away the time, after giving the morning to hearing mass and the reading of Holy Writ, they pass the afternoon in telling stories that take us very far from the atmosphere of such edifying exercises. Each person tells a story each day. Apparently it was Marguerite's plan that i(3 days should be passed thus, as in the De¬ cameron. But the death of her brother inter¬ rupted her labors, and but 72 stories had been finished at her death, bringing the seventh day to an end, but only beginning the eighth ; hence the name

Arthur G. Canfield.

HEPTARCHY, seven Anglo-Saxon king¬ doms into which England was at one time or other supposed to be divided, although the king¬ doms, were founded at different times, and at no one time were they all independent monarchies together. In 827 King Egbert of Wessex united them into one kingdom, and claimed the title king of England. See England.

HEPTASOPHS, Improved Order of, a

benefit society, organized in 1878 as an inde¬ pendent branch of the Order of Heptasophs (q.v.). At the time of secession the Hepta¬ sophs had not adopted the benefit system. The constitution and ceremonies are identical with those of the parent order. At the close of 1910 it had 1,102 conclaves, a membership of 74,656, and since its organization had disbursed in benefits nearly $17,000,000.

HEPTASOPHS, Order of, a benevolent society in the United States founded in New Orleans 1852 by Alexander Leonard Saunders and other Freemasons, originally called ((The Seven Wise Men.® The ritual of its ceremonial is elaborate; the membership of each chapter is seven, or a multiple of that number. In 1872 the adoption of a death benefit system

was agitated and the discussion led to the seces¬ sion in 1878 of the Zeta Conclave of Balt'more which organized the Improved Order of Hep¬ tasophs (q.v.). In 1880 the Order of Hepta-

sophs adopted the benefit system. Members must be white males and profess a belief in the Supreme Being. Their number in 18 States amounts to about 4,000.

HEPWORTH, George Hughes, American clergyman, journalist and author: b. Boston, 4 Feb. 1833 ; d. 7 June 1902. He was brought up a Unitarian and after leaving the Harvard Divinity School held Unitarian pastorates at Nantucket, Boston and New York. He advo¬ cated preaching in theatres and conducted the¬ atre meetings in various cities. Being not wholly at ease in the Unitarian denomination, he entered the Congregationalist ministry in 1872. He subsequently quitted the ministry and became attached to the editorial staff of the New York Herald. He published (The Whip, Hoe, and Sword) (1864) ; (The Criminal, the Crime, the Penalty) (1865) ; (Starboard and Port> (1876), record of a yacht cruise; (Hiram Golf's Religion } ; (Through Armenia on Horseback) (1899). Consult Ward, (George H. Hepworth; the Story of his Life (1903).*

HERA, he'ra or -re, a mythological goddess of the Greek pantheon, identified by the Romans with their Juno, the sister and wife of Zeus (Jupiter), and daughter of Kronos (Saturn) and Rhea (Cybele). The poets represent Zeus as a faithless husband and Hera as a violent, jealous and vindictive wife. She was wor¬ shipped in all Greece, but her principal seats were at Argos and Samos. The companions of Hera were the Graces and Hours. Iris, a personification of the rainbow, which seems to stretch from heaven to earth, was her mes¬ senger. Her usual attribute is a royal diadem. The temples built in her honor were called Heraea. The principal one was at Argos, which city was considered to be especially under her protection. She is represented by Homer as taking the part of the Greeks in the Trojan War, being actuated by revenge for the slight passed on her by the Trojan Paris, who gave the golden apple inscribed <(To the Fairest® not to her, but to Aphrodite. See Greek Gods.

HERACLES. See Hercules. .

HERACLITUS, Greek philosopher: b. Ephesus, who flourished about 513 b.c. He traveled in different countries, particularly in Africa, On his return

to Ephesus he was offered the chief magistracy, but refused it. He left a work on nature, in which he treats also of religion and politics. Some fragments only of this work remain. He is considered as belonging generally to the Ionic school of phi¬ losophers, though he differed from it in impor¬ tant particulars. He considered fire as the first principle of all things, describing it as an ethereal substance, ((self-kindled and self-ex¬ tinguished,® from which the world is evolved (not made) by a natural operation. It is also a rational principle and the source of the hu¬ man soul. Phenomena exist in a constant state of flux, always tending to assume new forms, and finally returning again to their source.

HERACLIUS, her-a-kli'us, Roman em¬ peror of the East, from 610 to 641 : b. Cappa¬ docia, about 575 a.d. He was the son of Heraclius, exarch of Africa, who had gained great renown by his v'ctories over the Persians. The elder Heraclius of the East was applied to by a powerful body of insurgents to claim

the throne for himself. This he declined, but sent his son Heraclius to do so. Heraclius the younger therefore ascended the throne, and though he undoubtedly possessed considerable talents, the Roman empire in the East was tottering to its fall and nothing he was able to do could save it. Before his death Mohammed had carried his victorious arms on every side, and Syria, Palestine, Mesopotamia and Egypt had fallen under the dominion of the caliphs. He was permitted, however, to die in peace and to transmit the succession to his son, who mounted the throne under the title of Con¬ stantine III.

HERALDIC CROSSES. See Crosses and Crucifixes.

HERALDRY is the whole group of cere¬ monial duties discharged by the heralds of a court, an army, a great noble or the like, with the assistance of their pursuivants and under the direction of the Earl Marshal, King-at-Arms, the College of Arms or other chief of the institution. These duties are generally divis¬ ible into heraldry proper or the business of regulating ceremonial occasions, such as coro¬ nations, marriages among princes, proclama¬ tions of important events and the like; and armory, or 'the art of quasi-science of armorial bearings. In the first of these divisions but little remains of any interest at the present day, for only in Great Britain is the herald of any consequence. There, however, he still has some direction, as at the eventful proclamation of # 1. May 1876, when the Queen of Great Britain assumed the title of Empress of India. In the second branch of the subject, the order and marshaling of arms, the Germans are per¬ haps at the head of modern writers, though the English and Scottish treatises on the subject are more numerous and more widely used. The Germans' thoroughness of investigation has marked their treatment of this subject,

which is eminently a branch of mediaeval and sub¬ sequent history serving to elucidate genealogical research.

Modern heraldry is no older than the tourna¬ ments of the Middle Ages. No linking evi¬ dences of the science occur during the Dark Ages, although badges and emblems are found on shields and helmets discovered in the ruins of antiquity, while in Biblical times the men of Israel were directed to pitch their tents, every man by his own camp and standard with the ensigns of his father's house. Greek and Roman writers describe devices on shields and helmets; the golden eagle on the shields of the kings of Media ; the standards and bril¬ liantly-colored shields borne by the ancient Germans in battle. The office of herald is as ancient as that of priesthood. Spartans, Greeks and Romans had heralds, the Roman officers being divided into three classes : caduceatores, heralds of peace ; fetiales, heralds of war and peace; and prcecones, judicial criers or mes¬ sengers. The caduceator on a mission carried a wand of laurel or olive (caduceus , q.v.), as a symbol of his office and for his security. The fetiales are thought to have had a college of 20 members founded by Numa, who formulated the procedure and ceremonies connected with the declaration of war and the making of treaties. The prcecones were employed to pro¬ claim matters of public interest to the people

at religious ceremonies, in the comitia, at pubi c sales, judicial trials, in the senate, on the publi¬ cation of laws which they read, at funerals, at games, in the army when a general wished to address his men, at executions and at all public meetings. The heralds of the Middle Ages had duties which in part resembled those of the heralds of antiquity. Thus, they carried mes¬ sages of peace and of defiance, and yet even in the earlier years of feudality their office was an inferior one, they being replaced by ambas¬ sadors, diplomats almost in the modern sense, statesmen in whose suite the heralds and pur¬ suivants went to the foreign court. So it was that the chief duty of the herald came to be the care of armories.

The first known tomb or monument with escutcheons in the period of modern history is stated to be the 11th century tomb in the church of Saint Emmeran at Ratisbon, where are the bearings of Varmond, a count' of Vasserburg; but this may be a later addition. Another very old specimen and certainly genu¬ ine is the shield at Le Mans of Geoffrey Plan- tagenet, who died in 1150. The use of coats of arms seems to have first become general in the 12th century. Rolls of arms in England are extant in the reigns of Henry III, Edward I and Edward II. Surcoats displayed armorial

bearings in the reign of Henry III. The Roll of Caerlaverock, a poem in Norman-French, contains the names and armorial bearings of the knights and barons who attended Edward I at the siege of the Castle of Caerlaverock, Dum¬ friesshire in 1300 and exhibits heraldry already in a developed form. On coins also, no armorial ensigns are found till the 13th century; but then both coins and the seals of nobles and monasteries display them ; the use of arms on the Great Seal of England was introduced by Richard I.

The study of armory became essential when at mediaeval tournaments aged knights were ap¬ pointed, whose duties were to act as arbiters and to pass judgment on coats of arms and the right of knighthood. Whenever a new knight appeared at a tournament, the herald had to blasen — that is to blow — the trumpet and proclaim and explain the bearing of his shield or coat of arms. Hence to blason (blasen) came to mean, to describe and explain a display of bearings. The heralds were also the chroni¬ clers of the times and were present on all occa¬ sions of public ceremony. In France the first herald — roi-d'armes — was crowned and con¬ secrated with religious ceremonies, and was called Montjoie, from the war-cry of the French royal armies. The heralds were united in asso¬ ciations and their duties formed a branch of science which was communicated only to the members. If any person pretended to the char¬ acter of a herald, who on examination was found not to belong to the corporation, he was driven away with insults and frequently with violence. The heralds in modern courts are masters of ceremonies. In England there are now three kings at arms; the highest is the Garter king at arms; the second, known as Clarencieux, is for the southern counties; the ihird, styled Norroy, for the northern provinces. These three kings at arms with six subordinate heralds and four pursuivants form, under the presidency of the Earl Marshal, always the Duke of Norfolk, the herald's college or her¬

ald's office, established in 1483. The use of arms by private persons in the British Isles was forbidden by proclamation in the reign of Henry V. All persons who had not borne arms at Agincourt were prohibited from assuming them unless by hereditary descent or with the sanction of the constituted authorities. Peri¬ odical circuits called visitations were held after¬ wards by the provincial heralds to take cog¬ nizance of the arms, pedigrees and marriage of such as were entitled to the use of armorial bearings. These visitations continued till about the end of the 17th century; their records, many of which are preserved in the British Museum and elsewhere, contain much genea¬ logical information and are still consulted for evidence of the hereditary right to bear arms.

The practice of blazoning the arms is fre¬ quently referred to in the poetry of the Trouba¬ dours of the 12th and 13th centuries. Those knights who

asserted a right to appear at tour¬ naments did so by the blazoning of their arms, and from the Germans this custom was trans¬ mitted to the French, for tournaments were held in Germany before they became general in France. The French, however, carried to far greater perfection the tournament, and the blazon of heraldry connected with it, as they d.d the whole system of chivalry; the French language prevailing at the court of England after the Norman Conquest, pure French ex¬ pressions came to be preserved in British her¬ aldry. German heraldry, on the contrary, con¬ tains almost pure German expressions.

The whole display of any person's arms is called an achievement, also spelled atchieve- ment. Only the escutcheon, however, is of vital importance. This is the broad surface on which the bearings are charged. It is always assumed to be a shield in the case of a man not an ecclesiastic; but churchmen's arms are charged upon an oval or other architectural form, a sort of cartouche, and women's bear¬ ings are charged upon a lozenge set vertically. The arms of husband and wife, however, may be charged on a shield divided vertically in the middle, and are then said to be dimidiated or impaled; thus we might say that such an escutcheon bears the arms of Smith impaling the arms of Jones — Smith and Jones standing for the two spouses. It is rare to charge the wife's arms unless she was an heiress, that is to say a lady without brothers, and therefore having the parental arms by right. These rules, however, are those of Great Britain; they dif¬ fer widely in other countries.

A single escutcheon may be complete with one simple partition. Thus, a horizontal line divides the chief or top of the field at one third of its height from the remainder of the field. If that chief is, say, of gold, while the rest of the field is blue, that by itself makes a very perfect and honorable heraldic blazon. The chief is one of ihe honorable ordinaries, and others are almost as simple. They are the pale, a vertical stripe in the middle of the shield and one third of its width ; the fess, a horizontal stripe; the bend, which goes diagonally from the left hand upper corner to the right hand lower part, ending against the rounded border of the shield; the bend sinister, which is a bend turned the other way (but see below, dexter and sinister) ; the chevron, which

is a pair of stripes meeting in the middle, forming a figure like the letter A without the cross-bar ; the cross, the two arms of which are usually of one quarter the width of the es¬ cutcheon ; and the saltire, which is a diagonal cross. A shield upon which there is any one of these honorable ordinaries

and nothing else, is one of dignity. In general the simpler shields are the older; thus the old family Er- skine, with a black pale on a silver field, or the family of Beauchamp with a gold fess on a red field, occupy the most enviable position in hav¬ ing such a plain escutcheon. There are ordi¬ naries of the second rank, such as the quarter or canton, the orle, and besides these there are very many bearings in common use, especially those which are diminutives of the honorable ordinaries. Thus, the pallett is a smaller pale, and the shield of Aragon has four red palletts side by side on a gold ground. These again may be used as charges upon the greater ordi¬ naries. Thus, the escutcheon of Loreyn bears a blue bend sinister on a gold field and the bend itself is charged with three golden six- pointed stars. That also is a simple and pre¬ sumably ancient armory.

In describing the escutcheon the side on the left of the spectator is called the dexter and that on his right is called the sinister side; that is because the shield, when carried on the arm with the man-at-arms behind it would be to him so disposed. The escutcheon is supposed to be divided into a certain number of imag¬ inary points or divisions for the fixing and placing of the bearings when they are described in words. When there are nine points, the three at the top following each other from the dexter to the sinister side are dexter chief, middle chief and sinister chief, and a similar nomenclature is used throughout. A modern and fuller arrangement is to give eleven points, the honor point interposed between the top horizontal row and the middle one ; and the nombril point spaced between the middle row and the lowermost one. A small bearing as a mullet (a five-pointed star) may be located as being in the dexter chief or the like.

The main purpose of armory is to so present simple patches of vivid colors as to be rec¬ ognized at a great distance. The tinctures used in Great Britain are seven — two metals, or and argent (gold and silver) ; five colors, gules (red) ; azure (blue) ; sable (black), vert (green), purpure (purple) ; though this last is very rare and green is not very common. There are also two furs, which are represented by curious conventional patterns supposed to rep¬ resent the patchwork of small skins sewed to¬ gether which make a garment or the lining of a garment. These furs are ermine and vair, but each has many curious variations known by different names. Thus ermine *shows black tails on a white field, or in modern times a flowerlike pattern suggested by the real ermine ; but erminois has the same pattern in black on a gold field.*

Dimidiation and impaling, mentioned a'bove, are varieties of the great general subject of marshaling. The more elaborate form of mar¬ shaling is to divide an escutcheon into quar¬ ters. Thus, the son of a married pair who

have borne their arms impaled, may divide the escutcheon into four quarters and will put his father's arms on the first and fourth quarters (dexter chief and sinister base) and those of his mother on the second and third quarters. This quartering may be quartered again, and so on indefinitely. Thus, the escutcheon of the Prince of Wales during the reign of Queen Victoria (of him who became King Edward VII) is too elaborate to describe fully here. This is because his bearings as Duke of Roth- say, Lord of the Isles, Duke of Cornwall, Baron Renfrew, and the like were all charged together, so that the number of small sub¬ divisions is remarkable. Now, there are different ways of charging these. Those which his escutcheon must bear are the royal arms of England differenced with the label of the heir apparent, which is a label of three points argent, and this escutcheon will bear in the middle a small shield with the arms of Saxony. Even in this the inescutcheon is out of place when we are considering his arms as heir to the Crown. It is held by many that the Prince of Wales should display two shields ; the first as simple as possible, with only the quarters for England, Scotland and Ireland; while the second should display all his primary and secondary arms, including those of his wife, who, in the case assumed above, was the Princess Alexandra of Denmark. Again, a system is adopted by which a large shield bears those royal arms upon it, an ines¬ cutcheon with the secondary arms of Cornwall, Rothsay, Chester, Dublin, Lordship of the Isles, Carrick, Renfrew, Wales as a principal¬ ity, and over all a small escutcheon of pretense charged with the arms of Saxony for Saxe- Coburg-Gotha. But even these do not include the arms of the Princess, his wife, which should rightly occupy the sinister side of the shield, while all the achievement described above should be charged upon the dexter side. It is evident, then, that a person whose family has formed many dignified alliances may have an indefinitely great number of quarterings. But let us take the escutcheon of a king of the House of Hanover, as George IV, and we shall find that the four quarters of the shield are charged in this way: the first quarter (dexter chief) in gules, bearing three lions passant gar- dant, and the fourth quarter (sinister base) exactly the same. These two quarters are Eng¬ land. The second quarter (sinister chief) is Scotland, a field or with a lion rampant gules, framed in a bordure deur-de-lisee, also gules. The third quarter (dexter base) is Ireland, the Irish harp or on a ground azure. Upon this shield is set an inescutcheon, divided in a curi¬ ous way into three parts, for Hanover, and having above it a royal crown. Upon this in¬ escutcheon is still a second inescutcheon, _ very small, simply gules with a bearing or, which is supposed to stand for the imperial crown of Charlemagne this in commemoration of the electoral dignity of the sovereign of Hanover, who was called the Elector until after the Na¬ poleonic wars. It is a rule never

to place metal upon metal or color upon color. Thus, if your shield is argent, any bearing put upon it must be in one of the colors — never in or.

But there are several curious exceptions ; as that of the Latin Kingdom of Jerusalem (which lasted only from 1099 to 1187, but which is per¬ petuated by the addition of its bearings to many private shields) was argent, a cross potent between four crosslets or. This means a large gold cross, at the end of each arm of which is a cross head like the handle of a crutch ; and in the little corners left by the cross, four small Greek crosses; all these in gold on a silver ground.

*No two persons should bear the same arms at the same time, therefore a distinction is made between the escutcheons of younger children. Even the heir may distinguish his bearings from his father's by a special mark, apart from the quartering described above. * The term marks of cadency is used for these differences. Many varying plans have been followed, and one which has been much accepted is the label. This is a band with pendant strips hanging from it, usually three ; and this is laid right upon the escutcheon near its head, and crosses it, partly concealing all the bearings. This label will be plain for the eldest son, differenced by a bearing like a crescent for a second son, a mullet for the third son, a martlet for the fourth son, and so on.*

The practical functions of the herald devel¬ oped into blazoning, historifying, passing judg¬ ment on, and marshaling coats of arms. Blazoning is the methodical description of a bearing. In the first place the shield is de¬ scribed according to its tinctures, figures and partitions. The other parts of a coat are then blazoned — the helm with its crest which are trumpet, wings and plumes, men and ani¬ mals, or their members ; then the wreath and its tinctures; after which the cornet, cap, etc.; finally the supporters, the mantling, the device or motto and other secondary addenda. To his- torify in heraldry is to explain the history of a coat of arms, its origin, and the changes it has undergone. If the herald is to explain a bear¬ ing historically, he must show that this figure is the proper emblem of the family or country. He derives, for instance, from historical sources the proof that the double-headed eagle of the German Empire was first introduced by Charlemagne (a.d. 802) ; and he records the privilege given to wear that eagle on a private escutcheon. So he shows that the three leopards (lions passant gardant) in the English arms were first derived in 1127 under Henry I from the Norman house. The mar¬ shaling of arms is especially important in the preparation of new escutcheons. In this mat¬

ter, the herald either follows the orders of the sovereign, or he invents the coat, and makes the charges on the escutcheon according to his own judgment, or he composes a new es¬ cutcheon from several coats of arms.

When color is not used, a system of conven¬ tional drawing is substituted ; thus, argent is left white, or is white with black dots, azure by horizontal black lines on white, gules by vertical black lines, sable by crossing black lines horizontal and vertical, vert by lines from the dexter chief to the sinister base, purpure by lines from the sinister chief to the dexter base. The furs have peculiar patterns and surfaces of their own.

The crest is the uppermost part of achieve¬ ments of arms and is set above the escutcheon. It is called crest from the Latin word crista, which signifies a comb or tuft, such as many birds have upon their heads. Crests were an¬ ciently marks of honor, because they were worn only by heroes of valor and high rank that they might be the better distinguished in an engagement, and thereby rally their men if dis¬ persed; or else they were of the nature of badges worn by all the followers of a chieftain and serving to identify them. They are at present considered as mere ornaments ; and they may be assumed without authority; obvi¬ ously they should not be used by women. Supporters are figures placed on each side of the shield and perhaps originated from the cus¬ tom of pages in fantastic dresses guarding the achievements of arms of their masters while the latter were taking part in the exercises of the tournament. The scroll is an ornament usually placed below the shield and supporters, containing a motto or short sentence alluding to the crest, or to the bearing- or to the bearer's name. The motto had its origin in the war cries of knights, though in some instances mottoes were borne differing from the war cry of the wearer. The badge does not belong to heraldry, though it may be a part of the heraldic achievement, used separately. The por¬ cupine was the badge of Louis XII of France, and the salamander was chosen by Francis I when he came to the throne, but neither of these was included in the escutcheon or worn as a crest. The reader may consult Palliser, historical Devices, Badges and War Cries 5 (London 1870). The most recent large and important book on heraldry in English is (The Art of Heraldry,5 by Arthur Charles Fox- Davies, which is based upon the heraldischer Atlas- of H. G. Strohl. An excellent book for persons who are making a serious study of the matter is Berry's Encyclopaedia Heraldica,5 in three volumes, n. d. (about 1820). The treatise on Heraldry by Woodward and Burnett (2 vols., 1892), is a very full and up-to-date manual. Smaller books are numerous. To name English ones alone Cussan's handbook of Heraldry,) Planche's (The . Pursuivant at ArmsJ Worthy's Practical Heraldry, 5 and especially Charles Boutell's two books, Eng¬ lish Heraldry > (2d ed., 1871), and the very re¬ markable essay, heraldry, Historical and Popular) (3d ed., 1864), now scarce, but never¬ theless the most suggestive book that can be found.*

Bibliography.— Berry, Wm., Encyclopedia Heraldica5 (London about 1840) ; Boutell, Charles, English Heraldry) (Boston, 6th ed., 1900) ; Copinger, Walter Arthur, heraldry Simplified) (Manchester 1910) ; Cussans, John E., handbook of Heraldry5 (London, 3d ed., 1882) ; Delgano, Molinier, (The Bibliography of American Heraldry5 (New York 1896) ; Fairbairn, J., (Crests of the Families of Gt. Britain and Ireland5 (Edinburgh 1860) ; Fox- Davies, Arthur Charles, (The Art of Heraldry> (London 1904) ; Gorham Co., (An Elementary Manual of Heraldry5 (New York 1905) ; Hol¬ den, E. S., CA Primer of Heraldry for Amer¬ icans5 (New York 1898) ; Hope, W. H. Saint John, heraldry for Craftsmen and Design-

ers> (New York 1913) ; Massicotte, Edouard Z. and Ray R., (Armorial du Canada frangais) (Montreal 1915) ; Mathews, F. Schuyler, (The Writing 1 able of the 20th Century; being an account of hearaldry, art, engraving, and es¬ tablished form for the correspondent (New York 1900) ; Milbourne, J. S., (Heraldry for Ainateurs) (New York 1909) ; Robson, Thomas, cThe British Herald) (Sunderland 1830) ; Ver¬ mont, E. De V., (America Heraldica; a compila¬ tion of coats-of-arms, crests, and mottoes of prominent families settled in this country be¬ fore 1800) (New York 1886-89) ; Whitmore, W. H., (The Elements of Heraldry; with es¬ say on use of coat-armor in the U. S. At (New York 1866) ; W iggins, J. lv., The Heraldic Journal, recording the armorial bearings and genealogy of American families (Boston 1865- 68) ; Zieber, E., (Heraldry in America) (Phila¬ delphia 1895) ; id., (Rules for the Proper Usage of Heraldry in the U. S. AP ; Woodward, John, (A Treatise on ecclesiastical Heraldry) (Edin¬ burgh 1894).

HERAT, her-at', Afghanistan, a city in the northwest near the Heri-Rud River, 550 miles west of Cabul, 66 miles south of the Russian railway terminal and 290 miles north of New Chaman, the British-Indian railway terminal. It is defended by a strong citadel. The cara¬ vansaries, public baths, and mosques are numer¬ ous. The trade, almost entirely in the hands of Hindus, is greatly favored by the situation of the town on the great thoroughfare from India westward. Herat was long the capital of the empire founded by Tamerlane, and was once much larger and more splendid than now. Its possession has been repeatedly contested among the peoples of central Asia. Its capture by Per¬ sia in 1856 led to a short war between Britain and Persia. As the key to Afghanistan near Persia and Russia, its strategic importance has often made it a scene of great military activity. Pop. 20,000.

*HERAULT DE SECHELLES, sa'shel, Marie Jean, French revolutionist: b. Paris, 1760 ; d. there, 1794. He became imbued with the teachings of Diderot, but, after his election to the Legislative Assembly in 1791, being rather a philosopher than a revolutionist, he at first paid little attention to the radical element there. He soon, however, joined the extreme left, and later on supported Danton in the revolution of Au¬ gust and September 1792. He was a deputy from the department of Seine-et-Oise to the Convention of 1792 and voted for the king's death. * He became a member of the committee of public safety, and as such gained the enmity of Robespierre, who claiming that he had be¬ trayed certain secrets to the army of the Rhine, caused him to be arrested and executed. His best writings were published under the title (Voyage a Montbard' (last ed. 1890).*

HERB PARIS, a poisonous plant of the lily family (Paris quadrif olio) , resembling and related to white hellebore (q.v.), the toxic prin¬ ciple of which is a specific alkaloid called para- din.

HERBARIUM, a collection of dried plants systematically arranged for study; it is some¬ times called liortiis siccus, <(dry garden,® and is an indispensable adjunct to the work of the systematic botanist. The most famous public herbaria are those of the Royal Botanic Gar¬

dens, Ivew, London, the British Museum and the Royal Botanic Gardens, Berlin. Those in Paris, Leyden, Berlin, Brussels and Vienna are also very full and complete.

In the United States there are several large herbaria, namely, the Gray Herbarium of Harvard University, the Herbarium of the New York Botanical Garden, the United States Na¬ tional Herbarium at Washington, that at the Missouri Botanical Garden, Saint Louis, and the herbarium of the Field Museum of Natural History, Chicago. Mˆny universities and col¬ leges also possess large collections of plants. The first named contains a majority of the older types of American plants, and the national herbarium contains the material brought to¬ gether by the government collectors and many of the most important collections of the early government surveys.

HERBART, Johann Friedrich, German philosopher: b. Oldenburg, 4 May 1776; d. Got¬ tingen, 11 Aug. 1841. His career is evidence of the fact that at least some men may live peaceful lives in stormy times. A student at Jena under Fichte, a tutor in Switzerland, a docent at Gottingen in the theory of education, and after that a professor to the end at Gottin¬ gen, at Konigsberg, and finally at Gottingen again — that is the story of his life. But if he ‘ took no part in the revolutionary tumults that afflicted his country, he at least became a leader in her intellectual contests. His meta¬ physics stands at the opposite pole from that of Hegel. His psychology laid the foundations for modern psychophysics and experimental psychology, while his pedagogics is still the source of much of our best educational theory and practice.

The turning point between Herbart and Hegel lies in the use to be made of the prin¬ ciple of contradiction. Herbart took the ortho¬ dox stand that what contradicts itself cannot be truly real or actual, whereas Hegel boldly incorporated the principle of contradiction as a stage in what might be called his dialectic of evolution, which follows the formula, thesis, antithesis, synthesis. The antithesis is the con¬ tradiction of the thesis, but only that the two may come together again in a higher synthesis. A familiar illustration is the relation of (1) being, (2) non-being and (3) becoming, in which the second is thought as the contradic¬ tion of the first, while the third is conceived as a higher synthesis of the first two, since be¬ coming has elements both of being and of non- being. Herbart, however, rejects such reason¬ ing as insufficient, and demands that philosophy shall accept the validity of the principle of contradiction, and honestly endeavor to remove the contradictions inherent in our everyday thought of the world. Such contradictions are encountered when we consider a thing and its attributes or the ego, which is both subject and object, or when we trace experience back to matter, in which the notions discrete and con¬ tinuous

are seen to be at variance. The effort to remove the contradictions leads Herbart back to a pre-Kantian method of speculation, for he holds himself ready to accept any sort of a presupposition, rational, or irrational, which promises to resolve the difficulty, even though the principle of explanation should forever resist demonstration as to its reality. In other words, we may assume anything to be true

which clears up our thinking. But this is the method of Leibnitz, of Spinoza, and of many others antecedent to the time of Kant (q.v.). The fundamental form in which contradiction appears is that the simple is conceived as mani¬ fold. For example, the thing we call water is at the same time thought of as heavy, fluid, colorless, having the quality of quenching both fire and thirst, and as being capable of trans¬ formation from a liquid to a solid or to a vapor. The way to overcome this contradiction is to assume a plurality of simple beings, and to explain the manifold as appearance arising from their relations. These simple beings that underlie the phenomenal world are atoms, or monads, or as Herbart prefers to call them, Reals. They are conceived to be in mechanical interaction, and to give rise to the manifold we have in experience. Like the atoms of Democritus they are simple and alike in quality, but unlike the monads of Leibnitz they are not points of self-active force, containing an inherent principle of development. Why and how the Reals act and interact Herbart does not explain, not even how they get and exercise their one function of Self-preser¬ vation. The inability to explain these things which we most want to know is the penalty at¬ tached to this type of metaphysics. Yet it would be unfair to assume that no good re¬ sults can come from even such pre-suppositions. The Reals are not spatial in the ordinary mean¬ ing of that term, for space and time as we know them are themselves phenomenal products, but they may be conceived to be in what Herbart calls intelligible space, in which the Reals ex¬ ist in a state of partial or total interpenetration. Here they reciprocally "disturb® one another, a "self-preservation® resulting, which is a "state® of the Real. When the Real which is "dis¬ turbed® happens to be a soul, the disturbance, or the state of self-preservation, becomes an idea, which is the primary form of mental life. Psychology is, therefore, the science of these self-preservations of the soul-monad, which is like all Reals unknowable, but as Herbart thinks a necessary presupposition of our experience. Psychical life is the reciprocal tension of ideas. Consciousness depends upon the degree of this tension. The lowest degree of strength which an idea can have and still be actual marks the threshold of consciousness. If reduced below this degree it remains as " impulse ,® and may rise again when freed from " arrest ,®

The soul monad has its seat in the brain and is in in¬ timate interaction with a multitude of other Reals. Outwardly originating stimuli are con¬ veyed to the brain by the nerves and reach the soul through the medium of the other Reals present. Since the idea is the primary form of mental life, feeling and volition must be ex¬ plained through an examination of the inhibi¬ tory relations of the ideas. Pleasure arises when there is a furthering of mental movement, and pain when there is an arrest. Volition arises from desire, a state of feeling, which has a natural impulse to find satisfaction through action. Since mechanical action and reaction of the Reals is the source of ideas, it seems a natural conclusion that there may be a statics and mechanics of mental states. This led to Herbart's attempt to work out the calculus of ideas, thus opening the road for the modern quantitative study of mental phenomena, as seen

in psychophysics and experimental psychology. Herbart claims to have founded psychology anew upon metaphysics, mathematics, and ex¬ perience. The third of these bases is treated under the term apperception , which has import¬ ant results for education.

Leibnitz, who introduced the term apper¬ ception, employed it in a double sense. Its first meaning is the original power of the mind to unify experiences originating in sensation ; this is the sense in which Kant uses the term. The second meaning is the mental assimilation that takes place when we use knowledge already acquired to interpret new knowledge. It is nat¬ ural that Herbart should emphasize the latter process, for though he could hardly deny the validity of the first form of apperception, yet so slight is the original equipment of the mind — merely the power of preserving itself against the encroachments of other Reals — that all the significance of its activity must be found in ac¬ quiring experience. This, it may be remarked, is the process most important to teachers, for they can help to supply and order experience, whereas they have no control whatever over the original constitution of the mind. Herbart sees in each new sensation a stimulus to ideas al¬ ready possessed, an attractive force for the sim¬ ilar, a repelling one for the dissimilar. The new idea therefore at first holds the centre of consciousness, gathering about itself similar ideas, and repelling hostile ones already in con¬ sciousness or newly attracted to it by contrast. But this very domination of the new idea is in most cases the cause of its reduction to a sub¬ ordinate place, for by bringing to consciousness a body of more deeply rooted related ideas, it enables the old to control the new by placing the new in its true relation to older and better ordered experience. In other words, the new is apperceived by the old. Herbart's theory, thus briefly stated, has been extended and freed from contradictions, by subsequent writers, no¬ tably Lazarus, Steinthal and Wundt (qq.v.).

All knowledge, feeling, desire and will, be¬ ing explained by the various relations into which ideas may come, there is no room in Herbart's system for transcendental will, hence no ethical imperatives antecedent to those de¬ veloped by experience. Ethics consequently be¬ comes a branch of aesthetics, and ethical judg¬ ment is founded upon pleasurable or painful feelings as the case may be. The mind spon¬ taneously approves some will relations and as spontaneously disapproves others. These basal relations refer to five fundamental aspects of conduct, two relating to the self as such, and the remaining three to the relations of the self to others. The first two are Inner Freedom (the feeling that arises from good conscience) and Efficiency of Will (the pleasure that is aroused by efficient action). The three other ideas are first Good Will (subjective attitude toward others), the second Justice (the legal basis of rights), and the third Equity (the de¬ mand that requital shall be adequate to deed).

Upon the basis of his psychology and ethics as above explained, Herbart built his educational structure. Since there is no source of character but experience, it is to experience, i.e., to organized knowledge or groups of ideas that we must look for the development of char¬ acter, which thus has its roots, not in a single department of knowledge as, e.g., that grounded

m sacred writings, but in the whole content of the mind. A man must be ethical all over, not in spots only. For this reason the Herbartians speak fondly and proudly of educative instruc¬ tion, meaning thereby such instruction as shall render all ideas contributory to moral charac¬ ter. . But since feeling is the bridge between cognition and volition, this bridge the teacher must induce the pupil to cross if his conduct is to be adequate to his knowledge.

By means of direct interest incited in the pupil for the subject-matter itself, not amuse¬ ment connected with the subject-matter, as some have erroneously thought, the pupil's per¬ manent attitude of mind toward the circle of thought itself and consequently toward the aspects of life involved will be established. This interest falls naturally into two groups, first that pertaining to knowledge itself, and second that pertaining to intercourse with others. The first group embraces em¬ pirical, speculative (causal), and aesthetic in¬ terests ; the second sympathetic, social and re¬ ligious interests. This doctrine of interest, so important in modern educational thought, has been brought into harmony with our more spir¬ itualistic systems of philosophy and psychology by Professor John Dewey (interest as Re¬ lated to WilP). The next important topic arises when we ask how the

teacher is to lead the pupil to build his circles of thought ade¬ quately, and then to have the right mental atti¬ tude toward them.

It is a common experience that faulty methods may easily lead to inadequacy of in¬ sight ; they may still more easily lead to the wrong attitude of mind, as when the student hates a subject and everything connected with it. The first point to consider is Attention, which is either spontaneous or forced. With the young where forced attention is painful, it is better to induce spontaneous attention, for here the ideas rise freely, producing liveliness and pleasure. Apperception has two marked stages, that of absorption, in which the mind gives itself up to new impressions ; and that of reflection, in which the newly acquired elements of knowledge find their appropriate place in the systems of the old. To bring about this two¬ fold process of absorption and reflection most effectively and most agreeably to the mind, we must observe at least four prominent stages of method. The first of these is clearness, by which is meant the adequate apprehension of the single object or element as such. The second is association, which consists in the progress from one absorption to another re¬ lated one. The third is system, or the step in which each part of that which is learned finds .its proper place in relation to other parts. Steps two and three may be said to embrace the process of generalization. The fourth stage is what Heidtart calls method, by which he under¬ stands the well-ordered activity of the pupil in the solution of problems and tasks.

Making due allowance for those parts of Herbart's system that are now of historical in¬ terest only, it may be seen that many of its elements are still of importance to the world, for they involve the most potent of modern educational processes and aims.

Herbart's chief philosophical works are (Lehrbuch zur Einleitung in die Philosophy (1813) ; (Lehrbuch zur Psychology (1816) ;

(Psychologie als Wissenschaft, neu gegrundet auf Erfahrung, Metaphysik und Mathematic (1824— 25); 'Allgemeine Metaphysik nebst den Anfangen der philosophischen Naturlehre) (1828-29) ; (Kurze Encyclopadie der Philoso¬ phic, aus practischen Gesichtespunkten entwor- fen) (1831). The complete works of Herbart have been edited in 12 volumes by G. Harten- stein (Leipzig 1850-52). Herbart's educational works, including the (Allgemeine Padagogik) and the (Umriss Padagogischer Vorlesungen,5 were edited by Dr. Otto Willmann in two vol¬ umes (Leipzig 1880). The Psychology is translated and to be found in the International Series, while the (Allgemeine Padagogik) and the trans. by Lange and annotated by De Garmo (New York 1901). The Her- bartian School has produced a literature in metaphysics, psychology and education too voluminous for mention here. Consult Adams, J., (Herbartian

Psychology applied to Educa¬ tion J (Boston 1906) ; De Garmo, C., (Herbart and the Herbartians) (New York 1895) ; Gockler, L., (La Pedagogie de Herbart, Expose et Discussion) (Paris 1905) ; Lang, O. H., Out¬ lines of Herbart's Pedagogy, with a bio¬ graphical Introduction) (New York 1894) ; Wagner, E., (Die Praxis der Herbartianer ; der Ausbau und gegenwartige Stand der Herbart- schen Padagogik (Langensalza 1900).*

Charles De Garmo,

Emeritus Professor of Education, Cornell Uni¬ versity ; Author of (Herbart and the Her¬ bartians.)

HERBELOT, her'blo, Barthelemy d

French Orientalist: b. Paris, 4 Dec. 1625, d. there, 8 Dec. 1695. Having gone through a course of study in the university of his native city, he applied himself particularly to the east¬ ern languages, with a view to the elucidation of the Hebrew Scriptures. He visited Italy, and while there commenced his great work, the (Bibliotheque Orientale. Recalled to Paris by Colbert, a pension was given him, that he might be at liberty to proceed with his undertaking. It was his first design to have published his collection in Arabic, and types were cast for the purpose of printing it. But the death of Colbert having interrupted this plan, he re¬ composed the work in the French language, as likely to prove more generally useful. He was appointed to the royal professorship of Syriac in 1692. His book was published in 1697, and after with a supplement at Maestricht (1 776—81). The best edition of the (Oriental Library > is that of The Hague (1777), with the supple¬ ments of Galland and Visdelou. Consult Goujet, (Memoires sur le College de France> (Vol. Ill, Paris 1758) ; Lefranc, (Histoire du College de France) (ib. 1893).*

HERBERMANN, Charles George, Ameri¬ can editor: b. Saarbeck, Westphalia, 8 Dec. 1840; d. New York, 24 Aug._ 1916. He was educated at Saint Francis Xavier College, New York, and was instructor there from 1858 to 1869. From 1869 to 1914 he was professor of the Latin language and literature at the College of the City of New York, serving also as libra¬ rian after 1873. From 1905 to 1916 he was editor in chief of (The Catholic Encyclopedia.) He

delivered a course on German literature at the Catholic Summer School of America in 1896, and lectured frequently on philology and mediae¬ val

schools and educators. In 1913 he received the Laetare medal of the University of Notre Dame. His published works include (Business Life in Ancient Rome' (1880) ; (The Sulpicians in the United States) (1916) ; translations of Torfeson's (History of VinlanxP ; (Life of Bishop Dubois) ; (The Waldseemiüller Map of 1507. > He edited Sallust's (Tugurthine WaD (1886); (Sallust's Catiline (1891);*

HERBERT, Edward, Lord Herbert of Cherbury, English philosopher : b. Eyton-on- Severn. near Wroxeter, 1583; d. London, 20 Aug. 1648. He was a famous soldier and diplo¬ matist in his day, but at the present is remem¬ bered as an author and philosopher. At Paris, in 1624, he printed his famous book, (De Veri- tate prout Distinguitur a Revelatione, a Veri- simili, a Possibili et a Falso, the object of which was to assert the sufficiency, universality, and perfection of natural religion, and thereby prove the uselessness of revelation. In 1624 he returned from France and was created an Irish peer; and in 1629 became an English baron with the title of Lord Herbert of Cherbury. In the civil war he at first tried as far as possible to pla}'- a neutral part, but afterward sided with the Parliamentary party chiefly with a view, it appears, to save his property. The character of Lord Herbert is strongly marked in his memoirs, which show him to be vain, punctilious and fanciful, but open, generous, brave and dis¬ interested. The (De Veritate) was followed by works entitled (De Causis ErrorunP (1645) ; and (De Religione Gentilium) (1663; Eng. trans. 1709). In 1649 was published his (Life and Reign of Henry VIII. * The English style of Lord Herbert is strong, manly and free from the quaint pedantry of his age. He was one of the first to attempt a systematic proof of the sufficiency of natural religion. ((Herbert's re¬ ligious doctrine,® says Sidney Lee, ((starts with the assumption that religion, which is common to the human race, consists merely of the five innate ideas or axioms that there is a God, that He ought to be worshipped, that virtue and piety are essential to worship, that man ought to repent of his sins, and that there are rewards and punishments in a future life. He regards Christianity as on the whole the best religion, because its dogmas are least inconsistent with his five primary articles.® His autobiography remained in manuscript till 1764, when it was published by Horace Walpole. There is a recent critical edition by Sidney Lee (1886).*

HERBERT, Edward, Lord Herbert of Cherbury, Autobiography of. The (Auto¬ biography of Lord Herbert of Cherbury is one of the most remarkable in the whole range of self-narrative. In point of time it.was among the first important autobiographies in the Eng¬ lish language, and it continues to hold its place as one of the most interesting and self-reveal¬ ing — as one that cannot be passed over by a student who is in any way vitally interested in

biography as a clue to man's nature or as a commentary upon the age in which it was written. It is worth while to know that a work which has afforded so much pleasure to the world lay in obscurity for many years, and was well-nigh lost. It appears that two copies were made, one of which was preserved at Lymore in Montgomeryshire; the other, after more than a century of drifting, was about 1737 handed over to Henry Arthur Herbert, Earl of Powis. Several pages of the Lymore manuscript were torn away or so stained as to be illegible, a loss which the second fortunately supplied. The Earl of Powis presented the originals to Horace Walpole by whom the narrative was first printed at Strawberry Hill in 1764. The (Autobiography is chiefly valuable as the record of an important representative of a distinguished family, told with a strict regard for truth, with a humble desire to be of service, and with a naive frankness that attracts while it amuses. The first paragraph is sufficient evidence of what has just been said, and is enough to convince a reader that the entire narrative is worthv of careful attention. Lord Herbert begins by lamenting that his own an¬ cestors had not <(set down their lives in writing and left them to posterity® that (*

and death. In addition to the manner in which the work reveals the individuality of the author, it throws much valuable light upon the customs and spirit of the age. As a reader puts the book aside he will feel that Horace Walpole spoke the truth when he called it ((perhaps the most extraordinary account that ever was given seriously by a wise man of himself.® The c Autobiography should be consulted in the edition of Saunders and Otley (London 1826), and particularly in that of Sidney Lee (ib.*

1886).

Waldo H. Dunn.

HERBERT, George, English religious poet : b. at the Castle of Montgomery, Wales, 3 April 1593; d. Bemerton, March 1633. His father, Richard Herbert, came of an illustrious Welsh family; his mother, Margaret Newport, also of excellent family, is more remembered for her own noble character. Between her and her poet son was rare sympathy; she guided his life in all things and early destined him to the saintly career in which he came slowly to find his happiness. Upon her hus¬ band's death in 1597, the care of her 10 children fell to her. The eldest son was Edward, Baron Herbert of Cherbury (q.v.). The family went to Oxford in 1595, where

George Herbert was 'brought up until 1605, when he entered Westminster School. From the first he distinguished himself, partly by his learning, partly by his daring, which showed itself in his attack in Latin epigrams upon Andrew Melville, the noted Presbyterian. In 1609 he was elected scholar of Trinity College, Cambridge, where three years later he took his degree. In 1614 he became a Fellow of Trinity, and won his Master's Degree in 1616. In 1619 he was elected Public Orator, an office he filled until 1627.

Until this election Herbert had looked to¬ ward a worldly career. Pride of family and ambition were strong in him ; the influence of his relatives and friends at court was great; he knew his own powers. But all that the court favor bestowed upon him was the lay rectorship of Whitford (1623), a sinecure post which Sir Philip Sidney had held; and shortly afterward the death of his most powerful friends darkened the promise of worldly advancement, and aided his mother's effort to turn him to the Church. In July 1626, while yet a layman, he. became prebendary of Layton Ecclesia, in the diocese of Lincoln. With the help of his mother and others, he restored the ruined church building — an act more expressive perhaps of the beauty- loving courtier than of the future parish priest.

His mother had married Sir Tohn Danvers in 1609. Her death in 1627 called forth Dr. Donne's famous funeral sermon and her son's farentaliaP This sorrow marks the begin¬ ning of George Herbert's nobler life. Shattered in health, and threatened with consumption, he resigned his oratorship and spent the next three years in London and Essex and Wiltshire'. In 1629 he married Jane Danvers, a relative of his stepfather, and the next year he was nre- sented to the living of Bemerton, with wh'oh his name is remembered. The short remainder of his life was remarkably active. In these years he wrote most of his poems and the best of them, and also the Character of the Coun¬ try Parson.) He died of consumption. Later

*in the same year his famous book of poems, 'The Temple, * was published in Cambridge.*

His extreme saintliness took no strange out¬ ward form, as did the piety of his friend Nicholas Ferrar, nor did it mar his writing with eccentricities of fervor or mysticism ; his genius is entirely sane. In no English poet, religious or secular, do the small common-places of life count for more. In such poems as (The Elixir, with its famous praise of drudgery Divine/ he insists on that kind of aspiration which scorns no humble or routine task; and his long¬ est poem,. (The Church PorclP — a series of wise maxims for the familiar discipline of the soul — sums up the moral and religious tradi¬ tions of the English race, though in his indi¬ vidual way. Llis genius is for*

common sense ennobled by lofty faith and passionate devotion. It is this, normal quality in him, this quickness to find inspiration along the highway, rather than his frequent reference to ecclesiastical customs and offices, that makes him, as Cole¬ ridge said, the representative poet of the Eng¬ lish Church.

*Bibliography. — The best editions are by George Herbert Palmer; Grosart, in the ful¬ ler's Worthies Library * and in the Aldine edi¬ tion; the Pickering edition, with the (Life) by Isaak Walton. For criticism, consult (Intro- ductions) to the above, especially to Palmer's edition ; also, for a charming study, consult the essay on Lady Danvers in Louise Imogen Guiney, (A Little English Gallery/*

John Erskine,

Professor of English, Columbia University.

HERBERT, Henry William, <(Frank

Forester,® American author : b. London, Eng¬ land, 7 April 1807; d. New York, 17 May 1858. He was graduated from Caius College, Cam¬ bridge, in 1828; removed to the United States in 1831 ; and until 1839 was instructor in the Greek and Latin languages in a private school of New York. In 1833 he established and until 1836 was editor of the American Monthly Magazine, during a portion of that time with Charles Fenno Hoffman (q.v.) as associate. From 1834 he became largely known as the first important American writer on sports and out- of-door subjects. He wrote also on French and English history, and made excellent trans¬ lations from Dumas and Sue. His volumes in¬ clude (Cromwell (1837); (Marmaduke WyviP (1843) ; (The Cavaliers of England* (1852) ; (The Chevaliers of France) (1853) ; (The Puri¬ tans of New England) (1853) : (Field-Sports of the United States and the British Provinces1* (1848) ; (Sporting Scenes and Characters) (1857) ; (Horses and Horsemanship of the United States and British Provinces) (1859).*

HERBERT, Hilary Abner, American law¬ yer: b. Laurensville, S. C., 12 March 1834; d. Tampa, Fla., 6 March 1919. He was educated at the universities of Alabama and Virginia, studied law and began practice at Greenville, Ala. He served in the Confederate army as captain and colonel of the 8th Alabama regi¬ ment; being disabled at the battle of the Wilderness (1864), he retired from the army, and continued the practice of his profes¬ sion, first at Greenville, then at Montgomery (1872). He was elected to Congress in 1877. and seven times re-elected; in three Congresses he was chairman of the committee on naval

affairs and hence was prominently connected with the reconstruction of the navy. In March 1895, he was appointed Secretary of the Navv bv President Cleveland, an office which he held until 1897. He subsequently practised law in Washington. Both in private and public life, he always took a prominent part in the re¬ conciliation of North and South. He pub¬ lished (Why the Solid South? or, Reconstruc¬ tion and Its Results) (1890); (The Race Problem of the South) (1901); (The Abolition of the Crusade and Its Consequences) (1912).

HERBERT, John Rogers, English his¬ torical and portrait painter : b. Maldon, Essex, 23 Jan. 1810; d. London, 17 March 1890. He studied at the Royal Academy, where he ex¬ hibited as early as 1830; later went abroad and in 1840 became a Roman Catholic, after which the. subjects of his paintings were chiefly re¬ ligious. In 1841 he was elected one of the masters of the government school of design at Somerset House, and in 1846 became a mem¬ ber of the Academy. His principal works are the frescoes in the peers' robing-room in the House of Lords; (The Appointed Hour) (1834); (King Lear Disinheriting Cordelia*; (Sir Thomas More and his Daughter in the Vernon collection at the National Gallery; and (Saint Gregory Teaching His Chant.*

HERBERT, Sir Michael Henry, English

diplomatist: b. England, 25 June 1857; d. Davos-Platz, Switzerland, 30 Sept. 1903. He went to Paris as attache in 1879; was charge d'affaires at Washington (1888-89) ; secretary to the British legation at Washington (1892- 93) ; at The Hague (1893-94) ; at Constanti¬ nople (1894-97) ; at Rome (1897-98) ; and at Paris (1898-1902). On 4 June 1902 he was ap¬ pointed British ambassador to the United States, at Washington, in succession to the late Lord Pauncefote, and the following year was compelled by ill health to return to Europe.

HERBERT, Victor, American musical di¬ rector and composer: b. Dublin, Ireland, 1 Feb. 1859. After studying music from his childhood in Germany, he was appointed principal 'cello player in the court orchestra, Stuttgart, from which time he appeared in concerts throughout Europe. In 1886 he took the position of solo 'cellist in the Metropolitan orchestra, New York, and has since been connected as soloist and conductor with the principal orchestras of the United States. Since 1894 he has been bandmaster of the 22d regiment band, New York, was conductor of the Pittsburgh, Pa., orchestra from 1898 to 1904, and since 1904 has conducted Victor

Herbert's New York Orches¬ tra. As a composer he has written (The Cap¬ tive, } an oratorio; and the comic operas, (Prince Ananias ; (The Wizard of the Nile* ; (The Serenade) ; (Cyrano de Bergerac > ; (The Ameer) ; (The Viceroy-* ; (The Idol's Eye) ; (The Fortune Teller) ; (The Singing GirP ;*

HERBIVORA, a group of mammals char¬ acterized by their herbaceous diet; the grazers or ruminants. The term is no longer in use.

PIERBS, Culinary, fragrant or aromatic plants used to add flavor to food, especially stews, soups, dressings and salads. They usually

owe these qualities to essential oils, which, be¬ ing readily soluble or easily volatilized by heat, quickly permeate the mass of food in which they are mixed. The seed of some, as caraway, anise and dill, is employed; the foliage of others, as parsley, sage, thyme, is more fre¬ quently used. The former plants are cut and placed loosely upon sheets as soon as the seed reaches maturity; allowed to dry a few days; lightly thrashed and the seed cleaned ; still fur¬ ther dried and stored in air-tight packages. The latter are gathered just before the first blossoms open, because they are then richest in flavor. With parsley the leaves are gathered as soon as mature, several cuttings being made in a season. They are then dried upon trays at a temperature below 120 degrees and in freely circulating air until crisp, when they are rubbed to powder and stored as above. Paper or pasteboard packages are bad, because they allow the flavors to escape. Both seeds and leaves may be used in decoction, being covered with vinegar or alcohol in stoppered bottles. Fresh herbs, which are always preferable to dried or decocted, are especially useful in salads; dried and decocted in dressings, stews, etc., and at seasons when fresh ones cannot be obtained. In the United States the species most in demand are parsley, sage, thyme, savory, marjoram, spearmint, dill, fennel, tarragon, balm and basil in nearly the order named. Parsley is beyond question the most popular because of its double use as a garnish and flavoring plant but sage is perhaps more frequently used in the latter capacity. It is most esteemed with pork, goose, duck and similar rich meats. Spearmint is used mainly with roast lamb ; tarragon with boiled fish ; dill with pickles ; and the other kinds mentioned with mild meats such as turkey, chicken, veal, venison, etc. The kind, quantity and mixture used with each sort of food depends upon per¬ sonal preference.

In general, herbs are of simplest cultivation. They usually prefer rather light, moderately rich, well drained soil and sunny exposures. Since the seeds of many are small or slow to germinate they are frequently started in a greenhouse, hotbed or window, and trans¬ planted to the garden when they are large enough and when conditions are favorable. Clean cultivation

and the removal of weeds is essential. The perennial kinds, such as sage, are often propagated by stem cuttings, di¬ visions or layers ; tarragon always thus because it does not produce seed; spearmint usually by cuttings of the rootstock. The great majority are. grown as annuals, being replaced each spring with fresh plants. Commercially they follow such crops as early cabbage, peas, etc., thus permitting a double use of the same soil annually. They are easily grown for winter use in the borders of benches in the greenhouse or in boxes placed in sunny windows.

HERCULANEUM, her-ku-la'ne-um, or HERCULANUM, Italy, an ancient buried city, about five miles southeast of Naples. Strabo says it was first occupied by Oscans, afterward by Tyrrhenians and Pelasgians, and then by the Samnites. It took part in the social war against the Romans. In the time of Sulla it was a municipium and a fortified town. It was situated between Neapolis and Pompeii, on ele-

vated ground between two rivers, and its port was one of the best on the coast. It suffered in 63 a.d. in the same earthquake that nearly de¬ stroyed Pompeii. In the greater eruption of Vesuvius in 79 a.d. it was buried under a vol¬ canic tuff formed of sand and ashes, partly consolidated by the agency of water. The site of Herculaneum, though well described, had been long sought in vain, when in 1713 three female statues (now in the Dresden Museum) were found in digging a well at Portici, a vil¬ lage situated on the ancient site. After this discovery further excavation was prohibited by the government, until in 1738 the well was dug deeper, and the theatre of Herculaneum was discovered. In 1750 a long, narrow passage, sloping down into the theatre, was opened, and is still the only way by which travelers descend to examine this structure. The excavations were continued more or less industriously for 50 years ; but comparatively little progress was made, as the work was difficult and also dan¬ gerous to the houses in the populous villages of Resina and Portici, situated above. As soon as one part was excavated and explored it was filled up with the rubbish from a new digging. The theatre is the only building to be seen underground, and it is encumbered with the supports built to sustain the rock above it. It is a noble edifice, massively built of solid stone, and seated 8,000 persons. Bronze statues of Drusus and Antonia and of the Muses were found in various parts of the building. In a square on the south of the theatre a temple was found which was connected with another temple, to the east of it, by a wide street lined with porticoes. One of these temples, dedicated to the mother of the gods, had been restored by Vespasian after the earthquake of 63 a.d. On the north of the theatre was a basilica 228

feet long and 132 broad, surrounded by a portico of 42 columns, and adorned with paintings. Many beautiful paintings and works of art were re¬ moved from these buildings to the museum at Naples. A sumptuous private villa was disin¬ terred, containing a number of statues, and in one of the rooms a quantity of papyrus manu¬ scripts. Some of the statues are excellent as works of art, such as those of Agrippina, Aris¬ tides, the Sleeping Faun and the Mercury. Other precious relics discovered here, and now in the museum, are busts of Plato, Demosthe¬ nes, Scipio Africanus, Augustus, Seneca, _ etc., beautiful mosaics, and articles of furniture. New excavations were carried out in 1 828-37, and since 1868. The chief discoveries made were those of the forum, a small and elegant temple, a basilica, a dilapidated building sup¬ posed to have been an inn, dwelling-houses, tombs, etc. One of the houses discovered at Herculaneum contained a quantity of provi¬ sions, dates, chestnuts, large walnuts, dried figs, almonds, prunes, corn, oil, pease, lentils, pies and hams, none of which had been disturbed for 18 centuries, for the doors remained fas¬ tened in the same state as they were at the period of the catastrophe which buried the town. The internal arrangement of the house, and the manner in which it was ornamented, proved that it had belonged to a rich family, admirers of the arts; for it contained many

pictures, vases, articles in glass, bronze and terra-cotta. Few skeletons comparatively have been found either in Pompeii or Herculaneum, so that it is probable most of the inhabitants saved themselves by flight. At the door of a villa in Herculaneum were found two, one of which held a key in one hand, and in the other a bag with coins and cameos. Near them were silver and bronze vessels.

Among the most interesting objects discov¬ ered here are the papyri above mentioned, over 1,750 of which are now in the Naples Museum. The rolls are of cylindrical form, and much charred. Hardly a third of them have been un¬ rolled. The process presents great difficulties, from the tendency of the MSS. to crumble. One of the works is a treatise by Epicurus on Nature; there are some writings of Philode- mus, a Syrian philosopher ; but on the whole they are of little value. There have been pub¬ lished 11 volumes of the (Volumina Hercula- nensiaP containing engraved transcripts of the unrolled papyri (folio, Naples, 1793-1855), and since 1861 several volumes of a continuation of the same.

Bibliography. — Atkins, S., (Relics of 'An¬ tiquity exhibited in the Ruins of Pompeii and Herculaneum (New York 1826) ; Barre, L., and Rouxaine, H., (Herculanum et PompeP (Paris 1875) ; Barker, E. R., (Buried Hercu- laneum) (London 1908) ; Furchheim, F., (Bib- liografia di Pompei, Ercolano e Stabia* (Naples 1891) ; Marechal, Pierre Sylvain, (Les Antiquites d'Herculanum, avec leurs Ex- plications) (Paris 1750-1803) ;*

Piroli, T., (Le Antichita di Ercolano) (Rome 1789-1794) ; Pis- tolesi, E., (Antiquities of Herculaneum and Pompeii (Naples 1842) ; Waldstein, C., and Shoolbridge, L., (Herculaneum, Past, Present and Future) (London 1908). See also Pompeii.*

HERCULES, her'ku-lez, called by , the Greeks Herakles, and also Alcides, al-sl'dez, after his grandfather, Alcaeus : a mythological hero of Greece, typified by poets, sculptors, and artists of later ages as a model of human per¬ fection, physical and mental. According to the traditions of the heroic age, he united the fin¬ est qualities of mind and heart, as understood at that period, with the highest development of bodily vigor, and under a ceaseless succes¬ sion of labors and sacrifices, strove perpetually after divine excellence. His indomitable per¬ severance was crowned with victories which showed the triumph of the divine part of man's nature over the earthly, while his death secured him immortality, a seat among the gods, and the homage of divine honors.

The legends relate that he was the son of Zeus or Jupiter, king of the gods, and of Alc- mena the Theban, daughter of Alcaeus, son of Perseus. Knowing that the child born on a certain day would rule over the descendants of Perseus, Hera or Juno, wife of Jupiter, con¬ sumed with jealousy, contrived to prolong the travail of Alcmena and hasten that of the wife of Sthenelus, another son of Perseus, who gave birth to Eurystheus, subsequently chief of the Persidae. Hercules was brought up at Tiryn- thus, or according to Diodorus, at Thebes. Ju¬ piter sought to protect his favorite son in every

manner, and to make him worthy of immortal¬ ity. On one occasion, while Juno was asleep, he laid the infant on her breast, that he might feed on the milk of the goddess. She awoke and cast the hated babe from her, and the drops that then fell from her are said to have formed the Milky Way. Under the care of Amphitryon, Alcmena's husband, Hercules received the best instruction in all arts. Castor, the son of Tyn darus, taught him how to fight; Eurytus, arch¬ ery; Autolycus, driving; Eumolpus, singing; Linus, to play the lyre ; and under the centaur Chiron he perfected his training, and became the most valiant and accomplished hero of the age.

In his eighteenth year he slew a huge lion in the neighborhood of Mount Cithseron which had preyed on the flocks of Amphitryon and of the king of Thespis. The king, desirous that his 50 daughters might have children by such a hero, entertained him at his court for 50 days, and Hercules became

the father of their sons, the Thespiadae. Hercules next freed his native city from the annual tribute of a hundred oxen, paid to Erginus, king of the Orchomenians. Creon, king of Thebes, rewarded Hercules by giving him his daughter Megara in marriage and intrusting him with the government of his kingdom. Subjected to the power of Eurys- theus owing to priority of birth, the latter, ac¬ quainted with Hercules' successes and rising power, ordered him to appear at Mycenae and perform the labors which he was empowered to impose upon him. Hercules refused, and Juno to punish him afflicted him with melancholic madness, during which he killed his own chil¬ dren by Megara, supposing them to be the off¬ spring of Eurystheus. When he recovered he was so horrified by the misfortunes which had proceeded from his disobedience and insanity that he consulted the oracle at Delphi ; he was told that he must be subservient to the will of Eurystheus and perform ten labors imposed by the king, after which he would attain immor¬ tality. Hercules thereupon went to Mycenae, where Eurystheus, apprehensive of so powerful an enemy, commanded Hercules to achieve a number of enterprises the most difficult and arduous ever known. The favors of the gods, however, had completely equipped him for their performance; from Minerva he 'had received a coat of arms and helmet, a sword from Mer¬ cury, a horse from Neptune, a shield from Jupi¬ ter, a bow and arrows from Apollo, and from Vulcan a golden cuirass and brazen buskin with a celebrated brass club.

The first labor was to destroy the lion which infested the forests of Nemea and Cleonae near Mycenae and was invulnerable to mortal arrows. Hercules attacked him with his club, chased him to his den, and after a sharp and fierce struggle choked him to death. He carried the dead beast on his shoulders to Mycenae, and ever after clothed himself with the skin. The second labor was to destroy the Lernaean hydra, which he accomplished with the assistance of his friend Iolaus, who burnt with a hot iron the root of each head as Hercules crushed it to pieces with his club. The third labor was to catch the hind of Diana, famous for its swiftness, golden horns and brazen feet. The fourth labor was to bring alive to Eurystheus a wild boar which

ravaged the neighborhood of Erymanthus. In this expedition he destroyed the Centaurs, and caught the boar by closely pursuing it in the deep snow. In his fifth labor Hercules was commanded to clean the stables of Augeas, where 3,000 oxen had been kept for many years ; this he accomplished in one day by turning the rivers Alpheus and Peneus through the stables, receiving as payment a tenth of the cattle and concealing the fact that he had been commanded to perform the service. The sixth labor was to destroy the carnivorous birds, with brazen wings, beaks and claws, which ravaged the country near Lake Stymphalis in Arcadia. In his seventh labor he brought alive into Peloponnesus the wild bull, a gift of Posei¬ don to

Minos, king of Crete, which had laid waste the island. In his eighth labor he was commissioned to capture the mares of Dio medes, which fed upon human flesh. He killed Diomedes, and gave him to be eaten by his mares, which he brought to Eurysfcheus. For his ninth labor he was commanded to obtain the girdle of the queen of the Amazons. In his tenth labor he killed the monster Geryon, king of Gades, and brought to Argos his nu¬ merous flocks, which fed upon human flesh. Adjudging the second and fifth labors as un¬ lawfully performed, Eurystheus imposed two others. These were : the eleventh, to obtain the golden apples from the garden of the Hes- perides; and the twelfth, to bring from hell the three-headed dog Cerberus. Pluto prom¬ ised him Cerberus on condition that he should use no weapons but force. Eurystheus, pale with fright when Hercules brought the mon¬ ster to him, ordered its immediate removal. This ended what are generally known as the Twelve Labors of Hercules, and relieved the hero from bondage.

Besides these, Hercules achieved other la¬ bors equally great and celebrated, such as his war with Jupiter against the giants, his expedi¬ tion with the Argonauts to Colchis, the pillage of Troy, the liberation of Prometheus and Theseus, etc. During three years' slavery, im¬ posed by the Delphian oracle for plundering the temple to avenge supposed neglect, Her¬ cules' mistress, Omphale, queen of Lydia, mar¬ ried him. Hercules afterward married De- janira, daughter of CEneus, king of HLtolia, and when Iole, daughter of the king of CEchalia, a princess formerly refused to Hercules, be¬ came his captive, Dejanira sent Hercules the tunic given her by the dying centaur Nessus as having the power to recall a husband from un¬ lawful love. The tunic had been infected by the poisoned arrow shot by Hercules at the centaur when he offered violence to Dejanira, after carrying her across the river Evenus. When Hercules put the tunic on, the poison penetrated his system and he suffered untold torments; in remorse Dejanira killed herself. In his agony Hercules had himself conveyed to Mount CEta and laid on a funeral pyre which at his commands was set on fire. In the midst of a dark cloud, accompanied by lightning and thunder, his immortal spirit was transported to Heaven, where he took his place among the gods, became reconciled to Juno and married her daughter Hebe.

HERCULES

HEREDITY

123

While the myth of Hercules is of Greek origin, counterparts of the legend appear among many nations. Some scholars regard Hercules as a solar hero, and the twelve labors to repre¬ sent the 12 zodiacal signs. Artists

represent him under a variety of forms, as a child, a youth, and man, in his numerous adventures and exploits. The principal ancient statue is the Farnese Hercules at Naples, by the Athe¬ nian Glycon. In the Vatican, the Torso di Michelangelo, so called because that artist studied it during several years, is a remarkable fragment of an ancient statue of Hercules. Consult Gayley, (The Classic Myths) (1911).

HERCULES, in astronomy, one of Ptol¬ emy's northern constellations. It is within this constellation that the point toward which the sun, with its accompanying system of planets, is traveling at present is situated. Tl\e constel¬ lation contains the finest globular cluster of stars in the northern heavens, and the bright double and variable star Ras Algethi.

HERCULES, Pillars of, name of the Straits of Gibraltar among the ancients. Her¬ cules is said to have erected a pillar on each side of the strait between Europe and Africa, upon the mountains Calpe and Abyla, as the limits of his wanderings toward the west. The earliest Greek writer by whom the Pillars of Hercules are mentioned is Pindar. On the other hand the Phoenicians called the strait the Pillars of Melkant (q.v.), whom the Greeks knew as Melicertes.

HERCULE.S-BEETLE, a very large South American lamellicorn beetle (Dynastes Hercules). An enormous horn projects from the prothorax of the male and a smaller one from the head; they act together like a pair of forceps. The length of the male is about six inches but the female is smaller and lacks the horns. Numerous related species are known, of which D. tityrus, found in the southern United States, is two and one-half inches long.

HERCULES' CLUB, a North American shrub or tree growing to height of 12 feet and sometimes to 40 feet. See Aralia.

HERDER, Johann Gottfried von, yo han

got'fred fon her'der, German critic and poet : b. Mohrungen, Prussia, 25 Aug. 1744; d. Wei¬ mar, 18 Dec. 1803. He was the son of a poor schoolmaster, but friends procured him an ap¬ pointment in Frederick's College, where he was at first tutor and at a later period instructor. During this period he became known to Kant, who permitted him to hear all his lectures gratis. His unrelaxing zeal and diligence en¬ abled him to become acquainted with science, theology, philosophy, philology, natural and civil history and politics. In 1764 he was appointed an assistant teacher at the cathedral school of Riga, with which office that of a preacher was connected. In 1769 he went to Paris; he be¬ came traveling tutor to the Prince of Plolstein- Oldenburg, but in Strassburg he was prevented from

proceeding by a disease of the eyes; and here he became acquainted with Goethe, on whom he had a very decided influence. Herder had already published his (Fragments on the More Modern German Literature, 5 his (Critical Woods5 (Kritische Walder), etc., which had gained him a considerable reputation, though he had not published anything of importance

in theology; yet, while in Strassburg, he was invited to become court preacher, superintendent and consistorial councillor at Biückeburg, whither he proceeded in 1771. He soon made himself known as a distinguished theologian, and in 1776 received an invitation to become court preacher, general superintendent and consis¬ torial councillor at Weimar. This appointment was through the influence of Goethe. In 1801 he was made president of the high consistory, a place never before given to a person not a nobleman, and was subsequently made a noble by the Elector of Bavaria. As a theologian Herder contributed to a better understanding of the historical and antiquarian part of the Old Testament. His (Geist der hebraischen Poesie5 is highly valued. He did much for the better appreciation of the classical authors, and his philosophical views of human character are full of instruction. His greatest work is his (Ideen zur Philosophic der Geschxhte der Menschheit5 (1785 et seq.). In poetry Herder effected more by his various accomplishments, his vast knowledge and fine taste than by cre¬ ative power; yet he has produced some charm¬ ing songs; and his (Cid,5 a collection of Span¬ ish romances into a kind of epic, is one of the most popular poems of Germany.

HEREDIA, a-ra-de'a, Jose Maria, Span¬ ish- American poet : b. Santiago de Cuba, 31 Dec. 1803; d. Toluca, Mexico, 7 May 1839. He was graduated from the law department of the University of Havana in 1819; for taking part in the attempted revolution of 1823 was ban¬ ished from Cuba, lived for two years in the United States and in 1825 removed to Mexico, where he held various civil, judicial and jour¬ nalistic positions. His poetic works have been to some extent rendered into other languages. The (Ode to Niagara5 is well known. Heredia has been considered by many the greatest of Spanish-American poets. One of the best edi¬ tions is that of Ponce de Leon, (Obras Poeticas de Don Jose Maria de Heredia5 (1875).

HEREDITARY MONARCHY. See

Monarchy.

HEREDITY. So long, as the part played by the male and female in procreation was obscure, as it was to the ancients, it was im¬ possible to arrive at a clear idea concerning the relationship of offspring to parents,

but after Spallanzani's discovery that the solid part only of the sperm forms the fertilizing agent, and more especially after Hamm's identification of the spermatozoon, it became possible to study the method of inheritance more directly. At the time when these advances were made the doctrine of praeformation was still generally held and the attempt to harmonize the new discovery of the spermatozoon split the prae¬ formation school into two schools. According to one side, the ovists, the egg contains in miniature a germ in all essential respects, ex¬ cept size, like the parent. The spermatozoon only starts the vital processes but contributes nothing material to the result. Heredity, there¬ fore, sensu strictu, could only take place through the female. According to the other s:de, the spermists, the spermatozoon contained the praeformed germ of the individual, and the egg supplied only the pabulum for its expan¬ sion and growth. Both ovists and spermists were logically forced to the further assumption

that each germ contained within itself other germs and these still others, and so, if not ad infinitum, still each contained a sufficient number of enclosures to insure the perpetua¬ tion of the species as long as its predestined course was to last.

This deadlock was broken with the discov¬ ery of the cell (1838-39) and the part it plays in fertilization. Plants and animals have been found to be made up of modifications of a single unit called the cell — a mass of protoplasm usually surrounded by a membrane and con¬ taining a central sphere or nucleus. The egg is such a cell — one so simple as compared with its many modifications in the body that the egg is almost an idealized type of the cell. Minute study of the spermatozoon and its origin re¬ vealed that it, too, starts as a cell as simple as the egg cell. Fertilization was found to con¬ sist of the union of these two cells, one from one parent and one from the other, at least in all animals and plants in which the sexes are separate. By union of the two cells a single cell is produced which through division gives rise to the host of cells of which the new indi¬ vidual is produced. Every cell of the new individual contains all the hereditary elements derived from the two parents. These heredi¬ tary elements are now recognized as contained in the cell in certain threads called chromo¬ somes that are the essential elements of the nucleus of the cell. The number of chromo¬ somes is definite for each species of plant or animal. The numerical constancy is maintained by a division that takes place in the ripen¬ ing of the egg and of the sperm mother cell, for at this time a process occurs that need not be further described here (see below), which leads to a reduction in the number of chromo¬ somes to a single set — one of each kind. By the union

of these reduced cells in fertilization the double number of chromosomes is again restored. This demonstration of the duality of the hereditary elements in the fertilized egg with the consequent duality of the same ele¬ ments in every cell of the adult body is the most important contribution of modern cytology to the theory of heredity.

While these discoveries were being made during the latter part of the last century, dis¬ coveries that were destined ultimately to throw a flood of light on how inheritance is brought about, a doctrine was attracting widespread attention, but has never succeeded in being brought into systematic relation with our knowledge concerning the cell.

In 1809 Lamarck had advocated the view that evolution is due in part to the direct in¬ fluence of the environment, especially in plants, and in part to the inheritance of structural and physiological changes that first take place in the body of animals as a result of use and dis¬ use of its parts. The doctrine involves the idea that in some way the germ cells respond spe¬ cifically to changes in the body. Darwin ac¬ cepted Lamarck's view (although Darwin erroneously supposed that Lamarck held a view essentially different from his own) and ad¬ vanced in 1866 a tentative hypothesis as to how somatic modifications could affect the germ cells. His view was the first attempt to show how such a process, that had been vague — even mysterious, might be made compatible with the teaching in regard to cell structure

and physiology that had at that time made very considerable advances. This is the famous hypothesis of Pangenesis. Darwin suggested that every cell of the body is, at all times, throwing off minute representative particles called gemmules which leave the cell, and, mi¬ grating through the fluids of the body, finally reach the germ cells into which they enter, and which in a sense they construct. It was as¬ sumed that the gemmules from every part of the body unite in the germ-cells with like particles. These particles determine in some way, not clearly specified by the theory, the nature of the organs or characters of the new individual that develops from the egg.

No evidence whatsoever in favor of the liberation of living units from the body cells, their accumulation in the germ cells and fusion there of like with like gemmules is to be found in the modern work on the germ cells. More¬ over, a critical examination, especially in Weismann's hands, of the evidence on which was rested the entire theory of inheritance of acquired characters, has shown that this evi¬ dence was in part mythical and in part due to uncritical deductions.

Beginning in 1883 August Weismann in a series of essays that were in part speculative, yet backed by a constant appeal to observation and

experiment, attacked the prevailing idea that characteristics acquired by the individual are transmitted to the germ cells and may re¬ appear in the offspring. The germ cells had been shown in many cases to separate them¬ selves at an early stage in the development of the embryo from the rest of the cells, remain¬ ing in an unspecialized condition while the re¬ maining cells from which the body of the individual is to be formed were differentiating. The germ cells become later the essential parts of the ovary and testis respectively. In origin, therefore, they are independent of the rest of the body and have never been a constituent part of it. They are protected and nourished by the body, but not otherwise influenced by it. The germ tract is the imperishable stream which throws off in each generation the body cells whose destiny is to maintain the germ cells. All new mod'fications arise primarily in the germ cells, and first show themselves as characters in the individuals that develop from these germ cells. Evolution is germinal in origin and not somatic as had been earlier taught. This idea of the origin of new char¬ acters is held almost universally to-day by biologists. Heredity is due, therefore, to the conservation in the germ plasm of those ele¬ ments that have appeared in it from time to time — the old as well as the new. The germ plasm is the capital of the race of which the interest only is spent in each generation in producing new individuals.

Darwin held not only that somatically ˆacquired" characters are transmitted, but also that new characters arise in other ways, in the main through the action of the outer world on the germ cells themselves. To this source he attributed many of the differences shown by individuals of any race or species. Darwin knew that some of these differences were due directly to the environment in which the indi¬ vidual was reared and were not inherited, but others he thought were in the germ stream and hence were transmitted (inherited). Darwin

thought that the latter variations were different from the larger differences that sometimes ap¬ pear and which were known to the breeder as "sports® (now as "mutations®). The former he bebeved to furnish the principal material on which natural selection acts to bring about evolution, while the larger and sudden changes or "sports® rarely if ever furnished the ma¬ terials for evolution. To-day it appears that no such distinction exists and that all varia¬ tions, whether large or small, that are inherited, arise in the same way, viz., as sudden changes (mutations) in the germ-plasm. Galton, whose studies in heredity, particularly those of human heredity, are based on much the same kind of evidence in regard to variation as that to which Darwin appealed, appreciated more fully the significance of discontinuity in

the origin of new characters, but in his treatment of the inheritance of characters he made no sharp dis¬ tinction between the methods of transmission of "blended® inheritance and "mosaic® inheritance and handled both by the same mathematical method. Nevertheless, Gabon's introduction of exact mathematical and quantitative methods has had an important bearing on all recent work. Its later development, especially by Pearson and the school, of Biometry, has furnished the Mendelian school with formulae indispensable for testing the validity of much of their data.

Galton reached the conclusion that the two parents of a given individual contribute to it on the average half of its inheritance; the four grandparents collectively one-fourth of its in¬ heritance, the great-grandparents one-eighth, etc. The assumptions on which this theory rests have been shown (see below) to be wrong, for the procedure by which the hered¬ itary elements are sorted out in successive gen¬ erations is incompatible with such an assump¬ tion in individual cases. Individual analyses rather than study of mass phenomena gave the successful method through which the real hereditary mechanism was discovered by Men¬ del in 1865.

Mendel's two laws of heredity have been shown to hold not only for many plants, but for man and other animals, for birds, amphibia, fish, molluscs, Crustacea, insects, etc. It has been found that Mendel's laws apply not only to characteristics of cultivated plants and animals, not only to superficial things such as color, but to the characters of wild animals, to differences that distinguish species, and to the most funda¬ mental attributes of living things. Mendel's law of segregation states that the elements that the two parents contribute to the offspring

constitute pairs, and that the members of each pair separate in the formation of the germ cells in the offspring so that each germ cell contains one member only of each pair. For example, Mendel crossed a race of edible peas having green seeds to one having vellow seeds. All of the offspring seeds were yellow. Yellow dominates green. If plants from these hybrid peas are self-fertilized (or crossed to each other) they produce both yellow and green peas in the ratio of three yellows to one green. These green peas are pure and never produce anything but green peas. The yellow peas, however, were found to be of two kinds, some were pure yellow always producing all yellow descendants, others were hybrids, producing both yellow and green peas in the ratio of three to one. Taken altogether these second generation peas appeared in the proportion of one pure yellow, two hybrid yellows, one pure green. Mendel pointed out that if the original green grandparent contributed an element for green and the yellow grandparent an element for yellow, these contrasted elements form a pair in the hybrid — a pair whose members separate (segregate) from each other when the germ cells (gametes) are produced. In con¬ sequence, half

of the ovules will contain the element for yellow and half the element for green; likewise half of the pollen grains will contain the element for yellow and half the element for green. Chance meetings of the ovules and pollen, thus :

Ovules Green ˆ Yellow

TXT

Pollen Green / \ Yellow

will give 1 green green ; 2 green yellow ; 1 yellow yellow.

Mendel's second law deals with cases where more than one pair of characters are involved. It has been found that tall and short races of peas are contrasted characters that segregate in the same way as do yellow and green. If a tall race with yellow peas is crossed to short race with green peas, the segregation of each pair is independent of that of the other, so that one-quarter of the egg cells of such a hybrid contains the elements for tall and yel¬ low ; another quarter the elements for tall and green; another quarter the elements for short and yellow, and another quarter for short and green. Similarly in the formation of the pol¬ len of the same four kinds of gametes are pro¬ duced. Chance meetings of ovules and pollen give 16 combinations as shown in the following diagram.

POLLEN

Ovules

Tall Yellow

Tall Green

Short Yellow

Short Green

Tall Yellow .

Tall yellow

Tall yellow

Tall green

Tall yellow

Short yellow

Tall yellow

Short green

Tall yellow

Tall Green .

Tall yellow

Tall green

Tall green

Tall green

Short yellow

Tall green

Short green

Tall green

Short Yellow .

Tall yellow

Short yellow

Tall green

Short yellow

Short yellow Short yellow

Short green

Short yellow

Short Green .

Tall yellow

Short green

Tall green

Short green

Short yellow Short green

Short green

Short green

Since yellow dominates green and tall dominates short, there are in this second filial (F2) generation nine tall yellow; three short yellow ; three tall green ; one short green. Thus, while members of each pair of factors of the hybrid segregate at the time of ripening of the germ cells, the separation is independent for each pair. This is Mendel's second discovery that may be called the law of independent as¬ sortment.

Mendel showed that three pairs of char¬ acters behave in the same way, i.e., their genes assort independently, and there is reason to suppose that this law holds whenever the genes for the two or more pairs of characters are carried by separate pairs of chromosomes, but, as will be shown below, whenever the genes are carried by the same pair of chromosomes the distribution is controlled by a third law of heredity, viz., the law of linkage.

The elements that are supposed to represent, in a sense, the hereditary characters are com¬ monly called genes and the word Genetics, or the study of behavior of the genes, has come to replace, in the modern work on inheritance, the older term Heredity with its numerous con¬ notations. The Mendelian characters have been spoken of as unit characters, and it is sometimes implied that the gene directly pro¬ duces each such character. The clearest evi¬ dence, however, indicates that the so-called unit character is only one of the many effects which the gene may produce in conjunction always with many, perchance with all of the other genes. Thus, the germ plasm is looked upon as the sum total of the genes whose combined effect is responsible for each character of the body. While the body is built up through the interaction of the materials that the gene pro¬ duces, yet in the formation of the germ cells the genes act as independent units that collect in pairs, then segregate, those pairs in separate pairs of chromosomes assorting independently; those pairs in the same chromosome pair being linked.

Modern work on the cell has pointed unmis¬ takably to the mechanism by

means of which both segregation of the genes and the assort¬ ment of the chromosomes takes place. Every cell in the body or immature germ cell con¬ tains a double set of chromosomes (except in the male of certain groups, which lacks one of the sex chromosomes) ; one member of each pair has come from the father and one from the mother. During the maturation process the maternal and the paternal chromosomes mate with each other — like with like. Subsequently at the so-called reduction division one member of each pair goes to one daughter-cell and the other member to the other daughter-cell. If the chromosomes carry the Mendelian genes the maternal and the paternal genes will be segre¬ gated when the chromosomes are reduced to produce the gametes ; but at the reduction divi¬ sion there is not a separation of all the maternal from all of the paternal chromosomes as a group, but each pair of chromosomes segre¬ gates independently of the others, so that the daughter-cells may get any possible assortment of the chromosomes of paternal and maternal origin, but always one or the other member of each pair. This condition fulfills all the re¬ quirements of Mendel's second law of free as¬ sortment.

But obviously if, as assumed, the chromo¬ some threads are the bearers of the genes and if, as generally held to-day, the thread is a structural element that remains intact even in the resting stages of the cell, then the genes must be inherited in groups corresponding in number to the number of the chromosomes. In a word, all the genes in a given chromosome will be linked together. The most recent evi¬ dence shows that this is the case, and that there are as many groups of linked genes as there are kinds of chromosomes. Since 1906 the number of demonstrated cases of linked genes has steadily increased so that it can no longer be questioned that this relation is a characteristic feature of Mendelian inheritance. In one in¬ stance, that of the fruit fly, Drosophila ampelo- phila, it has been shown that the 200 known hereditary differences are inherited in four groups corresponding to the four pairs of chromosomes. Thus, Mendel's law of segrega¬ tion has found its justification in the cytological mechanism of reduction in the germ cells ; while his law of free assortment has been confirmed in the method of assortment of the chromosome. Later the discovery of the meaning of linkage phenomena has brought all the fundamental properties of heredity into complete harmony with the chromosomal mechanism. The individ¬ uality of the chromosomes that is responsible for linkage has been found, however, not to be absolute, for the members of a pair have been shown to interchange equivalent parts at times, but the interchange has been found to follow a predictable course, and while it complicates the results, in no sense undermines the general principle involved. In some species the inter¬ change (crossing over) takes place only in the female sex (Drosophila), in others in the male sex (silkworm moth), while in still others it takes place, in both sexes, as in

some herma¬ phroditic plants.

The inheritance of sex has been one of the great biological discoveries of the present cen¬ tury. The factor or factors of sex have been shown to be carried by special chromosomes called the sex chromosomes. In certain great groups (mammals, most insects, etc.) the occur¬ rence of two of these chromosomes, called the X chromosomes, produces a female, the. pres¬ ence of one of them produces a male. Thus the female is XX, the male X. At the reduc¬ tion division in the female one X is eliminated from the egg so that each egg contains but one X chromosome. In the male there is only one X, this X chromosome goes in the reduction division to only one sperm cell of the two formed, so that two classes of spermatozoa re¬ sult. At the time of fertilization random meet¬ ing of any egg with any spermatozoon will give two classes of individuals, those with two X's (females) and those with one X (males). This mechanism preserves the numerical equality of the sexes. In other groups (birds, moths) the relation is reversed, the male containing two X's, the female one; hence all of the sperma¬ tozoa contain one X ; half of the eggs contain but one X, the other half none. This mechanism gives the same numerical results but the sex factors are presumably different. In hermaphroditic forms all of the individuals are alike in their chromosomal numbers, and the differentiation of testes in one part and ovaries in another part of the same individual must be

determined by the same kind of relation that de¬ termines the differentiation of any of the organs of the body. This is not the result of different chromosomal complexes but of the relation of the protoplasmic parts to each other.

In consequence of the method of distribu¬ tion of the sex chromosomes a unique type of inheritance called ((sex linked inheritance55 has been recognized. The sex chromosomes carry many other factors besides the sex factor which follows the distribution of the sex chromosomes. Thus, in man certain kinds of color blindness and hemophilia (bleeding re¬ sulting from failure of the blood to coagulate) are inherited as follows : an affected male transmits his characteristics to half of his grand¬ sons but to none of his sons, daughters or granddaughters ; but all of his daughters and half of his granddaughters carry his affected X chromosomes, and reproduce their peculiarity in half of their sons. Conversely, an affected female transmits her peculiarity to all of her sons (since each gets her affected X chromo¬

some) but to none of her daughters since the other X chromosome that they receive from their father counteracts the injurious effect of the maternal X chromosome, etc. In birds, where the female is X and the male XX, these relations are just reversed.

The word heredity has come to-day to have a more precise meaning than in the past, be¬ cause the recurrence of characters in succes¬ sive generations is now known to come not from the body of the parent, but to be an ex¬ pression of the factorial composition of the germ plasm. The germ plasm is the heritage of the species or race and changes only through mu¬ tation in one or more of its elements or genes. The character of each individual that arises out of this germ plasm is determined by the sum total of the factors contained in the germ, which factors acting on the cytoplasm deter¬ mine the character of the result in any given environment. Heredity is the name given to express this relation of continuity of the germ plasm material and its consequences in the suc¬ cessive generations that arise from the germ plasm.

Bibliography. — Bateson, William, (Mendel's Principles of Heredity) (Cambridge 1913) ; Castle, William Ernest, ˆGenetics and Eu- genics) (Cambridge, Mass., 1916) ; De Vries, Hugo, (The Mutation Theory5 (Chicago 1909- 10) ; De Vries, Hugo, (Species and Varieties, their Origin by Mutation) (Chicago 1905) ; Morgan, Thomas Hunt, (The Mechanism of Mendelian Heredity) (New York T915) ; Pearson, Karl, various articles in Biometrika ; Weismann, (The Evolution Theory5 (Eng. ed., 1906) ; Babcock and Clausen, (Genetics in Re¬ lation to Agriculture5 (New York 1918).

Thomas H. Morgan,

Professor Experimental Zoology , Columbia University.

HEREFORD, her'e-ford, England, a city and parliamentary borough, capital of Hereford¬ shire on the Wye, 144 miles by rail northwest of London. The chief building is the cathedral, built in 1012-56, rebuilt in 1072, and restored in 1863. It' is of early Norman architecture, 335 feet long and 174 feet wide, contains many fine monuments, some as ancient as the cathedral, and its accessory features include a lady chapel,

charterhouse, cloisters, an episcopal palace and a library containing valuable MSS., Wyclif's Bible, and a 13th century map of the world. A musical festival of the united choirs of Glouces¬ ter, Worcester and Hereford is given in the cathedral triennially. Cider and brewing and the making of excaustic tiles are among the in¬ dustries. David Garrick was a native. The see dates from 673; the city was incorporated in the reign of

King John. Pop. 22,568.

HERESY (Gr. hceresis) primitively means a choice or election, and in its application to religious belief is used to designate as well the act of choosing for one's self, and maintaining opinions contrary to the authorized teaching, as also the heterodox opinions thus adopted. In the Acts of the Apostles the word seems to be used of a sect or party, apart from the con¬ sideration of its character, whether good or bad; but in the Epistles and in the early Chris¬ tian writers it is almost invariably used in an evil sense, which is the sense uniformly accepted in all subsequent theological literature down to recent times.

Even in the apostolic times heresies had arisen in the Church, and before the Council of Nice the catalogue of sects had already swelled to considerable dimensions.

From the very date of the establishment of Christianity in the Roman empire heresy ap¬ pears to have been regarded as a crime cogniz¬ able by the civil law ; and Constantine enacted several severe laws for its repression, which were continued and extended by his successors, and were collected into a single title, (De Haere- ticis, 5 in the Justinian code. The penalties of heresy ordained by these enactments are very severe, extending to corporal punishment, and even to death ; and they all proceed on the dis¬ tinct assumption that a crime against religion is a crime against the state. These enactments of the Roman law were embodied in the various codes of the European kingdoms; in English law heresy consisted in holding opinions con¬ trary to the faith of Holy Church. By common law the offender was to be tried in the pro¬ vincial synod by the archbishop and his council, and, after conviction, was to be given up to the king ter be dealt with at his pleasure. But the statute 2 Hen. IV, chap. 15 {De hceretico com- burendo) empowered the diocesan to take cog¬ nizance of heresy, and, on conviction, to hand over the criminal directly, and without waiting for the king's writ, to the sheriff or other com¬ petent officer. This statute continued practically in force, with certain modifications, till the 29 Charles II chap. 9, since which time heresy is left entirely to the control of ecclesiastical legis¬ lation.

The doctrines considered heretical by the Christian Church may be found in the (Diction- naire des Heresies,5 by the Abbe Pluqiuet, with the history, progress, nature, and also the refu¬ tations of their errors. From the viewpoint of the Roman Catholic Church all Protestants (in¬ cluding in this term Anglicans) are accounted heretics; the right of private judgment is the keystone of Protestantism. The Protestant churches have themselves judged members who have dissented on doctrinal points heretics, and the Anabaptists were at one time so regarded; but with increasing toleration

prosecutions for heresy are becoming very infrequent and are

not regarded as excluding from the fellowship of believers those who thus come under the ban of ecclesiastical censure or disapproval.

HERETIC, in ecclesiastical terminology, one who embraces a heresy. It is evident that the word heretic can have only the relative meaning of heterodox. The early Christian Church always made a distinction between here¬ tics who obstinately persisted in their heresy, and heretics merely through error, or who had been born in heresy. The fathers of the Church declare themselves ignorant of the final condi¬ tion of the latter. Again, peaceable heretics are distinguished from those whose doctrines produce public confusion and disorder.

HERE WARD, her'e-ward, a Saxon yeoman who flourished about 1070. He was practically the last to withstand the Normans, holding the Isle of Ely against William the Conqueror 1070-71. After William had succeeded in reach¬ ing the refuge of the Saxon patriots, Hereward, scorning to yield, fled to the fastness of the swampy fens to the northward. He was com¬ monly styled Hereward the Wake, and his character and adventures form the theme of Charles Kingsley's popular historical romance,

*(Hereward. **

HERFORD, Oliver, American humorous author and illustrator : b. England, 1863. He was educated at the Slade School, London, and Julien's, Paris. Among his works are (Artful Antics) ; (The Bashful Earthquake and Other Fables and Verses > (1898) ; < Alphabet of Celeb¬ rities' (1899); (A Child's Primer of Natural History } (1899) ; (Wagner for-Infants) (1899) ;*

< Overheard in a Garden) (1900) ; (Rubaiyat of a Persian Kitten) (1904) ; (The Fairy God- mother-in-Law) (1905); (Peter Pan Alphabet (1909) ; (Kitten's Garden of Verses) (1911) ; (The Mythological Zoo) (1914) ; (Pen and Inklings) (1917); Confessions of a Caricatur¬ ist (1917).

HERING, Ewald, German psychologist: b. Altgersdorf, Saxony, 5 Aug. 1834. He studied medicine, and settled at Leipzig as physician in 1860; in 1862 he was lecturer in physiology at the Leipzig University, and in 1865 was pro¬ fessor of physiology and medico-physics in a medical school at Vienna, and in 1870 held the same chair at Prague. Hering is best known

for his work in the field of psychophysics, espe¬ cially for his investigations of visual space per¬ ception and for the color theory which he orig¬ inated. This theory is opposed to the empiristic theory of Helmholtz and is most generally ac¬ cepted by psychologists at the present time. His writings include (Die Lehre vom Binocularen Sehen> (1860); (1872-74); (Der Raumsinn und die Bewegung des Auges) ; /Das Gedachtniss als eine allge- meine Funktion der organisierten Materie) (1870) f (Grundzuge einer Theorie des Tem- peratursinnes) (1877) ; (Handbuch der Physi- ologie) ; (Ueber Newtons Gesetz der Farben- mischung> (1887) ; Crundzuge der Lehre vom Lichtsinn) (1905-11), and many papers on vis¬ ual theory.

HERING, Rudolph, American hydraulic and sanitary engineer: b. Philadelphia, Pa., 26 Feb. 1847. He was graduated at the Dresden (Germany) Polytechnic School, 1867, and be¬ came assistant engineer of Prospect Park,

Brooklyn, N. Y., the following year. He was assistant engineer of Fairmount Park, at Phila¬ delphia, 1869-71, and astronomer at Yellowstone National Park in 1872. After serving as assist¬ ant city engineer 1873-80 he opened an office for private practice in engineering and has furnished designs for sewerage and water sup¬ ply for numerous towns and cities in the United States, Canada and South America. He is mem¬ ber of many professional societies both in Eu¬ rope and Ainerica, and has written many pub¬ lished reports on sewerage and water supply of cities. He was president of the American Pub¬ lic Health Association in 1913-14.

HERIOT, her'I-ot, George, Scottish phi¬ lanthropist : b. Edinburgh, 1563 ; d. London, 12 Feb. 1624. His father was a goldsmith in Edinburgh, and the son followed his father's profession, and was admitted a member of the Incorporation of Goldsmiths in May 1588. In 1597 he was appointed goldsmith to the queen by a charter from James VI and on the acces¬ sion of the latter to the English crown followed the court to England. From the period of Heriot's settlement in London little is known of his history. He died on 12 Feb. 1624, and was buried at Saint Martin's-in-the-Fields. By his will he left nearly the whole of his fortune toward the founding and erecting of a school for poor boys in Edinburgh, styled in the bequest a "hospital.® The foundation of the present structure, known as Heriot's Hospital, was laid in July 1628; and the expense of the erection exceeded f30,000 sterling. From the rise in value of property the yearly revenue of the hospital has very greatly increased ; and the governors were empowered in the reign of William IV to establish elementary schools within the city for the gratuitous education of poor children, 16 day schools being ultimately established, besides evening schools. In 1885, however, an entirely new scheme was introduced and a great part of the funds are now devoted to

the support of Heriot's Hospital School and the Heriot-Watt College. The former is a day school for boys of 10 and upward, and the Heriot-Watt College is a college giving a thor¬ ough technical, commercial and literary edu¬ cation chiefly by evening classes, though there are also day classes. The annual revenue is now about $150,000.

HERKIMER, Nicholas, American militarv officer : b. about 1715; d. Danube, N. Y., 17 Aug. 1777. He became a lieutenant of militia, served in the French and Indian War, and de¬ fended Fort Herkimer in 1758. Promoted brig¬ adier-general of militia in 1776, he directed operations against Sir John Johnson, and when Fort Stanwix was threatened by a combined force of Indians, Tories and regulars, advanced to its relief. He was ambushed by Col. Saint Leger at Oriskany, and one of the most closely- fought battles of the Revolutionary War fol¬ lowed. Herkimer, having lost a third of his force, was unable to continue, and Saint Leger's army, was rendered thoroughly ineffective. Herkimer himself was wounded, and died as the result of an unskilful operation. The town and county of Herkimer, N. Y., were named in his honor.

HERKIMER, N. Y., village, county-seat of Herkimer County; on the Mohawk River, the Erie Canal and on the New York Central and

Hudson River Railroad; about 25 miles east of Utica and 68 miles northwest of Albany. 'I he chief manufactures are flour, furniture, mattresses, knit goods, beds, paper, creamery products, leather board, boxes, hardware and cigars. The city owns and operates the elec¬ tric plant and the waterworks. It is the seat of Folts Mission Institute, has a public library and a hospital. Fort Dayton occupied the northern part of Herkimer and before 1807, when it was incorporated the village was called Fort Dayton. Pop. (1920) 10,453.

HERKOMER, Sir Hubert von, English painter: b. Waal, Bavaria, 26 May 1849; d. 31 March 1914. His father, a wood carver, went to America in 1851, but returned to Europe and settled in Southampton in 1857. Hubert studied at the school of art in that city, wbere he assisted in founding a life school for draw¬ ing. In 1867 he exhibited in the Dudley Gal¬ lery. His first picture exhibited at the Royal Academy, (After the Toil of the Day' (1873), a German subject, attracted attention; and two years later he gained a great reputation by his famous picture representing cThe Last Muster — Sunday at the Royal Hospital, Chelsea. ' Later pictures are (Eventide: a Scene in Westminster Union) (1878), (

HERMANDAD, er-man-dath', a confeder¬ ation of the cities of Aragon, formed to defend themselves against the usurnations and the rapacity of the feudal nobility. This object was most clearly apparent in the brotherhood (Hermandad) formed about the middle of the 13th century in Aragon, and that formed about 1282 in Castile. In 1295, 35 cities of Castile and

Leon formed a joint confederacy for the same object. These fraternities were the model of the later Hermandad of the municipal com¬ munities, which was formed in Castile under the reign of Ferdinand and Isabella. It was established in 1486 with the approbation of the king. The city authorities raised a military force and appointed judges in different parts of the kingdom. Neither rank nor stat.on pro¬ tected the offender against the tranquillity of the country, nor could he find safety even in the churches. The Santa Hermandad (holy brotherhood) which readers of Don Quixote will be acquainted with, had, like the earlier institution, of which it was a continuation, the object of securing internal safety, and seizing disturbers of the peace and highway robbers, but did not act except in case of offenses act¬ ually committed. It consisted of a company of armed police officers, who were distributed in the different provinces of the kingdom of Castile, and whose duty it was to provide for the security of the roads outside of the cities. One of their strictest regulations was not to use their power within the cities. They were sub¬ ject to the council of Castile. The principal divisions of the company had stations at To¬ ledo, at Ciudad Rodrigo, and at Talavera.

HERMANN, her'man, Alexander, Amer¬ ican conjurer: b. Paris, France, 10 Feb. 1844; d. near Great Valley, N. Y., 17 Dec. 1896. From his brother Carl, Alexander took his earliest lessons in sleight-of-hand and the brothers then traveled in Europe and became widely known as skilled conjurers. Coming to the United States in 1867 they met with great success. The elder presently returned to Europe, but Alexander became a citizen of the United States, made a tour of the world and had few equals in his profession.

HERMANN, Friedrich Benedikt Wil¬ helm von, German economist : b. Bavaria, 1795; d. 1868. He received his education at Erlangen and Wurzburg, where he gave special attention to political economy. He was ap¬ pointed privatdozent at Erlangen in 1823 and two years later became professor of mathe¬ matics at the Nuremberg Gymnasium. In 1827 he was named professor extraordinary at the University of Munich. He was elected to the Bavarian Academy of Science in 1835 and also served as inspector of technical instruction in Bavaria. He became one of the advisers of the Minister of the Interior in 1845, and three years later he served as Munich

representative in the Frankfort Assembly. Here he led the forces opposed to the threatening leadership of Prus¬ sia. In 1855 Hermann was made Councilor of State and for a time was also in charge of the Bureau of Statistics. He published important pamphlets as head of this bureau, and is now regarded as one of the foremost pioneers in the field of statistics. His reputation as an economist is founded on his LStaatswirtschaft- liche Untersuchungen' (1832).

HERMANN UND DOROTHEA. Goe¬ the's (Hermann and Dorothea' is a bright idyll of a small German country town near the right bank of the Rhine, set against the dark back¬ ground of the French invasion of the Rhenish

Palatinate in 1794. It was written between September 1796 and March 1797, and was to some extent suggested by Voss's (Luise,> an idyll in hexameters, first published in 1782-84. The story of the well settled burgher's son marrying a poor fugitive was contained in an account of the Salzburg Protestants who, for their religion, in 1731 fled from their old homes into Germany. The inhabitants and conditions of the little town which is the scene of Her¬ mann and Dorothea are pictured in contrast to the turmoil of the French Revolution, for they stand for the foundations on which civil¬ ization will always rest. The leading characters represent the standard callings of men — the farmer, the merchant, the apothecary-doctor, the minister, the judge. The hero is the true son of mother earth, given to tilling the soil and harvesting his crops. The life both in family and community is depicted as the funda¬ mental social forms, with some hints of na¬ tional life. The love story of the young couple is free from wild romance, indeed their love makes them look to the future not with any anticipa¬ tion of pleasure or extravagance, but with the instinctive conviction that the true blessings of life flow from the performance of neces¬ sary tasks. The public spirit of Hermann's father germinates also in the son's character as his burning patriotism protests against the French invasion. But the spirit that permeates the poem as a whole is that of trust in the future and sympathy with mankind. The hexa¬ meters of the nine cantos are at times irregu¬ lar. The serene flow of presentation, the mas¬ terly descriptions of landscape and home, the plastic vigor of the main figures, the balance of color, all go to render (Hermann and Doro¬ thea* a great work of literary art. Consult edition of Goethe's works in (Deutsche Na- tional-Literatur) (Vol. V, pp. 1-99, 1882-98) ; English translation in German classics and in Harvard classics; von Humboldt, W., <.7Es- thetische Versuche : Hermann und Dorothea* (1799); Hehn, V., (Ueber*

Goethes Hermann und Dorothea (1893).*

Ewald Eiserhardt.

HERMANN, Mo., a town in Roark Town¬ ship, the capital of Gasconade County, on the south bank of the Missouri River, here crossed by a bridge, 81 miles west of Saint Louis, and on the Missouri Pacific Railroad. It is in a grape-vine-growing region and manufacturers wine, beer, flour, tools and cigars. Pop. 1,700.

HERMANNSTADT, or NAGY-SZE- BEN, Austria, the capital of a county in Tran¬ sylvania. See Szeben, Nagy.

HERMAPHRODITISM, the occurrence of both kinds of sexual glands in one and the same animal. The differentiation of the sexes begins with the polyps, when for the first time in the animal kingdom we meet with individ¬ uals which are male and female. The lower plants and in the animal kingdom the sponges and Hydra (q.v.) are monoecious, _ that is, sexual cells occur in the same individual. In the more highly specialized animals, the sexual glands exist in different individuals, and the form is said to be bisexual, or dioecious, as op¬ posed to hermaphroditic forms.

True or Natural Hermaphroditism. — This is found in many flowering plants, in sponges, most coelenterates, many worms, including the earthworm, many mollusks and in most barna¬ cles, and this appears to be in relation with their more or less fixed mode of life. As a rule testes and ovaries occur in the same animal, but situated in different regions of the body, while in land snails there is a hermaphroditic gland which produces spermatozoa and egg's in the same follicle. Certain animals, or frogs, which are bisexual as adults, pass through an embryonic hermaphroditism. Normal herma¬ phroditism is very rare in insects and verte¬ brates ; in the latter only two cases are known, that is, a sea-perch (Serranus scriba) and the hagfish (Myxine).

Abnormal Hermaphroditism. — What in man is called hermaphroditism is a misnomer, as it arises from malformation of the external reproductive organs. In insects occurs lateral hermaphroditism in which one-half of the moth or butterfly, for example, is male and the other female. In some of these cases dissection has shown that only male or female sexual glands alone occur in an undeveloped condition. This is called gynandromorphism. Abnormal her¬ maphroditism sometimes occurs in fishes and batrachians where an ovary is found on one side and a testis on the other. It is curious that in a threadworm (Angiostomun) and in certain isopod Crustacea (CymothoicUz) the reproductive glands are first male, the same gland afterward producing eggs.

HERMAS, Shepherd of, the traditional author of an early Ghristian work, so called because of the character and title of the angel by whom most of the revelations are made. Authorities disagree as to the identity of the author and date. Each theory presents diffi¬ culties, but it is quite probable that the author¬ ship is divided, or else that frequent revisions and editions were made before the work reached the form in which it has come down to us. The work includes five (Visions) ; 12 (Mandates and 10 (Similitudesˆ It is interesting chiefly in its bearing on the cir¬ cumstances in which early Roman Christianity flourished. In doctrine, it is thoroughly Chris¬ tian, but lays emphasis on the ethical, rather than the dogmatic, points of the religion. It has often been included in earlier editions of the New Testament, but lost prestige in about the 4th century. There are three defective ancient manuscripts of the Hermas in Greek. The best modern edition is by Harnack and Gebhardt (Leipzig 1877). Harmon published a later one with an English translation by Lightfoot (London 1893). K. Lake produced facsimiles of the Other Fragments of the Shepherd* (New York 1907). Consult Spitta, (Zur Geschichte und Litteratur des Urchristen-tums) (Vol. II, 241ˆ137, Gottingen 1896) ; Tay¬ lor, (The Shepherd of Hermas) (New York*

1901).

HERMENEUTICS, the study of or in¬ struction in, the science and art of interpreting the Scriptures. See Exegesis.

HERMES, her 'mes, Georg, German theo¬ logian: b. Dreyerwalde, Westphalia, 22 April

1775; d. Bonn, 26 May 1831. He studied the¬ ology at the University of Munster, became a teacher in the gymnasium of that city, and in 1807 professor of dogmatic theology in the university. When the Prussian government established the University of Bonn, Hermes was appointed to the chair of Catholic the¬ ology (1819). Here he began to distinguish himself by his attempts to found a speculative, philosophic and dogmatic school in the Church itself, delivering a series of lectures which caused great sensation by aiming at an alliance between Protestants and Catholics. This at¬ tempt to base the positive theology of the Church (a doctrine known as Hermesianism) drew around him great numbers of followers. Many of these in time filled chairs of theology and set forth their views in conjunction with their master in a magazine, the Zeitschrift fur Philosophic und katholische Thcologie, pub¬ lished at Cologne from 1832. The method

which Hermes advocated insisted that the truth of revelation and of the Catholic Church should first be tested by reason, and that revelation should then be followed. He did not go so far as to declare that all the dogmas in them¬ selves could be proved a priori, but endeavored to found the right of the Church to teach them on the ground of reason. Hermesianism was in fact an ingenious effort to base the doctrines of the Church on Kant's system of philosophy. It aroused powerful opposition, being con¬ demned as heretical by a papal letter of 26 Sept. 1835. Hermes' scholars stoutly defended their orthodoxy, many of them repeatedly ap¬ pealing to the Pope, on the ground that the Pope had been misinformed by persons who were ignorant of philosophy and theology alike. The Hermesians admitted that the doctrines specified in the papal brief were heterodox, but alleged that these were not the doctrines of Hermes. The chief adherents of the new school were the professors Braun, Elvenich and Achterfeldt. Hermesianism declined rapidly, however, and by 1850 had become a matter of history. Hermes wrote (Ueber die Warheit des Christentums) (1805) ; (Einleit- ung in die christkatholische Theologie) _ (2 parts, 1819-29) ; (Christkatholische Dogmatick) (1834). Consult Braun and Elvenich, (Acta Romana) (Hanover 1838) ; Lichtenberger, (German Theology in the Nineteenth Cen- tury) (Edinburgh 1889); Niedner, ˆPhiloso¬ phise Hermesii Explicatis) (Leipzig 1838) ; Werner, (Geschichte der katholischen The- ologie) (Munich 1866), and the biography by Gla in (Repertorium der katolisch-theologischen LiteratuU (Vol. I, Paderborn 1904).

HERMES, her'mez (called by the Romans Mercurius, and identified with their own god of that name), in Greek mythology the son of Zeus and Maia. According to legend his birth¬ place was in the mountains of Cyllene, Arcadia. Four hours after his birth he invented the lyre, which he made by killing a tortoise and string¬ ing the shell with three or seven strings. He then sang to it the loves of Zeus and his mother, Maia. Having concealed the lyre in his cradle, he was seized with hunger, went in the dark evening to Pieria, and stole 50 oxen from the sacred herd of Apollo which he drove back¬

ward and forward to confound their tracks; then walking backward himself, he drove them backward also; and after having killed two of them near the river Alpheus, roasted and sacri¬ ficed a part to the gods. He concealed the re¬ mainder in a cavern. He also carefully de¬ stroyed all traces of them. The next morning Apollo missed his oxen and went in search ot them, but he could discover no traces of them until an old man of Pylos told him that he had seen a boy driving a herd of oxen in a very strange manner. Apollo now discovered that Hermes was the thief. He hastened to Maia and accused the infant, who pretended to be asleep and, not terrified by the threat of the god that he would hurl him into Tartarus, steadily maintained his innocence. Apollo, not deceived by the crafty child,

*carried his com¬ plaint to Zeus. Hermes lied even to him. Zeus perceived him to be the offender, but was * not angry with him, and smiling at his cunning, ordered him to show the place where the oxen were concealed. To secure him Apollo bound 'his hands, but his chains fell off, and the cattle appeared bound together by twos. Hermes then began to play upon his newly-invented lyre, at which Apollo begged the instrument of the in¬ ventor, learned of him how to play on it and gave him a whip to drive the herd, thence¬ forth belonging to both in common.*

They then concluded a compact with each other; Hermes promised never to steal Apollo's lyre or bow ; the latter gave him the caduceus. The ancients represent Hermes as the herald and messenger of the gods. He conducts the souls of the departed to the lower world, and is therefore the herald of Pluto and the executor of his commands. His magic wand had the power to close the eyes of mortals, to cause dreams and wake the slumbering. The quali¬ ties requisite for a herald he possessed in the highest perfection, and bestowed them on others — grace, dignity and insinuating man¬ ners. He was also the symbol of prudence, cunning and fraud, and even of perjury, and was the god of theft and robbery. In the wars of the giants he wore the helmet of Pluto, which rendered him invisible, and slew Hip- polytus. When Typhon compelled the gods to fly before him and conceal themselves in Egypt, he metamorphosed himself into an ibis. He is also mentioned by Homer as the patron of eloquence, and still more particularly by Hesiod. Of his inventions Homer makes no mention. Later writers ascribe to him the invention of dice, music, geometry, the interpretation of dreams, measures and weights, the arts of the palaestra, letters, etc. He was also regarded as the patron of public treaties, as the guardian of roads and as the protector of travelers. He was represented in art as a boy in the prime of youth, sometimes with the caduceus, and some¬ times with a winged cap, standing, sitting or walking. The artists of later times placed him among the youthful and beardless gods. The most prominent traits of his character are vigor and dexterity. In the representation of Hermes of a later date the relations of cor¬ poreal beauty and mental dexterity are wonder¬ fully preserved. Artists made the cock his symbol, on account of its vigilance or love of

lighting (in allusion to gymnastics) ; the tor¬ toise, on account of his invention of the lyre ; the purse, because he was the god of traffic ; a ram and a goblet, because he was the di¬ rector of religious ceremonies and sacrifices ; the trunk of a palm-tree, upon which his statues lean, because he was the inventor of arithmetic and writing (upon palm-leaves) ; the

Jiarpe or sickle-shaped knife, because he was the. slayer of Argus. Consult Lang, Andrew, (Myth, Ritual and Religion } (1887) ; and Far- nell, (Cults of the Greek States) (Vol. V, 1909). See Greek Gods.

*HERMES TRISMEGISTUS, tris-me- jis'tus, the Greek title of the Egyptian moon god, Thoth, one of the most interesting figures in Egyptian mythology. He is represented as Ibis or with the ibis head, and is fully illus¬ trated in the monuments and papyrus rolls * from time to time brought to light. He is the god of time and of its divisions; he is the measurer and the god of measurements. He is the conductor of the dead. He is also the god of human intelligence, to whom are at¬ tributed all the productions of human art. All the literature of Egypt is attributed to him — all the writings that relate to the different sci¬ ences, mathematics, astronomy, medicine, music. These were called by the Greeks the Hermetic Books. Thoth is also credited with the inven¬ tion of alchemy and magic. The Hermetic art is used to mean alchemy. The secrets of this art were handed on from teacher to pupil orally and in secret and this transmission was termed the Hermetic chain. For these reasons the Greeks identified him with their Hermes, and besides called him Trismegistus, <(Thrice great.® By later writers, Euhemerists, Neo- platonists (q.v.) and Christians, Thoth was considered a great Egyptian king, a teacher of mankind, who had left books of magic and mystery behind him. Numerous books of such a sort once existed in Egypt. Clement of Alex¬ andria knew of 42, and so-called Hermetic fragments are still extant, in the works of Stobaeus, Cyrillus, Suidas and Lactantius. The Hermeti'c books as we know them belong probably to no earlier date than the 3d or 4th century of our era and are in Greek and Latin. Consult Mead. G. R. S., 'Thrice Greatest Hermes) (1907).*

HERMETIC LITERATURE. See Her¬

mes Trismegistus.

HERMIT (Gr. eremites) , a solitary as¬ cetic, who with a view to more complete free¬ dom from the cares, temptations and business of the world took up his abode in a natural cavern or a rudely formed hut in a desert, forest, mountain or other solitary place. Her¬ mits began to appear in the Christian Church in the 3d century. The advocates of asceticism (q.v.) were the first to set the example of re¬ tiring from cities to rural districts and villages. But the hermits sought to withdraw altogether from mankind, that they might give themselves up to holy contemplation. The earliest hermit is said to have been Paul of the Thebaid (Egypt), who during the Decian persecution fled to the desert (250) ; there he lived for the rest of his life, dying, 113 years old, about 342. The fame of his sanctity quickly incited others

to imitate his mode of life. The most famous amongst these successors was Saint Anthony (q.v.). At the time of his death (365) hermit cells existed in considerable numbers in the deserts of Egypt, Syr'a and Palestine. The fame of their sanctity drew many to visit these hermits partly out of curiosity to get ghostly counsel from them, partly also in the belief that diseases were cured by their blessing. Some¬ times they returned for a short time to the midst of their fellow-men to deliver warnings, instruction or encouragement, and were received – as if they had been inspired prophets or angels from heaven. But the number of hermits gradually diminished as the cenobite life of convents grew into fashion. Indeed the institu¬ tion at no time secured the same footing in the Western Church that it did in the Eastern; and perhaps the reason may in part be found in the difference of climate, which renders a manner of life impossible in most parts of Europe that could be pursued in Egypt or Syria. Partial revivals of the practice con¬ tinued to be made, however, during some cen¬ turies, Saint Cuthbert (q.v.) being a case in point. (See Monachism). Consult Charles Kingsley's

HERMIT-CRABS, crabs that shelter themselves in spiral sea-shells, for the protec¬ tion of the soft-skinned and unsymmetrical abdomen. They are members of the Macrura (see Decapoda), and have very large and gen¬ erally unequal claws, one being used to close the entrance of the shell into which the hermit can wholly retract himself. The abdominal appendages are practically aborted, with the ex¬ ception of those at the tip of the tail, which hold firmly to the spire of the inhabited shell. The hermit-crabs belong to three families, namely : Paguridce, or common marine hermit-crabs ; Parapaguridce , or deep-sea hermit-crabs ; and Cenobitidce, or terrestrial hermit-crabs. Two species are numerous on the American Atlantic coast running actively about in rock pools and shallows. The little hermit-crab (Eupagums longicarpus) generally inhabits the shells of dog-whelks (Ilyanassa), while the larger species (E . pollicaris) occupies those of Lunatia or sometimes of the wrinkles and conchs. As they grow they must move to larger and larger shells, and the search for new tenements and dangerous change of abodes in the presence of enemies makes the life of one of these animals more than ordinarily exciting. The habits of these and other hermit-crabs are of great interest, generally, and especially on account of the various hydroids, anemones and mollusca which associate with them as com¬ mensals. The palm or robber-crab (q.v.) of the East Indies, and the land-crabs of the West Indies, are good examples of terrestrial hermit- crabs. Consult Henderson, J. R., 'Challenger Report on Anomura) ; Verrill, 'Invertebrates of Vineyard Sound (1875); Arnold, 'Sea Beach at Ebb-tide* (1901). See Commensalism; Crab; Crustacea.*

HERMIT THRUSH. See Thrush.

HERMITAGE, The. Andrew Jackson's home at Nashville, Tenn., from

about 1804 when he removed there from Hunter's Hill'. In 1819 the house was built in which he lived till his death in 1845. The Hermitage is now the property of the State of Tennessee.

HERMITE, ar-met, Charles, French mathematician : b. Dieuz, Meurthe, German Lorraine, 24 Dec. 1822; d. Paris, 14 Jan. 1901. He entered the £cole Polytechnique in 1842, but left it to devote his attention wholly to mathematics. He taught at the ficole Poly¬ technique from 1848 to 1876 in various capac¬ ities, also acting as lecturer at the Bcole Nor- male Superieure from 1862 to 1873. From 1876 to his death he held the chair of higher algebra in the University of Paris. His principal claim to be considered a great and original mathe¬ matician rests on his investigations in the line of functions, and his first important work on this theory won for him election to the Acad¬ emy of Sciences. He proceeded to make dis¬ coveries in the theory of algebraic forms and in the theory of numbers. He finally settled the question of the solubility of the quintic equation, and really led the way to Linde- mann's further investigations. He became a Grand Officer of the Legion of Honor and a member of the Academy of Sciences in 1892. For a list of his writings consult (Catalogue of Scientific Papers of the Royal Society of Lon¬ don (Vols. Ill and VII) ; also Mittag-Leffier and Picord in (Acta Mathematica* (Vols. XXIII and XXIV, Stockholm 1901-02); and Darboux, G., (Notice historique sur Charles Hermite* (Paris 1905).*

HERMOGONES, her-moj,e-nez, Greek rhetorician, who lived about 170 a.d., a native of Tarsus. At an early age he showed marked ability in forensic and in lecturing, and at the age of 17 was appointed an instructor in ora¬ tory by Marcus Aurelius. His < Manual of Rhetoric, which was evidently published for the benefit of his pupils, remained for a long time the standard work on the subject. A consider¬ able fragment of this work, dealing with orator¬ ical precepts, has survived and has been pub¬ lished by Walz in (Rhetores Graeci* (Stutt¬ gart 1832-36), and Spengel, (Rhetores Graeci* (1853-56). Hermogones' faculties seem to have suffered from his great precocity and at the age of 25 they snapped under the strain, and he produced no further work.*

HERMON, Mount, a lofty mountain in Syria, on the border of Palestine, the southern¬ most peak of the chain of Anti-Libanus. It is about 9,050 feet high. Snow caps the summit throughout the vear, but the lower slopes bear rich vegation, chiefly grapes and fruit. Little Mount Hermon, bounding the plain of Esdraelon on the east, is 25 miles southeast of Acre, and was

*called Mount Hermon in the geography of the Middle Ages. The name in Hebrew signi¬ fies < (forbidden,** implying that a sanctuary or holy place was once located there.*

HERMOSILLO, har-mo-sel'yo, Mexico, capital of the state of Sonora, on the river Sonora, about 60 miles from the Gulf of Cali¬ fornia and 78 by rail north from the port of Guaymas, with which it has a large traffic, being the principal entrepot for the trade with the interior. Large quantities of fruit are grown in the vicinitv, especially grapes, from which much brandy is made.

HERNANDEZ DE C6RDOBA, Fran¬ cisco, Spanish soldier and explorer: b. about 1475; d. Leon, Nicaragua, March 1526. In 1514 he went to Panama with Pedrarias and was

sent by him' to take possession of Nicaragua. He founded Granada, Leon and other towns, and discovered the outlet of Lake Nicaragua. He was afterward accused of disloyalty in try¬ ing to set up an independent government and was seized by Pedrarias and beheaded.

HERNANDEZ Y GIMENO, Pablo,

Spanish author and priest of the Society of Jesus: b. Rubielos de la Cerida, Teruel, Spain, 9 Oct. 1852. He was educated at the Seminary of Saragossa and at Jesuit scholasticates in France and Spain. In 1872 he entered the Jesuit Order and from 1877 to 1880 was profes¬ sor of Latin grammar at a Jesuit scholasticate in Chile. From 1880 to 1885 he was professor of science in a Jesuit college in Argentina, and in the latter year returned to Spain. In 1888 he was ordained to the priesthood; taught phi¬ losophy at Valencia, 1889-90; scholastic phi¬ losophy, 1890-93 ; and Scripture, 1894, in various scholasticates in Spain. In 1894-96 he was pro¬ fessor of physics, zoology and mathematics in the College of Our Savior, Buenos Aires; in 1896-98 taught theology and canon law in the Seminary of Buenos Aires, and from 1898 to 1903 assisted Rafael Perez in writing his (1917).

HERNANI, by Victor Hugo, is an epoch¬ marking play in the history of French drama. Finished in September 1829, eagerly accepted by the committee of the Theatre Frangais in October, it was found so radical in its departure from French dramatic traditions, both in structure and in versification, that intense op¬ position to it developed among actors and dra¬ matic journalists, so that its first performance, 25 Feb. 1830, became a sort of pitched battle between the classicists and romanticists, the conservatives and the innovators. Gautier in his (Histoire du romantisme) has given the classic account of this memorable struggle in which he bore

the most conspicuous part. It extended through 45 performances. Almost every line had been at some time applauded or hissed, four parodies had appeared in as many Parisian theatres, before it was withdrawn. Victory rested with the radicals, but rather for the cause than for the drama. (Hernani is still occasionally acted, but its merits are lyric rather than dramatic. It has many passages of great strength an 1 some of 'striking beauty, but it lacks unity of action and is continued beyond*

a satisfying conclusion. The time of the play is 1519. It opens and closes at Saragossa. The third act is in the mountains of Aragon, the fourth at Aix-la-Chapelle. The story has no historical basis, though historical incidents and personages are skilfully involved in it. Doha Sol, the heroine, niece of Don Ruy Gomez de Silva, is beloved by him, by Don Carlos, king of Spain, and by Hernani, bandit pretender to the throne. The king favors her marriage with Gomez; she favors Hernani. The three rivals, fanatically devoted to ideals of Castilian honor, spare and protect one another. Gomez even suffers the king to take Dona Sol from his castle on the appointed wedding day rather than give up Hernani, his uninvited guest. Hernani, pledging his own life to his rival's command, enlists him in a con¬ spiracy to defeat the election of Carlos as em¬ peror. Carlos, triumphing, gives Doha Sol to Hernani. Gomez, recalling Hernani to his pledge, bids the bridegroom drink the poison he has prepared. Doha Sol shares it. Gomez kills himself. The play's finest passages are the monologue of the newly-elected Emperor Charles V (Act 4, Sc. 2), the closing love and death scenes (Act 5, Sc. 3 and 6) and the por¬ trait scene at the castle of Gomez (Act 3, Sc. 6). (Hernani) is edited with English notes by Matzke (1893), Harper (1891) and Perry (1888), Consult Le Roy, (L'Aube du theatre romantique) (1904), and for contemporary criti¬ cism Bire, (V. Hugo avant 1830, > pp. 489-508. Translations in Vol. I of

Benjamin W. Wells, Author of (Modern French Literature. y

HERNDON, William Henry, American lawyer: b. Greensburg, Ky., 28 Dec. 1818; d. near Springfield, Ill., 18 March 1891. He studied at Illinois College, was admitted to the bar in 1844 and in the same year formed a law part¬ nership with Abraham Lincoln, which continued formally till the latter's death. He was mayor of Springfield, Ill., in 1855. With J. W. Weik, he wrote the well-known (Herndon's Lincoln: The True Story of a Great Life) (in a new ed. 1891), which is particularly valuable for the study of Lincoln's personality and the details of his early career.

HERNE, James A. (James Aherne), American actor and playwright ; b. Troy, N. Y.,

1 Feb. 1840; d. New York, 2 June 1901. He first appeared in a traveling company and later in various roles and organizations throughout the United States. Later he was actor-manager at San Francisco and in 1878 presented his first play, (Hearts of Oak,* which won im¬ mediate success. (Drifting Apart* (1885), 'The. Minute-Men) (1886) and 'Margaret Fleming) (1890) were less favorably received, although the last was highly

ranked by the critics. In 1883-84 Herne wrote his most suc¬ cessful work, (Shore Acres,) which was first performed as 'The Hawthornes) at Chicago in 1892, and in 1892-93 in Boston under its present title. He himself appeared as "Uncle Nat® Berry. .'Shore Acres) was followed by (The Rev. Griffith Davenport (1899), a dramatiza¬ tion of Helen Gardner's 'An Unofficial Patriot* and 'Sag Harbor> (1900). As both actor and*

dramatist Herne was a skilful delineator of types of everyday life.

HERNIA (Latin, a rupture, a burst, a descent), a swelling formed by the displace¬ ment of a soft part, which protrudes by a natural or accidental opening from the cavity in which it is contained. The three great cavities of the body are subject to these displacements. The brain, the heart, the lungs and most of the ab¬ dominal viscera may become totally or partially displaced, and thus give rise to the formation of hernial swellings. Displacements of the brain and of the organs of the chest are, however, extremely rare, and are in general the result or symptom of some accident or disease. They are frequent in wartimes from gun-shot wounds and from the necessary surgical procedures. Many parts of the abdominal wall may become the seat of hernias, but they most commonly ap¬ pear in the front lower regions, which, being destitute in great measure of muscular fibres, and being the site of many of the openings lead¬ ing from the abdomen to the limbs, offer less resistance to the displacement of the viscera. Hernias are most common in the groin, at the navel, more rarely in the vagina, at the interior and upper part of the thigh, and at its lower and posterior part. They have received different names from their positions. All the abdominal viscera, with the exception of the duodenum, the pancreas and the kidneys may form a hernia, but they are not all displaced with the same facility. The omentum and in¬ testinal canal escape easily ; the stomach, liver and spleen rarely form hernias. Most of the viscera, when displaced, push the peritoneum forward before them ; this membrane thus forms a covering to the hernia, which is called the hernial sac. If the hernia, with its sac, can be entirely replaced, it is said to be reducible; if, from its size or other cause, it cannot be re¬ stored to its former place, it is irreducible.

Among the predisposing causes of hernia may be ranked any circumstance which dimin¬ ishes the resistance of the abdominal walls, whether natural or accidental ; such as muscular weakening of those walls by a forced distension, as in pregnancy, by accidents, by lifting heavy weights or by excessive standing. Any pro¬ longation of the viscera which tends to bring them in contact with points at which they mav protrude, and articles of dress which push the organs toward the weaker parts of the abdom¬ inal wall (as corsets), may also produce hernia. The efficient causes of hernia

are all circum¬ stances which may break the equilibrium exist¬ ing between the abdominal walls and the vis¬ cera, which react and mutually press upon each other. The simultaneous contraction of the abdominal muscles and of the diaphragm, which takes place on every violent effort, is one of the chief of these cases. Hence sneezing, coughing, leaping, playing on wind-instruments, etc., may be the direct cause of hernia.

The symptoms of a hernia are the existence of a tumor or swelling at any point of the abdo¬ men, but more particularly, in the region of the groin. A reducible hernia is not a very trouble¬ some disease, but may become so by acquiring an increase of size, and by strangulation. A hernia is said to be strangulated when it is not only irreducible, but also subjected to a con¬ tinual constriction ; this constriction may be pro-

duced by different causes, but it is generally a constriction at the opening through which the hernia protrudes. As soon as a patient per¬ ceives that he is affected with a hernia he should have recourse to medical advice, for the disease is then in its most favorable state for treatment. The hernia is immediately reduced, and must then be subjected to a constant compression. This is. done by means of a truss (q.v.). An irreducible hernia must be supported with great care. All violent exercises and excess in diet must be avoided. Strangulated hernia, present¬ ing greater danger, requires more prompt relief. The object of treatment is to relieve the con¬ striction. If the reduction cannot be effected by other means, an operation will be necessary. This consists in dividing the parts which pro¬ duce the constriction. The longer this opera¬ tion is delayed, the more dangerous it will become. After the parts are healed, the open¬ ing must be subject to compression, as in the case of a simple hernia. Radical operation for hernia is the most advisable form of treatment. It is safe in the hands of a competent surgeon.

HERO, a priestess of Aphrodite at Sestos. The loves of Hero and Leander, a youth of Abydos, on the other side of the Hellespont, are related in a poem by Musaeus. No difficul¬ ties could discourage Leander. He swam every night across the Hellespont, guided by a torch which shone across the strait from the tower of Hero, and even continued his visits during the winter. On one occasion, however, the guiding light was extinguished and his strength failed him, and the waves carried his body to the foot of the tower, where Hero anxiously awaited him. Overcome with anguish at the sight, she threw herself from the tower and perished.

HERO OF ALEXANDRIA (Gr. Heron), Greek mathematician and natural philosopher: fl. perhaps in the 1st century a.d. He seems to have invented a number of machines, among which are (

HERO AND LEANDER, one of the

world's unforgotten stories of ill-fated love, probably began as a legend of Sestos and Abydos on the Hellespont, in explanation of some immemorial local cult of swimmer, torch and tower. Its literary possibilities may have attracted a poet — perhaps Callimachus — at Alexandria, where many such setiological legends were versified; and his poem, now lost, seems to have taken the tale to Rome. Leander is the one human example cited by Virgil ((Georgics) iii 258ff.) in proof of the irresistible might of desire. Ovid invents two of the lovers' letters ((Heroldes) xviii and xix) tricked out with sentiments, ˆpoints,® verbal quips, and rhetorical conceits and antitheses in the right Alexandrian vein. There are al¬ lusions in Statius (

its decisive form for literature. From the lovers' first meeting in the temple of Aphrodite the narrative proceeds through Leander's nightly swimmings of the Hellespont until in a night of storm Hero's torch and Leander's life are extinguished together and Hero per¬ ishes at morning upon his corpse. Though tinged with rhetoric, though indeed sharing with Ovid's (Heroides) several conceits which may point to a common source in the hypothetical Alexandrian version, Musaeus's poem has pas¬ sages of fine imagination and of true pathos: the end especially has been left unlabored, with something of the old Greek reserve. The Renaissance (editio princeps, 1484, Aldus) as¬ sumed the author to be that early semi-mythical Musaeus who is associated in legend with Or¬ pheus and Linus. Uncritically accepting as primitive the work of a post-classical gram¬ marian, it proceeded to emphasize the Ovidian or Alexandrian traits of his poem. Marlowe's unfinished (Hero and Leander (published 1598 with an ending by Chapman) retains Musaeus's scenario, but expands his simple speeches and brief imagery into passionate tirades and long voluptuous descriptions. Chapman, at once more Puritanical and more ((conceited,® is stodgily concerned for the legality of the lovers' marriage, sermonizes about their passion, adds episodes, allegories, emblems, and other irrelevancies, and ends by metamorphosing the lovers into birds.*

Chapman also made a faithful and complete translation of Musaeus (1616; reprinted 1858) ; other English translations are by Sir Robert Stapylton (1647), the Rev. Francis Fawkes (1789), and Sir Edwin Arnold (1888). There are poems and extended allusions by Byron, Keats, Leigh Hunt, Moore, Hood, Rossetti, and Ten¬ nyson, a ballad by Schiller, and a five-act trag¬ edy by Grillparzer. Consult Rohde, Erwin, (Der gnechische Roman und seine Vorlaufer (Leip¬ zig 1914) ; Palmer, Arthur (ed.),*

(Ovid's Heroides) (Oxford 1899) ; Jellinek, M. H., (Die Sage von Hero und Leander in der Dich- tung) (Berlin 1890) ; Chabalier, Leonce, (Hero et Leandre (Paris 1911).*

Samuel Lee Wolff.

HERO OF OUR TIME, A (cGeroy nash- ego uremenP). Lermontov intended to rep¬ resent Pechorin, the ((hero® of this novel, as a type of cultured men of the thirties, bv taking himself as a partial example of that class. His obligation to Pushkin's Eugeni Onyegin is ex¬ pressed in the very name of the chief char¬ acter, which is derived from the river Pechora, as Pushkin derived his from the river Onyega, wherefore the critic Byelinski said that the two characters did not differ from each other more than did these two rivers. Pechorin is a blase, but in contradistinction to Onyegin he is filled with ambition and the love of power. He spurns the official career, which alone was then open to men of the upper classes, and directs all his energies to the conquest of women's hearts. In the thirties the critics dwelt on the reflective sides of Pechorin, his melancholy, in¬ trospection and despair; that is, they saw in him a member of the Byronic crew, so numerous in the literatures of that period. But, in the light of the later, more positive evolution of the in¬ tellectuals in Russia, the modern critics point out the fact that Pechorin belongs to the class

of unsuccessful, useless men who made social progress impossible. They look upon him as a literary specimen illustrating certain psycho-pathological defects common to men of the first half of the 19th century.

The novel contains also a series of positive characters, such as the mountaineers who are untouched by civilization and the simple-minded, faithful Maksim Maksimich and Bela. All these are described with rare accuracy and are totally devoid of melodramatic characterization. It is chiefly the romantic element of the novel in its exotic setting in the Caucasus that has attracted the Western readers to it, hence the considerable number of translations, especially in English, where we have the abbreviated ones by Theresa Pulszky (London 1854), by R. I. Lipmann (London 1887), and by J. H. Wisdom and Marr Murray,

Leo Wiener.

HEROD, called the Great, king of the Jews: b. about 62 b.c. ; d. 4 b.c. He reigned from 37 b.c. until his death. He was the second son of Antipater the Idumean, who, being made procurator of Judea by Julius Caesar,

appointed him to the government of Galilee. He as first embraced the party of Brutus and Cassius, but after their death rec¬ onciled himself to Antony, by whose interest he was first named tetrarch and afterward king of Judea. After the battle of Actium Augustus confirmed him in his kingdom. As a politician and commander, his abilities were conspicuous. He rebuilt the temple at Jerusalem with great magnificence and erected a stately theatre and amphitheatre in that city, in which he celebrated games in honor of Augustus, to the great dis¬ pleasure of the more zealous of the Jews. He also rebuilt Samaria, which he called Sebaste, and adorned it with very sumptuous edifices. He likewise, for his security, constructed many strong fortresses throughout Judea, the princi¬ pal of which he termed Caesarea, after the emperor. On his palace, near the temple of Jerusalem, he lavished the most costly materials, and his residence of Herodium, at some dis¬ tance from the capital, by the beauty of its situ¬ ation drew around it the population of a great city. Such, indeed, was his magnificence that Augustus said his soul was too great for his kingdom. Herod was the first who shook the foundation of the Jewish government, by dis¬ solving the national council, and appointing the high-priests, and removing them at pleasure, without regard to the laws of succession. His policy, ability and influence with Augustus, however, gave a great temporary splendor to the Jewish nation.

HEROD. The tragic figure of Herod the Great is one of the favorite traditions of litera¬ ture. History tells us that he was ambitious. Josephus in his J Antiquities of the Jews) (-xv), tells of his tragic love for Mariamne, his wife, but makes no reference to the Gospel story of the massacre of the Innocents. In the 5th cen¬ tury Macrobeus accepts some features of the biblical narrative and augments them by telling that two of Herod's own children were lost in the massacre. Modern writers, among whom

were Alexander, Hardy, Voltaire and Hebbel have used such strains of the story as pleased them. In the miracles of the Middle Ages Herod was a ranting figure whose excesses ex¬ plain Hamlet's words <(out-Herod's Herod.® In writing his version of the Herod story for the first year of the 20th century Stephen Phillips places, greatest weight on the great king's in¬ fatuation for his wife and fear of losing his kingdom. The victim of Herod's murderous in¬ trigue is in his play the young brother of Mariamne, Aristobulus. By means of this shift in characters the poet was able to combine the two strains of the Herod tradition. The in¬ genuity the playwright displays in the handling of his situation is equaled by the dramatic skill with which the story is put forth on the stage. The play is vigorous, crisp and poetic. Herod is a bluff and sympathetic figure. The love passages between Herod and Mariamne offer some of the rarest poetry of the modern theatre. They are full of dramatic prescience. Before writing plays in verse for the modern stage Phillips had been benefited by two types

of ex¬ perience. He had made himself a distinguished poet and in the traveling troupe of his cousin F. R. Benson he had secured abundant experi¬ ence in the practice of the theatre in its more romantic and symbolic orders. Well as it reads Herod is in no sense a closet play. It was written for production. Its single scene, vary¬ ing only by the change of light from morning to night and the placing and removal of a few stage properties, its effective use of the instru¬ ments of sight and sound, bespeak the experi¬ enced playwright. It is said that it was the poet's use of the sound of trumpets that decided Tree to accept the play for production. Though Herod is a great stage play it takes but a small place in the history of the modern English theatre. For some years reformers had been press¬ agenting a return to the poetic drama. George Alexander had in 1899 commissioned Phillips to write a play on the Paola and Francesca theme. Before this play could be produced and while it .was in the height of its popularity in its published form Beerbohm. Tree accepted and produced at His Majesty's Theatre, 31 Oct. 1900, the same poet's (Herod. > The play did not have a long run. In 1909 the play was given a. creditable production by Faversham at the Lyric Theatre in New York.

*Thomas H. Dickinson. HEROD AGRIPPA I, king of Judea: d. Caesarea, 44 a.d. He reigned from 37 a.d. until his death. He was the son of Aristobulus and lived at Rome in extravagance until his debts made him retire to Idumea, but he returned some years after. On the accession of Caligula 37 a.d. he was honored with the title of king, and received the tetrarchies of Philip and Lysanias, and later that of Antipas. Upon the accession of Claudius, his rule was extended to include all. the dominions of Herod the Great. It was this Herod who, to please the Jews, caused Saint James to be put to death and Saint Peter to be imprisoned. His power and opulence ac¬ quired him a great reputation and he really did much for the benefit of the Jews. His death is described in Acts xii, 20—23**

, HEROD AGRIPPA II, king of Tudea: d. 100 ad. He reigned from 53 a.d. until his death. He was son of Herod Agrippa I. He re-

sided much at Jerusalem, and here, together with his sister, Berenice, heard the defense of Paul, 'addressed to the Roman governor Festus (Acts -xxv, 13-xxvi, 32). A great builder, he im¬ proved his capital city of Caesarea Philippi; renamed by him Neronias. It was in his reign that the Temple was completed. Being driven from Jerusalem in the revolt which proved so fatal to the Jews, he joined Cestius, the Roman commander, and, when Vespasian was sent into the province, met him with 3. considerable rein¬

forcement. During the siege of Jerusalem he ,was very serviceable to Titus.

HEROD ANTIPAS, tetrarch of Galilee He reigned from 4 b.c. to 37 a.d. He was son of Herod the Great. This was the Herod who pul to death Saint John the Baptist (Mark vi, 14- 29), in compliment to his wife, Herodias, and it is he who is the familiar ((Herod® of the New Testament narrative. Accused of having been concerned in the conspiracy of Sejanus, and of being in secret league with the king of Parthia, he was stripped of his dominions and sent (39 a.d.) with his wife into exile at Lugunum (Lyons) or, as some say, to Spain, where he died.

HERODES, Atticus. See Atticus Her-

ODES.

HERODIADE, a'ro'dyad, a tragic opera in five acts by Jules Massenet, based on Flau¬ bert's (Herodias. > Originally produced at Brussels in 1881, in New Orleans 1892 and in London as

brought in. She repeats her desire to die with her lover, appealing to the queen with the words, ((If thou wert ever a mother, pity me.® Trembling at the word <(mother,® Herodias ap¬ pears to relent when the executioner appears and announces that the prophet is dead. With a furious cry Salome rushes to the queen and attempts to stab her, when Herodias cries, <(Mercy! I am thy mother!® Horrified, Salome falls back, curses her mother and stabs herself. Some of the finest music of Massenet is to be found in this opera.

HERODIAS, a granddaughter of Herod the Great and Mariamne, daughter of Aristob- ulus and sister of Herod Agrippa I. She was first married to her half-uncle, Herod Philip, whom she abandoned to connect herself with his half-brother, Herod Antipas. It was by her artifice that Antipas was persuaded to order the death of John the Baptist (Matt, xiv, 3-12; Mark vi, 17-29).

HERODOTUS, Greek historian, called the <(father of history® : b. at Halicarnassus in Asia Minor, about 484 b.c. Before writing his his¬ tory he traveled extensively, visiting the shores of the Hellespont and the Euxine, Sc3'thia, Syria, Palestine, Babylon and Ecubatana, Egypt as far as Elephantine and other parts of north¬ ern Africa, everywhere investigating the man¬ ners, customs and religion of the people, the history of the country, productions of the soil, etc. On returning home he found that Lygda- mis had usurped the supreme authority in Hali¬ carnassus and put to death the noblest citizens and Herodotus was forced to seek an asylum in the island of Samos. Having formed a conspir¬ acy with several exiles

he returned to Halicar¬ nassus and drove out the usurper, but the nobles who had acted with him immediately formed an aristocracy more oppressive than the govern¬ ment of the banished tyrant, and Herodotus withdrew to the recently founded colony of Thurii, in Italy, where he seems to have spent most of his remaining life. Here, at an advanced age, we are told by Pliny, he wrote his immortal work, a statement strengthened by the fact that events are noticed in the body of the book which occurred so late as 409 b.c., while, its abrupt ending proves almost beyond question that he was prevented by death from completing it. The history is divided into nine books, each bearing the name of a Muse, and is written in the Ionic dialect. The object of the historian is to narrate the conflict between the Greeks and Persians, and he traces the enmity of the two races back to mythical times. Pass¬ ing rapidly over the mythical period he comes to Croesus, king of Lydia, of whom and of his kingdom he gives a comparatively full history. The conquest of Lydia by Cyrus induces him to relate the rise of the Persian monarchy and the subjugation of Asia Minor and Babylon. The history of Cambyses and his Egyptian expedi¬ tion leads him to introduce the valuable details of the history, geography and manners and cus¬ toms of Egypt, occupying the second book. The Scythian expedition of Darius causes the his¬ torian to treat of the Scythians and the north of Europe; and the subsequent extension of the Persian kingdom affords him opportunity for an account of Cyrene and Libya. In the mean¬ time the revolt of the Ionians breaks out, which eventually brings on the conflict between Greece

and Persia. An account of this outbreak and of the rise of Athens after the expulsion of the Pisistratidse is followed by what properly con¬ stitutes the principal part of the work, and the history of the Persian War now runs on in an uninterrupted stream until the taking of Sestos. There are English translations of his history by G. C. Macaulay (1890) ; Beloe, Cary, Macan and Rawlinson, the last with important notes and dissertations. The at¬ tributed to Herodotus, and printed at the end of several editions of his works, is now uni¬ versally believed to be a production of a later date. The best editions of the history of He¬ rodotus are by Wesseling (1763) ; Schweighauser (1806); Biihr (1855-61); Stein (1871); and a notable commentary by How and Wells was published in 1912.

HEROES (ww plu. vpw?) were men among the Greeks distinguished for exceptional strength, bravery or achievement. The etymol¬ ogy of the word has not been satisfactorily made out. It may be connected with a root that means ˆstrong,® or one that signifies <(to guard, protect,® either

suggestive of soldierly qualities or attributes. (Cf. F. Deneken, in Ro- scher's (Lexicon der Mythologies. Other races cherish the memory of such outstanding figures, and by analogy the term is applied to them also. The heroes, whether of Hellas or elsewhere, belong invariably to an early age, before history records aught of their race; they live in the earliest form of that race's poetry, and draw thence an immortality in succeeding literature. They are often, rightly or wrongly — for there has been much written on the subject, — identified with myths and mytho¬ logical beings; but their proper sphere is in legend, and as legendary characters they come down to us, except in the classical literatures, where they attain divine dignity analogous to that which the gods themselves enjoy.

Greek Heroes. — Among the Greeks in his¬ torical times the heroes were half mythological beings who enjoyed a distinct cult of their own. <(What god, what hero, or what man (riva Qeov , riv' rjpua, riva d'avdpa) shall we resound?® asks Pindar in the beginning of the second Olympian ode, thus giving the heroes their hierarchic place between the Olympians and mortals. Hesiod ((Works and Days) 156-170) understands by heroes men of great renown, the fourth of the races of ((speech-gifted men® whom the immortals created, and who lived — probably for but a few generations — between the brass age and his own, the iron age. They were the warriors celebrated in epic poetry and perished in the wars before the <(seven-gated Thebes® and in the struggle for Helen at Troy ; but they now dwell in the Isles of the Blessed beside the streams of Ocean. A former age, says Hesiod, calls them demi-gods (y/iideoi). It is not clear what particular period of time is here meant. It has been customary to under¬ stand by the former age the age of the heroes themselves, and to see in fpiiOeoL an early belief in hero-cult similar to that well-defined worship of heroes which we find in proto- historic and historic times, at least down to Pausanias, and thence to deduce that heroes are ((depotentiated® gods, who sank from mythology and myth to legend, and are related to the chthonic gods in nature and origin,

(F. Deneken, J. Wassner, and others). Rohde combats this view, and thinks the cult-heroes are the glorified souls of the dead, differing even from the Demons, who are real deities of a lower order. The latter, as all the chthonic deities, were always immortal and never suc¬ cumbed to death, though they were of the underworld. Heroes, on the other hand, he points out, were always conceived to have been once mortals and, what is important, to have gone through death, whence the hero's grave always became the centre of the cult. An¬ cestor worship, therefore, would seem to be the root whence alone the cult of heroes sprang, though when this was once in full development influence from the cult of the chthonian deities was, of course, to be expected. But confusion between the two cults and the two sets of deities can hardly be shown to have existed in the Greek mind.

Hesiod's ˆ/xideoi Rohde in¬ terprets as merely defining their place between gods and men, and not in any sense indicating their origin. Certainly Homer knows nothing of the later hero-cult. The one striking pas¬ sage in the

Hero-cult and Hero-worship. — The cult of heroes, except in the case of Hercules, of whom the Greeks themselves were not sure whether he was a god or a hero (Herod. 2, 44, Paus. 2, 10, 1), was always sharply differ¬ entiated from that of the higher gods,' but had, indeed, much in common with the homage paid to the chthonian gods. The centre of the wor¬ ship was the grave where the mortal remains of the hero were supposed to be interned. This was generally located in a sacred grove and surmounted by a temple. Altars were erected over the place of sepulture or nearby, where divine honors were paid to the hero, sacrifices made to him, and votive or propiti¬ atory gifts presented. These ritualistic observ¬ ances, however, generally took place in the evening to mark the distinction from the hom¬ age paid to the gods, for whom the morning hours were reserved. Like the designations of the gods, too, the names of heroes became ejaculatory expletives and words of assenta¬ tion. A survival of ancestor worship, and inci¬ dentally an indication of the human origin of

heroes, is seen in the offering of food and drink to them on their special feast days and on other stated occasions. Along with the mortal remains of the heroes, relics of them were cherished and diligently sought out, offi¬ cially transferred from one place to another, or even stolen from one shrine to be venerated at another. Thus, for instance, was held in esteem the house of Cadmus at Thebes and that of Menelaus at Sparta, the sceptre of Agamemnon at Charoneia, the stone at Salamis on which Telamon sat, and elsewhere the lance of Achilles, the wings of Daedalus, and the skin of the Calydonian boar and a tusk of the Erymanthian boar whose depredations had summoned so many heroes to the hunt. Most heroes were worshipped at places with which they were' definitely identified during life, or where at all events their tombs were ; but we not infrequently find that a cult was instituted elsewhere for a specific purpose, as to obtain a hero's help in war (Paus. 3, 3, 5f) or to ward off an epidemic or other national evils (Paus. 9, 38, 3). The cult-heroes and their worship were objects of legislative enactments. Porphyry recalls the decree of Draco ordering <(gods and indigenous heroes® to be worshipped (

Teutonic Heroes. — Teutonic heroes are best known to-day through the operas of Wag¬ ner and popular renderings of the Norse Edda stories. The

gods of northern mythology, Odin (Woden, Wotan), Thor (Thunor, the thunder-

god with his hammer), Frey, and the mischiev¬ ous Loki, together with the genuine legendary hero Siegfried, who like Achilles of old was invulnerable except in one spot, and the Val¬ kyrie Brunhild, or Brynhild, are household words at least in America. The mythical ele¬ ments of the last two suggest, at first hand, a connection with the Norse gods in origin and nature, which scholarship once maintained and popular feeling still holds to. It has been un¬ mistakably shown, however, that, except for chance influences one way or the other, the Norse gods and the heroes of Teutonic legend¬ ary history had independent origin and went in¬ dependent ways of development. (Cf. especially Mogk in (Forschungen zur deut. Phil., Festgabe fiir Rudolf Hildebrand5 1894, p. 1, and Golther in Germania, xxxiii, 469, 476) . S. Bugge even has pointed out that a number of the Northern gods were really developed during the Viking age out of Christian legends, later, therefore, than the poetic invention of the heroes. Teutonic heroes are usually connected with the migra¬ tion of nations in the 4th and 5th centuries and the origin of heroic saga is assumed to be indi¬ cated by Tacitus who tells us that the deeds of Arminius were sung as late as a hundred years after his death. ((Annals5 ii, 88). The histori¬ cal period of the sagas, it is true, is separated from Tacitus' narrative by quite 400 years, but it is not inept to suppose that other notable characters in the history of the Teutonic nations were in like manner immortalized. The great national awakening that must have come to some of the northern races in their conquest and possession of the fair and opulent Roman provinces brought with it leaders and warriors whose renown could not but eclipse that of their predecessors and draw to themselves the lime¬ light of epic popularity. Among the great his¬ torical characters of the period who are thus held to have become the theme of minstrel song and epic saga are Ermanric, the East Goth, who ruled in southern Russia at the end of the 4th century; Theodoric the Great, who founded the East Gothic kingdom in Italy; and Attila, the Hun, who, though not himself a Teuton, was so prominently identified with the migration that poetic fancy appropriated him and made him a powerful and generous Teuton king, surrounded by his loyal retainership. Many other heroes of saga are thought to have historical prototypes in Teutonic kings of the age of migration. Among these the more prominent are : Hagen, the Frank; King Gunther, the Burgundian; Walter of Aquitaine and the Burgundian Prin¬ cess Hildigund. The (Beowulf,5 the Old Eng¬ lish epic, the earliest in composition of all Teu¬ tonic poetry, introduces in epidosic narratives a host of heroes who are better known to modern readers through the longer stories of the Edda and the (Nibelungenlied.5 A figure who runs through many of the Teutonic legendary his¬ tories, and perhaps is the only one who sur¬ vived to later

literature is Wieland — Walter Scott's Wayland the Smith.

Celtic Heroes. — The Celts possessed many myths regarding heroic figures, who were either ideal creations, or in the rich fantasy thrown around them tended to become mythical. The three best known are Cuchulainn, Finn (Fionn mac Cumhail) and Arthur. Cuchulainn and Finn belong to Irish legendary history; Arthur, the central character of mediaeval romance, is in

t3d

legendary history at home in Britain, or more narrowly in Wales, though we first meet him in French works. Cuchulainn is the hero of Ul¬ ster and was one of the courtiers around King Conchobar. His wanderings and exploits re¬ call the deeds of Hercules. Finn belongs to Leinster and fights the rest of the Irish, includ¬ ing the men of Ulster. J. A. Macculloch sug¬ gests that the hero's identification with Leinster may be due to Leinster annalists of the 11th century rewriting history in the light of later developments and with an eye single to the glory of their own part of the country. Finn has sur¬ vived to modern literature in the fame of his son Ossian (Oisin), the warrior-bard of Mac- pherson's poem of that name. Saint Patrick in the legend converts Ossian's son, Oscar, and meets the old Caoilte, the last of the Feinn, or Finn's men, who had survived the last dreadful battle of Gabhra. But the glory of Celtic he¬ roic saga is Arthur, son of Uther Pendragon, king of Britain. Unlike the Teutonic heroes, Arthur and the Knights of the Table Round have but fabulous historical antecedents. Even this they lose, and in later literature become more and more creations of myth and fancy until with Tennyson they become like Excali- bur ((mystic, wonderful,® emblems and types of moral virtues and vices. A Welsh legendary character of the (Mabinogion,5 Peredur, the <(Seeker of the Basin,® later mediaeval romance made into Parzival, the Knight of the Grail, and thus joined to the Arthurian cycle the stories of the mystical Cup of the Last Supper.

Romance Heroes. — The countries of west¬ ern Europe that once formed the Roman Em¬ pire gave birth to a class of heroes and a body of legend that had its inception in the wars waged by Christian princes against the growing and ever-threatening menace of Saracen domi¬ nation. The first clashes between Christian and Moslem came in the 8th century when the stretching south of the Frankish monarchy to¬ wards the Pyrenees brought it in contest with the conquering Moorish emirs of Spain. By a confusion of

ideas resulting from the ignorance of Westerns regarding things Oriental, the Saracens and Moors were thought to be idola- tors or pagans, whence in literature the Mo¬ hammedans came to be known as Paynims. By a similar misconception Mohammed was con¬ tracted into Mahmet (Mahmout) and meant <(idol,® and Mahmetry (Mahmoutry) came to signify ((idolatry.® In legend, therefore, the Ro¬ mance heroes, down to their last descendants in poetry are the champions of Christianity against paganism. The chief historical character of the earlier wars against the Moors of Spain was the Frankish king, Charles Martel, who from the decisive battles of Tours (a.d. 732) to the capture of Narbonne (a.d. 759), dealt the Sara¬ cens, who had established a kingdom in France, a series of telling death-blows and drove them forever beyond the Pyrenees. His exploits were in legend transferred to his more famous son, Charlemagne, whose wars were chiefly against the pagan and barbarous people, called Saxons, in the countries north of France. His warfare against the Saracens was not so glori¬ ous, and his army on the retreat from Spain was attacked at Roncesvalles in the Pvrenees, where the noblest of the Frankish chieftains, among them Roland, or Orlando, governor of the marches or frontier of Brittany, were

killed. Roland's name became famous in after times and the disaster of Roncesvalles became eventually the most celebrated enisode in the whole cycle of romance. It is probably through Roland, therefore, that Charlemagne drew to himself, in the opinion of the early historians and the writers of romance, the more famous exploits of his father and became with his knights once for all the chief heroes of the ((chansons de geste.® The earliest of these <(chansons de geste® is the (Chanson de Roland.5 Like Arthur, Charlemagne's person and character became obliterated in the romances and the chief stories circle around his knights, who are called Peers, as being on a footing of equality among themselves, or Palladins (Lat. palatinus, from palatium, palace), implying that they were in¬ mates of the palace and intimate associates of the king. The number of the Peers or Palladins is usually 12. Beside Roland they are his friend Oliver; Ogier the Dane; Huon of Bordeaux; Renaud of Montauban ; the traitor, Doon of Mayence; Ganelon, treacherously responsible for Roland's death; Archbishop Turpin, as good a specimen of a muscular churchman as Robin Hood's Friar Tuck; William Fierabras ; William of Toulouse; William of Orange (the three last probably identical personages) ; and Vivien, nephew of William of Orange. The later wars against the Saracens in Spain developed for the Spanish people the Cid and Bernardo del Car- pio, the latter the Spanish Roland. Curiously too Alexander the Great became a favorite character in the mediaeval romances.

Bibliography. — Greek: Daremberg and Sag- lio, (Dictionaire des antiquites5 ; Deneken, F., (Heros5 (in Rosoher's (Ausfuhrliches Lexikon

der griechischen u. romischen Mythologie5) ; Schomann, G. F., (Griechische Altertiimer5 (Vol. II, 159, 1897) ; Hild, J. A., Vol. Ill, 1900; 2d rev. ed., sep¬ arately printed, 1905) ; Chantepie de la Saus- saye, (The Religion of the Teutons5 (Eng. trans., 1902) ; Jiriczek, O. L., (Die deutsche Heldensage5 (3d rev. ed., 1906). Celtic: D'Ar- bois de Jubainville, M. H., (Cours de litterature celtique5 (12 vols., 1883-1902; 1 vol., trans. into English by R. I. Best, (The Irish Mytho¬ logical Cycle and Celtic Mythology,5 1903) ; Rhys, J., (Celtic Britain5 (3d ed., 1904) ; Squire, C., (The Mythology of the British Isles: An In¬ troduction to Celtic Myth and Romance5 (1905) ; Kittredge, G. L., (Gawain and the Green Knight5 (1916) ; Macculoch, J. A., (Celtic Mythology5 (1918, in (Mythology of all Races,5 Vol. III). Romance: Petit de Julleville, L., (Histoire de la langue et de la litterature fran- qa.ise en moyen age5 (1896) ; Lanson, G., (His- toire de la litterature franqaise5 (6th ed., 1901) ;

Weston, J. L., < Romance Cycle of Charle¬ magne and his Peers J (in (Popular Studies in Mythology, etc., No. 1(P). General European: Grasse, J. G. T., (Die grossen Sagenkreise des MittelaltersP (1842, a part of his (Lehruch einer Literargeschichte der beriihmtesten Volker des Mittelalters)) ; Ker, W. P.,

Francis J. Hemelt,

Associate Professor of English Language and

Literature , Catholic University of America,

Washington, D. C.

HEROES AND HERO-WORSHIP. In

1837 Carlyle had produced (The French Revolu¬ tion (q.v.), which established his fame, but brought him little money. Good friends rallied to his aid, and helped to set him on his feet by organizing courses of public lectures for him, drumming up an audience and selling guinea tickets. Between 1837 and 1840, Carlyle de¬ livered four such courses; the proceeds tided him over his money difficulties, and put him definitely beyond the reach of want. The final course on (

To describe

The book made its influence felt at once on current thinking. In 1849, an

acute foreign observer wrote : ((The rehabilitation of the hero is to-day of all Carlyle's ideas the most widely spread, and the one which has made head most rapidly. . . . This idea is the basis of Emerson's philosophy, and has inspired all his essays on_ confidence in oneself, and the power of the individual.® Ruskin's determina¬ tion to do something and be something has been attributed to his reading of (Heroes. } It had also a great influence upon the life and char¬ acter of Phillips Brooks. To aspiring youth with high hopes and lofty ideals it has a special appeal.

Archibald Macmechan.

HEROIC ACT, in the Roman Catholic church, the offering to God by a member of the church militant for the souls in purgatory all the meritorious works which he will perform during his lifetime, and all the suffrages which may accrue to his benefit after his death. Its practice is based on the Catholic doctrine of the communion of saints by which the good deeds of one member benefit all other members. The heroicity of the act arises from the wil¬ lingness of the maker to take upon himself all the dreadful pains of purgatory for the love of his neighbor, its merit arises from the intense charity and altruism which inspires it. The heroic act is not a vow, but is of the nature of an offering to God, and, unlike a vow, is revocable at wifi, although a vow <(never to re¬ voke the Act® is probably binding.

HEROIN, her'6-in, C1TL7NO3. (CH3CO)2, the diacetic ester of morphine. It occurs as a faintly bitter, colorless, odorless, crystalline powder, which is nearly insoluble in water. It is soluble in dilute acids, however, and is precip¬ itated by alkalis. Its hydrochloric dissolves freely in water and in alcohol, but is insoluble in ether. It is a relatively feeble analgesic, and a dangerous habit-forming drug. It is some¬ times useful in the treatment of dyspnoea. The dose should be small, as a single dose of two and a half grains has caused alarming symp¬ toms. Heroin was first prominently introduced to the medical world in 1898.

HEROLD, a-rold, Louis Joseph Ferdi¬ nand, French musical composer: b. Paris, 28 Jan. 1791; d. Themes, near Paris, 19 Jan. 1833. A pupil of the Conservatoire, he also studied composition under Catel, Mehul and Cherubini, and in 1812 won the Prix de Rome with the cantata (Mlle. de la VallereP His first opera, (La Gioventu di Enrico Quinto> (1815) was received by the Neapolitan public with applause. His first serious debut as composer for the French stage was with his comic opera (Les Rosieres> (1817). This very successful work was followed in quick succession by numerous others of varying fortune. . In 1828 he was elected a member of the Legion of Honor. At last in 1831 appeared his (1868) ; and-Pougin, A., (Herold) (ib. 1906).

HERON, Matilda, American actress : b. Draperstown, near Londonderry, Ireland, 1 Dec. 1830; d. New York, 7 March 1877. She was brought to the United States as a child, and appeared on the stage for the first time in Phila¬ delphia in 1851 as Bianca in

HERONDAS, or HERODAS, Greek poet, probably flourishing about the latter half of the 3d century b.c. Little positive informa-

tion is obtainable concerning the place of his birth, blit it was probably in the island of Cos. Prior to 1891 only a few fragments of his verses had been found, but in that year an Egyptian papyrus was found containing several poems (mimes or mimianibi) and these were published by F. G. Kenyon, thus bringing to light a phase of Greek life and times of which the history has been meagre. Seven of the poems are in comparatively complete form, and, besides giving an insight into Herondas' life and work, they picture the everyday life of the times in extremely realistic terms, though the satirical portions of them are not personal in their nature. In composition the mimes are in choliambic verse or iambic trimeter and are written in the Ionic dialect. Consult Crusius, (Untersuchungen zu den Mimiamben des He¬ rondas } (Leipzig 1892) ; Kenyon's Classical Texts from Papyri in the British MuseuirP (London 1891) ; Sharpley, (A Realist of the ˆEgean> (London 1906). See Mime.

HERONS, wading birds of the order He- rodii, forming, with egrets and bitterns, the family Ardeidce. The family is characterized by a thin, compressed body; a long, thin neck; a straight, narrow', pointed beak; fully feath¬ ered head; longish, slender legs; three toes in front, the two outer united by a membrane, the middle claw pectinate ; large, blunt wings ; ex¬ tensive development of powder-down tracts of disintegrating, shaftless feathers; and often by elongated feathers of the top of the head and other parts. Upward of 70 species of herons and their immediate allies are known, of which 14 inhabit North America. The bitterns (q.v.), with 10 tail-quills, form the sub-family Botaur- ince, the herons and egrets (q.v.), with 12 tail quills, the Ardeinee. Egrets are simply small white herons. The great blue heron (Ardea herodias) to which A. cinerea of Europe is closely related, inhabits all parts of North America and northern South America. It is a large bird with a length of about four and a spread of nearly six feet, and of beautiful slate- blue color, with the long flowing plumes black. It is to be found by the side of streams, lakes and the seashore, usually alone. Fish form the bulk of its food, but it also devours frogs, small reptiles, insects and almost any kind of animal which it can

capture. It roams in search of food mostly in the morning and evening. The herqnry, or breeding-place, is usually found among high trees, and the same breeding-place is used by successive generations if they are unmolested; frequently several species of her¬ ons consort together at a favorite breeding- place. The large nest is made of twigs and sticks, and is lined with rushes, grass and various similar materials. The eggs, usually three or four in a nest, are of a fairly uniform greenish blue color. Many nests are usually found in one heronry, and sometimes the nests are built on the ground or on a cliff. The cry is a sort of ((crank, crank,® uttered in a hoarse voice. In the North the blue heron is migratory, elsewhere it is resident. The little blue heron (A . ccerulea) is found in the eastern United States from the Middle States south¬ ward and in the West Indies and Central America. It is scarcely more than one-half the size of A. herodias and exists in two color phases, the one dark slate-blue with purplish

reflections on the head and neck, the other white with traces of blue, especially constant on the unfeathered parts. This species formerly bred with other southern species in great heronries, most of which have been decimated by plume- hunters.

The little green heron or fly-up-the-creek (Butorides virescens) ranges throughout tem¬ perate North America and somewhat beyond southward, breeding nearly everywhere. North¬ ward it is migratory and is the familiar heron about the streams and ponds of the Middle and New England States, where it usually nests in pairs or small communities and mostly in thick bushes or cedar trees; in other localities it sometimes breeds with larger species in heron¬ ries. The pale greenish elliptical eggs are from three to six in number. Its foods consist chiefly of small frogs, minnows and snakes, for which it searches by day as well as by night along the shallows of streams, where its harsh cry of alarm is often the first intimation of its pres¬ ence. The name refers to the beautiful deep bronze green color of the upper parts.

The night-herons (Nycticorax ncevius, and N. violacens) , which are closely related to the N. grisea of Europe, are easily distinguished from other herons by the thick, stout beak. The former, known as the black-crowned night- heron or squawk, is common throughout the United States and Canada in summer, and in the winter migrates far into South America, while the latter, or yellow-crowned species, is much less frequent and chiefly confined to the sea-coast of the warm parts of America. The squawk is about two feet long, the young brown¬ ish, the adults deep green and blue-gray above with two or three very long filamentous white occipital plumes. The night-herons are more active after dark than any other species, and are seldom seen abroad, except in the dusk or on cloudy days. Many species of herons reside in the warm parts of Africa and Asia, among them

being, the largest of all, the A. goliath. Consult Baird, Brewer and Ridgway, (Water- birds of North America) (1884); Reichenow,

(Journal of Ornithology) (1877) ; Job, (Among the Waterfowl) (1902). See Bittern; Egret.

HEROOPOLIS, an ancient Egyptian city found by excavation in the eastern Delta re¬ gion. Maps made prior to 1880 generally located the city near the present city of Suez, but the excavations of Naville in 1883 under the auspices of the Egypt Exploration Fund tend to show that the city was farther north. Heroopolis is given in the Septuagint version of the Old Testament as the meeting place of Joseph and Jacob. The Coptic translation is Pethom, very similar to the Hebrew Pithom, or ((House of Turn,® and for some time it has been known from Egyptian geographical lists that Pithom was situated in the land of Theku-t. This name has been identified with Succoth, the second resting place of the Children of Is¬ rael in their flight from Egypt. The Naville excavations brought to light the old site of Pithom and Succoth, the excavations being made at Tell el-Mashhutah, 12 miles west of Ismailah. A mile-stone which was recovered then showed the distance between Heroopolis and Clysma to have been nine miles. This would confirm the view taken by Strabo that the city was at the head of the Red Sea naviga-

tion and was situated on what he called «Hero- opohtan Gulf,® but if his view be correct, then it can only be inferred that the Red Sea ex¬ tended at that ancient date farther north than it now does and that the place where the Israel¬ ites crossed was not where it is generally sup¬ posed to be, but considerably farther north.

HERO'S FOUNTAIN, a pneumatic ap¬ paratus, through which a jet of water is sup¬ ported by condensed air. A simple mode of constructing it by means of glass tubes and a glass-blower's lamp is shown in the annexed figure. The column of water in the tube a compresses the air in b; this presses, on the surface of the water in c, and causes it to gush out at d. This princ ple is made use of in several large installations, notably in north¬ ern Michigan, Canada and other mining sections, the water being drawn from a reservoir down a shaft a, a large chamber in the rock being excavated to hold the air, similar to the lower bulb. From the rising pipe b the air compressed by the water col¬ umn is tapped for use. In this

Hero's Fountain.

plan the bulb c is unified with the lower bulb and d becomes a mere overflow. Air is sup¬ plied constantly to the compression chamber by trapping it in the downward moving column a.

HEROSTRATUS. See Erostratus.

HERPES, an acute, non-contagious, in¬ flammatory disease of the true skin, regarded generally as due to a lesion of nerve tissue. It is characterized by an eruption of one or more clusters of vesicles upon a reddened base. Several forms of the disease are recognized by dermatologists, of which the commonest are facial herpes and herpes zoster. Facial herpes constitutes the common fever blister, or cold sore, and is usually seen about the mouth, though it also occurs on other parts of the face. There is often some slight constitutional dis¬ turbance preceding the eruption, which first makes its advent known by a sensation of burn¬ ing or itching in the part, followed by reddish discoloration of the skin and after a few hours by a number of pin-head to pea-sized blisters filled with clear or turbid fluid. After a few days these dry up and form a yellowish crust, which then falls off, leaving a red spot that soon disappears. The usual duration of the disease is about a week and it shows a strong tendency to recur. Herpes often accompanies febrile conditions such as pneumonia and malaria, and a sim lar lesion is not rare about the genitals. Herpes occurs mostly in those whose skin is irritable or delicate, and is usually the result of some derangement of the mucous membrane of the respiratory, digestive or genito-urinary tract. It sometimes is the unfailing harbinger of the menstrual period. Cold, mental depression and injury or irr'tation of the skin are other causes. The disease belongs to the class of the neuroses, and in some instances its presence can be ex¬ plained only on the basis of nerve disturbance. In most cases no treatment is required, as the

lesions promptly heal of their own accord, but soothing ointments or lotions tend to relieve the irritation. The common domestic remedy is camphor ice. Herpes zoster, or shingles, is a special form remarkable for the fact that the eruption follows the course of certain nerves, and is usually disposed around one side of the body like a half belt. In rare cases it encircles the body. Its onset is preceded by stinging neuralgic pains, and by languor, lassitude, loss of appetite, shiverings, headache, nausea, quick¬ ened pulse, etc., after wh.ch the eruption ap¬ pears in irregular patches. The vesicles become enlarged to the size of small peas in 24 to 36 hours, and fresh clusters occur for three or four days, completing the belt-like appearance. As the eruption recedes, by the fifth or sixth day, the vesicles become white and opaque, and the red margins grow livid or purple. Some¬ times the vesicles burst, and several of the patches run together, forming irritable sores, discharging a thin serous fluid, which concretes and forms a crust

that falls off as the parts beneath heal. The disease occasionally follows injuries to the nerves, and it is common in damp, cold weather of spring or autumn, when it sometimes occurs in epidemics. It is sometimes produced by sudden exposure to cold after violent exercise, and sometimes follows acute affections of the respiratory organs. The treat¬ ment consists in attention to any systemic de¬ rangement present and in the local use of sooth¬ ing applications like talcum powder, protective dressings of cotton to prevent rupture of the vesicles, and the administrative of sedatives or even opiates in extreme cases. The duration of shingles is usually from 10 days to three weeks. Most cases run a favorable course and second attacks are rare.

HERPETOLOGY, her-pe-tol'o-ji, the study of reptiles. In its earlier days, included under the term ˆreptile® were not only those now properly so named, but also the amphibia (q.v.) and some other ˆcreeping things® not in either group. Cuvier's classification, the first approach to a scientific one, put both the true reptiles and the amphibians as corelated groups under Reptilia; but their distinction in form was soon perceived. Huxley showed that in their descent, embryology and structural rela¬ tions, the amphibians were more closely re¬ lated to the fishes than to the reptiles (lizards, serpents and turtles). He therefore united the two in a superior group Ichthyopsida, while he joined the birds to the reptiles in a group of similar rank called Sauropsida. But more recently the limits of herpetology have been restricted to truly scientific limits — the chor- date class Reptilia, a definite group distinguished by the following characters :

Reptiles are cold-blooded, the temperature of the body not differing much from that of the natural surroundings, and rising or falling accordingly; the heart is three-chambered, ex¬ cept in crocodilians, where four chambers first occur in the upward scale of natural creation; mostly venous blood goes from the heart to the anterior viscera, and mixed blood to the posterior region, only the head and anterior regions receiv ng pure arterial blood; through¬ out their whole life they breathe with lungs, never with gills ; the body is covered with scales, with which subjacent bony plates or

scutes are sometimes associated; the vertebrae are absolutely gastro-centrous (biconcave) ; the skull articulates by a single condyle with the backbone, and the lower jaw works aga'nst the quadrate bone; the great majority are ovip¬ arous, while in some the eggs hatch within the mother.

This characterization unites into the one class one order represented by a

single living species (the <(Tuatera Lizard®), and the exist¬ ing tortoises and turtles, lizards, snakes and crocodiles and many others now extinct. The group occupies a central position in the verte¬ brate series. Above it on the scale of organiza¬ tion are the birds and mammals; below it the amphibians and fishes. In respect to their phy- logeny Gadow is authority for the statement, (rOn the other hand, there is not the slightest doubt that they are evolved from some branch of the Stegocephali (q.v.), wh ist on the other hand the reptiles, probably through some branch of the Theromorpha, have given rise to the mammals ; some other reptilian branch, at pres¬ ent unknown, blossomed out into birds.®

The uncertainty arising from the more or less fragmentary testimony of the fossil re¬ mains of reptiles of geologic times has neces¬ sarily a restraining effect upon the completion of a classification of the reptiles. Moreover, the distortion of skeletons in the processes of fossilizing renders close decisions as to genera and species very difficult. It is cus¬ tomary, therefore, with cautious scientists to halt the differentiation downward at the sub¬ order, recognizing that in the present state of knowledge of the Reptilia all classification must be tentative. The most recently attempted classifi¬ cation is that of Dr. Samuel Wendell Williston, presented in 1914, and this may be said to be the most that can be done with the data now available. Dr. Williston divides the class ReptiLa into 12 orders and three provisional orders, as follows : Cotylosauria, with five sub¬ orders ; Chelonia, with three sub-orders ; Thero¬ morpha, with three sub-orders ; Therapsida, with three sub-orders; Sauropterygia. with two sub-orders; Proganosauria (provisional); Ichthyosauria ; Protorosauria (provisional); Squamata, with three sub-orders ; Thalattasauria (provisional) ; Rhyncocephalia, with three sub¬ orders ; Parasuchia, with three sub-orders; Crocodilia, with two sub-orders; Dinosauria, with three sub-orders; Pterosauria, with two sub-orders. The anatomical differences upon which these divisions are established are de¬ tailed in Dr. Williiston's (Water Reptiles of the Past and Present (Chicago 1914). (See Reptiles). Consult Boulenger, E. G., (Reptiles and Batrachians) (London 1914) ; Cunningham, J. T., (Reptiles, Amphibia, Fishes, and the Lower Chordata) (London 1912) ; Gadow, H., (Amphibia and Reptiles) (London 1902) ; Zit- tel, K. A. von, (Text-book of Palaeontology (Eastman's translation, London 1900-02).*

HERRERA, ar-ra'ra, Francesco de, called

El Viejo (the Elder), Snanish painter: b. Seville, 1576; d. Madrid, 1656. He broke with the Italian traditions of Spanish painting and became the founder of the Spanish national school. He also worked in bronze, and it was this probably which gave rise to the charge that he was connected with counterfeiters. He had a disposition so very detestable that his pupils,

of whom Velasquez was one, all left him. The Louvre contains some of his works, among others (The Israelites Gathering the Quail in the Wilderness. But the best are at Seville, in¬ cluding the (Last Judgment,* in the church of San Bernardo; (Saint Peter, * in the cathe¬ dral; and (Moses Smiting Water from the Rock,* one of four large canvases in the arch – episcopal palace. His frescoes at both Madrid and Seville have quite disappeared.*

HERRERA, Francesco de, called El

*Mozo (the Younger), Spanish painter: b. Seville, 1622; d. Madrid, 1685. He studied art under his father, Francesco, called El Viejo (q.v.) (to whom he was very far inferior as a painter), and remained some years at Rome. He was a founder of the Seville Academy (1660), and became its vice-director. Subse¬ quently he was appointed court-painter to Philip IV. In the Seville Museum is his (Four Doctors of the Church Adoring the Host) ; in the Prado Museum, (Saint Hermenegild. * During his residence in Italy he painted fish with such success that he was known there as (Lo Spagnuolo dei Pesci.*

HERRERA, Jose Joaquin de, ho-sa' hd-

a-ken, Mexican military officer: b. Jalapa, 1792; d. Tacubaya, 10 Feb. 1854. He joined the Mex¬ ican army in 1809, and in 1821 was promoted brigadier-general. He aided in overthrowing Iturbide, when the latter became emperor, and was successively Minister of War and presi¬ dent of the Supreme Court. President for a brief period in 1845, he again held office in 1848-51. During the war with the United States, he was aide to General Santa Anna.

HERRERO Y RUBIRA, Antonio Ma¬ ria, Spanish writer: b. Borja (Zaragoza), 1714; d. Madrid, 1 July 1767. He was a brother of Luis Herrero y Rubira (q.v.). Graduated as a doctor of theology from the University of Tolosa, he went to Madrid to study medicine. There he began writing on various subjects. Receiving his medical degree, he was appointed by Fernando VI doctor to the general hos¬ pitals of the court. Here he continued writing on medical and other subjects. In his special field he acquired a high reputation which led to his being appointed a censor of medical books printed in Spain, and perpetual secre¬ tary of the Royal Medico-Matriteuse Acad¬ emy. Among his published works are

HERRERO Y RUBIRA, Luis, Spanish

writer: b. Borja (Zaragoza), 24 Feb. 1716; d. Calanda (Teruel), 1 Feb. 1769. He was a younger brother of Antonio Maria Herrero y Rubira

(q.v.), and like his brother he pur¬ sued his literary and ecclesiastical studies in the universities of Huesca and Tolosa (de Francia), graduating from the latter with the degree of doctor of theology and of canonical law in 1734. He became an authority on the

latter and attained a reputation as a writer, among his works being cLa Vida de los siete sabios de Grecia) (Madrid 1738) ; (Discurso historico fidosofico sobre los terremotos> (Zara¬ goza 1756); (Arte de Pintura) ; (Secreta na¬ turae5 ; (Reyes crueles y aborrecidos) ; (Oplica mecanica5 ; (Arte de trabajar los vidrios que sirven para los anteojos de larga vista) ; (No siempre quien escucha su neal oye> (comedy) ; (Dos loas a San Juan Bautista.)

HERRERO Y RUBIRA, Sor Luisa del Espiritu Santo, noted Spanish religious writer, sister of Antonio Maria and Luis Herrero y Rubira (qq.v.) : b. Calanda, 1711 ; d. 24 Aug. 1777. She lived in a religious atmosphere, both her brothers being priests, and her nearest relatives being strongly inclined in the same direction. In the Convent of Concepcion de San Roque de Valdealgorfa were several of her aunts, and she became a nun in this convent while still almost a child. There she acquired great influence and was twice head of the institution. She was possessed of considerable poetical talent, which, had she had a broader field and more experience of life, might have made her one of the noted poets of Spain. A great student, she acquired a reputation as an au¬ thority on ecclesiastical history and sacred writings. Among her works are (Esposa y esposa) ; (Novenario de Nuestra Senora de Monte Santo> (Valencia 1773) ; (Sacro No- venario de Nuestra Senora del Pilar de Zara¬ goza5 ; (Glosa de la Salve) ; (Oraciones a Maria Santisiima> ; (Auto SacramentaP (1760) ; {Otro Dance al Santisimo y San MigueP ; (Su's Letrillas para la misa y festividad del Santisimo5 ; (Septenario espiritual.5

HERREROS, Manuel Breton de, Span¬ ish poet and dramatist: b. Quel (Logrono), 19 Dec. 1796; d. Madrid, 8 Nov. 1873. He left school to enter the army as a volunteer in 1814, in which he served until 1822. On his retirement from the army he held various offices under the government. In the mean¬ time he gave considerable attention to litera¬ ture, and in 1824 his comedy, (A la vejez viruelas,5 met with flattering success. Like other dramatic authors of his age, this initial success brought him employment in the way of translations and adaptations of dramatic works from French, some in prose and others in verse. This work included the masterpieces of several noted authors and covered 62 trans¬ lations and 10 adaptations.

(Los dos sobrinos,5 an original comedy, appeared in 1825, and CA Madrid me vuelvo5 in 1828. In all he wrote over 100 original comedies and dramas around which there was perhaps more bitter discussion than around the work of any other Spanish dramatist. So bitter and persistent in their attacks had his enemies become that he was forced to present his dramas under an as¬ sumed name. In 1831 he published a volume of poems which had already appeared in the newspapers ; and in 1837 he was elected a member of the Royal Spanish Academy of which he soon became perpetual secretary. He was for some time editor of the Gaceta (1843- 47). He res:gned to become head of the Bibliotica Nacional, a position he retained until his death. Breton de Herreros was one of the

really great dramatists of Spain. He gave life and individuality to the Spanish drama of customs and characters, nearly all of which he drew from the ranks of the middle class, which he knew intimately and which he depicted vividly and true to life. Many of the French dramas which he adapted he revivified with his imagination and his dramatic genius, thus making them better than the originals. Among his published works are (Achoques a los vicios5 (1830); (E1 Ensayo5 (1831); (E1 Templo de la Gloria5 (1833) ; (Un novio para la nina5 (1834); (Elena5 (1834); (E1 Hombre gordo5 (1835) ; (La redoccion de un periodico5 (1836); (Las improvisaciones5 (1837); (E1 hombre pacifico5 (1838) ;

HERRESHOFF, her'res-hof, John Brown,

American shipbuilder : b. Bristol, R. I., 24 April 1841 ; d. there, 20 July 1915. During early age he was attacked by infantile glaucoma, which during his youth destroyed his sight, after which he remained totally blind for life. His education was carried on at the schools of his native town, but his real education was gained by contact with the problems of a practical life and surroundings, aided, where his lim¬ itations required help, by the constant atten¬ tions of a large and devoted family circle. In boyhood Mr. Herreshoff fitted up at his home a well-equipped machine shop and carpenter shop; in the former he laid the foundations of the mechanical skill and knowledge that he turned to such good use later in life, and in his wood-working shop he began building with his own hands small craft which served as a splendid study for the later work which made him so famous. Aided by his father, Mr. Herreshoff began the construction of larger craft at about the age of 20, and in the year 1863 he began naval construction as a business, which he carried on for more than 50 years with success. At first he had as partner, Mr. D. S. Stone, which firm lasted a few years only, then for a short period he was alone in the busmess, but in 1872 he drew to his side his brother and life coadjutor, Mr. Nathaniel

G. Herreshoff, seven years his junior, and well equipped in construction, engineering and de¬ signing. The introduction of steam power as applied to yachts, launches, torpedo boats and craft for trade opened a new and wide field, which they grasped with eagerness and which soon placed them in the mastery of the new field. The early use of the water-tube boiler gave the business a boom, and the perform¬ ance of the first torpedo boat, The Lightning , built for the United States government, was a revelation in the then infancy of high speed craft. In 1879 Mr. Herreshoff and his brother, Mr. Nathaniel G. Herreshoff, incorporated the Herreshoff Manufacturing Company. The in¬ troduction of the compound engine in 1880 gave a fresh impetus to the business which was reflected by the construction of numerous steam yachts and torpedo boats and other naval craft for our own and foreign nations. In 1892 the Herreshoff Manufacturing Company took up the practical side of the defense of the Queen's Cup, which had been held at that date for 40 years by the New York Yacht Club, which successfully had held to the old trophy through many attacks from its motherland. The splendid series of defenses lasted about 13 years, in which the names of the Vigilant, Defender, Columbia and Reliance are fresh in the memory of all Americans, which, as well as the yet undetermined defense of the Reso¬ lute, goes to show to what height of perfec¬ tion the Herreshoff Manufacturing Company have carried the science of naval designing and construction.

HERRESHOFF, Nathanael Greene,

American naval architect and marine engineer: b. Bristol, R. I., 1848. He was educated in the public schools of Bristol and at the Massa¬ chusetts Institute of Technology. He was for nine years with Corliss Steam Engine Com¬ pany in designing department, and since then with Herreshoff Manufacturing Company, holding office of designer and superintendent, and in 1915 took the office of president after the death of his brother, John B. Herreshoff. He has designed and superintended the con¬ struction of many successful steam yachts and torpedo boats, and also many fast sailing yachts, including seven for international racing in defense of the (

HERRICK, Christine Terhune, American writer: b. Newark, N. J. She is the daughter of Mary Virginia Terhune (<(Marion Har¬ land55). She was educated in private schools and by teachers in Rome and Geneva. She mar¬ ried James Frederick Herrick in 1884, who died in 1893. She is well known as a writer on domestic topics, and is a frequent contributor to the Ladies' Home Journal, Woman's Home Companion, The Housekeeper,

Harper's Bazar and other magazines. She has published lib¬ eral Living Upon Narrow Means) (1890) ; (Chafing-dish Supper5 (1895); /Cradle and Nursery5 (1889) ; (First Aid to Young House¬ keeper5 (1900) ; housekeeping Made Easy5 (1888); (Little Dinner5 (1893);

Maid Servant5 (1904) ; Consolidated Library of Modern Cookmg and Household Recipes5 (1905); (Sunday Night Suppers5 (1907); (Like Mother Used to Make5 (1912); with Marion Harland, (The Helping Hand Cook- Book5 (1912); (My Boy and I5 (1913); (The ABC of Housekeeping5 (1915).

HERRICK, Francis Hobart, American biologist and educator: b. Woodstock, Vt., 19 Nov. 1858. He was educated at Dartmouth, Johns Hopkins and the University of Pennsyl¬ vania, and was instructor in biology in Adel- bert College (1888-91), and since the latter date professor of biology in the same institu¬ tion. Among his published works are (The American Lobster5 (1895) ; home Life of Wild Birds5 (1902-05) ; (Natural History of the American Lobster5 (1911); (Audubon the Naturalist5 (1917).

HERRICK, Myron T., capitalist and diplo¬ mat : b. Huntington, Lorain County, Ohio, 9 Oct. 1854. His ancestors, of the same line as that of Robert Herrick, the English poet, came to this country from Loughborough, Leicester¬ shire, England, early in the 17th century. His grandfather, Timothy Herrick, one of the pio¬ neers of Lorain County, was a soldier in the War of 1812. At the battle of Sacketts Harbor he was taken prisoner and sent to Canada. When released, he walked to Ohio, and upon locating his land warrant received for services in the war, built a log cabin in the woods and prepared as best he could to receive his family. He then returned to Watertown, N. Y., and brought his family of six children on to Ohio in ox teams. On his mother's side, Mr. Herrick is descended from Jeduthem Cross, who came from England to America and settled in Massa¬ chusetts in the early 17th century. Mr. Her¬ rick's father was Timothy R. Herrick, of Wel¬ lington, Lorain County, Ohio, a farmer of im¬ portance and influence. Myron T. Herrick was educated in a district school, in the high school at Wellington, and later studied at Oberlin Col¬ lege and Ohio Wesleyan University, which lat¬ ter institution conferred upon him the degree of A.M. Mr. Herrick studied law at Cleveland, Ohio, and was admitted to the bar in 1878. On 30 June 1880 he married Caroline M. Parmely, of Dayton, Ohio. He practised law, in which he was successful, but retired in 1886, becoming actively engaged in banking and manufacturing. In 1894. Mr. Herrick was elected president of the Society for Savings in the City of Cleve¬ land, having been its secretary and treasurer since 1886.

Mr. Herrick filled many positions in the councils of the Republican party, and from 1888 devoted a large part of his time to public service. He served as aide-de-camp on the staff of William McKinley when governor of Ohio. Later when Governor McKinley became President, he tendered to Mr. Herrick the position of Secretary of the Treasury in his first Cabinet, which was declined for business reasons. In President McKinley's second term he offered Mr. Herrick the ambassadorship to Italy, which offer was renewed by President Roosevelt, but was declined in both instances on account of his large business responsibilities. Mr. Herrick was president of the American Bankers Association in 1901. At the Republican

State Convention of 4 June 1903 he was unani¬ mously nominated as Republican candidate for governor and was elected by the largest ma¬ jority in the history of the State, 113,802 votes, over Tom L. Johnson, his opponent. Mr. Her¬ rick served one term in that office. His record stands among the first as an efficient and suc¬ cessful executive. He was offered the United States Treasury portfolio by President Taft at the beginning of his term, which was declined for business reasons. Later he was offered the ambassadorship to Brazil, which was also de¬ clined. In 1912 he accepted the ambassadorship to France, which he had once before declined, and at the outbreak of the World War in 1914, as American Ambassador, took over the Ger¬ man and Austrian embassies. On 2 Sept. 1914, preceding the battle of the Marne, when the French government removed to Bordeaux, Mr. Herrick requested his government to per¬ mit him to remain in Paris, as, in his opinion, the American interests were such that they could be better represented in Paris. Upon the departure of the diplomatic corps from the British, Turkish and Japanese embassies and the legations of various other countries, Mr. Herrick took over the representation of these interests. Three years later when Lord North- cliffe visited America, he said in an address, <(I had the honor of meeting Ambassador Her¬ rick in almost the earliest stages of the war, when between one and two millions of Germans were marching on Paris, and when Paris, with almost twice the number of inhabitants of Cleve¬ land, was panic stricken and the people were fleeing from that city. It was largely due to the man from Cleveland that that panic did not extend so far as to cause the whole population to leave and allow the Germans to march into Paris. That feat of Ambassador Herrick is one of the most remarkable achievements of any man during the war.®

Mr. Herrick formed the American Commit¬ tee which occupied his residence as a head¬ quarters. This committee rendered a great service in

extending financial help to Americans and others who had been traveling in Europe at the outbreak of the war and who found them¬ selves suddenly without funds and in need of advice and help. Mr. Herrick and his wife were largely instrumental in establishing an American ambulance hospital in the Elysee Pasteur at Neuilly, which was equipped and managed by resident Americans in Paris. It was established in 1914, having a capacity of about 1,600 beds, and performed a very great service. When America entered the war it was turned over to the Red Cross. The American Relief Clearing House was organized by Mr. Herrick and his home became its headquarters upon his leaving France. The Clearing House had also a branch in New York City and the admirable service which it has performed is well known to all Americans. Mrs. Herrick remained in Paris with her husband during the early days of the war, ministering to the needs of the stricken people of France, and as a result of her arduous duties in this connection, contracted the disease which resulted in her death on 15 Sept. 1918.

Before war was declared Mr. Herrick's suc¬ cessor had been appointed, and although he had then served nearly two years under a Demo¬ cratic administration, he remained at his post

at the request of President Wilson until long after the battle of the Marne, returning to America in December 1914. After retiring from office, the French government in recognition of his services, conferred upon him the cross of the Legion of Honor. He was also admitted to membership in the Gens de Lettres. The British government presented him with a piece of old English plate, and in his letter of trans¬ mittal the British Ambassador wrote : (

Before the war Mr. Herrick had been inter¬ ested in securing the participation of France in the Panama-Pacific Exposition in San Fran¬ cisco in 1915. After the declaration of war most of the European countries decided to give up their preparations, but the French govern¬ ment voted to continue with its plans ((in com¬ pliment to Ambassador Herrick,® as they said. Mr. Herrick initiated the rural credit movement in this country, and upon taking up his resi¬ dence in France, the ambassadors, ministers and councillors of various European countries were directed by their governments to report to him rural conditions and credit systems existing in these countries. In 1913 he reported the results of his investigations to the Department of State, and later published a book on the subject, (Rural Credits (New York 1914).*

For many years Mr. Herrick was a director of several railroads representing foreign inter¬ ests. He is interested in many business enter¬ prises which have been uniformly successful. Among them are the National

Carbon Company and the Union Carbide Company, which have merged under the name of the Union Carbide and Carbon Company and elected Mr. Herrick chairman of the board; and the Cleveland Hardware Company, in which he has been in¬ terested for over 30 years. He is a director in the New York Life Insurance Company, the National Surety Company and the Erie Rail¬ road. Since returning to America, Mr. Herrick has received the honorary degree of LL.D. from Columbia, Harvard, Yale, Princeton and West¬ ern Reserve universities and from Miami, Union and Kenyon colleges. He has been presented with a medal by the National Institute of Social Sciences and is a trustee of Carnegie Institu¬ tion of Washington. Immediately on his return to this country he became actively interested in war relief and is connected with many organ¬ izations engaged in this work, having given up the greater part of his time to these activities. Mr. Herrick again was appointed Ambassador to France in 1921 by President Harding, shortly • after the latter's inauguration.

HERRICK, Robert, English poet : b. Lon¬ don, August 1591 ; d. Dean Prior, Devonshire, October 1674. His father, Nicholas Herrick, was a goldsmith ; through inheritance and train¬ ing the son was enabled to transfer to the making of verse the exquisiteness of his father's craft. Shortly after Robert's birth the elder Herrick made his will, and two days later

he died, under circumstances that suggested suicide. To his wife and his seven children he left a small property.

*After a few years, perhaps at Westminster School, and a brief apprenticeship to his guard¬ ian uncle, William Herrick, also a goldsmith, the poet entered Cambridge University, at first * enrolling himself in Saint John's College. Two years later he removed to Trinity Hall, intend¬ ing to study law. During his residence he seems, from letters to his guardian, to have frequently needed money, and he left the uni¬ versity in debt. He took his degree of B.A. in 1617 and of M.A. in 1620.*

Few facts remain of his next years. He went to London and associated with the poets of the time, admirers of Ben Jonson, and he himself wrote verse. The words of two New Year anthems set to music by Henry Lawes were his ; through the friendly influence of prominent men at court, he may have been known to the king and queen. By 1627, when he was chaplain of the Duke of Buckingham's expedition to the Isle of Rhe, he must have taken orders. Two years later, shortly after his mother's death, he became vicar

of Dean Prior in Devonshire.

So little in Herrick's poetry suggests the priestly character that question has been made why he took orders at all ; he himself spoke of his Devonshire years as pure exile from London and the world. Yet the traditions of his career at Dean Prior are entirely pleasant. His pa¬ rishioners remembered him for his good humor and wit. He wrote his best poems in the little vicarage, whether in celebration of Prudence Baldwin, his housekeeper, or of Tracy, his spaniel, or of the village holiday ceremonies and superstitions, recorded with wonderful sympathy. Nothing more particular remains, save the legend of his keeping a pet pig in the house, and of his hurling a missile at an inat¬ tentive congregation — his only practical ex¬ pression of ill-will toward Devonshire.

In 1647, evicted as a loyalist by Parliament, he returned to London, glad to be free of the quiet country, and set about publishing his poems. They appeared that same year, under the title of (Hesperides, or The Works Both Humane and Divine of Robert Herrick, Esq. The sacred poems bear the separate title, (His Noble Numbers; or, His Pious Pieces, Wherein (amongst other things) he sings the Birth of his Saviour; and sighes for his Saviour's Suf¬ fering on the Crossed Nothing else is known of Herrick until 1662, when Charles II re¬ stored him to his old place at Dean Prior. The parish register records his burial on 15 Oct.*

1674.

There is almost no contemporary reference to Herrick's poems, but the frequency with which they were reprinted in collections proves the favor they found. By the end of the cen¬ tury, however, they were forgotten, sharing in the Augustan neglect of Elizabethan and Stuart poetry. A mention of Herrick, with some of his poems, in the Gentleman's Magazine , 1796, and Dr. Nathan Drake's essays and quotations in his (Literary Hours, two years later, re¬ vived his fame.*

Herrick's literary master, as he tells us in

more than one fine tribute, was Ben Jonson (q.v.). Campion and the poets of the later songbooks foreshadow him, but it was through Jonson that he derived the tradition of Horace and the Latin epigrammatists, and he remained Latin in spirit, though his own carefully achieved simplicity is often near to Greek re¬ straint. But it is not only in this literary in¬ heritance that he belongs with Jonson; per¬ sonally, if the Marshall portrait prefixed • to is faithful, and if the assault upon the drowsy congregation is no fable, he illustrates with Jonson and other Elizabethans, and with Landor in later days, the paradox of violent and robust

temperament reacting in fastidious art.

Herrick is first of all an artist; his merit is almost invariably a virtue of expression; he is master of the inevitable phrase. Many of his lyrics have indeed a larger perfection of form, yet he is most often concerned with the single word. His shortest poems, the numerous two-line fragments in which at first sight he would seem to scatter his genius, are fre¬ quently mere experiments in diction, usually for the sake of one word that he coins or dis¬ covers, easily recognizable for its curious awk¬ wardness or its complete beauty. For among these trial pieces can be found some unhappy ventures, as well as astonishing verbal felicities.

This gift for language, part of the poetical equipment in general, is more marked in Her¬ rick because of its intensity and its narrow¬ ness. It is so narrow as to be quite inflexible ; far from exhibiting the Elizabethan faculty for adjusting the style to the most varied matter, Herrick subdues to one manner every subject he treats. The lines to his dying brother, the wedding songs for his friends, the epitaph on his housekeeper, and the recipes for country charms, are uttered alike in one voice and in one rigid though lovely tone. And in his choice of subjects he exercises none of the fine selection that distinguishes his diction ; his con¬ scious art is a thing of words only; in his themes he is at once almost the coarsest and the daintiest of English poets. This imperturb¬ able manner, itself exquisite, becomes in the handling of shockingly different themes Her¬ rick's chief limitation; here is felt a certain hardness of character, an ill-proportioned sym¬ pathy, or some deep defect of heart. • But this impression is partly corrected elsewhere in his work.

The themes of Herrick's secular verse, upon which his fame rests, are given with character¬ istic confusion in the first poem of his book. He sings of youth and love — a Renaissance motive from which his cheerfulness or his limited sympathy subtracts most of the Renaissance sadness at the passing of beauty. He sings of his own numerous loves in the Horatian manner, leaving his admirers room to ponder whether he ever loved at all. He sings in his kindliest vein of fairy lore, and of country holidays; he identifies Renaissance springtime motives in the native village cere¬ monies around him, and gives to the English May. festival something of the significance it had in Provence; and he is the first writer to chronicle at length that old English Christmas spirit which Irving and Dickens recovered. No

poet who writes of such subjects with such de¬ light can be altogether

unsympathetic, and in the verses which are frankly about himself there is a frequent note of human pathos that partly disarms criticism of his less felicitous themes.

It is not surprising that his 'Noble Num¬ bers) are. little read; in them as in his secular verse he is the technical experimenter, the con¬ scious artist, where conscious art is out of place. But in the 'Christmas Carols, in the 'Graces for Children,* in the fine though fan¬ tastic 'His Saviour's Words Going to the Cross,* in the epigram 'Riches and Poverty,* and in the lines that Swinburne praised, 'De¬ votion Makes a Deity,* he shows feeling and thoughtfulness not unworthy of England's tra¬ dition of devout country parsons. See Hesperides.*

Bibliography.— The best editions are those by Grosart, Saintsbury (in 'Aldine Poets) and Pollard, with an introduction by Swin¬ burne, in the 'Muses' Library.* For criticism, consult 'Introductions> to the above; Grosse, E., in 'Seventeenth Century Studies) (London 1898) ; Aldrich, in 'Ponkapog Papers) (New York 1903) ; Moorman, F. W., 'Robert Her¬ rick: A Biographical and Critical Study) (New York 1910) ; and the 'Cambridge History of English Literature * (New York 1907-16).*

John Erskine,

Professor of English , Columbia University.

HERRICK, Robert, American novelist : b. Cambridge, Mass., 26 April 1868. He was graduated at Harvard in 1890, and in 1895 be¬ came professor of English at the University of Chicago. His literary style displays much finish, while his studies of character are both keen and discriminating. He contributes regu¬ larly signed articles to the Chicago Tribune. He has published 'The Man Who Wins> (1895) ; 'Literary Love Letters and Other Stories- (1896) ; 'Love's Dilemmas> (1898) ; 'Composition and Rhetoric * (1899) ; 'The*

Web of Life> (1900); 'The Real WorkP (1901); 'Their Child> (1903); 'The Common Lot (1904) ; 'The Memoirs of an American Citizen* (1905) ; 'Together) (1908) ; 'A Life for a Life* (1910) ; 'The Master of the Inn* (1908) ; 'The Healer* (1911) ; 'One Woman's Life* (1913) ; 'His Great Adventure* (1913) ; 'Clark's Field* (1914); 'The World Decision* (1916) ; 'The Conscript Mother* (1916).*

HERRICK, Sophie Mcllvaine Bledsoe,

American microscopist : b. Gambier, Ohio, 26 March 1837. She was editor of the Southern Review, 1875-78, and was connected with the editorial staff of Scribner's Magazine and its successor, The Century, 1878-1907.

She has pub¬ lished 'Wonders of Plant Life under the Micro¬ scope (1883) ; 'The Earth in Past Ages*; 'Chapters in Plant Life* ; 'A Century of Son¬ nets* (1902).*

HERRING. The typical fishes of the fam¬ ily Clupeidce (q.v.), to which also belong the shad, alewife, sardine (qq.v.) and other food- fishes, the numbers of which consumed make this the most important economically of all families of fishes. The true or sea-herrings belong to the genus Clupea. The common her¬ ring (C . harengus) of both sides of the north Atlantic swims in enormous schools containing countless numbers of individuals packed as

closely as possible over areas of often 6 to 20 square miles. The herring is a migratory fish but its movements are so complicated that much mystery still clings to them. The most satisfactory conclusions have been arrived at by a German commission appointed to study the natural history of the Baltic, etc., which concluded that the herrings live in the deep water off the coasts which they approach peri¬ odically chiefly for the purpose of spawning; that there exist a large number of distinct races, differing in size, form, times of spawn¬ ing and various other peculiarities, and that each of these races swims in separate schools, which move independently and have different seasons and grounds for spawning. Spawning takes place at various seasons, according to lo¬ cality, some schools spawning in the late win¬ ter, others in the spring and still others dur¬ ing the autumn months. The eggs are small and adhere in masses to seaweeds, stones, etc., on the bottom. Vast numbers are thus depos¬ ited in certain favored localities to which had¬ dock and other fishes are attracted for the pur¬ pose of devouring them. The number of eggs produced by each fish is not especially large, being from 10,000 to 50,000, but nevertheless the natural productiveness of the herring has been sufficient to overcome inroads caused by the fisheries and the much greater destruction due to the hordes of bluefish, sharks, porpoises, gulls and other enemies which accompany the schools in order to prey upon them. Having only few and small teeth, the herrings cannot capture active living creatures, but, as they swim with quick, nervous movements, water is being continually taken into the mouth anci strained through the gill-rakers. By this means great numbers of copepods and other minute forms of life, especially larval crustaceans, an¬ nelids and mollusks are retained within the mouth and swallowed.

The herring fishery is of stupendous im¬ portance to the countries of northern Europe. This is especially true of the Scandinavian countries, whose hardy fishermen take from the sea annually not less than 1,500,000,000 pounds. Scotland takes from 150,000,000 to 200,000,000 pounds and the other maritime nations usually smaller quantities. The herring is not found in the Mediterranean. On this side of the At¬ lantic the

*fishery is much less extensive, but is growing and is no doubt destined to reach a great magnitude, especially in the waters of British America, which furnish each year about 250 000,000 pounds. Although found as far south as North Carolina, the herring has a commercial importance only north of Cape Cod. The New England fisheries are chiefly confined to Maine. Most of the fish is sold fresh, either for food, or, early in the season, for cod bait; the remainder is salted or smoked. A favorite preparation is the partly smoked form of "bloaters.** Large quantities of young herrings are packed and sold as sardines. In the prosecution of the American fisheries use is made chiefly of several forms of drift or gill nets and seines ; under favorable condi¬ tions of great tidal movements, as in the Bay of Fundy, great numbers are captured in weirs.*

A closely similar species (C. pallasii) is found on the Pacific coast of America and is the object of a rapidly extending fishery. Of the anadromous river-herrings or alewives

(Pomolobus) , two species are of great com¬ mercial importance on the Atlantic coast of the United States, particularly southward, though the fisheries extend from Maine to Florida. They enter the rivers to spawn about the same time as the shad, with which they are caught chiefly in pound nets and seines. The greater number are smoked.

To the extensive literature of the herring the following references will serve as an intro¬ duction : Goode, (Fishery Industries of the United States) (1884); Smith, (Alewife Fish¬ eries of the United States (in Report of United States Fish Commission for 1898) ; Cunning¬ ham, (Marketable Marine Fishes) ; (Report of the Commission for the Scientific Investigation of the German Seas) (a very important contri¬ bution in German) ; (Annual Reports* of the United States Commissioner of Fisheries ; Samuel, A. M., (The Herring: Its Effect on the History of Britain) (London 1918).*

HERRING GULL, the most numerous and widely spread of gulls,- common in the breeding season throughout all the northerly parts of the world and migrating southward in winter. The silvery sheen of white and pearl- blue plumage are indicated in its lechnical name (Larus argentatus) ; and its habit of following schools of fishes and picking them up gives it the name of herring-gull. The same name is often given, however, to several others of the smaller gulls. See Gulls.

HERRNHUT, hern'hoot, a small town or village in the kingdom of Saxony,

in the circle and 18 miles southeast of Bautzen. It is situ¬ ated at the foot of Hutberg Mountain, 1,054 feet above the level of the sea. It was founded by Count Zinzendorf 1722, for the use of the Mo¬ ravian Brethren, and it afterward became the metropolis and centre of that sect of Christians, who, from this town, are often called Herrn- huters. (See United Brethren). The town is built with great regularity and distinguished by the order, cleanliness and stillness which prevail in it. It has a great variety of manu¬ factures, principally of linen, calico, tobacco and of articles in gold, tin, leather, etc. The objects of curiosity are the observatory and the burial-ground on a neighboring hill, resembling a garden, and called by the brethren <(Garden of Peace.® Pop. 1,200.

HERRON, Francis Jay, American sol¬ dier: b. Pittsburgh, Pa., 17 Feb. 1837; d. New York, 8 Jan. 1902. He was graduated at the Western University of Pennsylvania in 1854, and on the breaking out of the Civil War com¬ manded the Governor's Grays in the First Iowa regiment. In 1861 he was made lieutenant- colonel of the Ninth Iowa regiment. In 1862 he received the commission of brigadier-gen¬ eral of volunteers. Early in 1863 he joined General Grant at Vicksburg and commanded the left wing of the besieging forces as major- general (1862), until the capture of the city. He subsequently captured Yazoo City, with its boats and supplies; commanded the Thirteenth army corps and broke up the traffic along the Rio Grande; assisted President Juarez against Maximilian's forces, and in June 1865 received the surrender of the Confederate forces west of the Mississippi. In 1873 he took up his resi¬ dence in New York, where he practised law until his death.

HERRON, George Davis, American cler¬ gyman and social reformer : b. Montezuma, Ind., 21 Jan. 1862. He was educated at Ripon Col¬ lege, Wisconsin, and also studied in Europe. He became pastor of the Congregational church in Lake City, Minn., and while there made an address ((

(Between Caesar and Jesus) (1899); (Why I am a Socialise (1900) ; (From Revolution to Revolution ; (The Day of JudgmenU ; (Wagner and Parsifal (1903); (War and Peace under Socialism) ; (Socialism and Spiritual Expan¬ sion ; (Woodrow Wilson and the World's Peace.**

HERSCHEL, her'shel, Caroline Lucretia,

sister of Sir William Herschel (q.v.), Anglo- German astronomer: b. Hanover, Germany, 16 March 1750; d. there, 9 Tan. 1848. In her 22d year she went to England to reside with her brother, then organist in Bath. When William abandoned his former profession in favor of astronomy she became his helpmate, and when he was appointed private astronomer to

George III she discharged efficiently all the duties of an assistant astronomer, for which she was allowed a small salary. Although these duties were very arduous, she yet found time to conduct a series of observations of her own with a small Newtonian telescope her brother had made for her. She devoted special energy to the dis¬ covery of comets, and was so successful as to be entitled to claim the priority of discovery of at least five. Several remarkable nebulae and clusters of stars included in her brother's cata¬ logue were described from her original observa¬ tions. In 1798 her valuable work, (A Catalogue of Stars taken from Mr. Flamsteed's Observa¬ tions, with Introductory Remarks by W. Her¬ schel, > was published by the Royal Society. On her brother's death in 1822 she returned to her native country, where she died after an unusu¬ ally protracted life, distinguished by useful sci¬ entific labors. The Royal Society recognized the value of her labors by bestowing upon her in 1828 their gold medal, and some time afterward by conferring upon her the privileges of hon¬ orary membership. Consult Herschel, M. C,

(Memoir and Correspondence of Caroline Her- scheP (London 1876) ; and Clerke,

HERSCHEL, Sir John Frederick Wil¬ liam, English astronomer ; only son of Sir Wil¬ liam Herschel (q.v.) : b. Slough, near Windsor, 7 March 1792; d Collingwood, Kent, 11 May 1871. He was educated at Eton and Cambridge. His first publication was (A Collection of Ex¬ amples of the Application of the Calculus to Finite Differences) (1820). but it was not until the death of his father that he devoted his special attention to those astronomical researches which have made the name of Herschel so famous. He limited his first exertions to a re¬ examination of the nebulas and clusters of stars discovered by his father, and in 1824, with James South, reported :t'o the Royal Society the posi¬ tion and apparent distances of 380 double and triple stars, obtained by more than 10,000 meas¬ urements. This memoir attracted the notice of the French Academy, and they voted it their astronomical prize ; and two years later the gold medal of the Royal Society was awarded to each of the astronomers. The results of the re-examination were given in 1833 to the Royal Society in the form of a catalogue of stars in order of their right ascension. The catalogue contained observations on 525 nebulae and clusters of stars not noticed by his father, and on a great number of double stars, be¬ tween 3,000 and 4,000 in all. His (Treatise on the Theory of Light* appeared in 1827, that on (Sound * in 1830, and in the same year was published his well-known Preliminary Dis¬ course on the Study of Natural Philosophy,* one of the*

most charmingly written books on science. In 1831 he was created a knight of the Royal Hanoverian Order. In 1833 Her¬ schel published in Lardner's (Cabinet Cyclo¬ paedia a (Treatise on Astronomy,* subse¬ quently enlarged into (The Outlines of Astron¬ omyˆ of which several editions have been published. In the same year he undertook a private expedition to the Cape of Good Hope for the purpose of carrying out in the southern hemisphere observations similar to those he had made in the northern. Four years were spent near Cape Town (1834-37). His great object was to discover whether the distribution of the stars in the southern hemisphere cor¬ responded with the results of his father's labors, prosecuted mainly on the opposite side of the Galactic Circle. That the observations might be strictly comparable they were made by the same method as Sir W. Herschel, and with a telescope of the same optical power. The whole number of stars counted in the telescope amounted to 68,948, included within 2,299 fields of view. By a computation based on the star- gauges in both hemispheres relative to the Milky Way, Sir John found that the stars visible in a reflecting telescope of 18 inches aperture amounted to 5,331,572; and more than this, the number really visible in the telescope was vastly greater, for in some parts of the Milky Way the stars were found to be so crowded in space as to defy all attempts to count them. The results of this vast labor were published in 1847. On Herschel's return to England in 1838 he was received with every public honor, and on the queen's coronation was created a baronet. He was buried in Westminster Abbey.*

HERSCHEL, Sir William, Anglo-Ger¬ man astronomer: b. Hanover, Germany, 15 Nov. 1738; d. Slough, near Windsor, England, 25 Aug. 1822. He went to England in 1757, and at first was employed in the formation of a military band. Although enthusiastically fond of music, he devoted his leisure hours to mathematics and astronomy ; and being dis¬ satisfied with the only telescopes within his reach, he set about constructing one for him¬ self, in which undertaking he succeeded, having in 1774 finished a reflecting instrument of five and one-half feet. Encouraged by his success he proceeded to complete larger telescopes, and from this period gradually withdrew from his musical engagements. Late in 1779 he began a regular survey of the heavens, star by star, with a seven-foot reflector and after 18 months' labor discovered, 13 March 1781, a new primary planet, named by him the Georgium Sidus, but now known as Uranus. George III gave him a pension, enabling him to devote the rest of his life to astronomy. At Slough, he commenced the erection of a telescope of the dimensions of 40 feet, and completed it in 1787. Its diameter was four and one-half feet, and it weighed 2,118 pounds. With this powerful instrument he continued to prosecute his discoveries, regu¬ larly communicating the results to the Royal Society till 1818. He was knighted by George III, and received 'honorary degrees from Ox¬ ford, Edinburgh and Glasgow

universities. He was the first president of the Royal Astronomi¬ cal Society. In 1783 he thought he had dis¬ covered a volcanic mountain in the moon and from further observations made with his large instrument in 1787 found he was the victim of an optical illusion. He discovered two of the satellites of Saturn, and the fact that his system of rings revolved and he measured his rotation and that of Venus, announced to the world that there were binary stars in the heav¬ ens, etc. Herschel received much assistance in making and recording observations from his sister Caroline (q.v.), and later his brother, a skilful optical instrument-maker, lent him valuable aid. In 1802 he laid before the Royal Society a catalogue of 5,000 new nebulae, nebu¬ lous stars, planetary nebulae and cluster of stars he had discovered. Consult Dreyer, (Short Ac¬ count of Sir William Herschel's Life and Works (London 1912) ; (Herschel, his Life and Works, * by Holden (1881) ; Sime, (Wil¬ liam Herschel and His Work) (New York 1900). His scientific papers were collected and edited in 1912 under the direction of the Royal Astronomical Society and the Royal Society.*

HERSCHEL, Sir William James, British administrator: b. January 1833; d. 24 Oct. 1917. He was a grandson of the famous discoverer of Uranus, and son of the eminent arstronomer and chemist, Sir John Frederick Herschel, who is buried by the side of Isaac Newton in West¬ minster Abbey. William Herschel was gradu¬ ated at Oxford and entered the Indian. Civil Service in 1853. In 1859, while serving in the Hooghly district, he applied the first tests of the practicability of using finger-print impres¬ sions as a means of identification, with the object of circumventing the numerous cases of personation that came before the Bengal courts of justice. Owing to the general state of illit¬ eracy, it was frequently impossible to apply the test of comparing signatures, In a report

to the government Herschel recommended the adoption of the system throughout India, but his advice was not followed till many years later, when he had the satisfaction of seeing his methods applied in all parts of the world. He served as commissioner at Cooch Behar for some years and settled in Oxford on his re¬ tirement.

HERSCHELL, Farrer, Lord, English lawyer and statesman; b. Brampton, Hamp¬ shire, 2 Nov. 1837; d. Washington, D. C, 1 March 1899. He was educated at University College, London, and the University of Bonn. He became a barrister of Lincoln's Inn in 1860; was recorder of Carlisle 1873-80; solicitor-gen¬ eral 1880—85 ; and Lord High Chancellor in

1886. and again 1892-95. He was a member of the Venezuela and British Guiana boundary arbitra¬ tion tribunal in 1897, and was subsequently ap¬ pointed one of the high joint commissioners from Great Britain, on the Anglo-American Commission, designed to settle existing differ¬ ences between the United States and Canada, of which he became president. During the sit¬ ting of the commission in Washington, D. C., in February 1899, he had a severe fall, from the effects of which he died shortly after.

HERTEL, her'tel, Albert, German painter: b Berlin, 19 April 1843; d. 1912. He studied at the Berlin Academy, where he became professor in 1875, and was made a member in 1901. Among his landscapes are (01ive Harvest in Capri> (1872); (1878);

(Northern Coast Scene with Fishermen Re¬ turning (1883);*

HERTEL DE ROUVILLE, ar-tel de roo-vel, Francis, Canadian soldier: b. Three Rivers, Maurice County, Quebec, 1643; d. 1722. He was captured in 1681 and tortured by the Iroquois, who were so struck by his fortitude that they adopted him into their tribe. He suc¬ ceeded in making his escape and as one of Frontenac's lieutenants performed, in 1690, some remarkable exploits against the English' from whom he captured Falmouth, now Port¬ land, Me. Twenty-six years after this event Louis XIV tardily rewarded him with a patent of nobility.

HERTER, Albert, American artist: b. New York, 2 March 1871. He studied painting at Paris in the studio of Jean Paul Laurens. He has twice visited Japan and the years spent there have strongly influenced the character of his work. He is member of the Society of American Artists, of the Water Color Club and of the Water Color Society.

HERTFORD COLLEGE, Oxford, Eng¬ land, a foundation of Oxford University (q.v.), which in its modern form dates from 1874 when Thomas Charles Baring, then a member of Parliament for South Essex, provided an endowment for 15 fellows and 30 scholars, 7 lecturers and dean and bursar. The founda¬ tion now consists of a principal, 17 fellows and 40 scholars. In its earlier form the institution dated from 1283 when Elias of Hertford ac¬ quired a hall on the site which became known as Hert or Hart Hall. The hall was depend¬

ent on Exeter College until 1760 when a char¬ ter was granted establishing Hertford as a col¬ lege. After a struggling existence the charter was declared void from 1805 and the Hertford scholarship endowed by the university in 1834 with part of its property was all that perpetu¬ ated the name until, in 1874, the principal and scholars of Magdalen Hall, an offshoot of Mag¬ dalen College from 1602, who had occupied the old

buildings, reorganized anew and revived the title of Hertford College. The old buildings have undergone restoration and fine modern buildings have been added since 1903.

*HERTLING, Georg F., Count von, Ger¬ man statesman: b. Darmstadt, 31 Aug. 1843; d. Ruhpolding, Bavaria, 3 Jan. 1919. After completing his studies in philosophy and history at Munster, Munich and Berlin he spent two years in Italy studying the dogmatic history of the Roman Catholic Church, of which he was an uncompromising adherent. In 1867 he set¬ tled as tutor of philosophy at the University of Bonn, obtained his professorship in 1880 and two years later was transferred to the chair of philosophy at Munich. For many years he acted as the unofficial representative of Germany at the Vatican, where he conducted numerous important German negotiations with the Pope, dividing his time between occasional university lectures at home and frequent visits to Rome. He sat in the Reichstag from 1875 to 1890 and again from 1896 to 1912, ultimately becoming the leader of the Roman Catholic Centre party. In 1912 he succeeded Count Podewils as Min¬ ister-President of Bavaria. Hertling had con¬ tributed to the overthrow of Von Bethmann- Hollweg, the Imperial Chancellor, both by the Bavarian opposition to "reform** and by his own influence with the Centre party. In July 1917, without consulting Von Bethmann-Holl- weg, the Kaiser offered the chancellorship to Hertling, who refused the post, and it was given to an almost unknown Prussian official, Herr Michaelis , (q.v.). The latter, handicapped by the critical position of Germany and his personal incompetence, held office for only three months and a half. On 1 Nov. 1917 Hertling was formally appointed Chancellor and Minister-President of Prussia. Though in his 75th year, he was at first very suc¬ cessful, handling the internal situation with adroitness, bargaining with the emperor and managing the Reichstag so skilfully that he was able to begin with something like a definite pledge from the Reichstag of acquiescent be¬ havior for the duration of the war. He pro¬ duced as much stability in Germany as would have sufficed if the troops could have carried out their promises and prevented the defection of Germany's allies and the military disaster in the West. If the German offensive in 1918 had succeeded, Hertling would have emerged from the ordeal as the "victorious Chancellor.** He carefully kept himself in the background as regarded foreign policy, leaving to Herr von Kuhlmann the responsibility as well as most of the odium for the treaties of Brest-Litovsk and Bucharest. Before the end of June 1918 Kuhlmann announced the impossibility of end- ing the war by purely military means and was dropped out of office. Hertling clung on through all the military disasters until the de¬ fection of Bulgaria, when he fell and was 6Uc-*

ceeded by Prince Max of Baden, the 8th and last German Chancellor. In his last speech to the Reichstag (September 1918), Herding admitted that the situation was serious but not alarming ; he declared that the German peo¬ ple would not beg for mercy and that the hour must come <(when our enemies will see reason and make an end of the war.**

HERTZ, Heinrich, hin'riH herts, German physicist: b. Hamburg, 22 Feb. 1857; d. Bonn, 1 Jan. 1894. He studied at the University of Berlin, and in 1880 became assistant to Helm¬ holtz there. In 1883 he was lecturer on theoreti¬ cal physics at the University of Kiel; in 1885 was professor of physics at a technical school in Karlsruhe; and in 1889 succeeded Clausius as professor of physics at the Universitv of Bonn. His most important work was his experiments with electricity, by which he proved that elec¬ tricity can be transmitted in electromagnetic waves with the same rapidity as light, these waves showing the same phenomena of refrac¬ tion, polarization, etc., as light waves. His first paper describing his electrical discoveries ap¬ peared in 1887, and others followed for many years in Wiedermann's Annalen. He further developed and attested the truth of Faraday's electromagnetic theory of light. It is by means of the Hertzian waves also that wireless teleg¬ raphy (q.v.) is made possible. His (Ueber die Beziehungen zwischen Licht und ElectricitaG appeared in 1890, and (Gesammelte Werke) in 1895. English translations have been published under titles (Electric Waves, } by D. E. Jones, with a preface by Lord Kelvin (1893), and Miscellaneous Papers,) by D. E. Jones and G. A. Schott (1896). Consult Bonfort, H.,

(Sketch of Heinrich Hertz,) published by the Smithsonian Institution (Washington 1896).

HERTZ, Henrik, Danish dramatist and poet: b. Copenhagen, 25 Aug. 1797; d. 25 Feb. 1870. He was of Jewish parents but was con¬ verted to Christianity; was educated in the law at the University of Copenhagen, but soon abandoned this profession for the dramatic field. In 1826-27 two plays by him were pro¬ duced, (Mr. Burchardt and his Family* and Move and Policy.* The comedy in rhymed verse, a class of composi¬ tion hitherto unknown in Danish literature. He published anonymously in the same year ' Gengangerbrevene * ('Letters from a Ghost*) in which he defended J. L. Heiberg. In 1832 ap¬ peared the didactic poem Mature and Art* and 'Four Poetical Epistles.* These were followed by the comedy, (A Day on the Island of Als) and, in 1835, by 'The Only Fault.* 'The Sav¬ ings Bank* (1836) was one of his most success¬ ful comedies. Hertz, by this time, had been in¬ fluenced by the Romantic movement and his full genius was unveiled in the great nr+ional drama, 'Svend Dyrings Hus,*

which was produced in 1837. _ The year 1839 saw the less successful historical tragedy, 'Valdemar Atterdag, but world-wide fame came to the dramatist in 1845, on the appearance of his lyrical drama, 'Kong Rene's Datter* (King Rene's Daughter), of which translations have appeared in nearly all modern tongues. It was followed in 1848 by the tragedy,*

(1854) ; 'Three Days in Padua (1869). Hertz's dramatic works have been collected and pub¬ lished (18 vols., Copenhagen 1854-73), and (Poems) (4 vols., ib. 1851-62). See King Rene's Daughter.*

HERTZKA, hirts'ka, Theodor, Austrian political economist : b. Pest, 1845. He was edu¬ cated at Vienna and Pest; in 1872 became one of the editors of the Neue Freie Presse, Vienna, where he remained until 1879, when he founded the Wiener Allgemeine Zeitung. He was editor of the latter journal until 1886. In 'Die Gesetze der Handels- und Sozialpolitik (1880) and (Das Wesen der Geldes) (1887), he advocated the gold standard and free trade for Austria- Hungary. Later works were (Gesetze der sozialen Entwicklung) (1886) ; 'Freiland, ein soziales Zukunftsbild* (1890; 10th ed., 1896); (Reise nach Freiland* (1893). In these he de¬ scribed a socialistic community in Central Africa. He tried to found such an Utopia, and although many societies were formed to aid it, it failed about 1893.*

HERULI, her'u-li, a Teutonic tribe first heard of in history about the middle of the 3d century, who passed south from the coast of the Baltic and swept with the Goths into the eastern provinces of Rome and founded an empire on the Danube. They appear as reinforcements of Odoacer in his invasion of the western prov¬ inces of Rome in 476. Their king, Rudolph, formed an alliance with Theodoric the Great, but they were afterward conquered by the Longobardi.. A part of them were driven to¬ ward Scandinavia, a part lingered on the bor¬ ders of the Roman Empire. They did good service to the Byzantine Empire, but after en¬ countering the Vandals in Africa, and the Os¬ trogoths in Italy, they vanished from history.

HERVIEU, ar'vye', Paul Ernest, French dramatist and novelist: b. Neuilly, Seine, 2 Nov. 1857 ; d. 1915. He was educated at the Lycee Condorcet and in 1877 was admitted to the bar. He spent sometime in the office of the president of the council; qualified for the diplomatic service and in 1881 was named secretarv of the French legation at Mexico City. He resigned within a few months and began his literary career by contributing essays, novels and stories to French journals and magazines. He was elected to the French Academy in 1900 and was also an officer of the Legion of Honor. His works display his great ability as a character delineator but are at times too severely logical. They include (Les yeux verts et les yeux bleux (1886); 'L'lnconnu* (1887); 'Deux plaisanteries* (1888) ; 'L'Exorcisee* (1891) ; 'Peints par eux-memes* (1893) ;*

HERWEGH, her'vek, Georg, German po¬ litical and lyrical poet: b. Stuttgart, 31 May 1817; d. Lichtenthal bei Baden-Baden, 7 April 1875. He studied theology at Tubingen, be¬ came editor of A. Lewald's periodical Europa at

Stuttgart; became embroiled with a military officer at Stuttgart and was obliged to flee to Switzerland, and settled there at Emmishofen in the canton of Thurgau. He there edited jointly with Wirth a periodical called Die Volks- halle and published a volume of political lyrics, (Gedichte eines Lebendigen) ((Poems of a Liv¬ ing MarF); the title is in imitation of Prince Piickler's (Briefe eines Verstorbenen5 ((Letters of One Deceased) in 1841 (at Zurich; 10th ed., Stuttgart 1877). These poems showed consid¬ erable revolutionary spirit, yet on his journeys in Prussia (1842), he was favorably received, even by King Frederick William IV, who is said to have remarked <(I respect opponents who have principles® and summoned him to an audience. From the city of Konigsberg he ad¬ dressed a strongly provocatory letter to the king, resulting in his banishment from Prussia; Zurich also, to which he wished to return, would not receive him. But the king of Wiirt- temberg pardoned him for desertion from mili¬ tary service. In the canton of Basle, of which he now became a citizen, he married Emma Siegmund, daughter of a Jewish merchant at Berlin. At Paris, where he lived for a number of years, he wrote the poems in the second volume of (Gedichte eines Lebendigen) (Zurich 1844) and translated Lamartine's works into German (Stuttgart, 12 vols., 1843-44). He en¬ gaged in active revolutionary propaganda at Paris, and in April 1848 invaded Baden at the head of a Franco-German Workers' Legion, accompanied by his wife and A. von Bornstedt. His force was defeated at Dossenbach 27 April by the Wiirttemberg troops, and he fled to Switzerland, aided by his courageous wife. He produced little in the remaining years of his life, except translations of several Shakesperean plays. His works were issued in a complete edition in German with biography and intro¬ duction by Hermann Tardel (3 vols., Berlin 1909) ; (Neue Gedichte) (posthumous poems, Zurich 1877) ; Lassalle's, (Briefe an Herwegh* (Zurich 1896). Consult Walzel, O.,*

Jacob Wittmer Hartmann.

HERZEGOVINA, hert-se-go-ve'na, Jugo¬ slavia. See Bosnia.

HERZL, herts'l, Theodor, Hungarian jour¬ nalist and dramatist: b. Budapest, 2 May 1860; d. Edlach, 3 July 1904. Associated largely with

Vienna, where he had won his way as literary journalist and dramatist, he is chiefly known for his labors in behalf of Zionism (q.v.), which gained him international fame. He was deeply stirred by the persecutions of the Jews revived in his day in Rumania and Russia, and was in Paris as correspondent of the Vienna Neue Freie Presse during (he Dreyfus affair, which further quickened his determination to help solve the modern Jewish problem. In 1896 he issued a pamphlet (

the kaiser, and many leaders in Europe. Eng¬ land was ready (1903) to offer land in East Africa for the purpose, on the failure of his scheme to obtain a settlement in the Sinaitic Peninsula, adjoining southern Palestine. His energies, however, had been overtaxed and he died the following year. Of an attractive per¬ sonality his period of leadership, although brief gave profound impetus to Jewish thought as to present and future conditions. His political Zionism has been hailed as the solution of the Jewish problem and attacked by its opponents as the dissolution of Judaism.

HESIOD, Greek poet: b. Ascra, a village of Boeotia, at the foot of Mount Helicon, whence it is called the Ascrcuan. But little is known of Hesiod with certainty. Even the age in which he lived cannot be precisely deter¬ mined. Herodotus calls him a contemporary of Homer, and says they lived 400 years before himself (about 900 b.c.). In his (Works and Days) (172) Hesiod says that he belonged to the period immediately following the Trojan War; but there are many reasons for supposing that he lived at a later period. His father emi¬ grated from Cuma to Ascra where the poet was born, and where he spent h:s early days in rural pursuits. On his father's death, a dispute arose between Hesiod and his brother Perses concern¬ ing the father's property, which was decided in favor of the later. Hesiod then went to Orch- omenos, where he remained for the rest of his life, and was buried according to tradition. A great number of anecdotes and stories have been handed down concerning his life. Among these is the tradition that there was a contest between Hesiod and Homer in which the former came off victorious. This story owes its origin doubtless to the strife between the Boeotian and Ionic schools of poetry, of wh:ch Hesiod and Homer were the respective repre¬ sentatives. Of the numerous works attributed to him three only remain. These are the (Theogony, > a collection of the oldest fables concerning the birth and achievements of the gods, arranged so as to form a connected whole. It is the most important and difficult of all his works. With it was probably connected the lost Catalogues of Women- (or the Eoiai megalai), to the fourth book of which the second frag¬ ment (the (Shield of Heracles1*) must have belonged. This is evidently composed of three distinct parts, only one of which is occupied with the real description of the shield. The third fragment is a didactic poem, (Works and Days* (Erga , or Erga kai Hemerai). It treats of agriculture, the choice of days, etc., with prudential precepts concerning*

education, do¬ mestic economy, navigation, etc. Other works attributed to him are the epic story of (ZEgi- mius,5 the ancestral hero of the Dorians; the epic (Melampodia, concerning the prophet Melampus, and (Exegesis on Miracles.) Frag¬ ments of these are to be found in Gottling's edition of Hesiod. From a literary standpoint, the Hesiodic poems are far inferior to the Homeric. The former deal with the practical questions of actual labor, the bare genealogical account of the gods and the facts concerning the cosmogony of the un verse. They are un¬ imaginative treatises in poetical form, and their purpose, unlike the heroic recitations of the Homeric legends, is purely didactic, informative.*

Contemporary as well as succeeding generations held these poems in high esteem as authoritative accounts, and many early scholars zealously wrote commentaries, explanations and criti¬ cisms, of which only a few later fragments have survived. Whether or not the Hesiodic works as they have come down to us are the original work of one man, or the elaboration by suc¬ cessive interpreters of a much shorter work, is difficult to determine, though there is much evi¬ dence in favor of the latter viewpoint.

Bibliography. — The first Greek text was printed at Milan (1493). The first edition with the Greek scholia appeared at Venice (1537), and later at Cologne (1542) and Frankfurt (1591). Other important editions are by Gais- ford, T. (in Poetae Graecae Min.) ; by Gottling- Flach (1878) ; Paley, F. A. (with Eng. trans., London 1883); and Rzach, A. (1902). The (Works and Days has been edited by Van Lennep (1847) and Kirckhof (1889). The best English translations are by Thomas Cooke (London 1728) and A. W. Mair, (1908).*

HESPERIDES (daughters of Hesperis), the guardians of the gold apples which Ge (the Earth) had given to Hera on her marriage. They were the daughters of Atlas and Hesperis, but their parentage is differently represented by other writers. They were four in number and their names were Agle, Arethusa, Erytheia, Hesperia, or Hesperarethusa. They were as¬ sisted in the charge of their garden by the sleepless dragon, Ladon. It was the twelfth labor of Heracles to bring the golden apples of the Hesperides to Eurystheus.

HESPERIDES, hes-per'i-dez. The book of the collected lyrics of Robert Herrick, beau¬ tifully entitled (Hesperides, J was published in 1648. Included in the volume, in addition to the secular lyrics, which number nearly 1,200, were 271 religious poems, separately entitled (Noble

Numbers. The two collections com¬ prise practically all of Herrick's characteristic work; it is to the ((unbaptized rhymes® rather than to the ((pious pieces® that he owes his fame as the most delicate and tuneful of English lyric poets.*

The richly varied subject matter of Herrick's art is summed up in an introductory poem, <(The Argument of His Book.® First in the list stands nature, in its individual objects of grace and beauty, and all the exquisite perceptions of the sense :

I sing of brooks, of blossoms, birds and bowers.

Of April, May, of June and July flowers.

Then come the customs, ceremonies and fairy fancies of the folk; then love and ((cleanly wantonness,® and finally religion. Herrick is essentially a hedonist, delicately sensitive to beauty in all its myriad forms. He is the liter¬ ary descendant of the ancient lyrists — of An¬ acreon, Horace and Catullus ; and again of the Elizabethans, especially Ben Jonson, in the ros¬ ter of whose ((sons® he was proud to place himself. The qualities of his poetry are spon¬ taneity, simplicity and a lyric grace which places him above all rivals. The deeper ranges of spiritual and moral experience were foreign to him, and the element of thought is almost en¬ tirely absent from his work, save for the ever- recurring idea of the shortness of life and the

speedy decay of youth and beauty, which im¬ parts a wistful melancholy to his verse. He counsels us, like Horace, to pluck the flowers of life while yet we may enjoy them. In his love poems Herrick is never deeply serious. The numerous girls he celebrates are for him like the lilies and violets and morning dews, of a beauty as exquisite and as fleeting. Hence he is almost entirely without the note of sensu¬ ality which characterizes the work of many of his contemporaries.

A few of Herrick's lyrics — ((1910).

James H. Hanford.

HESPERORNIS, hes-pe-ror'ms, a re¬ markable extinct form of bird, the remains of which are met with in the Cretaceous deposits of Kansas. As described by Professor Marsh, it possessed small pointed reptilian teeth, which were implanted in a deep continuous groove, somewhat like those of Ichthyosaurus. Its brain was small and more reptilian in type than that of any adult bird as yet examined. It appears to have been a large diving-bird, measuring over five feet from the point of the bill to the end of the toes. Its wings were rudimentary, its legs powerful and its feet well adapted for rapid progression in water. The tail was broad, could move up and down,

and was probably used as a rudder or swimming-paddle. The long slender jaws were united in front only by cartilage, as in serpents, and had on each side a joint which admitted of some motion, so that <(the power of swallowing was doubtless equal to almost any emergency.® Consult Lucas, (Animals of the Past) (1901).

HESPERUS, hes'pe-rus, among the Greeks the planet Venus, when it appeared as evening star, personified as the divinity that at weddings leads the bride to the arms of her husband. He is called Phosphorus or Lucifer as a morning star, and is styled the son of Eos (Aurora) and Cephalus. He was also known as son or brother of Atlas, and brother of the Hesperidas.

HESPERUS PEAK, an elevation of the La Plata Mountains, in the southwestern part of Colorado. Gold and silver have been mined in the vicinity. This peak is one of a group of high peaks in the vicinity of the State ; the height is about 13,135 feet.

HESSE, hes'se, Hermann (also known un¬ der the pseudonym Hermann Lauscher), Ger¬ man novelist: b. Calw, Wurttemberg, 2 July 1877, the son of the editor of a religious jour¬ nal, Johannes Hesse. He became a mechanic, later a bookseller at Basle, where he simultane¬ ously attended lectures on literature and the history of art. In his choice of petty burgher subjects, as well as in his warmth of language and treatment, Hesse reminds one of the Swiss writers, particularly Gottfried Keller. Since

1905 he has been living at Gaienhofen, near Radolfzell, on Lake Constance. His delicate delineation of moods and milieus perhaps fits him better for the German short story (Novelle) than for the longer novel. In him, there are many reminiscences- of Adalbert Stifter; his mood of recalling the events of childhood, which seems to be a constant preoccupation with him, yields him material for delightfully intimate treatment in three of his romances, (Hermann Lauscher,> (Peter CamenzindP (Un¬ term Rad.) He avoids the narrative of strik¬ ing or impressive clashes of interest, preferring the more calm and peaceful life of the ordinary citizen. From (translated into English in Vol. XIX, New York 1914). His works include (Romantische LiedeU (1898) ; (Eine Stunde hinter MitternachC (1899) ; (Hin- terlassene Schr.ften und Gedichte Hermann Lauschers> (1901); under the title (1905) ; (Diesseits) (1907) ; (Leipzig 1907).

Jacob Wittmer Hartmann.

HESSE, hes, or HESSIA (German, Hes¬ sen, hes'sen), Germany, an ancient territory inhabited in the time of the Romans by the Catti or Chatti, an old Germanic tribe. Under the Frankish kings Hesse was governed by counts, the principal of whom were the counts of Gudensberg of the name of Giso. Philip I the Generous, wdio succeeded to the sovereignty of the whole country in 1509, and who was the earnest and zealous friend of the Reformation, divided his dominions among his four sons. The eldest, William IV, obtained one-half, in¬ cluding the capital, Cassel ; Louis IV one-fourth comprising Marburg; Philip II one-eighth, with Rheinfels; and George I also an eighth, with Darmstadt. But Philip dying in 1583, and Louis in 1604, without children, there remained only the main branches of Hesse-Cassel and Hesse- Darmstadt.

HESSE, Free State of (Freistaat Hes¬ sen), a component state of Germany lying between lat. 49° 24′ and 50° 5P N. and long. 7° 51′ and 9° 39′ E. Its capital, Darmstadt, is a city of 87,089 inhabitants according to the latest official census, which gave the total population of the state as 1,282,051. The area is 2,968 square miles. It is divided into two main parts, which are separated by Prussian territory, and 11 smaller outlying parts. The southern main constituent part is divided by the Rhine into the Starkenburg and Rheinhessen (Rhenish Hesse) provinces, and is bounded on the north by Prussia, on the east by Bavaria and Baden, on the south by Baden and on the west by the Bavarian Rheinpfalz and Rheinpreussen. The northern chief divi¬ sion, called Oberhessen (Upper Hesse), lies wholly within Pruss:a. The outlying members of the state are : Wimpfen a. Berg, Wimpfen i. Tal, Hohenstadt, Helmhof (interpolated in Ba¬ den), Steinbach (surrounded by Prussian terri¬ tory), several afforested districts belonging

to the province of Oberhessen but situated in

Prussian territory southwest of that province, etc. A further d vision is made for administra¬ tive purposes, according to which the provinces contain 18 Kreise (circles) and 983 communes. The fact that the members of this state are to such an extent dispersed, and that eight sepa¬ rate parcels of territory belonging to Prussia and Baden are enclosed by Hessian land, finds its explanation in the circumstance that the grand duchy represents the present sum of par¬ ticular additions made from time to time at the expense of older countries (Katzenelbogen, etc.) and that since 1803 it has secured portions of Kunpfalz and Kurmainz, the bishopric of Worms, the abbey of Seligenstadt, the old im¬ perial cities of Wimpfen, Friedberg and Worms and a part of the old French department of Donnersberg; moreover it now embraces the baronies or principalities of Isenburg, Solms, Schlitz, Erbach, Stolberg, Lowenstein-Wert- heim, as well as the domains of the families of Riedesel, Wambolt, Gemmingen and Low.

Topography. — The larger and much more densely populated lower chief division, compris¬ ing Starkenburg, with 1,169 square miles, and Rhenish Hesse, 530 square miles, although it is in a measure occupied by the Odenwald in the southeast, and to that extent resembles the rough country of Upper Hesse, has quite differ¬ ent characteristics in the west, the centre and the northeast where it extends into the fruit¬ ful valley of the Rhine or clings to the river Main southeast of Frankfurt and Offenbach. Rheffish Hesse includes the fertile and thickly settled country between Krewznach, Worms and Mayence (Mainz). On the other hand the Upper Hesse province, with 1,269 square miles, partakes of the geographical and topographical characteristics described in the article Hesse- Nassau (q.v.). The rivers of the grand duchy belong to the Rhine system, except that the eastern parts of the Vogelsberg declivities send their streams to the Fulda. The principal river, the Rhine, enters the state at the cathe¬ dral town of Worms, divides (as we have said) Rhenish Hesse from Starkenburg province, then forms the boundary with Prussia and leaves Hesse at Bingen. Its tributary streams, touch¬ ing or flowing through Hesse, are the Neckar, which divides Starkenburg province from Ba¬ den for a short distance; the Weschnitz; the Main (navigable where it forms the boundary with Prussia) ; the Mumling and the Lahn, the Salz and the Nahe. Tributary to the Fulda are the Schlitz and the Schwalm. In each of the three provinces there are mineral springs, of which the most widely known are the Sauer- quellen at Schwalhein, the (Saline) Bad-Nau- heim and Bad-Salzhausen in Upper Hesse. The climate in the southern valleys and plains is mild and well suited to the cultivation of fruits; in the mountainous districts, on the other hand, it is so much harsher, that only hardy crops are grown above a moderate alti¬ tude.

Population — The inhabitants (439 per square mile) are by derivation principally West Franks of the Upper or North German race. The ratio of males to females is as 1,000 to 1,006. About two-thirds are Protestants (66.63 per cent, according to an authoritative state¬ ment) ; Roman Catholics, 30.49 per cent; other Christian denominations, 0.67 per cent; Jews,

?Q09nPocr fent In years 1843-67, 1871-75 and loot>85 large numbers of the inhabitants emi¬ grated to other countries, but that tendency has .decreased since 1894 to a very large extent. As the basic principles of the elaborate educa¬ tional system, instruction is compulsory and the state contributes to the support of elementary schools. Public elementary schools number 979 with 215,709 pupils, 3,469 male and 584 fe male teachers. Schools of the next higher grade had 27,522 pupils a year or 18 months before the European War began; and at that time there were 11 gymnasia, two progymnasia, three realgymnasia, nine oberrealschulen and the same number of realschulen, an agricultural college, 32 superior Biirgerschulen, with 739 teachers and 12,584 pupils, six higher schools for girls with 3,523 pupils, and 49 private schools with 3,790 pupils ; the University of Giessen then having 1,436 under-graduates ; the Tech¬ nical High School at the capital, 1,347. The fore¬ going enumeration, though not complete, gives a fair idea of the educational system's scope.

Agriculture and Mining. — By means of insurance organizations, agricultural societies and institutes for instruction, the important agricultural interests are sustained and pro¬ moted by the local government as well as by individuals in private life. The cultivation of fruits is very profitable in all three provinces; especially noteworthy are the vineyards of Rhenish Hesse and some other localities — the wines of those regions figuring largely among exports. Mining plays a larger part in Upper Hesse than in the other two provinces, the chief products being iron, manganese, soft coal or coke, and salt; and in this matter also both the state and private ind.viduals are partici¬ pants. The quantity of coal produced during the year before the war was 397,520 tons.

Industrial Activity. — Complete industrial freedom has been the rule since the adoption of the German regulation of industries; but ex¬ ceptions are noted in the conduct of certain oc¬ cupations (those of the apothecary, the tavern- keeper, etc.) which are made dependent upon concessions or licenses. Manufacturing indus¬ tries in their many varieties support more than 38 per cent of the total population ; the principal manufactures being

chemicals, leather, cloth, paper, furniture, wagons, railroad cars, musical instruments and machinery.

Government. — The sovereign grand duchy, which attained that dignity i-n 1806, was up to 1918, in accordance with the constitution of 17 Dec. 1820, which had undergone many changes, an "indivisible constitutional mon¬ archy, at the head of which stood the Grand Duke (Grossherzog von Hessen und bei Rheim) who had also the title Konigliche Hoheit (royal or regal highness) and was titular head of the Evangelical Church of the duchy as well. His civil list was about $316,000, and he divided law-giving power with 'the nobility and repre¬ sentatives of the .people in the Landstanden, which was composed of first and second houses or chambers. The judiciary (including a high court at the capital and Landgerichte at Darm¬ stadt, Giessen and Mainz) maintained its dis¬ tinct existence although the head of the depart¬ ment of justice was the Minister of State who was also Minister of the Grand-Ducal House and Foreign Affairs.

Finance.— For the year 1915-16 the ordi¬ nary revenue and expenditure were estimated to balance at $22,736,925, leaving a deficit of $1,143,415, approximately. The public debt, nearly all for railroads, was stated at $112,- 215,505, approximately, in 1914.

™ J5?SSE"CASSEL > hes-kas'el, or ELEC¬ TORAL HES.SE, Germany, a former elec¬ torate and independent member of the Ger¬ manic Confederacy, between Rhenish Prussia and Bavaria, containing 4,430 square miles, with about 850,000 inhabitants, mostly Protestants. It was founded by the eldest son of Philip the Generous, the Landgrave William IV, sur- surnamed the Wise (1567-92). For a long period the history of Hesse-Cassel was a narrative of conflicts between the people for political freedom and the Elector for abso¬ lute rule. The demands of the people were on several occasions strengthened by appeals to the Elector from the Prussian government. On the outbreak of the German war of 1866, the Elector joined Austria, and his territory was occupied by Prussian troops. On the conclu- sˆon of the war Hesse-Cassel was annexed to the Prussian territories, and now forms part of Hesse-Nassau (q.v.). Consult Grafe, Hein¬ rich, (Der Verfassungskampf in Kurhessen) (Leipzig 1851) ; Rommel, Christopher, (Ges- chichte van Hessen > (10 vols., Cassel 1820-58) ; Sybel, H. von, (Die Begrundung des deutschen Reichs durch Wilhelm P (Munich 1889-94, Eng. trans., New York 1889—94) ; Wippermann, C. W.,

HESSE-DARMSTADT. See Hesse, Grand Duchy of.

HESSE-HOMBURG (Hessen-Homburg), Germany, former landgraviate comprising the districts of Homburg vor der Hohe and Meisen- heim on the

right and left bank of the Rhine respectively, with an area of about 106 square miles. It was anciently a part of Hesse- Darmstadt, but became a separate land graviate in 1768. From 1806 to 1815 it was again an integral part of Hesse-Darmstadt. In the latter year its independence was restored by the Con¬ gress of Vienna and its territory increased by the addition of Meisenheim. Baths and springs were opened at Homburg in 1833 and became a principal source of revenue to the state. Gambling also prevailed and was with difficulty kept within bounds until 1872. A liberal consti¬ tution was granted in 1848, but appears to have never been in effect. In 1866 on the death without issue of the last Landgrave, Ferdinand, the territory was divided, Meisenheim going to Prussia and the landgraviate to Hesse-Darm¬ stadt. Later in the same year (3 Sept. 1866) it was ceded to Prussia because of its having sided with Austria in the conflict with the for¬ mer, and became a part of the Pruss:an prov¬ ince of Hesse-Nassau. Consult Herget, (Das landgrafliche Hans Homburg) (Homburg

1903).

HESSE-NASSAU, hes'nas'a, or HES¬ SEN— NASSAU, hes'sen-nas'sow, Germany, province of Prussia, which includes the former electorate (Kurfiirstentum) of Hesse-Cassel (except some small districts), the greater part of the former duchy of Nassau, that portion of

the former landgraviate of Hesse-Horraburg which lies on the right bank of the Rhine, the territory and town of Frankfort-on-the-Main, and some small districts ceded by the grand duchy Hesse and Bavaria. It was formed in 1867-4)8 out of the foregoing regions, which were annexed by Prussia as a result of the War of 1866. The province is bounded by the Prus¬ sian provinces of Westphalia, Hanover, Saxony and the Rhine-province, the principality of Waldeck, the grand duchy of Saxe-Weimar and the kmgdom of Bavaria; area, 6,060 English square miles, divided into the two governments (Regierungsbezirke) of Cassel and Wiesbaden. The greater part of this province has a rugged surface, with only small and scattered areas of lowlands or valleys.

Topography and Climate.— In the Wies¬ baden governmental division the highlands be¬ long to the Rhenish- Westphalian mountain sys¬ tem, a branch of which extends like a peninsula between the new red-sandstone formations of the Cassel governmental division; and in the former division we find the Taunus and West- erwald, with the Feldberg and the Fuchskaiften as the highest points. Predominant in the lat¬ ter division

(Regierungsbezirke) are the red- sandstone mountains of the Rhenish system, in¬ cluding the high Rhon with the Wasserkuppe and the Milsdburg, etc. In the northern part of the province a great number of mountains, either separated or in relatively small groups, form the Hessian highlands, the altitude of the peaks ranging from 1,235 feet, in .the Lahn-berge near Marburg, to 2,054 fe'et in the Knullgebirge, between the Fulda and the Schw.alm, the heights of the Seulingswald be¬ tween the Werra and the Fulda; north of these the Richelsdbrfer Mountains and northeast the Ringgau Mountains; the Bombacher Wald and the Alheimer toward the west, etc. The Sohre, the Meissner and the Kauf unger forest lie farther toward the north ; the Langenberg, the Reinhardtswald and the Habichtswald extend north and south between the Weser, the Fulda, Diemel and Eder. New red-sandstone con¬ stitutes the basis of these mountain-regions ; only in rare instances is it covered with shell- lime. Basaltic columnar formations, however, occur in many localities, and in a noteworthy degree are interpolated among Tertiary forma¬ tions ˆ between Cassel and Ziegenhain. The Thuringian Forest occupies a part of Schmal-kalden, and in Rinteln are segments of the Weser Mountains; the most conspicuous point in either of these governmental "circles® being the Inselsberg (2,977 feet). As a whole, Hesse- Nassau belongs to the Weser and Rhine river- systems. The navigable larger rivers — in the south the Main and Rhine, and in the north the Werra and the Weser — are to be regarded as border or boundary streams; among those penetrating the territory of the province and more closely identified with it are the Kinzig, the Nidda, the Ohm, the Ems, the Weil, the Aar, the El'bbach, the Dill, the Eder, the Schwalm, the Diemel and (especially import¬ ant) the Fulda and the Lahn. In the Rhon Mountains and the Westerwald the climate is particularly harsh, these regions being covered with great masses of snow during nearly one- half of the year; on the other hand climatic conditions in low-lying districts are decidedly favorable.

*Population and Education. — The number of inhabitants according to the last official cen¬ sus was 2,221,021, or 366.5 per square mile. Protestants are about two and one-half times as numerous as Roman Catholics, and there are a'bout 50,000 Jews. The institutions of learning are The University of Marburg, 20 gymnas- ien or colleges, one progymnasium, four real- gymnasia and an equal number of realpro- gymnasia, six oberrealscVulen, 14 realschulen, one agricultural school, four private schools of the higher*grade, seven normal schools for men and women teachers, three institutions for the deaf and dumb, two for the blind, etc.*

Industries. — The inhabitants are chiefly employed in farming, cattle-raising, forestry and mining. About 45 to 46 per cent of the total area is devoted to arable fields and gar¬ dens; 11.6 per cent to meadow land; 0.2 to vineyards; 39.7 per cent to forest. In this province, which is the forest-

region par ex¬ cellence of Prussia, the principal trees are the beech, oak, fir and pine; forests covering both slopes and crests of the mountains with the ex¬ ception of the highest parts of the Westerwald and the High Rhon. Although this province is not very well adapted to agriculture, fertile areas are found near such rivers as the Main, the Ems, the Schwalm ; moreover, the meadows are utilized very generally for stock-farming. In the neighborhood of Cassel, fruit and garden vegetables are cultivated very profitably; and the same may be said on districts on the Werra, the Rhine, the Lahn and the Main. A pomolog- ical institute and nurseries on a grand scale are maintained at Geisenheim. For the culti¬ vation of the. vine the hills of Rheingau are famous ; and in this province are found those centres or wine-production, Hochheim, Rauen- thal, Erbach, Johannisberg, Geisenheim, Ass- manshausen and Riidesheim. The mines yield iron ores, coal, copper, manganese and lead. Mineral springs — particularly those of Ems and Wiesbaden, of Niederselters, Geilnau and Fachingen, contributed before the war in an important degree to the prosperity of the prov¬ ince, the waters of many springs being ex¬ ported; and an important source of income has been the throng of foreigners visiting Wies¬ baden and Ems and the well-known baths (Soden, Homburg, Langenschwalbach and Schlangenbad). Manufactures are important only in a few regions, for example : the city of Cassel (machinery, gold and silver ware and instruments of many kinds), Grossalmerode, Eschwege (leather and sole-leather from South American hides), Frankfort-on-the-Main (jew- elry, . iron and bronze wares, machines and chemicals). Other industrial establishments are those devoted to weaving, the manufacture of paper, etc.

The governmental district of Cassel is divided into 24 "circles,® and that of Wies¬ baden into 18, the Oberprasident exercising his authority as the chief representative of the Imperial government at the city of Cassel. In that city are located also the supreme courts (Oberlandesgericht) and one of the three pro¬ vincial or general courts of justice of the Cassel district, the other two being at Hanau and Mar¬ burg. In Frankfort-on-the-Main there is also an Oberlandesgericht and one of five general courts, the other four being at Limburg, Hech- ingen, Neuwied and Wiesbaden. The province

sends 14 members to the German Reichstag and 26 to the Prussian Chamber of Deputies. The Cassel governmental district belong to the circuit o f the 11th army corps; the Wies¬ baden district falls within the jurisdiction of the 18th army corps. The most important among the lines of railroad is that from Gottingen to Cassel and Frankfort-on-the-Main.

HESSEN-DARMSTADT, hes'sen-darm'-

stat. See Hesse, Ftcee State of.

HESSIAN FLY. See Wheat Insect Pests.

HESSIANS IN THE REVOLUTION, The. In the 18th century Germany was di¬ vided into nearly 300 sovereignties, each main¬ taining a court and a military force. The pos¬ sible revenue was often very limited, the bur¬ dens were almost intolerable and the prince¬ lings were often profligate and cruel ; they did not need their forces for home defense, and were glad to make money for themselves by letting out their regiments for hire, though ex¬ cept in one case they remitted no taxes on the people from the receipts. There was also a lingering tradition that soldiering was an honest trade like any other and that it was useful for helping sovereigns to keep order; especially to put down insurrections, which were wicked. This, however, did not apply to rulers hiring out their troops and pocketing the money; and not only the liberal school of writers and public men, but enlightened despots like Frederick the Great, denounced it. But England had not suffi¬ cient army for the American War, and wished drilled troops rather than raw recruits and after vainly endeavoring to hire 20,000 Russian soldiers, turned to the German princes, with some of whom she had dynastic relations and all of whom were so eager to sell their wares that two of them offered soldiers for hire im¬ mediately after Bunker Hill, without waiting to be asked. Only those which could furnish con¬ siderable numbers were worth treating with and all the German auxiliaries were finally hired from six states; about hdlf being from two Hessian states, and by far the largest (more than three times greater than any other) from one. All were indiscriminately termed ((Hes- sians,® as all German immigrants were for¬ merly called ˆPalatines.® The first treaty was made with the Duke of Brunswick, 9 Jan. 1776, for 4,300 troops; reinforcements or re¬ placements were sent year by year, till the total had amounted to 5,723, only 2,708 of whom ever returned. The second was with the Landgrave of Hesse-Cassel, 15 Jan. 1776, for 12,805; finally increased to 16,992, of whom 10,492 returned. The contingents from the others, under various treaties, amounted to — Hesse-Hanau, 2,038; Anspach-Baireuth, 2,353; Waldeck, 1,225; An- halt-Zerbst, 1,152. Total sent to America, 29,867, of whom 17,313 returned; the rest either died or remained as citizens. There were about 20,000 in America at any one time after 1776. These forces cost Great Britain in subsidies and incidentals about £1,770,000; besides the lump sum, it was obliged to replace the dead, and at least in one case count three wounded men as one dead one.

About 18,000 were shipped in 1776; the com¬ mander-in-chief was Lieut - Gen. Philipp von Heister, a veteran of the Seven Years' War. The first

division of some 8,000 landed at Staten

Island 15 August; they included a body of chasseurs and grenadiers under Lieut. E. W. F. von Donop, an able and daring officer. They took a leading part . in the battles of Long Inland and White Plains, and all the operations for capturing New York; and stormed Fort Washington with a loss of 56 killed and 276 wounded. During this time the second division of about 4,000, under Lieut. Gen. Wilhelm von Knyphausen, joined them. Washington's sur¬ prise at Trenton fell on Colonel Rail's brigade of Germans. Rail was a regular officer whose contempt for the ragged Americans surpassed that of the most arrogant Briton, and he re¬ fused to take the most elementary precautions ; he was mortally wounded. Early in 1777 Heister was superseded by Knyphausen; Howe finding the former intractable and the Land¬ grave of Hesse laying the blame of Trenton upon him. _ Meantime the Brunswickers and a Hanau regiment under Baron von Riedesel had made a clearance of Canada; and in 1777 they were joined to the expedition of Burgoyne, in whom Riedesel had no faith. It was from this division that Baum's detachment was sent off to raid Vermont and to meet its fate at Benning¬ ton, with Breymann's sent to support it ; 365 of Baum's 374 Germans did not return, and 231 of Breymann's were killed, wounded or captured. Riedesel and his remaining men shared in Bur goyne's surrender. Around Philadelphia, at Brandywine and Germantown, Knyphausen's command was of the first importance ; and at Red Bank Donop tried to storm the American fort and was mortally wounded, his command losing 82 killed and 229 wounded, besides 60 prisoners. In the three years' occupation of Rhode Island, from the fall of 1776 to that of 1779, about half of the British corps was Hes¬ sians ; and they liked, and were liked by the inhabitants — when they departed, all persons, but especially women, were prohibited from appearing at the Newport windows, in fear that the soldiers might not wish to go. In the South, at Savannah, Charleston, Pensacola, Baton Rouge, etc., they left many dead ; and shared in the bloody drawn battle of Guilford Court House. Finally, at Yorktown, they bore the brunt of the actual fighting, losing 53 killed and 131 wounded.

1. *The Germans did their duty bravely and faithfully, with loyalty to a service they had been sold into to no profit of theirs. Very few deserted, in spite of constant inducements held out to them ; a policy which Washington strongly deprecated. Probably one reason was, that they were at once recognizable from their speech! Nor were they in the least inhumane or rapacious : the charge that they were cruel barbarians was a mere political weapon of the time. In a strange country, they would have run the risk of being murdered in reprisal had they been such ; but in fact they appear to have been well-meaning men. Of the 29,867 who came over, only 17,313 returned*

to Germany. Of the 12,554 remaining, 548 were killed; some of the total 1,652 wounded died; some disap¬ peared; but a great number are known to have remained and settled in the country. Grants were given them in Nova Scotia, but many 'scat¬ tered as chance directed.. Consult Lowell, (The Hessians in 'the Revolution (1884).

HESSITE. A mineral consisting of silver telluride, AgsTe, containing 63.3 per cent of

silver. Has been mined in La Plata County, Colo., and in California and Oregon,

HESTIA. See Vesta.

HESYCHIUS, he-sik-i-us, the author of a Greek lexicon, which has probably come to us in an abridged form, and which he partly collected from former dictionaries, and partly enlarged by many new words and examples from Homer, the dramatic and lyric poets, the orators, physicians and historians. He was a native of Alexandria, and according to the best authorities flourished about the end of the 4th century after Christ. Of the circumstances of his life nothing is known. His lexicon pos¬ sesses great value, especially of an antiquarian kind, and is the most useful for the study of the Greek language of all the ancient critical writings that are extant. The best editions of his lexicon are Alberti and Ruhnken's (Leyden 1746-66, 2 vols. folio), and that prepared by Schmidt (Jena, 5 vols., 1867-68; in a smaller form, two parts, 1864 ; 2d ed., 1867).

HET2ERA, he-te'ra (Greek hetaira, a fe¬ male companion), the name given by the Greeks to a mistress, as opposed to a lawful wife. But the word had various shades of meaning, from a mistress, who might be a wife in all but the legal qualification of citizenship, down to a harlot. The beauty and accomplishments of many of the hetaerae occasioned their society to be sought by men of the highest eminence, even Plato and Socrates. No shame was attached to associating with them. Aspasia, the mistress of Pericles, is the most renowned of these hetaerae. (See Aspasia). Hetaerae, less intellectually fa¬ mous, were Lais, whom Aristippus the philoso¬ pher loved, Phryne and others. They also be¬ came famous for their connection with the works of art. Praxiteles made a marble and gold statue of the latter, and she was also the model for his statues of Aphrodite.

HETEROGAMY. See Metagenesis.

HETEROGENESIS, het”e -rd-jen’e-sTs, or

HETEROGENY. See Metagenesis.

HETEROPODA, het-e-rop’o-da, a group of small, pelagic, pectinibranch mollusks, which dwell together in the open sea, have the foot modified into a swimming organ and are pro¬ vided with a ventral sucker. The shells are spiral or. shaped Lke that of an argonaut and seem as if composed of thin glass; indeed, the whole animal is beautifully transparent. Het¬ eropods occur in enormous abundance at the surface of the sea in all the warmer parts of the world, and their dead shells sinking to the bottom form a large constituent of the abyssal ooze. They are highly organized, have well-developed eyes and other organs of sense, are bisexual and produce eggs in long cylindrical cords. The young in their development pass through a trochosphere and then a veliger stage. All are predatory, seizing and feeding on the numerous minute forms of life about them. They are most active in the early even¬ ing, darting about with twisting motions like worms, usually on their backs. They use the ventral sucking-disc for attaching themselves to any object they may encounter. Three fam¬ ilies, containing many species, are known, and their closest affinities are with the petropods.

Consult Kingsley, (Standard Natural History5 (Vol. I, 1885).

HETEROPTERA. See Hemiptera.

HETH, Henry, Confederate general : b. Chesterfield County, Va., 16 Dec. 1825 ; d. Washington, D. C., 27 Sept. 1899. Upon grad¬ uating at West Point in 1847 he was appointed second lieutenant, fought in the Mexican War and later against the Indians on the frontier, and became captain in 1855 ; but on the out¬ break of the Civil War entered the service of the Confederacy, being commissioned major 16 March 1861 and colonel of the 45th Virginia Infantry, 17 June 1861. On 6 Jan. 1862 he became brigadier-gneral, fought through the West Virginia campaign, was assigned to A. P. Hill’s division of the Army of Northern Vir¬ ginia, was wounded at Chancellorsville, and on 24 May 1863 was commissioned major-gen¬ eral. As commander of a division of the Con¬ federate army he rendered efficient service at Gettysburg, where he was again wounded ; dis¬ tinguished himself at Bristoe Station, Spott- sylvania, Bethesda Church, Petersburg, Reams’ Station and other places; and surrendered at Appomattox, 9 .April 1865. After the war he engaged in mining operations for a time, then in the insurance business at Richmond, Va., and later became personal adviser to President Grant in relation to alleged Indian frauds. He wrote (Memoirs of the War.5

HETMAN (Russian, Ataman), chief of the Cossacks, formerly elected by that people. He had the power of life and death, and was head of the army in time of war. Mazeppa in 1708 revolted against Russia, taking the side of Charles XII of Sweden, and Peter the Great abolished in consequence the power and au¬ thority of the hetman. Catharine II sup¬ pressed the office and title in the province of Ukraine; it still exists among the Cossacks of the Don. In Poland the commander-in-chief of the army was styled hetman, and was ap¬ pointed by the sovereign. The last elective hetman of the Cossacks in Russia was Platorf 1812-14. On his death the grand duke, heir to the throne, was made hetman.

HETTY SORREL, in George Eliot's Adam Bede5 (1859), a dairymaid whose un¬ fortunate career, condemnation to death, and final reprieve form an important part of the story.

HEVELIUS, Johannes, yd-han'nes ha- fa le-oos. or be-ve'li-us, known also as Johan¬ nes Hevel, Polish astronomer : b. Dantzic, 28 Jan. 1611.; d. there, 28 Jan. 1687. After visiting the principal countries of Europe he settled in his native city, and from 1639 till his death ap¬ plied himself almost exclusively to the study of astronomy. His (Selenographia,5 or description of the moon, published in 1647, was the first of numerous astronomical works of great value and authority on his favorite science. Halley, who visited Hevelius at Dantzic at the request of the Royal Society of London, of which Hevelius had been elected a member in 1664, reported favorably of the correctness of his observations. In 1661 he observed a transit of Mercury, a triumph confined to Gassendi alone of all preceding astronomers. Hevelius ranks

next to Flamsteed among the men of his day as a diligent and accurate observer of the heavens.

HEV/ES, huz, Joseph, American patriot : a signer of the Declaration of Independence : 1). Kingston, N. J., 1730; d. Philadelphia, 10 Nov. 1779. He was educated at Princeton Col¬ lege, and about 1760 he removed to Edenton, North Carolina. He soon became a member of the colonial legislature, and was a delegate to the General Congress at Philadelphia 1774- 77 and again in 1779. After taking his seat he was appointed on a committee to "state the rights of the colonies in general, the several instances in which those rights are violated or infringed, and the means

*most proper to be pursued for obtaining a restoration of them,** and aided in the preparation of its report.*

HEWETT, Waterman Thomas, American Germanic scholar: b. Miami, Mto., 10 Jan. 1846; d. London, England, 14 Sept. 1921. He was graduated from Amherst College in 1869, studied in Europe and was professor of German language and literature at Cornell University from 1870 to 1910, when he became professor emeritus. He lived abroad after 1913. In 1895 he became general editor of Macmillan's Ger¬ man Classics.) He was a frequent contributor to periodicals and published among other works (The Friesian Language and Lit¬ erature- (1879) ; (The University of Leiden) (1881) ; (University Administration (1882) ; (The Aims and Methods of the Collegiate Study of the Modern Languages1* (1884) ; (The Present Condition of Instruction in the Mod¬ ern Languages in American Colleges* (1885) ; (The House of Orange* (1885) ; Untroduction to the Life and Genius of Goethe* (1886) ;*

(Wilhelm Scherer (1887) ; (The Mutual Rela¬ tions of Colleges and High Schools* (1887) ; (The Revised Constitution of the Netherlands* (1887) ; (The Study of Modern European Lit¬ erature in America* (1887) ; (Ministers and Sovereign in Germany* (1888) ; (Homes of the German Poets* (1889) ; (History of Cornell University* (1894) ; (Matthias de Vries and his Contributions to Netherland Philology* (1895) ; (University Life in the Middle Ages* (1898) ; (Sources of Goethe's Printed Text* (1898); (The Historical Use of the Relative Pronouns in English Literature* (1904) ; Cor¬ nell University: A History* (3 vols., 1905); and editor of (A German Reader* (1899) ; Goethe's (Hermann and Dorothea* (1891) ; same for colleges and high schools (1907) ;*

(Bibliography of the Writings of Goldwin Smith (1916).*

*HEWIT, hu'it, Nathaniel Augustus, Amer¬ ican Roman Catholic clergyman : b. Fairfield, Conn., 27 Nov. 1820; d. New York, 3 July 1897. He was graduated from Amherst College in 1839 and was for several years in the Episcopal ministry. He became a Roman Catholic in 1846 and joined the Order of Redemptorists. He was later one of the founders of the Congrega¬ tion of Saint Paul (Paulists), taking the reli¬ gious name of "Augustine Francis,** and sub¬ sequently becoming professor and superior in the Paulist Seminary, New York. TJe wrote (Life of Princess Borghese* (1856); (Problems*

of the Age (1868) ; Wight in Darkness* (1871), etc.*

*HEWITT, Abram Stevens, American manufacturer and politician : b. Haverstraw, Rockland County, N. Y., 31 July 1822; d. New York, 18 Jan. 1903. He was graduated from Columbia in 1842 at the head of his class, and in 1843 he was made acting professor of mathe¬ matics there; he also began the study of law, and was admitted to the bar in 1845. He did not practise, however, but shortly after went into the iron and steel business with his brother- in-law, Edward Cooper. By careful and skilful management he built up the financial success of his firm (Cooper & Hewitt) ; which was the first to manufacture iron girders and supports for fire-proof buildings and bridges, and also furnished the government with large quantity of material during the Civil War. In dealing with his employees, he was particularly success¬ ful, never having any serious trouble ; it was his policy to keep the works running and the men employed, at least part of the time during dull seasons, though the business was some¬ times carried on at a loss. At the time of his death he was recognized as one of the foremost iron masters in the country, his firm controlling the Trenton Iron Company and the New Jer¬ sey Iron and Steel Company. He organized the Cooper Union Institute (q.v.), and as the secretary of the board of trustees largely shaped and controlled its policy for a number of years. He also gave largely to the institution. He was first active in politics at the time of the reorganization of Tammany Hall after the overthrow of the Tweed Ring. He served in Congress 1874-78, and again 1880-86 and was always especially prominent in all matters per¬ taining to finance, advocating a low tariff and the gold standard. In 1876 he was chairman of the Democratic National Committee, and immediately after the election issued a procla¬ mation to his party stating that Tilden had been elected; later he supported the policy of Tilden which resulted in the appointment of the Elec¬ toral Commission (q.v.). In 1886 he was nominated for mayor of New York by Tam¬ many and other Democratic organizations and after a hard campaign won the election over Henry George and Theodore Roosevelt. As mayor he gave the city a most efficient admin¬ istration, but his independent policy often an¬ tagonized the Tammany leaders, especially his strict enforcement of the excise law. He was not renominated by his party, and was defeated as a candidate on an independent ticket in 1888. While mayor he urged in one of his annual messages the need of improvement of the city's rapid transit, and advocated municipal ownership; though his suggestions were not heeded at the time, he continued his interest in the subject, and it was largely due to his ef¬ forts that recent improvements in that direction were undertaken ; in recognition of his services the Chamber of Commerce presented him with a gold medal in 1901. In February 1903 a num¬ ber of prominent citizens of New York set on foot a movement to raise a memorial fund of $500,000 to be presented to Cooper Union as the "Abram S. Hewitt Endowment of the Cooper Union.**

HEWITT, John Napoleon Brinton, Amer- can ethnologist and linguist: b. on the Tuscarora reserve, Niagara County, N. Y., 16 Dec. 1859. He is partly of Tuscarora descent and learned the language of that tribe while a child. He was educated in public schools at Wilson and Lock- port, and was for some years farmer and journalist. After 1879 he assisted Mrs. Erminie Smith (q.v.) in the linguistic researches she was making for the Bureau of Ethnology on the Tuscarora reserve, and he is now employed in linguistic work at the Smithsonian Institution.

HEWITT, Peter Cooper, American in¬ ventor: b. New York 1861; d. Paris, 25 Aug. 1921. He was the son of Abram S. Hewitt (q.v.) and grandson of Peter Cooper, was educated at Stevens Institute, Hoboken, and Columbia Col¬ lege. He entered business with his father, be¬ came a director of Cooper, Hewitt & Company and of the Cooper-Hewitt Electric Company, and of several other corporations. He was a trustee of Cooper Union and of the House of Rest, and member of the American Institute of Electrical Engineers, of the Illuminating Engi¬ neering Society, and other learned bodies. He invented improvements in the processes of the Peter Cooper glue factory, which the Hewitt firm controls. Turning his attention to elec¬ tricity he invented the Cooper-Hewitt lamp and static converter. The lamp in its present form consists of a glass tube of any desired shape with a bulb at one end which contains a small quantity of mercury. All air is exhausted from the tube, which thereupon fills with vapor from the mercury in the bulb. Electrodes are pro¬ vided at each end of the lamp, the negative electrode in the bulb of mercury and the posi¬ tive electrode at the opposite end. On passing a direct current through the lamp the vapor which fills the tube is rendered incandescent and gives off a steady, blue-white light. Owing to the great resistance at the negative electrode to the initial flow of current, it is necessary to use a high voltage to start the lamp. This is commonly done by passing a spark from a ((chok- ing" coil through the negative electrode, which when once penetrated offers but slight resistance to the flow of current. If for any reason the current is interrupted, the high resistance is immediately resumed and must be broken down again before permitting further flow of current. The. light given off by this lamp is entirely lack¬ ing in red rays, and consequently does not reveal the real color of the objects it falls upon. It is, however, of great value as a photographic illumi¬ nator, being rich in actinic rays, which most affect the photographic plate. In his last years, Mr. Hewitt endeavored to devise a method of turning some of the rays of the incandescent vapor into red rays anticipating that this dis¬ covery would be a means of great economy, be¬ cause the Cooper-Hewitt lamp is probably the cheapest artificial light in the

world. The mercury vapor lamp consumes one-half watt per candle-power, as against three and one-half watts in the incandescent lamps. He invented also a mercury vapor rectifier, which greatly simpli¬ fied the reduction of alternating current to direct storage batteries. He was also inventor of several mechanical appliances and of an improve¬ ment in wireless telegraphy by means of mer¬ cury vapor in a vacuum.

HEWLETT, hu'let, Maurice Henry, Eng¬ lish novelist: b. London, 22 Jan. 1861. He is

the son of Henry Gay Hewlett, a writer of some little note, and was educated at the London International College, Isleworth. He was ad¬ mitted to the bar in 1891, and in 1896-1900 was keeper of the land revenue records and enrol¬ ments. His reputation was made as an inter¬ preter of the more recondite phases of the life and thought of the Middle Ages, especially in Italy. His style is a skilful medium for his purpose, but frequently so archaized as to be somewhat difficult. His principal works are (Earthwork out of Tuscany) (1895), a collec¬ tion of Italian studies; (The Masque of Dead Florentines) (1895) ; (Songs and Meditations' (1897) ; (Pan and the Young Shepherd' (1898) ; (The Forest Lovers' (1898), his first popular success;

HEXAMETER (from the Greek six. and fihpovt' a measure), a verse of six feet. It is the heroic or epic measure of the Greeks and Romans, the finest examples of which are the two poems ascribed to Homer, the Iliad and the Odyssey, and the iEneid of Virgil. The sixth foot is always a spondee (two long sylla¬ bles) or a trochee (a long and a short). The five first may be all dactyls (one long syllable and two short), or all spondees, or a mixture of both. The scheme of this verse then is —

*» * > > > with all the varieties which the mingling of the two kinds of feet, as mentioned, affords ; as,*

, , , w' , 'ws~', – _

Forte sub arguto oonsederat ilice Daphnis;

Qui Bavium non odit amet tua carmina, Msevi;

and so on. The variety of which the hexameter is susceptible, its great simplicity, its harmony, and its numerous pauses,, constitute the charm of this verse, and adapt it to the most various subjects. A spondee is rarely used in the fifth foot, and then in Latin the word with which the verse ends is generally composed of four syllables, and the fourth foot at least must be a dactyl; as,

Cara deum soboles, magnum Jovis incrementum.

The prevalence of the dactyl or spondee in the hexameter depends much upon the genius of the. language ; thus the dactyl is more fre¬ quent. in Greek than in Latin, and in German than in Greek. It is evident that the hexa¬ meter cannot be formed in such languages as Italian, French, Spanish and English, whose prosody is regulated by the accent and not by the quantity of the words.

The French and Italian writers, however, early attempted the hexameter, as well as Sidney and Southey in English ; but without success. More recent English poets have also tried it, as Clough and Kingsley. Longfellow has made use of the hexameter in his (Evangeline.' But m no modern European language have hexa-

meters become naturalized, except in German, to which this measure seems as well adapted as to the Greek. Fischart attempted the German hexameter in the 16th century. In the middle of the 18th century it was used by Klopstock, Uz, and Ivleist. Goethe's hexameters are very often as poor as their sense is beautiful. John Henry Voss improved the German hexameter by the excellent translation of Homer and his valuable (Zeitmessung der deutschen Sprache) (Konigsberg 1802). See Prosody; Versifica¬ tion.

HEXAPLA. See Bible, Versions.

HEXAPODA, hek-sap'6-da, a group name for the six-footed arthropods, or true insects (Insecta), excluding spiders, myriapods and other forms often included in the term "insects.®

HEXATEUCH. See Pentateuch.

HEXOIC ACID, an organic acid having the formula CsHˆCL, or CsHnCOOH, and occur¬ ring in fats, in cheese, among the products of the butyric fermentation of sugar, and in the fruit of Heraclemn sphondylium and in the flowers of Satyrium hircinum. It is best pre¬ pared by the fractional distillation of crude fer¬ mented butyric acid. It is an oily substance, very clear and mobile, solidifying at about 29° F., and boiling at 400° F. It has specific gravity of 0.95, and is oxidized by nitric acid to acetic and succinic acids. It is also known as (

HEYSE, hi'ze, Paul, German poet and novelist: b. Berlin, 15 March 1830; d. April 1914. He studied classics in his native city, in 1852 traveled in

Switzerland and Italy, and two years later he settled in Munich on the invita¬ tion of King Maximilian II of Bavaria, who granted him a pension. He lived mainly in Munich, devoted almost exclusively to literature. He was ennobled in 1910 and was awarded the Nobel prize for literature in 1911. His first work was (Jungbrunnen, Marc'hen eines fahren- den Schulers 5 (Tales of a Traveling Scholar) (1850) ; and to the same year belongs his tragedy (Francesca da Rimini.5 (Die Brüder) (1852) and (Urica) (1852), were narrative poems, and formed part of the volume entitled (Hermen> (1854), later (Novellen in Versen,5 which did much to establish his reputation. Heyse's genius found its most perfect expression in his tales or novelettes (Novellen), and in this department of literature he holds almost a unique place among German writers. His work is almost throughout highly finished and artis¬ tic, and shows a rich imagination and great fertility in invention. His tales have been pub¬ lished in more than 20 collections, and a selec¬ tion appeared in 1890 under the title (Auswahl furs Haus.5 His early successes in narrative verse were followed by such works as (Die Braut von Cyperin5 (1856) ; (Thekla5 (1858) ; (RafaeP (1863); (1867);

(1866); (Kolberg5 (1868); (Die • Weisheit Salomos5 (1887) ; (Weltuntergang5 (1889) ; (Die schlimmen Brüder5 (1891) ; (Wahrheit?5 (1892); and (Jungfer Justine5 (1893). His larger novels, (Kinder der Welt5 (1873); (Im Paradiese5 (1875); (Merlin5 (1892); and (Uber alien Gipfeln5 (1895), have met with great success. Among other works are (Skiz- zenbuch) (1877) ; (Verse aus Italien5 (1880) ; (SprucMmchlein5 (1885); (Gedichte5 (Poems, 5th ed., 1895) ; and (Neue Gedichte und Jugend- lieder5 (1897). Consult Biese, A. H., (Deutsche Literaturgeschichte5 (Munich 1913) ; Brandes, Georg, (Moderne Geister5 (Frankfort 1887) ; Kraus, Otto, (Paul Heyses Novellen und Romane5 (ib. 1888) ; Kummer, F., (Deutsche Literaturgeschichte des 19. Ja'hrhunderts5 (Dresden 1909) ; Petzet, E., (Paul Heyse als Lyriker5 (ib. 1913). See Children of the World.

HEYWARD, ha'ward, Thomas, Jr., Amer¬ ican patriot: b. Saint Luke's Parish, S. C., 1746; d. there, 6 March 1809. He was of much prominence in North Carolina during the Revolution, was a delegate to the Continental Congress 1775-78 and one of the signers of the Declaration of Independence. In later years he was a judge in his native State.

HEYWOOD, John, English dramatist of the first, half of the 16th century. He was a paid musician at the court of Henry VIII, with whom he became a favorite on account of his skill in music. Heywood's dramatic works may be classed as interludes, standing between the miracle-plays and the drama proper. The earl¬ iest of them, (A Merry Play between the Par¬ doner and the Frere, the Curate and Neybour Pratte,5 was written before 1521.

Another famous piece is (The Four P's, an interlude in which figure a Palmer, a Pardoner, a Potycary, and a Pedlar.5 His allegory of the spader and the Fly5 (1556) fully reveals Heywood's re¬ ligious proclivities. By spiders, the Protestants are meant; by flies, the Catholics.

HEYWOOD, Thomas, English dramatist: b. Lincolnshire; d. c. 1650. He studied at Cam¬ bridge and appears to have been writing plays as early as 1596. Of all the old dramatists he was the most prolific. We learn from the pre¬ face to (The English Traveller5 that down to 1633 he had <(had either an entire hand, or at the least a main finger,® , in the comnosition of 220 plays ; and he continued for some years after that date to write for the stage. Twenty- four of Heywood's plays have been preserved. The J^est is (A Woman kilde with Kindnesse5 (1607). His work is usually distinguished by naturalness and simplicity; but he wrote at the beginning of his career one absurdly grandiose play, (The Foure Prentises of London5 (1615), which was parodied by Beaumont in (The Knight of the Burning Pestle.5 (The Rape of Lucrece5 (1608) is chiefly noticeable for its songs; (Love's Maistresse5 (1636), dealing with the story of Cupid and Psyche, is fanciful and ingenious ; and there is much tenderness in (A Challenge for Beautie5 (1636). (The Captives, or the Lost Recovered,5 an interest¬ ing play, acted in 1624, was first published in

1885.

HEZEKIAH, hez-e-kl'a (Hizkiyah, gen¬ erally Hizkiyahu, strength of Jehovah), the 12th

king of Judah. At 25 he succeeded Ahaz about 726 b.c. to 698 b.c. He had no sooner mounted 4he throne than he initiated a system of reform, on the injunctions of Isaiah, and broke up the idolatrous customs into which the people had fallen during the life of his father. He also endeavored to repair the injury done by national defeats and losses. He purged, repaired and reopened the temple with magnifi¬ cent sacrifices and a splendid ceremonial. So extreme was his indignation against idolatry that he destroyed the brazen serpent which was said to be the one used by Moses in his miracu¬ lous healing of the Israelites. With patriotic zeal he assumed the aggressive against the Phil¬ istines, and not only rewon the cities lost by his father, but dispossessed them of most of their own. In the 14th year of Hezekiah's reign he had a dangerous illness, which threatened serious

complications, and the kingdom was in a difficult crisis, for the king had no heir, Manasseh not being born till long afterward. The greater part of the Scripture records bear¬ ing on the reign of Hezekiah is occupied by the two invasions of Sennacherib. Several of the Psalms are supposed to allude to the dis¬ comfiture of Sennacherib, for example, xlvi- xlviii, lxxvi. Hezekiah did not long survive this deliverance, dying after a reign of nearly 29 years. Among the many highly useful works executed by him, the aqueducts of Jerusalem are of especial importance.

HIAWATHA, hi-a-wa'ta or -tha, the hero of an American Indian legend known by this name among the Iroquois and among the other tribes. He is mentioned in various works on the aborigines, and in 1855 was immortalized in the poem, (Hiawatha, > by Longfellow.

HIAWATHA, Kan., city, county-seat of Brown County, on the Saint Joseph and Grand Island and the Missouri Pacific railroads, about 70 miles northwest of Kansas City and 55 miles north of Topeka. It is situated in a rich agri¬ cultural region and has grain elevators, foun¬ dries and a flour mill. Its chief manufactures are flour, foundry products and agricultural implements. Its trade is principally in wheat, corn, fruit, livestock, flour and lumber. It has the Morrill Public Library and an academy in a Carnegie library building. The city owns and operates the waterworks and an electric- light plant. Another electric-light plant is owned by a private corporation. The commis¬ sion form of government was adopted in 1914 Pop. (1920) 3,222.

HIBBARD, Freeborn Garretson, Ameri¬ can clergyman: b. New Rochelle, N. Y., 22 Feb. 1811 ; d. 1895. He was the son of the Rev. Billy Hibbard, a clergyman of the Metho¬ dist Episcopal Church, well known for his ec¬ centricity and his revivalist preaching. At the age of 18 the son entered the ministry and held various pastorates in New York State until 1856, when he became editor of the Northern Christian Advocate. Four years later he was chosen presiding elder of the Geneva district. His principal writings are (Christian Baptism, its Subjects, and its Import, Mode, Efficacy and Relative Order) (New York 1845) ;

to the Family, and to the Church (1864) ; Commentary on the Psalm * (1882) ; the Whe- don series of Commentaries on the Old Testa¬ ment ; (History of the late East Genesee Con- ference) (1887), and edited 'Sermons* (1869) and*

HIBBARD, George, American writer of short stories: b. Buffalo, N. Y., 1858. He was graduated at Harvard in 1880 and was admitted to the bar in 1886. He at one time devoted much time to painting and exhibited at the National Academy of Design in 1887. He has also illustrated his own

stories. He has writ¬ ten (Iduna, and Other Stories (1891); Now¬ adays' (1893) ; 'The Governor) (1892), etc. His work is marked by finished style and much insight into character.*

HIBBEN, John Grier, American university president: b. Peoria, Ill., 19 April 1861. He was graduated at Princeton in 1882. He also studied at Princeton Theological Seminary and at the University of Berlin. He was ordained to the Presbyterian ministry in 1887 and was thereafter pastor at Chambersburg, Pa., until 1891. He then took up the teaching of logic at Princeton, where he was professor from 1897 until 1912. In the latter year he was chosen president of the university. He has published (Inductive Logic (1896); (The Prob¬ lems of Philosophy) (1898); 'Hegel's Logic) (1902); (Deductive Logic> (1905); (The Phil¬ osophy of the Enlightenment (1909)- 'A De¬ fence of Prejudice, and other Essays* (1911) * Che Higher Patriotism* (1915), and edited Epochs of Philosophy) by authors in the 1905) ˆta3teS anc* Great Britain (12 vols.,*

HIBERNATION, the winter sleep of warm-blooded animals. Under this term is also included the torpidity of frogs, toads, reptiles, certain fishesˆ insects, the horseshoe crab and snails, which is mainly due to prolonged cold. Among the mammals which hibernate are the bear, dormouse, badger, bat and hamster; a number are incomplete hibernators, as the prairie dog, while squirrels fall into a winter sleep during the coldest weather, but may be seen in warm spells in winter. The males of the black and white bear are more or less active dui mg the winter months, while the females are hibernating. The bears and some others, like the skunk, may in the southern portion of their range not hibernate at all. Neither do the hibernators all retire to their holes or dens or under fallen trees at the same date, but the tune varies with the temperature, and different degrees of torpidity are exhibited. It also ap¬ pears that continuous hibernators do not lay in a supply of food, as do intermittent ones like squirrels , yet the Arctic fox is said to store up a supply of dead lemmings, ermines, geese, etc.

*Hibernation is like sleep and has been com¬ pared with trance. During this period the ani¬ mal functions are nearly suspended, the excre¬ tions are greatly diminished and in the bears the rectum is closed by a resinous plug, called by the Swedes "tappen** and by American hunters seal.® The animal heat is lowered to that or nearly that of the air, the action of the heart being slight ; there is an increased mus¬ cular irritability and the animal loses from 30 to 40 per cent of weight.*

HIBERNIA — HIBERNIANS

Snakes, lizards, frogs, salamanders and certain fishes hibernate, burying themselves in the earth below the reach of frost, the aquatic, forms digging into the mud at the bot¬ tom of streams. The few fishes which are known to lie dormant and take no food sink into the mud of streams or of the sea. The horseshoe crab burrows in the mud beyond the reach of oyster dredges in November, remain¬ ing in deep water until the middle of spring. Most insects hibernate in the larva or pupa state, a few when adult, as certain moths, but¬ terflies and beetles. Caterpillars hide under moss, the bark of trees, etc., but they freeze solid and may be broken into two pieces like an icicle ; they gradually thaw out in spring, but when the changes are sudden, great num¬ bers die. Spiders and snails hibernate under stones, moss, etc., while slugs bury themselves in the mud, and mussels and other mollusks living in streams and lakes descend into the mud.

Estivation. — In the tropics there is a cor¬ responding period of torpor during the hot, dry season, when food is scarce and vegetation is taking a rest. Alligators, snakes, certain mam¬ mals, as the taurec, insects and land-snails- be¬ come dormant, the last-named closing the mouth of their shells with a membrane-like substance (epiphragm), leaving a small opening in it for the admission of air in breathing, yet after a prolonged shower they become active. Thus it is seen that heat, dryness and the lack of food operate in causing estivation, while cold and famine appear to be the cause of hibernation ; though all species are by no means affected alike. Among the lowest organisms the dor¬ mant vitality of resting spores, seeds of plants, winter eggs of sponges, of polyzoa, and the dormancy of certain adult forms, are connected with a lowered temperature, and a resting period is necessary both in plants and animals. The simultaneous shedding of the leaves of de¬ ciduous trees is certainly connected with if not caused by cold, and it is undoubtedly true that changes of temperature as well as lack of food, and the need of rest, cause hibernation and summer dormancy.

HIBERNIA, the ancient name applied to Ireland (q.v.).

HIBERNIANS, The Ancient Order of.

This order traces its origin to those ancient orders into which the people of Ireland were divided for many centuries before the coming of Saint Patrick.

The Military Orders. — The first of the orders was the military order of the Golden Collar, instituted by Munemen, king of all Ireland about 900 b.c. The custom of dividing society into orders seems to have been a Milesian innovation, as the Milesian kings in¬ stituted in succeeding centuries the bardic order, to sing the songs of war and peace; the order of druids, to offer sacrifices and per¬ form all priestly offices; the order of brehens, to

arrange and administer the laws and the ellamhs, to preserve genealogies and the his¬ tory of the people. The military orders made the most legible impression on the history of ancient Ireland of any of the divisions of the inhabitants. It was the military orders which were marshalled for the defense of the island when menaced by the Romans. In all foreign*

wars they provided the soldiers who crossed the Irish sea to fight the Piets, the sea-roving Danes or the Saxons, or even the Celtic in¬ habitants of ancient Britain.

It was these military orders which accom¬ panied Daithi, king of all Ireland, iir his inva¬ sion of Gaul in 420 a.d., when he led the van of the immense multitude of warriors of all the northern nations which drove back the Roman power beyond the Alps. Niall of the Nine Hostages led the military orders in the forays to Britain and Gaul which are so well authen¬ ticated because it was orr one of them that he brought back the boy Patrick, who afterward Christianized the country. While the Order of the Golden Collar was undoubtedly the first of the national military orders, yet the pro¬ vincial orders of Munster, Connaught. Ulster and Leinster achieved immense celebrity be¬ cause of their warlike deeds. The fame of these provincial orders was recounted in poems and songs by bards and ollamh's, and many of the loftiest sentiments ever uttered occur in the recitals of Ossian when recounting the martial prowess of the heroes of these orders. The duels of Finn MacCool and Loda are told in an imagery equal to that of Homer in the im¬ mortal narration of Achilles and the siege of Troy. Other old manuscripts tell of Queen Maeve, who led the Knights of Connaught, the Clanna Morna; of .the Knights of the Red Branch of Ulster, of the Clanna Deagha of Munster, and of the Feni of Leinster. These orders had rules and vows, and the claim has been made that in Ireland will be found the first trace of standing armies and of the insti¬ tution of chivalry.

Influence in Irish History. — When the people became Christian the military orders seemed to have lost somewhat the old influence. But with the revival of the foreign wars and the first incursions of the Danes, the ancient orders once more took the leadership in soˆ'ety. In the 6th century the knightly orders were con¬ secrated to the service of the Church, receiving the cross as their badge as the defenders of religion. This fact is chronicled in Ashmead's (Ecclesiastical History of the Irish Church. > Yet even the christianizing of the island did not weaken the strength of the traditions which had raised the old champions of the Knights of the Red Branch, the Feni, the Knights of Munster and Connaught with almost the at¬ tributes of deities. The characteristic of all primitive peoples is to worship mighty men, and the feats of Loda, Finn MacCool, Fergus Mac-Roy, and the other leaders were told through the _ generations, and even to

this day are the basis of many of the habits of the Irish people.

The written rules of the ancient orders are believed' to have antedated any system of organized military knighthood among mankind. These rules required that the candidate should be of good moral character, in perfect physical health, of an uncorrupted lineage and be able to pass a severe test of body and mind. He en¬ tered one of the military schools of the knights, where his education was directed for three years by the most learned teachers of literature and by the most celebrated masters of arms. The Abbe MacGeoghegan, Mooney and other historians quote these rules from the original Gaelic manuscripts as evidence of the remark¬ able attention given to the art of war in pagan

Ireland. It is recorded in numerous tales, songs and genealogies that almost all the kings, bards, sages and statesmen were on the rolls of the ancient orders of knighthood. In the long list it is noticeable that certain families main¬ tained an hereditary leadershio in their respec¬ tive orders. This peculiar fact is not unnatural among a people whose regard for genealogy surpassed that of other nations. Among these families no line of- descent is more renowned, nor marked with more legible clearness, than the . family of Roderick the Great, which originated with the great champions Conall Ivearnach and Lugadh (Loda), whose mighty swords were in the fables and mythology of the pagan Irish analogous to the hammer of Thor and the fury of 2Egir among .the Norse peoples. These warriors were the founders of, the O'Moore family, who were regarded by the Irish people as the hereditary marshals of the ancient orders even after the coming of the Normans. It is upon the traditions which con¬ nect this celebrated family with the ancient orders that the descent of the present Ancient Order of Hibernians from the mists of the pre- Christian past through the Middle Ages to modern times is so distinctly defined. Again and again this family appears in history, and almost, invariably they are accompanied by a military band easily indentified as the succes¬ sors of the ancient orders. Thus at the siege of Dublin in the 12th century by Roderick O'Connor, the last native king of all Ireland, there was a large body of the Knights of Con¬ naught, degenerate, perhaps, in soldierly skill, but still preserving some trace of individuality. In the 13th, 14th and 15th centuries the Knights of the Red Branch appear in old chronicles, and in the wars against the English during the reign of Queen Elizabeth Rory Oge O'Moore, and his son Owen, carried on the martial fame of their ancestors, the captains of the ancient orders.

In the 17th centurv the ancient orders were endowed with a national character through their revival and reorganization in the Catholic Confederation of Kilkenny by the popular hero, Rory O'Moore, a nephew of Rory Oge. This Confederation, which attempted to estab¬ lish the independence of Ireland, conducted a national -war against the English for 10 years. Its armies, under Owen Roe O'Neil, Bishop Heber MacMahon and Preston, took the vow of the Confederation, which was substantially the same as the vow of the ancient orders and almost identical with the obligation of the Ancient Order of Hibernians to-day. A nephew of Rory O'Moore, Patrick "Sars- field, was the chief figure in the war against the English under William of Orange, and the Rapparrees, an irregular organization of scouts and light cavalry, carried on a desultory war¬ fare until the early years of the 18th century. The Rapparrees had signs, passwords and "a somewhat loose system of organization which was adopted by their successors, the Whiteboys of the South, who endeavored to redress many grievances regarding land tenure through both civil and forcible . means until th«v were suc¬ ceeded by the various agrarian societies which expressed the protest of the peasants against intolerable conditions all through the latter part of the 18th and the early part of the 19th Centuries, In the North in the latter part of

the 18th century the Defenders were organized to resist the encroachments of the Orangemen, with whom, skirmishes and battles were fre¬ quent. During the Revolution of 1798 the De¬ fenders aided the Irish patriots, and in the United Irish movement they loyally supported Wolfe Tone and the gifted band of young men who sought to establish an Irish Republic.

History in America.— The Defenders and the Whitesboys had a system of intercourse and identification during the troubled times from 1790 to about 1820, and this connection resulted in the Ribbon Confederation, which was both Catholic and agrarian. When the Ribbonmen were legally suppressed and the emigration to England assumed considerable proportions, some Irishmen in Liverpool, to avoid the sus¬ picion of the authorities and for the purpose of aiding their fellow-countrymen, formed the Saint Patrick's Funeral Benefit Society. The name was changed several times, and Saint Patrick's Fraternal Society, Saint Patrick's Friendly Association, etc., are stated to have been -the appellations. Branches of the Saint Patrick's Funeral Benefit Society were estab¬ lished in the large industrial cities of England and Scotland, and in 1836 the society crossed the Atlantic. In May of that year a written charter was received in New York city. The organization was established simultaneously in New York city and in the anthracite coal regions of Pennsylvania, where the emigration of Irishmen had been large from the coal¬ mining counties of England. The head¬ quarters was for a few years in Schuylkill County, Pennsylvania, but greater convenience in transacting both domestic and foreign busi¬ ness*

resulted in their removal to New York city. In 1851 a charter was granted to the New York Divisions under the name of <(The Ancient Order of Hibernians in America.® National conventions were held in New York city until 1878 annually, and all the national officers were chosen from New York and vicinity. Since that year national conventions have been held in many other cities, and since 1884 have been held biennially. In 1876 there were bitter labor disturbances in the anthracite coal regions, and in these strikes and feuds a secret organization called the «Molly Maguires® was given an unenviable notoriety "through as¬ saults committed by its members upon mine bosses. While the spirit of the ancient order and its precursors has ever been animated with the fraternalism of the trade union, yet the at¬ tempt to cast odium upon the ancient order because of the violence of the <(Molly Maguires® was peculiarly unjust, as the members of this secret organization were, except in a very few cases, not connected with the Ancient Order of Hibernians. The national convention of the ancient order in 1877 denounced the ((Molly Maguires® and disclaimed any sympathy with lawlessness on any pretext.

During all its history in America the Ancient Order of Hibernians accorded most valuable support to every Irish national movement. The Divisions of the A. O. H. .were the recruit¬ ing field for the Fenian Society, for various associations which forwarded relief to the famine sufferers and to the victims of land¬ lordism in Ireland. Michael Davitt declared that without the co-operation of the Ancient Order the Land League of Ireland would have

failed in its purpose. Almost all the famous Americans of Irish birth or blood have been members of the order, and among these were Gen. Thomas Francis Meagher, Col. Michael Doheny, Gen. Michael Corcoran and Col. John O'Mahony.

Statistics. — In 1916 the organization had divisions in 50 States and provinces. Its mem¬ bership, comprising about 150,000 men and 70,000 women, includes residents of the United States, Canada, Alaska and Hawaii. It has aided multitudes of emigrants to obtain the means of livelihood, and for many years co-operated with the associations which aided Irish settlers to found homes in the West. The A. O. H. had, in 1916, assets of more than $2,500,000, and its annual payments to charitable purposes, to education and religion, exceed $2,600,000 an¬ nually. For sick and death benefits it pays an¬ nually more than $1,100,000, and during its existence in America has donated nearly $21,- 000,000 to works

of beneficence. Among the most useful of its gifts is the $50,000 endow¬ ment of the chair of Gaelic and Irish History in the Catholic University, and its contribution of $40,000 to the Catholic Church Extension Fund and $40,000 to the San Francisco earth¬ quake sufferers. The Ladies' Auxiliary was founded at the Omaha National Convention in 1894, and has increased until it numbered in 1916 70,000 members, inspired by devotion to home, religion and patriotism, with ideals of noble womanhood, and encouraging education, morality and social uplift with increasing vigor and efficiency. Among the gifts of the Ladies' Auxiliary is its endowment of the chair of Irish Literature in Trinity College, with $10,000.

Bibliography. — Curran, J. P (Speeches and Memoirs) (1846) ; Davitt, Michael, (The Fall of Feudalism in Ireland) (1904) ; Denieffe, Joseph, (Recollections of the Irish Revolu¬ tionary Brotherhood) (1900) ; MacGeoghegan and Mitchel, (History of Ireland> (1886) ; O'Dea, John, (History of the Ancient Order of Hibernians and Ladies Auxiliary) (1918) ; O'Connor, T. P., (The Parnell Movement (1891); O'Connell, Daniel, speeches and Memoirs* (edited by his son, 1867); Ossian, (FingaP ; Report of the House of Commons Committee on the Ribbonmen (1819) ; Histori¬ cal sketch of the persecutions suffered by the Catholics of Ireland, by Cardinal Moran (1884).*

John O'Dea,

Secretary, Ancient Order of Hibernians in America.

HIBISCUS, hi-bis-kus, a genus of plants of the mallow family (q.v.), distinguished by a calyx surrounded by an involucre and by a fruit of three or more many-seeded carpels united into a capsule. The species are numerous, mostly natives of warm climates, some trees or shrubs, but most of them large herbaceous plants. Many bear very beautiful flowers, much used in the South Sea Islands in wreaths, etc., for personal adornment. The rose-of-Sharon or Althaea (Hibiscus syriacus), a native of Syria, has long been in cultivation as an orna¬ mental shrub. Several other species have be¬ come favorite hothouse plants. The rose- mallow (H. moschcutos) is among the most striking and beautiful of North American wild flowers, conspicuous among the reeds of marshes in late summer with its pink blossoms. The

characteristic mucilaginous and fibrous prop¬ erties of the Malvaceae are very strongly de¬ veloped in this tribe. The fruit of H. escu- lentus, called gumbo, okra, etc., is in general use for food in the East and West Indies and the United States. It is an annual plant, with a soft herbaceous stem, three to five feet high, crenate leaves, axillary sulphur-colored flowers, and

pyramidal, somewhat podlike capsules. The fruit is used in an unripe state, and is gen¬ erally much esteemed, but is disliked by some on account of its viscidity. It enters as an important ingredient into the pepper-pot of the West Indies, or is used in soups. It also produces a coarse fibre. The bark of H. tiliaceus, a tree 20 feet high, with a very thick bole, abounds in mucilage. This is one of the most abundant trees of the South Sea Islands; and the wood, being light, tough and durable, is used for many purposes. From its fibre the Tahitians manufacture matting. Many other species yield fibres, some coarse, some fine and beautiful, which are used in dif¬ ferent countries ; but the most important in this respect is H. cannabinus, the Deccan hemp of western India (see Hemp). H. sabdariffa is very generally cultivated in warm countries, on account of its calyx, which, as the fruit ripens, becomes fleshy, and acquires a very pleasant acidity. It is much used for making tarts and jelly, and a decoction of it, sweetened and fer¬ mented, affords a refreshing beverage, well known in the West Indies as sorrel cool drink, the plant being called red sorrel; and in Madras it is used for similar purposes, and is named roselle or rouselle. Musk-seed (H. abel-moschus) is cultivated for its seeds, which have a fragrance between that of musk and that of amber. They are much used by per¬ fumers, and are called graines d'ambrette. In Egypt and Arabia they are mixed with coffee, and stimulant and stomachic qualities are as¬ cribed to them. The petals of H. rosa-sinensis possess astringent properties, and they are also used by the Chinese to stain their eyebrows and their shoes black.

HICCUP, or HICCOUGH, is a spasmodic affection of the diaphragm caused sympathetic¬ ally by the irritation of structures supplied by nerves communicating with the phrenic nerve. Though generally a slight and passing incon¬ venience, its occurrence in the last stages of acute disease is a grave symptom, indicating general collapse of the nervous system. It may last only a few minutes or may continue for weeks without being capable of being subdued by any kind of treatment. Fasting or a stimu¬ lant suddenly swallowed is one of the common¬ est causes of hiccup, which generally passes off of its own accord. Nothing removes it more effectually than some active emotion of the mind suddenly excited. Hiccup is a common attendant of dyspepsia, and is often observed in abdominal diseases when terminating fatally, and is especially a symptom in some forms of hernia. Many remedies have been suggested for it, such as holding the breath as long as possible, tying a belt tightly round the waist and the frequent swallowing of small rounded pieces of ice.

HICHBORN, Philip, American naval offi¬ cer: b. Charlestown, Mass., 1839; d. 1 May 1910. In 1869 he entered the United States navy;

in 1875 was made constructor, and in 1881 a member of the naval advisory board. From 1893 until his retirement 4 March 1901, he was chief constructor, and as such was identified with the reorganization and enlargement of the new United States navy. He attained rear- admiral's rank, and published a valuable report on foreign dockyards.

HICHENS, Robert Smythe, English jour¬ nalist and novelist: b. Speldhurst, Kent, 14 Nov. 1864. He was educated at Clifton College and the Royal College of Music, and after a short career as a musician turned to journalism. In 1893 he visited Egypt for his health, and there conceived the idea which materialized in the 'Imaginative Man* (1895); 'The Green Car¬ nation } (1894), however, epigrammatic and

keenly satirical in tone, first brought him into public notice. Later works of his are 'After To-Morrow* (1895); 'New Love* (1895); 'The Folly of Eustace and Other Stories* (1896); 'The Londoners* (1897); 'Byeways* (1897) ; 'The Prophet of Berkeley Square* (1901); 'The Woman with the Fan* (1904); 'The Garden of Allah* (1905) ; 'The Call of the Blood* (1906); 'Bella Donna* (1909) and successfully dramatized; 'Barbary Sheep* (1909) ; 'The Dwellers on the Threshold* (1911) ; 'The Way of Ambition* (1913) ; 'The Near East* (1913) ; 'In the Wilderness* (1917).

HICKEY PLOT (1776), a conspiracy of the British officials and Loyalists of New York to end the Revolutionary War by the murder or capture of its leaders and the seizure or de¬ struction of its supplies. The heads and prob¬ able devisers of it were Governor Tryon, who had fled from the city but remained on a man- of-war in the harbor, and sent supplies of money for bribery, etc. ; and Mayor Mathews. The scheme was to kill or seize the patriot generals, and at all events to deliver Washington alive to Sir William Howe, blow up the magazine and secure the passes to the city. Several hundred New York Loyalists were involved. Two of Washington's guard were bought, but a third pretended to accede and revealed the plot. Mathews, a goldsmith named Forbes and a dozen others were arrested and sent to Con¬ necticut, Mathews carrying the mayoralty flag with him. Thomas Hickey, one of the treach¬ erous guards, was hanged in New York, 27 June 1776, the first military execution in the American army.

HICKOK, Laurens Perseus, American

metaphysician : b. Danbury, Conn., 29 Dec. 1798; d. Amherst, Mass., 6 May 1888. He was graduated at Union College in 1820, was li¬ censed as a preacher in 1822 and was pastor successively at Newton and Litchfield, Conn., till in 1836 he was elected professor of theology in the Western

Reserve College, Ohio, where he remained eight years. He was professor in the Auburn Theological Seminary 1844-52, and then became professor of mental and moral science, and vice-president in Union College. In 1866 he was formally made president of that institution of which, however, he had been in sole charge for eight years previous. His pub¬ lications include among other works 'Rational Psychology (1848); 'Moral Science* (1853); 'Empirical Psychology, or the Human Mind as Given in Consciousness* (1854) ; 'Rational*

Cosmology (New York 1858), in which he attempts to demonstrate a priori the laws of the universe; 'Creator and Creation* (1872); 'Humanity Immortal* (1872) ; 'Logic of Rea¬ son* (1875).*

HICKORY (formerly Hickory Tavern), N. C, town in Catawba County, on the South¬ ern and the Carolina and Northwestern rail¬ ways, near the headwaters of the Catawba River, about 43 miles northwest of Charlotte and 50 miles west of Salisbury. The chief manufactures are flour, foundry products, wagons, lumber, air pumps, hosiery, gloves, carriages, overalls, harness, leather, boots and shoes. It has several private educational in¬ stitutions : Claremont Female College, opened in 1880; Saint Paul's Lutheran Seminary; Lenoir College, opened in 1891, under the aus¬ pices of the Lutheran Church. The commis¬ sion form of government was adopted in 1913. Pop. (1920) 5,076.

*HICKORY, a group of trees of the walnut, forming the genus Hicoria, and exclusively North American. They are large strong trees, 60 to 80 feet high, with close shaggy bark and large pinnately divided leaves, pistillate flowers on a terminal peduncle and staminate flowers in long, drooping aments. The fruit is a thick- shelled nut in a tough green husk. There are about 10 species, all natives of the eastern United States and Canada except a Mexican species. The best known of these are the fol¬ lowing: Shag-bark, shell-bark or white hick¬ ory (H . oyata), leaflets 5 to 7, whose bark scales off in great plates curving outward at both ends, and whose nuts are sweeter and better than those of any other species ; the northerly "big shag-bark** or king-nut (H. lacimosa) , leaflets 7 to 9, with narrower "shags,** darker wood and big nuts in husks often three inches long; white-heart, or fra¬ grant hickory, or mocker-nut (H . alba), noted for the hardness and toughness of its wood; the pignut or broom hickory (H . glabra), leaf¬ lets 3 to 7, which represents a group of mois¬ ture-loving species whose nuts are thin-husked, elongated and bitter and astringent to the taste.*

Uses of Hickory-wood — As timber this wood is of great value for articles requiring great strength with lightness and elasticity; but it is liable to quick decay when exposed to the atmosphere, and for this reason is little used in buildings, and should be painted. It was the most serviceable of all woods

to the aboriginal Americans; and the axe, pick and tool handles made from it are exported to all parts of the world. It enters into the manufacture of rakes, cradles and many forms of farm-imple¬ ments ; is largely used in carriage-making, espe¬ cially for thills, shafts and the parts of racing-sulkies, the lighter American vehicles owing their acknowledged pre-eminence largely to the availability of this wood. The wood of the various species differs in quality, however; that of the pecan is hard and brittle, and the water hickory soft and comparatively light. The wood of the others is exceedingly strong and tenacious, and weighs about 50 pounds to the cubic foot.

Insect Pests. — A. S. Packard recorded in

1890 170 species of insects attacking the hick¬ ories ; and Chittenden declared in 1903 that this number could be easily doubled. Hickory ap¬ pears to be an especial favorite of borers. Prominent among them are the painted hick¬ ory-borer, one of the long-horned beetles (Cyllene picta) ; the hickory twig-girdler (Oncidcres cingulata) , twig-pruner (Elaphidion villosum), and hickory-bark beetle (Scolytus quadrispinosus) . This bark-borer is the most important economic species, and during recent years has been the cause of considerable injury in hickory forests in the State of New York. Consult Packard, (Insects Injurious to Forest and Shade Trees, > published in 1888 as the fifth report of the United States Entomological Commission.

HICKS, Elias, American preacher of the Society of Friends: b. Hempstead, L. I., 19 March 1748; d. Jericho, L. I., 27 Feb. 1830. While a youth he manifested a talent for pub¬ lic speaking, and at 27 was a well-known preacher. For many years he labored zealously in advancing the generally accepted doctrines of the Friends; but having as he believed discov¬ ered errors in these tenets, put forth views of his own which he defended with energy and ability. To advance these views he traveled extensively in the United States and in the British provinces, attracting large congrega¬ tions by his oratory. The result was a schism in the body of Friends, those adhering to the old doctrines being specially termed orthodox, while the followers of Hicks were called after him Hicksites. (See Friends). He was an ac¬ tive abolitionist and with others was instrumen¬ tal in inducing the State of New York to pass an act which, on 4 July 1827, liberated all slaves within its borders. He was the author of (Sermons> (1828); ˆObservations on Slavery (1811) ; (The Letters of Elias Hicks> (1834) ; etc. Consult (Elias Hicks, Journal of his Life and Labors) (1828).*

HICKS, Thomas, American painter: b. Newton, Pa., 18 Oct. 1823; d. 1890. He stud¬ ied at the Philadelphia Academy, at the Na¬ tional Academy, New York, and afterward in Paris under Couture. Settling in New York he became one of the favorite portrait painters of his day. His pictures in the rooms of the New York Historical Society form an interest¬ ing gallery of historic figures, executed with more than ordinary artistic skill.

HICKS, Thomas Holliday, American pol¬ itician : b. Dorchester County, Md., 2 Sept. 1798; d. Washington, D. C, 13 Feb. 1865. After successively occupying the positions of sheriff, member of the State legislature, mem¬ ber of the State electoral college and member of the governor's council, he was in 1858 elected governor of the State. When war was threat¬ ened between North and South, although sym¬ pathizing with the South and condemning the North's attitude on the slavery question, he sided with the party of neutrality in Maryland and opposed the secession of that State. When there were rumors of a plot formed by 6,000 men of his State to prevent Lincoln's inaugu¬ ration and seize the city of Washington he sus¬ pended the writ of habeas corpus, and planned

the arrest of suspected persons. H'c was the only prominent State official who stood by the Federal government, and at the expiration of his term as governor the new legislature passed resolutions thanking him for having saved the State from joining the Confederates. In 1862 he was appointed to the Senate of the United States and served in it till his death.

HICKS-BEACH, Sir Michael Edward,

first Viscount St. Aldwyn, English states¬ man : b. London 1837 ; d. 30 April 1916. He was educated at Eton and Oxford, entered Parliament in 1864, and was Chief Secretary for Ireland in 1874 — 78, 1886-87. and Secretary of State for the Colonies in 1878-80. In 1885-86 and 1895-1902 he was Chancellor of the Exchequer and leader of the Conservative party in the House of Commons. He was president of the Board of Trade from 1888 to 1892. On the fall of the Gladstone ministry in 1895 he again was Chancellor of the Exchequer 1895-1902. On Lord Salisbury's retirement from public life he also left the government. In the fiscal contro¬ versy raised by Chamberlain's tariff reform proposals he warmly defended the established free trade policy; but his loyalty to Mr. Bal¬ four, the new Premier, was shown by his suc¬ cessful efforts to prevent the immediate snap¬ ping of party ties on the part of the free-trade Unionists.

HICKSON, Sydney John, English zoolo¬ gist: b. London, 25 June 1859. He was edu¬ cated at Cambridge and has been professor of zoology at Owens

College, Manchester, Eng¬ land, from 1894. He has published (A Natu¬ ralist in North Celebes) (1889) ; (The Fauna of the Deep Seas) (1894) ; (The Story of Life in the Seas) (1898).

HIDALGO Y COSTILLA, Miguel, me-

gel' e-dal'gd e kds-tel'ya, Mexican revolutionist, first leader in the Mexican war of independ¬ ence: b. state of Guanajuato, 8 May 1753; shot in Chihuahua, Mexico, 27 July 1811. He was a priest, and in earlier life was simply a man of great acquirements, anxious to promote in¬ dustry in Mexico, and noted for conscientious fulfilment of his ecclesiastical functions. He is said to have introduced the silkworm into Mexico, and did much to promote the culture of the vine. This conflicted with the policy of the Spanish government, which was to discourage all manufactures or agriculture which could in¬ terfere with the revenue, and the vines Hidalgo had planted were destroyed. This drove him to rebellion. Possessing much influence among the Indians, he formed the plan of a general insurrection, which was to take place 1 Nov. 1810; but the plot having been disclosed by one of the conspirators, some of his party were arrested, and he was obliged to precipitate his movements. On 10 September having been joined by three officers of the garrison of Guanajuato, he raised the standard of revolt. His eloquence had a remarkable effect on the multitude who heard him, and when after his oration he unfurled a rude copy of the picture of Our Lady of Guadalupe, the patroness of Mexico, the war assumed the . character of a crusade. On 29 September with an army of 20,000 men, mostly Indians, he captured Guana¬ juato. He took Valladolid and several small

places, and soon after was proclaimed general¬ issimo of the Mexican army, and advanced against Mexico; but finding himself almost without ammunition, was obliged to retreat. During this war the government party declared that the ordinary rules of warfare need not be observed as regarded the insurgents, while the latter retaliated with the most horrible atroci¬ ties. On one occasion Hidalgo is said to have massacred 700 prisoners because they were Eu¬ ropeans. After several defeats the insurgents were left at Saltillo under charge of Rayon, while Hidalgo and others went to the United States to obtain arms and military aid. On their way they were captured by a former friend, and finally shot in Chihuahua. He was after his death regarded as a saint by the peo¬ ple, and within a few years the place of his execution was shown to travelers as a holy spot. The town of Goliad, Tex., was named in his honor, the H, as silent in

pronunciation, being omitted and the other letters rearranged. At the founding of the town the name of Hi¬ dalgo was still proscribed by the Spanish rulers and the transposition of the letters of his name was made in order to avert the attention of the authorities.

HIDDENITE, a yellowish -green or emerald-green, transparent variety of spodu- mene, discovered by W. E. Hidden, in 1880, in Alexander County, N. C. The emerald-green varieties have been used as gems. They re¬ semble the emerald, but show a greater wealth of color on account of their pleochroism.

HIDES AND LEATHER. See Leather;

Tanning.

HIERAPOLIS, hi-er-op,o > -liz, Phrygia, an ancient city on the Churuk Su, about six miles north of Laodicea. Situated on a high eleva¬ tion, it was noted chiefly as a religious centre. Here were sulphur springs and a deep cavity called the Plutonium or Charonium, which ex¬ uded a vapor considered poisonous to laity. Hierapolis was the seat of the mysteries of the Phrygian goddess Leto, the native goddess of nature, corresponding to Cybele. It is also renowned as the birthplace of Epictetus. Ex¬ cavations on the site have uncovered ruins of tombs, a theatre, houses and a remarkable bath. Consult Ainsworth, W. F.,

HIERAPOLIS, Syria, an ancient town, also known as Bambyce (Gk.) and Mabog (Syrian), situated about 15 miles southwest of the point where the Sajur and the Euphrates meet. It first becomes known as an important station during the time of the Seleucids, and as a seat of the worship of Atargatis (q.v.), described by Lucian in his (De Dea Syria.) A gor¬ geously decorated temple housed the shrine. Crassus carried off its treasures in 53 b.c., but under Diocletian it was restored and became the capital of the province of Commagene or Euphratensis. It lost prestige under Justinian, was long a centre of the struggle among the Arabs, Turks and Byzantines and was many times fought for by the Crusaders. It fell into the hands of Saladin in the 12th century, and under the Mongols fell into complete ruin. Arab walls and ruins of the old temple still survive. The Greek name Bambyce has been

preserved in connection with a dress goods manufactured there through the Roman Bom- bycina vestis, in English ˆBombazine.® Con¬ sult Ramsay, W. M., (Cities and Bishoprics of Phrygia) (Vol. I, 1895).

HIERARCHY, hi'e-rar-ki (From Gr. hi- eros, sacred, and arche, government), sacred government or < (the administration of sacred

things,® first used by the pseudo-Dionysius in the 5th century in his work on the Celestial and Ecclesiastical Hierarchies. It is now gen¬ erally used to signify the body of officials in the Church organically graduated in their ranks and orders from the supreme head to those in the most subordinate position. In the Roman Catholic Church a threefold distinction is recog¬ nized : (1) A hierarchy of divine right, which

embraces, under the primacy of the popes, bish¬ ops, priests and deacons. This hierarchy is held by the Church to be of divine institution. (2) A hierarchy by ecclesiastical right, consist¬ ing of the Roman pontiff and the three original divine orders and of the five minor orders (two in the East), subdeacons, acolytes, exorcists, lectors and porters (ostiarii). (3) A hierarchy of jurisdiction, which includes all the judicial and administrative authorities, ordinary and delegated, charged with the maintenance of the faith among Christians, its union, its disci¬ pline and its general care and supervision. All its powers proceed from the Pope as primate, either expressly or by implication. In this cat¬ egory are ranked cardinals, patriarchs, exarchs, metropolitans and archbishops, and as deriving their powers from these, archpriests, arch¬ deacons, rural-deans, vicars-general, etc. The Anglican Church also recognizes a hierarchical rank in its body, comprising bishops, priests and deacons. The other Protestant bodies prac¬ tically reject hierarchical government.

c. HIERO I, hi'e-ro, king of Syracuse in Sicily: d. Catania 467 b.c. He was brother and successor of Gelon. Hiero's reign, though less glorious than the preceding, was marked by a peculiar splendor on account of his gen¬ erous encouragement of learning. Though some blemishes tarnish the first years of Hiero's reign, he compensated for his first faults by the noble actions which signalized the remainder of his life. A long sickness was the main cause of this alteration. Since he could no longer oc¬ cupy himself with the cares of royalty, he col¬ lected around him a society of learned men, and thus becoming acquainted with the pleas¬ ures of learning, he never afterward ceased to value it. His court became the rendezvous of the most distinguished men of his time. The names of Simonides and Pindar appear among those of his most constant companions, and when yEschylus left Greece, he betook himself to Hiero, to close his days in his kingdom. He was several times victor in the Grecian games.

HIERO II, king of Syracuse: b. before 306 b.c. ; d. 216 b.c. He was the son of Hier- odes, a noble. Syracusan, who claimed a descent from the family of Gelon. During Hiero's reign began the First Punic War, and he was able, by his adroitness, to preserve the friendship of both Romans and Carthaginians. The glory of Hiero and the prosperity of Syracuse culmi¬ nated. in the period which intervened between the First Punic War and the second; for in that season of peace Hiero enacted wise laws and

was devoted to the happiness of his subjects. His encouragement of agricultural pursuits en¬ riched him and doubled the revenues of the state. He left the crown to his grandson Hieronymus.

HIEROGLYPHICS. Hieroglyphics (((sa- cred carvings®) is the term which the Greeks applied to the monumental writing of the an¬ cient Egyptians. It fairly interprets the Egyp¬ tian mdw-ntr, ((speech of the god,® though with a different connotation; for to the Egyptian of about 3500 b.c., the date of the earliest surviving hieroglyphs, written speech presumably was so marvelous that it seemed necessarily of divine origin, while the Greek who compounded our term 3,000 years later was distinguishing rather between the form of writing which he saw carved on tomb and temple walls and the forms then in use for pen-and-ink documents. The temple inscriptions of that later age were, as we shall see, an artificial product, a sealed book not only to the Greek but to his Egyptian contemporary; and this thought of mystery survives in our common use of the word ((hiero- glyphs® for any (to us) unintelligible signs. In the field of science the term has been extended beyond the Egyptian which we shall consider here to other systems of picture-writing such as the Hittite in ancient Asia Minor and the Mayan of Yucatan.

Nature. — Marks of ownership, messages, memoranda of taxes, accounts and notable per¬ sonal achievements — all these call for a means of record. So identification marks are scratched on pottery jars, and royal votive offerings of carved stone commemorate their donor's conquests. For such purposes the Egyp¬ tian drew upon his environment. Men and women in various expressive attitudes, parts of the body, creatures of the animal world, objects of earth and sky, clothing, tools and weapons are among the fundamentals which could be directly illustrated. In Fig. 1 (from a votive slate palette of 3400 b.c. or earlier)

Fig. l.

the king, represented by his symbol the falcon, holds in one claw a rope passed through the nose of a human head. The latter grows out of the long, narrow sign which to the native of the long, narrow Nile Valley represented Hand.® From the Hand®-sign sprout six lotus leaves, such as occurred by thousands in the Delta marshes. The composite, thus resolved, indicates that the king has carried off from a hostile land 6,000 human captives. Such symbol¬ ism is, of course, not true writing; it is merely the expression of an idea, which different readers might phrase differently. But below the

Hand®-sign appears a harpoon, followed by a rectangle crossed with wavy lines. The name of the foreign land, then, is similar to the Egyptian name of this harpoon, wa (really wc ; see below) ; and the framed (

When we recall the strangeness of Chaucer to modern ears and how we treat Anglo-Saxon as a distinct tongue, it is but natural to assume that the hieroglyphs whose origin has just been traced really represent a whole series of suc¬ cessive languages. This is, in fact, true. The most important historical periods in Egypt, with their linguistic characteristics, are :

A. Old Kingdom (Dynasties III-VI, about 3000-2500 b.c.) . Earlier labels on boxes, jars or grave markers are now followed by nobles' tomb-inscriptions displaying the same brevity of writing. From royal burials come the most important of all early records, the Pyramid Texts (see below).

B. Middle Kingdom (especially the XII. Dynasty, about 2000 b.c.), the classic age. Spellings reach their greatest uniformity and the types of literary composition are most di¬ versified. The folk-speech of this period forms a distinct dialect, just as the common speech of to-day differs from the cultivated literary style.

C. Empire (especially the XVIII-XIX. Dynasties, about 1580-1200 b.c.). Tomb and temple inscriptions in hieroglyphic are modeled on classic forms ; but from these the folk-lan¬ guage has already diverged so widely that it deserves the distinctive name New Egyptian.

D. Renaissance or Restoration (XXVI. Dynasty, 663T525 b.c.). Imitation of Old Kingdom writing and ideas. But the hiero¬ glyphs thus reused have passed out of current knowledge. The colloquial language of this age is named after its cursive system of writ¬ ing, the demotic.

E. The Graeco-Roman Age (332 B.c.-4th century a.d.) used for ordinary purposes a later stage of the demotic. But its temple inscrip¬ tions were couched in absolutely artificial hiero¬ glyphic systems which exhibit an abundance of new signs and new values.

F. The Coptic (3d century a.d. ff.) is the last phase of the old Egyptian tongue, trans-

literated from the demotic into Greek char¬ acters when Christianity was introduced into Egypt. Though now a dead language, one dia¬ lect is still in official use by the Coptic Church, paralleling Latin in the Roman

Catholic.

The. Egyptian linguistic principles show kin¬ ship with East and North African language- groups and likewise with the Semitic tongues of neighboring Arabia and Palestine. As in the latter, the essence of a word is contained in its root, the consonantal framework left after excluding prefixes or affixes, while its particular application depends on these latter or (more commonly) on only the accompanying vowel sounds. The effect is as though ram, arm, army, ream, aroma and roomy in English were all related concepts based on a root rm. The context is expected to suggest the proper vocal¬ ization. The resultant mental attitude reckons consonants alone as making up the alphabet. The Egyptian alphabetic hieroglyphs (as ar¬ ranged by modern scientists), with their sym¬ bols and English equivalents, are :

A

A

(carrion-kite) , ,

Hebrew K (Aleph), the smooth breathing in Greek; it may be heard

in

am

»

or

an

(

hour® if the words are distinctly separated in pronunciation.

(palm-leaf) y or I; initially often = Aleph,

hence the two elements of the second symbol.

Hebrew y (Ayin), a vigor¬ ous expulsion of the breath through the con¬ tracted glottis.

(fore-arm, palm up)

(plover) w

□

(lower leg and foot)

(mat for offerings)

(snail?)

f

(owl)

m

/VWW

(wave of

n

water)

(mouth)

r and l

ra

(ground-plan h

of some building)

J (twisted h, fricative, stronger than h

fibers)

© (placenta) ht the guttural heard in

German ach or Scotch loch

£— «= > (teats, etc. h_, a stronger guttural than h of some ~*

animal)

P

(bolt of a 5 door)

(folded roll s of cloth)

) both pronounced as s what the original dis tinction in sound ma1 have been is unknown

CAL

A

Q

o

□ (pool of s, the sh- sound water sur¬ rounded by coping)

(hill-side) k or q

(cup with k handle)

(jar-stand)

(loaf of bread)

3 (tether) d (hand)

g

t

t,

‘o

(serpent)

_ the f/j-sound as in thin; later confused with t.

d, really a more emphatic t, the Hebrew ta (Teth); the Egyptian seems to have had no real d- sound.

d, etymologically = Hebrew S (Sadhe); later confused with the preceding d. The d, where it has pre¬ served its individuality, has in Coptic a j-sound.

The Egyptian could have written adequately with only these 24 alphabetic characters ; but he was too conservative to give up his other hard- won hieroglyphs. All the varieties, phonetic and determinative, thoroughly intermingled, per-

sisted to the end. Thus /%. i is the clas-

/wvw\ nr TJ

sic writing of the adjective mnh, “excellent?*

The EEEL j pictures an oblong chess-board seen from above, with a group

of chessmen upon it in side view, illustrating the Egyptian art prin¬ ciple of faithfulness to known realities rather than to a misshapen modern perspective. It is a phonetic group-sign for mn; the same n is repeated as a so-called "phonetic complement® by the alphabetic /ww\a. The alphabetic ˆ is

followed by a word-sign which will orig¬ inally have pictured a maul mnh, but is found

regularly in our transferred meaning instead. The use of the preceding hieroglyphs, which have already stated its phonetic value, is un¬ doubtedly a secondary development intended to

facilitate the reading; otherwise the here

might be considered a "phonetic determinative,® i.e., a determinative not of the sense but of the phonetic group. Unquestioned phonetic deter¬ minatives of parts of words do, indeed, occur.

The) , representing a rolled papyrus document

(see below) tied with a cord and sealed with a clay pellet over the knot, is the regular de¬ terminative of abstract terms. The supple¬ menting (not supplanting) of pictorial by pho¬ netic signs, as seen in the above example, means that instead of 24 some 600 signs were in com¬ mon use. Such a system was far more com-

**To make pronounceable these vowelless writings of Egyptian wordg, the modern Egyptologist often treats cer¬ tain consonants as if they were vowels (J and e as a, y as *,*

w as u) and then inserts short e's where needed. So mnh may be called meneh. ~

plicated than our English spelling, and the man who had mastered it in both its monumental and its cursive forms (see below) might well be proud to call himself a scribe. His ac¬ complishment opened for him the pathway to high office.

Use. — By the I. Dynasty (about 3400 b.c.) the Egyptian had learned to paint or incise his hieroglyphs on stone and pottery, wood and ivory, and moreover to carve them in relief (see Fig. 1). But the most representative of

all Egyptian methods of writing — in common use already by the Old Kingdom — was made pos¬ sible by the papyrus plant, whose tall stalks flourished in all the swamps and pools. The long strips into which sections of the stalk could be cut lengthwise were glued together side by side and crossed at right angles by another similar layer. When pressed, dried and scraped, a flexible sheet of vegetable fibre, the direct ancestor of our modern paper, was pro¬ duced. On such papyrus sheets or rolls (for the sheets were usually glued together into strips of the desired length) the Egyptian scribe wrote rapidly with pen and ink as do we, his cultural descendants. But a modern split pen- point would have been ill suited to the soft, unglazed surface of h's papyrus ; so the Egyp¬ tian softened the end of his reed pen, probably by chewing it, until it formed a sort of tuft with which he practically painted his characters. His black ink was of soot suspended in a solu¬ tion of gum and water ; his palette always car¬ ried red ink also, similarly made with iron oxide, and regularly used for headings and catch-words. This custom, passing into Euro¬ pean manuscripts, survives to-day in printed rubrics. The papyrus was ordinarily held in the unsupported left hand, except when the roll was extremely long and heavy, in which case the scribe might squat and spread it across his knees ; the pen met it at a right or slightly acute angle. As the writing-surface was un¬ rolled from the left so as to come under the pen held in the right hand, the lines and col¬ umns naturally progressed from right to left, reversing our own method. This same Egyp¬ tian technique spread into Asia soon after 1100 b.c., almost contemporary with the appearance of the Phoenician alphabet, from which the Greek, Latin and our modern Western alpha¬ bets are descended. Now the Phoenician differs from other Hither Asiatic writing, but agrees with the Egyptian, in technique, in direction of writing, in its lack of vowels and fundamen¬ tally in the very principle of alphabetic instead of syllabic signs. So it is quite probable that the letters with which this article is printed are the remote offspring of the hieroglyphs with which it deals.

That the hieroglyphs proper, especially as used on tomb or temple wall, were intended as much to decorate as to inform is evident from the calligraphic grouping of signs as far as pos¬ sible into squares and from the balancing of inscriptions as well as of scenes. For this pur¬ pose the normal order of writing, in which the signs face toward the right, the beginning of the line, is often reversed in one-half of a design. Each of the two units usually then faces toward the centre, reading from there outward. The decorative motive is emphasized in addition by pictorial details common in both

cutting and painting of individual signs, and by the calmness with which scribe as well as stone-cutter can overlook errors in the text which may entirely obscure its sense for modern readers and must often have done so

for the ancient. Papyrus documents, on the other hand, needed only to be useful. Thanks to the unusual dryness of the Egyptian climate, vast quantities of these elsewhere perishable records have survived. They include letters, reports of court proceedings, volumes of charms for the benefit of the dead and other volumes of romance to entertain the living. In drawing on papyrus the brush-pen naturally gave to the hieroglyphs a bolder, more cursive form. The resulting hieratic system of writing paral¬ lels the hieroglyphic for almost 3,000 years, being related to the latter much as modern handwriting is to print. The hieratic of the Old Kingdom was in vertical lines only, like the Chinese. During the Middle Kingdom horizontal lines appear and soon completely displace the vertical. Both styles are found together in Fig. 2, a bit of our earliest historical

Fig. 2. Pages from the Tale of Sinuhe.

novel, . the tale of Sinuhe (see below). Of the hieratic forms, though they change from age to age, two general types are distinguish¬ able : the uniform ((book-hand® with its signs mostly standing out individually as here illus¬ trated, and the hurried business hand of the clerk or court reporter who often links signs to¬ gether by the continuous sweep of his pen. By inevitable reaction many single signs or ligatured groups which had diverged widely from their originals were ultimately adopted as new characters into the hieroglyphic, while modified and disguised forms of others totally displaced their unequivocal originals. The process in Egypt was akin to that in early Babylonia, where, however, the rendering of signs by impressed wedges (cuneiform writing) in successive modifications not only effectively obscured the whole body of original pictures but entirely did away with the parent system. By 500 b.c. a new and more compressed busi¬ ness hand, the demotic, which had so lost all resemblance to the original hieroglyphs that whole associated groups of characters were fused into single signs, had developed in Egypt. The hieratic thereupon gained a sanctity which had previously accrued to the no longer under¬ stood hieroglyphs. The Greek names hieratic (<(priestly®) and demotic ((

could ill be spared to make scratch paper, memoranda and even actual letters and other documents were often scribbled on potsherds or flakes of limestone, which were abundantly available to everyone. These rough substitutes, inscribed in hieratic, demotic or Coptic, are called ostraka.

Decipherment.— The basis of our knowl¬ edge of ancient Egyptian dates back less than 100 years. Whatever the Greeks may once have known

about the subject was lost, with one unfortunate exception: the highly fanciful treatise of a certain Horapollo survived to spread a mistaken notion that the hieroglyphs were mystic symbols which pure science must avoid. Yet before 1800 the Dane Zoega had recognized that frames (<(cartouches®) met with around certain groups of signs indicated kings' names, and had correctly distinguished some monuments as late by their style alone. Then in 1799 Napoleon's expedition to Egypt dis¬ covered at Rosetta an inscription dated in 196 B.c., deifying King Ptolemy (V) Epiphanes for numerous benefits conferred upon the priest¬ hood and ordering that this their resolution be displayed beside Ptolemy's statue in all the im¬ portant temples (

Among Champollion's followers should be mentioned especially the German Lepsius and his successor at Berlin, Adolf Erman, the father of Egyptian grammar. Another German, Hein¬ rich Brugsch, composed in the years 1866-80 a seven-volume hieroglyphic-demotic dictionary, much of which, and especially the system of transliteration, is long since obsolete. For not

until the work was almost completed did the wholly consonantal nature of Egyptian writing become clear. The fact that the Greeks had artificially vocalized with 3, e, y, and w the proper names with which decipherment began is still, indeed, used by some Egyptologists as one evidence for vowels in the Egyptian alphabet. To advance the study of vocabulary as well as grammar, the four learned academies of Ger¬ many have been engaged since 1897 in minutely classifying the words and usages of all avail¬ able Egyptian texts. Specimen pages of the great (Berlin Dictionary which is to result were issued in 1916.*

Grammar.— The classic grammatical sys¬ tem may be briefly outlined. Various types of roots (see above) are distinguished, according as they contain two, three (the usual number), lour, or even five consonants (called radicals). these may be either strong or weak. The weak consonants (3, y, w) are so called be¬ cause they combine easily with preceding vowel sounds to lengthen them or form diphthongs with them. Hence y and w especially are in many cases omitted from the consonantal writing. The weak roots (those containing weak radicals) are distinguished as I 3, II w, u ˆ the Roman numeral indicating

the position of the radical concerned), or, in the case of w and y, which show numerous interchanges, simply I, II or III weak. Another variety of root has the last two radicals (most commonly II and III) alike. As the Egyptian, besides omitting weak consonants, never wrote two like consonants together except when a vowel sound came between them, these special types of roots assist in determining at least the position, though not the nature, of the unwritten vowels in several verb forms. The Coptic with

ˆree characters shows the vowels used at that late date in the tiny fractions of the old vocabulary and grammatical forms which still survived. Other hints of the vocalization are obtained from Greek transliterations of Egyp¬ tian words, and in still fewer cases from the earlier Babylonian and Assyrian.*

As in other languages, the verb is the heart of the Egyptian sentence. It follows in some measure the Semitic principle of distinguishing not among present, past and future, but between the finished (perfect) and the still progressing (imperfect) action or condition, in no matter what field of time they lie. The former cor¬ responds roughly to our past, the latter to our present and future. But the Egyptian-Semitic analogy is very incomplete ; so the usual desig¬ nations of Egyptian tenses are taken directly irom the paradigm-verb sdm , <(to hear.® The

simplest form is the sdm-f («he hears®), in which only an enclitic pronoun or a noun fol¬ lows the root as subject of the verb. The con¬ jugation of this tense runs: sdm y I hear sdm -h we hear

thou (m.) hearest

*thou (f.) hearest * dm-tn ye hear*

he hears

she hears sdm-sn they hear

In the earliest texts dual forms also, similar to the plural but with y added (sdm-ny , <(we

two hear,® etc.), are found. The consonantal modifications in special types of roots (espe¬ cially the II doubled and III weak) show that

sdm-k

sdm-t

fdmf

sdms

this tense was vocalized in at least three differ¬ ent ways, according to the shade of meaning: emphatic, declarative or optative, and circum¬ stantial

or conditional respectively.

Though the sdm-f occurs in narrative also, the commonest representative of our past tense E the w-fo.rm sdtn-n-f (<(he heard®). Other

shades of thought are expressed by forms with yn , hr or k l in the place of the n. For the

v

passive, tw is attached just before the subject (e.g., sdm-kl -tw-f, (

passive sdm-n-tw-f is usually, the passive sdm-tw-f sometimes, replaced in the case of noun subjects by a form sdm-w-f. A causative

conjugation is formed with prefixed s (e.g. s-nfr, «to make beautiful,® from nfr, «to be beautiful®).

A remnant of an older verbal system, ap¬ parently related to the Semitic perfect, uses in¬ flectional endings, takes no suffix-pronouns, and always follows a noun subject (contrary to the sdni-f usage). As it occurs chiefly in circum¬ stantial clauses, it has been called the pseudo¬ participle. Both this and the sdm-f system are

used with auxiliaries to make compound con¬ jugations closely analogous to such English forms as <(I am going,® ((I did go,® and ((I am to go.®

The Egyptian verb is distinguished for one unique development, the relative-form, made in the sdm-f and sdm-n-f tenses by inserting

masc. w or fern, t after the root. The result¬ ing sdm-w-y, sdm-t-n-sn, etc., mean (<(he)

whom I hear,® (((she) whom they heard,® etc., and are used as nouns or adjectives.

The problems involved in translating from Egyptian texts may be realized in some measure

when it is noted that such a form

may be read sdm-k {sdm-f form, with at least

three pronunciations and corresponding dif¬ ferences in meaning; or infinitive + suffix, «thy hearing,® where ((thy® may be either sub¬ jective or objective), sdm-{w)-k (passive in w,

((thou art heard®; or masc. relative-form, <([he] whom thou hearest®), or sdm-k (zvy) (pseudo¬ participle 1 per. sg., <(I being heard®). The context, in conjunction with fairly definite prin¬ ciples of word-order, must be our chief guide amid such perplexities.

The enclitic personal pronouns serve not only as verb subjects but are attached as possessives to nouns (e.g., pr-y, ((my house®). They enter also into composition to make an emphatic ab¬ solute pronoun employed as subject of a nominal sentence (a verbless type whose English equiva¬ lent would require an indicative form of the verb <(be®). Another, older set of absolute pronouns, from which the weak enclitics were derived, represents our objective case. The demonstrative pronouns in common use vary from age to age, but agree in containing p in the masc., t in the fern., and n in the plural. The definite, article ((the,® non-existent before the Empire, is a weakened demonstrative which even in the Coptic shows, the same character¬ istic letters. There is no indefinite article until the Coptic, which uses a weakened form of the numeral (

a in Egyptian thus parallel the developments m modern European languages, including English.

Egyptian nouns and adjectives are of but two genders, masculine and feminine. Their distinctive endings are:

masc. sg. none or w fern. sg. t dual wy dual ty

pl. w pi. wt

As in the verb, the dual was early lost. The prefix m (common in Semitic) is used some¬ times to make nouns of place and especially of instrument (e.g., m'sdm't , <(cosmetic,® from the root sdm, «to paint the face®). There are two main types of adjective formation. The one, showing the simple verb root, is often indistin¬ guishable from a participle; the other, the nisbe (so called from its Arabic counterpart), is made from nouns or prepositions (which were originally nouns) by adding y (e.g. hnsk-t-y,

((curly-haired,® from the fern, noun hnsk-t , (

follows its noun. The same close connection may exist between two nouns as between a noun and a suffix-pronoun; thus pr-f, <(his house,® is analogous to pr-Ymn, ((the house (temple) of Amon.® The second noun, Ymn, is called a direct genitive and is said to be in the construct relation with the first. That the vowel sounds are slurred in the first word of such a phrase, whose emphasis naturally falls at the end, is clearly shown by Coptic spellings. Under other circumstances an indirect genitive is used, preceded by the declinable adjective tty, (

Literature. — The Egyptian language, whose mechanism has just been noticed, has left an extensive literature, characterized by a con¬ creteness of thought as vivid as the concrete pictures with which it is written. Amid the maze of inscribed records which the dry cli¬ mate of Egypt has bequeathed us, the field most largely represented is religion. From the Old Kingdom, 4,500 years ago, come the <(Pyramid Texts,® the earliest large body of literature yet known from any source. A trust in mere mas- sivity of the tomb to preserve royal bodies and so win for them life hereafter was thus early felt inadequate. So during the V. and VI. Dynasties the corridors of five pharaohs' pyra¬ mids were inscribed with varying collections of hymns, prayers, rituals, and magic formulae, in part already hoary with age, calculated to make doubly sure the felicity of the royal dead. Religious texts whose benefits may be shared by all classes are found on the coffins of the Middle Kingdom, and at greater length on long rolls of papyrus (the so-called (

History is represented on the one hand by

fragments of royal annals, annotated royal re¬ liefs and hymns of victory. On the other are memorial records left by expeditions abroad, and the more intimate data derived from auto¬ biographies which nobles and high officials have left carved in their tombs.

The classic age, the Middle Kingdom, is richly productive of philosophy. Satisfaction with the traditional order is evident in a set of maxims, the Wisdom of Ptahhotep, suggestive of the biblical book of Proverbs. But pessi¬ mistic tendencies appear in a misanthrope's dialogue with his own soul on the wretchedness of a wronged and unappreciated life. Another writer looks beyond present misery to a mes- siah who shall establish justice. Eloquence as such is more prominent than the righting of grievous wrongs in a fourth composition, the Laments of the Peasant.

The same fondness for affected language permeates the Middle Kingdom tale of Sinuhe (see Fig. 2), a historical novel depicting the supposed adventures of a fugitive Egyptian courtier of that name in Palestine over five hundred years before the coming of the He¬ brews. Even love-songs survive from the late Empire.

Science, represented by mathematics and medicine, was clearly cultivated for practical pur¬ poses only; for the mathematical formulae are very inexact, and the medical prescriptions are in large part based on magic.

Bibliography. — A fuller picture of Egyptian literature proper, with translations, may be gained from Breasted, development of Reli¬ gion and Thought in Ancient Egypt5 (New York 1912), and Maspero, (Popular Stories of Ancient Egypt 5 (New York 1915). On the technique of the writing, consult Breasted in The American Journal of Semitic Languages and Literatures (July 1916, pp. 230-49, ill.). English readers have as yet no handy volume on the subject of hieroglyphics in general, such as Germans enjoy in Erman, die Hiero- glyphen5 (Berlin 1912).

T. George Allen,

Secretary, Haskell Oriental Museum, University

of Chicago.

HIERONYMUS. See Jerome, Saint. HIEROSOLYMA. See Jerusalem.

HIGGINS, Anthony, American politician : b. Red Lion Hundred, Del., 1 Oct. 1840; d. New York, 26 June 1912. He was educated at Yale, studied at Harvard Law School and was admitted to the Delaware bar in 1864. From 1869 to 1876 he was United States attorney for Delaware, and becoming interested in politics was chairman of the Republican State Conven¬ tion in 1868. In 1881 he secured the vote of the Republican members of the Delaware legis¬ lature for the United States Senate and in 1884 was defeated as a Republican candidate for Congress. He was United States senator 1889-95. He was counsel for Judge Charles Swayne in his impeachment in 1905.

HIGGINSON, Ella Rhoads, American novelist and poet : b. Council Grove, Kan., 1862. She was married to R. C. Higginson and has passed her life mainly in the vicinity of Puget Sound, Wash. She has contributed much to periodicals, and her work, which has a dis¬ tinctly original flavor, has attracted much at¬

tention from its vigorous presentation of life on the upper Pacific slope. She is in charge of the literary department of the Seattle Sunday Times, and is a member of the National Geo¬ graphic Society. Her most noteworthy book is (Mariella, or Out West,5 an extremely strong novel (1902) ; and other works of hers are (The Flower that Grew in the Sand5 (1896); (From the Land of the Snow Pearls) (1897); (A Forest Orchid5 (1897);

HIGGINSON, Francis, English clergyman in colonial America: b. 1587; d. Salem, Mass., 6 Aug. 1630. He was educated at Cambridge, England, and subsequently became rector of a parish in Leicester, but becoming gradually a Non-Conformist, was deprived of his benefice, and was employed among his former parish¬ ioners as a lecturer. While apprehending a summons to

appear before the High Commis¬ sion Court, he received an invitation from the Massachusetts Company to proceed to their colony, which he accepted. He embarked in May 1629, and it is related by Cotton Mather that as the ship was passing Land's End, he called the passengers about him and exclaimed : ((We will not say, as the Separatists were wont to say at their leaving of England, (Farewell, Babylon; farewell, Rome!5 but we will say, Farewell, dear England ! farewell, the church of God in England, and all the Christian friends there. We do not go to New England as Sep¬ aratists, though we cannot but separate from the corruptions of it. But we go to practise the positive part of church reformation, and propagate the gospel in America.55 He arrived at Salem 29 June, and on 20 July was chosen teacher of the congregation established there. Subsequently Higginson drew up <(a confession of faith and church covenant according to Scripture,55 which on 6 August was assented to by 30 persons, who associated themselves as a church. He wrote (New England's Planta¬ tions, or a Short and True Description of the Commodities and Discommodities of the Coun¬ try5 (1630), and an account of his voyage, printed in Young's (Chronicles of the First Planters5 (1846). Consult Higginson, T. W., (Life of Francis Higginson5 (1891).

HIGGINSON, Francis John, American naval officer: b. Boston, 19 July 1843. In 1861 he was graduated at the United States Naval Academy; was promoted through the various grades, becoming rear-admiral on 3 March 1899. In 1861-62 he served on the Colorado in the West Gulf blockading squadron; was wounded at Pensacola Harbor, and took part in the bom¬ bardments and passage of Forts Jackson and Saint Philip. He was present at the engage¬ ments with the Chalmette batteries and at New Orleans. He served on the Vixen in 1862 and on the Powhatan in 1863-64. Becoming at¬ tached to the South Atlantic blockading squadron he participated in the bombardment of Fort Sumter and was on board the Housa –

tonic when she was blown up by a torpedo off Charleston. After the war for 30 years he served all over the world in various squadrons and in various capacities at the naval stations at home. In 1897-98 he commanded the Mas¬ sachusetts and was advanced three numbers in rank for eminent and conspicuous conduct in battle during the Spanish-American War. In 1901-03 he was commander-in-chief of the North Atlantic fleet and from 1903 to 1905 commandant of the Washington navy yard. He Was retired 19 July 1905.

HIGGINSON, Henry Lee, American banker: b. New York, 18 Nov. 1834;

d. Boston, 14 Nov. 1919. He was educated at Harvard, studied music abroad and served in the Fed¬ eral army during the Civil War and was brev- etted lieutenant-colonel. He has long been con¬ nected with the Boston banking and brokerage firm of Lee-Higginson & Co., and contributed large amounts toward the organization and support of the Boston Symphony Orchestra. He was elected a Fellow of the Harvard Cor¬ poration in 1893. He was a member of the Massachusetts Historical Society, and the American Academy of Political and Social Sci¬ ence. His benefactions were numerous and his activity in the field of social service earned for him the title of ((Boston's first citizen.®

HIGGINSON, Mary Thacher, American author, wife of T. W. Higginson (q.v.) : b. Machias, Me., 27 Nov. 1843. She has written c Seashore and Prairie) (1876) ; (Room for One More> (1879) ; and (Such as They Are) (1893), poems written in collaboration with her hus¬ band; (The Playmate Hours, 5 poems (1904); (Thomas Wentworth Higginson: The Story of his Life) (1914).

HIGGINSON, Thomas Wentworth, Amer¬ ican author: b. Cambridge, Mass., 22 Dec. 1823; d. there, 10 May 1911. He was descended from Rev. Francis Higginson (q.v.) ; was graduated from Harvard in 1841, and from Harvard Di¬ vinity School in 1847. He became pastor of a Unitarian church in Newburyport, Mass., in 1847, but resigned in 1850, his anti-slavery views being unacceptable to his congregation. In the year last named he was the unsuccessful ((Free Soil® candidate for Congress, and he was pastor of a Free (unsectarian) church at Worcester, Mass., 1852-58. In the interim he had been prominent in anti-slavery agitation, and for his share in the attempted rescue of the fugitive slave Anthony Burns (q.v.), was indicted for murder in 1854 with Wendell Phillips, Theodore Parker and others, but owing to a flaw in the indictment the defendants were discharged. He also aided in the Kansas Free State efforts, and during the Civil War was captain of the 51st Massachusetts regiment of volunteers, becom¬ ing colonel in November 1862 of the 1st South Carolina Volunteers, the earliest regiment of freed slaves in the Federal service. He re¬ signed from the army in October 1864, by rea¬ son of disability, and thereafter gave his at¬ tention to literature, residing at Cambridge, Mass., since 1878. He was almost a life-long and consistent advocate of woman suffrage and of the higher education of woman, and was a member of the Massachusetts legislature 1880- 81, serving on the State board of education also, 1881-83. He was a polished, graceful speaker, and frequently appeared on the lecture vol. 14 — 12

platform. He was the Lowell lecturer on American literature in Boston in 1902. As an after-dinner or occasional speaker he was es¬ pecially happy, his felicitous sentences being almost always illuminated by the play of a

very delicate humor. He was president of the Round Table, a social Boston club, and vice- president of the Boston Authors Club, as well as a member of many other organizations, social and literary. He was for a generation a con¬ stant contributor to periodicals of the highest class and figured in literature as essayist, novel¬ ist, poet and historian. His principal work in fiction is (Malbone) (1869), in which his first wife is outlined as Aunt Jane. As an essayist he is perhaps seen at his best, the essay form seeming peculiarly adapted to his genius. Among collections of essays by him may be cited (Outdoor Papers) (1863) ; (Atlantic

Essays) (1871) ; (Women and Men5 (1887) ; (The New World and the New Book5 (1891) ; and (Concerning All of Us5 (1892). His (Young Folks' History of the United States) (1875) has been widely popular, and other his¬ tories by him are (Larger History of the United States) (1885) ; (English History for Ameri¬ cans5 (1893) ; Massachusetts in the Army and Navy, 1861—65) (1895-96). His verse is in¬ cluded in (The Afternoon Landscape) (1889) ; (Such as They Are) (1893). Yet other im¬ portant works by him are (The Monarch of Dreams,5 a strikingly original sketch (1886) ; (Army Life in a. Black Regiment5 (1869) ; (Cheerful Yesterdays5 (1898) ; (01d Cam¬

bridge5 (1899) ; Contemporaries5 (1899) ; and lives of Margaret Fuller (1884) ; Francis Hig¬ ginson (1891); Henry W. Longfellow (1903); John Greenleaf Whittier (1903) ; (History of the United States5 (1905). He translated the complete works of Epictetus (1865, revised ed. 1891). With Samuel Longfellow (q.v.) he completed a well-known anthology of seaside verse, (Thalatta5 (1853), and with Mrs. E. H. Bigelow (American Sonnets5 (1890). Several of his works have been translated into French, German, Italian and . even modern Greek. He was the friend of very many of the older New England writers and was especially helpful to many of the younger ones, not a few of whom owe him much in the way of kindly criticism or suggestion, the fruit of ripe scholarship.

HIGH BRIDGE, Engagement at. See

Farmville.

HIGH CHURCH, a term applied to a fac¬ tion in the Church of England. It was applied first to the younger clergy during the latter part of the reign of Elizabeth who asserted that Calvinism was inconsistent with the ancient doctrine and constitution of the primitive Church, and who claimed a divine right for episcopacy. Bishop Andrews was the chief writer of this faction, and Laud became its 'most active leader. The term now generally refers to those who exalt the authority and jurisdiction of the Church, and attach great value to ecclesiastical dignities and ordinances, heing more or

less identified with the ritualistic party. See Ritualism.

HIGH EXPLOSIVES. See Explosives and related references.

HIGH-FREQUENCY OSCILLATING CURRENT. This term is especially applicable to electrical currents, the high-frequency inter-

ruptions of which are obtained by means of con¬ denser discharges in contradistinction to those produced by a disrupted static current, without the interposition of a metallic condenser in series with one or both terminals. The latter differs in several characteristics and is essen¬ tially a high potential current, 10,000 to 50,000 volts, with a minimum amperage, usually about .0005. The usual alternating current in com¬ mercial use in the United States is that known as 60-cycle : that is, it makes 60 complete journeys — there and back, so to speak — in each second. It has changed its direction, therefore, 120 times in the second. The high- frequency current changes its direction 20,000 times or more per second.

To generate a high-frequency current it is usual to charge two Leyden jar condensers with a high potential current, the source of which may be a static machine or induction coil, shunting the two wires with a spark-gap for the purpose of disrupting the current. The external armatures of the condensers are short- circuited through a solenoid or helix consisting of a few turns of very coarse copper wire (D'Arsonval). The helix may be substituted by a straight copper bar (Sheldon). The helix prolonged to from 50 to 100 turns constitutes the resonator of Oudin. The upper part of the helix resonates in unison with the lower, when properly in tune, as would a tuning-fork reso¬ nate with another of the same pitch. The office of the extended helix is to amplify the current.

Another arrangement is after Tesla : The primary of a specially constructed induction coil is energized by an alternating current. The secondary terminals, giving a potential of 15,000 volts, are connected, one to each side of a suit¬ able condenser. From each of these terminals a shunt is taken. One leads to one end of the primary of a Tesla coil ; the other, broken by a spark-gap, is connected to the second terminal of the primary. The frequency obtained from the Tesla apparatus is fabulously high — mil¬ lions a second. The potential may be hundreds of thousands or millions of volts. The amper¬ age is sufficient to light to full candle-power several incandescent lamps. The primary of the induction coil consumes 15 to 25 amperes. For maximum high-frequency effects this type of apparatus

seems to be essential. There are many modifications of this apparatus.

At the terminals of a working high-fre¬ quency apparatus is seen a beautiful brush dis¬ charge or effluve of a peculiar violet color, which will leap to any object brought near it. These brush discharges range from 20 inches upward to 50 inches in length. Interpose a plate glass one-half inch thick (or more), and the effluve will penetrate it. If the object be a vacuum, tube it will glow almost as brightly as if nothing intervened. It is an ideal current for igniting Geissler and low-vacuum X-ray tubes ; only one terminal need be connected.

One characteristic of the high-frequency oscillating current is its lack of power to excite the motor nerves, and, aside from a slight sen¬ sation of warmth, the sensory nerves at the point where the electrode touches the body. The accepted explanation for this fact is, that the nerves respond to certain frequencies of stimulus ; for the motor nerves, reaction takes place up to about 5,000 frequencies; if these are

gradually increased muscular contraction di¬ minishes and finally ceases. This theory is in line with reasoning as to the cause for action of the special senses — sight and hearing.

The high-frequency discharge is a rich ozone generator, and, applied to unhealthy granula¬ tions and various skin diseases, acts as an oxi¬ dizer, antiseptic and disinfectant. Applied to the skin before incision, it will render the site aseptic. In the hands of the expert electric phy¬ sician the high-frequency current is used to remedy several diseased conditions. The vacuum-tube is employed to increase arterial tension, the D'Arsonval current to decrease it. The former is productive of a powerful tonic effect in cases where the blood pressure is nor¬ mal, but is dangerous where arterio-sclerosis exists. The vacuum-tube application increases the blood supply to the part under treatment, resulting in an improvement in nutrition at that point. Its application is also marked by an in¬ crease of the functions of excretion and secre¬ tion. The high-frequency current has been used successfully in renewing the growth of hair where the follicles have not been destroyed, and in many cases has restored the original color to hair which had turned gray. The treatment is also efficacious in corpulency. For a general tonic effect the patient is placed upon an auto-condensation couch or in the centre of an auto-conduction cage. In the treatment of sub-acute and chronic rheumatism, sciatica, neurasthenia, etc., it is most useful. (See Elec¬ trotherapeutics) . Consult Curtis, T. S., (Chicago 1913).

John M. Garratt, M.D.

HIGH-POTENTIAL SYSTEM. See

Electrical Terms.

.high PRIEST, the head of the Jewish priesthood. In the books of Moses the holder of this dignity is simply designated the priest, the epithet high occurs on one or two oc¬ casions, but as a distinctive epithet it appears to have been added subsequently. The formal consecration of Aaron, the brother of Moses, together with his sons, to a hereditary priest¬ hood, is recorded in Ex. xxviii. The high- priesthood continued in the line of Aaron, some¬ times in one, and sometimes in another branch of it, until the coming of Christ. After the subjugation of the Jews by the Seleucidse, the Ptolemies and the Romans, it was often arbi¬ trarily conferred by the foreign masters. The dignity of the priest's office is indicated by the splendor and costliness of his garment, which was among the most beautiful works of ancient art. To the high priest belonged the regula¬ tion and superintendence of the worship of God, the declaration of the oracles of Jehovah to the people (he alone being permitted to con¬ sult them on important public occasions), and the preservation of the national sanctuary. Al¬ though the administration of justice was com¬ mitted to particular judges, yet to him the last appeal was made in difficult cases, even in tem¬ poral affairs, and nothing important in war or peace could be undertaken without his assent.

HIGH SCHOOLS. The high school as commonly interpreted is distinctively an Ameri¬ can institution. The term is applied to those

schools which ordinarily give a four-year course of study to students who have completed eight years in the elementary school. The course is rarely longer and is sometimes shorter than four years.

These schools grew up in the early history of the United States to supply a distinct need. The state was providing an education for the people in the elementary schools. Those families which were intending to send their children to college sent them to Latin schools which received pupils at the age of 10 or 11 and gave them a course of six years. For en¬ trance to these there was demanded a prelimi¬ nary education of approximately six years.

To answer the demand of those who did not intend to send their children to college there grew up in the United States private academies which received pupils before they had finished their elementary course of eight years or after such a course had been completed. The academy therefore usually

furnished a pre¬ academic course for the former and the aca¬ demic course of four years for the latter. Students could go from the academy to a col¬ lege, but this was not the prime motive of the institution.

The academy was private, charged tuition fees and in a way was intended for people of means. A demand arose for an institution to which pupils could go who had finished the elementary school course, which should be free and prepare its graduates to enter the pursuits of practical life. The English High School of Boston, founded in 1821, was the first of its kind, and gradually, as free elemen¬ tary schools were established throughout the country, the high schools soon followed. The academies gradually died out.

The high schools were essentially demo¬ cratic in origin and were not intended to pre¬ pare students for college. With the passing of the academy, however, and in view of the fact that, except in the older States along the Atlantic seaboard, the Latin school was un¬ known, there developed a demand that the high school of the community should offer courses which would prepare students for college. As the principals and the teachers of the high schools were frequently products of the col¬ leges, they lent willing ears to such demands and the high schools came at times to take on the character of college preparatory schools, and their original ends were lost sight of. Even the pioneer of them, the English High School of Boston, felt called upon to offer a special year to prepare its graduates for college.

The studies offered in the high school, too numerous to be mentioned here, came to be grouped into the classical course, which had for its object the preparation of pupils for college, and the literary and scientific courses which aimed to prepare students either to go out into the world of business or to enter technical in¬ stitutions.

The dominating influence, however, was col¬ legiate and the introduction of business and in¬ dustrial subjects was gradual, and was often met with active hostility by the teaching force. The students and the teachers in the classical course looked down on the pupils who pursued the business or commercial and manual train¬ ing courses. The result was that these led a stifled existence. In communities, where the

high school population became large enough, the commercial students were drawn off and placed in a separate commercial high school, others in a manual training or technical or me¬ chanic arts high schools. Once separated from the classical, these new high schools began to develop rapidly into strong institutions. Sc/ large did they grow that the colleges, which had hitherto felt that the only kind of prep¬ aration which could*

possibly fit students for collegiate work must be that of the classical high schools, now began to rearrange their entrance requirements so that graduates of not only classical but of the other high schools could enter their walls.

In size high schools now range all the way from institutions housing over 5,000 pupils, as in New York city, to small country institutions of only three or four classes. In a community where only one high school exists it is usual to find the classical, literary, commercial, manual and scientific courses all given in one building. The buildings and equipment of some of the high schools and the courses offered both in the East and West frequently rival and out¬ shine colleges and universities, and so import¬ ant are they in some communities that they are called the ((people's colleges.®

Bibliography. — See that given under Edu¬ cation, History of; Brown, E. E., (The Making of Our Middle Schools) ; Brown, J. F., (The American High School > ; Dexter, E. G., (A His¬ tory of Education in the United States) ; John¬ son, C. H., (High School Education,) (The Modern High School) ; Smith, F. W,, (The High School, a Study of Origins and Ten-dencies) ; Weeks, A. D., (The Education of To¬ morrowˆ

James Sullivan,

Director of Division of Archives and History, State Department of Education, Albany, N. Y.

HIGH SEA, The. All the waters of the ocean, which are not included in the territorial limits of any nation, and over which no nation can rightly claim supervisory or exclusive juris¬ diction, are included by the term <(high sea.® A state's territory extends over its adjacent waters to a line following the sinuosities of the coast at a distance of one marine league, to all harbors, and to the mouths of rivers and to straits and bays, when embraced by headlands not too remote from each other. There is no general rule as to the distance between head¬ lands which determines the character of the waters enclosed by them ; but the Bay of Fundy, the mouth of the Amazon and the Strait of Dover, for instance, are unquestionably parts of the high sea, while Chesapeake and Delaware bays would properly be considered territorial waters. The high sea is free to all nations for commerce_ or fishing or any other lawful use; but this right has been conceded only partially and in comparatively recent times. Powerful maritime nations, ancient and modern, have as¬ serted superiority and exclusive jurisdiction commensurate with their ability to compel obedi¬ ence from those weaker than themselves. The Phoenicians would permit ships of no other nationality to pass the Pillars of Hercules out into the

Atlantic ; the Greeks at Byzantium barred others from the Euxine. For nearly 1,000 years, however, the freedom of the high sea was maintained by the Pax Romana ; the Romans included even the rivers in the common

liberties — flumen publica sunt, hoc est populi Romani — Institutes 2, title 1, sec. 2. But the unsettled conditions following the disintegration of the Roman Empire were not brought to a tolerable state of order until, toward the end of the 12th century, a system of maritime law .found general acceptance and was embodied in various compilations of ancient and mediaeval maritime usages and customs, in which the Roman idea of the high sea as a common human possession is assumed, though not de¬ clared, as a basic principle. This principle was controverted however by claims arising out of the great discoveries made toward the close of the 15th century. Vasco de Gama had doubled the Cape of Good Hope and made the voyage to India ; Columbus had opened the way to the western continent. By the famous bulla of Pope Alexander VI the worlds thus newly dis¬ closed were partitioned between Spain and Por¬ tugal, in whose service the great discoverers had sailed. The grantees, who were then and long after the leading maritime powers, asserted, and enforced, the right to exclude all other nations from the oceans as well as the lands divided between them by the papal grant. More particularly, the Spaniards asserted the Pacific and the Spanish Main to be their own by right of discovery, while the Portuguese, by the same right, insisted upon exercising sole dominion over the Indian Ocean. The circum¬ navigation of the globe by Francis Drake was in open defiance of the pretensions of both, and Hugo Grotius, in his celebrated treatise De Mare Liberum, which appeared in 1609, riddled their preposterous claims.

The plea of Grotius for complete freedom of the seas went unheeded, and the rivalry between the English, Dutch and French as colonizing and maritime powers brought forth jurisdictional claims over the ocean highways 'scarcely less objectionable than those previously asserted by Portugal and Spain. It was the exaggeration of belligerent rights at the expense of neutrals during the ensuing two centuries of war for maritime and colonial supremacy that caused the most trouble, however. The armed neutrality, established by the North European powers in 1780 under Russian leadership, was the first concerted effort of the weak to protect themselves against the arbitrariness of the strong in naval power. The objects of this concert of lesser naval powers were the limita¬ tion of contraband to actual war material, to immunize other neutral property, ships in¬ cluded, from seizure and confiscation on the high sea, and to

sustain the right of neutrals to carry on oversea trade in innocent products with all belligerents without interference from either of them. From its very beginning the American government stood out for the great¬ est possible freedom of high sea commerce, even in time of war, and the principle ex¬ pressed in the slogan, <(free ships make free goods,® carried the immunities proposed by the armed neutrality a step further, by extending protection to enemy property when transported in neutral ships. But the American commis¬ sioners sent to France in 1793 to secure adher- ences to this principle were able to obtain only a single treaty embodying the same, that with Prussia, signed by Franklin and his associates at Brussels in 1799. Twenty-five years later a proposal <(to abolish private war at sea and

restrict contraband® was simultaneously sub¬ mitted by this government to all the leading European powers. <(Exemption of private prop¬ erty at sea from destruction and the depreda¬ tions of war is offered to the civilized world by the United States,® wrote Secretary Adams to Middleton, the American Minister at Paris on 13 Aug. 1823. The offer was again rejected; this government, however, not only steadfastly maintained its position, but advanced it as time ran on. When the United States were requested to become parties to the Declaration of Paris, the answer was conditionally affirm¬ ative. This government would become a signatory if the Declaration should be amended by this addition : <(Private property of sub¬ jects and citizens of belligerents on the high sea shall be exempt from seizure by public armed vessels of the other belligerents, except it be contraband.® — President Pierce, 4th annual message, 1856. Even in the throes of the Civil War this government was prepared to forego the advantage of naval capture of enemy ship¬ ping and other property on the sea for the sake of establishing a principle in which it believed. <(We must claim for ourselves the rigors which other maritime powers apply to us when we are neutrals. But even to-day,' in the midst of this strife, if the other powers, in¬ cluding Great Britain, should agree to abolish naval blockades altogether and forever, and to exempt private property from confiscation in maritime war, we are prepared to consider the proposal.® — Secretary Seward to Minister Day- ton at Paris, 28 Feb. 1862. The trend of opinion in later years among international jurists seemed to be toward the American idea of complete freedom of high sea commerce in war as well as in peace. The British dele¬ gates to the second peace conference at The Hague in 1907 had instructions from Sir Ed¬ ward Grey, Minister for Foreign Affairs, to agree to the abandonment of high sea captures and the complete abolition of contraband. But the ((Convention Relative to Certain Restrictions with Regard to the Exercise of the Right of Capture in Naval War,® which was adopted by the conference, left matters practically where they stood. It merely immunized postal cor¬ respondence,

inshore fishing vessels and small boats operated exclusively in coastal waters. The Declaration of London, formulated and adopted by the maritime conference of 1908, failed of ratification, though it was merely declaratory of prevalent usages and gave un¬ diminished recognition to the right of capture on the high sea. The total disregard of con¬ ventions and morals by belligerents in the World War necessitates a complete reformation of the law of the sea, and its enforcement by a super¬ national authority.

With respect to navigable rivers, flowing to the sea through the territory of more than one nation, the Roman principle, flumen publica sunt, has obtained partial recognition. The Rhine was opened to all nations by the Congress of Vienna; the Danube is open, but under con¬ trol of the International Danubian Commis¬ sion. Secretary Marcy, in his instructions of 8 Aug. 1853, to Trousdale, United States Minis¬ ter to Brazil, declared: «The right to peace¬ fully navigate the Amazon River belongs, in international law, to all maritime states.® In a report of 18 March 1792, Jefferson insisted

that, where rivers enter the limits of another society and the rights of the upper inhabitants to descend (or ascend) is obstructed, it is an act of force by a stronger against a weaker nation and condemned by the judgment of man¬ kind. w So far as the Mississippi is concerned, controversy has been closed by the inclusion of the entire stream within the territorial limits of the United States. Access to the sea from the Great Lakes has been subjected at various times to various policies; but the Treaty of Washington (8 May 1871) finally declared that Navigation of the Saint Lawrence, ascending or descending, from the 45th parallel of North latitude, shall forever remain free and open for the purpose of commerce to citizens of the LJnited States.® Reciprocally, Lake Michigan, which is enclosed entirely by territory of the United States, was made free to British sub¬ jects. No laws or police regulations incon¬ sistent with such freedom may be made or en¬ forced in either case; and, by later arrangement, there has been established a perfect equality in the use of all canals and rivers traversed by or contiguous to the boundary and communi¬ cating with navigation on the Lakes. Straits giving access to enclosed seas are considered parts of the high sea. The imposition by Den¬ mark of Sound dues at the entrance to the Baltic had been submitted to by commercial nations, because of their antiquity and because of an unwillingness of the great powers to coerce a weak state (see Danish Sound Dues). Secretary Buchanan (manuscript instruction of 14 Oct. 1848) pronounced these exactions to be

“inconsistent with just principles of inter¬ national law,® and President Pierce (3d annual message, 1855) insisted upon the right of free transit into and from the Baltic. A convention making the Belts and the Sound free to naviga¬ tion by American vessels was ultimately signed 11 April 1857, and this extended, of course, to the citizens or subjects of all states entitled to the treatment of “most favored nations.® The Dardanelles were opened to the free tran¬ sit by commercial shipping of all nations by the Treaty of Paris, 1856. The great inter- oceanic canals of Suez and Panama have been declared open on terms of equality to the ves¬ sels of war and of commerce of all nations. “The government of the United States will not tolerate exclusive claims by any nation what¬ soever to the use of the Straits of Magellan and will hold any government responsible that undertakes to obstruct the same by imposts on commerce.® — Secretary Evarts, manuscript in¬ structions, Chile, 18 Jan. 1879. Crimes commit¬ ted on the high sea are under the jurisdiction of the nation whose flag is flown by the vessel on which they occur. Collisions of vessels of different nationality are properly subject to in¬ quiry in any admiralty court which first obtains jurisdiction.

Stephen Pfeil.

HIGH TREASON. There is a well-known epigram of Sir John Harrington, often quoted for its supposed wit and truth, though it pos¬ sesses little of either of these qualities, which goes as follows:

Treason never prospers. What’s the reason?

When it doth prosper, none dare call it treason.

To be sure, when an attack on established order has met with success the victors do not

prosecute themselves for treasonable conspir¬ acy. A new polity has come into being, the life of a nation has taken a new point of de¬ parture and a new direction, and the former legal sanctions have come to an end. In as¬ suming that an accomplished revolution is nothing more than successful treason, the epi¬ grammatist betrays a shallow way of thinking and an utter lack of appreciation of the fact that the mutability of human institutions is the condition of progress. Indeed, it may be, in the case of an insurrection which has attained the dimension of civil war, that the participants on either side will regard those on the other as enemy combatants, entitled to treatment as such, when made prisoners of war, in accord with the law of nations, and not as common criminals, to be hanged when caught. In the American War of Independence, as well as in the war between the States, the opponents tac¬ itly treated each other as

belligerents. The statute of 11 Henry VII, chap. 1 (1494) dis¬ tinctly provides that obedience to a king de facto, but not de jure, shall not expose the ad¬ herents of the former to penalty for high trea¬ son when the rightful sovereign is re-estab¬ lished in power. On the contrary, however, all systems of law make it treasonable to commit any overt act (Fr. attentat) the purpose of which is to destroy or change the existing government ; to arm citizens, or incite them to arms, for war against the public authorities ; to attack the armed forces of the state, or public property, buildings, fortresses, arsenals, ships, etc., or take possession of the same for use against the state. These and other similar acts, which are specified in the French law of Lese Majeste, are comprised in the English term "levying war,® which neither the laws of Great Britain nor the United States more closely define. In strict law, therefore, all those who had taken part in an insurrection that failed would be punishable criminally as traitors, irrespective of the nobility or ignobility of their cause.

Glanville in a brief note on the crime indi¬ cates that compassing the death of the sover¬ eign, insurrection or concerting with the ex¬ ternal foes of the realm were impeachable (infamatur) whether or not a prosecutor ap¬ peared to make the accusation. Bracton de¬ scribes the crime under the title Laese Majes- tatis and his description bears a recognizable likeness to the Roman law of Majestas. In his enumeration of the acts constituting treason, Bracton leads off with "The manifestation by action of a will to procure the death of the king; to foment rebellion against him; or to adhere to his external enemies.® The resem¬ blance in matter, and in the order of statement, to the Statute of Treason is remarkable; and that this is not accidental is suggested by the fact that the words of the statute, "compassing or imagining the death of our lord the king,® might pass for a translation from Bracton. The Statute of Treason (25 Edward III, a.d. 1352) is not only the foundation of the Eng¬ lish law on the subject, but contains the major part of it. Disregarding certain provisions for the safety of the king's family and the heir to the throne, the statute declares treason to be

(1) forming and displaying by any overt act an intention to kill the king; (2) levying war against the king; (3) adhering to the king's enemies. As Lord Justice Stephen remarked, it makes no provision for acts of violence against the king's person unless they display an intention to take his life. Nothing is said of attempts to imprison or depose him, or to interfere with his unquestioned prerogatives; nor about disturbances of the peace, however violent, which fail to reach the point of actual levying of war. It

fails even to mention at¬ tempts or conspiracies to levy war. In enact¬ ing the measure Parliament seems to have been less concerned for the security of the state than for the security of persons and its purpose seems to have been to make a definition of treason that would exclude perjuries in office, waste of the king's revenue or counterfeiting or clipping his coin, and similar offenses, Avhich had been so accounted. The crown was secure enough. The Scots were troublesome on the border, but domestic tranquillity seemed as¬ sured; the Constitution had been settled and the political institutions of the kingdom had taken practically the form which they have ever since maintained.

The omissions of the statute soon made themselves apparent in the tempestuous reign of Richard II. Acting in its judicial capacity, and overriding the jurisdiction of the courts, the House of Lords, in 1388, impeached the archbishop of York, the Lord Chief Justice, the lord mayor and others for treason, in hav¬ ing led the king to misgovern the country. The traitors were convicted and some of them executed.. Ten years later the accusers were in turn impeached by the king's party. The Duke of Gloucester, uncle of the king, who had been the prime mover in the former prosecu¬ tion, was assassinated, the Earl of Arundel was executed and the Earl of Warwick, who had been sentenced to be hanged, drawn and quar¬ tered, was remanded to imprisonment for life. A statute of Richard II, passed two years be¬ fore his deposition, is described in the repeal¬ ing act (1 Henry IV, chap. 10) as having left matters in such doubt that ((there was no man which did know how he ought to behave him¬ self, to do, speak or say.® The War of the Roses, .contrary to what might have been ex¬ pected in that era of depositions and usurpa¬ tions, passed without changes in the letter of the law. This is not to say, however, that every turn of political fortunes did not bring its score of attainders and executions. In the time of Henry VIII a great variety of new treasons were defined and the heads of many good men, including Thomas More, author of HTtopia,5 fell under the ax. It had become mis¬ prision of treason to assert the papal authority, and high treason to refuse to take the oath of abjurgation; to will or wish or desire, or by any craft to imagine, any bodily harm to the king or. queen or heir to the throne or to de¬ prive either of them of their titles or regal powers ; to utter slanders or libels pronouncing the sovereign a heretic, tyrant, infidel or usurper;, to question the legality of some of his marriages or to assert the legality of others. These <(war measures,® which were repealed

immediately on Henry's death, had been in¬ tended to fortify him in his opposition to the Pope, and to assure the royal succession in his heirs by making it dangerous to question their legitimacy. One of the first acts of Queen Mary's reign was to restore the statute of Ed¬ ward III in its integrity by a general repeal of all treason laws subsequently enacted. Since

then no permanent additions were made to the statute until, the reign of Victoria. A curious law passed in Mary's reign declared it treason¬ able to <(pray that God would shorten the life of the queen.® This was re-enacted in the time of Elizabeth and made applicable to her. A statute of Elizabeth making it treason for a priest to grant absolution for disloyalty to the Crown was continued in the reign of James I. By the statute 13 Charles II, chap. 1, it was declared high treason to display, ((by writing, preaching or malicious speaking,® any intention to depose the king or to do him bodily harm tending to his death, wounding or imprison¬ ment. All of these laws and one or two others not mentioned have expired by limitation or become obsolete.

The meaning of the words of the Statute of Treason had been greatly extended meanwhile by judicial interpretation. In the case of the Earl of Essex the judges advised that it was rebellion when a subject attempts to put him¬ self in such strength that the sovereign will be unable to resist and govern according to his own royal authority and direction; also, that in every rebellion the death of the sovereign must be presumed in law to be the consequence of success, ((for the rebel will never suffer that king to live and reign, who might punish or take revenge of his treason or rebellion.® Con¬ spiracy to levy war, which might manifest it¬ self in words spoken or printed, though not treasonable according to the letter of the law, was considered an ((overt act® for <(compassing or imagining® the death of the sovereign, apd, therefore, evidence to prove high treason. Like effect has been given to concerting with for¬ eigners or others to invade the kingdom, or to go, or even purpose going abroad, with that end in view. Nor would armed violence have to be carried into England to prove an intent to compass the death of the sovereign ; the statute was held to refer not to the natural life of the king but to his political existence. A conspiracy to invade Canada and an insur¬ rection in Ireland were both regarded evidence of an imagining of the king's death. In draw¬ ing the . line between tumultuous petitioning and levying war the courts have, not been con¬ sistent. The most authoritative is Lord Mans¬ field's pronouncement (a.d. 1780) with respect to the Gordon riots : ((If this multitude assem¬ bled with the intent, by acts of violence, to compel the legislature to repeal a law, it is high treason.® But Lord Gordon was ac¬ quitted. The trials . of Hardy, Horne Tooke and others in 1794 involved interpretations of the meaning of the words <(imagining the king's death.® The charge was a conspiracy to depose the king and put him to death, and the overt acts alleged were : Consultations to procure a convention to be assembled with intent to sub¬ vert the government; the circulation of books

and pamphlets recommending the choice of delegates; consultations concerning the call of the convention ; and the provision of arms for treasonable purposes. The purpose of the agitators was to obtain universal suffrage, an¬ nual parliaments, and the alleged design to depose the king and set up a republic was not proven. The prosecution failed.

The Constitution of the United States de¬ clares that ((treason shall consist only in levy¬ ing war against the United States or adhering to their enemies, giving them aid and com¬ fort.® In making this very close definition the founders of the republic were, no doubt, af¬ fected by the judicial interpolation of (

In practice, however, American war measures against the giving of moral afd or comfort to the enemies of the nation have been in the form of sedition laws. Actual consorting or conspiracy with the enemy would, of course, constitute high treason. The Articles of War, which are part of the statutory law of the United States, declare corresponding with the enemy; relieving the enemy with money, vic¬ tuals or ammunition; or harboring or protect¬ ing an enemy, to be capital crimes. See Mili¬ tary Law.

Stephen Pfeil.

HIGHBINDERS, a name given to a secret organization among the Chinese in the United States which has caused much bloodshed in the Chinese quarter of San Francisco, Cal., necessitating intervention on the part of the authorities. The Chinese call these societies <(hatchet® societies, and the members <(hatchet men.® The organization seems to be an off¬ shoot of the Six Companies (q.v.), though some claim that it is merely a revival of one which originated over 200 years ago in China.

HIGHER CRITICISM, The. The higher criticism is a science whose aim is the deter¬ mination of the literary history of books and writings. It sets forth the facts and principles by which we must determine, in the case of any writing, its literary form, its unity, its date, the place of its composition, its authorship, the method of its composition or construction, its integrity and the amount and character of any subsequent editing it has received, so far as these matters can be discovered by the use of such internal evidence as is presented in the writing itself. It is thus the science for ascer¬ taining the literary form and the literary his¬ tory of any writing by means of internal evi¬ dence. These same matters may also be deter¬ mined, in part or in whole, by external evidence in many cases ; that is, by history or tradition. This latter method will not necessarily be either better or worse than the method which employs internal evidence. The greater probability of the result, in every case, will depend upon the amount and the character of the evidence which is attainable. Sometimes

external evi¬ dence may be more abundant and trustworthy than the internal evidence, and sometimes the reverse may be true.

The science under consideration is termed higher criticism to distinguish it from the re¬ lated science of lower, or textual, criticism. This latter science has for its object the ascer¬ taining of the history of writings as the work of penmen and printers. It seeks to determine just the words and the letters which the author himsUf wrote, and what are the changes which his work has suffered in transmission. Since the literary history of a writing is, on the whole, of more importance than the history of the written or printed text, the science of the literary history is justly termed the higher criticism.

The higher criticism is a science which is equally applicable to all literatures. It may be used to determine the literary history of a writ¬ ing of any age, language or people. But, of late, it has been especially brought into not'ce in its application to the literature of the Bible. On this account, it is sometimes spoken of as

if it were a science belonging to Biblical study only. But the fact is that Biblical higher criti¬ cism is only one department of higher criticism in general.

As employed in Biblical study, higher criti¬ cism adopts the following method: (1) it sets forth the principles by which, according to the teachings of general literary criticism, we may correctly determine the literary form, the unity, the date, the place of composition, the author¬ ship, the method of composition or construction, the integrity, the amount and character of sub¬ sequent editing, of each of the Biblical books and writings; (2) it then presents the evidential facts to be found in each of the Biblical books and writings, to which these principles will apply; and (3) finally it gives the conclusions which result from the application of these prin¬ ciples to the evidential facts. In practice, how¬ ever, different schools of Biblical higher critics come to very different conclusions upon the same basis of evidential facts, while using the same principles of criticism. This results from the varying opinions held by these critics in relation to the value, and significance of the evidential facts, due to their differing views about the history of Israel, and their philo¬ sophical convictions concerning the place of the supernatural in that history. Those critics who refuse to allow the existence of any super¬ natural element in the history of Israel, and hold that this history was the product of only those forces which shape and determine all human history, so that it was exactly like the history of every

other people, cannot put the same value and meaning upon the historical testimony and references to be found in the Biblcal books, as those critics must who be¬ lieve that the history of Israel was, to no in¬ considerable extent, a supernatural history, and, therefore, different from the history of every other people. In the case of the Old Testa¬ ment, for example, some critics hold, because of their philosophical opinions in regard to the supernatural, and the universality of the work¬ ing of the evolutionary forces of history, that the historical material of the Old Testament, as we now have it, is not to be accepted as the true basis of Old Testament history, and that this history must be constructed out of this material, under the guidance of some philo¬ sophical theory. Other critics accept the his¬ torical material which is now to be found in the Old Testament, as furnishing in itself the true Old Testament history. Since the eviden¬ tial facts used in higher criticism receive their value and meaning from their evident relation to a previously determined history, it is clear that each of two so different histories cannot be a basis for the same critical conclusions. But it is to be noted that the determination of the histories is not a work of higher criticism, but is a matter which results from the philo¬ sophical opinions held by historians. The con¬ sequence of these facts is that the only results which have thus far been reached by Biblical higher criticism, which all schools of critics would accept, seem to be : (1) The existence of different documents in the Pentateuch, which have been used in its compilation, although there is, among critics, quite a little difference of view in relation to the age of these docu¬ ments and the time of their compilation into

the Pentateuch; (2) the plural authorship of the books of the Old Testament known as the books of Isaiah and Zechariah; and (3) the fact that older sources have been used in the making of the synoptic gospels and the book of Acts. From all that has been said, it will be seen that it is not the duty of higher criti¬ cism to assert or deny anything in relation to the inspiration of the Scriptures, or their au¬ thority for belief or conduct. With these mat¬ ters this science has absolutely nothing to do.

Bibliography. — Anderson, (The Bible and Modern Criticism 5 (1902) ; Cheyne, T. K.,

(Founders of Old Testament Criticism (Lon¬ don 1892) ; Jacobus, M. W., (A Problem in New Testament Criticism* (New York 1900) ; Kent, C. F., (Origin and Permanent Value of the Old Testament1* (1911) ; Lias, Principles of Biblical Criticism* (1893) ; McFadyen, (01d Testament Criticism and the Christian Church* (1903) ; Nash, H. S., (History of the Higher Criticism of the New Testament* (New York 1900) ; Nicoll, (The Church's One Foundation : Christ and Recent Criticism* (1901) ; Orr, (The Problem of the Old Testament Considered with Reference to Recent*

Criticism (1906) ; Peters, (The Old Testament and the New Scholarship* (1901) ; Rishell, (The Higher Criticism* (1893) ; Smith, W. R., (The Old Testament in the Jewish Church* (Edinburgh 1892) ; Wellhausen, J., Prolegomena zur Geschichte Israels* (5th ed., Berlin 1899) ; Zenos, (The Elements of the Higher Criticism* (1895).*

Sylvester Burnham, D.D., Formerly Dean of the Hamilton Theological Seminary, Colgate University.

*HIGHER LAW, a famous phrase used by William H. Seward (q.v.) 11 March 1850, in the United States Senate, on the admission of California as a State, which was held up by the Southern element to force the Congress to admit it as a slave State, or at least to divide it on the line of the Missouri Compromise (q.v.). Seward denied that the principle of compromise applied only to slavery, which was only one of many institutions, and held it equally applicable to the Territories, which were a possession to be enjoyed and administered in common by the States; and declared that the older States had no arbitrary power over them. He went on: <(The Constitution regulates our stewardship; the Constitution devotes the domain to union, to justice, to defense, to welfare, to liberty. But there is a higher law than the Constitution, which regulates our authority over the domain, and devotes it to the same noble purposes. The territory is a part ... of the common heri¬ tage of mankind, bestowed upon them by the Creator of the universe. We are his stewards, and must so discharge our trust as to secure in the highest attainable degree their happi¬ ness.** And to Webster's assertion that it was absurd to re-enact the laws of God, he answered that <(there is no human enactment which is just that is not a re-enactment of the law of God.** It was his first set speech in the Senate, and at once made him the recognized leader of the radical section. The conservatives de¬ nounced it as treasonable, implying that no one was under any obligation to support the Con¬ stitution if he believed it in opposition to the law of God, and making the execution of any laws impossible.*

HIGHER PLANE CURVES. See Curves, Higher Plane.

HIGHLAND CATTLE, a variety of small, rough-coated, usually red or black cattle, with upturned horns, kept half wild upon the moors of the Scottish Highlands, and believed to represent in part the cattle of the aboriginal Britons, which are replaced in the south of Great Britain by the short-horned breeds in¬ troduced by the Roman conquest. Compare White

Cattle.

*HIGHLANDERS, Scotch, in the United States. After the Jacobite risings in England in 1715 and 1745, in favor of the Old and Young Pretenders, which were zealously supported by the Highlanders (who indeed formed their backbone), the English government ex¬ erted itself to drain their strength by colo¬ nizing them elsewhere ; and many who were i'n danger of vengeance came to America volun- * tarily. The chief movement was after 1745, when the government thoroughly reorganized the Highlands, broke up the clans and deported large numbers to the colonies; but after 1715 many, in bands or as individuals, had come over, especially to the Carolinas. Some settled in western South Carolina, as farmers or In¬ dian traders; a considerable body near Fayette¬ ville, N. C., where their descendants still speak Gaelic in preference to English, and have their church ministrations in that language ; and a number of different colonies in the future Georgia, where Oglethorpe found them when he came over in 1733 with a patent for a new colony. Especially he won the hearts of a set¬ tlement at Darien, under a Captain Mackay. These Plighlanders gave him priceless help in his incessant fights with the Spaniards and con¬ stant negotiations with the Indians ; but they strongly opposed the slave trade or the intro¬ duction of slaves into Georgia. Some High¬ land companies sent to the Mohawk Valley, during the French and Indian War, were dis¬ banded there, and remained as settlers, a recognizable element during the Indian troubles of the early Revolution.*

HIGHWAY SYSTEMS AS RELATED TO SCHOOLS. See Education, Rural.

HILARION, Saint, a hermit of Palestine, said to have been the first to introduce monasti- cism into Palestine: b. Tabatha, 291; d. Cyprus, 371. He studied at Alexandria, and then be¬ came a hermit under Saint Anthony. Inspired by the example of that hermit, he returned to Palestine and began to live his solitary life in a little hut in the vicinity of Majuma, the port of Gaza. He spent his days weaving baskets of rushes to keep himself alive, and practising the most vigorous asceticism. The wonders he accomplished inspired many others to emulation, and in this way the hermetical life became established in Palestine. In 356 he revisited Egypt, and with his disciple, Hesychius, lived at S'cily for a time. The story of his great piety and his power of healing so extended his popularity in the island that the crowds who flocked about him soon became unendurable, and he went further into Epidaurus in Dalmatia. He spent his last days at Cyprus, but it is said that his remains were removed to the place of his first isolation by his faithful disciple. The chief source of information concerning Saint Hilarion

is the biography by Jerome based on a eulogistic letter, now disappeared,

written by Epiphanus of Salamis. The facts are somewhat obscure and are difficult to establish. Saint Hilarion's day is celebrated on the 21st of October. Con¬ sult Migne (Vol. Ill) for the original source; and also Israel, W., (Die Vita S. Hilaronis des Hieronymus als Quelle fiir die Anfange des Monchthums kritisch untersucht5 (in Zeitschrift fiir wissenschaftliche Theologie , Jena 1880) ; and Zockler, O., in (Neue Jahrbucher fiir deutsche Theologie5 (Vol. Ill, 1894).

HILARY, Saint, bishop of Poitiers : b. Poitiers, 330; d. there, 367. His parents were pagan, and by his own studies he became con¬ vinced of the truth of Christianity and accepted baptism. He became bishop of Poitiers some time before 350. His defense of the Nicene creed against the Arians resulted in his banish¬ ment to Phrygia. While there he produced his important work, (De trinitate,5 explaining his views on the subject of the trinity, chiefly for the benefit of those bishops who were inclined toward Arianism. He was released before the convocation of bishops at Seleucia, where he devoted his energy and attention to supporting the cause of the Homoiousian party against the Arians. Jn 361 he was sent back to his diocese, but soon found himself in great disfavor at the court because of his impeachment of Auxentius, bishop of Milan. His visit to Constantinople was the occasion for his great hatred of that monarch, which he expressed in his letter, (Contra Constantium.5 As a Latin author he was in high repute in his time. His day is 13 January. His works were published in Migne, (Patrologia Latina5 ix, x. Consult Harnack, A., (History of Dogma5 (Vol. IV, Boston 1899).

HILARY OF ARLES (Hilarius (Are- latensis) , Saint, bishop of Arles: b. about 403 ; d. at Arles, about 450. He entered the monastery of his relative, Honoratus, bishop of Arles, and succeeded him in the office. His efforts to extend the primacy of Arles over all of southern Gaul met with opposition on the part of Pope Leo the Great, and he was deposed from his see. His day is celebrated on 5 May His extant works are preserved in Migne, (Patrologia Latina5 (Vol. I, pp. 1213-92).

HILDA, Saint, Anglo-Saxon abbess : b. about 614; d. 680. She was consecrated as a nun by Bishop Aidan, and was successively head of the abbey of Hartlepool and of the famous monastery founded by her in 657 at Whitby, Yorkshire. This continued for several cen¬ turies a religious house of great power and in¬ fluence, in the time of its founder perhaps the strongest in Great Britain. Caedmon (q.v.), the Anglo-Saxon poet, was attached to the monastery during her rule and it was there that the celebrated synod took place in 664 in which the Celtic ritual was condemned. Consult Bede, Ecclesiastical History.5

HILDEBERT OF TOURS, French ec¬ clesiastic and author: b. Lavardin,

about 1055; d. Tours, 1133. According to tradition, he was a pupil of Berengarius and became a teacher at Le Mans, where he was made bishop in 1096. Having antagonized part of his clergy, he was taken prisoner by William II and carried off to England for a year. He was transferred in

1125 to Tours, where he was engaged in con¬ stant quarrels with other bishops and with the king of France, Louis VI. He presided over the Synod of Nantes in 1127. His works, con¬ sisting of letters, theological discussions, ser¬ mons and poems, were first published by Antoine Beaugendre (Paris 1708). Later research has proven these documents to be poorly edited since they include some spurious works. His Latin writings were extremely popular in his century. The poems were collected by Haureau under the title (Les melanges poetiques d'Hilde- bert de Lavardin' (Paris 1882). Consult Dieudonne, L., (Hildebert de Lavardin . . . Sa vie et ses lettres> (Paris 1898).

HILDEBRAND. See Gregory VII, Pope.

HILDEBRAND, Bruno, German econo¬ mist : b.. Naumburg-an-der-Saale, 1812; d. 1878. He received his education at Breslau and Leip¬ zig universities and in 1839 was appointed pro¬ fessor at the former institution. Two years later he became professor at the University of Marburg. In 1846 he contributed an article to a London journal and its tone giving offense to the authorities Hildebrand was suspended from his chair. He was reinstated in 1849 and in the Frankfort Assembly sat as a member from Marburg. In 1851 he became a teacher in the Zurich High School and in 1856 was made first chief of the Swiss Bureau of Statis¬ tics at Bern. In 1861 he removed to Jena as professor at the university there and chief of the Bureau of Statistics. After 1863 he was editor of the Jahrbiicher fiir Nationalokonomie und Statistik. He published Nationalokonomie der Gegenwart und Zukunft' (1848); (Die kurhessische Finanzverwaltung' (1850) ; (Statis- tische Mitteilungen fiber die volkswirtschaft- lichen Zustande Kurhessens) (1853);

HILDEBRANDSLIED, an Old High Ger¬ man poetic fragment, written about 800 a.d. by two monks of the monastery at Fulda, on the cover pages of a Latin manuscript, now preserved at Kassel. It treats the theme, rather frequent in Aryan (Indo-European) legend, of the unequal combat between an old, and there¬ fore stronger, father, and a younger, weaker son, with the inevitable outcome that the son (Hadubrant) is slain by his father (Hilde- brant). (Consult Matthew Arnold,

Jacob Wittmer Hartmann.

HILDRETH, Richard, American historian: b. Deerfield, Mass., 22 June 1807; d. Florence, Italy, 11 July 1865. He was graduated at Har¬ vard in 1826, studied law at Newburyport, en¬ tered practice in Boston and abandoned it in

1832 to become editor of the Boston Atlas. In this .position a series of articles by him in 1837, relative to the separation of Texas from Mexico, did much to stimulate the resistance which that movement encountered in the free States. In 1834 his anti-slavery novel, (The Slaved was written. This work was repub¬ lished and favorablv received in England and in 1852 an enlarged American edition appeared under the title of (The White Slave: Memoir of Archy Moore) (1837). In 1837-38 he was Washington correspondent of the Boston Atlas and resumed his editorial post as an advocate of the election of General Harrison, of whom he wrote a campaign biography. He then abandoned journalism, and in 1840 published, under the title of (Despotism in America,' a volume on the political, economical and social aspects of slavery, to which in the edition of 1854 was appended a chapter on the (Legal 'Basis of Slavery. ' In 1840-43 he resided in Demerara, British Guiana, and at Georgetown edited two free labor newspapers. Later, for several years, he was a member of the New York Tribune staff and in 1861 was appointed United States consul at Triest. His best-known work is his ˆHistory of the United States) (1849-56), which extends from 1492 to the end of President Monroe's first term. The author sought an authentic presentation of the con¬ spicuous figures of earlier American history. His work is accurate and careful, though with a Federalistic viewpoint; but so uninteresting in manner as to be ill-adapted for continuous reading. Hildreth also wrote (Theory of Morals) (1844) ; (Theory of Politics) (1853) ;

(Japan as it Was and Is' (1855) ; and Atro¬ cious Judges) (1856).

HILGARD, hil'gard, Eugene Woldemar,

German-American chemist and geologist : b. Zweibrucken, Bavaria, 5 Jan. 1833 ; d. Berkeley, Cal., 8 Jan. 1916. He ' came to the United States in 1836, returned to Europe for purposes of study and was graduated (Ph. D.) at Heidel¬ berg 1853. . In 1858 he became State geologist of Mississippi, in 1873 was appointed professor of geology and natural history in the University of Michigan and in 1875 was made professor of agricultural chemistry and director of the agri¬ cultural experiment station in the University of California. He became professor emeritus in 1909. He received the Liebig medal from the Munich Academy of Sciences in 1894, and his investigations into the chemistry and physics of. soils have done

much to promote agricultural science. He was a member of the Northern Transcontinental Survey which in 1880ˆ-83 studied the agricultural possibilities of Montana, Oregon and Washington. Much of his work was published in the bulletins of the California Agricultural Experiment Station. He published (Report on the Geology and Agriculture of Mississippi' (1860); (Report on the Agricul¬ tural Features of the Pacific Slope) (1882)- (Memoir on the Rock-Salt Deposit of Petite Anse, La.' (1872) ; (Soils of the Arid and Humid Regions' (1906); Agriculture for Schools of the Pacific Slope' with W T V Osterhout (1909). J*

mLL, Ambrose Powell, American rnili- toX °? c5,: b. Culpeper County, Va., 9 Nov. 1825; d. 2 April 1865. He was graduated at the United States Military Academy 1847; served

m the Mexican War, but resigned from the army in March 1861, and was made colonel of the 13th Virginia regiment of the Confederate army. Having distinguished himself in service, he was promoted major-general in May 1862, and lieutenant-general 20 May 1863, and placed in command of one of the three corps of the Army of Northern Virginia. He led his corps at Gettysburg and later at Bristow Station and the assault on the Weldon Railroad in 1864. He was killed in the attack on Peters¬ burg, Va.

HILL, Benjamin Harvey, American legislator; b. Jasper County, Ga., 14 Sept. 1823; d. 16 Aug. 1882. He was graduated at the State University of Georgia in 1844 and chose law as a career. In 1851 he was elected to the State legislature. He in vain attempted to with¬ stand the secession sentiment of his State, but at last yielded to the movement, and was elected to the Provisional Confederate Congress, and from the assembly promoted to the Confederate Senate. He supported Greeley for the Presi¬ dency in 1872, and was defeated for the United States Senate the following year, but after being elected to the Blouse of Representatives in 1875 was given a seat in the United States Senate 1876 and held it for the remainder of his life.

HILL, Daniel Harvey, American military officer; b. Hill's Iron Works, York District, S. C., 12 July 1821 ; d. Charlotte, N. C., 24 Sept. 1889. He was graduated at the United States Military Academy in 1842, and served in the Mexican War; became professor of mathe¬ matics and military tactics in Washington Col¬ lege, Va., in 1849, professor of mathematics in Davidson College, N. C., in 1854; and was made president of the North Carolina Military In¬ stitute in Charlotte in 1859. At the outbreak of the

Civil War he entered the Confederate army as colonel ; was promoted to lieutenant-general in 1863, and commanded a corps at the battle of Chickamauga. After the close of the war he resumed his educational work, and in 1877 became president of the Arkansas Industrial University, where he remained until shortly before his death.

HILL, David Bennett, American lawyer and politician : b. Havana, N. Y., 29 Aug. 1843 ; d. 20 Oct. 1910. He entered a law office in Elmira, N. Y., in 1862, and after admission to the bar in 1864 rapidly built up a law practice and was an acknowledged leader of the local bar. He was active in politics, and acquired a leadership there also, through his genius for organization. He was a member of the State assembly 1870-71, and president of the Demo¬ cratic State Convention in 1877 and 1881. In 1882 he was elected mayor of Elmira and lieu¬ tenant-governor in the same year, with Cleve¬ land as governor. In 1885, when Cleveland re¬ signed to take up his duties as president, Hill became governor. He was subsequently twice elected governor, serving till January 1892, when he took his seat in the United States Senate. During his first administration as gov¬ ernor, the legislature was Republican and he was involved in a number of partisan struggles. As senator, he opposed on some issues the policy of President Cleveland; he was also op¬ nosed to the income tax clause of the Wilson Tariff Bill. In 1892 he was a prominent can¬

didate for the presidency at the Democratic National Convention and at the convention of 1896 was one of the chief leaders of those who favored the gold standard and were opposed to radicalism in the party. In 1894 he was again candidate for governor of New York State, but was defeated by Levi P. Morton. In 1902 he practically dominated the Democratic State Convention and was active throughout the cam¬ paign.

HILL, David Jayne, American educator and diplomat: b. Plainfield, N. J., 10 June 1850. He was educated at Bucknell University, where he became professor of rhetoric 1877-79, and president 1879-88. He was president of Roch¬ ester University, New York, 1888-96, resigning to spend three years in Europe studying interna¬ tional law and diplomacy. He was First Assist¬ ant Secretary of State 1898-1903; Minister to Switzerland 1903-05, to the Netherlands 1905- OS and from 1908-11 to Germany. In 1914 he was an unsuccessful candidate for the United States Senate from New York to succeed Elihu Root. He is a member of the Permanent Ad¬ ministrative Council of The Hague Tribunal and was delegate to the Second Peace Conference at The Hague. He has written biographies of (Washington Irving) (1879) ; (William Cullen Bryant) (1879) ; Principles and Fallacies of Socialism (1885) ; (International Justice) ; (A Premier of Finance) ; (Genetic Philosophy) (1893) ; (The Life and Work of Hugo Gro- tius) (1902) ; (The Conception and Realization of Neutrality) (1902)*

; (A History of Diplo¬ macy in the International Development of Eu- rope) (1905), of which three volumes of six have appeared ; AVorld Organization as Af¬ fected by the Nature of the Modern State (1911) ; (The People's Government (1915) ; (The Rebuilding of Europe) (1917) ; (Present Problems in Foreign Policy* (1919).*

HILL, Frank Alpine, American educator: b. Biddeford, Me., 12 Oct. 1841 ; d. Brookline, Mass., 12 Sept. 1903. He had been long prom¬ inent among New England educators, and after being head-master of high schools in Milford, Chelsea and Cambridge, Mass., became secre¬ tary of the Massachusetts State Board of Edu¬ cation in 1894. He was a trustee of the Massa¬ chusetts Institute of Technology, of the State Agricultural College at Amherst and of the Boston Museum of Fine Arts, as well as a commissioner of the State School Fund.

HILL, Frank Pierce, American librarian: b. Concord, N. H., 22 Aug. 1855. He was grad¬ uated from Dartmouth in 1876 and received the degree of LL.D., 1906. In 1881 he became librarian of the Lowell public library, and in 1885 he organized the first free public library in New Jersey at Paterson. He also organized the Salem public library and the Newark library in 1889. At Newark a new building was erected under his administration and the library brought to a high degree of efficiency so that it is recog¬ nized as one of the model public libraries. In 1901 he was appointed chief librarian of Brook¬ lyn and under his administration the library has grown from a system of 18 branches with an annual circulation of 944,128 to a system of 31 branches and 13 stations with an annual circulation of 5,875,190 and now ranks as the second largest public library in the United States. During this period 20 buildings were

erected under the gift of Mr. Carnegie and plans made for a magnificent central library building which will cost approximately $5,000,- 000. He was secretary American Library As¬ sociation 1891-95 and president in 1906.

HILL, Henry Wayland, American lawyer: b. Isle La Motte, Vt., 13 Nov. 1853. He was graduated at the University of Vermont in 1876 with the degree A.B. ; a member of the Phi Beta Kappa Society. He was principal of Swanton, Vt., Union School 1877-79, and of Chateaugay, N. Y., Academy 1879-83. He re¬ ceived from the University of Vermont the de¬ gree of A.M. in 1881 ; was admitted to the bar at Albany, N. Y., in January 1884, and began the practice of law in Buffalo in May 1884, where he has

since been practising continuously. He was a member of the New York Constitu¬ tional Convention of 1894, of the New York assembly 1896-1900, and of the New York sen¬ ate 1901-10. He is the author of several New York constitutional provisions and many laws. He secured appropriations for Buffalo Harbor Improvements for the 74th and 65th Regi¬ mental armories, for the Pan-American State (now Buffalo Historical Society) Building, for the William McKinley Monument, for the State Normal School, all in Buffalo, and for other public purposes. During the latter year of the Hughes administration (1910) Mr. Hill was chairman of the finance committee of the senate. He was the sponsor for many State canal meas¬ ures, both constitutional and legislative. He is the author of (Waterways and Canal Construc¬ tion in New YorkP He contributed the ar¬ ticles on Rainfall, Water Supply and Water¬ ways in this Encyclopedia. He is also the au¬ thor of (The Development of Constitutional Law in New York, a contributor to ((The Bib¬ liophile Edition of the Odes and Epodes of Hor¬ ace,® and is the author of many other papers and addresses on literary, historical and fraternal subjects. He was grand chancellor of the Knights of Pythias in the Domain of New York in 1918-19, and his report has had a national circulation. He was the secretary of the New York Lake Champlain Tercentenary Commis¬ sion and compiled the first and final historical re¬ ports of that commission. Since 1910, he has been the president of the Buffalo Historical Society, and since 1913 he has been the president of the New York State Waterways Association. He is also a director of the National Rivers and Harbors Congress. He is a member of the American Historical Association, the American Bar Association, the Franco- American Society of New York, the Hobby Club of New York, the Bibliophile Society of Boston, a Knight Templar and Scottish Rite Mason. He "re¬ ceived the degree of LL.D. from the University of Vermont in 1900 and from the Middlebury College, Vermont, in 1910, and was made a chevalier of the Legion of Honor of France in*

1913.

HILL, James Jerome, American railroad promoter and financier: b. near Guelph, Well¬ ington County, Ontario, Canada, 16 Sept. 1838, of Scotch-Irish parentage; d. Saint Paul, Minn., 29 May 1916. Until his father's death, when the boy was in his 15th year, he attended a neigh¬ boring academy. After that he was employed in a country store, until in search of large'r op¬ portunities he reached Saint Paul, Minn., in

1856, after visiting different parts of the coun¬ try. As clerk or agent he was employed in the Mississippi River steamboat business for the next 12 years ; and in 1870 established the Red River Transportation Company. This gave service between Saint Paul and Winnipeg, and through it Mr. Hill

obtained an idea of the immense coming importance of transportation in the Northwest. In 1878, a syndicate of four men, of whom Mr. Hill was one, bought the defaulted bonds of the Saint Paul and Pacific Railroad Company. It had been in the re¬ ceiver's hands since 1873 and Mr. Hill was one of the few men who believed in its future. In 1879 this property was organized as the Saint Paul, Minneapolis and Manitoba Railway Com¬ pany and was completed and rapidly extended westward. Mr. Hill was general manager, be¬ came vice-president in 1881 and president in 1882. The latter office he held for 25 years. This enterprise contemplated from an early date, the extension of the line to the Pacific Coast. This was built, through a difficult and unsettled country, by private financing, without the government's assistance. The road was completed to Seattle, on Puget Sound, in 1893. Between 1881 and 1883 Mr. Hill was interested with other capitalists in building the Canadian Pacific line. His energy and interest were, however, concentrated upon the rounding out and perfecting of his own system. It was ex¬ tended to Duluth and connected with steam¬ ships owned by the railroad and operating on the Great Lakes. By 1890 all the fines of the system were united in the Great Northern Com¬ pany. Steamships were built to run from Puget Sound ports to Japan and China. Some lands containing iron ore had been bought by Mr. Hill, as a private citizen, in 1889. The ore de¬ posits, being large and valuable, were turned over to a company formed to hold them with others purchased later. The entire property was distributed later among holders of Great Northern stock. The Great Northern and the Northern Pacific together purchased, in 1901, the Chicago, Burlington and Quincy Railroad Company. Together they also built the Spo¬ kane, Portland and Seattle line along the north bank of the Columbia River. Connections of the Great Northern thus gave it access to all important markets and ports in the country. Mr. Hill resigned as president in 1907, to be¬ come chairman of the board of directors. He was succeeded in his former office by his son, L. W. Hill. From 1912, when he resigned the chairmanship, he held no official place in the company. Both personally and financially he was as closely identified as ever with the great property that wras so largely his own creation. Among the diverse interests of Mr. Hill's life, other than railroad work, was agricultural im¬ provement, which he instigated and assisted throughout the Northwest. From the begin¬ ning the prosperity of the farm and the pros¬ perity of the railroad were identical to his mind. In addition to that, he believed that the chief interest everywhere rests finally on the foundation of the farm. He gave much of the study and efforts of his best years to ascertain¬ ing methods of raising and maintaining soil fertility, and of increasing the quality and quan¬ tity of the acre product. His opinion was widely sought on many subjects; and he took a lively interest in art, literature and economic

and civic questions. Consult Pyle, Joseph Gil¬ pin,

HILL, Robert Thomas, American geolo¬ gist : b. Nashville, Tenn., 11 Aug. 1858. He was graduated from Cornell University in 1866 and was immediately given a position on the United States Geological Survey. He was also aT lecturer in the school of economics at the University of Michigan, and professor of geol¬ ogy at the University of Texas for two years, which position he resigned to return to the United States Geological Survey. He has been engaged in geological and geographical explora¬ tions in the Southwestern States, Mexico, Cen¬ tral America and the West Indies. His work in the two last-mentioned localities has been the investigation of the origin of the land forms, and the problem of the union of the continents. Among his most valuable contributions to geo¬ logical science have been the proof of the exist¬ ence of the lower cretaceous formation in the United States and the announcement of the possibility of artesian wells in Texas. In May 1902 he was sent by the National Geographical Society at the head of the expedition to investi¬ gate the volcanic eruption of Mount Pelee in Martinique. His publications include (On Occurrence of Artesian and Other Underground Waters in Texas, Eastern New Mexico, and Indian Territory) (1892) ; (Cuba and Porto Rico with other Islands of the West Indies) (1898) ; and numerous contributions to the bul¬ letins of the Geological Survey and periodicals.

HILL, Rowland, English popular preacher : b. Hawkstone, Shropshire, 23 Aug. 1744; d. London, 11 April 1833. He was ordained in the Anglican Church, but embracing the views of the Calvinistic Methodists, soon began to preach in barns and meeting-houses, and when they were too small or too distant, or not to be pro¬ cured, in streets, fields and highways. In 1783 he laid the foundation of Surrey Chapel, Black- friars road, London, where he preached with great success every winter for about 50 years, making summer excursions to the provinces, where his eloquent but eccentric preaching at¬ tracted immense crowds. He played a conspicu¬ ous part in the religious and philanthropic activities of his time. He published sermons and other theological works, of which the best known are his (Village Dialogues.*

HILL, Rowland, 1st Viscount, English soldier, nephew of Rev. Rowland Hill (q.v.) : b Prees, Shropshire, 11 Aug. 1772; d. near Shrewsbury, England, 10 Dec. 1842. He entered the army in 1790 and served with distinction in the campaign1ˆ from Toulon to Waterloo. In 1812 he was made a K.B., and in 1814 was created Baron Hill. At the battle of Waterloo, Lord Hill

commanded the right wing of the British. In 1828 he was appointed general commander-in-chief of the British army. This important office he continued to hold under sev¬ eral successive ministries, and only resigned it a few months before his death. He was made a viscount in 1842. He was often styled <(the right arm of Wellington.®

HILL, Sir Rowland, English postal re¬ former: b. Kidderminster, 3 Dec. 1795; d. 27 Aug. 1879. He conducted a school near Bir¬ mingham in his earlier years on what was known as the Hazelwood method, from the

name of the school, the feature of which was a system of self-government by the boys them¬ selves. In 1833 he abandoned this work, and shortly after this he was appointed secretary to the commissioners for the colonization of South Australia. He began to interest him¬ self in postal matters, and was amazed to find that in the face of enormously expanding trade, under a high tariff of charges, post-office re¬ ceipts were declining, whereas in France, with low rates, they were rapidly increasing. In 1837 he published a pamphlet recommending the adoption of a low and uniform rate of post¬ age throughout Great Britain and Ireland. The scheme was approved by a committee of the House of Commons, and early in 1840 the penny postage system was carried into effect with the assistance of Rowland Hill, who, for this purpose, received an appointment in the Treasury. He applied himself to the work, and in spite of the obstruction of officialdom soon proved the merits of his system. In 1846 he received a public testimonial of the value of upward of £13,000. In 1846, he was made sec¬ retary to the Postmaster-General, and in 1854 chief secretary to the Post-office. In 1860 he became K.C.B. Consult his (Life) and his¬ tory of Penny Postage) (2 vols., 1880) ; Smyth, (Sir Rowland HilP (1907).

HILL, Thomas, American Unitarian cler¬ gyman and mathematician : b. New Brunswick, N. J., 7 Jan. 1818; d. Waltham, Mass., 21 Nov. 1891. Left an orphan at 10 years; at 12 he was apprenticed to the printer of the Fredonian newspaper, where he remained four years. He then entered an apothecary's shop, after a year's attendance at school, and served in it several years. He was graduated from Harvard College in 1843 ; and from the divinity school in 1845, and was settled as pastor at Waltham the same year. He was president of Antioch College, Ohio, 1859-62. He accompanied Agassiz on his expedition to South America and was pastor of the Unitarian church at Portland, Me., 1873-91. He published (Elementary Treatise on Arithmetic (1845) ; (Geometry and FaitlP (1849); (First Lessons in Geometry) (1855); (Treatise on Curves) (1855); (The Natural Sources of Theology) (1875) ; (In the Woods

and Elsewhere, verse (1888), etc.*

•

HILL, Thomas, American painter: b. Birmingham, England, 11 Sept. 1829; d. 1908. He came to the United States in 1841. Re¬ turning to Europe he studied under Paul May- erheim for several months, but was practically a self-taught artist. He painted the (Yosemite Valley) which was chromo-lithographed by Prang. He continued to confine himself to the grander aspects of American scenery, and not¬ able among his productions are (The Home of the Eagle) ; and (Grand Canon of the Sierras) ; AVhite

Mountain Notch) ; (Donner Lake; (Muir Glacier.**

HILL, Walter Barnard, American lawyer and educator: b. Talbotton, Ga., 9 Sept. 1851; d. Athens, Ga., 28 Dec. 1905. He was graduated from the University of Georgia in 1870, and from the law school in 1871, with the degree of A.M. He was admitted to the bar, and prac¬ tised law in Macon, Ga., from 1871 to 1899. He was a member of the Georgia Bar Association, and was its president in 1888; a member also of the American Bar Association and the chair-

man of the committee on judicial administra¬ tion. He also was actively interested in edu¬ cational progress, being trustee of Vanderbilt University at Nashville, Tenn. In 1899 he was appointed chancellor of the University of Georgia ; as an educator he strongly approved the work of the Tuskegee and similar institu¬ tions for the negro. He wrote articles on legal and educational subjects and compiled the Law Code of Georgia (1873, 1882).

HILL RIVER. See Hayes River.

HILLARD, hil'ard, George Stillman,

American author and lawyer : b. Machias, Me., 22 Sept. 1808; d. Boston, 21 Jan. 1879. He was graduated from Harvard in 1828, and from the Harvard Law School four years later. .He was a member of the Massachusetts senate in 1850, where his policy as a legislator was warmly commended by Daniel Webster ; a member of the Massachusetts Constitutional Convention in 1853 ; and United States district attorney in 1866-70. Though successful as a lawyer his tastes were largely literary; he was well known as a lecturer; was editor of the Christian Register with George Ripley, and as¬ sociate editor of the Boston C ourier , wrote (Six Months in Italy ' (1853) ; (Life of George Ticknor> (with Mrs. Ticknor) ; (1864), and edited a series of school readers which bore his name, and the works of Spenser.*

HILLEBRAND, Karl, German critic and historian: b. Giessen, 17 Sept. 1829; d. Florence, 19 Oct 1884. For participation in the insurrec¬ tion in Baden (1849) he was imprisoned, but escaped to France, where he was graduated at the Sorbonne, and in 1863 became professor of foreign languages at Douai. On the outbreak of the Franco-Prussian War, he removed to Italy and passed the remainder of his life there. He was a remarkable linguist, writing valuable books in French, German, Italian and English. Among these are IIP (1848) ; (Des Conditions de la Bonne

Comedie' (1863);

HILLEGAS, Howard Clemens, American journalist and author: b. Pennsburg, Pa., 30 Dec. 1872; d. 29 Jan. 1918. He was graduated from Franklin and Marshall College, Lancaster, Pa., in 1894, and after being connected with sev¬ eral Pennsylvania journals was war correspond¬ ent of the New York World in South Africa 1899-1900. He published (Oom Paul's People' (1899); (The Boers in War' (1900); (With the Boer Forces' (1900).

HILLEL, Jewish rabbi, who flourished in the time of Herod. He was commonly called Ha-zaken, the elder, to distinguish him from others bearing the same name. Descended from an ancient family of Babylonia, he left his home to study law at Jerusalem. In order to earn a livelihood, he hired out as a day laborer, meanwhile studying diligently; and became an important authority on Jewish teaching and law. He was distinguished for the liberality of his thought and his interpretations of the

Scriptures and rabbinical teachings. Many fine sayings were attributed to him. He was presi¬ dent of the Sanhedrin for many years. By several modern writers, notably Renan, Hillel's influence on Jesus is given great weight. Con¬ sult Renan, (Vie de Jesus' (Paris 1863) ; Gei¬ ger, A., (Das Judenthum und seine Geschichte' (Breslau 1865) ; Stapfer, E., (Les Idees reli- gieuses en Palestine a l'epoque de Jesus Christ' (Paris 1878).

HILLERN, Wilhelmine von, German authoress: b. Munich, 11 March 1836. She is the daughter of a well-known novelist, Char¬ lotte Birch-Pfeiffer. She was brought up in Berlin, became an actress at Gotha (1854), and married the prominent jurist von Hillern at Freiburg in Breisgau in 1857. Her husband died 8 Dec. 1882. She has since been living chiefly at Oberammergau and Tutzing. Her principal novels and short stories were pro¬ duced during the 60's and 70's of the last century. One of them, (Hoher als die Kirche' (1877) is quite well known in America by reason of the fact that it is frequently read as a text by students of elementary German. It is a comparatively insignificant work, how¬ ever, by no means so important as the novels, (Ein Arzt der Seele' (Berlin 1869),

HILLHOUSE, James, American politician: b. Montville, 21 Oct. 1754; d. New Haven, Conn., 29 Dec. 1832. He was graduated in 1773 at Yale, of which institution he was treasurer from. 1782. He studied law, a-nd took an active part in. the struggle of the Revolution; was a Federalist member of Congress in 1791, and in 1795-1810 a member of the United States Sen¬ ate. He was also a member of the Hartford Convention of 1815. It was chiefly through his initiative in the planting of trees that New Haven came to obtain the title of ((Elm City."

HILLHOUSE, James Abraham, American poet: b. New Haven, Conn., 26 Sept. 1789; d. near there, 4 Jan. 1841. He was the son of James Hillhouse (q.v.L He was graduated at Yale College in 1808, entered commerce in New York and published in London his drama of < Percy's Masque,' reprinted in New York with changes in 1820. In 1822 he removed to a country seat near New Haven, where he passed the remainder of his life. In 1825 he published his second drama, (Hadad' ; and in 1839 a col¬ lected edition of his writings appeared under the title of (Dramas. Discourses, and other Pieces.' His dramatic writings, once greatly praised, now appear grandiose and dull.*

HILLIARD, hil'yard, Henry Washington,

American lawyer: b. Fayetteville, N. C., 4 Aug. 1808; d. Atlanta, Ga., 17 Dec. 1892. He was graduated at South Carolina College in 1826, was admitted to the bar in 1829, in 1831-34 was a professor in the University of Alabama (Tus¬ caloosa), in 1838 was chosen to the Alabama legislature, in 1842-44 was United States charge- d'affaires in Belgium, and in 1845-51 represented an Alabama district in Congress. Though op¬ posed to secession, he became a brigadier-gen¬ eral in the Confederate army. He was United States Minister to Brazil, in 1877-81. He wrote (Speeches and Addresses' (1855) ; (De Vane, a

Story of Plebeians and Patricians> (1865) ; and (Politics and Pen Pictures) (1892).

HILLIS, hil'is, Newell Dwight, American

Presbyterian clergyman: b. Magnolia, Iowa, 2 Sept. 1858. He was educated at Iowa College and Lake Forest University, studied theology at McCormick Theological Seminary, entered the ministry of the Presbyterian Church, and held pastorates at Peoria,' Ill. (1887-90), and Evanston, Ill. (1890-94). In 1894 he was ap¬ pointed pastor of the Central Church, Chicago, an independent congregation, and in 1899 of Plymouth Church of Brooklyn. He became known also as lecturer and has published (1904) ; (The Quest of Happiness) (1902); ˆSuccess Through Self-Help) (1903) ; (The Fortune of the Republic (1906) ; (Contagion of Character) (1911); (Anti-Slavery Epoch) (1911); (Prophets of a New Era) (1912);

(Story of Phaedrus) (1913); ˆLectures and Orations of Henry Ward Beecher) (1913); 'Message of David Irving) (1913) ; 'Studies of the Great War) (1915).

HILLSBORO, Ill., city, county-seat of Montgomery County, on the Cleveland, Cincin¬ nati, Chicago and Saint Louis and the Chicago and Eastern Illinois railroads, about 45 miles south by west of Springfield and 52 miles northwest of East Saint Louis. Its chief manufactures are flour, furniture, glass jars, woolen goods, carriages and wagons and dairy products. There is a coal-mine nearby and there are zinc and lead smelters, a condensed milk plant and a brickyard. It is the commer¬ cial centre of an agricultural section of the State. The waterworks are municipally owned. The commission form of government was adopted in 1911. Pop. (1920) 5,074.

HILLSBORO, Ohio, village, county-seat of Highland County, on the Norfolk and West¬ ern and the Baltimore and Ohio Southwestern railroads, about 60 miles southwest of Colum¬ bus and 50 miles east by north of Cincinnati. It is in an agricultural and stock-raising re¬ gion. The chief manufactures are furniture, foundry products, flour, lumber, safes and vaults, chairs, overalls, dairy products and ci¬ gars. It is the trade centre for a large part of Highland County. It has a public library con¬ taining about 8,000 volumes, and a number of fine public and private buildings. The city owns and operates the waterworks. Pop. 4,356.

HILLSBORO, Tex., city, county-seat of Hill County, on the Missouri, Kansas and Texas and the Saint Louis Southwestern rail¬ roads, about 52 miles southwest of Dallas and 38 miles north of Waco. It is situated in an agricultural and stock-raising region. Its chief manufactures are cottonseed oil, cotton goods, advertising novelties, hosiery, flour, candy, men's clothing, agricultural implements and lumber. The trade is largely in live stock, cotton, hides, grain, hay and lumber. It has a creamery, cot¬ ton-gins, cotton-compresses, planing-mills and hay presses. The government is administered by a mayor and four aldermen. The city owns and operates the waterworks and sewage sys¬ tem. Pop. (1920) 6,952.

HILLSDALE, Mich., city, county-seat of Hillsdale County, on the Lake Shore and Mich¬ igan Southern Railroad, about 88 miles south¬ west of Detroit and 60 miles west of Toledo, Ohio. The first permanent settlement was made about the year 1840. It is situated in a rich agricultural region in which are raised large quantities of fruit. The chief manufac¬ tures are flour, fur garments, screens for doors and windows, wagon-wheels, tables, furnaces, furniture, condensed milk and canned fruits. The trade, in addition to the manufactures, is chiefly in grain, fruits, vegetables and live¬ stock. Baw Beese Park, outside the city limits, is owned by the city and is a popular summer resort. Hillsdale is the seat of Hillsdale Col¬ lege (q.v.). The electric-light plant and the waterworks are owned and operated by the city. The government is vested in a mayor, elected for one year, and a council. Pop. (1920) 5,476.

HILLSDALE COLLEGE, a coeduca¬ tional institution founded in 1855 under the auspices of the Free Baptist Church, in Hills¬ dale, Mich. Since its establishment it has graduated about 1,300 students. The number of professors and instructors in 1916 was 24, the number of students 457. Special attention is given to the classical and scientific work, but the modern languages are not neglected. Departments of fine arts, music, elocution, home economics, business are flourishing.

HILL-TIT, a small, soft-billed, tit-like bird (Liothrix luteus) of the Orient, common as a cagebird, and known to dealers as Japan¬ ese robin, Pekin robin and Chinese nightingale. Its native home is the Himalayas and eastward into southwest China. It is about the size of the house sparrow. Its colors are rich. The upper parts are olive-green, with a yellow forehead, ring around the eye, and wing-patch. The sec¬ ondary wing quills are bluish-black. The throat is rich yellow, fading to whitish on the abdo¬ men. Bill red. The male has a brilliant song. This bird is hardy, but requires soft food.

HILO, he'ld, Hawaii, town on Hilo Bay, on the eastern coast of the island, about 38 miles from Mauna Loa, 36 miles from Mauna Kea (the highest peak of the group) and 28 miles from Kilauea. Hilo is the second town in size in the Hawaiian Islands. It has the best harbor belonging to the group. The lighthouse in the harbor can be seen many miles. Large lava-fields are near; on the northwest side of the town and in the vicinity are extensive for¬ ests. The craters of Loa and Kilauea, the largest in the world, are visited annually over delightful drives by many tourists who land at Hilo. The inhabitants of the town include many races; but people from the United States who have engaged in business in Hilo are quite prominent. The town has a library, custom house and a courthouse. Hilo has good schools to which attendance is compulsory. The popu¬ lation of the town, which is co-extensive with the district of the same name, is (1920) 10,431.

HILONGOS, he-long'ds, Philippines, pu¬ eblo of Leyte, on the southwest coast at the mouth of the Salog River, 62 miles southwest of Tacloban. It has a good harbor. Pop.

13.813.

HILPRECHT, Herman Volrath, her'- man fol'rat hil'preHt, American Assyriologist :

b. Ilohenerxleben, Germany, 28 July 1859. He was graduated at Leipzig in

1883 and was cura¬ tor of the Semitic section of the museum of the University of Pennsylvania, to which he pre¬ sented the greater part of the 27,000 original cuniform inscriptions which it contains. He was made professor of Assyrian and compara¬ tive Semitic philology in the same institution 1886-1911. In 1888-89 he was Assyriologist and scientific director of the University of Pennsyl¬ vania's expedition to Nippur, Babylonia, and editor-in-chief of its publications. In 1882 he studied the Assyrian inscriptions in the British Museum, traveled in Asia Minor and Syria and became an authority on cuneiform inscriptions. He reorganized the Babylonian department of the Imperial Ottoman Museum in Constanti¬ nople in 1893-1909. He also made trips to Ceylon, India, China, Japan and Korea 1911-12. Among his works may be mentioned (01d Babylonian Inscriptions, chiefly from Nippur) ; history of the Babylonian Expedition of the University of Pennsylvania to Nippur) ; (Recent Researches in Bible Lands > ; Explorations in Bible Lands during the 19th Century (1903) ; (Ausgrabungen in Assyrien und Babylonien) (1904) ; (The So-called Peters-Hilprecht Con¬ troversy* (1908) ; The Oldest Version of the Babylonian Deluge Story * (1910), and numer¬ ous contributions to scientific journals.*

*HILSA, the common shad of India and Burmah (Clupea Palasa) which in spring and summer migrates from the sea to the heads of the rivers to spawn in the shallows. The main body of these fishes ascends the river when the June monsoon begins; but their appearance in particular rivers is often long delayed, and varies with the rapidity of the current and what are regarded as inherited local habits and instinct. This widespread and valuable fish has many names ; thus it is Apulia® in the Indus Valley; ((sable-fish** in Bengal and <(palasah** among the Telingis, and is called <(nga-tha-louk** by the Burmese.*

*HILTON HEAD, an island, at the mouth of the Broad River, off the southeast coast of South Carolina ; a part of Beaufort County. Fort Walker, a Confederate fortification, was erected here during the Civil War. On 5 Nov. 1861, the fort was attacked by a Union fleet, under Commodore Dupont ; Commodore Tat- nall, with a Confederate flotilla, or <(mosquito fleet,** assisted Fort Walker, but it was cap¬ tured by Dupont. The reports gave Union loss 8 killed and 23 wounded; Confederates, 10 killed and 10 wounded.*

HIMALAYA, him-a'la-ya or him-a-la'y4 (from the Sanskrit signifying the abode of snow), a mountain system of Asia lying along the northern frontier of British India. It con¬ tains the highest peaks in the world, the prin¬ cipal mass of which is near the southern edge of the central section of the continent between long. 65° and 110° E., and lat. 28° and 37° N. The system extends approximately from north¬ west to southeast for about

2,000 miles, while its breadth varies from 100 to between 500 and 600 miles. The elevated plateau of Tibet, be¬ tween the Himalaya proper and its extension, the Kuen-Lun Range, is the widest part of the system. While the term Himalaya is usually confined to the range forming the northern

*barrier of India, the Hindu-Kush, on the north¬ west, and the Karakoram with the Kuen-Lun to the north are not distinct chains as frequently represented, but are all portions of the same connected mountain mass, having very little to distinguish them from the rest of the elevated system to which they belong. The Himalaya is connected on the east with the mountains of China and the Indo-Chinese Peninsula, and on the west with the mountains of Baluchistan and Afghanistan. The Pamir Plateau, described as a ((huge boss or knot® north of the Hindu- Kush, connects the Himalayas with the Thian- Shan, another mountain system which extends northeastward for about 1,200 miles. From the Ganges-watered plain of northern India, which has an elevation of about 1,000 feet above the sea, the Himalayas ascend by successive slopes. The transition from this plain to the ascent of the range is marked in the northwest by a belt of dry, porous ground, broken up into numerous ravines. East of this is the <(Terai,** a belt of sloping marshland covered with forest and jungle, very malarious and crowded with wild animals. Beyond this lies the ((Bhabar,** a belt of gravelly and sandy nature covered with forests of valuable timber trees. The <(duns,** <(maris** or <(dwars,** longitudinal valleys partly cultivated and partly yielding forest growth, occupy the space between the Bhabar and the slopes of the Himalayas. The principal passes are the highest in the world and include the Ibi-Gamin pass in Garwhal 20,457 feet, the Mustagh 19,019 feet, the Parangla 18,500 feet, and the highest on which traffic passes, the Kronbrung 18.313 feet and the Dura Ghat 17,750 feet. The greatest elevations of the Himalayan system are Mount Godwin-Austen' 28,278 feet in the Karakoram range, and in the Himalayas proper, Mount Everest 29,002 feet, the highest peak in the world, Kunchin- jinga 28,146 feet and Dhawalagiri 26,826 feet. On the north the limit of the snow line is 17,400 feet, on the south 15,000 to 16,000 feet. From the southern slope of the central portion of the great chain flow the various streams which unite in the Ganges; from the southern slope of the northwestern portion spring the rivers of the Punjab or «Five Waters,** which unite to swell the Indus which rises on the northern slope and flows southwestward to the Arabian Sea; also on the northern slope not far from the source of the Indus springs the Brahmaputra which flows east, southwest and south to the Bay of Bengal ; and also from the plateau of Tibet north of the main Himalayan range flow the Salwin, Mekong and other rivers of the Indo-Chinese Peninsula, the Yangtse, Hwang-ho and other rivers of the Chinese Em¬ pire. . The whole system is of granitic formation associated with gneiss and mica-slate,*

followed in descending by metamorphic and secondary rocks, until the alluvial deposits are reached. Minerals abound; copper and lead have been mined from ancient times, iron more recently, coal is found at the foot of the mountains, gold in the beds of the mounta n torrents, zinc, sul¬ phur, plumbago and salt are also obtained, and there are numerous mineral springs. The vege¬ tation js luxuriant; rhododendrons are in rich profusion, and there are forests of pine, spruce, silver-fir and deodar cedar at varying altitudes. Consult Freshfield, Douglas, (Round Karchen-

junga' (1903); Waddell, (Among the Hima¬ layas' ; Workman, (ln the Ice World of Hima¬ laya' (1900) ; Wall of the Snowy Hispar' (1907) ; (Icebound Heights of the Mustagh'

(1908).

HINCKLEY, Thomas, American colonial governor: b. England, about 1618; d. Barn¬ stable, Mass., 25 April 1706. In 1635 he emi¬ grated to America, and settled in Scituate, but four years later removed to Barnstable. He was deputy governor of Plymouth Colony in 1680 and afterward governor.

HINCKS, Sir Francis, Canadian states¬ man: b. Cork, Ireland, 14 Dec. 1807; d. Mon¬ treal, 18 Aug. 1885. He went to Canada in 1831, set up in business at Toronto, and founded in 1838 the Examiner. In 1841 he entered the first United Parliament as a Liberal. He first entered the cabinet in 1841 as Inspector-General of Accounts. He undertook the editorship of Pilot, Montreal in 1844. From 1851 to 1854 he held the premiership, during which time he passed many important measures. He showed great activity in railway development, and passed the Municipal Loan Fund Act designed to pledge local credit for railway construction; concluded, with Lord Elgin, a treaty of reci¬ procity witji the United States ; and was in¬ strumental in introducing the decimal system of coinage. In 1854 his ministry suffered defeat on the clergy reserves question. From 1855-62 he was governor of Barbadoes, from 1862-69, of British Guiana, Minister of Finance 1869-73, and from 1873 editor of the Montreal Journal of Commerce. He was created K.C.M.G. in 1869, and was one of the Ontario boundary commissioners in 1878. Among his publ ca¬ tions are (Canada: Its Financial Position and Resources' (1849) ; (The Political History of Canada between 1840 and 1855′ (1877).

HIND, hind, John Russell, English astron¬ omer: b. Nottingham, 12 May

1823; d. Twicken¬ ham, 23 Dec. 1895. In 1840 he obtained a sit¬ uation in the Royal Observatory at Greenwich. He was a member of the commission appointed to determine the exact longitude of Valencia (1844), and on his return was appointee the ob¬ server in Bishop's Observatory, Regent's Park. There he calculated the orbits of more than 70 planets and comets, noted several new variable stars and nebulae and discovered 10 minor planets. In 1851 he obtained from the Academy of Sciences at Paris the Lalande medal, and was elected a corresponding mem¬ ber; and in 1852 received the Astronomical Society of London's goll medal, and a pension of $1,000 a year from the British government. In 1857-91 he was director of the (Nautical Al¬ manac,' and in 1880 president of the Royal Astronomical Society. He wrote (The Solar System' (1846) ; (Astronomical Vocabulary'

(1852) ; (The Comets' (1852) ; ˆElements of Algebra' (1885) ; Untroduction to Astronomy' (1871), and other works.

HIND AND THE PANTHER, The, by Dryden (1687), is an elaborate piece of theo¬ logical controversy and satire in heroic coup¬ lets. The poet, recently converted to Catholi¬ cism, represents his new faith as the milk-white immortal hind, the Church of England as the panther, the atheists as the ape, the Baptists as the boar, the Presbyterians as the wolf, the Quakers as the hare and King James as the

lion. His original intention had been to con¬ ciliate the Church of England and to persuade it to make common cause with the Catholics against the Dissenters, who are roughly handled in the early part of the poem; but shortly be¬ fore the completion of the work the king by a declaration for liberty of conscience made a bid for the support of Dissenters against the Established Church, which left the poet in something of a predicament. In the last divi¬ sion of his piece he abandons his conciliatory tone and turns upon the Established clergy in his fable of the doves with bitter and abusive satire, directed with special sharpness at Gilbert Burnet, who is presented as the buzzard. Dry- den's eminence, his change of faith, his posi¬ tion as royal apologist, the multitude of his adversaries and the critical posture of public affairs all combined to give to the publication of his carefully barbed and envenomed satire the effect of an attack of hornets. The poem went through three editions in the first year, and provoked numerous replies, notably Prior and Montague's (The Hind and the Panther transversed to the Story of the Country Mouse and the City Mouse.' In the somewhat con¬ fusing and difficult allegory there are fine pas¬ sages of genuine piety and a sincere plea for tolerance and liberty of conscience. For further commentary consult Johnson, (Lives of the Poets' ; Scott, (Dryden' (in the

Scott- Saintbury edition of Dryden's works), and W. H. Williams' edition of (The Hind and the Panther' (1900).

Stuart P. Sherman.

HINDENBURG, Paul von Benecken- dorff und von; German Field-Marshal: b. Posen, 1847; cadet, 1864; lieutenant, I860: wounded at Sadowa; served in the Franco- Prussian War of 1870-71 ; present at Sedan and the siege of Paris. In 1873 he entered the War Academy at Berlin, and it mav be said that he was a ((military student" for the next 38 years. As division staff officer at Konigsberg in the early 80's he commenced that profound study of the Masurian Lakes districts which was destined many years later to bring him fame; to make him, in fact, the only really successful general (v. ith the exception of von Mackensen), that Germany produced during the first three years of the great war. He was appointed to the general staff in 1886 and lec¬ tured on applied tactics at the War Academy till 1893, making the Masurian Lakes region an important item in his lectures. In 1903 he at¬ tained the rank of general ; spent considerable time in East Prussia, and commanded in suc¬ cession the two army corps stationed at Koenigs- berg and Allenstein. In every annual manoeuvre he regularlv rehearsed the defense of the lake region against a Russian invasion. He often used his intimate knowledge to drive his <(op- ponents" into some marshy spots and kept them for hours up to their waists in mud. He resigned in 1911 at the age of 64; but retire¬ ment to him meant only more time to be de¬ voted to his all-absorbing hobby of defending East Prussia. He haunted the wilderness on foot, on horseback, in automobile and even with a field gun borrowed from a local garrison. There was the most serious method in his apparent obsession ; by his practical tests he found out where a horse or a gun could stand or be driven through; where mud or

water was deep or shallow, etc. Year after, year his investigations were pursued, and every spot was duly and precisely charted. The crisis of his life came about three years before the war, when a business' syndicate proposed to reclaim the Masurian Lakes region. The forests were to be cleared and drainage canals cut through. With furious energy von Hinden¬ burg opposed the scheme, went straight to Ber¬ lin, interviewed the emperor, and told him that this eastern wilderness was worth a dozen fort¬ resses and many army corps. He carried his point, and the project was

abandoned. On the outbreak of the war in 1914 he volunteered his services, though 67 years old. His offer was at first ignored, and it was not till the Russians had overrun East Prussia, shut up the German troops under General von Francois inside the Konigsberg lines, and were throwing advance cavalry in the direction of Danzig, that von Hindenburg was placed in command. With about 150,000 to 160,000 men he inflicted a ter¬ rific, crushing defeat upon the Russians under Generals Rennenkampf and Samsonoff at the battle of Tannenberg. He extended his left in a great curve round the Russian right flank and swept southward; performing the same evolu¬ tion on the Russian left, he drew two-thirds of a circle around the Russians. The retiring Russian batteries sank into the bogs; horses struggled in vain, and as the iron circle closed in whole regiments were driven into the lakes and drowned in the water or choked in the bottomless mires. Von Hindenburg took some 90,000 prisoners and enormous quantities of stores. The kaiser made him a field-marshal and placed him in command of the eastern armies. He led the great drive into Russia and conquered Poland. See War, European; Tannenberg.

HINDMAN, hlnd'man, Thomas Carmi¬ chael, American soldier: b. Tennessee, 1818; d. Arkansas, 1868. He studied law, entered prac¬ tice in Mississippi, fought in the Mexican War as a lieutenant of Mississippi volunteers, and in 1858-61 was a Democratic representative in Congress. Not long after the outbreak of the Civil War he was commissioned brigadier-gen¬ eral, was defeated' at Newtonia and Prairie Grove, was promoted major-general at Shiloh and later served in Arkansas.

HINDUISM is the name of a religion which is professed to-day by four-fifths of the population of East India, and which embraces within its folds the subtlest philosophic pan¬ theist and. the grossest animist. Unlike any other religion extant in the world, it owes its origin to no individual. Hinduism has passed through various stages of development, distin¬ guishable by marked features; but it would be wrong to. associate the stages with any process of evolution. The foundation of the faith is a collection of sacred writ, collectively known as the Vedas or Sruti (revelation). The Hindu Scriptures or the Veda has four subdivisions: Rig, Yajush, Saman and Atharvan. Each of the Vedas is further subdivided into Samhitas or sacred texts, Mantras or hymns and JJpani- shads or philosophic discussions. Besides the U panishad, each Veda has. an Aranyaka, which is principally connected with methods and effi¬ cacy of the worship of the Divine Beintr. The Hindu tradition is that the Veda, which means

ˆknowledge,® is eternal, and like the Divine Being it is ever-existent and part of it. But, the evidence is that all parts of the Veda are not equally old, nor could the authorship be ascribed to a single individual or even a group of individuals. The earliest are the hymns of the Rig Veda, which indicate

the purest form of nature worship known to mankind. The grand and striking phenomena of nature are visualized incomparably, and the hymns are dis¬ sociated from the mythology usually connected with polytheistic forms of belief. The hymns to Dyapus or the Dawn in the Rig Vega exalts one as no other poetry or any written word does. The idea underlying the hymns was not, however, nature worship. The ancient seers saw the Divine anywhere and everywhere, and they did not consider the world in water-tight compartments. The Divine was in all, and ev¬ erything was in the Divine.

The deities referred to in the Vedas are Indra, the lord of atmospheric region ; Vayu, the lord of air; Agui, the god of fire; Dyayns, the lord of dawn; Vanina, the lord of water; Brahaspathi, the lord of prayer; Prajapati, the lord of people; Visvakarman, the maker of all. The sage that praises Varuna attributed all creation, all qualities and all power to him, and had no cognizance of the ˆest of the pantheon. The same sage forgets all but Agui, when he chanted a hymn to him. The under¬ lying thought is that there is only one universal self-existent soul, and that all else are attri¬ butes. As the Vedic thought unfolded itself, the universal soul was identified with Brahma.

But the underlying thought has, of neces¬ sity, to suit itself to historic and social condi¬ tions. When the first Aryan settlers on the banks of Sindhu wished to chant hymns and devote their entire attention to worship they had to fight and cultivate and orovide for their own sustenance. The more they went inside the country, the fiercer was the resistance of the aboriginal tribes, who were called Rak- shasas and Pisachas. The necessity of exist¬ ence led to the division of the people into castes, which, at the outset, was not intended to be the hide-bound system that it latterly grew up to be. The Brahmin became the priest, the Khathruja, the fighter and the ruler, the Vaisya the trader, and the Sudra the laborer. Caste was defined as varna, which is usually foolishly held to denote color by European writers.

On account of the lack of adequate historic material, it is extremely difficult to trace the evolution, of. Hinduism. Owing, again, to the extraordinarily long period during which the re¬ ligion has remained a virile force, one can hardly point out any special trait which helped to keep its vigor.. If there is any quality above all which distinguishes the religion, it is its Catholicism. The Vedic texts, which formed the basis of thought, subscribed themselves to every kind of interpretation put upon them. Throughout the long period of its growth it has assimilated much that should normally be considered alien to it. It found a place for every phase of thought and every grade of life. No special thought, ritual or philosophy was superimposed upon the peoples it came in contact with.

First Period of Development. — From the meagre materials that we have, the first period

of the development of Hinduism can be asso¬ ciated with what is known as the sacrificial period. The Vedas were for all practical pur¬ poses hymns of worship. They were addressed in beautiful and exalted language to the gods, or the lords of the firmament. Offerings of delicious viands were made to them. Yagnya or sacrificial rites and ceremonies, which at one period was indissolubly connected with elabo¬ rate paraphernalia, was the order of the day.

Second Period. — The second period in its development may be called the Epic period. In this period the early Aryans extended the range of their conquest. They moved east from the banks of the Indus to the banks of the Ganges, and south to the banks of the Narbudda and the whole country of Deccan. Deeds of valor were committed in the process of conquest. With conquest came hand in hand assimila¬ tion, and all the inhabitants in the vast peninsula of the Hindustan found a place in Hinduism. The

The definitive establishment of the Brahmin- ical hierarchy follows closely the Epic period. There is a void between the close of the Epic period and the rise of the Brahminical era. It is generally believed that during this period there was a struggle between the Brahmins and the Khshatriyas, or the soldier class, for power, and that the former won. The legend of Parasurama is quoted as exemplifying the fall of the Kshatriya. The Dharmasutra, or the Code of Laws of Manu, reproduces on the whole pretty faithfully the state of Hindu society a few centuries before the Christian era. The Brahmins improved their newly acquired van¬ tage ground by investing everything connected with their order with a halo of sanctity, cal¬ culated to impress the lay community with feelings of awe. They invested the later reli¬ gious literature, so imbued with their own as¬ pirations and importance, with the same au¬ thority as Sruti or revelation. In their division of castes, and penalties to be inflicted for transgressions of the limits assigned to each, they forged the chain of their own supremacy. But it must be said to their credit that they denied themselves wealth and all means of acquiring wealth. No Brahmin was allowed to be a king. The most rigorous duties were im¬

posed on the Brahmin. While the lowest, or Sudra caste, was apparently treated without clemency, the real fact is that the punishment for any infraction was humane. The Brahmin had not to undergo severe physical

penalties; but he lost caste. The Sudra may rise to be a member of a higher caste. A Brahmin once fallen is fallen forever, and is ever the object of direct contempt. The three first castes, the Brahmin, Kshatriya and Vaisya were united by a bond of sacramental rites (Sanskaras) traditionally connected from ancient times with certain incidents and stages of the life of the Aryan Hindu, as conception, birth, name-giving, the first taking out of the child to see the sun, the first feeding with boiled rice, the rites of tonsure and hair-cutting, the youth's investi¬ ture with the sacrificial thread and his return home on completing his studies, marriage, funeral, etc.

The first three castes were considered the twice-born, because of their right to participate in ceremonials. The Brahmin had to go through four stages in life, i. e., student, house¬ holder, anchorite and recluse; while all the twice-born were entitled to do the same. Ac¬ cording to _ the Hindu, there are four sacred ((debts):> which a man has to discharge in life, i.e., that due to the gods, and of which he ac¬ quits himself by daily worship and sacrificial rites, that due to the rishis, or ancient sages, discharged by the daily study of the scripture ; that due to his manes, or ancestors, which he discharges by leaving a son ; that due to human¬ ity, which demands his continually practising kindness and hospitality. The domestic fire must be continually kept up, and never allowed to be extinguished.

The Development of Hindu Philosophy.

— The next stage of Hinduism is the develop¬ ment of philosophic thought. At about this time the Aryan Hindus had consolidated their conquests, and had time to devote to specula¬ tion. The fundamental thought that union with the Divine is the summtmi bonum of all ex¬ istence underlies all developments of the re¬ ligion. In the very early periods, hymns were the means. In the Epic period, the doc¬ trine was prevalent that the union of the human with the divine soul of existence was aided and expedited by penances of various kinds, collectively known as Yoga. In the next pe¬ riod, special stress was laid on sacrificial offer¬ ings, especially household rites with elaborate ceremonies. Doubt arose in the minds of many as regards the utility of penances or sacrifices. Just as the original hymnmakers of the Vedas speculated on existence in the Upanishad, so the later Hindus began to speculate on exist¬ ence. At first, there was confusion of thought, because the existence of a universal spirit was not' considered incompatible with the doctrine of a personal creator. Having devoted all their time and attention to sacrificial rites, they had failed to bring about a distinct formula of faith. The general drift of thought be¬ came pantheistic, although the ancient forms of belief still largely entered into it. Systems of philosophy grew up in the attempt to solve questions of the origin and destiny of man, and his relation to the Supreme Being. The

six well-known schools of philosphv are known as the Nyaya, Vaiseshika, Sankhya, Yoga, Mimamsa and Vedanta. They all agree in that

their object was to prescribe rules by which nian may be delivered from the bondage of ignorance, and be absorbed in the all-pervading divine soul. Their doctrine of the soul as something eternal and inextinguishable, distinct from mind, senses and body, yet sharing in the merits and demerits of good and bad deeds, the latter of which are caused by ignorance of what is best and highest, is identical. They agree so far as to how ignorance can be gradu¬ ally eliminated and right apprehension acquired ; to this end scriptures must be studied and clear¬ ness of mind and heart secured by sacrifices, almsgiving, pilgrimages and prayer. There was no question as regards what is best from an ethical point of view. There has also been no question as to the necessity for the attainment of _ the Divine. The point of conflict was mainly as regards speculative thought. These systems of philosophy were restricted in their scope, because they all acknowledge that the Veda was the fountain head of all knowledge, and an authority which cannot be questioned. On the other hand, they had a very wide lati¬ tude, because it was ever possible to quote some passage or other in the Veda to support any statement. The final result of the develop¬ ment of speculative thought was the enthrone¬ ment. of Brahman, as the be-all and end-all. The idea of a personal deity lost all force and the Great Abstract was the good of all exist¬ ence, and all existence was in it. The Vedanta philosophy was the culmination of the specula¬ tive thought of the Hinduism. See Vedanta.

Although the new dogma satisfied the aspirations of the most developed speculative minds, the votaries of the religion as a whole could neither comprehend nor take interest in it ; an abstract, colorless superentity like

Brahman awoke no sympathies in the hearts of those who can have no conception of God except as a personal entity. Even when the primitive symbolic worship of nature as seen in the

Hymns of the Vedas had not been touched by philosophic speculation, the mass of the people were drifting away toward the worship of gods of flesh and blood. Different localities became attached to the worship of a particular deity with special attributes. The thoughts and ob¬ servances of the original inhabitants of the

country had also had some influence on the

Aryan settlers. The priesthood was loath to give away to the superstitions and deity wor¬ ship of the common people, and would' gladly have raised them to its own level if it could. Attempts made in that direction signally failed. The only way open was for the priesthood to recognize and incorporate into their system some of the most prominent objects of popular devotion, and thereby to establish a kind of catholic creed for the whole community sub¬ ject to the Brahminical law. The pantheistic thought that had already been highly developed also" helped toward that end in view. Siva or Mahadeva and Vishnu were the two popular deities at the time, and they were admitted into the folds of the higher Hindu thought. This was only the beginning. A whole host of gods and goddesses then claimed recognition. Every small community had its local deity, and to re¬ fuse recognition would have meant the straying away of that community from the Hindu faith. The Brahmins settled the vexed question with¬ out, in any sense, giving up their own Vedantic

faith. As the Brahman was in all, and all was Brahman, what was there to prevent any ob¬ ject being identified with it, so long as there can be no other? What was, after all, in a name? Why should not the Brahman be called Vishnu, Rudra, Siva or Mahadeva? Life was meaningless without symbolism ; and the local deities were only symbols. The populace, how¬ ever, did not take the position; that the Brah¬ mins proposed to remedy by gradual education.

The result was that a whole pantheon of gods was created. Imagination was let loose and had a riotous play. Gods and goddesses by the galore peopled the firmament, although however only a handful found deification in the sense that they became objects of worship. New worlds were created, and Indra was made the ruler of 330,000,000 divinities. The trinity of Hinduism came into being in Brahma, the creator, Vishnu, the preserver, and Siva, the destroyer. The cosmogony of the world be¬ came extraordinarily interesting. The universe, before undiscerned, was made known by the sole, self-existent Brahman. The latter willed to produce from his own substance various lives, which were dormant in, and part of, him, created the waters by meditation. Out of the ultra-universal deluge was created Brahma, the creator of all things. Brahma, or the creator worship, did not last, because there were no votaries, and the idea was an innova¬ tion made to fit in with an artificial cosmogony. With Vishnu and Siva, however, it was differ¬ ent. The old conception of Vishnu as that of kindly protector appealed to the masses. He has been represented as undergoing, for the benefit of mankind, a number of avataras, or incarnations. The object for which Vishnu assumes a human form is always to deliver the people from the oppression of some wicked prince or influence, or when the world is over¬ whelmed in vice and has to be restored to virtue or Dharma. Siva is the destroyer, also known as Rudra, the god of the roaring storm,

usually portrayed, in accordance with the ele¬ ment he represents, as a fierce and destructive deity. But he is worshipped, because he is held to symbolize the destruction of sin and the unrealities and illusions of worldly existence, thus leading the soul to its goal. To give even a cursory idea of the various deities in" the Hindu pantheon would take volumes. The basis of the pantheon is the Puranas, of which the most noted are 18. Besides the Puranas, there are commentaries and works which exalt the particular deities of noted votaries. All the deities, however, are either the incarna¬ tions or attributes of Vishnu or Siva.

The Puranic period of Hinduism was con¬ temporaneous with Buddhism. Before the rise of Buddha the religion consisted either of elaborate sacrificial rites or pure philosophic speculation. Buddha found that the masses were ignored, and his teachings were prac¬ tically protestant Hinduism. The populace saw a new light and went en masse to Buddhism, especially as the votaries of the religion in¬ cluded such eminent monarchs as Asoka. There was something mellow in the new faith which appealed to popular imagination. The Brahmins found that their hold was being

wrenched from them. They did the best they could, and succeeded in driving Buddhism out of India. I hey incorporated all that was best i*1 the latter religion into their own faith ; in other words, they killed Buddhism by adopting it. In this process, the religion had two new accretions. One is the doctrine of metempsy¬ chosis. The doctrine of the transmigration of souls was not altogether new to the seers of the Vedas. But they did not emphasize it. The emphasis laid by Buddha proved a soothing balm to the masses, because they felt that they had always a chance to attain salvation so long; as they had a series of lives to achieve it in. The next accretion was that of Divine Mercy. Humanity has ever been noted for its weak¬ ness in as much as it is easily tempted away from the right path. But for the Divine guid¬ ance and mercy there is little for man to place his hopes on. The exaltation of mercy again appealed to the popular imagination. But Hinduism never accepted the doctrine of vica¬ rious punishment. Every individual soul was meted out its due desserts. There was no re¬ ward for virtue or punishment for vice ; each act had a certain result which must inevitably follow. But the Divine Mercy held a light, as it were, for the soul not to stray from the right path.

The doctrine of right was also developed during this period. Hinduism considers all life relative, and hence there is no cut and dried line of demarcation between vice and virtue. The code of morals is just the same

as in all religions. But in the philosophic dis¬ cussion of it, the religion holds that as the Divine is in all and is all, the distinction of right and wrong is purely one inevitable in the world of limitations, and is purely subjective.

Hinduism is, in the popular European con¬ ception, identified with idolatory. The mistake arises out of not understanding the Hindu mind and the chain of circumstances that brought about the worship of idols. Before the spread of Buddhism there were no idols or temples in India. But votaries of Buddha set up his image in different parts and made obeisance to it. When, however, Buddhism was incorporated into Brahminism, the latter took over the temples and allowed the masses to use idols of their particular deities. . The idols were only symbols, a form which makes the worship of the Divine convenient and easy for the average men and women. Later, of course, there was a degeneration in that the masses began to believe that there was special virtue in the idols.

Such in brief are the tenets of Hinduism and the history of that religion up to the date of the Mahommedan conquest of India. Since the 13th century the religion has, for all prac¬ tical purposes, stagnated. Much that is alien to the faith crept in, and the leaders had to incorporate customs and manners that were repugnant to them. The caste system, which was elastic up to that period, became petrified and fossilized, much to the detriment of the real interests and growth of the country. The Purdah system was then introduced in order to protect the honor of their womankind from the unscrupulous foreign hordes that ravaged

the country from time to time. The schools and universities that flourished in India either degenerated or were closed. The populace had little or no guidance in molding its religious thought, which gradually descended into the grossest mysticism, meaningless rites and un¬ savory practices. Occasionally reformers like Kabir, Tulsi Das, Ramanuja and Ramananda attempted to correct the evils. Little, however, was done.

The establishment of British rule brought with it a vigorous proselytizing activity on the part of Christian missionaries. The newly ac¬ quired knowledge and a wider conception of world affairs put new life into the religious thought of India. Ardent reformers arose by the score and strove for the purification of the religion of their ancestors, and a proper dis¬ semination of religious knowledge both to their own people and the rest of the world. The two most important movements that have achieved some results are the Brahmo Samaj and the Arya Samaj. The Brahmo Samaj owes its existence to Rajah Ram Mohun Roy, and was vigorously preached by the famous re¬ former Keshub Chunder Sen. The movement was ambitious and proposed to create a uni¬ versal faith, although it

immediately occupied itself with the purification of the Hindu faith. The movement never had more than a handful of followers; but it had an important effect on orthodox thought and practises, not only in Bengal, which was its birthplace, but also in all parts of India. The Arya Samaj owes its origin to Dayanand Saraswati, in Punjab. He proposed to go back to the faith of his an¬ cestors and would not accept any other text but the Vedas as authority. The movement has succeeded extraordinarily well. It has broken .the backbone of the caste system in many parts of the country and has a large number of ad¬ herents.

Bibliography.— Avalon, (Tantra of the Great Liberation (London 1913) ; Barnett, Einduism (ib. 1906) ; Barth, (Religions of India) (3d ed., London 1891) ; Bhandarkar,*

(Vaisnavism, Saivism, and Minor Religious Systems (Strassburg 1913) ; Bhatacharya, (Hindu Castes and Sects* (Calcutta 1896) ; Crooke, W., (Popular Religion and Folklore of Northern India) (2d ed., London 1896) ; Deus- sen, (Allgemeine Geschichte der Philosophy (2d ed., Leipzig 1906) ; Dowson, Classical Dic¬ tionary of Hindu Mythology* (5th ed., Lon¬ don 1913) ; Farquhar, Erimer of Hinduism* V (2d ed., ib. 1912) ; Grierson, (Modern Hindu¬ ism and its Debt to the Nestorians) and Mod¬ ern Hindu Doctrine of Works> (in Journal of the Royal Asiatic Society, London 1907-08) ; Hastings (ed.), Encyclopedia of Religion and Ethics* (New York 1908 et seq.) ; Henry, Ees literatures de l'lnde* (Paris 1904) ; Hopkins,*

(Religions of India (Boston 1895) ; id., < Great Epic of India> (New York 1901); id. (India, Old and New-* (ib. 1901) ; Kelkar, Essay on Hinduism* (London 1911); Levi, Ea forma¬ tion religieuse de l'lnde contemporaine* (in Annales du Musee Guimet, Vol. XXV, Paris 1907) ; Macdonnell, (History of Sanskrit Lit¬ erature* (London 1900; 1909); Mitchell, (Hin- duism, Past and Present* (2d ed., ib. 1897) ; Moore, G. F., (History of Religions* (New*

York 1913) ; Morrison, Hew Ideas in India during the Nineteenth Century) (London

1907) ; Nath, (Hinduism) (Meerut 1899) ; Oman, C. W. C, (Mystics, Ascetics, and Saints of India) (London 1903) ; id., (Brahmans, Theists, and Muslims of India) (2d ed., ib.

1908) ; id., (Cults, Customs, and Superstitions of India) (ib. 1908) ;

Risley, H. P., (People of India) (Calcutta 1908) ; Roussel, (Cosmologie Hindoue) (Paris 1898) ; id., (Legendes morales de l'Inde) (ib. 1900-01) ; Sacred Books of the East.) (London 1879 ct seq.;

, 1911) ; Sen. Guru Prasad, introduction to the Study ˆof Hinduism) (ib. 1893) ; Slater, 'Higher Hinduism in Relation to Christianity) (Lon¬ don 1902) ; Thurston, (Omens and Superstitions of Southern India) (ib. 1912) ; Williams, Mon- ier, Hndian Wisdom) (ib. 1876) ; id., Hindu¬ ism) (ib. 1877) ; id., (Brahmanism and Hindu¬ ism: Religious Thought and Life in India) (4th ed., ib. 1891) ; Wilkins, (Modern Hindu¬ ism) (ib. 1887) ; id., Hindu Mythology) (2d ed., ib. 1900); Wilson, Horace, Sketch of the Religious Sects of the Hindus) (in Wilson's (Works,) Vols. I and II, ib. 1862).

Srinivas R. Wagel.

HINDUSTAN, hm-doo-stan', HINDO- STAN, hln-do-stan', or INDOSTAN, signify¬ ing (

HINDUSTANI LANGUAGE AND LIT¬ ERATURE. Hindustani is the name given to the current vernacular of northern India. In structure it is based originally on a branch of the ancient Sanskrit, descended from a sister dialect and strongly modified by the various forms of Prakrit during the Middle Ages. The name Hindustani itself is derived from mod¬ ern Persian — Hindi (Indian). Hindustani is split up, however, into some 60 subdialects, and these, while all strongly resembling each other, are shading off one into the other according to geographical boundaries, so that in the east¬ ern region they rather tend toward Bengali and in the southern and western toward Mara¬ thi and Gujerati. The territory within which Hindustani is spoken in its various types is the most densely populated in India, for on but 248,000 square miles it is inhabited by 100,- 000,000 souls. The dialect of Hindustani en¬ joying a sort of pre-eminence is the Braj Bhasha, which prevails in the region of Delhi, Agra and Muttra. Hindustani contains also in varying degree a strong admixture of Arabic, Persian, Turkish and Tartar, as well as many words of Dravidian and Kolarian. When the latter is considerable, Hindustani is termed Urdu, meaning in Turkish <(camp,» «army,® and the term itself as well as the facts it stands for go back to the Mongolian and Turanian invasions of the 12th and subsequent centuries.

It was Urdu which became the accepted court dialect at Delhi, but a literary form of Urdu, richer in Persian elements, came to be known as Rekhta. During the last hundred years, however, by dint of strenuous efforts of gram¬ marians and teachers, Hindustani has been greatly purified and purged of elements not

cognate. Upon this purified Hindustani again has been conferred the appellation of Hindi, or High Hindustani.

As for its makeup Hindustani is an analyt¬ ical tongue. Like modern Persian and also like other dialects of India it has had fits grammar greatly simplified. Tenses, cases, etc., are indicated by means of prepositions, auxiliary verbs, etc. However, there are at least two genders, two numbers, two voices and nine tenses. Many of its constructions resemble analogous English ones closely, as <(I am going to see,® main dekhunga ; <(I am seeing,® main dekhto hun, etc. Hindi and Hindustani are both written with the characters of the Devanagari alphabet, as are Sanskrit and Marathi. But Urdu, faithful to its mixed origin, uses the Perso-Arabic script, with three additional characters to represent specifically Indian sounds.

Hindustani literature is very abundant, al¬ though with few exceptions of mediocre qual¬ ity. Its oldest achievement is the epic of Chand Bardai, the <(Prithviraj Rasau,® dating some 700 years back, in which the long sad story of the last Hindu ruler at Delhi is told. ((Hammir Deo,® by Sarangdhar, about 1363, describes the heroic fight made against the Sultan Aladdin Khilji, in 1300. The same author also wrote theJ(Hammir Kavya® and the Hammir Rasau,® similar warlike tales in epic form.

((Chattra-Prakas,® by Lai Kabi, is a long chronicle reciting the deeds of Rajah Chattarsal, who was killed in the battle of Dholpur, won by Aurangzeb, in 1658. «Padmawat» another epic, written in 1540, had a Mohammedan, Malik Mohammed, for its author. The poem, written in the purest dialect of Avanti, is based on the loss of his throne of Delhi by Humayan. The literature of the Bhagats, worshippers of Vishnu and adherents of a purified form of Brahmanism, is very extensive and has no doubt exercised much influence on national Hindustani speech. The name, Bhagats, means Children of the God.® In the line of fiction the <(Puranas» («01d Stories®) are notable.

Bibliography. — Catalogue of Hindustani Printed Books in the British Museum (London 1889) ; Fallon, S. W., Hew Hindustani Eng¬ lish Dictionary) (ib. 1879) ; Green, A. O.,

(Pract'cal Hindustani Grammar) (Oxford 1895) ; Grierson, Sir G. A., < Modern Vernacular Literature of Hindustan) (Calcutta 1889) ;

(Specimens of the Eastern Hindi Languages) (ib. 1904) ; Hoernle, A. F. R., Comparative Grammar of the Gandian Languages) (London 1880) ; Kellogg, S. H., < Grammar of the Hin¬ dustani Language) (2d ed., ib. 1893) ; Palmer, E. H., Simplified Grammar of Hindustani) (3d ed., ib. 1890) ; Tassy, J. H. S. V. Garcin de, (Histoire de la litterature hindoue et

hin- doustanie) (Paris 1870-71, 3 vols.) ; Tod, Col. James, (Annals and Ambiguities of Rajasthan) (London 1829-32) ; Vinson, E. H. J., (Manuel de la langue hindoustanie) (Paris 1899).

Wolf von Schierbrand, Author of (America, Asia and the Pacific >;

< Germany: the Welding of a World Power > etc.

HINGHAM, hing am, Mass., town in Ply¬ mouth County; on Massachusetts Bay, and on the New York, New Haven and Hartford Rail¬ road; about 15 miles southeast of Boston. In

the town are the villages of South Hingham, West Hingham, and Hingham Centre. The first permanent settlement was made in 1633, and it was then called Barecove. In 1635 it was incorporated under its present name. Its chief manufactures are awnings, cordage, wooden- ware, toys, bootheels, furniture, leatherette and upholstery. The harbor was improved in 1911 by the State and Federal governments. It has a meeting-house which was built in 1681. It contams a public library and is the seat of Derby Academy. Some of the noted people who have lived in Hingham are John A. An¬ drew, John D. Long, Benjamin Lincoln and James Hall, the famous geologist who for a number of years was State geologist of New York. Joshua Hobart, the Puritan ancestor of the Hobarts of New York State, also lived in Hingham. The government is arranged by town meetings. Pop. 5,604. Consult Cornish, L. C., Settlement of Hingham, Mass.5 (Hing¬ ham 1911) ; Lincoln, (History of the Town of Hingham.5

HINKSON, Katharine Tynan, Irish nov¬ elist and poet: b. Dublin, Ireland, 3 Feb. 1861. She was educated in a convent at Drogheda and since her marriage to LI. A. Hinkson in 1893, has lived in Ealing, a suburb of London. She is a voluminous writer both in prose and verse, but as a poet she has won the greater fame. She was one of the originators of what was known as the Irish Literary Revival. Her vol¬ umes of verse include (Shamrocks5 (1887) ; (Ballads and Lyrics5 (1890) ; (Cuckoo Songs5 (1894) ; (Miracle Plays5 (1895) ; (The Wind in the Trees5 (1898) ; (Collected Poems5 (1901) ; Hnnocencies5 (1905) ; (New Poems5 (1911) ; (Irish Poems5 (1913).

HINMAN, Russell, American editor of textbooks : b. Cincinnati, 23 Jan. 1853. He was educated at Antioch College, Ohio, went into business as a civil engineer; and later became editor of geographical textbooks for Messrs. Van Antwerp, Bragg & Co. of Cincinnati. Since 1890 he has been

in charge of the editorial of¬ fice of the American Book Co. He has written (Eclectic Elementary Geography5 ; (Eclectic

Complete Geography5 ; (Eclectic Physical Geog¬ raphy.5

HINNOM, Valley of, a ravine near or at Jerusalem, the exact location of which has not been determined. Here children were sacrificed to the god Moloch, and for this reason the valley was deemed accursed. Under the name of Gehenna, Hinnom became synonymous with Hell (q.v.).

HINOJOSA Y NAVEROS, he'no-yosa i na'ver'os, Eduardo de, Spanish public official and educator: b. Alhama, Spain, 25 Oct. 1852. He received his education at the universities of Granada and Madrid and from 1875 to 1882 was an assistant in the .National Archaeological Museum, Madrid. From 1882 to 1900 he was professor at the Madrid School of Diplomacy, serving meanwhile as civil governor of Madrid in 1897 and in 1900. Since 1900 he has been professor of ancient and mediaeval Spanish and American history at the University of Madrid. He is a Senator of the Kingdom and director general of public instruction, member of the Commission on Archives, Libraries and Museums. In 1908 he was elected honorary

president of the Congress of Historical Sciences, Berlin. He is also member of the Royal Academy of Spain, the Royal Historical Academy, the Royal Academy of Moral and Political Sciences, and corresponding member of the Institute of France. He has published (Historia del derecho espanol5; (Estudios sobre la historia del derecho espanol5 ; (E1 regimen senorial y la cuestion agraria en Cataluna durante la Edad Media5; Unfluencia de los teologos y jurisconsultos espanoles,5 and contributions to (The Catholic Encyclopedia.5

HINOYOSSA, he-noi-os'sa, Alexander d

Dutch colonial governor in America ; b. and d. Holland. He came to America in 1650 as lieu¬ tenant in a small military force sent to accom¬ pany 150 immigrants. In 1659 he became direc¬ tor of Nieuer Amstel, a Dutch colony on the eastern bank of the Delaware River. Al¬ though, owing to disagreements and illness, this colony was not at first a success, it was greatly developed by Hinoyossa's wise rule. Hinoyossa was for a time involved in a conflict of au¬ thority with Director Petrus Stuyvesant of New Amsterdam, who had general superintendence of the commissioners constituting the govern¬ ment of Nieuer Amstel. In 1663 he obtained authority over all the settlements on the Dela¬ ware. The Swedish colonists submitted and Stuyvesant relinquished his control. Upon the conquest of New Netherland by England, Hinoyossa returned (1674) to the continent

where he fought in the Dutch army against the French invasion by Louis XIV.

HINTERLAND, the land behind a coast or river : common in the phrase <(doctrine of the hinterland.55 This doctrine was first ad¬ vanced by Germany in 1883 by claiming that she had exclusive right to occupy certain territory behind the parts of the African coast over which she already ruled. This territory, it was claimed, extended back without defined limits until it reached the official boundary of ter¬ ritory controlled by another power.

HINTON, Richard Josiah, American au¬ thor: b. London, England, 25 Nov. 1830; d. 20 Dec. 1901. He settled in the United States in 1851 ; studied topographical engineering at the Columbia School of Mines ; and removing to Kansas in 1856 became a supporter of the cause of John Brown. He served in the National army in 1861-65; and was the first white man appointed to raise and lead colored troops. After the war he engaged in news¬ paper work in Washington, New York and San Francisco. He was the author of (Life of Wil¬ liam H. Seward5 ; (Life of Gen. P. H Sheri¬ dan5 ; (John Brown,5 etc.

HIP, that part of the trunk comprised be¬ tween the abdominal wall and the lower limb, particularly the region over the hip-bone (the crest of the ilium).

HIP JOINT, the joint of the upper leg or thigh (femur) where it joins the trunk. It is a ball and socket joint, formed bv the sinking of the smooth globular cap into the deep hollow, called acetabulum (vinegar bowl), of the os innominatum. Its movements are controlled by five ligaments: the capsular; the ilio-femoral ; the teres ; the cotyloid ; and the transverse. These movements are more wonderful than even those of the arm, being flexion, exten-

sion, abduction, adduction and rotation inward and outward. It is the most powerful joint in the body and hardest to dislocate.

HIP JOINT, Disease of, a disease of the ball and socket of the hip. It is most frequently a type of tuberculosis ; comes on in children or young persons, from very slight accidents which have caused an injury to the joint which, becoming infected, then develops the disease; is often traced to a long walk, a sprain in jump¬ ing or a fall. In the early stage of the disease the whole of the structures of the joint are in¬ flamed and after proper

treatment may be sometimes subdued with no worse consequences than a more or less rigid joint. Usually, how¬ ever, abscesses form around the joint and often communicate with its interior; and the acetab¬ ulum and the head and neck of the thigh-bone become disintegrated, softened and gritty. In a still more advanced stage, dislocation of the head of the thigh-bone commonly occurs, either from the capsular ligament becoming more or less destroyed, and the head of the bone being drawn out of its cavity by the action of the surrounding muscles, or from a fungous mass sprouting up from the bottom of the cavity and pushing the head of the bone before it.

As the disease advances, abscesses occur around the joint. True shortening of the limb now takes place, which at the same time be¬ comes adducted and inverted. From this stage, if the health is pretty good and the lungs arc sound the patient may be so fortunate as to recover with an anchylosed (or immovable) hip-joint ; but the probability is that exhaustion and hectic will come on and that death will su¬ pervene from the wasting influence of the puru¬ lent discharges occasioned by the diseased bone. See Tuberculosis.

HIPPARCHUS, hl-par'kus, Greek astron¬ omer: b. Nicsea, in Bithynia. He lived about 160-125 b.c. ; resided for some time at Rhodes, but afterward went to Alexandria, then the great school of science. A commentary on Aratus is the only work of his extant. He first ascertained the true length of the year, dis¬ covered the precession of the equinoxes, deter¬ mined the revolutions and mean motions of the planets, prepared a catalogue of the fixed stars, etc.

HIPPARION, hi-pa'ri-on, a genus of fossil three-toed Equidcc. See Horse, Evolution of.

HIPPELATES, a genus of midges to whose agency is ascribed the spread in many instances of the southern ophthalmic disease of cattle called pink-eye. See Flies; Pink-Eye.

HIPPOCRATES, hi-pok'ra-tez, Greek physician, the father of medicine: b. in the is¬ land of Cos, 460 b.c. ; d. Larissa, Thessaly, 357 b.c. Besides practising and teaching his pro¬ fession at home, he traveled on the mainland of Greece. His writings, which were early cele¬ brated, became the nucleus of a collection of medical treatises by a number of authors of dif¬ ferent places and periods, which were long at¬ tributed to him and still bear his name. The best edition is that of Littre (in 10 vols., Paris, 1839—61) . He has the great distinction of hav¬ ing been the first to put aside the traditions of early ignorance and superstition and to base the practice of medicine on the study of nature.

He maintained, against the universal religious view, that diseases must be

treated as subject to natural laws ; and his observations on the natural history of disease, as presented in the living subject, show him to have been a master of clinical research. His accounts of phenom¬ ena show great power of graphic description. In treating disease he gave chief attention to diet and regimen, expecting nature to do the larger part. His ideas of the very great in¬ fluence of climate both on the body and the mind were a profound anticipation of modern knowledge. He reflected in medicine the en¬ lightenment of the great age in Greece of the philosophers and dramatists.

HIPPODROME (from the Greek, Hippos , a horse and Dromos. a race course), the name given by the Greeks to places where races were held. This included both chariot and single horse racing, but the hippodrome later took the form of a circus, other games, such as wrestling, boxing, running, etc., being added, and for a short time after the introduction of Roman cus¬ toms and manners it became the scene of glad¬ iatorial combats, but as sights of this nature did not find favor in the sight of the Greeks, these combats were eventually eliminated and the main feature of the games, as in the begin¬ ning, was the chariot race. To the brutal taste of the Roman populace flowing blood acted as an elixir, but to the more refined Eastern people the amphitheatre was abhorrent. Though nu¬ merous amphitheatres were scattered through¬ out western Europe very few were ever built within the limits of the Eastern empire and then only where the influence and manners of the Romans were most powerful.

The first mention of a hippodrome is made by Homer, but it is believed that the term then applied to any course over which a race of any kind was run and that it did not necessarily have a fixed location. As the chariot-racing became the national game, the proper courses for the holding of such events became neces¬ sary, as in these races, though much of the suc¬ cess depended upon, the courage and skill of the driver, the loss of life was often great, through collision, the overthrow of the chariot in turn¬ ing caused by rough grounds, the breaking of an axle, or numerous other accidents. The h:ppo- drome was built for the purpose of avoiding, as much as possible, the possibility of such mis¬ haps, by providing a wide and smooth track, thus leaving plenty of space for the contestants. Of the ancient hippodromes (as distinguished from circus, amphitheatre, etc.), probably the most famous are those of Olympus and of Con¬ stantinople, and while the Circus Maximus of Rome may to a great extent have been more of a circus than race course, it was planned after the Greek race courses, was used by the Romans for this purpose and thus may properly be classed with the other two.

The origin of the hippodrome at Olympus tradition gives to Hercules. Of its length and breadth there was until recently no precise in¬ formation, the

overflow of the Alphus River having washed away the indications of its limits.

A Greek manuscript found recently in the old Seraglio in Constantinople gives its dimensions. The total circuit was eight stadia (about 0.95 mile), but the actual course was six stadia.

4 he breadth was 320 feet. Riding races con-

s:sted of but one lap (six stadia). The mule chariot race seems to have been about eight and one-half miles.

In general form the hippodrome was an ob¬ long, one end of which was semicircular; on three sides having seats for the populace and on the fourth, where the races were started, seats for the royalty and nobles. The right side, formed bv an artificial mound, was a little longer than the left side, which was built on the natural slope of a hill, the base of the fourth side being formed by the portico of Agnaptus, named after its builder. The form of the starting place was not unlike the prow of a ship, each side being 400 feet long and con¬ taining stalls for the chariots and their horses. In the arena were two goals around which the chariots passed several times to complete the race; one of these goals having a bronze statue of Hippodameia upon it, the other an altar dedicated to <(Taraxippus, the Terror of the Horses.® The principal difference between the Greek hippodrome and the Roman circus was in the width of the arena, in the latter only four chariots being able to race at one time ; there was also some slight difference in the arrange¬ ment of the carceres. '

The erection of the hippodrome of Constan¬ tinople was due to two Roman emperors, Sep¬ timus Severus and Constantine the Great, who each in turn captured Byzantium by storm. About six years after its capture by him (197 a.d.) Severus commenced operations a little to the west of Byzantium, but in that year was called away by a rebellion in the West and never returned to the city. For over a hundred years it remained untouched, until 323, when Constantine, having conquered the citv, pushed the work to completion after changing the de¬ tails in the original plans. On 11 May 330 it was inaugurated.

The external appearance of the hippodrome was imposing for its vastness, its height and even for its beauty. The walls were of brick, laid in arches and faced by a row of Corinthian columns 260 in number and standing 11 feet apart. There were four entrances from the city each flanked with

towers, but of the stairways leading to these entrances no description has come down to us.

Some idea of the immensitv of this pro¬ digious structure may be given by the fact that its dimensions were 1,400 feet in length by 400 feet in width, covering an area of 535,866 square feet, or 12.3 acres. On the north was a struc¬ ture containing the apparatus for the games, the servants' and attendants' apartments, the chariots and horses, the arsenal, etc., called by the Romans the carceres and by the Greeks fiayyava. This apartment was separated from the arena by pillars with latticed gates, 12 in number. Next to these gates was the little church or oratory, where the rival contestants prayed before the games.

The -ground story was 20 feet high. On it rested the palace of the Kathisma or Tribunal, in the centre of which, supported upon 24 mar¬ ble pillars was the platform in Kathisma proper, on the front of which was the emperor's throne. On either side and a little below the emperor were the seats for courtiers, ambassadors, etc. Far down the western side of the hippodrome and nearly opposite the built column was the gorgeous chamber of the empress, this sup¬

ported upon four porphyry pillars and hence called the tetrakion.

The eastern, western and southern portions were occupied by parallel rows of seats, appor¬ tioned to the spectators according to their rank. Behind these rose tier upon tier of benches until nearly half way to the top where was a broad promenade bounding the entire extent of the hippodrome except on the northern side. This promenade was without roof or covering, and, standing nearly 40 feet above the ground, pro¬ tected by a solid marble railing reaching to the breast, the spectator had a spacious avenue 2,766 feet long. It is estimated that the hippo¬ drome would seat 60,000 persons and have com¬ fortable standing room for 20,000 more, while with a little crowding 100,000 might be accom¬ modated.

The arena was 211 feet wide by 1,190 feet long and was bounded by a narrow walk called the Euripus, paved in tesselated stone. The semi-circular southern portion of the arena, that was included in the curve of the Sphendone, was reserved for the criminals and there too was the place for executions. In the centre of the arena and lying parallel to it was the Spina; a stadium, 607 English feet in length, it marked and governed the beginning, duration and end of each course of a race. At each end of the Spina was a high, narrow framework, sur¬ mounted by seven poles, on one group being placed seven fish, on the other seven eggs; one of each was taken down upon the completion of each circuit during the race until the race finished. Toward the southern end of the Spina was the Phiale, a

broad basin of running water devoted to the victims of accidents. The space between the northern goal and the car¬ ceres was called the Stama, where wrestlers and acrobats performed.

Many additions to. the works of art already gathered by Constantine were made during the 700 succeeding years, but in 1203 the hippo¬ drome was sacked by the Franks and Venetians and all were either carried off or destroyed. The most famous _ of these was the (Four Golden Steeds, > which was stolen by the Vene¬ tians and which in turn was brought to Paris bv Napoleon, and is now standing guard over the main entrance of the cathedral l f Saint Mark. Among the others are the statues of Hercules, the She-wolf and Hyaena, the Virgin Goddess Diana, the Brazen Ass, the Caledonian Boar, Helen of Trov, the God of Wealth and eight Sphinxes, beside the statues of the early Roman emperors, martyrs, teachers, philoso¬ phers, etc. In the early days of the city games were of frequent occurrence, but as time went by they became less and less frequent owing probably to the great cost (it is estimated that a single celebration cost 1,000,000 francs) and at last were celebrated only on 11 May and 25 December, the birthdays of the city and Christ respectively.

It is not known precisely when this hippo¬ drome was entirely destroyed, but as there is no definite reference to any chariot race later than the reign of Isaac Angelus, who was dethroned in 1195, and as the place was sacked in 1203-04 it is probable that it did not survive the begin¬ ning of the 13th century.

The Circus Maximus at Rome was for a long time the only structure of its kind in the world, taking its form from the Greek hippo-

drome and furnishing the model for all later circi. In the Vallis Murcia, between the Pala¬ tine and Aventine hills, wooden seats were first constructed by Tarquinius Priscus (Liv. I, 35) ; were frequently burned and rebuilt until the time of Julius Caesar, when the steps were con¬ structed of stone and greatly improved. At that time it probably accommodated about 100,- 000 people. After its destruction by fire in 31 b.c. Augustus completely restored it, making several magnificent additions. The upper tier of seats on the Aventine side was again de- troyed by fire in 36 a.d, but Claudius not only restored these, but greatly enlarged the entire circus. These additions were supplemented by others made during the reigns of Trajan and Constantine until it was estimated that the circus held 385,000 spectators, while the

The general plan of the Circus Maximus compared favorably with the Greek hippo¬ dromes, the main difference being in the arena around which Caesar had constructed a moat 10 feet wide and 10 feet deep to prevent beasts from injuring the spectators, and in the width of the arena as before stated. Before the reign of Augustus the circus was used for gladi¬ atorial fights with wild beasts and other forms of butchery, but after the erection of the amphitheatre of Statilius Taurus the circus was no longer used for such purposes. The popu¬ larity of this as of the Greek hippodrome also declined and it gradually decayed, now only a few of the remains standing.

The term hippodrome has also been applied to race tracks in England and on the continent, the most famous of these so-called hippodromes being those at Vincennes, Longchamps, Chan¬ tilly in France, Newmarket and Epsom in England, and Curragh in Ireland. The modern hippodrome, or indoor circus, had its beginning in Paris, where the first was constructed in 1845. It was built entirely of wood, the arena was 108 metres long and 104 wide, and it had a seating capacity of 15,000 persons. This was destroyed in 1870 by fire. The word hippodrome was first utilized in this country when Franconi conducted a circus at 23d street and Fifth avenue, New York.

The first hippodrome of the accepted type to be built in America was the New York Hippo¬ drome, which occupies an entire block on Sixth avenue, between 43d and 44th streets. This structure was begun on 1 July 1904 and finished in five months, the opening performance occur¬ ring 12 April 1905. The main fagade has a length of 200 feet, and the buildings extends 240 feet east on 43d and 44th streets. It is built of brick, marble and steel, and rises to a height of 72 feet on Sixth avenue, and 110 feet in the rear, the total cost being $1,750,000. It is the largest playhouse in the world, having a seating capacity of 5,200.

In the interior decorations the general scheme of coloring is a Roman red as a back¬ ground, with all the structural features done in ivory, gold and silver. The carpetings are of the same color, and the wall hangings, draperies and upholstery are executed in a Roman red velvet enriched with heavy gold and silver em¬ broidery and tassels.

The auditorium is about 160 feet long and 160 feet wide in the first story, and the balcony and gallery occupy the building in front of the

stage above the first story. At the rear of the balcony is the mezzanine floor, below the rear seats of the balcony being the wide segmental promenade with main entrances and flights of shallow stairs at each end leading to the street. Behind the promenade the space, 20 to 50 feet wide and 200 feet long, is occupied by smoking rooms, parlors, waiting rooms

and cloak rooms. The promenade and lobbies are finished in mar¬ ble and caen-stone, relieved by rich illumina¬ tions of the ornamented parts in gold and silver. A special feature of the auditorium is the ar¬ rangement and construction of cages for ani¬ mals of the feline kind. Their dens are ar¬ ranged in a segmental curve in the promenade floor and have plate glass fronts with iron bars behind.

The chief point of interest in the hippo¬ drome centres in the stage and the entirely novel mechanical arrangements for operating the movable platforms, filling and emptying the tank, raising and lowering the stage and hand¬ ling the scenery. The depth of the stage from the extreme front to the back wall is 110 feet, or 50 feet from the back wall to the proscenium opening and 60 feet from the arch to the front of the stage. This latter part of the stage lying forward of the proscenium arch is known as the "apron" It is large enough to conta'n two regulation circus rings, each 42 feet in dia¬ meter. Beneath the "apron" is built a huge steel and concrete tank, over 14 feet in depth and large enough for the whole "apron" to sink within it. When aquatic performances or naval pageants are given the tank is filled with water and the movable "apron" is submerged below the water to the bottom of the tank.

Bibliography— (v. 15 4 4; v. 120 $ 7 foil.). From results of excava¬ tions the best descriptions of the old hippo¬ dromes of the world may be had in the fol¬ lowing: Curtius, <01ympia) (Berlin 1852) ;

*Gardiner, E. H., (Greek Athletic Sports and Festival s> (London 1910), and the article "Hippidromos," in Daremberg and Saglio (Dic- tionnaire des antiquites> (Paris 1897) ; Gros- venor, (Hippodrome of Constantinople) (Lon¬ don 1889); Lehndorf, J Hippodromos) (Berlin 1876) ; Pollack, (New York 18*80). Of the New York Hippodrome probably the best description is contained in the Scientific American (Vol. XCII, No. 12; 25 March 1905). For a study of the architectural features of the structures of those times consult Sturgis, (European Architecture) (New York 1896).*

HIPPOLYTUS. a saint and martyr of the early church, who flourished early in- the 3d century. He was of Greek family, was con¬ verted to Christianiiy and eventually became a presbyter of Rome. His opposition to his bishop Zephyrinus, and to Calixtus, his suc¬ cessor on questions concerning Christology and discipline resulted in a schism. The dissenting party chose Hippolytus as its head, which posi¬ tion he maintained until about 235, when he was banished to Sardinia. Here he died shortly

afterward. Only fragments of his numerous works remain. Of these, the (Philosophumena) is the best known, and was first published as a work of Origen's. However, it was soon recog¬ nized as a treatise by Hippolytus and first edited as such by Duncker and Schneidewin. In it he states his theological position, dealing especially with heresies and their origins. Hippolytus was also the author of a number of shorter polemi¬ cal and exegetical treatises. His works are ac¬ cessible in Migne, (Patrologia Graeca) (Vol. X), and by Bonwetsch and Archelis (Leipzig 1897). Consult Achelis, Hans, (Hippolytstudien) (Leip¬ zig 1897).

HIPPOPOTAMUS, the generic and popu¬ lar name of a great amphibious ungulate, allied to the swine, of which two species are known. One (H , amphibius) is common throughout the greater part of Africa; the other (H . liberien- sis) is not only smaller, but has other import¬ ant differences, and is found only in the Afri¬ can west coast rivers, and those flowing into Lake Tchad. The former species has a thick and square head, a very large muzzle, small eyes and ears, thick and heavy body, short legs ter¬ minated by four toes, a short tail, two ventral teats, skin about two inches thick on the back and sides, and without hair, except at the ex¬ tremity of the tail. A curious feature of the skin is the reddish exudation which pours from its pores when the animal is excited or in pain. It is called ((bloody sweat, w but the blood has no part in it. The incisors and canines of the lower jaw are of great strength and size, the canines or tusks being long and curved forward. These tusks sometimes reach the length of two feet and more, and weigh upward of six pounds. The animal is killed by the natives partly as food, but also on account of the teeth, their hardness being superior to that of ivory, and less liable to turn yellow. The hippopotamus has been found as much as 14 feet long, and nearly five feet high, but usually measures much less. It delights in water, living in lakes, rivers, and estuaries and feeding on water-plants or on the herbage growing near the water, where it can walk as well as swim. It often leaves the water after nightfall, and goes, sometimes long distances, to grassy pastures to feed; reg¬ ular paths are worn through the reeds, and here the Africans often arrange pits, deadfalls, or other traps for their capture. These animals are quick of sense, timid and anxious to escape danger; but when brought to bay or enraged prove formidable antagonists and often destroy canoes. They are excellent swimmers and divers, and can remain under water eight or ten min¬ utes. The behemoth of Job is considered to be the hippopotamus. Several extinct species are found in Old World Tertiary formations, and modern species formerly inhabited not only Madagascar, but southern Europe and India, where they were contemporary with the men of the Stone Age.

HIPPURIC (hipu'rik) ACID, an organic acid, CH2NHCOOH, existing in the urine of herbivorous animals, and, in small quantities, in that of human

beings. It is in¬ creased by a vegetable diet, and by the disease called diabetes, and may be caused to appear in the human urine in considerable quantities by the administration of benzoic acid with the food. It is most conveniently prepared by boil¬

ing horse urine with milk of lime, filtering, neu¬ tral. zing with hydrochloric acid, and evaporat¬ ing to about one eighth of its volume. The con¬ centrated urine is then acidified with hydro¬ chloric acid and allowed to stand, when impure hippuric acid comes down as a yellowish-brown precipitate. To purify the crude product, it is heated to 21 2° F. with not quite enough water to entirely dissolve it, and chlorine gas is passed through the solution until the unpleasant smell has entirely disappeared. The solution is then filtered while hot, and the crystals which separate upon cooling are isolated and subjected again to the same treatment, the chlorine being passed through the solution, in this second treat¬ ment, until the solution is bright yellow. When thus prepared, hippuric acid crystallizes from water in the form of large prismatic plates, belonging to the trimetric system. Its crystals are colorless or white, free from odor and have a slightly bitter taste. Hippuric acid has a specific gravity of about 1.308, and melts at 369° F. ; it begins to boil at about 465° F., giv¬ ing off benzoic acid and benzonitrile. It is in¬ soluble in benzene, carbon disulphid, and cold chloroform, and is but slightly soluble in ether and in cold water. It is very soluble, however, in boiling water, and in hot alcohol. With bases, hippuric acid forms salts that are remark¬ able for the beauty of their crystalline forms. When boiled with dilute hydrochloric, sulphuric, nitric or oxalic acid, it yields benzoic acid and glycocoll.

HIRAM, a king of Tyre, who assisted David in the building of his palace. Hiram supplied timber and skilled workmen, and when Solomon succeeded to the throne, gave him sim¬ ilar co-operation in the construction of the temple. Great friendship existed between the two kings, Hiram even supplying a navy to Solomon, when the latter was in need of ships. Tyre was strongly fort'fied during his reign, and Cyprus was vanquished.

HIRAM COLLEGE, coeducational insti¬ tution, founded in 1850, in Hiram, Ohio, under the auspices of the Christian Church. It was first called the Eclectic Institute, but was incor¬ porated as a college in 1870. In 1916 there were in attendance about 266 pupils and 20 instruc¬ tors. There are about 13,000 volumes in the library. It owns six buildings entirely devoted to college purposes, has women's dormitories, a museum, gymnasium and laboratories.

HIROSHIMA, he-ro-she'ma, Japan, a town on the island of Hondo, about 160 miles from Kobe, and after Osaka the most important port on the inland sea. It is the capital of the Province of Aki and of the Prefecture of

Hiroshima. It is situated opposite the sacred isle of Itakushima, with its celebrated temple. Hiroshima contains several temples and tea houses. It is a centre of the trade in bronze, lacquered ware and other art objects. Pop.

142,763.

HIRSCH, hirsh, Emil Gustav, American

rabbi : b. Luxemburg, 22 May 1852. He studied at the University of Pennsylvania and at Ber¬ lin, was rabbi successively in Baltimore, Md. (1877), and Louisville, Ky. (1878-80), and in 1880 was' chosen minister of the Sinai congre¬ gation of Chicago, Ill. In 1880-87 he was editor of the Zeitgeist of Milwaukee, Wis., and

later became editor of the Reform Advocate of Chicago. He was appointed professor of rabbinical literature in Chicago University in 1892, and was lecturer at Johns Hopkins in 1902. He appeared as an orator on various patriotic and other occasions, and wrote several monographs on religious and Biblical topics. He was also prominent in Republican State politics, and in 1896 was presidential elector- at-large for Illinois. He was in charge of the Biblical department of the Jewish Encyclopaedia in 1903-06, and member of the Board of Com¬ missioners of Public Charities of Illinois since 1906. He translated Einhorn's (Ritual for Jewish Reform Congregations. J

HIRSCH, Maurice, Baron de (Baron Mau¬ rice de Hirsch de Gereuth), Austrian Jewish capitalist and philanthropist: b. Munich. 9 Dec. 1831 ; d. Ogyalla, Hungary, 21 April 1896. His fortune was computed to be $200,000,000 and his yearly income at about $20,000,000. His benefactions equaled nearly $100,000,000, the most of this sum being directed toward the im¬ provement of the condition of the Jews in all parts of the world. The De Hirsch trust for the United States is a fund of $2,500,000 for the Americanizing and education of Rumanian and Russian Jews. Other large gifts were those of $5,000,000 for the endowment of schools in Galicia and of $50,000,000 to the Jewish coloni¬ zation association for the establishment of colonies in Argentina. In 1888 he offered to the Russian government $10,000,000 for schools, with the condition that in the distribution of the amount no discrimination as to race or re¬ ligion be made. This offer was not accepted. Baron de Hirsch made extensive sums through the construction of railways in Turkey.

HIRSCH, Samson Raphael, German Jew¬ ish theologian: b. 20 June 1808;

d. 31 Dec. 1888. Born in Hamburg of a family devoted to He¬ brew studies, and strict conformists, his choice of theology as his vocation was natural and his preparation was thorough. Graduating from Bonn University, his first position (1839) was at Oldenburg and then at Emden (1841). He wrote his (Neunzehn Briefe fiber YudenthunP (1826), wh;ch was translated into Hebrew (1892) and into English (1899). In 1836 Hirsch issued his a Jewish text-book for mature young people, followed by two polem¬ ical essays against reform. His standpoint from the beginning was orthodoxy and its de¬ fense was his' leit motif. After preaching in Nicolsburg 1846-51, he was called to Frankfort, by the orthodox section of the community, where his activity was developed. He organ¬ ized a school, founded a monthly and wrote many books. He translated the Pentateuch (1867-78) and the Psalms (1882).

HIRSCHFELD, Georg, German dramatist and novelist: b. Berlin, 11 Feb. 1873. He be¬ longed to the Naturalistic School and during his early career he was hailed by some as a second Hauptmann. He followed closely in the foot¬ steps of Holz and Schlaf, their influence being clearly evident in his dramatic style. He studied in Munich, and while there his first production, a one-act drama, (Zu Hause> (1894), was staged, which is a portrayal of life in Berlin, W. The play which first made Hirschfeld well known was (Die Mfitter> (1896), which was

produced for the first time by the Freie Bfihne in 1895 in Berlin, where Hirschfeld had now come to reside. It proved a success and was then staged by Brahm in the Deutsches Theatre. This is the work by which Hirschfeld is chiefly known. His later dramas are (Agnes Jordan (1898), a variation of the theme of (Die Mfitter* ; the romantic drama (Der Wcg Zum Licht) (1902); the servant's comedy Paul¬ ine,* a counterpart to Hauptmann's (Biberpelz) ; the artist's comedy (Der junge Goldner,* and one other drama called ˆebeneinander.* At one time in Hirschfeld's career great things were expected of him as a novelist also. (Damon Kleist* was the first of his stories. It was published in Die Freie Bunrie in 1894. He had the same admiration for the poetic struggles of Kleist that many other literary men had for Byron. Hirschfeld's mystical genius made a better success of the story (Der Bergsee> (1896). It might be described as the attempt' of a naturalist to do homage to symbolistic art. Another story (Requiem * (1906) completes the list of his novels. His last accessible works are two conventional comedies*

William F. Hauhart.

HIRTH, hert, Friedrich, German- American educator: b. Grafentonna, Saxe-Coburg, Ger- many, 16 April 1845. He studied at Leipzig, Berlin, and Greifswald, entered the Chinese customs service in 1870; retired in 1897,

and in 1902 was called to the newly created professor¬ ship of Chinese in Columbia University. In 1900 he was consulted by Chancellor von Bfilow on the Chinese war indemnity question. In the summer of 1902 he was in Petrograd, catalogu¬ ing a collection of manuscripts taken at Peking. He made a valuable collection of Chinese porce¬ lains, now in the museum at Gotha, and one of printed books and MSS, now in the Berlin Royal library. Among his publications are (China and the Roman Orient (1885); An¬ cient Porcelain* (1888) ; (Chinesische Studien) (Vol. I, 1890) ; and (Ueber fremde Einflfisse in der Chinesischen Kunst* (1896); < Scraps from a Collector's Note-Book, Being Notes on Some Chinese Painters of the Present Dynasty, with Appendices on Some Old Masters and Art Historians> (1905) ;*

HIRUDINEA, bloodsuckers or leeches; formerly classed with flatworms and thought to resemble flukes and tapeworms but really flat¬ tened annulate worms (Annelida) with suckers or jaws, and related to the earthworms. Most leeches are carnivorous robbers of the aquatic fauna but some have acquired partial or com¬ plete parasitic habits. A few tropical species are land living in Japan, the Philippines, and other eastern regions where they attack travelers or soldiers on the march so violently as to imperil their existence.

HISCOCK, Frank, American legislator: b. Pompey, Onondaga County, N. Y., 6 Sept. 1834; d. 18 June 1914. In 1855 he was admitted to the bar, in 1860-63 was district attorney of Onondaga County, and in 1867 a member of the State constitutional convention of New York. He was a Republican representative in Congress in 1879-87, and obtained recognition as a party leader and speaker. In 1887-93 he was United States senator from New York and chairman of the appropriations committees and then returned to professional practice.

HISPANIA, his-pa'm-a. See Spain.

HISSAR, one of the mailed catfishes of northern South America, noted for its monogamous habits, and the fact the eggs, a few at a time, are voided by the female into a pouch made by the folded membranes of her ventral fins. Here they are fertilized by the male, and then are taken by the faithful pair to a secluded place and deposited. This opera¬ tion is repeated until about 250 eggs are placed in the nest which is then guarded. The hissar and several other species belong to the genus Callichthys.

HISTOLOGY, the science of animal and vegetable tissues. It investigates by means of the microscope the various tissues of rqan, ani¬ mals and plants in their anatomical relations and compositions. Topographical histology considers the more minute structures of the organs and systems of the body; normal his¬ tology deals with the healthy tissues; and pathological histology investigates the changes they undergo in disease. Marie Francois Xavier Bichat (1771-1802) is generally credited with the foundation of the science of histology. Un- fotunately the imperfect condition of the microscope in his time prevented Bichat and his contemporaries from carrying their investiga¬ tions to the point which Schleiden, Schwann, Johann Muller, Virchow, Von Recklinghausen, Cohnheim, etc., have reached. It has been found that all structures however complex are made up of cells, and that the parts of a body may be resolved into a small number of ele¬ mentary tissues now grouped as: (1) epithel¬ ium, which lines almost all the cavities of the body and is directly or indirectly in communi¬ cation with the atmosphere; (2) the nervous tissues, which as nerve cells originate and as nervous fibres transmit all nervous impulses; (3) muscle, which produces motion whether voluntary or involuntary; (4) glandular tissue which consists of cells standing in close relation with the blood-vessels which take from the blood certain substances and secrete them; (5) connective substances which support and hold together the more delicate and important struc¬ tures, especially forming the cartilages and bones. See Plants, Structure of.

Many tissues have the power of repairing injuries that happen to them. This power is called regeneration, and is found especially in the lower animals, in polyps, worms and in many amphibious creatures and reptiles. In other cases the lesion is supplied by a new growth of connective substance. In diseases the tissues undergo many changes and many of these diseases in the organism are shown also by the changing of color. The science of such changes is generally called pathological _ his¬ tology. It is a comparatively young science

and has been cultivated by Virchow, who was the founder of cellular pathology.

Vegetable histology is that department of botany which deals with microscopic phytotomy or the anatomy of plants, especially investigat¬ ing the plant cells and plant tissues. It is prop¬ erly subordinate to morphology and is a dis¬ tinctively descriptive science. It deals with the question in what relation the cells or forms of tissue stand to the vital activity of plants, what functions they perform, and in what respect they are constituted for the fulfilling of those functions. (Compare Cytology). Owing to the excessive minuteness of the cells which form the tissues of all plants the investigation relies almost entirely on the microscope, and naturally has

made its advance in proportion as the microscope has been made more perfect. Microscopes that are now used magnify at least 1,000 diameters, and the materials used have to be carefully prepared and mounted. Many of them have to be colored with hsematoxylin, fuchsin, saffranin, and other alcoholic or aqueous dyes. Consult Bailey, F. R., (Text-Book of Histology) (4th ed., New York 1913) ; Chamberlain, C. J., (Methods in Plant Histology) (2d ed., Chicago 1905) ; Lee, A. B., (Microtomist's Vade-mecum (6th ed., Philadelphia 1905) ; Strasburger, E., hand¬ book of Practical Botany) (7th ed., New York 1911) ; Delafield and Prudden, handbook of Pathological Anatomy and Histology) (9th ed., New York 1911).*

HISTORICAL DETERMINISM. See

Determinism.

HISTORICAL GEOLOGY, that branch of the subject that deals with the orderly treat¬ ment of the events of the past, chronologically, and with due regard to cause and effect. It includes Paleontology (q.v.) and Stratigraphy (q.v.). See section on Stratigraphy in the article on Geology. See also Paleozoic, Cam¬ brian, Carboniferous, etc.

HISTORICAL SCHOOL OF ECONOM¬ ICS. See Economics.

HISTORY, ITS RISE AND DEVEL¬ OPMENT: A Survey of the Progress of Historical Writing from its Origins to the Present Day.

I. The Nature of History.

1. Meaning of the Term. — The term His¬ tory, in popular usage, has been applied to two somewhat different concepts. It is often used to designate the sum total of human activities, and it is when used in this sense that one often hears the remark at a particularly active or critical period in human events that ((now history is being made.® A more common usage is that which regards history as the record of the events rather than as the events them¬ selves. In this latter generally accepted con¬ notation given to the term history, two defini¬ tions may be offered. In an objective sense history is, to use the words of Professor Robinson, ((all we know about everything man has ever done, or thought, or hoped, or felt.® Subjectively or psychologically expressed, his¬ tory may be regarded as a record of all that has occurred within the realm of human con¬ sciousness. . , .

In this sense of a record of the activities of the human race, history has been regarded

by some, particularly in earlier periods, as primarily an art — a branch of literature. By a continually increasing number of authorities it has tended, however, in its modern form, to be considered as in the main a genetic social science, which is concerned with reconstruct¬ ing the past thoughts and activities of human- itv. In the present article history will be re¬ garded in the sense of a science rather than as an art. It is the thesis of the writer that his¬ tory can lay no more claim to being an art than any other branch of social science and that while artistic achievement may be desired in history it is quite subordinate in importance to scientific accuracy and constructive thought. In fact, progress in historical writing may al¬ most be regarded as a development from an art to a science. It is this which constitutes the progress from Livy to Ranke or from Herodo¬ tus to Gardiner.

2. Fallacy of the Term Pre-historic. — Be¬ fore the important developments in anthropology and pre-historic archaeology,' which have done so much to extend our knowledge of human activities in the distant past, it was the con¬ ventional practice to limit the term history to a record of those events which were described or preserved in literary remains. Now, however, when archaeology tells one much more of cer¬ tain phases of the early life of man than was once known of even more recent periods through literary evidence, it is no longer ac¬ curate nor logical to use the term "pre-his¬ toric," unless it is employed to designate that vague and hypothetical period in the beginnings of human development of which there exists no positive and tangible record, or unless one is limiting his conception to history as a branch of literature. In the place of the now gen¬ erally discarded and discredited term "pre-his¬ toric" there has been substituted the concept of "pre-literary history," as descriptive of the records of that period of human development where the information is revealed by archaeol¬ ogical rather than literary evidence. In short, it has been agreed that a fundamental fallacy and contradiction is involved in the use of the term "pre-historic" for any period of which there is . any considerable record preserved, whether in writing or in the artifacts of daily life. With recent writers "pre-historic" has followed the term "pre-Adamite" into that oblivion of discarded categories which is being continually expanded as an inevitable result of the growth of the knowledge of human activi¬ ties in both time and space.

It has been deemed inadvisable at this point in the article to discuss the various interpre¬ tations of what history means or should be mainly concerned with narrating. It is in great part the task of this whole article to reveal the diverse interpretations of history, and this much debated problem of what history means or has been thought to mean will be shown in its

historical mutations and transformations.

II. The Essential Preliminaries to the

Origin and Development of History.

1. Archaeology as the "Threshold" of His¬ tory — Pre-literary History.— Having seen that history in the modern sense of the term goes back, to the beginnings, of any record of human existence and activities, one must look for the ultimate origin of history in those earl}"

artifacts which were sufficiently distinctive in form and durable in material composition to have been preserved through the ages as •evi¬ dence of what mankind was accomplishing in the vast expanse of time before the art of writing was mastered. History, thus, may probably be said to have had its real origin in the disputed eolithic period, and the first his¬ torical document may be accurately held to have been the first indisputable eolith, or if the eolithic period be denied, the first definite paleolith of the river drift period.

Space does not here allow even the briefest resume of that most interesting story of the early development of mankind as revealed by the artifacts which have been preserved. The thrilling evidences of man's interests and activities in that almost inmeasurable period of a quarter of a million years which are revealed by the "coup de poings" of the river drift period, the remarkable flaked flints of the cave period, as well as the engraving on animal bones and the early paintings from such sites as Altamira and Font-de-Gaume and the wonderful products of the bronze and iron ages, are all subjects of the most compelling interest, for the complete treatment of which the reader must be referred to the article on "Archaeplogy." Suffice it to say at this point that these archaeological products of the pre¬ literary period mark the real threshold of his¬ tory.

Nor can one, in the space, allotted to this article, do more than to refer to the origin in modern times of the science of pre-historic archaeology, so inextricably connected with the work of such men as Boucher de Perthes, Sir John Evans, de Mortillet, Rutot, Dechelette, Cartailhac, Breuil, Schmidt, Obermaier, Montelius, Peet, Schliemann and Sir Arthur Evans, and which has rediscovered what is, from the standpoint of the time which elapsed, the greater portion of human history. Even less can be said concerning the work of geolog¬ ists like Lyell, Le Conte, Winchell, Sollas, Geikie, Penck and Chamberlain; of biologists such as Darwin, Wallace, Huxley and Haeckel; and of anthropologists of the type of Tylor, Avebury, McLennan, Morgan and their more critical successors., all of whom have recon¬ structed the prevailing notions of the origin of the human race, of

chronology and the eras of human development earlier fixed by Julius Africanus, Eusebius, and Jerome, and have made it possible for the present genera¬ tion to interpret the real significance of the archaeological remains, rather than being com¬ pelled to view them in the manner of earlier generations as "thunder stones," or some other object of fancy and superstition.

2. The Mastery of the Art of Writing. — Though the non-literary archaeological remains of early man are of the utmost aid and im¬ portance in reconstructing his modes of life and activity, no extensive or ample record of past events was possible until some progress had been made in the way of being able to give uni¬ form objective and permanent expression to human thought and action, in other words, until the art of writing had been mastered.

The obscure origins of the art of writing must be regarded as dating back to the picture writing which first appears on the implements and the cave walls of the middle and later

paleolithic periods. Before these pictograms, however, could he regarded as real writing, it was necessary that they should pass through three well defined stages of development. In the first place, the pictures had to become conven¬ tionalized, so that they always had the same appearance and designated the same object. Next, it was necessary that they should not only refer to a concrete object, but also be¬ come the symbols of abstract conceptions. Finally, it was essential that the conventional¬ ized symbols should pass into that stage where they combined a representation of an abstract conception and the sound of the human voice. This last stage itself passed through a num¬ ber of developments. In the simplest and most elementary form of this <(sound writing® each symbol represented an entire word. Some languages, such as the Chinese, have never passed beyond this monosyllabic stage. Nor¬ mally, however, the symbols usually came to represent not a whole word but a syllable. Sooner or later, the various possible sounds of the human voice were analyzed and came to be represented by separate sj/mbols or letters, and the alphabet thereby came into existence. The first known example of a true alphabet ap¬ peared among the Phoenicians about 1000 b.c. Of its origins little is known further than that the Phoenicians borrowed most of these signs from their neighbors in Egypt, Babylonia and Crete. The Phoenician alphabet contained twenty-two consonants and it remained for the Greeks later to perfect the modern alphabet by adding the vowels. There seem to have been

at least five independent centres of the origin of writing, namely, Crete, Egypt, Mesopotamia, China and Central America.

Along with the mastery of the art of writ¬ ing went the provision of materials on which to set down the desired letters and words. Stone columns and walls and even the clay tablets of ihe Babylonians, whatever their virtues from the standpoint of permanence, were clumsy, awkward and restricted writing materials. The Egyptians solved the difficulty by utilizing the membrane of the papyrus reed. Later, parch¬ ment was fashioned from the skin of animals for the use of those peoples where' papyrus was not available. Paper, made originally from silk, first appeared among the Chinese about 200 b.c. The Arabs devised a paper made from cotton fibre, about 750 a.d. This was brought into Spain, where flax was substituted for cotton and the modern linen paper came into use about 1250. With the provision of an alphabet and writing materials, historical writing could begin that long course of development which was to bring it from Herodotus and Thucydides to Ranke, Aulard, Gardiner and Osgood. Pro¬ fessor Breasted has well stated the importance of this step in the evolution of civilization in general and of historical writing in particular, ftThe invention of writing and of a convenient system of records, on paper has had a greater influence in uplifting the human race than any other intellectual achievement in the career of man. It was more important than all the bat- lles ever fought and all the constitutions ever devised.® Before a true historical perspective could develop, however, it was indispensable that some method of measuring time should be discovered and a scientific system of chronology evolved.

3. The Development of the Conception of Time and the Provision of a Chronology. —

Indispensable as some method of measuring time was for chronicling the thoughts and ac¬ tions of man, it was not for this purpose that the calendar was originally developed. As Pro¬ fessor Shotwell has remarked, and Professor Webster has shown in greater detail, it was the deeds of the gods and not of men that the early calendars were designed to fix and record. The methods of measuring time grew up about the need for determining the dates of tabooed or holy days and for fixing and recording the occurrence of unusual natural phenomena which were believed to have some religious signifi¬ cance. In other words, the concept of time was born with the dawn of the consciousness of the repetition of natural processes and phenomena and the necessity of differentiating between days on the basis of their particular virtue or quali¬ ties. The perfection of the methods of measur¬ ing time has been a gradual process of transi¬ tion <(from luck to mathematics.® It was not until long after crude calendars had been pro¬ vided for these religious uses that they were utilized to fashion a

chronology for recording historic events.

The simplest and most primitive type of cal¬ endar was the lunar calendar based on the phases of the moon. The basis was the lunar month of 29 and one-half days. From this it was possible to provide roughly for convenient units of measurement, both longer and shorter than the month. The lunar fortnight was a widespread unit of time, and weeks were se¬ cured from the quarters of the moon or from a division of the months into three periods of 10 days each, the latter being closest mathemat¬ ical solution. Twelve lunar months produced a lunar year of 354 days, and to keep the months synchronized with the seasonal divisions, a thir¬ teenth month was interpolated at appropriate intervals. A longer interval was the lunar cjxde of about 19 years, which came into use among the Greeks about 750 b.c. Though the lunar calendar provided no exact divisions of time, either long or short, and was continually getting out of adjustment, it was tolerated and re¬ tained by all the peoples of antiquity except the Egyptians, who share with the aboriginal in¬ habitants of Mexico the honor of having first evolved the solar year and the beginnings of the modern calendar. The agricultural life of the dwellers in the Nile valley and the importance of the Sun-God in Egypt tended to increase the importance of the sun at the expense of the moon. Accordingly, as early as 4241 B.C., the earliest fixed date in history, the Egyptians had devised a solar year of 365 days, with 12 months of 30 days each and five feast days at the end of each year. The seven-day week of the mod¬ ern calendar, cutting through both month and year, was the product of the ingenuity and reli¬ gious arrangements of the Hebrews. As early as 238 b.c. Alexandrian scientists had devised the quadrennial leap year, and during the Hel¬ lenistic period the Hebrew week was adapted to form the planetary week of the modern cal¬ endar. In 46 b.c. Julius Caesar prescribed for the Roman world this solar year, but the planetary week did not come into general use in Rome before the 2d century a.d. The final step in perfecting the calendar was taken by the authority of Pope Gregory XIII in 1582,

Eleven days were dropped from the calendar and centennial years were regarded as leap years only when divisible by 400.

The provision of some sort of a crude cal¬ endar was an essential prerequisite of systematic history, but the process had to be carried on a step further before the mechanism for measur¬ ing and recording time was sufficiently perfected to be of any considerable service to the histo¬ rian. It was not enough to be able to measure time by the year and its fractions ; it was neces¬ sary to have some method of identifying suc¬ cessive years, in other words, to provide a chronology. While the Egyptians had an ad¬ mirable instrument for fashioning a scientific chronology in the astronomical (

Greek era in the semi-mythical siege of Troy and an unusually ingenious mechanism for measuring time in the ((Cycle of Meton,® did no better than their predecessors in creating a chronology. Down to the middle of the 5th century b.c. the only chronological records pos¬ sessed by the Greeks were the local genealogies and the names of archons, priests and priest¬ esses. The early attempt of Hellanicus of Lesbos, in the latter half of the 5th century b.c., to fashion a chronology from genealogies and name lists has been described by Bury as <(an ingenious edifice erected on foundations that had no solidity,® but even the attempt had some significance. Neither Herodotus nor Thucydides made any attempt at solving the problem of chronology, and the later Greek his¬ torians finished their work with no more satis¬ factory system of chronology than the clumsy method of reckoning by Olympiac years intro¬ duced by Timaeus about 300 b.c. The Olympic (

III. Oriental Beginnings of Historical

Writing.

While the climatic conditions have made Egypt a veritable archaeological museum, or, as Professor Breasted has termed it, ((a vast his¬ torical volume,® and have made possible the preservation of very valuable and extensive sources of historical information in the remains of the architecture, the engineering feats, the plastic art, and even the inscriptions cut on the stone surfaces of tombs, palaces, temples and monuments, there have 'been few or no Egyp¬ tian historical writings preserved. With the exception of a few fragmentary annals, such as the <(Palermo Stele® no native Egyptian histori¬ cal writings have been discovered except the garbled and incomplete work of Manetho re¬ ferred to above. One may safely agree with Professor Hall that «no real "historian is known to us in Pharaonic Egypt, nor is it likely that one will ever be discovered.®

While the true historical narrative can scarcely be held to have originated with the Babylonians or Assyrians, they certainly made a closer approximation to this achievement than the Egyptians. The earliest historical writings of the Babylonians, dating back to the third millenium b.c., were the votive inscriptions, giv¬ ing the names of the kings, 'their genealogies and a record of the buildings they erected. The great cylinder inscriptions of Gudea (2450 B.c.) are a valuable source for the contemporary manners and customs, while the Code of Ham¬ murabi (2150 b.c.) is probably the most import¬ ant single document in the history of jurispru¬ dence. In the period following Hammurabi there were important writings of the kings set¬ ting forth their achievements, but in an epic rather than a truly historical manner. The sec¬ ond Babylonian kingdom of the 6th century b.c. contributed some important chronicles epitomiz¬ ing some much earlier narratives, which are now preserved only in fragments, and lists of the Babylonian kings. While the Babylo¬ nians were concerned mainly with the arts of peace, the Assyrians dealt primarily with the feats of war in their annals and campaign and votive inscriptions. A most important histor¬ ical document, ascribed by some to Babylonian and by others to Assyrian sources, is the Syn¬ chronous History, 5 compiled in the 8th century b.c. This describes the successive boundary dis¬ putes between Babylonia and Assyria from 1600 to 800 b.c., with a list of the kings who participated. Finally, from Assyrian sources there are the above mentioned lists of limmi or the eponym canon, covering the period from 892-704 b.c. The Babylonian counterpart of Manetho's work, Berossos' history of Babylonia in three books, written about 280 b.c., was the first systematic historical narrative produced by a Babylonian or Assyrian scribe. It has, un¬ fortunately, been lost and only survives in scanty references in Josephus, Eusebius and a few other later historians. Whatever its value, its date shows that real historical narrative was not a product of the period of the height of either Babylonian or Assyrian culture.*

The honor of having first produced a true historical narrative of considerable scope and high relative veracity must be accorded to the Hebrews of ancient Palestine. The conventional assumption of the Mosaic authorship of the Pentateuch and the synchronous nature of its books, questioned by Hobbes in 1651 and by Spinoza in 1670, was riddled by the French physician, Jean Astruc in 1753, and the German theologian, Karl David Ilgen in 1799. The true nature of the composite authorship of tbe Pen¬ tateuch and the widely divergent dates of the composition of its various books were estab¬ lished as a result of the work of a number of courageous and brilliant scholars, the most prominent of whom were Professor De Wette of Jena, Professor Hupfeld of Halle, Pro¬ fessor George of Berlin, Bishop Colenso of Natal, Professor Kuenen of Leyden, Professor

Robertson Smith of Cambridge, Professor Bacon of Yale, and, above all, Professor Julius Wellhausen of Greifswald and Gottingen. Their labors have revealed the fact that the Pentateuch was the work of some five different authors, or groups of authors, writing between 900 and 450 b.c., their diverse writings were consolidated in the Pentateuch, as it is now

arranged, some time before 400 b.c. The oldest, or (

quest of Palestine by Alexander the Great to the accession of John Hyrcanus. The work centres about the deliverance of Palestine from Syrian domination through the military ex¬ ploits of Judas Maccabaeus and his successors. While fired by the thrills of patriotic pride, the author produced a unique work for his time, in that he explained the victories of the Hebrews as having resulted from the personal ability and courage of the Asmoneans and not from the direct intervention of the Deity in behalf of the Jews. Unfortunately, however, the Christian historians of mediaeval Europe took as their Hebrew model not the brilliant secular nar¬ rative of First Maccabees, but sought to strengthen their followers' zeal and to terrorize their opponents by imitation of the more con¬ ventional Hebrew tales of the miraculous inter¬ position of the Deity in rewarding the faithful and punishing the sinner. The last of the dis¬ tinguished Hebrew historians was Flavius Jo¬ sephus (c. 37-105 a.d.). He was the national historian of the Jews and, writing after the destruction of the power of his people in 70 a.d., he tried to compensate for the contemporary distress of the Jewish people by emphasizing the glories of their past. Consequently, he almost outdid the author of Chronicles-Ezra- Nehemiah in his exaggeration of the wealth, population and international prestige of ancient Palestine. His two chief works were the (War of the Jews) and the (Antiquities of the JewsP In his treatment of the Old Testament period his narrative is highly unreliable, but the dis¬ cussion of the post-Maccabean era is a most valuable source of information, though not wholly free from exaggeration and credulity. He wrote in Greek with a considerable degree of literary skill and he has been referred to as the ((Livy of the Jews,® but, while the com¬ parison is not without some basis, Josephus did not equal the national historian of Rome in either literary merit or in accuracy of statement. Though the Hebrews brought into being the historical narrative, Hebrew historiography did not affect the general current of the develop¬ ment of historical writing until after the Chris¬ tians had taken over the sacred books of the Jews and used them as the basis, not only of much of their theology, but also as the founda¬ tion of their chronology and their

synthesis of the history of the past. It is to the Greeks that attention must be turned in describing the chief source of the origins and development of the type of historical writing which dominated classical antiquity and prevailed to the time of Julius Africanus, Orosius and Eusebius.

IV. Historical Writing Among the Greeks.

1. The Intellectual Setting of the Origins of Greek Historiography. — The birth of his¬ torical writing in Greece required several essen¬ tial conditions which did not exist before the 6th century b.c., namely, the writing of prose, the critical rejection of the current mythology concerning Greek origins and the stimulation of interest in social origins and institutions. By the middle of the 6th century these indispensable prerequisites of history had come into being in the city of Miletus in Ionia. Cadmus of Miletus, at the beginning of the 6th century, had intro¬ duced the practice of writing prose instead of poetry and ranks as one of the earliest of Greek

prose writers or logographoi. At the same period there was coming into existence that speculative Ionian philosophy to which the world owes the origin of free thought and critical phi¬ losophy. As Professor Bury has said, ((Our deepest gratitude is due to the Greeks as the originators of liberty of thought and discussion. Ionia in Asia Minor was the cradle of free speculation. The history of European science and European philosophy begins in Ionia. Here in the 6th and 5th centuries b.c. the earliest philosophers by using their reason sought to penetrate into the origin and structure of the world. They began the work of destroying orthodox views and religious faiths.® Finally, the Persian absorption of Ionia tended to break down the provincialism of the Ionian Greeks, through that all-important factor of the contact of cultures, and to arouse their interest in the civilization of the diverse peoples who dwelt in the great empire of which they had recently become a part. The origin of Greek historical literature, then, was a part of that great in¬ tellectual movement conventionally known as the rise of the logographoi and of the critical Greek philosophy in Ionia. To these more general or cultural explanations of the appearance of the first Greek historical literature, there should be added the personal impulse from the dominating desire of the more prominent citizens of the time to link up their families with a distin¬ guished genealogy. Hesiod had favored the Greek gods by providing them with a respectable ancestry, and a similar service was rendered to the nobles by the logographoi.

2. The Origins of Greek Historiography. — In view of the foregoing sketch of the intel¬ lectual environment of early Greek critical prose, it seems but in the natural course of events that the first Greek historian should have

been Hecataeus (born 550 b.c.), a native of Miletus, the birthplace of both Greek prose and Greek critical philosophy. His main signifi¬ cance lies in the fact that he foreshadowed two significant developments of scientific historical method by setting up truth as the ideal of his statements and by assuming a frankly critical attitude toward the conventional Greek creation myths. The opening paragraph of his (Genealo- gies) is the first approximation on the part of any writer to a consciousness of the function of historical criticism, (

The influences which had produced Hecataeus grew more powerful and the necessary develop¬ ments between his of Herodotus were rapidly consummated. Charon of Lampsacus and Dionysius of Miletus compiled histories of Persia during the middle of the 5th century and Scylax of Caryanda pro¬ duced the first historical biography. In the latter half of the 5th century Antiochus of Syracuse composed the first history devoted to the peoples of Greece, and Hellanicus of Lesbos opened the way for Herodotus by the breadth of his interests. He not only covered the his¬ tory of Persia and Greece from a broad social point of view, but also was the earliest of the Greek historians to recognize the necessity of a comprehensive system of chronology and to attempt to supply it.

_ T£le. Systematic Historical Works of Greek Writers. — The first, and in the estimate oi modern exponents of "Kulturgeschichte,® the greatest oJ the systematic Greek historians was Herodotus of Halicarnassus (c. 480-425 b.c.). By his interest in geography and in the civiliza¬ tions of the East he gave evidence of his Ionic antecedents, while by his dominant concern with the Athenian democracy he gave proof of the transfer of historical attention to Hellenic so¬ ciety. His (History) was a narrative of Graeco- Asiatic relations and contacts from the reign of Croesus of Lydia (560-546 b.c.) to the defeat of the Persian invasion in 478 b.c. The central theme was the destruction of the forces of Xerxes by the Greeks. But his work was not like that of his great successor, Thucydides, nar¬ rowly political and military. It was the story of the struggle of two fundamentally opposed types of civilization, and to prove this antag¬ onism, Herodotus surveyed the 'foundations of these two cultures to locate the deeper causes of the conflict. It combined, thus, the charac¬ teristics of a "Kulturgeschichte® and a "Welt- geschichte,® though both were strictly limited in point of time. An ardent admirer of Athenian "democracy® he eulogized Athens and its tri¬ umph over autocratic Persian imperialism with the epic fervor of a Bancroft. While recog¬ nizing and stating the fundamental principles of historical criticism, he often deserted them,

especially in his credulity in accepting the tales he heard on his travels. On the whole, however, modern historical, archaeological and ethno¬ graphic research has tended to confirm rather than to discredit his statements, and no subse¬ quent historian has been more keen or sym¬ pathetic in his analysis of human nature. As the scope of history has been broadened in recent years through the reassertion of the value and position of "Kulturgeschichte,® the slogan has come more and more to be "back to Herodotus® rather than "back to Thucydi¬ des,® as was long so popular.

As much as subsequent historiography owes to Herodotus with respect to an illustration of the proper scope of history, it is equally in¬ debted to Thucydides (c. 465-396 b.c.) for con¬ tributions to the methodology of historical re¬ search and to the construction of a coherent historical narrative. His theme, the Pelopon¬ nesian War (431-404 b.c.), was as much more narrow and restricted a field than that covered by Herodotus as the American Civil War would be as compared with the evolution of civilization in the 19th century. As his his¬ tory was in part prepared by Thucydides dur¬ ing the course of the conflict, it was the work of a scholarly and philosophic war correspond¬ ent — an antique Hilaire Belloc — rather than of the dispassionate historian reconstructing the events of a distant past from a study of the documents. His sketch of the rise of Greece shows, however, that he had rare power in portraying the past if he had seen fit to utilize it. His greatest contribution to historiography was in the field of criticism and methodology. He set forth with great vigor the thesis that the permanence and enduring fame of an historical work should denend rather upon the accuracy of the statements than upon the entertainment furnished bv the narrative. Ranke, at the opening of the 19th century, did not state more effectively than Thucydides had at the close of

the 5tJh century b.c., that accuracy of data was the foundation of history. The second great historical canon of Thucydides was "relevance® of material, something widely at variance with the long and numerous digressions of Herodo¬ tus. To these should be added his ability in the mastery of details and their subordination to the movement of the whole narrative. In these respects Thucydides may rightly be held to have been the founder of scientific and critical history. Finally, while Thucydides has received much credit in this respect which really belongs to Polybius, he was probably the first historian clearly and definitely to state the alleged "pragmatic® value of the writing and study of history. In the opinion of Thucydides, "the accurate knowledge of what has happened will be useful, because, according to human probability, similar things will happen again.® Though his writings must not be judged by the canons of Lamprecht's Historical Institute, the Sorbonne or L'Lcole des Chartes, they were not free from major defects. He was unable to grasp the concept of

time and to view his facts in their true historical perspec¬ tive. He narrowed, the field of history not only to a consideration merely of contemporary political phenomena, but even to the external military and diplomatic phases of political activity. He missed the vital significance of the deeper social and economic forces in his¬ tory, a weakness perhaps over-emphasized by Mr. Cornford. It can scarcelv be doubted, moreover, that he carried the element of "relevance® too far and omitted as much ma¬ terial that was pertinent as Herodotus had included which was not germane to the subject. Again, he illustrated Carlyle's weakness in his dramatic interpretation of events in terms of great personalities, and he did not possess the latter's ability to portray a personality in its en¬ tirety. . Lastly, there appeared little or none of Mabillon's profound discussion of the critical use of documents; his sources were carefully concealed in order that the style of the narra¬ tive might not suffer. One may agree entirely with Bury that "the work of Thucydides marks the longest and most decisive step that has ever been taken by a single man towards making history what it is to-day,® wi-hout re¬ garding that statement as an unmixM com¬ pliment. Thucydides certainly was influential in bringing historiography under the domina¬ tion of the "political fetish® and the spell of episodes from which it suffered from classical times to the end of the 19th century, and from which it is only now beginning to escape. It must not be forgotten that, as Lamprecht has insisted, historical accuracy means as much the presentation of the complete analysis of an event, period or movement as it does the mere truth of such facts as are narrated. From the standpoint of this broader and more funda¬ mental view of historical accuracy Thucydides will scarcely rank as superior to Herodotus. The ardent admirers of the former have for¬ gotten that scope and content are quite as im¬ portant in history as refinement of the methodology of research.

An historian far inferior to Herodotus or Thucydides was Xenophon (c. 430-354 b.c.). His literary ability was of a high order, but his capacity, tor profound historical analysis was most limited. He was a good memoir

writer and his

The last of the major Greek historians was Polybius (c. 198-117 b.c.). From the stand¬ point of either productivity or profundity he was superior to Thucydides and was fully equal to him with respect to accuracy of state¬ ment, but his style being labored and diffuse he has been less popular than his two great prede¬ cessors. His (History) was a vast work

in 40 books dealing with the expansion of the Roman Empire to 146 b.c. As Herodotus had mir¬ rored the interest of early Greek historians in the East, and Thucydides had written of Athens at the height of its civilization, so Polybius testified to the decline of Hellas and the shifting of interest to the new empire of the West. His scholarship was equal to that of the great historian of British expansion, but he lacked the latter's power of compression and lucid statement. In the 12th book of his work is found, as a critique of the antiquarian, Timaeus, the first great treatise on the methodology of scientific history. Conceived independently of Thucydides, this discussion has scarcely been surpassed, and his impartial¬ ity is a model for all historians. Especially noteworthy was his Ritter-like insistence upon the value of a knowledge of topography to the historian. He intended his history to be in¬ tensely pragmatic — to be ˆphilosophy teaching by example,® but he never allowed the philos¬ opher in him to overcome the historian. Greatly interested in the problem of causation, he went deeper in his analysis of impersonal causes than Thucydides, though his interpretation was ethical rather than economic and social. The following brief quotation from his 12th book admirably epitomizes his views as to the scope, methods and purpose of history. ((The science of history is three-fold : first, the dealing with written documents and the arrangement of the material thus obtained ; second, topography, the appearance of cities and localities, the descrip¬ tion of rivers and harbons, and, 'speaking gen¬ erally, the peculiar features of the seas and countries and their relative distances ; thirdly, political affairs. . . . The special province

of history is, first, to ascertain what the actual woirds used were ; and secondly, to learn why it was that a particular policy or arrangement failed or succeeded. For a bare statement of an occurrence is interesting indeed, but not in¬ structive; but when this is supplemented by a

statement of cause, 'the study of history be¬ comes fruitful. For it is by applying analogies to our own circumstances that we get the means and basis for calculating the future; and for learning from the past when to act with caution, and when with greater boldness, in the present.® All in all, one may agree with Pro¬ fessor Botsford that ((a careful reading of this author is the best possible introduction to the spirit and method of history as we of to-day regard it.®

4. Minor Contributions to Greek His¬ toriography. — Polybius was unique in his age as an historian. Long before he composed his great work Hellenic historiography had begun to decline from the standard set by Thucydides and was brought under the influence of rhetoric in the 4th century. With their tendency to in¬ sipid moralizing, the interpolation of florid speeches, and their (

Historical biography among the Greeks was founded by Isocrates, the leader of the ˆRhetoricians,® and one of the earliest products was the biography of Agesilaus by Xenophon. Subsequent historians devoted considerable space to biography. Plutarch's (c. 50-125

a.d.) polished (Parallel Lives5 have remained at the head of the world's biographical product on account of their compelling interest, if not for their entire historical accuracy. Indeed, it must be remembered that Plutarch was a mor¬ alist and wrote his ((Lives® not as strictly his¬ torical biographies, but in order to furnish con¬ crete illustrations of his ethical principles for the moral edification of his readers.

In the period of the Hellenic revival in Rome a number of Greek historians made con¬ tributions to historical writing of widely dif¬ ferent merit. Among the less notable produc¬ tions were the (Anabasis of Alexander by Ar¬ rian (c. 95—175 a.d.) and the (History of Rome5 by Appian, in the same period. Far superior to these were the incisive (History of Rome5 of Dio Cassius (c. 155-240 a.d.) , and the broadly conceived, history of the later Roman empire, in its social as well as its political conditions, by Ammianus Marcellinus (c. 330-401 a.d.), the

last of the long and honorable list of Greek historians who, curiously enough, wrote his work in Latin.

V. Roman Historiography.

Rome added no original contributions to historiography. As in all other phases of its culture, Rome here followed the model set up by the Greeks. While there were distinguished Roman historians, none equalled Thucydides or Polybius for careful adherence to critical method and only Livy and Tacitus approached the best of the stylists among Greek historians.

The immediate dependence of the Roman historiography on the Greek is evident from the fact that down to the 2d century b.c. all the Roman historical literature was even written in Greek. These early historical works in Greek were chiefly (Annals) of which the first and most famous were those of Fabius Pictor (c. 250 b.c.) . The first Roman historical litera¬ ture in Latin was the were the best historical memoirs produced in the ancient world and rank well with those of any period. A more systematic historian was Sallust (c. 86-34 b.c.) the Roman disciple of Thucydides. His chief work, a history of Rome from 78 to 67 b.c. has never been re¬

covered, but from his monographs on the Conspiracy of Catiline J and the (Jugurthine War> one can appreciate his vigorous and graphic style and his power in the analysis of personalites and social forces, but he was not able wholly to conceal his pessimism with re¬ gard to the future of the Roman state in the last years of the Republic. The great national history of Rome was that of Livy (59 b.c.-17 a.d.). His work was a massive epic of the growth of the Roman world-state. While he had a general appreciation of the value of accuracy of statement, he subordinated this element to that of perfection of style, and the Greek <(Rhetoricians® rather than Thucydides were his model. The great literary merit af Livy's history, its ministry to the national vanity of' the Romans and their cult of modern admirers, and its great popularity with the humanists have given it a position in his¬ toriography higher than its purely historical value would warrant. A less successful ex¬ ample of the Roman historical writing of the rhetorical school was the history of Rome under the early empire by Velleius Paterculus in the period of Tiberius. The last of the major Roman historians was Tacitus (c. 55- 120 a.d.) . Like Polybius, he was a man of action, and, being an ardent admirer of the aristocratic Republic, his view of contemporary Roman society was even more pessimistic than that of Sallust. While he wrote with great vigor, had rare power of portraying personali¬ ties and was generally accurate, the subjective moralizing element in his writings, while add¬ ing to their literarv reputation, greatly reduced their historical value. To him and to Juvenal

is primarily due that notorious and venerable myth of the <(moral causes® for the decline of the Roman Empire, which was later revived and elaborated with such deplorable results by Kingsley. In addition to his purely historical works — the (Annals, } the (Histories } and the biography of Agricola, dealing with Roman his¬ tory in the 1st century of the Christian era, the (Germania 5 was one of the earliest excursions into the field of descriptive soci¬ ology. Being the only extensive source of information regarding the institutions of the Germans of that time, the (< Germania® has ac¬ quired a great importance in later years. It has been the most controverted historical docu¬ ment in existence, excepting only the Penta¬ teuch and the Synoptic Gospels. Recovered in the period of the humanists and brought before the learned public by Poggio, Enoc of Ascoli, and Conrad Celtis, it has been the centre of his¬ torical conflict between the modern Teutonist and Gallican historians, as much as Alsace- Lorraine has been the pivotal point in the polit¬ ical and military rivalry of their respective national States. More than this, the tendency of Tacitus to idealize the early Germans at the expense of the Romans originated that humor¬ ous but disastrous perversion of the interpreta¬ tion of the <(invasions® which culminated in the vagaries of Charles Kingsley's <(The Roman and the Teuton.® The last Roman historian of any repute,

unless it be the vague figure that Kornemann has endeavored to reconstruct, was Suetonius (75-160 a.d.), the erudite secretary of Hadrian. His diffuse Wives of the CsesarsC while reliable in its description of public affairs, was one of the earliest examples of. historical <(muckraking® and <(scandal mongerlng.® His chief significance in historiography lies in the fact that he became the model in style and arrangement for the historical biography of the period of humanism.. Though the Roman historians were not original and were always more or less under the -spell of the Greek (

VI. Patristic Historiography.

1. The Christian Synthesis of the History of the Past. — One of the most effective agen¬ cies in allaying suspicion and attracting con¬ verts to a movement is the ability to point to a glorious past. The Christians felt this keenly, and, having adopted the sacred books of the Jews as the official record of their antecedents, they were faced with the immediate and press¬ ing necessity of giving to ancient Hebrew his¬ tory a prestige which it had entirely lacked in the works of pagan historians, who had assigned to the history of the Jewish people only that slender allotment of space and attention to which their inconspicuous political history had entitled them. Therefore, the two world his¬ tories, which had already been produced by Dio¬ dorus Siculus and Pompeius Trogus,. and which were immensely superior to any universal his¬ tory compiled by Patristic historians, were ut¬ terly unsuited to the requirements of Christian

propaganda. Neither was the general Jewish history of Josephus acceptable, for, while it exaggerated tremendously the role of the Jews, it was distinctly antagonistic to the Christians. Therefore, the Christian <(literati® set about to produce a synthesis of the past which would give due weight to the alleged glories of He¬ brew antiquity and would, at ihe same time, show why the Jews were no longer worthy of their heritage, which had now passed to the Christians. The first writer to essay the task was Sextus Julius Africanus (c. 180-250) who composed a history of the world in five books bringing the story to 221 a.d. In this he tried to harmonize and synchronize Hebrew and Christian history with that of the four great successive pagan monarchies — the Assyrian, Persian, Macedonian and Roman. This was carried further in the

An important part of the Christian synthe¬ sis was the synchronizing of .the events in the history of the Gentile and Hebrew nations and the

*establishment of an official Christian chro¬ nology. The initial step was taken in this proc¬ ess by Julius Africanus in his 'Chronographia.**

In this, the period of the creation was set as having occurred 5499 years before Christ, and subsequent events in world history were dated through an ingenious combination of the various systems of chronology used by the different nations. Eusebius expanded the work of Afri¬ canus in his famous 'Chronicle, in which he epitomized universal history in a set of parallel synoptic and synchronous chronological tables giving the reigns of the rulers of the <(four great monarchies® synchronized with the events*

*of Hebrew history. <(In these tables,® says President White, <(Moses, Joshua and Bacchus, — Deborah, Orpheus and the Amazons, — Abi- melech, the Sphinx, and Oedipus, appear to¬ gether as personages equally real, and their positions in chronology equally ascertained.® The chronology of Eusebius was adopted by Jerome in his (Chronicle, * and in Jerome's ver¬ sion it became the authoritative Christian chronology until it was slightly revised by Scal- iger in 1583 and Usher in 1650. It entered sys¬ tematic church history in the (Historia Tripar¬ tita } of Cassiodorus and was the introduction to every authentic mediaeval chronicle.*

In this Christian synthesis of world history, aside from the artificiality of its chronology and synchronisms, two characteristics are note¬ worthy, namely, the absurd relative importance attached to Hebrew history and the serious bias against pagan civilization which made an objective historical narrative absolutely impossible. Of the former tendency Pro¬ fessor Robinson has said, ((this theological unity of history was won at a tremendous sacrifice of all secular perspective and accuracy. The Amorites were invested with an importance denied the Carthaginians. Enoch and Lot loomed large in an age which scarcely knew Pericles.® It is a curious but incontestable fact that the Jewish nation owes its prominence in world history to these distortions of the early Christian histo¬ rians. Always on the defensive in the Patris¬ tic period, the churchmen were compelled to answer the charge of having been the cause of the calamities which came to the Roman Empire in the 4th and 5th centuries. The calamities could not be denied, and so the only procedure possible was to prove a greater prevalence of misery before the Christian era. This was par¬ ticularly the task assigned by Augustine to Oro¬ sius and performed with great thoroughness in the latter's above mentioned work. Deliberately shutting his eyes to all the cultural contribu¬ tions of antiquity, he gathered a veritable «his- toria calamitatum® by combing pagan history to present an unrelieved picture "of all the most signal horrors of war, pestilence and famine, of the fearful devastation of earthquakes and innundations, the destruction wrought by fiery eruptions, by lightning and hail, and the awful misery due to crime.® ((A11 the achievements of Egypt, Greece and

Rome,® says a leading his¬ torian, "tended to sink out of sight in the mind Augustine s disciple, Orosius, only the woes ˚f a devil-worshipping heathendom' lingered » When one remembers that this work was almost the sole source of information during the Mid¬ dle Ages regarding the history of pagan an¬ tiquity, it is little wonder that Blondus could remark in the 15th century, that since Orosius there had been no history. Yet, in spite of the external and conscious bias of the "Fathers® against pagan culture, they could not escape the unconscious sources of influence springing out of their 'environment of paganism. Thus, by a curious irony of fate, it came about that the classical culture they assumed to abhor actually influenced their cosmic and historical philosophy, as much, if not more, than the cul¬ tural traditions of Judaism. The "Fathers® used the classical languages and were always under the spell of classical rhetoric ; many of

them were educated as pagans ; their syncretic theology was deeply colored with pagan ele¬ ments ; and their political ideals and practices were so thoroughly modelled after those of the Roman Empire that Professor Burr has very aptly described the origins of the Christian ecclesiastical polity as ((t'he rise of the new Rome.® This much is evident from such sources of information as have been preserved. If the great mass of early Christian historical writing which has been lost were available for study it might well be that an even greater amount of infiltration of pagan culture could be detected.

2. The Christian Philosophy of History. —

Almost as wide as the break with the classical historiography with respect to the status of pagan culture was the difference in the great emphasis placed on pragmatism and teleology in the Patristic historical literature. To the early Christian historians the (

3. Historical Method in the Patristic Period. — The Christian historians also departed widely from the canons of historical method laid down by Thucydides and Polybius. In addition to their tremendous bias against pagan¬ ism. which made objectivity out of the ques¬ tion, it was necessary to devise a special method for handling ˆinspired® documents. To assume towards the Hebrew creation tales the critical attitude that Hecataeus maintained toward the Greek irˆthology would have been impious and sinful. Therefore, if the obvious content of the

inspired statement was preposterous and unbe¬ lievable, some hidden or

inner meaning must be found, and, in response to this necessity, alle¬ gory and symbolism replaced candor and critical analysis as the foundations of historical method. wNot even Holy Writ,® says Professor Burr, uwas prized for the poor literal facts of history, but for those deeper meanings, allegorical, moral, anagogical, mystical, to be discerned beneath them.® The allegorical method of in¬ terpreting the Old Testament had been intro¬ duced by the Alexandrian Jew, Philo Judaeus, and appeared in early Christian writings in the Book of Revelations, in C(The Epistle of Barna¬ bas® and in ((The Shepherd of Hermas.® Its main early impulse among the Fathers came from Origen (186-255). According to Origen, says Conybeare, ((Whenever we meet with such useless, nay impossible, incidents and precepts as these, we must discard a literal interpretation and consider of what moral interpretation they are capable, with what higher and mysterious meaning they are fraught, what deeper truths they were intended symbolically and in alle¬ gory to shadow forth. The divine wisdom has of set purpose contrived these little traps and stumbling blocks in order to cry halt to our slavish historical understanding of the text, by inserting in its midst sundry things that are impossible and unsuitable. The Holy Spirit so waylays us in order that we may be driven by passages which taken in their prima facie sense cannot be true or useful, to search for the ulte¬ rior truth, and seek in the Scriptures which we believe to be inspired by God a meaning wor¬ thy of him.® This allegorizing tendency, which vaulted over criticism, was almost universally accepted by the <(Fathers® and received its clas¬ sical expression in the

Another element which entered into the his¬ torical attitude and methodology of the Patris¬ tic period was Neoplatonism. With its thesis of the superiority of the emotions and intuition to reason and intellect and its advocacy of <(un- bounded credulity,® it fitted in admirably with the Patristic mental reactions and became an integral part of the psychic complex of the Patristic and mediaeval historians and philoso¬ phers. Augustine flirted with it in his youth and it loomed large in his later philosophy. Its great mediaeval impulse came mainly from the philosophical and literary activities of Erigena. Along with the allegorizing tendency it served to make quite impossible any sceptical and crit¬ ical attitude towards the sources of historical knowledge.

Not only were these two standards for the use and interpretation of historical documents erected, but there were also delimited two sharply defined fields of history, the sacred and the profane, the first relating to religious and the latter to secular activities. It is needless to remark that an incomparably greater im¬ portance was attached to sacred history and that the working of a miracle was. considered much more significant than the making of a constitu-

tion. The “Fathers® were willing to devote the most extended labor to the allegorical explana¬ tion of dubious and contradictory statements in scripture, but it is impossible to imagine one gathering and analyzing the contents of 158 constitutions. It is only fair to state, however, that the evident decline of historical scholarship in the Patristic period cannot be wholly as¬ signed to the Christian attitude towards his¬ torical data and problems. Though there were the reasons enumerated above why the Chris¬ tian historiography was bound to be less sound than its pagan counterpart, it cannot be denied that the period of the

4. Systematic Ecclesiastical History in the Patristic Period. — The most creditable per¬ formances in the realm of Patristic historiog¬ raphy were achieved in the field of syste¬ matic history of the Christian Church. Though the (Weltanschauung) of the writers marred their perspective and warped their interpreta¬ tion, the resulting damage to historical scholar¬ ship was least in this department. While the anti-pagan bias, the lust for the miraculous, the pious credulity of the writers and the Christian philosophy of history were all in evidence, the very nature of the subject made their operation less disastrous here than in the synthesis of the history of antiquity; attention was centered almost entirely upon ecclesiastical matters and the writers dealt in a large degree with their co-religionists of the immediate past who scarcely received the reverence accorded to per¬ sonages who had figured in scriptural events — the Church Fathers, like the makers of the American constitution, were not always canon¬ ized by their own generation.

The earliest semi-narrative sources of the history of the foundations of Christianity are to be found in the (Epistles } of the 1st century , and in the (Synoptic Gospels, * written probably in the last quarter of the century. Of the former, the most important, naturally, are those of Paul, the great organizing missionary and theologian of the early Church. Of the Gos¬ pels, the earliest and most reliable is the straight-forward narrative of Mark, written about 70 a.p. The (Acts of the Apostles, > the remaining canonical historical work of the Apos¬ tolic period, was written by the author of Luke about 100 a.d. The “Apologists® of the 2d and 3d centuries are also valuable sources of infor¬ mation, though their writings were highly con¬ troversial. The first, and the most erudite and scholarly systematic ecclesiastical history of the Patristic period was the work of Eusebius of Caesarea (c. 260-340). His (History of the Christian Church, * which, in 10 books, brought the story to 324, was a work of massive erudi¬ tion and relatively high impartiality, but was compiled without

literary skill and was most superficial in its analysis of the underlying causes of the great social and religious move¬ ments^ Though he was not a profound thinker, Eusebius was. a real scholar and the literature he examined in the execution of his work was enormous. Many of the most important docu¬ ments he used were copied in extenso in his history; this makes the work a most valuable source book which contains the only extant por¬

tions of some highly important early Christian writings. A vast gulf exists between the level of the histories of Eusebius and Orosius.

*The (History * of Eusebius was continued by the historians Socrates, Sozomen and Theodoret in the 5th century. The whole was combined and translated into Latin under the direction of Cassiodorus (477-570) in the 6th century, and the narrative was continued to 518. This product of Cassiodorus and his disciples, known as the (Historia tripartita,* was the general manual of church history throughout the middle ages. Though confused, incoherent, inaccurate, and annalistic, it was certainly superior to the companion text-book on secular history by Orosius. The greatest defect in the early Church histories was their failure to analyze the deeper forces and the more significant events in the great religious movement which they were describing. This was due in part to the belief that Christianity was being advanced through divine favor and in part to the fact that the writers all succumbed to the tempta¬ tion to treat primarily of wonders, miracles, martyrs and saints.*

Christian biography was founded by Jerome's (De viris illustribus, a brief sketch of the lives of all who had contributed to the body of Chris¬ tian literature, and by the biographies of the earlier saints and hermits. Jerome's work was continued by Gennadius (c. 495), a priest of Marseilles, and by Isidore of Seville in works of the same title. Isidore's compilation was, in turn, supplemented by that of Ildephonsus of Toledo (d. 667), and the process of addition continued ithrough the mediaeval period to cul¬ minate in the collection of 963 biographies in ithe (Liber scriptorum ecclesiasticorum* of Johannes Tritbemiuis (1462-4516), abbot of Sponheim. The astonishing credulity of even the most learned of these early biographers, and their zeal for "miracle-mongering® can best be appreciated by a perusal of such a work as Jerome's (Life of Paul the First Hermit* or Athanasius'*

VII. Historical Literature in the Middle

Ages.

1. Its Relation to Patristic Antecedents. —

It will be evident from the foregoing discussion that Orosius and Cassidorus were the standard historical authorities for the Middle Ages and that there was no break with the Patristic PJL of history or historical methods. "The Middle Ages,® says Professor Burr, "did not dissever history and theology. Nay to for¬ bid it there grew to completeness that con¬ summate preserver of the unity of thought, the procedure against heresy. And to the end of that long age of faith history did not escape the paternal eye.® The chief representatives of his¬ toriography in the Middle Ages, as of other phases of mediaeval culture, were churchmen of one sort or another. The same zeal for the miraculous and diabolical and disregard of such non-essential "commonplaces® as the foundation and disruption of states and epoch-making po¬ litical, economic and social movements still per¬ sisted unimpaired. The "Christian Epic® kept its prestige unshattered and almost unchallenged for 14 centuries, disturbed only slightly by the 13th century "revival,® the growth of humanism and the controversies of the Reformation period It never received its first staggering blow until,*

)} I t)ie 18th century, the English and French Deists and ˆPhilosophes® revealed its weak¬ nesses and inconsistencies by their penetrating and disconcerting criticism. If anything, in at least, the first centuries after the close of the Patristic period, there was a decline in scholar¬ ship. The . mediaeval writers not only retained the Patristic defects but added to them the ab¬ sence of the great erudition of many of the ˆFathers® and the presence of those crudities incident to a recent emergence from barbarism. This assimilation of the Patristic outlook and methodology and its adaptation to mediaeval capacities was primarily the work of Rhabanus Maurus (776-856), his pupil and disciple, Wala- frid Strabo (c. -809-849) and John Scotus Eri- gena (d. 877). Heinrich von Sybel thus sum¬ marizes the outstanding characteristics of mediaeval historiography in a manner which brings out clearly its close relation to Patristic historical literature: ((This period possessed no idea of historical judgment, no sense of historical reality, no trace of critical reflection. The principle of authority, ruling without limi¬ tation in the religious domain, defended all tradition, as well as traditional dogma. Men were everywhere more inclined to believe than to examine, everywhere imagination had the upper hand of reason. No distinction was made between ideal and real, between poetical and historical truth. Heroic poems .were con¬ sidered a true and lofty form of history and history was everywhere displaced by epics, legends or poetical fiotion of some kind. A course of slow historical development . was traced back to a single great deed, a single personal cause. Almost no one. scrupled to give to existing conditions the sanction of venerable age by

means of fabricated history or forged documents. The question whether the as¬ cribed derivation was true interested no one; it was enough if the result harmonized with existing rights, dominating interests and prev¬ alent beliefs.®

2. Mediaeval Annals and Chronicles. — An

excellent illustration of the primitive nature of mediaeval culture is the fact that during the first centuries the main form of historical writ¬ ings was the (Annals) which, had been common in early Egypt and Babylonia. The mediaeval example of this type of historical writing origi¬ nated in the early Carolingian period as an in¬ cident of the mediaeval desire to locate the exact occurrence of Easter. The absence of a general knowledge of astronomy and chronology made it necessary for the more learned church¬ men to prepare and distribute to monks and priests Easter tables giving the dates upon which Easter would occur for many years in advance. An almost universal practice arose of indicating on the margin opposite each year, .the event, which, in the mind of the recorder, seemed to make that year most significant in the history of the locality. Not only were, these early annals very scanty in the information they con¬ tained, on account of mentioning only one or two conspicuous events which occurred during the year, but they were rendered still less valu¬ able because the mediaeval annalist frequently considered most important some insignificant avowed miracle or the transfer of the bones of a saint, information of little or no value to the modern investigator. In time, however, entries were more frequent and the interests of the

annalist grew wider, until the annals became, with such a work as Roger of Hoveden's An¬ nals of English History, in the early 13th cen¬ tury, a valuable record of the development of a nation.*

The origin and development of the Chron¬ icle" was immediately related to the growth of the annals. The annals were primarily a yearly record set down by a contemporary. The chronicle was more comprehensive. It normally consisted in the summarizing of the history of a considerable period on the basis of one or more sets of annals, preserving the chronolog¬ ical arrangement of the annals. Many of the. events transcribed by the chronicler might have occurred before his period and he might com¬ bine the records contained in several annals in order to obtain a more complete and compre¬ hensive story. To this compilation of annals was usually added, as an introduction, Jerome's translation of Eusebius' (Chronicle, which linked up the local chronicle with the Christian synthesis of world history from the beginning of creation. With the expansion of the basic annals in scope and pertinence, the chronicles became more and more an approximation to a history, until in the (Anglo Saxon Chronicle, * the*

(Chronicle) of Hermann of Reichenau (d. 1054), the (Universal Chronicle1 of Ekke- hard of Aurach in the early 12t'h century, the (Chronicle) of Otto of Freising (d. 1158) and the (Greater Chronicle) of Matthew of Paris (d. 1259) this characteristic vehicle of mediaeval historiography became one of the most thorough and reliable sources of information available in that age.*

The following were the most important of the mediaeval annals. For the Carolingian period the (Greater Annals of Lorsch and their continuation to 829 in the (Royal Annals,* the (Annals of Fulda) and the excellent (Annals of Saint Bertin* and (Saint Vaast,* coming down to the beginning of the 10th century, are the most valuable. The most important annals deal¬ ing with early French history are those of Flodoard (d. 966). For English mediaeval his¬ tory there is the above mentioned work of Roger of Hoveden coming down to 1201. For mediaeval Germany the great annalistic sources are the elegantly written but prejudiced (Annals of Lambert of Hersfeld,* covering the period to 1077, and the more valuable (Greater Annals of Cologne,* which come to 1237.*

The chronicles dealing with mediaeval Ger¬ man history begin with those of Fredegarius the Schoolmaster in the 7th century and of Regino of Priim in the 10th, and include the authoritative Chronicle1 of Hermann of Reichenau (d. 1054), Ekkehard of Aurach's (Universal Chronicle,* compiled at the begin¬ ning of the 12th century and the most com¬ prehensive of all mediaeval chronicles, the of Otto of Freising (d. 1158), the most notable of 12th century historians, and the valuable Chronicle1* of Arnold of Liibeck (d. 1212). For France the more famous chron¬ icles are the (Chronicle of Nantes, > coming to 1049, those of Hugh of Flavigny and Sige- bert of Gembloux in the 12th century and of William of Nangis at the beginning of the 14th century. The ˆChronicles* of Froissart (1373 ff) are attractive but highly colored and prejudiced and they illustrate to some extent the transition from the mediaeval chronicle to the historical*

narrative. For England the great mediaeval chronicles are the (Anglo-Saxon Chronicle,' describing events to 1154; Roger of Wendover's (Flowers of History, ' coming down to 1235, and their continuation to 1259 in Matthew of Paris' (Greater Chronicled From Italy is the valuable and voluminous Florentine Chronicle) of Giovanni Villani, dealing with events to

1348.

3. Attempts at Systematic History. — The

efforts to produce something like a systematic historical treatise during the mediaeval period varied greatly in their success. Their nature was, on the whole, closely correlated with the changes in the general level of culture. The earliest were usually slovenly and labored in style, sadly inaccurate in grammar and entirely credulous and uncritical in method. In the latter part of the period, however, the level of scholarship was raised, and in the works of such an historian as Otto of Freising, in the middle of the 12th century, one meets for the first time with an author who will compare favorably with the second-rate figures in classical historiography. On the whole, there were few attempts at a general or international history of a period, and the histories chiefly concerned local or national events and movements or the deeds of a conspicuous national monarch.

The following were the more important works dealing with German history from the period of the ˆInvasions." The first of these, and the earliest product of mediaeval historiog¬ raphy, was the (Ten Books of Frankish His- tory) of Gregory of Tours (540-594), which is the main source of information regarding the origin of the Merovingian dynasty. It was naive, credulous and prejudiced against the Goths, but was an exceedingly straightforward and human document, and was based, to a considerable degree, on Gregory's direct ob¬ servations. The Lombards found their national historian in Paul the Deacon (725-800), an erudite member of the group of scholars at the court of Charlemagne. His (History of the Lombards) was greatly superior to Gregory's work with respect to both accuracy and style. The first layman to produce an historical work in the mediaeval period was Nithard, whose Four Books of History) present an able and lucid narrative of the civil wars among the grandsons of Charlemagne and offer one of the few examples of vivid secular interests on the part of a mediaeval historian. The Saxon emperors had as their dynastic historian the monk Widukind, whose Feeds of the Saxons) gave an able survey of the reigns of Henry I and Otto fche Great. A more penetrating ac¬ count of the culture of this period is found in the (Book of Retribution, ' the (History of Otto) and the

toriography attained. The eminent authority, Wegcle, says of the work of Otto: ((A writer possessing such extraordinary literary talent as Otto of Freising did not appear again in German history for many a century. However much Lambert of Hersfeld may have excelled him as a polished narrator, Otto more than made up for this by the deep seriousness of his world-philosophy and the loftiness of the view¬ point which he invariably maintained. What¬ ever anyone may think of his philosophy, he is the only

mediaeval German historian who was able to grasp in a philosophical manner the march of world-history and who sought to give it a judicious exposition. And he occupies no less conspicuous a position as a narrator of the history of his own times."

For France, alleged historical works began with the prolix and highly prejudiced Four Books of History' of Richer, who wrote at the very close of the 10th century and is almost the sole source for the establishment of the Capetian dynasty. An even less reliable and a thoroughly mediaeval work with the same title by Raoul Glaber carried the story down for a half century further. Somewhat better was the (Gesta Dei per Francos' of Guibert of Nogent (1053-1124), which tells the story of the First Crusade, but it is based largely on an earlier Norman narrative and the author is hopelessly confused when he loses his guide. In the 12th century a superior work appeared in the lively and attractive Fcclesiastical History' of Ordericus Vitalis (1075-1142). Something like a real history is to be seen in Rigord's (c. 1 1 50— 1209) Feeds of Philip Augustus,' in the prep¬ aration of which the author made some ele¬ mentary use of the available documents, letters and archives. The Fonquete de Constanti¬ nople,' by Geoff roy de Villehardouin (c. 1160- 1213), was one of the more notable historical products of the Middle Ages. It was the first mediaeval historical work of any consequence which was written in the vernacular. While it was somewhat of an apology for Villehardouin's policy in the Fourth Crusade, it is much the best extant source for an interpretation of the real spirit of the Crusaders. It was a straight¬ forward account, written in a vigorous and concise style being full of personal touches and throbbing with virile human interests. The (Chronicles of France, England, Scotland and Spain,' originally written by Froissart (1338— 1410), a 14th century Lamartine, about 1375, have been mentioned above. They were the work of a poet and chronicler and were avowedly written to < (delight and please" his readers, and in this he succeeded wholly. It is episodical history at its best for literature and near its worst for history, though it is the fullest extant source for the Hundred Years' War. An incomparably superior historical work was the (Memoires' of Philippe de Corn- mines (c. 1445-1511), dealing with the period of Louis XI. It was a vigorous narrative ex¬ hibiting almost all of the traits of the true historian — a good grasp on the meaning of events, penetrating analysis of motives, a de¬ scription of contemporary culture and sound generalizations. Especially did Commines em¬ phasize the political and pragmatic value of history and advised all statesmen and diplo¬ mats to ((study it well, for it holds the master key to all types of frauds, deceits and perjuries."

With this work French history enters on the modern period.

Aside from the above mentioned chroniclers, the avowed mediaeval English historians were few. The confused and gloomy description of the invasion by Gildas (c. 516-570) has ac¬ quired an undeserved fame because of its being the only available source for that important period. A fine product of the lingering classical culture in tfie north of Europe is to be found in Bede's (c. 672-735) famous (Ecclesiastical History of the English Nation/ The work of a real literary artist and scholar, it was a remi¬ niscence of a fast passing culture rather than a promise of a new era in historiography. On the Anglo-Saxon and Norman monarchs a work of interest and merit was (The History of the Kings of England/ by William of Malmesbury (d. 1142). William of Newburgh (b. 1136) produced an important work on the significant reign of Henry II. He showed both critical power in rejecting earlier legendary material and unusual insight into men and policies. The most objective and critical of English mediaeval historians was Matthew Paris (d. 1259). His (Greater Chronicle) centred around the troubled times in the middle of the 13th century which accompanied the origins of the English parlia¬ mentary system. A work of high merit both as to style and accuracy on the reign of the three Edwards was brought out by Walter Heming- burgh in the 14th century.

4. Mediaeval Historical Biography. — The personal prowess of the great political and mili¬ tary figures in the Middle Ages made attractive subjects for historical biography. Often the monarch subsidized or otherwise favored a biographer to ensure a properly flattering record of his deeds. Needless to say, strict impar¬ tiality was never observed, and sycophancy often was added to the other defects of mediaeval historiography. In addition, the theological coloring of all mediaeval thought led the biog¬ rapher to represent the great secular figures of the period as the chosen agents of Divine Provi¬ dence in their age. Of these mediaeval _ biog¬ raphies the most notable were (The Life of Charlemagne/ by Einhard; 'The Life of Louis the Fat/ by Suger; and Joinville's Wife of Saint Louis/ one of the polished French histori¬ cal works written in the vernacular. Here also belong, almost as much as in the field of sys¬ tematic history, the works of Otto of Freising and Rigord. Among these mediaeval biogra¬ phers, especially such as Einhard and Joinville, one finds some of the best examples of the rare emergence of secular interests in mediaeval his¬ toriography.

While one is not likely to exaggerate the in¬ feriority of mediaeval historical writings as com¬ pared with modern historiography, it is possible to be unfair to the historians of the Middle Ages. The available models of historical writ¬ ing, such as Orosius and Cassiodorus, were of an inferior type. There were no lists of sources and no technique of scholarship. The

existing canons of historical scholarship were demoral¬ izing rather than helpful. There was little com¬ munication of intelligence between communities which would make possible a masterly grasp of situations as a whole. Their primitive and su¬ perstitious outlook upon life was something for

which they could not be held responsible. There was no natural science to furnish a basis for the rejection of miracles and no social science to furnish a valid criticism of social institutions. The marvel is that these historians were able to do so well.

Several facts stand out from even the fore- going brief survey of mediaeval historiography. In the first place, like the most of classical his¬ toriography, the historical works of the Middle Ages were for the most part concerned with strictly contemporary history. The treatment of a remote period was almost invariably in the nature of a rude and scanty chronicle of events. In the second place, it is almost impossible to differentiate sharply between chronicles, syste¬ matic histories and biographies on account of a common methodology. Thirdly, it is notice¬ able that the vast majority of the writers were churchmen. Therefore, while the ecclesiastics cannot be too severely criticized for their vitia¬ tion of historical methods, it is well to remem¬ ber that without them mediaeval historical lit¬ erature would have been practically a blank. Fourthly, it will readily be apparent that mediae¬ val history was almost exclusively episodical, there being almost no attempt to analyze the deeper social, economic and intellectual forces in historical development. Finally, one can easily discern that, with the stimulation of in¬ tellectual interests during and following the Crusades, there came an increase in the volume of historical output and an improvement in its quality that was a prophecy of a future recov¬ ery of the lost historical standards of classical antiquity.*

5. The Arabic Historians of the Middle Ages. — The contribution of the Arabs to mediaeval culture was not insignificant in the field of historiography, but only a few of the more notable Arabic historians can be men¬ tioned in this place. Orosius found his Ara¬ bian counterpart in Tabari (846-932), who compiled the first universal history from the Mohammedan point of view. The events of history were adapted to the creation of a ˆMo¬ hammedan Epic" justifying the triumph of Islam. History and ethnography were com¬ bined in the voluminous works of Mas'udi (d. 966), whose wide travels carried him over most of Asia, Africa and Europe. Not until the publication of the histories dealing with the discoveries of the 16th century was there an¬ other work which contained as much descrip¬ tive ethnographic material. The ablest contrib¬ utor to historical biography among the Arabs was Ibn Rhallikan (d. 1282), whom experts rank with the best biographers of classical an¬ tiquity. The first

Arab historian to possess any considerable philosophic grasp upon cause and effect in historical development was Atliir (1160-1232). But far and away the ablest and most significant figure in Arab historiography was Ibn Khaldun (1332-1406). His import¬ ance lies in the unique feat, for the time, of having been able to rationalize the subject of history and to reflect upon its methods and purpose. At the outset, in his 'Prolegomena to Universal History/ which was the system¬ atic presentation of his theoretical views, he drew a sharp distinction between the conven¬ tional annalistic and episodical historical writ-

ing of his time and history as he conceived of it, as the science of the origin and development of civilization. Anticipating Vico and Turgot, he comprehended the nature of the unity and continuity of historical development. In marked contrast with the static or eschatolog¬ ical conceptions of contemporary Christian his¬ toriography was his dynamic thesis that the process of historic growth is subject to con¬ stant change comparable to the life of the in¬ dividual organism, and he made clear the co¬ operation of psychic and environmental factors in this evolution of civilization. Flint makes the following estimate of the significance of his work : ((The first writer to treat history as the proper object of a special science was Mohammed Ibn Khaldun. Whether on this account he is to be regarded or not as the founder of the science of history is a ques¬ tion as to which there may well be difference of opinion; but no candid reader of his (Prolegomena can fail to admit that his claim to the honor is more valid than that of any other author previous to Vico.®*

VIII. Humanism and Historiography.

1. The Renaissance and Humanism. — Re¬ cent research and a more critical examination of the intellectual currents of European his¬ tory have profoundly modified the exaggerated opinions of Burckhardt and Symonds with re¬ gard to the relation of the so-called <(Renais- sance® to the development of European thought. It has been shown that, at the best, this period did not mark a direct and conscious advance toward modern, concepts, but was distinctly the revival of interest in an antique culture, which was in many fundamental ways opposed to the present-day outlook. This revival in¬ directly contributed toward the development of modern thought chiefly, through its aid in breaking up the ecclesiastical ((fixation® of mediaeval thought and by bringing to the front again an interest in secular matters. In its broadest sense the literary phase of this move¬ ment is. now conventionally designated as <(Humani.sm,® meaning by this not

only a re¬ vival of interest in classical literature, but also a renewal of appreciation for the broadly human interests and outlook of pagan culture. It was primarily an emotional and intellectual reaction against the narrow and ascetic atti¬ tude of the theologians without constituting any real or conscious revolution in theology.

2. Characteristics of the Historiography of Humanism. — Though there were great dif¬ ferences in the quality of the product of the historians of this period, as, for instance, be¬ tween the works of a Poggio and a Guicciardini, certain fundamental characteristics of the his¬ toriography of. humanism were sufficiently general and universal to justify enumeration. The reaction of humanism upon historical writ¬ ing was strictly in accordance with the funda¬ mental aspects of the movement. It meant, in the first place, a search for classical texts and the comparison, criticism, and improvement of those recovered. Again, it greatly reduced the element of the miraculous in historical interpre¬ tation and lessened the ((emotional thrill® of the ((Christian Epic.® Pagan history was to some extent restored to the position from which it had been excluded by the Christian writers in general, and by Augustine and Orosius in

particular. This was due in part to the ad¬ miration of the humanists for classical culture, and in part to. the fact, that, for the first time since the passing of Rome, a majority of the leading historians were laymen and practical men of affairs rather than churchmen and theologians. Naturally, also, the classical models of historiography were effective in lead¬ ing to an improvement in style and, what was more important, to a greater attention to politi¬ cal and social events and forces — it meant the re-secularization of history. A powerful im¬ pulse in this latter direction came from the be¬ ginnings of modern nationalism in the Italian city-states. Also, the criticism of literary texts produced at least an elementary sense of the value of a critical handling of historical documents. Finally, with the humanists his¬ tory became more historical. With their cen¬ tre of interest in the culture of a period long past, historical writing could no longer be limited entirely to contemporary history or to a mere repetition of the threadbare never wholly dispelled throughout the Middle Ages, now reasserted itself with double power. It was the humanist historian's very function to make the glories of his prince or of his city a vehicle for the display of the Latin style to which he owed his post. And if history, thus again an art, a branch of litera¬ ture,. dared- in a field so secular to shun the mention of ecclesiastical miracle and even to forget the great plan of salvation, it was too often to borrow from the ancients a strange varnish of omen and of prodigy.® While it bore no causal relation to humanism, it should be remembered that it was during this period that the printing press was invented and intro¬ duced into general use. It gave a great stimu¬ lus to the «makmg of books® in the field of his¬ tory, as in other branches of

‘literary effort. In its largest significance for the future of histori¬ cal science, the invention of printing can be com¬ pared only to the original mastery of the art

of. 1wnt’r]g- Tt is not t0° much to say that neither Thucydides, Polybius, Blondus, Mabillon

nor Ranke was as consequential or indispensable in making possible the present status of his¬ toriography as the inventor of the art of print¬ ing by movable type, be he Coster, Gutenberg or someone yet to be discovered.

3. The Chief Contributors to the His¬ toriography of Humanism. — Aside from the scholars whose activity lay solely in the search for classical texts, the first important product of humanist historiography was (The Twelve Books of Florentine History by Leonardo Bruni (1369-1444). In this and his later Com¬ mentaries/ are to be found nearly all of the characteristics of the historiography of the humanist school — a moderate adherence to the canons of style of the Greek and Roman Rhetoricians, the opinion that classical rather than contemporary culture was the most promis¬ ing field for historical inspiration, the elimina¬ tion of pagan and Christian miracles and le¬ gends, and a primary attention ‘to the practical analysis of political events and activities. The standards of Bruni were adopted by his Vene¬ tian disciple, Marcantonio Coccio (1436-1506), known as (Sabellicus,> in the production of the only serious humanist attempt at a world his¬ tory, his HinneadesP Though he took his chronology from Eusebius, he restored to the history of antiquity some degree of proportion in dealing with the various nations by depart¬ ing from the almost exclusive concern with Hebrew history, which had been the fashion for a millennium. Again, while he in no way foreshadowed Voltaire, that he made some progress toward rationalism and criticism may be seen from his placing the legend of Sam¬ son on a parity with that of Hercules. The great gulf between the historiography of the Patristic period and that of humanism can best be appreciated by a comparison of the (En- neades) with (The Seven Books of History against the Pagans. * If Bruni was the Hero¬ dotus of humanist historiography and Sabellicus its Diodorus, Poggio (1380-1459) was its Ephorus. His (Eight Books of Florentine His¬ tory* illustrate in its extreme form the influence of classical rhetoric on humanist historical literature and one may agree with Fueter that Svhat he gained as a literary artist he lost as an historian.®*

Of a widely different character from the work of Poggio was that of the

most distin¬ guished historical critic of the period, Lauren- tius Valla (1407-57). Valla's only systematic historical work, (The History of Ferdinand I of Aragon) was not conspicuously successful. It proved the author to be a ˆscandal-monger® rather than a historian in the field of narrative, though it may have been a slight methodological advance to have substituted scandals for mira¬ cles. His achievement, for which he has re¬ ceived undue fame in the field of criticism, was the final proof of the forgery of the (Donation of Constantine,) the authenticity of which had already 'been doubted by Cusanus and Bishop Peacock. As Fueter has clearly shown, Valla acquired fame by virtue of the venerable nature of the document he attacked rather than by the skill or erudition he displayed in its analysis. It was a testimonial to his courage rather than to his critical powers, which could be matched by several other humanists. As Emerton has said, (

prove the great learning or cleverness of the author, for neither of these was needed. The moment that the bare facts were held up to the world of scholars the whole tissue of absurd¬ ities fell to pieces, of its own weight.® More skill was shown in his (Duo Tarquinii, an attack on Livy's treatment of a certain phase of early Roman history. This work also showed that the most highly esteemed of secular authorities was no more immune from critical examination than venerable ecclesiastical docu¬ ments. Valla's methods were applied by his Venetian contemporary, Bernardo Giustiniani (1408-89), to dissipate the legends connected with the founding of Venice.*

Far the greatest historical scholar that Ital¬ ian humanism produced was Flavius Blondus (1388-1463), the Timaeus of humanism, who de¬ voted his life to a study of the antiquities of ancient Rome and the rise of the mediseval states. His chief work was (History since the Decline of the Power of the Romans, > in 31 books. The most notable thing about this work, aside from the careful scholarship, was the original attitude that its author displayed in his interpretation of the significance of the mediaeval period. ((The novel element in the attitude of Blondus,® says Professor Burr, <(,is that instead of thinking of the Middle Ages as the continuous history of a Roman Empire, as mediaevals had been wont to do, he left Rome to the past and told the story of the rising peoples who supplanted her.® (

The > humanist Pope, .Tineas Sylvius Pic- colomini (1405-64), deserves mention in a sketch of humanist historiography more from the nature of his personal career and the in¬ fluence he exerted on later German writers than from the value of his contributions to systematic history or to the improvement of historical method. His numerous historical works, Commentaries on the Council of BaseP ; (The History of Frederick IIP ; (The History of Bohemia) ; (The History of Europe ; Cniversal History,)*

and Commen¬ taries, } or his autobiography, were superficial, without deep philosophical grasp, fragmentary and incomplete. Contrary to the usual view, he did not even equal Bruni as an historical critic, to say nothing of Valla and Blondus. On the other hand, he was a man of action in politics to a degree scarcely equalled by Polybius or Tacitus. No contemporary knew more of

European politics and culture than he, and the most valuable aspect of his historical works is the fact that they are full of personal memoirs. As a member of the imperial chancery of Frederick III and through his later ecclesiasti¬ cal relations with the empire, his interest in German history and culture was greater than that of any of his Italian contemporaries. His significance in the development of historiography rests primarily upon his works on German his¬ tory and his influence on later German his¬ torians. In his history of Frederick III he made large use of Otto of Freising and brought him to the attention of contemporaries. His history of Bohemia was probably the first at¬ tempt of a humanist historian to introduce ethnography into historical literature. Finally, his history of Europe and his universal history sought to bring out the interrelation between history and geography. It was in these re¬ spects, chiefly, that he influenced later German historians. Fueter says on this point: < (Fneas Sylvius was. mainly responsible for the later appearance in the works of many German humanist historians of the tendency to introduce into works on history excursions into the origin and growth of law and the relations of geog¬ raphy to historical development, to assume at least a semi-critical attitude toward the legends of racial origins, and to display a boisterous chauvinism in matters touching the question of nationality.®

Flistorical biography among the humanists was founded bv Filippo Villani (c.1325— 1405) in his survey of the most illustrious citizens of Florence. Always handicapped by the crude¬ ness of their classical model, Suetonius, the biographical products of the period were not as successful as the more systematic historical works. The only notable work was Giorgio Vasari's (1511-1574) (Lives of the Most Emi¬ nent Painters, Sculptors and Architects. > This lacks almost every characteristic of a good his¬ torical work, but has become famous because of its subject matter and the scarcity of other sources. It was the first real history of art.

The transition from strictly humanist histo¬ riography to the beginnings of modern political and national historical writing in Italy was well illustrated by the works of the Florentine his¬ torians, Machiavelli and Guicciardini.

The cul¬ tural supremacy of Florence at the time, and the intensity of its political life, combined to make it a particularly favorable environment to stimulate the production of works of high value. With Blondus they valued truth more than rhetoric, but they were saved from the former's obscurity and unpopularity by avoid¬ ing a labored and pedantic style. With them history became wholly secular and was limited primarily to aˆ straight-forward narrative and analysis of political events. Some attempt also was made to substitute a psychological and material theory of causation for supernatu¬ ralism.

Machiavelli (1469-1527) was primarily a political philosopher without any particular emotion for history unless it was utilized in the interests of political theory. It is this tendency which gives his major historical work, its distinctive characteris¬ tics. From the standpoint of style or accuracy it was not superior to some other histories of the period, but is it doubtful if any previous

historian since Polybius, with whom Machia¬ velli was thoroughly familiar, had exhibited the power of grasping the nature of historical caus¬ ation or of presenting a clear picture of the process of historical development that Machia¬ velli displayed in his analysis of the political evolution of the city of Florence. It was as a political thinker and organizer of causal factors that Machiavelli excelled, and not as an ob¬ jective narrator of political events.

Not at all philosophical, but more truly his¬ torical, was Guicciardini (1483-1540). His ˆHistory of Florence) is one of the truly orig¬ inal works in historiography in that the author broke almost completely with both Patristic and humanist historiography and even went beyond the classical historical conventions in one par¬ ticular, namely, that he eliminated the introduc¬ tion of direct discourse in his narrative. In his lucid style, free from digressions and irrelevant details, there was no trace of florid rhetoric, and his primary concern with contemporary po¬ litical history allowed him, in the latter part of the work, to dispense, to some extent, with the annalistic and strictly chronological arrangement of the conventional historical writing of his time. He made no attempt at philosophic anal¬ ysis, but .devoted himself solely to a vigorous and incisive narrative of events and a candid criticism of men and policies. <(With the Flor¬ entine History, >» says Fueter, ((there began modern analytical historiography and political ratiocination in history.® Most critics contend that with Guicciardini's (History of Florence) historiography in western Europe had again at¬ tained to the level of Thucydides and Polybius. It had, however, no influence on contemporary historiography as it was not published until 1859. From the standpoint of style and ar¬ rangement Guicciardini's other major work, (The History of Italy, > was

less original be¬ cause here he compromised with those rhetori¬ cal conventions of humanism which he had so rigorously excluded from his first work. But with respect to its breadth, scope and original mode of approach, the latter work was even more epoch making. For the first time a his¬ torian had been able to. break with tradition and free, himself from primary concern with any particular state or dynasty and to devote his attention to a much broader field — <(the historv of a geographical unity.® This gave him an unprecedented opportunity to study the growth and decline of states, the interaction between states in all the phases of international relations and the processes of political evolution. In other words, the subject-matter offered rare opportunities for the study of universal history reproduced on a small scale, and, though Guic¬ ciardini almost entirely lacked that philosophical insight into social and political processes that distinguished Machiavelli and was thereby pre¬ vented from making the first great study of social and political evolution, the very novelty of his program constituted a great advance in historical method. Few will deny that Guicciar¬ dini reached the highest level to which post-

CrSˆ!rCa/- hlstori°ffraphy attained until the time of Mabillon, but the great progress that was necessary before modern scientific political his¬ tory could be reached is best appreciated by a perusal of the rather over severe criticism of Guicciardini by Ranke, the earliest, but by no means the most cautious and scholarly of the

modern school. The modern standards might more quickly have been reached had not the Reformation set back the progress of historical writing by the resurrection of theological inter¬ ests and religious bias and controversy which humanism was gradually and peacefully smoth¬ ering. Not until the theological monopoly had been crushed by the rationalism of the 18th cen¬ tury and secular interests had been reinforced by the commercial revolution and the rise of modern nations could any fundamental advance be achieved.

Outside of Italy, humanism found many distinguished converts, and not the least of them in the field of history. In general, the conventional canons of humanist historiography were faithfully followed, though there were some variations introduced as a result of chang¬ ing conditions. As the movement was some¬ what belated beyond the Alps, it became com¬ plicated by the religious conflicts of the Refor¬ mation period and took on a concern with ecclesiastical matters which was quite foreign to the Italians of the 15th century. Again, the literary tastes remained less purely

classical, and, in the zeal for florid rhetoric and sharp invective, Tacitus, rather than Livy, became the model of many of the northern humanists in the 16th century. As in Italy, so in the north, humanist historical literature gradually evolved into the beginnings of modern political his¬ toriography.

The most scholarly product of the historiog¬ raphy of Swiss humanism was the history of Saint-Gall by Joachim von Watt, better known as Vadianus (1484-1551). He is generally rated as a historian superior to Blondus. He not only rivalled Blondus in textual criticism, but also advanced a step further toward Ranke by making some rudimentary progress toward the internal criticism of the tendencies of the au¬ thors of the documents. He was able, further, to combine erudition with a clear and vigorous style and good grasp upon the general factors of historical development. Fueter regards his work as the most broadly conceived product of the historiography of humanism on account of the wide scope of the subjects and interests embraced. It was, however, doomed to an even longer period of obscurity than awaited Guicci¬ ardini's (History of Florence, > because it was not published until the third quarter of the 19th century.

*In Germany the list of distinguished human¬ ist historians begins with the name of Albert Krantz (1450-1517), who, following Aeneas Sylvius, was one of the first to apply the literary and historical methods of humanism to a study of primitive peoples, in his histories of the early Saxons and Wends. More famous was Johannes Turmair, known as Aventinus (1477-1534). In his (History of Bavaria) and his (History of Early Gei*many) he tried to combine the literary canons of Bruni with the scholarship of Blondus, but fell far short of either, and his bitter Protestant bias prevented any objective treatment of contemporary affairs. Few writers of the period, however, equalled him in his ability to analyze and interpret the manners and customs of a people. Ulrich von Hutten (1488-1523) was more distinguished for his brilliant satire in his campaign against bigotry than for his contributions to historical*

literature, but his recovery and publication, with extended comments, of a manifesto of Henry IV against Gregory VII was both a shaft of Protestantism against Rome and a valuable addition to historical knowledge. The only dis¬ tinguished representative of the erudite and critical tendencies of Blondus among the Ger¬ man humanist historians was Beatus Rhcnanus (1486-1547), the friend and disciple of Erasmus. He examined the sources of early German his¬ tory with the same exact and objective scholar¬ ship that Erasmus had applied to the ecclesi¬ astical records and doctrines. While he lacked the ability to organize his work into a coherent exposition of its results, his labors represent the highest level of scholarship to which the historiography of German humanism attained. Of all the publicists who have a place in the historiography of German

humanism, Samuel Pufendorf (1632-94) was the leader as a his¬ torian. His works included a (History of Sweden, > a (History of Frederick William the Great Elector and (An Introduction to the History of the Leading Powers and States of Europe.* He had a fine classical style, but ex¬ hibited to its fullest extent that fundamental fault still common to publicists when they enter the field of historical literature, namely, a con¬ cern only with the few distinguished figures in international relations and with that hitherto most superficial field of political history, the record of international relations when unaccom¬ panied by any attention to internal political or social history. As in the later work of Droy- sen, one searches in vain in the mass of refer¬ ences to external politics for even the slightest appreciation of those deeper popular movements and forces of which diplomatic history can give only the most scanty and unreliable reflection and information.*

A more distinguished scholar and publicist than Pufendorf, but not so noted an historian, was the Dutch writer, Hugo Grotius (1583- 1645), the founder of modern international law. His chief historical work was (The History of the Netherlands. Though his style, in imita¬ tion of Tacitus, was pompous, prolix and in¬ volved, he displayed great ability in psycholog¬ ical analysis and in dissecting the problems of military and political history connected with the struggle between Spain and the Nether¬ lands.*

That humanist historiography in England was closely related to the origins of that intel¬ lectual movement in Italy is to be seen in the fact that the first product of this type of his- toical literature in England was the scholarly and well-written (History of England in the Reign of Henry VIP by Polydore Vergil (1470-1535), an Italian ecclesiastic who had made his home in England. His scholarship was not matched in the British Isles until the time of Camden, a century later. England's earliest native humanist historian of note was Sir Thomas More (1478-1535), whose pol¬ ished style found expression in his (History of Richard HIP Of all the British historians of this period, it is probable that the truest repre¬ sentative of humanism was the erudite Scot, George Buchanan (1506-82). Few of the best Italians -equalled him for the purity of his Latin diction and the vigor and clarity of his narrative, but his (History of Scotland) was

most uncritical and credulous, utterly lacking in rationalistic tendencies and marred by a narrow chauvinism. Machiavelli and Guicci¬ ardini found their English disciple in the phi¬ losopher and statesman, Francis

Bacon (1 561— 1626). His (History of the Reign of King Henry the Seventh) was especially notable for bold criticism, judicial severity,® and the frank expression of the author's opinions. The Eng¬ lish representative of the erudite and critical school of Blondus was the court historian, Wil¬ liam Camden (1551-1623), an avowed admirer of Polybius. In his (Annals of English and Irish History in the Reign of Elizabeth > he showed, like his French contemporary De Thou, that the political history of the 16th century could not be wholly divorced from ecclesiastical questions.

The transition from humanism to modern political history in England was illustrated by the works of Lord Clarendon (1609-74) and Bishop Burnet (1643-1715). While the general arrangement of Clarendon's (History of the Rebellion and Civil Wars in Englandˆ re¬ sembled the French <(memoirs,® and though it was most superficial in its analysis of the fundamental social and political causes of the civil wars, it is doubtful if any previous his¬ torian, classical or humanist, possessed Claren¬ don's power of vivid delineation of personali¬ ties. Bishop Burnet, in his (History of the Reformation of the Church of England) and (History of My Own Time, was the first his¬ torian of party intrigues and parliamentary de¬ bates, a subject scarcely available for any pre¬ vious writer. An ardent Whig and Anglican, he belonged more to the forerunners of modern political history than to the list of disciples of humanism.*

Spain contributed three important figures to humanist historical literature in Diego Hurtado de Mendoza (1503-75), Juan de Mariana (1 535— 1625) and Geronimo de Zurita (1512-80). While Mendoza wrote his (History of the War with Granada) in a pompous, archaic and involved style, he equalled Bacon or Guicciardini in his sharp criticisms and acute judgments. Mariana, a Spanish Jesuit, was a writer of quite a dif¬ ferent sort. He has been called the Spanish Buchanan by Fueter, and his (History of Spain } in 30 books resembled the work of the Scot in its excellent style and cautious criti¬ cisms of Christian legends. His liberal allot¬ ment of space to ecclesiastical matters was a breach with humanist conventions. Much less able in narration, but a far more critical scholar, was Geronimo de Zurita, the historian of the kingdom of Aragon and the most prominent and faithful disciple of Blondus among the Spanish historians of this period. He was espe¬ cially significant through the fact that he was one of the first historians to make an extensive and fairly critical use of the diplomatic corre¬ spondence in reconstructing the record of polit¬ ical events in the distant past.

The most notable product of the historical scholarship of the French humanists was the work of Joseph Justus Scaliger (1540-1609) in the field of historical chronology. His (De emendatione temporum) was a bold attempt to put chronology on a scientific basis by revising the <(sacred®

chronology in the light of the evidence from the history of the <(gentile® and

<(pagan® nations of antiquity. His (Thesaurus temporunP was a most notable performance of scholarship, which provided a general history of the development of chronology and included a most valuable reconstruction of the lost (Chronicle) of Eusebius. Scaliger's publicist contemporary, Jean Bodin (1530-96), in his (Methodus ad facilem historiarum cogni- tionenV produced the first extensive treatise on historical method, with the emphasis on inter¬ pretation rather than upon criticism of sources. Especially significant was the emphasis which Bodin placed upon the influence of geographical factors in historical development, thus opening the way for Montesquieu and Ritter. It was, therefore, to a much greater degree a fore¬ runner of the first chapter of Buckle's his¬ tory of England) than of Bernheim's (Lehr- buchP A widely different contribution to his¬ toriography was contained in the work of Jac¬ ques Auguste de Thou (1553-1617), conven¬ tionally known as Thuanus. He was probably the most notable French contributor to the sys¬ tematic historiography of humanism. His (His- toria sui temporisP designed as a continuation of a work of the same title by the Italian humanist, Paulus Jovus (1483-1552), described the civil and religious wars in France in the latter part of the 16th century according to the spirit of an enlightened and tolerant French Protestant. He introduced into historiography the laudable tendencies displayed by his royal master and friend, Henry IV, in statesmanship. As might be expected in the work of one of the jurists who aided in drafting the <(Edict of Nantes,® he was scarcely fair to the extreme Catholic party, but his message was a lofty and noble plea for mutual religious toleration in the larger interest of France. His work ex¬ hibited great powers of extended intellectual labor and uniformly maintained a great dignity of tone. He might have equalled Machiavelli and Guicciardini if he had not reintroduced the theory of the divine determination of political causation, and if he had possessed the con¬ structive literary ability which would have enabled him to organize his work into a coherent narrative, tie may be said, however, to have improved upon them in one regard, namely, that he showed how essential a proper consideration of ecclesiastical affairs may be to a thorough understanding of political and con¬ stitutional development. The contributions of de Thou's contemporary, Isaac Casaubon, will be discussed in another connection. The finest literary product of the historiography of French humanism was the polished (Memoires) of . :Saint-Simon (1675-1755) dealing with France under the early Bourbons.

IX. The Protestant Reformation and the Counter-Reformation in Historiography.

1. Its Effect upon the Subject-matter and the Interpretation of History. — In the same year that Machiavelli received his commission to write his (History of Florence) Luther burned the papal bull at Wittenberg and the Protestant Reformation was soon in full swing. A rude shock was given to the great impulse ■of humanism toward the healthy secularization of historical literature, and the centre of his¬ torical interests was again forced back into the rut of theological controversies from which

it had been trying to free itself since the days of Augustine and Orosius. Again to quote irom Professor Burr, <(To the freedom of his¬ tory there came a sudden check with the great religious reaction we call the Reformation. Once more human affairs sank into insignifi¬ cance. Less by far than that of the older church did the theology of Luther or Calvin accord reality of worth to human effort. Luther valued history, it is true, but only as a divine lesson; and Melanchton set himself to trace in it the hand of God, adjusting all its teachings to the need of Protestant dogma. Had either Papist or Lutheran brought unity to Christendom, history again must have be¬ come the handmaid of theology.® Not only were ecclesiastical matters, dealing with both dogma and organization, deemed the all essen¬ tial sphere of historical investigation, but also universal history was again regarded as purely a great struggle between God and the Devil. Two new (

It is scarcely necessary to point out the fact that this revival of the religious orientation of historical interest was as fatal to the fine ob¬ jectivity of Guicciardini's type of historical product as it was to the maintenance of the secular point of view of the Florentine school. There was no longer any thought of prosecuting historical studies for the mere love of acquiring information or of enriching the store of knowl¬ edge regarding the past, as Blondus had labored for these purposes alone. History again be¬ came as violently pragmatic as with Augustine and his disciples. The past was viewed merely as a vast and varied "arsenal® from which the controversialists could bring unlimited supplies of ammunition for the conflict and put their enemies to an inglorious rout. The embryonic canons of criticism which had been in part re¬ stored by the best of the humanist historians were lightly ignored, and each party consciously strove to produce the most biased account of past events possible, in order to exhibit their opponents in the most unfavorable light. Sources of information were not valued for their authenticity, but for their potential aid in polemic exercises, and invective replaced the calm historical narrative. Finally, it should be emphasized that since the period of the Ref¬ ormation there has

been little opportunity for a completely tree and impartial study of the mediaeval period. An epoch, the interpretation of which was so vital to the two great re¬ ligious groups of Christendom, could scarcely again become a field for calm and dispassionate analysis.

It would be inaccurate, however, to hold that the Reformation gave no impulse to historical investigation. Never in the palmiest days of classical or humanist historical writing was there a more feverish energy exhibited in scanning the records of the past ; the great de¬ fect was not in the nature of a decline in activ¬ ity or interest, but in the character of the im¬ pulse that led to this vigorous quest for in¬ formation and the manner of use to which the knowledge was put after it had been acquired. vol. 14 — 15

Protestant historians were <(aided by the God of Saint Paul® in the search for evidence that would prove beyond a shadow of doubt that the elaborate ritual and body of dogma of the Roman Catholic Church had been wholly an extra-scriptural and semi-pagan growth, and that the Pope was the real Anti-Christ; and Catholic investigators were "specially guided by the Blessed Virgin® in their counter-demonstra¬ tion that the Church and all its appurtenances were but the rich and perfect fulfillment of Scripture, and that the Protestants were in¬ viting a most dreadful and certain punishment by their presumptuous and sinful defection from the organization founded by Saint Peter in direct obedience to the words of Christ. The only real contributions made by the controversy were the recovery and publication of important early documents on Church history and the production of telling criticisms by both factions which could be combined a century later by the rationalists to their mutual discomfiture.

2. The Chief Products of the Controversial Period. — The first serious contribution of the Protestant camp was (The Lives of the Popes of Rome) by Robert Barnes (1495-1540), an Anglican Lutheran who had fled to Germany for protection. Composed under Luther's di¬ rect supervision, it endeavored to prove the popes responsible for all the disasters of the Middle Ages and praised the virtues of their secular opponents. At last, the methods of Orosius had been turned against the Church itself. Much more important were the vol¬ uminous (Magdeburg Centuries, a composite work planned and edited by Matthias Vlacich (1520-75), better known by his latinized name of Flacius. He was aided by a number of prominent Protestant scholars, such as Aleman, Copus, Wigand and Judex. The history of the Church and of Christian doctrine was reviewed by centuries down to 1300 in the effort to prove direct historicity in the Lutheran position and to show that the Catholic doctrines and organ¬ ization had been an exotic and unholy growth away from the purity of Apostolic Christianity. While the authors displayed considerable critical ability in dissecting the papal doctrine and dogmas, they exhibited an equal*

gullibility in accepting preposterous tales to bolster up their side of the controversy. Its significance lies chiefly in the fact that it founded Church his¬ tory in its modern phase. Another Protestant polemic appeared about this time in England and met with great popular success. This was (The Acts and Monuments of the Christian Martyrs, by the Englishman, John Foxe (1516— 87). Beginning with Wycliffe, it traced the record of Protestant martyrs in such a manner as especially to represent the struggle as one between the purity and the perversion of Chris¬ tianity — between Christ and the Anti-Christ. Protestantism found its Scottish chamoion in John Knox (1505-72), who wrote his (History of the Reformation in Scotland> to prove the particular solicitude of the Devil for the wel¬ fare of the Catholic cause. In spite of its obvious bias, however, Knox's work was greatly superior to that of the Centurians and Foxe. From the standpoint of literary quality, h"s history was a work of genius, "displaying a marvelous precision and sureness in the selec¬ tion and presentation of the significant and striking details.® Nor did he fail to condemn*

in the most vigorous terms those who adopted Calvinism as a means of gaining selfish ma¬ terial ends or resorted to violence in the name of religion in order to revenge political or personal grievances. A work which can scarcely be regarded as a part of the campaign of theological polemic that is being described, but which calls for some brief notice on ac¬ count of its great interest and significance for the history of the Reformation, is the <(Com- mentaries on the Political and Religious Condi¬ tions in the Reign of Emperor Charles V® by Johannes Philippi (1506-66), more generally known by his latinized name of Sleidanus. The great importance of his work is that it was the first political analysis of the Reforma¬ tion movement and the Protestant revolt. He was the official constitutional apologist of the Lutheran states of northern Germany, and his task, not unlike that of Jefferson, was to justify at the bar of public opinion the entire legality of the secession of 'the Protestant princes from the Empire. He, therefore, approached the his¬ tory of the movement from a political and con¬ stitutional rather than a theological point of view. While he limited himself wholly to authentic documents, his work was the product of an advocate; though not a polemic, it was a lawyer's brief carefully selecting and mar¬ shalling the evidence to be presented. As might be expected from such circumstances, his ˆCommentaries® exhibited great power in the organization and concentration of material, an admirable lucidity of expression and a dignified tone, designed to make an appeal to the learned public of Europe. While it contained none of Ranke's religious fervor and in no way anticipated the social studies of Janssen, his work

was of the greatest significance as a direct foreshadowing of the now generally ac¬ cepted thesis of Professor Robinson that the Protestant revolt was far more a political than a religious movement — that it looked more toward the political adjustments of the Peace of Augsburg and the Treaty of Westphalia than to the triumph of the theology of ˆjustification by faith.® He anticipated this interpretation, not only through the general mode of his ap¬ proach to the problem, but also by specific com¬ ments upon the underlying political causes of the revolt.

The Catholic counter-blast was initiated by the monumental (Annales ecclesiastic^ of Car¬ dinal Csesar Baronius (1538— 1607) , the director of the Vatican library. By the use of an enor¬ mous mass of evidence he tried to prove the New Testament origin of Catholic Christianity and to show its logical development from Scrip¬ tural foundations. While he was more critical in his use of sources than the authors of the (Centuries and introduced more unpublished documents, the work was purely a polemic and marked no advance in historical method. In one way it was decidedly a retrogression. As the most authoritative critic of the historiography of this period has clearly shown, Baronius was mainly responsible for the introduction into his¬ torical controversy of the method of shuffling, quibbling and evasion, which has particularly characterized the Jesuit controversialists. He endeavored to avoid meeting dangerous issues by trying to confuse and obscure the vital ques¬ tion through turning the discussion into secon¬*

dary and irrelevant channels. The crudities and errors in the work of Baronius were re¬ vealed in the searching criticism of the great humanist scholar, Isaac Casaubon (1559-1614), to whom Baronius' weaknesses due to his in¬ ability to handle Greek were readily apparent. He devoted the last years of his life to a refu¬ tation of Baronius in his (Exercitationes in Baronium. The (Annales) were later continued with much greater scholarship by Odoricus Raynaldus (1595-1671), a learned Italian ec¬ clesiastic. The second great Catholic cham¬ pion was the French bishop, Jacques Benigne Bossuet (1627-1704). In his (History of the Differences among the Protestant Churches) he endeavored to convince the Protestants of the error of their ways by showing them that there could be no logical end to sectarian divisions once the crucial initial break had been made with ecclesiastical authority. Bossuet's im¬ portance lies in the fact that he alone of the controversialists, Protestant or Catholic, was able to get beneath personalities and events and to view the conflict in its deepest philosophical aspects as a struggle between liberty and au¬ thority, in which the victory of liberty meant to him indifference, atheism and religious anarchy. In his (Discourse on Universal History* he ap¬ peared as the Orosius of the Counter-Reforma¬ tion. Though incomparably more able and philosophic than the (Seven Books against the Pagans,* it was less critical and less*

historical than the (Enneades of Sabellicus. ((His dis¬ course^ ® says Fueter, <(was not an historical work. It was merely a sermon in which the biblical text was supplanted by historical sub¬ ject-matter carefully edited and prepared in the interest of the Church.® It was the last serious attempt at an interpretation of universal his¬ tory in terms of the old theology. After Vol¬ taire had published his (Essai sur les Mceurs* in the middle of the next century, no one dared to risk his reputation by a revival of the doc¬ trines of Orosius and Bossuet.*

The above-mentioned works of controversy are only the more notable ones selected from the great volume of lesser contributions to the historical literature of the Reformation and Counter-Reformation, but they sufficiently illus¬ trate the general tendencies in method and in¬ terpretation. It has not entirely ceased at the present day as one can readily perceive by a comparison of the works of Ranke and Schaff with those of Dollinger and Janssen. While humanists and religious controversialists were writing, a new Europe was being shaped by the effects of the commercial revolution, out of which was to come modern civilization and with it the birth of scientific historiography.

X. The Chief Influences in the Shaping of Modern Historiography.

1. The Era of Discoveries and the «Com- mercial Revolution »— Inasmuch as history down to very recent times has been regarded as primarily the domain and province of the theologian or litterateur , it was but natural that either the Reformation or the Renaissance should be taken as marking the origin of the modern phase of the development of historiog¬ raphy. Now that it has come to be generally conceded that, in its broadest interpretation, history is a branch of social science and related

generically to the whole body of science, it has become necessary to search for the causes which brought modern historical writing into being in the results of that great period of transformation which marks the beginnings of the present social and intellectual order, namely, the ((Commercial Revolution.® By this term is meant that vast movement of exploration and discovery, which occurred in the three cen¬ turies from 1450-1750, and its almost incal¬ culable social and intellectual consequences. The isolation, repetition, stability and provin¬ cialism of the old order could not endure in the face of the widespread contact of different cultures — that most potent of all forces in arousing intellectual curiosity and promoting radical changes of every sort.

The reaction of the commercial revolution upon historiography was in no way more not¬ able and far-reaching than in regard to the scope of the historian's interest. The narrow¬ ness and superficiality of the field of historical investigation since the canons of Thucydides and Orosius had come to prevail could no long¬ er endure unimpaired ; it meant the beginning of the return to the field that Herodotus had to some extent marked out for the historian. Writers to some degree ceased to be absorbed by those most superficial phases of political and ecclesiastical history, which had hitherto claimed all of their attention, and became for the first time interested in the totality of civ¬ ilization. It meant a much greater impulse to that broadening and secularizing process which had been revived by humanism. Not only were there great stores of knowledge to be obtained from the contact with the older civilizations of the East, but in the natives, historians and phi¬ losophers at last found the ((natural man,® who had hitherto only existed in the mythical period before the <(Flood.® No greater contrast could be imagined than the vast difference in the type of subjects which interested such .an historian as Pufendorf and those with which Oviedo con¬ cerned himself. Again, the new range of his¬ torical interests offered some opportunity for originality of thought ; there were fewer er¬ roneous notions to handicap the writer at the outset. Neither Thucydides, Polybius and Livy, nor Augustine and Aquinas had provided the final authoritative opinion on the marriage cus¬ toms of Borneo or the kinship system of the Iroquois. The only exception in this respect was the prevalent doctrine of a <(state of na¬ ture,® which had come down from the Stoics and Roman lawyers and now seemed to have practical concrete confirmation.

While the influence of the commercial revo¬ lution upon historiography was most effective indirectly, through the intellectual and social changes which it produced, and the reaction of these changes upon historical interests and methods, there were some important immedi¬ ate and direct results apparent in historical writing among those who dealt with the record of the discoveries. In the first place, there were radical changes in style and exposition. The old arrangement in the form of annals was no longer suitable ; what was needed now was a vehicle for comprehensive description and not for chronological narration. The majority of the early historians of the movement of explora¬ tion and discovery were practical men of af¬ fairs and wrote in a direct and unpretentious

style. Though there was later, with such writers as Herrera, a tendency to lapse into the lit¬ eral canons of humanism, an important breach had already been made with both the form and the style of the conventional historical litera¬ ture. The content of historical products was also greatly altered by these writers ; political and ecclesiastical intrigues were replaced by a comprehensive account of the manners and cus¬ toms of a people.

This tendency reacted strong¬ ly even on those writers who dealt exclusively with European affairs. The 'Chronicle of Eusebius or the genealogy of reigning mon- archs, as the introduction to historical works was generally displaced by a description of the land and its inhabitants. Excepting only the feeble advances of 2Eneas Sylvius and his numerous German disciples, for the first time since the days of the Ionic historians of the 5th and 6th centuries e.c., ethnography and geog¬ raphy began to make a feeble appearance in his¬ toriography. Finally, though the earlier of the members of this school of writers were prima¬ rily collectors of descriptive information, they later became speculative, and with Voltaire and Herder there appear attempts at a world his¬ tory conceived according to the new orientation and possessing some degree of comprehensive¬ ness and grasp of causal forces.*

As historiography was completely dominated by the canons of humanism at the beginning of the period of discovery, it was natural that the earliest of the historians of the commercial revo¬ lution should be humanists who turned their at¬ tention to the new movement. Their style and arrangement of material, however, had to be al¬ tered to some extent, and the centre of inter¬ est was profoundly changed. The first of these writers was Peter Martyr d'Anghiera (d. 1526), an Italian humanist who devoted himself to a description of the new world which had just been revealed. His (Decades of the New World) showed a fine power of descriptive composition, which sacrificed humanist conven¬ tions when necessary. While exhibiting no pro¬ fundity and little critical ability, it was a well- proportioned and fairly complete summary of the extant reports regarding the new civiliza¬ tions. Its great significance lies in the fact that it was the first work by an historian which de¬ scribed the civilization of a people without founding it upon the narrow and cramped basis of political life or religious activities. A more truly historical work and the most objective pro¬ duction of the period was the 'General and Nat¬ ural History of the Indies) of Gonzalo Fer¬ nandez de Oviedo (1478-1557), a Spanish nat¬ uralist who turned historian — a sort of early Alfred Russell Wallace. He was highly critical in recording his own observations, but was equally credulous in accepting tales told to him by others. His work contained a vast amount of information which was generally reliable. In his direct and matter-of-fact narrative there was nothing of the form of humanism, but his style was slovenly and the organization of material miserable. It was the least artistic and the most scientific work of this early group. At the opposite pole as to accuracy stood the notorious work of the Dominican bishop, Bartholomew de Las Casas (1474-1566) — the ((William Lloyd Garrison of the 16th century.® He was a biased and pedantic scholastic doctrinaire of a thoroughly mediaeval type. His (History of the

Indies, y idealized the natives without bounds and tremendously exaggerated the cruelty of the conquerors. It was worse than worthless for either history or ethnography and did not even possess the merit of an agreeable style. Infinitely superior was the (General History of the Indies> of Francisco Lopez de Gomara (1 5 10— c. 1 560) , the ablest historian of this school. He showed an admirable combination of excellent descriptive style with relatively high critical ability. His work would have been the great history of the discoveries had it not been vitiated by personal considerations. He was employed by the family of Cortes and was compelled to devote more space to the history of the conquest of Mexico than to all other events combined, and was also compelled to re¬ frain from candid criticism in this major por¬ tion of his work. The great ˆpopular® history of the period of discovery was the (General History of the West Indies* of Antonio de Herrera (1549-1625), the official historian of Philip II. This work was the best example of the lapse of the early descriptive narrative into the conventions of humanist style. He even adopted the annalistic arrangement and every¬ where subordinated subject-matter to external form. This meant that his work was greatly inferior to some of the earlier ones in its de¬ scriptive material as well as in critical method. It became the popular authority and did more than any other work to establish the generally accepted ideas concerning the discoveries and the great figures connected with them. Next to the work of Las Casas the least meritorious product of this school was the Commentaries on the Incas,* by Garciiaso de la Vega (1540— 1616), the son of a Spanish adventurer by a na¬ tive Peruvian mother. He was honest but en¬ tirely destitute of critical powers. Adopting the stye of the humanists, he constructed an uto¬ pian picture of ancient Peru which was exag¬ gerated beyond comparison. His almost worth¬ less picture of the Incas gained great vogue in the 17th and 18th centuries when such idealistic views of native populations were so popular. In passing, there might be mentioned the bump¬ tious and boastful (General History of Virginia and New England * by Capt. John Smith. The first work to deal with the exploration and settlement of India and the (

plorations in America from personal observa¬ tion and first hand contact. His (Histoire et description generate de la Nouvelle-France) (1744), though prolix and uncritical, was highly interesting and enjoyed a long popularity. The general reaction of the influences growing out of the period of discoveries and the commercial revolution upon this school of historians was best summed up in (The Philosophical and Political History of the Settlements and Trade of Europeans in the East and West Indies,* by the promoter and pamphleteer, Guillaume Thomas Raynal (1713-96). Published in 1771, it was not only somewhat of a synthetic com¬ pilation

from earlier works, but also indicated the reaction of the commercial revolution upon European thought. The reaction of geography on history appeared in the works of Nicolas Lenglet-Dufresnoy, (1674-1755), especially his (Methode pour etudier l'histoire) ; and his (Methode pour etudier la geographies But im¬ portant as some of these writers may have been in altering the conventions of style and the interests of the historian, the general effect of the commercial revolution upon historiography was less vital in the production of historians of the discoveries than in the alteration of all phases of life in the succeeding centuries which grew more or less directly out of it and indi¬ rectly wrought great changes in historical con¬ cepts and methods.

2. The Reaction of the New Scientific Philosophy upon Historiography. — None of the indirect influences of the commercial revo¬ lution upon historical writing were more im¬ portant and more obvious than its aid in pro¬ ducing that new philosophy of nature of which Bacon and Descartes were the most conspicuous exponents. The results of the explorations of all the major portions of the earth's surface had not only demonstrated the great extent of the habitable portions of the globe, but had also shown that the supposed marvels and terrors in the unexplored regions were but an unfounded myth which quite failed to materialize. At the same time that De Gama, Columbus and Ma¬ gellan were revealing the extent and nature of the surface of the globe, less picturesque fig¬ ures were devoting themselves to an explora¬ tion of the universe, with results equally disas¬ trous to the older theological traditions. The vast and immeasurable extent of the universe was apprehended to an elementary degree by Copernicus, Galileo and Tycho Brahe. The no¬ tion of an orderly arrangement and functioning of the universe was established by the great laws of mechanics, discovered and formulated by Galileo, Kepler and Newton. To these ma¬ jor advances in science should be added the ex¬ planation of the now commonplace natural phenomena through the great advances in every field of natural science in the 17th century. The net result of all these notable advances was a serious challenge to the old theological inter¬ pretations, based primarily upon the concept of 'a ((God of arbitrariness,® who was continually varying or suspending the laws of the universe to punish a recalcitrant prince or to answer the prayer of a faithful bishop.

The general implications of the above scien¬ tific discoveries were reduced to a systematic body of philosophical thought by Francis Bacon and Rene Descartes. Bacon especially empha¬ sized the necessity of following the inductive

method and Descartes attempted a mechanical interpretation of the universe. The new discov¬ eries and the new philosophy tended to produce a rationalistic interpretation of natural and so¬ cial phenomena which abruptly challenged the older and generally accepted view of miracles and wonders that had been so popular with Christian historians during the mediaeval period. The English Deists, such as Cherbury, Blount, Locke, Shaftesbury, Woolston and Hume, for¬ ever discredited the doctrine of the miraculous. Finally, with the attacks upon the traditional views of the composition of the Old and New Testaments by Hobbes, Spinoza, Astruc and Reimarus, the philosophy of wonder-working was undermined, not only through the evidence of natural science, but by questioning the au¬ thenticity of the Scriptural accounts in which the miracles were recorded. The gradual growth of toleration, especially in England, dur¬ ing the latter part of the 17th century and the opening of the 18th centuries enabled these rev¬ olutionary ideas to obtain an adequate expres¬ sion and a general currency.

It was also inevitable that the new scientific discoveries and the new philosophy of nature should react profoundly upon the contemporary social philosophy. The idea of orderly devel¬ opment and continuity in social as well as nat¬ ural processes was comprehended by Vico, Hume and Turgot. The older idea of social evolution as a gradual decline or retrogression from a primordial <(golden age® was replaced in the writings of Vico, Voltaire, Hume, Turgot, Kant, Godwin and Condorcet by the concept of continual progress from lower stages of civil¬ ization. The need for miracles to justify his¬ tory and the other sciences dealing with human activities was lessened by the growing preva¬ lence of the Deists' doctrine of the inherent and reasonable ˆdecency® of man — a notion widely at variance with the older views of the (

The reaction of this philosophy of the new natural science and of the new social philosophy upon historiography appears in the writings of what is conventionally known as the <(Ration- alistic School® of historians, or the historians of the ((Aufklarung.® While the writings of this school varied so greatly that it is custom¬ ary to divide the writers into several groups, there was a fundamental unity of method and interest which makes it possible to summarize the general nature of the rationalistic histori¬

ography of the 18th century. Much the most important innovation of this school was their uniform tendency to broaden the field of his¬ tory, so that it would extend beyond the polit¬ ical intrigues of church or state and embrace the history of commerce, industry, and civil¬ ization in its widest aspects. The historians of the discoveries had shown a similar tendency, but their work had been confined to a discussion of the new world and they had not constituted a general European school of historians. With the

rationalists, no matter what the period or country dealt with, there was an effort to adopt a broad cultural approach to history and to infuse embryonic sociological principles into historical analysis. Scarcely less important was their attempt to discredit superstition and the theological theories of historical causation, and to substitute for these purely natural causes. Their general theory of historical causation was crude and elementary, being the notorious so- called ((catastrophic theory of history,® whereby great movements or policies are accounted for as the result of a single personal act or of some isolated natural or political event. Being the first attempt in the history of historiography to provide a purely natural theory of causa¬ tion, it was bound to be imperfect and unsatis¬ factory, but it was a great advance over the previous theory of supernatural or miraculous causation. It led, however, to an exaggerated emphasis upon the possibility of abrupt and artificial changes in social and political institu¬ tions. The ((Romanticists® arose primarily as a reaction against this particular phase of the historical doctrines of the rationalists. Even the political history of the rationalists was given a new and more promising cast. It was no longer limited to the field of political apolo¬ getics, but became a truly critical political his¬ tory as far as its attitude towards policies was concerned. It was not usually written by mem¬ bers of the governing classes nor under their patronage, but by representatives of the new bourgeoisie or third estate, who had little influ¬ ence in the several European governments at that period. It became an agency of criticism and of agitation for reform but rarely for rev¬ olution. It must be remembered, however, that the critical powers of the rationalists were limited almost wholly to their attitude towards the general subject-matter of their history and were not exhibited to any comparable degree in their handling of the sources of information. As research scholars in the use and criticism of printed and manuscript documents they did not even approximate the level of the school of Mabillon.

The founder of the rationalistic school of his¬ torians and the master mind of the movement was Frangois Arouet, more commonly known as Voltaire (1594— 1778). The two dominating factors in Voltaire's political and historical philosophy were his great admiration for the English civilization of his time and his peer¬ less powers as a critic. An apologist of an en¬ lightened despotism allowing the free develop¬ ment of bourgeois culture and prosperity, he saw in the England of Walpole his political ideal, and his agitation for reform in France was limited wholly to a desire to create in France what he beheld in England. As a critic he has never been equalled in any age, pri¬ marily because of the fact that he was utterly

devoid of reverence or respect for any institu¬ tion and was, thus, wholly free to give full expression to his reactions against every phase of obscurantism. His most finished historical work was the (Siecle de Louis XIV,) which Fueter describes as (

Voltaire's point of approach found several distinguished representatives in England. There was one important difference, however; among the English writers there was no underlying im¬ pulse towards reform. In the case of the Eng¬ lish historians of the period there was that same complacent self-satisfaction over the final perfection of English institutions that was evi¬ dent in the legal works of Blackstone which aroused the fury of Bentham. The best ex¬ ample of this tendency was David Hume (1711- 76). His (History of England from the In¬ vasion of Julius Caesar to the Revolution of 1688 > gave Englishmen an interpretation of their national history conceived in the spirit of an urbane and dispassionate sceptic. Unlike the work of Voltaire, Hume's history was most su¬ perficial in its content and analysis. It was in no way a history of English civilization, and even the political history was superficial and in¬ accurate. The section on the mediaeval period was practically worthless. Its onlv merit was in its treatment of the Stuart period, for which it provided the first truly historical and analytic interpretation of the great Civil War. His point of view was wholly insular and he was probably the least universal of the rationalist historians. A much abler historian was the

Scotchman, William Robertson (1721-93), the most avowed of Voltaire's English disciples. Of his three major works, ˆhe History of Scotland) ; (The History of America) ; and (The History of the Reign of the Emperor Charles VC the latter, especially its introduction, was the most significant in the development of historical writing. Its lack of exhaustive schol¬ arship is revealed by the fact that the author never learned to read German, but he made the best possible use of the sources he employed. He was the first to make clear the major out¬ lines of the constitutional development in the Middle Ages and was one of the earliest to ap¬ preciate the cultural contributions of the mediae¬ val Church. He was, however, the most de¬ cided of the exponents of the catastrophic theory of historical causation and to him is mainly due the prevalence of the exaggerated notion of the importance of the Crusades in every phase of the later culture and politics of Europe and also the further elaboration of Baronius' notion of the special significance of the year 1000. The member of the English school who has gained the most enduring and general fame was Edward Gibbon (1737-94). Generally estimated by critics as less able than Robertson, he was a classic example of the at¬ tainment of great success through ministering to the prevailing sentiments of his time, in the possession of an appealing subject, a fine classic style and the current complacencv and mild rationalism. His (Decline and Fall of the Ro¬ man Empire> dealt with a

topic which was charged with an age-old thrill and a compelling interest. Less profound than Voltaire and much less significant for the history of histori¬ ography, Gibbon has won a more permanent reputation as a historian on account of causes readily understood. In addition to the more attractive and universally interesting subject with which he dealt, it was also a much more restricted subject, and, possessing abundant means and leisure, Gibbon was able to master most of the then available sources on his topic. The outstanding significance of his work con¬ sisted in the fact that it contained the first wholly secular and impartial study of the rise and expansion of Christianity. Possessing a cold and reserved personality he was not bit¬ terly hostile, but divested Christianity of its traditional envelope of unique supernaturalism and treated it as he later dealt with the spread of Mohammedanism. The general outlines of his picture have never been superseded.

In Germany Voltaire found three followers in Schlozer, Schmidt and Spittler. While Au¬ gust Ludwig Schlozer produced a minor at¬ tempt at a universal history, his main work was done in the history of Slavonic Europe, where he found his ideal in the enlightened despotism of Catherine II. He had very limited powers of criticism, especially in regard to biblical mat¬ ters ; had no imagination and an unattractive style; but he was far the greatest philologist of the rationalist school. What Voltaire did for France, Hume for England, and Robertson for Scotland, was done for Germany by Michael Ignatz Schmidt (1736-94). His (History of Germany was one of the most finished prod¬ ucts of rationalism in historical literature. His style was excellent ; he was cautious and accurate in the use of his sources and was free from all chauvinism; he was the first to handle*

the German Reformation in an impartial man¬ ner; and the scope of his work resembled Vol¬ taire s in being a true history of civilization. The smaller German states and the Christian Church found their rationalist historian in Lud¬ wig Timotheus Spittler (1752-1810). His work was . best in dealing with very recent times. He idealized the Middle Ages, and to him is primarily due the origin of that rosy and ro¬ mantic conception of the mediaeval period as one in which the main events were tournaments and the chief figures were the trouveres, trou¬ badours and minnesingers. He was the first writer to handle the whole history of the Church f rom the rationalist standpoint. His criticism was relatively mild, but he adopted the peculiar attitude of judging the Church from the viewpoint of an instrument for ad¬ vancing the cause of rationalism.

The discussion of the contributions of the school of Voltaire would not be complete with¬ out a brief reference to the work of two waiters not technically historians. Though the (Scienza nuova) of Vico (1668-1744) undoubt¬ edly contained the first definite anticipation of the modern dynamic theory of progress, he was too pious in his theology to be listed among the colleagues of Voltaire. Such was not the case with Turgot and Condo rcet. In his dis¬ course at the Sorbonne in 1750 on (The Suc¬ cessive Advances of the Human Mind,1 Tur¬ got (1727-81) first set forth clearly the doc¬ trine of continuity in history, the cumulative nature of progress and the causal sequence be¬ tween the different periods of history — theories later so greatly emphasized by Mr. Freeman. An equally notable work was Condorcet's (1743-94) (Historical Sketch of the Progress of the Human Mind,} which contained the best statement of the 18th century doctrine of prog¬ ress and perfectibility. Less thorough-going echoes of this doctrine were heard from Kant in Germany and Godwin in England.*

The rather advanced rationalism of Voltaire and his school could scarcely gain a general acceptance and a sustained success in the 18th century, when it was greatly beyond the general level of contemporary thought. It had also many crudities inseparable from the first courageous attempt to reconstruct history and bring it in harmony with the contemporary progress in scientific thought. It was natural, then, that there should be a reaction against many of its premises and methods, which was in part a recrudesence of obscurantism and in part an effort to correct some of the errors of the school of Voltaire. The stages in this re¬ action were gradual and clearly marked. It passed through the more moderate and con¬ servative rationalism of Montesquieu to the al¬ most irrational sentimentalism of Rousseau, and ended in the mystic and idealistic vagaries of romanticism. The school of Voltaire did not come to its own until it was revived with greater profundity by Buckle, Lecky, Morley, Stephen and White, as a result of the reaction of 19th century science upon historiography.

While Montesquieu's works as examples of historical criticism and accuracy are almost worthless, his broader attitude toward general methodology was of the utmost significance. He was not at all violent or revolutionary in his political theory, and his literary affinities were with humanism rather than rationalism.

He did, however, present certain phases of thought which were a marked improvement over Voltaire. Accepting Voltaire's unanalyzed doc¬ trine of the ˆspirit of a people, » he tried to show how this was produced by the operation of natural forces, particularly of climate, and first brought out clearly the fundamental propo¬ sition that the excellence of social

institutions must be judged, not by an arbitrary and ab¬ solute standard, but by their relative adapta¬ bility to the spirit of the people for whom they serve or are intended to serve. Again, where Voltaire and his followers had dropped only casual reflections, Montesquieu offered a syn¬ thesis of the various factors of historical de¬ velopment, which, though crude, marked a con¬ siderable methodological advance. Finally, while the school of Voltaire had introduced the treatment of commercial factors in connection with political development, Montesquieu and his followers laid much more stress upon the great influence of commercial activities in the life of the state. The school of Montesquieu most faithfully represented the reaction of the com¬ mercial revolution on European historiography.

Being primarily a political philosopher rather than a historian, Montesquieu's disciples were more numerous among the political theorists than among the avowed historians. J. L. Delolme's Constitution of England) ; Adam Ferguson's (History of Civil Society, } and Joseph Priestly's (First Principles of Govern¬ mentˆ were works that clearly exhibited the principles of Montesquieu in the field of polit¬ ical philosophy. But if Montesquieu had few disciples among historians, he had at least one of the highest order in Arnold Hermann Lud¬ wig Heeren (1760-1842), one of that brilliant group of Gottingen professors of the period. His great work was entitled 'Thoughts Con¬ cerning the Politics, Intercourse and Commerce of the Leading Nations of Antiquity. J Its prin¬ ciples were those of Montesquieu improved by the more scientific analysis of economic life in the works of Adam Smith. With great skill he attempted to reconstruct the commercial life of antiquity and to indicate its hitherto unsus¬ pected influence upon the course of the his¬ tory of the various nations. Heeren was one of the best writers among historians. Abandon¬ ing all attempts at rhetorical flourish, he pro¬ duced a most thoughtful work written with great clarity and coherence. Edouard Meyer, the greatest of authorities on the history of the ancient nations, has called Heeren the leader of all who have subsequently attempted to deal with this field.

Much less sound was the remaining group of the rationalist school, that which followed the lead of Rousseau and formed the logical transition from rationalism to romanticism. There were a number of important differences between Rousseau and Voltaire in their attitude toward historical and social problems. In the first place, Voltaire was purely intellectual and critical and little moved by sentiment; Rous¬ seau was almost pathologically emotional, sym¬ pathetic and sentimental. In the second place, Voltaire was realistic and practical ; Rousseau was idealistic and utopian. Finally, Voltaire wrote from the standpoint of the bourgeoisie, praised enlightened despotism, and had little faith in the political ability of the illiterate masses; Rousseau wrote as an ardent exponent

of the release of the masses from despotic political power. Until the period of the French Revolution, Rousseau's views could gain little currency in France for the intellectual circles were controlled by aristocrats, but in Germany he found several enthusiastic disciples.

The most attractive of Rousseau's German disciples in the field of history was the poet- dramatist-historian Friedrich Schiller (1759— 1805), whose chief works were the (History of the Rebellion of the Netherlands against the Spanish Rule and (The History of the Thirty Years War.* His works presented a combina¬ tion of the sentiment and pathos of Rousseau with the native powers of a great dramatist and poet. In his history of the Dutch revolt he found the basis of an epic of deliverance from oppression, while in the description of the Thirty Years' War he saw in Gustavus Adolphus and Wallenstein the central figures for a great historical drama. It scarcely needs to be pointed out that in his grand epic and dramatic themes there was no place for the commonplace description of the elements of culture and civilization. He had great power of clear preliminary analysis of political move¬ ments, but once his narrative got under way thˆpoet and dramatist gained complete control over the historian, and his work, like that of Carlyle, was a contribution to great literature rather than to historiography. A much more influential historian among contemporaries, but incomparably inferior in every sense to Schiller, was Johannes Muller (1752-1809). His most famous work was the 'History of the Swiss Confederation.* Though possessing a memory rivalling Macaulay's and a zeal for the study of sources comparable to that of Coulanges, he lacked wholly Macaulay's power of analysis, organization and narrative, and had none of the critical power of Coulanges. Though he read all the available sources, he not only lacked in organizing ability, but was also so devoid of critical powers as to be unable to detect and exclude contradictions in his own narrative. To Rousseau's sentimental devotion to liberty he added a pedantic imitation of classical rhetoric. His Swiss history became an epic of freedom combining the methods of Rousseau and Livy. His 24 books of general history were significant only in that they contributed to the exaggeration of that radically erroneous conception of the general "Gemiitlichkeit® of the Middle Ages, which had been given a power¬ ful initial impulse in the work of Spittler. Rather a representative of several of the phases of* the rationalistic historiography than a com¬ plete disciple of Rousseau was Johann Gott¬ fried Herder (1744-1803). His notable work — Reflections on the Philosophy of the History of Humanity> — was a composite of many cur¬ rent doctrines. It combined Rousseau's exag¬ gerated enthusiasm for the state of nature and freedom from authority,*

Voltaire's conception of the reality and permanence of national char¬ acter, Montesquieu's doctrine of the relation between national character and physical en¬ vironment, and the theological conception, later expanded by Hegel, of the gradual develop¬ ment of humanity toward a state of freedom. His zeal for the state of nature and the nat¬ ural man led him to restrict his discussion chiefly to primitive peoples. His particular em¬

phasis upon the fixity of national character and the organic unity of national culture put him in direct line with the romanticists. Friedrich Christoph Schlosser (1776-1861) took over Rousseau's conceptions through the intermedi¬ ary of Kant's ((categorical imperative.® In his 'History of the Iconoclastic Emperors) and his unfinished (History of the World, he antici¬ pated the attitude of Lord Acton and passed judgment on historical events and figures ac¬ cording to the principles of the Kantian precepts of individual morality. His work had a sombre cast, due to his inordinate passion for Dante's (Divine Comedy,* and his works were full of harsh and hasty criticisms of a purely subjec¬ tive nature. He was not a critical scholar and he ignored social and economic history. His chief significance lies in the fact that he was one of the first notable historians to lay great emphasis upon the political importance of a national literature.*

3. Romanticism and Historiography. — Even

before Louis XVI had issued the royal edict directing an election of delegates to an "Estates- General,® the reaction against the frank and direct rationalism of Voltaire had definitely commenced in the works of the above-men¬ tioned disciples of Rousseau. To the conserva¬ tive element it seemed that the events of the French Revolution had finally demonstrated the futility of the rationalistic doctrines of catas¬ trophic causation and the possibility of altering social institutions through the application of a few ((self-evident dictates of pure reason.® Un¬ fortunately, this laudable attempt to correct the artificiality of the dogmas of Voltaire led to a reaction in the opposite direction which was even less valid and progressive than the theories of the rationalists. Romanticism in historiogra¬ phy meant a decided retrogession in the direc¬ tion of obscuranticism, and was an integral part of that reaction in social science which is chiefly identified with the names of Burke, De Bonald, De Maistre and Von Haller. The basic his¬ torical premise of the historiography of roman¬ ticism was the doctrine of the gradual and un¬ conscious nature of cultural evolution. It pro¬ claimed the unique organic unity and develop¬ ment of all forms of national culture. There was a decided mystic strain in their thinking which maintained that the unconscious creative forces moved and operated in a mysterious manner which defied rationalistic analysis. It was held that all were subject to the operation of these mysterious forces of psychic power,

which were later termed by Ranke, the "Zeitge- ist.® Great emphasis was laid upon tradition and the alleged <(ideas® which went to make up this spirit of the age and of the nation. These conceptions naturally led to a dogma of polit¬ ical fatalism which represented the individual or the nation as powerless before the mass of creative spiritual forces. Revolution was repre¬ sented as particularly wicked, futile and worthy of special condemnation. There grew up that philosophy of political "quietism,® which fitted in excellently with the current laissez-faire doc¬ trines of the economists and political theorists. Out of this tendency there developed that noto¬ rious and specious myth representing the Anglo- Saxon peoples as the perfect examples of polit¬ ical quietism, and, hence, of inherent political capacity, while an equally erroneous doctrine

pictured the French as the typical example of a revolutionary and unstable nation utterly de¬ void of all political capacity. This funda¬ mental error did more than anything else to mar the accuracy of 19th century political his¬ tory and philosophy and has not even yet been fully eradicated. Again, the idea of the pure, indigenous and spontaneous nature of national culture led to a narrowing of that cosmopolitan outlook of the rationalists and the centering of attention on purely national history. Further, for each nation the period of particular fertility for historical research was held to be the Mid¬ dle Ages. This tendency was due in part to the strange misconception that this was the period of the fixing of the several national cultures and in part to the psychic affinity of the roman¬ ticists with the mediaeval mental reaction to the problems of existence and causation. Language was believed to be the vital mark or criterion of nationality. This doctrine took its deepest root in Germany where language was almost the only bond of nationality, and it led to the great researches in philology associated with the names of Humboldt, Wolf, the brothers Grimm and Lachmann. On account of the fact that the romanticists maintained the hopeless¬ ness of any detailed analysis of historical causa¬ tion, their philosophy of history ran in a <(vicious circle.® Without giving any scierftific explana¬ tion of the development of the spirit of a na¬ tion, they attributed the peculiarities of national institutions, laws, literature and government to the genius of the nation, and then represented national character as the product of the art, lit¬ erature, laws and institutions of a people. But in spite of the semi-obscurantic tendencies and the philosophical crudities of the romanticists, they must be given credit for having done much to correct the vicious catastrophic theory of the rationalists, and for having emphasized the ele¬ ment of unconscious growth in historical de¬ velopment and the vital truth of the organic unity

of a cultural complex. It was left for Lamprecht, nearly a century later, to take over what was really valuable in the romantic doc¬ trines and work them over into his famous theory of historical development as a process of transformations and mutations within the collective psychology of both the nation and humanity.

The expressions of romanticism in his¬ toriography were many and varied. Its doc¬ trines were employed in the field of the in¬ vestigation of legal origins by Karl Friedrich Eichhorn (1781-1854), whose (Political and Legal History of Germany) was devoted pri¬ marily to the study of early German law; and, above all, by Friedrich Karl von Savigny (1779- 1861) in his (History of Roman Law in the Middle Ages,5 which was the most able and dogmatic defense of the conception of law as a product of the national <(genius® of a people. In the field of the history and analysis of re¬ ligion and literature it received its most notable expression in Francois Rene Auguste de Chat¬ eaubriand's (1768-1848) (Genius of Christian-ity) ; in Madame de Stael's 0766-1817) liter¬ ature in Its Relation to Social Institutions) ; in Abel Francois Villemain's (1790-1870) (Sketch of the Eighteenth Century, 5 and in the his¬ tory of German Poetry> by Georg Gottfried Gervinus (1805-71). Romanticism entered the

philosophy of history in the works of Friedrich Schlegel (1772-1829), F. W. J. Schelling (1775- 1854) and Georg Wilhelm Friedrich Hegel (1771-1831). Schlegel viewed the historical process as the gradual restoration in man of the lost image of God through the operation of a divinely revealed religion. Schelling in¬ terpreted historical development as the gradual revelation of God through the operation of the unconscious forces of creative genius. Hegel's (Philosophy of History5 was founded upon his dialectic system of antithesis followed by synthesis, and upon his spiritualistic interpreta¬ tion of history as ((the necessary progress in the consciousness of liberty.® Working from these premises he adapted the facts of history in such a way as to portray the successive migrations of the ((Weltgeist® from the Orient to Lutheran Germany, bringing with it a continually expand¬ ing consciousness and realization of liberty. Hegel's rather grotesque system was purged of its most apparent crudities and applied with much greater learning and accuracy by Ferdi¬ nand Christian Baur (1792-1860) to the history of Christianity, and by Edouard Zeller (1814— 1908) to the reconstruction of early Greek phi¬ losophy. The narrative school of romanticist historians was not only dominated by the gen¬ eral theories enumerated above, but by the literary canons of the historical novels of Walter Scott with their great emphasis upon the element of <(local color.® This tendency was really anti-historical, in that it aimed primarily to destroy all sense of historical perspective and to portray episodes or periods in the past in such a manner as to make them have the vividness arid intimacy of contemporary events. It was a contribution to

literature rather than to scientific history. Its only real impulse to improved historical writing lay in the fact that its literary attractiveness awakened an interest in history on a wider scale than ever before, and brought into the field many eminent scholars whose individual contributions to his¬ torical knowledge were greater than those of all of the narrative school of romanticists com¬ bined. . Of this variety of narrative romanticist historical writing the most important products were the (History of the Conquest of England by the Normans5 and the (Narratives of the Merovingian Period) by Augustin Thierry (1795-1856) ; the (History of the Dukes of Bur- gundy) by Baron de Barante (1782-1866), and the (History of the Italian States) by Heinrich Leo (1799-1878). A still further intensification of the subjective element in the narrative school was reached in the works of Michelet, Carlyle and Froude, where an attempt was made not only to bring the reader in immediate touch with the setting of the events narrated, but also with the personal impressions and attitudes of the author. The (History of France5 of Jules Michelet (1798-1874) was the greatest product of French historical literature. The author was dominated by a passionate attachment to his country, possessed a marvelous creative imagination and a style notable Jor its word painting and its power of symbolical presenta¬ tion, and stood forth as the great historical apologist for French democracy. The best por¬ tions are those dealing with the picturesque figures of the Middle Ages and the scenes of the French Revolution. The least attractive

personality of the group and the least worthy as a historian was Thomas Carlyle (1795-1881). In radical contrast to Michelet he was pos¬ sessed of a sour contempt for the masses and an equally exaggerated interest in the pic¬ turesque figures of history. To him history was but the collective biography of the con¬ spicuous figures through the ages, and he was responsible more than any other historian for the conventional disdain of the modern his¬ torian for those commonplace things of daily life which have had incomparably greater in¬ fluence upon social development than the pic¬ turesque personalities. Carlyle indulged his prejudices in his (Letters and Speeches of Cromwell, 5 his (History of Frederick the Great} and his (French Revolution. While possessing only moderate value as sources of information, on account of the writer's uncon¬ trolled prejudices and his utter lack of critical method, they earned him the undisputed position as Hhe greatest of English portrait painters.® While his name has been adopted to designate chronic inaccuracy in historical investigation, Carlyle's disciple, James Anthony Froude (1818-94), was a much abler historian than his master. His faults were those of one constitu¬ tionally*

rather than carelessly or intentionally inaccurate, as he had a keen appreciation of the value of critical methods and his work was the first extended English history written on the basis of unpublished documents. His his¬ tory of England from the Fall of Woolsey to the Defeat of the Spanish Armada) was an epic of English deliverance from the ((slavery of Rome,® and his Carlylian attraction for great personalities found ample scope fob expression in his portraits of Henry VIII and Burleigh. As a writer he was approached among English historians only by Macaulay. ((No other Eng¬ lish historian,® says Gooch, ((has possessed a style so easy, so flowing, so transparent.®

. America found its sole distinguished represen¬ tative of the school of Carlyle and Froude in John Lothrop Motley (1814-77), who devoted his life to a narration of the struggle of the Netherlands against Spain. Surpassing even Freeman in his passion for liberty, he found a most congenial subject in tracing the successful revolution of the Dutch and the establishment of their republic. For word painting and vivid description of dramatic scenes only Carlyle has equalled him among historians writing in the English tongue. While the conceptions of romanticism gained some dominion over the minds of greater scholars, such as Ranke, they served rather to stimulate the author's interest in history than to vitiate his scholarship. With its emphasis on the doctrine of the <(genius of a nation® and its deep emotional basis, romantic¬ ism was a powerful influence in stimulating the nationalistic historiography which dominated the historical writing of the 19th century.

4. Nationality and Historiography.— The

commercial revolution not only was the main factor in arousing historical interest in non- European peoples and a powerful impulse in the development of the new natural science and its accompanying sceptical philosophy, but was also the chief force in bringing to completion the process of shaping the modern national states out of the great feudal monarchies of the later Middle Ages. By its contributions to

the increase of the capital and resources at the disposal of the monarch, and its creation of a loyal middle class, it enabled the kings to pro¬ vide a hired officialdom and military force, by means of which they could crush the opposition of the feudal nobility and bring to perfection the modern national state. The psychological impulses arising from the welling-up of national pride in the newly fashioned states led to the production of narratives glorifying the national past and to feverish activity in collecting the sources of information which preserved the priceless records of the achievements of the nation from the most remote period. While this movement, in its earliest phases, goes back to the 16th century it took on its

modern form after the French Revolution, the Napoleonic Wars and the regeneration of Prussia had con¬ tributed so greatly to the creation of an ardent national self-consciousness in most of the European states. Coming at this time, it was reinforced by the then popular tenets of roman¬ ticism emphasizing the importance of national character and the imperishable ((genius of a people.® The nationalistic impulse was re¬ freshed from another source in the middle of the 19th century by the vicious influence of the notorious (Essai sur 1'inegalite des races hu- maines, published by Count Joseph Arthur °f Gobineau (1816-1882) in 1854. It proclaimed the determining influence of racial differences on the course of historical development, as¬ serted the inherent superiority of the «Aryan® race, and held that racial degeneration was the inevitable result of its mixture with inferior races. His now utterly discredited doctrines gained great vogue among French, English, and especially among nationalistic German, histor¬ ians and publicists, culminating in the Teutonic rhapsody of Charles Kingsley and Houston Stuart Chamberlain, the Gallic ecstasy of Mau¬ rice Barres and the Saxon paeans of Kipling and Homer Lea. Not only was this doctrine effective in developing a still greater degree of chauvinism upon the part of the governing <(races,® but it also led to the persecution of minority (*

Perhaps the earliest state to begin a national history was Germany in the days of humanism and the old empire. The cultured Emperor Maximilian I (1493-1519) followed the example of Charlemagne in gathering to his court at Vienna some of the leading historical scholars of German humanism. Conrad Celtis revived an interest in the (Germania> of Tacitus Johannes Spiessheimer (1473-1529), better known as^ Cuspinian, made a critical study of the historical works of Jordanes and Otto of Freising. Irenicus, Peutinger and Beatus Rhenanus (1486-1547) exhibited the spirit of Blondus in their researches into German antiqui¬ ties. Their activity was soon smothered, how¬ ever, in the controversies of the Reformation, and interest in secular and national history waned. A century later Melchior Goldast (1578-1635) produced his famous collection of documents dealing with _ early and mediaeval German history and public law, known as the (Monarchia romani imperii, > which was the standard German collection until the (Monu- menta had covered the same period and mate¬ rial in a more thorough fashion. The distin-*

guished philosopher G. W. Leibnitz (1646-1716) was ambitious to provide a collection of the sources of German history which would rival those on French history which had been gathered by Duchesne. He was not,

however, able to obtain the necessary imperial support and the project had to be abandoned. He merely produced a collection on the history of the Guelfs as a by-product of his history of the dynasty of Brunswick. The great modern collection of the sources of German history, the justly famous (Monumenta Germaniae His¬ torical was a product of the spirit of the War of Liberation and was begun by that greatest of all the German statesmen of his time, Baron vom Stein. Discouraged by the reactionary tendencies of the period following the Con¬ gress of Vienna, Stein devoted his energies to the stimulation of popular interest in German history. Failing to obtain government support for a collection of the sources of German his¬ tory, he raised the funds from the resources of himself and his friends, and with rare good for¬ tune secured an editor of great scholarship and energy in the Hanoverian archivist, G. H. Pertz. Pertz carried the burden of the editorship for a half century, aided by the best of German scholars, most prominent of his colleagues be¬ ing the constitutional historian, Georg Waitz. This magnificent and colossal compilation in¬ cludes all the important sources of information regarding German history from the time of the Roman writers on the invasions, and is still in process of execution. It was, perhaps, one of the greatest landmarks in the development of scientific historical writing, as it alone made possible the productivity and accuracy of the succeeding generations of historians.

National history in Germany was not lim¬ ited to the collection of sources, but received expression in glowing narratives which usually found their theme in the glories of the Ger¬ man imperial past of the mediaeval period or in laudatory accounts of the Hohenzollern achieve¬ ments, which served as the basis of enthu¬ siastic proposals for a Prussian revival of the glories of the empire. Schmidt had written a history of Germany from the rationalist stand¬ point, but his cosmopolitan outlook made his work quite unsatisfactory to the patriots. Wilken initiated the nationalistic narrative bv an account of German prowess in the period of the Crusades. Luden, under the spell of Jo¬ hannes Muller's views of the mediaeval period, produced a (History of the German People,' in which he aimed to arouse national enthu¬ siasm for the magnificence of mediaeval Ger¬ many. Voigt contributed an epic dealing with the conversion and conquest of Prussia by the Teutonic knights. Raumer pictured the achieve¬ ments of the Hohenstaufens, and Stenzel por¬ trayed the deeds of the Franconian emperors with critical skill as well as patriotic edifica¬ tion. Giesebrecht analyzed the formation of the mediaeval empire with a display of scholar¬ ship not less remarkable than his Teutonic fervor. Though his history of the Reformation was a powerful influence in making Luther the great German national hero, it must be admitted that Ranke and his immediate disciples shared something of the universal outlook of the ra¬ tionalists, but with the rise of the <(Prussian School" nationalistic history became even more

chauvinistic and dynastic. Hausser contributed

a voluminous epic on the War of the Libera¬ tion in his < History of Germany, 1 786-1815.' Duncker, the historian of antiquity, from his work in editing the state papers of the great Hohenzollerns developed a fervid admiration for the dynasty which convinced him of its fit¬ ness to revive the imperial glories of old Ger¬ many. The first massive panegyric of Prussian- ism was the work of Johann Gustav Droyseu (1808-84), who deserted his early liberalism to become an almost sycophantic eulogist of the Hohenzollerns. His monumental (History of Prussian Policy' was marred not only by its grave prejudices in favor of the ((mission" of the dynasty he admired, but also by the fact that it was almost wholly limited to the super¬ ficial field of Prussian foreign politics with little attention even to domestic policy, to say nothing of its total omission of the deeper social conditions and economic forces. The story was picked up where Droysen had left it by Heinrich von Treitschke (1834-96). His

Nearly a century after the beginnings of German national historiography at the court of Maximilian the French began to turn their attention to the analysis and collection of the sources of their national history. This move¬ ment may conveniently be dated from the pub¬ lication of the 'Franco-Gallia' of Francois Hot-

man in 1574. Other early examples of this tendency were the (Antiquites gauloises et frangoises5 of Claude Fauchet (1579) ; the (Annales Francorum5 of Pierre Pithou (1588) ; the (Recherches de la France5 of Etienne Pas- quier (1611), and the material on the Crusades in the Cesta Dei per Francos) of Jacques Bongars (1611-17). The true beginning of the critical collection of sources was marked by the work of Andre Duchesne (1584-1640) in compiling the (Historic Normannorum scrip- tores antiqui5 (1619) and the (Histori3e Fran- corum scriptores coaetanei5 (1636f.) ; the ((geneologies55 and the Callia christiana) of the brothers Sainte-Marthe (1572-1650, 1655) ; the critical editions of Villehardouin and Joinville by Charles du Fresne du Cange (1610—88) ; and the Capitularia regum Francorum5 of Etienne Baluze (1630-1718). During the last half of the 17th century and the first half of the 18th this work of collecting sources was car¬ ried on almost entirely by the scholarly Bene¬ dictine monks of the Congregation of Saint Maur at Saint-Germain-des-Pres in Paris, which was founded between 1618 and 1630 by Dorns Martin Tesniere and Gregoire Tarisse, and whose leader in historical scholarship was the great Jean Mabillon (1632-1707). Only a few of their

more notable collections can be mentioned here. Dom Thierry Ruinart (1657— 1709) prepared critical editions of Gregory of Tours and Fredegarius; Dom Edmond Mar- tene (1654-1739) the (Thesarus novus anecdo- torum seu collectio5 and the (Veterum scrip- torum et monumentorum amplissima col¬ lection Dom Bernard Montfaucon (1655 — 1741) (Les Monuments de la monarchic fran¬ chise5 ; Dom Martin Bouquet (1685-1754) the famous (Rerum Gallicarum et Franciscarum scriptores, 5 which is still being continued bv modern scholars under the title of the (Recueil des historiens des Gaules et de la France;5 and Dom Antoine Rivet de la Grange (1683-1749), aided by Duclou, Poncet and Colomb, began that unique (Histoire litteraire de la France) which was continued by the French Institute to the very close of the last century. The Mau- rists also turned their attention to the history of the French provinces and gathered many valu¬ able collections, the most famous of which was the (Histoire generale de Languedoc) of Dorns Vaisette and Vic (1730-49), recently revised by Molinier. In the latter part of the 18th century the laymen again came to the front, the most notable center of their activity being the Academie des Inscriptions et Belles-lettres, which had been founded by Colbert in 1663. The most valuable product of their labors was the great collection of Crdonnances des rois de

France5 by J. de Lauriere, Denis Secousse and L. G. de Brequigny (1714-1794). They also continued the (Histoire litteraire5 and the c Gal¬ lia Christiana.) A further stimulus came when P. C. F. Daunou was appointed national archi¬ vist by Napoleon. He brought many foreign ar¬ chives to Paris and also continued the work on the (Histoire litteraire5 and the other great Benedictine collections. The first monumental collection of sources produced in the 19th cen¬ tury was the voluminous Collection de memoires relatifs a l'histoire de France) by Petitot and Monmerque in one hundred and thirty volumes (1819-29). What Germany owes

to Stein for the gathering of the sources of German national history, France owes to Guizot, and more, for the latter not only organized (he movement for the scientific work in collecting and editing the sources, but also was a histor¬ ical scholar of the first order who contributed most valuable works from his own pen. Be¬ fore he left historical writing for the field of political activity he had published a collection of thirty volumes bearing the same title as that of Petitot. In 1834 he organized the Societe de l'histoire de France, which was first presided over by Barante and has since included in its membership the most famous historians . of France. The (Ouvrages publies5 of this society have amounted to over three hundred and fifty well edited volumes of source material. Even more important was Guizot's initiative in induc¬ ing Louis Philippe to appoint a sub-committee of the ministry of public education which was to devote itself to publishing the hitherto un¬ published source material of French history. In the next year

their work began to appear in the monumental series of the Collection de documents inedits sur l'histoire de France,5 of which about three hundred and thirty volumes have thus far been published. The early edi¬ torial associates of Guizot in this enterprise were Mignet, Thierry, Guerard and Raynouard. With the foundation of the Societe de l'Ecole des Chartes in 1829 the provision of competent editors was henceforth assured through the es¬ tablishment of the world's greatest historical institute for the 'training of students in the use of documents — L'Bcole des Chartes. The (Documents inedits5 are the official French counterpart of the German (Monumenta5 and are even more valuable in that they are confined entirely to the presentation of material never before published. The elaborate collection of the Bibliotheque de l'Ecole des hautes etudes also deserves mention. The French have also ad¬ vanced a step beyond any other nation in pro¬ viding great collections of sources for a study of their history in modern times. This has been due primarily to the fact that no other Euro¬ pean stage has possessed a national event or movement in modern times at all comparable in picturesque or romantic interest to the French Revolution. In 1903 the socialist historian and statesman, Jaures, succeeded in indue ing the government to establish a commit¬ tee of the ministry of public instruction to su¬ pervise the publication of the unpublished docu¬ ments dealing with the economic history of the French Revolution. This work has been car¬ ried on by the leading French historians, and the Collection de documents inedits sur l'his- toire economique de la Revolution Frangaise5 has been appearing in successive volumes since 1905. The municipal government of Paris has been publishing the Collection de documents relatifs a l'histoire de Paris pendant la Revo¬ lution Franchise5 since 1888. In addition to these public collections, many collections of sources dealing with special phases of the Revo¬ lution have been made by enterprising scholars, among whom Aulard and his pupils have been most active.

The French also vied with the Germans in the production of nationalistic historical narra¬ tive. . The publication of Chateaubriand's Cenius of Christianity5 in 1802 gave a lustre

and romantic touch to the French past in the middle ages comparable to the effect produced in Germany by Spittler and Johannes Muller. Fauriel anticipated Coulanges and Jullian in his history of Gaul by contending for the superior¬ ity of Celtic to Frankish culture in the forma¬ tion of mediaeval civilization. Michaud de¬ scribed the glories of the French in the period of the Crusades. Raynouard drew a vivid pic¬ ture of the

troubadours and proclaimed the supremacy of French among the Romance lan¬ guages. Hanotaux, Fagniez and Cheruel ana¬ lyzed with both critical erudition and patriotic pride the centralization of the French monarchy by the great statesmen of the 17th cen¬ tury. Lamartine, in a work which rivalled Carlyle in the field of literature and was equally unscientific as history, set forth with fervid ad¬ miration the glories of the French Revolution, and especially the exploits of the Girondists. Mignet, the most scholarly French historian in the first half of the 19th century, made an attack on the Bourbon Restoration by rep¬ resenting the French Revolution as the neces¬ sary and inevitable outgrowth of the tend¬ encies of the age and as the dawn of a new and better era in the history of the world. Thiers, while critical of the empire, praised the first consul as the saviour of France and of European civilization. Napoleon was defended in his imperial splendor by Masson, Vandal and Levy; Vandal representing him as peace-loving and goaded to war by English jealousy, and Levy presenting a superhuman and faultless personality. Thureau-Dangin, while deploring its popular origin, appeared as the historical apologist of the ((Jnly Monarchy.® La Gorce dealt with the <(Second Empire® as an apologist of monarchy and clericalism, if not of the per¬ sonality of Napoleon III. Ollivier dwelt with pride upon the liberal tendencies of the last decade of the Empire, and Hanotaux, in one of the finest products of national historiog¬ raphy in France, has described and defended the establishment of the (

torians, such as Gorce and Sorel, maintained an impartiality in treating of the war of 1870, which put to shame the fawning apology of Sybel, there was a great outburst of nationalis¬ tic ardor on the part of the ((super-patriots® among their countrymen. These tendencies found expression, above all, in the fiery speeches, poetry and pamphlets of Paul Derou- lede, the chief of the <(Ravanchards,® and in the brilliant polemics and eulogies of his ad¬ mirer, that ardent Gallican and head of the League of Patriots, Maurice Barres, whose study of French history has convinced him that ((the French make war as a religious duty. They were the first to formulate the idea of a Holy War. It is not in France that wars are entered upon for the sake of spoil, but as a champion in the cause of God, as a knight upholding jus¬ tice.®

England did not begin any systematic collec¬ tion of the sources of its national history until the beginning of the 19th century. In the year 1800 the Record Commission was created, but no real historian was connected with its labors until Sir James Mackintosh was appointed in 1825. In 1830 Harris Nicolas called attention to the deplorable condition of the (((Rerum Britannicarum medii aevi scriptores) or, more briefly, as the (Rolls Series) from the fact of its publication by the Master of the Rolls. It is the official British analogue of the

The historiography of nationalism has not been less vigorous in England than in Germany or France. Its most conspicuous feature has been the expansion of the <(Mvth Teutonicus® regard¬ ing the political superiority of the Anglo-Saxon

peoples, which was so popular a tenet o'f roman¬ ticism and had been so fervidly expounded by Edmund Burke. It rested primarily upon the assumption that the Teutonic invaders of England had made a clean sweep of the Briton and Celtic inhabitants and had created a purely Germanic England in culture if not in race. The most vigorous and the earliest statement of this view appeared in Kemble's (The Saxons in England,) which was published in 1849. It not only taught this notion to Englishmen, but was widely read in Germany and served to fur¬ nish the German nationalists with a further basis for their convictions regarding the Ger¬ manic ˆmission,® which had been drawn from their own mediaeval sources. Freeman carried the argument still further in his (History of the Norman Conquest, > in which he not only accepted the Saxon theory, but, being an ardent lover of liberty like Michelet, espied the real foundations of political liberty in the Ger¬ manic folk-moot, and particularly in its English manifestation. This myth, dating back to Thoy- ras and Montesquieu, so thoroughly punctured by Coulanges, has been one of the most persist¬ ent and pernicious sources of error which have come down from a pre-anthropological stage in historical studies. Even the calm and cautious Bishop Stubbs and the charming John Richard Green were also seduced by this fiction of a Teutonic England, which was to be challenged by Seebohm and modified by Maitland and V inogradoff. The greatest popular emotional impulse toward this Teutonic interpretation came from the notorious work of the poet-his¬ torian, Charles Kingsley, on (The Roman and the Teuton, > which was first published in 1864. Highly entertaining but almost wholly un¬ scientific and non-historical, it did more to pervert the interpretation of early mediaeval history than any other book of its time. He idealized the <(young and virile® Teutonic <(Forest Children® with the ardor of a Las Casas, and set them in marked and flattering contrast with the morally and physically de¬ cadent Romans of the <(Dying Empire,® and re¬ joiced in the destruction of the latter by the <(Human Deluge® from the North. It is a sufficient commentary upon the accuracy of his work to note that the labors of scholarly medievalists for the last generation have chiefly centered about the rejection of everyone of his main theses. The book, however, gained a great popular vogue and no Englishman could read it without desiring to trace his ancestry back to Arminius and Alaric. Passing from the Middle Ages, where the national

grandeur of Britain had been laid by the Teuton, the most intensely nationalistic of English historians, James Anthony Froude, described the glories of the English re¬ volt from Rome. Carlyle lauded the virtues of Cromwell and his associates of the Common¬ wealth oenod. The Whig apologists, Mackin¬ tosh, Hallam, and above all, Macaulay, de¬ scribed the salvation of the world's liberties by the ˆGlorious Revolution® of 1688. Macaulay's r History > is the English counterpart of Treit- schke and Michelet, and marks the most bril¬ liant of English contributions to historical lit¬ erature, as well as a valuable, though preiudiced body of historical knowledge. Lecky's study of 18th century England could scarcely be

called nationalistic on account of its impartial- ity, but Napier praised English prowess in the Peninsular War in a work which was as frank an adulation of war as a process in human so¬ ciety as was Bernhardi's work a half century later. Finally, Seeley, an example of both na¬ tionalism and erudition, wrote with restrained pride of the development of the British Em¬ pire in his (Expansion of England- and (Growth of British Policy.) Not only was Seeley a na¬ tionalist, but along with Freeman he was chiefly responsible for turning English historiog¬ raphy into the narrow and unnatural channels of political history. The growth of English national enthusiasm, which accompanied the work of Cecil Rhodes and the Boer War, did not fail to produce its nationalistic literature, which was as far removed from the scholarly grasp of Seeley as was the attitude of Bern- hardi from that of Sybel. Bernhardi found his English counterpart in Prof. J. A. Cramb, who detected in England's past wars the governing principle <(of that higher power of heroism which transcends reason.® Curiously enough, as it had fallen to a renegade Englishman, H. S. Chamberlain, to arrange the apotheosis of <(Germania,® so it required an American, Homer Lea, to link up the future salvation of the world with the necessity of the universal triumph of ((Britannia,® through the strengthen¬ ing and preservation of «the scarlet circle of power that the Saxon has marked around the earth as has no other race before him.®*

Italy shares the double honor of having been the first nation to provide a complete collection of its sources of national history and of having produced the most indefatigable of all editors in Lodovico Antonio Muratori (1672-1750). From 1723 until his death in 1750 'he brought together in the 25 folio volumes of the (Rerum italicarum scriptores nearly all of the extant sources of Italian history. So thorough was his work that it has only been deemed neces¬ sary in recent years to undertake a new edition of his collection, which has been in progress since 1900 under the supervision of Giosue Carducci and Vitorio Fiorini. It is scarcely to be doubted that the new edition is quite as much a sublimation of patriotic impulses as an enterprise entered upon in the interests of his¬ torical*

scholarship.

While the national narrative history, like the collection of sources, dates back to a" more re¬ mote period in Italy than in the other states of Europe, it began in its modern phase with Botta's (History of Italy during the Revolu¬ tionary and Napoleonic Wars, which breathed forth the ardent liberalism which found ex¬ pression in the politics of the period in the ac¬ tivities of the Carbonari. Coletta condemned the corruption and incapacity of Bourbon abso¬ lutism in Naples. Troya and Tosti surveyed the history of mediaeval Italy for evidence to support their plea for papal leadership in Ital¬ ian unity, while D'Azeglio turned to contempo¬ rary Italy to prove papal incapacity and to call attention to the promise of leadership in the House of Savoy. More recently Luzio, De- Caesare and Chiala have dealt with the period , * , a ˆ and establishment of na¬*

tional unity, but the Italian enthusiasm over their attainment of national independence and unity has scarcely cooled sufficiently to find his-

tory an effective method of expression ; up to the present time it has been recounted chiefly in the patriotic poetry of Giosue Carducci and Gabriele D'Annunzio.

The first collection of Spanish sources was not the work of Spaniards, but of the itinerant English scholar, Robert Beal (d. 1601), who published his (Rerum hispanicarum scrip- tores) in 1579-81. Nearly two centuries later J. A. C. Bertodano produced his extensive col¬ lection of sources on diplomatic history (1740- 52). The great national collection of sources, however, was not begun until the middle of the 19th century when Pidal, Salva and others started the (Coleccion de documentos ineditos para la historia de EspagnaP which was com¬ pleted in 112 volumes (1842-95)'. In addition, the Royal Academy of History at Madrid has been publishing source material since 1851 in the collection entitled (Memorial historica es- panolP Spain found her great national his¬ torian in Modesto Lafuente (1806-66). His monumental (Historia general de EspanaP which was intended to be a continuation of Ma¬ riana, appeared in 30 volumes from 1850-67, and was continued after his death by J. Valera.*

The sources of Austrian history were not only collected in the German (MonumentaP where the great scholar, Theodor Sickel, ren¬ dered valuable editorial assistance, but also in separate national collections, the (Fontes rerum AustriacarumP published since 1849 by the Vi¬ enna Academy, and the new edition of Boh- mer's (Regesta imperii, } edited by Ficker since 1877 at Innsbruck. The great national narra¬ tive history of Austria was Arneth's monu¬ mental work on the times of Maria Theresa, while Klopp has recalled the imperial heroes of the Thirty Years' War and conducted an attack on Frederick the Great.

In Bohemia, Czech nationalism did not initi¬ ate interest in history as in other European states, but rather history aroused nationalism in the first instance. To the vigorous patriot¬ ism of F. Palackv's (History of Bohemia, more than to any other source, the modern Czech national spirit owes its origin. The sources of Bohemian history have been collected by the greatest of Bohemian historical scholars, Anion Gindley, and are entitled (Monumenta Historise Bohemica) (1864—90). The Hunga¬ rian government has been publishing the (Mon- umenta Hungarise historica) at Budapest since 1857, and Hungary has found in Fessler and his continuators its national historians. Poland has published two large collections of sources, and Lelewel and Szajnocha have reminded the Poles of their ancient splendor and power. The ob¬ scurantism of Czardom has prevented the de¬ velopment of historical scholarship in Russia, a loss to*

Russia which can be appreciated by a survey of the great work of the exile, Vinogra- doff. Karamsin's antiquated history presents an apology for the absolutism and Oriental cul¬ ture of the early czars, while the more recent and scholarly work of Soloviev defends the in¬ troduction of Western culture by Peter the Great. Further, it should not be forgotten that both Belgium and Holland are represented by extensive collections of sources and able na¬ tional historians. Belgian enthusiasm for the collection of sources of national history began with the attainment of independence in 1830.

The great national collection is the Collection de chroniques Beiges ineditesP published in 111 volumes at Brussels since 1836. The So¬ ciety d'emulation de Bruges, published be¬ tween 1839 and 1864 the 56 volumes of the (Recueil de chroniques, chartes, et autres docu¬ ments concernant l'histoire et les antiquites de la Flandre occidentale.* In addition Wauters has edited the great collection of communal charters and Gachard has edited the foreign archives of the period since the '15th century. The great Catholic and Belgian counter-blast to Motley's work, as well as to that of Prin- sterer, was contained in the work of Lettenhove on the 16th century. He condemned William the Silent and his Protestant supporters and defended the position of Spain and the Catholic party. His somewhat chauvinistic and ob- scurantic work has been superseded by the admirable critical works of Fredericq and Pirenne. While Holland has not provided as complete a collection of national sources as Belgium, the Historical Society of Utrecht has been publishing important sources since 1863 — the (Werken uitgegeven door het Historisch Genootschap te Utrecht* — and Prinsterer has edited the voluminous archives of the House of Orange. In 1902 a royal commission of the most eminent Dutch historians was appointed to arrange for the systematic publication of the manuscript sources of the history of Holland. The most enthusiastic Dutch nationalistic nar¬ rative history was that by Prinsterer in which Protestantism and the House of Orange received their vindication and eulogy. This has now been rendered obsolete by the scholarly mono¬ graphs of Fruin, the greatest of Dutch his¬ torians, and by the accurate and well-balanced general history of Blok. The Scandinavian nations have not been unproductive in the field of national historiography. The sources have been collected in the following series : the (Scriptores rerum Danicarum medii seviP edited by Langebek and his successors; the (Diplo- matarium NorvegicumP edited by Lange; and the (Scriptores rerum SuecicarumP edited by Geijer and his associates. The nationalistic his¬ torical narrative was introduced in Denmark by Worsaae; in Norway by Keyser and Munch ; and in Sweden by Geijer, Carlson and Fryxell. These works have been succeeded by the more recent and scholarly national histories of Steen- strup on Denmark; Sars on Norway; and Hjarne on Sweden. If there were*

available space it would be easy to demonstrate the very great, if not determining, influence of the study of the glories of their national past upon the rise of the national aspirations of the Balkan peoples since 1820. The well-known influence of Alexandru Xenopol's (Histoire des Rou- mains de la Dacie Trajane upon Roumanian nationalism is but a typical illustration of the fertility of such an investigation.*

Surely, no account of the interrelation of nationality and historiography in modern times would be complete without some reference to the national historiography of Judaism and Zionism. The rise of Jewish nationalism in the last century was intimately related to the general development of nationality in Europe during that period. This stimulated Jewish national spirit, both by the direct influence of imitation and through the persecution of the

Jews, as a result of the growing chauvinism throughout continental Europe after 1870. The relation of this growth of Jewish national senti¬ ment to the remarkable development of the in¬ terest of the Jews in their national history is readily apparent. Historical societies were formed in all the leading modern states — the <(Societe des etudes juives,® founded in 1880; the Historical Commission of the <(Union of German- Jewish Congregations,® appointed in 1885; (published by the German Jewish Historical Commission since 1887. Including an account of the Jewish persecutions in the mediaeval period, it has tended to arouse their national resentment at past, as well as present, oppression. The Jews have also been stirred by the work of a great national historian, Hein¬ rich Graetz (1817-91). Isaac M. Jost (1793- 1860), in his (History of the Israelites, > and his 'History of Judaism, > had surveyed the history of the Jews, but he was too liberal, rationalistic and impartial a writer to serve as a truly national historian. Widely different was the work of Graetz, sometimes called the Jewish Treitschke. Conservative and generally orthodox, and fired with a warm enthusiasm for the past and future ot his people, Graetz traced in an eloquent manner the history of the Jews from their origins to 1848, laying special stress upon their literary and spiritual development, in other words, upon the elements which contributed the most to the development and persistence of their national culture. Graetz's work was especially in line with the development of "Zionism,® for he insisted that the true Messiah was the national spirit of the Jewish people and he discouraged further delay through awaiting the coming of a personal Messiah. In addition to the general history of Graetz, there should be mentioned the many histories dealing in a comprehensive fashion with the

history of the Jews in the different European states.

In connection with this brief summary of the reaction of nationalism upon historiography in Europe some passing reference should be made to the growth and accumulation of archival material and its accessibility to students. The development of the national states and their ad¬ ministrative bureaucracies led to a great amount of administrative "red tape® and to the growth of fixed diplomatic correspondence. From these sources a rich storehouse of historical material had accumulated in the national, eccle¬ siastical and private archives by 1800. Before they could be generally useful to historians, however, the sources in the archives had to be classified and centralized and made public to creditable historians. In the matter of central¬ ization and classification of archival material France has taken the lead, due chiefly to the large number of highly-trained archivists pro¬ vided by L'Fcole des Chartes. At the present time only England is exceedingly backward among the European states in providing for a systematic arrangement and classification of its

archival material. In the same way that na¬ tional pride and competition led to the compila¬ tion of the great source collections of national history, it forced the several European states at various dates during the 19th century to open the national archives to historical scholars. In addition, the liberal-minded Pope, Leo XIII. opened the Vatican archives in 1881 and secu¬ lar scholars for the first time had the privilege of examining the treasures that Baronius had made use of. Even at the present time, how¬ ever, complete freedom is not accorded any¬ where in the use of archival material, scholars being excluded from the more recent documents. For instance, the Vatican archives are accessible only to 1815, those of France to 1830, and those of England to 1867. In America, scholars like Gaillard Hunt are laboring to put the archival material of the United States upon the same high plane that it has reached in most European countries.

The United States has never provided a great official collection of the sources of its na¬ tional history comparable to those prepared by the European countries. This has been due in part to the particularism inherent in the Amer¬ ican Federal system and in part to the fact that the American central government has been too much absorbed in the details of routine legisla¬ tion to be able to concentrate its attention on the furthering of intellectual interests. The true American counterpart of the movement of collecting sources of national history, which was associated in Europe with the names of Pertz, Guizot, Nicolas, Hardy and Stubbs, is to be found in the rather pathetic attempt of Peter Force (1790-1868) to obtain adequate government support for his (

sources of the history of the Pacific States. Un¬ fortunately, he did not follow the example of Stein and secure the aid of a Pertz, but trusted to his own untrained guidance the execution of the project, with the result that the work lacked in critical scholarship and careful edit¬ ing. An incomparably more scholarly work was the co-operative history of the colonization of America, edited by Justin Winsor, but, though this contained much source material, it was primarily a narrative work giving a critical re¬ view of the sources rather than including them. Parallel with this movement went the publica¬ tion of source material by the various common¬ wealths in the vast collections of colonial rec¬ ords and archives, but in the great majority of cases these collections were prepared by eru¬ dite antiquarians rather than by men trained as critical historical editors, and there was no uniformity in the methods employed. Some of these state collections have, however, been of a very high order, the most notable being, perhaps, the extensive series dealing with the exploration and settlement of the middle West by Reuben G. Thwaites of Wisconsin. Another mode of collecting sources was exhibited in the editions of the messages and papers, of the presidents and the writings of the chief states¬ men by numerous scholars, which have varied widely in quality, reaching the highest level in W. C. Ford's (Writings of Washington ; Gail- lard Hunt's (Writings of James Madison and P. L. Ford's (Writings of Jefferson. > The United States has not been lacking in editorial ability of the highest order, for in Worthington C. Ford, John Franklin Jameson, Paul Leices¬ ter Ford and Gaillard Hunt are to be found the equals of Pertz, Waitz, Guizot or Stubbs. The great defect has been the lack of concerted planning and continued and adequte govern¬ ment aid. Promising beginnings in the right direction are to be seen in W. C. Ford's edi¬ tion of the (Journals of the Continental Con¬ gress } and the scholarly products of the Car¬ negie Institution under Dr. Jameson's direc¬ tion. John Bassett Moore has labored with almost Benedictine patience and productivity in the preparation of his monumental series dealing with the documentary history of diplo¬ macy. There also should be mentioned the mon¬ umental collection of sources dealing with the history of labor in America which has been prepared by Professor Commons and his asso¬ ciates. Miss Adelaide Hasse has begun an in¬ valuable series of volumes describing and classi¬ fying the sources for American economic and social history which are available in the public documents of the various commonwealths. On the whole, however, the United States has been incomparably delinquent in the thorough and scholarly collection of the sources of its na¬ tional history, and it cannot seek refuge be¬ hind any assertion that this has been due to a lack of rabid nationalistic emotions.

If this country has not kept abreast of Eu¬ ropean development in the

editorial aspect of national historiography, it can lay claim to hav¬ ing produced historians enthused with as ardent a patriotism as fired a Treitschke, a Michelet or a Froude. Nationalism in American historiog¬ raphy has, naturally, centred mainly about the romantic period of colonization and the strug¬ gle for American independence, and American

historians have surrounded this period with the halo given to the early national history of Ger¬ many and France by Johannes Muller and Chateaubriand. The chief figure in the crea¬ tion of this national epic of migration and de¬ liverance was George Bancroft, whose early years fell in that period of national bumptious¬ ness and florid democracy in the ˆthirties® and ((forties.)) To Bancroft, the history of the formation of the American Republic was no modest secular achievement of ordinary mor¬ tals, but a veritable ˆEneid in which Augustus was replaced by Washington and which ex¬ hibited in its succession of scenes ((the move¬ ment of the divine power which gives unity to the universe, and order and connection to events.® His history of the United States through the period of the Federal Constitutional Convention represented the process of coloniza¬ tion as the flight of brave spirits from oppres¬ sion, characterized the American Revolution as a crusade of wholly virtuous and disinterested patriots in behalf of the liberties of civilized hu¬ manity, described the American constitution as the creation of a group of unique mental giants, never before equalled and not to be matched at any later epoch, and regarded their work as even more notable than its makers. The pa¬ thetic inaccuracy of all of his major premises can only be appreciated by a careful perusal of the scholarly treatment of the same topics by Beer, Van Tyne, M. C. Tyler, Osgood, Alvord, Andrews, Fisher, Farrand and Beard, and the damage done to proper perspective in American history by his works has been almost incalcula¬ ble and irreparable. The myth was perpetuated in Palfrey's long Puritan apology and was repeated in a less vigorous form in Mr. Lodge's discussion of the English colonies in America. From his pride in American exploits in behalf of liberty and democracy, Motley was encour¬ aged to study the analogous movement among the Dutch, when they rebelled against Spanish tyranny and established a republic. Francis Parkman, turning from the Anglo-Saxon pho¬ bia of Bancroft, first gave full credit to the work of France in colonizing the New World. He found that the record of heroism had not been wholly monopolized by the English and German colonists. While Parkman had turned his attention to the French in the North and West, William H. Prescott found his theme in the conquest and colonization of Central and South America by the Spanish, and in a bril¬ liant description of the splendor of the native American civilizations of Mexico and Peru. Mahan, enthused by the exploits of the small American navy in the wars of the Revolution and 1812, was

encouraged to make a study of the influence of naval supremacy upon the his¬ tory of the past. Few works have been more influential in stimulating the disastrous growth of modern armaments. The period of cement¬ ing the national union through the efforts of the Federalists was glorified in the works of Hil¬ dreth and John Church Hamilton, and the bless¬ ings of the (

West and an ardent patriot and national im¬ perialist. Von Holst beheld in the struggle over slavery one more great episode in that eternal conflict between righteousness and iniquity. Professor Burgess saw in the suc¬ cess of the North in the Civil War, not only a justification of his own nationalistic political philosophy, but also a sure manifestation of Teutonic genius in the field of political unifica¬ tion and organization. On the whole, however, by the time that the achievements of the Civil War and Reconstruction periods had come to be subjects for historical analysis the objective scholarship of the critical and erudite school had begun to prevail and the <(American epic® passed, to be preserved only in the school texts of succeeding generations. The task of rationalizing the (

He pictured it as the work of Whigs on both sides of the Atlantic in the heroic effort to check and crush the autocratic tendencies of a Tory squirearchy and the unconstitutional tryanny of a <(German King,® and to preserve for the world the liberties embodied in the Bill of Rights. He dwelt with pride upon the establishment of the American Federal Repub¬ lic and regarded it as the great contribution of the Western Hemisphere to the solution of political problems, by reconciling the liberty of the New England town-meeting with the exist¬ ence of large political aggregates. He con¬ templated with unmixed pleasure the progress of the middle class in its political and economic conquest of the American continent in the 19th century, and, just before his death at the open¬ ing of the 20th, he was deeply gratified to see his own country at last assume its part of the "white man's burden® by the retention of the Philippines. Not at all a militarist, he looked upon this as a most significant step in that pro¬ cess of bringing the world under the peaceful dominion of (

Even the more progressive Latin American states have begun to produce extensive collec¬ tions of the sources of their national history. The (Documentos para la Historia Argentina, > which have been edited by L. M. Torres and the .faculty of philosophy and letters of the National University of Buenos Aires since 1911, are a typical example of this process.

The net result of the growth of nationality and of nationalism upon historiography has been greatly varied and a mixed blessing. Its fortunate results have been, above all, the pro¬ vision of great collections of source material which would otherwise never have been made available and the training of many excellent historians in the process of the compilation and editing of the sources. T.he deplorable effects have centered about the creation of a danger¬ ous bias of patriotism, which not only prevented a calm, objective and accurate handling of his¬ torical facts, even by highly trained historians, but also contributed in no small degree to the great increase in chauvinism which led to the calamity of 1914. The responsibility of the nationalistic historians in this regard has been well stated by Prof. H. Morse Stephens, prob¬ ably the most thorough student of this particu¬ lar subject: "Woe unto us! professional his¬ torians, professional historical students, pro¬ fessional teachers of history, if we cannot see written in blood, in the dying civilization of Europe, the dreadful result of exaggerated nationalism as set forth in the patriotic his¬ tories of some of the most eloquent historians of the 19th century.® It would be fortunate, indeed, if this were all, but for every patriot made by a Treitschke, a Michelet, a Froude or a Bancroft, hundreds have been enthused by the petty chauvinism of the third-rate text¬ book compilers who have imitated their bias without their literary virtues. The nature and effect of these textbooks upon the past genera¬ tion has been indicated for this country by Mr. Charles Altschul and for France and 'Ger¬ many by Dr. J. F. Scott. England has not fallen behind any of these nations in this re-

spcct. Some optimism for the future may, how¬ ever, be discovered in the fact that there is an ever greater tendency for the textbook writing to be handed over to reliable and relatively unbiased professional historians.

It should be pointed out in passing that the zeal for collecting historial source material was not limited to the sources of secular history. In the same way that the gathering of the sources of national history was begun by Duchesne in the 17th century, so activity in collecting the sources of ecclesiastical history was initiated at this same period and has been continued to the present time. The first complete collection of the writings of the Church Fathers was gathered and published by Migne in 382 volumes between 1844 and 1864. While, like Bancroft's (History of the Pacific States, it was a publisher's rather than a scholar's enterprise, it has been of immense value to students. The failure of Migne to use the best texts in all cases has led to the attempt to produce better collections of*

Patristic literature. Since 1866 the Vienna Academy has been publishing a carefully edited collection of the writings of the Latin Fathers, and in 1897 the Berlin Academy began to issue an edition of the Greek Fathers. The collection of ma¬ terial dealing with the lives and deeds of the saints, which was begun by Bolland in the middle of the 17th century, is still in progress. A collection of the acts of the Church councils by Labbe and Cossart appeared in the latter half of the 17th century and was continued by Etienne Baluze in 1683. In 1685 Jean Har- douin started a new collection, and in the middle of the 18th century Mansi compiled the largest of all collections of the councils, a new edition of which is now appearing in Paris. At the same time that Mansi was preparing his collection of conciliar material Mainardi published the collection of papal bulls. In the latter half of the 19th century Jaffe and Potthast produced scholarly collections of papal ((Regesta" to the year 1304, and Kehr is now engaged in the publication of the latest and most complete compilation of this type of ma¬ terial. On the whole, the collections of source material for the history of the Church are fully equal if not superior to those for the secular history of Europe.

5. The Rise of Modem Critical Historical Scholarship. — Professor Gooch, in his scholarly and informing account of the development of historiography in the 19th century, points out that prior to the beginning of the last century historical science labored under four serious handicaps — the catastrophic theory of historical causation and the contempt for the mediaeval period, which had characterized the rationalist school ; the absence of any extensive collection of original sources ; the lack of critical methods in handling historical materials; and the failure to provide for any systematic and competent teaching of the subject-matter or methods of history. It has already been pointed out how the ˆRomanticists" had corrected the faults of the rationalists by insisting upon the law of continuity in historical development and by looking upon the mediaeval period as the most fruitful age for historical research, and it has also been briefly shown how the pride of ex¬ uberant nationalism had led to the provision of magnificent collections of source material for

the history of every leading modern nation. It now remains to trace the rise of critical scholar¬ ship in the field of history and to show how critical methods were widely disseminated through the development of the professional teacher of history.

It was shown above that the promising rise of critical methods in the use of historical ma¬ terials as an incident of humanism and ex¬ emplified in the work of Blondus, Beatus Rhenanus, Vadianus and Zurita had been checked and smothered in the fierce religious controversies of the period of the Reformation. By the latter part of the 17th century, however, the volume of

polemic had tended to decline and it was again possible to assume to some extent an objective attitude and to begin a dispassion¬ ate search for truth. This development of sci¬ entific historical method passed through two natural and normal stages : first, the develop¬ ment of those auxiliary sciences, such as diplo¬ matic, chronology, palaeography, epigraphy and lexicography, which would enable the historian to ascertain the genuineness of a document ; and, second, the growth of internal or interpre¬ tative criticism, wThich passes beyond the mere establishment of the authenticity of the docu¬ ment and examines into the degree of the credi¬ bility of its author.

The first of the above steps in the growth of modern historical science was primarily the work of those same Benedictine monks of the Congregation of Saint Maur who had been so active in the preliminary period of the collec¬ tion of the sources of French history. Their priority in this movement seems to have been due to the fact that not being a militant order they did not have to appear as vigorous apolo¬ gists for Catholicism and that they also had the advantage over lay writers in not being com¬ pelled to glorify a particular city, province, family or dynasty. In the quiet libraries of their monastery they brought into existence an indispensable portion of the mechanism of the modern historian. The leader of the historical scholars of the Order was Jean Mabillon (1632- 1707), who created the science of diplomatic — or the critical method of determining the au¬ thenticity of documents. In 1675 a Jesuit his¬ torian, Papebroch, made a sweeping claim that many of the documents upon which the Maur- ists had relied were worthless. Mabillon de¬ voted the next six years to the preparation of his reply, and in 1681 his opponent was crushed under the erudition of the (De re diplomatica, which remained the standard treatise on the subject until it was displaced in. the present generation by the volumes of Sickel, Ficher and Giry. The basis of modern paleography and archaeology was laid by Dom Bernard Montfaucon (1655-1741) in his (Palaeographia graeca* and his (L'Antiquite expliquee et rep¬ resentee en figures. * While a layman, Charles du Fresne Du Cange had founded historical lexicography in his (Glossarium mediae et in- fimae latinitatis> (1678), the Benedictines left their impress upon this field in the famous re¬ vision of Du Cange's work by Dom Carpentier (1768). Finally, in a great co-operative work, begun by Dantine and Durand, and finished in 1790 by Dom Clement,*

tines did not limit their efforts wholly to the perfecting of methods of research, but applied these methods in the production of voluminous works

and source collections on Church and national history. The advance in scientific method which they brought into existence can scarcely be overestimated. Before this time there had either been no attempt to cite sources or the citations had been hopelessly confused ; there had been no general practice of estab¬ lishing the genuineness of a text; and there had been no hesitancy in altering the text of a document to improve the style. Now docu¬ ments were searchingly examined as to their authenticity, the text was quoted with exactness, and the citations were invariably included and given with scrupulous accuracy. It is, however, easily possible to overestimate the modernity of the Maurists ; they were as near to Timaeus as to Ranke or Gardiner. Their critical methods were almost . entirely limited to external or textual criticism — to an examination of the genuineness of the document. They were greatly inferior to the school of Voltaire in examining the credibility of contemporary au¬ thorities and generally regarded the contents of an authentic primary source as entirely iden¬ tical with absolute truth. Neither did they pos¬ sess anything of the romanticist conception of historical development and the continutiy and organic nature of cultural evolution. They were nearer to scientific antiquarians than to modern historians. Nor were they sceptical of ecclesiastical tradition. They labored under the pious opinion that the truth would sub¬ stantiate the contentions of the Church, but in reality provided their rationalist contem¬ poraries and successors with a supply of scholarly information with which to rout the ecclesiastics.

Almost identical in method with the Bene¬ dictines was the work of the Jansenist, Louis Sebastian de Tillemont (1637-1698), on the his¬ tory of the Church and the Roman Empire to 600 a.d. His product was highly objective, being primarily a mosaic pieced together from sources which were selected to harmonize but were not altered. It was one of the earliest of modern historical works to include a critical discussion of the principal sources for each period. His solid work, designed as a pillar of Christian doctrine, was one of the chief sources used by the sceptical Gibbon. A similar example of. the new erudite methods was the researches into the history of the Guelfs car¬ ried on by the German philosopher, Gottfried Wilhelm Leibnitz (1646-1716) in his (Annals of the House of Brunswick. > A step was taken towards the development of internal criticism by the great Italian, Muratori (1672-1750), who made a number of advances over his mas¬ ter, Mabillon. He was as critical of miracles as Blondus and departed widely from the Bene¬ dictine practice of regarding contemporary sources as infallible. The methods of Mabillon and Muratori were combined with some faint anticipation of the romanticist conception of historical development in Rapin Thoyras' (1661- 1735) (History of England, } which long re¬ mained the chief source on the Continent for the history of 17th century England. Finally, in the co-operative (Universal

History) pro¬ duced by the English scholars, Campbell, Sale, Swinton, Bower and Psalmanazar, the erudite

school published the most scholarly universal history since the humanist attempt in the (En- neades) of Sabellicus. While thoroughly pious in its approach, it has been called by no less authoritative a critic than Fueter ((the first universal history worthy of the name.®

While Vadianus, Muratori and Thoyras had shown at least an embryonic power of criti¬ cizing the credibility of contemporary or ((pri- mary,® sources and documents, the real begin¬ ning of the searching internal criticism of his¬ torical documents must be assigned to the work of the Jesuits. Having been put upon the de¬ fensive by the Protestant onslaughts, they were compelled to examine the sources of ecclesias¬ tical history to discover what portion of the old traditions and legends would bear the test of scientific scrutiny. By this means they hoped to eliminate the damaging criticism of the Church by Protestant historians who ridiculed the many crude and obviously false legends connected with the Catholic past. The chief example of this Jesuit criticism was the monu¬ mental (Acta Sanctorum, > begun by the Belgian Jesuits under Bolland's direction in 1643. Here the sources bearing on the lives of the various saints were arranged according to their age and authenticity. A much more healthy spirit of criticism was exhibited by Pierre Bayle (1647-1706) in his historical and Critical Dic¬ tionary0 and in his criticism of the histoty of Calvinism by Maimbourg. Bayle took especial delight in pointing out the grave discrepancies between the views and opinions of contem¬ porary authorities and did not hesitate to ex¬ tend his methods to the examination of <(sacred® history. Since the period of humanism the his¬ torians of classical antiquity had been regarded with a reverent confidence second only to the ® Fathers.® Valla had questioned some asser¬ tions of Livy, but it was left for Louis de Beaufort (d. 1795) in his (Dissertation sur l'incertitude des cinq premiers siecles de l'his- toire romaine,> to prove that the divergence in the accounts of the period by the great classical authorities indicated that the history of Rome before the third century b.c. rested almost wholly on legendary material. The work of Beaufort marked a break with humanism in attitude and method as well as in style. The most obscure member of this critical school, but perhaps the ablest historian before Niebuhr was Jean Baptiste Dubos (1672-1740). His (Histoire critique de l'establissement de la monarchic francaise dans les Gaules) was the first attempt to turn the new critical methods upon the study of institutions. In as objective a spirit as that exhibited by Ranke he examined the documentary sources for the early history of France and anticipated Fauriel and Cou- langes in proving that the Merovingians had merely adapted and not displaced Roman cul¬ ture in Gaul. He also anticipated the roman¬ ticists in possessing a grasp upon the concep¬ tion,

of the gradual and organic development of civilization which was vastly superior to the catastrophic theory of the contemporary ration¬ alists.. In this respect he marked an advance in the direction of Moser. Less critical, but more truly historical was the (History of Osnabruck> by Justus Moser (1720-94), regarded by many as the first real constitutional history, in that it showed the manner in which political institutions develop out of the deeper social

and economic forces in the life of a state. It was a disciple of Moser, Barthold Georges Niebuhr (1776-1831), who is conventionally re¬ garded as the creator of modern historiography, but if the foregoing discussions have shown anything they have proved that no single per¬ sonality or school can be regarded as having brought into existence the totality of modern historical science. Niebuhr, a Dane called to the new University of Berlin bv Humboldt in 1810, is one of the best examples of this tend¬ ency to synthesize the progressive methods of his predecessors. He was influenced by Savigny's romanticism in the study of the evolution of legal and political institutions. He followed Moser in his profound conception of the development of political institutions. Finally, he applied to the sources of early Ro¬ man history the critical methods which had been adopted by Wolf in his epoch-making studies of the authorship of the Homeric poems. His (Roman History> was the first book to combine the best of the newer critical methods with the constructive principles of synthetic in¬ stitutional history, and it was the chief source of inspiration for the historical work of his greater successors, Leopold von Ranke and Theodor Mommsen.

Von Ranke (1795-1886) first became inter¬ ested in history through his studies in classical literature, the influence of romanticism and the reading of Niebuhr. His immediate activity as a historian was initiated by his discovery of the wide divergence between the accounts of the events of the 15th century in Italian his¬ tory as presented by the leading contemporary authorities. This led to the publication in 1824 of his (History of the Romance and Germanic .Peoples, 1494-1535.) Its most significant por¬ tion was the appendix, entitled (Zur Kritik neuerer Geschichtschreiber, and devoted to an analysis of the sources of information for the period that he had covered. This did for in¬ ternal and interpretative criticism what Mabil- lon's treatise on diplomatic had done for ex¬ ternal criticism, or the critical study of texts, It was Ranke's great contribution to historical method to have insisted that the historian must not only use strictly contemporary sources of information, but must also make a thorough study of the personality, ˆtendencies® and ac¬ tivities of the author to determine*

as far as possible the personal equation in his record of events. There were two more fundamental characteristics in the historical mechanism of Ranke, namely, the conception derived from the romanticists that every nation and age is domi¬ nated by a prevalent set of ideas, designated by Ranke, the ˆZeitgeist,® and the doctrine that the historian must view the past wholly freed from the prejudices of the present and must narrate the events of the past ((wie es eigentlich ge- wesen.® His defects have been pointed out by later writers as the failure to exhaust the sources available for any subject upon which he wrote and a primary concern with political events and dominating personalities to the neglect of the more fundamental facts of economic and social, and even of political, life. While he ranged over the entire history of Europe and the world and left an enduring mark upon every field, it was his contributions to historical methods and teaching which were mainly significant for the growth of historiog¬

raphy. To historical method he contributed primarily through his formulation of the prin¬ ciples of internal criticism and his insistence upon entire objectivity in the treatment of the past. His influence upon historical scholarship through his teaching was probably greater than through the exemplification of his methods in his written works. That fundamental instru¬ ment for the advancement of historical scholar¬ ship in the academic world — the Historical Seminar — was founded by Ranke in 1833 and it seryed to train not only the leading German historians, but historical students from all over the world who came to serve in the historical laboratory which he maintained during the period of half a century. When Ranke became too aged to conduct his seminar with effective¬ ness, his greatest pupil, George Waitz, adopted the methods of his master at the University of Gottingen, where nearly every leading medieval¬ ist of the last generation received at least a part of his training.

With the work of Ranke the foundations of modern historical scholarship were finally laid. The progress since his time has consisted pri¬ marily in a further refinement of critical meth¬ ods and their general dissemination among a continually growing body of historical scholars. This progressive expansion of scientific his¬ torical scholarship has been in part the result of the direct imitation of Ranke's methods by his students and in part the outgrowth in every country of those same preliminary conditions and developments which made the work of Ranke possible.

In Germany the growth of the critical school of historiography was primarily the result of the work of Ranke. Among his pupils were Kdpke, Jaffe, Waitz, Giesebrecht and Von Sybel who perpetuated the methods of their master in their own writings and teaching. Waitz prob¬ ably surpassed Ranke in the thoroughness and exactness of his scholarship. The existence of independent sources of the new scholarship is best seen in the

case of Mommsen, who was a product of the same general circumstances that made the work of Ranke possible, and who fully equalled Ranke in the field of schol¬ arship. In the generation since Droysen, Treitschke and Svbel, the works of the younger contributors to German history have shown more perfectly the objectivity of Ranke and have eliminated the errors due to the rabid patriotism of their predecessors. Moriz Ritter has produced the most detailed and scholarly treatment of the Thirty Years' War and the events of the Counter-Reformation. Bernhard Erdmannsdorffer has dealt with great scholar¬ ship and candor with the period from the Thirtv Years' War to the accession of Fred¬ erick the Great and has rejected Droysen's laudatory picture of the early Hohenzollerns and their <(mission.® R. Koser, in what is probably the most scholarly biographical pro¬ duct of modern critical historiography, has re¬ moved from Frederick the Great the halo with which he was adorned by Droysen and Carlyle. The period from Jena to the Revolution of 1848 has been studied by Hans Delbriick, Max Leh¬ mann and F. Meinecke with much greater fair¬ ness, poise and scholarship than was exhibited by Treitschke. Erich Marcks and Max Lenz have removed from Bismarck the (

and have laid bare his policies and intrigues. Alfred Stern is engaged upon what is by far the most exhaustive and scholarly history of Europe in the 19th century. Further, the influ¬ ence of the Ecole des Chartes in improving the exact methods of handling documents has been evident in the Germaines in the work of such men as Sickel and the foundation of the Vienna Historical Institute in 1854. The general nature of German historical scholarship as exemplified in the adoption of critical methods is best ob¬ servable in the co-operative work edited by W. Oncken, (Allgemeine Geschichte in Einzel- darstellungen) ; and in the (Jahrbucher der deutschen Geschichteˆ which has been in pro¬ cess of publication by the Historical Commis¬ sion of the Munich Academy since 1862. The most erudite and complete synthesis of scien¬ tific historical methodology ever prepared has been produced by E. Bernheim, though G. Wolf has more recently made a creditable contribu¬ tion to this field. The discussion of the ap¬ plication of this new critical scholarship to the field of German political history should not cause one to lose sight of the fact that equal progress has been made in the field of Church history since the days of the Centurians. In¬ terest in this subject was revived by Neander in the first half of the 19th century. In the work of Hinschius, Richter and Sohm on the canon law ; Hauck's history of the German Church; the labors of Hefele and Hergen- rother on the councils; Pastor's history of the Popes of the Renaissance ; Harnack's monu¬ mental history of Christian dogma, and

Kraus' history of Christian art, are to be seen works which rank with the best products of critical political historiography.

The growth of critical historical scholarship in France owed something to German influences and some of the leading French historians, such as Monod, were trained by the German masters, but on the whole the progress of historical scholarship in France has been primarily an in¬ digenous development. To Niebuhr might be compared Fauriel, who was the inspiration of Guizot and his associates. While Guizot never equalled Ranke with respect to exact scholar¬ ship or productivity he was far superior to Ranke in analysis and more capable and active as an editor, and his influence in stimulating historical scholarship in France was fully com¬ parable to that exerted by Ranke in Germany. The precise scholarship of Waitz found its first French counterpart in the works of Frangois Mignet, which foreshadowed modern French historiography, not only by their high critical standards, but also by their almost un¬ canny powers of causal analysis and their re¬ markable lucidity in exposition. The perfec¬ tion of exact historical methods in France was not due to an individual, as in Ger¬ many, but to the labors of many scholars and teachers in the greatest of the world's schools for the training of historians in the re¬ fined methodsof criticism, L'Lcole des Chartes, which began its work in 1829. The names of Delisle, Guerard, Monod. Luchaire, Molinier, Giry and Viollet are indicative of the quality of work produced by the institution. In Aulard, France possesses a scholar whose de¬ tailed and masterly knowledge of a brief period of national history can be equalled among the

world's historians only by Gardiner, and the myths surrounding the French Revolution have at last been put to rest. The finest representa¬ tive collection of French historical scholarship is to be found in the co-operative (Histoire generale edited by Lavisse and Rambaud and in the (Histoire de France) edited by Lavisse. Space forbids more than a brief enumeration of some of the leading members of this recent generation of French scholars who have made the most notable contributions to historical knowledge. C. Jullian has carried the methods of his master, Coulanges, into a thorough survey of ancient Gaul under the Roman Empire. A. Berthelot has distinguished himself by studies in the later Roman Empire and the beginnings of mediaeval Europe. G. Bloch has contributed some striking monographs on the transition from Ro¬ man to mediaeval civilization. C. Diehl has de¬ voted himself to the period of the revival of the Eastern Empire under Justinian. Feudalism has been analyzed by C. Seignobos and A. Luchaire. Seignobos has also rendered valu¬ able service to modern history and to the gen¬ eral history of civilization, while Luchaire is the peerless authority on France of the 11th, 12th and early 13th centuries. C. Langlois has traced the decline of the Capetians. Town life in the Middle*

Ages has received the atten¬ tion of A. Giry, who has also contributed the standard treatise on diplomatic. C. Bemont is easily the leading French student of mediaeval England, though Ferdinand Lot has done notable work in early French and English mediaeval history. C. Bayet holds the same place with respect to the investigation of the Mediaeval Empire and has also done signal work on the Byzantine Empire. A. Coville is the mas¬ ter of the period of the Hundred Years' War. C. Pfister has contributed important mono¬ graphs to mediaeval history, the history of Nancy and the administrative policy of Henry IV. The 15th century has received the attention of C. Petit-Dutaillis. H. Lemonnier is the un¬ disputed authority on the history of France in the 16th century. Hanotaux has analyzed the France of the opening of the 17th century. E. Lavisse has also claimed the 17th and holds the first place among French editors of co-operative historical works. H. Vast has surveyed in a brilliant fashion the political history of France in the later 17th and 18th centuries and the era of Napoleon. The 18th cen¬ tury has also profited by the labors of H. Carre and P. Sagnac in the political his¬ tory of France and Europe, while A. Sorel has mastered the international relations of this cen¬ tury to an unparalleled degree. Aulard's unique work on the French Revolution has been men¬ tioned above. A. Debidour and A. Malet have synthesized the recent scholarship dealing with France in the last century and have done notable work on the history of modern European diplo¬ macy, while H. Marieiol has covered the history of modern France and Spain, being especially an authority on the early Bourbons. The leading French authority on modern Germany and Austria is G. Blondel, while the similar posi¬ tion with respect to Hungarv, Bohemia and Poland must be assigned to E. Denis and L. Leger. A. Rambaud, . perhaps the most erudite and versatile figure in French historiography, has earned for himself an enviable position in

many fields. Winning his reputation by a monograph on the Byzantine Empire, he has since become the leading French authority on Slavonic Europe and has contributed brilliant surveys of French civilization and the growth of the French colonial empire. All students of the ecclesiastical and political history of Europe are immensely indebted to the masterly reviews of the relation between the Church and the State throughout the history of France by E. Chenon and Debidour. Renan has found bis ablest successor in Emile Faguet whose survey of French thought cannot be matched in any other country. Nor should one forget the contributions of E. Levasseur to economic history; of P. Tannery to the history of science; and of C. Langlois to the subject of historical bibliography and methodology. The

contributions of other recent French historians will be mentioned in the treatment of special phases of modern historiography. What Ranke achieved for the improvement of the teaching of history in Germany was accomplished in France by Jean Victor Duruy, Ernest Lavisse, Charles Bemont and Gabriel Monod. Monod, probably the most scholarly and stimulating teacher of history who has yet lived, brought to perfection the seminar method which had been introduced by Duruy. In conclusion, no sketch of French historical scholarship would be complete without proper recognition of the unparalleled ability of French historians to unite careful scholarship with a broad inter¬ pretation of historical material, an admirable lucidity of expression and rare powers of syn¬ thetic organization.

Even more than was the case with France, critical historical scholarship in England was a native product. Beginning in the work of such men as Freeman, Stubbs, Green, Lecky, Creighton and Seeley, it has reached its highest point in the work of Samuel Rawson Gardiner on the stirring events of the first half of the 17th century. For a thorough mastery of all the available sources for a limited period and the ability to organize these in an intelligible narrative he has but one rival, Aulard, and the objectivity of his werk surpasses that of the Frenchman. The English have never, however, provided anything comparable to the Ecole des Chartes or the Historical Institute at Vienna for the training of young historians in the most recent methods of exact critical scholarship. The great repertory of the best products of recent English historical scholarship is the co-operative works — the incomplete Cam¬ bridge Mediaeval History, > the Cambridge Modern History, and the less pretentious series edited by Hunt and Oman. Any cata¬ logue of the modern leaders of English critical historical scholarship would certainly include the following names. N. H. Baynes has dealt with the Eastern Roman Empire, a field which has been more extensively cultivated by J. B. Bury, whose thorough and versatile scholarship has also been demonstrated by work on the later Roman Empire, by his critical edition of Gibbon and by his planning of the Cambridge Mediaeval History.* The mediaeval history of both England and continental Europe has profited by the labors of C. W. Oman, who has also distinguished himself in the field of modern history by a comprehensive work on the Peninsular War. H. C. W. Davis, one of the*

most brilliant of the younger present-day mediaevalists, has contributed notable work on the whole field of mediaeval history, but partic¬ ularly upon the 11th and 12th centuries. T. F. Tout has dealt with England in the 13th and 14th centuries, as well as with the relations be¬ tween the Church and empire in the Middle Ages, from a broad and well-balanced point of view. J. H. Round has exhibited exceptional scholarship by his studies of English feudalism and mediaeval legal institutions. The work of

the late F. W. Maitland on the social inter¬ pretation of English legal institutions marked the greatest advance in that field since the time of Stubbs. The work of James Bryce on the Mediaeval Empire has never been superseded, though H. A. L. Fisher has more recently turned to that subject with both insight and scholarship. Ernest Barker has contributed a number of scholarly monographs on diverse phases of mediaeval history. G. M. Trevelyan has dealt with England in both the 14th and the 17th centuries in works which not only ex¬ hibit original scholarship, but also the finest mastery of English prose to be found among critical English historians of the present day. The careful scholarship of Richard Lodge has been displayed in the treatment of the transi¬ tion from the mediaeval to the modern period in both England and continental Europe. J. A. Doyle's account of English colonization in America is, perhaps, surpassed only by the American work of Professor Osgood. James Gairdner's calm and scholarly work on the 1 5th century and the Tudor period has been carried on by A. D. Innes, H. A. L. Fisher and A. F. Pollard, the latter one of the most original and promising writers now engaged in the field of English history. G. W. Prothero has sketched the later 16th century and has secured for him¬ self a position as an historical editor com¬ parable to that held in France by Lavisse. It is a sufficient commentary on the work of C. H. Firth on the history of the middle of the 17th century to observe that the scholarship of (Gardiner has not suffered in the work of his continuator. That Lecky's great work on the 18th century did not doom his successors to barren efforts is shown by the works of L. S. Leadam and W. Hunt, C. G. Robertson's narra¬ tive on the early Hanoverians, G. O. Trevelyan's survey of the American Revolution and by the biographies of the elder Pitt by Rosebury and Williams, of Burke by Morley, of Fox by Trevelyan and of the younger Pitt by Rose. Stanley Leathes has no English competitor as an authority on the political history of France.

F. C. Montague and J. R. M. Macdonald have investigated the history of 18th century France, and H. Morse Stephens contributed the first scholarly synthesis of the French Revolution before he left his native land to win academic distinction in the United States. J. H. Rose is the undisputed English authority on the Napoleonic period, while H. A. L. Fisher has been attracted by Napoleon's administrative re¬ forms. The 19th century has been covered by the works of Spencer Walpole, Herbert Paul,

G. Slater and J. A. R. Marriott and by a num¬ ber of notable biographies, such as those of Francis Place by Graham Wallas, of Cobden and Gladstone by Morley of Bright by G. M. Trevelyan and of Disraeli by Monypenny and Buckle. The history of the British Empire has

received detailed attention from Egerton, Lucas Innes and H. H. Johnston. European politics and international relations in the last century have been dealt with by W. A. Phillips, G. L. Dickinson and J. A. R. Marriott. In addition, there should be mentioned the exhaustive scholarship of A. W. Ward with respect to all things connected with the political history of modern Germany and the detailed studies of W. H. Dawson on the modern German Empire ; the scholarly work of R. N. Bain, R. W. Seton- Watson, D. M. Wallace, F. H. Skrine and W. Miller on Scandinavian, Slavonic and eastern Europe; the studies of Italian unification by Bolton King and G. M. Trevelyan; and the comprehensive work of Martin Hume on modern Spain. Church history has not been neglected in England, the more notable products in this field being the works of H. M. Gwatkin and F. J. Foakes-Jackson on the early Church; of H. B. Workman on the Mediaeval Church and the preliminaries of the Reformation; of C. Beard and T. M. Lindsay on the Reforma¬ tion in general, and of James Gairdner and R. W. Dixon on the Reformation in England; of R. W. Church and F. W. Cornish on the re¬ ligious movements of the last century; of H. W. Clark on the Non-Conformists; and the monumental co-operative history of Stephens and Hunt on the whole period of English ecclesiastical history. The contributions of Cunningham and Ashley to economic history and of Morley, Stephen, Benn and Merz to intellectual history will be dealt with in another place. Finally, no student of historiography could fail to commend G. P. Gooch for his ex¬ cellent execution of Lord Acton's long-deferred plan to sketch the development of modern his¬ torical writing. Of the teachers of history in England who have done the most to inspire their pupils with the ideals of modern criticism and with an interest in historical investigation Freeman, Seeley, Acton- and Maitland have had the widest and most salutary influence.

The beginning of modern critical scholar¬ ship in the field of American history dates back only to about the period of the close of the American Civil War. It owed its origin very largely to the influence of Germany. In the first quarter of the 19th century George Ban¬ croft had attended the lectures of Heeren and had later been a friend of Ranke. Not having been an academician, Bancroft had little in¬ fluence on scientific historical methods in the United States. The real beginning of the sys¬ tematic introduction of the improved methods of German historical scholarshio into the United States began in the year 1857 when Henry Torrey succeeded Sparks at Harvard, Francis Lieber assumed his professorship at Columbia, and Andrew D. White accepted a chair of history at Michigan. All of these men had been trained in Germany and estab¬ lished a direct contact between German and American scholarship. Professor White had also been profoundly influenced by Guizot, and his teaching was never limited to the

narrowly episodical and political history which attracted the extreme disciples of Ranke, and the Prus¬ sian school. A still greater impulse to the sound establishment of historical scholarship in America came when Herbert Baxter Adams instituted the teaching of history in Johns Hopkins University in 1876 immediately after

the conclusion of his studies in Gottingen, Ber¬ lin and Heidelberg. To Prof. H. B. Adams was due not only the establishment of the ˆseminar" method of instruction in America, but also the organization and creation of the first great training school for historians in America. There is scarcely a great American university at the present day which does not have in its department of history one or more men trained in the Johns Hopkins seminar, and the literary products of this seminar were the first conspicuous exemplification in America of the newer critical historical scholarship. Much the greatest personal influence in the in¬ troduction of the German methods and ideals was that of Professor John William Burgess, who began his work at Amherst in 1873 after having studied in Gottingen, Leipzig and Ber¬ lin and who founded in 1880 the famous faculty of political science at Columbia, which came to rival and later to overshadow Johns Hopkins. Professor Adams, while appreciating the value of the exact German methods, had a healthy confidence in the ability of American scholars to interpret and apply the new methods, but Professor Burgess was convinced that at best Americans could be but lame and halting imi¬ tators of Germanic genius and induced most of his students to finish their studies in Germany. As Prof. H. B. Adams has expressed it, <(The students of Professor Burgess went to Berlin in shoals. They went in such numbers that they began to be called the (Burgess School. They all went to hear Droysen lecture ; and came home with trunks full of Droysen's (Preussische Politik) and of the writings of Leopold von Ranke." In addition to the work of Johns Hopkins and Columbia, Michigan ad¬ vanced the new methods under Charles K. Adams, and Cornell under President White, Moses Coit Tyler and George Lincoln Burr. About this same time Edward Channing, at Harvard, carried to completion the beginnings in the newer historical scholarship which had been made by Henry Adams in the ˆseventies." At the present time the new scholarship has permeated the whole American university world and the American students of history need no longer, as Professor Gooch would seem to indicate, seek their training abroad. In the seminars of such scholars as Herbert L. Osgood, William A. Dunning, George Burton Adams, J. F. Jameson, Frederick Jackson Turner, George Lincoln Burr, Edward Channing, Ed¬ ward G. Bourne, Dana C. Munro and Charles H. Haskins the serious American student has received or may receive training in refined critical methods quite equal in most respects to anything to be obtained abroad. The French influences have to some degree displaced the*

German in recent years and most American medisevalists finish their training in the ficole des Chartes, a substitute for which scarcely ex¬ ists in America. A number of American scholars, such as H. B. Adams, E. G. Bourne, B. A. Hinsdale, N. M. Trenholme, F. M. Fling, Henry Johnson, H. E. Bourne, W. H. Mace, J. M. Vincent and F. H. Foster, have made worthy contributions to the systematic elabora¬ tion of historical methodology, but nothing has appeared in this field in America that in any way rivals the works of Bernheim or Langlois and Seignobos. Any account of the introduc¬ tion of the modern methods of historical re-

search in America would be incomplete with¬ out some mention of the work of Prof. Albert Bushnell Hart of Harvard. While he has not contributed notably to the further refinement of critical methodology in historiography by his own works, there can be no doubt that he has been easily the leader in promoting the produc¬ tion of scholarly contributions to the field of American history and government, in his ca¬ pacity as an editor, and in popularizing the more scholarlv methods.

The application of the more critical methods to the field of American history has resulted in works worthy to rank with the best European products and has quite reconstructed the earlier notions of American national develop¬ ment. The period of colonization has been ex¬ amined by Professor Osgood a student of Pro¬ fessor Burgess and Ranke, and his monumental seven volume work on the American Colonies constitutes the highest point to which exact American scholarship has attained, and is worthy to rank with the writings of Gardiner and Aulard. The relation of the colonies to British foreign policy has been recast by Pro¬ fessor Osgood's disciple, George Louis Beer. Professor Alvord, in a scholarly and original work, has for the first time shown the full significance of the problems of British im¬ perial administration west of the Alleghenies for the preliminaries of the American Revolu¬ tion, and has finally rescued the study of the beginnings of that conflict from the octopus of Boston Harbor. Fisher, Flick, Siebert, Ty¬ ler and Van Tyne have at last dealt fairly with the Loyalists. The study of the period of the formation and adoption of the American con¬ stitution has finally been secularized through the detailed and critical research of Prof. Max Farrand and the brilliant essay of Pro¬ fessor Beard. Professor McMaster has sur¬ veyed the first 70 years of national develop¬ ment with not only scholarship, but a broader and more synthetic approach than has been attained in any other comprehensive American historical work. Much more super¬ ficial and narrow in its scope, but equally scholarly is Henry Adams' detailed account of American

foreign policy in the administra¬ tions of Jefferson and Madison. Professor Turner and his students have applied some¬ thing of the scholarship of Osgood and the originality and the breadth of interest of Mc¬ Master to a study of the colonization of the West, and their work has in many ways super¬ seded the vigorous and interesting survey by Roosevelt. Professor Turner's "school® is the best illustration in America of the combination of exact scholarship with the synthetic tendency in modern historiography. The period of the Civil War and Reconstruction has been dealt with in a calm and temperate fashion by Mr. James Ford Rhodes in a detailed work which for objectivity and scholarship fur¬ nishes the only rival to that of Professor Os¬ good. The same period and the subsequent generation have been covered in an exhaustive manner by Professor Dunning and his students. Dr. E. P. Oberholtzer, a disciple of Professor McMaster, has made a promising beginning in the attempt to present a detailed analysis of the history of the people of the United States since the Civil War, interpreted in the original and comprehensive spirit of his master. The

whole period of national history has been sketched in a careful and dispassionate manner by James Schouler, and Professor Channing is engaged on an ambitious attempt to trace the history of the United States from the period of colonization to the present in a work which, if completed, bids fair to become the great na¬ tional history in the better sense of that term. The character of the best American historical scholarship in the first generation of those who had imbibed the newer critical methods is to be discovered in the co-operative (Narrative and Critical History of America, edited by Justin Winsor. A much more comprehensive and rep¬ resentative repertoire of American scholarship of a slightly more recent type is to be found in the (American Nation,* edited by Professor Albert Bushnell Hart. Even more ambitious and recent is the (Chronicles of America* series edited by Allen Johnson. In addition to investi¬ gation of the history of their own country, American historians have made important con¬ tributions to many other periods and phases of history. Professor Breasted has earned a place among the leaders of modern Egyptology and Rogers, Hilprecht, Jastrow, Olmstead and Good-speed have done creditable work on the history of Babylonia and Assyria. Professor Ferguson is the world's foremost authority on Hellenistic Athens, Westermann has dealt in an original fashion with the provinces of the Roman impe¬ rial system, and Botsford ranged over the whole period of classical antiquity with both insight and the most exacting scholarship. In the field of mediaeval history Professor Burr has mastered the Carolingian period and is easily the leading authority in Europe or America on the history of toleration ; Larson has investigated the early mediaeval history of England and Thompson has dealt with the growth of the French mon¬ archy under Louis VI ; Munro had devoted himself particularly to a study*

of the Crusades; the part played by the Normans in the history of mediaeval Europe has been investigated by Haskins with a thoroughness not equaled by any other American or European scholar; few if any English scholars can rival G. B. Adams' knowledge of the constitutional history of mediaeval England ; Henderson has summarized the results of modern scholarship dealing with mediaeval Germany ; Emerton has contributed scholarly and detailed manuals covering the entire mediaeval period ; Lynn Thorndike has recently presented an original synthesis of the best modern scholarship dealing with the Middle Ages, and H. O. Taylor has furnished the best survey of the intellectual history of this period. The original and now generally accepted thesis that the ((commercial revolu¬ tion® rather than the "Renaissance® or the "Reformation® marked the dawn of the mod¬ ern world has furnished the centre of orienta¬ tion for the stimulating works of Abbott, Shep¬ herd, Bolton, Bourne, Gillespie and Cheyney. The French Revolution and the Napoleonic pe¬ riod have profited by the works of H. M. Stephens, Fling, Sloane, H. E. Bourne and Johnston. Thayer has written in an interest¬ ing fashion on the history of Italy from the end of the Napoleonic regime to the comple¬ tion of unification; Henderson, Schevill, Ford and Fay have treated the history of modern Germany; Lybyer has been the only American

historian to devote special attention to the mod¬ ern history of southeastern Europe ; and C. M. Andrews and Hazen have contributed standard political narratives on the history of modern Europe. In Prof. John Bassett Moore the United. States has the most productive and authoritative student of the history of interna¬ tional law and diplomacy, and D. J Hill J. W. Foster, A. C. Coolidge, C. R. Fish and E. S. Corwin have been some of the other American writers who have contributed to this field. Church history has attracted a large number of American students. H. C. Lea's monographs have entitled him to rank with European scholars like IJarnack and Duchesne. G. P. Fisher and Philip Schaff sketched the whole history of the Christian Church. Mc- Giffert won an international reputation by his edition of Eusebius and has since made im¬ portant contributions to the history of the early Church. The rise of the mediaeval Church has received the attention of Ayer and Flick. The period of the ˆReformation® has been covered by the monographs of Preserved Smith, Emer- ton, Faulkner, Jackson and Jacobs. W. Walker has provided a survey of Church history in both Europe and America. David Schaff, S. M. Jackson and W. W. Rockwell have contributed to this field by valuable editorial labors, and Professor Rockwell has been especially active in keeping Americans in touch with the latest developments in European

scholarship in this field. The primary attention of European his¬ torians to ancient and mediaeval history — a lingering effect of humanism and romanticism — has left its impress upon American scholar¬ ship and has led to a neglect of modern his¬ tory. . The younger generation of American historians, however, by devoting their energies primarily to modern history, have tended to make, a salutary break with tradition and are promising to equal in. volume and quality the contributions that their former teachers made to the study of the C(Middle Ages.®

Historical biography in the United States has tended to take the form of a great number of brief biographies, such as the <(American Statesmen Series® and the <(Riverside Biograph¬ ical Series,® rather than being limited to a few notable products. Some fine biographies have appeared, however, such as the voluminous documentary biography of Lincoln by Nicolay and Hay, the excellent biographies of Buchanan and Webster by G. T. Curtis, and the more recent ones of Douglas by Allen Johnson, of Andrew Jackson by J. S. Bassett, and of Stephen Girard by J. B. McMaster.

XI. The Industrial and Scientific Revolu¬ tions and the Leading Tendencies in Modern Historiography.

L The Persistence and Development of Earlier Trends — While the major portion of the progress in historiography since Ranke has consisted in rise of new and sounder tendencies there have been important improvements in the earlier and traditional lines of development.

In the first place, . while little Eas been achieved that was not implicit in the methodo¬ logical system of Ranke, there have been some important improvements in both the critique and the technique of historical methodology since Ranke's time. The fundamental principles of historical criticism have been refined and

systematized in the admirable works of Bern- heim and Langlois and Seignobos, so that the beginner may now have at his disposal a more extended discussion of all phases of historical method than Ranke was ever acquainted with. There has also been a great improvement in the mechanical accessories of historical scholar¬ ship. Elaborate bibliographies of the historiog¬ raphy of the various countries have been pre¬ pared by Paetow, Langlois, Molinier, Monod. Dahlmann-Waitz, Gross and Channing, Hart and Turner. These are supplemented by cur¬ rent lists of the new works which appear, pub¬ lished in the various technical historical jour¬ nals, and the student is enabled to keep thor¬ oughly abreast of the literature in his field. Remarkably thorough and accurate guides to the vast collections of sources of national and ecclesiastical history which were

gathered dur¬ ing the 19th century have been provided, and the modern student may locate in a few minutes in any great library sources which might have occupied any earlier generation in months of fruitless searching. Of this invaluable type of aid the monumental works of Potthast and Chevalier are most worthy of mention. Again, archives, public and private, have been opened more freely to the historical scholar, though he is still excluded from the more recent material. Nor should one neglect to point out the great contribution to efficiency, expedition and accu¬ racy in historical investigation which has come about from the general introduction of card catalogues, filing systems, loose-leaf note books and elaborate schemes for indexing and cross- reference. This important type of innovation and improvement has been chiefly the work of American scholars. As important as the ad¬ vances in bibliographical and other mechanical aids has been the great extension and im¬ provement of the teaching profession in the department of history. Under the guidance of trained scholars, the members of historical seminars, though of mediocre literary talent « may contribute more exact knowledge to the field of history in their dissertations than was contained in many volumes of the older and popular literary history. Finally, historical science has, after two centuries of delay, followed the lead of natural science and be¬ come co-operative in the true sense of the word. National historical societies have been formed in all the leading countries, each sup¬ porting one or more technical journals. It is also rare now that a single authoritative his¬ torian attempts a comprehensive survey of a wide field of history; it has rather come to be the general practice to produce extensive his¬ tories on the co-operative plan in order to utilize to the full the ability of specialists. It would seem that historiogranhv can make little more progress in the refinement of critical methodologv. It only remains to bring modern history as far as possible under the control of the same exact apparatus of research that has already been provided for mediaeval and church history.

A less salutary type of persistence of older tendencies has been the perpetuation of the political fetish of Ranke and his school. A number of causes , have accounted for this rather curious survival of a strange distortion of historical interests. In the first place, a great impulse was given to the political orienta-

tion through the students and disciples of Ranke who held steadfastly to the tenets of their master. This was superseded in Germany by the more violent nationalism and political pre¬ dilection of Droysen, Treitschke, Von Sybel and the others of the Prussian school. The rise of nationalism and political

interests in France under the Third Republic kept alive the earlier nationalistic political history that had before been stimulated by the interest in the episodes of the French Revolution and the conquests of Napoleon. In England the univer¬ sal conviction as to the supreme political capacity of the Anglo-Saxon seemingly im¬ posed a moral obligation upon English his¬ torians to concentrate their attention upon the proofs of this superiority. In America the political and episodical historiography was stimulated by the thrills of a great and success¬ ful war in behalf of national unity and was perpetuated by the introduction of the tenets of Ranke and Droysen by their returning pupils, who became the leaders and organizers of his¬ torical study in this country. Finally, this type of history received a last source of inspiration from the recrudescence of nationalism through¬ out the world as an inevitable accompaniment of the imperialism or "neo-mercantilism® which developed more or less universally in the period of the "seventies® and the following years. That the adherents of this form of history will gain at least momentary strength and encourage¬ ment from the revived importance of national¬ ism and militarism growing out of the present World War is scarcely to be doubted.

2. New Developments in the Study and Interpretation of History. — Important as has been the further development of earlier tenden¬ cies in historiography during the 19th century, this has been dwarfed into insignificance by the great advances made in totally new directions or in channels which had been only slightly foreshadowed and anticipated in earlier epochs. The critical political historians provided modern historiography with its accurate methods of research and its vast compilations of primary sources. But, as Professor Shotwell has very aptly said, these scholars were so intensely ab¬ sorbed in the task of perfecting the method¬ ology of research that they failed to discrimi¬ nate in the importance of the events which they narrated. It has become the task of an ever-increasing group of progressive historians to promote the synthetic tendency in the hope of giving history a more natural content and a better balanced body of subject-matter. While there can be no doubt that the basis for many of the new developments was laid by the progress of earlier periods in the way of creating the national constitutional state, ex¬ panding the European consciousness, throughout the world by the commercial revolution, and en¬ croaching upon the field of the mysterious through the great scientific discoveries in the field of natural science during the 17th and 18th centuries, there can be no question that most of the novel elements introduced into the writ¬ ing and the outlook of the historian in the last century were the product of the . vast transformations in social conditions and intel¬ lectual interests and attitudes since the first quarter of the 19th century. The chief reason for the great transformation in the historical outlook in the last century has been the fact

that the "Industrial Revolution® and the pro¬ gress in natural and social science have com¬ pletely altered not only the material conditions of human life, but also the whole "Weltan¬ schauung® of the civilize!! world. A more com¬ plete reconstruction of the whole mode of life and of the intellectual orientation of civilized peoples has been achieved in the last century than had previously taken place since the be¬ ginning of the Christian era, and this great change could not but affect historical concepts viewed as an important branch of intellectual interests.

By the industrial revolution, which was effected between 1750 and 1850, the whole basis of life was profoundly modified and the former ideas and interests quite uprooted and dis¬ located. The old period of rural stability and repetition was broken up and with the growth of cities the possibilities of invention, imitation and progress were immensely increased. The changes in the centres of population and in the mode of life gave rise to new and strange social problems on a scale hitherto unknown, and demanded the provision of some adequate "science of society® to serve as a guide in their solution. As in the period of the so-called "Renaissance,® humanity again loomed larger than the state and social rather than purely political interests forged to the front in his¬ torical as in other social sciences.

Not less consequential and epoch-making were the notable advances in natural science in the 19th century which were much more destruc¬ tive to the traditional philosophy of life than the great discoveries of the 16th and 17th cen¬ turies, in that the scientific work of the earlier period centered chiefly in the realm of mechanics and other fields which did not directly concern the problem of the origin and destiny of man, while those of the 19th century had a direct and inevitable bearing upon the interpretation of the derivation and origin of the human race and its relation to the rest of the organic world. Lyell and his fellow geol¬ ogists revealed the undreamed-of antiquity of the earth and of various forms of animal life. Lawrence, Lamarck, Chambers, Darwin and Wallace, working from both geology and biology, suggested and later proved the gradual and "natural® development of man from the lower varieties of the animal kingdom. The chronology of Africanus, Eusebius and Jerome was discredited for all time through the revela¬ tions of pre-historic archaeology in the hands of Boucher de Perthes and Sir John Evans, and the (Chronicle J of Jerome was replaced by the Classification ethnologique> of de Mortil- let. "Adam® was reduced, in the new perspec¬ tive of time, from the originator of the race to a fairly close contemporary of Darwin himself. Man was revealed as the product of natural causes and not of a mysterious creation, in the old and obscurantic sense, of the term, and he became, thereby, a legitimate subject for analysis, particularly at the hands, of psy¬ chology. Along with this progress in natural science went a much further

development of critical philosophy and the subjection of scrip¬ tural authority and sacred history, already weakened by the . established conclusions of scientific investigations, to the same candid and critical investigation which has been accorded to secular history much earlier. The spirit of

Voltaire, Hume and Gibbon had at last per¬ manently come to its own.

It was inevitable that these sweeping altera¬ tions in man's outlook upon life should pro¬ foundly affect his attitude toward the study of the past, as well as his interests in the present and future. In view of the fact that the indus¬ trial revolution was the prime mover in the social transformations of the period it was not surprising that the first vigorous reaction against the conventional political historiography should come through the avenue of a greater emphasis upon the economic factors and the commonplace facts of daily life, the primary importance of which was demonstrated by the historical events of the 19th century. To be sure, the rationalist school had laid considerable stress upon eco¬ nomic influences, Heeren had shown the im¬ portance of the commercial activities of antiq¬ uity, and Moser had insisted upon the vital re¬ lation of economic factors to the development of political organization, but these were only isolated instances of more than the usual con¬ temporary insight and profundity which were almost totally overshadowed and engulfed in the episodical and biographical historiography of ro¬ manticism and in the political bias of national¬ istic historiographv. Economic history, as a general and universal movement of revolt from the narrow political historiography, dates from the publication of Karl Marx's pamphlet enti¬ tled, the (Holy Family, > in 1845, and his joint work with Engels three years later, the Com¬ munist Manifesto. While few of the leading figures in modern economic history would de¬ fend the economic determinism of Marx, they would at least contend that economic events have an historical significance not second to any other category of facts, and that to pass over them in silence, as did writers like Droysen and Sybel, Stubbs and Freeman, and Burgess and Holst, is to miss much of the significance of any period and inevitably to yield but an im¬ perfect and distorted picture of any epoch. It is important to note that the new economic history was not a break with the exact scholar¬ ship of the school of Ranke, but was rather an application of critical scholarship to the recov¬ ery of our knowledge of the economic life of the past in its relation to the totality of civili¬ zation. In the names of Roscher, Knies. Inama- Sternegg, Nitzsch, Sohmoller and Bucher in Germany; of Rogers, Cunningham, Ashley, Gib- bins, Hammond and Webb*

in England; of Le- vasseur, LePlay, Leroy-Beaulieu, Avenel and Jaures and his associates in France; of Koval¬ evsky and Vinogradoff from Russia; and of Bolles, Veblen, Bogart, Coman, Dewey, Clark, Commons, Gay, Callender and Day in America, the student of historiography recognizes scholars worthy to rank with the best disciples of Ranke in the field of critical methodology. In addi¬ tion to the epoch-making work of the avowed economic historians, this new emphasis upon economic factors in history has filtered into the works of the orthodox school, and few serious historical works are now attempted which do not give at least grudging .recognition to the im¬ portance of the industrial and commercial life of a people.

Another important new development in his¬ torical writing which grew more or less directly out of the effects of the industrial revolution was the origin of sociology and the influence of

the sociological point of view upon historical writing. While there had been sociological tendencies in the writings of earlier publicists and historians, it is generally agreed that the science of sociology had its origin in the neces¬ sity of providing a general <(science of society' to criticize, evaluate and guide the various re¬ form movements which sprang into existence as a result of the evils of the social and economic transition which accompanied the industrial revolution. Its two great original systematizers were Auguste Comte and Herbert Spencer. The influence of sociology upon history has been varied and profound. One aspect of this influence was evident in Buckle's avowed desire to follow Comte's suggestion of the existence of well defined laws of historical development and to combine this with Quetelet's statistical method of measuring social phenomena, and thus to arrive at an exact science of historical development wholly comparable to the precision reached in natural science. While Buckle's sug¬ gestions have been only moderately developed, it has long since been recognized that few valid laws of historical development can be discov¬ ered which do not rest upon the firm basis of adequate statistical study. A much more far- reaching reaction of sociology upon historiog¬ raphy has been its influence in broadening the content of history, so as to include all of the important phases of social life and activity. This type of departure from orthodox procedure gained its first great success in the world famous work of John Richard Green. Less popular but equally able were Professor Dill's volumes on the social phases of Roman imperial history. While Green found few immediate followers among his countrymen, who, with the exception of Lecky, for the time being held faithfully to the canons of Freeman, Stubbs and Seeley, the younger generation, led by such scholars as Pol¬ lard, Marvin, Zimmern and Slater have organ¬ ized a powerful movement in favor of a re¬ vival of Green's broad social mode of approach to historical problems. Germany has probably been most prolific in the production of*

his¬ torians affected by the sociological movement. In the middle of the last century Riehl and Frey tag gathered data for the first comprehen¬ sive picture of the social history of Germany, Friedlander described the social life of the Roman Empire, and Buckhardt drew the classic picture of the civilization of the Renaissance. A quarter of a century later Janssen, from a warmly Catholic standpoint, described the so¬ cial conditions of Germany in the epoch of the Reformation. Erman provided the first reliable and comprehensive account of the civilization of ancient Egypt. The great impulse to social his¬ tory in Germany, however, came though the labors of the able Leipzig professor, Karl Lam- precht, and his supporters and co-workers Gothein, Steinhausen and Breyssig. In France the effect of the new social impulses has been less apparent because the French historians have never been so narrowly political as the German and English schools of history — even such technical and ultra-critical medievalists as Luchaire, Giry and Mopod finding time to dis¬ cuss social conditions in the mediaeval period. Rambaud is probably the nearest French coun¬ terpart to Green. The far greater breadth of ˆview in French historiography than in Eng¬ lish can best be appreciated by a comparison of

the tables of contents of the lHistoire generale and the (Histoire de France) with those of the (Cambridge Mediaeval History > and the Cam¬ bridge Modern History.* In Italy, Ferrero has upheld the social point of view in his history of ancient Rome. Worthy and successful imita¬ tions of Green's sociological mode of interpre¬ tation are to be found also in Blok's (History of the Dutch People,* and in Kluchevsky's pub¬ lication of his lectures on the development of the Russian national culture and political organization. Among American historians McMaster has followed most faithfully in the footsteps of Green, and Turner has exhibited a breadth of view not less notable than his exacting scholarship in tracing the colonization of the West. Cheyney's work in the field of English history has always been marked by a broad and well-balanced interpretation. Nor should one forget the promising beginnings in a social interpretation of American history by such writers as W. E. Dodd and Carl Becker, and the application of similar methods to modern European history by Abbott, Lingelbach and others. Professors Breasted and Jastrow have done notable work in reconstructing the civilization of oriental antiquity. Finally, Professor Shotwell of Columbia, while his own written contributions have not been extensive, has rivalled Maitland in stimulating an enthu¬ siastic interest in social history on the part of an ever increasing group of disciples. Another very significant outgrowth of the sociological movement has been its reaction upon the field of constitutional history. While Moser had*

anticipated the recent movement in stressing the creative influence of social and economic forces in shaping political forms and institu¬ tions, the first great modern school, of consti¬ tutional historians, represented in Germany by Waitz and Gneist, in England by Stubbs, and in America by Holst and Burgess, had been content to trace constitutional development in a purely external and formal legalistic manner, or had represented it as a product of the in¬ fluences of powerful personalities. The spirit of Moser first reappeared in the uncompleted work of Alexis de Tocqueville on the consti¬ tutional developments in 18th century France, which forever discredited the cataclysmic inter¬ pretation of the French Revolution by showing how it was the natural and logical culmination of fundamental social and economic forces which had been operating for centuries. A simi¬ lar mode of approach was evident in the bril¬ liant contributions of Fustel de Coulanges to the constitutional history of France in the early mediaeval period. The influence of social and psychic forces in legal and constitutional his¬ tory was fully recognized in Otto Gierke's monumental work on <(Genossenschaftsrecht,)> perhaps, the most notable German contribu¬ tion to the newer tendencies in constitutional interpretation, and also in Brunner's monu¬ mental history of early Germanic law and Ihering's extensive studies in comparative jurisprudence. What Tocqueville and Cou¬ langes accomplished for France was achieved for English constitutional history by the powerful, original and unbiased mind of Gierke's disciple, Frederick W. Maitland, who for the first time effectively demonstrated the social and economic background of English legal history and made clear the futility of a purely legalistic recon¬

struction of constitutional development. Mait¬ land's work in English legal history has been carried on by his friend, Paul Vinogradoff, with a more impressive, if less subtle, scholarship, and with equal productivity. In America a worthy disciple of Maitland has appeared in Prof. Charles A. Beard. Sociological jurispru¬ dence has been notably forwarded by Roscoe Pound, Ernest Freund, J. H. Wigmore, T. R. Powell and G. W. Kirchwey.

A direct outgrowth of the industrial revolu¬ tion which has been of the utmost significance for both historical events and historiography has been the neo-mercantilism or national impe¬ rialism which has developed since about 1875 as a result of the need for new markets and in¬ vestment opportunities which was created by the increase of both commodities and capital through the great revolution in industry be¬ tween 1800 and 1875. The process has repeated in a much more thorough-going way the com¬ mercial revolution of three centuries earlier. European civilization was again brought into contact with different cultures of every conceiv¬ able type, and the possession of the scientific knowledge that had been accumulating since 1650 was of the greatest value and assistance in appropriating the new discoveries. The re¬ actions of this movement upon

historiography have been nearly as diverse as the civilizations and cultures which have been discovered. Its more unfortunate results have been a perpetu¬ ation of ardent national sentiment in historical writing and a stimulation of racial egoism on the part of European and American historians. Its more favorable effects upon historiography, as exhibited in the writings of the more thoughtful historians, have been a broadening of the knowledge of mankind, the enriching of the stores of historical information, an increase of tolerance for cultures different from our own and the great stimulation of the attention of the historian and publicist to the new social, eco¬ nomic and administrative problems created and to their solution in harmony with the principles of enlightenment and humanity. Among the historians and publicists who have given espe¬ cial attention to these subjects have been Bryce, Douglas, Hobhouse, Hobson, Johnston, Keltie, Kidd, Lewin, Macdonald, Rose and Skrine in England ; Bordier, Cordier, Gaffarel, Leroy- Beaulieu, Piquet and Rambaud in France; Mei- necke, Meyer, Peters and Zimmermann in Ger¬ many; and Blakeslee, Bolton, Hornbeck, Jones, Keller, Krehbiel, Latourette, Morris, Reinsch and Shepherd in America. On the whole, the movement has tended to broaden the historical outlook not only with respect to geographical space, but also with regard to the scope of the historian's interests. Especially significant has been the interest that it has aroused in the his¬ tory of international relations.

*A further significant innovation, which was in part a product of the concentration of popu¬ lation due to the industrial revolution and in part an outgrowth of the more scientific ap¬ proach to the study of social and psychic phe¬ nomena, has been the rise of social psychology and its reaction upon history. Voltaire had foreshadowed the psychological interpretation by his doctrine of ((the genius of a people,** but this concept in the hands of Voltaire was essen¬ tially non-historical. He regarded national character as something fixed and immutable,*

and he made little attempt to explain its origin. The romanticists had improved somewhat on Voltaire's conception by viewing the develop¬ ment of civilization as the product of obscure psychic or spiritual forces, but they even denied the possibility of discovering or analyzing the nature or operation of this process of psychic causation. Ranke and his school had borrowed from the romanticists the doctrine of the (Zeit¬ geist,® but they had been content to describe its varied manifestations in different periods and made no attempt to analyze its content or to account for its origin or mutations. With the growth of cities and the means of communica¬ tion

during the industrial revolution and the re¬ sulting increase of social contacts and of the volume of psychic interstimulation, and with the development of modern science with its empha¬ sis upon the amenability of human activities to psychological analysis, there gradually arose a science of collective or social psychology, which first made its appearance in the work of Lewes, Bagehot, Lazarus and Steinhal and was de¬ veloped by Wundt and Dilthey in Germany; by Fouillee, Guyau, Tarde, Durkheim and Le Bon in France, by Sighele in Italy; by McDougall, Trotter and Wallas in England; and by Gid- dings, Sumner, Ross, Cooley and Ellwood in America. While this novel development of psychology was at first applied either to abstract or contemporary problems, it soon began to re¬ act upon historical interpretations. If the col¬ lective psychology was so all-important a factor in recent times it was natural for the original historian to ask the question as to why it had not been of fundamental significance in every age. From a semi-obscurantic view of a ((Welt- geist® and a ((Zeitgeist,® which were either held to be unanalyzable or were left without analysis, the progressive historians turned to an attempt to discover and evaluate the factors which have produced the particular collective psychology of various ages and peoples, and to an effort to account for the transformations of intellectual reactions through the centuries. This line of approach was foreshadowed by Comte's famous formulation of the three stages of the develop¬ ment of psychic reactions. The transition from romanticism to the more scientific collective psy¬ chological approach was best exemplified by Taine, who was never quite able to free himself from the obscurantic trends of romanticism. The first and the most distinguished exponent of this newer line of approach to the interpre¬ tation of histoiy through the genetic study of the transformation of the collective psychology was the original Leipzig professor, Karl Lam- precht, who not only set forth an elaborate the¬ oretical justification of his methods, but also illustrated them in a monumental survey of German history. Lamprecht's principles have been valiantly defended by some enthusiastic and progressive scholars in every civilized country. While the avowed exponents of the value of an interpretation of history in terms of the changing attitudes of the intellectual classes have as yet been relatively few, the volume of literature which has been produced by them and others which serves to substantiate their thesis has already become considerable. In England Lecky's youthful but brilliant study of the development of rational¬ ism in modern times; John Morley's voluminous

appreciation of the contributions of the French (

modern religious thought in a brilliant fash¬ ion. Finally, Prof. James Harvey Robinson has not only aroused an ardent interest in intel¬ lectual history on the part of the large number of enthusiastic students who have attended his stimulating lectures at Columbia University, but is now engaged on what promises to be the first complete summary of the transformations in the intellectual reactions of humanity. In this same field of intellectual history probably belong the valuable researches into the history of natural science in its relation to the progress of civilization which have been carried on by Karl Pearson, Shipley and Whetham in Eng¬ land; Du Bois-Reymond, Mach, Ostwald and Dannemann in Germany; Sarton in Belgium; Tannery and Duhem in France; and Sedgwick, Tyler, Libby, and L. Thorndike in America. Here also belong the contributions to the field of the history of aesthetics which has been cul¬ tivated by Symonds, Ruskin, Mahaffy and Mur¬ ray in England ; by Winckelmann, Burckhardt, Gervinus, Gregorovius, Woltmann and Liibke in Germany; by Renan, Sainte-Beuve, Taine and Reinach in France; and by Charles Eliot Nor¬ ton and Ralph Adams Cram in America. Nor should one forget the many stimulating con¬ tributions of such writers as James, Royce, Dewey, Hall and Santayana, in the effort to make the more original and helpful trends in philosophy and psychology the common prop¬ erty of the intellectual classes.

The discussion of the extraordinary develop¬ ment of intellectual history in the last half cen¬ tury furnishes the logical transition from a dis¬ cussion of those recent trends in historiography which have grown primarily out of the indus¬ trial revolution to those which have been a product of the remarkable progress in natural science in the last hundred years. As the in¬ dustrial revolution was the great event in the economic and social history of the 19th century, so the discovery of the Darwinian theory of evolution was the central fact in the develop¬ ment of natural science in this period. While, as Professor Osborn and others have shown, the idea of evolution is an old one which orig¬ inated in a certain crude and formal sense, at least, with the same Ionic Greeks that began the writing of prose and of history, its true significance as a fact in science and philosophy began with the publication of Darwin's (Origin of the Species) in 1859. With the subsequent controversies over the details of the doctrine of natural selection one is not here concerned. Its reaction upon the outlogk of the alert and pro¬ gressive historical student was profound. . Spen¬ cer worked over the whole field of social sci¬ ence from the evolutionary standpoint and gave it a genetic trend and meaning from which it could never escape. Enterprising biologists and sociologists like Schallmayer and Ammon in Germany, Lapouge in France, Galton in Eng¬ land and Keller in America have attempted to work out a science of social evolution con¬ ceived in terms of biological evolution carried over into the social field.

Others, among them several distinguished historians, have essayed histories of religion and ethics based upon the new evolutionary conceptions and criteria. In this field the work of Spencer, Leckv, Leslie Stephen, Kidd, Hobhouse, Fiske and Suther¬ land has been most notable. Finally, an at¬ tempt to put the history of law and politics

upon an evolutionary basis was initiated in the suggestive writings of the ˆorganic® school of sociologists and political scientists and of Maine, Bagehot and Ritchie. On the whole, however, the outstanding reaction of the new evolutionary conceptions upon historiography did not consist so much in the various special phases of their application to historical prob¬ lems which have been mentioned above as in fixing upon the historian's mind the perception of the genetic nature of the social process and in giving him a firm basis upon which to develop a sound theory of progress.

With the general acceptance of the evolution¬ ary hypothesis as to the origin and development of the human race it was inevitable that much greater attention would be given to the in¬ fluence of the physical environment upon his¬ torical development. The general notion of the effect of physical environment upon human types and their behavior was an exceedingly old one which had originated with Hippocrates and had been passed on through the ages by Aristotle, Strabo, Vitruvius, Aquinas, Ibn Khaldun, Bodin and Montesquieu. While their general observations had some rough similarity to the conclusions of modern students, . their ex¬ planations of environmental causation were most crude, being based primarily upon the doctrine of the alleged planetary influences upon the physiological processes of the human body. The foundations of a scientific study of the relation between geography and history were laid by the monumental studies of Karl Ritter in the first half of the 19th century, which were interpreted to the public in a more popular form by Guyot. Ritter found a worthy successor in Friedrich Ratzel whose profound and voluminous works are conventionally held to have founded the science of anthropogeog- raphy. His researches were rivalled in France by those of fflisee Reclus and were interpreted to the English and American world by his pupil, Miss Ellen Semple. In addition to the systematic works of Ratzel and Reclus, many suggestive contributions have been made to special phases of the influence of geography upon history. Metchnikoff has pointed out the significance of the great river systems of the world in the development of the chief historic civilizations. Demolins has dwelt in detail upon the great importance for history of the configuration of the land which has determined the routes which the peoples have travelled in their various dispersals from original seats of culture. Especially noteworthy has been the suggestive, if not entirely convincing, work of Professor Huntington, whose investigations in Asia Minor have enabled him to ascertain the existence of considerable climatic oscillations in the past

which throw new light on the hitherto unexplained problems of the shifting of the centres of civilization from Egypt to north¬ western Europe and of the invasions of Eurone by successive waves of Asiatic peoples. The net result of this work of students of anthropo- geography has been to compel every self- respecting historian to acquire some knowledge of the geographical setting of a nation before attempting to narrate its history. Historians have not been slow to appreciate the value of these significant studies upon the relation of geography to the development of ciyilization. Professor George has produced a stimulating

attempt to indicate the general dependence of history, particularly in its military aspects, upon geographical conditions. Professor Myres has sketched in a brilliant fashion the geographic background of the rise of the earliest seats of civilization. The significance of geographical elements in the history of antiquity has been abundantly recognized by Professors Hogarth, Olmstead and Breasted. Ernst Curtius, a disciple of Ritter, for the first time made clear the geographical basis of the history of Greece. Freeman described in great, detail the topog¬ raphy of Sicily. Nissen has shown with admir¬ able thoroughness the effect of Italy's topog¬ raphy and situation upon its historical develop- ment. _ The importance of local geographical conditions for the development of national his¬ tory was made apparent in the case of France by Michelet ; with regard to England by Green ; for Germany by Riehl ; and with respect to the settlement and history of North America by Payne, Shaler, Semple, Hulbert, Brigham and Turner. Finally, Buckle and Hellwald have, with less success, attempted general surveys based upon the conception of the interdepend¬ ence of nature and the human mind, while Hel- molt has presided over the production of the first extensive co-operative history which has made a consistent attempt to emphasize the anthropological and geographical factors in his¬ torical development according to the general doctrines of Ratzel. The above bald enumer¬ ation of the chief phases of progress in modern anthropo-geography and its contributions to his¬ torical interpretation, perhaps, calls for some critical reservations. In no field has there been greater exaggeration of a single set of "causes,® or a more persistent flouting of the rules of critical methodology. Particularly have the adherents of this type of interpretation failed to distinguish between a "conditioning® and a "determining® influence. Finally, it is a gen¬ erally accepted doctrine among all critical students of cultural evolution that environmen¬ tal influences decrease in importance in propor¬ tion as the progress of science and civilization enables man to subdue nature to his own pur¬ poses. _ For these valuable criticisms of too enthusiastic an

acceptance of the geographical interpretation students are more indebted to the analytical anthropologists, such as Boas, Wissler, Lowie and Goldenweiser, than to the criticism of historians.

Even more direct and vital in its influence upon historiography was the new science of anthropology, which, in its modern form, was a product of the new evolutionary concepts applied to the study of mankind as a unity. While not ignoring the contributions of earlier students, modern anthropology owed its origin primarily to the researches and writings of Tylor in England, Bastian in Germany and Boas in America. Its purpose, according to Professor Boas, is "to reconstruct the early history of mankind, and, wherever possible, to express, in the form of laws ever-recurring modes of historical happenings.® The chief point y of contact between anthropology and his¬ tory is found in the attempt of the former to discover and formulate the laws of cultural evolution. With the controversies between the older school of unilateral evolutionists, repre¬ sented by Spencer, Avebury, Morgan and Frazer, the more recent advocates of the doc¬

trine of "diffusion,® such as F. Graebner, Rivers and Elliott Smith, and the exponents of the so-called theory of "convergent develop¬ ment® of cultural similarities and repetitions, among the most important of whom are Ehrenreich, Boas, Lowie and Goldenweiser, it will be impossible to deal in this place. It will be sufficient to insist upon the fact that no historian can regard himself as competent to attempt any large synthesis of historical ma¬ terial without having thoroughly acquainted himself with these fundamental attempts to bring definite laws of development out of the chaos of historical facts. An attempt to link up cultural anthropology with a dynamic his¬ tory has recently been made in two thoughtful books by Professor Teggart of the University of California. Dr. Goldenweiser in a recent brilliant . article has endeavored to provide a systematic methodological point of departure for scientific history and critical anthropology.

. Several other significant influences of anthropology in altering the attitude of the historian should be noted. In the first place, nothing could be more destructive of chauvinism or more important for acquiring a proper perspective for the interpretation of his¬ torical development than a perusal of the com¬ parative surveys of legal, political, social and religious institutions by such writers as Lippert, Ihering, Tylor, Westermarck, Hobhouse, Durk- heim and Sumner. The greatest blow to the venerable myth of the origins of political democracy in the Germanic folk-moot, which it ever sustained, was the discovery that it could be matched among primitive peoples the world over and that it was not the sole posses¬ sion, of the "noblest branch of the Aryans.® Again, while the laws of cultural

development which have been formulated by anthropology and the breadth or view inseparable from the handling of anthropological data are of the utmost value to all fields of history, anthropol¬ ogy has a particularly close relation to the field of ancient history in that the beginnings of civilization cannot be properly understood and interpreted without a thorough acquaintance with the background of the primitive culture which preceded the dawn of written history. Finally, anthropology, by its study of mankind as a unity in time and space and especially through its basic premise developed by Bastian of the fundamental unity of the human mind, has for the first time provided a firm basis for a rational conception of the real unity of history.

Closely related to the subject of anthropol¬ ogy, and by some considered a branch of that science, is the relatively recent science of pre¬ historic and proto-historic archaeology. Work¬ ing in co-operation with geologists and students of paleontology and comparative anatomy the archaeologists, such as Boucher de Perthes, Rutot, Breuil, Boule, Dechelette, Cartailhac, Schmidt, Obermaier, Peet and Munro, have revealed the existence of mankind on the earth during a space of time almost beyond the range of human conception. The origins of the race have been pushed back from the few thousand years comprehended in the exact chronologies of Eusebius, Jerome, Usher and Lightfoot to a vague and uncertain period not less than a quarter of a million years ago. The profound modification in the historical perspective which this epoch-making discovery has necessitated

is obvious. As Professor Robinson has pointed out, 1 hales and Herodotus can no longer be regarded as among the <(ancients," but in the new scale of time must be viewed as our con¬ temporaries. Not only has the discovery of the remoteness of human origins fundamentally altered all previous conceptions of the time ele¬ ment in history, but it has given a new impulse to a dynamic theory of progress, in that it has shown that mankind have advanced further in the few centuries that have elapsed since the dawn of written history than they had in the tens of thousands of years previous to that time, and also because it has demonstrated that the rate of progress seems to be accelerated almost beyond comparison as one approaches extremely recent times. Not only have the archaeologists rendered almost revolutionary services to his¬ tory in lengthening the historical perspective, but they have also been of the utmost assist¬ ance in increasing the historian's knowledge of "lost civilizations" within what are convention¬ ally regarded as ˆhistoric" times. Winckler and Garstang have rediscovered the lost Hittite civilization of ancient Syria. Schliemann, Evans

and Dorpfeld, among others, have re¬ vealed a flourishing Aegean civilization coeval with the civilization of. Egypt in the ((Pyramid Age" of the third millenium b.c. The pro¬ genitors of the historic Greeks no longer ap¬ pear as the builders of civilization but as bar¬ barous destroyers who ruined a civilization which they were unable to match for five centuries. Equally significant, though less familiar, are the researches of Dechelette, Jullian, Rice Holmes and others in the history and culture of ancient Gaul, which have ex¬ hibited an early north European civilization which was in touch with the Aegean civiliza¬ tion at its height and have thrown into high relief the relative savagery and backwardness of Teutonic culture as it appeared in western Europe at the beginning of the Christian era. No adequate history of Europe can any longer ignore the vital importance of this ancient Celtic culture. In this same department should be placed the epoch-making discoveries in philol¬ ogy and archseologv which have allowed scholars to arrive at an accurate and compre¬ hensive knowledge of the civilizations of the ancient East, which had been hitherto known only by allusions in the literature of the Hebrews, Greeks and Romans. About 1825 Champollion deciphered the Rosetta stone, mastered hieroglyphics and laid the foundations of Egyptology. Egyptian chronology and philology were firmly established by Lepsius and Brugsch. Mariette, Maspero and Petrie have led in the excavations that have produced Egyptian archaeology. Meyer has revised Egyptian chronology and Breasted has produced the best synthesis of the history of Egyptian civilization. Erman has provided the only de¬ tailed study of the social history of Egypt. What Champollion achieved for Egyptology was ac¬ complished for the history of Babvlonia and Assyria by Henry Rawlinson through his read¬ ing of the Behistun inscription in the middle of the 19th century. Schrader, Delitzsch and Lagarde perfected Assvriology and Semitic philology; Botta, Layard, Sarzec, Hilorecht and Winckler have supervised the all-important excavations of this region ; and Maspero. Meyer, Rogers, Goodspeed and King have pro-

vided the most reliable narratives of Assyrian and Babylonian history, while Jastrow has drawn the best picture of the culture of these ancient nations.

Another most important development in his¬ toriography in the last century has been the gradual but sure secularization of <(sacred" his¬ tory and the consequent removal of the last ob¬ stacle to the scholarly and objective treatment of every field of history. This progress has been in part a product of the brilliant advances in the critical methods in the last century, and in part has been due to the philosophical de¬ struction of the whole basis of the conception of (

still further by the brilliant Cambridge pro¬ fessor, Robertson Smith, in his (Religion of the Semites,* which showed the many points of similarity between the religion of the Hebrews and the religious beliefs and practices of the other branches of the Semitic peoples. Finally, Delitzsch, Winckler and Rogers have made clear the profound influence of the ˆBabylonian his¬ torical and religious traditions upon the religion of Israel. While the work of the most of these writers was highly technical and intended pri¬ marily for scholars, its general significance was popularized through Renan's brilliant and wide¬ ly-read (History of the People of Israeli No less startling has been the result of the inva¬ sion of the "sacred® history of the Christian era by the critical methods. Building on the basis of the textual criticism of the sources of the New Testament by such scholars as Strauss, Baur, Loisy and Harnack, and the study of con¬ temporary religions by Renan, Hatch, Cumont, Glover, Dill and others, Percy Gardner, Weiz-sacker, Conybeare, Wernle, Harnack, Duchesne and McGiffert have explained with great schol¬ arship and lucidity the syncretic nature of Apostolic and Patristic Christianity, the his¬ toric causes for the final success of Christian¬ ity, and the nature of the gradual development of Christian dogma and ecclesiastical organiza¬ tion. Henry C. Lea, in a series of massive monographs, which constitute the most notable contribution of America to Church history, has dealt with the most diverse phases of the his¬ tory of the mediaeval Church in a fine objective and secular spirit. Beard and Troltsch have traced the rise and development of Protestant¬ ism with insight and candor. Three Catholic scholars of the highest rank in the field of scholarship, Dollinger, Huber and Reusch, have made as great contributions to the battle against ecclesiastical obscurantism as any his¬ torians from the Protestant or sceptical camps. Dollinger totally demolished the alleged his¬ torical foundations of ultra-montanism and in¬ fallibility in his work on (The Pope and the Council.) Huber surveyed the history of the Jesuits with the aim of proving their deadly opposition to the spirit of modern learning and the freedom of thought. Reusch contributed the standard treatise on the history of the Papal Index and threw a flood of light upon the sinister machinery through which the re¬ actionary element in Catholicism has endeavored to perpetuate the credulity of its followers and to exclude the perilous fruits of modern scien¬ tific and critical research. The net result of the labors of critical scholars of every religious complexion in the field of <(sacred history® has been to destroy entirely the premises of the "Fathers,® which led them to mark 'off a field of historical development which was taboo to critical research, and it has opened every field to the operation of the same degree of patient research and calm and objective narration.

With the growth of modern natural science and the critical attitude in the appropriation and assimilation of knowledge, the effort to formu¬ late some magnificent and systematic philo¬ sophical scheme for the organization and pres¬ entation of historical development, such as was devised by Augustine and Hegel, has greatly declined. Scepticism of any formal philosophy of history seems to be but a necessary accom¬ paniment of our increasing knowledge of the

infinite complexity of social and historical phenomena, as these attempts to reduce history to such simplicity savor too much of the a priori method, now so thoroughly discredited. To take the place of the older dogmatic philoso¬ phy of history there have developed what may be called various "interpretations® of historical data. These at present differ from the older philosophy of history in the absence of any teleological element and in the rejection of the deductive method. They aim solely to em¬ phasize and bring into high relief those factors, which, according to the various schools, seem to have been most influential in producing the civilization of to-day. It is, in short, the at¬ tempt to supplement Ranke's aimless search for what occurred in the past by at least a feeble and humble effort to explain how the present order came about. Far from being less scientific than the older program of Ranke, it really constitutes the perfect completion of scientific method in historiography, in the same way that 'the formulatipn of the great laws of natural science constitute the logical com¬ pletion of the task of gathering data by observation and experimentation in the labora¬ tory. The preceding sketch of the develop¬ ment of historiography affords striking corrobo¬ ration of the thesis of Professor Shotwell that the prevailing types of historical interpretation through the ages faithfully reflect the dominat¬ ing intellectual interests of the successive eras. The divine epics of the ancient Orient were superseded by the mythological and philosophi¬ cal interpretations of the thinkers of classical antiquity. With the general acceptance of Christianity, the classical mythology was replaced by that eschatological conception which domi¬ nated historical interpretation from Augustine to Bossuet. With the coming of the commercial revolution and its violent shock to the old intellectual order, there arose the critical and rationalistic school of Bacon, Descartes, Vol¬ taire and Hume, which, on account of its being too far in advance of the intellectual orienta¬ tion of the masses, tended to lapse into the idealism of Kant and Fichte and the romanti¬ cism of Burke, Bonald, DeMaistre and Hegel. The growth of nationalism following the French Revolution tended to give temporary precedence to the political mode of interpre¬ tation, but the great transformations which constituted the industrial revolution, of ne¬ cessity doomed so superficial a view to an ephemeral existence. The unprecedented breadth and depth of modern knowledge and intel¬ lectual interests have produced a number of interpretations of historical

development, most of which represent the outgrowth of some one of those outstanding intellectual and social transformations which were reviewed above. There are at present some eight definite schools of historical interpretation among the representatives of the modernized students of historical phenomena, each of which has made an important contribution to our knowledge of historical development. They are in no sense in all cases mutually exclusive, but are rather, to a large degree, supplementary. They mav be designated as the personal or "great man® theory; the economic or materialistic; the allied geographical or environmental ; the spirit¬ ual, or idealistic; the scientific; the anthropo¬ logical; the sociological; and the synthetic or

"collective psyschological.® It may be pointed out in passing that, in the main, the older type of historian either clings to the outworn theory of political causation, or, with Professor Emer- ton, holds that historical development is en¬ tirely arbitrary and obeys no ascertainable laws. The best known of these schools of historical interpretation, and the only one that the cur¬ rent political historians accord! any considera¬ tion, is that which found its most noted rep¬ resentatives in Carlyle and Froude, who claimed that the great personalities of history were the main causative factors in historical de¬ velopment. This view is. of course, closely allied to the catastrophic interpretation of the 18th century rationalists. Perhaps its most dis¬ tinguished adherents io-day are Prof, fimile Faguet of Paris, and Mr. William Roscoe Thayer of Harvard University. The contribu¬ tions of the economic school of historical inter¬ pretation, which was founded by Feurbach and Marx, and has been carried on by a host of later and less dogmatic writers, such as Sumner, Schmoller, Loria, Simons, Ashley, Beard, Bogart and Simkhovitch, are too familiar to call for any additional elaboration. In its best and most generally accepted form, it contends that the prevailing mode and status of the economic processes in society will to a very great degree decide the nature of existing social insti¬ tutions. In spite of slight exaggerations, no phase of historical interpretation has been more fruitful or epoch-making. Imme¬ diately related is the geographical interpreta¬ tion of history which began with Hippocrates and continued through the writings of Strabo, Vitruvius, Bodin Montesquieu and Buckle, has been revived and given a more scientific inter¬ pretation in the hands of such writers as Karl Ritter, Ratzel, Reclus, Semple, Metchnikoff, Demolins and Huntington. Since the days of Ritter no respectable historian has dared to chronicle the history of a nation without first having acquired a knowledge of its geography. The special phases of this interpretation have been sketched above and need not be repeated at this point. Widely at*

variance with the economic and geographical interpretation is the somewhat belated offshoot of the idealism of Fichte and Hegel, to be found in the so-called spiritual interpretation of history, which finds its most ardent advocates in Prof. Rudolph Eucken of Germany and Prof. Shailer Matthews of Chicago. Professor Matthews thus defines this view of history: "The spiritual interpre- tion of history must be found in the discover of spiritual forces co-operating with geographic and economic to produce a general tendency toward conditions which are truly personal.

And these conditions will not be found in gen¬ eralizations concerning metaphysical entities, but in the activities of worthful men finding self-expression in social relations for the ever more complete subjection of physical nature to human welfare.® Viewed in this sense, this type of interpretation can be said to have a considerable affinity with the "great man® theory and apparently aims to reconcile this doctrine with the critical and synthetic interpretation, under cover of a common theological orienta¬ tion. Closely conformable to this mode of inter¬ pretation is Prof. E. D. Adams' attemot to con¬ nect the historical development of the United

States with a succession of great national ideals, the origins of which are not explained.. The attempt to view human progress as directly correlated with the advances in natural science received its first great exposition in the writings of Condorcet and was revived by Comte and Buckle. Aside from the attention given to it by students of the history of science, such as Sarton, Tannery, Libby and Sedgwick, this phase of historical interpretation has been sadly neglected by recent historians, though Prof. F. S. Marvin and Prof. Lynn Thorndike have recently shown its promising potentialities. It has been emphasized incidentally by Professors Lamprecht, Shotwell and Robinson in their synthetic interpretation of history, but it re¬ mains the least exploited, and yet, perhaps, the most promising of all the special phases of historical interpretation. Its adherents claim a more fundamental causal importance than can be assigned to the economic interpretation, in that they contend that the prevailing state of scientific knowledge and application will deter¬ mine the existing modes of economic life and activities. The main tenets of the anthro¬ pological interpretation, as well as an enumera¬ tion of its chief adherents, have been provided above and may be passed over at this point. The closely related sociological intepretation of history goes back as far as the Arab, Ibn Khal¬ dun; was developed by Vico, Turgot, Ferguson, Condorcet, Comte and Spencer; and has its ablest modern representatives in Professor Giddings of Columbia, Professor Thomas of Chicago and Professor Hobhouse of London. Professor Giddings admirably describes this theory as "an attempt to account for the origin, structure and activities of society by the opera¬ tion of physical, vital and psychical causes, working together in a process of evolution.® As a genetic social science, it works hand in hand with cultural anthropology

in the effort to explain the repetitions and uniformities in his¬ torical development and to formulate the laws of historical causation. But the latest, most inclusive and most important of all types of historical interpretation, and the one which, perhaps, most perfectly represents the newer history, is the synthetic or "collective psycho¬ logical.® According ,to this type of historical interpretation no single category of "causes® is sufficient to explain all phases and periods of historical development. Nothing less than the collective psychology of any period can be deemed adequate to determine the historical development of that age, and it is the task of the historian to discover, evaluate and set forth the chief factors which create and shape the collective view of life and determine the nature of the group struggle for existence and improvement. The most eminent leaders of this school of historical interpretation have

been Professor Lamprecht of Leipzig; Pro¬ fessors Levy-Bruhl, Fouillee, Seignobos and Durkheim of Paris; Professor Marvin of Lon¬ don ; Professors Robinson and Shotweff of Columbia University, and Professor Veblen of New York. Their general doctrine has gained particular acceptance in France, probably on account of the early and extensive development of social psychology in that country.

Even this brief and hasty review of a few of the more conspicuous innovations in the de-

velopment of historiography in the last century will convince the reader that the progress in this field has not been less than in the other branches of human knowledge. It will serve to convey the full significance of Frederic Har¬ rison's statement that Freeman's conception of history as exclusively <(past politics® ignored nine-tenths of human history. A synthesis of the various modes of approach to the subject- matter of history must be the ideal of all future historians, but the difficulties inherent in this endeavor will make it hard to be attained. An attempt at a synthetic review of the de¬ velopment of civilization has been essayed by Professor Seignobos. A less complete, but a more stimulating and suggestive outline has been supplied by Professor Marvin. An ambi¬ tious attempt at both a synthesis and exposition of universal history has recently appeared from the pen of H. G. Wells. While uneven in qual¬ ity and often inaccurate it will doubtless revolu¬ tionize the popular view of history. A much more successful, though more restricted, at¬ tempt at historical synthesis is to be seen in the recent lectures of Prof. J. H. Breasted on (The Origins of Civilization.) Professors Robin¬ son and Shotwell have long urged and

pre¬ dicted a larger synthesis of historical ma¬ terial. Whatever success daring individual scholars may achieve in this synthetic move¬ ment, it will be apparent that the history of the future must be more and more a co¬ operative work. The complete mastery of all the newer points of attack will be denied to most individuals and each must contribute through his own speciality. The understanding of this vital fact has contributed more than anything else to a growing spirit of mutual toleration and appreciation among the various "schools® of historians. In much the same way that the truth has been replaced by truth in recent years, so the history of various enthusi¬ asts has been supplanted by a broader and sounder history. Again, in view of the fact that it has now become apparent that the prog¬ ress of the human race in a cultural sense since 1500 has been greater than the advancement in 50 or more preceding centuries, the supreme importance of modern history has come to be generally recognized, and the primary at¬ tention of the previous generation to mediaeval history has become a thing of the past. The earnest labors of the medievalists cannot be deplored for they have furnished the younger generation of historical scholars with not only a sound methodologv, but also with the indis¬ pensable background for interpreting the origins of the modern age. Out of the labors of the last half century has come a "new history® which will not only furnish a mental discipline for training in the methods of exact scholarship, but will also enable one to know the past and interpret its significance. As Professor Robin¬ son has said:. "The (New History> is escaping from the limitations formerly imposed upon a study of the past. It will come in time con¬ sciously to meet our daily needs; it will avail it¬ self of all those discoveries that are being made about mankind by anthropologists ; economists, psychologists and sociologists • — discoveries

which during the last 50 vears have served to revolutionize our idea's of the origin, progress and prospects of our race. . . . History must not be regarded as a stationary subject

wtliich can only progress by refining its methods . and accumulating, criticizing, and assimilating new material, but it is bound to alter its ideals and aims with the general progress of society and the social Sciences, and it will ultimately play an infinitely more im¬ portant role in our intellectual life than it has hitherto done.®

Bibliography — I. The Nature of His¬ tory. — Adams, E. D., (The Power of Ideals in American History) ; Adams, G. B., (History and the Philosophy of History) (in The Amer¬ ican Historical Review, 1909) ; Adams, H. B., (Methods of Historical Study); Barth, F., Pie Philosophic der Geschichte als Soziologie) ; Beard, C. A., (An Economic Interpretation of the Constitution of the United States) (Chap. I) ; Bernheim, E., Pehrbuch der historischen Methode (Chap. I) ; Berr, H., Pa Synthese en Histoire) ; Bourne, H. E.,*

(The Teaching of History); Bristol, L. M., (Social Adapta¬ tion) (Chaps. Ill, VI, VIII, IX); Buckle, H. T., (History of Civilization in England> (Chap. I) ; Burr, G. L., (Freedom in History) (in The American Historical Review, 1917) ; Bury, J. B., (The Science of History) (Inau¬ gural Lecture as Regius Professor of Modern History at Cambridge) ; Carlyle, T., < Essay on History) ; Comte, A., (The Principles of A Positive Polity) (Vol. Ill) ; Croce, B.,

(Inaugural Lecture as Regius Professor of Modern History at Cambridge) ; Dilthey, W., (Einleitung in die Geisteswissenschaften) ; Droysen, J. G., Precis of the Science of His¬ tory) ; Dunning, W. A., Pruth in History) (in The American Historical Review, 1914) ; Eucken, R., Pie Einheit des Geistlebens) ; Flint, R., (The History of the Philosophy of History) (2 vols.) ; Freeman, E. A., ('The Methods of Historical Study) ; George, H. B., historical Evidence) ; Giddings, F. H., Prin¬ ciples of Sociology) (Book I) ;

J. H., headings in European History) (Vol. I Chap. I) : (The New. History) ; Seligman, E. R. A., The Economic Interpretation of His¬ tory) ; Shotwell, J. T„ (The Interpretation of Hrstory) (in The American Historical Review, 1913) ; History) (Eleventh edition of Encyclo¬ paedia Britannica) ; Simmel, G., Pie Probleme der Geschichtsphilosophie) ; Small, A. W., (The Meaning of Social Science) ; Spencer, H. What Knowledge is of Most Worth) (in West-

minister Review, 1859) ; Taine, H., (History of English Literature) (Introduction) ; Tarde, G., (The Laws of Imitation5 (Chap. IV) ; Teggart, F. J., (Prolegomena to History) ; (The Process of History) ; Thorndike, L., (History of Medi¬ aeval Europe5 ; (Chap. I) • 'The Scientific Pre¬ sentation of History5 (in Popular Science Monthly, 1910) ; Todd, A. J., 'Theories of So¬ cial Progress) (Part III) ; Trevelyan, G. M., 'Clio, A Muse) ; Troeltsch, E.,

II. The ((Threshold of History.® — Arthur, J., 'Time and its Measurement ; Breasted, J. H., 'Ancient Times) (Chaps. I— II) ; 'The Development of Religion and Thought in An¬ cient Egypt 5 ; Dechelette, J., 'Manuel d'Arche- ologie prehistorique5 ; Dussaud, R., 'Les Civil¬ isations prehelleniques5 ; Fowler and Wheeler, 'Greek Archaeology) ; Haddon, A. C., (A His¬ tory of Anthropology5 (especially Chap. VIII) ; Hall, H. R., (Ancient History of the Near East (Chap. I, Section 6) ; Hawes, H. B., 'Crete, the Forerunner of Greece) ; Lubbock, J., Prehistoric Times) ; Macdonald, J. C., Chro¬ nologies and Calendars) ; Marett, R. R., (An¬

thropology^ 5 (Chao. V) • Marti, K., (Chronol¬ ogy) (in Encyclopedia Biblica) ; Meyer, E., 'ZEgyptische Chronologie5 ; Morgan, J. de, 'Les premieres civilisations) ; Mortillet, G. de, (La Prehistoric5 ; (La Classification ethnologique) ; Munro, R., Palaeolithic Man and Terremare Settlements in Europe) ; (The Lake Dwellings of Europe) ; Osborn, H. F., 'Men of the Old Stone Age) ; Peet, T. E., (The Stone and Bronze Ages in Italy) ; 'Rough Stone Monuments and their Builders) ; Robinson, J. H., 'The New History5 (Chap. Ill) ; Sedgwick and Tyler, 'A Short History of Science) (Chaps. I-VI) ; Shotwell, J. T., 'The Discovery of Time) (in Journal of Psychology, Philosophy and Scien¬ tific Methods, 1915) ; Sollas, W. J., 'Ancient Hunters and their Modern Representatives5 ; Tylor, E. B., ' Anthropology 5 (Chaps. IV, V, VII, XIII, XV) ; Webster, H., Pest Days5 (especially Chap. VI) ; 'Ancient History) (Chap. I) ; White, A. D., 'A History of the Warfare of Science with Theology5 (Vol. I, Chaps. I, V-X).

III. Historiography in Oriental Antiquity. — Bacon, B. W., 'The Genesis of Genesis5; Breasted, J. H., 'Ancient Records of Egypt5 (Introduction) ; Charles, R. H., 'Between the Old and New Testaments5 ; 'Apocrapha and Pseudepigrapha5 ; Cheyne, T. K., 'The Found¬ ers of Old Testament Criticism5 ; Cory, I. P., 'Ancient Fragments5 ; Duff, A., 'History of Old Testament Criticism5 ; Hall, H. R., 'The An¬ cient History of the Near East5 (Chap. I) ; Harper, R. F., (ed.) 'Assyrian and Babylonian Literature5 ; Jacobs, J., 'Historiography5 (in Jewish Encyclopedia) ; Johns, C. W. H., 'An¬ cient Babylonia5 (Chap. I) ; 'Ancient Assyria5 (Chaps. I— II) ; Kent, C. F., 'The Students' Old Testament logicallv and chronologically Ar¬ ranged5 ; King, L. W., 'Chronicles Concerning the Early Babylonian Kings5 ; Moore, G. F., 'The Literature of the Old Testament5 ; Rogers, R.W., 'History of Babylonia and Assyria5 (Vol. I, especially Chap. X) ; 'Cuneiform Parallels to the Old Testament5 ; Sayce, A. H., and others

(ed.), 'Records of the Past5; Torrey, C. C., 'The Composition and Historical Value of Ezra-Nehemiah5 ; Wellhausen, J., 'The History of Israel5 ; 'Die Composition des Hexateuchs.5

IV. Historiography among the Greeks and Romans. — Boissier, G., 'Tacitus5; Botsford, G. W., 'A Source Book of Ancient History5 (Chaps. VI, XXVIII) ; Botsford and Sihler, 'Hellenic Civilization5 ; Bury, J. B., 'The An¬ cient Greek Historians5 ; Cauer, F., 'Thukydides und Seine Vorganger5 (in Historisclie Zeit- schrift, 1899) ; Christ, W.,'Geschichte der griech- ischen Literatur5 ; Cornford, F. M., 'Thucy¬ dides Mythistoricus5 ; Croiset, A., 'Histoire de la Litterature Grecque5 ; Cruttwell, 'History of Roman Literature5 • Cuntz, O., 'Polybius und sein Werk5 ; Drerup, E., 'Die historische Kunst der Griechen5; Duff, J. W., 'A Literary His¬ tory of Rome5 ; Gomperz, T., 'Greek Thinkers5 ; Grundy, G. B., 'Thucydides and

the History of his Age5 ; Holmes, T. R., 'Julius Caesar's Con¬ quest of Gaul5 ; Kornemann, E., 'Thukydides und die romische Historiographie5 ; 'Kaiser Hadrian und der letzte grosse Historiker von Rom5 ; Mackail, J. W., 'Latin Literature5 ; Ma- haffy, J. P., 'History of Classical Greek Litera¬ ture5 ; Murray, G.,' 'A History of Ancient Greek Literature5 ; Myres, J. L., (ed.) 'Anthro¬ pology and the Classics5 (Chap. V) ; Peter, H., 'Wahrheit und Kunst, Geschichtschreibung und Plagiat im Klassischen Altertum5 ; 'Die ge- schichtliche Literatur fiber die romische Kaiser- zeit bis Theodosius I und ihre Quellen5 ; Sus- emihl, F., 'Geschichte der griechischen Litera¬ tur in der Alexandrinerzeit5 ; Teuffel and Schwabe, 'History of Roman Literature5 ; Wachsmuth, C., 'Uber Ziele und Methoden der griechischen Geschichtschreibung. 5

V. The Historical Writings of the Apos¬ tolic and Patristic Periods. — Ayer, J. C., 'Source Book for Ancient Church History5 ; Bacon, B. W., 'The Making of the New Testa¬ ment5 ; Bardenhewer, O., 'Patrology5 ; 'Ges¬ chichte der altkirchlichen Litteratur5 ; Bury, J. B., 'The History of the Freedom of Thought5 (Chap. Ill) ; Church, R. W., 'Cas- siodorus5 ; Conybeare, F. C., 'Myth, Magic and Morals5 ; 'History of New Testament Criticism5 ; Duchesne, L., 'The Early History of the Christian Church5 ; Ebert, A.,ˆ 'Histoire generate de la litterature du moyen age5 (Vol. I) ; Flick, A. C., 'The Rise of the Mediaeval Church5 ; Gibbon, E., 'The Decline and Fall of the Roman Empire5 (Chaps. XV-XVI) ; Gwatkin, H. M., 'Selections from the Early Christian Writers5 ; Harnack, A., 'A History of Dogma5 ; 'Geschichte der altchristlichen Litteratur5 ; Kirch, J. P., 'History5 (in CathoHc Encyclopedia) ; Krfiger, G., 'History of Early Christian Literature5 ; Loisy, A., 'Les Lvan- geles synoptiques5 ; McGiffert, A. C., 'The Church History of Eusebius5 ; 'History of the Apostolic Age5 ; Muzzey, D. S., 'The Rise of the New Testament5 ; Nash, H. S., 'The His¬ tory of the Higher Criticism of the New Testa¬ ment5 ; Ogden, C. J., 'Orosius' Seven Books of History Against' the Pagans5 ; Renan, E., 'History of the Origins of Christianity5 ; San¬ tayana, G., 'Reason in Religion5 (Chap VI) ; Schaff and Wace, (eds.), 'The Ante-Nicene, Nicene, and Post-Nicene Fathers5 ; 'A Dic¬ tionary of Christian Biography5 ; Shot- well, J. T., 'Christianity and History5; Taylor, H. O., 'The Mediaeval Mind5 (Chaps.

TII-V) : Vincent, M. R.,. (The Histoiy of the Textual Criticism of. the New Testament; Wrede, W., (The Origin of the New Testa¬ ment.)

VI. Medieval Historiography. — Balzani,

U., (Early Chroniclers of Europe: Italy) ;

Brehaut, E., (The History of the Franks by Gregory, Bishop of Tours) ; Budinger, M., ; Delisle, L., Citterature latine et histoire du moyen age) ; Ebert, A., (Histoire generale de la litterature du moyen age a l'Eu- rope occidental ; Foulke, W. D., ; Gairdner, J., (Early Chroniclers of Europe: England) ; Giles, J. A., (Matthew Paris' Eng¬ lish History from the Year 1235 to 1273) ; Gross, C., (The Sources and Literature of Eng¬ lish History) ; Hashagen, J., (Otto von Freis¬ ing als Geschichtsphilosoph und Kirchenpolit- iker) ; Hayes, C. J. H., (An Introduction to the Sources relating to the Germanic Invasions) ; Jahncke, R., (Guilelmus Neubrigensis) ; Jones, W. L., Catin Chroniclers from the Eleventh to. the Thirteenth Centuries) (in Cambridge History of English Literature) Vol. I, Chap. IX); Langlois, C. V., C'historiographie) ; Lasch, B., (Das Erwachen und die Entwicke- lung der historischen Kritik im Mittelalter) ; Manitius, M., ˆGeschichte der lateinischen Lit¬ eratim des Mittelalters) ; Masson, G., (Early Chroniclers of Europe.: France); Molinier, A., Ces sources de l'histoire de France> (Vol. V, Introduction) ; Otto of Freising, (Die Taten Friedrichs) (in Die Geschichtschreiber) ; Pae- tow, L. J., (A Guide to the Study of Mediae¬ val History) ; Paris and Jeanroy, < Extraits des chroniqueurs francais ; Potthast, A., (Weg- weiser durch die Geschichtswerke des euro- paischen Mittelalters) ; Ritter, M., (Die Christ- lich-mittelalterliche Geschichtschreibung) (in Historische Zeitschrift, 1911) ; Robinson, J. H.,*

(Readings in European History > (Chaps. I, IV, X-XII) ; Sandys, J. E., (A History of Class¬ ical Scholarship) (Vol. I) ; Schulz, M., (Die Lehre von der historischen Methode bei den Geschichtschreibern des Mittelalters) ; Steven¬ son, W. H., (Six English Chronicles) ; Taylor, H. O., (The Mediaeval Mind) (Chaps. X-XIII, XXI, XXXI) ; Teuffel, R., (Individuelle Per- sohnlichkeitschilderung in dem Deutschen Ge- schichtswesen des 10 und 11 Jahrhunderts) ; Wattenbach and Lcrenz, Ceutschlands Ge- schichtsquellen im Mittelalter.)

VII. Humanism and Historiography. — Beck, F., (Studien zu Leonardo Bruni) ; Benoist, E., (Guichardin) ; Brandi, K., (Das Werden des Renaissance) ; Brown, P. H., (George Buchanan, Humanist and Reformer) ; Cirot, G., Mariana historien) ; Clarke and Fox- croft, (A Life of Gilbert BurneG (Introduction by C. H. Firth) ; Emerton, E., (The Begin¬ nings of Modern Europe) (Chaps. IX-X) ; Firth, C. H., Clarendon's History) (in English Historical Review, 1904) ; Fueter, E., C'His- toire de l'Historiographie Moderne) (Books I- II) ; Gebhardt, E., Ces historiens florentins de la Renaissance et les commencements de la economic politique et sociale) ; Gervinus, G., f Geschichte der florentinischen Historiogra- phie) ; Hulme, E. M., (The Renaissance and the Reformation> ;

Joachimsen, P., rGe-

schichtsauffassung und Geschichtschreibung in Deutschland unter dem Einfluss des Human- ismus) ; Loomis, L., (Mediaeval Hellenism) ;

Masius, A., (Flavius Blondus) ; Mayer, E. W., (Machiavellis Geschichtsauffassung) ; Morley, J. Critical Miscellanies) (Vol. IV) ; Pattison, M., (Essays) ; Ranke, L., (Zur Kritik neuerer Geschichtschreiber) ; Ritter, M., (Studien zur Entwickelung der GeschichtswissenschafC (in Historische Zeitschrift, 1912) ; Rodding, (Puf- endorf als Historiker und Politiker) ; Sandys, J. E., (A History of Classical Scholarship> (Vol. I); Schwahn, W., Corenzo Valla: ein Beitrag zur Geschichte des Humanismus) ; Vil- lari, P., (Niccolo MachiavellP ; Voigt, G., (Die Wiederbelebung des classischen Alterthums) ; Walser, E., (Poggius Florentinus, Leben und Werke) ; Wegele, F. X., Ceschichte der deut¬ schen Historiographie) ; Whitcomb, M., (A Literary Source Book of the Renaissance) ; Wolff, M., Corenzo Valla : sein Leben und seine WerkeP

VIII. The Protestant Reformation and Historiography.— Baur, F. C., (Die Epochen der kirchlichen Geschichtschreibune) ; Beard, C., (The Reformation of the Sixteenth Century in its Relation to Modern Thought and Knowl¬ edgˆ Berger, A. E., (Die Kulturaufgaben der Reformation) ; Bury, J. B., (A History of the Freedom of Thought) (Chap. IV-V) ; Calen- zio, G., (La vita e gli scritti del cardinale Cesare Baronio) ; Floquet, A., (Bossuet, precepteur du Dauphin) ; Fueter, E., C'Histoire de l'histori- ographie moderne) (Book III) ; Lang, A., (John Knox and the Reformation) ; McGiffert, A. C, Crotestant Thought before Kant) ; Maurenbrecher, W., (Studien und Skizzen zur Geschichte der Reformationszeit) ; Robinson, J. H., (The Study of the Lutheran Revolt) (in American Historical Review, 1903) ; Scha¬ fer, E., Cuther als Kirchenhistoriker) ; Schaum- kell, F., (Beitrap- zur Entstehungsgeschichte der Magdeburger Centuries) ; Smith, P., (The Life and Letters of Martin Luther) ; Cuther's Correspondence and Other Contemporary Letters); Weltz, P., Ctude sur Sleidan.)

IX. The Foundations of Modern Histori¬ ography. — (1) The Commercial Revolution and Historiography ,— Abbott, W. C., (The Ex¬ pansion of Europe); Bourne, E. G., (Spain in America).; Cunningham, W., (Western Civiliza¬ tion in its Economic Aspects) (Book V) ; Fueter, E., C'Histoire de l'historiographie mod.- erne) (Book III) ; Gillespie, J. E., (The Influ¬ ence of Overseas Expansion on England to 1700 ˆ; MacNutt, F. A., (Bartholomew de las Casas) ; Merriman, R. B., (The Rise of the Spanish Empire> ; Moses, B., (The Establish¬ ment of Spanish Rule in America) ; Prescott, W. H., (The Conquest of Mexico) ; (The Con¬ quest of Peru 5 (Notes) ; Seignobos, C., Mediae¬ val and Modern Civilization) (Chap.

XVII) ; Shepherd, W. R., Cnpublished Lectures on the Expansion of Europe.)

2. The Rise of Rationalism and Historiog¬ raphy. — . Benn, A. W., (A History of English Rationalism in Nineteenth Century) ; Brougham H. P., Robertson); Bury, J. B., (A History of the Freedom of Thought) (Chaps. VI-VII) ; Daisches, (Das Verhaltniss der Geschichtschrei¬ bung Humes zu seiner praktischen Philoso¬ phic) ; Delvaille, J., Cssai sur l'histoire de l'idee de Progres) ; Fester, R., (Rousseau und die deutsche Geschichtsphilosophie) ; Flint, R.,

(The Philosophy of History in France and Germany5 ; (The History of the Philosophy of History in France) ; Fueter, E., C'Histoire de l'Historiographie moderne) (Book IV) ; Grund- mann, J., (Die geographischen und volkerund- lichen Quellen und Anschauungen in Herders Ideen) ; Henking, K., (Johannes von Miiller) ; Lecky, W. E. H., (The Rise and Influence of Rationalism in Europe) ; McGiffert, A. C., (Protestant Thought oefore Kant5 (Chap. X) ; Morley, J., X-XIV ;) Seignobos, C., Contemporary Civilization (Chap. Ill) ; Stephen, L., (A History of English Thought in the Eighteenth Century) ; Weber, G., (Fried- rich Christoph Schlosser.*

3. Romanticism and Historiography. — Barth,

F. , (Die Geschichtsphilosophie Hegels) ; Brandes,

G. , (The Romantic School in Germany5 ; Dewey,

J. (German Philosophy and Politics) ; Fester, R., (Humboldts und Rankes Ideenlehre5 ; Fueter, E., CHistoire de l'Historiographie moderne) (Book V) ; Flint, R., cThe Philoso¬ phy of History in France and Germany5 ; Froude, J. A., (Thomas Carlyle5 ; Harrison, F., (Tennyson, Ruskin, Mill and Other Literary Estimates5; Holmes, O. W., c Motley5 ; Jullian, C., (Augustin Thierry) (in Revue de synthese historiqne, 1906) ; Monod, G., (Jiiles Michelet5; (La place de Michelet parmi les historiens du XIXe siecle) ; Nichol, J., (Thomas Carlyle) ; Paul, H., (The Life of Froude) ; Robertson, J. M., (Modern Humanists) ; Roe, F. W.,

Carlyle as a Critic of Literature5; Vauthier, G., (Villemain.5

4. Nationalism and Historiography. — Alt- schul, Charles, (The American Revolution as Presented in Our School Text-Books1 ; Bar- doux, A., V-VI)*

; Galley, J. B., Claude FaurieP ; Gooch, G. P., ‘History and Historians in the Nineteenth Cen¬ tury } (Chap. V, VIII-XXII) ; Guerard, B., Notice sur Daunou5 ; Guilland, A., ‘Modern Germany and Her Historians) ; Hausrath, A., ‘Treitschke5 ; Hayes, C. J. H., ‘The War of the Nations) (in Political Science ■ Quarterly, 1914) ; Hanotaux, G., ‘Henri Martin) ; Krehbiel, E., Nationalism, War and Society5; Marcks, E., ‘Treitschke, ein Gedenkblatt5 ; ‘Heidelberger Professoren) ; Meinecke, F.. ‘Heinrich von SybeP (in Historische Zeitschrift, \ 895) ; Mer- riam, C. E., ‘A History of American Political

Theories5 (Chap. VII) ; Morison, J. C., (Ma¬ caulayˆ Monod, G., (Renan, Taine, Michelet5; Jameson, J. F., ‘The History of Historical Writing in America) ; Caps in the Published Records of United States History1* (in Ameri¬ can Historical Review, 1906) ; Jullian, C., (Ex¬ traits des Historiens frangais5 (Introduction) ; Peck, H. T., (W. H. Prescott5 ; Rein, A.,

(Seeley, eine Studie uber den Historiker) ; Remusat, P., (Thiers) ; Robinson, J. H., (What is National Spirit ? > (Century Magazine, 1916) ; Rose, J. H., Nationality in Modern History) ; Simon, J., (Qiiatre Portraits) ; (Thiers, Guizot, Remusat, } (Mignet, Michelet, Henri Martin } ; Sorel, A., Notes et Portraits5 ; Springer, A., (F. C. Dahlmann5 ; Stephens, H. M., (Modern Historians and their Influence on Small Na¬ tionalities5 (in Contemporary Review, 1887) ; Nationality and History5 (in American His¬ torical Review, 1916) ; Stephens, W., (The Life and Letters of Freeman5 ; Trevelyan, G. O., (The Life and Letters of Macaulay5 ; Varren- tropp, C., (Vortrage und Abhandlungen von Heinrich von Sybel5 ; Vinogradoff, P., (Villain¬ age in England5 (Introduction).

5. The Rise of Critical Historical Scholar¬ ship. — Adams, G. B., (Methods of Work in Historical Seminaries5 (in American Historical Review, 1905) ; Adams, H. B., (The Study of History in American Colleges and Universi¬ ties5 ; Altamira, R., (La Ensenanza de la His- toria5 ; Baumer, H., (Mabillon5 ; Bernheim, E , (Lehrbuch der historischen methode5 (Chaps. II-VI) ; Bourne, E. G., (Ranke and the Be¬ ginning of the Seminary Method5 (in Essays in Historical Criticism); Boutmy, E., (A. SoreP; Broglie, E. de, (Mabillon et la societe de Tabbaye de Saint-Germain- des-Pres a la fin du XVIIe siecle5 ; Cazenove, R. de, (Rapin Thoy- ras5 ; Cazes, A., (Pierre Bayle5 ; Channing, Hart and Turner, (A Guide to the Study of American History5 ; Cipolla, C., Ceibniz e Muratori5 ; Classen, J., (B. G. Niebuhr5 ; Dal- berg-Acton, J. E. D., Cerman Schools of His¬ tory5 (in Historical Essays and Studies) ; Daville, L., Ceibniz historien5 ; Dahlmann- Waitz, (Quellenkunde der deutsch’en Ges- chichte5 ; Dilthey, K., Cttfried Müller5 ; Fred- ericq, P., (The Study of History in England, Scotland, Belgium and Holland5 (in Johns Hop¬ kins Studies in Historical

and Political Science, Vols. V-VIII) ; C'Enseignement superieur de l'Histoire en Allemagne, France, Ecosse, Angle- terri, Hollande et Belgique5 ; Fueter, E., C'His¬ toire de l'Historiographie moderne5 (Books V- VI) ; Gooch, G. P., (The Growth of His¬ torical Science5 (in Cambridge Modem His¬ tory, Vol. XII, Chap. XXVI) ; (History and Historians in the Nineteenth Century5 (Chaps. I-IV, VI-VII, XII, XVIII, XXIII) ; Gross, C, (The Sources and Literature of English His¬ tory5 ; Guglia, E., (Ranke's Leben und Werke5 ; Guiraud, P., (Fustel de Coulanges5 ; Hall. G. Stanley (Editor), (Methods of Teaching His¬ tory5 (2d ed.) ; Hartmann, L. M.. (Theodor Mommsen5 ; Haskins, C. H., (Opportunities for American Students of History at Paris5 (in American His.torical Review, 1898) ; Hoffmann, M., (August Bockh 5 ; Tadart, Com Tean Ma- billon5 ; Langlois, C. V., (Manuel de Biblio¬ graphic historique5 ; Langlois and Seignobos, introduction to the Study of History5 (Xpnen- dix II) ; (Melanges et Documents publies a

i'occasion du deuxieme centenaire de la mort de Mabillon' ; Molinier, A., 'Les Sources de l'histoire de France' ; Monod, G., (Georg VVaitz et le Seminaire historique de Goettin- gue' ; (Bibliographie de l'histoire de France' ; Neumann, K. J., (Entwickelung und Aufgaben der alten Geschichte' ; Pattison, Mark, 'Es¬ says' ; Petit, E., 'Frangois Mignet' ; Pitra, Abbe, 'Etudes sur la collection des Actes des Saints' ; Renan, E., 'Etudes d'histoire reli- gieuse' ; Ritter, M., 'Leopold von Ranke' ; Rosenmund, R., 'Die Fortschritte der Diplo¬ mats . seit Mabillon'; Schulte, J. F., 'Karl Friedrich Eichorn' ; Shotwell, J. T., 'The Ecole des Chartes' (in American Historical Re¬ view, 1906) ; Stubbs, W., 'Lectures on Mediae¬ val and Modern History' (I— IV) ; Vincent, J. M., 'Historical Research' ; White, A. D., 'European Schools of History and Politics' (in Johns Hopkins Studies in Historical and Po¬ litical Science, Vol. V) ; Wyer, J. I., 'A Bibliography of the Study and Teaching of History.'

X. Leading Tendencies in Modern His¬ toriography. — Ashley, W. J., 'Surveys, His¬ toric and Economic' j Barth, P., 'Die Phil¬ osophic der Geschichte als Soziologie' ; Beaumont, G. de, 'Notices sur Tocque- ville' ; Bernheim, E., 'Lehrbuch der his- torischen methode' (Chap. I) ; Berr, H., 'La Synthese en Histoire' ; Boas, F., 'The Mind of Primitive Man' (Chaps. VI- VII) ; Bourne, H. E., 'The Teaching of History and Civ¬ ics' ; Bristol, L. M., 'Social Adaptation' (Chaps. IV- VI, VIII-IX) ; Bryce, J., 'Studies in Contemporary Biography' ; Buckle, H. T., 'A History of Civilization in England' (Chap. I) ; Caron and Sagnac, 'L'Etat actuel des Etudes d'Histoire moderne en France' ; Coker, F. W., 'Organismic Theories of the State' ; Conybeare, F. C., 'Myth, Magic and Morals' ; 'A History of New Testament

Criticism' ; Cooley, €. H., 'Social Organization' (Part II) ; Davis, M. M., 'Psychological Interpretations of Societv' (Chaps. II, VI-VIII, XIII) ; Duff, A., 'A His¬ tory of Old Testament Criticism'; Dunning, W. A., 'A Generation of American Historiog¬ raphy' (Address before American Historical Association 1917) ; Ellwood, C. A., 'Sociology m its Psychological Aspects' (Chaps. II— III, VI-VII, XVTII-XIX) ; Firth, C. H , 'A Plea for the Historical Teaching of History' ; Fisher, H. A. L., 'F. W. Maitland'; Friedrich, J., 'Ignatz von Dollinger' ; Fueter, E., 'L'His- toire de l'Historiographie moderne' (Book VI) ; Gibbins, H. D. B., 'Economic and Indus¬ trial Progress of the Century' ; Giddings, F. H., 'A Theory of History,' in The Political Science Quarterly \ Vol. XXXV, December 1920; Gide and Rist, 'A History of Economic Doctrines'; Goldfriedrich, J., 'Die historische I deem eh re im Deutschland' ; Gooch, G. P., 'History and Historians in the Nineteenth Cen¬ tury' (Chaps. XXV-XXVIII) ; Haddon, A. C 'A History of Anthropology' ; Hankins, F. H' 'Adolphe Quetelet as Statistician'; Hayes, C.

J. H., 'A Political and Social History of Mod¬ ern Eurooe' (Vol. II, Chaps. XVIII, XXI XXVII-XXVIII) ; Hazen. C. D.. 'Europe Since 1815' (Chap. XXXII); Hecker, J. F., 'Russian Sociology' (Part II, Chao. IV, Part HI, Chap. IV) ; Hobhouse, L. T., 'Social Evo¬ lution and Political Theory' ; Huth, A. H., 'The

Life and Writings of Buckle' ; Jacobs, P. J., 'German Sociology' (Chaps. II-III) ; Jodi, F., 'Die Kulturgeschichtschreibung' ; Lamprecht, K., 'What is History'; Mace, W. H., 'Method in History' ; Macgregor, D. H., 'The Evolution of Industry'; Mackintosh, R., 'From Comte to Benjamin Kidd'; Merz, J. T., 'History of Eu¬ ropean Thought in the Nineteenth Century' ; Michaelis, A., 'A Century of Archaeological Discoveries' ; Oppenheimer, F., 'The State' ; Robertson, J. M., 'Buckle and His Critics'; Robinson, J. H., 'The New History' ; 'Outline of the History of the Intellectual Class in Western Europe'; Robinson and Beard, 'The Development of Modern Europe' (Vol II Chaps. XVIII, XXXI) ; Rogers, R. W., 'Cunei¬ form Parallels to the Old Testament' ; Scha- piro, J. S., 'Modern and Contemporary Euro¬ pean History' (Chaps. Ill, XXIV-XXVI) ; Schaumkell, F., 'Geschichte der deutschen Kulturgeschichtschreibung' ; Seignobos, C., 'Contemporary Civilization' (Chaps. XIV- XIX) ; Seligmann, E. R. A., 'The Economic Interpretation of History' ; Shotwell, J. T,, 'The History of History: Texts and Commen¬ tary' (in preparation) ; Introduction to G. S. Slater s 'The Making of Modern England' • Introduction to N. D. Harris' 'Intervention and Colonization in Africa' ; 'The Interpreta¬ tion of History' (in American Historical Re¬ view, 1913) ; Small, A. W., 'The Meaning of Social Science' ; Smith, A. L., 'F. W. Maitland, Two Lectures' ; Sumner, W. G., 'Folkways' (Chap. I) ; Todd, A. J., 'Theories of Social Progress' (Chaps. IX, XIV-XV, XXVI- XXVII, XXXI); Tout, T. F., 'Schools of History' (in

University Review, 1906) ; Wal¬ lace A- R-*

Harry Elmer Barnes, Professor of History, Clark University.

HISTORY, Ancient. In the ordinary use of the word, history is a record of past events and conditions as determined by the processes of investigation included in historical method. The history of mankind treats not so much of individuals as of the progress and decline of communities and states with especial reference to morality, religion, intelligence, social organi¬ zation, economic condition, refinement and taste government, and the peaceful and military re¬ lations of governments to one another (cf" An¬ drews, 'Institutes of General History,' p 3) Strictly there are no periods; the life of man¬ kind flows continuously, never wholly chang¬ ing the direction of its current at any definite time. . But for the convenience of study his¬ tory is more or less arbitrarilv divided into periods, during each of which the resultant of changes in the life of mankind, or of a particu¬ lar part of it, is supposed to be a determinable movement of progress or decline which the his¬ torian takes as characteristic of the period.

The familiar division of general history into ancient, mediaeval, and modern may be ac¬ cepted as the most practical, though it is ex¬ ceedingly difficult to define these long and com¬ plex ages. ˆ Most obvious is the geographical chairactenstic. Leaving out of account India and the farther East, which have contributed little to the progress of the rest of the world ancient history has to do (1) with the fertile

river-valleys adjoining the east end of the Med¬ iterranean; (2) with the Mediterranean basin itself ; for the few outlying countries which had a share in ancient history depended upon this area for their civilization. Or taking race and religion as the basis of division, we may define ancient history as the development of pagan, non-Germanic civilization ; for with the thor¬ ough establishment of Christianity and the com¬ ing of the Germans the Middle Age begins. Although ancient history includes many nations and numberless movements of growth and de¬ cay, it shows nevertheless remarkable unity. From simple though diverse beginnings the various peoples of the area above defined de¬ veloped into the one complex political and social organization known as the Roman em¬ pire ; and when with the wreck of this system the ancient world passed away, there began under new conditions that fresh life of man¬ kind which in its earlier stage we call mediae¬ val and in its more mature growth modern.

History does not concern itself with ulti¬ mate origins ; it begins with man in the lowest condition in which it actually finds him, and with the help of anthropology, archaeology and kindred sciences it traces his improvement from that point upward through the earlier known stages of his existence. For the pre¬ historic age, which precedes contemporary written records, we are in many cases in a posi¬ tion to ascertain with great distinctness the condition of government, society and culture, although the nature of our sources do not per¬ mit us to reconstruct a narrative either of po¬ litical activities or of personal achievements. Even when the historian reaches the period of contemporary documents and literature, he con¬ tinues to use all available auxiliary sciences, principally epigraphy, archaeology, numismatics, philology and geography. In testing the genu¬ ineness and the historical value of sources he makes use of critical principles which are be¬ coming more and more definite and effective with the growth of historical method into a science.

Nowhere has source material accumulated so rapidly in recent years as in the Orient and the region about the Higean Sea. As a result of continued explorations there our knowledge of human life has been vastly increased, and the beginnings of history have been pushed much farther back into the past. We are 'now able to study the Egyptians of the paleolithic age (cf. Petrie, (History of Egypt, 4th ed. i. p. 5 ff), although no date can yet be assigned to that primitive culture, nor have yet been dis¬ covered all the links which connect it with the historic age. Beginning with the earliest ap¬ pearance of written records in the Orient, we may divide ancient history into the following periods. In the chronology of the entire time preceding 1500 b.c. there have been great dif¬ ferences of opinion. This article accepts the system of Eduard Meyer, which has been most widely adopted by scholars.*

I. Dawn of Civilization; Political Unifi¬ cation and the Early Centuries of the Old Kingdom of Egypt; the Sumerian Period in Babylonia; the Later Neolithic Age in the iEgean Country, 4000-3000 b.c. — Whether man¬ kind first emerged from the Stone Age in the valley of the Nile or in that of the Tigris and Euphrates rivers has long been disputed, but

the evidence now seems to incline decidedly in favor of Egypt. The date of this event, how¬ ever, has not been closely determined. There can be no doubt that in the fourth millennium b.c. the Egyptians were acquainted with the use of copper tools and weapons. They irri¬ gated their fields, built cities in which they lived under kings, and were acquainted with the elementary practical sciences, such as arithme¬ tic, geometry, surveying and astronomy, as well as with the art of writing (pictographs, hiero¬ glyphs). They had a year of 365 days, which they divided into 12 months.

Gradually the many small principalities along the Nile were united by conquest in a Northern and a Southern kingdom, which were finally joined in one kingdom under Menes about 3300 b.c. The earliest period of united Egypt is designated as the Old Kingdom. Meanwhile tribes of mountaineers, the Sume¬ rians, were invading the lower valley of the Euphrates, evidently from the East. They re¬ deemed these lands from swamps, developed agriculture, created a system of writing (cune¬ iform), which in time they improved in a pho¬ netic direction, and they discovered the use of copper (Hall, (Ancient History of the Near East, p. 30), although for this period no cer¬ tain written records have been found. They invented also the moon-month calendar and the sexagesimal system of numbers. Briefly, they laid the foundations of Babylonian civilization. As no communication between them and the Egyptians can be discovered, we assume, at least provisionally, that these two peoples made their cultural progress independently of each other. During this period the population of the region about the yEgean Sea were passing through the final millenium of neolithic civili¬ zation, best represented in the excavations of Dr. Evans at Cnossus (Hawes, (Crete the Fore¬ runner of Greece*). The rest of the world was not as yet advanced beyond the neolithic stage.*

II. Continuation of the Old Kingdom of Egypt; Early Semitic Migrations into South¬ western Asia; the City-States and the Politi¬ cal Unification of Babylonia; the Early

Minoan Age in the TEgean country; the

Aeneolithic Age in Italy, 3000-2000 b.c. — In the beginning of this period the capital of

Egypt was transferred from Thinis to Mem¬ phis, whose Pharaohs of the fourth dynasty (2840-2680 b.c.) constructed as tombs for

themselves the great pyramids of Gizeh. For the grandeur and strength of its buildings this age is unique in ancient history. At the same time these immense structures are evidence of a high centralization of power in the hands, of the monarchs. A complex system of officials administered the details of governmental busi¬ ness at the capital and in every nook and cor¬ ner of the kingdom. After the age of the pyramid-builders, however, the central govern¬ ment weakened, and the high officials became feudal lords. It was a period of great eco¬ nomic development, involving a change from copper to bronze. The crafts were highly spe¬ cialized. Commerce was carried on by river and caravan with the interior of Soudan ; a canal was dug which connected the lower Nile with the Red Sea; and royal fleets visited the Phoenician coasts, and occasionally the .Egean islands, for the exchange of products. The people, devoted to agriculture and the indus-

trial arts, were peace-loving, submissive to au¬ thority, and intensely religious.

• In Asia bands of Semites, issuing from Arabia, overran all Syria. They were the Canaanites of the South, the Amorites of the North, and the Phoenicians along the coast. These larger tribes divided into small city-kingdoms. Phoenician examples are Sidon and Tyre. Their civilization they obtained from Egypt and even more from Babylonia. About the same time other Semites occupied Accad in the Tigris-Euphrates valley north of the Sumerian country (Sumer, Shinar), and Assur (Assyria) still farther north. Inde¬ pendent city-kingdoms prevailed among the Sumerians till they were conquered by Sargon, king of Accad (about 2750 b.c.). He extended his empire to Elam on the East and to the Mediterranean on the West. After that date the forces of centralization and of disintegra¬ tion alternated till the valley of the two rivers was unified under Hammurabi, an Amorite who had gained control of Babylon (about 2000 b.c.) . He is especially famous for his code, the earliest body of written law preserved to our day.

In the .TEgean region the Early Minoan cul¬ ture, including the use of copper, followed after a few centuries by bronze, prevailed. A sys¬ tem of picture-writing was in use. For a long time the culture centred in Melos, which radi¬ ated its influence upon the neighboring islands, and even farther, upon the Troad in one direc¬ tion and upon Boeotia and Argolis in the other ; but near the close of the period Crete began to occupy the forefront of progress. The use of copper was introduced into Italy about 2500, probably by way of the Danube.

III. The Middle and New Kingdoms and the Empire of Egypt; Culmination and De¬ cline of Babylonia; Beginnings of the He¬ brews; the Middle and Late Minoan Ages; the Bronze Age in Italy and Sicily, 2000- 1200 e.c. — In the beginning of the period Thebes supplanted Memphis as the political centre of Egypt. The most brilliant dynasty was the 12th (about 2000-1788 b.c.). The Pharaohs of this family with a firm hand controlled the feudal lords who since the 6th dynasty had been growing strong over all Egypt, and to whom most of the famous rock-graves of the period belong. The same dynasty conquered Ethiopia (Nubia), carried on a lively trade with Syria, and had commerce with countries as far west as Crete. They built splendid temples, and regulated the waters of the lower Nile by means of a great reservoir in the Fayum. Their utilitarian works contrast strikingly with the grand though selfish idealism of the pyramid- builders.

After the 12th dynasty Egypt again weak¬ ened. While she was in this condition, the Hyksos, who seem to have been Semites from Syria, invaded the Nile Valley, and held parts of the country in subjection a hundred years (1680-1580 b.c.) . Less civilized than the natives, they brought Egypt to a lower stage of culture, but gradually their king and leading men were assimilated. Their own contribution was the introduction of the horse and the war-chariot, the use of which gradually extended to the re¬ motest parts of Europe. After their liberation from this foreign yoke, the Egyptians became a conquering people. The 18th dynasty (158CL

1321 b.c.) built up an empire which extended southward through Nubia and northeastward to the Euphrates River. Cyprus and the <(isles of the Great Sea,ˆ doubtless the .Egean Islands, sent their gifts, which Pharaoh regarded as tribute.

After Hammurabi, Babylonia suffered from frequent invasions of barbarian tribes. Though her political greatness vanished, her civiliza¬ tion, however impaired by the invasions, con¬ tinued. In the industries both Egypt and Baby¬ lonia had reached a high stage of technical skill. The Egyptians excelled in inlaid work, the Babylonians in the engraving of gems. The architecture was massive, the Babylonian in brick, the Egyptian in stone. The sculpture, too, though lacking grace, showed great strength. The literature was looked upon by after ages as classic. In government we find a central¬ ized monarchy with a bureaucratic administra¬ tion. In this period the creative energy of the Egyptians had exhausted itself. Life became artificial; wealth, flowing in from conquests, substituted magnificence for taste, and in the end enfeebled the national spirit. On account of the wars the military class came into great prominence; the king, more than before, be¬ came the proprietor of the state, and the priests gained control of the material as well as of the spiritual activities of the nation. In Hither Asia, also, artistic and industrial civilization suffered through the decline of Babylonia; for the Assyrian genius was chiefly political and military rather than artistic or intellectual. The family was monogamic, and society was defi • nitely organized in classes. The prime motive power in life was religion, which, manipulated by the priests, was already reducing the ac¬ tivities of man to a system of conventions and thus putting an end to originality.

As the Egyptians lost military power after the 18th dynasty, they were expelled from most of their Asiatic possessions by the Hittites, a people of eastern Asia Minor. They were the first to use iron, obtaining it from the country afterward known as Pontus. In the 13th century we find them supplying Egypt with that metal. Soon afterward their power de¬ clined, as they were assailed on the East by the Assyrians, and on the opposite border by many roving tribes from western Asia Minor, from the Egean Islands,

and probably from Europe. One of these peoples from the Minoan area settled on the Mediterranean Coast south of Phoenicia, and are known as the Philistines • others raided the Egyptian Delta (12th century b.c.). Before this date the interior of Syria had come to be occupied by new Semitic tribes from the desert, the Hebrews in the South and the Aramaeans about Damascus in the North. Meanwhile there flourished in the Egean region the Middle Minoan civilization, centering in Cnossus and Phaestus, Crete, and manifesting itself in great palaces, sumptuous dwellings of nobles, a high development of arts, industries and commerce, polychrome pottery of great va¬ riety and brilliancy, a linear script as yet unde- fiphered, and a bureaucratic administration similar to that of Egypt. In most respects this civilization far outshone the Oriental. The Late Minoan period (1600-1200 b.c.) is one of stagnation and decline, in which the centre of political power shifted from Crete to Tiryns and Mycenae on the Greek Peninsula.

From about 2000 b.c. Indo-European tribes were entering various parts of the civilized world, including Iran and India in Asia and Greece and Italy in Europe. Everywhere they blended with the natives, and usually gave their language to the people resulting from the amalgamation. In the Greek Peninsula the Hellenic or Greek race was thus formed. From the mainland it gradually colonized the islands and the eastern coasts of the Aegean Sea. About 1400 the cities of Crete were devastated, probably by Hellenic and other raiders. After¬ ward these sites were occupied by far poorer and less civilized villages. The decline of the Minoans through internal decay and barbarian immigrations brought their period to a close about 1200 b.c. In Italy there prevailed the bronze civilization, including the peculiar Terre-mare settlements in the Po Valley. Sicily and southern Italy were in communication with the ˆEgean area, whence they received various cul¬ tural elements, and probably colonies.

IV. The Growth and Decline of the Sy¬ rian Kingdoms; Rise of the Assyrian Em¬ pire; the Greek Middle Age; the Early Iron Age and the Coming of the Etruscans in Italy, 1200-700 b.c. — As the Minoans declined, the Phoenicians succeeded for a time to their commercial position in the Mediterranean. From what has been said it is clear that they were by no means the earliest mariners. At first Sidon was their leading city, but after a time its place was taken by Tyre. The Phoenic¬ ians explored the coasts as far as the Pillars of Hercules (Strait of Gibraltar) and even the adjoining Atlantic seaboard, planting along the way trading stations, some of which like Carth¬ age (founded about 800 b.c.) became flourish¬ ing

cities. Their civilization, with that of all Syria, was fundamentally Babylonian, affected to some extent by Egyptian commerce and con¬ quest. Their alphabet seems to have been de¬ rived by a process of selection from the Minoan script, and was the first purely phonetic system. The Greeks adopted it with modifications, probably about 900 b.c.

The Hebrews under their most famous kings, David (about 1000 b.c.) and Solomon, developed a great political power; but after the death of Solomon they split into two king¬ doms, Judah and Israel. Damascus, which David had acquired, again became the capital of an independent Aramaean kingdom. Near the end of the period, however, all Syria excepting Tyre fell under the Assyrian yoke. The people of Damascus (about 730 b.c.) and Israel (722 b.c.) were carried into captivity, and Judah be¬ came tributary. Babylon, too, was definitely conquered (728 b.c.). Egypt, again declining, divided into many small principalities, while Ethiopia rose to p power of the first importance. Her king conquered the Nile Valley to its mouth in 728 b.c. But the greatest political event of the period was the rise of the Assyrian Empire. Through persistent warfare carried on by a line of able kings for crushing frequent rebellion as well as for new conquests, the empire reached the height of glory, though not yet its widest extent, under Sargon (722-705 b.c.).

Babylonia was crippled for centuries by the invasion of barbarous Chaldeans, who were Semites from Arabia; and it was not till the following period that the reinvigoration, caused by these virile people, prepared the

lower Euphrates Valley for a new imperial career.

Meantime great progress was made in civili¬ zation. The Hebrews, afflicted by Assyria, were purging themselves of polytheism, and under the lead of inspired prophets were learning to look upon Jehovah as the only God, almighty, pure and jealous, who demanded of his worshippers not only ceremonial exactness but clean hearts and spiritual devotion. With the Assyrians, notwithstanding their strong religious nature, political motives were dominant. For strength¬ ening their empire they adopted the plan (1) of recruiting their armies partly from conquered peoples, (2) of transplanting populations from one part of the empire to another, to break up local attachments and weaken the power of resistance, (3) of organizing some of the con¬ quered countries into provinces ruled by Assyr¬ ian officials, though many were still left under their native rulers. In government and admin¬ istration, accordingly, Assyria was at this time the most progressive of Oriental nations. Effi¬ ciency, however, was offset by harshness. The transplanting of populations is always attended by extreme suffering, to which the Assyrians lent a deaf ear. They mercilessly exacted trib¬ ute ; and suppressed rebellions with horrible cruelty. The records teem

with royal boastings of tortures inflicted upon conquered enemies.

In this period the centre of interest in the growth of civilization shifts to the /Egean region, where the Hellenic race was gradually emerging from the union of invading Indo- Europeans with native Minoans. Doubtless the latter had more than the former to bestow upon their common progeny, the historical Greeks, particularly in religion, in law and social organization, and in the elements of industry and art. For a long time life was relatively barbarous, represented by the prevailing geo¬ metric art ; but in the various excavations, es¬ pecially those of Sparta, Ephesus and Miletus, we can trace the gradual recovery of civiliza¬ tion. Most progressive were the Hfolian and Ionian Greeks who had colonized the eastern coast of the 2Egean sea and the neighboring islands. It was they who produced the first European literature — the

direction and to the Euphrates in the other. Among the most important constructive agencies in the industrial world was the use of iron, introduced from the Hittite country into Crete in the 13th century b.c., and extended gradually from that island over the vEgean region and to Italy and Sicily. In the 8th century it was known to the Spartans, and probably still earlier to the more progressive people of the coast and islands. Hardened to steel, it added greatly to the efficiency of weapons and of all cutting instruments.

In Italy the Terremare settlements were abandoned (about 1000 b.c.), and the tribes of Indo-Europeans, who had entered the Po Valley a thousand years earlier, began their migrations into the peninsula. As a result the Latins, the Umbrians and the Sabellians took possession of their respective historical countries. Here, as in the vEgean region, with the transition from bronze to iron, civilization fell temporarily to a lower level, from which it gradually rose. The Early Iron (Villanova) Age extended from 1000 to 800 b.c. In this period the famous (hut urns make their appearance in Etruria and Latium. Nearly at the latter date occurred the migration of the Etruscans from the Aegean region or its neighborhood into Italy. In cul¬ ture and in language, which has not yet been de¬ ciphered, they bear close resemblances to the de¬ cadent Minoans and to the natives of Asia Minor.*

V. The Fall of Assyria and the Rise of the Persian Empire; in Greece Colonial Ex¬ pansion and the Awakening of a National Consciousness; the Struggle Between Asia and Europe, in which Greece Becomes the Centre of Interest in the World's Politics; in the Central Mediterranean Region the Political Growth of Carthage and Etruria; at Rome the Primitive Kingship

and the Be¬ ginning of the Republic, 700-479 b.c.— Early in the period Lydia became a conquering state, and reached the height of its imperial power under Croesus (560-546 b.c.). who ruled nearly all Asia Minor west of the Halys River. Egypt fell under the Assyrian power (664 b.c.) ; but soon throwing off the yoke, it enjoyed a long period of independence (645-525 b.c.). Before the loss of Egvpt the Assyrian empire reached from Thebes on the Nile nearly to the Caspian Sea, and from the Persian Gulf nearly to the Black Sea — the greatest extent of country yet united under one ruler. In Nineveh, their new capital, the kings built magnificent palaces of brick, adorned with representations of their wars in sculptured reliefs. They established libraries too, of Babylonian learning. But they had already ceased to make political progress, and they failed to give their empire an organic unity, and to inspire the conquered nations with loyalty to the central government. Suddenly the empire was overthrown by a combination of the Babylonians and the Medes, who destroved Nineveh in 606 b.c. With this event Assyria disappeared from history.

Two empires — the Median and the Baby¬ lonian — divided between them the Assyrian domain. The former lay in the north of Hither Asia, the latter in the south. Under Neb¬ uchadnezzar (606-562 b.c.) Babylon became the largest and wealthiest city in the world, a brilliant seat of industry and commerce. He destroyed Jerusalem, carried Judah into captiv¬ ity (586 b.c.) , and conquered Tyre. Of the

other empire the ruling people were the Medes, an Indo-European people, who inhabited the plateau between the Tigris Valley and the Caspian Sea. Their sway extended westward, on the north of Babylonia, to the Halys River, and southward over their Persian kinsmen. Both empires, however, were short-lived ; in 550 b.c. Cyrus, an Elamitic prince, at the head of a Persian revolt, established himself master of the Median realm. This event made the empire Persian. After conquering Lydia (546 b.c.) and Babylon (538 b.c.), Cyrus proceeded to subdue the countries to the east and north¬ east of Persia; so that at his death (529 b.c.) his empire extended from the .Egean Sea to the Indus River, and from t'he Persian Gulf to the Jaxartes River — an area perhaps five or six times as great as that of the Assyrian empire. His son and successor, Cambyses, added Egypt (525 b.c.), and Darius, the follow¬ ing king (522-485 b.c.), completing an organiza¬ tion begun by Cyrus, divided the empire into 20 satrapies (provinces), each under a governor termed satrap. This magistrate, appointed by the king, exercised full military and civil au¬ thority over his province, subject to royal regu¬ lations and commands. Though checked by the continual presence of a royal secretary and by the occasional visits of the king's (

In the beginning of this period the Greeks were extending the sphere of their influence through colonization. About 750 b.c. they had begun to settle in

*southern Italy and Sicily; and for two centuries the movement of expan¬ sion continued, till their settlements extended from Naucratis, Egypt, to the Pillars of Her¬ cules, and from the northern coast of the Black Sea to Libya. With colonial enterprise the in¬ dustries and commerce kept full pace. They manufactured armor, artistic bronze-ware, and tastefully painted vases. From Lydia they learned the art of weaving and dyeing fine woolens; from Egypt they derived the elements of astronomy, of surveying, and of the other practical sciences. Great intellectual progress took place; lyric poetry, which flourished in all parts of Greece, shows by its contents that the Greeks were actively thinking on all sub¬ jects suggested by their expanding environment. They made a beginning of geography, history and philosophy. Thinking led to religious and moral progress ; the Greeks began to exercise self-restraint and moderation in life. Their sympathies widened with their intelligence; they discovered that they were all of one blood, one speech, and one religion, and began to call themselves by the common name of Hellenes. They became aware, too, of the differences be¬ tween themselves and foreigners, whom they termed ˆbarbarians,** and of their own superior¬ ity to all other races. Conflicts with foreigners made the Greeks feel that they ought to com¬ bine for mutual defense. In the preceding age (1200-700 b.c.) their whole country was divided among a multitude of small city-states, each under an independent king. While in the more progressive parts of the nation in the period*

I10'v before us the government was rapidly de¬ veloping from kingship through aristocracy, oligarchy or timocracy, and tyranny in the di¬ rection of democracy, a corresponding move¬ ment was going on toward political unity. The city of Sparta, after uniting by conquest La- coma, Messenia, and Cynuria in the strong military state of Lacedaemon, built up the Jreloponnesian league with herself as leader, ihe basis of her superior military organization was the phalanx. Under the fear of Persian invasion this power expanded into an Hellenic league of all the loyal Greek states on the peninsula and on the neighboring islands. In Sicily a similar league grew up under Syracuse for defense against two formidable powers, Etruria and Carthage. The Etruscan dominion extended from the Alps to the vicinity of the present Naples, and probably included the then insignificant city of Rome, which after having been ruled from the earliest times by kings set up a republic in 509 b.c. The Etruscans, now at the height of their development, were equally powerful by land and sea. Even more formidable to the Greeks was Carthage, the greatest Phoenician colony, which united under its leadership all the other Phoenician settle¬ ments in the western Mediterranean region. By means of enormous wealth

accumulated through commerce, this city recruited a vast army of mercenaries, with which she hoped to overwhelm the western Greeks.

Checked by the growth of foreign powers, Greek colonial expansion came to an end about 550 b.c. Then the boundary of free Hellas on the east was pushed back by the Lydian and Persian conquests in Asia Minor. A revolt of the Ionians against Darius,— in which the in¬ surgents were aided by the mother country,— precipitated between Asia and Europe a conflict destined to affect the whole future history of the world. An army sent into Greece by Darius, was beaten back by the Athenians at Marathon in 490 b.c. Ten years afterward, Xerxes, son and successor of Darius, led a vast host into Greece, hoping to overwhelm the free little country by the sheer force of numbers. But his fleet was shattered in the battle of Salamis (480 b.c.) and his army destroyed at Platsea by the forces of the Hellenic league (479 b.c.) . Meantime at Himera, Sicily, the despot of Syracuse destroyed the invading mercenary army of Carthage (480 b.c.). The Greeks met with brilliant success both in the East and in the West: those of their race in Asia Minor were liberated; all were relieved from fear of foreigners; Greek civilization was free to develop without the restraint of alien rule; Greece came out of the struggle strong, proud, self-conscious, ready for great achieve¬ ments in peace and in war.

VI. The Culmination and Decline of Greek Political Power and of Greek Civili¬ zation; the Hellenization of the Orient; the Unification of Italy Under Rome, 479-264 B.c. — – The splendid naval force which Athens furnished for the war, together with superior statesmanship, placed her at the head of a new league of maritime Greek states, known as the Delian Confederacy (organized 477 b.c.).

Rivalry for the headship of Greece between democratic Athens and oligarchic Sparta led to the Peloponnesian War, which involved a great part of the Greek world (431-404 b.c.), and

which ended in the establishment of Spartan supremacy (404-371 b.c.) over eastern Greece, while nearly adl western Greece was united under Syracuse. Oppression on the one hand, and oil the other the love of the Greeks for city-autonomy, caused the down¬ fall of both political powers. For a short time under Epaminondas (371-362 b.c.). Thebes attempted to take the place of Sparta, but in vain ; the Greek state- system, — consisting of leagues and hegemonies of cities, — was rapidly crumbling. Meanwhile Macedon, a territorial state under King Philip, taking advantage of the political disunion and mutual jealousies of the city republics, began to encroach on free Hellas. After defeating the combined forces of Athens and Thebes at Chaeronea (338 b.c.) he imposed his protectorate upon the Hellenic state-system. His son Alex¬ ander the Great in a series of brilliant

cam¬ paigns (334—331 b.c.) conquered the Persian Empire, and afterward extended its boundaries to the northeast and the east. His empire was the largest the world had known. Among his improvements was the specialization of adminis¬ trative functions, financial, judicial and mili¬ tary. When he died, the empire after a long struggle among his generals ultimately divided into three great states,— Egypt, Asia (the Seleucid Empire) and Macedon. including Greece. To regain and preserve their liberty many of the cities of eastern Greece entered into two federal unions, the iEtolian and the Achaean. These institutions, though long known to the Greeks, came into favor too late to save them from the domination — not of Macedon but of Rome. The western Greeks, however, were first to meet their fate.

After adopting a Republican constitution Rome engaged with her neighbors in a long, desperate struggle for existence' (509-431 b.c.). Then by securing the headship of Latium (431- 406 b.c.) and by the conquest of Veii she be¬ came one of the strongest powers in Italy. A series of wars with the Latins, Samnites and Italiot Greeks (343-290 b.c.) gave her control of all Italy south of the Rubicon River. The success of the Romans was due to their im¬ provement on the Greek phalanx, their strict discipline and obedience to authority, their laborious patience in fortifying acquired terri¬ tory and their liberality in the treatment of conquered peoples. The political system which in this period they gradually built up on the basis of Italian nationality recognized various gradations of rights and obligations among the communities of the system from the tributary subjection of the Gauls to the full Roman citi¬ zenship. Though partly federal, the system left to Rome absolute control of foreign and military affairs. At the close of the period (264 b.c.) Rome and Carthage were the great powers of the western Mediterranean ; those of the East were Macedon, Egypt and the Seleucid Empire.

The century and a half (479-322 b.c.) fol¬ lowing the Graeco-Persian War was in some re¬ spects the most brilliant in the history of civil¬ ization. The tremendous energy roused in Greece by the war displayed itself under the guidance of taste and reason in every field of activity. A wave of independence, overthrow¬ ing tyrannies and oligarchies, established popu¬ lar governments in many cities, and intensified the democracies already existing. In Periclean

Athens, which depended economically upon the labor of slaves and tributes from dependent al¬ lies, the citizens enjoyed a more liberal educa¬ tion

and a wider range of political and social privileges than have ever fallen to any other community known to history. In close relation with this political and social development archi¬ tecture, sculpture and literature reached ideal perfection. The 5th century produced the Attic drama (2Eschylus, Sophocles, Euripides and Aristophanes), the noblest historical writing (Herodotus and Thucydides), and the inimitable Parthenon and Erechtheum. But the Pelopon¬ nesian War exhausted the energy and resources of eastern Greece. The growing refinement and love of peace which characterized the fol¬ lowing century is indicated by the fact that the inhabitants of the city-states shirked military service, so that war came largely into the hands of mercenaries drawn from the less cultured territorial states. Thought prevailed over ac¬ tion ; and in art strength was to some extent sacrificed to beauty and finish. While poetry declined, oratory and philosophy reached the height of their development in Demosthenes, Plato and Aristotle, who brought classic Greek literature to a close.

Following the conquests of Alexander, com¬ merce, colonization and administrative policy spread Hellenic civilization over the Orient. In the post-classic. period (after 322 b.c.) Per- gamum and Alexandria became the most famous seats of Hellenistic culture, which was distinguished for painstaking scholarship rather than for creative power. The West, too, was falling under Hellenic influence. Rome adopted from the Greeks not only the phalanx, but also various deities and religious ideas, the alpha¬ bet, — either directly or through the Etruscans, — and other rudiments of civilization. From the Etruscans chiefly came the impetus to the building of public works, — temples, sewers, roads, bridges, fortifications, — in which the Romans showed creative genius. But to the end of the period they paid little attention to learning; they were without literature and had few if any schools. A realistic, practical peo¬ ple, they were narrow and unamiable in private and business relations, but excellent warriors and citizens. Duty and Discipline were the great commandments to which the family and society, citizens and soldiers, yielded religious obedience. These heroic virtues were not the least important factor in the creation of their empire.

VII. The Expansion of the Roman Power over the Mediterranean World; the Growth of Plutocracy and the Decline of the Repub¬ lic, 264-227 b.c. — The extension of the power of Rome over the peninsula brought her into collision with Carthage, which had occupied nearly the whole of Sicily and was now threat¬ ening southern Italy. Not only did Rome feel bound to protect Italy, but her growing com¬ mercial class desired by conquest to extend its opportunities for trade and speculation. The First Punic War (264-241 b.c.) may be com¬ pared in character and importance with the war between the United States and Spain, which resulted in the occupation of the Philip¬ pine Islands by the former power. To meet the Carthaginians

on their own element, Rome built a navy, and thus equipped herself for transmarine conquests. As a result of the

war, Carthage surrendered Sicily to Rome in addition to paying a heavy indemnity. This island became the first Roman province (227 b.c.) . Sardinia and Corsica, acquired soon after the war, were organized into a second province. Then by conquering the Gauls in the north of Italy (225-222 b.c.) the Romans extended their sway to the Alps. In the Second Punic War (218-201 b.c.) the Carthaginian Hannibal, one of the most eminent generals of all time, invaded Italy, defeated one Roman army after another, desolated the country and came near wrecking the power of Rome. Her preservation was due to the wisdom of the Senate, to the solidity of Roman character and to the tie of common interests and of kindred blood which bound the Italians together against the alien intruder. This war of defense shows Rome at her best. Peace brought her two provinces in Spain and the destruction of her rival's navy. So greatly superior was now her strength that the conquest of the civilized world had become merely a question of a few years. In another series of successful wars (200-146 b.c.) she acquired Macedon, Greece, Asia Minor and the country about Carthage. Corinth and Carthage were destroyed, and most of the acquired territory was organized into provinces. At this date (146 b.c.) Rome was the only great power in the entire Mediterranean basin. The further growth of her empire consisted mainly in the conversion of protected and de¬ pendent countries into provinces and an oc¬ casional conquest. To Pompey belongs the subjugation of Syria (65-62′ b.c.), which alone remained of the Seleucid Empire, and to Julius Caesar the more important conquest of Gaul (58-50 b.c.). Egypt, long dependent, be¬ came a province in 30 b.c. The Roman Empire, consisting of provinces and dependent allies, now included the whole circuit of the Mediter¬ ranean.

Some advantages came to the world from Roman rule: while in the East Graeco-Oriental culture continued undisturbed, Latin civilization, which was falling more and more under Hel¬ lenic influence, gradually permeated the prov¬ inces of the West; throughout the empire the cities retained their own laws and self-adminis¬ tration under the government of their wealthy class; all parts but the frontiers enjoyed lasting peace. The evil effects of the system, however, soon began to outweigh its advantages. To secure a monoply of commerce for themselves, the Romans restricted trade among the subject communities. Over all the empire they ac¬ quired vast estates, which they worked by slave labor, thus destroying everywhere the free peasantry. Their policy of farming the taxes was also unjust and oppressive. The governors, too, with rare exceptions made office a means of amassing fortunes. In these ways the ad¬ ministrative and capitalist classes recklessly ex¬ ploited the provinces for their own profit. At the same time commercial restrictions and the competition of slave labor were ruining the

farmers and business men of Italy, and a worth¬ less, dangerous mob was growing up in the capital.

The early government of Rome by magis¬ trates, Senate and assemblies, although admir¬ ably adapted to a small community, proved un¬ equal to its new and complex functions. The assemblies, now becoming oorrupt, were in the

hands of magistrates, ministers of the Senate, which as a whole was controlled by a small knot of members, the curule ex-masristrates. This inner circle formed in the beginning a nobility of merit; it saved the state from Hannibal and conquered the Mediterranean world. But it soon transformed itself into an hereditary caste, which, monopolizing the domestic and imperial offices, used them as a means of absorbing the wealth of the world. In brief the nobility de¬ generated into a corrupt, self-seeking plutoc¬ racy. As to the general condition of the world at this time it should be noted that the want of competition, such as exists among nations of approximately equal power, or stated positively, the rrtonopolistic greed of Rome, by reducing the vitality of mankind, stopped progress, and decay was already setting in. Thorough reform was needed even to postpone the collapse of an¬ cient civilization.

The Gracchi sacrificed their lives in a vain attempt to regenerate the peasantry and to re¬ store Italy to its old condition of economic health ; at the same time they showed the enor¬ mous power of the plebeian tribunate for purposes of reform or revolution. Far prefera¬ ble to government by the corrupt aristocracy or by the mob, which Gaius Gracchus organized, would be the strong rule of one man ; and the task of creating in the army a solid foundation for a government of the kind was accomplished by Gaius Marius. After him the governor (proconsul) of a military province employed his position as a means of acquiring an army for political use ; and the proconsuls became rivals for the mastery of Rome. Finally Gaius Julius Caesar, an aristocrat by birth but a cham¬ pion of the neople, allying himself with the tribunes, overthrew the republic and created a virtual monarchy. This great statesman planned many radical reforms, includ'ng the abolition of the pernicious system of tax-farming, the reorganization of the municipalities and the subjection of the provincial governors to a stricter supervision. His enemies, however, did not permit him to live long enough to carry out his reforms; and it is in fact doubt¬ ful whether the absolute monarchy which he planned would have proved a blessing. The assassination of the monarch, far from restor¬ ing the republic, was followed by a war of suc¬ cession, in which his grand-nephew Octavius — after 27 b.c. Augustus — won the imperial prize (31 b.c.).

VIII. The Empire at Its Height, 27 b.c. — 180 a.d. — Instead of recurring to the autocracy of Caesar, Augustus hit upon a compromise be¬ tween republic and monarchy (27 b.c.). The Senate through its magistrates and

promagis¬ trates was still to govern Rome, Italy and the peaceful provinces, while Augustus as holder of the military authority (imperator , hence em¬ peror) was to rule directly the exposed and unquiet provinces and to exercise supervision even over those administered by the Senate; the republic was to continue for Italy, the monarchy was established for the subject countries. In Rome, Augustus held the tribunician power, and was sometimes elected to republican offices; but his chief influence over the home government was exercised not through office but in the capacity of political ((boss,® — a position which the Romans dignified with the name of princeps (foremost citizen). The prince and the Senate

had not only their separate fields of administra¬ tion but also separate treasuries and separate sets of officials. Augustus and his successor, Tiberius, strove to maintain what was left of the republic ; the Claudian and Flavian princes, by gradual encroachment on the senatorial prerogatives, aimed to convert the principate into a monarchy. As the Senate declined, the officials cff the prince, originally his friends and household servants, developed into an imperial bureaucracy. After the tyranny of Domitian the ((Good Emperors® (96-180 a.d.), in recon¬ ciling the nobility to the principate, laid more firmly the constitutional basis of their power. The government may now be termed a monarchy, although the Senate, with its repub¬ lican traditions, continued to be a material check upon the powers of the prince.

The emperors made few permanent con¬ quests, — chieflv Britain and the Danubian prov¬ inces. Their fundamental task was to extend Latin civilization to the un-Hellenized parts of their dominion. In Africa west of Egypt, not¬ withstanding the survival of the Phoenician language in private life, Latin civilization took deep root. Spain and southern Gaul became perhaps even more thoroughly Latinized. Northern Gaul was less affected, and Britain still less, by the Romans, while the northern provinces east of Gaul varied greatly in their receptivity of Latin culture. The principal factor in the work of civilization was the city; in most of their European domains the Romans superseded the old tribal organization by the Italian municipal system, which gave the nations the refining and disciplining influence of com¬ fortable homes, useful and artistic public works, schools, courts of justice and local self-govern¬ ment. Each city was a centre from which Latin modes of life and Latin ideas radiated. Imperial rule cured most of the ills of repub¬ lican administration. Abolishing the farming of direct taxes, it placed their collection in the hands of imperial officials, and distributed them on the basis of a careful census. The gov¬ ernors, now drawing their salaries from Rome, and deprived of their former unlimited oppor¬ tunity for extortion, were held responsible to the emperor. The armies, placed under strict discipline and controlled by one will, no longer wasted the empire by civil wars. For the vast extent of the frontier the

soldiers were few, and the burden of their support was light. The republic had looked upon the provinces as its estates ; in the 2d century a.d. the emperor came to regard himself as the parent of the subject peoples, whom he was in duty bound to treat with love as well as with justice. Though op¬ pression was not wholly eradicated, the imperial government was in a high degree efficient, just and humane. The progress of civilization was followed by the extension of the Roman citizen¬ ship. The liberal policy of Claudius in bestow¬ ing it was continued by his successors, till shortly after the period under discussion all freemen of good standing in the empire be¬ came Romans by the edict of Caracalla (212 a.d.) ■;

In this period was tried the experiment of maintaining profound and lasting peace over the large area comprising the interior prov¬ inces. Prominent among the results was a material prosperity which had at least the ap¬ pearance of being very great. Another result

was the development of the <(fetninine virtues.5 Men (*

The unimaginative Romans failed to produce a literature of the highest rank. In the late republic lived Lucretius, a poet of real genius, and Cicero, the versatile author of orations, philosophic works and private correspondence. The Augustan Age created the epic and rural poetry of Virgil, the (Odes and Satires* of Horace on social and moral topics, and Livy's stately history of the republic. The most splendid Latin writers of the age of the Good Emperors were the satirist Juvenal and Tacitus, the historian of the early empire. Among the most famous writers in the Greek language in the first two centuries a.d. were Strabo the geographer, Pausanias, author of a (Tour of Greece,* Appian, the historian, and Plutarch, the biographer of eminent men. Hellenism con¬ tinued to be the chief liberalizing and refining force in the empire. Its highest intellectual product from Roman soil was stoicism, which found its best expression in the writings and character of Marcus Aurelius.*

IX. From Limited Monarchy to Despot¬ ism; the Reorganization of Diocletian and Constantine; the Barbarian Invasions and the Decline of the Empire, 180-500 a.d. — Writers generally agree in making the decline begin with the reign of Commodus (180-192 a.d.) , though disintegrating forces had long been in operation and though for generations after¬ ward the empire at times, as under Septimius Severus and Diocletian, showed great recuper¬ ative power. The century which intervened be¬ tween the death of Marcus Aurelius and the ac¬ cession of Diocletian (180-284 a.d.)

we may re¬ gard as a period of revolution. The happiness of the Roman world under the Good Emperors had been chiefly due to the wisdom of a succession of rulers who were able to secure the good will of the Senate and of the populace of Rome, the subordination of the pretorians and of the army and the respect of surrounding nations. The weak, brutish Commodus allowed these nicely adjusted forces to conflict, and the re¬ sult was civil war and anarchy. The revolu¬ tion, sweeping away the influence of pretorians, populace and Senate, almost of Rome itself, brought new principles of government into play. The emperor was to be a despot of the Oriental type, — a God on earth, — who sur¬ rounded himself with stately splendor, and gov¬ erned through a complex bureaucracy. He appointed a colleague, and two Csesars were named as heirs of the emperors, all four digni¬ taries being men of eminent military ability. The empire was reorganized in prefectures, dioceses and provinces under appropriate mag¬

*istrates. These arrangements, chiefly the work of Diocletian (284-305 a.d.), and Constantine (sole emperor 324-337 a.d.), were in the main permanent. In making better use of the re¬ sources of the empire for the purposes of de¬ fense the new organization brought fresh strength, but rivalry between the emperors again caused civil wars with all their evil con¬ sequences. Under Constantine, who removed the capital to Byzantium, thereafter called Con¬ stantinople, the two imperial offices were again vested in one person. After that date there were often two or more emperors; and the division of the empire into East and West for administrative purposes acquired a new sanction at the accession of Arcadius and HonOrius, sons of Theodosius (395 a.d.). Even then the empire was a unit, ruled by two colleagues ; and when in 476 a.d. Romulus <(Augustulus** was deposed at Rome and the imperial trappings were sent to Constantinople, people understood merely that the collegial government had once more given way to unitv in the imperial office.*

Meanwhile from the heart outward through every limb the empire was falling to decay. The most obvious cause was economic. Judged by any modern standard, the empire as a whole was poor. It is true that parts of it, espe¬ cially in the Orient, were wealthy; but through¬ out the West were vast undeveloped regions, whose administration and protection formed a perpetual burden on the imperial treasury. The emperors made heroic efforts to improve these territories ; but in doing this they ex¬ hausted the productive areas. With modern means their task would have been simple ; but there were practically no machines in Roman times. Consequently everything had to be done by hand ; and under the circumstances it was impossible to produce enough useful materials to make good shortages in the less developed parts of the empire and those losses that were caused by drought and pestilence, in addition to providing the necessities of life for the armies, the hosts of officials and the idle poor in all the cities. In other

words, the industries were not sufficiently developed for the maintenance of so vast an empire.

Another cause was the excessive concentra¬ tion of the people into cities, where the lack of sanitary arrangements, such as now exist, brought about an enormous mortality, where too the relatively high standard of living and the want of remunerative occupations discour¬ aged the rearing of families. Hence the city population had continually to be recruited from the country; and when the rural districts came to be sparsely inhabited, the consequent disap¬ pearance of the cities was accompanied by the wreck of ancient civilization. Among the con¬ tributory causes was slavery, which long before Marcus Aurelius had been destroying the free population ; in his time the plague, and after him foreign and civil wars, continued to waste life, while the burden of taxation, always in¬ creasing, made life every day more wretched. The wealth of the empire flowed to the East in exchange for useless luxuries ; and for want of gold and silver the coinage was debased; at the same time the cost of living became exces¬ sive. Then, too, the growing splendor of the imnerial courts added to the burden. With their scant means many found it impossible to support families, and even the slaves grew

fewer. In these conditions most of the lower population, free and slave, became hereditary serfs — coloni — bound to the soil and to the payment of fixed dues to their lords. But it was not only the poor who suffered. The municipalities had once enjoyed freedom in local affairs, each governed by a senate, whose members — decuriones — were the wealthier men of the community. Gradually the emper¬ ors encroached upon the liberty of these cities, till they had converted even the privileges of the senators into intolerable burdens. For as these officials were responsible for the taxes due from their districts, many of them, unable to wring the required amount from the poorer classes, were themselves reduced to poverty. Nevertheless they could in no way shirk their duty, but were held for life by an iron hand to the unenviable task of collecting and of pay¬ ing oppressive taxes. Artisans and traders, too, were bound strictly to their hereditary vo¬ cations, in order that the government might be sure of the dues to which they were subject. In brief, society was forced into a rigid caste¬ like system, which crushed freedom and made the life of rich and poor, bond and free, almost equally wretched. Under these circumstances, and after ages of governmental brow-beating, the inhabitants of the empire lost their interest in the welfare of the state, of the community, of future generations. As the civilized part of the human race lost love of life and hope for the

future, it began rapidly to die out, and those who still lived grew continually more barba¬ rous. As they were unwarlike, the government found it more and more necessary to make up the armies of Germans, who consequently set¬ tled in the empire in ever-increasing numbers. Although they readdy adopted Roman civiliza¬ tion, their independent spirit, out of harmony with the conditions above described, acted as a new distintegrating force. Another power, which while aiming to make the world over on its own model tended to destroy ancient ideas and institutions, — including the empire itself, — was Christianity. Rome, essentially polytheis¬ tic, always tolerated the religions of the nations which she conquered; in the adoption of their gods into her pantheon she found a means of political centralization. Judaism, however, she regarded with disfavor, and attempted to sup¬ press Christianity. These exceptions to her policy of toleration were due to the irreconcil¬ able conflict between monotheism and polythe¬ ism and to the leveling tendency of the Chris¬ tian religion. The apostles of Christ taught that the gods of Rome were demons, that the worship of the emperor was sinful, that all men from the emperor to the slave were equal be¬ fore God, that the heaping up of wealth was an abomination ; in brief their religion seemed to the Romans subversive of all the principles on which the empire rested. But although Christianity and Germanism were disintegrat¬ ing the empire, they were destined in combina¬ tion to make the old world new. The estimate of their value as creative agencies belongs to the mediaeval period.

In appearance more formidable than internal decay were the hostile nations outside the em¬ pire. In the 3d century the Germans, who had long been threatening, began to break through the northern frontier. The Franks flung them-

selves upon Gaul ; the Goths occupied Dacia and crossed the Danube to defeat and kill an em¬ peror. In the East, too, a new danger ap¬ peared ; on the ruins of the old Seleucid power had arisen in the Parthian Empire, which in the 3d century was supplanted by a new, vigorous Persian Empire. The warlike Persian monarchs nearly made good their threat to drive the Romans from Asia.

Early in the 5th century the Germans began to establish their states within the empire — the Visigothic khigdom in Gaul and Spain (415 a.d.), that of the Vandals in Africa and of the Burgundians in the Rhone Valley. About the middle of the century the Angles and Saxons began to overrun Britain ; a little later the Franks, who long before had crossed the Rhine, began the conquest of Gaul (486 a.d.) ; and in 493 a.d. the Ostrogoths conquered Italy. Before the end of the century the western branch of the empire had

fallen into the hands of Ger¬ manic chiefs, who while vaguely recogn'zing the emperor at Constantinople as their lord were in reality sovereign kings of the countries they ruled. Here ancient history ends.

Bibliography. — For the method of history see Bernheim, (Lehrbuch der historischen Meth- ode) (4th ed., Leipzig 1903) ; for an elementary sketch, Botsford, (History of the Ancient World> (1911) ; somewhat more detailed, Breasted, (Ancient Times) (1916), valuable for the Oriental part; by far the best detailed an- c ent history is Meyer, (Geschichte des Alter- tums) (I-V, Stuttgart and Berlin 1884-1902; new edition of I, 1909-10), reaching to the mid¬ dle of the 4th century b.c. ; earlier general his¬ tories by Duncker, Oncken and Helmholt are in large part antquated, so that it is better to be guided by works on special periods or localities ; e.g., Myres, (Dawn of History> (New York 1911) ; Hogarth, (The Ancient East) (1914) ; Hall, (Ancient History of the Near East) (Lon¬ don 1913) ; Erman, (Life in Ancient Egypt> (New York 1894) ; Breasted, history of Egypt (2d ed., 1909) ; King, (History of Baby¬ lonia and Assyria) (2 vols. are ready, London 1910, 1915) ; Rogers, history of Babylonia and Assyria* (6th ed., New York 1915) ; Jastrow, Civilization of Babylonia and Assyria) (Phila¬ delphia 1915) ; Sayce, (Babylonians and Assyr¬ ians; Life and Customs) (New York 1909); Cornill, (History of the People of IsraeP (4th ed., Chicago 1909) ; Kent, (History of the Hebrew People) (12th ed., 1912) ; Smith, his¬ torical Geography of the Holy Land* (16th ed., London 1910) ; Bury, (H:story of Greece* (2d ed., New York 1913) ; Holm, history of Greece* (4 vols., New York 1895-98) ; Grote, history of Greece* (12 vols., New York 1846, date of author's first preface) ; Busolt, Criechische Geschichte* (3 vols. of 2d ed. published. Gotha 1893-1904, with best critical apparatus) ; Beloch, (Griechische Geschichte* (3 vols., Strassburg I and II, 2d ed., 1912, 1913, the rest, 1st ed., 1897-1904) ; Botsford and Sihler, hellenic Civ¬ ilization* (New York 1915) ; Ferguson. (Greek Imperialism* (Boston 1913) ; hellenistic Athens* (New York 1911) ; Mommsen, his¬ tory of Rome* (5 vols., conformed to the 8th German ed., New York 1895) ; (Provinces of the Roman Empire* (2 vols., 1886) ; Ferrero,*

able) ; Heitland, (Roman Republic) (3 vols., Cambridge 1909, the last volume valuable) ; Duruy, (History of Rome) (8 vols., Boston 1883, valuable for the imperial period) ; Schil¬ ler, (Geschichte der rbmischen KaiserzeiC (2 vols., Gotha 1883, the best political history of the imperial period) ; Seeck, (Gesch'chte des Untergangs der antiken Welt) (5 vols. ready, Berlin 1897-1913, a brilliant work marred some¬ what by

untenable theories) ; Philippson, (Das Mittelmeergebiet : seine geographische und kulturelle EigenarD (Leipzig 1904, valuable for physical environment) ; Shepherd, (Atlas of Ancient History) (New York 1913, the best historical atlas) ; Cunningham, (Western Civ'li- zation in its Economic Aspects) (Cambridge 1898) ; Webster, (General History of Com¬ merceˆ (Boston 1903) ; Perrot et Chipiez, (Histoire de l'Art dans l'Antiquite (8 vols., Paris 1882-1903) ; for general tendencies, Free¬ man, (Chief Periods of European History) (New York 1886). The best encyclopaedias for Greece and Rome, containing much information also regarding the Orient, are Daremberg et Saglio, (Dictionnaire des Antiquites grecques et romaines) (Paris 1873) ; Pauly-Wissowa, (Real-Encyclopadie der cl. Altertumswissen- schafri (Stuttgart 1894) ; the best period'cal is Klio: Beitrdge zur alten Geschichte (Leipzig 1901 —) ; for bibliography past and current, (Jahresbericht fiber die Fortschritte der cl. Altertumswissenschafri including ˆibliothetca Philol. clri (ed'ted by Bursian, Berlin) ; for bibliographies of special countries see the arti¬ cles on Egypt, Chaldea, Babylonia, Assyria, Greece and Rome.*

George Willis Botsford, Late Professor of Ancient History, Columbia

University.

HISTORY, Mediaeval. Definition. — Me¬ diaeval history may be defined as the middle period between ancient and modern history. Some scholars have wished to do away with the term entirely and to use only two divisions, ancient and modern. In fact, in Oriental his¬ tory there is no mediaeval period. But most students prefer to keep to the threefold division for European history. This is due largely to the fact that the mediaeval period can be pre¬ sented with greater unity than either ancient or modern.

Mediaeval history began with the disintegra¬ tion of the Roman Empire in the 5th century, the ruin of Paganism and the migrations. Without arguing the merits of the various dates wh:ch may be assigned for the end of the Mid¬ dle Ages (q.v.), we shall here discuss the his¬ tory to about 1500 a.d. During th's period of 1 000 years, the most marked characteristic is the dominant influence of the Church. The most important peoples are the Germanic races, who emerged slowly from barbarism, and gradually assimilated some of the features of the Roman civilization. Based upon the ruins of the older rose a new civilization which caused a radical transformation in political, social and religious ideals.

Contrast Between Romans and Germans. — The Romans had a highly developed and very complex civilization.. From their Greek sub¬ jects, they had acquired the knowledge of art, literature, science and philosophy. Under the Roman peace, an active commerce had grown

up throughout the empire, supplying to each province the products of all the others. In law and administration the Romans had reached such excellence that we still imitate them. Moreover, Christianity had become the state religion.

The Germans were barbarians, having the virtues and vices of their savage state, and resembling, in many respects, the North Ameri¬ can Indians. But they were a vigorous race, with a great capacity for learning. Some of them had been converted to Christianity before they entered the Roman Empire, but most of them were still pagans.

Migrations. — The Roman Empire had for centuries held the barbarians in check, by the prestige of its name, by the payment of tribute or by the policy of exciting dissension among its enemies. This last is well summed up in the Roman proverb,. Divide et impera, which may be paraphrased, <(Cause divisions and strife among those whom you fear and thus rule over them.ˆ In the latter part of the 4th century, however, the terrors inspired by the advance of the Huns (q.v.) into Europe, the knowledge of the weakness of the Roman Empire and their own des:re for more fertile lands, caused the Visigoths (q.v.) to enter upon their great migra¬ tion. Their example was followed by other German tribes and the movement continued throughout the 5th and 6th centuries. By the year 600 all the European portion of the West¬ ern Empire, except a few positions in Italy, was held by the Germans.

During the period of the migrations there was some destruction of life and property, but the amount of the damage varied ; it was great in northern Africa and Britain; slight in Gaul. And nowhere were the conquered inhabitants either exterminated or driven out. The Ger¬ man invaders were relatively few in number, and in many sections they found unoccup'ed lands sufficient for their needs. The conquerors and the conquered lived in constant contact with one another, and the resultant civilization was partly Roman and partly German. See Migrations.

Fusion of the Two Civilizations. — The

7th and 8th centuries were the period of fusion. By the year 800 the terms Roman and Barbarian were no longer used. The inhabitants -formed a single people, with a civilization much lower than the Roman but much higher than that of the .Germans when the latter had entered the empire. In this new composite civilization the Roman influence was greater in language, me¬ chanical arts, business arrangements and munic¬ ipal, intellectual and ecclesiastical affairs. The German influence was greater in military mat¬ ters and judicial procedure.

The fusion was practically completed by the time of Charles the Great. He realized clearly the task of the Middle Ages, and did all in his power, on the one hand to retain all that was best of the older German customs, and, on the other hand, to introduce from Italy such Roman customs as his subjects were able to adopt. He did much to foster education, which followed Roman models. By his wars, he brought under his sword most of the German peoples.

. The New Empire.— In 800, Charles' serv¬ ices received fitting recognition in his election as emperor of the Roman Empire. The idea of

a Roman empire which embraced all Christians had never been lost. After 476, when Romulus Augustulus was deposed, by Odoacer, the people in the West, Germans and Romans alike, had regarded the emperor at Constantinople as the head of the Christian world. Even barbarians like Clovis (q.v.) had been proud to secure recognition and obtain a title from the emperor. The popes had looked to the emperors for support. In the last years of the 8th century the East was ruled over by Irene (q.v.), who was despised both because she was a woman and for her crimes and heresy, so that it seemed to many that the imperial office was vacant. Consequently, Charles was crowned emperor and was considered the successor of Augustus, Trajan and Constantine. Under his strong rule the Western world was governed firmly and the Western nations were held together.

Disintegration of the Empire. — After Charles' death, his son was unequal to the task of ruling the empire. Under the combined effects of civil strife and constant invasions by the Northmen, the Mohammedans and the Slavs (qq.v.), the central power was weakened and the last Carolingian rulers were unable to pro¬ tect their subjects. The whole frontier was ex¬ posed to attacks and the raids of the enemy even extended far into the interior. In each district the strongest man came to be regarded as the natural leader and protector. Sometimes it was a royal official, holding a fortification ; sometimes it was an abbot or aˆbishop; at other times, a bold adventurer, who usurped authority. In the absence of a strong central government, each leader had to police his land and admin¬ ister justice. Naturally, he demanded to be paid for his services and exacted tribute from all under his control.

Because of the lack of money, the Carolin- gians (see Carlovingians) had always fur¬ nished to their counts and other officials estates from which to obtain a living. Under the weak kings, the temporary grants of both land

and office became hereditary, with or with¬ out the rulers' consent. The rulers, however, soon recognized the necessity of allowing this and sought merely the recognition of their own overlordship. Consequently, they granted the benefices to the heirs and conferred, in addition, the immunity or right of independent jurisdic¬ tion. Thus almost all land and power came to be held feudally. See Feudalism.

Feudal Anarchy. — There was constant warfare as each strong lord sought to obtain greater power or a more independent position. On the other hand, each king tried to increase his own feudal holdings by conquest or mar¬ riage. Every vassal was anxious to avoid all the feudal services that he could, and, at the same time, to exact as much as possible from the people subject to him. Commerce was burdened with excessive tolls in each fief and exposed to the depredations of the robber bar¬ ons. Little attention was paid to maintaining roads and bridges, consequently travel was difficult as well as dangerous. As a whole, the feudal regime tended to isolate each fief and to reduce the peasantry to misery. It is sig¬ nificant that the term <(Dark Ages,® formerly applied to the whole of the Middle Ages, is often used now for the 9th and 10th centuries.

The Church. — The great cohesive and edu¬ cational force was the Church. Soon after

they entered the Roman Empire, each tribe of Germans had been converted to Christianity ; all except the Franks (q.v.) became Arians (q.v.) at first, but gradually this heresy was abandoned. In every barbarian kingdom the bishops were important officials. They often obtained great wealth, and ruled over vast estates. On their possessions, the serfs were treated somewhat better than on the lay fiefs. Monasteries had been founded throughout western Europe, and often these served both as schools and as model farms. Boniface did much to bring the tribes of Germany into direct connection with Rome, and he held frequent Church councils at which the clergy and nobles of a whole district came together. These coun¬ cils were very important for their effect in uni¬ fying the Church and making its work more effective.

From this time the Church gained steadily in power and influence. Charles the Great did much to increase its wealth by enforcing the payment of tithes. He insisted that the clergy should be better educated themselves and should do more for the education of the people. In the 9th century the growing power of the papacy and the weakness of the kings enabled the popes to bring the bishops more directly under their own control. Thus the clergy of western Chris¬ tendom were brought into intimate association with Rome. Latin was the common language of all churchmen. Their feeling of membership in the Church was frequently stronger than any local

attachment. Consequently the more able men were equally at home in every country and the Church had a greater unity than any lay power. This all-pervasive Church was the great unifying element amid the divisions of the feudal period.

Investiture Struggle. — After periods of weakness in the first half of the 10th and again in the first half of the 11th century, the Church at Rome was purified and strengthened by the support of the German emperors. About the middle of the 11th century, the strong person¬ alties of Pope Leo IX (q.v.) and of Hildebrand (later Gregory VII) (q.v.) led to a reform movement, and also to an effort to make the popes' power more effective. One feature of this movement was an attempt to secure entire control of appointment to church offices. This brought the papacy into conflict with the kings who considered that they had a right to nom¬ inate the bishops in their own kingdoms. The struggle was most acute between the German emperors and the popes, and resulted in the long investiture conflict, which was ended in 1122 by a compromise. See Investiture. .

Roman Empire of the German Nation. — But the investiture struggle was only a single phase in the relations between the empire and the papacy (q.v.). In order to understand this it is necessary to study the fortunes of the em¬ pire after Charles the Great. Under his suc¬ cessors, the emperors had gradually lost their power, so that by the end of the 9th century, the title of emperor had become almost a mean¬ ingless designation, either conferred by a Pope on anyone of whom he wished to make use, or else usurped by any ruler who chanced to be temporarily the strongest personality in Italian affairs. This continued to be the fate of the imperial title until Otto the Great (q.v.) was summoned to Italy, because of the discord and

anarchy in the peninsula. In 963 he was crowned emperor, and became the ruler of both Ger¬ many and Italy. Under his son and grandson, Otto II and Otto III, <(the Roman Empire of the German nation® was a very effective power in controlling both the imperial lands and the papal policy. After the death of Otto III in 1002, the German rulers paid little attention to Italian affairs until 1046, when Henry III was summoned to Rome because of the contest which was being waged between three rivals for the papal office. For 10 years he wielded a power similar to that of the Ottos. But at his death, as the heir was a young child, the re¬ formed and strengthened papacy was able to assert its independence. When Henry reached manhood and desired to regain his father's power, the contest

began and took the shape of the already mentioned investiture struggle. After the Concordat of Worms (q.v.) there was little conflict until the accession of Frederick Barbarossa (q.v.), who was determined to be emperor in fact as well as in name.

Empire and Papacy. — On the other hand, the papacy was strong and was determined to assert its paramount authority. There ensued a struggle of 100 years between the Hohen- staufen emperors and the popes. In spite of the ability of the rulers and the brilliancy of their reigns, the popes triumphed, largely by means of the assistance of the Lombard cities, which had grown rich and powerful and aimed to be independent of the imperial control. The death of Frederick II in 1250 really marks the end of the mediaeval empire as a strong inter¬ national power, although it continued, under a changed form, to be a factor in European poli¬ tics for centuries longer, and came to a close only in the 19th century.

The Crusades. — The increasing power of the popes was also marked by their desire to ex¬ tend their authority over the Eastern Church as well as the Western. This was in part the cause of the Crusades, which were the most important manifestation of the strength and influence of the Church. The spirit of asceti¬ cism (q.v.) had long been inculcated as the most distinguishing mark of Christianity. The consciousness of their own sins and the teach¬ ings of the Church led many to do penance. One of the favorite forms, especially for heinous crimes, was a pilgrimage to some hallowed spot. The most difficult pilgrimage and the one to which greatest sanctity attached was the journey to Jerusalem. In the 11th century, 116 separate pilgrimages to Jerusalem are re¬ corded, and, in some of these expeditions, hundreds and even thousands took part. Thus attention was directed to the Holy Land. Moreover, in spite of the disorders of the feudal regime, the population was increasing, especially in France. The people were hard pressed to get food, and were anxious for a change of any kind. Consequently, when the Emperor Alexius appealed for aid and Pope Urban II preached the crusade at Clermont thousands took the cross. The movement spread rapidly and affected every country in Europe. Although Jerusalem was in the possession of the Christians for little more than a hundred years, the crusades to the Holy Land, which continued for 200 years, produced great results. In order to understand these, it is

necessary now to take up the Byzantine and Moslem civilizations. See Crusades.

Byzantine Civilization. — Until 60 years ago, Byzantine history was misunderstood. It was looked upon as the long death struggle of a society in which all progress had ceased, and despotism, tempered by assassination, crushed out all vitality. Gibbon styled the his¬ tory (

Moslem Civilization. — No less important was the influence of the Mohammedans. After the death of the Prophet in 632, his followers had conquered with wonderful rapidity the greater part of the civilized world. From Persia and India they held all Asia to the Hel¬ lespont. Egypt and the whole north coast of Africa, Spain and about one-third of Gaul, were under their sway within a century. Their advance in civilization was equally rapid. The Arabs had great acquisitive ability. In each country they learned the arts and sciences known by the inhabitants, and they carried this knowledge wherever they ruled. The Greek philosophy, which they acquired from the peo¬ ples in the lands formerly under Greek sway, the mathematical knowledge of India, the irri¬ gation practised in Egypt, are illustrations of their acquisitions, which enabled them, in the 10th and 11th centuries, to develop a civiliza¬ tion far in advance of any other, with the ex¬ ception of the Byzantine. From. Bagdad to Spain this culture was spread throughout the Mussulman world. In Syria, the Crusaders were in contact with this civilization for two cen¬ turies. By their agency and by the association of Christians and Mussulmans in Spain, Sicily and other points, much of the Moslem learning was conveyed to the Christians of western Europe.

Changes in the 12th and 13th Centuries. Enrichment of Europe. — In addition to this fructifying intercourse with other civilizations, many elements in their own contributed to cause a rapid advance in the 12th and 13th centuries. Among these may be noted the increase in popu¬ lation, the cultivation of waste lands, the revival of commerce, the general progress along educa¬ tional lines and the rise of strong kingdoms. But as it is impossible to isolate each factor

and to determine the part which it played, the results will be considered as a whole and the changes which took place in western Europe after 1100 will be described.

The hundreds of thousands of Crusaders had to procure large sums of money for their equip¬ ment and journey. Consequently the precious metals which had been hoarded came into cir¬ culation as money. Instruments of credit were devised and the money circulated rapidly. Con¬ tact with other civilizations gave birth to new tastes and these were gratified bv means of a greatly increased commerce which extended to all parts of Europe and even to the extreme East. The merchants became numerous and prospered. Cities increased rapidly in popula¬ tion and new ones were founded. The Italian cities, because of their position, prospered

the most of all. The merchants became an im¬ portant class because of their wealth, and by the end of the 13th century became a political fac¬ tor which was recognized by their inclusion in the new parliamentary bodies.

Intellectual Advance. — The investiture struggle had caused scholars to study history in order to find precedents in support of the imperial or of the papal claims. The contact with other peoples broadened the intellectual horizon of the Western people. The new points of view with which they became acquainted led them to question the traditions which had ruled their lives. The new books, especially the works of Aristotle (q.v.), which fell into their hands, were studied eagerly. The new wealth gave leisure. Students flocked to the centres where teachers were to be found, and gradually uni¬ versities arose. Roman law was fostered by the emperors; canon law by the Church. Scientific knowledge, especially in medicine, was acquired from the Greek and the Arabic works. Gothic cathedrals of exquisite beauty were built in west¬ ern Europe. The deeds of the Crusaders fur¬ nished new material to literature. The old tales were reworked and given a literary form.

Growth of Monastic Orders. Temporal Power of the Popes. — No less marked were the changes in the Church. At the close of the 11th century a great wave of asceticism spread over western Europe. The idea of sacrifice caused thousands to enter monasteries, and many new orders of monks were founded. These orders vied with one another in austerity and asceticism. Their reputation for sanctity and their services to the community brought to them great donations. Their knowledge en¬ abled them to increase their wealth. But this wealth led many to enter the monasteries from unworthy motives, and thus caused a gradual decline in their morals. The wealth of the Church, as a whole, caused many, both monks and laymen, to attack it as having departed from its Christian ideals. Heretics became numerous and had to be repressed by persecutions and the Inquisition. In the 13th century the men¬ dicant orders became prominent, partly as a protest against the wealth of the Church, and partly as an agency to combat heresy. The ideal of service to others for which they stood be¬ came dominant in monasticism, and later orders were founded, almost universally, for some special service. See Monachism ; Orders, Re¬ ligious.

The papacy, engaged in a struggle with the monarchs, felt the need of temporal power and

strove for it. Innocent III had monarchs as his vassals, and wielded a temporal authority greater than that of any previous Pope. After the popes had triumphed over the Hohen- staufens they seemed to have achieved

success. Their struggle with the French king, at the be¬ ginning of the 14th century, however, led to defeat and to the <(Babylonian captivity® at Avignon. Then ensued the schism and the con¬ ciliar period when many felt that the general councils and not the popes should be supreme. Finally the papacy emerged triumphant, but with a changed ideal, laying less stress upon temporal power (q.v.), and more upon control over the conscience of .the individual.

Chivalry. Decadence of the Knights. — In the 12th century, the clergy and the knights formed the aristocracy. The latter, too, had their period of great splendor. The ideals of chivalry, which became prominent in the 12th century, were inculcated by the Church, and the knights were often likened to the clergy as a class specially set apart by their religious vows. These ideals were also inculcated by the new literature, which glorified not only bravery and loyalty, but also generosity and luxury. The latter led to the ruin of many of the knights. Their income, arising from feudal dues, was rel¬ atively fixed. As their tastes expanded and they expended more upon luxuries, they fell into debt. The rate of interest was ruinous and they were unable to pay. Consequently many were compelled to alienate their fiefs; the mon¬ archs and other lords of large fiefs absorbed the lesser fiefs, and there was a tendency for the knights to become retainers of the more wealthy. Their consequence as a class declined in comparison with the growing importance of the merchants. The development of strong infantry forces finally deprived them of their pre-eminence in military matters. See Chivalry.

Rise of the Nations. — The contact with other peoples led to the rise of a national con¬ sciousness. In the earlier days, when each feudal castle or village was practically isolated and often at strife with its neighbors, there had been little feeling of common interests. Asso¬ ciation with foreigners brought a sense of national feeling in opposition to the foreigners. This is very marked in the armies of the second and third crusades. This movement was coin¬ cident with, and one cause of, the growth of the strong monarchies. The merchant class was also an important element in the development of the king's powers. Commerce was heavily burdened with feudal tolls and exposed to dep¬ redations by the knights. The merchants sought privileges and protection from the kings. In return they furnished them money, which aided them in extending their power at the ex¬ pense of that of their nobles. The kings came to depend largely upon the cities for support in all struggles with the nobles. By their wealth the citizens were able to rival the nobles in luxury and ostentation. The sons of the mer¬ chants frequented the universities and developed into officials of the kings. More and more the kings came to depend upon the third estate and to withdraw power from the nobles.

The French Monarchy. — The development of the monarchical power took different forms in the several countries, but took place about the same time in the leading nations. In France,

the Capetian kings (see Capet) had at first lit¬ tle power. They had only a small territory directly under their control, and consequently only a small income. But by fortunate mar¬ riages and by confiscations they enlarged their feudal domains. Several of the kings had long reigns and the evils of a minority or a change of dynasty were avoided. Gradually all the fiefs were brought under the control of the king, and feudal usages were made the basis for the assertion of a really monarchical power. Under Saint Louis (1226-70) and his successors France was centralized and the kings became supreme. The prosperity of France was checked for a time by the Hundred Years' War (1328-1461). This was due in part to a failure of male heirs in the direct line, which enabled the English kings to make a claim to the throne on the ground that they were the most direct heirs. But France finally emerged triumphant and England lost all her territory in France. The kings, supported by the third es¬ tate, became practically absolute.

The English Monarchy. — In England the Norman Conquest (q.v.) made William supreme lord. Following the Norman feudal usages, he insisted upon an oath from each one of his subjects, and did not allow the intervention of the feudal nobles. In spite of the civil wars of the 12th century, Henrv II was able to retain the supreme control. The tyranny and incom¬ petence of John led to a revolt on the part of the barons and the extortion from him of the Great Charter. (See Great Britain — Mediae¬ val England). The efforts of the kings to evade the provisions of the charter caused the union of the nobles and the third estate, the distinctive feature of the English Constitution as contrasted with that of France or of Ger¬ many. The loss of its continental possessions really strengthened England and enabled it to develop a strong government in its own island.

The German Monarchy. — Germanv was a kingdom made up of great duchies. The king was strong only when he had all these duchies under his immediate control. The imperial title which he held was usually a source of weak¬ ness, because of the necessity of maintaining his authority outside of Germany. Those kings who neglected the imperial interests in Italy and Burgundy were strongest at home. Frederick Barbarossa, Henry VI and Frederick II (qq.v.), who attempted to build up strong em¬ pires, were compelled, as the price of support from their German subjects, to make constant concessions. Thus they bartered away most of their German lands

and royal rights. The towns and cities, in particular, acquired privi¬ leges and practical independence in payment for their support in men and monev. On the extinction of the Hohenstaufen house, Germanv was divided up into many separate entities, varying in size from a duchy to a village or to a knight's fee, all claiming independence of all control except the imperial. The weak em¬ perors of the 14th and 15th centuries were un¬ able to maintain any effective control or order. Each emperor was intent only upon retaining his position and securing such property for his family as he could. Consequently Germany be¬ came a prey to internal dissension and division.

The Other Monarchies.— The other coun¬ tries were more backward. In Spain, the Chris¬ tian kings were engaged in conquering Moslem

territory or else in warring with one another. These movements were going on for several centuries, and culminated just at the close of the Middle Ages. In 1492, the Moors were conquered in Granada, their last stronghold. The two most powerful kingdoms, Castile and Leon, had already been united, and 20 years later the Spanish portion of Navarre was added. In Scandinavia powerful monarchies were growing up. In the eastern portions of Europe new Christian kingdoms had arisen, especially Russia and Hungarv. which were destined to play an important role in the latter centuries.

The Period of the Renaissance: Discover¬ ies. — The last period of the Middle Ages is often spoken of as the Age of the Renaissance (q.v.). The name is to a certain extent a mis¬ nomer. But it is sanctioned by general usage, and there are certain factors that may be brought together, which serve to mark the transition from the mediaeval to the modern world.

The travel and commerce of the 12th and 13th centuries caused an interest in foreign lands which never abated. In particular, the taste for spices, which had become common, led to attempts to secure these more easily and more cheaply. After the loss of the Christian possessions in Syria, the importation of soices into Europe was burdened with heavy tolls by the Moslem rulers through whose territories they had to be carried. To the men of the 15th century there seemed to be two possible routes by sea to the spice islands, one by sailing around Africa, the other by sailing directly west to India. Attempting the latter led to the dis¬ covery of America; attempting the former, to the doubling of the Cape of Good Hope. The result of these discoveries was to make the na¬ tions on the ocean the leaders in commerce. The Mediterranean ceased to be the centre of the. world's commerce and the Italian cities lost their pre-eminence as commercial centres.

Inventions : Compass, Printing-press, Gun¬ powder. — This exploration was possible only by the use of the compass (q.v.). This had been known in the West by the 12th century; in the East, centuries earlier. But it was per¬ fected as a real aid to navigation only in the 14th century. About the middle of the 15th century came an even more important inven¬ tion, that of printing (q.v.). This resulted at once in increasing enormously the number of books in existence and in cheapening their cost to one-fifth or less, so that books were readilv accessible to a much larger number than before. At about the same time the manufacture of gunpowder was being perfected. Compositions similar to gunpowder (q.v.) had long been known in the East, and the knowledge of the composition of «Greek fire» had been brought to the West. But it came into general use only in the 15th century, and the guns long after that were held by many to be inferior to the cross-bow.. But gunpowder, before 1500, was revolutionizing the art of war and rendering the mediaeval knight obsolete.

Classical Literature and Pagan Spirit.— Contemporary with these discoveries and in¬ ventions was the awakening of an interest in classical literature. In the 12th century there had been at some centres an eager study of the Latin classics, but, in the 13th this had been superseded to a great extent by the branches

considered more practical, especially law, math¬ ematics and science. In the 14th and 15th centuries men turned again to the classics, and Greek, which had long been neglected, became a favorite study. Along with the study of the pagan authors developed a new feeling for art, which resulted in the wonderfully natural works of the Renaissance artists. Other sides of this new activity were manifested in the more schol¬ arly spirit of criticism and in scientific. study. In fact, with the period of the Renaissance modern history had dawned.

Bibliography. — Lavisse et Rambaud, (His- toire Generale du IVe siecle a nos jours) (Paris 1893ff. ; the first three volumes form the best general history of the Middle Ages) ; Cam¬ bridge Mediaeval History) (New York 1911- 13, 2 vols. to 800 a.d., published, which

supersede all earlier works) ; Gibbon, decline and Fall of the Roman Empire (edited by Bury, 7 vols., London and New York 1896- 1900) ; Milman, (History of Latin Christianity > (9 vols., 1867; formerly a general favorite). Of the many Church histories, two may be men¬ tioned: Alzog, (Manual of Univeral Church History) (3 vols.; a scholarly treatise*

from a Roman Catholic standpoint) ; Schaff, his¬ tory of the Christian Church (4 vols., to Gregory VII ; scholarly, from a Protestant standpoint). Three volumes in the (Periods of European History* ; Oman, (Dark Ages* ; Tout, (Empire and Papacy* ; Lodge, dose of the Middle Ages) (New York 1893-1901), furnish a detailed, but somewhat uninteresting, sum¬ mary of the political history. Hodgkin, (Italy and Her Invaders) (8 vols.), and Bury, Cater Roman Empire) (2 vols.), are Useful for the period before 800. Bryce, (Holy Roman Em- pire) (new ed., 1904; wonderfully compact and useful); Symonds, (Renaissance in Italy* (7 vols.) ; Burckhardt, Civilization of the Indian Renaissance) ; Voight, (Wiederbelebung des classischen Alterthums* (2 vols., 3d ed.) ; these works are to be commended for the period of the Renaissance. For special subjects: Montalembert, (Monks of the West) (6 vols.) ; Lea, (History of the Inquisition (3 vols.; the masterpiece of a great historian) ; Oman, /His¬ tory of the Art of War> (Vol. II), for military matters; Heyd, (Histoire du Commerce du Levant* (2 vols.), very important for the com¬ merce; Levasseur, (Histoire des classes ouvrieres avant 1789) (2 vols.), admirable for economic conditions; Gregorovius, Come in the Middle Ages* (8 vols.), scholarly and in¬ teresting; Rashdall, (History of the Universi¬ ties of Europe in the Middle Ages) (2 vols.), the best treatise on the subject; Saintsbury, flourishing of Romance, * the best brief ac¬ count of the literature in the 12th and 13th cen¬ turies; Munro and Sellery, (Syllabus of Medieval History* (7th ed., 1913), contains references by topics to about 500 works, mainly in English.*

Dana Carleton Munro, Professor of History, Princeton University.

HISTORY, Modem. General Charac¬ teristics. — When History is divided merely into Ancient and Modern, the term Modern applies to history subsequent to the 8th century a.d. The Americana, however, keeps to the more usual triple division into Ancient Mediaeval and Modern ; and with this classification Modern History begins about the year 1500.

At that date, as for several centuries pre¬ ceding it, the scene of human progress was con¬ fined to western Europe, and the actors were the Latin and Teutonic peoples. Except for Poland with its Latin church and borrowed German culture, eastern Europe was outside the pale of civilization. The barbarous northern Slavs seemed doomed to Tartar domination, and the somewhat less barbarous southern Slavs with the neighboring Magyars were enslaved by the Turk. From the devouring victorious march of the Turk even central Europe was in im¬ minent peril.

Even in western Europe, nations, in the proper sense, were not made; and the political map bore faint resemblance to that of to-day. There was one Latin Christendom, binding in feeble union the several geographic units. But

most of the units themselves were broken into fragments under local rulers; and these frag¬ ments, sometimes of widely separated lands, were recombined, with kaleidoscopic confusion, in loose, shifting aggregates which possessed not even permanent names. Out of this feudal chaos, strong monarchies were just emerging to organize states, in France, England, Spain, Austria and Bohemia, Sweden and Denmark. Like governments had appeared, too, in Hun¬ gary and Poland; and Switzerland and the Netherlands were loosely related to the Aus¬ trian monarchy. There was hardly a prophecy of a Germany or an Italy.

The rise of monarchic states is the change that marks the close, politically, of the Middle Ages. At the moment it seemed a disaster to many good men, like Dante, who clung to the old ideal of a united Christendom. But since the days of the old Roman Empire, Europe had never known a true union. <(Latin Christen¬ dom, }) in its best period of union, had been made up of various layers of society — nobles, burgesses, artisans, priests, peasants ; and the horizontal cleavages between these classes had been more fatal to unity of spirit and to progress than the new cleavage into nations was to be. One class had been more foreign to another in the same land than France to England. French noble and German noble were always ready to make common cause against French peasants or German townsfolk. The new monarchies were to change all this. The real mission of each of them, whether the monarchs saw it or not, was to weld all the classes within its land into one people. While this was being done, some old class liberties were lost. But the way was being paved for a new popular freedom, broader and safer than the world had ever known.

Until 1250, for centuries Italy and Germany had been the two centres of interest in Europe. Each had claimed universal empire; and its overreaching claim had left each broken in frag¬ ments. Not for centuries was either to attain to this new political form of a united monarchy. Leadership therefore had passed from these two lands to France, Spain and England,— the three countries in which the new movement was most advanced. Germany and Italy were to be, for long, little more than a battleground for these neighbors.

The social and economic conditions of the year 1500 made a dismal picture. Society was hopelessly aristocratic and predominantly mili¬ tant, and it was crystallized in strata. The

skilled industry of the towns was managed upon the guild system; and

agricultural labor, except in England and some other small districts, was carried on by serfs.

But Europe had been astir with dim im¬ pulses to change for 400 years, — ever since the Crusades broke the torpor of the Dark Ages and prepared the way for the rise of towns and the Renaissance. Near the close of the 15th century the tendency to progress became more pronounced, and the lines of activity more varied. Louis XI in France, the Tudors in England, Ferdinand and Isabella in Spain, pre¬ pared the way for new consolidated political societies, and for new principles of government; the invention of printing made possible the preservation and utilization of the recently re¬ discovered Greek learning and the rapid dis¬ semination of new ideas ; the discoveries of Columbus and Vasco da Gama set free un¬ dreamed-of energies among the lands of the Atlantic seaboard, and summoned commercial Europe to a right-about from east to west; the adoption of gunpowder in the wars between Francis I and Charles V marked the passing of the military superiority of the knight in armor, and undermined . the citadel of aristocracy in politics ; the opening of the Protestant Reforma¬ tion (1520) shattered the old unity of Christen¬ dom, and, together with the Catholic Counter- Reformation, called out new energies in the fields of morals and intellect. Within two gen¬ erations, the one just before and the one just after the year 1500. there stood revealed not merely a new physical hemisphere and new con¬ tinents in the old one, but also a new universe of thought and feeling. Europe had passed into a new age.

The four centuries of Modern History have been a period of constant, marvelous, increas¬ ingly rapid transformation, — intellectual, politi¬ cal, industrial. The stage itself has widened from a corner of the smallest continent into wellnigh the whole surface of the globe. The actors have multiplied, until they promise in the near future to include all branches of the human race. The drama has become infinitely complex, with the interaction of countless streams of influence. As compared with Ancient or Mediae¬ val History, Modern History deals with a brief time, but with vast spaces, complex relations and accelerated progress. The separate move¬ ments that make up the bewildering maze are discussed severally in some detail, under appro¬ priate headings, in the Americana. This article attempts only to marshal them in such order as to bring out the essential relations between them.

It is convenient to divide the four centuries of Modern History into the age of monarchic states and the age of nation-states. The Ameri¬ can and French Revolutions make the transition from one to the other, and the most satisfactory dividing date is 1789.

From the Reformation to the French Revolution.

Monarchic States. — The constant warfare of the 16th, 17th and 18th centuries is the simplest thread by which to connect the other movements of the age. Speaking broadly, the contests of the first half of the period, to 1648, are ((religious wars,® Catholic against Protest¬

ant, while after 1648 the struggles grow out of dynastic and commercial rivalries.

The declaration of the war which split Christendom into opposing camps for over a century came in 1520, when Luther burned the Pope's bull. The Diet of Worms at once pro¬ nounced against the rash monk the ban of the Empire; and the decree would have been en¬ forced, and Protestantism stifled at its birth, if the young emperor, Charles V, had had a free hand. But Charles had just become involved in strife with Francis I, over the claims of Spain and France in Italy, and he was kept busy with war against France and the Turks until 1544. For a generation, therefore, the new faith was left to spread itself unchecked over Germany and Scandinavia, while during the same period the English Church cut itself off from Rome, and Presbyterian heresy made headway in France and Switzerland. For a time, indeed, Protestantism threatened to con¬ quer even the south of Europe ; but the Catholic Counter-Reformation, with equal zeal and su¬ perior skill, finally saved the Romance lands to the old faith.

Religious Wars, 1546-1648. — Meanwhile, entangled in his strife for European sovereignty, Charles could not strike at Protestants in Ger¬ many until 1546. It was then too late. In 1555, after brief struggles, the princes of the Schmalkald League forced upon him the Peace of Augsburg; and, though troubled with in¬ cessant bickerings, Germany had no further civil war for 60 years. Just that period, how¬ ever, was filled with terrible religious contests in the Netherlands and France; and then the age of religious wars closed with another civil war in Germany, — the most destructive in European history, until the World War of 1914. But the century of strife from the opening of the Schmalkald War to the close of the Thirty Years' War (1546-1648) did not materially alter religious frontiers. Catholicism, to be sure, made some conquests with the sword, — Bohe¬ mia, South Germany and the southern Nether¬ lands, — but in most of these districts, as in the Latin countries of southern Europe, the Counter-Reformation was making rapid gains before war began.

The close of the period of religious war is marked by the decay of Spain, the continued disruption of the Holy Roman Empire and the rise of France and of the Dutch Republic. To explain these changes it is needful to dwell somewhat further upon the wars.

In 1556-57, after his failure in Germany, Charles V resigned his crowns —

the Austrian possessions passing to his brother, and the Spanish to his son, Philip II. Despite the di¬ vision, Philip was far the most powerful mon¬ arch in the world. Each year the gold fleet filled his coffers from the exhaustless wealth of the Americans and in 1580 Portugal with her East India empire fell intp his hands. This was the power — supreme in Europe and sole mistress of the New Worlds, east and west — against which the petty, disunited Netherland provinces dared to rebel. Beginning as a po¬ litical revolt in 1568, the struggle soon became a religious war; and it was waged for more than 40 years with a relentless fury which made it a byword for ferocity even in that brutal age. The 10 southern provinces were finally brought back to Spanish allegiance; but

the northern provinces — Dutch in blood and Protestant in religion — fought on with desper¬ ate courage until they won independence. At the same time they preserved political and re¬ ligious liberty for the world. Midway in the struggle, Elizabeth of England sent some tardy aid. Philip then turned upon England ; but the destruction of his ((Invincible Armada" in the splendid sea-fight in the Channel not only saved England at home but also paved the way for the English colonization of North America. The war closed in 1609. Spain had sunk into a second-rate power, never again to play an im¬ portant part in European politics ; but the Uni¬ ted Provinces, through the stage of the desolat¬ ing war, had grown prosperous. They drew wealth, not from wasted land, but from the sea, plundering the new possessions of Spain in the East Indies and building there a colonial em¬ pire for themselves. For most of the century, in intellectual, commercial and industrial activ¬ ities, the Dutch held the first place in Europe.

In France the Edict of Nantes (1598) closed the wars of religion by guaranteeing toleration and handing over certain garrisoned towns to the Huguenots as security. During the next half century, under the wise administration of Henry IV and then of Richelieu, the industry of the people restored prosperity with marvel¬ ous rapidity. Richelieu crushed the feudal no¬ bles and recaptured from the Huguenots their garrisoned towns. In other respects however, he kept toward the Protestants the pledges of the Edict of Nantes; and as he warred upon the Protestants within France in order to strengthen the royal power, so he aided the Protestants of Germany in the Thirty Years' War in order to make France supreme in Eu¬ rope. France had long been in real peril from the Hapsburg powers of Spain and Austria, which ringed her about in hostile embrace ; but the failure of Spain against Holland and Richelieu's policy of weakening Austria in the German war removed the peril, and, as Spain declined from the first place

in Europe, France stepped into it.

Meantime the ***Thirty Years' War (1618-48) was desolating central Europe. The princes of North Germany proved timid and incapable; and the cause of Protestantism was saved only by foreign intervention — by Denmark, by Swe¬ den and finally by Catholic France. At the close of the struggle, the first European Con¬ gress reorganized Europe. By the Peace of Westphalia, France received most of Alsace and some other Rhine districts. The independ¬ ence of Switzerland and of the United Provinces was formally recognized; and the second of these two republics ranked as one of the Great Powers. Sweden, already reaching down both west and east shores of the Baltic, secured much of the south shore also, with command of the mouths of the German Oder, Elbe and Weser. On the other hand, the empire lost more than territory. The political rearrange¬ ments within that state reduced the imperial Diet to the level of a useless debating society and put an end to whatever shadow had per¬ sisted*** *of national unity. From this time until it vanished, a century and a half later, the Holy Roman Empire was a meaningless survival, cumbering the earth. Henceforth the Haps¬ burg "Emperors" . derived their only real im¬ portance from their position as hereditaiy arch¬*

dukes of Austria; and soon they turned to their proper task of defending Europe against the Turk. To most of Germany the war had brought blasting ruin. Half the population and two-thirds the movable property were swept away. Land tilled for centuries became waste, and men became savages. Not till the middle of the 19th century did large districts again contain as many homesteads and cattle as in 1618; while the low position of the German peasantry, until 1850, was due in great measure to this war.

American Colonization. — Before the re¬ ligious wars closed, the continent of Europe had ceased to be the sole scene of important historical development. American colonization was well advanced and political liberty had re¬ ceived a remarkable development both in Eng¬ land and in English colonies. These topics de¬ mand attention before the student considers the next period of European wars.

Spain made her first settlement upon the American continent at the Pearl Coast in 1513. Then sweeping to north and south, she took swift possession of all South America except Portugal's Brazil, all Central America and Mex¬ ico, and of the Floridas and Californias, far up both coasts of North America, while plans were afoot to plant her flag over the rest of that continent. But the ruin of the Armada, together with Spain's decay at home, came in time to leave room for other colonization. France seized upon the mouths of the Missis¬ sippi and the Saint Lawrence, the apparent

gate¬ ways to the continent; and English colonies stretched themselves in patches along the fringe of the North Atlantic Coast. The Dutch spent their colonizing energies mainly in the Orient ; and, despite some ambitious beginnings, Swe¬ den soon grew too weak to be a serious factor in North America. Thus that continent was left in dispute between Spain, France and Eng¬ land. The contest was to be interwoven with the European wars of the last half of the 17th century and of the 18th century, and the out¬ come was big with consequence to the world. All European countries except England gov¬ erned their colonies on despotic plans. The English colonists took to the New World insti¬ tutions and principles of freedom, and soon gave them a wider development there than had been possible even in the old home. Besides the rights of free speech and jury trial and ha¬ beas corpus, each English colony had from the first, or very quickly inaugurated, a representa¬ tive legislature with full parliamentary privi¬ leges and with control over taxation. In sev¬ eral colonies, local government also was con¬ ducted on extreme democratic principles. Not until 200 years later did any of these free prin¬ ciples appear in the colonies of any other peo¬ ple — and then only because of their success in the English colonies.

England in the 17th Century.— In England itself the 17th century saw an important development in free government. Through the Stuart period, from 1603 to 1688, England was engaged in a critical struggle between the royal claims of "Divine Right" government and the rising spirit of popular government. Except for brief intervals the conflict was parliamen¬ tary, not military, but it was constant and stub¬ born. Much of the time it was confused with ecclesiastical questions, which, to the men of the

time, often seemed the chief issue; and it was fortunate, indeed, that the stern heroism of Puritanism became engaged on the side of po¬ litical liberty. During this century, too, Eng¬ land was the last remaining battle ground in Europe for free government. In the other large states, — in Spain, France, Austria, in the Scandinavian lands, even in the petty principal¬ ities of Italy and Germany, — despotism was triumphant. In England, popular principles not merely maintained themselves against the Stu¬ art attack : they came out of the conflict with increased vitality. The great experiment of a Puritan Commonwealth failed; but after the Stuart Restoration it became apparent that the body of the monarchists themselves were now thoroughly devoted to parliamentary govern¬ ment, and the attempt of the later Stuarts to set up a personal absolutism called forth the ((Glorious Revolution® of 1688, which estab¬ lished the supremacy of Parliament over the king.

Dynastic and Commercial Struggles, 1648- 1783. — We now return to the general develop¬ ment of Europe after 1648. On the Continent the period from the Peace of Westphalia to the French Revolution (1648-1789) is marked (1) by absolutism within the several states and (2) by dynastic interests in their foreign relations, — with incessant selfish war, as the result. The famous phrase ascribed to Louis XIV of France, — ((I am the State,® — might have been used appropriately by any monarch of the time outside of England. A few great rulers domi¬ nate the period. Indeed the stage is largely filled by three monarchs, — Louis XIV (1643— 1715), Peter the Great (1689-1725), and Fred¬ erick the Great (1740-86). The influence of Peter was restricted for the most part to Russia, which had thrown off the Tartar yoke a century and a half before, and had been looming an indistinct menace on the East. But the other two monarchs belong to all Europe, and the period divides itself naturally into the Age of Louis XIV and the Age of Frederick II. The chief aim of statesmen was to prevent any one country from becoming too strong for the safety of its neighbors. The Peace of Westphalia had transferred political predomi¬ nance from the Hapsburgs to the Bourbons. Thus, during the first half of the period France threatened the <(balance of power,® and league after league of other powers was organized against her. International morality, however, was low; and commonly rulers were willing to let a strong power rob a weaker one if they could find ˆcompensation® by robbing some other state themselves. In the last wars of Louis XIV, just before and after 1700 (known in American history as King William's War and Queen Anne's War), the dynastic interests of European ruling families became merged in a titanic, century-long struggle between France and England for world dominion, — though neither country was yet fully conscious of the import of the strife.

In Europe, France was no longer in peril, as she had been in the period preceding Richelieu; and Louis the Fourteenth's half-century ot war was merely a struggle to enlarge his do¬ minions. For a generation the victories of Turenne dazzled Europe; and France annexed some important strips of territory on the east,

at the expense of Spain and of the decaying empire. But in the closing period, when the Allies also had found great generals, in the English Marlborough and the Austrian Prince Eugene, even success in the field deserted Louis ; and to a comprehensive view his failure was profound. Exhausted France was crushed by taxation to pay the interest of the war debt; while, in attacks upon petty provinces in Europe, she had wasted energies and oppor¬ tunities that might have made her supreme in Asia and America. Within, the economic re¬ forms of the great Colbert were abandoned; and the revocation of the Edict of Nantes (1685) drove into exile more than 200,000 of the best citizens of France. The effect

corresponded in a measure to the effect upon Spain of the expulsion of the Moriscoes somewhat earlier. The Huguenots had com¬ prised the skilled artisans and the enterprising merchant classes ; and their flight added to the terrible economic demoralization and deprived France of all chance at industrial leadership.

To men of the time, however, the failure was partially disguised by the glamor that sur¬ rounded the court of the Grand Monarque. French literature, brilliant and sparkling, was in its first splendid period; and French intel¬ lectual leadership survived for more than a cen¬ tury. . Until after 1800, the court of Louis XIV remained the model for every court in Europe; and French thought, French fashions and the French language were the common property of all polite society.

The Treaty of Utrecht (1713), while it left France still one of the three greatest powers, marks her recession from predominance. Spain resigned her territories and claims in Italy and on the Rhine, and, except for her decaying colonies, withdrew finally within her own pen¬ insula. England gained Newfoundland and Nova Scotia from France, and in Europe she secured command of the Mediterranean by the conquest of Gibraltar and Minorca. By the same treaty and by the rearrangements that im¬ mediately followed, the old Spanish Nether¬ lands, the duchy of Milan, and the kingdom of Naples and Sicily fell to Austria. The Duke of Savoy (one of the faithful allies against France) acquired Sardinia, with the title of a kingdom for his enlarged state. A little be¬ fore, in 1701, the Elector of Brandenburg had secured the title of king of Prussia. Thus, out of the wars of Louis, at the beginning of the 18th century, arose the two kingdoms, Prussia and Sardinia, which in the latter part of the 19th century were to make modern Germany and modern Italy against the will of modern France.*

About 1700, other important changes took place in the map of Europe. For three cen¬ turies, Austria had been one of the chief bul¬ warks of Christendom against Mohammedan¬ ism. In 1683 Vienna had been besieged by the Turks and had been saved only by the arrival of the gallant Sobieski with his Polish chivalry. But thereafter Austria took the offensive. She won back Hungary, and then, step by step, ex¬ tended her domains down the Danube valley and the Illyrian coast. In the latter part of the reign of Louis XIV, the Austran Hapsburgs, turning away from the Rhine, definitely adopted a Danubian policy and sought to aggrandize

themselves by seizing Slav territory from Turkey.

This new policy of Austria gave Louis XIV a freer hand on the Rhine than he otherwise would have had, and so helped on the decline of Holland. In 1640 Dutch vessels carried the commerce of the world, — even the greater part of that between England and her colonies. Soon after that date, however, England attacked the Dutch commercial supremacy by navigation laws, and at last by war. Fearful of French conquest, and deserted or timidly defended by Austria, Holland had no choice but to ally herself to her commercial rival. After 1689 in particular (when William of Orange became king of England), Holland followed the lead of England in politics, while that country drew to herself the Dutch carrying trade.

In the north of Europe the former great powers, Sweden and Poland, were declining before the rise of Russia and Prussia. Peter the Great (1689-1725) consolidated the govern¬ ment in Russia, introduced a veneer of Western civilization and started his country on its de¬ liberate march toward distant seas, west, south and east. Peter himself secured the western "window® by seizing from Sweden the south¬ eastern Baltic provinces. In the middle of the century, the Empress Elizabeth (1741-62) robbed Sweden of the rest of the Baltic coast up through southern Finland. The northern half of Finland remained Sweden's until Alex¬ ander I seized it in the Napoleonic wars; but toward the close of the 18th century, under Catherine II, Russia began her advance along the Black Sea at the expense of Turkey. Under the same ruler occurred the Russian gains in the partitions of Poland, — a story which can be understood only in connection with the rise of Prussia.

For three centuries the Hohenzollern Mar¬ graves of Brandenburg had been patiently add¬ ing scrap by scrap to their realms. Soon after 1600 these dominions lay mainly in three widely separated groups, — Cleves on the Rhine, Bran¬ denburg on the Elbe and East Prussia beyond the Vistula. The object of Hohenzollern poli¬ tics was to consolidate these provinces by ac¬ quiring intermediate territory. Toward the close of the Thirty Years' War, Frederick William, the Great Elector, made important headway in this respect and accomplished still more for his country after the close of that struggle by persistently maintaining peace and fostering in¬ dustry. It was his son who in 1701 secured the title of king. The second king of Prussia built up a magnificent army and reared a son who was to use it magnificently — and treacherously. Frederick II ascended the throne in 1740 and began his long reign of an unjust but profit¬ able war. The Hapsburg realms had just fallen to a woman, and, disregarding solemn treaties in truly Hohenzollern fashion, Fred¬ erick took unscrupulous advantage of the sup¬ nosed weakness of the Archduchess, Maria Theresa, to seize from Austria the rich prov¬ ince of Silesia by surprise, without

even the warning of a declaration of war. The hetero¬ geneous Hapsburg realms seemed about to fall to pieces; and Spain, France, . Savoy and Ba¬ varia hurried to join Prussia in dismembering the carcass. But England and Holland threw themselves into the stuggle on the Austrian side, and the Treaty of Aix-la-Chapelle (1748)

closed the War of the Austrian Succession without further territorial changes. Frederick kept Silesia, reaching far down into the heart of Germany, and Prussia stood forth as one of the great powers.

The significance of the contest, however, lay in its wide extension into India and America. Indeed, colonial war between England and Spain had already begun before Frederick appeared on the stage, and France must soon have joined Spain in any event. In the New Worlds, too, the peace restored the former boundaries ; but the war marks a clear consciousness in Eng¬ land and France that the two were rivals for vast realms outside Europe. The family in¬ terests of monarchs as a cause for war were giving place to the commercial interests of Eng¬ lish and Dutch merchants as opposed to those of French and Spanish merchants, while back of these selfish motives lay the mighty question, big with consequence to the world, whether French or English political ideas should hold the New World.

In 1756, Austria fortified herself by alliance with Russia, Sweden and even her old enemy France, and prepared to destroy Prussia. Fred¬ erick's supreme military genius saved his coun¬ try for the moment, and the next year England came to his aid. During the brief interval be¬ tween the European wars, England and France had practically remained at war in America; and now that France had joined Austria, Eng¬ land was constrained to support Prussia. In all the period from 1689 to 1815, no matter what the origin of the wars, England and France soon became the chief factors; and though they were at one time or another on every side of every question, they were never on the same side at the same time.

This Seven Years' War (1756-63), or Great French War, as it is commonly known in America, was literally a world-wide struggle. Red men fought by the Great Lakes of North America, and black men fought in Senegal, while Englishmen and Frenchmen grappled in India as well as in Germany, and their fleets engaged on every sea. The showy battles took place in Germany, and on the whole the Euro¬ pean conflict determined the wider results. Pitt, with vision fixed upon a coming British em¬ pire, declared that in Germany he would con¬ quer America from France. This he did. England furnished the funds, and her navy swept the seas. Frederick, supported by Brit¬ ish subsidies, furnished the generalship and most of the troops for the German battlefields. The striking figures in the struggle are (1) Pitt, the English imperialist and the directing genius of the war; (2) Frederick, the

mili¬ tary genius, who won Pitt's victories in Europe; (3) Wolfe, who won French America from the great Montcalm, and (4) Clive, the East India Company's clerk, who laid the basis for England's supremacy in India.

Changes in the World-Map; the American Revolution. — The Treaty of Paris (1763) left Europe without change; but in India France lost all except a few unfortified trading posts, while in America, England received Florida from- Spain, and Canada and the eastern half of the Mississippi Valley from France. France ceded to Spain the western half of the Mis¬ sissippi Valley, in compensation for the losses Spain had incurred as her ally; and, except for

her West India Islands, she ceased to be an American power. Spain still held South Amer¬ ica and half of North America; but her huge bulk was decaying day by day. Holland, too, with widespread empire, was plainly in decline. England, having dispossessed France in both Asia and America, stood forth as the leading world-power.

The American Revolution, a few years later, did not lessen this pre-eminence; but it had other results of supreme, significance. The war came because the American colonies had really be¬ come a nation, and because the English govern¬ ment unwisely insisted upon managing Amer¬ ican affairs after the Americans were quite able to take care of themselves. English interfer¬ ence in economic matters had long been irk¬ some, and the danger of interference in eccle¬ siastical matters was feared. England had just relieved the colonies from fear of French con¬ quest. External bonds were gone, and inter¬ nal ties were dissolving. Then George III and his ministers supplied the necessary jar to ef¬ fect separation by trying to raise revenue in America by Acts of Parliament. Astute pa¬ triots rallied the majority of the Americans by an old English shibboleth ; and after a bitter eight-years' conflict (1775-83), the 13 Eng¬ lish colonies became the first free American nation.

The Revolution ((split the English race and doubled its influence.® It paved the way for a more enlightened economic science, since, con¬ trary to all expectations, the trade of free America from the first proved more valuable to England than that of colonial America had been. It reacted upon England, so that, when the great wars were over, both that country and its remaining colonies made new advances in political liberty. It set up the standard of independence for the states of Spanish Amer¬ ica in both continents. But its supreme im¬ portance lay in the birth into the family of

nations of the United States itself, though the full significance of the new nation hardly be¬ gan to impress Europe for more than two gen¬ erations.

England's European enemies had seized the opportunity to attack her in a war of revenge. England came out of the contest with glory little tarnished. She had been fighting, not America alone, but France, Spain and Holland, as well ; and though she had lost the best part of her old American empire she was not with¬ out compensating gains. She seized Dutch colonies at will ; she strengthened her grasp upon India ; she won back the undisputed sov¬ ereignty of the ocean by shattering the navy of France; she rebuffed all assailants from the rock of Gibraltar, the key to the Mediterranean; and in some measure she made good even her American loss by the acquisition of Australia just afterward.

The Partitions of Poland. — To return to continental Europe in the closing half of the Age of Frederick the Great: — one more terri¬ torial change calls for attention. Poland had fallen into anarchy under its elective, figure¬ head king and its oligarchic nobles. This an¬ archy gave the neighboring powers excuse for plunder. Catherine II determined to seize a large part of the country. Frederick II per¬ suaded his old enemy, Austria, to join him in compelling Russia to share her booty. The

First Partition of Poland (1772) pared off a deep rind. The Second and Third Partitions, which <(assassinated the kingdom,® had not even the pretext of misgovernment in Poland, for the Poles had earnestly taken up the work of reform. These final divisions took place in 1793 and 1795, after the death of Frederick, amid the wars of the French Revolution. Prussia gained large extent of territory, with valuable sea coast; and most important of all, the additions brought the principal Prussian provinces, — formerly scattered, — into a compact body. But Russia gained far the greatest part of the territory, and she now bordered Germany on the east, as France had come to do earlier on the west, after the destruction of the Bur¬ gundy of Charles the Bold. The wise policy of the Germans, early and late, would have been to support the buffer states against the greed of Russia and France. Failure to do so has left Germany exposed ever since to di¬ rect attack by powerful enemies, and has com¬ pelled her to build up artificial frontiers of fortresses and bayonets, and to accept an un¬ due militant character for all her civilization.

The Beneficent Despots of the 18th Cen¬ tury. — In foreign relations, the Age of Fred¬ erick the Great saw little improvement over that of Louis. In the government within the several states, however, there was a benefi¬ cent and significant change. Frederick of Prussia, Catherine of Russia, Charles III of Spain, Leopold of Tuscany, Ferdinand of Naples, Joseph II of Austria, all belonged to a new class of (

The Age of Nation States.

The French Revolution, 1789-99. — In the

latter part of the Middle Ages Italy had given the world an intellectual. revolution ; Germany began Modern History, with a religious revolu¬ tion; and France now introduced the last great division of the Modern period by a political

and social revolution. Pre-eminently among political revolutions, the French Revolution de¬ serves the name. The English Revolution of 1688 swept away temporary interference with ancient principles of English politics. The American Revolution made the Americans polit¬ ically independent : so far as it brought any social change, it merely hastened slightly a movement, long under way, toward democ¬ racy. The French Revolution overturned a society that had been growing up for centuries, cut loose from the past, and started France, with all the world, upon new lines of growth.

But if it destroyed the old, it also built the new. The work of destruction was needlessly horrible and bloody; but as a whole the Revo¬ lution was a vast and fruitful reform. The really significant thing is not the temporary mob-rule and bloodshed ; the significant thing is the great national awakening which swept away an absurd society, founded on ancient violence and warped by time, to replace it with a simpler social system, based more nearly on equal rights.

The chief institutions of France were: (1) a monarchy, centralized, despotic and irrespon¬ sible ; but in weak hands, incumbered by com¬ plex survivals of ancient local institutions, and hampered by its respect for the good opinion of the privileged classes; (2) an aristocracy, wealthy, privileged, corrupt, skeptical; and (3) an established church, wealthy and often cor¬ rupt. Below these spread the masses, a nec¬ essary but ugly substructure. Over the Con¬ tinent, similar conditions held sway. In France the nobles had fewer duties, the peasantry had more completely risen out of serfdom, and more of a middle class had grown up, than in the other large countries of the Continent. Feudal society was more decayed, and industrial so¬ ciety was more advanced. The great Euro¬ pean revolution broke through at the weakest spot.

The fundamental cause of the Revolution was the unjust privileges of the favored classes and the crushing burdens of the masses. The evil was no greater than for centuries, but the consciousness of it was greater. The

masses had begun to demand reform ; and the classes had begun to question the righteousness of their privileges. A revolution ˆrequires not only abuses but also ideas.® The combustibles were ready, and so was the match.

Science had upset all old ideas about the world outside man. The telescope had proved that other planets like our earth revolved about the sun, and that myriads of other suns whirled through limitless space; and Newton had shown how this vast universe is bound to¬ gether by the unvarying <(law® of unseen gravi¬ tation. The microscope had revealed an un¬ dreamed-of world of minute life in air and earth and water; and earth, air, water (and fire) themselves had become new, — since La¬ voisier had just resolved them into components and proved that they were not the ˆelements® the ancients had held them. Such a revolution in the way of looking at the material world prepared men to ask questions about the world of man and society. Tradition and authority had been proved silly in the one field : perhaps they might be wrong in the other. And so the Revolution was really begun by the revolt against the authority of the past among the

dazzling galaxy of French literati led by Vol¬ taire, Montesquieu, Diderot and Rousseau.

The Revolution, however, is conveniently dated from the meeting of the States-General in 1789. The king had summoned that body, hoping to induce the privileged orders to give up their exemptions from taxation, and so relieve the bankrupt treasury. The Third Es¬ tate, representing the middle class, and the liberal nobles and clergy had assembled with the determination to secure far-reaching re¬ forms and to establish a ˆconstitution.® A sharp contest, with a brief period of anarchy, left power in the hands of these liberal ele¬ ments, where, despite some attempts at counter¬ revolution and some danger of mob predomi¬ nance, it remained for two years. The Consti¬ tution fashioned during this period provided for a weak kingship and abolished nobility and all special privileges before the law ; but it carefully entrenched middle-class supremacy against democracy by graded property qualifi¬ cations and a complex system of indirect elections.

Further changes were inevitable ; but, if France had been left to herself, they might have come about as quietly as these first ones. In¬ stead, foreign war gave the movement a new character. War was inevitable. Emigrant no¬ bles gathered their forces on the Rhine undet the protection of German princes. The em¬ peror, Leopold, brother-in-law of Louis of France, called upon the sovereigns of Europe to recognize the cause of Louis as <(the cause of kings,® and demanded from France such changes

in her government as should protect Europe against the spread of revolution. This presumptuous dictation in their internal af¬ fairs roused a tempest of righteous wrath in the French nation; and in 1792 war began be¬ tween (

France was girdled with foes. The empire, Prussia and Sardinia, were at once in arms, Naples and Spain joined the coalition. Sweden and Russia both offered to do so, if needed. Ere long England and Holland were added to the enemies who expected to partition France. Vast armies invaded France; and the French forces were demoralized by treachery of of¬ ficers and by fear of Royalist plots. If France was to be saved, it could not be done by half¬ measures, nor with a king in secret alliance with the enemy. Control fell to extremists ; and, while the mighty Danton roused and organ¬ ized the national energies, the frenzied mob, unhindered, answered the victories and boast¬ ings of the invaders by the attack on the Tuil- eries and the Massacres. In September, the Convention established the French Republic with extreme democratic features and with manhood suffrage. Then revolution within revolution transferred power to more and more radical factions. The defeated Girondists raised the provinces against the capital ; and for a time Paris and a score of central departments faced the remaining three-fourths of France and united Europe. Out of this crisis, in 1793, grew the great Committee of Public Safety, which ruled France for a year with despotic power. The Revolution now became construc¬ tive, and never has the French genius for or-

ganization shown itself more triumphantly. The Committee deliberately adopted a policy of <(Terror® to crush plots and dissension and to secure united action. Revolt was stamped out. A million soldiers were sent to the front. The invaders were rolling back in rout, and the rag¬ ged but devoted French armies swarmed vic¬ toriously across all the frontiers, to sow civil liberty over Europe' with fire and sword. France was not again in serious danger from foreign foes until the fall of Napoleon, 20 years later.

Meantime, while the grim, crime-stained men of the Committee in war and tumult were or¬ ganizing order within and victory abroad, the Convention was laying anew the foundations of French society and advancing the progress of the human race. It adopted the projects of Cambarceres for the codification of French law, and the plans of Condorcet for a system of national education ; it accepted Argobast's metric system of weights and measures ; it abolished slavery in the French colonies, created provi¬ sion for the public debt, instituted the first Normal School, the Polytechnic

School, the Conservatory, the Institute of France, the Na¬ tional Library and began the improvement of prisons and hospitals, and the reform of youth¬ ful criminals. Meantime the peasants had be¬ come free landholders, and the whole laboring class was rising rapidly in standard of living.

In 1794 the Jacobins split into factions, and these turned the <(Terror® upon one another. The following year a conservative reaction gave the Republic a new constitution, which restored property qualifications and indirect vot¬ ing. But the new plural executive (the Di¬ rectory) proved incompetent and corrupt, and kept itself in power only by a series of coups d' etat. It was assailed by conspiracy, radical and royalist; and France breathed more easily when, in 1799, Bonaparte overthrew it with his troops and set up a firm military despotism, veiled by plebiscites.

Napoleonic Period, 1800-15. — For 15 years,- as First Consul (1800), Consul for Life (1802) and Emperor of the French (1804-14), Na¬ poleon was sole master of France. He pre¬ served the principle of civil equality and all the economic gains of the Revolution, but po¬ litical liberty for a time was lost. True, his rule was a denial of the old doctrine of Divine Right : each new usurpation received the sanc¬ tion of a popular vote, and he boasted that he was chief by will of the people. But every form of constitutional opposition was crushed or muzzled. The legislative chambers existed only to speak when and as he chose; free speech, free press and all security for personal liberty were suppressed by a system of spies and secret police and by arbitrary imprisonment of suspects ; local administration was centralized more highly than ever under the old monarchy, (

This all-pervading absolutism was directed by the penetrating intelligence and indomitable energy of the world's most (

was simplified and codified ; the Church was again brought into alliance with the state; in¬ dustry was fostered, and magnificent public works were carried out. But in all this, Na¬ poleon was merely the last and greatest of the beneficent despots. And in the outcome, his rule fixed, more firmly than before in the mind of the nation the dangerous willingness to de¬ pend upon an all-directing central power; so that in our own day, after many revolutions, the supremely difficult task of the Third Re- publ'c has been to create the spirit of local self-government.

No doubt, in 1800, when Napoleon came into power he sincerely desired peace, in order to reconstruct France. By the brilliant victories of Marengo and Hohenlinden he dissolved the hostile coalition, and a series of treaties, clos¬ ing with the Treaty of Amiens (1802), gave Europe a breathing spell. But soon Napoleon again desired war. His victories in Italy, as a general of

the Directory, had first brought him to the world's notice, and only military glory could keep France from murmuring at his rule. Moreover, he aspired frankly to European empire. On the other hand, the nations felt that there could be no lasting peace with him except by complete submission to his will. In 1803, England and France renewed their strife, and between these powers there was to be no more truce until Napoleon's fall 11 years later. In that time Napoleon fought also three wars with Austria, two with Prussia, two with Russia, a long war with Spain and various mi¬ nor conflicts. From 1792 to 1802, the unceas¬ ing European wars belong to the Revolutionary movement. From 1803 to 1815, they are prop¬ erly Napoleonic wars, due primarily to the am¬ bition of a great military genius. In the first series, Austria was the chief opponent of the Revolution; in the second series, England was the relentless foe of Napoleon.

Napoleon's insight readily divined his true enemy; but Nelson's great sea fight put an end to all possibility of directly invading Eng¬ land. On the Continent, however, victory fol¬ lowed victory. After Austerlitz (1805), Aus¬ tria gave up her remaining. Italian and Illyrian territory and many of her possessions in Ger¬ many. After Jena (1807), humiliated Prussia was reduced half in size, thrust beyond the Elbe and bound to France by a shameful treaty. Less decisive conflict with Russia was followed by the diplomatic victory of Tilsit (1807). Em¬ peror and Tsar entered into friendly alliance. France was to have a free hand in western Europe; Russia was to be permitted to aggran¬ dize herself at the expense of Sweden, Turkey and Asia; and the two were to join in ruining England by enforcing Napoleon's ˆcontinental system.®

The refusal of Portugal to obey Napoleon's command for the confiscation of English com¬ merce led to the seizure of that state. Then followed a like seizure of Spain, out of which grew the long Peninsular War, which, as Na¬ poleon confessed afterward at Saint Helena, was really the canker that destroyed him. At the time, however, it seemed trivial, and for five years after Tilsit Napoleon was master of the Continent. At its greatest extent the huge bulk of France filled the space from the ocean to the Rhine, including not only France as we

know it, but also Belgium, half of Switzerland and large strips of Germany, while from this central body two outward-curving arms reached toward the east, one along the North Sea to the Danish Peninsula, and the other down the coast of Italy past Rome. The rest of Italy and half the rest of Germany were under Napoleon's protection, ruled as a vassal states by his brothers

and generals. Denmark and Switzerland were his willing allies and Prussia and Austria were unwilling ones. Sweden and Russ:a, though nominally his equals, were al¬ lowed that dignity only because they upheld his policy. Only the extremities of the Continent — the islands of Sicily, Sardinia and England, and the mountainous Spanish Peninsula — kept their independence, at the cost of wasting war.

The period was filled with important re¬ arrangements for Europe, territorial, political and social. Many of these were designed in selfishness ; but nearly all were to bear good fruit.

In Germany, even the territorial rearrange¬ ments paved the way for later national unity. Not only the 1,500 anarchic territories of the "knights,® but also the 300 petty, scattered, despotic principalities, ecclesiastical states and oligarchic city-republics (with a few excep¬ tions) were absorbed in larger neighbors; so that the multitudinous, ill-governed states of the vanished "Empire® were consolidated into less than 40. Most of these reorganized states, outside Austria and Prussia, were fur¬ ther combined in the Confederation of the Rhine; and in this Confederation as well as in the German and Italian territory annexed to France, and in the various vassal states over Europe, serfdom and feudalism were abolished and civil equality and the Code Napoleon were introduced. The administration of justice was made cheap and simple, and the old clumsy and corrupt methods of government gave way to order and efficiency.

Most important of all, similar reforms were adopted in Prussia, not from French pressure, but by the influence of the Prussian Minister, Stein, who sought to make his country strong enough to throw off the French yoke and to regenerate Germany. Napoleon's insolence had at last forced part of Germany into a new na¬ tional patriotism ; and that patriotism began to arm itself by borrowing weapons from the arsenal of the Revolution.

Napoleon's "continental system,® if embar¬ rassing to England, was ruinous to Europe. Moreover, Tsar Alexander began to suspect Napoleon of intriguing against him in Finland and Turkey; and in 1811 he refused longer to follow Napoleon's commercial policy. Napo¬ leon declared war. The destruction of his Grand Army amid Russian snows was the signal for the rising of the peoples of central Europe in the Wars of Liberation. Napoleon, like a desperate gamester, refused all terms, and finally was crushed and deposed. The Bourbon dynasty was restored to the throne of France, and the powers met in the Congress of Vienna (1814-15) to reconstruct the map of Europe.

The Congress of Vienna. — In its desires, that Congress stood for reaction. Says Fyffe, "It complacently set to work to turn back the hands of time to

the historic hour at which they stood when the Bastille fell.® It ignored peoples, and considered only princes. Its work,

therefore, had to be slowly undone through the next half-century.

Still, its power for restoration was less than its wish; and even its most selfish work con¬ tained seeds of progress. Nobody thought of restoring the old ecclesiastical princes, nor of undoing the consolidation of Germany. That country was left in 38 states, and Italy in 12. Austria, which had lost territory in central Europe, received its compensation in Italy, so that its despotic energies were more than ever drawn away into Italian and Danubian ques¬ tions. Renovated Prussia, in return for Slav lands, which it ceded for the tsar's new king¬ dom of Poland, received German territory — half of Saxony, the Pomeranian sea coast and German provinces on the Rhine taken from France. Thus, reaching down into the heart of Germany, and with distant isolated districts to defend on the Rhine and on the Niemen, Prus¬ sia stood forth the natural champion of Ger¬ many against Slav and Gaul. In like manner, Sard nia's gain of Genoa was one more step in the consolidation of Italy. In return for the vast national debt incurred in supporting coali¬ tions against Napoleon, England added still fur¬ ther to her colonial supremacy by holding South Africa, Cyprus, Malta and other im¬ portant stations. Despite its brief welcome to Napoleon at his return from Elba, France was wisely left with the boundaries she had when the Revolutionary wars began. The most seri¬ ous disappointment to the liberals was the failure to secure a national union in Germany. Reactionary Austria secured instead the Ger¬ manic Confederacy — a loose league under Austrian presidency, with a Diet which was merely a meeting of ambassadors — "a polite and ceremonious means of doing nothing.®

It was worth much to Europe merely to rec¬ ognize that it had common interests which could be arranged by a peaceful congress. Even this gathering of despots was an advance from 18th century politics toward a better in¬ ternational organization. Some of its work, moreover, was distinctly progressive, such as the declaration (secured by England) against the African slave trade, the opening to commerce of the rivers flowing between or through dif¬ ferent countries, and especially the neutraliza¬ tion of Switzerland under the protection of the powers.

The Industrial Revolution.— Here it is needful to interrupt the political survey to trace a vast economic movement. While France had been giving the world her great social and polit¬ ical revolution with noise and blood, in Eng¬ land an even greater "industrial revolution® had been brought by humble workers busied in homely toil, puzzling day after day over wheels and belts and levers, seeking some way to save time. In the days of Voltaire and George Washington men raised grain and wove cloth and carried spare

products to market in the same way in which these things had been done for 4,000 years. The farmer with strenuous toil scratched the soil with a clumsy wooden plow, not unlike those pictured on Egyptian monuments 6,000 years ago. He had no other machine for horses to draw except a rude harrow and a cart. He sowed his grain by hand, cut it with the sickle of Tubal Cain and threshed it with the prehistoric flail. Car¬ penter's tools differed little in number or style

from a set, 4,000 years old, recently found in Crete. The 17th century had seen the invention of sawmills driven by water (like the still earlier grist mills) ; but these only cut logs into rough boards; all planing and dressing of lumber was still hand work. Merchandise was still carried on pack horses or mules ; and travel was mainly on horseback, though slow six-horse coaches toiled along on a few main roads, at perhaps four miles an hour. No woman had ever cooked by a stove. Household lights were dim, ill-smelling candles or smoky and flaring torches. If a householder carelessly let his hearth fire go out, he borrowed live coals from a neighbor or struck sparks into tinder with flint and steel. If a leg was to be amputated, the agony had to be borne without the merciful aid of anaesthetics. The few cities were still small and mediaeval, without water supply, sewerage disposal or regular police protection. London was the only town in Europe that boasted lamp posts.

The first improvements came in agriculture. By the middle of the 18th century English land¬ lords were introducing a scientific crop rota¬ tion — which then brought with it a helpful circle of gains — larger crops, more stock, richer soil. The increase in farm products, to¬ gether with the new interest in agriculture, led, about the beginning of the next century, to the invention of the cast-iron plow, the cradle-scythe and the threshing machine. Even sooner it led to better facilities for transporta¬ tion, — turnpikes, macadamized roads and lock- canals.

The main change that was to revolutionize working society, however, came not in farming but in cloth manufactures. In the 17th century the primitive distaff for drawing the fibre of flax or wool into thread had been replaced by the wheel, run first by hand, but afterward by the foot of the spinner. But the spinning wheel spun only one thread at a time, and one weaver with his clumsy hand-loom could weave into cloth all the thread eight spinners could supply. In 1761 the English Royal Societv for the En¬ couragement of Manufactures offered a prize for an invention for swifter spinning. Then in swift succession, Hargreaves' "Jenny® (1764),

Arkwright's "Water Frame® (1771) and Cromptor's "Mule® (1779) enabled one spinner to spin 200 threads at a time. The weavers still using the hand loom older than any records of history could not keep up with this until (1784) Cartwright invented a power loom whose shuttle automatically threw the wool back and forth through the warp. After that, both spinners and weavers needed more raw ma¬ terial. This need was met in America after Whitney's Cotton Gin (1793) made it possible for one slave to clean as much cotton fibre from • seed as 300 slaves could clean before. To use the vastly increased supply of cotton there was needed a better motive power for manufacturing machinery, and by 1785 Watt's improvements on the pumping steam- engine had produced. an engine that worked swiftly and economically, and which could transmit its power to wheels by an arrangement of shafts and cranks. By 1800 there were more steam-engines in England than water wheels, and the age of steam and iron had begun for that country. Since prehistoric man found ways to make fire and bake pots, and make spindles,

and extract iron from the ore, there had been no change in man's work and life comparable to this tremendous change in the last quarter of the 18th century.

The English inventions were soon known in America, but they came into common use there only when the War of 1812 forced Americans for a time to manufacture all their cloth. In 1800 that country had only four steam-engines,, and its four small cotton mills were run by water wheels. From the continent of Europe, too, the new age was shut out for some years by Napoleon's "continental system®; and it did not really establish itself there, even in indus¬ trial and progressive France, until about 1830. The problems of the new system had to be met first in England.

With machinery and steam, one worker was soon producing more wealth than hundreds had produced by the old hand processes. Part of the marvelous increase went to the common gain, in lower, prices, but to multitudes of the workers the industrial revolution meant not higher life but lower life. This was not the fault of Hargreaves and Watt; the fault lay in the imperfect organization of society. The inventors had swept away the cumbrous and outgrown "Domestic® system of manufactures for an efficient and economical "Factory® sys¬ tem. But the new machinery was costly. Workmen could not own it as they had owned their spinning wheels and looms; nor did they know how to combine so as to own it in groups. And so far-sighted individuals of wealth built huge factories, story on story, filled them with the new machinery, furnished the raw material, paid wages to hired "hands® and took to them¬ selves the bulk of the new wealth. The new factory system became also a capitalist system and a wage system.

At a touch, the factory system had changed magically the face of England — as soon it was to change the face of the civilized world. In 1750 England was still rural, with only five towns of more than 6,000 people; in 1800, it had 100 such towns, and its total population had already nearly doubled. In the next 50 years, it doubled again, and the towns much more than doubled in size and number. And this growth of towns — long without water supply or garbage collection — brought new problems which at first no one saw clearly and with which neither science nor law was then fit to grapple.

And in the new cities appeared two new ele¬ ments in human society: the capitalist manu¬ facturer, dwelling in his pompous mansion and soon dominating middle-class society; and the capitalless and landless proletariat of pallid factory workers, with nothing to sell but their hands. This new class was at first made up of old workers drawn away from their rural homes, — with garden spots, fresh air and varied industry, — to herd in squalid, indecently crowded tenements, bordering on pestilential alleys, amid destitution, disease, filth and vice. In 1837, one-tenth the people of the great city of Manchester "lived® in cellars.

These destructive tenement conditions were due to general ignorance, to the poverty of the workers and to the careless greed of the em¬ ployers. Even more disastrous conditions with¬ in the factory itself were due directly to cap¬ italistic selfishness. Multitudes of men were clamoring for work, and much factory work

could be done by women and young children, ihe operatives had not begun to bargain col¬ lectively ; and the employer fixed wages and hours at will. Accordingly, the <(dawn-to- dark)} working day was brought from out of doors — where it was endurable because spent in fresh air and in varied activity — into the factory, where it was unendurable because of foul air, poor light, incessant nerve-racking noise of machinery, and because there it crushed women and young children so as to become a menace to the national life. These conditions in England, from 1800 to 1834, are too notorious to need amplification. Even in America as late as 1832 a committee reported that two-fifths of all factory workers were children whose day of toil averaged 14 hours — every day of the year except Sundays and the few holidays — and who had no chance whatever for school¬ ing.

The new society soon begot new social philosophies. The prosperous

capitalist class resented all thought of interference in their business, by government. Such meddling by the paternalistic governments of the past, they easily proved, had been harmful, even when best intended; and the new science of political economy, founded by Adam Smith, taught re¬ morselessly that the ((greatest good of the greatest number® could be secured only by non¬ interference with the ((natural laws® of supply and demand. This Laisses faire, or Manchester, doctrine soon became the religion of the town middle-class; but from the first there were raised voices to protest that it united the strong but was merciless and unchristian to the weak. Against the teachings of that ((dismal science,® such thinkers at once set up an opposing set of doctrines; and before 1850 the utopian socialistic dreams of Owen, Fourier and Saint Simon had grown into the scientific socialism of Karl Marx.

Now we may turn back to the course of political history.

From 1815 to the Revolutions of 1820. —

For more than 30 years after the Congress of Vienna reaction held sway in Europe. The restored princes, who (XVIII had found it necessary to. give France a charter; but in that document itself the theory of divine right was preserved, until the revolutionary changes of 1830. That theory could have no place in England ; but even there the government was for many years in the hands of an extreme Tory party. The evil genius of the whole period was the subtle Austrian statesman, Met- ternich, w'th his motto, ˆGovernment is no more a matter for debate than religion is.® The one good thing to be said for Metternich's long su-

premacy is that he permitted no great war; and this was because he felt it necessary to hold the powers in friendly alliance, so as better to arrest progress within the lines drawn at the Congress of Vienna.

. However, beneath the tide of reaction, the principles of the Revolution survived. The two positive forces in politics for the 19th century were to be democracy and nationality. The league of princes compelled them to work un¬ derground; but before the middle of the cen¬ tury they emerged in three series of revolutions — in 1820, 1830 and 1848.

The revolutions of 1820 started in Spain, to re-establish the Constitution of 1812, which had been adopted first during the war for Inde¬ pendence. Completely successful there for the time, the movement spread swiftly over the southern peninsulas — to Portugal and to the states of North and South Italy, while it stimulated the Greeks rising against the Turks. Metternich

found a weapon of repression ready. After. Waterloo the four great allies, Russia, Prussia, Austria and England, had agreed to preserve their union against revolutionary France by holding occasional congresses. Met¬ ternich now summoned these powers to the Congress of Troppau. Here the despotic mas¬ ters of Russia, Austria and Prussia signed an agreement to unite in putting down revolution against any established government. England protested and withdrew from the alliance; but her place was taken by France, and the united despots, popularly known as the ((Holy Al¬ liance,® proceeded to carry out the Troppau program. With overwhelming armies they crushed constitutionalism in Naples and Pied¬ mont, and a little later in Spain. England's fleet preserved the little sea-coast country of Portugal from attack; and the tsar's sympathy for his Greek coreligionists held Metternich from aiding Turkey. Portugal and Greece were the only European lands to reap good from the widespread risings of this period.

American Progress. — Greater gain there was, however, outside Europe. The ((Holy Alli¬ ance,® successful in Spain, wished to restore monarchic control over revolted Spanish Amer¬ ica. . Here they failed. When Napoleon seized Spain (1808), the Spanish colonies, nominally loyal to the old Spanish dynasty, began to taste the sweets of economic and political freedom. They were powerfully influenced, too, by the success of the United States ; and soon thev be¬ gan, one after another, to avow independence not only of Napoleon, but also of the mother country. The United States had recognized their independence. England had not done this ; but now she interposed her sea-power to shield them against the proposed attack by the <(Holy Alliance.® England indeed1 urged the United States to join in a formal alliance to protect Spanish America. The United States chose to act separately, but it did act along the same line; in 1823 President Monroe's message an¬ nounced that this country would oppose any attempt of the despotic powers to extend their political system to America. Thus was born a group of new nations. For more than 50 years, it is true, the best of the new states manifested anarchic tendencies; but before the close of the 19th century some of them began to make steady and promising progress in gov¬ ernment and society. Their constitutions have

been modeled generally upon that of the United States.

Before returning to Europe, brief attention should be given to the progress of the United States itself in the generation following the French Revolution. The Constitution of 1787 saved the 13 States of that time from falling apart into jangling, insignificant units, and gave the world an advanced

tvoe of federal govern¬ ment. Jefferson's peaceful "revolution® of 1800 marked the resumption of progress toward democracy and Americanization, which the aristocratic reaction just after- the Revolution¬ ary War had interrupted. The Louisiana Pur¬ chase (1803) doubled the territory of the coun¬ try and confirmed its destiny as the home of a mighty continental nation. During the closing Napoleonic struggles, the contemptuous disre¬ gard of England for the rights of neutrals, to¬ gether with the treacheries of Napoleon, in¬ volved America in war with England; but, be¬ yond this, except for the enunciation of the Monroe Doctrine, the United States, busied with its marvelous growth at home, had kept free from foreign complications. At the moment of the European revolutions of 1820, the great American republic was entering on the 40 years of anti-slavery debate which pre¬ ceded the Civil War.

Revolutions of 1830 — The year 1830 is one of the notable dates in the 19th century. In America the victory of Jackson had just marked a fresh advance in popular government; and the first labor union movement in America (the backbone of Jacksonian Democracy in the East) was agitating, in some places with successful strikes, for a 10-hour day in place of the dawn- to-dark day, for regulation of child labor so as to permit schooling during part of the year at least, and for a modern free State system of schools in place of the existing "pauper® schools for the poor. In England the First Reform Bill began its two-year struggle in Parliament. On the continent of Europe, revolution struck a new blow at the system of Metternich. This time the movement started in France, where the July Revolution replaced the divine-right Bour¬ bon monarchy with the constitutional, bour¬ geois monarchy of the Orfeanists. Explosions followed over Europe. The Belgians rose against their Dutch masters; the Poles against Russia; Italian risings seemed for a moment to have some chance in the Papal States and the duchies; and, while Russia and Austria were busied in Poland and Italy, liberal gains were secured in several German states. But soon Metternich, his hands free once more, set himself patiently to restore the old order in Germany. France, it is true, was lost to the "Holy Alliance,® and joined England in de¬ fending liberal Belgium against despotic inter¬ vention. But in the final result, France and Belgium were the only European gainers from this period. It was to take the third great "year of revolutions,® to sweep away Metternich's shattered system.

To appreciate in any measure the wonderful progress of the remaining two-thirds of the 19th century, it is needful to grasp conditions when the Victorian era began. It was still a small, despotic world, far more remote from the great, progressive world of 1900 than from the world of 1600. Civilization held only two patches on the globe, — western Europe and

eastern North America. In the latter, the real frontier of the United States

reached less than one-third the way across the continent, and poli¬ tics and society were dominated by the slave power. Europe knew "Germany® only as a pious aspiration of revolutionaries, and "Italy® as a "geographical expression.® Metternich stood guard over central Europe. On the east hung Russia, an inert mass, in the chains of her millions of serfs. Under the contemptible Or¬ leans monarchy, France was taking breath be¬ tween spasmodic revolutions. England herself had only begun to stir under the long oligarchic rule of her landlord class. The rest of the globe hardly counted; a fringe of Australia held a convict camp ; eastern Canada was a group of jealous, petty provinces, learning to agitate in disorderly fashion for self-govern¬ ment; Spanish America, prostrate in anarchy, gave as yet little hope of the coming renaissance ; Japan was to sleep a generation longer; while the two largest continents were undisturbed in their native barbarism, except for England's grasp upon the hem of India and South Africa.

England in the 19th Century. — In Europe, England was to lead the van of progress; and in England, almost alone in Europe, reform was to come without revolution. But the England of 1830 was still mediaeval. During the great French wars from 1690 to 1815, except for the one development of ministerial government, England had retrograded politically and socially. Her society was marked by extreme inequalities between rich and poor, intensified by cruel class legislation; her government, superficially rep¬ resentative, had really fallen into the hands of a selfish landlord class; her boasted local self-government was intensely aristocratic; her Established Church was aristocratic and unspir¬ itual. In the last half-century along with the industrial revolution had come a marvelous in¬ crease of population and growth of city life, calling imperatively for new adjustments; but the great Tory party met all calls for reform with sullen denunciation and repressive legis¬ lation which made free speech a crime.

Under the system of rotten and pocket bor¬ oughs, more than half the House of Commons were the appointees of less than 200 landlords, while most of the rest represented small fan¬ tastic constituencies. Thus, reform necessarily began with Parliament itself. This parlia¬ mentary reform was accomplished by three great measures; that of 1832 placed power in the hands of an intelligent middle class, the landed and mercantile interests; 35 years later, the Second Reform Bill (1867) gave power to the skilled artisan class of the towns; the bill of 1884 once more doubled the electorate; and the reform of 1918 made England a democ¬ racy with complete manhood and womanhood suffrage, and with abolition of all "plural voting.®

The Reform Bill of 1832 was followed at once by social reform, in response to the swell¬ ing tide of humanitarianism in literature and society.

Legislation swept away negro slavery in the colonies, and the hideous white slavery of women and children in English factories and. mines ; reformed the barbarous and fan¬ tastic criminal code ; abolished the worst abuses of the pauperizing poor-law ; began the pro¬ tection of workmen in factories against care¬ lessness or wilful neglect of capitalists; gave

women a. few legal rights; adjusted taxation nioie equitably; swept away the corn laws and introduced the free-trade era; removed the press gang and brought in the penny post; en- lajged the self-government of the colonies; and established a wonderfully efficient system of democratic self-government in cities at home. Subsequent political reform, despite the Irish difficulties after 1870, added to the rate of social reform. In particular should be noticed: (1) ballot reform and the elimination of corrup¬ tion from politics; (2) the adoption of a broad school system; (3) the true democracy estab¬ lished in rural units by the local government bills of 1888 and 1894; (4) the complex indus¬ trial legislation; and (5) for dependencies where the nature of the population forbids self- government, the adoption of efficient, unselfish colonial administration, in which England has set an example for all world powers. Even India and Egypt, with their tremendous diffi¬ culties, were touched with new life. And the great provinces of the English-speaking col¬ onies, Canada and Australia, were encouraged to organize themselves into two mighty federal states (1867 and 1901) — a movement fitly consummated after the Boer War by the generous establishment of the federal Union of South Africa (1909). Mr. Gladstone's de¬ feat and retirement in 1895 checked internal reform for some 10 years; but by 1906 the Liberals had come into power again, under the vigorous leadership of Asquith and Lloyd George. As early as 1892 a famous Liberal platform had called for Irish Home Rule, Welsh disestablishment, sweeping reforms in taxation, old-age pensions, and, as a necessary step toward any reforms for the Amending or ending® of the lords. This program was now taken up in earnest. In 1911, after successive referendums and a three-year parliamentary struggle, the veto of the Lords was virtually abolished. Then the rest of the ((New Castle program® was quickly put into law, along with the most advanced and comprehensive factory acts, workman's compensation acts, and social insurance acts yet known to the world — including insurance against unemployment. By Lloyd George's radical system of taxation, too, the money to wage this ((war against pov¬ erty® was being drawn largely from that class of wealthy men who receive their wealth with¬ out rendering services to society in return. Other countries were moving, too, along like lines. But at the instant of success, all this fair promise of the new 20th century was

blighted, in all European lands, by the devasta¬ tion of the World War.

Revolutions of ’48. — Meantime, on the Con¬ tinent, the next great progress after 1830 came with the revolutions of 1848. A general ex¬ plosion had been preparing; but again th: signal was given by France. The Orleans monarchy had become reactionary; and the socialistic Feb¬ ruary revolution set up the Second Republic. March saw Metternich himself a fugitive, es¬ caping from Vienna in a laundry cart, while thrones were tottering everywhere between Rus¬ sia and Turkey on one side and England on the other. Even England trembled with a Chartist movement and the threat of an Irish rebellion. The kings of Holland, Spain, Denmark and Sweden made constitutional concessions. In Germany and Italy there were complex move¬

ments, working (1) for constitutional liberty and social reform within the several states; (2) for the union of the fragments of the German race into a nation ; and (3) for the independ¬ ence of Italians, Slavs and Hungarians held in subjection by Austria.

The third movement resulted in wars, out of which Austria finally emerged triumphant; and her victorious army was a ready tool to restore absolutism at home. In Germany the undisciplined Liberals had wasted opportunity, Austria dispersed the Frankfort National As¬ sembly, and, after humiliating unready Prussia at Olmiitz, restored the old confederation (1850). A year later (1851) the coup d’etat of Louis Napoleon closed the revolution in France and prepared the way for the Second Empire of the next year.

But there had been great gains. Feudalism and serfdom were gone forever, even from Austria. Sardinia, Prussia and the minor Ger¬ man states kept their new constitutions. Swit¬ zerland had become a true federal republic upon the American type. Sardinia, by her sacrifices, and Prussia, in spite of the past mistakes of her timid government, were clearly marked out as the champions of Italy and Germany against Austria. Victor Emmanuel of Sardinia recog¬ nized his mission to unite and free Italy; and Prussia, so recently shamed, had statesmen who would see that next time sue should be ready.

From 1850 to 1880.— The next 30 years saw not only the advance toward democracy in England, the victory of nationality and the abolition of slavery in the United States, the formation of the federal Canadian Dominion, on the American model, and the awakening of Japan under American constraint, but also a new federal German Empire, a united, constitutional Italy, a stable French republic, a constitutional Spain and a constitutional, federal Austria- Hungary. The period was one of <(blood

and iron.® Napoleon III, who had drawn England into the Crimean War (1854) to humiliate Russia, was himself drawn by the statesmanship of Cavour into the Austrian War of 1859 to help free Italy. Within a year after the re¬ sulting campaigns in Italy had closed, the Amer¬ ican Civil War began; and before it ended, Bismarck had entered upon his trilogy of wars. In 1864 he robbed Denmark of the Schleswig- Holstein duchies, with the great harbor of Kiel for Prussia's projected navy, and so made trial of the new army he was at once to use (1866) in driving Austria out of Germany by the Six Weeks' War. The North German Confedera¬ tion then formed was expanded into the Ger¬ man Empire by the Franco-Prussian War (1870-71), into which Bismarck next tricked the despairing ambition of the decaying French government. These struggles completed also the unity of Italy. In 1866 Italy recovered Venetia from Austria, and in 1870, when France could no longer interfere, it at last marched its troops into its ancient capital, Rome. Out of the Russian-Turkish War of 1877-78 a new group of Balkan nations was born, mainly Slav in blood, with at least the forms of constitu¬ tional government; but in the Treaty of Berlin, the short-sighted selfishness of England's Tory party, led by Disraeli, kept the Turk from being wholly driven out of Europe, and left smoulder¬ ing the fatal embers of future and vaster con-

flagrations. Even for the vanquished, in the warlike period, reform grew out of war. The Crimean catastrophe struck the chains from Russia's serfs; the shock of defeat in 1859 and 1866 woke Austria to constitutional progress; only when Germany shivered the sham of the Second Empire did France enter upon true re¬ publican life ; and it was in the ashes of her old social system that our own South found re¬ generation.

From 1880 to 1914 the Continent of Europe offers a marked contrast to the picture shown by the preceding period. Progress was mainly peaceful, until men began to dream that "blood and iron® were forever out of date. Except Russia, little Montenegro and European Turkey, all the monarchies of Europe had already be¬ come "constitutional,® more or less after the English model. In none of the monarchies on the Continent, it is true, were the ministers so powerful, or so truly dependent on the people's will, as in England; and in some the formal constitutional monarchy merged into a practical despotism. Political advance consisted during the last period (1) in a growth of "ministerial responsibility® ; (2) in a rapid extension of the franchise in almost all countries toward a man¬ hood basis; and (3) soon after 1900, in a swift series of almost bloodless revolutions, which set up constitutional forms in Russia, Turkey, Persia and China, until for a time

Siam was the only sovereign state on the globe without a representative assembly. Some of the Oriental revolutions were soon undone in part and in most European countries the actual adminis¬ tration of government remains highly aristo¬ cratic. On the other hand, in nearly every Eu¬ ropean land, the Socialists make a formidable political party with much weight in the national assembly ; and nearly everywhere the people are training themselves, in compulsory school sys¬ tems, for ultimate control.

International Relations Since 1880. Eu¬ rope in Africa and Asia — International rela¬ tions since 1880 require brief statement. France, longing to recover her lost provinces from Germany in a war of revenge, drew close to Russia. Bismarck offended Russia by sup¬ porting Austria in the Balkans. Italy was angered by the French seizure of Tunis in 1881. Thus new combinations of the powers appeared. In 1882, Germany, Austria and Italy (all old enemies) leagued in the Triple Alli¬ ance; while a little later, France and Russia formally adopted a dual alliance. The Con¬ tinent was thrown into two hostile camps and rested for the next 30 years under a crush- ingly burdensome armed peace. England, un¬ willing to join the Triple Alliance/as Bismarck wished, was left in a position her statesmen characterized as one of "splendid isolation.® Soon, however, England began to see in Ger¬ many a rival in Africa and Asia (below) more to be dreaded than France. Germany's grow¬ ing commercial activity, too, threatened Eng¬ land's supremacy in trade. Above all, German militarism was intensely repugnant to English democracy. On the other hand, England and France grew to a better understanding of each other, and in 1903 a standing arbitration treaty between them went far to prevent future jealousies. From that time England was prop¬ erly regarded as allied with the old Dual Al¬ liance — which now became the Triple Entente.

To this alliance the small states of Europe gave their sympathies. On the other hand, Turkey fell away more and more from Eng¬ lish influence into a practical dependency of Germany. And while the Dual Alliance grew into the Triple Entente, the old Triple Al¬ liance was partly disrupted. Italy's acquisition of Tripoli (1911) canceled her old grievance against France; and. then her ancient bitter¬ ness against Austria, because of Austria's re¬ tention of the Italian Trentino, began to drive her away from the central European powers.

In the 90's all these European arrange¬ ments were threatened by the active appear¬ ance, in the field of international politics, of two non-European powers. The Chinese War of 1894 revealed Japan as a modern and pow¬ erful state ; and the Spanish- American War (1898) made it apparent that the United States had abandoned its exclusively American policy. Moreover, since about 1880, European politics had been merging

more completely than ever before in world politics. Rhenish and Danu- bian questions for a time were dwarfed by mighty African and Asiatic problems. The earlier part of the 19th century, indeed, had been an age of expansion of civilization. The United States had quietly filled its borders from ocean to ocean with a homogeneous population. Russia had spread across northern Asia to the Pacific, and was reaching down in the Trans- Caspian region toward the Persian Gulf. And England had continued annexation of the keys to empire in waste spaces of the earth. These three were the world-powers. Far behind came France, with some important possessions in North Africa and some ancient claims in south¬ east Asia. Until 1884 Germany had no thought of colonial empire.

But about 1880 a new, conscious greed for colonial territory seized Europe. Africa, some Pacific islands and the helpless Asiatic em¬ pires of Persia, Turkey, Siam and China were the only unappropriated lands. There followed a swift, peaceful division of Africa. In 1880, only patches here and there on the coast were European ; in 1891, except for the native states of Abyssinia, Liberia and Morocco, the conti¬ nent was mapped out between European claim¬ ants. The three important African powers had come to be England, France and Germany, though Belgium, Spain, Portugal and Italv were also represented. England was far in the lead. Her ambition had been to unite her two main possessions, in the Nile Valley and in South Africa, by acquiring intermediate territory; but the Kongo Free State and German East Africa were thrust between too soon. France came second in extent of territory; but, except for Algeria and Madagascar, her dis¬ tricts were less valuable than those of England or Germany. France would have liked to join her holdings on the east and west of the con¬ tinent ; but she found English territory thrust in between. German ambition was frustrated in similar manner. Until the World War be¬ gan the three powers had mutually stale-mated one another's attempts to dominate Africa.

The occupation of Asia by European states has proceeded more slowly, but has moved with increasing rapidity in recent years. England, Russia, Japan and France have been the chief powers concerned, though Germany has shown

an active disposition to take a hand in any partition.

In 1894, Japan and China engaged in war over the control of Korea. With amazing rapidity, Japan overcame her bulky antagonist; but Russia,

backed by France and Germany, stepped in to rob her of the fruits of her vic¬ tory. Japan, owning not even one modern ship of war, was forced to yield — to spend all energies for the next 10 years in preparing for further conflict. Russia secured from China the right to extend her Siberian railroad through Manchuria, and in 1898 she also ob¬ tained the powerful fortress of Port Arthur. Germany and England then compelled China to grant them important districts, which, like the Russian acquisitions, seemed to command the heart of China and to doom that power to partition. In 1900 the Chinese resentment against (

A Summary of Progress. — Historically measured, the 19th century extends from 1789 to 1914 — from the French Revolution to the World War. That (

The rate of this form of progress is roughly indicated by the records of the United States Patent Office. From the inauguration of Wash¬ ington to the War of 1812, patents for new in¬ ventions averaged less than 80 a year. From 1812 to 1820 they rose to nearly 200 a year, and in 1830 — the year of a new democracy in politics and industry — the number was 544. Twenty years later the 1,000 mark was passed, and in 1860 the number was nearly 5,000. These inventions mostly saved time or tended to make life more comfortable or more attractive. De¬

tailed treatment, with technical features, be¬ longs to special articles such as may be found elsewhere in The Americana. Three groups only will be mentioned briefly here. The re¬ markable series that underlay the industrial revolution, just before 1800, has been partially surveyed above, and we may now add that America, with its vast spaces and with its rivers for almost its only roads, soon modified the steam engine, one invention of that series, into an engine for locomotion by water, giving the world the steamboat. The next great group belongs to the second quarter of the century. Just after 1830, in both England and America, the steam railway became a success. English friction matches (1837) made the first im¬ provement on prehistoric methods of fire¬ making, and soon afterward illuminating gas for city streets began to improve public morals. Stern-wheel propellers replaced the old side- wheel arrangement for steamers, and in 1838 the Great Western established steam naviga¬ tion across the Atlantic. In 1839, in France, Daguerre began photography; and still earlier French chemistry had taught the world to can foods. In America, the McCormick reaper (1831), with the quickly following self-binders, mowers and other like machines, made it possi¬ ble to apply horse power to agriculture in other ways beside preparing the soil; the year 1838 saw the invention of the steam hammer and the successful application of anthracite coal to smelting iron; the anaesthetic value of ether was discovered for the relief of suffering humanity in 1841 ; the magnetic telegraph, in¬ vented in 1835, became a practical working success in 1844; Howe's sewing machine (1846) relieved the overburdened housewife ; and the long line of improvements upon it, including machinery for sewing leather, soon revolution¬ ized tailoring and created new industries in clothing factories and shoe manufacturing; and in 1847 the rotary printing press marked the dawn of a new intellectual day. The period of J(blood and iron® (1854-78) saw a circle of inventions in Europe and America relating largely to warfare; and then came the third group to be considered here, replacing the age of steam by the age of electricity and trans¬ forming the face of the world and all habits of life once more before the eyes of men still under middle age. Here belong electric lights and the electric street railway, telephone and phonograph, wireless telegraphy, automobile and auto truck (with a <(horseless age® for city and farm), submarine and

aeroplane, along with such a transformation of all earlier ma¬ chines and processes of production as to make those of 1850 quaint objects for a museum of natural curiosities.

It remains to mention, for this last period, the new relation of science to medicine. In the 80's. Pasteur broke the way, proving the germ theory of disease and inventing methods of inoculation against some of the most dreaded forms, like hydrophobia. Devoted dis¬ ciples followed in his footsteps. During the American occupation of Cuba after the Span- ish-American War, Major Walter Reed showed that ordinary malaria and the deadly yellow fever alike were spread by the bite of mos¬ quitoes. In like manner it has been proved that certain fleas, carried by rats, spread the bubonic plague. In 1903 Dr. Charles W. Stiles

proved that the inefficiency and low vitality of the <(poor whites® in the southern United States were due to the parasitic hookworm. The special causes of typhoid and tuberculosis have become well known ; and the germ that causes infantile paralysis has been discovered. Each such discovery has enabled men to fight dis¬ ease more successfully. It is not improbable that in the not distant future all deadly con¬ tagious disease may be practically banished from the earth. Between 1850 and 1900 the average human life in civilized lands had been lengthened by a fourth, and population has been trebled.

This larger and better life of the 20th cen¬ tury, too, is bound together, for good and for ill, in a new human solidarity. The enlarged world of 1900 is more compact than the small world of 1800. Ox-cart and pack-horse have been replaced as carriers by long lines of cars swiftly moving thousands of tons of all kinds of freight across continents. New methods of banking make it possible to transfer credit with magical quickness between distant portions of the earth; and, to say nothing of telegraphy, lines of communication are so organized that it costs no more to send a letter or parcel around the globe than to send it around the nearest street corner. The Minnesota farmer's market is not Minneapolis, but the world. The sheep raiser in Australia, the Kansas farmer, the New York merchant, the London banker, are parts of one industrial organism. All this solidarity means one more revolution in indus¬ try. The age of small individual enterprise has given way to an era of vast consolidation of capital and management — department stores, mighty corporations, huge trusts, flouring cen¬ tres like Minneapolis, meat-packing centres like Chicago, money centres like Wall street. And this consolidation has brought

incalculable sav¬ ing of wealth in economy of management and in utilization of old wastes into by-products. The new unity of society, too, has its moral side. Any happening of consequence is known within the hour in London, Petrograd, Pekin, New York, San Francisco, and, within a day, in almost every "hamlet where civilized men live. A world opinion shapes itself, in ordinary times, as promptly as village opinion could be brought to bear upon an individual citizen a century ago.

Even before the horrible catastrophe of the World War, it was plain enough that all this modern progress had a darker side. The in¬ dustrial organization produced wealth with gratifying rapidity, but failed to distribute it equitably. The world had become rich ; but multitudes of workers remained ominously poor. Even in the most democratic countries about nine-tenths of the increased wealth was held by one-tenth the population, while at least two-tenths of the people were reduced to a stage of poverty that imperiled both health and decency. The apex of the social pyramid contains real captains of industry, but it con¬ tains also pirates and parasites. Service to society has less to do with its revenues than plunder and privilege have. The broad base of the pyramid contains multitudes whose poverty results from physical or mental or moral lack; but it contains other multitudes of willing, hard-working, sober men and women now de¬ nied a chance at comfortable and happy life.

And this modern poverty is harder to bear than that of earlier times because it is less necˆ essary. Then there was little wealth to divide. Now the poor man is jostled insultingly by ostentatious affluence and vicious waste. These were the conditions that summoned enlight¬ ened thinkers and statesmen to a hopeful ((war upon poverty® when the calamitous World War of 1914 set back indefinitely the hand of progress.

For modern society contained other poison more potent even than those industrial ills. All ((civilized® nations, on occasion, still showed callous disregard of humane principles and of just dealing in their relations with barbarous and weak states. And among them¬ selves the civilized peoples were still in the im¬ perfect (

To lessen this peril, the world had recourse to The Hague Congresses of 1899 and 1907 and to a long series of standing arbitration treaties for the judicial settlement of future disputes between nations. This movement held much of promise: but, ominously, all proposals at The Hague meetings for disarmament, or for the. limitation of armaments, fell before the opposition of Germany. Between nations armed to the teeth, arbitration treaties backed by no international police it was plain could have little more lasting value than laws have between armed desperadoes in a district with¬ out a sheriff.

Still, despite. all warnings, the mighty strug¬ gle that began in the summer of 1914 amazed the world. The conflagration spread swiftly until the two central powers, Germany and Austria, with their two dependent allies, Tur¬ key and Bulgaria, were encircled by a ring of 10 hostile nations. The various phases of the mighty conflict are treated elsewhere in this work under appropriate headings. (See War, European). From the historian's viewpoint, this much is clear: the conclusion of the war must mark the end of one age and the begin¬ ning of another. That new age must begin un¬ der indescribable handicaps. If ultimately it prove better than the age just gone, it will be only because of some happy outcome from the stern world-wide determination already aroused that some new way shall be found to prevent future wars. A confederation of nations to en-

force arbitration, from the prophetic forecast of poets, has suddenly become the most press¬ ing practical problem of statesmen. This is the ray of hope that breaks from the war clouds over Europe.

Bibliography. — Within the space at com¬ mand, no detailed bibliography is possible. Since the dawn of the scientific study of his¬ tory, writers have shunned the attempt to cover the complex field of modern history ex¬ cept in co-operative ˆseries.® Of such series the most important in English are (The Cam¬ bridge Modern History, > edited by Ward (1903-14, 12 vols.) ; (Periods of European History, edited by Hassall (1890-92, 8 vols., of which the last 5 belong to our period). Hazen's 'Europe Since 1815 } (1909); An¬*

drews' (Historical Development of Modern Eu- rope) (1896) ; Fyffe's (Modern Europe to 1878 } (1884), and Seignobos' (Europe Since 1814> (1899) deal with the 19th century. For further references the reader may consult the special bibliographies at the close of the articles on leading countries and movements.

Willis Mason West,

Sometime Professor of History and Head of the Department, in the University of Minne¬ sota.

HISTORY, Great Events of. The follow¬ ing list gives only those important events which have affected or changed the subsequent history of nations. The cross-reference will refer the student to the special information concerning these epoch-making occurrences, and the follow¬ ing special articles may also be consulted. His¬ tory, Ancient; Mediaeval; Modern;

Wars of the World; Peace Treaties; Republics, His¬ tory of; Explorations in the 19th Century; Polar Research; Jewish History; Crusades; Cromwell; Gunpowder; Thirty Years' War: Seven Years' War; Napoleon; Waterloo, Battle of ; Crimea ; America, Discovery and Colonization of; Discoveries of America to 1562, Spanish and Portuguese; Colonial Wars in America; United States, Wars of the: Declaration of Independence; Slavery in the United States ; Confederate States of America; Monroe Doctrine; United States — The American Revolution; The War with France; War of 1812; Mexican War; Slavery ; Causes of the Civil War ; Recon¬ struction ; War with Spain, etc. ; Treaties of the United States with Foreign Nations; The Eastern Question; The Oregon Ques¬ tion ; Emancipation in Latin-America ; Pe¬ kin, Siege of; Boers; South African War; Riel's Rebellion; War, European, etc.

b. c.

1277. Exodus of the Children of Israel from Egypt.

1111. Mariner's compass (q.v.) discovered.

753. Rome (q.v.) founded.

603. Geometry and maps (q.v.) first used.

551-479. Confucius (q.v.) flourished.

538. Fall of Babylon (q.v.).

490. Battle of Marathon.

336. Accession of Alexander (q.v.); urecian Empire.

63-44. Caesarian era; Britain invaded; Gaul conquered.

A. D.

33. The crucifixion of Christ (q.v.).

451. Battle of Chalons.

570-632. Mohammed (q.v.) flourished.

800. Charlemagne (q.v.), emperor of the West.

967. Egypt conquered by the Turks.

1066. Battle of Hastings in England.

1095. Crusades (q.v.) in Holy Land begun.

1234. Gunpowder (q.v.) first used by Genghis Khan.

1453, End of the Roman Empire in the East.

1455—85. War of the Roses in England.

1492. Columbus discovered America.

16th Cent. Period of Reformation (q.v.) in Europe.

1588. Destruction of the Spanish Armada.

1618-48. Thirty Years' War (q.v.).

1619. Beginning of slavery (q.v.) in America.

1642. Beginning of the Civil War in England.

1627. Barometer and thermometer (qq.v.) devised.

1648—52. Civil war of the Fronde in France.

1642-1724. Newton (q.v.) discovered gravitation.

1713. Peace of Utrecht Ending War of Spanish Succession (q.v.).

1741-48. War of the Austrian succession.

1756-63. The Seven Years' War (q.v.).

1776. Declaration of Independence (q.v.).

1789-1802. French Revolution.

1804-15. Napoleon (q.v.), emperor of France.

1812-14. War of 1812 (q.v.).

1815. Battle of Waterloo (q.v.).

1819. Electro-magnetism discovered.

1821-29. Greek war of independence.

1831-39. Belgian war of independence.

1845-48. Mexican War (q.v.) with the United States, 1853-55. Crimean War.

1857-59. Indian mutiny and war.

1861-65. Civil War (q.v.) in United States.

1863. Battle of Gettysburg (q.v.).

1866. Laying of first Atlantic cable.

1868-99. Cuban war of independence.

1870-71. Franco-Prussian War (q.v.).

1877-78. Russo-Turkish War.

1883-84. War in the Sudan.

1894. War between Japan and China.

1895. Roentgen discovery of X-rays (q.v.).

1897. War between Turkey and Greece.

1898. Spanish-American War began.

1898. Hawaii (q.v.) annexed to the United States.

1899. Peace conference at The Hague (q.v.).

1899-1900. War between England and Boers.

1902. First Anglo-Japanese alliance. See Anglo- Japanese

Treaties.

1903. Panama Canal Treaty signed. See Panama Canal. 1903. Pacific cable completed. Invention of human flight. 1904-05. War between Japan and Russia, terminated 5 Sept.

1905 by Treaty of Portsmouth (q.v.). See Man¬ churia.

1905. Second Anglo-Japanese alliance.

1906. Earthquake and fire, San Francisco, Cal. See Earth¬

quake.

1908. Restoration of the constitution in Turkey. The

American battleship fleet sailed around the world.

1909. The North Pole discovered 6 April. Union of South

Africa, 31 May.

1910. Republic established in Portugal.

1911. The Italian-Turkish War began. President Diaz of

Mexico expelled. The South Pole discovered 14 December. China proclaimed a republic.

1912. Balkan War. Wreck of the Titanic, 14 April.

1913. Rebellion in Mexico. Peace palace at La Hague

dedicated.

1914. Great European War began.

1915. Wireless communication established between United

States and Japan. Lusitania sunk by German submarine, 2 May.

1916. American troops enter Mexico on punitive expedition

against outlaws. Deutschland, German com¬ mercial submarine crosses and recrosses the Atlantic. U-53, German war submarine, enters Newport, R. I., and departing sinks five commercial vessels off Nantucket lightship.

1917. United States enters European War.

HISTORY, Logic of. The relation of his¬ tory to the problems of the philosopher has been mostly confined to those questions which are treated in the philosophy of history. The object of this discipline is to interpret the mean¬ ing of mankind's historical development and to comprehend the progress of humanity in the setting of a metaphysical system. It is only in recent times that philosophy has recognized clearly the importance of an entirely different relation. If the philosopher studies in the sci¬ ence of logic the ways of thought and the special methods by which the different special sciences are able to reach the truth it must be logical and thus, ultimately, a philosophical task to examine the methods of historical in¬ vestigation. The special schemes of the his¬ torian's technique belong to historical science proper. But as soon as the attitude which the historian has to take

toward the world is in

question, we stand before a logical problem which is most nearly connected with the gen¬ eral problem of the meaning of truth. A rich literature devoted to this circle of problems has grown up in late years, partly through the activity of philosophers and psychologists, partly from the interests of historians and economists themselves.

Of course, it is possible to take the skeptical attitude and to deny the existence of a par¬ ticular problem here. We can say that all sci¬ ence has the same kind of task, and that the logical problems are thus not other for history than for the natural sciences. Yet this attitude may lead to two different standpoints. The first is the most popular one. From that it would appear that history is not a real science at all. It collects a mass of material just as the zool¬ ogist collects his specimens ; but that kind of treatment which makes zoology a real science, the study of the common characteristics and of the underlying laws, is not in question for the historical material. Instead of this an art enters into play, the art of historical presentation. The works of the great historian are thus in first line works of art parallel to the great epic nar¬ ratives, with only the difference that the epic poems follow the lines of imagination while the historian reconstructs the facts as they may have happened. Scientifically history would thus stand on the lowest level, as a mere col¬ lection of facts without that real scientific treat¬ ment which makes the value of the other sci¬ ences. The best which can be hoped, then, is that it may be brought to a kind of scientific height by introducing as much as possible the results of other sciences such as physics, biol¬ ogy, anthropology, geo-physics, etc., into the explanation of historical happenings. The in¬ fluence of climate, of race disposition, of tech¬ nical inventions, and so forth, then become predominant in the scholarly treatment of his¬ torical events. It may be said that this low opinion of the pure scientific character of his¬ tory has been prevalent throughout the whole history of science.

But those who consider the natural sciences as the only type of real scientific work may be led, and have been led frequently in recent times to still another standpoint. They may say that history has the greatest possibility of being a full-fledged science. The only step it has to take is that from the merely descriptive to the law-seeking attitude. The real task of the historian, they say, would be to find the com¬ mon features which belong to the growth of every nation and to the political and social, artistic and scientific, economic and religious movement of the different periods and of

the different communities. As long as isolated proc¬ esses are described, history indeed remains on a pre-scientific level, but as soon as we recog¬ nize characteristic types of development, we reach general laws like those of the biologist or the chemist. The interest concentrates itself then on the psychological factors which molded the fate of the nations, and especially the life of the masses becomes a true historical agency. That which is unique then becomes insignificant and accidental as compared with the great typ¬ ical processes which repeat themselves under similar conditions in the most different coun¬ tries. A kind of natural science of historical nations thus becomes the logical goal.

Those modern movements, however, which have forced the problems of the logic of history to public attention object to both these stand¬ points because they refuse to admit the first presupposition. They deny that the natural sci¬ ences are the only type of a real science. They claim, rather, that this is a prejudice which has been suggested to the world by the overwhelm¬ ing influence of the Aristotelian logic on the one side, and the impressive triumphs of natu¬ ral science on the other. They hold that there exists two types of scientific thought in principle commensurable, and that the historical way of thinking is in its importance and in its logical right perfectly co-ordinate with naturalistic thought. Yet here again a variety of stand¬ points have been taken.

The simplest presentation of this doubleness of logical method is offered by those who hold that the whole separation is to be deduced from the doubleness of the logical attitude. They say that we can take with reference to everything in the universe either the attitude of interest in the general law or the attitude of interest in the particular thing. The one interest can never be substituted for the other. In the one case the particular object is for us only a sample illustration for a general relation. We seek the law which expresses that relation and inhibits therefore the interest in the special chance case which is before us. That is the attitude of the naturalist. On the other hand we may give our whole attention to the par¬ ticular object before us in its uniqueness, and there is no doubt that our practical interests of life force on us just this attitude. Our earth may be astronomically not more important than any other planet, but our practical interest be¬ longs to this planet alone. Our friends may be to the biologist not more instructive than any other group of organisms, but for our friend¬ ship those particular men have their unique po¬ sition and cannot be replaced by other chance copies. To develop systematically this interest in the particular is the function of the historian, and anything which has its particular existence is possible historical material. Yet it is evident that no science can have the task of describing every particular pebble on the beach. There must be a principle of selection, and this is given in the reference to our values. The men who have relation to that which is

valuable in the world, to the development of state and law, of art and science and religion, are to be selected for the historian's account. And this ultimate reference to values binds the particular objects together, while it is evident that the law of natural science brings the facts under a point of view under which they have no special value at all, but are indifferent objects of theo¬ retical observation. The antithesis is thus com¬ plete. The naturalist seeks the general, the historian seeks the particular. The naturalist refers everything to the law, the historian everything to the value. Both groups of inter¬ est create logically independent systems of knowledge. Their difference is thus in no way a difference of material, as there is nothing in the world which cannot be considered from both points of view. The sun which the astronomer studies in relation to the astronom¬ ical laws as a chance case of a general relation which holds for myriads of suns may be at the same time the object of interest for those

who ask about the development of this one particular sun which gives us light. And on the other hand, even the Napoleon of the historian may be brought under the laws of biology from the standpoint of the naturalist.

Others who welcome this sharp separation feel doubtful whether it is really the logical attitude which determines the difference and not the content. They claim that it is not true that natural science has to deal with laws only. Natural science may very well give its atten¬ tion to particular objects too, and the develop¬ ment of our sun or our earth or our mankind is not history but natural science. The true difference, they say, lies rather in the double¬ ness of the objectifying and the subjectifying attitude.

The sun and earth are for us all objects, but men and their work can be considered in a double way. We can consider our neighbors as objects, as phenomena which we describe and explain but we can consider them also as sub¬ jects of will which we understand and inter¬ pret and appreciate, and this doubleness of attitude reaches over the whole of mankind. Wherever there is will, there the object can be taken as a subject and it is claimed that the work of the naturalist is the study of the world in so far as it is conceived as a system of objects, while the study of the historian is the world in so far as it is conceived as a system of will relations. Only subjects of will would thus be able to enter into history at all. And the task of the historian is to understand the systematic relations between the purposive ac¬ tions. The naturalist starts from the objects of his perception and seeks their causes and their effects. The historian starts from those will demands which reach him as the political, legal, artistic, scientific, economic,*

religious de¬ mands of his social world, and he seeks to interpret them by connecting them with the purppses of the past. The naturalist explains, while the historian interprets intentions and links the will purposes into a connected unity.

Bibliography. — Bernheim, Ernst, (Lehr- buch der historischen Methode) (Leipzig 1894) ; Freeman, E. A., (Methods of Historical Study 5 (London 1886) ; Droysen, J. G., (Grundriss der Historik5 (Boston 1893) ; Windelband, (Natur- wissenschaft und Geschichte) ; Simmel, (Prob- leme der Geschichtsphilosophie) ; Rickert, (Greazen der naturwissenschaftlichen Begriffs- bildung) ; Miinsterberg, Psychology and Life5 ; Lamprecht, (What is History?5; Morley, J., (Notes on Politics and History> (New York 1914) ; Rhodes, J. F., (Historical Essays) (New York 1909) ; Robinson, J. H., (The New His- tory) (ib. 1912).

Hugo Munsterberg,

Late Professor of Psychology , Harvard Uni¬ versity.

HISTORY OF ECONOMICS. See Eco¬ nomic History.

HISTORY OF EDUCATION. See Edu¬ cation, History of.

HITCHCOCK, hich'kok, Charles Henry,

American geologist, son of Edward Hitchcock, geologist: b. Amherst, Mass., 23 Aug. 1836; d. Honolulu, 7 Nov. 1919. He was graduated from Amherst College in 1856, was assistant State geologist of Vermont in 1857-61, State geologist

of Maine 1861-62 and of New Hampshire 1868-78. In 1868 he was appointed professor of geology in Dartmouth College, retaining this position until 1908, when he became professor emeritus. In connection with his survey of New Hampshire, he maintained, during the winter of 1870, a meteorological station on Mount Washington, the earliest high-mountain observatory in the United States. He became known as a compiler of geological maps, and for his investigations regarding the geology of the crystalline schists, ichnology and glacial geology. The location of the terminal glacier in the United States was first suggested by him. His later work was in connection with the Geological Survey of Vermont, particularly the glacial geology, and with the New Jersey Geological Survey, studying the Trianic foot¬ marks. He claimed that the animals that made the tracks were largely <(birds with teeth® and not dinosaurs. He was a founder of the Geological Society of America, and in 1883 vice-president of the American Association for the Advancement of Science. His publications include (Elementary Geology) (1861, with E. Hitchcock) ;

(Mt. Washington in Winter5 (1871) ; and a (Report on the Geology of New Hampshire) (1873-78), with folio atlas, his most valuable work; and (Hawaii and its Vol- canoes> (1909; 2d ed., 1911).

HITCHCOCK, Edward, American Con¬ gregational clergyman and geologist : b. Deer¬ field, Mass., 24 May 1793; d. Amherst, Mass., 27 Feb. 1864. He was princ:pal of the academy in his native place 1815-18; pastor of the Congregational Church in Conway, Mass., 1821— 25 ; professor of chemistry and natural history in Amherst College 1825-45 and president of Amherst College and professor of natural the¬ ology and geology 1845-54. He was appointed State geologist of Massachusetts in 1830, of the First District of New York in 1836 and of Vermont in 1857. In 1850 he was commissioned by the government of his native State to ex¬ amine the agricultural schools in Europe. His life was in a great measure identified with the history of Amherst College. Connected with it almost from the beginning, in his own presi¬ dency he procured for it buildings, apparatus and funds to the amount of $100,000, doubled the number of students and established it on a solid pecuniary as well as literary and scien¬ tific basis. His earliest scientific publications were the (Geology of the Connecticut Valley> (1823), and a Catalogue of the Plants within Twenty Miles of Amherst5 (1829). Later works were (Lectures on Diet, Regimen, and Employment (1831) ; (Lectures on the Pecul¬ iar Phenomena of the Four Seasons) (1850) ;

(Reports on the Geology of Massachusetts 5 (1833-35-38-41) ; (Illustrations of Surface Geol¬ ogy 5 (1857) ; (Elementary Geology,5 which

passed through 25 editions in America, and one- third of that number in England; (Religion of Geology and its Connected Sciences5 (1851) ; and Reminiscences of Amherst College5 (1863). Dr. Hitchcock suggested as well as executed the geological survey of Massachusetts, the first not only in the long series of scientific surveys in the United States, but the first survey of an entire State under the authority of govern¬ ment in the world. He was the first to give a scientific exposition of the fossil footprints of

the Connecticut Valley, and with him ichnology as a science began.

HITCHCOCK, Ethan Allen, American

soldier: b. Vergennes, Vt., 18 May 1798; d. Sparta, Ga., 5 Aug. 1870. He was a grandson of Ethan Allen (q.v.), and was graduated at West Point in

1817, entering the corps of ar¬ tillery as a third lieutenant. In 1829 he became the military commandant of the corps of cadets, in which office he continued until 1833. He served in Florida against the Indians, and in the war with Mexico, where he received two brevets, one as colonel and another as brigadier- general. In 1855 he printed for private cir¬ culation a pamphlet in support of his opinion that genuine alchemy was not an art for making gold, but that the alchemists were students of man, whose perfection was symbolized by their (

Ph losopher) (1858) ; (Notes on the Vita Nuova of Dante) (1866) .

HITCHCOCK, Ethan Allen, American politician : b. Mobile, Ala., 19 Sept. 1835 ; d. Washington, D. C., 9 April 1909. Was in mer¬ cantile business at Saint Louis, Mo., 1855-60, then went to China to enter a commission house, of which firm he became a partner in 1866. In 1872 he retired from business, in 1874 returned to the United States, and in 1874-97 was president of several manufacturing, mining and railway companies. He was appointed Envoy Extraordinary and Minister Plenipoten¬ tiary to Russia in 1897 and in February 1898 Ambassador Extraordinary and Minister Pleni¬ potentiary, the first Ambassador accredited from the United States to the court of Russia. In 1898 he was nominated and confirmed as Secretary of the Interior, and held that position till 4 March 1907.

HITCHCOCK, James Ripley Wellman,

American art critic : b. Fitchburg, Mass., 3 July 1857; d. 4 May 1918. He was graduated at Harvard in 1877, and in 1882-83 made long jour¬ neys in the West, Mexico and Northwest as special correspondent of the New York Tribune, was art critic of the Tribune 1882-90. He was literary adviser to D. Appleton and Company in 1890-1902, and after 1902 to Harper and Broth¬ ers. He wrote much upon American history, outdoor life and literary topics as well as art. He lectured extensively upon artistic and literary subjects. He wrote (The West¬ ern Art Movement) (1885);

George Inness) (1885); (Madonnas by Old Masters } (1888), the text to photogravures; (The Future of Etching) ; (Some American Painters in Water Colors > ; (Etching in Amer- ica) ; (Notable Etchings by American Artists) ; (Thomas De Quincy: a Study; (The Louis'ana Purchase and the Building of the West) (1904) ; (The Lewis and Clark Expedition (1905). He edited (The Life of an Artist, by Jules Breton } ; (The Last Words of Thomas Carlyle ; (The Art of the World Illustrated in the Paintings, Statuary and Architecture of the Columbian Exposition, with an introduct'on and much other text* ;*

Trapper, with introductions; (Recollections, * by Richard Henry*

Stoddard; (The Trail- Makers, a Library of History and Explora¬ tion ; (Decisive Battles of America, and other works.*

HITCHCOCK, Roswell Dwight, Amer¬ ican Congregational clergyman : b. East Machias, Me., 15 Aug. 1817; d. Somerset, Mass., 16 June 1887. Graduated from Amherst College in 1836 and from the Andover The¬ ological Seminary in 1838, he also studied at Halle and Berlin (1847), in 1845-52 was pastor of the First Congregational Church at Exeter, N. H., and in 1852-55 professor of revealed religion in Bowdo:n College. In 1855 he became professor of church history at the Union The¬ ological Seminary, of which institution he was elected president in 1880. He became presi¬ dent of the Palestine Exploration Society in 1871, and vice-president of the American Geo¬ logical Society in 1880. An editor of the (American Theological Review ; he- wrote (The Life, Character, and Writings of Edward Robinson* (1863) ; (Complete Analysis of the Holy Bible) (1869) ; and*

*HITOTSUBASHI, Japanese statesman and _ party leader : b. 1837 ; d. 1902. Son of Nariaki Daimyo of Mito (q.v.), and naturally a supporter of the Doctrine of Mito (q.v.), he appeared as the leader of the party opposed to the open door in Japan. He is known as Keiki (Ka'ke), the pronunciation of the Chinese characters representing his name, and as Yoshinobu, his real name. The cognomen Hitotsubashi he obtained when he was adopted into the feudal house of that name in 1848. He became guardian of the young Shogun in 1863, a position that gave him great prominence in the affairs of Japan at a time when the nation was at the parting of the ways. He is known as «the last of the Tycoons,** or the last Shogun. His real title was Yoshinobu Toku- gawa, Prince Tokugawa. He was heir of the house of Hitotsubashi, and as such eventually became Shogun. He came of a long line of illustrious ancestors which had helped to make the history of Japan for over 300 years. Yoshinobu became Shogun in August 1866, and the following year, notwithstanding his family tradition, he presented a memorial to the emperor advising to call the barons together to discuss the <(open door question® and the rela¬ tion of Japan to foreign countries and civiliza¬ tion. He also took steps to have all the gov¬ ernment of the country centred in the em¬ peror. But the Shogunate party which he represented opposed this and open war broke out between the emperor and the Shogunates. Yoshinobu, in the difficult position of owing allegiance of a traditional and religious char¬ acter to the emperor and leadership to his own family and party, decided to follow the will of his famous father, Nariaki (q.v.), and be faithful to the emperor at all cost. In the war the party of the emperor won out and Yoshi¬ nobu retired to private life still retaining the favor and confidence of the court by whom he was recognized as Prince Tokugawa. His princely residence was one of the conspicuous objects by the Kioshikawa Gate in Tokio. Con-*

suit Okuma, Count Shigenobu, < Fifty Years of New Japan5 (translated into English by Mar¬ cus B. Huish, London 1909).

HITTELL, Theodore Henry, American historian : b. Marietta, Pa, 5 April 1830. In 1852 he was admitted to the bar at Cincinnati, in 1855 removed to California, in 1855-61 was connected with the Bulletin and Times of San Francisco and from 1862 practised law. He was State senator in 1880-82. He wrote a (History of California, 5 his chief work; and compiled (The General Laws of California,5 known as

HITTITES, hit'its, the name of several peoples mentioned in the Old Testament, and in Egyptian and Assyrian inscriptions. In the Old Testament the name is applied to three more or less distinct groups, namely, the ((chil- dren of Heth55 from whom Abraham purchased a bury:ng-place ; a people or group of peoples which inhabited Palestine before the Hebrews and resisted their invasion ; a kingdom in north¬ eastern Syria, with which Solomon formed mar¬ riage alliances. The first group dwelt around Hebron in southern Palestine, and the Hittites mentioned in connection with David, of whom the chief was Uriah, may be their descendants. The second group of Hittites dwelt among the mountains of central Palestine, and the third group, united in some sort of emp:re, had their seat still farther north. Of this Hittite empire we learn more from the Egyptian and Assyrian records than from the Old Testament. The Heta according to the hieroglyphic inscriptions, offered a vigorous resistance in northern Syria to the Egyptian king Thutmosis III (18th dyn. : c. 1560 b.c.), and to his successors of the 19th dynasty, Sethos I, Rameses II and III, c. 1350- 1200 b.c. Carchemish, Kadesh and Hamath were among their chief cities. The cuneiform inscriptions contain notices of a people called Hatti who frequently fought with the Assyrians from the time of Tiglath-pilesar I (c. 1100 b.c.), till that of Sargon II (721-704 b.c.), after which they are no more heard of. The Hittite monu¬ ments and inscriptions which have been found in Carchemish, Hamath, and neighboring places, as well as throughout Asia Minor, appear to be¬ long to the Assyrian period.

HITTORFF, Jacques Ignace, French architect: b. Cologne, 1792; d. 1867. He studied his profession in Paris under Percier. In 1819— 25 he traveled in England, Germany and Italy, making a special study of the Greek ruins of Sicily. He became architect to the king in 1825 and in conjunction with Lepere designed the church of Saint Vincent de Paul, Paris, to which he applied the results of his studies of Greek polychromy. The Place de la Concorde has two fine fountains and other embellishments from his hand,

likewise the Bois de Boulogne, the Champs Elysees and other squares and boulevards. He was appointed Surveillant-Gen- eral du Conseil des Batiments in 1864. Among his publications may be mentioned Architecture antique de la Sicile 5 (1830) ; Architecture

moderne de la Sicile5 (1835) ; and Architec¬ ture polychrome chez les Grecs5 (1851) — all works of standard and permanent value.

HITZIG, Ferdinand, German theologian: b. Hauingen, Baden, 23 June 1807; d. Heidel¬ berg, 22 Jan. 1875. He was educated at He del- berg, Halle and Gottingen. He went to Zurich in 1833 as professor of theology, where he re¬ mained until 1861, when he returned to Heidel¬ berg. He was quite a voluminous writer on the Old Testament, composing commentaries on the Minor Prophets (1838); Jeremiah (1841); Ezekiel (1847) ; Ecclesiastes (1847) ; Daniel (1850) ; Song of Solomon (1855). He made a translation of the Psalms in 1835. His 'Prophet Jesaia iibersetzt und ausgelegt5 (1834), gave him a high place among Biblical scholars of his day; as also the (Exegetisches Handbuch zum alten Testament,5 which con¬ tained man}'- of his commentaries. He also wrote on the New Testament, and his general work (Geschichte des Volkes Israel5 (1870), marked an jmportant advance in B blical arch¬ aeology. Consult Cheyne, founders of Old Testament Criticism5 (London 1893), and the biography by H. Steiner (Zurich 1882).

HIVE-BEE. See Honey-bee; Beekeep¬ ing.

HIVES. See Urticaria.

HJORLEIF.SSON, Einar, Icelandic nov¬ elist and journalist: b. Godhdalir, Skagaf- jardharsysla, 6 Dec. 1859. He is the best known of the short story writers of his coun¬ try. He spent the years 1885 to 1895 in Can¬ ada, editing the weekly Heimskringla at Win¬ nipeg (1886-88) and the weekly Logberg (1888- 95). Since 1910 he has 'been receiving a regular stipend from the government of Iceland for his literary work. His best collection of short stories is probably (Vestan hafs og austan5 ((West of the Sea and East,5 1901), which contains three stories ((Vonir,5 (Litli Hvammur5 and {Ordhugasti hjallinn5), none of which has been translated into English. Those wishing to read specimens of his work should consult The International (New York September 1914), and The American-Scandin- avian Review (New York May 1917).

HOACTZIN, ho-akt'zm or ak'zin, a sin¬ gular South American bird (Opisthocomus cris tatus) of the size of a pheasant. It is brown streaked with white, and the head has a movable crest. It is interesting principally from the ex¬ traordinary way in which the fledglings, as soon as they leave

the nest (in a tree), scramble about the branches by aid of their wings used like hands, by reason of the fact that they have a temporary claw on both the index and pollex. This is an interesting reminder of primitive methods of progression in birds, reminding one of how the archaeoptery utilized its fingers as well as its feet. The food of these birds is mainly leaves and fruit ; and a strong musky odor is given off by the adults, so that in British Guiana they are called ((stinking pheasants.55 They nest in trees in companies much after the manner of herons. C. William Beebe has given description and pictures of the hoaetzin in his book (Our Search for a Wilderness5 (New York 1910), and in the publications of the American Museum of Natural History.

HOADLEY, hod'll, George, American lawyer: b. New Haven, Conn., 31 July 1826; d. Watkins, N. Y., 27 Aug. 1902. He was grad¬ uated at Hudson College, Ohio, in 1844; studied

law at Harvard, was admitted to the bar in 1847 and joined a law firm in Cincinnati of which Salmon P. Chase (q.v.) was the leading member. He was appointed judge of the Superior Court of Cincinnati in 1859, and re¬ elected in 1864. He took a leading part among the ˆBarnburners® (q.v.), was a War Demo¬ crat, and during the war joined the Republican party. He defeated Foraker in a contest for the governorship of Ohio in 1883, but failed of re-election in a struggle against the same candidate.

HOADLEY, Benjamin, English Anglican prelate: b. Westerham, Kent, 14 Nov. 1676; d. Chelsea, 17 April 1761. He was educated at Cambridge; took orders in 1701, and after being settled in London distinguished himself in con¬ troversy with Bishop Atterbury and others. A staunch Low-Churchman, he was appointed bishop of Bangor in 1715. During his incum¬ bency he is not known to have visited the dio¬ cese. A sermon preached before the king in >717 gave rise to the ((Bangonan Controversy® regarding the d vine authority of the king and the Church. He was translated to the see of Hereford in 1721, to Salisbury in 1723 and Winchester in 1734.

HOANG-HO. See Hwang.

HOAR, Ebenezer Rockwood, American jurist: b. Concord, Mass., 21 Feb. 1816; d. there, 31 Jan. 1895. He was the son of Samuel Hoar (q.v.), was graduated at Harvard (1835), and subsequently admitted to the bar. He rose to be judge of the Court of Common Pleas (1849), judge of the State

Supreme Court (1859), and Attorney-General of the United States (1869), and was a member of the Joint High Commis¬ sion that framed the Treaty of Washington

(1873-75).

HOAR, George Frisbie, American states¬ man: b. Concord, Mass., 19 Aug. 1826; d. Worcester, Mass., 30 Sept. 1904. Senator Hoar's paternal and maternal inheritance was very re¬ markable. His grandfather was an officer in the Revolutionary army and his father, Samuel Hoar, was one of the ablest lawyers and states¬ men of his time, a member of Congress from Massachusetts and a man of great learning and force of character. Senator Hoar's mother was a daughter of Roger Sherman, a signer of the Declaration of Independence. He was gradu¬ ated from Harvard in 1846, studied law there and began his law practice in Worcester, Mass. The young man was early attracted to politics and identified himself with the Free Soil party, and his purpose in 1895 — so characteristic of his whole career — is thus stated by himself: (

was a member of the Republican party from the first and in 1852 was elected to the Massachu¬ setts house of representatives; in 1857 to the State senate. In the intervals of service he practised law. In 1860 he was city solicitor. He presided over the Republican conventions in Massachusetts in 1871, 1877, 1882 and 1885; was a delegate to his party's national conventions in 1876, 1880 (the chairman in that year), 1884,

1888, 1892 and 1896. He served in the national House of Representatives for four successive Congresses, 1869-77, elected as a representa¬ tive of the Worcester district; in 1877 he was elected to the Senate and was re-elected in 1883,

1889, 1895 and 1901, serving his country con¬ tinuously as a national legislator since 1869, hav¬ ing represented Massachusetts for a longer pe¬ riod in the national Congress than any other representative from that State. In 1876, he was one of the managers on behalf of the House in the Belknap impeachment trial, and was also a member of the Electoral Commission (q.v.), which decided the Hayes-Tilden contest for the Presidency, the other Republican members of that famous body being Senators George T. Edmunds, O. P. Morton and Frederick T. Fre-linghuysen, arid Representative James A. Gar¬ field. In the Senate he was chairman of the Judiciary Committee, and of the Committee on Privileges and Elections, and a member of other important committees. He was known as the old man eloquent of the Senate, having served in that body for 37 years and taken part in all the great questions that have been before

the country during that time. He was a determined opponent of the retention of the Philippines and independent enough to state his views fearlessly in the support of his own theory that the United States should leave the islands to the control of the Filipinos and prevent interference from foreign nations, but his honesty and sincerity were unquestioned and he always retained the confidence of his party and the respect of all. He was a thorough American and believed in the future of his country and placed its wel¬ fare above all personal considerations. ((The lesson which I have learned in life, which has been impressed upon me daily and more deeply as I grow old,® he said in his autobiog¬ raphy, «is the lesson of Good Will and Good Hope. I believe that .to-day is better than yesterday, and that to-morrow will be better than to-day. I believe that, in spite of many errors and wrongs, and even crimes, my coun¬ trymen of all classes desire what is good, and not what is evil.®

Senator Hoar was an idealist, and was not to be turned aside, even by his loyal love of party, from following his sincere convictions. He demanded justice for the negroes and the Indians, openly declared his sympathy for Cu¬ ban and Filipino, and as firmly opposed re¬ ligious intolerance in Massachusetts because his actions were controlled by reasons which he considered were founded in righteousness and truth, and therefore not subject to change.

Senator Hoar was a man of considerable scholarship and took great delight in literary and historical studies. He was a member of several historical and scientific societies and took much interest in their work. He was president of the American Historical Society, president of the American Antiquarian Society, regent of the Smithsonian Institution in 1880, and trustee

of the Peabody Museum of Archaeology. He received the degree of LL.D. from the College of William and Mary, Amherst, Yale and Har¬ vard. In 1903 he published (Autobiography of Seventy Years, } which first appeared in Scrib¬ ner's Magazine as a serial. The same year, in a speech in his home city of Worcester, Senator Hoar, as if in anticipation of his approaching dissolution, thus summed up the creed of his career :

(

Although 78 years of age, he was in good health until the death of his beloved wife in 1903 ; their devotion had led many to predict that neither

would long survive the other. Sen¬ ator Hoar was taken seriously ill in June 1904, but lingered until 30 September, when he died at Worcester, Mass.

His death was the occasion of a remarkable display of panegyric in the press of both Re¬ publican and Democratic parties. It possessed the peculiar quality of reconciliation, one party regretting what the other considered his noblest quality. The only flaws in his judgment, said the Republican press, were his disagreements with the party leaders on the Philippine and Panama issues ; but to the Democratic press his noble loyalty to the right on these occasions was convincing proof of his lofty statesmanship. The Democratic press regretted his inability to see any good in their party, while to Republican journals this virtue redeemed his errors of judg¬ ment on the matters of party policy.

One journal said: ((As long as the confi¬ dence and affection of all the people are given to such a man, it is foolish and false to assume that the old standards are departing and the old ideals becoming broken. The people still know a man when they see him. Still they respect and honor the statesman who loves the republic better than he does himself, who never falters in his service, to whose fingers gold does not cling, and whose never-forgotten ideal is the people's welfare. While they honor such qual¬ ities above all others, pure and able statesmen will continue to come to their service,® senti¬ ments which were summarized in Ex-President Cleveland's statement that ((Senator Hoar's abil¬ ity, his high-mindedness, and his freedom from political trickery, furnish an example of a useful life which may well be imitated by all those entrusted by their countrymen with public du¬ ties.®

HOAR, Samuel, American lawyer and leg¬ islator: b. Lincoln, Mass., 1778; d. 1856. He was graduated at Harvard in 1802 and three years later entered upon a highly successful career as a lawyer. He served two terms as a State senator and was chosen by the Massachu¬ setts legislature to challenge the constitution¬ ality of certain laws in South Carolina relating to the imprisonment of free negroes. He was subsequently excluded from South Carolina courts by the State legislature.

HOARHOUND. See Horehound.

HOBART, GaiTet Augustus, American lawyer and politician: b. Long Branch, N. J., 1844; d. Paterson, N. J., 2 Nov. 1899. He was

graduated at Rutgers College, New Jersey, in 1863, and admitted to the bar in 1866. At Pat¬ erson, where he made his home till his death, he enjoyed a successful law practice. He be¬ came successively city attorney,

prosecuting at¬ torney for Passaic County, a member of the State assembly 1873-78, and of the State sen¬ ate 1879-85. During his several terms he was speaker of the assembly and president of the senate. In 1896 he was nominated at Saint Louis for Vice-President on the ticket with William McKinley, whose intimate friend he was, and was elected to that office. Here he was more than the proverbial figurehead, exer¬ cising a strong influence at the capital in favor of sound business methods. In his later years he was known also as a banker and capitalist.

HOBART, George Vere, American jour¬ nalist, playwright and author : b. Cape Breton, N. S., 16 Jan. 1867. He was educa-ted in Nova Scotia, later coming to the United States as a telegraph operator for the United Press. He became editor of the Cumberland Sunday Scimitar, later writing for the Herald, Evening News and American of Baltimore. Since then he has been writing for the Hearst newspapers the humorous sketches, (J˚hn Henry > and ˆinkelspielP He has written (Many Moods and Many Meters) (1890), and (Li'l Verses for Li'l Fellers) (1903), both poems; the (Dinkel- spieP series the (John Henry books (1901— (M), and the .plays, (After Office Hours,) (Miss Print,* (Hodge, Podge & Co.,* (Sally in Our Alley,* etc.*

HOBART, John Henry, American Prot¬ estant Episcopal bishop : b. Philadelphia, 14 Sept. 1775; d. Auburn, N. Y., 10 Sept. 1830. He was educated at the College of Philadel¬ phia (now the University of Pennsylvania) and the College of New Jersey (now Prince¬ ton), and after trying commercial life in his brother-in-law's counting-house, went back to Princeton as a tutor for two years, and was ordained deacon in 1798 and priest in 1801. After brief periods of pastoral service in Penn¬ sylvania, New Jersey and Long Island, he be¬ came assistant in Trinity Parish, New York, where he remained until his elevation to the episcopate, combining with his other duties a prominent share in the legislative councils of the Church, as deputy to the General Conven¬ tions of 1801 and 1804, and secretary to the House of Deputies in the latter year. In 1811 he was consecrated as bishop-coadjutor in the diocese of New York, and upon the death of Bishop Moore in 1816 succeeded him both in the full charge of the diocese and in the rectorship of Trinity Church. He also gave provisional episcopal care at different times to New Jersey and Connecticut. He was very active in pro¬ moting the establishment of the General The¬ ological Seminary, and upon its location in New York became professor of pastoral theology. Hobart College also owed much to him, a debt recognized by the taking of his name, when, in 1852, the original title of Geneva College was changed to Hobart Free College. He wrote or edited a number of theological, works, some of which, especially his Companion for the Fes¬ tivals and Fasts) (1805), reached several edi¬ tions. His (Apology for Apostolic Order) (1802) is still used as a textbook.

HOBART, the capital of Tasmania, and up to 1881 called Hobart Town, is situated at the foot of Mount Wellington (4,166 feet high), on the Derwent River, 12 miles from its outlet in Storm Bay on the south coast. It has hand¬ some public buildings, including government house, the government offices, Parliament houses, Episcopal and Catholic cathedrals, tech¬ nical schools, hospitals, library, museum and art gallery. There are important domestic manufactures, and in connection with its con¬ siderable shipping interests, a fine harbor with modern accommodations for ships of the lar¬ gest size. Hobart is connected by rail with Launceston, and has steam communication with Sydney, Melbourne, New Zealand and England. It has several fine parks and drives and is a favorite summer resort. Hobart was settled in 1804 and became a city in 1857. A United States consul resides here. The temperature varies from 42° in winter to 63.1° in summer. Pop. 27,526; with suburbs 39,937.

HOBART COLLEGE, located at Geneva, N. Y. In 1825 it was chartered as Geneva Col¬ lege, but in 1852 the name was changed to Hobart Free College, and in 1860 to Hobart College. Bishop Hobart (q.v.) had aided the school by advice and by money. An endow¬ ment from Trinity Church, New York, had greatly assisted the institution. The college offers scholarships and prizes to worthy stu¬ dents, and the departments are all well sus¬ tained. The courses lead to the degrees of A.B. and B.S. There are about 60,000 volumes in the library. In 1915 the school had 24 pro¬ fessors and instructors and 135 students. The graduates number about 1,700. In 1906 the col¬ lege received a bequest of a half million dollars from Mr. William Smith of Geneva for the establishment of a co-ordinate college for women. This college, known as William Smith College, was opened in 1908. The faculty of Hobart College with the addition of four women constitutes the faculty of William Smith College. All instruction is, however, given separately in the two institutions. The number of students in William Smith College in 1916 was 107.

HOBART PASHA, Augustus Charles Hobart-Hampden, third son of the Earl of Buckinghamshire, English, sailor : b. Waltham- on-the-Wolds, Leicestershire, 1 April 1822; d. Milan, Italy, 19 June 1886. He entered the English navy as midshipman 1836 and retired as captain at the conclusion of the Crimean War in 1856. During the American Civil War he took the name of

HOBBEMA, Meindert, mm’dert hob’e-ma,

Dutch landscape painter: b. Amsterdam, 1638; d. there, 7 Dec. 1709. He was considered, next to J. Ruysdaal, the best of the Dutch landscape-painters, and as a colorist reckoned even supe¬ rior to Ruysdaal. The figures in his landscapes are painted mostly by Berchem, Van de Velde,

Lingelbach and J. Van Loo. His paintings con¬ sist chiefly of forest scenes, ruins, villages, etc. Some of the most celebrated works of this master are to be found in public or private gal¬ leries in France, Germany and Holland. His greatest painting is (A View in Holland, with figures painted by Adrien van de Velde.*

HOBBES, John Oliver. See Craigie, Pearl Mary Teresa.

HOBBES, Thomas, English moralist, phi¬ losopher and .political scientist : b. within the borough of Malmsbury, Wiltshire, 5 April 1588; d. Hardwicke, Derbyshire, 4 Dec. 1679. Thomas Hobbes is eminent as writer on the theory of government, on psychology and on metaphysics and as master of a vigorous and picturesque English style. He was born in the year of the Spanish Armada, 1588, and lived to be 91 years old, active to the end in mind and in body. He was the son of a poor Eng¬ lish vicar, was educated by his uncle, a pros¬ perous glover, and spent the last five of his student years at Magdalen College, Oxford. The Oxford of that period was given over to a restricted and arid scholasticism, barring out mathematics,, for example, as a black art; and Hobbes retained through life a vivid memory of the pedantry and narrowness of the Oxford of his youth. At the end of these student years, in 1608, he was employed by Cavendish, afterward Earl of Devonshire, as tutor to his son ; and he remained for the next 20 years in the service of this same great family and throughout his life in close and friendly con¬ nection with it. Two years of travel with his pupil on the Continent were followed by 18 years in England — a service terminated only by the death of his former pupil and con¬ stant friend, the second Earl. During these years Hobbes devoted himself to classical study, which bore fruit in his vigorous translation of Thucydides, published in 1628. The three suc¬ ceeding years were spent on the Continent, at first in travel with another English youth, later in the eager study, mainly at Paris, of mathematics and natural science. Hobbes him¬ self tells us with what astonishment and de¬ light he first, in 1628, when he was 40 years old, saw and read Euclid's 'Elements. In 1631 he became tutor to the third Earl of Devonshire, son of his late patron and first pupil. With him he made, in 1634, a third continental jour¬ ney, learned to know Galileo during his sojourn in Italy, and was admitted, in Paris, to the fellowship of a group of mathematicians and scientists. He must have been pondering on problems of politics and of psychology in the intervals of his study of physics and geometry, for. his next book, which circulated in manu¬ script as early as 1640, set forth his theory of human nature and of the body*

politic. The publication even privately of this doctrine brought its author into prominence and strongly influenced the course of his life.

The psychology of Hobbes forms the basis both of his political and of his metaphysical doctrine. He distinguishes the "cognitive (or conceptive)® faculty from the "motive® faculty of the mind, and. recognizes five senses, to which he adds ((a sixth sense, but internal, . . commonly called remembrance.® He defines the affective consciousness as <(motion about the heart,® which <(when it helpeth is called pleasure

. . but when it hindereth the vital motion is called pain.® And he ends with a discussion of the passions which reduces will to desire and conceives each emotion from a narrowly individualistic standpoint. <(To endeavour,® he says, ((is appetite® and, in the race of life, <(continually to out-go the next before is felicity.®

The foundation of the political system of Hobbes is the teaching that men ((are by nature .equal®' and self-seeking; that ((many men at the same time have an appetite to the same th.ng; which yet very often they can neither enjoy in common, nor yet divide®; that con¬ sequently ((every man is enemy to every other® and that ((during the time men live without a common power to keep them all in awe, they seek such a Common Power, as may be able to defend them from invasion of foreigners and are in that condition which is called War.® ((The only way,® Hobbes continues, (

Hobbes asserts unambiguously the subor¬ dination of church to state. <(The Kingdom of Christ,® he declares, ((is not of this world; therefore neither can his ministers (unless they be Kings) require obedience in His name.® It follows, he teaches, <(that every Christian Sovereign [is] the supreme Pastor of his own Subjects®; and that every subject is bound to obey the command of his sovereign with re¬ gard not only to the forms of religious wor¬ ship but to the nature of the doctrines openly professed. Such conformity to the will of even an ftinfidel sovereign® does not conflict, Hobbes insists, with our duty to God. For God requires of us only faith and obedience to his laws. ((And when the Civil Sovereign is an Infidel, every one of his own Subjects that resisteth him sinneth against the Laws of God (for such are the Laws of Nature) and rejecteth the counsel of the Apostles that admonisheth all Christians to obey their Princes. . . . And for their Faith it is intejnal and in¬ visible ; they have the license that Naaman had, and need not put themselves into danger for it. But if they

do, they ought to expect their

reward in Heaven, and not complain of their Lawful Sovereign; much less make war upon him.®

It is not possible, within the limits of this article, to outline the ingenious argument by which Hobbes seeks to foist upon a present generation, the responsibilities of a social con¬ tract which a past generation made. Still less is it possible to present an adequate criticism of the conception of Hobbes. Psychologists and sociologists have long since agreed that his psychology and his political theory are alike defective; that societies and governments grow, and are not manufactured; and that sympathy no less than selfishness is a basal instinct. Yet Hobbes' theory of society is still worth studying, not only because it is expressed in such vigorous English, nor even mainly be¬ cause of the influence it exerted on Rousseau and Spinoza (qq.v.), but primarily because it so ruthlessly depicts society as it would be if men were no more than self-seeking and egoistic.

It is evident that the brilliant attempt of Hobbes to justify the absolute supremacy of the monarch could find little favor in England in the years of the Parliamentary struggle with Charles I. Hobbes, who was morbidly timid, believed that he stood in personal dan¬ ger and betook himself, a voluntary exile, to Paris where he spent 11 years in the society, on the one hand, of French men of science and letters, and on the other hand, of the Eng¬ lish royalists. In 1646 Hobbes became the tutor of the young prince, later Charles II. He pub¬ lished in the meantime an epitome in Latin, (De CiveP of his doctrine of government, and afterward the earlier work already referred to. In 1651 he brought out the work by which he is best known, ˆLeviathan, Or, The Matter, Form and Power, of a Commonwealth. } This book is the most popular, forcible and detailed discussion of the political theory of Hobbes. It is prefixed by several chapters which are prop¬ erly psychological, and _ which embody an egoistic and sensationalistic psychology full of acute introspection and of keen discrimination. The later chapters of

The metaphysical doctrine of Hobbes is expounded in two books published a few years after his return to England, (De Corpore, which appeared in 1655, and a translation, Con¬ cerning Body,* published a year later. This teaching is succinctly stated in these words : <(The world (I mean . . . the whole mass of things that are), is corporeal, that is body;*

. . . and that which is not body is no part of the universe.® The doctrine of Hobbes is, in other words, frankly materialistic : he teaches that the innumerable realities which go to make up the universe are, one and all, non¬ spiritual, or material. So-called spirits are, he holds, merely subtle

and intangible bodies; and even God. the First Cause of the universe is

body. The philosophy of Hobbes becomes in its detail a system of mechanics or of physics ; for, since all reality is physical, laws of space or of motion must be ultimate laws.

The metaphysical doctrine of Hobbes de¬ serves more attention than it often receives, be¬ cause it is so thoroughgoing and internally con¬ sistent a system of materialism. The arguments, implicit rather than explicit, on which Hobbes bases' it are none the less, in the view of the writer of this notice, unsound. In brief, Hobbes argues for materialism partly because of the untrustworthiness of consciousness, and partly on the ground that physical motions are ad¬ mitted to be cause of consciousness. ((It is evident,® he says, while describing the phe¬ nomenon of vision, in the second chapter of (Human Nature, <(that from all lucid . . . bodies, there is a motion produced to the eye, and through the eye to the optic nerve and so into the brain . . . and thus all vision hath its original from . . . motion.® From similar ob¬ servations he concludes that ideas (or in his own words, apparitions or phantasms) ((are nothing really but motion . . . .® The reasoning that consciousness because conditioned by mo¬ tion is, therefore, identical with motion is evi¬ dently illicit; and it is observable that Hobbes, when he tries to define body, motion and space, really conceives them in terms of ideal reality.*

Just before the appearance of the metaphysi¬ cal works, in 1654, an essay <0f Liberty and Necessity, > written by Hobbes eight years be¬ fore in the course of a private discussion with Bishop Bramhall, was published without the knowledge and consent of the author. It was followed in 1656 by a longer and more polemical work, (The Questions Concerning Liberty, Necessity and Chance, clearly Stated and De¬ bated between Dr. Bramhall . . . and Thomas Hobbes. The unambiguous teaching of these works is a determinism grounded in psychology, the doctrine <(that voluntary actions have all of them necessary causes and are therefore necessitated.®*

Most of the works which Hobbes published from this time onward are, indeed, controver¬ sial in character. Most bitter of them are the books and essays on mathematical subjects, maintaining against Wallis and Ward, Savilian professors in Oxford, the possibility of squar¬ ing the circle. The titles of two of these works are an indication of the spirit in which Hobbes wrote them: (Six Lessons to the Professors of the Mathematics ... in the chairs set up by . . . Sir Henry Savile in the University of Oxford) ; and

<2 Tiyfmi or Marks of the Ab¬ surd Geometry, Rural Language, Scottish Church Politics and Barbarisms of John Wallis. > Hobbes, who was, after all, no trained mathe¬ matician, was always worsted in these mathe¬ matical contests, but never acknowledged him¬ self defeated.

More serious than the justified criticisms of Ward and Wallis on the mathematics of Hobbes were the attacks upon the orthodoxy and the morality of his teaching. These attacks, and especially the' abortive attempt to suppress (Le¬ viathan by act of Parliament, caused Hobbes great uneasiness. In the Appendix which he added to his translation of

he wrote at the same time a very vigorous (Answer to a Book Published by Dr. Bramhall . . . called (Catching of the Leviathan, a book in which the bishop of Derry had maintained ((that the Hobbian principles are destructive to Christianity and to all religion.® Nobody doubts to-day that these charges are unfounded. Hobbes, it is true, inculcated a materialistic philosophy and an egoistic and necessitarian ethics; but upon these doctrines he himself based both the philosophical conclusion that God exists, and an ethical system which ex¬ horts to justice and social virtues, even while it derives these virtues from purely selfish in¬ stincts. It is necessary to suppose that many of the men who decried Hobbes had never read him; and that the epithets ((free-liver® and (*

Hobbes spent the last four years of his life with the family he had so long served, that of the Earl of Devonshire. In these later years he returned to the classical studies of his youth, publishing, when he was 87 years old, (The Iliads and Odysseys of Homer, translated out of Greek into English, with a large preface concerning the Virtues of an Heroic Poem. In his very last year he wrote a sketch, in Latin metre, of his own life. He had feared many things, and death most of all, but he died quietly after a short illness, in 1679. See Leviathan.*

Bibliography.— The authoritative edition of Hobbes is that of Sir William Molesworth :

(English Works (in 11 vols.) ; edited by M. W. Calkins (Chicago 1905), contains the important chapters of /Concerning Body.* For biography and criticism the reader is referred to G. C Rob¬ ertson,*

Mary Whiton Calkins, Professor of Philosophy and Psychology, Wellesley College.

HOBBLE-BUSH, a viburnum (V. alnifo- lium) of the southern interior of the United States, whose branches often stretch along the ground and root at the other end tripping up the unwary; hence it has such other names as

war-

faring-tree, tanglefoot and devil's-shoestrings. The branches are long, flexuous and reddish in color, and the leaves are nearly orbicular and turn to a deep red in the autumn. See Viburnum.

HOBKIRK'S HILL, Battle of, in the

Revolution, 25 April 1781. After Guilford Court-house (q.v.), Greene marched toward the British position at Camden under Rawdon and encamped at Hobkirk's Hill, about one and one- half miles north. He had 940 men in line, prudently encamping in order of battle; and some militia just arrived who took no part in the battle. His trains and artillery had not come up, and a renegade drummer boy inform¬ ing Rawdon of this, the latter took action and making a detour to the right through the woods in front of Greene, drove in Greene's pickets with so sudden an onslaught that the Americans had barely time to form. Greene ordered the First Maryland to charge bayonets and William Washington to take the British in the rear with his cavalry, while Ford and Campbell executed flanking movements on Rawdon's wings. But Ford was killed, one of the First Maryland's captains was shot, the men fell into disorder, and Colonel Gunby ordered the regiment to form on the rear companies in¬ stead of moving the latter forward; the re¬ tiring men were seized with a panic, the famous veterans broke, and though soon reformed, the position was dangerous and Greene had to re¬ treat. Gunby was court-martialed, but ac¬ quitted of anything but grave misjudgment. Greene's loss was 135, besides missing militia; Rawdon's 220 (his own figure) or 258 (Tarle- ton's). Consult Dawson, (Battles of the United States) (New York 1858) ; Carrington, (Battles of the American Revolution (New York 1877).

HOBOKEN, ho'bo-ken, N. J., city in Hud¬ son County, on the Hudson River. It is the terminus of the Delaware, Lackawanna and Western, the Lehigh Valley and the West Shore railroads. It is opposite New York city, north of and adjoining Jersey City, and has on the north and west the Palisades. Its area is about one square mile. It has electric railwav connections with a number of the cities and towns of the State, and by direct ferries and tunnels with the business district of New York. The principal streets run north and south, nearly parallel with the river. Its long water¬ front gives it excellent shipping facilities; and here are located the docks of the ocean steam¬ ship lines, the Thingvalla, the Netherlands-American, the Scandinavian-American and the former German-American

lines. The land upon which Hoboken is located, as well as much of that adjoining, once formed a part of the territory of New Netherlands. It was early known as Hobocan Hacking, which means <(the land of the tobacco-pipe.® The to¬ bacco-pipes which were made by the Indians from the stone found in the vicinity gave rise to the name. In 1630 Michael Pauw of Hol¬ land purchased from the New Netherlands Company a tract of land a part of which is the site of the present city of Hoboken. The land around was soon cultivated and as New Amster¬ dam grew in numbers and importance, the gar¬ dens across the river became more valuable. John Stevens (q.v.), in 1804, purchased the land upon which the city now stands, and began vol. 1 4 — 20

the town. The development of steam navigation and steam railroads received an early impetus in Hoboken. John Stevens invented and first employed here the modern type of ferry slip, made of piling. He also invented and put into operation at Hoboken the first steam-propelled ferryboat in 1811. At this time and for some years after the Elysian Fields of Hoboken were much used as pleasure grounds by New York¬ ers. At first Hoboken was a part of the town of North Bergen, but on 28 March 1855 it was incorporated as a city. The disastrous fire at the wharves of the North German Lloyd Steam¬ ship Company, which occurred in 1900, de¬ stroyed considerable of the city property and three steamers. The estimated number of lives lost was 200.. The chief manufactures of Ho¬ boken are iron products, machine engines, technical instruments, motor fire engines, cast¬ ings, elevators, inks, metal tubes, waterproof fabrics, leather, silk, lead-pencils, caskets, wall¬ paper, sugar, ship-building and repairing and chemicals. It has extensive coal yards and large lumber and brick yards. The drainage of the lowlands is under way and by this means a large tract of land will be reclaimed and the sanitary conditions of the city improved. The city is the seat of the Stevens Institute of Technology (q.v.), and of the Sacred Heart Academy. It has Saint Mary's hospital, public and parish schools and several fine church build¬ ings. The municipal income amounts to about $4,000,000 annually, and the expenditures al¬ most reach the same figure. The government is vested in a mayor, who holds office two years, and a city council. The mayor appoints the school, library, fire and health commissioners, also the assessors. The police commissioners are appointed by the mayor and approved by the council. The council elects the inspectors, the city clerk and his assistants. Pop. (1920) 68,166.

HOBSON, John Atkinson, English social economist: b. Derby, England., 6 July 1858. He was graduated at Oxford University, and from 1887. to 1897 taught English literature and eco¬ nomics for the University Extension Delegacy, and the London Society for the Extension of University Teaching. He is one of the foremost of economic writers in England and, as

a Social¬ ist, advocates the monopolistic control of indus¬ tries by government, whether municipal or national. Among his works are (1894) ; (1911); (Gold, Prices and Wages) (1913); (Work and Wealth) (1914) ; (Towards International Gov¬ ernment (1915) ; (The New Protectionism> (1916) ; (Democracy after the War (1917).*

HOBSON, Richmond Pearson, American naval constructor, lecturer and author: b. Greensboro, Ala., 17 Aug. 1870. He was gradu¬ ated at the Annapolis Naval Academy in 1889 and took a post-graduate course at the Ecole Nationale Superieure des Mines, and the Ecole d'Application du Genie Maritime in Paris. As midshipman he accompanied the White Squad¬ ron in Mediterranean and south Atlantic waters in 1889-90. in 1894-95 was on duty at the Navy

Department, in 1895-96 was stationed at the New York navy yard and in the following year was in charge of construction at Newport News. In 1897-98 he organized and conducted the post-graduate course for officers destined for the construction corps at the United States Naval Academy. Early in 1898 he served as constructor with the fleet, his principal work dealing with stability and fire systems of vessels in action. During the war with Spain he was present in the bombardment of Matanzas and took part in the expedition against San Juan, Porto Rico. He distinguished himself by his heroism in sinking the collier Merrimac across the entrance to Santiago Harbor, on the night of 3 June 1898, for the purpose of preventing the exit of Cervera's fleet. While he did not succeed in blocking the entrance to the harbor because the Merrimac was disabled by gunfire before reaching the point chosen, and when sunk lay almost parallel with the channel, the exploit brought commendation even from the enemy and Hobson and his comrades became the heroes of the nation. From 3 June to 6 July 1898 he was confined as a prisoner of war in a Spanish fortress, but was well treated. Subsequently he was inspector of Spanish wrecks and had charge of the salvage opera¬ tions of the Spanish warships beached along the south shore of Cuba in the battle of 3 July 1898. In 1899-1900 Hobson was on duty in the Far East and from 1900 to 1903 had charge of naval construction at several stations. In the latter year he resigned from the navy. In 1904 he was presidential elector-at-large from Ala¬ bama. From 1907 to 1915 he was member of Congress from the sixth Alabama district. Mr. Hobson is prominent as lecturer, speaker and writer and as an advocate of American naval supremacy and of American leadership in the internat.onal movement for peace. He is also

advocate of nation-wide and world-wide pro¬ hibition and was the first to introduce in Con¬ gress a prohibition amendment to the Constitu¬ tion. He is the author of (A Study of the Sit¬ uation and Outlook in Europe) (1894); (The Disappearing Gun Afloat5 ;

«HOBSON'S CHOICE,55 may best be translated, "that or nothing.55 Tobias Hobson was a carr'er and innkeeper at Cambridge, who erected the handsome conduit there and settled "seven lays55 of pasture ground toward its main¬ tenance. But the story about him, as told by The Spectator, is as follows: "He kept a stable of forty good cattle, always ready and fit for traveling; but when a man came for a horse he was led into the stable, where there was great choice, but was obliged to take the horse that stood nearest to the stable door, so that every customer was alike well served, accord¬ ing to his chance, and every horse ridden with

the same justice.55 Milton wrote two quibbling epitaphs upon this eccentric character.

HOCCLiEVE, Thomas, English poet of the 15th century. See Occleve, Thomas.

HOCHE, Lazare, la-zar osh, French sol¬ dier: b. Montreuil, 25 June 1768; d. Wetzler, 19 Sept. 1797. He took service in the French guards when 16 years old, and at the Revolution joined the popular party. He greatly distin¬ guished himself at the siege of Thionville and the defense of Dunkirk, and shortly afterward, when scarcely 25 years of age, received the com¬ mand of the army on the Moselle. In 1793 he drove the Austrians out of Alsace, and soon after was arrested by the Jacobins and impris¬ oned at Paris. In 1794 he was released, and appointed commander of the army destined to quell the rising in the west, and afterward to that in La Vendee. In 1796 he conceived the plan of attacking Britain, and making a descent on Ireland, but expired suddenly while in camp with his army of invasion.

HOCKEY, a game of ball known as hurley in Ireland and shinty in Scotland, dating in its present form from about 1883, when a definite code of rules was drawn up by the Wimbledon Club. According to standard rules the game is played between two teams of 11 players each, on a ground 100 yards long by 50 to 60 yards wide. A goal is erected at each end of the field, and consists of two uprights 12 feet apart sup¬ porting a horizontal bar 7 feet from the ground. In front of each goal a line 12 feet long is drawn parallel to the goal-line and 15 yards from it; and from each end of this line, with the corresponding goal-post as centre, a seg¬ ment of a circle is drawn outwards to meet the goal-line. Thus, a kind of semi-circle flattened at the top is drawn in front of each goal, and no goal is scored

unless the ball is hit from within this line or striking-circle. The ball used is an ordinary cricket ball painted white; and each player is provided with a stick, curved at the end, without any metal fittings, and not too thick to be passed through a ring two inches in diameter The players are arranged on the field as in Association football, namely, goal¬ keeper, two backs, three half-backs, five for¬ wards. The game is started by one player of each side bullying the ball in the centre of the ground, that is, by first striking the ground with his stick and then str.king his opponent's stick three times, after which either may strike the ball. When the ball is driven between the goal¬ posts under the bar by a stroke from within the striking-circle, a goal is scored, and the game is won by the side with a majority of goals scored. The ball may be caught or stopped with any part of the body, but it must not be carried, kicked or knocked on except with the stick; it must be played from right to left only. The goal-keeper is allowed to kick the ball away in defending his goal. Ends are changed at half¬ time.

HOCKING, Joseph, English Non-Conform¬ ist clergyman and novelist : b. Saint Stephen's, Cornwall, 1859. He was educated at Owens College, Manchester, and entered the Non-Con¬ formist ministry in 1884. Among his many pub-

/iono\ ,°,k,s are (Story of Andrew Fairfax5 0893) -The Scarlet Woman5 (1899);

Baring) (1900) ;

Ksau (1904); (The Woman of Babylon (1906); 'The Trampled Cross* (1907); (The Jesuit* (1911); 'Spirit of the West* (1913); (All for a Scrap of Paper* (1914); (The Day of Judgment) (1915) ; The Path of Glory, Tommy and the Maid of Athens* (1917). He is a brother of S. K. Hocking (q.v.).*

HOCKING, Silas Kitto, English Methodist clergyman and novelist : b. Saint Stephen's, Cornwall, 24 March 1850. He was ordained a minister in the Methodist Free Church in 1870, and after holding pastorates in Liverpool, Man¬ chester and elsewhere, resigned from the min¬ istry in 1896. He is a prolific writer and sev¬ eral of his books have been much read in Amer¬ ica. Among them may be named 'Alec Green (1878) ; (For Light and Liberty* (1890) ; (One in Charity* (1893) ; (A Son of Reuben* (1894) ; Mod's Outcast* (1898); 'The Awakening of Anthony Weir* (1901); 'Gripped* (1902); (A Bonnie Saxon* (19.03) ; 'Smoking Flax* (1904) ;*

(The Flaming Sword (1906) ; (A Modern Pharisee* (1907) ; (Yours and Mine* (1909) ; (Who Shall Judge* (1910) ; (The Third Man* (1911); (In Self-Defense* (1914); 'His Own Accuser* (1917)*

HOCKING RIVER, a stream which has its rise in Fairfield County, Ohio, and flows southeast into the Ohio River. The whole length ˆis about 80 miles ; it is navigable for about 70 miles. Along the shore, in the upper part of the course, is the Hocking Canal.

HODGE, Archibald Alexander, American Presbyterian divine: b. Princeton, N. J., 18 July 1823; d. Princeton, 11 Nov. 1886. He was the son of Charles Hodge (q.v.) and was graduated at Princeton College 1841, where he became assistant professor. In 1847 after graduation in the theological seminary of the same place he went to Allahabad, India, as a missionary. He stayed in Asia for three years and returning home held pastoral charges in Maryland, Vir¬ ginia and Pennsylvania until 1877, when he became his father's assistant at Princeton Semi¬ nary, succeeding in 1878 to the chair of didactic and exegetical theology made vacant by his father's death. He was a trustee of Princeton College and for a time was editor of the Pres¬ byterian Review. Among h's works the most important are 'Outlines of Theology (1879) ; (The Atonement* (1886) ; 'Life of Charles Hodge* (1880) ; (Manual of Forms, Conformed to the Doctrine and Discipline of the Presbyte¬ rian Church* (1883) ; (Popular Lectures on Theological Themes* (1887).*

HODGE, Charles, American Presbyterian theologian : b. Philadelphia, 28 Dec. 1797 ; d. Princeton, N. J., 19 June 1878. He was edu¬ cated in Princeton College, graduating in 1815. In 1816-19 he studied in the theological semi¬ nary at Princeton, in 1820 was appointed instructor there and two years later made pro¬ fessor of Oriental and biblical literature. In 1840 he was transferred to the chair of didactic and exegetical theology in the seminary, and 12 years afterward appointed to the additional chair of polemical theology. In 1825 he founded the Biblical Repertory , afterward was re¬ named Biblical Repertory and Princeton Review and merged in 1872 in the Presbyterian Quar-

. terly and American Theological Review. The semi-centennial anniversary of his connection with Princeton was commemorated there in 1872 by the foundation of the Charles Hodge pro¬ fessorship with an endowment of $50,000. At the same time he received a gift of $15,000. He was moderator of the Presbyterian General As¬ sembly in 1846 and was one of the revisers of the 'Book of Discipline in 1858. From the foundation till 1872 he was editor of and chief contributor to the Review, and two of his works, (Princeton Theological Essays* (1846-47) ; and 'Essays and Reviews* (1857), were compiled from his numerous articles in that periodical. Other works are Commentary on the Epistle to the Romans* (1855; enlarged 1866) ; Consti¬ tutional History of the Presbyterian Church in the United States* (1840-41); Che Way of Life* (1842) ;' Systematic Theology* (1871-72), a comprehensive treatise giving an exposit'on of Calvinistic theology; and 'What is Darwin¬ ism r* (1874). Consult Che Semi-Centennial Commemoration of the Professorship of Charles Hodge, D.D., LL.D., September 24, 1872* (Phil¬ adelphia 1872), and Hodge; A. A., 'Life of Charles Hodge, Professor in the Theological Seminary, Princeton* (New York 1880).*

*HODGE, Frederick Webb, American eth¬ nologist : b. Plymouth, England, 28 Oct. 1864. He was brought to this country at the age of seven years, and was educated at Washington, D. C. In 1884 he received appointment to the United States Geological Survey, in 1886 be¬ came secretary of the Southern Archaeological Expedition and in 1889 was appointed to the Bureau of Ethnology, Smithsonian Institution. He explored New Mexico and Arizona in 1895, 1897 and 1899; in 1897 scaled the precipitous ((Enchanted Mesa** of New Mexico and found traces of former human occupancy. Since 1910 he has been ethnologist in charge of the Bureau of Ethnology, and prepared the hand¬ book of American Indians,* issued by it. He has published Mist of Publications of the Bu¬ reau of Ethnology* (1894) ; 'The First Dis¬ covered City of Cibola* (1895) ; (Coronado's Route from Culiacan to Quivira* (1899), and contributions on ethnological topics to scientific periodicals and to standard cyclopedias. He*

is editor of (Narratives of Cabeza de Vaca and Coronado (1907); Curtis's 'North American Indian.* He edited the American Anthropolo¬ gist in 1899-1910, and again after 1912. He has written various papers on the Indians of the Southwest.*

HODGES, George, American Episcopal clergyman: b. Rome, N. Y., 6 Oct. 1856; d. 27 May 1919. He was graduated from Hamilton College, Clinton, N. Y., in 1877, and from the Berkeley Divinity School, Middletown, Conn., in 1881. He was assistant rector of Calvary Church, Pittsburgh, Pa., 1881-89, and rector 1889-94, in the year last named becoming dean of the Epis¬ copal Theological School in Cambridge, Mass. He published among other works 'Christianity Between Sundays (1892) ; (The Heresy of Cain* (1894) ; 'In the Present World* (1896) ; (Faith and Social Service* (1896); (The Bat¬ tles of Peace* (1897) ; 'The Path of Life* (1897); (William Penn* (1900); 'When the King Came* (1904) ; 'Holderness* (1907) ;*

GCS

HODGKIN — HOFER

Heroes) (2 vols. , 1911-12); draining of-

Children in Religion' (1912) ; (Castle of Zion' (1912); (Moral Training in the School and Home' (1913) ; (The Cross and Passion) (1915); (The Episcopal Church, Its Faith and Order' (1915); (Henry Codman Potter' (1915); Religion in a World at War' (1917). He was one of the most prominent members of the Low Broad Church School in the Episcopal Church.

HODGKIN, hoj'km Thomas, English his¬ torian and banker; b. Tottenham, Middlesex, 29 July 1831 ; d. 2 March 1913. He was for many years the senior partner in a banking firm at Newcastle-on-Tyne, but after 1874 gave his time to historical writing, to which he applied scientific methods. He has published (Italy and her Invaders' (1880-99);

HODGKIN'S DISEASE. See Pseudo-

LUC/EMIA.

HODGKINSON, hoj'kin-son, Eaton, Eng¬ lish engineer: b. Anderton, Cheshire, 1789; d. Manchester, 18 June 1861. After a somewhat desultory education he engaged in pursuit of independent investigations in mechanics, which soon brought him fame. His first important work was on strains and the strength of ma¬ terials, on which subject he read a paper before the Literary and Philosophical Society of Man¬ chester in 1822. He

subsequently made re¬ searches on the forms of the catenary in sus¬ pension bridges and on the strength and best forms of iron beams. He was appointed in 1847 professor of the mechanical principles of engineering at University College, London. He was one of the royal commission appointed in 1847 to inquire into the application of iron in railroad building. He was president of the Literary and Philosophical Society of Man¬ chester in 1848-50. He was a member of the Geological Society, of the Royal Irish Academy, and an honorary member of the Institute of Civil Engineers. He made investigations as to the temperatures of the earth in deep mines. His principal experiments led him to the deter¬ mination of the "neutral line" in the section of fracture, _ an important step in the progress of engineering science. Among his many writings is Researches on the Strength and Other Properties of Cast Iron' (1846). Consult the ((Life of Eaton Hodgkinson" in 'Memoirs of the Manchester Literary and Philosophical So¬ ciety' (3d series, No. II, Manchester 1862).

HODGSON, hoj'son, Shadworth Hollway,

English metaphysician : b. Boston, Lincolnshire,

25 Dec. 1832; d. 13 June 1912. He was educated at Rugby and Oxford and is the author of

HOE, Richard Marsh, American inventor: b. New York, 12 Sept. 1812; d. Florence, Italy,

7 June 1886. He was the son of Robert Hoe (q.v.). In 1846 with his brother Peter S. he perfected, a rotary printing-press which was called "Hoe's lightning press." Subsequently

the two brothers invented the Hoe web-perfect¬ ing press, which superseded the rotary press and prints upon both sides of the sheet, and includes apparatus for folding and cutting. This was especially adapted to newspaper print¬ ing and made a revolution in that art. The sons of Richard M. Hoe and of Peter S. Hoe conducted the business after the death of the brothers, and added various improvements to the original Hoe printing-press. See Printing.

HOE, Robert, American inventor: b. Lei¬ cestershire, England, 1784; d. 1833. He came to the United States in 1803, was for a t;me a joiner, and later entered partnership with his brothers-in-law, Matthew arid Peter Smith, for the sale of a hand printing-press, the invention of the latter. He took over the business in 1823. He retired in 1832. The original Hoe printing-press was designed and built by him. He is believed to be the earliest American ma¬ chinist who utilized steam as a motive power in his

plant.

HOE, Robert, American manufacturer: b. 1839 ; d. 1909. He is a nephew of Richard M. Hoe (q.v.). He became the head of the Hoe firm, and maintained its high position among establishments of its class. A founder of the Grolier Club of New York, he was also its first president. He was an extensive collector of rare books and manuscripts as well as of silver, miniatures and other art objects, his col¬ lections at the time of his death being valued at several million dollars. He published an edi¬ tion (1880) of Maberley's (Print Collector,' and wrote 'A Short History of the Printing Press' (New York 1902); Rookbinding as a Fine Art' (Grolier Club, id. 1886). Consult biographical sketch by Gilliss in (New York Genealogical and Biographical Record' (Vol XII, ib. 1910).

HOEBER, Arthur, American artist : b. New York, 23 July 1854; d. Nutley, N. J., 29 April 1915. He studied under Beckwith at the Art Students' League in New York, and under Gerome at the Ecole des Beaux Arts, ex¬ hibited for the first time at the Salon in' 1882 and was a contributor to most American ex¬ hibitions. He was art critic of the New York Times for three years, associate editor of the Illustrated American for one year and later be¬ came art critic of the New York Globe and Commencal Advertiser. He was also known as a lecturer on art. He was elected an associate of the National Academy. Among his writings are 'Treasures of the Metropolitan Museum of Art' (1892); and 'Painting in the 19th Cen¬ tury in France, Belgium, Spain and Italy.' His Salon picture in 1882 was 'Sur la Grande Route' and in 1885 'Le Pain Quotidien.'

r\ HOEGH-GULDBERG, heg-guld'berg, Ove, Danish statesman: b. Horsens 1731 ; d. 1808. Appointed preceptor of Crown Prince Frederick, son of Christian VII, he conspired against Queen Caroline and Struensee ; and on their overthrow rose rapidly in political power. He became Cabinet Secretary in 1773 and three years later, Secretary of State. From 1784-1802 he was governor of Aarhus. Besides some religious works, he wrote an important Uni¬ versal History.'

HOFER, ho'fer, Andreas, Tyrolese pa¬ triot: b. Sankt Leonhard, 22 Nov. 1767; d. Man-

tua, 20 Feb. 1810. He was landlord of the inn l(Am Sandw at Sankt Leonhard, and hence often known as ((Sandwirt» In 1796 he led a rifle company against the French on Lake Garda, and after the Peace of

Luneville was prominent in the organization of the Tyrol militia. In 1809 he led in an insurrection of the Tyrolese for shaking off the yoke of Bavaria, to which their country had been transferred by the Treaty of Presburg. In a short time, with intermittent assistance from the Austrians, he defeated the French and Bavarian troops, and nearly the whole country was liberated. Hofer then car¬ ried on the military and civil administration, till the Peace of Vienna was proclaimed. Mis¬ led by false reports he commenced hostilities anew, and thus forfeited the protection of the amnesty. He remained concealed for some time, but was at last betrayed to the French, and carried to Mantua, where he was tried by a court-martial and shot. His family was in¬ demnified for the loss of their property by the emperor of Austria in 1819, and his son en¬ nobled. The career of Hofer furnished ma¬ terial for tragedies by Immermann and Auer¬ bach. Consult the studies by Heigel (1874) and Stampfer (1891).

HOFF, hof, William Bainbridge, Amer¬ ican naval officer: b. Philadelphia, 1846; d. Washington, D. C., 23 May 1903. He entered the naval service in 1860, and in 1863 was gradu¬ ated from the Naval Academy. He took part in several naval campaigns during the Civil War, and at the torpedo school and on the United States steamship Dale he gave his at¬ tention to the instruction of seamen in gunnery. In 1893 he was marine com¬ missioner to Great Britain for the World's Fair at Chicago, and was retired in 1897. He was the author- of (Elementary Naval Tactics) ; and (Avoidance of Collisions at SeaP

HOFFMAN, hof'man, Charles Fenno,

American poet and novelist: b. New York, 1806; d. Harrisburg, Pa., 7 June 1884. He en¬ tered Columbia College, and studied law at Al¬ bany, being called to the bar in 1827. In 1830 he became joint editor of a New York journal, and three years later started the Knickerbocker Magazine. For many years he edited the American Monthly Magazine also. In 1849 his mind began to give way, and from that time till his death he was an inmate of Harrisburg Lunatic Asylum. His first separate publication was (A Winter in the West) (1835), followed in 1837 by (Wild Scenes in Forest and Prairie, > and in 1840 by the novel (Greyslaer: a Romance of the Mohawk, } which met with immediate and remarkable success. An earlier novel, (Vander- lynP appeared in the American Monthly Mag¬ azine during 1837. Several of his songs have gained great popularity. His published volumes of verse include (The Vigil of Faith (1842) ; (The Echo) (1844) ; (Lays of the Hudson, and other Poems> (1846) ; (Love's Calendar, and other Poems) (1848).*

HOFFMAN, Eugene Augustus, American Episcopal clergyman: b. New York, 21 March 1829; d. near Plattsburg, N. Y., 17 June 1902. He was

educated at Rutgers and Harvard col¬ leges and at the General Theological Seminary. He held successive rectorships at Elizabeth, N. J., Burlington, N. J., Brooklyn, N. Y., and Philadelphia, and in 1879 was appointed dean

of the General Theological Seminary, New York, and with others of his family heavily endowed that institution. Dean Hoffman built Christ Church and rectory at Elizabeth, N. J., and also churches at Woodbridge and Milburn, N. J. He was the author of (Free Churches> (1858) ; and (The Eucharistic Week) (1859 and 1893). Consult Riley, T. M., (Memorial Biography of E. A. Hoffman (New York*

1904).

HOFFMAN, Richard, American pianist and composer: b. Manchester, England, 24 May 1831 ; d. 17 Aug. 1909. He came to New York in his 16th year. He received early instruction from Rubinstein, Liszt, Thalberg, Dobler and Meyer. After his arrival in America he made a tour of the country as a soloist, and later ac¬ companied Jenny Lind on her tours; he also played with Gottschalk and Von Billow in New York in 1875.. Later he became an important figure in American musical life. He composed music for the piano, songs, anthems, ballads and church music.

HOFFMANN, August Heinrich, ow'- goost hln'riH hof'man, usually known as Hoffmann von Fallersleben, German poet and philologist : b. Fallersleben, Hanover, 2 April 1798; d. Corvei, 19 Jan. 1874. He studied at Gottingen and Bonn, was appointed in 1823 custodian of the university library at Bres¬ lau, and in 1830 became extraordinary, in 1835 ordinary professor of the German language and literature in the university of that city. He resigned his librarianship at Breslau in 1838, and in 1842 was removed from his chair without a pension because of the liberal political views represented in his (Unpolitsche Lieder (1840- 41). He led a wandering life till 1845, when he obtained the right of domicile in Mecklen¬ burg. In 1848 he was granted a pension by the Prussian government, and from 1860 he was librarian to the Duke of Ratibor. Of his origi¬ nal writings the best known are his songs, not a few of which, especially that beginning (Deutschland, Deutschland fiber Alles) (1841), have long received emphatic popular approval. For several of them he composed tunes. They were published in several volumes, among these being (Gedichte) (1827) ; (Alemannische*

Lieder> (1827) ; (Hundert Schullieder (1848) ; (Deutsches Volksgesangbuch* (1848) ; (Soldat- enlieder) (1851) ; (Kinderwelt in Liedern,* and (Alte und Neue Kinderlieder> (1873). A com¬ plete edition of his (Kinderlieder* was pre¬ pared by von Donop in 1877. (Mein Leben) (1868; abridged edition continued to his death, by Gerstenberg, 1892-94),*

is autobiographical. Consult also the by Wagner (1869).

HOFFMANN, Ernst Theodor Wilhelm,

German novelist: b. Konigsberg, 24 Jan. 1776; d. 24 July 1822. In admiration of Mozart he dropped the name Wilhelm and substituted Amadeus. . His childhood and youth were joy¬ less and in 1792 he entered the University of Konigsberg to prepare for a legal career. He practised for a short time at Konigsberg, re¬ moving subsequently to Glogau and in 1798 to Berlin. In 1800 he went to Posen but his powers of caricature cost him his place and caused his virtual banishment to Plozk. His leisure moments were spent in musical composi¬ tion. In 1804 he removed to Warsaw, where he was influenced by the Romantic writers such as

Novalis, Tieck and Wackenroder. During his sojourn in Warsaw he composed the music to Brentano's (Lustige Musikanten) and to Wer¬ ner's (Kreuz ar-i der Ostzee) and the opera (Liebe und EifersuchtP Hoffmann's fortunes were impaired when the French invaded War¬ saw, and in 1808 he moved to Bamberg as musical director of a theatre there. This in¬ stitution became bankrupt and Hoffman turned to literature in order to enhance his scanty earnings as composer and teacher of music. His earliest work was a series of musical sketches, (Phantasiestucke in Callots ManieU (4 vols., 1814). In 1814 he was recalled to Berlin and in 1816 was made councillor of the Court of Appeal. In the latter year appeared his great novel,

(E. T. A. Hoffmann : Stud'ien zu seiner Person- lichkeit und seinen Werken) (Leipzig 1908) ; Wolzogen, Hans,

HOFMANN, August Wilhelm von, Ger¬ man chemist: b. Giessen, 8 April 1818; d. Ber¬ lin, 5 May 1892. He studied law, obtained the degree of doctor of philosophy, became assistant under Liebig in the Giessen Laboratory, and in 1845 became professor of chemistry in the University of Bonn. The same year he was appointed superintendent of the new Royal Col¬ lege of Chemistry in London, and in 1853 be¬ came professor of chemistry in the Royal School of Mines, though still remaining at the head of the College of Chemistry. In 1861 he was elected president of the London Chemical So¬ ciety, and in 1863 was appointed to the chair of chemistry in the University of Berlin, where he remained till his death. In 1864 he built a lab¬ oratory at Bonn and became its director, and in 1868 founded the German Chemical Society. He was judge of several industrial

expositions and was a member of many scientific societies, and for his valuable services was ennobled in 1888. A statue of him is in the National Gal¬ lery of Berlin. Hofmann's researches contrib¬ uted much to the development of the color industry and have revolutionized the art of dyeing. He investigated the organic bases of .coal-tar and discovered the amines. He dis¬ covered a method of transforming acid amides into amines by means of bromine and caustic potash. This method is known as Hofmann's reaction. He also discovered aniline among the products of distilled bituminous coal and meth¬ ods for the preparation of coloring substances from, aniline. Entire departments of organic chemistry have developed from his researches and chemical theory in general has been greatly influenced by his work. He wrote (A Handbook

of Organic Analysis (1853); Untroduction to Modern Chemistry) (1865; and several later editions) : this work led to important reforms in methods of teaching chemistry; (Zur Errin- nerung an vorangegangene Freunde) (1889); (The Life Work of Liebig in Experimental and Philosophic Chemistry > (1876), etc. Consult Volhard and Fischer, (August Wilhelm von Hofmann : Ein Lebensbild, im Auftrage der deutschen chemischen Gesellschaft* (Berlin*

1902).

HOFMANN, Heinrich, German painter: b. Darmstadt, 19 March 1824; d. 1902. In his native town be began his studies as a copper¬ plate engraver, but subsequently under Schadow and Hildebrande turned his attention to painting, to which henceforth he devoted his life. After extensive travels in Europe, which included a residence of four years in Italy in 1854-58, and practising in various German cit¬ ies, he settled at Dresden in 1862 as professor of painting in the Academy there. The most famous of his pictures are (The Burial of Christ ; (King Enzio in Prison) ; (The Be¬ trayal of Christ, > in the Darmstadt Gallery; (The Finding of Christ in the Temple,* in the Dresden Gallery; (Christ Preaching on the Lake,* in the Berlin National Gallery; (Venus and Cupid* ; (Romeo and Juliet) ;*

HOFMANN, Josef, yo'sef, Polish pianist: b. Cracow, 20 Jan. 1877. He studied with his father, a professor in the Warsaw Conservatory and director of the Warsaw opera, appeared as a pianist in public at the age of six, became known as one of the most notable of musical prodigies visited the United States in 1887-88, and was there prevented from playing through the action of the Society for the Prevention of Cruelty to Children. After a period of study, two years of which were spent as a pupil of Rubin¬ stein, he made his debut as a virtuoso at Dres¬ den in 1894. His recitals in New York in 1901 showed him to be one of the leading modern pianists. His compositions include some inter¬ esting works for the pianoforte. He

success¬ fully interprets both the classic, romantic and modern schools. His two handbooks (Piano Playing) and (Piano Questions Answered) are very popular and practical works in their field.

HOFMANNSTHAL, Hugo von, Austrian poet : b. Vienna, 1 Feb. 1874. He belongs to a circle of neo-romantic poets, headed by Stephan George (q.v.), who represent a reaction against the naturalistic movement. Not much is known of his life and very little knowledge of this sort is necessary for the interpretation of his works, as he and his associates sought the sal¬ vation of the poetic art in fleeing from the realities of the present day into the romantic dreamland of the past. Hofmannsthal espe-

cially is an adept in sensing and reproducing the feelings of characters of by-gone civiliza¬ tions, especially of the Renaissance. He is a child of wealth, lives in Vienna and has made journeys to France and Italy, in which latter country he spends most of his time in Venice. His works have mostly appeared for the first time in costly prints, accessible only to the few. The poets of this group in most cases printed their works privately. They were intended only for a small circulation among the adherents of this movement, as it was held that only they were capable of appreciating them. To under¬ stand the aims and theories of this coterie of poets, it is necessary to read their private jour¬ nal Blatter fiir die Kunst. Hofmannsthal's masters were Keats, D'Annunzio and Swin¬ burne.

His first work, (1892), and (Der Abenteurer und die Sangerin5 (1899), are the most important. There is lacking all dramatic action, but one is fascinated by the sweet melancholy of the verse of this master- painter of words.

In his later works there is evident more of a tendency to naturalism. This is seen in (Elec- tra) (1903), a free imitation of Sophocles, (Das gerettete Venedig) (1904), in which he followed Thomas Otway, and (Odipus und die Sphinx) (1905). Here we find a naturalism based upon the brutal instincts of the senses. No dramatic talent is shown. There is only a mixture of pleasing sound of musical words together with a sensuous mysticism. Other works of Hof¬ mannsthal are (Die Frau im Fenster) (1899), (Die Hochzeit der Sobeide) (1899) ; (Der Kaiser und die Hexe) (1900) ; (Das Bergwerk zu Falun) (1900) ; (Das kleine Welttheater) (a puppet play, 1903) ; (Odipus der Konig5 (1907) ; (Ausgewahlte Gedichte) (1903) ; (Das Marchen der 672. Nacht und andere Erzahlungen5 (1905); (Unterhaltungen fiber literarische Gegenstande5 (1905) ; (Prosaische*

Schriften) (1907); (Jederman, ein altes Spiel erneuert) (1912) ; (Ariadne auf Naxos) (1912). and (Der Rosenkavalier,5 an opera libretto with music by Richard Strauss, performed in New York in 1913. Consult Sulzer-Gebing, Emil, (Hugo von Hofmannsthal, eine literarische Studie) (Leipzig 1905) ; Seiberth, Philip, in 'German Classics5 (Vol. XVII, New York 1914). See Electra.

William F. Hauhart, Assistant Professor of German, University of Michigan.

HOG-FEEDING. See Nutrition of Farm Animals

HOGAN, John Joseph, American Roman Catholic bishop : b. Bruff, County Limerick, Ire¬ land, 10 May 1829; d. 21 Feb. 1913. He came to Saint Louis, Mo., in 1848, studied at the Roman Catholic theological seminary there,

was ordained priest in 1852, and built and be¬ came pastor of Saint Michael's Church of Saint Louis. In 1868 he was consecrated bishop of Saint Joseph, Mo., and in 1880 was transferred to the see of Kansas Citv.

HOGARTH, ho'garth, David George,

English archaeologist: b. Barton-on-Humber, Lincolnshire, 23 May 1862. He was educated at Oxford and has since conducted excavations at Paphos, Alexandria, Fayum and elsewhere in the East. He was director of the British School at Athens 1897-1900, was appointed keeper of the Ashmolean Museum, Oxford, 1909 and has published (Devia Cypria) (1890) ; (Modern and Ancient Roads in Asia Minor5 (1892) ; (A Wandering Scholar in the Levant 5 (1896) ; (The Nearer East5 (1902) ; 'The Pene¬ tration of Arabia5 (1904) ; (Ionia and the East) (1909) ; (Accidents of an Antiquary's Life) (1910) ; (The Ancient East5 (1914).

HOGARTH, William, English painter and engraver: b. London, 10 Nov. 1697; d. there, 25 Oct. 1764. He studied art at Sir James Thorn¬ hill's school, James street, Covent Garden. About 1720 he set up for himself, and designed plates for booksellers, the chief of which are the illustrations to Gray's edition of 'Hud bras5 (1726). He had ample employment for what are called "conversation pieces,55 that is, groups of family portraits, united by some common occupation or interest, but never cared greatly for this branch of art. In March 1729 he mar¬ ried clandestinely the daughter of Sir James Thornhill, and shortly afterward began to dis¬ play h s extraordinary faculty for depicting the vices and follies of his time. In 1730-31 he painted (A Harlot's Progress,5 a series of six pictures, like many of his other works, engraved by himself. It was published in April

1732. The (Harlot's Progress5 was followed by other satiric delineations, such as 'A Midnight Mod¬ ern Conversation5 (1734); 'Southwark Fair5 (1735) ; 'A Rake's Progress5 (1735) ; 'TheDis- trest Poet5 (1736) ; 'The Four Times of the Day,5 and the (Strolling Actresses Dressing in a Barn5 (1738). With less success he also pro¬ duced the large canvases still in Saint Bartholo¬ mew's Hospital — the "Pool of Bethesda5 and the (Good Samaritan,5 both executed in 1736; and also painted several portraits. The series of graphic satires was, however, continued by the 'Enraged Musician5 (1741) and the famous (Marriage a la Mode5 (his master¬ piece), six pictures now in the National Gallery, and engraved by various hands in 1745. industry and Idleness,5 12 plates, fol¬ lowed these in 1747; (Calais Gate5 (1749) came next, and in 1750 the fine plate known famil'arly as the 'March to Finchley.5 The minor plates of 'Beer Street5 and (Gin Lane5 and the set called (The Progress of Cruelty5 belong to 1751. In 1753 Hogarth published his (Analysis of Beauty,5 a treatise containing many shrewd remarks but confused and illiter¬ ate in style and the cause of much ridicule. After this he produced (with the aid of Grig- nion and others) the four prints of the Elec¬ tion Series5 (1755-58), the (Cockpit5 (1759), etc. In 1762-63 he became involved in a miser¬ able quarrel with Wilkes and Churchill, the result of which, on his side, was the well-known portraits of Wilkes, and of Churchill as a bear ('The Bruiser5). Most of Hogarth's pictures,

which now enjoy a much higher repute for tech¬ nique than formerly, are preserved in public or private collections in Great Britain. He was entirely uninfluenced by foreign art. His pow¬ ers of invention and combination were extraor¬ dinary; and as a humonst and social satirist with the pencil he has never been surpassed. There can be no doubt also that he genuinely desired to assist by his work in the reformation of manners. Consult the biographies by Sala (1866), and Dobson (1879).

HOGBACK. See Cuesta.

HOGE, hog, Moses Drury, American Pres¬ byterian clergyman: b. Hampden-Sfdney, Va., 17 Sept. 1819; d. Richmond, Va., 1899. He was graduated at Hampden-Sidney College and Seminary and was pastor of the Second Presby¬ terian Church in R chmond, Va. (1845-85). He ran the blockade in a ship from Charleston dur¬ ing the Civil War and secured from England a large number of copies of the Holy Scriptures for distribution among the Confederate soldiers, the British and Foreign Bible Society mak.ng a special grant at his request. After the war he was

instrumental, especially during the ses¬ sion in 1874 of the Southern Presbyterian Church, in reconciling differences with the Northern Presbyterian Church.

HOGG, James, Scottish poet, familiarly known as ((The Ettrick Shepherd® : b. Ettr ck, Selkirkshire, 25 Jan. 1770; d. Altrive, on the Yarrow, 21 Nov. 1835. After receiving a very scanty education, he began to earn his bread by daily labor as a shepherd. His early rhymings brought him under the notice of Sir Walter Scott, by whose advice he published a volume of ballads called (The Mountain Bard.> He then went to Edinburgh, where he published the (Forest M.nstreP (1810), and started a weekly periodical entitled The Spy. The appearance of the (Queen's Wake> in 1813, with its charm¬ ing ballad of Kilmeny, established Hogg's repu¬ tation as a poet. In 1815 he published (Pilgrims of the Sun,> followed by*

HOGNOSE, a North American colubrine serpent (Heterodon platyrhinus) , so called be¬ cause of its upturned pig-like snout. It is usu¬ ally about two feet long, gray marked with brown bars, but sometimes is so dark that the

whole surface appears blackish; it dwells and seeks its prey mainly in the woods and thickets. When alarmed — and it is extremely timid — it hisses violently (whence other rustic names such as ˆblowing-adder®), and expands and flattens the head and neck by inhaling air and stretching out the ribs, giving itself a most ugly aspect. If these tactics do not succeed in ter¬ rifying the enemy sufficiently, the snake begins a series of astonishing contortions and twistings which end in the animal throwing itself upon its back and seeming dead until a chance of escape offers. Two or three other species are known in the South and West, all of which are re¬

garded as poisonous by most country people, but are really quite harmless.

HOGS. See Swine.

HOGSHEAD, a liquid measure formerly in use in England. Its capacity varied in different cases. For beer it was 54 gallons, for rum 45 to 50 gallons, for brandy 45 to 60 gallons and for different kinds of wine it varied from 46 to 93 gallons. In the United States the measure is still in use, being equivalent to 63 American gallons or 52.485 imperial gallons ; for tobacco it varies from 750 pounds in some States to 1,200 pounds in others.

HOHENLINDEN, ho-en-lin'den, Ger¬ many, village of Bavaria, 20 miles east of Munich, celebrated for the victory gained by the French under Moreau over the Austrians under the Archduke John, 3 Dec. 1800. Moreau placed his army on the plain between the Inn and the Isar, thus

barring the way to Munich, the ob¬ jective of the Austrians. When the latter advanced Moreau simply held them in check and sent Richepanse around their flank to attack them in the rear. When Richepanse be¬ gan h.s rear attack, Ney was ordered to attack the Austrians in front, who were thus caught and crushed between two forces. The Aus¬ trians left 10,000 dead on the field, while the French loss was only about 5,000. The French took nearly 80 pieces of cannon, 200 caissons and more than 10,000 prisoners, with three gen¬ eral officers. The French victory led to the treaty of peace concluded at Luneville, 9 Feb.

1801.

HOHENLOHE – SCHILLINGSFURST,

ho-en-16'e shiriings-fiirst, Chlodwig Karl Vic¬ tor, Prince von, German Chancellor : b. Roten- burg-an-der-Fulda, March 1819; d. Ragatz, Switzerland, 6 July 1901. He took courses in law and political science at Heidelberg, Gottin¬ gen and Bonn. He entered public life and became in 1866 Prime Minister of Bavaria. In 1874 he was German Ambassador to France and in 1885 became governor-general of Alsace- Lorraine. In 1894 he was appointed Chancellor and resigned in 1900.

HOHENSTAUFEN,ho'en-stow-fen, House of, a German dynasty reigning from 1138 to 1254. After the deatn of the emperor, Henry V (1125), his two nephews, Frederick II, Duke of Swabia, and Conrad, Duke of Franconia, aspired to the German crown; but were opposed by the directors of the election, the archbishop of Mayence and the papal legate; and Lothaire of Saxony was elected. The circumstance, with the demand made by the new emperor of the restitution of all the possessions acquired by the lords of Hohenstaufen during the preceding reign, produced a fierce war between the em¬ peror and the two brothers. Lothaire preserved himself by a union with Henry the Proud, Duke of Bavaria, to whom he gave his daughter and ihe duchy of Saxony. The Peace of Miihl- hausen (1135), between Lothaire and Conrad, put an end to this Ten Years' War. Conrad renounced his title of king of Italy which he had taken, but received the first rank among the dukes, and both he and his brother regained all their lands. After Lothaire's death (1137) Conrad, Duke of Franconia, of the house of Hohenstaufen, was raised to the throne of Germany, with the title of Conrad III. After

the death of Conrad III (1152) the confidence which was felt in the

Hohenstaufen family caused the choice to fall on his nephew, Fred¬ erick III of Swabia, called Barbarossa (the Red-beard), who was followed by Henry VI (1190), and he again by Otto IV (1197) and Freder ck II (1215-50), all belonging to the same house. After the death of Frederick II his son Conrad was acknowledged as his succes¬ sor, with the title of Conrad IV, by most of the states of the empire; but Innocent IV laid him under an interdict and declared him to be de¬ prived of all his lands. The conflict between Conrad and the Pope lasted until the latter's death in 1254. The fame of the house of Ho¬ henstaufen is based upon the political greatness to wh ch the Fredericks in particular attained; their success in reducing to order all the states of the empire ; the encouragement which they gave to commerce and trade and their efforts to promote the sciences and arts.

HOHENZOLLERN, ho'en-tsol-lern, Ger¬ many, province of Prussia, formed in 1849 by the union of the two principalities of Hohen- zollern-Hechingen and Hohenzollern-Sigmarin- gen. It consists of a narrow irregular strip of country encircled by Wiirtemberg and Baden. Area 441 square miles; pop. (1911) 71,011. The province is traversed by the Danube and the Neckar. Iron, coal, gypsum, peat and rock salt are found in the mountains, and the valleys yield fruit, grain and hops. There are several mineral springs. Cotton spinning, iron found¬ ing, agriculture and cattle raising are the prin¬ cipal industries. Sigmaringen is the seat of the Landtag since 1873. The province is represented in the Reichstag by one deputy. The inhabitants are nearly all Roman Catholics, under the jurisdiction of the archdiocese of Freiburg. The princely family of Hohenzollern dates from Thassilo, Count of Zollern, who died about 800 a.d., after having founded a castle near Hech- ingen, on the Zollern hill in the Swabian Alps. The fine Hohenzollern castle of 14th century architecture, built in the latter half of the 19th century, occupies the site of the ancient family- seat. There have been several lines and branches of the Hohenzollerns, the first separa¬ tion tak'ng place about 1165, when Frederick IV founded the elder or Swabian and Conrad III the younger or Franconian line. The elder line was subdivided, in 1576, into the branches of Hechingen and Sigmaringen. Frederick VI, the representative of the younger line, in 1415 re¬ ceived from the Emperor Sigismund the in¬ vestiture of the electorate of Brandenburg, thus founding the reigning dynasty of Prussia. The two branches of the elder line continued un¬ broken till 1849, when the reigning princes ceded their respective rights and principalities to the king of Prussia, who in 1871 became German Emperor. The main branch of the Hohenzol¬ lerns is represented by the former imperial family of Germany. See Germany.

HOHENZOLLERN CANAL, Germany, running from Berlin to the river Oder, thus connecting the capital with Stettin by water, was opened by

Kaiser Wilhelm II on 17 June

1914.

HOISTING APPARATUS. See Crane;

Derrick; Elevator.

HOJO. A line of rulers in Japan (1219— 1333) who, though historically considered as

usurpers, were the regents and real executives of the country from 1200 to 1333. Descended from Imperial and Taira ancestors, they were men of ability. They made Kamakura their seat of power and virtual capital of the empire and set up and deposed both emperor and sho¬ gun at tneir will. They were finally driven from power by Nitta Yoshisada, in 1333, and Kamakura was burned and left desolate. Their chief claim to honorable fame lies in the energy shown by the regents Tokimune and Yasutokf in driving off the Mongols, when they attempted invasion. This era furnishes the theme of much Japanese fiction and many art motives. To re¬ inforce the national spirit, when the Russian War of 1904—05 was at its height, the Mikado conferred high posthumous honors upon Ho jo Yasutoki (1183-1242), for his defeat of the Mongols and the vindication of Japanese Bushido in keeping Japan inviolate. Consult Murdoch and Yamagata, (History of Japan (1905); Yamada, (Ghenko; the Mongol In¬ vasion of Japan* (1916) ; Griffis, (The Mikado's Empire> (1912) ; and, in fiction, Fraser, (A Stolen Emperor* (1903).*

HOKE, Robert Frederick, Confederate general : b. Lincolnton, N. C., 27 May 1837 ; d. Raleigh, N. C., 1906. He was educated at the Kentucky Military Institute and at the begin¬ ning of the Civil War enlisted in the Confeder¬ ate army as a private, soon being promoted to the rank of colonel. He took part in the early battles around Richmond, served in North Carolina, on 17 Jan. 1863 was commissioned brigadier-general, and was seriously wounded at Chancellorsville. As a reward for capturing Plymouth, N. C., he was promoted to major- general, 20 April 1864, and assigned to the command of a division of the Army of Northern Virginia. From May to December, 1864, he fought in front of Richmond, serving with distinction at Cold Harbor, where his command bore the brunt of the fighting. For a short time afterward he commanded the district of North Carolina; in 1865 took charge of a division of J. E. Johnston's army; at Benton- ville (q.v.) fought his last battle; and sur¬ rendered at Durham Station, N. C., 26 April 1865. After the war he engaged in the iron business in North Carolina and later became president of the Seaboard Air Line system. In 1898 President McKinley offered him a com¬ mission as

major-general of volunteers in the war with Spain but he declined.

HOKUSAI, hd-koo-sa'e. See Japanese Art.

HOLACANTHU.S. See Butterfly-fish.

HOLBACH, Paul Heinrich Dietrich, powl hin'riH det'rm hdl'baH (Fr. ol-bak), Baron von, German philosophical writer: b. Heidels- heim, in the Palatinate, 1723; d. Paris, 21 June 1789. He was educated in Paris, where he passed the greater part of his life. He was the centre of a circle of men of wit but of free- thinking principles, using his great fortune, says Rousseau, generously, and appearing to advan¬ tage in the learned society which he gathered round his table. He was the author of a great number of works, most of which were anony¬ mous or pseudonymous. The principal work at¬ tributed to him, which appeared in 1770 under the name of M. Mirabaud, and excited much at¬ tention in the learned world, is the (Systeme

de la nature. He afterward published (Sys- teme social* — a development of the previous work, showing the application of the principles promulgated in it to morals and politics; (Bons Sens, or Idees naturelles opposees aux Idees surnaturelles) ; (Elements de la morale uni- verselle,* etc. According to Holbach matter is the only form of existence, and everything is the effect of a blind necessity. Consult Hall, E. V., (The Friends of Voltaire) (1907).*

HOLBEIN, Hans, hants hoi- or hol'bln, the Elder, German painter : b. Augsburg, 1460 ; d. Alsace, 1524. His art training began under the influence of Martin Schongauer, but he quickly launched out into a new style, which left ancient precedents behind. He developed a dramatic energy, a clear and lifelike coloring and pre-eminent distinction of expression which rendered him the acknowledged head of a new school. His figures took the attitude of life. The pictures over the altar in the cathedral at Augsburg, painted in 1493, are good specimens of his best work; in them are portrayed in¬ cidents in the life of Virgin Mary. To the same class belong the remains of an altarpiece in the Dominican church at Frankfort-on-Main, representing scenes of the Passion (1501) ; 16 paintings of the Passion in the Munich Gal¬ lery; the portrait of the artist with his two sons, in the gallery at Augsburg. His later pictures show traces of the influence exercised by the Italian Renaissance, and those painted about 1512 and later are vastly superior to his early work. Among them is

his (Fount of Life) (1519), now in the royal gallery at Lisbon; the altarpiece (Saint Sebastian) (1515), at Augs¬ burg; the altarpiece (Saint Katharine, in the same gallery, etc. In such works the bold and devotional conception, delicacy and directness of expression, ease of drawing and splendor of coloring, are beyond praise. Excellent also are some of his preliminary sketches and outlines, and in Basle, Berlin and Copenhagen are col¬ lections of his pencil sketches, the most re¬ markable of which is that at Berlin. Consult Woltmann, (Holbein und seine Zeit* (1866), and the monograph by A. B. Chamberlain (1905; new ed., 2 vols., London 1913).*

HOLBEIN, Hans, the Younger, German painter: b. Augsburg, 1497; d. London, Nov. 1543. He probably received instruction in painting from his father, and about 1515 went to Basle, where he engaged in illustrating books. At Basle he also painted his earliest portraits, and in 1517 went to Lucerne. Here he painted the house of Jacob von Hertenstein, designed win¬ dows, and executed other works. Returning to Basle in 1519, he became a burgher in the fol¬ lowing year, and during a seven years' resi¬ dence in that city he executed many works of great importance. In 1526 he went to England. Letters from his friend Erasmus, whose famous (Praise of Folly) he had illustrated, procured him the patronage of the chancellor, Sir Thomas More, who employed him to delineate the por¬ traits of most of his own personal friends about the court, and introduced him to the notice of Henry VIII, who was a liberal encourager of the fine arts. Among the portraits produced by him during this period are those of More, Archbishop Warham and Bishop Fisher From 1528 till 1532 he was again in Basle, but in the latter year he returned to England, where he

was destined to spend nearlv all the remainder of his life. Holbein painted most of the prin¬ cipal English nobility, whose portraits place him among the world's greatest portrait-painters. Some of his earlier productions, especially his (Dance of Deaths are also celebrated. In 1538 he completed and published this series. Among the pictures of Holbein's last period arc (The Ambassadors) (1533), and portraits of Hans of Antwerp (1532), English Lady and Gentlemen (1534), Sir Richard Southwell (1538), Duke of Norfolk (1539), Thomas Cromwell, Lady Jane Seymour, Henry VIII (1542, unfinished), and others. Comparatively few of Holbein's pictures are still extant in England, great numbers of them having been destroyed by Puritan fanatics, or sold and dis¬ persed over Europe. Many of them also per¬ ished in the great fire in London in 1666. Hol¬ bein also excelled in wood-engraving, and be¬ fore his visit to England had produced a large number of wood-cuts. He was one of the earli¬ est to paint portraits in miniature. Consult Woltmann, (Holbein und seine Zeit (1874) ; Knackfuss, (Holbein der Jiingere) (1896), and monographs by A. B. Chamberlain (1913), Davies (1903), and Wornum (1867).*

HOLBERG, Ludwig, lood'vTg hol'berg, Baron, Danish author: b. Bergen, Norway, 3 Dec. 1684; d. Copenhagen, 28 Jan. 1754. He studied at Copenhagen, Oxford and Paris, and after paying a six months' visit to Rome re¬ turned to Copenhagen in the end of 1716. In 1718 he was appointed to an ordinary professor¬ ship in the university of that city, where after this date he chiefly resided till his death. In 1735 he was unanimously elected rector, and in 1737 treasurer of the university, and in 1747 was raised to the rank of baron. Holberg's numerous productions in various departments of literature as well as the important and salu¬ tary influence which he exercised upon his countrymen place him in the front rank of the literary men of his age. He is considered the greatest of Danish authors, and the founder of its literature. He was extremely versatile — now devoted to history, now to poetry and now to the drama; but during his whole life he was a sworn enemy to pedantry, theological disputa¬ tiousness and scholastic metaphysics. His works may be divided into four classes — poems, stage pieces, philosophical treatises and histori¬ cal works. His poems are chiefly of a satirical nature. The most celebrated among them is (Peder Paars, a comic heroic poem in 14 cantos, still regarded throughout the Scandina¬ vian countries as a masterpiece, and the hero of which has become the national comic im¬ personation in Denmark. It has been translated into several languages. Almost equally famous is his (Nicholas Klimm's Subterraneous Travels,* a satirical romance in prose, originally written in Latin, but translated into seven modern European languages shortly after it appeared, into Danish first by Baggesen (1789). His numerous stage pieces are either comedies or farces, and nearly all characterized by true comic power. In ˆErasmus Montanus) (q.v.), Holberg attacks the pedantry and scholas¬ ticism so characteristic of the university life of his day. Among his philosophical writ¬ ings the most important is his (Moral Re- flections) (1744). His historical works include*

(The Political, Ecclesiastical and Geographical Condition of the Danish Monarchy,' a work of great value as a source of reference; 'A Gen¬ eral History of the Jews,' and 'A History of Famous Men and Famous Women' (1739-45). Consult fives' by Smith (Copenhagen 1858) ; and Brandes (1884).

HOLBORN, ho-burn, England, a metro¬ politan borough in central London. Area, 405 acres, the smallest of the boroughs. Here, in Saint Giles in the Fields and Seven Dials, are the lowest strata of London; but Halton Gar¬ den, on the other hand, is the centre of the diamond trade. The

ancient chapel of Saint Etheldreda, built in the Decorated style, was acquired by the Roman Catholics in 1874, and is now restored for public worship. The City Temple, belonging to the Congregational body, is another important religious edifice. Lincoln's Inn and Gray's Inn, incorporated schools of law, are within the borough. Pop. 49,357. Con¬ sult Milton, series.

HOLBROOK, John Edwards, American naturalist: b. Beaufort, S. C., 30 Dec. 1794; d. Norfolk, Mass., 8 Sept. 1871. He was gradu¬ ated from Brown in 1815, from the medical school of the University of Pennsylvania in 1818, began practice at Charleston, S. C., in 1822, and in 1824 was appointed to the chair of anatomy in the Medical College of South Caro¬ lina, a post he held for over 30 years. In the Civil War he was head of the South Carolina examining board of surgeons. His 'American Herpetology, or a Description of Reptiles In¬ habiting the United States) (1842), won for him recognition among European scientists. He published but 10 numbers of his 'Ichthy- ology of South Carolina) (1854 et seq.), when the Civil War compelled its discontinuance.

HOLCOMB, Silas Alexander, American jurist: b. in Gibson County, Ind., 25 .Aug. 1858. He received a common school training, studied law in Nebraska, was admitted to the bar in 1882, and in 1891 was made judge of the 12th judicial district. He was governor of Nebraska from 1894 to 1898, having been elected by fusion of the Populist and Demo¬ cratic voters. He was justice of the Supreme Court of Nebraska 1900-06 and chairman of the Board of Commissioners of State Institutions since 1913.

HOLCOMBE, Chester, American diplo¬ matist and author: b. Winfield, N. Y., 16 Oct. 1844; d. 25 April 1912. He was graduated at Union College in 1861 ; and served as inter¬ preter and secretary to the United States lega¬ tion in China, 1871-435. He was acting Minister in 1875-76, 1878-79 and 1881-82. Becoming an authority on the Chinese and Chinese affairs, in 1896 he acted for the Chinese government in its financial embarrassments, preparing the Chi¬ nese and English documents for the govern¬ ment loan of $100,000,000, and drawing up. in both languages the details for the construction of 3,000 miles of railroads in China. In 1902 he lectured at Lowell Institute, Boston. He has published 'Travels in Western China' (1875) ; 'The Practical Effect of Confucianism upon the Chinese Nation' (1882) ; 'Catalogue and Handbook of Antique Chinese Porcelains) (1890) 'The Real Chinaman) (1895) ; 'The Real Chinese Question) (1899); 'China's

Past and Future) (1904) ; and in Chinese he wrote 'A Mental Arithmetic (1873) ; 'Life of Christ' (1875), and a translation of the Amer¬ ican Declaration of Independence.

HOLDEN, Edward Singleton, American astronomer: b. Saint Louis, Mo., 5 Nov.- 1846; d. 16 March 1914. He was graduated at Wash¬ ington University in 1866, and at the United States Military Academy in 1870; was profes¬ sor of mathematics at the Naval Academy in 1873-81 ; and director of the Washburn Ob¬ servatory (Madison, Wis.) in 1881-85. In 1885-87 he was president of the University of California and in 1888-98 director of the Lick Observatory, on Mount Hamilton, San Jose, Cal. It was in connection with the Lick Ob¬ servatory that his most important work was done, and his services to astronomy found recognition in America and from European states. Most of the buildings and instruments at the Lick Observatory were designed by him. He became librarian of the United States Mili¬ tary Academy in 1901. Among his publications are 'Bastion System of Fortification> (1872) ; 'Index Catalogue of Nebulae' (1877) ; 'Life of Sir William HerscheP (1881) ; ' Astronomy ' (with S. Newcomb, 1892) ; 'Mountain Observa- tories) (1896) ; 'Essays in Astronomy) (1900); 'Elementary Astronomy' (1900); 'The Sciences) (1903); 'Galileo) (1905).

HOLDEN, Sir Isaac, English inventor: b. Hurlet, near Paisley, 7 May 1807 ; d. Keighley, Yorkshire, 13 Aug. 1897. While a worker in a cotton mill in Paisley he fitted himself for the post of a teacher. While conducting an experi¬ ment he discovered the lucifer match, previ¬ ously, however, invented by John Walker of Stockton-on-Tees. Subsequently he was man¬ ager, then owner of a wool-combing establish¬ ment, and by his mechanical improvements made significant changes in that industry. His shops at Bradford, with branches at Croix and Rheims, eventually became the largest of the kind in the world. He was several times elected to Parliament in the Liberal interest, and was created a baronet in 1903.

HOLDER, hol'der, Charles Frederick,

American naturalist : b. Lynn, Mass., 5 Aug. 1851; d. 11 Oct. 1915. He studied at the United States Naval Academy, but resigned in 1871 ; in 1871-75 was assistant curator of the American Museum of Natural History, from that time turned his attention to lecturing and literary work, and became known as a leading writer on popular science. At Pasadena, Cal., whither he removed in 1885, he became presi¬ dent of the board of education, professor of zoology in Throop University and honorary curator of the university museum. Among, his publications are 'Marvels of Animal Life' (1880) ; 'Elements of Zoology) (1885) ; 'Liv¬ ing Lights> (1887); 'Frozen Dragon' (1888); 'A Strange Company ' (1889) ; 'Around Pasa¬ dena' (1889); 'Santa Catalina Island) (1889); 'Louis Agassiz, his Life) (1892) ; 'Darwin's Life and Work) (1893) ; 'The Treasure Div¬ ers' (1898) ; 'Along the Florida Reef> (1892) ; 'Stories of Animal Life' (1900) ; 'Half-Hours with Nature' (1901); 'The Boy Anglers' (1904) ;

‘Half Hours with the Lower Ani¬ mals’ (1905); ‘Life in the Open’ (1906); ‘Log of a Sea Angler’ (1906) ; ‘Big Game at Sea’ (1908) ; ‘The Marooners’ (1909) ; ‘The

Channel Islands) (1910); distinguished American Scientists> (1911); (Game Fishes of the World) (1911); (1913); (Angling Adventures Around the World)

(1914).

HOLE, Samuel Reynolds, English Angli¬ can clergyman : b. Ardwick, Manchester, 5 Dec. 1819 : d. Rochester, England, 27 Aug. 1904. He was educated at Oxford, took orders, was or¬ dained in 1845 and was vicar of Caunton, 1845- 87. From 1887 he was dean of Rochester Cathedral. He visited the United States on a lecture tour in 1896, where his humorous, anec- dotical lectures were very popular. He was a recognized authority on rose culture and wrote (A Book about Roses,5 which has reached its 15th edition; (The Memories of Dean Hole1 ; (More Memories5.; (Addresses to Working Men1* ; (A Little Tour in America5 ; (Our Gar¬ dens5 ; (Then and Now,5 etc. Consult the Memoir by G. A. B. Dewar prefixed to his (Letters5 (1907).*

HOLE, William, English painter: b. Salis¬ bury, 7 Nov. 1846. He was destined for the profession of engineering but after a journey to Italy turned his attention to art. He studied at the Edinburgh School of Art, and in 1889 was elected member of the Royal Scottish Academy. His versatility is shown by the ex¬ cellence of his work in portrait, genre and fresco, while as an engraver he has made many famous plates after such masters as Millet, Constable and Millais. Among his best-known paintings are (The End of the Forty-five5 (1879) ; and (News of Flodden5 (1886) ; and a series of 80 water colors, (The Life of Jesus of Nazareth.5 He executed a series of re¬ markably fine mural paintings illustrative of Scottish history for the National Portrait Gal¬ lery, Edinburgh (1900), and another for the municipal buildings in that city (1903).

HOLGUIN, ol-gen’, Cuba, city in the prov¬ ince of Oriente, about 25 miles by rail south by west of Gibara, its port, and 70 miles north¬ west of the city of Santiago de Cuba. Fertile agricultural lands are in the vicinity; also on the southwest is a hilly section bordering on the interior mountain range. A rioted cave is in the vicinity. The trade is chiefly in sugar¬ cane,

tobacco, timber, corn and cattle. It was settled in 1720 and became a city in 1751. Pop.

7,592.

HOLIBUT. See Halibut.

HOLIDAY, any day set apart as a religious or national festival. (See Festivals). Cer¬ tain days are fixed by law as bank-holidays for England and Scotland, and it is enacted that all business transactions which would have been valid on any such holiday shall be held as valid if performed on the day following. Thus, when a bill of exchange becomes due, or notice of dishonor fails to be given, on a bank-holiday, the bill is payable or the notice stands good on the following day. The days fixed for England are Easter Monday, the Monday in Whitsun Week, the first Monday in August and the 26tb of December if a week-day. These are in addi¬ tion to Christmas Day, Good Friday and other hol: days previously established. The days fixed as bank-holidays for Scotland are New Year's Day, Good Friday, the first Monday of May,

the first Monday of August and Christmas Day; and if either New Year's Day or Christmas Day falls on a Sunday, the Monday after is held as a holiday. The same act em¬ powers the sovereign to appoint by proclama¬ tion a special day to be observed as a bank- holiday, and to alter by order in council any of the days settled by the act.

In the United States there is no national holiday, not even 4 July. The 53d Congress passed an act making Labor Day a public holi¬ day in the District of Columbia, and various States have followed with a similar act. The proclamation of the President designating a day of Thanksgiving makes it a legal holiday only in the District of Columbia and in the Ter¬ ritories. New Year's Day is a legal holiday in all the States and in Porto Rico and Hawaii. Lincoln's birthday (12 Feb.) is a legal holiday in Arkansas, California, Colorado, Connecticut, Delaware, Illinois, Indiana, Iowa, Minnesota, Montana, Nebraska, Nevada, New Jersey, New York, North Dakota, Oregon, Pennsylvania, South Dakota, Washington, West Virginia and Wyoming. Washington's birthday (22 Feb.) is a legal holiday in all the States and in Porto Rico and Hawaii. Decoration Day(30 May) in all the States except Arkansas, Florida, Louisiana, Michigan, Mississippi, North Caro¬ lina, South Carolina and Texas. Independence Day (4 July) in all the States and Territories. Labor Day (in general, the first Monday in September) in all the States and in Porto Rico and Hawaii. Election Day and Christmas Day are generally observed as legal holidays in all the States and Territories. There are various States holidays, such as Patriot's Day (19 April) in Maine and Massachusetts, Pioneer's Day (16 Aug.), in Utah,.

All Saints' Day (1 Nov.) in Louisiana, Admission Day (9 Sept.) in California, and Confederate Memorial Day (10 May) in North and South Carolina. Every Saturday after 12 o'clock noon is. a legal holi¬ day in many of the States and cities and in the District of Columbia and the Territories. In Canada eight public holidays are generally observed exclusive of Thanksgiving Day ■ — New Year's Day,. Good Friday, Easter Monday, Victoria Day, King's Birthday, Dominion Day and Labour Day; but in the. province of Que¬ bec there are others in addition, chiefly Church anniversaries.

HOLINSHED, hol'inz-hed, Raphael or Ralph, an English chronicler: d. about 1580. He is only known by his (Chronicles of Eng- lande, Scotlande, and Irelande,5 the first edition of which, known as the ((Shakespeare edition,55 because it is the one the poet is supposed to have used in collecting material for his histori¬ cal plays, was published in London in 1577. In the preparation of this work Holinshed was assisted by several of the most learned men of the day.

HOLL, Frank, English portrait and genre painter, son of Francis Holl, an eminent en¬ graver: b. London, 4 July 1845; d. there, 31 July 1888. He was a very successful student at the Royal Academy, and exhibited constantly from his student days. . Among his best-known pic¬ tures are (Faces in the Fire5 ; (Fern-Gather¬ ers5 ; (No Tidings from the Sea5 ; (Leaving Home5 and the (Gifts of the Fairies5 In the later portion of his career he devoted himself

to portraiture, in which he greatly excelled, and painted many of the celebrities of the day.

HOLLAND, Edmund Milton, American

actor: b. New York, 7 Sept. 1848; d. 24 Nov. 1913. He began his professional career at Barnum's Museum in 1866, was later for 13 years a member of Lester Wallack's Company, and as a member of the Madison Square Com¬ pany from 1882 created the parts of Captain Redwood in 'Jim the Penman^ Colonel Mo- berley in (Alabama) and the title role in Col¬ onel Carter of CartersvilleP In 1895-97 he starred with his brother Joseph, and later (1901 J ap¬ peared as Eben Holden in the dramatization of Irving Bacheller's book of that name. In 1903- 06 he appeared in ' Raffles? as Captain Bedford. He became a member of the New Theatre Com¬ pany in 1909, and in 1909-11 appeared succes¬ sively

as Sir Oliver Surface in 'The School for Scandal,) Canon Bonington in 'Don, Mr. Elkin in (The Thunderbolt,* Gaffer Tyl in (The Blue Bird) and Baron Von Haugh in 'Old Heidelberg.* In 1912 he appeared in (Years of Discretion as Metz. Consult McKay and Wingate, (Famous American Actors of To- Day * (New York 1896) and Strang, L. C., 'Famous Actors of the Day jn America * (Boston 1900).*

HOLLAND, Henry Richard Vassall Fox,

3d Lord, English statesman : b. Wiltshire, 21 Nov. 1773; d. 22 Oct. 1840. He succeeded to the peerage by the death of his father when less than one year old. In 1798 he took his place in the House of Lords, and as the nephew of Charles James Fox was at once acknowledged as a Whig leader. In 1806 he was commissioner for settling disputes with the United States; was lord privy seal in 1806-07 ; and chancellor of the duchy of Lancaster. He made Holland House the resort of the wit, talent and beauty of his day. He was the author of (Life of Lope de Vega (1806) ; 'Three Comedies from the Spanish) (1807) ; 'Foreign Reminiscences) (1850) ; 'Memoirs of the Whig Party) (1852).*

HOLLAND, John Philip, American in¬ ventor: b. Liscannor, County Clare, Ireland, 1841; d. 12 Aug. 1914. He was educated at the Christian Brothers' School, Limenck, taught school for 15 years in Ireland and America. As one of the most successful designers in the interesting field of submarine navi¬ gation, Holland is well known. His first boat was built in 1875 ; a second was launched in 1877 and a third in 1881. After a series of severe tests, the Holland boat was ordered by the United States government for the navy in 1900. In 1903 eight of the sub¬ marines were put in commission. These have a speed varying from 8.87 to 8 knots, a horse¬ power of 160 (with one exception), and a dis¬ placement in general of 122.55 tons. For some time the inventor was interested in the Hol¬ land Submarine Boat Company, but from this he retired to devote his time independently to submarines and flying devices. His later designs called for smaller and more compact vessels, with much less complicated mechanism, power of remaining longer submerged and increased safety in operation. See Submarine Naviga¬ tion, History of.

HOLLAND, Josiah Gilbert, American ed¬ itor and author: b. Belchertown, Mass., 24 July 1819; d. New York, 12 Oct. 1881. He began the

studv of medicine in 1840, in 1844 was gradu¬ ated from the Berkshire Medical College, and entered practice at Springfield, Mass. The years that followed were discouraging, for patients did not come to the young doctor. With true Yankee versatility he turned his hand to anything, — taught district school, was a travel¬ ing writing-master and a daguerreotypist. Of

his boyish mortification at being a mill hand he has written in 'Arthur Bonnicastle. He tried editorial work, and started The Bay State Weekly Courier, which ran for six months. Subsequently he taught at Richmond, Va., and for 16 months was superintendent of public schools at Vicksburg, Miss. All these varied experiences gave him the knowledge of Ameri¬ can life and appreciation of workday struggles which later made the value of his poems, essays and novels. In 1849-66 he. was assistant editor of the Springfield Republican, and from 1851 also part owner of that journal. It was largely due to his influence that the Republican be¬ came so widely known and popular a journal. In it his 'Letters to Young People Married and Single: By Timothy Titcomb) first attracted readers by their vivacious style, moral sincerity and good common sense. Later, in book form (1858) they had a great and immediate success. In 1870 Dr. Holland was one of the founders and became editor of Scribners Monthly, _ later the Century Magazine and the editorship of this periodical he retained till his death in 1881. Holland's novels 'Arthur Bonnicastle) (1873) ; 'Sevenoaks) (1876) and 'Nicholas Minturn* (1877), although showing his quick and sympathic observation and containing fine passages, have been less popular than his poems. The latter, in their constant appeal to the moral sense, and in their accurate portrayal of the homely and picturesque in New York life, found many admirers. Several of the short lyrics, with 'Bittersweet* (1858) ; 'Kathrina* (1868) and 'The Mistress of the Manse* (1871), came as messages of an American poet who understood and honored his own people. Con¬ sult the 'Life* by Plunkett (1894).*

HOLLAND, Samuel, cartographer: b. England, 1717 ; d. 1801. He entered the army at an early age, served on the Continent and at¬ tained the rank of captain in 1765. He took part in the expedition against Louisbourg in 1758, and was Wolfe's engineer-in-chief at Quebec. In 1763 he was appointed surveyor- general of Quebec and director of surveys in British North America, and carried through many important surveys.

*HOLLAND, Thomas Erskine, English jurist: b. Brighton, 17 July 1835. He studied at Oxford, was called to the bar in 1863, in 1874 became a reader in English law at Ox¬ ford, and shortly afterward professor of in¬ ternational law 1874—1910. His best-known work is his 'Elements of Jurisprudence) (1880; 11th ed., 1910), now a standard textbook in Eng¬ land and the United States. He wrote further 'An Essay on Composition Deeds) (1864); 'Essays on the Form of the Law> (1870) ; 'The European Concert in the Eastern Question * (1885) ; 'Studies in International Law) (1898), and subsequently works bearing on the laws of war and the rights and duties of neutrals.*

HOLLAND, William J(acob), American zoologist and palaeontologist : b. Jamaica, W. I.,

16 Aug. 1848. He was graduated from Am¬ herst College in 1869, from the Princeton The¬ ological Seminary in 1874, entered the ministry of the Presbyterian Church, and was a pastor at Pittsburgh, Pa., in 1874-91. In 1891-1901 he was chancellor of the Western University of Pennsylvania (Allegheny), and in 1897 was ap¬ pointed director of the Carnegie Museum at Pittsburgh. In 1887 and 1889 he was naturalist of the United States eclipse expeditions to Japan and West Africa respectively. In 1907-09 he was president of the American Associa¬ tion of Museums. A recognized authority on museum administration and zoology, he wrote numerous scientific papers in learned publica¬ tions, and (The Butterfly Book' (1898); (The Moth BoolC (1903) ; (To the River Platte and Bade (1913) ; (The Butterfly Guide' (1915) ; also papers on the Tertiary fauna and Jurassic dinosaurs. He has received numerous decora¬ tions from foreign governments and honorary degrees from several universities.

HOLLAND, a popular designation for the kingdom of the Netherlands, derived from the provinces of North and South Holland, for¬ merly constituting a feudal countship allied to the Holy Roman-German Empire, and from 1806-10 with other parts of the Netherlands, Hanover and Oldenburg, ruled by Louis Bona¬ parte as the kingdom of Holland. The region is the seat of the hardy and industrious Dutch race and of the Dutch language called by the natives N ederduitsch, a dialect of Low German phonology, with evolutionary periods of old, middle and modern, and an interesting his¬ torical and varied literature. See Nether¬ lands.

HOLLAND, Mich., city in Ottawa County, at the head of Black Lake, which is really an arm of Lake Michigan, and on the Pere Mar¬ quette Railroad, about 80 miles west of Lansing and 25 miles southwest of Grand Rapids. It has direct communication by steamers with Chicago, Milwaukee and other lake ports. Hol¬ land was settled in 1847 by a Dutch colony, and many of its inhabitants are of Dutch descent. In 1867 it was chartered as a city. It is located in an agricultural region, once a lumber section. The manufactures are largely articles made of wood, but the 'beet-sugar industry is growing in importance. The chief manufacturing estab¬ lishments are planing-mills, furniture, tub and basket factories, flour-mills, tanneries, wood¬ working machinery shops, pickling-plants, beet- sugar factory, grain elevators and creameries. The manufacture of launches is also an import¬ ant industry of Holland. The trade is chiefly in the manufactures, and in grain and vege¬ tables. The city owns and operates the electric- light plant and the waterworks. Holland is the seat of the Western Theological Seminary and of Hope College, both under the

auspices of the Reformed Church in America. . It has a number of fine public buildings and a free public library. The summer resorts on Black Lake add to the industrial wealth of the city. Pop. (1920) 12,166.

HOLLAND-LINEN, a fine and close fabric, so called from its first being manufac¬ tured in Holland ; also a coarser linen fabric, unbleached or dyed brown, used for covering furniture, carpets, etc.

HOLLANDER, Jacob Harry, American

economist: b. Baltimore, Md., 23 July 1871. He

was educated in the Baltimore schools and grad¬ uated from Johns Hopkins University in 1891, receiving his Ph.D. degree in 1894. His ability as economist and financier was soon recognized, and he became associate professor of finance at Johns Hopkins. In 1897 he was appointed sec¬ retary of the Bimetallic Commission abroad and was chosen chairman of the Baltimore munici¬ pal lighting commission in 1900. In the same year the Secretary of War appointed him special commissioner to revise the laws relating to taxation in Puerto Rico, and while engaged in this service he was made treasurer of Puerto Rico by President McKinley. He devised and put into operation the present revenue system (<(Hollander Law®) of the island. In 1904 he was special agent on taxation in the Indian Territory for the Department of the Interior. In 1905 he was sent by President Roosevelt to the Dominican Republic as special commissioner to investigate its public debt. Later, as special commissioner plenipotentiary to Santo Domingo (1905-06), and as financial adviser of the Do¬ minican Republic (1908-10), he planned and carried out the readjustment of the public debt of that country. Since 1904 he has been pro¬ fessor of political economy in the Johns Hop¬ kins University. He is the author of various books and monographs on economic and finan¬ cial subjects, including (The Cincinnati South¬ ern Railway: A Study in Municipal Activity) (1894) ; (The Financial History of Baltimore' (1899); (Studies in State Taxation' (1900);

(Report on the Debt of Santo Domingo' (1906); (David Ricardo: A Centenary Esti¬ mate' (1910). He edited the (Letters of David Ricardo to J. R. McCulloch' (1895) and to (Hutches Trower' (1899).

HOLLAR, Wenzel or Wenceslaus, vent'-

zel or wen'ses-las hol'lar, Bohemian engraver: b. Prague, 13 July 1607; d. London, 28 March 1677. He accompanied the Earl of Arundel, English Ambassador to Germany, to London, who employed him to engrave some of the pictures of his collection. Among his numerous works, which are

greatly esteemed for their delicate, firm and spirited execution, and which include some 2,740 plates, are the set of 28 plates, entitled, (Ornatus Muliebris Anglicanus,' representing the dresses of Englishwomen of all ranks and conditions in full-length figures ; Holbein's (Dance of Death,' etc.

HOLLEBEN, horia-ben, Theodore von,

German diplomat: b. Stettin, Pomerania, 16 Sept. 1838; d. 1913. He was educated at the universities of Heidelberg, Berlin and Gottin¬ gen ; became an officer in the Body-Guard Hus¬ sar Regiment; and took a distinguished part in the Franco-Prussian War. He entered the diplomatic service in 1872; was charge-d'affaires at Peking, China, 1873-74, and at Tokio, Japan, in 1875; Minister at Buenos Aires in 1876-84; at Tokio 1885—89; and at Washington, D. C., 1892-93. In 1897 he became Ambassador Extraordinary and Plenipotentiary to the United States. At the command of Emperor William he, together with Secretary Hay, of the State Department, had charge of the arrangements for the official reception of the emperor's brother, Admiral Prince Henry, in Februarv 1902. Failing health together with his inability to have President Roosevelt arbitrate the Ger¬ man-Venezuelan dispute caused his resignation,

and in 1903 he was succeeded by Baron Speck yon Sternberg. Consult Roosevelt, Theodore, (An Autobiography5 (New York 1913).

HOLLEY, Alexander Lyman, American engineer: b. Lakeville, Conn., 20 Tuly 1832; d. Brooklyn, N. Y., 29 Jan. 1882. He was grad¬ uated at Brown University in 1853, and became editor of The Railroad Advocate in 1856, chang¬ ing its name to The American Engineer. He introduced into the United States in 1865 the Bessemer steel process, erecting the first Besse¬ mer works in the country at Troy, N. Y. He was lecturer on the manufacture of iron and steel at Columbia University 1879-82. Holley secured many patents, the most important probably being that for the detached converter- shell, an improvement in the Bessemer process. He published with Z. Colburn: (Railway Economy: a Report on European Railways 5 (1858) ; (American and European Railway

Practice) (1860);

HOLLEY, Marietta, American author, known by her pseudonym, (

(Poems 5 (1887); (Samantha Among the

Brethren) (1891), considered by many her best volume; (Samantha Amongst the Colored Folks5 (1892) ; (Samantha at the World's Fair5 (1893) ; (Samantha in Europe5 (1895) ;

HOLLIDAYSBURG, hol'i-daz-berg, Pa., borough, county-seat of Blair County, on the Juniata River, and the Pennsylvania Railroad; about 82 miles east of Pittsburgh and five miles south of Altoona. Rich coal-fields, iron- ore beds, ganister and limestone quarries are in the vicinity. The chief manufactures are foundry products, agricultural and mining im¬ plements, nails, silks, cars, furniture and classi¬ fication yards. Hollidaysburg Female Seminary is a prosperous institution. The famous Ant Hill Woods are in the vicinity. The water¬ works are municipally owned. Pop. 4,071.

HOLLINS, George Nichols, American naval officer: b. Baltimore, Md., 20 Sept. 1799; d. there, 18 Jan. 1878. He entered the navy as midshipman in 1814, and while assigned to the President, Commander Decatur, was captured by the English and held prisoner at Bermuda

until the conclusion of peace. He served also in the Algerine War of 1815, later assumed com¬ mand of an East Indiaman, and in 1844 attained commander's rank. In 1855, on complaint of American residents who claimed they had been injured by the local officials, he bombarded Greytown, Nicaragua. At that time Nicaragua was under English protection, and the property and lives of English residents having been im¬ periled, international complications with Great Britain arose. Hollins was commissioned com¬ modore in the Confederate navy at the outbreak of the Civil War, attacked the Federal blockad¬ ing squadron at the passes of the Mississippi River, and was appointed flag-captain of the New Orleans station. He was superseded in

1862.

HOLLLS-MOSS BILL, better known as the Federal Farm Loan Act, and the Rural Credits Bill; a bill to provide capital for agri¬ cultural development, to create a standard form of investment in farm mortgages and other kindred purposes. It established the Federal Farm Loan Board, to be appointed by the President, and provided for the establishing of 12 Federal Land Banks by the Board in 12 equalized districts and for any needed number of National Farm Loan Associations to be made up of borrowers from the Land Banks. The bill was signed by President Wilson 17 July 1917. The full text of the bill may be found in Senate Document 444, 64th Congress, 1st Session.

HOLLISTER, Cal, town, county-seat of San Benito County, on the Southern Pacific Railroad about 80 miles southeast of San Francisco, and 35 miles

east by south of Santa Cruz. It is situated in a rich agricultural region, noted for its fruit. The chief indus¬ trial interests of the town are connected with farming, dairying, fruit-growing and the ship¬ ment of grain and live-stock. Pop. 2,781.

HOLLOWAY, hol'6-wa, Laura Carter,

American author: b. Nashville, Tenn, 22 Aug. 1848. She was at one time editor of the Home Library Magazine of Chicago, Ill, was for 12 years associate editor of the Brooklyn Daily Eagle, and collaborated with Anton §eidl in the preparation of musical terms for the (Standard Dictionary.5 She wrote (Ladies of the White House5 (1870); (The Mothers of Great Men and Women5 (1884); (The Home in Poetry5 (1884); (Chinese Gordon; (1885);

HOLLOWAY, Thomas, English patent medicine proprietor and philanthropist: b. Devonport, 22 Sept. 1800; d. Tittenhurst, 26 Dec. 1883. About 1837 he began to sell his well-known ointment, and soon afterward brought his pills to the notice of the public. He ultimately succeeded in amassing a very large fortune which he partly devoted to benevolent objects. The Royal Holloway Col¬ lege for Women, on the equipment and endow¬ ment of which he expended about $4,000,000, was opened on 30 June 1886. It contains a col¬ lection of pictures valued at $500,000. Near it is a sanatorium founded by him for the men¬ tally afflicted of' the lower middle class.

HOLLS, holz, George Frederick William,

American lawyer and statesman : b. Zelienople, Pa, 1 July 1857; d. Yonkers, N. Y, 23 July 1903. He was graduated from Columbia in

1878, and from the law school there two years later. He was admitted to the bar and estab¬ lished a large law practice in New York city, becoming senior member of the firm, of Holls, Wagner & Burghard; in his later life he visited Europe frequently and became widely known there, especially in Germany where he estab¬ lished a branch of his law firm. He was prominent in philanthropic work, being for years an officer of the Legal Aid Society and a director of the Charity Organization Society. He was also an active member of the Republi¬ can party, and much in demand as a campaign speaker, especially as he could address the Germans in their own language. In 1893 he was a delegate-at-large to the New York Constitu¬ tional Convention, where he was chairman of the committee on education,

a member of the committee on cities and author of several amendments. His frequent visits abroad gave him a wide and intelligent interest in interna¬ tional questions, and at the time of The Hague Conference he was very influential in arousing interest and obtaining a large delegation from the United States. He was secretary of the American delegation at the Conference (1899), was the American member of the committee which drafted the arbitration treaty, and author of the clause on <(Special Mediation. » He was afterward appointed a member of the permanent international court of arbitration. A few months before his death President Roosevelt asked him to umpire the adjustment of claims between Germany and England and Venezuela, but he declined. He has written (Sancta Sophia and Troitza) (1888); (Compulsory Vot¬ ing' (1891) ; and (The Peace Conference at The Hague and Its Bearings on International Law and Policy) (1900).*

HOLLWECK, Josef, German Catholic clergyman and jurist: b. Pfaffenhofen, Bavaria, 16 Jan. 1854. He received his education at the Royal Gymnasia of Amberg and Eichstatt, at the Episcopal Lyceum, Eichstatt, and at the University of Freiburg. In 1879 he was or¬ dained to the priesthood and for the following six years jvas engaged in parish work in his native diocese of Eichstatt. In 1885-90 he was assistant director of the Seminary of Eichstatt, and since 1890 he served as professor of canon law and catechetics of the Episcopal Lyceum there. In 1910 he was made a domestic prel¬ ate of His Holiness Pius X. In 1904 he as¬ sisted in the work of the new codification of the canon law and was repeatedly called to Rome to assist the Commission of Codification in its work. He has published (Das kirchliche BiücherverboU (1897) ; (Die kirchlichen Straf-gesetze) (1899) ; (Die Civilehe des bürgerlichen Gesetzbuches im Lichte des kanonischen Eherechts) (1900) ; (Das Testament des Geistlichen) (1901) ; (Lehrbuch des Kirchen- rechts) (1905) ; (t)ber das Alter der Erstkom-municanten) (1910), and contributions to (The Catholic Encyclopedia, and various periodicals.*

HOLLY. See Ilex.

HOLLY SPRINGS, Miss., a point on the Mississippi Central Railroad, about 40 miles southeast of Memphis and about 25 miles south of Grand Junction, on the Memphis and Charleston Railroad, and an important stra¬ tegical point. After the battle of Iuka, 19 Sept. 1862, and the Confederate defeat at Corinth,

3-4 Oct. 1862, the Confederates fell back to Holly Springs. Early in November General Grant had concentrated an army of 30,000 men in the vicinity of Grand Junction to make a movement along the line of the Mississippi Cen¬ tral Railroad in the direction of the rear of Vicksburg. On

*8 November General McPherson, with 10,000 infantry and 1,500 cavalry advanced from Grand Junction southward and pushed the Confederates under General Pemberton back to Holly Springs. The main body of Grant's army moved forward, and Pemberton, abandoning Holly Springs, fell back to Grenada, Grant fol¬ lowing to Oxford, 30 miles beyond Holly Springs. There he arrived 5 December, and arranged with General Sherman a combined movement on Vicksburg. Grant was to move directly south on the line of the railroad and take the place in rear ; Sherman to move a force from Memphis, accompanied by a gunboat fleet, to descend the Mississippi and attack in front. A depot of supplies was established at Holly Springs, guarded by Colonel Murphy, with two regiments of Wisconsinˆ infantry and a regiment of Illinois cavalry, and Grant was about to move forward from Oxford, when Gen. Earl Van Dorn, at the head of 3,500 cavalry, dashed into Holly Springs at daylight, 20 December, and attacked Murphy, who had been warned of the impending danger on the 19th, but neglected to take the necessary pre¬ cautions and was surprised. He made a feeble resistance and surrendered his infantry; the cavalry cut its way out and escaped with the loss of only seven men. Van Dorn took about 1 500 prisoners, destroyed stores to the value of $1,500,000, and left town in the afternoon. This disaster, in connection with Forrest's raid into West Tennessee, which destroyed Grant's communication, forced him to abandon his movement on Vicksburg and fall back to Grand Junction, leaving Pemberton at liberty to con¬ centrate his forces at Vicksburg against Sher¬ man. Sherman was informed of Grant's failure, but the information reached him after his bloody repulse at Chickasaw Bluff, 27-28 Dec 1862. Consult < Official Records > (Vol. XVII) ; Greene, (The Mississippi.**

HOLLYHOCK, a tall and rather coarse flowering plant (Althea rosea) of the mallow family, said to be a native of China, but now cultivated all over the world as an ornament of gardens. It rises in a single leafy stalk, some¬ times to the height of six or eight feet studded with large single or double flowers, in varieties from white to yellow, scarlet, and purple. Al¬ though rather difficult to start and slow of growth, it remains a hardy and easily nurtured perennial of highly effective beauty when suit¬ ably placed.

HOLM, Frits, Danish explorer, author and lecturer: b. Charlottenlund, Copenhagen, Den¬ mark, 23 June 1881. After passing a preliminary examination at the Copenhagen University, he received, 1895-1900, an officer's education in the Danish royal navy, but resigned after passing his navigator's examination before being com¬ missioned. At the age of 19 he went to the Far East and worked in journalistic and com¬ mercial positions in Shanghai and Hankow, and as executive of The Japan Daily Advertiser at Yokohama. In 1904, during the Russo-Japanese war, he left Japan and returned to Denmark via

the United States, completing, in 41 months, his first trip around the world. From 1905-07 he was engaged in special journalistic work in Lon¬ don under the Earl of Kintore, Sir William Ramsay, Sir Rider Haggard and others, fre¬ quently visiting the Continent. In July 1906 he represented the Associated Press at the Inter¬ parliamentary Conference on Peace in the House of Lords. Shortly after the outbreak of the European War, he again visited London as war correspondent for the Associated Press. At the age of 25, he commanded the Holm-Nesto- rian Expedition to Sian-Fu in the interior of China, covering by caravan and houseboat over 2,500 miles, and brought back a two-ton, 10-foot high monolithic replica of the famous Nesto- rian monument of a.d. 781, which from 1908-16 was exhibited in the Metropolitan Museum of Art, New York. In 1916 the replica was taken to Rome and in January 1917 was permanently placed in the Lateran Palace, title to it having been acquired by an American who presented it to Pope Benedict XV. Reproductions of the monument have been presented to six govern¬ ments by Doctor Holm, who allowed Yale Uni¬ versity a seventh at cost. Consult (The Nes- torian Monument > (Chicago 1909).

Dr. Holm has lectured in many universities and institutions in the United States, Denmark, Canada, Italy and Mexico on his explorations, and has been a frequent contributor to various periodicals. He holds doctorates in civil law, philosophy jurisprudence and laws. He has written many papers on the Far East and other subjects and is an expert on Chinese archseology and art and on certain heraldico-numismatic matters. He is a member of 22 scientific and humane societies and academies, and has had 30 decorations conferred upon him. During the European War he served for some time as an American war correspondent in Europe and also as delegate-general and commissioner abroad of the Cuban Red Cross.

HOLM, Saxe, a pseudonym affixed to a collection of <;Stories) (1st series 1874; 2d 1878), originally published in Scribner's Monthly and generally believed to be by Helen Hunt Jackson (q.v.).

HOLMAN, Frederick Van Voorhies,

American lawyer: b. Baker’s Bay, Pacific County, Wash, (then in Oregon), 29 Aug. 1852. He was educated in public and private schools, at the Portland Academy and the Uni¬ versity of California. In 1879 he was admitted to the Oregon bar and has since practised at Portland, specializing in corporation, real prop¬ erty, and probate law. He was general counsel and director of the Portland Railway, Light and Power

Company, counsel for and director of the Oregon Power Company and other cor¬ porations. Since 1903 he has been a regent of the University of Oregon. He has done much for the growth and development of Portland, Ore., and originated and caused to be adopted the name of ((The Rose Citv® for Portland. In 1904-08 he was Democratic National Committee¬ man for Oregon, and served as delegate to the Democratic National Conventions of 1892, 1904 and 1912. He is a member of the bars of the United States and the Washington State Su¬ preme Courts and in 1909-10 was president of the Oregon Pioneer Association. He published

Oregon) (1907). also historical articles, pam¬ phlets, contributions to various magazines.

HOLMAN, hol'nian, William Steele,

American politician : b. Veraestau, Dearborn County, Ind., 6 Sept. 1822 ; d. Washington, D. C., 22 April 1897. He studied at Franklin College (Ind.), was admitted to the bar. and began practice at Aurora, Ind. In 1847ˆ49 he was prosecuting attorney, in 1850 a member of the State Constitutional Convention, in 1851-52. of the State legislature. He was a judge of the Court of Common Pleas in 1852-56, in 1856 was elected as a Democratic representative to Congress, where with the exception of eight years he served until his death. His vigilance in opposing unnecessary appropriations and doubtful measures obtained for him the so¬ briquets of ((The Watchdog of the Treasury,® and ((The Great Objector.®

HOLMAN-HUNT, William. See Hunt,

William Holman.

HOLMES, homz, Abiel, American Uni¬ tarian clergyman and annalist: b. Woodstock, Conn., 24 Dec. 1763; d. Cambridge, Mass., 4 June 1837. He was graduated at Yale College in 1783, and became subsequently a tutor in the college, pursuing at the same time his theo¬ logical studies. In 1785 he was settled over a parish at Midway, Ga., where he remained till 1791. Returning north he became pastor of the first parish in Cambridge, and continued to fill the office till 26 Sept. 1832. Besides publishing a (Life of President Stiles) in 1798, he was the author also of (Annals of America) (1805), which gave him a high reputation for care and accuracy. It was republished in England in 1813. He contributed frequently to the collec¬ tions of the Massachusetts Historical Society, in Vol. XXVII of which will be found a com¬ plete list of his publications.

HOLMES, o-mes', Augusta Mary Anne,

French composer: b. Paris, 1847; d. there, January 1903. She studied composition with Lambert, Klose and Cesar Franck, and began her career as a pianist. Her first work of magnitude was a setting of the psalm (In ExituC sung for the first time in 1873. She later wrote considerable music, including 100 songs, characterized by much grace of expres¬ sion. In the larger forms her compositions in¬ clude the well-known symphony (Hero et Leandre) ; three other symphonies,) which in 1879 won third prize in an open com¬ petition directed by the Paris municipality, and (Irlande) ; the symphonic poems, (Les Sept Ivresses, Co¬ logne, }*

HOLMES, E(lias) Burton, American traveler and lecturer: b. Chicago, 8 Jan. 1870. After a secondary education at Chicago he traveled in all the countries of continental Eu¬ rope, as well as in Japan, Algeria, Tunis, Mo¬ rocco, Corsica, Greece and Thessaly. Hawaiian Islands, the Yellowstone Park, the Grand Canon of the Colorado, the Philippines and China. About 1890 he became known as a plat¬ form lecturer, giving in popular form the results of his observations. He has traveled and lectured in all countries except Australia, New

Zealand and South Africa. He has published 'The Burton Holmes Travelogues5 (12 vols.).

HOLMES, Charles John, English land¬ scape painter: b. Stratton, Cornwall, 11 Nov. 1868. He was educated at Saint Edmund's Canterbury, at Eton and at Oxford, where he was classical scholar in 1887. In 1896-1903 he was publisher and manager of the Vale Press; in 1903-09 was editor of the Burlington Maga¬ zine, and from 1904 to 1910 was Slade professor of fine art at Oxford. His works are in the Art Galleries of Manchester and Johannesburg; in the Ashmolean Museum, Oxford, and the British Museum. In 1909 Mr. Holmes was made keeper and secretary of the National Por¬ trait Gallery and in 1916 was appointed director of the National Gallery, to succeed Sir Charles Holroyd. He has published 'Hokusai5 (1898) ; 'Constable5 (1901) ; (Pictures and Picture Col-lecting) (1902) ; 'Constable and his Influence on Landscape Painting) (1902); (Notes on the Science of Picture-Making) (1909); 'Notes on the Art of Rembrandt5 (1911) ; (The Tarn and the Lake} (1913).

HOLMES, George, Canadian bishop: b. Westmoreland, England, 1860. He was educated at the Church (Anglican) Missionary College, Islington, and was ordained to the priesthood in 1888. He was consecrated bishop of Moosonee 25 Jan. 1905, and translated to the diocese of Saskatchewan

1909.

HOLMES, Mary Jane Hawes, American novelist: b. Brookfield, Mass.; d. Brockport, N. Y., 7 Oct. 1907. She was married to Daniel Holmes, a lawyer of Brockport, N. Y. She published many volumes of domestic fiction which have had an extraordinarily wide circu¬ lation but in which the literary element is slight. Among her novels are (Tempest and Sunshine) (1854) (perhaps the best known of them all) ; 'Lena Rivers) (1856); (Marian Gray5 (1863); (Milbank) (1871); 'Queenie Hetherton5 (1883).

HOLMES, Nathaniel, American jurist and Shakespearean scholar: b. Peterboro. N. H., 2 Jan. 1815; d. Cambridge Mass., 26 Feb. 1901. He was graduated from Harvard in 1837 and after admission to the bar in 1839 began to practise in Saint Louis. He was judge of the Supreme Court of Missouri 1865—69, and Royall professor of law at Harvard 1868-72. He re¬ tired from his profession in 1883 and henceforth devoted himself to study and authorship. He was a strong believer in the Baconian theory of the origin of Shakespeare's plays, which he defends in his work, 'The Authorship of Shakespeare 5 (1866). In 1888 he published 'Realistic Idealism in Philosophy Itself. J

HOLMES, Oliver Wendell, American poet, essayist and physician : b. Cambridge, Mass., 29 Aug. 1809; d. Boston, Mass.. 8 Oct. 1894. He was the son of Rev. Abiel Holmes (q.v.), minister of the first parish in Cambridge, and on the maternal side was a descendant of Anne Bradstreet (q.v.) and related to the orator, Wendell Phillips, the poet, Richard Henry Dana, and the theologian, Dr. Channing. He was educated at Phillips Academy, Andover, and at Harvard, and was graduated from the latter in 1829 in a class which contained several who afterward became famous. In the next year he became well known through his poem 'Old Ironsides. 5 first published in the Boston Adver¬

tiser, and which prevented the breaking up of the famous frigate Constitution. He spent a year in the Harvard Law School but soon turned his attention to medicine and after studying in Paris three years returned to Amer¬ ica where he received his degree of M.D. in 1836, the same year in which his first volume of poems appeared. He was professor of anatomy and physiology at Dartmouth College 1839ˆ-0. He married in the last-named year, and estab¬ lished a practice in Boston, becoming in 1847 professor of anatomy and physiology in the Harvard Medical School, a post which he re¬ signed in 1S82, when he was at once made pro¬ fessor emeritus. In 1849, and for several suc¬ ceeding years, he made his summer home at Pittsfield, Mass., the scene of his novel 'Elsie Venner.5 He was one of the first contributors to the Atlantic Monthly when it was established in 1857, the opening chapter of his 'Autocrat of the Breakfast Table)

appearing in the first issue. It is this work, which has found in¬ numerable readers both at home and abroad, by which he will be longest remembered. These brilliant conversational papers were followed in 1859 by a similar series, 'The Professor at the Breakfast Table, 5 and these in 1872, by 'The Poet at the Breakfast Table.5 Many of his best poems were scattered through these volumes. In 1861 appeared his novel 'Elsie Venner: a Romance of Destiny,5 and in 1868 'The Guard¬ ian Angel,5 a less striking fiction than its prede¬ cessor, but like that exhibiting a remarkable series of studies of character. 'A Mortal An¬ tipathy 5 (1885) was his only other essay in fiction. His volumes of verse, 'Urania) (1846) and 'Astrea) (1850), had made him well known as a poet ere he appeared before the public as the kindly breakfast table autocrat, and he con¬ tinued to write poetry at frequent intervals for the rest of his life. He was especially happy as the poet of occasions, but much of his verse, witty and sparkling as it is, is ephemeral from its very nature and not destined to endure. In such serious poems, however, as 'The Cham¬ bered Nautilus) ; 'The Voiceless> ; 'The Last Leaf5 ; 'The Iron Gate> ; and one or two hymns, he takes high rank among the poets of his time, while such poems as 'The One Hoss Shay5 ; 'Evening, By a Tailor, > and 'Parson Turrell's Legacy,5 to name no others, are inimitable ex¬ amples of humorous verse. His later collections of poems comprise 'Songs in Many Kevs5 (1861) ; 'Songs of Many Seasons5 (1875) ; 'The Iron^Gate5 (1880) ; and 'Before the Curfew5 (1887). As a physician and medical lecturer he was. very successful, and among his purely professional works may be named 'Lectures on Homeopathy and Its Kindred Delusions5 (1842); 'Currents and Counter Currents in Medical Science5 (1861); 'Border Lines in some Provinces of Medical Science5 (1862); 'Medical Essays,5 a reissue of some of his earlier work (1883). Still other volumes by Dr. Holmes are 'Soundings from the Atlantic5 (1864), a series of essays originally contributed to the Atlantic Monthly, where the bulk of his writing first appeared; 'Mechanism in Thought and Morals5 (1871); lives of 'John Lothrop Motley5 (1879) ; and 'Ralph Waldo Emerson5 (1884) ; 'Our Hundred Days in Europe5 (1888), a sprightly record of a short visit to England in 1886, on which occasion honorary degrees were conferred upon him by the uni-

'

. ■* ' i

•

.

versities of Cambridge, Oxford and Edinburgh ; and (Over the Teacups* (1891). His 70th birthday was celebrated by a breakfast given in his honor by the publishers of the Atlantic Monthly, and on this occasion the poet read his poem (The Iron Gate,* which many persons have considered even finer than (The Chambered Nautilus) which Holmes himself preferred to any other verses of his. At its best Holmes's prose style is thoroughly admirable, character¬ ized as it is by an unerring sense of the value of words and their fitness for conveying a de¬ sired impression, and illumined by the interfused play of a delicate fancy and the most sparkling humor. Next to (The Autocrat* must be ranked (The Guardian Angel* among his prose works, the same kindly tolerant spirit being dominant in both, and the same shrewd, wholesome per¬ ception of character. In much of his earlier poetry, excepting in his lyrics, Holmes uses the formal 10-syllabled iambic pentameter of the 18th century, but in his hands the measure seems at times more flexible than when used by Pope and his school, and it is at all events relieved from solemnity by his ever-present humor.

(Literary Friends and Acquaintances* (1899). See Elsie Venner.

HOLMES, Oliver Wendell, Jr., American jurist: b. Boston, 8 March 1841. He was grad¬ uated from Harvard in 1861, and in the same year entered the army as lieutenant of the 20th Massachusetts regiment. He was wounded at the battles of Ball's Bluff, Antietam and the second battle of Fredericksburg and was mus¬ tered out of the army in 1864 with the rank of brevet lieutenant-colonel. He then studied at the Harvard Law School and was admitted to the bar in 1866 beginning his practice in Boston. He was editor of the American Law Review (1870-73); became professor at the Harvard Law School in 1882 and in the same year justice in the Massachusetts Supreme Court ; in 1899 he was appointed chief justice of the same court. His decisions in this position gave him wide fame among lawyers and were characterized by originality and literary finish. In several cases his decisions were in favor of organized labor; his position being that workingmen had a right to combine and to "support their interests by arguments, persuasion, and the bestowal or refusal of those advantages which they other¬ wise lawfully control, so long as they do no violence or threaten no violence.® In August 1902, he was appointed a member of the United

States Supreme Court. He has published (The Common Law* (1881), lectures delivered before the Lowell Institute, and an important contribu¬ tion to legal history ; and a collection of speeches (1900); a second

collection (1913); he also edited the 12th edition of Kent's (Commentaries) (1873).

HOLMES, Theophilus Hunter, American soldier: b. Sampson County, N. C., 1804; d. near Fayetteville, N. C., 21 Tune 1880. He was graduated from the United States Military Academy in 1829, served in the Florida war, the occupation of Texas and the Mexican War, and at the beginning of the Civil War was major and superintendent of the general re¬ cruiting service. On 22 April 1861, he resigned his commission in the United States army, forthwith was appointed brigadier-general in the Confederate forces and organized several North Carolina regiments. He was in command at Aquia Creek, and, promoted major-general, was in command of the trans-Mississippi de¬ partment from September 1862 to March 1863, was commissioned lieutenant-general, and 3 July 1863 lost heavily in an unsuccessful attack on Helena, Ark.

*HOLMES, William Henry, American anthropologist and archaeologist : b. near Cadiz Ohio, 1 Dec. 1846. He was graduated at Mc- Neely Normal College in 1870, and was assist¬ ant on the United States Geological Survey 1872-80. During that period he accompanied Dr. F. V. Hayden's explorations in the Rocky Mountain region and superintended the survey of the San Juan territory until the reorganiza¬ tion of the survey in 1880, when he was ap¬ pointed geologist in charge of the department of illustrations. He had charge of the archae¬ ological explorations of the Bureau of Ethnol¬ ogy in 1889-93, in 1894-98 was professor of archaeologic geology at the University of Chi¬ cago, from 1898 to 1902 and again after 1910 was curator of the United States National Mu¬ seum, and was chief of the Bureau of Amer¬ ican Ethnology from 1902 to 1909. He was president of the American Anthropological Association, and of the National Society of Fine Arts in 1909. In 1905 he became a mem¬ ber of the National Academy of Sciences. He edited geological publications, including Hay¬ den's (Atlas of Colorado, * and the 11th and 12th (Reports of the Geological Survey,* and has published (Archaeological Studies among the Ancient Cities of Mexico> (1895) ; (Stone Im¬ plements of the Potomac-Chesapeake Tidewater Province* (1897) ; and papers on aboriginal American art.*

HOLOCAINE. See Cocaine.

HOLOCEPHALI, hol-o-sef'a-ll, or CHI- M.7EROIDEA, a group of small shark-like fishes of bizarre appearance occurring in the deeper portions of all colder seas, including in all about seven species, five in American waters. They have a cartilaginous skeleton, are of no value as food and are known to fishermen as rat-fish and elephant-fish (q.v.). The name Chimaera, given to one genus, emphasizes the strange appearance of these

fishes. See Ich¬ thyology.

HOLOPHYTES, ho'lo-fits. See Fungi.

HOLOSTEI, ho-los'te-i a group of fishes, the bony ganoids, largely fossil, represented by the garpikes. See Ichthyology.

HOLOTHURIA, hol-d-thii'ri-a, echino- derms (q.v.) of the class Holothuroidea, popu¬ larly called (

The holothurians undergo a metamorphosis, somewhat like that of the starfish; but the transparent larva called ((auricularia" is barrel¬ shaped; what corresponds to the hoops of the barrel being bands of cilia, while the ear-like projections in certain forms give it the name auricularia. Before the larva is fully grown, the body of the young holothurian begins to bud out from near the side of the larval stom¬ ach, the calcareous cross-like plates are depos¬ ited, and the tentacles begin to grow out. Fi¬ nally after the larval body is absorbed the young holothurian sinks to the bottom. The degree of metamorphosis is less marked than in other echinoderms, while in two forms development is direct, the young growing in a marsupium or broodpouch. A form (Clado – dactyla crocea) living in the south seas at the

Falkland Islands, carries its young in a sort of nursery where they are densely packed in two continuous fringes adhering to the dorsal tubes. Holothurians are remarkable from the fact that when captured they eject their intestine, a new one in time being regenerated. The large forms lying about on the coral reefs are known to harbor a small slender fish (Fierasifer) which lodges in their cloaca or in the branchial tree. Many of the species are very large, being nearly two feet in length. A common species on the Florida keys and reefs is Holothuria doridana; it lives in water only a few inches deep and can be picked up in large numbers ; it is fully 15 inches in length and lives on foram¬ inifera. It has been collected, dried and a ship¬ load exported to China, but the trepang or beche-de-mer of commerce is either of two species (H. ednlis, and H. tremnla) inhabiting the Pacific Ocean. (See Trepang). A Cali¬ fornia species is also dried and exported by the local Chinese.

The class of Holothuroidea is divided by Ludwig into two orders: (1) Actinopoda. with radial canals, represented by Holothuria, Cucu- maria, Thyone, Psolus, etc.; and (2) Paractin- opoda, without radial canals, of which Synapta is an example, the common form living in sand at low water

on the New England coast being Leptosynapta girardii. MacBride, on the other hand, divides the holothurians into six orders. A few forms inhabit great depths. Remains of holothurians have been found fossil; certain calcareous plates attributed to them occurring in the Carboniferous, Lias, Jura and Cretaceous strata. Minute calcareous bodies referable to Synapta, etc., have been detected in the Paris Eocene limestones. Consult Cambridge Natu¬ ral History > (Vol. I, London 1909).

HOLST, hoist, Hermann Eduard von, Ger-

man-American historian : b. Fellin, Livonia, Russia, 19 June 1841 ; d. Freiburg, Germany, 20 Jan. 1904. He studied history in Dorpat and Heidelberg and in 1865 traveled through France, Italy, etc. His writings were looked upon with suspicion by the Russian authorities and his further stay in that country becoming unsafe, he removed to the United States in 1866. Here he became American correspondent of the Kolnische Zeitung. and sub-editor of the (Deutsch-amerikanischer Conversations-Lexi- conP In 1872 he was appointed extraordinary professor of history in the University of Strassburg and in 1874 ordinary professor at Freiburg-im-Breisgau. In 1876 he undertook, with means furnished by the Baden government, a journey to London for the purpose of study and in 1878-79 a similar j ourney to North Amer¬ ica at the expense of the Prussian Academy of Science. In 1892 he accepted an appointment m the University of Chicago. He has pub¬ lished Constitutional and Political History of the United States' (1873);

HOLSTEIN, hol'stin, Germany, a former duchy of Denmark, and member of the Ger¬ manic Confederation, since 1866 united to Schleswig-Holstein (q.v.), Prussia.

HOLSTEIN CATTLE. See Cattle.

HOLSTON, hol'ston, a river which rises in the ' southwestern part of Virginia, flows

south and southwest into Tennessee and unites with the French Broad River about five miles east of Knoxville. The Holston and the French Broad are the head-streams of the Ten¬ nessee River. The course of the Holston is through a mountainous country, noted for its beautiful scenery. It has as tributaries many small mountain streams. It is navigable for about 50 miles for vessels of fight draught. Its length is about 200 miles.

HOLT, Joseph, American jurist: b. Breck¬ inridge County, Ky., 6 Jan. 1807 ; d. Washing- ton' C., 1 Aug. 1894. He began legal practice at Elizabethtown in 1828, and in 1857 was ap¬ pointed commissioner of patents. In 1859 he became Postmaster-General and in 1860 Secre¬ tary of War. He was made by Lincoln a judge- a'dvocate-general of the army, with colonel's rank, was promoted brigadier, brevetted major- general for distinguished service in the Bureau of Military Justice and was retired in 1875. With the exception of Cass, he was the only member of Buchanan's Cabinet that was not a Confederate sympathizer. Among the courts oyer which he presided were those before which Fitz-John Porter and Lincoln's assassins were tried.

HOLTON, Kan., city, county-seat of Jack- son County, on the Missouri Pacific, the Chi¬ cago, Rock Island and Pacific and the Union Pacific railroads, about 28 miles north of To¬ peka and '30 miles west of Atchison. It was settled in 1859 and received its charter in 1870, and adopted the commission form of govern¬ ment in 1912. It is situated in a section noted for good farms. The chief manufactures are flour, wagons, cigars, bottles, creamery products and planed lumber. There are also a quilting factory, a fruit nursery and a rat-trap fac¬ tory. Its trade is chiefly in wheat, corn, hay, live-stock and local manufactured products. It is the seat of Campbell College. The waterworks and electric-light plant are the property of the city. Pop. 2,842.

HOLTY, Ludwig Heinrich Christoph,

lood'vig hln'riH kres'tof hel'ti, German lyric poet: b. Mariensee, near Hanover, 21 Dec. 1748; d. Hanover, 1 Sept. 1776. In 1769 he went to Gottingen to study theology. Here, falling in with Burger, Voss, the Stolbergs and other poets of kindred tastes, he became one of the founders of the Gottingen ˆHainbund.®. This league of young enthusiasts was aflame for Klopstock, then considered the greatest German poet for patriotism and for friendship, detested Wieland's sensual poems and his Frenchified manner, read the classics together and wrote poetry in friendly emulation. Holty's poems re¬ veal a lovable personality. The strain of senti¬ mentality that runs through all his work is not affectation, as it was with so many of the younger poets of that age in which Rousseau /lad made sentimentality fashionable, but the true expression of his nature. His range was small; but within his limits his work was ex¬ cellent, and many of his songs have become the common property of the people. Consult Voigts, (Holty, ein Roman > (1844); Reute,

(H61ty, Sein Leben und DichterP (1883).

HOLUB, ho'loob Emil, Austrian explorer: b. Holies, Bohemia, 7 Oct. 1847 ; d. Vienna, 21 Feb. 1902. At 25 he went to South Africa,

where he practised in Kimberley and elsewhere as a physician. Later he became engaged in African exploration and in recognition of his services as an explorer received from the Aus¬ trian emperor the Order of the Iron Crown. He published (Beitrage zur Ornithologie Siid- afrikas>; (Sieben Jahre in Siidafrika5 (1881); (The Colonization of Africa) ; and (From Cape Town to the MaskukulumbeP

HOLY ALLIANCE, an international league proposed by Alexander I, emperor of Russia, 26 Sept. 1815, after the defeat of Na¬ poleon at Waterloo had cleared the way for the execution of his desire of establishing a settled peace in Europe. Alexander, Francis of Aus¬ tria and Frederick William III of Prussia, signed with their own hands, and without the countersign of a minister, the act establishing this alliance, which is said to have been sent to the two latter in the handwriting of the first. It was not wholly published till 2 Feb. 1816, when the text was given in full in the Frank¬ fort Journal. It consisted of a declaration, that, in accordance with the precepts of the gospel of Jesus Christ, the principles of jus¬ tice, charity and peace should be the basis of their internal administration, and of their in¬ ternational relations, and that the happiness and religious welfare of their subjects should be their great object. Their majesties considering themselves as delegated by Providence to gov¬ ern three branches of the

same family, namely, Austria, Russia and Prussia, and regarding their peoples as having no other sovereign than- Him to whom alone all power belongs of right, de¬ clared that _ they would lend one another on every occasion and in every place assistance, aid and support. Its real aim was to maintain the power and influence of the existing dynas¬ ties. It was also stipulated that the three sov¬ ereigns should invite others to become members of the Holy Alliance. In Russia and Germany its principles were not discussed except in a spirit of eulogy, but they were uncompromis¬ ingly condemned in Britain by many of her foremost statesmen. On 4 Feb. 1823 both Lans- downe and Brougham openly condemned its doctrines in their places in Parliament. Sir James Mackintosh said of the doctrine of legit¬ imacy, in the sense in which it was used by the Holy Alliance, ((Sophistry lent her colors to the most extravagant pretensions of tyranny.® The events of 1848 broke up the' Holy Alliance. It had previously lost much of its authority from the death of Alexander, and the French Revolution of 1830. By a special article of the treaty the members of the – Bonaparte family were declared incapable of occupying any European throne. It was in pursuance of the terms of the Alliance that revolutionary uprisings in Naples, Piedmont and Spain were suppressed by the armed forces of its members in the early part of the 19th century. The threat of the Allies to intervene in the war be¬ tween Spain and her South American colonies with a view to restoring those colonies to Spain from whom they had separated and declared their independence was the chief cause which led President Monroe in 1823 to send his fa¬ mous message to Congress proclaiming what later came to be known as the Monroe Doc¬ trine (q.v.).*

For the text of the Treaty of the Holy Alii-

ance with a full discussion of its nature and purpose and the historical events which pro¬ duced it and to which it led, Consult Snow, (Topics in American Diplomacy5 (pp. 237ff. Boston 1894).

HOLY CROSS, College of the, an insti¬ tution in charge of the Fathers of the Society of Jesus, situate'd at Worcester, Mass. The school was founded in 1843. The college grants the usual degrees given by classical and scientific institutions. It is self-supporting; up to 1916 it had received no State aid nor any endowments. It has established six fellow¬ ships. In 1916 there were connected with the school 30 professors and instructors and nearly 600 students. The library contained about 40,000 volumes.*

HOLY CROSS, Mount of the, a peak of the Rocky Mountains, in Eagle County, in the State of Colorado. The peak is about 75 miles southwest of Denver, and 20 miles north by west of Leadville. It is 14,170 feet high.

HOLY DAY, a day set apart in the Cath¬ olic Church for the commemoration of some saint or mystery. It is called ((of obligation® when attendance at Mass and abstention from servile works are prescribed.

HOLY GHOST, in Christian theology, the third person of the Trinity. The doctrine of the Holy Spirit is a distinctively Christian one, but foreshadowings of it are believed by some to be found in the Old Testament. Thus the Spirit of Jehovah is the active divine' principle in nature (Gen. i, 2; Ps. civ) and the gener¬ ator of the higher energies of the human soul (1 Samuel xvi, 13) especially of the prophetic faculty, while the prophets look forward to the Messianic age as the special time for the full manifestation of the Spirit. But it is in the New Testament that we find the bases of the doctrine of the Spirit's personality. The early Christians saw its work in the form of ex¬ traordinary gifts, as at (the day of Pentecost (Acts ii, 4; x, 44) whch inaugurated the new dispensation ; for Saint Paul it is the principle of the divine life in the community (Rom. viii, 10), the begetter of all the spiritual graces (Gal. v, 22). But the Spirit's proper personal¬ ity is most clearly found in the Gospel of John (xiv, 16—26) , though it seems to be already im¬ plied in Matthew (xxviii, 19). Yet the early Church did not forthwith attain to a complete doctrine; nor was it, in fact, until after the essential divinity of Jesus had received full ecclesiastical sanction that the personality of the Spirit was explicitly recognized, and the doctrine of the Trinity formulated. Rational¬ istic writers have usually' endeavored to reduce the being of the Spirit to the presence of the moral faculty in man, but this is to put the matter lower than the _ facts warrant. It is better to regard the Spirit as the agency which, proceeding from the Father and the Son, dwells in the church- as the witness and power of the life therein. If we realize this energy as im¬ plying the presence of God Himself, the divin¬ ity and personality would seem to become intel¬ ligible and credible. (For the question as to whether the Spirit proceeds from the Father alone, or from the Father and the Son, which ultimately brought about the separation of the Greek and' Roman churches, see Greek

Church; Trinity). Consult Arnal, J.,

HOLY GHOST, Order of, a former order of Hospitalers, founded by Guy, son of Wil¬ liam, Count of Montpellier, in the 12th century for the relief of the poor, the infirm and foundlings. In the 18th century it was united with the order of Saint Lazarus by Clement XIII. Also the name of the principal military order in France instituted in 1578, abolished in 1789, revived at

the Restoration and finally abolished in 1830.

HOLY GHOST FLOWER, or HOLY SPIRIT PLANT. See Dove Plant.

HOLY LAND, a name given by Moham¬ medans to Arabia because it was the birthplace of Mohammed ; also by Buddhists to India be¬ cause it was the country of Sakya Muni. It is a common name of Palestine, because the place where Christ lived when upon earth. See Pal¬ estine.

HOLY LIVING AND HOLY DYING.

*(The Rule and Exercises of Holy Living5 and 'The Rule and Exercises of Holy Dying,5 com¬ panion works by the celebrated Anglican divine, Jeremy Taylor, were published in 1650 and 1651 respectively. They are religious treatises de¬ signed to give, in the one case, a rule for virtuous conduct in all the circumstances of life, and, in the other, ((the means and instru¬ ments55 of preparing for a blessed death. Be¬ sides counsels, meditations and minute instruc¬ tions, the author gives numerous prayers and devotions, some of them among the most beautiful in English. The practical character of these works, the wisdom, piety and spiritual beauty which inform them, and the universality of their appeal to those who are striving after the Christian life, have given them a wide and permanent popularity. They have won, also, what*is denied to most purely devotional works, an assured place in English literature. For their beauty is not of content alone. In style Taylor is perhaps the noblest representative of the wonderful prose writing of the 17th cen¬ tury and particularly of the great tradition of religious and ecclesiastical eloquence which coincided with the reign of Charles I. He em¬ ploys the magnificent rhetoric of his age with¬ out the obscurity and affectation of many of its writers. The sentences are very long, but they are less involved than those of Milton and Sir Thomas Browne, and their complexities are, as critics have pointed out, often a mere matter of punctuation. The vocabulary, too, is comparatively modern, though Taylor is not wholly without the fondness for strange phraseology which was the inheritance of 17th century stylists from the Renaissance. Mason called* Taylor ((the > Shakespeare of English prose,55 and the term is appropriate to his catho¬ licity of taste, to his subtlety and variety, and above all to the imaginative qualities which make his prose pages glow with poetic beauty. His is a style full of sensuous imagery, brilliant in metaphor, abounding in sonorous cadences. Like the Elizabethans he is delicately sensitive*

to the phenomena of nature and makes frequent use of similes and illustrations drawn from the world of eye and ear. t(But so have I seen a

rose newly springing from the clefts of its hood, and at first it was fair as the morning and full with the dew of heaven as a lamb's fleece ; but when a ruder breath had forced open its virgin modesty and dismantled its too youthful and unripe retirements, it began to put on darkness and to decline to softness and the symptoms of a sickly age : it bowed the head and broke its stalk, and at night, having lost some of its leaves and all its beauty, it fell into the portion of weed and outworn faces.® Of the two works (Holy Living) is on the whole less interesting from the literary point of view. Practical considerations were upper¬ most in the author's mind. In (Holy Dying Taylor, stirred by the memory of a recent sorrow, throws all his powers into the theme and produces a work in which the eternal truisms about death are dignified and ennobled, and made to throb with personal emotion. His view of death is sane and temperate. Avoiding the tendency to dwell morbidly on the hideous images of the sepulchre, he comforts and forti¬ fies the soul until sickness and misfortune and the inevitable end itself come to appear a blessing. The best complete edition of Tay¬ lor's writings is that of Reginald Heber, re¬ vised by C. P. Eden (1845-52). Reprints of (Holy Living> and (Holy Dying* are very common. Consult Edmund Gosse's (Jeremy Taylor* (in the ˆEnglish Men of Letters Series,* 1904), and especially the remarks of Coleridge,*

(Literary Remains) (Vol. Ill, 1836).

J. H. Hanford.

HOLY ORDERS, the several ranks of the ministry of a church ; also the power or author¬ ity to exercise that ministry.

In the Roman Catholic Church, Holy Orders is one of the sacraments and there are seven orders of the ministry, viz. : priesthood, deacon- ate, and sub-deaconate : these are the greater or sacred orders ; and the four minor orders of lector, acolyte, exorcist, and doorkeeper. Usually the episcopate is classed, not as a separate order, but as the completion and extension of the priesthood. Though every candidate for the priesthood is inducted into the four minor orders and the sub-deaconate and deaconate before he receives priestly ordination, it hap¬ pens yery _ seldom that a man enters any of those inferior orders intending to remain there¬ in : they are simply steps to the priesthood.

In the Oriental churches, both those in com¬ munion with the Roman See — as the Greek Uniate, the Maronite, the United Armenian, etc., and those which are separated from Rome by schism or by heresy, the number of orders is less than in the Latin Church ; in all the fore¬ going churches only four orders or, counting the episcopate as a distinct order, five orders are recognized; those of bishop, priest, deacon and lector: and of these the first

three, at least, are held to be of divine institution and sacra¬ mental.

By the Anglican Church and the Protestant Episcopal Church of the United States three orders are recognized: those of bishops, priests and deacons but in the 25th of the Articles of Religion those orders are expressly declared to be no sacrament.

The orders of the Oriental churches are generally recognized as valid by the Church of Rome; and when a priest of any of those churches is received into the Roman Catholic Church he is still regarded as a priest: but an Anglican or a Protestant Episcopal Minister enters the Latin Church as a simple layman even though he were in Anglicanism a bishop; for Anglican orders have ever been held by Rome to be invalid.

Generally, the non-episcopal churches, such as the Presbyterian and Lutheran, recognize but one order as having valid scriptural au¬ thority, that of the teaching presbyter. Congre- gationalists and Baptists recognize their pastors as members set apart for the functions of ministry, but not as setting up any essential dif¬ ference between them and laymen.

HOLY ROMAN EMPIRE. The Roman Empire, which Julius Caesar's nephew Octavia- nus won for himself at the battle of Actium, b.c. 31, remained for centuries undivided. Even when Constantine the Great transferred the seat of government from Rome to Constantinope, a.d. 326-28, the Roman Empire still continued in¬ tact. Not until 364 was it partitioned into an Eastern and a Western realm by Valentinian I. The empire was finally divided in 395 between Arcadius, who took the Eastern, and Honorius, who took the Western provinces. This separa¬ tion, however, was made for administrative pur¬ poses only, and the two realms were still re¬ garded as forming a single empire. In 476 Odoacer brought the Western line to an end by forcing the abdication of Romulus Augustulus. Thenceforward until 800, the emperor reigning at Constantinople was, in theory at least, ruler of the whole Roman Empire.

In 751, with the authorization of Pope Zacharias, Pepin the Short, Mayor of the Palace in Gaul, became king of the Franks in place of the deposed Childeric III, last of the Merovin¬ gians, and in 754 the new monarch was anointed and crowned by Pope Stephen II. Pepin's son and successor Charles, known as the Great or Charlemagne, became successively king of the Franks of Neustria (758) and of the Franks of Austrasia (771). He conquered the Saxons (772-803), and, having attacked the Lombards (773-74), he added North Italy to his territories and was recognized as suzerain of Rome. In 797, the Empress Irene having deposed and blinded

her son, the Eastern Emperor Con¬ stantine VI, the time seemed ripe for the re¬ establishment of the Western branch of the em¬ pire, and the man for the imperial office was at hand. Charlemagne was now unquestioned master of western Europe, and was recognized as Champion of the Faith and Defender of the Holy See. In 800 he entered Rome with his Frankish host, and on Christmas Day of that year he was crowned emperor by Pope Leo III. From that event dates the establishment of the Holy Roman Empire, which, through all the shocks and changes of time, survived until the year 1806. After some negotiations, Charle¬ magne was in time recognized by the Eastern monarchs as emperor and as ruler of northern Italy except Venice, southern Italy and Sicily remaining subject to Constantinople. Charle¬ magne was succeeded in 814 by his son Lewis I, the Pious, whom he had crowned as coemperor in the previous year. His line continued to hold

sway until the death of Charles III, the Fat, in 888. After that event, the dominions of Charlemagne fell asunder and the Carolingian empire disappeared. There then succeeded a period of turbulence, during which the empire subsisted but little more than in name. Phan¬ tom emperors, like Guido of Spoleto, his son Lambert, Arnulf, Duke of Carinthia, Lewis III, and Berengar, appeared, but, if they reigned, they certainly did not rule.

A great change was effected on the accession of Otto I, the Great, founder of the Saxon line. Crowned king of the East Franks at Aachen in 936, he continued the work of his father, Henry I, the Fowler, and consolidated his kingdom by a series of conquests. On the invitation of the Pope, he descended from the Alps with a powerful army, was acknowledged king of Italy at Pavia, and was crowned em¬ peror at Rome in 962. One of his first acts was to convoke a synod in Saint Peter's, at which Pope John XII was deposed and Leo VIII was elected in his stead. From the latter Pope, Otto received a confirmation of that veto on papal elections which the citizens of Rome had bestowed upon him on the occasion of his coronation. He continued to extend his con¬ quests, and after a wise and glorious reign he transmitted his power and his titles to his son Otto II (973-83) and his grandson Otto III (983-1002). With the latter the direct line of Otto the Great ended, but there was one more Saxon emperor, Henry II, the Saint (1002-24).

The Franconian line of emperors was es¬ tablished by Conrad II, the Salic (1024-39). Under his son and successor, Henry III, the Black (1039-56), the empire attained perhaps its maximum of strength. Henry was powerful

in Germany and successful in foreign wars, and he received from a Roman synod the right of nominating the Pope. In the reign of Henry

IV (1056-1106), the great struggle for suprem¬ acy between the empire and the papacy began. In 1059 Pope Nicholas II, at the instigation of the famous archdeacon Hildebrand, afterward Pope Gregory VII, vested the papal election in the college of cardinals, reserving the rights of the clergy and people of Rome and of the emperor. When Hildebrand as Pope declared it criminal for an ecclesiastic to receive a bene¬ fice from a layman, he raised the whole ques¬ tion of feudal investiture of land to the clergy. It had a special bearing on Germany, where a great part of the land and wealth was vested in bishops and abbots, who, under the new ruling, could pass from the control of the emperor to that of the Pope. A war between the secular and the religious powers was thereupon begun. Gregory summoned Henry to Rome for judg¬ ment : Henry retaliated by convening a synod which deposed the Pope. The Pope's reply was to excommunicate Henry, who, deserted by his nobles, went as a penitent to Canosa in 1077, and, clad in woolen and standing barefoot on the snow, sued and obtained forgiveness from the successor of the Fisherman. It was a scene well calculated to strike the imagination, and the admission that the spiritual was greater than the temporal power was destined to have momentous consequences. Henry's son, Henry

V (1106-25), was as able and determined an opponent of the papal claims as his father. He asserted all the rights over ecclesiastics which had ever been enjoyed by his predecessors, and

it was not until the Concordat of Worms (1122), concluded between Pope Calixtus II and Henry V, that a settlement, greatly dimin¬ ishing the emperor's powers, was effected. Another blow at the emperor's prerogative came from a different source. On the death of Henry in 1125, the elective principle was estab¬ lished instead of the hereditary. It was by election that Lothar II, of Saxony (1125-38), Conrad III (1138-52), founder of the Swabian or Hohenstaufen line, and Conrad's nephew, Frederick I, Barbarossa (1152-90), succeeded. The reign of the last mentioned was a glorious one, but it was marked by a long struggle with the papacy. There were early bickerings be¬ tween Frederick and Pope Hadrian IV. On the death of the latter in 1159 there was a dis¬ puted papal election, the real Pope being Alex¬ ander III, while Barbarossa took the side of the anti-Pope, Victor IV. A fierce contest be¬ tween Pope and emperor ensued. After the defeat of the imperial army by the allied North Italian cities at Legnano in 1176, Frederick surrendered, and he and Alexander III were reconciled at Venice in 1177. At their meet¬ ing, Frederick, it is said, knelt in awe, but the Pope raised him and gave him the kiss of peace. The scene, which has been variously represented, marked the abandonment by the

secular power of a contest in which it had now been twice beaten. Frederick led a great Ger¬ man army on the third Crusade, and was drowned in the river Kalykadnus in Cilicia in 1190. He was succeeded by his eldest son, Henry VI (1190-97), who had already as a child been chosen king and crowned at Aachen. Henry endeavored to have the crown pro¬ nounced hereditary in his family, but met with so much opposition that he had to be content with procuring the election of his infant son, Frederick II, as king of the Romans. On Henry's death that election was set aside, and a contest for the crown ensued between Otto of Brunswick and Philip of Hohenstaufen, which was not terminated until the murder of Philip in 1208. Otto IV was then formally re-elected emperor and was crowned in 1209. He was, however, excommunicated and declared deposed by Pope Innocent III, and was dethroned by the youthful Frederick II, son of Henry VI. Frederick's whole reign (1212-50) was em¬ bittered by a dispute with the papacy, which continued through the reign of his son, Con¬ rad IV (1250-54). Conrad's son, Conradin, the last of the Hohenstaufen house, never reigned. Fighting for his rights, he was de¬ feated as a lad of 15 at Tagliacozzo and be¬ headed at Naples in 1268.

On the death of Conrad IV there was an interregnum, nominally broken in 1257 by the election of Richard, Earl of Cornwall, and a little later of Alfonso X of Castile, who theoretically were rival emperors, but, while Richard was crowned at Aachen, neither he nor Alfonso was ever crowned as emperor at Rome. During this time conditions in Germany were frightful, and in an attempt to cope with the disorganization, the electors in 1273 chose Rudolf, Count of Hapsburg, founder of the house of Austria, as the occupant of the im¬ perial throne. He, too, was crowned at Aachen, but not. at Rome. Dying in 1291, he was suc¬ ceeded in 1292 by Adolf, Count of Nassau, who was killed in battle (1298) by Rudolf's son,

Albert of Hapsburg, Duke of Austria. Albert was thereupon chosen king of Germany and crowned at Aachen. Pope Boniface VIII re¬ fused at first to recognize him, but subsequently, in 1303, became reconciled to him, and invited him to Rome to be crowned, an invitation of which Albert never availed himself. He was killed in 1308 by his nephew John. Henry VII, Count of Luxemburg, was then chosen king, and in 1310 was crowned emperor at Rome by the legates of Pope Clement V, who in 1305 had removed the papal court to Avignon in the then kingdom of Arles. On Henry's death in 1313, a double election took place, Lewis IV, Duke of Bavaria, and Frederick, Duke of Austria, being chosen by different sections of the electors. A civil war followed. Lewis de¬ feated Frederick at

Muhldorf in 1322 and took him prisoner. In 1324 Lewis came to an open rupture with Pope John XXII, who excom¬ municated him. Nothing daunted, however, Lewis marched on Rome (1327), where he was welcomed by the Roman people and was crowned emperor in 1328 by four lay syndics named for that purpose by the people. Lewis soon afterward was obliged to quit Rome and Italy, and on his return to Germany he en¬ deavored to conciliate the Pope, who, however, insisted on absolute submission, but this Lewis was not prepared to give. In 1343 Pope Clement VI set up Charles IV, king of Bohemia, as rival emperor and his selection was confirmed by a majority of the electors. On the death of Lewis in 1347 the electors chose in turn Edward III, king of England, who be¬ cause of the objection of his Parliament de¬ clined the honor; Frederick, Marquis of Meis¬ sen, who was bought off by Charles ; and Gunther of Schwartzburg, who accepted but died soon afterward. Charles was then re¬ chosen and recrowned at Aachen. In 1354 he was crowned king of Italy at Milan and finally emperor at Rome by the cardinal-bishop of Ostia, who was deputed to perform that func¬ tion by Pope Innocent VI. In 1355 Charles IV gave up to the Pope all the territorial rights over Rome and Italy which his predecessors had claimed and asserted in arms.

In 1356 Charles promulgated the celebrated Golden Bull (Aurea Bulla), which settled the composition of the electoral college, the proceed¬ ings at elections, and the privileges of the elect¬ ors. Seven electors were named : the Arch¬ bishops of Mainz, Treves, and Cologne; the King of Bohemia, cupbearer; the Count Pala¬ tine of the Rhine, seneschal; the Duke of Saxony, marshal ; and the Margrave of Brand¬ enburg, chamberlain.

Charles IV died in 1378, and was succeeded by his son Wenzel, who had been elected and crowned two years earlier. In 1400 Wenzel was pronounced deposed by a majority of the electors, who chose Rupert of Wittelsbach, Count Palatine of the Rhine, in his stead. Wenzel, however, retained his title and his kingdom of Bohemia until 1410-11, when a dis¬ puted election took place between Wenzel's brother, Sigismund, king of Hungary, and Jobst, Margrave of Moravia. On the death of Jobst, Sigismund was again chosen in 1414 and crowned at Aachen and in 1431 he was crowned king at Milan and in 1433 emperor at Rome. On his death in 1437, his son-in-law, Albert of Hapsburg, Duke of Austria and king of Hun¬

gary and Bohemia, was elected (1438) king of the Romans. He died in 1439 without having re¬ ceived the imperial crown. He was succeeded in 1440 by Frederick III, of Hapsburg, Duke of Styria, who was crowned emperor at Rome in 1452. His was the last imperial coronation that took place there. In 1493 Frederick died and was succeeded by his son Maximilian I of Hapsburg (1493-1519), who had been already elected. On

Maximilian's death in 1519 his grandson Charles V (1519-58), king of Spain, was elected emperor and was crowned at Bo¬ logna, not at Rome. Charles abdicated in 1555, and on his death in 1558 was succeeded by his brother Ferdinand I (1558—64) , who had been already elected. He in turn was succeeded by his son Maximilian II (1564-76) , Maximilian by his son Rudolf II (1576-1612), and Rudolf by his brother Matthias (1612-19).

On the death of Matthias his cousin Ferdi¬ nand II, of Styria, became emperor and reigned from 1619 to 1637. Ferdinand made a change in the electoral college in 1623 by taking away the electorate from Frederick, Count Palatine, and bestowing it upon Maximilian of Bavaria. The Count Palatine recovered his electoral rights in 1648, thus making eight electors, and a ninth was created in 1692 when the Duke of Brunswick-Luneburg was given the electorate of Hanover.

The emperors who followed Ferdinand II were Ferdinand III (1637-58), Leopold I (1658-1705), Joseph I (1705-11), Charles VI (1711-40). From the election of Albert II in 1438 to the death of Charles VI in 1740, the empire had remained in the possession of the Hapsburg family. With the decease of the last- named monarch, the male line of the Hapsburgs became extinct, and Charles VII, Elector of Bavaria, was selected to fill the vacant throne (1742-45). When Charles died, Francis I, duke of Lorraine, husband of Maria Theresa, daugh¬ ter of Charles VI, was elected emperor and crowned at Frankfort, and reigned from 1745 to 1765. In the person of his son, Joseph II (1765- 90), already elected in his father's lifetime, the Hapsburg line was restored. Joseph was suc¬ ceeded by Leopold II, who reigned from 1790 to 1792. On Leopold's death, Francis II, the last of the Holy Roman Emperors, ascended the throne at the fateful period of the French Revo¬ lution. In 1804 Napoleon Bonaparte became emperor of the French and regarded himself as the successor of Charlemagne in the empire of the West. In 1805 he overthrew Austria and Russia at Austerlitz and formed the Confedera¬ tion of the Rhine under the protection of France. By the act establishing the Confedera¬ tion (17 July 1806), Bavaria, Wiirttemberg, Baden, and 13 other states withdrew from the empire and repudiated its laws, and on 1 August the French ambassador announced to the Diet at Regensburg that Napoleon no longer recog¬ nized the existence of the empire. Thereupon Francis II, by a declaration of 6 Aug. 1806, in which he stated that, finding it impossible to carry out the obligations taken at his election, he considered the bonds which attached him to the Germanic body as dissolved, that he released the states of which it consisted from their al¬ legiance, and that he retired to the government of his hereditary dominions under the title of emperor of Austria, resigned the imperial dig¬ nity. Thus, in fact, if not perhaps in theory.

h; Holy Roman Empire came to an end 1,006 years after it had been established by Pope Leo 'll and Charlemagne. Consult Bryce, (The Holy Roman Empire) (London 1864, new ed., New York 1904).

Patrick J. Lennox,

Professor of English Language and Literature, Catholic University of America.

HOLY SEPULCHRE, Jerusalem, the tomb in which the body of Jesus was laid by Joseph of Arimathea the owner of the tomb, and by Nicodemus, ((nigh at hand® to Golgotha. As described by John, an eye-witness of the Crucifixion, (

HOLY SEPULCHRE, Orders of the.

The four orders under this title most deserv¬ ing of mention are (1) Canons of the Holy Sepulchre, an organization formed originally in the early 12th century, binding together the clerks of the church of the Holy Sepulchre into a community, under Arnulf, patriarch of Jerusalem. It was transferred to Acre in 1187, and spread to the Occident where its houses offered shelters to pilgrims to the Holy Land. Under Innocent VIII, this order was united with the Knights of Saint John, and its inde¬ pendence was practically extinguished. (2) The Canonesses of the Holy Sepulchre, estab¬ lished by the Marchioness Claudia de Mouy at Charleville. Some houses of the order still exist. (3) Knights of the Holy Sepulchre, or Golden Knights, an order of all the knights who in pilgrimages to Palestine had received the accolade at Jerusalem. It was confirmed bv Benedict XIV in 1746; and its rule was formu¬ lated by Pius IX in 1847. The costume worn is a white mantle with the red cross of Godfrey de Bouillon. The order comprises three classes : knights, commanders and grand crosses. (4) Fathers of the Holy Sepulchre, the group of Franciscans stationed in Jerusalem to protect the Holy Places. Their chief house is San Sal¬ vator in Jerusalem.

HOLY WAR, The. written by John Bunyan about 1684, is an al¬ legory of sufficient excellence to have brought

fame and immortality to any man. Even though in all its imagery and nomenclature it belongs to a by-gone age, doing unpardonable violence to many scriptural texts, and careless of theo¬ logical accuracy, it still has power to grip with an interest that flows from a seemingly living plot and

*from the force of dramatic presenta¬ tion. This masterly piece of literature has been almost obliterated by the brightness of its truly remarkable predecessor, (The Pilgrim's Prog¬ ress.) It is however likely that had the order of production and publication been reversed (The Holy War> would have dropped into second place because it lacks what the * Progress > has, a hero with a definite and stirringly real personality. The theme of (The Holy War* and in places the treatment and characters re¬ mind one of (Paradise Lost) which without doubt Bunyan had never had knowledge of. Bunyan images man, the soul, or other-than- body man as a ((fair and delicate town, a cor¬ poration, called Mansoul.® ((The first founder and builder of it . . . was one Shaddai,® the name for deity which the author adopts. <(This famous town of Mansoul had set in the walls gates in at which to come, out at which to go . . . Eye-gate, Ear-gate, Mouth-gate, Nose-gate and Feel-gate.® The state of Mansoul was at the first perfect in life, loyal and obedient to its king, Shaddai. Diabolus (Devil), originally a servant and prince in Shaddai's government being cast out of office and ((down into the horrible pits,® because of rebellion, has deter¬ mined to revenge himself by making war upon Mansoul and capturing it. Approaching the town ((under the shape and in the body of a dragon® — Bunyan's interpretation of the Garden- of-Eden serpent — Diabolus ((drew up and sat down before Ear-gate® and attacked with subtle arguments made familiar through the Biblical story. <(Lord Innocent® and <(Captain Resist¬ ance® are slain in the encounter by Diabolus' associates, and (*

Shaddai and Diabolus. It is a most vivid and realistic presentation, by personifying the dif¬ ferent sentiments and passions and thoughts, of the idea that the soul of man is the battle ground where Good and Evil fight for the mastery.

Charles Graves.

HOLY WATER, in the Greek and Roman Catholic churches, water which has been conse¬ crated by prayers, exorcism and other cere¬ monies to sprinkle the faithful and things used for the church. The use of holy or lustral water was borrowed from the Jews, and the same symbolism was employed among the Romans. The Roman Catholic Church considers holy water not only symbolical of the purity of the soul, but in certain cases as effectual in exorcism. Before high mass on Sundays the celebrant sprinkles the people with holy water. At the entrance of all churches is kept a font of holy water, in which those going in and out dip the fingers and bless

themselves. The consecration of holy water takes place on Holy Saturday before Easter Sunday.

HOLY WEEK, or PASSION WEEK,

is that which immmediately precedes Easter. The name Passion Week rather refers to the days following and exclusive of Palm Sunday, since this day, strictly speaking does not commemorate any incident of Christ's passion, but his triumphant entry into Jerusalem. The three chief days of the week are Maundy Thursday (or Holy Thursday), Good Friday and Holy Saturday, the most sacred of all be¬ ing Good Friday. The observance of Holy Week is of very early origin, and it was known as Great Week, Silent Week, Penitential Week, etc. In the ancient Church of Rome, when any of the ordinary church festivals falls on this week, it is not observed till after Easter. In Rome it used to be observed with much greater solemnity and penitential rigor than now; for the shops are kept open, concerts and other amusements are given, though the theatres are closed. The washing of the feet of poor men is still practised in Roman Catholic churches ; and the Pope washes the feet of 13 poor persons, all of whom are priests. In Austria the em¬ peror keeps up the old rite of feet-washing with much ceremony.

HOLYOAKE, hol'i-ok, George Jacob,

English political reformer: b. Birmingham, 13 April 1817; d. Brighton, 22 Jan. 1906. He early became connected with various advance move¬ ments in Birmingham. In 1841 he was one of the lecturers chosen to explain Robert Owen's social theories, and next year was imprisoned on a charge of atheism. He supported the Chartist demands, but did not sympathize with their hostility to the Whigs. He took an im¬ portant part in the agitation for the repeal of the corn laws, and for the repeal of the so- called (; (The Logic of Life5 ; (The Trial of Theism5 ; (Nature and the Origin of Secular¬ ism5 ; (Thirty-three Years of Co-operation5 (1872) ; (History of Co-operation in England, Its Literature and Its Advocates5 (1875) ; (Among the Americans5 (1881) ; (Self Help

'One Hundred Years Ago5 (1888); (The Co¬ operative Movement of To-day5 (1891), a short, useful account of the history of co-operation; (Sixty Years of an Agitator's Life5 (1892), an autobiography; and (Jubilee History of the Leeds Co-operative Society5 (1897).

HOLYOKE, hol'yok, Mass., city in Hamp¬ den County, on the Connecticut River and the New York, New Haven and Hartford, and the Boston and Maine railroads, about 75 miles southwest of Boston and eight miles north of Springfield. Holyoke was settled in the last part of the 17th century by people from Ireland, and for some time it was called Ireland Parish. It was

incorporated as a part of West Spring- field in 1786; but in 1850 it became a distinct town, with its own government, and it was chartered as a city in 1873. Like the other settlements along the shore of the Connecticut, the inhabitants saw the advantages to be de¬ rived from the water power. At first only the small streams flowing into the Connecticut were dammed and used for turning machinery; the main stream itself was the great route whereby trade intercourse was established with settlements along its shores. In 1847 the Had¬ ley Falls Company began to devise ways and means of using the water power of the Con¬ necticut River, which at Holyoke had a fall of about 60 feet. In a few years the dam, 1,000 feet in length, was placed across the river, and the water power thus obtained gave Holyoke great opportunities for the establishment of manufacturing industries, and they have been well utilized. For some years it was noted for the number and magnitude of its paper-mills; but other industries now enrich the city. Its chief manufactures are paper, paper-products, thread, cotton and woolen goods, knit goods, alpaca, silk, automobiles, machinery, bicycles, wire, belting, screws, bricks, furniture and school supplies. Some of the public institutions are the College of Music, public library, House of Province Hospital, City Hospital, two or¬ phanages located outside the city limits, Saint Vincent's for girls and Holy Family for boys. A large percentage of the people are of foreign birth or foreign descent. The law which de¬ clares: ((No minor who cannot read and write the English language can be employed in any factory or commercial enterprise55 is rigidly enforced. Evening schools are provided for those who cannot attend school in the day time. The Holyoke Scientific Society has done special and excellent work in American archaeology. It owns a valuable collection of Indian relics. Some of the places of interest near the city, and which may be reached by the electric rail¬ way, are Mount Holyoke (q.v.), Mount Tom (q.v.) and Springfield. In 1896 the city char¬ ter was revised, and the government is now vested in a mayor, who is elected annually, and a city council. The annual income of the city reaches over $3,000,000 and its expenditures are proportionate. The w.ater system, gas and elec¬ tric-light plants are owned and operated by the city. Pop. (1920) 60,203.

HOLYOKE, Mount, a narrow ridge of greenstone, the highest point of which is about 1,120 feet above the sea. It is in Hampshire County, Mass., about one mile east of the Con¬ necticut River, five miles southeast of North¬ ampton and eight miles northeast of Holyoke.

On the summit is a hotel, built in 1821. The' hotel can be reached by a carriage road which winds to the top, or by a railway which runs up a

steep incline.

HOLYOKE COLLEGE, Mount. See

Mount Holyoke College.

HOLYROOD, ho-li-rood, Palace and Ab¬ bey of, Scotland, the ancient royal residence at Edinburgh (q.v.).

HOLZ, holts, Arno, German poet: b. Ras- tenburg, East Prussia, 26 April 1863. He came to Berlin early in life, attended the schools and university there, and made it his permanent home. To write verses seems to have been an early passion with him. Geibel, Heine and Eichendorff were his first models. In honor of the 70th birthday of Geibel, he published his first book of poems,

Holz continued working alone, with much self-confidence, on his theories of art and then tried to put them into practice as a poet, which resulted in the following publications: (Die Kunst, ihr Wesen und ihre Gesetze5 (1891) ; (Die Socialaristokraten) (comedy, 1896) ; (Phantasus) (poems, 1899) ; (Die Revolution der Lyrik) (1899) ; (Dafnis, Lieder auf einer alten Laute) (1903-04) ;

William F. Hauhart.

*HOLZAMER, holts'am-er, Wilhelm, Ger¬ man novelist and short-story writer: b. Nieder- Olm, near Mainz, 28 March 1870; d. Berlin, 28 Aug. 1907. He was the son of an artisan and first prepared himself for the calling of a com¬ mon school teacher, serving in that capacity at the Realschulc of Heppenheim an der Berg- strasse from 1892 to 1896. His literary career began during these years, wh*1 the production*

of poems and short stories, and a number of monographs on German writers, prepared for newspapers in Germany and in the United States. After 1896 he devoted himself en¬ tirely to literary pursuits, retaining his home at Heppenheim until 1902, when Grand Duke Ernst Ludwig of Hessen, whose attention had been called to the poet in so favorable a man¬ ner that he was determined to give him an opportunity to develop his talents, called him to Darmstadt to become his private librarian. After occupying this position for a few years, Holzamer left it and settled in Paris as cor¬ respondent for a number of German papers, moving to Berlin in 1905, where he fell sick with diphtheria and died in the Elizabeth Hos¬ pital. Only one of his short stories has been translated into English ((Cellist Behnke5 in The New Review, April 1914) ; it gives an excellent idea of his impressionistic word-paint¬ ing. Among his works are (Meine Lieder) (poems, 1892) ; (Auf staubigen Strassen) (sketches, 1898) ; (Im Dorf und

draussen) (short stories, 1901) ; (Die Siegesallee) (let¬ ters on art, 1902) ; (Ellida Solstratten) (novel, 1904) ; biographies of (Konrad Ferdinand Meyer) and (Heinrich Heine) (1905) ; (Der Entgleiste5 (novel in 2 vols., 1910).

Jacob Wittmer Hartmann.

HOLZWARTH TURBINE. See Inter¬ nal Combustion Engine.

HOMATROPIN, ho-mat'ro-pm. See Atropine.

HOME, Henry, Lord Kames, Scottish lawyer and author : b. Kames, Berwickshire, 1696; d. Edinburgh, 27 Dec. 1782. He studied law at Edinburgh, and, called to the bar in 1724, soon acquired reputation by a number of publications on the civil and Scottish law. In 1752 he became a judge of session, and assumed the title of Lord Kames. In addition to legal works he published (Essays on British Antiq- uities) ; (Essays on the Principles of Morality and Natural Religion,5 in which he advocates the doctrine of philosophical necessity; (Intro- duction to the Art of Thinking ; and his best- known work, (Elements of Criticism,) in which, discarding all arbitrary rules of literary com¬ position, he endeavors to establish a new theory on the principles of human nature. In 1776 he published the (Gentleman Farmer5 ; and in 1781 (Loose Thoughts on Education. >*

HOME, The (Hemmet). In her novel (The Home5 (or (Family Sorrows and Joys5), written in 1839, Fredrika Bremer produced her masterpiece. Though not as absorbing as 'Grannarne,5 which was translated into many languages and made her famous, it is more true to life. Though the plan of construction shows a certain weakness, the characters are drawn with superior skill. The chief character is Elisa Frank, and her relations to her husband, Judge Frank, and her children form the main theme. Fredrika and her own sisters served models for the daughters whose characters are convincingly described. Petrea, <(ready to give away indiscriminately the presents which had been given to her,® is the author herself. Ten¬ derness is shown in the description of the death of Henrik (her brother August), while her humor is at its best where Petrea and Jeremiah are described. In (The Home5 we see Fred-

rika Bremer for the first time as the champion of woman's emancipation and advancement. For years afterward, and especially after her return from a visit to America, it became her aim in life to deliver also the Swedish woman from the restrictions in her social position. Long before she

wrote (The Home' the social conditions which confined woman's activities within very narrow limits and left her help¬ less, unless she was ˆhappily® married, had aroused the author's indignation. Her bitter¬ ness increased when Gota Superior Court ex¬ pressed its narrow-minded opposition to the proposition that women, at the age of 25, should have the legal right to manage their own affairs. Through the study of the writings of Harriet Martineau she had become convinced that re¬ form by law was necessary. (The Home has been translated into English by Mary Howitt.*

Gisle Bothne.

HOME ECONOMICS. Home economics is the organized body of knowledge which treats of food, clothing, shelter and household management in their physical, economic and social aspects as related to the life and welfare of the individual, the family and the com¬ munity.

As a subject for formal instruction and a field for investigation home economics is con¬ cerned with living places, the materials used in them, the arts by which they are maintained for families or other groups of people bound to¬ gether by kinship, affection or necessity, and with the methods by which they can be made to contribute to the length, happiness and pro¬ ductiveness of the individual life. The forms that instruction takes and the lines that inves¬ tigation follows depend largely on the char¬ acter and purposes of the educational institu¬ tion into which the subject is introduced. It takes in one institution the form of applied science, in another that of manual training, while in still others it appears as branches of vocational or normal training or of economics.

Though its subject matter had long received the attention and thought of students and writers, and though a large body of knowledge had accumulated as a result of housekeepers' experience, home economics did not find an established place as a recognized subject for formal instruction until about 1870, when it was introduced into the State agricultural col¬ leges of the United States. In these institu¬ tions which were founded for the benefit of regions where the interests of the home and those of the industry that chiefly supports it are very closely allied, it developed rapidly as an applied science side by side with agri¬ culture, and benefited by the same investiga¬ tional work in the sciences, particularly those that have a bearing on nutrition and diet. It has drawn from these investigations suggestions for the means of improving the methods bv which families are fed and clothed and protected from the elements, and has in turn reacted upon them and encouraged further research. By so doing it has added to its own content and its own cultural value, with the result that it is now often given a place in the courses of study of higher institutions of learning from which applied science, as such, is excluded..

As a branch of manual training, home economics first found a place in the elementary

and secondary schools. When the curriculum of these schools was enlarged to include hand training, the particular exercises given to girls were naturally those connected with traditional home industries, — cooking, sewing and clean¬ ing. Even weaving and other handicrafts that had left the home were introduced for the understanding they give of the development of the home as well as for their value in training eye and hand. The rapid development of these subjects in the lower schools and the demand for instructors led to the establishment of teachers' training courses, and promoted seri¬ ous investigations into the pedagogical value of the subject, and into the question of the forms in which it should be presented in order to meet the changing needs of public schools which represent the only formal education obtained by the vast majority of people. The import¬ ance of this pedagogical problem at a time of rapid changes in social and industrial condi¬ tions, all of which affected the home, tended to add still further to the subject matter of home economics.

Extension work in household arts for the benefit of those already engaged in home mak¬ ing, and therefore unable to attend school, has for many years been a part of the courses in home economics in agricultural and other col¬ leges. The value of this work was recognized and its possibilities for usefulness greatly increased when in 1914 Congress passed the Smith-Lever Extension Act which made Federal funds available for the promotion of extension work in agriculture and home economics in the various States under certain conditions which include grants of funds from the States co-operating. The general adminis¬ tration of these funds was given to the United States Department of Agriculture, and particu¬ larly to the States Relations Service, which co¬ operates with the various States through their agricultural colleges. At the time of the pas¬ sage of this act a form of home economics in¬ struction known as home demonstration was al¬ ready being carried on by the Department of Agriculture. Practical demonstrations of the best methods of canning, cookery and doing other forms of housework were made for the benefit of the housekeepers of a given commu¬ nity. This work, and also education through clubs, classes and lectures, has been greatly enlarged since the passage of the act. Origin¬ ally limited to rural regions, the work has since been broadened to cover urban districts also.

On still another side the subject has de¬ veloped as the result of a growing demand for vocational education. The arts by which satis¬ factory homes are maintained, cooking, sewing, cleaning, etc., have always been followed by women outside of the home as a means of earn¬ ing a livelihood. .The opportunities for such employment have increased as changed condi¬ tions

of living have called for the establish¬ ment of a greater number, of hotels, restaurants, boarding-houses, public institutions and other places where food is prepared in large quan¬ tities. A vocation which can be followed in maintaining a home and also as a means of livelihood is particularly desirable for women who as a rule spend a comparatively short time in industrial work outside, their own homes. This fact has been recognized by the Federal government in the passage of the Smith-Hughes

Act in 1917. This gives Federal aid to voca¬ tional education in many subjects, including home economics. Under this form of educa¬ tion according to the provisions of the act, home making and industrial activities which may be the means of earning a livelihood are included within the range of home economics.

Shortly after the passage of the Smith- Lever Extension Act the Nutrition Investiga¬ tions work of the Department of Agriculture, which since 1892 had been a large contributor to the subject matter of home economics, was expanded into the Office of Home Economics of the States Relations Service. The appropriation for this work is made <(to investigate the rela¬ tive utility and economy of agricultural prod¬ ucts for food, clothing and other uses in the home, with special suggestions of plans and methods for the more effective utilization of such products for these purposes.® In a general way the Office of Home Economics provides, as a result of laboratory and other technical studies, material for the use of teachers, students and trained workers, as well as a great amount of both popular and more technical literature for general distribution, and also gives attention particularly to subject matter for the instructional work of extension offices of the States Relations Service of the Depart¬ ment. The United States Bureau of Education also deals with home economics, being con¬ cerned particularly with methods of teaching in schools of all grades, collegiate, secondary, ele¬ mentary and normal.

During the progress of the Great War the machinery for teaching home economics was used by government agencies for the purpose of transmitting and interpreting the message of conservation, and the fact that it proved itself useful in the great world crisis without doubt reacted favorably on the subject itself by estab¬ lishing it in public favor. There can be no doubt that its organization facilitated the carry¬ ing out of the programs of the Food and Fuel Administrations and the emergency work of the various permanent departments of the govern¬ ment. In turn its workers were brought into close touch with those who were studying food, clothing and

fuel in the light of national and world needs and learned to see home problems in their larger relations.

Although the subject matter of home economics has been formulated in institutions of many different grades and purposes, and al¬ though as a field of investigation it has been marked off as the result of the recognition of the large number of social needs, the tendency is not toward further separation into a large number of subjects, but toward formulation into a systematic body of knowledge which can be presented progressively from the lowest schools to the highest. So broadened, it is a subject of universal interest, and deserves a place in general, education, since it deals with the natural, social and economic foundations of home life. The tendency is to give to the broad, general, inclusive subject the name home economics, and to apply such terms as household economics, domestic science, cooking, sewing, textiles, etc.., to its various branches. This usage is favored by the tendencies in the field of general economics, which though it originallv considered little besides the produc¬ tion and the distribution of material wealth

now includes the consumption or use of wealth. Even when the satisfactory consumption of wealth, involving, as it necessarily does, health¬ ful food, clothing and shelter, is looked upon merely as a means of increasing the productive¬ ness of the individual it must include the home¬ making subjects. There is, however, another tendency in economics which is often described as humanizing. This tendency reflects a tend¬ ency in society to recognize the individual's value to himself apart from the value of the material wealth which he is able to create. This naturally directs attention to the import¬ ance of leisure in the life of the individual. It tends to emphasize the value of the home as the most satisfactory place for the child during the years of preparation for life, for the adult during periods of recuperation after labor, and for the aged during the period of rest at the close of life. Home economics is, therefore, being recognized as a branch of economics con¬ cerned largely with the consumption of wealth and its direction toward the enrichment of the individual life. In this form it includes not only a study of the materials that enter into the construction of the house and those that are used for food, clothing, household equipment, furniture and decorations, but also a considera¬ tion of],he social and economic forces that affect the homes, put them within the reach of different groups of people, and determine their usefulness.

As a pedagogical subject home economics has been systematically codified in a syllabus of home economics which was prepared by the Department of Agriculture in co-operation with the American Home Economics Associa¬ tion.

The literature of the subject is large and growing rapidly.

Bibliography.— Bevier, Isabel, and Usher, S., (The Home Economics Movement (Part I, Boston 1906) ; Hunt, C. L., (Home Problems from a New Standpoint (Boston 1908) ; Richards, E. H., (The Art of Right Living> (Boston 1904) ; (Syllabus of Home Economics (American Home Economics Association, Balti¬ more, Md., 1913) ; (Home Economics Library) (American School of Household Economics, Vols. I— XII, Chicago 1907) ; Bulletins and Reports of the United States Department of Agriculture and the State colleges of agri¬ culture.*

C. F. Langworthy,

United States Department of Agriculture.

HOME EDUCATION. See Supple¬ mental Education.

HOME RULE, the domestic control of local affairs in a province, colony, dependency or integral part of an empire. The term has been employed in recent history most especially with regard to Ireland, which became a depend¬ ency of England ever since Pope Hadrian, as is averred, handed it over to Henry II of England in 1155, on condition that a certain portion of its revenue should flow into the treasury of the Holy See. Since , that time Ireland has been more or less subject to English government. The Irish are a high-spirited and proud nation, and the history of their subjugation has been a bloody one. For many years, however, they had their own Parliament, and managed their own domestic affairs. Then came what is

the Union. The Irish Parliament was abolished, and Irish constituencies were ac¬ corded representation at Westminster to the number of 103. This was in 1801. The Irish Parliament which passed the bill for its own destruction was bribed or cajoled into what the majority of Irishmen of to-day consider a fatal and suicidal act. The first Irishman of note to attempt a remedy for Irish grievances was Daniel O'Connell and his aim, the repeal of the Union, was much more drastic than that of his successors in leadership, who only desire self-government in local affairs, leaving the Imperial Parb'ament with control over other matters. Catholic emancipation had been won largely through his agitation, seconded by the strong and clear-headed statesmanship of Wel¬ lington. In 1834 O'Connell brought forward in the House of Commons his motion for a repeal of the Union. By recent act of Parliament the municipal councils of Ireland had been thrown open to Roman Catholics. O'Connell was elected lord mayor

of Dublin, and wh le his motion for repeal was supported with but 40 votes in Parliament, he carried it by 45 to 15 votes in the municipal chamber at Dublin. This was undoubtedly the earliest step in the movement toward Home Rule, which from that time to the present moment has agitated Ire¬ land. In the town council at Dublin one of the 15 who had voted against O'Connell's motion for the repeal of the union was a brilliant young lawyer named Isaac Butt. Glad¬ stone's measure passed in 1869 for the dis¬ establishment of the Episcopal Church in Ire¬ land was followed by the formation in Dublin in 1870 of the (

The period between 1880 and 1885 was an exciting one. Obstruction in Parliament be¬ came a fine art ; there was continuous political and agrarian agitation in Ireland accompanied by (boycotting® and outrages, these being fol¬ lowed by repressive measures, under which the Irish leader himself suffered imprisonment. In the general election of 1885, the votes of the Irish electors in Great Britain were mainly cast for Conservative candidates, some of whose leaders had indulged in flirtations with the Home Rulers. This election, taken on a widely extended franchise, resulted in a further ac¬ cession to the strength of the Home Rule or Nationalist party, 85 out of a total Irish repre¬ sentation of 103 being returned, and this party further held the balance of power in the House of Commons. In January 1886 the Nationalists aided the Liberals in overthrowing the Salisbury government, and Mr. Gladstone, after a year in opposition, again resumed the reins. At the general election of 1885 he had appealed for a majority that would make him independent of the Irish vote. That majority had not been accorded him, but he determined to accept the verdict of the Irish people as constitutionally expressed at the polls, announced his conversion to the principle. of Home Rule, and immedi¬ ately thereafter introduced his first Home Rule Bill. In moving the second reading of the measure, he made one of the most powerful and moving speeches in his career. But he had already lost the support of the <(Whig® element in his cabinet and in the country, as well as that of Bright and Chamberlain; the second reading was lost by 30 votes, and in the ensu¬ ing general election he went down to defeat. The election, however, showed a majority for Home Rule in Ireland, Scotland and Wales; England, the ((predominant partner,® returned a great majority against it. The appearance of Parnell in 1890-91 as co-respondent in the O'Shea divorce suit was followed by a request from Gladstone — urged thereto by the English Non-Conformists — for his withdrawal from the leadership, by his deposition at the hands of the majority and the formation of a small party of his personal followers, and by his death in October 1891, which however did nothing to heal the divisions within the party. Under these strokes it appeared for a time as if the cause, that united the warring factions were to suffer eclipse. However, in 1892, Gladstone was again returned to power, with a majority of 40

votes. He again brought in a Home Rule measure, which was carried through all its stages in the House of Commons, but rejected summarily by the House of Lords. Shortly thereafter Gladstone retired from political life, and his immediate successor, Lord Rosebery, was not in sympathy with the Irish demands, and accepted the failure of the Home Rulers to convert England, the ˆpredominant partner,® as conclusive evidence of defeat. The reunion of the Nationalists under John E. Redmond in 1900 was followed by new activity. The accession of Sir Henry Campbell-Bannerman to power as Prime Minister in December 1905 (follow¬ ing on the long Unionist regime, 1895-1905) was regarded as of happy aueury for the suc¬ cess of Home Rule, and on his death in April 1908, he was succeeded in the premiership by Mr. Asquith. The hotly-contested elections of 1910 resulted in drawn battles as between

Liberals and Unionists, and gave the balance of power to the Nationalists and Laborists. Mr. Asquith introduced a Home Rule bill on 11 April 1912 providing for a bicameral Parlia¬ ment, a Senate of 40 members nominated in the first instance by the British government, and a House of Commons of 164 members, responsible to an Irish executive. Peace and war, treaties, navy and army, trade and navi¬ gation, coast defense, coinage, stamps, weights and measures, copyright, religion and free¬ masonry are subjects reserved for the Imperial Parliament. Ireland was to have 42 representa¬ tives in the British House of Commons. (A subsequent amendment provided for election to the Irish House of Commons on a basis of pro¬ portional representation, and the Senate after an interval of five years was to be elected by this method). This bill passed the House of Commons on 16 Jan. 1913, and was rejected by the House of Lords on 30 January. The bill was reintroduced in the summer session, passing its third reading in the House of Com¬ mons on 17 July. The government refused the LInionist demand that the bill should be the occasion of a reference to the country, and a third time was passed by the House of Com¬ mons on 25 May 1914. An amending bill had been introduced by the Premier providing that those counties of Ulster which should by referendum so determine, be excluded from the act for a period of six years. This was a concession made to the demands and threats of the Unionists of Ulster, who, under the leadership of Sir Edward Carson (q.v.), de¬ clared themselves unalterably opposed to being forced into allegiance to a Dublin Parliament, and had pledged themselves to armed resistance. Further difficulties were introduced by an un¬ dertaking given by the War Secretary to cer¬ tain army officers that they would not be re¬ quired to. take up arms against Ulster in revolt against Home Rule, which was

followed by the repudiation of the pledge by the gov¬ ernment and the resignation of Colonel Seely, the War Secretary, and by the assumption of the War Secretaryship by Mr. Asquith. Mean¬ time negotiations to effect a settlement by con¬ sent had proved abortive. So matters stood at the declaration of war on Germany on 4 August 1914. Mr. Asquith announced his in¬ tention to introduce a suspensory bill postpon¬ ing the inauguration of Home Rule in Ireland for a twelvemonth or until the conclusion of the war. This measure received the royal assent on 17 September, and the Home Rule Act — under the provisions of the Parliament Act, passed in 1911 with the object of curtailing the powers of rejection up till that time possessed by the House of Lords — automatically became law without further reference to that branch of the legislature.

Following on the serious revolt in Ireland in Easter Week of 1916, an effort was made by the government to bring in Home Rule by con¬ sent of the various factions, and Mr. Lloyd George was the minister deputed to undertake these difficult and delicate negotiations. Success seemed to attend his efforts, for a basis of agreement was reached. The 78 members then sitting in the Imperial Parliament for the 26 Home Rule counties were to form the Dublin Parliament, and the 25 members from the six

excluded Ulster counties were to remain at Westminster. Among those who thus accepted seats in the new Parliament were Sir Edward Carson and Mr. J. H. M. Campbell, the attorney-general for Ireland. This temporary settlement was to continue for one year after the war, when the whole question was to be con¬ sidered at a Great Imperial Conference of all the dominions. On two points, however, the agreement failed to command the assent of the Unionist party. The first point dealt with the means by which the exclusion of the six Ulster counties was to continue or be brought to an end, the Unionist contention being that only by their full consent could they be brought in. Under the agreement the Irish members were to remain in undiminished numbers at Westminster until a permanent settlement had been carried through and embodied in an act of Parliament. The Unionists found it quite im¬ possible to vote for a proposal which would maintain the Irish members in undiminished numbers after a general election and after a Home Rule government had been set up in Ireland. On these points the proposed settle¬ ment broke down, and for their failure to ratify it the government was strongly assailed by Mr. Redmond and the other Irish leaders. The former rule of government from Dublin Castle abolished after the revolt — was again set up, Mr. Henry Edward Duke, a Unionist member of Parliament, being appointed chief secretary on 31 July, and Lord Wimborne ap¬ pointed to his former office of Lord Lieu¬ tenant on 6 August. See also Sinn Fein Movement.

In addition to the movement for Irish Home Rule — under the name of

((Home Rule all Round®—— a similar movement has been inaugu¬ rated with the aim of setting up national Par¬ liaments in Scotland and Wales. So far, how¬ ever, no responsible British government has stood sponsor for them.

Bibliography. — There is extensive liter¬ ature on the subject. The published speeches of the great political leaders in the United King¬ dom — Gladstone, Morley, Chamberlain, Bal¬ four, Asquith, Parnell and Redmond should be consulted. Gladstone's Life5 by Morley is specially valuable, as are also Gladstone,

(Special Aspects of the Irish Question5 (1887) ; McCarthy, (The Case for Home Rule5 (1892) ; Chamberlain, 'Home Rule and the Irish Question5 (1887); Anderson, 'Sidelights on the Home Rule Movement5 (1906) ; O'Don¬ nell, 'History of the Irish Parliamentary Party5 (2 vols., 1910); Redmond, 'Home Rule5 (1910 V 'The Home Rule Bill5 (1912); Balfour, 'Against Home Rule: The Case for the Union5 (1912) • 'Nationality and Home Rule5 (1914).

HOME RULE, Municipal. See Munici¬ pal Government.

HOMER is merely a name for the unknown authorship of the 'Iliad5 and the 'Odyssey,5 the two noble epics that stand at the beginning of Greek literature. Poems so exquisite can¬ not really be a beginning either in thought, language or metre. They presuppose a com¬ plex evolution of legend and a long apprentice¬ ship to the poetic art. But for our knowledge they are still a beginning. We know that "the

work of Homer is the most admirable product of human poetry55 (Sainte-Beuve) ; that «the Iliad is the most important poetical monu¬ ment existing® (Matthew Arnold); that «the Odyssey) is the only long poem that is never dull" (Lowell) j that for the teaching and preaching of English literature Homer ranks with Shakespeare and the Authorized Version (Quiller-Couch) . But of Homer himself we know nothing save what we deduce from the poems and infer from their descriptions of the Aoidos or bard. The Greeks themselves knew nothing. The eight Greek lives that fill 49 pages of Westermann's (Vitarum Scriptores) are manifestly late inventions. They are de¬ velopments of anecdotes, old epigrams and pas¬ sages in the hymns attributed to ˆHorner.® Hence come the patronymic names Melesigenes and Maeonides, the tale of the seven cities that claimed the honor of his birth, "where living Homer begged his daily bread,55 the

conception of the poet as the blind old bard of Scio's rocky isle (Chios), the legend of his poetical contest with Hesiod and of his suicide because of failure to answer the fisherman's riddle, the tradition of a guild, clan or family of "Homerids55 who transmitted the poems to posterity.

All older Greek poetry is reminiscent of • Homeric language and phrasing, and there is a sense in which all Greek literature and civili¬ zation not to say all European civilization flow from this fountain-head. The earliest mention of Homer's name occurs in the complaint of the philosophic poet, Xenophanes of Colophon, that Homer and Hesiod attributed to the gods actions that would be shameful in men. The historian Herodotus, the first extant prose writer to name and discuss Homer, says that he lived ((about four hundred years before my time,® i.e., about 850 b.c. This is consonant with the fact that the (Iliad) and the 'Odyssey5 speak¬ ing of Achaeans, Danaans and Hellenes practi¬ cally ignore the historical division of the Greeks into Dorians, Ionians and Hfolians and know nothing of the ((return of the Heraclidae® and the Ionian colonization of Asia Minor with which the history of Greece begins. Back of this historical Greece the new archaeology and the spade of Schliemann and Dorpfeld have re¬ vealed the so-called Mycenaean civilization of Mycenae, Tiryns, Hissarlik (Troy) and many other sites, and the discoveries of Sir Arthur Evans and others in Crete have carried the hypothetical history of "Higean55 or ((Minoan)) civilization back to 2000 b.c. These discoveries have added enormously to the interest of the Homeric poems as documents. The civiliza¬ tion portrayed so minutely in the poems and that reconstructed by "Mycenology,55 though closely related are not identical. Their precise relation is still undetermined. The immense literature of speculation on this subject, includ¬ ing such delightful romances as Professor Murray's 'Rise of the Greek Epic5 and Walter Leaf's 'Homer and History,5 leave the Homeric problem precisely where Matthew Arnold found it in 1860. "These are questions which have been discussed with learning, with ingenuity, nay with genius . . . but there really exist no data for determining them. 55 The English reader will find all the facts and the German bibliog¬ raphy in Seymour's Wife in the Homeric Age> (London and New York 1907), and the

VOL. 14 — 22

most reasonable argumentative discussion of the facts and theories in Andrew Lang's three books, (Homer and the Epic,5 (The World of Homer, > (Homer and His Age.5 Jebb's little (Homer5 though now somewhat out of date is still an admirable summary. Another type of speculation about Homer combines critical analysis of the poems with the ancient tradi¬ tion of their collection, arrangement or recita¬ tion at a later date than their composition. Passages in Cicero, the Pseudo-Platonic Hip¬ parchus, and

Diogenes Laertius speak vaguely of some regulation of the order of the <(rhapsodes'5) recitations of Homeric poetry at the Panathenaic festival by Peisistratus or Solon or Hipparchus. The literature of the modern Homeric question beginning with Wolf's famous Prolegomena5 (1795) interprets this to mean that the (Iliad5 and the (Odyssey5 were late compilations of traditional ballad or epic material, and seeks to confirm this notion by disintegrating analysis of the defects in the plot of the poems and the inconsistencies be¬ tween their parts. The blown bubble of Wolf's reputation is punctured in Victor Berard's 'Un mensonge de la science allemande5 (Paris 1917). But apart from the personality of Wolf the entire speculative literature of the Homeric question is a gigantic bluff of modern scholas¬ ticism. It can be defended only as alchemy or scholasticism are approved, on the ground that the by-products of so great an intellectual ef¬ fort have been suggestive and interesting. Neither the facts nor the arguments of any one of the 20 or 30 most prominent books of this literature will endure critical scrutiny. This so-called science always breaks down when challenged by a competent scholar who knows the texts, as may be seen, for example, in many articles published in Classical Philology in the past 10 years. When Huxley enumerated in a list of the achievements of science the fact that "the unity of authorship of the 'Iliad5 was suc¬ cessfully assailed by scientific criticism, he was dogmatizing in dependence on authority about matters which he had not tested and which have now failed to stand the test. There is to-day neither proof nor preponderant probability that the II-XI to be a flaw is at least as well constructed as the 'iEneid5 or 'Paradise Lost.5 The Homeric poems are doubtless "traditional books.55 So- are Shakes¬ peare's plays, and there is no presumption that Homer followed his sources more closely than Shakespeare followed North's Plutarch or Lodge's Rosalind. The differences between the 'Iliad5 and the 'Odyssey5 are less than those between the earliest and the latest poems of Tennyson. and Goethe. And while it may be true that in Augustan ages great poets come in clusters there is no example in literature of two poems so great and so like by different authors. The wise student of literature, then, will not waste his time on these idle speculations but will endeavor by loving study of the poems themselves to appreciate their unique combina¬ tion of noble literary art with the charm of an earlier, simpler and more natural humanity. Consult Arnold, Matthew, 'On Translating

Homer ; Pope's Preface to his Translation; Shorey, introduction to edition of Pope's Homer* ; Mackail, (Lectures on Greek Poetry* ; Lang, (Letters to Dead Authors — Homer* ; Jebb, (Lectures on Greek Poetry.* See Iliad;*

Odyssey.

Paul Shorey,

Professor of Greek, University of Chicago.

HOMER, Winslow, American painter: b. Boston, 24 Feb. 1836; d. Scarboro, Me., 29 Sept. 1910. He studied in the National Acad¬ emy of Design, and was also a pupil of Frederic Rondel. He was sent to the front during the Civil War as special artist to Harper's Weekly, and on his return to New York exhibited his first important work, (Prisoner from the Front (1864), which won him recognition. In 1865 he was elected Academician. Taking up his residence in Scarboro, Me., he painted a series of pictures which indicated a marked develop¬ ment in style, sentiment and power. There was a trace of conventionality at least in the sub¬ jects of such pictures as 'Home, Sweet Home,* the series of which he painted between 1864 and 1884. From the latter date he began his por¬ trayal of the fisher population of New England. Dramatic and realistic in the highest degree is the series of seven canvases from the (Life Line* (1884) to the (Lookout* (1897). But this artist reached his finest vein in his pure marines, of which the greatest is (The Maine Coast.**

HOMESTEAD, hom'sted, Pa., borough in Allegheny County, on the Monongahela River and on the Pittsburgh and Lake Erie, the Penn¬ sylvania and other railroads, about seven miles south of Pittsburgh. It was settled in 1871 and incorporated and chartered in 1880. The chief manufactures are foundry-products, glass, machinery and steel products. It is noted for its large steel plants, which employ over 7,000 men. The government is vested in a mayor, elected for three years, and a council, which appoints the chiefs of police, street and waterworks departments. The borough owns and operates the waterworks. At one time An¬ drew Carnegie (q.v.) was the principal owner of the Homestead steel works. Pop. 21,256.

There occurred in Homestead a serious strike which began 6 July 1892. Reductions in wages, change in time of signing the schedule and refusal to recognize the Amalgamated Iron and Steel Association, or to -hold any confer¬ ences with the men, had brought on a general strike to date from a certain time, and enraged the men into'burning H. C. Frick, the manager, in effigv; whereupon the works were at once shut down, 1 July, two days ahead of the agreed time, and the men armed themselves and prepared to resist by. violence any attempt to supply their. places with non-union men. The advisory committee of the union took charge of the town with regular armed companies, and allowed no one to enter the mills without their permission. On 5 July the company announced an intention to make

repairs, and appealed to the sheriff for protection : he sent a small squad, who were at once driven from town by the strikers, the latter denying that any damage was intended and offering to be sworn in as deputies themselves. The company then hired a body of 300 Pinkerton detectives, who came up the river in barges; but the strikers broke

*through the fence surrounding the mill, en¬ trenched themselves behind a barricade of steel rails and billets, and whenever the Pinkerton men attempted to climb the steep bank (which they began at 4 a.m. of 6 July), shot them down. Next day they procured a 10-pounder brass cannon and bombarded the boat, splinter¬ ing her wooden sides, but failing to pierce the steel plates within. They then sprayed the boats with oil from a hose, and emptied barrels of it on the river, setting it on fire to float down and fire the boats. The detectives repeatedly ran up flags of truce, which were at once shot down. At length the advisory committee sent delegates to offer a safe-conduct to the detec¬ tives, if they would leave their arms and am¬ munition and quit the town under guard ; they were forced to submit, but when leaving under escort, the mob stoned, shot and clubbed them shockingly, one having an eye struck out by a woman in the mob. Seven were killed first and last, and 20 to 30 wounded; and 11 strikers and spectators were killed by their return fire from the boats. The governor (Pattison) re¬ fused to use the State power to quell the riot till the 10th, insisting that the local authorities must do their utmost first, and the sheriff must summon the citizens ; and the troops did not arrive till the 12th, when the town was put under martial law. A committee of Congress « was appointed to investigate the case ; and later, a Senate committee in the interest of the strikers was appointed to inquire into the hiring of private armed parties to maintain public order. On 21 July Mr. Frick was shot and stabbed in his office, but recovered. On the 18th a number of strikers were arrested for murder ; and retorted by indicting the Carnegie Com¬ pany, the Pinkerton brothers and five of their men for murder. The advisory committee was also charged with treason and usurpation, in taking military possession of the town. The mills were soon supplied with new men, but the strike was not officially declared <(off** till 20 Nov. 1892.*

HOMESTEAD EXEMPTIONS, home¬ steads of a certain value or extent which the law provides shall be exempted from sale on execution or by any final court process. Home¬ stead exemptions differ throughout the States.

*In Alabama <(every homestead not exceeding 80 acres and the dwellings and appurtances there¬ on** is exempt, if the property is not in any city, town or village; also, any city, town or village lot with its dwellings and appurtenances owned and occupied by a citizen and pot ex¬ ceeding in value $2,000 is exempt. In Florida the exemption is on half-an-acre city or town lot, and on 160 acres in the country. In Texas, the exemptions are on*

$5,000 city or town lots and on 200-acre counry lots. In Michigan on $1,500 urban lots and country lots of not over 40 acres. Exemption, however, does not ex¬ tend to lawful mortgages, to payment of pur¬ chase obligations and contracts, or from sale for public assessments and taxes. See Home¬ stead and Land Laws.

HOMESTEAD LAW. The Homestead Law is a series of enactments beginning with the Act of 20 May 1862, which provides for the disposition of the public lands to home¬ makers without requiring any compensation ex¬ cept the mere acts of residence, cultivation and improvement. A person who is the head of a

family or who has reached the age of 21 and \vho is a citizen of the United States or has declared his intention to become a citizen and who is not the owner of more than 160 acres of land in the United States, may apply for not exceeding 160 acres, and upon residing thereon, cultivating and improving the same for three years in compliance with the law may obtain patent therefor.

1 here are various modifications of the orig¬ inal law and various extensions by which one may obtain under recent acts 320 acres under what is known as the Enlarged Homestead Law, or as much as 640 acres in Western Ne¬ braska under what is known as the ((Kinkaid Act.ˆ The details of these acts will be dis¬ cussed under this title.

In the beginning of the history of the dis¬ position of the public lands the desire of the people seemed to be to secure a large return as rapidly as possible and many sales of large areas were made in the earlier period. This idea was later followed by the policy of en¬ couraging settlement on the public lands and the building of homes. See the article Public Lands.

The home-making idea and the disposition of the public lands gained greater and greater strength until in 1852 it became a national polit¬ ical issue. In that year the Free Soil democracy incorporated in its platform for the Presi¬ dential campaign this declaration : «That the public lands of the United States belong to the people, and should not be sold to individuals nor granted to corporations, but should be held as a sacred trust for the benefit of the people, and should be granted in limited quantities, free of cost, to landless settlers.®

This question held the public attention, was discussed and debated and remained a political issue before the people for 10 years. A home¬ stead

bill was passed by the House of Repre¬ sentatives in 1859, but after being voted on by the Senate several times failed to pass. In June 1860, after much discussion in both Houses, a homestead bill was agreed upon and presented to President. Buchanan, who on 23 June 1860 vetoed the bill.

The provisions of the bill may be sum¬ marized as follows : Any citizen of the United States who is the head of a family, and any person of foreign birth residing in the country who has declared his intention to 'become a citizen, may enter and settle upon not exceed¬ ing 160 acres of public land, and, after residing upon it for five years, shall receive patent for the land. The bill also contained a cession to the States of all public lands within their limits which remain unsold after having been subject to sale for 30 years.

The veto message states that the proposed cessions to the States would involve a present donation to them of 12,229,731 acres and would from time to time transfer to them other large bodies of land. President Buchanan stated a number of objections to the bill. His principal point was that the bill was unconstitutional because it made a donation of the public lands to the States and to individuals, holding that the power given by the Constitution to dispose of the public lands did not include the power to give them away. The President objected because of the injustice to the early settlers who had braved the hardships and dangers of

frontier life and had paid $1.25 per acre for their lands ; also because it would depreciate the value of the land warrants of old soldiers, which were given for their services in fighting the battles of their country. An effort was made in the Senate to pass the bill over the veto, but the necessary two-thirds vote in its favor could not be obtained.

In the political campaign of that year the Ljee-Homestead Law was an important feature of the discussions of Lincoln and the other candidates. Soon after the opening of the extra session called by President Lincoln to con- vene 4 July 1861, on account of the. troubled conditions in the South, a new homestead bill was introduced in the House of Representatives on 8 July, and it was promptly taken up at the opening of the regular session in December. There was vigorous opposition, and the bili did not pass the House of Representatives till 28 Feb. 1862. The bill was amended in the Senate and passed by that body on 5 May. The two Houses soon after agreed upon a form of bill, and it was finally passed by both Houses on 19 May and approved by President Lincoln on 20 May 1862. The Act as passed differs in only one important particular from the bill which was vetoed, namely, in the omission of the proposed cession of lands to the States.

The Homestead Law has now been on the statute-books for nearly 50 years, substantially as originally enacted. It is regarded as the basis of our land laws and was the most suc¬ cessful of our land policies. The constitution¬ ality of the Act does not seem to have been seriously questioned in the courts.

Under the Homestead Law proper, the appli¬ cant is limited to 160 acres and must reside upon the land and make it his home to the exclusion of any other residence during the period of three years. At the end of this time he may make final proof of his resi¬ dence and of the cultivation and improvement of the land. If this is satisfactory he re¬ ceives a patent from the United States which conveys to him full title and •unrestricted ownership. If a homestead settler dies without having filed application for entry or if having entered he has not submitted final proof, his rights pass to his widow or if there be none then to his heirs or devisees. If all the heirs are minor children and the other parent is dead the right to the patent vests in the children at once.

The laws provide for the commutation of a homestead entry before the completion of the three years' period of residence, after 14 months' continuous residence, and by the payment of $1.25 per acre, or, where the land is within the limits of certain railroad grants, $2.50 per acre and upon the proof of substantial im¬ provements and cultivation of not less than one-sixteenth of the area.

Homestead entrymen are not allowed to alienate any part of the land in the homestead entry prior to making proof except for public purposes, but they may mortgage the land for the purpose of securing money for improvement or for any other purpose not inconsistent with good faith. Only one homestead entry is al¬ lowed but where the original homestead entry was less than 160 acres an additional entry of such amounts as not to exceed a total of 160 acres will be allowed.

Beginning with the Act of 19 Feb. 1909 several acts were passed providing for en¬ larged homesteads not exceeding 320 acres of public land in the States of Arizona, California, Colorado, Idaho, Kansas, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming, ap¬ plicable, however, only to lands designated by the Secretary of the Interior as non-mineral, non-timbered, non-irrigable and subject to the said acts. The entryman of an enlarged home¬ stead must reside thereon for three years and must cultivate at least one-sixteenth of the area

for agricultural crops other than naked grass, beginning with the second year of the entry, and at least one-eighth of the area must be continually cultivated beginning with the third year.

The Kinkaid Act of 28 April 1904 provides for homestead entries not exceeding 640 acres in western Nebraska except for such lands as may be designated by the Secretary of the Inte¬ rior as irrigable. The general homestead laws will apply but the entryman must expend not less than $1.25 per acre in permanent improve¬ ments. Those who have already made home¬ stead entry may take additional land in the area covered by this Act but the total entered must not exceed 640 acres.

HOMICIDE, hom'i-sld, or man-killing, is either justifiable, excusable or felonious. Of the first sort are such cases as arise from un¬ avoidable necessity or accident, without any imputation of blame or negligence in the party killing. Where a crime is punishable capitally according to the laws, the judge is bound to condemn the criminal to death, and the sheriff or other executive officer to carry the sentence into effect in the manner prescribed by the sentence of condemnation. But the judge must have jurisdiction of the offense, and be duly commissioned; and the executive officer must be empowered to carry the sentence into effect, and must perform the execution in the manner prescribed by law, otherwise the execu¬ tion of the criminal will make the judge or the officer, as the case may be, guilty of crimi¬ nal homicide. So, too, where an officer of justice is resisted in the execution of his office, in his attempt to arrest a person in a criminal, or, as is maintained, even in a civil case, he is not obliged to give back, but may repel force with force; and if the person resisting is un¬ avoidably killed, the homicide is justifiable, for few men would quietly submit to arrest if, in case of resistance, the officer was obliged to give back. It is, however, laid down as law that if a felony be committed, and the felon attempts to flee from justice, it is the duty of every private citizen to use his best en¬ deavors to prevent an escape, and if in the fresh pursuit the party be killed where he cannot be taken alive, it will be deemed a justifiable homicide. The same rule applies to cases of an attempt on the part of a felon to break away and escape after he has been arrested, and is on the way to jail. So if a party has been indicted for felony and will not permit himself to be arrested, the officer having a warrant for his arrest may lawfully kill him if he cannot be taken alive. But this is to be understood only of officers, and not of private persons. Magistrates and officers authorized to

suppress and disperse mobs are justified by the common law in taking the requisite measures and using the requisite force for this purpose, though it extend to the killing of some of the rioters. The law arms every private citizen in the community with the power of life and death for the

prevention of atrocious felonies accompanied with violence and personal danger to others, as in case of an attempt to murder or rob, or commit burglary or arson, the person making the attempt may, by the common law, if he cannot be otherwise prevented, be killed on the spot, and the law will not recognize the act as a crime. In cases of this sort, in order to justify the homicide, it must appear that there were good grounds for a suspicion that the person killed had a felonious intent. A woman is justifiable in killing one who attempts to ravish her, and the husband or father may be justified in killing a man who attempts a rape on his wife or daughter.

The cases already mentioned of justifiable homicide are those in which the public authority and laws are directly concerned. The laws of society, however, leave every individual a por¬ tion of that right of personal defense with which he is invested by those of nature. If one may interpose to prevent an atrocious crime against society, where he is not himself in any personal danger, the laws will, a fortiori, permit him to defend himself against attacks upon his own person. Murder is the killing of a person who is under the protection of the laws, with malice prepense, either expressed or implied. Malice is the distinguishing character¬ istic of murder, and may be either aforethought, or expressed, or implied. It is not necessary in order to constitute the crime of murder that the slayer should have the direct intention of killing. If the act be done with d wicked, depraved, malignant spirit, a heart regardless of social duty, and deliberately bent upon mis¬ chief, it is characterized by what the law de¬ nominates malice though it may not result from any enmity or grudge against the particu¬ lar victim. So if a man wantonly discharges a gun among a multitude of people, whereby any one is killed, the act will be done with that depravity of disposition which the law considers malice. Murder can be committed only by a free agent, for the crime presupposes a will, motive or disposition on the part of the perpetrator. An idiot or insane person cannot commit this crime. But drunkenness is in general no excuse for homicide, though the act be done under its immediate influence.

The manner of killing is not material. Whether it be by shooting, poison, beating, im¬ prisonment, starvation or exposure to the in¬ clemency of the atmosphere, it will be equally murder. This crime may be committed by mere advice and encouragement. An infant unborn is within the protection of the law, and it is laid down that if, in consequence of poison given or wounds inflicted before the birth of a child which is afterward born alive, it dies soon after its birth, the act is murder. The act of suicide is considered by the law to be murder, and the person making away with himself is accordingly styled a "self-felon.® This view is undoubtedly being modified by public opinion.

The lines of distinction between felonious and excusable or justifiable

homicide, and be¬ tween manslaughter and murder, are in many

cases difficult to define with precision. But in general the accused has the advantage of any uncertainty or obscurity that may hang over his case, since the presumptions of law are usu¬ ally in his favor. The characteristic distinction laid down in law books between murder and manslaughter is the absence of malice in the latter. Sudden provocation may be an excuse for striking another without the intention to give a deadly blow ; and though death ensue, the party may not be guilty of murder. One circumstance, showing the degree of malice, or rather showing its presence or absence, is the kind of weapon used in giving a wound on a sudden provocation ; and another circumstance of importance is the fact of the weapon's being already in the hand or not', for going to seek a weapon gives time for deliberation. The ground of excuse of homicide, in case of prov¬ ocation merely, is the supposed sudden passion, some influence of which the law concedes to the frailty of human nature. But the excuse of self-defense goes still further; and where a man is attacked, so that his own life is endan¬ gered, or in such way that he may reasonably suppose it to be so, he may repel the attack with mortal weapons. One of the most fre¬ quent cases of manslaughter was that occasioned by single combat, and on account of the firm hold which the point of honor had taken of European nations, was long among the most difficult subjects of legislation. (See Duel). The crime of murder in its most aggravated de¬ gree is punished with death in most parts of the civilized world.

HOMILY (Greek, homilia, intercourse), as an ecclesiastical term, a discourse addressed to an audience on some subject of religion. The homily was so called to distinguish it from the speeches of profane orators. The ancient hom¬ ily was sometimes simply a conversation, the prelate talking to the people and interrogating them, and they in turn talking to and interro¬ gating him. The difference between the homily and the sermon was the entire absence of ora¬ torical display from the former, and the eluci¬ dation of the Scriptural text in natural order, without throwing the exposition into the form of an essay.

The earliest existing examples of the hom¬ ily proper are those of Origen in the 3d cen¬ tury. In the schools of Alexandria and An¬ tioch this form of discourse was sedulously cultivated, and Clement of Alexandria, Di¬ onysius and Gregory Thaumaturgus are among the names most eminent in this department. Augustine and Gregory the Great were among the Western composers of homilies. Later still Bede, several of the popes and foreign

ecclesi¬ astics still adhered to the homiletic form of exposition as the most suitable to impress the truths of Scripture with efficacy on the popu¬ lar mind.

In the Church of England there were two books of homilies that were long authoritative, and are still sometimes appealed to to settle disputes as to what the Anglican doctrine is in points on which they bear.

HOMING-PIGEON, a variety of the com¬ mon pigeon in which the love of home and power of flight have been developed to make the bird useful and reliable as a bearer of messages; also a fancy variety characterized

by the possession of certain definite points, but not necessarily useful as a homer. The show carrier-pigeon is a large, long-necked variety, with abnormally developed wattles about the base of the beak and round the eyes, but the true homer is of smaller size and lacks the enormous tuberculated growth.

The training and breeding of homing-pig¬ eons were long almost confined to Belgium, and two main types of the Belgian homer have been distinguished as the Antwerp and the Liege varieties, the former being larger but less graceful in form than the latter. American pigeon fanciers breed mainly from the Ant¬ werp type, and the birds are commonly desig¬ nated Antwerps.

The training of a homing-pigeon begins when it is about three months old. It may then be taken to a distance .of about a mile from its loft in a suitable direction and liber¬ ated in order that it may fly back. After an interval of a day or two it should be carried three miles from home in the same direction and set free, and on the third occasion, a few days later still, the distance is usually increased to six miles. This mode of training is con¬ tinued steadily during the season, the succes¬ sive distances above those already mentioned being 12, 25, 50, 75, 96, 125, 155 and 200 miles. The intervals of rest must be carefully pre¬ served especially in times when the weather is unfavorable. During the bird's second season it is made to repeat something of its first year's performances and to extend its flight to 250 miles or possibly to a greater distance. Dur¬ ing the following three seasons good birds will be at their best, and even for some few years later they may do good work. During the training period and also at other times the housing and feeding of the birds must be care¬ fully attended to.

Velocities of over 30 yards per second have been recorded for various pigeons, but the aver¬ age velocity is rather less than half that amount. One bird, in 1896, actually covered the distance from Thurso to London, just over 500 miles, within one day, its average velocity being about 24

yards per second. In unfavor¬ able weather the height attained varies from about 320 to rather over 400 feet, but in good weather some birds will reach a height of about 1,000 feet. The distance from Algiers to Paris, fully 1,100 miles, is one of the longest on rec¬ ord as having been traveled by a pigeon.

There has been much discussion regarding the means by which pigeons return to their homes over such long distances. Untrained birds often fail to return, and during training young birds are often lost.

Many instances are recorded of the employ¬ ment of pigeon messengers by ancient peoples. During the first half of the 19th century pig¬ eons were widely used in Great Britain for the rapid communication of intelligence, and in par¬ ticular many stockbrokers obtained early in¬ formation of the state of the markets by this means. The introduction of the electric tele¬ graph, however, soon led to the complete dis¬ use of the pigeon post. The siege of Paris during the Franco-German War of 1870— 71 first brought the carrier-pigeon into prominent notice as a valuable means of communication in time of war. During that siege, more than 350 birds were sent out of the city in balloons,

and of these some 300 were liberated with messages. Only some 70 returns were made, and these were effected by 57 birds. By the adoption of microphotography the space occu¬ pied by a message was so reduced that a single pigeon could carry a very large number of messages without having its movements ham¬ pered in the least. One of the pigeons that succeeded in returning to Paris carried no less than 40,000 messages on 18 collodion films which were enclosed in a goose-quill attached to the tail. Since that time the leading Con¬ tinental powers have established elaborate pig¬ eon systems for use in time of war. During the war with Spain, in 1898, the fleet of vessels that patroled the Atlantic Coast was supplied with a number of carrier-pigeons' ' cotes, but happily there was no occasion for testing their effectiveness, though in times of peace mes¬ sages are frequently successfully carried from war vessels to points on the shore. During the European War carrier-pigeons were exten¬ sively used by all the belligerents. Consult books mentioned under Pigeons.

HOMINIDiE, ho-min'i-de, the family to which man was assigned in the earlier systems of animal classification ; but many modern zo¬ ologists refuse him so great a distinction, mak¬ ing man, zoologically considered, only a species (Homo sapiens) of a genus of the family Simiidce, which

also includes the genera of the anthropoid apes. See Man.

/ HOMCEOPATHY signifies similar affec¬ tion, passion, suffering or disease. As em¬ ployed in medicine, and as understood by Hahnemann and physicians of the homoeo¬ pathic school, homoeopathy may be defined as : the. treatment of disease by means of its si- milimum. The cure is undertaken by a medicine capable of producing in a healthy person symp¬ toms similar to those manifested by the patient. The name or type of the disease, the type or class of the drug administered or the size or strength of the dose have no direct relation¬ ship to homoeopathy. Nevertheless, it does hold important incidental relationship to the classi¬ fication of drugs, to the facts and principles of dosage, to diagnosis, to pathology and bacteri¬ ology and to. all other departments of medicine and allied sciences. Under this definition, the experimental application of homoeopathy re¬ quires that the drug shall cover the tout en¬ semble — or, as Hahnemann expresses it, the "totality® of the symptoms as exhibited by the patient; and not merely one or a few of the dominant or diagnostic symptoms or condi¬ tions. Neither does it imply that the homoeo¬ pathic remedy can overcome any and all the adverse conditions and circumstances under which it may be administered. In its practice, homoeopathy recognizes this principle of sim¬ ilarity as between the symptoms of the cura¬ tive drug and the symptoms appearing in the patient. The symptoms exhibited by the pa¬ tient are carefully ascertained and studied with reference to their significance and relations, and these , furnish the indications upon which the selection of the ((similar remedy® is then made with equal care. Whether the object of the prescriber be immediate and complete restora¬ tion to health in a curable case or mere allevia¬ tion of suffering in a case not curable, the same course is pursued.

In homoeopathic practice the finding of the curative remedy is of first importance, as a matter of course. But the diagnosis of the case is a most urgent consideration, because it materially aids the physician in his quest for the "totality® of the symptoms, suggests his general management of the case, prompts the sanitary precautions to be taken, guides him in his prognosis, etc. Moreover, it sometimes calls to his mind a group of medicine's among which the curative similimum will probably be discovered, and in this indirect way may assist in the medical treatment.. Yet it must be dis¬ tinctly understood that in homoeopathic pre¬ scribing the final choice of the remedy is al¬ ways determined, not by the name of the dis¬ ease, nor even by the symptoms usually present in the disease, but only by those symptoms oc¬ curring in the individual patient. Pathology, both structural and functional, is also a sub¬ ject of careful research in connection with homoeopathic practice, as under other systems ; but never for the purpose of formulating "theories® of the nature of the disease, on which to base treatment.

In common with all other modern ((schools® of physicians, homoeopathists hold that when¬ ever the originating or ((exciting» cause of the disease can be discovered it should be removed if possible. When the disease does not disap¬ pear after removal of the cause which had ap¬ parently produced it, homoeopathic physicians are convinced that there must be some other contributory cause. In many cases this perpetu¬ ating cause is hidden and its nature altogether undiscoverable. They also hold the view that if this latter cause be removed the continuance of the malady is inconceivable. Equally in¬ credible is it that the disease can be actually cured® so long as the cause remains operative; it it could be, no matter how brilliant might seem the (

Under this view, that the disease has a cen¬ tral morbific cause, it is impossible that homoeo¬ pathists can accept the opinion that the malady can be cured by the mere lopping off of one or a few of its principal symptoms, or of its prominent pathological processes or conditions How, then, do homoeopathists explain their ability to reach with their remedies the per¬ petuating or "maintaining® cause of disease conceding, as they do, their inability to deter¬ mine its nature, or even its location? Starting out with the accepted principle that "like causes operating under like conditions produce like effects, the homceo.pathist assumes the con¬ verse of the proposition to be likewise true namely, that like results appearing under like conditions and circumstances indicate the op- eration of like causes. When two patients in similar conditions of health manifest similar*

morbid symptoms, the phenomenon is, by ail pathologists, considered as indicating the operation of causes in corresponding portions of the two organisms, and acting in a similar manner. This view is not peculiar to any med¬ ical school, but is held by all physicians alike. To this doctrine the homoeopathist adds the belief that it also applies to the effects of drugs, as well as to those of ordinary disease. Therefore, when similar morbid manifestations result, in one case from disease and in the other from the effects of a drug, the symptom- complex indicates a physiological (or patho¬ logical) cause operating in a similar part or parts of the organisms involved, and operating in a similar manner in both.

So much as to the locality of the cause, — the <(seat of the disease,® upon which the ˆsimilar® drug acts. What of the manner in which it acts? It was long ago shown by Hahnemann and others that the effects of almost any drug upon the human body are of two kinds, primary and secondary, di¬ rect action and reaction ; and that these two actions are, in a measure,

the opposite, one of the other. This view has been advocated by numerous physicians, not always of the homoeopathic school. Of late years the phe¬ nomenon has attracted -more attention from medical writers than formerly, and is generally spoken of as (

Homoeopathy, like any other principle or art, has its own particular field of application and operation. Thus it does not cure directly a mechanical injury to the tissues, or any im¬ pairment wrought by chemical means; though it does cure the functional diseases and dis¬ orders caused by the irritation of such in¬ juries. The homoeopathic remedy acts directly only upon function. It never alters a structure except by first modifying a function. Nor does a drug ever act homceopathically upon a func¬ tion unless that function be disordered. When a drug acts on a healthy function, or when it causes disorder in a function, such action is never homoeopathic, whatever may be the mode of the selection of the drug and whatever the form or quantity in which it is administered. Such, in brief, is an exposition of homoeopathic belief and practice, and of its underlying prin¬ ciples and doctrines as taught by Hahnemann and held by the profession as a body. The small dose used by homoeopathic prescribers is considered in another part of this article.

Homoeopathy as a mode of medical practice is usually said to have originated in 1796, when Dr. Christian Friedrich Samuel Hahnemann published in Huf eland's Journal, at Jena, an (Essay on a New Principle for Ascertaining the Curative Powers of Drugs. } In this essay he criticizes the state of the medical art, and especially urges that the chemical properties and powers of drugs are not adapted to the work of curing disease, but that cures must be accomplished by an entirely different property resident in medicinal substances. Having read of cures in medical literature and observed, in his own patients, recoveries occurring under the evident influence of the (section 26, in the following lan¬ guage : <(A weaker dynamic affection is per¬

manently extinguished in the living organism by a stronger one, if the latter (while differing in kind) is very similar to the former in its manifestation.® This action he designates the ˆhomoeopathic law of nature.® The term <(homoeopathy® or (

A correct and adequate conception of homoeopathy, of the difficulties necessarily en¬ countered in its propagation and establishment, and of the place it holds and the influence it exerts in the development of therapeutics can be obtained only through knowledge of the conditions of general medicine down to the close of the 18th century. It is essential, there¬ fore, that reference be made to certain points in the progress of medical history from its be¬ ginnings, to and including the period of the investigations that

resulted in the discovery of homoeopathy as a general therapeutic principle. This reference does not need to embrace all the departments of medical science — anatomy, physiology, pathology, etc. — but the department relating to treatment, or therapeutics only. It is requisite for us to know and appreciate the mental conception upon which the <(art of heal¬ ing® was established prior to the advent of homoeopathy as a system of medical practice.

The earliest efforts of men to alleviate the sufferings caused by illness and mechanical in¬ jury were chiefly instinctive. Water, moist earth, the fleshy portions of plants and other cooling substances were employed by men, as well as by the lower animals, to mitigate the pain, heat and discomfort of local inflammation; and other simple expedients were instinctively re¬ sorted to for various disordered conditions. In time the number and variety of known reme¬ dial agents, as well as the diseases for which they were used, must have been rapidly ex-

tended by experience. And thus began the "empirical method® of treatment — the natural second step in the progress of medicine. In¬ efficient as were these modes of treatment, they were far more rational than most of those that occupy the pages of medical history for many succeeding centuries. These later methods were based, not on observation and experience, but upon pure assumptions having, as John Stuart Mill expresses it, "no limitations other than those of the imagination.® (The construction of medical theories, or philosophical explana¬ tions of observed facts, was a still later de¬ velopment). Among the large number of these ancient hypotheses are the following: (1) That disease, is a punishment sent by some malevo¬ lent deity; (2) that it is due to the influence of a comet, a planetary conjunction, an earth¬ quake or some other celestial or terrestrial phenomenon; (3) that it is caused by ab¬ normal preponderance of some one of the four elements (fire, air, earth and water) of which the human body was said to be composed; (4) that it originates in a disturbance of the bodily states of heat, coldness, moisture and dryness ; (5) that it arises from disproportion in the lour humors which supply the organism- — blood, mucus, black bile and yellow bile; (6) that it is produced by a materia peccans, or offending matter, which must needs be ex¬ pelled; (7) that the body contains multitudes of "invisible pores® through which circulate infinitesimally minute atoms or corpuscles, and that disease has its cause in obstruction or re¬ laxation of these pores; (8) that disease is based upon three possible states of the organ- ism "strictum,® "laxum® or "mixtum® — which must be treated with

laxatives, astringents or a combination of both, as might be needed, etc. All these hypotheses, and many others, arose prior to the close of the 2d century a.d. Their absurdity is not more grotesque than that other hypothesis which underlies each and all of them, namely, that a knowledge of the cause or nature of disease necessarily indicates the means and method of its cure; a view not held at present by any homoeopathic or other scien¬ tific physician. The period between the 2d century and the 15th presents little record of therapeutic art; but with the invention of the printing press came a stronger impetus to all forms . of research, medical included. Since "J'M increasing knowledge of anatomy,

chemistry, bacteriology and physiology has led to the elaboration of therapeutic theories based upon certain facts relating to these natural sciences. The advances in anatomy had sug¬ gested a mechanical basis for therapeutics ; pneu¬ matics, friction of fluids in vessels, the diam¬ eters, curvatures and angles of blood-vessels were brought forward to explain the phenomena of disease and to suggest measures for its cure Physiology and chemistry brought out a re¬ newal of the ancient doctrine of "four ele¬ ments® . and the substitution of the three alchymistic symbols® represented bv mercury, salt and sulphur, whose union is health and their separation disease. The author of this doctrine, Paracelsus, also ascribed to the "vital force®, not only power, but also the intelligence, t° resist disease and to provide for its cure' About the middle of the 18th century, or near the time at which the discovery of the general principle of similars was made, physiological

hypotheses became largely identified with thera¬ peutics; and the same might be said of chemk al theories. Health and disease were the result,, of a contention between the acids and the al¬ kalis. Haller held to the view that disease was due to change in the "irritability® of the tissues. Cullen revived an old doctrine that disease was caused by "spasm® and "atony® and required to be treated in accordance with that view. Brown, the rival of Cullen, con¬ cluded that diseases were either "sthenic® or "asthenic,® and required asthenic, or sthenic medication, as the case might be. Before the close of the 18th century the medical profes¬ sion had acquired knowledge of a number of drugs possessed of "specific® properties for the cure of particular diseased conditions; among them were Peruvian bark for intermittent and other malarial fevers, mercury for syphilitic diseases, sulphur for itch, etc. These specifics exerted their curative effects by virtue of prop¬ erties not at all understood at that time, and but imperfectly known a century later. These specific cures were limited to comparatively few diseases.. For the treatment of the conditions with which the -medical practitioner is contend¬ ing daily which constitutes almost his entire duty, he depended on nothing but fallacious assumptions and hypotheses. Such was the condition of the .medical art at the time Hahne¬ mann. began his

independent researches in ther¬ apeutics.

. nannemann possessed unusual linguistic at¬ tainments, which gave him access to the pub¬ lications not only of Germany, but of Eng¬ land . France, Spain, Italy, Austria, Greece and Arabia Not only was he a scholar in the held of letters, but he was also a practical expert in chemistry, pharmacy and industrial technology. He made many discoveries in in¬ dustrial chemistry and introduced scores of im¬ provements in the details of manufacturin'"- chemical products. At the period of his ear hest responsible connection with medicine "there was,® says Rapou, "complete anarchy in the domain of therapeutics.® Hahnemann, unwill- mg to trust the lives of his patients to the tender mercies of this conglomeration of as¬ sumptions, adopted the use of the class of remedies known as specifics, whose effects were easily ascertainable, though their modus oper- andi was altogether unknown. Homoeopathy was not an invention, like some of the "

«

terns® of medicine that preceded it; neither Was it a sudden discovery. It was an evolution

*Ivon6 \°oPˆent Raiding over the time from 1790. to 1835, a period of 45 years. The earlier portion of the process is described by Brad- W1° in sPeaking of its beginning says * We now come to the translation of a very im¬ portant book (Cullen's (Materia Medica)), 'from which must be dated the discoverv of the Law of Similars. He was translating for the book- sellers and publishers of Leipzig, and it is not hkely that he selected the books which he was \o translate. Dr. Cullen was an authority on the subject of the materia medica of his'dav an expenenced lecturer, a talented chemist and a . bnlliant and popular teacher in Edinburgh. J\ aturally, the Germans wished to learn of his new and peculiar theories regarding disease H yeVs to obtain the use of his 'Materia work03' Wˆlcˆ at time was a standard*

(< Hahnemann was the most accomplished translator of medical works of the time, and what more natural than that the task should be given to him. Cullen published the first edition of this book, in London, in 1773. Another edi¬ tion was issued in 1789, in two volumes, and it was this edition that Hahnemann used in his translation. In this book, Volume II, Cullen devotes about 20 pages to Cortex Peruvianis (Peruvian Bark), gives its therapeutical uses in the treatment of intermittent and remittent fevers,*

advises its use to prevent the chill, and gives minute directions for the safest period of the disease in which to use it. Hahnemann was impressed with the use of this drug, with which he, as a physician, had before been familiar. Something in the manner in which Cullen wrote decided Hahnemann to experi¬ ment with it upon himself and to see what effect it would have upon a person in perfect health. The result of this experiment will be given in Hahnemann's own words. In the translation of William Cullen's (Materia Med- ica) (Leipzig 1790, page 108 of Vol. II), ap¬ pears the following foot-note by Hahnemann : (By combining the strongest bitters and the strongest astringents, one can obtain a com¬ pound which, in small doses, possesses much more of "both these properties than the bark, and yet no specific for fever will ever come of such a compound. This the author, (Cullen) ought to have accounted for. This perhaps will not be so easily discovered for explaining to us their action in the absence of the Cinchona principle.

<((I took, by way of experiment, twice a day, four drachms of good China. My feet, finger ends, etc., at first became cold ; I grew languid and drowsy; then my heart began to palpitate and my pulse grew hard and small; intolerable anxiety; trembling (but without cold rigor) ; prostration throughout all my limbs; then pul¬ sation in my head, redness of my cheeks, thirst, and in short, all those symptoms which are characteristic of intermittent fever, made their appearance, one after the other, yet without the peculiar, chilly, shivering rigor.

((< Briefly, even those symptoms which are of regular occurrence and especially characteristic — the stupidity of mind, the kind of rigidity in all the limbs, but above all, the numb, dis¬ agreeable sensation which seems to have its seat in the periosteum, over every bone in the body — all these made their appearance. This paroxysm lasted two or three hours each time, and recurred if I repeated this dose, not other¬ wise ; I discontinued it and was in health.®

(

35-37).

These experiments seemed to show that Peruvian bark is capable of producing in the healthy human organism a series of symptoms quite closely resembling those of that peculiar form of fever which it is known to cure. In¬ stead, however, of solving any questions in the mind of Hahnemann it only served to suggest several others. Does Peruvian bark then pro¬ duce the same symptoms that it specifically cures? If so, is this power peculiar to Peru¬

vian bark, or is it to be discovered in other drugs r And do all drugs possess the power to cause symptoms similar to those they cure? To obtain light upon these questions occupied his efforts during the six years between the translation of Cullen's (Materia Medica5 and the publication of the c Essay5 above mentioned. To quote from a writer in the British Homoeo¬ pathic W orld (1875, p. 234) : ((Drug after drug, specific after specific, was tested on himself and on healthy friends with one unvarying result — each remedy of recognized specific power ex¬ cited a spurious disease resembling that for which it was considered specific. But many more symptoms than those diagnostic of any one disease resulted from almost every medicine, and aroused a hope in the experimenter's mind of specifically treating a greater number of dis¬ eases than had ever been so treated before. Besides discovering many valuable phenomena undreamt of, he verified his discoveries and observations by ransacking the volumes of re¬ corded experiments in materia medica and the whole history of poisoning.® The members of his family and his personal and professional friends aided in the work of experimentation, and tests of each medicine were made with different doses, and on many different persons, all the work being conducted under his own supervision.

Dr. Bradford tells us that at the time of Hahnemann's translation of Cullen's (Materia Medica,5 that is, at the beginning of his in¬ dependent investigations in 1790, he had no preconceived theories or opinions to sustain. This view of his biographer is corroborated by the absence from Hahnemann's writings of even remote reference to any a priori concep¬ tion or suspicion of a general curative relation between drugs and diseases. Nor does it ap¬ pear that he then possessed the faintest con¬ ception of the magnitude, or of the quality, of the task he was gradually assuming. His orig¬ inal object evidently was to ascertain why Peruvian bark cures intermittent fever, and to learn if the view held by Cullen — that its curative property resides in a combination of bitter (tonic) and astringent qualities — was indeed true. There is no historic evidence that before 1790 the general therapeutic principle of similars had even dawned upon his mind. But we may be quite sure that the logical and philosophical principles that must necessarily govern his researches had been well thought out before the work had very far advanced.

Hahnemann and his disciples claim that in the discovery of homoeopathy as a general prin¬ ciple of organic science, and in its conception and development as a system of medicine, as¬ sumption, speculation and hypothesis have had no place ; but that observation, experimentation and inductive classification constitute the scien¬ tific and solid foundation of fact upon which it rests. They assert that all its essential doc¬ trines are susceptible of demonstration, that they have been verified and reverified times without number, and that for the first time in the history of

intellectual development the estab¬ lishment of the homoeopathic principle showed that the Baconian method of research is as applicable in the realm of therapeutics as in any other department of scientific investigation. If we look over the records of the processes leading to its discovery, it appears that these

processes were under the guidance of the fol¬ lowing principles of scientific philosophy, all ot which are distinctly set forth by Hahnemann m his 'OrganonJ : (1) That in'the study of

disease with a view to its cure, the only safe dependence is upon the manifestations (symp¬ toms) perceptible to the senses, and that no safe conclusions can be drawn from mere theories erected upon these signs and symptoms, lhe signs and symptoms constitute the only side of the disease that is turned toward the physician, and the totality of these signs fur- nishes the only true expression or portrait of tie disease, (2) that the specifically curative power of a drug resides not in its physical, nor yet in its chemical properties, but in its capac¬ ity to produce changes in the functions of the organism; (3) that the dynamic properties of a drug — in other words, its power to specific- a ly cure disease — can be ascertained only by observing the signs and symptoms which it can produce in the organism, and that these specific- ˆ y curative properties cannot be inferred from the physical or chemical properties of the drug substance; (4) that experiments for the pur¬ pose ot ascertaining the pathogenetic properties (signs and symptoms) of drugs must be con¬ ducted under the precautions necessary in other researches; and the tests must be repeated and varied with a view to eliminating every influ- ence and agency that can vitiate the experiment.

1 ne drug experimented with, and the person experimented upon, must both be "standard.® lhat is, the drug must be pure and unmixed W1 j. _ai)y other substance capable of disguising modifying, or otherwise affecting its own spe¬ cific activity, and the person experimented upon (prover) must be possessed of good health and free from any unhealthful occupation or habit, and from any mental, moral or other influence or agent that modify the pure effects ot the drug upon his organism. Also, that the experimentation with the drug must be con¬ tinued until its whole pathogenetic effect has been elicited; (5) that the observations made from such experiments as those here indicated constitute the only source of a pure and «stand- a . materia medica, and supply the only ma¬ terial from which general therapeutic principles can be discovered or deduced; (6) that

ef¬ fects observed from the action of a drug upon diseased persons (clinical effects) or those ob¬ tained irom a combination of drugs (polyphar¬ macy) are not "standard® effects and cannot serve as reliable guides in a search for thera¬ peutic principles.

In the opening sections of the 'Organon > Hahnemann mentions as among the physician's essential acquirements : (1) Knowledge of

disease (2) knowledge of the dynamic prop¬ erties of drugs; (3) knowledge of the curative relations between the two. This knowledge he holds essential both to the development of thera¬ peutic science and to enable the physician to prescnbe the curative remedy. In order to qualify the physician for his work his knowl¬ edge of disease must be composed of facts perceptible to the senses. Our physiological and pathological deductions in reference to a case of disease are more or less uncertain and theoretical. Absolute knowledge of disease is limited to its signs and symptoms, besides which there can be no certain and assured foundation for a science of therapeutics. The knowledge

of drug-properties must be equally certain and substantial. All drugs possess three classes of properties — physical, chemical, and specific or dynamic.® The physical and chemical proper- can be ascertained by physical and chemical methods. The specific or dynamic properties, that is, the properties which alone impart the power to accomplish specific cures of disease, can be learned only by observing their power to cause changes in the health of the organism as shown by their capacity to produce signs and symptoms. Here again the signs and symptoms constitute the only sure basis of classification and induction in the construction of a science of therapeutics.*

Possessed. himself of so much of such knowledge as was within his reach, Hahnemann then began the investigation of the great and dominating question : Given a knowledge of diseases as expressed by signs and symptoms, and a knowledge of drug properties as ex¬ pressed by signs and symptoms, can we discover between them any general relation that will guide the physician in his search for the cura¬ tive drug? In this work of "interrogating nature he had already been led to infer what her reply might be. His experiment with Peru¬ vian bark had given him a somewhat emphatic hint. Then followed the six years o'f experi- ments upon himself, his family and friends; with what result we have already seen. Ac- companying and following came the "ransacking of the libraries® — a work for which few men were so will fitted. This literary search re¬ sulted in two important discoveries. First that when two diseases manifesting quite similar symptoms appear in the same organism they antagonize or annihilate each other. This sub¬ ject is carefully outlined in the 'Organon

(sections 42-45) and in section 46 the writer cites a score of illustrative instances obtained trom the pages of contemporaneous literature the authority being carefully mentioned in every citation. # The second result of this hterary search is that it corroborates the view with which Hahnemann set out, namely, that even under the modes of treatment in vogue before h!s day, undoubted cures frequently re¬ sulted from the action of drugs possessed of the power to cause symptoms similar to those of the cases cured. Some of these cases are well worthy of study by these interested in medical subjects. In the earlier editions of the Organon and in the 'Essay on a New Prin- ciple for Ascertaining the Curative Powers of Drugs, these published cures are reported in extenso, the literary source being given to-

Cr TWltf4, thn !!iame °f the Physician in 'each case. In the Dudgeon translation of the fifth

German edition the same list occupies 31 pages of the appendix. In practically all of the cases reported, the mere name of the disease is suffi¬ cient to suggest the fact of similarity between the symptoms of the malady cured and the symptoms of the drug prescribed. In other cases the symptoms themselves are given with more attemon to detail than was customary at that period of medical history. If we sum un the remedies named in the 'Essay > together

r!otil°of Mniioned in 'Organon,- we have a totai of 63 drugs to which Hahnemann was

able to ascribe homoeopathic cures occurring in

the pracfice of physicians who had no knowledge

of the homoeopathic principle. In presenting this

list of cases successfully treated with the similar remedy Hahnemann had made nearly 500 cita¬ tions of writers who had no suspicion that any general law of therapeutics was involved in the operation of their prescriptions. The degree of similarity shown between the pathogenetic prop¬ erties of the drugs administered and the symp¬ toms manifested by the patients seemed, in most cases, to be positive and emphatic, and in some instances striking. _ In what he has to say regarding the curative effects of opium this fact is graphically shown. He says: "A condition of convulsions without consciousness, resembling the death-agony, alternating

with attacks of spasmodic and jerky, sometimes also sobb:ng and stertorous, respiration, with icy coldness of the- face and body, lividity of the feet and hands and feebleness of the pulse (precisely resembling the symptoms of opium observed by Schweikert and others), was at first treated unsuccessfully by Stiitz with potash, but afterward cured in a speedy, perfect and permanent manner by opium. According to Vicat, J. C. Grimm and others, opium produces an extreme and almost irresistible tendency to sleep, accompanied by profuse perspiration and delirium. This is the reason why Osthoff was afraid to administer it in an epidemic fever which exhibited similar symptoms, for the sys¬ tem he pursued prohibited the use of it under such circumstances. It was only after having employed in vain all the known remedies and seeing that death was imminent that he resolved to try it at all hazards and behold, it was always efficacious. J. Lind also avowed that opium removes the head troubles, and the burning sensation in the skin and the difficulty of perspiring during the pyrexia ; under opium the head becomes free, the burning febrile heat disappears, the skin becomes soft, and its sur¬ face is bathed in a profuse perspiration. But Lind was not aware of the circumstance that opium produces very similar morbid symptoms in the healthy. Alston says that opium is a rem¬ edy that excites heat, notwithstanding which it certainly diminishes heat where it already exists. De la Guerene administered opium in a case of fever attended with violent headache, tension and hardness of the pulse, dryness of the skin, burning heat, and hence difficult and debilitating perspirations, constantly interrupted by the ex¬ treme restlessness of the patient. He was suc¬ cessful in this case because opium possesses the faculty of creating an exactly similar feverish condition in healthy persons, of which he knew nothing, though it is stated by many observers. In a fever where the patients were speechless, eyes open, limbs stiff, pulse small and inter¬ mittent, respiration labored, snoring and stertor¬ ous and deep somnolence (all of which are symptoms perfectly similar to those which opium excites), this was the only substance which C. L. Hoffman saw produce any good effects. Wirthenson, Sydenham and Marcus have in like manner cured lethargic fevers with opium. C. C. Mathai, in an obstinate case of nervous disease, where the principal symptoms were insensibility and numbness of the arms and legs, after having for a long time treated it with inappropriate remedies, at length effected a cure by opium, which, according to Stiitz, Young, and others, causes similar states in an intense degree. Hufeland performed, by the

use of opium, the cure of a case of lethargy of several days' duration. How is it that opium, which, as everyone knows, of all vegetable sub¬ stances is the one which in its primary action (in small doses) produces the most severe and °o:Sˆnaˆe consˆPahon, should be one of the most efficient remedies in constipation of the most dangerous character, if not by virtue of the homoeopathic therapeutic law, so long un¬ recognized? The honest Bohn was convinced by experience that opiates were the only reme¬ dies in the colic called "miserere" ; and the cele¬ brated F. Hoffman, in the most dangerous cases of this nature, placed his sole reliance on opium combined in the anodyne liquor called after his name. Can all the "theories" contained in the 200,000 medical books which cumber the earth furnish us with a rational explanation of this and so many other similar facts? The great German physician and philosopher was careful to credit other medical men with hav¬ ing obtained foregleams of his great discovery. "How near," he says, "was the great truth sometimes of being apprehended !» And again, "There have been physicians here and there across whose minds this truth passed like a flash of lightning without ever giving birth to a suspicion of the homoeopathic law of nature."

From Hahnemann's literary and experi¬ mental investigations alone, both he and his disciples have unhesitatingly justified their be¬ lief in a general curative relation between drugs, as represented by their symptoms, and diseases as represented by their symptoms, and their belief that this curative relation is prop¬ erly set forth by the word "similarity." The proofs herein presented are considered con¬ clusive, although similar evidence has been con¬ stantly accumulating in the writings of medical men of all schools, and in the practice of hun¬ dreds and thousands of homoeopathic physicians for more than a century.

In Hahnemann's foot-note (Dudgeon's Appendix to the (Organon, p. 207) it is shown that he early became aware of the "danger which is to be anticipated from large doses of homoeopathic remedies." He says, however, that "it often happens, from various causes which cannot always be discovered, that even very large doses of homoeopathic medicines effect a cure, without doing any particular harm." In most instances homoeopathic phy¬ sicians come to regard the small dose as a necessity to homoeopathic practice. Thus, a full dose of belladonna, or of opium, administered to a patient already suffering with symptoms like those producible by one of these drugs, might be perilous. Experience also taught them that the curative action of the homoeopathic drug could be secured as well or even better through the small dose. The results claimed for these small or minute doses naturally aroused the skepticism of physicians and lay¬ men alike, and became a serious hindrance to the spread of the homoeopathic system. The very nature of the homoeopathic principle, how¬ ever, carries with it*

the necessity for the use of the diminished dose. Homoeopathic physi¬ cians, when prescribing minute doses of their remedies, are under the necessity of employing great care in securing absolute purity and simplicity in the preparation of their medicines ; and this has led to the need of a special phar-

macy for homoeopathic prescribers. Another corollary of the homoeopathic .law of cure is the <(single remedy,® without which no prescription can be strictly homoeopathic. Still another prin¬ ciple follows from the application of this law, namely, that a homoeopathic prescription can never be made from the name of the disease. The similarity must be traced between the symptoms of the drug and those of the indi¬ vidual patient. This fact is fortunate in that it at once brands the advertised ˆhomoeopathic® proprietary medicine as a fraud and a pretense, no matter in what form it may be put upon the market. The spread of homoeopathy in the country of its birth, and in other countries of Europe, has been slow. The delay in securing its establishment has been due partly to the cause already mentioned : — an unwillingness on the part of both physicians and laymen to ac¬ credit the little dose with curative potency. But the chief obstacle to its advancement is to be sought in inimical legislation and the lack of facilities and authority to educate young men and women for homoeopathic professional life, and the consequent inability to supply the pub¬ lic need of homoeopathic physicians/ Homoeo¬ pathy was introduced into the United States in 1825 by a physician named Hans B. Gram, who, at that time, settled in New York. In this country, with its free institutions and its as¬ serted freedom of opinion, the new medical thought found less antagonism to overcome, al¬ though there were many obstacles to be en¬ countered, chiefly of a social and legislative character. The physicians of America, less con¬ servative, perhaps, than those of Europe, were more disposed to inquire into the scientific and practical aspects of homoeopathy, with the re¬ sult that in less than 20 years more than 300 of them were engaged in its practice. These physicians speedily conceived the necessity for having their own students educated under teach¬ ers of their own faith and practice, and in 1848 organized and equipped a medical college for this purpose. This school was almost im¬ mediately succeeded by others, and these insti¬ tutions have very largely contributed to the rapid spread of homoeopathic practice in all parts of the United States. When Dr. H. B. Gram arrived in New York in 1825, the only homoeopathic literature in the English language was Hahnemann's (Geist der homoeopathischen HeilkunstP a pamphlet of 24 pages, translated by himself and published by J. & J. Harper of New York. At the close of the

first quarter- century of the new practice, more than 25,000 pages in the English language had been pub¬ lished by the homoeopathic press, and at the end of 50 years the aggregate reached more than 150,000 pages. (Consult transactions of the World's Homoeopathic Convention of 1876, > Vol. II, pp. 1020-65). The progress that homoeopathy has made in the United States can be best shown by the records of its organ¬ ization and institutions. The American Insti¬ tute of Homoeopathy, the national society of homoeopathic physicians, organized in 1844, now has a membersh:p of over 3,500. There are six other national organizations, formed to pro¬ mote various departments of medical and sur¬ gical interest. State societies are organized in 46 Commonwealths, and at the present rate of increase these bodies will, in a few years, exist

in every State. To these may be added 150 local societies of various kinds. In the United States homoeopathic physicians are in charge of 220 hospitals, general and special, 66 other institutions, asylums, homes, etc., and 65 dis¬ pensaries, 20 medical colleges and 32 medical journals.

The exact number of physicians practicing homoeopathy in the United States cannot be ascertained with accuracy, but it is known to be not less than 12,000, and has been estimated as high as 18,000. The number of people em¬ ploying these physicians, regularly or irregu larly, cannot be less than 15,000,000. Thus has the influence of homoeopathy extended during its American career of 75 years. The influence of homoeopathy upon public and professional sentiment has been beneficent and pronounced. Daymen and physicians have alike learned from the practice that large quantities of potent and dangerous drugs are not often necessary to de¬ termine recovery from disease, and physicians have reached the wise conclusion that cures sometimes occur under the influence of small doses, as well as quantities with larger.

Bibliography.— Ameke, < History of Ho¬ moeopathy) ; Boericke, (A Compend of the Principles of Homoeopathy ; Bradford, ho¬ moeopathic Bibliography of the United States from the Year 1825 to 1891 inclusive) ; ;*

Pemberton Dudley, M.D., Late Professor of Institutes of Medicine, Hahne¬ mann Medical College, Philadelphia' Pa.

Revised by Royal S. Copeland, M.D., Dean New York Homoeopathic Medical College and Flozver Hospital.

HOMOOUSIAN, ho-mo-oo'si an (Greek homo-, (HOMOIOU.SIAN (Greek homoios , ((like,® and ousia, «substance»). The Council of ' Nice adopted the word homoousian to express that the Son was of the same substance with the Father, while the followers of Arius adopted the term

homoiousian, as a sort of middle and reconciling theory, to express that the Son, though not of the same, was yet of a similar substance with the Father. The doctrine of Ananism was not only that the Son was sub¬ ordinate to the Father, but that he was totally unlike him, being a mere created being. See Christian Doctrine; Creeds and Confessions.

HOMOPLASY, ho'mo-plas-i, the effect of the influences of convergence (q.v.), upon homologous structures. The term was proposed by E. Ray Lankester and used at first with a rather broader meaning subsequently restricted and defined by Osborn. See Analogy.

HOMOPTERA. See Hemiptera.

HOMS, horns. See Hems.

HONDA, Yoitsu, Japanese Methodist Epis¬ copal bishop: b. Hirosaki, Hondo, 1848; d. 1912. He studied first at Yokohama where he accepted Christianity, and was baptized in 1872. Joining the Protestant Church, he became a member of the provincial assembly and in 1878 was ordained local elder of the Methodist Episcopal. Church. From 1889-90 he attended the Drew Theological Seminary in the United States, and returning to Japan assumed the presidency of the Anglo-Japanese College of the Methodist Episcopal Church. In 1907, he was elected first bishop of the newly-organized Methodist Church of Japan. Reverend Honda was extremely ac¬ tive in Y. M. C. A. work, representing his nation at the World's Student Conferences in Europe several times. He was in the United States in 1910 as delegate to the M. E. Confer¬ ences, and the World's Sunday School Conven¬ tion. Throughout Japanese Christendom he was recognized as an able leader and repre¬ sentative.

HONDO, hon'do (signifying <(chief island"), .the largest island of Japan (q.v.), for a long time erroneously known as Nippon or Niphon, the Japanese name for the whole empire.

HONDURAS, Central American republic, bounded on the north and northeast by the Gulf of Honduras and the Caribbean Sea; on the southeast and south by Nicaragua; and on the southwest and west by the Gulf of Fonseca, Salvador and Guatemala. Estimated area, 46,250 square miles. The republic, divided into 17 departments and one territory, has as its present capital the city of Tegucigalpa, the onl}r national capital in the new world without a railway. The number of Tegucigalpa's in¬ habitants was given in 1916 as 40,000. It is situated on an interior plateau about 3,200

feet above sea-level, 12 hours' journey by automo¬ bile from the nearest port, Amapala.

Mountain ranges, which rise to heights of 5,000 to 10,000 feet, are massed in the western half of the republic; the Camasca and Tom- pocente ranges, however, are near the frontier of Nicaragua in the east, and parallel with these and some 200 miles from the frontier is the Juticalpa Range, which stretches from the coast into the interior. Rivers emptying into the Caribbean Sea or Gulf of Honduras are the Patuca and Negro, in the east, and the Ulua in the west. The Choluteca flows southward from the Misoco Mountains near Tegucigalpa, and empties into Fonseca Bay, on the Pacific coast. Large lakes are the Caratasca on the Mosquito coast, and Yojoa, among the western mountains. The chief port on the Pacific is Amapala; other ports of entry are Omoa, Puerto Cortes (on the Gulf of Honduras), La Ceiba, Trujillo and Roatan (on Bay Islands).

History and Government. — The first place of debarkation of Christopher Columbus on the American mainland was near the present Cape Honduras, where he landed on Sundav, 14 Aug. 1502. On the following Wednesday Barthol¬ omew Columbus landed at the mouth of the Rio Tinto. They sailed thence along the coast to Cape Gracias a Dios. The conquest of the country was effected by Hernan Cortes, who set out from Mexico City to bring to terms one of his officers, Cristobal de Olid, who had founded Triunfo de la Cruz in Honduras,

and established an independent government. The march to Honduras occupied six months and Cortes found the natives manageable, but their land ((covered with awfully miry swamps," as he wrote to the Spanish monarch 3 Sept. 1526. (

(

The first constitution of Honduras was adopted in 1848, the second in 1865, the third in 1880 and the fourth, under which the country is governed to-day, became operative 1 Jan. 1895. The usual division of authority between legislative, executive and judicial branches is followed; Congress, however, is a single body, the Chamber of Deputies, consisting of 42 members, elected by direct vote for a term of four years at the rate of one deputy for every 10,000 inhabitants. The chamber is renewed by halves every second year, and for each deputy a substitute is elected to take his place when¬ ever necessary. All male literate citizens over 18 years of age, if married, or 21, if unmarried, <(are not only entitled but are compelled" by law to vote. The President and Vice-President are elected for a term of four years by direct vote. The President is assisted by a cabinet of six ministers: Minister of Government an

Justice, of Encouragement (Fomento), Public Works and Agriculture, Foreign Relations and Public Instruction, War and Navy, Treasury and Public Credit. The judicial branch in¬ cludes a Supreme Court (five justices elected by popular vote for four years) ; municipal courts (judges appointed by Supreme Court), and justices of the peace elected by popular vote, u e 10. of the constitution declares

Opt The Republic of Honduras is a sacred refuge for every person fleeing to its territory,®

aa i- l ■' ' 27 the death penalty is

abolished. Military service is compulsory from the ages of 21 to 40. The standing army num- 2,000, approximately, and the reserve has 54,000 officers and men. Two small vessels are placed in the. care of the Minister of War and Navy, for patrol duty along the coasts.

The institutions for secondary education under public control are the National Institute of Tegucigalpa, the National College of Santa Rosa «La Independence® of Santa Barbara and «La Fratermdad® of Juticalpa. A school of commerce is annexed to the National In¬ stitute. Education is nominally <(free and com¬ pulsory®; and facilities are actually provided at Ceiba, where schools are supported by the municipal government, and to a limited extent in poorer sections by a small tax or assessment imposed by the national government. The uni¬ versity at Tegucigalpa has faculties of medicine, law, political and natural sciences. A military college also forms part of the university. At Comayagua there is a school of jurispru¬ dence. According to an official statement, mixed schools, attended by boys and girls together, will be established in rural districts. Provision for agricultural training has not been made on an adequate scale; the training of teachers is done in five normal schools, one in each of the departments. Freedom of worship is secured by constitutional guaranty. The government does not contribute to the support of any church, but the prevailing religion is Roman. Catholicism.

National Activities.— Agriculture receives more attention than formerly. The leading product for home consumption is still maize, 224,844,500 pounds were raised in 1914-45, chiefly in the departments of Copan, Gracias and Santa Barbara. Bananas are cul¬ tivated for export principally and, although the banana grows wild in nearly all parts of Honduras up to an elevation of 3,000 feet, the industry (at present the

most important) of cultivating this fruit for export is confined to the hot lands along the north coast, not ex¬ tending farther inland than 50 of 75 miles The shipping-points are Puerto Cortes, La Ceiba and Trujillo, adjoining such lands. F“om the

rSnmnAA°-ne(Port shipuients average about $1,000,000 in value a year for over 1,000,000 bunches. The annual wheat crop is about

] c°ffee > 3,860,000 pounds; rice,

4,000,000 pounds ; beans, 14,030,000 pounds, and tobacco, 1,500,000 pounds.. Nearly 20,000 acres are devoted to the cultivation of plantains. Cocoanuts, lemons and oranges are grown for export on a large scale. Sugar-cane is culti¬ vated on 13,263 acres; indigo on about 9,000 acres. The total value of agricultural products annually is about $3,000,000. Honduras is es¬ sentially a cattle country. The number of cattle is estimated at 571,120; horses 68,000;

mules, about 25,000. Large quantities of sarsaparilla are exported to the United States.

Prolonged drought during 1913-14 oc¬ casioned short crops and has been a calamity perhaps greater for Honduras than the Eu¬ ropean War. The total value of the republic’s * foreign commerce, in the fiscal Vear 1913-14 was $10,046,261 ; imports, $6,624,930, and ex¬ ports $3,421,331. Products exported were: Ba¬ nanas 6,610164 bunches; coffee, 1,214 454 pounds; cocoanuts, 10,366,955; hides, 805 861 pounds; deerskins, 81,791 pounds; gold and sil¬ ver cyanides, 156,685 pounds. The distribution ot foreign trade was : United States, $5,262,043 i??o°7AS9 ˆnd $2’914 > 157 exports; Great Britain, Ii5i .imP°rts and $17,896 exports; France, H41 imP°rts anc* $5,353 exports; Germany, $521,837 imports and $164,607 exports. Straw hats (Panama) are manufactured in the de¬ partments of Santa Barbara and Copan, and cigars are made in different towns. Of the more than 100 factories in the republic aguar¬ diente, soda water, sugar, soap, candles, shoes and ice constitute the principal products. Pan¬ ama hats and cigars are the only manufactured exports of any great value of the republic.

Gold is found between the south and centre ; silver in almost all sections. Lead, copper, salt¬ peter, iron, coal, zinc, nickel, platinum and anti¬ mony are also widely distributed. The value

2i ooo non P annually is approximately $1,UOO,UUO (20,000 ounces of gold, 1,000,000

ounces of silver and a considerable quantity of copper). Only about 5 per

cent of the mines of the country are being worked. Silver, copper and lead ores are exported. The forests from sea-level to an altitude of 1,000 feet contain mahogany, ebony, dyewoods, sarsaparilla and other medicinal plants, cabinet woods and cedar At an elevation of 1,800 feet are dense and very extensive forests of pine and similar woods.

The unit of the monetary system, which is based on the silver standard, is the peso, divided to ˆcentavos and weighing 25 grammes of silver 900 fine, or say 22.500 grammes fine sil¬ ver. 1 he value of the peso of Honduras fluc¬ tuates with the rise and fall of the price of silver in the international market. Thus, it was given as about $0.42 currency of the. United States in April 1916; but $0.39786, with silver at .55 cents an ounce as a basis, is the value assigned in (Latin American Monetary Systems and Exchange Conditions > (New York' 1915) and in Gonzales, V., (Modern Foreign Ex¬ change (New York 1914). In March 1918 the government of Honduras entered into a contract for one year with the Banco Atlantida oi La Ceiba, whereby the latter was authorized and empowered to establish agencies in the ports of the republic, the departemental capitals and in other commercial centres for the further¬ ing of commercial affairs and the stabilization of the national currency by the storage of the silver coinage of the country as a reserve to guarantee the paper issue. Principal banks, in 1915, were the Banco de Honduras and the Banco de Comercio at the capital and the Banco Atlantida at Ceiba. The interior debt of the nation, according to the message of the Presi-*

to C?'ˆ?!'es.s in 191 5> amounted, on 31 July 1914, to 4,611,464.68 pesos. Honduras has a heavy external debt which consists principally ot bonds issued for the construction of the

railway from Puerto Cortes to La Pimienta and the arrears of interest thereon. The British Council for Foreign Bondholders represents the holders of these bonds. The amount of the external debt was given (1 Jan. 1914) as £23,- 693 969, of which £18,295,399 represented arrears of interest. In other words, a debt of less than $26,000,000 (in 1870), increased to $120,000,000, approximately, by 1917. The budget for 1915-16 estimated receipts at 5,929,420 pesos, and the value of the peso at that time was approxi¬ mately 36.15 cents, currency of the United States.

The Nat'onal Railway extends from Puerto Cortes to Pimienta, 56 miles. Privately owned lines in the banana regions aggregate about 109 miles. The Ulua River is navigable for a dis¬ tance of 125 miles, and other streams

facilitate, to a limited extent, communication between the north coast and the interior. On that coast, service with Puerto Cortes (and occasionally Ceiba, Trujillo and Tela) is maintained by steamers from New Orleans, New York and Mobile. On the Pacific coast dependence is placed upon the San Francisco-Panama steam¬ ship lines. There are 278 post offices. The number of letters (both internal and foreign correspondence) is not more than 1,550,000 in a year. The republic has 4,281 miles of telegraph wire ; the capital and some other towns tele¬ phone services.

Bibliography.— (Biblioteca Nacional de Honduras, Revista de Archivo y del Proceso Contra el Filibustero William Walker ; Ulti¬ ma Expedicion de Walker) (Tegucigalpa 1907) ; Charles, C., (Honduras* (Chicago 1890) ;*

(Financial Conference, Proceedings of the First Pan Amer can (Washington 1915) ; Gordon, G. B., (Caverns of Copan, Honduras* (Cambridge, Mass., 1898) and (The Hieroglyphic Stairway * (Cambridge, Mass., 1902) ; Jalhay, H.,*

Marrion Wilcox.

HONDURAS, British, or Belize, a crown colony in Central America, south of Yucatan, and 660 miles west from Jamaica. It is bounded on the north and northwest by Mexico (Yuca¬ tan), on the east by the Caribbean Sea and Gulf of Honduras and on the south and west by Guatemala.

Area, Physiography, etc.— Its area is 8.598 square miles, including numerous cays. The coast is generally low and swampy and the in¬ terior is largely covered with forests of log¬ wood, pine and mahogany. The Cockscomb Mountains in the southern district rise to the height of 3,700 feet; the northern part contains many lagoons. The climate is hot and moist and, generally speaking, is unhealthful for Eu¬ ropeans. About 50,000 acres are under cultiva¬ tion and produce fruits, coffee, rubber, etc.

Commerce. — The total value of the imports in 1916 was $2,690,306, a gain of $561,303 over the previous year, due principally to the in¬ creased price of nearly every article invoiced. The United States supplied goods worth $1,583, 650; Great Britain, $430,345; British colonies, $30,359; and other countries, $645,952, consist¬ ing chiefly of chicle from Guatemala ($263,760) and Mexico ($169,673) in transit to the United States.

The principal articles imported in 1916 from the United States were: flour, $162,343; boots and shoes, $119,895; fruits and vegetables, $73,- 360; miscellaneous foodstuffs, $51,970; lard and compounds, $56,956;

hardware and cutlery, $46- 237; drugs and chemicals, $38,032; condensed milk, $48,125; wearing apparel, $69,134; piece goods, cotton and silk, $107,707. The total ex¬ ports from the colony in 1916 were valued at $2, 543,622, of which $1,392,836 went to the United States; more than half of the remainder, $1,150,786, represented products and manufac¬ tures of other countries in transit through the colony. The value of the principal exports to the United States in 1916 was : mahogany, $473,- 548; chicle, crude and dried, $330,045; bananas, $259,410; coconuts, $154,290; logwood, $94,519. Exports to the United States in 1915 totaled $1,850,000 and to the United Kingdom, $311,200. Tonnage entered and cleared in 1915 amounted to 803,181 tons, of which 91,370 was Br tish. Registered shipping in 1914 consisted of 298 sailing vessels of 4,531 tons and 53 steamers of 1,981 tons.

Government, Finances, etc. — The colony is administered by a governor, who is also com¬ mander-in-chief, assisted by an executive coun¬ cil of six members, and a legislative council consisting of five official and seven unofficial members. The chief sources of revenue are the customs duties ($291,450 in 1914-15) ; ex¬ cise, licenses, land-tax, etc., also the sale and letting of Crown lands. The total revenue is about $550,000 annually. The expenditure, mainly administrative and for the various serv¬ ices, reached $614,175 in 1915, in which year the public debt was $972,705. Banking facilities are furnished by a branch of the Royal Bank of Canada. There are six government savings banks, which had, on 31 Dec. 1915, $104,313 on deposit credited to 932 depositors. United States gold is the standard of currency. The British sovereign and half-sovereign are legal tender for $4.86 and $2.43 respectively. There is a paper currency of $197,825 in government notes and a subsidiary silver coinage of $158,- 917 in circulation. There is also a bronze cent piece and a nickel-bronze five-cent piece, whose issues amount to $5,750 and $2,500 respectively.

Post Office, Communications. — In 1915, 356.000 letters and post-cards, and 166.000 books, newspapers and parcels passed through the post office. The Belize River forms the chief highway from the coast to the western and southwestern parts of the colony. It is navi¬ gable for light-draft motor and cargo boats for a distance of more than 100 miles. The rates for both passengers and freight are high, but most of the traffic to and from the interior is carried over this route. There is only one rail¬ way in the colony, from Stann Creek to the interior, about 25 miles. It has a gauge of three feet and was built by the government at

a cost of $826,250. The British Honduras Syn¬ dicate has a tram line running eight and three- quarter miles from the Stann Creek pier inland beyond Melinda and another about three miles long connecting the Sennis and the Monkey rivers. The trams are used chiefly for the transportation of bananas. Telegraph and tele¬ phone lines connect Belize with Corozal, Con- sejo and other stations in the north, El Cayo in the west and Punta Gorda in the south. Foreign telegrams are sent from Corozal to Payo Obispo, Yucatan, whence they are trans¬ mitted by the Mexican line. The wireless tele¬ graph station at Belize was completed in 1915 and affords communication, through other sys¬ tems, with the United States. A station of the United States Weather Bureau was estab¬ lished at Belize in November 1916. Steamship communication between Belize and New Or¬ leans is afforded by the regular weekly mail service of the United Fruit Company, which also maintains a fortnightly service to and from New York.

Education — In 1915 there were in opera¬ tion 54 primary schools, with 5,528 enrolled children, and an average attendance of 1,912; in addition there were 6 primary schools, with 230 in average attendance, which received no government aid. The government spent $23,300 on primary education in 1915. There are five schools with secondary departments with alto¬ gether about 350 pupils. They are under de¬ nominational management and none receive aid from the government.

Population. — In 1911 there were 20,374 males and 20,084 females, a total of 40,458. The population of the colony at the end of 1916. was estimated at 42,323. The whites num¬ ber about 650, the rest consisting of negroes, mulattoes and Indians. The birth-rate per 1 000 was 40.1 in 1915, and the death-rate 26.2. Belize, the chief town and seaport, had a population of 10,478 in 1911.

For the origin and early history of the colony, see Belize; also Central America.

,17 Bibliography.— Bristowe, L. W., and Wright, P. B,, 'Handbook of British Honduras5 (Edinburgh 1892) ; Gibbs, A. R., < History of British Honduras5 (London 1883) ; Morris', D, 'The Colony of British Honduras5 (ib. 1883) • Henderson, 'An Account of the British Set¬ tlement of Honduras5; 'Colonial Reports5 (London, annually) and 'Supplement to Com¬ merce Reports5 (No. 21a, 28 July 1917,' issued by the Bureau of Foreign and Domestic Com¬ merce, Washington).

J. B. McDonnell, Editorial Staff of The Americana.

HONDURAS, Gulf of, spacious inlet of the Caribbean Sea, having on the

west British Hon¬ duras and on the south Guatemala and Hon¬ duras. In it several smaller bays of which the Gulf of Amatique, with its inner recess, the bay of Saint Thomas, are spacious and deep. Several large rivers, the Belize, Chamelicon, Dulce, Motagua and Ulua, flow into the gulf. Along the shores are the islands of Turneffe, Manabique, the Bay Islands including Ruatan, Utila and Bonacca and numerous islets and reefs called cays.

HONE, hon, Philip, American merchant : b. New York, 1781 ; d. there, 4 May 1851. He was a successful auctioneer in New York, es¬

tablished there the first savings bank (1816), was mayor in 1826 and one of the founders of the Mercantile Library Association. Prominent in national political affairs, he aided in the formation of the Whig party. His diary, a por¬ tion of which, edited by Tuckerman, appeared in 1889, contains important sidelights on the early. history of the Whigs. Hone was also at one time naval officer of New York port.

HONE, William, English bookseller and author: b. Bath, 1780; d. Tottenham, 1842. He was sent to s-tudy law, but his preferences led him to undertake the business of bookselling. He was. well known in his day for his parodies and satires on religious and political subjects, of which the most notorious were 'Political Litany5 (1817) ; and the 'Political House that Jack Built5 (1819). Of greater literary value are 'Ancient Mysteries5 (1823) ; 'Every-Day Book5 (1826-27); 'Table Talk5 (1827-28)'; 'The Year Book5 (1832). A representative collection of his works is to be found in Tegg, 'Every Day Book, Table Talk and Year Book5 (1873); and 'The Three Trials5 (1876), con¬ taining an account of his acquittal at the trials which he had to undergo for railing against the government. His autobiography, 'Early Life and Conversion of William Hone, bv Him¬ self5 was edited by his son (London 1841).

HONE, a strop or stone for sharpening knives and razors. See Whetstone.

HONESDALE, honz'dal, Pa., borough, county-seat of Wayne County, on the Lacka- waxen River; the Erie and the Delaware and Hudson railroads; about 15 miles northeast of Carbondale and 30 miles northeast of Scran¬ ton. The first locomotive used in America, the "Stourbridge Lion,55 made its trial trip from this city. It is situated in a coal-mining re¬ gion, with good farming land in the valleys. Its manufactures are silk and woolen goods, boots and shoes, machine-shop and foundry products, axes, concrete blocks, paints, electric elevators' green, cut, engraved and decorated glassware' men s clothing and wheels for polishing glass. Large quantities of coal are shipped annually from Honesdale. Pop. 2,945.

HONESTY. A flowering herb. See Satin- flower.

HONEY, a sweet sticky liquid obtained by bees and other insects from flowers (see Hon¬ ey-Bee; and Flowers and Insects) as food, or taken home to be stored as food for the young. The care with which the honey-bee (q.v') col¬ lects and stores this substance in its hive has led to bee-culture (q.v.). Honey is highly nu¬ tritive, especially as a fuel for the energies of the body, as four-fifths of its components are carbohydrates, the remainder being water with a trifle of protein. The saccharine elements are mainly grape-sugar and some fruit-sugar, which are so readily affected by yeast that various fermented drinks are made with honey as their basis, of which the best known are the mead and metheglin in great demand among all Teu¬ tonic peoples a thousand years ago, and the equivalents of which are still made in Russia, Abyssinia and elsewhere. Before the general manufacture and use of cane-sugar, honey was largely depended upon for purposes of sweet- ening, and was put into a great number of cakes and confections now rare or only locally manu¬ factured. Of the place which it took among

the ancients in the household, in ceremonials, worship and for lore a large amount of curi¬ ous information may be gathered from such books as Beckman's (History of Invention) (1846) ; Dutt's (Materia Medica of the Hin¬ doos } (1877), and similar works, of which lists may be found in Warring's (Bibliography of Therapeutics) (1868), and in the Catalogue of the United States Army Medical Museum. } The importance of honey was, indeed, much greater to the ancients than to us ; as might be inferred from its frequent mention in the Bible as a sign of abundance or the resource of the desti¬ tute. It has well-recognized medicinal proper¬ ties, especially as a demulcent against hoarse¬ ness, catarrh, etc., in promoting expectoration in disorders of the breast and as an ingredient in cooling and detergent gargles. Its effect is usu¬ ally laxative also. It is used to sweeten cer¬ tain medicines ; and is sometimes mixed with vinegar in the proportion of two pounds of clarified honey to one pint of the acetic acid, boiled down to a proper consistence over a slow fire, and thus forms the oxymel simple of the shops. It enters into the composition of vari¬ ous sweetmeats, as in the East, such as the gen¬ uine Oriental nougat. Its use in confections in the United States was considerably increased as a result of sugar shortage in 1917 and 1918 and the importation has become a considerable business. The properties and the flavor and color of honey vary with the qualities of the flowers from which it is made. Thus in Eu¬ rope the white Narbonne honey of France is said to owe its peculiar and delicious flavor to the rosemary and other labiate flowers on which the bees feed. The Grecian honey also stands in high estimation. Mount Hymettus in Attica has been

famous since classic. times for this product; but that yielded by the bees who range the thyme-covered hills of Corinth is said to excel it. Another famous ancient source of supply was Sicily, especially about Mount Hybla ; and Corsica is yet celebrated for its honey and wax, which in ancient times were the chief exports of that island. In the eastern United States the early light-colored honey ob¬ tained from the blossoms of the white clover is especially esteemed; also that derived from raspberry plantations, bass-wood flowers and the like ; while that made later in the summer from buckwheat is in favor among darker va¬ rieties. California is an extensive producer of honey from various flowers.

As the aromatic agreeable flavors and health¬ ful qualities of special flowers (fortunately in the majority) are kept and apparent in ordinary good honey, so certain bad qualities are re¬ tained and spoil some honey, which thereby becomes deleterious to the human system, acting as a nauseant, a purgative, affecting the nerve- centres or even seriously poisoning those who eat it. This is the case in the United States with honey made from the flowers of the moun¬ tain laurel (Kalmia) and some other toxic plants. Some persons are unable to eat any kind of honey, without disarrangement of the digestion or nerves, or both ; and all should use it in moderation.

The industry of bee-keeping is for the pur¬ pose of supplying the market demand for honey. Modern hives are so constructed that the bees build separate combs each filling a box with glass sides, which are taken out and sent to vol. 14 — 23

market as the bees finish them. Another method of marketing is in the form of strained honey, the liquid pressed from the comb after warming, through sieves of linen cloth, or by other means. There is no reason why this should not be as good as that left in the comb, if properly prepared and preserved, and it permits of saving the material of the combs for wax (q.v.) ; but it makes possible adulteration, which is freely taken advantage of. The chief adulterant is commercial glucose, which occasionally is substituted to the extent of three-fourths of the volume, leaving only enough real honey to flavor the mass. As glu¬ cose (grape-sugar) is a large constituent of this substance in nature no great harm results (when the glucose is good), beyond the decep¬ tion ; and wholly artificial honey has been largely sold in the past' as the product of bees. Consult Simmins, (A Modern Bee Farm) ; Bee- Keepers' Record. See Bees.

HONEY ANT, a true ant of the family Formicidce, and chiefly of the sub-family Cam- ponotince. The honey ant (Myrmecocystm melliger) is so

called from certain of the wing¬ less individuals becoming so many honey-pots, their abdomens being distended with honey fed to them by the normal workers, including both dwarfs and majors. It occurs from central Colorado (Garden of the Gods) to New Mex¬ ico and as far south as the City of Mexico. It erects mounds six or seven inches across and two or three inches in height, of the shape of a truncated cone. In the interior is the (honey® is obtained in the night time by the workers which go in long processes to some distant scrub-oak bearing nectar-produc¬ ing galls. The workers return with distended abdomens, and feed the honey-bearers with the nectar. C. McCook thinks the honey-bearers are not a distinct caste, but simply workers <(with an overgrown abdomen. The honey is thus stored, as bees store their honey, for food in winter or times of famine. A similar habit has been acquired by various related kinds of ants in the dry plains and deserts of Mexico (where these ants are dug up by the people and utilized as a regular food-supply) and in South Africa and central Australia. Consult McCook, (The Honey Ants of the Garden of the Gods, etc. (Philadelphia 1882) ; Wheeler, (Ants* (New York 1910).*

HONEY-BADGER, a small muste line bur¬ rowing animal (Mellivora indica) of India, which eats insects, frogs, birds' eggs and small animals generally, and is fond of honey. The natives believe it robs graves, but destruction of poultry is its worst sin. It is nearly related to the South African ratel.

HONEY-BALL, or GLOBE-FLOWER.

See Button-bush.

HONEY BEAR, the sun-bear (q.v.).

HONEY-BEE. Bees in general are Hy- menoptera, of the family Apidce. Bees are dis¬ tinguished from wasps and other hymenoptera in the first place by the long, broad, flattened

basal joint of the hind tarsus, which is adapted for carrying pollen to the nest. Bees are also more hairy than others of their order, and some of the hairs are plumose or feathery. The mouth-appendages are long and highly special¬ ized, especially the long flexible proboscis or tongue (hypopharynx) . There are no wingless adult forms. While the more primitive genera are solitary, in the more specialized or social kinds, besides the males and females, there are workers, which are, as a rule, sterile females in which the ovaries are undeveloped. Of the bee family

there are now known to be about 150 genera and 1,500 species.

Original Home of the Honey-bee. — Al¬ though the honey-bee (Apis mellifica) has fol¬ lowed the white man in his migrations from the Old World to the New, and to Australia, New Zealand, etc., its original birthplace is in south¬ ern Asia, probably including the eastern shores of the Mediterranean Sea. Besides A. mcl- Itfica there are seven or eight other species, all except one southern and eastern Asiatic, in¬ cluding the islands of Timor and Celebes; the exceptional one (A. adamsoni) inhabiting tropical Africa and Madagascar. We know little of the honey-bees of China and Japan.

Like other domestic animals (and the honey-bee is. the only domestic insect we pos¬ sess), this bee is divided into races of which the Ligurian bee (variety ligustica), originally inhabiting Italy and adjoining regions, is a well- marked one, and another is the Egyptian honey-bee (variety fasciata). There are sev¬ eral subvarieties of the northern form of A. mellifica in Germany. The English naturalist Ray, who published before Linne, gave the name A. domestica to the northern dark form, our common honey-bee. This dark, northern form is the one which has been carried by the European race to various parts of the world, in some of which it is now wild. It occurs in the West Indies, in North America, including Mex¬ ico, in central and southern Africa and in Aus¬ tralia and New Zealand. The variety ligustica has also been found at the Cape of Good Hope.

Besides the honey-bee there are other social forms in Central and South America, as well as other tropical countries, including Australia, which store up honey; these are small bees, exceedingly numerous in individuals, which be¬ long to the genera Melipona and Trigona, and are stingless, though the sting exist in a rudi¬ mentary state. Trigona mosquito is known to send off swarms and to have but a single queen in a colony. The nests are built in hollow trunks of trees, in banks of clay or earth, and they gather pollen, nectar and resin. On the whole, the honey-bee stands at the head of the hymenopterous series, and, in fact, at the head of the class of insects, though the house-fly is in some respects more extremely specialized.

Structure of the Honey-bee.— Besides the males or drones, and the female or queen, the colony consists of workers ; these carry on the work of the society, gathering nectar, pollen, building the cells and feeding the young. The colony is permanent, differing in this respect from that of bumblebees, which come to an end each autumn. We will first describe the chief points in the external anatomy of the insect. The body is divided into three regions, the head, thorax and abdomen. The eyes are of two kinds, simple and compound, the male differing

from the queen and the workers in the large compound eye meeting in the middle of the top of the head. The mouth-appendages consist of three pairs, — first the jaws or mandibles; these in the queen and drone are notched, but in the worker the edge is entire and serves for biting, and in comb-building for thinning out wax shreds, also for scooping and molding the wax, while the next pair of appendages, or accessory jaws, are called maxillae, and are used as a trowel. In the bumblebee the maxillae are also used for piercing the corolla of flowers like the wistaria and honeysuckle, but those of the honey-bee appear to be too weak for this pur¬ pose. They also ensheathe the proboscis. The so-called tongue (ligula, lingua or hypophar¬ ynx) is the long, slender, hairy appendage adapted for gathering the nectar of flowers. It is an outgrowth of the under lips (labium or fused second maxillae), is situated in a tube formed by the maxillae and labial palpi, and can be partially withdrawn into the memtum, or base of the under lip. It can move up and down in the tube thus formed. It is covered by a hairy sheath, and is very elastic, this being due to a rod extending through its centre, en¬ abling it to be used as a lapping tongue. Chesh¬ ire states that the rod on the under side has a gutter or trough-like hollow, which forms a false tube by the intercrossing of black hairs. There are also two side-ducts, which extend along to the end of the tongue, where the ˆspoon® or ((bouton® is situated. This is pro¬ vided with very delicate split hairs, ((capable of brushing up the most minute quantity of nectar, which by capillarity is at once trans¬ ferred by the gathering hairs to two side groove-like furrows at the back of the bouton.® The central duct, because of its smaller size and consequent greater capillary attraction, re¬ ceives the nectar, if insufficient in quantity to fill the side ducts. (

Organs of Smell and Taste.— Bees are guided to flowers chiefly by smell, rather than by the color of the flowers they visit. (See Flowers and Insects). The olfactory organs are multitudes of microscopic pits in the an¬ tennae — the organs of smell. The sense of taste is lodged in a minute soft baggy fold on the under side of the upper lip, which is rich m taste-cups; and, besides, there are a few taste-papillae or cups found by Packard at the base of the paraglossae and on the base of the labial palpi.. These sites of the gustatory or¬ gans are situated where the food or nectar will come in contact in passing down the throat into the stomach.

Formation of Honey and the Honey-Stom- ach.— Tn insects there is the fore stomach (pro- ventriculus) and the true or chyle-stomach. The former is called by apiarians the (

bee, its calyx-like (stomach-mouth) may be seen to gape open and shut with a rapid snapping movement. ® 1 he entrance to the stomach is

guarded by four valves, which open to allow the passage of food from the honey-sac to the chyle-stomach. It is closed at will by circular muscles. Thus the bee can carry food for a week's necessities, either using it rapidly in the production of wax, or eking it out if the weather is unfavorable for the gathering of a new store. By means of a complicated mechanism a bee in sucking up, from composite and other flowers, nectar together with much pollen (1) can either eat or drink from the mixed diet she carries, gulping down the pollen in pellets, or swallow¬ ing the nectar as her necessities demand; (2) when the collected pollen is driven into the chyle-stomach, the tube-extension prevents the pellets forming into plug-like masses just below, for by its action these pellets are delivered into the midst of the fluids of the stomach to be at once broken up and digested; (3) <(while the little gatherer,® says Cheshire, (

Many and probably all bees eat the pollen while gathering it. The plumose hairs of bees are of use in collecting the pollen grains which adhere to them, but the exact method of ac¬ cumulation of the pollen and the mechanism of its conveyance from hair to hair till it reaches the part of the body it must attain in order to be removed for packing in the cells is not fully understood, but the head and front legs scratch up the pollen-grains, and the honey-bee has a pollen-basket on each hind leg, the basal joint of the tarsus being broad and slightly hollow, with nine rows of short hairs to which the pol¬ len-grains adhere.

Life History and Social Life. — In found¬ ing a new colony the young swarms consist of a queen-bee and a number of workers, a surplus population of the old colony. The swarming is not a nuptial flight, but an act of emigration. After the new swarm has been housed, the workers begin their labors by secreting wax. This is formed in glands on the inside of the ventral plates of the abdominal segments, ap¬ pearing outside as thin projecting plates, which are removed by' the wax-pincers on the hind legs; after being molded by the jaws they form the hexagonal cells in which the young or larvae

live and the food is stored, and thus the comb is gradually built up. The queen then lays an egg in each cell, and the larvae (grubs) on hatching are fed by the workers. This they do by eating honey and pollen, which is formed in the digestive organs, into a kind of pap. This pap looks like arrowroot made with water, and the very young grubs partly float in it, besides absorbing it by the mouth. The young grubs, as they increase in size, are weaned from this glandular secretion or pap, pollen, honey and water being added, while the pap or glandular secretion is gradually

withdrawn. The queen larvae, according to Cheshire, is not weaned, but the secretion or pap (the so-called (

The new queen arises from an egg laid in t'he royal cell, which is large and slipper-shaped. She develops in 16 days. Only one queen is allowed in the hive at one time. The males (drones) arise from unfertilized eggs. The drone cells are a little larger than the ordinary worker cells. A drone is developed in about 24 days. When a swarm leaves the hive the old queen quits with it, but when a second swarm goes off from a hive it is accompanied bv a young queen, who is frequently, and perhaps usually, unfertilized.

The young queens will usually mate when five to seven days old, flying from the hive for this purpose. In a day or two after mating the queen generally begins to deposit eggs, and is then ready for use in the hive or to be sent away as an <(untested queen.®

Bee-Culture. — Spring is the best season to start a hive or apiary. In April a good colony situated in the Central States ought to have brood in five or six combs. The Langstroth hive with its modern improvements is the best, and the novice should select those holding 10 to 12 frames in each story.

Swarming is the result of an abundant se¬ cretion of honey, and combs crowded with bees and brood, that is, overpopulation. Just before swarming there is a partial cessation of field¬ work, the workers clustering or. loitering about the entrance to the hives. Suddenly those which happen to be in the hive at this time rush forth, accompanied by the old queen, and cluster on some tree or shrub near by. Hiving the new swarm can be done after a little experience and the use of smoke. Swarming may be prevented by giving abundant room for the storage of honey early in the season, before, as Benton says, the bees get fairly into the swarming no¬ tion. The honey also should be frequently removed. Also the hives should be well ven¬ tilated and shaded in hot weather. To success¬ fully winter bees the colony must have a good queen, and young workers, also good and abun¬ dant food. Those colonies having the most honey compactly stored in the brood department and close about the very centre when the last

brood of young bees should emerge, are the ones which will winter best. A good substitute for honey is a syrup made of granulated sugar, to be fed early in autumn. The bees should be kept dry and warm, and there should

be no manipulation out of season. (Benton).

Diseases and Enemies. — Diarrhoea is due to sour or fermented honey, dampness, and chilling of the bees. Foul-brood is a germ-disease, oc¬ casioned by Bacillus alvei ; it affects both the brood and the adult bees. Of insect enemies the caterpillar of the wax or bee-moth is the most destructive, but with care it can be kept out of well-regulated hives.

Agency of Bees in Cross-Fertilization of Plants. — A hive is an essential thing in an or¬ chard, and were it not for the visits of bees the fruit in many cases would not set. Also in hothouses where cucumbers are raised, a small hive of bees is indispensable for fertilizing the flowers. See Bee-keeping; Flowers and In¬ sects.

*Bibliography. — Ashmead, Classification of the Bees) (in (Trans. Am. Entom. Society, > Philadelphia 1899) ; Cheshire, (Bees and Bee- Keeping) (2 vols.. London 1886) ; Benton, (The Honey Bee** ; Bulletin No. 1, new series, United States Department of Agriculture, Division of Entomology, Washington 1896), contains a list of the best books on bee-keeping; Phillips, (Bees) (in Farmers' Bulletin 447) ; (The Treat¬ ment of Bee Diseases) (id. 442) ; Snodgrass, (The Anatomy of the Honey Bee) (in Bureau of Entomology, Tech. — Series Bulletin 18); White, (The Bacteria of the Apiary-* (in Bureau of Entomology, Tech. — Series Bulletin 14) ; (The Cause of Foul Brood) (Bureau of Entomology Circular 157) ; (Sac Brood* (id.*

169).

Alpheus S. Packard,

Late Professor of Zoology, Brown University.

HONEY-BIRD, or HONEY-GUIDE.

See Guide-birds.

HONEY BLOOM, one of the American species (Apocynmn androscemifolimn), the ˆspreading dogbane® of the family Apocynacece (q.v.). It grows in fields and thickets all over temperate North America, and has the medici¬ nal qualities characteristic of the family.

HONEY-BUZZARDS, a genus (Pernis) of Old World hawks, formerly called (

HONEY-CREEPERS, a group of small warbler-like birds (the family Coerebidce) of gay plumage, numerous in the West Indies and neighboring

lands, where they are known as (

HONEY-DEW, the sweet secretion of cer¬ tain plants and insects. (1) Some trees in warm climates yield from their leaves in very warm, moist weather a saccharine liquid which may fall in drops, or may form a sticky film

over each leaf. This exudation, dried, is one form of manna. (2) Certain minute insects, chiefly plant-lice, leaf-hoppers and related bugs, yield a sweetish secretion, sometimes so copi¬ ously as to bedew a whole tree, and even fall in drops, giving the phenomena called weeping trees. The usual cause in this case is the pres¬ ence of a tree-hopper (Proconia undata). Honey-dew in both cases attracts insects in large numbers, who feed upon it or upon the lesser insects gathered to the feast ; and these, in turn, attract larger predatory animals, as birds, lizards, etc. Moreover dust sticks to it, closing the pores of the leaves to the injury of the tree ; and, still worse, the honey-dew forms a highly favorable culture-ground for the spores of smuts and other pernicious fungi.

HONEY-EATER, or HONEY-SUCKER,

any of various small and somewhat thrush-like long-billed birds of the family Meliphagidce, which inhabit the Australian regions, and seem to feed upon the nectar of flowers. They do so to some extent, but mainly are in search of insects within the corolla, collecting them easily by means of a peculiar tongue, which is divided near the end into a sort of fringe. They also eat soft fruit, and spend much of their time hunting insects on the ground. Well-known examples are the soldier-bird, parson-bird, pim- lico, friar-bird and others familiar in Australia and New Zealand.

HONEY-GUIDES. See Guide-birds.

HONEY HILL, Battle of. On the night

cf 28 Nov. 1864, General Foster, commanding the Federal troops in the Department of the South, left Hilton Head, S. C., with 5,000 in¬ fantry, cavalry and artillery, and about 500 sailors and marines, for Boyd's Neck on the south side of Broad River, the object of the movement being to cut the railroad connecting Savannah and Charleston and otherwise co-op¬ erate with Sherman, who was marching to the coast. Owing to a thick fog many of the boats lost their way and it was late in the afternoon of the 29th before the troops got ashore. Gen¬ eral Hatch was put in command, with orders to push forward and cut the railroad. Hatch marched immediately; the guides and maps proved worthless, and, after marching and countermarching the greater part of the night, he went into bivouac about 2 o'clock on the morning of the 30th. Information of Foster's

appearance at Boyd's Neck was carried to General Hardee at Savannah on the evening of the 29th, and next morning at 2 o'clock, the advance of G. W. Smith's Georgia militia ar¬ riving at Savannah, Hardee directed Smith to hasten it to Grahamsville Station on the Charleston and Savannah Railroad. The station was reached at 8 a.m., and the men marched out on the road leading to Broad River landing, about three miles, where, on the crest of the north bank of a small stream, a work for light guns had been thrown up and trenches for in¬ fantry prepared. These works were about 100 yards from the little stream and upon Honey Hill, 10 or 12 feet above the water level. On the right of the battery of five guns was a dense forest, on the left an open pine wood. The ground in front was open. Preparations were completed by 10 o'clock, at which hour about 1,000 militia filled the trenches on the right and left of the battery. Early in his

march Hatch encountered the Confederate out¬ posts, drove them in and soon after 10 o'clock came under fire of the guns. Hatch attempted a flanking movement, but failed, and made several direct assaults during the day, all of which were repulsed, and at dusk he began his retreat to Boyd's Neck. His loss was 711 killed and wounded and 43 missing. During the ac¬ tion Smith was reinforced by the 47th Georgia, but at no time did he have more than 1,400 men. He lost 8 killed and 42 wounded. Consult (Official Records (Vol. XLIV).*

HONEY-LOCUST, or HONEY- SHUCKS. See Locust Tree.

HONEY-SWEET. See Meadow-sweet.

*HONEYSUCKLE, a genus of plants, Lon- icera, belonging to the family Caprifoliacece. About 175 species are native to the northern hemisphere. The genus is represented in the North American flora by different species, among which are L. sempervirens, the trumpet honeysuckle ; L. caprifolium, American wood¬ bine, an introduced species ; L. j Hava, yellow honeysuckle, etc. ((Coral honeysuckle** is an¬ other name in the United States for L. semper¬ virens. It is much valued in the South, where it is native, for its flowers of beautiful color and sweet perfume. In the eastern United States the Japanese honeysuckle has escaped from cultivation. The common honeysuckle, L. periclymenum, with distinct leaves and red berries, is indigenous in Europe. There are many other species in America, Europe and Asia, and the name honeysuckle is often given to shrubs with sweet flowers of quite different genera.*

HONGKONG, hong'kong', or HIAN KIANG, he'an-ke'ang (signifying (

Climate. — The maximum temperature is 93° F. Rainfall is very heavy at certain sea¬ sons and the humidity percentage is so great during certain months that the climate is very trying to all except the native Chinese. De¬ cember is the dry month of the year and is perhaps the most enjoyable month also. The European quarters have modern sanitation sys¬ tems which ensure the community somewhat against the epidemics so frequent in this quarter of the world.

Education. — The government educational institutions comprise Queen's College, average attendance 490 boys, mostly Chinese ; the Kau- lung, Peak and Victoria schools, for children

of both sexes of British parentage, average attendance 60, 29 and 47, respectively ; the Belilios Girls' School, average attendance 384; eight English schools for Chinese boys, average attendance 1,397 ; one English school for Indian boys, average attendance 51. There are 39 schools, mainly denominational, which are in receipt of government aid and are subject to government inspection, with an average attend¬ ance of 3,500. The net cost of education amounts to about $235,000 (Hongkong currency) annually. There is a police school and about 360 unaided schools with over 13,000 pupils. In 1906 a technical institute was founded. It is maintained by the local government and has over 500 students. Hongkong University was opened in March 1912, with faculties of arts, medicine and engineering. It has about 200 students at present.

Industry and Commerce. — The principal industries of the colony are cotton-spinning, sugar-refining, ship-building and repairing, rope¬ making, the manufacture of cement, brewing and the manufacture of knitgoods. Deep-sea fishing is growing in importance. The com¬ merce is chiefly with Great Britain (about 50 per cent of both imports and exports), India, Australia and the United States. Hongkong is a free port except as regards the importation of intoxicating liquor and tobacco and there are no official returns of trade, only mercantile estimates, according to which the imports aver¬ age $20,000,000 and the exports $10,000,000. It is the great distributing port for South China and trades in nearly all kinds of goods. Among the principal are opium, sugar and flour, salt, earthenware, oil, amber, cotton and cotton goods, rice, sandalwood, coal, timber, hemp, kerosene, ivory, betel, live stock, granite, vege¬ tables, etc. The tea and silk trade of China is largely controlled by Hongkong interests. In 1917 the colony exported goods to Great Britain valued at $7,284,035, and imported thence goods to the value of $15,355,245. Exports to the United States averaged about $3,000,000, and imports from that country, $10,000,000. The latter comprise mostly flour, oil and cotton.

In 1916, 24,201 vessels aggregating 11,062,288 tons entered the harbor, and 24,151 vessels of 11,246,173 tons cleared. About 20,000 fishing and other craft frequent the harbor and bays of the colony. The harbor is one of the best in the world, having extensive docking facilities and modern machinery. The only danger is from typhoons, which at times have caused great destruction.

Communications. — An electric railroad of nine and one-quarter miles and a cable tramway connect the Peak district with the lower levels of Victoria. There is a railway line to the Chinese frontier connecting with the Canton Railway. It was opened in 1910. The branch line from Fanling to Sha Tail Kok was opened in 1912. There are 17 post offices in the colony, the revenue from which in 1916 amounted to $216,165, and the expenditure for which amounted to $167,795. Telegraph lines, includ¬ ing cables, have a length of 254 miles. Tele¬ phone wdres, excluding military lines, have a length of 8 272 miles. There are military and naval wireless stations and a postal wireless station. Hongkong, as one of the great marts of the world, has steamship connection with all great ports of Europe and America.

Finance, Money, etc. — In 1916 the reve¬ nue of the colony was $7,27 6,940, derived chiefly from land, taxes, licenses, quarry rent, liquor duties and an opium monopoly. The expendi¬ tures in the same year amounted to $5,828,500, a great part of which is devoted to the mainte¬ nance of a strong police force. The public debt amounts to about $7,200,000. The British banking institutions in the colony are the Hong¬ kong and Shanghai Banking Corporation, the Chartered Bank of India, Australia and China, and the Mercantile Bank of India, Ltd. There are also several Chinese and foreign banks.

The currency consists of the notes of the above named banks, and of British, Hongkong and Mexican dollars, besides subsidiary coins. The British dollar is of 416 grains of silver, 900 fine; the Mexican, 417.74, of 902.7 fineness. The circulation of foreign copper coin was prohibited in 1912, and similar action is being taken in regard to foreign silver and nickel coins and bank notes. The Hongkong dollar is of variable value. In 1917 it was worth $0,525 in American currency.

History, Government, etc. — The Crown colony was ceded to Great Britain by China in 1841, the cession was confirmed by the Treaty of Nanking in 1842 and the charter is dated 5 April 1843. It is a military and naval station of first importance. The administration is in ihe hands of a

governor, aided by an executive council, composed of the general officer com¬ manding the troops, the colonial secretary, the attorney-general,. the treasurer, the secretary for Chinese affairs, and the director of public works and two unofficial members. There is also a legislative council, presided over by the governor and composed of the commander, the colonial secretary, the attorney-general, treas¬ urer, director of public works, superintendent of police, secretary for Chinese affairs and six unofficial members — four nominated by the Crown (two of whom are Chinese), one by the Chamber of Commerce and one by the justices of the peace. The courts of justice comprise a Supreme Court, a court of summary juris¬ diction and a third court" or appeal court, a police magistrates' court and a marine magis¬ trates' court. In 1916, 1,418 were committed to jail; the daily average of prisoners in jail in 1916 was 638. The police force numbers 1,215 men, of whom 165 are European, 463 Indians and 587 Chinese.

Population. — The population of Hongkong, exclusive of the military and naval establish¬ ments, and the new leased territory, was, in 1911, 354,187 Chinese, 8,074 Europeans and Americans, and 3,884 other nationalities, a total of 366,145. The new territories contained 90,594, making a grand total for the colony of 456,739. The total estimated population in 1916 .(including the new territories) was 529,000.

Bibliography. — Bentham, G., (Flora Hong- kongensis) (Hongkong 1902) ; Eitel, E. J., (Europe in China) (London 1895) ; Ireland, A., (The Far Eastern Tropics (ib. 1905) ; Kyshe, I. W. N., (History of the Laws and Courts of Hongkong) (ib. 1899) ; Lucas, C. P.. his¬ torical Geography of the British Colonies) (2d ed., London 1906) ; Morse, H. B., (Currency in China) ; (Oxford Survey of the British Em- pire) (Vol. II, London 1914) ; Skertchly, S. J. B., (Our Island) (Hongkong 1893) ; twen¬ tieth Century Impressions of Hongkong, Shang¬*

hai and Other Treaty Ports) ; (Annual Report on PIongkong) (London).

HONOLULU, Hawaii, capital and princi¬ pal city of the Hawaiian Islands (now a United States Territory), and commercial metropolis of Polynesia; the business heart of the central Pacific. It is 2,089 miles southwest of San Francisco, in lat. 21° 17′ 56″ N., long. 157° 51′ 48″ W. It lies on the southwest side of Oahu (the third island of the group in size and north¬ west of Hawaii, with a safe harbor formed by a natural breakwater of coral reef, pierced by a broad opening. A fine lighthouse here throws a light visible for 25 miles. With its natural advantages and the absence of rivals, the city occupies a unique position. From its central location it is a common point of touch for the three great trans-Pacific steamship routes — from the United States and British Columbia to New Zealand and Australia, from

the same to Japan, China and the Philippines and from South America to Japan and China. Several independent steamship routes also run from it. It has regular communication with San Fran¬ cisco, Vancouver and Seattle, Peru, Auckland and Sydney, New York and Boston, Yokohama and Hongkong, Liverpool, Glasgow and Bre¬ men, besides other places. The steamship line to Sydney touches at the Fijis; the line to Auck¬ land, at Apia, Samoa. From Honolulu it is 3,850 miles to Auckland, about 4,000 to Sydney and 3,445 to Yokohama. It is the port of for¬ eign trade for the archipelago; about 1,000 vessels and many millions worth of products pass in and out of it ' annually. There are numerous wharves and warehouses here and a government custom-house. (For the items of the trade, see Hawaii ; the great items are sugar and molasses, rice, coffee, hides and wool).

Honolulu lies at the mouth of the valley of Nuuanu, which runs back between two high ridges to a pass between two peaks about 3,000 feet high in the great eastern range of moun¬ tains; the view, from the brink of the pali or precipice at this pass is one of the notable sights of the neighborhood. The climate is mild and equable and many sufferers from lung troubles in the United States seek it for a sanatorium. The extreme range of temperatures is 52° to 88°, average 70°. The rainfall is very irregular, but never slight; from 40 to 60 inches annually. The island is volcanic, the bordering reefs coral ; hence the city streets are macad¬ amized with coral and lava, porous rock making good surface drainage. The city is well laid out in American fashion, being indeed a mod¬ ern American place; the old one-story wooden huts, mingled with grass huts among the trees, have mostly given place to cottages, unpreten¬ tious indeed, but neat and comfortable, and mak¬ ing parts of a beautiful and picturesque whole of luxuriant gardens and surroundings of tropical trees, with which also some of the streets are abundantly shaded — the great Norfolk pine, papaya, bread-fruit, mango, and monkey-pod, umbrella-tree, tamarind tree, algaroba, bamboo and koa, date and cocoa palms, candle-nut, royal- palm and poinciana regia, alligator-pear, china- rose bush, blooming all the year round, etc., many with rich and fantastic blossoms, others with great parasitic ferns, besides peach, olean¬ der, banana, guava, orange, citron and others.

The flowers are also of great beauty and lux¬ uriance.

The city has nearly 200 acres of public parks, there are all modern appliances and services for civilized work and comfort; several first-class

hotels, physicians, lawyers, daily and weekly newspapers, banks and theatres, insurance of¬ fices, several hospitals, a public library, etc. There are 32 public schools, including a high school and normal school, with a total attend¬ ance of oyer 5,000 pupils, besides 37 private schools, with an attendance of 2,700 pupils. There are a number of churches, Protestant and Catholic; the city is the seat of a Roman Catholic and an Anglican bishop. It is also the residence of the government officials, and the consular agents of many European powers. It has waterworks owned and operated by the Territorial government and furnishing excellent water, pumped from artesian wells, supple¬ mented by water from the adjoining valleys. Ice is made by machinery. There is an electric street lighting system operated by the govern¬ ment, and an electric street railway system, built and conducted by a chartered company; a telephone system ; and there is a submarine cable to San Francisco and wireless telegraph to the neighboring islands and to the United States. Of manufactures the number of dif¬ ferent lines is upward of 30, of course chiefly for local needs ; the largest branch is foundry and machine-shop manufacture. Next to this is rice-milling. Minor industries are ice, har¬ ness, leather, jewelry, soap and shipbuilding.

The chief building is the former royal palace, now the executive building, in the Italian style, finished in 1882. The judiciary and other gov¬ ernment buildings are near it. The most inter¬ esting place is the museum, with many curious relics of early Hawaiian history, corals and shells and other native curiosities, land and marine. The chief in interest and value is the great feather war-cloak of Kamehameha I, the founder of the monarchy, valued at $150,000. This was the chief treasure of the former sov¬ ereignty and was used as a mantle of state by the sovereigns. It was made of yellow feathers from the mamo bird, found only in the moun¬ tains, each bird furnishing only two small tufts of feathers for it, one from under each wing. It is four feet long and has a spread at the bottom of WY2 feet. Nine generations were employed in making it.

Honolulu harbor was discovered by Captain Brown in November 1794. The city as a mod¬ ern foundation dates only from 1816, when John Young, an Englishman, and a faithful counsellor of the king, Kamehameha, advised its fortification. Previously it had been only a native village of huts, of little commercial im¬ portance. In 1820 it was made the capital of the archipelago, and afterward became the seat of government. Population (1920) 80,369. Of the population of 52,183 in 1910, 15,618 were Hawaiians, 9,674 Chinese, 12,093 Japanese, 6,147 Portuguese, 4,233 Caucasian-Hawaiians and 9,200 other Caucasians.

HONORIUS I, ho-no'ri-us, Pope: d. 12 Oct. 638. He was elected Pope in 625. In the hope of allaying a controversy he temporized with the leaders

of _ the Monothelite heresy, which, while recognizing the twofold nature of Christ, declared he had but one will, a doctrine

condemned by the sixth Council of Constanti¬ nople. He was anathematized by the council that condemned the heresy. Pope Leo II, in confirming the acts of this council, says that Honorius was condemned for ((not extinguish¬ ing the flames of incipient heresy. w For a full account of the case of Honorius, consult Par¬ son, (Studies in Church History > (Vol. I).

HONORIUS II, Pope: d. 14 Feb. 1130. He was elected Pope in 1124 and was at the time of his election bishop of Velletri. A section of the bishops and cardinals had previously in¬ vested Cardinal Thibaut with the papal dignity; but both candidates having resigned Honorius was re-elected.

HONORIUS III, Pope: d. 18 March 1227. He became Pope in 1216 on the death of Inno¬ cent III. He at once wrote to the king of Jeru¬ salem to assure him of his support; to the bish¬ ops of France, to encourage pilgrims, and to the emperor of Constantinople to promise him as¬ sistance. John, king of England, had left to his successor, Henry III, the burden of a war with the French Prince Louis, who laid claim to the English throne and had been encouraged in his pretensions by Innocent. Honorius recon¬ ciled the barons with Henry, and obliged Louis to renounce his pretensions. He then turned his attention to the Crusades, and crowned Frederick II emperor of Germany, on condition that he would go to Palestine within two years. In France he instigated Philip Augustus and Louis VIII to support the war against the Albigenses. He was succeeded by Gregory IX.

HONORIUS IV, Pope: d. 3 April 1287. He was elected Pope in 1285 and supported the French king, Philip the Bold, in the war against Peter of Aragon.

HONORIUS, Flavius, Roman emperor, son of Theodosius the Great : b. Constantinople, 9 Sept. 384 a.d. ; d. Ravenna, Italy, 26 Aug. 423 a.d. . On the death of his father in 395 the empire was divided into two parts, Honorius receiving the western half, with Rome as his capital. The principal events of his reign are the, adoption of rigorous measures against paganism in 399; the devastation of northern Italy by Alaric in 400-403 ; another irruption of barbarians under Rhadagasius 405-06. Both invasions were repelled by his able minister, Stilicho, who, however, fell under the dis¬ pleasure of his weak and indolent master and was assassinated at Ravenna in 408. Taking advantage of the death of the defender of Rome, Alaric marched upon the city and plun¬ dered it in 410.

HOOCH, or HOOGH, Pieter de, pe'ter de hooH, or hog, Dutch painter: b.

Utrecht, 1630; d. Amsterdam, soon after 1677. His early art training was much influenced by Rembrandt. In 1655 he was enrolled in the Painters' Guild of Delft, where he resided, but later removed to Amsterdam. He was the chief representative of Dutch genre painting and his specialty was the delineation of Dutch interiors, with their semi¬ darkness, suffused by the witchery of sunlight. Sometimes he set out two or more rooms in perspective, the vista of which was drawn and lit up with extraordinary skill.

HOOD, Arthur William Acland Hood,

Baron, English naval officer: b. Bath, 14 July 1824; d. Glastonbury, 16 Nov. 1991. After

service on the coasts of Spain and of Syria, he was made lieutenant in 1846 and in 1854 commander in recognition of his services with the naval brigade before Sebastopol. As¬ signed to the China station, he participated in the capture of Canton (December 1857), and in 1858 received the commission of post-captain. In 1862-66 he was in command of the Py lades of the North American station, in 1866-439 of the Excellent and the Royal Naval College at Portsmouth, and in 1869-74 director of naval ordnance. He was promoted rear-admiral in 1876, was commander-in-chief of the Channel fleet 1879-82, was First Sea Lord of the Admir¬ alty in 1885-89, and became admiral in 1886. In 1892 he was raised to the peerage. His attitude in connection with the development of the Brit¬ ish navy was strongly conservative.

HOOD, Edwin Paxton, English Congre- gationalist : b. London, 18 Dec. 1820; d. Paris, 12 June 1885. He prepared himself for the ministry privately and held several pastorates, the last being at Falcon Square Church, Al- dersgate street, London. He was exceedingly active in philanthropic work and succeeded in raising huge sums for the benefit of the Royal Hospital for Incurables. Among his best-known publications are (Lamps, Pitchers and Trum¬ pets: Lectures on the Vocation of the Preacher) (1867) ; (The World of Moral and Religious Anecdote (1870) ; (The Throne of Eloquence: Great Preachers, Ancient and Modern* "(1885); and biographies of (John Milton) (1852) ; An¬ drew MarvelP (1853); (Swedenborg* (1854); (William Wadsworth* (1856) ; (Isaac Watts) (1875); (Thomas Carlyle* (1875); (01iver Cromwell * (1882) ; and numerous others.*

HOOD, John Bell, American soldier: b. Owingsville, Ivy., 29 June 1831 ; d. New Or¬ leans, La., 30 Aug. 1879. He was graduated at West Point in 1853 and bore a commission in the United States army till 1861 when he joined the army of secession. The part he took in the Virginia campaign gained for him the rank of major-general and at Gettysburg his division made a gallant record in its position at the ex¬ treme right of the Confederate line. He took part in the battle of Chickamauga on 19-20 Sept. 1863, having come to Tennessee to the support of General Bragg. When General Johns¬ ton was endeavoring in the spring of 1864 to impede Sherman's advance on Atlanta, Hood was a lieutenant-general in his army and his corps, on 25 May 1864, was attacked by Hooker at New Hope Church. He succeeded Johnston the following July in the command of the Army of Tennessee, fought the battle of Peach Creek with Sherman 20 July 1864, but was compelled to retire behind the fortifications of Atlanta. After the battle of Jonesboro he retired from Atlanta, which was entered by Sherman. His attack on the forces under Schofield at Frank¬ lin being repulsed, he proceeded to Nashville, where' he met General Thomas. Thomas ad¬ vanced from his entrenchments on 15 December, and a two-days' battle ensued. Federal prep¬ aration had been carefully and deliberately made. A general attack on the afternoon of 16 December caused the entire Confederate line to give way. Soon Hood's army was in full retreat toward Franklin, the larger part of it (

Federals, the remnant of the Confederates, now largely disintegrated crossed the Tennessee, Hood, at his request, was relieved of his com¬ mand. Subsequent to the war he was a com¬ mission merchant at New Orleans. He wrote (Advance and Retreat: Personal Experiences in the United States and Confederate States Armies) (1880), and articles for (Battles and Leaders of the Civil War) (1887). Consult these works; see also Nashville, Campaign and Battle of.

*HOOD, Robin, English outlaw: said to have been b. 1160 and d. 1247. According to the popular account, with his followers, he in¬ habited Sherwood Forest, in Nottinghamshire, and also the woodlands of Barnsdale in the adjoining West Riding. They supported them¬ selves by levying toll on the wealthy, and more especially on ecclesiastics, and by hunting the deer. The principal members of his band were his lieutenant, Little John, his chaplain, Friar Tuck, William Scadlock, George-a-Greene, Much the miller's son, and Maid Marian. His skill with the long-bow and quarter-staff was celebrated in tradition. What basis of fact there is for the story of Robin Hood is doubtful. Grimm maintained that he was one with the Teutonic god Woden. Other theories suppose him to have been a rebel yeoman in Lancaster's rebellion under Edward II ; a Saxon chief who defied the Normans; and a fugitive follower of Sir Simon de Montfort after the battle of Evesham. He figures prominently in Scott's novel (Ivanhoe,**

*and in (The Foresters, * a drama by Tennyson. The earliest known men¬ tion of him is in (The Vision of Piers Plow¬ man, J version B. (about 1377), in which Sloth says he knows <(rymes of Robin Hood.®*

1885).

HOOD, Samuel, Viscount, British naval officer: b. Thorncombe, Devonshire, 12 Dec. 1724; d. Bath, Somersetshire, 27 Jan. 1816. He entered the navy in 1740, was promoted lieu¬ tenant in 1746, commander in 1754, and post¬ captain in 1756. While commanding the Vestal in 1759 he took the French Bellona after a three- hours' fight. From 1767 to 1771 he was com¬ mander-in-chief in North America. Having served as commissioner of the Portsmouth dock¬ yard in 1 778— 80, he was made admiral of the blue in 1780, and almost immediately was sent in command of a squadron to reinforce Rodney on the North American and West Indian sta¬ tions. He remained on that duty until the signing of the peace, and distinguished himself in several battles. Dispatched in 1781 to block¬ ade Martinique, he was intercepted by De Grasse and the French fleet, against which he fought in April and in July (under Admiral

Graves). Again in the West Indies in 1782, after an absence along the North American coast, he outmanoetivered De Grasse in several minor contests, and later, on 12 April, took an important part in the victory of Dominica, when he led the rear of the British line. In 1784 he was elected to Parliament for Westminster, and in 1788 made a lord of the admiralty. He took command of the British fleet in the Mediterra¬ nean in 1793, and occupied Toulon. Hood had a great reputation as a tactician, and a high tribute was paid him by Nelson, who had been one of his subordinate officers. Consult James, (The Naval History of Great Britain) (1822— 24 ; new ed., 1837).

HOOD, Thomas, English poet and humor¬ ist : b. London, 23 May 1799; d. there, 3 May 1845. In 1821 he became sub-editor of the Lon¬ don Magazine , and from that time appears to have resolved on devoting himself entirely to a literary life. In 1826 he published (Whims and Oddities.' This was followed by (National Tales ' in prose, and a volume of serious poetry, which, though favorably received, did not obtain much popularity. In 1830 he started the Comic Annual, which, during the eight year,s of its existence, was made the vehicle of many of his most remarkable productions. At the same time his pen was diligently employed on other subjects, and he published the powerful poem called (Eugene

Aram's Dream,) (Tylney Hall,' a novel, which, though defective in its plan and structure, abounds in fine strokes of wit and humor. His health had begun to fail, and in consequence he lived on the Continent 1835-40. He continued his Comic Annual during his residence at Coblenz and Ostend, and in 1838 published Hood's Own. His continental ex¬ periences also furnished materials for his (Up the Rhine) (1839), a series of imaginary letters after the manner of Smollett's (Humphrey Clinker. ' The whimsical cuts inserted in the work, as well as its combination of good sense and humor, made it very popular. Shortly after his return, he undertook the editorship of the New Monthly Magazine, and continued it un¬ til 1843. His principal contribution to it was the famous tragi-comic story in verse of (Miss Ivilmansegg.' His last periodical, entitled Hood's Magazine, was commenced in 1844. It contains some of his best productions, though several of them were written after his health had completely given way, and while he was propped up by pillows in bed. Hood is unrivaled as a punster, and seems to have been almost equal master of the comic and the pathetic. In the latter style his (Song of the Shirt) is universally known, and as a burst of poetry and indignation gave him enduring fame.

HOOD, Thomas, generally known as Tom Hood, English miscellaneous writer; son of the preceding: b. at Wanstead, Essex, 19 Tan. 1835; d. Peckham Rye, Surrey, 20 Nov. 1874. He was educated at Oxford with a view to a clerical career, but did not graduate; he edited the Liskeard Gazette in 1858-59, and from 1860 till 1865 was a clerk in the accountant-general's department at the War Office. In 1865 he became editor of the comic paper called Fun. His first separate publication was (Pen and Pencil Pictures) (1857), and among his subsequent works are (The Daughters of King Daher. and other Poems) (1861); (Jingles and Jokes for

the Little Folks) (1865) ; (Captain Masters's Children) (1865), his best novel; (A Golden Heart' (1867) ; (The Rules of Rhyme: A Prac¬ tical Guide to English Versification' (1869), a work which has gone through two later edi¬ tions; (From Nowhere to the North Pole' (1874). From 1867 he produced Tom Hood's Comic Annual. A volume of his favourite Poems,' with a memoir by his sister, Mrs. Bro- derip, was published in the United States in

1877.

HOOD, Mount, a peak of the Cascade Range, in the northern part of Wasco County, in Oregon. The height is usually given as over 11,225 feet, but the latest explorers claim it is nearly 12,000 feet. Mount Hood was at one time an active volcano; the lava is found on the slopes and some distance from its base.

HOOD RIVER, Ore., name applied to a valley, town and river in Wasco County. The town is situated on the Columbia River and on the line of the Oregon-Washington Railway and Navigation Company, 66 miles east of Port¬ land and 22 miles below The Dalles, the county- seat. The Hood River strawberry has acquired a reputation almost phenomenal, and is distrib¬ uted over an immense area of country extending from Denver and Omaha on the south to Winni¬ peg in the province of Manitoba to the north and east. The apple industry is also rapidly assuming large proportions, grades of superior excellence are produced, and the highest priced Spitzenburgs and Yellow Newton Pippins found in the markets of New York and London were grown in Hood River. The valley proper ex¬ tends south from the Columbia River to Mount Hood, some 20 miles, and is protected and cradled by the Cascade range of mountains on the west and a high divide putting out from Mount Hood on the east. The amount of land adapted for fruit culture in this unique valley exceeds 50,000 acres. The river itself drains all of the north side of Mount Hood, has a large and constant flow of water, and for the last 10 miles of its course before entering the Columbia has an average fall of over 60 feet per mile, affording 10,000 measured horse power per mile? There are immense forests of fir and cedar about the head-waters of this stream, and one of the largest saw-mills in the State is con¬ veniently situated near its confluence with the Columbia. The climate is a happy mean be¬ tween the moist section of western Oregon and the semi-arid plains of the Columbia. The scenery is grand in the extreme and yearly at¬ tracts the attention of many visitors. The town is pleasantly situated, overlooking the Columbia River, is supplied with electric lights, has a Carnegie library, county hospital, high school, and operates its waterworks, while the tele¬ phone is universally present in both town and country. It is, however, the. superlative ex¬ cellence of its fruits that has given Hood River a reputation almost world-wide. The town has saw and planing mills, canneries, evaporators, a vinegar factory, meat-packing plant, cider and syrup factories, machine shops, wagon works and a co-operative creamery. Pop. of town 3,195, valley about 6,000.

HOODED CROW, a crow native in north¬ ern Europe (Corvus cornix), so termed in al¬ lusion to markings on the head. Head, wings and fore parts are jet black, the rest of the

bird ash-gray; bill and feet are black. It re¬ tires to the southward from its more northerly haunts at the time of the crow migration. In England it is known as the gray, dun or Roy- ston crow. The hooded crow found in

India is similar in general appearance, but is a smaller species.

HOODED SEAL, a large dark-gray spot¬ ted seal of the north Atlantic, closely related to the common harbor seal, and named Cysto- phora cristata. It reaches a length of about 10 feet, and is especially distinguished by a large inflatable sac upon the face, the expansion of which is thought to be a defensive device, cal¬ culated to terrify enemies. It is occasionally seen on ice-floes along the Labrador coast.

HOODED WARBLER, a fly-catching

warbler (Sylvania mitrata), common in the southern United States in summer and making its nest in low bushes. It is bright yellow ex¬ cept a solidly black crown, neck and breast, comparable to a hood, leaving the face golden yellow.

HOODOO. See Mascot.

HOOF, a toe-nail which is large, envelops the terminal phalange, and is of material as¬ sistance in walking, as in the case of horses, cattle and other ruminants, and in the elephant, rhinoceros, etc. It is most highly developed in the horse, where the whole terminal part of the foot is reduced to a single, well-booted toe. In split-hoofed or cloven-hoofed animals there are two toes approximately equal, and booted with hoofs flat on their inner sides and closely appressed. The small non-functional toes hanging behind the hock-joint in most split-hoofed animals are often called ((false hoofs.® Accidents and diseases affect the .hoofs of domestic animals (see Foot-rot, etc.), and require careful attention, especially in the case of horses. The soundness of a horse's foot is mainly preserved by permitting it to grow un¬ injured by the rasp and knife, and kept clean by being washed with cold water; all other ap¬ plications are injurious and destroy the tough¬ ness of the <(horn sflrface .® Softness and brit¬ tleness of the hoof, which are fruitful sources of cracks and corns, may be remedied by plac¬ ing the feet for several hours daily in thick woolen swabs, kept cool and moist by frequent applications of cold water, and by encouraging a more healthy growth of horn by occasional mild blisters round the coronary band. Cracks (or sand-cracks) mostly occur among horses much upon the road, cause lameness and con¬ stitute unsoundness. When serious and recent, poulticing, thinning away of the crust about the crack and perfect rest are essential. After the earlier heat and tenderness are removed a hot iron should be drawn at right angles to the crack, both above and below, so as to separate the diseased from the sound horn. Waxed thread or fine wire should be wound round the hoof, and a sound growth of horn stimulated by a blister round the coronet.

HOOFT, Pieter Corneliszoon, pe-ter kor- na'les-zon hoft, Dutch poet and historian: b. Amsterdam, 26 March 1581 ; d. The Hague, 21 May 1647. He was son of that Cornelius Hooft who did much to procure Elizabeth's re¬ call of the incompetent and tyrannical Leices¬ ter in 1587. He traveled through France, Italy

and Germany in 1601, and on his return began with patriotic ardor to improve and purge the speech of his mother country. With this aim in view he translated Tacitus into Dutch, and made that Latin writer the model of his style, as a historian. His historical writings are vivid and comprehensive. His poems are chiefly in the erotic vein. He also produced dramas in the form of pastoral, tragedy and comedy. In his comedies the domestic life of the Netherlands is admirably portrayed. In the castle of Moritz, Prince of Orange, at Mui- den, where he lived as high bailiff, he used to gather round him a coterie of brilliant men and women, and this intellectual circle famous as the ((Muiderkring® included the poets Huy¬ gens, Vondel and Baerle. His principal works are (Hendrik (IV) de Grote zijn leven en bedrijP (1626) ; (Nederlandsche Historien) (1642) ; the poems ; the pastoral drama (Granida) (1605); the tragedies (Geeraerdt van Velzen) (1613); and

HOOK, Theodore Edward, English novel¬ ist and journalist: b. London, 22 Sept. 1788; d. 24 Aug. 1841. As a mere lad, sometimes in conjunction with his father, and sometimes on his own account, he wrote 13 farces and melo¬ dramas. For a time Hook led a life of. gaiety in London, and became notorious for practical jokes and similar escapades. In 1812 he through the favor of the Prince Regent, al¬ though he was quite unversed in- business and even in arithmetic, was appointed accountant- general and treasurer of the island of Mauri¬ tius ; but, owing to his gross incompetence, a large deficiency in the military chest was dis¬ covered, and in 1818 he was sent home under arrest, and although no proceedings were taken against him, the liabilities thus incurred were a millstone round his neck ever after. In 1820 he was appointed editor of John Bull, a jour¬ nal established in order to lampoon Queen Caroline and her supporters, and this paper he conducted till 1841. From this source he ob¬ tained at first an income of £2,000 a year. The years 1823-25 were spent in the debtors' prison. At intervals from 1824 to 1828 he published his < Sayings and Doings while in 1836 he became editor of the New Monthly Magazine. His other principal works are a series of novels, among which may be mentioned (1849).*

HOOKER, > huk'er, Edward, American sailor: b. Farmington, Conn., 1822; d. Brook- lyn, N. Y., 1 May 1903. He followed the sea in the merchant service until the outbreak of the Civil War when he joined the United States navy as acting master and served with distinguished bravery.

He wars commissioned as lieutenant-commander in the regular naval service in 1884 and full commander two years later, when he retired.

HOOKER, Isabella Beecher, American philanthropist: b. Litchfield, Conn., 22 Feb. 1822; d. 25 Tan. 1907. She was a daughter of Dr. Lyman Beecher (q.v.) and in 1841 married Joseph Hooker, a lawyer, She made a special

study of the right of women of the United States to vote; was active in various reform movements, and was widely known as a public speaker. She wrote (Womanhood, Its Sancti¬ ties and Fidelities. >

HOOKER, Joseph, American soldier : b. Hadley, Mass., 13 Nov. 1814; d. Garden City, N. Y., 31 Oct. 1879. He was graduated at West Point in 1837 and received a commission dn the First Artillery. He served in Florida and on the northeast frontier 1837-ˆ40 and during the Mexican War was aide to Generals Smith, Harmer, Butler and Pillow. He saw much service in both the northern and southern cam¬ paigns and resigned from the army in 1853. From that date to the breaking out of the Civil War he was successively farmer, engineer and militia colonel. In 1861 he went to the front as a brigadier-general of volunteers. In 1862 he was commissioned major-general of volun¬ teers and was present at the battle of Williams¬ burg, Va., and was subsequently conspicuous in the Peninsular campaign and in the battles of Bristoe Station and Chantilly. He also took part in the Maryland campaign, and in Septem¬ ber of 1862 was appointed brigadier-general in the regular army. Two months later he was placed in command of the Fifth corps, and at the battle of Fredericksburg commanded the Third and Fifth corps. In 1863 he was put in command of the Army of the Potomac, but al¬ though very successful in refitting and reorgan¬ izing his troops, failed to show, as head of an army, those qualities which had characterized him in the field as corps and division com¬ mander. At Chancellorsville the defeat of the Federal troops by General Jackson was largely due to Hooker's vacillation and his want of power to cope with the sudden surprise of his right flank by the Confederate general. Public opinion in the North and an increasing lack of confidence in Hooker on the part of President Lincoln led to his resignation from his com¬ mand and on 28 June 1863 he was succeeded by General Meade. He was then given com- maned of the 11th and 12th corps, later com¬ bined in the 20th corps and on 24 Sept. 1863 was dispatched in command of the Army of the Cumberland to reinforce Rosecrans at Chattanooga and distinguished himself on 24 November in the so-called (

HOOKER, Str Joseph Dalton, English

surgeon and botanist : b. Halesworth, Suffolk, 30 June 1817; d. aged 94, Sunnvdale, 10 Dec. 1911. His father was Sir William Jackson Hooker, regius professor of botanv at Glas¬ gow University, and his mother the daughter of a banker, Dawson Turner, of Great Yarmouth. Educated at the High School and University of Glasgow, he took his M.D. degree in 1839. He was only 21 when he accompanied the famous expedition of Sir James Clark Ross in the Erebus and Terror, sent out by the government to investigate the phenomena of terrestrial magnetism in the south circumpolar seas. His

official or nominal position was that of assist¬ ant-surgeon, but in reality he was the naturalist of the expedition. His researches during this voyage resulted in a series of priceless volumes on the botany of the southern regions, embrac¬ ing the Antarctic Islands, New Zealand, Tas¬ mania and Fuegia. He succeeded in extending our knowledge of the laws governing the dis¬ tribution of plants by comparing those he found with the flora of other parts of the world.

Returning home after four years he became botanist to the Geological Survey of Great Britain in 1846, and in 1847 went to India to study the flora of a hitherto unknown region of the Himalayas. Returning in 1851, he pub¬ lished two volumes of (Himalayan Journals) and other botanical works on India. In 1855 Hooker was appointed assistant director of Kew Gardens under his father, succeeding on the death of the latter to the directorship in 1865, and resigned in 1885. In 1868 he was president of the British Association, and presi¬ dent of the Royal Society 1872-78. He visited Syria and Palestine for botanical study in 1860; the Atlas Mountains in 1871, and the Rockies in 1877. On his return he presented to the Royal Botanical Gardens (Kew) a large collection of seeds and museum specimens, and a herbarium of some thousand species, together with a mass of notes on the distribution of North American trees. He was the recipient of many honors and medals for his eminent services in scientific geography by promoting an accurate knowledge of the floras apd economic vegetable products of the colonies and dependencies of the British Empire. In 1907 King Edward conferred the rare distinc¬ tion of the Order of Merit upon him. Hooker was twice married (in 1851 and 1876), and left six sons and two daughters. A list of his writings forms almost a botanical catalogue, for he wrote thousands of monographs in ad¬ dition to his larger works. The great (Index Kewensis) (Oxford 1893-94) was compiled under Hooker's direction at the request and expense of Darwin (d. 1882).

HOOKER, Richard, English theologian: b. Heavitree, near Exeter, March 1554; d. Bishops- bourne, 2 Nov. 1600. He was educated at Ox¬ ford. In

1581 he took orders, and was shortly after made preacher at Saint Paul's Cross, in London. In 1584 he became rector of Drayton Beauchamp, Buckinghamshire. The following year he was appointed by Archbishop Whitgift Master of the Temple for life. Here he be¬ came engaged in a controversy with his col¬ league, Walter Travers, whose sympathies were strongly Puritanical, and to this controversy we owe his celebrated work (Of the Laws of Ecclesiastical Polity.* The first four books were printed in 1594. The fifth book of his great work appeared in 1597; the last three in 1600. (The Ecclesiastical Polity,) written in defense of the Church of England, is no less remarkable for learning and extent of research than for the richness and purity of its style, which entitles its author to be regarded as one of the classics of the Elizabethan Age. Consult Lives by Walton and Keble.

HOOKER, Thomas, American colonial clergvman : b. Markfield, Leicestershire, Eng¬ land/probably 7 July 1586; d. Hartford, Conn.,

7 July 1647. After being graduated at Cam¬ bridge he took orders, preached in London and was chosen lecturer at Chelmsford in 1626. Having been silenced by Laud for non-con¬ formity, he established a grammar school, and about 1630 went to Holland, where he preached at Delft and Rotterdam. In 1633 he came to New England with Cotton and Stone, and was settled with the latter at Newtown, now Cam¬ bridge, being ordained by the brethren of the church. In 1636 he removed with about 100 others to what is now Hartford, Conn., where he and Stone were the first ministers of the church. He was a remarkably animated and able preacher, of commanding presence and earnest zeal, and he has been called the Luther of ˆew England. It was his custom to preach without notes. Some 200 of his sermons were sent to England, where about half of them were published. His most celebrated work, (A Survey of the Summe of Church Discipline,* written with John Cotton, was published in England (1648). Many of his works have gone through repeated editions. Consult Walker, (Life of Hooker* (1891).

HOOKER, Sir William Jackson, English botanist: b. Norwich, 1785; d. 12 Aug. 1865. He applied himself to the study of botany at an early age, and in search of botanical specimens visited Scotland and the Scottish islands, France, Switzerland and Iceland. His investi¬ gations on the British (Jungermanniae and Mosses* drew attention to his attainments, and he .was elected to the chair of botany in the University of Glasgow, a position he filled for 20 years. In 1836 he was knighted, and in 1841 was

appointed director of the Royal Gardens -at Kew, a post which he held up to the time of his death. Under his management these gardens increased their area from 11 acres to 270. They are well laid out, and contain hot¬ houses and conservatories far superior to any¬ thing of the kind on the Continent, and include museums filled with objects derived from the vegetable kingdom, botanical libraries and a most extensive and excellently arranged her¬ barium. Among his works may be mentioned (Tour in Iceland (1811) ;*

(British Ferns, etc.*

HOOKER, Mount, Canada, a peak in the Rocky Mountains, 15,690 feet high, near the eastern boundary of British Columbia.

HOOKS. See Shore Lines.

HOOKWORM, Anatomy and Life His¬ tory. The hookworms or ankylostomes are true roundworms (Nematoda, q.v.) and belong to the order of the strongyles. They are char¬ acterized by a well-developed buccal capsule armed with teeth or cutting plates, and in the male a fan-shaped bursa around the posterior end of the body. The anterior end is curved dorsad so that the mouth opens toward the wall of the intestine though the worm, when attached, lies parallel to the lining of the canal.

The hookworms are all dangerous blood¬ sucking . parasites, and give rise to profound and lasting anemias in the host. Many species are known to occur in the higher mammals; two are found in man, often called the Old World and the New World hookworm. The former was discovered in 1843, though the

disease to which it gives rise was recorded in ancient writings and the effects of its presence are recognizable in many regions and races. It is designated scientifically Ancylostoma duodenale.*

The New World hookworm, Necator ameri- canus, was discovered by Stiles in 1902 in the South and has proved to be the most common form in North, Central and South America.

*f*g. 1. — Ancylostoma duodenale — X 15 (After Looss). A, Adult male seen from ventral side. B, Adult female seen from right side, a, anus; c, cervical gland; e, ex¬ cretory pore; i, intestine; o, ovary; t>, papilla; s, spicule; t, testes; u, uterus; v, vagina.*

Later recognized by Looss among the parasites from pigmies in forests of Central Africa, it is now thought to have been imported into the western continent by the slave trade. The negro seems to be tolerant of its presence

but in the white to which it has been abundantly transferred in the regions where the two races are in close contact, it evokes a most serious anemia which results in marked physical and

- *The exact spelling of this name, which has been written in some 20 different ways, following an erroneous orthography employed by the discoverer of the worm, has finally been settled as given here by the International Com¬ mission on Zoological Nomenclature.*

*mental deterioration of the white host. Stiles regards the present condition of the <(poor white trash** of the South to be due largely to its attacks. The two hookworms are so much*

F'lG. 2. Oral capsule of Ancylostoma duodenale from man in Egypt. Viewed from in front (dorsal aspect). On each side two heavy teeth, the inner (upper) one of each set carrying a minute accessory denticle. X 100. (After Looss).

alike in appearance that careful microscopical examination is demanded for their differentia¬ tion. Their effects on the host are in general similar though those due to Necator are more intense and persistent.

The adult Ancylostoma duodenale (Fig. 1) measures in the male 8 to 11 mm. in length by 0.4 to 0.5 in breadth, and in the female 10 to 18 mm. long by 0.5 to 0.6 wide. The most significant region is the anterior end (Fig. 2, A). On looking down into the oral capsule one notes at the anterior ventral margin two pairs of large uncinate teeth turning inwards, and deeper within the capsule two short lateral cutting plates. In Necator the corresponding

Fig. 3. — Oral capsule of Necator americanus from man, Central Africa; A, lateral aspect; B, dorsal view. The armature consists of cutting plates which completely close the upper part of the oval mouth opening and of lancet-like teeth on the bottom of the capsule. (Com¬ pare with Fig. 2). X 240. (After Looss).

region (Fig. 3) shows that the. ventral teeth are replaced by broad cutting plates and the deeper lateral plates are lancet shaped. These differences facilitate a diagnosis when the micro¬ scope is employed.

The bursa of the male Ancylostoma duo¬ denale (Fig. 4, A), is also easily distinguished under suitable circumstances from that of the male Necator

americanus (Fig. 4, B), as appears from the figures.

The life history of the hookworm is strik¬ ingly complex. The eggs are thin shelled and when evacuated in feces are ordinarily in the four-celled stage, i.e., they have started on de¬ velopment but little and hence are readily dis¬ tinguishable from those of other nematodes

with which they are associated and might be confused (Fig. 6). Development proceeds within the eggshell slowly, the rate varying with the external temperature, until the embryo takes form (Fig. 7) and later a minute larva (Fig. 5, a) is hatched out. This passes its existence free in mud or feces until, after the second molt, the second stage of development lies within the larval skin of the first and in a cyst so that this worm is often spoken of as the encysted stage (Fig. 5, b). In this form known as the infective stage it seeks out water and there awaits an opportunity for gaining en¬ trance into a new host. Eggs or younger larvae do not cause infection even when intro¬ duced into man by chance.

B

A

Fig. 4. — A, Bursa of A ncylostoma duodenale, seen from the left side. Bursal lobes short, distinctly broader than long, ribs moderately thick. X 60. (After Looss). B, Bursa of Necator americanus, seen from the left side. Bursal lobes longer than broad, ribs in general heavier than in A. duodenale. X 60. (After Looss).

The distribution of human wastes over the surface of the ground as is prevalent in many regions gives the chance for the young larvae on hatching out to be dispersed generally in the mud and water of the soil. In those regions where the temperature does not go low enough to kill these larvae the top layer thus becomes loaded with them in the infective stage. By the contamination of food and water supplies they may gain access directly to the human

Fig. 5. — Larva of Ancylostoma duodenale; A, newly hatched in rhabditiform stage, X 230; B, anterior end of same during first ecdysis. X 640. (After Looss).

alimentary system, and such direct infection does take place though doubted by many after the indirect method of infection had been dis¬ covered. It seems likely, however, that the in-

direct method is the more common as it is surely the more difficult to combat.

The facts in the indirect method were deter¬ mined by Looss in Egypt for the Old World

Fig. 6. — Eggs of A, Trichostrongylus instabilis which might be confused with the hookworm; B, Necator americanus-, C, Ancylostoma duodenale. All three X 205. (After Looss) .

type and by Claude A. Smith for the New World species in this country. When the larvae are brought on to the skin in masses of mud and water they essay at once to bore into the tissue. Penetrating the opening of a sweat gland or a hair follicle they reach the more open

Fig. 7. — Developing eggs of Ancylostoma duodenale from old feces. X 205. (After Looss).

inner layers where they enter the lymph spaces and are ultimately carried into the blood stream. Borne by it into the lungs they desert the vessels to enter the air spaces. Here one finds them in the surface mucus, moving out¬

Fig. 8. — Section of head of Ancylostoma attached to in¬ testinal wall, showing plug of tissue drawn into the oral capsule. The mucosa and villi have completely dis¬ appeared from this area. X 160. (After Looss).

ward. They ultimately ascend the trachea to the pharynx and pass over into the esophagus down which they travel to the stomach and intestine, thus completing their migrations. In

the course of their wanderings they undergo two molts during which the structures of the adult are gradually acquired. In the intestine sexual

maturity is attained in a short time and the production of eggs completes the cycle.

The hookworm attacks the surface of the intestinal wall, rasping and sucking away the delicate inner cells on which in fact — not on blood — the animal feeds, and laying bare the deeper layers (Fig. 8). To the effects of this severe mechanical injury is added another in¬ fluence of serious import : the worm produces in large salivary or cervical glands (Fig. 1, c) a secretion of marked hemolytic power which inhibits the coagulation of the blood. As a result the wound continues to bleed for a long time, even after the worm has deserted the spot to which it was attached.

It is evident that environmental conditions play a large part in determining the frequence of the parasite since they favor or hinder its development in the free stage and the coincident infection of man. Since the eggs are killed by a temperature of 34° F. in 24 to 48 hours the parasite never becomes abundant north or south of the subtropical zones. The encysted larvae will live readily a month or even a year in moist soils but perish rapidly when the earth dries out; consequently moist climates and heavy water-filled soils favor the spread of the parasite whereas dry seasons or absorbent soils bring about its rapid elimination whenever it chances to be introduced. For further data con¬ sult Looss, A., (Records of the Egyptian Gov¬ ernment School of Medicine) (Vols. Ill, IV ; 1905, 1911) ; Smith, Claude A. (in Journal of the American Medical Association, Vols. XLI, XLIII ; 1903, 1904) ; Stiles, C. W., Hygienic Laboratory (Washington, D. C., Bulletin 10,

1903).

Henry B. Ward,

Professor of Zoology, University of Illinois.

HOOKWORM DISEASE, synonyms: ankylostorraiasis, anchylostomiasis, uncinariasis, dochmiosis, brickmakers' anaemia, miners' anaemia, geophagia or dirteating, Egyptian or tropical chlorosis, tunnel-workers' anaemia, tun¬ nel disease (and very improperly), malarial cachexia or anaemia. The disease has also re¬ ceived other names in many other tongues. That this disease existed in Africa and perhaps other countries from time immemorial there can be no reasonable doubt, but it was only within recent times that its cause was dis¬ covered. Clinically the malady seems to have been first accurately described by Piso, in 1648, he having observed about that period persons evidently afflicted with the disease in Brazil, though he was ignorant of its causation. Al¬ though the affection was unquestionably very common in most tropical countries, and must

have been encountered by all practitioners in these regions, nothing further appears to have been written concerning it until just a hundred years later, when it was observed in Guadeloupe, and a short time thereafter in Jamaica. Follow¬ ing this, under the name of ((miners' anaemia, » it was. described in Hungary, and later in Bohemia and France. Subsequently the worm which, causes the malady was .discovered by Dubini, of Milan, in 1838, who proposed that the parasite be called ancylostoma which he first misspelled ((agchylostoma,» from two Greek

words meaning «bent mouth." Notwithstand¬ ing that others had preceded him in finding quite similar and closely related worms in the intestines of various animals, and regardless of the fact that this investigator failed to recog¬ nize the vital connection that exists between the presence of these parasites in the alimentary tract of the human being and the profound anaemia that follows, his work was of ele¬ mentary importance in paving the way for a proper comprehension of this insidious, com¬ mon and fatal affection.

The connection between these worms and the symptoms that they produce when living in the intestinal tract of the human being was first clearly established by Bilharz, in 1853, and Griesinger, in 1854. In the succeeding years this parasite was discovered in manjr countries of southern and middle Europe, — being mostly found in laborers in tunnels, mines and brick¬ making establishments. Previous to this, as early as 1808, ˆdirt-eating" was described in America by Pitt, and, about a half century later, still more fully by Duncan. Although several cases of the disease of foreign origin had been previously reported, the first recorded cases of the endemic hookworm disease of the United States are those of A. J. Smith, who, in 1901, recognized the eggs of the parasite in a sailor who had lived- for some time in America. It is of interest to note that the writer of this article observed and sketched the eggs of what was in all probability this parasite from a patient with amoebic dysentery about 1892, but, misled by the absence of all records of the disease in the new world, failed at the time to identify them. In the meantime the extreme prevalence of hookworm disease in the southern portions of the United States was slowly gain¬ ing recognition, and after some years was gen¬ erally accepted as one of our most common and most serious diseases. Such importance did the subject later assume that the principal efforts of the boards of health of the Southern States have in recent years been directed toward combating this old but newly discovered affec¬ tion. Some years ago a commission was formed for the eradication of the hookworm, and still more recently, owing

to the fact that the malady was found extremely common in the West Indies, in Central and South America, and in other tropical countries, the activities of this commission have been greatly enlarged and its beneficent influences extended to these countries, preventing # much suffering, saving many lives, and at the same time preparing the countries affected for the advance of civiliza¬ tion.

The principal pathological change produced by the hookworm consists an a profound anaemia, characterized by a great diminution in the haemaglobin or coloring matter of the blood. In the young — who are unfortunately the most common sufferers — the alterations of the blood cause a retardation of development in every part of the body, and if the infection per¬ sists, as is often the case, the victim is per¬ manently stunted, — being often left for life a dwarf both mentally and physically.

Where the worms attach themselves to the mucous membranes of the gut there is a local lesion, with more or less destruction of the epithelial coating, surrounded often by an area of swelling and redness. In some instances.

this process goes on until small ulcers are formed on the inner surface of the intestine. Of course under such circumstances there are found sometimes extensive inflammatory de¬ posits in the mucosa, and even in the submucosa of the wall of the gut. Among the morbid changes produced by the parasite the dermatitis induced by its larvae as they pass through the skin should not be forgotten. The symptoms produced by the presence of the hookworm in the alimentary canal of the human being may be in a general way inferred from what has been said of the pathological changes brought about by the parasite; naturally, the number of worms present in the intestinal tract — which may be f-rom a very few to several thousand — and the age and size of the individual attacked modify more or less their severity. No greater mistake could be made, however, than to as¬ sume that such influences completely control the clinical picture, since individual susceptibility to the malign influences exerted by the parasite largely determines the severity of the resultant symptoms. On the other hand the degree of dermatitis produced is doubtless greatly in¬ fluenced by the number of the larvae that pass through the skin, but even here it is more than probable that some individuals react more pro¬ nouncedly than others. It is of importance to emphasize the fact that where the individual has a light infection, or where there is a high degree of resistance to the disease-producing power of the parasite, few and insignificant symptoms may occur, and the victim may be only slightly indisposed, or even appear to be in perfect health. This is particularly apt to be the case in the negro. Under such circum¬ stances, however, the matter should not be treated lightly, since such persons act as car¬ riers of the disease, and are a grave

menace to their neighbors under certain circumstances. When hookworm larvae in any considerable numbers attack the skin there is a feeling of irritation and burning, which is quickly fol¬ lowed by swelling, an increase in the uncom¬ fortable symptoms and a severe itching. In from 24-36 hours there form in the affected area small blisters, which, when numerous, are apt to coalesce ; in another day the vesicles be¬ come pustules, as a result of their watery con¬ stituents becoming infected with the germs of suppuration. The tops of the pustules become scabs, and gradually fall off, leaving the raw surface beneath, and in effect forming sores; slowly these heal, so that in from two to three weeks, as a rule, the parts return to a normal condition, — though leaving the surface at¬ tacked more or less discolored. The condition described is the so-called ((ground itch." In the meantime no general effects are observed in the patient, except that at first the lymph nodes, or <(glands," are enlarged and tender in the affected area, and there may be a slight rise in temperature, lasting only a short time. Follow¬ ing this the victim appears to return to a per¬ fectly normal condition, — it being six weeks or two months before he begins to exhibit the symptoms that result from the presence of the worms in the intestine. If the number of worms be sufficient and the patient does not de¬ velop sufficient immunity there now begins a gradual decline in strength and general health of the infected individual, accompanied by a certain amount of pallor, which may in extreme

cases become the most prominent objective symptom of the affection. Usually the patient complains of slight tenderness and pains in the upper part of the abdomen, not uncom¬ monly associated with more or less indigestion, and often constipation as well. The victim is often sluggish, and frequently, though by no means always, shows a disposition to avoid exertion of any character, but this is simply the result of a want of physical strength, which by no means warrants the somewhat unflatter¬ ing characterization of "laziness,® which has been so commonly . and indiscriminately be¬ stowed on it. Where the disease is severe the patient may in time become so weak that all labor is impossible, — not infrequently ac¬ centuated by a shortness of breath that be¬ comes manifest on the slightest exertion. In such cases the feet, legs, face and other parts of the body often become oedematous, and col¬ lections of fluids may occur in the abdomen, pleural cavity, the pericardium and other serous sacs. As is the case in other profound anaemias the patient looses little or no flesh. Where conditions such as those just described occur, death may result if the parasites are not expelled. On examination the blood shows in¬ teresting but no characteristic changes. In severe cases there is a

great and even extraor¬ dinary diminution in the red coloring matter of the blood- — being sometimes as much as 90 per cent — but strange to say there is no corre¬ sponding decrease in the number of the red cells, which are carriers of the coloring matter just mentioned, — in this respect resembling the alterations that occur in *he .peculiar anaemia of young girls called chlorosis ; however, if the disease persists for a long time there is a very gradual falling off in the red cells, but even in such instances the number of these cellular ele¬ ments rarely go below 50 per cent. In the average case of hookworm disease the number of red cells will be from 3,000,000-4,500,000 to the cu.mm, of blood. There are no marked changes in the white cells, — though there is generally a slight increase in their number; not usually there will be found on examina¬ tion the normal 6,000 cells to the cu.mm., but much more commonly there are 8, 9, 10 or even as many as 18,000. Differential count usually shows nothing but an increase in the osinophile cells, — they being generally from 5-8 per cent of the total number. The most striking and wholly pathetic effects of the hook¬ worm are observed in the young. Where the parasite attacks its victims in early youth, and infection constantly recurs during the succeed¬ ing years, it would be difficult to imagine that anything could produce more frightful results. In addition to the symptoms already described the wretched victim almost wholly ceases to de¬ velop, and usually remains throughout life dwarfed, and a pitiful travesty on humanity. Under such circumstances the sufferer when between 20 and 30 may appear a youth of not more than 8 or 10, without beard, or hair about the pubes, physically weak and incredibly stupid; close inspection shows the skin of the face yellow and wrinkled, with a suggestion of old age, altogether at variance with an other¬ wise boyish appearance. It is, of course, true that by no means all of the victims of this malady exhibit such terrible effects of the in¬ fection, but even where the worms are gotten*

rid of comparatively early a failure to develop and a scanty beard are apt to remain through¬ out life. Notwithstanding the serious character of this malady the prognosis is good if its true nature be discovered, and the proper remedies applied. Recovery almost invariably follows where the parasites are expelled, but con¬ valescence is always slow, — it usually requiring from six to eight months for the sufferer to regain his normal health. The prophylaxis is simple. All that is necessary is for the stools to be passed in a properly constructed water closet, and adequate means taken to prevent the feces being scattered about the premises. Those living in hookworm districts should be instructed as to the danger of children defeat¬ ing in the horse-lot, in the garden and in other places in the neighborhood of their houses, — a habit very common among the negroes and poor whites in the backwood districts of the South. Likewise the curing of those infected is of the first importance, as so long as they have the

disease they are a constant source of danger to those with whom they live. The treatment is also very quick and simple. The day before the treatment is to be given the patient must take no evening meal. It is good practice to give at bed time a dose of some good purgative, such as calomel or castor oil, and if it does not act well before morning a saline laxative should be administered as soon as the patient awakes. After the bowels act well the real treatment for expelling the worms is taken; of such drugs we have several. Perhaps the best and safest is oil of chenopodium, either alone or combined with 10 drops of chloroform with each dose ; the medicament is given in two portions, one hour apart; the amount usually prescribed is in the ratio of two drops to each year of life up to 24, after which the quantity is not increased. Another excellent remedy for hookworm is thymol; it is very important to have the drug finely powdered; it should also be administered in two doses at an interval of an hour, — the quantity being about two and a half grains to each year of life of the patient, but is not increased after the 24th year. As this drug is poisonous, and has in a few instances caused death, it should be given with a great deal of care. In using it for the treat¬ ment of hookworm disease it should be remem¬ bered that the object is to cause it to lie in the intestine in contact with the worms just sufficiently long for it to kill or stupefy them, but to prevent its being absorbed into the cir¬ culation of the patient as far as is possible. Therefore we should give nothing that would dissolve the medicament, such dissolvents are: alcohol and anything containing it; butter and all oils; and, since thymol is slightly soluble in water, fluids and drinks of all kinds in greater quantities than absolutely necessary so long as the drug remains in the patient's intestine. For the foregoing reason it is perhaps as well not to give castor oil in any stage of the treatment where thymol is to be used to expel the worms. In addition to the foregoing beta-naphthol, the oleoresin of the male fern, oil of eucalyptus and several other drugs are sometimes given in the treatment of hookworm, but the results with the two agents first mentioned are so much superior that it is useless to go into details of their administration. Whatever the drug that is used to expel the worms it is well for the

patient to have a suitable laxative some hours alter it is given, he should remain in bed during the entire day that the treatment is ad¬ ministered, and should take no food until late ln n j afternoon. After the worms are ex¬ pelled nothing but good food is, as a rule, necessary, but it is thought by some that the administration of tonics, especially those con¬ taining iron and other supposed blood-builders, is of benefit. The treatment of ground itch consists in keeping the parts cleaned and pro¬ tected from external injury, together with some antiseptics and soothing ointment.

Bibliography.— Stiles, C. W.,

Rockefeller Sanitary Commission for the eradication of Hookworm Disease) (Annual Reports).

H. F. Harris, M.D.

Georgia State Board of Health.

HOONOOMAUN, hoo'noo-man. See Entellus Monkey.

HOOP ASH. The black or water ash (Fraxmus nigra). See Ash.

HOOPER, hup'er, John, English reformer and martyr : b. Somersetshire, about 1495 ; d. Gloucester, 9 Feb. 1555. He embraced the prin¬ ciples of the Reformation and in 1539, to avoid the persecution consequent on refusing to sign the new articles of faith put forth by Henry VIII, withdrew to the Continent. On the ac¬ cession of Edward VI in 1547, he went to Lon¬ don and contributed greatly to the progress of the Reformation. In 1550 he was nominated bishop of Gloucester. On the accession of Mary, in 1553, he was one of the first victims fixed upon, and being imprisoned in the Fleet, was treated with great severity. In 1555 he was required formally to recant his opinions. This he refused to do and was burned at the stake near his own cathedral. His works con¬ sist chiefly of a (Godly Confession and Protes¬ tation of the Christian Faith ; (Lectures on the Creed* ; (Sermon on the Book of Jonah) ; An¬ notations on the Thirteenth Chapter of the Romans. **

HOOPER, William, American patriot : one of the signers of the Declaration of Independ¬ ence : b. Boston, Mass., 17 June 1742; d. Hills¬ boro, N. C., October 1790. He was graduated at Harvard College in 1760, studied law with James Otis in Boston and removed permanently to Wilmington, .N. C., in 1767, where he soon rose to professional eminence and was noted for his social qualities and hospitality. He was delegated to the Continental Congress in 1775, and was till his. death a leader in the councils of North Carolina.

HOOPESTON, hoops'ton, Ill., city in Ver¬ milion County, on the Lake Erie and Western and the Chicago and Eastern Illinois railroads, about 85 miles south of Chicago and 48 miles south by east of Kankakee. It has a Carnegie library, several public parks and is the seat of Greer College, established in 1891. It is situ¬ ated in an agricultural region and its chief in- vol 14 — 24

dustries are connected with agricultural prod¬ ucts. It has large sweet-corn canning establish¬ ments and factories for making the cans and the

canning machinery. There are manufac¬ tured other canned goods, also horseshoe nails, gas engines and agricultural implements. Grain and hay are shipped to the larger markets. The government, in accordance with the charter of 1877, is vested in a mayor who serves for two years and in a city council. The city owns and operates the waterworks. Pop. (1920) 5,451.

HOOPING-COUGH, a series of coughs ending in a long-drawn breath, during which a shrill whistling sound, the hoop, is produced. Several fits of coughing succeed one another until some phlegm or mucus is expelled. Vom¬ iting not infrequently follows a fit of coughing. It has recently been discovered that the cause of the complaint is a poison acting as an irritant on the pneumogastric nerve. Hooping-cough is contagious and most commonly attacks chil¬ dren, generally but once in their lives. The first symptoms are a difficulty of breathing and other slight febrile affections, which are suc¬ ceeded by hoarseness, cough and difficulty of expectoration. After a fortnight or more the cough becomes convulsive and is attended by the hoop. In four or five weeks the expectora¬ tion becomes loose and the fits of coughing gradually diminish in frequency and duration. Hooping-cough is seldom fatal to adults, but is most fatal in the first year of childhood. Bron¬ chitis and pneumonia are the most serious complications.

HOOPOE, hoo'po, a peculiar bird of the Old World, which takes both its vernacular and scientific name (Upupa) from its whooping cry. It is of the group Coccygomorphce (q.v.) and represents a family (U pupidoe) , many spe¬ cies of which inhabit southern Asia and Africa, while one (U. epofs) is a well-known migrant in Europe. It is about 12 inches long, is brown above and white beneath, with black, white- barred wings and a very large cinnamon-red black-tipped crest and a long, sharp, curved bill. It seeks its food on the ground, nests in holes in trees, crannies in walls, etc., and has many curi¬ ous traits and habits which have caused the bird to take a prominent place in the folklore of all countries. The African hoopoes belong to the genus Irrisor and are called wood-hoo¬ poes. They have brilliant plumage but no crest. They go about in noisy flocks and have much the appearance and habits of Woodpeckers.

HOORN, horn, or HOORNE, hor'ne, or HORN, or HORNES, orn, Count of (Philip de Montmorency-Nivelle) , Flemish soldier and statesman: b. about 1520; d. Brussels, 5 June 1568. His father was a descendant of the French family of Montmorency, and on the mother's side he was related to Lamoral Eg- mont, with whose fate his own was linked. His mother became a widow when he was about eight, and was married again to John, Count van Horn, one of the wealthiest nobles of the Netherlands, who left his estates to his wife's children on condition that they should assume his

name. Philip was thus at the outset of his career one of the most influential of his order, and received from Charles V and Philip II im¬ portant trusts and distinctions. He accompanied Philip II to Spain, where he is supposed to

have received information of the designs of the Spanish court against the Netherlands and to have communicated them to the Prince of Orange. Returning to the Netherlands he joined Orange and Egmont in resisting the ag¬ gressive policy of Philip; yet continued loyal to the Crown. He was, however, suspected by the Spanish court, and upon the arrival of Alva in Brussels was enticed with Egmont to that city, and arrested in September 1567, on a charge of high treason. Ceaseless but vain efforts were made to obtain for him a fair trial, and appeals for clemency on his behalf were made by potentates in all parts of the Continent. He was executed with Egmont in June 1568. Consult Cambridge Modern History> (Vol. Ill, 1905).

HOOSAC (hoo'sak) MOUNTAIN, the

name given to a spur of the Green Mountains which is in the northwestern part of Massa¬ chusetts, on the east side of the valley of the Hoosac River; maximum altitude 2,400 feet. The whole length is about 16 miles. The moun¬ tain is noted for its beautiful scenery.

HOOSAC TUNNEL, in the towns of Adams and Florida, in Berkshire County, in Massachusetts, and piercing the Hoosac Moun¬ tain. It is on what is now known as the Boston and Maine Railroad, the route from Boston to Troy, N. Y., by way of Greenfield. From the west entrance of the tunnel to Troy is 54 miles; from the east entrance to Boston, 137 miles. The tunnel is nearly five miles in length, the longest tunnel in the United States and with the ex¬ ception of the Rogers Pass tunnel in British Columbia the longest on the continent. Before the general introduction of railroads, and, as early as 1825, the project was broached of mak¬ ing a canal across Massachusetts from Boston to the Hudson River. This plan was abandoned when railroads were built across the State. In 1851 the tunnel question had advanced so far that surveys of various routes were made and some experiments were begun. The work of tunneling began in 1856 and was completed in 1873. For so long a tunnel the ventilation is good owing to the shaft, 1,028 feet, sunk near the centre. The width is sufficient for two tracks. The total cost, including 39 miles of adjoining railroad, was about $13,000,000.

HOOSICK FALLS, N. Y., village in Rens¬ selaer County, on the Hoosick River and on the Boston and Maine Railroad, about 28 miles northeast of Albany. The first permanent set¬ tlement was made in 1688, and the first charter was received in 1827. The charter has been re¬ vised and the last revision was in 1890. The village has excellent water power. The chief manufactures are agricultural implements, paper and paper-making machinery, electric insulators, shirts, cotton and woolen goods and flour. The government of the village is vested in a presi¬ dent who holds office three years, and a board of trustees. The site of the British entrenchments at the battle of Bennington, 6 Aug. 1777, is near here and is now maintained as a State park. The waterworks are the property of the village. Pop. 5,532.

HO OSIER SCHOOLMASTER, The. In

the conclusion to the (Hoosier Schoolmaster) Edward Eggleston announces his belief that readers whose taste is not perverted always

want a story to ((come out well.® Accordingly he so planned this his first and most important romance that the lovers are all happily united, the poor orphans become prosperous and the evil-doers receive just punishment, mitigated somewhat through the generous intervention of those whom they have wronged. The (Hoosier Schoolmaster> owes its great popularity not so much to the conventional plot as to its happy description of early days in Indiana. It pictures the country school in which custom pre¬ scribed a constant warfare between the master and the big boys, the community spelling-school, the different forms of bigoted and illiterate preaching that were offered to the new settlers, the amusing attempts at formality in the pro¬ ceedings of the courts, and other features of pioneer life as the author had seen them in his career as itinerant missionary and agent for a Bible society. Eggleston's fondness for his¬ torical accuracy sometimes led him to sacrifice the artistic unity of his story in order to intro¬ duce a detail exactly as it was found in real life, but this defect is less noticeable in the (Hoosier Schoolmaster than in some of his later novels. There is a great variety of char¬ acters who, while they are drawn pretty much in unshaded black and white, have enough truth to human nature to seem real. A sufficient humor pervades the whole, the action never drags and the book despite its limitations de¬ serves the great vogue it has had since its publication in 1871.*

William B. Cairns.

HOOSIER STATE, a popular name for Indiana. The word is said to be a corruption of (

HOOVER, Herbert Clark, American engineer and public official : b. West Branch, Iowa, 10 Aug. 1874. He was graduated at Stan¬ ford University, California, in 1895, was assist¬ ant on the Arkansas geological survey in 1893 and the United States geological survey of the Sierra Nevada in 1895. In- 1896 he was assistant manager of the Carlisle mines, New Mexico, and the Morning Star mines, California. In the following year he went to West Australia as chief of the mining staff of Bewick, Moreing and Company and manager of Hannan's Brown Hill mine. In 1899 he was chief engineer of the Chinese Imperial Bureau of Mines and per¬ formed extensive exploration in the interior of China. He took part in the defense of Tientsin during the Boxer disturbances of 1900. From 1900 to 1914 he served successively as general manager, director and partner of various min¬ ing companies. In 1915—16 he served as chair¬ man of the American Relief Committee in London and went to Belgium as chairman of the Commission for Relief in Belgium. Under his direction millions of dollars worth of food and clothing were distributed to the needy in devastated Belgium. In 1917 President Wilson appointed him Food Administrator for the United States and in 1921 he became Secretary of Commerce in President Harding's Cabinet.

HOP-HORNBEAM. See Iron-wood.

HOPATCONG, ho-pat'kong, Lake, in

Morris and Sussex counties, New Jersey, about 33 miles northwest of Jersey Citv and 25 miles west of Paterson. The lake is 72 5 feet above

the sea, and eight and one-half miles long and three and one-half miles wide. Its area is 2,443 acres. Its outlet is the Musconetcong River which flows into the Delaware, but it is also the source of supply for the upper level of the Morris Canal, through which some of its waters pass into the Rockaway River. Lake Hopat- cong is a favorite summer resort, its beautiful scenery being one attraction. It is surrounded by hills and low mountains, all well wooded, and many of the trees are evergreens.

HOPE, Anthony. See Hawkins, An¬ thony.

HOPE, Ascott R. See Moncrieff.

HOPE, Ark., city of Hempstead County, 115 miles southwest of Little Rock,

on the Saint Louis and San Francisco, the Louisiana and Arkansas, and the Saint Louis, Iron Mountain and Southern railroads. Situated in a cotton and fruit-growing region it has cottonseed-oil mills, compresses, planing and lumber mills, cotton gins, wagon works and box, spoke, stave and handle factories. The waterworks, electric lighting and sewage disposal plants are owned by the city. Pop. (1920) 4,790.

HOPE COLLEGE, in Holland, Mich., co¬ educational institution, founded in 1866 by Dutch settlers, and under the auspices of the Reformed Church in America. The Western Theological Seminary was founded in 1869. It maintains a preparatory school. The campus comprises 16 acres. Five courses are given — classical, philosophical, natural science, modern language English and mathematics. The de¬ gree of B.A. is conferred. At the close of 1915 there were connected with the school 23 instructors and 400 students. The library contained 21,000 volumes. The income amounts to about $36,000 annually, and the endowment to $388,000. The principal buildings are the Carnegie Gymnasium, Graves Library, Van Raalte Memorial Hall, the Ackerman Hoyt Ob¬ servatory and the Winants Chapel.

HOPE DIAMOND, a famous blue diamond weighing 44ˆ4 carats, in possession of the fam¬ ily of H. T. Hope, of England, until 1903, when it was sold to an American.

HOPEDALE, the name of a community founded by Rev. Adin Ballou, in 1841, at Mil¬ ford, m Worcester County, Mass. At the be¬ ginning there were 28 persons who wished to lead lives in accordance with high ideals of Christianity. They formed themselves into a joint-stock company, purchased a farm of 238 acres, established a settlement, and proceeded to cultivate the soil, and to manufacture their own breadstuffs and clothing. At first a board of trustees were the chief governing power and had entire control of the industries. Later more responsibilities were given to the mem¬ bers, and the industries were, in different ways, apportioned among them. In 1854 there were 200 members ; but the community had become a financial failure and dissensions had crept in. In 1856 they were in debt, and as a joint-stock company they disbanded; but continued as a semi-communistic community until about 1862, when they gave. up the industries they had es¬ tablished to. private individuals, and formed themselves into Hopedale Parish with their founder as pastor. Consult Ballou, Adin, (Hopedale Community,5*

HOPKINS, Alphonso Alvah, American author: b. Burlington Flats, N. Y., 27 March 1843; d. 25 Sept. 1918. He was for three years professor in the American Temperance Univer¬ sity; from 1867-86 was editor of three agricul¬ tural papers successively. After 1868 he lec¬ tured on temperance

and other social and politi¬ cal subjects; in 1882 he was the prohibition can¬ didate for governor of New York. He was edi¬ tor of the National Advocate. He wrote (Geraldine, a Romance in Verse,5 a popular poem in the style of Owen Meredith's (1888) ; 'Wealth and Waste5 (1896) ; (Ballads of Brotherhood) (1900) ; (Profit and Loss in Man5 (1909) ; 'The Bugle of Right)

(1943).

HOPKINS, Edward, American colonial governor: b. England, 1600; d. London, March 1657. He was a prominent merchant of Lon¬ don, and came to Boston in 1637, but soon after removed to Hartford, where he was chosen a magistrate in 1639, and governor of the colony of Connecticut every other year from 1640 to 1654, alternating with Haynes. He afterward went back to England, where he was chosen warden of the English fleet, commissioner of the admiralty and navy and member of Par¬ liament. But he never lost his interest in the colonies, and at his death bequeathed much of his estate to New England, giving £1,000 for the support of grammar schools in Hartford and New Haven, which are still flourishing, and £500 which went to Harvard College and the grammar school at Cambridge.

HOPKINS, Edward Washburn, American philologist: b. Northampton, Mass., 8 Sept. 1857. He was graduated from Columbia in 1878, and going to Germany to study took the degree of Ph.D. at the University of Leipzig. He taught at Columbia (1881-85) and at Bryn Mawr (1885-95). In 1895 he became professor of comparative philology and Sanskrit at Yale. He is a member of American Philosophical Society, American Academy of Arts and Sci¬ ences, American Oriental Society, German Ori¬ ental Society, Royal Asiatic Society, etc. He has written (Caste in Ancient I.ndia) (1881); 'Manu's Lawbook) (1884) ; 'Religions of India5 (1895) ; 'The Great Epic of India5 (1901) ; 'India Old and New5 (1901) ; 'Epic Mythology5 (1915) ; besides numerous papers on philology and Hindu history. For 10 years he was editor of the Journal of the American Oriental Society, of which he became president in 1908.

HOPKINS, Esek, first commodore of the American navy: b. Scituate, R. I., 1718; d. North Providence, R. I., 26 Feb. 1802. In No¬ vember 1775 he received a commission from the Continental Congress as commodore and "com- mander-in-chief55 of the navy, soon after which he put to sea with the first squadron sent out by the colonies. The fleet sailed for the Bahama Islands, and captured the forts at New Provi¬ dence, and with them 80 cannon and a large quantity of ordnance, stores and ammunition. On his return, when off Block Island, the com¬ modore took the British schooner Hawke and the bomb brig Bolton. For this act the presi¬ dent of Congress

complimented Hopkins offi¬ cially. Commodore, or Admiral Hopkins, as he

was generally called (even by Washington, who so addressed him in his official letters), performed other remarkable exploits, though he had great difficulties to contend with. His name became a synonym for heroism and for American patriotism. In June 1776, Hopkins was ordered by Congress to appear before the naval committee in Philadelphia to reply to charges which had been preferred against him for not annoying the enemy's ships on the southern coast. He was defended by John Adams, and was acquitted. The unavoidable delays at a later period in getting his ships ready for sea gave another chance for his ene¬ mies to complain ; and neglecting a citation to appear at Philadelphia, because no specific charges were made against him, and on ac¬ count of his general disgust at the conduct of his opponents, he was dismissed the service, 2 Jan. 1777. He resided near Providence and exerted during a long life a great political in¬ fluence in Rhode Island, being often elected to the general assembly of that State. Consult Field, Esek Hopkins } (1898).

HOPKINS, Ezekiel, bishop of London¬ derry: b. Pinne, Devonshire, 3 Dec. 1634; d. Aldermanbury, 19 June 1690. After being graduated at Oxford he became chaplain of Magdalen College in 1656. After conforming to the Church of England he became incum¬ bent of the parish of Saint Mary Woolnoth at London. The great plague drove him to Exeter, where he remained until 1670, when, through the prestige of Lord Robartes, lord lieutenant of Ireland, he obtained the deanery of Raphoe, and in the following year the bish¬ opric of that district. He was appointed bishop of Londonderry in 1681. His office terminated in 1689 with the siege of the town by the Irish supporters of James II. Returning to London, he became rector of Saint Mary, Alderman¬ bury (1689). His published works include

HOPKINS, John Henry, American Protes¬ tant Episcopal bishop: b. Dublin, Ireland, 30 Jan. 1792; d. Rock Point, near Burlington, Vt., 9 Jan. 1868. At the age of eight, he was brought to America, his father settling in Phila¬ delphia. He became a successful member of the bar in Pittsburgh, where his interest in church work was so earnest that the vestry of Trinity Church unanimously elected him rector of the parish though he was not even a candi¬ date for orders. He accepted the call, was ordained in 1823, and remained in Pittsburgh until 1831, when he went to Trinity Church, Boston, as assistant, and became at the same time professor of systematic

divinity in a theo¬ logical school. He was consecrated bishop of Vermont in 1832 and combined with the epis¬ copate the rectorship of Saint Paul's Church, Burlington. Though at the head of a small diocese, he exerted a widespread influence as a learned theologian and a controversialist of uncompromising bravery and great versatility. FTe is said to have been the first to suggest the idea out of which grew the important Lambeth Conferences of the entire Anglican Com¬ munion, and it is unquestionably to his prudent and charitable efforts that the happy reunion of

the Northern and Southern dioceses after the Civil War was largely due. Besides controver¬ sial works, which at the time had great effect, he published 'The Primitive Creed) (1834) ; (The Primitive Church) (1835); (The Amer¬ ican Citizen> (1857) ; and (The Law of Ritual- ism) (1866). See 'Life of Bishop Hopkins by One of his Sons) (1873).

HOPKINS, Johns, American financier and philanthropist : b. Anne Arundel County, Md., 19 May 1795; d. Baltimore, 24 Dec. 1873. His parents, Quakers, gave him a fair education and the training of a farmer. At 17 he went to Baltimore, there became a grocer, and in 1822 founded the house of Hopkins and Brothers. He built up a trade in Maryland, Virginia and North Carolina, having practically a monopoly in his line. His credit and counsel were highly valued in financial and mercantile affairs. He retired in 1847 with a large fortune, which he employed in banking and railway operations. In 1873 he gave property worth $4,500,000 to found a free hospital; he presented Baltimore with a public park, and also gave over $3,000,000 to found the Johns Hopkins University in Bal¬ timore.

HOPKINS, Lemuel, American physician and political writer: b. Waterbury, Conn., 19 June 1750; d. Hartford, Conn., 14 April 1801. He practised medicine at Litchfield 1776-84, when he removed to Hartford, where he sus¬ tained a high reputation, and had an extensive practice till his death. He was singular in his appearance, manners and opinions ; a man of talents and learning, and also a poet. He was associated, with Trumbull, Barlow, Alsop, The¬ odore Dwight and others (called the "Hartford wits**), in the 'Anarchiad,* 'Echo,* Eolitical Greenhouse, * Guillotined and other similar satirical compositions ; and is said to have writ¬ ten for Barlow the beautiful and well known version of the 137th psalm beginning, "Along the Banks where Babel's Current Flows.®

HOPKINS, Margaret Sutton Briscoe,

American author: b. Baltimore, 7 Dec. 1864. She married Prof. A. J. Hopkins of Amherst College, and has been engaged in literary work since 1890. She has written under the pen name of "Margaret Sutton Briscoe® (Per¬ chance to Dream and Other Stories) (1892) ; Einks in a Chain*

*(1893) ; 'Jimty and Others * (1898) ; (The Sixth Sense and Other Stories) (1899) ; 'The Change of Heard (1903) ; 'The Image of Eve* (1909).*

HOPKINS, Mark, American college presi- dent: b. Stockbridge, Mass., 4 Feb. 1802; d. Williamstown, Mass., 17 June 1887. He was graduated at Williams College, Massachusetts in 1824, and having filled a tutorship in the college two years received in 1828 the degree of M.D., and in the.same year commenced the practice of medicine in New York. In 1830 he was re¬ called to Williams College to fill the chair of moral philosophy and rhetoric, and in 1836 be¬ came president of the college, a position which he held till 1872. In addition to his labors as an instructor, he lectured before the Lowell Institute of Boston, the Smithsonian Institution and various scientific and literary associations. Presiding over a college which has been called the cradle of foreign missions, he took an active part in the deliberations of the American Board

of _ Commissioners for Foreign Missions, of which he was president from 1857. He pub¬ lished (Lectures on the Evidences of Christi¬ anity J (1846) ; (Miscellaneous Essays and Dis- courses' (1847); (Lectures on Moral Science) (1862) ; 'The Law of Love and Love as Law' (1869) ; 'Outline Study of Man' (1873) ; 'Scriptural Idea of Man' (1883); 'Teachings and Counsels' (1884). Consult Carter, 'Life of Mark Hopkins' (1892).

HOPKINS, Pauline Bradford Mackie,

American novelist : b. Fairfield, Conn., 6 July 1874. In 1899 she married H. M. Hopkins, who died in 1910; she has been in literary work since 1896. Her works include Made¬ moiselle de Berny, a Story of Valley Forge' (1897) ; 'Ye Lyttle Salem Maide, a Story of Witchcraft' (1898) ; (A Georgian Actress, an Historical Romance' (1900) ; (The Washing¬ tonians' (1902) ; (The Flight of Rosy Dawn' (1902); (The Voice of the Desert' (1903); 'The Girl and the Kaiser' (1904) ; 'The Story of Kate' (1907) ; and the plays 'Yellow Bird' (1915) ; (The Moving House' (1915) ; and 'The Spell' (1916), with Sarah Jefferis Curry.

HOPKINS, Samuel, American Congrega¬ tional clergyman: b. Waterbury, Conn., 17 Sept. 1721 ; d. Newport, R. I., 20 Dec. 1803. He was graduated at Yale College in 1741, studied the¬ ology under Jonathan Edwards (q.v.), and in 1743 was ordained at Housatonic, now Great Barrington, Mass., where he continued until 1769, when he removed to Newport, R. I.,

and was pastor there till his death. He possessed almost incredible powers of application, and is said to have been sometimes engaged during 18 hours of the day in his studies. He pub¬ lished 'Dialogue, Showing it to be the Duty and Interest of the American States to Eman¬ cipate all their African Slaves' (1776) ; Sys¬ tem of Doctrines Contained in Divine Revela¬ tion, Explained and Defended' (1793), etc. His theological opinions gave rise to the famous Hopkinsian Controversy. Hopkins differs from orthodox Calvinism in his opposition to the doc¬ trines of original sin and of the atonement ; moreover, he put particular stress on the virtue of altruism and unselfishness, even claiming that selfishness, of whatever nature, was inherently and essentially sinful. Consult West, 'Life of Hopkins' (1805) ; Park, Memoir' (1852). Consult also Mrs. Stowe's novel, 'The Min¬ ister's Wooing,' in which Hopkins is the cen¬ tral figure.

HOPKINS, Stephen, American statesman, a signer of the Declaration of Independence : b. Scituate, R. I., 7 March 1707 ; d. Providence, 13 July 1785 In 1733 at Providence he was elected a member of the general assembly and in 1739 became chief justice of the Court of Common Pleas. In 1755 he was elected governor of the State and remained in office, with the exception of four years, until 1768. In 1754 he was appointed a member of the board of com¬ missioners assembled at Albany, N. Y., to con¬ cert a plan of union for the colonies. In 1765 he was elected chairman of a committee ap¬ pointed at a special town meeting held in Provi¬ dence to draft instructions to the general as¬ sembly on the Stamp Act. In August 1774 he was, with Samuel Ward, elected to represent the State in the general Congress held at Phila-*

delph a and was also chosen in 1775 and 1776. On the naval committee he was placed next after John Hancock, the chairman, and greatly assisted in the formation of a navy. For 50 years he filled some public station ; he was for many years chancellor of Brown Uni¬ versity. In 1765 he commenced a (History of the Planting and Growth of Providence,' pub¬ lished in the Providence Gazette. In the same year he published 'The Rights of the Colonies Examined,' which was reprinted in London.

HOPKINSON, Francis, American jurist, one of the signers of the Declaration of Inde¬ pendence : b. Philadelphia, 21 Sept. 1737; d. there, 9 May 1791. He was graduated at the College of Philadelphia (now the University of Pennsylvania), having been the first student who entered that institution at its opening, and afterward studied law. In 1776 he was sent from New Jersey as one of her representatives in Congress. During the Revolution he dis¬ tinguished himself by satirical and political writings, which attained such popularity that it has been said that few pens effected more than Hopkinson's in educating the American people for political independence. He also ridi¬ culed in prose and verse most of the social

follies of his time. In 1779 he was made judge of the admiralty of Pennsylvania, which office he held for 10 years, until the organization of the Federal government, when it expired. As soon, however, as Washington became Presi¬ dent of the United States, he addressed to Hopkinson a letter enclosing a commission as United States district judge for Pennsylvania. He was skilled in painting and music, compos¬ ing highly popular airs for his own songs. Of his political writings the most prominent were 'The Pretty Story' (1774) ; 'The Proph¬ ecy' (1776) ; 'The Political Catechism' (1777). The best known of his poems are 'The Battle of the Kegs,' a humorous ballad, and 'The New Roof, a Song for Federal Mechan¬ ics.' The Miscellaneous Essays and Occa¬ sional Writings of Francis Hopkinson' were published in 1792.

HOPKINSON, Joseph, American jurist and poet; b. Philadelphia, 12 Nov. 1770; d. there, 15 Jan. 1842. He was son of Francis Hopkinson (q.v.). He was educated at the University of Pennsylvania, studied law and began to practise at Easton, Pa., in 1791, whence he returned to Philadelphia. From 1815 to 1819 he was a member of the House of Representatives from Philadelphia. He op¬ posed the recharter of the United States Bank, and made a noted speech on the Seminole War. At the close of 1819 he retired from Congress, declining a re-election. Having gone to Bor- dentown to reside, he was elected to the legis¬ lature of New Jersey. In 1828 he was appointed judge of the United States court for the eastern district of Pennsylvania, an office which had been filled by his father under Washington. In 1837 he was chairman of the judiciary com¬ mittee of the convention to revise the constitu¬ tion of Pennsylvania. He is, however, best known as the author of the national song, 'Hail Columbia,' written in 1798 for the benefit of an actor named Fox.

HOPKINSVILLE, Ky., city and rounty- seat of Christian County, on the Louisville and

Nashville and the Oh:o Valley railroads. Here are Bethel Female and Southern Kentucky col¬ leges, Western Kentucky Insane Asylum and manufactures of tobacco, lime, brick, wagons and carriages, a national bank and the Hop¬ kinsville High School. The city has an assessed property valuation of over $2,000,000. Pop.

9,419.

HOPPER, Isaac Tatem, American philan¬ thropist: b. Deptford, N. J., 3

Dec. 1771 ; d. New York, 7 May 1852. He was a member of the Society of Friends, and in the division which took place in 1827-28 joined the anti¬ orthodox or ˆHicksite branch. In 1829-41 he was director of a New York shop for the sale of Hicksite books ; in 1841-45 was treasurer and book-agent of the Anti-Slavery Society, and from 1845 devoted his efforts to the work of the New York Prison Association. He was widely known for his interest in benevolent objects, especially negro emancipation and the assistance of discharged prisoners. At Phila¬ delphia he was a founder and the secretary of a society for the employment of the poor, teacher in a colored school and otherwise in¬ terested in philanthropic measures. He was an eloquent speaker. Consult the*

(1853).

HOPPER, (William) De Wolf, American actor: b. New York, 30 March 1858. He made his first professional appearance in (Our Boys> (1878) and later appeared with Daniel Froh- man's Madison Square Company as Pittacus Green in (Hazel Kirke) and other plays. He studied vocal music for several years and be¬ came a star in comic opera and musical comedy. He was with the Weber and Fields Company for a time and then starred at the head of his own company, playing (Mr, Pickwick. > He again starred in the revivals of and the Lord Chancellor in the star revival of (Iolanthe) in the same year.

HOPPIN, James Mason, American scholar and author: b. Providence, R. I., 17 Jan. 1820; d. 1906. He was graduated from Yale in 1840, studied law at the Harvard Law School (1841-42), theology at the Union and Andover seminaries (1843-45) and the University of Berlin (1847-49), was ordained to the Congre¬ gational ministry in 1850 and was pastor at Salem, Mass., in 1850-59. In 1861—79 he was professor of homiletics at Yale, in 1861-63, also pastor of the college church, and from 1879 until his retirement as professor emeritus in 1899 professor of the history of art. His publications include (Notes of a Theological Student > (1854) ; (01d England: Its Art, Scen¬ ery and People) (1867) ; (The Office and Work of the Christian Ministry) (1869) ; Wife of Rear-Admiral Andrew Hull Foote) (1874) ;

HOPS (Humulus lupulus) are the strobiles or catkins of a climbing plant, often met with in the wild state in norihern Europe and in

North America. The hop belongs to the nettle family and it is the sole representative of its genus, but is cultivated in many varieties. It is a dioecious plant, that is, the pistillate (female) and staminate (male) inflorescence are borne by different plants. In American and English hop-gardens it is customary to grow a sprinkling of male plants, but these are

rigorously excluded on the Continent. In the former case the pistillate inflorescence becomes impregnated and forms seeds, in the latter they do not. In good hops the seeds are scarce, small, shrunken and sterile, that is, incapable of propagating the plant. Many be¬ lieve that the formation of seed ought to be prevented, as the seeds are useless to the brewer, the main consumer of hops, and besides they cnly add weight to the hops, and this, indeed, is the chief reason for growing them. Their presence, however, grades the hops to a lower price so that the net result is a loss.

The hop is a perennial herbaceous plan, which produces each year several long, twisting, striated stems, 15 to 30 feet in length, which clamber over hedges, brush, etc., with ease. The leaves are stalked, opposite, generally three lobed (sometimes five- to seven- lobed) and coarsely dentate. They are, like the stem, rough to the touch. The male inflorescence forms a panicle; the flowers enclose five stamens in a small greenish five-parted perianth. At an early stage the female inflorescence is less con¬ spicuous. The strobile or catkin consists of several small acute bracts' or leaves at whose base are situated two sessile ovaries, each sub¬ tended by a rounded bractlet. These bracts are one-half to three-quarters of an inch long and are attached to the extremity of the stem in such a way as to lap and form a cone.*

The ovary and the base of the bracts are covered with a, yellowish powder, the Wop- meal® or lupulin, which is the active principle of the plant.

Hops contain hop-oil, hop-resins, acids, hop- tannin, hop-bitter, hop-wax, nitrogenous bodies, carbohydrates and mineral substances. Dias¬ tase (an enzyme) has also been found, which is especially valuable in ale brewing. Hop-oil, the principal constituent of the lupulin, present in 0.2 per cent to 0.8 per cent, is obtained by dis¬ tilling the hops with water. It is colorless and hardly soluble in water. The characteristic agreeable aromatic flavor of the hops depends on this oil. If exposed to air the oil turns to resin, passing to valerianic acid, to which the cheesy odor of old hops can be traced. Ac¬ cording to Hayduck, there are three resins in hops, the a p and y, of which the first two are. soft and the latter hard. Tl^e preserving, antiseptic effect of hops is due to the two soft resins, as they are distinctly prejudicial to the growth of butyric acid and many other bacteria, but do not have much effect on acetic acid bac¬ teria and sarcina. In old hops- valerianic acid, malic acid, citric acid and succinic acid are present. Hop- tannin is chiefly stored in the leaves of the strobile and is a pale brown amorphous powder soluble in dilute alcohol, which through oxidation passes into phlobaphen. The hop-bitter is obtained from the two soft resins, and imparts a pleasant bitter taste to the beer, without which it would be flat and in¬ sipid. They are present in the dry hops up to 15 or 17 per cent. Hop-wax is present in con-

siderable proportions in hops, but, since it is insoluble in water and even in 90 per cent alcohol, it has no value in beer. Nitrogenous constituents of hops are about 2 per cent to 4 per cent, which calculated to albumen are 12 per cent to 24 per cent, of which 0.75 per cent to 1.6 per cent are soluble. Bungerer maintains that 30 per cent of the nitrogenous substances are asparagin. Behrens says that trimethylamin and free ammonia are also pres¬ ent. Griess and Harrow have discovered cholin in hops. Brown and Morris have shown the presence of an enzyme similar to diastase, which will saccharify starch, that is, change it into sugar. This enzyme is chiefly accumu¬ lated in the seeds. The carbohydrates contained are cellulose, sugar, dextrin. According to Brown and Morris there is present 1.55 percent dextrose and 2.10 per cent levulose, together 3.65 per cent of inverted sugar. According to Thausing hops contain 5.3 per cent to 15.3 per cent of ash and an average of 7.54 per cent, of which over one-third is potash, one-sixth phosphoric acid, one-sixth silica, and some sodium, lime, magnesia, iron oxide, sulphuric acid and chlorine. The presence of an alkaloid in the seed has been ascertained by Dr. Ernst Hantke, but research on this point is still pro¬ gressing.

Only a very small amount of hops is used in medicine, being chiefly employed as a stomachic in dyspepsia; a pillow stuffed with hops is said to induce sleep. By far the largest portion of the hops produced is used in the manufacture of various beers, so that here this subject is treated with that idea in view.

For about 1,000 years hops have been added to beer or wort, to give it its pleasant and characteristic flavor and aroma ; and their cul¬ tivation has progressed as the manufacture of beer became widespread. Germany and Eng¬ land had hop gardens in the 8th and 9th cen¬ turies, but the cultivation was not nationalized until the 16th century, and at present hops are a very important agricultural product.

The pistillate plant alone is cultivated on the Continent, especially Germany and Austria, because the hop growers there find that unferti¬ lized pistillate plants produce strobiles richer in aroma, more plenteous in lupulin, and in general better than where the plants were fertilized through the pollen of the staminate plant. In the United States we always find the strobiles containing much seed, while the choice imported Bohemian and Bavarian hops are seedless. The pistillate plant flowers in August, and its stro¬ biles are ready for harvesting during Sep¬ tember.

The continental European growers always strive to have early, medium and later hops, so that there the hop-picking begins late in August and lasts through the early part of October. In the United States the picking is usually over in two to three weeks. Much loss can occur by too early picking, while too late harvesting is also detrimental to the value and quality of the product.

Abroad the finest hops are raised in Bohemia, its <(Saazer® hops being known throughout the world. Next to this ranks the Bavarian ((Spalter hops,® and the product of the so-called ((Hal- lertau.® As a rule the Bavarian hop is stronger than the Bohemian, but somewhat inferior in quality. Wiirtemberg, Saxony, Baden, Prussia

and Alsace also raise a good quality of hops; and Belgium, northern France and Burgundy cultivate it on a large scale. England's most famous hops are the (

The world's production of hops in the year 1913 (the latest normal figures available) amounted to 173,936,914 pounds, about 21,000,000 pounds less than the average, and 50,556,372 pounds less than the preceding year. This de¬ ficiency in 1912 was due chiefly to a shortage of 25,000,000 pounds in the Austrian crop, 22,- 000,000 pounds in the German crop and 13,- 000,000 pounds in the English crop. This was partly made up by an increase of 13,000,000 pounds in the crop of the United States. The production by countries in 1913 was as follows : United States, 62,898,718 pounds; United King¬ dom, 28,631,792 pounds; Germany, 23,408,272 pounds ; Austria, 23,314,733 pounds ; Russia, 16,973,016 pounds; France, 8,028,492 pounds; Belgium, 7,3 95,231 pounds; Australia, 2,078,100 pounds ; Canada, 1,438,459 pounds.

Although hops may be grown generally throughout the United States, their production is limited to a very few sharply defined areas. Nearly the whole annual crop is grown in Oregon, California, New York and Washington. Small quantities are reported from Wisconsin, Idaho, Massachusetts, Pennsylvania, Michigan, Vermont, Kentucky and Ohio. They do not thrive where the winters are long or severe, and they are dependent in large degree upon the rainfall, a wet season at the time of ripening being disastrous. Hops require bulky nitrog¬ enous manure, and it is the approved practice to manure heavily with stable manure, and to add generous dressings of chemical fertilizers. The crop takes from the soil per acre 129 pounds of nitrogen, 86 pounds of phosphoric acid and 132 pounds of potash. Of these substances 56 pounds of nitrogen, 30 pounds of phosphoric acid and 54 pounds of potash are contained in the hops, and definitely removed from the soil, the remainder being in the stems which can be returned. These figures show that the hop re¬ quires twice as much

fertilizer as the usual crop of wheat. As the roots run very deep subsoil cultivation is required for the best success.

The hop does not come true from seed, so the commercial crop is grown from cuttings of the (2 to 7 feet apart both ways; that is, from 1,031 to 889 hills to the acre. Three cuttings . are set to the hill to grow — a fourth is sometimes set to ensure three vines, in case one should be lost. The top bud on the cutting should be placed at two inches below the level of the surface or at the level if the plant is to be hilled up. The price of such sets ranges from $1 per thousand when plentiful to $10 per thousand when scarce. The field is thoroughly cultivated from the time the plants start into growth until they are well branched out, weeds being scrupulously kept down. The number of

shoots allowed to grow is limited to 9 or 10 to the hill, the other shoots starting being pruned out. The most vigorous ones are left to grow. Some growers cut away the shoots from the top buds (after these have aided the plant to make roots), claiming that a sturdier growth and a larger yield of hops is gained from the deeper buds. The former use of poles has been very largely abandoned in favor of wire trellises. The high trellis- is most in favor, the posts being 20 feet high (set two feet into the ground) and six or seven hills apart. A stout wire is carried over the tops of the posts, and to these are fastened strings carried up from pegs set into the ground at each hill. The upper third of each of these strings is of twine strong enough to carry at least 80 pounds. In some hop yards wires are used instead of strings, and are fastened into S-hooks at the top, so as to be readily unhooked and thrown down to the pickers at harvest time. The low trellis has posts eight feet high set every third or fourth hill. As the' hop vine will not run horizontally, a good deal of extra labor is required with the low trellis in training the vines by hand along the top wire. Where the pole system is still in vogue it is common practice to set a pole at each hill, and to run twine from a point on each pole five or six feet above the ground across to the tops of the adjacent poles. This is known as the arbor method. To be of first quality hops have to be picked when just ripe. It is customary therefore to grow several vari¬ eties with different periods of ripening, stretch¬ ing over three or four weeks, so as to work the staff of pickers to the best advantage. Hops generally, but not always, acquire a yellowish hue when ripe. A better test is the texture : when the hops give a crisp rustling sound when crushed in the hand they are <(ripe." At this time also they give out their characteristic odor. Hops are cured by drying until the 75 per cent of water in the newly gathered hops is reduced to 10 to 14

per cent. This is done in kiln houses where they are submitted to an airblast of from 110° to 140° F. They are then fumed with sulphurous acid gas to improve their color and keeping qualities, and are then cooled and pressed into bales. If not immediately mar¬ keted, they are placed in cold storage where they may remain in perfect condition for 15 to 18 months — perhaps longer. Sulphured hops keep well for a time even if not put in cold storage, and when unsulphured seem to preserve their freshness if so stored, but unsulphured hops not stored in the cold will soon deteriorate and become strong and musty.

In California, the hop will yield the first year the fields are planted; in New York no crop is secured until the second year. For winter pro¬ tection in New York State it is customary to place a large forkful of strawy stable manure over each hill.

The cost of producing hops is about 10 to 12 cents per pound. The price they bring varies enormously, from 12 cents up to 50 or 60 cents, and sometimes over $1 per pound. In times of extreme scarcity the prices have been fabulous.

The hop plant is subject to many diseases, due mostly to parasites, among which are the hop plant-louse (Phordon humuli), the hop- grub (Gortyna immanis), the hop-vine snout- moth (Hypena humuli), the hop-merchants

(Polygonia interrogationis) , the zebra cater¬ pillar (Mamestra picta), the common woolly bear caterpillar (Spilisonma virginica), the saddle-back caterpillar (Empretia stimulea), hop-vine leaf-hopper (Tettigonia confluenta) ; various beetles, the ((red spider" or spinning mite, and the needle-nosed hop-bug (Calocoris fulmomacuiatus) , which mostly produce red smut, etc., and even destroy entire crops. Fun¬ gus pest, blight and mold (black smut), are extremely rare in the United States, although widespread in England and Europe. Within the last few years the hop fields of New York have been devastated by the ((powdery mildew" or <(blue mould," a fungus imported from Europe. This pest thrives in rainy weather, and if allowed to gain headway quickly ruins the fields. It has been measurably controlled by spraying dry flowers of sulphur, or finely ground sulphur flour among the plants at in¬ tervals: (1) before any signs of the mildew appear, about the time of the second tying;

(2) when the hops are well up on the poles;

(3) when the hops are in full bloom; and two sprayings later if needed. The amount of sulphur used for each spraying is about 50 pounds per acre. Should the pest be very severe, 70 pounds are used. The best remedies for the destruction of the animal parasites is the use of bisulphide of lime or a

heavy spray¬ ing of soap and tobacco emulsion. Sulphur in any form is a good remedy, and a snray of kerosene soap emulsion, to which a small quantity of flowers of sulphur is added, is gen¬ erally effective. In extreme cases the affected plants are cut down and burned to prevent a spread of the disease.

The elements also play havoc with the de¬ velopment of the tender hop-vine. High winds will tear the vine from its support; drouth will tend to change the color of the light yellow strobile to the objectionable ((pole redness"; and too much water will result in a lack of lustre, when the hops are said to be ((blind." This is due to the fact that the entire energy of the plant is spent in the formation of leaves, the strobile being imperfectly developed.

Although it is possible to estimate with a fair degree of accuracy the several constituents of hops, it has not been so far found possible to establish any definite relation between the value of the hops and the amounts of hop-oil, resins, tannin, etc., which they contain. Con¬ sequently up to the present time, chemistry has not afforded much assistance in this direction. Hence the value of hops is still judged accord¬ ing to its general properties. The color, size and appearance and lustre of the strobile, the quantity and color of the lupulin, the amount of seed, the odor, . taste and cleanliness, are the essential points in the valuation of hops.

Fine hops possess a silkv lustre which is lacking in inferior grades. The color is green¬ ish yellow, varying with the origin. New York hops have a somewhat paler color of a stronger greenish shade, while the Pacific coast hops have a more pronounced yellowish color. A reddish tint may indicate pole-redness, or, what is worse, that the hops have become overheated in the bale, which implies a darker coloration of the lupulin and deterioration of quality. The form and size of the strobile is also characteris¬ tic of the origin. Small strobiles are prefer¬ able to big ones, as they contain on an average

more hipulin ; and the fewer the seeds the bet¬ ter. The bracts ought to lap over one another and hold firmly together, whereby the lupulin is kept in better. The odor and aroma should be strong, fine, free from any off-smell such as odors of fruit, garlic, etc. Only very slight amounts of stems, foliage or stripped cones should be present, as they impart a coarse taste to the beer. The amount of lupulin present in the strobile is an indicator of the value of the hops, because it contains those resins, volatile oils and bitter

substances, which are so essen¬ tially valuable to the brewer. In fresh hops, slight pressure will force out the contents of the strobile in a transparent droplet, but in old hops the contents of the lupulin granule will not flow, due to resinification, and1 the expressed juice is more syrupy, wax-like and opaque. The largest part of the German crop is merely air- dried or sun-dried, and it is claimed that this <(natural cure® preserves far more of the essen¬ tial oils and other active principles than is pos¬ sible by the artificial hot-air cure used in the United States and England, and that this at least in part accounts for the peculiarities of Spalt hops that command such extraordinary prices. Hops are easily affected by warmth, moisture, air and light, and for this reason must be protected in storage against these in¬ fluences. For brewing purposes it is almost im¬ possible to pass off a substitute for hops, al¬ though lupulin and hop-extract are now manu¬ factured. The lupulin is separated from the strobile, and inasmuch as it contains the essen¬ tial constituents for which hops are used in brewing, it can be better utilized, although it is impracticable and impossible to replace the en¬ tire quantity of hops with lupulin alone because it contains very little tannin, which also is es¬ sential. The same remark is applicable to hop- extract. The essential oil of hops is another similar preparation. It consists mainly of myrcene and humulene, which constitute from 80 to 90 per cent of the whole, and small pro¬ portions of linalool, linalyl tVo-nonoate, some ester or geraniol and a diterpene.

In the United States, the culture of hops was introduced as early as 1625 in New Nether¬ lands, and 23 years later in Virginia, but al¬ though encouraged by special legislation in 1657, never assumed its present important agricul¬ tural role until 1800. During the first half of the 19th century Vermont produced seven- eighths of the entire United States crop; and Massachusetts, Vermont and Maine were the chief hop States, but as the quality of the New York hops was far superior, and the quantity three times as great, the former States soon abandoned hop culture. The result was that during 1850-65 a small portion of New York, lying south of the New York Central Railroad between Rochester and Albany, monopolized the hop raising of the United States. Small patches were planted in Wisconsin and Michigan in 1860 and in 1866, when the New York crop was completely destroyed by vermin, Wisconsin hop-growers obtained exorbitant prices for their excellent product, which induced many to plant hops, expecting to realize a fortune in a few years, but the prices speedily declined ow¬ ing to an overproduction. During 1870 and 1880 New York again was at the head, but at that time fresh competition began to develop on the Pacific Coast. The "Russian River® hops

of California were a marvel; their texture was <(fine as silk® ; their color (

pounds; California, 8,391 acres, 11,995,000

pounds; New York, 12,023 acres, 8,677,000

pounds; Washington, 2,433 acres, 3,433,000

pounds. The acre-yield in the States mentioned was California, 1,400 to 2,200 pounds; Wash¬ ington, 1,200 to 2,000 pounds; Oregon, 1,000 to 1,600 pounds; New York, 600 to 1,500 pounds. The highest acre-yield recorded was for a locality in Sacramento County, Cal., on a piece of alluvial land four feet deep, where 4,000 pounds to the acre was harvested. The New York hops brought nearly double the price in the market that the Pacific Coast hops com¬ manded, and the imported Bohemian hops brought double the price of the New York hops. New York hops are almost entirely con¬ sumed in the United States, while the greater amount of the Pacific Coast hops (especially Oregon) is exported. The English production is scarcely ever sufficient for its needs, so that Great Britain must import some and mostly takes Oregon hops, because they are especially adapted to the English ale brewer's require¬ ments.

Consult Myrick, H., (The Hop: Its Culture and Cure, Marketing and Manufacture > (New York 1899) ; United States Agricultural Depart¬ ment's Farmers' Bulletin 304; United States Plant Industry Bureau Bulletin 271 and cir¬ cular 33.

Dr. Ernst Hantke.

HOR, a mountain on which Aaron is said to have died (Num. xx, 22-27, xxxiii, 37-41 ; Deut. xxxii, 50ff). It is traditionally supposed to have been identical with Jebel Nebr Harun, a mountain southwest of Petra.

HORACE (Quintus Horatius Flaccus), Roman poet of the Augustan Age: b. Venusia, Italy, 8 Dec. 65 b.c. ; d. Rome, 27 Nov. 8 b.c. Our information about Horace's life is derived in the main from his own writings, which are supplemented in a few details by a brief biog¬ raphy attributed to Suetonius. He was born at Venusia, a small town in Apulia, _ near the boundaries of Lucania and Samnium. His father was a freedman, and, according to Hor¬ ace's own statement, followed the trade of a coactor, or collector. He seems to have pros¬ pered, for he was able to purchase a small farm. He was not satisfied to send the boy to the local school of Flavius, which was patronized by the aristocracy of Venusia, but moved to Rome to give his. son the best possible educa¬ tional advantages. It is to his credit that he did this, not that Horace might better his posi¬ tion in life, but for the sake of the education itself. At the capital he supplied his son with the means of making a creditable appearance, and he himself

accompanied him to and from his classes, giving him moral instruction in a shrewd and homely way by pointing out men who offered examples to be followed or shunned. To this training Horace owed both his habit

of self-examination and his consequent tem¬ perance and self-control, and that keen ob¬ servation of men and things which is one of his marked characteristics. He nowhere makes mention of his mother, who very likely died while he was an infant.

At Rome, Horace pursued the usual gram¬ matical studies under the notorious <(flogging Orbilius,® and doubtless supplemented them by mpre advanced work in rhetoric and literature. It is, however, in marked contrast to the fullness of our information about the other details of his life, that we know little or nothing about the masters who influenced him or about the particulars of his education, except that he im¬ plies that he attended the classes of several teachers. We may, however, infer something from the results. He certainly acquired a taste for reading, both in the literature of Greece and that of his native land, a habit which he continued to follow throughout his life. Some¬ where about 46 b.c., in his 19th year, Horace went to Athens to study philosophy but he does not seem to have been especially at¬ tracted by any particular school. In his early life he leaned toward the Epicurean doctrine, but as time went on he turned more and more to that of the Stoics, without, however, com¬ mitting himself to either sect. The assassination of Caesar and the arrival of Brutus in Athens in September 44 b.c. put an end to his quiet student life. He joined the army of the liber¬ ators, and received a commission as tribune, though he was in no way fitted for the post. At Philippi he fled from the field with the rest of the routed forces, and, as he himself says, <(left his shield behind.® His humble estate was confiscated, but on his return to Rome in 41, when a general amnesty was granted by Oc- tavian, he in some way secured a position as clerk in the quaestor's office, which furnished him the means of livelihood.

Horace freely admits that it was lack of money which first led him to write verse, and it was to his efforts in this line that he owed his advancement. He soon made the acquaint¬ ance of Virgil and of Varius, by whom he was introduced to Maecenas. After a delay of several months, during which the astute states¬ man doubtless took the young man's measure, his position was established by his admission to the select circle of Maecenas' literary friends. This honor, as he says with pardonable pride, was due not to high birth, but to his personal character. In 33 he received from his patron a

small estate, the famous Sabine farm, situated in the valley of the Digentia, a small stream flow¬ ing into the Anio, about 30 miles northeast of Rome. Through Maecenas he became intimate with the most eminent men of the day, both in literary and in political life, including Augustus. Toward the emperor his attitude was one of dignified independence. He was quick to rec¬ ognize the advantages of the peaceful and es¬ tablished order of things which Augustus had brought about, and he celebrates it in many of his odes ; but lie did not hesitate to decline the position of private secretary which the emperor offered him. This he did without giving offense, for Suetonius quotes extracts from letters of Augustus which indicate a cordial and even an intimate friendship. Horace also preserved his indenendence in his relations with Ifis bene¬ factor, Maecenas, as appears from several pas¬

sages in his works, although he showed a proper gratitude for his many favors.

In the year 35 Horace issued his first book of satires, to which he himself gave the title of ˆermonesC or familiar talks. On this branch of literature, which the Romans claimed as their own creation, see Satire. He took as his model Lucilius, and at first seems to have fol¬ lowed him closely, but he soon found himself out of sympathy with the earlier poet's severity in invective and disregard of form. In the fourth and tenth satires he subjects the work of his predecessor to a thorough criticism, and defines his own ideal of what satire should be. This book was complete in itself, and begins with an essay addressed to Maecenas. That the reception given to his first effort, which did not lack serious defects, was not wholly favor¬ able, and that Horace had not satisfied himself, is evident from the poet's own words in the introductory essay of the second book, which seems to have appeared in the year 30. This book marks a great advance on the first, from which it differs in its externals in having no formal dedication and in being cast almost wholly in dialogue form, whereas in the first book Horace himself had been the chief speaker. In the following year, urged by Maecenas, Hor¬ ace published his first collection of lyrics, some of which doubtless represent his earliest at¬ tempts at verse. It was a volume of 17 Epodes, or HambiC as he himself named them. He chose as his model the Greek iambic poet Archi¬ lochus, and followed him closely in form. His work, however, has little of the bitter invective for which the Greek poet was notorious, and » Horace shows no little 'Originality both in his choice of themes and in his treatment of them. Six years later Horace, now a man of 42, pub¬ lished the first three books of the Odes, Ayhich form a work complete in itself, opening with a dedication to Maecenas and closing with an epi¬ logue in which he predicts his own immortal¬ ity. In his choice of metres he followed espe¬ cially Alcaeus and Sappho, from whom he also took many of the subjects of his odes. But he shows the influence of many

other Greek poets, as well as considerable independence. Al¬ though this work did not wholly escape hostile criticism, it at once placed Horace in the front rank of Roman poets. This position was for¬ mally recognized in 17 b.c. through his appoint¬ ment by Augustus to write the ode, the well-known (Carmen Saeculare, which was sung at the celebration of the secular games in that year.*

His next work was a return to the field of satire, for the belong with the (Ser- mones) to that branch of literature in the Ro¬ man sense of the term. They differ from the

20 letters, of which some are genuine and some fictitious, is also dedicated to Maecenas. The second book is devoted wholly to literary criti¬ cism, a subject which lay within the domain of satire and had already been handled in some of the

Of the remaining years of the poet's life we know very little. Suetonius says that he died 27 Nov. 8 b.c., and there seems to be no ground for rejecting this testimony. No authentic por¬ trait of Horace has come down to us. From his own allusions to his personal appearance, and from a letter of Augustus, quoted by Sue¬ tonius, we learn that he was stout and short, with dark eyes and hair, but prematurely gray. He further tells us that he was quick to anger, but easily appeased. He never married, and of all the loves of which he sings, Canara alone seems to be other than imaginary.

It is probably safe to say that Horace has been the most widely read of all Roman writ¬ ers, not excepting Virgil, and that he has ap¬ pealed to a more varied circle of readers than any of his countrymen. This statement applies especially to his odes, since it is to them that his popularity with the general public is for the most part due. It has been said that the odes are not poetry of the highest type, and that when they are analyzed and their contents sub¬ jected to searching criticism, the sum total of poetic material is scanty. This is unquestion¬ ably true, yet it is equally true that their influ¬ ence and popularity have none the less been great. This is due in part to the personality of the man and the sympathetic feeling which he rouses in his readers on account of his broad humanity; and in part to the fact that the very simplicity of the odes and their ease of comprehension appeal to readers of all classes. As Mackail says, he realized that lim¬ ited as was his own range of emotions, that of mankind at large was still more so. In some cases, notably in the love poems and the con¬ vivial odes, we are conscious that he did not always feel even the emotions which he de¬

scribes. In spite of all criticism, the one un¬ doubted fact remains, that the odes of Horace

have pleased readers of all epochs and all sorts and conditions of men.

Horace's claim to originality is greater than is usually admitted. In his day the question of imitation of Greek models had ceased to exist, and the question was, rather, which model to choose. In the Augustan Age we find two schools, those who followed the Alexandrine writers, and those who went back for their inspiration to the Greeks of the classical period. Horace belonged to the latter class. His con¬ tempt for the followers of Alexandria is out¬ spoken, and so undiscriminating as to include such really great poets as Calvus and Catullus. He certainly knew how to make what he bor¬ rowed his own, and many of his odes are so thoroughly national in character that they can have owed little except their external form to Greek sources. In his satires, in spite of his avowed imitation of Lucilius in the beginning, his originality is far greater, and these are in reality his greatest works. While less popular with the general reader, they are of great inter¬ est for the light which they throw on Horace's life, personality and habits, as well as for the vivid pictures which they set before us of the complex Roman life. In his daily walks about the city, Horace used his powers of observa¬ tion, and drew material from all sides and from all classes of society. Above all we can trace in them his own self-improvement and the de¬ velopment of his character, and the gradual growth of that sound judgment and good taste which characterize the work of his mature years. The satires are further characterized by a genial and good-natured humor. Like Dickens, he chose appropriate names for many of his characters — such as Novius, or Newman, for the parvenu, though, like those of Dickens, they were not always of his own coinage. The satires also abound in the familiar phrases of every-day life, in puns and plays upon words, in proverbs and homely fables and stories.

Horace's works, as he himself humorously predicted, became school textbooks at an early period. Juvenal implies that this was the case in his day. This fact and his general popularity led to the numerous commentaries on his works, which began to appear as early as the days of Nero, of which those of Porphyrio, of the early part of the 3d century, and the collection falsely attributed to Helenius Acron, have come down to us. The great number of manuscripts which exists testifies to his popularity in the Middle Ages. His fame at that time was, however, much less than that of Virgil, and, though he also was regarded as a magician, it was only at Palestrina and at Venusia that such legends were current. In modern times his influence on French and English satire has been great, as well as on modern poetry in general. See Odes (Horace).

Bibliography. — The date of the first edi¬ tion is uncertain, but is earlier than 1471. Since then the editions of Horace's works, or of parts of them, have been legion. Of these may be mentioned as epoch-making that of Richard Bentley (Cambridge 1711), which has often been reprinted (the reprint at Berlin in 1869 contains a word-index by C. Zangermeister) . The standard critical text is that of O. Keller and A. Holder (Leipzig 1864-70, a second edi¬ tion of the first volume containing the (OdesP (EpodesP and (Carmen SseculareP appearing

in 1899). A commentary on this edition is furnished by Keller's (Epilegomena zu Horaz) (Leipzig 1879-80). Of editions with notes may be mentioned J. G. Orelli (4th ed. by W. Hirschf elder and W. Mewes, Berlin 1886-92), containing a complete word-index; A. Kiess¬ ling (Berlin, 2d ed., 1890-98) ; H. Schutz (Ber¬ lin 1880-83) ; these two appear in new editions from time to time; L. Muller, by P. Shorey (New York 1896) is of special interest to the general reader on account of its large number of paral¬ lel passages from English poetry.

The simplicity and directness of Horace's thought have been a constant temptation to translators, and the number of English ver¬ sions, particularly of the (London 1892) ; Gladstone, (Odes) (New York 1894) ; Green, (Odes and Epodes) (London 1904). An edition of Horace's works, in six volumes, containing both text and translations, has re¬ cently been issued by the Bibliophile Society of Boston. To give an adequate literary criticism of Horace is nearly as difficult as to translate him, and is out of the question within the lim¬ its of a brief article. Consult the various his¬ tories of Roman literature, especially that of Mackail (New York 1900) ; Sellar, (Roman Poets of the Augustan Age — Horace and the Elegiac Poets) (London 1892) ; Nettleship, (Lectures and Essays) (Oxford 1885) ; Patin, (Etudes sur la poesie latine) (3d ed., Paris 1883) ; Tyrrell, (Latin Poetry) (Boston 1895) ; Boissier, (The Country of Horace and VirgiP (London 1896) ; Lang, (Letters to Dead Au¬ thors } (London 1886).

John C. Rolfe,

Professor of Latin Language and Literature, University of Pennsylvania.

HORACE'S SATIRES AND EPIS¬ TLES. The (Satires and Epistles > of Horace, each in two books, appeared at irregular inter¬ vals from 35 b.c., when the poet was 30 years of age, to almost the close of his life in 8 b.c. They are the products of a mature and well- balanced mind and spirit, and

are most fully appreciated by readers of philosophic age. In spite of the dual title, the variety of their subject matter and the length of experience they represent, they form a homogeneous body of literature. Horace himself calls them all sermones, which may be translated ˆdiscourses,®

((talks,® <(chats® or causeries; thus testifying to their likeness in his mind. There is less per¬ sonal satire and more formal philosophy and literary criticism in the Epistles than in the Satires ; but they are essentially one. The Epistles are only Satires rendered by advancing age and experience more mellow in spirit and more urbane in manner. The same form is em¬ ployed throughout the four books; they are all in hexameter, the author disclaiming any pre¬ tension to verse in the lofty style and professing a natural freedom and simplicity, yet holding to the ideal of urbanity and purity. The con¬ tent also is homogeneous ; the prevailing theme is human life. The Satires and Epistles are most of all a revelation of human nature. First, there is the self-revelation of the author himself. These compositions tell us not only most of what we know of Horace's origin and of his rise from the humblest of positions to a place in the friendship and esteem of the best and greatest men of the age; they have the more important effect of making us intimately acquainted with one of the most sympathetic personalities in the literature of all time. The Horace of the Odes is on the whole the court poet, the exquisite product of the higher cul¬ ture of Rome and Athens ; in the Satires and the Epistles it is the simple, direct and natural Horace of ordinary Italian manners and ideals, who appears only occasionally in the Odes and whom we may call the real Horace, that is everywhere face to face with the reader. No poet establishes so easily and so completely the personal relation with us. There are few ex¬ pressions of self in all literature so spontane¬ ous, so sincere and unreserved, so complete and so engaging. Horace becomes the reader's familiar and friend — <(the friend of my friends and of so many generations of men,® as Andrew Lang addresses him. In the second place, the Satires and Epistles are a revelation of the poet's milieu. In every composition he is ad¬ dressing some one of his great number of friends, and in this way holds the mirror up to a wide diversity of character and circum¬ stance in one of the greatest ages in history. The Satires and Epistles are kaleidoscopic with scenes not only from the larger life of the time, but also from the daily life of men in the humbler walks of existence. Their pages are golden with the poet's own reasoned contem¬ plation of the facts of life in beautiful and fruit¬ ful Italy, and with the homely thought, precept and action of the common man as well. The story of the town mouse and the country mouse find its best telling in Horace.

Again, the Satires and Epistles reveal the reader to himself. This is their greatest charm and their greatest value. They are timeless; they are universal. Their vignettes from na¬ ture, their miniatures of the life of men,

their tributes to friendship, their homely anecdotes, precepts and aphorisms, their sound common sense, their quiet humor, and, above all, their gemal philosophy of life, belong to the com¬ mon stock of human experience. Even those epistles which are devoted for the most part to literary criticism, far-reaching as their influ¬ ence upon letters has been, owe their effect hardly more to their exposition of critical prin¬ ciples than to a certain fund of good sense that applies to life in general. In a word,

Horace in the Satires and Epistles is an en¬ gaging personality with the gift of art — the man of wide and deep experience in a stirring age who not only looks upon life with under¬ standing and sympathy, but is able to give at¬ tractive and effective expression to his thoughts. For keen but genial and charitable contempla¬ tion of the human comedy, for kindly humor¬ ous and winning expression of the philosophy of life, Horace has no equal. His works, especially the Satires and Epistles, are one of the rare crystallizations of life into art.

The best Satires are I — 1, 4, 5, 6, 9; II — 1, 6, 8. These and all of the Epistles should be read in connection with the more personal and philosophic Odes, such as I — 9, 11, 31, 35; II — 2, 3, 6, 10, etc. The verse translations of Theodore Martin and Conington are well known.

Grant Showerman.

HORiE, ho're, in Greek mythology, god¬ desses of the seasons. They were generally regarded as attendants of the gods and guard¬ ians of the Olympian gates. Their character¬ istics, however, varied and their number was variously represented as two, three or four. Hesiod names three — Eunomia (good order). Dike (justice) and Eirene (peace), and thus makes prominent their attributes as also guard¬ ians of social and political conditions.

HORATII, ho-ra'shi-I, three Roman brothers who, in the reign of Tullus Hostilius, engaged the same number of Alban brothers (the Curiatii), in order to decide the contest between the two nations. A sister of the Horatii was betrothed to one of the Curiatii ; but both sides forgot their private relations in the service of their country. Two of the Ro¬ mans soon fell. The contest was unequal, but Horatius saw his antagonist faint with the loss of blood. In order therefore to separate them from one another, he feigned flight, and, while they pursued him as well as their wounds would permit, at unequal distances, he suddenly turned and slew one after the

other. He was con¬ ducted back to the city amidst the rejoicings of the Romans, adorned with the spoils of the slain. There he saw in the crowd his sister in tears for the death of her betrothed. Angered that her lamentations for her lover should mingle with the rejoicings of the nation on his victory, the brother plunged his dagger into her breast. He was condemned by the duumviri to be scourged to death, but he was later pardoned.

HORATIUS, commonly called Cocles (the one-eyed), a Roman hero, who, with the aid of Lartius and Ilerminius, kept the Tarquins under Lars Porsena from crossing the Sublician Bridge. These three kept the vast array of enemies at bay while the Romans cut the bridge down. When it was about to fall, Cocles sent his companions back, but he him¬ self, when it had fallen, plunged into the Tiber and swam to the Roman shore. He received a reward of as much land (

HOREB, ho'reb, a mountain in the north¬ ern part of Arabia, of the same ridge as Mount Sinai, which lies not far distant from it, memo¬ rable in the history of Moses. The monks on

Mount Sinai still point out the rock on Horeb from which water issued at the blow of Moses.

HOREHOUND, or HOARHOUND, so

*named from the white downy or hoary appear¬ ance of the stem and branches, the name given to plants of the mint family of which marru-bium vulgare, the common or white horehound i*s the most widely distributed species. It occurs in the northern temperate latitudes of America, Europe, Asia and Africa, and is popu¬ larly used for its medicinal properties as a cure for coughs, in the form of an infusion, as a syrup with sugar or as rock candy. It has a pungent aromatic odor, a bitter taste and is stimulant, tonic and laxative. It grows in waste places, on dry chalky or sandy ground and is a perennial with a sturdy root stock, thick stems, one to one and one-half feet high, ovate wrinkled leaves and clustered whorls of white flowers. Ballota nigra black or fetid hore¬ hound, of the same natural order Labiatce, re¬ sembles white horehound in its medicinal quali¬ ties. Water horehound or gypsy wort, Lycopns, is a plant of the same order of which several species have been successfully introduced with the white and black horehounds in the United States.*

HORGAN, Stephen Henry, American editor: b. Norfolk, Va., 2 Feb. 1854. He was educated at Cork, Ireland, the public schools of Nyack, N. Y., and the College of Saint Francis Xavier, New York. In 1874 he was photog¬ rapher on the New York Daily Graphic and from that year to 1907 gave all his time to newspaper illustration ; was art manager on several New

York dailies, managing editor of the Newark Monitor, etc. He invented a proc¬ ess of illustrating the Daily Graphic of New York. He was the first to make half-tone illus¬ trations which could be successfully reproduced on news print paper. He published (Three Color Process Work) (1902) ; (Horgan's Half¬ tone and Photo-Mechanical Processes) (1912) ; (About Photo-Engraving) (1914).

HORICON, hor'i-kon. See Lake George.

HORIZON. In its most familiar sense the horizon is the line or circle around which earth and sky seem to meet. On the ocean this circle is smooth and easily visible, and is then called the sea horizon.

In astronomy the horizon is defined by a plane at right angles to the direction of grav¬ ity, extending out indefinitely on all sides, and called the plane of the horizon. The circle in which this plane cuts the celestial sphere is called the astronomical horizon. All points of it are apparently on a level with the eye of the observer. Owing to the rotundity of the earth

the sea horizon is lower than this astronomical horizon — a narrow strip of sky separating the two. The angular distance between them, A E H, is called the dip of the horizon. The higher the observer is above the ocean, the greater is the dip. To an eye on the surface of the water, the sea horizon and the astronomical horizon coincide, so that there is no dip. The geometri¬ cal principle which determines both the dip and the distance of the visible horizon are seen in the figure. The circular arc is here the surface of the ocean. The eye of the observer is situ¬ ated at the point E, a short distance above the surface of the water. A tangent drawn from the eye to the surface meets the latter at the visible horizon, H. Let a horizontal line E A be drawn from the ey.e, the angle A E H is then the geometric dip of the horizon. The geometer will readily see that this is equal to the angle subtended at the centre of the earth be¬ tween the observer, at E, and the point H. Since one minute of arc in the curvature of the earth's surface corresponds to one nautical mile, it follows that, geometrically, the dip of the horizon in minutes is equal to its distance in nautical miles. But, in the actual case, the line of sight is curved in consequence of the refraction of the air. The result of this is that the actual horizon is further than given by the geometric theory, and the dip somewhat smaller. The following table shows the relation between the apparent dip and the height of the eye above the water and the distance of the sea horizon.

Distance of

Height

Dip of

Horizon

in Feet

Horizon

Miles

1

1.0

1.3

2

1.4

1.8

3

1.7

2.3

4

2.0

2.6

9

2.9

4.0

16

3.9

5.3

25

4.9

6.6

On board a steamship the eye of ah observer on the promenade deck is generally from 15 to 20 feet above the water. It follows that the distance of the horizon is about five miles. A ship farther away than this will have more or less of her hull below the horizon. At double the distance the entire hull will be below the horizon, and only smokepipe and masts visible. As she goes yet further, these also will dis¬ appear, as if sinking below the water.

On land the plane of the true horizon is frequently determined by a so-called artificial horizon. This may be either a small rectangu¬ lar basin containing metallic mercury or else an accurately surfaced plate which is mounted upon three leveling screws and adjusted to the horizontal plane by means of a small level which may be placed in various positions upon it. The first form of artificial horizon is shown in the figure. In use the basin is placed upon an approximately level portion of the ground or other firm support, the mercury is poured into it, and the glass roof is placed over the whole. If a sheet of paper is first laid upon the ground below the basin, this will prevent moisture from accumulating on the inside of the glass plates and so blurring the reflected image. It is evident that if the observer measures the angle between any object in the sky and its image as seen reflected in either form of artificial horizon, the result thus ob¬

tained will be twice the altitude. When alti¬ tudes are measured at sea, the ray of light from the distant sea horizon passes immediately above the surface of the ocean through many miles of dense and wet air before it enters the telescope. Its change in direction by refrac¬ tion is therefore very great and very uncertain in amount, so that however carefully the ob¬ servations may be made, the resulting positions will be uncertain by at least from three to five miles and often by much more. With the arti-

Artificial Horizon.

ficial horizon, however, both the rays of light which fall on the mercury and those which enter the telescope directly pass through our atmosphere at an altitude equal to that of the body observed; the effects of refraction can here usually be determined with a high accuracy. Thus on voyages of exploration, when the ship approaches sufficiently near any island or coast, a sextant party is usually set on shore by boat to determine the position by

a land observation. The position of the horizon plane as a fixed plane of reference for large, solidly mounted instruments of astronomy is usually determined by means of the spirit level. See Astronomy, Practical.

Simon Newcomb.

HORN, a tough, flexible, semi-transparent substance derived from the epidermis, which may be developed morbidly as a corn, or nat¬ urally, as in the callosities on the legs of a horse; or in connection with important func¬ tions, as when it forms the outer sheath of the outgrowths upon the heads of ungulate animals, called "horns,® the "shell® of the tortoise, the nails, claws and hoofs of animals, the beak of bird and turtle; and the hairs and feathers of mammals and birds, or their modification into spurs, scales, pines, bristles, whalebone, nasal horns, etc. This epidermal tissue consists largely of keratin, an albuminoid composed mainly of carbon (about one-half), oxygen, nitrogen and sulphur.

The horns of mammals are in effect modi¬ fications of the hairy integument covering parts liable to great wear, or needing to be hard and sharp, especially the outgrowths of the skull characteristic of male ruminants. Hollow horns are usually unbranched and persistent, but in the prong horn they are shed annually while the bony cores grow and their vascular coverings persist and give rise to the new horns.

Hollow horns are found usually in both sexes, but in some genera of antelopes only in the male. In the pronghorn the horns of the female are almost hidden in the hair of the head, and are small, short and unbranched. Such horns as these are called hollow or sheath horns, and are very different from antlers (q.v.). Another form of true horn is that on the snout of the rhinoceros (q.v.) where, when more than one appears, the projections stand one behind the other in a median line, and not side by side. This nasal rhinoceros-horn is not a hollow sheath clothing a bony core, but a solid mass of coarse agglutinated hairs arising from the skin and supported by a thickening of the underlying bone.

Utility of Horn. — In their natural form, the horn-sheaths of oxen, sheep and antelopes have been put to a great variety of use, as weapons, receptacles, handles and musical in¬ struments — the latter surviving in certain cere¬ monial usages and in the general term ˆhorn® for a wind instrument. Cleaned and polished it served many additional needs, forming the primitive drinking cups; and it is from this •ancient usage that the

general name of ˆhorns® has been given to a species of drinking cup, and its spirituous contents. The horns of victims sacrificed to the gods were often gilded by the Romans and suspended in the temples, more especially in those of Apollo and Diana. From the most remote times the altars of the heathen divinities were likewise embellished with horns, and such as fled thither to seek an asylum embraced them. Originally the horns were doubtless symbolical of power and dignity, since they are the principal feature of graceful¬ ness in some animals, and instrument of strength in others. Hence these ornaments were frequently bestowed in imagination and art upon gods, and were actually worn by heroes. In more modern times ox-horns have been used the world over for carrying gun¬ powder; and museums abound in quaint relics of this kind elaborately ornamented by soldiers and hunters. Small bottles (ink- horns) of this substance were the first recep¬ tacles for ink, and are still used in the East, where opium for smoking is usually kept in horn-boxes. Before the general adoption of glass panes in windows thin plates of horn were often used, as they still are in barbarous parts of Asia; lanterns were made of them; and the faces of the mediaeval hornbooks were so pro¬ tected. The material now lends itself to manu¬ facturing into many other articles by reason of its toughness, pliability and capability of being softened by heat and then molded. The heat is applied in the form of hot water; and splitting into thin sheets, or welding pieces to¬ gether, or molding fragments into various forms, may all be accomplished under com¬ bined moisture, heat and pressure. Both the natural horn and the molded substance may be carved, or impressed with a die, polished and dyed. Hence an enormous variety of useful and ornamental articles may be made, and the horns of cattle have commercial value.

HORN, a musical instrument, originally formed, as the name denotes, from the horn of an animal. The name includes a large family of wind-instruments, many of which have fallen into disuse. The hunting-horn was long the

chief form extant. The French horn consists of a metallic tube of about 10 feet in length, very narrow at top, bent into rings, and gradually widening toward the end whence the sound issues, called the bell, or in French the pavilion.

It is blown through a cup-shaped mouth-piece of brass or silver, and the sounds are regulated by the player's lips, the pressure of his breath and by the insertion of the hand in the bell of the instrument. The compass of the instrument is three octaves. Music for the horn is always written in the key of C, an octave higher than it is played, with the key of the composition marked at the beginning of each movement. Great improvements have been made in the instrument by C. J. Sax of Paris, whose saxhorn gives a

greater volume of sound than the old instrument. The buglehorn is a tube of 3 feet 10 inches in length bent into small compass. It is usually provided with keys, and has a range of two octaves, and notes commencing with the upper B of the bass clef.

HORN, Cape. See Cape Horn.

HORN-FLY, a European fly (Hamatobia serata), since about 1890 became widespread in North America, which have a curious habit of clustering in masses about the base of the horns of cattle. It is closely related to the house-fly and stable-fly, and although annoying does no serious harm to the cattle or their horns.

HORN REEFS, off the coast of Jutland, Denmark, where a light ship is stationed. It was in this vicinity that the naval battle of Jutland was fought between the British and German fleets, 31 May to 1 June 1916. That fight is sometimes called the battle of Horn Reef. See War, European; Jutland Bank, Battle of.

HORNADAY, William Temple, American naturalist : b. Plainfield, Ind., 1 Dec. 1854. He studied zoology and in 1875-79 visited as a zoological collector South American countries, India, Ceylon, the Malay Peninsula and Islands. In 1882-90 he was chief taxidermist of the United States National Museum, and in 1896 was appointed director of the New York Zoological Park. In 1907—10 he was president of the American Bison Society. He has been active in promoting game preserves and new laws for the protection of wild life generally. He advocated the Bayne law to prohibit the sale of native game; and the new tariff law to prohibit all importations of wild birds plumage into the United States for millinery purposes. His publications are (Two Years in the Jungle) (1885) ; (Free Rum on the Congo > (1887) ; (The Extermination of the American Bison' (1887) ; (Taxidermy and Zoological Collecting> (1892); (The Man who Became a Savage (1895J ; (Guide to the New York Zoological Park* (1899) ; (The American Natural His- tory> (1904) ; Camp-Fires in the Canadian Rockies* (1906); (Camp-Fires on Desert and Lava) (1908) ; (Our Vanishing Wild Life) (1913) ;' (Wild Life Conservation in Theory and Practice) (1914).*

HORNBEAM (Carpinus), a genus of trees of the family Betulacea, of which the species C. bctulus is common in Europe, in some places growing to nearly 100 feet in height, although in Great Britain, where it is much planted, it is a small tree. It is also called

horn-beech, hardbeam and yoke-elm. It has staminate flowers in cylindrical catkins; fertile flowers in lax catkins; nuts in pairs. It grows in woods and hedges, often in a damp tenacious soil, and forms a principal part of the ancient forests on the north and east sides of London. The wood is white,

tough and hard, and burns like a candle. It is used in turnery for cogs of wheels, etc. The inner bark yields a yellow dye. The American hornbeam (Carpinus caro- liniana) is a small tree rarely attaining the height of 30 feet, sparingly diffused over the eastern United States. It is also called water- beech, blue beech and ironwood. The wood, fine-grained, tenacious and very compact, is used for handles, as of carpenter's tools, etc., its serviceability being restricted by reason of its inferior size. See Ironwood.

HORNBILL, a genus (Buceros) and of h family (Bucerotidce) of birds now placed in the division (Coraciiformes) , and related to the hoopoes and owls. The species are numerous and are found in Africa, India and throughout the Malayan region as far as New Guinea, are mostly large birds, the largest being more than four feet long, the smallest rather smaller than a magpie. They are bulky birds of heavy, noisy flight ; their large bills are surmounted by bony crests or "helmets" of varied shape and sometimes of great size, but rendered light by the presence of numerous air-cells. Their food is principally fruits, but in certain cir¬ cumstances they become to a great extent omnivorous. Thus a well-known South Afri¬ can ground-hornbill devours snakes, and is highly regarded by the negroes because of its enmity to them, and ability to overcome the largest and deadliest vipers. Several are mainly terrestrial in their habits. The most curious fact regarding these birds is that during the breeding season the female is imprisoned on her nest in a cavity in a tree-trunk, she herself apparently gradually plastering up the entrance by the use of her excrements, until there is left only a small aperture through which the male supplies her and her offspring with food until the young ones are nearly full grown. In captivity the male bird has been observed to disgorge at intervals the lining of his giz¬ zard in the form of a bag, and it is supposed that the food supplied to the female during her term of captivity in the breeding season is enclosed in this structure.

HORNBLENDE, horn'blend, or AMPHI¬ BOLY, an abundant and widely diffused min¬ eral, remarkable on account of the various forms and chemical, compositions that it ex¬ hibits, and its diversified colors. Almost num¬ berless varieties of it are recognized, to many of which distinct names have been given. It crystallizes in the monoclinic system, and is brittle, with a hardness of from 5 to 6 and a specific gravity of from 2.9 to 3.4, according to its composition. It has a vitreous or pearly lustre, and its fibrous varieties often have a silky appearance. The variety most commonly known as "hornblende" is usually black or greenish black, and occurs in many rock forma¬ tions, notably in granites and basalts, and in certain schists and slates. The strongly colored varieties are pleochroic. Common hornblende is a silicate of iron, aluminum, magnesium and calcium. The various hornblende minerals are

now collectively known as the "amphibole group." See Amphibole.

HORNBOOK, an elementary school book in use in England down to the time of George II. It was made up of a single leaf on which was written the alphabet in large and small letters; the Roman numerals, and the Lord's Prayer. The leaf was sometimes set in a frame and sometimes pasted against a piece of sliced transparent horn; hence the name. There was a handle through which a string was inserted whereby the book might be tied around the . waist.

HORNE, Richard Henry, or Hengist,

English poet and essayist: b. London, 1 Jan. 1803; d. Margate, 13 March 1884. He was educated at Sandhurst and entered the Mexi¬ can navy as midshipman, serving till the close of the Mexican war of independence. He then returned to London to begin a literary career. To his early period belong two tragedies,

(Cosmo de' Medici } (1837), and (The Death of Marlowe) (1837), both of which contain fine passages. A poem sent to him for criticism by Elizabeth Barrett opened the way to a cordial' friendship and a correspondence that extended for seven years. In 1852 Horne removed to Australia, and remained there until 1866; his book, { Australian Facts and Prospects, } being one outcome of this residence. Again return¬ ing to England, he continued literary work until his death. His last publications were tragedies, including (Judas Iscariot: A Miracle- Play } (1848), and a curious prose tract, (Sith- ron the Star-Stricken) (1883), which he pre¬ tended to have taken from the Arabian. His best-known work, however, is his epic poem (Orion > which Poe said might be called "a homily against supineness and apathy in the cause of human progress, and in favor of energetic action for the good of the race."

HORNED DACE, RATTLESNAKE, SCREAMER, VIPER, etc. See Dace; Rat¬

tlesnake.

HORNED TOAD, lizards of the family Iguanidce, popularly called toads from a cer¬ tain general resemblance in form and manner to those animals. The body and head are broad, thick and flattened, the tail short and the usual attitude a sort of squatting posture with the head elevated. About a dozen species of the genus Phrynosoma occur in the arid parts of the southwestern United States and in Mex¬ ico. The best known are P. cornutum and P. coronatum, which, because of the bizarre ap¬ pearance, quaint ways and tolerance of captiv¬ ity, are often brought back as

souvenirs by visitors to those regions. The scales on the body bear prominent conical spines, and the long horns of the head are supported by bony cores. Their mottled brown and gray colors harmonize well with their natural surroundings. The horned toads love to bask in the sunshine jn the hottest weather and to bury themselves in the burning sand. Never very active they become extremely sluggish in cool or dull weather and hibernate in the winter. They feed on all kinds of insects, for which they search only during the hottest hours of the day, and < drink copiously of water when sprinkled in the form of drops. Like many

other lizards, but unlike most of the Iguanidce, they are viviparous.

HORNED VIPER. See Viper.

HORNELL, hor'nel, N. Y., city in Steuben County, on the Canisteo River, and on the Erie and the Pittsburgh, Shawmut and North¬ ern railroads, about 57 miles south of Roches¬ ter and 46 miles northwest of Elmira. The first settlement was made in 1790, but it was a part of Canisteo and was called Upper Can¬ isteo until 1820. The present name was given in honor of George Hornell, who had done much for the early development of the town. It was incorporated as a city in 1890. Hornell is situated in a -fertile agricultural region, noted for fruit. Its chief manufactures are sash, doors and blinds, railroad supplies, furniture, leather, carriages and wagons, silk, bricks, shoes, electrical machinery, tiles, wire-fencings, gloves and agricultural implements. It has a good public high school, Saint Ann's Academy, Saint James Mercy Hospital and a number of fine public and private buildings. The govern¬ ment is vested in a mayor, who holds office two years, and a city council. The subor¬ dinate officers are appointed by the mayor sub¬ ject to confirmation by the council. The water¬ works are the property of the city. Pop. 15,025.

HORNER, William George, English alge¬ braist : b. 1786; d. Bath, 22 Sept. 1837. He was educated at a private school near Bristol, and later taught there, becoming head master in 1806. In 1809 he established a school at Bath, which he conducted until the time of his death. His only work of importance was his discovery of a method of solving numerical equations of any degree, which he first an¬ nounced in a paper read before the Royal So¬ ciety in 1819, and afterward published in the Philosophical Transactions. } The method is still in use, and is known by Horner's name. See Algebra, History of the Elements of.

HORNET. The true hornet is a European wasp (Vespa crabro) ; but in America the term is applied to almost any form of large sting¬ ing wasp, especially such as make papery nests. In some portions of the United States this is considered the only ˆhornet,® but in the vicin¬ ity of New York the European hornet also occurs ; and southward a somewhat smaller species (V . Carolina) goes by this name.

HORNET, The, the name of two sloops- of war in the American navy during the War of 1812. The chief was a ship-rigged 18-gun sloop, and did brilliant service. Through De¬ cember and January 1812-13, under Master- Commandant James Lawrence, she blockaded the 20-gun English sloop Bonne Citoyenne in the harbor of Bahia, Brazil, till overmatched by a 74; Lawrence was surprised and was obliged to take refuge in the harbor, but instead of being blockaded, slipped out the next night under the very guns of the man-of-war. After capturing a merchantman, on 24 February, he fell in with the English sloop-of-war Peacock, Capt. William Peake, each at this time having 20 guns; they engaged at 5.25 p.m., and in 11 minutes the Peacock was a sinking wreck and surrendered. Her captors made every ef¬ fort to keep her afloat, but in a few minutes she sank, carrying down 13 of her own crew and three of the Hornefs. Peake and four vol. 14 — 25

men were killed and three wounded ; the Hornet had one killed and two wounded, besides two more hurt by an exploding cartridge. <(A ves¬ sel moored for the purposes of experiment could not have been sunk sooner,ˆ said an English paper of the time; «it will not do for our vessels to fight theirs single-handed.ˆ On 22 Jan. 1815, under Capt. James Biddle, she encountered off Tristan d'Acumha, in the south Atlantic, the English brig Penguin, Capt. James Dickinson, with 19 guns of about the same metal as her own 20; in 22 minutes the Pen¬ guin surrendered, but on Biddle going forward, two British seamen shot him in the neck (not vitally), and were immediately shot down them¬ selves. The Penguin lost her captain and 9 others killed and 38 wounded; the Hornet, 1 killed and 11 wounded. The Penguin was shot to pieces, and could not be taken away, so she was scuttled; the Hornet was almost unin¬ jured. On 28-29 April she had a long chase f rom the British ship of the line Cornwallis, the rear-admiral's flagship, and only escaped by thoroughly dismantling herself.

HOROLOGY. See Clock; Clock-work.

HOROSCOPE. See Astrology.

HORROCKS, hor'oks, Jeremiah, English astronomer: b. Toxteth, near Liverpool, about 1617; d. 3 Jan. 1641. He was educated at Cam¬ bridge and was appointed in 1639 to the curacy of Hoole, Lancashire, and in that village made his famous observation (24 Nov. 1639, O. S.) of the transit of

Venus, the first on record. Newton, in the

HORSCHELT, Theodor, German painter: b. Munich, 1829; d. 1871. He began his early studies in the Munich Academy, and later be¬ came a pupil of Albrecht Adam. At first he painted horses, among which is (The Poacher (1850), and then turned to military scenes, painting (The Seizure of ShamyP and Cos¬ sacks Returning from a Razzia. **

HORSE, in a general sense, a member of the ungulate family Equidce; but in ordinary use the word designates the single domestic species (Equus caballus), the wild original of which is unknown. It is not decided, in fact, whether a single species, or more than one, was the source, nor where the domestication of the horse was first effected. The evolution of the species is elsewhere sketched. It is probable that at the dawn of civilization the wild an¬ cestors of our modern horses roamed in bands over the whole extent of grassy uplands stretch¬ ing from northern Africa to eastern Manchuria, on the steppes of Russia, and wherever in Europe open country might be found; and it is also probable that they were among the first animals which men killed for food and after¬ ward captured and tamed in order to keep a supply of food under control. This act must

have been one of the earliest steps toward community life and civilization. The oldest paintings and carvings left by the ancient in¬ habitants of the valley of the Euphrates show that saddle-horses were familiar to them; and it is fair to suppose that the supremacy primi¬ tively gained by the people of central Asia over other parts of the world was largely due to their use of horses in war, giving them a great advantage over unmounted tribes ; but it was not until much later — probably no earlier than 2000 b.c. — that the animal came into use in Arabia and Egypt, where before had been only camels and asses. So far as can be judged, these early Assyrian war-horses were rather small, robust, large-headed and shaggy beasts, much like Przewalsky's horse or the kiang. A very similar animal was domesticated by the men of the Polished Stone Age in Europe, ex¬ cellent portraits of which were etched by neolithic artists upon pieces of bone, and have come down to us among the contents of graves opened by archaeologists in France, Switzer¬ land and elsewhere. Later, but still in the pre¬ historic period, Europe was repeatedly invaded by Asiatic hosts who brought with them East¬ ern horses. These modified, if they did not supersede, the local stock. When Rome con¬ quered the barbarous inhabitants of Europe its horses, which were of Asiatic stock, with per¬ haps some African mixture, largely super¬ seded those of the conquered tribes, and from the mingling

there sprang the big heavy breeds which characterized the Middle Ages, and were intended for strength and weight-carrying, rather than- for nimbleness and speed. It was not until near the end of the 17th century that the introduction into France and England of certain sires of Arabian breed — a clean¬ limbed, small-headed, agile, hardy race, which arose in Arabia and Palestine about 2,000 years ago — began the improvement of British stock, which has reached its highest development in the modern European racehorse, coach and hackney. The normal horse lives to about 18 or 20 years ; he is not valued for stud after 20. Occasionally some live to 40 or 50 years. The long intestinal tract seems to operate against longevity. The term horse is applied to males of the Equus, as well as to the entire family. A stallion is a mature uncastrated male, also termed a stud-horse ; a gelding is a castrated or unsexed male, it being customary to castrate all except those used for breeding. A mare is a female of the horse family. Right after birth the young animal is termed a foal, a little later a colt. The young mare is distin¬ guished as a filly.

The horse owes his speed largely to his long, clean limbs, the advantageous angles made by the leg bones, and to the substitution of a single strong bone for the ulna and radius in other quadrupeds, together with the growth of a strong hoof out of a central toe. The joint corresponding to the knee in man is close to the body, while the horse's wrist-joint is 18 or 20 inches from the ground in a fair-sized ani¬ mal's foreleg. The horse's hip or thigh joint is entirely imbedded within his muscular hip, and the knee-joint is close up to the body) while the ankle-joint of the hind leg is at the height of a man's knee. By walking and run¬ ning on his toes, the horse has gained one more joint for leg action. The teeth of the horse

are also peculiar. On each jaw of a mature horse are 6 incisors, 2 canines, 6 premolars and 6 molars; but most mares are minus the incisors. See Horse, Evolution of the, for further peculiarities of teeth and bones.

The best American horses are derived from the English thoroughbreds, though the heavy draft horses mostly show Flemish origin. The light mustang or Indian pony is descended from the early Spanish stock that came to Mexico in 1519 and later; but the great majority of horses in this country come under the title farm horses, and these are fully tabulated by the United States census, together with their half-brothers, the mules.

Farm Horses. — In 1850 the census recorded 4,336,000 horses on the farms of the United States; in 1880, 11,201,000; in 1900, 13,537,000; and in 1910, 19,833,000, of the value of $2,083,- 000,000, or a little more than $100 per animal. This figure included the colts, the average value of grown or mature horses being $112.36. The 1910 census showed 4,209,000 mules on the farms, of the value of $525,000,000, or $131.49

each for mature mules. Thus it appears that the humble mule is more valued on the farm than the better bred horse. And this in spite of the fact that a very large proportion of these farm horses have good blood in them from the common use of stallions rated in the stud books, or their near relatives. It is not believed that there has been a rapid increase in American farm horses since 1910. The estimates of 1917 run between 21,000,000 and 22,000,000. In ad¬ dition to these farm animals there are at least 250,000 blooded horses registered in the stud books of the 19 United States horse-breeding associations, and probably a million city and town horses not enumerated in the census.

Texas is the leading State for breeding farm horses, having 1,870,000 in 1910. But territory and population considered, Illinois is the banner State, having over 1,600,000 in the census year. Other States having over 1,000,000 are Iowa, Missouri, Kansas, Nebraska and Oklahoma. In the South Atlantic States almost half the farms report no horses at all, but this is not due to scarcity of horses, rather to the fact that small tenant farmers are numerous, who use the horses of their landlords.

Horses are commonly denominated as thor¬ oughbreds, coach, hackney, Cleveland bay, several varieties of draft, trotter, pacer, hunter, roadster, saddle, bus, express, farm, pony, mus¬ tang broncho, cayuse, etc. The thoroughbred, from which most of the blooded horses are de¬ scended, is fully described farther on, as the progenitor of. the American trotter. The hack¬ ney or nag is the common English everyday livery horse, what some would call a light coach horse, of no particular breed. The French coach horse is slightly taller and heavier than the hackney type, and there is a registry of blooded horses of this name. The German coach may be a Hanoverian, Oldenburg, East Prussian, etc. He is typically 15 to 16ˆ hands, stylish and sleek, and may weigh up to 1,500. The Cleveland bay is a coach, obtained by crossing English thoroughbreds with Cleveland mares. They are 16 to 16.2 hands and weigh 1,200 to 1,500. This type makes an excellent farm horse as well as coach and the United States registry increases.*

Draft-horses are mainly of Flemish origin,

_ a-

HORSES

1 Pure Arabian

2 Arabian Stallion

3 Shetland Pony

4 Welsh Mountain Pony

5 English Shire Stallion

6 Clydedale Gelding

7 French Coach Horse

8 English Hackney

HORSES

1 English Running Horse

2 English Coach Horse

3 Morgan Trotting Horse

4 Percheron

5 Percheron

6 Wilkes-Hambletonian Trotting Horse

7 American Thoroughbred

8 Belgian Stallion

and the Belgian draft animals are highly es¬ teemed in the United States. The standard English draft-horse is the shire, 16 to 17.2 hands, and weighing 1,800 to 2,300 pounds. They have stout legs, a large head, are broad between the eyes, have a neck well arched, full chest, straight back, round body or barrel and large feet, with plenty of hair at the fetlocks. The Clydesdale is not quite as large as the shire, but is more popular in America. They average a little over 16 hands and weigh up to 2,200. Bay and dapple gray are the common colors. The Suffolk or Suffolk punch is an English draft-horse, of 15 to WA hands and weighing 1,500 to 1,900. He has slighter legs than either the shire or Per- cheron and is not much valued on this side of the Atlantic. The Percheron or Percheron- Norman is the handsomest of the draft-horses, and largely imported from France, being used to improve the farm breeds and build up larger animals. They are 16 to 17.2 hands, and weigh 1,700 to 2,200 or more, and are gray, black and white or dappled in color. The Percheron shows his heels in walking and is

apt to straddle a bit.

The American trotter, and the pacer, are described under Horse, Trotting and Pacing, and Horse-Racing. The Morgan horse, re¬ nowned for his beauty and intelligence, the Hambletonian and the hackney are fully dis¬ cussed under Horse, Riding and Driving. The saddle horse, the hunter, the roadster and the park horse are not breeds of horses, but horses of any breed adapted to those purposes. A typical roadster is 15.1 to 15.3 hands and weighs 950 to 1150. A good saddle horse has a flat back, weighs 1,000 to 1,100, stands about 15.2 hands and has five gaits: the walk, trot, amble, canter and either a running walk, slow pace or fast trot. He should hold his head up well and appear stylish. The Morgan is a fine type of saddle horse. Any saddle horse that takes hurdles well is called a hunter.

Horses below 15 hands have lesser value. The English call a horse of 14 to 15 hands a hobby; if below 14 hands a Galloway; any¬ thing below 13 hands is a pony. The Shetland pony is from 9 to 10.2 hands and weighs 275 to 400 pounds, being valued mainly as a pet, for children's driving. The Indian ponies, de¬ scendants of the Spanish mustangs, imported in the 16th century, abound in the Far West, Northwest and in Mexico. They are called mustangs, bronchos and in the Northwest cayuses. They are small, hardy, cheap, and live on almost anything, and will pick up enough to keep them in a new country. The broncho crossed with a thoroughbred makes a good polo pony.

The ordinary cab horse is 15 to 15.2 hands and weighs 1,050 to 1,150. The so-called bus horse is a trifle larger, weighing 1,200 to 1,400. The horses selected for express work are 15.2 to 16 hands and weigh 1,350 to 1,500. For further details of the horse, see articles fol¬ lowing.

HORSE, American Thoroughbred. The

American thoroughbred is the production of pure breeds imported from England, first dur¬ ing the 17th and 18th centuries. They first found their way into the Old E|ominion of Virginia, where they founded a tribe of early racehorses, to which are traced to-day many of

the most fashionable pedigrees. From Virginia the thoroughbreds finally found their way into the Carolinas and as far south as Mississippi and Louisiana, and, upon the formation of Tennes¬ see and Kentucky as States, the breeding of thoroughbreds became with them what might be termed an industry.

The early part of the 20th century finds Ken¬ tucky in the lead in the production of thorough¬ bred horses, followed next by California and then

by Tennessee. Missouri and Illinois have recently greatly increased their thoroughbred holdings, while both New York and New Jersey produce a goodly number. Many of the other States take rank as fair producers of thorough¬ breds, and, in fact, the breed has found its way into every section of the country, .even as iso¬ lated a State as Oregon annually producing a number of thoroughbred horses.

The requirements of an American thorough¬ bred horse are that the pedigree contains five uncontaminated crosses, but the average pedi¬ gree traces through 16 to 18 crosses, some hav¬ ing as many as 25. Those reaching an origin of a natural Barb source are considered the most fashionable, but many great racehorses have descended from lines unknown to early English or Arabian pedigrees.

Diomed, the winner of the first English Derby, imported to this country in 1799, when he was 20 years old, is classed as the greatest of early importations, and he has left a marked impress upon American pedigrees. The most successful importation of the 19th century was unquestionably Glencoe (imported in 1836) and in later days Leamington ranks the highest. In more recent years, the ranks of the American thoroughbred have been greatly increased by almost unlimited importations from England. France, Australia and other foreign countries, and horses are produced in this country now that are of entirely foreign pedigrees, while there are numerous instances where the first few crosses are strictly foreign lines.

The average height of the early thorough¬ bred horse was something less than 15 hands, but at this time they average over 15 hands 2 inches and weigh 150 pounds more than they did a half century ago. In individuality, too, the improvement is verv marked, the types now being far superior in form to the horses of early times.

In soundness and general service the Amer¬ ican thoroughbred has no superior, this being the result of judicious breeding and favorable rearing conditions. The statistics of the Amer¬ ican turf (commonlv known as Turf Guides) extend over a period of about 40 years, and in this time these records show that the thorough¬ bred horse has improved some 35 pounds in weight, and also in style and speed. This marked improvement can be attributed to an accepted theory of breeding that like begets like, to intelligent methods of training and to superior riding.*

The most favorable condition which has proved so successful in -aising the thoroughbred in this country is that he is housed less and has, at all times, access to lands covered by the finest of grasses, which brings his feet constantly into contact with moisture. The frog of the foot, being like a sponge, absorbs this moisture, thus creating a gentle pressure which spreads

the hoof. A horse having bad feet naturally fayors

them, which has a tendency to make bad ankles and tendons on account of their not being freely used and it is a conceded fact that (

In America the horse has been bred more for business than pleasure. The invention of the elliptic spring and the use of American hickory in the production of light vehicles for pleasure and business, together with the development of macadam and asphalt roads, turned the de¬ mand from the running to the trotting horse. The first private coach was introduced into New York in 1745; but coaches were scarce until after the Revolutionary War, and not until after 1840, when the light one-horse vehicle came into use, did the changed conditions of travel develop a harness-horse for purposes of business and pleasure. Along with the change in vehicles incident to the evolution of the trotter came as great a change in the style of harness and trappings.

About the beginning of the 19th century there came from the lines of breeding of the thoroughbred, traceable to Flying Childers, Byerly Turk, and the Darley Arabian, Mes¬ senger, a gray, stoutly built horse, of won¬ derful powrer and stamina, with a slashing open gait, fitted to found a race of trotters. He was foaled in 1780, and became the pro¬ genitor of the trotting families in America. In 1793 Justin Morgan was foaled, sired by one believed to be thoroughbred. Three of his sons, Bulrush, Sherman and Woodbury, be¬ came noted as the sires of horses of intelligence, courage and speed, and the get of some of them excelled as roadsters and stage horses. From Black Hawk Morgan, sired by Sherman out of a fast trotting English mare, has come the beautiful, useful and courageous line of Morgans. The original horse (2.40) died in 1856 at the age of 23. In 1849 was foaled Rysdyck's Hambletonian, the founder of the most noted family of trotters, sired by Abdallah, who traced to Messenger by both the sire and dam, out of a dam by Bellfounder, with Mes¬ senger crosses on the dam's side. As early as 1876 the interest in breeding and rearing trotters had become so great that fabulous prices were paid for colts, simply on the strength of their breeding. Two fillies, untrained, sold for $13,000. The three-year-old colt, Steinway, was sold for $13,000 in 1879. Maud S., bred at Alexander's noted stock farm in Kentucky, was sold to Mr. Bonner for $21,000 when four years old, with a record of 2.1014, and the title (

a record of 2.14, arid won on the turf close to $250,000; Almont sired 22 2.30 trotters; Belmont got nine with records better than 2.30. So the

descendants of Alexander's Abdallah have been worth to their owners hundreds of thousands of dollars. Volunteer was another who ranked among the most successful of the noted Hambletonian sires, having to his credit 23 2.30 performers. Electioneer, bought by Governor Stanford, proved a noted sire, get¬ ting the fastest yearling, 2.36J4 ; the fastest two-year-old, 2.21 ; the fastest three-year-old, 2.19ˆ4; and the fastest four-year-old, 2.18J4- The bracing climate of Palo Alto, and the methods of handling peculiar to Governor Stan¬ ford's breeding farm, aided in these accom¬ plishments. These are but a few of the thou¬ sands of good horses that owe success to the Hambletonian blood. The value of trotters has been measured largely by their speed, taken as a measure of ability to win future races, or as evidence of blood lines that will make the animal valuable in the stud. Success in cam¬ paigning is undoubted evidence of pluck and stamina; and the breeding and training of the trotter, and his contests on the track, have de¬ veloped these qualities in so high a degree that no other class can equal him. The evolution of the trotting horse has also shown the value of a training peculiar to America as a factor in breeding.

It is pertinent to notice that in the first years of the last century running races became com¬ mon in the Middle and Southern States, while a strong sentiment against racing prevailed in the Northern States. In 1820, Pennsylvania, for example, not only forbade racing, but also enacted that no person should Sprint or cause to be printed, set up or cause to be set up, any advertisement mentioning the time and place for the running, trotting or pacing of any horses, mares, or geldings,® etc. A similar law was in the statutes of Connecticut until within 30 years. New York passed an act to prevent horse¬ racing 19 March 1802, which was amended 30 March 1821, permitting the "training of pacing, trotting and running horses® in Queens County for five years. The sheriff was required to be on hand to witness these <(trials of speed,® as called in the statute. This amendment was re¬ enacted 3 April 1826, without a time limit. In 1825 the New York Trotting Club was organ¬ ized, with a view of <(improving the speed of road horses.® This track was probably the first trotting course in the world. The Hunting Park Association was formed in Philadelphia in February 1828, and the next year a trotting club was organized in Baltimore. These facts show a changing public sentiment and the rec¬ ords begin to fall. The keeping of records became an established custom as early as 1829, when the American Turf Register began. The English had not then begun to keep records, but the American custom has enabled us to mark the development of speed and establish well- defined breeds during the threescore and more years it has been in use. Wallace's American Trotting Register was started in 1871 by J. H. Wallace, New York, since which time the busi¬ ness of breeding trotters has increased, until now it is estimated by good authority that the number of registered standard-bred trotters ex¬

ceeds 150,000. In the early history of the rec¬ ord many animals were admitted to registry

that are not now classed as standard-bred. The term ((standard® indicates to-day ability of one or more ancestors to trot within 2.30.

Before the days of macadam roads and light vehicles, saddle-horses were as common as trot¬ ters are to-day. They were of no particular breeding, but traced to the thoroughbred, the Narragansett pacer or the Scottish Galloway. Herbert suggests that they were of Spanish origin, their ancestors coming from Cuba. There is now some slight revival of interest in the saddle-horse as a luxury. From the ideal set up, especially in Kentucky, it is safe to predict that there will soon be an improved breed of American saddle-horses.

Prior to the introduction of railroads Ver¬ mont had what Herbert called a distinct breed of cart-horses. He described them as «the models of what draft-horses should be, com¬ bining immense power with great quickness, a very respectable turn of speed, fine show, and good action.® They had (

County, Ohio, in the spring of 1851. He bought and brought home from France the famous Louis Napoleon, a <(short-legged, closely ribbed, blocky and compact gray, three years old.® In 1853 he was sold to A. P. Cushman, of De Witt County, Ill., and after his colts in Union County proved his worth, a company Was formed for importing other horses of his type. The author of the (Percheron-Norman Stud-Book says of him that he was un¬ doubtedly the best-known and most popular French horse ever brought to America. The first importations west of the Wabash were made in 1868 by W. J. Edwards, of Chicago, in the great stallions Success and French Em¬ peror. The latter went to Iowa as the property of Hon. J. B. Grinnell. Success was sold to the Fletcher Horse Company, of which M. W. Dunh am, of Wayne, Ill., was an active member. In 1874 he purchased the entire interest of the company, establishing his celebrated importing and breeding farm at Wayne. Success's colts at the average age of two years and eight months sold at the average price of $450 per head, and in 1874 alone the sales of his get amounted to $36,000. The Clydesdale has been the strong rival of the Percheron-Norman ; is popular in Canada, and has numerous representatives in the Northwest. The secretary of the American Clydesdale Association, Alexander Galbraith, says: ((No importations into the United States appear to have been made until about 1870 and 1872, when John Reber, of Lancaster, Ohio, and the Fullingtons, of Union*

County, began the work. From that date small importations Were made by various parties, the most promi¬ nent being the Powell Brothers, of Shadeland, Pa. Importations steadily increased up to 1888. Among the larger breeders in America are Col¬ onel Holloway, of Illinois; N. P. Clarke, of Minnesota, and R B. Ogilvee, of Wisconsin. These three breeders have among them about 175 brood-mares, and have the very cream of Scotland both in blood and individual merit. As high as $10,000 has been paid for one Clyde. Many volumes of the (American Clyde Stud- Book J have been published, containing 10,000 entries.® The Shire horse is little esteemed in Canada, but in the American craze for heavy horses he finds admirers. See Horse-racing; Horse, Trotting and Pacing.

Milton Young, Lexington, Ky.

HORSE, Care and Diseases of the. Breeding. — As heredity is the basis of all per¬ manence in breeding and variation the condition of advancement, we can, under intelligent selec¬ tion, environment and control, attain to a con¬ stant . improvement. In selecting horses for breeding, certain leading principles must guide. These may be shortly stated as: (1) adaptability to the use of the breed; (2) quality, style; (3) strength, endurance; (4) good conformation; (5) good constitution; (6) good pedigree; (7) prepotency; (8) no violent crossing of equally prepotent animals; cross the desirable prepotent animal on a non-prepotent cross-bred animal ; (9) a speedy amelioration of a large number is most certainly obtained through a prepotent stallion, which leaves a large number of his offspring every year; (10) sound, vigorous health ; the prepotent parent must be at his best, and no non-prepotent one should be bred to him, none that is old, feeble or reduced by

disease, overwork, underfeeding, etc.; the lack of prepotency will not prevent the transmission of the systemic weakness to the offspring; (11) secure an environment calculated to enhance the qualities we seek in the progeny. Systematic exercise that is not exhausting, generous tissue forming, but not fat forming regimen, and pure, dry, genial but bracing air are especially im¬ portant.

Contagion Through Sexual Congress. —

Many maladies may be transmitted during co¬ ition, but some are especially liable to be so. Dourine, glanders, genital eczema, contagious acne, horse-pox, mange and contagious abortion are to be specially

guarded against. Some, like strangles, influenza and contagious pneumonia, may be transmitted by an animal that has al¬ ready passed through the disease and acquired immunity. Special care, therefore, or even veterinary supervision of horses devoted to breeding is a desideratum.

Care of the Pregnant Mare. — Exercise is a valuable provision too often neglected. Free range on breeding ranches, or, for valuable mares, separate paddocks, secure this, while working mares are better to continue the work, provided it is not unduly straining nor jarring, nor productive of excessive fatigue, exhaustion or debility. This maintains appetite, digestion, assimilation, muscular tone and vigor, favors the development of a stronger, better foal, and keeps the dam fitter for foaling and nursing. Feed well, avoiding what is hard of digestion or liable to cause impaction, indigestion, fer¬ mentation, or, above all else, diarrhoea. On good pasture grain may be omitted, unless in the last month of gestation or if the mare is visibly running down. Good, clear, sound oats or barley, or bran mash with some boiled flax¬ seed may be given, and heating agents like maize, buckwheat or wheat avoided. During gestation violent purgatives and active diuret¬ ics are liable to bring on abortion.

Care of the Foal. — To avoid danger to both mare and foal in parturition, provide a roomy box-stall with door opening outward, or a paddock. The foal born indoors is always in danger of infection through the raw surface of the navel. The common or box-stall swarming with microbes is more to be dreaded than ex¬ posure to stormy outside. When severe weather forbids foaling outdoors, the box should be thoroughly cleansed, disinfected and whitewashed to obviate this danger. Navel in¬ fection may cause simple inflammation, swelling and abscess, or the germ may propagate itself through the inactive umbilical vein to the liver, causing infective hepatitis with abscesses or necrosis ; or reaching the bowels, it causes in¬ fective diarrhoea (white scour) ; or it may colonize the joints, as infective arthritis (joint ill) ; or again it may cause pneumonia or multi¬ ple abscesses in different organs. The gravity of the resulting disease varies with the infection, and a deadly germ, located in a stable, is liable to attack all foals that come later in the season. Both stable and navel should be disinfected. The foal should be delivered on clean straw, which may be sprinkled with carbolic acid! The navel-string may be severed with an emas- culator previously cleaned and boiled or tied with a carbolized new cord painted with tincture of iodine, and, when dry, dusted with tannic acid impregnated with iodine and carbolic acid.

The new-born foal may have the back (flexor) tendons contracted so as to stand over at the knee and fetlock, and in the worst cases the extensor pedis tendon, the opponent of these, is found to be divided across and the muscle wasted and degenerated. A succession of such cases in the same

stable suggests in¬ fection. Slight cases will recover under splints and bandages, while for more severe ones an aseptic surgical operation may be required. The foal should have the first milk (colostrum) to clear away tenacious bowel contents and pre¬ pare for healthy function. A mild laxative of raw linseed or olive oil may be requisite in the absence of colostrum. In the absence of the dam's milk the foal may be raised on cow's milk reduced by adding one-third .boiled water and sugar to sweeten. After two or three weeks the undiluted cow's milk may be allowed. The cow should be free from tuberculosis.

For the pure bred racer or trotter the foal should have half a pint of oats daily at a month old, to be increased with his growth. Even draft breeds are benefited by such early grain¬ feeding.

*Exercise is essential to the growing foal. The quality of bone, muscle, brain and other parts depends largely on physiological use, and rich blood, active digestion, and assimilation, vigorous health, strength and endurance are incompatible with confinement and inactivity. This may at first be secured by freedom to play in pasture or by careful handling and training by a judicious manager. But to put the two- year-old into a severely contested race, or full training, or to devote the draft colt to regular work, is but to invite disaster. The bones are as yet too soft, they contain too much organic matter and too little mineral, the muscles lack firmness and power *of endurance, the whole system is immature and imperfect, and over¬ taxing exhausts or deranges the functions, and direct injury or impaired development is the natural result.*

Care of the Feet.

. Overgrown Hoofs.— With unlimited exer¬ cise on firm ground, the unshod foot is suffi¬ ciently worn down, but when confined for months indoors or in a limited straw yard over¬ growth occurs, especially at the toe, and a dan¬ gerously increased strain is thrown on the joints, ligaments and back tendons. Distorted and twisted feet, bruises of the sole by the in¬ growing heels and quarters, ringbones, ossified cartilages, sprains of the flexor tendons, and diseases of the fetlock, pastern and coffin joints are common, and irreparable results. The feet exposed to this should be frequently pared and adjusted Remove excess of toe, reduce and balance the inner and outer sides of the wall, file or cut to the level the incurving heels and quarters and round off the sharp outer edge of the hoof. Dry, imprisoned plates of horn press¬ ing up on the sole must be set free and re-

m°ii mi?Ut d° not file the surface of the hoof- wall. This removes nature's protective cover¬ ing and exposes open horn tubes to exhale moisture, and conduces to dryness, brittleness, shrinking, compression and inflammation

of the sensitive parts, atrophy and lameness.

Defective Growth of Hoof. — Imperfect growth of hoof may arise from shoeing, pinch¬ ing, filing, paring, etc., to excess, but also from

compulsory idleness. The circulation inside the hoof is greatly accelerated by the ascent and descent of the foot within the horny box in action, and a free blood supply in a healthy tissue favors growth. Life at pasture on firm ground tends to abundant, strong, tough, dur¬ able hoof,, while close confinement in a stall makes for a thin, friable, brittle and shrunken horny covering. Constant soaking in water softens the hoof, reducing its tenacity, and tending to flattening of both wall and sole. The Belgian and other horses bred on wet, swampy ground generally show large, flat, pliant and most undesirable hoofs. Such feet are especially liable to thrush, canker, corns, bruises, grease and laminitis. Feet habitually resting on piles of reeking manure in stalls, sheds or yards suffer the additional injury of softening and disintegration from the ammonia gas, and attacks by the swarming putrefying microbes which abound in such material.

Good hoofs, beside use and care, depend on generous living. The fuller growth on the spring and summer grass, forming a permanent ring, illustrates this. Daily washing of the hoof is important, and a subsequent smearing with an ointment of tar and vaseline or oil is useful in preserving the natural moisture and preventing the attacks of microbes.

Shoeing. — For good feet shoes may be dis¬ pensed with on soft ground or mud roads, but they become necessary on hard roads and for

normal function of the foot is one of the best means of protection against distortions and dis¬ eases of the various joints of the limb, it fol¬ lows that the preservation of sound feet by good shoeing and intelligent care is one of the greatest desiderata in horse management.

Feeding and Digestive Disorders.

The natural food of the horse is grass and though charged with excess of water, and at first liable to scour, and always to cause flaccid muscles and lack of energy and endurance, yet a run at pasture, with pure air, normal, easy exercise, and stimulation of stomach, liver, bowels, metabolism and excretion will often improve or arrest infirmities of digestion, as¬ similation, elimination and even innervation. Heaves (broken wind), chronic bronchitis, vari¬ ous forms of nasal discharges, indigestion, torpid

liver, gall stones and kidney affections are ex¬ amples of maladies which improve at pasture. Dried grass in the form of hay is the standard food of the domesticated horse. This is best from natural pastures with a mixture of grasses to be followed by blue grass, timothy, ryegrass and clover, the latter being the most dangerous as a horse feed. Upland hay is more aromatic and choice than that from low, damp or irrigated meadows, and the first crop is al¬ ways the best. New hay will sometimes disa¬ gree, while the old, though lacking aroma and less palatable, is less likely to cause digestive

Water

Proteids

Carbohydrates

Fats

Cellulose

Salts

Meadow hay .

14.59

10.11

40.90

2.34

25.52

6.54

Oats .

14.3

12.0

60.9

6.0

10.3

3.0

Maize .

10.6

10.3

70.4

5.0

2.2

1.5

hard-worked animals. Tips, extending back to the broadest part of the foot only, are the least objectionable. Full sized shoes are too often made to pinch, distort, bruise or injure the foot beyond repair; and a poor foot is as injurious to a horse as an unstable foundation to a build¬ ing. The first consideration is the preparation of the foot, giving due balance to heel and toe, inner side and outer, sole and wall, heel and bars. While removing all overgrown wall and bars, and all sole-plates that have become de¬ tached from the tough living horn beneath and now act as foreign bodies, the tough horn itself should not be exposed, nor removed except as a thin margin around the outer edge, where it is smoothed to the same level as the wall, to which it acts as a support, and the bearing sur¬ face of which for the shoe it slightly extends. The outer surface of the wall must be spared abrasion by the file, with consequent drying and contracting as already noticed. Shoes should be removed and reset every four weeks at the utmost, to avoid pinching, setting in, bruising and other injuries. Intelligent shoeing, con¬ serving the feet, goes far to obviate diseases of the feet, the most common and harmful of equine diseases. Among these may be specially named corns, bruises, pricks, quittors, sand- cracks, thrush, canker, sidebones, laminitis, navicular disease, contracted hoof, cleft hoof, dry hoof, crooked hoof, loose wall, hollow wall and graveling. As the integrity and easy

disorder. At a year old and over it is brittle, dried, more fibrous and less nutritive. Badly cured hay is always innutritious and often di¬ rectly poisonous when altered by bacterial fer¬ ments, molds and their products. The results are shown in heaves, gastric disorders, liver troubles, brain affections (staggers), kidney and skin diseases. Second crop hay, clover and al¬ falfa hay are especially dangerous in this sense, the excess of proteids in the last two and es¬ pecially of foliage, delaying curing and favor¬ ing the multiplication of ferments. Oats are the standard grain feed

for horses. But like hay they must be well matured on good soil, and well cured. Mustiness brings essentially the same evils as in hay, and newly harvested they are liable to disagree. Kiln-dried oats are to be avoided, also those that have sprouted. The composition of oats and hay shows the excess of proteids, carbohydrates and fats in the first.

Maize is notorious for the deficiency of pro¬ teids relatively to the carbohydrates and fat. With a great excess of heat and energy pro¬ ducing constituents and a deficiency of earthy salts it is less calculated to foster growth and development and predisposes rather to fat. It tends more to impactions of the bowels and indigestion, with the resulting skin eruptions, and above all to the destructive recurrent in¬ flammation of the eyes, which ruins so many young horses. Yet it is fed over large areas

t

as the exclusive grain feed, and such is the adaptability of the living system that the mini¬ mum evil results. To obviate the evils it can be fed with cooling, laxative agents as wheat bran, carrots or turnips, or an ounce of Glau¬ ber salts may be given daily.

Barley, rye and wheat have been success¬ fully fed to horses, but are not equal to oats in supporting the animal and fitting for hard work.

Beans, peas and other leguminous seeds are fed when a horse is subjected to an extraor¬ dinary strain of work or endurance, being espe¬ cially valuable for the excess of proteids they contain. They should be thoroughly matured and dried as the fully formed and partially ripened seeds of several species contain a nar¬ cotic poison.

The relative amount of hay and oats for a horse of 1,000 pounds live weight may be stated as follows: Cavalry horse: Oats 12 pounds, hay 14 pounds. Carriage horse: Oats 10 pounds, hay 12 pounds. Draft-horse : Oats 15 pounds, hays 12 pounds. The horse at rest can live on a mere maintenance ration sufficient to keep up bodily temperature and repair waste. A horse in active work will need about one- half more. For very severe or rapid work about one-third more must be added. For hard work a broad ration-proteids 1, to car¬ bonaceous matter 6, is preferable to a narrow ration-proteids 1, to carbonaceous matter 3. An economical feed can often be made of a number of agents compounded from their known chemical composition, to form such a balanced ration, but mere chemical ingredients are not final, as palatability and adaptability have still to be

reckoned with and a given weight of oats is of more value than an equal amount of similar nutritive elements in wheat or barley.

Good judgment and regularity in feeding and watering are essential to success with any feed. Feeding in irregular amounts at varying intervals and with uncertain watering will undo the good effects of a generous ration. The small stomach (16 quarts) cannot admit a large feed of oats and saliva without suffering, and. if overdistended, it becomes paretic or tor¬ pid and dangerous fermentation and gaseous distension may ensue. Again, if feeding is de¬ layed the hungry craving and nervous excite¬ ment cannot be undone by a generous feed later. Then again, if the perspiring and ex¬ hausted animal be allowed to slake his thirst with a bucket of ice-cold water,- he may have heart failure, or colic, or gastric congestion with sympathetic skin eruption or laminitis, or inflammation may attack any organ that has been previously weakened.

An excellent appetizing food is molasses. This has been largely neglected because of the mistaken idea that it contained heat producing elements only. But corn carbohydrates furnish energy to the acting muscles and other tissues as fuel does to an engine, and sugar, having no need of digestion, can supply force with less loss than can starch or fat. Not the least of its good qualities is the relish with which it is taken and that it imparts to other less at¬ tractive food taken with it. For the horse, otherwise healthy, but debilitated by poor or faulty feeding or overwork, molasses is to be depended on to restore weight and energy alike.

For this purpose it may be given in the amount of two pounds per day, and even in double that amount if subjected to severe work.

Overdistension of the Stomach. — Sudden inflation of the stomach with gas, the product of fermentation in unwholesome contents (frosted grass, roots, apples, green potatoes, overripe ryegrass, millet, vetch, etc., irritant plants) ; from overfeeding (at the cornbin in ripe grain, etc.), from violent exertion on a full stomach, or from a full feed when debilitated from star¬ vation, disease or overwork, is liable to cause death in two hours or a little more. The horse can rarely vomit, or belch gas, the stomach does not absorb and the outlet by the bowels is 100 feet long, so that the organ is usually rup¬ tured with fatal results. Among the other less rapid disorders are catarrhal inflammation of the stomach, intestinal colic, congestion, in¬ flammation, impaction, twisting, invagination, calculi and worms. Of poisons may be named: lead through water, etc. ; molds, fungi and ‘ bacteria in food (causing gastric, intestinal, hepatic, pulmonary, nervous, cutaneous or kidney diseases) ; ergot, smut (causing gastric disorder, ulcers of the mouth, abortions, etc.) ; lupines, Senecio Jacoboea (causing cirrhosis of liver) ; astragalus, oxytropis (loco, brain disease) ; equisetum (gastric

and intestinal catarrh) to which may be added cicuta, conium, oenanthe, aconite, rhus, ranunculus, larkspur, anemone, digitalis, wild cherry, wild onion, camas, helenium, hyacinth, clematis, thorn apple, colchi- cum, belladonna, hyoscyamus, bitter sweet, eu- phorbium, hellebore, wild parsnip, laurel, ole¬ ander, etc.

Liver Diseases. — These are notoriously prevalent in hot, damp regions in horses kept in close stables on rich, abundant feeding; in such as have dry feeding and scarcity of water in winter ; and in such as have a poorly bal¬ anced ration with excess either of proteids or of heating carbohydrates. In damp tropical regions special care is needed as to the site, exposure, ventilation and purity of stables, the dietary, exercise and grooming to obviate liver complaints. Transient fevers, nervous, diges¬ tive, skin and kidney disorders often originate from troubles in the liver.

Grooming is most important in the finer breeds of horses in clearing off oil and dandruff, rendering the skin pliant, and favoring secre¬ tion, exhalation, cooling and elimination. On the contrary, animals at pasture and exposed to cold and wet find a measure of protection in the sebaceous and thick hairy covering. When, however, drenched with perspiration or rain, and in a warm air, the relaxing effect on the skin and general system is very debilitating, hence clipping may become a necessity to be followed by special precautions against cold. The active friction (massage) of grooming renders circulation active, especially that of the lymph, relieving fatigue, favoring elimination and improving the tone of the muscles and gen¬ eral system. The heels need particular care. Clipped heels are irritated by the stubby hair in the folds back of the pastern often precipi¬ tating chaps and grease which would have escaped in the unclipped. The heel is normally protected by the abundance of sebaceous secre¬ tion, but when this is rubbed off by dust, clay, sand, etc., the part suffers readilv from cold, wet, dried gritty mud or other irritants. Washing

the heels, especially with caustic soap, and leav¬ ing them to dry in cold air or draft is hurtful. Prompt drying of the heels will obviate the danger, and, if there is already any swelling, gentle massage with a little vaseline will im¬ prove the condition. In obstinate cases the source of the trouble may be sought in dis¬ order of digestion, liver or kidney.

Many disorders of the nervous system, lungs, skin, eye and kidneys are due

to consti¬ tutional troubles which cannot be dealt with here in general terms. Such diseases are usu¬ ally manifested by elevated body temperature and accelerated or modified breathing or pulse. The temperature of the healthy, mature horse, at rest in a cool or moderate environment, is 99° to 100° F., respirations 10 to 12 per minute and pulse 35 to 45.

Contagious Diseases. — These agree in one fundamental feature that each is due to a microbe, which passes more or less directly from the affected animal to the sound one, thus propagating the disease. The arrest of the epi¬ zootic and even its complete and final ex¬ tinction is merely a question of preventing such transmission and of destroying every infecting germ. This truth is not yet duly- appreciated by stock-owners, legislators nor sanitary officers, but when it is fully realized we shall be near the total extinction of most animal plagues to the unspeakable profit of humanity. The Contagious diseases may be divided into twro classes: (1) Those in which the infection is either confined to solipeds, or mainly propa¬ gated by the equidae, so that its extinction in these would mean the final extinction of the disease, and (2) those which are propagated in other genera as well, so that the extinction of the germ in other species also would be essen¬ tial to its complete eradication.

To the first class belong strangles (distem¬ per), contagious pneumonia, equine influenza, glanders, tetanus, vesicular exanthema, con¬ tagious acne, petechial fever, gastro-enteritis of the new born, South African horse sickness, dourine, surra, Nagana, Mai de Caderas, in¬ fectious paraplegia. The first four of these affections are constantly spread in the United States through sales, public stables, stockyards, railroad cars, ships and sale-stables, and no radical measure is taken to destroy the germs in such infected places, or to prevent the in¬ fection of all solipedes that pass through them.

In the second class must be included: Horse-pox, contagious abortion, thrush of the month, infectious ophthalmia, tuberculosis, rabies, malignant oedema, anthrax and emphyse¬ matous anthrax. The first six of these are propagated more by other genera than the horse, so that the burden of the work for their extinction would have to be expended on these other classes. The last three are caused by germs which can live out of the animal body in the soil, and their extinction would in¬ volve the drainage and sanitation of the in¬ fected soils as well.

.Shipping Fever. — In the matter of com¬ municable diseases of horses, unfortunately, some one thought the name shipping fever as a profitable one to exploit. It embraced not only all contagious and communicable diseases, but all caused by parasites, and all due to ex¬ posure, accidents,

changes of food and water, to impurities of air and to a thousand other

insanitary conditions. Confining it to con¬ tagious diseases affecting the breathing organs alone it would cover glanders, all forms of in¬ fectious sore throat, complaints of the nasal passages, of nasal sinuses, of the Eustachian tubes and middle ear, of the tonsils, of the thy¬ roid glands and parathyroids, of the thymus, of the long chain of lymph glands adjoining the nose, mouth and air passages generally, equine influenza, the different kinds of communicable pneumonia, — fibrinous, mycotic, aspergillous, croupous, diphtheritic, verminous, brustseuche, bronchitis, broncho-pneumonia, pleuropneu¬ monia, pleurisy, tuberculosis, etc. The sellers of curative and protective serums had thus to provide the means of contesting the field with scores of anti-serums, each claiming to be the deadly enemy or antidote of one particular brand of the many microbes and microbian poisons (toxins) that operate in producing and maintaining the many transmissible affections of the breathing organs. But as they had taken the first step toward assuming to pro¬ vide the world with an antidote for the whole conflicting group of destructive affections, something that could be blindly used for all alike, they felt obliged to carry out, in form at least, their reckless promise that their product would answer equally well for any dis¬ order that could be classed rightly or wrongly as a shipping fever. They did not dare de¬ lay long enough to consider that to produce a real antidotal serum for each of the many diseases named they must keep, at their labora¬ tories, a large number of animals suffering from each separate malady, from which they could draw at frequent intervals the fresh, active and trustworthy antidotal products neces¬ sary to deal with and control this form of in¬ fection, and that the animals under each infec¬ tion must of necessity be so closely shut in and cared for that by no possible unlucky chance could the infinitesimal infection they carried escape through visitor, instrument, para¬ site, wind, breath, dust, insect, secretion, fod¬ der, manure, etc., so as to carry infection to anything outside. They did not consider that the laboratory animals must be guarded with similar care after as well as before they have yielded up their protective material. It was formerly supposed that a quarantine of 40 days was sufficient for the death and disposal of any living disease-producing germ, and that the subjects could then be set free to mingle. safely with other susceptible animals. But this illu¬ sion no longer holds sway. Many germs (glanders, syphilis, tuberculosis, etc.) continue for a lifetime in the bodies of their victims ready to infect others; many others, if frozen, dried or shut up from light, moisture, elec¬ tricity and air, maintain their vitality and virulence for months and years in the bodies of such victims. But our serum vender is out for commercialism and is not to be hindered by small matters; he has already compressed the many diseases due to trading into one problematic (but utterly indifferentiated) ship¬ ping fever, he can- just

as easily offer a poly¬ valent (multivaluable) serum guaranteed to protect against the whole of the different dis¬ eases involved. He can go a step further still : as the Department of Agriculture has been appointed to inspect, supervise and license firms that make prophylactic and curative serums he

can call upon this department to inspect and en¬ dorse his polyvalent serum and so secure the requisite guarantee that will procure him a large sale. The buyers of live stock naturally trust to the knowledge of their government and use the commercialized material on a large scale. Only a certain percentage of the horses traded in a district were both susceptible and exposed to a disease existing in that district, so that a large number remained for which the traders could secure certificates that the ani¬ mals had been treated with this prophylactic and had escaped or survived the prevailing disease. Like the live stock insurance company, trusting to the fact that a given class of ani¬ mals must increase in numbers or be aban¬ doned, they exacted a premium on each animal that would on the whole more than compen¬ sate for the average losses under ordinary con¬ ditions and yet leave a handsome surplus for themselves. Prior to the advent of the deadly cattle plagues in Great Britain (Rinderpest and Lung plague) these live stock insurance companies were very prosperous, but after their coming the institutions got into difficulties and were driven to the wall. Their main use was to distribute and average the losses over the whole country. They did little or nothing to remove the causes of the loss. Very nearly a similar experience was had in the would-be immunizations against the deaths from shipping fever in horses. So long as trading was com¬ paratively restricted, the fact that the so-called shipping fever comprehended over a score of different diseases, each with its own specific microbe, its own deadly toxins and its own protective materials, it was easy to get evi¬ dence of tens or hundreds of thousands of protective inoculations and of immunizations from the pest. Nothing was easier than to collect these from pest-free areas. But when the demand arose for army horses for the un¬ precedented war in Europe, the hollowness and falsity of this evidence was quickly revealed. The whole continent was laid under contribu¬ tion for suitable horses, they were shipped from every available locality in railroad cars to collecting centres, infecting shipping places, stables, sheds, pastures, auction yards, water¬ ing and resting places, cars, and finally destina¬ tion camps and transports ; further infection entered through fodder, litter, grain, blankets, combs, brushes and other appliances until each rendezvous of army horses became a veritable pest-house. We cannot leave out the strongly contributing causes attendant on the haste of shipment. The purchases were

crowded into cars, good and bad, open and closed, and fresh from the quiet of the fields they were exposed

to the terrors of railway travel, the continuous and intermittent explosions of escaping steam, the whirring and plunging of moving wheels, the constant movements and straining to re¬ store the disturbed equilibrium, the jamming against confining walls, and jerking of limiting halters and slings, the attempted or accom- nlished kicks, blows and bites of neighboring horses, the uncertain steps on bare wet floors. The constancy of this unceasing turmoil and strain, the undeniable imminence of danger, of injury and even of death, throws the nervous horse into a condition of mental excitement and physical fever, which enormously decreases

its capacity of resistance to disease whether from constitutional or microbian enemies. Add to this that the animal, while in the greatest state of excitement, overstrain and exhaustion, aching in overworked muscles, flushed with kurried breathing and circulation, drenched it may be with perspiration, is delayed for many hours in the burning rays of a summer sun from which he cannot protect himself by change of position, or subjected to the rapid motion of 50 miles an hour or more, with no available shelter from the coldest head wind or the chill of rain or snow, and no one can be surprised at the severe illnesses brought on by physical suffering and climatic vicissitudes, altogether apart from microbian invasion. But how much more if the microbian invader is also present, urgently seeking an animal system already be¬ low par in which it can begin its deadly work. Some army veterinarians (Turner) are dis¬ posed to charge the shipping fever losses mainly, if not altogether, on the unsanitary physical conditions of the shipping, and to seek for the much needed relief in the improvement of these conditions. A large amelioration could unquestionably be secured by this means, but with the fatal drawback of blinding the eyes to the real cause of each of these shipping maladies, the specific microbe, which is the ultimate, essential cause of any one of the pestilential disorders that propagates itself without limit from animal to animal. More¬ over, the pestilential microbe readily acquires a greater or lesser virulence and potency ac¬ cording to the conditions in which it exists, so that although we could diminish, or even for a time abolish, the fatality and loss in a given district, yet if we failed to definitely de¬ stroy and thoroughly exterminate all of the microbes of each particular disease we would be in a sense but preserving the disease-seed against the time when it could propagate itself anew in a less sanitary environment. We have sad examples of this continually before our eyes in the present mode of dealing with hog cholera, tuberculosis, anthrax, blackleg and a great variety of other plagues. The only ra¬ tional and universally effective remedy, for the transmissible microbian pest, is one that in¬ volves the complete and permanent extinction of all microbes that keep the particular

pest going. Anything short of this is a make-shift at best, and must in the end fail to give us a perfect and enduring success. In the obnoxious conglomeration now masquerading under the name of shipping fever the first consideration should be to quarantine all districts wherein anyone of its dangerous list of diseases exists. This should include, not only animals suscepti¬ ble to the disease in question, but other animals that have in any way come into contact or near proximity, or, secondarily, into relation with the infected or suspected animals en¬ dangered through food, litter, manure — solid or liquid — or through coverings, har¬ ness or implements used in connection with such animals or their products, and par¬ ticularly through persons attending to the suspected animals and handling their food, litter, manure or other products. Vermin that live in or visit the premises must be destroyed, end all predatory animals — rats, mice, weasels, skunks, mink, squirrels, woodchucks, buzzards,

eagles, falcons, hawks, vultures, owls, crows, looks, etc. must be disposed of. If quaran¬ tine is needed at all it must be instant and abso- lute ; any concession or day of grace is but a sacrifice of the most important public right, and the person granting it can only be looked on as a criminal and should be dealt with accordingly, as an enemy of the public, of the live-stock industry and of the first principle of sanita¬ tion. The area quarantined must be wide enough to exclude any possibility of the escape of infection. The quarantine of a few more herds on suspicion (precaution) is a very tem¬ porary evil at the worst, which will be corrected when the short period of incubation has passed without any infected cases, whereas the omission of but one infected herd and the spread of the germ by shipment, sale or other¬ wise, would perhaps have become the cause of utterly unnecessary and incalculable losses and might even have placed the resulting outbreak beyond the reach of permanent control. The first wrong step by an official appointed to take effective measures against infection cannot fail to make a second and even worse step easier, and will do much to undermine the con¬ fidence and morale of the stockowners gen¬ erally, to encourage the evil disposed to op¬ pose and circumvent the best extermination measures and to turn an easy success into a failure. A census list of quarantined animals, identified by indelible markings, must be kept, also a record of every death and the mode of disposal of the carcass, also a heavy penalty imposed for every animal missing. No per¬ mission to drag out a carcass to be exposed unburied (or unburned) can be permitted or neglected. Thorough sterilization- by boiling in water is ideal, as preserving the carcass-values for fertilization, or otherwise, without any pos¬ sible escape of infection, would be effected. Thorough disinfection of

the premises where the animals are shut in and of all pro¬ ducts of the animals is quite as essential. The standing rule is safety with conserva¬ tion. In all self-limiting affections the sur¬ vivor would recover immune, so that no elab¬ orate nor expensive immunization method need be adopted. An attack of the disease it¬ self followed by recovery gives the subject the most reliable protection. But an animal may have become itself immune and yet may re¬ main a carrier of the disease-germs and prove dangerous to every susceptible subject he may meet, and thus start new outbreaks wherever he may go. Such an immune bearer of a deadly infection may be tested and detected bv one of the various laboratory tests (agglutinin, pre¬ cipitin, complement fixation, antigenetic action, hemolysis, etc.). But any such test is open in this case to the objection of the multiplicity of the germs found in different cases of shipping fever, of the delay and cost of so many dif¬ ferent tests made in turn, to the constant temptation to stop short of completing the many successive tests for the diseases involved, when all the materials for the different tests are not at hand and cannot be at once com¬ manded ; — this temptation would be especially trying in the case of the many numbers of ani¬ mals in a polyvalent serum manufactory, where so many animals are needed to be kept under the many diseases necessary to furnish the req¬ uisite amount of defensive and immunization

products to protect against the 20 or 30 dif¬ ferent affections and microbes to be dealt with m the different forms of shipping fever. All the more is this trying when it is taken into account that the polyvalent serum making is commercialized; that an urgent demand has come through the exigencies of war; and that this must be met at any cost. Need we wonder that when it thus came to a great nation-wide demand and test, under bad sanitary condi¬ tions, that the serum proved a dismal failure?

A rigid, inflexible quarantine of a duration covering the length of incubation found in any of the maladies, in the complex shipping fever would be a rational alternative with the unspeakable advantage of being a successful one; it would make an end of the disease (diseases) in the existing areas of prevalence, would purify our markets for horses, the sup¬ plies of which would no longer come already- infected, and those that had passed through the disease (diseases) and recovered would come themselves immune from such disease, and such as come to the markets infected would furnish the means of tracing the offending microbe back to its source and of bringing the sellers up for lawbreaking. This would be a telling step toward the extinction of all such plagues in the land.

An important co-operative resort would be the adoption of the auto-therapy referred to in the article on Cattle and Their Diseases. The first step in this would be to isolate, quarantine and disinfect all equines, showing any sugges¬ tion of any one of those diseases now disguised under the

misleading name of shipping fever. Not in foul and infecting railway, market nor shipping yards, but in clean, open pasture if the weather is fine, or in pure, airy buildings, with good exposure in severe weather. This guards owners, shippers, railways, cars, ships, etc., against complicity in spreading infection, and places a wholesome responsibility on every one handling such stock. Any suspicious symp¬ tom in stock sent is indicative of complicity. Among disinfectants, freshly made bleaching powder is usually the most available, efficient and cheap with the drawback of injuring the fer¬ tilizer, but it may be replaced by others (for¬ malin, carbolic acid, copperas, etc.). Some mild antiseptics (graduated sulphur fumes, eucalyp- tol, naphthaline, thymol, lime sulphide, etc.) may be used on the respiratory, or digestive mucous membranes, or on the skin. Laxatives (Epsom or Glauber salts) may be used with judgment to counteract constipation, and diuret¬ ics (nitrate of potash) to correct suppression of urine. The auto-therapy is sought by the use of the blood serum of insusceptible animals (healthy ox, sheep, swine) taken by the mouth, nose-douche or better subcutaneously, or by the serum of the immunized horse hypodermically, or again the blood serum of an animal already under the disease, after it has been Pasteurized or sterilized by heat (212° F.). This may be used subcuteno. The serum of the infected has these great advantages of avoiding the blunders and risks that attend on the use of the polyvalent serum which may or may not contain the defensive matters of the particular disease we are now contending with, but which (if really polyvalent) ought to contain those belonging to a large number of other diseases of the shipping fever group and we cannot be

quite sure that it does not contain some of the living germs. By taking the blood from the infected or suspected (exposed) animal before us for treatment, we can get no germ that is not already in its body or in its fel¬ lows, and we thus run small risk of inoculating with germs more deadly than they now possess. We thus greatly restrict the complexity of our problem and largely invite good results. By sterilizing, however, at the temperature of boil¬ ing water we get rid of all disease germs, leaving no living microbe to propagate itself in the body of the animal we are now dealing with, and thus adding to the force of any disease actually present in its system. Some of the defensive and poisonous bodies present in the infected blood, like alexines, are often¬ times robbed of their potency by the boiling, but a large number of others retain their ac¬ tivity, which is largely antagonistic to the mi¬ crobe and when used in moderation are bene¬ ficial to the case. Those products that are even transiently hurtful or dangerous are the toxins and other poisonous proteids, which in excess and

in addition to those already in the system might temporarily aggravate the disease- conditions, but, on the other hand, these are among the desirable elements in stimulating the body cells, especially the white cells of lymph, blood and tissues, to increase the production of the elements that really antagonize the disease-microbes. Even these toxins and pro¬ teids therefore must be looked upon as highly important in drawing out from the guardian and defensive body cells that which opposes the attacking microbes and their poisons. In using them indirectly we enlist in our service the native, inherent defensive powers of the body attacked. In the infected (attacked) body of our subject _ these defensive elements have al¬ ready been increased, and now, by the guarded use of the poisons of the microbe, we are soliciting a further increase of the protecting and reparatory compounds, where the dead mi¬ crobes are no longer able to increase their own numbers and poisons. The degree to which this may be pushed will depend on the violence of any attack in hand, the excess of the mi- crobian chemical poisons already present in the animals' system, and the amount of the self- defensive power still remaining in that system. This power it is, in which we must place our trust for recovery, hence the importance of taking our patient in hand at the earliest possible moment after it has become infected. We can judge this condition largely by the morbid symptoms shown, but it is always well to use the clinical thermometer on all the subjects be¬ fore us and to hasten the treatment for all such as show bv a rise of temperature that the system is already under the sway of the disease. W e cannot hope that under all circumstances we shall succeed, but we are working in strict accordance with nature's own laws and the sooner we can take the case in hand, and the more judiciously we can check bacteridian in¬ crease, and stimulate systemic defense the greater may be our hope of a final success.

Parasitic Diseases. — A number of parasites that prey upon solipeds can live indiscriminately in other animals as well. Among these may be named the T ricophyton of ringworm ; Aspergil¬ lus of pneumomycosis; Actinomyces: different species of wood ticks ; Dermanyssus of poultry

acariasis ; Trombidium Americanum (and F. Holosericium) ; Linguatula Denticulata; Eu- strongylus Gigas ; Filaria Medinensis ; Distoma Hepaticum and D. Lanceolatum. By reason of their variety of hosts these would be less easily got rid of. But another list includes the ob¬ ligate parasites which must live in the soliped at some stage or perish. These accordingly can be extinguished on the same principle as can the microbes of exclusively equine plagues. They include the larvae of four species of bot¬ fly (CEstrus Equi, CE. Hcemorrhoidalis, CE. Pe corum and CE. Nasalis) ; three lice (Flee mat o – pinus Marcrocephalus, Trichodectes Pilosus and Tr. Pubescens) ; four mange acari (Sarcoptes Scabei V. Equi, Psoroptes Communis V. Equi, Symbiotes Communis V. Equi and Demodox F olliculorum V. Equi;

three tapeworms

(Tania Perfoliata, T. Mamillana and T. Plicata) ; two stomach worms (Spiroptera Microstoma and Sp. Megastoma) ; five intesti¬ nal worms (Ascaris Megalocephala, Oxyuris Curvala and O. Mastigodes, Sclerostoma Equinum and Sc. T etracanthum) ; one of the serous cavities (Filaria Papillosa) ; one of the lungs (Strongylus Arnfieldi) ; and four of the blood (Filaria Hcemorrhagica, F. Irritans, F. Sanguinis Equi and F. Reticulata). For the obligate parasites their extinction on the victim and his removal from the source of a fresh supply means a final extinction of the parasite, as the worm cannot be perpetuated without its host. In the case of worms, which survive as eggs and embryos in damp earth and water, the exclusion of solipeds for a year or two from infested stables and fields, from waters (ponds, lakes, wells, streams) that receive drainage from infested places, and from food derived from such verminous localities, entails the in¬ evitable destruction of these parasites in such habitat outside the body. An essential condi¬ tion of complete success is that the infested animals must be themselves cleared of the worms, to prevent their colonizing new places with the parasitic, and, in the case of such as are entertained in the blood, or serous cavities or in cysts in the tissues, this takes time to allow of their migrating into the bowels or reaching their limit of life and perishing. The mere use of anthelmintics or vermifuges alone is no radical treatment for these parasites. A veterinary sanitation which is far reaching enough to do away for all time with the class of contagious and parasitic epizootics, is the only one worthv of 20th century knowledge, or which will ful¬ fill the duties of the age.

. James Law,

Director New York State Veterinary College,

Cornell U niversi ty.

HORSE, Evolution of the. As a domestic animal the horse is to be found almost every¬ where that man can live. He is spread all over the world — from torrid to arctic climates, in all the continents, in remote oceanic islands — he is completely cosmopolitan. But as a wild ani¬ mal the horse is limited to the Old World, and is found there only in the open arid or desert plains of central Asia and Africa. There are two species in Asia, the Asiatic wild ass (Equus hemionus), and the little known Przewalsky's horse (E. przewalskii) , while in Africa there are the African wild ass (E. asinus) and the several species of zebra (E. zebra, E. burchelli, E. quagga). In the Americas and Australia

I

tlieie are no true wild horses, the mustangs and broncos of the Western plains and South Amer- ica being feral (domesticated animals run wild) and descended from the horses brought over from Europe by the early white settlers. When the Spaniards first explored the New World they found no horses on either continent. The Indians were quite unfamiliar with them and at first regarded the strange animal which the newcomers rode with wonder and terror, like that of the ancient Romans when Pyrrhus and his Greeks brought elephants to fight against them.

The horse is distinguished from all other animals now living by the fact that he has but one toe on each foot. Comparison with other animals shows that this toe is the third or middle digit of the foot. The hoof corresponds to the nail of a man or the claw of a dog or cat, and is broadened out to afford a firm, strong support on which the whole weight of the ani¬ mal rests. Behind the ˆcannon-bone® of the foot are two slender little bones, one on each side, called splint-bones. These represent the second and fourth digits of other animals, but they do not show on the surface, and there is nothing like a separate toe. So that the horse may be said to be an animal that walks on its middle finger-nail, all the other fingers having disappeared.

The teeth of the horse are almost equally peculiar. The molars are long, square prisms which grow up from the gums as fast as they wear off on the crowns. Their grinding surface exhibits a peculiar and complicated pattern of edges of hard enamel between which are softer spaces composed of dentine and of a material called “cement,® much like the dentine in quality but formed in a different way. The dentine is formed on the inside surfaces of the enamel while the tooth is still within the jaw-bone; the cement is deposited on the outside surfaces of the enamel after the tooth has broken through the jaw-bone and before it appears above the gums.

Various other peculiarities distinguish the horse from most other animals; some of these are shared by other hoofed animals. The two long bones of the fore-arm (radius and ulna) are separate in the greater number of animals, but in the horse, and in many other hoofed ani¬ mals, they are consolidated into a single bone. The same consolidation is seen in the bones of the lower leg (tibia and fibula). The lengthen¬ ing of the foot and stepping on the end of the toe raises the heel in the horse, as in many other animals, to a considerable height above ihe ground, where it forms the hock joint, bend¬ ing backward, as the knee bends forward. In these as in

various other ways the legs of the horse are especially fitted for swift running over hard and level ground, just as its teeth are for grinding the wiry grasses which grow on the open plain.

The zebra and the ass have the same peculiar structure of teeth and feet as the domestic horse, and differ only in the color of the skin, proportions of various parts of the body, etc.

Fossil Horses of the Age of Man. — In the early part of the Age of Man, or Quaternary Period, wild species of horse were to be found on every continent except Australia. Remains of these true native horses have been found buried in strata of this age in all parts of the United

States, in Alaska, in Mexico, in Ecuador, Brazil and Argentina, as well as in Europe, Asia and Africa. All these horses were much like the living species and most of them are included m the genus Equus. A complete skeleton of one of them (Equus scotti) was found by the American Museum expedition of 1899 in north¬ ern Texas. The difference between it and the domestic horse is chiefly in proportions, the skull shorter with deeper jaws, the legs rather . short and feet small in proportion to the body. In these characters this fossil horse resembles an overgrown zebra rather than a domestic horse. We know nothing of its coloring. It may have been striped and in this case would have been very zebra-like; but there are some reasons for believing that it was not prom¬ inently striped. The bones are petrified, brittle and heavy, the animal matter of the bone having entirely disappeared and having been partly replaced by mineral matter. They are not much changed in color, however, and are so perfectly preserved that they look almost like recent bone.

All t'he remains of these native horses which have been found in America have been petrified more or less completely; this means that they have been buried for many thousands of years, for petrifaction is an exceedingly slow process. It serves as an easy method of distinguishing them from bones of the domestic horse, found buried in the earth. These cannot in any case have been buried for more than four or five cen- tries, and have not had time to petrify. Re¬ mains of these fossil horses are found in various parts of the United States, chiefly on the Nio¬ brara River in Nebraska, and in central Oregon, Many separate teeth and bones have been found in the phosphate mines near Charleston, S. C. ; other specimens have come from central Flor¬ ida, _ from southern Texas, Arizona, Kansas, Louisiana and even from Alaska. They are, in fact, so often found in deposits of rivers and lakes of the latest geological epoch (the Pleistocene) that the formation in the western United States has received the name of Equus Beds.

In South America, in strata of the Pleistocene Epoch, there occurs besides

several extinct species of the genus Equus, the Hippidium, a peculiar kind of horse characterized by very short legs and feet, and some peculiarities about the muzzle and the grinding teeth. The legs were hardly as long as those of a cow, while the head was as large as that of a racehorse or other small breed of the domestic horse. All these horses became extinct, both in North and South America. It may have been that they were unable to stand the cold of the winters, probably Jonger continued and much more severe during the Ice Age than now. It is very probable that man — the early tribes of pre¬ historic _ hunters — played a large part in ex¬ tinguishing the race. The competition with the bison and the antelope which had recently migrated to America, may have made it more difficult than formerly for the American horse to get a living. Or, finally, some unknown disease or prolonged Reason of drought may have exterminated the race.

In central Asia, two wild races persist to the present day; others were domesticated by man in the earliest times, and their use in Chaldsea and Egypt for draught and riding is depicted in

the ancient mural paintings. In Africa the larger species became extinct in prehistoric times, as in America, but the smaller zebras still survive in the southern part of the con¬ tinent (one species, the quagga, abundant 50 years ago, is now probably extinct), and the African wild ass is found in the fauna of the northern part. The wild horse of prehistoric Europe, a small race, short-legged and shaggy- haired, was domesticated by man, a fact that is known from the rude drawings scratched on bone or ivory by men of the Neolithic or Pol¬ ished Stone Age. But the domestic horse now in use is derived chiefly from the Asiatic race, although it is probable that in some breeds there is a considerable strain of this shaggy, short-legged European race, and it is possible also that African races may have been domes¬ ticated and to some extent mixed with the Asiatic species. The domesticated ass is a de¬ scendant of the African species.

The Evolution of the Horse. — The his¬ tory of the evolution of the horse through the Tertiary Period or Age of Mammals affords the best known illustration in existence of the doc¬ trine of evolution by means of natural selection and the adaptation of a race of animals to its environment. The ancestry of this family has been traced back to nearly the beginning of the Tertiary without a single important break. During this long period of time, estimated at nearly 3,000,000 of years, these animals passed through important changes in all parts of the body, but especially in the teeth and feet, adapt¬ ing them more and more perfectly to their particular

environment, namely, the open plains of a great plateau region with their scanty stunted herbage, which is the natural habitat of the horse. In the series of ancestors of the horse we can trace every step in the evolution of those marked peculiarities of teeth and feet which distinguish the modern horse from an an¬ cestor which so little suggests a horse that, when its remains were first found 40 years ago, the animal wTas named by the great palaeontol¬ ogist, Richard Owen, the Hyacotherinm or ((Coney-like Beast.® Its relation to the horse was not at that time suspected by Professor Owen, and was recognized by scientific men only when several of the intermediate stages between it and its modern descendant had been discovered. On the other hand, this first an¬ cestor of the horse line is very difficult to dis¬ tinguish from the contemporary ancestors of tapirs and rhinoceroses, and indicates how all the modern quadrupeds have diverged from a single type, each becoming adapted to the needs of its especial mode of life.

The earliest known ancestors of the horse were small animals not larger than the domestic cat, with four complete toes on each forefoot and three on each hindfoot. There is reason to believe that the still more ancient ancestors of this and all other mammals had five toes on each foot. In the forefoot of the earliest known stage we find a splint-bone or small, slender rudiment representing the missing first digit or thumb, which no longer appears on the surface of the foot, while in the hindfoot there is a similar rudiment representing the outer or fifth digit, but no trace is left of the innermost or first digit. The proportions of the skull, the short neck and arched back and the limbs of moderate length, were very little horse-like; re¬

calling, on the contrary, some modern carnivo¬ rous animals, especially the civets (Viverridce) . The teeth were short-crowned and covered with low rounded knobs of enamel, suggesting those of monkeys and of pigs or other omnivorous animals, but not at all like the long-crowned complicated grinders of the horse.

Commencing with the Hyracotherium, 12 stages have been recognized from as many successive formations, showing the gradual evo¬ lution of the race into the modern form and each stage is characteristic of its particular geological horizon. Some of the stages have been found in several parts of the world, but by far the most complete and best-known series comes from the Tertiary Bad Lands of the Western States. Besides the main line of de¬ scent which led into the modern horses, asses and zebras, there were several collateral branches which have left no descendants. Of some stages all parts of the skeleton have been found, of others, only the jaws, or jaws and feet, are known. We can mention only the more important stages.

1. The Hyracotherium is the most primitive stage known, but only the skull has been found, so that it has not been determined exactly what the feet were like. The teeth display six rounded knobs or cusps on the upper molars and four on the lower ones, and these are just be¬ ginning to show signs of fusing into cross¬ crests. The premolar teeth have only one main cusp, except the third and fourth premolars (next the molars) in each jaw, which have two and three, respectively. The only specimens which have been found were in the London Clay or Lower Eocene of England and are preserved in the British Museum.

2. The Eohippus is much better known. It comes from the Lower Eocene of Wyoming and New Mexico, and is very like the Hyracother¬ ium except that the molar teeth have the cusps more clearly fusing into cross-crests, and the last premolar is beginning to look like one of the true molars. The forefoot of this animal has four complete toes and the splint of a fifth. The hindfoot has three complete toes and the splint of another.

3. Protorohippus — In these animals the splint of the first digit in the forefoot and the splint of the fifth digit of the hindfoot have dis¬ appeared, but there are still four complete toes in the fore- and three in the hind-foot. The crests on the molars are a little clearer and the last premolar has become almost like the molars, while the next to the last premolar is beginning to become so. A skeleton of Protorohippus shows an animal of the size of a small dog, and proportioned much like the breed known as the whippet. The Protorohippus was found by Dr. J. L. Wortman in 1880 in the Wind River Bad Lands of Wyoming, and was described by Professor Cope and others under the name of the (

4. Of Orophippus we have only parts of jaws and teeth. A specimen of the forefoot is exhibited in the museum of Yale University.

5. Epihippus (Upper Eocene). — Of this stage of the evolution of the horse only incom¬ plete specimens have been found. The molar teeth have the once round cusps almost com¬ pletely converted into crescents and crests, while another tooth of the premolar series has be¬ come like the molars. The toes are still four in

HYPOHIPPUS

Courtesy of the Philadelphia Commercial Museums

Skeleton from Middle Miocene Beds, near Pawnee Butte, Colorado

1

HORSE

the forefoot and three in the hindfoot, but the central toe in each foot is becoming much larger than the side toes. (This species hap¬ pens to be somewhat smaller than those found in the Middle Eocene stage, but no doubt there were others of larger size living at the same time). Palcetherium and Paloplotherium of the Upper Eocene of Europe form a side branch. They were very abundant in Europe, but have not been found in the New World. On each foot they had three toes of nearly equal size, and the teeth show a rather peculiar pattern. One of these animals was thought by Professor Huxley to be a direct ancestor of the horse, but it now is considered to be merely a collateral relative. Some species of Palceotherium were of large size, equal to a tapir. They were first described in the year 1804 by the celebrated Baron Cuvier from remains found in the gyp¬ sum quarries of Montmartre, Paris.

6. Mesohippus Oligocene (White River For¬ mation). — In this stage there are three toes on each foot, a splint representing the fifth digit of the forefoot of the Eocene ancestors. The middle toe is now much larger than the side toes, which bear very little of the weight of the animal. Three of the premolars have now be¬ come entirely like the molar teeth, the crests on the crown are completely formed and the out¬ side crest in the upper molars has taken the shape of two crescents. In the Middle Oli¬ gocene is found Mesohippus bairdi about the size of a coyote, while in the Upper Oligocene occurs Mesohippus intermedins as large as a sheep. Of both these animals all parts of the skeleton are known.

7. Anchitherium (Lower Miocene). — This stage has been found both in Europe and in America. It is much like its predecessor, but is larger and has the crests of the teeth somewhat higher and more complete. It probably is not in the direct line of descent of the horses, but is on a side branch.

8. Parahippus and Hypohippus (Middle Mio¬ cene). — In Parahippus the tooth-crests are much higher, and the transverse ridges on the upper molars are beginning to change shape so as to become a second pair of crescents inside the outer pair. Hypohippus is off the direct line of descent; its teeth are like those of Anchitherium, by which name it has been gen¬ erally called, but the animal was much larger, equaling a Shetland pony in size. A complete skeleton of the Hypohippus was found near Pawnee Buttes, Colorado, in 1901 by Barnum Brown, of the Whitney expedition. In the fore¬ foot of Hypohippus small rudiments still remain representing the first and fifth digits, but there is no splint of the fifth, as in Mesohippus. The second and fourth digits still touch the ground, though lightly. The feet of Parahippus were much like those of Hypohippus, but the side toes were smaller.

9 and 10. Protohippus and Pliohippus (Mid¬ dle and Upper Miocene). — In this stage the crowns of the upper molars have become much longer, the two pairs of crescents on the upper molars are complete, with two half-separated cusps within the inner pair. And the valleys between the crests have become filled with cement, so that with the wear of the teeth the edges of hard enamel are backed inside by dentine and outside by cement. In this way the surface of the tooth has a series of enamel

ridges always projecting a little above the grind¬ ing surface, because the softer material on each side wears down into hollows, yet never break¬ ing off, because they are braced so thoroughly on each side. This is a very efficient instrument for grinding hard grasses. In Protohippus and Pliohippus, especially in the former, the crowns of the teeth are by no means as long as in the modern horses; they must therefore wear more slowly or wear out at an earlier age. The feet in these two genera have but one toe touching the ground. The side toes (second and fourth digits) are complete, but much more slender than in the earlier stages and are apparently useless, as they cannot reach the ground. In some species of Pliohippus they have almost disappeared. The forefoot of Protohippus still retains tiny nodules of bone at the back of the Svrist® (sometimes improperly called in the horse the ˆknee-joint®), which are the remains of the first and fifth digits.

11. Hipparion (Pliocene) . — This genus, probably also a side branch of the genealogical tree of the horse family, is much like Proto¬ hippus, but larger and with more complication about the tooth pattern. It is common in the European Pliocene beds and has been found in America also. The feet are still three-toed, the side toes as large as those of the older Proto¬ hippus.

12. Equus (Pleistocene and Recent). — In this stage, that of the modern horse, the side toes have entirely disappeared and are repre¬ sented by splints on the fore- and hind-foot. No trace remains on the forefoot of the little nodules which in Protohippus represented the first and fifth digits. The crowns of the teeth are much longer than in the last stage, and of the twio half-separated inner columns on the upper molars, one has disappeared, the other has increased in size and changed in form. The skull has lengthened and the animal is much larger.

13. Hippidium (Pleistocene. South Amer¬ ica). — The feet are like those of Equus, ex¬ cept that they were short and stout. The teeth are like those of Pliohippus, from which it is supposed to be descended. The skull is large and long, with very long, slender nasal bones. Casts of the skull and limbs presented by the Museo Nacional of Buenos Aires, Argentine Republic, are exhibited here.

The Change in Feet and Teeth. — Along with the disappearance of the side toes in the evolution of the horse there is a considerable increase in the proportionate length of the limbs, and especially of the lower part of the leg and foot. The surfaces of the joints, at first more or less of the ball-and-socket kind, which allows free motion of the limbs in all directions, become keeled and grooved like a pulley-wheel, permitting free motion forward and backward, but limiting the motion in all other directions and increasing considerably the strength of the joint. By this means the foot is made more efficient for locomotion over a smooth regular surface, but less so for travel¬ ing over very rough ground, and it becomes of little use for striking or grasping or the varied purposes for which the feet of polydactyl ani¬ mals are used.

The increased length in the lower leg and foot increases the length of the stride without decreasing its quickness. The heavy muscles

of the leg are chiefly in the upper part, and to increase the length of the lower part changes the centre of gravity of the limb very little. Consequently the leg swings to and fro from the socket nearly as fast as before, since in an ordinary step the action of the leg is like that of a pendulum and the speed of the swing is regu¬ lated by the distance of the centre of gravity from the point of attachment, as that of a pen¬ dulum is by the height of the bob. To increase the length of lower leg and foot therefore gives the animal greater speed ; but it puts an in¬ creased strain on the ankles and toe-joints, and these must be strengthened correspondingly by converting them from ball-and-socket joints to ˆginglymoid® or pulley joints. Additional strength, likewise at the expense of flexibility, is obtained by the consolidation of the two bones of the fore-arm (ulna and radius) and of the leg (tibia and fibula) into one, the shaft of the smaller bone practically disappearing, While its ends become fused solidly to its larger neighbor.

The increase in length of limb renders it necessary for the grazing animal that the head and neck should increase in length in order to enable the mouth to reach the ground. An ex¬ ample of these changes is the modern horse, in which we find the neck and head much elon¬ gated when compared with the little Hyraco- therium, and this elongation has taken place pari passu with the elongation of the legs. The reduction and disappearance of the side toes and the concentration of the step on the single central toe serve likewise to increase the speed over smooth ground. The soft yielding sur¬ face of the polydactyl foot is able to accommo¬ date

itself to a rough irregular surface, but on smooth ground the yielding step entails a cer¬ tain loss of speed. A somewhat similar case is seen in the pneumatic tire of a bicycle ; a ®soft>:> tire accommodates itself to a rough road and makes easier riding, but a ˆhard® tire is faster, especially on a smooth road. Similarly, the hard, firm step from the single toe allows of more speed over a smooth surface, although it compels the animal to pick its way slowly and with care on rough, irregular ground.

The change in the character of the teeth from ˆbrachydont® or short-crowned to <(hyp- sodont® or long-crowned enables the animal to subsist on the hard, comparatively innutritious grasses of the dry plains, which require much more thorough mastication before they can be of any use as food than do the softer green foods of the swamps and forests.

All these changes in the evolution of the horse are adaptations to a life in a region of the level, smooth and open grassy plains which are now its natural habitat. At first the race was better fitted for a forest life, but it has become more and more completely adapted to live and compete with its enemies or rivals un¬ der the conditions which prevail in the high dry plains of the interior of the great continents. The great increase in size, which has occurred in almost all races of animals whose evolution we can trace, is dependent on abundance of food. A large animal, as may be shown on or¬ dinary principles of mechanics, requires more food in proportion to its size than does a small one, in order to keep up a proper amount of ac¬ tivity. On the other hand a large animal is bet¬ ter able than a small one to defend itself against

its enemies and rivals. Consequently, as long as food is abundant, the larger animals have the advantage over their smaller brethren and by the laws of natural selection the race tends to become continually larger until a limit is reached when sufficient food becomes difficult to obtain, the animal being compelled to devote nearly all its time to getting enough to eat.

Cause of the Evolution. — The evolution of the horse, adapting it to live on the dry plains, probably went hand in hand with the evolution of the plains themselves. At the commencement of the Age of Mammals the western part of the North American continent was by no means as high above sea-level as now. Great parts of it had but recently emerged, and the Gulf of Mex¬ ico still stretched far up the valley of the Mis¬ sissippi. The climate at that time was probably very moist, warm and tropical, as is shown by the tropical forest trees, found fossil even as fa-r as Greenland. . Such a climate, with the low elevation of the land, would favor the growth of dense forests all over the country, and to such conditions of life the animals of the be¬ ginning of the Mammalian period must have been adapted. During the Tertiary the conti¬ nent was steadily rising above the ocean-

level, and at the same time other influences were at work to make the climate continually colder and drier. The coming on of a cold, dry cli¬ mate restricted and thinned the forests and caused the appearance and extension of open, grassy plains. The ancient forest inhabitants were forced either to retreat and disappear with the forests, or to adapt themselves to the new conditions of life. The ancestors of the horse, following the latter course, changed with the changing conditions, and the race became finally as we see it to-day, one of the most highly specialized of animals in its adaptation to its peculiar environment. At the end of the Age of Mammals the continents stood at a higher elevation than at present, and there was a broadband connection between Asia and North. America, as well as those now existing. At this time the horse became cosmopolitan, and inhabited the plains of all the great conti¬ nents, excepting Australia.

It is a question whether the direct ancestry of the modern horse is to be searched for in western America or in the little known interior plains of eastern Asia. If is also unknown why the various species which inhabited North and South America and Europe during the early part of the Age of Man should have become extinct, while those of . Asia (horse and wild ass), and of Africa (wild ass and zebra) still survive. Man since his appearance has played an important part in the extermination of the larger animals; but there is nothing to show how far he is responsible for the disappearance of the native American species of horse.

Parallel Evolution in Other Races. — It is interesting to observe that while the evolution of the horse was progressing during the Ter¬ tiary Period in North America another group of hoofed animals, the Litopterna, now extinct, in South America evolved, a race adapted to the broad plains of Argentina and Patagonia and singularly like the horse in many ways. These animals likewise lost the lateral' toes' one after another, and concentrated the step on the cen¬ tral toe; they also changed the form of the joint-surfaces from ball-and-socket to pulley-

wheel joints; they also lengthened the limbs and the neck ; and 'they also lengthened the teeth, and complicated their pattern. Unlike the true horse, they did not form cement on the tooth, so that it was by no means so efficient a grinder. This group of animals native to South America became totally extinct, and were succeeded by the horses, immigrants from North America, which in their turn became extinct before the appearance of civilized man.

Many of the contemporaries of the horse in the northern hemisphere were likewise lengthen¬ ing the limbs, lightening and strengthening the feet, elongating the tooth-crowns to adapt them¬ selves to the changing conditions around them, but none paralleled the horse evolution quite so closelv as did the pseudo-horses of South Amer¬ ica. But the camels in America, the deer, ante¬ lope, sheep and cattle in the Old World, pro¬ gressed on much the same lines of evolution, although their adaptation was not to just the same conditions of life.

William D. Matthew, American Museum of Natural History.

HORSE, The French Coach. The pre¬ vailing characteristic of a Frenchman is his de¬ votion to those things that make life pleasant. From an artistic standpoint he leads the world. Pleasure and horses go together. A French¬

man is instinctively a horseman. The French cavalry is without an equal in the world. Since the time of Napoleon the French government has taken charge of the breeding of horses that are best adapted for cavalry uses, and in ac¬ complishing this purpose the government has contributed to the production of a very high- class coach horse. The cavalry horse of France is usually selected after the committee has finished their work of picking out the very best stallions for breeding purposes. Nearly every French coach stallion that stands for public service in France is owned by the French gov¬ ernment. The French have been willing to advertise and sell their other breeds of horses, but they have been loath to part with their coach horses. The instinct of self-preservation causes the French government and the French people to keep their French coach horses at home in order to have better horses than can be found in any other country.

The breed of French coach horses has its origin from the same source as the English thoroughbred. On the one hand, the English thoroughbred surpasses in speed, while the French coach horse is superior in all of those qualities that go to make up a high-class car¬ riage horse. Like the Percheron, the French coacher is developed in its highest state of per¬ fection in Normandy, but he comes from the northern part, while the Perche is in the south of Normandy.

The French coach horse is about 16 hands high; his average weight is between 1,200 and 1,300 pounds. His color is as a rule bay, brown or chestnut. His outline is most pleasing. He is a fast trotter, and under the conditions of horse racing in France under saddle over a turf track a distance of 4,000 metres he holds the record. The French method of developing their trotters cultivates a very high, attractive style of action. Not only is the French coacher seen in every French city hauling the most gorgeous equipages over the boulevards surrounding VOL. 14 — 26

Paris, but he is to be seen in the best stables throughout all of the capitals of Europe, especially in London. The French coacher sup¬ plies the English royalty with their most useful and most attractive carriage horses.

For more than 20 years French coach stal¬ lions have been brought to America very spar¬ ingly. Where they have been crossed with the best road mares, trotting bred mares, the result has been most satisfactory. High-grade car¬ riage horses that go into our best markets and sell for the highest prices usually have a strain of French coach blood flowing through their – veins. A perfect type of the French coach horse when standing or in action is impossible to describe in words. To fully realize his superiority, to appreciate and admire his style and magnificent high action, one must actually see him. Words are inadequate to describe him, and the most perfect picture falls far short of the most perfect horse.

John R. McLaughlin.

HORSE, Military. The relative import¬ ance of the horse as a factor in the progress of civilization has been somewhat reduced by the introduction of steam and electricity, but me¬ chanical devices such as the bicycle and auto¬ mobile are not likely to wholly supplant the indispensable ally of man for war purposes. The value of cavalry has not, within the cen¬ tury, been so fully recognized as during the South African campaigns, where the supply of horses reached enormous proportions. The kind of horse for cavalry and artillery use is Controlled by the character of service for which he is to be used. Hardy range horses are desirable in a campaign where the question of forage supply is a difficult one, but, if fully armed and equipped men of average size are to be transported and held in readiness for mounted combat with opposing cavalry, then larger and better trained horses are desirable.

The source from which cavalry horses are obtained differs in various countries. Some European nations breed and raise their re¬ mounts, while others provide the . services of selected stallions gratuitously to breeders, the foals being held subject to purchase by the state. The American plan differs from the European practice and involves only the inspec¬ tion of such animals as are presented by contractors. This encourages all farmers to breed a fair class of horses, and whenever the requirements of the markets increase the breed¬ ing usually increases until prices sometimes fall below a level at which colts can be profitably reared. Only a small percentage of horses raised in the United States are adapted to the requirements of cavalry service. This arises from the preference of the farmer for heavy horses to draw large loads; the cavalry service requires animals of particular conformation and character. The inspection of remounts for soundness and confirmation is a very important duty, demanding technical training and intelli¬ gence. It requires judgment, much instruction and long practice to correctly estimate the rela¬ tive value of various points of the horse and to determine whether the good qualities counter¬ balance the existing defects. Contractors do not usually present ideal animals, but the market from which they draw is so large that there is no serious difficulty in supplying the remounts

annually required for the United States cavalry.

In European armies horses are accepted at four years of age, and sometimes under that age. It has been found in practice in the United States

preferable to buy no horses under six years of age for immediate use in field service. Younger horses may be accepted during peace when there is no likelihood of immediate hard service, but they are subject to influenza or shipper's fever to a degree which often renders them unserviceable for many months. The foreign buyers of our horses in 1914, 1915 and 1916 were not as a rule able to get precisely the class of horses they preferred. Good points in a cavalry horse are not mere matters of beauty, but shapes which, on mechanical prin¬ ciples, are likely to answer required ends. Cavalry horses must have certain qualifications, the most important of which are the possession of sufficient mobility to execute tactical manoeu¬ vres at varying degrees of speed and the ability to stand hard service while carrying weight. The weight of trooper and equipment averages about one-fourth the weight of the horse Ability to carry flesh under stress of short rations is a commendable quality in a cavalry horse, since it enables him to stand hard work and to avoid a sore back. The requirements demanded in the cavalry horse of the United States are:

<(The cavalry horse must be sound and well bred; gentle under the saddle; free from vicious habits; with free and prompt action at the walk, trot and gallop ; without blemish or defect ; of a kind disposition ; with easy mouth and gait, and otherwise to conform to the following description :

(VA gelding of uniform and hardy color; in good condition; from 15ˆ4 to 16 hands high; weight not less than 950 nor more than 1,150 pounds; from four to eight years old; head and ears small ; forehead broad ; eyes large and prominent ; vision perfect in every respect ; shoulders long and sloping well back; chest full, broad and deep ; fore legs straight and standing well under; barrel large and increasing from girth toward flank; withers elevated; back short and straight ; loins and haunches broad and muscular; hocks well bent and under the horse; pasterns slanting and feet small and sounds See also Horse, Riding and Driving.

HORSE, The Percheron. The Percheron horse is the production of the most patient care and the application of the best scientific principles of breeding. From the dawn of his¬ tory the French breeders of draft-horses have been most successful, and the horses they have raised have been renowned the world over.

In the 16th, 17th and 18th centuries the same rules of selection in breeding have been applied that prevail to-day. The good horses were per¬ mitted to reproduce themselves and multiply. The inferior and unsound ones were never per¬ mitted to breed. The result of this most care¬ ful selection, based on scientific principles, has given the French the best draft-horse that the world produces.

In a very small portion of Normandy called the (

day means the ideal draft-horse the world over. From the very beginning up until the present time the object of the Percheron breeders has been to produce the kind of horse that would move the greatest weight with the greatest speed.

In making their selections for breeding pur¬ poses the Frenchmen have not only picked out stallions and mares that would make the best horses, but comely appearance and pleasing out¬ line have also in a measure been their guide, and as a result the Percheron horse to-day is not only the best draft-horse in the world, but he is one of the most attractive. He is indeed a handsome horse. The prevailing color of the Percheron horse is from black to white, in¬ cluding all of the various gradations from black, dark gray, dapple gray, gray and white.

About 50 years ago the first Percheron stal¬ lions were imported from France to America, and those that became most famous came to Ohio. One, called Louis Napoleon, owned in Union County, Ohio, and afterward sold to go to Normal, Ill., both here in Ohio and in his new home in Illinois, was admired by all. In a few years, when his colts began to appear, -the reputation of the Percheron breed in Amer¬ ica was so well established that hundreds and even thousands of them have been imported to America each year.

During the past 100 years the government in France has maintained a system of super¬ vision over the horse-breeding industry. The government does not own every Percheron stal¬ lion, but every Percheron stallion must be ap¬ proved by the government inspectors and must receive a certificate of approval before he can be used for breeding purposes in France. Many of the best stallions belong to the govern¬ ment. Many of those owned by private in¬ dividuals receive a subsidy from the government if their owner will offer their services to the public.

On account of .the very high tariff laws the French breeders supply nearly all of the horses used in France. The ups and downs of pros¬ perity and depression do not affect the horse- breeding industry in that country. Instinctively the French breeders keep their best stallions and mares, no matter what the foreign demand may be, and as long as they pursue this policy the best Percheron horses will be found in France and the best breed of draft-horses in the world will be the Percheron.

John R. McLaughlin.

HORSE, Riding and Driving. In the lat¬ ter days of this country one can

hardly go to even an insignificant town or village without finding that a number of its residents spend time and money in raising, training and driving as good horses as their means will afford. Another striking feature of this country horse¬ manship is the rivalry and constant vying of each horse-fancier to excel among his fellows, and the interest manifested to-day in buying, selling and ˆswapping® horseflesh is typical of the American.

The county and State agricultural fairs which now make the exhibition of horses a special feature are largely the outgrowth of this far-reaching interest in horses. Nearly every country fair has, besides trotting and perhaps running races, a department for harness

horses and breeders' competitions. As freight and passenger rates are commonly commuted by the railroads or the fair corporations, these meetings enable the farmer to see the best the country for miles around can produce, raise his standards and teach him the results to be attained by proper breeding.

The horse shows, held annually in many of our large cities, at regular seasons throughout the year, and so arranged that they may not con¬ flict as to dates, invite competitors from all parts of the country, who exhibit what they have with fair prospects of making their ex¬ penses from the prize money won. These horse shows are fostered both as sporting and busi¬ ness institutions, and the best horsemen in the country form their directorates and act as judges. These large shows do much to estab¬ lish the types of animals that meet with favor, and their growth and popularity has cultivated the taste and interest of the general public in horses more than any other factor.

The types of horses highly valued in the large cities and in the country are, of course, similar to a large extent. A good horse is good anywhere. Nevertheless, the requirements of a metropolitan market are much more exacting and extend to the many qualities which we will try to outline in this article. While the country is often satisfied with mere ((getting there® qual¬ ities in the horse, regardless of how it is done, or perhaps a mere combination of speed and endurance, the standard of a large city calls for certain definite requisites and qualifications — ˆpoints® — which are well-nigh indispensable if the horse is to command a good price.

To fill the requirements of the affluent class it is estimated that not more than 5 per cent of the horses throughout the country, including those raised

with this object solely in view, can be utilized. Indeed, taste has become so fas¬ tidious that the right kind can only be found by diligent search, and prices verge into sums that 10 years ago would have been unbelievable. It must not be thought that the general run of horses in this country, or indeed that the qual¬ ity of our native bred horses, has deteriorated in the past few years. Such, in the writer's opin¬ ion, is not the case. The fact is, that to fill the high requirements of the metropolitan market has become the recognized goal of all horse breeders; and it is now generally understood throughout the country that the market for the inferior horse is limited to those who can afford to pay so little that the breeder is not compen¬ sated' for his care and outlay in breeding any¬ thing but the best. The general introduction of trolleys and the automobile has been an im¬ portant 'factor in curtailing the market for horses that are merely Serviceable® and has reduced it to a competitive point that is un¬ profitable.

The high qualifications for the metropolitan market have reduced the available horses to such a small number that expert buyers search this country and the Dominion of Canada from one end to the other. Buying as cheaply as possible, so thorough has been the scouring of the country that the prices paid would seem fabulous to the seller if the cost alone pf raising the horse were taken into consideration. The buyer must also assume the risk and expense of transportation to market.

The <(points® for which the breeder is striv¬ ing are well defined, but the individual may vary so much in combining them that the interesting feature of personal taste remains as the deter¬ mining factor in selecting horses for personal use.

Heavy-Harness Horse. — The term ((heavy- harness horse® is a general one. Under it may be classed anything from the 12 hand pony for basket-phaeton or village cart, through the vari¬ ous types suitable for the runabout, gig, brougham, victoria and other vehicles that fash¬ ion prescribes for various uses, to the 16-1 hand carriage horse for pulling the capitalist's omnibus.

The importation into this country, since 1883, of English hackneys and the exhibition of them has undoubtedly done much to educate the pub¬ lic to a type of carriage horse. While no dis¬ paragement is intended to the standard bred trotting horse, whose origin, indeed, is allied to the hackney — although his later history is somewhat different — the serviceable, short backed, straight-legged and intelligent horse now the standard for metropolitan use is never¬ theless nearer the hackney type than the old style American trotter. It should be stated, however, that very few either of the trotters or hackneys of 25 years ago would generally fill the

requirements of the harness horse to-day. A type having been once well established, how¬ ever, horses filling the requirements can be selected from carefully bred trotters as well as from hackneys, and one breed is often mistaken for the other, such is their closeness in resem¬ blance and the result of breeding with particu¬ lar ends in view. The elements to be taken into consideration in the harness horse are as follows : Conformation, manners, action, speed, color, size and age. Conformation ranks first in point of importance, but manners are an absolute essential also. These two although somewhat variable must be present in any horse required for harness ; the others vary consider¬ ably according to the type and weight of the vehicle to which the horse is to be harnessed and the purchaser's personal taste.

The elements in the order of their import¬ ance from a purely selling point of view are :

1. Conformation as to head and neck. This is probably the first feature the average pur¬ chaser will look for. The horse should pos¬ sess a small head, delicately molded nostrils' and a small tapering muzzle. His jaw-bones

should be well apart so that when the head is reined in they will not interfere with his breath¬ ing. He should have good sized eyes, well sep¬ arated; a narrow forehead or small eyes being general indications of lack of intelligence, nerv¬ ousness or a tendency to fright or bad temper. The ears should be small and well apart. The neck should be gently tapering and well cut out in the throat, and the so-called <(crest® from which the mane grows should have the slight convexity which indicates strength, maturity and condition. The neck should be set on slop¬ ing shoulders, so that the head will be naturally held erect, turning upward from the forward line of the trunk nearly perpendicular. A taper¬ ing neck is an indication of breeding and fine¬ ness as distinguished from the coarseness of draft blood and the common horse in ordinary use.

2. Conformation as to legs. The general re¬ quirements are that all four legs shall be ap¬ proximately straight and not too long. A mod¬ erately short-legged horse is generally preferred, both for looks and service, to one that depends upon long legs for height. The forelegs should be perpendicular when the horse is standing erect, bones flat, but not heavy or coarse. The hind legs, when in a natural position, should be so formed that a plumb line dropped from pos¬ terior point of the haunch will be nearly tangent at the point of the hock, the rear line of the leg below the hock

being approximately parallel to the plumb line. The thighs should be moder¬ ately heavy at the height of the lower line of the trunk. The modern idea is that the horse's buttocks should be round and muscular viewed from behind. The pasterns of all four legs should be springy and long rather than short.

3. In general. The horse should be "close- coupled® ; in other words, there should not be too much space between the last rib and the quarter. His trunk should be round and just fleshy enough so that his ribs may be felt ■ — not seen. Standing on level ground the height of his withers and croup should be about the same. The trunk, directly under the withers, should be deep and the chest from the front view broad, giving room for the heart and lungs and an ap¬ pearance of power. The belly should be well picked up beneath the kidneys with a gentle, convex, upward curve from between the front legs — not enough, however, to produce the waspy effect sometimes seen in horses other¬ wise well formed. The back should be short, lending to the trunk an appearance of compact¬ ness and solidity. The quarters should not fall away back of the kidneys more than an inch or so to the root of the tail. The tail, if set well forward of the posterior line of the horse's haunches, is generally admired, and in this posi¬ tion will be carried at the proper angle naturally.

Under the subject of manners, full tech¬ nical treatment should be sought in various books relating to horse training and breaking. We will endeavor to point out, however, to what extent manners in a harness horse is sup¬ plemental to ordinary training; to treat the sub¬ ject fully being like attempting to describe what a gentleman should do under all circumstances. A few salient points will perhaps give a fair indication of the general subject.

The well-mannered horse should be so trained that when bitted his head is carried al¬ most vertical, and close to his neck, which will be gently curved ; the head and neck taken to¬ gether being straight with the line of direction in which he is traveling. This position is not only graceful but gives the driver the utmost command over him. He should ((fill his collar® without urging, but be light mouthed and sus¬ ceptible to the slightest hint from the reins, voice or whip. He should be afraid of nothing and possess sufficient intelligence so that after first acquaintance with motor vehicles, railroad trains and other startling objects, he will pay no attention to them.

Into this subject, therefore, the question of natural disposition necessarily enters, as with¬ out a sensible but willing and high-strung dis¬ position, it is impossible to produce a fashion¬ able carriage horse. The horse should be trained to back and turn for the voice or with the slightest pressure of the reins without mani¬

festing any disposition to shake his head or bore upon the bit. Plunging, rearing or trickiness must be absolutely eliminated, so that he is safe for a lady to drive through crowded city streets. He should be broken single, double and tandem, and to the saddle for convenience sake, and should be ready at any moment to serve in any one of these capacities.

All this mannering constitutes a supplemental or post-graduate education, for the horse as delivered from the country is broken, but com¬ monly utterly devoid of manners. To accom¬ plish this a training extending over a period of as much as three months is often necessary even with a horse that would be considered thor¬ oughly broken in the country; and after mannering him as to how he shall carry his head and respond to the driver, it is necessary, so perfectly must the horse be trained to suit the metropolitan purchaser, to spend a week or more in thoroughly accustoming him to city pavements and sights. It is almost superfluous to state that many horses cannot be brought to this high state of perfection, but the question of manners enters very largely into the price con¬ sideration, and the schooling should be carried on to as high a point as the disposition of the individual will admit.

. While action is not absolutely indispensable, it is nevertheless the feature that many amateur horsemen will look for first, often neglecting much more important points to secure the flash¬ iness of the high actor. Many dealers say, ((Give me action and I can sell anything.® With¬ out going to this extreme, it is undoubtedly true that high action will cover many sins, and if a horse will only ((get his head up and act® he is apt to be salable. Without action speed sel¬ dom attracts the city purchaser, and while it is undeniable that high action, except with careful driving and stable attention, will often cripple a horse on hard pavements who might otherwise go sound for years, the average high-price buyer not only asks for clean, straight action, but verges to the danger point in its height. The expert will seek horses having action both in front and behind as he knows that without hock action, little, if any, speed will be produced, the propelling force lying in the power of the thighs. He will look at the horse going, coming and sideways, first to see that the horse neither toes in, paddles or interferes in front; second, to see that he keeps his hocks close together as they pass, and consequently does not "straddle® or place his hind legs at the extreme forward stride outside of the line taken by his fore legs, or interfere by brushing either fetlock joint; third, that he does not forge and that his action is even when looked at from the side, each leg advancing at a stride the same distance and height as the corresponding leg on the other side.

The only gait admissible in the heavy har¬ ness horse is a trot. Pacing, racking, single¬ footing or any gait other than a square line trot, by

whatever term it may be called, have no place in the metropolitan market. The horse should strike out straight from the shoulder in front, the whole leg straightening at the instant the hoof touches the ground, the hoof striking flat. The straightened foreleg then passes under the body of the horse and is rolled up when it leaves the ground, the hoof nearly touching in extreme cases the point of the elbow joint.

While still <(folded® the arm bone reassumes the position for the next forward stride. As indicated above, the action of any single leg and hoof should be in a single longitudinal vertical plane. Some writers have endeavored to dem¬ onstrate, by projecting upon a longitudinal verti¬ cal plane the arc described by the forward point of the hoof from the time the horse picks up his foot from the ground until he touches it again, that the ideal action thus projected would form a symmetrical arc of an ellipse. While it is con¬ ceivable that such may be the case, it is prac¬ tically impossible to determine slight variations from this ideal, and if the horse acts high, clean and straight without interference or forg¬ ing he will not generally be open to criticism.

The modern buyer looks more and more nowadays for strong hock action, which means that the horse will cover ground and retain much of his action regardless of the amount of weight behind him.

While speed is not a very important element in horses for carriage use, it would be a truism to state that people like to go fast, and of two individuals equal in other respects, the pur¬ chaser will prefer the horse that has the most <(step.® A discriminating dealer will commonly aim to secure horses than can go a mile under ordinary circumstances in three and one-half minutes, and if possible in three minutes. This is, ordinarily, quite fast enough for salability, and the horse that will <(road® steadily at 10 to 12 miles an hour and can increase the speed a little for a short spurt fills the market require¬ ments pretty fully.

In color, modern fashion prescribes bays, chestnuts and browns, a dark seal brown being perhaps the most popular. Golden chestnuts are also popular, and blood bays are in high favor. Very few purchasers will consider a white or black horse, regardless of any number of other good qualities. Grays, except of the dark dap¬ ple variety, are rarely used, except in a cross- matched pair, and then only as a matter of per¬ sonal fancy. In a road coach four, however, they are approved by the best authorities.

The amount of white on a horse is a matter of personal taste, many people liking white fet¬ locks and a star, stripe or blaze on a chestnut or bay's head, others preferring solid color. Bays are generally most popular with black points, but in general it may be stated that the horse possessing too much white will not please. One or two white legs, with white extending a short way to the knee or hock, will not be objected to, but it can be stated positively that, except for a leader or wheeler in a road coach team, where a showy effect is desired, there should be no white upon the body of the horse.

A sleek, shiny coat is a recommendation for any horse, as it usually bespeaks condition and breeding.

The question of size is one that is a matter of personal taste primarily, and secondly, one of suiting the vehicle to which the horse is to be harnessed. The salable horse for ordinary city use is rarely under 14j/2 hands, and in the opin¬ ion of most judges should not exceed 16ˆ4 hands. For a lady's phaeton a small team with considerable substance and not usually less than 14/2 hands in height is required, and for a heavy omnibus sufficient weight and strength are usually secured in the horse whose height does*

not exceed 16 hands. The most salable size for horses in general use is about 15-2ˆ2 hands. Most buyers will restrict their purchases to horses between 15-1 and 16 hands, unless the animal is very remarkable in other respects, be¬ cause customers for extremes in size are few in number, and such horses are consequently less readily salable.

A word should be said as to the age of the marketable horse. It is pretty well understood that colts suitable for heavy harness do not at¬ tain maturity and maximum strength until they reach the age of five or six years, and the ordi¬ nary purchaser will prefer the six-year-old horse. From 7 to 10 years the horse is at his best. While some horses hold their good qualities and are serviceable up to an extreme age of perhaps 20 years, — in the city horses rarely stand the strain of travel on hard pave¬ ments for many years without showing signs of usage sufficient to render them unsalable, ex¬ cept at small prices.

Horses kept for the show-ring and therefore not subject to usage on hard pavements exem¬ plify the fact that there is little or no advantage per se in the young horse. Indeed, the horse may be at his best at the age of 10 years, and many of the blue ribbon winners of the past few years are even somewhat older.

The Saddle Horse. — Neglecting the sub¬ ject of chargers and hunters, the former having but a limited market and being generally sub¬ ject to army

specifications, and the latter consti¬ tuting too large a subject for discussion in an article of this character, and of more interest abroad, especially in England and Ireland, than in America, we shall say a few words of the saddle horse, presenting as briefly as possible some of the facts which should be borne in mind in supplying the market.

The conformation of the saddle horse will not be found to differ very materially from the carriage horse, and many private owners, who do not feel able or warranted in stabling horses for saddle purposes only, will find a combina¬ tion horse for saddle and harness use a possi¬ bility. A saddle horse is not improved in gait by being harnessed to a vehicle, particularly a heavy one, in fact is impaired thereby, but moderate driving to light vehicles will not in¬ capacitate him wholly for the saddle.

In a ((park hack® we should look for some¬ what substantial, conformation. As in a carriage horse, depth of girth should be sought and the back should be short, all the distance possible, however, separating the forelegs from the hind, the horse having much of his length in his shoulders and quarters. The croup should be long, so that, taken in combination with high and prominent withers and heavy shoulders, the saddle will have a good seat and be prevented from slipping forward. As in the hind legs reside the seat of propelling power the thighs should be long and muscular, and some people prefer the hocks well bent. The pasterns should be somewhat longer and have more, spring than in the harness horse.

As in the harness horse, the saddle horse should be about the same width in front as be¬ hind. Many will not object, however, to a horse slightly wider behind than in front, as the claim is made that, in a gallop, the hind legs will better pass outside of the forelegs; but,

under no conditions should the horse be wider in front than behind. He should have a mod¬ erately long and upright neck and a prominent crest, as this is the muscle that supports his head, and the neck should be arched. With this combination a horse will usually carry his head erect without support from the reins, and the rider will have better control and fe'el that he has something in front of him.

The manners of a saddle horse is an element worthy of particular notice. Besides the quali¬ ties and disposition valuable in a harness horse, primarily he must possess a high degree of in¬ telligence and be absolutely fearless ; and he needs a further education to make him ((bridle wise.® By

this term is indicated response to the slightest pressure of the rein on either side of the neck, so that the horse turns readily by the lateral movement of the rein hand. This allows the rider one hand free for use or emergency.

As to gait and action, the horse should have a fast walk, so that when ridden in company he will keep up without breaking into a jog. The trot should be even, springy and regular, so as not to jolt the rider. Extreme action is not a necessary feature, but the horse should possess enough action to be noticeable in company; and high action is not a detriment if unaccompanied by pounding. An easy canter and gallop are necessities, and particularly is this true of the horse intended for long rides or to be used in the country. These gaits should be accom¬ plished with a maximum of forward motion and a minimum of rocking.

Types and sizes of saddle horses vary greatly according to personal taste and the weight to be carried. Some desire a short-legged, thick¬ set cobby horse for weight-carrying, while those of lighter build may prefer a taller horse of less substance and more speed. Above all things the horse should be free and willing, as no man desires, or will tolerate, a horse needing con¬ stant urging.

Breeding. — A word or two as to breeding may not be inappropriate, as the requirements of the market are so exacting that every breeder should take them into consideration, in order to produce and raise as large a percentage of marketable horses as possible.

Much has been written upon the subject of horse breeding and genealogy in America, and careful investigation reveals much shallow eru¬ dition. The results of recent research have shed sufficient light upon this subject to show that much of the published matter as to the ancestry of the American trotter will not bear close in¬ vestigation. Heretical as it may seem, the his¬ tory and origin of the Hambletonian strain of blood, which for years has been held in high esteem among breeders throughout the country, we believe is open to reasonable doubt as to its authenticity. It does not seem unlikely that some of the breeders, in their desire to create a lineage for their horses, drew on their imag¬ ination for the breeding of the ancestors. After many years of assumption that the published facts were correct, grave doubt is now cast upon the breeding of some of the original stock. Perhaps, therefore, the less we attempt to demonstrate results by referring to the lineage of the standard bred trotting horse the safer.

Of the other breeds of this country perhaps the best known are the Morgans and Clays, but, generally speaking, such numerous and often

careless crosses have been tolerated that these breeds in anything like purity

of blood have mostly disappeared. In the author's opinion, up to a recent date, the breeder in America has sought speed to the detriment of action, even going so far as to make conformation a second¬ ary element.

A word should be said about the hackney. Much confusion has resulted temporarily, and probably only temporarily, from the placing on the market of so-called hackneys, which are such only in conformation and not in the action and speed which are characteristic of the hack¬ ney of honest blood. This breed lends itself exceedingly well to the requirements of the heavy harness horse when proper individuals are used in the stud. Although at present there are but few such individuals in this country, the hackney dates back in England to the 18th century. It was originally a cross between the shire or English cart horse, an animal some¬ what coarse but of much substance, power and action, and the sleeker thoroughbred of deli¬ cate conformation and high strung tempera¬ ment. So well has this breed been cultivated, to the elimination of the coarser individuals by a few reputable breeders in this country, that it is not difficult for the careful judge to dis¬ criminate.

Recently, American breeders have achieved extremely satisfactory results by crossing hack¬ ney stallions with clean-limbed, nicely turned trotting-bred mares, and while this cross is one that breeders claim should not be carried beyond one generation for fear of the infusion of cold blood in the offspring, a single cross certainly produces a large percentage of good marketable stock. This cross commonly combines high ac¬ tion and much substance with speed and breedy appearance.

As most scientific breeders now acknowledge, the main fact of all breeding is that it is a mat¬ ter primarily of individuals, good lineage count¬ ing for little in the issue if the breeding stock do not themselves fill all the requirements desired. Not only should care be taken to use proper individuals, but if a slight fault exists in either parent — no horse being absolutely perfect — the other should be selected especially proficient in what the one lacks.

Back of the standard bred trotting horse, Morgan, hackney and French coach horse — another imported breed — stand practically the same Arabian ancestors, and as all are to-day bred with one end in view, the choice of one breed as against the others, is a matter of select¬ ing the individual best filling requirements.

If the main purpose be to breed for that market which is the most profitable, that of the heavy harness horse, it seems to the author that, instead of horses becoming standard by performance on the track if they became stand¬ ard by performance in the show-ring all the qualities

desired as well as speed would be more properly conserved. Of course, many practical difficulties, some of which would defeat the very ends sought, stand in the wav of such a movement unless it were conducted by the government. A stud book formally conducted by the government and authentically recording the lineage and performance of stock, so that the history of a strain and the results of crosses might be generally published and read, would be of immense value to the horse breeder

and lo the government itself by raising the quajity and value of the horses raised both for domestic use and export.

An interesting commentary on the subject of the harness horse and an evolution well worth notice is the gradual elimination of the unre¬ liable small dealer in the metropolis; in fact, the market is fast falling into the hands of the comparatively few reputable dealers who en¬ deavor to conduct their business on broad com¬ mercial lines. The purchasing public are be¬ ginning to recognize that it is best for their interests to patronize such dealers as can rather afford to take a loss on an unsound or unsafe animal by giving him away than to sell him under a misrepresentation and make a financial gain at the expense of reputation. This fact is not only an assurance that the interest mani¬ fested in the horse in our large cities will not decrease, but the business being in good hands that many who have in the past been slow to venture into this field of pleasure and sport can now enter into it as beginners without a long, unsatisfactory and expensive experience as a preliminary. See also Horse, American Thor¬ oughbred.

Arthur Man,

Standard Coach Horse Co., New York.

HORSE, Trotting and Pacing. The har¬ ness racing horse has two gaits, namely, the trot and the pace. They were both originally the connecting link between the walk and the gallop, but by development and careful training have come to take the place of the latter so far as ex¬ treme speed in harness is concerned. The term (

The history of harness racing in America is practically contemporaneous with that of the republic of the United States. After the Revo¬ lution the development of speed in the horse had its attractions here as in Europe. At first the running gait was the only one considered, but the importation of an English sire called Messenger marked the beginning of a new era. He was brought over in 1788 and landed at Philadelphia. Though descended

from stock that inclined to the gallop and practically a thoroughbred, this horse was more inclined to the trot. What is more remarkable, he trans¬ mitted this habit or instinct to so marked a de¬ gree that he made a great reputation in the New World through the superiority of his progeny over all other breeds. So <(Imported Mes¬ senger,® as he was popularly known, was the patriarch of the American trotter, and nearly all of the immense troop of harness racers in this country to-day trace descent to him. His death in 1808 near Oyster Bay, N. Y., was looked upon as a national calamity, and he was buried with military honors, the funeral being attended by prominent horsemen from all the neighboring States. As this horse was the founder of a notable family and represents a type in some respects separate and distinct from others of the genus equus it seems unfortunate that no portrait or drawing of him was ever

made. There is a pen picture which in some measure atones for this, and is worth quoting. It describes Messenger as of a gray color, stand¬ ing full 15 hands 3 inches in height, with a thin mane and tail, ears larger than most well-bred horses, but erect and lively.

At the time of Messenger's death the limit of speed at the trot was, in round numbers, a mile in three minutes. The saddle was chiefly in vogue for this gait as well as running, but the employment of a vehicle with two wheels followed the building of better roads. Accord¬ ing to J. H. Wallace, an authority on the thor¬ oughbred, a chestnut horse trotted at Philadel¬ phia in a sulky 25 Aug. 1810, one mile in 2 :48l/2 for $600. The horse was 14 years old and barely 15 hands high. There is an earlier feat now accepted as authentic of a horse called Yankee, trotting a mile in 2:59 in 1806 on Har¬ lem Lane, a favorite driving place for New Yorkers. The breeding of these first champions of the sulky remains in obscurity, but it was not long before the descendants of ((Imported Mes¬ senger® began to do greater things. Topgallant, who is credited with three miles in 8:11 and easily the best trotter of his day, was inbred to Messenger, his sire and dam both being by the potent English stallion. Screwdriver, who went three miles under saddle in 8:02 a year before this, was another of the stars descended from Messenger, as was Dutchman, another long dis¬ tance trotter, who went his three miles under saddle in 7 :32z/2 ; but the most famous of the Messenger brood in the nearer generations was Lady Suffolk. She was the first queen of trot¬ ters, her reign being a long and undisputed one from 1833 to 1852. She enjoyed the special dis¬ tinction of being the first trotter to score as fast as 2:30 for a mile in harness. Following Lady Suffolk there were a few lesser lights that improved slightly on her best record, but her real successor as a conqueror of time was Flora Temple. She was foaled in 1845, her turf career beginning in 1852. Five times this won¬ derful mare reduced the figures that repre¬ sented the speed limit, her greatest effort being 2:1944- Then came the mighty Dexter, who reduced the record to

2:17ˆ4. His public career was cut short when Robert Bonner purchased him and took him to New York for his private driving on the road. Goldsmith Maid came out in 1871 and clipped a fraction from Dexter's mark. She was foaled in 1857, made her debut at 10 years and continued to fill engagements in races and against time up to 1877. Rarus man¬ aged to improve Goldsmith Maid's record a trifle during a very creditable career. The gelding Saint Julien eclipsed him a year after by a full second. Then a new queen appeared in Maud S., and between this fleet pair was a lively duel for the championship. The figures were improved by fractions of a second until the mare reached 2:1044 in 1880, which proved too much for the gelding. After his surrender another candidate appeared in Jay Eye See. Meantime Maud S. had got down to 2:10ˆ4. but Jay Eye See enjoyed the distinction of being the first to touch the even 2:10. This was in 1884, and then the mare showed that she was the better horse by compassing the track in

2:0944, and again in 2:0844-

The greatest mechanical aid to the harness horse that has yet been devised came into use during 1892. This was the application of the

ball-bearing axle first applied to the bicycle, with the pneumatic tire and a wheel of about 28 inches diameter. Its first public trial was in a race at Worcester, Mass., early in May, where its manifest advantage enabled a slow horse to fairly play with a field of faster competitors. None of the prominent trainers had seen this new contrivance, and it was not until well along in July that they awoke to a full realization of its merits. The writer was privileged to see and try this sulky with its frictionless gear be¬ fore it had come into general use, and on ex¬ ploiting it with a conservative opinion that a horse could go at least two seconds faster than if hitched to the high wheel sulky, was informed by Budd Doble, the leading reinsman of that day, that he was the victim of a hoax. Less than three months after this same Doble had driven Nancy Hanks to one of these smooth running machines a mile in 2:04, or nearly five seconds faster than the record of Maud S. This material reduction was only the beginning of a new era in speed, as other trotters at once took advantage of this appliance and earned the championship in turn. Alix only clipped a quar¬ ter of a second from the mark set by Nancy Hanks, but she did this after a hard race cam¬ paign that took away from her real ability. It was six years before this resolute overworked mare had to surrender the crown, when in 1900 The Abbot trotted in 2 :03J4- He had previously won his spurs in several

creditable races, but his successor and conqueror, Cresceus, proved to be a much more remarkable representative of his kind. Starting at three years this Her¬ cules among trotters met and defeated older and more seasoned campaigners in his colthood, scaring 2:1 1J4 in the eighth heat of a winning race. Then each successive season found Cres¬ ceus able to add to his laurels until in 1901 he earned the championship twice. His record of 2 :02j4 was followed by the famous match against The Abbot at Brighton track, Brooklyn, N. Y., 15 August, when, in the presence of an immense crowd, many of whom came hundreds of miles to see this battle of the giants, Cres¬ ceus was the victor. It was no light task at first, as The Abbot forced him to go in 2:03%, the fastest mile by nearly two seconds ever scored in a trotting race. Besides these feats Cresceus had lowered many other records, in¬ cluding the one for two miles which he placed at 4:17 late in 1902. During the season of 1903 he again battled against time, and after his previous championship record had been several times beaten by Lou Dilion and Major Delmar this stout warrier trotted in 1 :59% at Wichita, Kan., in October 1903.

Lou Dillon was first trained in the winter of 1902 on the track at Pleasanton, Cal., and on the death of her breeder and owner was brought to Cleveland and sold at auction. The purchaser, C. K. G. Billings, of Chicago, got a rare bargain at $12,500, and being strictly an amateur he promptly canceled all racing engagements. She then received special train¬ ing for miles against time, and not only aston¬ ished the world by her mile in even time at Boston, but a few days later drew the old-style sulky with high wheels, in 2 :05 at Cleveland, clipping three seconds and three-quarters from the record Maud S.. made nearly 20 years be¬ fore. Later on, at Memphis, Lou Dillon added to her fame by another mile in 1 :58j4 to sulky,

and one to wagon in exactly two minutes. She also defeated Major Delmar in a race for the Memphis gold cup ; as a six-year-old her best performance was 2:01 at Memphis, 11 Nov.

1904.

Eight years more breeding and training were iequired before Lou Dillon's mark was passed. Then the wonderful gelding Uhlan appeared and 8 Oct. 1912, at Lexington, Ky., cut the world's trotting record to 1 : 58, where it stands to-day. It was demonstrated that Uhlan had considerable reserve speed, for after a number of trials, with a running mate, he accomplished a mile in 1 :54j4, taking three and a half seconds off his own best speed. This astonishing per¬ formance took place at Lexington, 9 Oct. 1913, or just a year and a day after he set the world's record. The 1 :54j4 does not stand as a trotting record, not having been made under the conditions of record

racing. The running mate served as an incentive to develop what speed there was in this phenomenal animal.

The fastest mile trotted in a race is that of Hamburg Belle, at North Randall, Ohio, 25 Aug. 1909, 2 :01J4- Uhlan holds the record for a half-mile track, made at Goshen, N. Y., 24 Aug. 1911, 2.02%. The stallion record is held bv The Harvester, made at Columbus, Ohio, 22 Sept. 1910, 2:01. The yearling record is held by Airdale, made at Lexington, Ky., 2 Oct. 1912, 2:15j4- Peter Volo took the two, three and four-year-old records in 1913, 1914 and 1915, the figures being 2:04j4, 2 :03j4 and 2:02. The best two-mile heats recorded stand to the credit of Hamburg Belle, 25 Aug. 1909, 2:01% and 2:01%. The Harvester holds the two-mile trotting record, made at Lexington, Ky., 13 Oct. 1910, 4:1534- In trotting to wagon against time, Lou Dillon, at Memphis, Tenn., 28 Oct. 1903, made a mile in 2 :00, but she was paced by a runner carrying a wind shield. Uhlan trotted a mile to wagon with no shield or arti¬ ficial aid, at Cleveland, Ohio, 8 Aug. 1911, in the same time, 2:00. At Lexington, Ky., 11 Oct. 1912, Uhlan and Lewis Forest trotted as a team

in 2:0334- '

The following table gives the names of all the record makers among the trotters and shows how the figures have been reduced from 2:30 to 1 :58:

Lady Suffolk, gr. m. foaled 1833, by Engineer 2d; dam by Don Quixote. Driven by David Bryan, Beacon Course, Hoboken, N. J,, 13 Oct. 1°45, 2:29}.

Pelham, b. g. foaled 1837, pedigree not traced. Driven by William Whelan, Centreville, N. Y., 2 July 1849, 2:28.

Highland Maid, b. m. foaled 1847, by Saltram; dam Roxanna, by Hickory. Driven by F. J. Nodine, Centre¬ ville, N. Y., 15 June 1853, 2:27.

Tacony, ro. g. foaled 1844, by Sportsman; dam not traced. Union Course, N. Y., 14 July 1853, 2:27.

Flora Temple, b. m. foaled 1845, by Bogus Hunter; dam Madam Temple, by Terry Horse. Driven by Hiram Woodruff, Union Course, East New York, N. Y., 2 Sept.

1856. 2:243.

Flora Temple. Driven by Tames D. McMann, Centre¬ ville. N. Y., 9 Aug. 1859, 2:23J.

Flora Temple. Driven by James D. McMann, Centre¬ ville, N. Y.. 9 Aug. 1859, 2:22.

Flora Temple. Driven by James D. McMann, Cin¬ cinnati, Ohio, 7 Oct. 1859, 2:213-

Flora Temple. Driven by Tames D. McMann, Kala¬ mazoo, Mich., 15 Oct. 1859, 2:19$.

Dexter, br. g. foaled 1858, by Hambletonian; dam Clara, by American Star. Driven by Budd Doble, Riverside Park, Boston, Mass., 30 July 1867, 2:19.

Dexter. Driven by Budd Doble, Buffalo, N. Y., 14 Aug. 1867, 2:17$.

Goldsmith Maid. b. m. foaled 1857, by Alexander's Abdallah; dam Ab. by Abdallah. Driven by Budd Doble, Milwaukee, Wis., 6 Sept. 1871, 2:17,

Goldsmith Maid. Driven by William H. Doble, Mystic Park, Boston, Mass., 9 June 1872, 2:16.*

Occident, br. g. foaled 1863, by Doc; dam Mater Occi- dentis, pedigree not traced. Driven by George Tennet, Sacramento, Cal., 17 Sept. 1873, 2:16.*

Goldsmith Maid. Driven by Budd Doble, East Saginaw, Mich., 16 July 1874, 2:16.

Goldsmith Maid. Driven by Budd Doble, Buffalo, N. Y., 7 Aug. 1874, 2:15.*

Goldsmith Maid. Driven by Budd Doble, Rochester, N. Y., 12 Aug. 1874, 2:14.*

Goldsmith Maid. Driven by Budd Doble, Mystic Park, Boston, Mass., 2 Sept. 1874, 2:14.

Rarus, b. g. foaled 1867, by Conklin's Abdallah; dam Nancy Awful, by Telegraph. Driven by John Splan, Buf¬ falo, N. Y., 3 Aug. 1878, 2:13.*

St. Julien, b. g. foaled 1869, by Volunteer; dam Flora, by Harry Clay. Driven by Orrin Hickok, Oakland, Cal., 25 Oct. 1879, 2:12.*

Maud S., ch. m. foaled 1874, by Harold; dam Miss Rus¬ sell, by Pilot Jr.

Driven by W. W. Bair, Rochester, N. Y., 12 Aug. 1880, 2:11.*

St. Julien. Driven by Orrin Hickok, Rochester, N. Y., 12 Aug. 1880, 2:11.*

St. Julien. Driven by Orrin Hickok, Hartford, Conn., 27 Aug. 1880, 2:11.*

Maud S. Driven by W. W. Bair, Chicago Driving Park, Chicago, Ill., 18 Sept. 1880, 2:10.*

Maud S. Driven by W. W. Bair, Homewood Park, Pittsburgh, Pa., 13 July 1881, 2:10.*

Maud S. Driven by W. W. Bair, Rochester, N. Y., 11 Aug. 1881, 2:10.*

Jay Eye See, bl. g. foaled 1878, by Dictator; dam Mid¬ night, by Pilot Jr. Driven by Edwin Bither, Providence, R. I., 1 Aug. 1884, 2:10.

Maud S. Driven by W. W. Bair, Cleveland, Ohio, 2 Aug. 1884, 2:09.*

Maud S. Driven by W. W. Bair, Lexington, Ky., 11 Nov. 1884, 2:09.*

Maud S. Driven by W. W. Bair, Cleveland, Ohio, 30 July 1885, 2:08.*

Sunol b. m. foaled 1886, by Electioneer; dam Waxana, by Gen. Benton. Driven by Charles Marvin, Stockton, Cal., 20 Oct. 1891, 2:08.*

♦Nancy Hanks, br. m. foaled 1886, by Happy Medium; dam Nancy Lee, by Dictator. Driven by Budd Doble, Chicago, Ill., 17 Aug. 1892, 2:07.*

Nancy Hanks. Driven by Budd Doble, Independence, Iowa, 31 Aug. 1892, 2:05.*

Nancy Hanks. Driven by Budd Doble, Terre Haute, Ind., 28 Sept. 1892, 2:04.

Alix, b. m. foaled 1888, by Patronage; dam Atlanta, by Attorney. Driven by Andy McDowell, Galesburg, Ill., 19 Sept. 1894, 2:03.*

The Abbot, b. g. foaled 1893, by Chimes; dam Nettie King, by Mambrino King. Driven by Ed. Geers, Terre Haute, Ind., 25 Sept. 1900, 2:03.*

Cresceus, ch. h. foaled 1894, by Robert McGregor; dam Mabel, by Mambrino Howard. Driven by George H. Ketchum, Cleveland, Ohio, 26 July 1901, 2:02.*

Cresceus. Driven by George H. Ketchum, Columbus, Ohio, 2 Aug. 1901, 2:02.*

Lou Dillon, ch. m. foaled 1898, by Sidney Dillon; dam Lou Milton, by Milton Medium. Driven by Millard F. Sanders, Readville, Mass., 24 Aug. 1903, 2:00.

Lou Dillon. Driven by M. F. Sanders to high wheel sulky, Cleveland, Ohio, 12 Sept. 1903, 2:05.

Cresceus. Driven by George H. Ketchum, Wichita, Kan., 19 Oct. 1903, 1:59.*

Lou Dillon. Driven by M. F. Sanders, Memphis, Tenn., 24 Oct. 1905, 1:58.*

Uhlan. At Lexington, Ky., 8 Oct. 1912, 1:58. The following year Uhlan made a mile with running mate in 1 :54, but this does not stand as a record.*

The progress and development of the lateral or pacing gait has kept side by side with trot¬ ting. Before Lady Suffolk had opened the door for the 2 :30 list, the pacer Dover had gone a mile in 2 :28. Dividing the century, since speed in harness for a mile was first considered, into two decades we are able to compare the two gaits and note the progress of each by the fol¬ lowing table. The names of pacers are in italics : •

1800-1810

Yankee, b. g . Harlem, N. Y. 2:59

1810-1820

Boston Horse, ch. g . Philadelphia, Pa. 2:48ˆ

Bolton Blue, bl. g . Jamaica, N. Y. 3:00

1820-1830

Topgallant, b. g .

. 1829-

-3 miles

8:11

Bowery Boy .

1829

*5-04**

1830-1840

Edwin Forrest, bl. g. (to saddle! .

. 1834

*2:31**

Sally Miller, b. m .

1834

2:37

Drover, b. g .

. 1839

2:28

1840-1850

Lady Suffolk, gr. m .

. 1845

*2:29**

Moscow, b. g .

, 1845

2:30'

Pelham, b. g .

, 1849

2:28

James K. Polk, ch. g .

1845

2:27

1850-1860

Flora Temple, b. m .

. 1859

*2:19**

George M. Patchen, b. h .

. 1859

*2:26**

Ethan Allen, b. h .

. 1858

2:28

Pocahontas, ch. m .

. 1855

*2:17**

Pet, ro. g .

, 1852

*2:18**

1860-1870

Dexter, br. g .

. 1867

*2:17**

Goldsmith Maid, b. m .

. 1869

*2:19**

George Wilkes, br. h .

. 1868

2:22

George M. Patchen, b. h .

. 1860

*2:23**

Ethan Allen, b. h .

. 1860

*2:25**

Billy Boyce, b. g. (to saddle) .

. 1868

*2:14**

1870-1880

St. Julien, b. g .

. 1879

*2:12**

Rarus, b. g. . . .

. 1878

*2:13**

Goldsmith Maid, b. m .

. 1874

2:14

Smuggler, br. h .

. 1876

*2:15**

Sleepy Tom, ch. g .

. 1879

*2:12**

Rowdy Boy, bl. g .

. 1879

*2:13**

1880-1890

Maud S., ch. m .

. 1885

*2:08**

Jay Eye See, bl. g .

, 1884

2:10′

St. Julien, b. g .

. 1880

*2:11**

Axtell (3 yrs.), b. h .

. 1889

2:12

Malxie Cobb, b. h .

. 1884

*2:13**

Phalas, b. h . ‘ .

. 1884

*2:13**

Johnston, b. g .

. 1884

*2:06**

Gold Leaf C4 yrs.), ch. m .

1889

*2:11**

Little Brown Jug, b. g .

1881

*2:11**

Brown Hal, br. h .

. 1889

*2:12**

1890-1921

Peter Manning .

. 1921

1:58

Uhlan, g .

1912

1:58

Lou Dillon, ch. m .

1903

*1:58**

Cresceus, ch. h .

1903

*1:59**

Major Delmar, b. g .

1903

*2:00**

The Harvester, s .

. 1910

2:01

Hamburg Belle, m . .

. 1909

*2:01**

Cresceus, ch. h .

1901

*2:02**

The Abbot, b. g .

1900

*2 03**

Alix, b. m . •. .

1894

*2:03**

Nancy Hanks, br. m .

1892

2:04

Azote, b. g .

, 1895

*2:04**

Directum, bl. h .

, 1893

*2:05**

Stamboul, br. h .

1892

*2:07**

Arion, b. h .

1893

*2:07**

Kremlin, b. h .

. 1892

*2:07**

Martha Wilkes, b. m .

. 1892

2:08

♦Lou Dillon .

. 1903

2:05

**Sunol, b. m .*

. 1891

*2:08**

♦Palo Alto, b. h .

. 1891

*2:08**

♦Direct .

. 1891

2:06

Dan Patch, br. h .

. 1906

*1:55**

Directum I .

. 1915

*1:56**

Prince Alert .

. 1903

1:57

Star Pointer, b. h .

. 1897

*1:59**

John R. Gentry, b. h .

. 1896

*2:00**

Prince Alert, b. g .

. 1902

2:00

Dariel, m .

. 1903

*2:00**

Joe Patchen, bl. h .

. 1897

*2:01**

Robert J b. g .

. 1894

*2:01**

Mascot, b. g .

. 1892

2:04

Hal Pointer, b. g .

. 1892

*2:04**

DirecL bL h .

. 1892

*2:05**

The stallion Dan Patch remains the king of pacers, his half-mile made at Memphis, Tenn., 27 Oct. 1903, and his mile made at Saint Paul, 8 Sept. 1906, in 1 :55}4, being unequaled. The greatest pacers in 1915 are William, who as a four-year-old, at Grand Rapids, Mich., 5 Aug. 1914, made a mile in 2:00, and at Cleveland, Ohio, 16 Aug. 1915, beat Directum I in 1 : 58ˆ2, and Directum I, who a month after losing to William made 1 :56 Y at Syracuse, N. Y., this being the stallion record for pacers. In 1918 Miss Harris did a mile in 1 :58ˆ4-*

- *First champion mile to bicycle sulky.*
- *Made to high wheel sulky.*

HORSE BAT-FLY

HORSE-RACING

In the matter of breeding, reference has al¬ ready been made to the fact that the imported horse Messenger, who played so important a part in the generation of harness horses, was of running stock. His descendants that have in¬ fluenced this type more than any others were Rysdyck's Hambletonian and Mambrino Chief. The former was the son of Abdallah, whose sire Mambrino was by the English Messenger. This same Mambrino was also the grandsire of Mam¬ brino Chief, so that his blood more than that of any of the get of Messenger has been potent in the production of the numerous fast exponents of the two harness gaits. Bellfounder, another English horse, brought over to Boston in 1823, had also much to do in founding the American trotter. His origin seems to be obscure, but he was probably of the type known as the Norfolk roadster, from which the hackney has sprung. The most famous of his progeny in the first generation was the Charles Kent mare, the dam of Rysdyck's Hambletonian. At least 75 per cent of what are called <(Standard bred® trotters trace to this sire, and as none of the rest of Abdallah's get amounted to much there is every reason to believe that this daughter of imported Bellfounder had the inherent quality which made the Hambletonian strain so valuable. Every one of the champion trotters that succeeded Flora Temple are descended directly from this horse, Dexter himself being one of his sons.

The records of the running horses will be found under Horse-Racing.

HORSE BOT-FLY, a bot-fly (Gastrophi – lus equi) parasitic in horses. The adult is about .75 inch long; the wings transparent with dark spots forming an irregular band toward the centre ; the body brown and very hairy, the head whitish in front, and the abdomen dark- spotted. The females (males are rarely seen) have an elongated tapering abdomen. The ob¬ long light, yellow eggs are glued, one by one, to the hairs of the forepart of the body, where they are likely to be licked off by the animal. The moisture of the tongue causes the de¬ veloped larvae to break through the shell almost instantly, and to be carried into the mouth and thence to the stomach. Many curious facts have been observed in connection with these eggs and their development and may be found fully dis¬ cussed by Osborn in his (Insects Affecting Do¬ mestic Animals,® issued by the United States Department of Agriculture (1896).

HORSE-CHESTNUT, or BUCKEYE, a

tree of the small family Aesculacece and genus Aesculus, represented in Europe by the horse- chestnut (A . hippo castanum') , now cultivated in

many parts of the world, but native to Greece, Turkey and southwestern Asia; and by several indigenous American species known as buck¬ eyes, from the appearance of the fruit.

HORSE-FLY, GAD-FLY, or DEER- FLY, any species of the family Tabanidcu, usu¬ ally large, robust flies, with a broad head pointed in front and concave behind, with pro¬ portionally immense eyes, and fitting closely to the thorax.

HORSE-MACKEREL. See Tunny.

HORSE POWER. See Engineering Terms; Internal Combustion Engine; Water- Power.

HORSE-RACING, a national pastime, which has been called the sport of kings be¬ cause it has been one of their amusements since the earliest dawn of civilization. The racing horse is of three distinct types, the running horse, the pacing horse and the trotting horse. For many centuries the running race has been the traditional turf sport in Great Britain and on the Continent, with many varieties, such as flat racing, or racing on level ground ; steeple¬ chasing, or racing over ground not specially prepared for the purpose, and hurdle-racing, in which the horses have to leap over obstacles purposely placed in the way. Trotting is pri¬ marily an American institution, the outcome of thoroughbred development. Late in the 19th century horse-racing made a wonderful ad¬ vance in the United States and easily became the great national pastime of the country.

Early History. — Thothmes I, of the 18th Egyptian dynasty, left a papyrus letter telling of his conquest of Mesopotamia, and priding him¬ self upon the acquisition of the racing horse (the Arab) and being the first to introduce him in Africa. Somewhat later the records tell of King Solomon buying horses from Egypt, and paying as much as $3,000 for some of them. Among the Greeks it was introduced into the Olympic games in the 33d Olympiad (648 b.c.). From Greece it was introduced into Rome, where it gained a place as one of the games of the circus. The institution of horse-races in England, where the sport has become a great national pastime, belongs to a very remote pe¬ riod. The first regular horse-races, however, did not take place till the reign of James I. The successors of James I down to Queen Anne were all more or less attached to the sport. In the reign of the latter, in 1711, the York Plates were founded, and about that date the passion for betting on the turf began to be general. Under George I, the successor of Queen Anne, horse-racing became more flour¬ ishing. The two most celebrated horses of that period were Flying Childers (foaled in 1715) and Eclipse (foaled in 1764), which long had the reputation of being the fleetest horses that ever ran. From the latter are descended many of the

first-class thoroughbreds of the present day. None of the English soverigns was more devoted to horse-racing than George IV. Between 1784 and 1792, while yet Prince of Wales, he gained 185 prizes, including the Derby of 1788. Horse-racing was introduced into France from England during the reign of Louis XIV, and under Louis XV was pursued with the utmost enthusiasm.

Breeding and Training.— The breeding of thoroughbred horses, that is of horses that trace unbroken descent according to authentic records to Arab or (

Britain some 25 years ago for the stallion Fly¬ ing Fox. Many valuable stallions, notably Val d'Or, Cyllene, Diamond Jubilee, Ormonde, Craganour have been sold in Great Britain and France to thoroughbred producers of the Ar¬ gentine Republic for sums ranging from $50,000 to $175,000. The stallion Ormonde was im¬ ported to the United States from Argentina in the middle 90's at a cost of $150,000. Au¬ gust Belmont paid $125,000 in 1907 to bring the triple crown (Two Thousand Guineas, Derby and Saint Leger) winner, Rock Sand, to the United States. Mr. Belmont in 1920 sold a son of Rock Sand — Tracery to Senor Unzue of Argentina for $265,000, while the same year Inchcape brought the record price in America for a two-year-old of $115,000. The Ameri¬ can-bred stallion Fair Play brought $100,000 in 1919. The British stallion Saint Blaise brought $100,000 at public auction in New York in the early 90's. The highest price paid at pub¬ lic auction in the United States for a yearling thoroughbred up to the last of Sept. 1921 was $25,000. This sum was fetched by an English- bred colt foaled in America. American-bred yearlings by Celt and Ultimus fetched $22,500 and $24,500 at public auction in August 1919. A record price for a yearling was established in Great Britain in 1920 when a colt claiming The Tetrarch for sire brought $72,500 at public auction. The previous year an English colt fetched $40,000; six brought upward of $30,000 each ; 19 upward of $20,000 each. It is esti¬ mated that there were upward of $200,000,000 invested in the United States in thorough¬ bred breeding establishments in 1919. Thor¬ oughbred production is a profitable industry in many States. It is concentrated mainly in Kentucky, Virginia, New York, Maryland, Pennsjdvania and New Jersey.

Thoroughbred mares in the northern hemi¬ sphere as a rule foal between January and June each year. Their offspring become yearlings, arbitrarily, on 1 January following foaling. The training of yearlings for racing

generally begins in September. It proceeds by gentle progression under the direction of the trainers, who are to handle the yearlings according to the disposition of each individual. No two thoroughbreds are alike. Sagacious handlers study closely the physical and temperamental pe¬ culiarities of their charges and act on the re¬ sults of their observations. Great "doers,® i.e., big eaters, must work hard. Light "doers® do not have to do so much. General development is promoted by jogging, cantering and gallop¬ ing exercises that occupy several hours each day. Yearlings are tried for speed in sprints of two and three furlongs. They are classified according to the quality of the speed they then show. They advance or drop in the scale of class according to their forwardness or back¬ wardness in the spring of their two-year old seasons. Some mature quickly and reach racing condition in February and March. Some do not reach the summit of their powers until they are three or four years old. In Great Britain and France horses are trained for races of im¬ portance with trial horses. Trial horses are reliable veterans of sober disposition that can be depended on to gallop to cer¬ tain standards of speed they themselves have set at all times. In the United States training

is generally done "against the stop watch.® By this is meant that horses are tried at various distances and classified according to the time they make at chosen distances. Often fast workers are poor racers in company. Indiffer¬ ent workers not infrequently become racing cracks when they encounter stiff opposition.

All thoroughbreds are registered as wean¬ lings in the stud books of the countries in which they come into being. After they have finished with racing practically all thoroughbred mares find homes at thoroughbred studs. The stallions that are employed for the improvement of the racing family are members of families — gen¬ erally female families — distinguished for the production of desirable stock horses, that have made racing reputations. It rarely happens that an indifferent racer no matter what his ancestry may have been makes good at stud service. It has been by racing and selective breeding that the 14-hand Arab with a stride of 17 feet has in three centuries improved into the thorougbred of to-day with an average height of 15 hands three inches and a stride of 23 to 25 feet.

Race Meetings. — In Great Britain the prin¬ cipal race meetings are held at Epsom, New¬ market, Ascot, Doncaster, Goodwood, Lincoln, Kempton Park, Liverpool, Manchester, Lei¬ cester, Sandowne Park, York, etc. Newmarket, which dates back to the time of Charles II, is the oldest and most famous of British racing places. It is the favorite training ground of British sportsmen. Ascot Park has for a cen¬ tury. been considered the most fashionable of British racing centres. Racing in England has always enjoyed high favor with all classes. The king of England and the great

noblemen of the realm, as well as great statesmen and millionaire commoners have from time im¬ memorial maintained racing stables. The Derby and the Oaks are annually renewed at F'.psom,the Thousand Guineas and the Two Thousand Guineas at Newmarket, the Saint Leger at Doncaster. Chantilly, Longchamps, Auteuil and Maisons La Fitte are the most popular of French racing places. During the progress of the Great War, when racing was suspended in France, most of the sportsmen of that country transferred their activities to Spain, and in Spain racing is fast supplanting bull-fighting in popular favor. All over conti¬ nental Europe, in Germany, Austria-Hungary, Rumania, Russia, Poland, Italy and Bulgaria racing has flourished for half a century or more. None of the countries of continental Europe, save France, suspended racing while the Great War raged. The king of Spain has become the most enthusiastic patron of racing on the Iberian Peninsula. His stable was the most successful in the kingdom in 1919. The American jockey, Lucien Lyne, rode for him.

There is racing in the United States the year round; in the North and East in spring, summer and autumn ; in the South and South¬ west, in winter. The Jockey Club, of New York, which was modeled in a general way after the Jockey Club of Great Britain, is the central controlling body in the North and East. The authority of the Kentucky Jockey Club, which since January 1919 has owned the tracks at Lexington, Louisville and Latonia, is gener¬ ally recognized in Kentucky and the Southwest.

There is racing in Canada between the first of May and the middle of October. The Ontario Jockey Club, of Toronto, controls racing in Canada. These three controlling bodies — the Jockey Club of New York, the Kentucky Jockey Club and the Ontario Jockey Club — en¬ force uniform forfeit regulations and recog¬ nize the findings of each other in matters per¬ taining to discipline.

Racing on the tracks that accept the au¬ thority of the Jockey Club of New York, is promoted at Prince George's Park, Havre de Grace, Pimlico and Laurel Park tracks, all in Maryland; at Jamaica, Belmont Park, Aque¬ duct, Yonkers and Saratoga tracks, in New York. The Eastern racing season opens at Prince George's Park, Bowie, Md., on 1 April, with a two-weeks' meeting, and closes there with another two-weeks' meeting in the latter half of November each year. Year after year the order of the meetings in Kentucky are Lexington, Louisville and Latonia, in the spring and early summer, and Lexington, La¬ tonia and Louisville in the autumn. There is no racing in Kentucky between the middle of August and the

middle of September. 1 No¬ vember marks the end of the Kentucky sea¬ son.

The features of the spring meetings on the Eastern tracks include the running of the $25,000 Preakness stakes at Pimlico, and the Withers and Belmont stakes and the Suburban handicap at Belmont Park. Summer features at Aqueduct, Yonkers and Saratoga are the re¬ newals of the Brooklyn handicap, the Dwyer stakes, Empire City handicap, Empire City derby, Saratoga handicap, Saratoga Cup, Sara¬ toga Special and the Hopeful stakes. Salient features of September racing about New York are renewals of the Futurity and Lawrence Realization stakes and the Jockey Club's weight- for-age race. Outstanding features of autumn racing in Maryland are renewals of the Potomac and Havre de Grace handicaps, the Eastern Shore stakes, the Maryland, Annapolis, Capital and Manor handicaps, the Bowie and Pimlico Cups, the Walden stakes and the Manly Me¬ morial Steeplechase, the last named being an event of $10,000 for steeplechasers.

Spring and summer attractions in Kentucky are the Kentucky and Latonia derbies and the Kentucky handicap. The Kentucky derby is a $50,000 race for three-year olds at ope mile and a quarter. Autumn specials are the Lexington Cup, the Latonia Cup, the Kentucky Jockey Club stakes (for two-year olds), the Latonia Championship, a race that has a gross value of about $60,000 annually, and the Louisville Autumn Cup.

A new stake that will be called the Mary¬ land Futurity, a produce race for two-year olds, open to the entire world, that will have a value annually of about $75,000, has been created in Maryland. This race will be run alternately at Havre de Grace, Laurel Park and Pimlico.

Handicapping. — When racing was new, as a general thing, the horses that met in speed tests of any sort and at all distances carried equal weight. It soon became evident that all horses were not created equal as regards speed and ability to carry weight. Recognition of this fact led to the institution of handicaps, con¬ dition races, claiming and selling races, etc.

The race that is technically known as the ˆhandicap® is the race in which the weights are fixed by a single functionary who is called the ˆhandicapper,® or by a board, generally con¬ sisting of three individuals, who are known as the board of handicappers. The condition race is a race in which horses competing have been penalized automatically, or obtained allowances, by previous successes or failures. Claiming and selling races are events for horses of the cheaper grades which owners enter under weights they (the owners) fix themselves. The claiming and selling price is the value the entering owner is theoretically willing to accept for his horse,

the weight being fixed accordingly. Actually all so-called handicaps, all selling and claiming races, all condition races are handicaps.

There are weight for-age-races for two-year olds exclusively, for three-year olds exclusively, for horses three-years old and over and for horses two-years old and over. Such events, exclusive of those to which two-year olds are admitted, are, as a general thing, run in the spring and early summer before the horses that take part in them have publicly classified them¬ selves. Two-year olds rarely run with horses of maturer years before the middle of Septem¬ ber in the northern hemisphere and at a corre¬ sponding seasonal period in the southern. American examples of the two-year old weight- for-age race are the Juneville and Keene me¬ morial run at Belmont Park, and the Saratoga Special run at Saratoga Springs. Important American races at weight-for-age for three- year olds are the Preakness, run at Pimlico, and the Withers and Belmont, run at Belmont Park. In 1919 there were only two American races at weight-for-age for horses three years old and over. These were the Saratoga Cup, run at Saratoga Springs and the Jockey Club stakes run at Belmont Park. American races in which two-year olds are permitted to compete at weight-for-age with older horses are the Serial- Weight-for-Age Races, of which there are three, one at three quarters of a mile, one at one mile, and one at one mile and a furlong, run at Pimlico in November.

Betting and Bookmaking.— The practice of betting on the results of contests of speed and endurance between thoroughbred horses is as old as racing itself. Originally such betting was confined for the most part to the high con¬ tracting parties, i.e., the owners of the com¬ peting horses. Races were mostly matches, two, three and four cornered. As racing grew in popular favor, betting became general and its systematization followed. In Great Britain, in the United States and Canada, on the con¬ tinent of Europe and in the southern hemi¬ sphere,. where racing flourishes, there are two recognized schemes of betting now in vogue — bookmaking and the pari mutuel system. Book¬ making is of English origin and the older sys¬ tem. The pari mutuel system was evolved on the continent of Europe. Where bookmaking prevails it is carried on by groups of men be¬ longing to bookmakers', clubs or guilds, which guarantee the responsibility of members. Gen¬ erally bookmakers, as individuals, pay tribute to the directorates of the tracks on which they operate. In the United States bookmaking is in vogue mainly on the tracks of New York State and in Louisiana. In Maryland and Kentucky,

a^s.

°n AC°n^*nen^ Europe and throughout pouth America, wherever racing has attained Development and is a popular sport. In oouth Africa and Australia both betting sys¬ tems prevail. In Tasmania and New Zealand the. pari mutuel scheme obtains. Where the pan mutuel system prevails the managements of the tracks control and direct the betting. Revenue derived from betting by racing asso¬ ciations, whether in the form of per capita lev¬ ies on persons to whom bookmaking privileges are granted, or from percentages deducted from gross amounts wagered on races under the pari mutuel system, is used to pay purses, maintain plants, defray operating costs and pay divi¬ dends to stockholders.

The bookmaker endeavors to arrange his slate, and regulate his intake of money in such fashion that he shall retain a percentage of the total amounts wagered by the public, no matter which horses may win. The prices he "lays,® or the "odds® he quotes, are based on his indi¬ vidual opinion of the public form of competing horses. This opinion is fortified by information supplied him by agents, colloquially called "dockers,® as to the private form of horses, that may not have appeared in public, or as to im¬ provement in the form of horses that have raced. This improvement may be indicated by private trials, of which the public may have little or no information. Before the advent of the "form charts® of races already run, carried by papers specializing in racing news and by most great dailies, and before the development of a system of public "touting® (public touting being the dissemination broadcast of information that formerly only bookmakers and certain individ¬ uals who "play the races® as a business ob¬ tained), the making of a safe percentage, or "round" book, was, comparatively, an easy mat¬ ter. Great fortunes were amassed by many bookmakers. To-day, however, in the United States and elsewhere the public possesses, or may possess, as much information as the book¬ maker himself and the latter's calling has be¬ come a precarious one.

The pari mutuel system is what the name implies — a system of wagering under which all of the money bet upon a race is thrown into a common pool to be distributed at the conclusion of the race among the backers of the winning horse. Bettors purchase tickets at booths, oper¬ ated by the racing association, where machines register not only the number of tickets sold on each horse, but, also, the total number sold on the race. Usually, in America, the tickets sell at $2, $5, $10, and . $20 each, and a better can purchase as many tickets of each denomination as he desires. He may also purchase one or more tickets on as many horses in the race as he wishes to back. • Under this system the betting public makes the odds which vary according to the amount of money in the pool and the number of tickets sold on the winning horse. In other words, the greater the pool and the

smaller the number of tickets sold on the winning horse, the larger will be the odds. In selling the tickets and in distributing the money in the pool among the holders of winning tickets, the racing asso¬ ciation acts merely as stakeholder, deducting a

commission from the total amount wagered. In the United States the commission deducted is usually five per cent ; in Europe, where racing is more or less under governmental control, the commission is ordinarily larger, certain percent¬ ages being deducted for charities, the mainte¬ nance of government breeding establishments, and for road-building.

Under the pari mutuel system, as under the bookmaking system, it is possible to bet a horse to run first, second, or third. This necessitates the operation of three pools called, in track par¬ lance, "straight,® "place,® and "show® pools, the funds in each pool being kept separate. In determining the value of winning tickets $2 is used as the basis for calculation, tickets for larger amounts being, for convenience sake, reduced to that denomination. Of course, in the "pay-off,® the holder of a winning $5, $10, or $20 ticket receives 2j4, 5, or 10 times the value of a $2 ticket.

To determine the value of a winning "straight® ticket, first, deduct from the total of the "straight® pool five per cent for the associa¬ tion and then divide the remainder by the number of tickets sold on the winning horse. For example, suppose that in a race the wagers on all of the horses total $10,000 and that, of this sum $2,000 — the equivalent of 1,000 $2 tickets — was wagered on the winner, the value of a $2 ticket would be determined as follows : from $10,000 deduct $500 (5 per cent) and di¬ vide. the remainder ($9,500) by 1,000; the quotient will be $9.50.

The method of determining the value of a winning "place® ticket is more complicated. In this connection it should be stated that "place® pools are divided between the holders of "place® tickets on the horses finishing first and second. Therefore, to ascertain the value of a $2 "place® ticket, after deducting from the total of the "place® pool five per cent, add to¬ gether the "place® money wagered on the horses finishing first and second and deduct this from the amount in the pool after the five per cent commission has been taken out. Next divide this second remainder into two equal parts and then divide one part by the number of "place® tickets sold on the horse that finished first and the other part by the number of "place® tickets sold on the horse that finished second. This will give the net value of the "place® ticket on each horse, to which in each case $2 must be added as the bettor is entitled to receive in addition to the net value of his ticket the $2 which he wagered. Suppose, for example, that the net value of a "place® pool, after five per cent has been deducted, is $8,000 and that of this amount $2,000 was bet on the horse that finished first and $1,000

was bet on the horse that finished second, the problem could then be stated as follows : . $8,000 'minus $3,000 equals $5,000 which divided by two equals $2,500. Divide $2,500 by 1,000 (the number of $2 tickets sold on the first horse) which equals $2.50; then divide $2,500 by 500 (the number of $2 tickets sold on the second horse) which equals $5. Now add $2 in each case and the result will be $4.50 as the value of the "place® ticket on the first horse and $7 as the value of the "place® ticket on the second horse.

The value of "show® tickets is determined in the same way that the value of "place®

tickets is determined except that in this case the pool is divided into three instead of two parts.

Should a race be won by a horse on which no "straight® ticket has been sold, the "straight® money goes to the horse which finished second. If a horse upon which no "place® ticket has been sold runs second, the pool is apportioned among the holders of "place® tickets on the horse that finished first. Should a horse upon which no "show® ticket has been sold finish third the "show® pool is divided between the holders of "show®® tickets sold on the horses that finished first and second.

Americans Abroad. — In 1855 an American horse had. never won a race abroad, and an American jockey had never ridden in an English race. The first American to go to England with a stable of thoroughbreds was Richard Ten Broeck, who sailed for England in 1856, taking with him Lexington ; Lecompte, the only horse that ever beat Lexington ; Pryor and Prioress. Lecompte died of influenza the first year, and Pryor soon followed. It was left for Prioress to retrieve the fortunes of the stable. Her great victory was in the Cesarewitch, a race at two miles, two furlongs and 28 yards. There were 37 starters, the very best horses on the English turf. After one of the most exciting races ever run, Prioress, El Hakim and Queen Bess fin¬ ished* in a dead heat. In the run off, the Ameri¬ can horse won by a length* in four minutes and 15 seconds. American successes really began in 1878, when Pierre Lorillard and James R. Keene shipped stables to England. The former's Parole won the Newmarket Handicap, defeat¬ ing the English favorite, Isonomy, a horse that was x:alled the best ever foaled on English soil. The American gelding next took the great Metropolitan, the great . Cheshire and the Epsom Gold Cup in quick succession. Iroquois followed Parole, winning many im¬ portant stakes, notably the Derby and*

the Saint Leger in 1881. Americans who have been more or less conspicuously identified with racing in Great Britain and France since the time of Iroouois include William C. Whitney, James R. Keene, Clarence H. Mackay, John Sarwford, John W. Gates, John A. Drake, Her¬ man B. Duryea, Thomas P. Thorne, August Belmont and Richard Croker. Mr. Keene won the $50,000 Jockey Club stakes of 1900 with the American-bred three-year old Disguise. Fox- hall Keene won the Oaks of 1901 with the American-bred fillv Cap and Bells. Mr. Whit¬ ney won the Derby of 1901 with the British- bred three-year old Volodyovski, which he leased that he might have a starter. Mr. Croker won the Derby of 1907 with Orby, an English- bred son of Orme from an American dam — Rhoda B. Mr. Belmont won the Sandowne Eclipse and the Champion stakes of 1913 with Tracery, a Kentucky-bred stallion. Dr. Duryea won the Derby of 1914 with Durbar 2d, a French-bred colt claiming Armenia, an Ameri¬ can matron, for dam. Mr. Belmont bred Hour¬ less, the American three-year old champion of 1917, at his French stud. Chateau Villers, Nor¬ mandy. Since 1915 Americans have bred abroad, or bought at English and French sales, and brought to the United States, some $10,000,000 worth of thoroughbred stallions and mares. The men most active in this direction have been*

Commander J. K. L. Ross, of Montreal, who created a great breeding establishment in Mary¬ land; W. R. Coe, A. K. Macomber, John H. Rosseter, Arthur B. Hancock, William Woodward, John Sanford, August Belmont, Willis Sharpe Kilmer and Henry T. Oxnard.

American jockeys that have won distinction in Great Britain and France, and in other European countries since James Todhunter Sloan revolutionized the style of riding thor¬ oughbreds in races, include Sloan himself, the brothers Reif, Lester and John; Daniel Maher, J. H. Martin, Nash Turner, Winfield Scott O'Connor, Lucien Lyne, Vincent Powers, Frederick Taral, Frank O'Neill and Frederick Williams.

Prominent Owners and Records. — Prom¬ inent Americans who produce and race thor¬ oughbreds — running horses — are former United States Senator Johnson N. Camden, Maj. Thomas Clay McDowell, George J. Long, Ed¬ ward R. Bradley, J. W. Parrish and Charles H. Berryman of Kentucky; August Belmont, Harry Payne Whitney, John Sanford, Willis Sharpe KJlmer, Gifford A. Cochran, James Butler, F. Ambrose Clark, Cornelius M. Garrison, W. R. Coe, Richard T. Wilson, Sam C. Hildreth and Edward F. Whitney of New York; William Woodward, Capt. Ral Parr, J. E. Griffith, J. S. Cosden, Richard F. Carman and Jere Wheel¬ wright, of Maryland; Joseph E. Widener, Samuel D. Riddle. Walter M. Jeffords and Jo¬ seph L. Murphy,' of Pennsylvania; John H. Rosseter, Edward Cebrian and Adolph Sprec- kels, of California; George Wingfield, of Ne¬ vada;*

Henry A. Porter, of Oklahoma; W. V. Thraves and Edward F. Simms, of Texas; Ar¬ thur B. Hancock and Henry T. Oxnard, of Virginia.

Racing Records.— The fastest American running records to date (1 Oct. 1921) are:

Two furlongs, Bob Wade, 4 years, 122 pounds, Butte, Montana, 20 Aug. 1890, #21 1/4 seconds.

Three furlongs, Atoka, 6 years, 105 pounds, Butte, Mon¬ tana. 7 Sept. 1906, 33 1/2 seconds.

Four furlongs, Geraldine, 4 years, 122 pounds, Morris Park, N. Y., straightaway, 30 Aug. 1889, 46 seconds; Donau,

2 years, 115 pounds, Santa Anita, Calif., around a turn, 13 March 1909, 46 1/5 seconds; and Amon, 2 years, 115 pounds, Juarez, Mex. around a turn, 9 Feb. 1911, 46 1/5 seconds.

Four and a half furlongs, Preceptor, 2 years, 112 pounds, Belmont Park, N. Y., straightaway, 19 May 1908, 51 sec¬ onds; Distinction, 2 years, 107 pounds, Latonia, Ky., around a turn, 10 June 1919, 52 2/5 seconds.

Five furlongs, Penrose, 2 years, 110 pounds, Belmont Park, N. Y., straightaway, 12 Sept. 1918, 55 3/5 seconds; Pan Zareta, 5 years, 120 pounds, Juarez, Mex., around a turn, 10 Feb. 1915, 57 1/5 seconds.

Five furlongs and a half, Plater, 2 years, 107 pounds, Morris Park, N. Y., straightaway, 21 Oct. 1902, 1:02 2/5; Iron Mask, 6 years, 150 pounds, Juarez, Mex., around a turn, 8 March 1914, 1:03 2/5.

Six furlongs, Artful, 2 years, 130 pounds, Morris Park, N. Y., straightaway, 15 Oct. 1904, 1:08; Iron Mask, 6 years, 115 pounds, Juarez, Mex., around a turn, 4 Tan. 1914.

1:09 3/5.

Six furlongs and a half, Lady Vara, 2 years, 90 pounds, Belmont Park, straightaway, 19 Oct. 1906, 1:16 3/5; Brook- dale Nymph, 4 years, 124 pounds, Belmont Park, around a turn, 14 Oct. 1907, 1:17 2/5; Sweep On, 3 years, 112 pounds, Belmont Park, N. Y., around a turn, 31 May 1919, 1:17 2/5.

Seven furlongs, Roseben, 5 years, 126 pounds, Belmont Park, around a turn, 16 Oct. 1906, 1:22; Paris, 2 years, 110 pounds, Belmont Park, straightaway, 12 Sept. 1914, 1:22 2/5.

Seven and a half furlongs, Restigouche, 3 years, 107 pounds, Belmont Park, 29 May 1908, 1:31 1/5.

One mile against time, Roamer, 7 years, 110 pounds, Saratoga Springs, around a turn, 21 Aug. 1918, 1:34 4/5; and Salvator, 4 years, 110 pounds, Monmouth Park, N. J., straightaway, 28 Aug. 1890, 1:35 1/2.

One mile in races, Audacious, 5 years. 118 pounds, Bel¬ mont Park, N. Y., around a turn, 1 June 1921, 1:35 3/5; Man

o' War, 3 years, 118 pounds, Belmont Park, N. Y., around- a turn, 29 May 1920, 1:35 4/5.

One mile and a sixteenth, Celesta, 4 years, 108 pounds, Syracuse, N. Y., 3 Sept. 1914, 1:42 3/4.

One mile and a furlong, Goaler, 5 years, 94 J pounds, Belmont Park, N. Y„ 10 June 1921, 1:49; Grey Lag, 3 years, 123 pounds, Aqueduct, N. Y., 7 July 1921, 1:49.

One mile and three-sixteenths, Sir Barton, 4 years, 133 pounds, Saratoga Springs, N. Y„ 28 Aug. 1920, 1:55 3/5.

One mile and a quarter, Whisk Broom 2d, 6 years, 139 pounds, Belmont Park, 28 June 1913, 2:00 (This record has been questioned but stands as official); Hourless, 3 years, Laurel Park, Md., match race against Omar Khayyam, 18 Oct. 1917, 2:02.

One mile and five-sixteenths, Ballot, 4 years, 126 pounds, Sheepshead Bay, L. I.f 1 July 1908, 2:09 3/5.

One mile and three furlongs, Man o' War, 3 years, 126 pounds, Belmont Park, N. Y., 12 June 1920, 2:14 1/5.

One mile and a half, Man o' War, 3 years, 118 pounds, Belmont Park, N. Y., 11 Sept. 1920, 2:28 4/5.

One mile and five furlongs, Man o' War, 3 years, 126 pounds, Belmont Park, N. Y., 4 Sept. 1920, 2:40 4/5.

One mile and three-quarters, Exterminator, 5 years, 126 pounds, Saratoga Springs, N. Y., 31 Aug. 1920, 2:56 2/5.

One mile and seven furlongs, Ocagna, 4 years, 96 pounds, Oakland, Calif., 2 March 1909, 3:17 3/5.

Two miles, Exterminator, 5 years, 128 pounds, Belmont Park, N. Y., 15 Sept. 1920, 3:21 4/5.

Two miles and a quarter, Ethelbert, 4 years, 124 pounds, Brighton Beach, L. T., 4 Aug. 1900, 3:49 1/5.

Two miles and a half, Kyrat, 3 years, 88 pounds, New¬ port, Ky., 18 Nov. 1899, 4:24 1/2.

Two miles and five furlongs, Ten Broeck, 4 years, 104 pounds, Lexington, Ky., 16 Sept. 1876, 4:58 1/2.

Two miles and three-quarters, Hubbard, 4 years, 107 pounds, Saratoga Springs, 9 Aug. 1873, 4:58 3/4.

Three miles, Mamie Algol, 5 years, 105 pounds, New Orleans, La. (City Park), 16 Feb. 1907, 5:19.

Four miles, Sotemia, 5 years, 119 pounds, Churchill Downs, Ky., 7 Oct. 1912, 7:10 4/5.

The leading money-winning horses have been — American : Man o' War, $249,465, won in two years of racing; Domino, $193,550; Sy- sonby, $184,438; Colin, $180,912; Ballot, $154,- 545; Kingston, $138,917; Hanover, $118,872; Banquet, $118,535. English: Isinglass, $291,- 275; Donovan, $277,215; Rock Sand, $238,900; Bayardo, $223,665; Lemberg, $204,795; Flying Fox, $203,200; Sceptre, $197,915. French: Sardanapale, $211,505; Maintenon, $181,705; Verdun, $137,410; Ajax, $130,985; Finasseur, $130,170; Sea Sick, $126,655. Australasian: Carbine, $147,380; Cetigne, $113,535; Desert Gold, $110,670; Trafalgar, $110,555.

The biggest purse ever won by a thoroughbred on an American track was the Coney Island Jockey Club's futurity of 1890 — $67,675. The Futurity is now run at Belmont Park under di- . rection of Westchester Racing Association.

The most famous of British races between thoroughbreds is the Derby, a gallop of about one mile and a half that is annually renewed at Epsom Downs. Normally this race pays about $35,000 to the winner. The Derby was instituted in 1788. Its distance on the occasion of its first running was one mile. Its first winner, Diomed, was imported to the United States. Winners of the Derby in the course of the last ten years were:

1910, A. W. Cox's Lemberg, time 2:35 1/5, Greenback second

1911, J. B. Joel's Sunstar, time 2:36 4/5, Stedfast second.

1912, W. Raphael's Tagalie, time 2:38 4/5, Jaeger second.

1913, W. Bower Ismay's Craganour, time 2:37 4/5, Aboyeur second.*

1914, H. B. Duryea's Durbar 2d, time 2:38 2/5, Hapsburg second.

1915, Sol Joel's Pommern, time 2:32 3/5, Let Fly second.

1916, E. Hulton's Fifinella, time 2:36 3/5, Kwang Su second.

1917, A. W. Cox's Gay Crusader, time 2:40 3/5, Dansellon second.

1918, Lady James Douglas' Gainsborough, time 2:33 1/5, Blink second.

1919, Lord Glanely's Grand Parade, time 2:35 4/5, Buchan second.

- *Craganour was disqualified for fouling one of his opponents and Aboyeur was placed first by the stewards.*

Between 1914 and 1919 the Derby was run at Newmarket and called the New Derby, the Epsom Downs course having been turned over to the government for war purposes.

O'Neil Sevier.

HORSE-RADISH, a species of water¬ cress (Radicula armoracia) , native to Europe, but now cultivated everywhere. The grated roots mixed with vinegar, are used as a sauce.

HORSE-RADISH-TREE. See Ben, Oil of.

*HORSE-SHOE ROBINSON: a Tale of the Tory Ascendency, was published by John Pendleton Kennedy in 1835 with a dedication to Washington Irving, whose (Bracebridge HalP Kennedy had already followed in his charming and truthful * Swallow Barn, or a Sojourn in the Old Dominion* (1832).*

HORSEFIELD, Thomas, American nat¬ uralist and explorer : b. Bethlehem, Pa., 12 May 1773; d. London, England, 1866. He was graduated in medicine at the University of Pennsylvania, and served as <(medical appren¬ tice® in the Pennsylvania Hospital from 1794- 99. In October 1799 he accepted service as surgeon on the China, about to sail for Java and was commissioned as regimental surgeon by the Dutch Colonial government. From 1802 he devoted himself to the thorough examination of the flora, fauna and geology of the island. In 1824 he gave to the world his great work entitled (Zoological Researches in Java and the Neighboring Islands,* and from 183&-52 issued in folio parts the (Plantae Javanicae Rariores.* In 1856-58 he published the (Catalogue of the Birds in the Museum of the East India Com¬ pany, * and in 1857-59, with Frederic Moore, the (Catalogue of the Lepidopterous Insects in the Museum of the East India Company. *

HORSEFISH. See Moonfish.

HORSEFOOT CRAB, HORSE-SHOE CRAB, or KING CRAB. This marine animal (Limulus polyphemus) was formerly regarded as a crustacean, and is the sole survivor of an extinct group of arthropods intermediate be¬ tween the trilobites and arachnids. It belongs to the order Xiphosura, class Merostomata, and phylum Palceopoda. By some English authors it is regarded as an arachnid allied to the scor¬ pion. This difference of opinion regarding its affinities is due to the generalized structure of the animal, and to the fact that its nearest allies are extinct.

The body of the horsefoot crab is sometimes two feet in length, and consists of a head and a hind-body or abdomen, the latter ending in a long spine (telson), which is elevated by the creature in defense. The head is covered by a broad carapace, and is in shape somewhat like a horse's hoof, and in burrowing it acts, as a shovel, being bent down at nearly right angles to the hind-body. There are a pair of compound and of simple eyes; the mouth is on the under side, nearly surrounded by six pairs of walking legs, while on the hind-body are six pairs of broad swimming legs. There are no antennae, jaws, maxillae or foot-jaws, as in the lobster. The horsefoot crab breathes by means of gills attached to the under side of the last five pairs of abdominal legs, which consist of a

pile of about 100 thin broad sacs growing out, one pile on each side, from the base of the legs.

Limuhts polyphemus inhabits the eastern coast of North America from Boothbay, Me., to the West Indies and Honduras, but is most abundant in shallow, retired, sandy or muddy bays on the coast of New Jersey, Virginia and North Carolina. Several other species inhabit the seas of the Eastern Archipelago, China, Philippines and southern Japan. In the United States it is used as a fertilizer, while in the Malayan markets the animals are sold as food.

The Limuli date from the Devonian. An allied group, in shape and structure approach¬ ing scorpions, is the Eurypterida, one of which (Stylonurus lac coanus) of the Devonian of New York and Pennslyvania was about five feet in length, while the British Pterygotus anglicus is estimated to have been about si feet in length and two feet across. It is now thought that the scorpions have descended from some merostome, which became adapted for a terrestrial life. See Eurypterus.*

HORSEHEADS, N. Y, village, in Che¬ mung County, on the Erie and

Central New York, and branches of the Delaware, Lacka¬ wanna and Western and the Northern Central railroads, about six miles north of Elmira. It is in a fertile agricultural region. Its chief manufactures are creamery products, bricks, screens, doors, blinds, men's clothing, cigars, cattle-feed, shoes and hardware. Pop. 2,078.

HORSEMANSHIP. See Riding.

HORSESHOE BEND, Battle of, an en¬ gagement in the War of 1812 fought between the forces of General Jackson and Ocfuskee (Creeks) Indians on 29 March 1814 in the great, loop of the Tallapoosa River at Tohopeka. Jackson had 3,000 men. Indian casualties were heavy only 200 escaping. Jackson's loss was 51 ' killed and 150 wounded. This battle destroyed the Indian power, and on 9 Aug. 1814, Jackson signed a capitulation and treaty with the Creeks whereby a large portion of their lands was ceded to the government. (See Creeks). Soon afterward Jackson went to defend New • Orleans (q.v.). Consult Adams, Henry, ˆUnited States) (Vol. Ill, pp. 251-261) ; (American State Papers, Indian Affairs5 (Vol. 1, p. 826) ; Brackenridge, H. M., (History of the Late War5 (pp. 194-195) ; Fay, H. A., (Official Account5 (pp. 179-181) ; Lossing, (War of 1812) (pp. 779-780) ; Monette, (Valley of the Mississippi (Vol. II, p. 421) ; Wiley and Rines, (The United States5 (Vol. V, pp. 454-456) ; biographies of Jackson by Parton (Vol. I, pp. 479-523) ; Buell (Vol. I, pp. 324-329), and Frost (pp. 231-236).

HORSESHOE FALLS. See Niagara Falls.

HORSESHOE SNAKE, a large colubrine serpent of Spain and North Africa (Zamenis hippocrepis) , so called from a horseshoe-like mark on its nape, and renowned for its fierce disposition as is characteristic of the genus (rat-snakes) to which it belongs. It is yellow¬ ish above, strikingly marked with a variety of blackish lines and spots ; the underside is yellow or red. Its usual home is in the burrow of some ground-squirrel or similar animal.

HORSESHOEING. See Horse, Care and Diseases of.

HORSENS, Denmark, a seaport in the province of Aarhus, at he head of the Fjord of Horsens, distant from Aarhus by 32 miles southwest. The principal industries are iron¬ working, shipbuilding, the manufacture of woodenware and lime, and weaving. The chief imports are hay, grains and fertilizers ; the ex¬ ports are meats and dairy products. Pop. about

25,000.

HORSFORD, Eben Norton, American chemist: b. Moscow, N. Y., 1818; d. 1893. He received his education in the civil engineering course of the

Rensselaer Polytechnic Institute, and in 1839 was employed on the geological sur¬ vey of New York State. From 1844-46 he studied chemistry under Leibig in Germany, and on his return to the United States received the Rumford professorship in applied science at Harvard. In 1863 he resigned this post to engage in business. Mr. Horsford was known 'for his antiquarian research, especially in regard to his studies concerning the old Norse settle¬ ment which he supposed to be on the Charles River ; and for his philanthropy. He endowed the library and a splendidy equipped laboratory at Wellesley College. He published a dictionary of the Iroquois and Algonquin languages; and the (Discovery of Norumbega) (1892).

HORSLEY, hors'li, John Calcott, Eng¬ lish painter: b. London, 29 Jan. 1817; d. 18 Oct. 1903. After studying in the schools of, the academy, he made his debut in 1836 with (The Pride of the Village5 (Vernon Gallery) at the Royal Academy. He then devoted himself to genre paintings, among which the most famous are (Malvolio5 and (L'Allegro5 and (I1 Pen-seroso5 which he painted for the Prince Con¬ sort. The Westminster Hall competition awarded him first prize for his cartoon of (Saint Augustine Preaching5 (1843). In the follow¬ ing year 'he executed frescoes for the houses of Parliament. He organized the winter ex¬ hibits of the <(01d Masters55 at Burlington House after 1870. His protests against paintings in the nude won for him the nickname in Punch of (

HORSLEY, Samuel, English clergyman: b. London, 15 Sept. 1773; d. Brighton, 4 Oct. 1806. He studied law at Trinity College, Cam¬ bridge, and then received the living of New¬ ington Butts in Surrey, which his father had held before him. It is in connection with his spirited attacks on Dr. Joseph Priestley's doc¬ trines as set forth in the latter's (History of the Corruptions of Christianity5 and the con¬ troversy which followed that Horsley is chiefly known. In 1781 he became archdeacon of Saint Albans and in 1788′ was promoted to the see of Saint David's. Subsequently he was bishop of Rochester (1793), and of Saint Asaph's (1802). Besides his controversial works and sermons, he edited the works of Isaac Newton (5 vols., 1779-85) ; wrote several treatises on mathe¬ matics, and also (On the Prosodies of the Greek and Latin Languages5 (1796), and translated

several books of the Bible. Posthumously various collections of his works were made : (Speeches in Parliament (1813) ; Collected Theological Works) (6 vols., 1845).

HORST (German, the top of a rock), a term applied to a block of the

earth's crust lying between two faults and upthrown relative to the adjacent blocks; also applied to the topographic elevation so formed. The opposite of graben (q.v.).

HORSTMANN, Ignatius F., American Roman Catholic prelate : b. Philadelphia, Pa., 16 Dec. 1840; d. Cleveland, Ohio, 13 May 1908. In 1857 he was graduated from the Central High School, and afterward attended Saint Joseph's College, Philadelphia. He went to the Preparatory Seminary of Glen Riddle in 1859, and in 1860 entered the American College, Rome, where, after completing his course, he was ordained priest by Cardinal Patrizzi, 10 June 1865. In 1866 he took in Rome the degree of doctor of theology, and in the same year returned to Philadelphia and accepted the chair of mental philosophy in the diocesan seminary of Saint Charles Borromeo, continuing to hold the same position in the new seminary at Over¬ brook. In 1877 he became pastor of Saint Mary's Church, Philadelphia, and in 1885 was named chancellor of the archdiocese. On 29 Nov. 1891 Leo XIII appointed him to the vacant see of Cleveland, Ohio, and he was consecrated bishop 25 Feb. 1892.

HORT, Fenton John Anthony, British theologian: b. Dublin, 23 April 1828; d. Cam¬ bridge, 30 Nov. 1892. He studied at Cambridge, becoming Fellow there in 1852. In the follow¬ ing year he undertook with B. F. Wescott an edition of the Greek New Testament, and founded with others the Journal of Classical and Sacred Philology. He received ordination in 1856, and became vicar at Saint Ippolyts, near Cambridge. However, the scholastic life held more attraction for him and he returned to Cambridge, where he rose from examiner to a professorship in 1878. His edition of the New Testament appeared in 1881, a monumental and authoritative work. His (Introduction to the New Testament in Greek) is a fine scholarly production. Numerous treatises and lectures have been published posthumously, including (The Way, the Truth, and the Life (London 1893); (Judaistic Christianity) (1894); (Lec¬ tures on the Ante Nicene Fathers* (1895) ;*

(Prolegomena to Romans and Ephesians (1895) ; (The Christian Ecclesia) (1897) ; (Vil¬ lage Sermons) (1897) ; (Village Sermons in Outline) (1900). Consult Hort, A. F., (Life and Letters of F. J. A. Hort, by his Son) (2 vols., London 1896).*

*HORTENSIUS, hor-ten'shi-us, Quintus, Roman dictator, about 286 b.c. * He was chosen to settle the differences between the plebs and the Senate, which had resulted in sedition and their secession to the Janiculum. Hortensius enacted the Lex Hortensia, by which resolutions passed by the plebs were made bind¬ ing on the whole people, without the Senate's approval.*

HORTENSIUS, Quintus, who was sur- named Hortalus, a Roman

advocate, and who flourished in the time of Cicero: b. 114 b.c.; d. 50 b.c. At an early age he showed remarkable

ability as an orator, and his skill won for him the successive offices of quaestor (81) ; aedile (75) ; praetor (72) and consul (69). The re¬ mainder of his life he spent in practise of law and became distinguished in pleading of cases. His oratory was insincere for the most part and very flowery. He opposed Cicero in the cases of Verres, and his failure to win the trial was the turning point of his career. Thence¬ forth, Cicero occupied the position of leading orator. The works of Hortensius have not been preserved.

HORTICULTURE, the art of growing, improving, propagating and utilizing fruits, vegetables and flowers for food and for orna¬ mentation. While horticulture is strictly an art, it is grounded in and supported by many branches of science, all of which play an im¬ portant part in the success of the work. Al¬ though the sciences of plant physiology, chem¬ istry and physics may aid greatly in all branches of horticulture, there have been, are still and will no doubt continue to be men endowed with natural gifts who must be re¬ garded as masters in this field, to whom the sciences as such remain unknown. The de¬ gree to which plants may intuitively be molded, shaped and made to respond to the needs of man are little short of marvelous. Science with all its power cannot always accomplish the ends secured by the skilled craftsman who knows plants and loves them, who may work wonders with them himself, but who may be unable to pass this knowledge on to others. While the word horticulture is still retained for a large number of activities, the field has become so extensive that there are now well- recognized groups. No hard and fast lines can be drawn between these groups, but they are generally recognized as more or less distinct and are as follows: (a) Fruit growing, or pomology; (b) Vegetable growing; (c) Flower growing, or floriculture; (d) Landscape art.

Fruit Growing, or Pomology. — Fruit growing embraces all those practices having to do with the production, handling and within certain limits the utilization of fruits. Here again it is impracticable to draw any arbitrary lines between products commonly classed as fruits and those classed as vegetables. The tomato is a fruit, but the tomato grower may be either a trucker or a vegetable gardener. He would not be classed as a pomologist or a fruit grower. In America fruit growing embraces the production of fruits like the apple, pear, peach, plum, apricot, quince, orange, lemon, and a considerable number of products from trees, vines, bushes, and even soft wooded plants like the strawberry, banana and papaya. Fruit growing as a whole has been more highly de¬ veloped commercially in America than in

any other country. The last decade has shown progress in the standardization of methods and pract'ces. A striking feature of the past 20 years' development in fruit growing, especially with the apple, has been the demonstration of the fact that the more successful operators are those who live with their trees, who work with them and know them, and that orcharding by proxy through corporations or syndicates is in large measure a failure. In the necessary keen competition that exists in the production of a high-grade fruit like the apple, the limiting

factors are of such a nature that their recog¬ nition and control cannot be syndicated or re¬ duced to mathematical formulae so that an indi¬ vidual may expand his activities indefinitely. An apple grower who owns his orchard of 40 to 60 acres, who knows his trees and lives with them may be highly successful, but if he at¬ tempts to expand his activities and oversee several hundred acres, the chances are that he may fail or else become a mediocre grower. In the light of developments during the past 20 years, we may, therefore, look forward to com¬ mercial fruit growing as more or less of an industry preeminently suited to individual effort so far as production is concerned. The handling and marketing, however, are matters that lend themselves to organization, but of these points we shall speak later.

The latest available figures indicate that the total value of fruits produced in the United States is somewhere around $250, 000, OCX) to $300,000,000 annually. The deciduous tree fruits like the apple, pear, peach, plum, apricot and quince represent at least two-thirds of the total value of all fruits. Quoting the available fig¬ ures in percentages, deciduous tree fruits repre¬ sent about 65 per cent of the total value, citrous fruits 10 per cent, grapes 10 per cent, small fruits 14 per cent, miscellaneous fruits (mostly subtropical) 1 per cent. The apple leads in quantity and value of fruits grown. It also leads in distribution and may without ques¬ tion be characterized as the most important fruit in the United States. More than one-half of the farms in the United States, of which there are now nearly 6,500,000, produce apples. The quantity of fruit produced is quite vari¬ able, running all the way from 125,000,000 to 225,000,000 bushels a year. The last census figures give the number of bearing trees as 151,322,340 and the vield as 146,122,318 bushels. About 500 different varieties of apples are reported as being offered by nurserymen for planting. Of these, however, 30 to 35 varie¬ ties constitute the chief source of this valuable fruit. About one-fourth of all the apples grown in this country are of two varieties — namely, Baldwin and Ben Davis. The principal apple¬ growing States in the order of quantity pro¬ duced and

value of fruit are New York, Wash¬ ington, Missouri and Pennsylvania. The great centres of apple production are to be found in southern Maine, southern Vermont, eastern Massachusetts and Connecticut, western New York, western Pennsylvania, the Appalachian region of Virginia, West Vireinia and North Carolina, southern and western Missouri, south¬ ern Michigan and western Washington and Oregon.

Next to the apple, the peach and nectarine rank in importance in deciduous fruits. Pro¬ duction is variable, ranging from 15,000,000 to. 65,000,000 bushels annually. Except in the State of California, the peach, probably more than any other tree fruit, is subject to the vicissi¬ tudes of climate. The trees in even the most favored regions are subject to winterkilling. If they survive the winter, the crops may be greatly curtailed or entirely destroyed by late spring frosts. Most of our valuable varieties of peaches owe their parentage to natives of warm climates. The peach, therefore, is prone to respond quickly to a few warm, sunny days,

only to be injured when severe cold follows, as is likely to be the case in many parts of our country. The principal peach producing States are California, Georgia, Mississippi, Texas, New York, Pennsylvania, Ohio, Arkansas and Missouri, in about the order named. The yield of peaches, as given for the last census year (1909), was in round numbers 35,000,000 bush¬ els. The estimated yield for 1915, a banner year, was 64,000,000 bushels. The estimated yield for 1917 was in round numbers 45,000,000 bushels. Certain regions in the States named have become more or less centres of intensive peach production. Such regions are to be found along the southern shore of Lake On¬ tario in New York State, on the eastern shore of Lake Michigan in the southern Michigan Peninsula, in central and northern Georgia, eastern Texas, western Arkansas and the lower part of the Sacramento Valley in California.

Plums and prunes are pretty widely grown over the whole United States east of the Mis¬ sissippi River. California, Oregon and Wash¬ ington, however, are the great centres of production, especially of the prune. The quan¬ tity of these fruits produced is between 15,000,- 000 and 20,000,000 bushels a year, of which California pioduces at least one-third.

The pear constitutes an important crop. Its production is more stable than the peach and to a certain extent pear growing as an industry may be regarded as less risky than peach grow¬ ing. The limiting, factor in pear growing is fire blight, a disease which destroys many thousands of trees annually, and which has brought about the need of a system of con¬ tinuous planting in order to keep the orchards intact. The annual production of pears during the last 10 years is close to 11,000,000 bushels. California is the leading pear-growing State, with New York a close second.

Oregon and Washington are also large producers of this fruit. The latest available figures, which are estimates for 1916, give the yield of pears in California as 3,124,000 bushels; Washington, 551,000 bushels; Oregon, 555,000 bushels, and New York, 1,675,000 bushels. The estimated yield of pears for the whole of the United States for 1917 is 13,281,000 bushels, valued at $15,379,000, or an average of $1.15 per bushel.

The production of cherries may be regarded as a minor fruit industry in this country. Cali¬ fornia ranks first in quantity produced, with Pennsylvania second. Grape growing is pretty widely disseminated, although the large com¬ mercial plantings are centred in certain regions, principally in California and New York. The annual value of the grape output of the country is in round numbers about $23,000,000. Califor¬ nia produces between 70 and 75 per cent of the total crop. The, State of New York is second in production, with something like 250,000,000 pounds to her credit. Michigan is third, with 121,000,000 pounds.

Citrus growing, especially the orange and grapefruit, has become one of the most highly, organized intensive horticultural indus¬ tries in this country. The latest estimated figures as to the quantity of oranges produced give 12,282,000 boxes for 1917. The produc¬ tion in 1916 is estimated at 24,433,000 boxes, valued at $61,463,000. According to the latest census figures (1909), there were produced in

the United States 19,487,000 boxes of oranges, 2,770,000 boxes of lemons and 1,189,000 boxes of grapefruit. About 75 per cent of the oranges were grown in California and 25 per cent in Florida. The grapefruit industry is practically confined to Florida, while lemon growing is confined almost entirely to Cali¬ fornia.

Of the small fruits produced in the United States, those leading are the strawberry and the raspberry. According to the census figures, the total production of strawberries in the United States was 256,000,000 quarts. Maryland is the leading strawberry producing State, with New Jersey second.

Fruit growing may be commercial or non¬ commercial, with varying intermediate types involving features of both. Commercial fruit growing has to do with all those matters of location and sites for orchards, securing of young trees, planting, cultivating, pruning, spraying and harvesting of the fruit. In keen competition all of these matters become im¬ portant, some, of

course, more important than others. The successful commercial fruit growers are those who are able by good judg¬ ment and foresight to bring about conditions most favorable to the production of the par¬ ticular fruit in which they are interested. Many men go into the business who are not fitted for it and who do not have the proper conception of the knowledge required to be successful. It is quite remarkable that many men who have been successful in some manu¬ facturing or similar commercial enterprise as a result of long study and experience should become possessed of the idea that they can em¬ bark in fruit growing and make a success of it without knowing much about the subject. It must be borne in mind that orcharding is a business that cannot be learned in a month, or a year or a series of years. There are a good many people who can never learn it. There is always room for the right man in this work. Given the right man and one who knows or can learn the methods, and success is assured.

As a business, fruit growing is more profit¬ able than farming, but the risks are greater. The element of risk has its fascination, but un¬ less one is temperamentally suited for this sort of thing, he had better occupy himself with some line of work less hazardous. A big money-making crop of fruit is usually the re¬ sult of a combination of circumstances and conditions. Some of the conditions are not controllable. A good many of them are con¬ trollable. The grower must have patience and nerve, for he may go along for a number of years with nothing but expenses and hard labor to show for his efforts. If in discourage¬ ment he relaxes his efforts or his vigilance, if he decides for a year to omit proper fertiliza¬ tion, proper spraying, or cultivation, taking a chance, as it were, when the time comes for the big strike his trees will likely fail him. If the grower, on the other hand, has kept himself keyed up and has done the things he should have done, he may in one year make enough to pay a handsome profit on his own labor and his investments for a considerable period of years.

Within the past decade great progress has been made in the handling and marketing of fruit. Gradually the producers themselves are

assuming control of these matters and are thereby enabled to strengthen their business and increase their profits. Various associa¬ tions, exchanges and other organizations have been developed for the purpose of standardiz¬ ing the product, ensuring uniformity, a more equitable distribution, the avoidance of gluts, mutual help in transportation matters, and in the purchase of materials and supplies used in the final disposition of the fruit. Some organi¬ zations have entered the selling field so that the growers practically control the product from their own hands directly to the consumer. The citrus growers of California are more highly organized than any other fruit-growing group in the country. During the past 10 years the California Citrus Exchange has worked a revolution in the growing,

handling and market¬ ing of the orange crop of that State. The California Citrus Exchange is a leader in this field and has pioneered a way that has proved just and equitable to all concerned.

Vegetable Growing. — Vegetable growing may for convenience be considered under three heads : Market gardening, truck farming, home gardening.

Market gardening as a commercial enter¬ prise has Developed in this and other countries largely as a concomitant of the growth of large cities. The city must be fed, and as an important part of the food supply consists of fresh vegetables, it was but natural that the production of these vegetables should attract men of energy and foresight, with the result that a very important business has developed. As the cities grew, many of the market gar¬ deners were forced to go further out into the country in order to find land sufficiently cheap to warrant its use for intensive cropping. Not an inconsiderable number of the earlier market gardeners who owned land within the city limits were able to realize handsomely on the land, for the increase in real estate values were rapid and great. The advent of the trolley car, the extension of good roads, the difficulties of securing sufficient quantities of stable manure in the city, especially from the street car com¬ panies, the coming of the automobile and the motor truck have all profoundly affected this business. Being an extremely intensive line of work, and as every foot of soil must be used and doubly used, the market gardener can afford to continue cropping his land even when values have reached several thousand dollars per acre. It is not unusual for a good market gardener to take from $1,000 to $2,000 worth of produce from an acre of land in the course of a year. * This is accomplished, furthermore, without the aid of glass or other forcing equipment or forcing methods. The area handled by market gardeners is relatively small, running from two to three acres to as high as 50 to 60 acres in exceptional cases. It is not uncommon to find men who have brought up their families, educated their children and put away something for the future on three or four acres of land devoted to market garden¬ ing. Handled properly, land devoted to market gardening should give a net profit of from $300 to $700 a year per acre.

The use of glass in forcing vegetable crops greatly intensifies the work. Some market gardeners use nothing but glass, either as greenhouses or frames or both. The principal

crops forced under glass are lettuce, cucumbers, tomatoes and radishes. A considerable number of other crops are also forced, but the fore- named are the leaders. Handled properly, glass houses may be made to yield a gross return of from 30 to 50 cents per square foot of bed space covered. The average will probably be somewhere from 30 to 40 cents per square foot. There are many acres of glass devoted to this work in the vicinity of our large cities, es¬ pecially Boston, New York and Chicago. No late figures are available as to the extent of the industry. It would appear from the data at hand that from 60,000,000 to 75,000,000 square feet of glass would fairly represent the- extent of this industry. Probably two-thirds of this glass is in well-constructed houses, the re¬ mainder being in cold frames and hotbed sash.

Truck growing as an industry is of com¬ paratively recent origin. Little was heard or known of truck growing prior to the Civil War. Improvements in transportation, and especially the wider use of the refrigerator car, and the better organization of marketing and selling agencies have tended to greatly enlarge the scope of this work. Moreover, the people of the country, even in the remote villages, have been educated to the use of fresh vegetables in winter. Improved transportation facilities have made it practicable to deliver these fresh vege¬ tables at nearly all seasons of the year. Truck growing has for its primary object the pro¬ duction of large quantities of certain standard vegetable crops, such as cabbage, kale, spinach, potatoes, sweet potatoes, green beans, tomatoes, eggplant and lettuce. The principal trucking regions are to be found near the seaboard in southern New Jersey, Delaware and Virginia, especially the vicinity of Norfolk, the eastern coast of North Carolina, South Carolina and the coastal plain sections through Georgia and Florida. A large trucking area is also to be found in the Gulf States, especially in southern Alabama, Mississippi, Louisiana and Texas. Considerable development in truck growing has come about in the interior of some of the South¬ ern States, notably Kentucky and Oklahoma. Trucking is also developing considerable im¬ portance in the Western States, including parts of New Mexico, Arizona, Nevada and Cali¬ fornia. No authentic figures as to the extent of truck growing are available since those pub¬ lished in 1909. There have been rapid changes since that time. On the eastern shore of Mary¬ land and Virginia the increase in potato grow¬ ing has been very great, owing in part to the perfection of an efficient, organized plan of assembling, growing, handling and- marketing the product. Reliable estimates would indicate that the increase is over 2,000 per cent since the last census was taken. The increase in the Norfolk, Va., section has also been large, aggregating 40 per cent or more for all truck crops. A striking example of the growth of a special truck industry is found in early Irish- potato growing in Florida. From a small area of something like 1,200 acres planted in 1900, the land devoted to this crop

had increased to 16,000 acres in 1915. Florida, with its light, sandy, warm soil, its relatively warm winter climate and its excellent transportation facili¬ ties by land and water to the markets of the North is preeminently suited to truck farming. The total area devoted to the vegetable indus¬

try in Florida for the census year 1909 was 67,442 acres. In 1915 the estimated area was 99,162 acres, an increase of 47 per cent in six years. On account of the nearly universal de¬ mand and the ease of transportation and han¬ dling, lettuce constitutes one of the important trucking crops. Florida leads as a lettuce-pro¬ ducing State, the land planted being in the neighborhood of 5,000 acres. An acre of let¬ tuce will yield from 30,000 .to 40,000 salable heads, so that the annual output of lettuce from Florida alone is somewhere near 200,000,000 heads.

The production of green vegetables for can¬ neries may be considered as a feature of truck growing. The field requirements for the pro¬ duction of the different crops are similar. and the methods followed are for the most part the same. Sweet corn, tomatoes and peas are the principal crops grown. The latest figures in¬ dicate the land devoted to these crops for canning as being nearly 450,000 acres. Sweet corn leads with nearly 200,000 acres, tomatoes follow with something like 150,000 acres, and peas show approximately 100,000 acres. From a dozen to 14 different kinds of vegetables are grown in considerable quantities for canning purposes. All of these are grown under the best trucking conditions and in accordance with up-to-date trucking methods.

The home vegetaDie garden as a feature of horticultural activity has come to be recognized as an important adjunct to our national system of food supply. This is especially true since the great increase in the demand for food as a result of the World War. The home vegetable garden has unquestionably played an important part in producing wholesome and valuable foods for the home. The great interest aroused in this work owing to abnormal con¬ ditions is likely to continue even when matters assume their' normal state. As countries grow older and more thickly populated, there de¬ velops on the part of the people a love for working in the ground. It is found that these activities satisfy a natural craving for creative and productive work, making for contentment, health, happiness and the prolongation of life.

Floriculture. — The growing of flowers or ornamental plants as a commercial industry has come to be an important one during the past two decades. The greater part of this work is done under glass and the business now reaches into millions of dollars annually. The great centres of flower production are near the large cities. There are now between 10,000 and 12,000 establishments in this country engaged in floriculture, with an

annual output of $35,000,000 to $40,000,000. The States leading in the production of flowers are New York, Pennsylvania, Illinois, New Jersey and Massa¬ chusetts in the order named. Census figures show 114,655,276 square feet in glass houses in the United States. There is also reported 9,- 489,556 square feet in sashes and frames. In the earlier days of floriculture in this country the business was general — that is, a miscel¬ laneous assortment of plants for bedding and home adornment were grown, together with plants for cut flowers. Gradually specialization developed, with the result that there are now rose specialists, carnation specialists, violet specialists and other specialists. Rose growing under glass from the standpoint of money in-

vested and annual returns is probably the most, important floricultural industry. The growing °f the carnation is a close second, with the violet third. Rose growing and carnation grow¬ ing have developed to a marked degree near certain points. Climate and soil do not seem to have had very much influence in bringing about these centres of industry in the growing of roses and carnations, except that the most successful establishments are to be found in the more northern portions of the country. The changeable climate of the Southern States is not suited for the forcing of these crops under glass. With the violet, however, climate seems to play a more important part in the success of the industry. Somewhat uniformly cold weather during the winter months, accompanied by a maximum of sunlight, gives the best con¬ ditions for the production of the violet. The production of bedding plants and ornamentals for outside planting constitutes an important phase of the industry. The forcing of a long list of specialties for the Easter and holiday trade should also be noted. Lilies of various kinds, numerous hard wooded plants, tulips, hyacinths, narcissus, and other bulbous stock are now forced in large quantities. A great deal of the stock is grown abroad and is im¬ ported by the florist for purposes of forcing.

A feature of _ floriculture is the business enterprise shown in the maintenance of beauti¬ ful stores and shops in nearly all of our cities. Most of these establishments grow some or nearly all of the flowers and plants they sell. A valuable educational feature of the work of the various flower stores is to be found in the constantly changing beautiful window displays. The florists are well organized nationally and locally. Some of the more important national organizations are ((The Society of American Florists and Ornamental Horticulturists,® ((The American Rose Society® and <(The American Carnation Society.® The mechanical improve¬

ments and developments in the construction of forcing houses have been marked during the past decade. In the early days the houses for the most part were low, relatively small, and constructed of wood in such fashion that plants were subjected to rather unfavorable condi¬ tions, especially during the winter months. More recently, iron and steel have come to be used quite generally in the construction of much larger and better lighted houses, all well ven¬ tilated and heated. Many of these houses are of large size, sometimes covering acres of ground. The construction of glass houses and the utilization of glass houses for the growing and forcing of plants has advanced more rapidly in this country than in any other coun¬ try of the world.

Landscape Art. — Landscape art or land¬ scape gardening is the development or creation of landscape pictures through the proper and artistic use of plants, roadways, walks, drives, water courses, lakes, etc. In a broad sense the term landscape architecture is sometimes used. This term, however, applies to matters outside the realm of horticulture, hence does not con¬ cern us here. Landscape gardening involves not only a knowledge of how to use plants in the development of beautiful and artistic land¬ scape effects, but it also involves broad horti¬ cultural knowledge regarding plant growing, propagation, plant habits, hardiness, tenderness,

etc. Landscape gardening may be natural or formal, or it may be of many intermediate forms between these two styles. The tendency in America, as in England, is in the direction of the natural form in landscape work • — that is, to make a beautiful natural picture, to bring into our dooryards or into our public or private parks, large or small, a bit of nature as we frequently see it in the woods or in the fields. Formal landscape work has its place, but it is limited. Even in cities where everything is formal, it is coming to be recognized that bits of natural scenery are appreciated by the peo¬ ple. A study of the history of landscape work shows that it has been profoundly influenced by the literature and thought of the people of the time. Japanese landscape designing, for ex¬ ample, is in a measure an expression of the soul of the people. To us much of their work may seem purposeless and meaningless, but probably nowhere in the world has so many meanings been put into an art as in the landscape art of Japan. Plants and flowers are not always nec¬ essary for landscape work in Japanese designs. Stones may be used to symbolize such ideas as peace, old age, contentment, etc. Japanese gar¬ dening has been introduced here and some fine examples of it are to be found in various parts of the country. . Within recent years there has been a great awakening of the public, especially in the older and more thickly populated centres, in home beautification and community effort in civic improvement. The rapid growth of sub¬ urban villages, owing to better facilities for transportation, has made practicable an expres¬ sion of the love for gardening in the

adorn¬ ment of the home lot, the village street and the village community centre. The nature study movement, the home improvement clubs, the civic centre clubs have all contributed to wider interest in landscape work. The ad¬ vances in educational work in horticulture should be noted. The pedagogical value of horticulture, or a knowledge of plants, how they grow and live, has come to be recognized and is now applied in the elementary and sec¬ ondary schools in many sections of the coun¬ try. Horticulture is not taught with the object of turning the minds of the pupils especially toward plants and crops, but the subject is rec- ognized. as a means of awakening the mind, developing the observational powers and in other ways aiding in the physical, moral and mental growth of the pupils. The school gar¬ den work is gradually assuming an important role in educational effort. This is particularly true of rural schools, where theory and practice may be co-ordinated through classroom work with what has come to be called the home project. The pupil gets the basic ideas in the classroom and proceeds to apply them under the direction of the competent teacher in the carrying out of a definite piece of work like the care of an orchard, a vineyard or a gar¬ den in his or her own home. Through these activities the proper foundation is laid for broader work in the State agricultural colleges and universities. Nearly all the State univer¬ sities and agricultural colleges now have well- organized -departments of horticulture. A considerable number of the institutions have gone farther and have separated horticulture into the four classes discussed here. In these institutions these classes are recognized as

separate and distinct departments with separate and distinct courses of study. The increasing work of the State agricultural experiment stations has created a demand for trained men in horticulture, consequently the courses at nearly all the institutions are sought by young men and young women who recognize in the work a fine field for professional service as well as one where excellent training in the growing and selling of many horticultural prod¬ ucts which the people demand may be secured for practical work on one's own place.

Bibliography.— The literature on horticul¬ ture is voluminous. The National Department of Agriculture, the State experiment stations and the State agricultural colleges are all turn¬ ing out numerous bulletins and leaflets each year. There is scarcely a subject in the whole horticultural field that has not already been covered in the series of Farmers' Bulletins

issued by the United States Department of Agriculture. The standard horticultural work is Bailey's (Cyclopedia of Horticulture, > pub¬ lished in six volumes, with 3,639 pages and more than 4,000 illustrations. This valuable work was published 1900-02; new edition 1917. Special works are White, E. A., Principles of Floriculture) ; Galloway, B. T., Commercial Violet Culture> ; Wilkinson,. A. E., (The AppleJ ; Corbett, L. C., Carden Farming. >

Beverly T. Galloway,

United States Department of Agriculture, Washington, D. C.

HORTON, Robert Forman, English Con¬ gregational clergyman and author : b. London, 18 Sept. 1855. He was educated at New Col¬ lege, Oxford, and in 1879 he was made a Fellow of New College, and lecturer on history. In 1880 he became pastor of Lyndhurst Road Con¬ gregational Church, Hampstead. In 1893 he delivered the Lyman Beecher lectures at Yale. His writings include (History of the Romans (1885) ; Unspiration and the Bible) (1887) ; Che Teaching of Jesus) (1895) ; (Women of the Old Testament (1897) ; (The Command¬ ments of Jesus* (1898) ; (England's Danger* (1898) ; (The Pastoral Epistles) (1901) ; Che Trinity* (1901); Reunion of English Christen- dom) (1904) ; Coes the Cross Save?) (1905) ; Che Law of Spiritual Power* (1906) ; Che Holy Spirit > (1907) ; (My Belief * (1908) ;*

Creat Issues) (1910) ; Che Hero of Heroes (1911) ; Reconstruction1* (1915) ; (An Auto¬ biography } (1917).*

HORTON, Samuel Dana, American pub¬ licist: b. Pomeroy, Ohio, 16 Jan. 1844; d. Wash¬ ington, D. C., 23 Feb. 1895. He was graduated from Harvard in 1864, and from the law school in 1868, and also studied abroad, especially in Berlin 1869 and 1870. He began the practise of law in Cincinnati, moving later to Pomeroy, but devoted himself mainly _ to the study of monetary questions, spending much time abroad; he was one of the first to advocate the establishment and maintenance of an interna¬ tional ratio between gold and silver. He was a recognized authority on all questions concern¬ ing coinage, was a delegate secretary of the American delegation to the international mone¬ tary conference at Paris in 1878, and a delegate from the United States at the conference of 1881 ; in 1889 he was again sent abroad by the President as a special commissioner; shortly

*before his death he went to Washington at the request of the administration for a conference concerning the financial situation. His writ¬ ings include (Silver and Gold and their Rela¬ tion to the Problem of Resumption **

(Cincin¬ nati 1876) ; (The Silver Pound and England's Monetary Policy since the Restoration (Lon¬ don 1887) ; (The History of the Guinea) (Lon¬ don 1887) ; (Silver in Europe) (New York 1890). He also assisted in editing the proceed¬ ings of the conference of 1878 (Washington 1879) to which there is attached a vast body of documents, etc., collected and selected by him as (Historical Material for, and Contributions to the Study of Monetary Policy* (in Senate Ex¬ ecutive Document No. 58, 45th Congress, 3d Session, Washington 1879). The Proceedings of the International Monetary Conference, etc., in Paris, April-July 1881) (Cincinnati 1881) contain a number of addresses, remarks, etc., made by him in his capacity as delegate. Con¬ sult Walker, F. A., (S. D. Horton> (in Eco¬ nomic Journal, Vol. V, p. 304, London 1895).*

HORUS, an Egyptian god or group of gods to all of which the falcon was sacred. The term is supposed to mean ((the upper or superior one.® Horus was patron of upper Egypt; was worshipped especially at Edfu and in time came to be the type of the king. See Egyptian Religion and Sociology.

HORVATH, hor'vat, Michael, Hungarian clergyman and statesman : b. Szentes 1809 ; d. 1878. Although he was trained for the priest¬ hood and was ordained (1830), he reacted against this work, and was appointed professor of Hungarian language and literature at Vienna. His learning and sincerity of purpose won for him the appointment of bishop of Csanad (1848), and, when Hungary declared its independence, Horvath became Minister of Public Education and Worship (1848). After the popular government lost its power he spent several years in continental travel, and returned to Hungary in 1867. He sat in Parliament in the Lower House, sympathizing with the Deak following. His historical works are of great importance. They include history of the Hun¬ garians to 1823 (3d ed., 8 vols., Budapest 1873) ;*

HORWICH, England, a town in Lanca¬ shire, four miles west-northwest of Bolton. The chief industries are railway works, coai mining, paper and cotton manufacture and stone quarrying. The town owns its water supply. Pop. 16,500.

HOSANNA, ho-zan'na, the cry of those who greeted Jesus on his last entry into Jeru¬ salem (Matt, xxi, 9; Mark xi, 9; John xii, 13). The use of the word in different places has led to some disagreement of authorities as to its ex¬ act meaning. In Mark xi, 9 and John xii, 13, it stands alone; while in Matt, xxi, 9 and 15 it is followed by r

interpretations by Clement of Alexandria and Augustine, it is generally assumed that the word was a form of joyous interjection, equivalent to the Englishv <(Hail !» Consult Dalman, (2d ed., New York 1907).

HOSEA, ho-ze'a, the first in order among the minor prophets of the Old Testament, but more probably the third in order of time. Noth¬ ing is known of his life, except what can be gathered from the introduction to his prophecies, namely, that he was the son of Beeri, and that his ministry belonged to the reigns of Uzziah, Jotham, Ahaz and Hezekiah, kings of Judah, beginning probably about the end of the reign of Jeroboam II, king of Israel. See Hosea, Book of.

*HOSEA. A Hebrew prophet whose re¬ corded ministry was slightly later than that of Amos, the first ˆwriting prophet.® Hosea was evidently, like Elijah, a citizen of the northern kingdom, to whom the king of Samaria was *<0Ur King,® while Amos came from his home in Judah to preach in Israel. The first three chapters of the book of Hosea have as their historical background the closing years of the prosperous reign of Jeroboam II, which ended about 740 c.c. Chapters iv-xiv carry us into the first years of the period of anarchy that fol¬ lowed Jeroboam's death. The second part of the heading of the book — in the reign of Jeroboam the son of Joash — probably belonged to the original title of chapters i-iii, while the first part of the heading naming a series of Judean kings may have been added by a later editor, in the southern kingdom, who knew that Hosea's ministry continued after the death of Jeroboam. Hosea's personal life was a tragedy; his wife, whom he loved with deep devotion, proved to be a wanton who left him for her lovers. At last, deserted of these, she fell into slavery and then her husband bought her back to protect her. Though he could not receive her now into the fellowship of a wife, he him¬ self would marry no other. Out of such bitter experience as this, Hosea learned the great lesson of Divine love which he was the first to frame in human speech.*

As a literary whole, the book is clearly divided into two main sections, corresponding to the two different periods of Hosea's ministry. (1) Chapters i-iii, Hosea's love and Gomer's faithlessness, . an allegory of Jehovah and Israel, his faithless wife. (2) Chapters iv-xiv, a series of discourses on Israel's guilt and pun¬ ishment, with glimpses of Jehovah's unchang¬ ing love and readiness to restore after purifi¬ cation.

The great question of debate in connection with this book has been the true character of chapters i-iii; do these reflect Hosea's actual experiences or are they pure allegory? The great difficulty in the way of literal interpre¬ tation has been that Hosea seems to say that he received Divine command to marry a woman who was a profligate. When it is recognized that the Hebrew prophets are wont to interpret God's guidance in the light of later

experience and, in their vivid mode of speech, to style this guidance through experience as the command of God, the difficulty disappears. The succes¬ sion of names given Gomer's children accords

with the view that it was slowly through the years that the conviction of his wife's character was forced upon Hosea's mind. This interpre¬ tation fits, too, with the thought of the latter part of the book that Jehovah had betrothed Israel to himself as a pure bride and that afterward she proved untrue. The prevalent view to-day is accordingly that Hosea married one whom he supposed to be pure. To his first child he gave the name Jezreel as a prediction that Jehu's bloody work in the valley of Jezreel must be avenged upon his dynasty. As time went on and other chil¬ dren were born, he came to know that his wife was indifferent to him and sought other lovers. The names of the later children contain sug¬ gestion of their mother's faithlessness. In his own bitter sorrow, Hosea came to see and un¬ derstand something of the sorrow of Jehovah's heart for a people blind to his loving care, who turned away unto other gods.

In the second part of the book, this blindness, ignorance of God, is the explanation of the complete dissolution of society that followed so quickly upon Jeroboam's death. The king's son reigned but six months and was then struck down by an assassin; a month later the mur¬ derer met a similar fate. Drunkenness and all debauchery characterized the upstart monarchs who in their political weakness turned now to Egypt and now to Assyria for support. In the land there was not truth nor knowledge of God; naught but swearing, lying, killing, steal¬ ing and adultery. Again and again the prophet returns to the root of the nation's troubles, that they know not Jehovah; their sacrifices are not acceptable because they have forgotten their Maker. In Hosea's time, the licentious symbols and rites of Canaanite Baal worship were still mingled with the worship of Jehovah, whose distinctive character was not understood. Through all that is hopeless in the second sec¬ tion of the book there runs also the deep cur¬ rent of conviction that Jehovah's love is un¬ changeable and that he cannot give up his people to irreparable doom, despite their sensual blindness. The prophet's thought swings be¬ tween hope and doom as he contemplates now the brutishness of the people and now the un¬ changing heart of God. His experience of life has been too deep to permit him to fall into the childish error of supposing that the Divine love can obliterate sin and its effects where there is no answering love and penitence. He knows that there must be long and desolate expiation before there can be any future of hope for his nation. Hosea's ethical teaching corresponds with his conception of God. With him kindness is Jehovah's supreme demand for man's conduct toward man ; but again he does not fall into the error of supposing that a sentimental kind¬ ness can supersede the claims of justice.

As poet and preacher, Hosea combines deepest insight with compelling emotion and a picturesqueness of speech that has rarely been surpassed in any age or nation. The influence of the rounded hills and broader, more fertile valleys of Samaria are felt in his pages, in contrast to the rugged wilderness reflected in the words of Amos. The luxuriant vine that putteth forth his fruit, the morning cloud and the dew that goeth early away are in pleasing contrast with the fierce and bloody pictures of man's deeds, and yet even these gentler aspects

of nature are made, in the prophet's speech, tell¬ ing means of presenting man's weak and wanton ways. In his intense emotion, the prophet iden¬ tifies himself now with God and now with the people in a way that gives dramatic power to his words. Although the opening chapters re¬ flect actual experiences of Hosea and Gomer, they picture also God and Israel in such a manner as to give the elements of a true alle¬ go ry. Later in the book (chapter xi) the char¬ acters change from husband and wife to cherish¬ ing father and wayward son ; here Hosea gives us the first clear presentation of God as the loving father, but it is the father of the nation, not of the individual. The full revelation of the relation of God to the individual must wait deep and terrible experiences of national failure.

Bibliography. — Batten, L. W., (The He¬ brew Prophet-' (London 1905) ; Buttenweiser, M., (The Prophets of Israel > (New York 1914) ; Cornill, C. H., Hntroduction to the Canonical Books of the Old Testament (Lon¬ don 1909) ; Creelman, H., Hntroduction to the Old Testament (New York 1917) ; Driver, S. R., Hntroduction to the Literature of the Old Testament (New York, revised ed., 1914) ; Encyclopedia Biblica* (New York 1901) ; Fowler, H. T., 'History of the Literature of Ancient IsraeP (New York 1912) ; Harper, W. R., Amos and Hosea) (in Hnternational Criti¬ cal Commentary, New York 1905); Hastings, J., dictionary of the Bible* (New York 1900) ; 'Jewish Encyclopaedia* (New York 1904) ; Kent, C. F., (Sermons, Epistles and Apocalypses of Israel's Prophets) (in 'Student's Old Tes¬ tament,) New York 1910) ; Smith, G. A., 'The Book of the Twelve,* Vol. I (in 'Expositor's Bible,* New York 1896) ; Smith, J. M. P., 'The Prophet and His Problems) (New York 1914).*

Henry Thatcher Fowler, Professor of Biblical Literature and History, B ro wn Un iversi ty.

HOSIERY AND KNIT GOODS IN¬ DUSTRIES IN THE UNITED STATES.

Most of the history of the hosiery industry re¬ lates to inventions of knitting machinery. The first knitting machine, invented in 1589 by Wil¬ liam Lee, an Englishman, knit a complete course at one operation. His machine had hooked, spring needles, which are still generally used. In Europe nearly all hosiery is knit on machines, the original type of which was patented in England by William Cotton, in 1864. These machines have flat frames and spring needles. The leg is knit on a legger, usually of 18 sections, each section knitting one stock¬ ing, and the foot on a footer, usually of 20 sections. The fabric is knit flat, varying in width to fit the slopes of the foot and leg. On the top of ladies' stockings is knit a welt. The toe and heel are closed by a looping machine, the sole and back of the leg by a sewing machine. The product is called full- fashioned hosiery.

A circular machine, invented by Decroix, in France, in 1798, did not come into general use. A latch needle was invented in 1847, by Matthew Townsend, of England, who died in America. Many knitting machine inventions have been made by Americans, and this is true especially as to machines for knitting seamless hosiery. Such a machine was patented, in 1860, by William Goddard, of New York; and im¬

proved machines, largely automatic, were in¬ troduced, in 1889, by Branson & Son, of Phila¬ delphia. Seamless hosiery is produced by latch needles on small, circular machines, which revolye with great rapidity. The finest quality is knit on machines with 2\l/2 needles to the inch, making that many stitches per inch. The ribbed part of half-hose and children's socks, full-fashioned or seamless, is knit on a ribbing machine, and then transferred to the machine which completes the knitting process, Sewing machines close the toe and make the welt of seamless hosiery. With seamless machines hosiery is knit which, shaped to some extent by loose or tight tension, does not conform so closely to the ankle and leg as full-fashioned hosiery, but the cost of production is consider¬ ably less. One skilled man and a boy attend two full-fashioning leggers or one footer, while one comparatively unskilled operator attends as many as 15 to 20 machines knitting plain seam¬ less hose for ladies. The quantity produced is much greater per operative on seamless ma¬ chines. than on full-fashioning machines. The operatives in mills manufacturing both hosiery and other knit goods are mostly women; opera¬ tives on full-fashioning machines are men ex¬ clusively, and on seamless machines women.

Inventions have made seamless machines more and more- automatic. By 1910 there were in use machines that had five or six self-acting yarn changes, by which it became possible to insert a finer yarn on the top of the foot, in the instep and on the lower part of the leg than in other portions of the fabric, to insert heavy strong yarn in the toe and heel and to reinforce them, also to make horizontal stripes. With these machines silk or artificial

silk can be plaited on cotton, and an anti-run back course knit to prevent raveling from garter tears. By a new invention, the welt is knit on seamless hose; by another, seamless half-hose, includ¬ ing the ribbed part, is knit on one machine ; by another, perfectly fashioned seamless hosiery, with closed toe, is knit on a machine, which is neither flat nor circular, but more like the former type; all of these being recent Ameri¬ can inventions, which, on account of restricted patent rights, are not yet in general use.

While hosiery manufactured in Europe is nearly all full-fashioned, some circular machines for knitting seamless hosiery were exported from America to European countries before the European War began in 1914, some even to Germany, until then the largest hosiery manu¬ facturing country in the world, and some to Japan and China. While the domestic product is mostly seamless, the desire of well-to-do Americans for the best fitting hosiery has led in recent years to a great increase in the domestic production of the full-fashioned kind, especially in silk. The full-fashioned product has been knit on flat machines of the Cotton type, most of which were imported from Ger¬ many, the remainder from England. In 1898 or earlier, however, full-fashioned machines of American invention were used in the United States. Such machines are simpler than those made abroad.

at tˆle Bailey Company, at Cohoes,

r ‘ eSan t° llse a power knitting machine for underwear, the first in this country. It was a circular spring-needle machine, and produced flat goods, that is, a flat-effect fabric. About

1858, Cooper & Tiffany patented in the United States a spring-needle machine for making iil»bed underwear. By 1882 flat underwear had been largely displaced by ribbed underwear. Before that year ribbed underwear was pro¬ duced by latch-needle machines of Philadelphia make. Spring-needle machines are used for the finer goods, but with latch-needle machines the production is greater at lower cost. To a small extent full-fashioned underwear is made in this country on flat machines of the Cotton type, but practically all is knit on circular machines that make a tubular fabric, which, when laid out, forms a continuous piece of goods of double thickness. After the fabric is cut into parts for garments, shirt cuffs, drawer bottoms and rib tails, knit on flat or circular ribbing machines, are attached by a looping machine, and the. parts are seamed by sewing machines.

Fabrics for knit underwear are now knit flat, ribbed, fleeced, balbriggan or mesh. Ribbed underwear is much more generally used than the other kinds. The fleeced fabric is napped by sharp-pointed needles on a napping ma¬ chine. Balbriggan is made of hard twisted yarn, of Egyptian cotton in the finer goods, and of yarn stained to resemble Egyptian for cheaper varieties. . About 1910 there were important changes in the underwear industry. Many people began to wear underwear knit of cotton instead of wool because they believed the former was sufficient protection against cold and more healthful. For summer wear, mesh fabrics began to supplant balbriggans. Sleeve¬ less shirts and knee-length drawers came into vogue. Union suits began to displace two piece suits. The knit underwear industry was af¬ fected also by the introduction of underwear made from woven material.

Statistics of manufacturing industries, col¬ lected in 1810, show that the value of hosiery produced then in the United States was $572,742. Hosiery manufacturing then was strictly a household industry, and before 1850 hosiery was chiefly the product of knitting needles plied by hand. Census statistics of the hosiery and other knit goods industries combined, first shown for 1849, appear in the accompanying table.

815; wool, $2,490,815; merino, $6,706,102; silk, $886,248; silk-mixed, $393,618; all other, $501,436. Total underwear, $93,119,085. Bath¬ ing suits, $2,033,889 ; gloves and mittens, $10,- 519,613; hoods, scarfs, etc., $3,456,326; cardigan jackets, sweaters, etc., $26,195,002; all other products, $25,490,398.

Hosiery and other knit goods were manu¬ factured in 34 States in 1914, and the value of the product in New York was $78,299,235 ; in F.U1 1 a > $64,153,449; in Massachusetts, $17,419,077; in Wisconsin, $13,292,305; in North Carolina, Ohio, New Jersey, Tennessee, Illinois, Michigan and Connecticut each, between $9,- 000,000 and $5,000,000. The population of the United States, excluding outlying possessions, increased 21 per cent between 1900 and 1910, while between 1899 and 1909, the domestic pro¬ duction of hosiery and other knit goods in¬ creased in value 108.8 per cent. During the five years from 1909 to 1914, the increase in pro¬ duction exceeded 100 per cent in Tennessee, Minnesota and New Jersey, and was be¬ tween 50 and 100 per cent in California, North Carolina, Wisconsin, Indiana and Georgia.

All imports of hosiery have been of the full- fashioned kind, and, under the Tariff Act of 1913, as well as under previous acts, most im¬ portations have been of the cheaper grades of stockings and of children's socks. The im¬ portations of cotton hosiery during the fiscal year ended 30 June 1914 amounted to $2,949,678, or less than 5 per cent of the domestic produc¬

tion in 1914. The imports of underwear have been insignificant as compared with the domes¬ tic production; during the fiscal year 1914, the importations of cotton knit underwear amounted to $341,973, or less than half of 1 per cent of the domestic production in 1914. Imports of woolen and silk hosiery and other knit goods have been very small. Before the war began in 1914, American seamless hosiery was exported to the United Kingdom in con¬ siderable quantities, to other European countries in smaller quantities, even to Germany, and to Canada, Mexico and South America. The ex¬ ports of cotton hosiery and other knit goods in¬ creased from $1,916,325 in the fiscal year 1909

Hosiery and Other Knit Goods Industries in the United States, 1859-1914.

Source: Census of Manufactures

1859

1869

1879

1889

1899

1904

1909

1914

Establishments . Value of prod¬ ucts .

Wage-earners. . . Wages .

197

$7,280,606

248

$18,411,564

14,788

398

$29,613,581

30,699

824

$67,446,788

59,774

1,006

$95,833,692

83,691

$24,434,497

1,144

$137,076,454

104,092

$31,614,607

1,374

$200,143,527

129,275

$44,740,223

1,622

$258,912,903

150,520

$59,758,151

The production of hosiery and knit goods in 1914 was $258,912,90 3, in detail as follows: Hose — cotton, $38,390,194; wool, $2,548,047; merino, $1,414,118; silk, $13,851,251; silk-mixed, $6,940,959. Half-hose — cotton, $21,241,280; wool, $1,327,439; merino. $3,384,831; silk, $4,- 701,969; silk-mixed, $4,298,502. Total hosiery, $98,098,590. Shirts and drawers — cotton, $43,- 097,937 ; wool, $3,448,575; merino,

$9,228,686; silk, $1,214,609; silk-mixed, $313,439; all other, $219,805. Combination suits — cotton, $25,617,-

to $2,546,822 in the fiscal year 1914, or over 150 per cent. Since 1914 exports have increased enormously.

Reports by the undersigned on the hosiery and other knit goods industries, published by the Bureau of Foreign and Domestic Com¬ merce, in 1915, contain a bibliography of both industries.

Walter B. Palmer,

Formerly Special Agent , Bureau of Foreign and Domestic Commerce.

HOSIUS (ho'shi-us) OF CORDOVA,

churchman of the 3d century: b. about 257; d. about 358. Sources concerning his life are limited to two letters, one to Emperor Constantine and one to Julius of Rome, and to allusions by contemporaries. He was probably made bishop about 295, holding the office until his death. He held steadfast in his faith and was not shaken by the per¬ secutions under Maximian. It is not cer¬ tain what part he played at the Synod of Elvira which he attended. For many years, Hosius was the intimate counsellor of Constantine in ecclesiastical matters, and was sent by him to Alexandria in 324 to settle the disagreements between the bishop there and Arius, and also concerning the celebration of the Easter holi¬ days. Subsequently, Hosius attended the Coun¬ cil of Nicsea, at which he exerted great influ¬ ence, though probably not in any official capac¬ ity. There is no doubt that Constantine's sig¬ nature to the decrees of the council was gained by his religious adviser. The next record of Hosius finds him at the Council of Sardica (343), where, with Athanasius, he formulated the creed of the council. About 10 years later he was invited by the bishops of the court party to join them in condemning Athanasius. This the loyal Hosius refused to do, and accordingly lost prestige in the favor of Constantine. When he refused for the third time to conform to the Arian creed, he was summoned by the em¬ peror to Sirmium, where he was kept practi¬ cally prisoner for a year, and was finally forced against his will to sign a compromise document formulated by Arian adherents. His signature was widely advertised, and his so-called con¬ version to Arianism used as a weighty argu¬ ment by the king's party. After this he was suffered to return to his office at Cordova. His letters are published in Migne, (Patrologia Lat¬ ina5 (Vol. VIII). Consult Gams, P. B., (Kirchengeschichte von Spanien) (Vols. II

and III, Regensburg 1864-79).

HOSLEY, Harry Hibbard, American naval officer : b. about 1855 ; d. 1908. Upon gradua¬ tion from the United States Naval Academy (1875) he entered the government naval serv¬ ice and became lieutenant (1889J ; lieutenant- commander (1899), and commander (1904). It was under his direction that the great dry dock Dewey, weighing some 11,000 tons, was hauled from Chesapeake Bay by way of the Mediter¬ ranean Sea, the Suez Canal and the Indian Ocean to Olongapo. The time spent in the journey was but seven months and 15 days, and the distance covered 13,080 miles. Hosley's last years were spent as supervisor of New York Harbor.

HOSMER, hoz'mer, Harriet G., American sculptor: b. Watertown, Mass., 9 Oct. 1830; d. 21 Feb. 1908. She became a modeler in clay, and after receiving a general education studied anatomy in a medical college at Saint Louis. Her first work, a reduced copy of Canova's Napo¬ leon, was followed by an ideal head of Hesper (1852). She went to Rome in 1852 and studied under John Gibson, the English sculptor. About this period she produced ideal busts of Daphne and Medusa, and in 1855 completed her first life-size figure, GEnone. To the same year belongs Puck, which gained her a great reputa¬ tion in the United States, and the next year she

executed a Will-o'-the-Wisp. The statue of Beatrice Cenci in the public library of Saint Louis was finished in 1857, and her colossal statue of Zenobia in 1859. Her next work was a statue of Benton, the Missouri statesman, a bronze cast of which was erected in Lafayette Park, Saint Louis. Other works are Sleeping Faun, exhibited at Dublin in 1865 and at Paris in 1867; a statue of the queen of Naples as the Heroine of Gaeta ; a monument to Abraham Lincoln; and Waking Faun.

HOSMER, James Kendall, American

librarian, biographer and author: b. Northfield, Mass., 29 Jan. 1834. After serving as a Unita¬ rian minister at Deerfield, Mass., 1860-66, and as a private in the Civil War, he was a pro¬ fessor in Antioch College, Ohio, and the Uni¬ versity of Missouri, in 1874— 92 was professor of English and German literature in Washing¬ ton University (Saint Louis, Mo.), and in 1892 became librarian of the public library of Minne¬ apolis. Among his works are (The Color Guard5 (1864), a record of experiences as a private in the Civil War; (The Thinking Bayo- net> (1865), a novel; (History of German Lit¬ erature (1879) ; (Life of Samuel Adams5 (1885) ; (Life of Sir Henry Vane5 (1888) ; (A Short History of Anglo-Saxon Freedom5 (1890); (How Thankful was Bewitched5 (1894); a (Life of Thomas Hutchinson5 (1896) ; (A Short History of the Mississippi Valley5 (1901) ; (The Louisiana Purchase-' (1902) ; (The Civil War in America5 (2 vols.,

(1912) ; (The Last Leaf — Observations during 25 Years in America and Europe5 (1912). He edited the Journal of the Lewis and Clark Ex¬ pedition (1904) and for the American Historical Association the Journal of Winthrop Ames (1908). He was president of the American Library Association 1902-03.

HOSPINIAN, Rudolf, Swiss Reformed writer: b. canton of Zurich 1547; d. Zurich, 11 March 1626. He studied at Marburg and Heidelberg and then returned to Zurich to preach and teach. He was head of the Karo- linenschule which was a part of the Great Min¬ ster from 1576-95. In the religious controver¬ sies of the time he championed the Reformed Church. His principal antagonists were Bel- larmine, on the Catholic side, and Hutten on the Lutheran. He was appointed archdeacon of the Great Minster at Zurich in 1588 and pas¬ tor of the Fraumiinster Church in 1594. His collected works were published by Heideffer (7 vols., Geneva 1681). The most prominent of these was (Historia Jesuitica5 (1619).

HOSPITALS, Field. In the United States army, the director of field hospitals is, like the director of ambulance companies, immediately under the division surgeon and is the latter's executive in respect to the field hospitals of the division.. His supervision over the field hospi¬ tals is similar to that exercised by the director of ambulance companies over those companies. He ordinarily accompanies the field hospital in advance on the march, remains with it in camp and keeps the division surgeon informed of his movements. He should maintain communica¬ tion with the director of ambulance companies, to enable that officer to make suitable arrange¬ ments for the removal of patients from the front, and with the surgeon in charge of the sanitary column from the advance section to

promote the rapid evacuation of patients to the rear.

1 he personnel of a field hospital at war strength are ordinarily assigned as follows: 1 major (commanding) ; 5 captains and lieuten¬ ants (1 adjutant and quartermaster, 4 ward sur¬ geons) ; 3 sergeants first class (1 acting first sergeant in general supervision of the hospital and in charge of medical property and records, 1 in charge of transportation and quartermaster property and records, 1 in' charge of mess sup¬ plies and cooking); 6 sergeants (1 in charge of the dispensary, 1 in charge of operating equip¬ ment, 1 in charge of patients' clothing and ef¬ fects; 3 in charge of wards) ; 3 acting cooks; 55 privates first class and privates (46 attend¬ ants, 1 dispensary assistant, 1 artificer, 4 order¬ lies, 3 supernumeraries) ; and of

the quarter¬ master corps, 1 sergeant (wagon master) and 7 privates (drivers).

The function of the field hospitals is to keep in touch with the combatant organizations and ito provide shelter and such care and treat¬ ment as are practicable for the sick and wounded of the division who are brought in by the ambulance companies until the sanitary service of the line of communications takes charge of. them. A field hospital can meet these requirements only when it is relieved so promptly by the sanitary units in the rear that its mobility is not interfered with. Prompt evacuation of the sick and wounded is neces¬ sary also it o secure for them the facilities for treatment and the comforts which are available on the line of communications.

On the march and in temporary camps, however, the field hospitals are the nightly col¬ lecting points for the divisional sick and in¬ jured who are unable to continue the march, and provide for the care of such patients until they can be turned over to the medical service of the line of communications or to a local hospital or hospitals. The use of the field hos¬ pitals for this purpose should be carefully reg¬ ulated by the division surgeon.

For service in combat, the locations of the field hospitals and the number to be opened will be determined by the division surgeon act¬ ing under the instruction of the division com¬ mander. The director of field hospitals will supervise their opening, giving the necessary orders therefor to the commanders of the field hospitals. He will report their opening to the division surgeon. It is desirable that they be centrally located and beyond the zone of con¬ flict, which will usually necessitate placing them three or four miles in rear of the dress¬ ing stations.

On receipt of an order to open a field hos¬ pital the following departments are established: Dispensary, kitchen, receiving and forwarding, slightly wounded, seriously wounded, operating room and mortuary. All wounded arriving are received at the receiving and forwarding de¬ partment, which is the administrative office of the hospital.

When no adequate provision is made for the evacuation of the sick and wounded and a field hospital becomes the nucleus around which a. camp hospital is developed, it becomes an immobile unit, and, if the troops to which it is attached should move, another field hospital is required to accompany them. If by reason of retreat or otherwise a field hospital is required

to move before it can evacuate its patients, its commanding officer takes

action similar to that prescribed for dressing stations in the like contingency.

Field hospital companies form part of the sanitary train and are set up, when conditions so warrant, three, or four miles from the battle field. Their position must be one accessible both from the front and rear and where good water is available.

Major Edward S. Farrow. HOSPITALS, History and Construction. History. — Hospitals in the sense of institu¬ tions for the care of the ailing poor first occur in history as Christian foundations. Public hospitals are mentioned by no classical writer before the time of Christ, and no trace of one is to be found in the explorations. As Meyer- Steineg points out, Vitruvius, the Greek archi¬ tectural authority, treats of every kind of public building, but not hospitals. Private hospitals were common enough among the Greeks, and many physicians set aside portions of their buildings for the care of patients. According to ancient Irish traditions (300 b.c.), hospitals of this kind were so common as to be the rule, and there were special Brehon laws regulating their ventilation and other conditions. In India there are some not very definite details with regard to hospitals for men and animals, even before the time of Christ. The only thing re¬ sembling our modern hospitals in ancient times were the valetudinaria for slaves, and the mili¬ tary lazarettos for wounded soldiers. These latter were supported by government funds. There were a number of health resorts, as at Cos and Epidaurus, but these were for the well-to-do and as in our time, were more fre¬ quented by neurotic patients than by the seri¬ ously ill.

With the advent of Christianity, there came a new development, and Christ's example in healing the sick made this one of the features of the early history of the Church. Saint Luke was a physician and emphasized this phase of Christ's work in his Gospel. Care for the ailing became a Christian tradition. A portion of the bishop's house in the primitive Church was set aside for the care of those who had no other shelter, and as Harnack notes, at times the bishop was a physician and gave medical attention to the ailing poor in them. Until' the end of the persecutions, there could be no pub¬ lic hospitals, but Saint Zoticus is said to have built one at Constantinople during the reign of Constantine. A letter of Julian the Apostate (361) makes it clear that the Christians had many such institutions, for he insists that the old Imperial religion cannot be brought back without charitable institutions similar to those of the Christians, where all, regardless of faith, were cared for. Saint Basil established a hos¬ pital at Caesarea in Cappadocia (369), which shows how seriously the duty of caring for the ill poor was taken. His foundation was out¬ side the city proper and was so extensive that it was called <(New Town.® There were

struc¬ tures for different classes of the needy, — for children, for the old, and strangers as well as the ill, besides buildings for physicians and nurses, workshops for what we have learned to call reconstruction work, and even industrial schools and an employment bureau. Basil's example was followed very widely throughout

the East. In the West the earliest hospital foundation, according to Saint Jerome, was that of Fabiola at Rome about the end of the 4th century. With it was connected a system of visiting the sick, Fabiola herself organizing it. In the hospital work of Christians there was no distinction of creed, and its open-hearted charity deeply influenced the people of the time.

After this, hospital development continues uninterrupted. The Hotel Dieu of Paris is said to have been founded in the 7th century, or perhaps the 6th. There is a record of a hospital in Spain at Augusta Emerita (modern Merida) in 580. This was for the ill, <(slave or free, Christian or Jew.® Charlemagne (circa 800) decreed that there should be a hospital in connection with every cathedral and monastery.

During the Crusades, the hospitals of the Hospitallers of Saint John of Jerusalem accom¬ plished an immense amount of good for the very large numbers of the Crusaders at long distances from their homes, in the East. Their hospital in Jerusalem is said to have accommo¬ dated 2,000 patients and became so famous for its successful effort to meet every need of the patients that according to an old legend, Saladin, the Sultan of the Saracens, went in disguise to the hospital as a patient to see for himself if it could possibly be true that so much was done for the patients there as he had heard. The hospital of Saint Mary Mag¬ dalene in Jerusalem was under the female branch of the Hospitallers which had another large hospital in the Holy Land and a number of branches in various parts of Europe to which the wounded and sick were sent to convalesce. These hospitals became famous for what they accomplished in times of emergency, famine, flood and epidemics, so that the institute would remind one in many ways of the Red Cross in the modern time. After some generations, when the Crusades were drawing to a close, the Hospitallers found it necessary to organize a military branch for the protection of pilgrims and of their convalescent patients on their way home. The word Knights was then added to Hospitallers as their title. This did not occur, however, until nearly a century and a half after they began their work. Both the men and women of the Order wore a rather striking costume with

a white cross prominently dis¬ played on the breast of it, so that they must have been conspicuous figures on the battlefield or near it, and there are traditions that both men and women in the Order served close to the lines. There was an immense outpouring of charity everywhere in Christian countries at this time, to enable these Orders to do their work, reminding the modern of our own suc¬ cessful organization of war activities. The resulting good example had much to do with the magnificent development of hospitals throughout Europe which occurred almost im¬ mediately after the end of the Crusades. With regard to this movement Virchow calls atten¬ tion to all that the Popes did for hospital encouragement. He has words of highest praise for Pope Innocent III who did so much for the creation of an extensive hospital system in Christendom. The Pope wishing to have a model hospital in Rome, sent for Guy of Mont¬ pellier (circa 1200), who, he was told, had organized the greatest hospital of the time in

that city. Guy was commissioned to establish a model hospital in Rome and planned the Santo Spirito in the Borgo not far from the Vatican which existed until our time. The Pope commended this hospital to bishops when they officially visited Rome, and recom¬ mended under conditions in which a recom¬ mendation was a virtual command, the establishment of similar institutions in their dioceses. As a result, nearly every town of 5,000 inhabitants or more in France, England, Italy, Spain and Germany came to have its public hospital in the course of the next 200 years. Virchow notes over 150 in Germany. Many of these hospitals were beautiful build¬ ings, and not a few of them in the more popu¬ lous centres were constructed so as to fulfil the most modern requirements. They were as a rule of single story, rather high, with windows Well up in the walls to avoid draughts ; with galleries for convalescent patients to sit in the sun and for nurses' observation, running along just below the windows; with tiled floors; with a kitchen in a separate building and surrounded by beautiful gardens. The hospital site was often fixed on a stream of water, sometimes an artificial islet being created which insured flow¬ ing water all around the hospital, for coolness and refuse disposal. Some of the hospitals in the cities in the Middle Ages were among the most beautiful of their public buildings archi¬ tecturally and their interiors were decorated by the great painters and sculptors of the time. Some of these in a lofty spirit of charity gave their services for this purpose. Sometimes artists who had been patients painted pictures for the hospitals out of gratitude for their treatment. A noteworthy example is Saint Jean at Bruges, where Memling's paintings visited at a franc per person still give a revenue of thousands of dollars a year. Wards were often built cruciform with an altar at the crossing where Mass was said every morning which provided religious consolation for the patients' thoughts during the day. The windows were often of beautiful stained glass with figures or Bible stories on them which occupied patients' minds.

Hospitals began to run down with the sup¬ pression of the religious houses in many countries after the religious revolt in the 16th century. They became state institutions under paid officials and above all women were replaced by men in control of them. The rule of history is that whenever women are not at least co¬ ordinate in authority and not mere subordinates in the care of the ailing, the old and children, serious abuses soon creep in. The lowest period of decadence in the history of hospitals came during the later 17th, 18th, and the first half of the 19th century. Jacobsohn, in his (Essays on the History of Care for the Ailing, says <(it is worthy of remark that attention to the well-being of the sick and improvements in hospitals and institutions generally, had a period of complete and lasting stagnation from the close of the Thirty Years War® (1648). He adds : <(The hospitals of cities were like*

prisons, with bare, undecorated walls and little dark rooms, small windows where no sun could enter, and dismal wards where 50 or 100 patients were crowded together, deprived of all comforts and even of necessaries. In the mu¬ nicipal and state institutions of this period the

beautiful gardens, roomy halls and springs of water of the old cloister hospital of the Middle Ages were not heard of, still less the comforts of their friendly interiors.® Garrison in his c History of Medicine says that*

The modern hospital revival began well after the middle of the 19th century, and in¬ deed did not make itself felt to any serious extent until after Lister's discoveries led to the development of modern surgery. Three things, good hospitals, good nursing, and good surgery, are inseparably bound together Dur¬ ing the period of fine hospital construction in the later Middle Ages, there was an excel¬ lent development of surgery and of nursing. Strange as it may seem, for several centuries at this time, serious operations were performed under an anaesthetic and surgeons boasted of getting union by first intention. They used linen soaked in strong wine as primary dress¬ ings for their wounds and this acted as an antiseptic. These mediaeval surgeons declared that it was not necessary to have pus in wounds, but that on the contrary the presence of pus was an index of negligence of the surgeon. Unfortunately, this teaching went out, to be followed, for some five centuries, by the doc¬ trine of laudable pus. As a result, hospitals became surgically unclean, and infections multi¬ plied to such an extent that surgeons feared to operate. Before Lister's time, a mortality of over 50 per cent of operative cases was not unusual in hospital experience. After Lister, the necessity of absolutely clean hospitals came to

be appreciated and hospital construction has

been largely influenced by the necessity of avoiding infection to as great an extent as possible. Practically all the developments in hospital building in recent years are made with an eye single to facilitating such care of patients as will prevent their becoming infected or com¬ municating any infection to other patients or leaving anything after them that might prove a source of danger to subsequent inmates.

Construction. — The old-fashioned method of building hospitals came to an end when under the initiative of Dr. John S. Billings, Assistant Surgeon-General and Librarian of the Surgeon General's Library, special studies were made for the erection of the Johns Hop¬ kins Hospital in Baltimore (1875). After this, much less attention was paid to the outside of hospital buildings, and the inside became the subject of intensive study so as to be adapted to various purposes of hospital work. Ques¬ tions of ventilation, of floor space and of ar¬ rangements for the convenience of patients and physicians, with the proper segregation of in¬ fectious cases medical and surgical, and the provision of convenient rooms for laboratories and dietetic equipment, were now the main purpose of hospital architects. A new school of hospital architecture arose and America came to be the centre of world attention in hospital construction. Appropriate rooms were supplied for the hospital resident staff who, as late as the 1860's, were often crowded into a single room, four, six, or even eight together, sometimes with no other place for study or relaxation. This sadly interfered with their work and its usefulness for themselves and the patients. With the coming of the trained nurse, fitting quarters had to be provided for her, and training schools gradually added, be¬ cause it was found that it was through them that hospitals could best secure this valuable adjunct. Once these principles were clear, the erection of hospitals excellently adapted to the needs of modern medicine and surgery went on apace here in America, until now there are altogether some 5,000 hospitals in the country. Many large industrial corporations have met the problem of caring for the injured among their workmen in special hospitals where the nursing and medical and surgical attention is supplied by the employers.. Some not using heavy machinery provide a physician and nurse in attendance during the day in special hospital quarters, because it has been shown that in this way the health of working people, particularly women, can be better conserved and absence due to sickness with consequent reduction in commercial efficiency greatly lessened. These hospital quarters are often built with every modern detail and are models of their kind.

The features of modern hospitals that are most important are the reception rooms and the operating rooms. The reception rooms should provide a special apartment for emer¬ gency operating and all the patient's outdoor

clothes should be removed there, transferred immediately to a sterilizing room and then placed in lockers to be kept until the patient needs them on exit. Except in emergency sur¬ gical cases where there is shock, the patient is thoroughly bathed before being dressed in the regular hospital garments and then transferred to the ward. Private patients are taken directly

to their room and cared for on similar prin¬ ciples.

The heart of the modern hospital is the operating room. The supreme idea in the construction of this is cleanliness, though light is a very important secondary consideration. If possible it is built with a northern exposure on the top floor of the hospital both for light and air, as well as that in this situation only those approach it who have business there. It is thus less exposed to the infections that might be brought in from outside. The per¬ fection of artificial light in our day has made the natural lighting problem of ever so much less significance than it was and has facilitated emergency operations at night, even in the receiving ward on the lowest floor, when time is vital. For the sake of surgical cleanliness, the operating room is floored with tile, and the walls for some distance up are made of the same material or of some very hard cement coated with enamel paint that can be thoroughly washed. If there are places for students, these are of limited extent, are made of polished artificial stone or other unabsorbent material with metal railings and usually furnish only standing space. The old surgical amphitheatres built of wood, whose central arenas after a time must have been quite impossible to clean sur¬ gically, are a thing of the past. Where they are still used, it is only because of the neces¬ sity of teaching large numbers of students and then only for already infected cases. Operating tables have become elaborate apparatus, making it possible to put the patient in any position required, and yet so constructed of polished metal, commonly nickeled, that surgical clean¬ liness is facilitated.

The operating room is connected with a series of rooms for the sterilization and storage of dressings, for the anaesthetizing of patients, which is no longer done in the operating room as before; for the transfer of soiled dressings, and other such material, so as to be sure that the sterilizing room will be saved from all con¬ tact with possibly infected matters, and some¬ times with temporary rooms for the treatment of shock after the operation, so that patients may not have to be moved far, nor subjected to the almost inevitable draughts of corridors and elevators during removal after the opera¬ tion, until the reaction has begun. The im¬ provement of the

elevator has greatly facili¬ tated hospital work and the ready removal of patients, making the presence of the operating rooms on the top floor in the warmest part of the hospital possible. Wheel carriages of vari¬ ous kinds add to these facilities so that there is very little of that disturbance in moving patients which was almost inevitable under older conditions.

In the operating room itself, all water con¬ nections are so arranged that they can be turned off and on either by the foot or knee, so that there is never any need for the surgeon or his assistants to touch any object with the hand when once cleansed for operations. Instrument cases, if placed in operating rooms, are now made entirely of glass and metal, though preferably there is a special instrument room. Tables on which instruments and dressings are placed are made of metal and glass, the metal usually finished with white enamel paint, easily cleaned, revealing the slightest trace of dirt.

As an additional precaution the operating, dressing, and instrument tables are covered with sterilized materials just before the opera¬ tion. These are changed between all successive operations. All these apparatus are mounted on casters usually of metal or porcelain so as to facilitate necessary movement by simple touch without the necessity of lifting.

The hospital kitchen has grown greatly in importance, and then there are. special diet rooms and apparatus for keeping things warm on each floor or with each ward. These are not directly connected with wards, but open out upon the corridor. The development of bath¬ ing arrangements in recent years, private baths in connection with many of the private rooms, and a number of baths for ward patients is another important advance of modern times. Corridors of the hospital are usually in slate or tiling with rounded joints to facilitate wash¬ ing at the angles, though artificial stone floors of various kinds have recently been used for this. These are hard on the feet of nurses, hence the use of compressed cork which is now coming in.

Ventilation is one of the most important requirements for good hospital work. To se¬ cure this, patients must have a definite amount of air space. It has been decided by experts that the minimum square feet of floor space and of cubic feet of air for each patient must, according to age, be in accordance with the following table :

MINIMUM SQUARE FEET OF FLOOR SPACE.

Adults Children Babies

In private rooms . 90 75 55

In wards . ; . 80 65 45

MINIMUM

CUBIC FEET OF AIR

SPACE.

Adults

Children

Babies

In private rooms. . . .

. 900

675

500

In wards .

. 800

600

400

Experience has shown that in wards there should be at least eight feet from centre to centre of beds. If there are two rows of beds in the ward, then the ward must be at least 24 feet wide, for the beds should not be placed nearer than \l/2 feet from the wall. The beds themselves should be 6j/2 feet long, with 8 feet of corridor space between them.

Another feature of the modern hospital in which there has been reversion to old time hospitals is in the arrangement of the gardens. Mediaeval hospitals usually had pretty gardens around them which made pleasant vistas from the doorways and windows and restful resorts for convalescent patients. Landscape archi¬ tects are now asked to design hospital gardens and some of these are very beautiful. Such pleasant surroundings are considered a very important addition to other modes of thera¬ peutics affecting patients' minds very favorably.

Bibliography. — Aikens, (Hospital Manage¬ ment (Philadelphia 1911) ; Clay, (The Medie¬ val Hospitals of England (London 1909) ; Hornsby and Schmidt, (The Modern HospitaP (Philadelphia 1913) ; Jacobsohn, (Beitrage zur Geschichte des Krankencomforts) (in Deutsche Krankenpflege*

Zeiiung 1898) ; Meyer-Steineg, ˆranken-Anstalten im griechisch-romischen AltertunP (Jena 1912) ; Nutting-Dock, his¬ tory of Nursing) (New York 1907) ; Stevens, (The American Hospital of the Twentieth

HOSPITALS

Century) (New York 1918); Virchow,

James J. Walsh, M.D.

HOSPITALS, Military. Military hospitals were organized under the Greeks and Romans but only for their own soldiers. Enemy wounded were neglected, often even delib¬ erately maltreated, sometimes massacred. They often became slaves upon recovery. With Christianity, better conditions prevailed but war always lessened the feelings of humanity. Queen Isabella of Spain is one of the first in history to have insisted that enemy wounded must be cared for like her own soldiers. She organized camp hospitals first in modern time. Early in the 16th century, Camillus of Lellis founded an association for the care of wounded on the battlefield, which wore as a symbol of its special mission a red cross. Later he founded a religious order whose aim was the care of the wounded in battle, and also the plague stricken and others in need at critical times and who visited the sick in their homes. All this pioneer work in the organization of care for wounded soldiers had been lost with the descent of hospitals and nursing which reached its lowest ebb in the mid-19th century. The awful neglect of the wounded in the Crimea (1854) led to Florence Nightingale's work and the reform of hospitals generally. Modern military hospitals have the advantage even when in but temporary quarters, of recent progress in hospital construction and organiza¬ tion. When they are single story barracks, they are thoroughly clean, with abundance of light and air and careful arrangements to pre¬ vent contamination of the quarters. The oper¬ ating room is the heart of the military, as of the civil hospital and is thoroughly equipped. Floors are made of matched boards if not of cement or tile and an abundance of water used for cleansing. Separate rooms for anaesthesia, for sterilizing, for the disposal of septic ma¬ terials, are provided, so there is as little likeli¬ hood of infection within the hospital, as in any good city hospital.

Special care is taken that the hospital shall be free from the visits of flies and in malarial and yellow fever regions, of mosquitos and that the body vermin shall be destroyed without any possibility of transfer to others. These little pests as they were considered, have been proved to be the distributors of disease which caused more deaths than the bullets of the enemy. The situation of the hospital then is usually such that it is out of direct contact with the camp, and separate buildings are provided for infections of various kinds. Excreta and all absorbent materials that had been in contact with infectious cases are incinerated, special provision being made for this. Proper cleanli¬ ness requires a large supply of water,

nearly 10 gallons a day, for each man. Anything less than 10,000 gallons for 1,500 men is too small an amount. Probably the most important fac¬

tor for the saving of human life in modern hospitals has been the introduction of the trained nurse since Miss Nightingale's time. Good nursing, that is faithful care and skilled observation, so that any threatened symptoms will be noted at once, regular, appropriate meals, and thorough personal cleanliness of the patient account quite as much as the modern expert surgical treatment for the lessened mortality of wounded soldiers in war.

In times of peace or in territory not the scene of active military operations hospitals are established at the various camps or posts under the charge of the senior medical officer of the camp or post to take care of the sick. For the care of the more serious, complicated or ob¬ scure cases department and general hospitals are organized. General hospitals are under the exclusive control of the surgeon-general except as to matters which concern the admin¬ istration of military justice. They are staffed by officers of the medical and dental corps, men of the hospital and quartermaster corps, nurses belonging to the army nurse corps, and civilian employees. Permanent general hos¬ pitals are established at Hot Springs, Ark., for the treatment of such diseases as are benefited by the waters there, and at Fort Bayard, N. M., for the treatment of pulmonary tuber¬ culosis. Additional general hospitals may be established by the surgeon-general in wartime at such places as he considers most suitable. At points of embarkation where there are no general hospitals, port of embarkation hospi¬ tals may be established under the surgeon of the port of embarkation. Special general hos¬ pitals may also be organized for the care of prisoners of war.

In time of war and in the zone of operations, the field hospital is that unit of the medical service known by the name of hospital which is nearest the front. Its personnel consists of 1 major in command, 5 junior officers, 3 ser¬ geants, first-class, 6 sergeants, 3 acting cooks and 55 privates or privates, first-class, in addi¬ tion to 1 sergeant and 7 privates of the quar¬ termaster corps. Its function is to shelter and care for. the wounded and sick as they are brought in from the firing line until the sani¬ tary service of the communications can remove them. Field hospitals are attached to divisions, and are used on the march or in temporary camps for the care of the divisional sick or in¬ jured until they can be. sent to local hospitals or to the rear. In action, the divisional sur¬ geon determines the position of the field hos¬ pitals, paying due attention to securing for them a central position, easily accessible, with good water, and if possible with suitable build¬ ings. The field hospitals are opened by order of the division surgeon to the director of field hospitals on his staff as soon as the number of wounded justifies it. Patients are sent as soon as possible from the field

hospitals to the evacu¬ ation hospitals (two to a division) on the line of communications. The evacuation hospital is manned by a lieutenant-colonel, a major, 14 captains and lieutenants, 8 sergeants, first-class, 20 sergeants, 10 acting cooks and 141 privates first-class and privates. The evacuation hos¬ pital replaces the field hospitals and allows them to move on with their divisions. Like a field hospital, an evacuation hospital continu¬ ally sends to the rear all who can be moved.

They are received by the base hospitals, which are located in buildings, if possible, at the base of the line of communications. They are under the charge of the surgeon of the base group on the line of communications. The establishment of a base hospital consists of a colonel, a major, 18 junior officers, a dental surgeon, 8 sergeants, first-class, 16 sergeants, 14 acting cooks, 115 privates, first-class, and privates, and 46 fe¬ male nurses. The base hospital is the place where definitive treatment is given to the men from the field and evacuation hospitals. They only send home those who are permanently dis¬ abled and those whose recovery will consume a long time, unless their capacity is exceeded. Special hospitals may be formed for other causes, as for contagious diseases. Military hospital organization in foreign countries fol¬ low the principles here outlined, though differ¬ ing somewhat in details. Consult the (Manual for the Medical Department, United States Army (Washington 1916) ; and the corre¬ sponding publications of foreign governments. See Ambulance Companies; Army Organiza¬ tion; Hospital Corps; Hospital Ships; Hos¬ pital Trains ; Red Cross.*

James J. Walsh, M.D.

HOSPITAL, Psychopathic. Psychopathic hospitals (psychiatric clinics, psychiatric insti¬ tutes) are institutions for the specialized care and investigation of mental disease. They represent the application of general hospital ideals and investigative standards to the problems of disorders of mind. They are in¬ stitutions for the first care and observation of mental cases, for treatment of the acute and curable cases, for special investigation into the causes, types and treatment of the mentally dis¬ ordered, for the study of cases in which nervous or mental disease or defect is suspected to be the cause of conduct disorder, and for the in¬ struction of students and physicians.

There are about 60 such institutions in the world, over half of them in German-speaking countries. Some have grown out of general medical

clinics, many (especially in Prussia) from the necessities of teaching in insane hos¬ pitals, others as specialized institutions, be¬ cause of elevating the standards of care and study of the insane. Eight such clinics were established in Germany from 1866 to 1882. The first specially constructed institute was that at Halle, opened in 1891 under the direc¬ tion of Hitzig, who was famous for the dis¬ covery of the electrical stimulability of the brain cortex. At the present time there are some 25 such clinics in Germany with capaci¬ ties from 60 to 300 beds.

Institutes of a somewhat similar type have been opened in practically all the European countries and in Japan. Some of them are ad¬ ministered as departments of general hospitals, others are related to insane hospitals.

There are six institutions of this general type in the United States. The Psychiatric (originally Pathological) Institute of the New York State Commission on Insanity was reorganized with clinical as well as pathologi¬ cal aims in 1902, under Dr. Adolf Meyer. This is almost purely a research and instruction in¬ stitute, since the patients are derived from among those sent to the Manhattan State Hos¬ pital where the institute occupies quarters.

Cases which the institute desires to study are sent to special wards.

The Albany, N. Y., General Hospital opened a ward called Pavilion F, for the observation and treatment of mental cases in 1902. In the same year the Bellevue and Allied Hospitals were established in New York and the psycho¬ pathic service was augmented. This service now deals with a great number of patients in the course of a year, chiefly as an observation or detention ward prior to commitment.

In 1906, the State Psychopathic Hospital at the University of Michigan, Ann Arbor, was opened with Dr. A. M. Barrett as director. This hospital comes very close to the European ideal but its bed capacity is somewhat limited and there are certain restrictions on the volun¬ tary admission law which interfere to some ex¬ tent with its work.

In 1913, the Phipps Psychiatric Clinic at Johns Hopkins University in Baltimore, Md., was opened under the direction of Prof. Adolf Meyer. It approximates closely the ideals of the foreign clinics.

In 1912, the Psychopathic Department of the Boston State Hospital, or as it i$ commonly called, the Boston Psychopathic Hospital, was opened under the direction of Prof. E. E. Southard, and maintains an active clinical service as well as pathological service for the Staite Commission on Mental Diseases.

Such institutions are important forces in the modern movement for mental hygiene. They are valuable centres for the mental health of the community. They represent the appli¬ cation of the highest standards to the problems of mental disease and such an institution should be provided for every large city.

Lawson G. Lowrey, M.D.

HOSPITAL CORPS, United States Army, a branch of the United States Mili¬ tary Medical Service, established by the act of 1 March 1887. It consists of sergeants, first class, sergeants, corporals, acting cooks, pri¬ vates, first class, and privates, and has as its function the performance of all necessary hos¬ pital services in camp, garrison and field, in¬ cluding ambulance service. Sergeants, first clkss, and sergeants are appointed by the Secre¬ tary of War upon passing an examination pre¬ scribed by the s-urgeon-general. Acting cooks are promoted by an officer commanding any hospital or sanitary formation from among the privates and. privates, first class, employed therein. Enlistments are made by medical offi¬ cers by the authority of the surgeon-general or department surgeon. Men may also be transferred from other branches of military service. See Ambulance Companies; Army Medical Corps; Hospital, Military.

HOSPITAL CORPS, United States Navy, a branch of the United States navy under the control of the Bureau of Medicine and Surgery which has the duty of performing all necessary medical and hospital service at naval hospitals, naval stations, navy yards and marine barracks, and on vessels of the navy, coast survey and fish commission. It was es¬ tablished by the act of 17 June 1898. It con¬ tains chief pharmacists (commissioned warrant officers), pharmacists (warrant officers), hos¬ pital stewards (chief petty officers), hospital ap¬ prentices, first class (petty officers, third class),

and hospital apprentices (seamen, second class). All enlistments except for the rate of hospital apprentice must be addressed to the surgeon- general. Hospital apprentices may be examined and enlisted at any navy yard or recruiting sta¬ tion. Men in other branches of navy or marine corps service are eligible for transfer to the hospital corps. All promotions are made by examination, and the total number of phar¬ macists and chief pharmacists together is limited to 25. The hospital corps men on board ship form what is known as the surgeon's division. Schools for hospital corps men are maintained at the training stations at Newport, R. I., and San Francisco,

Cal.

HOSPITAL SHIPS. By the regulations for the government of the navy of the United States, ships may be designated by the Navy Department as hospital ships. In all matters concerning their use as hospitals, they are as¬ similated to hospitals on shore, and are under the control of the Bureau of Medicine and Sur¬ gery of the United States navy. They are com¬ manded by naval medical officers not below the rank of surgeon. The commander has under him a merchant crew and officers, for the pur¬ pose of navigation, and a detail from the hos¬ pital corps of the navy, together with such female nurses and junior medical officers as may be required. The ship is considered to be a naval auxiliary, and in all non-medical mat¬ ters is subject to the inspection, care and super¬ vision of the supervisor of medical auxiliaries. The merchant crew is under the command of its master, who is in full control of its discipline and the navigation of the ship. Hospital ships are for the sole purpose of the care of the sick and wounded of the navy, marine corps and army, and of the shipwrecked or other persons needing medical assistance. They are forbid¬ den to carry any officers or men not sick, dis¬ abled or shipwrecked besides their complement, or any contraband of war except the coal and stores needed for upkeep and movement. Strict neutrality is enjoined on all hospital ships, and they carry no guns or ammunition not neces¬ sary for the protection of the sick and wounded and the maintenance of order on board. Naval hospital ships fly the Geneva cross at the main instead of the narrow pennant and are painted white, with a horizontal band of green a meter and a half wide. In 1916 the only naval hos¬ pital ship of the United States was the Solace , of 5,700 tons, with a complement of 59 hos¬ pital corps men and 100 in the merchant crew. It was used for hospital purpose with the fleet in time of peace. The army also provides on oversea expeditions hospital ships which are manned by the medical department as far as their medical aspect is concerned, and ships for patients, which are ordinary transports or merchant vessels put into temporary medical use. The medical complement of a hospital ship of 200 beds consists of 1 lieutenant-colonel or major; 4 junior officers; 1 sergeant, first class ; 4 sergeants ; 5 acting cooks ; 30 privates, first class, and privates. When hospital ships are furnished by the American Red Cross, they are likewise commanded by army medical offi¬ cers. Hospital ships are also used for the conveyance of medical department personnel and supplies.*

The second Geneva Convention of 1868 pro¬ vided that hospital ships, merchantmen having VOL. 14 — 28

wounded on board and boats picking up the wounded or shipwrecked should be neutral and immune from attack or capture. They are painted in the manner which has been described for the United States navy if they

belong to a government, and with a similar red stripe if they belong to an aid society. They fly the Red Cross flag besides the national ensign, and are not allowed to carry arms. They lose their rights to neutrality if they are used for other than strictly medical purposes.

Civilian hospital ships may be classed under two heads : those that work among the merchant fleet ; and those that work primarily among the children of the great cities, giving them the benefit of sea air and a respite from the sum¬ mer heat during their sickness. The United States coast-guard cutter Androscoggin has been fitted out as a hospital ship under a sur¬ geon of the public health service for service among the fishing fleet of the north Atlantic, and the same sort of duty was done by a French ship, the Saint Frangois d' Assise. Of the second class, the Boston Floating Hospital and the hos¬ pital ship maintained by the Bellevue Hospital of New York city are good examples. The latter ship is used primarily for tuberculous ' cases, and is in commission throughout the year. See Army Medical Corps; Geneva Conventions; Hospital Corps, United States Army; Hospital Corps, United States Navy; Red Cross Societies; War, European.

HOSPITAL TRAINS. See Hospitals, Military.

HOSPITALLERS, mediaeval charitable brotherhoods whose members devoted them¬ selves to tending the sick in hospitals. The name was specially applied to an order of the Knights of Saint John. See Orders, Religious.

HOSPODAR, hos'po-dar, a title formerly worn by the governors of Moldavia and Wallachia, signifying, in its simplest deriva¬ tion, ˆmaster.® The title was also applied to the princes of Lithuania and Poland, and to the emperor of Russia.

HOS.S, Elijah Embree, American Meth¬ odist Episcopal bishop : b. Washington County, Tenn., 14 April 1849; d. 23 April 1919. He was graduated at Emory and Henry College, Vir¬ ginia, and was ordained in the ministry of the Methodist Episcopal Church South in 1870. He was incumbent of the pastorates at Knoxville, Tenn., San Francisco and Asheville, N. C., successively. From 1876-81 he was president and professor at Martha Washington College, Abingdon, Va., and was connected with Emory and Henry College from 1881-85, first as vice-president and then as president. He was pro¬ fessor of ecclesiastical history at Vanderbilt University from 1885-90, and editor of the Nashville Christian Advocate (1890-1902). After May 1902, he was a bishop, with resi¬ dence at Muskogee, Okla.

HOST, or HOSTA SACRA (sacred host), in the liturgy of the Catholic

Church, the body of Christ present in the sacrifice of the Mass under the appearance of bread (see Eucha¬ rist; Transubstantiation). The Latin word hostia denotes that which is offered in sacrifice ; hence in the Mass, where the victim is the same who offered himself on the cross, ((the cup® is no less the hostia than is ((the bread® ; but usage

has sanctioned the appropriation of the word host to the latter. In the canon of the Mass, the priest, in offering the consecrated elements to God the Father, speaks of both the (

HOST, a term in pathology, chiefly in plant pathology, designating the organism upon which a parasite is living. In the case of galls, for example, the plant is the host for the para¬ site (q.v.).

HOSTAGE (French, Stage; Latin, obses; Low Latin, obstagius) , a person or sometimes a thing left as pledge or surety for the per¬ formance of the articles or conditions of a treaty. The taking or giving of hostages is now scarcely known in the relations of modern communities, but was formerly almost universal, and many questions in the law of nations arose

out of the practice. Writers on international law have discussed how far the rights of con¬ querors extend over hostages, what circum¬ stances may release them from their obligation and what effect their escape will produce on the treaty proposed by the contracting parties. In modern warfare hostages are not usually interchanged.

HOSTELRY. See Hotel.

HOSTIUS, hos'ti-us, a Roman epic poet of the 2d century b.c. All that is known con¬ cerning his works is that he wrote metrical annals in imitation of Ennius and a poem, Vellum Histricum, on the Istrian War (129 b.c.) , celebrating the victory of the consul Gaius Sempronius Tuditanus. The fragments of this work are preserved in Baehrens, (Fragmentae Poetarum Romanorum' (1886).*

HOSTRUP, hds'trup, Jens Christian, Dan¬ ish poet and dramatist: b. Copenhagen 1818; d. 1892. He studied at the university in his native city, where he produced a play which was successfully presented by his fellow stu¬ dents, under the title

bors, } 1843). He wrote, under the pen name of ((Kristrup,® numerous plays of a strongly na¬ tional character, including

HOT AIR ENGINE. See Engine.

HOT-BED. See Horticulture.

HOT SPRINGS. See Springs.

HOT SPRINGS, Alaska, a town on Baker Creek, near the mouth of the Tanana River. On account of its hot springs it is a popular health resort. Truck-farming is ex¬ tensively carried on. The mines of the district are well known. Pop. about 125.

HOT SPRINGS, Ark., city and county-seat of Garland County, and one of the most famous sanatoriums of the United States, in the south¬ eastern centre of the State, 55 miles southwest of Little Rock and 397 miles from Saint Louis, on the Saint Louis, Iron Mountain and South¬ ern, the Chicago, Rock Island and Pacific and other railroads. The location is 600 feet above sea-level and lies principally at the easterly base of the mountain complex known as the Ouachita Range, the nearby peaks of which are ofttimes called the Ozark Range — in a val¬ ley between two rocky and heavily wooded ridges called West Mountain and Hot Springs Mountain, 400 feet higher — and in its sheltered situation has a mild and pleasant climate. Lat. 34° N. long. 93° W. Through the valley runs the Hot Springs Creek, starting two miles above; and into this the water from 47 hot mineral springs — originally 73, but many merged artificially or run dry — springing from vents in the gray volcanic tufa near the base of the Hot Springs Mountain on the east. Forty- four are in use or usable; the others rise in the bed of the creek. The former yield 830,000 gallons a day, contain large amounts of calcium and magnesium carbonates, and the presence of lithium, iodides and bromides, etc. ; the total mineral matter in solution is between 275 and 280 parts per million and the results, as to the percentage composition of the mineral matter in each hot spring, are very much the same. The waters are prescribed for bathing and drinking and have remarkable curative prop¬ erties. De Soto, it is said, sought to explore them as the veritable fountain of youth. As many as 150,000 patients and pleasure seekers visit the place annually. The temperature of the springs varies from 97° to 147°. All issue from a space something over a quarter of a mile long and from 200 to 300 feet up the slope, some 10 acres in all. By treaty with the Quapaw Indians in 1818 and by act of Congress in 1832, four sections (2,529 acres) became a reserva¬ tion, and the springs are in the centre. Dunbar and Hunter of the Lewis and Clark expedition visited the place in 1804 and settlement was made in 1807. After 1832 numerous attempts were

made to enter the lands and title to property involved many years of contention and “shot¬ gun right.® In 1870 Congress authorized suits against the United States in the Court of Claims. In 1876 title was held to be in the United States by the Supreme Court. Justice Field of the Supreme Court in an opinion said :

With one exception the springs are all en¬ closed in solid masonry, and the water is con¬ ducted by protected pipes into reservoirs near the base of Hot Springs Mountain or to the 23 bathhouses on and off this reservation. The exception is left open and accessible to the p-ublic. The government maintains a free bathing establishment for the indigent, at which over 10,000 bathe annually, over 90 per cent being benefited. The prices of baths and fees of attendants are fixed by the Department of the Interior, with severe penalties for deviation. A handsome city has grown up to house the guests and permanent residents. On the slope of Hot Springs Mountain is a fine park of 100 acres, with the most elegant buildings facing it. The creek is covered in and sidewalks and roadways built over it. Several hotels, as the Arlington, Eastman, Majestic, Como, are among the largest and best appointed in the country. The city has a fine courthouse, city hall and opera house. One of the features of the place is the tower on the summit of the mountain, from which four States can be seen and one of the best 18-hole golf courses in the South.

Hot Springs received its city charter in 1879. The city has a mayor and four com¬ missioners, who employ a city manager. Being a pleasure resort, as well as a health resort, it has a large itinerant population. Large quantities of novaculite rock’, “Arkansas® and “Ouachita® are quarried in the surrounding mountains, and 5,000 bales of cotton are marketed annually. The country abounds in cold springs, some of which have remarkable curative properties, notably Mountain Valley and Potash-Sulphur, 10 and 17 miles distant

from Hot Springs ; these are efficacious in con¬ ditions affecting the kidneys and intestinal tract. Pop. (1920) 11,695.

George R. B elding, Secretary Business Men’s League.

HOT SPRINGS, N. C., a town in Madison County, on the French Broad River, 38 miles northwest of Asheville. The Southern Rail¬ way serves the town. It is a popular health resort. Lumbering and mining are the chief in¬ dustries. Borland Institute, a mission school for mountaineers is here. Pop. 450.

HOT SPRINGS, S. D„ city, county-seat of Fall River County, on Fall River, the Fre¬ mont, E. & M. V. and the B. & M. railroads, about 100 miles south of Deadwood. It is the trade center for stock, lumber and mining in¬ terests. The water power is used for several manufactories, a stucco-mill, board and planing- mills and machine shops. It has thermal and medicinal springs and is the seat of the Black Hills College (M. E.), opened in 1890, the State Soldiers' Home and the National Battle Moun¬ tain Sanitarium, erected at a cost of $2,000,000. Pop. 2,141.

HOT SPRINGS, Va., health resort in Bath County, about 60 miles southwest of Staunton on a branch of the Chesapeake and Ohio Railway, extending from Covington. The mineral springs attract numerous visitors at all seasons of the vear for whose accommodation a magnificent hotel — 'the New Homestead — and a large number of cottages are maintained. The waters are especially recommended in the treatment of rheumatism and gout. Pop.

(1920) 1,000.

HOT SPRINGS RESERVATION, or HOT SPRINGS NATIONAL PARK, Ar¬ kansas, the oldest of the 16 national parks of the United States. It now contains an area of 911 acres near the centre of Arkansas, and is visited annually by 125,000 or more persons who are attracted by the fame of the radio¬ active waters. The authentic history of this place begins with 1804, in which year Dunbar and Hunter of the Lewis and Clark expedition visited the springs, as their report shows. A cabin was built here by Manuel Prudhomme in 1807, and he was joined in the same year by John Purciful and Isaac Cates, who engaged in hunting and trapping. Toward the end of the 20's there were permanent residents ; and in 1832 four sections of land were reserved by the government, with the hot springs near the centre. In 1878, however, this land was sold to various claimants, with the exception of that portion which now forms the Hot Springs Reservation, consisting of five units, namely, Hot Springs Mountain, Whittington Lake Reserve Park, and the North, West and Sugar Loaf mountains. The hot water springs issue forth only from the west slope and at the base of Hot Springs Mountain, which embraces 264 acres ; the 46 springs, with an average daily flow of 826,000 gallons and an average tem¬ perature of 135° F., are confined within an area of 500 by 1,400 feet. The superintendent writes, in his report to the Secretary of the Interior for the fiscal year ended 30 June 1915, that <(the trust reposed in the government by the people has been guarded with extreme care. The springs are now the property of the people, free from monopoly and extortion, and within

the reach of all.® But in the same year the government was urged — and with good reason — to provide for the erection of a new public bath. Mark Daniels, the general superintend¬ ent and landscape engineer, wrote : (

The Department of the Interior exercises no direct control or supervision over any mat¬ ters connected with the city of Hot Springs, which is a municipality (pop. about 16,000) governed under State laws. Adjoining the res¬ ervation and well supplied with all modern facilities (hotels, furnished apartments and cottages, etc.), it is built at an elevation of 600 feet above sea-level and the climate is good the year round. It is the county-seat of Garland County, 54 miles from Little Rock, on the Saint Louis, Iron Mountain and Southern, the Chi¬ cago, Rock Island and Pacific and the Memphis, Dallas and Gulf railways. See National Parks and Monuments.

HOT SULPHUR SPRINGS, Colo., bor¬ ough, chief town and county-seat of Grand County, on the Grand River, near the north- central part of the State, and on the Denver and Salt Lake Railroad, about 65 miles from the Wyoming boundary line and 110 miles northwest of Denver. It was settled in 1873 by W. N. Byers and family, and was incorpo¬ rated in 1903. It is in a high valley surrounded by mountains. The famous (

HOTCHKISS, Benjamin Berkely, Ameri¬ can inventor: b. Watertown, Conn., 1 Oct. 1826; d. Paris, France, 14 Feb. 1885. He was in early life a machinist and turned his attention to the invention of deadly weapons, among them the

Hotchkiss magazine gun and the Hotchkiss machine gun, adapted for use in the fighting- tops of warships. In 1870 he established a factory at Paris. His guns were widely used by navies and armies until supplanted by other devices. He also improved heavy ordnance and projectiles.

HOTCHPOT, a legal term for the bring¬ ing together of the advancements made to children during the life of a parent and the joining of these advancements with the prop¬ erty left at death. This is done in order that the whole may be equally divided among the children. Blackstone explains the term as fol¬ lows : <(Hotchpot is, in English, a pudding; for in a pudding is not commonly put one thing alone, but one thing with other things.® The various States of the United States have enacted laws to cover the provisions of this old English law, the object of which was to provide equality among the children of de¬ ceased persons. This law, however, generally only provides for the return of advances and not of gifts. See Collation.

HOTEL, or HOSTELRY, an inn or pub¬ lic tavern. The palatial hotels that have sprung up since the introduction of railways are too well known to require notice. One point of difference between the European and the American systems is that under the former the charge is for lodging only, while under the American plan it includes both lodging and meals. In former years many American hotels were run on the American plan. In modern times their number has greatly decreased, and they are restricted almost entirely to smaller cities and towns. The modern French word is still used for the house of a rich or dis¬ tinguished man, or for a public building, such as the Hotel de Ville, the French term for city hall. Recent developments of hotels have re¬ sulted in the building of hotels for many special purposes, such as hotels for women, working- men, girls, boys, etc. An extensive literature on the subject of hotels, their architecture, equipment, management, etc., has sprung into being, much of it in the form of special articles in architectural and other class journals. The hotel business itself has its own circle of trade journals of which numerous are published in every civilized country, amongst which are dailies, weeklies and monthlies. Consult Beal, J. H., (The Law of Innkeepers and Hotels, etc.> (Boston 1906) ; Guyer, E., (Das Hotelwesen der GegenwarD (Ziirich 1874) ; McGovern, J.,

(Hospitality ; Mine Host from the Time of Babylon to the Age of the Aeroplane) (Chi¬ cago 1910) ; Michel, F., and Fournier. E.,

HOTEL-DIEU, dye, the name of the principal hospital in most French towns. The Hotel-Dieu at Paris is one of the oldest in Europe and is said to have been established in 660 a.d. In 1772 it was destroyed and shortly after rebuilt on the same place. In 1868 it was moved from its old location on the south side of the Isle de la Cite to its present place near Notre Dame on the north side of the island. Other interesting ancient Hotels-Dieu are to be found at Angers (1153) ; Beaume, Cote d'Or (1443) ; and at Tonnerre, Yonne (1338).

HOTEL DES INVALIDES, da zan'va'- led , an institution in Paris for the maintenance

of wounded veterans of the French army. It was established in 1670 by Louis XIV. It was reorganized in 1811, and under the republic became national property supported from the annual budget. Three buildings comprise the Invalides : The hotel, or residence house, a huge edifice, containing also the National Mu¬ seum of Artillery, a historic military

museum, and some of the offices of the Ministry of War; the chapel of Saint Louis, where mass was held for the inmates ; and the Dome des Invalides, a royal sepulchral edifice, to which the remains of Napoleon Bonaparte were transferred in 1861. The Hotel proper can accommodate about 6,000 inhabitants.

H6TEL DE VILLE, de vel, or de ve , the town-hall of the French municipalities. Excel¬ lent ancient types are to be found at Saint An¬ tonin Compiegne, Orleans and Saint Quentin. The famous Hotel de Ville at Paris was first erected in the 16th century. It was burned by the Communists in 1871 and was rebuilt between 1873-83. The distinguishing feature of the new building is its fine fagade containing sculp¬ tured allegorical groups and statues represent¬ ing the principal cities of France. Excellent statues and pictures ornament the interior.

HOTELS, LODGING-HOUSES, Regula¬ tions of, the legislation enacted in different States to secure efficient service in buildings in which people are lodged for hire and provided with meals. These regulations vary according to localities, but generally have been directed toward fire prevention, means of exit, limita¬ tion of height and the rights of travelers. The legislative regulations are usually to be found posted in a convenient place for guests to con¬ sult. See Hotels in America.

HOTELS IN AMERICA. The public house, or hotel, was established in the early days of the colonies to afford accommodation for those who might be compelled to journey from one place to another. As roads were poor, in those days, and stage transportation was slow, many of these houses were opened along the principal roads, or turnpikes, and the majority of these so-called inns bore such names as "King's,® "Queens,® "The Red Lion,® etc. As public opinion changed, however, and the colo¬ nies inaugurated their revolt against the Crown, there was a corresponding change in the names of these hotels which brought them into closer harmony with the spirit of the times. From being mere public houses, wherein beds and food might be obtained by travelers, they be¬ came the meeting places of patriots, so it was but natural that the portrait of Washington, or of some other great American, should have taken the place of that of George III, and other royal personages, on the swinging signs before these doors. As time passed and the patriotic spirit rose to greater heights, these inns became the scenes of many events that brought them into the closest relation with the progress of the Revolutionary period and with the forma¬ tive days which followed the declaration of peace. There was, for example, the City Tav¬ ern, in Philadelphia (177a), at which General Washington was frequently a guest; the Bunch of Grapes Tavern, Boston, where he enjoyed that "elegant dinner provided at public expense, while joy and gratitude sat on every counte¬ nance and smiled in every eye® (28 March

1776) ; the True American Inn, at Trenton (1777); Arnold's Tavern, Morristown; Suf- ferin's Tavern, Smith's Clove. N. Y. ; the Buck Tavern, near Philadelphia; Smith's Tavern, Smith's Clove, N. Y. (1779); the tavern at East Chester, N. Y., where he was ill (1780) ; the Fountain Inn, Baltimore (1781) ; Day's Tavern, Harlem, where he stopped with Gov¬ ernor Clinton (1783) ; Fraunces Tavern, New York, where, in the assembly-room, he bade farewell to the men who had followed his for¬ tunes so faithfully; Mann's Hotel, Annapolis, from which he proceeded to Congress on the day when he resigned his commission, and the City Hotel, Alexandria, where he was after¬ ward entertained by the Alexandria Lodge, of which he was a member. The tavern at East Chester, where Washington stayed during his illness, was erected soon after the beginning of the 17th century. At one time Lafayette was entertained in the house, and, for a season, it was practically the seat of the national govern¬ ment, President John Adams having taken refuge at East Chester during the yellow fever epidemic at Philadelphia, then the Federal capi¬ tal. This tavern now stands within the New York city limits, and the rooms which have the greatest historic interest still preserve the same appearance which they had in those old days.

Among the other taverns of the country which are rich in historic memories, but which were not directly associated with the career of the first President, were the Catamount Tav¬ ern, at Bennington, Vt. ; George Burns' Coffee- House, in New York, long the lounging place of the British officers, although privately fre¬ quented by the Sons of Liberty during the occupation of the city by the British; the Tun Tavern, Philadelphia, the house in which the first Masonic lodge in America was organized; the City Tavern and the Bird in Hand at Rich¬ mond, Va., and the Rose Tree Inn, at Media, Pa.

The fiist hotels in this country were con¬ ducted on the so-called American plan, which provided a fixed price for a day and for each fraction of a day. In those times $1 a day was considered a "good round price,® and taverns were ordinarily so small that one which was provided with 20 rooms was regarded as a most commodious house. The rooms were usually comfortable, however, and were neatly, if plainly, furnished with strongly made furni¬ ture. Carpets were rarely found, although hand- woven rag-rugs frequently appeared on the floors. Meals, which were served at fixed hours only, were announced by the ringing of a bell or gong, and all guests were expected to re¬ spond as quickly as possible. The table was abundantly supplied with dishes that were both substantial and palatable, the cooking being done by the wife of the landlord, with such assistants as the patronage of the inn might authorize, and while meat dishes predominated, game was so plentiful that its appearance at¬ tracted no comment.

At this time in the history of the American public house there were comparatively few inns that made an extra charge for wines. Instead decanters of liquors and of some favorite wine, like Madeira, port or sherry, frequently stood upon the tables, and from these the guests served themselves freely. There were no printed bills of fare in these days, but practi¬ cally all the food to be served was placed on

the table at one time. Guests helped them¬ selves some slight assistance being given by the waiter who stood at hand. When Congress met in New York in 1789 the members found accommodations chiefly in the boarding-houses which abounded in the neighborhood of the Batter}ˆ — on lower Broadway, in Cedar street and in Maiden Lane. It is rather amusing to note that people from other parts of the country complained about the (

The most important American taverns in 1795 were located in New York, Philadelphia Baltimore and Boston. The best New York taverns were Fraunces', opened in 1762, and formerly known as the Queen Catherine, one of the largest inns during the Revolutionary period, as it contained some 30 rooms ; the City Hotel, which was erected on the site of the George Burns Coffee House, in 1793, and which was not only the meeting place of the fashion¬ able City Assembly, but was patronized by the so-called (

The National Hotel, in Washington, which was for many years the home of the most emi¬ nent public men of the nation, was opened in 1827. In 1829 the Tremont House was opened in Boston, and for years it was noted as being the grandest hotel in the land, if not the most elegant public house in the world. Prior to that time the principal hotels in Boston had been the Eastern Stage House, Doolittle's City Tavern and the Lamb Tavern.

It was about that time, or, to be exact, in 1830, that Delmonico opened the first high-class restaurant in New York. High as his prices were, when compared to those which prevailed elsewhere, epicures and persons of fashion flocked to his support and the enterprise pros¬ pered from the day of its inception. In 1833 the United States Hotel, in New York, was opened ; in 1834 the Louisville Hotel, and, in 1835 the Galt House, also at Louisville, all of which immediately became noted as fine houses. The United States Hotel, at Boston, which has since been greatly enlarged and is still standing, was opened in 1835, while, about this time, the old Washington Hotel, at Port¬ land, Me., which had been established since 1823, also took the name of the United States. The Rockingham, at

Portsmouth, N. H., once the home of Governor Langdon, was opened in 1834, but, like other hotels of that time it was not particularly commodious in the modern sense of the word. In fact, up to 1836, there were comparatively few hotels in the United States that were capable of accommodating as many as 200 persons. In 1836 the Astor House, in New York, was opened. Built of massive granite, and furnished with all the conveniences of that day. it was a fitting rival to Boston's Tremont House. Barnum's Hotel, at Balti¬ more, which was opened at about this time,

eclipsed the best houses which had hitherto been built in that city, while the opening of the Saint Charles Hotel, at New Orleans, in the same year, was an event which was heralded from one end of the land to the other. Situated in the centre of the ((American® portion of the city, its stately portico, built in the style of a Corinthian temple, made it, next to the Capitol, at Washington, the most imposing structure in the land. It was also one of the best appointed and most commodious houses in America, hav¬ ing accommodations for more than 700 persons. The original buildings were burned in 1851, but it was almost immediately rebuilt, and it con¬ tinued to enjoy its position as the centre of Southern hotel life until the outbreak of the Civil War. In 1894 the structure was once more burned, but it has since been rebuilt, and still ranks as one of the best hotels in America.

The Charleston Hotel, at Charleston, had the distinction of being the only hotel in the country that had been burned to the ground on the same day on which it was opened. This was in 1839, but as it was rebuilt at once it was again opened in 1840, afterward becoming the favorite resort of Calhoun and other great Southern statesmen. When the Planter's House, at Saint Louis, was opened in 1841, it justly prided itself upon being ((the largest hotel west of the mountains.® It had 215 well- furnished rooms, a classic ballroom with a floor-space <(8,911 square feet more than the celebrated Tremont House, in Boston,® while the china and cutlery, all of which was made in England, bore the name of the house. Charles Dickens, who stopped there in 1842, spoke favorably of the hospitality of this hotel in his American Notes.) The Massassoit House, at Springfield, Mass., one of the celebrated New England hotels, and the New York Hotel, were both opened in 1848. The Delevan House, at Albany, was opened in 1845. The year 1847 will always be a memorable one in the history of the American hotel, for it marks the date of the opening of the Revere House, Boston, a house which, under the management of Paran Stevens, soon became the pattern which all other hotels in this country sought to imitate.

Up to 1855, the principal hotels in Philadel¬ phia were the Mansion House, the United States, the Washington City and the Girard House, and it was in that year that the Burnett House, at Cincinnati, was opened with

250 bed¬ rooms, besides many drawing-rooms, and espe¬ cially spacious corridors. The Eagle Hotel, at Richmond, where Lafayette had stopped in 1824, was burned in 1840, and the Exchange and Ballard's were afterward opened. The Clarendon and the Irving House, in New York, were opened about 1850. The first Tremont House, at Chicago, which for some time was the leading hotel in that city, was opened about this time, while the Battle House, at Mobile, the Saint Louis Hotel, at New Orleans, and the Saint Nicholas and the Metropolitan, in New York, were opened about 1852. All were large houses, and were conducted upon an ex¬ pensive scale, while the two New York houses were particularly conspicuous in having intro¬ duced ((bridal chambers® and other novelties.

In 1854, the Brevoort and the Everett were opened, on the European plan, in New York; the famous Parker House, in Boston, also on the European plan, was opened in 1855, while

the Fifth Avenue Hotel, in New York, was fin¬ ished in 1859. It was the first hotel to intro¬ duce a passenger elevator.

Willard's Hotel, at Washington, was the fo¬ cus of many thrilling scenes and events during the Civil War, and among the houses that were opened during the next few years were the Lindell and Southern hotels, at Saint Louis ; the Albemarle, Hoffman, Saint James and Grand, in New York, and the Arlington, at Washington. The Gilsey House, which was opened in 1871, in New York, at once took rank as one of the best European-plan hotels, while the Windsor House, in New York be¬ gan the successful career that ended so disas¬ trously in the fire of 1899, in 1873. The Bruns¬ wick, in Boston, and the Palmer and Grand Pacific, both in Chicago, were opened about this time, while the Palace Hotel, at San Fran¬ cisco, one of the most famous and palatial houses in the Far West, began to receive gueists in 1875.

The last two decades of the 19th century were conspicuous, not only for the sudden in¬ crease of new and more splendid hotels, but also for the enlargement and improvement of those already built, in every part of the coun¬ try, while, in such a brief review of the hotel business, it is impossible to name all the ho¬ tels worthy of mention that have been built during the past 25 or 30 years, it may justly be said that the revival of interest in the mak¬ ing of new and better houses extended from the Atlantic to the Pacific, and from our north¬ ernmost boundary to the Gulf. Beginning with the Vendome and Young's, at Boston, the list would include

the Narragansett, at Providence; the Grand Union, Park Avenue and Murray Hill, in New York; the Lafayette and Strat¬ ford, at Philadelphia; the Rennet, at Baltimore; the De Soto, at Savannah ; the Kimball, at At¬ lanta ; the Iroquois, at Buffalo; the Hollenden, at Cleveland ; the Grand, at Cincinnati ; the Cadillac and Russell, at Detroit; Auditorium, Blackstone and LaSalle, at Chicago; Plankin- ton, at Milwaukee ; the Ryan, at Saint Paul ; the West, at Minneapolis; the Coates House, at Kansas City; Brown Palace Hotel, at Denver; the Portland, at Portland, Ore., and the Tacoma, at Tacoma. The impetus to the hotel business, which began some 30 years ago, how¬ ever, has continued up to the present time for the last few years have witnessed the construc¬ tion of many new and finer hotels than any that had hitherto been built, among them being the Imperial, the Savoy, the Holland, the Wal¬ dorf, the New Astor, the Martinique, McAlpin, Knickerbocker, Ritz-Carlton, Plaza, Belmont, Saint Regis, Vanderbilt, Biltmore, Pennsylvania and the Commodore, while one of the most unique experiments in the hotel line was the establishment of the Martha Washington, a hotel exclusively for women, which is success¬ fully operated, also in New York.

The watering-place and summer-resort hotels also represent an important and rapidly increas¬ ing branch of the business. At the beginning of the 19th century there were a few inns at places like Saratoga, while a tavern at the White Mountains was built by Crawford in 1803. In 1822, the Catskill Mountain House was opened, and, by 1840, there were good houses at Trenton Falls and Delaware Water Gap, Twenty years later, Newport, Nahant,

the White Mountains, Lake George, Saratoga, Niagara, Cape May, Old Point Comfort, and the Virginia springs, all had good hotel accom¬ modations, but, since that time this branch of the business has grown to such an extent that splendid hotels are now located on almost every available spot on the coast from Maine to Flor¬ ida, while the Adirondacks, the Catskills and many interior resorts have accommodations for guests that can compare favorably with the best hotels in the country. At such hotels the American plan usually prevails, as it does to a considerable extent throughout the smaller cities and towns. In the large cities, however, the European plan, which fixes a price for the room, and which charges for extra service and for each item on the bill of fare, has become more popular, for while, in some instances, the two plans are combined, it is the European plan that is generally followed by the large hotels. Moreover the charges at the best hotels are about twice as great as they were in 1850.

The year 1914 was a great, era of hotel build¬ ing enterprises. The following year showed a remarkable decrease in the number of new hotels,

but was enlivened by the noticeable sumptuousness of the larger erections ; these in¬ cluded the mammoth Hotel Traymore, at At¬ lantic City, N. J. ; the Hotel Morrison, Chicago, with 1,600 bedrooms; the fine Hotel Pantlind at Grand Rapids, Mich. ; the attractively de¬ signed Hotel Muhlbach, Kansas City, Mo. ; the Adelphia Hotel, Philadelphia, built of brick and terra-cotta; and the great William Penn Hotel, Pittsburgh, Pa., 20 stories high with 900 rooms.

When compared with the palatial hotels of to-day even the fine houses like the Tremont and the Astor House were primitive in their construction and management. The modern hotel is equipped with running water and set basins in every room ; many rooms also have water-closets and baths with exposed plumb¬ ing; everywhere there are open grates and steam heat, improved ventilation, elevators for both passengers and baggage, electric bells, tele¬ phones and every possible device to prevent fire, or to assure the safe escape of guests in case of a conflagration. Utensils and machinery have also multiplied greatly during the past few years, for the best hotels now run a thoroughly up-to-date laundry, an electric-lighting plant, apparatus for the distilling of water, and the most elaborate cold-storage conveniences, often including an individual ice-making plant, while among the other necessary conveniences of every well-equipped hotel one may mention the reading, writing and music rooms ; the coat, package and baggage rooms ; the barber shop, with its manicuring, boot-blacking and other accessories; the billiard-room; telephone, tele¬ graph and ticket offices ; the book and news¬ stand ; the stenographers and typewriters, and the carriage and messenger services, not to mention a score of other details that are just as imperative a necessity. It is no uncommon thing to-day to find single hotel structures val¬ ued at $3,000,000 or $5,000,000 equipped with furnishings costing many hundred thousand dollars.

A conservative estimate of the number of hotels in the United States, in a recent year, exclusive of those in process of erection, places the number at over 50,000. Of these about 4,000 are summer or winter resort hotels,

3,000 are family hotels, while the balance are commercial houses. These hotels now give em¬ ployment to no less than 4,000,000 persons, and the amount of capital invested in the business is undoubtedly in excess of $6,500,000,000. Con¬ sult (Hotel Red Book: the United States Offi¬ cial Hotel Directory > (New York 1886ˆ-1918).

HOTHAM, huth'am, William, British ad¬ miral: b. 1736; d. 1813. He

received his edu¬ cation at Westminster School and at the Royal Naval Academy, Portsmouth, and entered the navy in 1751. He was assigned to the North American waters, and received his first commis¬ sion as lieutenant on the Saint George, the flagship of Sir Edward Hawke. He rose rap¬ idly in rank, becoming commander of different frigates. In 1759 his ship captured a French frigate, which, pressed into service, made a number of other captures. From 1776-81 he continued to serve in American waters, taking an important part in the Cul de Sac of Saint Lucia in the West Indies in 1778. He was re¬ turning with a large fleet of merchantmen when he was attacked by a French force and lost a number of his ships. He assisted in the operations at Gibraltar under Lord Howe (1782), and was appointed rear-admiral (1790) and later vice-admiral. On the retirement of Admiral Hood, Hotham succeeded to the chief command. In 1797 he was created a peer of Ireland, under the title of Baron Hotham of South Dalton.

HOTMAN, Franqois, French author and jurist: b. Paris, 23 Aug. 1524; d. Basel, 12 Feb. 1590. At the age of 15 he was sent to the Uni¬ versity of Orleans. In 1542 he obtained his doctorate and became a pleader at Paris. In 1546 he became lecturer in Roman law at the University of Paris. He was converted to the Reformed faith soon afterward; went first to Geneva, and then to Lausanne, where, on Cal¬ vin's recommendation, he was appointed to the chair of belles-lettres and history. In 1555 he lectured on law at Strassburg and in the fol¬ lowing year became professor there. His fame extended to foreign countries and he was sought by various rulers, including Elizabeth of England. He was made professor of civil law at Valence in 1564 and three years later was appointed to the chair of jurisprudence at Bourges. Soon afterward he fled to Paris and was for a short time historiographer to the king. On several occasions he was Ambassador of the Huguenots and in 1568 negotiated the Peace of Blois. He returned to Bourges but fled after the massacre of Saint Bartholomew to Geneva, where he was made professor of Ro¬ man law. In 1579 he removed to Basel, where, with the exception of short" sojourns in Mont-beliard and Geneva, he spent the remainder of his life. He wrote numerous works, mostly polemical, including (1858).

HOTTENTOTS, hot'en-tots, an African race, the aboriginal occupants of the south end of that continent, near the Cape of Good Hope.

The name now given to the whole race was that of the tribe in the immediate vicinity of the Cape of Good Hope, with which the Dutch settlers first became acquainted. The origin of the name is unknown. They are, when young, of remarkable symmetry; but their faces are ugly, and this ugliness increases with age. The complexion is a pale olive, the cheek-bones project, the chin is narrow and pointed and the face consequently is

triangular. The lips are thick, the nose flat, the nostrils wide, the ears large and lobeless, the hair woolly and the beard scanty. The women in early life are often models of proportion, and their gait by no means deficient in grace. Their bloom, how¬ ever, is transient, for, marrying at 12 or 13, after the first child they lose their grace and proportion, and soon become hideous. Both sexes are distinguished by excessive incurvation of the spine. When the Dutch first settled at the Cape the Hottentots were a numerous na¬ tion, and occupied a territory of 100,000 square miles. They had abundance of horned cattle and sheep ; and it is supposed that the seven tribes into which they were divided made up to¬ gether a population of over 100,000. At the present day this race is much degenerated and mixed within the wide territory which formerly belonged to it. They may amount to about 50,000. They are believed to be descendants of an ancient cross between the Bantu negroes (who are Hamitic) and the Bushmen. The cranial capacity is little above that of the Bush¬ men, and the yellowish, leathery color also shows relationship. They are short in stature (16.3 centimeters), and many of the women have a tendency to be over fat. They are of a happy-go-lucky, friendly disposition, like many of . the plantation negroes of the southern United States, In their native state they wore loin-cloths and a cloak of skin (kaross). The women added fringed girdles and often a skin cap and were fond of ivory arm-rings. When in full dress they daubed themselves freely with a sooty fat. They raised cattle and lived on the plentiful African game in small villages or kraals. They were not over-fond of work and much given to feasting and dancing. The tri¬ bal government was patriarchal, chiefs being hereditary, and kraals having each a captain, who was a member of his chief's council. A tax of a portion of the products of the chase belonged to the chief. The councils held court at times, tried cases and disposed of criminals. Murderers were stoned or beaten to death. Adultery was also often punished by death at the hands of the aggrieved husband. Thieves were beaten, starved or banished. Duelling was common, clubs or spears being the weap¬ ons. They evidently imbibed some religious ideas from the East, for they were given to an¬ cestor worship, and oriented their huts and graves. Their language possesses much inter¬ est, and Hottentot grammars have been pub¬ lished in both English and German. They pos¬ sess a great fund of myths and legends. The Koras or Korannas (shoe-wearers), south of the Kalahari Desert, still remain a favorable specimen of the Hottentot race. They are taller, stronger and more cleanly than some of the other tribes. Most of them possess cattle ; those who do not soon degenerate into Bush¬ men. On the eastern frontier of the colony

*are still some remnants of the Gona or Gonaqua tribe ; but they have nowhere pre¬ served their ancient usages and purity of blood, but are much mixed with the Amakosa Kafirs. The Namas, who are the purest type of Hot¬ tentots now existing, dwell in Namaqualand, in German Southwest Africa. The Namas are a pastoral people, almost exclusively. Many of them have been Christianized. Consult Stow, (Native Races of South Africa * (1907) ;*

(South African Natives y (1900).

HOTTENTOT'S-BREAD. See Ele-

phant's-foot.

HOTZENDORF, Count Conrad von, Aus¬ trian field-marshal : b. 1852. He became chief of the Austrian general staff in 1906, and in that capacity made annual visits to the German general staff in Berlin. In March 1917 he was relieved at his own request in order to assume a command in the field. In the fol¬ lowing August he was appointed to the chief command of the Austro-Hungarian forces. He had made a special study of mountain warfare, a factor that no doubt contributed materially to the Austro-German victory over the Italians on the Isonzo in the autumn of 1917. Though regarded as a skilful strategist, Count Hotzen- dorf and practically all his generals suffered in¬ variable defeat when unsupported by German officers and troops. It is believed that he was largely instrumental in fanning the flame of Italian animosity against Austria long before the war. He retired in July 1918. One of his sons was killed in the battle of Rawa Russka in Galicia.

HOUBRAKEN, hou-bra'ken, Jacobus, Dutch engraver: b. Dordrecht, 25 Dec. 1698; d. 14 Nov. 1780. He was the son of Arnold Hou- braken, an artist of some repute. In 1707 he removed to Amsterdam, where he devoted him¬ self to the study of the old Dutch masters. His engravings consist entirely of portraits and genre, his first work being a series for his father's book of biography of Dutch painters. His claim to fame rests chiefly on his illus¬ trations of Cornelis Troost's comedy (De Ontdekte SchijndeugdP Consult ver Hull, Alexander, (Jacobus Houbraken et son ceuvre) (Arnhem 1875).

HOUDAN, hoo'dan, a breed of domestic fowls, well known and widely cultivated in the United States. They are of medium size, .mot¬ tled black and white, with black wing bars. The cock has a heavy crest which is divided in the middle of the crown. The hen's crest falls backward. They weigh from six to seven pounds and have five toes. Analogous French breeds are Crevecoeur and La Fleche.

HOUDARD, oo'dar', George Louis,

French composer and musical historian: b. Neuilly-sur-Seine, 1860. He studied under Hille- macher and Massenet, and devoted his efforts to the study of musical history. In this field he wrote (L'Art Dit Gregorien d'apres la nota¬ tion neumatique) (1897) ; (Le rythme du chant dit Gregorien d'apres la notation neumatique) ; (La richesse rythmique musicale de l'antiquite) (1903) ; (La cantilene Romaine> (1905); (La rythmique intuitive) (1906) ; (Vademecum de rythmique gregorienne) (1912). Houdard has composed sacred music, of which the best- known work is a (Requiem. }

HOUDETOT, oo'd'td', Elizabeth Fran- goise Sophie de la Live de Bellegrade, Com-

tesse d', French woman of society: b. 1730; d. 1813. She married, in 1748, Claude Constance Cesar de Houdetot, lieutenant-general of the French army, by whom she became the mother of Cesar Houdetot, governor of Martinique and lieutenant-general under the empire. She was the sister-in-law of Madame d'Epinay. Her liaison with the Marquis of Saint Lambert lasted a number of years. Her fame rests chiefly on Rousseau's descriptions in his (Con- fessions) of his unrequited passion for her. She is generally described as plain in appear¬ ance, but of sprightly wit and amiable tempera¬ ment.

HOUDON, Jean Antoine, zhon an-twan oo-doii, French sculptor: b. Versailles, 20 March 1741 ; d. Paris, 15 July 1828. Having gained the first prize for sculpture in the ficole des Lleves Proteges at Paris in 1761, he went in 1764 to Italy where he studied at the Academy in Rome until the latter part of 1768. There he finished, among other works, the statue of Saint Bruno in the church of Saint Maria degli Angeli. Returning to Paris, he executed ad¬ mirable busts of Rousseau, Diderot, D'Alembert, Franklin, Turgot, Mirabeau, Gluck, Barlow, Fulton, Jefferson, John Paul Jones, Lafayette, Moliere, Napoleon, Voltaire, Washington and many other distinguished men and women; statues of Voltaire and Tourville; the cele¬ brated (Diana} for the empress of Russia; and other works, which placed him in the first rank of French sculptors. In 1775 he was made a member of the Academy of Painting and Sculp¬ ture where he taught for many years. In 1785 he accompanied Franklin to the United States, to prepare the model for the statue of Wash¬ ington ordered by the State of Virginia, and passed two weeks at Washington's residence at Mount Vernon for that purpose. The statue, bearing the sculptor's legend, "Fait par Houdon, citoyen Francais, 1788,® now stands in the hall of the capitol of Virginia at Richmond, where there is also' one of his marble busts of Lafayette. Among Houdon's later works is the celebrated statue of Cicero ordered by

Napoleon I for the Senate chamber. Speci¬ mens of his work are in many public buildings in Paris and in many European museums, es¬ pecially in the Louvre. The Metropolitan Museum of Art, New York; Pennsylvania Academy of Fine Arts, Philadelphia; National Academy of Design, New York; American Philosophical Society, Philadelphia; Girard Col¬ lege, Philadelphia and the collections of B. Alt¬ man, H. C. Frick, J. P. Morgan and other art patrons possess valuable examples of his skill. Some of his works have in recent years brought very high prices when sold at auction, a marble bust of one of his little daughters selling in 1912 at Paris for $90,000. Consult Borgmeyer, C. L., Among Sculptures) (in Fine Arts Jour¬ nal, Vol. XXX, p. 199, Chicago 1914) ; Delerot, E., and Legrelle, A., (Memoire sur la Vie et l'ceuvre de J. H. Houdon } (in Memoires de la Societe des Sciences Morales de Seine-et-Oise , Vol. IV, p. 49, Versailles 1857) ; Dierks, H., (Houdons Leben und Werke) (Gotha 1887) ; Hart, C. H., and Biddle, E., (Memoirs of the Life and Work of J. A. Houdon) (Philadelphia 1911) ; Montaiglon, A. de, and Duplessis, G., (Houdon> (in Revue Universelle des Arts, V ols.

I and II, Paris 1855-56) ; Quincy, Qu. de, (Notice Historique sur la Vie et les CEuvres de M. Houdon) (Paris 1829) ; Reau, L., (L'oeuvre de Houdon eu Russie) (in Gazette des Beaux- Arts , Periode iv, Vol. XIII, p. 129, Paris 1917) ; Smouse, F. I., (Houdon en Amerique) (in Revue de l' Art, Vol. XXXV, p. 279, Paris 1914) ; Taft, L., (J. A. Houdon5 (in Scribners Magazine , Vol. LI II, p. 659, New York 1913) ; Terrade, A., (Autour de la Statue de Jean Houdon5 (Versailles 1892) ; Vitry, P., (Works of Houdon in America5 (in Art in America , Vol. II, pp. 217 and 368, New York 1914).

*HOUGH, huf, Emerson, American author: b. Newton, Iowa, 28 June 1857. He was gradu¬ ated from the State University of Iowa in 1880, traveled extensively in the wild portions of the West, was for several years a writer in Chi¬ cago, and there became in 1899 western man¬ ager of the New York periodical Forest and Stream. His publications are (The Singing Mouse Stories) (1895) ; (The Story of the Cow¬ boy5 (1895)j. (The Girl at the Half-way House) (1900); *The Mississippi Bubble5 (1902); (The Way to the West) (1903) ;*

HOUGH, George Washington, American astronomer : b. Montgomery County, N. Y., 24 Oct. 1836; d. Evanston, Ind., 1 Jan. 1909. He was graduated at Union College in 1856 and received the A.M. degree from Harvard in 1859. In the same year he was appointed assistant astronomer

at the Cincinnati Observatory; in 1860 he became assistant astronomer and in 1862 astronomer and director of the Dudley Observatory, Albany, N. Y. In 1879 he became director of the Dearborn Observatory and pro¬ fessor of astronomy at the Chicago University; upon the removal of the Dearborn Observatory to Evanston he accepted a similar position at Northwestern University. He invented several astronomical instruments and discovered more than 600 double stars. He was also the inventor of the recording and printing barometer (q.v.) and of the anometer (q.v.). He belonged to many scientific societies, both in this country and abroad, amongst them being the Royal Astronomical Society of England. He wrote (Annals of the Dudley Observatory5 (Albany 1866-71). Consult Doolittle, E., Catalogue and Re-measurement of the 648 Double Stars Discovered by Prof. G. W. Hough5 (in Uni¬ versity of Pennsylvania Publications, Series in Astronomy , Vol. Ill, part 3, Philadelphia

1907).

HOUGH, Walter, American ethnologist: b. Morgantown, W. Va. (Va.), 23 April 1859. He was educated in Monongalia Academy, pub¬ lic schools and West Virginia University, grad¬ uating A.B. in 1883. He was granted Ph.D. pro honoris causa in 1894 ; admitted Phi Beta Kappa 1913. After teaching in common schools and at Wyman Institute, Upper Alton, Ill., he

was appointed to the division of ethnology, United States National Museum, January 1886, becoming curator in 1910. For services in connection with the Columbian Exposition of Madrid, 1892-93, he was knighted by Maria Christina, queen regent of Spain. He carried on field work in ethnology and archaeology in Arizona and New Mexico, 1896-1907, and pub¬ lished numerous papers on ethnology and Pueblo Indian archaeology. He was secretary of the Anthropological Society of Washington, 1901, and president, 1908.

HOUGH, Warwick, American jurist: b. Loudoun County, Va., 26 Jan. 1836; d. 28 Oct. 1915. He was graduated from the University of Missouri in 1854, studied law and was ad¬ mitted to the bar in 1859. In January 1861 he was appointed adjutant-general of Missouri, as such issuing the general order under which the State military organizations went into camp on 3 May. He was for a short time secretary of state in Missouri, resigning in 1863 to enter the Confederate service, and serving on the staffs of General Polk and other Confederate commanders. For a few years after the war he practised law in Memphis, Tenn., but after¬ ward returned to Missouri, establishing himself in Kansas City. He was a judge of the Mis¬ souri Supreme Court 1874-84, for two years of that period serving as chief justice of the State. In 1884 he removed to Saint Louis, where he was circuit judge 1901-07, and after leaving the circuit bench, associated with

his son, War¬ wick Massey Hough, continued in the active practice of his profession until his death in his 80th year.

HOUGHTON, George Hendrick, American Protestant Episcopal clergyman: b. Deerfield, Mass., 1820; d. 1897. He was graduated at New York JJniversity in 1842 and at the Gen¬ eral Theological Seminary in 1845. He or¬ ganized and was rector of the church of the Transfiguration in New York city, which bears the sobriquet <(The Little Church Around the Corner.55 The origin of the name is narrated as follows : A certain actor died and was re¬ fused burial services by a prominent city pastor. The reverend referred him ito the (

HOUGHTON, ho'ton, Henry Oscar,

American publisher: b. Sutton, Vt., 30 April 1823; d. North Andover, Mass., 25 Aug. 1895. He was apprenticed in 1836 to a printer in Burlington, Vt., and in 1842 entered the Uni¬ versity of Vermont, where he was graduated in 1846. Going soon after to Boston he became a member of the Cambridge printing firm of Freeman & Bolles which was then changed to Bolles & Houghton in 1849, and founded the (

tury, both In regard to quantity and to quality, and was also a strong and sincere supporter of the movement for international copyright. Consult Scudder, H. E., (Henry Oscar Hough¬ ton 1 (Cambridge 1897).

HOUGHTON, how'ton, Richard Monck- ton Milnes, Baron, English poet: b. Fryston Hall, near Pontefract, Yorkshire, 19 June 1809; d. Vichy, France, 11 Aug. 1885. He was edu¬ cated at Cambridge University and became prominent in Parliament as a moderate Con¬ servative. He was raised to the peerage in 1863. He was long distinguished as the friend of famous authors, notably Tennyson and Swinburne, and himself the author of sev¬ eral volumes of verse and prose, including a (Life of Keats1 (1848). Consult Reid, T. W., (Life, Letters and Friendship of R. M. Milnes) (London 1910).

HOUGHTON, William Stanley, English dramatist : b. Manchester, 1881 ; d. 1913. After being graduated from the Manchester Grammar School, he worked for a time in the cotton trade. His natural proclivities tended toward the drama, however, and in 1906 he became assistant dramatic critic and reviewer for the Manchester Guardian. Among his plays the best are (The Dear Departed1 (1908); Unde¬ pendent Means1 (1909); (The Master of the House1; (The Younger Generation1 (1910); (Hindle Wakes1

(1912, also produced in New York in 1913); (Fancy Free1; Phipps1; Pearls1 (1912) and (Trust the People1 and (The Perfect Cure1 (1913). Most of his plays were produced by the Repertory Players in LondJon and at the Horniman repertory theatre in Manchester. A collection of his one-act plays was published in 1913 under the title (Five One- Act Plays.1

HOUGHTON, Mich., a village and the county-seat of Houghton County, 94 miles northeast of Marquette, on the south bank of Portage Lake, and on the Copper Range, Min¬ eral Range and Duluth, S. S. & A. railroads. Portage Lake is connected with Lake Superior at the south by the Portage River and at the north by a ship-canal by means of which steam¬ ers avoid the detour around Keweenaw Point. Houghton is the centre of the rich mineral dis¬ trict in the peninsula of Keweenaw, the total output of which is approximately 150,000,000 pounds. The larger part of the copper export of the region is shipped from this port. There is also considerable lumbering, manufacture and commerce, and the shipping interests are important. The various industries have about 1,000 employees. It is the seat of the Michigan College of Mines, which was founded in 1885 and occupies a fine structure. There are Episco¬ pal, Methodist Episcopal, Catholic and Presby¬ terian churches. Mention should also be made of the county courthouse. Houghton was first settled in 1851. Its government is by a president and a council of six members elected biennially, three in each year. Pop. 5,113.

HOULDING, John Richard (<(Old Boom¬ erang11), Australian writer: b. in England and was taken as a child to Australia. He wrote for numerous newspapers and magazines. His published works include Adventures of Chris¬ topher Cackle1 ; Australian Sketches and Tales from Real Life1 ; (Fortunes of the Stubble Family1; Unvesting Uncle Ben's Legacy1;

Adventures of a Young Governess1 ; (Rogcr Larksway's Strange Mission1 ; Un the Depth of the Sea1 ; A Flood that Led on to Fortune.1

*HOULT, Joseph, English shipowner : b. Liverpool, August 1847; d. 'Penrith, Cumber¬ land, 18 Oct. 1917. He began his business career as a youth at a salary of $300 a year, and at 21 launched out for himself as a ship- broker. He established the firm of Joseph Hoult & Company, steamship owners, of Liver¬ pool, and built up a very prosperous busi¬ ness. Shortly before his death he made a gift of $350,000 in War Loan stock, for chari¬ table distribution. He offered a reward of $2,500 apiece for four German submarines de¬ stroyed by any British ship. He sat in Parlia- * ment as a Conservative member for the Wirral division of Cheshire from 1900 to 1906.*

HOULTON, hol'ton, Me., town and county- seat of Aroostook County, in

the eastern part of the State, on the Canadian Pacific and Ban¬ gor and Aroostook railroads, 138 miles north¬ east of Bangor. Houlton is the trade centre for a large agricultural section, abounding in wonderful possibilities and immense agricul¬ tural riches. Industries are composed of fer¬ tilizer factory, starch factories, woolen mill, long and short lumber mills, carriage factory, foundry and machine works, flour mills, cream¬ eries, stave and barrel mills. The water, light and sewerage systems are owned by the town. There are two newspapers, free public library of 10,000 volumes, seven churches, high school and graded schools, also a preparatory school, private; four banks, with deposits of over $2,000,000. Seat of county buildings. Pop.

(1920) 6,191

HOUMA, hoo'ma, La., city, seat of Terre¬ bonne Parish, on the Bayou Terrebonne, the Barataria Canal, and the Southern Pacific Rail¬ road, about 72 miles southwest of New Orleans.

It is situated in an agricultural region where the principal crops are rice, sugar-cane and grain. The canning of oysters is one of the important industries : it has a la,rge moss-fac¬ tory, lumber yards, municipal-owned water¬ works and electric-lighting plant. Houma — signifying mound — was the original home of the Houma Indians. Pop. (1920) 5,160.

HOUND, a dog that hunts by scent, a definition which excludes the greyhound (q.v.).

It is difficult to determine from what stock the English hound has originally sprung, but the old <(Southern hound11 or talbot was most prob¬ ably the source of the various hounds now known, among which the bloodhound, foxhound, beagle, harrier, dachshund, turnspit, otterhound and boarhound (now known as Great Dane) are the principal varieties. The mastiff (q.v.) ought also to be included in this group. See Dog.

HOUNSLOW HEATH, a region west of the township of Hounslow, London, formerly a resort of highwaymen. A military camp was established on the heath in 1686 by James II, and in the next century extensive barracks were built. Powder-mills now cover part of the territory; the rest is cultivated.

HOUR-GLASS, a primitive instrument for measuring time. It consists usually of two hol¬ low bulbs joined one above the other, and hav¬ ing a narrow neck of communication, with

means for placing either bulb in uppermost position. Dry sand is introduced in quantity sufficient nearly to fill one of the bulbs and fine enough to pass freely through the orifice of the connecting neck. . The quantity of sand is ad¬ justed to the time which the glass has been con¬ structed to indicate. In the case of an hour¬ glass the sand in the upper bulb takes an hour to pass into the lower bulb; and so on for any other definite division of time. This instrument is always subject to slight error in its indica¬ tions of time, owing to the expansion and con¬ traction of the glass by changes of temperature, and by the variations of dryness in the sand. The hour-glass was commonly used in churches during the 16th and 17th centuries to regulate the length of the sermon, and in some places it continued in use down to the beginning of the 19th century.

HOURIS, hoo'- or how'riz, the ((black- eyed® nymphs of Paradise, whose company, ac¬ cording to the Koran, is to be one of the rewards of the faithful. They are described as most beautiful virgins endowed with perpetual youth. They dwell in beautiful gardens, by flowing streams, have none of the failings but all of the virtues of the sex, and delight in catering to the comfort and pleasures of those good Mohammedans who die in the faith.

HOURS, Book of, a devotional book for the use of the laity, popular in Catholic coun¬ tries from the 14th to 16th centuries. It con¬ tained an almanac, calendar of the feasts and various devotional selections, litanies, prayers, etc. Some of the ancient books are printed with great care and are beautifully illuminated. Those belonging to royal families were often illustrated by artists according to the taste of the owner. Consult Langlois, (Essai sur la calligraphic des manuscrits du moyenage et sur les ornements des premiers livres d'heures im- primes) (Rouen 1841) ; Soleil, F., (Les heures gothiques) (ib. 1882) ; Wordsworth and Little- hales, (01d Service Books (London 1890).*

HOURS, Canonical. See Canonical

Hours.

HOURWICH, hoor'wich, Isaac Aarono- vich, American statistician : b. Vilna, Russia, 26 April 1860. He was graduated at the Classi¬ cal Gymnasium at Minsk in 1877 and studied medicine at the Saint Petersburg Academy of Medicine and Surgery. The Demidor Juridical Lyceum at Yaroslav awarded him the degree of LL.M. in 1887. Emigrating to the United States, he became Seligman Fellow at Columbia, receiving the degree of Ph.D. in 1893. He is a member of the Russian bar (since 1887), of the Chicago bar (since 1893) and of the New York bar (since 1896). From 1893-95 he was instructor in statistics at the University of Chi¬ cago

; translator of the bureau of the mint at Washington (1900-02) ; expert special agent of the Bureau of Census (1902-06) ; statistician of the public service commission, New York (1908 -09) ; expert special agent on mining, Bureau of the Census, 1909-13. Dr. Hourwich is also prominently connected with various Jewish philanthropies and the municipal reform move¬ ment. Among his works are (Peasant Migra¬ tion to Siberia> (in Russian, 1887) ; (1893) ; immi¬ gration and Labor) (1912) ; (Mooted Questions of SocialisnP (in Yiddish, 1917).

HOUSANTONIC, hoo-saton'Tk, a river which has its rise in the Berkshire Hills, in the western part of Massachusetts, and flows south, through Connecticut, into Long Island Sound. Its course of about 155 miles is through a hilly, mountainous country, noted for its scenic beauty.

HOUSE, Edward H., American author, journalist and musician: b. about 1843; d. Tokio, 18 Dec. 1908. Prominent in promoting friendship between Japan and the United States and in interpreting the men of the two civili¬ zations to each other, reaching the English speaking world through his brilliant writings. Educated at the Chauncy Hall private school, Boston. As correspondent of the New York Tribune, he reported to that paper the John Brown episode at Harper's Ferry and was re¬ sponsible for the incident of John Brown's kissing the negro mother's baby, which has been made the theme of Hovenden's painting and Whittier's poem. He accompanied, to re¬ port, the first embassy from Japan in 1860. In 1863, in London, he reported for the London Times the prize fight between Heenan and Tom Sayers. There he collaborated with Dion Boucicault in (Arrah na Pogue and*

HOUSE, Edward Mandell, universally

known as Colonel House, personal representa¬ tive of President Wilson to European govern¬ ments during the war: b. Houston, Tex., 26 July 1856. His father, Thomas William House, was an Englishman who settled in Texas and there built a mansion in which he lived with his family the life of an English country squire. A typical Westerner, Colonel House spent his youth in farming, hunting and riding. He was graduated from Hopkins Grammar School, New Haven, Conn., in 1877 and Cornell University in 1881. He made a special study of politics and economics, and though he never sought any public office, he was actively engaged in State and national politics for many years in the Democratic interest. He first came into wider prominence when President Wilson entrusted him with a diplomatic mission to Europe early in 1914, some months before the outbreak of war. Though strong premonitions of war were in the air, he found no belief in a coming con¬ flict either in England or France, but strong military excitement in Germany. In 1915 and 1916 he again

represented the President on mis¬ sions to the governments of the European bel¬ ligerents, and on 7 Nov. 1917, after the United States had entered the war, Colonel House

arrived in London as chairman of an American mission to the Allies, to attend the deliberations of the Supreme War Council. Thereafter he had under his supervision the task of preparing materials for the use of the American com¬ missioners at the eventual peace conference. At the Inter-Allied Conference of Premiers and Foreign Ministers held in Paris in Novem¬ ber 1917 he presented the views of the Ameri¬ can government in relation to the co-ordination of activities and unity of command. In Oc¬ tober 1918 Colonel House again visited Europe in connection with the general peace movement and armistice question. In 1918-19 he was one of the American Commissioners to the Peace Conference which met in Paris.

HOUSE, a place of abode of a family or individual. The common expression, (

HOUSE ANT. See Red Ant.

HOUSE-BOAT, a combination of boat and house, used largely as pleasure craft on rivers, canals and lakes in Great Britain, the United States and other parts of the world. While palatial house-boats were used by Roman em¬ perors and have been in continuous use in China since early times, the house-boat of modern days first appeared in England about 1860. It was transplanted to this country late in the 19th century, and at first found favor with only a select few ; but as soon as its ad¬ vantages became manifest it began to develop rapidly and advanced to a remarkable state of perfection. A ˆhouse-boat® is not a boat with two, three or four decks and a number of staterooms, but a commodious, comfortable craft arranged for the accommodation of a family party, a company of bachelors or any suggestible combination of people. It might be likened to a suite of apartments afloat.

The house-boat in England has been par¬ ticularly a Thames attraction and is seen to the best advantage at Henley. There are several hundred of these floating houses on the water of the Thames. The price of a house-boat ranges from $300 to $25,000. But a comfortable craft, containing saloon, kitchen and four bed¬ rooms may be purchased for $2,000. The Thames season lasts from June to September and is at its height in July and August. A paper published once a week chronicles the daily movements of each

boat. A large house¬ boat may be hired for the season, including Henley, for $1,000.

In the United States the house-boat is seen to best advantage on the waters of Florida and during the summer months on the Hudson River, the Saint Lawrence River and Long Island Sound. The American vessels are larger

than the English boats and more expensive. They are constructed on approved plans, and contain every possible comfort and convenience that may be found in the best equipped dwelling or suite of apartments ashore. There are spacious sleeping-rooms, larger than the state¬ rooms on ocean steamers, a cosy sitting-room, a parlor, a library, a reception-room, all the necessary storerooms, a lavatory, a cook's galley and, in fact, everything that a well-ordered household might demand. The properly con¬ structed houseboat has a promenade deck and a high rail encloses it so that children may play about the deck with the utmost freedom and safety. The more pretentious are lighted with gas supplied from a naphtha gas-making ma¬ chine, or electric light, with the energy supplied by storage batteries.

The great charm of the house-boat is the power that its occupants possess to move it from one place to another. On dry land when a man or a family does not fancy a place he or they move away and leave the house behind. On the house-boat they take their house along with them, and they can go wherever navigable water exists. The boat can be anchored in mid¬ stream or moored to a pier. No persons can interfere with the privacy of those on board. It is their own floating castle. When they are tired of one place they can go to another, and they have the advantage over their land-living friends that they not only take their house along, but all their belongings, and without the aid of the baggage master.

A typical American house-boat is the Idler, owned by a New York gentleman and used about Alexandria Bay, in the Saint Lawrence River. The cabin has a dozen or more windows of goodly size ; there is a saloon and opening from it a dining-room. The kitchen, store¬ rooms and quarters for a servant or two are ((aft.® The promenade deck has hammocks, steamer chairs, camp stools, rugs, tables, books, work baskets and flowers ; here the family live, for three-quarters of the time is spent on the boat. Among other well-known house-boats on the Saint Lawrence are the Nydia, Mavis, River God, Bohemia, Amaryllis, Merrivale and Summerholme.

On the Mississippi River, Ohio River and other large streams in the Western States the house-boat is utilized for business a.s well as for pleasure, and floating grocery stores, photo¬ graph galleries and dry goods and notion shops are not uncommon. There is on the Mississippi at least one floating theatre built on the house¬ boat plan, and hundreds of small families have

adopted a rudely constructed inexpensive type of boat for permanent residences. Consult Hunt, A. B., (House Boats and House Boating) (New York 1905).

HOUSE-BOAT ON THE STYX, A, a

humorous book by John Kendrick Bangs (q.v.) published in 1895. It purports to be an ac¬ count of the doings and conversations of a company of literary ghosts assembled in a house-boat managed by Charon. Among the ghostly personages represented are Shakespeare, Raleigh, Dr. Johnson and many more of various degrees of renown.

HOUSE CENTIPEDE, an insect of the family Cermatiidce common in the Southern States of the United States. It is a myriapod,

possessing long legs and antennae, and is con¬ spicuous for its bright colors. It feeds on lice and smaller insects, and is harmless. Consult Howard and Morlatt, Principal Household Insects of the United States5 (Washington

1906).

HOUSE OF CORRECTION, an institu¬ tion where disorderly persons are confined, now more commonly known as a reformatory. One of the earliest houses of correction was the Bridewell (q.v.) in London. One of the most modern is the reformatory at Elmira, N. Y., which since 1877 has been a model institution for criminal reform, and its methods an object lesson to other nations. See Elmira Reforma¬ tory; Penology.

HOUSE-CRICKET. See Gryllidˆe.

HOUSE-FINCH, a familiar garden finch (Carpodacus frontalis) of California, grayish, with the head, neck and breast of the male scarlet-carmine. It represents a group of beautiful and interesting Pacific Coast and Mexican finches, also known as linnets and burions.

HOUSE-FLY. See Flies.

HOUSE OF LIFE, The. The manu¬ script which Rosetti in his love and grief at the death of his wife, buried with her and seven years later caused to be disinterred and pub¬ lished, contained under the general title of Poems a section named <(Sonnets and Songs, towards a work to be called The

House of Life ,55 (The House of Life,5 as finally pub¬ lished in 1881, consisted entirely of sonnets, the various pieces in it ranging in their date of composition from 1848 to 1869.

From their appearance at that time until now they have held their position as one of the three or four finest sonnet sequences in Eng¬ lish. Of this work as a complete sonnet se¬ quence perhaps the only rivals are Mrs. Brown¬ ing's (Sonnets from the Portuguese5 and Shakespeare's bonnets.5

(The House of Life5 is divided into two parts ; the first, in the Elizabethan manner at times but more often after Dante and his circle of poets, deals with the poet's love ; the second, in a greater variety of manners, as found in the range of English poetry, deals with many and varied subjects out of his experience. The unique and supreme quality of these poems, as compared with poetry in general, lies in their combination of the mystical and sensuous at once, imagery that is at the same time spiritual and realistic, naive and complex; and in singu¬ larly exquisite vividness and poignancy — some¬ times strained, exotic, morbid and unregulated — and a passionate love of color and light, of moments, dreams, memories, sound, of seasons and the earth and all beauty, that makes the title, (The House of Life,5 seem perfect and inevitable.

Stark Young.

HOUSE OF LORDS. See Parliament.

HOUSE OF REPRESENTATIVES, the

branch of most State legislatures, and of Congress, which has the more numerous mem¬ bers, elected from smaller districts, and in some cases for shorter terms. Congress — -according to the first article of the Constitution — con¬

sists of a Senate and House of Representa¬ tives. The House represents population ; the Senate represents the States. Both represent constituencies and the public equally, and both are not only theoretically but practically equal. The Senate's power of confirming appointments and treaties is fully balanced by the House's power of impeachment, or originating revenue bills, and electing a President if the electors fail of a choice. Nor are the members of either as individuals presumptively superior in power to those of the other. The actual superiority of the Senate is due to the longer terms, which give the older members a parliamentary ex¬ perience before which the mass of raw mem¬ bers of the House bow ; to the seats being the subject of eager competition among the ablest politicians, so that the average public position is higher; and to the lesser membership and smaller

number of new bills, which enable it to preserve more independence of the chairman's prerogative than the House. Still,, a certain glamour always surrounds the latter as the ˆpopular branch55 ; partly due to the fact that, owing to its great number and short terms, popular movements are more quickly trans¬ formed into legislative action than in the Sen¬ ate. In this respect alone the idea is correct; a party entrenched in the Senate has often boasted that no matter what the majority of the people wished it could not be dislodged for at least eight years, or the time of two presidential elections, in which anything might happen.

In its formation, the model in the State legislatures was simply to follow the old colo¬ nial form of council and assembly — the polit¬ ical theory of ((checks and balances55 being more potent, however, in defining the distribu¬ tion of powers than in creating the forms of the houses. The actual form of Congress was a compromise, without which the Union could not have been formed. The large States were averse to being outweighed by the small, and wished for a two-chambered body, with repre¬ sentation in each proportionate to population ; the small ones were determined on a single- chambered one, with each State having one vote. The present arrangement was the sug¬ gestion of the Connecticut members ; a final item of the compromise was that the senators should vote individually and not by States, so that a State should only have its power on con¬ dition of keeping its members in place. For the general functions of the House, and its rela¬ tions present and prospective to the Senate, see Congress.

The members of the House, according to the Constitution, must be 25 years of age, seven years citizens of the United States and residents of the States which send them ; by act of 25 June 1842 they must be chosen from districts formed of contiguous territory (but see Gerrymander for the observance of this). This put an end to electing on general ticket, but there is no provision that the representa¬ tives shall be residents of their districts, and the people have a perfect right to choose them from any part of the State. What prevents this is not law, but the intense local particular¬ ism which, even in State senatorial districts made up of several towns, insists on passing the office around among the towns ; at bottom, the American conviction that public office de-

mauds no training. The number of members is fixed by Congress after each new census.

A quorum of members is a majority of those actually chosen. The House

*organizes by hav¬ ing the clerk of the last House call the new members to order, and if a quorum is present lie calls the roll for a vote on choice of speaker. The members choose their seats in turn as their numbers are drawn by lot. The principal officers are the speaker, clerk, sergeant-at-arms, doorkeeper, postmaster and chaplain. (For the speaker's powers, see Congress). The ser¬ geant-at-arms is the constable. The symbol of his authority is the mace, made on the pattern ordered by the House 14 April 1789; a Ro¬ man device, ebony fasces, of which each rod ends in a spear-head, bound at the ends and in the middle with silver bands, and on the end a globe surmounted by an eagle with outspread wings. The House is governed by Jefferson's (Manual of Parliamentary Practice, * plus its standing rules and orders and the joint rules of the two houses. Consult Beard, C. A., American Government and Politics) (New York 1910) ; Bryce, J., (American Common¬ wealth* (4th ed., New York 1910) ; McLaugh¬ lin, A. C., and Hart, A. B., (Cyclopedia of American Government* (New York 1914) ; Reinsch, P. S., (American Legislatures and Legislative Methods* (New York 1907) ; Wil¬ son, W., Congressional Government* (15th ed., New York 1900).*

HOUSE OF THE SEVEN GABLES.

A romance written by Nathaniel Hawthorne immediately after the (Scarlet Letter (q.v.) and published in 1852. The scene is laid in Salem, the author's native town, which he had quitted for a residence in western Massachu¬ setts when his fellow townsmen became in¬ censed over the personalities in the Introduc¬ tion to the (Scarlet Letter.* Something of the resentment shown in this unfortunate sketch is seen in the creation of Judge Pyncheon, the vil¬ lain of (The House of the Seven Gables,* who is said to have been drawn after the local politi¬ cian whom Hawthorne held chiefly responsible for his removal from the Salem custom-house. Other materials in the tale which have a personal or family origin are the inherited curse of the Pyncheons, which was really invoked on an early Hawthorne who was one of the witch-judges, and the account of lost title- deeds to vast estates in Maine, which was one of the traditions in the family of the author's mother. The story involves the aristocratic Pyncheons, who own the house of the seven gables, and their humble fellow-townsmen, the Maules. Between these two families has existed a strange relationship since early colonial times when Matthew Maule pronounced a dying curse on his enemy, a Pyncheon who had brought about his condemnation as a wizard. The reader, however, cares far less for the plot which brings about the removal of the curse than for the treatment of characters and scenes, and the atmosphere which pervades the whole. There is an element of humor which is lacking in the Scarlet Letter* and no work of the author shows better his delicacy and subtlety. The portrayal of Hepzibah, the poverty-stricken but proud descendant of the Pyncheons, is masterly in its blending*

of sympathy and playfulness. While inferior to the (Scarlet Let¬ ter as a unified work, (The House of the*

Seven Gables is richer in passages that linger in the reader's memory, and is the romance of Hawthorne most frequently studied in schools and recommended for the reading of young persons.*

William B. Cairns.

HOUSE SNAKE, or MILK SNAKE, a

variety of Lampropeltis doliatus, the corn-snake (q.v.) of the South, found abundantly in most parts of the northern half of the United States westward to the Rocky Mountains. The dorsal scales are not at all keeled and the ventral plates often exceed 200 in number; the ground- color is gray with three series of rounded black- bordered brown blotches, and the belly check¬ ered with black and white; a length of four feet is sometimes attained. This is a hand¬ some and mild-tempered colubroid snake, very abundant in farming districts, where it fre¬ quently enters houses, but probably in search of mice rather than for the purpose of drinking milk, as is popularly believed. It is an expert climber, often ascending porches and vines at¬ tached to the walls of houses. Usually the eggs are deposited in a hole dug in a. sandy field.

HOUSE SPARROW, or ENGLISH SPARROW, the typical and most familiar sparrow of Europe (Passer domesticus) , which has now become a cosmopolitan. Its original specific range cannot be determined, as from the first it has attached itself to civilized mankind, clustering about his cabins, settlements and cities, because it was naturally fearless, and still more because human occupations furnished it with an unfailing supply of food; and it spread northward and eastward as Roman civ¬ ilization extended itself into the wilderness. Its hardiness, non-migratory habit and vast fecundity under the stimulation of a constant food-supply, have enabled it everywhere to thrive and to increase in numbers, until now it is probably the most numerous of any sort of land-bird in the world. Certainly it is, as a species, the most widely distributed, yet lo¬ cally in the sense that it avoids uncultivated or thinly inhabited tracts. When colonies of Eu¬ ropeans, especially British, were formed in variouscountries, men missed the cheerful little companions of their paternal dooryards, and imported pairs into their new homes in India, Australia, New Zealand and elsewhere, princi¬ pally from an impulse of sentiment. Mean¬ while the bird had made its own way, ap¬ parently, across Asia to China and Japan.

This sparrow was introduced into the United States by the deliberate action of gentlemen connected with the Institute in Brooklyn, N. Y.. and 50 pairs

*were set free in that city in the year 1850. Other importations speedily fol¬ lowed, and during the next 10 years colonies were established in Cincinnati, Saint Louis, San Francisco and other interior and western cities, on the theory that they would protect shade-trees from foliage-eating caterpillars. From these centres the adventurous sparrows spread rapidly, chiefly along the highways, ((where the droppings of horses furnished an abundant supply of half-digested grain, and along the railways where the grain-cars were continually scattering food.** It is now resident in all parts of the continent, as fay north as agriculture extends, but is migratory in northern Canada in the time of winter snows. Every-*

where it is most numerous in cities, flocking to the rural districts somewhat in autumn, and re¬ turning to town or village during the winter.

The natural food of the species consists of seeds, supplemented by buds, fruit and similar fare in season. Caterpillars, ants and other in¬ sects are taken, but mainly as food for fledg¬ lings. Hence these sparrows have not contrib-. uted in a greater degree than do our native fringilline species to the destruction of trouble¬ some "worms? On the contrarv they have driven from gardens, villages and city parks, by their numbers and pugnacity, many gentler kinds of native birds that were better insect-catchers. This is true especially with reference to such birds as are willing to make their homes in nesting-boxes within gardens and parks, such as martins, barn-swallows, bluebirds and wrens, which the sparrows attack incessantly, tearing their nests to pieces to get materials for their own, and seizing on their quarters. They are destructive in gardens, also, eating young plants, pecking at all kinds of fruit and plucking off buds and flowers. They make a nuisance of themsejves, also, by the construction in shade and ornamental trees, and among vines over porches and walls, of their big, ragged, globular nests, entered by a hole in the side; and often place these unsightly structures on buildings, or amid architectural decorations, and at the same time befoul the buildings with their droppings, and disturb the sleeping occupants by their noisy chirping. Moreover the nests and the birds themselves harbor and distribute vermin and disease-germs.

These noxious traits far overbalance any good .these foreign sparrows do, and are a heavy cost to pay for the cheer of their pres¬ ence in the streets of the large cities. In many circumstances repressive action is necessary, and the government not only refuses them the pro¬ tection of law, but has issued directions for killing them by wholesale ; but little can be ac¬ complished toward ridding an estate or a village of the pest except by co-

operative and concerted action, steadily continued, and this is hard to obtain.

Much has been written about this subject in ornithological and agricultural literature, in¬ cluding several special treatises, of which the most comprehensive is by W. B. Barrows, en¬ titled (The English Sparrow in North America, > published by the Department of Agriculture at Washington, in 1889, as Bulletin 1 of the Bio¬ logical Survey.

Ernest Ingersoll.

HOUSEHOLD GODS. See Lares; Pen¬ ates; Vesta.

HOUSEHOLD WORDS, a weekly mag¬ azine published by Charles Dickens, founded 30 March 1849. Many of the short stories of Dickens and contemporary authors appeared in its numbers. In 1858 it was discontinued and its patronage absorbed by All the Year Round.

HOUSELEEK, a genus of plants of the family Crassulacece. The leaves are of dark green, thick and spiny, growing in rosette¬ shaped clusters. The flower grows on a slender stalk and is pale-red and star-shaped. The leaves have the property of relieving pain caused by stings, burns, etc. See also Sedum.

HOUSING PROBLEM. See Tenement House.

HOU.SMAN, Laurence, English author and illustrator: b. London, 18 fuly 1865. He has illustrated (The Goblin Market > ; (Weird Tales) ; (The Were WolU ; (Jump to Glory Jane ; and other books, his work being mostly engraved on wood by his sister Clemence. His publications include (The Writings of William Blake) (1893) ; (A Farm in Fairyland) (1894) ; (The House of Joy) (1895) ; (Gods and Their Makers* (1897) ; (The Field of Clover* (1898); (The Little Land* (1899) ; (The Seven Young Goslings) (1899) ; (Love Letters of an English¬ woman (1901), which appeared anonymously; (The Blue Moon) (1904); (The Cloak of Friendship) (1905) ; (Mendicant Rhymes) (1906) ; ˆSelected Poems* (1909) ; (Pains and Penalties* (1911); (John of Jingalo) (1912); (The Royal Runaway* (1914), and (Jingalo in Revolt* (1914) ; (The Return of Alcestis**

(1916).

HOUSSAYE, oo-sa', Arsene, French writer: b. Bruyeres, 28 March 1815; d. 26 Feb. 1896. His family name was Housset. A few years after his arrival at Paris (1832), he published two interesting romantic novels, (La couronne de bluets) and (La pecheresse (1836). He was a facile writer,*

producing works of equal merit in various literary forms and on many diverse subjects. They include (L'histoire de la peinture flamande et holland- aise) (1846) ; (Mlle. de la Valliere et Mme. de Montespan) (1860); (Galerie de portraits du XVIIe siecle (1844) ; (Histoire du quarante et unieme fauteuil de l'academie frangaise* (1855), literary criticisms written with satirical poignancy;*

HOUSSAYE, Henri, on-re oo-sa', French historian: b. Paris, 24 Feb. 1848; d. 1911. He was educated at the Lycee Napoleon, fought with distinction in the Franco-German War, became an editor of the Revues des Deux Mondes and the Journal des Dehats , and was chosen president of the Societe des Gens de Lettres. In 1864 he obtained election to the French Academy, which in 1873 awarded the Thiers prize to his ˆistoire d'Alcibiade. He published in three parts — <1814,) and (1815* (2 vols.) — a study of Napoleon's downfall, which enjoyed wide sale in France, and is con¬ sidered one of the best extant works on the subject.*

HOUSTON, hus'ton, David Franklin,

United States Secretary of Agriculture : b. Monroe, N. C., 17 Feb. 1866. He received his education at Harvard, where he took his M.A. in 1892. From 1887-88, he was tutor in ancient languages at the South Carolina College ; and superintendent of city schools at Spartanburg, S. C. (1888-91), when he returned to Harvard to pursue advanced courses in political science. He was appointed associate professor in 1897, full professor of political science (1900-02), and dean of the faculty (1899-1902) of the University of Texas. He then resigned in or¬ der to accept the presidency of the Agricul¬ tural and Mechanical College of Texas, where he remained for three years; after which he

returned to the University of Texas in the capacity of president. From 1908-16 he was chancellor of Washington University, Saint Louis, and was appointed in 1913, Secretary of Agriculture in the Cabinet of President Wilson. In February 1920 he succeeded Carter Glass as Secretary of the Treasury.

HOUSTON, Edwin James, American elec¬ trical engineer: b. Alexandria, Va., 1847; d. 1914. He studied at the Central High School, Philadelphia, where he taught later in the de¬ partments of physical geography and natural philosophy. From there he was called to the chair of physics at

Franklin Institute, and taught the same subject at the Medico-Chirur- gical College. His fame rests on his research in regard to electric systems, in which field he was coinventor of the Thomson-Houston sys¬ tem of arc-lighting. He was a member of the United States Electrical Commission and chief electrician of the International Exposition at Philadelphia in 1884. He was president of the American Institute of Electrical Engineers (1893-95). He was the author of < Elements of Physical Geography5 (1878); dictionary of Electrical Word Terms and Phrases5 (1889) ; (Arc Lighting5 (1897) ; (Electricity in Every Day Life5 (3 vols., 1904) ; (Arc Lighting5 (revised, 1906) ; (Wonder Book of Magnetism5 (1908) ; (The Land of Drought5 (1910) ; (Born an Electrician5 (1912).

HOUSTON, .Sam, American soldier and statesman : b. near Lexington, Va., 2 March 1793; d. Huntsville, Tex., 26 July 1863. In 1806, after the death of his father, the family moved to Tennessee. Some years later he left home, crossed the Tennessee River and took up his abode with the Indians, by whom he was kindly received, and with whom he lived after their own fashion for several years. Oolooteka, one of their chiefs, adopted him as his son. In 1811 he returned to his family, and to main¬ tain himself opened a school. In 1813 he en¬ listed as a common soldier in the United States army, was soon promoted ensign and lieutenant and fought under General Jackson, who from then on became his admirer and friend, against the Indians at the battle of Tallapoosa, in March 1814. There he received a severe wound which gave him considerable trouble throughout his entire life. In November 1817 he was ap¬ pointed Indian sub-agent to carry out the treaty with the Cherokees just ratified. In the following winter he conducted a delegation of Indians to Washington. On arriving he found that complaints had been made against him to the government on account of the zeal with which he had exerted himself to prevent the un¬ lawful importation of African negroes through Florida, then a Spanish province, into the Southern States. He was acquitted of all blame, but conceiving himself to be ill treated he resigned his commission in the army, and returning to Tennessee settled in Nashville and began the study of law. In 1819 he was elected district attorney, and in 1821 was chosen major-general of militia. In 1823 he was elected to Congress, was re-elected in 1825, and in 1827 was chosen governor of Tennessee.

In January 1829 he married Miss Eliza Allen, member of a prominent Tennessee fam¬ ily. Three months later his wife left him for reasons unknown ; he immediately resigned his vol. 14 — 29

office, separated from his family, and deserting civilization, went to Arkansas, where his for¬ mer Indian friends, the Cherokees, had re- moved. He was kindly received and for years remained with the Indians. In 1832 he went to Texas and at the outbreak of the Mexican War (q.v.), was elected commander-in-chief of the Texan army.*

After the massacre of the Alamo, the Mexican President-general, Santa Anna, was defeated by Houston at the battle of San Ja¬ cinto, 21 April 1836. Santa Anna was cap¬ tured by the Texans and the independence of Texas was achieved. On 23 July a general elec¬ tion for President, Vice-President, and mem¬ bers of Congress of the republic of Texas was ordered to take place on the first Monday of the following September. Houston was solic¬ ited to be a candidate, but declined; but as the day of election approached the popular feeling in his favor became so manifest that he had no alternative but to accept. He was elected by a large majority, one of the other candidates being S. F. Austin (q.v.), and was in¬ augurated 22 Oct. 1836. One of his first acts was to liberate Santa Anna, who had been kept in captivity, and to send him to Washington to confer with the President of the United States. He next opened negotiations with the United States government for the annexation of Texas to the Union, but the measure encountered such strong opposition in the United States that it did not succeed till several years later. Houston was again elected as President of Texas in 1841.

Texas became one of the United States in 1845, and Houston and Rusk were the first sen¬ ators sent to Washington. Houston was re¬ elected at the end of his term in 1853, and re¬ mained in the Senate till March 1859. Both during his service in the Senate and House of Representatives he distinguished hinfself by his powerful eloquence. As a senator he was op¬ posed to the Kansas and Nebraska bill, against which he made one of his most elaborate speeches, in which he declared that the repeal of the Missouri Compromise was a flagrant breach of faith, which would involve the coun¬ try in interminable agitation and difficulty. Ue was prominently mentioned in 1854 as a presi¬ dential candidate of the (

grass, 3d Session, No. 474, Washington 1905) ; Williams, A. M., (Sam Houston and the War of Independence in Texas) (Boston 1893).

HOUSTON, Tex., city and county-seat of Harris County, on the Houston Ship Channel and the Houston and Texas Central; Galveston, Harrisburg

and San Antonio; Texas and New Orleans; Beaumont, Sour Lake and Western; Houston East and West Texas; International and Great Northern; Trinity and Brazos Val¬ ley; San Antonio and Aransas Pass; Gulf, Colorado and Santa Fe; Missouri, Kansas and Texas; Saint Louis, Brownsville and Mexico; Galveston, Houston and Henderson; Texas Transportation Company, Sugarland Railway, and Houston and Brazos Valley railroads, 48 miles northwest of Galveston. It is at the highest point in the State, permanently ac¬ cessible by water from the Gulf of Mexico.

Transportation. — The Houston Ship Chan¬ nel, formerly known as the Buffalo Bayou, which furnishes an outlet to the sea 50 miles distant, has been navigated from the earliest days of the city's history. The work of widen¬ ing and deepening it at a total cost of $4,500,- 000, was completed in 1914. after considerable delay, and when half of the final appropriation of $2,500,000 necessary to finish the work, on the offer of the Harris County Navigation Dis¬ trict, was accepted by the Federal government. It now admits of the passage of large ocean steamers, and the government stands pledged to maintain it forever. The ship channel has been the greatest factor in the development of the city. Its banks offer excellent sites for industrial enterprises, which can acquire the ownership of their wharves and warehouses, and many large manufacturing plants are al¬ ready fixed there, including those of the Hous¬ ton Packing Company, The Texas Company, Bayou City Compress, Density Cotton Yard, International Press, Magnolia Compress and Warehouse Company, Merchants Compress Company, Shippers Compress Company, Stand¬ ard Compress Company, R. R. Dancy & Co., Merchants and Planters Oil Company, Nelms- Kehoe Cotton Dock Company, Armour Fertil¬ izer Company, Calhoun Pattern, Foundry and Machine Company, Fidelity Chemical Corpora¬ tion, Houston Lighting and Power Company Houston Gas and Fuel Company, Pritchard Rice Mills, Galena Oil Refinery, Sinclair Oil Refinery, Universal Shipbuilding Company, Midland Bridge Company, Houston-Humble Oil Company Refinery, Pacific Chemical Com¬ pany, Gulf Refining Company (mixing plant), Peden Iron and Steel Company, Schuhmacher Grocery Company, Farmers Oil Company, Texas Portland Cement Company. Regular steamship service has been established between Houston, Philadelphia and New York City, and also with Tampa, Fla., Tampico, Mexico, and other points, and the completion of the Intercoastal Canal further facilitates transportation. Hous¬ ton is also the great railroad centre of the Southwest and the headquarters of the larger lines as listed above.

Industries. — Being the centre of a rich lumber and agricultural region, it is the dis¬ tributing point of most of the raw material of the State, and the largest inland port corton market in the world. Its extensive cotton plants handle over 1,000,000 bales annually, and

over 3,000,000 bales are marketed through Houston. It is the headquarters of 23 oil cor¬ porations and 47 lumber corporations, and has important rice mills, cotton-seed oil and sugar refineries, lard factories, fertilizing plants, etc., making a total of 369 factories turning out 283 different articles with an approximate value of

$63,000,000.

Banks. — There are six national banks, two State banks and six trust companies, with a combined capital of $9,000,000. The combined deposits in November 1918 amounted to

$53,210,821.

Buildings. — Houston has more skyscrapers than any other city of equal population. Prom¬ inent among these are the Texas Oil Company building (costing $1,000,000), the Union Na¬ tional Bank, the Kress, Mason and Foster build¬ ings. Among the principal edifices are the city hall (with new annex), the city audi¬ torium (costing $400,000), the Carnegie library and Houston Lyceum, union station, the market, City Hospital, Cotton Exchange, United States government building, South End Junior High School (costing $325,500) and Rice Institute.

Bridges and Parks. — Sixteen bridges span the ship channel and smaller streams of the city, 10 of which are concrete ; the largest, the Main street viaduct, was built in 1912, at a cost of $555,375. The park area of the city is over 800 acres, 409 acres having been donated in 1914 by Mr. G. H. Hermann.

Education. — Houston has exceptional edu¬ cational facilities. It is the seat of the Rice Institute, the largest educational institution in the South, founded by the late William M. Rice in 1892 as a free coeducational institution of liberal and technical learning. The orig¬ inal endowment of $5,000,000 has been increased to over $10,500,000, and it was opened for students in 1912. The property covers 100 acres; six of the proposed 33 buildings are completed. The city has, besides, 23 public schools — three of which are high schools for the whites and 12 (one high school) for col¬ ored, with a combined building valuation of $1 ,415,050 and equipment valuation of $144,225. Saint Agnes Academy is the most important of several Catholic educational institutions, and there are a number of private schools. There are 34 churches of all denominations for whites, and 29 for colored, besides missions, chapels and numerous charitable institutions.

Government, etc.— In 1905 Houston adopted the commission form of government, vested in a mayor and four commissioners, chosen from the

city at large every two years. The municipality owns and operates the water¬ works which are abundantly supplied by arte¬ sian wells. The city has a sinking fund of $1,452,315.94 in 1917. Its total expenses in 1916 amounted to $3,290,900, of which $551,380 was expended for schools ; $86,204 for the water department; $178,068 for the fire department; $223,592 for the street and bridge department. In 1914 the area of the city was increased from 16 to 32 square miles. The total assessed valuation of lands, improvements and personal property was $143,000,000.

History.: — Houston was settled shortly after the battle of San Jacinto, which was fought on 21 April 1836, within a few miles of its location. It was named after Gen. Sam Hous¬ ton (q.v.), was incorporated in 1837 and until

1840 was the seat of government for the re¬ public of Texas. Pop. (1920) 138,076.

James Z. George,

General Manager, Houston Chamber of Com¬ merce.

HOUTMAN, hout'man, Cornells, Dutch traveler: b. Gouda, middle of 16th century; d. 1599. He is said to have been the founder of the East Indian trade. He journeyed in a trad¬ ing vessel to Lisbon in 1593, where he suffered imprisonment. On his release he became inter¬ ested in the routes to the East and was success¬ ful in organizing an expedition of four ships which set forth in 1595. His route led him around the Cape of Good Hope, through the Strait of Sunda to the south coast of Java, and thence returned to his native country, two years later. The importance of this discovery of an accessible route to the Spice Islands re¬ sulted in the formation of the Dutch East India Company. Houtman made other voyages over the same passage and was killed by the natives of Achin.

HOUTMAN, _ Frederik, brother of the preceding: b. 1570; d. 1627. He accompanied his brother on his various expeditions as navi¬ gator of the fleet. He suffered capture by the natives of Achin in 1598, purchased his free¬ dom and eventually found his way back to Holland in 1601. Two years later he under¬ took another voyage to the East Indies and was appointed governor of Amboyna in 1605. In 1618 he was given a similar post in the Moluc¬ cas and in 1625 received a gold medal from the government in recognition of his services to Dutch trade. Houtman was also a noted linguist, publishing a grammatical dictionary of Malay and

Madagascar. An edition of this work as a grammar and dictionary of Malay and Dutch appeared in 1680. The citizens of Gouda erected bronze statues to Frederik and Cornelis Houtman in 1880.

HOVE, hov, England, a municipal bor¬ ough in Sussex, England, on the English Chan¬ nel, near Brighton, on the London, Brighton and South Coast Railway. The great seawall of Brighton extends along the Hove front and forms an attractive promenade. There are fine walks, hotels, public buildings, library and mu¬ nicipal baths. The Sussex County cricket ground is stationed here. The municipal bor¬ ough was incorporated in 1898, the govern¬ ment being vested in a mayor, 10 aldermen and 30 councillors. Pop. 37,000.

HOVEDEN, huv'den or . hov'den, or HOWDEN, Roger of, an English chronicler: b. probably at Howden, Yorkshire; d. about 1201. He served as clerk at the court of Henry II, was itinerant justice for Cumber¬ land, Northumberland and Yorkshire. His fame rests chiefly on his (Cronica,) a record beginning with the year 732 and ends with 1201. It was edited by Bishop Stubbs (4 vols., 1868- 71). A modern translation appeared by Riley at London, 1853, in the (Bohn Library.)

HOVELACQUE, oV-lak, Alexandre Abel, French anthropologist: b. Paris, 1843; d. 1896. He is known chiefly as one of the founders of the Ecole d'Anthropologie, where he was professor of linguistic ethnography, and director in 1890, succeeding Gavarret. He was also active in politics and was elected mayor of Paris in 1888. He published Melanges

des linguistique et d'anthropologie) (1889) ; (Les races humaines) (with Emile Picot and Julien Vinson 1882), and (Precis d'anthropolo- gie} (with G. Herve, 1887). He was also one of the founders of the Revue de Linguistique.

HOVENDEN, Thomas, American genre painter: b. Dunmanway, in County Cork, Ire¬ land, 28 Dec. 1840; d. Norristown, Pa., 14 Aug. 1895. He studied at Cork, at the South Kens¬ ington art schools and after his emigration to the United States in 1863 at the National Academy of Design, New York. A few years were also spent in France, where he studied under Cabanel at Paris, and devoted much of his time to a study of peasant types in Brit¬ tany. On his return to the United States he became a member of the National Academy in 1882. His principal works are (The Last Mo¬ ments of John Brown) (Metropolitan Mu¬ seum) ; ˆBreaking Home Ties,) a popular work, depicting an American farm lad leaving home to seek his fortune in the city; (News from the Conscript5 ; (A Brittany Woman Spinning) ; (Loyalist Peasant Soldier of La Vendee5 ; (A Breton Interior5 (1793), and Jerusalem the Golden.5

HOVEY, Alvin Peterson, American sol¬ dier: b. near Mount Vernon, Ind., 6 Sept. 1821; d. Indianapolis, 23 Nov. 1891. He taught school by day and at night studied law, and was ad¬ mitted to the bar in 1843 ; was appointed suc¬ cessively circuit judge, judge of the Supreme Court and United States district attorney. In 1846, at the outbreak of the Mexican War, he enlisted in the Indiana volunteers, but saw no active service. He was colonel of the 24th regiment of Indiana volunteers, and afterward major-general during the Civil War. He went through the Vicksburg campaign under Grant who thought very highly of him. In 1864 he was made commander of Indiana. He was Minister to Peru; was elected to Congress in 1886, and became governor of Indiana in 1888. Consult Johnson, R. U., and Buel, C. C, bat¬ tles and Leaders of the Civil War5 (4 vols., New York 1884) ; Walker, C. M.,

HOVEY, Charles Mason, American horti¬ culturist : b. Cambridge, Mass., 26 Oct. 1810; d. Boston, 2 Sept. 1887. He was the first to in¬ troduce a pistillate strawberry, known as ((The Hovey,55 a variety that marks the beginning of strawberry culture in the United States. He edited the Magazine of Horticulture for many years, and was the author of (Fruits of Amer¬ ica5 (2 vols., 1880).

HOVEY, Edmund Otis, American geolo¬ gist: b. New Haven, Conn., 15 Sept. 1862. He was educated at Yale University, receiving his doctor's degree in 1889. In 1890 he studied at the University, of Heidelberg, and on his re¬ turn to the United States became principal and superintendent of schools at Janesville, Minn. (1884-85) ; of Elk River, Minn. (1885-86). From 1886-87 he was assistant at the min- eralogical laboratory of the Sheffield Scien¬ tific School, and served also as principal there from 1891-92. At the Chicago Exposition he had charge of the Missouri mineral exhibit In 1894 he entered the employ of the geological department of the American Museum of Natu¬ ral History, serving first as assistant, and finally becoming curator in 1910. He assisted

on the United States Geological Survey in 1890 and in 1901-06. His publications include Martinique and St. Vincent) (1902) ; (The 1902-03 Eruptions of Mont Pelee, Martinique and the Soufriere, St. VincentP

HOVEY, Richard, American poet: b. Nor¬ mal, Ill., 4 May 1864; d. New York, 24 Feb. 1900. He was graduated at Dartmouth 1885, studied

theology for a year, but soon went abroad and led a bohemian life, being in turn actor, journalist, dramatist and poet, and finally lecturer on English literature in Barnard Col¬ lege, New York. His verse was of the ideal¬ istic school and marked with the influence of Ibsen and Maeterlinck. His works ‘ are (Launcelot and Guenevere) ; (Taliesin: a Masque) (1900); (Seaward: an Elgy) (1893);

(Richard Hovey (in Nineteenth Century, Vol. XXXV, p. 240, London 1894) ; Hale, E. E., Jr., (Launcelot and Guenevere) (in Dial, Vol. XXVI, p. 17, Chicago 1899) ; Knorr, H., ˆRich¬ ard Hovey’s Promise and Work (in Poet- Lore, Vol. XII, p. 436, Boston 1900) ; Page, C. H., (Plays and Poems of Richard Hovey) (in Bookman, Vol. VIII, pp. 360 and 449, New York 1898-99) ; Rittenhouse, J. B., (Younger American Poets* (New York 1900) ; Ward, L.,*

(Richard Hovey (in Harvard Monthly, Vol. XXXI, p. Ill, Cambridge 1901).*

*HOW, William Walsham, English prel¬ ate: b. Shrewsbury, 13 Dec. 1823; d. 10 Aug. 1897. He received his education at Oxford and became rector of Whittington in Shrop¬ shire, where he worked for 30 years. In 1879 he was appointed suffragan bishop of Bedford, and in the following year bishop of Wakefield. He was exceedingly active in church revival work in the East End, founding a philanthropic fund and extending his efforts along social lines. In 1888 he became bishop of Wakefield. Bishop How wrote a number of popular hymns, religious poems and sermons, and also a Com¬ mentary on the Four Gospels, * Manual for the Holy Communion * ; < Private Life and Min¬ istration of a Parish Priest* (1873) ; Com¬ mentary upon. St. John* (1879), and*

HOWARD, Blanche Willis. See Teuf-

fel, Blanche Willis Howard, Baroness Von.

HOWARD, Bronson, American playwright : b. Detroit, Mich., 7 Oct. 1842; d. 1908. Pre¬ paring for college he turned to journalism in¬ stead of entering Yale, and from 1867 to 1872 was employed on the New York Tribune, Even¬ ing Mail and other newspapers. In 1864 he had written a dramatic piece called (Fantine, which was produced in Detroit, but his first im¬ portant play was (Saratoga, * produced by*

Augustin Daly in 1870, and the first of a long list of successes, which gave him a foremost position among American playwrights. Among his plays are (‘The Banker’s Daughter (1878) ;*

(Young Mrs. Winthrop (1882); (The Henri- etta> and Met by Chance)*

(1887); (Shenan- doah) (1889); (Aristocracy (1892); (Peter Stuyvesant* (with Brander Matthews), etc.*

HOWARD, George Elliott, American educator: b. Saratoga, N. Y., 1849. He was graduated at Nebraska University (1876), spent a year at the universities of Munich and Paris, and returned to Nebraska as professor of history (1879-91). He occupied a similar position at Leland Stanford Junior University (1891-1901) ; was at Cornell, giving a special course in history (1902), and lectured at the University of Chicago (1903-04). In the last- mentioned year he resumed his work at the University of Nebraska as professor of institu¬ tional history, and later filled the chair of polit¬ ical science and sociology (1906). From 1885—

*91 he was secretary of the Nebraska State Historical Society. He has written (Local Constitutional History of the United States) * (1889); development of t-he King's Peace* (1891) ;. /History of Matrimonial Institutions, chiefly in England and the United States) (1904); Preliminaries of the American Revo¬ lution (1905); ˆSocial Control and the Func¬ tion of the Family, in Congress of Arts and Science* (Vol. VII, 1906). He has contributed many articles to encyclopedias on history, social science and institutional history.*

HOWARD, Henry. See Surrey, Earl of.

HOWA.RD, Jacob Merritt, American leg¬ islator: b. Shaftsbury, Vt., 1805; d. 1871. After studying at Williams College he prepared him¬ self for a legal career and took up practice in Detroit, Mich. In 1838 he was elected to the State legislature, and two years later sat in Congress in the Whig party. He devoted much of his time and interest to the Whig campaigns, and was one of the organizers of the new Re¬ publican party. He served as attorney-gen¬ eral of the State for three terms. In 1862 he was appointed United States senator to the vacancy occurring on the death of Senator Bingham, and was re-elected in 1864. He pub¬ lished in translation the (Secret Memoirs of the Empress Josephine) (1847).

i HOWARD, John, English philanthropist: b. probably Hackney, 2 Sept. 1726; d. Kherson Russia, 20 Jan. 1790. From 1742-70 he made repeated journeys to the Continent. In 1756 he became a member of the Royal Society

r V '3 he was aPP°inted high sheriff of Bed¬ fordshire, when the subject of prison discipline came under his notice ; and finding many abuses in the management of jails, he resolved to de¬ vote his time to investigation of the means of correcting them. With this view he visited most of the English county jails and houses of correction, and in March 1774 laid the result of

his inquiries before the House of Com¬ mons. This resulted in the passage of a num¬ ber of bills improving prison conditions in England to a considerable extent. From 1775- 80. he again traveled extensively, inspecting prisons in France, the Low Countries, Ger¬ many, Switzerland, Austria and Italy. In 1781 and 1782 he made a tour through the northern parts of Europe, including Denmark, Sweden,

Russia and Poland. In 1783 he visited Spain and Portugal, and again surveyed the prisons of his own country. At the same time was published a complete edition of his (State of the Prisons in England and Wales, etc.,' which had been published first in 1777, but was now enlarged by considerable supplementary mat¬ ter. A new subject now engaged his attention, namely, the management of lazarettos, and the means of preventing the communication of the plague and other contagious diseases. In 1789 he published (Account of the Principal Laza¬ rettos in Europe.) In 1789 he proceeded through Germany to Saint Petersburg and Mos¬ cow. Prisons and hospitals were everywhere thrown open for his inspection as a friendly monitor and public benefactor. While in Rus¬ sia he died of camp-fever. A statue by Bacon was erected to his memory in Saint Paul's, London. Consult Aikin, J., (A View of the Life and Philanthropic Labours of the Late John Howard' (Boston 1794) ; Anon., Anec¬ dotes of the Life and Character of John How¬ ard' (London 1790) ; Brown, J. B., (Memoirs of the Public and Private Life of John How¬ ard' (London 1818) ; Dixon, W. H., (John Howard and the Prison World of Europe' (New York 1850) ; Field, J., (London 1836) ; Stoughton, J., (Howard, the Philan¬ thropist (London 1884).

HOWARD, John Eager, American sol¬ dier : b. Baltimore County, Md., 4 June 1752; d. (VII, p. 276, New York 1881).

HOWARD, John Galen, American archi¬ tect : b. Chalmsford, Mass., 8 May 1864. He spent three years at the Massachusetts Insti¬ tute of Technology; then studied with private architects and finally entered the Ecole des Beaux Arts, Paris, where he remained for three years. Among his designs are the Hotel Renaissance, the Hotel Essex and several Park buildings in New York; the high school at Newark, N. J. ; the Majestic Theatre, Boston; the public library, Montclair, N. J., and the Electric Tower at the Pan-American Exposi¬ tion, Buffalo. Since 1901 he has been professor of architecture and supervising architect at the University of California, and since 1913 direc¬ tor of the School of Architecture. A number of the university buildings, as well as the Greek theatre, were

designed by Howard. Af¬ ter the San Francisco earthquake, he became an advisory member of the reconstruction com¬ mittee; and was later appointed one of the chief architects of the Alaska-Yukon-Pacific Exposition (1909). Since 1912 he has been a member of the board of consulting architects of San Francisco.

HOWARD, Katharine, fifth queen of Henry VIII (q.v.): b. about 1520; d. 13 Feb. 1542. She was the daughter of Lord Edmund Howard, a granddaughter of Thomas Howard, second Duke of Norfolk, and a niece of Thomas Howard, third Duke of Norfolk. She was also a cousin of Anne Boleyn, second queen of Henry VIII. Married privately to Henry VIII at Oatlands in July 1540, she was publicly ac¬ knowledged as queen soon afterward. In November 1541 she was accused of misconduct previous to her marriage and thrown into prison. Released in December, new evidence was uncovered, apparently showing that she had betrayed the king even after her marriage. She was again imprisoned and beheaded in the Tower. Her story has been dramatized by Alexander Dumas the Elder in Catherine Howard,' first played in Paris in 1834 and adapted into English by W. D. Suter (in (Lacy's Acting Edition of Plays,' Vol. XXXVII, London n. d.) ; and by the German poet Rudolf von Gottschall, in (Katharine Howard) ; it also forms part of the novel by L. Muehlbach, (Henry VIII and his Court) (English trans., New York 1864). Con¬ sult Brenan, G., and Statham, E. P., (The House of Howard' (2 vols., London 1907) ; Fronde, J. A., (The Reign of Henry VIIP (3 vols., New York 1908) ; Flerbert, H. W., (Memoirs of Henry VIII, etc.' (New York 1855) ; Hume, M., (The Wives of Henry VIII' (London 1905) ; Reville, A., (Le Roi Henri VIII et ses Femmes' (in Revue Politique et Litteraire, Series V, Vol. VI, p. 805, Paris 1906) ; Strickland, A., (Lives of the Queens of England' (Vol. Ill, London 1877).

HOWARD, Leland Ossian, American en¬ tomologist: b. Rockford, Ill., 11 June 1857. He studied at Cornell University, and later took graduate work at Georgetown University, Dis¬ trict of Columbia. He was assistant entomolo¬ gist, and. later became chief, of the Bureau of Entomology (1894), a position which he still oc¬ cupies. He was appointed honorary curator of the department of insects in the United States National Museum (1895) ; and consulting ento¬ mologist in the United States Public Health

Service (1904). In 1917 he was made member of the committee on agriculture of the National Council of Defense. From 1900-05, he was a trustee of Cornell University. For many years he was editor of Insect Life, and collaborated in the Century and Standard Dictionaries. He lectured

also at Swarthmore College and the Post-Graduate School of Georgetown Univer¬ sity. Dr. Howard is the author of (Mosquitoes — How They Live) (1901) ;

(1912) and also many government publications.

HOWARD, Oliver Otis, American gen¬ eral: b. Leeds, Me., 8 Nov. 1830; d. 1909. He was graduated from Bowdoin in 1850, and from West Point in 1854. He was then as¬ signed to the ordnance department of the regu¬ lar army, served in Florida against the Semi- noles and was professor of mathematics at West Point 1857-61. At the outbreak of the Civil War he entered the volunteer service as colonel of' the 3d Maine regiment. He was in over 20 important battles; in 1861 he was at the battle of Bull Run, and was after¬ ward made brigadier-general of volunteers ; in 1862 he served in the Virginia campaign, and at the battle of Fair Oaks lost his right arm. He commanded at the battles of Antietam and Fredericksburg; in 1863 was appointed to the command of the 11th Army corps and led them at the battles of Chancellorsville and Gettys¬ burg. When the 11th corps was united with the 12th he was given the command of the 4th corps of the Army of the Cumberland, but was shortly afterward transferred to the command of the Army of the Tennessee, which was the right wing of Sherman's army on his <(march to the sea.® In 1864 he was appointed briga¬ dier-general in the regular army, and in 1865 made commissioner of the Freedmen's Bureau; 1869-73 he was president of Howard Uni¬ versity (q.v.), established in Washington for the higher education of the negro. In 1874 he was placed in command of the Department of the Columbia, and there conducted four campaigns against the Indians, including that against the Nez Perces tribe. In 1881 he was superintendent at West Point, and subsequently in command of the Departments of the Platte and of California; in 1886 he was promoted to the rank of major-general and assigned to the Department of the East, where he remained until his retirement in 1894. In 1895 he founded the Lincoln Memorial University, Cumberland Gap, Tenn. He wrote (Donald's School Days) (1879); (Chief Joseph, or the Nez Perces in Peace and War) (1881) ; Gen¬ eral Zachary TayloD (1892) ; Usabella of Castile J (1894) ; (Fighting for Humanity)

(1898), and c Henry on the War) (1898). Consult Autobiography of O. O. Howard) (2d ed., 2 vols., New York 1907).

HOWARD, Thomas Benton, United States naval officer: b. Galena, Ill., 10 Aug. 1854; d. 9 Nov. 1920. Graduated, United States Naval Academy (1873), and saw service at the battle of Manila Bay, where he was navigator of the Concord. He rose through successive ranks to rear-admiral (1910). In that year, he was placed in command of the fourth divi¬ sion of

the Atlantic fleet; of the third division in 1912. and in 1912-13 was president of the Naval Examining and Retiring Board. He was

retired in 1916; and in 1917 was appointed superintendent of the United States Naval Ob¬ servatory. For some time Rear-Admiral How¬ ard was instructor in mathematics at Annapolis ; later taught applied mathematics and physics and chemistry, and was head of the department of ordnance and gunnery.

HOWARD, William Schley, American legislator: b. Kirkwood, Ga., 29 Jan. 1875. He received an academic education, was admitted to the bar in 1895 and has since practised his profession at Decatur, Ga. In 1899 he was elected to the Georgia house of representatives and subsequently was solicitor-general of the Stone Mountain judical circuit from 1905 to 1910. He was elected to Congress in 1911, and was subsequently re-elected several times. Dur¬ ing the Spanish-American War he served in the 3d Georgia Volunteer Infantry.

HOWARD, Ivan., city in Elk County, on the Elk River, 76 miles south of Emporia, on the Atchison, Topeka and Santa Fe Rail¬ road. The principal industries are agriculture and stock-raising. The city owns and operates its gas and electric-light plants. Pop. 1,175.

HOWARD COLLEGE, a Baptist institu¬ tion of learning at Birmingham, Ala., founded in 1841. Its faculty numbers 20; the average annual attendance of students is 220. The tuition fees are $75; living expenses, board, etc., $150; the productive funds amount to $97,000; the total income, including tuition and incidental charges, is $38,024. The college colors are crimson-blue. The library contains over 20,000 volumes.

. HOWARD UNIVERSITY, a coeduca¬ tional institution in Washington, D. C., was chartered by the United States government in 1867. It was named for Gen. O. O. Howard, who was head of the Freedmen's Bureau and had much to do with the founding of the uni¬ versity. It has the following departments with the standard courses : College of Arts and Sciences, Teachers College, School of Medicine with its Medical College, Dental College and Pharmaceutic College, School of Law, School of Theology (undenominational), School of Manual Arts and Applied Sciences, Conserva¬ tory of Music, Library School, Commercial College and Academy. Total faculty 111, students 1,452 from 35 States and six foreign countries. Annual income for all purposes $204,000, about one-half of which comes from an appropriation of the United States govern¬ ment. Productive endowment $309,018; value of grounds $615,692, buildings $551,924, aca¬ demic library $32,700, law library $8,000, equip¬ ment : medical laboratories $34",744; academic laboratories $11,457, manual

arts and applied sciences $22,912, other equipment $29,707. This university has done a very large work in train¬ ing teachers, physicians, ministers and other leaders of the colored race in the western hemisphere.

HOWE, Albion Paris, American artillery officer: b. Standish, Me., 1818; d. 1897. After receiving training at West Point he was as¬ signed to the 4th Artillery. He returned to West Point in 1843 as mathematical instructor until the outbreak of the Mexican War, where he distinguished himself in active service. He became a captain in 1855, and when the Civil War began was appointed chief of artillery

ELIAS HOWE

Inventor of the Sewing Machine

.

*E**

- *’ •

•

V /

*J ‘ * ■%*

.

HOWE

455

under General McClellan during the 1861 cam¬ paign. He fought in the Peninsular campaign, commanding a light artillery brigade in the Army of the Potomac. In 1862 he was ap¬ pointed brigadier-general of volunteers and served in Couch’s division in the 4th Army corps, from 1864—66 he was in command of the artillery depot at Washington, and at the close of the war (1865), he was brevetted major-general in the regular army. In 1882 he retired from the service.

HOWE, Andrew Jackson, American eclec¬ tic surgeon and author : b. Paxton, Mass., 14 April 1825 ; d. Cincinnati, Ohio, 16 Jan. 1892. He was educated at Leicester Academy and Harvard College, from which he graduated in 1853. He then attended medical lectures at Jefferson Medical College, Philadelphia; Col¬ lege of Physicians and Surgeons and the New ’V ork Medical College of New York City, and Worcester Medical Institute,

graduating from the latter in 1855. He was demonstrator of anatomy in his alma mater in 1855-56; professor of anatomy and surgery in Cincinnati College of Eclectic Medicine and Surgery, 1856-59; demonstrator and professor of anatomy in Eclectic Medical Institute of Cincinnati, 1859— 61 ; professor in same of surgery, from 1861 to 1892. He wrote (A Treatise on Fractures and Dislocations5 (1873) ; (Manual of Eye Surgery 5 (1874) ; (Art and Science of Surgery) (1876) ; (Operative Gynaecology5 (1890); Conversations on Animal Life5 and (Miscellaneous Papers, 5 published in 1894, after his death. He was as¬ sistant editor of and a frequent contributor to the Eclectic Medical Journal. His chief interest outside of his own profession was the study of comparative anatomy; he left his large collec¬ tion of preparations and drawings to the Cin¬ cinnati Natural History Society of which he was a very active member. His great scholar¬ ship and equally great ability as a lecturer and speaker made him a highly successful medical teacher, just as his skill as an operator made him one of the foremost surgeons of his day. He was president of the National Eclectic Medical Association in 1882-83.

HOWE, Edgar Watson, American novel¬ ist and editor: b. Treaty, Ind., 3 May 1854. At the age of 12 he entered a printing office, and when only 19 was publisher of the Golden Globe in Golden, . Colo. Ten years later he be¬ came proprietor and editor of the Atchison (Kan.) Daily Globe. In 1883 appeared (The Story of a Country TownJ which attracted con¬ siderable attention; this was followed by (The Mystery of the Locks) ; (A Moonlight Boy) ; (A Man Story) ; (An Ante-Mortem Statement ; (The Confession of John Whitlock) ; (Daily Notes of a Trip Around the World) ; (Travel Letters from New Zealand, Australia and Africa5 ; (The Trip to the West Indies5 ; ˆCountry Town Sayings5 ; (The Hundred Stories of a Country Town5 ; (Pagan Psalms,5 etc.

HOWE, Elias, Junior, American inventor: b. Spencer, Mass., 9 July 1819; d. Brooklyn, N. Y., 3 Oct. 1867. He lived with his father, who was both farmer and miller, till 1836, work¬ ing upon the farm and in the mill and attend¬ ing the district school during the winters. He then learned the trade of a machinist, and ex¬ perimented in inventing a sewing-machine. The

*model was completed in 1845 and the patent issued 10 Sept. 1846. A patent was also taken out in England, but from this the inventor realized nothing. After constructing four ma¬ chines in *the United States, he visited England in 1847, where he sold one of his machines with all his English rights for $1,250 to a corset manufacturer. He returned to Boston after two years entirely destitute, and resumed his trade for the support of his family. From this period until 1854 he was involved in expensive lawsuits, when the principal infringers of his patents acknowledged his rights, and arranged to manufacture sewing-machines under licenses from*

him from which he finally derived con¬ siderable wealth. His patent was renewed in 1860 for seven years. Upon its second expira¬ tion in 1867, the inventor refused an offer of another renewal. He served as a private in the 17th Connecticut Volunteers during the Civil War. After the war he founded a sewing- machine plant in Bridgeport, Conn. He was the recipient of the Legion of Honor cross and many medals. Consult Anon., (Elias Howe5 (in Practical Magazine, Vol. V, p. 321, London 1875) ; Gifford, G., (Argument, etc., for an Ex¬ tension of E. Howe, Jr.'s Patent, etc.5 (New York 1860) ; Holland, R. S., (Historic Inven¬ tions5 (Philadelphia 1911) ; Hubert, P. G., Jr., Hnventors5 (New York 1893) ; lies, G., head¬ ing American Inventors5 (New York 1912) ; Koehler, W., (Die Deutsche Nahmaschinen In¬ dustrie5 (Munich 1913) ; Neuburger, A., (Er- finder und Erfindungen5 (Berlin 1913) ; Roe, A. S. ; (Elias Howe5 (in New England Maga¬ zine, n. s., Vol. XXXI, p. 356, Boston 1904) ; Talbot, F. A., (All about Inventions and Dis¬ coveries5 (New York 1916).

HOWE, Frederic Clemson, American lawyer: b. Meadville, Pa., 21 Nov. 1867. He studied at Allegheny College, Pa., and at Johns Hopkins. Later he went to Germany, where he pursued advanced courses at Halle Univer¬ sity, and on his return to the United States prepared for the legal profession at the Uni¬ versity of Maryland and the New York Law School. From 1894-1909 he practised at Cleveland. In 1911 he became director of the People's Institute in New York city, and three years later became commissioner of immigra¬ tion, port of New York, which office he still holds. In 1905 was United States commissioner to investigate municipal ownership in Great Britain. He held important offices at Cleve¬ land; sat in the Ohio senate (1906-09); dur¬ ing which .time he also was professor of law at the Cleveland College of Law ; lecturer on taxation at Western Reserve University, and lecturer on municipal administration and politics at the University of Wisconsin. Dr. Howe is the author of (Taxation and Taxes in the United States Under the Internal Revenue System 1 791— 1895 5 ; (The City — The Hope of Democ¬ racy5; (The British City — • The Beginnings of Democracy5 (1907) ; Privilege and Democracy in America5 (1910); (Wisconsin: An Experi¬ ment in Democracy5 ; European Cities at Work5 ; Socialized Germany5 (1915) ; (Why War?5 (1916); (The High Cost of Living5

(1916).

HOWE, Henry Marion, American metal¬ lurgist : b. Boston 2 March 1848. He is the son of Julia Ward Howe, and brother of Laura

Elizabeth Richards. He received his education at Harvard, and at the Massachusetts Institute of 1 echnology (1871). He became professor of metallurgy at Columbia University (1897), and .after having taught there for a number of years was retired as professor emeritus. Dr. Howe has been the recipient of medals from the Franklin Institute of Philadelphia, from the British Iron and Steel Institute and the gold medal of the Verein zur Beforderung des Gewerbfleisses, In 1893 he was elected presi¬ dent of the American Institute of Mining Engi¬ neers, and in 1912 president of the Interna¬ tional Association for Testing Materials. His publications include (Copper Smelting) (1885) •

(Metallurgy of SteeP (1890-1904); (Metal- lurgical Laboratory Notes5 (1902);

HOWE, John, English Puritan divine: b. Loughborough, Leicestershire, 17 May 1630; d. London, 2 April 1705. He was educated at Christ's College, Cambridge, and Magdalen Col¬ lege, Oxford, of which latter he was a Fellow and chaplain. About 1654 he was appointed per¬ petual curate of Great Torrington, Devonshire; in 1657 Cromwell appointed him as his domestic chaplain. As such he served until Richard Cromwell's deposition in 1659. During his ab¬ sence from Great Torrington various substi¬ tutes acted in his place amongst whom was Increase Mather (q.v.). He was frequently styled C(The Platonic Puritan® and is ranked as the greatest of the Puritan clergymen. He was an eloquent preacher and a powerful contro¬ versialist, but fortunately free from animosity or theological bitterness. He was a prolific writer. His works were collected and pub¬ lished in various editions (in 2 vols., 1724; in 8 vols., 1822; in 1 vol., 1838; in 3 vols., 1848; in 6 vols., 1862-63). Amongst them have been especially valued (A Treatise on the Blessed¬ ness of the Righteous, etc.5 (1668); (A Treat¬ ise of Delighting in God, etc.5 (1674); XXVIII, London 1891) ; Horton, R. F., (John Howe5 (London 1895) ; Miller, S., (Works of John Howe5 (in Princeton Biblical Repertory and Theological Review, n. s. Vol. Ill, p. 177, Phila¬ delphia 1831); Rogers, H., (The Life and Character of John Howe, etc.5 (London 1836 and 1863).

HOWE, John Ireland, American inventor : b. Ridgefield, Conn., 20 July 1793; d. Birming¬ ham, Conn., 10 Sept. 1876. He studied medicine and practised his profession for a number of years. In 1828 he patented a process for mak¬ ing a rubber compound, but was unsuccessful in his attempt to utilize his invention commer¬ cially. In 1830 he invented a pin-making ma¬ chine for which he secured a patent in 1832. After building a more perfect machine in 1833 he secured patents also in France, England, Scotland and Ireland. In 1835 he established the Howe Manufacturing Company, first in New York, and later in Birmingham, Conn., of which he Was general manager for some 30 years. His first machines were perfected

later

by utilizing the inventions of Fowler and Piper, and soon became the means of revolutionizing the pin manufacture.

HOWE, Joseph, Canadian journalist, orator and statesman: b. North West Arm, Halifax, 13 Dec. 1804; d. Halifax, 1 June 1873. He was the son of John Howe, a United Empire Loyal¬ ist, the deputy postmaster-general of Nova Scotia and founder of the Weekly Chronicle. He learned the art of printing in his father's office, contributed his first poem to the Acadian Magazine in 1826, and in 1827 acquired the Novascotian, to which he contributed a re¬ markable series of articles descriptive of rambles in the province and in whose hands it was destined to become the potent instru¬ ment of liberal reforms. A trenchant attack on the magistrates of Halifax in 1835 led to his prosecution for libel, when he defended his own case, was triumphantly acquitted and ((found himself55 as an orator. The follow¬ ing year he was elected to the assembly for Halifax County. In 1833 he visited England, and was influential in the establishment of the mail steam service with Halifax that was the beginning of the Cunard Line. He became a member of the executive council in 1840, and speaker of the assembly in 1841, both of which offices he resigned in 1843 to take up the editorship of the Morning Chronicle. He was provincial secretary 1848-54, and in the latter year he was appointed commissioner of the provincial railway board. He undertook a recruiting campaign for the British army in the United States in 1855, and the same year was defeated by Dr. Charles Tupper in Cumberland County. In 1862 he resigned from the assembly on his appointment as fishery commissioner. When in 1864 Confederation became a burning question, Howe threw all the weight of his authority and influence against the scheme, visited England to oppose the passing of the British North America Act, and after Con¬ federation had become an accomplished fact, swept the province in both provincial and fed¬ eral sections for repeal. After fighting on for a time, he bowed to the inevitable, secured bet¬ ter financial terms in the federal bargain for his native province and accepted office in the Macdonald government, first as president of the council and, 1869-73, Secretary of State for the provinces. His acceptance of office was liable to misconstruction by his opponents and it lost him popularity in his native province to which he returned as lieutenant-governor, but had held office for only a few weeks when he died. His death provoked a revolution of feel¬ ing in Nova Scotia and was the occasion of great public sorrow. He had won the battle of self-government; he thought imperially; he had been associated with all the great and far-reaching enterprises of his time. In the great¬ est crisis of his life, when he turned his back on his past utterances and took the field against Confederation, he was less than true to him¬ self. But in the influence he wielded by his pen, in his powers as an orator to sway the hearts of the*

people, in his personal magnetism and dynamic force, in his rare combination of statesman's grasp and insight with prophetic vision, he is the most remarkable figure in the public life of any British colony and ((stands out like a splash of scarlet on the drab back¬ ground of Canadian politics.55 Consult An-

•v.'TV 2

*,V. . •>»; .-*5' '*

*. * • • #* > » «*'*

*L > • » ■€','**# %•*,•**■* >.*

JULIA WARD HOWE

■

•

.

HOWE

457

nand's (Speeches and Letters of Joseph Howe> (Chisholm's ed., 1909), and Longley's (Joseph Howe.5

HOWE, Julia Ward, American author and philanthropist: b. New York, 27 May 1819; d. Middletown. R. I., 17 Oct. 1910. She was care¬ fully educated and in 1843 she married S. G. Howe (q.v.) of Boston and immediately be¬ came active in philanthropical work. Their home quickly became a centre of the best in¬ tellects of Boston. With her husband she ed¬ ited the Boston Commonwealth, one of the ablest anti-slavery papers, to which she con- •tributed leading articles, essays, poems, etc. At the same time she also wrote for the New York Tribune and the Anti-Slavery Standard. She also was editor of the \V Oman's Journal. After the Civil War she was active as writer and speaker in social and philanthropic work, par¬ ticularly in the agitation for woman's suffrage and for prison reform. She was one of the founders and for many years president of the New England Women's Club, the first organ¬ ization of its kind in America; she was also one of the organizers and for a number of years president of the Association for the Ad¬ vancement of Women; she was delegate to the World's Prison Reform Congress in London (1872) and at that time founded the Women's Peace Association, being an ardent believer in

international peace; and was president of the women's branch of the New Orleans Exposi¬ tion (1885). She preached occasionally in Uni¬ tarian pulpits and was president of the Boston Authors' Club from its foundation in 1899. Eler writings include (Passion Flowers5 (1854) ;

(Words for the Hour5 (1856); (The World's Own5 (1857) ; (Later Lyrics5 (1866) ; (A Trip to Cuba5 (1860) and (From the Oak to the Olive5 (1868), two books of travel; (The World's Own5 (1855), a drama; (Sex and Edu¬ cation5 (1874); (Modern Society5 (1881); (Is Polite Society Polite?5 (1895); (Life of Mar¬ garet Fuller5 (1883); (From Sunset Ridge5 (1898) ; and (Reminiscences5 (1899). Her best-known poem is (The Battle Hymn of the Republic5 (in (Later Lyrics5), written early in the Civil War, while she was visiting the camps around Washington. It was set to the music of (John Brown's Body,5 and immediately be¬ came popular with the soldiers. As a writer she was best in her lyrical poems, most of which show a strong religious feeling. As a speaker she was successful as much by the strength and clearness of her arguments as by her eloquence. She kept 'her mental and to a great extent her physical abilities up to within a very short time of her death and throughout the many years of her active life was a strong power for the advancement of women and the improvement of mankind. Consult Ad¬ ams, E. C., and Foster, W. D., (Heroines of Modern Progress5 (New York 1913) ; Bos¬ ton, Mass., City Council, (Memorial Exercises in Honor of Julia Ward Howe5 (Boston 1911) ; Chapman, J. J., (Memories and Mile¬ stones5 (New York 1915) ; Elliott, M. H.,

285, Boston 1909) ; Richards, L. E., and Elli¬ ott, M. PI., (Julia Ward Howe5 (2 vols., Bos¬ ton 1915) ; Stedman, E. C., (Julia Ward Howe5 (in (Genius and Other Essays,5 p. 254, New York 1911) ; Townsend, H. A., (Reminiscences of Famous Women5 (Buffalo 1916).

HOWE, Mark Antony de Wolfe, Amer¬ ican editor and author: b. Bristol, R. I., 28 Aug. 1864. He was educated at Lehigh and Harvard universities and on leaving college entered the editorial office of The Youth's Companion , Boston. In 1893-95 he was assistant editor of the Atlantic Monthly, and from 1899 to 1913 was corresponding editor of The Youth's Com¬ panion. Since 1913 he has been editor of the Harvard Alumni Bulletin. He has published (Shadows,5 verse (1897); (American Book¬ men5 (1898) ; (The Memory of Lincoln5 (ed¬ ited) (1899); (Phillips Brooks5 (1899); Bos¬ ton: the Place and the People5 (1903);

(Boston Common: Scenes from Four Cen¬ turies5 (1910) ; (Life and Labors of Bishop Hare, Apostle to the Sioux5 (1911) ; hines of Battle and Other Poems, by Henry Howard Brownell5 (edited) (1912); (Letters of Charles Eliot Norton5 (with Sara Norton) (1913) ; (The Boston Symphony

Orchestra5 (1914). He edited the series of 'Beacon Biog¬ raphies5 from 1899 (31 vols.).

HOWE, Richard, Earl Howe, English ad¬ miral : b. London, 8 March 1726; d. 5 Aug. 1799. At 14 he shipped as a midshipman on board the Severn, in which he sailed with Anson for the Pacific, and passed through the usual grada¬ tions of the service under that admiral till 1745, when he obtained the command of the Baltimore sloop-of-war, in which he took part in the siege of Fort William during the last Jacobite rebellion. In 1756 he served in the Channel fleet; in 1758 reduced Cherbourg. In 1759 he defeated a French squadron under Conflans, and for two years (1763-65) occupied a seat in the Board of Admiralty. In 1776, as com¬ mander-in-chief in North America, he acted against the American forces and against D'Es- taing, who commanded a superior French fleet. He sailed to the relief of Gibraltar in 1782 and was successful in spite of the combined fleets of France and Spain, and was rewarded with a British peerage. On the outbreak of war with France in 1793 he took the command of the British fleet, and on 1 June 1794 obtained a decisive victory off Ushant for which he re¬ ceived the thanks of Parliament. He was made admiral of the fleet in 1796. His name is one of the highest among those of the famous naval commanders of Great Britain. He greatly im¬ proved the service by the introduction of a new system of tactics and perfected the signaling code. Consult the (Life5 by Barrow (1838).

HOWE, Robert, American colonial sol¬ dier: b. Brunswick County, N. C., 1732; d. there, 12 Nov. 1785 He was a member of the as¬ sembly and of two provincial congresses and took a prominent part in the preparation for the Revolution. At the outbreak of the war he was given a command and aided in driving the British out of Virginia; was promoted to the rank of major-general and commanded in the South. In 1778 he was repulsed by the British

and compelled to evacuate Savannah ; though then deprived of command he was afterward acquitted by the court-martial by which he was tried for the loss of the city. In 1780 he com¬ manded at Charleston; in 1783 assisted Wash¬ ington in putting down a mutiny; and in' 1785 was elected to the North Carolina legislature, but died before he took his seat.

HOWE, Samuel Gridley, American phi¬ lanthropist: b. Boston, 10 Nov. 1801; d. there, 9 Jan. 1876. He was graduated from Brown University in 1821, which later gave him the honorary degree of LL.D., and from the

Har¬ vard Medical School in 1824. Immediately after completing his studies he joined the Greek army at the time of the war for inde¬ pendence ; he created an excellent surgical corps for the Greeks and was also distinguished as a brave commander in battle ; at the declara¬ tion of peace he established an industrial colony of Greeks on the Isthmus of Corinth. He re¬ turned to the United States for a short time and collected a sum of money, supplies of food and clothing which he personally distributed in Greece, keeping thereby many hardships from Greek women and children. He then again re¬ turned to America, but becoming interested in the work for the blind, went back to Europe in order to study the schools for the blind there; while in Paris he was chairman of the committee for the relief of the Poles in the time of the Polish uprising; he went to Prus¬ sia to distribute the funds collected and was imprisoned by the Prussian authorities for five months. In 1832 he returned to Boston and with the assistance of Colonel Perkins and some other friends founded the Perkins Insti¬ tution for the Blind, of which he became super¬ intendent; in this position he did much to improve the methods in the instruction of the blind; he gradually built up the Howe Press for printing books in raised type, and as early as 1841-42 an edition of the Holy Bible in eight volumes was prepared under his direction in raised type. He was, though extremely modest in his personal relations, a powerful and con¬ vincing speaker and by untiring work and con¬ tinuous effort did much to induce the legisla¬ tures of many States to found schools similar to the Perkins Institution. His greatest suc¬ cess was in the training of Laura Bridgman, a deaf, mute and blind little girl. He also as¬ sisted m organizing the . Massachusetts School for Idiots. He was active in the anti-slavery cause; was candidate of the Conscience Whig Party for Congress, but was defeated; and was editor of the anti-slavery paper, the Boston Commonwealth, assisted by his wife, Julia Ward Howe (q.v.). At the close of the Civil War he joined in the work of the Freedmen's Bureau (q.v.). He was always active in many lines of philanthropic work, organized the Mas¬ sachusetts State Board of Charities, as chairman of which he served 1864-74, and went to Greece in 1867 with supplies for the Cretans. In 1870 he was one of the commission appointed by President Grant to visit Santo Domingo and report upon the advisability of its annexation. He wrote f Historical Sketch of Greek Revolu¬ tion (1828); ˆReader for the Blind) (1839); (Appeal to the People of the United States, to Relieve from Starvation the Women and Chil¬ dren of the Greeks of the Island of Crete) (1867). His many reports in his capacity as

chairman and director of several boards and institutions are distinguished by their remark¬ able clarity and vision, as much as by their thoroughness and humaneness. Consult Elliott W. H., and Hall, F. M. H., (Laura Bridgman, etc.' (Boston 1903) ; Holmes, O. W., XXXVII, p. 464, Boston

1876) ; Howe, J. W., (Memoir of Dr. S. G. Howe) (Boston 1876) ; Perkins Institution, Boston, Proceedings at the Celebration of the One Hundredth. Anniversary of the Birth of S. G. Howe) (Boston 1902) ; Richards, L. E., ed., (Letters and Journals of S. G. Howe' (2 vols., Boston 1906-09) ; Sanborn, F. B., (Dr. S. G. Howe, the Philanthropist' (New York 1891) ; Stearns, F. P., (Chevalier Howe' (in Cam¬ bridge Sketches,' p. 218, Philadelphia 1905).

HOWE, Timothy Otis, American states¬ man : b. . Livermore, Me., 24 Feb. 1816; d. Kenosha, Wis., 25 March 1883. He received a common school education, studied law, was ad¬ mitted to the bar and sat in the Maine legis¬ lature in 1845. He removed in that year to Green Bay, Wis., entered politics, and in 1861 was chosen United States senator, serving till 1879. He declined a Supreme Court judge- ship on the death of Salmon Chase, but in 1881, after serving as delegate to the International Monetary Conference at Paris, became Post¬ master-General in President Arthur's Cabinet. During his administration of this department, which continued until his death, the postage rate was reduced and various other reforms were instituted.

HOWE, Sir William, English general: b. 10 Aug. 1729; d. 12 July 1814. He was edu¬ cated at Eton and received a commission in the Duke of Cumberland's Light Dragoons in 1746. In 1772 he was promoted major-general, lieutenant-general in 1775 and a full general in 1793. He was a brother of Admiral Lord Richard Howe (q.v.) and was appointed rather against his wishes successor of General Gage in command of the British forces in America. He had previously served under Wolfe at the battle of Quebec. He also took part in the campaign against Havana in 1762. He commanded at the battle of Bunker Hill (1775), in which he lost one-third of his men present in the action; in August 1776 he won the battle of Long Is¬ land and in September took New York city. He won the battle of Brandywine in September 1777, in consequence of which Philadelphia was occupied by his army. At his own request he was recalled in 1779, and was succeeded by Sir Henry Clinton, who repulsed Washington at Germantown in the October following. After his return, he represented Nottingham in the House of Commons and held various military commands in England. At his request his con¬ duct of the war, which had been severely criti¬ cized, was investigated by a committee of the House before which he spoke at considerable length in his own and his brother's defense. He succeeded, to his brother's Irish peerage as fifth viscount in 1799. In 1805 he was appointed governor of Plymouth, which Dost he held until his. death. Consult Howe, Sir W., (The Nar¬ rative of Lieut. Gen. Sir W. Howe in a Com¬ mittee of the House of Commons, etc.' (Lon¬ don 1780) ; Stevens, B. F., ed., (Gen. Sir W. Howe's Orderly Rook, 1775-76. etc.' (London 1890); Tower, C., (Essays Political and His-

torical' (Philadelphia 1914); Wilkin, W. H,, (Some British Soldiers in America' (London

1914).

HOWELL, Clark, American journalist and legislator: b. Barnwell County, S. C., 21 Sept. 1863. Graduating from the University of Georgia in 1883, he engaged in journalism, be¬ came managing editor in 1889, editor-in-chief in 1897 and eventually general manager and con¬ trolling owner of the Atlanta Constitution. He was elected a member of the Georgia house of representatives in 1887, and speaker of the house 1890-91. He was a member of and president of the Georgia senate 1900-05 ; has been a member of the Democratic National Committee from Georgia since 1894; and a member of the board of directors of the As¬ sociated Press since 1897.

HOWELL, John Adams, American naval officer; b. Bath, N. Y., 16 March 1840; d. 10 Jan. 1918. He was graduated from the United States Naval Academy in 1858, and rose by successive ranks to lieutenant-commander (1865). His rise thereafter was consistent: he became -commander (1872) ; captain (1884) ; commodore (1895) ; and rear-admiral (1898). Pie was in charge of the navy yard at Wash¬ ington in 1893-96, and of the yard at League Island (1896-98.) In 1898 he commanded the European squadron and the Northern Patrol squadron. From 1898-1902, he was president of the Naval Examining and Retiring Board, and retired in -the last-mentioned year. Mr. How¬ ell was an inventor of considerable repute, patenting a fly-wheel torpedo, a disappearing gun carriage, an amphibious vehicle and a gyroscopic steering torpedo.

HOWELL, Mich., city, county-seat of Livingston County, on the Pere Marquette and the Ann Arbor railroads, 50 miles northwest of Detroit. It is located in a rich agricultural section of the State. The chief manufactures are flour, condensed milk, plows, pumps, wire goods, electric motors, and automobile parts, etc. Pop. (1920) 2,951.

HOWELLS, William Dean, American author and critic: b. Martin's Ferry, Ohio, 1 March 1837 ; d. 11 May 1920. During his boy¬ hood his father owned and published daily papers in Hamilton and Dayton, Ohio, success¬ ively, and he learned the printer's trade and gradually the whole business of conducting a newspaper. In 1851 he was working in Colum¬ bus as a compositor; in 1856 he became Colum¬ bus correspondent of the Cincinnati Gazette ; and in 1859 was appointed news editor of the Ohio State Journal. At this time he published a small volume of poems, and also

some poems in the Atlantic Monthly. In 1860, when Lin¬ coln was nominated, Howells wrote his life, and in 1861 was appointed United States con¬ sul at Venice, where he remained till 1865. The impressions of his stay there were embodied in (Venetian Life) (1866), and (Italian Journeys' (1867). Oq his return to the United States he was for a time connected with the staff of the New York Times and the Nation. In 1866 he became assistant editor of the Atlantic Monthly, and editor-in-chief in 1872. In 1886- 92 he conducted the critical department of Har¬ per's Monthly called "The Editor's Study® ; in 1892 was editor of the Cosmopolitan for a short time, and thereafter was the writer of the

(Editor's Easy Chair' in Harper's Magazine. After 1901 he received the degree of doctor of . letters from Oxford, Yale, Columbia and Princeton universities and LL.D. from Adel- bert College, and from its foundation in 1909 until his death was president of the American Academy of Arts and Letters.

His first novel, (Their Wedding Journey,' was published in 1871 ; his other novels include (A Chance Acquaintance) (1874) ; CA Fore¬ gone Conclusion' (1875); (The Lady of the Aroostook ' (1879) ; (The Undiscovered Coun¬ try' (1880); ˆDoctor Breen's Practice) (1882); (A Modern Instance' (1882) ; (A Woman's Reason ' (1883) ; (The Rise of Silas Lapham' (1885) ; (Indian Summer ' (1886) ; (The Min¬ ister's Charge' (1886) ; (April Hopes' (1887) ; (A Hazard of New Fortunes ' (1889) ; (The Shadow of a Dream' (1890) ; (An Imperative Duty' (1892) ; (The Quality of Mercy) (1892) ; (The World of Chance' (1893); (The Coast of Bohemia' (1893) ; (A Traveller from Al truria' (1894) ; (The Landlord at Lion's Head' (1897) ; (An Open-Eyed Conspiracy' (1898) ; (The Story of a Play' (1898) ; (Ragged Lady' 1899) ; and (Their Silver Wedding Journey' (1900). Mr. Howells also wrote farces and comedies, including 'The Sleeping-Car' (1883) ;• 'The Mouse-Trap' (1897) ; 'The Unexpected Guests' (1898) ; and (The Albany Depot' (1898), etc., and the following volumes of verse: (Poems of Two Friends' (1860), with J. J. Piatt; 'No Love Lost, a Romance of Travel' (1868), and 'Poems! (1873). His other works include (Tuscan Cities' (1885J; (Modern Italian Poets' ; (Essays and Ver¬ sions' (1887) ; 'Criticism and Fiction' (1891), and 'Impressions and Experiences' (1896) ; (Literary Friends and Acquaintances' (1899), and 'Heroines of Fiction' ; 'A Pair of Patient Lovers' ; (The Kentons' ; (Literature and

Life'; (The Flight of Pony Baker' (1902); Questionable Shapes' (1903) ; (Miss Bellard's Inspiration' (1905) ; 'London Films' (1905) ; 'Certain Delightful English Towns' (1906) ; 'Between the Dark and the Daylight'

(1907) ; (Through the Eye of the Needle' ; (Fennel and Rue' ; (The Mother and the Father' ; 'Seven English Cities' ; 'New Leaf Mills' (1913) ; 'The Seen and Unseen at Stratford-on-Avon' (1914); Wears of My Youth' (1915); 'The Daughter of the Storage' (1916) ; /The Leatherwood God' (1916). He edited (Choice Autobiographies with Essays' (8 vols.) ˆand 'Library of Universal Adventure.' In 1915 he was awarded the gold medal of the National Institute of Arts and Letters (

In American literature Howells was the leader of the realistic school ; his novels portray the average, everyday American life ; he had a true and sympathetic understanding of the "com¬ mon people" of the United States, and types of the American (

defect ; but it is by no means true that he entirely excluded the ideal sides of life from treatment. His work is marked by carefulness and thoughtfulness in style and construction, and by fidelity to a high ideal of artistic excel¬ lence. His essays, like his novels, have al¬ ways that indefinable charm which is the en¬ during note in good literature, and to the charm are added the broad outlook and the deep ethical interest which are typical of the man. See Modern Instance, A ; Rise of Silas Lapham, The.

HOWISON, George Holmes, American philosopher : b. Montgomery County, Md., 29 Nov. 1834 ; d. 31 Dec. 1916. He was graduated from Marietta College, Ohio, in 1852, and from Lane Theological Seminary, Cincinnati, in 1855, and after holding various college profes¬ sorships elswhere became Mills professor of philosophy at the University of California in 1884 until his retirement in 1909 as professor emeritus. He published (Treatise on Analytic Geometry) (1869) ; (Limits of Evolution)

(1901), and he edited, and contributed to Royce's (The Conception of God5 (1897).

HOWISON, Henry Lycurgus, American rear-admiral : b. Washington, 10 Oct. 1837 ; d. 31 Dec. 1914. He was graduated from the United States Naval Academy in 1858. He served in various important engagements dur¬ ing the Civil War, becoming lieutenant-com¬ mander in 1865. In 1899 he became rear- admiral and was retired 19 Oct. 1899.

HO WITT, William and Mary, English au¬ thors commonly named together ; the one pub¬ lishing 50 works and the other over 100. Wil¬ liam (b. Heanor, Derbyshire, 18 Dec. 1792; d. Rome, Italy, 3 March 1879), showed such a bias to literature that he published verses at 13. In 1821 he married Mary Botham (b. Coleford, Staffordshire, 12 March 1799; d. Rome, 30 Jan. 1888), who wrote both by herself and with her husband. Their first joint work, a volume of poems, (The Forest Minstrel,5 was published in 1823, and 1827 appeared (The Desolation of Eyam.5 The best lines in these are by Mrs. Howitt, Howitt himself having no great poetic gift. In 1871, however, he published a volume entitled (The Mad War Planet and Other Poems.5 William and Mary Howitt settled first in Staffordshire. In 1823 they removed to Nottingham, where they resided till 1837, and in 1840 visited Germany, where they resided for three years. Results of their residence in Ger¬ many appeared in (Student Life of Germany5 (1841) and (Rural and Domestic Life of Ger¬ many5 (1842), which being translated into Ger¬ man acquired flattering popularity. While at Heidelberg Mrs. Howitt set herself to trans¬ late the tales of Frederika Bremer into Eng¬ lish, and later the works of Hans Andersen. Their most ambitious work is (The Literature and Romance of the North5 (1852). Howitt's best works are those in which English history and life are treated in connection with English scenery. The earliest of these was the

his wife he published volumes on (The Ruined Abbeys and Castles of Great Britain.5 Mrs. Howitt's books for young people were long popular in the United States, and ˆThe Pet Lamb5 and a few other unpretending verses of hers have become familiar to thousands of juvenile readers. Consult the (Life5 by Margaret Howitt (1889).

HOWITZER. See Guns.

HOWLAND, Sir William Pearce, Cana¬ dian statesman: b. Pawling, N. Y., 1811; d. 1907. At the age of 19 he emigrated to Upper Canada and settled in York County, where he engaged in business, and later established a wholesale trade at Toronto. His political en¬ thusiasms led him to support the Liberal party, and in 1857 he was elected a member of the Canada legislative assembly. Under the Mac- donald-Sicotte administration he was Minister of Finance (1862-63), and under the Macdon- ald-Dorion, Receiver-General (1863-64). He was appointed Postmaster-General under the coalition government, and again Minister of Finance. With A. T. Galt he represented Can¬ ada in the reciprocity negotiations with the United States (1865) ; and was a delegate at the London conference at which the terms of the British North America Act were adopted. He sat in the first Parliament under the new Dominion (1867) ; and was also Minister of Inland Revenue. Sir Howland served for one term as lieutenant-governor of Ontario (1868- 73), and in 1879 was knighted.

HOWLEY, Michael Francis, Newfound¬ land ecclesiastic: b. Saint John's, Newfound¬ land, 25 Sept. 1843; d. 15 Oct. 1914. After pre¬ liminary studies at Saint Bonaventure's he en¬ tered the Propaganda at Rome as a student for the priesthood, and was ordained in 1868. After service in Scotland and at Rome, he re¬ turned to his native land, and for the re¬ mainder of his life worked with great success in its spiritual interests. He became bishop of Saint George's, West Newfoundland, in 1892 — the first Newfoundlander to attain the dignity of the episcopate — was translated to Saint John's in 1894 and raised to the dignity of archbishop in 1904. Archbishop Howley was not only distinguished as a theological student and thinker, a devoted missionary and able preacher, but also as linguist, poet and an¬ tiquary. He contributed largely to the his¬ torical study of Newfoundland (q.v.), and is the author of (The Ecclesiastical History of Newfoundland5 (1888).

HOWORTH, howTrth, Sir Henry Hoyle,

English author and politician : b. Lisbon, Portu¬ gal, 1 July 1842. He was a Conservative mem¬ ber of Parliament for South Salford 1886-1900. In recognition of his works on Eastern history and other subiects, he was created K. C. I. E. in 1892. Besides very many scientific memoirs, he published (History of the Mongols5 (2 vols., 1876-78) : (The Mammoth and the Flood5 (1887) ; (The Glacial Nightmare and the Flood5 (1905) ; (Saint Gregory the Great5 (1912) ; (Saint Augustine of Canterbury5 (1913) ; (The Golden Days of the Early English Church5

(1916).

HOWRAH, how'ra, India, an independent municipality, opposite Calcutta (q.v.). and its most important suburb. Pop. about 179,000.

HOWTH, hotli, Ireland, a seaside town of County Dublin, situated on the side of the Howth promontory, on the north shore of Dub¬ lin Bay, nine miles northeast of Dublin, with which it is connected by the Great Northern Railway and by street cars. There is an arti¬ ficial harbor used chiefly by smaller craft. In¬ teresting old buildings are the picturesque col¬ legiate church, dating from the 13th century, and a very ancient castle with valuable his¬ torical relics. Howth is a popular watering place. Pop. about 1,200.

HOXIE, Vinnie Ream, American sculp¬ tor: b. Madison, Wis., 23 Sept. 1846; d. 20 Nov. 1914. She was educated at Christian Col¬ lege,

Columbia, Mo., and going to Washington, D. C., studied art, executed busts of Grant, Sherman and others, and a statue of Lincoln for the National Capitol, while still an art student, having won in competition a $30,000 prize for the statue of the martyred President. She then went abroad, where she designed me¬ dallions of Dore, Liszt, Buchanan, Read and others. Among other works of hers are ideal statues of (Sappho > ; (The Spirit of the Carni¬ val } ; and the statue of Admiral Farragut in Farragut Square, Washington. She was mar¬ ried in 1878 to Maj. R. L. Hoxie of United States Engineers.

*HOY, one of the Orkney Islands, Scotland, the second in size, in lat. 58° 50′ N., long. 3° 20′ W. It is about 13*4 miles long and from six to eight miles wide. It has an excellent harbor, Long Hope, which is four miles long. A strik¬ ing feature of the island is- its steep red and yellow sandstone cliffs which rise abruptly from the sea to a height of some 1,300 feet. Pop. about 1,200. See Orkney Islands.*

HOYLAND NETHER, England, an ur¬ ban district in the Hallamshire parliamentary division of the West Riding of Yorkshire. It is about six miles southeast of Barnsley, with which it is connected by the Midland Railway. It has extensive coal mines and manufactures bricks.

HOYLE, Edmond, English writer on games: b. 1672; d. London, 29 Aug. 1769. It is said that he was educated for the law, but nothing definite is known of his career except that he was for many years in Lon¬ don a writer on and instructor in games. His (Short Treatise on Whist (1742), a com¬ pendium of the laws of the game and many rules for play, sold largely and has been the basis of. all subsequent manuals of the .kind. So generally has his authority been accepted in the game that <(according to Hoyle® has at¬ tained a proverbial significance.*

HOYT, Arthur Stephen, American clergy¬ man : b. Meridian, N. Y., 3 June 1851. He was graduated at Hamilton College and the Au¬ burn Theological Seminary. From 1872-75 he was tutor at Robert College, Constantinople, Turkey, and on his return was ordained in the Presbyterian ministry. He was pastor at Oregon, Ill., from 1879-86; when he became professor of English literature and public speak¬ ing at Hamilton College. Since 1891 he has been professor of homiletics and sociology at Auburn Theological Seminary. His published works include (The Work of Preaching) (1906) ; (The Preachers) (1909) ; Public Wor¬

ship for Non-Liturgical Churches) (1911); (The Vital Elements of Preaching) (1914).

HOYT, Henry Martyn, American lawyer and soldier: b. Kingston, Pa., 8

June 1830; d. Wilkesbarre, Pa., 1 Dec. 1892. He was edu¬ cated at Wyoming Seminary and Lafayette Col¬ lege and graduated from Williams College in 1849, taught school 1849-52, read law, was ad¬ mitted to the bar in 1853, practised at Wilkes¬ barre, at the opening of the Civil War was appointed lieutenant-colonel of 52d Pennsyl¬ vania regiment, which he helped to raise, served during the Peninsular campaign in 1862, and was captured in a night attack on Fort John¬ son during the siege of Morris Island. Ex¬ changed and mustered out with the grade of brevet brigiadier-general ; he practised his pro¬ fession until 1867, and was then appointed addi¬ tional law-judge of the Lucerne County courts. In 1879—83 he was Republican governor of Pennsylvania. His administration was particu¬ larly characterized by a wise financial policy, by means of which the State debt was reduced to $10,000,000 and refunded at 3 per cent. He published. (The Controversy between Connecti¬ cut and Pennsylvania) (Harrisburg 1879) ; Protection versus Free-Trade (New York 1885). He held honorary degrees from the University of Pennsylvania and Lafayette Col¬ lege. Consult Anon., CH. M. Hoyt* (in (A Biographical Album of Prominent Pennsyl¬ vanians, } Series I, p. 125, Philadelphia 1888).*

HOYT, John Wesley, American educator : b. near Worthington, Ohio, 13 Oct. 1832; d. 23 May 1912. He was graduated at Ohio, Wesleyan University in 1849, and later studied both medi¬ cine and law. He had charge of educational exhibits in several international expositions, and was made chairman of the National Com¬ mittee to Promote the Establishment of the University of the United States. He was the first president of the University of Wyoming, and was governor of Wyoming 1878-83. He published Progress of University Education) (1869) ; (Studies in Civil Service) (1878) ; ˆHistory of University Education) (1903), etc.

HOZIER, Pierre d', Seigneur de la Garde, French genealogist: b. Marseilles, 10 July 1592; d. Paris, 1 Dec. 1660. He acquired a prodigious knowledge of the histories of principal families and of heraldry, and in 1616 began genealog¬ ical researches. In 1628 the king honored him with the Order of Saint Michel and pensioned him in the following year. He soon rose to the position of royal histographer and genealo¬ gist of France (1634) ; and in 1641, juge d'arnies of the kingdom. For several years thereafter he was occupied in tracing the de¬ scent of the pages of the king's household. In 1654 he was made Councillor of State. His principal work was in the collection of docu¬ ments, but he published a number of works also, including (Receuil armorial des anciennes mai- sons de Bretagne) (1638) ; (Les noms, surnoms, qualitez armes et blasons des chevaliers et of¬ ficers de l'ordre du Saint-EspriC (1634) ; and the genealogies of the houses of La Roche¬ foucauld (1654) ; Bournonville (1657) ; and Amanze (1659). His genealogies of the prin¬ cipal families of France which comprised the collection numbered about 150. After his death, they were deposited in the

Bibliotheque Nationale. Two sons survived: Louis Roger,

b. 1634; d. 1708. He succeeded his father as juge d'armcs, but became blind in 1675 and the office fell to the younger brother, Charles Rene d', b. 1640; d. 1732. He made a splendid collection of armorial bearings, which was the foundation of the Armorial General de France. His collection is in the Bibliotheque Nationale, and comprises 34 volumes of text and 35 of colored armorial bearings. The entries number some 60,000. His nephew, Louis Pierre, be¬ came his heir and also succeeded to the office of juge . d'armes. He pMblished an unofficial (Armorial general, ou registre de la noblesse de France1 (17 38—68) . Other descendants of the family continued in similar work. Am¬ brose Louis Marie (b. 1764; d. 1846) was the last juge d'armes of France.

HRABANUS MAURUS. See Rabames Maurus.

HRDLICKA, dlich'ka, Ales, American an¬ thropologist: b. Humpoletz, Bohemia, 30 March 1869. After a preliminary education in Bo¬ hemia he emigrated to the United States and undertook studies at the Eclectic College and the Homeopathic College. His work led him to undertake special research among the insane and defectives, from which studies he became interested in physical anthropology. From 1896-99 he was associate in anthropology at the New York State Pathological Institute. He spent some time also in Europe studying at the University of Paris and making extensive investigations in criminal and defective insti¬ tutions. For many years he lias been associated with the American Museum of Natural History, where he conducted expeditions in anthropolog¬ ical research in various parts of the United States, Mexico, Peru, South America, Egypt, the Balkans, Europe, Siberia, Russia and Mon¬ golia. He holds the theory that the American aborigines are of Asiatic origin. Since 1910 he has been curator of the American Museum, in the department of physical anthropology. Hrdlicka is a member of various distinguished American and foreign societies devoted to this subject and was associate editor of the American Naturalist. He has written (Report on Anthropological Work in the State Institu¬ tion for Feeble-Minded Children, Syracuse, N. Y.) (1898) ; (Anthropological Investigations on One Thousand White and Colored Children1 (1899);

HROSWITHA. See Roswitha.

H.SUAN TUNG, shooin' toong', reigning title of Pu-Yi, last of the Manchu

dynasty of Chinese kings: b. 11 Feb. 1906. He was the son of Prince Chun, and nephew of the Emperor Kwang-su, whom he succeeded to the throne (1908). Prince Chun was appointed regent by the Empress Dowager Tzu-hsi. But her death a few hours after that of the emperor re¬ moved his most conservative opponent. Chun did all in his power to make the regime a liberal one, but was finally compelled to ad- dicate to the republican forces in 1912. The emperor was retired, thus bringing the Manchu dynasty to a close. He was given a residence and a yearly income of 4,000,000 taels. A re¬

actionary movement against the Chinese re¬ public was launched in fuly 1917, which was successful in restoring Hsuan Tung. A few days later he was forced again to abdicate.

HUAINA CAPAC, wa-e'na ka'pak, or HUAYNA CAPAC, 11th Peruvian Inca: b. Cuzco, Peru, about 1450; d. Tumibamba, Ecua¬ dor, November 1525. He began his reign in 1480, or, according to some authorities, 1491, and made many conquests, even subduing the country as far south as Chile. Bv his will he divided the empire between two of his sons, Huascar and Atahualpa (q.v.). Consult Mark¬ ham, (The Incas of PeriP (1910).

HUAMANGA, wa-man'ga, or GUAMAN-

GA, gwa-man'ga, Peru, the former name of Ayacucho (q.v.).

HUAMBXSA, wam-be'sa. a tribe of South American Indians, of the Jivaroan linguistic stock, living onˆthe upper Santiago and Maranon rivers, Peru. They are of savage habits, fair of skin and wear beards. In the 16th century they participated in the capture of the Spanish settlement at Sevilla del Oro, wffien several thousand Soanish women were carried off. Their coloring is accounted for by this ad¬ mixture. In 1843, they wiped out the inhabit¬ ants of Santa Teresa, a town between the Santiago and Marona. They maintain a lofty isolation both from their Indian and white neighbors.

n hwa-na ko, the most numerous

and widely distributed of the two species of the genus Lama (L. guanaco) , of the camel family, resident in South America. It is somewhat like a large goat in form, but with a much longer neck, surmounted by a small camel-like head and long, pointed, alert ears, but no weap¬ ons. A large male is about four feet tall at the withers, a female somewhat less. The coat is of long, woolly, reddish-gray hair,1 the improve¬ ment of which by selective breeding in domes¬ tication has formed the alpaca breed (see Alpaca). It roams the open plains of Argen¬ tina and Patagonia, serving as the principal game animal of that region, and furnishing the scattered natives

with food, clothing and shelter. In the autumn it gathers into large herds and behaves in general like the antelopes of the sim¬ ilar arid plains of other parts of the world. The animals mate in August and September and the young are born in May and June. The huanaco is to be found also in Tierra del Fuego and nearby islands. Consult Darwin, Charles, (A Naturalist's Voyage) (London 1860) ; Hud¬ son, 'The Naturalist in La Plata1 (4th ed., ib., 1903) ; Spears, (Gold Diggins of Cape Horn1 (New York 1895). See Llama.

HUANCAVELICA, wan'ka-va-le'ka, Peru (1) a department in the central part, bounded south by lea, west by Lima,, east by Ayacucho and nor th by Lima and funin. It is traversed by the Cordillera Occidental, so that there is little . agriculture, possible.. The principal in¬ dustries are mining of silver and quicksilver. The area is 9,251 square miles. Pop. about 250,000. (2) A city and capital of the depart¬

ment of the same name. It is situated in a ravine of the Andes, at an elevation of 12,500 feet. It was founded in 1572 by Francisco de Toledo. The principal industry is mining. Pod about 6.500. ~ 1

HUANCAYO, wan-ka'yo, Peru, a town in the department of Junin, on the river Mantaro, situated at an elevation of about 11,000 feet. Pop. about 5,000.

HUANG-HSING, or HWANG-HSING,

kwang shing', Chinese general and revolution¬ ist : b. near Changsha, Hunan Province, 1875. After studying at native colleges, he was grad¬ uated at Tokio University, Japan. His active propaganda against the Manchu dynasty brought upon him the odium of the govern¬ ment and he was forced to flee. He took refuge in Japan where he carried on his efforts in be¬ half of the revolution. With the funds which had been collected by Dr. Sun Yat-sen, he gathered forces and was second in command m the attacks against the imperial forces at Hankow, Hanyang and Wuchang. Under Dr. Sun's provisional administration Huang-Hsing was made Premier and Minister of Navy and Marine. In 1912 when Yuan Shihkai was elected President, the provisional Premier was appointed commander-in-chief of the Southern army. In this capacity he was instrumental in founding the Southern party or Kuomin- tang, which incurred the displeasure of Presi¬ dent Yuan and resulted in the expulsion of Huang-Hsing from the Peking Assembly. He led an unsuccessful revolt in protest

and was forced to retire. He visited the United States in 1914.

HUANUCO, wa'nu-ko, Peru, city and cap¬ ital of the department of the same name. It is situated at an elevation of some 6,000 feet, not far from the Hualaga River, about 170 miles northeast of Lima. Founded by Gomez Alvarado in 1539, Huanuco, in the years 1881 to 1883, was almost destroyed by the Chilean riots and massacres. It is the seat of a bish¬ opric and until 1855 was the capital of the department of Junin. The chief industries are the manufacture of cocaine and mining. It is also renowned for its wonderful fruits and sweetmeats. The Inca town of Huanuco Viejo, which was settled by Spaniards in 1535 and is practically abandoned now, is not far distant. Pop. about 7,500.

HUANUCO, a department of Peru, bounded by Loreto on the north and east, Junin on the south and Ancachs on the west. The Cordillera traverse the department, rising to a great height in the western part. The prin¬ cipal rivers are the Maranon and Huallaga, and there are numerous smaller streams, includ¬ ing the headwaters of the Amazon. The chief industries are mining of gold, silver and quick¬ silver and the cultivation of coffee, tobacco and sugar-cane. Area 14,024 square miles. Pop. about 150,000.

HUARAZ, or HUARAS, wa'ras, a city of Peru, capital of the department of Ancachs on the river of the same name, about 60 miles from the coast, with which it is connected by rail, and 190 miles northwest of Lima. It is situated at a considerable elevation, in a fertile valley of the Cordillera Occidental. The climate is mild and the appearance of the town severely plain. The principal buildings are the govern¬ ment quarters, the. hospital, school and churches. The chief industries are agriculture, principally wheat-raising, sugar and fruit, cattle-farming and the mining of copper, coal,

gold and silver. There are interesting ruins in the vicinity of the aboriginal Incas.

HUARTE DE SAN JUAN, war'ta da san Hwan, or HUARTE Y NAVARRO, Juan de Dios, Spanish physician and psychologist : b. Lower Navarre, about 1530; d. about 1592. He received his medical education at the Uni¬ versity of Huesca and rendered important serv¬ ice in the plague at Baeza (1566). He is known principally for his unique book on phrenology, (Examen de ingenios para las ciencias) (1575), which was translated into several European tongues. It is interesting as the first attempt to establish the relation between psychology and physiology and to present new and bold theories of education. Consult Guardia, J. M.,

(Ensayo sobre la obra de J. Huarte) (Paris 1855) ; and (Biblioteca de

autores espaholes> (Vol. LXV, Madrid 1873).

HUASCAR, was'kar, Peruvian Inca, son of Huaina Capac (q.v.). See Atahualpa.

HUASCO, was'ko, Chile, a port in the province of Atacama. Several steamship lines connect with the port and are served by rail¬ ways from the interior. The important ex¬ ports are copper, silver, gold, hay, produce and cattle. Pop. about 2,500.

HUA.STECS, was'teks, a tribe of Indians of the Mayan stock, living in the state of Vera Cruz and San Luis. From the archaic forms of their language, as well as from their legends, it is inferred that this tribe was left behind in a southward migration of the Mayan tribes of Central America.

HUAYNA CAPAC. See Huaina Capac.

HUB AY, hoo'bo-T, Jeno, Hungarian violin¬ ist: b. Budapest 1858. His master was Joachim at Berlin. He made his debut in Hungary at the age of 18, and later went to Paris where he met with splendid' success. In 1882 he was head violinist at the Conservatory at Brussels, and four years later succeeded his father, Charles Hubay, as chief professor at the Buda¬ pest Conservatory. His compositions include several operas: (Der Geigenmacher von Cre- mona) (1893); (Alienor (1892); (A falu rozsaC Hungarian opera; (Lavothas Liebe) (1906), and (Anna Karenina) (1915); a sym¬ phony, a concerto for the violin and numerous single pieces for the violin.*

HUBBARD, Elbert, American author: b. Bloomington, Ill., 19 June 1859; d. on the Lusitania, 7 May 1915. After working on a farm as a boy, he went to Chicago, where he entered a printing-office and later was employed in a soap factory. In the latter business he rose to be manager and finally partner of the firm; selling out his interest, he devoted him¬ self for a time to study and travel and finally settled at East Aurora, where he established the Roycroft shop, devoted mainly to the artistic printing and binding of books. Hubbard edited the Philistine, a (fmagazine of protest,® and wrote (Little Journeys (biographical sketches) ; (No Enemy but Himself* ; Mes¬ sage to Garcia) (1898) ; (Time and Chance) (1901); (The Man of Sorrows> (1904);*

(Hollyhocks and Golden Glow) (1912).

HUBBARD, Joseph Stillman, American astronomer: b. New Haven, Conn., 7 Sept. 1823; d. there, 16 Aug. 1863. He was graduated from Yale in 1843 and in 1844 accepted a call

to Washington from Lieutenant Fremont for the purpose of computing the observations for latitude and longitude made during the latter's transcontinental journey. From 1845 until his death he was stationed at the Washington Ob¬ servatory as professor of mathematics in the United States navy. He made important inves¬ tigations regarding comets, was at two different periods editor of the Astronomical Journal , and was a member of the National Academy of Sciences, of the National Institute of Wash¬ ington, of the Connecticut and of the American Academies of Arts and Sciences, and of the American Philosophical Society. The results of his astronomical observations have been published in successive numbers of the As¬ tronomical Journal Consult Gould, B. A., ■Memoir of J. S. Hubbard' (in (National Academy of Sciences, Biographical Memoirs ,' Vol. I, Washington 1877).

HUBBARD, Leonidas, Jr., American jour¬ nalist, writer and explorer : b. Waldron, Mich., 12 July 1872; d. Labrador, 18 Oct. 1903. He was a teacher in the public school at Angola, Ind., while still in his teens and early in life showed keen interest in writing, exploration and athletics. He was graduated from Uni¬ versity of Michigan in 1897. While still at college he did reportorial work in Ann Arbor and later on the Detroit Evening News. He came to New York in the summer of 1899 and attached himself to the staff of the Daily News, but early in 1902 became associate editor of Outing, in which work he was much interested. He conceived the idea of exploring into the wilds of Labrador and 20 June 1903, accom¬ panied by Dillon Wallace, a New York lawyer, and George Elson, a Cree Indian guide, he left New York, going by steamer, frpm Saint Johns, N. B., to Rigolette, a Hudson Bay trading post on the Grand River. From this point Hubbard and his friends traveled by canoe and on foot, mapping correctly for the first time Grand Lake; then penetrating the interior in a west¬ erly and northwesterly direction, mapping the course of the Beaver River from its source to the point where it flows into the southeast bay of Lake Michikamau; and locating and mapping several large lakes in the interior. The party penetrated some 250 miles further into new territory than any previous expedition. Notes on the geology and general observation of the topography of the country were also made. The small party struck unexpected diffi¬ culties and an unusual scarcity of game, which combined to hold them back until winter had overtaken them. Hubbard's health gradually weakened and when he had become too weak to continue he insisted that his two companions should keep on without him. By 'the time help was brought to him he was dead. Wallace, who broke down a few days later, was rescued and brought his friend's body to New York. His wife, Mina Benson Hubbard, undertook in 1905 to complete her late husband's plans and made a successful journey into the interior of

Labrador. Among Mr. Hubbard's most noted writings are (The Moonshiner at Home' (1902); 'Barataria' (1902); 'Going to the Woods' (1903) ; 'Children of the Bush' (1903) ; and (Where Romance Lingers' (1904). He also wrote many short articles on outdoor life which were published in Outing from 1900

to 1904. Consult Ellis, M. B. Hubbard, LIX, p. 189, New York 1911) ; Whitney, C., 'Hubbard Expeditions into Labrador' (in Outing, Vol. XLV, p. 643, New York 1905).

HUBBARD, Richard William, American artist: b. Middletown, Conn., 15 Oct. 1810; d. 1888. He was educated at Yale, set up his studio in New York and was elected to the National Academy in 1858. Among his numer¬ ous American landscapes are 'Mansfield Moun¬ tain at Sunset' ; 'Showery Day, Lake George' ; 'Glimpse of the Adirondacks' ; and (Lake Caze- novia.'

HUBBARD, William, American colonial clergyman and historian: b. Tendring, Essex, England, 1621 ; d. Ipswich, Mass., 14 Sept. 1704. He came to New England in the Defence in 1635, settled with his father at Ipswich, was graduated at Harvard College in 1642, and was ordained about 1656 as minister at Ipswich, where he continued during the remainder of his life. He is the author of 'The Present State of New England, Being a Narrative of the Troubles with the Indians from 1607 to 1677, etc.,' the map accompanying which is supposed to be the first executed in America. It was first published in 1677, both in Boston and London, and has gone through some 10 further editions, the latest and most carefully annotated of which was edited by S. G. Drake (2 vols., Roxbury 1865). He left in manuscript a (General His¬ tory of New England,' for which the colony paid him £50, and which has been consulted with advantage by Mather, Hutchinson, Holmes and other American historians and annalists. However, it should be used with considerable discretion as it is far from being absolutely correct. It was published by the Massachusetts Historical Society in 1815 and republished in 1848. Consult Caldwell, A., 'William Hubbard and His Parish' (Boston 1885) ; Deane, C., 'Hubbard's Map of New England' (in Massa¬ chusetts Historical Society Proceedings, Vol. IV, p. 13, Boston 1887) ; Green, S. A., 'Hub¬ bard's Map of New England' (ib., Vol. IV p. 199; Vol. VI, p. 41, Boston 1888 and 1890).'

HUBBARDTON, Vt., town in Rutland County, 13 miles from Castleton, its nearest railroad station. It is in an agricultural region, and has but little manufacturing; its raw prod¬ ucts are sent direct to the markets. On 7 July 1777 a battle took place here between the Amer¬ icans under Colonels Francis and Warner, and a British and Hessian force under Generals

Riedesel and Fraser, in which the British were successful. The Americans, the rear-guard of General St. Clair s army, who were retreating from Ticonderoga, lost in killed, wounded and

prisoner's 324 men; and the British loss was 183 men. A monument in memory of the American soldiers who were killed in this battle occupies a prominent position. Pop. 500.

HUBER, hoo'ber, Eugen, Swiss lawver : b. Stammheim, Canton Zurich, 1849. After several years of nrivate practise, he became lec¬ turer at the University of Bern (1873) ; and later (1880) professor of civil law at Basel; at Halle >(1888) ; and in 1902 returned to Bern

as professor. He took an active part in the political life of his nation, as a member of the Swiss National Council and as a life member of the Permanent Court of Arbitration at The Hague. His principal contribution to the law of Switzerland has been his codification of the civil law and the standardization of court usage. Since 1907, he has been editor of Schweizer- isches Z ivilgesetzbuch. The most widely known of his legal publications is (System und Ge- schichte des schweizerischen Privatsrechts) (4 vols., 1886-93).

HUBER, u'bar', Frangois, Swiss natural¬ ist : R Geneva, 1750 ; d. Lausanne, 1831. His father was a naturalist of some repute and his mother a well-known writer on religious sub¬ jects and translator of the Spectator. As a boy Frangois received careful training in the sci¬ ences; but before he was 15, his eyes began to weaken and he eventually became blind. How¬ ever, his interest in nature was greatly stimu¬ lated by his wife, Marie Aimee Lullin; and with her aid, assisted also by his devoted serv¬ ant, Frangois Burnens, his research was made possible. His principal investigations were in the life-cycle of the bee, in which study he was the fkst scientist of distinction. His observa¬ tions were published as

HUBER, Johannes, German philosopher and theologian: b. Munich, 18 Aug. 1830; d. there, 19 March 1879. He was educated at the University of Munich, became professor of philosophy there in 1859, and was one of the leaders of the Old Catholic party and an active opponent of the Ultramontanes. He vigorously attacked the definition of the dogma of papal infallibility. Among his works were Studies1 (1867) ; (Das Papsttum und der StaaP (1870) ; (Der Jesuitenordeffi (1873) ; and (Zur Philos¬ ophic der Astronomie> (1877). Consult Zirn- giebl, E., (Johannes Huber)*

(Gotha 1881).

HUBER, Ludwig, Ferdinand, German au¬ thor: b. Paris, 14 Sept. 1764; d. Swabia, 24 Dec. 1804. In 1766 he was brought to Leipzig and subsequently received his training in lan¬ guages and literature in that city. His literary talent soon impressed itself on his contempo¬ raries, and he was admitted to the talented group of writers of the period which included Korner and Schiller. From 1787-92, he was secretary of the Saxon legation at Mainz, where he fell in love with Therese Forster. On the death of Forster, he married the clever Therese. Four years later he assumed the editorship of the Allgemeine Zeitung ; and was appointed counsellor of education for Swabia (1804) a few months before his death. In addition to his political writings which were contributed largely to Fried 'ens- praliminarien and Klio, he was the author of numerous plays, of which the one which has endured is (Das heimliche GerichtP As a critic he was highly esteemed, his best essays annearing as (Vermischte Schrif- tcn von dem Verfosser des heimlichen GerichtP VQU, 14—30

(1793). A collection of his works was pub¬ lished posthumously with a biography by his wife (4 vols., 1807-19).

HUBER, Victor Aime, German publicist and author: b. Stuttgart, 10 March 1800; d. Wermgerode, 19 July 1869. Educated at Wurz¬ burg and Gottingen, he became professor of the history of literature and of modern history at Rostock in 1833, of the languages of western Europe at Marburg in 1836, and at Berlin in 1843. He retired in 1850. Huber was one of the most profound of German scholars in the Spanish language and literature. Among his publications were (Die Geschichte des Cid) (1829); (Die englischen universitateiP (1839— 40); (Cronica del Cid> (1844); and

*HUBERT, Saint, apostle of Ardennes, the patron of huntsmen ; d. about 727. Legend says that he was a keen hunter, and that being once en§< *gcd in the chase on Good Friday, in the forest of Ardennes, a stag appeared to him having a shining crucifix between its antlers, and he heard a warning voice. He was con¬ verted, entered the church and became bishop of Maestricht and Liege. He worked many miracles, and his body, at first deposited in the church of Saint Peter at Liege, was in 817 con¬ veyed to the Benedictine convent of Andain, in the Ardennes, which received the name Saint Hubert's of Ardennes. The day of the saint is 3 November, and was formerly celebrated at many courts by a solemn chase.*

HUBERT DE BURGH, English states¬ man : d. London, 12 May 1243. He held office under Richard Coeur de Lion, and was made castellan of Falaise by King John, with whom he sided in the struggle with the barons, though advising the granting of Magna Charta. In the year of Runnymede

(1215) he was made justi¬ ciar (chief justice) of England. On 24 Aug. 1217 he won a great victory over a French fleet bringing reinforcements to the army besieging Dover Castle; the Treaty of Lambeth was con¬ cluded (11 September) and the enemy evacu¬ ated England. After 1219 he was coregent with Langton, archbishop of Canterbury, for Henry III. He vigorously opposed the for¬ eigners who were endeavoring to obtain control of the government, and sought to end the exac¬ tions of the clergy. In 1232 he was dismissed, owing largely to his failures in the conflict with the Welsh, and thereafter he had no part in the government.

HUBERTUSBURG, hoo-ber'tus-burk, Sax¬ ony, a chateau and royal hunting seat, near Wermsdorf, between Oschatz and Grimma. It is known principally as the scene of the signing of the peace which brought the Seven Years' War to a conclusion. It serves at present as an asylum for the insane. Consult Riemer,

HUBLI, hoo'bli, British India, a town in the Dharwar district of Bombay, 15 miles south¬ east of the town of Dharwar, and 90 miles northeast of Karwar. The principal trade is in cotton, grain, salt and produce. There is also considerable manufacture of cotton. Several ancient temples belonging to the Jains are here. An English factory was established early in the

17th century, but was plundered by Sivaji, a Mahratta chief, in 1673.

. HUBNER, hup'ner, Emil, German classi¬ cist: b. Diisseldorf, 1834; d. Berlin, 1901. After studying at Berlin and Bonn, he traveled widely on the Continent. On his return to Germany, he became professor at the University of Berlin, where he remained from 1870 until his death. His work consists mainly in researches in Latin epigraphy. His numerous publications in this field include (De Senatus Populique Romani Actis> (1859) ; (Epigraphische Reiseberichte aus Spanien und Portugal (1861);*

HUBNER, Joseph Alexander, Count, Austrian diplomat: b. Vienna, 26 Nov. 1811; d. there, 30 July 1892. He was educated at Vienna, and, having entered the service of the government, became in 1849 Minister at Paris, and in 1865-68 was Ambassador at Rome. In 1879 he became a member of the Clerical-Con¬ servative wing in the upper house of the Reichsrat. Among his published works are (Sixte-Quint-D'apres des Correspondances Di- plomatiques Inedites (1870, new ed., 1883) ;*

(Ein Spaziergang urn die Welt) (1872, 7th ed., 1891) ; and (Durch das Britische Reich (1886; 2d ed., 1891).*

HUBNER, Julius, German painter and poet: b. Oels, Silesia, 27 Jan. 1806; d. Loseh- witz, Saxony, 7 Nov. 1882. He studied at the Berlin Academy, and was also a pupil of Scha- dow at Berlin and Diisseldorf. In 1841 he be¬ came professor in the Dresden Academy of Arts. He was an historical painter of the Diisseldorf School, his works including dis¬ putation between Luther and Eck ; (Charles V and Saint Just,* and (Last Days of Fred¬ erick the Great.*

HUBNERITE. A mineral consisting of manganese tungstate, MnWo4, containing 76.6 per cent of tungsten trioxide when pure. A source of tungsten, ferrotungsten and sodium tungstate. Mined in places near Diagoon and from quartz veins in granite at Arivaca, Ariz. In Colorado occurs in gold ore at Leadville, and mined in Uncompahgre district and near Silverton and Gladstone. In Idaho mined in Bluewater district. Small quantities occur at several places in Montana. Mined it Ellsworth, Round Mountain, Hub and other places in Nevada and in Victoria district, New Mexico.

HUC, uk, Evariste Regis, French Roman

Catholic missionary: b. Toulouse, 1 Aug. 1813; d. Paris, 31 March 1860. After studying at Toulouse, he joined the Congregation of Saint Lazarus at Paris and was sent to China in 1839. He was occupied for a time in the south¬ ern province, and then . set out for the north and succeeded in establishing a settlement not

*far from Peking. In 1844, he undertook a journey through Tibet, and had penetrated as far as Thasa (1846) when he, with his com¬ panion, Gabet, were returned to China by orders of the Chinese Ambassador. He visited India, Egypt and Palestine, and returned to Europe in 1852. His accounts of his voyages are con¬ tained in (Souvenirs d'un voyage dans la Tar- tarie, le Thibet et la Chine * (2 vols., Paris 1850, Eng. trans., London 1851); (L'Empire Chinois* (2 vols., Paris 1854, Eng., trans., Lon¬ don 1855) ; (Le Christianisme en Chine, en Tar- tarie, et au Thibet* (4 vols., Paris 1857-58, Eng. .trans., 3 vols., London 1857-58). The historical information contained in these works is still valuable, although it was received by his con¬ temporaries in Europe with incredulity. Con¬ sult Henri d'Orleans,*

HUCBALD, or HUBALD, Benedictine monk and musician : b. Saint-Amand, near Tournai, about 840; d. there, about 930. Most of his life was spent in the monastery of Saint- Amand, where his uncle Milo conducted a school. He was absent for a number of years, but returned to Saint-Amand in 872, when he succeeded his uncle in his position at the school. Hucbald is noted principally as a composer of music and of treatises on music.

There are numerous works which have been ascribed to him, but the most authentic of these is har¬ monica Institution a system of musical educa¬ tion. (The Musica Enchiriadis, long attrib¬ uted to Hucbald, has been proven to have been of a later period. Consult Mfiller, (Hucbald's echte und unechte Schriften fiber Musik) (Leipzig 1884).*

HUCH, hoog', Ricarda, German novelist : b. Braunschweig, 18 July 1864. She lost her parents early and was educated by her grand¬ mother, to whom she dedicated her drama (Evoe) (1892). This is an historical Renaissance drama and has been called an overture to her later works. Being desirous of obtaining a higher _ education, she entered the University of Zurich, one of the first higher institutions of learning in Europe, admitting women on a par with men. She took the degree Ph.D. in 1891 and then accepted a position as secretary at the city library in Zfirich. Later she traveled, es¬ pecially in Italy, and returned to Germany in 1897. After marrying an Italian dentist, Ceconi, she lived for a time in Vienna and Munich. She has since been divorced from her husband, has married her cousin, Richard Huch, a law¬ yer, and now resides with him in Braunschweig. Her writings are of three types, poems, novels and stories, and literary criticism. Her poems were published in two collections : (Sammlung von Gedichten) (1894) and (Neue Gedichte (1907). At first she worked under the influence of Conrad Ferdinand Meyer. She loves to comment on life in her poetry and therefore her poems are not always purely lyrical, but they are full of reverence for things beautiful. She does not wish to reproduce everyday liie, but to suggest that whidh is noble, artistic and musical. She has a keen sense for the beautiful in color, tone and similes. Her chief novel is (Ludolf Ursleu) (1893). It is the history of the decline of a patrician family of the city of Hamburg. (Vita Somnium Breve) (1902) is a variation of the same theme,*

A third novel, (Aus der Triumphgasse> (1901), takes us to the slum district of an Italian city. She contrasts the aristocratic-aesthetic view of life of the Romanticists with the social-demo¬ cratic views of our days. Her writings on literary criticism comprise (Die Bliitezeit der Romantik) (1899); (Ausbreitung und Verfall der Romantik) (1902), and an essay on Gott¬ fried Keller. They are distinguished by sympathetic interpretation and psychological in¬ sight. Recently she has added to this list a book entitled (Natur und Geist als Wurzeln ties Lebens und der Kunst) (1915). Her other literary writings are (Der Bundesschwur) (1891) ; the modern fairy tale (Mondreigen von Schlaraffis> (1896); (1897), humorous stories ; and (Haduvig im KreuzgangP (1897), a realistic story of dreams

and visions) ; the novel (Liebe) (1899) ; and the stories (Fra Celeste >
(1900) ; (Von den Konigen und der Krone) (1904) ; and (New York
1914).

William F. Hauhart,

Assistant Professor of German, University of Michigan.

HUCKLEBERRY, a name of uncertain derivation applied to a variety of shrubs, es¬ pecially to species of the genus Gaylussacia, and also to those belonging to the genus Vac- cinium. The principal species are found mainly in the northern hemisphere, throughout North America and Europe. In many places in the United States huckleberries are a valuable product, the fields in which they grow are pre¬ served and the berries are secured either for household use or for profitable marketing.

HUCKLEBERRY FINN, The Adven¬ tures of, a story by Samuel L. Clemens (((Mark Twain®), (q.v.), published almost simulta¬ neously in London and New York in 1884, parts of it having been previously published in the Century Magazine. It was the first book brought out by the firm of C. L. Webster and Company of which its author was a member. Even previous to its actual publication 40,000 copies had been sold to subscribers. It was illustrated according to the author's own ideas by E. W. Kemble and has gone through many editions. It is a sequel to, and follows the fortunes of, the leading characters of the same author's (Tom Sawyer. In this book the author not only, preserves to us a valuable record of a rapidly disappearing social order, but throws light upon some questions of moment to the student of history. It is, per¬ haps, Mark Twain's most notable work of pure fiction and was received with great enthusiasm by many keen critics. At one time it created considerable discussion by the action of a num¬ ber of librarians who removed it from the shelves of their institutions on account of*

some imaginary shortcomings in ((Huck's® moral character. Consult Henderson, A., (Mark Twain) (New York 1911) ; Johnson, M., (A bibliography of the Work of Mark Twain, etc.> (New York 1910) ; Paine, A. B.,

HUCKNALL TORKARD, England, a town in Nottinghamshire, five miles north of Nottingham, and 132 miles northwest of Lon¬ don, on the Great Central, Great Northern and Midland railways. Near by is Newstead Abbey where Byron lived; and his tomb is in the old town parish church of Saint Mary Magdalene. The principal industries are the manufacture of tobacco and hosiery, and coal mining. Pop. about 16,000.

HUDDE, hud'de, Andreas, Dutch mer¬ chant.: b. about 1600; d. 1663. He was a prominent member of the Dutch West India Company and in 1633 was director-general in America. The company awarded him im¬ portant posts in its newly found territory. He was surveyor of Manhattan (1642) ; and arbi¬ trator in the disputes between the Dutch and Swedish settlers on the Delaware River, which territory he finally conquered and held for the company. His prestige continued and grew. He was placed in command of Forts Altona and New Gottenburg (1657) ; was colonial sur¬ veyor, and

later parish clerk. His records in the Albany archives testify to the quality of his intellect and his education.

HUDDERSFIELD, England, municipal, county and parliamentary borough in the West Riding of Yorkshire, on the Colne, 16 miles southwest of Leeds. It is the chief seat of the English cloth and woolen manufacture and also manufactures silk, iron and machinery. Coal-mining and stone-quarrying are also car¬ ried on extensively. The borough has good water power and many of the industries are run by it. The town is thoroughly modern, is well built and has spacious streets. It has also fine churches and public buildings. There are. here, a proprietary college affiliated with the University of London, a technical school and several grammar schools. The municipal gov¬ ernment is of a high order and has been a pioneer in several important particulars. The town was the first to own and operate its street railways ; it owns its gas, electric and water plants, maintains free public libraries, a slaughter-house, public markets, a hospital, cemeteries and a modern sewage disposal plant. It was the first town to adopt an eight-hour labor day. As far back as 1853 artisan's dwell¬ ings were established for married couples and for single women as well as for bachelors. In ancient times known as Odersfelt, Hudders¬ field has been of importance only from the establishment of the woolen industry in the 18th century. A consulate of the United States is located here. Pop. 107,821.

HUDIBRAS. This satirical mock-epic by Samuel Butler, perhaps the wittiest poem ever written in the English language, consists of 11,000 lines of so-called <(Hudibrastic® verse (Iambic tetrameter, with burlesque rhymes), and is divided into three parts, each of several cantos. The action, which fills only about 1,800 lines, is constantly interrupted by digressions upon a variety of themes. It is often stated that Hudibras is a kind of rhymed parody of

'Don Quixote, which is frequently alluded to and is even travestied in several of its minor incidents ; but, except for the idea of a crazy knight and his squire setting out to reform the world, Butler owes little to Cervantes, and*

The story concerns Sir Hudibras, a religious- mad Presbyterian, and Ralpho, his squire, who set forth to reform social abuses banned by the Puritans. Their fight with the bear-baiters and their defeat; Hudibras in the stocks and his release by his Lady; his oath of flagellation — which he breaks; their rout by the merry¬ makers; their visit to the astrologer Sidro-

*phel — whom they rob ; plots and counter-plots by both Hudibras and Ralpho, each in turn in league with the Lady, are the main incidents of the disconnected story, which breaks off but does not end. The characterization is weak and inconsistent ; the characters being in the main mere nicknames for absurdities. Hudi¬ bras, perhaps in part a caricature of Sir Samuel Luke, once an employer of Butler's, is a mixture of incongruous traits, knight errant plus Presbyterian magistrate, who, although meant to be ridiculous and cowardly, at times talks good sense, and fights right valiantly. Minor characters have been identified with various members of the Puritan party, but such identi¬ fication is uncertain and unimportant. The character of Sidrophel the astrologer is cer¬ tainly meant for William Lilly, a notorious impostor of the day. This portrait of the uni¬ versal and permanent quack is Butler's master¬ piece; but the portraits of Shaftsbury and Lilburn are also admirable, and perhaps fur¬ nished Dryden with models for his 'Absolom and Achitophel.**

The story itself, with its satire on Puritan¬ ism, serves merely as a frame on which Butler hangs his ridicule of the many excesses of con¬ temporary life. A conservative in politics and a rationalist in religion, he was a royalist and an Episcopalian not through sentiment or re¬ ligious conviction but through hatred of excess and dislike of change. Of strong, well-balanced mind and of eminent good sense, he saw in royalty and in an established church the safety of the state. Satire makes no fine distinctions, and Butler's portrait of Puritanism is of course the grossest and most unfair caricature ; but in his burlesque of Puritan habits of mind and speech there was enough truth to render his satire wonderfully telling. He touches upon religion in general apart from Puritanism ; upon contemporary science (the researches of the Royal Society he especially ridicules) ; upon matrimony ; upon astrology and kindred super¬ stitions; upon lawyers, with incidental satire on a large variety of political, moral, social and literary themes. The enormous whole forms a "commonplace-book® of satire, for which Butler's prose notebooks furnished the

material, gathered through an entire life of observation and reflection and in parts talked out many a time over a bottle with his friends. 'Hudibras is utterly devoid of poetry or sentiment. This is amply compensated for by its brilliant and pervasive wit, which, though so often based upon the local, or the temporary, or the recondite as to be unintelligible without the aid of explanatory notes, occasionally at¬ tains the universal, and in such passages has become a part of the language. The style of the poem, compounded of its peculiarities of metre, diction and figures of speech, is so original and individual as simply to be termed "Hudibrastic.® Butler employs the old iambic tetrameter but gives it a twist of his own by means of astonishing rhymes. He changes the vowel sounds, forces two monosyllabic words to rhyme with a dissyllable, and employs fre¬ quent*

trisyllabic rhymes that are always out¬ rageous but often irresistibly comic. For all this he gained hints from his predecessors, such as Ben Jonson and John Taylor, the "water poet,® but he was the first to popularize the practice. Working with the rhyme to make the burlesque effect is Butler's habit of levying upon all fields of knowledge for his illustra¬ tions, of alluding even to the most recondite, almost unheard-of things in history, science, pseudo-science, mediaeval lore of all kinds. Rabelais and Burton in prose and Cleveland in verse satire had done something of this kind, but Butler is without a peer in the range of his material and in his extravagant use of it.

Although a portion of (Hudibras was writ¬ ten before the execution of Charles I, even the first part was not published until 1663 ; a second followed in 1664, and a third and last in 1678. Thus the satire as an attack upon Puritianism lost utterly any militant value. But few works have ever gained such immediate and universal popularity. It became household property among the royalist reading public, not through whatever of permanent truth it contained, but through its partisanship.. No poem in English has ever bred so many imitations. Within the . century after its publication appeared at least 23 Hudibrastic satires, many of great length and of intolerable dullness and, oftentimes, of obscenity. Its influence was rife even in Amer¬ ica, and it is notable that the only one of these imitations which shows any originality is (Mc- Fingal,* an able political satire by John Trum¬ bull the American, some of whose couplets are often credited to Butler. That (Hudibras* has practically ceased to be read is not altogether to the credit of the public. True, it is verbose ; its political significance has passed; many of its allusions are unintelligible to the average reader ; but, on the other hand, much of its satire will remain perennially applicable as long as society, contains absurdities and shams, and much of its wit yet sparkles after the lapse of over two centuries.*

There are many editions. That edited by Dr. Zachary Grey (Dublin 1744, rep. London 1869) is the standard; Hogarth's illustrations are in the London edition of 1726, reprinted 1775; Grey's notes are used in the three-vol¬ ume London edition of 1819; the Bohn Library edition (London 1859) contains notes by Grey and Nash. Among other editions are the Aldine (Poetical Works of Samuel Butler) (London 1893), and that by A. R. Waller

(Cambridge, England, 1905). < Hudibras > was

translated by John Townley into French verse (London 1757) and by D. W. Soltau into Ger¬ man (Riga 1787). Among critical studies are 'Butler's Hudibras, ein echte zeit- und sitten- gemaldeC Rudolph Boxberger (Leipzig 1876), and 'Die Reime von Butler's Hudibras; eine metrische und lautliche Untersuching, Bruno Harder (Konigsberg 1900).*

Marion Tucker.

HUDSON, Erasmus Darwin, American physician: b. Northampton, Mass., 1843; d. New York, 1887. In 1864 he was graduated at the College of the City of New York and three years later at the College of Physicians and Surgeons, New York. He entered Bellevue Hospital as surgeon immediately thereafter, and in 1869-70 was appointed health officer of New York city. Subsequently he was professor of principles and practise of medicine at the Woman's Medical College (1872-82), and from the last-named year until his death was pro¬ fessor of general medicine and diseases of the chest at the New York Polyclinic. His works include (Report of Pulse and Respiration of Infants> (in Eliot's Obstetric Clinic, 1872) ; 'Doctors, Hygiene and Therapeutics) (1877) ; 'Methods of Examining Weak Chests) (1885) ; limitations of the Diagnosis of Malaria) (1885) ; 'Home Treatment of Consumptives) (1886) ; 'Physical Diagnosis of Thoracic Dis- eases) (1887).

HUDSON, George, English railway spec¬ ulator: b. York, March 1800; d. London, 14 Dec. 1871. He began as a linendraper's ap¬ prentice, and soon acquired a considerable fortune in that business. At the age of 27, he fell heir to £30,000. He immediately began to invest in railroads, especially in the North Midland line, and his energy and zeal soon ele¬ vated him to the position of director. In 1833 he organized the York Banking Company, and in 1837 became mayor of York. The projection of new railroads now occupied his attention, until, by 1844, he was the owner of more than 1.000 miles of railway and was known as the "railway king.® His fortune accumulated rapidly and honors were heaped upon him. Re-election to the mayoralty came twice ; and finally, in 1845, he was sent to Parliament. Two years later the crash came; railway prop¬ erty experienced a sudden decline, and Hudson was involved in overwhelming difficulties. In¬ vestigations revealed the fact that the money invested had been unscrupulously handled; Hudson spent his last years on the Continent, living on an annuity supplied by his friends.

HUDSON, Henry, English navigator. (Some authorities gave his name as Hendrick). The time and place of his birth appear to be lost. We only know that he had earned, per¬ haps by the time he was 40, sufficient reputa¬ tion as a bold and skilful navigator to be placed in command of the ship Half Moon of Amsterdam. Early in 1609 he made a con¬ tract with a

party of Dutch merchants to act as captain of their private exploring expedi¬ tion, and in the written agreement between them he was described as "Henry Hudson, Eng¬ lishman.® This settles the honor of his birth country, though nothing more. At that time the one great commercial demand was for a

*shorter and better, all-sea trade route to the * Far East. It was known that there was land to the west of Europe and it was believed that a passage could be found through these lands directly westward to the East. It is clear that Hudson believed that the western route was the most promising and, no doubt, he suggested it to his employers, but they evidently had more faith in a sea passage north and then east, round Europe and Asia to China. Thus it happened this English sea captain sailed from the Dutch port of Amsterdam in the small ship Half Moon bound for China by the way of the North Cape. The ship's company of Dutch and Eng¬ lish was fortunate in having as mate one Robert Juet (perhaps also of England), and the mate could read and write. Juet kept the ship's log, and in this log book on the first page are these words : "On Saturday, the five and twentieth of March, 1609, after the old account (style), we set sayl from Amsterdam, and by the seven and twentieth day we' were down at the Texel; and by twelve of the clock we were off the land, it being east of us two leages off.®*

Once "off the land® the ship was free to go where the captain pleased and it certainly did not please the crew to face the arctic cold of the attempted voyage round Europe. Solid pack ice and the open mutiny of the crew de¬ cided Hudson to turn back and he steered south — and west. It is evident that he felt free to carry out his own plans and reach China by another route. His owners' plans had failed and, while his plan might fail, his success would justify his action. Hudson's decision was almost as bold as that of Colum¬ bus for, while he had, no doubt, some knowl¬ edge of the lands to the west, he evidently had no conception of the shape or size of North America nor of the width of the Pacific.

The Half Moon was a slow sailor, and four months passed before she made the land along the eastern coast of what is now the United States. The log book described the land as "low white sandy ground® — exactly describing all the shore line south of Sandy Hook. The book might also have described parts of Long Island or Cape Cod and it is clear it did not describe the coast of Maine, and it is more than probable the first land mentioned in the book was south of Sandy Hook for, on reaching the land and finding no passage westward, Hudson steered "northeast by north® until, about two weeks later, he came to a great bay. The log book which does not give the name of the month, and which must have been September, says, "And from that lake or bay the land lyeth north by east, and we had a great streame out of the bay.® The Half Moon had found

the “great stream® described by Verrazano, and with the flood tide sailed into New York Bay and headed for the Narrows and, as the log book says, “came to three great rivers.® And it continues : “So we stood along to the north- most, thinking to have gone into it.® The Half Moon was off Manhattan. It was true Verrazano, in 1524, had entered New York Bay and left a record of a high hill and a great bay out of which flowed a large river, but Verrazano had not the courage to pass the Narrows, except in a small boat. Other explorers may have looked into the bay. The Half Moon was the first ship to pass up the “great stream® and to Hudson belonged the entire honor of discover-

ing and exploring the river that now bears his name.

The pages of Juet’s journal tell nothing of Hudson’s own hopes, fears and anticipations. Yet, it is fair to conclude that Juet’s enthusiasm over the beauty and value of the great valley was shared by his captain and that the ship’s log was, in a sense, a reflex of Hudson’s own views. There is no hint of Hudson’s belief that he could reach China by this route, yet it is reasonable to suppose he entered New York Bay in the hope that the <(great stream® would lead through the land to the Pacific. The great size of the bay and river, and the fact that the tide flowed far into the land, and that for the first few days’ sail the water remained salt, no doubt encouraged him to keep on through this most promising opening in the land. Favored by "fairer weather® and a favorable breeze he steered northerly over the wide salt arm of the sea until the apparent strait became a river and the sea water became fresh. At the High¬ lands all hope of a road to China must have faded away. Still, he would sail on, push through the mountains and see what manner of country lay beyond.

The items of the log book plainly show that Hudson, after passing the Highlands, began to recognize the transcendent importance of his discovery. He had found a new land of sur¬ passing beauty and fertility and everywhere clothed in splendid forests. Hudson clearly recognized the commercial value of his dis¬ covery, for the log book enumerates all the potential wealth of the river and valley in fish, game, lumber, fruits, vegetables, grains and peltry. It even mentions the fact that Hudson, while the ship was at anchor some¬ where near the present city of Hudson, sent the ship’s carpenter ashore to fashion a new fore¬ arm out of one of the primeval trees — the first bit of lumbering done by white men in the valley. Hudson seems to have decided, after reaching the upper river and sailing to a point opposite the Catskills, that the best way to mollify his owners on his

return would be to report as fully as possible the potential wealth he had discovered and he sent a boat up the river to explore the country. The boat party appears to have been absent several days, for they rowed up stream about nine leagues or perhaps beyond Albany, where, as the log book says, the boat found "it bee at an end for shipping to goe in — with but seven foot water and unconstant soundings.® Meanwhile Hud¬ son evidently traded with the Indians for peltry, no doubt regarding the furs as some¬ thing that would demonstrate to his merchant owners the value of his discovery.

Three weeks after the Half Moon entered <(the great streame® she again passed Sandy Hook and steered away for Amsterdam. There is no record of the return voyage, nor is there any record of Hudson's report to the merchants of Amsterdam, yet it is evident that his story and perhaps the exhibit of peltry created a tre¬ mendous sensation in the commercial cities of Holland. Hudson appears not to have cared much about this side of the affair. He seems to have considered his voyage a failure. He had tried to reach China and failed, and wished to sail again, but the merchants seem to have been wholly occupied in fitting out new ships under mere commercial captains and would

not listen to him. At last, after some delay, he did secure a second ship and set forth once more to find a sea path through America. He appears to have thought there might be a passage round by the north of America and he steered for Baffin's Bay. Once more he found a great passage leading westward into the land, once more a salt water strait seemed to promise success, but it only led to an inland sea. His miserable crew, ignorant, frightened at the arctic cold and gathering ice, rose in mutiny, and putting their great captain in an open boat, with his son, a boy of seven, and some invalid sailors, set them adrift in the vast waters of Hudson Bay and left them there to perish. Consult Read, (Historical Inquiry Concerning Henry Hudson) ; Janvier, 'Henry Hudson5 J1909).

HUDSON, Henry Norman, American Shakespearean scholar and Episcopal clergy¬ man: b. Cornwall, Vt., 28 Jan. 1814; d. Cam¬ bridge, Mass., 16 Jan. 1886. He served as chaplain in the Civil War, was professor of Shakespeare at Boston University and for a time editor of the Churchman. He published (Lectures on Shakespeare5 (1848); 'Campaign with General Butler5 (1865) ; 'Shakespeare, his Life, Art, and Characters5 (4th ed., 1883) ;

(Essays on Education5 (1883). He edited the Harvard and the University edition of Shake¬ speare.

HUDSON, William Henry, English edu¬ cator and critic: b. London,

England, 2 May 1862. He was for five years private secretary to Herbert Spencer, and coming to America was assistant librarian of Cornell University, 1890-92. From 1892— 1907 he was professor of English literature at Leland Stanford Jr. Uni¬ versity; from 1902-03 professional lecturer at the University of Chicago, and later staff lec¬ turer in literature to the extension board of London University. He published (The Church and the Stage5 (1886) ; 'An Introduction to the Philosophy of Herbert Spencer'5 (1894) ;

(Studies in Interpretation' (1896) ; (Idle Hours in a Library5 (1897) ; 'The Study of English Literature5 (1898) ; 'The Sphinx and Other Poems5 (1900); 'The Meaning and Value of Poetry5 (1901); 'Life of Sir Walter Scott5 (1901); (Famous Missions of California5

(1901) ; 'Rousseau and Naturalism in Life and Thought5 (1903) ; numerous volumes on Eng¬ lish poets and literature (1910-12) ; 'The Story of the Renaissance5 (1912); (The Man Napo¬ leon5 (1915).

HUDSON, W. H., English naturalist and author. His boyhood was largely spent in Ar¬ gentina and at school in the British Isles. He published 'The Purple Land,5 a romance (1885; new ed., 1916); (Argentine Ornithol¬ ogy5 (collaborating with Dr. P. L. Sclater, F. R. S., 1888-89); 'The Naturalist in La Plata5 (1892) ; (Birds in a Village5 (1893) ; Udle Days in Patagonia5 (1893) ; 'British Birds5 (1895) ; 'Birds in London5 (1899) ;

(Nature in Downland5 (1900) ; (Birds and

Man5 (1901); (E1 Ombri5 (1902) ; 'Hamp¬ shire Days5 (1903) ; and with the publication of 'Green Mansions,5 a remarkable romance of Venezuela (1904; new ed., New York 1916), it became known that in this author was, as ex¬ pressed by John Galsworthy, "a simple narrator who is well-nigh unsurpassed, a stylist who has

few, if any, living equals.55 His later publica¬ ns delude (A Crystal Age5 (1906; new ed. 1916); (The Lands End> (1908); (Afoot in England> (1909); (A Shepherd's Life> (1910); Adventures Among Birds> (1913; new ed.,

l(Tales of the Pampas) (1916) ; (The Book of a Naturalist5 (1919).

HUDSON, Mass., town, Middlesex County, on the Assabet River, and on

the Boston and Maine and the Fitchburg railroads, about. 17 miles northwest of Worcester. The town is in an agricultural region, but is particularly noted for its manufactures of leather and rubber, gos¬ samer clothing, webbing, goring and boots and shoes, paper and wooden boxes. The town owns and operates the electric-light plant and the waterworks. Pop. (1920) 7,607.

HUDSON, N. Y., city, port of entry, county-seat of Columbia County, on the Hud¬ son River, and on the New York Central and Hudson River and the Boston and Albany rail¬ roads, about 30 miles south of Albany. Area of the city, one square mile. Hudson was settled in 1783 and was called Claverack Landing; but the year following the name was changed to Hudson. In 1785 it was chartered as a city, and in 1790 it was made a port of entry. From the first it was a trading station of importance and a whaling port. After the Revolution a large foreign trade was established, but the commerce of the city was injured by the de¬ struction of its shipping in the War of 1812. The surrounding country is devoted largely to agriculture, and the city has a number of manu¬ facturing establishments. The chief manufac¬ tures are foundry products, machinery, knitˆ goods, car-wheels and creamery products. It has a large sash and blind factory and several small manufacturing establishments. Some of its prominent buildings are the State Volunteer Firemen's Home, the State House of Refuge for Women, an orphanage, hospital and the city public buildings. The city owns and operates the waterworks. The government is vested in a mayor, who holds office for two years, and a city council. Pop. 11,417.

HUDSON, Ohio, town in Summit County, on (the Pennsylvania Railroad, 20 miles south of Cleveland. This was one of the earliest set¬ tled towns on the Ohio Western Reserve, and prior to the Civil War was an abolition strong¬ hold. The Western Reserve College, before its removal to Cleveland, was located here. Pop.

1,021.

HUDSON, Wis., city and county-seat of Saint Croix County, on Lake Saint Croix, an expansion of the Saint Croix River, and on the Chicago, Saint Paul, Minneapolis and Omaha Railroad, 65 miles northwest of Eau Claire and 20 miles east of Saint Paul, Minn. The chief manufactures are railroad cars. The city has a saw-mill, interior finish factory, brewery, large cold-storage plant and ample facilities for shipping the butter, poultry, vegetables and fruits of the surrounding valuable farm lands.

It has a large sanatorium, fine courthouse and the Galahad School for Boys. The electric- light plant and the waterworks are owned and operated by the city. Pop. (1920) 3,014.

HUDSON, the largest river in the State of New York, has its head waters in Hamilton and Essex counties, and flows southwest into Saratoga County, then nearly directly east to

Sandy Hill in Washington County, and from this point south through New York Bay into the Atlantic Ocean. It is fed by several of the Adirondack lakes, a number of small streams, and by Schroon River, Batten Kill, Hoosick, Wappinger and Croton from the east, and the Sacandaga, Mohawk, Wallkill and Esopus Creek from the west. The Mohawk (q.v.), which flows into the Hudson at Cohoes, is the largest tributary; the Rondout enters the Wall- kill near the Hudson. The head waters of the Hudson and the sources of several of the streams which flow into the Saint Lawrence are very near each other in the Adirondack Mountains. At Troy, three miles below the mouth of the Mohawk, the Hudson becomes a navigable tidal stream. There is a tidal rise of about one foot at Albany. Above Troy there are a number of rapids and long falls in the river; but below, the navigation is uninter¬ rupted. At one time there were a few obsta¬ cles, the largest of which was ˆOverslaugh,55 or Castleton Bar, at Castleton. This hindrance to navigation has been almost wholly removed by the Federal and State governments. The Cats- kill Mountains, on the west side, begin about 25 miles below Albany. Lower down are the Highlands,, averaging about 1,100 feet in height, which extend along the shore for a dis¬ tance of about 20 miles. The Highlands of the Hudson are noted for their beautiful scenery. On the west bank are the famous Palisades (q.v.) about 13 miles long, their southern ex¬ tremity being near Fort Lee, in New Jersey, and the northern extremity near Piermont, N. Y. This remarkable arrangement of rock rises from near the water's edge, almost per¬ pendicularly, from 350 to 550 feet. Below Ver- planck and Stony Point is an expansion in the river, the upper pant of which is called Haver- straw Bay and the lower part Tappan Sea. Many small islands in the river serve as foun¬ dations for lighthouses, or for the erection of dredging platforms. Iona, on which there is now a naval station, Constitution and Beeren islands have all figured in history. Below Al¬ bany the Hudson is more an estuary or fiord than a river, which accounts for the great depth of water. The area drained by the Hudson above where the Mohawk enters is about 30,000 square miles. The river is noted for its beau¬ tiful scenery from the source to the mouth. Along the lower part of its course there are many fine residences, as a large part of the country , on both banks from New York to Albany is now a residential section. The Hud¬ son is fittingly called the ((Rhi,ne of America.55

Hudson River was discovered by Verrazano, an Italian navigator, in 1524; but it was ex¬ plored by Henry Hudson in 1609. The Indian name for the river was Shatemuc, and the first colonists called i,t North River, as the Delaware was then called South River. The part of the river west of New

York city is still called North • River ; but it was given the name Hud¬ son in honor of its first explorer. The history of the country since its discovery by Europeans occupies an important place in the history of the United States. The almost unbroken waterway from the Atlantic Ocean through what is now the State of New York, to the Saint Lawrence River, made this an important route for missionaries, traders and for the armies in the various wars. From the mouth*

of Lake Champlain to Lake George, across the portage from Lake George to the Hudson, and the Hudson to the ocean, was all disputed ter¬ ritory, and the scene of many a contest of the Revolutionary War. See Champlain, Lake; Crown Point; Haverstraw; Ticonderoga.

The river is navigable for ships of the first class for about 117 miles from the ocean. Its whole length is about 300 miles. Before the in¬ troduction of railroads, the navigable waters of the Hudson, connecting New York with a large section of country, gave the city great oppor¬ tunities for development. A canal built along the Mohawk Valley, in 1817-25, connected the Hudson with Lake Erie, and the Champlain Canal completed the water route from the Hud¬ son to Lake Champlain. Later the Erie and the Delaware and Hudson railroads brought the coal of Pennsylvania to the Hudson River for transportation by water to markets in the inte¬ rior. The New York Central and Hudson River Railroad is on the east side of the river and the West Shore on the west side. In 1807 Robert Fulton made on this river the first suc¬ cessful experiment with steam navigation. The Hudson is now a thoroughfare for an immense amount of freight, and elegant passenger steamers ply daily between New York and Al¬ bany. The government has erected and main¬ tains 21 lighthouses and lighted beacons. Navi¬ gation ceases in winter because the river is frozen nearly its whole length. The ice crop harvested each winter on that part of the river between Albany and the Highlands is shipped, when navigation opens, chiefly to New York city. Shad fishing is one of the important Hudson River industries. Many of the cities on the Hudson were at first only trading posts or ferry towns, but nearly all have kept pace in development with the rest of the State. The principal cities and towns on the river from north to south are Glens Falls, Sandy Hill, Fort Edward, Mechanicsville, Cohoes, Troy, Albany, Hudson, Catskill, Kingston, Poughkeepsie, Newburgh, West Point, Peekskill, Haverstraw, Ossining, Nyack, Tarry town and Yonkers. At the mouth of the river are New York and Jer¬ sey City, with the suburbs, which are important shipping ports, Hoboken and Weehawken. The only bridge crossing the river between New York and Albany is the one which

ex¬ tends from Poughkeepsie on the east side to Highland on the west. There are 14 public fer¬ ries. The use of the water power of the Hud¬ son as an aid in developing electrical power for the mechanical arts is most important. From Mechanicsville the power of the Hudson is transmitted to the General Electric shops of Schenectady. At Spiers Falls, at the foot of Mount McGregor, about 40 miles above Albany, there is a stone dam over 1,800 feet long, 100 feet high and containing 1,800,000 cubic ' feet of masonry. The Hudson is raised 50 feet above its former river bed, then its waters fall 80 feet, and the power developed Is transmitted for electrical machinery to Schenectady, Al¬ bany, Troy, Amsterdam and other places. This power development of the waters of the Hudson combined with development of like power of the waters of the Saint Lawrence at Massena keeps the two rivers, as in early years of our country, of vast importance to the State. Many industries are affected by this great new power, not the least of which are the coal¬

mining of Pennsylvania and the preservation of the Adirondack forests.

The Hudson occupies an important place in the historical, commercial and mechanical de¬ velopment of the nation, also in its literary and artistic progress. Washington Irving who lived at ((Sunny Side® and was laid to rest in Tarrytown, introduced to the world many of the places along the Hudson. Cro' Nest is associated with Joseph Rodman Drake and his poem, (Culprit Fay} ; West Park and the coun¬ try around have been practice observation ground for the naturalists John Burroughs and Ernest Ingersoll ; Cornwall-on-the-Hudson was the home of N. P. Willis and E. P. Roe. Art¬ ists who have received inspiration from Hud¬ son's scenery and history have become suffi¬ ciently numerous and their works of impor¬ tance enough to be called <(The Hudson School of Painters.® Consult Johnson, C., (The Pic¬ turesque Hudson > (New York 1909).

HUDSON BAY, Canada, an extensive bay or inland sea extending between lat. 51° ana 64° N. and long. 77° and 95° W. Its greatest length north to south is about 800 miles, great¬ est breadth, 600 miles. It is connected with the Atlantic Ocean by Hudson Strait and with the Arctic Ocean by Fox and other channels. Hudson Bay is navigable in summer from the middle of June to the end of October, being obstructed by drift-ice during the rest of the year. There are many islands, reefs and sand banks. The white whale is found in its waters, and there is a considerable summer fishery, steam whalers frequenting the bay from the middle of June to the end of October. Numer¬ ous rivers flow into the bay, the chief being the Nelson and Churchill on the east. The shores on the east are high and bold; those on the west are low and level, and much of the land is favorable for stock and dairy farming, while valuable deposits of iron ore, galena and plum¬ bago exist. With the exception of a few fur trading stations there are

*no settlements. **

HUDSON FALLS, N. Y. See Sandy Hill.

HUDSON RIVER SCHOOL OF PAINT¬ ING. See American Art.

HUDSON STRAIT. See Hudson Bay.

HUDSON'S BAY COMPANY, the great fur-trading and later landholding and adminis¬ trative company of Northwest Canada, incor¬ porated 1670. It originated in the dissatisfac¬ tion of two French Protestant employees of the French fur-trading monopoly at Quebec, Gro- seilliers and Radisson, over its unwillingness to extend the trade to Hudson Bay. After vainly trying to induce Boston merchants and the French court to take up their scheme for so doing, they gained the ear of a company of London merchants and Prince Rupert, cousin of Charles II ; brought a load of furs from the bay; and on 2 May 1670 Rupert and 17 associ¬ ates received from Charles a charter for «The Governor and Company of Merchants- Adven- turers trading into Hudson's Bay.® It had the monopoly of the right to trade in the bay or on its coasts, and could expel any one entering the territory without its license; could build forts, send out ships of war and privateers and declare war and make peace with any non- Chnstian people. Its capital was £10,500, di¬ vided into 34 shares with an extra one for

Prince Rupert, and in 1676 it imported some £19,000 worth of furs, sending in return £650 worth of goods to the Indians. The profit was high on the petty capital paid in, but the gross amount was not large for a century. In 1748 the trade was carried on with four ships and employed about 120 men in all, including the garrisons at its forts. The furs and other im¬ ports amounted to over £30,000, the exported goods to £5,000 and the costs of business over £17,000. The average profit was 40 per cent on capital, but the sum was trivial. Moreover, the company had great losses and tribulations from the French rivalry and assaults, especially in the national wars. The French laid claim to the territory on the strength of a mythical expedi¬ tion of Jean Bourdon in 1656, and in 1682 and 1686 captured several of the company's forts. The two countries' trading posts shared in the long war ended by the Peace of Ryswick in 1697, captured each other's forts, and the treaty yielded Port Nelson to the French, to the great damage of the company. The War of the Spanish succession inflicted frightful hardships on both sides ; the company claimed a loss of over £100,000, hundreds of trappers and em¬ ployees starved to death and the

Indians turned cannibals. The Treaty of Utrecht in 1713 finally resigned all French claim to the Hudson's Bay territory and thence till the cession of French Canada in 1763, the monopoly gave the company an easy life and good profits, though still on a small scale. But when that cession opened up access to Hudson's Bay from both land and sea, the possibilities of trade were incalculably en¬ larged. Despite the clandestine rivalry of Mon¬ treal traders who intercepted their boats, the gross volume of trade increased, and it was not crippled by the ravages of France in 1782, as part of the war begun in 1778, when they captured and partly ruined the massive stone Fort Prince of Wales at the mouth of Church¬ ill River and altogether destroyed property valued by the company at half a million pounds. But a much worse rivalry was at hand, organ¬ ized and powerful: the Northwest Company (q.v.), started on a co-operative plan in 1784 by an association of Scotch merchants in Mon¬ treal. The Declaration of Rights having guar¬ anteed free and open trade to all British subjects, this company invaded its rival's terri¬ tory, and the trade competition for many years merged into actual war. In 1821 they had done each other so much harm that they consolidated, and Parliament in view of the evils of competi¬ tion empowered the Crown to issue licenses for the <(Indian territories, M which was exercised in favor of the new company. Meantime explora¬ tion had been steadily enlarging the territory; Samuel Hearne for the old company had reached the Arctic in 1771, Alexander Macken¬ zie for the new one reached the Pacific in 1793. With the United States, its rivalry for the far Northwest was strenuous and persistent; it planted posts in the Oregon district, repelled settlers and there was much danger of war till the boundary settlement of 1846 quieted the dispute. In 1849 it secured a grant of Van¬ couver Island. This was the time of its palmi¬ est growth. In 1846 it had 513 employees and 35 officers, in 1856 it had over 3,000 employees and officers together, with 152 posts. Its trade monopoly expired by limitation in 1859, but

there was also a great desire to settle the North¬ west Territories, with which the fur-trade and administrative rights of the company were in¬ compatible. The company, liable to be dispos¬ sessed by force if it refused to come to terms, agreed in 1869 to transfer its territorial rights to the Dominion of Canada for £300,000 and one-twentieth of the lands set out for settle¬ ment by the government for the next 50 years. It retained its posts and its rights of trade. The transfer to Canada, and the survey of lands for settlement, was immediately followed by the Riel rebellion (q.v.). The company, de¬ spite its lapse of administrative powers, remains the most potent influence for law and order in the unsettled parts, through its relations with the Indians. Consult Bryce, ˆHistory of the Hudson's Bay Company > (1900) ; Willson, (The Great Company) (1900) ; Cawston and Keane, (Early Chartered Companies (1896). For the Northwest*

Company, consult Irving, < Astoria. }

hu£, hoo-a, French Indo-C'hina, the capital of Annam, on the river Truong, 10 miles from its mouth in the Gulf of Tonking. It is sur¬ rounded by Vaubanian fortified walls, five miles in circumference, the internal city being built on a rectangular plan with wide and straight streets. The chief building is the royal palace, containing a famous museum of ancient Annam- ite art, mainly in gold and jade jewelry. Hue is the seat of a French political resident, and at Thuan-an, the port at the river mouth, there is a French garrison. Pop. 60,600, of whom less than 400 are Europeans.

HUE AND CRY. (1) Formerly, the com¬ mon-law process of pursuing criminals with loud outcry, in which all persons were bound to join and assist in the capture. (2) In recent usage, a proclamation for the finding of stolen goods or for the capture of a criminal ; hence, any outcry or clamor of pursuit or the like. (3) In England, an official gazette for the in¬ formation of the authorities as to criminals, crimes committed, etc. Under the process of hue and cry (definition 1) no proof was re¬ quired of the guilt of the accused, and he had no right of appeal, but all statutes relating thereto were repealed in England in 1887 by the Sheriffs Act, which provided simply that every person in a county, at the command of the sheriff, must be ready to arrest a felon or be fined on failure to comply.

HUELEN, wa'lan, Chilean hero : b. about 1540; d. 1603. He attained the command of the native forces in Araucania and was for a time successful in repelling the invading Spaniards, whose methods of warfare he copied. He de¬ feated the enemy at Valdivia, near Concepcion, and near Bio-Bio, but died during the siege of Osborno.

HUELVA, wal'va, Spain. (1) A maritime province in the southwest, bounded on the north by Badajos; on the east by Seville; south by the Gulf of Cadiz, and west by Portugal. The Sierra de Aracena cross the province in a southwesterly direction. The chief rivers are the Guadalquivir and the Gudiana, the Odiel and the Tinto, and several other tributaries of the main streams. The principal industries are the manufacture of bricks, pottery, soap, can¬ dles, flour, brandy and some agriculture. Min¬ ing, however, is the leading occupation, the

minerals produced in greatest quantity being copper, manganese and iron. Area, 3,913 square miles. Pop. (est.) 340,560. (2) A city, capital

of the province mentioned above. It is situ¬ ated on the left bank of the

Odiel River, about 10 miles from the Atlantic Ocean, and serves as a railroad centre. Originally a Carthaginian trading post, it fell into the hands of the Romans who colonized it. An interesting Ro¬ man aqueduct in good repair still survives. Other noteworthy features are the monastery of Santa Maria la Rabida near by, in which Columbus resided after his failure to interest King John of Portugal in his adventurous schemes ; the colossal statue of Columbus, erected in 1892 to commemorate his sailing from the port there on his voyage of discovery, and several fine churches. The principal in¬ dustry is the mining of copper and other min¬ erals at the Rio Tinto mines. To facilitate exportation, excellent modern piers have been constructed at great effort and cost. There are also machine shops, shipyards and considerable trade in grain, fish, olives, grapes and cork. Pop. 34,492.

HUEPPE, hiip'pe, Ferdinand, German hy¬ gienist: _b. Heddesdorf, Rhine Province, 24 Aug. 1852. He studied at the Friedrich Wil¬ helms Institut of Berlin and in 1890 became professor of hygiene in Prague University (Ger¬ many). His researches in bacteriology and dis¬ infection have been extensive and important. He wrote (Die Methoden der Bakterienfor- schung) (1885) ; (Naturwissenschaftliche Ein- fiihrung in die Bakteriologie) (1896); (1899) ;

GesundheiC (1912) ; (Sport und ReizmitteP (1913), and other works.

HUERCAL-OVERA, war'kal o-va'ra, Spain, a town in the southeastern part, in the province of Almeria, on the Lorca-Baza Rail¬ way, 16 miles from the Mediterranean coast. It is finely built, the chief edifice being the church. The rich silver, lead and copper mines of the Sierra de Almagrera in the neighbor¬ hood supply the town with considerable trade. Agriculture is carried on extensively in the vicinity. Pop. about 17,500.

HUERTA, war 'ta, Vicente Antonio Garcia

de la, Spanish poet and literary critic : b. Zaf ra in Estremadura, 1734; d. Madrid, 1787. After studying at Salamanca, he went to Madrid, where he occupied the position of head librarian of the Royal Library. His first literary work of distinction was the tragedy ˆaqueip which made its first appearance in 1778. He was a staunch upholder of the ancient traditions of Spanish literature and wrote with considerable force and skill. His principal works were his two volumes of poems, (Obras poeticas) (1778— 79), which were printed in (Biblioteca de autores espanoles> (Vol. LXI, Madrid 1869). He was also editor of (Teatro espanoP (17 vols.,# Madrid 1784— 85), a collection of old Spanish dramatists.

HUERTA, Victoriano, Mexican military officer and president: b. Colotlan,

Jalisco, 23 Dec. 1854; d. El Paso, Tex., 13 Jan. 1916. He was a full-blooded Indian and prided him¬ self on his ancestry. At the age of 17 he was made secretary to General Guerra and soon afterward was admitted to the military aca-

demy of Chapultepec. After graduation there he was attached to the topographical bureau of which he was chief for several years. He con¬ ducted many surveys throughout the country and as a result had a wider knowledge of Mexican topography than any of his country¬ men. For his part in suppressing revolts of the Yaquis and Mayas, Huerta was promoted to the rank of brigadier-general. Huerta was greatly trusted by Porfirio Diaz, and when the latter deemed it advisable to resign the presi¬ dency and leave Mexico, it was Huerta who safely conducted the Diaz party to the port of Vera Cruz, where they embarked for Europe. During the Madero regime, Huerta was dis¬ patched to suppress the insurgents led by Pascual Orozco. Felix Diaz, nephew of ex¬ president Porfirio Diaz, instigated a revolt against the Madero government in February 1913, within the capital city, where a violent conflict was waged for 10 days. Huerta, now a general of division, conducted the defense for the Maderistas. By the latter it was charged that he did not use his best efforts to suppress Diaz. At the end of the street battle Madero and his vice-president, Jose Pino- Suarez, were seized, and on 18 Feb. 1913 Huerta proclaimed himself provisional presi¬ dent of Mexico. Four days later Madero and Suarez were murdered while being transferred from one prison to another. The circum¬ stances surrounding the murders have never been cleared up, but the general belief is that Huerta was at least a party to the deed, if not the prime instigator, and the world doubted him when he disclaimed responsibility. Pub¬ lic opinion in the United States was aroused and demands were made for intervention. President Taft, however, being about to leave office, wished to leave his successor full free¬ dom of action and President Wilson discounte¬ nanced intervention but firmly refused to rec¬ ognize Huerta as president of Mexico al¬ though several European nations, including Great Britain, had done so.

Huerta's regime was troubled from within. Three more or less independent revolutions were in full blast during 1913, led severally by Carranza, Villa and Zapata. The United States ambassador was recalled and John Lind, ex¬ governor of Minnesota, was sent as personal envoy of President Wilson to demand of Huerta that he permit a regular presidential election at which he would not be a candidate. Huerta refused and when the Congress set about investigating his autocratic action he caused the arrest of the members hostile to him, and, after dissolving the chamber, assumed full dictatorial powers. In April 1914 some members of the crew of the United

States ship Dolphin were arrested at Tampico while seek¬ ing gasoline supplies on shore. Upon explana¬ tion of their errand by Admiral Mayo they were released but the admiral demanded an apology and a salute to the American flag. Huerta refused compliance with this demand and on 21 April Vera Cruz was bombarded by American warships, and landing parties of marines and sailors took the city after a sharp and decisive conflict with the Mexican forces. At this juncture Argentina, Brazil and Chile offered their services as mediators, but the subsequent ((A. B. C.M conference at Niagara was barren of result. Failure of recognition

by the United States government greatly weakened Huerta's hold in Mexico; he re¬ signed on 15 July; and within a short time set °u] f°r Spain. He left the latter country on 3 March 1916 and within a few weeks arrived m New York and established his family at Forest Hills, L. I. Soon afterward he set out for the southwest, but on 27 Tune was ar¬ rested at Newman, N. M., on the charge of fomenting a revolution against Mexico, a country then friendly to the United States. Huerta was released under bond, but on 3 July was rearrested at El Paso, just as he was preparing to enter Mexico. Thereafter until a few days before his death he was under guard Bliss. Many stories were circulated that German money was being used to put Huerta back in control in Mexico, but none of these was proved as he died before his trial, from acute sclerosis of the liver, aggravated by his hard-drinking habits.

HUESCA, wa/ska, Spain. (1) A province of northern Spain, formed in 1833 of districts once belonging to Aragon; bounded on the north by France, west and southwest by Sara¬ gossa, southeast by Lerida and northwest by Navarre. The Pyrenees traverse the northern part, reaching an altitude at Monte Perdido of 10,997 feet. The principal rivers are the Ara¬ gon in the northwest; the Gallego in the west; the Noguera Ribagorzana in the east, and the Cinca in the centre. Agriculture and cattle raising are the chief industries. The forests are abundant and there is considerable mining of lead, copper, iron, salt, cobalt, limestone and granite. Some manufactures of soap, leather, pottery and cloth are also carried on. The chief towns are Huesca, the capital, Jaca, Bar- bastro and Fraga. Area, 5,84£ square miles. Pop. (est.) 249,265. (2) A city, capital of the

province of the same name, on the river Isuela, 45 miles northeast of Saragossa, with which it is connected by rail. It is a very old town, as its many winding streets, mediaeval houses and ancient walls testify. The

important build¬ ings are the splendid Gothic cathedral dating from the 15th century; the church of San Pedro, in the Romanesque style, dating from the 12th century; and the former university edifice, occupied by a secondary school since 1845, when the university took up its head¬ quarters at Saragossa. Huesca is the seat of a bishop and the episcopal palace is another fine structure. Manufactures of cloth, pottery, bricks and leather are carried on and there is important trade in wine and produce. Under the name of Osca it was an important town in Roman days. Sertorius founded a school there for native chiefs. It was later the scene of the death of Sertorius at the hands of Perpenna (72 b.c.). Under the Moors it was strongly fortified in the 8th century, but in the 11th it was regained by Pedro I of Aragon and became the capital of Aragon. In the follow¬ ing century, with the removal of the capital to Saragossa, it began to decline in prestige.

HUE.SCAR, wa'skar, Spain, a city in the province of Granada, 75 miles northeast of the city of the same name. The principal manufac¬ tures are flour, paper, linen and woolens. Pop. about 9,000.

HUET, u-a', Pierre Daniel, French Roman Catholic scholar: b. Caen, 1630; d. Paris, 1721.

*After studying at the Jesuit school at Caen, he went to Paris in 1651. In the following year his friend and teacher, Samuel Bochart, was invited to the court of Queen Christina at Stockholm, whither Huet accompanied him. Here he conceived the plan for his edition and translation of Origen which appeared in 1668. By indefatigable efforts he mastered many scientific studies, and gained also a most com¬ prehensive knowledge of languages and litera¬ ture. In 1670 he was appointed assistant tutor to the Dauphin and in this capacity con¬ tributed largely to preparation of the Delphine classics. In 1676 he took holy orders, and two years later he was given the abbey of Aulnay. His famous * Demonstratio evangelica) was published in 1679. As abbot, he published (Alnetame Qu;estiones de Concordia Rationis et FideP (1690); (Censura philosophise Cartesianse> (Paris 1689), and also his (Nouveau memoire pour servir a l'histoire du Cartesianisme) (1692), and his discussion with Boileau on the Sublime. In 1685 he was created bishop of Soissons, which office, how¬ ever, he never filled, being transferred to Avranches in 1692. After serving as abbot of Fontenay for a short period, he withdrew to the Jesuits' House at Paris, where he spent his last days. Huet was conceded to be one of the most versatile and brilliant minds of his period. He left a huge library which eventually became incorporated in the royal library. A collection of his works was published in 1712, and uetania a volume containing many of his essays and miscellaneous writings, was edited by the abbot of Olivet (1722). In his (Com- mentarius de rebus ad eum pertinentibus) was found his*

autobiography, since translated into French, and into English by J. Aiken (2 vols., London 1819). Consult de Gournay, F. A., (Huet, Eveque d'Avranches, sa vie et ses oeuvres) (Paris 1854) ; Trochon, (Huet, Eveque d'Avranches) (ib. 1877).

HUFELAND, hoo'fe-lant, Christoph Wil¬ helm, German physician : b. Langensaiza, 12 Aug. 1762; d. Berlin, 25 Aug. 1836. His father was court physician to the Grand Duchess of Weimar, at which city the younger Hufeland received his preliminary education. Later (1780) he studied at Jena and at Gottingen, be¬ coming professor of medicine at the former institution in 1793. In the same year he suc¬ ceeded his father as court physician at Weimar. Five years later he established himself at Ber¬ lin. He was professor of therapeutics and pathology at the university from 1810, became councillor of state in the same year and was prominent in state medical affairs. His reputa¬ tion was unequaled in his time. Of his many excellent medical writings, the most widely known are his (1799) ;

(Enchiridion MedicunP (1836). His auto¬ biography was published in 1863.

HUFELAND, Gottlieb, German political economist and lawyer: b. Dantzig, 19 Oct. 1760; d. Halle, 25 Feb. 1817. He received his

education at Leipzig, Gottingen, and finally at Jena, where he was appointed extraordinary professor of law in 1788 and full professor in 1793. His expositions of the Kantian ideas of legislation won him considerable reputation and attracted many students to his lectures. In 1830, Hufeland became professor of law at Wurzburg, but remained only a short time, and then accepted a call to Lanshut. From 1808—12 he was burgomaster at Dantzig. In 1813 he re¬ turned to Landshut, where he remained for three years and left to resume work at Halle. His legal works include (Versuch fiber den Grundsatz Naturrechts> (1785); (Lehrbuch des Naturrechts' (1790); (Lehrbuch der Geschichte und Encyclopadie aller in Deutschland gelten- den positiven Rechte) (1790) ; Hnstitutionen des gesammten positiven Recht) 0798); and his greatest work (Neue Grundlegung der StaatswirthschaftskunsD (2 vols., 1807-13).

HUFFCUT, Ernest William, American lawyer and educator: b. Kent, Conn., 1860; d. 1907. He studied law at Cornell University, being graduated in 1888. He then established a practice in Minneapolis, Minn. (1888-90),

which he abandoned for the chair of law at Indiana University (1890-92). From 1892- 93 he taught at Northwestern University, and from the last-mentioned year was dean of the Cornell Law School. He was appointed legal adviser to Governor Hughes at the beginning of his first term (1907), but shortly afterward he suffered a nervous breakdown and committed suicide. His publications include (American Cases on Contract (1884 ; 3d ed., 1913) ; (Cases on the Law of Agency' (1896, with Woodruff), and (Elements of Business Law' (1905), which is still a standard textbook on the subject.

HUG, hoog, Johann Leonhard, Roman Catholic scholar: b. Constance, 1 June 1765; d. Freiburg, 11 March 1846. After studying at Freiburg he was ordained in 1789. Two years later he received the appointment of professor of Oriental languages and of the Old Testament and New Testament exegesis (from 1792) at Freiburg. Here he remained for the rest of his life, except for short sojourns at other univer¬ sities where he participated in the organizing of new courses ; and for travel on the Continent in pursuance of his literary labors. He attained great eminence as a political scholar, his works including (Erfindung der Buchstatenschrift' (1801) ; (De Antiquitate Codicis Vaticanae Commentation (1810); (Das hohe Lied' (1813); (De Pentateuchi Versione Alexandrina Com¬ mentate (1818) ; (Gutachten fiber das Leben Jesu, kritisch bearbeitet von D. Fr Strauss) (1835), and his most widely-known (Einleitung in die Schriften des Neuen Testaments) (1808), which was translated into English and French. It is an important contribution to the history of Bible versions. Consult Werner, K., (Geschichte der Kathologischen Theologie in Deutschland' (Munich 1867).

HUGER, u-je, Francis Kinloch, American soldier: b. Charleston, S. C., September 1773; d. there, 14 Feb. 1855. He was a nephew of I. Huger (q.v.). His father, Maj. Benjamin Huger, was killed before the lines of Charles¬ ton in 1779. He studied medicine in London and Vienna where he became acquainted with Dr. Eric Bollman whom he joined in an at¬ tempt to rescue Lafayette (q.v.) from the dun¬

geons of Olmfitz, his father having been the first to receive that general on his arrival in Georgetown in 1777. The enterprise resulted in their imprisonment for eight months. After his liberation he went to Philadelphia where he continued his medical studies at the University of Pennsylvania from which he received the degree of M.D. in 1797. A bronze tablet was erected in the Medical Hall of this institution in his memory in 1909. Huger became a cap¬ tain in the United States army in 1798, was a colonel in the War of 1812 and served in both branches of the legislature of his State. Con¬ sult Headlev, P. C., (Life of General Lafayette) (New York 1855) ; Lafayette, M. J., Marquis de, (Memoirs, Correspondence and Manuscripts of General Lafayette) (3 vols., London 1837) ; Quincy, J., (Figures of the

Past' (Boston

1883) ; University of Pennsylvania, (Memorial to F. K. Huger, etc.' (Philadelphia 1909) ; Varnhagen von Ense, K. A., (Denkwfirdig- keiten und Vernischte Schriften' (Vol. IV, Leipzig 1843).

HUGER, Isaac, American general : b. Lim¬ erick Plantation, S. C., 19 March 1742; d. Charleston, S. C., 17 Oct. 1797. He was one of five, patriot brothers active in the Revolution, beginning his military service as lieutenant- colonel in 1775, after having participated in 1760 in the expedition against the Cherokees. Promoted to the rank of brigadier-general in 1779, he took a conspicuous part in the engage¬ ments connected with the siege of Savannah in 1779, commanded a force of cavalry at the siege of Charleston in 1780 which was sur¬ prised and dispersed by Tarleton, and com¬ manded the Virginia brigade which formed the right wing in the battles of Guilford Court¬ house and Hobkirk's Hill in 1781. He was wounded in 1779 at Stono Ferry and again in 1781 at Guilford, but recovered and served until the end of the war.

HUGGINS, hfig'mz, Sir William, English

astronomer: b. London, 7 Feb. 1824; d. there, 12 May 1910. He was educated at City of Lon¬ don School, and in 1856 erected an observatory at Tulse Hill, in northeastern Surrey. When in 1859 Professor Kirchoff of the University of Heidelberg announced the true interpretation of the dark Fraunhofer lines in the solar spectrum, Huggins at once saw the possibility of using his practical knowledge of chemistry and physics in the service of astronomy. With W. A. Miller, professor of chemistry at King's College, Lon¬ don, he at once set about the task of construct¬ ing a star-spectroscope. The two then began the observation of stellar spectra. A full state¬ ment of their results was read before the Royal Society in 1864, the essence of the statement being, in Huggins' own words, that the chem¬ istry of the solar system prevails, essentially at least, .wherever a star twinkles. In August 1864 Huggins directed his star-spectroscope toward a planetary nebula in Draco and found its spec¬ trum to be a monochromatic one, thus proving that the nebula consists of a luminous gas. In 1868 he was able to announce to the Royal Society the results of his first measurements of the motion of stars in the line of sight. He began his observations of comet spectra with that of Winnecke's comet in 1868, and in 1868-69 made spectroscopic observations of the solar prominences. ' About 1876 he resumed his

abandoned efforts to photograph stellar spectra, using the gelatine dry plate process then re¬ cently introduced, and this time he was com¬ pletely successful. His photographs of the in¬ visible ultra-violet portions of stellar spectra have proved extremely valuable, providing, for example, the only reliable data for determining the relative ages of the stars. He was awarded successively the Royal, Rumford and Copley medals of the Royal Society ; was president of the Royal Astronomical Society 1876-78 and of the Royal Society 1900-06, was created K.C.B. in 1897, and was (1902) one of the original recipients of the Order of Merit. In his wife (nee Margaret Murray) whom he married in 1875, he had a valued coadjutor, and with her published in 1900 a valuable (Atlas of Represen¬ tative Stellar Spectral

HUGH, hu, Saint, of Avalon, bishop of Lincoln: b. about 1140; d. London, 16 Nov. 1200. When Hugh was a young child, about eight years old, his father, Lord of Avalon, re¬ tired with him to the monastery at Villard-Benoitt near Grenoble. Here he received his early training; and when he became 19, under¬ took the duties of deacon. In 1160 Hugh be¬ came attracted to the Carthusian order, and joined their ranks at the Grande Chartreuse. He was appointed procurator of that order, and in this capacity gave evidence of that fine administrative ability and tact which induced Henry II to request him to undertake the estab¬ lishment of a Carthusian monastery at Witham, Somerset. His great success in this work secured his elevation to the bishopric of Lincoln at the favor of the same monarch. However, in spite of the king's patronage, Hugh remained fearless and independent, often opposing his ruler on matters which seemed to him worthy of his championship. He attended rigidly to his ecclesiastical duties, avoiding participation in secular affairs. His benevolence and kind¬ liness endeared him to the people of his see, and made him an object of universal respect and admiration. On his return from a visit to his native monastery, he became ill and died. He was buried in Lincoln Cathedral, and his tomb became a shrine for pilgrims. Hugh was canonized on 17 Feb. 1220. His day in the Roman Catholic calendar is 17 November. His (Montreuil 1890; En,g. trans. by H. Thurston, London 1898).

HUGH, king of Provence and Italy: flour¬ ished in the 10th century; d. 947. The son of Lothair, Count of Arles, he was chosen ruler of Provence to succeed Louis the Blind (923). He was also given the crown of Italy by the re¬ volted subjects of Rudolph. His reign was occupied with attempts to maintain his posi¬ tion. Revolts and insurrections were rampant throughout the kingdom and Hugh himself was driven out of Italy by Berengar.

HUGH CAPET, king of France, founder of the Capetian dynasty. See Capet.

HUGH OF LINCOLN, Saint, a child who

is the central figure of a popular mediaeval story. He was a boy of 10- when he was found murdered on the premises of a Jew.

Another version makes Hugh guilty of having thrown a ball through the window of the house of a Jew who murdered the boy for his crime. The name of the murderer was revealed to the mother by the child himself, who spoke to her from the well into which his body had been thrown. The belief that Jews were wont to kill Christian children at Passover time was current throughout the Middle Ages, and many Jews were made to suffer bitter persecution because of this superstition. The story of Hugh is treated in Chaucer's (Prioress's Tale and by Marlowe in the (Jew of Malta.)*

HUGHENDEN, hu'en-den, England, a parish of Buckinghamshire, two miles north of High Wycombe. It is known principally for Hughenden Manor, where Benjamin Disraeli, Earl of Beaconsfield, lived, and for the parish church in which the Earl and his wife are buried. Pop. 2,150.

*HUGHES, Ball, American sculptor: b. London, 19 Jan. 1806; d. Boston, Mass., 5 March 1868. He early exhibited a decided taste for modeling and at 12 years of age made out of wax candle ends a bas-relief copy of a pic¬ ture representing the wisdom of Solomon, which was afterward cast in silver. He was then placed in the studio of Edward Hodges Bailey, where he remained seven years. At this time he successfully competed for the prize awarded by the Royal Academy, winning the large silver medal for the best copy in bas- relief of the Apollo Belvedere; also .the silver medal from the Society of Arts and Sciences for a copy of the Barberini faun, the large silver medal for the best original model from life and a gold medal for an original composi¬ tion, <(Pandora brought by Mercury to Epi- metheus.** He emigrated in 1829 to New York, where his first work of importance was a marble statue of Hamilton, for the Merchants' Exchange, which was destroyed by fire in 1835. He also made a life-size statue of Bishop Ho¬ bart for the vestry of Trinity Church. Soon afterward he moved to Dorchester, Mass. Among later works of his are the bronze statue of Bowditch at Mount Auburn Cemetery, a bust of Washington Irving and a statuette of General Warren at Bunker Hill. A plaster figure, (Little Nell,* and a group, (Uncle Toby and Widow Wadman,* are in the Boston Athenaeum.*

HUGHES, Charles Evans, American ju¬ rist: b. Glens Falls, N. Y., 11 April 1862. He attended the public schools and Madison, now Colgate, University, 1876-78, and was graduated from Brown University in 1881 ; he then taught Greek and Latin in the Delaware Academy, Delhi, N. Y., studying law at the same time. In 1882 he went to New York city, where he

continued to study law. He received honorary degrees

of LL.D. from Brown in 1906, from Columbia, Knox and Lafayette in 1907, from Union and Colgate in 1908, from George Washington Uni¬ versity, Washington, D. C., in 1909, from Wil¬ liams, Harvard and Pennsylvania in 1910, and from Yale in 1915. He studied law in the office of Gen. Stewart L. Woodford and in the Co¬ lumbia Law School, from which he was gradu¬ ated with the degree of LL.B. in 1884 ; he was admitted to the bar the same year and prac¬ tised in New York city. He won the prize

fellowship at Columbia Law School and was a Fellow 1884—87 ; he was a member of the firm of Carter, Hughes & Cravath, 1887-91 ; pro¬ fessor of law at Cornell University, 1891-93 ; special lecturer, 1893-95, and also a special lecturer at the New York Law School, 1893- 1900. He returned to his old law practice in New York as a member of his old firm, which became Carter, Hughes & Dwight, and in 1904, on the death of Mr. Carter, the firm became Hughes, Rounds & Schurman. In 1905 he was made counsel for the legislative committee, headed by Senator Stevens, appointed by the New York State legislature to investigate the Consolidated Gas Company and the price of New York city gas, and he framed the 80-cent gas and the assault proof bills, which became laws. In the same year, while in Europe, he was recalled to act as attorney for the Arm¬ strong legislative insurance committee, and drew up a set of insurance laws which were adopted and which have meant the effective stoppage of waste and theft which had run into millions of dollars annually. In 1906 he was appointed special assistant to United States Attorney-General William Henry Moody, in the investigation of the coal trust; in the same year he was nominated for governor of New York State on the Republican ticket and was the only Republican candidate elected on the ticket, defeating William Randolph Hearst, the Democratic nominee, and was re-elected in 1908. In 1908 Governor Hughes was regarded as a possible candidate for President of the United States as successor to Theodore Roose¬ velt, the delegates from New York giving him a complimentary vote in the convention. On 25 April 1910 he was appointed by President Taft an associate justice of the United States Su¬ preme Court. He was sworn in 10 Oct. 1910, and was succeeded as governor by Lieut. – Gov. Horace White, who served the re¬ maining three months of the term. As gov¬ ernor he gave to New York State one of the most efficient administrations in its history. He carried many of his measures against the strong opposition of the legislature and other political forces, by gaining for them popular opinion through speeches

made throughout the State. The most important amongst them were: Creation of State Probation Commission, Pub¬ lic Service Commissions, State Highway Com¬ mission, New Apportionment Act, Anti-Race Track Gambling Act, Direct Primary Law. During his administration the State also cele¬ brated in a worthy manner the tercentenary of the discovery of Lake Champlain and of the Hudson River. He resigned from the

United States Supreme Court after having been nominated on 10 June 1916 by the Repub¬ lican National Convention for the presidency. After his defeat by President Wilson in No¬ vember of that year he returned to the prac¬ tise of his profession. After the entrance of the United States into the World War, he was appointed chairman of the New York District Board of Exemption. In the spring of 1918 President Wilson placed in his hands the in¬ vestigation of supposed irregularities in con¬ nection with the building of airplanes for the United States army and navy, and he sub¬ mitted his findings to the -President October 1918. He is a member of the American, New

York State and New York city bar associations, a Fellow of Brown University, a trustee of Chicago University and of the Rockefeller Foundation, and president of the Legal Aid Society. In Marcn 1921 he became Secretary of State in President Harding's Cabinet. His speeches have been published as (Addresses of C. E. Hughes) (revised ed., New York 1916) ; his messages, etc., as governor of New York have been collected as (Public Papers of C. E. Hughes, Governor, 1907-KP (Albany 1908-10). He has also published Conditions of Progress in Democratic Government (Yale Lectures on the Responsibilities of Citizenship, New Haven

1910).

HUGHES, David Edward, English-Amer- ican inventor: b. London, 16 May 1831; d. there, 22 Jan. 1900. When very young came with his parents to the United States, of which he became a citizen. He was educated at Saint Joseph's College, Bardstown, Ky., where he was appointed professor of music (1850) and later of natural philosophy. In 1855 he patented his first important invention, that of the well-known printing telegraph which bears his name. It was at once adopted in America, and by 1876 by practically every European country. In 1877 he settled in London. In 1878 Hughes announced to the Royal Society his invention of the microphone, an ingenious instrument which not only transmits sound, but so magnifies faint sounds as to make them dis¬ tinctly audible. The microphone is now in uni¬ versal use in the telephone. Another important invention, that of the induction balance, was completed by Hughes in 1879, and in 1880 he was elected a Fellow of the Royal Society, which awarded him its gold medal in

1885. He was a member and at times an officer of the Society of Telegraph Engineers (now Institu¬ tion of Electrical Engineers), and a manager and vice-president of the Royal Institution. In his later years he experimented along the lines which some years later led to the discoveries of Hertz, Branly and Marconi, resulting in wireless telegraphy. He left a large fortune which was divided among four London hos¬ pitals and a number of scientific bodies. A list of his scientific papers will be found in Royal Society of London, Catalogue of Scientific Papers. Consult Anon., LXI, p. 325, London 1900).

HUGHES, Edwin Holt, American Metho¬ dist Episcopal bishop: b. Moundsville, W. Va., 7 Dec. 1866. After studying at the Ohio Wes¬ leyan University and the theological department of Boston University, he became pastor at Newton Centre, Mass. (1892-96) and at Mal¬ den, Mass. (1896-1903). In the last-mentioned year he. was appointed president of De Pauw University, Greencastle, Ind., which position he occupied for five years, when he was called to the bishopric, with his residence at San Fran¬ cisco. He was elected president of the State Teachers' Association of Indiana for the year 1904. His publications include (Letters on Evangelism > (New York 1906) ; thanksgiv¬ ing Sermons) (1909) ; the Teaching of Citi¬ zenship } (1909) ; (A Boy's Religion) (1914) ; the Bible and Life) (1914) ; Haureau, J. B., (Les CEuvres de Hugues de Saint Victor) (Paris 1886) ; Harnack, Togma5 (Vol. VI).

HUGHES, Hugh Price, English Wesleyan clergyman: b. Carmarthen, 8 Feb. 1847; d. Lon¬ don, 17 Nov. 1902. He was educated at Uni¬ versity College, London, and the Wesleyan Theo¬ logical College, Richmond; was appointed to Dover in 1869 and was afterward at Brighton; Stoke-Newington ; Mostyn Road, London; Ox¬ ford; Brixton Hill; and the West London Mission. From 1885 he was editor of the Methodist Times, and he was also at one time president of the national council of Evangeli¬ cal free churches. He was prominently identi¬ fied with reform work in London and with the Anti-gambling League. He was a powerful preacher, possessing great personal magnetism, and politically a radical. Among his writings are (Social Christianity > (London 1889) ; (The Atheist Shoemakerˆ (London 1889) ; (The Philanthropy of God) (London 1890) ; (Ethical Christianity) (London 1892) ; Essential Chris¬ tianity } (London 1894) ; and (The Morning Lands of History: A Visit to Greece, Palestine and Egypt) (London 1901). Consult Hughes, D. P., (The Life of Hugh Price Hughes> (Lon¬ don 1904) ; Mantle, T. G., Eife of H. P. Hughes (London 1903) ; Robinson, J. A., and others, (Hugh Price Hughes As We*

Knew Him) (London 1902) ; Stead, W. T., (H. P. Hughes and His Work) (in Review of Re¬ views, Vol. IV, p. 279, New York 1891-92).

*HUGHES, John, American Roman Catholic prelate: b. Annaloghan, County Tyrone, Ire¬ land, 24 June 1797 ; d. New York, 3 Jan. 1864. His parents were poor but made sacrifices to give him the opportunity' of acquiring an ele¬ mentary education ; and by his own efforts he continued his studies so that when he came with his parents to America in 1817 he was prepared for college. However, for lack of means he had to defer entering any school, and instead began work as a day laborer, in which occupa¬ tion he continued for three years, but at 23 entered the Roman Catholic Theological Sem¬ inary, Mount Saint Mary's, Emmitsburg, Md. As a student, his remarkable power of reason¬ ing and his ability in argument attracted atten¬ tion. He was ordained priest in 1826, and for a time was stationed *it Bedford, Pa., from which he was transferred to Philadelphia. Here he had charge of Saint Joseph's parish and later Saint Mary's parish. In 1838 he was conse¬ crated titular bishop of Basileopolis and ap¬ pointed coadjutor to the bishop of New York. In 1842, after the death of Bishop Du Bois, he was made bishop of New York. In 1850 the diocese of New York became an archdiocese and on 19 July 1850 he was raised to the dignity of first archbishop of New York, which office he held until his death. He was an active and effective worker. As a speaker or writer he was ever ready to defend the Church which he represented. He was a resourceful controver¬ sialist, a powerful preacher, and, even though he was one of the most ardent- supporters of the Pope and a faithful son of Ireland, he became a strong and sincere believer in the truth and desirability of American freedom and of American institutions. He established Saint John's Orphan Asylum in Philadelphia and a number of charitable and educational in¬ stitutions in New York. The <(school question® was to him all important. One of his first*

undertakings was to establish a theological seminary at La Fargeville in Jefferson County, N. Y. ; the distance from New York caused the abandonment of this plan, and Saint John's College (q.v.) was founded at Fordham in¬ stead. In 1858 he laid the corner stone of Saint Patrick's Cathedral. In 1861, being a bold and strong supporter of the Union cause during the Civil War, he was sent by the United States government to Europe, to present the cause of the Union and counteract any adverse sentiment which might exist against the attitude of the North. His diplomatic mis¬ sion was most successful in France, Italy and Ireland. After his return, though in feeble health, he promptly responded to official appeals to use his influence toward the breaking up of the Draft Riots (q.v.) in New York city. His remains were at first buried in Old Saint Pat¬ rick's, Mott street, but in 1883 were transferred to the new cathedral, whose founder he was, where they were laid to rest under the sanc¬ tuary.

Of his controversial speeches the fol¬ lowing were published: (A Discussion of the Question, (

HUGHES, Rupert, American novelist: b. Lancaster, Mo., 31 Jan. 1872. He received his education at Adelbert College (Western Re¬ serve University) and took graduate work at Yale, where he received his M.A. in 1899. He was assistant editor of Godey's Magazine, Cur¬ rent Literature and The Criterion ; and then served for four years in London and New York on the staff of the Encyclopedia Britannica. His published works include a number of books for children, also (The Musical Guide* (1903) ; Eove Affairs of Great Musicians* (1903); (Songs by Thirty Americans * (1904) ; (The Gift-Wife> (1910); Excuse Me* (1911);*

HUGHES, Sir Sam, Canadian soldier and statesman : b. Darlington, Ont., 8 Jan. 1853 ; d. Lindsay, Ont., 23 Aug. 1921. He completed his education at Toronto University ; was lecturer in English language, literature and history at To¬ ronto Collegiate Institute, and resigned in 1885 ; proprietor and editor of the Lindsay Warder, 1885—97 ; was member of the Canadian House of Commons from 1892; and was appointed Minister of Militia and Defense 1911. The outbreak of the European War imposed on him the task of organizing a huge volunteer force; to this task he bent himself with char¬ acteristic energy, and in the first 20 months of the war an army of 320,000 was raised for overseas service. Sir Sam served in the Fenian raid of 1870 and in the South African War 1899-1900. He was created K.C.B. in 1915.

HUGHES, Thomas, English author: b. Uffington, Berkshire, 20 Oct. 1823; d. Brighton, Sussex, 22 March 1896. He was educated at Rugby and Oxford, later studied law at Lin¬ coln's Inn, was called to the bar of the Inner Temple in 1848, and began practice at once. In 1869 he was appointed queen's counsel, in 1882 County Court judge. Throughout his long pub¬ lic career, as advanced Liberal in Parliament (1865-74), as president of the Working Men's College in London, as a champion of the co¬ operative movement, as founder with Canon Kingsley and Frederick Maurice of the Chris¬ tian Socialists and as creator of Rugby, a so¬ cialistic community in the mountains of Ten¬ nessee (1880), he tried most earnestly to exer¬ cise a helpful influence upon English working- people. He early essayed journalism, writing many sketches for the London Spectator, chiefly accounts of traveling experiences. These sketches served

as his apprenticeship in Writing, and afterward were collected in book form with the title (Vacation Rambles (18951. But authorship was a secondary interest until (Tom Brown's School Days,* first appearing in 1856, made him famous. This work is largely a presentation of the influence of Dr. Thomas Arnold (q.v.) in the great public school. (The Scouring of the White Horse> (1858), a spirited account of a vacation trip, had a respectful although less cordial recep¬ tion. The great success of the first story led him to continue his hero's career with (Tom Brown at Oxford) (1861), first published seri¬ ally in Macmillan's Magazine. At the time of the American Civil War, Hughes was a decided abolitionist, and thus established a friendship with James Russell Lowell. Among other works of his are (Alfred the Great> (1869) ; (Life of Livingston) ; (Memoir of a Brother) ; (Macmillan the Publisher0 (1882); (Life of Bishop Fraser) (1887) ; (Vacation Rambles)*

(1895).

HUGLI, or HOOGHLY, hoog'li, British India, (1) a district in Bengal in the Burdwan division along the river Hugh (q.v.). The principal railway is the East Indian. Transpor¬ tation is carried along the Hugh, the Damodar and Rupnarayan rivers; and the Eden Canal irrigates the country between. The chief occu¬ pations are the manufacture of brass and bell metal. Flour mills, a bone-crushing mill and brick and tile works are also active industries. Area, 1,190 square miles; pop. 1,060,000. (2)

A town, capital of the district of the same

name, on the west bank of the Hugli, 24 miles north of Calcutta, with which it is connected by rail. With Chinusra, an old Dutch settle¬ ment, it forms one municipality. Hugli was founded by the Portuguese in 1537, who estab¬ lished a fort at Gholghat, which formed the nucleus of the present city. The principal buildings are the mosque, Hooghly College, a Mohammedan college, several high schools, and a hospital. The manufactures consist of jute¬ bagging, bags and oil. Pop. about 25,000.

HUGLI, or HOOGHLY, British India, a channel which connects the Ganges with the Bay of Bengal. The group of rivers known as the Nadia rivers, i.e., the Jalangi, the Bhagira- thi and the Churni form the Hugli by their confluence. The Hugli itself measures 125 miles and its estuary 35 miles. Its importance is due to the fact that it is the most navigable of the channels of the Ganges. The peculiari¬ ties of the tide in the river make it an object of physiographical interest. The tide in the dry season is felt about 17 miles above Calcutta; while during the southwest monsoon it is sub¬ ject to a bore seven feet high and ascends rap¬ idly at the rate of 22 miles an hour. The shoals at the mouth of the river demand con¬ stant

dredging. It is navigable as far as Cal¬ cutta to boats drawing 26 feet of water. Above Calcutta the constant silting has rendered it unnavigable.

HUGO, Gustav von, German jurist: b. Lorrbach, Baden, 1764; d. Gottingen, 15 Sept. 1844. He studied law at Gottingen for three years and in 1786 wgs appointed tutor to the Prince of Anhalt-Dessau (1786). Two years later, he was called to the chair of law at Gottingen, becoming professor ordinary in 1792. His principal contribution to the study of law is in his application of the historical method to the great unsifted mass of legal mat¬ ter which had been handed down by Roman legislators. His name ranks with Savigny and Haubold as one of the founders of this method. His important writings in this field are (Lehr- buch eines civilistischen Kursus) (7 vols., 1792- 1821) ; and (Civilistisches Magazin) (1790- 1837),. together with its supplement

HUGO, hu'go (Fr. ii'go), Victor Marie, French poet and novelist: b. Besangon, 26 Feb. 1802; d. Paris, 22 May 1885. Major Hugo, his father, having entered the service of Joseph Bonaparte, king of Italy and afterward of Spain, Victor's earlier years were partly spent in these countries. At the age of 12 he was already writing verses of considerable promise, and in 1823 his first novel, (Han d'lslande, appeared, followed in 1825 by (Bug Jargal.* In 1828 a complete edition of his 'Odes et Ballades> appeared. In these pro¬ ductions Hugo's anti-classical tendencies in style and treatment of his subject had been very visible, but the appearance of his drama, (Cromwell* (1827), with its celebrated preface, gave the watchword to the anti-classical or ro¬ mantic school. (CromwelP was too long for representation, and it was only in 1830 that 'Jlernani,* over which the great contest be¬ tween Classicists and Romanticists took place,*

was brought on the stage. Other dramas fol¬ lowed — (Marion Delorme) (1831); (Le Roi- s'amuse) (1832); (Lucrece Borgia) (1833);

(Marie Tudor (1833); < Angelo* (1835); (Ruy Bias* (1838) ; (Les Burgraves* (1843). Dur¬ ing those years he had also published a novel,*

(Notre Dame de Paris) (1830), and several volumes of poetry, (Les Feuilles d'Automne (1831) ; (Les Chants du Crepuscule* (1835); (Les Voix interieures* (1837); (Les Rayons et les Ombres) (1840). The poetry of this period has a melody and grace superior perhaps to any that he afterward wrote, but wants that deep and original sense of life characteristic of his later poems. During the same period he also wrote*

critical essays on Mirabeau, Voltaire, and a number of articles for the Revue de Paris. In 1841, after having been four times previously rejected, he was elected a member of the French Academy; made shortly afterward a tour in the Rhineland, of which he wrote a brilliant and interesting account in (Le Rhin (1842). In 1845 he was made a peer of France by Louis Philippe. Th£ Revolution of 1848 threw Hugo into the thick of the political struggle. At first his votes were decidedly Conservative, but afterward whether from suspicion of Na¬ poleon's designs or from other reasons, he be¬ came one of the chiefs of the Democratic party. After the coup d'etat, 2 Dec. 1851, he was one of those who kept up the struggle in the streets against Napoleon to the last. He then fled to Brussels, where he published the first of his bitter satires on the founder of the Second Empire, (Napoleon le Petit. * In August 1852 he went to live in Jersey, but finally settled in Guernsey, where he bought an estate called Hauteville House. In the following year (1853) the famous volume (Les Chatiments,* a wonderful mixture of satirical invective, lyrical passion and pathos, appeared. It was in the comparative solitude and quietness of the Channel Islands that he wrote most of the great works of his later years. (Les Contem- plations) (1856) ; (La Legende des Siecles,* 1st series (1859) ; (Chansons des Rues et des Bois) (1865), and his celebrated series of social novels, (Les Miserables* (1862) ; (Les Travail- leurs de la Mer* (1866) and (L'Homme qui Rit* (1869). In 1870, after the fall of the empire, Victor Hugo returned to Paris, where he spent his remaining years in occasional at¬ tendances at the Senate, and in adding to the already long list of his literary works. Among these latest productions may be cited, (Quatre- Vingt-Treize* (1873) ; (L'Art d'etre Grand- pere* (1877); (L'Histoire d'un Crime* (1877); (Le Pape* (1878) ; (La Pitie Supreme* (1879) ; (Religions et Religion* (1880); (Les Quatre Vents de l'Esprit* (1881); La Legende des Siecles* (last series, 1883) ; (Torquemada* (1882). If not the greatest writer that France has produced, certainly he is her greatest poet. But he had grave defects and limitations, the chief being an entire want of humor, a too fre¬ quent straining after effect through the abnor¬ mal and bizarre, an overweening belief in his own infallibility and an ever-present conviction that he was a sage, all of whose sayings might be regarded as priceless teachings, to be eagerly caught up by a listening world. His death was the occasion of an imposing public funeral in the Pantheon, preceded by his body lying in state and guarded for several days under the vol. 14 — 31*

Arc de'Triomphe. Posthumous works include (Le Theatre en liberte ; (La finde Satan* ; and (Tonte la lyre.* An edition of his complete works in 40 volumes appeared at Paris in 1886. The house in which Victor Hugo lived, on the Place des Vosges was transferred to the city of Paris, and now forms a Victor Hugo Mu¬ seum, full of interesting relics of the poet. (See*

Hernani; Les Chatiments; Miserables, Les; Notre Dame de Paris; Ruy Blas). Con¬ sult Swinburne, (Study of Victor Hugo (1886); Barbou, (Victor Hugo et son Temps* (1882); Mabilleau, (Victor Hugo* (1893); Nichol, (Victor Hugo, a Sketch of his Life and Work* (1894) ; Dupuy, (Victor Hugo, l'Homme et le Poete* (1887) ; Bire, (Victor Hugo apres 1852* (1894); Stapfer, (Victor Hugo et la grande poesie lyrique en France* (1901) ; Claretie, (Victor Hugo, souvenirs intimes* (1902) ; Mack, (Romance of Victor Hugo and Juliette Drouet* (1905).*

HUGO, Okla., city and county-;seat of Choctaw County, 125 miles northeast of Dallas, Tex., served by the Saint Louis and San Fran¬ cisco Railroad. Situated on the Kiamichi River, Hugo is a manufacturing city. The chief industries are in railroad repair shops ; manufacture of cotton and its by-products; saw and planing mills, and creosote factories. The government is under a mayor and aider- man. The municipality owns the waterworks. Pop. (1920) 6,368.

HUGO OF SAINT VICTOR, a monk of the 12th century: b. either Saxony or Flanders, about 1097 ; d. Saint Victor's at Paris, probably on 11 Feb. 1141. He was doubtless of Saxon origin, and impelled by a desire for learning, came to France with his uncle, Archdeacon Hugo of Halberstadt. He entered the monastery of Saint Victor at Paris, and rose eventually to be the head of the school there. His contem¬ poraries held Hugo in high esteem for his bril¬ liance as a scholar and teacher, and his erudite writings. These include several mystical treatises ; an encyclopedic survey of the field of knowledge: (Eruditio didascalica ; and his dis¬ tinguished work on theology, (De sacramentis christianae fidei,* in which he opposes the scep¬ ticism of other critics and insists on adherence to the best dogma of the Church. The sub¬ jective mysticism of his point of view accounts in some degree for his decline in popularity with later scholastics. However, his influence on the 12th century religious thought surpassed that of any other contemporary theologian. His works were first published at Paris (1518), and were reprinted several times.*

HUGO VAN DER GOES, hu'go van der goos, Dutch painter: b. Goes, Zealand, date uncertain; d. 1482. Very little is known con¬ cerning the early period of his life. It is probable that his. artistic education was ob¬ tained in Holland. He resided at Ghent and in 1467 was admitted to the painters' guild of that city. He was employed by the city authorities in public decoration in 1468-69 and in 1473-75 was dean of the painters' guild there. Subsequently he retired to a monastery near Brussels, where he remained until his death. There survive copies of an oil decoration by Hugo for the home of a wealthy citizen of Ghent. The Novak Gallery of Prague has the best copy. His greatest surviving work, how-

ever, is the Portinari altarpiece, now in the Uffizi Gallery. It represents the Madonna and Child with shepherds, angels, etc. Other works of Hugo are panels in the Vienna Gallery, of which one represents the (Fall of Man> ; in others are (The Sorrows of Christ* and (Saint Genevieve.* In the townhall of Bruges is Hugo's (Death of the Virgin.* Consult Voll, (Die altniederlandische Malerei* (Leipzig 1906) ; and Wanters, (Hugues van der Goes) (Brussels 1872).

HUGUENOT (hu'ge-no) SOCIETY OF AMERICA, The, a patriotic society, founded in New York city 1883, for the purpose of per¬ petuating Huguenot history by collecting rele¬ vant documents and libraries; and also by public commemoration. The membership is limited to descendants of Huguenot families which emigrated from France prior to the Edict of Toleration (1787); and also to his¬ torians and authors who have done important work in Huguenot history. The society has headquarters at New York and branches in other States of the East. Its publications are under the title Collections of the Huguenot Society of America.* A celebration of the tercentenary of the Edict of Nantes was held in 1898; an account of the exercises appearing in a memorial volume in 1900.

HUGUENOTS, hu'ge-nots, a term of un¬ known origin, believed to be a diminutive of the personal name Hugo, applied to the Protes¬ tants of France during the religious struggles of the 16th and 17th centuries. During the early part of the 16th century the doctrine of Calvin, notwithstanding the opposition of Francis I, spread widely in France. Under his successor Henry II, 1547-59, the Protestant party grew strong, and under Francis II be¬ came a political force headed by the Bourbon family, especially the King of Navarre and the Prince of Conde. At the head of the Catho¬ lic party stood the Guises. The contest between the two parties was as much political as re¬ ligious. The result was that a Huguenot con¬ spiracy headed by Prince Louis of Conde was formed for the purpose of compelling the king to dismiss the Guises and accept the Prince of Conde as regent of the realm. But the plot was betrayed, and many of the Huguenots were exe¬ cuted or imprisoned. In 1560 Francis died, and during the minority of the next king, Charles IX it was the policy of the queen mother, Catherine de Medici, to encourage the Protes¬ tants in the free exercise of their religion in order to curb the Guises. In 1562 an acci¬ dental conflict between the followers of the Duke of Guise and some Protestants at a church meeting precipitated a series of reli¬ gious wars which desolated France almost to the end of the century. Catherine, however, be¬ gan to fear that Protestantism might become a permanent power in the country,

and sud¬ denly making an alliance with the Guises, with their help she projected and carried out the massacre of Saint Bartholomew's (q.v.)., 24 Aug. 1572. The Protestants fled to their forti¬ fied towns and carried on a war with varying success. On the death of Charles IX, Henry III, a feeble sovereign, found himself com¬ pelled to unite with the King of Navarre, head of the house of Bourbon and heir-apparent of the French Crown, against the ambitious Guises, who openly aimed at the throne, and had ex¬

cited the people against him to such a degree that he was on the point of losing the crown. After the assassination of Henry III the King of Navarre was obliged to maintain a severe struggle for the vacant throne ; and not until he had, by the advice of Sully, embraced the Catholic religion (1593), did he enjoy quiet possession of the kingdom as Henry IV. Five years afterward he secured to the Huguenots their civil rights by the Edict of Nantes (q.v.) which confirmed to them the free exercise of their religion, and gave them equal claims with the Catholics to all offices and dignities. They were also left in possession of the fortresses which had been ceded to them for their security. This edict afforded them the means of forming a kind of republic within the kingdom, which Richelieu, who regarded it as a serious obstacle to the growth of the royal power, resolved to crush. The war raged from 1624 to 1629, when Rochelle, after an obstinate defense, fell before the royal troops ; the Huguenots had to sur¬ render all their strongholds, although they were still allowed freedom of conscience under the ministers of Richelieu and Mazarin. But under Louis XIV a new persecution of the Protestants commenced. They were deprived of their civil rights, and bodies of dragoons were sent into the southern provinces to com¬ pel the Protestant inhabitants to abjure their faith. The Edict of Nantes was revoked in 1685, and by this act about 50,000 Protestant subjects were driven out of France to other countries. (See Huguenots in America). In the reign of Louis XV. a new edict was issued repressive of Protestantism, but so many voices were raised in favor of toleration that it had to be revoked. The Code Napoleon and later enactments place Protestants in France on an equality with their Catholic compatriots. Consult Browning, < History of the Huguenots (1840); Felice, (Histoire des Protestants de France) (1874); Baird, (New York) ; Thompson, (1909).*

HUGUENOTS, The, a dramatic opera in five acts by Giacomo Meyerbeer, libretto by Augustin Scribe and Deschamps. This is re¬ garded as the best of Meyerbeer's operatic compositions, the music being intenselv dra¬ matic, with brilliant orchestration and fine themes. The subject is the persecution of the Protestants by the Catholics in France in 1572. The opening scene represents the interior of the castle of the Count of Nevers, where the Catholic noblemen receive Raoul de Nangis a Huguenot, recently promoted captain. During the toasts at the banquet each member of the party is

called on to give the name of his lady love, when Raoul informs the company that he once rescued a beautiful girl who in her sedan chair was molested by students. She had thanked him for his gallantry and, though he did not know her name, he had lost his heart to her. Marcel, an old retainer of Raoul and a Protestant, warns his master of the danger he is courting by drinking with the noblemen. A lady is announced, and Raoul recognizes her as his unknown charmer. She turns out to be Valentine, daughter of St. Bris, betrothed to the Count of Nevers. She has come to beg i Ol?n^ release her from her promise, to which he reluctantly agrees. A page brings a note to Raoul, in which he is commanded to

attend a lady, unknown to him. The others, however, recognize the seal of Queen Margaret of Valois; regarding Raoul as an important person, they endeavor to win his friendship. The second act shows Raoul in the presence of the Queen, who is striving to reconcile the warring religious factions. With this object she desires Raoul the Protestant to marry Valentine, her maid of honor and a Catholic. The girl had told her mistress of her meeting with the dashing cavalier and of her love for him. Raoul, as yet not knowing that he is speaking to the Queen, willingly vows to be Margaret's knight and promises St. Bris to wed his daughter. When, however, he finds that that daughter is his unknown lady, about whom he entertained certain doubts, he revokes his promise and makes an enemy of the offended father. On behalf of Raoul, Marcel later car¬ ries a challenge to St. Bris, who accepts it, but a fanatical noble named Maurevert advises St. Bris to crush his enemy by other means. Notwithstanding her disappointment with Raoul, Valentine determines to save him and tells Marcel to warn his master not to meet his opponent alone. In the presence of four witnesses the duel takes place, during which a quarrel breaks out between Catholic and Protestant citizens. The Queen intervenes and listens to the mutual recriminations, not know¬ ing which side to believe, when Valentine enters to bear witness. Raoul now learns the object of her interview with Nevers — to regain her freedom. But too late, for her father has again promised her to Nevers, who arrives on the scene accompanied by wedding guests. In the fourth and fifth acts the dreadful Saint Bar¬ tholomew's night is shown. Raoul takes a last farewell of Valentine in her room when her father breaks in with a party of Catholics. Raoul hides and hears the details of the great conspiracy to destroy the Protestants, to begin with the murder of their leader, the great Coligny. While all the assembled Catholics agree to the plot, Nevers alone declines to soil his honor by murder, but is willing to fight in honest battle. Raoul resolves to warn his brethren ; despite Valentine's entreaties he rushes forth. At the end the Queen and her

husband. Henry of Navarre, are seated in the hall surrounded by courtiers when Raoul rushes in pale and blood-stained, describes the horrors being perpetrated outside and implores the royal help. It is too late. Valentine and Raoul meet again ; she implores him to accept her faith and thus save his life. He remains firm, how¬ ever; nothing can move him. Then Valentine decides to remain. She accepts his creed and they meet death together.

HUGUENOTS IN AMERICA. The

French Protestant settlements in the New World divide themselves into two classes : those of choice (or at least with time and opportunity to make choice) and those of necessity. The former extend from the middle of the 16th century down to the capture of New York by the English in 1664; the latter comprise all those dating from the increasing severity of repression that heralded the Dragonnades and the Revocation of the Edict of Nantes to the end. The former were deliberately organized colonizations, of the same stamp as the English and from the same motives; the latter were the desperate and generally hurried resource of

crowds of ruined exiles. The former were complete failures, and were soon suppressed, absorbed or exterminated; the latter sought only life and livelihood and welcomed absorp¬ tion. The former include the abortive attempts in Brazil and Florida, the earliest settlements in Acadia and Canada, the first settlement of New York and the settlement of some of the West Indies ; the latter include the feeble attempts at settlements in New England, the flood of ac¬ cessions to the French element in New York, the founding of New Rochelle, the migrations to Pennsylvania, Delaware and Maryland, the promising but aborted attempt in Virginia and, greatest of all, the tide of immigrants that created South Carolina.

The first attempt at creating a New-World Huguenot asylum and magazine of supplies was undertaken in 1555; Nicholas Durand de Ville- gagnon pretended to undertake it for Coligny, and settled a colony in Rio Janeiro Harbor. But it was half Catholics ; Villegagnon was a scamp, persecuted and scattered the Protestants and finally deserted the colony; and the Portu¬ guese killed the remnant in 1567. A more hon¬ est attempt was made by Jean de Ribault in 1 562, at Port Royal, S. C, but failed. In 1564 Rene de Laudonniere founded a colony on the Saint John's in Florida, at Fort Caroline; but the next year Pedro Menendez de Avilles butch¬ ered the entire settlement. Saint Bartholomew and the religious wars intervened; and no fur¬ ther efforts were made till after the accession of Henry of Navarre, who had imbibed the ar¬ dor for colonization from Coligny. In 1664, un¬ der his commission, Sieur de Monts planted a settlement to be on the basis of perfect religious equality, the first in the New World — at Port Royal, N.

S. ; French mercantile jealousy had the commission revoked and it perished; but two years later it was refounded by Poutrin- court, and De Monts and Champlain founded Quebec. In 1613 Sir Samuel Argali (q.v.) de¬ stroyed Port Royal, but the French stayed and bands of Protestants came to reinforce them at intervals. A small settlement was made on Newfoundland, but was broken up by the gov¬ ernment except for a few who would turn Catholics. The founding of New Amsterdam, usually supposed to be by the Dutch, was in fact by Huguenots under Dutch auspices. The Huguenots — largely French-speaking Walloons — who had crowded into the Netherlands to escape persecutions, had tried to gain permis¬ sion to found settlements in the English colo¬ nies ; rebuffed in this, they engaged with the Dutch, and the first shipload of emigrants that came to the future New York were entirely Huguenot, Peter Minuit himself being a Wal¬ loon. French families had been there already for years, the first white child born on Manhat¬ tan Island being French. For three generations the French element continued to be a highly important factor in the city, and composed much of the business aristocracy; even after the English occupation, all official documents were printed in both Dutch and French as well as English. Of the first shipload of emigrants, a number went up the Hudson and founded Fort Orange (Albany). In 1660 a number of Wal¬ loon and Vaudois exiles, who had taken refuge in the Lower Palatinate, settled near Kingston, N. Y. ; later, the Vaudois founded New Paltz in the Wallkill Valley. In 1677 a French town

was founded at Hackensack, but the fast in¬ creasing Dutch soon swamped it. Small French groups settled in various parts of New Jersey.

Of the second class, the refugee emigration – — 100 scattered and hurried in general to found separate French settlements — the first begin¬ ning from the north was at Boston. From 1660 on, small numbers had come from the Channel Islands and Rochelle, but after the Dragon- nades 200 or 300 families came over, including some of the most notable names in Boston his- torv. A settlement at Oxford, Mass., was made in 1687, primarily to convert the Nipmuck In¬ dians, but that tribe joined hands with the Canadian tribes in league with the French and inflicted such horrors on them — one whole summer besieging them in their blockhouse — that the settlement broke up in despair, many of them taking refuge in Milford, Conn. Many small groups settled in Rhode Island ; the largest had a miserable history, being defrauded by a New England company organized expressly to sell to innocent foreigners a tract of land to which it had no title. In Connecticut, Hartford and Milford received the greatest number. In

New York the arrivals strengthened the French element, but soon melted into the general mass. In Pennsylvania Delaware and Maryland, many hundreds settled, but as scattered members of the population, and left no outward trace. In Virginia, whose southern climate was congenial to them the Huguenots had settled in consider¬ able numbers for many years, but in 1690 William III sent over some 300 Huguenots who had followed him from Holland and they made a settlement named Monacantown, from an extinct Indian tribe. In 1700, after long nego¬ tiations, four shiploads more came over under Marquis de La Muce; about half of them set¬ tled at Jamestown, Va., and in South and North Carolina, the rest at Monacantown. Several hundred more came over at different times and the settlement seemed to have struck enduring roots ; but furious religious dissensions broke it in two, and the pastor led part of them to the Trent in North Carolina, whence in fear of Indian massacre they finally went to South Carolina, the Canaan of the Huguenots, settling at Jamestown. This South Carolina French immigration, due to the latitude and soil fitting their habits, began in 1670 in small numbers. In 1680 the city of Charleston was founded, largely under French auspices; the same year Charles II sent over about 90 Huguenots tc produce wine, oil and silk. After the Revoca¬ tion the great tide began to flow in ; in 1687 there were four wholly or largely French settle¬ ments — Jamestown on the Santee, the (

mission by government support of the churches and having the liturgy translated into French.

The Huguenot settlements in the West In¬ dies — Saint Christopher, Martinique, Guade¬ loupe and some smaller ones — belong in origin to the former group, that of voluntary coloniza¬ tion ; their later history and the flight from them belong to the latter. They were colonized by a trading company under Richelieu's patron¬ age from 1626 on ; there was nominal prohibi¬ tion of public worship, but actually the law was a dead letter, as there would have been no trade but for the Huguenots; the Walloon Synod of Holland supplied ministers and the life was one of prosperity and content. Then as the Revo¬ cation approached, atrocious penal laws were passed, but still not enforced. The Revocation changed everything into a scene of misery. The first result was the using of the islands as a penal settlement for the Huguenots of France; they were sold into service, sometimes of the worst character, and the horrors of the passage rivaled the worst of the slave-trade. Then the governor-general was ordered to extirpate heresy at all hazard and threatened a dragon- nade if the inhabitants did not recant. The effect was a general flight; next a stern order from the governor-general to stop or he would carry out the government orders in all their severity, which produced a still greater stampede, as¬ sisted by the Catholics themselves. In a few months the islands were half depopulated and their trade nearly ruined. The king then

modi¬ fied his orders ; the flight ceased and a few re¬ turned ; but most of the refugees remained in the English colonies or Bermuda. Several score at least removed to New York, and some of them founded New Rochelle; a few to New England, and the Southern colonies naturally received the largest quota. This immigration had an important effect on the United States trade with the West Indies, as the Huguenot merchants, from their familiarity with the re¬ gion and their family ties, took the lead and greatly developed it.

*The <(dead-line" of the French churches in America, the test of that element's separate existence, is about the middle of the 18th cen¬ tury; beyond that, according to Baird, few existed and fewer kept their language. French instinct was to blend, and of course it was much the best that it should do so. The element was absorbed soon and utterly, but its blood and its ideas have been very valuable to the United States. Consult Baird, (History of the Hugue¬ not Emigration to America 5 (1885) ; (Collec¬ tions of the Huguenot Society of America.**

HUIA, a New Zealand bird (Heteralocha acutirostris) , one of the starling family. It is about the size of a thrush, is greenish black in color, with a white tail band and red wattles at the gape. The bill of the male is much shorter than that of the female, the latter being long and curved like that of a snipe. It feeds on timber beetles. The bird is fast becoming extinct, being sought after as a cage-bird by the whites and by the natives for its tail feathers. It is now protected by law in an effort to save it.

HUICHOL (we'chol) INDIANS. See

Indians, American.

HUILA, we'la, Colombia, a department sit¬ uated between the central and western Cordil-

leras. The principal river is the Magdalena, which traverses it in a northward direction. Cacao, rice, coffee, sugar-cane, tobacco and com are cultivated. There is also some stock raising and gold mining; and manufactures of straw hats, cigarettes and woolens are carried on. The capital is Neiva. The country on the whole is not developed. Pop. about 160,000.

HULL, Charles Henry, American his¬ torian and political scientist: b. Ithaca, N. Y., 29 Sept. 1864. He received his education at Cornell

University and subsequently spent several years in Germany at Gottingen, Ber¬ lin and Halle, where he took his Ph.D. in 1892. He became assistant librarian at Cornell (1886— 90), and then held an instructorship in political science there (1892-93). He was appointed professor of American history in 1901, which office he has since occupied, combining with his professorial duties from 1908—13, the office of dean of the College of Arts and Sciences. He has published (The Economic Writings of Sir William Petty. >

HULL, Cordell, American congressman : b. Overton County (now Pickett), Tenn., 2 Oct. 1871. He studied law at Lebanon Law School where he was graduated in 1891. From 1893-97, he was a member of the Tennessee house of representatives; judge of the 5th judicial circuit of Tennessee 1903-07; and was elected a member of the 60th and 65th United States Congresses (1907-19). He rendered distinguished service in the Spanish-American War as captain of the 4th Tennessee regiment.

HULL, Edward, Irish geologist: b. An¬ trim, 21 May 1829. As a member of the Geo¬ logical Survey of Great Britain for 20 years, he geologically mapped a large portion of the cen¬ tral counties of England. From 1869-90 he was professor of geology at the Royal College of Science, Dublin ; and in 1883 commanded an expedition under the auspices of the Palestine Exploration Society to Arabia Petraea and Palestine. Among his important works are (The Coal-Fields of Great Britain) (1865) ; (Building and Ornamental Stones) (1872) ; (A Text-Book of Physiography (1888) ; (Mount Seir, Sinai and Southern Palestine) (1885); (Volcanoes, Past and PresenD (1892) ; (Our Coal Resources at the Close of the 19th Cen¬ tury > (1897) ; (Reminiscences of a Strenuous Life) (1910) ; (Monograph on the Sub-oceanic Physiography of the North Atlantic Ocean **

(1912).

HULL, Isaac, American commodore: b. Derby, Conn., 9 March 1773; d. Philadelphia, 13 Feb. 1843. He commenced his career in the merchant service, and was commissioned as lieu¬ tenant in the navy at the commencement of hos¬ tilities with France in 1798. In 1800, when first lieutenant of the Constitution, he cut out a French privateer from under a strong battery in the harbor of Port Plate, San Domingo. Dur¬ ing the war with Tripoli (1802-05) Hull served with distinction in the squadrons of Commo¬ dores Preble and Barron, in command of the schooner Nautilus and brig Argus, participating in the several attacks on the city of Tripoli in July, August and September 1804, and subse¬ quently co-operating with General Eaton in the capture of the city of Derne. In May 1804 he was promoted to the rank of master com¬ mandant, and in April 1806 to that

of captain.

At the opening of the War of 1812 between the United States and Great Britain he was in com¬ mand of the frigate Constitution, and in July of that year, while cruising off New York, fell in with a British squadron, which chased the Constitution closely for nearly three days and nights. The wind was light and baffling, but Hull handled his vessel with superior seaman¬ ship and finally escaped without injury; at one time he resorted to a novel and successful ex¬ pedient ; the boats were lowered, and all the spare rope on board was bent to a kedge anchor which was carried out nearly a mile ahead and let go. The ship was warped up to this kedge, which was weighed while another was carried out. In this way she left her pursuers before they discovered the manner in which it was done. After this remarkable escape, Hull went into Boston for a few days, whence he sailed 3 August, and 19 August met the English frigate Guerriere, which after a short conflict he re¬ duced to a complete wreck and forced the Eng¬ lish to surrender. (See Constitution, The). As this was the first naval action of the war, it was regarded as a very important one ; Captain Hull was enthusiastically received, and Con¬ gress at its next session presented him with a gold medal. After the war his principal serv¬ ices were in command of the navy yards at Bos¬ ton and Washington, of the squadrons in the Pacific and Mediterranean, and as a member of the board of navy commissioners.

HULL, William, American soldier: b. Derby, Conn., 24 June 1753; d. Newton. Mass., 29 Nov. 1825. He was graduated at Yale Col¬ lege in 1772, then taught school and studied theology for one year, but finally studied law at Litchfield, Conn., and was admitted to the bar in 1775. He entered the army of the Revolu¬ tion at Cambridge in 1775 as captain of a Con¬ necticut company of volunteers; was promoted to the rank of major in the 8th Massachusetts regiment in 1777, and to that of lieutenant-colonel in 1779. He was in the battles at White Plains, Trenton, Princeton, Stillwater, Saratoga, Monmouth and Stony Point and in all the bat¬ tles fought against Burgoyne. His services throughout the war received the approbation of his superior officers, and neither his courage nor patriotism was ever doubted. After the English evacuation he accompanied Washington to New York and was made lieutenant-colonel of the one regiment which then made up the entire peace establishment of the United States army. He was sent to Canada as a commis¬ sioner in 1784, and again in 1793, after which he returned to the practice of law at Newton, Mass. After a trip to Europe in 1798 he was appointed judge of the Court of Common Pleas and later was elected to the Massachusetts senate where he served until 1805. In 1798 he was also made major-general of the Massachu¬ setts militia. He was governor of Michigan Territory from 1805 till 1812, when he was ap¬ pointed as brigadier-general to the command of

the northwestern army. He marched his troops to Detroit, heard of the declaration of war, and of the fall of Michilimackinac, which let loose the Indians of the Northwest upon him, crossed into Canada, but found his communications cut off, recrossed, and on the arrival of General Brock surrendered to that officer the post of Detroit and the territory. For this he was tried two years after by a court-martial, and

sentenced to be shot. The execution of the sentence was remitted by the President in con¬ sideration of his age and Revolutionary services. Historians are now agreed that the difficulties which surrounded General Hull were so great that we need not ascribe his surrender either to treason or to cowardice. He published (De¬ fence of Brigadier-General W. Hull, etc.5 (Bos¬ ton 1814) ; (Memoirs of the Campaign of the North Western Army of the United States, 1812 } (Boston 1824). Consult Campbell, M., 'Revolutionary Services and Civil Life of General W. HulP (New York 1848) ; Clarke, J. F., 'History of the Campaign of 1812) (New York 1848) ; Clarke, S. C., 'General W. Hull's Surrender at Detroit, 1812) (in Magazine of American History, Vol. XXVII, p. 343, New York 1892) ; id., 'General W. HulP (in New England Historical and Genealogical Register, Vol. XLVII, pp. 141 and 305, Boston 1893) ; Forbes, J. G., ed., 'Report of the Trial of Brid.-Gen. W. Hull, etc,5 (New York 1814) ; Foster, J., 'The capitulation, or a His¬ tory of the Expedition Conducted by William HulP (Chillicothe 1812) ; Lossing, B. J., 'Hull's Surrender of DetroiP (Philadelphia 1875) ; Summer, W H., 'General W. HulP (in New England Historical and Genealogical Register, Vol. IX, p. 41; Vol. XI, p. 167; Boston 1855 and 1857) ; Snelling, J., 'Remarks on Hull's Memoirs of the Campaign of 1812) (Detroit

1825).

HULL, Canada, town and county-seat of Ottawa County, Quebec, on the Ottawa River, at the junction of the Gatineau River, opposite the city of Ottawa, and on the Canadian Pacific Railway. It is connected with its important neighbor by a fine suspension bridge spanning the Chaudiere Falls. Iron mining is carried on in the neighborhood, and the falls afford im¬ mense water power. Lumbering is the chief industry of the district; and Hull has vast lum¬ ber yards, saw- and planing-mills, and manu¬ factories of pulp, paper, matches, pails, wooden- ware, woolens, axes, etc. The total annual value of its manufactures is over $7,258,000. It has several churches, a college, a convent, many fine residences, and French and English news¬ papers. The population is chiefly French Cana¬ dian. The

town has been rebuilt since its al¬ most total destruction by fire, 26 April 1900. Pop. 18,222.

HULL, officially KINGSTON-UPON- HULL, England, a city, river port, municipal and parliamentary borough, and self-contained county, situated in the East Riding of York, on the north shore of the estuary of the Humber, where it is joined by the Hull, 34 miles east- southeast of York. Its total area in land and water is 9,042 acres. The buildings of note are the town-hall, the exchange, the corn exchange, market-hall, postoffice, the custom-house, Trinity House, dock offices, public rooms, royal insti¬ tution (containing the rooms of the Philosoph¬ ical Society, etc.), art gallery, technical schools, central library, Hymers College, grammar- school, the jail, royal infirmary, borough asy¬ lum, hospitals, crematorium and dispensary.

.The city possesses three well-laid-out public parks. The industries are varied. There are several ship-building yards, iron-foundries, machine-shops and steam flour-mills ; the other principal branches of industry include

seed-crushing, color-making, paper-making, can¬ vas, rope and cable-making, tobacco manufac¬ turing and oil boiling. Hull ranks as the sixth port in the kingdom, and has extensive ship accommodation, docks, quays, etc. The prin¬ cipal exports are coal, coke and manufactured fuel (in 1914, 3,056,368 tons valued at $10,133,- 265), machinery, metal goods and woolen and cotton goods ; imports — timber, corn, iron, wool, flax, hemp, tallow, hides, pitch, tar, resin, bones, etc. The total net tonnage of ocean¬ going vessels entering and leaving the port in 1914 was 6,760,000. The name of Kingston- upon-H;ull was given by Edward I, who erected a fortress, and constituted it a chartered town and port. When Edward III invaded France in 1359 Hull contributed 16 ships and 470 mari¬ ners. During the Civil War Hull was besieged unsuccessfully by the Royalists twice. Pop. 277,991 of which 136,006 are males.

HULL HOUSE. See Social and Uni¬ versity Settlements.

HULLAH, John Pyke, English musical composer: b. Worcester, 27 June 1812; d. Lon¬ don, 21 Feb. 1884. In 1833 he entered the Royal Academy of Music. His first important com¬ position, an opera entitled 'The Village Co¬ quettesˆ of which the words were by Charles Dickens, was successfully produced at Saint James' Theatre in 1836. Early in 1841 he opened classes in Exeter Hall for the instruc¬ tion in vocal music of schoolmasters and the general public, and from 1849 to 1860 continued them in Saint Martin's Hall, built for him by his friends and supporters. His classes were remarkably successful despite much adverse criticism of his method of

teaching. In 1858 he succeeded Horsley as organist at the Char¬ terhouse, and in 1872 received the appointment of musical inspector of training schools for the United Kingdom. He conducted the Philhar¬ monic concerts at Edinburgh 1866-67, and those of the Royal Academy of Music 1870-73. He also held professorships in King's College, Queen's College and Bedford College. Hullah's best-known compositions are songs, of which several, such as 'The Sands of Dee,5 'Three Fishers, 5 'The Storm, 5 and 'O that We Two Were Maying,5 have become very popular. He issued many excellent collections of songs and other musical pieces, among which are 'Part Music,5 in three series (1842-45) ; 'Vocal Scores) (1846 onward); 'School Songs) (1851) ; 'Sea Songs5 ; 'Singer's Library of Con¬ certed Music5 (1859); and 'Song Book5 (1866). Dr. Hullah was the author of the fol¬ lowing among other works on the history and theory of music: 'Grammar of Vocal Music5 (1843) ; 'On Vocal Music5 (1849) ; 'Grammar of Musical Harmony5 (1852) ; 'The History of Modern Music5 (1862) ; 'Grammar of Counter¬ point5 (1864); 'Music in the House5 (1877). Consult the 'Life5 bv his wife (1886).

HULLIN, u'lan', Pierre Augustin, French general: b. Geneva, 1758; d. 1841. He learned the trade of watchmaking and went to Paris to practise. When the Revolution broke out, Hul- lin was one of the leaders of the attack on the Bastile. However, he was unwilling to go to the extremes to which his fellow revolutionists reverted during the Terror, and was conse¬ quently imprisoned by them. When released, he joined the Italian army and was made adju-

tant-general to Napoleon I. In 1802 he was given command of a division and two years later was head of the military court which pro¬ nounced judgment on the Duke d'Enghien (1804). Napoleon held him in high esteem, distinguishing him with the rank of count in 1809. In 1812 he was made governor of Paris. When the power of Napoleon declined, Hullin made several unsuccessful • efforts to maintain his position, and although he was restored to the governorship of Paris during the Hundred Days (q.v.), he was later banished. After a few years at Brussels and Hamburg, he re¬ turned to France in 1819.

HUMACAO, oo'ma-ka'o, Porto Rico, city and capital of the province of the same name, on the Humacao River, about five miles from the coast. It is beautifully situated in a moun¬ tainous district. The chief public buildings

are the schools and library. The original settle¬ ment at Humacao was made in 1793, and it be¬ came incorporated as a city in 1894. Pop. 6,500.

HUMAITA, oo-ma-e'ta, Paraguay, town and fort, on the Paraguay River, near the mouth of the Parana River, in the southwest¬ ern part of the republic. A situation of strat¬ egic importance during the war of the ((Triple Alliance," it withstood a siege for a whole year, the attacking forces being Argentine and Brazil soldiers. In 1868 it surrendered and the fortifications were destroyed. It is surrounded by a fertile agricultural country. There is but little local manufacturing, but there is an ex¬ tensive trade in coffee, sugar, cotton, tobacco, hides and live stock. Pop. 4,000.

HUMAN EMBRYOLOGY. See Embry¬ ology, Human.

HUMANE ASSOCIATION, American, a

consolidation of various societies, formed at Cleveland, Ohio, in 1877, becoming a national organization for the prevention of cruelty to animals and children. The initial work of the Society was to regulate the abuses in cattle- transportation by the railroads, and to secure the passage of State laws looking to this end. It offered a prize of $5,000 for the best model of a cattle car that would make possible the feeding, watering and resting of cattle in tran¬ sit, and many improved cattle cars were brought into use. Prizes for- essays on vivisection, its abuses and their remedy were also offered for competition in 1900 among colleges and medical students. Since 1913 the societies represented in the Association number over 300 with art aggregate membership of 141,000, and since that year have published the National Humane Review.

HUMANE SOCIETY, Royal, formed in London, in 1774, for the purpose of resuscitat¬ ing those who had been immersed in water and were apparently drowned. The headquarters is on the Serpentine in Hyde Park and numer¬ ous stations are maintained in different parts of the metropolitan area. At the present time it distributes rewards, consisting of medals, clasps, testimonials and sums of money to those who save or attempt to save life from drowning. Also ((all cases of exceptional brav¬ ery in rescuing or attempting to rescue persons from asphyxia in mines, wells, blast-furnaces, or in sewers where foul gas may endanger life, are recognizable by the society." It likewise

gives prizes for swimming to the pupils of pub¬ lic schools and of training-ships.

HUMANISM. (1) That phase of the Re¬ naissance which consisted in a

renewed study of the so-called humanities — the Latin and Greek classics. Like the entire movement of the Renaissance, Humanism had its source in Italy, which had at all times maintained a con¬ tinuous (through often a slender) tradition of its ancient greatness. Furthermore, Italy was the nearest of the civilized western countries to the Empire of the East, and so it was to Italy that the Byzantine scholars fled when their country fell under Turkish dominion. Much before this, however, the Italian scholars had begun to set a high price on the remains of ancient learning. Petrarch (1304-74), and Boccaccio (1313-75) (qq.v.) were both more highly esteemed by their contemporaries for their Latin writings than for their compositions in the vernacular, and both spent much effort in the discovery and preservation of classical works. Boccaccio indeed was familiar with Greek as well as with Latin.*

The definitive introduction of Greek into Italy, however, took place in 1391, when Michael Chrysoloras, being on his way through Flor¬ ence on a mission from the emperor of Byzan¬ tium, was induced to settle there and teach Greek. After him came Johannes Bessarion, Theodorus Gaza, Johannes Argyropoulus and Demetrius Chalcondylas, who had left the By¬ zantine Empire on account of the menace of the Turks or on account of the fall of Constan¬ tinople in 1453. These men had as pupils Piero and Lorenzo de Medici, Pitian, Reuchlin, Linacre, Grocyn, Latimer and many other scholars from both sides of the Alps. The re¬ covery of manuscripts became the passion of monarchs and popes. Nicolas V, Leo X, Cosimo and Lorenzo de Medici, Alphonso the Magnanimous of Naples, Guarino Veronese and Poggio Bracciolini stand out among the many ardent bibliophiles of this age. Under the de Medicis the revival of learning came to be associated with a revival of Platonism and a new academy was organized, the most distin¬ guished head of which, Marsilio Ficino (1433-99), tried to unite Platonism and Christianity. Aristotle too was read in the original, and many disputes arose between the advocates of the Catholic or Arabic traditions and those who in¬ terpreted the works of Aristotle in their own fashion.

Humanism received a great impetus from the invention of printing. Aldus Manutius (q.v.; 1450-1515), the greatest of Italian print¬ ers, produced editions of 28 Greek and Latin classics. Aldus associated himself with a large number of scholars, who co-operated with him in his work. For him publishing was not merely a business, but a propaganda for the dispersion of knowledge.

The revival of learning ended in Italy with the conquest of the Italian cities by the ruffianly soldiers of Charles V in 1527-30, after the strength of the country had been sapped by the dissipation and profligacy which followed the upsetting of the old religious sanctions by the influence of ancient

philosophy. _ This failed to impose its own standards of righteousness on a people given over to the splendid luxury which accompanied the rebirth of art. Human-

ism might well have perished had it not been that it had already taken .root in a more north¬ ern soil. Among the pioneers of humanism be-

Sond the Alps were Agricola (1443-85), Johann leuchlin (1455-1532), and Melanchthon (1497- 1560). Between these men and their obscuran¬ tist reactionary opponents there was waged a continual strife. Italian humanism turned its energies primarily to literature and art; German humanism to theology, education and social betterment, thus forming the prelude to the Reformation.

Like the humanism of all northern countries, that of France had Italian origin, and may be said to have received its first great impulse from the invasion of Naples by Charles VIII in 1494. It owed much, however, to the influence of perhaps the greatest of all the scholars of the Re¬ naissance, the Dutchman Desiderius Erasmus (1467-1536). Erasmus also played an import¬ ant part in British humanism. Humanism in England was foreshadowed by Chaucer, who was at once a literary debtor and a disciple of Petrarch and Boccaccio. In the reign of Henry V, Humphrey, Duke of Gloucester, was a pa¬ tron of learning in the Italian sense, and gath¬ ered around him a coterie of English and Italian scholars. However, British humanism first became definitely established by Thomas Linaere (1460-1524), William Grocyn (1446- 1519), and William Latimer. These three friends made secure the hold which humanism had already obtained on Oxford, so that Brit¬ ish humanism became able to meet that of Italy on even terms. Through Colet (1467-1515), the pupil of Linaere and Grocyn, the humanis¬ tic movement led to the foundation of the great schools of England. Sir Thomas More (1478- 1535), another pupil of Linaere and Grocyn, did much to break down the opposition to Greek at Oxford. More was also an ardent Platonist, as is shown by his famous book, the

(2) The word ˆhumanism" is often used for that theory of education which claims that a study of the classics is the best means for a well-rounded and broad culture. It often takes the form of a protest against the scrappiness of a training based on a too exclusive devotion to natural science.

(3) <(Humanism" is sometimes used to des¬ ignate that type of

philosophical view which makes man the measure of all things. Its chief contemporary exponent is F. C. S. Schiller of Oxford.

Bibliography. — Consult Tebb, R. C, hu¬ manism in Education) (New York 1899) ; Schiller, F. C. S., humanism' (New York 1903) ; Mackenzie, T. S., (Lectures on Human¬ ism' (New York 1907).

HUMANISTS, a class of scholars which arose about the 14th century in Italy and was prominent throughout Europe in the 1 5th and 16th centuries.. See Humanism,

HUMANITARIAN CULT, The, a society founded at New York, 5 Nov. 1914, by Misha Appelbaum. Its object is to develop between individuals a proper sense of responsibility, to create a correct understanding of the essence of true religion and to develop the spirit of helping mankind from a sense of love, rather than merely from a sense of duty. It is abso¬ lutely non-sectarian ; has no officers, incurs no expenses and levies no dues. Collections and contributions are not permitted. The society is non-partisan in politics but is interested in securing legislation for improving the condi¬ tion of the masses. The only qualification necessary for membership is a desire to be just human and be of some assistance to one's fellow-man. Its relief work is undertaken voluntarily by the members, who give the un¬ fortunate kindness and sympathy as well as material aid. The society aims to abolish all philanthropic institutions, charity societies and foundations, by the establishment in every municipality of departments of welfare. A section of the cult is devoted to the abolition of capital punishment, and it has done good work in creating public sentiment in favor of abolishing the death penalty in New York State. The movement has spread to other States.. Meetings and concerts are held at fre¬ quent intervals in Carnegie Hall, New York. Its propaganda is also furthered by the Humanitarian Magazine (New York). The cult has now a total membership of 123,012.

HUMANITARIANS, a term applied to the various classes of anti-Trinitarians, who regard Christ as a mere man. The earliest known author of the purely humanitarian theory is Theodotus of Byzantium, who lived in the 2d century. A contemporary of his, Artemon, taught the same doctrine, and asserted that such had been the universal belief of Christians up till the beginning of the 3d century. See Unitarianism.

HUMAYUN, Mogul emperor of Delhi: b. 1508; d. 1556. He was the son of Baber, whom he succeeded in 1530. His reign was oc¬ cupied with 10 years of warfare in the effort to maintain his possessions; but he was finally driven from India. Taking refuge at the court of Persia, he devoted his energies to plans for his restoration. With his son, the famous Akbar, be returned and reconquered Delhi in 1555. He died shortly afterward and

was suc¬ ceeded by his son. A splendid mausoleum was erected for him at Delhi.

HUMBER, the estuary of the Ouse and Trent rivers between Yorkshire and Lincoln¬ shire. Its length is 38 miles, and its width varies from one to seven miles. It is import¬ ant as a shipping route, having the city of Hull on its north shore and Great Grimsby on the south. The presence of shoals makes careful buoying necessary. The Humber is connected by canals with South Yorkshire and Trent. Historically, the river is known as the point of entrance for the Norse invasions in the 9th and 10th centuries. The tidal bore sometimes occurs on the Humber and the shore-line is constantly shifting.

HUMBERT I, Ranieri Carlo Emanuele Giovanni Maria Ferdinando Eugenio, king of 14 March 1844: d. Monza, near Milan, 29 July 1900. He was eldest son of Vic-

tor Emmanuel II and Queen Marie Adelaide, daughter of the Archduke Regnier of Austria. He received a most careful education, entered the army, took part as a youth in the war of independence, and in 1866 was in command of a division at Custozza. On 22 April 1868 he married his cousin, Princess Margherita of Savoy, daughter of the Duke of Genoa. On the death of his father he succeeded to the throne of Italy, 9 Jan. 1878, as Humbert I. During his reign he carefully regarded constitutional limi¬ tations, and directing his choice of prime ministers according to parliamentary conditions selected but one, Rudini, from the Conservatives. In 1891 was concluded the (

HUMBERT SWINDLE, The, one of the

most daring and extensive frauds on record, perpetrated for 20 years by a Mme. Humbert of Paris with the aid of her husband and various accomplices. It was alleged by Mme. Humbert that a certain Robert Henry Crawford, Ameri¬ can millionaire, had left to her his fortune of $20,000,000. A subsequent will divided the estate between her younger sister, Marie Daurignac, and Henry and Robert Crawford, nephews of the testator, while a third document bound the heirs to the preservation of the title deeds and securities, and placed these in the keeping of M. and Mme. Humbert until Marie should at¬ tain her majority. Without examination the alleged title deeds and Securities were deposited and sealed in a safe by the authorities. On this wholly fictitious basis Mme. Humbert netted about

$10,000,000, while the amount of notes in the form of original loans and renewals equaled $140,000,000. The fraud was discovered, and the Humberts disappeared in May 1902; they were arrested in Madrid in December and brought to Paris for trial. They were found guilty of forgery and swindling, and were sen¬ tenced 22 Aug. 1903 to five years' solitarv im¬ prisonment, but were released 13 Sept. 1906.

HUMBLE-BEE. See Bumblebee.

HUMBOLDT, hum'bolt (Ger. hoom'bolt), Friedrich Heinrich Alexander, Baron von, German traveler and naturalist : b. Berlin, 14 Sept. 1769; d. there, 6 May 1859. His father was chamberlain to the king of Prussia. He studied at the universities of Frankfort-on-the Oder, Berlin and Gottingen, and in 1790 traveled along the Rhine to Holland, France and Eng¬ land. This journey gave rise to his Observa¬ tions on the Basalt on the Rhine,) published in 1793. In 1791 he studied mining and botany at the mining school in Freiberg, where his acquirements, his attractive and instructive con¬ versation, his wit and goodness of heart gained him universal esteem and affection. In 1792 he was appointed assessor in the mining and smelting department, and soon afterward re¬ moved to Bayreuth as overseer of the mines in Franconia. Here he introduced many improve¬ ments, among which was the establishment of the mining school at Steben; he likewise made valuable galvanic experiments, the results of which were published in 1796, in two volumes. But in 1797 he gave up this office, from a desire to travel. Owing to the disturbed state of the Continent, however, it was not easy for him to carry out his project. For some time he resided in various parts of Germany, particu¬ larly at Jena, where he became intimately ac¬ quainted with Goethe and Schiller. In 1797 he went, in company with his brother Karl Wil¬ helm, a Prussian minister of state, to Paris, where he became acquainted with Aime Bon- pland, a pupil of the medical school and botanic garden in Paris. He then went to Madrid, and having obtained permission from the Crown to travel through the Spanish colonies in America, immediately sent for his friend Bonpland, and sailed with him from Corunna. They landed at Teneriffe, where they ascended to the crater in Pico, in order to analyze the atmospheric air, and to make geological observations. In July they arrived at Cumana in South America. For five years they were occupied incessantly in traveling through tracts of the earth rich in all that could interest the scientific observer, and till then never scientifically described. They explored the regions of South America watered by the Orinoco and the upper part of the Rio Negro, fully tracing the connection between the Orinoco and the Amazon ; then returned to the coast and sailed for Cuba, where they remained some months. Leaving Cuba in 1801, they re¬ turned to the South American continent, sailed up the Magdalena as far as they could, pur¬ sued their route by land to Popayan and Quito, and thence as far south as Lima, crossing the Andes no fewer than five times in the course of their jcurney, and, besides other mountain as¬ cents, climbing Chimborazo (23 June 1802) to an elevation of 19,300 feet, being the highest point of the Andes then reached by man; from Lima they sailed to Guayaquil, and thence to Acapulco, Mexico (January 1803). Some months were spent in examining the City of Mexico and the surrounding country, and in a visit to the

United States; and in January 1804, they set sail for Europe, taking Cuba again on their way. On 3 Aug. 1804, they arrived at Bordeaux, bringing with them, as the result of their labors, an immense mass of fresh knowledge in geography, geology, clima¬ tology, meteorology, botany, zoology and every branch of natural science, as well as in eth-

nology and political statistics. Humboldt selected Paris as his residence, no other city offering so many aids to scientific study, or haying so many distinguished savants, and re¬ mained there till March 1805, arranging his collections and manuscripts, and experimenting with Gay-Lussac, in the laboratory of the poly- technical school, on the chemical elements of the atmosphere. He was accompanied by Gay-Lus¬ sac, who exerted a lasting influence on his chemical studies, in a visit to Rome and Naples, and also by Von Buch on his return through Switzerland to Berlin, where, after an absence of nine years, he arrived in November 1805. As the condition of Germany made it imprac¬ ticable to publish there his large scientific works, he was permitted by King Frederick William III, as one of the eight foreign members of the French Academy of Sciences, to remain in Paris, which was his residence, excepting brief periods of absence, from 1808 to 1827. There appeared his (Voyage aux Regions equinoxiales du Nouveau Continent (with Atlas, 1809-25; German edition, Stuttgart 1825-32; new edition, edited by Hauff, 4 vols., 1859-60). When in 1810 his elder brother resigned the direction of educational affairs in Prussia to become Am¬ bassador at Vienna, the former post was urged upon Humboldt by Hardenberg; but he declined it, preferring his independence. He had also already decided upon a second scientific expe¬ dition, through Upper India, the region of the Himalaya and Tibet, in preparation for which he was diligently learning the Persian language. The political events between the Peace of Paris and the Congress of Aix-la-Chapelle gave him occasion for several excursions. He went to England in the suite of the king of Prussia in 1814; again in company with Arago, when his brother was appointed Ambassador to Lon¬ don; and again in 1818 with Valenciennes from Paris to London, and from London to Aix-la- Chapelle, where the king and Hardenberg wished to have him near them during the Con¬ gress. He also accompanied the king to the Congress of Verona, and thence, to Rome and Naples; and in 1827, at the solicitation of the monarch, gave up his residence in Paris, and returned by way of London and Hamburg to Berlin, where in the following winter he deliv¬ ered a series of public lectures on the cosmos. Under the patronage of the Tsar Nicholas he undertook in 1829 an expedition to northern Asia, to explore the Ural and Altai mountains, the Chinese Dsoungaria and the Caspian Sea. In this

expedition he was accompanied by Eh- renberg and Gustav Rose. Their course lay through Moscow, Kazan and the ruins of Old Bulghari to Ekaterinburg, the gold mines of the Ural, the platinum mines of Nijni Taghilsk, Bogoslovsk, Verhoturye and Tobolsk, to Bar¬ naul, Schlangenberg and Ustkamengorsk, in the Altai region, and thence to the Chinese frontier. From the snow-covered Altai Mountains the travelers turned toward the southern part of the Ural Range, and traversed the great steppe of Ischim, passed through Petropavlovsk, Omsk, Miask, the salt lake of Ilmen, Zlatousk' Taganay, Orenburg, Uralsk (the principal seat of the Uralian Cossacks), Saratov Dubovka, Tzaritzin and the Moravian settlement of Sarepta, to Astrakhan and the Caspian Sea. They visited the Kalmuck chief Sered Taab, and returned by Voronesh, Tula and Moscow. The

*entire journey of over 10,000 miles was made in nine months; its results are given in Rose's 'Mineralogischgeognostische Reise nach dem Ural, Altai und dem Kasjischen Meere) (1837- 42) ; and Humboldt's (Asie Centrale, Recher- ches sur les Chaines de Montagnes et la Clima- tologie compareeP It extended the knowledge of telluric magnetism, since in consequence of it the Russian Imperial Academy established a series of magnetic and meteorological sta¬ tions from Saint Petersburg to Peking, which was followed, on Humboldt's application to the Duke of Sussex, by the establishment of similar stations in the southern hemisphere by the Brit¬ ish government. The convulsions of 1830 gave a more political direction to Humboldt's activ¬ ity for several years. On the news of the French Revolution, and the accession of Louis Philippe, he was selected to convey to Paris the Prussian recognition of the new monarch, and to send political advices to Berlin. The latter office fell to him again in 1834-35, and he was called upon to fulfil it five times in the 12 following years, residing four or five months in Paris on each mission. To this period be¬ longs the publication of his (Examen critique de la Geographic du Nouveau ContinenD (1835-38). He accompanied the king of Prus¬ sia in visits to Denmark, England, etc. (1841- 45), *and resided for several months in Paris in 1847-48, from which time he lived in Prussia, usually in Berlin; occupying a high position at the court until his death. His last great work,*

< Cosmos > (1845-58), has been unanimously rec¬ ognized as one of the most valuable contribu¬ tions to science ever published. It explains the physical universe according to its depend¬ encies and relations, grasps nature as a whole, moved and animated by internal forces, and by a comprehensive description shows the 'unity which prevails amid its variety. It has been translated into all languages in which a book of science is required, and has been without an equal in giving an impulse to natural studies. Consult > Bruhns, Alexander von Humboldt, eine Wissenschaftliche Biographie) (English trans., 1873) ; Klenke, Alexander

von Hum¬ boldt, ein biographisches DenkmaP (1859).

ˆ HUMBOLDT, Karl Wilhelm, Baron von, German statesman and philologist, brother of the preceding: b. Potsdam, 22 June 1767; d. Tegel near Spandau, 8 April 1835. He studied law at Berlin, at Frankfort-on-the-Oder and at Gottingen, and at the same time devoted equal attention to antiquities, aesthetics and the phi¬ losophy of Kant. In 1789-90 he lived in Erfurt and Weimar, where a friendship commenced with Schiller continued without interruption till the poet's death. A valuable memorial of his friendship with Schiller is the correspond¬ ence between them ((Briefwechsel zwischen Schiller und Wilhelm von Humboldt, > 1830)

In 1790 he became Prussian Councillor of Lega¬ tion at Berlin, resigning in the following year. From 1794-97 he was one of the Schiller circle at: Jena. In 1801, at the request of the Prus¬ sian government, he accepted the situation of ministerial resident at Rome. From 1806-08 he was here Minister Plenipotentiarv, but, having been called from Rome to fill' the office of Minister of the Interior in connection with ecclesiastical and educational matters, had a

*rnuˆt,lrrP0rˆa*nˆ sˆar® the educational progress which Prussia has since made ; more especially*

is the erection of the Berlin University to be ascribed to him. In 1809 he was appointed Privy Councillor of State, and in this office was in charge of public worship and education. He exchanged this situation in 1810 for that of Extraordinary Ambassador and Minister Plenipotentiary to Vienna. He took an active part during the armistice of 1813 in the peace congress at Prague; in 1814 at the Congress of Chatillon, and the conclusion of the first Paris peace; in 1815 at the Congress of Vienna; and in 1816 at Frankfort-on-the-Main, in all mat¬ ters connected with the German Diet. He was afterward appointed Ambassador to London, and in 1818 attended the Congress of Aix- la-Chapelle. In 1819 he was an active member of the Prussian Ministry of the Interior, but sent in his resignation the same year, in favor of a freer and more constitutional system. It was not until 1830 that Humboldt was recalled to the Council of State. His publications in¬ clude the elegiac poem (Rom) (1808) ; the im¬ portant work in philological research in the Basque language (Prfifung der Untersuchungen

fiber die Urbewohner Hispaniens vermittelst der baskischen Sprache) (1821) ; also (Uber die Kawisprache auf der Insel Java (3 vols., 1836-40) ; (Ideen zu einem Versuch, die Gren- zen der Wirksamkeit des Staates zu bestimmen* (ed. by Cauer in Reclam's*

1901).

HUMBOLDT, Kan., a city in Allen County, 60 miles southeast of Emporia, on the Neosho River. The Missouri, Kansas and Texas and the Atchison, Topeka and Santa Fe railroads connect with the town. Th. chief occupations are the mining of oil, and the manufacture of tile, bricks, cement and flour. Oil refining and agriculture are also carried on. The city owns its waterworks. Pop. 2,600.

HUMBOLDT, Tenn., a city in Gibson County, 85 miles east of Memphis. It is situ¬ ated on the Forked Deer River and is served by the Mobile and Ohio and the Louisville and Nashville railroads. It is a shipping centre for the surrounding region which grows cotton and fruit. There are marble and granite works, cotton mills, brickyards, canning factory and cotton gins. The municipality operates its own waterworks and electric-light plant. Pop. 2,525.

HUMBOLDT, a river which has its rise in Elko County, Nevada, in the northeast corner of the State, and flows west and southwest, a distance of about 350 miles into Humboldt Lake, in the eastern part of the State. The stream is narrow, the waters saline and the whole course is through a barren region, destitute of large trees and but few shrubs, ex¬ cept a few clusters of willows. The fields are covered with sage brush. The only east and west pass through the mountains of Nevada, which rise to a height of 11,000 feet above sea-level, is the valley of the Humboldt. The

Central Pacific Railroad, in its course through the State, follows this river. Humboldt Lake has no outlet ; but the waters evaporate so rapidly that sometimes its bed is dry, but when the water is high it overflows the banks. A dam built a few years ago prevents the over¬ flow from falling in Carson Sink.

HUME, David, Scottish historian and meta¬ physician : b. Edinburgh, 26 April 1711 ; d. there, 26 Aug- 1776. He appears to have entered the University of Edinburgh at 12 and to have left at 14 or 15 without taking a degree. He began the study of law, but abandoned it first for commerce and then in order to devote himself to the ((pursuits of philosophy and learning.® These he carried on in France, largely at the Jesuit school of La Fleche. His first work, the (Treatise of Human Nature/ was published partly in 1739 and partly in 1740; the books en¬ titled (Of the

*Understanding) and (Of the Passions * appearing in the former, and that en¬ titled (Of Morals* in the latter year.*

The (Treatise of Human Nature) is the final and most complete exposition of the funda¬ mental principles of the old school of empirical philosophy, — the school to which belonged Bacon, Locke and Berkeley. According to Hume, the contents of the mind are embraced in the term ˆperceptions.® Perceptions con¬ sist of sensuous impressions and ideas. Ideas are merely faded-out sensuous impressions. Knowledge is the cognition of the relation be¬ tween perceptions. There is no necessary con¬ nection between cause and effect. The idea of cause depends on the habit of the mind which expects the event that usually follows another. Mind — and it is precisely this point that Hume transcends Berkeley — is but an isolated series or succession of impressions and ideas. As knowledge is dependent on experience derived through the senses, and as the senses frequently deceive, one can have no absolute knowledge of things, but only of one's impression of them. Or rather, there are no things apart from ex¬ perience, but merely chains of experiences which constitute the things. Hence, to give the con¬ clusion later arrived at in the famous (Essay on Miracles/ a miracle even if genuine is in¬ capable of proof.

The (Treatise of Human Nature) is clear, forcible and untechnical. Its most striking characteristics are its spontaneity and indivi¬ duality. Hume owed little to academic train¬ ing, and wrote his earlier works at a distance from centres of learning, without access to large libraries. The literary beauties of the (Treatise/ however, are marred by its structural defects. It is a series of brilliant fragments rather than a well-rounded whole, and is concerned mo-re with criticism of metaphysical opinions from the point of view of Hume's theory of knowl¬ edge than with the construction of a complete system of philosophy, yet this lack of system¬ making can scarcely be held up against a man whose chief contribution to philosophy was of the nature of a destructive criticism of the old notions of substance. The

In 1741 appeared the first volume of (Essays, Moral and Political/ the second volume coming out in the following year. These, with some

additions and omissions, were republished in 1748 under the expanded title, (Essays, Moral, Political and Literary,5 which has been retained in the many subsequent editions. In 1744 Hume failed to receive an appointment to the chair of ethics and pneumatic philosophy at Edin¬ burgh on account of the reputation for unor¬ thodoxy, which the

Hume's philosophical fame rests primarily on the fearless and unrelenting way in which he carried to their logical conclusion the implicit assumptions of the Empiricist school of Great Britain and, for the matter of that, of the entire philosophy of the Enlightenment. Among the most important heirlooms handed down to the Enlightenment from the Schoolmen was the notion of substance.

The Aristotelian logic made every proposi¬ tion essentially the attribution or denial of some predicate to some subject. As a natural and even necessary consequent of this, the Middle Ages and the Enlightenment viewed every rela¬ tion under the aspect of a subject-predicate relation. The tendency, moreover, was to re¬ gard certain entities, not merely as in the sit¬ uation of subjects, but as subjects in their very essence, and others as essentially predicates. Locke already saw that if every fact is a pred¬ ication of an attribute to a subject, and if such a predication, as he thought, consists in the modification of the subject by the predicate, the unmodified subject or substance is not sus¬ ceptible to any cognition in the least analogous

to that which we have of the modified subject. Berkeley took the next step, saw that an un¬ knowable substratum is useless for explanatory purposes and ousted substance from the ma¬ terial world. However, he retained the old sub¬ stantial notion of unity essentially unmodified in his explanation of the unity of conscious¬ ness — the soul. It was left to Hume to expel substance from its last hiding-place, and to view mind and matter alike as mere aggre¬ gates of impressions and ideas in essence no more mental than material.

It is important to note that Hume, no less than his predecessors, retained the opinion that unity is essentially of a substantial character. For this reason he interpreted his reputation of the substantial character of consciousness as a refutation of all intrinsic unity whatever which consciousness might possess. This led to his associationism : he believed that ideas group themselves together according to the principles of (

Hume left the universe of his philosophy in danger of falling to pieces from sheer lack of any principle of cohesion — indeed, of any prin¬ ciple at all. It is space and time are aggrega¬ tions without arrangement ; his cause in coex¬ istence without connection. It is this destruc¬ tion of the unity of the older systems which has given Hume a reputation for scepticism. Hume's chief work is destructive, yet by this very destruction he showed the necessity and prepared the way for a theory of the universe which should not found its unity on the in¬ secure basis of substance. The first definite step toward this theory was taken by Kant, whom Hume (

In ethics Hume is a utilitarian. He believes that pleasure and pain are the only springs of action, and that utility to the race is the end of all good action. While he emphasizes the share played by intuition in all ethical matters, he does not deny all efficacy to reason. He is a rigid determinist. Consult Burton, J. H., (Life and Correspondence of David Hume5 (Edin¬ burgh 1840) ; Gizycki, Georg von, 'Die Ethik David Humes5 (Breslau 1878) ; Hume, D„ 'My Own Life5 (London 1 777); Huxley, T. H.,

(David Hume5 (London 1879) ; Hyslop, J. H., 'The Ethics of Hume5 (Boston 1893) ; Jodi, 'David Humes Lehre von der Erkenntniss5. (Halle 1871) ; Knight, W., 'Hume5 (Edin¬ burgh 1886) ; Orr, J., 'David Hume and his In¬ fluence on Philosophy and Theology5 (New York 1903) ; Seth, A., 'English Philosophers and Schools of Philosophy5 (London 1912).

HUME, Fergus, English novelist: b. 24 July 1862. He was educated at the University of Otago, New Zealand, became a barrister, and in 1888 removed to London. His first long work, 'The Mystery of a Hansom Cab,5 pub¬ lished in Melbourne (1887), and later in Lon¬ don, achieved a phenomenal circulation. Later

publications are (1890); (A Creature of Night (1891) ; (An Island of Fantasy> (1894) ; (The Bishops Secret) (1900); (The Turnpike House> (1902) ; (1906).*

HUME, Joseph, English politician : b. Montrose, Forfarshire, 22 Jan. 1777; d. Nor¬ folk, 20 Feb. 1855. He studied medicine at Aberdeen, Edinburgh and London, and in 1796 became a member of the College of Surgeons of Edinburgh. In the following year he became assistant surgeon in the sea-service of the East India Company, and after several years of service was transferred to the land company. Having mastered Hindustan and Persian, he was employed by the government in political duties. He acted in the capacity of surgeon and interpreter in the Mahratta War and filled several high posts during that time. Returning to England in 1808, he spent several years in travel and study, and then began to take an active interest in politics. He represented Wey¬ mouth in Parliament from 1812, re-entering in 1818, and remained there until his death, for 3G years being a leader of the Radical party. He published a translation in blank verse of the (Inferno of Dante (1812). Hansard's Parliamentary Debates) are the best record of his incessant political activity. His letters were published by Cornewall Lewis (1894).*

HUME, Martin Andrew Sharp, English historian: b. London, 8 Dec. 1847; d. 1 July 1910. He was educated in Madrid, became a major in the British army and was attached to the Turkish army 1878-79. He was editor of Spanish State Papers in the Public Record Office and examiner of Spanish in the University of London. He was a distinguished authority on Spanish history and literature and was the author of numerous books on the Spain of Philip II, and Elizabethan England.

HUMIDITY. See Climate; Meteorology.

*HUMMEL, Johann Nyomuck, Austro- Hungarian composer and pianist: b. Pressburg, 14 Nov. 1778; d. Weimar, 17 Oct. 1837. His father became music-director in one of the theatres of Vienna, and removed his family there when the boy was seven years old. In Vienna he attracted the notice of Mozart, who took him into his own family and taught him for more than two years. The boy's talent seems to have made a great impression on all the musicians with whom he came in contact, and the list of his teachers takes in most of the masters of the .day, including Haydn. So great was his success and appreciation that he was at one time considered to be a rival to the great Beethoven. When he was only nine years old his father took him on a two years' concert tour through Germany, Denmark, Scotland, Eng¬ land and Holland, in all of which countries he was greatly admired as a pianist. In 1 791— 92 he lived in London, where his first composi¬ tion, Variations for the Piano, * was pub¬ lished. He returned then to Vienna and studied composition, etc., under Albrechtsberger, Salieri and others. From about 1803-11 he was in the service of Prince Nicholas Esterhazy. He justly ranks among the best pianists of the time, and his chief importance in music is due to his efforts to introduce correct and scientific fingering in piano playing. He trav¬*

eled and taught music in Vienna from 1811-16. In the latter year he accepted a call as royal orchestra leader at Stuttgart, where he remained until 1820. In the same capacity he went then to Weimar, where he remained until his death, except for a trip to Paris and London in 1830, and to Dresden, Vienna and Italy in 1834. While his compositions number among the hun¬ dreds, only comparatively few have survived the test of time. Among these should be mentioned

HUMMING-BIRDS, a family of small birds, the Trocliilidce, closely allied to the swifts, peculiar to America and almost exclu¬ sively tropical. They are distinguished by small size, iridescent plumage, long slender bill and the peculiar form of the tongue, which con¬ sists of a double tube tapering and separating at the tip into two externally lacerated sheaths, which contain the extensile portion. ((The horns of the hyoid apparatus are greatly elon¬ gated, and pass round and over the back of the head, meeting near the top,

and thence stretch¬ ing in an ample groove to terminate in front of the eyes. This arrangement, analogous to that found in woodpeckers, allows the tongue to be suddenly protruded to a considerable distance, and withdrawn again in an instant.® This is a modification of parts adapted to food-getting hahits, and is accompanied by others equally characteristic. Humming-birds feed almost en¬ tirely upon minute living insects, especially those that gather about flowers and loiter in the corollas, feeding upon the nectar; or dwell on the leaves and bark of plants and trees. Such honey as may be taken with them seems to be gratefully accepted, but the birds do not seek for, nor <(suck® the nectar from flowers, as has been popularly supposed. They will dart from a perch and capture an insect like a flycatcher, but ordinarily they obtain them by poising upon their wings about leaves and in front of tree- trunks, picking up morsels, not with the manda¬ tes, but with the tongue; and still more fre¬ quently by searching flowers. As it is in the deep, tubular, sweet corollas of trumpet-creepers, orchids and similar great blossoms of tropical shrubs and vines that insects most abound so there does the humming-bird find its richest hunting-ground ; and the long curved beaks of most species have been developed in the con¬ stant effort to penetrate to the nectarous depths of these deep blossoms; in truth, the head and half the tiny body may often be pushed into the flower, and in so doing gather and dispense pollen from flower to flower, so that hum¬ ming-birds are important if not exclusive agents in the cross-fertilization of certain large flow¬ ered plants. (See Flowers, Fertilization of

by Birds). This method of obtaining food re¬ quires the power of sustaining themselves in the air in a fixed position while they explore leaves or blossoms, since no perch is available for their feet, which are small and weak at best. Hence humming-birds have developed lightness of body coupled with extraordinary muscularity and extent of wings, which in most species reach far beyond the root of the tail. These long narrow wings are operated by pec¬ toral muscles that proportionately exceed in size those of any other bird, — even those of the chimney-swifts ; and these huge muscles actuate remarkable short wing-bones, so that- extreme rapidity of movement is possible, but it is accom¬ panied by a loss of that power secured by the relatively longer alar bones of other birds. By this apparatus the humming-birds are able to beat the air with a rapidity Which enables them to sand still, or to dart and dodge in pursuit of some agile insect, or in escaping danger, with a speed which defies human sight to trace; the moving wings at such times, indeed, appear only as a misty halo about the body of the bird, and make a loud humming noise. Most species have very

long bills — frequently exceeding, and sometimes twice as long as the head; but some have short, awl-like beaks, with which they pierce the base of such flowers as are too deep for them.

A characteristic of humming-birds is that flashing beauty of plumage which long ago led to calling them the gems of the air, and is due mainly to the quality of the feathers, upon the surface of which are small scales that reflect the light in prismatic hues, giving an iridescent or metallic sheen to certain parts, especially the throat (gorget), comparable only to the shards of some beetles. Such brilliance, however, be¬ longs only to the males, the females being uni¬ formly more plainly dressed, though still highly colored. In many species, also, the males are further adorned with fanciful crests, mustaches, tufts, pendants of the chin and throat, ˆpuffs® upon the legs, and especially with ornamental developments of the tail-feathers; and these they seem to take great delight in displaying for the admiration of the female, and the ex¬ asperation of rivals. They are extremely pug¬ nacious, especially in the nuptial season, when constant and bitter fighting occurs, and their courage is so great that neither sex has any hesitation in attacking any bird that offends them or comes too near the nest, — even hawks and crows often flee ignominiously before the impetuous onslaughts of these little furies. On the other hand no bird is more fearless of man.

The nests of humming-birds are small cups of downy materials, sometimes resting upon the limb of a tree (as is the method with the common ruby-throat of the eastern United States; sometimes fastened in a crotch of a bush or of large leaves; or fastened to the tip of a pendant leaf, or in a bunch of hanging moss or foliage. The materials are adapted to the place in color and appearance, and further con¬ cealment is gained by coating the structure with lichens, or bits of bark, or with cone- scales, as is the habit of the familiar Calliope hummer of California, which nests in pine trees. The eggs of all species are only two in number and purely white.

The family is exclusively American, and is represented from Labrador and southern

Alaska to Patagonia; but the more vagrant species are few, and withdraw in winter toward the equator. About 125 genera with some 500 species are recognized by ornithologists. Nine- tenths of them belong to the Amazon and Orinoco valleys, or to the lowlands of Central America; yet some species habitually spend the summer on high mountains. The variety de¬ creases northward, but nearly 20 species reach the boundary of the United States and sev¬ eral are regularly present in summer west of the great plains as far north as southern Alaska. One species wanders over the whole country, and is abundant in the Eastern States. This is the ruby-throat (TrocJiilus colubris). It is about three and one-half inches long. The whole

upper part, sides under the wings, tail coverts and two middle feathers of the tail are rich golden green ; the tail is forked, and, as well as the wings, of a deep brownish purple; the bill and eyes black; but what con¬ stitutes their chief ornament is the splendor of the feathers on the throat of the male, which are ruby-red, and gleam like a great jewel. The females and immature young lack this gorget.

The Anna humming-bird (Calypte annce), with crown and throat glittering purplish- pink; the broad-tailed (Selasphorus platy- cercus), green, with pink throat; the rufous (S . rufus), back reddish brown, gorget red; Allen's (S. alleni), crown and back green, tail rusty; and the calliope (Stellula calliope), very small, green above, throat purplish-pink, mixed with white; are more or less common and widespread summer visitors to the Pacific slope.

Bibliography. — Jardine, Naturalists' Li¬ brary (Vols. I and II, Edinburgh 1833) ; Lesson, (Histoire Naturelle des Colubris> (1830) ; Gould, (Monograph of the TrochilidaP (5 vols., 1850-95) ; Mulsant and Verreaux, (Histoire Naturelle des Oiseaux-Mouches ou Colubris) (4 vols., 1876) ; Rldgway, (The Hum- ming-'birds) (Am. Rept. United States National Museum for 1890, Washington 1892).*

Ernest Ingersoll.

HUMOR, a fluid of the living body, of which Hippocrates enumerated four, namely, blood, phlegm, yellow bile and black bile. These were considered to be the principal seats of disease in man. In modern medicine humor is a term generally applied to the thinner fluids, whether natural or morbid, limpid, serous or sanious, such as the humors of the eye or the watery matter in a blister of the skin caused by heat. etc.

HUMORESKE, hu'mo-resk'. The word first came into prominence when applied by Schumann to short musical compositions, free and whimsical in form and strikingly original in harmony and rhythm. The popular ((Hu- moreskes® of Grieg and Dvorak have made the term a familiar one.

HUMPBACK SALMON, Whitefish, etc., several kinds of fishes are said to be <(hump- backed® because of an unusually raised dorsal outline. The humpback salmon of the Pacific coast is a commonly known but little valued species (Oncorhynchus gorbuscha) , whose flesh is styled in market pink salmon. (See Salmon). The common whitefish (q.v.) is known locally as humpback or bowback ; and the curious razor-backed sucker (Xy ranchcn cypho), is locally called the humpback.

HUMMINGBIRDS

G ,4

U oo

•a o +J O ni

o t| ^ ft

aJ c/5

O

u

H J5

W CTJ

£ d .

I-. cc O 1

o

O ^ Ih

o

d C

fnt w c

C/5 *»H

:§ &

c ^

^ £

a) hh

Q K

M

UO

t/3

t/3 •«

G i3

U3

d

G

t-

0

A H a w v _

C B

TJ *t <0

£ > 3G u

G

H Q

W

G

v-,

o

>

~ x)

X a)

Is

aj o

-M >

A <

u

A, P <

i-.

A

G

c/3

>

° H o C

c/3

^G

• rH

rC

CJ

0

bo

g

*5

a;

>

£ w

05

4- >

aj

O X

u C/5 rC 3 +->

i *° .a £

G d

-g

c4 ^

3 °

*> T-j 2 'S

o ^ ° 00

v3 d • »-<

03 UJ

*- b

a Ok

Ji H

.Q C- G o

G

o

O

ba

.

-

.

HUMPBACK WHALE, one of the baleen whales or rorquals (q.v.) of the genus Mcgap- tera, characterized by a low hump in place of the inconspicuous dorsal fin and a tuberculous head. The genus is world-wide, and an unde¬ termined number of species exist, of which the best known is the northern M. longimanus, the specific name referring to the elongated pec¬ toral fin, with which the animal beats the water, itself and often its playmates. These whales reach 50 or 60 feet in length, and go about in small schools. See Whale.

HUMPERDINCK, Engelbert, German composer: b. Siegburg, near Bonn, 1 Sept. 1854; d Neu-Strelitz, 28 Sept. 1921 ; after studying music at Cologne and elsewhere he taught in the conservatories of Barcelona and Cologne, and was musical adviser to a publishing firm in Mainz. Wagner asked him to assist in the production of the latter's only symphony ; and he prepared and coached the first cast of (Par¬ sifal 5 at Baireuth (1882). He subsequently be¬ came famous as the author of the phenomenally successful children's musical fairy play, han¬ sel und GreteP (1894) ; followed by (Schnee- Madchen> (The Snow Maiden), (The Royal Children5 and other operas, with incidental music to fairy plays and dramas, distinguished by appealing melody, harmony and orchestra¬ tion.

HUMPHREY, hum'fri, Charles Fred¬ eric, American soldier: b. New York, 2 Sept. 1844. He served in the 5th Artillery in the Civil War, became first lieutenant of the 4th Artillery in 1868, was transferred to the quartermaster's department in 1879 as assistant quartermaster with captain's rank; distin¬ guished (

HUMPHREY, Heman, American Con¬ gregational clergyman and college president : b. West Simsbury, Conn., 26 March 1779; d. Pitts¬ field, Mass., 3 April 1861. He was graduated from Yale in 1805, was pastor of the Congre¬ gational church at Fairfield, Conn., 1807-17, and of that at Pittsfield, Mass., 1817-23, while from 1823 to 1845 he was president' of Amherst College. He published several works, includ¬ ing a popular (Tour in France, Great Britain, and Belgium, 5 but is best known by a famous pamphlet called the <(first temperance tract® and entitled (Parallel Between Intemperance and the Slave Trade.5 Consult Tyler, W. S., his¬ tory of Amherst College) (Springfield 1873).

HUMPHREY GAS PUMP. See Inter¬ nal Combustion Engine.

HUMPHREYS, Alexander Crombie,

American mechanical engineer and educator: b. Edinburgh, Scotland, 20 March 1851. His vamily settled in Boston in 1859 and he was

educated by his father, an English classical scholar. He passed preliminary examinations for entrance to the United States Naval Acad¬ emy, but disbarred by youth began to work in 1866, and by 1872 had reached a point of re¬ sponsibility, when he was made secretary and shortly afterward superintendent of the Bay¬ onne and Greenville Gas-Light Company. While in this position he studied and was grad¬ uated from Stevens Institute of Technology in 1881, shortly after being appointed chief engi¬ neer of the Pintsch Lighting Company of New York. From 1885 to 1892 he was general su¬ perintendent of the United Gas Improvement Company of Philadelphia, rebuilding and re¬ organizing the gas and electric properties and reducing the management to a system of high efficiency. He became senior member of the firm of Humphreys & Miller of New York city; president of the Buffalo Gas Company; and president of the faculty (since 1902) and of the trustees (since 1907) of the Stevens Insti¬ tute of Technology. He received the degrees of Sc.D., University of Pennsylvania 1903; LL.D., Columbia 1903; New York University 1906; Princeton 1907. He is a member and official of numerous learned and scientific so¬ cieties and the author of a great number of papers on engineering education and the eco¬ nomics of gas engineering, including (Business Features of Engineering Education5 (1905).

HUMPHREYS, Andrew Atkinson Amer¬ ican soldier: b. Philadelphia, Pa., 2 Nov. 1810; d. Washington, D. C., 27 Dec. 1883. He was a grandson of Joshua Humphreys (q.v.) and was graduated at West Point 1831, receiving a com¬ mission in the artillery. He took part in the Seminole War. Resigning in 1836 he was as¬ sociated with Maj. Hartman Bache as a civil engineer in government work. He re¬ entered the army in 1838, joining the newly- founded corps of topographical engineers, was detailed in 1844 to the Coast Survey office and was engaged in several government surveys, especially in connection with the Mississippi River delta. In 1854 he was detailed to the supervision of the surveys of railroad routes to the Pacific. In 1856 he became a member of the Lighthouse Board. In the Civil War he was chief topographical engineer to the Army of the Potomac. In 1862 he was made brigadier-general and commanded the 5th corps of the Army of the Potomac at the battles of Fredericksburg and Chancellorsville. He com¬ manded a division in the battle of Gettysburg and earned promotion to a major-general¬ ship in the volunteer forces. He then became chief of staff of General Meade. He com¬ manded the 2d corps of the Army of the Potomac in the campaign which closed with Lee's surrender After his services at Sailor's Creek, he was brevetted major-general in the regular army and was subsequently placed in command of the engineer corps with the regu¬ lar rank of brigadier-general. Throughout his career during the Civil War he displayed the greatest courage and wisdom and was one of the most successful commanding officers on the Union side. These

characteristics, combined with great administrative ability and untiring industry, made him equally suc¬ cessful as commander of the engineer corps. He was retired at his own request in 18/9.

He held the honorary degree of LL.D. from Harvard and was a member of the American Philosophical Society, National Academy of Sciences and of numerous other domestic and foreign scientific bodies. He wrote Pre¬ liminary Report Concerning Explorations and Surveys principally in Nevada and Ari¬ zona) (Washington 1872) ; with H. L. Abbott, (Report upon the Physics and Hydraulics of the Mississippi River, etc.) (Washington 1876); (The Virginia Campaigns of 1864 and 1865 > (New York 1882) ; Prom Gettysburg to the Rapidan) (New York 1882) ; historical Sketch of the Corps of Engineers) in Occasional Papers No. 16 (United States Army, Engineer School, Washington 1904). Consult Abbott, H. M., (A. A. Humphreys) (in Science, Vol. Ill, p. 476, New York 1884) ; De Peyster, J. W., (A. A. Humphreys) (in United Service, Vol. X, p. 254, Philadelphia 1884) ; Humphreys, H. H.,

(Major-General A. A. Humphreys' United States Volunteers at Fredericksburg and Farm- ville, VaP (Chicago 1896) ; McClellan, C.,

(General A. A. Humphreys at Malvern Hill and Fredericksburg, VaP (Saint Paul 1888) ; Wilson, J. H., (Major-General A. A. Hum- phreys) (in Military Historical Society of Massachusetts, Papers, Vol. X, p. 69, Boston

1895).

HUMPHREYS, David, American writer and diplomat: b. Derby, Conn., 10 July 1752; d. New Haven, 21 Feb. 1818. He was educated at Yale and graduated in 1771 ; after teaching for a few years he entered the army at the be¬ ginning of the Revolutionary War, serving as aide-de-camp to Generals Parsons and Put¬ nam and in 1780 became a colonel and aide-de-camp to General Washington, who became his sincere friend and patron. In 1784 he went to Europe as secretary of the commission for negotiating treaties of commerce with for¬ eign powers consisting of Jefferson, Franklin and Adams; in 1786 was elected to the legisla¬ ture of Connecticut and was soon associated with the "Hartford Wits,® Hopkins, Trumbull and Barlow, in the composition of the (An- archiadp a satirical poem of political condi¬ tions existing at that time. After Washing¬ ton's first election he acted, more or less unof¬ ficially, as his private secretary. In 1789 he was appointed one of the three "commissioners for treating with

Indians south of the Ohio.® In the following year he was sent to England, Portugal and Spain on a confidential diplomatic mission. He was Minister to Portugal 1791-97, Minister Plenipotentiary to Spain in 1797-1802. During his service in the diplomatic corps of the United States he concluded treaties with Tripoli and Algeria. On his return he imported from Spain 100 merino sheep, the first introduced into the United States, and en¬ gaged in the manufacture of woolens. In 1806 he erected a woolen mill in Derby, one of the

first in this country and destined to become one of the most successful. That part of Derby which he developed industrially became known from then on as Humphreysville. He held command of the Connecticut militia in the War of 1812, and also served in the State legisla¬ ture 1812-14. He held honorary degrees from Brown University and Dartmouth College, and was a Fellow of the Royal Society of London. Throughout his entire life he displayed great

interest in and considerable ability for writ¬ ing. Amongst his works the best known are (A Poem Addressed to the Armies of the Uni¬ ted States of America) (New Haven 1780) ; (The Glory of America) (New Haven 1783) ; (A Poem on the Happiness of America) (Lon¬ don 1786) ; (An Essay on the Life of the Hon. Major-General Israel Putnam) (Hartford

1788) ; (A Poem on Industry) (Philadelphia 1794) ; (The Yankey in England, a Drama in Five Acts) (1815) ; (A Discourse on the Agri¬ culture of the State of Connecticut, etc.) (New Haven 1S18). Various collections of hi»s writ¬ ings were published: (Philadelphia

1789) ; (The Miscellaneous Works of Colonel Humphreys) (New York 1790) ; (The Miscel¬ laneous Works of David Humphreys) (New York 1804). Consult Cutting, N., (Journal of an Embassy to Algiers, 1793, under Col. David Humphreys- (in Dawson's Historical Maga¬ zine, Vol. IV, pp. 262, 296, 359, New York 1860) ; Humphreys, F. W., (in Book Buyer, Vol. XX, p. 369, New York 1900).*

HUMPHREYS, Frank Landon, Amer¬ ican Protestant Episcopal clergyman and au¬ thor: b. Auburn, N. Y., 16 June 1858. He was educated at Columbia and Oxford universities and attained the degrees of A.M., Mus.Doc., S.T.D. and LL.D. He was precentor and min¬ ister in charge of the cathedral of the Incarna¬ tion, Garden City, L. I., 1885-90, canon in the cathedral of Saint John the Divine, New York, 1900-06; chaplain of the Naval Order of Uni¬ ted States Society of 1812 from 1895 ; historian of the Society of Colonial Wars; president of the Society of the Cincinnati in New Jersey; and vice-president of the Morristown Electric Light Company. Among his writings are (The Evolution of Church Music)

(1896); Clerical Education (1896);

Joshua, American ship¬ builder: b. Haverford, Pa., 17 June 1751; d. there, 12 Jan. 1838. He came of Welsh Quak- ei stock, his grandfather, Daniel Humphrevs settling near Philadelphia in 1682. In 1765 he was apprenticed to a Philadelphia shipbuilder and, before reaching his majority, opened a shipyard of his own. He was the first builder of war vessels for the American colonists and is therefore often called the "father of the American navy.® As a result of his activities in behalf of the Revolution he was disowned by the Quakers. He was the first naval con¬ structor of the United States navy. Among the ships constructed by him were the Chesa¬ peake ˆCongress, United States, President, Con¬ stellation and the famous Constitution. Of these the Constitution is now at the Boston navy yard, the Constellation at Newport and

the President, captured in 1814, during the war with England, at London. Consult Hum¬ phreys, H. H., (Who built the First United States Navy?) (in Pennsylvania Magazine of History and Biography, Vol. XL, p. 385, Phila¬ delphia 1916).

HUMPHREYS, Milton Wylie, American university professor and scholar: b. Green¬ brier County, Va. (now W. Va.), 15 Sept. 1844. . He served with distinction as a gun¬ ner in the Confederate army from 1862-65. After the Civil War he resumed his studies and took his master's degree at Washington and Lee University in 1869. In 1874 he received his P'h.D. at the University of Leipzig. He held the professorship of Greek at Vanderbilt University (1875-83) ; of classical languages at the University of Texas (1883-87), and then became professor of Greek at the University of Virginia, where he remained until his re¬ tirement in September 1912. Dr. Humphreys has been the chief American editor of the Revue des Revues (Paris 1878-88) and has ed¬ ited independently the (Clouds) of Aristo¬ phanes (1885) ; (Antigone) of Sophocles

(1891) ; and Demosthenes' (On the Crown (1913). , He has contributed many erudite papers to both American and foreign journals.*

HUMPHREYS, William Jackson, Amer¬ ican physicist : b. Gap Mills, Monroe County, W. Va., 3 Feb. 1862. He received his educa¬ tion at Washington and Lee University and then pursued an engineering course at the Uni¬ versity of Virginia ; later specializing in phys¬ ics and chemistry at Johns Hopkins. From 1889-93, he was professor of physics and mathe¬

matics at the Miller School, Virginia ; from 1893-94 occupied the chair of physics and chemistry at Washington College, Maryland; and was instructor in physics at the University of Virginia (1897-1905). Since the last-named year he has been professor of meteorological physics of the United States Weather Bureau and occupied the same chair at George Wash¬ ington University since 1911. Dr. Humphreys was director of the Research Station at Mount Weather, Va. (1905-08) and was a prominent member of the eclipse expedition to Sumatra under the auspices of the United States Naval Observatory. He has written numerous papers on electric phenomena.

HUMPHRY CLINKER. the last of Smollett's novels, was published in 1771, just before the author's death. It is the story of a Welsh gentleman named Matthew Bramble, a crusty bachelor who, suffering from gout and imaginary dis¬ eases, makes a tour of England and Scotland in order to be amused and to drink the waters at famous wells. He visits Bristol, Bath, Lon¬ don, Harrogate, Scarborough, Edinburgh, Glas¬ gow and the Scottish lakes. Of his party are his sistter Tabitha, a mature spinster, with her maid Winifred Jenkins and her dog Chowder; his nephew Jeremiah Melford, a student fresh from Oxford, and his sentimental niece Lydia Melford. The novel takes its name from a footman picked up on the way between Bath and London, a shabby country lad who proves to have many accomplishments and the innate qualities of a gentleman. He becomes a Methodist preacher and converts the women of the company to the new doctrine of grace VOL. 14 — 32

without works. The novel, written primarily to describe the sights and misadventures of a journey through the British Isles, has a sort of plot. Tabitha and Lydia both get husbands; and Humphry Clinker, made happy by the dis¬ covery that, though his mother was but a bar¬ maid, his father was Matthew Bramble, is married to Winifred Jenkins. All return to Brambleton Hall in time for a Christmas dinner.

Thackeray rightly thought (Humphry Clinker the most laughable novel ever writ¬ ten. The farcical comedy, naturally rising out of the situation, is enhanced by a very clever use of letters which the travelers send to their friends at home, descriptive of the same in¬ cidents from the very different points of view of a hypochondriac, an aged spinster, a young woman in love, a young man of the world and a vivacious servant-maid. To Lydia, for ex¬ ample, the journey is a continuous round of delight ; while nothing except Scotland gives the slightest pleasure to her uncle. All the scenes are based upon the direct observation of the author, who makes Matthew Bramble ' the mouthpiece of his own sardonic humor. In this gentleman more than anywhere else, Smollett embodied his own personality. Lie was generous, irritable, keenly intelligent, but thoroughly disillusioned. Perhaps*

the most amusing character is Lismahago, a soldier of fortune, wiho has been scalped and otherwise mutilated in Indian wars in America. To Ta¬ bitha he is <(the prettiest gentleman® she has ever seen, and she marries him. With others besides Thackeray (Humphry Clinker has been a favorite. Lismahago, after undergoing a sea- change, reappears in Scott's Dalgetty; and from Smollett, Dickens learned the art of caricature. From the one passed to the other the humor to be derived from comic misspellings, unex¬ pected turns of phrases and whimsical exag¬ geration. These characteristics in their ex¬ treme form appear in the letters of Winifred Jenkins, who writes from London to Mary Jones at Brambleton Hall : <(I have seen the*

park, and the paleass of Saint Gimses, and the king's and the queen's magisterial pursing, and the sweet young princes and the hillyfents, and pye-bald ass, and all the rest of the royal family.®

Wilbur L. Cross.

HUMUS, a term applied in the generic sense to the decomposed organic matter which makes up a certain percentage of soil matter. The carbon, nitrogen, oxygen and hydrogen are carried off in the process of decomposition in the form of water, carbon dioxide and ammo¬ nia, etc. The matter which remains is called humus. Chemical investigations of the com¬ pounds of which humus is composed have been unable to determine their exact nature and re¬ lations. However, the amount of humus in soil is an important factor in determining the degree of its fertility. See Soil.

HUN, Henry, American physician : b. Al¬ bany, N. Y., 1854. He received his education at the Sheffield Scientific School at Yale, where he was graduated in 1874. From 1874- 75 he was assistant in physics there, and was graduated from the Harvard Medical School in 1879. He became professor of nervous dis¬ eases at the Albany Medical College (Union

University) and established a wide practice in that locality. Dr. Hun was president of the Association of American Physicians (1910) and president of the American Neurological Association (1913-14). He is author of (Guide for American Medical Students in Eu- rope) (1883); and differential Diagnosis of the Diseases of the Nervous System) (1913).

HUNAN, hoo'nan, China, an inland prov¬ ince, bounded on the north by Hupeh, on the east by Kiangsi, on the south by Kwangsi and Kwangtung and on the west by Kweichau and Szechuan. The country is hilly, with

con¬ siderable elevation in the south, southeast and along the western border. The chief rivers are the Siang, which rises in the Nan-shan and flows north into the Tung-t'ing Lake; the Tsze, which is only navigable for small boats; and the Yuen, which rises in the southeastern part of Kweichau and empties into Tung-t'ing Lake. The irrigation afforded by these streams and their tributaries makes the soil exceedingly fertile. It produces tea, hemp, rice and to¬ bacco in large quantities. A considerable yield of lumber is produced annually. The coal mines cover a large part of the area of the southeastern part. Antimony ore, copper, tin and some precious metals are also mined. The chief cities are Siangtan, on the Siang River (Pop. about 400,000); Yochau, the ((treaty port,® which is an important transportation point, having steamer connection with Han- kau (Pop. 20,000) ; and Changte (Pop. 150,- 000), on the Yuen River. The capital is Chang¬ sha, on the Siang River, about 60 miles above Yochau. It is a fine city noted for its educa¬ tional institutions, its wealth and culture. (Pop. 250,000). The people of Hunan are of an independent, healthy type ; and for many years were entirely hostile to foreign intrusion. This spirit has been greatly minimized, however, in recent years. The most important railway is the Changsha-Chuchau, about 35 miles long, which is a branch of the Canton-Hankau line; but transportation is carried on principally by water. The area of Hunan is 83,330 square miles, and the population is estimated at 20,-

580,000.

HUNDRED, (1) in England and Ireland, a division of a county, or the body of residents and landholders therein. (2) In the United States, a political division similar to that in England and still surviving in Delaware. Hun¬ dreds in England were of varying sizes, but it is supposed to-day that originally they consisted of 100 families. Each hundred was presided over- by a court, known as the Hundred Court. Until very recent times a hundred was held liable in England for damages resulting from various offenses, as rioting. Most of the hun¬ dred courts, have been abolished, their juris¬ diction having been acquired by the County Courts, but a few are in existence to-day.

HUNDRED DAYS (Fr. Cent Jours), the name applied to the period between 20 March 1815 and 28 June 1815 — the time which in¬ tervened between Napoleon's return to Paris from Elba, and the restoration of Louis XVIII. The term became popular through its use by the Comte de Chambrol, prefect of Paris, in his speech of welcome to Louis. For the events of the Hundred Days, see Napoleon; France, History.

HUNDRED YEARS' WAR, the name given to the prolonged struggle between France and England which began in 1337 and ended in 1453.

Among the chief of the immediate causes of the war was Edward Ill's claim to the French throne, but the keen rivalry of the two nations rendered conflict inevitable. It lasted during the reigns of five English kings, Edward III, Richard II, Henry IV, Henry V and Henry VI, and of five French kings, Philip

VI, John II, Charles V, Charles VI and Charles

VII, ending in the expulsion of the English from France. The most important events were: Defeat of French fleet at Sluys (1340) ; defeat of French at Cregy (1346) ; siege and capture of Calais (1347) ; defeat of English at Saint Omer (1352) ; defeat of French at Guines (1352) ; defeat of French and capture of John II at Poitiers (1356) ; Treaty of Bretigny (1360) ; defeat of English at Pontvallain (1370); defeat of English at Chize (1373); truce of Bruges (1375); defeat of French at Agincourt (1415); Treaty of Troyes (1415); defeat of French at Verneuil (1424); siege of Orleans (1428) ; capture of Meaux and Paris (1429); defeat of English at Patay (1429); capture of Joan of Arc at Compiegne (1430); Joan of Arc burned at Rouen (1430); loss by English of Paris (1436), Nemours (1437), Meaux (1439), Mons (1448), Rouen (1449), Cherbourg (1450), Bordeaux (1453); defeat of English at Formigny (1450) and Castillon (1453) ; truce of Tours (1444). Besides the English and French kings mentioned, many of the most famous Frenchmen and Englishmen of the 14th and 15th centuries were active participants in these struggles: Edward, the Black Prince; Bertrand du Guesclin ; Joan of Arc; John, Duke of Bedford; Arthur, Earl of Richmond; Dunois, Talbot, etc. Some of these events form the historical background for Shakespeare's (Henry V, > and (Henry VIP

Bibliography.— Borderie, A. de la,

(Chronicles of Froissart (New York 1903) ; Cosneau, E.,*

Voiox°f^English History, No. Ill, London 1898) ; Oman, C., (Political History of Eng¬ land, 1377-1485) (Vol. IV, London 1906) ; id A History of the Art of War) (London

1898) ; Puiseux, L., (Siege et Prise de Rouen, etcP (Caen 1866) ; id., ^Colonisation Anglaise en Normandie en XVme Siecle) (Caen 1867) ; Stevenson, J., (Letters and Papers Relating to the Wars of the English in France) (London 1861-64) ; id., (Narratives of the Expulsion of the English from Normandy, 1 449-50 > (Lon¬ don 1863) ; Tout, F. F., (

Political History of England, 1 216 — 1377 > (Vol. Ill, London 1905) ; Vaisette, D., (Histoire Generale de Languedoc) (Paris 1885) ; Wrottesley, G., (Crecy and Ca¬ lais) (London 1897).

HUNEEUS, Jorge. See Hunneus, George.

HUNEKER, James Gibbons, American musical critic: b. Philadelphia, 31 Jan. 1860; d. 9 Feb. 1921. In Paris he was a pupil of Barili, Ritter and Dontreleau, and subsequently became an instructor in piano at the National Conservatory of New York. He was musical and dramatic critic of the New York Recorder in 1891-95, and of the Morning Advertiser in 1895—97. Subsequently he was musical, dra¬ matic and art editor of the New York Sun. Among early writings which attracted wide attention are (Mezzotints in Modern Music,) essays (1899); (Chopin, as Man and Musician } (1900) ; an interesting study;

(Melomaniacs) (1902), clever but often extrav¬ agant stories satirizing the musical profession. His later works include (Overtones J (1904) ; ‘ Iconoclasts > (1905);

- *Egoists: A Book of Supermen) (1909);*

(Franz Liszt) (1911) ;

(1915) ; (New Cosmopolis) (1915) ;

HUNG HSIU-CH‘UAN, Chinese rebel; b. Hua, Kungtung, 1812; d. 1864. After a youth spent in desultory studies, including the doctrines of Christianity, he took up the oc¬ cupation of a fortune-teller; and ere long joined the Society of God, organized by Chu Chiu-t’ao, of which he rose to be the head, one of his chief associates being Yang Hsiu-ch‘ing. In 1836 he started, on the borders of Kuangtung and Kuangsi, a sect of professing Christians, and set to work to collect followers, styling himself the Brother of Christ. In July 1850 he headed a rising in the district of Kuei-p’ing, and made his way, plundering and ravaging, as far as Yung-an. He then adopted the term “Heavenly Dynasty of Perfect Peace® (Taiping Kwoh), styling himself the Heavenly King; and working his way northward in 1853, he captured Wu-ch‘ang and all the other cities on the Yang-tsze down to An-ch‘ing. On 11 March 1853 he took Nanking; and with that city as his headquarters he succeeded in capturing over 600 other cities in no less than 16 out of the 18 provinces. There he remained until 1864, when the Imperial forces under Tseng Kuo-fan closed around him and the fall of the city was imminent. On 30 June, seeing that all was lost, he took poison, his body being subsequently found and burned. On 19 July Nanking was taken by assault, and one of the greatest rebel¬ lions the

world has ever seen was at an end. From the fact -that the T'ai-p'ings ceased to shave the head and wear a queue according to the Manchu fashion, they also came to be known as the Long-haired Rebels. Consult Brine,

(The laiping Rebellion) (London 1862); and Lin-Li, c Ti-ping Tien-Kwoh : History of the Taiping Revolution J (2 vols., London 1866).

HUNGARY (in Hungarian, Magyar- orszag, "Land of the Magyars®) ; German, Un- garn ; French, La Hongrie) Italian, Ungheria; Turkish, Magyaristan; Latin, Hungaria: A country in the middle of the southern half of Europe, lying in the basin of the Danube. Until the downfall of the Hapsburg Dynasty late in 1918, the kingdom of Hungary included Croatia-Slavonia, Dalmatia, Transylvania and the Terri¬ tory of Fiume. The Treaty of Neuilly, signed 5 June 1920, and ratified by Hungary 13 Novem¬ ber following, greatly circumscribed the area of Hungary, leaving about one-third of the terri¬ tory of the old kingdom. The treaty mentions in general terms the new boundaries with Aus¬ tria, Czechoslovakia, Jugoslavia and Rumania. The northern boundary of the new Hungary be¬ gins at Pressburg (Pozsony) and runsˆ parallel with the Danube to Esztergom (Gran), thence north and northeast to Mogoslizet, on the Tisza ; thence southwest to the Maros at Nagylak; thence west to the Drave at Beremendo; thence along the Drave to Toka, and thence north to Pressburg. The exact boundaries with Ru¬ mania and Jugoslavia are to be determined by a joint commission under the terms of the Treaty of Neuilly. The area of old Hungary was 109,- 188 square miles with a population (1910) of 18,264,533. The area of the new state is 35,164 square miles with a population (1921) of

7,840,832.

Old Hungary was a large basin surrounded by mountains on every side except the south, and even here the natural boundaries were com¬ pleted at no great distance from the frontier by the highlands of Croatia, Bosnia and Serbia, that meet those of Wallachia and Transylvania at the Iron Gate, a pass formed by the abrupt divisions of the mountains on either side of the Danube, through which that river flows in whirling rapids. This old territory has been sliced off all around the border. Croatia-Sla- vonia and Dalmatia now form part of Jugo¬ slavia; Transylvania has been ceded to Ru¬ mania. A northern strip to the south of the old Carpathian frontier is incorporated in Czechoslovakia, while to the west a narrow strip (Burgenland) has been ceded to Austria.

The mountains of old Hungary belonged to a dual system, the Carpathians being the greater and the Transylvania Alps the lesser range. The new

Hungary has but three small ranges — the Bakonywald and the Bukk in the north and the Mecsek range in the south. From Bud¬ apest (the capital) to Mohacs near the south¬ ern frontier, and from Tokaj to Szeged, stretches one vast alluvial plain, marshy in some places, parched in others, here and there loamy, but on the whole of extraordinary fer¬ tility. The Bakonywald, really a branch of the Alps, is a low range of over 2,000 feet in height.

The Little Hungarian Plain (Kis-Alfold) lies in the northwestern portion of the country from Pressburg to Esztergom (Gran). Its northern part is now in Czechoslovakia. The southern portion, still in Hungary, is exceedingly fertile. Coming through the passes of the Dan¬ ube at Vacz (Waitzen), we reach the Great Hungarian Plain, lying in the eastern half of

the country and reaching from the Czechoslo¬ vakian frontier on the north to that of Jugo¬ slavia on the south. Its greatest length is tra¬ versed by the Theiss (Tisza). The undulating surface is covered with salt marshes, sand-dunes and rows of mounds. During recent years much of the monotony of the territory has been lessened by cultivation ; great pastures and luxuriant meadows have been broken by fine forests and orchards ; broad roads and rail¬ ways intersect the former lonely tracts, and the immense pasture-grounds are filled with cattle, horses, sheep and swine. The villages are large and populous, but are generally long distances apart.

Hydrography.— The Danube (Duna) is the principal waterway of Hungary, and most of the rivers belong to it. Traversing the coun¬ try for nearly 200 miles, the Danube contains several large islands, the principal ones being Csallokoz and Szigetkoz between Pressburg and Komorn; above Budapest lies the island of Szent Endre and below that of Csepel. The Danube is navigable by steamships from Vienna to the Black Sea. Tributary streams of the Danube on the left side are the Morva, Vag, Garam, Ipoly, Tisza and Temes, of which only the Tisza and its tributaries lie mostly within the territory of new Hungary ; on the right the Lajta (or Leitha), Raba, Kapos, Drave and Save. The Mura flows into the Drave. The Tisza flows through the eastern half of the' country. Four silver stripes in the old Hun¬ garian coat-of-arms represented the Danube, the Tisza, the Save and the Drave. The largest lake in Hungary is the Balaton or Plattensee. The Ferto or Neusiedler See now lies within Austrian territory. Its southern shore is the frontier of Hungary. Both lie in that part of both countries which extends along the right bank of the Danube, the Pannonia of the Ro¬ mans. Balaton is 46 miles long from N.E. to S.W., has an area of 230

square miles and stands 420 feet above sea-level. Its banks are flanked by watering-places and the surrounding hills covered with rich vineyards. Ferto Lake has an area of 110 square miles and its surface '—which is not permanent — is 370 feet above sea-level. Although many canals have been projected in Hungary, there are few in actual existence; the Ferencz Canal between the Dan¬ ube and the Tisza, and the canal at the Iron Gates, both old constructions, are now in Jugo¬ slav territory.

Climate. — Though the whole territory of Hungary is situated within 45° and 49° (lati¬ tude) North, i.e., within the temperate zone, yet there are great divergencies between the various parts of the country in respect of mean, minimum _ and maximum temperature. The winter is. in general very cold, especially in the great plain; the summer is hotter than in west-tern Europe in the same latitude. The average temperature ranges between 42° and 58° F. The average monthly temperature in January falls to 40° and 42° F. In January the tem¬ perature is highest in the western half of the country and lowers gradually toward the east. In July, on the other hand, it is highest in the southwest and in the district between the south¬ ern frontier and the centre of the country on both banks of the Tisza. The climate is very variable in the highlands, but snow does not lie

in summer. The rainfall varies considerably in different parts. In the southern district the av¬ erage is about 79 inches ; whereas in the Small Plungarian Lowlands it is only 20 inches and in the Great Hungarian Lowlands about 25 inches. Spring is the cloudy season ; in the summer the delibab, or Fata Morgana, rises about noon on warm, tranquil days and spreads like a shim¬ mering sea over the heated plain. Despite its climatic variability Hungary is one of the healthiest countries in Europe.

Natural Resources. — While most of the soil of Hungary is productive, more than half is arable land. Agriculture is the chief indus¬ try; together with forestry it gives employment to 64.5 per cent of the inhabitants. The recent loss of her northern territory deprived Hungary of most of its ore-producing regions. The whole region of the north mountains of old Hungary between the upper Tisza and the Dan¬ ube is noted for its mineral wealth, which has been worked from very early times. The dis¬ tricts of Szepes (Zips) and Gomor, to the southeast of the Tatra, abound in iron ores. Kassan (Kaschan) to the east was the largest town in northern Hungary and the centre of a district containing metals and the only opal mines in Europe. To the southwest, in the basin of the Gran, lie Schemnitz and Kremnitz, noted for the production of the precious metals, especially silver. These rich mineral territories are now lost to Hungary, being awarded to the new state of Czechoslovakia by the Treaty of Neuilly. Lignite is mined among Tertiary rocks in several of the valleys. Salt abounds in the val¬ ley of the upper Tisza; varying quantities of silver, copper, mercury, zinc,

nickel and lead • are found, in certain districts. Other parts yield coal, petroleum, cobalt, antimony, sulphur, soda, saltpetre, alum, vitriol, arsenic, marble, peat and remarkably fine chalcedony. The alluvial and diluvial deposits in the plains form excellent soil for wheat, rye, barley and maize, of which large quantities are exported. Most of the mountainous districts are covered with forests; the woods occupy 30 per cent of their area, as against from 1 to 5 per cent of the plains. There is a valuable export trade in timber, principally oak, poplar and acacia. Fruit trees are widely cultivated and much fruit is ex¬ ported, while the wine production is of great magnitude. The most celebrated wine is made in the Tokay district, and that which goes by the name of Carlowitz is well known. Vine¬ yards cover more than 30,000 square miles. The great moors and forests provide ample game for the sportsman, the bear, wolf, lynx, wild cat and boar still roam, as well as stags and chamois. The vulture and the eagle soar above. The Danube and the Tisza abound in wild fowl, and the plains are plentifully stocked with hares and partridges. No other European country rivals Hungary in the wild and profuse luxuriance of fauna and flora. Vines, maize, almonds, figs, olives and apples flourish in abundance. Hungary is also endowed with a wealth of medicinal waters. Cold mineral and thermal springs are to be found almost every¬ where. Budapest is rich in medicinal springs, and a whole series of hot springs containing lime and sulphur rise out of the volcanic hills on the right bank of the Danube. Sulphuric hot springs of remarkable healing properties

HUNGARY

■ *ii*

*jt! J?*r|3*

TTTTrrw”r

TtoTLpxi

mmnm

wm

fplP

SJLLM

*wwi’k’ ** ‘9ml*

*S S $ t * s*

.’ v .■ > . j.k Sfe « sis

‘v. – ■ ■ V-^“ . ‘V v- vˆSi.-.1 ‘ W*htfiw!

‘AtS > -rf*}

-

SHSWIiiMKT*^

~s [image]

!**-*■ –

•w-‘- .

Photographs by Divald

1 The Royal Palace, Budapest

2 Houses of Parliament, Budapest

HUNGARY

Photographs by (1) Divald; (2) Erdelvi

1 Royal Opera House, Budapest 2 Academy of Music, Budapest

HUNGARY

for the treatment of rheumatism, gout and diseases of the bones are plentiful. There are several important watering places with hot springs in the country and very many climatic health resorts. The famous medicinal water called Hunyadi Janos is exported to all parts of the world.

Ethnography and Population. — Like old Austria and Russia, old Hungary was a poly¬ glot country, of many races whose unity was merely political. Exact statistics are not ob¬ tainable, since for many years .the census re¬ turns were deliberately falsified for “Magyar State® reasons — -to prove that the Magyars were the predominant race in numbers as well as in political power. Competent observers esti¬ mated that, in Hungary proper — excluding Croatia-Slavonia, the new Jugo-Slav state — there were about 8,500,000 Magyars, or over 1,500,000 less than the official figures showed. Some authorities even placed the number of Magyars as low as seven to eight millions. Of these classified as “Magyars® there were nearly

I, 000,000 professing and a large number of bap¬ tized Jews. Against this total there were more than 2,000,000 Germans, including the numerous colonies on the Austrian border, the Swabians of the south and the Saxons of Transylvania; more than 2,000,000 Slovaks, inhabiting chiefly the northwestern counties ; between three and four million Rumanes, living between the Tisza and the eastern Carpathians ; some 500,000 Ru- thenes or little Russians, who inhabited the northeastern counties ; some 600,000 Serbs and Croats in the central southern counties ; 100,000 Slovenes along the borders of Styria and Carin- thia ; and some 200,000 other non-Magyars, in¬ cluding about 90,000 gypsies, who speak a lan¬ guage of their own. Taking the population of old Hungary proper at 18,000,000, the Magyars are thus in a minority, which becomes more marked when the former (till 1918) crown-lands of Croatia-Slavonia are added, with their popu¬ lation of 2,600,000 Southern Slavs. In 1868 Croatian was recognized by law as the official language of these crown-lands ; it has since proved to be the mother-tongue of over 60 per cent of the inhabitants. The census returns (1910) for Hungary show that there were

II, 820,416 persons speaking the Hungarian lan¬ guage, or 64.7 -per cent. Obviously, a great number would naturally speak the official lan¬ guage of the country without being of Magyar birth. The census also showed' 278,130 foreign residents of whom 235,475 were Austrians ; 8,655, Germans ; 10,612, Italians ; 5,640, from Bosnia and Herzegovina; 1,055, French; 2,389, Russians; 998, Swiss; 1,042, British; 1,674, Turks, and 10,590 of other nationalities. The town population of Hungary was close to 4,000,000. In 1913, the last normal year before the war, there were 751,517 births and 500,875 deaths ; the rate of illegitimacy was 9.2 of the total number of births. Marriages, 195,030. The infant death rate is remarkably high. The Magyars (pron. mad'yar), who are the domi¬ nant race, are located for the most part in the centre of the country. They are high-spirited, proud, warlike and generous; according to travelers they are more sincere than their Serbian and Wallachian (Rumanian) neighbors. Their general deportment is serious; and in many respects they resemble the. Turks, who

followed them out of Asia, and belong to the same great family of mankind. The Magyar costume is remarkable for its picturesque ele¬ gance. Most of the Hungarian nobles are Magyars ; and it is by this section of the popu¬ lation that the constitutional form of govern¬ ment and municipal institutions have been mainly, if not wholly, upheld. The Slovaks are among the people apparently the earliest settled in Hungary .; they inhabit the old northwest, and are similar in race, customs and language to the adjacent Moravians, to whose extensive empire they belonged before the Magyar conquest. The Ruthenians or Rusniaks dwell beneath the north and northeastern Carpath-ians. The Rumanians (Wallachians) occupy a

tolerably wide tract of country . on both sides of the west and north boundaries of Transylvania. They are behind the Slovaks, and, indeed, nearly all the other races of Hungary, in education and civiliza¬ tion. They appear to be the descendants of Italian colonists, placed in Dacia during the Roman dominion there, and have been accord¬ ingly called Daco-Romans — an epithet to which- their classic features, easy manners, language and antique costume seem to give them a claim. They call themselves Romouni ; and speak a dialect of Latin. The Croats people nearly all Slavonia and Croatia, and stretch into seven of the counties of Hungary proper as far as the county of Pesth. The Wens (Vandals) in¬ habit two counties of Hungary proper as far as the county Theresianopel, and a few other •parts of the Banat; the Montenegrins a part of the county Temes ; and the Armenians portions of three of the eastern counties. The Germans appear, in the first instance, to have emigrated into the country during or before the 7th cen¬ tury, subsequently to which many successive im¬ migrations took place, especially under Geysa, king of Hungary, who ascended the throne 1141 a.d. and who established large numbers of Ger¬ man colonists from Francanio, Thuringia and Alsace in several of the northern counties, and in Transylvania. They speedily became dis¬ persed in detached settlements over all Hun¬ gary; and early in the 13th century Pesth was described as a "large and rich German town.® In the 18th century other Teutonic immigrants, with some French refugees, settled in the king¬ dom. They people the greater part of the western frontier, from Pressburg and around the shores of Lake Neusiedler south nearly to the limit of Croatia; elsewhere they are most nu¬ merous in the former Hungarian county of Zips, the mining districts, the Banat (Rumania) and the towns, where they compose the bulk of the trading population. Class animosity is exceed¬ ingly strong among the mixture of races. The Magyar peasant never forgets the dominance of his race and treats the peasants of other nation¬ alities with more or less good-natured insolence. He especially despises Jews and gypsies.

According to the last census Budapest, the capital, a magnificent double city, also called Pest-Ofen or Buda-Pest, and situated on both sides of the Danube, had a population of 1,- 184,616. The only other town with a population of over 100,000 was Szeged, 118,328. Some of the true Hungarian cities spread over the Alfold have enormous areas wjth small popu¬ lations. Debreczen, for instance, is larger than New York city in area and has only 93,000 in-

habitants. Similar conditions obtain in Kecske¬ met, Szabadka, Szolnok,

Hodmezo and other cities. Country life is monotonous and dull; the ablest men are attracted to the cities, and little is left to the villagers beyond <(the call to work at dawn and the church bells in the even¬ ing.)} There was no absolute ownership of land except in the hands of the Crown ; so long as a member of a family lived, the property re¬ mained in his hands, otherwise it devolved upon the king, who could vest it only in a noble family.

Emigration. — As most of the peasantry live in grinding poverty, large numbers- who are able to do so emigrate to other countries, principally to the United States. In 1911 the United States admitted 19,996 Magyars, 18,982 Croats and Slavonians, and 21,415 Slovaks; in 1912 there were 23,599 Magyars, 24,366 Croats and Slavonians and 25,281 Slovaks ; in the year before the war broke out the numbers rose to 30,610 Magyars, 42,499 Croats and Slavonians and 27,234 Slovaks. For the year ending June 1917, after the United States had been three months at war, only 112 immigrants were ad¬ mitted from Hungary.

Agriculture, Live Stock and Trade. — Al¬ most the only industry in Hungary is agricul¬ ture, which provides a living for nearly 65 per cent of the population. Directly or indirectly agriculture supports nearly three-fourths of the inhabitants. Of the total area of arable land no less than 82.09 per cent is farmed by the proprietors, and only 17.91 by tenants. Stock- breeding was the chief industry for centuries, but agriculture has become increasingly im¬ portant during the last 70 years. The great plains are dotted with agricultural villages separated by long solitary tracts. The principal products of Hungarian agriculture are wheat, rye, barley, oats, maize, potatoes, clover and lucerne, rape-seed, peas, lentils, hemp, flax, to¬ bacco, sugar-beet, vegetables and rice. Nearly all the corn is consumed in Hungary and Aus¬ tria ; only the finest flour is exported. The great pride of Hungarian agriculture, however, is Hungarian wine, for which one of the best foreign markets is, strange to say, Bordeaux. The industry is so disfigured by a wide system of adulteration that a bottle of genuine Hun¬ garian wine, it is admitted by natives, rarely leaves the country. A kind of brandy called Slivovitz is prepared from plums. Horses, cat¬ tle, sheep, hogs, game (in the north hears), poultry, fish (among which the sturgeon and salmon are the principal), bees and silkworms are among the productions of the animal king¬ dom. Long hours and small pay mark the lives of agricultural laborers, causing much discon¬ tent and friction. Government intervention and numerous acts of Parliament have vainly en¬ deavored to check the flow of emigration by improving the lot of the workers.*

The principal, artisans are tanners, furriers, manufacturers of tschism (cordovan boots), lace-makers, harness-makers, makers of wooden wares,

of straw-plait works, etc. There are few extensive manufactures in Hungary. There are numerous iron and steel works, tinplate and wire works in the ceded districts. There remain to. Hungary potteries, glass works, sugar-refin¬ eries and beet-sugar works, soap-works, tallow, stearine and wax-candle works ; soda, saltpetre

and potash works and brandy distilleries. Trade is almost exclusively in the hands of the Ger¬ mans, Greeks and Jews. Internal commerce is promoted by the railways and rivers, the fairs (which amount to 2,000), and the complete absence of tolls. Old LIungary had a total length of about 13,400 miles of railways; 5,1 15 miles being run by the state, and the remainder by private companies. The total length of navi¬ gable rivers and canals was 3,736 miles, of which 2,177 miles were navigable for steamers. The Danube was and is the most important highway of traffic. Before the war Hungary possessed about 540 merchant ships, steam and sail.

Government. — The Hungarian constitution and the system of central government obtaining in Hungary under the old regime which ended in 1918 are dealt with in the article Austria-¬ Hungary. Of that famous constitution it may be said that the practical application of its princi¬ ples was not in strict accordance with its writ¬ ten provisions. Although, on paper, Magyars and non-Magyars were on terms of equality be¬ fore the law and nominally fully represented in the legislature, the fact was that the repre¬ sentatives rather represented the Magyar upper classes than the subject nationalities or the masses of the people. Only a quarter of the men qualified to vote were permitted to exercise that power, being disfranchised by various question¬ able means besides property qualifications. As the Germans in Austria, so the Magyars in Hungary were in the minority, hence the ma¬ nipulation of the census returns referred to un¬ der Population. The Dual Settlement after the Austrian defeat at Sadowa had the effect of making the German minority supreme in Aus¬ tria and the Magyar minority supreme in Hun¬ gary, a circumstance, by the way, which ren¬ dered both minorities dependent upon Prus¬ sian support as against the Slav majorities. The remarkable disparity between population and the numbers of the 413 deputies for Hun¬ gary, alone in the last election preceding the war is shown by the returns of 1910: Magyars, Independents and other parties, 404; Socialists, 1 ; Rumanians, 5 ; Slovaks, 3 ; Serbs, none. About 400 of these were Magyars ; the remain¬ ing 13 represented nearly 10,000,000 non-Mag¬ yars, out of a total population of, roughly, 18,000,000. Elections were invariably accom¬ panied by bloodshed, violence and terrorism. For the 1910 elections no fewer than 202 bat¬ talions of infantry were mobilized, besides 126 squadrons of cavalry, while a large number of troops were brought in from Austria. The price of "maintaining order® was estimated" at nearly $4,000,000 (DanzePs A rmeezeitung, 6 June 1910). Troops and

gendarmes prevented many thousands of qualified voters from enter¬ ing polling booths in the country districts. Dur¬ ing one election 32 men were killed and 70 wounded. An electoral reform bill in 1918 en¬ franchised every mgje Hungarian over 24 pos¬ sessing anyˆ one of the following qualifications : Two years' service in the war; non-commis¬ sioned rank; passed primary education; pay¬ ment of annual tax ($2) ; 'having a licensed profession or trade; permanently employed; being a former elector. The ability to read and write is attached to each qualification. On 1 Nov. 1918 Count Karolyi announced that fol-

lowing a revolution in Budapest a Hungarian National Council had taken over the govern¬ ment. The king-emperor formally abdicated on 13 Nov. 1918. Thus ended nearly 400 years of revolt against Hapsburg rule.

Under Karolyi, the two houses of the legis¬ lature were abolished and a Provisional National Assembly took their place. A Soviet govern¬ ment succeeded that of Count Karolyi, 22 March 1919, but an opposition government was set up at Arad and Szeged, which with the aid of a Ru¬ manian army ousted the Soviet government and on 7 Aug. 1919 a national government was once more established at Budapest. Elections were held on a basis of universal suffrage early in 1920 and resulted in the victory of a bloc com¬ posed of parties of the Right. The new legis¬ lature elected a Regent with the official title <(Protector of the Magyar Republic.1® On 23 March 1920 a government order stated that Hungary was a monarchy, that the ministry is to be styled officially the ((Royal Hungarian Min¬ istry® and that Hungary is to be described as a Monarchy in all official documents.

In local government, communes are classed according as they are large or small. Every male inhabitant over 20 years of age, who for two years has paid the state tax, possesses the communal electoral right. The representative body is composed half of members who pay the highest taxes, and half of members elected for terms of six years. The committee is made up of members appointed, in towns for six years, in rural communes for three years, and officials with tenure for life. Counties and cities have councils constituted similarly to the representa¬ tive bodies of the communes.

Law and Justice. — The Minister of Justice stands at the head of judicial affairs and exer¬ cises only administrative control. His func¬ tions, prescribed by law, relate to the supervi¬ sion of judges, legal redress in

international law, extradition, the execution of punishments, pardons, dispensation in divorce cases, and es¬ pecially the preparation of bills. The judges were appointed by the king; they were perfectly independent and irremovable. As courts of first instance there were — in Hungary proper — 385 district courts with single judges and 67 county courts with collegiate judgeships. Alto¬ gether there were over 2,000 judges of first in¬ stance. As superior courts there were the 11 <(Royal Tables® (Courts of Appeal) and the Curia (High Court of Justice) in Budapest, the first composed of 200 judges, the latter oi 92. Civil procedure is regulated by the Consolida¬ tion Acts of 1868 and 1881 ; summary procedure was codified in 1893. The Criminal Code of 1896 closely resembles the English model.

Religion. — In old Hungary nationality and religious profession were coterminous. The Magyars were and are mostly Calvinists; the Slovaks and Germans, Lutherans; the Ruman¬ ians of the old kingdom were either Uniats or Greek Orthodox, while the Serbs were mostly Greek Orthodox. Several nationalities fur¬ nished large numbers to the Roman Catholic Church, which had four archbishops with sees at Eger (Erlan), Estergom (Gran), Kalocsa, and Agram (Zagreb). The last-named is, of course, now lost to Hungary. The archbishop of Estergom is the primate, and under the old regime bore the title of prince and enjoyed

the special privilege of crowning the sovereigns of Hungary. The two great Protestant bodies 7— Calvinists and Lutherans — are divided each into five eccesiastical districts, the head of each being termed superintendent.

The creeds of the Hungarian people in order of their numbers are : Roman Catholic, Greek Catholic, Old Catholic, Greek Oriental or Orthodox, Evangelical, Unitarian, Evangelical Brotherhood, Baptist, Gregorian — Armenian, Jewish and Mohammedan. All are recog¬ nized and each sect independently admin¬ isters its own affairs; on the whole this princi¬ ple is loyally respected. The education act of 1907 somewhat restricted that autonomy in re¬ gard to the Church schools. The latest statis¬ tics, whicly include the whole of the former kingdom, give the religions as follows :

Roman Catholics . JO, 888 ,138

Greek Catholics . 2,025,508

Evangelical . 3,961,472

Greek Orthodox . 2,987,163

Unitarians . 74,296

Jews . 932,458

Others . 17,452

Total . 20,886,487

It is somewhat remarkable that the true Magyars, in spite of having become Christians, still preserve to this day the original pagan ex¬ pression, The God of the Hungarians.

Education. — Since 1868 all children between the ages of 6 and 12 are supposed to attend day schools. Children that are educated privately or at home must pass a public examination at the end of the year. Three years (12 to 15) must be spent in continuation schools. In 1910 there were over 9,000,000 who could neither read nor write — 'nearly half the population of the former kingdom. Continuation schools for technical instruction in agriculture gradually took the place of general continuation courses all over the country and give both theoretical and practical instruction, the latter on model farms and gardens attached to the schools, which are separately for boys and girls. Since 1907 Mag¬ yar is the language used in all continuation schools. About 1,000,000 children attend ele¬ mentary day schools, to the upkeep of which the local authorities defray 71 per cent of the cost; the state contributes the rest. Higher educa¬ tion is provided by secondary schools wherein pupils are prepared for college and university. There are two kinds of secondary schools — the gymnasia or classical schools, which attach most importance to the humanities, to the classical languages, history and literature; and the rcal- schulen, which, by putting modern languages, mathematics and natural science in the fore¬ ground, prepare their pupils for the higher grades of technical science. The latest figures for old Hungary show 192 gymnasia with 66,863 pupils and 43 rcalschulcn with 14,938 pupils. The Magyar element prediminates. In a few of these the German, Italian, Serbian or Rumanian languages are used. In Hungary proper there are some 30 institutions of university status; 2 universities of sciences, 1 of technical sciences, 10 law academies and 47 theological col¬ leges. The state maintains 4 universities: Budapest, Kolozsvar, Pressburg and Debrec- zen. All but one comprise the four faculties

of medicine, law, philosophy and theology. Women are admitted to the universities as ordi¬ nary students. The theological colleges are thus distributed : Roman Catholic, 25 ; Greek Cath¬ olic, 4; Greek Oriental, 3; Protestant, 7; Jew¬ ish, 1. A large number of Hungarian students go agroad to study at foreign universities. Be¬ fore the war Hungary possessed

over 1,000 in¬ stitutions for instruction in agriculture, com¬ merce, industries, technology, mining, art, music and military training. The Hungarian National Museum (founded 1802) in Budapest contains a library of over 1,500,000 volumes and a rich collection of antiquities, natural his¬ tory and ethnographical exhibits, and the old¬ est monuments of Hungarian life, language, literature and history. Among other museums, that of Fine Arts contains numerous old mas¬ ters and the works of modern painters.

Language. — Hungarian (properly Magyar) is a branch of the Ural-Altaic family of lan¬ guages to which belong the Samoyede, Mon¬ golian, Tungusian, Turco-Tartaric and Finno- Ugrian languages. It is classed in the Ugric branch of the northern division of the Turanian group and is most closely allied to the Ostiak, Vogulic and Mordvinic, and is also akin to the Turkish. Together with Finnish and Turkish it is one of the three non-Aryan languages that have taken root in Europe. The language of the Huns (from whom the name of Hungary is derived) is not known; neither do we know when they first appeared in Europe. They were conquered by the invading Magyars toward the end of the 9th century. Magyar differs from all the cultivated languages of Europe in inter¬ nal structure and external form and is difficult to learn. Its origin has been the subject of much speculation; philologists have sought its cradle in the Hebrew, Turkish and Slavonic tongues. An Hungarian monk in the 13th cen¬ tury found a tribe called the Baskirs on the banks of the Kama in eastern Russia who spoke Magyar. An Hungarian astronomer visited the extreme northern coast of Norway in 1769 to observe the transit of Venus when he found that he was able to understand the Laplanders, which led him to write a book en¬ titled (Demonstratio Idioma Ungarorum et Lapponum idem esse, a work that proved the origin of Magyar. But Leibnitz, who died half-a-century before, had already propounded a theory that the Finns, Lapps and Hungarians were related.*

At the dawn of the 19th century Latin was the language of the scholar and the native tongue was held in disfavor. At that time the language of the people was inadequate to ex¬ press the new ideas. A national movement began to stimulate literature, invent new words, and to substitute Magyar for Latin as the literary and political language of the country. By 1830 some 7,000 new words had been coined and added to the language ; others have been added since, while not a few were borrowed from German and Slavonic languages.

Magyar is written in Latin letters (no W) ; by a system of accents, umlauts and combina¬ tions, 15 vowels and 26 consonantal characters represent every sound in the language with in¬ variable fidelity. As in the other Turanian languages the root is never obscured in words, whatever changes

they undergo. Determining or modifying syllables are placed at the end.

and have a double form, always taking a dif¬ ferent vowel when attached to a sharp-vowel root from what they have when attached to a flat-vowel root — a general characteristic of the Turanian languages. These suffixes represent the case-endings of nouns and the conjugations of verbs in other languages, and are very numerous. Hungarian has no diphthongs nor gutturals. At the beginning of a syllable the Hungarian never allows more than one conso¬ nant; in foreign words which begin with two consonants, the consonants are made to go with different syllables by putting a vowel before them (for example, of schola they make iskola), or a vowel is put between (as from krai they make kirdly) . It also has no distinction of sex whatever. No vowel is mute. Family names are considered as adjectives, from which they mostly originated, and hence are put before the baptismal name; for instance, Batori Gabor (Gabriel Batori), as if it were the Batorish Gabor, the Gabor of the Batori family. The perfect proportion between vowels and conso¬ nants, the accurate shadowing and full articu¬ lation which every syllable requires, and the fixed succession of vowels, give to the language a character of masculine harmony. The tonic accent or stress is always on the first syllable.

The preference given to Latin over the na¬ tional language, not only in the Church, but in judical proceedings, legal documents and parliamentary debates prevailed until 1844. The use of a dead language in common life, as well as in all scientific subjects, could neither be advantageous to the general improvement of the people nor to the national literature. Though with the introduction of Christianity into Hungary the Latin language acquired the ascendency in the Church, in schools, in public affairs, parliament and courts, yet Magyar was used in commerce, in the streets and in camp, and even the resolutions of the diet were first drawn up in it and then translated into Latin. After a struggle which had continued almost without interruption since 1790, the Magyar lan¬ guage was raised (1844) to the position to which it was entitled as that of a dominant nation.

Literature. — It is said that nationality is to the Hungarians a question of more absorbing interest than religion, and the truth of this assertion is reflected in almost every phase of their literature. Already their earliest poetical myths reveal the influence of national politics, Though the Magyars under Arpad conquered the Huns and their territory, they nevertheless adopted the Hun king, Attila, as their own ancestor and a national hero. Their own leg¬ ends and traditions are interwoven with those of the Huns and form part of (The Legend of the Occupation of the Fatherland, the second great cycle of primitive Hungarian poetry. Af¬ ter its conversion to Christianity (about the year 1000) under king Saint Stephen, churches, monasteries and schools sprang up in Hungary, but the*

earliest written memorial of the lan¬ guage dates from the beginning of the 13th century, in the shape of a short funeral address. Of the two mighty forces that dominated the literature of Christendom during the Middle Ages — religion and the spirit of chivalry — only one, religion, is represented in the relics of Hungarian literature that have survived. Traditional sagas and prose legends inscribed

on parchment still exist to bear witness to a high standard of literary culture at Hungarian courts and among the nobles and ecclesiastics during the 14th and 15th centuries. Earlier manuscript books exist containing legends of Saint Francis of Assissi ; other documents re¬ tail legends clustering around the national saints, the Arpad kings, and especially Stephen.

In 1465 Janus Pannonius wrote an Hun¬ garian grammar, which is lost. The 16th cen¬ tury was favorable to Hungarian literature, through the religious disputes in the country, the sacred, martial and popular songs, as well as by the histories written and published for the people, and the multiplied translations of the Bible. Among writers of ballads or metrical tales belonging to the 16th century may be mentioned Tinodi, Kakonyi, Tsanadi, Valkai, Tserenyi, Szegedi, Illesfalvi, Fazekas, Balassa, etc. A higher aim was manifested by the epic poems of Count Niklas Zrinyi (1652), Ladislaus Lissthi (1653), Christopher Pasko (1663), Count Stephen Kohary (1699), and in particular the numerous and excellent productions of Stephen von Gyongyosi (1664-1734), as well as the lyric poems of Rimai, Balassa, Benitzky, etc. In 1653 an encyclopaedia of all the sciences, and in 1656 a work on logic, were drawn up in the Hungarian language by John Tsere (Apatzai). A large number of grammars and dictionaries were printed from the 16th century to the 18th. But the hopes of the further development of Hungarian literature were not realized; a Latin period again succeeded, from 1700 to 1780, dur¬ ing which time numerous and finished works were composed in Latin by Hungarian writers. In 1721 a Latin newspaper was established, and the state calendar, which commenced in 1726, was regularly published in Latin. In 1781 the first Hungarian . newspaper was printed in Pressburg.

After Joseph II died (1790) several laws were passed in favor of the Hungarian lan¬ guage. Several periodicals were established, Hungarian theatres erected in Buda and Pesth, many works were written both in poetry and prose. The modern period of Hungarian liter¬ ature may be said to date from the time of Joseph II. The epic poem of Arpad was writ¬

ten by Andrew Horvath, and published at Pesth in 1830. The brothers Alexander and Charles Kisfaludy acquired a great and deserved reputa¬ tion as poets and dramatists, and did much toward developing the national language and literature. The latter (who died in 1830) may be looked upon as the founder of the mod¬ ern drama in Hungary. The most celebrated works of the former are his lyrical masterpiece, (Himfy SzerelmeP (Himfy's Love, 1802), his (Regek a Magyar eloidoboP (Tales of the Early Hungarian Times), and his historical tragedies, which were partly modeled on those of Schiller. The development of the Hungarian literature owes much to the influence of the periodical press, which spread abroad a taste for literature at the same time as it intensified the sentiment of nationality among the people. In this department the name of Kossuth de¬ serves honorable mention. Previous to the troubles of 1848-49, which, checked for a time the national growth of the literature, almost every species of composition was successfully practised. Works on politics and narratives of travel were written by Eotvos, Szechenyi,

Szalay, Szemere, etc. ; on history by Stephen and Michael Horvath, Szalay and Jaszay; on philology by Fogarassy and Bloch ; works on the exact sciences, however, were confined to trans¬ lations from the German, French and English. Novels and romances were written by Baron Josika, Eotvos, Kemeny, Kuthy, Nagy, Palffy, etc., which, though of no great originality, showed considerable artistic skill, and helped to diffuse a more correct style. The dramatic pieces of Eotvos, Obernyik, Vorosmarty, and the prolific Szigligeti — who for a long time had almost the exclusive possession of the national stage — have greater value and originality. It is in poetry, strictly so called, however, that modern Hungarian literature shines. Many of the poems (songs, ballads, etc.) of Czuczor, Vorosmarty, ˆ Bajza, Garay, Bachot, Szasz, Erdelyi, Kereny and others, are among the finest things that modern literature has pro¬ duced. In this field the palm must be awarded to Alexander Petofi, who completely freed Hun¬ garian poetry from its dependence on foreign models and subjects, and inspired it with a life drawn fresh from nature and national feeling; and who, in artistic skill and masterly handling of his mother tongue, ranks as a model. Tom- pa, Hiador, Lisznyai and others, have copied him with more or less success. The collection of ancient Hungarian national poetry, compiled and edited by John Erdelyi, at the instance of the Kisfaludy Society (three vols., Pesth 1845—47) , contributed greatly toward bringing back the modern poetry to nature and origin¬ ality, and to impress upon it the stamp of nationality. The ill success of the revolution¬ ary struggle seemed for a time to have dealt a heavy blow to the progress of Hungarian literature, the most gifted writers having either fallen in battle (as Petofi), or been imprisoned or banished. Time, however, opened the pris¬ ons and brought back the exiles ; to the writers already mentioned others were added, and

an active literary life again began. The greatest recent Hungarian poet is John Arany, who surpasses even Petofi in artistic feeling, and whose national epic, (Toldi, } is looked upon as a masterpiece. Baron Josika holds the first place among the novelists ; Jokai, Kuthy, Berczy, Palffy, Miksrath and Dobzsa are also favorite fiction writers. Narratives of travel have been written by Count Andrassy, Ladislaus Magyar, Vambery, etc. ; on politics by Esen gery, Szalay, Pakh and Eotvos. National his¬ tory has attracted much attention ; and besides the works of Szalay and Horvath, we should mention Teleki's (Age of HunyadP Jaszay's

Music. — From the earliest stages of his known existence the Magyar appears to have had a special love for music and dancing, which found their place in every ceremonial, whether it was religion, war, rejoicings, sacrifices or funerals. Accompanying themselves on the lute, their minstrels sang the heroic deeds of

fallen warriors. The Hun minstrels before them both sang and fought in battle. Chroni¬ clers of the 10th century mention Hungarian hymns, dirges and martial songs. From this period, too, dates the well-known slow-moving national dance, called the (

Dance and the celebrated Csardds (char'dash) or Tavern Dance. Three prominent dance com¬ posers of the 19th century are John Lavota, Anton Csermak and Mark Rozsavolgyi. An early opera composer was Sigismund Cousser (d. 1730) ; his works include

A new era opened for music in Hungary at the dawn of the 19th century when the old clavichord developed into the forerunner of the modern pianoforte. Hungarian noblemen in¬ stalled these instruments in their homes, with the result that many famous pianists settled in Hungary to engage in teaching. As former pupils of Haydn, Beethoven and Mozart, these tutors introduced the works of their great mas¬ ters to the Hungarian aristocrats, among whom, it may be presumed, were some excellent play¬ ers, for Beethoven dedicated several of his sonatas to Hungarian ladies. With the spread of music several Hungarian textbooks on piano instruction were issued, and a Hungarian (Stephen Gadi) wrote the first School for the Piano) (Buda 1809), followed by others. Nepomuk Hummel (1778-1837) left over 100 compositions. The greatest genius of Hun¬ garian music was Franz Liszt (q.v.), the great¬ est pianist of the century, the creator of the Rhapsody and the Symphonic Poem. His contemporary, Franz Erkel (1810-60) was the creator of the Hungarian Opera, who reintro¬ duced

into his works long-forgotten native in¬ struments with striking originality. Charles Goldmark (b. 1832) stands high as a composer of symphonies and operas: Queen of Sheba (1873), Sakuntala (1860) and other dramatic works.

In more recent years the Hungarian school of music and musicians has spread throughout the artistic world. Not only in composition of grand and light opera, ballet and chamber music and in prominent vocalists, but also in the domain of instrumentalists — on the violin, such masters as Joachim, and the large num¬ ber of piano virtuosi who attract large audiences in American and European cities, has the Hun¬ garian nation attained a position second to none. In 1819 and 1833 the first Hungarian conservatoires were founded at Kolozsvar and Arad; another in Budapest, followed by more in Debreczen, Kassa, Szeged and Szabadka. The National Hungarian Academy of Music (1875) had Liszt and Erkel as it first directors. Musical and choral societies are spread through¬ out the country, and historical concerts of the highest merit are periodically given in the academy of Science.

History. — The nations which occupied parts of Hungary before its conquest by the Magyars were the Dacians, Bastarnae, Illyrians, Pan- nonians, Samatians, Vandals, Bulgarians, Jazyges, Alans, Huns, Marcomanni, Longo- bards, etc. The Romans held the southwest part of the country under the name of Pan- nonia, while the southeast belonged to their province of Dacia. Various Slavic tribes, to¬ gether with Wallachians, Bulgarians and Ger¬ mans, were the chief occupants at the time of the Magyar invasion. The Magyars, called

Hungan by the Latin writers, a warlike people ot I uraman race, had made various migra¬ tions and long dvvelt in the vicinity of the Caucasian Mountains, and afterward in the region between the Don and the Dniester, be¬ fore they approached and crossed the Car¬ pathians (about 887) under the lead of Almos, one of their seven chiefs (vezer), and elected head (fejedelem) or duke. Arpad, the son of Almos, conquered the whole of Hungary and 1 ransylvania, organized the government, and also made various expeditions beyond the limits of these countries. These incursions were extended under his son Zoltan (907-46) and grandson Taksony (946-72), as far as the Ger¬ man Ocean, the south of France and Italy, and the Black Sea. These formidable enemies were first defeated by Henry I the German em¬ peror, at Merseburg in 933 ; they then invaded Franconia in 937, and Saxony in 938, were de¬ feated at Stederburg, and also on the

river Ohre. _ Their last incursion into Bavaria (954 and 955) terminated with their complete over¬ throw on the Lech, where Otho I, king of the Germans, conquered them. They gradually learned from the Slavonians and Germans whom they conquered, and from the prisoners whom they had taken in their incursions, the arts of peace, agriculture and manufactures. The hospitality of Geysa (972-97), and the religious zeal of Sarolta his wife, did much to attract strangers from different countries and of all classes into Hungary. The Hungarians violently opposed the introduction of Chris¬ tianity and Geysa was obliged to leave the ex¬ tension of it to his son Stephen (997-1038), who finally prevailed by the assistance of Latin monks and German knights. King Stephen granted a constitution, the principal features of which were never lost, but the unsettled state of the succession to the crown, and the conse¬ quent interference of neighboring princes and of the Roman court in the domestic concerns of Hungary, long retarded the prosperity of the country. The religious zeal and bravery of Saint Ladislaus (1077-95), and the energy and prudence of Coloman (1095-1114), shine amid the darkness of this period.

The introduction of German colonists from Flanders and Alsace into Zips and Transylvania by Geysa II (1141-61) had an important influ¬ ence on those districts. In 1186 Hungary be¬ came connected with France by the second mar¬ riage of Bela with Margaret, sister to Henry, king of France, and widow of Henry, king of England, who introduced French elegance at the Hungarian court. The reforms of Bela IV (1235-70) were interrupted by the invasions of the Mongols (1241), and the kingdom was in a most deplorable condition. After one year of pillage they left the land a desert. With Andrew III (1290-1301) the male line of the Arpad dynasty became extinct, and the royal dignity became purely elective. Charles Robert of Anjou, by his mother a descendant of the extinct dynasty, was the first elected (1309). The reign of his descendant Sigismund (1 387— 1437) ,s interesting from the invasion by the Turks (1391) and the war with the Hussites. The Turks routed the army of Sigismund, reinforced by the flower of Western chivalry, in 1396. From their first appearance the Turks constantly disturbed the tranquillity of Hun¬

gary which served as a bulwark to the rest of Europe. The death of Ladislaus I in the unfortunate battle of Varna (1444) is to be regretted, as the plan of the hero John Huniades, for driving the Turks from Europe, failed through the coldness of the Christian couits and the intrigues of his enemies.

Matthias Coryinus (1458-90), son of Huni¬ ades, held the. reins of government with a firm hand, and gained the love and confidence of the nation, notwithstanding the severe measures which he was often compelled

to adopt.

During the reigns of Ladislaus II (1490- 1516) and Louis II (1516—26) the ambition and rapacity of the optimates, headed by Stephen Zapolya, and afterward by his son John ex¬ cited domestic troubles and caused an insur¬ rection of the peasants, which was only sup¬ pressed by the severest measures (1514), while they destroyed the foreign influence of the king¬ dom. The battle of Mohacs (1526), in which Louis II lost his life, and which for 160 years made a great part of Hungary a Turkish province, was the natural consequence of this state , of things. The rest of the country was in dispute between the rivals Ferdinand of Austria and John Zapolya. The contest was de¬ cided by the Protestants, who, fearing the persecution of Zapolya, declared for Ferdinand, who thus became the first Hapsburg king of Hungary, a connection that endured through the reigns of 16 monarchs till 1918. Zapolya was compelled to rest satisfied with the posses¬ sion of Transylvania and some counties of Upper Hungary; but this division of the king¬ dom caused continual disputes with the de¬ scendants of Zapolya, instigated by the Turks and the French, and gave rise to civil com¬ motions, which were quieted by the treaties of Vienna with Stephen Botskay (1606), of Nikelsburg with Gabriel Bethlen (1622), and of Lintz with George Rakoczy (1645). Deliver¬ ance from the Turk came when, in 1683, Kara Mustapha besieged Vienna and John Sobieski, king of Poland, and Duke Charles of Lorraine relieved the city and routed the Turkish army. After the expulsion of the Turks Leopold I finally succeeded so far that he took Buda (1686), and by the Peace of Carlowitz (1699) recovered the rest of Hungary (except the Banat) and Transylvania. Joseph I became king in 1705. With England, Holland and Savoy he fought against Louis XIV under the Duke of Marlborough and Prince Eugene. Joseph inherited from his father the "long struggle of the Magyars against Austrian en¬ croachment on their liberties. Persecution of the Protestants led to revolt in Hungary, which Joseph suppressed. He granted a general amnesty, observed the constitution and made peace with his people in the year of his death (1711), ending 200 years of continuous war.

The Congress of Passarowitz (1718) re¬ stored the Banat to Hungary, and the Peace of Belgrade (1739) terminated hostilities with the Porte for a long time. Charles VI (1711-40) by the Pragmatic Sanction secured the inherit¬ ance of the Hungarian crown to the female de¬ scendants of the house of Hapsburg, and im¬ proved the administration of the kingdom by giving the royal chancery and the vice-regal office an organization better suited to the age. He also formed a standing army for Hungary,

and established the military contribution for its support. Joseph II (1780-90), one of the greatest sovereigns of his age, was influenced by the best intentions in the changes which he undertook in the Hungarian constitution; but his zeal made him forget the necessity of pro¬ ceeding gradually in such reforms, and the na¬ tion, far from entering into his views, opposed them.

The subsequent history of Hungary — the adoption of the Magyar language in its Diet; the resistance against the encroachments of Austria ; the heroic struggles for independence, and the noble work of Batthyani, Deak, Kossuth and Klauzal along these lines; the disastrous war of 1848 and the reduction of Hungary to the position of an Austrian crown- land ; its rehabilitation to independence in 1867 and the constitution of the former dual Austro- Hungarian Empire, are described under Aus¬ tria-Hungary.

HUNGARY AND THE WAR. It is too

early yet to weigh — with even approximate ac¬ curacy — the influence and responsibility of Hungary in provoking the war and abetting the designs of Austria and Germany. Two cir¬ cumstances, however, seem to be clearly re¬ vealed : Whereas Austria was drawn or pushed into the war without the consent of Parliament or people, in Hungary, on the other hand, the war was popularly declared — by Magyars — to be a Hungarian war, and the fact that it had spread to such gigantic proportions was re¬ garded with rather a feeling of national pride. Vienna, during the first months of the conflict, was apathetic and anxious; Budapest was en¬ thusiastic and confidently jubilant. The long tradition of Austria's ((facility for defeat" weighed heavily upon her people ; neither doubt nor misgiving clouded the Hungarian vision. The one-sided Dual Compromise of 1867 had invested Hungary — or rather the Magyar gen¬ try — with two-thirds of the power in the mon¬ archy and left Austria with the burden of de¬ fraying two-thirds of the costs. Though the foreign relations of the empire were exclusively in the hands of the Austro-Hungarian Minister in the Reichsrath in Vienna, his policy not in¬ frequently was dictated from Budapest or Ber¬ lin. (See Aehrenthal ; Berchtold). Nearly every important official in the Foreign Office was a Hungarian. Vienna was nominally the capi¬ tal of the empire, but Hungary was practically an independent country in which the ruling classes, as we have already pointed out, stood in the minority. Yet it would have been no very difficult task for the Magyars, by genuine constitutional government and a policy of con¬ ciliation, to build up a powerful and united state. The Slav races under their control would have accepted Magyar leadership the more willingly as they themselves had formerly been oppressed by Austria as severely as the Magyars had been. The few prominent Hun¬ garian statesmen, such as Deak and Eotvos, who had endeavored in the past to secure po¬ litical*

justice for the non-Magyars were over¬ ruled. Since 1875 the "Magyar State" idea de¬ veloped into a ruthless policy of "Magyariza- tion," in pursuance of which coercive measures were employed to crush out the national senti¬ ments and languages of the greater part of the population. Newspapers and banks fell into the

hands of Magyarized Jews who became the most ardent promoters of the cause. All non- Hungarian place-names and, by persuasion, the surnames of prominent persons underwent the process. Thus, Pressburg became Pozsony ; Vienna, Bees (batch); Klausenburg, Kolozs; Hermannstadt, Szeben. The real name of Mun- kaesy the painter was Lieb; that of Vamberv, Bamberger; Toldi the author was originally Schebel ; Petofi the poet was a Slav, Petro- vitch ; Komlossy was Kleinkind, and the eth¬ nologist Hunfalvy was Hundsdorfer, etc. Let¬ ters from Austria bearing German place-names were returned "not known," though every child in the town knew the two names. Austrian postal authorities retaliated by returning letters addressed "Bees" (Vienna) with the inscription, <(place not known." The inevitable conse¬ quences of the Magyarization policy was that the Croats, Serbs and Dalmatians looked toward Serbia for deliverance; Rumanes turned their hopes to Rumania, Ruthenes to Russia and the Slovaks to their kinsmen of Bohemia and Mo¬ ravia. The races of Austria were free to use their national languages, and since 1907 enjoyed universal suffrage. Under Hungarian domin¬ ion the Magyar language alone was recognized, while the constitutional suffrage became a dead letter. (See Government). Koloman Tisza (1830-1902) inaugurated and pursued the Mag¬ yarization policy during his 15 years of the pre¬ miership; it was continued by his son Stephen (Count) Tisza, who became the most dominant personality in the empire. He was murdered a few days before the end of the war, in the progress of which he, and not the Austrian Foreign Minister, attended the German war councils. His policy bore retributive fruit early in the war in the defection of Austro-Hungarian Slav regiments. It brought about the Czecho¬ slovak and Jugoslav risings, their fighting on the Allied side, their eventual recognition as belligerents and independent states by the Al¬ lies, and, finally, the collapse of the empire fol¬ lowed shortly after by the surrender of Ger¬ many. See Austria; Croatia-Slavonia ; Czecho-Slovaks ; Jugoslavs; Slavs; Tisza; Transylvania; War, European.

Bibliography.— A1 den, P. (editor), 'Hun¬ gary of To-Day 5 (an anthology by Hungarians: London 1909) ; Andrassv, Count J., 'The Com¬ promise of 1867) (Budapest 1896) ; Bailey, W. F., 'The Slavs of the War Zone5 (London 1917); Baker, J., 'Austria: Her People and their Homelands: (London 1913) ; Bertha, A. de, 'La Hongrie moderne5 (Paris 1901) and 'Magyars et Roumanie devant l'histoire5 (Paris 1899) ; Bovill, W. B. F., 'Hungary and the Hungarians5 (London 1908) ; Barker, J. E.,*

‘The Great Problems of British Statesmanship (pp. 105-145, London 1917) ; Bunzel, J., ˆStu- dien zur Sozial — und Wirtschaftspolitik Un- garns> (Leipzig 1902) ; Chelard, R., ‘La Hon¬ grie millenaire5 (Paris 1896) ; Cserny, K. von, ‘Deutsch-ungarische Beziehungen) (Introduc¬ tion by Count Tisza, Leipzig 1915) ; Drage, G., A.ustria-Hungary5 (London 1909) ; Dymond, T. S., ‘Agricultural Industry and Education in Hungary5 (Chelmsford, Eng., 1902) ; Felber- 5 L-> (Hungary and its People5 (London /r> / FrarV D. P., ‘Magyars and Jugoslavs5

(Review of Reviews, New York, June 1918) ; Gayda, W., ‘Modern Austria: Her Racial and

HUNGERFORD — HUNS

509

Social Prob\ems> (London 1915) : Gibbon, E., ihe Story of the Huns’ (London 1914) ; Gon- nard, R., (Entre Drave et Save’ (Paris 1912) ; Hegenmiiller, Baron L., (Hungary’s Fight for National Existence, 1703-11′ (London 1913); Hinkovitch, M. H., (Les Croates sous le joug Magyar’ (Paris 1915) ; Hoetzsch, O., Gester- reich-Ungarn und der Krieg’ (Stuttgart 1915) ; Hungary and the War’ (reprinted from The Times: London 1915) ; Jekelfalussy, Her Tausendjahrige Lhigarische Staat’ (Budapest 1896); Jerrold, W., (The Danube’ (New York) ; Knatchbull-Hugessen, C. M., (The Po¬ litical Evolution of the Hungarian Nation’ (2 vols., London 1908) ; Leipnik, F. L., (The For¬ eign Policy of Austria-Hungary 1866-1915′ (London 1915) ; Lowell, Governments and Parties in Continental Europe’ ; Ludwig, E., (Austria-Hungary and the War’ (New York 1915) ; Mailath, Count J. de, (La Hon- gne rurale, sociale et politique’ (Paris 1909) ; Marczali, H., (Hungary in the 18th Century’ (Cambridge, Eng., 1910) ; Matlekovits, A. von, (Das Konigreich Ungarn’ (2 vols., 1900) ; Mit- ton, G. E., (Austria-Hungary’ (London 1914) ; Palmer, F. A. G., (Austro-Hungarian Life in Town and Country’ (New York 1903) ; Patter¬ son, (The Magyars: Their Country and Institu¬ tions’ (2 vols.) ; Phillimore, L., (In the Carpa¬ thians’ (London 1912) ; Reich, E., Hungarian Literature’ (London 1898) ; Riedl, F., Hunga¬ rian Literature’ (London 1906) ;

Henri F. Klein,

Editorial Staff of The Americana.

HUNGERFORD, Margaret Hamilton Wolfe Argles (<(The Duchess"), Irish novel¬ ist: b. Ross, Ireland, about 1855; d. Bandon, County Cork, 24 Jan. 1897. She was the daughter of a vicar choral of Cork Cathedral and the death of her first husband, Edward Argles, left her with a young family to

sup¬ port, whereupon she took to writing novels, using the pseudonym ((The Duchess." Later she was married to T. H. Hungerford. Her more than 30 novels were widely popular both in America and England and without possess¬ ing a large amount of literary value are cleverly written, entertaining fictions. Among them may be cited Hhyllis' (1877) ; (Molly Bawn' (1878) ; (Airy Fairy Lillian' (1879) ; (Beauty's Daughters' (1880); (Mrs. Geoffrey' (1881); Hortia' (1882) ; (0 Tender Dolores' (1885) ; Green Pastures and Grav Grief' (1886) ; (A Modern Circe' (1887) ; (The Duchess' (1887) ; Hndercurrents' (1888) ; Hon. Mrs. Vereker'

(1888). Consult Taisin, A., (Best Sellers of Yesterday' (in Bookman, Vol. XXXVIII, p. 645, New York 1914).

HUNKERS (supposably from Dutch honk, (Post(> or "station"; ((stick-in-the-muds") , in American politics, at present a contemptuous nickname, like wmoss-backs," for the unpro¬ gressive elements of a party, which detest change. Originally, a name given about 1844 to the section of the New York State Demo¬ crats which opposed new issues : the points for which it then stood, however, had become party tenets from about 1835. Thence till 1840 the Hunker faction was in opposition to the Loco- foco wing (q.v.) which opposed bank charters; but was obliged to yield in 1838. From 1840 to 1846 they opposed the Radicals, who wished a revised State constitution, elective judges and cessation of State canal building. Thence till 1852 they opposed the Barnburners (q.v.), who, at first separately and then in alliance with the Free-Soil . party (q.v.) fought the National Democratic party for recognition of its State power. After the election of Pierce in 1852, it divided into <(hards" and ((softs» ; the first under Daniel S. Dickinson opposed the admin¬ istration, the second under William L. Marcy supported it. The former made up the bulk of the ((War Democrats" after 1861. Besides those named, Horatio Seymour is the best re¬ membered Hunker leader; while the opposition has the familiar names of Martin Van Buren, Silas Wright and John A. Dix, besides others remembered by the older generation.

HUNNERIC, a king of the Vandals in Africa, who flourished in the 5th century; d. 484. He succeeded his father, Genseric, in 477. In 435 he was sent to Italy as a hostage. He married a daughter of Theodoric, king of the Visigoths. When she was suspected of an at¬ tempt against the life of his father, Hunneric caused her ears and nose to be cut off and sent her home. -He later married Eudocia, daughter of Valentinian III, emperor of Rome.

HUNNEUS, un-na'us, George, Chilean statesman : b. Santiago, Chile, 1831 ; d. 1889. He was graduated at the university of his native town in 1857, and became professor of political economy and jurisprudence at the same

institution the following year. Montt, President of Chile, drove him out of the country on ac¬ count of his forceful eloquence and his liberal opinions, which he found carried into actuality in the government of the United States, where he spent his time of banishment. He was re¬ called to his native land in 1861, was elected to the House of Representatives and became its speaker. He was also appointed Secretary of Public Instruction and became rector of Santiago University, while holding from time to time high positions in the Chilean adminis¬ tration. His. collected works, chief of which is (La Constitugion ante el Congress' (1879), were edited by his sons and published by the government as Gbras' (4 vols., Santiago 1890-

91).

HUNS, a people who make their appear¬ ance m authentic history about 375 a.d. Eth¬ nologists identify them with a Mongolian peo¬ ple of northern Asia, who invaded the Chinese Empire about 200 b.c., and after various migra¬ tions entered Europe. They appear afterward

to have sided with the Goths of Mcesia against the Romans, and sometimes in alliance with the emperors, who purchased their services, and sometimes in hostility with them, they con¬ tinued to extend their dominion along the Danube until the time of Attila (434), their greatest leader, whose reign constitutes the best-known period of their history. See Attila.

HUNT, Gaillard, American historian and author: b. New Orleans, 8 Sept. 1862. He studied at Emerson Institute, Washington, and in 1893 represented the State Department at the World's Fair at Chicago. From 1900-09 he was chief of the Bureau of Citizenship; and after 1909 was chief of the Division of Manu¬ scripts in the Library of Congress. He at¬ tained great prominence on matters of citizen¬ ship, being appointed a member of the Natural¬ ization Commission (1905); a member of the Citizenship Board (1906), and adviser to the Department of State on citizenship matters (1915 and 1917). In 1913 he lectured on nationality at the Graduate School of Political Sciences at George Washington University, and on materials for history at Johns Hopkins. Dr. Hunt is the author of (The Seal of the United States5 (1892), revised as (History of the Seal of the United States5 (1909);

HUNT, Helen. See Jackson, Helen Fiske Hunt.

HUNT, Henry, English politician and re¬ former: b. Widdington Farm, Upavon, Wilt¬ shire, 6 Nov. 1773; d. 15 Feb. 1835. He re¬ ceived some

training for the ministry, but abandoned this for farming. After his ac¬ quaintance with John Horne Tooke he adopted those radical views which made his career a particularly stormy one. He suffered imprison¬ ment for duelling in 1800, and for attacking a gamekeeper in 1810. Again, he was a speaker at a meeting held in Saint Peter's field, Man¬ chester, which ended in a riot; and he was im¬ prisoned for two and a half years. His fol¬ lowing . continued to increase rapidly. In 1830 he sat in Parliament for Preston, but failed of re-election in 1833. His term was occupied with the forwarding of radical reforms, such as women's rights, universal suffrage and the re¬ peal of the corn laws. Hunt was extremely vigorous and blatant in his speeches, and gained considerable reputation as an orator. He re¬ tired from politics in 1833. He wrote 'Mem¬ oirs of Henry Hunt, written by himself in His Majesty's Jail5 (London 1820). Consult Huish, R., (Life of Hunt5 (1836).

HUNT, Henry Jackson, American soldier : b. Detroit, Mich., 14 Sept. 1819; d. Washington, D. C., 11 Feb. 1899. He was graduated from West Point in 1839, receiving a commission in the artillery. He saw service in the Canadian Rebellion 1837-38; afterward in the Mexican Vyar. In General Scott's advance on the City of Mexico he distinguished himself as officer of the artillery at Contreras (18 Aug. 1847) and Churubusco (20 Aug. 1847) and subse¬ quently received the brevet rank of major for gallantry. In 1856 he was placed on the board engaged in revising the system of light artillery tactics. At the outbreak of the Civil War he was stationed at Fort Pickens, Fla., 1861, and the same year commanded the artillery at the battle of Bull Run, and in the defense of Washington. He subsequently or¬ ganized and commanded the reserve artillery of the Army of the Potomac. As commander of artillery he was present at the battle of Malvern Hill (1 July 1862) and he also took part in the battle of South Mountain. He was brevetted brigadier-general of volunteers in 1862, and was present at the battles of Antie- tam, Fredericksburg, Chancellors ville, Gettys¬ burg, served in the Wilderness campaign and at the end of the war retired from his position with the rank of brigadier-general in the United States army. In 1866 he received the commis¬ sion of colonel in the reorganized army, and in 1883 became governor of the National Sol¬ diers' Home at Washington. Among his writ¬ ings are 'Instruction for Field Artillery5 (1860) and 'The Battle of Gettysburg5 (in 'Battles and' Leaders of the Civil War5 (New York 1887). V

HUNT, (James Henry) Leigh, English

journalist, essayist and critic: b. Southgate Middlesex, England, 19 Oct. 1784; d. Putney' near London, 28 Aug. 1859. He was the young¬ est of a large family of children, and was de¬ scended on the one side from Tory cavaliers of West Indian adoption, and on the other from American

Quakers of Irish extraction. From his father, an improvident and engaging clergyman of convival habits and of lax doc¬ trines, Hunt seems to have inherited his op¬ timism of temperament, his liberal views and his courage of conviction; from his mother, a passionate love of nature and of books. From birth a delicate child, he early developed hypo¬ chondriacal tendencies that never left him. The years from 1791 to 1799 were spent at Christ's Hospital, and were his only formal preparation for a literary life. In 1801 his father pub¬ lished Juvenilia, 5 a collection of Hunt's poems written from the age of 12 to 17. They show wide reading and some fluency in versification but are mostly poor imitations. From 1803 to i805 he worked in his brother Stephen's law office and, at the same time, began his long career as a journalist with contributions to The Traveller, The News and other papers. His

. ie1aiJLcaˆ criticisms were reprinted separately in 1807. J

His next position was in the office of the Secretary of War,, resigned in 1808 in order to start his political journal, The Examiner, in its far-reaching effects the most significant step of his career. With his brother John as pub¬ lisher, he continued editor until 1821. The Examiner was a departure from the standards of contemporary journalism in its combination

of the news-giving quality of the daily sheets with the essay style of the weeklies (Fox- Bourne, . (English Newspapers5). Discussion ot politics was its chief object. The liberal policy and boldness of attack of the editor caused one charge of libel by the Tory govern¬ ment to follow closely upon the heels of an- other. . The third resulted in prosecution and conviction for applying to the Prince Regent, afterward George IV, the phrase ((a fat Adonis of fifty.® The two brothers were sentenced to imprisonment of two years, dating from 15

in .seParate prisons, and a fine of £1,000 to be divided between them. They re¬ jected offers from the government to remit the punishment on condition that The Examiner should change its attitude, and served the full sentence. Hunts finances, which up to this time had been good, became greatly iti- volyed during his incarceration. Not until 1844 was he free from want. His health suffered greatly from the long confinement. The Re¬ flector (1810-12) had much the same political and literary character as The Examiner. The chief measures for which Hunt labored through these journals, were Catholic emancipation, re¬ form of Parliamentary

representation, liberty of the press, reduction and equalization of taxes, greater discretion in increasing the pub¬ lic debt, education of the poor and ameliora¬ tion of their sufferings, cessation of child labor, abolition of the slave trade, reform of mili¬ tary discipline and of prison conditions and of criminal and civil laws. After Hunt's re¬ lease from prison he was never again so active m political matters.

In 1809 Hunt married Marianne Kent. She was an invalid the greater part of her life; consequently, the (

During Hunt's imprisonment he had made the acquaintance of Byron, Shelley, Moore and

Lamb. The friendship with Keats probably did not begin until the winter of 1816. In the case of Shelley it was the beginning of a wonderful friendship that involved personal sympathy and public defense with his pen on the part of Hunt, and much financial aid on the part of Shelley. It was through the latter that Byron, in 1821, invited Hunt to Italy to undertake, the management of The Liberal, an ultra-political-literary journal, suddenly aban¬ doned after a few months of unsuccessful run¬ ning. The failure of the project led to Byron's desertion of Hunt and his family in a foreign land, and Hunt's revenge in 1828 in the shape of JLord Byron and Some of his Contempo¬ raries, > an error which Hunt later greatly de¬ plored. During the stay in Italy he edited the Literary Examiner, wrote < Ultra Crepidarius,5 a satire on William Gifford, translated the (Bacchus in Tuscany5 of Redi, and contributed the (Wishing-Papers5 to The Examiner. He returned, to England in 1825 in great poverty. From this time on his work consisted of edit¬ ing numerous magazines: The Companion (1828), Chat of the Week (1830), The Tatler (1830-32), Leigh Hunt's London Magazine (1834-35), Monthly Repository (1837-38), Leigh Hunt's Journal (1850-51), unsuccessful because of the great impracticability of the schemes and the monotony of one chief con¬ tributor; of contributing to an incredible num¬ ber of other magazines; of publishing reprints from previously edited journals and collected editions of his ((poetical works®; of selections from other writers made with running com¬ ment or introductory essays, as Hmagination and Fancy5 (1844), (Wit and Humor) (1846), (Stories from the Italian Poets5 (1846), of guidebooks, as (The Town5 (1848), and

Hunt's best prose work is to be found in his Autobiography5 and in his essays of the kind already mentioned as having appeared first in The Indicator. Carlyle said of the former, ((except it be Boswell's of Johnson, I do not know where we have such a picture drawn of a human life as in these volumes.5® Though less of a poet than an essayist, some of his short poems are exquisite, notably the famous Abou Ben Adhem,5

(Mohamme(I,5 (Jaffar 5 (The Nile, 5 (On a Lock of Milton's Hair,5 (Paganini 5 and others. As a translator, some of his work is admirable. Hunt's powers of criticism and of selection will not be fully recognized until scattered notes and buried prefaces are collected. He had an inborn love of poetry and all beautiful things. His insight was most remarkable of all in the appreciation of his contemporaries. His personal quality was as rare as his opportunity. He had a per¬ sonal ascendency, a strange fascination born of the sympathy and chivalry, the sweetness and joyousness of his nature. Barry Cornwall said that he was <(compact of all the spicy winds that blow.®

Bibliography. — Hunt's works have never been collected and as a whole are difficult of access. His poems and essays, except in small selections and dieap editions, are out of print.

The best edition of the former is that edited by S. Adams Lee (Boston 1857) ; of the latter The Indicator and Companion (2 vols., London 1834). Scribner publishes in a uniform edition some of the most popular of his works. Con¬ sult also Johnson, R. B., (Leigh Hunt) (1896) ; Monkhouse, Cosmo, (Life of Leigh Hunt (1893) ; Clarke, (Recollections of Writers) (1878) ; Trelawney, (Recollections of the Last Days of Shelley and Byron) (1858). Frequent references to Hunt are to be found in the writ¬ ings of Byron, Shelley, Keats, Carlyle, Dickens, Lamb, William Hazlitt and Alexander Ireland. Excellent bibliographies of Hunt's works are to be found in Ireland's (Lists of the Writings of William Hazlitt and Leigh Hunt> (1868) ; Monkhouse's (Life of Leigh Hunt) mentioned above, and R. B. Johnson's (Essays and Poems of Leigh Hunt* (Temple Library 1891).*

Barnette Miller,

Instructor in English in Vassar College.

HUNT, John, English clergyman and mis¬ sionary: b. Balderton, Nottinghamshire, 1812; d. Fiji Islands 1848. He studied theology at the Wesleyan Theological Institution at Hox- ton, and was sent in 1838 to the Fiji Islands. Here he won many converts to Christianity and established numerous missions. His works, which were published posthumously, include (Entire Sanctification: Its Nature, the Way of Attainement and Motives of Its Pursuit (1853) ; (Memoir of Rev. W. Cross, Mission¬ ary to the Friendly and Feejee Islands) (1848) ;*

HUNT, Richard Morris, American archi¬ tect: b. Brattleboro, Vt., 31 Oct.

1828; d. New¬ port, R. I., 31 July 1895. He began the study of architecture in Europe at an early age, at¬ tended the Ecole des Beaux-Arts in Paris, traveled in Germany, Italy, Asia Minor and Egypt, and under his former teacher, Lefuel, was clerk of the works on the buildings that were erected to connect the Tuileries with the Louvre. In 1855 he returned to the United States and proceeded to signalize himself by a remarkable series of noble architectural crea¬ tions, such as the Capitol extension at Washing¬ ton; the Lenox Library, New York; the York- town Monument, Virginia ; Presbyterian Hospi¬ tal, New York; Tribune building, New York; Fogg Museum, Cambridge, etc. He also de¬ signed the pedestal for Bartholdi's colossal statue of (Liberty Enlightening the World) on Bedloe's Island, New York Harbor. He was also chiefly instrumental in the artistic success of the World's Fair at Chicago for which he designed the administration building. Some of the finest private houses in the country were built by him on a truly palatial scale of mag¬ nificence, such as those of W. K. Vanderbilt, E. T. Gerry, H. G. Marquand, J. J. Astor, Ogden Mills, etc., in New York; the country house of George Vanderbilt at Biltmore, N. C. ; the so- called <(Marble House® and the ˆBreakers® at Newport, and many other residences at the Rhode Island resort. He was one of the founders and president of the Institute of Architects; an associate of the Academie des Beaux-Arts ; member of the Royal Institute of British Architects and holder of its gold medal; a chevalier of the Legion of Honor, and a mem¬

*ber of numerous other domestic and foreign societies. In 1892 he was made an associate member of the Institute of France. He held the honorary degree of LL.D. from Harvard. There are two monuments to his memory in New York city: a fountain by D. C. French on Fifth avenue opposite the residence of H. C. Frick and a life-sized statue on top of the W. K. Vanderbilt residence. Through his artistic and structural faculty he exercised a profound influence over American architecture. Consult Anon., (A Reminiscence and an Appreciation (in Architectural Record, Vol. XXXIX, p. 295, New York 1916) ; id., (The Richard M. Hunt Memorial * (in Engineering Record, Vol. XXXVIII, p. 493, New York 1898) ; Cortissoz, R., (R. M. Hunt* (in Art and Common Sensed New York 1913) ; Schuyler, M., (Works of R. M. Hunt) (in Architectural Record, Vol. V, p. 97, New York 1896) ; Van Brunt, H., (R. M. Hunt* (in American Architect, Vol. L, p. 53, Boston 1895).*

HUNT, Theodore Whitefield, American

Presbyterian clergyman and educator: b. Me- tuchen, N. J., 19 Feb. 1844. He was graduated from Princeton 1865 and from Princeton Theo¬ logical Seminary 1869 ; was instructor in Eng¬ lish at Princeton 1868-71 and professor of Eng¬ lish there from 1873. He published (The Prin¬ ciples of Written Discourse) (1884) ; (English Prose and Prose Writers) (1887) ;

(Studies in Literature and Style) (1890) ; (Ethical Teach¬ ings in Old English Literature (1894) ; Amer¬ ican Meditative Lyrics) (1896) ; (English Medi¬ tative Lyrics) (1899); (Literature — Its Prin¬ ciples and Problems) (1906) ; 'English Literary Miscellany* (1914).*

HUNT, Thomas Sterry, American chemist, mineralogist and geologist: b. Norwich, Conn., 5 Sept. 1826; d. New York, 12 Feb. 1892. In 1845 he became an assistant to the elder Silli- man at Yale College; was chemist and miner¬ alogist to the Canadian Geological Survey 1847-52, professor of chemistry at Laval Uni¬ versity, Quebec, 1856-62, and at McGill Univer¬ sity 1862-68, and professor of geology in the Massachusetts Institute of Technology 1872-78. In 1859 he invented the green ink with which greenbacks (q.v.) are printed. He was made an officer of the Legion of Honor in 1867; Fellow of the Royal Society in 1859, and was president of the Royal Society of Canada in 1884. He was also a member of the National Academy of Sciences ; a member and president of the Amer¬ ican Association for the Advancement of Science; a member of the American Institute of Mining Engineers, and of the American Chemical Society. One of the organizers of the first Geological Congress he became its sec¬ retary, and acted as vice-president of the Geo¬ logical Congresses at Paris (1878), Bologna (1881) and London (1888). Among his pub¬ lished books are (Chemical and Geological Es¬ says (Boston 1875) ; (Coal and Iron in South¬ ern Ohio, etc.* (Boston 1881) ; (Mineral Physiology and Physiography* (Boston 1886) ; 'New Basis for Chemistry* (New York 1887; Paris 1889); Systematic Mineralogy) (New York 1891). Some 400 papers of varying length, published in scientific journals of the United States, Canada, England, France and Germany, attest to his remarkable industry. Consult Douglas, J. B., (T. S. Hunt* (in*

American Philosophical Society, Proceeding , Memorial Vol. I, p. 63, Philadelphia 1900); Frazer, P., (T. S. Hunt5 (in American Geol¬ ogist, Vol. XI, Minneapolis 1893) ; Laflamme, J. C. K., (Le Docteur T. S. Hunt5 (Quebec

1892).

HUNT, William Henry, English water- color painter: b. London, 28 March 1790; d. 10 Feb. 1864. Born of poor parents and crip¬ pled in childhood, Hunt became the pupil of John Varley, the landscape painter. He ex¬ hibited three paintings in oil in 1807 ; but later painted exclusively in water-color, becoming an associate of the Water-Color Society in 1824 and

full member three years later. He painted genre and still life with great delic-acy and variety of color, so that Ruskin in his criti¬ cism has these words of praise for him : <(He was, take him for all in all, the finest painter of still life that ever existed.® His humor, accuracy and technical expertness made his genre scenes particularly popular. Of these the best known are (Boy and Goat) ; (The Card Players) ; (Too Hot) ; (Plums, Primroses and Birds' Nests.5 Hunt ranks high in the group of founders of the English school of water- color painters. He lived for the best part of his life at Hastings.

HUNT, William Henry, American lawyer: b. New Orleans, La., 5 Nov. 1857. He was ed¬ ucated at Yale; became attorney-general of Montana in 1884; and held various public of¬ fices there after Montana became a State. He was for a time United States agent before the Chilean Claims Commission, but resigned that post in 1900 to become secretary of Porto Rico, and from 1901 to 1904 was governor of the island. He then became United States district judge for Montana; from 1910-11 was asso¬ ciate judge of the United States Court of Cus¬ toms Appeals, and in December 1910 was ap¬ pointed United States Circuit judge, taking office in February 1911.

HUNT, William Holman, English painter of religious subjects: b. London, 2 April 1827; d. there, 7 Sept. 1910. He studied at the Royal Academy in 1845, and next year exhibited his first picture, (HarkP repre¬ senting a child holding a watch to her ear. His early years as an artist were spent in great poverty. About 1848 Hunt, D. G. Rossetti and J. E. Millais formed the Pre- Raphaelite Brotherhood, afterward enlarged by the admission of other painters and writers, and which attained a position of great influence through the eloquent support of Ruskin. Each of the three founders exhibited in 1849 a picture painted in strict accordance with the principles of the Brotherhood. Hunt's picture represented (Rienzi Vowing to Obtain Justice for the Death of His Younger Brother,5 and was ex¬ hibited at the Royal Academy. The exhibition of 1854 included two of his greatest pictures, one of them the well-known (Light of the World,5 now in Keble College, Oxford, and a life-size copy in Saint Paul's, London. Both it and (The Awakening Conscience) are char¬ acterized by the careful draughtsmanship and attention to detail which form notable features of the best Pre-Raphaelite work, but their full meaning is far from clear to the average spec¬ tator. In 1854 Hunt went to Palestine in order to obtain a living acquaintance with the scenes VOL. 14 — 33

of the Biblical stories, and the first fruits of his study of Eastern life was (The Scapegoat5 (1856), one of his most original and most poet¬ ical works; but much finer is his (Finding of the Saviour in the Temple, 5 exhibited in i860. Among subsequent works of Hunt's are (A Street Scene

in Cairo — the Lantern-Maker's Courtship) (1861) ; (Portrait of D. G. Rossetti5 (1850) ; (Fairlight Downs) (1858) ; (The After- Glow in Egypt 5 (1865), ((1905) ; and Bayliss, cFive Great Painters of the Victorian Era) (1902).

HUNT, William Morris, American painter: b. Brattleboro, Vt., 31 March 1824; d. Isles of Shoals, 8 Sept. 1879. In 1840 he entered Har¬ vard University, but ill health obliged his re¬ moval before completion of the course. He traveled in Europe, studied at Paris under Cou¬ ture and subsequently came under the influ¬ ence of Jean Franqois Millet. Hunt introduced the Barbizon School to America after his return home in 1855. Settling in Boston, he was very successful as an art teacher ; painted several pictures reminiscent of his French travels and in general turned American aspirants in art toward France. His best works are (Sheep-Shearing at Barbizon> ; (The Fortune-Teller5 ; (The Prodigal Son> ; (The Farmer's RetunP ; (Girl with Kitten5 ; (Girl Reading5 ; Mar¬ guerite5 ; (Hurdy-Gurdy Boy.5 He is well

represented in the Boston Museum. The Metro¬ politan Museum, New York, contains his (Girl at a Fountain5 ; (A Landscape5 ; (The Bathers5 and other examples. Among his portraits are those of Chief Justice Shaw, Mrs. F. G. Ward, Mrs. Charles Francis Adams, Mrs. G. W. Long, William H. Gardiner, William M. Evarts, Horace Gray. The Albany capitol contained colossal decorations by Hunt which were later either covered or removed. He published (Talks about Art5 (London 1878). Consult Knowlton, H. M., (The Art Life of William Morris Hunt5 (Boston 1899) ; and Isham, Samuel, (History of American Painting5 (New York 1903).

HUNTER, David, American soldier: b. Washington, D. C, 21 July 1802; d. there, 2 Feb. 1886. He was graduated at West Point in 1822, became captain in 1833, and resigning from the army in 1836 settled in Chicago. He, how¬ ever, re-entered the army in 1842 as paymaster with the rank of major, and in May 1861 was

appointed brigadier-general of volunteers, and a few month later major-general. He recruited and organized in South Carolina the first negro regiment in the Union army. In 1863 his man¬ umission of the slaves in Florida, Georgia and South Dakota was annulled by the President. He defeated the Confederates at Piedmont, 5 June 1864, and was chairman of the military commission which tried the conspirators en¬ gaged in the assassination of President Lincoln. He was brevetted major-general in the

regulars 1865, and retired in 1866.

HUNTER, Edward, American soldier: b. Gardiner, Me., November 1839. He was grad¬ uated from West Point in 1865, and was com¬ missioned second lieutenant in the 12th Infantry, and a few months later, first lieu¬ tenant. He served as aide-de-camp to General Getty at Santa Fe, N. M., in the opera¬ tions against the Arapahoe and Cheyenne In¬ dians. In 1870 he was transferred to the 1st Cavalry; and for subsequent meritorious serv¬ ices in California, Nevada, Washington and Montana was' commissioned captain. In 1888 he became major and was appointed judge-ad¬ vocate in the division of the Pacific and the De¬ partment of California (1889-95). He was made lieutenant-colonel and deputy judge-advo¬ cate in the Department of Dakota (1895-98). In the last-named year he accompanied General Brooke as judge-advocate in Porto Rico. He occupied a similar office in the Department of the East a few years later, and was officially re¬ tired in 1903.

HUNTER, George Leland, American au¬ thor and expert on interior decorating: b. Bel¬ lingham, Mass., 8 May 1867. He was graduated at Harvard in 1889, and devoted many years to the study of furniture and textiles. His pub¬ lications include (Tapestries, their Origin, His¬ tory and Renaissance) (1912) ; (Home Furnish- ing> (1913) ; (The House That Jack Built) (1914) ; Utalian Furniture and Interiors5 (1917); (Decorative Textiles5 (1918). Mr. Hunter was also decorative art editor of the (New International Encyclopedia,5 and has or¬ ganized exhibits of tapestries at various museums.

HUNTER, John, British surgeon and phys- ologist: b. Long Calderwood, Lanarkshire, 13 Feb. 1728; d. London, 16 Oct. 1793. He was a younger brother of William Hunter (q.v.). In 1749 and 1750 he studied surgical pathology at Chelsea Hospital, London, and already began to make original observations, which his subse¬ quent experience confirmed. In 1754 he was en¬ tered as a surgeon pupil at Saint Georges Hos¬ pital ; and in 1754 or 1755 he was admitted to a partnership in his brother's school of anatomy, and continued to lecture there till 1759. He served as staff-surgeon in France and Portugal 1760-63, and then returned to London and com¬ menced practice as a surgeon. In 1767 he was elected a member of the Royal Society, and in 1768 was appointed surgeon to Saint George's Hospital. His investigations at this time ex¬ tended over every branch of natural history, particularly pathology, comparative anatomy and physiology, to which he devoted his entire leisure time. In 1790 he was appointed inspec¬ tor-general of hospitals and surgeon-general to the army. Hunter left at his death a museum which he had built for himself, and filled with

upward of 10,000 preparations illustrative of the departments of science to which his attention had been devoted. It was afterward purchased by government and presented to the Royal Col¬ lege of Surgeons. His leading works are the (Natural History of the Human Teeth) (1771) ; (Treatise on the Venereal Disease5 (1786) ; Ob¬ servations on Certain Parts of the Animal Economy5 (1786); (Treatise on the Blood, In¬ flammation and Gun-shot Wounds5 (1794). The complete works, edited by Palmer, were pub¬ lished in 1838.

HUNTER, Peter, Canadian administrator and soldier: b. Scotland, 1746; d. Quebec, 1805. He served in the Revolutionary War and rose to the rank of lieutenant-general and com¬ mander-in-chief of the forces in British North America (1799). In this capacity he was also ap¬ pointed successor to Gen. John Graves Simcoe as lieutenant-governor of Upper Canada. His administration was severely critized because of his neglect of civil and preference for mili¬ tary duties. Reforms instituted by him were improvements in the system of representation and the trade agreements between the United States and Upper Canada. Later critics have given more favorable estimates of Hunter, lay¬ ing emphasis on his fair-mindedness and capa¬ bility in face of the great difficulties involved in the administration of a poorly organized and not wholly responsible government.

HUNTER, Robert, British colonial gov¬ ernor of New York and Jamaica: d. 1734. He was of an Ayreshire family, and entered the military service. He fought at Blenheim and became colonel of dragoons. In 1707 he was made lieutenant-governor of Virginia, but was captured by the. French en route and was held prisoner until his captors found it expedient to exchange him for the bishop of Quebec. Three years later he returned to America with a group of German Protestants who had sought escape from persecution in England. Colonel Hunter remained as governor of New York for nine years, during which time he was con¬ tinuously occupied with dissensions with the colonial assemblies. He returned to England in 1719, and remained a short while, when he was sent out as governor of Jamaica and major- general of the troops stationed there. He ful¬ filled these commissions very ably.

HUNTER, Robert Mercer Taliaferro,

American statesman : b. Essex County, Va., 21 April 1809; d. .18 July 1887. He was graduated at the University of Virginia, and, choosing the law for his profession, commenced practice in 1830. He soon began to take an active part in politics, and at 24 was elected to the house of delegates, where he remained until 1837, when he was elected to Congress. In the discussions growing out of the commercial convulsion of that year, he at

once took his stand on the side of the administration in favor of the inde¬ pendent treasury bill, and in his first speech de¬ veloped those principles of free trade to which he consistently adhered throughout his public career. In the succeeding Congress he was elected to the speakership ; and at the close of his term of service, the usual vote of thanks was passed without a dissenting voice, in a House of Representatives strongFr marked by partisan bitterness. At the election in the spring of 1843 for members of the 28th Congress,'

Hunter was defeated by a small majority, mainly on account of his adherence to that clause of the independent treasury scheme re¬ quiring all dues to the government to be paid in species. At the next Congressional election in 1845, he was successful. In 1846 Hunter, in common with other southern representatives, re¬ sisted the application of the Wilmot Proviso. He voted for all the measures necessary to prosecute the war to a just and honorable con¬ clusion, but altogether opposed the project, favored by some, of incorporating the whole of the Mexican states into our political system. He represented Virginia in the Senate, 1847-61. He was active in framing the Tariff Act of 1857, and after leaving the Senate became the Con¬ federate Secretary of State. At a later period he was a Confederate senator, and in 1865 com¬ missioner of peace. He became treasurer of Virginia in 1877, and retired from public life in 1880. Consult the memoir by M. T. Hunter

(1903).

HUNTER, William, British anatomist : b. Long Calderwood, 23 May 1718; d. London, 30 March 1783. After studying at Glasgow Uni¬ versity 1732-37, and subsequently medicine at Edinburgh, he went to London in 1741, and in 1746 received the appointment of lecturer on anatomy to a society of naval surgeons. In 1747 he became a member of the College of Sur¬ geons and practised surgery and midwifery, but at length confined himself entirely to the latter, and was appointed accoucheur to the British Lying-in Hospital. In the first volume of Ob¬ servations and Inquiries, > published by the Med¬ ical Society in 1757, appeared Hunter's his¬ tory of an Aneurism of the Aortal In 1762 he published (Medical Commentaries, } and in 1764 was appointed physician-extraordinary to the queen. In 1768, on the establishment of the Royal Academy of Arts, he was appointed pro¬ fessor of anatomy. The most elaborate of his publications, the (Anatomy of the Human Gravid Uterus, > appeared in 1774. In 1770 he purchased and completed a house and theatre, in which he constituted a

splendid museum. At first he only contemplated a collection of preparations in human and comparative anat¬ omy, but added a collection of shells, corals and other objects of natural history, paintings and ancient coins and medals. He bequeathed the whole of his splendid museum, valued at 4150,000, to the University of Glasgow, . with the sum of 48,000 in cash to be expended in an ap¬ propriate building for its reception, and a fur¬ ther sum of 4500 per annum to bear the charges of its preservation.

HUNTER, Sir William Wilson, English statistician and author: b. Glasgow, 15 July 1840; d. 1900. He was educated at the Univer¬ sity of Glasgow and foreign universities and appointed to the Bengal Civil Service in 1862. As director-general of statistics he made a statistical survey of India, the results of which are embodied in the well-known Imperial Gazetteer of India (1881; 1885-87). He also published (Annals of Rural Bengal } (1868 ; 5th ed., 1872), continued in (Orissa) (1872) ; (The Life of the Marquess of Dalhousie) (1890) ; (A Dictionary of the Non-Aryan Languages of India and High Asia) (1868) ; (Brief History of the Indian Peoples) (1880; enlarged ed. as 'The Indian Empire) (1895), which has been

translated into five languages, and was editor of the series of biographies known as (The Rulers of India. > He was knighted in 1887.

HUNTER-BLAIR, Oswald (Sir David Hunter-Blair, 5th Baronet), Scottish clergy¬ man: b. Dunksey, Scotland, 30 Sept. 1853. He was educated at Eton and at Magdalen College, Oxford. Entering the army he was commis¬ sioned in the Prince Regent's Royal Ayrshire Militia, becoming captain in 1876. He was converted to Roman Catholicism in 1875 and three years later became a member of the Benedictines. He was ordained to the priest¬ hood in 1886, and from 1890 to 1895 was rector of the Abbey School at Fort Augustus. In 1896 he succeeded to the baronetcy on the death of his father. From 1899 to 1909 he was master of Hunter-Blair's Hall, Oxford, and since 1913 has been abbot of Saint Benedict's Abbey, Fort Augustus, Scotland. He was a private chamberlain to the late Leo XIII and spent some time in Brazil employed in educa¬ tional research for his order. He published (Jerusalem of To-day) ; (Catholics at the Na¬ tional Universities) ; (Oxford as It Is) ; (His- tory of the Catholic Church in Scotland, a translation of the (Geschichte der katholischen Kirche in Schottland* of Bellesheim ; (Holy Rule of St. Benedict,* and contributions- to the Tablet, the Weekly Register, the New Era, the Glasgow Observer and (The Catholic Encyclo¬ pedia. }*

HUNTER COLLEGE. See Normal Col¬ lege.

HUNTING, the pursuing of wild animals as a sport. Hunting for the market

is termed pot-hunting. Among sportsmen certain con¬ ventionalities obtain, and the hunter who does not observe these unwritten rules is stigma- • tized as unsportsmanlike.

Within comparatively recent years the in¬ discriminate slaughter of wild game has moved the devotees of the sport of hunting to insist upon such regulations, statutory or self-im¬ posed, as shall protect game birds and animals from extinction, and afford them a <(sporting chance® to escape an unskilful hunter. In the extension of this idea many sportsmen of the higher type deliberately reduce their chances of killing the game by substituting the rifle with its one missile for the shotgun with its widely scattering scores of deadly pellets. What may be called the (

The complete disappearance from the United States of several kinds of game birds and ani¬ mals which formerly were abundant and the depletion of other species to almost the point of extinction has united the sportsmen of the country in an effort to check the further rav¬ ages of the pot-hunter and those who find their pleasure in wholesale slaughter. As one in¬ stance of the danger of unrestrained ®gun-

ning® in areas where game is plentiful the fol¬ lowing figures taken from a report of the State Game Commission of Louisiana for the season 1909-10 are enlightening. While it is stated that the record can be regarded as only ap¬ proximate, it shows the killing of 3,176,000 wild ducks, 1,140,750 quail and 1,402,474 other game birds ; 5,470 deer, 690,270 squirrels and rabbits and 1,971,922 other fur-bearing animals • — .a total for one season for that State alone of 8,386,876 game birds and animals. Most of the ((hunters® who bagged this game were hired men sent into the State by wholesale dealers in game in distant markets.

With such incentives to action to prevent the total destruction of the wild life of the country sportsmen have worked actively to have suitable game laws passed in the several States, urging especially the protection of closed sea¬ sons for appropriate terms of years, in order to give vanishing species a chance to multiply again to such numbers that a surplus could be spared without danger of extinction. A lack of uniformity in the State laws, however, has been a serious obstacle to the success of a country-wide plan. Within recent years the Department of Agriculture in the exercise of its authority over migratory birds has aided to a considerable degree the preservation of sev¬ eral species which were subjected to indis¬ criminate slaughter both while going north to their nesting places and on the return

trip to their winter habitat. There have been estab¬ lished also by Presidential executive orders a number of bird refuges which have served to stem the tide of unreasoning destruction. But much remains to be accomplished, and the struggle is still on between those who would save the game, and with it the sport of hunt¬ ing, and those who would heedlessly and sel¬ fishly destroy both the game and the sport.

Dr. William T. Hornaday, the well-known hunter-naturalist, designates as the principal re¬ maining game areas in North America: the Arctic prairies north of the tree limits ; the Alaska-Yukon region; the northern extensions of the Canadian provinces, Ontario and Que¬ bec; Labrador and Newfoundland; British Columbia, and the Sierra Madre of Mexico. In 1912 the. hunting grounds in and near the United States and southern Canada where big game may still be found in numbers which permitted hunting without danger of extermina¬ tion were :

The Maine Woods — for white-tailed deer.

New Brunswick — for moose, caribou, deer and black bear.

The Adirondacks — for white-tailed deer.

The Pennsylvania Mountains — for deer and black bear.

Northern Minnesota — -for deer and moose.

Northern Michigan and Wisconsin — for white-tailed deer.

Northwestern Wyoming — for elk, deer, grizzly bear and black bear.

Western and Southwestern Montana'- — for elk, mule deer and white-tailed deer.

Northwestern Montana — for mule deer and white-tailed deer.

Wyoming east of the Yellowstone Park — for elk, deer and two species of bear.

Woods of Northern Ontario and Northern Quebec — for moose and deer.

Southern British Columbia — for mountain goat, mountain sheep, deer and grizzly bear.

Northern British Columbia — for moose, elk, bighorn sheep, grizzly bear and black bear, mule deer and white-tailed deer.

Northwestern Alberta — for grizzly bear, bighorn sheep and mountain

goat.

The hunting of large game, as bear, deer, tigers, lions, leopards, etc., will be found treated under the titles by which they are described. In Europe the various modes of shooting game are known as open shooting, covert shooting, river and pond shooting and salt-water wiid fowl shooting. See Deer Stalking ; Fox Hunting; Game Laws; Game Preserves, etc.

*Bibliography. — Boone and Crockett Club, (Hunting in Many Lands * (New York 1895), (Trail and Campfire* (New York 1897) and (American Big Game Hunting* (New York 1910) ; Dixon, W. S., (Hunting in the Olden Days* (Boston 1912) ; Dodge, R. I., (The Hunting Grounds of the Great West* (London 1877) ; Dunraven, Earl of, (Hunting in the Yellowstone* (New York 1917) ; Grinnell, G. B., (Hunting at High Altitudes) (New York 1912) ; Hammond, S. H., (Hunting in the Northern Wilds (the Adirondacks) } (New York 1856) ; Hornaday, W. T., (Two Years in the Jungle* (New York 1886), (Camp-Fires in the Rockies) (New York 1906), (Our Vanish¬ ing Wild Life) (New York 1913) and (Ethics in Hunting Game) (The Forum, New York, January 1917) ; Leveson, H. A.,*

1910) ; Selous, F. C., (Recent Hunting Trips to British North America) (London 1907) and 'A Hunter's Wanderings in Africa) (London

1911) ; Sharpe, D. L., (Where Rolls the Ore¬ gon (Boston 1914) ; Ward, R., 'Records of Big Game) (London 1896) ; United States De¬ partment of Agriculture Farmers' Bulletin 910, (Game Laws for 1917: A Summary of Federal! State and Provincial Statutes,* and Farmers5 Bulletin 911, 'Laws Relating to Fur-Bearing Animals* (both Washington 1917) ; British Columbia Provincial Information Bureau Bulle¬ tin 17, (Game of British Columbia**

HUNTING-DOG. See Hyena-dog.

HUNTING LEOPARD. See Cheeta.

HUNTINGDON, Selina Hastings, Count¬ ess of, English Methodist leader: b. 24 Aug 1707; d. 17 June 1791. She was married in 1728 to the Earl of Huntington and on his death in 1746 became very devout, appointing the famous. George Whitefield (q.v.) her pri¬ vate chaplain. Adopting the principles of the Methodists, she was long considered, owing to her rank and fortune, as the head of the Cal- vinistic Methodists, her followers being known as the "Countess of Huntingdon's Connection.® She founded a college at Trevecca in Wales for the education of ministers, built some 64 chapels and contributed liberally to their en¬ dowment and to the support of the clergy. Consult New, A. H., 'The Coronet and the

Cross, or Memorials of Selina, Counters of Huntingdon > (London 1857) ; Tytler, S.. (Countess of Huntingdon and Her Circle) (London 1907).

HUNTINGDON, England, a municipal borough, capital of Huntingdonshire, situated on the Ouse, 59 miles north of London, and served by the Great Northern, Great Eastern and Midland railways. The town was orig¬ inally settled by the Saxons, and was the seat of a royal castle built in the 10th century. It was chartered in 1189. It is connected by bridge with Godmanchester. Huntingdon is famous principally as the. birthplace of Oliver Cromwell, whose birth is registered in the books of the old parish church of Saint John. His house is still standing. Pop. 4,000. 'Con¬ sult Griffith, Edward, (A Collection of An¬ cient Records relating to the Borough of Hunt¬ ingdon) (1827).

HUNTINGDON, Pa., borough, county- seat of Huntingdon County, on the Juniata River,, and on the Pennsylvania Railroad, about 200 miles west of Philadelphia. Where Hunt¬ ingdon is located was once a famous council ground for the Indians of the central part of Pennsylvania, now marked by the ((Standing Stone Monumentˆ erected at the centenary cele¬ bration. It was first settled by white people in 1760 and. was chartered in 1796. The country around is a fertile agricultural region, with valuable mineral deposits and quite extensive forests. The chief manufactures are boilers, machinery, radiators, sewer-pipe, flour, furni¬ ture, stationery, knit goods and stoves and there is an important trade in grain and fruits. Hunt¬ ingdon is the seat of the State Industrial School and of Juniata College, an institution opened in 1876 under the auspices of the German Bap¬ tist Brethren. The original charter is still in force and provides for a chief burgess, who holds office three years, and a council. Pop.

(1920) 7,051.

HUNTINGDONSHIRE, England, an east-midland county, bounded on the east by Cambridgeshire, on the west and north by Northamptonshire and on the south by Bed¬ fordshire. Area, 366 square miles, of fertile rolling valley. The chief streams are the Ouse and the Nene; the Kym joins the Ouse at Saint Neots. Agriculture is the principal occupation of the county, about nine-tenths of the entire area being under cultivation, or used for pas¬ turage. Wheat, barley, beans, peas, fodder, cabbage and mangold are raised, and there is also considerable truck-farming, bee-cultivation and cattle raising; and some dairy- farming. The manufactures consist of paper and parch¬ ment, brick tile and ale. Railways traversing the country are

the Great Northern, the Great Eastern and the London and North-Western. The chief cities are Godmanchester (Pop. 2,000) ; the capital, Huntingdon (Pop. 4,250) and Saint Ives (Pop. 3,000). The county is rich in historical remains, some of which date back to Roman times. Huntingdonshire was settled by an East Anglian tribe in the early 6th century and has shared in the vicissitudes of the struggles between the Anglians and Mer¬ cians ; the Danes and the Saxons. Pop. 56,000.

HUNTINGTON, Archer Milton, Amer¬ ican author: b. New York, 10 March 1870. He

received his education in New York and in Spain, and became deeply interested in Spanish archaeology. Dr. Huntington is known chiefly in the United States as the founder and first president of the Hispanic Society of America. Under his auspices, the society became a flour¬ ishing organization ; for, besides endowing it heavily, he gave it a building, splendid collec¬ tions and library. Yale awarded him the de¬ gree of honorary A.M. in 1897, and Harvard in 1904; Columbia, the degree of Litt.D. in 1907. Besides numerous criticisms and magazine arti¬ cles, he is the author of (A Note Book in Northern Spain (1898), and*

HUNTINGTON, Collis Potter, American capitalist : b. Harwinton, Conn., 22 Oct. 1821 ; d. Pine Knot Camp, near Lake Raquette, N. Y., 13 Aug. 1900. He worked on his father's farm, until his 14th year. In his 16th year he pro¬ cured credit in New York for $3,000 worth of clocks and traded them through the South and West. He then, together with one of his brothers, set up as a general merchant at One- onta, N. Y., where he prospered immediately. He shipped goods to California in 1848; fol¬ lowed them in person in 1849 by way of the Isthmus where he was detained for three months on account of the overcrowded conditions. During this time he used his small capital to such good purpose that he increased it from $1,200 to some $5,000. He then took ship to California and began to make his fortune in the hardware business, soon becoming associ¬ ated with Mark Hopkins (q.v.). In 1860 he matured a plan for a transcontinental railroad in conjunction with Leland Stanford, Charles Crocker and Mark Hopkins. The Central Pa¬ cific was finished in 1869. This was the crown¬ ing achievement of his life and at his death the railroad system known as the Southern Pacific, of whose managing board he was presi¬ dent, comprised 26 corporations, with more than 9,000 miles of tracks and 5,000 miles of steamship line. Another achievement was the upbuilding of the Chesapeake and Ohio Rail¬ road and the accompanying marvelous develop¬ ment of Newport News, Va. He was one of the largest landholders in the country and his fortune was estimated at $35,000,000. He built a granite church, to the memory of his mother, in his native town; gave C. W. Peale's portrait of Washington to the New York

Metropolitan Museum ; a library and reading-room to West¬ chester, N. Y. ; materially aided in building and equipping Hampton (Va.) Normal Agricultural Institute ; and gave $50,000 for the endowment of Tuskegee (Ala.) Normal and Industrial In¬ stitute, He was one of the foremost art col¬ lectors of his time, leaving a magnificent col¬ lection of paintings, valued at $3,000,000 to the New York Metropolitan Museum, the bequest to become operative after the death of his wife and adopted son. Consult Anon., (C. P. Hunt¬ ington (in Review of Reviews , Vol. XXII, p. 325, New York 1900).*

HUNTINGTON, Daniel, American painter: b. New York, 14 Oct. 1816; d. there, 18 April 1906. He was educated at Hamilton College, where he made the acquaintance of Charles

L. Elliott, from whom he received a decided bias for his art. In 1835 he entered the studio of Professor Morse, president of the National Academy of Design and soon after produced the (Bar-room Politician ; (A Toper Asleep,* besides some landscapes and portraits. In 1839 he went to Europe and in Florence painted the (Sibyl* and the Florentine Girl.* Removing to Rome soon after, he painted the (Shepherd Boy of the Campagna,* and (Early Christian Prisoners,* both of which were purchased by New York collectors. In 1845 he returned to New York. He became a member of the National Academy in 1840 and was its president in 1862 and 1869, and contin¬ uously from 1877 to 1891. He devoted himself mainly to portraits and among portraits by him of well-known people are those of Presidents Lincoln and Van Buren and of Sir Charles Eastlake. His noted (Mercy's Dream-* is now in the Corcoran Gallery at Washington.*

HUNTINGTON, Ellsworth, American explorer and author : b. Galesburg, Ill., 16 Sept. 1876. After receiving his B.A. from Beloit College, he became president's assistant and instructor at Euphrates College, Harput, Tur¬ key (1897-1901). His first tour of exploration was along the canons of the Euphrates River in 1901. Returning to the United States, he was research assistant at the Carnegie Insti¬ tution, Washington; and from 1903-04 was a conspicuous member of the Pumpelly expedi¬ tion to Russian Turkestan. From 1905-06, he traversed Chinese Turkestan with the Barrett expedition. He taught at Yale University sub¬ sequently, becoming assistant professor (1910— 15), and research associate since 1917. Other noteworthy explorations conducted by Hunt¬ ington were to the Syrian Desert, Palestine and Asia Minor (1909) ; and for investigations of climatic conditions in the United States, Mexico and Central America (1910-13).

He received his degree of M.A. from Harvard (1903) and his Ph.D. from Yale (1909). Dr. Huntington is associate editor of the Bulletin of the American Geographical Society and the Journal of Race Development. Vari¬ ous geographical and ethnological societies have distinguished him by medals and election to their membership. He is author of (Ex¬ plorations in Turkestan) (1905) ; (1915) ; (Human Geography (1917).*

HUNTINGTON, Frederic Dan, Amer¬ ican Protestant Episcopal bishop : b. Hadley, Mass., 28 May 1819; d. Hadley, Mass., 11 July 1904. He was graduated at Amherst in 1839, and studied three years in the divinity school of Cambridge. In 1842 he was ordained pastor of the South Congregational (Unitarian) Church in Boston, which he left in 1855 after a highly successful pastorate to become the first occupant of the college pulpit and Plum¬ mer professor of Christian morals at Harvard. During these years he was also a highly suc¬ cessful lecturer on the lyceum platform, a form of popular education then at its height. He spoke on philosophical, historical and theo¬ logical subjects and his eloquence was as im¬ pressive there as in the pulpit or the classroom.

From 1847-51 he edited the Christian Register and from 1845-59 the Monthly Religious Mag¬ azine. In 1860 he resigned and took orders in the Episcopal Church, founding Emmanuel Church, Boston, and serving as its rector 1861— 69. In April 1869 he was consecrated bishop of Central New York with residence at Syra¬ cuse. He has published (Sermons for the People (1856) ; (Christian Believing and Liv¬ ing* (1859)* (Divine Aspects of Human So¬ ciety* (1859) ; (Helps to a Holy Lent* (1872) ; Few Helps to a Holy Lent* (1876); Fitness of Christianity to Man: Bohlen Lectures* (1877) ; (Christ in the Christian Year* (2 vols., 1878), Forty Days with the Master* (1892), etc. Consult Huntington, A. S., < Memoir and Letters of F. D. Huntington* (Boston 1906).*

*HUNTINGTON, Lucius Seth, Canadian statesman: b. Compton, province of Quebec, 1827; d. New York, 1886. He was elected to the Canadian Parliament in 1861 and was solicitor-general for Canada East 1863-64. In 1873 he moved in the House of Commons for inquiry into the alleged corrupt practices in connection with the proposed transcontinental railway, afterward called the <(Pacific Scandal.** He held office in the Mackenzie administration from 1874-78 and retired from public life in 1882. He was the author of a novel on English and American political life, Frofessor Conant.**

HUNTINGTON, Margaret Evans, Amer¬ ican educator: b. Utica, N. Y., 9 Jan. 1842. In 1869 she was graduated at Lawrence Uni¬ versity and, subsequently studied at Berlin, Paris, Heidelberg and Oxford. In 1874 she began her connection with Carleton College as professor of English

*literature and dean of the women's department. After 1879 she served as president of the Minnesota Congregational Board of Missions and from 1885 to 1899 of the Minnesota Federation of Womens' Clubs. She was also chairman of the Minnesota Public Library Commission and was the first woman member of the American Board of Commis¬ sioners for Foreign Missions of the Congrega¬ tional Church. In 1908 she was elected honor¬ ary vice-president for life of the General Fed¬ eration of Womens' Clubs. In 1914 she mar¬ ried the Rev. 'George Huntington. She has published several addresses and the volume en¬ titled (Woman as Citizen.**

HUNTINGTON, Samuel, American ju¬ rist: one of the signers of the Declaration of Independence: b. Windham, Conn., 3 July 1731 • d. Norwich, Conn., 5 Jan. 1796. Although at first intended for a farmer and merchant he managed to study law and soon became a suc¬ cessful lawyer at Norwich, Conn. From 1765- 74 he was king's attorney; from 1775-83 asso¬ ciate justice of the Superior Court of Con¬ necticut, of which he became chief justice in 1784. In 1764 he began service in the general assembly, advancing in 1775 to the senate or governor's council. In spite of this long serv¬ ice as an officer of the Crown, his sympathies were strongly on the side of the colonists and. in January 1776, he entered the Continental Congress as a delegate from his native State In September 1779 he succeeded John Jay as president of Congress and discharged the func¬ tions of that office until July 1781 when he re¬ sumed his seat on the Connecticut bench. He served again in Congress from May to June.

1783, and in the succeeding year was appointed chief justice of the Superior Court of Connecti¬ cut. In 1785 he was elected lieutenant-governor of Connecticut and in 1786 he succeeded Roger Griswold as governor, to which office he was annually re-elected until his death. Consult Huntington, S., (S. Huntington } (in Connecti¬ cut Magazine, Vol. VI, p. 247, Hartford 1900).

HUNTINGTON, William Edwards,

American university president : b. Hillsboro, Ill., 30 July 1844. He served in the Civil War as private in the 40th, and first lieutenant in the 49th Wisconsin Infantry. After the war, he studied at Wisconsin University, and pre¬ pared himself for the ministry, being ordained in the Methodist Episcopal Church in 1868. He held pastorates at Nahant, Mass. (1870-71) ; Roslindale (1872-74) ; Newton (1875-76) ; Cambridge (1877-79) ;

Boston (1880-82). He received the degree of Ph.D. at Boston Uni¬ versity in 1881, and in the following year be¬ came dean of the College of Liberal Arts. From 1904-11 he was president of that univer¬ sity, and dean of the graduate department

(1911-17).

HUNTINGTON, William Reed, Amer¬ ican Episcopal clergyman : b. Lowell, Mass., 20 Sept. 1838; d. 1909. After graduation from Harvard in 1859 he took orders in the Episco¬ pal Church, was assistant at Emmanuel Church, Boston, 1861-62, rector of All Saints,, Worces¬ ter Mass., 1862-63, and from 1883 until his death was rector of Grace Church, New York. He was prominent in the councils of the Epis¬ copal Church, an acknowledged leader of the Broad Church school of thought and author among other works of (A National Church) (1898); (Sonnets and a Dream) (1904).

HUNTINGTON, Ind., city, county-seat of Huntington County, on the Little River, and on the Chicago and Elkhart, the Wabash, C., B., & C. railroads, and the Fort Wayne- Northern Indiana Traction Line, about 26 miles southwest of Fort Wayne and 70 miles south¬ east of South Bend. It was settled in 1834, incorporated as a town in 1848 and received its charter in 1873. Its chief manufactures are boots and shoes, pianos, lime, cedar chests, fur¬ naces, rubber specialties and railroad cranes. It has railroad shops and wood-working fac¬ tories. The trade, in addition to the manufac¬ tures, is from crushed stone, lime-kilns near by and agricultural products. It is the seat of the United Brethren College. The public library has over 30,000 volumes. The city owns and operates the electric-light plant and the water¬ works. A commercial association of over 500 members is maintained. Pop. (1920) 14,000.

HUNTINGTON, N. Y, town in Suffolk

County on Long Island. It is on Long Island Sound and on the Long Island Railroad. Hunt¬ ington originally included the village of Baby¬ lon and other adjoining places. As first laid out, the area was 150 square miles. The first settlement was made in 1653, and the first deed of land given to actual settlers was made on 2 April 1653, on behalf of the Matinecock tribe of Indians, and conveying to the whites six square miles between Cold Spring and North- port. The consideration paid was six coats, six kettles, six hatchets, six Hiowes,® six shirts, 10 knives, six fathoms of wampum, 30 ˆmuxes,® and 30 needles. Additional lands were pur¬

chased in 1656-58. The early settlers were nearly all Puritans from England. The inhabit¬ ants of Huntington were among the first of the

colonists to protest against ˆtaxation without representation.® From the first agriculture was the chief occupation; but trade with the West Indies began at an early date. In 1675 Thomas Fleet was listed as owning 40 vessels. Whales were often caught along the south coast. Nathan Hale (q.v.) was captured in Hunting- ton. The place of capture is marked by a boulder, a shaft and a drinking fountain. The town celebrated its 250th anniversary on 4 July 1903. Large market gardens are in parts of the town, but much of it is a favorite residential suburb of New York. Pop. (1920) 13,893.

HUNTINGTON, W. Va., city and capital of Cabell County, on the Guyandotte Valley, the Chesapeake and Ohio and the Baltimore and Ohio railroads, and on the Ohio River, 300 miles southwest of Pittsburgh, and 160 miles northeast of Cincinnati. The city, named after the late Collis P. Huntington, was founded and incorporated in 1871. It is an important commercial and industrial centre and among its industrial establishments are the car manufac¬ turing shops of the Chesapeake and Ohio Rail¬ road, foundry and machine shops, lumber and planing mills, manufactures of woodwork, glass, stoves, bricks, pottery, ice, bottling and meat¬ packing establishments. The city is regularly laid out, has 64 miles of paved streets, water 99 plus pure, complete modern sewer system, aver¬ age temperature 54.5. ((Five Cent Gas® for manufacturing purposes — domestic 15 cents. Nine banks. The city is noted for its educa¬ tional establishments, which includes Marshall College (the State Normal School), Saint Ed¬ ward's College, numerous graded schools and a high school with a building that cost $300,000. Commission form of government. Pop. 50,177.

HUNTINGTON'S DISEASE, hereditary chorea, a comparatively rare disease, commenc¬ ing in middle life, was first described by Dr. George Huntington of New York in 1872. At times it is hard to distinguish from locomotor ataxia (q.v.). The offspring of adults thus affected are likely to have congenital or heredi¬ tary chorea.

HUNTSVILLE, Ala., city and county- seat of Madison County, on the Nashville, Chattanooga and Saint Louis and the Southern railroads, 96 miles due north of Birmingham, 97 miles due west of Chattanooga, 125 miles south of Nashville and 210 miles east of Mem¬ phis. The city is located in the heart of the famous Tennessee Valley, and is surrounded by a large and fertile agricultural cotton, fruit and stock-raising country, making it an import¬ ant commercial centre. As a cotton manufac¬ turing point, its spindles lead the South, and is second only to Lowell, Mass. Its nine cotton mills have 203,000 spindles, with 4,374 looms, the annual product of which amounts to $8,500,- 000 in sheet cloth, knitted goods, khaki cloth, drilling and printing cloth. These mills own 1,246 acres of land and have 34J/> acres of floor space, support and maintain three Y.

M. C. A. buildings, four libraries and trained nurses for the benefit of the employes. Besides these, Huntsville has machine and foundry shops, cot¬ tonseed-oil mills, hoop and heading factory, fibre and planing mills, brick plants, sanitary

dairy, mattress factory, broom factory, canning factory, wholesale grocery stores, wholesale seed store, wholesale millinery store, flour mills, bonded warehouses, private warehouses, car¬ riage works, wholesale and retail lumber yards, cottonseed and fertilizer plants; one of the largest nurseries in _ the world, and one of the largest nursery sections in the United States. The annual pay-roll is $2,018,100. The government of the city is by commission, this being one of the first cities of the State to adopt this form. The city has paved streets, gas and electric plants, electric car lines, paid fire department and municipal waterworks, with a daily capacity of 24,000,000 gallons. The city is well supplied with a number of private schools, and an excellent public city school with new modern building erected at a cost of $25,000. Four miles north of the city is located the Alabama Agricultural and Me¬ chanical College for Negroes. There are 11 churches, a city infirmary and other notable buildings, including Elks' home and theatre cost $110,000, Y. M. C. A. cost $75,000 and four banks.

The first settler here was John Hunt, a Vir¬ ginian and a soldier of the Revolution, who came to the <(Big Spring® in 1805, built his cabin, the first, nearby and in 1806 went back to Tennessee and brought his family, having lived in that State before coming to Alabama. In 1811 the town was incorporated by the Territorial legislature as Huntsville. The first State constitutional convention was held here 5 July 1819. The first legislature sat here and assembled on the first Monday in August 1820, and this was the first capital of Alabama. Pop. (1920) 8,018, but the city corporate limits have not been extended in 50 years ; estimated popu¬ lation including suburbs and mill district is about 20,000.

HUNTSVILLE, Canada, a town in Mus- koka County, about 150 miles north of Toronto on the Grand Trunk Railway. The waterworks and electric light plant are owned by the munic¬ ipality. The chief manufactures are lumber, leather and machinery. Huntsville is also a well-known summer resort, attracting numerous visitors. Pop. about 2,500.

HUNTSVILLE, Mo., city and county-seat of Randolph County, on the Wabash Railroad, 150 miles northwest of Saint Louis and 122 miles

northeast of Kansas City. It is situated in an agricultural and coal-mining region. Its prin¬ cipal industrial establishments are flour mills, machinery shops, rake and stacker factory. Its trade is chiefly in agricultural and mining im¬ plements, live stock and farm products. Poo

2,247.

HUNTSVILLE, Tex., city, county-seat of Walker County, on the International and Great Northern Railroad, about 200 miles southeast of Austin and 72 miles north of Houston. The first settlement was made about 1835. It is in a fertile agricultural region in which cotton, one of the large crops, is the staple of trade. The chief manufactures are cotton goods, cottonseed oil, cigars, steam-engines, foundry products, agricultural implements, furniture, ice, corn-meal, and wagons. Here are the home and grave of Gen. Sam Houston, and the grave of H. Yokum, the first historian of

Texas, which are of historic interest; the main State Penitentiary, and the Sam Houston State Normal School are located in this city. Pop.

(1920) 4,689.

HUNYADY, Janos, Hungarian statesman and soldier: b. about 1387; d. 11 Aug. 1456. Little is known of his early life, but while still a youth he entered the service of Sigismund. His prowess was recognized by that monarch and by his successor, Albert II. He was made royal councillor and received gifts of large estates. In 1438 he was made ban of Szoreny, on the border of Transylvania, a difficult post which necessitated constant vigilance to repel the Turkish incursions then at their high tide. During the civil war in which Hungary was engaged after Albert's death in 1439, Hunyady supported Ladislas III of Poland, defeated the Turks in several battles and in 1443 secured from them favorable terms of peace. After the battle of Varna, Hunyady was made regent during the minority of Ladislas Posthumus. He lost the decision over the Turks at Kossovo in 1448, was imprisoned by the Serbians for a short time when he was ransomed by the Mag¬ yars. In 1456 he successfully defended Bel¬ grade against the hosts of Islam. The plague broke out soon after the Turks raised the siege and Hunyady fell a victim to its ravages. To Hunyady is due the repulse of the Turk and the saving of Western civilization. He was also a great military genius; was the first to raise a regular army in the modern sense; and the first to make general use of tactics and strategy. Consult Teleki, J., (The Age of the Hunyadis in Hungary > (Perth 1857) ; Vam- bery, A., (Story of Hungary (New York 1894), de Chassin, J.,*

1859).

HUON PINE (Dacrydium Franklinii) , a timber tree of Tasmania, of the order Conifetfcs. It grows in swampy land, chiefly along the upper Huon River, and attains a height of 75 to 100 feet. It is exceedingly valuable as timber, being used extensively in ship building, because of its close-grained quality.

HUPA, hoo'pa, an Indian tribe of Atha¬ bascan stock, inhabiting the Hupa Valley Reser¬ vation, California. Their original settlement was also in this locally, along the lower part of the Trinity River. They number about 650. Consult Goddard, P. E., (Life and Culture of the Hupa (University of California Publican tions, Vol. I, 1903).*

HUPEH, hti'pa, China, a province in the central part, bounded on the north by Honan, east by Ngan-hui, south by Hunan and west by Shensi and Szech'uen. Irrigation and means of transportation are supplied by the Yang-tse River which traverses the southern part, and the Han, which, after many windings, joins the Yangtsze Kiang at Hankow. Agriculture is extensively carried on, the principal products being cotton, wheat, tea, tobacco, beans and rape seed. The country is a level, marshy plain, with

some mountains of the Ta-pa-shan and Fu-miu groups in the north. The principal ports are Hankau, Ichang and Shashi, and the capital is Wuchang on the Yang-tse, opposite Hankow. Hanyang on the Han has extensive iron and steel works, utilizing the products of the great coal fields and iron mines of the

province. Area, 71,410 square miles. Pop. (estimated) 21,260,000.

HURA, hu'ra, a genus of euphorbiaceous plants of which the best known is Hura crepitans, common in the West Indies and in the American tropics. The stalk contains a milky juice; the leaves are acuminate, thick and heart-shaped. The seeds are contained in a tough, large, woody capsule, shaped like an apple flattened at the ends, and are embedded in carpels, of which there are from 12 to 15, surrounding a common axis. From the use of the hollowed fruit as a sandbox, the plant be¬ came known as the ((sandbox tree.))

HURLBUT, Jesse Lyman, American Methodist Episcopal clergyman: b. New York City, 1843. After studying at Wesleyan Univer¬ sity, he held successive pastorates at Newark, Montclair, Paterson, Bloomfield and other towns in New Jersey. He rendered important service in the Sunday school work of his com¬ munity, was secretary of the Epworth League, and with Dr. J. H. Vincent was active in the superintendencv of the Chautauqua Literary and Scientific Circle. From 1909-14 he was district superintendent of the Newark district. His publications include (Manual of Biblical Geog¬ raphy) (1882) ; (Outlines in Old Testament History> (1890);

HURLEY, Wis., town,, capital of Iron County, on the Montreal River, at the State boundary, opposite Ironwood, Mich., 49 miles by rail east by south of Ashland, on the Chicago and North Western, the Milwaukee, Lake Shore and Western and the Wisconsin Central rail¬ roads. It is in a rich iron mining district and has saw-mills and considerable lumbering in-trests. Pop. 3,000.

HURLING, an ancient field sport, to which the modern game of hockey owes its origin. A field 150 X 84 yards is required, marked across at 21, 50 and 75 yards from either end. The goals at the ends are indicated by posts, 21 feet apart, connected by a crossbar at a height of eight feet. Twenty-one feet from each goal post is a point post, 16 feet high. The im¬ plements for the game are the ball, made with a cork centre, bound with wool and cased in leather, five inches in diameter and weighing seven

ounces ; and the hurley stick, similar to a short ice-hockey stick, held in the left hand. Teams are composed of 17 players. The object of the game is, as in hockey, to drive the ball between the opponent's goal posts. The ball, or ((slitter)) may be caught by the hand, but must be played with the stick. In a locked play, the ball may be moved with the foot. The game is played in Ireland, where it had great vogue formerly.

HURON, hu'ron, an Indian tribe. See Wyandot; Indians, American.

HURON, S. D., city and county-seat of Beadle County, on the Chicago and North¬ western and Great Northern railroads; also on

the proposed line of the Duluth, Huron and Southern Railroad. Located at the centre of population for the State. Huron is surrounded by rich, fertile farms producing corn, alfalfa, hogs and. cattle, also some dairy oroducts and small grain. The city is a distributing point of considerable importance, being the division point of the Chicago and Northwestern roads go- mg in all four directions, and is the home of the State Fair. Huron College, one of South Dakota's leading colleges, having $500,000 en¬ dowment, is also located here. Huron has commission form of government. Pop. 8,302.

HURON, Lake, one of the Great Lakes on the boundary between the United States and Canada. Canada is on the north and east, Canada and Michigan on the south and Michi¬ gan on the west. It receives the waters of Lake Superior through the Saint Mary's River, and the waters of Lake Michigan through Straits of Mackinac, and discharges its waters through Saint Clair River into Lake Saint Clair (q.v.). Its general direction is northwest and southeast. It length is about 250 miles, its average width about 155 miles and its area 22,322 square miles. This area includes Georgian Bay and North Channel. It is 581 feet above the sea, the same as Lake Michigan, 21 feet below the level of Lake Superior. The depth of the waters be¬ yond the land shelf is from 200 to 750 feet; and along the coast, from 20 to 60 feet. The waters of the whole lake are remarkably clear, and in the northern part cold. In summer the temperature of the surface varies from 52° to 58° and of the bottom from 42° to 52°.

The chief arm of the lake on the east coast is Georgian Bay, which indents. Ontario ; and on the west, Saginaw Bay, in Michigan. Other indentations on the west coast are Thunder, Presque Isle and Hammond bays. A number of short streams flow into the lake from Michi¬ gan, the largest of which are Thunder Bay, Au Sable and Black rivers. The lake receives from Canada a large amount of water from lakes Nipissing, Simcoe, Muskoka, and several other small bodies which discharge their waters through short rivers into Georgian Bay.

There are no large islands in the main body of the lake, but on the north and northeast shores are a number of small islands, composed chiefly of glacial deposits and limestone. Grand Manitoulin and Cockburn islands, together with several small islands, belong to Canada. Drum¬ mond, Mackinac and Bois Blanc islands belong to the United States. The long group of islands in the northeast are separated from the main¬ land of Ontario by North Channel. The greater part of the shore line is low and at one time the country on the west was well wooded. Regular terraces showing different water levels, deposits of fine sand and clay containing fresh¬ water shells, extend inland fully 20 miles and at heights above the lake to 100 and 200 feet. These wide beaches show that at one time this lake, as the other lakes, must have been much larger than at present. The area of the whole basin o{ the lake, including the surface of the water, is about 74,000 square miles. Some pic¬ turesque cliffs along the southeastern coast rise to a height from 80 to 150 feet. The harbors are nearly all protected by breakwaters. The chief ports on the west coast are Cheboygan, Alpena, Tawas City, Bay City (at the head of Saginaw Bay) and Sandbeach. Mackinaw and

Saint Ignace, at the entrance to the Straits of Mackinac, are important ports. A railroad line from Detroit to Mackinaw is almost parallel with the west coast. There is an abundance of fish in this lake ; one kind, the whitefish, is most important.

Violent storms, to which the lake is subject, make navigation dangerous. During the sum¬ mer months, from the first of May to Decem¬ ber, there are but few storms. Lake Huron as a factor in commercial enterprises is most import¬ ant; it is one of the great waterways of the world, and the shipping on its waters is growing in amount and importance. The great bulk of the iron ore from the Lake Superior district is now brought to the Cleveland and Pittsburgh districts; the wheat and flour from the North¬ west comes east, and nearly all are carried over Lake Huron ; and a large proportion of the products of the East which are sent to the Northward pass over this same lake. The Saint Mary's Falls Canal, ((The Sault or (Soo5 Canal,® has been the means of greatly increasing the travel and traffic on Lake Huron.

As early as the 17th century this lake was crossed by the French missionary, Pere Mar¬ quette, who, in 1668, established a mission at Sault

Sainte- Marie, Saint Mary's Falls. In 1673 he was in charge of the mission at Mackinaw, from which place, on 17 May 1673, he departed with Joliet and others in search of the <(Big River.® For amount of shipping and tonnage see Great Lakes. Consult Morton, E. P., (Lake Huron and the Country of the Algonquins) (Chicago 1913).

HURONIAN SERIES, the name first given by Sir William Logan to a series of strata lying in the vicinity of Lake Huron. They are very thick and consists chiefly of quartzite with great masses of greenish chloritic schist, sometimes containing pebbles derived from the Laurentian rocks. No organic remains have yet been found in them, and limestones are subordinate. They lie uncon formably on the Laurentian. As the term is now used, the Huronian makes up the lower part of the Algonkian system and is divided into Lower, Middle and Upper Huronian. The latter is also called Animikean. The Middle Huronian con¬ tains the important iron ores of the Marquette Range in Michigan, and the Upper Huronian is the ore horizon of the Mesabi Range in Min¬ nesota. The Lower Huronian conglomerates of Ontario are believed by many to be of glacial origin, as indicated by striated boulders within the main mass of the rock. If so, it is the earliest record we have of glaciation during the great geologic past. See Geology.*

HURRICANE. See Cyclone; Storms; Tornado; Typhoons.

HURRICANE CLIFFS. See Grand Wash Cliffs.

HURST, herst, Hal, English artist : b. Lon¬ don, 26 Aug. 1865. He started on his artistic career by drawing eviction scenes in Ireland. He emigrated to the United States, and joined the staff of the Philadelphia Press; afterward at New York, Paris and London he contributed to various journals and periodicals. He became a painter, studying at the Art League in New York and under Julian at Paris. Among his paintings are (The Siren) (1896); (The Cap¬

ture) (1898) ; and (The First Court of King Edward VII.5

HURST, John Fletcher, American Meth¬ odist bishop: b. near Salem, Md., 17 Aug. 1834; d. Washington, D. C, 4 May 1903. He was graduated from Dickinson College, Carlisle, Pa., in 1854, studied theology at Halle and Heidel¬ berg, Germany, and after holding pastorates in New Jersey and Staten Island became bishop in 1880, and chancellor of the American University 1891-1902. He was one of the leading men in his denomination and of much prominence as a writer. Among his many works mav be cited lit¬ erature of Theology) ; (History of Rationalism) (1865); (Martyr to the Tract Cause) (1873); 'Life and' Literature in the Fatherland5 (1874) ;

(Outline of Church History5 (1875) : (Our Theological Century5 (1876) ; (Bibliotheca

Theologia5 (1883) ; (Short Histories of the Church5 (1888-90) ; (Short History of the

Christian Church5; 'Indika: the Country and People of India and Ceylon5 (1891) ; (History of the Christian Church5 (1897) ; 'History of Methodism5 (1904). Consult the (Life,5 by Osborn (1905).

HUS, John. See Huss, John.

HUSBAND AND WIFE. The legisla¬ tion of the past 50 or 60 years, beginning with the Married Woman's Property Acts of the 40's in the last century, have profoundly affected the rights and obligations of the parties to a marital contract, with respect to each other as well as with respect to the world at large. But the new legislation has been of the greatest diversity in character so that it is impossible to make a statement of the law that will exactly fit every locality. Moreover, the general rule that a statute does not abrogate the common Jaw, unless such is clearly and irrefragably the intent thereof, makes a knowledge of the ante¬ cedent legal rules essential to an understanding of those which have superseded them in whole or in part. It is the duty of husband and wife to adhere to the marriage contract and cohabit; the husband having the right to determine the place of domicile. If he changes the same the wife must go with him; though in this country the husband is obliged to show a reasonable cause for removing to another abode in order to obligate the wife to follow him. The un¬ reasonable refusal of the wife to follow would be an act of desertion. It is the duty of spouses by mutual forbearance to make a living to¬ gether tolerable. Blackstone would find few subscribers nowadays to his dictum that a hus¬ band may correct his wife by subjecting her to restraint and even to ((moderate® corporeal pun¬ ishment. Such restraint and chastisement would have to be very moderate to satisfy modern ideas of ethical or legal propriety. On the other hand, if a wife is a woman of bad temper and provokes her husband's ill-usage, she will not be permitted by law to separate herself from his bed and board; "her remedy in such case is by bettering her own manners.® (Warring v. Warring, Haggard Consistorial Reports). If the husband drives his wife from his house by "conduct so abominable that no decent woman would live under the same roof with him,® her departure would not be desertion. Incontinence, of course, would justify the innocent party in leaving the guilty one, and no legal right would be forfeited in consequence of such departure.

HUSBAND AND WIFE

Either spouse has a cause of action against any one who entices away or estranges the affections of the other. In England either the husband or the wife may bring suit against the other for a restitution of conjugal rights; actions of this character have not obtained judicial favor in this country, however.

At common law the husband was responsible for the torts of his wife even when committed before marriage. In theory of the law the hus¬ band stood in the position of a universal suc¬ cessor; having succeeded, on marriage, to all the rights of his wife, whether to things in possession or choses in action, he was assumed to have succeeded as well to her obligations, whether ex delicto or ex contractu. So the hus¬ band alone could proceed to recover damages for an injury suffered by his wife and was solely responsible for her torts during cover¬ ture. If the wife slandered another lady or horsewhipped a blackguard, the husband had to pay the damages. When a husband thus liable died, the right of action died with him and could not be pursued against the surviving widow or the husband's estate. Even for mis¬ demeanors of a wife, not punishable by im¬ prisonment, the husband alone could be held and prosecuted — and would be compelled to pay the fine. At the present time, and in nearly all jurisdictions, the husband's liability for the torts and misdemeanors of his wife is more narrowly circumscribed, and is limited to those committed in his presence ; the presumption of law being that he coerced or commanded the wife to do what she did, or, at least, that he encouraged or connived in the wrong. The husband, however, can defend himself by show¬ ing the wrong to have been done by the wife against his will. As to higher crimes the com¬ plicity of the husband was also presumed from his presence. The suggestion, however, to ab¬ solve the wife from punishment for a felony committed presumptively under coercion from, or at the command of, the husband never found favor. When a married woman commits treason no presumption of coercive influence over her was deducible from her husband's participation in the crime, because the peculiar dangerousness of this offense to the state re¬ quired from all persons connected with the act the fullest responsibility for their own part therein. Where a man and wife are charged with keeping a brothel, coercive influence from the husband will not be presumed, because in such a case ((the wife probably would be the chief manager, and to hold her guiltless would be absurd.® The presumption of the guilt of the husband from his presence at the commission of a criminal act by the wife could always be re¬ butted, while, nowadays, his partnership in crime would have to be proven like that of any other accomplice. It was a general rule of the com¬ mon law that husband and wife could not bear witness against one another in any action, civil or criminal. The rule was mandatory, not merely a rule of

privilege — and was grounded on public policy, which would not be served by the disruption of conjugal relations and the disturbance of domestic tranquillity. From this rule an exception was again made in trials for high treason, in which either party to the mari¬ tal contract could become a competent witness against the other; and where the testimony of the wife was of necessity required, as in the

case of personal violence or cruel treatment charged against the husband, she would be a competent witness to prove the facts. In civil actions a wife might testify against her hus¬ band to anything she had done in the capacity of his agent. Modern legislation has brushed most of these disabilities and distinctions aside; and husbands and wives are permitted, and may be compelled, to testify against each other in nearly all kinds of legal proceedings. They are not competent witnesses in suits for divorce on the ground of adultery, nor in actions for criminal conversation, except to prove the fact of marriage. They are permitted but cannot be compelled to testify against each other in crimi¬ nal actions ; and they will neither be compelled nor permitted to disclose anything communicated in the confidence of the marital relation. A husband or wife giving harbor, aid and com¬ fort to a spouse who has committed a crime does not thereby become an accessory after the fact. The duty of the husband to protect im¬ plies his right to defend the wife from personal injury; and a battery committed by either in defense of the other is not actionable.

It is the duty of the husband to support and maintain the wife as long as she lives with him. And from this duty the husband is not relieved, though the wife have independent means quite adequate to her needs. The obligation of the husband is to provide necessaries,® and to ob¬ tain these the wife may contract debts which the husband by law is bound to pay. For more than 200 years the principal laid down in the leading case of Manby v. Scott — namely, that a husband is not bound by his wife's contracts, unless she acts by his authority — has controlled the decisions of the courts. The wife in the case had lived apart 20 years and returned ; the husband had refused to receive her and forbid¬ den tradesmen to trust her. The long separa¬ tion t countervailed any presumption of an au¬ thority conferred on the wife to contract even for necessaries. Such authority will be pre¬ sumed to have been given only when the rela¬ tions apparently are normal and the parties live together as husband .and wife. But the fact of cohabitation as man and wife will not raise a presumption of the husband's assent to the pur¬ chase by the wife of non-essentials. This is illustrated by the triumphs over the Philistines of the gentleman who figured as defendant in the actions of Montagu v. Benedict, and Seaton v. Benedict, reported with much humor in Shirley's (Leading Cases in Common Law Mrs. Benedict, who appears to have been a woman of extravagant tastes, contracted a sub¬ stantial debt with the plaintiff, Montagu, for jewelry. In due course the jeweler presented a substantial bill, which Mr. Benedict declined to pay; and the court held that, ((tradesmen, who are about to trust a married woman for what are not necessaries, ought in common prudence to inquire if she has her husband's consent for the order.® Mrs. Benedict con¬ tinued to ((walk on primrose path® and by the way dropped in at Seaton's millinery establish¬

ment, whence she took, with the gladly-given consent of the proprietress, large quantities of fine laces, scarves, gloves, etc., on the credit of her husband. The latter had always liberally furnished his wife with apparel or, what amounts to the same thing, with money to buy what she required, and he knew nothing of her

clandestine dealings with Seaton. This person, confident in the correctness of her assumption that (

In theory of the common law the personality of a woman, on her marriage, was merged in that of the husband. The twain had become one person with the husband as head. With respect to legal rights in property this merger

was complete. The husband, on marriage, ac¬ quired absolute title of the wife's personal property, not held in trust ; it became his as completely as if he had bought it, and could never again become hers, unless he gave it to her by will. In the event of the husband dying, without having made a will, the wife's per¬ sonal property did not revert to her but went to his estate. Choses in action also passed to the husband, who alone could sue for a recovery. Unless the personal property of the wife was reduced to his possession during his lifetime, however, it remained her own, and would not pass to the husband's executors or administra¬ tors,, nor become chargeable with the payment of his debts or legacies. On the death of the wife, however, the surviving husband was en¬ titled to the administration of personal prop¬ erty that had remained in her possession, and he was unaccountable therefor to her next of kin. A gift or sale of personal property from the wife to the husband, or vice-versa, was a nullity, of course. The wife, in such case, would merely have transferred to the husband that which was already his; while he would im¬ mediately and again become the legal owner of the thing that had just been transferred to the wife. The wife, during coverture, gained noth¬ ing from her marriage so far as the personal property of the husband was concerned. In case of his death intestate, the wife surviving, she was entitled to one-third of his personal estate if there were children, or to one-half if there were none; but this right could be de¬ feated by the testamentary disposition of the husband. Besides an absolute right to the per¬ sonal property of the wife the husband, on mar¬ riage, obtained an usufructuary interest in all of the wife's real estate during the period of their joint lives; he was entitled to collect and use the rents and profits thereof. On the death of the wife, and if there had been any living children born of her husband, the latter became entitled to the possession, and the enjoyment of the income, for life of all

his wife's real prop¬ erty (estate by curtesy) even though no child of the marriage survived. By no act of the wife could the husband's estate by curtesy be diminished or destroyed. A wife by her mar¬ riage acquired a right of dower. This was a life interest, to the extent of one-third of its value, in all real estate owned by the husband at the time of the marriage or acquired by him subsequently, whether by purchase, gift, inherit¬ ance or process of law. The right qf dower could not be defeated by a conveyance of the property by the husband during the period of coverture nor by his will ; and it attached to all real property owned by the husband at any time during his married life. The right of dower could be terminated only by a release from the wife, or the acceptance by her, in lieu of dower, of a provision made for her during his life', or by his will, out of the husband's individual' estate. Dower could be admeasured, on the basis of its cash value as an annuity, and the owner of. the right could thus be satisfied by a payment in gross. Conveyances of, real estate from husband to wife and vice-versa, if direct and without intervention of a trustee, are void mW; though it has been held also that the effect of such a conveyance would be to create a joint estate for life, the surviving party taking the whole property on the death of the other.

HUSBAND AND WIFE

525

While the common law rigorously adhered to the theory of the unipersonality of husband and wife, in equity the separate existence of the wife was abundantly acknowledged. She might own separate property, real as well as personal, free of any control on the part of her husband. Her right to the sole use and pos¬ session during coverture of property owned by her while single was usually effectuated by an ante-nuptual settlement ; but property could also pass to her after marriage, for her sole and separate use, from any person and in any man¬ ner, by will, deed or gift — and it would be more absolutely her property than her hus¬ band's property was his. Sometimes the legal title to a married woman's separate estate was held by trustees, but the beneficiary of the (

The legal status of married women before the emancipatory legislation of the past half century was not quite as degraded as has some¬ times been represented. The statutory changes are, to a large extent, matters of form. Under the statutes passed in the United States and in England, it is true, the husband, on marriage, acquires no rights whatever in the personal property owned by the wife at the time of mar¬ riage or acquired by her in any manner there¬ after. It remains her separate property. But, as we have seen, even before the passage of this legislation both personal and real property could be owned separately by a married woman if she or her

grantors and devisors took the precaution of converting it into a "use.® Under the new law a man, on marriage, acquires no right in his wife's real estate during her life¬ time ; but he still has a life estate by curtesy which vests on the wife's death. Women, as before, acquire a right of dower in their hus¬ band's real estate when they marry; in this respect, as with respect to estates by curtesy,

the law has not been altered. The wife, by her marriage, now acquires as little as she did un¬ der the old law with regard to the husband's personal property. If the husband dies intes¬ tate she gets one-third or one-half, or whatever share thereof the statutes of the State of her domicile may award her; if he chooses to make a will in favor of anybody else, even his "affinity,® the widow has no remedy at law nor in equity. There is little comfort in the reflec¬ tion that she fares neither better nor worse than her sisters of a by-gone age. The hus¬ band's right to administer a deceased wife's personal property and convert it to his own use may be defeated by a will. Moreover, there are statutes of distribution fixing the rights of the next of kin of an intestate wife. The American statutes uniformly permit married women to hold separate property and conduct business as (

bill of goods, which she received and delivered to her husband to be used by the latter in his business. An action against her was dismissed, because the debt was not contracted by the wife in a business separately conducted by her, and her separate estate was not shown to have benefited by the transaction. This defect of the law has been remedied in many places. The English Married Woman's Property Act of 1870 laid down the more equitable rule, that the wife's separate estate is answerable for all debts contracted by her except as her husband's agent. To sum up the law, neither husband nor wife have any rights in the personal property of either that cannot be defeated at the caprice of the other; their interest in each other's real property is, an 'estate by curtesy to the hus¬ band if he survive, and a right of dower to the wife if she survive. Beyond this the wife has the right to be supported, which may be enforced either by the decree of an equity court for her separate maintenance, by actions in debt against the husband for necessaries, or by a quarter sessions court in a criminal pro¬ ceeding for desertion. There remains to be mentioned the widow's right to her (

Stephen Pfeil.

HUSBANDRY, Patrons of. See Gran¬ gers.

HUSH MONEY, a term used in English law, signifying a sum of money or its equiva¬ lent, given or offered to another in order to induce him to refrain from giving evidence or prosecuting an offense. Such a contract is not considered a penal offense at common law, but is illegal and cannot be enforced. The offense comes under the crime of compounding a felony and the punishment is imprisonment.

HUSHI, hoo'she, Rumania, capital of the department of Falciu 90 miles north of Galatz, about 10 miles west of the Pruth, and 40 miles southeast of Jassy. An episcopal see, Hushi has an interesting 15th century cathedral and a theological seminary. There is active trade in cattle. Hushi was the seat of the Treaty of Pruth between Russia and Turkey in 1711. Pop. 15,500.

HUSI. See Hushi.

HUSKISSON, hus'ki-son, William, Eng¬ lish statesman and financier: b. Birch-Moreton, Worcestershire, 11 March 1770; d. 15 Sept. 1830. He was sent to Paris in 1783 to study medicine. In 1789 he became an enthusiastic sympathizer with the French Revolution, was present at the taking of the Bastille and joined the Club of 1789, instituted the following year. He made a speech at the club against the proposed crea¬ tion of paper money, and withdrew from it when the assembly decreed the issue of assignats. His views of the Revolution afterward under¬ went a change. In 1790 he was appointed sec¬ retary to the British Ambassador; and when the Ambassador was recalled in 1792 he returned to England, and in 1795 he became Under-Secretary

for War and the Colonies. In 1796 he was elected member of Parliament for Morpeth. He resigned in 1801, and returned in 1804. In Pitt's administration formed in this year he became Secretary of the Treasury, and during the Whig ministry that succeeded. Pitt's death was an ac¬ tive member of the opposition. In 1807 he re¬ sumed his post as Secretary of the Treasury, which he resigned in 1809. In 1823 he was elected Member of Parliament for Liver¬ pool, and appointed president of the Board of Trade and treasurer of the navy. From 1827 to 1828 he was Secretary of State for the Colonies. He was killed at the opening of the Liverpool and Manchester Rail¬ way, 15 Sept. 1830. He seldom spoke in Par¬ liament except on commercial or financial sub¬ jects, on which he was an authority as also on subjects affecting India. He was a strong sup¬ porter of Catholic emancipation, and he antici¬ pated Peel in his advocacy of a free-trade policy. Lord Melbourne regarded him as the greatest practical statesman he had known. A collective edition of his speeches and a memoir appeared in 1831.

HUSS, or HUS, John, Bohemian religious heresiarch : b. Husinec, Southern Bohemia, about 1369; d. Constance, Switzerland, 6 July 1415. He studied at the University of Prague and in 1398 began to lecture on theology and philosophy. In 1401 he was made dean of the faculty of philosophy, and was made rector of the university (1400). Since 1391 he had been acquainted with the writings of Wiclif, and his denunciations of the indulgences, of masses for the dead, of auricular confession, etc., alarmed Archbishop Stynko of Prague, who had 200 volumes of Wiclif's writings burned (1410) in the archiepiscopal palace, and the preaching of his doctrines in Bohemia prohib¬ ited. Huss appealed to the Pope, John XXIII, who summoned him to appear at Bologna. Huss refused to appear and was in consequence ex¬ communicated, and Prague threatened with an interdict as long as Huss should remain in it. Wenceslas, the king, alarmed by this menace, thought to bring about peace; and at his de¬ mand, Huss made an orthodox profession of faith in 1411. But the quarrel broke out again when Huss and his friend Jerome publicly con¬ demned the papal indulgences granted for the crusade against Ladislas of Naples. Huss was again excommunicated and Prague interdicted. He now retired to Husinec to the protection of his feudal lord and here he wrote his books 'On the Six Errors and (On the Church,* in which he attacks transsubstantiation, the belief in the papal primacy and the saints, the efficacy of the absolution of a vicious priest, uncondi¬ tional obedience to earthly rulers, and makes the Scriptures the only rule in matters of reli¬ gion. In the meantime the Council of Con¬ stance had convened in 1413. Huss was sum¬ moned to this council to render an account of his doctrines. The Emperor Sigismund granted him a safe conduct to the council. After sev¬ eral examinations of his doctrines, and his per¬ sistent refusal to retract the points which were regarded as heretical, he was sentenced to death and burned 6 July 1415. The Hussite War fol¬ lowed. See Hussites. The best editions of his works are by K. J. Erben (1865-68); F. Pal- acky (1869) and by W. Flojshaus (1904). Con-*

suit also Neander, J. A. W., (Allgemeine Ge- scliiclite der christlichcn Religion und Kirche) (Eng. trans. by J. Torrey, 1850-58) ; von Lech- ler, G., cWiclif und die Vorgeschichte der Reformation) (Eng. trans. by P. Lorimer, 1878) ; the (Acta} of the Council of Constance (in P-Labbe, / Concilia, > Vol. XVI, 1731). Good biographical material is contained in Denis, F., (Huss et la guerre des Hussites } (1878) ; Liitzow, F. H. H., (Life and Times of Master John Hus) (New York 1909) ; Lea, H. C, (History of the Inquisition (Vol. VIII, New York 1888) ; Creighton, M., c History of the Papacy0 (1897).

HUSSARS, huz -zarz', light cavalry troops, originally raised by Matthias Corvinus in 1458 to fight against the Turks. Of the several possible origins suggested for the word, the most generally accepted is that it is derived from the Magyar word ˆhusz,® meaning atwenty,)) the troops having been raised by selecting every twentieth man in the community. The effectiveness of these light-mounted troops recommended their adoption by other European armies; and they became part of the British cavalry in 1805. The peculiar uniform of the Hungarian hussar with its characteristic loose coat, hanging from the left shoulder, was adopted with considerable modification by the other European light cavalry.

HUSSEIN KAMIL PASHA, hus-san ka'mel, first sultan of Egypt : b. Cairo, 20 Dec. 1853; d. there, 9 Oct. 1917. He was the second son of the Khedive Ismail and brother of the late Khedive Tewfik (d. 1892). The latter was succeeded by his son, Abbas Hilmi (q.v.), who reigned till 18 Dec. 1914, when the British government deposed him for having <(adhered to the King's enemies, w namely, intriguing with Turkey and Germany. A British protectorate was proclaimed over Egypt and Hussein Kamil became sultan. After attending native schools he was sent to Paris in 1867 to complete his education. There he was the guest of the Emperor Napoleon III and the playmate of the ill-fated Prince Imperial, who was killed in the Zulu War, 1879. He accompanied his exiled father to Naples, but was permitted to return to Egypt in 1883. Fully appreciating the bene¬ fit of the British occupation to his country, he became strongly pro-British in sentiments and was a friend and adviser to Cromer, Gorst and Kitchener. Two attempts were made to assassinate him in 1915; in November a court- martial in Constantinople sentenced him to death for alleged treachery. He had gained a wide experience in administrative positions, personally attended to all public affairs and freely gave advice to all who sought it. He was twice married and had one son and four daughters. His youngest brother, Prince Ah¬ med Fuad (q.v.), succeeded him.

HUSSEIN NAZIM PASHA, Turkish

general: b. Constantinople, 1848; d. 1913. After a preliminary education at native schools, he was sent to the military school at Saint Cyr, Paris. By successive steps he became chief of the Turkish staff during the war with Rus¬ sia. His sympathies were completely with the revolutionary element in Turkey and this brought him into conflict with the government repeatedly. He was thrown into prison for a five-year sentence, but managed to escape, and.

joining the Young Turks, took an active part in planning the Revolution of 1908. His skill recommended him to the royal party and in 1909 he was appointed Minister of War under Kiamil Pasha. Under threat by the Young

lurks he was forced to withdraw. He sub¬ sequently served as Vali at Bagdad, where he proved himself a capable and efficient governor; was made chief of the army council in 1911 and Minister of War under Mukhtar Pasha. Dur¬ ing the Balkan War he distinguished himself by the vigor and brilliance of his moves. His early adherents, the Young Turks, assassinated him in 1913.

HUSSITES, followers of the Bohemian re¬ former and martyr John Huss (q.v.), who to avenge his death on the treacherous Emperor Sigismund and the clergy involved the empire in one of the most terrible wars of history (1420-34). Instead of suppressing the teach¬ ings of Huss, the auto-da-fe of Constance was the slogan of union for multitudes of all classes, including a league of 450 Bohemian nobles. Their symbol was the chalice, the withdrawal of which in the celebration of the Lord's Supper had been a cause of contention. The wavering and temporizing King Wenceslas was compelled in 1417 to grant the use of many churches for the celebration of the sacrament in both forms. After his death, 13 Aug. 1419, the inquisitorial violence of the cardinal legate, John Dominico, kindled the fire of insurrec¬ tion. The people could not overthrow the claims of the hated Emperor Sigismund to the vacant throne and, bent upon the extirpation of so-called heresy, faithless in treaties, but un¬ equal to contend with the activity of the Hus¬ sites and the genius of their generals Ziska and Procopius, for 15 years Sigismund saw his kingdom in a state f utter anarchy. The Hus¬ sites comprised three parties (a) Calixtines or Utraquists (q.v.); b. Orphans; and (c) Tabor- ites. Overtures tending to conciliation were made by the Council of Basel in 1431 which were listened to by the Calixtines who were desirous of peace. On 20 Nov. 1433 the com¬ promise or compact of Prague was made, which, however, was not accepted by all parties and hostilities recommenced, but ended by a complete victory of the Calixtines and Catho¬ lics under Meinhard of Neuhaus, at Bomisch- brod, 30 May 1434. The Orphans and Taborites deprived of political influence and religious freedom finally merged in the fraternity of Bohemian and Moravian Brethren (q.v.), which arose in 1457. Consult Berger, W.,

(Johannes Hus und Konig Sigmund) (1871); Denis, E., (Huss et la guerre des Hussites) (Paris 1878) ; Krummel, L., (Geschichte der bohmischen Reformation (Gotha 1866) ; ib., (Utratisquen und Taboriten) (Gotha 1871); Lotzone, Count, (The Life and Times of John Hus> (London 1909).*

HUSTING, the name applied to an ancient court held in the city of London. It was the County Court and listened to pleas of land, common pleas and appeals from sheriffs. The court in its original sense no longer exists, although a hustings court is sometimes held for registering gifts to the

municipality. In its present sense, the word denotes the place where members of Parliament used to be nom¬ inated, before the Ballot Act of 1872 rejected

the form of nominating openly. From this it has come to be applied to any electioneering platform. In the United States a hustings court existed in many towns in Virginia which were settled during the 18th century. The establishment of such a court is recorded in the charters of Norfolk and of Richmond.

HUTCHESON, Francis, Irish philoso¬ pher: b. Drumalig, Ireland, 8 Aug. 1694; d. Glasgow, 8 Aug. 1746. He was educated at theˆ University of Glasgow, taught in Dublin 1717-29, and in 1729 became professor of philos¬ ophy at Glasgow. In 1725 the first edition of his celebrated < Inquiry into the Ideas of Beauty and Virtue ' appeared without his name. In 1728 he published his (Treatise on the Pas¬ sions, 5 often reprinted and admired even by those who dispute the soundness of its philos- ophv. In 1775 was published from his MSS. a 'System of Moral Philosophy. 5 The philos- . ophy of Hutcheson is based primarily on that of Locke. His particular theory of conscience as a distinct sense was attacked by Richard Price in a celebrated work, Principal Ques¬ tions and Difficulties in Morals. 5 The views of Hutcheson and Price are reviewed in Jouffroy's 'Cours de droit naturel.5 Hutcheson was a writer of considerable originality who stimu¬ lated the spirit of inquiry in Scotland and is justly regarded as the precursor of Reid and the founder of the Scottish school in philos¬ ophy. An admirable resume of his works is contained in Cousin's (1902); Scott, (Francis Hutcheson1

(1901).

HUTCHINS, Harry Burns, American uni¬ versity president: b. Lisbon, N. H., 8 April 1847. He received his education at the Uni¬ versity of Michigan, where he subsequently became assistant professor of history and rhetoric (1872-76), Jay professor of law (1884-87). He then was called to the chair of law at Cornell University, remaining until 1894. In the following year he resumed his connection with the University of Michigan, serving as professor of law, dean of the law department (1895-1910), acting president (1897— 98), and from October to June 1910, on which latter date he became president. Dr. Hutch¬ ins received the degree of LL.D. from the University of Wisconsin (1897), Wesleyan (1916) and Notre Dame (1917). He is also a member of the advisory board of the

Michi¬ gan Law Review and has revised and anno¬ tated, under appointment from the Supreme Court, five volumes of (Michigan Supreme Court ReportsP He also edited the American edition of Williams' book on

HUTCHINS, Thomas, American geog¬ rapher: b. Monmouth, N. J., 1730; d. Pitts¬ burgh, . Pa., 28 April 1789. In early life he en¬ listed in the English army and saw active serv¬ ice in the. French and Indian War. He was in England in 1779 and was arrested in London

and thrown into prison as an advocate of American independence. He escaped to France, from which country he sailed to America, joined the Continental army and was appointed geographer-general by General Greene. Among his published works are (Topographical De¬ scription of Virginia, Pennsylvania, Maryland and North Carolina5 (1778); (History, Narra¬ tive and Topographical Description of Louisi¬ ana and Western Florida5 (1784).

HUTCHINSON, Anne, American reli¬ gious leader, the founder of the Antinomian party in the New England colonies: b. Lin¬ colnshire, England, about 1590; d. Westchester County, N. Y., August 1643. She was the daughter of a Lincolnshire clergyman. In England she was interested in the preaching of John Cotton and her brother-in-law, John Wheelwright, and it was her desire to enjoy the ministry of the former which induced her to follow him to New England. She arrived in Boston with her husband 18 Sept. 1634, was admitted a member of the Boston church 2 November and rapidly acquired esteem and in¬ fluence. She instituted meetings of the women of the church to discuss sermons and doctrines, in which, with a ready wit, bold spirit and im¬ posing familiarity with the Scripture, she gave prominence to peculiar speculations which even on her voyage had attracted the attention and caused the displeasure of her fellow passengers. Such were the tenets that the person of the Holy Spirit dwells in every believer and that the inward revelations of the Spirit, the con¬ scious judgments of the mind, are of paramount authority. She had been two years in the country before the strife between her sup¬ porters and her opponents broke out into public action. Among her partisans were the young governor, Vane, Cotton, Wheelwright and the whole Boston church with the exception of five members, one of whom was the associate pastor, Wilson, while the country clergy and churches were generally united against her. ftThe dispute,55 says Bancroft, ((infused its spirit into everything; it interfered with the levy of troops for the Pequot War; it influenced the respect shown to the magistrates, the distribu¬ tion of town lots, the assessment of rates; and at last the continued existence of the two opposing parties was considered inconsistent with the public peace.55 The peculiar tenets of Mrs. Hutchinson were among the 82 opinions condemned as erroneous by the ecclesiastical synod at Newtown 30 Aug. 1637 ; and in*

No¬ vember she was summoned before the general court and after a trial of two days sentenced, with some of her associates, to banishment from the territory of Massachusetts, but was allowed to remain during the winter at a private house in Roxbury. She joined the larger number of her friends, who, led by John Clarke and Wil¬ liam Coddington, had been welcomed by Roger Williams to his vicinity, and had obtained through his influence from the chief of the Narragansetts the island of Aquidneck, subse¬ quently called Rhode Island. There a body politic was formed on democratic principles, in which no one was to be ((accounted a delinquent for doctrine.55 The church in Boston, from which she had been excommunicated, vainly sent a deputation of <(four men of a lovely and winning spirit55 to the island with the hope of

HUTCHINSON

ba 9

reclaiming her. After the death of her hus¬ band in 1642 she removed with her surviving family into the territory of the Dutch, probably from apprehensions that Rhode Island might not be a safe place of refuge from the en¬ croachments of Massachusetts. The precise lo¬ cality where she settled has been a matter of dispute, but according to the latest authorities it was near Hell Gate, Westchester County, N. Y. The Indians and the Dutch were then at war and in an invasion of the settlement by the former her house was attacked and set on nre and herself and all her family, excepting one child who was carried captive, perished either by the flames or by the weapons of the savages. Consult the biography by Jared Sparks in the (Library of American Biography > (Vol. XVI, 1845). . y'

HUTCHINSON, Horatio Gordon, Eng¬ lish golfer: b. 16 May 1859. He was educated at Charterhouse School, London, and graduated with classical honors in the University of Ox¬ ford. He was golf champion in England 1886- 87. He has published (Hints on Golf) ; (in Badminton Library) ; (Creatures of Cir¬ cumstance^; /Peter Steele the Cricketer ; ; (The Book of Golf and Golfers) (1899) ;*

(Little Lady Mary) (1900) ; (Dreams and Their Meanings ; (A Friend of Nelson) (1902); (Bert Edward, the Golf Caddie) (1903); (Glencairly Castle* (1904) ; (Amelia and the*

Doctor (1906) ; (A Saga of the Sunbeam* (1910); (The Faun and the Philosopher* (1915) ; (From Doubt to Faith) (1916).*

HUTCHINSON, John, Puritan English soldier: b. Nottinghamshire, 1615; d. Sandown castle, Kent, 11 Sept. 1664. While a student of law, being of a

religious turn of mind, he devoted much time also to the study of divinity, from which his attention was soon diverted by the serious political questions which agitated the kingdom. A careful investigation of the matters at issue between the king and the Parliament satisfied him of the justice of the latter's cause and after the commencement of the Civil War he declared for the Parliament and was appointed governor of Nottingham castle, which he held until the close of the war. He afterward represented Nottingham in Par¬ liament, and as a member of the high court of judiciary appointed for the trial of the king concurred in the sentence pronounced on him. The subsequent course of Cromwell, however, met with the disapproval of Hutchinson. At the restoration he was comprehended in the general act of amnesty, but was subsequently arrested on a suspicion of treasonable con¬ spiracy and after a detention of 10 months in the Tower was removed to Sandown castle, where he died of fever.

HUTCHINSON, John, English philoso¬ pher, founder of a mystical school of philos¬ ophy and theology: b. Spennithorne, Yorkshire, 1674; d. 28 Aug. 1737. In 1724 appeared the first part of his (Moses' Principia, in which he disputed the Newtonian theory of gravita¬ tion. In the second part (1727) he continued his criticisms of Newton and maintained on Biblical authority the doctrine of a plenum in opposition to that of a zracuum. From this time one or more volumes, containing a sort of cabalistic interpretation of the Hebrew Scrip-*

tures, appeared annually. His leading idea is that the Scriptures contain the elements of all rational philosophy as well as of general re¬ ligion. The Hebrew language has not only its literal but its typical sense, every root of it being significant of hidden meanings. With this elastic principle of exegesis he deduces a system from which the occult powers of at¬ traction, gravitation, magnetism and electricity are excluded, but according to which the whole mechanism of the heavens is the result of the agency of fire, light and spirit, the three mate¬ rial elements which were set to work in the beginning and which typify the three persons of the Trinity.

HUTCHINSON, Thomas, American co¬ lonial governor: b. Boston, 9 Sept. 1711; d. Brompton, near London, 3 June 1780. He was the son of a merchant of Boston who was long a member of the council, and graduated at Harvard College in 1727. He represented Bos¬ ton for 10 years in the general court, of which he was for three years speaker; became judge of probate in 1752, was a councillor from 1749. to 1766, lieutenant-governor from 1758 to 1771, and appointed chief justice in 1760, thus hold¬ ing four high offices at one time. In the dis¬ putes which led to the Revolution he sided with the British government; but he favored a moderate policy. His

*brother-in-law, Andrew Oliver, was appointed distributor of stamps under the law which was to go into effect 1 Nov. 1765, but was compelled by mobs to resign the office before that time. The mansion of Hutchinson was also twice attacked in conse¬ quence of a report that he had written letters in favor of the act, and on the second occasion (26 August), when the rioters were maddened by liquor, his house was sacked, the furniture burned in bonfires in the street and many manuscripts relating to the history of the prov¬ ince, which he had been 30 years in collecting and which could not be replaced, were lost. The inhabitants of the town on the following day in public meeting voted their abhorrence of the proceedings; but though many of the actors were well known, no one was punished. He, however, received compensation for his losses. When in 1769 Governor Bernard was trans¬ ferred to Virginia, the government of Massa¬ chusetts fell to Hutchinson. The popular ex¬ citement had already been increased by the arrival of the British troops, and after the so- called Boston massacre a committee of citizens, headed by Samuel Adams, obliged him to con¬ sent to the removal of the regiments. The popular indignation against Hutchinson be¬ came so great that he at last obtained leave of absence and sailed for England, 1 June 1773. The Privy Council investigated his official acts, and decided in favor of <(his honor, integrity, and conduct,** which decision was approved by the king. He was rewarded with a pension. He published (History of the Colony of Massachu¬ setts Bay, -from the First Settlement Thereof, in 1628, until the Year 1750) (2 vols., 1760-67 ; Vol. Ill, 1828) ; (Brief State of the Claim of the Colonies* (1764) ; Collection of Original Papers Relative to the History of the Colony of Massachusetts Bav) (1869). His diary and letters appeared (1883-86). The sober judg¬ ment of later times has reversed the prejudiced accusations of his American contemporaries,*

and he is now seen to have been a conscientious man, zealous in the performance of duty but sorely perplexed between the claims of loyalty to the king and his natural inclinations in favor of the colony. Consult Hosmer, (Life of Thomas Hutchinson > (1896) ; Fiske, historical Essays > (Vol. I, 1902).

HUTCHINSON, Kan., city and county- seat of Reno County, on the Arkansas River, and on the Atchison, Topeka and Santa Fe, the Chicago, Rock Island and Pacific, the Hutchin¬ son and Southern and the Missouri Pacific railroads, 40 miles west of Wichita. The city, founded in 1871, has one pf the largest salt interests in the world, pro¬ ducing about 6,000 barrels per day. It is also an important meat packing and ship¬ ping centre;

and has manufactures of lumber, machinery, boilers, etc., and the 'railroad shops of the Hutchinson and Southern Railroad. It has a public library, high school, State reforma¬ tory, electric lights, a national bank and an assessed property valuation of $1,500,000. The commission form of government has been in operation since 1909. Pop. (1920) 23,298.

HUTIA, a West Indian rodent. See Rodentia.

HUTSON, Charles Woodward, American educator and author: b. McPhersonville, S. C., 23 Sept. 1840. He was graduated from South Carolina College in 1860; served in the Con¬ federate army 1861-65 ; was professor of Greek in Louisiana State University, 1869-73 ; of modern languages in the University of Missis¬ sippi 1881-89, and of English and history in the Texas Agricultural and Mechanical College 1893-1908. South Carolina University, his alma mater, conferred on him the LL.D. degree in 1911. He has published (Out of a Besieged City' (1887) ; (The Beginning of Civilization (1888) ; (The Story of Beryl > (1888) ; (French Literature) (1889); (The Story of Language) (1897); two articles in (The South in The Building of The Nation (1909), and edited Lafcadio Hearn's

HUTTEN, hoot'ten, Philip von, German adventurer; cousin of Ulrich von Hutten (q.v.) : b. Birkenfeld, about 1490; d. Venezuela, 1546. In 1528 the Emperor Charles V made a grant of the province of Venezuela to the Wel-sers, a firm of Augsburg merchants; and Hut¬ ten sailed with one of the companies sent out by them. He accompanied the viceroy, Georg Hohemut, in a journey (1536-38), in which they reached the headwaters of the Rio Japura, near the equator. In 1541 he set out in search of the Golden City. After several years of wandering, harassed by the natives and weak¬ ened by hunger and fever, he and his followers came on a large city, the capital of the Omaguas, in the country north of the Amazons, where they were routed by the Indians, and Hutten himself severely wounded. He led those of his followers who survived back to Coro in 1546, where Juan de Caravajal had in the meantime usurped the office of viceroy; and by him Hutten and his lieutenant, Bartel Welser, were seized and beheaded. Eight years later the Welsers' grant was taken from them, and the German rule in Venezuela was concluded. Hutten left an account of his journeyings, which was pub¬ lished under the title (Zeitung aus Indien)

(1765). Consult Von Langegg, (E1 Dorado >

(1888).

HUTTEN. Ulrich von, ool'riH fon, Ger¬ man knight, distinguished for his poems and satires, and for the influence which his writings exercised upon

the Reformation : b. Steckel¬ berg on the Main, 21 April 1488; d. Ufnau, an island in the lake of Zurich, 23 Aug. 1523. His father placed him at Fulda in order to educate him for a monk. The monastic school there was one of the most famous in all Germany, and he received an excellent education. Here he lost his faith and, the declared enemy of Christianity, fled to Erfurt in 1504, where he became intimately acquainted with several scholars and poets. In 1511 he went to Witten¬ berg, where he published a work on versifica¬ tion.. Ulrich, Duke of Wurtemberg, murdered a •cousin of Hutten and Hutten gave free course to his indignation in poems, letters and ad¬ dresses, which made him' known throughout Germany. He distinguished himself no less in the Reuchlinian controversy with the Dominican Hogstraaten in Cologne. Hutten severely criticized the monastic life, and was so much the enemy of the clergy, that by his edition of Laurentius Valla, (De falso credita et ementita Donatione ConstantiniP he declared war upon the Church and prepared the way for Luther. In 1518 he entered the service of Albert, arch¬ bishop of Mayence, and made several official journeys to Paris. He also accompanied the archbishop to the Diet at Augsburg, where Luther held his well-known discussion with Cajetan ; and Hutten, in a Demosthenic oration, urged the German princes to a war against the Turks. .He took the field with the Swabian League in 1519 against his hereditary enemy, Ulrich of Wurtemberg, and then retired to the solitude of his paternal castle of Steckelberg, to engage anew in the controversy with the monks. Here he published work after work, violently assailing the Church, the clergy and the state. Leaving Steckelberg in 1522 he went first to Basel and thence to Zurich, where he died. He was a savage and violent contro¬ versialist, and was unsparing in the vehemence of his invective. Consult

HUTTON, hut'n, Charles, English mathe¬ matician: b. Newcastle-upon-Tyne, 14 Aug. 1737 ; d. 27 Jan. 1823. The destruction of the old bridge at Newcastle having attracted his attention to the subject of the construction and properties of arches, he was led to the produc¬ tion of a small work on the Principles of Bridges) (1772), which laid the foundation of his future fame. He was in 1773 appointed professor of mathematics at Woolwich Acad¬ emy, elected a Fellow of the Royal Society in 1774 and in 1785 published his (Mathematical Tables,) preceded by an introduction, tracing the progress and improvement of logarithms from the date of their discovery. In 1778 he had gained the Copley medal for investigations on ballistics. At the request of the Royal Society, he carried out investigations concern¬ ing the density and mass of the earth. From 1779 to 1783 he was foreign secretary of the Royal Society. On account of ill health he resigned his chair in 1807. receiving a pension of £500 a year. From 1774 to 1817 he edited

fhe Ladies Diary. Later works were (Tracts, Mathematical and Philosophical- > (1786) ; Ele¬ ments ol Conic Sections'*; (Mathematical and Philosophical Dictionary5 (1795-96); (Course of Mathematics> (1798-1811).

HUTTON, Edward, English author: b. London, 12 April 1875. He became deeply in¬ terested in the literature and art of Italy, and spent several years traveling through that country and through Spain on foot. He is the author of a number of well-known books re¬ lating to his studies there. Among these may be mentioned Erederic Uvedale : A Ro- mance) (1901); (Italy and the Italians)

(1902); (Studies in the Lives of the Saints5 (1902); (The Cities of Umbria> (1905); (The Cities of Spain5 (1906) ; (Sigismondo Mala- testa) (1906) ; Elorence and Northern Tus¬ cany5 (1907); (County Walks about Flor¬ ence) (1908) ; (In Unknown Tuscany5 (1909) ; (Giovanni Boccaccio> (1909) ; (Rome) (1909) ;

(Siena and Southern Tuscany) (1910) ; (Venice and Venetia) (1911) ; (Highways and Byways in Somerset5 (1912) ; (The Cities of Lombardy) (1912); (Ravenna 5 (1913); England of My Heart5 (1914) ; (Naples and Southern Italy-* (1914) ; (Attila and the Huns) (1915) ; (High¬ ways and Byways in Wiltshire) (1917). He edited also two extremely important works : Dennistoun's (Dukes of Urbino) (3 vols., 1908) ; and Crowe and Cavalcaselle's (History of Painting in Italy5 (3 vols., 1908-09).

HUTTON, Frederick Remsen, American mechanical engineer and educator: b. New York, 28 May 1853 ; d. 14 May 1918. He graduated at Columbia University in 1873; was professor of mechanical engineering there from 1877 to 1907, when he was retired as professor emeritus. He received the honorary degrees of Sc.D. from Columbia in 1904 and Rutgers College in 1914. He was secretary of the American Soci¬ ety of Mechanical Engineers 1883 to 1906, president 1907, honorary secretary from 1907; consulting engineer department of water, gas and electricity, New York city, 1911; consulting engineer and chairman Technical Committee of Automobile Club of America since 1911; general secretary National High¬ ways Association ; secretary Engineering Foun¬ dation 1915. A contributor to the leading ency¬ clopedias he was also author of (Machine Tools5 (United States Census 1880) ; Mechani¬ cal Engineering of Power Plants5 (1897) ; Eeat and Heat Engines5 (1899); (The Gas * Engine5 (1904).

HUTTON, James, Scottish geologist: b. Edinburgh, 3 June 1726; d. there, 26 March 1797. He studied medicine at Paris and Ley¬ den, but on his

return (1754) devoted himself to agricultural pursuits and to chemistry, from which he was led to mineralogy and geology. In 1768 he removed to Edinburgh, and there spent his time in scientific investigations. He was the first great British geologist, and the ((originator of the modern explanation of the earth's crust by means of changes still in progress.55 He published (A Theory of the Earth5 (1795) and (A Theory of Rain5 (1784) ; Eissertations in Natural Philosophy5 (1792) ; ˆConsiderations on the Nature of Coal and Culm5 (1777) t and other works. See Hutto- nian Theory.

HUTTON, Lawrence, American editor and critic: b. New York, 8 Aug. 1843; d. Princeton, N. J., 10 June 1904. He was pri¬ vately educated, for some time devoted himself to the study of literature and to foreign travel, in the early 70's became a dramatic critic, and began contributions to periodicals of many sorts. From 1886 to 1898 he was literary editor of Harper's Magazine and subsequently he became lecturer in English literature at Prince¬ ton University. He was a well-known collec¬ tor, possessing among various things a famous series of death-masks of historical personages. He was also an organizer and founder of the Authors' Club and of the American Copyright League. Among his numerous writings were Elays and Players5 (1875) ; Eiterary Land¬ marks5 of famous cities (1885-1904), etc. Consult Wood, Eawrence and Eleanor Hutton: Their Books of Association5 (1905).

HUTTON, Maurice, Canadian education¬ ist : b. Manchester, England, 1856. He was edu¬ cated at Magdalen College School and Worces¬ ter College, Oxford, and was a Fellow of Mer¬ ton College, Oxford, 1879-86. In 1880 he was appointed lecturer on classics and ancient his¬ tory in Firth College, Sheffield, was professor of classics in University College, Toronto (1880-87), and from the latter year has held the chair of Greek in that university, and be¬ came principal in 1901. He has published sev¬ eral translations from the classics and articles on Herodotus and Thucydides.

*HUTTON, Richard Holt, English essay¬ ist and journalist: b. Leeds, 2 June 1826; d. Twickenham, 7 Sept. 1897. The son of a Uni¬ tarian clergyman, he was educated at Univer¬ sity College, London, and in Germany, for the Unitarian ministry, but, coming under the in¬ fluence of F. D. Maurice, he entered the Angli¬ can Church. In 1861 he became editor of the Spectator which owed its prominence largely to him. Through this journal he exercised grea*t influence on the thought, political and religious of his time. During the American Civil War he incurred great hostility and ventured the for¬ tunes of his paper by a strenuous advocacy of the cause of the North. Up till the time of the Home Rule split (1886), he supported the Lib¬ eral party. Hutton's best work is in the crit¬ ical Essays, Theological and*

Literary5 (1871) ; Essays on Some Modern Guides of English Thought5 (1887) ; in the biography of Sir Wal¬ ter Scott in the English Men of Letters5 (1878) ; and (Aspects of Religious and Scien¬ tific Thought5 (1899). Consult Hogben, (R. H. Hutton of the Spectator5 (1900).

HUTTONIAN THEORY, a view of geo¬ logical processes first published bv James Hut¬ ton (q.v.) in 1788, in his (Theory of the Earth,5 and developed in 1795. He was the first to distinguish between cosmogony and geology, believing the latter to be in no way concerned with ˆquestions as to the origin of things.55 His view was that the upraised land of the globe must be worn away by atmospheric influences and the debris be finally deposited in the bed in the sea, where it is consolidated under great pressure; it is then forced upward by subterranean heat, acting with an expansive power, and thereby split and cracked, the fis¬ sures at the same time filling with molten min¬ eral matter; and so the process goes on. Hut-

ton was the precursor of Sir Charles Lyell, whose views were essentially the same, and who procured for them large acceptance among geologists. See Uniformitarianism.

HUXLEY, Thomas Henry, English biolo¬ gist : b. Ealing, Middlesex, England, 4 May 1825; d. Eastbourne, Sussex, 29 June 1895. When he was 12 or 13, he wished to become a mechanical engineer; but a medical brother-in- law (Dr. Salt) took him in hand, and he com¬ menced at this early age the study of medicine. Eventually he went to Charing Cross Hospital, and passed the first M.B. examination of the University of London. Stern necessity com¬ pelled him, as soon as his medical course was over, to seek at once, even before he was of age, some post or employment. At the suggestion of a fellow-student, Huxley in 1846 applied for admission to the medical service of the navy, was admitted and was in attendance at the naval hospital at Haslar. The next year he was appointed assistant-surgeon of the Rattlesnake, which was sent on an exploring and surveying cruise in the seas on the east and northeast of Australia. The voyage lasted four years and gave Huxley an opportunity of gaining an almost unrivaled knowledge of marine zoology. Various papers on this subject were contributed by him to the Linnaean and the Royal Society (one of them gaining a medal from the latter body, of which he was elected a member in 1851), and a further result >of his investigations was the important work published in 1859, en¬ titled (The Oceanic Hydrozoa. He suggested the homology between the germinal layers of a vertebrate embryo and the two layers of a medusa.*

The Rattlesnake returned to England at the end of the year 1850 and Huxley found that the scientific papers he had sent home had already made him famous. By the aid of those who valued the promise given by his published work, he was allowed by the Admiralty for three years to draw pay as a navy surgeon while devoting himself to the working up of the results of his observations when at sea. In 1854 he was appointed lecturer or professor of natural history in the Royal School of Mines, a post long combined with that of naturalist to the Geological Survey. In 1855 he was appointed Fuflerian professor of physiology to the Royal Institution, and delivered four courses of lec¬ tures in as many years; while he was also an examiner for seven years to the University of London. The posts of Croonian lecturer to the Royal Society and Hunterian professor in the College of Surgeons were likewise filled by him.

There is no doubt that Huxley was fortunate to obtain at 28 a post, worth nearly a thousand a year, in London, and unburdened with any excessive duties. He had to give during winter (October to end of February) a course of lec¬ tures on five days of the week, and attend in his study at the Museum in Jermyn street, but had not the cares of a laboratory. He carried out his researches alone, and consequently was able to arrange the employment of his day in his own way. He wrote largely for the press upon such topics as belonged to his branch of science; lectured frequently in other places be¬ sides Jermyn street; and took an active and im¬ portant part in various government commis¬ sions, to which his official position rendered it

proper that he should be appointed. His lectures to workingmen, in 1860, on the dela¬ tion of Man to the Lower Animals, gave rise to much discussion, and led him to treat the subject in his (Evidence as to Man's Place in Nature) (1863). By this time the Darwinian theory had given rise to much excited contro¬ versy, and Huxley's thorough-going Darwinism brought many a bitter attack upon him. In 1862 he was appointed by government to assist in inquiring into the effects of the acts regard¬ ing trawling for herring; and his labors and advice had much influence in determining the course of fishery legislation and administration. In 1870 his name became more prominent than ever on the publication of his collection of papers entitled 'Lay Sermons, Essays and Re¬ views, } which met with fierce denunciation in many quarters. In this year he presided over the Liverpool meeting of the British Associa¬ tion, and was also elected a member of the first London school board. In 1872 he was elected lord rector of Aberdeen University; in 1875-76 lectured on natural history in Edin¬ burgh University.*

In 1883 Huxley received the crowning honor of his life, being elected president of the Royal Society. But ill health soon compelled him to give up

his official work. In 1885 he retired from his professorship, from his fishery post and from the presidency of the Royal Society, and confined himself to such work as he could perform in his study at Eastbourne (where in 1890 he built himself a house), or in the Enga- dine, where he usually spent the summer.

He produced between 1885 and his death in 1895 a large _ series of brilliant and interesting essays, especially on the relation of science to Hebrew and Christian tradition, and on the evolution of theology and of ethics. During this period he was president of the Marine Biological Association, in the founding of which he took an active part, and in 1892 was made a member of the Privy Council.

in loos Huxley received the Copley medal of the Royal Society, and in 1894 the Darwin medal. Huxley was one of the first scientists of his time; his chief and most valuable work was in the direction of the popularization of science, particularly of the Darwinian theory. He was also active along lines of social and political reform, and in the development and organization of scientific education. He wrote, besides the books already mentioned. Elemen¬ tary Physiology* (1866); (Anatomy of Verte- brated Animals* (1871) ; (Critiques and Ad- dresses) (1873) ; Elementary Biology* (with Dr. H. N. Martin, 1875) ; (American Addresses) (delivered at New York in 1876 on the fossil horses, 1877) ; Ehysiography* (1877) • <.Hume) (1878); (The Crayfish: An Introduc¬ tion to the Study of Zoology> (1880); (Col-

ienCA-?d ,Essays) (1893-94) . Between 1898 and 1902 there appeared four volumes of his Scientific Memoirs,* under the editorship of Sir Michael Foster and Prof. E. Ray Lan- kester. An authorized edition of his lesser works was published at New York between 1897 and 1900 in eight volumes. Consult Cadman, S. P., (Charles Darwin and Other English Thinkers* (Boston 1911); Clodd, Edward, (Thomas Henry Huxley* (New York 1902) ; Davis, J. R. A.,

(ib. 1907) ; Fiske, John, (Reminiscences of Huxley > (in (Essays, Historical and Literary, > Vol. II, ib. 1907) ; Huxley, Leonard, cLife and Letters of Thomas Henry Huxley5 (London 1900) ; Mitchell, P. C., (Thomas Henry Hux¬ ley: A Sketch of his Life and Works5 (ib. 1900) ; Osborn, H. F., (Huxley and Education5 (New York 1910).

HUY, u'e', Belgium, a town on the right bank of the Meuse, at its confluence with the Hoyoux. It is in the province of Liege and 18 miles from the city of Liege. Interesting features are the old citadel, built in the rock wall, dating from 1822, topped by the ancient cathedral of Notre Dame with a 13th-century gateway. Huy had many educational institu¬ tions, including a theological seminary and teachers' institute. The ruins of the abbey of Nemoustier founded by Peter the Hermit on his return from the first Crusade are to be found in the suburbs. The principal occupation of the vicinity is the cultivation of grapes, and the distilling of wine. There is some manu¬ facture of paper and cloth, and some tin min¬ ing. Because of its strategical position, Huy has been a battle ground and has changed hands many times. In 1703, it was captured by Marl¬ borough and Coehoorn ; and during the European War fell into the hands of the Ger¬ mans in 1914, after a stubborn resistance. See War, European.

HUYGENS, hoi-gens or hi'genz, Chris¬ tian, Dutch mathematician, astronomer and physicist: b. The Hague, 1629; d. there, 8 June 1695. Lie studied at Leyden, and at Breda, where he went through a course of civil law from 1646-48. He settled in Paris at the in¬ vitation of the minister, Solbert, was elected to the Academy and was given rooms at the Royal Library. He returned to Holland when the Edict of Nantes was revoked, and remained there till his death. Among his most important contributions to science are his investigations on gravitational acceleration and the oscillations of the pendulum, which he was the first to apply to clocks, and his (System of Saturn,5 in which he first proved that the ring completely sur¬ rounds the planet, discovered the fourth satel¬ lite, and determined the inclination of its plane •to that of the ecliptic. He perfected the tele¬ scope and invented the micrometer. In 1690 he published important treatises on light and on weight. His (Traite de la lumiere5 . was an exposition of the undulation theory, but in con¬ sequence of the prevalence of the Newtonian theory was long neglected till later researches established its credit. Huygens discovered the polarization of light, which he could not ex¬ plain because he thought the vibrations of light longitudinal rather than transverse. He also investigated the theory of probabilities. Huy¬ gens also wrote (Theoremata de Quadratura Hyperbolis, Ellipsis, et Circuli, ex Dato Por- lionum Gravitatis Centro5 (1651) ; (De Circuli Magnitudine Inventa5 (Leyden 1654) ; (De Ratiocinatione in Ludo Aleae5 (1656) ; (Hor- logium Oscillatorium, sive de Motu Pendu- lorum5 (1673). His works have been published in 10 volumes by the Koninglijke Akademie van

den Wetenskapen (The Hague 1888-1905). Consult Bosscha, ˆChristian Huygens5 (tr. into German, Leipzig 1895) ; Harting, P., (Christian

Huygens in Zijn Leven en Werken Geschetzt5 (Groningen 1868).

HUYGENS, Constantin, Dutch writer : b. The Hague, 1596; d. 1687. From his early youth he received special training in diplomacy. He was educated at the universities of Leyden, London and Oxford. In 1620 he was special diplomatic envoy to Venice and the following year to London. King James I conferred knighthood on him in 1622. In 1625 he was ap¬ pointed private secretary to the Stadtholder and five years later became a member of the Privy Council. His works include (Batava Tempe5 (1623) ; (Costelick Mai5 (1624);

HUYGENS' PRINCIPLE. See Light.

HUYSUM, hoi'sum, Jan Van, Dutch painter : b. Amsterdam, 1682 ; d. there, 8 Feb. 1749. His father was Justus van Huysum, a landscape painter and decorator of no mean skill. From him he acquired the art of paint¬ ing formal landscapes, imaginative, and fine in coloring, but lifeless and studied in composi¬ tion. No motion stirred the trees of his scenes, nor did any animation brighten the faces of the figures of his paintings. Later he abandoned landscape painting for still life reproductions and proved himself a consummate master in the art. His backgrounds are generally light, against which he projects gay bouquets of flowers and fruits, often introducing butter¬ flies, insects, birds' nests, etc. His work is characterized by a remarkable perfection of detail and coloring, rarely surpassed. Later critics have found fault with this heightened perfection and have deplored the absence of breadth of treatment and insight. The works of Huysum are best seen at the Louvre; the gal¬ leries of Berlin, Amsterdam, Petrograd, The Hague, Copenhagen, Vienna ; and in private collections in England.

HWANG or HOANG-HO, hwang'ho, or YELLOW RIVER, China, a large river which rises in the mountains of North Tibet, in the Koko-Nor territory, about lat. 34° 30′ N. and long. 97° 30' E. It derives its name from the vast quantities of yellow mud continually car¬ ried down by its waters. After a winding course, north, east and south, of about 2,600 miles, it flows since 1853 into the Gulf of Pe-chi-li ; prior to that year its outlet was in the Yellow Sea. It is a turbulent, turbid and impracticable stream, but little used for naviga¬ tion, and subject to disastrous floods is known as <(China's55 sorrow. The misery which fol¬ lowed the flood of 1898 was the chief cause of the Boxer Rebellion. To prevent inundation and the former frequent changes in its bed and outlet, great expense is incurred maintaining artificial embankments.

HYACINTH. (1) A genus (Hyacinthus) of lilies with corolla-like, bell-shaped. s:x-clcft perianth, six stamens fixed in the tube of the

perianth, and dry capsular fruit. The Oriental hyacinth (H. orientalis), one of the chief favorites of florists, is a native of Asia Minor, Syria and Persia. It is now naturalized in some parts of the south of Europe. It has broad linear leaves, and a scape with a raceme of many flowers pointing, in all directions. The flowers in cultivation exhibit great variety of color, chiefly blue, purple and white. They are very beautiful and very fragrant. The fra¬ grance is strongest about or after 11 o'clock at night. Among cultivated hyacinths are many with double flowers. The hyacinth has been cultivated from a remote period. It was intro¬ duced into Europe, probably by the Dutch, about the beginning of the 16th century. The grape- hyacinth is a somewhat different plant of the genus Miiscari, of which M. racemosunv is common in gardens. (2) See Zircon.

HYACINTHE, Pere, par e-a -sant. See

Loyson, Charles.

HYACINTHUS, in Greek mythology, the youngest son of King Amyclas of Amyclae, 'who was killed by Apollo. The story is told as follows : Apollo, attracted by the beauty of the young prince, fell in love with him. One day while he was teaching the lad to throw the discus, Boreas (or Zephyrus), who was jealous, lifted the discus so that it struck and killed Hyacinthus. His death was greatly mourned by Apollo, who admitted him with his sister Polybcea to the immortals. A flower called the hyacinth grew up out of the blood of the boy, and on its petals were inscribed the word ((in the Golden Bough, > Pt. IV, Book II, Chap. 7, London 1906).

HYADES, hi'a-dez, in Greek mythology, the daughters of Atlas and 2Ethra. They lived at Dodona,. where they cared for Zeus and nursed the infant Bacchus. As a reward they were translated to the stars. Another tradition makes them sisters of the Pleiades. Their brother Hyas having been killed, they mourned so for him that Zeus changed them into stars. Their rising and setting ushered in the rainy season in April and November. The Romans translated the name into "Suculse® (little pigs), deriving the word from vq, sow. The Hyades were associated with the fertilizing principle of rain and moisture.

HYZENODON, hl-en'6-don, a genus of primitive carnivorous mammals (creodonts), fossil in the Upper Eocene and Lower Miocene rocks of

Europe, Africa and the western United States, of which several species are known by well-preserved skeletons. The skull was rela¬ tively very large and long, with great canines and strong, hyena-like molars, but the brain-cavity was very small. The feet were fully five-toed, had powerful claws, and the animal, which must have somewhat resembled a small, cat-like bear, was partly plantigrade. Species

of this family (Hycenodontidce) were the last of the creodonts, surviving to -the Middle Oligocene (Oreodon zone).

HYALITE. A variety of opal (hydrous silica) which occurs in clear globular or botryoidal forms resembling drops of melted glass. Used as a gem. Occurs in Arizona and Georgia and a large deposit of banded hyalite in Beaver County, Utah, is being utilized to some extent.

HYAMS, Henry Michael, American lawyer and politician: b. Charleston, S. C., 1805; d. New Orleans, 1875. In 1828 he went to New Orleans, studied law, and after 15 years of country practice in Alexandria, La., resumed his residence in New Orleans, where his invest¬ ments in landed property made him wealthy. In politics he was originally an old line Whig, but on the outbreak of Know-Nothingism joined the Democratic party. In 1855 he was elected to the State senate ; in 1859 he was chosen lieutenant-governor, the first member of the Jewish race to hold such an honor in the United States. He was devoted to the Southern cause, sent his sons to fight in the Confederate army and. after the war found his large fortune vanished. Prepared to begin life anew, he; resumed the practice of law until his death.

HYATT, Alpheus, American naturalist: b. Washington, D. C., 5 April 1838; d. Cambridge, Mass., 15 Jan. 1902. He was graduated from the Lawrence Scientific School at Harvard in 1862, then entered the army and served during the war in the 47th Massachusetts regiment, being promoted to the rank of captain. After leaving the army, he resumed his studies under the instruction of Agassiz, and later studied abroad.

u "ir went to Salem, where he was one of the founders of the Peabody Academy of Sciences and one of the curators of the Essex Institute. > In 1870 he was made custodian of rhe collections of the Boston Society of Natural History, becoming curator in 1881. He was also

?nno SS°ri biology and zoology from 1877 to 1902 at Boston University; was organizer and

7V££ger of the Teacher's School of Science (1870-1902) ; had charge of a summer labora¬ tory of marine zoology founded by the Women's

Educational Society at Annisquam, which was later moved to Woods Hole where its work was greatly expanded with Hyatt as president of the board of trustees; he was also for 18 years professor of zoology and palaeontology at the Massachusetts Institute of Technology. In his later life he had charge of invertebrate fossils in the Museum of Comparative Zoology at Cambridge. He was a member of the Amer¬ ican Academy of Arts and Sciences, of the American Philosophical Society, of the Geological Society of London, of the National Academy of Sciences and of the American So¬ ciety of Naturalists. He was one of the founders ol the last mentioned society and its first president (1883) ; he was also one of the founders and, from 1868-71, editor of the American Naturalist. He held the honorary degree of LL.D. from Brown University. His most distinctive work was the investigation of the development of the fossil Cephalopods and of the fossil and semi-fossil Planorbis on Stein- henn Lake. Germany, from which investigations he deduced laws of growth very important to the evolutionary theory. He was also especially

successful as a teacher of science teachers. His interests were broad and he was a member of that remarkable coterie of intellects which adorned Boston in the latter part of the 19th century, including Longfellow, Emerson, Holmes, James and others. His works include (Observations on Polyzoa) (1866) ; ˆFossil Cephalopods of the Museum of Comparative Zoology (1872) ; (Revision of North American Poriferse* (1875-77), the only work on North American commercial sponges; (Genesis of Tertiary Species of Planorbis at SteinheinP (1880); (Genera of Fossil Cephalopoda> (1883) ; (Larval Theory of the Origin of Cellu¬ lar Tissue) (1884); (Genesis of the Aretidse* (1889); (Carboniferous Cephalopods) (1891— 93) ; (Bioplastology and the Related Branches of Biologic Research) (1893) ; (Phylogeny of an Acquired Characteristic (1894) ; (Pseudo- cerabites of the Cretaceous) (1903) ; (The Triassic Cephalopod Genera of America* (1905). All of these were published in scien¬ tific journals or as part of official scientific reports, as were also many other shorter papers on similar subjects. A full bibliography will be found attached to the memoir by W. K. Brooks, (Alpheus Hyatt) (in National Academy of Sciences, Biographical Memoirs, Vol. VI, p. 311, Washington 1909). Consult also Anon., (Memorial of Professor A. Hyatt* (in Boston Society of Natural History, Proceedings, Vol. XXX, p. 413, Boston 1902) ; Jackson, R. T., (A. Hyatt and his Principles of Research) (in American Naturalist, Vol. XLVII, p. 195, Lan¬ caster 1913) ; Mayer, A. G., (Alpheus Hyatt* (in Popular Science Monthly, Vol. LXXVIII, p. 129, New York 1911) ; Packard, A. S., (Alpheus Hyatt) (in American Academy of*

Arts and Sciences, Proceedings., Vol. XXXVIII, p. 715, Boston 1903) ; Zirngiebel, F., (Teachers' School of Science (in Popular Science Monthly, Vol. LV, p. 451, New York 1899).*

HYATT, Anna Vaughn, American sculp¬ tor: b. Cambridge, Mass., 10 March 1876.

After a preliminary education at private schools, she studied at the Art Students' League, New York, and later under Henry Kitson, H. A. McNeil and Gutzon Borglum. Her works con¬ sist mainly of small bronzes of animals, which are executed with rare spirit and delicacy. They have appeared at various exhibits and a num¬ ber are owned by the Metropolitan Museum. Her larger pieces include a lion at Dayton, Ohio; a memorial statue at Lancaster, N. H. ; (Joan of Arc, New York city. Miss Hyatt has been awarded honorable men¬ tion at the Paris Salon (1910) ; silver medal at the San Francisco Exposition (1915) ; Rodin gold medal at Philadelphia (1917), and was appointed curator of sculpture in the French Museum of Art in the United States.*

HYBLA, hi-bla, the name of several an¬ cient cities in Sicily, of which the best known are Hybla Major, identified with Hybla Megara, a seaport near Syracuse; and Hybla Minor, or Galeatis, near Mount 2Etna, where the city of Paterno now stands. Hyblaean honey, cele¬ brated in Roman poetry, is generally supposed to have come from the former city.

HYBRIDITY, the crossing of two individ¬ uals of distinct species. The result of the intercrossing of species is a hybrid, for exam¬

ple, the mule, which is the result of breeding the horse with the ass. As the mule is invari¬ ably sterile, the infertility has always been supposed to be a test of species. But this is not an invariable rule, as not a few so-called <(goodw species have been crossed with one another. It may be set down as a general proposition that the difficulty of crossing in¬ creases the more distant the systematic relation¬ ship of the species experimented with. Also these difficulties are, says Hertwig, by no means directly proportional to the systematic diver¬ gence of the species.

Nature tends to keep species separate, in the higher animals, as well as among insects, etc. ; mating is usually prevented by the structure of the parts concerned with sexual union; also the principle of preferential mating comes into play among mammals as well as insects, as often between males and females, even of closely allied species or varieties. When there are no structural differences there may exist an aversion which prevents any union of the sexes.

Artificial Hybridization. — Many experi¬ ments have recently been made on the lower marine animals in which the eggs are fertilized in the sea without sexual union, by placing the eggs of starfish and sea-urchins, etc., in a watch-glass and adding the sperm of the males, thus securing artificial fertilization In this way hybrids have been obtained from species belonging to quite different genera, while it has been found that in some cases closely related species will not cross. For example, among the sea-urchins the spermatozoa of Strongylocen- trotus lividus readily fertilize the eggs of a species of Echinus, but only rarely those of the more closely allied S pheer echinus granularis. Hybrids have been obtained from different genera of fishes, as those between the salmon and brown trout. It appears that salmon eggs have been fertilized by trout sperm, but not trout eggs by salmon sperm. According to Hertwig eggs have been fertilized by sperm belonging to species of different families, orders and possibly classes. For example, the eggs of a flounder (Pleuronectes platessa) and of Labrus rupestris have been fertilized by the sperm of the cod; frog's eggs (Rana arvalis) by sperm of a triton, and even, it is said, the eggs of a starfish by milt from a sea-urchin ; in such cases, however, the hybrids die during or at the close of segmentation of the yolk.

Fertility of Hybrids.- — While the mule and many other hybrids are sterile, there are some known exceptions. Hybrids of hares and rab¬ bits have continued fruitful for generations, and also hybrids obtained from the wild buck and she-goat, from the Chinese goose (Anser cygnoides) and the common goose (A. domes- ticus) ; from Salmo s alvei inns and S. fontinalis ; Cyprinus carpio and Crassius vulgaris, as well as between the two silkworm moths, Philosamia cynthia and P. ricini, the Arrhindy worm. In this country Caton has hybridized the common Virginian deer with the Ceylon deer and the Acapulco deer, and states that the hybrids seemed perfectly healthy and prolific. Ewart states that the Indian buffalo and the American bison produce fertile hybrids with the European wild ox.

In the human species it is a well-established fact that marriages between remote varieties or races tend to sterility while crossing between

allied races are fertile, and such unions are most beneficial. Thus the most mixed white races are the most fertile and vigorous. Ewart thinks that as there are no definite limits be¬ tween species and varieties, there can be <(no fundamental difference between a hybrid and a cross, nor yet any a priori reason why any given hybrid should be sterile, or any given cross fertile.® He also states that sterility has in some cases been slowly

acquired, in others abruptly, but how it has been acquired is not known.

As the result of breeding thousands of moths Standfuss states that in no case observed by him has the female of a true hybrid been shown to be fertile. On the other hand, the occurrence of undoubted cases of fertility in male hybrids has been proved by crossing the male hybrids with the females of both parent species.

Ewart's Experiments with Crossing the Zebra and Horse, and the Wild Ass and Horse. — A Burchell's zebra stallion, <(Matopo,® became the father of nine zebra hybrids by mares of various sizes and breeds. The hy¬ brids exhibited a curious blending of charac¬ ters, which seemed to have been derived partly from their actual and partly from their remote ancestors ; some of the hybrids strongly suggest their zebra sire, others their respective dams, «but even the most zebra-like in form are utterly unlike their sire in their markings.®

He succeeded in securing a male wild ass (kiang) from central Asia and a couple of Mongolian pony mares, one a yellow dun and the other a chestnut. The wild ass was mated with the dun Mongol mare, a brownish-yellow Exmoor pony and a bay Shetland-Welsh pony. The kiang hybrid in its long legs, slender joints and speed took after its kiang parent. The mane and tail ((are exactly what one would expect in a mule.® This kiang hybrid also dif¬ fers from the wild horse (Przewalsky's horse) in not neighing like a horse. The result is to prove that the wild horse is not a kiang-pony male, but a ((good® species. Also in accordance with Mendel's law (see under Heredity) the kiang proved to be dominant, the Exmoor pony recessive. It is generally' held that an old species is prepotent over a more recent variety.

Hybridity in Plants.— The method of hy¬ bridizing hermaphroditic flowers is to cut away their stamens before they are ripe and then enclose the flower in a paper bag. After the stigma has ripened the pollen is placed on it, the bag is again tied over the flower and not removed until the seed begins to form. Great advantages and improvements in agriculture have resulted from hybridizing plants, chief among which are many new varieties of culti¬ vated plants, increased size and vigor, hardiness, or adaptation to warmer Climates, and increased resistance to disease, as well as increase in odor of flowers and the quality and flavor of fruits.

Sterility in Hybrids . — Thus far the cause of infertility in animals is unknown, but bot¬ anists attribute the frequent sterility of plants to the imperfect formation of the pollen. Stand- fuss' experiments with moths agree with Focke's statement as to the great variability of the off¬ spring resulting from the crossing of a plant hybrid with one of the parent species.

In plants, as discovered by Mendel, the proportion of the pure races is constantly increasing in the suc¬ cessive generations descended from a hybrid.

Malformations and sports are much more fre¬ quent, especially in the floral organs in hybrids, than in individuals of a pure descent. Double flowers appear to be formed especially easily in hybrids.. Recent experiments and results in the study of hybridity show how intimately the subject bears on heredity (q.v.) and the origin of species.

Bibliography. — Animals: Bateson, William, (Mendel's Principles of Heredity } (New York 1909) ; Dixey, F. A., (Recent Experiments in Hybridization } (in Science Progress, Vol. VII, London 1898) ; Ewart, J. C., cThe Peny- cuik Experiments } (ib. 1899) ; Ghigi, A., 'Ricerche di Sistematica Sperimentale sul genere Gennseus Wagleri (Bologna 1909) ; de Vries, Hugo, (Species and Varieties > (2d ed., Chicago 1906) ; id., Untercellular Pangenesis) (ib. 1910) ; Standfuss, M., (Handbuch der pala-arktischen Gross-Schmetterlinge fur Forscher und Sammler) (Jena 1896) ; id., (Experimented zoologische Studien mit Lepidopteren) (Zurich 1898) ; Suchetet, Andre, (Des hybrides a l'etat sauvage) (Vol. I, Paris and Berlin 1897). Plants: Bailey, L. H., (Plant Breeding) (4th ed., New York 1906) ; Darwin, C. R., Varia¬ tion of Plants and Animals under Domestica¬ tion (2 vols., ib. 1900) ; Focke, William, (Die Pflanzen-Mischlinge) (Berlin 1881) ; de Vries, Hugo, (Die Mutationstheorie) (Leipzig 1901) ; Jordan and Kellogg. Scientific Aspects of Luther Burbank's Work> (San Francisco 1909); Mendel, G. J., (Versuche fiber Pflanzen- Hybriden> (in V erhandlungen des Naturforsche Vereins, Brunswick 1866) ; Swingle and Web¬ ber, ˆHybrids and their Utilization in Plant Breeding) (in (Yearbook of the Department of Agriculture for 1897, } Washington 1898).

HYBRIDS IN PLANTS. A hybrid may be defined as a cross between two parents be¬ longing to different varieties or different spe¬ cies. In a few cases, two different genera have been crossed. Thus, it is evident that the term, hybrid, is used whenever the two parents do not belong to the same species or variety. Con¬ sequently, a hybrid differs from the result of ordinary fertilization only in the fact that the two parents are not so closely related. When hybrids are produced artificially, the pollen from one parent is placed upon the stigma of the other parent, great care being taken to ex¬ clude all other pollen. When the parents are dioecious — the male bearing only anthers with pollen, and the female only ovaries tipped with stigmas — it is easy to exclude other pollen by placing a paper bag over the female flowers. When the anthers and ovaries are on the same plant, but in different flowers — as in corn, where the tassel bears the anthers and the silk is tipped with the stigmas — there is little diffi¬ culty in making a cross. The tassel of the plant to be used as the female parent is cut off

before it ripens any pollen ; a tassel from the male parent is shaken over the silks of the female until the silks are well dusted with pol¬ len , a paper bag is then placed over the silks. It is an interesting fact that in corn, the male parent determines whether the content of the grain is to become starch or sugar, i.e., whether ˆ ˆ <

that sweet corn may be raised on a plant grown from field corn seed, and vice-versa. When the two parents, anthers (male) and

ovaries (female), are in the same flower, as in lilies and most flowers, the anthers of the flower to be used as the female parent must be removed before they ripen their pollen, lest (

The term, graft hybrid, has become fixed in the literature of the subject. As the name implies, it is a hybrid secured by grafting. Such hybrids have been known for nearly 100 years ; but they have more recently come into prominence through the> researches of Winkler, who succeeded in grafting the nightshade (So¬ larium nigrum) upon the tomato (Solanum ly-copersicum) . The resulting form had some leaves like those of the nightshade and some like those of the tomato and still others showed mixed characters ; altogether, the <(hybrid® was so bizarre that it was called a. chimera. It is now believed that such chimeras are not the result of any blending of characters but that they are built up of pure cells of the two <(parents,® so that the chimera may be re¬ garded as a mosaic built up of two kinds of blocks, the cells representing the blocks. Con¬ sult Winkler, H., (Untersuchungen uber Propf- bastarde) (Jena 1912) . A review, with refer¬ ences, may be found in the Botanical Gazette (Vol. LI, 1911, p. 147).

Charles J. Chamberlain.

HYDASPES. See Jhelam.

HYDATHODES, hi'da'thddz, special sur¬ face organs or glands on plant leaves exuding water when there is excess pressure in the moisture channels, due to diminished transpira¬ tion. They are of great variety and widely dis¬ tributed, especially in the tropics where the roots of plants absorb abundantly under humid atmospherical conditions. Some hydathodes both secrete and excrete moisture.

HYDATID, hi'da-tid. See B l adder wor m ; Tapeworm.

HYDE, Anne, Duchess of York, eldest daughter of the Duke of Clarendon, and first wife of James II of England: b. 1637 ; d. 1671. At the age of 17 she became maid of honor to the Princess of Orange, and while visiting in Paris in the retinue of the Princess made the acquaintance of James who was then Duke of York. Despite the disapproval of both fami¬ lies, the young couple were married in Septem¬ ber 1660. Slander and threats were used to dissolve the match, but Anne maintained a dig¬ nified aloofness to all interference. In 1667 she became a Roman Catholic, converting her husband shortly after. She was the mother of queens Mary and Anne.

HYDE, Douglas, Irish author and his¬ torian : b. Frenchpark, County Roscommon, 1860. After receiving his bachelor's degree from Trinity College, Dublin, in 1884 and his LL.D. three years later, he became interim professor of modern languages at the State University of New Brunswick (1891). Hyde's chief title to fame rests on his splendid studies of Irish lit¬

erature and his collections of Irish folklore. He is a prominent figure in the Irish national revival. He was president of the Irish Na¬ tional Literary Society (1894-95), and was one of the prime organizers and first president of the Gaelic League, resigning from that office in 1915. In Ireland he is popularly known by the Gaelic pseudonym of ((An Craoibhin Aoib- hinn® (sweet little branch). In 1906 he visited the United States in order to raise funds for the support of the league, and was successful in collecting some $55,000. He was president of the Irish Texts Society; examiner in Celtic to the Royal University of Ireland; assistant editor of the New Irish Library ; a member of the Royal Commission on Irish University Edu¬ cation ; and a member of the senate and pro¬ fessor of modern Irish in the National Univer¬ sity of Ireland (1909). Hyde's most monumen¬ tal work is his (Literary History of Ireland> (1899), a fine piece of pioneer scholarship. His other writings are in varied literary forms : lyrics, essays, folktales, plays and history. He writes with equal fluency and skill both in Gaelic and English. His numerous works in¬ clude (Leabhar Sgeuluigheachta) (1899) ; Re¬ side the Fire> (1890) ; (Cois na teincadh) (1891); (Love Songs of ConnachD (1894); (Three Sorrows of Story Telling) 0895) ; (Story of Early Irish Literature (1897) ; (An Sgeuluidhe Gaodhalach* (1898-1901; translated into French, 1901) ; (Mediaeval Tales from the Irish* (Vol. I of Irish Texts Society, 1899) ; (Ubhla den Chraoibh* (Irish poems, 1900) ; (Casadh an tsugain* (a play in Irish, 1901) ; (Sgealta* (1902) ; (Filidheacht Ghaedhalach* (1903) ; (Raftery's Poems) (1904) ; (The Bursting of the Bubble, * (An Posadh,* (An Cleamhnas,* (King James,* (The Tinker and the Fairy* (Irish plays, 1905) ; (The Religious Songs of Connacht* (1906) ; (Sgealuidhe Fior na Seachtmhaine) (1909) ; (Maistin an Bheurla* (a play, 1913) ; (Legends of Saints and Sinners from the Irish) (1915). Many of his poems reproduce the exact metre of the orig¬ inal Gaelic verse, and are replete with quaint conceits which show a*

sympathetic and schol¬ arly handling of the translations. Dr. Hyde has kept aloof from the political and religious embroilments which have torn the Irish nation¬ alists, preferring always to keep the main prob¬ lem above party interest.

HYDE, Edward. See Clarendon, Ed¬ ward Hyde, Earl of.

HYDE, Edward. See Cornbury, Edward Hyde, Lord.

HYDE, Edward, British colonial governor in America: b. England, about 1650; d. North Carolina, 8 Aug. 1712. In 1710 he arrived as governor of the Albemarle district of North Carolina province. The provincial governor, by whom he was to be commissioned, was dead, and Thomas Carey, formerly a deputy gov¬ ernor, had undertaken an armed insurrection. Hyde, at the request of the better class of the population, took office as governor and, assisted by Spottswood, governor of Virginia, crushed the revolt. Not long after massacres by the North Carolina Indians compelled him to seek aid from Virginia and South Carolina.

HYDE, Helen, American artist : b. Lima, N. Y. ; d. 14 May 1919. After a preliminary course at the Wellesley School, Philadelphia, she

studied under Kmil Carlsen at the San Francisco Art Institute. Later she continued her work under Frank Skarbina, Berlin; Raphael Collin, Paris, and Kano Tomonobu, Tokio. Miss Hyde's best work is in studies af women and children, executed chiefly by wood cut and etching. Par¬ ticularly charming are her wood cuts and water colors of Japanese women and children, the fruit of 14 years of work in Japan. On her return to the United States, she made a series of cuts of Mexican subjects, which are preserved in the Congressional Library at Washington. Others are to be seen at the New York Public Library and the Art Museum at San Francisco. Miss Hyde was a member of various American, European and Asiatic art and etching societies.

HYDE, William Dewitt, American col¬ lege president: b. Winchendon, Mass., 23 Sept. 1858; d. 29 June 1917. He was graduated from Phillips Exeter Academy in 1875, from Har¬ vard in 1879, and studied theology at Union and Andover. After completing his theological studies he was pastor for a time at Paterson, N. J. In 1885 he became president of Bowdoin College; at that time he was the youngest col¬ lege president in the United States, and' was not widely known. He soon gained a high reputa¬ tion as a scholar and an able executive, the col¬ lege growing

largely in numbers and resources during his administration. His clear, logical and brilliant contributions to American litera¬ ture include Practical Ethics) (1892); (1895) ; Practical Idealism) (1897) ; (The Evolution of a College Student) (1898) •

(God's Education of Man) (1899);

HYDE, England, a town and municipal borough in Cheshire, on the Tame River, about eight miles east of Manchester on the Great Central Railway. The principal industry is cotton manufacture. There are also important iron works, and factories for machinery, hats and margarine. Coal-mining is extensively carried on in the district. Its greatest increase of population has taken place within the last century, due to the increase in -the number of factories and the development of the collieries. The old manor hall once owned by the ancient family of Hyde dates from the reign of King John. Hyde received its charter as a municipal borough in 1881, and is governed by a mayor, six aldermen and 18 councillors. The munici¬ pality owns its waterworks, sewage plant, markets and cemetery. There are also a library' public baths and a hospital. Area, 3,081 acres' Pop. 33,500.

HYDE PARK, London, a park in the West End, adjoining Kensington Gardens. It derived tj ˆro.m having been the manor of the

Hyde belonging to the abbey of Westminster, and contains nearly 400 acres. It was opened to the public shortly after the Restoration in 1660, and abounds with fine trees and pleasing scenery. The sheet of water called the Ser¬ pentine River was made between 1730 and 1733 by order of Queen Caroline. It is much fre¬ quented in summer for bathing, and during

frosts for skating. The park is the regular meeting place for public speech on popular questions by independent orators. Attractive features of the park are the fashionable drive, bridle path, promenade of Rotten Row, the Ladies' Mile, Marble Arch and the statue of Achilles by Westmacott, cast from the cannon trophies of Waterloo, in honor of the Duke of Wellington.

HYDE PARK, Mass., a former town in Norfolk County, on the Neponset River, and on the New York, New Haven and Hartford Railroad, southwest of, but since 1912 incor¬ porated with, Boston. The town enclosed four villages and was incorporated in 1868. Rubber goods, paper, morocco, cotton and woolen goods, curled hair, chemicals, dyestuffs, looms and machinery are manufactured within its boundaries. It is a residential suburb for many Boston business men. It has good schools and a well-equipped free library. Pop. 16,000.

HYDE PARK, Vt., village in the town of Hyde Park, county-seat of

Lamoille County, on the Lamoille River and on the Boston and Maine Railroad, about 31 miles northeast of Burlington and 23 miles north of Montpelier. Stone quarries nearby are worked ˆnd flour, lumber, dairy products and leather are manu¬ factured. Pop. (1920) 600.

medan prince: b.' Bangalore,' about 1728; d. Chittore, 7 Dec. 1782. Of humble origin and unable to read or write, his bravery at a siege in 1749 attracted the notice of the Rajah of Mysore , deposing Kandih Rao, he was chosen Rajah of Mysore in 1762, and he so greatly ex¬ tended his dominions, that in 1766 they con¬ tained 84,000 square miles, and afforded an immense revenue. His reign was passed in wars with the English and with the Mahrattas A treaty which he made with the East India Com¬ pany in 1769 for the mutual retrocession of all conquests, was violated in 1/80, and, forming an alliance with the Mahrattas, he obtained the services of French officers, invaded the Car¬ natic and took Arcot on 31 October of the same year. He was finally defeated by Sir Eyre Coote, 1 June 1781. He was succeeded by his son Tippoo Saib (q.v.). Consult Bovtring

*i5?\dar All> (ln *he (Rulers of India) seriesˆ*

1893). ,

_ a5Y5ERABAD' hi-der-a-bad', or HAIˆ DARABAD, hi-da-ra-bad', India. (1) One of the largest native states occupying the greater part of the Deccan plateau of southern India in possession of the Nizam, a Mohammedan prince, and frequently called the Nizam's Do minions. It is bounded north by Berar, north- east by the Central Provinces, southeast by Madras and west by Bombay. Area 89 698 square miles; pop. about 13,374,676. The chief rivers are the Godavari in the north and the Kistnah in the south. The soil generally is fertile but poorly cultivated ; the principal crops are rice wheat, maize, sugar-cane, tobacco, cot¬ ton and fruits. Indigo is manufactured, and the forests yield valuable timber; there are coal and iron deposits, and diamonds and other gems are found. The ruler belongs to the dynasty founded by Asaf Jah, a distinguished soldier, whom the Emperor Aurungzebe made viceroy of the Deccan in 1713 with the title of Nizam or Regulator.

(2) Hyderabad, the capital, is on the Musi River, at an elevation of 1,672 feet above the sea, about 400 miles in a direct line southeast of Bombay, with which it is connected by rail. It is wall-girt, and its chief buildings are

the ex¬ tensive nondescript palace of the Nizam, the handsome British Residency, the Charshinar, or Four Minarets, built about 1590 as a Moham¬ medan college, but now used for warehouses, and the Jumma Musjid or cathedral mosque, a reproduction of that at Mecca. Pop. about 500,623. (3) Hyderabad, the capital of a dis¬

trict of Sindh, British India, on the east bank of the Indus, is a well-fortified town connected by rail with Karachi, 105 miles to the southwest. Pop. 76,000.

HYDRA, hi'dra, a monster well known in Greek fable. She was the offspring of Echidna and Typhon, and inhabited the marshes of Lerna, not far from Argos. She had many heads, which were endowed with the faculty of renewing themselves endlessly. Thus, al¬ though many heroes tried to slay the hydra, Hercules alone succeeded by a clever trick. As fast as he severed her heads, Iolaus, his com¬ panion, burned the roots with a flaming brand. The central head which was immortal was buried underneath a huge rock by the hero who then dipped his arrows in the poisonous blood of the hydra. With these weapons he slew the gorgon, Medusa. According to Preller, the hydra-myth is the allegorical interpretation of the damp ground of Lerna, with its numerous springs which exuded a poisonous vapor. The slaying of the hydra by Hercules signifies the purification and draining of the marsh.

HYDRA, a minute fresh-water polyp, living on the stems and underside of submerged leaves. The body is a club or vase-shaped sac, the mouth at the upper end surrounded by a crown of from five to eight long tentacles armed with lasso or nettling cells buried in the skin. The hydra feeds on minute Crustacea, etc., which become paralyzed when swimming in contact with the arms of the hydra, thus being easily drawn by the creature into its stomach. The body is very retractile, and the hydra can slowly move from one place to another, by detaching the end of the body. The sexual cells are, during the reproduction season, developed in the skin, appearing as circular swellings, one (male) just below the tentacles, the other mass, corresponding to the ovary of higher animals, farther down the body. The hydra is famous from its power of regenerating parts of its body. Trembly in 1744 experimented upon this animal ; he cut them in two, also into slices, and found that each bit became a new hydra, finally he turned one inside out, the stomach-lining becoming the skin, this experiment having re¬ cently been successfully repeated. This is due to the lack of differentiation in the tissues and organs # of the body, there being no distinct nervous, or circulatory system, the hydra being the most generalized member of its class, except the Protohydra, which has no tentacles. See Hydrozoa.

HYDRA, Greece, an island five miles off the east coast of Morea. Its length is 11 miles, and its breadth three miles, at its widest point. The island is rocky, with steep cliffs descending to the sea. Hydra, the main town, was in former times an important seaport, but has

greatly declined. Silk, cotton, leather goods and ships are manufactured, and there is still some trade. Hydra is the seat of a bishopric. Pop. about 6,000.

HYDRANGEA, hi-dran'je-a, a genus of shrubby plants of the family Hydrangeacece , with about 35 species indigenous to eastern Asia and temperate America. They have large simple leaves and very large cymes of flowers, the outer ones often infertile. H. arborescens grows on the Alleghanies, and in other parts of the United States. H. radiata, a more orna¬ mental shrub, occurs in the region of the southern Alleghanies. H. quercifolia, distin¬ guished by its lobate leaves, inhabits the States bordering the Gulf of Mexico. The best-known species is H. opuloides, a common greenhouse plant. H. panicnl'ata, a hardy species, is one of the commonest cultivated shrubs. Both the last are natives of China and Japan.

HYDRANTS. See Valves and Hydrants.

ˆ HYDRASTIS, a genus of plants of the Ranunculacece family, having two species, H. canadensis, popularly known as orangeroot, yellowroot and golden seal, and a Japanese variety of which little is known. The rhizome and rootlets are used as a bitter stomachic tonic and a tonic to the uterus in various dis¬ eases. In poisonous doses it stops the heart- action.

HYDRATE, in chemistry, a compound con¬ taining one or more molecules of the radical <(hydroxyl)) (OH). In these compounds, the water may be considered as playing the part of an acid, and the compounds themselves are entirely analogous, to salts. Thus water, H20, combines with sodium oxide, Na20, according to the equation Na20 + H20 = 2 NaOH; the re¬ action being accompanied by the liberation of considerable heat. The sodium hydrate (NaOH) that is produced is quite a different substance from the simple oxide, Na20, and it cannot be resolved into Na20 and water by the action of heat alone. In organic chemistry hydrates are met with very frequently. The large and ex¬ ceedingly important class of substances collec¬ tively known as the alcohols, for example, are hydrates of organic radicals. See Alcohol,

The word hydrate is also used in a less definite manner, to signify any compound which contains water, or from which water can be expelled by the action of heat. Thus salts or minerals which are associated with water of crystallization are said to be ˆhydrated? When an aqueous solution of a

salt, containing an excess of the salt in the free state, is cooled until it freezes, a mechanical mixture of ice and of the precipitated salt is obtained, which is known as a ˆcryohydrate,® although it is not a definite chemical compound.

HYDRAULIC (hi-dra'lic) CEMENT.

See Cement.

HYDRAULIC CRANE, a type of crane in which the motive power is water under hydrau¬ lic pressure. There are two general styles of hydraulic cranes : direct-acting and indirect- acting. In the former class the lifting mechan¬ ism is applied directly to the load; in the latter the power works upon a system of pulleys and chains, for the purpose of increasing the speed of operation, or of multiplying the working force. The mechanical action of the hydraulic

crane is the same as in the hydraulic press (q.v.).

The direct-acting cranes are of two distinct designs; those in which the lifting mechanism is contained within the post of the crane, and those where the lifting cylinder with its piston and ram is suspended from the crane-head, as in the Armstrong crane. The indirect mechan¬ isms are generally placed horizontally in a pit under the base of the crane, the operating chains passing up through the post and thus to the crane-head. Provision is generally made also for revolving the crane by the hydraulic power.

The hydraulic crane has a decided mechan¬ ical advantage in conditions where a very great force is to be exerted through a comparatively short lift. In the Armstrong crane, however, lifts of 40 feets are attained with remarkable speed. It is economical as compared with other forms of cranes, because when the crane is idle no power is being used to keep up the momen¬ tum of the driving machinery, as with steam and electric cranes. Moreover, the hydraulic crane has but very few moving parts, and there is therefore a minimum of wear and great dura¬ bility. It is, besides, capable of instantaneous control, impossible in any form of geared cranes. In the direct-acting hydraulic cranes the effi¬ ciency is close to 90 per cent.

In designing a hydraulic crane the formula commonly in use is that for each pound of pres¬ sure per square inch on the lifting piston a ((head}) of 2.31 feet is required in the water- supply — whence the required head of

water will be the total lifting power desired divided by the area in square inches of the lifting piston, multiplied by 2.31. As a matter of prac¬ tice the pressure of the water used is not often due directly to a head of falling water, but to^ water from hydraulic accumulators which is under the pressure of weights and sustained by high-pressure pumps. The water pressures commonly in use vary from 400 pounds to 1,200 or even 1,500 pounds per square inch, that most irequently found being about 700 pounds. There are, however, a 'number of cranes known as low-pressure cranes in which the working pressure is 70 pounds per square inch, or even lower. These cranes are usually run by direct gravity water pressure from an elevated tank in a nearby tower, supplying a water main with hydrants, the crane itself being movable and arranged to be coupled to the near¬ est hydrant.

Hydraulic cranes, especially if of the low- pressure type, are susceptible to damage by frost, and in order to reduce the freezing point of the water with which they are operated to a temperature at least as low as the weather con¬ ditions may produce, various substances have been added to the water. Glycerine has had the preference, but its cost has been almost prohibitive. Alcohol has been used, but the most economical substances have been cheap, non-corrosive salts. The cylinders, pipes and valves are covered with non-conducting coat¬ ings, and the exhaust of the compressor-pumps has been utilized to impart some warmth to the water. In high-pressure cranes the danger of freezing is very much less. Consult Boettcher, A., (Cranes> (London 1908) ; Collyer, F., 'Hydraulic, Steam and Hand Power Lifting and Pressing Machinery > (London 1892).*

HYDRAULIC ELEVATORS. See Ele¬ vators.

HYDRAULIC ENGINE, an engine which is driven by the power or pressure of water seeking a lower level. The simplest form of engine utilizing water power is the water¬ wheel. The overshot wheel acts partly by the impact of the stream flowing in the sluice, partly by the weight of the water in the buckets ; the breast wheel gets its power almost wholly from the rush of the water, but to a small de¬ gree by the weight of water in the curved buckets ; the undershot wheel is acted upon purely by the force of the moving stream, and thus is the more purely hydraulic of the three. (See Waterwheels). " The turbine wheels are highly developed hydraulic engines. They utilize the power of falling water in one of three ways : as axial turbines, in which the water is supplied and discharged in a current parallel to the axis ; as outward flow turbines, in which the water enters and is discharged in currents radiating away from the axis; as in¬ ward flow turbines, in which the water enters and is discharged in currents converging radically toward the axis. (See Turbines) . The well-known hydraulic ram (q.v.) is another simple form of hydraulic engine, but is waste¬ ful of

power even in the most improved forms.

The rotary forms of hydraulic engines such as the turbines, Pelton wheels, etc., have proved difficult of adaptation to many forms of work on account of the high speed at which they run, and the necessity of gearing them down t° the usable speed, which renders them less flexible. But a more potent objection is that they vary extremely in efficiency under vary- mg speeds. These difficulties led to the in¬ vention of the reciprocating hydraulic engine, which has been found dependable and very steady in operation, although it must run always at the same speed, using the same power, no matter what its load : it is therefore of commendable efficiency (about 65 per cent) only when running under a full load. The reciprocating engine which has found most favor is the Brotherhood hydraulic engine, or modifications of it. This engine has three cylinders set at angles of 120 degrees with each other, the three piston rods working on the same crankpin. Each cylinder has a single port which becomes alternately an inlet and an outlet the cylinders being all the time full of water, that on one side of the piston having a greater pressure than that on the other. The opening and closing of the ports and of the inlet and outlet valves is accomplished by a rotary valve mechanism carried by the crank shaft. The piston speed of these engines is about 30 feet per rmnute for all sizes, and they are built up to 30 horse power. They are built for use with water pressures (in pipes) ranging from 60 pounds per square inch up to 1,000 pounds per square inch. Another type of reciprocating engine is the Riggs hydraulic engine. In this the crankpin is fixed, and the cylinders, fas¬ tened 120 degrees apart upon a disc, revolve with the disc around. Consult Butler, E., < Modern ,nu™Pmˆ an,d Hydraulic Machinery (London IttV' Dunkerley, S., 'Hydraulics* (Vol. 1, Hydraulic Machinery,** London 1907) ; Gelpke V. and Van Cleve, A. H., (Hydraulic Turbines* (New York 1911); Gibson, A. H., (Hydraulics and Its Applications* (New York 1915).*

hydraulic engineering

HYDRAULIC ENGINEERING, that branch of civil engineering which deals with the application to the use and convenience of natural laws governing water and other liquids. In practice it is closely connected with and utilizes the details of other branches, such as mechanical, electrical, mining and the almost infinite subdivisions of engineering. During recent years the range of uses of water has rapidly expanded and the hydraulic engi¬ neer is being called upon to solve more and more, intricate problems growing out of the in¬ creasing density of population and multiplica¬ tion of industries. In the practice of his pro¬ fession, especially in relation to the larger problems, he must have available the results of meteorological observations, — of the occur¬ rence of. water in the form of rain or snow, — and obtain data as .to variations in precipitation which takes place from day to day and from year to year and of the resulting stream flow. He must consider the topography of the coun¬ try and the possibility of building storage reser¬ voirs to conserve the supply; he must be pre¬ pared to discuss the questions of river control, of erosion and sedimentation; and of the use of water in domestic and municipal supplies, also in the production of-power in manufactur¬ ing and for other purposes created by the ever¬ growing needs of a civilized community. In earlier years when the sparse population was occupied mainly in agricultural pursuits and the industries were few, there was usually enough water and to spare, especially in the humid areas of Europe and America. No great difficulty was found in procuring ample drinking water and there was little interference of one community with another through pollu¬ tion by discharging sewage or manufacturing wastes into the streams. With the rapid change from a rural to an urban population and with the growth of manufacturing centres, the question of obtaining adequate supplies has become more pressing; joined with this have been conflicts between the diverse interests of manufacturing, power production and naviga¬ tion.

Operations. — The operations of hydraulic engineering may be classified according to the uses to which the water is put. First is that for drinking, for domestic and municipal supply. Mankind under ordinary conditions can exist only a few days without water and to retain good health the water must be of a high degree of purity. It is obvious therefore that the procuring of water for immediate con¬ sumption, for cooking and related purposes, must take precedence. Second in importance is the use of water in the production of food, in¬ cluding in this the watering of live stock and • the artificial application of water to agricultural soils or irrigation in arid or drought-stricken regions. Correlated with irrigation is drainage or the removing of an excess of water from farm lands. The third class of uses of

water is that of disposing of the sewage or the waste from centres of population and manufacturing establishments. Wherever adequate supplies of water have been provided for municipal pur¬ poses there arises at once the need of dispos¬ ing of an equal quantity of sewage or industrial effluents. The importance of this has not always been recognized and the public health has been needlessly sacrificed because of neglect

of this important detail of hydraulic engineer¬ ing. A fourth use and one in which the hydraulic engineer has made the most rapid progress during the past quarter of a century has been in connection with water-power de¬ velopment and employment of water in manu¬ facturing, including the production of steam. For years following the development of the steam engine the water powers of the country gradually fell into disuse; but with the im¬ provement of methods of generating and trans¬ mitting electricity the hydraulic engineer is called upon to co-operate with the electrician in developing hydro-electric power, often at remote points. At the same time the necessity of procuring an ample supply of pure water for certain manufacturing purposes as well as for the steam engine has become more pressing and requires that the hydraulic engineer co¬ operate with the chemist in obtaining the de¬ sired quality as well as quantity. In the fifth group of uses are the details of transportation by water or navigation. The rapid development of the steam locomotive put out of use the canal boat and caused the abandonment of in¬ land waterways in very much the same way as the stationary steam engine overshadowed the water powers. Similarly there is now a re¬ vival of interest in navigation of inland waters. The hydraulic engineer is again called upon to take up questions of improvement of rivers, particularly of the deepening and maintenance of channels. Closely joined with these are the problems of flood protection or prevention. With the increase of industries upon the flood plains of the rivers, the annual losses have been becoming greater and greater and reach into millions or tens of millions of dollars. For in¬ stance in the State of Kansas the flood losses for a little over a decade have been estimated at over $50,000,000 and at Pittsburgh, Pa., for 10 years they have amounted to over $12,000,-

000.

Wide Range. — Hydraulic engineering in its practical application thus calls into play almost .the entire range of civil engineering activities and requires co-operation at one time or another with the chemist, physicist, electrician, topog¬ rapher, geologist, meteorologist and with other students of natural phenomena. Its distinguish¬ ing feature is that fundamentally it deals with water in its various phases and has for its special province the practical application of the three distinct sets of laws or principles, namely, (a) hydrostatics, which relates to liquids at rest and has application in

particular to the pressure of water against a dam or other re¬ straining body; (b) hydraulics which con¬ siders liquid in motion, as, for example, the action which takes place through an orifice in the dam or restraining wall; and (c) hydro¬ dynamics or hydro-mechanics, which discusses the effect of a stream in motion issuing, for example, from an orifice and acting upon a. water wheel or other mechanical device.

Historically hydraulic engineering is among the most ancient of the recorded activities of men. The Egyptian engineers are known to have largely controlled the flow of the Nile and to have built canals and reservoirs whose magnitude caused them to be mistaken for works of nature. Almost innumerable works for storage and distribution of water to agri¬ cultural lands have been built in India and

Mesopotamia. Aqueducts, the remains of which still exist, were built by the Romans and other people of antiquity. Although a high de¬ gree of mechanical skill was developed in dis¬ tributing the water supply to houses, baths and fountains, the principles of water measurement were not understood until within comparatively recent times. There is now a steady advance in experimentation to discover the laws which govern the movements of water under varying conditions, such as the form and character of material composing the channels or orifices along or through which the movements occur. The fundamental formula now accepted is that

suggested by Chezy in 1775, $v = c\sqrt{rs}$, in which v represents the mean velocity of the fluid, r represents the hydraulic radius and s the slope of the surface. The value of c is determined by experiments. Kutter, a German scientist in 1868, from the results of data then available de¬ veloped the formula, expressed in feet per second,

$$41.6 + \frac{.00281}{s} + \frac{1.811}{n}$$

c =

1 +

41.6 +

.00281

s

The factor n termed the coefficient of rough¬ ness varies with the nature of the channel and its degree of smoothness. The values of ii for channels of various types are as follows:

0.010 Planed lumber or plaster.

0.012 Smooth cement lined section.

0.015 Smooth brick or vitrified surface. 0.017 Rubble.

0.20 Firm trimmed soil.

0.225 Canals in good condition.

0.25 Canals in average condition.

0.275 Canals below average condition.

0.030 Canals in defective condition or rivers.

0.035 Very defective channels.

Municipal Supply. — At the present time the greatest activity in 'hydraulic engineering is in connection with procuring water, suitable in quality as well as quantity, for municipalities or similar communities. It is no longer con¬ sidered advisable to take water directly from the flowing streams because of the widespread pollution of these due to increase of population. In most localities the treatment of the water by filtration must be undertaken, necessitating ex¬ tensive works. The ideal condition for obtain¬ ing water for drinking and related purposes is from some elevated watershed which can be protected from intrusion and where the erosion of the soil may be prevented by the mainte¬ nance of forests or other suitable vegetation. Such conditions are found, for example, in the water supply of Portland, Ore., which ob¬ tains its water from a national forest. These favorable surroundings, however, are rare and in case of large cities such as New York and Boston it has been necessary to purchase large areas of land near the head water of small streams and build storage reservoirs, in

some cases removing towns and factories in order to secure the necessary land and to ensure the purity of the supply. Among the more notable works are those of the city of Los Angeles, Cal., which brings its water supply from Owens Valley, a distance of upwards of 240 miles. As

contrasted with this is the abundant supply of the city of Chicago, pumped from Lake Michi¬ gan, being obtained through tunnels extending out for several miles under the margin of the lake to avoid the pollution. This city dis¬ charges its sewage inland through the Illinois River which empties into the Mississippi near the intake of the Saint Louis waterworks, which utilizes, after filtration, the muddy and polluted waters received from the vast drain¬ age area above.

There has been steady progress in the art of supplying water to towns during the past century and now the questions which the hy¬ draulic engineer is required to consider in the design and construction of any waterworks em¬ brace a great variety of subjects. It is neces¬ sary to consider :

1. The quantity of water likely to be needed. There is not yet any consensus of opinion among engineers on this point, the estimates varying from 100 to 150 gallons per day for each resident of the district to be supplied, at the expiration of 20 years from the inauguration of the supply. The prospective population is estimated from the records of past growth of the district and the growth of districts of simi¬ lar character of occupation.

2. The possible sources whence the required quantity of water can be obtained, including the legal as well as physical limitations to its con¬ tinued use.

3. The quantity of the water obtainable from each source, as regards its chemical constitu¬ ents, in order to judge of its economical as well as its sanitary value. It sometimes happens that a water otherwise acceptable is so hard or contains in solution such quantities of various chemicals that the amount of soap required for washing with it is greatly in excess of that re¬ quired by another water more difficult to pro¬ cure, so much so that the cost to individual consumers for its constant use will be greater than the cost to the community of the introduc¬ tion of the other supply.

4. The character of the water biologically; the number and nature of the organisms which are found in it. This is most important from the sanitary point of view. The identification of certain organisms as pathogenic or disease- producing marks a decided advance in sanitary science and is. of great interest to the hydraulic engineer. It is found that the removal of the injurious organisms from water can be effected by filtration,, and it now is

considered to be the engineer s function to design or construct works for filtration through sand or other material which experiment proves to be adapted to the purpose.

5. The quantity of water obtainable from each source which appears generally suitable the area of the watershed, the amount of an- nual rainfall upon it, the distribution of the rainfall through the year, the geological and topographical features of the surface, the wind movement and the range of temperature of the air, with especial reference to the probable evaporation losses, must all be taken into con¬ sideration. Whenever the minimum rate of daily run-off from the watershed exceeds the maximum daily consumption to be provided for reservoirs must be constructed to retain the stream-water in times of excessive flow and deliver the excess gradually as required

6. The location of reservoirs requires a thorough acquaintance with the topography of the district, and their construction demands a high order of both theoretic and practical ac¬ quaintance with the action of water on various materials and with the form and method of their use. The construction of dams of earth, concrete and masonry has been the subject of careful study within the last few years, and the general principles have been fairly well es¬ tablished. There still remains a number of un¬ settled problems due largely to the progress of the mechanical arts and the introduction of new modes of construction, particularly of con¬ crete and steel.

7. The means of conveying the water from the source to the point where it is to be used must be studied. The conditions of this prob¬ lem are unlike those which are encountered in rivers, or in canals for either irrigation or navigation. A nearly uniform quantity of water must be continuously carried a long dis¬ tance at as great a velocity as is consistent with safety and economy. It must be protected from loss by evaporation and by leakage of the channels, and kept free from pollution on its route. These conditions are best fulfilled by an enclosed conduit or pipe of masonry or metal, with a smooth interior surface. The relations between different values of n, which can be obtained by using different classes of material and of construction, and values of c, obtained by using different grades and alignments, have been for many years the subject of carefully conducted experiments by scientists. It is the function of the hydraulic engineer to apply to the special case he has in hand the use of the materials which are available and the mode of construction practicable in the case, in ac¬

cordance with the latest results of scientific re¬ search. Up to the present time the best form and material for large conduits seem to be ma¬ sonry or concrete, of horseshoe form, with •smoothly plastered interior surface ; or steel- plate circular pipes, with as few irregularities caused by rivet-heads as possible, sometimes lined with cement mortar and encased in con¬ crete.

8. On reaching the point of distribution an entirely different set of conditions is encoun¬ tered. The water heretofore concentrated in large masses has to be distributed over a wide area in a great number of small pipes in which orifices are opened and shut at irregular inter¬ vals of time; these pipes, moreover, are under a great head of water producing a pressure of 50 to 100 pounds per square inch, with conse¬ quently a high velocity of efflux from any ori¬ fice. The problem to be solved is so to arrange the connections and sizes of these pipes that, under the ordinary conditions of use, the pres¬ sure in the pipes will not be materially altered at any time, and a constant supply may be kept up in the entire system. As illustrating the magnitude and complication of the distributing system in a large city, the conditions existing in the city of Chicago may be cited. There were there, in 1916, in an area of 128,000 acres, 2,600 miles of pipes for the delivery pf water, with 275,000 taps or orifices from which water is drawn at irregular intervals, 20,000 of these being controlled by meter. The development ot such a system as this involves the exercise of not only theoretical knowledge of the prin¬

ciples governing the flow of water under all conditions, but also a thorough acquaintance with materials of construction and the methods of using them to produce the best results at the least expenditure.

Irrigation and Drainage. — Next in im¬ portance to municipal and domestic supply are the hydraulic engineering problems connected with the obtaining of an adequate quantity of water or the proper regulation of it to enable the production of food. Throughout the western two-fifths of the United States, on much of the best agricultural lands, the rain¬ fall in insufficient in quantity, or so irregularly distributed throughout the year, that valuable crops cannot be produced with certainty without an artificial application of water. In the Missis¬ sippi Valley and to a certain extent in most of the States of the Union there are vast tracts of otherwise fertile lands which have an excess of water to a degree such that crops cannot be profitably raised. Here the hydraulic engi¬ neer is called upon to solve the problems of drainage. In many respects these are similar to those of irrigation and are intimately con¬ nected with it as the object to be attained is the maintaining of the moisture in the soil within relatively narrow limits, for ordinary soils not dropping below 8 per cent of the volume nor rising above 15 per cent. There are also simi¬ lar problems of providing adequate supply of water for cattle and other domestic animals

used largely for food.

For the production of crops by irrigation or for relieving the lands of an excess of water by drainage, quantities of water must be han¬ dled which are relatively very large when com¬ pared with those needed for city supply. For example, a 160-acre farm will require for its irrigation or may need for drainage the hand¬ ling of a volume of water as large as would be needed for domestic or general supplies if the area were covered with dwelling-houses ol¬ factories. When it is considered that an ordi¬ nary American city of say 100,000 persons cov¬ ers an area of about 10,000 acres, while an irri¬ gation or drainage project may include 100,000 acres or more, some conception may be had of the relative magnitude of the works needed for the two purposes. Although for irrigation or drainage there must be constructed works of large capacity, yet it is not practicable to pay for these works an amount comparable with the expenditures which may properly be incurred by a municipality. For farming purposes a cost of irrigation exceeding, say, $50 per acre or for drainage $20 per acre may be practically pro¬ hibitive, but for municipal supply the cost of providing water for a similar densely populated area may properly run into thousands of dol¬ lars. Thus the hydraulic engineer while en¬ countering similar problems of quantity and quality of water, adequacy of supply and diffi¬ culties of storage and distribution, must keep down the cost of these irrigation or drainage works to a small fraction of that which is feasible in considering questions of municipal supply.

Extensive studies must be made by the hy¬ draulic engineer and detailed maps prepared to show the topography of the country from which water may be obtained for irrigation and to which it may be carried. This mapping should be accompanied by measurements not only of

the rainfall, wind movement and other meteor¬ ological phenomena, but especially of the flow of various streams at typical points on their course. Usually problems of flood conserva¬ tion or water storage are involved, these being on a larger scale than those in connection with municipal supply. The result of these meas¬ urements of rainfall and run-off should be available for a considerable period of time, as the fluctuations during five consecutive years, particularly in the arid region, may not fully reveal the ordinary conditions. Ten years are better, but it appears from study of data now available that the engineer cannot assume to have complete knowledge of the climatic fluctu¬ ations from observations extending for a shorter period than half a century. Of course, it is impossible to wait that

length of time be¬ fore preparing plans for works, but when util¬ izing data which extends over a short period, a large factor of safety, especially with refer¬ ence to extreme drought and flood, should be employed.

The United States government has recog¬ nized the necessity of furnishing data of this kind and has instituted through its Weather Bureau and Geological Survey series of obser¬ vations of climatic factors and steam flow, which enable the hydraulic engineer to make his estimates with a fair degree of accuracy.

Rapid advances have been made throughout the United States, especially in the western or arid portions since 1900 in the construction of large storage reservoirs and distributing canals for bringing water to agricultural lands; so that in 1919 about 15,000,000 acres are under irrigation out of possibly 40,000,000 acres in all which may be watered. Also in other parts of the country drainage works have been provided for say 10,000,000 acres out of 70,000,000 acres needing such treatment to relieve the low lands of an excess of moisture. Large works have been and are being built in arid countries, not¬ ably in Egypt, India, South Africa and Aus¬ tralia by the British engineers. In other dry lands, notably in Spain and Italy, there has been a gradual development and in many cases resto¬ ration and enlargement of great works built centuries ago.

Disposal of Waste. — With the rapidly in¬ creasing density of population, the question of disposal of sewage from towns and cities is offering more and more intricate problems to the hydraulic engineer. In this he must call to his assistance the bacteriologist and chemist. Closely connected with the sewage problem is that of disposing of manufacturing or indus¬ trial wastes, especially where the custom has grown up of discharging these into the sewers or natural streams. Water is the universal carrier and solvent and of necessity must be largely employed in removing noxious materials.

The opinion has been advanced that the streams, of the country should be preserved in their original purity and that each city or manu¬ facturing establishment should be required to dispose of its sewage or waste in some other way than by using water as a carrier. Prac¬ tically, however, it has been found that the natural streams must be used to a continually increasing degree in removing sewage, prefer¬ ably of course after its more or less complete purification. The hydraulic engineer and his advisers are becoming expert in reducing the

amount of pollution and in maintaining a high degree of purity in the effluent which escapes from the sewage or waste treatment works, and which flows away in the natural stream channels so that it will not be injurious to health or offensive to the senses.

Manufacturing. — The next large use of water with which the hydraulic engineer is concerned is in connection with manufacturing

— this coming fourth in the scale of importance to human life, following after drinking water, food production and sewage or waste disposal. The problems in many respects are similar to those just enumerated as they are concerned with the provision of an adequate quantity and quality.. In manufacturing water may be needed either for direct consumption or simply in washing or cooling. Included under this head is the use also of water for steam purposes in which case it must be free from mineral sub¬ stances which would encrust the boiler or cause other deleterious action. For each purpose of manufacture there are certain requirements of purity, such, for example, in paper making where freedom from soluble matter is essential and where the hydraulic engineer and chemist must work together.

Water Power. — Next in importance after manufacturing is the employment of water in the production of power. As compared with other uses, the quality of water — its mineral contents or freedom from bacteriological life — is insignificant. What are required for power production are large volumes with steady flow and an . adequate fall. The use of water for power is ordinarily compatible with its later employment for irrigation or in manufacturing

— so that development of water power often goes hand in hand with the upbuilding of municipal supplies, irrigation works or other industries.

Through the United States the smaller water powers were sought and developed about a cen¬ tury ago but with the introduction of the steam' engine these water powers were abandoned to a large extent and the cities which had origin¬ ally been located near the water power gradu¬ ally came to depend more and more upon the use of. steam, while other cities built at more convenient railroad points have surpassed them in size and in manufacturing capacity. The immobility of water power and the former im¬ practicability of transmitting power to any considerable distance from the water fall re¬ sulted in stagnation or even abandonment of the use of the water in power production. The situation was changed, however, by the inven¬ tion of methods of electrical transmission of power. Since 1900 there has been a notable revival of interest in water-power development. Hydraulic engineers are being called upon to a greater extent than in the past to utilize the larger and more inaccessible streams of the country. Similar conditions prevail throughout the world and in localities such as in Norway and Sweden the water falls are now being de¬ veloped and utilized by electrical transmission, the cheap power making possible the manu¬ facture of certain chemicals, particularly the fixation of nitrogen from the air to form the basis of agricultural fertilizers.

In this branch of his work the hydraulic engineer enters largely into the field of hydro¬ mechanics as above defined, since he must study

the mechanical effects which may be produced by utilizing the force exerted by water in mo¬ tion to generate power. In hydraulic works, distinctively so called, the effort is constantly made to diminish the mechanical effect of the moving water so as to avoid injury to surfaces and substances unprepared to resist it. In hydrodynamic works the effort is made to con¬ centrate all the power obtainable from- the moving water and transmit it to machines which do effective work.

In the present state of hydraulic science more attention is being paid than' ever before to the obtaining of closely accurate results of experiments conducted by skilled observers, in which the aid of electricity is used to register all phenomena in a manner never possible here¬ tofore. Great as the advantages have been during the last 25 or 30 years, equal or greater progress in the elucidation and practical appli¬ cation of principles may be expected within the next quarter of a century.

Navigation. — The least in present import¬ ance to mankind but the first in historic de¬ velopment of industries is the use of water in inland navigation. Railroads have increased to such an' extent that the use of the rivers and lakes for transporting persons and products, while still important, is relatively far less so than in former years. Civilization can expand and succeed if there is an adequate supply of water for the purposes before mentioned, even if navigation is not employed, as goods can be transported by rail with a high degree of economy. Up to the first half of the 19th century, however, water transportation was of prime importance as communication by land was slow and in places almost impracticable. On the other hand the relatively sparse popula¬ tion and undeveloped condition of industries offered few hydraulic problems. It thus re¬ sulted that in the Constitution of the United States, while the rights of navigation are pro¬ tected, there is practically no provision made for other uses of water. What are now found to be the more pressing needs of communities in regard to water supply required for domestic and municipal purposes, for irrigation, for dis¬ posal of wastes, for manufacturing or for power purposes — have come forward promi¬ nently since the Constitution was adopted. Par¬ ticularly with reference to interstate waters there is much uncertainty in Federal and State laws, hampering the work of the engineer.

Navigation upon the ocean is, of course, of vital importance to the nations of the world and hydraulic engineering works having to do with harbors are being built of rapidly increas¬ ing magnitude as the size of the ships increase, but with respect to the inland passages and rivers there has been rapid decline of their use in navigation, such that, outside of the opera¬ tions of the corps of engineers of the United States army, few advances have been made. There are indications, however, that a change is about to take place and that with the de¬ velopment of different types of barge and of modified power boats, the rivers upon which navigation has practically ceased will be more generally employed and there will be a larger demand for works for their regulation and control for purposes of navigation.

As a notable exception in the general decline of interest in inland navigation should be cited vol. 14 — 35

the expenditures being made in enlarging and changing the alignment of the Erie Canal from the vicinity of Buffalo, N. Y., east to Albany and the connecting canal to Lake Cham¬ plain. Over $100,000,000 was appropriated by the legislature of New York State for chang¬ ing the old waterway into a barge canal capable of navigation by boats drawing nine feet of water. Later appropriations have been made and notable hydraulic works executed. There have also been large expenditures made by the Federal government for the improvement of the channels connecting the Great Lakes. On these the conditions are more nearly comparable to ocean navigation; the freight traffic, prin¬ cipally of iron ore, coal and grain on Sault Sainte Marie and Detroit River surpasses that of the Suez Canal.

Harbors. — An interesting and important branch of hydraulic engineering is that which deals with larger masses of water than any of those so far considered. Along the sea-coasts of all countries there are places where the con¬ formation of the shore and the nature of the contiguous lands render the creation of harbors , desirable, but where the tidal waves and littoral currents come in conflict in such a way as to make the approach from the sea dangerous to vessels. To lessen the destructive effects of the great masses of water in motion, impelled by either the wind or the tidal currents, break¬ waters or piers of stone projecting from the shore are built with good results. The massive¬ ness which such structures are required to possess may be judged from the fact that it has been learned that the foundation for a break¬ water must extend out to where there is from 18 to 20 feet of water at low tide ; that the height of the waves by which it is likely to be assailed may be from 10 to 20 feet; and that the impact of the wave on the opposing struc¬ ture may be as high as 6,000 pounds to the square foot. In the open sea it is not likely that waves as high as this are formed, or that the force exerted by them is nearly as great, but the problem of the form and resisting power of the hull of ships has to be

considered from the standpoint of the dynamic effect of the water which is impelled by the wind and waves against the hull, as well as the resistance offered by the water to the passage of the hull through it.

Floods. — • Each stream in a state of nature fluctuates in accordance with the rapid changes of weather and alternates between high and low water, having usually a spring flood due to increased temperature, the melting of snow and frequent rains. The factors which com¬ bine to produce floods vary in intensity from year to year ; occasionally the combination of extraordinary rains on frozen ground or with rapidly melting snow produces flood of ex¬ ceptional violence. During their geological his¬ tory the streams during high water periods have built up flood plains by deposits from the muddy waters. Such lands are of exceptional fertility and their level character has invited settlement. The tendency has been not merely to cultivate these lands but to build manufac¬ turing establishments, railroads and towns upon the level surface. During periods of low water or even of ordinary flood there is no difficulty, but at times of high flood, the bridges, factories and other buildings along the bank interfere

with the free flow. The river of necessity at such times spreads out and endeavors to take possession of its ancient flood plain, with con¬ sequent destruction to property or even life. The immediate answer to questions, which are presented to the hydraulic engineer by these flood conditions, is to remove from the' river channel and the flood plain the obstructions placed there by man and to erect permanent buildings only on higher ground, saving the low land for such agricultural purposes as will not be seriously injured by the occasional floods. This, however, has often become impracticable and it is necessary to consider other solutions for the many flood problems. In attacking these there are two lines of effort : First, flood prevention ; second, flood protection.

In flood prevention the remedy is to be sought by careful surveys and examinations on the drainage basin to discover possible reservoir sites and by storing the flood water in suitable basins, enlarging the natural ponds or lakes or making artificial reservoirs where the floods may be restrained for a period of days or weeks, the excess being let out slowly in accordance with the capacity of the channel to receive it. There are not many localities where adequate reservoir capacities have been provided by nature or where dams can be erected creating a reservoir at a cost commensurate with the im¬ mediate benefits. Investigations have been made, however, and it is evident that in the future many reservoirs will be constructed to reduce the

flood crest.

In flood protection the object sought is to build near the points of danger large dykes or walls, shutting off the river from its ancient flood plain, and confining it in a relatively nar¬ row channel. This is the most immediate and direct method of solving the difficulties for any particular locality, but of course does not assist other threatened points as in the case of reservoirs or similar works built for flood pre¬ vention. In fact the protection of one area may jeopardize another by increasing the flood heights. The combination of flood protection by reservoirs and of flood prevention by dykes offers many interesting problems and is the sub¬ ject of continued study by engineers in many parts of the world.

River Regulation. — All these hydraulic en¬ gineering problems of (a) domestic and munic¬ ipal supply, (b) irrigation and drainage, (c) disposal of sewage and waste, (d) manufactur¬ ing, (e) water power, (f) navigation, (g) flood protection and prevention, may be con¬ sidered as part of the general hydraulic en¬ gineering problem of river regulation. As a rule each of these items has come up as a separate matter to be handled by the hydraulic engineer within certain territorial limits or re¬ strictions of funds available. The artificial re¬ striction of property lines, or of State or other boundaries, have usually prevented any broad consideration of the subject, but it is obvious that for the full development of any country each river system must be considered as a whole and examined, beginning at its head waters, with the intent of utilizing all possible storage reservoirs for holding water for municipal sup¬ ply, irrigation, water power or flood prevention — considering in this connection also the forest cover and cultural conditions of the drain¬ age area. There should be studied also the

requirements of disposing of sewage and manu¬ facturing waste, the employment of water for manufacturing and water power and finally in its lower courses its use for navigation. Regula¬ tion in the interest of the commonwealth de¬ mands broad consideration of all such problems by qualified hydraulic engineers and requires a broad control, usually by national authorities, because of the fact that the larger river systems are independent of artificially drawn State lines.

In river regulation in general and in the individual problems a wide field is thus offered to the engineer. The capacity and arrangement of storage reservoirs must be proportioned to the fluctuations of the natural flow of the stream. The channels for the conveyance of the water must be proportioned for the various proposed uses and with reference to the mate¬ rials of which they are composed. When used for irrigation a low velocity of flow is desir¬ able to avoid abrasions of the banks, and the sizes of the channel are proportioned to convey definite quantities of water steadily. In

other cases the channels must be maintained in such manner as to carry constantly varying quan¬ tities of water at different speeds of current, and the banks must be fortified against injury from sudden fluctuations of level in the water surface and from abrasion by floating material or accretion by deposit.

The construction of levees or embankments along the banks of a river and parallel to its current is the earliest and simplest of t.he methods of river improvement ; but it is only within the last half century that this has been reduced to a science, and the most effective and economical methods of design and construc¬ tion formulated. If the stream improved is of sufficient size to be navigable, the conditions of the problem are again changed. The course of the channel in places may have to be altered to avoid rapids of too steep descent for pas¬ sage of boats, and a sufficient depth of water must be maintained at all times and in all places for boats of definite dimensions and draft. Where such artificial channels are necessary it is important that they should be so propor¬ tioned that the passage of the largest boat at the maximum permissible speed should not create a wave which would injure the banks or retard the progress of the boat.

The problem of the resistance of the water to a vessel passing through it enters into the consideration of navigation, especially of canals and inland waters. The more rapidly a vessel passes through a small channel the greater is the work to be done in the displacement of the bulk of water occupied by the hull. The dis¬ placed water is prevented from flowing off by the adjacent banks and shallow bottom, and the pressure required to propel the boat is so increased that it is found that a greater ve¬ locity than three miles per hour is not eco¬ nomical. All such factors must be listed for consideration in the general plans for improve¬ ment of inland waters.

From the above review of hydraulic engi- neering it is to be noted that it is a profession which has numerous ramifications and under¬ lies the health, comfort and prosperity of the human race to a . greater and greater degree as population and industry increase. Each year is showing notable advances in methods and results of work. The literature on the subject

is already voluminous and each month shows some notable contribution either in the proceed¬ ings of engineering and scientific societies or in textbooks or treatises on one or another of its many details. See Hydraulics; Hydro¬ statics; Hydrodynamics; Hydro-Electric De¬

velopment.

Frederick H. Newell,

Professor of Civil Engineering , University of

Illinois.

HYDRAULIC' MACHINERY, machinery which is operated by water pressure, either natural or transmitted: natural, as in a pipe leading down from an elevated reservoir; transmitted, when the pressure is produced by an engine, such as a pump or a hydraulic ram. The more powerful hydraulic machines are worked through an accumulator, which acts as a governor. _ This device substitutes a uni¬ formly' acting weight for the fitful variation of impulse inseparable from pumps and. natural sources. It consists essentially of a piston held down by heavy weights, acting in a cylinder into which the water supply is led below the piston. The water under pressure pours into the cylinder, lifting the piston and its weights. If the impulse is much greater than the weight, the pressure in the cylinder does not change, but the piston is driven higher. The machine is operated by water taken from the' cylinder at the constant pressure represented by the weight. The smaller the area of the piston in proportion to the weight the greater the pres¬ sure per square inch available to run the machinery.

Hydraulic machines include metal working machinery like presses for corrugating and stamping, punches, shears, rivetters, bending machines, etc. ; many kinds of cranes, lifts and elevators; hay and goods presses; jacks, pumps, capstans, and winches ; railway switches and turntables ; drydocks ; gun brakes to take up the recoil of guns when fired, and gun lifts to raise disappearing guns to the firing posi¬ tion ; door-closing mechanism for closing safety doors in bulkheads on shipboard ; grain eleva¬ tors and dredges ; and similar power applica¬ tions. (See Hydraulics; Hydraulic Engine; Hydrodynamics). Consult Butler, E., (Ne'w York 1915) ; Merri-man, M., (Treatise on Hydraulics) (New York

1916) ; Robinson, H., (Hydraulic Power and Hydraulic Machinery) (London 1912) ; Slocum, S. E., (Elements of Hydraulics (New York*

1917) .

HYDRAULIC MINING. See Gold Min¬ ing; Hydraulics.

HYDRAULIC PRESS. The action of the hydraulic press depends on two facts concern¬ ing water: (1) that it is incompressible; (2) that when confined it will transmit equally in all directions any pressure to which it is sub¬ jected. The hydraulic press by which these facts are put to economic

use consists essen¬ tially of two connected cylinders, one of large diameter and the other of small diameter. Each is fitted with a piston. The smaller cyl¬ inder is operated as a pump, the larger one as a reservoir. Any pressure per square inch put upon the pump piston is transmitted to the res¬

*ervoir piston per square inch. Thus, if the pump piston has an area of two square inches, and the reservoir piston an area of sixty square inches, a pressure of 80 pounds on the pump piston rod will exert a pressure of 2,400 pounds on the reservoir piston rod. As applied indus¬ trially, the hydraulic press carries a platen, or platform, on the upper end of the reservoir pis¬ ton rod — generally a plunger of large diam¬ eter. A massive frame work extends from the base of the reservoir cylinder up and overhead, and upon this is fastened a fixed platen opposite the moving platen. The material to be pressed is placed on the movable platen below and is forced up against the upper platen by pumping water with the pump cylinder in-to the reservoir cylinder below its piston. The efficiency of the hydraulic ' press is very high — above 90 per cent; that is, less than 10 per cent of the power put into the machine is absorbed *by the friction developed in operating it.*

The principle of the hydraulic press is made use of in the portable hydraulic jack, used in raising heavy vehicles, and even great build¬ ings, bridges, etc. The hydraulic cranes used for lifting heavy castings and machines, such as locomotives, is a development of the hy¬ draulic press. Perhaps the most common appli¬ cation of -the hydraulic press is in the gaining of oil from oil-seeds and oil-nuts. These re¬ quire the immense pressures long continued which the hydraulic press supplies. Another use is in forcing into place the metal hoops on large and strong barrels. A very interesting application of the hydraulic press is in the making of lead and tin pipes. These metals become plastic under the tremendous pressures exerted, and flow out of the prepared orifices in the same way that macaroni is forced from the machine in which it is made by a very mod¬ erate pressure upon the soft dough. By an in¬ genious device lead pipe lined with tin is as readily produced as the plain lead pipe. The hydraulic press is also used to coat electric cables with lead, the cable passing through the core stem which preserves the hollow when lead pipe is made. Still another application of major importance is the use by engineers of the hydraulic press in tunneling, the shield through which the excavations are made being forced forward into the new excavation by six (usually) hydraulic presses butting against false work in the completed part of the tunnel.

HYDRAULIC RAM, an automatic ma¬ chine generally employed to lift water from a low level to a higher one, but also to supply compressed air for motor purposes. The hy¬ draulic ram operates by the momentum' of a

body of falling water. It consists essentially of a large pipe sloping downhill, the lower end rounding upward and being fitted with a heavy drop valve ; and a small pipe reaching uphill to the point where the water is to be delivered. Back a few inches from the lower extremity of the pipe is attached an air-chamber connecting with the body of the pipe by an ordinary lift valve. The exit valve or ((pulse valve, }) as it is called, having dropped by gravity below its seat, the water in the drive pipe flowing down from the reservoir out of the exit gathers in¬ creasing velocity, and therefore momentum, until it is strong enough to lift the exit valve to its seat and close it. The column of water in the drive pipe being thus suddenly halted

exerts a pressure all about it equal to its mo¬ mentum at the moment it was stopped. This pressure operating on the valve into the air chamber opens it and a part of the water rushes into the air chamber, compressing the air within, until the pressure of the compressed air balances the pressure of the checked stream in the drive pipe. The force which closed the exit valve being thus greatly reduced, that valve drops down- again from its seat, and the stream of water begins flowing again from the exit. This cycle is continuously repeated. The lift pipe is connected with the lower part of the air-chamber just above the inlet valve. When the latter closes in the balancing of the air pressure, the water entering the lift pipe is forced upward until its weight balances the air pressure. As but a small proportion of the water running in the drive pipe enters the air- chamber, the lift pipe is always much smaller in diameter than the drive pipe.

It is evident that the pulse valve must be designed or regulated to suit the momentum of the water with which it is to operate: if it is too heavy it will not close at all, and the ram will not work; if too light, it will close before the stream in the drive pipe has attained its full force, and the result will be that so little water will enter the air-chamber that there will be practically no air pressure developed to lift the water in the lift pipe. The newer types of rams have a balanced lever with a sliding weight connected with the exit valve so that it may be adjusted with great delicacy to the available water power. The efficiency of the hydraulic ram depends upon the momentum of the flow of water in the drive pipe ■ — that is, to its velocity multiplied by its mass. The ve¬ locity being dependent on the vertical fall or head of water available, greater power at the ram is gained by increasing the mass of water moving in the drive pipe, by making it larger in diameter or longer. This will mean that more water will flow into the air-chamber when the current is halted, and thus the air be com¬ pressed to a greater degree,

and consequently a higher or larger lift of water attained in the lift pipe. The formulas in common use by engineers for calculating the diameter and length of the drive pipe for any given condi¬ tions are as follows:

Diameter of drive pipe =\/1.63X M where M is the volume of water continuously avail¬ able in cubic feet.

h

Length of drive pip e= =H+/i+ X2 where

H is the fall (perpendicularly) of the drive pipe, and h the height to which the water is to be carried in the lift pipe.

One of the difficulties to be guarded against in the operation of the hydraulic ram . is the gradual absorption of the air in the air-cham¬ ber by the water continually flowing through. Water under pressure dissolves a considerable quantity of air, and this has to be replaced, or the air cushion would become too small to be effective. An attachment to keep a sufficient supply of air always in the air-chamber is a low standpipe connected with the drive pipe at its base and to the air-chamber from its top, with suitable valves to take air from outside at low pressures, and force it into the air-chamber at high pressures.

The more common use of the hydraulic ram is to supply water from a lower level to a coun¬ try house or dairy upon an elevation near by. It is also used by builders to get a water sup¬ ply on the upper floors of new buildings where the water service fails. In the boring of the Mont Cenis tunnel the engineers used hydraulic rams to compress air to drive the rock drills employed, the compressed air being taken from the top of the air-chamber direct. The water power operating the rams was the natural drainage of the tunnel.

The pumping ram is designed to raise a water supply separate from that which operates the machine, so that water that is not fit to drink may be used to deliver a supply of whole¬ some water through the lift pipe. In this form of ram the momentum of the checked flow of water in the drive pipe expends its force upon a large area piston of a pump working in the lift pipe.

An industrial application of the principle of the hydraulic ram is made in the machine known as the ((hydraulic ram accumulator,® a device for storing water under great pressure, in some cases reaching 1,000 pounds per square inch. Consult Bradley, F. A., < Pumping and Water Power) (London 1912) ; Clarke, J. W.,

(Hydraulic Rams) (London 1907) ; Hutton, W., (Country Plumbing .Practice > (New York 1914) ; Kennedy, R., (Modern Engines* (Lon¬ don 1912).

HYDRAULIC TRANSMISSION. The

fact that water confined within an unyielding encasement transmits equally in all directions any pressure put upon it gives rise to the principle of hydraulic transmission — the transference of power by means of a column of water under pressure. In the industrial appli¬ cation of diis idea the column of water is held in a pipe, which may be vertical, horizontal, in¬ clined or in any combination of these positions : wherever the water reaches, the pressure under which it has been placed is available as power at. any point of the pipe line. In large cities this principle is made use of for supplying many power users from central sta-tions by means of water pipes laid in the streets. Lon¬ don has the largest development of this form of power transmission, having upwards of 150 miles of pressure mains,, some of them seven inches in diameter, carrying water under 750 pounds to the square inch. At Glasgow and Manchester the pressure carried is 1.120 pounds to the square inch. Many other British cities have similar hydraulic power service. The pressure upon the water is supplied by steam pumps at the central stations. The steam is used expansively in high and low pressure cylinders working directly upon single-acting pumps of small diameter. The action is a direct reversal of the hydraulic press (q.v.). The water from the pumps is forced into storage cylinders known as hydraulic accumulators. These cylinders are fitted with pistons which are weighted with loads per square inch equal to the pressure the confined water is to carry. The water from the pumps enters at the bot¬ tom of the accumulator at a little higher pres¬ sure than is represented by the weight, and lifts the piston with its load, thus storing power in proportion to the amount of the confined water. In the case of the London service the pres-

sure in the steam cylinders is 80 pounds to the square inch, and in the accumulators 800 pounds to the square inch — the areas of the steam cylinders to the pump cylinders being as 10 to 1. The high pressure power is used gen¬ erally through Pelton wheels. The cost of hydraulic power in London is equivalent to about five cents per horse power per hour — from 30 to 60 per cent less than the cost of electric power.

The natural gravity pressure of water in pipe lines leading from elevated reservoirs is equally available for power, and is usually passed through an

accumulator to render the pressure uniform. Each 32 feet of elevation contributes about 14 pounds pressure to the square inch.

HYDRAULICS, that branch of engineer¬ ing science which deals with liquids (especially water) in motion, the regulation of the flow of liquids, and utilization of the momentum, pres¬ sure, weight, etc., as when confined in pipes and channels, for the operation of machinery, or doing useful work.

Water being the most common liquid, and having considerable weight (62ˆ pounds to the cubic foot), is excellently adapted to do work by its gravity. When allowed to run it acquires momentum, a quality available for the con¬ venient use of the designer of hydraulic mechanisms. Being of very slight elasticity, that is, practically incompressible, it can be used when confined with great advantage, as we note in the hydraulic press and similar machines. Flowing as it does in streams, in almost every locality, it is comparatively easy to direct it for the service of man.

The density of water is apparent from the fact that it supports heavily laden ships, and from the tremendous power with which large waves driven at great velocity by high winds beat upon a shore or breakwater, exerting a pressure in the case of a 30-foot wave of 7,000 pounds per square foot. This density will be better appreciated after studying this table showing

The Density of Water.

Temperature

*/ – * –*

- s

Weight per Comparative

Fahr.

Cent.

cubic foot

density

32°

0′

3 62.417

. 999884

37.4

3

62 . 424

1 . 000004

41

5

62.423

1 . 000003

50

10

62 . 409

.999760

59

15

62.373

.999173

68

20

62.316

.998272

104

40

61.947

.992366

167

75

60.863

. 974999

212

100

59.844

. 958666

Sea water

will

weigh about

one and

pounds more than fresh water, on which the above table is based. Ice loses weight, or expands on freezing, weighing 57.28 pounds to the cubic foot. A cubic foot of water equals 7.48 United States gallons; a liter of water equals 0.264 United States gallons.

The volume and speed of flowing water in a stream constitutes its theoretical utility. To calculate the horse power available in a stream, it is first necessary to know its cross section. If it can be determined that the average depth is five feet and the average width 50 feet, then the cross section is 250 square feet. If the water flows three miles an hour, that is 264

feet a minute or 4.4 feet per second. Since 33,000 pounds raised one foot in a minute is the horse power equivalent, it is obvious that this gives a basis for figuring the horse power. If a dam is built, there will be normally 250X264 cubic feet of water weighing 62ˆ3 pounds per foot coming over the dam every minute, that is, 4,114,000 pounds, a potential of nearly 125 horse power. This water to be utilized may be con¬ veyed by a level mill race to a point where it can fall over an overshot waterwheel, and thus be made to yield from 70 to 90 per cent of its potential horse power, depending upon the me¬ chanical efficiency of the wheel. If the same water

were taken from the bottom of the dam to operate a turbine wheel a higher efficiency would be gained. Such a large volume of water as that supposed — 1,000 cubic feet per second would suffice to run several ordinary wheels.

The actual horse power developed will be considerably less than the theoretical, owing to friction and imperfect machinery. About 75 per cent of the theoretical is generally consid¬ ered as available for use in practice. Since no stream flows uniformly, and since the power will be used intermittently, it is obviously neces¬ sary to provide a large storage reservoir for the power plant if the approximate value of the power is to be obtained. The engineer must therefore calculate how large a dam he needs and can build in that locality, and what it will cost, and how high this dam should be.

If the water in a stream is to be led away in a pipe, it is necessary to figure the carrying capacity of the pipe, for Which the following table is useful :

Velocities of Water Through Pipes.

(In feet per second;

Diameter Gallons flowing per minute

of pipe in – — — — – - – -

inches 100 200 300 400 500 1000

3 . 4.54 9.08 13.62 .

4 . 2.55 5.11 7.76 10.21 12.17 .

5 . 1.63 3.27 4.90 6.54 8.17 .

6 . 1.14 2.27 3.40 4.54 5.67 11.35

7 . 0.83 1.67 2.50 3.34 4.17 8.34

8 . 0.64 1.28 1.92 2.55 3.19 6.38

9 . 0.50 1.01 1.51 2.02 2.52 5.04

10 . 0.82 1.23 1.63 2.04 4.09

15 . 0.55 0.73 1.09 1.82

20 . 0.40 0.62 1.02

30 . . 0.45

The above figures are to be taken as approxi¬ mate, because in each actual case there will be differences of friction, depending on the rough¬ ness of the interior of the pipe.

Water moving through a pipe at a certain velocity acquires momentum — that is the ve¬ locity multiplied by its weight. When water is suddenly stopped in a pipe it delivers a blow that is called water-hammer, or more properly water-hammering. In a large or long pipe with rapid flow this momentum may be strong enougfi to rupture the pipe, hence it is extremelv dangerous to shut off suddenly the flow in a large pipe. A similar effect is produced in pipes carrying great head. In one reported in¬ stance the sudden closing of an automatically balanced valve in a short 42 inch pipe, under a head of 25 feet, caused a hammer equivalent to a head of 250 feet, and sprung the rivets, causing a leak in a ˆ-inch steel casing. In another instance, with a 24-inch pipe, a valve was closed by hand in 20 seconds, and the pres¬ sure, measured 2,100 feet away, was found to

oscillate a number of times between the ex¬ tremes of 40 and 65 pounds.

It is obvious that the first use of water for mechanical purposes involved leading the water from a stream or other source, for use at another place. A primitive mechanism for raising water from a stream was the noria, consisting of a large upright framework like a wheel, placed over a stream or river so that the flow of the current turned it around on its axis. To the periphery of the wheel were at¬ tached hinged buckets, which were often earthen jars tied on the frame, and which were partly filled as they dipped in the stream, and being carried to the top were emptied by a tripping device into a trough, which led the water away on the higher level.

When men began to use machinery, as for grinding wheat, a better mechanism than the noria was necessary, and they learned to dam a stream and secure a fall of water to drive the wheel, which was provided with cross boards, so as to give the water a surface to push against. When the water struck the wheel on top, pushing with both its weight and velocity, it was an overshot wheel; if it passed under it was an undershot wheel ; if the water struck the wheel just below the level of the shaft it was a breast wheel ; when the wheel was mounted on its side rotating on an upright shaft, with spiral or curved flanges for buckets, it was a tub-wheel, which form is the progenitor of the turbine. Overshot and undershot wheels

were used for hundreds of years to drive flour mills, and a few are still in use, but such wheels are very wasteful of water, as compared with modern constructions.

Flow of Water Through Orifices. — A

large and important section of the science of hydraulics is that which treats of the study of the flow of water through orifices of varying shapes and sizes and under varying heads. From these studies has come the knowledge which guides the mechanic in the proper forma¬ tion of a nozzle suitable to the economical and efficient delivery of a certain amount of water under the pressure of any given head. Experi¬ ments in this direction are carried on by passing the water through an opening in a thin plate. Careful measurements of the spouting jet give a very close idea of its natural form. In this way the observed contraction of the jet just after issuing from the opening has led to the use by water-supply engineers of an entrance tube, or ((mouthpiece® of modified funnel-shape placed within the reservoir, in the case of the supply pipe leading out of a reservoir. Out¬ side of this mouthpiece the pipe is gradually expanded into an elongated funnel or ((adju- tage.® The effect of these modifications has been to increase the velocity and consequently the discharge from the reservoir into the pipe to, in some cases, twice the volume to be theo¬ retically expected from the existing head of water in the reservoir.

Another economic result from the study of the jet from an orifice is in the formation of hose nozzles for fire service, where the aim is to produce a jet of the largest possible volume and velocity with the smallest amount of fric¬ tion.

Flow of Water in Channels. — In the prac¬ tical applications of hydraulics, water is con¬ veyed to a place where it is to do work, in open

channels or in pipes. In the case of the former the velocity or speed of the current depends solely on the grade of the bottom of the chan¬ nel. The water simply <(runs down hill,® and the steeper the grade the swifter the current. The material in which the channel is formed will control the grade it is possible to give the canal or ditch, as too high a velocity for the water will tend to destroy the channel. So where the channel is simply cut in the natural earth the grade is perforce made safe for the material. A water velocity of three inches per second will carry off fine clav ; at six inches per second, ordinary soil will be carried away; at one foot per second, coarse sand will run off; at two feet per second, gravel washes away; at six feet per second, large stones will be rolled along. It is customary, therefore, to line a channel with some enduring material, such as concrete, or even masonry if it is to be permanent. The flow of water in these channels will

obviously be affected by the fric¬ tion at the bottom and sides of the channel. This is technically known as the (

Flow of Water in Pipes. — When the flow¬ ing stream of water is completely enclosed, as in a pipe, it is evident that no attention need be paid to the grade. The pipe may stand vertical if so desired. The difference in level vertically between the intake of water at the upper end of the pipe and the point of discharge is called the «head.® It is expressed in feet, but in prac¬ tice it is translated into pressure — the pressure equivalent to the weight of a column of water having the area of the pipe and a height equal to the head.

The friction set up by the perimeter of a pipe filled with running water is very consider¬ able, and as soon as the lower end of the pipe is opened and the water is allowed to flow the pressure corresponding to the head disappears by a large percentage. This is called technically ((loss of head.® Its effect is to cut down the velocity of the stream in the pipe, and hence, to reduce the theoretical discharge very materially. Several <(la\vs® have been deduced from a num¬ ber of experiments made under these conditions. They are :

(1) The loss of head from friction is di¬ rectly proportional to the length of the pipe. (2) It is inversely proportional to the diameter of the pipe. (3) It increases nearly as the square of the actual velocity of the stream in the pipe. (4) It increases with the interior roughness of the pipe. Another source of loss of head is to be found in every bend of the pipe. This is greater as the velocity is large, and is very small when the current is very slow.

From the first two laws above quoted it is seen that the discharge of water from a pipe

must depend upon the proportion of the length to the diameter. Hydraulic engineers are ac¬ customed to classify pipes as ((short® and Hong.® A short pipe is one whose length is less than 500 times its diameter ; a long pipe is one whose length is more than 500 times its diameter. In a short pipe the loss of velocity due

to friction is so small as to be negligible

in practical work. In a long pipe, on the

contrary, particularly if of very small pro¬ portional diameter, the friction

is sometimes great enough practically to nullify the velocity and reduce the discharge to a mere trickle. As an example it may be stated that experiment has proved that one pipe of 24 inches diameter (452 square inches in area) will dis¬ charge as much water as 32 pipes of 6 inches in diameter (904 square inches in combined

area). That is, the advantage of half of the area of the smaller pipes was lost by the fric¬ tion of the larger perimeter surface. This mat¬ ter assumes great importance in designing water-supply systems for cities, where the ap¬ portionment of the large mains and the small supply pipes must be directed to conserving the Uiead® or force of the flow against its too great diminution by ((long-pipe® friction.

Hydraulic Gradient. — Another phenomenon which presents itself in the problem of the water-supply engineer is what is known as the (the varying pres¬ sure by a body of water flowing in a pipe toward a lower level. It is ascertained experimentally by inserting in such a pipe a series of vertical tubes freely open to the atmosphere, and reach¬ ing upward to the level of the water in the supply reservoir. If the water in the pipe were not flowing, it is evident that in all the tubes the water would stand at the same level — that of the water in the reservoir. Upon allowing the water to flow, however, the water in the up¬ right tubes falls, not to a uniform level, but to a graded line. In the tube nearest the reservoir it falls least; in the tube farthest from the res¬ ervoir it falls most. A line connecting the points at which the water stands in all of the tubes is -the hydraulic gradient for that partic¬ ular pipe.

The hydraulic gradient will vary according to the diameter of the pipe, its length, the grades on which it is laid, the roughnesses of its in¬ terior, its expansions or contractions in diameter and the distances from the reservoir at which they occur, and the number and sharpness of the bends placed in the system. The application of the principle of the hydraulic gradient in water-supply work appears when it becomes nec¬ essary or desirable to carry a supply pipe over a hill, which, though it be on a lower level than the water in the reservoir, may be above the line of the hydraulic gradient. In this case a siphon must be formed, otherwise the water supply will be cut off from the hill and the pipe line beyond it. See Siphon.

Hydraulic Power. — Reference has already been made to the potential power for work by water stored at a height above the level where it is to be used. This power is exercised only in case the water is allowed to move. The power developed is that of the weight of the water used multiplied by the speed or velocity at which it moves ; this product being termed its ˆmomentum.® From the previous discus¬

sions it is seen that in making use of moving water a much greater power can be secured by confining it in pipes than by conducting it in open channels. In the latter case, while the weight of the water used may be the same, the velocity factor in the momentum is quite small, whereas in a pipe it may be very large if the grade of the pipe is steep. So that a small quantity of water operating under a great head may be made to do much more work than a large quantity with practically no head at all, as in the case of an open channel. For this reason the open water water-wheels are much less efficient with the same volume of water than the enclosed Pelton and turbine wheels operated by pipe lines.

The Turbine Wheel. — An overshot wheel is unscientific, because it carries a small part of the water beyond its lowest point, back on to the rising side of the wheel, where its weight is opposed to the forward movement; the undershot wheel gets the push of the water dur¬ ing only a small part of its revolution, and also carries up waste water. The best construction aims to throw the water quick and hard into the wheel and get it out again without dragging on the wheel. The theoretically best construction has been found in the turbine wheel, which is fundamentally a wheel rotating on its sides, on a perpendicular or upright axis, and taking in water at the sides, from gates in a stationary case, which admit the water at a desirable angle so that it strikes the curved blades of the runner or running wheel, gives them a quick thrust and falls through, delivering usually at the centre. It should be here noted that in English and Continental usage all water wheels are called turbines, while in American usage the word turbine is reserved for the style of water wheel just described, having spiraled flanges and runners. The turbine has been built in many forms, in the endeavor to secure the most power from the flowing water. The style which has become most common is the impulse or action turbine, having stationary gates with curved guides that direct the flow of water. Immediately below is the runner, having flanges curved but substantially at right angles to the fixed guides, so that the water delivers a push to the runner, and falls down, perhaps to a second, third or fourth runner. This developed type is now commonly called the Francis tur¬ bine, after an engineer who developed it about 1850. The reaction turbine has spiral-shaped flanges positioned to receive the water axially and deliver it tangentially.

The turbine is now almost universally adopted for all water powers of low head that is under 300 feet head. It should be under¬ stood that

• Impulse or Pelton Wheels. — The impulse or direct-action wheel, after going through evolutionary development as overshot, under¬ shot, breast wheel, etc., has settled into the form known as the Pelton wheel as the best type. It is in almost universal use for high heads of 500 feet and over and in hydraulic street service. It is named after L. A. Pelton,

because he did more than any other man to perfect the dividing wedge principle, which serves to direct the water to the best advantage, securing the highest efficiency deemed possible with a direct-impulse wheel. The Pelton is a wheel in its simplest form, usually rotating on a horizontal axis, having buckets bolted to its periphery, against which the impelling water is directed from one or more nozzles. The buckets are like twin hollowed hemispheres or half¬ globes that are pushed together so that they divide by a straight line and sharp edge. The jet from the nozzle is aimed directly at this dividing ridge, which separates the water and gives it a direction that tends to throw it out of the hemispherical twin buckets as soon as it has done its work. The impulse wheel for utilizing high heads of water was first intro¬ duced by the California miners of 1850, and gradually^ improved, Pelton doing his work about 1878 to 1880. In modern practice the construction has improved. See Hydro-electric Development.

The Pelton wheel is not quite as efficient theoretically as a turbine, wasting from 5 to 7 per cent more water; a Francis turbine will deliver more water for the same diameter than a Pelton. But the turbines are more compli¬ cated and more costly, and not so well adapted to receive the enormous pressures to which Peltons are subjected under a high head. For many years a three-foot Pelton wheel was run at the California and Consolidated Virginia mine in Nevada, under a 2,100-foot head with a little half-inch stream of water, making 1,150 revolutions per minute, or the equivalent of 240 miles an hour, and delivering 100 horse power. They are built in sizes up to 10,000 or more horse power, and use from one to four nozzles distributed around the periphery, the tendency being to employ one nozzle. Some of the larger nozzles deliver a stream of 9 or 10 inches diameter. This flow is regulated by a central ^needle® which can be advanced to par¬ tially close the aperture of the nozzle. Deflec¬ tors are also employed to turn aside the flow of water should the Hoad® be suddenly re¬ duced. Both turbines and Peltons are now commonly coupled directly to dynamos for gen¬ erating electricity, that the power may be sent out on wires, or the current used for electric lighting, etc.

Pumps. — To comprehend the action of pumps the reader must understand that water always seeks the lowest possible level. If a garden hose is nearly filled with water and the two ends are held up, it may be demon¬ strated that the level of the water in one end is the same as the other end ; this crude device is sometimes used in making grades for drains. It must also be borne in mind that water is under atmospheric pressure. The air weighs 14.7 pounds per square inch (at sea-level), and if the lower end of a pipe

of one inch cross section be placed in water, and the air be pumped out or otherwise removed from the pipe, the water, being relieved of 14.7 pounds pressure, at once rises in the pipe until the col¬ umn of water in the pipe equals the weight of the atmosphere removed, which in theory is about 32 feet, or in practice a little less.

The hand pump is made in almost an infi¬ nite variety of forms and styles. The common

suction pump (see Fig. 1) has a pipe whose lower end rests in the water; the pump proper is a barrel A of larger diameter than the water pipe. A piston B with valves CC is recipro¬ cated in this pump barrel A, by moving the pump handle up and down. As the piston moves upward the valves CC are automatically closed, and the valve D opens, when the tend¬ ency to create a vacuum below sucks up the water, which may thus be raised to a height not exceeding 32 feet. In other words the up¬ stroke of the piston causes the water below to rise because of the atmospheric pressure. To force water higher than 32 feet with a piston movement, the force-pump is employed. This has a solid piston, moving up and down in a cylinder, but the valves are both in the lower part of the cylinder, as shown in Fig. 2. When the piston is rising, as illustrated, the lower

Fig. 1. — Suction Pump. Fig. 2. — Force Pump.

valve A opens and water is drawn into the pump barrel, the valve B being closed. When the piston reaches the top and starts its return downward stroke, the pressure closes the valve A and opens the valve B, and the water in the cylinder or pump barrel is forced into the pipe leading upward which may extend to a con¬ siderable height. As described, the action of the force-pump is intermittent, but it may be made to deliver water continuously by attach¬ ing an air-chamber to the eduction pipe. The air in this chamber is compressed while the pis¬ ton is forcing water up the eduction pipe, and on the return movement of the piston, its pres¬ sure being removed for an instant, the com¬ pressed air acts as a spring and pushes up some water. The force-pump, it is apparent, raises the water as far as the pump barrel on the same principle as the suction pump, atmospheric pressure being the raising force in both cases, but above that point the action of the force- pump is that of the downward force exerted

by the pump handle on the confined water in the pump barrel, so that it is free to raise more water on every stroke regardless of its per¬ haps having

already raised a column of water 32 feet up to the barrel.

The force-pump barrel is usually set in a horizontal position, with the pump handle ver¬ tical, so that the man pumping can throw his weight against it in much more effective fash¬ ion than in an up-and-down stroke.

A lift pump is one that raises the water bodily by lifting or scooping it up; it may employ a piston in a tube, but the common de¬ vice is an endless chain with circular buckets fixed a few inches apart, these buckets being shaped like washers and fitting loosely the bore of the pipe through which the chain is raised. The chain is hung at the top over a driving windlass; the lower end dips in the water ; the turning of the windlass by a crank draws one side of the chain up through the pipe, and the washer-like buckets draw up the water between them. The old-fashioned ship-pump was the simplest sort of lift pump, consisting of a pipe running from the deck nearly to the bottom of the ship's hold. In this pipe was let down a rod, having a handle at the top and dish-shaped leather buckets near the lower end. By working the handle up and down the sailor who manned the pump lifted water in a con¬ tinuous stream. With such a pump it was nec¬ essary for the sailor to make the downward movement rapidly, so as not to lose the water raised, while reaching down for more.

A centrifugal pump of the form also called a rotary pump is one having a short cylindrical case, in which turns a rotary piston having several radial arms that embrace sectors of the cylindrical space, so that water may be ad¬ mitted at one side and passed out at the other side. Tesla's pump might also be called centrif¬ ugal, since it receives the water axially in a wheel, and throws it out at the periphery; its fundamental characteristic, however, is capillary attraction or skin friction. By placing several discs about three-sixteenths of an inch apart and rotating them in unison the water is picked up by .the side friction of the discs, and then when the disc spaces are full, it is thrown out by centrifugal force. A centripetal pump is one having a rotating mechanism that picks up the water at the periphery and delivers it at the axis, a sort of reversed turbine.

Steam pumps are made in numerous forms, some being simple force-pumps operated by a steam-engine. A common direct-acting steam pump has large gears mounted in a water-tight case, and meshing closely so that their rota¬ tion withdraws .the air from a water pipe, creates a partial vacuum and raises the water. The propeller pump, or spiral pump, also called Archimedes pump, employs an inclined tube, within which a broad-bladed screw turns, the edges of the blades filling the tube. When the lower end is placed in water, and the tube placed at an angle of about 30 degrees, rotation of the screw picks up the water by the advancement of the blades and carries it to the top.

The vacuum pump utilizes a closed vessel, to which steam is admitted and a little cold water then turned in to condense the steam. This condensation forms a partial vacuum, and because of atmospheric pressure the water rises and fills the steam chamber. The pulsometer

pump is of this type. It consists essentially of a double chamber, having a ball-valve at top . and clack-valves at bottom. Steam is admitted to one of the chambers and presses out the water contained there. Condensation then tak¬ ing place a vacuum is formed, and the ball falls over and closes the opening through which the steam entered and water flows up through the clack-valves and again fills the chamber. The steam in the meantime acts upon the water contained in the adjoining chamber. Conden¬ sation then taking place there, the ball falls back to that side, and the operations go on alternately, the result being a steady stream of water sucked into one chamber after an¬ other, and then forced out and upward by the steam pressure. The water is drawn into the machine from the centre.

A hydraulic or hydrostatic pump is simply the pump of a hydraulic press, crane, punch, etc. The principle of the hydraulic press and hydraulic ram are described under those titles. The hydraulic crane and hydraulic punch are simply a crane or a punching press having one or more hydraulic cylinders with large diam¬ eter pistons which are moved with great force by means of water pumped in through a small aperture. The pressure of water varies with the degree of surface. If a stream of water of one square inch cross section be forced into a large cylinder under a pressure ot 100 pounds, the pressure of the water will move a piston of 500 square inches surface sliding in the large cylinder, with a push of 50,000 pounds, less the friction involved, which is slight. The larger piston of course will move at one five-hun¬ dredth of the speed of the smaller pumping piston.

Hydraulic Mining.— This term is applied to that system of mining in which heavy streams of water are played on a bank of earth or gravel to wear it away. The streams are thrown by ˆgiants,® which are simply huge nozzles by which the water is delivered from some high head, giving great pressure. Where plenty of water is to be had there is no such cheap way of opening up a hillside for the miner as the hydraulic system. The giant streams bring down the gravel rapidly and in just the right condition for easy panning of the gold or other valuable metal content. But this system ruins the locality for agricultural purposes, because all the soil is buried beneath deep beds of gravel, and so hydraulic mining is in disfavor with all other interests, and in some States is prohibited by law. The ˆminer's inch,® originally a measure of water for the placer miner, and now also a unit of measure for water used in irrigation in the arid regions of the West and Southwest, has

interest as a hydraulic flow through an orifice and subject to the laws governing such flows. It is ad¬ judged to be that amount of water which will flow through an inch-square opening in an inch board, all the edges being sharp, under a head of six inches (sometimes seven inches) above the upper edge of the opening. The amount of water which actually passes under such conditions is 1.52 cubic feet per minute. It varies, however, in different localities. In Arizona, Idaho, Nevada and Utah the custom¬ ary miner's inch is a deliverance of 1.2 cubic feet per minute. In California and Montana it is fixed by law at 1.5 cubic feet per minute.

Dams and Canals.- — ■ The hydraulic engi¬ neer is called upon to design and construct dams under ever varying conditions. Most modern river dams are made of concrete, or part concrete and part stone; the concrete is often reinforced. It is common to curve the dam up stream so as to form an arch, thus greatly increasing the strength of the dam, as its re¬ sistance may be considerably more than its weight. The up-stream side of a dam is usu¬ ally sloped, and if the dam is of rubble or rip¬ rap, is faced with timber or concrete ; the down¬ stream side of a .dam may approach the perpen¬ dicular. Every dam requires a waste weir with gates to let out the surplus water in time of flood or emergency. Insufficient dams have oc¬ casionally burst, flooding the valley below, as at Johnstown, Pa., but these calamities have served to inform engineers more fully as to conditions, and there is every reason to place confidence in modern dams. See Irrigation; Water Supply.

Canal engineering is a part of hydraulics, and has reached its highest development in the building 'of the Panama Canal (q.v.). The principle of a canal lock is simple. Where there is a change of level of the water in a canal a lock is formed by building two dams having great gates and located a few hundred feet apart. The space between these dams is termed the lock. When a vessel is to pass, say from the lower to the higher level, the water within the lock is let out by means of small gates until the water of the interior of the lock is at the lowest level, the upper gates of course being kept closed. The large lower gates are then opened wide and the vessel is floated in to the lock ; then the lower gates are shut, and small gates in the upper end of the lock are opened, so that water flows in until the lock is filled to the upper level, when the upper large gates are opened, and the vessel floated up and out of the lock. To pass a vessel down through a canal lock the operation described is reversed. Water is lost from the upper level at every such passage, but in designing a canal the engineers find streams to supply wafer to keep the upper levels full.

Wave Motors. — One of the most interest¬ ing fields of hydraulic study is connected with wave motors. In theory the waves on the ocean constitute a tremendous power, which it ought to be easy to harness for man's use; in prac¬ tice the wave motor has never been able to compete with the steam-engine. The wave motor has been constructed in hundreds of ways, and the files of the Patent Office are flooded with designs, most of them ingenious, and very many of which have been built and tried out ; but though the machines develop immense power at times, they accomplish little at low tide and in very calm weather, while in storms they are apt to be broken to pieces by the tremendous exercise of surplus power. It remains for some inventor of the future to make the wave motor commercially practicable.

See Canal; Engineering, Hydraulic; Hy¬ draulic Ram ; Hydrodynamics ; Hydro-Eco¬ nomics; Hydro-Electric Development; Hydro¬ statics ; Hydrography ; Hydrology ; Irriga¬ tion ; Water- Works, etc.

Bibliography.— Fanning, J. T. 'Practical Treatise on Hydraulics and Water Supply En- gineering) (New York 1902) ; Gibson, A. H

'Hydraulics and Its Applications (New York 1915) ; Hughes, H. J., and Safford, A. T., 'Treatise on Hydraulics> (New York 1911) ; Merriman, M., 'Treatise on Hydraulics* (New York 1914) ; Parker, P. A. M., (The Control of Water* (London 1913) ; Smith, H., Jr., 'Hydraulics) (New York).*

Charles H. Cochrane, Author of ' Modern Industrial Progress .

HYDRAZINE, or DIAMIDOGEN, a

substance having the formula N2H4 (or H2N. NH2), obtained (together with oxalic acid, H2C204,) by heating an aqueous solution of the complicated substance known as triazoacetic acid (GsHsNeˆfCOOHˆ. It is a gas with a peculiar penetrating odor, but the properties of the pure substance are imperfectly known, on account of the avidity with which it combines with water to form the hydrate, N2H4H20, and the consequent difficulty of isolating it. Hy¬ drazine hydrate is a powerful base, combining with acids to produce numerous definite crystal¬ line salts. Among these the sulphate, N2Ht. H2S04, and the two hydrochlorides, N2H4.2HC1 and N2H4.HC1, are important. The hydrate may be prepared by boiling the sulphate with a solu¬ tion of caustic soda. It is a fuming liquid, somewhat oily in appearance, and boiling at 245° F. The hydrate reduces cold ammoniacal solutions of silver nitrate and also reduces Fehling's solution. It attacks glass, cork and india rubber, but may be kept in silver vessels.

The substances derived from hydrazine by replacing one or more of its

hydrogen atoms by compound radicals are also called "hydra¬ zines.ˆ If only one hydrogen atom is replaced the hydrazine is said to be "primary.® If two hydrogen atoms are replaced, the hydrazine is said to be "secondary.® The radical which re¬ places the hydrogen may belong to the fatty series, or to the aromatic series. One or more of the hydrogen atoms may also be replaced by a metal, such as sodium. The most important of the organic hydrazines is phenylhydrazine, in which one of the hydrogen atoms is replaced by the aromatic radical phenyl, C6H5. This sub¬ stance, which has the formula (CgH5)HN.NH,, is a colorless, oily liquid, which solidifies a mass of tabular monoclinic crystals on cooling to 73° F. It mixes with alcohol, ether, benzene and chloroform, but hardly at all with water. It re¬ duces Fehling's solution in the cold, and is very poisonous. A secondary hydrazine is "sym¬ metrical® when the two substituted radicals are attached to different nitrogen atoms ; it is "unsymmetrical® if they are attached to the same nitrogen atom.. Thus (C6HS)HN.NH (C2H3) is the symmetrical secondary hydrazine of phenyl (CeHs) and ethyl (C>Hs), while (CsHr,) (C2H5) N.NH2 is the unsymmetrical sec¬ ondary hydrazine of the same radicals.

HYDRAZONES. See Coal-tar Colors. HYDRIDE. See Vases.

HYDRIDE, a chemical substance formed when hydrogen combines with a metal, or some simple or compound metallic base, or with a compound radical acting as a base. Formerly the term had the same meaning as hydrate, and this must be borne in mind when studying the older works on chemistry.

tˆ«™odic.acid. or hydrogen

1UUIDE is an acid composed of hydrogen in

HYDRIODIC ETHER

HYDRO-ECONOMICS

555

combination with iodine, and having the formula HI. Hydriodic acid is analogous to the more familiar hydrochloric acid, both in its chemical structure and in its general prop¬ erties. It may be prepared by the direct union of hydrogen and iodine at a red heat. A more convenient method, however, consists in passing sulphuretted hydrogen gas (H2S) into water in which a little pulverized iodine is suspended. The reaction is HaS + 21 = 2HI + S. The ac¬ tion is slow owing to the deposition of sulphur which encases the iodine particles and prevents their free solution. The larger the amount of hydriodic acid formed, the faster the operation progresses. Fresh

supplies of iodine are added from time to time, and the liberated sulphur is finally removed by agitation and filtration, the sulphuretted hydrogen remaining in solution be¬ ing also removed by the application of gentle heat. In another method the iodine is dis¬ solved in carbon bisulphide, and the solution covered with a stratum of water. When sul¬ phuretted hydrogen is passed into this mixture, the hydriodic acid as it forms is dissolved in the water, and the sulphur set free is dissolved in the carbon bisulphide. The aqueous solu¬ tion is boiled to expel the sulphuretted hydro¬ gen it may have taken up and the hydriodic acid remains in a pure state in the solution. The aqueous solution so prepared possesses strongly acid properties, and combines with bases to form salts called iodides. The pure acid is a colorless gas, with an odor similar to that of hydrochloric acid gas. It has a density about 63 times as great as that of hydrogen, and at a temperature of 32° F. it condenses to a liquid when subjected to a pressure of four atmospheres; the liquid so obtained freezing to a solid mass at about 67° F. below zero. The specific heat of the gas, at ordinary tempera¬ tures, is about 0.055 (at constant pressure), and the ratio of its specific heat at constant pressure to its specific heat at constant volume is 1.397. It dissolves freely in water, the spe¬ cific gravity of a saturated aqueous solution, at 32° F., being about 2.00. The aqueous solution is colorless when pure, but it is slowly decom¬ posed by sunlight, becoming dark from the liberation of iodine. It is also decomposed by sulphuric and nitric acids and by chlorine and bromine, which set the iodine free. In med¬ icine hydriodic acid is administered as a syrup.

HYDRIODIC ETHER (more correctly known as ethyliodide), a heavy, colorless liquid with a sharp, pungent taste and a pene¬ trating ethereal odor, obtained by acting upon pure ethyl alcohol (C2H5.OH) by iodine, in presence of red phosphorus. The proportion is 1 part of red phosphorus (or equal parts of red and yellow phosphorus), 5 parts of alcohol and 10 parts of iodine added slowly. After 24 hours the hydriodic ether is distilled off, and washed with a solution of sodium hydrate and water, and dried over calcium chloride. In large quantities it is prepared by adding sulphuric ether slowly to a warm, con¬ centrated aqueous solution of potassium iodide, or by the action of hydriodic acid upon sul¬ phuric ether. Hydriodic ether has the formula C2H.-J, boils at 162° F. (under ordinary atmo¬ spheric pressure), and has a specific gravity of about 1.946. When not quite pure it becomes brownish upon exposure to light, from the liberation of iodine. In chemistry, hydriodic

ether (or ethyl iodide) is largely used as a fundamental substance in the preparation of the various other compounds of ethyl.

HYDRO-ECONOMICS. The science that investigates the conditions and laws affect¬ ing the occurrence and use of water as a material means of

satisfying human needs and desires, and that takes into consideration also the proper balance between cost and benefits to be derived in each particular case from the practical application of these laws. Water for drinking purposes next to air is the most important substance necessary for the support of life. It must be had at short intervals in suitable quantities and qualities for the daily needs of mankind and for all animals and plants; thus to the extent to which these are used as a food, it is vital also in food production. The regulation of its supply for watering live stock and for irrigation in producing crops is an essential for the welfare and the increase of population. As a correla¬ tive, the reduction of excess of water by drain¬ age is equally important. Related to these is the conveyance away from human habitations and centres of population of waste products through sewage systems and the economic dis¬ posal of manufacturing effluents or waste in running water, where this can be properly done.

The data for the study of hydro-economics necessarily fall into several groups of subjects, primarily those relating to the properties — physical and chemical — of water as a sub¬ stance, next to its occurrence in nature,, these facts being included within the science of me¬ teorology. Following these are the measure¬ ments of its volume included within hydrology and the mapping of large bodies of waters, rivers, lakes and oceans, known as hydrography. All of these data are needed in the considera¬ tion of the largest development and use of water for human needs, first , as above stated in the direct support of life involving ques¬ tions of domestic and municipal supply; second, in the production of food directly through water needed for domestic animals and for the irrigation of crops or the relief of the excess from the tilled fields by means of drain¬ age ; third, in relative importance come ques¬ tions of conveyance of waste from towns and factories ; fourth, the employment of water in the industries in the production of power directly by water wheels, included in the sci¬ ence of hydraulics, or in steam production, this being within the range of thermo-dynamics. The fifth use of water is that of transportation of persons, and goods, included under the head of navigation. This latter use, under modern conditions and due largely to the rapid de¬ velopment of railroads, has declined in relative importance. From the standpoint of Federal law, however, navigation has priority over other uses, the Constitution of the United States pro¬ viding, in Section 8, that Congress shall have the power <(to regulate commerce with foreign nations, and among the several States, and with the Indian tribes.®

Under a very broad interpretation of this provision, Congress has undertaken the regu¬ lation not only of the interstate but of many intrastate streams and has authorized the build¬ ing of extensive levees and related works for the protection of agricultural lands from over¬ flow. It has also made appropriations for the

purchase and protection of forests at the head¬ waters of streams whose lower reaches may be navigated — the tendency being to enter upon the development and use of the water resources of the country under Federal auspices as far as practicable under a liberal interpreta¬ tion of Federal power conferred by this clause of the Constitution.

As proprietor or guardian of the vast area of public lands in the western part of the United States, Congress has made appropriation of the funds resulting from the disposal of portions of these lands to be used in the storage and distribution of water occurring in the arid and semi-arid States and under the terms of the Newlands or Reclamation Act, 17 June 1902, has provided for the irrigation of extensive tracts, the Reclamation Service being created for this purpose. It has expended over $100,- 000,000 in building large works such as the Roosevelt Dam in Arizona, the Arrowrock Dam, 350 feet high, the highest in the world, in Idaho, and other great structures, including tunnels, canals and subsidiary works, such as roads, railroads, electric transmission lines and minor manufacturing plants, all for the purpose directly or indirectly of conserving and utilizing the natural resources of the country.

The science of hydro-economics may thus be said to bring together for practical applica¬ tion many of the subjects which form portions of physics, chemistry, meteorology, hydrology, hydrography and hydraulics and to combine these in the building of waterworks, sewers and disposal works for towns and cities. Also for irrigation and drainage systems, for power plants — electrical or otherwise, — for steam production, for flood prevention, by forest growth, reservoirs or other means, also for flood protection by levees or dikes, and finally for navigation including the character and size of channels and related details, boats, barges and terminal facilities. The constitutional and legal phases introduced by Federal, State or mu¬ nicipal laws and the interpretation by the courts of the common law regarding riparian rights as well as statutory enactment have a part.

Bibliography. — Inland Waterways Com¬ mission, Preliminary Report, 1908; Interna¬ tional Engineering Congress, 1915; Transac¬ tions — Waterways and Irrigation, 1916; Mead, Daniel W,, (Hydrology — the Fundamental Basis of Hydraulic Engineering) (1917, pri¬ vately printed) ; Meyer, Adolph P., (The Ele¬ ments of Hydrology > (1917) ; National Con¬ servation Commission, various reports; Newell, F. H., (The Public Lands .and their Water Supply, > also

Frederick H. Newell,

Professor of Civil Engineering , University of Illinois.

HYDRO-ELECTRIC DEVELOP¬ MENT, the term by which the engineering profession has come to designate the production of water power and its electrical distribution for use as power, light and heat. About 1890 it was recognized by some that a change in motive power was imminent, and that gradually the steam-engine and boiler depending on coal would be replaced by water wheels, utilizing the largely v/asted forces of the rivers, streams

and waterfalls, and converting these into elec¬ tricity, to be sent out at high pressure, over hundreds of miles of wires, and thus distributed to lighting plants and electric motors for use where needed. Gradually capital was inter¬ ested, and power sites have been acquired, and now there has come to be competition for the remaining good water powers, and the public has even been alarmed at the suggestion of monopoly of the important natural resource represented by the potential power of its flow¬ ing waters.

The Niagara Falls power plants settled the question of economical utilization of water power on a large scale. The latent power of the great waterfall was utilized in 1877 in a small way, and in 1886 the Niagara Falls Power Company was chartered to utilize the power on a large scale. It took them 10 years to get going, and the leading engineers of the world were consulted as to the best, mechanical means of using the tremendous head and mighty volume of descending water. The difficulty of the problem lay in the fact that there was so much power that ordinary machinery was likely to be broken up by the mighty force it was desired to harness. But the cataract yielded to man's genius just as has the harnessed lightning. A side channel was dug by the Falls, and a pit sunk so as to allow of using a head of 136 feet, and at the foot of these were placed turbines, with shafts running up to the top of the pit, and directly connected to dynamos, each of 5,000 horse power, far the largest that had then been constructed. To support the weight of this great 136-foot steel shaft, carrying the heavy dynamo and turbine, and whirl it around at a peripheral speed far exceeding- that of the fastest railway train, without wearing itself out with friction was indeed a problem. No known bearing would stand such tremendous friction, therefore a new form of bearing had to be devised ; and the form decided on was highly admirable. As constructed the heavy column and revolving machinery rest on the flowing water itself. The water comes down the interior of the columnar pipe, strikes the lower surface, rebounds or reacts against the blades of the turbine, causing it to rotate and at the same time lifting or suoporting it in an almost frictionless manner. Thus was solved the pioblem of using the turbine wheel for comparatively high heads of water to gain very large power for a single

unit machine.

One other important invention was needed to make the utilization of great water power complete, and that was means for sending out a great voltage of electricity to a long distance. This was accomplished by Nikola Tesla, in his notable discovery of the rotating magnetic field. He reversed the arrangement of the dynamo as constructed before his time, making the core stationary, and arranging the magnetic field to revolve around it. This made possible a dy¬ namo for high service, and with the develop¬ ment of improved methods of insulation and minor details, the mechanism for long-distance power, light and heat transportation was com¬ plete.

It is true that before 1891 two fair-sized hydro-electric plants had been established, one sending electricity 13 miles from Ofegon Citv to Portland, Ore., and the other 29 miles from Pomona to San Bernardino, Cal., but these

were single phase currents, of not more than 10,000 voltage, adapted to running street cars and electric lights, but not for miscellaneous purposes, for which a polyphase current is req¬ uisite. It should be understood that an alter¬ nating current generator can be constructed to generate two or more currents alternating at the same rate but not at the same time. One current will be just stopping and changing its direction when the other current is flowing with full force; the next instant the first cur¬ rent will come up to its full strength, and the second current will stop and reverse. Three as well as two alternating currents can be com¬ bined and transmitted in this way to a distance, and this system is called three-phase or poly¬ phase transmission. A polyphase current ap¬ plied to an alternating current motor produces a balanced rotation of the armature very much as three or more cranks on an engine-shaft balance each other. One current in the motor will be doing its maximum work while another is at or approaching zero, just as in the engine one crank is exerting its maximum push as another is at or approaching its dead centre. Three-phase transmission was 'first successfully accomplished in 1891 at Frankfort, Germany, and is now universal.

The transformer is an important adjunct in an electrical transmission system. It is based on the principle of the induction coil (q.v.). The essential parts are a core of laminated sheet iron wound with two coils of copper wire, one coil consisting of numerous turns of fine wire and the other coil of a few turns of coarse wire. If the fine wire coil is con¬ nected to the line

a much lower pressure cur¬ rent can be drawn from the coarse wire or secondary coil ; if the connections are reversed and the fine wire coil is used for a secondary, a current of much increased pressure is gener¬ ated. Thus the transformer is used, as its name implies, to <(step up® or <(step down® the pressure. The relative number of turns in the primary and secondary coils determines the ratio of the steps obtained.

To distribute hydro-electric power economic¬ ally, it has been found best to first create a very high potential for the alternating current, and to send this out to a station, where there are transformers, and it can be stepped down for use, and by means of rotary converters can be changed into direct current when desired. It is not many years since it was considered an achievement to send out 40,000 volts on a wire, but now 150,000 voltage is used, and still higher pressures are contemplated.

To develop the water power, a stream has to be dammed, a reservoir formed to maintain a flow of water and a power-house with water wheels must be installed. The head or fall of water determines the sort of water wheel to be employed. All heads under 300 feet are now classed as low heads, and all over about 700 as high heads; the wheel accepted for low heads is the turbine, and for high heads the impulse or Pelton wheel. For intermediate heights of head, conditions have to determine which form of wheel is best. For a fuller description of water wheels see Hydraulics.

Water-power plants are usually supplied with two sorts of dams, storage reservoirs and diverting dams. These are now mostly con¬ structed of masonry and concrete. Conduits

for conveying the water are made of both wood and steel ; the wood may be rectangular or box-shaped, or of circular cross-section, made like a continuous barrel with staves and steel bands. These wood stave pipes are exceedingly strong, and will carry a 200 foot head, and last for years. But for greater pressure and durability steel pipe is requisite. Lap-welded galvanized sheet steel is the favorite material, and it is made of a tensile strength of 50,000 to 65,000 pounds per square inch of section. It is lapped and triple-riveted for carrying heavy pressures. . Such steel pipes are often three to five feet in diameter, and have been made up to seven feet. When of considerable length the construction has to allow for contraction and expansion of the metal with changes in temperature. One engineer reported that a long section of metal pipe <(crawled® — that is, ex¬ panded and moved its position lengthwise — seven inches between the extremes of heat and cold of a single 24 hours.

Where the water is not under pressure, as in a tail-race, it may be carried in an open channel, and such are frequently built of con¬ crete. It is often

necessary to tunnel through the rock to find a proper outlet. To use a high head of water a power station must oc¬ cupy a low site,. which means standing in a valley. After using the water here the next problem is to get rid of it, which means lead¬ ing it to some lower locality where it can flow away. To find such lower level it is sometimes necessary to tunnel for miles.

*Complete statistics of the extent of hydro¬ electric power development are lacking. * The United States census of 1910, covering returns made by manufacturing establishments in 1909, shows only a very, small percentage of water power in use, and it is known to be far larger than the official figures show. To illustrate: In 1869 the census reported a total of 2,346,000 horse power used in manufacturing, of which 1,130,000 or nearly a half was water power. In 1889 the total power recorded as used in manu¬ facturing was only 10,000,000 horse power, of which 1,454,000, or 14.4 per cent, was water power, and nearly all the rest steam power. This was the date at which hydro-electric de¬ velopment really began, yet 20 years later, in 1909, in spite of the tremendous development of plants, as recorded farther on, the increase of water power is given at only a little more than 1 per cent a year. The steam power is credited in 1909 with 14,199,000 horse power, electric power is credited with 1,749,000 horse power and the water wheels get credit for only 1,823,000, or less than 10 per cent of the total. This despite the known development of tremendous horse power at Niagara, Big Creek, Tallulah River, Las Plumas, Butte, Keokuk, etc. It is. true that the census figures quoted do not include the use for mines and quarries, which is reported separately at the insignificant figure of 97,460 water power, as against 255,699 electric and 4,608,000 steam horse power. This 1909 census does credit New England with 27.9 per cent of her horse power as being derived from water, but only allows 5 to 8 per cent for far Western States.*

It would appear that the reason why the census does not show the extent of the hydro¬ electric development is that the method of gathering returns frertn manufacturers did not

cover the situation. Probably a very large part of the power credited as electric is hydro¬ electric, and another large part escapes enumera¬ tion under the head of manufacturing or mining, because it is utilized by street railways and lighting companies whose reports do not always indicate the source of their supply. Hence the census figure of 1,823,000 total water power used in manufacturing in 1909 probably repre¬ sents less than half of the total use, and at the present time it is a fair estimate that the total

hydro-electric horse power in use in the United States for all purposes is 5,000,000 and the capacity of these plants is fully 9,000,000 horse power.

A description of a few of the hydro-electric power and transmission plants will afford some idea of the actual accomplishments in this field. The Pacific Light and Power Company of Big Creek, Cal., has utilized a small stream for a phenomenal power development. The creek drops 4,000 feet in six miles and by two in¬ stallations the engineers utilized 3,680 feet of this head. The equipment includes three large concrete storage reservoirs that will hold 4,500,000,000 cubic feet of water. From these the water flows first through a 10,360 foot tunnel, and 425 feet of standpipe, arriving at Power Station No. 1 with 1,900 feet effective head. Here are installed two 17,500 k-v-a gen¬ erators and four 10,000 horse power Pelton water-wheels, each of one nozzle. The tail water from this plant runs off through another long tunnel and pipe, and delivers at Power Station No. 2, with 1,780 feet effective head. Here there is another installation of a total of 35,000 k-v-a generators and 40,000 horse power water-wheels. These two stations have an ulti¬ mate capacity of double the power they are now supplying. The dynamos send out the power over a line of 240 miles, made of steel aluminum wires, carried on steel towers, at the enormous pressure of 150,000 volts.

The Pacific Gas and Electric Company, with headquarters at Denver, Cal., have 150 miles of transmission line operated at 110,000 volts, 380 miles at 20,000 volts and many miles of minor lines at 11,000 volts. In 1913 they were equipped with generators for 25,000 kilowatts, but a capacity of 50,000. They use 12,500 k-v-a generators, each driven by two 8,500 horse power Pelton wheels of single nozzle type. They now have in all 11 hydro-electric stations, and their highest head is 1,345 feet. The Sierra and Santa Fe Power Company, at Stanislaus, Cal., in 1907-08 built a plant which is running at 34,000 kilowatts, the capacity may be increased any time to 75,000 kilowatts, which is the equivalent of about 100,000 horse power. The plant includes four 8,500-kilowatt genera¬ tors, and eight 6,000 horse-power single-nozzle Pelton wheels.

The Tallulah River plant of the Georgia Railway .and Power Company, which supplies Atlanta and vicinity, is one of the most notable in the South. The electric current is sent 90 miles to Atlanta and 50 and 80 miles in other directions, at as high as 110,000 volts. The storage reservoir has a billion and a quarter feet capacity, and there is a large diversion dam. A tunnel of 6,670 feet carries the water to the six penstocks, each of which serves a 10,000- kilowatt Francis turbine of 514 revolutions per minute. A large medium-head plant is that

of the Great Western Power Company at Las Plumas, Cal., which was

completed about 1910, and supplied with five 10,000-kilowatt genera¬ tors, each driven by 18,000 horse-power, vertical shaft, single-runner turbines. The head here is 465 feet, and the water is carried 15,168 feet through a pressure tunnel. An illustration of large power obtained from a low head is seen in the plant of the Mississippi Power Com¬ pany, at Keokuk, Iowa, which sells power in Saint Louis at the low rate of $18 per horse power. In 1913 the plant was developed for

112.500 kilowatts, but there is an ultimate capacity of 225,000 kilowatts. They use 7,500- kilowatt generators and 10,000 horse-power Francis turbines, employing 32 feet head. The Alabama Power Company's installation at Coosa Lock, in 1914 totaled 52,000 kilowatts, with 78,000 ultimately available. They use

17.500 horse power single-runner turbines, direct-connected to 13,500 k-v-a 'generators, and have 68 feet head of water. The No. 3 plant of the Niagara Falls Hydraulic Power and Manufacturing Company uses generators to a total of 130,000 k-v-a, and has 13 10,000 horse¬ power turbines running under 210 feet head. The power projects now under way at Niagara indicate an increased development on the Amer¬ ican side of at least 600,000 horse power, and as much on the Canadian side.

The great trunk line railways of the country are most of them planning for a greater or less electrification of their lines, and naturally will avail themselves of water powers along their routes wherever they can be used economically. Much of the water that is dammed for irriga¬ tion or transported for city supply can be used en route for supplying power without loss, and this is already being done, and is sure to become a common practice.

Charles H. Cochrane, Author of (Modern Industrial Progress d

mii1oLDRO'THERMAL METAMOR- PHISM. See Metamorphism.

HYDROBROMIC ACID, or HYDRO¬ GEN BROMIDE, a compound having the for- miYa and analogous in its general prop-

erties to hydrochloric and hydriodic acids. Hydrogen and bromine do not combine directly even in strong sunlight; but when hydrogen that is charged with bromine vapor is burned, hydrobromic acid and water are formed. Hy¬ drogen and bromine may also be made to com¬ bine by electric sparks, or by passing the mixed gases through a hot tube, or over hot platinum, the most convenient way of preparing the acid, however, is by the action of bromine upon water, in the presence of phosphorus, the reac- tion being 4H20 + 5Br + P = 5HBr + H3PCh. Phosphoric acid, it will

be seen, is formed at the same time ; but the two are easily separated by heat. Pure hydrobromic acid, when free from water, is a colorless gas of pungent odor, uingr l density about 39.1 times as great as that of hydrogen. Under ordinary atmospheric pressure it condenses into a liquid at 99° below zero F , and at a slightly lower temperature it crystallizes. It dissolves freely in water a saturated solution, at 32° F., having a specific gravity of 1.78, and containing 82 per cent of hydrobromic acid, by weight. A concentrated aqueous solution of hydrobromic acid fumes strongly in the air, but does not decompose.

\ hen heated, the gaseous fumes are evolved until the solution contains about 47 per cent of the acid, when it boils continuously at 126°. Hydrobromic acid is a powerful acid, forming, with metallic bases and with organic radicals, definite salts called ˆbromides.® Hydrobromic acid is used in medicine in the treatment of the ear, and the bromides of the alkalis are ex¬ tensively used as sedatives. Bromide of silver is also used in large quantities in photography, in the manufacture of sensitive dry-plates.

HYDROCARBON GASES. See Lique¬ fied and Compressed Gases.

HYDROCARBONS, the simplest of or¬ ganic compounds, consisting solely of carbon and hydrogen. They are exceedingly numerous, and many of them occur in nature, both in petroleum, asphaltum and similar minerals of organic origin, and in the essential oils of plants. They are produced economically in the dry distillation of wood and peat, and are components of illuminating gas and the oils of coal tar. The hydrocarbons can be broadly divided into two general classes: (1) saturated hydrocarbons; (2) unsaturated hydrocarbons; — according to the way in which the carbon atoms that they contain are connected to one another. The first class contains only the single-linked carbon atoms; the second class comprises those in which pairs of carbon atoms are united in doubles or threes. The first class includes only the paraffines.

In the fatty series, the atoms are all con¬ nected in open chains, while in the aromatic series the carbon atoms are connected with one another in such a manner as to form closed rings. (See Fatty Compounds and Aromatic Compounds). As a class, the hydrocarbons are insoluble in water; they cannot be saponified; and they are neutral, and do not combine with acids to form salts.

The classification of the hydrocarbons is as yet incomplete ; but the greater

number of those that are known can be included in one or an¬ other of the following groups :

1. The Paraffins, having the general formula Cn Hon+2. The lowest member of this series is methane, or marsh gas, CH4, and many other members of the series are known, each contain¬ ing one carbon atom and two hydrogen atoms more than its immediate predecessor. See Paraffins.

2. The Olefines, also known as Alkylenes, or Alkenes, having the general formula Cn Hin. Ethylene, C2H4, is the simplest member of this series, which includes also propylene ; the buty¬ lenes; amylenes ; hexylenes; heptylenes, etc.

3. The Acetylenes, or Alkines, and the Ally- lenes or Diolefines, having the general formula

Acetylene gas, C2H2 is the sim¬ plest representative of this series, which in¬ cludes also allene; divinyl, erythrene or pyr- rolylene ; piperylene ; isoprene, diallyl, conylene, etc.

The foregoing all belong to the fatty sub¬ division. At a red heat three molecules of acetylene unite to form one molecule of ben¬ zene, thus linking the aliphatic or fatty series with the aromatic series. The latter class em¬ braces :

4. The Benzene series, having the general formula CnBBn-> known also as the cyclic hydrocarbons, and the terpenes.*

5. The Terpenes, or alicyclic compounds, a class of substances having the general formula CioHie, and including pinene, camphene, fen- chene, sylvestrene, carvestrene, terpinolene, ter- pinene, etc.

The known hydrocarbons having any one general formula may be ranged in a series, whose members exhibit a sort of regular pro¬ gression in their properties. For example, the first eight members of the normal paraffin group may be arranged as follows :

Boiline Point.

Methane

CH4

(Gase

Ethane

c2h0

«

Propane

C3Hs

«

Butane

C4Hio

34° F.

Pentane

C5H12

100° F.

*Hexane **

GH16

160° F.

Heptane

gh14

209° F.

Octane

C8Hl8

258° F.

A series of this sort is said to be (

The paraffins are said to be ˆnormal® when they contain but two methyl groups (CH3). Thus normal propane, CsHs, has the constitu¬ tional formula CH3.CH2.CH3; and it is not pos¬ sible to arrange its atoms in any other way. In proceeding from this hydrocarbon to the next in the same series (that is, butane, C4H10,) we may substitute the methyl group, CH3, for a hydrogen atom in the CH2 of the propane, or for a hydrogen atom in

one of the CH3 groups. Hence we may have either of the two following constitutional formulas for the hydrocarbon bu¬ tane :

CHa— CH — CH3

I

CHa

or

CH3 — CH2 — CH2 — CHa.

The latter compound, which contains only two CHa groups, is called ((normal butane}) ; while the former, which contains three such groups, is known as Hsobutane.® Two butanes, each having the empirical formula C4Hi0, are there¬ fore possible, and both are actually known. When we pass to the higher members of the paraffin group we find that a far greater number of isomeric forms can exist, according to the way in which the new CH3 group is introduced, in generating the new hydrocarbon from the one next below it in the general series. Thus oc¬ tane, CsHis, can exist in 18 different isomeric forms, and tridecane, C13H2.S, in no less than 802.

The saturated hydrocarbons are of the great¬ est value in the arts, comprising a series of solvents (as naphtha, benzol, etc.) for fats, oils and resins, the mineral oils used for lighting and lubrication, motor fuels, vaseline, paraffin wax, the essential oils from which are derived perfumes and flavorings, the camphors, etc. Consult Norris, J. F., Principles of Organic Chemistry) (New York 1912) ; Plimmer, R. H. A., Practical Organic and Bio-Chemistry) (London 1915) ; Pond, F. J., (Heusler's Chem¬ istry of the Terpenes (Philadelphia 1902) ; Spielmann, P. E., < Richter's Organic Chemistry) (Vol. I, London 1915).*

HYDROCELE, hi'dro-sel, a collection of serous fluid forming tumors around the testicle or spermatic cord. During the foetal life the testicle pushes the peritoneum before it as it

descends from the abdomen into the scrotum. Along the spermatic cord the sac is usually obliterated, but if it is not it may become dis¬ tended with fluid. The pouch of the peritoneum normally remains alongside of the testicle, and is called the tunica vaginalis. Distentions of these pouches may be congenital, but ordinarily they begin after maturity and probably are

due to some fault in the blood-vessels, allowing the escape of the serum. Symptoms are due to the weight of the tumor, and the only danger lies in the possibility of the injury and rupture of the sac. Aspiration of the fluid, followed by the injection of a few drops of carbolic acid, may accomplish a cure, but partial removal of the sac may be necessary.

HYDROCEPHALUS, a dropsical effu¬ sion of fluids into the interior of the skull, occupying one or more of the ventricles of the brain or the submeningeal space, or both. The symptoms of acute meningitis are such that the older authors called this disease acute hydro¬ cephalus, but there may be very little fluid exudation in meningitis, and when present it is not often clear and watery. The causes of chronic hydrocephalus are various. A low- grade inflammation may give rise to chronic hydrocephalus, just as chronic peritonitis is ac¬ companied by fluid in the belly, but the usual cause of chronic hydrocephalus is some ob¬ struction to the venous circulation. It is re¬ garded as certain that arrest of development of the brain-substance, pressure upon the veins of Galen by masses of tubercle or cancer, and in fact any condition which obstructs the venous circulation in the brain, may .lead to hydro¬ cephalic effusion, just as pressure on the veins of the leg may produce dropsy of the feet. It is probable also that in arrest of brain develop¬ ment the increase of the normal subarachnoid fluid is a conservative process, serving to keep full the space between the brain and the cranium. The large majority of cases are con¬ genital, and hydrocephalus must be set down as a disease (or symptom) belonging to infantile life; but cases occasionally occur in mature life or in old age. Dean Swift, after three years of illness, died with hydrocephalus, the result, doubtless, of organic brain disease. The prog¬ nosis of chronic hydrocephalus is very grave. The child may live for many years, but, with rare exceptions, becomes idiotic, and in some cases is epileptic. The head becomes distended, the fontanels remain open, supernumary bones form in the courses of the cranial sutures, and in some cases quarts of fluid are effused, con¬ sisting of water, with earthy salts and a little albumin; while in acute hydrocephalus there is sometimes much albumin present, with some pus-corpuscles or a little blood. When the dis¬ ease is detected early, mercurial inunctions, with the administration of the iodides, may possibly afford benefit. Treatment by systematic com¬ pression or by tapping the skull has been tried in many cases, but the most common result has been the speedy death of the patient, although in a few instances it would appear that more or less advantage has been obtained by these means. The term spurious hydrocephalus is sometimes applied to cholera infantum, infantile typhoid or other enteric disease, the general svmntoms of which may simulate those of acute meningitis.

HYDROCHARIDE2E, hi-dro-ka-rid'e-ai, monocotyledonous floating or submerged aqua¬ tic plants of the series Helobieae. About 50 widely

distributed species are known, divided into 15 genera; 12 fresh water, occurring in temperate zones, and three marine occurring in tropical or sub-tropical zones. Vallisneria (q.v.), or eel-grass, and Elodea canadensis, or water-thyme, are well-known American types ; Hydrocharis Morsusranae, or frog-bit, and Stratiotes alo'ides, or water-soldier, are well-known European types. The tropical marine types are Thalassia, Enhalus and Halophila, submerged plants found chiefly in the Pacific and Indian oceans.

HYDROCHLORIC ACID, or HYDRO¬ GEN CHLORIDE, an important compound of hydrogen and chlorine, which under the names <(spirit of salt® and <(muriatic acid,® has been known in aqueous solution from very early times. It has the chemical formula HC1, and may be formed by exposing a mixture of equal volumes of hydrogen and chlorine to diffuse daylight, the combination taking place quietly under these circumstances, but explosively un¬ der the influence of direct sunlight. A more convenient and usual method of preparing hy¬ drochloric acid is by treating common salt (((so- dium chloride,® NaCl) with strong sulphuric acid (H2SO4). The reaction is as follows: NaCl + H2SO4 = = HNaSCh + HC1. Pure . hy¬ drochloric acid is a colorless gas, 1,259 times as heavy as an equal volume of air at the same temperature and pressure, and with the molecu¬ lar weight 36.457. By weight hydrochloric acid consists of 2.74 per cent of hydrogen and 97.26 per cent of chlorine. At a temperature of 50° F. it condenses, under a pressure of 40 atmospheres, to a colorless liquid, which boils, under ordinary atmospheric pressure, at 171° F. below zero, and solidifies at a temperature about 6° below the boiling point. The specific heat of the gas at constant pressure (compared with water) is about 0.19; and the ratio of its specific heat at constant pressure to its specific heat at constant volume, at ordinary temperatures, is 1.389. Hydrochloric acid gas was first prepared, in an approximately pure state, by Priestley, in 1774; but it was believed to be an oxide of a new element (provisionally called ((murium®) until Davy, in 1810, showed that it is a com¬ pound of hydrogen and chlorine.

Hydrochloric acid gas is exceedingly soluble in water. If a dry glass flask, which is com¬ pletely filled with the dry gaseous acid, be brought mouth downward under water, and the stopper is then removed, solution takes place with such extreme rapidity that the water is often drawn into the flask suddenly enough to break it. By passing a stream of the gaseous acid into water, an aqueous solution may be prepared which has a specific gravity, when saturated, of 1 .2257 at 32° F., and contains 45 per cent by weight of the acid. The commer¬ cial acid is commonly known, to the present day, as ˆmuriatic acid.® Large quantities of it are obtained as a by-product in the manufacture of sodium carbonate by the action of sulphuric acid upon common salt. The hydrochloric acid gas liberated in

this process is passed up through stone towers packed with hard coke over which trickles, water, which greedily absorbs the gas. The acid solution which collects at the bottom

of the tower, if too weak for concentration, is taken to the top and again allowed to seep down and gather a larger content of gas. The acid thus obtained is not pure but contains sulphuric acid, ferric chloride, arsenic and free chlorine and sulphurous acid gases. These impurities give it a yellowish tinge. The pure acid (in aqueous solution) is obtained by re¬ moving the arsenic with stannous chloride and then distilling; or by digesting the diluted acid solution with bright copper strips and distilling with ferrous chloride. Aqueous hydrochloric acid is largely used in the laboratory and also in the arts, in the manufacture of a great variety of substances.

Hydrochloric acid combines with metallic bases to form salts which are known as "chlo¬ rides.® Common salt (chloride of sodium, NaCl) is the most familiar and the most abundant example, in nature, of this class of substances. The chlorides of silver, gold, mercury, barium, aluminum, platinum and ammonia are also im¬ portant and are described under Mercury, Aluminum, etc. The largest use of hydro¬ chloric acid is in the manufacture of chlorine (q.v.) and chlorides of the metals. It is also used extensively in the arts, as well as in the manufacture of agricultural fertilizers, coal tar colors, etc.

HYDROCYANIC ACID, or PRUSSIC ACID, an exceedingly poisonous substance, discovered by Scheele in 1782. It has the chem¬ ical formula HCN, and may be formed by passing a series of electric sparks through a mixture of nitrogen and acetylene (q.v.). The reaction in this case is 2N + C2H2— 2HCN. The pure acid is more conveniently prepared by passing sulphuretted hydrogen gas, HaS, over dry mercuric cyanide, Hg(CN)», hydrocyanic acid and mercuric sulphide being formed, ac¬ cording to the equation Hg(CN)2+ HaS — 2HCN + HgS. As thus prepared, hydrocyanic acid is a volatile liquid, boiling at 80° F. and freezing at 5° F., and possessing a peculiar smell of bitter almonds. It is inflammable, pro¬ ducing by its combustion carbon dioxide. It is so intensely poisonous that a single drop of the anhydrous acid produces instant death when swallowed, and its vapor, even when mixed with considerable quantities of air, is also exceed¬ ingly poisonous. It mixes readily with water, ether and alcohol. Although it is called an acid, and forms salts that are known as "cyanides,® it is very weak in its acid prop¬ erties. It does not redden

litmus paper, and its salts are readily decomposed by other acids. Hydrocyanic acid is formo-nitrile, and like the nitriles is hydrolysed rapidly by boiling alkalis and slowly by mineral acids. In the presence of oxygen the cyanides dissolve all metals but

lead and platinum. .

Hydrocyanic acid is found in nature in the glucosides of plants, typically in amygdalin, the glucoside of bitter almonds, to which it gives its characteristic odor and taste. In dhurrin, the glucoside of sorghum, it is so plentiful that cattle have been poisoned by eating the green plant too freely. The method usually employed in the manufacture of hydrocyanic acid is to run a solution of sodium cyanide in about twice its weight of water slowly into a small excess of cold 60 per cent sulphuric acid. The resulting vapor of hydrocyanic acid is almost anhydrous, and it is completely dried over cal- VOL. 14 — 36

cium chloride. It is kept at a temperature of 85° F., and finally condensed to liquid form in an ice-cooled receiver. Hydrocyanic acid may be synthesized by passing dry ammonia over wood charcoal heated to 1,300° to 1,800°. At 2,000° it is liable to a reverse action, the form¬ ing hydrocyanic acid being decomposed as it forms.

Among the more important compounds of hydrocyanic acid are potassium cyanide and mercuric cyanide. Potassium cyanide, KCN, may be formed by passing nitrogen gas over a white-hot mixture of charcoal and potassium carbonate, the reaction being:

K2COs + 2N + 4C ■ = 2KCN + 3CO.

It is more conveniently prepared, however, by strongly heating potassium ferrocyanide (see below), which breaks up into potassium cyanide, carbide of iron and free nitrogen. Po¬ tassium cyanide is a white salt, soluble in water and in alcohol and exceedingly poisonous. It is much used in electroplating as a solvent for gold and silver, and also in the extraction of gold from certain ores by the process known as "cyaniding.® It melts without decomposi¬ tion, and in the molten state it is a powerful reducing agent. For this reason it is often used as a flux in welding and in other metal¬ lurgical operations. It is used in solution to dissolve unaffected silver salts in the tintype process in photography.

Mercuric cyanide, which is also very poison¬ ous, is used in medicine, and is prepared by dis¬ solving mercuric oxide in an aqueous solution of hydrocyanic acid.

Allied to hydrocyanic acid are two other acids, known respectively as

“ferrocyanic acid,® HsFeˆCsNaK and “ferricyanic acid,® H«Fi (C3N3) 4, which are not of any importance in the arts in the free state, but whose potassium salts are much used. Potassium ferrocyanide, or yellow prussiate of potash, KsFe2(CsNs)4’t- 6HaO, is prepared on a large scale by heating a mixture of nitrogenous organic matter and caustic potash, and treating the mass with freshly prepared ferrous carbonate. Crude cyanide of potassium is formed in the first in¬ stance, and this combines with the ferrous car¬ bonate to form the yellow prussiate of potash and potassium carbonate, from which the yel¬ low prussiate may be obtained in large crystals, by evaporation. When pure, the yellow prus¬ siate is not poisonous. It is used, in the arts, as a source of Prussian blue, and also for the manufacture of potassium cyanide, . which is liberated when the yellow prussiate is strongly heated.

Potassium ferricyanide, or red prussiate of potash, K6Fe2(C3N3)4, is prepared by passing chlorine gas through a solution of the yellow prussiate, two molecules of potassium being thereby abstracted from it, with the formation of potassium chloride as a secondary product. The red prussiate is used in the manufacture of sensitive paper for making blue-prints.

HYDRODICTYON, a genus of the fam¬ ily Chlorophycece or green algae. Each individ¬ ual plant consists of a long cylindrical cell, attached to others at the ends, forming a mesh in polygonal shape. The plant is freely mov¬ ing, and its greatest length is one foot. It is familiarly known as “water nets.®

HYDRODYNAMICS (vtop, water; divafiig, force), or HYDROMECHANICS, is that

part of Dynamics which treats of the motion or rest of fluids under the action of forces. A perfect fluid is defined as a body whose parts are perfectly free to move under the action of the smallest forces, or otherwise, as a body such that the reactions between any two portions of it are normal to the surface separating them. If there is any tangential drag tending to prevent the one portion of the substance from slipping past the other, the fluid is said to be viscous. A perfect fluid is an abstraction, like the material particle or the rigid body, but many of the ordinary fluids, like water, alcohol, air and other gases, are so slightly viscous that for many purposes they may be consid¬ ered as perfect. The normal reaction, which alone we suppose to be present, is called the pressure, and is measured by ‘the limit of the ratio of the force exerted on an element of surface to the area of the

element, when both diminish without limit. The usual gravitational unit of pressure is the pound-weight per square inch, the usual scientific, absolute unit (see Mechanics), is the dyne per square centimeter. The pressure of the atmosphere may be con¬ sidered as equal to 1,000,000 dynes per square centimeter.

The fundamental theorem of hydrodynamics is that the pressure on an element of surface is independent of the direction of the normal to the surface. This may be proved by con¬ sidering the equilibrium of a small tetrahedron, ABCD, Fig. 1, and resolving the forces on its

A

faces in the direction BD. The pressure being normal, the forces on ABD, BCD have no component along BD, while if the pressures on ABC, ACD, and the areas of those sides are respectively pi, pi, Si, Si, their normals m, n2, we have for equilibrium pSiCOS (ni,BD) = p2Si cos (n2, BD). But Si cos (m, BD), Si cos (n2, BD) are the projections of the areas on a plane perpendicular to BD, which are equal, therefore pi= pt. If there are other forces applied to the fluid besides the pressure, such, for instance, as its weight, these will be proportional to the volume of the tetrahedron, and when its size is diminished indefinitely, the volume vanishes to the third order of small quantities, . and may thus be neglected in comparison with the area, which is of the second order, so that the result is not affected.

Hydrostatics. — We will first consider hydrostatics, or that part of our subject which deals with fluids at rest Suppose that the fluid is subject to the action of forces whose components along the co-ordinate axes are equal to X, Y, Z per unit of mass. These we call bodily forces. Now consider the equilib¬ rium of an infinitesimal rectangular parallelo-

piped, Fig. 2, whose edges, parallel to the co¬ ordinate axes, have lengths d.v, dy, dz. Sup¬ pose that the mean value of the pressure on the side ABCD, which is at a distance x from the origin, is p, then the X-component of the force

dp

origin, the mean pressure will be p + ˆ dx ,

and the component on the face EFGH, acting on the parallelopiped, being in the opposite

direction will be —

Now if

the density of the fluid is p, the amount of matter in the parallelopiped, being the product of the density and volume, will be pdxdydz, and the force exerted upon it in the X-direction will be Xpdxdydz. We must therefore have for equilibrium

pdydz — [p + ˆ dxj dydz + pXdxdydz

and passing to the limit by decreasing the dimensions, p will be the pressure at any point, and dividing by dxdydz, we have

In a similar manner we have

P Y— PZ =

dp

Ty ’ dp

dz ‘

Thus the fluid can be in equilibrium only under the influence of bodily forces such that the components of the bodily forces, multi¬ plied by the density, are the derivatives of the same functions of the co-ordinates. Now there is in general a physical relation between the pressure of a fluid and the density at any point. If we put

we have

dP _ 1 dp p

dP _dP dp _ \dP_ dP _ dP dp

dx dp dx p dx ’ dy dp dy

dP dP dp 1 dp

dz dp dz p dz’

1 dp P dy’

HYDRODYNAMICS

563

and our equations (1) become

dP

(2) $x = X - r = 7p$. *■ = —.

ox oy oz

Now this is the condition that the bodily forces are conservative. (See Mechanics). In that case the potential energy for unit mass is called the potential of the forces, and will be denoted by V. Thus we shall have P — — V

dp

+ const., and dV — — dP =

If two fluids

of different densities are in contact, we have at their common surface

so that

— dp = fhd V = Pid V, (pi — p2)dV = 0,

and since Pi — Pi is not zero we must have dV ~ 0, dp = 0. Consequently the surface of separation is a surface of constant potential and constant pressure. In the case of gravity we have, if the Z-axis is measured vertically upward, V = gc, so that the surfaces of con¬ stant V are horizontal planes, and a surface where water is in contact with the atmosphere must be a horizontal plane, or level surface, the pressure being the constant atmospheric pres¬ sure. If we suppose the fluid to be incom¬ pressible, we have p constant, P — p/p,

P

(3) — = — V + const. = — gz + const.,

(4) p = — gpz + const.,

so that, if we neglect the atmospheric pressure, and count the depth from the plane 2 = 0, we have the fundamental theorem for heavy liquids, namely, that the pressure is propor¬ tional to the depth This may be proved ex¬ perimentally by placing a well-fitting plate

under a tube, Fig. 3, communicating with a vessel of any shape, and holding the plate up by a wire hung from a balance, while water is poured in above. The weight required to hold the plate up is found to be independent of the shape of the vessel, and to depend only on the depth and the area of the plate. The vase and plate may also be immersed in liquid, while, instead of liquid within, weights are placed on the plate; the

weight supported will then be proportional to the depth.

Consider now a gas, or compressible fluid, satisfying the law of Boyle and Mariotte,

$P = ap.$

Accordingly,

(5)

and

(6)

(7)

$p—f\text{-}j = \pm J'\sim\text{-} = a \log p + \text{const.},$

$V = gz = c—a \log p,$

$_\ o \pm\ p = Poe\ a.$

Thus as we ascend to heights in arithmetical progression the density decreases in geometrical progression, becoming zero at an infinite height. From equation (7) the barometric formula is obtained by which heights are found from barometer readings. The law of Boyle assumes constant temperature. It is, however, more likely that the temperature varies in accordance with what is called con¬ vective equilibrium, so that if a portion of air is hotter than the stratum in which it lies it will rise, and, cooling and expanding, will eventually find a layer of the same density and temperature as its own. The principles of thermodynamics give us the relation between pressure and temperature when the rarefaction is adiabatic, that is, when no heat is lost or gained by the air,

$p = bpk$

where k is a constant for the gas, whose value is about 1.4. We then have

(8) F-'js.i J /«,, V- c~*

*Since * > 1, P diminishes as z increases, and is equal to zero when gz = c , so that on this hypothesis the atmospheric has an upper limit.*

Let us now consider the equilibrium of a solid body floating in a liquid. If we consider the body removed and the space that it occu¬ pied filled with water, since this water is in equilibrium, its weight is borne up by the

pressure of the surrounding water, the effect of which is accordingly to apply to each por¬ tion of the water in question an upward force just equal to its weight. Now just the same forces must be the resultant of the pressures on the solid when it is substituted for the dis¬ placed water, so that it is borne up by a force equal to the weight of the displaced water. This is the Principle of Archimedes. Since the resultant of the weight of all the displaced water is a single force applied at its centre of mass, the resultant upward thrust on the floating body is applied at a point coinciding with the centre of mass of the displaced water. This point is called the centre of buoyancy of the body. If the body is to be in equilibrium, according to the principles of statics of a rigid body, its weight must be equal to that of the displaced body, and its centre of mass and centre of buoyancy must be in the same ver¬ tical line. If the first condition is satisfied, but not the second, the body will float, but will be subject to a turning couple.

Suppose the body floats without being wholly immersed. A plane which cuts off from the body a volume equal to the volume of water having an equal weight is called a plane of flotation, and if we draw all such planes they will envelope a surface called the surface of flotation. For every plane of flotation there will be a centre of buoyancy, and the locus of all these points is called the surface of buoy¬ ancy. Suppose the floating body is displaced from its position of equilibrium by rotation through a small angle 60 about an axis OX through O, Fig. 4, and let IVL, WL' he the original and final planes of flotation. By turn¬ ing the figure until either is horizontal both positions of the body may be shown. Let B be the original centre of buoyancy, G the centre

of mass of the floating body. Then if B were the centre of buoyancy in the second position, the body would be acted on by the couple of which either arm would be the weight

M

W — mg, and the arm the horizontal projection of BG, bˆd, where b — BG. The moment of the couple tending to further displace the body will then be IVbˆd. But this is not the only couple, for the immersed part is not the same as before, the volume of the wedge EOE' having become immersed, giving rise to an upward thrust, and the wedge DOD' having emerged and lost its buoyancy, both these causes giving rise to a turning moment in the same direction, and opposite to that previously found. Since

the volume under water is to be the same in both positions, the volume of the wedges of immersion and emersion must be equal. Since the wedges are infinitely thin, the thickness at any point x, y in the plane of flotation is z = ydO. The condition for equality of volumes is then

(9)

J' J' zdxdy = dO ^ J' ydxdy = 0,

the integral being taken over the plane of flotation. This will be the case if the axis passes through the centre of mass of the area of flotation. The thrust on any element of vol¬ ume d'T~ zdxdy being gpdr, the moment about the X-axis will be

(10)

- .0/

gf)ydT = gpdO ff y2dxdy

= gpdeSK.x2,

where % is the square root of the mean of the squares of the distances of the elements from the X-axis, or the so-called radius of gyration of the area of flotation about the X-axis, and vS1 is the area of flotation. In like manner the moment about the F-axis is

(ID

xydxdy.

There are always two axes at right angles to each other, called principal axes, for which the integral above vanishes, and for such an axis a displacement about it gives rise only to a couple about that axis. Subtracting this couple L' from the one previously found we obtain for the magnitude of the righting couple

(12)

L—gd d (pSkB — m b) .

It is evident that in moving the point of application of the thrust from the centre of mass of one wedge to that of the other, the

centre of buoyancy will be moved in a parallel direction, so that, in the limit, this direction being that of the plane of flotation, the line BB' will be parallel to that plane, or the tangent to the surface of buoyancy is parallel

to the corre¬ sponding plane of flotation. It is also evident that the body is under the same forces that it would be if the surface of buoyanev were material and rested on a horizontal plane, for the reaction would be vertical and equal to the weight of the body.

If B ‘ be the new centre of buoyancy, and we draw verticals from B and B\ they will be normals to the surface of buoyancy and will intersect at M, the centre of curvature of the section of the surface of buoyancy. This point is called /the metacentre , and its distance hx above G the metacentric height. Evidently for stable equilibrium, or a positive righting couple, M must be above G. The arm of the couple being the horizontal projection of MG is equal to hx66 and we have L = mghxd0. Inserting this in equation (12) we obtain for the metacentric height

(1 3) mhx=pSrx 2 — mb,

and dividing by m and writing V =m/ p for the volume of displaced liquid,

(14) &.

The equilibrium is stable or unstable accord¬ ing as this is positive or negative.

For the displacement about the F-axis we have in like manner a couple proportional to the angle of displacement, with a new meta¬ centric height,

(15) kv=^-b.

where kv is the radius of gyration about the F-axis. It is evident that the metacentric height is greater for a displacement about the shorter principal axis of the plane of flotation. Thus, it is easier to roll a ship than to tip it endwise. The above theorems concerning the surfaces of flotation and buoyancy are due to Dupin.

If the floating body is totally submerged, like a submarine boat, only the first moment mgbdd comes into play, 5 being zero, and the centre of buoyancy becomes the metacentre. The stability is in this case only secured by placing the centre of gravity low.

Hydrokinematics. — We will now consider the motions possible to a fluid, without regard to the forces causing them. Let the velocity

at a point be the vector q, with components u, v, w,’ and let us consider the quantity of fluid entering or leaving any closed surface in the unit of time. The amount of fluid which crosses the element of surface dS, Fig. 5, with a velocity q would in unit time, if q were

constant, fill a prism on the base dS with a slant height q. If n is the normal to dS, the volume of this prism is dSq cos (qn), and the mass of fluid in it dS pq cos (qn), or using the formula for the projection of q on n (see Mechanics, equation (12)),

dS pqn = dSp \ it cos (nx) + v cos (ny) + w cos (nz) .

Consequently if we consider any closed sur¬ face, whose outward normal is «, we have for the whole outflow in unit time the surface integral

(16) * = // pqndS— ff p[u cos (nx)

--v cos (ny) -flw cos (nz)]dS .

But we may find a different expression for the same quantity, by considering the ele¬ ments of volume. Consider the parallelepiped of Fig. 2, and let u be the mean velocity on

the side ABCD, m + — d. v on the opposite side

EFGH. Then the inflow on the first side will be pudydz, while the outflow through the

second will be dx J- dydz. The total

outflow will thus be

d(pu)

or in more abbreviated notation,

dx

dxdydz.

In a similar manner we find the outflow through the two remaining pairs of sides to depend on the other two components. From the whole surface we accordingly have the outflow

j djjm) a^w) a(£ro)) dxdydz <

(dx dy dz)

and for the outflow per unit volume we have

(17)

d(pu) , d(pv) , d(pw) T r

dx

dy

dz

On account of this kinematical interpretation, if we have any vector F, whose components X, Y , Z are functions of the co-ordinates of a point, the expression

dX , dY . dZ

(18> 1 te+aFf'ai

is called the divergence of the vector, and will be abbreviated div F. Summing up the out¬ flow for all the elements of volume, inside the surface S, it is evident that the volume integral thus found must be equal to the surface integral 4>. Thus we have

(19) ^^p \ u cos (nx) + v cos (ny) +w cos (nz) }■ dS

dxdydz.

■///I

d(pu) , d (pv) , d(pw))

dx

dy

+

dz j

This may be -taken as a kinematical proof of the Divergence Theorem, due to Gauss and Green, in which, for any vector function which is continuous and has a definite value at every point in the volume within S,

(20)

//

-///l

dX , dVA dZ. , . te + Ty+Tz\dxdydz'

(20)

div F- dr.

The surface-integral in (20) is called the flux of the vector F through the surface .S If we have any continuously distributed vector- function F, that is, one whose components X, Y, Z are continuous functions of the point x, y, z, we may draw curves having the prop¬ erty that at every point on a curve its tangent has the direction of the vector F. The differ¬ ential equations of these curves are

dx _ dy _ dz _ ds

X Y~Y~ ~F*

and the curves are called lines of the vector F. For instance, lines of the vector q are called lines of flow. If we draw all the lines of the vector passing through a closed contour, we shall obtain a tubular surface called a tube of the vector, Fig. 6.

If the fluid is incompressible, as much fluid must flow out from as into any volume, so

that the total outflow is zero. The density is then constant, and we have, dividing (17) by p,

(21)

.. du , dv . dw

dlVq=rx + Fy+Tz = °-

A vector whose divergence is zero is said to be solenoidal (aulr/v, a tube), for its tubes have the property that the flux across a cap, or por¬ tion of a surface bounded by 'the tube, is the same wherever the surface be drawn. Ana¬ lytically, applying the divergence theorem to the portion of space bounded by a portion of such a tube and two caps forming ends, since along the sides of the tube the normal com¬ ponent vanishes, that portion of the flux in (20) is zero. Accordingly the flux through both ends is zero, or the flux out through one is equal to that in through the other. Or, look¬ ing in the direction of the vector-lines, the flux across any cap is the same. If we consider a tube of infinitesimal cross-section, and 5 is the area of a -

right section, since the flux is FS, which is constant for the tube, the magni¬ tude of the vector F is inversely proportional to the area of the cross-section.

If the liquid is not incompressible the total outward flux is equal to the time-rate of de¬ crease of the mass inside the surface, S, so that, the mass in an element of volume dr = dxdo)dz being pdr, we have

(22)

dm

i X cos (nx) + Y cos (ny) + Z cos (nz) } dS

dt

■*fff*

di v(pq)d

Now since the volume over which we inte-

grate is. independent of the time, we may differentiate under the integral sign ; also, both integrals being taken- over the same volume, we may combine them into one,

(23) r C f \~~dr div (pq) 1 dr = 0.

This equality holding for any volume whatever, the integrand must vanish, so that we have

/ 9 ˆ \ dp d(pu) , d(pv) , d(pw)

(24) a (+

= 0.

dy dz

This is the so-called equation of continuity, the term arising from the continuity of existence of mass, none being created or destroyed, but being conveyed without change from place to place.

Besides the' surface- and volume-integrals dealt with above, we need to consider certain line-integrals. If we resolve the vector q along the direction of the tangent to a curve run¬ ning from. A to B, and multiply by the length of the arc ds, and integrate from A to B along the curve, the line-integral

(25) fqsis s (udx-\ – vdyA- wdz)

is called the circulation along the curve. If we describe the curve in the reverse direction, the integral changes sign. If the curve is a closed one, we shall prove the line-integral to be equal to a certain surface-integral over any surface A which has the contour in question as a boundary. Suppose first the contour is a plane, curve and the surface is a plane. Let us divide the area up into infinitesimal rectangles by lines parallel to the axes of X and }, Fig. 7. If we then find the circulation around each of the rectangles in the same di¬ rection, we shall have gone around all the

Fig. 7.

sides common to two adjacent rectangles twice in opposite directions, so that those parts of the circulation will have destroyed each other, and there will remain only those parts which belong to the original contour. Accordingly the integral around the contour is equal to the sum of all these around the infinitesimal rectangular contours. Consider one of these, ABCD, Fig. 8. Along AC the

B D

Fig. 8.

tangential component is u, and the contribu¬ tion to .the integral udx. Along BD the value

of u is u + j^dy, and since we are going in the

opposite direction the contribution to the

integral is — (u + j^dyj dx. Along AB the

tangential component is v, and, since we are

moving from B to A, the contribution to the integral is — vdy. Along CD the tangential

dv

component is v + jj^dx and the contribution dy. Adding these four we have

and summing for all the rectangles,

*(26) g)**,*

which is a particular case of our theorem.

If the contour is not a plane curve, so that the surface A is not plane, let us by drawing a series of planes parallel to one of the co-or¬ dinate planes divide it into infinitesimal strips, Fig. 9, and then- by drawing planes alternately

parallel to the two other co-ordinate planes divide each strip into infinitesimal triangles each having one side parallel to each coordinate plane. As before, the sum of the circulations around all the triangles is equal to the circu¬ lation around the contour. Let us consider one of these triangles, BCD, Fig. 10, and let A

be the poinjt from which lines drawn parallel to the co-ordinate axes will pass through B, C, D. Again, circulation around BCD is equivalent to the sum of the circulations around the triangles ABC, ACD, ADB, the projections °ti BCD parallel to the co-ordinate planes. Let the areas of these four triangles be respectively dS, dSx~dS cos (nx), dSy = dS cos (ny), dSz dS cos (ns), n being the normal to A.' Then we have, applying (26) to th'e three contours

(t-SK

ABCA

/— (S- £)«>•

AC DA

ADBA

HYDRODYNAMICS

567

dw dv\ . .

dy~rJCos(nx)

(dv du\ . . — — I cos (nz)

dS.

cos (ny) + (

\dx ay!

Summing up for all the infinitesimal tri¬ angles, we find the surface-integral over the surface S to he equal to the circulation around the contour.

(27)

+

J (udx--vdy --wdz) =

((dw dv\ . .

1 \Ty- Tz) C0S (nx)

dw\ (dv du\

~¥x)cos iny) +(---)

cos

(nz)^dS.

This is known as Stokes's theorem.

If we define a vector ^ with the components

6 v, C,

(28)

_ dw _ dv

^~~dy~dzy _ du dw

0 2 0X

OX

3m

dy'

we have the integrand in the surface-integral in (27),

2[f cos (nx) + v cos (wy) + C cos (wz)] = 2«n,

as the component of 2ˆ normal to the surface S'. The vector 2 is called the curl of q, for the reason that if the lines of the vector (

(27)

fqsds=ff

(curl q)ndS.

As an example of the kinematioal significance of the curl, let us consider a portion of fluid which revolves like a rigid body about the Z-axis. We then have u — — ay, v~ax, where a is a constant representing the angular velocity. We thus have

2f 2*

dx dy

Or applying Stokes's theorem to a circle with centre on the axis of rotation, since q — ar.

the line-integral is 2ˆr . q = 2rrr!a, which is equal do the area of the circle multiplied by 2a, which must represent the curl. Thus we find that the curl of the velocity is twice the angular velocity with which an element of fluid is revolving. On this account the vector « has received the name of vorticity, and fluid moving so that « is not zero is said

to move vertically. As the difference between vortical and non-vortical motion is very im¬ portant, we may illustrate it as follows : It is possible that fluid may circulate in a region either vortically or non-vortically. Suppose that the fluid is filled with short straws repre¬

sented by the short lines in Figs. 11 and 12; if, as the fluid moves about, these all remain parallel to their original direction, the flow is non-vortical, Fig. 11; if they turn, the flow is vortical, Fig. 12. Thus it is impossible to tell by merely looking at a diagram of stream-lines whether the flow is vortical or not.

CAXJCX (j=Q

di/ir (J > o CMxl (J = o

dw) < o

CAixX ˆ=0

CAXxX (£

dW o

CALvX (J 7ˆ0

Fig. 1

It will be shown later that the divergence and curl of a vector function are characteristic of it, and that if they are known everywhere the complete nature of the , vector is known. They are quite- independent… of. each other, as is illustrated in Fig. 1 3, which show's "fe-

gions where the divergence and curl are zero or not, independently.

N on-vortical Motion. — Let us first examine non-vortical motion, that is, where curl q — 0 everywhere. If we connect A and B by any two curves ACB, ADB, the circulation around the closed path ACBDA will be zero, hence the circulation from A to B will be the same by either path. Thus the circulation does not depend on the path, but only on the position of its ends, so that we have

(29)

/:

qsds = A,

which necessitates

qsds — udx f vdy -f wdz = d

and therefore

tty , , d

= Txdx + ˆdy + dSii'

(30)

U-

d d d

The function is called th e velocity-potential. The direction of the velocity q is everywhere normal to the equipotential surfaces ˆ = const., for if we move along the equipotential we have

d = udx + vdy + wdz— 0,

which is the condition that the vectors u, v, w, the velocity, and dx, dy, dz, the displace¬ ment, are perpendicular. According to the

relation qsds — d(f>, we have the component of

Q(j>

velocity in any direction equal to the

space-rate of variation of potential in that direction ; and since the velocity itself is equal to the rate of change of ˆ in the direction of the normal to the surface — const., a vector related to a function 0 by the' relations (30) is called the gradient of the function. A vector which is thus derived from a potential function is called a lamellar vector.

As an example of lamellar flow, let us take the case in which the velocity is directed radially outwards from a given point a, b, c with a value depending on the distance

r=V(* — a)2 + (y — b)“1 +(z — c)2 from that point, q — f®. The equipotential surfaces are con¬ centric spheres, and we easily find the poten¬

A

tial to be — f®dr. For, since the direction

cosines of r are cos (rx) =

x — a , . y — b

- , cos iry) — – - >

r r

cos (rz) velocity,

(30)

r, we have the components of the

, , .x — a ddr d

M = /(r)— = irTx = Tx'

r dr dy

,, . z — c d dr

w—f (r) – = — —

r drdz

d

The flux out through any of the concentric

spheres is M — ˆr2qy so that if the fluid is in¬ compressible we must have

M . M

(31) q~ tz~9>

r2'

4 nr

where M is constant. The vector q is then solenoidal as well as lamellar, and the equa¬ tion of continuity becomes

rn\ a • du , dv ■ dw – 9 ty i d20 ,

(32) dlV5 01 x + dy + dz dx2 + dy2 + dz2

This equation for

(33) M = /// a dr,

while the total potential will be

*< * —iff!"*

where r represents the distance from the ele¬ ment dr to the point where

(35) C CqndS = C j'^dS = C C (grad

(36) // QndS — /// di yq'dr -Iff J(f > -dr

■//

(grad

Since this flux must be equal to the strength of all the sources within the surface of inte¬ gration, we must have

(37) fffJ°dT = fffcdT-

Now as this equality holds for any volume whatsoever, the integrands must be equal ; ac¬ cordingly we have

(38) . M =

as a consequence of equation (34). The equa¬ tion (38) is called Poisson's equation. We may also prove the converse, namely, that if o is given as a function of the point, the inte¬ gral of equation (38) is given by (34). This is done by means of Green's theorem.

In the divergence theorem (20) let us put for the vector F the value U- grad V, where U and V are two functions, both of which, with their derivatives, are finite, singly-

valued, and continuous in the region of inte¬ gration. Then we have

0X

X = u »/, Y = iM, Z = ua/, dx dy dz

dY dZ rTJTr

a l- 1T~ "h ^r~ — UAV ox dy d z

dUdV 0Z70F .d£dVt dx dx dy dy dz dz

(39)

U (grad V)ndS

- Iff

If

I PliS

vn

j UAV

dUd_V dUdV d_UdV> dx dx dy dy dz dz

Interchanging the functions U and V and sub¬ tracting from (39), we have

(40)

S

V dU. U- – V— yds

*dn dn *

Iff

UAV—VA U dr.

The equations (39) and (40) are known as Green's Theorem. Let us applv it to two functions, one of which, U, is the reciprocal distance from a fixed point P, U = l/r. Let us apply the theorem to the whole extent of space, bounded by the infinite sphere, with the exception of a portion bounded by a small sphere with centre at P, which we exclude, on account of the infinite value of U at P. We must thus take the surface-integrals over the large and small spheres, the normals being in each case drawn away from the volume considered, or out in the first case, in in the second. Since the direction of the normal coincides with that of the radius of the sphere,

d(l/r) d(l/r)

1

dn dr r2

in the two cases respectively while dS—r2du, where du is the element of area of a sphere of radius unity, cut out by a cone of vertex P, having as base the element dS. Accordingly on either sphere.

(41) || V~^±dS= + | | Vdo,

If

If

and if V vanishes at r =°o , the integral over the infinite sphere vanishes. If we now let the radius of the small sphere diminish with¬ out limit, the value of V to be taken is the value at P, so that

(42)

If

v^ilM(is=

dn

-rrff

du= 4 TT V p.

On the other hand the surface-integral

im-r'fff,—

over the spheres vanishes for r = oo , on account

dV

of the vanishing of — to the second order,

On

and for the small sphere in the limit, on account of the factor r. As for the volume- integrals we have seen in (31), (32), that any multiple of l/r satisfies Laplace's equation, hence A (l/r) =0, so that finally

(43)

Vp

kin ->■

the integral being taken over all space. But this is the required theorem, the converse of

(38).

Solutions of Laplace's equation can be found for the case of uniplanar flow, where the velocity is parallel to a given plane, and inde¬ pendent of the co-ordinate perpendicular thereto. A plane diagram then represents the

flow. If the given plane is that of X, Y, Laplace's equation becomes

(44)

029 dty

dx2ˆ dy2

An infinite number of solutions are fur¬ nished us by the method of functions of a com¬ plex variable x + iy, where i is the imaginary defined by i2 = • — 1.

If now we take any function iv= f(z) of the combination z — x + iy, on arranging it in powers of x, iy, all even powers of i will be real, all odd ones real multiples of i; accord¬ ingly w will be of the form ip are real functions of the two real variables x, y. Differentiating partially,

dw .02 , . . dw ,, .dz .dw

aS=/(2)a7=/ (s)' aTT r(,)ay=

dzu _ d(f> . dtp _ .dw _ ,d

dy dy 1 dy 1 dx 1 dx dxy

and equating real and imaginary parts,

_ dip d

dx dy' dy dx'

(45)

Differentiating the first equation by x, the second by y, and adding, we have

and similarly

6ˆ,

dx2 ˆ dy2 '

dx2 ˆ dy2

Thus. either function 9 or ip derived from any function of a complex variable gives us a case of uniplanar flow of an incompressible fluid. From

the equations (45) we obtain by cross- multiplication

(46)

d

0,

which is the condition that the normals to the family of curves 9 = const, and those of the family ip — const, intersect each other at right angles. Such families are called orthog¬ onal. For instance, the function

(47)

gives

(48)

1 1 _ x — iy

z x--iy x2 + y2

(f> =

x

9 =

— y

x2 + y2' x2+y2'

and the curves

x

x2 + y2

const.,

x2 + y2

■ *const.*

are a set of circles tangent to the F-axis and the X-axis, respectively, the two sets intersect¬ ing each other at right angles.

The flux across any cylindrical surface whose generator has the length unity parallel to

the Z- axis, and which intersects the XF-plane in a curve from A to B, is, if $p = 1$,

(49) 'fABdids

C B t 90 . . 90 . .) ,

~J A Vfx {nx) + TyC0S {ny) \ds'

But if the normal lies on the right as we go along the curve, Fig. 14,

cos (nx)ds — dy, cos (ny) ds = — dx.

Using these values and equations (45), we have for the flux

/g

A d£dx + 8iid7 = i'B-'pA ■

so that the quantity of liquid crossing the sur¬ face does not depend on the curve joining

AB, but is the same for one as for another, as must be the case if the liquid is incom¬ pressible. The function is called the flux- function, and .since if no liquid crosses,

it is evident that the curves ip = const, are stream-lines. It is evident from equations (45) that either of the two functions 0, V' may be taken for the velocity-potential, the other being taken for the flux- function. Functions satisfying equations (45) are called conjugate functions, and the two states of flow just described are called conjugate. In the case just investigated, the two conjugate flows happened to be identical ; this is not generally the case.

For instance, consider the functions $w = \log z$, and introducing polar co-ordinates r, 0,

(51) w — log z = = log {x + iy)

= log i r(cos 0-f i sin 0)) = log \ reid) = log r + id.

Thus we may put

(52) 0 = log r, f — 6,

obtaining a radial flow, or uniplanar squirt, with circular equipotentials, or

(53) 0 = 0, ip — \og r,

obtaining a circular flow with radial equi¬ potentials.

Vortical Motion. — Let us now free ourselves from the restriction that the curl of the vel¬ ocity vanishes. There will then be no velocity- potential in regions where there is curl. Lines whose tangent has everywhere the direction of the vector «, the vorticity, are called vortex- lines, and tubes generated by such lines vortex- tubes, tubes of infinitesimal cross-section being termed yortex-filaments. The fluid within such a tube is called a vortex. Since the curl of any vector is solenoidal, as is seen by differ¬ entiating the equations (28) to find the di¬ vergence, the vorticity is a solenoidal vector and its tubes have the solenoidal property that the vorticity in any filament is inversely

proportional to the area of the cross-section of the filament. The product which is

constant for the filament, is called the strength of the filament. Consequently the vorticity cannot vanish at any point on a tube, nor can the cross-section. The vortex-tubes must ac¬ cordingly be closed, or end at a free surface of the liquid, as do those vortices formed by an oar at the surface of water.

The properties of vortex-motion were first investigated in an important paper by Helm¬ holtz in 1858. Following him we shall now show that any continuous flow vanishing at infinity may be represented as the sum of a lamellar and a solenoidal part, and that the solenoidal part may be represented as the curl of another vector. Suppose that be the potential of the lamellar part, Q the vector with components U, V, W, whose curl represents the solenoidal part. Then we assume

(54)

_ d0 OIL

U dx dy

60, at/

V

w

dy

00

dz

-fir.

dz' dx

d V dz' dW dx' dU

dy

(55)

Finding the divergence of q we have du . dv . dw

= 40,

div 5 = ~ f f + dx dy

dz

since the divergence of the curl vanishes, by (43) we have

But

0 =

■*///?—/. / f~*

Since q represents a continuous flow, div q is finite. Accordingly we find that the lamellar part of the flow is. completely determined by the distribution of its divergence.

Secondly, find the curl of q.

rsM ? c— _ d (00 dv dUi

ˆ – gy + _ – -

_ _0 \dj. dU_dW

dz)dy'~ dz dx

= — JU +

dx

d_U

dx

dV_ dW\ dy dz\

Since the vector Q is as yet undetermined except as to its curl, let us assume it to be solenoidal, which will make the divergence in

(56) vanish, giving

(57) 2 £ = — A U, 2ˆ = — AV, 2 C, A— — W.

As before, we find the integrals of these equations to be

The integrals are to be taken over all space, but as any part of space where the vorticity vanishes will contribute nothing to the inte¬ grals, we may suppose them restricted to the vortices Thus we see that the solenoidal part of the flow q, which is due to the vortices, is completely determined by the distribution of curl q. . Thus the statement is justified that a continuous vector-function is completely determined by its divergence and curl. Kine¬ matically we may say that any flow is the

resultant of squirts and vortices. The vector Q * whose components are formed in the manner of potentials from the components of 2ˆ, is called the vector -potential of 2 w.

Thus the velocity due to a vortex is the curl of the vector-potential of twice the vorticity. We may find this velocity by differentiation. Let us distinguish the point of integration from the point for which the potentials are calcu¬ lated and by which we differentiate, by attach¬ ing an accent to the co-ordinates of the former. We have

(59)

dW_dV dy dz

— dr’ —

Thus the portions of velocity contributed by the element of the vortex dr ‘ are

(60)

du = 2~ \ C(y’—y) — v’(z’ — z) | dr’,

• = j 1 ‘(z’ – 2) – c’(‘ ~ *) F iT’<

dw

1

2 rrr3

\v’(x’ — x)—$’{y’ — y) \dr’.

These are immediately seen to be, aside from the factor 1/2 nr*, the projections of the paral¬ lelogram whose sides are the vectors w’ and r the vector from x’ , y, z’ to x, y, z. If dq be the magnitude of the resultant, we accord¬ ingly obtain

(61)

, w’ sin (o’r) , , di = 2«r* iT ’

the direction of dq being perpendicular to both and r, as shown by (60).

Let us take for the element of volume dr’ a length ds of a vortex-filament of cross- section .S. Then dr’ — Sds, and since Su’ — r, the strength of the filament

i *ds- sin (wr)

(62) = -“2 nr> •

The velocity is connected with the vorticity in the same way that the magnetic field due to an electric current is connected with the current-density, equation (62) giving us the magnetic field produced by a current of strength k/2tt.

Hydrodynamics. — We now arrive at the subject of Hydrodynamics proper, in which we take account of the forces that are capable of producing the states of flow that have been previously described. Suppose that the co-or¬

dinates of a particle are x, y, z, then

v

dy

dt

The principles of dynamics tell

us that the product of the mass by the accelera¬ tion of any particle is equal to the resultant of all the forces applied to it. Taking the mass contained in the element of volume dr, and the resultant of the bodily forces and pressures, as found under the treatment of hydrostatics,

(64)

du

1t = X

dt

from which we obtain the equation with two similar ones,

1 tip dv _ y _ dp

*P dx ’ dt p dy**

dw _ _ _l dp

dt p dz

By the derivative — is meant the rate of

dt

change of velocity of a particular particle as it moves about. If we have any function F of the position of a particular particle, we may write its derivative

(65) d_F=dF d_Fdx dF(dy d_Fdz

*dt dt dx dt * dy dt + dz dt ’*

where dF/dt would be the rate of change of the function if the particle were at rest. The j . dx dy dz

derivatives — , ˆ ˆ are the velocity-compo¬

nents u, v, w. Accordingly we have

dF dF dF . dF , dF

(66) —=l-—+u +v -f w — •

dt dt dx dy dz

We call this mode of differentiation particle differentiation.

Introducing this terminology, our equations of motion become

du du du du „ 1 dp

dt dx dy dz pdx

t dv , „ dv dv dv t 1 dp

(67) + w — + v- -f iv— = Y – ,

dt dx dy dz pdy

dw dw , dw , dw

dt dx dv dz

7 _ dp

P dz ‘

These equations are due to Euler. These three equations, with the equation of continuity (24), and the physical relation between p and p furnish five equations for the determination of the five variables u, v, w, p, p, as functions oi x, y, z, t.

Subtracting from both sides of the first of equations (67) the quantity

d j . . , du , dv , dw

1 Ut+v+w* + V— + W*

dx \2 J 2 dx we obtain

,KQs du (du dw\ (dv du

(68) St + W\dz~X)-V\FX-Jy)

dx

v_d_P

dx

■M

dx

If the bodily forces are conservative and de¬ rived from a potential V, the. right-hand member is the derivative of the quantity — (V-hP + qV2) = U, and inserting the values of £, il,

du . _ .

u + 2(m>

r\ dU dx

(69)

dv . r dU

dw _ , . v d U

» + 2W-«)—5r-

If the motion is steady, that is, independent of t, the time-derivatives vanish. Then multi¬ plying the equations (69) by dx, dy, dz re¬ spectively, adding and integrating along any curve, we obtain on the right the difference between the terminal values of V ~b P -f <7l/2.

If the curve is either a stream- or vortex-line, that is, if dx, dy, dz are proportional either to u, v, w, or to v, C, the sum on the left will also vanish, so that along a stream-line or a vortex-line we have V + P + q2/2 = const. If the motion is non-vortical, the left-hand side of (69) vanishes, so that the above sum is constant throughout the fluid. In this case

(70) V + P + 2

this result being called Daniel Bernoulli's theorem.

If the fluid is incompressible, P — p/p, and if there are no bodily forces V~0, so that (70) becomes

(71) ~ i fi2 = const.

P ^

Accordingly where the velocity is small the pressure is large and vice-versa. By con¬ stricting the tube the velocity is made large and the pressure small. This k the principle of jet exhaust-pumps, like that of Bunsen, the air being sucked in at the narrow part of the jet. The same principle is used in the Venturi water-meter. The horizontal main being re¬ duced in diameter in a certain portion and the difference of pressure at a point in that por¬ tion and in the main observed, the velocity is computed. If the pressure at the two cross- sections and Si is p&, p, we have*

(72) pi — p2 = ^(q2 — qp).*

But since the flow is solenoidal, Siqi~ Saq. Combining with (72),*

(73) pt — p2 = — 1 j,

which determines q\ in terms of the pressure- difference. The efflux in unit time is pqiSi. For the adiabatic expansion of a gas,

We may use Bernoulli's theorem to calculate the efflux of gas from a reservoir. If we con¬ sider a point in the reservoir where the pressure is p, so far from the orifice that the air may be considered at rest and if the velocity at the orifice is q and the atmospheric pressure p0, we have

± K fc — 1 k — 1

(75) g2 = 2bK^zr\ P k — P° k r»

which is the usual formula for the efflux of gases.

If the external force be gravity, V — gz, and we have for an incompressible fluid,

(76) ^ + gz + = const.

r

If we again consider efflux from a reservoir whose upper free surface z — Zi is so large that q is negligible, the pressure being that of the atmosphere,

the same above and at the orifice where z: = Z2, the velocity of efflux is given by

po , po . , ,

- + g = – + gz* + to,*

(77) g2 = 2g(zi — z2),

or the velocity of efflux is that acquired by a body falling freely from a height equal to that

of the free surface above the orifice. This is the theorem of Torricelli, one of the oldest on hydrodynamics.

Wave-motion. — The case of uniplanar waves may be dealt with by the method of the complex variable. We shall find that the waves travel with constant velocity a and that it will simplify the problem if we impose upon the whole fluid a horizontal velocity equal and opposite to that of the waves. The waves then stand still and the motion is steady, as in the case of waves about an obstruction in a running river.

Let us consider waves in deep water. At a great depth the vertical motion will dis¬ appear, so that

u = — a, v = 0, $ = — ax.

The function

w— — az + Ae—ik = — a(x – -iy) -f Ae—ikfx + iv) gives*

i> + tip = — a(x -H iy) --Aeˆv{cos kx — i sin kx).

(78)

When y = — 00 this makes

(79) ay + Aeˆy sin kx = 0,

which shows that y is a periodic function of x with the wave-length 7, = = 2ˆ/k. The longer the wave-length, that is the smaller k, the more nearly does the exponential reduce to unity and the profile to a curve of sines. The veloc¬ ity is given by

u= ˆ = — a — Akeky sin kx,

(80) dy , .

d

v — — = — — — A keky cos kx, dy dx

(81) qS= M2 + v2 = a2 + A^k^tcy -f 2Ake^y sin kx.

So far we have merely kinematics. The dynamical relation required is that for steady motion,

(82) £ + gy + Jj. = C.

At the^ surface putting p = 0 and making use

gy + h { a2 + AWeVcy — 2a*ky }•= C.

Since the surface passes through the origin, putting y = 0,

C=i(a2 + A*fr).

(83) (g — a*k)y + ^2£V*v — 1) = = 0.

This equation can be only approximately fulfilled, but if the height of the waves is so small in comparison with the wave-length that the square of 2ky may be neglected, developing the exponential gives

(g — a*k + A2k*)y = 0,

giving the relation between the velocity and the wave-length.

(84) g — a2k + A2k*= 0.

If ky is small, the equation of the profile (79) is approximately

(85) y = – sin kx,

a

so that the height of the waves above the

origin is B — A/a, inserting which in (84) gives

<« '{?(■-*£) (-.

For long waves we accordingly have a* =gV 2x, or the velocity of long waves in deep water is equal to the velocity acquired by a body in falling freely from a height equal to one- half the radius of a circle whose circumference is the wave-length.

In order to study the motions of the indi¬ vidual particles of water let us now impress upon the motion given by (80) a uniform velocity a in the X-direction. Equations (80) now give the motion with respect to axes traveling with the waves, so that in order to obtain the motion with respect to fixed axes we have to add a to the u of (80) and replace x by x — at, obtaining /r7n u — — Akeky sin k(x — at),

ˆ ' v — — A kekv cos k(x — at) .

If the displacement of a particle which when at rest was at x, y is £, V, the above values are

d *" dv

j , ~r, and if we neglect the small change of at at

velocity from x, y to x f £ , y + V, we may in¬ tegrate with respect to the time.

£ = — Be*y cos k(x — at),

V = — Beˆy sin k(x — at).

(88)

Thus each particle performs a uniform revo¬ lution in a vertical circle of radius Beˆv in the

time T =

2JL

ka

— . The rapidity of decrease of a

the motion as we go below the surface is seen by the fact that at a depth y = — * the ampli¬ tude has diminished in the ratio e~27r= .001867. The form of the wave-profile is shown in Fig. 15, the crests being farther above the

Fig. 15.

level than the troughs are below it. As the height increases the waves become sharper at the crest.

Vortex-motion. — Let us consider the change in circulation along a line that always contains the same particles. We have

(89) A ˆ UdX + Vdy + WdZ ˆ

=/ | Tt dx + u7t(dx) + 7tdy +4 {dy)*

+dˆiz + 4 (dz) [•

NOw consider an element ds which at a time later by dt has moved to a position ds , Fig. 16. Since one end has moved in the X-direction a distance udt and the other a distance

|- + s'+S*'+l*[‘*

the new value of its X-projection is

dx' = x + dx + j« +Jxdx+fydy +jzdz\dt

from which we obtain the derivatives

d , . . dx' — dx du . , du , . du ,

T (dx)= – ~r – =t dx + IT dy + ˆ~dz,

dt dt dx dy dz

m lt (dy) = — j;— =gx dx + d~dy+ dz.

d . dz' — dz dw , , dw , , to.

It {dz) = Jt = dx dx+dydy+

But the equations of motion (67) are, in abbre¬ viated form,

du d(U + gV 2) dv d(U + q>/ 2)

(91) dt~ dx

dy

' dt

dw _ 6(U + q2/ 2)

dt dz

(V + P + q'-/2). Accordingly

3(u+

dt J A ^ dx – ' dy

d(U+qUz) , , 1 du . dv dw\ , + – iz + ("to + "dx + WVx)dx

+ {u¥y+vWy + wJy)dy+ \

du . UJz +

dv dw\ , Vdz+WTz)dz

= rBW±&dx+KV±£Liy

J A dx dy

dx

(U + g2)

f

d(U±q -)iz dz

B

which vanishes for a closed curve. Therefore if the bodily forces are conservative, the circu¬ lation around any closed curve moving with the fluid is independent of the time. If the circulation around a closed path is zero at one time, it remains zero, so that if the velocity- potential once exists, it always exists. This theorem is due to Lagrange.

From the equations (69), whose right-hand members are derivatives of the same quantity Ur this quantity may be eliminated by differen¬ tiation. Differentiating the last equation by y, the second by z, and subtracting,

±d_(dw_dv\ fo v 2 dt\dy dz) ^ * dy

dj

dy

du rhr ■ dy

dv Jdu %~^~dz

dC , J)w d~

— 4/ — 4- – - U 1 — « •

or otherwise,

0c 0- , 0c , 0c j 0r 07

(M)-H7 + «^+r- +ro-=H(– +

+ * 1

• 02 J

_ + ^ + ^

‘ 0X 0V 03 f ^ 0JC ^0V

0y ‘ 03 ” (dx ‘ by

tiu

‘by ‘ ’03-

On the right the coefficient of n, being the divergence of the vorticity, is zero, while that of c is by the equation of continuity equal to

1 dp

— ^ , so that equation (93) becomes

df _ $ dp „ 0M 0M 0W

• “ p dt + + yy + ’

which may be written, with its two companions,

(94)

ill

dt\p d dt

d_(v\ = l

dt\p) p

1 a ^_l a

p bx p by p bz

bv.V_bv C bv bx P by p bz'

d_ (Cj _ bw ^ y^bw ^ C 0w;

+

+

a given

dt\p J p bx 1 p by 1 p 03

Thus the time derivatives of — » — > — for

P P P

particle are homogeneous linear functions of those quantities. By continued differentiation with respect to t and the substitution of the derivatives from these equations, we see that all the time-derivatives are homogeneous linear functions of the quantities themselves. Thus if at any time these quantities are zero, all their derivatives are zero, and developing by Taylor's theorem, we find that the function remains zero for all times. Thus if a particle is once not vortically revolving, it never can acquire such rotation under conservative forces.

Let us now consider two points A and B lying on the same vortex-line at a distance o

apart ds = e – , where e is a small constant. p

Since the particles lie on the vortex-line we have

(95)

dx _ dy _ dz- _ ds _ e

£ 7 C « P *

For the difference of velocity at A and B we have

<96> +

_ £ \ £_bu V_bu bu)) P bx p by ‘ p bz i”

or, by equations (94), (97) . u

d

B

U . = £

A dt

©■

Now at an instant later by dt, when the parti¬ cles are at A’ and B’

dx’ — dx + {uB — uA)dt = e

(98) dy’=dy + (vB—vA)dt = e

dz’=dz + (wB — wA)dt — £

i + -,

p r d t \ p

dt

1 + i(1)dt

P dt\p)

*- + i (-) **

p dt\p)

Therefore the projections of the arc ds in the new position are proportional to the new

values of the components of u/p, as they originally were, so that the particles still lie on a vortex-line. Accordingly a vortex-line is always composed of the same particles of fluid. Also, since the components of ds have changed so as to be always proportional to the components of u/p, if the liquid is incom¬ pressible the rotation is proportional to the dis¬ tance

between the particles. And whether P vary or not, if S is the cross-section of a vortex-filament, since the mass pSds of a length ds remains constant, so does Aw, the strength of the filament. Accordingly the strength of a vortex-filament is constant, not only at all points in the filament, but at all times, consequently a vortex existing in a perfect fluid is indestructible, however it may move. It is from this remarkable property of vortices discovered by Helmholtz that Lord Kelvin was led to imagine atoms as consist¬ ing of vortices in a perfect fluid.

From the kinematical properties of flow due to vortex-motion (62), we see that the velocity at every point of a circular vortex-ring, Fig. 17, due to all the elements of the vortex.

is in the same direction perpendicular to the plane of the ring, and in the direction in which the inside of the ring is turning; the ring there¬ fore advances with a constant velocity, as if it were rolling in a tube which it just fits. We may verify this by an experiment due to Professor Tait, where smoke is suddenly forced out through a circular hole in a box provided with an elastic back. The smoky air rolling on the edge of the hole is endowed (by the friction, a non-conservative force) with a vorti¬ cal rotation, and issues as a vortex-ring, which advances with approximately constant veloc¬ ity for a considerable distance. That it con¬ sists always of the same air is seen by the smoke which it carries with it. Such a ring, on striking an edge or obstacle, is not destroyed or cut. Similar experiments can be performed with the rings formed by letting drops of ink fall into water. The loss of velocity finally obtaining in all these cases is due to the viscosity, that is, to non-conservative forces. The treatment of viscosity is beyond the scope of this article.

*Bibliography. — Lamb, * Hydro dynamics y ; Bassett, (Hydrodynamics * ; Webster dy¬ namics 5 ; Tait, (Dynamics. >*

Arthur Gordon Webster, Professor of Physics, Clark University.

HYDROFLUORIC ACID. See Fluorine „ HYDROFLUOSILICIC (hl”dr6-floo”< > si-lls lk) ACID. See Fluorine.

HYDROGEN (Greek, <(producing water.® in reference to the fact that in burning in air or oxygen, hydrogen forms water-vapor), a

gaseous element, discovered by Cavendish in 1766. It was at first called (the present name being due to Lavoisier. Hy¬ drogen is the lightest known

*substance, and it also has the smallest known atomic weight. The atomic weight of hydrogen is often taken as unity in stating the relative atomic weights of the different elements (see Atomic Theory), but it is now more usual to assume the atomic weight of oxygen to be precisely 16, which amounts to making the atomic weight of hydro¬ gen 1.0076. According to Regnault's experi¬ ments, hydrogen has a density equal to 0.06926 of that of an equal volume of air, at the same temperature and pressure. In absolute measure, the mass of a cubic centimetre of hydrogen, at the freezing point of water and under a pres¬ sure of 76 centimetres of mercury at Paris, is 0.00008957 gram, or 0.08957 milligram. Hydro¬ gen has the chemical symbol H, and is one of the most abundant elements known. It occurs in the free state in volcanic gases, and in the sun and in many of the fixed stars. Free hy¬ drogen is also present in the earth's atmosphere in exceedingly small amount. Water (or hy¬ drogen monoxide) is its commonest and most abundant compound, and it is an essential con¬ stituent of nearly all organic tissues. Hydro¬ gen may be prepared very easily by many methods. One of the most convenient of these consists in acting upon metallic zinc with dilute sulphuric acid, the reaction in this case being: Zn + H2S04 = ZnS04 + 2H. Hydrogen is chem¬ ically inert toward most of the elements,' at ordinary temperatures, but it combines with chlorine * when exposed to light, — quietly in diffused daylight, and explosively under the direct action of sunlight. At elevated temper¬ atures it combines with other elements also, and it burns in air (or oxygen) with the develop¬ ment of .an intense heat, but with very little light ; water being produced as the result of the combustion. Hydrogen has been both liquefied and solidified. Its critical temperature is esti¬ mated, by Dewar, to be about 402° F. below zero, and the same authority gives 15 atmo¬ spheres as the critical pressure. See Critical Point, and Gases, Liquefaction of.*

Hydrogen combines with oxygen in two pro¬ portions. The monoxide, or common water, H20, is formed, as already noted, when hydro¬ gen is burned in air or in oxygen. It is also formed in many of the double decompositions that occur in chemistry, as when metallic oxides or hydrates are dissolved in acids. Sodium hydrate, for example, combines with sulphuric acid according to the equation 2NaOH + H2SO4 — Na2S04 T 2H20, sodium sulphate and water being formed.

Hydrogen peroxide (or dioxide), H2O2, may be prepared by acting upon barium dioxide, Ba02, with dilute sulphuric acid; the reaction being : Ba02 T H2SO4 = = = BaSCh + H2O2. The barium sulphate that is formed at the same time is a heavy, insoluble substance, which is easily removed from the solution by filtration, or by settling and subsequent decantation. The aque¬ ous solution of the peroxide may then be con¬ centrated by evaporation over strong sulphuric acid, under the receiver of an air pump.

When the water has all evaporated, the pure peroxide remaining behind has a specific gravity of 1.452, and is a colorless, oily liquid, devoid of odor,

but having a disagreeable metallic taste. The peroxide does not freeze, even when cooled to 0° F. At 70° F. it slowly gives off half its oxygen, passing into water. At 212° F. this change takes place very rapidly. Owing to the facility with which hydrogen peroxide gives off oxygen, it is used quite largely as a bleaching agent, and also, in surgery, as a disinfectant in the treatment of wounds.

When hydrogen is passed through boiling sulphur, combination takes place, with the formation of hydrogen sulphide, or sulphuretted hydrogen, H2S. This compound is more con¬ veniently prepared, however, by treating sul¬ phide of iron, FeS, with dilute sulphuric acid, ferrous sulphate (FeSCh) being formed at the same time. The reaction is: FeS + H2S04" FeSCh f H2S. Sulphuretted hydrogen is a gas, devoid of color, but possessing an overpowering odor, suggestive of rotten eggs. It burns with a bluish flame and is poisonous when inhaled in any considerable quantity, even though largely diluted with air. Under ordinary at¬ mospheric pressure, sulphuretted hydrogen gas condenses, at 80° F. below zero, to a colorless liquid, which freezes to an ice-like solid upon being further cooled to 121° F. below zero. Liquefaction may also be induced at the ordi¬ nary temperature of the air by the application of a pressure of from 17 to 20 atmospheres. Sulphuretted hydrogen is an invaluable reagent in the chemical laboratory, where it is greatly used for separating the metals into groups, in inorganic analysis. See Chemical Analysis.

With carbon, hydrogen forms a large num¬ ber of compounds which are collectively known as hydrocarbons (q.v.). With carbon and oxy¬ gen, and with carbon, oxygen and nitrogen, hydrogen forms compounds past enumeration. For further information concerning these, con¬ sult any treatise 011 organic chemistry, and also, in this encyclopaedia, the articles Compressed Gases ; Fatty Compounds ; and Aromatic Compounds.

HYDROGEN AND OXYGEN, Electrol¬ ysis of. See Electrochemical Industries.

HYDROGEN PEROXIDE, HYDRO¬ GEN SULPHIDE, etc. See Hydrogen.

HYDROGRAPHIC OFFICE, United States, an institution established by Act of Congress in 1866 for the improvement of the means for navigating safely the vessels of the navy and mercantile marine. It is attached to the Bureau of Navigation of the Department of the Navy, and prepares the instructions for and receives the results of the ocean and coast sur¬ veys which the

naval service is authorized to perform. The accumulations of this office, in the form of charts, sailing directions, and nau¬ tical tables for the use of mariners in the prac¬ tice of navigation and nautical astronomy, have resulted from original naval surveys, from geo¬ graphical and cartographical data gathered from the reports of commanding officers of vessels in the general naval service, from information collected from mariners of all nationalities by the branch hydrographic offices operating in sixteen of the principal ports of the United States, and from the hydrographical informa¬ tion that comes into the custody of the Depart¬ ment of the Navy through the prosecution of surveys by foreign governments. These publi-

cations relate to all parts of the navigable waters of the globe and form an important asset in the operation of American shipping.

At regular intervals there have also been constructed world-charts showing the lines of equal declination and inclination of the mag¬ netic needle and the intensity of the earth's magnetic force, which have been supplemented by publications of the results of the analytical treatment and the discussion of magnetic ob¬ servations made at a great number of places in all parts of the world, and also charts show¬ ing the telegraphic connections of the world, and showing the tracks for full-powered steamers with the shortest distances in nautical miles. These charts, as well as those issued for purely navigational purposes, are, in nearly all cases, constructed upon the Mercator projection. The exceptions include the circumpolar charts showing the frigid zones and the great circle sailing charts of the several oceans.

A pamphlet of notices to mariners is issued each week, giving information to enable mari¬ ners to amend the publications that are extant from the hydrographic office, by means of de¬ scriptions of newly discovered dangers to navi¬ gation and recently installed or altered lights, beacons and buoys.

The opportunities that surround the seafarer for observing the processes of nature have been made of avail by the hydrographic office in col¬ lecting observations in relation to the physical geography of the sea, which, when collated and digested, are of benefit to the material inter¬ ests of commerce and navigation. For such a field observers are necessary in numbers that come only at the call of nations ; and, in order that no man may feel that he has labored in vain, it is necessary to give back to each, to his own

profit, the results of the united experience of all. This is the purpose of the pilot charts — to give timely expression, in a graphical form easily comprehended by navigators, of those conditions and facts of experience which, on being taken account of in navigation, will tend to safeguard the lives of seamen and ac¬ celerate transit from place to place. These charts. are published monthly for the North Atlantic, Indian, and North Pacific oceans, and at quarter-yearly intervals for the South At¬ lantic and South Pacific oceans. They show the. regions of storm, fog and floating masses of ice, the set and rate of ocean currents, the average direction and force of the winds to be expected, the trade-wind limits, the best pas¬ sage routes, the normal isobaric and isothermal lines over the ocean, the variation of the com¬ pass and its change with time and locality, and the positions in which derelict vessels and float¬ ing obstructions to navigation are reported to exist.

George W. Littlehales, United States Hydrographic Office.

HYDROGRAPHIC SURVEYING. See

Surveying.

HYDROGRAPHY. Hydrography has been viewed by past generations of writers as comprehending all those branches of science which pertain to the waters of the earth's sur¬ face. In the present generation, however, the description and knowledge of the oceans is em¬ braced in oceanography; the description of the river systems, their function as agents for the

sculpture of the land, and the conditions under which their courses are modified, and the de¬ scription of the lakes, and the processes of their creation and extinction are viewed as sub¬ jects of physical geography; the treatment of rivers from the point of view of their manner of flow, their floods, and their employment as sources of power is designated as river hydrau¬ lics; and the motions and oscillations of lakes and other bodies of fresh water, including then- physical, chemical, meteorological and biological description, constitute the science of limnol¬ ogy. Hydrography, in its definite application, comprehends those operations and investiga¬ tions which relate to the representation and charting of the depths, shoals and shore lines of oceans, lakes, rivers, harbors and other bodies of water, mainly in the interests of navi¬ gation and for the purpose of indicating the hidden dangers to be avoided and the channels where safety is to be sought in the guidance of shipping. It is not only necessary to designate the exact position and extent of dangers to navigation, but also to indicate the undulations and characteristics of the bottom which, being charted, frequently enable the navigator, by casts of the lead or sounding-plummet, to rec¬ ognize his position, or the course he is follow¬ ing, and which, at

night, are often the only guides to an anchorage.

History. — There came a time in the history of the woxld when commerce was pushed into the sea. There was an age in which, by twTo world-old high roads stretching across Persia, the slow caravans passed and repassed bearing silks and spices and merchandise from Central Asia and India to Syria and the West. Then came the sweeping hordes from the northeast to interpose a barbaric wedge which practically shut the main gates of the Eastern trade; and Europe began to find the way to India and China in ships. Long before the rise of Greek civilization, and long before the oldest Greek and Hebrew records, Phoenician navigators, having emigrated from the shores of the Ery¬ thraean Sea or Indian Ocean, were making voy¬ ages over the Mediterranean Sea and through the Pillars of Hercules or the Strait of Gibral¬ tar into the Atlantic Ocean. And, after the Phoenicians, the Carthagenians, animated by the same spirit of commercial enterprise, con¬ tinued to conduct voyages which might rival those of much later centuries. These experi¬ ences must necessarily have produced some knowledge of the configuration of the coasts with which the Phoenician's and Carthagenians were familiar and of the depths of the border¬ ing waters, but this knowledge, whatever its ex¬ tent, was not transmitted to us, and it remained to later centuries to provide those foundations of knowledge upon which the superstructure of hydrography has been raised.

Although the Greeks must be regarded as the founders of scientific geography, they are not known to have undertaken voyages of dis¬ covery before the 4th century b.c., when they sent an expedition to the North Sea under the direction of the illustrious astronomer and mathematician, Pytheas, who, at that distant period, had determined the latitude of Mar¬ seilles with such exactitude that 20 centuries afterward Gassendi found it correct to within a few seconds. There is no doubt that, before this voyage, the chart of the seas to the west

of Europe was almost a blank, and that, down to the time of Strabo, it retained the form given to it by Pytheas. Hydrography is also indebted to the solicitude showai for the sciences by the Ptolemies, the successors of Alexander in Egypt. Timosthenes, a native of Phodes, who was admiral of the Egyptian fleet under Ptol¬ emy Philadelphus, drew up a treatise ((Concern- ing Ports® which may be regarded as the precursor of the modern sailing directions issued by the hydrographic offices of the mari¬ time nations. Although the Romans carried their arms throughout nearly all the world known to the ancients, including in their rule a great extent of

coast bordering on the At¬ lantic, they never organized any voyages of discovery into this outer sea, after the manner of the Carthagenians and Greeks. It was near the beginning of the Christian era when the celebrated Grecian geographer, Strabo, sug¬ gested that besides the world known to the Greeks and Romans, other continents or other worlds might yet be discovered inhabited by different races of men. Strabo does not appear to have been acquainted with Hippalus,. an Egyptian navigator, living about the same time, who proved the regular alternations in the di¬ rection of the monsoons of the Indian Ocean, and profited by the discovery to open up a route across the high seas between the shores of the Red Sea and India. Coast routes, followed up to this time, were abandoned, and a fresh im¬ petus was given to voyages in oriental waters. Nevertheless, 150 years afterward, Ptolemy, whose great authority gave his views a scien¬ tific stamp, rejected the hypothesis of an ocean extending to the east of the Asiatic continent and regarded these great land masses as ex¬ tending indefinitely toward the north and east. His maps, in which he accomplished so great an advance in projection by latitude and longi¬ tude, show also that he shared the view of many of his predecessors in representing the Indian Ocean as a sea enclosed by an exten¬ sion of Africa eastward to China. This South¬ ern Ethiopia remained on maps down to the time of the second voyage of Captain Cook. Two principal views prevailed among the an¬ cients regarding the distribution of coasts and seas. The school that may be called Homeric

_ to which Eratosthenes and Strabo belonged

— considered the three continents of the Old World as forming a single island surrounded by the ocean. On the other hand, the ad¬ herents of what may be called the Ptolemaic sch00l — to which Hipparchus belonged — did not admit the extension of the sea around the known world. They considered the Atlantic and Indian oceans to be great enclosed seas like the Mediterranean; they held that the extreme points of the known lands toward the east and the west approached so nearly to each other that a ship, parting from the west, might easily reach the eastern extremity, which they re¬ garded as greatly extended. This error was perpetuated, thanks to the influence of Ptolemy, and led directly, 14 centuries afterward, to the discovery of the New World by Columbus. When the barbarians invaded and overran Europe in the 4th and 5th centuries, the maps and other scientific works of ancient civiliza¬ tion were destroyed or lost sight of for centu¬ ries afterward. In the Middle Ages, the Arabs extended their voyages as far as China in the VOL 14 — 37

East, and, in the West, they were acquainted with the whole of southern Europe and of northern Africa. It is to their intercourse in the 10th and 11th centuries that the knowledge leading to the introduction of the

mariner s compass is believed to have been conveyed from China to Europe. The ancients, who made so many excellent circumnavigations of the Med¬ iterranean, never constructed general or coast charts. The marine compass-charts of the Middle Ages therefore demonstrate a great progress in knowledge in relation to coast charts which were based on rounds of angles taken from successive positions by means of the compass. The compass-charts, or portu- lani, a name applied both to the charts and the accompanying sailing directions, made their appearance in Italy in the 13th century. The most remarkable of these compass-charts is known as the Catalan chart. It is a map of the world in six sheets, dated 1375, and is. at. once a planisphere and a marine chart. It indicates in particular the new islands discovered in the Atlantic Ocean, and shows much progress in the representation of the Indian Seas. It is on this chart that India appears for the first, time as a peninsula, and the Indian Ocean is no longer an inclosed sea as had been previously represented.

The compass shows the mariner his course, but not how far he may have been drifted from it by wind or current. It is. the province of nautical astronomy to tell him from time to time his exact position by latitude and longi¬ tude. Nautical astronomy was greatly ad¬ vanced by Prince Henry the Navigator, a prince of Portugal, who founded an observa¬ tory and school at Sagres in 1420, employed, the best Italian mapmakers and pilots, and inspired the heroic age of Portuguese, and Spanish ex¬ ploration, which took its course toward the Atlantic because Europe, whose face was turned toward Asia up to the time of the clos¬ ing of the routes to the East through the cap¬ ture of Consantinople by the Turks in 1453, now began to transfer the centre of her civili¬ zation and commercial activity to the Great Western Ocean. The great works of the an¬ cient geographers were, rescued from the ex¬ piring Byzantine Empire and reproduced in the West, and, after the lapse of a thousand years, maps were once more constructed on the principles of latitude and longitude initiated by Ptolemy. It was into such a state of the progress of knowledge of the coasts of the world that the generation of Columbus, Gama, and Magellan was introduced — the generation that gave America, the route to India, and the circumnavigation of the globe. The revolution that had been effected in the map of the world between the sailing of Columbus and the year 1600 may be realized by comparison of Behaim's famous globe of 1492 — the year of the sailing of Columbus — with Hakluyt's map of 1599. Behaim's globe had no America, and the Indian Ocean was inclosed to the south by an eastern extension of South Africa: it was essentially the same as Ptolemy s of 13 centuries earlier. But, Hakluyt's map, a century later, shows the modern world, except for the omission of Australia which had only recently been reached by the Dutch in those voyages from their East Indies' colonies as a result of which its western coast was explored

and represented in the map by Ortelius, in 1570, as New Holland.

In the 16th century the art of drawing up sea charts found its greatest cultivation among the Spaniards and Portuguese. The govern¬ ments of Spain and Portugal endeavored to have charts constructed with the greatest pos¬ sible accuracy. Portugal created a commis¬ sion, of which Martin Behaim was a member, for the greater development of this science. In Spain, Amerigo Vespucci was appointed Chief Pilot in 1508, and soon became the head of a hydrographic bureau for the execution of charts and kindred purposes. It was ordered at this time <(that henceforth all navigators sail¬ ing towards known or unknown parts of India, who should discover new regions, islands, har¬ bors or bays, affording some interest for the general chart, should, on their return to Europe, report the same to the Chief Pilot? Such was the importance attached to the proper construction of these charts, that for¬ eigners were summoned to correct or complete these documents. It was for this purpose that the celebrated English navigator, Sebastian Cabot, repaired to Spain in 1512.

In the course of his voyages, Cabot care¬ fully observed the changes in the variation of the compass, and he was instrumental in bring¬ ing it to pass that, after the early part of the 16th century, care was taken to introduce this datum when drawing charts. Charts were fur¬ ther improved toward the middle of the 16th century by the use of the Mercator projection, which has rendered signal services to naviga¬ tion, and by a more accurate outline of the sea coasts and a more precise representation of the position of each of the points : the progress thus made was in direct relation to the im¬ provement of the. methods of determining lati¬ tude and . longitude, and the improvement of nautical instruments. The soundings which could be ascertained with the appliances then in existence soon were noted in charts at im¬ portant points of the coasts, and hydrographic signs, resembling those at present in use, began to be employed to show reefs and rocky bottom by means of crosses, and sand banks and shal¬ lows by means of masses of dots. The period which opens with the voyages of Captain Cook, in the second half of the 18th century, marks the beginning of the more precise observations in hydrography. After these voyages, the chart of the Pacific, until then almost a blank, dif¬ fered but little from that of the present, in general superficial outlines; and the reduction of Australia approximately to the proportions now accepted, and its separation from New Zealand and from the Terra Australis Incog¬ nita were among his great achievements. It was reserved to the United States Exploring Expedition under Charles Wilkes to discover the Antarctic

Continent in the first days of the year 1840, and to chart 1,500 miles of its coast¬ line; and also to contribute extensively to the records of geography and terrestrial physics with which the splendid set of sea voyages by our own and all other maritime countries have stocked the hydrographic offices established by the various nations during the last one hun¬ dred years or so.

By the labors of these institutions, new de¬ tails have been introduced for determining position, based upon astronomical and geodetic

observations; the survey of coastlines is no longer made by the compass, but by trigono¬ metrical measurement ; the meteorological ele¬ ment is introduced in the graphical representa¬ tion of the seas, hydrographic signs guide the seaman, reliable soundings inform him of the depth of water in the approach to nearly every coast, the currents are delineated, and the local tides are indicated.

Modern Practice. — The two branches of surveying on which hydrography is most de¬ pendent, and which it is most convenient to have precede it, and on which its accuracy largely depends, are triangulation and topog¬ raphy. The triangulation fixes the position of the trigonometrical points on land by means of which the location of the soundings is deter¬ mined. The topography provides the delinea¬ tion of the shore, locates the rocks that show above water, and the limits of dry shores and banks. These data are placed in their proper relative position on an outline map whose scale will depend upon the minuteness with which the submerged features are to be mapped, and this in turn will largely depend upon the char¬ acteristics of the area and its importance to navigation or other commercial purpose. A scale of 1-10,000 (which means that 10,000 feet on the surface of the earth are represented by one foot on the projection) is well adapted for the survey of most harbors. The points de¬ termined by triangulation are plotted on the outline map or projection in their proper geographic positions. These points consist of prominent objects, such as church spires, chim¬ neys, conspicuous rocks or trees and specially built signals, all of which are of a suitable kind to be observed from a boat or vessel while sounding. When a sufficient number of these signals or other objects have been located and a tide gauge or tide staff hias been erected at some suitable point in the vicinity of the work, the next step in the hydrographic survey is making the soundings for the depth of water. Power launches and ships are now more often used than rowboats in running sounding lines. The lines of soundings are run in accordance with such a plan as will best develop the con¬ tour of the bottom and its characteristic features; generally a rectangular system of lines is used, and where the two systems of lines cross each other the soundings must agree within prescribed limits varying with the depth of water. When beginning a line of soundings, two

observers, with sextant in hand, the i ecorder, with a watch or clock and record book, and the leadsman, with) his sounding line, take their respective positions. The ob¬ servers measure with their sextants the two angles between three shore signals and read the angles measured; the leadsman gets a cast of the lead and announces the depth of water in feet or fathoms and feet, and the recorder records all these with the time the boat begins to move. The boat does not stop again until the end of the line is reached. The position of the boat is determined by the observation of pairs of angles at equal intervals of time (two to four minutes), or when there is a change in the direction of the line, or a change of speed of the boat or sudden change in depth of water, and at the end of the line. Where the depths are changing rapidly the soundings are taken by the leadsman as frequently as possible, and the

time of each sounding may be noted to sec¬ onds; but where the bottom is comparatively level the soundings, are preferably taken at equal intervals of time. The pairs of angles taken for position of the sounding boat are plotted on the projection or outline map by means of . a three-arm protractor, thus each sounding is laid down in its proper position, when practicable the lines of soundings are run on ranges — that is, with the boat in the same straight line with two fixed objects on shore.

While the boat has been running the lines of soundings, the water has not remained at the same level owing to the rise or fall of the tide, and, therefore, the tides must be observed by means of a staff or self-registering tide gauge while the sounding is in progress, so that the depths can be reduced to a common plane of reference. Each sounding must therefore be corrected for the stage of the tide at the time it was taken. The plane of reference usually adopted is that of <(mean low water,® which is, roughly speaking, the mean reading of all the low waters observed on the tide staff for as long a period as practicable, but usually not less than one lunar month. The reading of mean low water on the tide staff being known and the observations of the height of the tide having been made at sufficiently frequent in¬ tervals while the soundings were in progress, the tidal corrections may be readily applied to the measured soundings. In order to preserve the plane of reference permanent tidal bench marks are established on shore and the plane of reference is referred to them by leveling. In deep-sea sounding, offshore it is not necessary to apply the tidal reduction to the soundings.

The successive positions of the sounding boat being plotted, and the number

and time in¬ tervals of the soundings being shown in the record, intermediate soundings are spaced ac¬ cordingly between the positions. The result is practically the same as though the boat's posi¬ tion had been instrumentally ascertained at each sounding. Up to depths of about 20 fathoms the soundings can readily be made by the hand line; for greater depths machine sounding appliances are used. Down to about 85 fathoms, these appliances are designed to be used while the sounding vessel is under wav; at greater depths, including deepsea work, the vessel is stopped while the sounding is made. When sounding in the deep offshore waters, piano wire is used on the drum of the sounding machine, and spherical or pear-shaped shot weighing about 60 pounds is used as a sinker and is attached to the wire by a device which automatically, detaches it on reaching the bot¬ tom. The wire is then reeled in by means of the reeling engine and a new sinker attached for the next sounding. The depth of water is measured by noting the length of wire run out, and, as a check, this is again noted in reeling in. In addition to ascertaining the depth of the ocean, a mechanical device is also attached to the end of the sounding wire by means of which a. specimen of the materials of the ocean bottom is secured and brought up in deep-sea sounding. While the vessel remains in sight of land the method of determining position in running the sounding line is similar to that explained in relation to sounding boats and launches in inshore and harbor hydrography, but when out of sight of land the position is ob¬

tained by radio-direction plotting or by astro- nomical observations and dead reckoning.*

Hydrographic surveys with the lead line, while developing the slopes of the bottom, do not with certainty reveal all of the hidden dan¬ gers to navigation that lie in the pathway of ships. In regions like the coast of Maine and in Alaska, where there are isolated rocks and ledges on the bottom, or in the tronical regions fringed with coral reefs and dotted with coral hea.ds, the work must be supplemented by ex¬ amination with special appliances. Owing to the extension of commerce and its increasing demands, bringing into use ever larger and deeper draft vessels, much special examination is now required. To meet these requirements and in order to be certain that an area is free of obstructions to navigation to a specified depth, the water area is swept over by an ap¬ pliance known as a wire drag, which is essen¬ tially a large wire rope (lengths up to 12,000 feet have been used), supported at intervals by specially designed buoys so arranged that the wire can be maintained at any required depth irrespective of the changes in the stage of the tide. This apparatus is towed through the water by two or three launches, and, if no ob¬ struction is encountered, it is certain that no dangers exist at a less depth of water than that at which the drag was set. One of the best features of the wire drag is the rapidity with which an area can be examined. The length of drag now commonly

used is 3,000 feet or over, except when used in channels of less width than this. The average speed of the drag through the water is about a mile and a half per hour, and the area that can be covered in a day depends largely upon local conditions, such as natural or artificial obstructions. Great accuracy is required of the hydrographer, even where the water is so deep that there is no pos¬ sible danger of the largest ship afloat touching bottom, because the hydrography shown on a mariner's chart has a twofold object: First, to point out to the navigator the invisible dangers which he must avoid ; and second, to reveal the configuration of the bottom and also its physical characteristics so truly that by the use of his sounding appliances he may fix his posi¬ tion in relation to those dangers, or, when off¬ shore. or the coast line is invisible, determine his distance from land.

Marine hydrography also embraces the ob¬ servation and reduction of the tides and the tidal currents. Tidal phenomena present them¬ selves to the observer under two aspects — as an alternate rising and falling of the surface of the sea and as a recurrent inflow and out¬ flow of the waters. In common and general usage, the name tide is applied both to the vertical and the horizontal movements, but, in the strict sense, its meaning is confined to the changes of elevation, while the recurrent streams are properly distinguished as tidal cur¬ rents. While the rise or fall of the tide in a given period may be practically uniform in amount and nearly simultaneous at widely separated points within an extensive area, the currents which accompany the change will vary widely within the same region, being modified by every outline of the shore and by every ir¬ regularity of the bottom. Moreover, the time at which the tidal current changes its direc¬ tion, as from flood to ebb, or the reverse, does

not generally coincide with the time at which the tide begins to fall or to rise.

The basis of fact derived from the observa¬ tion of the tides in hydrographic surveying provides for the prediction of their occurrence, and, accordingly, on account of the vital import¬ ance of tidal knowledge in navigation, the United States issues an annual volume of tide tables in which the predicted times and heights of every high and low tide throughout the year are stated for 70 of the principal parts of the world, along with provision, by means of tidal differences, for affording like information in relation to more than 3,000 other ports in all parts of the world. See Navigation.

George W. Littlehales, United States Hydrographic Office.

HYDROID, a class of coelenterate ani¬ mals. See Hydrozoa.

HYDROLITE. See Gmelinite.

HYDROLOGY, hl-drol'-o-ge. Although etymologically hydrology covers the entire science of water, its properties, phenomena, laws and distribution, the application of the term usually is restricted to investigation and description of water in or on the earth, that is, underground waters and stream flow or the increment of water from rainfall. Water that comes to the earth from the atmosphere in the form of rain or snow is in large part gathered into streams or lakes while a smaller part passes underground. Some of it evaporates so rapidly that it does not add to the increment and there is also considerable loss by evapora¬ tion from all water bodies and from ground water brought to the surface by vegetation and capillary action. Many factors influence the volume and movement of surface waters and the passage of waters underground. Stream flow depends on conditions of precipitation, light showers often yielding no flow and heavy storms resulting in floods. The most import¬ ant factors are climate, vege'tation, topography, the works of man and various geologic condi¬ tions, especially those affecting the absorption of surface water by soils and rocks. The passage of water into the ground is controlled by the texture of surface materials and of the rocks below, and in large measure by the con¬ figuration of the land and conditions of rainfall or snow melting. Much underground water comes again to the surface in the general seep¬ age on slopes and also in springs which often draw from deep sources, and the water in the ground is depleted by vegetation and capillary action. The science of underground water is sometimes designated hydrogeology because it is a branch of geology. Extensive investiga¬ tions of underground waters have been made by geologists in various parts of the world with most important economic results. The basis of the work is geologic because the water is mostly contained in sand, sandstones and various other rocks which occur in succession among the strata constituting the earth's crust. The water-bearing beds are carried to great depths by downward dips of monoclines or basins. Locally they are cut by faults and igneous masses and generally they are affected by variations in texture both of themselves and of. adjoining strata. The "head® controlled by height of intake is an important factor in de¬ limiting the area in which artesian flows may

be expected. Mineral or saline components affect the quality of the water and variations in texture and thickness of the beds control the volume of water available. The study of most problems of hydrology relating to artesian water and their prospects require the determina¬ tion of geologic conditions in wide areas, for the evidence is often many miles away from

the place where the water is desired. The rate of movement of water through various rocks and sands and the capacity of these materials for water have been studied extensively by King, Slichter and others. For many years a branch of the United States Geological Survey has been devoted to studies of problems of hydrol¬ ogy. The function of this work is to investi¬ gate water supply from wells and streams for domestic use, manufacturing and irrigation and consideration is also given to water powers and methods of pumping and storing water. The determination of volume of water in sur¬ face streams is an important branch of hydrol¬ ogy. Ordinarily streams are gaged by current meters taking the velocity on a measured cross section but on many rivers vertical gages are set and observations are made of the height of the water while in some cases water stage re¬ corders are used which give a continuous record. Volume of flow is calculated from these records by a rating table computed from observations made at various stages of flow. Ihe amount of water flowing in a stream, termed, the discharge or run off, is expressed either in rate of flow or volume of increment. Rate of flow is given in second feet (cubic feet per second) but some records are given in miner s inches or in second feet per square mile. A miner s inch is the discharge through an orifice one inch square under a head which varies locally and is defined by State laws. In California the miner's inch is .187 gallons a second or .0248 second feet ; in Colorado it is .195 gallons or about 5 per cent more. A second foot is 7.48 United States gallons a second, 1.9834/ acre-feet a day. One acre-foot is 325,851 United States gallons, (43,560 cubic feet) the amount covering an acre one foot deep. It is equal to 50 miner's inches in Idaho, Kansas, Nebraska, New Mexico, North Dakota and South Dakota, 40 miner's inches in Ari¬ zona, California, Montana and Oregon and 38.4 miner's inches in Colorado. A second foot fall¬ ing. 8.81 feet is equal to one horse power. The United States Geological Survey alone and in co-operation with various state surveys maintains many stations, where volume of stream flow is determined as often as may be necessary to indicate the total yearly flow and its variations from year to year. By this means in the last 25 years or more there has been ascertained the amount of water available for various pur¬ poses including water power in all the prin¬ cipal streams of the country. Similar observa¬ tions have been made in Canada for the past 10 years. The methods have been largely de¬ veloped by engineers in the water resource branch of the United States Geological Survey and they are generally accepted as standard. Records of rainfall such as those systematically obtained by the weather bureau of the United States Department of Agriculture throughout the country afford important hydrologic data, for their averages show the amount of pre¬ cipitation that may be expected in various areas.

The determination of rates of evaporation throw light on the prospects for water storage. See Geology; Irrigation; Physiography; Rivers ; Artesian Wells.

Bibliography.— Darton, N. H., (Report on Artesian W aters of the Dakotas } (in United States Geological Survey, 17th Annual Report, pt. 2, Washington 1896) ; id., (Geology and Undei ground Waters of the Central Great Plains) (United States Geological Survey, Prof. Paper 32) ; Hoyt, J. C., and Grover, N. C., (River Discharge) ; Iveilhack, K., (Lehrbuch der Grundwasser und Quellcnkunde) ; King, F. H., (Principles and Conditions of the Move¬ ments of Ground Water > ; Slichter, C. S,, (In¬ vestigations of Movements of Ground Waters) ; id., (Motions of Underground Waters) (Wash¬ ington 1902) ; id., (Field Measurements of Rate of Movement of Underground Waters* (ib. 1905) ; Woodward, H. B., (Geology of Water Supply* ; Darton, N. H., (Geology and Under¬ ground Waters of the Arkansas Valley in Southeastern Colorado) (Washington 1906) ; Fuller, M. L., (Summary of Controlling Fac¬ tors of Artesian Flow) (United States Geo¬ logical Survey, Bulletin 319, Washington 1908).

Nelson H. Darton,

Geologist, United States Geological Survey.

HYDROMETAMORPHISM. See Meta¬ morphism.

HYDROMETER, an instrument for de¬ termining specific gravity, as of fluids, by flota¬ tion. For determining the specific gravity of a liquid, the instrument is floated in the liquid itself. When a solid body floats in a liquid, and displaces a quantity of the liquid, it is sup¬ ported by the same upward pressure that for¬

liquids are inversely proportional to the den¬ sities of the liquids. On each of these principles a form of hydrometer is founded. One is called the constant weight hydrometer, the other the

Fig. 1. — Forms of Hydrometer.

constant volume hydrometer. The first, usually made of glass, is shown in Fig. 1. It has a large hollow bulb, and below that a smaller bulb, weighted with mercury, to make the in¬ strumentˆ float upright and it is surmounted by a cylindrical glass stem which is graduated, the

Fig. 2. — Nicholson's Hydrometer.

merly supported the liquid which it displaces. The weight of the solid body is thus equal to the weight of the liquid that it displaces. Hence the depth to which the same solid body is immersed in a liquid is greater as the density of the liquid is greater. This makes it possible to test the strength or purity of various solu¬ tions. And, likewise, the weights required to immerse a given body equally deep in various

divisions being usually marked on or within the stem. The depth to which the hydrometer sinks in the liquid gives the density.

Of constant volume hydrometers, Nichol¬ son's hydrometer, the best known, possibly, is adapted for determining the specific gravities not only of fluids, but of solids also. It is shown in Fig. 2. It consists of a hollow cylin¬ der of metal, surmounted with a very fine

metallic stem, to the top of which there is at¬ tached a plate or pan for

weights. From the bottom of the metallic cylinder hangs a cup or basket. The whole instrument is weighted so as to float upright. On the fine metallic stem there is a marked point : and by putting weights on the upper pan the hydrometer is always made to sink precisely to the point. If the weight of the instrument itself is known, and also the standard weight, or weight required to sink it to the marked point in distilled water, the cal¬ culation of the specific gravity of any liquid from an observation with the instrument is very easy. To. determine the specific gravity of solids, the instrument is placed in distilled water and the solid body is put on the upper pan. Weights are then added till the hydrometer sinks to the marked point. But the standard weight of the instrument being known, it is plain that the difference between it and the weights that must be added on the upper pan to the weight of the body whose specific gravity is to be determined must be the weight in air of that body. The body is now transferred to the basket below the instrument, and the weight of the solid in water is similarly determined. From these data the specific gravity of the solid is calculated. Hydrometers are variously named from their use, as areometer, one for determin¬ ing the density of fluids ; lactometer or galacto- meter, one for measuring the density of milk, and usually haying a scale graduated from .1.000 to 1.029; incorrectly called creameter, as it does not correctly measure the cream ; sacharometer, one for determining sugar con¬ tents ; salinometer, one for testing saline solu¬ tion, as the brine in a marine boiler; urinometer, one for detecting the presence of sugar, etc., in urine ; volumeter, one for determining the specific gravity of a solid by measuring its volume in a liquid. Alcoholometers are com¬ monly graduated to show pure alcohol as 200 and proof spirit (50 per cent alcohol) as 100. The chemical hydrometer is simply a balance in which equal volumes of liquid are weighed, or in the case of testing a solid, it is weighed in air and in distilled water of tested temperature. A simpler device for the same purpose, com¬ monly called a specific gravity bottle or pycno¬ meter, is a measuring flask which permits easy comparison with the known weight of a similar measure of water. In all these devices tem¬ perature is a modifying condition, because fluids increase in volume with heat, and therefore it is customary to have one or more thermometers permanently attached to the apparatus. See Specific Gravity.

HYDROPATHY, a name for the treat¬ ment of diseases by the use of water. This name is now largely superseded by the term hydrotherapy (q.v.).

HYDROPHANE or «MAGIC STONE,®

a porous dehydrated opal, which is opaque when dry but becomes translucent in water.

HYDROPHILIDiE, hTdrd'-fifii-dl, a fam¬ ily of beetles inhabiting submerged vegetation in stagnant waters. They are of the scavenger variety, the larvae being carnivorous and the adults feeding on decaying vegetable matter. Some forms are found in moist earth or dung heaps,, feeding on lesser animal forms. The body is black and elliptical, with a white sheen

on the. ventral surface imparted by a film of air which covers it. The antennae are thick and club-shaped. About 150 species are found in the United States, of which one of the most common is Hydrophilus triangularus.

HYDROPHOBIA (from Greek words meaning ((fear of water®), an acute or subacute infectious disease, particularly of canine animals. It is usually communicated by a bite of the afflicted animal, and the contagion, the exact nature of w'hich is still under discussion, is resident for the most part in the saliva, al¬ though iit has been found in the peripheral nerves, the pancreas and the suprarenal gland. It is frequently communicated to man, although the dog, wolf, fox, deer, cat, cow and skunk are the animals most frequently affected; it has been known to occur also in the horse, pig, birds and other animals. Nine-tenths of all the cases are contracted through the bites of rabid dogs. Hydrophobia may be produced, however, by wounds occurring during the dissection of rabid animals ; it Is said to have been caused by eating the flesh of animals that have died of the disease; . and the milk of sucklings, animal and •human, is thought to contain the virus. This poison has been found to be active in a dog 44 days buried, and in a rabbit buried 21 days.

In dogs the disease is comparatively common. In 1900 D. E. Salmon, chief of the United States Bureau of Animal Industry, determined that the disease was prevalent throughout the United States, and largely on the increase. The chief symptoms in dogs may be divided into two classes. Dogs suffer from furious rabies, and from dumb rabies. In the former Pasteur thought that the brain was involved ; in the latter, the spinal cord. The furious form of the disease . shows (1) a period of melancholy or depression; (2) a period of irritation; (3) a period of paralysis. The first varies from a few hours to two days. During this period the anxious and restless dog may also be cross. He hides from his master, obeys sullenly and changes his position frequently. His appetite may not be at first affected, but it soon fails; he may lick everything in sight, or bite every¬ thing within reach, swallowing all sorts of foreign bodies. The period of irritation usually persists three or four days, during which the dog is spasmodically mad ; restlessness increases, and the animal has an irresistible impulse to run away. During the running spells dogs may bite at everything in sight ; at such times they usually seem fearless, and rarely avoid other dogs or people. If caged, they tear and chew on the bars, even breaking their teeth

or fracturing their jaws. . The bark is modified into a peculiar howl.. During the third or paralytic period the dog is subdued and more sullen; the lower jaw becomes paralyzed and hangs down, saliva dripping from the mouth; the gait is staggering from the fourth to the eighth day after the onset he dies of paralysis or exhaustion.*

In dumb rabies the characteristic second stage may be entirely absent. The most persistent feature of durnb rabies is the dropped lower jaw, the paralysis of the jaw in the later stages preventing the dog from biting. Veterinarians see many cases of dumb rabies in dogs brought to them by owners who think that the trouble If caufed by ,a bone in the throat. Beware of a dog that becomes listless and dull and hides

away ; is always on the go, prowling about and restless ; one that is sullen and walks with his head down like a bear. A dog that scrapes in¬ cessantly and tears things up, and one that sud¬ denly becomes excessively fond of its master, desiring to lick his hands and face, should be watched and guarded. A dog that has trouble in swallowing, that seems to have a bone in his throat, or, having wandered away from home, returns covered with dirt, exhausted and miser¬ able, should be put under lock and key.

So far as the water-test is concerned, it is nonsense. The mad dog is often very fond of water; he is thirsty and rushes into water, thrusts his head into it ; but he may have great difficulty in swallowing it, the act of swallowing usually bringing about severe convulsions.

In man the disease may go through some¬ what similar stages, but the course is greatly modified; males are more likely to be affected than females, the difference in dress and ex¬ posure accounting for this; and two-fifths of the subjects are below the age of 15. Bites on the face, neck and hands are thought to be the most liable to develop the disease, and punctured wounds are more dangerous than lacerated wounds because of the difficulty in cleansing them. In man the period of incubation varies widely, from 20 to 60 days is the usual range, but six months may represent an extreme limit. In exceptional instances the period of incuba¬ tion seems to have been greatly prolonged. The pathological changes recently discovered are found to be extremely characteristic, so that it is. now even possible to diagnose- rabies in a dog within a reasonable time after his death.

In all cases of suspected hydrophobia it is best not .to kill the dog; but if, by

accident or design, the death is accomplished the body should at once be sent to the health board au¬ thorities for a confirmation of the diagnosis. The characteristic changes, as described by Nelis in 1900, consist in minute alterations in the spinal ganglion cells, especially in a proliferation of the endothelial cells of the ganglionic cell- capsule. These changes are considered char¬ acteristic of this disease and are not known to occur in any other affection. The general treat¬ ment is both prophylactic and remedial. All stray dogs should be destroyed; or, if they have bitten anyone, they should be imprisoned and watched. It is best to have dogs muzzled or held in leash. In Germany muzzling has en¬ tirely eradicated hydrophobia. London in 1889 had 176 cases of hydrophobia. Muzzling was made compulsory, and in 1890 the number of cases of rabies had fallen to 44 ; in 1891 to 28 ; and in 1892 to 3. The muzzling was then al¬ lowed to lapse, owing partly to the sentimental agitation of many so-called lovers of dumb ani¬ mals, and the cases of rabies increased, 25 per¬ sons dying of the disease in five years, while 174 patients were sent for treatment to the Pasteur Institute.

The direct treatment of the wound causing rabies is important. The poison seems to diffuse slowly, so that, if a ligature is promptly placed about the limb on the body side of the wound, a suction-cup or direct sucking may extract all of the virus. In the non-abraded mouth the virus is not very poisonous. If the wound is deep it is sometimes wise to make immediately a free incision, permitting the flow of blood to wash away the virus and also allowing a more

open surface for the actual cautery. One of the best cauterizing agents to use is strong nitric acid. Fhe after-treatment will depend very largely on the promptness and thoroughness of the first treatment. If there is reason to believe that the early cauterization was ineffectual, the Pasteur method of treatment (see Pasteur, Lours) is advisable. This is a complicated method which was elaborated by Pasteur about 1880. He found that the virus was present in the spinal cord of a rabid animal; that its viru¬ lence slowly diminished after -the death of the animal ; that the virus could be artificially weak¬ ened by passing it through a series of monkeys until it was powerless ; and that, conversely, this virulence could be restored by inoculating the attenuated virus in a series of rabbits. Thus Pasteur made a weak virus and a strong one at will, and he later produced immunity to the virus by the use of his attenuated material. The final plan that was adopted was to kill a rabbit by means of his strong virus, remove its spinal cord, cut this up into short sections and dry it for varying periods of time. In this manner he secured a graded series of cord-sec¬ tions of gradually decreasing virulence. These were emulsified in salt-solution and used to in¬ ject into animals or man, .the weaker virus be¬ ing first used and the stronger later. Two methods are now in vogue — the simpler method, for

*the less severe bites, in which 19 injections are given in 14 days; and the in¬ tensive method, for the severe bites about the neck and face and the large nerve-trunks, in which 28 injections are administered in 21 days. The serum-treatment of the disease is also rapidly becoming a possibility. Two Ital¬ ian investigators, Tizzoni and Centanni, have made an anti-rabic serum that promises some¬ thing for the future. For the present, however, the Pasteur method is the most reliable. It is certainly harmless and is worthy of trial. The results are assuring and the statistics, to most minds, convincing. It should next be forgotten that there is a false hydrophobia which is of purely hysterical origin, during an attack of which some patients have died. Consult Brad¬ ford, (Two Lectures on Rabies) (Lancet , 3 March 1900) ; (Hydrophobia in Germany**

(Hygienische Rundschau, 7 Nov. 1899) ; Re¬ port of Select Committee of the House of Lords on Rabies in Dogs) (Blue Book, 1887) ; Medical News (15 Aug. 1903) ; Sixteenth An¬ nual Report Bureau of Animal Industry (1899) . See Hysteria.

Smith Ely Jelliffe, M.D.

HYDROPHYTES, plants which grow in water or mud. They may be wholly submerged, completely without roots, and derive their suste¬ nance wholly from the water; or may live amphibiously, rooted in soil and lifting some or all of their leaves into the air, and so differ only in a greater or less degree from land plants. Adaptations of water plants are especially to meet the difficulty of obtaining oxygen and of effecting pollination under water. In plants which grow wholly in or under water, roots, when present, are comparatively small and free from hairs, stems are slender and abound in air-space, and leaves are, as a rule, either long and, narrow, or else greatly subdivided, so as to expose the greatest possible amount of surface. The cuticle of the leaf, also, is very thin, and

lacks several of the structures, such as palisade cells and stomata, always present in aerial leaves. Water therefore enters easily into the tissues of the plant and carries with it a large amount, not only of oxygen, but of dissolved nutriment, so that in any oceanic plants, and plants of ponds and rivers, no roots whatever are developed, and these live practically inde¬ pendent of any connection with the land. The fertilization of submerged cryptogams is ef¬ fected by the passing of generative elements through the water, but only a few submerged phanerogams make such use of the agency of the water. The pollen of the eel-grass (Zostera) has been modified for

under-water efficiency. It does not form round grains, but elongated thread-likeˆ filaments which have the same specific weight as the water, and hence neither float nor sink, but move about at the level of eel-grass growth until they come in contact with the stigma of some neighboring flower. In the duckweeds and some other submerged plants, the male flowers break loose, rise to the surface and float away like little boats carry¬ ing pollen to the female blossoms, which at that time have risen to the surface but sink again as soon as fertilized. The hydrophytes show many examples of exceedingly wide distribu¬ tionˆ as might be expected of oceanic plants, but is not so easily explained of those of fresh waters, many genera and species of which, nevertheless, are cosmopolitan.

HYDROPLANE. See Aeroplane.

HYDROQUININE, one of the five prin¬ cipal alkaloids of the cinchona barks, having the formula C20H2GO2N2. It is found i'n nearly all samples of commercial quinine (sulphate). Its properties are very similar to the ordinary sulphate of quinia, but as it is soluble to a larger degree, it is more Speedy in medical ac¬ tion, and requires a smaller dose to produce a like effect. It is usually prepared from the commercial quinine sulphate, which is dis¬ solved in hot water and carefully recrystallized at the highest possible temperature at which the crystals will form. The hydroquinine re¬ mains in the mother liquor — along with the sulphates of any other of the cinchona alka¬ loids which may have been present in the sam¬ ple. To this mother liquor is added slowly a solution of. potassium permanganate until the whole is tinted a red which does not grow paler upon standing. It is then filtered to re¬ move the precipitate, and the filtrate is made slightly alkaline with ammonia, and shaken with ether, which dissolves out the hydroquinine. The ether solution is drawn off and evaporated and the residue is dissolved with dilute sul¬ phuric acid. Ammonia is then added in quan¬ tity just sufficient to neutralize the solution, and the hydroquinine crystallizes in long needle¬ like prisms.

HYDROQUINONE, QUINOL, or DI¬ HYDROXY-BENZENE (GHiCOH).), the most used of all photographic developing agents, being practically indispensable in the making of photographic prints on developing paper. Its characteristic property is the great density it gives to the developed image, to the point of harshness of contrast, and for this reason it is almost always combined with a ˆsoft® acting developer, such as metol, edinol, eikonogen, ro- dinal, paramidophenol, etc. Hydroquinone

fails to work if cold, when it has a tendency to deposit as crystals from the solution. The proper temperature is 65° F. in summer and 70° in winter. At higher temperatures it is lia¬ ble to produce fog in the shadows and exces¬ sive intensity of the high lights.

Hydroquinone is prepared commercially from aniline. A dilution of sulphuric acid is made by dissolving 8 parts of the acid in 30 parts of water : this, when cold, is added to ,1 part of aniline, and after cooling, 3ˆ parts of potassium bichromate, or sodium bichro¬ mate, is added so slowly as to avoid much rise in the temperature of the mixture. To the thick brownish liquid resulting is passed a stream of sulphurous acid gas until the mix¬ ture smells strongly of it. It is then filtered to remove the precipitate, and the filtrate is shaken with ether, which dissolves out the hy¬ droquinone. The ether layer is drawn off and distilled, the ether being recovered, and the hy¬ droquinone remaining in the forms of a yel¬ lowish (almost white) crystalline powder. It is purified by preparing a saturated solution with water and boiling it with animal charcoal and a little sulphuric acid, filtering and crystal¬ lizing.

If chlorine gas be passed through a solu¬ tion of hydroquinone in benzol, monochlorhydro- quinone is obtained, and this also is used largely as a photographic developer under the commercial name of ˆAdurol.®

Previous to the war in Europe the entire American supply of hydroquinone had come from the laboratories of Germany. The chem¬ ical workshops of America were called upon to meet the demand, and are producing a qual¬ ity of the reagent which is unsurpassed. The market, however, has been flooded by shame¬ lessly adulterated samples of all photographic developers, and rigid tests are necessary for products where there is no guaranty by a manu¬ facturer of known integrity.

HYDROSPHERE is a term used by geog¬ raphers to designate the total of the water on the earth. It, therefore, includes the oceans, all lakes and rivers, the water-vapor in the atmosphere and that which has penetrated into the substance of the globe (lithosphere). To estimate the amount of this with accuracy is manifestly impossible, as we cannot easily calculate the bulk of the vapor, and know noth¬ ing about the amount contained in the rocks and spaces beneath the surface. It is possible to give some interesting facts as to the masses of water in the oceans and large inclosed seas and lakes on the surface! of the earth. The latest calculations by physicists compute the area of the oceans and seas directly connected with them at 139,295,000 square miles, and the area of all lands, including inclosed lakes, etc., at 57,254,000 square miles. The water-area is, therefore, about three-fifths of the total super¬ ficies of the globe. Its mass, however, requires multiplication by depth, and the greater part of the oceanic area is covered by water more than 1,000 fathoms deep. Two-thirds are oc¬ cupied by water exceeding 2,000 fathoms' in depth, and one-fifteenth of the oceanic basins lies beneath more than 3,000 fathoms (18,000 feet) of water. The deepest place yet discov¬ ered is near Guam Island in the Pacific — 5,269 fathoms. This is equal to 31,614 feet, and it*

exceeds the altitude of the highest mountain (Everest in the Himalayas, 29,000 feet) by 2,610 feet. This makes the greatest known dif¬ ference between the lowest and highest points on the earth's surface about 11ˆ4 miles; but it must be remembered that where as the moun¬ tain-tops are mere points, the "deeps® in the ocean floor are often areas of hundreds of square miles. It is, therefore, evident that were all the solid surface of the earth reduced to a level, the water would cover the globe to a very considerable depth — probably two or three miles. See Lithosphere.

HYDROSTATIC PRESS, a machine for compressing, in which a liquid, as water or oil, pumped through a pipe of small diameter, is utilized to exert a multiplied pressure through the increased area of a much larger piston in the large cylinder: called also hydraulic press. The diagram illustrates the principle. Two tubes of unequal area are connected, and the whole vessel filled with water. Let the area of the smaller tube be one square inch, and let the piston that closes it be loaded with one pound.

A pressure of one pound per square inch will be exerted on every part of the boundary of the liquid. There will thus be a pressure of one pound per square inch put upon the piston that closes the larger tube ; and if we suppose the area of the piston to be 16 square inches, it is evident that it must be loaded with 16 pounds in order that the pressure to which it is exposed may be equilibrated. Thus a load of one pound on the smaller piston supports 16 pounds on the larger.

The principle of the hydrostatic press was pointed out by Stevinus ; but it was Joseph Bramah who, in 1796, by devising a tight pack¬ ing for the cylinder, gave the principle practical application. The diagram sho*ws a section aa of the collar surrounding the piston p, the shaded area qq representing the walls of the

cylinder: The collar consists of a circle of solid leather, or cup-leather aaa. When water pres¬ sure is applied to move the piston, some of it leaks into the ring-space aa, and the leather ring curls and swells, filling the space water¬ tight, so that there is no leaking. In modern practice this primitive device has been suc¬

ceeded by a stuffing box, employing spring steel rings. See Hydrostatics; Hydraulics.

HYDROSTATICS, that branch of engi¬ neering science which deals with the mechanics of liquids at rest, and the action of forces upon static liquids

; that is, the theories of pressure and equilibrium as concerning liquids, especially water.

The mechanics of confined liquids are based largely on the following conclusion: any in¬ crease of pressure at one point of a confined liquid is transmitted almost instantly to every other point. This proposition discards the minute modifications of capillarity, skin friction and surface tension, which are practically negli¬ gible; it also dismisses the almost infinitesimal compressibility of a liquid as inconsequential. A liquid has size but not shape ; if poured out on a level table it covers the entire surface, and will fill all depressions, but its upper surface will be uniform and level. In a large body of water it is seen that this level conforms to the curvature of the earth. It is a common pro¬ cedure to explain this level by referring it to the constant pressure of the atmosphere 14.7 pounds per square inch, and this is not mislead¬ ing if it is borne in mind that the pressure of the atmosphere is due to the attraction of gravi¬ tation — to which the water level is actually attributable. A liquid offers no permanent re¬ sistance to forces tending to change its shape. The particles of a fluid are mobile; and while in the case of liquids very considerable forces of cohesion are exhibited, yet the particles show great freedom to alter their relative positions, and to pass from place to place within the gen¬ eral mass. A very important property that follows from the nature of fluids is that of the equable transmission of pressure. Suppose a liquid inclosed in a vessel a, which is fitted with a piston p. If pressure is applied to P it will be transmitted in all directions through

the liquid. If other openings are made, and if they are fitted with pistons, it is evident that to keep each of these pistons in its place, pressure inward must be applied. The pressure that must be applied to any piston equal in area to the area of p is equal to the pressure on p ; and if the area of one of the other pistons is greater or less than the area of P, the pressure required to keep iit in its place is proportionately greater than or less than the pressure that is applied to P.

It is thus apparent that there is a normality of liquid pressure, and in calculating such pressure it is only necessary to consider one direction of pressure. The law is: Any addi¬ tional pressure applied to a confined liquid at any point will be transmitted equally to any other point of contract. This principle finds

application in the hydraulic press. It is to be noted, however, that water

under static pressure does not produce work until it begins to move, and moving water comes under the head of hydraulics. These two divisions of science are therefore closely related, and need to be studied together. (See Hydraulics). In the apparatus known as the ((hydrostatic bel¬ lows," a true hydrostatic equilibrium is ob¬ tained. This experimental contrivance consists of a pair of circular boards connected by a band of pliable leather fastened watertight around the circumferences of the boards (like a pair of bellows). A small tube inserted into an opening near the bottom connects a tall tube rising perpendicularly. Heavy weights may be put on the upper circular board, and if water be then poured into the upright tube they will be raised up by the pressure of the water from below. For the pressure to which the under side of the circular board is exposed is equal to the weight of a column of water whose section

Fig. 2.

is that of the circular board, and whose height is the difference of the heights of the under surface of the top circular board and of the free surface of the water in the small upright tube. When shown in this form the principle here employed is often called the hydrostatic paradox, on account of the very great pressure that a very small quantity of water may be made to produce.

It is a well-known principle .that liquids tend to find their own level. Thus, in the accom¬ panying figure, showing a series of connected vessels,. the liquid is seen to stand at the same height in the principal vessel and in the vari¬ ously shaped tubes communicating with it, while from the short, narrow mouthed tube it spouts up to nearly the level of the water in the prin¬ cipal vessel.

. Archimedes is credited with discovering the principle that a body immersed in a liquid dis¬ places its volume of the liquid; and that it is buoyed up by a pressure equal to the weight of liquid it displaces. This principle is illustrated in the hydrometer (q.v.). When a solid is im¬ mersed either partially or wholly in a liquid, a portion of the liquid is displaced. The solid is at the same time pressed at every point by the liquid, the pressure being always perpendicular

to the surface. The upward pressure on the solid is greater than the downward by an amount equivalent to the weight of the liquid displaced by the solid; for if, instead of the solid, the quantity of liquid displaced by it were present, its weight would be upborne by the pressure on every side. These pressures now act on the solid and whether or not the solid floats under their influence, as much of the weight of the solid as corresponds to this pres¬ sure is supported by the surrounding fluid. Experiments that are

made for the purpose of determining the specific gravity of bodies heav¬ ier than water also depend on this principle. See Specific Gravity.

The conditions of floatage and of stability of a body floating in a liquid are of great im¬ portance. A floating body displaces a certain quantity of. the liquid, and the weight of the solid body is equal to the weight of the liquid

Fig. 3.

that is displaced by it. To calculate how much of the body is. submerged, and how much floats above the liquid, it is only necessary to consider what volume of the liquid would be equal in weight to the weight of the floating body. For example, the specific gravity of ice is about nine- tenths. of that of ordinary sea-water. Hence 9 cubic feet of . sea-water weigh as much as 10 cubic feet of. ice. Thus in an iceberg nine- tenths of the ice is under water, and one-tenth is above, the surface. In ships and other float¬ ing bodies the stability depends on the form of the. body. A sphere of wood floating in water is indifferent as to position. The slight¬ est force is sufficient to overturn it from any given position or to set it rotating in the water. With a ship or other body, that must float with one side upward, the stability is quite as impor¬ tant as the floating power. The accompanying figure 4 illustrates the conditions of stability. When a solid body is slightly displaced from its ordinary position of equilibrium, the forces that

act upon it are seen to be two-fold. First there is the force of gravity on the solid acting verti¬ cally downward, which, if g be the centre of gravity may be considered to act downward through that point ; and secondly, there is the resultant of the upward pressures of the vari¬ ous portions of the liquid, which, if o be the centre of these upward parallel forces, or centre

of buoyancy, may be considered as equivalent to a single force acting vertically upward through that point. In the figure these two parallel forces are seen to form a mechanical couple whose tendency is to right the boat, and bring it back into its ordinary floating position. The metacentre m is a changing centre, representing the centre of the two forces of gravity and buoyancy. The higher the meta¬ centre above the centre of gravity the more stable is the vessel.

Let a b in the figure be a line drawn through the point g, the centre of gravity of the floating body, and h the centre of the figure of liquid displaced (also the centre of buoyancy) when the body is floating with a b vertical. Let the body be then slightly displaced, and let o be the new

position of the centre of the figure of the displaced liquid, and let m be the point in which a b is cut by a vertical line through o : m is the metacentre which will be different or slightly different for every list. If the meta¬ centre is above G then the equilibrium is stable ; if it is below g the equilibrium is un¬ stable, and the body being slightly displaced, it tends to fall farther and farther from its position of equilibrium. That a vessel may be stable and not overturn, it is apparent that the centre of gravity must be kept considerably be¬ low the metacentre. This is why vessels load the keels at times with lead, and why vessels without freight in the bottom of the hold, take in ballast.

Among the instruments and machines founded on the hydrostatic principles here laid down are the barometer, the siphon, the hy¬ drostatic press, and the hydrometer (qq.v.).

The engineering problems involved in the stability of dams, water gates and reservoir walls are those of hydrostatics. The pressure of water behind such structures exerts a con¬ stant force toward overturning them, due to its tendency under the influence of gravitation to seek the lowest level. To counteract or coun¬ terbalance this force is placed the weight of the dam or wall — fin other words the larger at¬ traction which the earth has upon the materials of which they are built than it has for the water. The higher the body of water behind a dam the greater the impulse to run down hill, and hpnee the greater push against the dam which stands in its way. The form of solid which is most difficult to overturn by pressing against one side of it is that of triangular cross- section, and this is the one used by engineers for dams and reservoir walls. These trian¬ gular bodies are built with broad bases, and one toe of the triangle pushes up-stream under the water of the pond or lake, which helps in part to hold it down with its weight. Hydrostatic pressures exist also in all water- supply pipes, tending to burst them apart from within. The greater the head, of the water- supply the greater the hydrostatic pressure, and the stronger the water-pipes must be made to hold it securely.

HYDROTHERAPY (Greek, vdup water, and, depenreia, cure), a method of treating dis¬ eases by the application of hot and cold water, which has come extensively into practice of late years, and is recognized by the medical pro¬ fession as a very efficient therapeutic _ agent. The efficacy of water as a hygienic medicine has been recognized from the earliest times. Hip¬

pocrates, Celsus and Galen regarded water as of especial value in the treatment of acute dis¬ eases ; and during the Middle Ages the same view was advocated bv many famous physicians. Duing the 18th century there was a growing belief in its virtue as a curative agent, though rather in acute

than in chronic diseases. Some physicians used- water for internal treatment, others for external treatment, but hydrotherapy, as now understood, combines both methods. It was originated by Vincent Priessnitz, a Silesian peasant. When a boy of 13, having sprained his wrist, he applied it to the pump, and afterward bound a wet bandage upon it. As this became dry he rewetted it, and thereby reduced the inflammation, but produced a rash on the surface of the skin. Shortly after¬ ward he crushed his thumb and applied the wet bandage> as before, and again an eruption showed itself. He concluded that the rash was an indication of impurity of blood; and having instituted a series of observations in regard to various wounds and ulcers on the persons of his. neighbors, he was led to form a pathological theory, according to which disease is caused by an accumulation of morbific matter, which must be eliminated from the system by cold water applications and the observance of a strict regimen. His views were confirmed by an acci¬ dent to himself, in which, through a cart run¬ ning over him, he received some broken ribs and severe contusions and was given up by the physi¬ cians ; but on learning their opinion he tore off their bandages and applied others wet with cold water. He also replaced his ribs by inflating his lungs while pressing his abdomen against the window-sill. Either through or in spite of this treatment Priessnitz recovered and the carrying out of this cold-water theory became the object of his life. In rapid succes¬ sion he invented the sponge-bath, the wet-sheet packing, the sitz, foot and arm baths, the douche, the steam-bath, the dripping sheet, the plunge, the dry-blanket packing and other appliances of the hydropathic system. In 1829 he established, at his native village of Grafenberg, a range of baths, which speedily grew in reputation and attracted visitors from all parts of Europe. The Austrian government lent him its patronage, and all the opposition of the medical faculty was unable to stem the popularity of the new system. The original establishment at Grafen¬ berg soon expanded into an extensive suite of buildings, stretching along the slope of one of the Sudetic Mountains, and resorted to by troops of invalids, who sought to regain health by bathing, exercise, simple diet and agreeable society. Similar institutions soon sprung up in other parts of Germany and were at length introduced into England, a hydropathic society having been formed in London in 1842. At the present time hydropathic institutes exist in great numbers throughout the world, and so universal have ffiydrotherapeutic procedures be¬ come that a large body of quacks thrive on the prestige given to hydrotherapy by regular physicians. The theories of Priessnitz are now known to be fallacious.

The work of Winternitz and his disciples has put the general principles of hydrotherapy on a rational footing; there is little doubt, however, that hydrotherapy, like any other therapeutic agent, may be greatly abused. It is by no means a universal panacea. There are a large number

of ways of applying hot and cold water to the body. One enthusiastic advocate has described over 300 separate kinds of application. In gen¬ eral, however, the water may be applied in the shape of tub-baths, ablutions, packs, rain-baths and douches. These may be divided and sub¬ divided as indicated. Tub-baths may be full, half or local baths, as to the pelvis, the feet, the hands, etc. The full tub-bath is usually given at a temperature of 55° F., unless special indi¬ cations are to be met. If the patient's reaction is not of the best, the temperature should be about 60° F., and vigorous friction of the skin should be maintained. The time spent should be short, 10 to 20 seconds. The full tub-bath is a strong tonic. In severe illness- the tub-bath should be given only by a trained nurse under the physician's orders. Half-baths are taken at a temperature of 60°-75° F. After wetting the face and chest the patient sits in a tub about one-third to one-half filled with water, sufficient at least to cover the legs and the pelvis. The . attendant splashes the cold water over the patient's bodv, maintaining at the same time a vigorous friction by means of a flesh-brush. The time is from one to five minutes, but the bath should not be continued if the teeth begin to chatter or if there is any evidence of defec¬ tive reaction, as blueness of the lips, or thin pulse. Local cold baths, such as sitz-baths and foot-baths are very important hydriatic meas¬ ures. The cold, foot-bath, plunging the feet for one to three minutes in cold running water, is of service in sluggish circulation of the feet, neurasthenia and hysteria. Warm full baths at a temperature of 90°-98° F., for a period of from 5 to 20 minutes are very useful as sedatives to the nervous system, particularly so m insomnia and nervousness from overwork, especially when taken at night. The best effect is obtained if they are taken at the time of retiring and are followed by a brief application of cold water, either in the shape of a half-bath, or a douche. After the bath the patient should wrap up in a linen sheet and a blanket to keep up the dilatation of the blood-vessels of the skin. Perspiration is to be avoided, save in particular instances.

Ablution. — This is one of the simplest of 'hydriatic measures. It is a valuable skin and nerve tonic, and is particularly adapted for chil¬ dren and women. It consists in the application of q water to the body at a temperature of 50°- 60° F., from the hollow of the hand, or by means of a bath-glove or wash-cloth. The entire body is gone over, one part after another being systematically treated. One to two minutes application followed by vigorous rub¬ bing with a coarse towel or flesh brush is suffi¬ cient.. Ablution is particularly valuable for reducing temperature,, often bringing about quiet, restful sleep in tossing and fretful children.

Affusion. — In this treatment a volume of water from a pitcher or a pail is poured over the entire body, or. upon certain parts, the patient sitting or standing erect in a tub or bath. The temperature should be 50°-60° F., and the whole procedure should not consume over 10 or 15 sec¬ onds.. The reaction is obtained by rubbing. In certain muscular tremors, in neurasthenia, etc., this procedure is of service.

Packs or Compresses. — These may be dry or wet, general or local. The dry and wet packs

are applied in the same manner. The patient is placed on a narrow bed or couch with a rubber sheet, a blanket and a linen sheet beneath him, the blanket and sheet falling on each side of the couch. The sheet is then brought up and, with the arms to the side, wrapped thoroughly about him, the face alone being exposed. The blanket is then wrapped about the patient in a similar manner. Cloths wrung out in cold water may be applied to the head. In a wet pack the sheet is first wrung out in cold water; in the dry pack it is frequentlv warmed. The object of the application is to bring about free perspiration, and .this is the usual result. Hot drinks may be administered freely. The time given to the ap¬ plication will depend largely on the conditions to be met. If reduction of temperature alone is desired, the patient may remain in the pack until the perspiration is free, and he may then be wrapped up in a dry blanket. In certain uraemic states, and in infantile convulsions, a longer period may be necessary. The wet pack is an excellent procedure in the treatment of alcoholic excesses. The initial effect of a cold pack is constriction of the blood-vessels ; this is soon followed by a dilatation which continues throughout the application and is the main cause of the free perspiration. The pulse-rate is re¬ duced and the arterial tension falls. The stress of elimination is taken from the kidneys, the amount of blood within the brain diminishes and sleep is encouraged. In the hot general pack a blanket only is used. This is wrung out in water at 140°-150° F., the temperature at the time of application not being over 105°-108° F. Local packs or compresses are of inestimable service in a variety of conditions. These are usually made of pieces of heavy muslin, canton flannel or linen, varying in shape according to the site of application. They are wrung out in cold or hot water and applied to the head in headache, to the neck in- sore throat, ton- silitis, diphtheria, earache ; to the chest in pleurisy, pneumonia, neuralgias ; to the heart in rapid overacting heart-action; to the stomach in indigestion; to the joints in sprains, rheuma¬ tism and gout; to the abdomen in gastroduode¬ nal catarrh, irritable bladder, catarrhal appendi¬ citis, colitis, peritonitis. Hot applications are particularly serviceable in painful menstruation. Hot water-bags have largely taken the place of hot compresses since they have been made so handy in shape and size and so reasonable in price.

The Douche. — This application is one of the best tonics, but requires special rooms for its use. These are found in the best appointed hydropathic institutes. The douche consists in the application of hot and cold water delivered through a hose. It combines the elements of the water, heat, cold and force. The regula¬ tion of the pressure and temperature is an im¬ portant feature in the scientific use of the douche. See Bath.

Bibliography.— Cohen, Physiologic Ther¬ apeutics Hydrotherapy) (1902); Baruch,

HYDROTHORAX, dropsical collections occurring in the pleura, which when aggravated exert pressure on the lungs and consequently interfere with the blood circulation. The ex- uernrLSb=n is a livid countenance accompanied by difficult breathing. In aggravated cases the

fluid is tapped and drawn off through a hollow needle.

HYDROTROPISM, the property pos¬ sessed by most roots and by other plant-organs of growing in the direction of the greatest moisture. It is not only possible to demon¬ strate by experiment that the growth of root- hairs is in the direction of the greatest water content, but it can also be shown that the root actually curves toward moisture. The advan¬ tages of hydrotropism are evident, inasmuch as it enables the plant practically to go in search of water at those times when the supply is more or less inadequate. The stimulus appears to act as follows : the water, absorbed more rapidly on the side of its greatest abundance, doubtless causes an osmotic swelling and tension greater on that side than on the other ; and this differ¬ ence is ample to establish a line of direction toward which the roots turn in their growth. Stems and leaves display no hydrotropism at all, as they do not absorb any water under normal conditions; its one-sided abundance is a matter of indifference to them; it being a general rule that plant parts are indifferent to stimuli to which there is no profit in responding. Tree roots sometimes extend themselves toward a drain and introduce themselves through a crevice in the tiles; finding a combination of air, water and mineral substances they grow profusely, sometimes to so great a degree that they choke the drain completely.

HYDROZINCITE, or ZINC BLOOM,

A white mineral consisting of basic zinc car¬ bonate supposed to be 3Zn0.C02.2H20. A com¬ mon ore mined in Arkansas, Kansas and New Mexico, and also occurs in Inyo County, Cali¬ fornia and Tintic District,

Utah.

HYDROZOA, a class of Ccclenterata (q.v.) embracing the polyps, all of which bear a general resemblance to Hydra (q.v.). There are two alternating generations, that is, (1) the sessile asexual polyp, which gives rise to (2) a jelly fish or medusa. The hydroid polyp is like hydra, a two-layered vase-like sac, with a circle of tentacles around the mouth. This gives off by a budding process a bell-shaped medusa, which is much more highly organized than the polyp, having a well-developed digestive and nervous system, and sense-organs (eyes and ears, or otocysts). They have the peculiar cells known as Nematocysts (q.v.), which are numer¬ ous in the tentacles, and secrete a fluid resem¬ bling formic acid, which may be exploded with danger to their enemies. The Hydrozoa are cnidaria capable of producing two different types of individual, the polyp and the medusa. (See Gorgo). Each of these develops from the egg through the blastula, porenchymula, gastrula and actinuala. The Hydrozoa are at present divided into seven orders, the most im¬ portant of which are, besides Hydraria repre¬ sented by hydra : the Hydro corallines , of which Millepora (q.v.) is the type; the Tubularice, comprising Hydractinia, Tubularia, etc.; the Campanulari, of which Campanularia, Clytia and Obelia are examples. Near this group be¬ longs the extinct order of Graptolites, which were floating forms living in the Paleozoic seas. The last order (Siphonophora) comprises the Portuguese man-of-war (q.v.) and other forms, which are beautiful transparent pelagic animals,

very brightly colored and highly specialized. An interesting type is the Actinozoa and the subclasses Zoantharia and Aleyonaria. Consult Hickson, (Coelenterata and Ctenophora) (in (Cambridge Natural History, > Vol. I, 1906). See Jellyfish; Polyp.

HYENA, hi-e'na, one of a family (Hy&ni- dee) of carnivorous mammals, having relations in structure to the bears, the cats and the civets, familiar in Africa and southern Asia. They are of considerable size, about 150 to 250 pounds for adults, have large, rather short heads, powerful forequarters, feeble and droop¬ ing hindquarters and short tails. The eyes are large, and have longitudinal pupils; the ears. are long, erect, very open, and directed forwards. The teeth are numerous, massive, tuberculated, and well adapted to • aid the muscular jaws crunch the strongest bones, as hyenas are able to do. Hyenas are nocturnal animals which pass the day in solitude in caves or other hiding places, which they quit at night in order to seek their prey in bands. Carrion is a favorite food, and the stench attracts the hyena by night as it does the vulture by day. In some cases they dig up dead bodies and devour them. They also prey on living animals, and flocks of sheep and goats suffer severely from their ravages in some localities. The common or striped hyena (Hyccna striata) is a native of Northern Africa

and parts of Asia, even eastward to Burma. It is brownish-gray and marked with bands of darker brown on the body, which become oblique on the flanks and legs. The hair upon the line of the back is much thicker and stronger than on any other part, forming a sort of mane, extending from the nape of the neck to the origin of the tail. This species was well known to the ancients, who entertained many absurd notions respecting it, believing that its neck con¬ sisted of but one bone ; that it changed its sex every year; that it could imitate the human voice, etc. The notion as to the neck is doubt¬ less due to the fact that in age the neck vertebrae are apt to become anchylosed. It is a most uncouth and disagreeable animal, singularly homely, with a sneaking carriage, a fetid breath, and a glandular pouch beneath the anus, of most unpleasant odor. It was formerly sup¬ posed that the hyena was untamable, but that it can be completely tamed there is not the shadow of a doubt. The spotted hyena (H . crocnta) has a considerable resemblance .to the former species, but is larger, and is marked with numer¬ ous round blackish-brown spots instead of stripes, nor is the mane so large. This species inhabits many .parts of Africa, and was for¬ merly very numerous around the Cape of Good Hope. There is another species, the brown hyena (H. brunnea), which differs from the preceding by having stripes on the legs, the rest of the body being of a dark grayish-brown. It also inhabits the south of Africa. An ex¬ tinct species, the cave hyena, was abundant in England, France and Germany anterior to the glacial epoch, and has left its remains in many caves of these countries. Though named H. Spelcca, it seems practically identical with the existing H. crocuta. The fossil ancestry goes back into the tertiary whence it seems to have sprung from the same stock that gave rise to the viveroids. Consult writers upon nature and sport in Africa and India; Sydecker, (The Game Animals of Africa) (1908) ; Roosevelt

and Heller, (Life Histories of African Game Animals) (1914).

HYENA-DOG, an African canine animal (Lycaon pictus), which takes its name from its hyena-like appearance in shape and color, and is also called Cape hunting-dog because it hunts in packs. It differs from the typical dogs in having only four toes on both the fore and hind limbs, and in its dental fauna, and it seems to be a comparatively recent immigrant into South Africa, since its bones are found in British caves. It preys upon antelopes, cattle, etc., and was a scourge to the early settlements, when it was more numerous and bold than now.

HYfeRES, e'ar', France, a town in the De¬ partment of Var, in the

southeastern part, 10 miles east of Toulon, with which it is connected by rail. With its suburb, Costebelle, it is a very popular winter resort. At the sea coast, a distance of two and one-half miles, is situated the harbor of Hyeres, off which are three little islands called 'the lies d'Hyeres. The town is located on the southern slope of a hill belong¬ ing to the chain of Montagues des Maures. It is sheltered, has a salubrious climate, and is noted for its fine fruits, vegetables and flowers. The chief objects of interest are the parish church .of Saint Louis, dating from the 13th century, the hotel de ville, library, zoological gardens and a museum. Salt is extensively cultivated. Hyeres was founded in about the 10th century, as a harbor from pirates. It was strongly fortified.

HYGEIA, hi-ge'ya, according to the Greek tradition, the goddess of health. The name was used at first in the allegorical sense ; but later Hygeia came to be regarded as the daughter of Asclepius, and, by some cults as his wife. The origin of the introduction of the worship of Hygeia, together with the date and place of its incipiency are difficult to trace. At Titane in Sicyon, her worship appears to have been synchronous with that of Asclepius. The cult came from Epidaurus to Rome in the 3d century b.c., where Hygeia was latinized as Valetudo and her worship identified with Salus. At Oropus, she was associated with Amphiaraus, the god of healing ; at Athens, the name Hygeia was one of the attributes of Athena, to whom an altar was erected on the acropolis after the great plague. Hygeia is represented as a vigor¬ ous young maiden, often accompanied by her father. Consult Roscfrer, (Vol.

I, Leipzig 1884-90).

HYGIENE, broadly the science and art of preserving and improving health. Health in this instance is defined as soundness of body, that is, such a condition of all its several parts that they are able to perform their functions without difficulty, and every natural appetite can be satisfied without consequent distress. A typically healthy man is defined as one who lives vigorously, who in every part of his life, wherever it may be, does the largest amount of the best work that he can, and, when he dies, leaves healthy offspring. The objects of hygiene are the rendering growth more perfect, decay less rapid, life more vigorous, and death more remote. It is sometimes called preventive medicine, but it includes more than prevention; and is sometimes referred to as sanitary science, or the science of health; but its aim is not

merely to know, but to act in view of what is known. It is an ancient art, some of its most important precepts formed a part of the wisdom of the Egyptians at least 1500 b.c., and it is probable that from this source were derived many of the sanitary regulations of the Jews as given in the

Levitical code. The Mosaic laws recognize the three great principles of cleanli¬ ness, isolation, and wholesome diet with a thoroughness that leaves little to be desired. Hence, the Jews were almost immune for many centuries from the plagues which swept away their Christian neighbors ; this was one reason why they were often suspected of starting or spreading the plagues. Thence also, through Pythagoras and the earlier Greek philosophers who studied in Egypt, came the rules of the Asclepiadae, and a large part of the teachings of Hippocrates on this subject. In Egypt, Assyria, India and among the Jqws, hygienic rules were framed by the priests, and were promulgated and enforced as a part of their religious sys¬ tems, the reason given for many of these rules, such as for ceremonial ablutions, for the avoid¬ ance of certain foods, for circumcision and other matters connected with sexual hygiene, for the disposal of the dead, and for dealing with certain forms of contagious disease, being simply that they were Divine commands. Under the influence of Greek philosophy these rules were modified and placed upon another basis, the effects of various kinds of diet and exercise were discussed, and finally the famous treatise on airs, waters and places, by Hippocrates, placed the whole subject on a much broader foundation than it had before occupied. In so far as public hygiene is concerned, the ancient legislators had in view what they considered to be the benefit of the community or nation solely, and enforced their regulations to this end with little or no regard to the rights or welfare of individuals. The Jewish laws provide for driving out lepers and destroying their houses, but not for the care of the lepers themselves. The maxim of the Roman law, Salus reipublicce suprema lex , was executed in the same spirit. Modern hygiene endeavors to preserve both the community and the individual, recognizing that each has rights which should not be sacrificed for the benefit of the other. As regards per¬ sonal hygiene, the teachings of the Greek and Roman writers, and of those of the Middle Ages, consisted mainly of rules for diet and exercise intended for the benefit of kings, nobles and the wealthier classes. The typical ancient work on personal hygiene is the (Code of Health) of the school of Salernum, which dates from about the 12th century, and was first printed in 1480. It was several times re¬ printed and for over two centuries was the most popular book in existence. The great epidemics of the Middle Ages, from the plague of Justinian to the Black Death, seem to have had little effect in advancing hygiene ; they were supposed to be visitations of Providence against which human means availed not. In the 18th century some elementary ideas of hygiene had become known : the prevention of scurvy by lemon juice and vegetable diet, of jail fever by less crowding and more cleanliness, and of smallpox by inoculation, were among the fore¬ most advances. Our new scientific acquaint¬ ance with ultimate causes for the first time enables us to make hygiene a true science on a

basis of exact knowledge. The next step made in the 19th century, was the recognition of the difference between typhus, typhoid and relaps¬ ing fevers, which pointed to different causes and therefore require different methods of pre¬ vention. The establishment of a general sys¬ tem of registration of deaths in England in 1838 was a most important step in its influence as public hygiene. The cholera epidemic of 1832 differed widely in the mortality caused by it in different places, and as this became known, public interest on the subject of the causes and possibilities of preventing certain diseases increased, until, in 1849 a committee on the health of towns, appointed by the House of Commons, made a most important report upon water supplies, overcrowding, etc. Thereafter development was rapid and by 1858 a general board of health was appointed for the suppres¬ sion of health nuisances, etc. The scientific foundations of public hygiene were laid by such men as Pettenkofer, Pasteur and Koch, and their pupils.

Public Hygiene. — A very great part of the work of public sanitary officers consists in the prevention of the specific infections and con¬ tagious diseases which are liable to become epidemic in a community, and as the majority of these are now believed to be due to micro¬ organisms, the efforts of health officials are largely directed to measures which will either prevent their introduction or dissemination or will make the surroundings unfavorable for their development, or will destroy their vitality if they are present. The present methods of quarantine or maritime inspection, of isolation of cases of contagious disease, and of disinfec¬ tion, are based mainly upon the results of bac¬ teriological research, and differ in many respects from those in force a generation ago. The greater the number of persons residing within a limited area, the greater is the need for a general system of sanitary regulations which will prevent individuals from causing or spread¬ ing disease, and will secure to each one pure water and air. The greater part of public hygiene, therefore, may be said to be municipal hygiene, and the problems which present them¬ selves to city and town authorities in regard to it are numerous and complicated. It includes general climatic conditions, soil under human habitations, the character of the latter and their cleansing, the disposal of refuse and excreta, and the cleansing of streets.

Climatic conditions cannot to any extent be modified : they must be neutralized, when in¬ sanitary, by other conditions pertaining to hygiene. All nations have more or less adapted their habits to their climate, unless acclimated so that they become part of its working: the hours of work or travel, the character of dwellings, the sites, the diet found wholesome by

experiment, all form part of a hygienic sys¬ tem built up by social experience and tradition. Those unacclimated may have personal advice from predecessors ; too often nothing but per¬ sonal experience can be of any avail, and fre¬ quently that is only acquired by fatal results.

The subject of dwellings includes a number of considerations. The site, if possible, should not be one where the ground water is near the surface, or freshets or tides set back the drain¬ age of closets, or where there are great fluctua¬ tions in the level of the ground water, which it

is better to have nearer the surface and steady than lower and more unstable. Filled-in land in cities is often unhealthful, but tenants cannot in practice exercise much choice; the city au¬ thorities should prevent bad results by thorough sewerage with a good fall. The construction most important to have right is the plumbing, including the drains at the bottom; it is a commonplace which need not be dwelt on, that leaking sewer pipes and clogged drainage mean the infection of a house with disease-laden air. Paint is better than paper for walls, as it can be washed; and old paper should be scraped off before new is laid on. When possible rooms should be large enough not to need incessant change of air; when not possible, as is usual in cities, plenty of windows and the fullest pos¬ sibilities of draft should make up; if this, too, is not available, the best systems of artificial ventilation. Unhappily, science is very back¬ ward in this class of invention, and small, close, unventilated rooms shorten millions of lives and prematurely break down working power in even the civilized cities of the world. The normal supply should be at least 3,000 cubic feet of air per head each hour, and this largely in¬ creased in work or sickness. The volume of consumption and other scrofulous diseases, bronchitis, pneumonia, etc., is directly dependent on foul air, which also increases the virulence of all zymotic diseases. The ventilation of public buildings rests on the same principles, and has the same result. The warming of houses is of great importance, and is generally ill done, with disregard of ventilation. The vast majority of houses in America are over¬ heated even when the air-supply is enough, giv¬ ing a sensitive skin which very readily ((catches cold.® The water-supply is a matter of public concern : where there is a flat price, people do not stint themselves. Where there are meters, they often do ; but toilets should be kept fully flushed at any cost. In country houses, where city water and sewerage are not available, it is necessary to insist on the frequent cleaning and disinfection of receptacles for excreta. Ad¬ vice on this point is obtainable gratis from phy¬ sicians, public health officers and others. If the dry methods are carefully used, they have many advantages in healthfulness over the elaborate city systems.

Personal Hygiene. — This has very many divisions : the most obvious are considerations of food, and drink, nerve stimuli, clothing, cleanliness,

natural necessities, work and rest, and moral self-control. In the matter of diet, there can be no one rule : ((at forty,® says the proverb, ((one is either a fool or a physician® ; and each must use his own experience as a guide to whether meat is a necessity or vege¬ tarianism an advantage, what foods agree with him, whether dry meals give him heartburn or drinking with them impedes digestion, and whether he is eating so much as to make him heavy, impairing his capacity for work and enjoyment, or making his body gross. In gen¬ eral, probably professional and sedentary work¬ ers as a class over-eat, and would find their minds more alert and their bodies freer from disorders with less gratification of appetite. Nerve stimuli, ranging from tea, coffee and cocoa, tobacco, alcoholic drinks and opium, are hard to frame a general rule upon; they, too, have infinitely varied effects. Cocoa is

largely a food; coffee with most is an agree¬ able stimulant, with many an active nerve- poison, producing heavy headaches and incipient stupor; tea is a real nerve food on occasion and in small quantity, while taken steadily and largely it is a poison and a very mischievous one; tobacco sparingly used by grown men probably does little harm, and sometimes saves worse things, but should not be used by those under age, nor by those with weak nerves, and is highly injurious in heart disease, Bright's disease, and veneral diseases ; alcoholic drinks suggest too many questions for discussion here ; narcotics like opium, hashish, etc., as well as chloral and its like, should be used only on a physician's prescription. Clothing, if there is time and means, can be accommodated to changes of weather and occasion so as greatly to advance health; with most, there must be a rough average. Personal cleanliness within limits is a sine qua non of reasonable immunity from disease, and with delicate persons, of rea¬ sonably good ordinary health ; but even this good thing can be irrationally overused and made mischievous. Too frequent hot baths in a northern climate are a great aggravator of lung-diseases, and one great city (Pittsburgh) had a marked decrease of pulmonary complaints one winter when the water-supply broke down, and people resorted greatly to dry rubbing. Especially it is possible to use too much soap, and keep the natural oil of the skin washed away. Natural necessities should be attended to more constantly than they are : workmen especially often grudge the time, but the wait¬ ing till there is severe pressure often creates dangerous bladder and intestinal complaints. Work, for most, is not under their own control; but to some extent resting is, and the average American perhaps owes more to compulsory public holidays than he is aware. There is more temptation to overwork than to idle, for the average man. Exercise should be taken by the sedentary, even

a homespun housemethod being preferable to nothing. Grotius preserved his health in prison by whipping a top two hours a day. This should be one of the most rigidly imposed forms of self-control, which in all forms is all-important. Excessive sexuality, either of act or imagination, is simply destruc¬ tive of will-power as well as bodily fibre; giving way to fits of anger or despondency is almost a recipe for entire nervous wreck. As to laziness, of mind or body, it is one of the worst and most incurable forms of this evil.

The management of children is really per¬ sonal hygiene, only controlled by another than the subject; the care of the dead belongs to pub¬ lic hygiene ; the prevention of disease belongs either to medicine, by the use of drugs like quinine or inoculations, or to house-hygiene as disinfection. The hygiene of the sick-room should be under the direction of the physician. See Bacteriology; Bath; Dress; Cookery; Dietetics ; Disinfection ; Exercise, Physi¬ cal ; Educational Athletics ; Hospitals ; Nursing; Plumbing; Sanitary Science and Public Health; Waters, City, Disposal of; Ventilation; Hygiene, Military; Military Sanitation ; Water-Supply.

Bibliography. — Bergey, D. H., (The Prin¬ ciples of Hygiene> (4th ed., Philadelphia 1912) ; Harrington, Charles, Practical Hygiene) (4th «d., Philadelphia 1910 ; Daniels and Alcock,

(Tropical Medicine and Hygiene> (London 1911) ; Parkes and Kenwood, (Hygiene and Public Health (Philadelphia 1914) ; Encyclo¬ pedic d'Hygiene et de medecine publique) (Paris 1892) ; Rubner, (Lehrbuch der Hygiene) (Leipzig 1891) ; Rohe, G. H., and Robin, A., (Text-Book of Hygiene* (4th ed., Philadelphia 1908) ; Price, G. M., (Hygiene and Public Health> (Philadelphia 1910) ; Pyle, W. L.,*

(Manual of Personal Hygiene) (ib. 1812); Sedgwick, W. T., (Sanitary Science and the Public Health (New York 1902).*

HYGIENE, Military. In all modern arm¬ ies special attention is given to the personal hygiene of the soldier. Camp diseases are pre¬ ventable and their presence in a command shows that the laws of hygiene have been violated. In ordinary campaigns sickness disables from five to ten times as many as wounds and any deliberate disregard of sanitary regulations should be regarded as a grave military offense and dealt with accordingly.

In a modern engagement it requires, on an average, an expendiure of from 200 to 400 rounds of ammunition for each one of the enemy put out of the fighting, and considering the number of rounds carried, this expenditure represents the effectiveness of from one to two men. When it is realized that but a sin¬ gle cupful of polluted water may be equally damaging by

rendering a fighting man unfit for duty for many weeks, if he survives at all, and may be the means of spreading disease far and wide in a command, then the great importance of faithfully observing hygienic precautions will be appreciated. A great many diseases are due to germs, which are either little ani¬ mals or small plants so very small that they can only be seen by aid of the microscope. All diseases caused by germs are ((catching.)) All other diseases are not catching. Persons may have these germs sometime without apparently being sick with any disease.

Care of the Body. — As certain mosquitos can transmit malaria and yellow fever, use the mosquito bar for this reason as well as for personal comfort.

Keep the mouth clean by brushing the teeth once or twice a day. Decayed teeth cause toothache and lead one to swallow food without properly chewing it, and this leads to stomach troubles of various kinds. Food left around and between the teeth is bad for the teeth and forms good breeding places for germs.

Keep the skin clean. Through the pores of the skin the body gets rid of much waste and poisonous matter. Therefore remove this and keep the pores open by bathing once every day, if possible. If water is scarce, rub the body over with a wet towel. If no water is at hand, take a dry rub. The skin nrotects the sensitive parts underneath from injury and helps to keep out germs. Therefore ‘ when blisters are formed don’t tear off the skin. Insert a needle under the skin a little distance back from the blister and push it through to the opposite side. Press out the liquid through the holes thus formed. Heat the needle red hot first, with a match or candle, to kill the germs. When the skin is broken (in cuts and wounds) keep the opening covered with a bandage to keep out germs and dirt; otherwise the sore may fester. Pus is always caused by germs.

Keep your hair short. Long hair and a long beard in the field favors skin diseases, lice and dandruff.

Don t let any part of the body become chilled, as this very often is the direct cause of diarrhoea, dysentery, pneumonia, rheumatism and other diseases.

Wet clothes may be worn while marching or exercising without bad results, but there is great danger if one rests in wet clothing, as the body may become chilled.

When hot or perspiring or when wearing damp clothes, don't remain where a breeze can strike you.

Every day, if possible, hang your blanket and clothing out to air in the sun ; shake or beat them with a small stick. Wash your shirts, underwear and socks frequently. The danger of blood poisoning from a wound is greatly increased if the bullet passes through dirty clothes.

Pitch your tent as soon as you can, partic¬ ularly a shelter tent, even if you camp for one night only.

Always prepare your bed before dark. Level off the ground and scrape out a little hol¬ low for your hips. Get some straw or dry grass if possible. Green grass or branches from trees are better than nothing. Sleep on your poncho. This keeps the dampness from coming up from the ground and chilling the body.

The use of intoxicating liquor is partic¬ ularly dangerous in the field. Its excessive use, even at long intervals, breaks down one's sys¬ tem. If alcohol is taken at all, it is best after the work of the day is over. It should never be taken when the body is exposed to severe cold, as it diminishes the resistance of the body. Hot tea or coffee is much preferable under these cir¬ cumstances.

Care of the Feet. — A soldier cannot march with sore feet, and marching is the main part of an infantryman's daily duty in the field. All soldiers should be familiar with the proper methods of caring for the feet. Sore feet are generally due to carelessness, neglect or ignor¬ ance on the part of the soldier.

The most important factor in the care of the feet and the marching ability of the -soldier is the shoe. Civilian shoes, particularly light, patent leather or low shoes, are sure to cause injury and in time will ruin a man's foot. Only the marching shoe issued by the quarter¬ master corps should be worn, and they must be properly fitted to the individual. New shoes should be properly broken in before beginning a march by wearing them for several hours daily for a week before the march, and they should be adapted to the contours of the feet by stretching them with shoe stretchers with adjustable knobs to take the pressure off pain¬ ful corns and bunions. Such stretchers are issued by the quartermaster corps, and there should be one or more pair in every company of infantry. On taking the shoes off a very little neat's-foot oil should be rubbed into the leather to prevent its hardening and cracking. If it is desired to waterproof shoes at any¬ time, a considerable amount of neat's-foot oil should be rubbed into the leather. Waterproof leather causes the feet of some men to perspire unduly and

keeps them constantly soft.

Light woolen or heavy woolen socks are habitually worn for marching. Cotton socks VO! 14 — 38

are not worn unless specifically ordered by the surgeon. 1 he socks should be large enough to permit free movement of the toes, but not so loose as to permit of wrinkling. Darned socks, or socks with holes in them, should not be worn in marching.

As soon as possible after reaching camp after a day of marching the feet should be washed with soap and water, and the soldier should put on a dry pair of socks and his extra pair of shoes from his surplus kit. If the skin is tender, or the feet perspire, wash with warm salt water or alum water, but do not soak the feet a long time as this, although very com¬ forting at the time, tends to keen them soft. If serious abrasions appear on the feet, or corns, bunions and ingrowing nails cause trouble, have your name placed on sick report and apply to the surgeon for treatment. Cut the toe nails squarely (fairly close in the mid¬ dle, but leaving the sides somewhat longer), as this prevents ingrowing nails. A footsore army is an army half defeated.

Water. — Immediately on making camp a guard should be placed over -the water supply. If the water be obtained from a stream, places should be designated for drawing water (1) for drinking and cooking, (2) for water¬ ing animals, (3) for bathing and washing cloth¬ ing. The first named should be drawn farthest up the stream ; the others, in the order named, downstream. If the stream be small, the water supply may be increased by building a dam. Small springs may be dug out and each lined with a gabion, or a barrel or box with both ends removed, or with stones, the spaees be¬ tween the lining and the earth being filled with puddled clay. A rim of clay should be built to keep out surface drainage. The same method may be used near swamps, streams or lakes to increase or clarify the water supply. Water that is not known to be pure should be boiled 20 minutes ; it should then be cooled and aerated by being poured repeatedly from one clean container to another, or it may be purified by approved apparatus supplied for the pur¬ pose. Arrangements should be made for men to draw water from the authorized receptacles by means of a spigot or other similar arrange¬ ment. The dipping of water from the re¬ ceptacles, or the use of a common drinking cup, should be prohibited. See Military Sanita¬ tion.

Edward S. Farrow, Consulting Military and Civil Engineer .

HYGIENE, Social. See Vice, Regulation of.

HYGINUS, Gaius Julius, Latin author. Little is known of his life, except that he came from Spain or Alexandria, studied under Cor¬ nelius Alexander Polyhistor, and was made a superintendent of the Palatine Library under Augustus. He wrote on many subjects, rang¬ ing from agriculture to commentaries on Virgil and Ciuna, all of which have been lost. Two works attributed to him are the (Fabularum Liber, > containing legends and biographies of the gods, with many valuable references to lost literary masterpieces; and (De AstronomiaP a treatise on the stars, dealing with the myths and legends connected with the heavenly bodies. The identity of the author of both of these treatises is well established, but various theories have been advanced to explain the poverty of

the scholarship of the translation from the Greek. The most plausible of these is that the works, as they have been handed down to us, are an abridgment of the original by an inferior Latin scholar of the latter half of the 2d cen¬ tury. Consult Schang, (Geschichte der romis- chen Litteratur> (3d ed., Munich 1911).

HYGROMETER (Gr. <(moisture-meas- ure®), an instrument for determining the degree of humidity or of moisture present in the at¬ mosphere; when of primitive form, calculated only to show the difference between a dry day and a damp day, called hydrosoope as when constructed of catgut, hair or other fibrous material, having the property of lengthening when wet and contracting when dry. Sausson's hydroscope employs a human hair, the stretch¬ ing or shortening of which with variations of moisture in the air moves a pointer on a grad¬ uated arc. A similar machine is Richmond's hydrograph, in which the hair is wrapped around a screw-thread, turning a cylinder as it lengthens or contracts, so that a connecting pencil may make a record on the cylinder. The first hygrometer properly so-called was made by Professor Daniell. It consists of a glass tube, bent at right angles into arms of unequal length. Each arm terminates in a bulb, one bulb

T

Regnault's Hygrometer

(usualy black) being two-thirds filled with sul¬ phuric ether, and the other bulb being, at the commencement of an experiment, empty. In process of construction the tube is exhausted of air, and. is thus filled with vapor of ether through its entire length. A thermometer with a bulb immersed in the

ether of the lower arm is inserted in the tube to register variation of temperature, and a second thermometer is at¬ tached to the stand of the instrument to show the temperature of the outer air. For use one bulb containing the sulphuric ether has a zone of polished gold, and the other bulb a muslin cover. If . sulphuric ether be dropped on the latter, as it evaporates the bulb is cooled, and the vapor of ether is condensed within it from the other bulb; the temperature of which rap¬ idly falls owing to evaporation from it. The operation is carried, on, ether being dropped on the second bulb as is required, till the tempera¬ ture of the first is so far reduced that dew from the surrounding air just begins to condense upon it. By means of the thermometer con¬

tained in the first bulb the temperature is read off at the instant at which vapor begins to con¬ dense, and the dew-point is thus obtained. The hygrometric condition, that is, the ratio between the quantity of moisture that the air actually contains and the quantity which it is capable of containing at the existing temperature is then easily deduced.

Regnault's hygrometer, shown in the above figure, is an important modification of Daniell's instrument, d and d' are two precisely similar cups or thimbles of polished silver; each is sur¬ mounted with a similar glass tube into which, by means of a cork, two thermometers are fitted, and the bulbs of the thermometers are covered with ether. Through the cork in one of the tubes a small glass tube t passes, and is carried down below the surface of the ether; while a side tube establishes communication with the vertical tube u v which is connected with an aspirator a (or vessel into which air is sucked at the top to supply the place of water which escapes at the bottom). There are no cor¬ responding side tubes connecting the left-hand tube of the hygrometer d'. By means of the aspirator a current of air. is drawn through t; it therefore bubbles through the ether, causing evaporation and cooling the ether till the dew¬ point is reached. This is observed with great nicety by means of a silver cap; for the in¬ stant the dew commences to deposit, the bril¬ liant polish of the silver is dulled. The temper¬ ature of the air is at the same time read off by means of the other thermometer in d'. Reg¬ nault's hygrometer, both from its construction and from the use. of the aspirator, avoids the too great proximity of the observer, which from the nature of the experiments, is objec¬ tionable.

Mason's dry and wet bulb hygrometer (some¬ times called psychrometer or hydrodeik) con¬ sists of two thermometers arranged side by side as in the figure. The dry bulb gives the tem¬ perature of the air at the time of observation; and the other bulb, which is covered with mus¬ lin, and kept moist by filaments of cotton car¬ ried from it into a small cistern of rain or distilled water, reduces the height of the mer¬ cury in its tube in proportion to the capacity of the air for drying or taking up additional vapor. This

instrument does not give the dew¬ point directly. The difference between the read¬ ings of the two thermometers is multiplied by a special factor for every temperature of the dry bulb. The United States Weather Bureau psychrometer has two thermometers mounted parallel on a jointed handle that permits their being whirled. One thermometer bulb is cov¬ ered with wet muslin, the other exposed to the air; the difference in the record of the two thermometers is greater as the air is drier.

HYKSOS, hik'soz, according to the Egyp¬ tian annals, a conquering nomadic race from the East, who, under Salatis, their first king, took Memphis and rendered the whole of Egypt trib¬ utary. Their name probably means (

archs took Egyptian names. It seems likely also that a great part of Syria was subject to them. The only detailed account of them in any ancient writer is an unreliable passage of a lost work of Manetho, cited by Josephus in his rejoinder to Apion.

HYLAS, hi'las, a character in Greek leg¬ end. He was the son of Theiodamus, king of the Dryopians in Thessaly, and accompanied Hercules on the Argonautic expedition. When they stopped in Mysia near the mouth of the Ivios, Hylas went to a certain spring to draw water. The nymphs of the spring drew him down into the depths, and he was lost. The loss of his favorite grieved Hercules greatly, and he threatened to ravage the land of Kios unless Hylas was found. Therefore a day was fixed on which the inhabitants of the island wandered about the country calling the lad's name. The story as it has come down to us is doubtless a later treatment of an old Greek legend.

HYLID.7E, the tree-frog family. This is the fourth family of the Anura, or tail-less amphibians and is nearer in its relations to the toads than to the typical frogs (Ranidce). Its members are of comparatively small size and arboreal habits. Technically the family is char¬ acterized by an arciferous sternum, sacral di¬ apophyses, teeth in the upper jaw, and the terminal phalanges of the fingers elongated, claw-shaped and swollen at the base, and bear¬ ing adhesive discs. This disc is a cartilaginous pad situated between the terminal phalanx and the one preceding it, the muscular contraction of which in action produces one or more fur¬ rows on its under side. It is rich in mucilag¬ inous glands on the surface, and enables the frog to cling to the vertical surfaces, as tree- trunks, where it customarily perches, by the com¬ bined effect of pressure and stickiness, for no suction

is applied, and the assistance of the clawed toes where the surface is rough. The hylidae dwell in all the warmer and forested parts of the world except Africa, and have extraordinary breeding habits. The hylidae are almost exclusively American, a few species in Australia, two in China, and the widely distributed Hyla arborea of Europe being the only exceptions. The centre of the family is tropical America, where about 100 species have been listed. See Tree-frog.

HYLLESTED, hiil'le-sted, August, Swe¬ dish pianist : b. Stockholm, Sweden, 1858. He began his musical education at a very early age, making his first public appearance in 1863. He was sent to Copenhagen to study under Holger Dahl, where he remained until 1869. He then toured Scandinavia and subsequently spent some years at the Royal Conservatory of Copenhagen. 'His next connection was as organist of the cathedral and director of the musical society in the same city. In 1879 he went to Berlin, where he studied under Kullak and Kiel. Later he had Liszt as a teacher, and began his various concert tours. He was enthusiastically received in the musical centres of the United States, where he was assistant director of the Chicago Musical College (1886-91) and director of the piano department of the Gottschalk Lyric School (1891-94). After a year's tour in Eu¬ rope, he made his home in Chicago. He has

composed a number of very fine songs and piano selections.

HYLOBATES, an anthropoid ape of the Gibbon group. See Gibbon.

HYLOGLYPHS, small wooden tablets, found on Easter Island (q.v.) carved with con¬ ventionalized figures. Twelve of these have been preserved. In spite of persistent efforts, the picture writing has not yet been translated satisfactorily. They are chiefly important as the one specimen of an attempt at writing on the part of the South Sea Islanders, except for a rarely used syllabary discovered in 1914.

HYMANS, Solomon Louis, loo-e e-mail, Belgian historian, journalist, novelist and poet: b. Rotterdam, 1829; d. Brussels, 22 May 1884. He removed to Belgium in boyhood and rose rapidly to distinction as a Liberal journalist. He edited the Belgian Star and the Parliament¬ ary Echo for some years, and was elected to Parliament in 1859. He wrote (History of the Marquisate of Anvers5 (1848) ; (Popular His¬ tory of Belgium5 (1860) ; (Political and Parlia¬ mentary History of Belgium > (1869-70);

(Notes and Souvenirs) (1876) ; (Types and Silhouettes) (1877); Brussels Throughout the Ages) (1883-89) ; two popular novels, (Andre Bailly) (1861) and (The Buvard Family5 (1858) ; and some pleasing poems.

HYMEN, the god of marriage in Grecian mythology; originally the Greek name of the marriage song. The common legend is that he is the son of Apollo. No marriage took place without his being invoked to sanction it. He is described as having around his brows the flower of marjoram, in his left hand the flame-colored nuptial veil, and in his right the nuptial torch.

HYMENOPHLLACEiE. See Ferns and Fern Allies.

HYMENOPTERA, hl-men-op'te-ra, an

order of Hexapoda or insects, considered by many entomologists to be the highest and most perfect expression of the insect type. The meta¬ morphosis is complete and extensive. The larvae are short, thick grubs, footless except in the saw-flies (Tentliredinidoc) and in most cases are carefully nurtured and fed in nests. The pupae have nearly the form of the perfect in¬ sects. The imagos are of compact, highly com¬ plex construction, with the three regions well marked, except that the first segment of the abdomen is united with the thorax. A consid¬ erable part of the large head is occupied by the conspicuous compound eyes, besides which there are three ocelli. The jaws or mandibles are conspicuous biting organs, and the remaining mouth-parts usually form more or less of a proboscis with a large ligula or tongue. Al¬ though the wings are small, they move with great rapidity and sustain the body in rapid and extended flight ; there are two pairs (usually), membranous, veined and transparent. The hymenoptera are divided by Linnaeus into two sections, the Terebrantia, which have an ovipositor instead of a sting in the female, and the Aculeata whose females have a sting. A more generally accepted division regards the saw-flies as a primitive sub-order, having no waist or constricted region at the middle, and an incomplete union of the first abdominal seg¬ ment with the thorax, and also having thoracic and often abdominal legs in the larval stage.*

Marked sexual dimorphism is very frequent especially among the social forms, in which a third class of individual, the worker or neuter, in reality imperfect females, also occurs. Many of the ant communities are still farther poly¬ morphic. The order is one of great extent and exceptional interest, as it includes the ants, bees and wasps, the ichneumon-flies, gall-flies and saw-flies, divided into numerous families. Among the ants and bees are exhibited most re¬ markable and complex social states, which are described in the articles on these groups. The habits of the numerous species of wasps, and especially the varied architecture of their nests, are of nearly

equal interest. A remarkable series of adaptations to special conditions are presented by the parasitic ichneumon flies and their allies, which lay their eggs within the bod¬ ies of the larvae or even in the eggs of other insects, on the substance of which their own larvae feed. Confining their parasitism to plants, the gall-flies produce by the irritation caused by their eggs or secretions deposited with them in the tissues of leaves, twigs or fruits, the famil¬ iar excrescences whose shapes are almost as numerous as the species which produce them. (See Galls). Finally, the saw-flies are least typical of the order but stand nearest to the main hexapod stem. Their larvae have both thoracic and abdominal legs and closely re¬ semble caterpillars; they are vegetarians and many of them are very destructive to plants. Consult standard works of Entomology (see Insects), and the bibliographical list given by L. O. Howard in the appendix to his (Insect Book) (New York 1902).

HYMETTUS, a mountain range in Attica, about 3,500 feet high, about five miles south¬ east of Athens. Its honey has been famous since ancient times. Its extensive quarries pro¬ duced a bluish marble, often used for buildings and sculpture ; but the white marble was con¬ sidered superior.

HYMNOLOGY. A hymn is the expres¬ sion of praise to God, designed to increase the reverence and arouse the devotion of a wor¬ shipper, and is often the vehicle of prayer. It is usually expressed in lyric verse, but not al¬ ways. Some hymns are designed to be recited and not sung and are in prose. This is espe¬ cially true of some Buddhist hymns.

From the beginning of history music and poetry have gone hand in hand. When men turned to worship they endowed it with music and poetry. They gave of their best. The early religions used songs of incantation ap¬ proaching some of the Psalms of the Old Tes¬ tament. The incantations from the Assyrian and Babylonian religions are of this character. The Egyptian religion also furnished some specimens. A hymn to the Nile used by its ancient worshippers seems almost like a Psalm. The Buddhist hymns are more like meditations. Ancient Greece was the land of song and ali sorts of events were celebrated in poetic set¬ ting. Many splendid productions have come to us from the devotees of many religions. The non-Christian world has not known much of congregational singing. That has been peculiar to the Jewish and Christian religions.

The Old Testament contains many hymns finding their culmination of excellence in the Book of Psalms, which has set a standard for

all succeeding years. The songs of Moses, Miriam, Deborah and Hannah, and the lament of David over Jonathan should be mentioned. The temple worship is said to have required great choruses, as many as 12,000 men

singing antiphonally at a single service. The volume of sound was so great that it could be heard 12 miles away.

The New Testament furnishes several speci¬ mens of early Christian hymns. The first and second chapters of the Gospel of Luke contain the Gloria in Excelsis, the Magnificat, the Bene- dictus, the lesser Benedictus and the Nunc Di- mittis, early expanded and used in the worship of the church. Other remains of early Chris¬ tian hymnody are found in Acts iv, 24-30; Ephesians v, 14; 1 Timothy vi, 15, 16; 2 Tim¬ othy ii, 11-13; Revelation i, 4-8; v, 9, 10, 12-14; xi, 15, 17, 18; xv, 3, 4; xxi, 10-14: xxii, 17. There are traces of the very early use of these passages as hymns by the church.

The church of the post-Apostolic age was a singing church. Origen tells us of a Christian hymnbook, now lost, called

The Eastern or Greek Church had many hymn writers of note. Methodius, who died about 311, has a hymn in his (Banquet of Ten Virgins. J The Ter Sanctus was a hymn in use before the year 400. Gregory of Nazianzen and Anatolius were noteworthy writers of hymns. With Saint Andrew of Crete began a series of noteworthy hymn writers. Modern hymnals use translations of several of his hymns. Saint John of Damascus, Saint Cos- mas and the poets of the Studium are the most noteworthy writers in the 200 years ending about the year 800. Bardesanes, a Gnostic leader, has sometimes been called the father of hymn-writing. His hymns were so popular that Ephrem Syrus wrote new hymns to replace them and thus became the father of hymnody in the Syrian Church.

Saint Hilary of Gaul, Bishop of Poitiers, was the father of hymnody in the Latin Church. Pope Damasus I wrote two hymns. With Ambrose of Milan a new era begins in Latin hymnody. He composed several hymns used in later service books. In the period from the 4th to the 11th century only a few names are worthy of note. Aurelius 'Clemens Prudentius, born in Spain in the last half of the 4th century, was a writer of many hymns. Ccelius Sedulius composed a hymn in acrostics and several others. Venantius Honorius Cle- mentanus .Fortunatus was one of the greatest of the Latin hymn writers (d. 609). The next group contained Peter Damiani, Boniventura Bernard of Cluny, Bernard of Morlaix, Notker Thomas of Celano, Adam of Saint Victor, and other writers. This, is sometimes called the Golden Age of Latin hymnody. The Anglo-

Saxon Church produced the Venerable Bede, its historian and also the father of English learn¬ ing and English hymnody. Dr. Philip Schaff divides German hymn-writing into six periods: the period previous to the Reformation; the Reformation, 1520-1648; the Confessional Pe¬ riod, 1618-80; the Pietistic and Moravian Pe- n˚d> 1680— 1757; the Rationalistic Period, 1757— 1817; the Modern Period, including the last 100 years. Martin Luther was the father of German hymnody and German church music. His hymns were sung all over Germany and his opponents declared that his hymns «de- stroyed more souls than his sermons." Justus Jonas Alber, Nicholas Hermann and Michael Weiss of the Reformation group also con¬ tributed to the growth of the Lutheran move¬ ment by their hymns. The first German Evangelical hymnbook appeared in 1524 and be¬ cause it contained only eight hymns was entitled (AchtliederbuchP

During the period of the Thirty Years' War several noted poets lived, including Martin Opitz and Michael Altenburg. The latter was the author of the first three verses of the battle hymn of Gustavus Adolphus. The Golden Age of German hymn-writing is in the third period, and found its culmination in Paul Gerhardt (1607-76), a Lutheran pastor in Berlin and Lubben. Johann Franck and Sebastian Michael and Peter Franck, Johann Rist, George Neumark and Michael Schirmer are only a few of the names of the more prominent hymn com¬ posers of the period.

In the fourth period, Philip Jakob Spener and August Hermann Francke were the leaders among the Pietists in hymn-writing. The son- in-law of Francke, Johann A. Freylinghausen, is said to have produced the best hymn book of the movement. The list of Pietist hymn com¬ posers is a long one. In the Moravian move¬ ment Nicolaus Ludwig Graf von Zinzendorf was the author of 2,000 hymns. Of these 205 have been translated into the English language, largely by John Wesley, Mrs. Charles and Miss Jane Borthwick. The Count's second son was also a hymn composer. August Gottlieb Span- genburg, who resided in America for many years, composed three noteworthy hymns.

The German Reformed Church produced Joachim Neander, Friedrich Adolf Lampe and Gerhard Tersteegn, writers of hymns of the first rank.

In the fifth period, Christian F. Gellert, Friedrich Gottlob Klopstock (called the Ger¬ man Milton), J. C. Lavater, Matthias Jorissen and Matthias Claudius were the chief hymn writers.

In the modern period there is a long list of writers of note, including Ernest Moritz Arndt, the Krummachers, father and son, Friedrich Riickert, Albert Knapp, C. G. Barth, Johann Peter Lange, K. J. P. Spitta and Karl Gerok.

French hymnody received a contribution from Jean Racine, and his four paraphrases are still in use. Some portions of the poems of the poet Pierre Corneille have been used as hymns. Fenelon composed a few hymns. Madame Giuyon composed nearly 900 pieces which were set to the music of popular tunes of the day. The Huguenots produced nine small books of Chansons, 1532-97. A selection from these was published by Henri Bordier in Paris, 1871.

John Calvin wrote a few hymns. The psalter of Clement Marot and Beza's psalter were used in the Reformed Church until 1705, when a supplement containing a few hymns by Benedict Pictet was added. Caesar Malan (1787- 1864) was the greatest of all the French hymn writers. He compiled (Chants de Sion,> 1841, to which he contributed several hymns, some of which have been widely used. Later hymn composers include Ami Bost. H. Empaytz, Guers, Galland, and Dr. J. H. Merle d'Aubinge, the historian of the Reformation. In 1834 M. Henri Lutteroth issued (Chants Chretiens, > which included 44 from his own pen, and con¬ tributions were included from Alexander Vinet, Adolphe Monod and other leaders.

Scandinavian hymn-writing dates from the introduction of Lutheranism. Two brothers, Olaf and Lars Petersen, were the first leaders. Olaf had been a pupil of Luther and Melanc- thon at Wittemburg. Two other brothers, Lawrence and Peter Anderson, were the next noteworthy hymn-writers. The first hymnary of Norway and Denmark was published at Malmo in 1528 by Claus Martensen Tonde- binder ; Thomas Kingo, a poet of ability re¬ vised it. Gruntvig, the great Danish scholar, exercised a profound influence on fhe char¬ acter of Danish hymnology, giving it a more spiritual trend.

Ireland does not possess a distinctive hymnody of its own. Wales is a land of song and has produced some noteworthy hymns. In Scotland the early history of hymnology deals almost entirely with metrical versions of the Psalms. The earliest version is sometimes known as the (Dundie PsalmesP 1578. The first edition may have been published before the year 1546. The first Scottish Psalter prop¬ erly so called was issued in 1564. Some of the versions were made by the Scottish and other exiles in Geneva. The Westminster As¬ sembly authorized a new edition which was published in 1650.' Later the General Assembly, not satisfied with the Westminster version, au¬ thorized other psalters and paraphrases. (The Scottish Psalter was prepared by a com¬ mittee and sanctioned by the General Assem¬ bly. The Baptists, Congregationalists, United Presbyterians, Free Church, and Scottish Epis¬ copal Church have each issued a series of hymnals.*

The hymnody of England, as in Scotland, had at the beginning only versions of the Psalms. Thomas Sternhold, who was groom of the robes to

*Henry VIII, was scandalized at the songs sung at court, and that something better might be sung translated 51 Psalms into English metre. The first published edition con¬ tains 19 Psalms. A second edition published n 1549 contained 37. The third edition of 1551 included seven additional versions by John Hopkins, and henceforth it was called ˆtern- hold's and Hopkins' Psalms. * Next followed the ˆGeneva Psalter) of 1558, mentioned above. In 1562 (The Complete Psalter) of Sternhold and Hopkins was published by John Daye. It influenced largely the worship and hymnology of England for a long time. A new version by Nicholas Brady and Nahum Tate appeared in 1695-96. Later many Eng¬ lish writers tried their talents in making ver¬ sions of the Psalms. Julian lists 326 distinct versions.*

Isaac Watts has been called the father of English hymn-writing. He is so in a qualified sense. John Donne and George Herbert wrote hymns, and there were occasional hymns writ¬ ten by others before the first hymn-book, (Hymns and Songs of the Church, > was is¬ sued in 1623 by George Withers. Then fol¬ lowed hymn-books by Robert Herrick, Henry Vaughan, Jeremy Taylor, Samuel Crossman, John Austin, John Mason, and Benjamin Keach, besides the many individual hymns of merit including the three unsurpassed hymns of Bishop Thomas Ken. Nevertheless, Watts (q.v.) occupied a large place as a hymn com¬ poser. Philip Doddridge soon followed him. Then came the Wesley brothers, John, Charles and Samuel, all poets and sons of a poetical father. Samuel Wesley, Jr., left a volume of poems. Six of his hymns are in common use. John and Charles Wesley issued jointly or singly no less than 64 hymnbooks. The first one was issued at Charleston, S. C., in 1736, and the last at London in 1786. They were gathered by Rev. George Osborn, and published in 13 volumes as the / Poetical Works of John and Charles Wesley/ John Wesley translated many hymns. Charles Wesley was the author of more than 6,000 hymns. More than 500 hymns of John and Charles are in common use to-day in various hymnals. The Wesleys influenced many followers. There were Thomas Olivers, John Cennick, William Hammond, Ed¬ ward Perronett, Joseph Hart and Robert Rob¬ inson among the Methodists; John Newton, William Cowper, R. Madan, R. Conyers and R. De Courcy of the Evangelical party of the Church of England. They even inspired their opponents, one of the chief of whom was Augustus Montague Toplady, author of (Rock of Ages/ The Congregationalists were like¬ wise influenced by the movement. Rowland Hill, Ralph Wardlaw and John Dobell each issued hymnbooks.

James Montgomery, a Moravian, was the next great hymn-writer. Seventy-one of his hymns are still in common use. Mrs. Bar- bauld (1772) and

Anne Steele (1760) were among the first women to write hymns. Twenty-one by Mrs. Barbauld are in common use, while 75 of Miss Steele's 144 hymns are still sung. Henry Kirk White should not be omitted from this period. He composed only 10 hymns, but they are all in common use. Reginald Heber wrote some of the greatest and best beloved hymns of the Church.

The Oxford or Tractarian movement pro¬ duced a notable group of hymn-writers : John Henry Newman, Edward Caswell, Frederick W. Faber and John Keble. Some of their hymns are among the greatest in the language.

Space forbids the mention of the great host of English hymn-writers. We can only men¬ tion a few of the most outstanding ones who have appeared since the Tractarian movement. John Mason Neale (1818-66) has rendered a great service to the English-speaking world in his translation of hymns of the Eastern Church. John S. B. Monsell, Sir Henry Williams Baker, Henry Frances Lyte, Sir John Bowring, Francis T. Palgrave, Henry Alford, Mrs. C. F. Alexander, Charlotte Elliott, Frances Ridley Havergal and Sarah Flower Adams must not be omitted. George Matheson, the blind

preacher of Endinburg, gave us (0 love that will not let me go/ a great hymn destined to live.

The first book used in worship in America was (The Bay Psalm Book/ or New England Version, first published by Stephen Day in 1640. It is supposed that (

Bibliography. — The great authority on the subject is J. Julian, (Dictionary of Hymnology (London 1892, revised 1907). There are many volumes dealing with the subject. Benson, E. F., (The English Hymn: its development and use in Worship* (New York 1913) ; Breed, W. P., (History and Use of Hymns and Hymn Tunes* (New York 1903) ; Campbell, Duncan, (Hymns and Hymn Makers* (London 1898) ; Duffield, S. W., (English Hymns: Their Au¬ thors and History> (New York 1903), and (Latin Hymns, Writers and their Hymns* (New York) ; Fischer, A. F., UCirchen Lieder Lexicon* (2 vols., Gotha 1878-79) ; Hatfield, E. F., (The Poets of the Church) (New York 1894) ; Jones, F. A., (Famous Hymns and their Authors* (London 1903) ; the various works of Neale on the Hymns of the Eastern Church, arud Pick, Bernard, (Hymns and Poetry of the Eastern Church* (New York 1908) ; Price, Carl,

(Music and Hymnody of the Methodist Hymnal * (New York 1911).

S. G. Ayres, Garrett Biblical Institute.

One Hundred Widely Used Hymns.

Abide with me; fast falls the eventide. — H. F. Lyte.

A charge to keep I have. — Charles Wesley.

A few more years shall roll. — H. Bonar.

All hail the power of Jesus' Name. — E. Perronet.

All people that on the earth do dwell. — W. Kethe.

A mighty fortress is our God. — Martin Luther.

Art thou weary, art thou languid. — Stephen the Sabaite. Awake my soul and with the sun. — Bishop T. Ken.

Be strong, we are not here. — M. D. Babcock.

Blest be the tie that binds. — J. Fawcett.

Children of the heavenly king. — J. Cennick.

Christ, the Lord is risen to-day. — Charles Wesley.

Come O thou traveller unknown. — Charles Wesley.

Come thou fount of every blessing. — Robert Robinson. Come ye sinners poor and needy. — Joseph Hart.

Fairest Lord Jesus. — From the German.

Faith of our fathers living still. — F. W. Faber.

Fear not O little flock the foe. — Altenburg.

For all the saints who from their labor rest. — W. W. How. Forever with the Lord. — James Montgomery.

For thee, O dear, dear country. — St. Bernard of Cluny. Forward be our watchword. — Henry Alford.

From Greenland's icy mountains. — R. Heber.

Glory to Thee, my God, this night. — Bishop T. Ken.

God be with you till we meet again. — J. E. Rankin.

God calling yet shall I not hear. — G. Tersteegen.

God moves in a mysterious way. — W. Cowper.

Guide me, oh thou great Jehovah. — William Williams.

HYMNS

599

Hail thou once despised Jesus. — J. Bakewell.

-Hark, id ark, my soul, angelic songs are swelling. — F. W. Faber. Mark the herald angels sing. — Charles Wesley.

Hasten, Lord, the glorious time. — H. Auber.

He leadeth me ! Oh blessed thought. — Joseph Gilmore Holy, Holy, Holy, Lord God Almighty. — R. Heber.

Holy Spirit, faithful guide.— M. M. Wells.

How firm a foundation. — G. Keith.

How gentle God's command. — P. Doddridge.

How sweet the name of Jesus sounds. — John Newton.

If on a quiet sea. — A. M. Toplady.

I heard the voice of Jesus say. — H. Bonar.

I love Thy kingdom, Lord. — T. Dwight.

I need Thee every hour. — Mrs. A. S. Hawkes.

In the cross of Christ I glory. — Sir John Bowring.

Jerusalem my happy home. — F. B. P. and J. Montgomery. Jerusalem the golden. — St. Bernard of Cluny.

Jesus and shall it ever be. — Joseph Gregg.

Jesus calls us o'er the tumult. — Mrs. Alexander.

Jesus lover of my soul. — ■ Charles Wesley.

Jesus shall reign where'er the sun. — Isaac Watts.

Jesus the very thought of Thee. — St. Bernard.

Just as I am without one plea. — Charlotte Elliott.

Lead kindly light amid the encircling gloom. — J. H. Newman. Lead on. Oh king eternal. — E. W. Shurtleff.

Lift your glad voices in triumph on high. — H. Ware, Jr. Lord dismiss us with thy blessing. — J. Fawcett.

Lord I hear of showers of blessings. — Elizabeth Codner. Lord in the morning thou shalt hear. — Isaac Watts.

Lord of all being, throned afar. — O. W. Holmes.

Love divine, all loves excelling. — Charles Wesley.

More love to Thee, oh Christ. — Mrs. E. P. Prentiss.

My faith looks up to Thee. — Ray Palmer.

Nearer, my God, to Thee. — Sarah Flower Adams.

Now thank we all our God. — M. Rinkart.

Oh day of rest and gladness. — C. Wordsworth.

Oh for a closer walk with God. — W. Cowper.

Oh for a heart to praise my God. — Charles Wesley.

Oh for a thousand tongues to sing. — Charles Wesley.

Oh God, our help in ages past. — Isaac Watts.

Oh Jesus I have promised. — J. E. Bode.

Oh little town of Bethlehem. — Phillips Brooks.

Oh love that will not let me go. — George Matheson.

Oh Paradise ! Oh Paradise ! — F. W. Faber.

Oh sacred head once wounded. — St. Bernard.

Oh worship the king all glorious above. — R. Grant.

One more day's work for Jesus. — Anna B. Warner.

One sweetly solemn thought. — Phoebe Cary.

Onward Christian soldiers. — S. Baring-Gould.

Rescue the perishing. — Fanny Crosby.

Rock of Ages, cleft for me. — A. M. Toplady.

Safe in the arms of Jesus. — Fanny Crosby.

Saviour again to Thy dear name we raise. — • J. Ellerton. Saviour breathe an evening blessing. — James Edmeston.

Sun of my soul Thou Saviour dear. — John Keble.

Soldiers of Christ arise. — Charles Wesley.

Take my life and let it be. — Frances Ridley Havergal. Tell me the old, old story. — Mrs. Hankey.

The Church's one foundation. — S. J. Stone.

The King of love my shepherd is. — H. W. Baker.

There is a fountain filled with blood. — W. Cowper.

There is a green hill far away. — Mrs. Alexander.

There is a land of pure delight. — Isaac Watt.

The Son of God goes forth to war. — R. Heber.

The spacious firmament on high. — Joseph Addison.

We may not climb the heavenly steeps. — J. G. Whittier When all Thy mercies, O my God. — Joseph Addison.

When I survey the wondrous cross. — Isaac Watt.

Where cross the crowded ways of life. — F. M. North.

While shepherds watched their flocks by night. — N. Tate. Work for the night is coming. — A. L. Coghill.

Zion stands with hills surrounded. — T. Kelly.

HYMNS. See Hymnology.

HYMNS, Latin. From the beginning, the Church adopted the psalms and made use of various versicles and devotional hymns in its service. Once the

persecutions ceased, and Christians had no longer to hold their services so as to avoid notice, this practice grew in significance. The great Fathers of the Church wrote or encouraged the writing of hymns, and by the end of the 4th century a large number

were in use. Hilarius Pictaviensis, Hilary of Poitiers (died 368), made a collection of hymns with the title, (Liber Mysteriorum, mentioned by Saint Jerome, now lost, for which he has been called the Father of Western Hymnology. Some of the hymns of Pope Damasus (died 384) whose secretary Jerome was, have been preserved. The greatest hymn writer of the 4th century is Saint Ambrose. Not all the hymns attributed to him are his, but many are, and one at least, the (Te Deum, } is still in common use. Among the other great hymn writers of the earlier centuries are Saint Au¬ gustine, Prudentius, Sedulius (an Irishman of the 5th century), Fortunatus, and Eugenius (of the 6th and 7th centuries), Pope Gregory the Great, Venerable Bede, Alcuin, (8th century), and Peter Damien (died 1072). It is the latter part of the Middle Ages, however, especially the 12th and 13th centuries, that saw the birth of the greatest Latin hymn writers. They are Bernard of Clairvaux and Bernard of Morlaix, Adam of Saint Victor, and Alanus of Lille,' of the 12th century, and Thomas of Celano! Bonaventure, Aquinas, and Jacopone da Todi of the 13th century.*

At first these hymns in the Western Church were written in the meters of the old Latin poets, but after the introduction of rhyme, they gradually came to follow the new mode. In the earlier Middle Ages an essential change took place in the pronounciation of Latin. (

The language of the early hymns is the common speech of the day, colored by Bible idioms. New words appear but only such as are needed for new thoughts. Familiar words are lifted to the standard of poetic diction by application to Christian usage. An extreme simplicity of language just as far as that is compatible with the expression of the profound devotional truths of Christianity characterizes them. They are much simpler than classical Latin poetry, and for that reason deeply influ¬ enced popular devotion and thinking and served to modify popular language and poetry. In the history of literature, the Latin hymns occupied an important place because they were the first original poetry of the people in the Latin lan¬ guage. The Latin poetry of the classical period was an echo of Greece <(both in sub¬ stance and form, the matters and meters were

both imitated and the poems were composed for the lovers of Grecian art in the Roman court. It did not spring from the people and it never moved the people, but the Christian hymns were proper folk-poetry, the (Bible of the people) — their Homeric poems.® (March). It was their use by the people that fostered rhyme in the poetry of the modern languages. The folk listened to these Latin hymns sung on the festival days many times every year, (they were required to go to church nearly 100 times a year), became familiar with the cadence of them, and the music of verse, often joined in using them at the time when the modern languages of Latin origin were coming into existence, and these hymns therefore con¬ stituted t-he school in which modern rhymed poetry took its rise.

The supreme place among the Latin hymns is universally accorded to the (Dies Iras1 (q.v.), written by one of the early Franciscans. Prof¬ essor Saintsbury says : "There is not likely to be ever lack of those who, authority or no authority, in youth and in age, after much reading or without much, . . . will hold these wonderful triplets, be they Thomas of Celano's or another's, as nearly or quite the most perfect wedding of sound to sense that they know.® This enthusiastic recognition has been shared by Crashaw, Jeremy Taylor, Dr. Johnson, Goethe, the Schlagels, Dryden, Scott, Villemin, Trench, Macaulay, and a host of similar per¬ sons of ability. Just after the 'Dies Irae1 comes the 'Stabat Mater1 (q.v.), written very probably by another of the early Franciscans, Jacopone da Todi. Schaff declares: "It is the most pathetic, as the (Dies Irse) is the most sublime hymn of the Middle Ages, and occupies the second rank in Latin hymnology.® It has inspired some great musical compositions by the most famous composers. The five other greatest of the Latin hymns constituting an immortal septet are the 'Ad Regias Agni Dapes,1 probably written by Saint Ambrose, surely coming from his time; the 'Vexilla Regis,1 an unrhymed hymn usually said to have been written by Fortunatus in the 6th century ; the 'Jesu Dulcis Memoria) of Saint Bernard of Clairvaux written in the 12th century; the rhythm of Bernard de Morlaix or Bernard of Cluny, a contemporary of Saint Bernard, and finally the (Pange Lingua Gloriosi1 (q.v.), of Saint Thomas Aquinas. There are many other hymns urged by admirers for the place in this list of honor, but those given are surely the favorites. Neale says that Aquinas' 'Pange Lingua> <(contests the second place among the hymns of the Western Church with the 'Vex-illa Regis,1 the 'Stabat Mater,1 and the 'Jesu Dulcis Memorial . . . leaving the 'Dies Irae) in its unapproachable glory.® It is a supreme surprise to find the greatest scholar of his time possessed as so many think with the greatest human mind after that of Aristotle, thus placed among, the greatest of poets, for it is generally recognized that these hymns are among the greatest poetry ever written, unsurpassed and never equalled except by Dante and Shake¬ speare. (Saintsbury). The loving devotion with which

these hymns were written can be very well appreciated from the rhythm of Bernard of Morlaix, out of which a number of the modern hymns on Jerusalem the Golden1 were composed, Jt i§ written in hexameters

following rather strictly the old prosody, but there are two internal sub-rhymes in each line and the lines rhyme as couplets. The difficul¬ ties of the task must have been enormous but they have been marvellously overcome and have only served to enhance the beauty of the hymn. Schaff, in his 'Christ in Song) says: (

After the beauty of the Latin hymns, their most wonderful feature is the admirable crit¬ ical faculty, which served to recognize and preserve to posterity so many precious gems of religious poetry, though there must have been at all times, as has been so true in ours, so many counterfeit imitations of mere senti¬ mentality and not true poetry.

Bibliography. — March, (Latin Hymns1 (New York 1874) ; Trench, 'Sacred Latin Poetry1 (London 1864) ; Neale, 'Mediaeval Hymns and Sequences1 (London 1867) ; Schaff, (Christ in Song1 (New York 1868) ; Charles, (The Voice of Christian Life in Song1 (New York 1867) ; Daniel, (Thesaurus Hymnologicus1 (Leipzig 1841-56, 5 vols.) ; Mone, 'Lateinische Hymnen des Mittelalters1 (Freiburg 1853-55,

3 vols.).

James J. Walsh.

HYMNS, National. See National Hymns.

HYMNS OF HATE, two German metrical effusions composed in 1914 and 1915 by Ernst Lissauer and a man named Hochstetter. That of the former, (Hassgesang gegen England1 consists of three long stanzas, each ending with ((We (or They) have but one enemy — Eng¬ land !® The other has four shorter stanzas each concluding with ((God punish England !® This gave rise to a popular expression in Ger¬ many of <(Gott strafe England! 11 — a phrase at¬ tached to salutations, stamped on medals and for a time printed on little stamps and paper money. Lissauer's ((Hymn® was translated into English and sung in London music-halls — the audiences joining in the chorus. Consult Ger¬ ard, J. W., 'My Four Years in Germany1 (pp. 218 and 308, New York 1917). For transla¬ tions consult Current History (New York Feb¬ ruary and April 1915) ; New York Times (15 Oct. 1914) ; Public Opinion (London 5 Feb.

1915).

HYNDMAN, hind'man, Henry Mayers,

English Socialist and author : b. London, 7 March 1842.. He was educated at Trinity Col¬ lege, Cambridge; and entered journalism. He was special correspondent for the Pall Mall Gazette in the war of 1866 between France and Italy, made a world tour 1869-71, and wrote leading articles in favor of free education in the Melbourne Argus in 1869. In 1881 he was. one of the founders of the Social Demo¬ cratic Federation, and has since been active in the Socialist movement, being the acknowl¬ edged leader of the Marxian Socialists in Eng¬ land. In 1884 he founded and edited the paper Justice. His works include 'Historical Basis of Socialism1 (1883); 'Socialism and Slavery,1

a reply to Herbert Spencer; (The Commercial Crises of the Nineteenth Century } (Social Sci¬ ence Series, 1892) ; (Economics of Socialism) (1896); ' The Future of Democracy) (1915); the autobiographical (Record of an Adventur¬ ous Life) (1911) ; and (Further Reminiscences y

(1912).

HYPATIA, hl-pa'shi-a, Greek philosopher of the eclectic school, daughter of Theon, a celebrated astronomer and mathematician, who was at the head of the Neo-Platonic school in Alexandria early in the 5th century. Such was her reputation that she became a precep¬ tress in the school of Plotinus at Alexandria, and expounded the principles of his system to a numerous auditory of students from all parts of the East. Her house became the resort of all the persons of learning and distinction in Alexandria, and, among others, of Orestes the Prefect, between whom and Cyril, patriarch of Alexandria, a conflict respecting authority existed. A fanatical mob, believing that Hy¬ patia encouraged Orestes in his opposition to the patriarch, set upon and murdered her (March 415). Hypatia appears as the central figure of Kingsley's novel of the name (q.v.) 1853.

HYPATIA, or NEW FOES WITH AN OLD FACE (1853), is a striking and brilliant historical novel by Charles Kingsley. The scene is laid in Alexandria during the 5th cen¬ tum, a.d., and it is the story of a five-fold conflict among the Jews, the Roman authorities. Gothic invaders, Greek philosophers and Chris¬ tian sectarians of a pronounced militant char¬ acter. The main struggle is that between the attempt under the leadership of the gifted and beautiful Hypatia to restore to its former glory the ancient Greek pagan worship and philos¬ ophy and the counter efforts of the Christians under the leadership of Cyril to overcome both the Jews and the Greeks, as well as to make dominant their own power under the Roman

government. They are successful to the ex¬ tent of getting the upper hand of the Jews, of discomforting the Roman prefect and of mur¬ dering Hypatia, but their violence is shown in no amiable light. As in all of Charles Kings¬ ley's important books, (Alton Locked (Yeast, J (Westward Ho!) and others, genuine satisfac¬ tion lies only in the acceptance of a gentle, spiritual and charitable Christianity. This doc¬ trine is most manifest in the final philos¬ ophy and triumph over Hypatia of the con¬ verted Jew, Raphael Aben-Ezra, and in the ultimate destiny of Philammon, a young monk, who, coming to Alexandria, passed through the various phases of the turbulent life of Alex¬ andria and, rich in experience, spent his last days as a beneficent Christian abbot. The lat¬ ter character is the real hero of the book in that his various experiences furnish the main thread for the presentation of the philosophical elements and political and spiritual conflicts of the novel ; but Kingsley, in order to give a fuller account of contemporary affairs, is obliged to leave his hero from time to time and take the reader to witness such scenes as the defeat of Count Heraclian at Ostia or to visit with Saint Augustine and Synesius at Cyrene. The attempt is a panoramic account of the 5th century with, as is implied in the title, a very decided sermon in favor of spiritual Christianitv,

William T. Brewster.

HYPERBOLA, a conic, the Cartesian equation of which, by a proper choice of axis,

yp yp

can be made of the form — — ~~ = 1. The x axis

a2 b2

is called the transverse axis, and the y axis is the conjugate axis. The length of the trans¬ verse axis is said to be a, of the conjugate

axis ft.— – — = -l is another hyperbola, known

as the conjugate hyperbola of the first. The

x y

two lines — = ± ~ approach the hyperbola closer

than any assigned limit, and are called the assymptotes of the hyperbola. The points

(± a \ j > o) are called foci, and have

the property that the difference between the distances from a point on the curve to the two foci is constant. The ratio of the distance

from a point on the curve from (a|^_ _ 1 j >0)

to its distance from the line xa —

a £

a2+b2

has

v/fl2 I 2

the constant value – — — . This latter value

a

is called the eccentricity of the hyperbola,

and is often written e, and the lines x — zr. — — —

are known as directrices. If e=\/2, the hy¬ perbola is said to be equilateral or rectangular, has perpendicular assymptotes and is congru¬ ent with its conjugate. A non-denegerate conic with the equation

A x2+ Bxy-- Cy2- f- Dx-- Ey + F=0

is a hyperbola if B2 — 4 AC is positive. A hy¬ perbola is generated by the section of a cone by a plane which cuts both nappes, and ac¬ cordingly consists of two infinite branches. Projectively considered, it is a conic with two real points at infinity. See Conic Sections.

HYPERBOLE, hi-per'bo-le, a figure of speech. It consists in exaggeration for the purpose of making the object described more significant or striking. It is often employed in metaphors and similes.

HYPERBOREANS, hi-per'bo-re'anz, a mythical race, inhabiting a land beyond the Rhipaean Mountains. They were supposedly the bearers of sacrifices and gifts to Apollo, and were endowed with eternal youth. The name came to be applied ethnically to races of the Far North. Consult Roscher, (Lexikon der griechischen und romischen Mythologies

HYPERIDES, hi-per-i'dez, an Athenian orator: b. about 390; d. about 322 b.c. He studied philosophy and oratory, and began to practise at the law

courts. His prosecutions of Autocles, an Athenian general, for treason; of Aristophon during the ((Social Warw (358— 355 b.c.) , and of Philocrates for high treason (343 b.c.) , distinguished him as one of the leading public speakers of the time. His polit¬ ical sympathies led him to support Demosthenes (q.v.) and the democratic party. In the bitter struggle against Macedon, Hyperides equipped two triremes, and throughout was untiring in

his patriotic zeal. When Demosthenes was ac¬ cused of having been bribed by Harpalus, the treasurer of Alexander, the loyalty of Hyperi- des to his leader, long strained, snapped. He was chosen to lead the prosecution, and when the punishment of exile was inflicted on the head of the patriotic party, Hyperides was the choice of the people to fill his place. In the Lamian War against Antipater and Craterus, Hyperides was a conspicuous figure. His career came to an inglorious close at the deci¬ sive defeat at Crannon ; and he was condemned to death with the other leading orators of Athens. His efforts at flight were unsuccess¬ ful. He was overtaken by the agents of Anti¬ pater and killed. As an orator, Hyperides was fluent, subtle and popular. He had the power of rendering his speeches simply and tactfully, and with a certain attractive grace and assur¬ ance that carried his audience invariably. Of the large number of speeches which have been attributed to Hyperides, about 50 are consid¬ ered authentic. Research of the last century has brought to light a number of fragments, some of appreciable length. The funeral ora¬ tion over the Athenians who had fallen in the Lamian War was unearthed at Thebes in Egypt. The speeches (Against Phillippides) and (Against Athenogenes) were edited by F. G. Kenyon (London 1893). There is a complete edition of all the literary remains of Hyperides with an ample bibliography, under the title (Hyperidis orationes sex cum ceterarum frag¬ mentˆ (Leipzig 1894). Consult Jebb, R. C.p (Attic Orators1* (Vol. II, London 1880) ; Blass, (Attische BeredsamkeiC (Vol. Ill, Leipzig

1898).

HYPERION, hi-pe'ri-on, in Greek mythol¬ ogy, a Titan, son of Uranus and Ge, and father of Helios, Selene and Eos. Homer and later poets apply the name as a patronymic for Helios himself. The attribute of beauty has therefore been connected with the name, as in Shakespeare's comparison of <(Hyperion to a satyr.®

HYPERION, in astronomy, the name as¬ signed to the 7th satellite of

Saturn, discovered in 1848, at the Harvard Observatory by G. P. Bond. It is outside the satellite Titan, whose mass causes perturbations in the orbit of Hy¬ perion, which have proved to be a difficult prob¬ lem in celestial mechanics, and a unique case in the solar system. They apparently give large eccentricity to Hyperion's orbit, and cause the apparent line of apsides to follow the con¬ junction points of Titan and Hyperion, in a direction contrary to the usual motion of this line.

HYPERION. (Hyperion,> a fragmentary epic in blank verse, published in 1820, was begun while Keats was caring for his dying brother and was continued during his strug¬ gles with grief and hopeless' love. It is a fragment, yet a masterpiece. The theme, the triumph of the Gods over the Titans, is one of the most august in Greek myth, and the poem, in intensity of feeling and beauty of form, rises to its subject. The poem breaks off in the third book, leaving the hero, <(blazing Hyperion,® still unconquered, facing the in¬ evitable triumph of the young Apollo. But in its very incompleteness the fragment is perfect;

to end it would have been to weaken it. For the Titans have fallen before <(a power more strong in beauty.® In a poem that makes the old myth a symbol of the "eternal law® of the evolution of higher beauty, no such dramatic conflict as that of (Paradise Lost, no such triumphant consummation as that of Pro¬ metheus Unbound) is possible. Keats made one quickly abandoned attempt to recast the story. (Hyperion, a Vision) is but a groping beginning; but the noble lines recording the poet's search for the deeper vision born of suffering remain a poignant promise of the Keats that might have been. Shelley wrote: ((If the (Hyperion > be not grand poetry, none has been produced by our contemporaries.® It is poetry of an unescapable grandeur. The random course of (Endymion) has given way to clear-cut structure ; the romantic heroic couplet to a blank verse Miltonic in stateliness, lovely in melody; the misty fantastic scenes to imagery that is reality wrought of the poet's <(natural magic.® And the conquered Titans are depicted with a nobility, a humanity that alone would place (Hyperion > at the height of the poetry of Keats. Consult Colvin, Sidney, (John Keats) (New York 1917) ; de Selincourt, E., Introduction and notes in (The Poems of John Keats } (London) ; bibliography in Cambridge History of English Literature* (Vol. XII).*

Frances W. Cutler.

HYPERMETAMORPHOSIS. See Meta¬ morphosis.

HYPEROPIA, hi -per-6'pi-a, a refraction of the eye which may be either acquired or congenital. When the refracting surfaces are not sufficiently convex, parallel rays of light converge on a point behind the retina, instead

of on the retina, producing what is generally known as long-sightedness or hypermetropia. Hyperopia is the opposite refraction from myopia. See Vision, Defects of.

HYPERPYREXIA, hl-per-pi-rek'si-a. See Fever.

HYPERSPACES. Dimensionality. — In

order to make quite intelligible the concept variously denoted by such terms as hyperspace, space of higher dimensions or dimensionalitv, multi-dimensional space, w-space, H-fold or n-di- mensional space, it is in the first place neces¬ sary to explain the meaning of dimensionality and to indicate the way in which the dimension¬ ality, or number of dimensions, of a given space in a given element is determined or ascer¬ tained. Because, in order to determine the position of a point in a curve or straight line, it is necessary and sufficient to know one fact about the point, as, for example, its distance (with algebraic sign) from a fixed point or origin ; a line is said) to be a onˆ-dimensional space of points. But instead of the point, we may choose for element of the space (line) a pair or a triplet, . . . or an n-set of points.

In such cases, in order to determine the ele¬ ment, i.e., to pick it out or distinguish it from among all others of its kind, it is necessary and sufficient to know two or three, ... or « independent facts about it. Hence a line is 2. two- or three-, ... or w-dimensional space of pairs or triplets, ... or n-sets, of

points In like manner a flat pencil (totality of lines of a plane that have a common point) is a mm-dimensional space of lines, while its dimensionality is 2 in line pairs, 3 in triplets, and so on. For like reasons a plane is a two-dimensional space of points or of lines. In circles its dimensionality is 3, in conics 5, in curves of third order 9, and so on. It is at once seen that the dimensionality of a given space depends on the entity chosen for primary element, the element, i.e., in terms of which we elect to study and express the properties of the given space. Illustrations abound. A curved surface, as, say, a sphere, regarded as the envelope of (its tangent) planes, is a two-dimensional space of planes, while, conceived as the assemblage of (its tangent) lines, it is a three- dimensional space. The reader will observe that the term space is employed ge- nerically to denote any unbounded continuum of geometric entities. The generalization is, however, a natural one, for, for geometric pur¬ poses, ordinary space is viewed primarily as

an assemblage of elements of one kind or another. To determine the position of a point in ordi¬ nary space, three independent data (as the dis¬ tances of the point from three mutually per¬ pendicular planes of references) are necessary and sufficient. Ordinary space is, therefore, three-dimensional in points, and that is what is meant, consciously or unconsciously, when, without specifying the element (point), it is simply said that space is . three-dimensional. But tri-dimensionality is in no strict sense a definitive property of ordinary space. For some little understood, probably economical, certainly extra-logical, reason, the point recom¬ mended itself to primitive man as the element par excellence with which to geometrize, and so it has become traditional and proverbial that our space is essentially, uniquely, character¬ istically, intrinsically, exclusively three-dimen¬ sional. Such, however, it is not. It is indeed three- fold in planes as in points, but in lines it is /owr-dimensional. So? too, it is four- fold in spheres, but in circles its dimensionality is six. In general, it is possible by proper choice of element to endow any given space with any prescribed dimensionality however high. Ac¬ cordingly, if by hyperspace is meant a space of dimensionality greater than 3, the notion is simple and near at hand, we need not go beyond ordinary space to realize it, we detect it in the line, in the plane, in ordinary space, here, there and yonder. Well, such is one of the recognized significations of the term. But it has ˆanother,® namely, hyperspace usually means a space whose point dimensionality is four or more. Now this latter meaning is logically and conceptionally quite consistent with the other ; it is indeed a special case of it; but a hyperspace of points is difficult or im¬ possible to picture, to realize in visual imagina¬ tion, and it is this non-logical circumstance that renders the term hyperspace at once so tan¬ talizing, mysterious, baffling and fascinating to the non-mathematician. To the mathema¬ tician, however, whose activities, so far from being confined within the limits of the visual imagination, lie for the most part quite beyond them, the conception in question offers as such no difficulty whatever, and it has long since

established itself among the most approved of orthodox scientific notions.

Hyperspace of Points. —

What, then, is a hyperspace of points? How is the notion arrived at? And what is its utility? The values of a single continuous variable x are familiarly representable by the points of a right line; the ordered pairs of values of two independent variables xt and x2, by the points of a plane ; and the ordered trip¬ lets of values of three independents xh x2, x3, by the points of ordinary space. To the analyst with geometric bias or predilection, the sug¬ gestion immediately and forcibly presents itself and there ought to be a space whose points would serve to represent, as in the preceding cases, all ordered sets of values of n independ¬ ent variables Xi, x3, . . . xn .

Such a space

is not present to intuition, vision, or visual imagination. The mathematician is not in the least concerned, however, whether his two or three dimensional geometry appeals to any visi¬ ble space or not His geometry is simply the theory of a certain structure which is exempli¬ fied by the system of pairs or triads of numbers, and after an imperfect fashion by the space of our experience. The transition to the theory of the systems exemplified by number tetrads, pentads or n-ads is simple and natural.

Co-ordinates, etc. — In point space of n dimensions the simplest co-ordinates of the point are the distances Xi, x2, . . . xn of

*the point from n mutually perpendicular point spaces of n — 1 dimensions. These co-ordinate spaces, taken n — 1 at a time, determine n co¬ ordinate axes. A linear equation + £2*2-F*

• • • $nXn+ 1=0 defines or represents an n — 1- dimensional space of order one, the analogue of the plane in ordinary space. The s are the negative reciprocals of the axal intercepts of the

n — 1-space. Holding the .r's fixed and letting the c 's vary, the foregoing equation will repre¬ sent a point as envelope of its generating

n — 1-spaces. Two such equations together de¬ fine an n — 2-space as. their intersection or a straight line as their envelope. Similarly, three

such equations serve to represent an n — 3-space as locus of points or a plane as envelope of

n — 1-spaces, and so on. A space that is n-fold in points is also w-fold in spaces of n — 1-di- mensions. Its dimensionality is 2(n — 1) alike in lines and in spaces of « — 2 dimensions. In general, its dimensionality is p (n — p + 1) if the point space either of p — 1 or of n — p dimen¬ sions be taken as generating element. Not only, however, do the two last-mentioned elements furnish the same dimensionality, but they are indeed reciprocal elements of 77-fold point space, for the same system of equations which on proper interpretation defines one of the ele¬ ments admits of a second (dual) interpreta¬ tion defining the other. It thus appears that by taking as elements the various simple spaces of less than n dimensions for generating ele¬ ments of 72-fold point space, there arise n geometries of this space; or, if we regard two reciprocal theories as but two aspects of one geometry, the elements in question yield n : 2 or l (n — 1) :2 geometries according as n is even or odd, the element having (n — 1) : 2

dimensions being, in case of n odd, its own reciprocal, or self-reciprocal , like the line in ordinary space. See Line Geometry and Allied Theories.

Remarks on Four-space.— Thus point space of four dimensions is also 4-dimensional in ordi¬ nary spaces (say lineoids), the point and the lineoid being reciprocal elements. It is 6-di- mensional in lines and also in planes, which are also reciprocal elements of this space. It appears that this space, unlike ordinary space, does not admit of self-reciprocal construction. An equation of degree n in point (lineoid) co-ordinates Xi, x2, x.t, Xi, (~i» £2, £3, £4) represents a locus (envelope) of order (class) n. If n=\, the locus (envelope) is a lineoid (point). Two linear equations define a plane as locus or a line as envelope ; three, if independent, repre¬ sent a line as locus or a plane as envelope ; and four give a point or a lineoid. In general, two planes have, not a line, but only a point in common; reciprocally, two planes are not in general in a same lineoid. A lineoid being de¬ termined by four independent points, it appears that two arbitrary lines determine a lineoid. In 4-space a point can pass from the inside to the outside of a (2-dimensional) closed surface, such as an ordinary sphere, without going through the surface, just as in ordinary space a point can pass from the inside to the outside of a circle without crossing the circumference. Accordingly, in 4-space a 3-fold solid like the human body could be literally seen through, and no ordinary prison-house could confine.

Do hyperspaces exist? Undoubtedly they have logical existence, the concept of hyper¬ space being interiorly consistent and available for thought. More mathematics does not de¬ mand. The hypothesis of their ˆphysical® ex¬ istence, ˆnatural® science may yet be compelled to employ. Indeed it has been conjectured that certain chemical phenomena (as of the carbon compounds) may be due to greater freedom of motion than ordinary space affords. How¬ ever, except in so far as time and space are part of one 4-dimensional system, as is re¬ quired by the theory of relativity (q.v.) the ob¬ servations of physics do not find any clear evi¬ dence of a motion in the fourth dimension.

Bibliography. — The literature of the geom¬ etry (both pure and analytical) of hyperspaces is very extensive. It is, however, chiefly con¬ tained in the mathematical journals. All scien¬ tific nations have contributed to the subject, the Italians probably more than any other. The best work for the beginner is P. H. Schoute's (Mehrdimensionale Geometrie) (1902). An excellent explanation, addressed to the non¬ mathematician, of the concept of 4-space is found in Hermann Schubert's (Mathematical Essays and Recreations. >

Cassius J. Keyser,

Adrain Professor of Mathematics, Columbia University.

HYPERSTHENE, a mineral of the ortho¬ rhombic pyroxines, similar to enstatite and bronzite, but containing more iron. It is found in crystal forms occasionally, but most gen¬ erally in granular masses as a large constituent of igneous rocks, such as norite, gabbro, hy- persthene-andesite, etc. Excellent specimens are found also in connection with labradorite

and other basic feldspars. The color is brown¬ ish-black, sometimes with a bronze-reddish tinge, which responds to polishing and is valued for ornamental purposes.

HYPERTROPHY, in pathology, the over¬ growth of any part or organ resulting from equal increase of all the constituent parts of that part or organ. It may be caused, first, by an in¬ creased exercise of the part, an exemplification of which is seen in the blacksmith's arm ; sec¬ ond, by an increased supply of blood to a part, the part being healthy. Hypertrophy, as a rule, is a desirable process, the part or organ in ques¬ tion increasing in size and therefore in func¬ tion just as much as is necessary to supply un¬ usual demands made upon it. Mere increase of size, as in the case of abscess or tumors, in an organ is not hypertrophy.

HYPNOTICS are agents that induce sleep. They may be mental, physical or medicinal. Thus certain kinds of music, the human voice and suggestion may have power to induce sleep, which may also follow from eating, or from a walk, or a warm bath before retiring. All such simple measures should be used before drugs are resorted to in the treatment of in¬ somnia (q.v.). Hypnotics per se may be di¬ vided into two broad groups — those that induce sleep by alleviating pain and those that have no pain-relieving character. The latter are pure hypnotics. Combinations of the two are fre¬ quently employed in medicine. The pain- relieving drugs all come under the head of analgesics (q.v.). The pure hypnotics may be divided into a number of groups based on their chemical relationship, for in this class of drugs the relation between chemi¬ cal composition and physiological action is peculiarly close. Alcohol is one of the most prominent of the hypnotics, but while it is extensively used to induce sleep, the practice of taking a ˆnightcap® cannot be regarded as a safe one. Substituted alcohols, however, yield some of the most widely employed of all hyp¬ notics. Chloral, paraldehyde, amylene hydrate belong to this series, while from chloral as a basis a number of allied hypnotics have been made. These are chloralamide, chloralose, chloretone, urethane, etc., which are all re¬ garded as less objectionable than alcohol. They all dilate blood-vessels, relieve spasm and in¬ duce sleep. In large doses they depress the heart

action. Another group of hypnotics in¬ cludes substituted sulphur compounds. The most important of these are sulphonal, trional and tetronal. They are all closely allied in chemical structure. Sulphonal is the weakest, tetronal the strongest, trional occupies a middle position. In poisonous doses, and even in small doses if long continued, hypnotics of this group cause a form of chronic poisoning in which the red blood-cells are disintegrated. This is shown by the appearance of a cherry-red or purple-red discoloration in the urine. A third group of hypnotics depends on some form of bromine, as. bromides. Sodium bromide, potas¬ sium bromide, bromal bromoform, etc., are representatives. These are regarded as the least objectionable. They depress the activity of the brain and are useful hypnotics. If used very long the bromine compounds cause skin-erup-

tions, foul breath and heart-depression. See Alcohol; Chloral; Insanity; Insomnia; Neurasthenia; Sulpitonal.

HYPNOTISM, hip'no-tism, the process by which one person, called a hypnotist, obtains, holds and exercises control of the will, volun¬ tary powers and sensory organism of another person, the subject (or victim). The charac¬ ter of hypnotism has been a matter of long dispute, and the literature of the subject is very contradictory, but the facts have finally been demonstrated, and come to the knowledge of a number of advanced physicians, who are endeavoring to promulgate them. Hypnotism has been known and practised through the ages, and is referred to in early writings as the <(evil eye.® There is no reason to doubt that the sorcerers and wizards of olden times were in many cases hypnotists, whose bewitching consisted in hypnotizing others and taking ad¬ vantage of the supremacy thus gained over them. Dr. James Braid of England, originator of the word hypnotism, in 1841, gave public exhibitions of hypnotism, brought on by in¬ viting the subjects to blank their minds and gaze on a bright object, and then by exer¬ cising his will to overcome their wills. Be¬ cause he made no conscious use of animal magnetism, Braid thought he had discovered something different from mesmerism — the name given to hypnotic therapeutics as prac¬ tised by Franz A. Mesmer at Paris late in the 18th century. But it is now apparent that mesmerism and hypnotism are identical, except in the method of inducing the state of artificial somnambulism. It has also been demonstrated that the mediumistic trance is accomplished on the same underlying principle — that of robbing the subject or victim of his will power by a partial or total paralysis of the brain. It is also now known that hypnotism is not the harmless pastime nor the wonderful curative agent which it has long been supposed to be. It is

granted by all authorities on the subject that one person may surrender his will, and be put into an abnormal hypnotic sleep through exertion of the will of a hypnotist, and that in this condition the subject or victim can be made to do very many foolish and ridiculous things for the amusement of spectators, or he may be put into such a deep coma that a surgical operation can be performed without his knowledge or feeling any pain, the hypnosis serving the purpose of an anaesthetic. The dis¬ covery that hypnotism could be used to put patients to sleep for severe operations was hailed by the surgical profession with delight, as the anaesthetics generally used are not wholly satisfactory. It led to the practice of hypno¬ tism by various medical men, and some of them undertake to use it to cure bad habits, such as the liquor habit, by so-called ˆsuggestion® to the patient while he is under hypnotic in¬ fluence.

That all practice or experiment with hypno¬ tism is wrong and harmful is not at first ap¬ parent, and has been suspected only by a minority. Those stage exhibitors who found money in it, and those physicians who found it an interesting addition to their stock of methods of cure, have generally been loud in defending the practice when attacked, and un¬ questionably most of the physicians have been

honest in such defense. The continued de¬ lusion on the subject has been due largely to the misuse of the simple word ˆsuggestion® — there being so many suggestions which are harmless, and which are employed legitimately to effect cures by stimulating the faith of the patient. Faith is indeed a powerful curative agent, according to views held by many physi¬ cians.

But the so-called ((suggestion® of hypnotism is a very different thing, because what the hypnotist really does is to paralyze the normal action of the brain of his victim, and rob him of his will power; and then to give him, while this helpless state continues, imperative com¬ mands which he is powerless to resist, because he is for the time — in just so far as he is con¬ trolled — a slave to the will of his hypnotist. To call this ((suggestion® is somewhat like ap¬ plying the term suggestion to the act of the highwayman who orders one to hand out his money at the point of a revolver.

Foster's (Medical Dictionary) defines hypno¬ tism as <(an abnormal state into which some persons may be thrown ... by the exercise of another person's will, and consequent obedi¬ ence to the suggestions.®

The (Standard Dictionary) defines mesmer¬ ism as <(an abnormal condition resembling sleep, with or without somnambulism, during which the mind of the subject remains passively sub¬ ject to the will of the operator.®

Dr. John D. Quackenbos, in his work on (Hypnotism in Mental and Moral Culture, > states : <(It has long been known that a human being can be thrown into an artificial sleep, during which he sustains such a relation to an operator who has induced it that he is sensitive only to what the operator tells him he is sensi¬ tive to, and is wholly subject, so far as his mental operations and physical actions are con¬ cerned, to the volition of his hypnotist. A hypnotized person sees, hears, tastes, smells and feels what the operator says he sees, hears, tastes, smells and feels — and nothing else. For the time being his individuality is surrendered to the person who has hypnotized him.®

Dr. James R. Cocke says on page 35 of his work on (Hypnotism } : ((The moralists . . .

are right to condemn a practice which may rob a man of his free will without the possibility of resistance on his part.®

Dr. Luys, of the Charity Hospital of Paris, in his (Clinical Lectures, > says: <(You cannot only oblige this defenseless being (hypnotized subject), who is incapable of opposing the slightest resistance, to give from hand to hand anything you choose, but you can also make him sign a promise, draw up a bill of exchange, or any kind of agreement. You can make him write an holographic will, which he will hand over to you, and of which he will never know the existence. He is ready to fulfil the mi¬ nutest legal formalities, and will do so with a calm, serene and natural manner, which would deceive the most expert law officers. The som¬ nambulist will not hesitate, either, you may be sure, to make a denunciation, or bear false witness. They are, I repeat, the passive instru¬ ments of your will.®

Prof. L. A. Harraden, in his book (Hvpnotic Exhibitions (p. 10), relates how (*

thereupon made a man of straw and placed it, unknown to the patients, in a well-known

professor's bed. A properly submissive sub¬ ject was next chosen, put to sleep and fur¬ nished with a real dagger. He was then ordered to go and stab the sleeping professor through the heart. The sensitive promptly obeyed in an unmistakably thorough and de¬ cided manner.®

This same Prof. L. A. Harraden, in hypno¬ tism Made Easy,5 p. 5, says: ((The subject . . . responds as automatically as a locomo¬

tive obeys the manipulations of its driver. He is, indeed, for the time, a mere thinking autom¬ aton. He is given up to the domination of any idea that may be made to possess him.

. . . His mind, having lost its power of self- direction, cannot shake off the yoke of any dominant idea, however tyrannical, but must execute its behests.® He says also on p. 4; <(The subject is insensible to his surroundings and yet under perfect control of the operator, wh'o may direct his thoughts into any channel desired and compel him to execute any com¬ mand.®

Dr. J. D. Buck of Chicago writes in (Life and Action5 (Vol. II, p. 368) of a subject or victim of hypnotism : (

In Psychical Research Proceedings5 (Vol. XI, p. 146) Charles L. Tuckey says of Dr. E. Mesnet of Paris : <(He comes to the same con¬ clusion as Bernheim and Leigeois, of Nancy, that these highly sensitive subjects can be sub¬ jected to ill treatment, made to sign docu¬ ments and impelled to commit crimes by hypnotic suggestion.®

(The Great Work,5 edited by F. Huntley, p. 158, states : <(The hypnotic process . may be set in motion by any person who pos¬ sesses the necessary intelligence and will-power, quite regardless of his moral status; ... it may be invoked by a criminal of the most vicious and degenerate character.®

Moreover such subordination is progressive in its insidiously evil tendencies; for, as it has been truly said, the condition is more readily induced the second time than the first, the third time than the second, the subject ultimately becoming so pliant to the will of the operator that a fixed look or a wave of the hand may compel instant obedience.

Dr. I. Sossnitz of New York writes: <(Hypnotism is certainly not a cure for any disease. On the contrary, it is harmful in its final effect. The eminent French physician, Charcot, discarded it after a thorough trial, and many other prominent physicians have given it up as harmful. The mysterious and fascinating methods involved in hypnotism, and, above all, the lack of understanding of the fundamental points of hypnotism, are responsi¬ ble for the successful spreading of this mis¬ leading and dangerous (art.555

A ˆmodern instance® should find place here, and such an instance is recorded in the files of Chicago newspapers of June 1906. On the 22d of that month Richard G. Ivens. of Chi¬ cago, a peaceful, temperate, well-behaved young man of 24, of rather weak will but good character, was hung, having been found guilty

by a jury ((of very moderate intelligence® of assault and murder of a

young woman. His lawyer presented a good alibi, but the evidence against him was a confession twice obtained by the police under < (third degree® methods, and repeated somewhat different^ by him in court, but which he at (

The foregoing citations are made to em¬ phasize the ample scope of the evidence that hypnotism, when complete, robs the subject or victim of his will power, of his self-control and substitutes the control of another person. The honest physician hypnotist, who still believes in hypnotism as a therapeutic agent, has to face these facts : All authorities agree that hypnotism is an artificial, unnatural or ab¬ normal sleep ; they all agree that the victim is robbed of or loses his will power for the time; they all agree that his bodily functions respond to the will of his hypnotist. The victim is robbed of his will just as surely as if he were doped with whisky or morphine, but in addi¬ tion the robber obtains control of his will. But nature gives an individual power through his will to control his own functions, obviously for the purpose that he and he alone may con¬ trol them and be responsible; and so long as he exercises his will actively he sets up a barrier that no hypnotist can break down. This is why the hypnotist tells his subjects they must blank their minds and be passive.

These conclusions point to another interest¬ ing scientific fact which is making its impress on the scientific world. Mediumship has puzzled the leading scientists for over 50 years. They set out through the Psychical Re¬ search Society to prove mediumship and spirit¬ ualism a sham, and in the end Prof. Oliver Lodge, one of England's leading scientists, ad¬ mits he is convinced of the reality of these things, and asserts that he has communicated with the spirits of the dead. Lombroso, Flam- marion, Stead, Nordau and a host of others now admit Dr. J. M. Peebles' contention that it is possible to communicate with dis- carnate intelligences. If this be true, the process must be in harmony with universal laws of nature. That there is such a process, and that it is based on the control of the magnetic element of one person's being by another, as in hypnotism, is now confidently urged by many.

Bibliography.— Burrows, J. F., < Secrets of Stage Hypnotism5 (London 1913) ; Corva, A., (Telefonia Umana5 (Alessandria 1915) ; (Hypnotismt Telepathy, and Dreams5 (Unpop –

ular Review, New York 1914) ; Moll, A.,

1 Hypnotism } (ˆContemporary Science Series, * Vol. IX, London 1913) ; Wilkinson, S., (Recent Experience in Hypnotic Practice J (American Society for Psychical Research Proceedings, New York 1914) ; Willcox, W. H.,

HYPOCHLOROUS ACID, an acid hav¬ ing the chemical formula HC10, which is formed when chlorine monoxide, CbO, is dis¬ solved in water. The most convenient method of preparing it is by distilling a mixture of dilute nitric acid and a salt of hypochlorous acid. The sodium salt of hypochlorous acid known as sodium hypochlorite, NaCIO, may be prepared by passing a stream of chlorine gas through a cold dilute solution of caustic soda, NaOH; the reaction being 2NaOH + 2Cl = NaCIO + NaCl + H20. Potassium hypochlo¬ rite may be prepared in a similar manner. Crude calcium hypochlorite, Ca (C10)2, known in the trade as <(bleaching powder,® is prepared by acting upon slaked lime with chlorine gas. Hypochlorous acid and the hypochlorites possess powerful bleaching properties, owing to the readiness with which they part with a portion of their chlorine or of their oxygen. (See Bleaching). Hypochlorous acid is only known in its aqueous solution, which is a colorless liquid, with a peculiar smell. It decomposes readily with the liberation of chlorine, and the formation of chloric acid, HCIO3, the decompo¬ sition proceeding rapidly in .the sunlight. Hy¬ drochloric and sulphuric acids also decompose it with liberation of chlorine, the reaction in the case of hydrochloric acid being HC10 + HC1 = H2O + 2C1. Heat decomposes the hypochlo¬ rites, with formation of the corresponding chlo¬ rates and chlorides.

HYPOCHCERIS, hi-po-ke'ris, a genus of plants of the family Compositce. The leaves re¬ semble those of the dandelion, with more hairy surface, and the flowers are arranged and formed like the dandelion, but are smaller. It is generally relished by cattle. The most com¬ mon species is Hypochoeris radicata, found abundantly in fields in Great Britain and Eu¬ rope, and in the eastern United States. The common name is long-rooted cat's ear.

HYPOCHONDRIASIS, hI"po- or hip"- o-kon-dri'a-sis, a morbid condition of the mind in which an individual fears himself afflicted with various diseases. The name comes, from the ancient belief that the symptoms of this dis¬ order came from perversions of the vital force in the liver and pylorus of the stomach. The tend¬ ency to this condition is frequently inherited ; it is more common in males, and is sometimes brought on by excesses. Patients afflicted with hypochondriasis are apt to watch for any ex¬ pression of abnormality in their bodies, to con¬ nect various symptoms, and to readh the con¬ clusion that they are sufferers from some dis¬ ease. In conditions of perfect health any indi¬ vidual may have slight, temporary . twinges of pain, or may show passing changes in the func¬ tions of the organs; but by the hypochondriac these abnormalities are seriously

regarded, and efforts to disabuse him. are usually futile. Such constant fear and worry divert the nervous en¬ ergy from its proper course, and may cause actual disturbance of the bodily functions that

are serious. The condition known as neuras¬ thenia may follow ; also, more rarely, true mel¬ ancholia. The milder cases continue in actual good health, but become an unhappy burden to themselves and others. In the treatment it is to be remembered that mental occupation outside of the thoughts of self is essential to a cure.

HYPOCOTYL, hfipo-cot-il, the axis which supports the cotyledons of seed plants. The growth of this part of the plant raises the em¬ bryo and holds it in place. Darwin considered it the most sensitive and active organ of the seed plant in its earliest stages.

HYPOCYCLOID, in geometry, a kind of roulette, the path traced in the plane of a fixed circle by a point in the circumference of an¬ other circle which rolls inside of the fixed circle. It is the opposite of the epicycloid, or the curve traced by a point in the circumference of one circle which rolls on the outside of a fixed circle. In this connection two other roulettes or trochoids may be mentioned: (a) The epitrochoid, the curve traced by a point on the radius (or radius prolonged) of a rolling circle, but not on the rolling circle, but only on the outside of the fixed circle, (b) The hypo-trochoid, a curve generated in every respect like the epitrochoid, but with the exception that the generating or rolling circle runs only along the inside of the fixed circle. See Cycloid; Trochoid.

HYPODERMIC INJECTION (Greek hypo, under; derma, skin), a method of intro¬ ducing medicines through the skin into the sub¬ cutaneous cellular tissue, sometimes deep into the fibres of a muscle by an instrument specially made for the purpose. This instrument is the hypodermic syringe, which is made of glass, with a graduated scale engraved on it, and fitted with a long, hollow, needle-shaped point of steel. It must be filled before using, to prevent the possibility of introducing air into the veins. Hypodermic injection should never be resorted to excepting under the specific directions of a physician and patients are distinctly cautioned against using ((the needle® on themselves. A little carelessness in sterilizing may result in forcing germs into the system, resulting in ab¬ scesses or blood-poisoning.

HYPODERMIC MEDICATION, as op¬ posed to endermic medication, means the admin¬ istration of medicine by piercing the skin with a hypodermic needle so as to throw the drug direcitly into the circulation, and bring it im¬ mediately in contact with the seat of pain, if pain is to be treated. There are some drugs which act on. the system in a manner which

dif¬ fers in accordance with the method of their ad¬ ministration ; thus podrophyllin is a powerful cholagogue when administered through the mouth; when administered hypodermically it promotes the secretion of the kidneys. There are, however, distinct advantages of a general character in this method of administering drugs. The action of the drug is more rapid, sometimes instantaneous ; the effect is concentrated and in¬ tensified ; it takes a smaller dose to produce the desired effect; it is sometimes easier and pleas¬ anter than administration by the mouth, and often obviates unpleasant or even dangerous complications. The process of hypodermic in¬ jection was invented and brought into vogue by Dr. Alexander Wood of Edinburgh.

HYPODERMIS, in plants, a layer of cells underlying the epidermis. Tissues juxtaposed to the hypodermis and cells originating directly under the epidermis are called hypodermal.

HYPODERMOCLYSIS, hi'po-der'moc- li'sTz, the subcutaneous infusion of saline solu¬ tion, which is steadily replacing blood trans¬ fusion in operations. See Transfusion.

HYPOGENE, a term applied to the inter¬ nal forces of the earth that produce deformation of the crest. See Geology.

HYPOPHO.SPHITES, salts of hypo- phosphorus acid (q.v.).

HYPOPHOSPHOROUS ACID, an

oxyacid of phosphorus, having the formula H3PO2. The free acid is of no importance in the arts, but its salts, which are called (

HYPOPHYSIS. See Pituitary Body.

HYPOSCOPE (from Greek words mean¬ ing ((to see under®), is the name given to an instrument adapted to be secured to the stock of a rifle near the breech, and intended to enable a marksman to fire with accurate aim without exposing his head to the fire of the enemy. The successful American contestants for the Palma trophy at Bisley, England, in 1903, brought back with them this device, which seems likely to play an important part in the warfare of the future. It was invented by Wil¬ liam Youlton of Brighton, England, who con¬ ceived the idea of it after the battle of Colenso in the Boer War, during which it is stated that not a single Boer was to be seen. Later in the war it was employed with good results, its use at Mafeking receiving particular mention.

The hyposcope consists of a series of mir¬ rors mounted in a tube of inverted L shape ; the shorter arm lies across the barrel of the rifle, while the longer arm hangs down at one side.

HYPOTHESIS

The first mirror reflects the light coming in along the barrel of the rifle to a second mirror at the elbow of the instrument, which directs the rays downward to a mirror at the lower end of the tube, and thence it passes out at right angles to the eye. Thus on looking in at the eyepiece one can see the sights of his rifle, and take accurate aim while holding the gun above his head. The vertical arm of the instrument comprises two telescoping sections so that, by means of a thumbscrew at the side, this arm may be extended to elevate the device for long- range shooting. The amount of elevation may be accurately determined by means of a fine scale on the upper section. In order to allow for windage, a thumbscrew at the end of the horizontal arm may be rotated to move the mirror contained therein slightly to one side or the other. A scale on this arm shows just how far the mirror must be moved for different velocities and directions of the wrind. The entire instrument is very compact and light, weighing about a pound. It is provided with a holster in which it may be encased to prevent it from - sus¬ taining any injury when not in use.

The advantages of this instrument in actual warfare will be apparent to all. Only the muz¬ zles of the rifles are exposed to the enemy, and the soldiers are entirely concealed in the trenches. But aside from its advantages as a means of protection, the device will be found greatly to increase the effectiveness of the firing. The fear of being shot while taking aim makes the soldier fire hurriedly and at random ; with the hyposcope attached to his rifle no fears will be entertained, and the soldier may fire de¬ liberately and with perfect aim. By applying it to the end of a field-glass, an observer can watch the movements of the enemy without dan¬ ger of discovery. It has also been designed for use on Maxim guns. Hyposcopes and similar instruments were much used by snipers during the great World War.

HYPOSTATIC UNION, the union of the divine and human nature in the one person of Jesus Christ. See Trinity and related refer¬ ences.

HYPOTENUSE, in geometry, the longest side of a right, angle triangle, opposite the right angle. According to Euclid, the square on the hypotenuse equals the sum of the squares of the other two sides, a theorem whose proof is gen¬ erally attributed to Pythagoras. Recent re¬ search has discovered similar proofs in Egyp¬ tian and Chinese philosophies, considerably pre¬ dating the Greek philosopher.

HYPOTHEC, HYPOTHECATION, a

property lien arising from the operation of law or from a special agreement or contract. In Ro¬ man law it empowered the creditor to seize and dispose of the debtor's property. If more was realized from the sale than the amount of the debt such amount was returned to the erstwhile debtor. The debt might arise similar to a mort¬ gage or a lien. See Lien; Mortgage; Real Property.

HYPOTHESIS, in logic, the antecedent of a conditional proposition. An extensive mathematical or scientific investigation often as¬ sumes the form of a vast conditional prop¬ osition. In such a case the hypothesis is usually stated once for all at the beginning and taken for granted in the rest of the investigation.

HYPOTHETICAL QUESTION — HYPSOMETRY

Mathematics is neither more nor less than the study of hypotheses of this type and the de¬ duction of their^ logical consequences. Thus the axioms of Euclidean geometry form the hypothesis on the basis of which the proposi¬ tions of geometry are proved. In natural science the truth of the hypothesis, which is a matter of indifference to the mathematician, is of fundamental importance. As this is but rarely, if ever, subject to a direct inspection, and cannot always be deduced from known gen¬ eralizations, a hypothesis is generally established or destroyed by reference to its logical conse- quences. While a single unfulfilled consequence of a hypothesis is sufficient to refute it, no num¬ ber of verified consequences, however large, is adequate to its complete demonstration. How¬ ever, hypotheses have certain properties, by virtue of which their degrees of difference or similarity may be compared. It is, moreover, a principle generally valid that the fewer and less important are the details in which a hypoth¬ esis breaks down, the slighter will be the dif¬ ference beween it and the true hypothesis. Thus a scientific hypothesis, which at first furnishes only a very crude approximation to the ob¬ served facts, by the gradual remodeling of de¬ tail after detail, comes as close to the truth of the matter as may be desired. The Darwinian hypothesis of natural selection is a good ex¬ ample of this ; slow variations have been found an insufficient basis for evolutionary changes, and have been replaced by mutations ; the theory of the inheritance of acquired characteristics has been discarded ; and the whole notion of the survival of the fittest has been accommodated to these changes in opinion. The modern theory of evolution is thus more firmly established than its predecessor, though it still remains a hy¬ pothesis capable of further rectification. See Induction.

HYPOTHETICAL QUESTION. See

Evidence.

HYPOXANTHINE. See Sarcine.

HYPSOMETRY (Greek, <(height-measure- ment®), the art of determining differences of elevation on the earth's surface. Three dis¬ tinct modes of procedure may be adopted for measuring a given difference in level. The first and most accurate of these consists in running a (

same kind is made upon it at this point. The height above the ground of the division that is here found to be on a level with the instru¬ ment is then subtracted from the known height of the cross-hairs in the telescope and the re¬ sult is the height of the point C. The instru¬ ment is then carried forward to a point, D, situ¬ ated beyond C, and the altitude of a still more remote point, E, is determined in the same manner, by observing the graduated staff at C and at E, and then calculating the height of E from the known height of C, as determined by the preceding operation. A chain of ob¬ servations of this sort is called a "line of lev¬ els,® and it is obvious that the difference of ele¬ vation of any two points whatever may be de¬ termined with great precision by running such a line from one of them to the other.

The labor and expense of joining two dis¬ tant points by a line of precise levels are often prohibitively great; and hence when a high order of accuracy is not essential, trigonomet¬ ric or barometric methods are used instead. In determining the height of a mountain (for example) by the trigonometric method, a con¬ veniently situated station is selected, from which the summit of the mountain can be well seen and the horizontal distance from this sta¬ tion to the vertical line passing through the summit of the mountain is first determined by any of the methods used by surveyors for de¬ termining the distance of an inaccessible ob¬ ject. The apparent angular elevation of the mountain is next observed; that is, the angle included between the horizontal plane through the station and the line joining the station to the top of the mountain is measured. If the earth were flat and devoid of any atmosphere, these data would enable us to compute the height of the mountain with considerable pre¬ cision. For the vertical height of the moun¬ tain above the station and its horizontal dis¬ tance from the station, and the line joining the station to its summit, would constitute the three sides, of a right-angled triangle; and the base of this triangle being known, as well as one of the adjacent angles, its vertical height (that is, the height of the mountain above the observing station), could be easily calculated by the ordinary rules of trigonometry. In the actual case, however, the problem is compli¬ cated by the curvature of the earth's surface and by the refraction effects due to the pres¬ ence of the atmosphere. Corrections can be easily applied for the curvature, since that

is constant in any given spot, and its value is well known. The refraction effects, however, are variable from time to time, according to at¬ mospheric conditions; and it is impossible to determine them, at any given moment, with a precision sufficient to enable the trigonometric method to compete, in accuracy, with the method of leveling already described.

The third general method of determining elevations on the earth's surface depends upon the fact that the atmosphere possesses weight, so that its pressure diminishes as we pass up¬ ward. The difference in depth of two given points below the surface of the sea can be de¬ termined with a good deal of precision by not¬ ing the hydrostatic pressures at the two points. If these pressures are expressed in pounds per square foot and their difference is divided by the weight, in pounds, of a cubic foot of the

water, the quotient will be the difference in depth of the two points, expressed in feet. The same general principle applies to the determina¬ tion of the differences of elevation in the at¬ mosphere, only in this case the problem is far less simple in its actual application, because the air, instead of having a practically constant density as water has, is very elastic and com¬ pressible and very sensitive to changes of tem¬ perature. The observations, therefore, have to be combined by means of a formula which will take these facts into account, so far as possible. In determining differences of height by this method (which is called ((barometric hypsom-etryw)> the difference in atmospheric pressure at the two poinvs that are to be compared is usually determined by means of barometric readings, though the boiling-point method, to which reference will presently be made, is also used. The mercurial barometer gives the most accurate results, but the aneroid form is so much more convenient to manipulate and trans¬ port that it is commonly preferred for ordinary work. (See Barometer). When the differ¬ ence of elevation between two given stations is to be determined, it is preferable to make the barometric observations at both places simul¬ taneously, simultaneous observations of the at¬ mospheric temperature being also taken. This implies the co-operation of two observers and the possession of two sets of instruments ; and hence it is not always feasible. When the work is carried out by a single observer, or with a single set of instruments, the observations should be made first at Station A, then at Sta¬ tion B and finally at Station A again ; the average readings at Station A, both of baro¬ metric pressure and of temperature, being adopted as the definite observations at that sta¬ tion. In this way the effects of variations of temperature and pressure are eliminated as far as possible. If h is the average reading of the barometer at the lower station, in

inches, and H is the reading of the barometer at the upper station, also in inches, and if t and t' are the temperatures observed at the two stations, on the Fahrenheit scale, then the difference in height between the two stations, as expressed in feet, is approximately

(log h — log H) X60.1S8.6X (1 + '-~H'~64)

In place of the barometer, an instrument called a Niypsometer® is sometimes used for determining the difference in barometric pres¬ sure between the two stations. The hypsom- eler is essentially an instrument for determin¬ ing the boiling point of water with a consider¬ able degree of precision. Water, which at the normal atmospheric pressure boils at 212° F., boils at a lower temperature on the tops of mountains, where the atmospheric pressure is less. The change in the boiling point is ap¬ proximately 1° F. for every 511 feet of ascent; though this relation is not exact. In the practical application of the method, the boiling point is observed, on the mountain top, by an accurate thermometer which should be graduated as fine as fiftieths of a degree on the Fahrenheit scale. The difference between the temperature so obtained and 212° F. is then multiplied by the constant factor 511 and added to n (n — 1), where n is the difference in tem¬ perature, and the result is the desired estimate

of the height of the mountain above the sea. This procedure, it will be seen, assumes that at the time the observation is made, the atmos¬ pheric pressure at the sea-level has its normal (or average) value, so that water would boil there at 21 2° F. precisely. This condition will seldom be more than approximately fulfilled, and hence the method by boiling points, as usu¬ ally carried out, is more uncertain than the barometric method as described above. The thermometric method is very convenient, how¬ ever, and for this reason it is in strong favor among travelers and explorers, who usually are content with a more or less rough approxima¬ tion to the height to be measured. The method is capable of being refined further than has here been indicated ; but when more accurate results are desired than are obtainable by the process as described above, it is better to make use of simultaneous readings of the barometer and thermometer, at the two stations to be compared. (See Surveying). Consult John¬ son, (Theory and Practice of Surveying) (17th ed., rewritten by L. S. Smith, New York 1913).

HYRACODONTS, small, long-legged, slender, swiftly-running prototypes of the rhi¬ noceros of the early Tertiary. -They had short heavy heads and no horn on the nose, so that they depended entirely on their speed for safety and had much the look and manners of the primitive horses. The group (Hyracodon – tide?) was a large one, but the typical hyraco- donts were confined to the Eocene and Oligo- cene periods of North America.

HYRACOTHERIUM. See Horse, Evo¬ lution OF THE.

HYRAX, hi'raks, the type-genus of a group of small rabbit-like, animals forming the group Hyracoidea. There are two species, not very sharply defined, the daman (H. Syriacus), which spreads from the African shores of the Red Sea t

HYRCANIA, Asia, an ancient district, south of the Caspian Sea, bounded on the east by the Oxus River, and on the southeast by the. Elburz (formerly Sariphi) Mountains, which marked the boundary between the dis¬ trict and Parthia; and on the west by Media. Hyrcania covered the territory now occupied by Mazanderan and Astarabad. Its chief city was called Tape by Strabo, and was probably situated on the site of the present city of Astarabad.

HYRCANUS (her-ka'nus) I, John Hyk- canus, a Jewish high-priest and prince of the Asmonean family, who ruled in 135-105 b.c. He was the son and successor of Simon Mac- cabaeus. At first dependent on the Syrians, he succeeded in throwing off their yoke, and also in subjugating the Samaritans. He next over¬ came the Idumaeans, and obliged them to sub¬ mit to Judaism. He afterward confirmed his powers by an alliance with the Romans and made Judaea more powerful than it had been since Solomon's time. He was originally a Pharisee, but ultimately favored the Sadducees.

HYRCANUS II, high-priest of the Jews and prince of the Asmonean family, who ruled intermittently from 69 b.c. to 30 b.c. He was the grandson of Hyrcanus I. His younger brother, Aristobulus, seized the government, and finally Pompey removed Hyrcanus from the kingship, and made Antipater of Idumaea gov¬ ernor of the colony. In 47 b.c. Caesar pro¬ claimed Hyrcanus tetrarch and high-priest. Antigonus, son of Aristobulus, deposed Hyr¬ canus and removed him to Seleucia, whence later, at the request of Herod, he returned to Jerusalem, where he was finally put to death (30 b.c.) .

HYSLOP, his'lop, James Hervey, Ameri¬ can psychologist and educator : b. Xenia, Ohio, 18 Aug. 1854; d. 17 June 1920. He was educated at Wooster University (Ohio), at Leipzig and the Johns Hopkins universities, taught suc¬ cessively in Lake Forest University, Smith Col¬ lege and Bucknell University, and was appointed professor of logic and ethics in Columbia Uni¬ versity. He became well known for his con¬ nection with the investigations of the Society for Psychical Research, of which he was the secretary, and as editor contributed extensively to its proceedings and Journal. His further work includes articles in prominent periodicals ; an edition of Hume's (Ethics > (1893) with in¬ troduction; a textbook on (The Elements of Logic (1892); one on (The Elements of Ethics* (1895) ; (Democracy: A Study of Gov¬ ernment (1899) ; (Logic and Argument (1899); (A Syllabus of Psychology) (1899); (Problems of Philosophy* (1905); (Science and a Future Life) (1905) ; (Enigmas of Psy¬ chic Research* (1906) ; (Psychic Research and the Resurrection (1908) ; (Psychic Research and Survival * (1913).*

HYSSOP, his'up (Hyssopus) , a genus of plants of the family Menthacece, with four straight diverging stamens and a 15-ribbed calyx. The common hyssop (H . officinalis) is a perennial shrubby plant about two feet in height. The leaves stand in pairs without petioles. The flowers are blue, growing chiefly on one side of short verticillate spikes. It is a native of the south of Europe and the East, and is sparsely naturalized in the United States. The leaves have an agreeable aromatic odor, and an extract from

them is produced by water and spirits. The hyssop of Scripture (that is, the plant whose Hebrew name ezob has been translated (

somewhat similar properties. The name of hedge-hyssop is applied to species of plants of the genus Gratiola, belonging to the family Scrophulariacece.

HYSTASPES, his-tas'pez, the name of several persons in Persian history: (1) The father of Darius I, who, while ruler of Persia, made his son governor of Parthia. He has sometimes been identified with Vishtaspa, the patron of Zoroaster in the Avesta, but later historical research has established the impos¬ sibility of this theory. (2) The son of Darius I, and brother of Xerxes. He is mentioned as having led a contingent of Bactrians and Sacse in the army of Xerxes. Consult Jackson, 'Zoroaster, the Prophet of Ancient Iran) (New York 1898) ; and Justi, Uranisches Namen- buch) (Marburg 1895).

HYSTERESIS. See Magnetism.

HYSTERIA, a morbid state of the nerv¬ ous system in which the clinical manifestations present a wonderful variety of symptoms closely simulating some forms of organic disease. There is often increased physical irritability; the condition is frequently manifested by neu¬ ralgic pains, hypersesthesias, hallucinations and convulsive and paralytic phenomena. It may foe regarded as a brain affection — a mild insanity.

Among the causes of hysteria heredity plays • a most important part. There may be direct transmission of the hysterical temperament from parent to child or other nervous mani¬ festations in the family and its branches, such as epilepsy, chorea, neuralgia, insanity, etc. It occurs more frequently in women, but it is much more common in men than is ordinarily believed ; it occurs in boys and girls at a ten¬ der age or about the time of puberty. Briquet found that one-eighth of his cases were in children under 10 years of age. Anything which lowers the general tone of the nervous system may give rise to it in predisposed per¬ sons. Haemorrhages, severe illness, poor food, anaemia, overwork in uncongenial occupations, anxiety, fright, jealousy, disappointments, make a profound impression; so does an education which fosters and stimulates inherited insta¬ bility, The enforced social restrictions of women, which they often inflict upon their young children, with lack of proper exercise for physical development and an artificial and premature education and habits heighten this predisposition. Accidents are a frequent cause of the first appearance of hysteria, as has been clearly pointed out by Charcot. The disease may, at times, occur in young girls who have witnessed attacks in others.

To understand the symptoms of hysteria, it must be borne in mind that there are two classes of phenomena. These have been termed the mental stigmata and the mental accidents. The stigmata are anaesthesias (loss of sensa¬ tion), amnesias (forgetfulness), abulias (loss of will power), motor disturbances and modi¬ fications of character. These are the cardinal symptom-groups that characterize the mental state of the hysteric. Any or all of the mental accidents may likewise be noted — suggestibility and sub-conscious acting, fixed ideas, ecstasy, automatism, convulsive movements, sleep-walk¬ ing, deliriums, etc. The occurrence of these constitutes important corroborative evidences of

hysteria and while not found in all hysterics, they may be very common symptoms.

Hysterical persons often complain of some of the symptoms found in neurasthenia — neu¬ ralgic pains in various parts and hypersesthetic areas about the abdomen, chest or back, fre¬ quently in the neighborhood of the ovary, mam¬ mary gland, etc. There may be anaesthetic patches in various parts of the body or there may be complete loss of sensation on one side associated with anaesthesia of the mucous mem¬ branes. The special senses on that side are involved ■ — sight, taste and hearing.

There may be irritations of the bladder and urethra; pain in the joints, which may be mis¬ taken for joint disease.

In some cases the senses are exceedingly acute. Persons notice odors imperceptible to others; are often made sick by odors which do not affect normal individuals ; may have a liking for odors and substances disagreeable to others. Perverted sense is shown in an abnormal taste, in eating soap, slate-pencils, etc. Hysterical manifestations in some are simply emotional exaggerations ; they laugh and cry without cause. In serious attacks there are likely to be various hysterical manifestations. Occasion¬ ally tactile sensibility is disturbed and the muscular sense may be abolished. The anaes¬ thesia may affect the mucous membranes of mouth, pharynx and nose, abolishing the re¬ flexes of the parts. The secretions may be diminished or arrested.

Spasmodic convulsions and paralytic phe¬ nomena may occur. The spasmodic attack may be rhythmic ; may simulate the trembling of organic disease; may be confined to one mem¬ ber or involve the entire half of the body; may be coarse, as in disseminated sclerosis, or a fine tremor, as in

paralysis agitans, or the tremor may simulate the trembling of organic brain dis¬ ease. It may occur in any muscle or group of muscles ; may manifest itself as contracture, which may be intermittent or may last contin¬ uously for months or years. Contracture may be confined to the strong muscle of the jaw and other muscles in their neighborhood, causing trismus. Spasms of the glottis may take place giving rise to severe difficulty in breathing; or of the pharynx, causing difficulty in swallowing. Globus hystericus is a constant symptom, but is not as frequent as it is often thought to be. Persistent and severe vomiting often occurs, but the nutrition rarely suffers materially from these attacks. Retention of urine is frequent, owing to spasm of the sphincter, and the catheter may have to be used for months.

Paralysis occurs in these cases; it is variable in distribution and may come on suddenly after a convulsive attack or without it; it may be flaccid or associated with contracture ; it may come on slowly; it may be confined to one limb or be hemiplegic in type.

Hysterics are easily affected by pleasurable or painful impressions, and there is often a morbid craving for sympathy and attention. They may show moral perversion ; may lie, steal, quarrel with and intrigue against their own family; may form and change attachments and dislikes without obvious reason ; may mani¬ fest aversions, as to frogs, spiders, mice, cats, etc. ; may deceive for deception's sake or to excite wonder. Some are painfully depressed;

they have forebodings or are compelled to do certain acts. Here the hysterical insanities are approached on the one hand and the imperative conceptions and neurasthenias on the other.

Hystero-epileptic attacks in their greatest severity are often preceded by general discom¬ fort or by hallucinations of vision and hearing. Usually sudden, they may be preceded by an <(aura,}) globus hystericus, singing in the ear, etc. Breathing is spasmodic; consciousness is obscured; the convulsion may be similar to those of mild epilepsy. In some cases the body is thrown into all sorts of contortions. An ex¬ treme opisthotonos may be present, the body being bent backward, resting on the head and heels. Gestures and noises are made. Some¬ times religious ideas have an influence over the attitudes assumed; at other times, ideas of de¬ moniacal possession.

From milder forms, recovery is the rule. In graver cases, and when there is a strong neuro¬ pathic tendency, the persons will probably pass from one hysterical manifestation to another.

Treatment. — In cases where there is deterioration of the physical health, tonics and nutritious diet should be given. Hydrotherapy improves nutrition and also the mental state. Many drugs have been recommended, but they are all uncertain in their action, at one time giving a result and failing at another. Convul¬ sive attacks may at times be stopped by the cold douche to the spine. Isolation from the family circle is of the utmost importance in the treat¬ ment of these cases. Every effort should be made to discover the psychic shock which has produced the attack. Only the patient may have knowledge of this and he will not often reveal it. There is no disease the treatment of which it is more difficult to describe. Suggestion- therapy gives by far the best results, but the great difficulty is that good results are rarely permanent.

Bibliography.— Charcot, (Legons sur les maladies du systeme nerveuxP tome 3; Fox,

(Psycho-pathology of Hysteria (Boston 1913) ; Freud, (Studien fiber Hysterie) (Vienna 1909) ;*

(Selected Papers on Hysteria and Other Psychoneuroses (New York 1912) ; Jolly, 'Hys¬ teria*; Ziemssen, 'Cyclopedia of Medicine*; Seguin, 'Hysterical Symptoms in Organic Dis- ease) ; Janet, (Mental State of Hysterical (1902) ; Richer, 'Paralysis et contractures hysteriques* (Paris 1892).*

Smith Ely Jelliffe.

HYSTEROPHYTES, his'te-ro-fits. See

Fungi.

HYTHE, hith, England, a market town and municipal and parliamentary borough of Kent, about 70 miles southeast of London, served by the South-Eastern and Chatham Railway. It is situated not far from the sea, Romney Marsh intervening, and is a popular resort. Hythe is connected with Sandgate, three miles distant by a sea-wall and parade, and an electric tramway along the shore front. On a height near the town is the interesting church of Saint Leonard, of late Norman style. In its vaults there are several human skulls and bones, supposed to be the remains of Norsemen or Danes killed in battle near the town in 456. The cemetery near the church contains the re¬ mains of Lionel Lukin (b. 1742; d. 1834), the

inventor of the life-boat. The guildhall of Hythe was founded in 1794. Saint Bartholo¬ mew's Hospital was founded in 1336 by Haimo, Bishop of Rochester, while Saint John's Hos¬ pital is still older, the date of its foundation as a lepers' home being unknown. It was remod¬ eled and reconstructed in 1802. In 1854 the government established a musketry school at Hythe, which has far outgrown its original proportions. Not far away from Hythe is Lympe, now three miles inland, which is thought to have been the original harbor, which as one of the Cinque Ports, enjoyed special privileges. The course of the estuary is easily traceable for all the distance between Hythe and Lympe. The latter place has the ruins of a Roman fortress and modern excavations have uncovered many other Roman remains. Great parts of the walls of the Roman fortress still stand, together with a well-preserved circular watch-tower. Some of the material of the Roman Portus Lemanis were used in the early English church of Lympe, the tower of which was built by Lanfranc. Saltwood Castle nearby is of great historic interest, being very old even in the time of Richard II. In 1026 it was given to the See of Canterbury; was escheated to the Crown after the murder of Thomas a Beckett, and again given to Canterbury by King John. The archbishops resided there until the reign of Henry VIII. In 1882 it was restored as a residence. Hythe, variously spelled Heya, Hethe, Hithe, i.e., landing-place, was already of importance as a seaport in Saxon times. Half- den granted it to Christ Chursh, Canterbury. In the Domesday Survey the borough is given as part of the archbishop's domain, and the bailiff of the town was his appointee. It was one of the Cinque Ports even before the Con¬ quest ; its liberties and privileges were con¬ firmed by King John in 1205 as they were under Edward the Confessor. These privileges were again confirmed in Magna Carta, and subse¬ quently by general charters from various kings down to James II. In return for these privi¬ leges — freedom from toll, etc., — Hythe with its sisters of the Cinque Ports furnished 57 vessels for the service of the sovereign, and of these five were furnished by Hythe. In 1365 it sent

four members to Parliament, this being the first time it had any representation there. The gov¬ ernment of the port until 1574 was vested in twelve jurats; but in that year Queen Elizabeth incorporated it under the title of ((mayor, jurats, and commonalty of Hythe.® On 29 June privilege was granted to hold a fair for the sale of fish. The filling up of the harbor with sand gradually choked off the sea-borne com¬ merce of the town and it declined considerably in importance. The waterworks are the prop¬ erty of the municipality. Pop. 6,500.

HYVERNAT, hi'ver'nat, Eugene Xavier Louis Henri, French- American Oriental scholar: b. S. Julien-en-Tarret, Loire, 30 June 1858. He was educated at Saint John's Semi¬ nary and the University of France, Lyons, the Seminaire de S. Sulpice and Seminaire d'Issy, Paris. In 1882 he was

ordained to the priest¬ hood and the following three years was chaplain of the church of Saint Louis of the French, at Rome. From 1885 to 1889 he was employed as interpreter of Oriental languages at the Propaganda, Rome, and also in 1885-88 as professor of Assyriology and Egyptology at the Roman Seminary. He also spent a year in Armenia on a scientific mission for the French government. Since 1889 he has been chief of the department of Semitic and Egyptian litera¬ tures at the Catholic University of America, Washington, D. C., where he is also professor of Oriental languages and archaeology. He is a member of the Pontifical Roman Academy dei Nuovi Lincei, the Roman Academy of Archaeology, the American Oriental Society and many other learned and scientific societies of both America and Europe. He has published (Les actes des martyrs d'Egypte) (1886) ; Al¬ burn de paleographie copte5 (1888); with Paul Muller-Simonis, (Du Caucase au Golfe Per- sique5 (1892). He compiled (Acta Martyrum,5 with Coptic text and Latin translation, with G. Balestri (Paris 1907-08). He edited ˆcrip- tores CopticP ; (Corpus scriptorum christian- orum orientalium5 and collaborated in Vigou- roux's (Dictionnaire de la Bible5 and (The Jew¬ ish Encyclopedia,5 of which he was consulting editor.

I

Ithe ninth letter and third vowel of all the alphabets of western Europe, came into the Latin alphabet from the Greek. It is named in Greek iota, which is the yod of the Hebrew and the corresponding let¬ ter of the Phoenician alphabet from which the Greeks derived it. Iota and yod (whence jot) being the smallest letter in the Hebrew and Greek, gave occasion for the New Testament phrase (

The dot over the i appears first in MSS. of the 13th century. The sound value of i in all languages except English is constant and is equal to e in he and to i in him. What is called the long sound of English i as in hide is a diph¬ thong made up of the two vowels a and i: this value of i in English is believed to have been given to the letter not earlier than the 16th cen¬ tury; till then the letter had the same sound in English as in other languages.

In the standard alphabet of philologists the values of the vowels are about as in the lan¬ guages of continental Europe, in which i is sounded as English e.

It is the general rule in English pronuncia¬ tion that i followed by two consonants in the same syllable is short; yet when the two con¬ sonants are Id or nd the i is nearly always long and diphthongal, for example, mild, rind; in wind (noun) it is short, but in wind (verb) it is long. Combined with o it forms a true diph¬ thong of' as in oil; it also forms diphthongs

with e and a, as rein, aisle, or mere digraphs repre¬ senting sounds in which often the i has no part; examples : seize, pier, friend. Usually a final e indicates that the i in a word is to be pro¬ nounced as the. diphthong; for example, fine as contrasted with fin ; yet genuine is genuin; or . the i is pronounced as e long, — marine, quinine, Augustine.

In Pope's time and long after oblige was pronounced obleege and rhymed with besiege : the i in oblique is pronounced either e or i. i.e. stands for id est, the Latin for <(that is.®

I. H. S., an abbreviation for Jesus (Greek IH20T2) — the H representing the long e. To mark the contraction, the abbreviation was formerly written I H C £Greek C=S), which

in. later times became I H S. The H being mistaken for the Latin H, the idea arose that I H S meant Jesus Hominum Salvator, <(Jesus Saviour of Men,® and the mark of contraction over the H being thus rendered unmeaning, was turned into a cross, as on modern chasu¬

bles and altar-cloths. By some the letters were taken to mean In Hoc Signo, (

I. N. R. I., the abbreviation of the Latin inscription placed on the cross over the head of Jesus at the order of the Roman governor, Pontius Pilate. The full inscription reads: Iesus Nazarceus Rex Iudceorum (Jesus of Nazareth, King of the Jews), John xix, 19.

I PROMESSI SPOSI. See Betrothed,

The.

I. W. W., see Industrial Workers of the World.

IAGO, a character in Shakespeare's (Othello.) He is the attendant of the hero, and is depicted as a jealous, hypocritical villain. His ambition is to avenge the slights, chiefly imaginary, which he has endured at the hands of his master. While ingratiating himself to Othello, he connives a plot against the chastity of Desdemona, Othello's wife. So successful is his clever villainy, that Othello's jealousy is properly aroused, and he kills his wife. Further events uncover the plots of Iago and he suffers the same fate. See Othello

IALYSU.S, an ancient city of Rhodes. It was located near the northern end of the island on the western coast, and was probably settled by Phoenician traders. The Dorians colonized the place subsequently, and with Lindus and Camirus it formed the Tripolis of Rhodes. Ialysus was famed for its wealth.

In the 5th century the. towns of the Tripolis united to found the city of Rhodes. Significant remains ol Mycenaean civilization have been unearthed at a necropolis discovered at Ialysus.

. IAMBIC, in classical prosody, a term ap¬ plied to verses consisting of feet made up of a short syllable followed by a long. In English, the same designation is used to denote verse in which the feet are composed of an un¬ stressed syllable followed by a stressed, such as:

And in | thy right [hand bring | with thee The moun [tain nymph | sweet lib [er ty

The iambic form is most easily adaptable to the English language.

IAMBLICHUS, i-am'bli-kus, Greek phi¬ losopher of the Neo-platonic school: b. Chalcis, Coele- Syria ; d. about 330 a.d. Little is known or the events of his life beyond the place of his birth and that he came of a noble family and was trained in philosophy under Anatolius and Porphyry. He wrote numerous works, but few have come down to us. His extant works are (On the Pythagorean Life- ; (The Exhortation to Philosophy } ; (On the General Science of*

Mathematics } ; (0n the Arithmetic of Nico- machus) ; fragments of a work on fate, and on prayer; and (Theological Principles of Arith¬ metic. > (See Neo-Platonism). Consult Whit¬ taker, T., (The Neo-Platonists) (Cambridge 1901), and Zeller, Eduard, (History of Greek Philosophy> (New York 1889).

IAN MACLAREN. See Watson, John.

IAPETUS, a Titan, son of Uranus and Gsea. Hesiod claims that he was the father of the giants Atlas, Prometheus, Mencetius and Epimetheus. He participated in the rebellion against the gods and was condemned to live in Tartarus. .Consult Myer, M., (Giganten und Titanem) (Berlin 1887).

IBA, e'ba, Philippines, pueblo and capital of the province of Zambales, Luzon, situated on a river two miles from its mouth, 85 miles northwest of Manila. Ih has a good anchorage and is on the south coast road. It is a well- built town, and has several fine public build¬ ings. In 1901 a United States meteorological station was established there. Pop. 4,500.

IBACH, Lawrence J., American astron¬ omer: b. Allentown, Pa., 17 Jan. 1816; d. New- manstown, Pa., 9 Oct. 1888. He learned the blacksmith's trade and followed it throughout his life, chiefly at Sheridan, Lebanon County, Pa. He studied with the astronomer Charles F. Engleman, who, on his death in 1860, be¬ queathed all his charts, books and instruments to Ibach. His benefactor having promised to make several series of astronomical calculations for almanacs Ibach filled the first order (1863), and thereafter till his death made annual calcu¬ lations for almanacs in the United States, Can¬ ada, South America and Cuba. He was com¬ monly known as the ˆblacksmith-astronomer.®

IBADEN, e-ba'dan, Africa, a city of Yorubaland, southern Nigeria, about 125 miles northeast of Lagos, with which it is connected by rail. The town is built of low thatched houses, relieved by a few more modern struc¬ tures. There are several mosques, and idol houses. Agriculture and handicraft work are the chief occupations of the town. Ibadan is the capital of one of the Yoruba provinces. The government is in the hands of a civil and a military ruler; in addition to which there is a woman who has charge of the disputes of the women. The British maintain a resident and a detachment of Hausa troops there. Pop. about

150,000.

IB AGUE, e'ba-ga', Colombia, a city and capital of Tolima, about 60 miles west of Bogota. Its situation at an elevation of some 4,000 feet renders its climate particularly salubrious. In addition to its commercial ac¬ tivities, Ibague is occupied in mining the ex¬ tensive sulphur and silver mines of the vicinity. The founding of Ibague dates back to 1550. Pop. about 25,000.

IBA JAY, e-ba-hi', the Philippines, pueblo of the province of Capiz, island of Panay, situated on the Ibajay River, 42 miles north¬ west of Capiz, the capital of the province. Pop.

15,000.

IBANEZ, e-ba'nyath, Vicente Blasco,

Spanish novelist: b. Valencia, 1867. A member

of the gild of modern Spanish writers of fiction, which includes Fernan Caballero, Va¬ lera, Pereda, Palacio Valdes, Pardo Bazan, Perez Galdos, to mention some of the best who have won recognition at home and abroad as masters of their craft. Vicente Blasco Ibanez differs from most of them (much less, how¬ ever, from Galdos than from the others) in that he, a revolutionist, has written largely for purposes of propaganda. Hence, his most effective stories are those in which, as in (La Barraca, (La Bodega**

and (La Catedral, he inveighs against features of the Spanish social system. He is undoubtedly a Socialist, voicing that protest against the existing order of things which is not uncommonly raised in his native district of eastern Spain. While in certain cases unable to acquiesce in his attacks upon society and its individual categories, it must be admitted that his pictures of phases of Spanish life are often a correct reflection of the facts and make manifest a need of reform. (The Four Horsemen of the Apocalypse) (1918), added considerably to his reputation. See La Barraca.*

IBARRA, e-bar'ra, Ecuador, city and capi¬ tal of the department of Imbabura, 60 miles northeast of Quito. The chief industries are the manufacture of cotton and woolen goods. An earthquake almost demolished the town completely in 1868, since when it has greatly deteriorated. Pop. about 9,000.

IBERIA, T-be'ria. (1) The ancient name of a district of Asia, between the Euxine and Caspian seas. It now forms part of Russian Georgia, and consists of an extensive fertile plain, surrounded by mountains traversed by four passes. It probably belonged to Persia, until subjected by Pompey and Trajan to the Roman Empire, under which it remained till after the time of Julian. (2) The ancient name of Spain, the Ebro, the principal river, being called Iberus. The Iberian language still lives in the Basque. See Basques ; Celtiberi.

IBERIAN LANGUAGE. See Georgians.

IBERIANS, an ancient people who dwelt by the river Iberus, the modern Ebro of Spain. About the time of Strabo the name was ex¬ tended to the inhabitants of the entire peninsula. Of the distribution of this race and of its social and other characteristics we have only frag¬ mentary and often contradictory accounts. An¬ thropologists now employ the term to the men of the Bronze and Neolithic Ages, whose skulls and remains are found in southwest Europe. Consult Keane, (Man: Past and Present (Cambridge 1899), and Sergi, (The Mediter¬ ranean Race) (London 1901).*

IBERIS, i-be'riz. See Candytuft.

IBERVILLE, Pierre le Moyne, pe-ar le mwan e-ber-vel, Sieur d', French-Canadian naval and military commander: b. Montreal, 16 July 1661 ; d. Havana, Cuba, 9 July 1706. He entered the French navy, in 1686 took part in the successful expedition for the capture of the English forts on Hudson Bay; in 1689 he cap¬ tured Forts Severn and Albany. In 1694 he was again on Hudson Bay and captured Fort Nelson ; in 1696 he seized and demolished Fort Pemaquid, built for the protection of the New

England settlements, and laid waste the British settlements in Newfoundland, and in 1697, gain¬ ing a remarkable victory over a superior Brit¬ ish fleet, recaptured Fort Nelson, the last post of the Hudson's Bay Company. In 1698 he sailed from Brest in charge of an expedition to discover the mouth of the Mississipi and plant a colony there, in both of which pur¬ poses he was successful. In 1699 he ascended the Mississippi for some distance, and built Fort Biloxi at the head of Biloxi Bay. This post he removed to Mobile in 1701. In 1706 he captured the island of Nevis. He was con¬ sidered the ablest officer in the French naval service of his time, and is generally called the founder of Louisiana.

IBERVILLE, Canada, town and county- seat of Iberville County, Quebec. It is situated on the Richelieu River, about 38 miles south¬ east of Montreal, and is served by the Canadian Pacific, the Quebec, Montreal and Southern, the Central Vermont and Rutland railways. The principal industries are the manufacture of iron, pottery, agricultural implements, monu¬ ments and carriages. Pop. 2,000.

IBEX, any of several species of wild goat (q.v.), sometimes placed apart in a sub-genus Ibex, distinguished by the form of the horns of the ram, which are large (30 to 50 inches long), backward curving, compressed and marked on the front with bold cross-ridges or knob-like protuberances. The ibexes are larger than other goats, about three feet at the withers, although adults of the Himalayas stand 40 inches high. Their coats are harsh, uniformly brown, becoming much grayer in winter, whit¬ ish on the under surface and buttocks, and with darker tints on the face and fore-legs. These animals inhabit the most precipitous and inaccessible heights of lofty mountains, where they assemble in flocks, sometimes consisting of 10 or 15 individuals. During the night they feed in the highest woods, but at sunrise they again ascend the mountains, till they have reached the most perilous heights. They are remarkably swift, and display amazing agility and. dexterity in leaping. Several species are distinguished by locality and minor differences. The typical ibex, bouquetin or steinbock (capra ibex), once numerous throughout the European Alps, now exists only as a semi-domesticated animal in certain valleys on the Italian border.

Other species are named according to their locality: The Arabian ibex (C. sinaitica) of Palestine, Arabia and northern Egypt (see Beden) ; the Caucasian ibex or tur (C. cau- casia), having reddish hair and flattened horns; the Nilgiri ibex (C. hylocrius) of southern India; the Nubian ibex (C*. Hubiaua), charac¬ terized by slender horns; the Abyssinian ibex or

walie (C . walie), characterized by a protuberance of the forehead; and the great Himalayan ibex (C. sibirica), which ranges over the high mountains and plateaus of all central Asia, keeping as wear the snow-line as possible,, and affording the best sport known to that region of game. They move about in small herds, led by a dominating ram, the size of the herd depending mainly on his prowess in keeping together his family. Every spring the young rams leave or are driven away from the herd. When gestating the ewes seek retired

spots where the hunter cannot readily locate them.

IBICUHY, e-be-kwe', or IBICUI, Brazil,

an affluent of the Uruguay River, which rises in the Serra de Santa Anna, province of Rio Grande do Sul, and after a westward course of about 400 miles joins the Uruguay at Yapeyu opposite Saint Martin in Argentina.

IBILAO, e-be-la'o, a head-hunting Philip¬ pine tribe inhabiting the border lands of the provinces of Nueva Ecija and Nueva Vizcaya in the central part of the island of Luzon. They are heathens, of the Malay race, with an infusion of Negrito blood. See Philippine Islands.

IBIS, a family of wading-birds (Ibididce) inhabiting warm regions. They are related to the storks on the one hand and to the spoonbills and flamingoes on the other. Their bills are long, weak, curved and the nasal grooves are very long. The legs are long, the tibia partly naked and the toes long with small webs. In size they are like herons, rather less than storks; and in color present a great and beau¬ tiful variety of tints, often with a metallic sheen; the sexes are similar. Ibises are shy birds, which inhabit not only watery and wooded country, but dry plains and rocky gorges. They are capable of a powerful and elevated flight, extending their neck and legs and uttering a hoarse croak. They ordinarily wade for their food, poking in the mud with the long bill for aquatic insects, worms and small shellfish; they also catch fish, and on land eat insects, especially locusts, frogs, newts and crustaceans. Some species breed in com¬ munities, like herons, others apart, but the nest is always a rude cradle of sticks on a tree or ledge of rocks and occasionally on marshy ground, and the eggs are usually green, with or without markings. There are 12 or 15 genera and a large number of species scattered throughout the whole tropical zone. The typi¬ cal genus, Ibis, contains the sacred ibis (I. cethiopica) , called by the natives of Upper Egypt abu Hannes, or ((Father John,® which arrives in Egypt about the time that the inundation of the .Nile commences, its numbers increasing or diminishing with the increase or diminution of the waters ; and it migrates southward about the end of June. This species is about the size of a fowl; the head and neck are bare; the body white ; the wing tipped with

shining, ashy black, among which the white forms oblique notches; the secondaries and scapulars which m summer curve gracefully over the ' hinder parts, are bright black. . This was one of the birds adored by the ancient Egyptians, and of which numerous mummies are found. The Greek and Roman writers give many fabulous stories relating to ibis, which Savigny has gathered in (Histoire Naturelle et Mvtho- logique de l'lbisP He concludes that the rever¬ ence for this ibis was not due to its alleged de¬ struction of snakes, which, in fact, does not occur, but arose from the birds' return at the ■time the Nile began to rise, the commencement of the season of abundance. Modern writers on Egyptian customs and antiquities may be consulted further on this point. Many other interesting species occur in Africa, Asia and the Australian region ; and many species reside

THE IBIS FAMILY

|v$r4

Hr /wJi

p|p||

i ji'/.

1 Open-bill (Anastomus lamelligerus)

REPRESENTATIVE IBISES

2 Wood Ibis (Tantalus ibis)

3 Sacred Ibis (Ibis religiosa)

111 the American tropics — two, the white ibis (Eudocimus albus) and the scarlet ibis (E . ruber) , flocking in summer in the southern United States. Both are birds of extreme beauty of plumage, and both have been so ruthlessly persecuted by plume-hunters, seeking feathers of millinery purposes, that the scarlet ibises are nearly exterminated. Fossil ibis re¬ mains of the Tertiary period have been located at many points in Europe.

*Wood-ibises and shell-ibises are names for birds of other groups, elsewhere described Consult Taylor, (Ibis) (1878); Shelley, (Birds of Egypt-) ; Whymper, 'Egyptian Birds**

(1909).

IBN AL-KIFTI, ib'n al kef'te, Arabian historian and statesman : b. Kift, Upper Egypt, 1172; d. 1248. He greatly encouraged litera¬ ture, education, art and national progress. See Kifti, Ibn Al-.

IBN BATUTA, ba-too'ta, ABU ABDUL¬ LAH MOHAMMED, Moslem traveler: b. Tangier, 1304; d. 1378. When he became 21 years of age he started on his journeys. His first trip was along the Mediterranean coast from Tangier to Alexandria. He visited Cairo, Aleppo and Damascus, and then journeyed to Mecca. After crossing to Isfahan and going back to Bagdad, he again made the pilgrimage to Mecca, remaining for three years. His next trip took him down the Red Sea to Aden ; then along the African coast, and back by a cir¬ cuitous route through Oman and Arabia to Mecca again. After a short stay, he again set forth, this time through Syria and Asia Minor, to Kaffa on the Black Sea. This was his first acquaintance with a Christian city. For a time thereafter he attached himself to the Khan Mohammed Uzbeg; and, with the court of a certain Greek princess who was of the same train, visited Constantinople. A trip through the lower part of Russia and his return to the Indus occupied the years until 1333. Not long afterward he was appointed kazi of Delhi by the ruler, Mohammed Tugklak. Here he re¬ mained for a number of years, retiring when his profligacy had destroyed his prestige. How¬ ever, when the Chinese emperor had sent an emissary to Delhi and a man was needed to return with his contingent, Ibn Batuta was chosen. A wreck destroyed the party, and he was stranded at Calicut. He journeyed on to the Maidive Islands, becoming kazi there; visited Bengal, Burma and journeyed far into the interior of China. Eventually he stopped at Jerusalem and Cairo and returned in 1349 to Morocco, and thence to Tangiers. His last wanderings took him to Spain, central Africa and Egypt. His book narrating his many ad¬ ventures was dictated by orders from the king. His descriptions are vivid and accurate, full of life and color. A French translation by De-fremery and Sanguinetti was published at Paris (4 vols., 1858-59).

*IBN JANACH, ha-nach. ABULWALID MERWIN, or JONAH MARINUS: Jewish grammarian : b. Cordova, Spain, close of 10th century; d. early 11th century. After receiving training in Hebrew and in medicine, he be¬ came interested in philological research. His principal contribution to the study of Hebrew was his work on grammar 'Kitab-al-Luma**

which was a pioneer study of the whole field. His dictionary 'Kitab-al-'UsuP is replete with erudite and comprehensive discussion of the grammatical points involved. The former was published by J. Derenbourg (Paris 1886) ; the latter by Neubauer (Oxford 1873-75). In trans¬ lation they have been published bv B. Gold¬ berg (Frankfort 1856) and by W. Bacher (Leipzig 1889). Consult Bacher, 'Leben und Werke des Abulwalid Merwan ibn Ganach) (Leipzig 1885).

IBN KHALDUN, ABD AL RAHMAN,

*Arabic historian: b. Tunis, 1332; d. 16 March 1406. He was a brilliant student of Arabic lore, and in 1352 entered the public service at Fez; being suspected of malfeasance he was impris¬ oned for a short time merely on suspicion. He emigrated to Spain and was well received at Granada. In 1364 he was driven back to Africa and was well received by. the Sultan of Bougie. On the latter's fall Ibn Khaldun raised an army and entered the service of the Sultan at Tlem- Qen. In 1378 he was allowed to return to Tunis. Here he prosecuted his studies and produced his history of the Berbers. He set out for Mecca in 1382, but was prevailed upon to tarry in Egypt, where he was made cadi at Cairo. He instituted many reforms and began his his¬ tory of the Arabs in Spain. In 1385 he made the pilgrimage to Mecca, and on his return was cadi no less than five times. In 1400 he visited Tamerlane at Damascus. His great work is the 'Universal History) in three books, with an introduction and an autobiography. Book one treats on the influence of civilization ; book two of the Arabs and other peoples, and book three of the Berbers. An edition in Arabic ap¬ peared at Bulaq (7 vols., 1867). Part of the work has been translated by Slane in his 'His- toire des Berbers * (Algiers 1856). Book one was edited by Quatremere (3 vols., Paris 1858). The parts dealing with the Crusades were edited by C. Tornberg (Upsala 1840). Consult Flint, R., 'History of the Philosophy of History* (Edinburgh 1893) ; Huart, C. I., 'Histoire des Arabes) (Paris 1912) ; Nichol¬ son, R. A., 'A History of Arabic Literature* (Cambridge 1907).*

IBN KUTAIBA, koo-ta'e-ba, QUTAIBA or KOTAIBA, Arabian author: b. Bagdad or Kufa, 828 ; d. Bagdad, about 889. He was a zealous student of history and philologv. and was appointed local ruler at Dinawar. After a few years' service, he was made teacher at Bagdad, occupying this position until his death. Ibn Kutaiba is important as the author of sev¬ eral works which throw light on the Arabian language and antiquities. Of these the most noteworthy are the 'Adab ul-Katib, a treatise on literary style (edited by Max Grunert, Leyden 1900) ; Katib al-ma-Arin,* a popular outline of history (edited by F. Wiistenfeld, Gottingen 1850) ; and 'Ayun al Akhbar,* a general treatise on government, nobility, char¬ acter, science, friendship, women and food. It was edited by Brockelmann (Weimar 1898). Consult Brockelmann, 'Geschichte der arab- ischen Literature* (Vol. I, pp. 120-122, Weimar*

1898).

IBN SINA, ib'n se'na. See Avicenna.

IBRAHIM, e-bra-hem', Ottoman Sultan, third son of Ahmed I. He

succeeded his

brother Amurath IV in 1640. His reign was occupied mainly with a war against Crete. He was an oppressive tyrant, with little considera¬ tion for his people. The Janizaries finally broke out in rebellion and put him to death.

IBRAHIM PASHA, Egyptian general : b. Kavala, Thrace, 1789; d. 1848. His father was Mehemet Ali, the pasha of Egypt. At the age of 16, he was sent as a hostage to the Ottoman Empire, but returned to Egypt after the failure of the English army to gain a foot¬ hold in his father's territory. In 1816 he led the Egyptian army in Arabia and was success¬ ful in vanquishing the Wahhabis in western Arabia and in Nejd. He proved himself an able commander, and in the War of Greek Inde¬ pendence was appointed in charge of both the naval and land forces in the Morea. His long siege of Missolonghi was conducted with great vigor and resulted in victory in 1826. He was so ruthless in his punishment of the Greek troops that European forces felt called upon to punish him. At the naval battle of Navarino (1827), his fleet met those of the combined English, French and Russian squadrons, and was completely destroyed. Shortly afterward the French expeditionary forces landed in Morea, and in 1828 Ibrahim was compelled to leave the country. He returned to Egypt, but it was not long before his father became en¬ gaged in a quarrel with Syria and Ibrahim again took the field. With characteristic im¬ petuosity he laid siege to Acre, captured it and put the Turkish forces to rout. By the Treaty of Kutayah in 1833, Syria was surrendered to Mehemet Ali, and Ibrahim was made governor of Cilica. There was a lull in hostilities until 1839, when Ibrahim was sent out once more against the Turkish armies, and inflicted a de¬ cisive defeat at Nezib. However, by the inter¬ vention of foreign powers, the Egyptian armies were defeated on the sea, and their leader was again obliged to return to Egypt. He outlived his father by a few months, and his son, Ismail Pasha, succeeded to the rule of Egypt.

Ibrahim Pasha was distinguished by his ex¬ treme energy and vigor, as well as by his in¬ telligence and docility in learning European methods from the armies with which he came in contact. As a ruler, he showed superior judg¬ ment and diplomacy, winning over hostile fac¬ tions with great shrewdness and tact. Consult (Cambridge Modern History' (Cambridge

1903).

IBSEN, Henrik, Norwegian dramatist: b. Skien, Norway, 20 March 1828; d. Christiania, Norway, 23 May 1906. He became an apothe¬ cary's apprentice in the little town of Grim- stad, being forced to earn a living owing to the impoverished condition of his family, but was determined not to ignore any possibility of ob¬ taining an education by reading and study. His opposition to convention at first took the form, so common among young persons, of an avowed advocacy of the wicked and irregular, expressed in the thought that if he should be destined ever to perform a great deed, it would necessarily be a «deed of night," and in his occupation with the study of the subversive characters of history, including chiefly Cati¬ line (q.v.), who became the hero of his first play (

pare for the medical school of the university. He failed in the entrance examinations, how¬ ever, and undertook the publication, together with two other young men (Aasmund O. Vinje and the bibliographer, Botten-Hansen), of an unsuccessful weekly, Andhrimnir. Ibsen's con¬ tributions to this paper were short satires and lyrics. He was also much interested in Old Scandinavian history and legend, and began to write a number of dramas on themes con¬ nected with these legends, not uninfluenced by the works of Oehlenschlager (q.v.) and H. Hertz, the first of which is (Kaempeh6jen' ((The Warrior's Grave,' 1850), which had three performances at Christiania and was later printed serially in a Bergen newspaper (1854). In 1851 the violinist Ole Bull obtained for him the position of manager in the National Theatre at Bergen, which he held until 1857. Very im¬ portant for Ibsen's artistic development was the trip which he undertook in 1852, under instructions from the Bergen theatre, to in¬ spect the theatres of Dresden and Copenhagen, which were then managed by Devrient and L. Heiberg, respectively. His chief duty in con¬ nection with the theatre at Bergen was to pro¬ duce an original play for performance each year on the anniversary of the theatre's founda¬ tion (2 January). The 1855 play was (Fru Inger til Ostraat' ((Lady Inger of Ostraat,' dealing with the events preceding the Reforma¬ tion in Norway). In 1856 came <01af Lilje-krans) (not printed until 1898, and then only in German, as a part of the nine-volume edi¬ tion edited by Georg Brandes for S. Fischer, Berlin), and in 1857,

((The Banquet of Solhaug'), a drama from the life of the Norwegian people in the 14th century. From 1857 until the bankruptcy of the Norwegian Theatre at Christiania, in 1864, Ibsen held the post of manager at that institu¬ tion. In this period he produced onlv three plays, (Hasrmaendene paa Helgeland) (1868) (introduced to the English and American stage a few years ago by Ellen Terry: (The Vikings at Helgoland'), a pregnant, intense, laconic tale of Icelandic family feuds, taken from the Saga of Sigurd, and written in a prose not unlike that of the Icelandic sagas; (Kjaerlighe- dens Komedie' ((The Comedy of Love,'

*1862), a rimed satiric play dealing with social condi¬ tions; and (Kongsemnerne' ((The Pretenders, * 1864), another study of Norwegian history, in¬ teresting chiefly in that it presents a picture of self-confidence and moral responsibility in their struggle with laxity and irresoluteness, as per¬ sonified in the persons of King Hakon and Jarl Skull. In 1864 Ibsen was so fortunate as to obtain a traveling scholarship, and from this time until 1891 he spent almost all his time in foreign countries, where most of his great plays were to be produced, residing chiefly at Rome, Dresden and Munich. The larger, freer, more cosmopolitan life of Europe gave Ibsen a larger outlook than the narrow parochial atmosphere of the small Norwegian city, but he now turned to Norwegian themes with a greater intensity and vigor than before, treating them now as universal in their appeal ; no dramatist ever limited himself so completely to his own coun¬ try in his choice of subject, and none ever treated all his subjects so absolutely from the purely human point of view. (Brand' (1866) and (1867) are the first of his*

great plays. They are the last plays Ibsen wrote before discarding verse. (Brand) ex¬ poses the danger and destructiveness of the idealist who would force others to live accord- in to his ideals, while (Peer Gynt) satirizes the idealist who constructs a world only for himself and shuts all others out of it.

In 1869 came (De unges forbund) ((The League of Youth)), a modern social comedy exposing the knavery of conscienceless political agitators and inaugurating the long line of social dramas, dealing with vital and con¬ crete problems of every-day life, to which Ibsen was to devote the rest of his active labors. Once only (in his next play, Em¬ peror and Galilean,5 an enormous tragedy in two parts, of five acts each) he was to work again in the field of history, producing an im¬ pressive study of the clash of free will and his¬ toric preordination, impersonated in the char¬ acter of Julian the Apostate, in his vain effort to restore paganism at a time when the world was already ripe for Christianity. It is the re¬ maining plays, produced after (Kejser og Gali- laeerC with which readers are chiefly acquainted, which make Ibsen immortal, and which have entirely remolded the dramatic literature of the world since their appearance. They are (Sam- fundets Stotter5 ((Pillars of Society,5 1877), (Et Dukkehjem5 ((A Doll's Housed 1879), (Gjengangerne) QG'hosts,5 1881); (En Folke- fiende5 ((An Enemy of the People,5 1882); (1894); (John Gabriel Borkman) (1896) ; (Naar vi dodevaag- ner) (l(When We Dead Awaken,5 1900). These 12 plays are a complete comedie humaine, a com¬ prehensive

indictment of the evils necessarily associated with a disordered society, beginning with (Pillars of Society,5 which is a sort of headline synopsis, in cruder form, of all the plays that follow, and running on through play after play, each taking up and pursuing with merciless clearness some problem outlined but not completely disposed of in its predecessor. Thus, (A Doll's House5 puts the problem of the devoted self-sacrificing wife whose husband values respectability and social position above her affection, and who deserts him that she may know what life really is ; it caused Ibsen's provincial critics to ask : ((Why did she not remain? Was not her first duty with her two children?55 Ibsen accordingly answered this question in (Ghosts, 5 the next play, in which, in three terrible acts, he presents the case of a wife who remained with her husband and child. The husband's respectability cloaked a boundless dissoluteness, and the disease con¬ tracted in one of his dissipations causes the son to go insane many years later. The dis¬ closure by Ibsen of these evils of modern family life led one of his critics to accuse him of being an ((enemy of society,55 and Ibsen's next play, (An Enemy of the People,5 in which an honest physician calls attention to the infected condition of the waters, from the supposed healing qualities of which his fellow-townsmen earn their living, is his answer. The honest Dr. Stockmann is termed an <(enemy of the people55 and finally driven out of town. Un¬ qualified truth-telling, even when it may be

personally unprofitable, would appear to be the lesson of this play, but in the (Wild Duck5 his thesis seems to be, as Shaw, his most bril¬ liant interpreter puts it, ((that a truth-teller who cannot hold his tongue on occasion may do as much mischief as a whole university full of trained liars.55 The student wishing a com¬ plete interpretation of Ibsen and of the connec¬ tion between his social plays is referred to G. B. Shaw's, (The Quintessence of Ibsenism,5 from which the above quotation is taken (1st ed., 1891) ; there is also an interesting but rather crabbed essay on (Hedda Gabler5 by Henry James. The understanding of the later plays, beginning with (Rosmersholm5 (1886), is rendered somewhat difficult by the introduc¬ tion of numerous symbolic elements. The tone becomes one of bitter resignation, of regret at having wasted opportunities for natural living and real enjoyment. The last 15 years of his life were spent at Christiania, the last seven years in increasing mental disturbance, which indicated that Ibsen's mind was slowly weaken¬ ing. In 1900, after the last play, (When We Dead Awaken,5 was finished (Ibsen seems to have intended it to be his last, for he called it ((A Dramatic Epilogue55), a bronze statue (by Sinding) was erected to him in Christiania. See Doll's House, A ; Ghosts ; Hedda Gabler ; Master Builder, The; Peer Gynt; Wild Duck, The.

The reception of Ibsen's plays in Norway and in foreign countries was at first uniformly hostile. The venomous nature of the attacks by professional literary critics is best evidenced by the quotations given in Shaw's book (see

above) from contemporary London newspapers, and is paralleled onlv by the similar outbursts called forth from the musical critics by the first of the epoch-making innovations of Richard Wagner. The New York press greeted the first American performance of (Ghosts5 in 1902 with equal hostility. But Ibsen's popular¬ ity long before his death was already so great that the later plays appeared simultaneously in all the capitals of Europe, translations into the important languages having been prepared be¬ fore the publication of the original.

Bibliography. — Consult Ibsen's (Collected Works,5 with introduction by W. Archer (1906-07) ; (Prose Drama,5 edited by W. Archer (1890-91); (Correspondence, 5 trans¬

*lated by Marison (1905) ; (Lyrical Poems,5 selected and translated by R. A. Streatfield (1902). Critical works on Ibsen are Jaeger, H., (Henrik Ibsen5 (in Danish, 1888; Eng. trans. by Clara Bell, 1890) ; Brandes, G., (Det mod- erne Gjennembruds Maend5 (Copenhagen 1883, trans. by J. Muir as (Critical Studies,5 1899) ; Gosse, E. W., (Ibsen5 (1907) ; Macfall, H., < Ibsen: the Man, his Art and His Significance5 (1907) ; Moses, M. J., (Henrik Ibsen: the Man and His Plays5 (1908) ; Vasenius, V., (Henrik Ibsen's dramatiska diktning5 (Helsingfors 1879) ; id., (Elt skaldeportriitt5 (1882) ; Passarge, (Henrik Ibsen5 (Leipzig 1883) ; Brahm, O., (Henrik Ibsen, Ein Essay5 (Berlin 1887) ; Jaeger, H., (Henrik Ibsen og hans vaerker5 (Co¬ penhagen 1892) ; . Andreas-Salome, (Henrik Ibsen's Frauengestalten5 (Berlin 1892) ; Reich, (Henrik Ibseffis Dramen5 (Dresden 1903) ; Woerner, * Henrik Ibsen's Jugenddramen5 (Munich 1895) ; von Hanstein, (Ibsen als Ideal¬ ist5 (Leipzig 1897) ; Garde, (Der Grundgedanke*

in Ibsen's Dichtung) (Leipzig 1898) ; Brandes, (Henrik Ibsen5 (Copenhagen 1898) ; Woerner, (Henrik Ibsen > (2 vols., Munich 1899 ff.) ; Litzmann, (Ibsen's Dramen, 1877— 1900) (Ham¬ burg 1901).

Jacob Wittmer Hartmann, Assistant Professor of the German Language

and, Literature , The College of the City of

New York.

IBSEN, Sigurd, Norwegian diplomat and author, the son of Henrik Ibsen (q.v.) : b. Christiania, 23 Dec. 1859. He lived in foreign countries with his parents until he entered the diplomatic service of Sweden (then forming a

united monarchy together with Norway) in 1885. After working for a time in the Foreign Office, he was attached successively to the em¬ bassies of Washington and Vienna, but gave up this career in 1889, in order to devote him¬ self to problems of a social and administrative character. He delivered a course of lectures on sociology at the University of Christiania in 1896-97, and in 1899 became head, in the Department of the Interior, of the Section for Foreign Affairs,. Commerce and Industry. He was connected in various ways with the ad¬ ministrative service of the united monarchies until their definitive separation in 1905, main¬ taining to the last his advocacy of a continu¬ ance of the policy of union. He has held several editorial positions connected with radi¬ cal papers. His published works include (Unionen5 (1891); (Msend og Magter5 (trans¬ lated into English as (Human Quintessence5), and < Robert Frank5 (a tragedy, translated into English by Marcia Hargis Janson, New York 1914). The last is the story of a scholarly aristocrat whose reasoning throws him into the arms of the syndicalist movement, as the leader of which he inaugurates a revolution in which he loses his life.

Jacob Wittmer Hartmann.

IBYCUS, ib'i-kus, Greek lyric poet; b. Rhegium, Italy, flourished in the 6th century B.c. He spent his days wandering about, sing¬ ing his lyrics and narrating poems. He was for some time a member of the court of Polycrates at Samos. While traveling near Corinth, a band of robbers fell upon him and murdered him. The story is told that when the crime was committed, Ibycus called to a flock of passing cranes to avenge his death. The murderers traveled on to Corinth, and while seated at the theatre there suddenly noticed the cranes circling above their heads. One of their number, terror-stricken, shouted <(Behold the avengers of Ibycus,55 and the crime was betrayed. Ibycus was the author of charming lyrics, mainly love-themes, describing the love-inspiring charms of beautiful boys and girls. The fragments were collected by F. W. Schneidewin (1833). Consult Bergk,

ICA, e-ka Peru. (1) A littoral depart¬ ment bounded north by the departments of Huancavelica and Lima, east by Ayacucho, south by Arequipa and west by the Pacific Ocean. Area, 8,718 square miles; pop. esti¬ mated at 90,000. Topographically the depart¬ ment slopes from its eastern border to the ocean, with small ranges of hills, It has a hot

and arid climate and the soil is little adapted to agriculture except in the valleys. Gold, copper and iron are mined. Grapes and sugar-cane are grown as well as corn, cotton and indigo. The only industries are those dependent on the viti¬ culture and the sugar-cane crop. (2) A town, capital of the above department, on a river of the same name, 46 miles southeast

of Pisco on Pisco Bay, with which it is connected by rail. It was founded in 1563. It is in a grapevine and sugar-cane producing region and has manu¬ factures of wine and brandy. Pop. 9,000.

IQA, e'sa', or PUTUMAYO, a river of South America, one of the chief tributaries of the Amazon. It takes its rise in the Andes in Colombia, flows southeast and empties into the Andes near San Antonio. It is navigable during the wet season for about 900 miles of its course, which is nearly 1,000 miles in length. It waters a woody region, unfavorable to close habitation. There are rubber plantations along the shores. A large part of the Iga was ex¬ plored in 1878-79.

ICARIANS, l-ka' ri-anz, a communistic so¬ ciety founded and led by Etienne Cabet. For an account of this organization see Cabet.

ICARIUS, in Greek mythology the hero after whom the Attic deme Icaria is named. Dionysus taught him how to make wine, which he gave to some shepherds. Their companions thinking their intoxication was due to poisoning murdered Icarius. His daughter Erigone was led by the hound Maera to his grave on Mount Hymettus under a tree on which she hanged herself. During a plague of madness which Dionysus sent over the land, the Athenian maidens, following Erigone's ex¬ ample, hanged themselves. The Acora or ˆswing55 festival later commemorated the pro¬ pitiation to Icarius and Erigone, who also, with the dog of Maera, were placed among the stars as Arcturus, Virgo and Procyon.

rne son ot Daedalus (q.v.).

ICAZBALCETA, e-kas-bal-saffa, Joaquin Garcia, Mexican author: b. Mexico City, 1825; d. 1894. He contributed numerous biographical articles to the (Diccionario universal de his- toria y geografia.5 His historical researches are most important and are a great storehouse of information. They include XVI por Francisco Geronimo Mendieta de la orden de San Francisco5 (1870) ; and (Nueva coleccion de documentos para la historia de Mexico5 (1886-92); XVI,5 an exhaustive study, and Don Fray Juan de Zumarraga5 (1881) the life and work of the first bishop and arch¬ bishop of Mexico.

.ICE, water in the solid state. When suf¬ ficiently cooled, water loses its fluidity, and be¬ comes filled with multitudes of needle-like crys¬ tals belonging to the hexagonal system (see Crystal), which increase and interlace until the whole mass becomes solidified. In nature, this change begins at the surface of the water and spreads gradually downward, so that the exact course of the freezing is not so easy to trace as it is in the laboratory, where the water can be

uniformly c°°led throughout its entire mass. \ hen the freezing process is complete, the crys¬ talline nature of the solid that results from it is not at all obvious. It is clearly visible, however, in snow-flakes, where the hexagonal form is also evident. In a solid block of ice the crystalline structure can also be demonstrated by a method that was used by Tyndall, as a beautiful and instructive lecture experiment. The image of a slab of pure ice is thrown upon a screen by means of a projection lantern provided with a powerful electric light. At first nothing is seen, but very shortly the heat-rays passing through the ice cause it to melt internally, and the melt-mg takes place according to the internal crys¬ talline structure, which is gradually brought out upon the screen in great beauty. Six-sided stars, suggestive of the snow-crystals, appear, and these enlarge and become serrated at the edges as the electric beam gradually destroys the molecular architecture, the process continu¬ ing until the ice has been again reduced to the liquid form.

Pure water normally freezes at a tempera¬ ture which is denoted by 32° on the Fahrenheit scale, and by 0° on the Centigrade and Reaumur scales. It is possible, however, to cool pure water to a temperature considerably lower than this, if proper precautions are taken, without crystallization. As long ago as 1836, for ex¬ ample, Gay-Lussac observed thal water, when placed in a vessel and covered with a layer of oil, may be cooled to 10° F. without freezing. If the vessel be slightly shaken or jarrod, how¬ ever, solidification ensues at once.

Pressure has an effect upon the tempera¬ ture at which water freezes. This effect was predicted, from theoretical considerations, by James Thomson, in 1849. Dewar has since measured its amount with much care, finding that the freezing temperature is lowered by 0.014° F. for each atmosphere of pressure. Small as this quantity is, it is of importance in some branches of physics. In 1858 Mousson, by the application of an enormous pressure, suc¬ ceeded in reducing the freezing point to 4° below zero, Fahrenheit. The presence of dis¬ solved substances in the water also depresses the freezing point. Sea-water, for example, freezes at about 27° F. (the ice that is formed being nearly free from salt), strong brine is used in the circulating pipes and cooling coils of refrigerating plants, since it can be cooled much below this temperature without freezing.

The effect of pressure in lowering the freez¬ ing point is illustrated in the familiar process of making a snow-ball from damp snow — that is, from snow whose temperature is precisely 32° F. Under the pressure of the hand,

the freez¬ ing point of the snow mass is lowered slightly, with the result that a partial melting of the crystals takes place. When the pressure is re¬ moved, the freezing point rises to the normal, and the water that was formed by the pressure alone freezes again, and cements the mass to¬ gether. (The superficial moisture, due to the warmth of the hand, is not here contemplated. The melting from this cause is a separate phe¬ nomenon.) The slight but real plasticity of large masses of ice, such as are met with in glaciers, is probably related to this phenomenon of the variation of the freezing point by pres¬ sure, but there is some difference of opinion among the authorities as to the precise way in

which the slow downward flow of these ice masses is accomplished. The melting of ice by pressure, and its subsequent solidification upon the removal of the pressure, is known to physicists as ((regelation.»

*Experiments that have been conducted in COrjn?C*10n precise thermometry, by Pernet and Marek, show that the temperature of melt¬ ing ice is slightly different, according to the source of the ice, and the way in which it is treated ; this variation being independent of the pressure, and probably due to unrecognized im¬ purities. A variation in the melting point of as much as 0.164° F. has been observed; and in order toeliminate the effects of error from this cause, it is necessary, for the purposes of precise thermometry, to adopt a uniform mode of procedure in the treatment of the ice that is to be used for the establishment of the freezing point upon accurate thermometers. Consult Guillaume, (Thermometrie de Precision (Chap. 2).*

When water that contains solid matter in solution or in suspension is frozen, the solid matter is mostly eliminated, so that the ice is much purer than the water from which it is produced. Some of the solids are almost in¬ variably entangled among the interlacing crys¬ tals of the ice, however, so that numerous little particles of foreign matter often remain in the ice, imprisoned in tiny cavities. Bacteria and other germs that may Lave been present in the original water appear to be largely excluded from natural ice by the freezing process, though some of them are undoubtedly caught among the crystals and retained. In artificial ice, where a mass of water is frozen simultaneously on all sides, so that the solidification' proceeds from the outside toward the centre of the cake in all directions, purification from this cause is hardly possible, and the middle part of the ice- cake is likely to be rich in whatever germs the original water may have contained. Fortunately the recent experiments of Sedgwick and others indicate that freezing and protracted storage of the ice is much more fatal to typhoid bacilli than was formerly supposed. Artificial ice, if prepared from distilled water, or from water that is certainly known to be free from disease germs, is undoubtedly safer than natural ice that is taken from streams or ponds

of un¬ known purity ; but in choosing between natural and artificial ice from the same identical water, the preference should be given to the natural product.

Water expands upon freezing, one volume of water at 32° F. becoming transformed, by freez¬ ing, into 1.0908 volumes of ice at the same tem¬ perature; which is equivalent to saying that water expands by one-eleventh of its own bulk upon freezing. The quantity of heat required to melt one pound of ice, from the state of ice at 32° F. to that of water at 32° F., is 142 times as great as the quantity of heat required to raise the temperature of a pound of water from 32° F. to 33° F. The specific heat of ice, near the temperature 32° F., is approximately 0.50. The production of ice by artificial means has increased rapidly in recent years. See Re¬ frigeration and Refrigerating Machinery.

ICE, Artificial. See Icf. Industry; Re¬ frigeration and Refrigerating Machinery.

ICE AGE. See Glacial Period.

ICE BOAT. See Ice Yachts and Ice

Yachting.

ICE-BREAKER, a vessel, especially a strong heavy steamer, with powerful engines, for opening up navigable channels in frozen waters. On the Great Lakes of the United States, where such vessels are extensively used, they are generally fitted for carrying cargoes or transporting railroad cars. Such vessels are usually so built as to run their bows up on the ice and break it by means of their great weight.

ICE INDUSTRY. Though the use of

natural and artificial ice as an article of com¬ mercial value practically began only in the first part of the 19th century, yet the artificial pro-duction of cold began long before the modern civilized era.

In Greece and Rome during the early ages snow was more commonly used, being placed in cone-shaped pits 45 feet in diameter, 50 feet deep and lined with straw and prunings of trees. The snow was packed down and covered with more straw and prunings, over all of which a thatched roof was placed; after the ice was formed it was cut and carried out through a door

left in the side of the pit for the purpose. During the 16th century snow and ice were stored in cellars for the purpose of cooling drinks. This custom spread from Greece and Italy to western Europe and to France during the reign of Henry III in the 16th century, and by the end of the 17.th century the sale of snow and ice had become a profitable trade. From that time until the beginning of the 19th century the ice trade was practically at a standstill, no material ad¬ vance being made in the direction of improving the methods of harvesting the ice supplied by nature; nor was any attempt of any importance made to produce artificial ice. For the purposes of description and comparison, ice may be di¬ vided into two classes, the natural and the arti¬ ficial.

Natural Ice. — Probably the first ice cut and shipped as an article of commercial value was sent, in 1799, from New York to Charleston, S. C. This cargo was cut from a pond near Canal street. While this shipment was the first recorded it was of little importance; the real beginning of the industry came in the year 1805 when Frederic Tudor of Boston, shipped a cargo of 130 tons to the West Indies. This re¬ sulted in a loss of $4,500, and Tudor's second shipment, two years later, to Havana likewise was made at a loss, enormous for those days. He stuck to the business, however, and finally; in 1812, was granted by Great Britain a mo¬ nopoly of the trade with her colonies in the West Indies, and later, in 1815-16, Spain granted him the same concession to export to Havana. In 1817-18 the trade was extended to Charleston and Savannah; to New. Orleans in 1820; to Cal¬ cutta in 1833; and to Rio Janeiro in 1834. Thus a large and lucrative trade with southern countries and southern cities of the United States was built up; competitors began to come into the field, the first of these to enter the ex¬ port field being the firm of Gage, Hittinger and Company of Boston, who introduced American ice to the people of London. They were in turn followed by a Salem merchant named Lan¬ der, and others.

The harvest of natural ice is gathered on an enormous scale in the United States, the de¬

mand for the article being due in a large meas¬ ure to the growth of other industries to which ice was a necessity. Before Croton water was introduced into New York, and as far back as 1825, ice was cut on Sunfish pond, on the out¬ skirts of the city, by some butchers who de¬ sired to preserve their stock of meat. In 1826 ice was cut on Rockland Lake, and at first all the ice cut was stored in the ground, but later storehouses at Hubert street and Christopher street were built, and as the demand for ice gradually developed in all the larger Eastern cities, large storehouses were erected near the places where the ice was cut. The capacity of these houses ranges from 10,000 to 190,000 tons, and in size run from 100 to 150 feet

in length by 30 to 50 feet' in width. For gathering the ice there is an elaborate system of apparatus, but the usual methods employed are as follows : After the snow is cleared from the ice by means of scrapers or snow-plows, an ice-plow, either propelled by steam or drawn by horses — the lat¬ ter means being more commonly used — cuts deep grooves in the ice in one direction and then repeats the operation at right angles with the first, thus forming rectangular pieces, measur¬ ing approximately 2 X 3ˆ4 feet. As these grooves extend nearly through the ice, it is a simple matter to saw through the remaining thickness, pry the cakes loose with crowbars and float them to the icehouses through channels opened up as the work proceeds. Upon reach¬ ing the icehouse the cakes are slid up an incline, with the aid of an endless chain apparatus, operated by horse or steam power; if the ice¬ house be very close, the same engine that runs the elevator may be used. The hoist or elevator of an icehouse is so located that ice may be conveniently slid to any part of the building. By means of an automatic indicator and trips the elevator is stopped at the proper height and the blocks of ice stored in layers. The floor of the house is built a little lower in the centre than at the sides, so that the weight of the ice may not lean on the walls. The walls are double and insulated to preserve the cold tem¬ perature inside.

The cost of harvesting a ton of natural ice varies greatly, it depending to a great extent upon the weather conditions, both during the process of the formation of the ice and during the process of cutting and housing. Under average conditions the cost of harvesting amounts to about 80 cents, though under favor¬ able conditions it has cost only from 25 to 30 cents per ton, but this is exceptional. This, of course, does not include the cost of transporta¬ tion, delivery, etc., and as the majority of the icehouses are a considerable distance from the centres of consumption, the cost of transporta¬ tion is a large factor.

The moving of this enormous quantity of ice necessitates the maintenance of a large fleet of barges and other boats for the domestic trade, and of sailing vessels for. the export trade' and to the cost of maintaining these vessels, when figuring the cost of harvesting, must be added the cost of towing, loading, discharging, dock and stable rent, repairs of boats, icehouses and wagons, etc., all this before the ice is placed in the hands of the retailer.

Since 1900 the natural crop has tended to reduction owing to increased use of artificial ice. Not much natural ice is now used south

of Baltimore and Washington, and these cities use very large quantities of artificial ice.

1 he tools used in harvesting this crop are many and varied. Many of them were invented by Nathaniel Wyeth and John Barker of Bos¬ ton. The ice plow was invented in 1839 and the patent clearing-tooth in 1872. Some of the most common tools now in use are : the snow- scraper or plane, the masher .and the plow ; augers and axes for tapping the ice in order to drain off surface waters ; saws ; forked bars for prying the cakes loose; various forms of hooks for handling the cakes; trimming bars for squaring the cakes after loose; adzes, edg¬ ing tongs and chisels used in packing the ice when in the storehouse ; saws and bars for pry¬ ing loose previous to shipment ; and tongs, scales, axes, etc., used on the retail delivery wagon.

Artificial Ice. — The manufacture of ice as an industry was begun as early as 1866, but only reached a degree of commercial importance about 1880. The beginning was naturally made in the Southern States, but as it became more generally used, factories sprang up over the entire country. The growth of the <(infant in¬ dustries® throughout the United States gave this industry an added stimulus, because the supply of natural ice was by far too small to meet the requirements of slaughtering and meat packing-houses, refrigerator cars, cold-storage warehouses, etc.

The first experiments for making artificial ice for mercantile uses started with the Italians in the 16th century. The first machine used for the actual manufacture was invented by Dr. William Cullen, this being based on the vacuum principle, the atmospheric pressure being re¬ duced by means of an air pump. L'ater, in 1795, several experiments were made by a Mr. Walker of Oxford, England, in the line of freezing mixtures. Professor Leslie of England pro¬ duced a considerable degree of refrigeration by including in the exhausted receiver of an air- pump sulphuric acid, a substance rapidly ab¬ sorbing vapor. In 1834 Jacob Perkins, an American engineer residing in London, ob¬ tained a patent for a machinei generally credited with being the forerunner of the modern com¬ pressor machine. The refrigerant used in this machine was ether and brine, and was circu¬ lated at a temperature of 5° Fahrenheit through pipes which encircled the evaporator containing the ether. After running through the pipes, the brine flowed into a receptacle containing boxes filled with water and thus the water was frozen. Later experiments were made by French and German inventors, boxes being sup¬ planted by cans, and this developed into the manufacture of can ice. Many of the improve¬ ments made in the ice-making apparatus are due to the efforts of Prof. A. C. Twining of New Haven, Conn. He patented an ice machine in England in 1850 and in the United States in 1853; in 1855 he invented a machine and put it into active operation in Cleveland, Ohio, which produced 1,600 pounds of ice

in 24 hours; and later discovered that ice would be trans¬ parent, with the exception of a small porous core, if frozen at a temperature slightly below the freezing point. In 1857 Dr. John Gorrie of Apalachicola, Fla., patented his ice-making machine; this was later followed by the com¬ pressed-air machine of Dr. Alexander Kirk; in

1858-60 the machine, upon which the modern ammonia absorption system was founded, was brought forth bv Ferdinand P. E. Carre; and later the plate-ice system was introduced by Capt. David Smith of Chatham, Mass., who erected the first machine of this character in the United States at Oakland, Cal. There have been nearly 4,500 patents taken out in the United States alone for refrigeration processes.

Two systems of making ice are now used, the compressor and the absorption systems, the former the more generally used. The first step is the compression of the anhydrous ammonia (that is, ammonia which contains no water) by means of a steam pump, a pressure of from 125 to 175 pounds per square inch being ex¬ erted. This raises the boiling point of the ammonia. This pressure heat-s the ammonia and it gasifies as released. The next step is to reduce the gas to a liquid state by passing the ammonia through pipes which are in contact with the cold water or some other cold sub¬ stance. By the condensation process 'the heat is greatly reduced and it loses theoretically all the heat it gained by compression-. Thus the temperature of the ammonia falls to 5° or 10° F., and when it is circulated around tanks or cans containing water, the water freezes in a few hours. A good ammonia ice-machine will produce 30 pounds of ice with one pound of coal.

In the absorption process aqua ammonia is first converted into gas by the application of heat which raises the pressure to from 120 to 160 pounds per square inch. The ammonia is then reduced to liquid form by being passed through pipes in contact with cold water. The ammonia is then changed from a liquid to a gaseous form by expansion, the methods being the same as in the compressor system. The ex¬ pansion draws out any heat in the gas, which, as it passes through the pipes in contact with the water to be frozen, absorbs the heat from them till they are of a like temperature.

A large portion of the ice manufactured in the United States is produced by the can sys¬ tem or the plate system. In making ice by the can system the wate.r is first boiled and allowed to settle, in order to free the ice from any foreign substances and to reduce it to the greatest possible degree of purity. The water is then distilled, boiled again and run through three kinds of filters. A series of tanks, con¬ taining a strong solution of brine, is placed un¬ der the freezing room and through this brine run the pipes containing the liquefied ammonia gas. Into the tanks containing the brine are

submerged the cans holding the water to be frozen. The ammonia in the pipes is expanded into gas as it passes into the brine and absorbs enough heat from the brine and water to form the water in the can into ice. The whole proc¬ ess requires from 20 to 66 hours, according to the size and weight of the blocks of ice and to the temperature of the brine. The can is then raised from the tanks by means of a hoist and dipped into a well of warm water to loosen the contents. The blocks produced weigh from 50 to 400 pounds.

The production of ice by the plate system is much slower and more cumbersome. In this process the tank contains the water to be frozen and into it is placed a hollow iron plate holding the coils of pipe filled with the freezing medium.

Thus the ice is formed on the outside of the iron plate, is taken out and removed and is then ready for use. The mechanism of an ice- plant consists mainly of a steam-boiler, feed- water conveniences, an oil-separator or high- pressure trap for removing the oil that collects in the ammonia, a steam-condenser, feed-water pump, an ice-machine, freezing tanks or cans and a cooling tower, where the heated water may be brought in contact with the atmosphere to quickly reduce its temperature.

The rapid growth of the artificial ice in¬ dustry is most eloquently shown by the census figures. During the period between 1870 and 1880, the number of establishments increased from four to 35, and the production from a quarter million dollars worth to over half a mil¬ lion. During the next decade the number of factories increased from 35 to 222, and the production rose to almost $5,000,000 worth. Ten years later in 1900 the census records 787 es¬ tablishments, with a capital of nearly $40,000,- 000, and an annual product of nearly $14,000,- 000 worth of artificial ice, most of this manu¬ facture being in the Middle or Central States of the country. By 1905 the factories had in¬ creased to 1,320, the capital to $66,600,000, and the industry gave employment to over 12,000 people, receiving $5,550,000 in wages and salaries. The total production for the previous year was worth $23,790,000. In 1910 there were 2,004 factories, mostly capitalized between $20,000 and $100,000, and the production was valued at $42,453,000, while the wage earners in¬ creased to 16,000. In 1916 a conservative esti¬ mate places the total of factories at 2,500, and their production at $55,000,000 annually. Pennsylvania is the leading State in the indus¬ try, with 200 factories and 11.2 per cent of the country's production. Texas and New York each are credited with 8.9 per

cent of the total production, but Texas has 200 factories to about 100 for New York State. Ohio, Indiana and Tennessee are the next States in the industry.

Strange to say the largest item of expense in the artificial ice industry is neither labor nor materials, as in most other manufactures. The material being water costs little and the ma¬ chinery does the work. The great item of ex¬ pense is coal, to produce the heat to expand the steam and run the compressor ice-machines.

The cost of producing a ton of ice averages throughout the country for all seasons of the year, between $1.00 and $1.50; the average price to the wholesaler ranges from $2 to 82.25; and the retail prices range from 15 to 40 cents per hundredweight according to the season. The changes and improvements in the methods of producing artificial ice have so reduced the cost of manufacture that it now competes with the natural product. See Refrigeration and Refrigerating Machinery.

ICE IN MEDICINE. See Cold.

ICE PLANT (Mescmbryanthemum crys- tallinuni), a native of Africa and southern Europe. Its name is derived from the trans¬ lucent shimmer of the bladder-shaped papillae which cover the surface. The genus comprises 400 species, nearly all native to southern Africa. In southern California the ice plant is also successfully cultivated; and here, too, flourishes M. cequilaterale, a trailing species distinguished by attractive purple flowers. In the Madeira

Islands, the seeds of the plant are eaten by the natives. When burned, it yields barilla, which contains carbonate of soda, valuable in the manufacture of soap and glass. M. edule yields the fruit known as Hottentot figs. The flowers of the ice plant are many petaled, colored white, red or yellow and the leaves are thick and , compact.

ICE POLO, a game played on skates. It differs from ice hockey in that a ball is used instead of a puck; the stick is shaped differently and the formation and play are more open. The team is composed of five men, distributed as follows : one centre, one half back, one goal tend and two rushers. The rules vary slightly, the object of the game being similar to that of hockey. The rink is 150 feet long (i.e., the dis¬ tance between goals), and the goals are four feet wide. The game is divided into halves of 20 minutes, with 10 minutes' intermission. One goal scores three points.

ICE YACHTS AND ICE YACHTING.

The amusement or sport of sailing yachts over the ice has reached its

highest development in the United States. The sport abroad is con¬ fined to Russia, Sweden and Norway. Boats of the Russian River Club are sailed over a portion of the Gulf of Finland. In 1901 the Stockholm Ice Yacht Club of Sweden built a fleet of fast-racing ice yachts from American designs by Ashley.

The first authentic ice boat in the United States was built by Oliver Booth at Pough¬ keepsie, N. Y., in 1790. It was a square box mounted on three runners, shod with rough iron, with a rudder post and tiller of wood. In 1850, on the Shrewsbury River, in New Jersey, George D. Allaire constructed an ice yacht of the box order, equipped with rough square iron bars for runners, sharpened with cutting edges. In 1855, on the same river, Nathan B. Clark built a three-cornered platform boat, having sharpened runners, and added a jib to the sprit sails previously carried. The type of side-rail boat came into use about 1871. Jacob Buckhout of Poughkeepsie was the pioneer designer of this type and at the Centennial Exhibition (1876) exhibited the side-rail yacht Whiff, built for Irving Grinnell of the New Hamburgh, N. Y., Ice Yacht Club. She carried 347 square feet of canvas and measured 40 feet from the top of the bowsprit to the end of the main- boom. The sloop-rigged Icicle built on these lines carried 1,070 square feet of sail, but this excess of canvas was found impracticable and the building of large boats was abandoned. The revolution in ice yachting began in 1879, when H. Relyea of Poughkeepsie built the Robert Scott, having a single backbone and an elliptical steering box. This boat carried 499 square feet of canvass and easily outsailed boats of twice her size. In 1883 the Jack Frost was built by Archibald Rogers of Hyde Park-on- the-Hudson and the famous racing yacht Haze was built the same year. The Jack Frost won the world's pennant in 1883 and the Haze in 1884 and 1885. About this time the Shrewsbury Ice Yacht Club of Red Bank, N. J., built a large lateen-rigged boat, the Scud, carrying over 600 square feet of duck in a single sail. The Orange Lake, N. Y., Club built at the same time the catboat Shadow, carrying 800 square feet of sail and said to be the strongest ice

ICE-BOATS

Ice-boating " on the Mojave Desert, Southern California. The " ice " is the compact sand of an ancient salt lake, now 2000 feet above sea-level

,

■*n*

**4 .;•••*

yacht ever constructed. Both of these vessels proved unsuccessful as prize or pennant win¬ ners. The Icide, owned by J. A. Roosevelt, took the American pennant in four races out of five in the years between 1888 and 1899. The Jack brost, owned by Archibald Rogers, won the pennant in 1887, 1893 and 1902. In March 1904, the Wolverine won the Stuart In¬ ternational Trophy, over a 20-mile course. In the last heat the time made was 42 minutes. On 24 Feb. 1907, the same yacht broke all world's records for a two-point course, at Kal¬ amazoo, Mich., making the 20 miles in 39 min¬ utes and 50 seconds, which remains as a record.

Racing Rules. — For class racing, ice yachts are divided into four classes: (1) Yachts carrying 600 square feet of sail area and over. (2) Yachts carrying 450 square feet and under

America is open to any American or foreign built yacht.

Ice Yacht Construction. — In the modern ice yacht the centre timber or backbone may be made of two pieces joined, or of one solid stick or as a hollow truss. To this is joined at right angles the running plank, which is supported by the two principal runners ; the third runner is placed aft on a pivot and operated by a tiller as a rudder. The cabin, steering box or cock¬ pit is attached at the aft extremity of the back¬ bone. The mast is stepped two or three feet forward of the running plank. The backbone running plank, mast and bowsprit are con¬ nected and braced by wire ropes. The best material for the main beams is seasoned bass¬ wood, which is very light and stiff. The central objects in construction are lightness and

A Modern and Expensive Ice Yacht.

600. (3) Yachts carrying 300 square feet and

under 450. (4) Yachts carrying less than 300

square feet. Handicap or time allowance for mixed classes is made as follows : One second per square foot for every foot of canvas car¬ ried over the smaller boat, providing the race is sailed in one hour. If the race is sailed in 30 minutes one-half second per square foot . is allowed and proportionately in accordance with the time of the race.

The course is usually a triangle, sailed over as required to make the

number of stated miles; or a straight course to windward and return or to leeward and return. The standard distances for ice-yacht races are 20 miles, 15 miles or five miles. The larger the yacht the longer the course. Time limit: 20 miles, 1 hour 15 min¬ utes; 15 miles, 35 minutes; 5 miles, 20 minutes.

In the United States and Canada there are many ice-yacht clubs. The challenge pennant of

strength and adaptability for perfect handling. The centre of sail balance should agree with the centre of balance of the hull.

The cost of building an ice yacht of the first class, carrying about 650 square feet, is $1,200 and of the fourth class, carrying 300 square feet, about $350.

Sailing.— Racing on a lake is preferred to river racing, as there are neither tides nor ice cracks to interfere. Besides the sailing on the Shrewsbury and Hudson rivers there is now regular sailing and occasional racing on Lake Champlain, New York; Lake Minnetonka and Lake Pepin, Minnesota; Lake Winnebago, Wis¬ consin; Gull Lake, near Kalamazoo, Michigan, and the shores of Lakes Erie and Ontario. The 1914 races were sailed on the Shrewsbury, R. Heitemeyer's Imp winning the American pennant in 40 minutes 5 seconds. In a 10-mile race off Red Bank the Scud offered 7 minutes

handicap to all comers, but lost to the Imp. I he 15-mile race for the Heitemeyer Cup was won by W. Content's Blanche in 35 minutes 35 seconds. In sailing a yacht the sheets are trimmed flat. The closest a boat will go to the wind is 30 degrees or 22/3 points. The best course, or the one that will take the yacht farth¬ est to windward is 60 degrees or S]4 points from the wind, when the advance to windward should be at the rate of half the velocity of the wind,

while the actual velocity is equal to that of the wind. The yacht encounters the greatest veloc- ity of the wind when her course is 90 degrees or 8 points from the wind, when the apparent wind is twice the actual velocity. The great¬ est speed of the boat is attained at 120 degrees or 10f3 points from the wind, when her speed is twice that of the wind. The most rapid progress to leeward is made at 150 degrees or 13ˆ4 points from the wind, when the

ap¬ parent velocity of the wind will equal its true velocity.

ICEBERG, a mass of floating ice, usually detached from the front of a glacier, though the term is also applied to floe ice that has frozen on the surface of the ocean and then broken up. The fronts of many Alaskan and Greenland glaciers are discharging icebergs al¬ most continuously. The ice masses may break away from the glacier as a result of under¬ mining by waves, as a result of large blocks shearing away from the ice cliffs due to their weight and the great height of the cliff (300 to 500 feet in some cases), or as a result of the buoyant effect of the deep water into which they flow.

Ice in the north _ Atlantic occurs in three forms: slab ice, ice fields and icebergs.

Slab ice is sea-ice formed in the river mouths, as in Labrador, occurring in sheet or circular masses. Ice fields are caused by the freezing of the sea itself and come usually from Labra¬ dor, though occasionally from Greenland. These two forms are not particularly danger¬ ous to mariners, but may become so by mass¬ ing or freezing to an unusual thickness. Ice¬ bergs, however, which are always freshwater ice, are never anything but dangerous, and

constitute the deadliest menace to navigation that ships have to face.

All the icebergs that are so perilous to travel in the transatlantic routes come from Green¬ land, in the neighborhool of Melville Bay, or outlying islands. Greenland is itself a huge, dome-shaped island covered with an ice-cap in places probably more than a mile in thickness. The western slope is far more extensive and it is on this side that most of the icebergs are formed; those that are made on the east coast are smaller, fewer in number, and, being quickly broken up by the open Atlantic waves, melt before they float far south.

The immense glaciers on the West Greenland side are constantly descending and push out to sea in enormous "tongues,® as they find their way down the ice-covered mountains. These "tongues® form icebergs in three ways. Masses of ice may simply break off of their own weight; the sea waves may undermine the "tongue® until the weight of overhanging ice causes it to fall into the sea — a process called "calving® ; or the ground swell of the ocean may dislodge large blocks of ice from the base of the glaciers. This glacier ice is unlike any other, having become exceedingly hard and flintlike from the enormous pressure; and, mingled with it, on the underside, are often boulders, stones, soil and other detritus. This is the birth of the iceberg — masses of ice of all shapes and sizes, launched into

the sea every day of the year, but most generously in the short Arctic summer and contributed to by every mile of coast from Cape Farewell to Disco Bay, tributary to 120,000 square miles of ice cap. There is a single glacier that furnishes 200,000,000,000 cubic feet annually in icebergs.

These icebergs, as released, drift across the entrance of Baffin's Bay and Davis Strait to the Labrador coast. Here they catch the Labra¬ dor current and drift slowly southward on a journey of weeks or months — that is, for those that manage to escape to the open. The great majority of them become grounded or are immeshed by the numerous islands and bays that mercifully line. the Labrador coast and protect the Atlantic in large measure from the iceberg menace. Those that finally make their way through — and they are countless in num¬ ber divide into two streams, one passing through the Strait of Belle Isle into the Gulf of Saint Lawrence, and the other, much the larger, going to sea by the way of the Grand Banks of Newfoundland. The "Banks,® it is interesting to note, have been formed, it is thought, by the. detritus brought down from Greenland by icebergs through unnumbered ages and dropped here, as the icebergs disin¬ tegrated, to become the breeding ground of cod, herring and other fish used by man.

When icebergs reach this point, they seem of every size, shape and contour, some of them rising to a hundred or more feet in height with spires of crests or "minarets® 200 to 300 feet above the base, which may be hundreds of yards in length. From one-eighth to one-ninth of the mass — not necessarily height — lies above water. It must be remembered that mass and height are very different qualities. It is quite possible that an iceberg is disintegrating in such a way that it is as high out of the water as it is deep below the surface.

Icebergs reach the transatlantic routes in

ICEBERGS

ICEBERGS

1 Iceberg off Silt Cave, St. Johns, Newfoundland, appearing like a vacht unHˆr #,,n 0 -i

2 Iceberg composed partly of soft ice, which rapidV melts on its jouSeysomhwa?"

ICELAND

greatest numbers in April, May and June, but may be met with earlier and later. During the months named a more southern route is chosen by the ocean steamships. The place of most frequent contact with icebergs is at latitude 42° 45′ and longitude 47° 52′, where the Labra¬ dor current meets the Gulf Stream. It was at about this point that the Titanic met her fate in April 1912. The iceberg peril is lessened by the issuance of monthly (

Icebergs disintegrate very rapidly, beginning almost as soon as they are afloat. This is due in part to the fact that there is so marked a difference between the tension of the exterior and interior portions of such a mass of ice. The water that melts on an iceberg during the day works its way into crevices, and then, freezing at night, expands and splits the ice, often violently. After the icebergs get out of the Labrador current, disintegration goes on naturally and much more rapidly. They finally disappear about 400 miles south of Nova Scotia, the (

ICELAND. An island in the north Atlan¬ tic Ocean, on the border of the Arctic Circle, 200 miles east of Greenland. It belonged to Denmark from 1381 to 1 Dec. 1918, when it became a sovereign state ; the two countries, however, have the same king. Iceland is an al¬ most impossible land for human occupancy.

Area and Physiography.— Iceland is situ¬ ated between 13° 22′ and 24° 35′ west longitude and extends from 63° 12′ to 66° 33′ north lati¬ tude. Approximately 300 miles from east to west and 200 from north to south, its area is about 40,450 square miles. Its coast line of 3,700 miles is deeply and irregularly indented by fiords, those of the northwestern peninsula be¬ ing especially numerous. Three-fourths of the area is on the main island ; the remaining por¬ tion is that of the northwest peninsula, which barely escapes being an island, as the connect¬ ing isthmus is only a few miles wide. This peninsula is largely mountain masses, with an average elevation of 2,000 feet. The main island is a series of volcanic tablelands, high and ir¬ regular, ranging from 1,500 to 3,000 feet above the sea. Overlaid here by extensive lava-beds and there by vast neves, or snow-fields, these plateaus present great areas of barrenness devoid of vegetation and are also broken up by ridges, fissures and spurs. More than one-eighth of Iceland is covered by lava-beds and another eighth by neves or glaciers. The. only areas suitable for human habitation and industry are the bordering lowlands of the ocean and fiords, with the adjacent fertile valleys. Among the many mountains the highest are Orsefa, 6,424 feet, and Hecla, 5,108 feet. Lakes are numer¬ ous though of small size, the largest being Thingvalla and Thors, each less than 30 miles in area. The so-called crater lakes, especially those to the west of Vatna, are subject to sud¬ den and violent displacements through volcanic

action Pasturage for herds and arable lands are almost entirely confined to valleys near the fiords.

Climate. — Iceland's climate is typically in¬ sular — equable and humid, with cool summers and warm winters. The following data com¬ piled from observations of many years at Styk- kisholm, 65u N., closely represent all of the island The monthly averages of temperature, number of rainy days and amount of rainfall are: January, 50°, 20, and 2.76 inches; Febru¬ ary, 27°, 18, 2.48; March, 27°, 18, 1.93; April, 34°, 16, 1.22; May, 40°, 15, 1.38 June, 47°, 16, 1.57; July, 50°, 13, 1.34; August, 49°, 14, 1.54; September, 45°, 18, 2.99; October, 38°, 19, 2.76; November, 33°, 18, 2.28; December, 28°, 20, 2.32. The coast temperatures differ slightly from those given, but on the central tableland vary from two to six degrees warmer in summer, and that much colder in winter. The annual rainfall of the southeastern shores averages 46 inches or more, while that of Grimsey Island, off the north coast, falls to 15 inches.

Fauna and Flora. — The woods are repre¬ sented only by birch, mountain ash and willow, all stunted; trees more than 20 feet high are rare. The floral species number 435 and pertain to the Arctic flora of Europe. Indigenous ani¬ mals are the blue and white foxes, visiting polar bears and mice. Wild reindeer are from the herds introduced in the 18th century. Of the 100 birds, the majority are aquatic. The most valued is the eider duck, for the down with which it lines its nest.

Volcanoes. — The physical features and material prosperity of Iceland have been largely dominated by its volcanoes, whether active or quiescent. During inactive periods the drifting ashes and cinders often destroy the fertility of fields and the pastoral ranges. From the erup¬ tions have come vast masses of lava, which have transformed by their unbroken sheets thousand of square miles of cultivated valleys into desolate deserts. The fearful devastation wrought by eruptions has scarcely been sur¬ passed elsewhere. In two centuries (1625-1860) Katla has been active 13 times, once sending its ashes to Norway. On occasion the lava streams from this volcano melted enormous masses of neve, causing violent floods which through its debris changed many farms into barren wastes. As late as 1875 Askja sent forth great rivers of lava from its crater of 34 square miles.

The most frequent eruptions have been from Hecla, which numbered 43 periods, of activity up to 1845 ; they were generally violent. The outflow of 1783 wasted a large extent of country, while that of 1845 continued at inter¬ vals for nearly a year, pouring out a lava stream 50 feet deep and a mile wide.

Hecla has the record for, devastation, its single eruption (1783) causing

almost incon¬ ceivable havoc. It is asserted that no less than 230,000 head of stock were killed, including more than half of the cattle, three-fourths of the horses and four-fifths of the sheep. These frightful losses of fields and of stock caused famine to fall on the land, and in succeeding years 9,500 persons died of starvation, one- fifth of the entire population.

Earthquakes are naturally associated with volcanic energy, though not directly connected with it. The earthquake of 1784 destroyed 92

homesteads and injured 372 others. The dam¬ age of that of 1896 was fully as great, half of the 320 homesteads affected being destroyed. The lava beds work the greatest injury, as they gradually diminish the arable and pastural areas of the island. The greatest lava producers have been Askja, Hecla and Katla; these parent volcanoes are encircled by lava sheets which aggregate in area nearly 5,000 square miles. The Odadahrum field, to the north of Vatna, is an unbroken sheet of 1,700 square miles, in¬ cluding branches. One danger is the melting of the surrounding neves by the burning lava, thus producing devastating inundations. The most destructive of such floods was caused by the eruption of Oearefa Tokeell (1362), when 40 farms with occupants and stock were swept bodily into the ocean.

Glaciers and Neves. — There are 200 or

more of neves, or permanent snow-fields, the most extensive, 2,300 square miles being that of Vatna, which borders the Atlantic. While the northern snow-line of Vatna, facing the Arctic Ocean, is at an elevation of 4,000 feet or more, the southerly snow-bearing winds of the North Atlantic are so effective that they bring the neve of the oceanic slopes down to 2,000 feet. From this neve issues a glacier of nearly 200 square miles area. Practically all the glaciers are dead, that is do not reach the sea, though the Breidenmerkur closely ap¬ proaches the Atlantic. On the Arctic and coldest coast, the lowest glacier terminal is 2,500 feet above the ocean.

Geysers. — Hot springs exist in large num¬ bers, and are of three types : quiescent springs, boiling mud lakes, and geysers where boiling water is ejected intermittingly. The largest geyser system — numbering a hundred — is about 60 miles northwest of Hecla, and 70 miles from Reikjavik. The best known are the Great and Little Geysers, and Storkr (the churn). The Great Geyser is surrounded by a silicate basin, 70 feet across and 5 feet deep. The vent extends 80 feet downward, and its diameter is about 8 feet. At irregular intervals, varying • from 6 to 30 hours,, the Great Geyser

ejects with a roar a column of boiling water to great heights — 80 to 150 feet. The surface water usually has a temperature near 180°, but occa¬ sionally reaches 250°.

Agriculture, Fisheries and Industries. —

About 50,000 persons are engaged in agri¬ culture, of whom a surprisingly large number are owners. Hay is the principal crop, fol¬ lowed by potatoes and turnips. Berries are the only native fruits. Stock-raising is the import¬ ant factor. In 1914 there were 1,021 goats, 25,380 cattle, 46,644 horses and 585,022 sheep. Grain cannot be profitably grown, thus necessi¬ tating importation of cereals. The most import¬ ant of the exports are the products of the deep-sea fisheries, in which 15,890 persons were engaged in 1914. Cod i.s the most lucrative, fol¬ lowed by herring and salmon. Industries are limited, only 7 per cent being employed therein. The principal industries are the curing and salting of fish, rendering of oil, preparation of eiderdown and the manufacture — largely domestic — of woolen cloth for local use.

Minerals. — Difficulties of transportation and poverty of metallic deposits have delayed the exploitation of the minerals of Iceland. In recent years a mine of the well-known Iceland

spar has been developed, and with the growing demand for fuel the mining of the low-grade coal is also being attempted.

Communications. — Keeping pace with in¬ ventions, Iceland has emerged from the period of bridle-paths and infrequent mails. Bridges and roads now exist, and the introduction of motors compels further progress. Cable com¬ munication with Europe is supplemented by a network of telegraph and telephone lines; this system, 862 miles in length, has about 90 sta¬ tions in operation. The coast settlements are served by regular steamship lines.

Government. — Under the Act of Union, passed 30 Nov. 1918, Iceland and Denmark are free, sovereign states, united under one king and by the agreement set forth in the Union Act. Executive power over Iceland is exercised by the king through responsible ministers, while the legislative power rests conjointly with the king and the parliament. The latter, called the Al¬ thing, consists of two houses — upper and lower — with a total of 40 members. See History.

Commerce. — Until 1854 trade was a Dan¬ ish monopoly. At present 40 per cent is Danish, 25 English, and 10 Norwegian. The larger part of the cargoes are carried in Eng¬ lish bottoms. The value of the imports (1913)

reached 16,717,000 kroner: they consisted prin¬ cipally of cereals, 12 per cent ; clothes, etc., 14 per cent; coal, 15 per cent; and wood materials,

7 per cent. The exports (1913) aggregated 19,128,000 kroner. Of this fish amounted to 64 per cent, mutton to 10, oil and hides, 5 each, horses and eider-down about 1 per cent each.

Population. — The inhabitants of Iceland are Scandinavian by race and Lutheran by reli¬ gion. Once said to number 100,000, they were reduced by famine and epidemics to 47,240 in 1801. The population increased steadily to 72,- 445 in 1880, but fell off the following decade to 70,927 through an epidemic of measles and by emigration to America. The census of 1911 registered 85,133, and doubtless the number now exceeds 90,000, as the 2,333 births of 1914 exceeded the deaths by 904. The Icelanders are educated, intelligent and temperate. Thrift is shown by the saving-banks where the deposits approximate $1,500,000. More than one-half the population are agriculturists, and one sixth are engaged in deepsea fisheries.

Education. — In the remote and rural dis¬ tricts the education of children begins at home, aided by traveling teachers and super¬ vised by the clergy. Wherever there is a vil¬ lage or town a regular school system is main¬ tained. Reikjavik is the seat of higher educa¬ tion, headed by a theological seminary and a university. Technical schools are maintained for medicine, navigation, agriculture (there are four on the island), Latin and advanced train¬ ing for women. _ There are about 20 Icelandic newspapers and journals, which are widely dis¬ tributed and diligently read.

History. — The definite history of Iceland begins with its settlement in the 9th century by Norwegians, whose emigration was forced by . the tyrannical oppression of King Harald Fairhair The colonists came in clans, their home chieftains ruling selected districts in the new land. These chiefs soon established a rep¬ resentative government, organizing the Althing in which all Iceland participated. For two cen¬ turies the laws there made were promulgated

orally and handed down by memorizing. The introduction of Christianity, in the year 1000, was followed by the development of a rich and remarkable literature. Feudal quarrels and religious dissensions, fostered by the king of Norway, led to civil war. Through emissaries, by means of assassination and bribery, the Althing was influenced to ratify (1264) a

Treaty of Union with Norway, safeguarding Icelandic liberties by provisos retaining powers of taxa¬ tion and of law-making. In 1381, through changes in the Scandinavian dynasty, Iceland passed under control of Denmark.

The epidemic of Black Death (1402-04) threatened extinction, while later famines, pi¬ ratical raids, smallpox (1707) and volcanic eruptions (especially in 1783) brought untold misery on the people. After an existence of over eight centuries the Althing was abolished (1800), and home government seemed to have perished. But patriotism was not dead, and after years of struggle the Althing was restored in 1843. Denmark attempting (1849) to restrict Icelandic liberty, a constitutional struggle fol¬ lowed, which terminated (1874) by the grant¬ ing of a constitution. This reformation was ac¬ complished under the leadership of Jon Sigurds- son, on whose monument is engraved, < (Ice- land's beloved son, her honour, sword and shield. w While the Althing was largely elec¬ tive, the Upper House was formed by 12 mem¬ bers, of whom six were nominated by the king of Denmark, who also appointed the governor. The Crown however exercised very freely its power of veto on Icelandic measures, which led to further struggles that did not end, despite certain liberal concessions by Denmark, until Ice¬ land was recognized as a sovereign state in 1918. The constitution of Iceland is embraced in the Charter of 1874, as modified by acts of 1903 and 1915. Originally this charter ap¬ plied only to the separate affairs of Iceland, while Denmark exercised sole power in common affairs ; but since 1918 the charter governs all the affairs of the country. The Althing, which is the legislative body of the country, consists of two houses — the upper house and the lower house. The former has 14 members, six selected by proportional representation for the entire country, and eight, chosen by the Althing, sitting as a whole, from the 34 members elected by universal suffrage in constituencies. The remain¬ ing 26 members constitute the lower house. The flag of Iceland is a white cross, with a stripe of red, in a blue field.

Bibliography.— Thoroddsen, (Geschichte der Island Geographie) (2 vols., Leipzig 1898) ; and (Islands Kultur) (Copenhagen 1902) ; Annan- dale, N., (The Faroes and Iceland (London 1895) ; Stefansson, J., (Denmark and Sweden, with Iceland and Finland) (New York 1916) ; Russell, W. S. C, Hceland: Horseback Tours in Saga Land* (Boston 1914).*

Major-Gen. A. W. Greely, Author of c Handbook of Alaska 2

ICELAND MOSS, a lichen (Cetraria islandica), found in all the northern parts of the world. It is valued for its nutritious and medicinal properties, and as an article of com¬ merce is collected in Iceland and Norway. In the extreme north it grows even near the sea- level ; farther south, only on the

mountains. In Iceland it often thickly covers great tracts,

and the gathering of it is a summer industry. It grows about one and one-half to four inches high, consists of an almost erect thallus, and is of a substance leathery and rather cartilagin¬ ous. It has a bitter principle which is reduced by steeping in water, and the moss is prepared as food either by pounding and making it into bread or by boiling, with water or milk, till it makes a jelly, in which form it is art agreeable and beneficial diet in some forms of disease, especially in pulmonary disorders. 'It is also utilized in dressing the warp in weaving, and for sizing, paper, being mixed in the vat with pulp. It is also of value as one of the foods of the northern caribou.

ICELANDIC LANGUAGE. The Ice¬ landic language is a member of the Scandina¬ vian branch of Germanic languages. Together with Old Norwegian as spoken in Norway and in her Western colonies, the modern Norwe¬ gian dialects, and Faroish it forms the Western Scandinavian group, while Swedish and Danish form the Eastern. (See Danish Language). The original settlers in Iceland came from Nor¬ way direct or from the Norwegian colonies on the islands north of Scotland. The majority were from southwestern Norway, and with the dialect of this section of Norway the Icelandic language remained most closely related till the 14th century, from which time Icelandic is a language separate from Norwegian. Owing to the island's isolated location, the Icelanders have for a longer time than other countries preserved old habits and customs, and partic¬ ularly has the ancient language been retained with comparatively few changes. The popula¬ tion has at no time exceeded 100,000, while about 25,000 have in recent years found new homes on the North American continent, about equally divided between Canada and the United States. But the language and literature of this people, so insignificant in number, are of the greatest interest and value.

The history of the Icelandic language may be divided into two periods: Old Icelandic (874 to the time of the Reformation) and Modern Icelandic. In the so-called classical period, from the latter half of the 12th century to 1350, the language of Iceland and Norway was often called ((Norront maP (Norse tongue). The <(Norn):> language is still used about what re¬ mains of the Norwegian language on the Shet¬ land Islands (cf. Jakob Jakobsen's (Etymolo- gisk Ordbog over det norrone Sprog paa Shet¬ land*)• While changes common to the lan¬ guage of Norway and Iceland are developed in this period, there are also certain characteris¬ tics in Icelandic distinguished from Norwegian (see Norwegian Language), but as by far the most important literature was either produced or preserved in manuscript in Iceland, .the Ice¬ landic form became the standard, and even in Norway Old Norwegian is taught in the schools in the Icelandic form. Some*

differences be¬ tween Norwegian and Icelandic are: u-muta- tion of a is found in Norwegian only when u is dropped in the following syllable, in Ice¬ landic both when it is dropped and when it is retained (Icelandic forum, Norwegian fariim) ; original h has been retained in Icelandic (even till this day) before /, n and r. while in Norwe¬ gian h was dropped (Icelandic hlutr, Norwe¬ gian lutr; Icelandic hmga, Norwegian niga) ;

d (a?) becomes (13th century) in Icelandic (ae) (norrona, Icelandic norrcena) ; later, e be¬ fore ng is changed to ei in Icelandic. The classical Icelandic was practically uniform throughout the island, with very few dialectic differences. This was owing to the lively in¬ tercourse between the different settlements of the island and between these and the mother country, to the annual Althing gatherings and to the flourishing literature. As a literary lan¬ guage it takes the highest rank among the old Scandinavian languages not only on account of its wealth of literary treasures, but also on account of its pliancy, its expressive and ele¬ gant style. Both the valuable literary produc¬ tions and the retention, on the whole, of the more ancient forms give it a fundamental im¬ portance for the study of Scandinavian lan¬ guages and literatures in all their branches. Even at an early date their language became to the Icelanders an object of scientific study, as seen, e.g., in the so-called (First Grammati¬ cal Treatise) in Snorre's (Edda,) written by an unknown scholar in the 12th century. From the 14th century, Middle Icelandic falls far below the Classical in power and grace. From the orthography, often inconsistent and a mix¬ ture of old and new, is seen the transition to the pronunciation which is characteristic of Modern Icelandic. A considerable number of foreign words make their appearance, borrowed from French, German and Danish.

Modern Icelandic as written does not differ verv much from Old. Especially from the 19th century, it has in the main retained the orthog¬ raphy of classical Icelandic, while in its earlier periods the orthography resembled more the Middle and was closer to the pronunciation. In this respect it differs very much from Old Icelandic. A number of the vowel sounds have changed. One example: d is spoken as the diphthong au and before tt almost as German ach. The same is true about the consonants. Examples: ll (in certain cases) and rl spoken is dl. The same sounds as in English th in Mather" and Mhink" have "V and h retained. The accent is on the first syllable. As to the vocabulary, the modern Icelanders have with passionate zeal practised the exclusion of all foreign words and have formed new words, as occasion demanded it, from native material. There is, on the

whole, much similarity between linguistic conditions in modern Greece and modern Iceland. The result of this purism so consistently carried out is that modern Ice¬ landic has fewer words of foreign origin than any other language. New words have in many cases been coined successfully, as bokasafn (li¬ brary), umrceda (discussion). But in a num¬ ber of cases these attempts have not been so successful. Where it is impossible to coin new words from Icelandic material, the strictest nurists would rather avoid the use of the word or use an Icelandic word that has a somewhat similar significance.

Bibliography.— Fritzner, (Ordbog over det gamle norske Sprog) (Christiania 1896) is the best dictionary; Cleasby-Vigfusson, (Ice- landic-English Dictionary) (Oxford 1874) ; Egilsson, (Lexicon Poeticum Antiquae Linguae Septentrionalis) (Copenhagen 1860, 2d ed. of this excellent work now being published by Finnur Jonsson) ; Thorkelsson, (Supplementer til islandske OrdbogeD (Reykjavik 1876-97) ;

Haegstad-Torp,

1905).

Gisle Bothne,

Professor of Scandinavian Languages and Lit¬ erature, University of Minnesota.

ICELANDIC LITERATURE— Old Ice¬ landic (800-1500). — The old Icelandic poetry is a development of the old Norwegian, which, however, it soon surpassed. From the middle of the 10th century almost all the skalds (poets) are Icelanders. After the famous Nor¬ wegian Eyvind Skaldaspillir, whose (Hakonar- mal,) composed in memory of King Hakon (d. 961) is one of the finest songs handed down from the past, poetic art almost ceased among the Norwegians while it flourished among the Icelanders. The Elder Edda or Ssemund's Edda is a collection of lays, treating of gods and heroes of antiquity. In these famous poems together with the Younger or Snorre's Edda we find the principal sources of our knowledge of Scandinavian and, indeed, Germanic myth¬ ology. Many scholars have in recent times dis¬ cussed both the age and what was the probable original home of the Eddaic poems. The con¬ sensus now is that the oldest are from the latter half of the 9th century, and that most of them came from the 10th and the early part of the 11th century. Their original home is Norway and her colonies, and of these principally Ice¬ land, where they were preserved in their writ¬ ten form. Related to the Eddaic lays whose authors are unknown, is the poetry of the known skalds. These poems treat of a variety of themes. Joy and grief, love and hatred find expression in them, but the majority are

com¬ posed in honor of kings and princes, in whose presence the skald himself recited his poem. The Icelandic skald would visit especially Nor¬ way, but also Sweden, Denmark and the Brit¬ ish Isles. The princes gave them as a rule a hearty welcome and rewarded them liberally. These poems of praise and songs of heroic deeds often have great historical value, superior to the artistic, and in the sagas are found fre¬ quent quotations from them in support of the story. Simple rules of versification, as a rule, governed the lays of the Edda. In the age of the skalds it is much more artificial, bordering sometimes on the incredible. Combined with the rules, to be strictly observed, of metre, alliteration and rhyme was developed an elabo¬ rate system of complicated figurative para¬ phrases (kenningar). All this artificiality is far removed from the noble simplicity of early poetry and often makes the skaldic verses unin- !Lˆ/8jble. Toˆ a number of these enigmas, the Skaldskaparmal of Snorre's Edda furnishes the key.

ICELANDIC LITERATURE

©31

The first great poet of Iceland was Egil Skallagrimsson, the hero of one of the best sagas. This famous viking of the 10th century was both a great skald and a mighty warrior. Of his poems that have been preserved (Sonar-torrek) ((Loss of the Son) bears the best evi¬ dence of his great poetic gifts. In his War¬ riors of . Helgeland* Ibsen has imitated it. Glum Geirason composed a poem in memory of the Norwegian king Harald Graafeld and was the first Icelandic skald to compose a poem in praise of a king. Soon this species of poetry was exclusively confined to the Icelanders. But there are also poems of a different kind, as the love songs of Kormak Agmundsson and Gunn- laug Ormstunga who visited Norway in the time of Earl Haakon (d. 995). Hallfred Van- dnedaskald composed poems in honor of King Olav Tryggvesson (1000). Thormod Kolbrun- arskald was one of Saint Olaf's skalds and fell in the same battle as his master (1030). Most famous of all Icelandic skalds is Sigvat Thords- son, who made his home in Norway and was strongly attached both to Saint Olaf and his son Magnus. Best known are his (Bersoglis- visur> (songs of free speech). Arnor Thords- son and Tjodolf Arnorson were attached to King Harald Hardradi who also was a poet. Of the many poets after the time of King Harald must be mentioned the great historian Snorre Sturlasson who wrote in honor of King Hakon and Earl Skill e, his well-known (Hat- tatal* (enumeration of metres) in 102 different kinds of verses. Snorre's nephew Sturla Thordsson is the last poet who is known to have composed songs in honor of Norwegian kings ((Hakonarkvida)) . In all these songs of praise which principally glorify the warlike deeds of kings and princes, we find compara¬ tively few traces of the changes brought, about in customs and views by the acceptance of Christianity. Even in the drapas that were*

produced after the introduction of Christianity figurative language and expressions are used which get their explanation from the myths of heathen gods and heroes. But it is clear that sooner or later the new religion would furnish the poets new material. Most remark¬ able and, perhaps, the. oldest in this respect is (Solarljod) ((Song of the Sun). Even this Christian poem, giving visions of heaven, pur¬ gatory and hell, uses much of the heathen ma¬ terial. But it was easy to transfer the practice of singing the praise of kings and warriors to the religious field. Christ and the Saints were looked upon as heroes and warriors. The last and most famous of these religious poems is Eystein Asgrimsson's*

Even in the early heroic lays and in the

skaldic poetry the Norwegians and the Ice¬ landers had shown an interest in the history of their people. But the most adequate expres¬ sion for this we find in the prose literature, of which the best productions are the famous sagas, a name applied both to history and fic¬ tion. The skald who composed the historical drapa and the writer of the saga had much in common, and the two were sometimes united in one person. The skald visited foreign countries and brought back with him, as did other travelers, the wealth of material for the prose tradition. From a more primitive be¬ ginning this tradition gradually developed, probably under the influence of the Irish saga developed in a similar way, into a well rounded and complete narrative of a certain fixed form, so that the writer who gave it its final shape in many cases only arranged the material for the purpose he had in mind. Another similarity with the Irish saga we find in the numerous quotations of skaldic verses to strengthen and confirm the reliability of thi narrative. Most of the sagas treat of conditions on Iceland and of the history of the kings of Norway. In some sagas are found also remarkable experiences among other peoples with whom the Icelanders came in contact. It is especially in this his¬ torical field that the Norwegian-Icelandic litera¬ ture reached its highest point and produced masterpieces that may both as to contents and form be called classical. The Icelandic sagas had their beginning about 1120 and continued down to the close of the 14th century. The first half of the 13th century may be considered the golden age of the sagas. Also in this literary production is seen a development into maturity, a growth and decay. But on the whole, the majority of the sagas show distinct character¬ istics of a very high value. The description in the so-called historical sagas is wholly impar¬ tial, and even in the few cases when we know who the author is he keeps entirely in the background. Often quotations from skalds and other authorities are found, the time of the happenings is carefully stated, and accurate descriptions of the historical places are given, the family connections, the personal appearance and the character of men and women are de¬ scribed in almost complete detail. Especially are the descriptions of character,

although ex¬ pressed in few words, admirable. The style of the saga shows its origin from oral tradition. It is simple and natural, without any long periods, and the frequent use of dialogue re¬ minds one of the speech of every-day. The dramatic style in connection with the artistic arrangement of the subject gives the Icelandic saga a high rank in comparison with any other literature. The historical sagas treat of Ice¬ land as a whole and embrace also the family sagas, whose trustworthiness is considered by modern scholars often very doubtful; the sagas of the kings of Norway; the sagas treating of other countries. Ari Frodi Thorgilsson (1067-1148) is the pioneer among historians. His Hslendingabok ((Book of the Icelanders*) gives an account of the early settlement down to 1118. He also began the production of the (Landnamabok) ((Landtaking Book*) which was continued by several others, among them Sturla Thordsson. This unique work tells of the original settlers and their families and con¬ tains the names of 3,000 persons and 1,400*

places. To the general history of Iceland be¬ longs also (Kristnisaga> on the introduction of Christianity, to which may be added several sagas of the bishops and collections of legends. (Sturlungasaga,> the greater part of which was written by Sturla Thordsson, tells the history of the Icelandic republic down to 1284.

The family sagas discuss, with few excep¬ tions, persons and events from the first settle¬ ment of the island to approximately 1030. Ow¬ ing to the fact that in this period Iceland was occupied by the early settlers and that the new faith was introduced and to other causes, the many remarkable events furnished a wealth of material for the oral tradition to build on. These sagas are properly grouped according to the localities they describe. Of the lar .e num¬ ber only the most prominent may be men¬ tioned. To the South belongs (Njal's Saga,} the most celebrated and best of these sagas. In the West we find (Egil's Saga, .also one of the best, telling us about the skald and warrior Egil Skallagrimsson. A continuation, in a way, of this saga is Gunnaug Ormstunga's Saga, shortˆ but very beautiful. Hoensa-Thori's Saga contains important contributions to the history of the Icelandic constitution. Eyrbyggia-Saga gives valuable information about customs and manners at the time the new land was oc¬ cupied and tells about the heathen superstition. Laxdoela-Saga, remarkable for its excellent de¬ lineation of character and its vivid style. Gisle Sursson's Saga is a well told story of a man who was outlawed and gives information of the foster-brotherhood of the early days. (Fost- broedrasagaP tells of Thorgeir Havarsson and Thormod Kolbrunarskald. To the North Dis¬ trict belongs*

Kormak's Saga telling about his adventurous life and containing a number of love-songs. Hallfred's Saga tells about the fates of the above mentioned H. Vandrsedaskald. Vatnsdoela Saga gives fine descriptions of per¬ sons and conditions at the time Christianity was introduced. Gretti's Saga contains many ex¬ aggerations and fables in telling about the out¬ law Gretti the Strong. Viga-Glum's Saga is one of the oldest and best and throws much light on the culture of early times. In the North Hrafnkell's Saga gives much valuable information about the worship of the gods, the administration of law and political institu¬ tions. The history of Norway occupied the at¬ tention of Icelandic writers at an early date. Ari Frodi was the pioneer also in this field. Soon others followed his example, some writing a complete sketch of all of Norway's history, while others confined themselves to the history of one or several kings, especially Olaf Tryg- gvesson and Saint Olaf. For a short time the Latin language was used: The Norwegian monk Tjodrek wrote his (Historia Norvegise) about 1179, and the Icelandic monks Odd and Gunn- laug wrote in Latin about Olaf Tryggvesson, but this work is now only preserved in an Ice¬ landic translation.

ficent parchment), a history of Norway from Half dan the Swarthy to 1177. Among the skaldic poems found in this work is* ***Eiriks- maP about King Erik Bloodyaxe. All the above mentioned historical works were pre¬ liminary to, and used as sources of, the greatest and most celebrated of historical works in all the old Scandinavian literature, Snorre Stur- lason's ˆeimskringla.*** *It begins with the story of the royal family of £he Ynglings, descended from the gods, and tells the history of Norway down to 1177. The saga of King Sverre (1177-1202) had already been written by one of his contemporaries, the Icelandic abbot Karl Jonsson. The so-called great saga of Saint Olaf is probably an elaboration of Snorre himself of the Olaf's saga in his Heimskringla. Continuations of Snorre's work are, besides the Sverre's saga, the saga about Sverre's three successors and the Saga of King Hakon Hakonsson, whose author was Sturla Thordsson. Of the saga of King Magnus Lagaboter (Law-mender) by the same author, we possess only a fragment. This was the last original Icelandic production on the history of Norway. From the close of the 13th century and through the 14th century there are a num¬ ber of rather uncritical collections of historical sagas. Among these may be mentioned the (Flateyarbok) (1370-80), containing not only sagas of Norwegian kings, but also sagas of the Orkneys and Faroes and other minor narratives. The sagas of Erik the Red and Thorfinn Karl- sevne tell about the Norwegian discovery of Greenland and Vinland (America). Much in¬ formation about the early history of Denmark is found in the (Jpmsvikinga Saga* and es¬ pecially the (Knytlinga Saga.* Contributions to. the history of Sweden are found in several minor narratives, while Eymund's Saga*

gives information about Russia. Another class of sagas is the mythic-heroic ((Fornaldar-s6gur>) , in which the imagination of the writer has full play. A prominent place in this group has the Volsunga Saga, a narrative with many romantic embellishments, based on the heroic poems in the Elder Edda and others that have been lost. Connected with this saga is the Saga of Dietrich of Bern, compiled from Ger¬ man sources in Bergen, Norway, about 1250. lhe sagas of Hervor and Half and His Heroes contain many fragments of old poems. Hrolf Krakes Saga and Ragnar Lodbrok's Saga, es¬ pecially. valuable for the study of Danish tradi¬ tions, give romantic descriptions of the viking age. The beautiful Fridthjof's Saga has fur¬ nished .material for Tegner's famous poem, this with the saga of Orvar-Odd and others deals with Norway. It becomes difficult to draw the line between these heroic-mythic sagas and the folk-tales to which the transition was easy To the latter belong the stories of Bard Snaefellsass, Gautrek, Sorle the Strong and many others. As early at s in the 13th century the taste for romances and romantic poems full of strange adventures and sentimental love- stories. had spread to the North from foreign countries. We know that at the suggestion of the Norwegian king Hakon Hakonsson and his successors, stories of this kind were translated. There are more than 100 more or less free translations from Latin, English, Ger¬ man and especially French. Some of the translations made in Norway are by Icelanders.

As an example may be mentioned the long Ivaiiamagnus Saga, a free prose translation of the French (Chanson de gesteF Foreign in¬ fluence is also seen in the legendary sagas. A few of these are of Norwegian origin, but most of them are translations. Best known is the saga of Barlaam and Joasaphat, translated by Hakon Sverreson, king of Norway. Also to be mentioned are Mariw saga, (Postola sogur, Helgra manna sogur. }

Gragas) is the name of the code of laws for the Icelandic republic. It is based on the laws brought from Norway by Ulfljot and adopted by the first Althing in 928. The manuscripts are from the 13th century. After the union with Norway a new law was adopted, called (Hakonarbok) after King Hakon or (Jarnsida) (Ironside) from its cover. In 1281, during the reign of Magnus Lawmender, the

Modern Period. — Printing was introduced in 1530 by the last Catholic bishop, Jon Arason. He was a lyric poet of note. The first, not very good, translation of the New Testament wras made by Oddur Gottskalksson, printed in Denmark in 1540. Bishop Gudbrandur Thor- laksson completed

in 1584 his fine translation of Luther's German version of the whole Bible. On this translation as on a foundation was created the modern Icelandic literature. From his printing establishment at Holar no less than 85 works were issued between 1574 and 1624. The new literary interest created by the Reformation had an almost exclusively re¬ ligious character down to 1720. Jon Thorkels- son Vidalin (1666-1720) ranks with the very best preachers of the Scandinavian countries, and his family book of sermons was found in almost every home. In this period Iceland had a large number of writers of hymns. Religious poetry reached its highest in the popular pro¬ ductions of Hallgrimur Petursson (1614-1674). In the Age of Learning, Arngrimur Jonsson Vidalin and Brynjolfur Sveinsson, who dis¬ covered the manuscript of the Elder Edda, were excellent Latin scholars and published works in Latin. Vidalin published (Crymogaea) ((Ice-land)), the first comprehensive description of

Iceland's nature, people, language and history. Through his correspondence with the Danish scholar Oluf Worm and others a beginning was made in the modern scientific study of Scandinavian antiquities and languages. Even among the Icelandic peasants (Bjorn Jonsson, Jon Gissursson) is found this awakened inter¬ est. Some begin to write ˆannals,® others re¬ vive the old custom of copying. The first Ice¬ landic dictionary was written by Magnus Olafsson and published by Worm (1650). "The Magnsenum)) . In Latin wrote Finnur Jonsson Pall Jonsson Vidalin published a learned work on the laws. Of the greatest importance are the works of the historian Torfaeus (1636-1719) and the famous Arni Magnusson (1663-1730) who brought his great collection of manuscripts to Copenhagen. A large number of poets pro¬ duced thousands of rimur or epic poems. Gudmundur Bergthorsson (1655-1705) pro¬ duced 252 rimur and enjoyed a great reputation. Also a large number of lyric poems were pro¬ duced. In the beginning of the 18th century Iceland suffered greatly under various mis¬ fortunes, especially smallpox, which reduced the population to 32,000.

The language at this time shows Danish in¬ fluence, especially in business and law. Eggert Olafsson who writes on economic and other subjects, is the first to again revive the na¬ tional spirit. He was also a poet. Economic works are published in this Age of Enlighten¬ ment.. The first periodical makes its appear¬ ance in Danish. The study of history and lit¬ erature was revived. Many works were pub¬ lished, often in Danish and printed in Den¬ mark; Icelandic scholars were important con¬ tributors as Jon Olafsson, Jon Erichsson, Gri- mur Jonsson Thorkelin ((Diplomatarium Arna- MagnaenunF) In Latin wrote Finnur Jonsson the ecclesiastical history of Iceland, Halfdan Einarsson his literary history. The first valu¬ able dictionary was by Bjorn Halldorsson. It was published by Rasmus Rask in 1814. The first Icelandic periodical was started in 1796. The 19th century is in Iceland as in other coun¬ tries characterized by a strong,

conscious na¬ tional awakening. It had in its beginning a literary, later also a political, character, which is leading to new political relations with Den¬ mark, if not to complete separation and the es¬ tablishment of the Icelandic nation. In 1816 the great Danish scholar Rask established with his friends, the Icelandic scholars Sveinbjorn Egilsson, Arni Helgason, Bjarni Thorsteinsson, Finnur Magnusson <(Hid islenzka Bokmenta- felagA The aim of this literary society was to work for the purification of the language and the education of the people. Under very able leaders, especially Jon Sigurdsson (1851-79), the great leader of modern Iceland, this society which is still flourishing has done great services for the development of Iceland in almost all fields, through the publication of old Icelandic works, studies in language and literature, the two periodicals Timarit and Skirnir. But most of the scholarly contributions to old Ice¬ landic history, literature and philology have been made by these and other great Icelandic scholars independently. Here we have such prominent names as Finnur Magnusson, Svein- bjorn Egilsson, Jon Sigurdsson, Gudbrandur Vigfusson, Eirikr Jonsson, Jon Thorkelsson, Benedikt Grondal, Gisli Brynjulfsson, and in

most recent time Finnur Jonsson, professor in Copenhagen, Bjorn M. Olsen, president of Ice¬ land's University at Reykjavik (1911), Valtyr Gudmundsson. The special history of Iceland has been treated in a number of books. The periodical literature has played an important part. Eimreidin is at present the best known periodical. Modern Iceland has produced a number of lyric poets. Some of these have also excelled in other fields. Jon Thorkels- son's novels (Piltur og stulka) and (Madur og kona) have been translated into English. There are many good translations from the lit¬ erature of the Scandinavian and other countries. In most recent time the drama has an excellent representative in Johann Sigurjonsson, also known to English readers.

Bibliography. — Jonsson, Finnur, (Den old- norske og oldislandske Literaturs Historic' (Copenhagen 1894-1902) ; id., (Den islandske Literaturs Historic tilhgemed den oldnorske) (ib. 1907) ; Prolegomena to Vigfusson's (Stur- lunga Saga (Oxford 1878) ; Vigfusson's Cor¬ pus Poeticum Boreale) (Oxford 1883) ; Vigfus- son-Powell (Origines Islandicae* (Oxford 1905) ; Morris and Magnusson, (Saga Library * (6 vols., London 1891-1905); Mogk, (Geschichte der norwegisch-islandischen Literatur* (Strass- burg 1904) ; Poestion, J. C., Hslandische Dich- tei der Neuzeit* ; Gudmundsson, V., Hslands Kultur ved 1900) ; Craigie, (The Icelandic Sagas* (New York 1913); Horn, Winkel, (Literature of the*

Scandinavian North, trans¬ lated by R. B. Anderson (Chicago 1884), with a bibliography. There are a number of Eng¬ lish translations of Icelandic sagas ; these include the (Landnamabok,* translated by Ell wood (London 1898) ; the ˆeimskringla,* trans¬ lated by David Laing (London 1844; 1889) and by Morris and Magnusson (London 1895) ; the (Faereyingasaga, * translated by F. York Powell, (1896) ; parts of the (Flateyarbok* relating to America, edited by A. M. Reeves in (The Find¬ ing of Wineland the Good) (London 1890) ; the (Vosunga Saga,* translated by W. Morris and E. Magnusson (London 1888) ; the (N jals Saga,* translated by G. Webbe Dasent (New York 1912) ; the (EyrbyggjaP translated by Sir Walter Scott; Thoroddsen's (Piltur ok Stulku* (translated by Reeves, (Lad and LassP London 1890). Jon Stefansson's (Denmark and Swe¬ den' (1917) contains a very brief history of Ice¬ land; Hslandica* (Cornell University).

Gisle Bothne,

Professor of Scandinavian Languages and Lit¬ erature, University of Minnesota.

ICENI, I-ce'ni, a tribe which inhabited ancient Britain, occupying the territory now called Norfolk and Suffolk. When Aulus Plau- tius engaged in battle against the sons of Cym- beline, the Iceni assisted him. However, they resisted the further aggressions of the Romans, and under their Queen Boadicea fought against them. Roman arms were victorious and the Iceni were forced to retire. Consult Oman, (History of England) (New York 1910).

ICH DIEN, iH den (Ger. I serve), the motto of the Prince of Wales, written on his official crest surmounted by three ostrich plumes. The Welsh derive it from Eich dyn, meaning <(Behold your man,® and tell the story that the expression was first used by Edward I in presenting his new born son to his people.

Another current version of the origin of the phrase is that the Black Prince found the motto inscribed under the plume of John, king of Bohemia, who was killed at Crecy. Historians give preference to the former interpretation.

ICHANG, e'chang, China, a city in the Province of Hupeh, on the left bank of the Yang-tse River, from which position it derives its great commercial importance. The chief agricultural products are rice, cotton, wheat, barley,, wood-oil and fruits. In 1877 Ichang be¬ came an open port for European trade. Be¬ cause of its. proximity to the Yang-tse Gorges which are impassable, all downstream traffic must be transshipped. Light vessels can pro¬ ceed to Ichang proper in an upstream course, and there are certain

ships designed especially to accommodate the navigation facilities of the Yang-tse. There is a railway route from Ichang to Kweichow. Pop. (1916) 55,000; total foreign imports, 1,429,897 haikwan taels (1 haikwan tael = about $.75) ; native imports, 1,685,492 haikwan taels; and total exports, 3,514,662 haikwan taels.

ICHIDO, e'che'do, the private name of Hitotsubashi, leader of the anti-foreign party in Japan and the «last of the Tycoons.® See Hitotsubashi.

ICHNEUMON-FLY, lk-nu'mon, the name of a large family (Ichneumonida) of insects of the order Hymenoptera. As the species of this family are very numerous (more than 1,100 genera have been described) so their manners are extremely diversified; but, in the general outlines of their character, they all agree, par¬ ticularly in their depredations among the insect tribes. In some the female has the ovipositor in the form of a boring instrument, with Which she is capable of perforating the hardest wood. The larvae of wasps are the devoted prey of these insects, who no sooner discover one of their nests than they perforate the material of which it is constructed, and deposit their eggs within it. Others glue their ova to the skin of a caterpillar, while others again penetrate through it and lay their eggs in its body. In all these cases the young, as soon as they are hatched, prey on the caterpillar or larva, with¬ out, however, destroying it at once, as upon the life of its victim that of the spoiler appears to depend. The caterpillar, in fact, seems healthy until the. larvae of the ichneumon have bored through its skin, have spun their cocoons on its surface and entered the chrysalis state. These carnivorous insects are of various sizes ; some are so small that the aphis, or plant-louse, serves as a cradle for their young; others again, from their size and strength," are for¬ midable even to spiders, destroying them with their stings. They are, as a whole, highly bene¬ ficial to humanity, as a large part of their prey consists of insects which are injurious to crops and valuable vegetation. Consult Howard, (The Insect Book* (New York 1901).*

ICHNEUMONS, ik-nu'monz, small carniv¬ orous animals of the civet family (Viverridce) and sub-family Herpestince, which are distin¬ guished from the true civets by the straight non-retractile claws, and various skeletal char¬ acters. . While there are a number of genera the typical and most important is Herpestes, many species of which inhabit Africa, southern

1 (1) Exenterus marginatorus attacking the larva of the pine-tree moth; (2) the cocoon of the latter as left by an ichneumon-fly; (3) as left by its rightful occupant; (4) Bassus albosignatus attacking the larva of the syrphus-fly; (5) male of the same; (6) Banchus falcator stealing upon a caterpillar; (7) larva of the

ichneumon-fly .

2 Anomalon circumflexum attacking a caterpillar; and Ophion undulatus thrusting its ovipositor into the body of a caterpillar

3 Spathius clavatus, in a window

4 Pimpla instigator, preying upon a willow-moth

5 Pupa-case of an Oph on

6 Larva of Microgaster nemorum emerging from an infested caterpillar of the pine-tree moth

7 Ichneumon pisorius, the left-hand figure being that of a female depositing eggs in a boring in the trunk of an oa

Asia, and the neighboring islands. The teeth are numerous, usually 40 ; the head is elongated, with short rounded ears ; the limbs are short ; and the body and stout tail are covered with long hairs. They vary in size from that of a squirrel to a cat. Their food consists of all kinds of small animals; rats and mice, birds and their eggs, snakes, lizards, etc., which they pursue chiefly on the ground but also in trees. The Egyptian ichneumon (H. ichneumon) or Pharoa'h's rat (or mouse) is famous as one of the many animals venerated by the ancient people of that country, because, it has been said, of its reputation as a destroyer of croco¬ dile's eggs. While the eggs of this reptile may be occasionally devoured, the importance of the ichneumon in this respect is purely mythical ; and it was protected, more likely, as a killer of the asp and other venomous serpents. Even now it is kept by many rural households there, as a hunter of rats, snakes and other vermin. The Indian ichneumon or mungoose (H. mun- goos) is still better known. It lives in a semi- domesticated state, and performs an invaluable service as a destroyer of venomous serpents, whose fangs it generally manages to escape by its wonderful agility. This species has been introduced into Jamaica for the purpose of destroying rats, and has multiplied exceedingly and become a serious pest, though of late years it has been held in check by a great increase in the number of ticks. See Mungoos.

ICHNOLOGY, ik-nol'6-ji, that department of palaeontology which treats of the foot-prints petrified in sedimentary rocks and made by ex¬ tinct animals; the science of fossil foot-prints. Such foot-prints frequently occur

in all forma¬ tions, and have sometimes been the first and most instructive intimation of the existence of the animals that made them. This was partic¬ ularly true of the foot-prints of dinosaurs (q.v.) so numerous and sharply marked in the brown sandstones of the Connecticut Valley; and they have greatly assisted in arriving at a true realization of those reptiles, which were at first regarded as birds. The tracks, trails, bur¬ rows, outlines of bodies, feathers and appen¬ dages of a vast variety of animals occur in the rocks and interest the ichnologist.

ICHTHYOL, a medicinal substance occur¬ ring as ammonium and sodium ichthyol sul- phonate, the two most important salts of ichthyolsulphonic acid, which is prepared from a bituminous mineral of the Tirol, which con¬ tains large amounts of fossilized remains of fish and other sea animals. Ichthyol was first introduced into medicine by Unna of Hamburg, and has proved very valuable when applied ex¬ ternally in certain diseases of the skin, acne, erysipelas, acute articular rheumatism, etc., and for the purpose of removing pain and indura¬ tion about the inflamed joints. The ammonium salt is liquid, but the sodium salt is solid, and the latter is therefore most frequently employed when the drug is given internally for the pur¬ pose of affecting the alimentary canal or the general system.

ICHTHYOLOGY, ik'the-ol'o'jT (Gr. fish; Aoydc, a discourse), is the science of fishes. It is that branch of human knowledge which treats of the aquatic gill-bearing vertebrates, popularly known as fishes to English-speaking people.

Classification of Fishes. — In different treat¬ ises on fishes there appear very great differ¬ ences in the classification proposed or adopted. Often in two works of parallel scope scarcely a group will appear in both with the same boun¬ daries or under the same name. For this con¬ dition there are several causes. First, the tendency in some minds toward the extreme of subdivision, and in others toward the extreme of aggregation ; second, the various values as¬ signed by different authors to different sorts of characters, the actual value of each only to be determined by the final judgment of palaeontol¬ ogy; third, the tendency of many writers to give new names to old groups. On this ac¬ count a single class order may have half a dozen virtually synonymous names. Thus the terms Chondropterygii, Elasmobranchii, Piagio- stomi, Selachii, Placodii, Antacea, and other less known names have been applied to the group of sharks _ and skates. Again various authors, recognizing the validity of a given group, may find it necessary at times to change its boundaries. In such a case a new name may be proposed, or a new definition be given to an old one. Either arrangement may lead to con¬ fusion. Thus with some writers, the groups of sharks, under various names may include the order of Chimceroids, or, under the same names, the Chimceroids may be excluded from it.

The Chordata. — The great branch of chor- date animals finds its origin perhaps in extinct wormlike types or possibly in marine creatures remotely allied to the horse-shoe crab and to spiders. Common opinion favors the first hypothesis. It differs essentially from the in¬ vertebrate branches in the presence of a more

or less developed notochord (which in the higher forms gives place to a backbone), and in the presence of gill-slits, connected with respiration. These gill-slits and accompanying gill-structures are persistent in fishes, while in higher vertebrates they are mostly relegated to the embryonic stages.

The Chordata include several classes of ma¬ rine animals leading up to the true fishes, as follows :

Entropneusta. — Balanoglossus (q.v.).

Tunicala. — Ascidians (q.v.).

Leptocardii. — Lancelets (q.v.) .

Cyclostomi. — Hag-fishes and Lampreys (qq.v.).

Cy dice. —An extinct (Palceospoudylus) fish¬ like form.

Pisces. — Fishes, properly so-called ; the various primary divisions of which Elasmo¬ branchii, Ostracophori {Ostracodermi) , Arth- rodira and Teleostomi are usually called sub¬ classes.

But in view of the uncertainty attached to the mutual relations and origin of these groups, we may follow recent American custom in re¬ garding the elasmobranchs, ostracophores, ar-

throdires and teleostomes as distinct classes, the last named group containing the typical or true fishes. On anatomical grounds we must regard the Elasmobranchii (sharks) as the most primitive of these classes. As to this, palaeontol¬ ogy gives no certain answer but the tendency of evidence is rather toward regarding the ostracophores as still more primitive. There is no doubt that fishes existed and that some of the classes were well differentiated at a period long antecedent to the deposition of the oldest known remains. The earliest remains of fossil fishes now known occur in the Ordovician or Lower Silurian deposits at Canon City, Colo¬

rado. Among the broken fragments are ap¬ parently parts of shields of ostracophores, scales of crocsopterygians and vertebrae of a pos¬ sible chimaeroid. It is probable that primitive sharks existed still earlier than this, but no definable remains precede the Devonian.

*The class or sub-class of Elasmobranchii (also called Chondropterygii, Antacea, etc.) agrees with the higher fishes in the presence of lower *jaw, shoulder-girdle, pelvic girdle, paired fins, well developed skull, brain and viscera. The gills are well developed, and the general structure and anatomy may be described as fish¬ like.*

In distinction from the true fishes, the gills are differently formed, adnate by their outer margin, there are no membrane bones about the head, the ova are very large, the ventral fins are provided with claspers, there is no trace of air- bladder, the arterial bulb has three series of valves, there is a spiral valve in the rectum, the upper jaw is formed of palatal elements, the' typical jawbones of the fish being undevel¬ oped. The lower jaw is also different in struc¬ ture from that of the true fishes.

The existing elasmobranchs are known as sharks, rays and chimaeras. The vast majority of the known species are extinct. There are two strongly marked sub-classes among the elas¬ mobranchs, the Selachii or sharks and rays, and the Holocephali or chimaeras. In the Selachii there are five to seven gill-openings, the jaws are distinct from the skull, and the teeth are distinct. In the Holocephali there is but one external gill-opening, the jaws are coalescent with the skull, and the teeth are united to form

are broad and fold-like, the notochord is appar¬ ently not segmented, the tail is short and keeled, well specialized, its tip abruptly turned upward. There are no spines, the teeth are small, with many cusps. There is probably but one family, the Cladoselachidce (extinct), Cladoselache fyleri, 3. large elongate shark from the Devonian of Ohio, is the best known species.

The Acanthodii are small sharks with a spine at the front of each fin except the caudal. The teeth are minute or wanting, and the skin is covered with small checker-like plates. There are three families, Acanthoessidce (extinct), with one dorsal fin, Diplacanthidce (extinct), with two, and the Ischnacanthidce (extinct), small sharks found from the Devonian to the Permian.

The Ichthyotomi have the pectoral fin de¬ veloped as an archipterygium or jointed limb with a fringe of rays on one or both sides. The dorsal fin extends along the back, and on the head is a first dorsal preceded by a long spine. There are two well-marked families, Pleuracanthidce and

Cladodontidce, abundant in the Carboniferous and Permian, but now ex¬ tinct.

The Notidani or Diplospondyli have the notochord imperfectly segmented by vertical partitions, and the gill-clefts are six or seven in number instead of five, as in other sharks. Most of the species are extinct, the teeth being found in the rocks from the Jurassic to the present time. Two families are represented, the Hexanchidce and the Chlamydoselachidce , the latter ell-shaped sharks of the open sea, chiefly about Japan.

In the large order of Asterospondyli the ver¬ tebrae are. strengthened by secondary plates of calcified tissue, which radiate outward from the small primitive cylinder. In these typical sharks there are five gill-slits, two dorsal fins and one anal fin.

In the most primitive group, the sub-order Cestraciontes, the dorsal fins are each armed with a spine, the numerous teeth are small and mostly blunt, differing in form in different parts of the jaw, and the vertebrae are imper¬ fectly formed. A curious fact in geological dis¬ tribution is that a multitude of early types of shark disappear in the Permian or toward the

A Lancelet (Branchoistoma).

bony plates or lamellae. Both groups are very old in geologic times, having been separated at least since the Devonian. For this and other reasons some writers prefer to regard the sharks and chimaeras as separate and co-ordinate groups or classes.

We may without serious violence divide the sharks and rays into six orders ; namely, Pleu- ropterygii, Acanthodii, Ichthyotomi, Notidani, Asterospondyli, and T ectospondyli, the first three of these being confined to Palaeozoic time. We may regard the Pleuropterygii or the allies of Cladoselache as the most primitive, and therefore as standing first in an ascending series.

In this group the pectoral and ventral fins

end of Palaeozoic time. Only cestraciont sharks are known to have any representatives in the Triassic, and this group may be ancestral to all modern sharks.

Of the Cestraciontes the Palaeozoic families of Cochliodontidce (extinct) and Orodontidce (extinct), known mainly by the teeth, occur in the Lower Carboniferous. In some and prob¬ ably all of these forms the dorsal fins were each armed with a spine. The Edestidce (ex¬ tinct), known only from coiled whorls of fused teeth, are doubtless closely related to these forms. .

These are found in the coal measures. I he principal living family of Cestraciontes, the Heterodontidce, begins in the Permian, and is represented by five living species all in the

Pacific Ocean, the longest known being the Port Jackson shark of Australia (Heterodontus philippi). We may here mention two families ot sharks of uncertain relationship, the species confined to the Carboniferous Age. These are the Petalodontidce (extinct), with blunt teeth and some of them with broad fins like rays, and the Psammodontidce (extinct), known from the blunt teeth only. Still more uncertain is the croup of Tamiobatidce (extinct) from the Devonian of Kentucky, resembling a ray, but Probably a primitive offshoot from the sharks.

The remaining asterospondylous sharks form a sub-order, Galei, without dorsal spines, and with the vertebrae, more perfectly calcified. The principal family is the Galeorhinidce. Others are the Sphyrnidce or hammer-heads, Scyllior- hinidce or cat-sharks, Ginglymostomidce, Henvi-scylliidce, Orectolobidce , Lamnidce or man-eater sharks, Odontaspidice, or sand-sharks, Alopiidoe, or thresher-sharks, Mitsukurinidce or spoon-bill sharks, Cetorhinidoe or basking-sharks, Pseu- dotriakidce and Rhine odontidce. Of the Lam – nidce and related families fossil teeth (Car- char odon, I sums, Lanina) are very numerous from the Jurassic to modern times.

The Tectospondyli have the vertebrae each provided with secondary plates of calcified tis¬

In the sub-class of Holocephali or Chimce- roids the upper jaw or pterygoquadrate arcade is immovably joined to the skull. The teeth are coalesced into broad plates, and a fold of skin covers the gill-clefts ..so that there is but one external opening. The vertebral axis is imper¬ fectly segmented, and the notochord is sur¬ rounded by partially calcified rings. In all recent genera., and in most others, there is a strong spme in the first dorsal, and in the male the iorehead has a singular cartilaginous hook with a brush of spines at the end.

There are fragments referred to the skeleton of a chimaeroid found in the Lower Silurian at Canon City, Col. Numerous forms appear in the Devonian. Four genera, representing three families, are now extant, the Rhinochimce- ndce (Rhino chimcera and Hariotta) in the deep seas, C himceridce or elephant-fishes (Chimcera) .the north and south temperate

seas, and Callorhynchidce (Catlorhynchus) in the seas of the southern hemisphere only. Extinct families are the Ptychodontidce (extinct), the Squalor aii- ace (extinct), and the Myriacanthidce (extinct) Numerous extinct genera are referred to the C himceridce. Fossil fin-spines of many species of sharks and chimseroids, fishes otherwise un¬ known, occur in the rocks. These are called

Bullhead Shark of California (Gyropleurodus francisci).

sue concentrically arranged in one or more series. In these sharks there is no anal fin. To these belong the Squalidce or dog-fishes, Dalatii- dce, Oxynotidce and Echmorhinidce or bramble- sharks, these families forming together the sub¬ order Cyclospondyli, having the vertebral cen¬ trum a simple constricted cylinder pierced by the notochord. To the Tectospondyli proper we may refer a few families of sharks, the Squat- midce (Rhinidce) or monk-fishes, and Pristio- phoridce or saw-sharks. A third sub-order, Batoiaei, includes all the skates or rays. These agree with the true Tectospondyli in having a number of series of concentric plates within the vertebrae. The body is, however, more or less depressed, the broad pectoral fins outlining a body disk, and the gill-openings lie underneath instead of being lateral, as in all the sharks. The rays are first certainly known from the Jurassic, although several of the Carboniferous shark have ray-like teeth, and have been re¬ ferred to the group of rays.

The recognized families of rays are the Pristididce or saw-fishes, the Rhinobatidce or guitar-fishes, the Narcobatidce or torpedos, the Rajidce or skates, the Dasyatidce or sting-rays, the Myliobatidce or eagle-rays, the Mobulidce or devil-fishes, and the Ptychodontidce (extinct) of the Cretaceous. The earliest of these groups, the Rhinobatidce, date from the Jurassic.

ichthyodoroulites, and their proper classification is often a matter of much uncertainty. The earliest of these are known as Onchus, occur¬ ring in the Upper Silurian.

Class O straco phori. — The earliest verte¬ brates actually recognized as fossils are known as ostracophores (oTcpanov, a box:

This group was originally called Ostraco- dermi, a name preoccupied for the group of bony trunk-fishes (Ostraciidce). The names Protocephali and Aspidoganoidei have also been used for them. The still earlier name Placodermi included the Arthrodires as well.

It may be that they are really allied to certain early crustacean-like forms which they resemble.

The ostracophores are found in the Ordovi¬ cian, Silurian and Devonian rocks, after which they disappear. The species are very numer¬ ous and varied. Their real affinities have been much disputed. Traquair regards them as much modified allies of ancient sharks, which view of the case is supported by features in the structure of the most shark-like of the orders, Anaspida. The absence of jaws and limbs separates them widely from true fishes, and there is no clear evidence in the structure of the fins and fin-supports that these structures

Ceplialaspidce (extinct), Thyestidce (extinct), and Odontodontidce (Trematastpidce) (extinct), with many genera and species.

The Antiarcha have also bone-corpuscles in the plates, which are also enameled. The sense- organs occupy open grooves, and the dorsal and ventral shields are of rnany pieces. The head is jointed on the trunk, and jointed to the head are paddle-like appendages covered with bony plates and resembling limbs. There is no evi¬ dence that these erectile plates are real limbs. They seem to be rather jointed appendages of the head-plate, erectile on a hinge like a pec¬ toral spine.

Spotted Sting-ray_ (A etobatus narinari).

are homologous with the fins and fin-supports of true fishes, or even of sharks. In this group are four well-marked orders, Heterostraci, Anaspida, Aspidocephali and Antiarcha.

The Heterostraci (hepoq t different ; bcrpanov , box) have no bone-corpuscles in the coat of mail. This order includes the Pteraspidce (ex¬ tinct), Thelodontidce (extinct), Drepanaspidce (extinct) and Psammosteidce (extinct).

The Anaspida are more fish-like in appear¬ ance, having the armature of the head not plate-like, but formed of tubercles. There are two families, all of recent discovery, Birkenii- d(B (extinct) and Euphaneropidce (extinct).

The Aspidocephali (also called Osteostraci) have bone-corpuscles, in the shields, and the shield of the back is of one piece, without lateral line-channels or sense-organs. The order includes four families, Ateleaspidce (extinct),

There is but one family, Asterolepid.ee (ex¬ tinct). Pterichthyodes milleri, named by Agas¬ siz for Hugh Miller, from the Lower Devonian, is the best-known species.

. Class Arthrodires. — Another group of ex¬ tinct mailed fishes is known as Artlirodira {apdpov, joint; Seitf t neck). In this group jaws are developed, but of peculiar character, the mandibles being regarded as mere der¬ mal elements, not forming part of the skele¬ ton. The head in all the species is covered with a gi eat bony helmet. Behind this on the nape is another large shield, and between the two is typically. a hinge-joint, which has been compared to the hinge of a spring-beetle (elater). Some of these plates are traversed by sensory grooves. Nothing whatever is known of the internal structure, and as the skeleton is soft, the back¬ bone notochordal, there is no trace of shoulder-

girdle, nor any certain evidence of limbs, although peculiar structures have been inter¬ preted as such. The presence of a peculiar type of jaws separates the group from the mailed ostracophores, from which the arthrodires differ also widely in the character of the armature.

Dr. Woodward and several other recent writ¬ ers have regarded the arthrodires as armored, widely modified offshoots of the primitive Dip- ncusta. But the evidence does not seem to justify the union of the arthrodires with the latter group, and it would seem as reasonable to regard them as derived directly from the sharks or the ostracophores. The arthrodiran fishes occur in abundance from the Silurian times to the Mesozoic. In the Devonian their gigantic size and thick armor gave them the leading position among the hosts of the sea, ranging in size (

The class, called by Dr. Dean Arthrognathi, is divided by him into two sub-classes, Arthro- dira, with a hinge at the neck, and Anarthrodira, without hinge. In the first of typical sub-class are two orders, Temnothoracici, with the single family Chelonichthyidc 2 (extinct), Anthrotlio- raci, with the families Coccosteidce , Dinichthyi- dce (extinct), T it anichthy idee (extinct), My- lostomidce , and Selenosteidce (extinct). To the Chelonichthyidc e belongs the noted species Homosteus or Pterichthyodes milleri, celebrated by Hugh Miller under the name of <(the Astero- lepis of Stromness,® in his footprints of the Creator.*

The arthrodires without joint at the neck constitute the order Stegothalami , with the fam¬ ilies of Macropetalichthyidce (extinct), and Asterosteidce (extinct).

The best known of the many genera of arthrodires is Coccosteus, found in the Scottish Devonian.

Class Teleostomi. — We may unite the re¬ maining groups of fishes under a single class for which the name Teleostomi (rDeog, true; erd/ua, mouth), proposed by Bonaparte in 1838, may be retained. The fishes of this class are characterized by the presence of a suspensorium to the mandible, by the existence of membrane- bones (opercles, suborbital, etc.) on the head, by a single gill-opening, leading to gill-arches bearing bilamellate gills, and by the absence of claspers on the ventral fins. The skeleton is more or less ossified in all the Teleostomi. M ore important as a primary character distinguishing these fishes from the sharks is the presence typically and primitively of ythe air-bladder. This arises at first as a diverticulum from the ventral side of the oesophagus, and develops as a lung, but in later forms it becomes degraded to a swim-bladder, springing from the dorsal side of the alimentary canal, and in very many forms it is altogether lost with age. The group comprises the vast majority of recent fishes, as well as a large percentage of those known only as fossils. In these, the condition of the lung can be only guessed.

The Teleostomi are doubtless derived from sharks, their relationship being perhaps nearest to the Ichthyotomi or to the primitive chimaeras. The lowest Teleostomi retain the shark-like con¬ dition of the upper jaw, made of palatal ele¬ ments which, as in the Chimcera, may be fused with the cranium. In the lower forms also the primitive diphycercal or protocercal form of

tail is retained, as also the archipterygium or jointed axis of the paired fins, fringed with rays on one or both sides.

We may divide the teleostomes or true fishes into three sub-classes, the Crossopterygii or fringe-fins, the Dipneusti or lung-fishes, and the Actinopterygii or ray-fins. Of these, recent writers are disposed to consider the Crossoptery¬ gii as most primitive, and to derive from this, by separate lines, each of the remaining sub¬ classes, as well as the higher vertebrates.

Sub-class Crossopterygii. — The earliest teleostomes constitute the class called after Huxley, Crossopterygii (Kpocc6gy fringe \tctep6v, fin). Its essential character is the retention of the jointed pectoral fin or archipterygium, its axis fringed by series of soft rays. This char¬ acter it shares with the Ichthyotomi among sharks, and with the Dipneusti. From the lat¬ ter it differs in the hyostylic cranium, the lower jaw being suspended from the hyomandibular — and by the presence of distinct premaxillary and maxillary elements in the upper jaw. In these characters it agrees with the ordinary fishes. The skeleton is more or less perfectly ossified. Outside the cartilaginous skull is a bony coat of mail. The skin is covered with firm scales or bony plates. The tail is diphy¬ cercal, straight, and ending in a point. The shoulder-girdle, attached to the cranium, is car¬

tilaginous, but overlaid with long, bony plates, and the branchiostegals are represented by a pair of gular plates.

In the single family (Polypteridce) repre¬ sented among living fishes the heart has a mus¬ cular arterial bulb with many series of valves on its inner edge, and the large air-bladder is divided into two lobes, having the functions of a lung, though not cellular as in the lung-fishes.

The fossil types are very closely allied to the lung-fishes, and the two groups have no doubt a common origin in Silurian times. It is now usually considered that the crossopterygian is more primitive than the lung-fish, though at the same time more nearly related to the ga¬ noids, and through them to the ordinary fishes.

From the primitive Crossopterygii the step to the ancestral amphibia, which are likewise mailed and semi-aquatic, seems a very short one. It is true that most writers until recently have regarded such dipneustans as the Ceratodonti- dee as representing the parents of the amphib¬ ians. But the weight of recent authority, Gill, Boulenger, Dollo and others, seems to place the point of separation of the higher vertebrates with the crossopterygians.

Cope and Woodward divide the Crossoptery¬ gii into four orders or sub-orders, Haplistia, Rhipidistia, Actinistia and Cladistia. To the last belong the existing species (Polypterus) alone. In all 'these the pectorals are narrow with a single basal bone, and the nostrils, as in the dipneustans, are below the snout.

In the Haplistia the notochord is persistent, and the basal bones of dorsal and anal fins are in regular series, much fewer in number than the fin-rays. The single family Tarrassiidce , re¬ garded as lowest of the crossopterygians, are small fishes of Carboniferous Age.

In the Rhipidistia the basal bones of the median fins are found in a single piece, not sep- rate as in the Haplistia. Four families are recognized, Holoptychiidce (extinct), Rhizodon- tidee (extinct,) Osteolepidce (extinct), Onycho-

dontidce (extinct), the first of these being con¬ sidered as the nearest approach of the crossop¬ terygians to the dipnoans.

In the Actinistia there is a single fin-ray to each basal bone, the axonosts of each ray fused in a single piece. The notochord is persistent, causing the

backbone in fossils to appear hollow, the cartilaginous material leaving no trace in the rocks. The genera and species are numer¬ ous, ranging from the Subcarboniferous to the Upper Cretaceous, and belonging to the single family Ccelacanthidce (extinct).

In the Cladistia the axis of the pectoral limb is fan-shaped, made of two diversified bones joined by cartilage. The notochord is re¬ stricted and replaced by ossified vertebrae. The axonosts of the dorsal and anal are in regular series, each bearing a fin-ray. The order con¬ tains the single family Polypteridce, represented by numerous species. in the Nile, Senegal and Kongo rivers. In this group the pectoral fin is formed differently from that of the other cros¬ sopterygians, being broad, its base of two diverging bones with cartilage between. This structure, more specialized than in any other of the crossopterygians or dipneustans, has been regarded by Gill and others, as above stated, as the origin of the fingered hand (chiropterygium) of the frogs and higher vertebrates. The base of the diverging bones has been identified as the antecedent of the humerus, the bones them¬ selves as radius and ulna, while the intervening, non-ossified cartilage breaks up into carpal bones, from which metacarpals and digits ulti¬ mately diverge. This hypothesis is at least a reasonable one. The nostrils, as in true fishes, are superior. The body in these fishes is cov¬ ered with rhombic enameled scales, as in the garpike, the head is similarly mailed, but in dis¬ tinction from the garpike, the anterior rays of the dorsal are developed as isolated spines.

The young have a bushy external gill, with a broad scaly base. The air-bladder is double, not cellular, with a large air-duct joining the ventral surface of the oesophagus. The intes¬ tine has a spiral valve.

The cranium is remarkable for its general¬ ized form, this forming a trait of union be¬ tween the ganoids and the primitive Amphibia or Stegocephali. Without considering Polyp- terus, it is not possible to interpret the homol¬ ogies of the cranium of the amphibians and the sharks.

Sub-class Dipneusti or Lung Fishes. — The Dipneusti (SU x, twice; 7rwo, to breathe) are a group characterized by the presence of paired fins consisting of a jointed axis with or without rays. The skull is autostylic, the upper jaw be¬ ing made, as in the Chimcera, of palatal ele¬ ments fused with the cranium and without pre¬ maxillary or maxillary. Dentary bones little developed. Air-bladder cellular, used as a lung, in all living species. Heart with many valves in the muscular arterial bulb. Intestine with a spiral valve. Teeth usually of large plates of dentine covered with enamel on the pterygopala¬ tine and splenial bones. Nostrils concealed, when the mouth is closed, under a fold of the upper lip. Scales cycloid, mostly not enameled.

This group has been usually known as Dip¬ noi. But this term was first taken by Leuckart, in 1821, as a name for amphibians, before any of the living Dipneusti were known.

The Dipneusti agree with the crossoptery¬ gians by the presence of lungs, a character which separates them from all the earlier orders of fishes. In its origin the lung or air-bladder arises as a diverticulum from the alimentary canal used by the earliest fishes as a breathing- sac, the respiratory functions lost in the prog¬ ress of further divergence. Nothing of the nature of lung or air-bladder is found in lance- let, lamprey or shark. In none of the remain¬ ing groups of fishes is it wholly wanting at all stages of development.

In the Dipneusti or dipnoans, as in the cros¬ sopterygians and higher vertebrates, the trachea or air-duct arises from the ventral side of the aesophagus. In the more specialized fishes, yet to be considered, it is transferred to the dorsal side, thus avoiding a turn in passing around the oesophagus itself. From the sharks these forms are further distinguished by the presence of membrane-bones about the head. From the Actinopteri (ganoids and teleosts) dipneustans and crossopterygians are. again distinguished by the retention of the fringe-fin or archiptery- gium as the form of the paired limbs. From the crossopterygians the dipnoans are most readily distinguished by the absence of maxillary and premaxillary, the characteristic structures of the jaw of the true fish. The upper jaw injihe dipnoan is formed of palatal elements attached directly to the skull, and the lower jaw con¬ tains no true dentary bones. The skull in the dipnoan, as in the Chimcera is autostylic, the mandible articulating directly with the palatal apparatus, the front of which forms the upper jaw, and of which the pterygoid hyomandibular and quadrate elements form an immovble part. The shoulder-girdle, as in the shark, is a single cartilage, but it supports a pair of superficial membrane-bones.

. In ah the dipnoans the trunk is covered with imbricated cycloid scales and no bony plates, although sometimes the scales are firm and enameled. The head has a roof of well- developed bony plates made of ossified skin and not corresponding with the membrane-bones of higher fishes. The fish-like membrane-bones, opercles, branchiostegals, etc., are not yet dif¬ ferentiated. The teeth have the form of grind¬ ing-plates on the pterygoid areas of the palate, distinctly shark-like in structure. The paired fins are developed as archipterygia, often with¬ out rays, and the pelvic arch consists of a single cartilage, the two sides symmetrical and con¬ nected in front. There is but one external gill¬ opening, leading to the gill-arches, which, as in ordinary fishes, are fringe-like, attached at one end. In the young, as with the embryo shark, there is a bushy external gill, which looks not unlike the archipterygium pectoral fin itself, although its rays are of

different texture. In early forms, as in the ganoids, these scales were long and enameled, but in some recent forms, deep sunken in the skin. The claspers have disappeared, the nostrils, as in the frog, open into the pharynx, the heart is three-chambered, the arterial bulb with many valves, and the cellular structure of the skin and of other tis¬ sues is essentially as in the Amphibia.

The developed lung, fitted for breathing air, which seems the most important of all these characters, can, of course, be traced only in the recent forms, although its existence in all

ICHTHYOLOGY

SCALES AND ARMOR OF TELEOST FISH

1 Flying Gurnard (Pegasus chirop- terus)

2 Seahorse (Hippocampus anti- quorum)

3 Seaweed fish (Phyllopteryx eaues)

4 Tentacle fish (Antennarius tridens)

5-16 Characteristic forms of scales among teleost fishes

5, 6, 7 Sparidae (sea-breams)

8-9 Percidae (perches)

10 Centriscidae (snipefish)

11 Siluridae (catfish)

12 Fistularidae fflutemouths)

13 Pleuronectidae (soles)

14 Labridae (wrasses)

15 Pristipomidae (fossil)

16 Sparidae (Cantharus)

.

.

ft I I I j ii

f.

‘

.

■ ■

.

others can be safely predicated. Besides the de¬ velopment of the lung we may notice the gradual forward movement of the shoulder- girdle, which, in the dipneustans, as in the crossopterygians, is attached to the head. In the fishes generally there is no distinct neck, as the post-temporal, the highest bone of the shoulder-girdle, is articulated directlv with the skull.

We may divide the dipnoans into two orders, Ctenodipterini , with the families Uronemida ? (extinct), Dipteridce (extinct), and Ctenodon- tidcB (extinct). These families occur from the Devonian to the Mesozoic. The more specialized order of Sirenoidei includes the families of CeratodontidcE and Lepidosirenidce, each of these represented. by living forms. – Most of the Ccratodontidce are extinct, occurring in the Mesozoic; but two species, Neoceratodus forsteri and N. miolepis, live in rivers of Aus¬ tralia. No fossil Lepidosirenidce are known. Lepidosiren paradoxus lives in the swamps of southern Brazil and Protopterus annectens, P. dolloi, and P. cethopicus, in those of the Nile region.

Sub-class Actinopteri. — After setting off from the great group of fishes primitive or archaic types, one after another, we are left at last with only those having fish-jaws, fish-fins, and in general the structure of the typical fish. For all these in all their variety, as a class or sub-class, we adopt the name of Actinopteri, suggested by Prof. Cope. The name (a/crtf, ray; TTTEpdv, fin) refers to the structure of the paired fins. In all these, the bones supporting the fin- rays are highly specialized, and at the same time concealed by the general integument of the body.

In. general, two bones connect the pectoral fin with the shoulder-girdle. The hyperacora- coid is a flat square bone, usually perforated by a foramen lying above, and parallel with it the irregularly formed hypocoracoid. Attached to these is a row of bones, the actinosts or ptery- gials, short, often hourglass-shaped, which actu¬ ally support the fin-rays. In the higher forms the actinosts are few (four to six) in number, but in the lower types

they may remain numer¬ ous, a reminiscence of the condition seen in the crossopterygians and especially in Polyp- terus. Other variations may occur ; the two coracoids are sometimes imperfect or specially modified, and the actinosts may be distorted in form or position. Among the lower Actinopteri many archaic traits still persist, and by its earlier representatives the group is joined very closely to the Crossopterygii. The great class may be divided into two series or sub-classes, the Ganoidei, which retain ancient traits, and the Teleostei or bony fishes, in which most of these have disappeared.

Even among the Ganoidei, as the term is here restricted, there remains a great variety of form and structure. The group constitutes sev¬ eral distinct orders, and as a whole does not admit of perfect definition. All of the species known have the tail strongly he.terooercal.Most of them have the skeleton still cartilaginous, and in some it remains in a very primitive con¬ dition. Most of them have an armature of bony plates, diamond-shaped with an enamel like the surface of teeth. All of them have the air bladder highly developed, usually, cellular and functional as a lung, but connecting with VOL. 14 — 41

the dorsa side of the gullet, not with the ven¬ tral. side, as in the dipnoans. In all these re¬ main more or less perfectly developed the optic chiasma, the many valves of the arterial bulb, and the spiral valve of the intestines found in the more archaic types. But traces of some or all of these structures are found in some bony fishes, and their presence in the ganoids by no means justifies their separation with sharks, dip¬ noans, and crossopterygians as a great primary class,. P alceichthyes as proposed by Dr. Gunther. All forms of body may be found among the ganoids. In the earlier seas they were scarcely less varied and perhaps scarcely less abundant that the teleosts in the seas of to-day. So far as fossils show, the characteristic actinop- terous fin, with its reduced and altered basal

Oceanic Sunfish or Headfish (Mola mold).

bones, appeared at once without intervening gradations.

The name Ganoidei (yavuc brightness; eldog, resemblance), alluding to the enameled plates, was first given by Agassiz to those forms, mostly extinct, allied to the garpike, and cov¬ ered with bony scales or hard plates. As originally defined cat-fishes, sea-horses, Agoni- dce, and other wholly unrelated types were in¬ cluded with the garpikes and sturgeons as ganoids.

These were eliminated by Johannes Muller, who recognized the archaic characters common to the existing forms. Still later Huxley re¬ moved the crossopterygians, and others have shown that the Ostracophori and

Arthrodira should be placed far from the garpike in sys-

tematic classification. Cope and Woodward have dropped the name ganoid altogether as pro¬ ductive of confusion through the many mean¬ ings attached to it. Others have used it as a handy group name for the orders of archaic Actinopteri. For these varied and more or less divergent groups it seems convenient to retain it.

The order Lysopteri (kvotg, a loosing; TTrepoy , fin) comprises the earliest ganoids, be¬ ginning in the Devonian which have the body covered with enameled scales. The families are Palceoniscidee, Platysomidce, Dictyopygidee and Dorypteridee. The order Chondrostei (xbvdpog, cartilage; oorkov , bone), includes a great variety . of forms, characterized by the less cartilaginous skeleton, the distinctly heterocercal tail, and the presence of bony plates, rather than scales, on most parts of the body. These represent a degenerate offshoot from the Lysopteri, the form being less like that of the typical fishes. The earliest members of this group appear in the Tertiary, the most primi¬ tive family being the Chondrosteidee (extinct).

Anna calva (Amiatus calvus), in the waters of the eastern United States. In these forms there is a gradual transition from diamond-shaped scales, covered with enamel, to the cycloid scales of the. ordinary soft-rayed fishes. The line separating the Lepidostei and Halecomorphi from each other and from the Isospondyli is a very narrow one.

Sub-class Teleostei or Bony Fishes. — The fishes which still remain for discussion con¬ stitute the great sub-class or series of Teleostei or bony fishes. They lack wholly or partly the ganoid traits, or show them only in the em¬ bryo. The tail is slightly if at all heterocercal, the fulcra disappear, the actinosts of the pec¬ toral fins are few and large, rarely if ever over five in number, the air-bladder is no longer cellular in most species, nor does it assist in respiration. The optic nerves are separate, one running to each eye without chiasma. The skeleton is almost entirely bony, the notochord usually disappearing entirely with age. The valves in the arterial bulb are reduced in num¬ ber, and the spiral valve of the intestines dis-

Another family is that of Belonorhynchidee (extinct). The Acipenseridce (sturgeons) are well represented among living fishes. The order Selachostomi (ckAaxog, shark; oroya, mouth) includes the paddle-fishes (Polyodontidce), two living species, and one extinct, in the Eocene. The

order Pycnodonti including the family of Pycnodontid.ee (extinct), consists of a deep¬ bodied, compressed fishes with small mouths and a peculiar physiognomy. The order Lepi¬ dostei (ysTrig, scale; oorkov, bone) includes numerous families with rhombic enameled scales. The families are Semionotidce, Lepi- dotidee, Isopholidee, M acrosemiidee, Pholidop- horidce, Asp i d o rhy nch idee, and Lepisosteidee, all extinct save the Lepisosteidce, represented by four species known as garpike in the rivers of North. America. The earliest fossil garpikes occur in the Eocene. The Halecomorphi (halec, herring; yoptyv, form) comprise the Pachy- cormidee Protosphyreenidee, Liodesmidce, Oli- gopleurid.ee, and Amiidee. All these have perished, except the Amiidee, which group is represented by a single species, the Bowfin,

appears. Traces of each of the ganoid traits may persist somewhere in some group, but as a whole we see a distinct specialization and a distinct movement toward the fish type with the loss of characters distinctive of sharks, dipnoi, and ganoids. In a general way the skeleton of all teleosts corresponds with that of. the striped bass, and the visceral anatomy is in all cases sufficiently like that of the sunfish.

The. mesocoracoid or praecoracoid arch found in all ganoids, persists in the less special¬ ized types of bony fishes, although no trace of U is found, in the perch-like forms. With all this there is found among the bony fishes, an infinite variety in details of structure. For this reason the Teleostei must be broken into many orders and these orders are very different in value and. in degrees of distinctness, the various groups being joined by numerous and puzzling mtergradations.

Order Isospondyli. — Of the various subor¬ dinate groups of bony fishes there can be no question as to which is most primitive in struc¬ ture or as to which stands nearest the orders

of ganoids. Earliest of the bony fishes in geological time is the order of Isospondyli (loog equal; on ovdvXog vertebra), containing the allies recent and fossil of the herring and the trout. This order contains those soft-rayed fishes which have the ventral fins abdominal, the mesocoracoid or praecoracoid arch developed (sometimes lost in degeneration), and the an¬ terior vertebrae unmodified, essentially similar to the others.

The ganoids pass by degrees into the Iso¬ spondyli, and the soft-rayed fishes pass again by imperceptible gradations into those more specialized

forms having spines in the fins structures which are again lost in the most modified members of the same group.

Ganoid traits are present in certain families of Isospondyli. Among these are the gular plate (found in Amia and the Elopidce), pre¬ sumably derived from the similar plate in the earliest ganoids, additional valves in the arterial bulb in Albulidce, the cellular air bladder of Notopterus and Osteoglossum, the spiral intes¬ tinal valve in Chirocentridce, and the ganoid scales of the extinct Leptolepidce. From these characters it is inferred that the soft-rayed fishes are descended from the Lepidostei or

Benthosauridce ,Bathypteroidce , Ipnopidce ,Ronde- letiidce, Cetomimidce, Myctophidce or lantern- fishes, Rhinellidce (extinct), Dercetidce (ex¬ tinct), Chirothissidce (extinct), Exocoetoididce (extinct), Maurolicidce , Chauliodontidce or viper fishes, Gonostomidce, Astronesthidce, Sto- miatidce , Malacosteidce , Plagyodontidce or lancet- fishes, Evermannellidce, Paralepididce , Sternop- tychidce and Idacanthidce.

The order of Lyopomi loose, noya ,

opercle), contains a few deep-sea fishes, without mesocoracoid and with the opercular bones distorted. One family, the Halosauridce, with fossil allies.

A series of soft-rayed fishes descended from the Isospondyli are grouped together to form the super-order or series called O stario phases . These differ from the Isospondyli in having families of Characidce and Erythrinidce, the air-bladder being connected, by a series of ossicles called the Weberian apparatus, with the auditory organ.

This senea includes the orders of Eventog¬ nathi, Heterognathi, N ematognathi, and Gym- nonoti, immense groups comprising the vast majority of the fresh-water fishes of the world.

The Eventognathi and Heterognathi have the

Rat-fish or Elephant-fish of California (Hydrolagus colliei). A Chimaeroid.

Halecomorphi. The more primitive Isospondyli approach more nearly to these ganoid forms than to their later descendants, the catfishes, the eels, or the pikes.

Most ancient of the Isospondyli is the ex¬ tinct family of Leptolepidce of the Triassic. Families mostly still extant, but nearly all of them more or less represented in fossils from the Jurassic on, are the Elopidce or tarpons, the Albulidce or lady-fishes, the Chanidce or milk- fishes, the Hiodontidce or

moon-eyes, th eSpanio- dontidee (extinct), the Pachyrhizodontidce (ex¬ tinct), the Thryptodontidce (extinct) the Ptero- thrissidcF, the Chirocentridce, the Notopteridce, the Enchodontidce (extinct), the Ichthyodectidce (extinct), the Osteoglossidce, the Phare odon- tidce (extinct), the Clupeidce or herrings, the Dussumieriidce or round herrings, the Doroso- midee or gizzard-shad, the Engrauidce or anchovies, the Alepocephalidce, the Pantodon- tidce, the Salmonidce or salmon and trout, the T hymallidce or graylings, the Argentinidce or smelt, the Microstomidce , the Salangidce or ice-fish, the Galaxiidce or New Zealand trout, the Happlochitonidce, the Gonorhynchidce, the Notopteridce, and a host of other forms, mostly from the deep seas, constituting (sub-order Iniomi) the families of Aulopidce, Ctenoth.iris- sidee (extinct), Synodontidce or lizard-fishes,

mouth-parts normal, the maxillary not rudi¬ mentary, and the body usually covered with ordi¬ nary scales. In the order Heterognathi (erepog differing; yvadog , jaw) the lower pharyngeals are not especially modified, and the jaws usually with teeth. This group comprises most of the river-fishes of South America and Africa with multitudes of genera and species. It includes the families of Characidce and Erythrinidce, the former with and the latter without the adipose fin characteristic of catfishes and salmon.

The order Eventognathi A, well; h, within; yvaQog, ‘ jaw, is characterized by the absence of teeth in the jaws, and by the high degree of specialization of the lower pharyngeals, which are scythe-shaped, and in typical forms are armed with a relatively small number of highly specialized teeth of peculiar forms and arranged in one, two or three rows. In all the species the gill-openings are restricted to the sides, there is no adipose fin, and the broad flat branchiostegals are but three in number. In all the species the scales, if present, are cycloid, and the ventral fins, of course, abdominal. The modification of the four anterior vertebrae and their _ connection . with the air-bladder are essentially as seen in the catfishes. The families of Eventognathi are the Kneriidce, Homalopter- idee, Cobitidce or loaches, Catostomidce or suck-

ers, and Cyprinidce or carp, dace and minnows. The last is the largest family recognized in ichthyology, comprising over 2,000 species, al¬ most all confined to the north temperate zone.

The order of Nematognathi or catfishes is characterized among the Ostariophysce by the fact that the maxillary bone is rudimental, form¬ ing the base of a long barbel. There are no true scales, the body being naked or mailed, and about the mouth are always fleshy feelers. The multitude of species inhabit chiefly the rivers of the tropics, only the typical catfishes of the principal family of Siluridce occurring in waters

ventral fins. These characters are lost in all or most of the living forms.

The eels may be distributed among different orders. The Symbranchia (dvv together; fipavxog, gill) — Ichthyocephali, and Holostomi ■ — have normal fish-like jaws, and the shoulder-girdle is sometimes joined to the skull. The families are Monopteridce or rice-field eels, Symbran- chidce, Amphipnoidce and Chilobranchidce.

The true eels or apodes have the shoulder- girdle free from the skull, the premaxillaries more or less coalesced with the vomer, and the body elongate and of many vertebrae. The

of the United States and Europe. The families are Diplomystidce, Siluridce , Bunocephalidce, Plotosidce, Chacidce, Chlariidce, Hypophthalmidce , Argidce, Sisoridce, Pygidiidce, Loricariidce and Calliththyidce, the members of the last three groups armed with a bony coat of mail.

The order Gymnonoti contains elongate eel¬ like fishes without dorsal fin and with the tail excessively long. The vertebrae are modified, as in the preceding orders, but there is no meso- coracoid arch. The families are Electro phoridce and Gymnotidce, all river-fish of South America.

The order Scyphophori contains river-fishes of Africa in which the small mouth is at the end of a long snout. There are no pharyngeal teeth,

families are Anguillavidce (extinct) with dis¬ tinct caudal and sometimes with ventral fins, Anguillidce or true eels, Congridce or conger-eels, Simencheylidce, Murcenesocidce, Nettasomidce, Nemichthyidce , O phichthyidce , llyophidce, Heter- ocongridce , Dysonimidce Encheliidce (extinct), Murcenidce or morays, Myrocongridce and Moringuidce.

The small order of Carencheli contains one family, Derichthyidce, characterized by the snake-like neck and the structure of the jaws.

The order Eyomeri includes deep-sea eels of enormous gape, with the parts of the head very loosely joined, and with the fifth gill-arch not modified to form a pharyngeal. There are

and the opercular bones are considerably modi¬ fied. In all there is a deep cavity on each side of the cranium, covered by a thin bony plate, the supertemporal bone. The families are Mormy- rid.ce and Gymnarchidce. .

Next we may place a long series of more or less related families, known collectively as eels. In all these the upper jaw is more or less degenerate, the ventral fins are wanting, and the shoulder-girdle has typically lost its connection with the skull. The earliest fossil eels have traces of scales, the caudal fin separ¬ ate, and, according to Dr. O. P. Hay, abdominal

two families, Saccopharyngidce and Eurypharyn- gidce.

Still more aberrant is the small order of Heteromi (erepog differing; ufioq shoulder), the spiny eels, elongate fishes, having the shoulder-girdle detached from the head and the. coracoids united in an imperforate plate. This group includes eel-like fishes of the deep sea, with spines in the dorsal

fin — the families, Protonotocanthidce (extinct), N otacanthidce and Lipogenyidce.

Another order of uncertain relationship is that of Opisthomi, with normal coracoids,

spines in the dorsal fin, and the shoulder-girdle remote from the skull. It contains one family, the Mastacembelidce , small fishes from the streams of tropical Asia and Africa.

Another small order, the Xenomi (ghog strange; bpog shoulder), has the coracoids rudimentary and cartilaginous, with no basal bones or actinosts to the pectoral fin. One family, Dalliidce, containing the black-fish of the marshes of Alaska and Siberia.

In the order Haplomi, the mesocoracoid arch

girdle, the scales are often ctenoid, and the edge of the upper jaw is formed by the pre¬ maxillary alone, the maxillary being always toothless.

But it is impossible to define or limit the group by any single character or group of characters. It is connected with the Isospondyli through the Haplomi, on the one hand, by transitional groups of genera which may lack any one of their characters. On the other hand, in the extreme forms, each of these distinctive

Murasna.

is wholly undeveloped, as is the case in all of the other groups remaining to be enumerated.

In common with the soft-rayed fishes in gen¬ eral, the air-bladder has a persistent air-duct, the fins are without spines, the ventral fins are abdominal and the scales are cycloid.

There is no adipose dorsal in the Haplomi, the dorsal is inserted far back, and the head is generally scaly. Most, but not all, of the species are of small size, living in fresh or brackish waters, and they are found in almost all warm regions, though scantily represented in California, Japan and Polynesia. The families are Esocidce or pikes, Umbridce or mud-min¬ nows, Poeciliidc e or killifishes, and Amblyopsidce or blind-fishes of the caves. The Gonorliynchidce and the extinct families of Crossognatahida ?

and Cobitopsidce may be doubtfully added to this group.

Order Acanthopterygii. — The most of the remaining bony fishes constitute a natural group for which the name Acanthopterygii {aravQa, spine; nrepov fin or wing), may be used. This name is often written Acanthopteri,

characters may be lost through degeneration. Thus fin-spines, ctenoid scales and the homo- cercal tail are lost in the cod-fishes, the con¬ nection of ventrals with shoulder-girdle fails in certain peculiar forms, and the development of the air-duct is subject to all sorts of variations. In one family even the adipose fin reappears.

The Acanthopterygii or preferably Acanthop¬ teri, the Physoclysti of Muller, the Thoracices of older authors, and the Ctenoidei of Agassiz, include substantially the same series of forms.

Among the many subordinate groups, sub¬ orders or super-families, a few stand out as susceptible of definition. Among these is the group of Salmopercce, composed of perch-like fishes, with spines in the fins and with ctenoid scales, yet retaining at the same time the ab¬ dominal ventrals and the adipose fin of the salmon. This constitutes the family of Per- copsidce, trout-perches or sand-rollers. The ex¬ tinct Erismatopteridce and Asineopidce probably belong here.

The sub-order synentognathi agree exter¬ nally with the Haplomi, but have the lower

Barracuda (Sphyrcena barracuda)

a form equally correct and more euphonious and convenient. These are characterized, with numerous exceptions, by the presence of spines in the fins, by the connection of the ventral fins to the shoulder-girdle, by the presence, in gen¬ eral, of more than one spine in the anterior part of dorsal and anal fins, and as a rule of one spine and five rays in the ventral fins, and by the absence in the adult of a duct to the air- bladder. Minor characters are these: The pectoral fins are inserted high on the shoulder-

pharyngeals solidly united, and the air-duct lost in the course of development. The families are Belonidoe, the gars, Scombresocidce, the sauries, Hemiramphidce or half-beaks, and Exocoetidce or flying-fishes. This order and the Haplomi are joined by Hay under the name of Mesichthyes, the groups forming a perfect transition from soft-rayed to spiny-rayed fishes.

The group of Percesoces has the general traits of the spiny-rayed fish, with the ventral

fins abnormal. Here belong the Sphyrcenidce or barracudas, the Atherinidce or silversides, and the Mugilidoe or mullets. Another sub-order, Rhegnopteri, includes the Polynemidce or thread-

has proposed to unite them as a distinct order. Phthinobranchii (Qdivov, waning). The Hemi- branchii include the families Gasterosteidce (sticklebacks), Protosyngnathidce (extinct),

A Flying-fish (Cypseluvus speculiger).

fins. Other transitional forms, with the veil- trals abdominal, and spines usually present in the fins, constitute the sub-orders of Hemi- branchii, Lophobranchii and Hypostomides. In

all of these the bones of the gill-arches are re¬ duced in number, and the gill-structures are dis¬ tinctly degenerate. For this reason Dr. Hay

Aulorhynchidce, Fistulariidce (cornet fishes), Aulostomidce (trumpet-fishes), Urosphenidce (extinct), Rhamphosidce (extinct), Marco-rhamphosidce (snipe-fishes), and Centriscidce (shrimp-fishes). The more degenerate sub¬ order of Lophobranchii includes the Solenos- tomidce, the Syngnathidce (pipe-fishes), and the Hippocampidce or sea-horses. The singular order of Hypostomides includes the Pegasida (sea-moths or sea-dragons).

In another sub-order we may place the Berycoidei, fishes perch-like in general structure and usually well armed, with the ventral fins thoracic, but their number of rays never I; 5, the typical number in all perch-like forms. The berycoids are especially characterized by the presence of the orbitosphenoid bone, a struc¬ ture wanting in all perch-like families ; are the earlies in time of the fishes of this pattern, appearing in the Cretaceous or earlier. The families are Berycidce, Trachichthyidce , Holo- ccntridce or soldier-fishes, Polymixiidce, and Monocentridce or pine-cone fish.

Another group or sub-order Zeoidei, agrees well with the beryces in the presence of more than five soft rays in the ventral fins and in the armature of the fins. It differs, however, in the character of the skeleton, the post-temporal, especially being adnate to the skull, as in the butterfly-fishes or Chatodontidce.

One family, Zeidce, the John-dories. belongs here. In the same group we may place pro¬ visionally an extinct family, Amphistiidce. Dr Boulenger

has suggested that to fishes allied to the Amphistiidce we may trace the origin of the John-dories, and of the great group of flounders as well. This is an interesting sug¬ gestion, but the actual line of descent is as yet not proved.

The sub-order Selenichthyes includes the family of Lampridide or opahs. In this group is a single species, a huge fish almost as deep as long, with the hypercoracoids greatly de¬ veloped and the ventral fin with many soft" rays, an archaic character unknown in other spiny- rayed fishes, 7

In this neighborhood perhaps belongs the sub-order of Heterosomata, or flounders, char¬ acterized by the twisting of the cranium, an arrangement which permits the fish to lie flat on one side on the sand, while both eyes are turned to the upper or colored side. In this

structure, but the scales are usually coarser and rougher, and the structure less adapted to swift movement. Many members of this group are confined to the fresh waters. The families Cent) archidcz, the sunshines, Kuhliidcz , the silver-bass, Elassomidcz, the pigmy-perch,

Mackerel (Scomber scombrus).

group there are no fin-spines. The young flounder when first hatched has the skull and eyes symmetrical, and the modification of the head proceeds by degrees.

There are two families, Plexironzctidcz or flounders, and Soleidcz or soles.

To the group or super-family Scombroidea belong a great variety of fishes, usually swift in motion and with thin soft scales, the ventral fins, if present, having a spine and five soft rays.

The families are Rachxcentridaz , the sergeant- fishes, P omatopiidcz or bluefishes, Carangidcz or Cavallas, N ematistiidez or papagallos, Scom-bridez or mackerels, Palczorhynchidcz (extinct), Lepidopidc z or scabbard-fishes, Trichiuridcz or cutlass-fishes, Istxophoridcz or sail-fishes, Xiphiidcz or sword-fishes, Coryphcznidcz or dol¬ phins, Bramidcz or pomfrets, Ptzraclididcz, Stromateidcz or harvest-fishes, Icosteidcz or rag-fishes, Acrotidcz, Zaproridcz, Louvaridcz or Louvars, Menidce, Leiognathxdcz , Steinegeriidcz, and Tetragonuridcz or square-tails. The Gram- mxcolepidcz perhaps belong in this neighbor¬ hood.

Aphredoderidcz, the pirate-perch, Percidcz, the river-perch and darters, Apogonidcz, the beardless mullets, Scombropidcz, Acropomidcz , Serranxdcz , the bass, Lobotidcz, the flashers, Rypticxdcz, the soap-fishes, Kyphosidcz, the chopas, Scorpididcz, Tlieraponidoz , the slave- fishes, Hczmulidcz, the grunts, Lutianxdcz, the snappers, Sparidcz, the porgies, Cczsionidcz, Ger- ridez, the mojorras, Mcznidcz, the picarels, Scicznidcz, the drums, Centropomidcz (or Oxyla- bracidcz), the robalos, P oly cent rid az , Nandidcz, Oplegnathxdcz or stone-wall perch, Sillaginidcz , Pentacerotidcz, Priacanthidcz, the catalufas, Mullidcz, the surmullets. Remotely allied to the percoid fishes are the Pseudo chromididcz, the Opisthognathidcz or jaw-fishes, the Malacanthidcz , the Lafilidcz or tile-fishes, and possibly the Czpolidcz or band-fishes.

. The group or sub-order of Labyrinthici com¬ prises fresh-water fishes of the Indian region, with a peculiar apparatus for storing water connected with the gills. The families are Osphromenidcz or gouramies, Anabantxdcz or climbing perch, Helostomidcz , Luciophalidcz, and Ophiocephalidcz or snakehead-fishes.

Yellow Perch (Perea flavercens).

The imperfectly known families, Batliyclupe- idoz , Stephanoberycidcz and Pempheridcz have some resemblance to berycoids, but the ventral rays are I, 5.

The great group or super-family Pericoidea agrees with the mackerel-like fishes in general

Another group, called Pharyngognathi by Muller, is characterized by the complete union of the lower pharyngeals, a character de¬ veloped independently in the Synentognathi and in some Scicznidcz. It contains three sub-orders or super-families. The Chrontides

have a single nasal opening on either side. Of these there are two families, the Pomaccn- trida? or damsel-fishes, chiefly beautiful in¬ habitants of the coral reefs, and the Cichlidce,

perhaps derived from ancestors of the Zeoidca, is known as Squamipinnes or Chcutodontoidea. These are characterized in general by the union of the oost-temporal or uppermost bone of the

river-fishes of the tropics of both continents.

The Holconoti comprise the viviparous perch or surf-fishes of California and Japan; one family, Embiotocidce.

The Pliaryngognathi proper, having two nostrils on either side, smooth scales and the gills three and one-half, constitute four fam¬ ilies, Labrida, wrasse-fishes or doncellas,

shoulder-girdle with the skull. The ventral fins in these fishes have one spine and five (rarely fewer) rays. The scales are small and often rough. The presence in the more primi¬ tive forms of 24 vertebrae and five soft rays in the ventrals indicates the common origin of these fishes with the members of the scombroid, percoid and labroid groups. While the more

Moorish Idol (Zanclus cornutus).

Odacida Siphonognathida and Scarida (Cal- lyodontidae) or parrot-fishes, in which the teeth are united to form a bird-like beak.

A large group of more or less related forms,

primitive of the chaetodontoid series much re¬ semble primitive members of the other series, the extremes of the former represent a wide divergence, specialization and degeneration.

The typical families are the Ilarchidee or spade-fishes, ‘ the Chcetodontidce or butterfly fishes, characteristic of coral reefs, and the Zanclidce or Moorish idols. Aberrant types are the Toxoidee or arches, Ephippidce (Scato – phagidee), Antigoniidce or boar-fishes and Dre- panidce. Still more aberrant are the Acan- thuridee, tangs or surgeon-fishes, the Siganidce, with the last ventral rays spinous like the first. From the tangs are descended the degenerate types known collectively as Plectognathi, the bones of the jaws being more or less consoli¬ dated. Three sub-orders exist among these forms, Sclerodermi, with separate rough scales and separate teeth, the Ostracodermi, with the body enclosed in a bony box, and the Gym- nodontes, with the teeth coalescent into one or two plates in each jaw.

To the Sclerodermi belong the three fam¬ ilies, T riacanthidce, Balistidce or trigger-fishes, and Monacanthidcc or file-fishes. To the Ostra¬ codermi belong the Ostraciidee or trunk-fishes, and to the Gymnodontes, the Triodontidce, the Tetraodontidce or globefishes, the Tropidiclithy-

Caracanthidce, the Hexagrammidce or green- fishes, the Anoplopomidce or skil-fishes, the Zaniolepidee, the Ophiadontidee or (

In the sub-order Discocephali the spinous dorsel fin is modified to form a sucking disc. This is placed on the head, and is made of two series of flat plates. There is one family, the Echineididee or remoras.

The large family of Gobiidce forms a super¬ family called Gobioidea. The gobies are dis¬ tinguished by numerous minor traits, the re¬ stricted gill-openings, the short spinous dorsal

A Californian Globefish (Ovoides setosus).

idee, the Chonerhinidce, the Diodontidce or por¬ cupine fishes, the Heptadiodontidce (extinct), and the Molidce or head-fishes.

A small group known as the super-family Cirrhitoidea is characterized by the thickened and unbranched character of the lower pectoral rays, the third suborbital being at the same time not enlarged. Here belong the Cirrhitidce, the Aplodactylidee, the Latrididce and possibly the Trichodontidcc. This group seems to mark a direct transition from the perch-like fishes to those with mailed cheeks.

The sub-order of mailed-cheek fishes, Parei- oplitce, is characterized by the presence of the suborbital stay, a process extending backward from the third suborbital to or toward the upward limb of the preopercle. This stay is subject to great exaggeration in some forms, while in others it is much reduced. It is, how¬ ever, always present in these fishes and in no others. In the more primitive types the ven- trals have one spine and five rays. There are 24 vertebrae, and the scales are normally de¬ veloped. In the extremes there are remarkable cases of specialization on the one hand and of degeneration on the other.

The families of mailed-cheek fishes are the

and usual connection of the ventral fins among others. With the gobies may be associated the •small family of Oxudercidce.

To the sub-order Jugalares we may refer many families which agree in having the ven¬ tral fins inserted before the pectorals. The super-family Trachinoidea for the most part retain the normal number of ventral rays, the spine and five soft rays. To this group belong the Trachinidee or weavers, the Uranoscopidce or stargazers, the Percophidce, N dtotheniidec, Pteropsaridee, Harpagiferidce, Chccnichthyidce , Champsodontidce , Bovichthyidce, the Draconet- tidee, Callionymidce or dragonets, the Platypt- teridee, and perhaps the Chiasmodontidce and Hemeroccetidce.

Other divergent or aberrant families in this neighborhood are the Comephoridee or Baikal- fishes, the Bathymasteridce or ronquils and the Gadopsidce. The Batrachoididee or toad-fishes represent the group Haplodoci.

The group Xenopterygii, without spinous dorsal and with a large sucking disc between the ventral fins, contains the Gobiesocidce or cling-fishes.

The .super-family Blennioidea contains the blennies and their relatives, with the ventrals

jugular and always few-rayed. Here belong the Blenniidce, Pholididce , Stichceidce, Xiphasi- idce , C ryptacan l hodidce or wry-mouths, Anar-rhichadidce or wolf-fishes, Ptilichthyidce, Per- dahdce, Patcecidce , Gnathanacanthidce and the extinct family of Blochiidce.

Very closely allied to the blennoid series, and also belonging to the Jugulares, is the super¬ family Ophidioidea, differing in the absence of fin-spines. Here belong the Zoarcidce or eel- pouts, the Ammodytidc e or sand-launces, the Bleekeriidce, the Brotulidce, the Brotulophidce, the Opliidiidce or cusks, the Fierasferidee or pearl-fishes, the Xenocephalidce, Scytalinidce, Congrogadidcc and Bregmacerotidce.

A sub-order of uncertain relations, charac¬ terized by the absence of foramen in the hyper¬ coracoid, by the peculiar form of the tail, by the jugular insertion of the ventrals and the absence of spines, is the Anacanthini. Here belong the Gadidce or codfishes, the Merlucciida ? or hakes, the Macruridce or grenadiers, the Ateleopodidce and Bathyonidce.

Still more uncertain are the relationships of

ological philosophy; (3) Genera of fishes, in¬ volving a complete classification of the forms he knew, his genera corresponding to the groups now called families; (4) Synonymy of all species recorded by authors, and (5) De¬ scription of all the species actually examined by Artedi. Of true fishes (exclusive of whales) 228 species are recorded by Artedi • — a small portion of the 12,000 species now actually known (1903).

But the work of Artedi is masterly in its method and shows a stronger touch than that of any of his successors in ichthyology until the time of Cuvier. In the (Systema Natural Linnaeus did little more for fishes than to sub¬ stitute binomial names for the descriptive phrases of Artedi.

After Artedi, and independently, the group of fishes was arranged in genera by Klein and by Gronow, both writers of ability, but neither with the genus for taxonomy shown by Artedi.

With the (Regne Animal > (1817-28) of

Cuvier, a new era in zoology began. In this epoch-making work the ((Animal kingdom,® as

the sub-order Tceniosomi, ribbon-shaped fishes of the deep sea, soft in body and often reach¬ ing an immense size. The families are Trachypteridee or deal-fishes, Regale cidce or oar-fishes. The Lophotidce or crest-fishes show some resemblances to these.

Finally we may close the long series with the order of Pediculati. These are jugular fishes, degenerate in structure, the small gill- opening behind the pectoral fins. The families are Lophiidce, the anglers, Antennariidce or walking-fishes, Ceratiidce or sea-devils, and Ogcocephalidce or sea-bats.

History of Systematic Ichthyology. — The title of ((Father of Ichthyology® is justly given to Petrus Artedi, a Swede, associate and inti¬ mate friend of Linnaeus. Artedi was the first to recognize the meaning of genus and species in ichthyology, and to supply the outlines of a rational classification. After Artedi's un¬ timely death (by drowning in a canal in Hol¬ land), Linnaeus edited his manuscripts, pub¬ lishing them in 1738, in five parts, as follows: (1) Ichthyological biography; (2) Ichthy-

the title indicates, was <(arranged according to its organization.® Comparative structure found its reflection in the schemes of classification. The application of the principles of morphology was carried out in detail with the fishes in the great (Histoire Naturelle des Poissons) (1828- 49) of Georges Dagobert Cuvier and Achille Valenciennes, long the most valuable general work on fishes. The only general work on fishes since Cuvier and Valenciennes is the monumental Catalogue of the Fishes of the British Museum } (1859-70) by Dr. Albert

Gunther. In this work 6,843 species are de¬ scribed and 1,682 doubtful species are men¬ tioned m foot-notes, the number of species known in 1870 being estimated at 9,000. Since that date about 3,000 have been described, the number of living species at present, according to an enumeration made by Dr. Boulenger, be¬ ing about 12,000. The number of fossil species known may be estimated at 3,000 to 4,000.

The systematic arrangement of Cuvier was extended and modified by Louis Agassiz to in¬ clude the multitude of fossil forms made

known in his

the Red Sea and neighboring parts of Africa, (Atlas zu der Reise im nordlichen Afrika) (1828) and (Neue Wirbelthiere) (1837), rank with the very best of descriptive work.

In Italy, Charles Lucien Bonaparte, Prince of Canino, has published an elaborate (Fauna Italica) (1838), and numerous minor papers. O. G. Costa published (about 1850) a (Fauna of Naples.*

In France, the fresh-water fishes are the subject of works by Emile Blanchard (1866) and Emile Moreau. Leon Vaillant has written on various groups of fishes. The (Mission Scientifique au Mexique,* by Vaillant and F. Bocourt, is a most valuable contribution to our knowledge of the fishes of Mexico. In this field our knowledge has been much extended by the work of Seth E. Meek and of Mr. Regan.

In Holland the chief great works have been those of Schlegel and Pieter van Bleeker. Professor Schlegel, of the University of Ley-

A Ribbon-fish or Oarfish (Regalecus).

In modern times the students of systematic ichthyology have been very numerous. The local faunal work in various nations has been very extensive. In Great Britain we may note Parnell's (Natural History of the Fishes of the Firth of Forth1* (1838) ; William Yarrell's (History of British Fishes1* (1859) ; the earlier histories of British fishes by Edward Dono¬ van and by William Turton, and the works of Jonathan Couch (1862), and Dr. Francis Day (1888), possessing similar titles. H. G. Seelye has also a useful (Synopsis of the Fresh-water Fishes of Europe.) William Swainson studied the fishes of Sicily, W. Thompson those of Ireland and Rev. Richard T. Lowe and J. Y; Johnson have done excellent work on the fishes of Madeira.

In Germany and Austria the chief local works have been those of Heckel and Kner on the fresh-water fishes of Austria (1858), and C. Th. von Siebold on the fresh-water fishes of central Europe (1863). The two memoirs of Eduard Ruppell on the fishes of

den, described in (The Fauna of Japonica* the fishes collected about Nagasaki in Japan by Ph. Fr. de Siebold and Biirger.

*Pieter van Bleeker (1819-78), a surgeon in the Dutch East Indies, is the most volumi¬ nous writer in ichthyology. His chief work is the (Atlas Ichthyologique des Indes Orientales Neerlandaises, * illustrated by colored plates. The writings of Dr. Bleeker constitute the chief source of our knowledge of the fauna of the East Indies. Dr. Van Lidth de leude, of the University of Leyden, is the author of a few descriptive papers on fishes.*

The fish 'fauna of Cuba has been the life¬ long study of Dr. Felipe Poey y Alov (1 799— 1891), a pupil of Cuvier, for a half century or more the honored professor of zoology in the University of Havana. Of his many useful pa¬ pers, the most extensive are his (Memorias sobre la Historia Natural de la Isla de Cuba,1 followed by a (Repertorio* and an (Enumer-atio* on the same subject. Before Poey, Gui- chenot of Paris had written on the fishes*

collected in Cuba by Ramon de la Sagra. Philip H. Gosse (1810-88) wrote on the fishes of Jamaica. Much earlier, Robert Herrmann Schomburgk (1804-65) wrote on the fishes of British Guiana. Other papers on the Carib¬ bean fishes were contributed by Johannes Mul¬ ler and F. H. Troschel, and by Richard Hill and J. Hancock.

Besides the work in South America of Marc- grave, Agassiz, Reinhardt, Liitken, Steindach- ner, Jenyns, Boulenger and others already named, we may note the local studies of Dr. Carlos Berg in Argentina, Dr. R. A. Philippi in Chile, and special records of Humboldt, Gar- man, J. F. Abbott and others in recent times. Carl H. Eigenmann and also Jordan and Eigen-mann have studied the great collections made in Brazil by Agassiz, the work of Dr. Eigen- ' mann now comprising most of our detailed knowledge of the fish-fauna of equatorial America. Steindachner has described the col-

treatment at the hands of Dr. Jared Potter Kirtland (1793-1877), an eminent physician of Cleveland, Ohio. In 1842 the amiable and scholarly James Ellsworth Dekay (1799-1851) published his detailed report on the New York fauna, and a little earlier (1836) in the (Fauna Boreali-Americana) Sir John Richardson (1787-1865) gave a most valuable and accurate account of the fishes of the Great Lakes and Canada. Almost simultaneously, Rev. Zadock Thompson (1796-1856) gave a catalogue of the fishes of Vermont, and David Humphreys Storer (1804-91) began his work on the fishes of Massachusetts, finally expanded into a Syn¬ opsis of the Fishes of North America> (1846) and a (History of the Fishes of

Massachu¬ setts (1867). Dr. John Edwards Holbrook (1794-1871), of Charleston, published (I860) his invaluable record of the fishes of South Carolina. The monograph on Lake Superior*

lection of Johann Natterer and Gilbert also those made by Dr. John C. Branner. The most recent extensive studies of the myriads of Brazilian river-fishes are those of Dr. Eigen¬

mann.

A Ceratiid (Caulophryne jordani)

In New Zealand, F. W. Hutton and J. Hec¬ tor have Published a valuable work on the fishes of New Zealand. Later writers have given us a good knowledge of the fishes of Australia. Notable among them are W. Maclay, James Douglas Ogilby and Edgar R. Waite. Clarke has also written on (Fishes of New Zealand. The most valuable work on the fishes of Hindustan is the elaborate treatise on the Fishes of India, > by Francis Day.*

. The most recent as well as the most exten¬ sive studies of the fishes of Japan were made in

1900 by the present writer and his associates, John Otterbein Snyder and Shigeho Tanaka. ‘ The scanty pre-Cuvieran work on the fishes of North America has already been noticed. Contemporary with the early work of Cuvier is the worthy attempt of Prof. Samuel Latham Mitchill (1764—1831) to record in system¬ atic fashion the fishes of New York. Soon-after followed the admirable work of Charles Alexandre Le Sueur (1780-1840), artist and naturalist, who was the first to study the fishes of the Great Lakes and the basin of Ohio. Constantine Samuel Rafinesque (1784-1842), the third of this remarkable but very dissimilar tEo, published numerous papers descriptive of the. species he had seen or heard of in his various botanical rambles. This culminated in his. elaborate but untrustworthy Hchthyologia OhiensisP The fishes of Ohio received later a far more conscientious, though less brilliant.

S0),a„d other publications of Louis Agassiz (1807-73) are well known. One of the first of Agassiz s students was Charles Girard (1822— Jj), who came with him from Switzerland

with SPencer Fullerton Baird (1823-87) described the fishes from the United States Panfic Railway Surveys (1858) and the

(1859) btatCS and Mexican Boundary Surveys

Most eminent among the students and as¬ sistants oi Professor Baird was his successor, George Brown Goode (1851-99), whose great¬ est work,. 'Oceanic Ichthyology, > published in collaboration with Dr. Tarleton Hoffman Bean was barely finished at the time of his death' The work of Theodore Nicholas Gill and Ed¬ ward Drinker Cope has been already noticed.

*The present writer began a systematic (Cata- a*9gue of the Fishes of North America* in 1875, in association with his gifted friend, Her- bert Edson Copeland (1849-76), whose sud¬ den death, after a few excellent pieces of work, cut short the undertaking. Later, Charles*

Henry Gilbert (1860 –), originally a student of

Professor Copeland, took up the work, and in 1883 a < Synopsis of the Fishes of North Amer¬ ica > was completed by Jordan and Gilbert. Dr,

Gilbert has since been engaged in studies of the fishes of Panama, Alaska and other regions, and the second and enlarged edition of the (Synopsis was completed in 1898, as the (Fishes of North and Middle America,* in col¬ laboration with another of the writer's students, Dr. Barton Warren Evermann.*

As students of the extinct fishes, following the epoch-making (Poissons Fossiles) of Louis Agassiz, some of the notable names are those of Pander, Asmuss, Heckel, Hugh Miller, Tra- quair and Eastman. An indispensable (Hand- buch der Palaeontology is that of Karl A. Zittel, translated by Charles R. Eastman. The most valuable general work is the Catalogue of the Fossil Fishes in the British MuseunP in four volumes, by Dr. Arthur Smith Wood¬ ward, a worthy companion of Gunther's Cat¬ alogue of living fishes.

States, and the remains of two species and of some allied forms, as Aptornis, are found in western Kansas, but they became extinct at the end of the period. See Birds, Fossil.

ICHTHYOSAURIA, ik'thi-6-sa'ri'a, ICH- THYOPTERYGIA, or FISH-LIZARDS,

an order of reptiles, embracing primitive mar¬ ine forms with a fish-like body, long head and tail, and no distinct neck, whose remains are found exclusively in the Mesozoic, and most plentifully in the Lias. Remains of

these lizards are sparse in the middle Jura, but numerous in the upper Jura of southern and western Europe; and are found in the Creta¬ ceous of Europe, the East Indies, Australia, New Zealand and Chile. They varied in length from 3 to about 30 feet, and, as shown by their numerous coprolites (q.v.), fed upon fishes and

Atlantic Bat-fish (Malthe vespertilio).

In America Dr. John Strong Newberry and Prof. Edward W. Claypole have studied the fossil fishes of Ohio. Edward Drinker Cope and Dr. Joseph Leidy have written on the Eocene and Cretaceous fishes of the Rocky Mountains. Numerous recent papers of im¬ portance have been published by Dr. Bashford Dean, of Columbia University, Dr. Charles R. Eastman, of Harvard, and Dr. Oliver Perry Hay, of New York. Other important records are due to Orestes St. John, A. H. Worthen, Charles D. Walcott, J. F. Whiteaves, S. W. Williston and the Redfields, father and son.

Besides all this there has risen, especially in the United States, Great Britain, Norway, Canada and Australia, a vast literature of com¬ mercial fisheries, fish culture and angling, the chief workers in which fields we may not here enumerate even by name. See Fish ; Fishes, Geographical Distribution of.

David Starr Jordan,

Chancellor Emeritus, Leland Stanford Junior U niversity.

ICHTHYOPSIDA, ik-thi-6p'si-da. See Herpetology.

ICHTHYOPTERYGIA. See ICHTHYO¬ SAURIA.

ICHTHYORNIS, ik-thi-or'ms, a genus of fossil carinate birds constituting an order Ich- thyornithes and family Ichthyornithidoe. They were about the size of, and presumably had much the habits and appearance of, rather large gulls, but they had extremely large heads, and both mandibles of the long pointed beak were studded with sharp, backward pointing, snake-like teeth, each set in a distinct socket. These sea-birds fished in the great inland sea which during the Cretaceous Age covered so much of the present western half of the United

cephalopods (squids). <(The members of this order,® remarks Zittel, (

book of Palaeontology, } (Vol. II, New York 1902) ; Gadow, (Amphibia and Reptiles) (Lon¬ don 1901).

ICHTHYOSIS, ik-thi-6'sis, a congenital, chronic disease of the skin characterized by dryness, harshness, increased thickness, atrophy of the sebaceous glands, resulting in a scaly appearance. It usually affects young children. It is little understood, but a diet of fresh, juicy vegetables is recommended.

ICHTHYS, lk'this, a symbol used by the early Christians. It was derived by taking the first letters of the common title of Christ <(Jesus Christ, the Son of God, the Saviour,® in Greek ('I /rjGo'vq X/piordg Q/tov T /tog h/ oTyp, which spells IxOvg, the Greek word for fish. The acrostic and the figure of the fish thus be¬ came the symbol of Christ.

ICON BA.SILIKE. See Eikon Basilike.

ICONOCLASTS, i-kon'6-klasts (image- breakers), that Christian party in the Church of the 8th and 9th centuries who would not tolerate images in the churches or places of worship. The Byzantine emperor, Leo the Isaurian, issued an edict in 726 ordering the people to abstain entirely from paying religious reverence to sacred images and a second edict soon after ordered the destruction of the im¬ ages. This order occasioned commotions, first in the islands of the Archipelago; and as the Popes Gregory II and III, as well as Germanus, the patriarch of Constantinople, declared the veneration of sacred images to be in consonance with the Church's doctrine and constant prac¬ tice, and the Emperor Leo refused to recall his edict on their command, they excommunicated him, and his subjects in Italy threw off their allegiance. Thence arose two parties, the Icono- latrae (image worshippers) and the Icono¬ clasts. Leo's son and successor, Constantine Copronymus, held the same views as his father. He convened a council at Constantinople (754), in which the use as well as the worship of images was condemned. Constantine's son, Leo IV, who ascended the throne 775, fol¬ lowed the same course, but proceeded with more clemency and moderation. On the death of Leo IV, in 780, he was succeeded by his son, Constantine, under the guardianship of Irene, mother of the latter, and widow of Leo. Irene favored the orthodox party, and on attaining this position of authority, openly avowed her sentiments, and summoned a council to be held in 787, under her protection at Nicaea (Nice) in Bithynia, to pass upon the question at issue. This council condemned the Iconoclasts. Among the Greeks the controversy concerning images broke out anew after the banishment of Irene (802), and lasted about half a cen¬ tury. Her successor, Nicephorus, did not, in¬ deed, remove the images from the churches, but he forbade the adherents of the images from persecuting their adversaries. Finally the Empress Theodora,

by a council held at Constantinople (842), restored the worship of images among the Greeks, which was confirmed by a second council, held 869-70, in the same place. Consult (Seances Academy des Inscript J (May 1903) ; Tougard, (La Persecution Icono- claste) (1897).

ICONOSTASIS, T'ko-nos'ta-sTs, in a Greek church, the screen dividing the sanctuary from the church proper. This is usually ornamented

with pictures of Christ, the Virgin and saints. The screen has three doors generally, whose curtains are dropped while Mass is being cele¬ brated.

ICTERIDZE, lk-ter'i-de, a family of birds, the American orioles, or hangnests, and black¬ birds (qq.v.).

ICTINUS, ik'ti -nuz, a Greek architect, who flourished at the time of Pericles. He designed the Parthenon at Athens, the hall for the mysteries at Eleusis and the temple of Apollo Epicurius at Bassae near Phigalia. Litile is known of his life.

ICY CAPE, Alaska, a promontory so named on account of the immense masses of ice by which it is usually surrounded. On the north coast it projects into the Arctic Ocean west of the Otakah River, about midway between Capes Lisburne and Barrow. It was discovered by Cook in 1778, and was the farthest point that he reached north of Bering Strait.

IDA, (1) Asia Minor, the classical name of Kaz-Dagh, a mountain range, 30 miles south¬ east of the plain of Troy, with its highest peak, Gargaron (4,650 feet), near the head of the Gulf of Adramyti. In mythology it is famous as the range where Ganymede was stolen ; where Paris pronounced judgment on the beauty of the rival goddesses and where the celestials stationed themselves to witness the battles for Troy on the nether plain. (2) The classical name also of a mountain (now Psiloriti) in Crete (q.v.), the loftiest (7,500 feet) of the range which traverses the island. The most celebrated legends connected with it are those relating to the infancy of Zeus.

IDA GROVE, Iowa, a town, the capital of Ida County, 28 miles north of Denison, on the Maple River, and on the Chicago and North¬ western Railroad. Farming and stock-raising are carried on largely in the vicinity, and the town has flour mills, grain elevators and manu¬ factures of machinery, harness, brooms and bricks. Among municipalized installations are a heating and an electric-lighting plant. Pop.

2,090.

IDAHO (Indian, <(Mountain Gem®), one of the Northwestern States of

the United States. Its extreme length from north to south along the. western border .is 485 miles. The width varies from 50 miles in the northern part where it borders on the Dominion of Canada to about 300 miles in the south. The total area is approximately 84,000 square miles of which about 534 is water surface. The capital is Boise.

Topography. — Idaho is widely diversified topographically, having many hills and moun¬ tains, interspersed with fertile valleys, rugged canyons, mountain gorges, wide upland mead¬ ows and wooded parks, broad plateaus, rolling prairies, sage brush plains, great rivers with cascades and cataracts, beautiful lakes with jetting bays, studded, with great pines and Douglas fir. The Cabinet, Cceur d'Alene and Bitter Root mountains, principal spurs of the great Rockies, form the eastern boundary separating Idaho and Montana. From these mountain chains spurs are sent out west and southwest through nearly every part of the State to the great plains of the Snake River Basin which extends in crescent shape across

IDAHO.

Estimated population, 428,586

COUNTIES

Pop.

29,088 Ada . B 6

Adams . B 4

(Pop. incl. in Wash¬ ington Co.)

19,242 Bannock . G7

7,729 Bear Lake . G7

Benewah . B 2

(Pop. incl. in Koot¬ enai Co.)

23,306 Bingham . F 6

8,387 Blaine . D6

5,250 Boise . C 5

13,588 Bonner . B 1

. Bonneville ..... G 6

(Pop. incl. in Bing¬ ham Co.)

. Boundary . B 1

(Pop. incl. in Bonner Co.)

. Butte . E 6

(Pop. incl. in Blaine, Jefferson and Bing¬ ham. Cos.)

. Camas . D 6

(Pop. incl. in Blaine Co.)

25,323 Canyon . B6

. Caribou . G-7

(Pop. incl. in Ban¬ nock Co.)

7,197 Cassia . E 7

. Clark . F-5

(Pop. incl. in Fre¬ mont Co.)

. Clearwater . C 3

(Pop. incl. in Nez Perce Co.)

3,001 Custer . D5

4,785 Elmore . C 6

. Franklin . G7

(Pop. incl. in Oneida Co.)

..,606 Fremont . F5

... Gem . B 5

(Pop. incl. in Can¬ yon and Boise Cos.)

Gooding . D 7

(Pop. incl. in Lincoln Co.)

12,384 Idaho . C4

. Jefferson . F 6

(Pop. incl. in Fre¬ mont Co.)

. Jerome . D-7

(Pop. incl. in Lin¬ coln and Minidoka

Cos.)

22,747 Kootenai . B 2

18,818 Latah . B 3

4,786 Lemhi . D 4

. Lewis . B 3

(Pop. incl. in Nez Perce Co.)

12,676 Lincoln . D7

. Madison . G 6

(Pop. incl. in Fre¬ mont Co.)

. Minidoka . E 7

(Pop. incl. in Lin¬ coln Co.)

24,860 Nez Perce . B 3

15,170 Oneida . F 7

4,044 Owyhee . C 7

. Payette . B 6

(Pop. incl. in Can¬ yon Co.)

. Power . F 7

(Pop. incl. in Oneida Co.)

13,963 Shoshone . C 2

. Teton . G 6

(Pop. incl. in Madi¬ son Co.)

13,543 Twin Falls . D 7

. Valley . C 5

(Pop. incl. in Idaho and Boise Co.)

11,101 Washington . B 5

Pop.

Incorporated Cities, Towns, and Villages

392 Albion . E 7

953 American Falls. . .F 7 214 Ammon, Bingham. G 6

322 Arco . E 6

502 Ashton . G 5

281 Athol . B 2

200 Basalt . F 6

702 Bellevue . D 6

2,202 Blackfoot . F 6

539 Bloomington, Bear

Lake . G 7

33,846 Boise . B 6

1,071 Bonners Ferry . B 1

639 Buhl . D 7

3,543 Caldwell . B 6

349 Cambridge . B 5

130 Centerville . , .C 6

338 Challis . D 5

7,291 Coeur d'Alene . B2

555 Cottonwood . B 3

312 Council . B 5

436 Culdesac . B 3

1,351 Emmett . B 6

214 Filer . D 7

534 Franklin . G 7

742 Genesee . B 3

410 Georgetown . G 7

153 Gifford . B 3

800 Glenns Ferry . C 6

1,444 Gooding . D 7

1,534 Grangeville . C4

1,231 Hailey . . . D 6

932 Harrison . B 2

215 Hope . B 1

262 Idaho City . C6

4,827 Idaho Falls . G6

209 Ilo . B 3

353 Iona . G 6

970 Jerome . D 7

414 Juliaetta . B 3

324 Kamiah . B 3

1,273 Kellogg . B 2

543 Kendrick . B 3

111 Kippen . B 3

301 Kooskia . C 3

6,043 Lewiston . A3

346 Lewisville, Fremont

G 5

321 McCammon . F 7

638 Mackay . E 6

1,303 Malad City . F7

298 Marysville . G 5

294 Menan . G 6

619 Meridian . B 6

1,924 Montpelier . G6

3,670 Moscow . A3

1,411 Mountain Home … C 6

1,667 Mullan . C 2

4,205 Nampa . B 6

274 New Plymouth ...B 5

599 Nez Perce . B 3

911 Oakley . E 7

384 Oroflno . B 3

1,038 Paris . G7

432 Parker . G 6

338 Parma . B 6

1 ,948 Payette . B 5

123 Pearl . B 6

236 Peck . B 3

187 Placerville . B 6

12,293 Pocatello . F7

658 Post Falls . B 2

2,110 Preston . G 7

248 Priest River . B 1

725 Rathdrum . B2

1,893 Rexburg . G6

158 Richfield . D 6

555 Rigby . G 6

192 Roberts . F 6

297 Rupert . E 7

1,238 St. Anthony . G 6

869 St. Maries . B 2

1,434 Salmon . D4

366 Samaria . F 7

2,993 Sandpoint . B 1

537 Shelley . G 6

1,155 Shoshone . D 7

501 Soda Springs . G 7

266 Soldier . D 6

885 South Boise, iAda.B 6

907 Spirit Lake . B 2

300 Stites . C 3

391 Sugar . G 6

543 Troy . B 3

5,258 Twin Falls . D 7

279 Vanwyck . B 5

332 Vollmer . B 3

3,000 Wallace . B 2

1,369 Wardner . B 2

2,600 Weiser . B 5

482 Wendell . D 7

398 Weston . F 7

Klockmai

IDAHO

'Bonners/ Ferry | Moravia,

Statute Miles, 42 = 1 Inch.

,Coolin

J iola or 'Samuelsˆ

Colburn

j ' f Kuutena t\L

sanil Point L in- 1

, 1 Vaˆlley > ˆ'

Band McNally ’8 New 11 x 14 Map of Idaho, Copyright by Rand McNally & Co.

latchWoil

wport,

Ivalispell

*X CocolaUii nmonfl/^^*

!abiueD

,Mffrioa‘

LaktrlewX

Flathead

iLj Oud»l‘ rAA;*

latcoh

BlEdS e v

Ennda

*Santa^*

?4Fernwood

‘Frceae

Harvard

Neihart

.sou I a

i fit xT

WHITMAN (

Pu/. V/

*Garfield 1§4 rj’s“’omeroyj|C_*

“h l Lett istonv^up”’!*

; //Awebbll

ll> I Asotin • vii, V?

KeadrlCL

*,eJ8Slia*f*

Dent / — ‘

- ,vl£

ICavemlbh

Ahsahka /

_ , sVOjolino

jdland J

® White Sulphur Spiiaga

Pierce

Spalding

Rimini

GRANIT,

Deer I .odgo

Philinsburg

*»« ‘-A 'VtolS?,*JV*

. °tjnr^-b-— Art’ ‘

BROADWVATER

Hamilton

\A W inchest!

*ASOTIN ^\W*KJ*

o Glen wood

vveF erdinand p^t Steunvnberg |\

JBiowii$q Anacomli ! DEE

(JEFFERSON'

Harpster/ fyu\&aj,d

_ I C^Cle:kr^^^\V^N\i/, a n

^^Grangeville _■ //^v '

Mt.° R\lot fcno6j;.t§ o" \

Idaho p-> — J^rrTs\l_Eik city

' y Golden o'— —

i^V hite Bird \ oGrogrnnde

Buffalo Hump^.

Joseph,

"T fdppe> i /ower

Llvlnsrstou,

Adaimn

Concord iospel Mt. °'

j'uiisville j L^B.ighole Frass

~ • .,,Pyramid)Peak

obcepeater

Salmon'

Bu rgdorf °

>) i*< j V

n)f Cj*M' IronlSprinffs; ft /f^Xandpre | ^

° Cuprum / 1

*Carnven^*

Salmon

Vinegar HJII.

Dillon

Homestead,

• ^Lemhl Pass

.BakerVyAv

Rubicon,

Mead

Evergreci

*— * titiakejY*

Armstead

> Tendoyj

•pei/Qu^en

XOVtSXON

**7 '.Donnelly r(l:*Rosebefi^ *p|XAYlingr « I loCcntcr^.*

*® 1 l ui \ / ■ * V-'*

^ Heath! ° ; Goodrij Cambridge]

^LeadorehK0/

,Mineral

WASHING'Xl

Marble1

M|U1/

*\Mesa * I k /-*

\ \ • 1 \Ly

tenter.

•r\ Vwilburus

Brogan

Hig^my

vy

“S#ss,

French o

layett:

r > ‘ndtiand r

Payetti

Bayeitt

[c Pierson

l /bouthS9;K?’ IdlULs Store’»i^’

/-‘Pioneerville^

(Centerville.0

Jacksoij r Lafce J

M Butte

Barton

•uyiett

FeiiT —

| teto|n

p’ CmKw

^ Butte., _ ,

fe-T X)t35tU

JEFFERSON

,d 1

ft/ ^ldalio

(Rye Hat j*y iHolcnml)^/ 'Daggftt

Ete-Yv;

'Slar>A"

Atlanta1

(Buui'4.F|

K,,rt„n oR0 rTwin Featherville Springs O ? |

lM oor^

^Crouse,

llcCoaixT

utupa

Gimlet ^Halley j yv.Bellevui

Martin

rWc

/ LenoxV <

Mayfield

Pioneer^

Crooks

e on ,, <4^1

b SbellevTt.Fall81 ,V /

/Finh0ia4U «> 1 i-V

y, M 1

yJjyllu,*' |\V'M \

[agio %, Kayslcy

Cftina*

Irunzell

ilurphy5*^,

r Castlev^

J ^Bulte«;J [u mu r o (j u 1 (,

[Silt er.'C^Hs Dastle Creek ^ *S«nd View,

Rockford

ij/vlilackfoot

Tort Hall C

plateau]

! Blanohc- ' ; 6 ODIN

Oilfield

OfL

Sho^liomT

j • ■ . . r i ; ! –

'l,. > ~t} > rfield

Henry

•dbeD,

I'orateLlo

iS^Tnkom

illiamsl

uneai

.Ktrraama1]

t-‘Ameri.-au

Falls \ ■)

Neeley \

JD W ElR Rubin

,0 KuOktand \ / □

W, liawkvtfS ˆ V’P.nllne0 Li- Carl

\ -Ml _ olWeb-now

V i

.Sterrett >. LAlexander V

[iTTT jS.Kla Shriuesii

Broxtor

Plateau I

>. Minidokaˆ

Vs

Clearlaj

#S” TˆC.

Fb-Jaekson I V P Yale o m

sSJ-hCottei/l BbB

#7 ?\ /(iT

/ J Heglero Y°/Idahoine

> Sublet, I D.yrtt ■ Ketigll

V|?

ˆ(•I‘ Twill F«is»

Fil-vg

i /Vwli/N

jArinto

INounah«»n

iVoGeOiˆeto]

Toptcherˆ

Clevbianib

Swanlaxc

Bonningtoi

*iontpelior**

CWehill

// Hazel yˆvibloii \Kn Locust Maltaq A\ 0 Conanto i6\ Bom no Elba

m s , s j

jrt \ \ BrnlgJ

£0ˆXln,0olA?y

Hollister J

Amsterda

isantviewolo

Malad ClYy 3 feafnariaAˆ Cherry ortck’ W./nlfUlI,

[yt’jnl [t

Ob to ‘

rhitnej’/ˆ

Frankbi

the southern part from east to west and forms nearly half the west central boundary separat¬ ing Idaho from the States of Oregon and Wash¬ ington. . J he Boise, Payette, Salmon and Clear¬ water livers, all affluents of the Snake, drain the central part of the State. The Spokane, Pend d Oreille and Kootenai rivers make out¬ let for the waters of the beautiful lakes of Coeur d Alene, Pend d'Oreille, Kaniksu and Spirit Lake, all in the extreme northern part. A small portion of the southeastern part is drained through the Bear River into Salt Lake. This river also forms an outlet for Bear Lake, a beautiful body of water about half of which lies in the extreme southeastern part and ex¬ tends into Utah.

Climate. — – Idaho extends through seven de¬ grees of latitude. Its altitude ranges from about 700 feet to more than 12,000 feet. Its northern end lies within the path of the rain areas which pass eastward from the north Pacific Ocean while the southern portion lies well out of that path. As a result of these complex factors the climate is so diverse as to render description difficult and accurate graphic representation impracticable. The lower Snake, Salmon and Clearwater River valleys have a very pleasant and equable climate. The higher valleys have most agreeable summers with long winters and heavy snowfall. The tem¬ perature of Idaho is varied, ranging from 108 degrees above in summer to 45 degrees below- zero in winter. The mean temperature is 56 degrees. The normal annual precipitation is about 17 inches, ranging from 37 inches in Shoshone County in the northern part of the State, to six inches in the southern section.

Soils. — The rock from which the soil of central and southern Idaho was derived is known as the Columbia River lava, or basalt. There were successive flows of this lava, as is demonstrated by intervening sedimentary de¬ posits. Above the lava the soil is fine and of a dark color, while the subsoil, of equally fine texture, is always of dark yellow or brownish color without pebbles or sand grains. The soils on the older lavas are usually light colored and contain sand and fragments of rocks and minerals. In the region of the great inter¬ mountain plateau along the course of the Snake River the soils consist of the fine, silty loams, formed through the

weathering of the rolling basaltic country at higher levels, or they con¬ sist of ash-like and silty loams of ancient lake beds within which volcanic ash was deposited to great depths. Wherever water is available for the irrigation of these lands they have proven wonderfully fertile for the production of gen¬ eral and special crops. On the basaltic uplands heavy yields of grain and vegetables are ob¬ tained without – irrigation. The soil of the northern part of the State is sandy and of a clayey loam less fertile yet it produces good crops without irrigation.

Geology. — There are many unusual geolog¬ ical phenomena in Idaho. The <(City of Rocksˆ in Cassia County is as strange as, and but little less magnificent in scale than, the Garden of the Gods in Colorado. A thousand homes in Boise, the capital city, and the great Natatorium are heated by natural hot water from springs. Some of the cities obtain their summer water from springs at almost freezing temperature;

in winter they obtain their water from other springs at 78° F. Near Richfield in Lincoln County is an ice cave in the lava beds with an ice dome that thaws out in winter and freezes in summer. There are many farms upon which cellars have been dug and deep wells have been bored for domestic water from which come streams of very cold air that is used for refrigerator purposes. There are hot mineral springs on the upper Salmon and Hood rivers — many along the course of the Snake River, and in southern Bannock County there are soda and other mineral springs noted for their medicinal properties. The magnificent cataracts of the Snake River are not surpassed in grandeur in the United States. The Shoshone Falls are 46 feet higher than those of Niagara. In central Idaho there are a number of streams that are NosU— that, crystalline up to the last, sink away into the desert and disappear. In the very tops of some of the highest mountains are beautiful fresh water lakes fringed with tall pines and fir. Great lava planes extend along the Snake River Basin in width from 10 to 60 miles. These are of relatively recent overflow as evidenced by the numerous geysers and hot springs.. They are rich in various fossils.

Agriculture. — There are considerably over 6,000,000 acres of land in Idaho under cultiva¬ tion. There are numerous areas of irrigated and dry farm land on the alluvial bottoms and Upon the bench lands of the small and large valleys included within the Rocky Mountain portion of the State. In Idaho, agriculture may be considered under three separate divisions, namely: humid farming, dry farming and irri¬ gated farming. The humid section comprises the northern part of the State, where 67 per cent of the crop is wheat. Great areas of logged-off lands are now being put under cul¬ tivation and are specially adapted to the grow¬ ing of clover. The chief crop in the dry-farm¬ ing region, the southeastern part, is wheat raised by intensive cultivation. By far the greater proportion of the

agricultural land, however, is found in the great intermountain plateau, along the course of the Snake River where the largest irrigation systems in the country are maintained. These embrace 5,003,- 833 acres with canals aggregating 10,491 miles in length, and constructed at a cost of more than $90,000,000. These canals are assured an abundance of water by great dam and reservoir systems, among which are some of the largest and best in the world. The Jackson Lake reser¬ voir on the head waters of the south fork of Snake River is one of the largest in the United States. The Arrowrock dam, storing water for irrigating 240,000 acres of land, is the highest dam in the world. The average yield of wheat per acre here is 26.6 bushels; of oats, 40.6 bushels. Idaho produces more alfalfa than any other State in the Union of equal acreage, the yield for 1917 being approximately 1,500,000 tons. An average yield of nearly three tons per acre is obtained. Idaho has about 140,000 acres of orchard. Her apples have won some of the greatest horticultural honors known. Idaho prunes are the finest in the world.

.Stock Raising.— Idaho's stock growing has increased almost in keeping with its increased growth in agricultural development and popula¬ tion, chiefly due to available public range and

wise Federal supervision of the extensive forest reserves on which hundreds of thousands of beef cattle and sheep graze during the summer season. There is ample winter provender on the great alfalfa farms of the Snake River valleys. In 1917 Idaho had nearly 500,000 beef cattle and 3,250,000 sheep. The dairy industry is growing rapidly. In 1918 there were about 140,000 milch cows in the State.

Forests. — Although lying partly within the arid belt, Idaho is well forested. Approxi¬ mately 20,000,000 acres or 37 per cent of the total land area of the State is forested. Ample provision is made for the protection of the forested area by the fact that out of the total of 129,000,000,000 feet board measure, 71,000,- 000,000 feet or 55 per cent is included in the national forests, leaving 50,000,000,000 feet pri¬ vately owned and 8,000,000,000 otherwise held by the government or State. In area about 90 per cent or 18,000,000 acres of the forest is under national control. Much of the area con¬ tains immature stands which have not yet reached the producing stage but will repay protection. The large white pine forests of northern Idaho are among the most valuable in the United States. Lumber production is increasing rapidly, the cut being mainly soft woods, western pine, white pine, larch and. Douglas fir.

The following table gives the names of the national forests in Idaho, area, headquarters of supervisor and last proclamation date effective :

Sugar City, Lincoln, Blackfoot, Burley, Twin Falls and Rupert, produced 102,000,000 pounds of sugar in 1917. Another factory was built at Shelley in 1917. Others are now in course of construction. The chief manufactured products are lumber, beet sugar, concrete, packed meats and flour. Large fruit evaporating plants were erected and operated at Meridian and Payette in 191 7.ˆ

Mining. — Idaho is the largest lead-pro¬ ducing State in the Union. The total produc¬ tion of lead from Idaho's mines in 1917 aggre¬ gated 395,883,000 pounds. With an output of 12,496,017 ounces of silver in 1917, Idaho ranks a close second with the other principal produc¬ ing States of the Union. The zinc mines of Idaho produced 96,123,000 pounds of this metal in 1917. The consolidated Interstate-Callahan mine of the Cceur d'Alene district ranks third among the individual producers of the United States. Copper mining is of less importance, there being a total yield of a little over 7,000,000 pounds in 1917. Gold placer mining was the original source of mining activity in Idaho. The State is credited with a total yield to date, since the original discoveries at Pierce City, of $200,000,000 in placer gold, which was mostly derived from mountain basins in the central •granite _ batholith formations. The placer in¬ dustry is now at a low ebb which is due to the ractical ground exhaustion of the larger mines, daho produced, in 1917, 41,326 ounces of fine gold. Among the rare metals that are known to exist in Idaho are tungsten, molybdenite,

FOREST

Boise .

Cache1 .

Caribou1 .

Challis .

Clearwater. . . Coeur d'Alene

Idaho .

Kaniksu1 ….

Lemhi .

Minidoka1. . . Nezperce

Payette .

Pend Oreille . . Saint Joe

Salmon .

Sawtooth ….

Selway .

Targhee1 .

Weiser .

Total. . . .

Land area within national forest boundaries

National forest land

1,058,941

492,668

681,540

1,259,237

785,103

662,611

1,193,439

198,757

1,095,924

509,536

1,624,582

831,926

676,014

493,925

1,621,707

1,203,387

1,693,711

977,847

562,609

Other lands

17,623,464

59,173

16,633

30,090

10,753

122.743 127,623

15,841

260,220

4,638

21,584

41,497

31,748

198,724

481 . 743 21,653 16,743

108,289 47 , 893 98,291

1,715,879

Total

1,118,114 509,301 711,630 1,269,990 907 , 846 790,234 1,209,280 458,977 1,100,562 531,120 1,666,079 863,674 874,738 975,668

1,643,360 1,220,130 1,802,000 1,025,740 660,900

Date of latest proclamation

19,339,343

Dec. 24, Oct. 9, April 18, May 21, July 1, July 1, Mar. 23, May 6, May 19, Jan. 2 4, July 1, July 26, May 6, April 24, May 19, May 19, July 1, June 6, July 1,

1910 1917 1914 1914

1911

1911

1912

1910

1913 1916

1911

1916

1910

1917 1913 1913

1911 1917 1911

Forest

headquarters

Boise

Logan, Utah

Montpelier

Challis

Orofino

Cceur d'Alene

McCall

Newport, Wash.

Mackay

Burley

Grangeville

Emmett

Sandpoint

Saint Maries

Salmon

Hailey

Kooskia

Saint Anthony

Weiser

1 A portion of these forests lie within adjoining States.

Manufactures — Manufacturing has more than kept pace with the growth of the State in population. Idaho has some of the largest lumber mills of the world. The Potlatch with a daily capacity of 750,000 board feet of lumber in a 24-hour run is considered the largest and the Boise-Payefcte with a capacity of 500,000 feet a close second. The State has an abun¬ dance of water power available for use in manu¬ facturing. Idaho claims the establishment of the first commercial potato flour factory in the United States. It is located at Idaho Falls. Idaho's six beet sugar factories, located at

The areas given are only for that part within Idaho.

nickel, tin, antimony and quicksilver. Idaho possesses the richest resources of phosphate rock in the world, located in the southeastern part of the State. Its resources of the com¬ moner mineral substances in the form of fire¬ clays, Portland cement, etc., are practically in¬ exhaustible.

Transportation.— There are 2,430 miles of steam and about 150 miles of electric roads in the State. From Lewiston, boats run on the Snake and

Clearwater rivers, carry¬ ing freight from the inland through the Columbia River to the Pacific. Stages ply

IDAHO

657

daily to nearly all parts of the State not ac¬ cessible by railroads. On 1 Jan. 1917, Idaho had spent a total of $856,979 in general State funds on highways and bridges. The programs for expenditures for State highways alone

bonded debt amounted to $2,227,750 and a sink¬ ing fund of $400,000. The assessed value of real and personal property for 1917 amounted to

$444,857,675.

Education. — The Idaho system differs from

Statistics of Idaho Manufactures • — 1912.

KIND OF MANUFACTURE

Number of establish¬ ments

Capital

invested

1 1

Number of proprietors and firm members

Number of employees

Total number persons

engaged in industry

Total salaries and wages for year

Average number hours

worked per day

Average number days

worked per year

Total value of products,

1912

Male

Fe¬

male

Male

em¬

ployees

Female

em¬

ployees

Saw and planing mill

products 1 .

274

$18,123,808

360

6,553

49

6,962

$4,391,000

$20,525

10

238

$11,346,000

Flour and grist mill

products .

57

2,244,848

58

292

350

306 016

o

295

9 OOd. ftd_ft

Sugar manufactures. . .

5

5,300,000

2

653

655

179,575

24

100

2 1 X? S00

Butter and cheese 2. . . .

36

756,000

81

180

36

297

132,558

16,146

9.5

299

1 ,768,129

Printing and publishing

143

1,382,810

271

475

80

826

489,428

45,077

9

312

1,730’689

Cars and repairs by rail-

roads .

5

468,328

960

960

696 , 409

8

307

1,366,408

Bakery and confection-

ery products 2 .

84

348,816

111

166

102

379

150,356

50,667

10.5

333

774,507

Slaughtering and meat

packing 3 .

5

428,999

8

60

2

70

53,208

1,600

10

307

664,625

Brick and tile .

36

800,137

40

429

469

139,425

8

100

487 985

Liquors, malt 4 .

9

1,006,911

9

83

92

83,000

8

307

417,150

Foundries and machine

shops .

14

276,753

15

87

102

83,941

10

307

228 469

Fruit canning 2 .

6

63 , 600

6

73

153

232

15,768

25,707

12

96

193,000

Tobacco manufactures.

24

74,753

25

73

29

127

93,951

12,856

8

286

187,803

Ice, manufactured ….

9

424,341

18

30

48

25 , 200

10

280

145,863

Total .

707

$31,700,104

1,004

10,114

451

11,569

$6,839,835

$172,578

$24,487,976

1 Does not include detached planing mills doing custom work.

1 Includes commercial plants only.

3 Plants operating under government supervision.

4 Since compilation of above statistics, manufacture of liquor has been prohibited.

during the years 1917 and 1918 amounted to $2,345,000. State highways connect all principal parts of Snake River Valley in the south and the chief centres of population and industry of the north. A north and south highway is now being constructed to connect the northern and southern parts of the State which have hitherto been separated by great mountain chains and river valleys almost impassable.

Banking and Finance. — On 20 Nov. 1917 there were 137 State banks with total deposits of $44,663,884. The reserve of all State banks reporting for call on that date shows an average of 30 per cent. Individual deposits held sub¬ ject to check in these banks was $30,728,763.97 Individual saving deposits was $2,965,802.95, averaging about $7 per capita.

For the two years ending 31 Dec. 1919 the receipts and disbursements were

as fol¬ lows :

Cash in hand, 1 Jan. 1919 . $705,493

Receipts, 1919 . 17,000,478

Total . $17,705,971

Disbursements 1919 . 15,099,664

Balance in treasury, 31 Dec. 1919 . $2,606,307

The revenues are derived from general tax levies, receipts from the department of the secretary of state, interests on funds and re¬ ceipts from other departments. Disbursements are, of course, made to defray the expenses of State government and to maintain the various State institutions. On 30 Sept. 1916 the State

all others in its complete unity of the school affairs of the State, from the primary grades to the university, which are under the super¬ vision of one single State Board of Education. This board consists of five members appointed by the governor, and one ex-officio member, the State superintendent of public instruction. Three members act as a governing board for the six State educational institutions, including the university, the two State normal schools, the Idaho Technical Institute, the Industrial Train¬ ing School and the State School for the Deaf and Blind. This same board exercises general supervision over the public elementary and high schools. The State Board of Education has the duty of assisting the legislature in every possible way in framing and enacting the educa¬ tional laws, and it is the duty of the board, prior to each meeting of the State legislature, and in ample time for due consideration by said legislature, to prepare a financial budget setting forth the financial needs of all State educational institutions under its supervision and control.

Idaho spends annually on her public schools approximately $4,500,000. It has 147 public high schools and 11 private academies, 1,594 public school buildings and 3,636 teachers. There are two State normal schools — one lo¬ cated at Albion and one at Lewiston. An excel¬ lent State university is located at Moscow, embracing the following colleges : letters and science, agriculture, engineering, law, school of

forestry, school of mines, extension division and experiment station. The Technical Insti¬ tute is located at Pocatello and an industrial training school at Saint Anthony. The School for the Deaf and Blind is located at Gooding.

Charities and Corrections. — The State Penitentiary located at Boise, the State Insane Asylums located at Blackfoot and Orofino, an Institute for the Feeble-Minded at Nampa and the State Industrial School at Saint Anthony all own agricultural lands and cattle in connec¬ tion, cultivated and cared for chiefly by the inmates of these institutions, making them almost, if not quite, self-supporting. The Orphans' Home at Boise and the School for the Deaf and Blind at Gooding is supported by State appropriations.

Militia. — The State of Idaho has no armories. The strength of the National Guard of- Idaho in the Federal service, 1 Jan. 1917, was 56 officers and 1,073 men. This has been increased since the declaration of war with Germany.

Religion. — In religion Idaho is predomi¬ nantly Latter-Day Saint, or Mormon, with Catholics, Methodist, Baptist, Presbyterian, Christian, etc., following in the order named.

Indians. — A total Indian population of 3,791, consisting of remnants of what were once five great tribes, reside now within three reser¬ vations in Idaho. Their number is fast decreas¬ ing and ere long the red man of Idaho, who not more than 40 years ago was held in con¬ tinual fear by the white pioneer, will be known only in story. Yet the memory of the race will be everlasting, because of the many beauti¬ ful words that the white settler has adopted from the Indian language, and has given to the mountains and the valleys, the lakes and the streams, the counties, cities and towns. Vital statistics of the Indians of Idaho show a death rate that greatly exceeds the rate of birth. The Cceur d'Alene Reservation, comprising 104,077 acres, is located in Kootenai County. It is inhabited by 623 Cceur d'Alene and Spokane Indians. The office of the superin¬ tendent of the reservation is located at Tekoa, Wash. The Fort Hall Reservation in Bing¬ ham and Bannock counties, with headquarters at Fort Hall, Idaho, includes 454,239 acres of land. It is set apart for the Bannock and Shoshone Indians and for the Lemhi tribe, which was moved from the reservation in Lemhi County. There are 1,779 Indians on the Fort Hall Reservation. The Nez Perces at Fort Lapwai, near Lewiston, are considered the most highly civilized Indians in Idaho. The tribe numbers 1,389, all of whom have dis¬ carded their native attire and have adopted modern customs. There are 212,390 acres in the Fort Lapwai Reservation. Agriculture is the principal occupation followed by the In¬ dians of Idaho. Sufficient land is set apart for them to ensure each Indian a liberal income should he choose to

cultivate the soil. How¬ ever, much of the land is rented to white farmers, the Indians generally only cultivating small tracts. This work is done largely by the women. Houses have been built for the In¬ dians, but in most instances they prefer their tepees. In northern Idaho the native dwellings may be seen erected near the houses, while on the Fort Hall Reservation fully 300 Indians

live in tepees. Of the Nez Perces, 235 live in permanent houses with floors and 240 live in houses without floors. Many Indians of the State have discarded the costume of the savage. However, on the Fort Hall Reservation there are 1,233 Indians who wear native attire. Ex¬ tensive agricultural development has taken place on the Fort Hall Reservation during the past 10 years. Approximately 47,800 acres of land on this reservation are under irrigation. Schools are maintained in each of the reserva¬ tions by the Federal government and by churches. Missions are also located among the Indians. The majority are favorable to educa¬ tion. There is an average enrolment of 415 pupils at the three reservation schools. Idaho and Nevada share the Duck Valley Reserva¬ tion, which is inhabited by the Piute and West¬ ern Shoshone Indians. The Idaho portion of this reservation is in Owyhee County. The In¬ dian affairs are under the direction of the De¬ partment of the Interior.

Population.— Population (1870) 13,999;

(1880) 32,610; (1890) 84,385 ; (1900) 161,772;

(1910) 325,594. In 1920 the population, accord¬ ing to the United States census, was 431,866. The chief cities are Boise with population of 21,393; Pocatello, 15,001; Twin Falls, 8,324; Idaho Falls, 8,064; Lewiston, 6,574; and Cceur d'Alene, 6,447. There are 42 counties in the State..

History. — Lewis and Clark were the first white men to visit the territory in 1805-06. The first permanent settlement was made at Fort Hall. The first agriculturalists and home¬ builders were Mormons who settled at Frank¬ lin. Idaho originally formed a part of the Oregon country and was claimed by the United States, Great Britain, Spain and Russia. At the time of the Florida Purchase, in 1819, Spain transferred her rights to the United States. Russia did likewise in 1824. In 1818 a treaty had been concluded between the United States and England under which they were to jointly occupy this region. In 1846 this joint occupa¬ tion .was terminated by the establishment of the international boundary at approximately 49° N. which now marks the northern boundary of Idaho. On 3 March 1863 Idaho Territory was organized from parts of the territories of Washington, Dakota and Nebraska. It then in¬ cluded the area now comprising Idaho, Mon¬ tana and a part of Wyoming. The organiza¬ tion of Montana and

Wyoming as Territories in 1864 and 1868, respectively, left Idaho with its present boundaries. In 1889 a State consti¬ tution was adopted, and on 3 July 1890 Idaho was admitted into the Union.

Suffrage, Elections, etc.— Idaho extended to women the right of suffrage, 27 Nov. 1896, being one of the first States in the Union to grant this privilege. Every male or female citizen of the United States 21 years old who has actually resided in the State for six months and in the county where he or she offers to vote 30 days next preceding the day of elec¬ tion,. if registered as provided by law, is a qualified elector, except those guilty of crime, under guardianship, idiotic or insane. At least 40 days before each general election and when¬ ever he orders a special election the governor issues an election proclamation. All general elections are held in the several precincts in

the State on the Tuesday succeeding the first Monday in November every even year. Special elections, when effecting counties only, may be called for public good by the county commis¬ sioners, or may be called for a county, district or the State by the governor on 10 days' notice. All elections must be by absolutely secret bal¬ lot. By legislative enactment approved 3 March 1915 the State of Idaho was, on 1 Jan. 1916, constituted a prohibition district and the manu¬ facture, disposal and transportation of intoxi¬ cating liquors for beverage purposes prohibited in the State of Idaho. All candidates of polit¬ ical parties for Congress and for all elective State, district and county offices, at regular elec¬ tions are nominated at a primary election con¬ ducted substantially the same as a general elec¬ tion. At least 30 days prior to the primary each candidate for office, or some qualified voter in his behalf, files his nomination paper in the proper office. Such paper must set forth that the candidate for office is legally qualified to fill said office and represents the principles of the party for which he was filed. A primary ballot is prepared for each political party on which is arranged in proper order the names of the candidates regularly nominated for office. When an elector offers to vote he calls for the ballot of the political party of which he is a member. He may vote for a first and second choice. The person receiving the highest num¬ ber and not less than 40 per cent of the first choice votes, or if no person receives 40 per cent of the first choice votes then the person receiving the highest number of first and second choice votes becomes the nominee for such office of the party nominating him.

Municipal Corporations. — The legislature provides by general laws for the

incorporation, organization and classification of cities and towns in proportion to population, which laws may be altered, amended or repealed by the general laws. Any county or incorporated city or town may make and enforce, within its limits, all such local police, sanitary and other regulations as are not in conflict with the char¬ ter or with the general law. A municipal cor¬ poration can in no way become a stockholder or raise money for, or make donations to, or loan its credit to any company, corporation or association, except for school, water, sanitary and illuminating purposes.

Government. — The powers of the govern¬ ment of the State are divided into three dis¬ tinct departments, the legislative, executive and judicial. The legislative power is vested in a senate and house of representatives. The senate at present consists of 37 members and the house of 65 members. These are elected for the term of two years. Each county is entitled to one senator; the representatives are apportioned by the counties according to population, each county being allowed at least one representative. The sessions of the legislature are held biennially, commenc¬ ing on the first Monday after the first day of January and are limited to 60 days except at the members' expense. The governor may convene the legislature by proclamation, but no extra session shall continue for longer than 20 days. The executive department consists of a governor, lieutenant-governor, secretary of state, State auditor, State treasurer, attorney-

general and superintendent of public instruction, each of whom shall hold office for two years beginning the first Monday in January next after his election. The supreme executive power of the State is vested in the governor. He is commander-in-chief of the military forces of the State, except when called into actual service of the United States. He has power to nominate, and by and with the consent of the Senate appoint, all officers whose offices are established by the constitution and to appoint other officers whose election or appointment is not otherwise provided for, to fill vacancies that may be caused by death, resignation or otherwise in office created by constitution or statute.

The governor, secretary of state and at¬ torney-general, constitute the Board of Par¬ dons, a Board of State Prison Commissioners and a State Board of Examiners. The super¬ intendent of public instruction, the secretary of state and attorney-general constitute the State Board of Public Instruction of which the superintendent is president. The governor, secretary of state, attorney-general, State auditor and superintendent of public instruc¬ tion constitutes a State Board of Land Commis¬ sioners. The judicial power of the State is vested in a court for the trial of impeachments, a Supreme Court, District Court, Probate Court, court of the justice of the peace and such other courts inferior to the Supreme Court as

may be established by law for any important city or town. The court for the trial of impeachments is the senate, the judgment of which does not extend beyond removal from and disqualification to hold office in the State. The power of impeachment rests solely with the house of representatives. When the gov¬ ernor is impeached the chief justice shall pre¬ side.

The Supreme Court consists of three jus¬ tices, and are elected by the electors of the State at large for a term of six years. At least five terms of the Supreme Court are held annually. It has jurisdiction to review, upon appeal, decisions of District Courts or judges thereof. It has original jurisdiction to issue writs of mandamus, certiorari, prohibition and habeas corpus and all writs necessary to com¬ plete its appellate jurisdiction. It also has original jurisdiction over claims against the State, but its decisions are merely recommend¬ atory, and reported to the legislature. The State is divided into 10 judicial districts for each of which a judge is elected by the electors thereof for a term of four years. A District Court is held in each country at least twice a year and has original jurisdiction in all cases both at law and in equity, also certain other appellate jurisdiction. The Probate Courts are courts of record and have original jurisdiction in all matters of probate, and to hear and deter¬ mine all civil cases where in the debt or dam¬ age claimed does not exceed the sum of $500 exclusive of interest, and concurrent jurisdic¬ tion with justices of the peace in criminal cases. Justices of peace have such jurisdiction as may be conferred by law, but not of any case wherein the value of property of the amount in controversy exceeds the sum of $300, nor where the boundaries or title of real prop¬ erty are called in question.

The governors of Idaho have been:

TERRITORIAL

William H. Wallace . 1863-64

Caleb Lyon . 1864-66

David W. Ballard . 1866-70

Samuel Bard (resigned without acting) ap¬ pointed . 30 Mar. 1870

Gilman Marston (resigned without acting) ap¬ pointed . 7 June 1870

Alexander H. Conner (resigned without acting)

appointed . 12 Jan. 1871

Thomas M. Bowen (resigned without acting)

appointed . 19 April 1871

Thomas W. Bennett . 1871-75

D. P. Thompson . 1875-76

Mason Brayman . 1876-78

John P. Hoyt . 1878-80

John B. Neil . 1880-83

John N. Irwin . 1883-84

William B. Bunn . 1884-85

Edward A. Stevenson (first resident) . 1885-89

George L. Shoup (second resident) . 1889-90

STATE

. Republican

George L. Shoup .

Norman B. Wiley. . . . William J. McConnell Frank Steunenberger .

Frank W. Hunt .

John I. Morrison. . . . Frank R. Gooding . . .

James H. Brady .

James H. Hawley. . . .

John M. Haines .

Moses Alexander .

W. L. Harding .

D. W. Davis .

Democrat-Populist.. .

II

Republican .

M

u

Democrat .

Republican .

Democrat .

Republican .

1890- 91

1891- 92 1893-97 1897-01 1901-03 1903-05 1905-09 1909-11 1911-13 1913-15 1915-19 1919-21

1921-

Bibliography. — Bancroft, (Washington,

Idaho and Montana 5 (San Francisco 1890) ; McConnell, (Early History of Idaho) (Mos¬ cow, Idaho, 1913) ; Onderdonk, (Idaho, Facts and Statistics Concerning Its Mining, Farming and Industries5 (San Francisco 1885) : Gold- thwait, Reuben (ed.), (Early Western Travels, 1748-1846) (1906) ; French, Hiram T., (History of Idaho5 (3 vols., New York 1914) ; Rose, (Civil Government of Idaho) (Boise 1912) ; Talkington, (Political History, State Constitu¬ tion and School Laws of Idaho5 (Lewiston 1911) ;

B. Harvey Allred,

Speaker of the Idaho House of Representatives,

1918.

IDAHO, University of, the State univer¬ sity situated at Moscow, established in 1889 and work was begun in 1892; it is open to both men and women, and there is no tuition except moderate fees in law and music. The government is by the State Board of Educa¬ tion ; the curricula offered include the classical course, general science, forestry, home eco¬ nomics, education, civil, mining, electrical, me¬ chanical, engineering, agriculture and law. The Agricultural Extension Division, with head¬ quarters in the State House, Boise, has a staff of 17 workers besides the county agriculturists, and carries on its work by lectures, movable schools, demonstration trains, demonstration farms, etc. The annual income, derived mostly from Federal and State appropriations, is about $255,000; in 1916 the number of students was 865; the number of professors and instructors 85 (not counting the extension staff).

IDAHO FALLS, Idaho, city and county- seat of Bonneville County. It is

situated on the Snake River, 30 miles northeast of Blackfoot, and is served by the Oregon Short Line. The rhief industry is the manufacture of sugar.

Agriculture is also extensively carried on. The municipality owns its own waterworks and elec¬ tric-lighting plant. Pop. (1920) 8,064.

IDAHO SPRINGS, Colo., town in Clear Creek County, on the Colorado & S. Railroad, about 35 miles west of Denver. It is situated in the plateau region of the Rocky Mountains at an elevation of about 7,600 feet in the pic¬ turesque Clear Creek Canon. The hot and cold soda springs make it a famous resort for health seekers. Since 1859 when gold was dis¬ covered at Jackson's Bar, now. a part of the town of Idaho Springs, this district has been most productive in its yield of gold and has notable mining tunnels, of which the Newhouse tunnel is the longest in the world. The chief industrial establishments are concentrating mills, lumber-wards and machine-shops. Pop.

(1920) 1,192.

IDDESLEIGH, idz'li, Earl of. See North-

cote, Stafford Henry.

IDDING.S, Joseph Paxson, American geol¬ ogist : b. Baltimore, Md., 1857. He was edu¬ cated at the Yale Sheffield Scientific School, where he also took graduate work and in¬ structed in mechanical drawing and surveying (1878). Later he went to Columbia University, specializing in geology and microscopic petrog¬ raphy, and continued further study in these fields at Heidelberg. On his return to the United States he was employed by the United States Geological Survey from 1880-92, and again in 1895. Interim he was assistant pro¬ fessor of petrology at the University of Chi¬ cago (1892-95), and full professor (1895). In 1914 he was honorary Silliman lecturer at Yale, and was made honorary associate in petrology at the United States Natural Museum (1917). Dr. Iddings is a member of various American and European scientific societies, and in addi¬ tion to numerous reports and contributions to scientific magazines was joint author of (Ge¬ ology of the, Yellowstone National Park) (1899); Quantitative Classification of Igneous Rocks) (1903). He translated and published in abridged form H. Rosenbusch's Micro¬ scopical Physiography of the Rock-Making Minerals5 (1898); and has written also 'Rock Minerals5 (1906); 'Igneous Rocks5 (1909, Vol. II, 1913) ; and (The Problem of Volcanism5

(1914).

IDE, Fannie Ogden ((

IDE, Henry Clay, American jurist and diplomat: b. Barnet, Vt., 18 Sept. 1844; d. St. Johnsburg, Vt., 13 June 1921. He was graduated at Dartmouth in 1866, and was a member of the Vermont State senate 1882-85. In 1891 he was appointed United Commissioner in Samoa, and later (1893-97) was chief justice of Samoa under the joint appointment of the United States, Germany and England. He be¬ came in 1900 a member of the Taft commission; secretary of finance and justice of the Philip-

pines, September 1901 ; vice-governor 1 Feb. 1904; and in 1906 governor-general. He was Ambassador to Spain from 29 March 1909 to 23 August 1913. Besides numerous contribu¬ tions to the North American Review and other periodicals he was the author of

IDE, id, a fish (Leucis cus idus), of the roach family. It frequents the northern lakes of Europe, spawning in April and May in the river outlets. The ide is relished as food. In Germany a species of ide is marketed as an ornamental specimen for aquariums, because of its golden sheen.

IDEA, philosophical and psychological term denoting that which is imaged or con¬ ceived in the mind. The word idea has how¬ ever borne very distinct meanings in the his¬ tory of philosophy and psychology. Probably to no other term of the kind have there been attached so many different shades of meaning as to the word idea. Yet what the word signi¬ fies is of much importance. Till the end of the 17th century, idea had the signification given to it by Plato. The word originally meaning appearance, image, shape, and employed even in philosophy before Plato received and retained from his time a specific sense. With Plato it denotes in the world of things the counterpart of the concept, an immutable essence or being, accessible only to thought. Plato's doctrine of ideas gave stability and objectivity to philo¬ sophical concepts. A bold logical fantasy in Platonism transfers concepts to the external world, hypostatising them into independent es¬ sences standing over against us. The world of thought which thus originates becomes for Plato the core of all

reality, the supporter of the world of sense.

Thus it was Plato who won for the term idea the prominent position it holds in the his¬ tory of philosophy.

Originally Greek, the term appears to have passed without change into the Latin tongue. In Greek, as we have said, it seems to have meant appearance, shape or form, whence. by an easy transition it acquired the connotation of nature or kind. It is equivalent to eiSoc of which it is merely the feminine, but Plato's particularity for this form of the term and its subsequent adoption by the Stoics secured its ultimate triumph over the masculine form. Plato's view comes to this: To the universal notions or concepts which constitute science or general knowledge as it is in our mind, there correspond ideas in the objective world. These ideas are not something indwelling in the indi¬ vidual things, as for instance form in matter, or the essence which determines the nature of the object. Each universal platonic idea has its own separate and independent existence apart from the individual object related to it. It also seems to proceed from or to dwell in some celestial world. There is indeed community be¬ tween the ideas and objects of sense experience. This community consists in participation. The ideas are prototypes, the sensible objects, copies; imperfect imitations of their archetypes.

In the 'tenth Book of his Laws, Plato dis¬ cusses 10 kinds of motion, reducing them to

two kinds. Inasmuch as he regarded the truth or essence of ideas to consist in self-activity as we see it manifested in life and mind, it will be well to recall these two modes of motion. The one Plato called ((movement through an¬ other® ; he called the other movement through self. For him the latter is the origin of the existence of all being and all change. And it is precisely here that we find Aristotle in agree¬ ment with Plato. The former arrives at the same thought and calls it ovcia but

retains idea, Greek A6og for <(species,® using ((entel- echy,® to convey the notion of the <(self-active cause of life.® For Plato the ideas were inde¬ pendent sovereign forms. In post-classical Hellenism, we find Philo of Alexandria using idea to denote the thoughts of the Divine Spirit. Accordingly we here not only have a unity as a source of all multiplicity, but the whole of reality is supported and spiritualized by a uni¬ versal Soul. Likewise, mighty movements were introduced by the fact that the powers mediating between the Deity and mankind were combined into the unity of the Logos or World- Reason, the first-born Son of God. Even with Origen the essence of reality consists of an in¬ visible world of ideas. Thenceforth the doc¬ trine becomes a constituent element in Christian speculation ; and material being originates sub¬ sequent to this invisible world, and continually requires its constituting and animating power.

From Descartes onward usage has become confused and inconstant. John Locke in par¬ ticular ruined the term for English philosophy, where it has ceased to have any recognized definite meaning. He tells us : ^Whatsoever the mind perceives in itself, or as the immediate object of perception, thought, or understand¬ ing, that I call idea.® He says further that he has used 'the term to express whatever it is which is meant by phantasm, notion, species or whatever it is which the mind can be employed about when thinking. In fact, with Locke, idea appears to denote indifferently a sensation, a perception, an image of the imagination, a con¬ cept of the intellect, or emotional feeling, and sometimes the external material object which is perceived or imagined. Yet in spite of Locke the word was used in the Platonic sense in literature as well as in philosophy till the 17th century. Examples in literature are to be found in Spencer, Shakespeare, Hooker and Milton. Thus in (Paradise Lost* :

" God saw his works were good,

Answering his fair idea."

The fortune of the word idea is curious enough. Employed by Plato as described above it stands in lofty contrast to the unreal images of Plato's sensible world. But it was lowered by Descartes who extended it to Ihe objects of our consciousness in general. And when, after Gassendi, the school of Condillac had analyzed our highest mental faculties into our lowest, idea was still more degraded from its Platonic .position. ((Like a fallen angel, it was relegated from the sphere of Divine intelligence to the atmosphere of human sense. . . .® (Hamil¬

ton).

Locke followed Descartes who, instead of employing the words image, species, phantasm in speaking of the mental representations of sense-perceptible objects, used the word idea. Hume tells us that all the perceptions of the

human mind resolve themselves into ideas and impressions. With him the idea is a purely mental structure or content which is a less vivid copy of an original sensation, emotion or volition. With Kant an idea becomes a trans¬ cendental conception of the pure reason, such as the idea of God. With Hegel the highest thought of the logic is named by him Idee, suggesting Plato's highest principle. Idee thus suggests the final category of the Hegelian dialectic — the realized ideal, energy in its su¬ preme manifestation; it is the Absolute Idea, or the Absolute. At the present time many psychologists use the word idea only for a com¬ plex that does not arise from direct outward impressions. They thus use it for the so-called memory-images. For ideas formed from out¬ ward sense-impressions they generally use the word perception. Wundt does not regard this distinction as of any importance, since, as he says, there is really no valid difference between memory ideas and the so-called sense percep¬ tions. Yet, according to Professor Stout, the existence of ideas

is subsequent to that of per¬ cepts, and even implies some complexity of per¬ ceptual cognition. Perhaps, however, all agree that ideas are symbols, symbols having a mean¬ ing. The whole realm of mental representa¬ tions may be viewed with regard to either their symbolism or their significance. Considering their symbolism ideas of things as well as ideas of relations are not unreasonably regarded as products of the mind. But considering their meaning, ideas represent realities. In other words, their contents or that which they signify is real. There are indeed some ideas that are not even representations. Such are solely of an auxiliary nature, comparable to tools of the mind. Such are hypotheses. This brings us to the concept of content. Content, obiter dicta, is absolutely incomprehensible from a merely mechanical view of the world. For who could explain the meaning of a word mechanically? Content involves a principle of order — that of objective reality, meaning and dependency. We perceive this for example in the relationship of the characteristic marks of a logical concept to one another. Only grossest misunderstanding can confound the inner structure of such a con¬ cept with the juxtaposition within a mere sense- presentation. The fundamental form of con¬ nection in the case of such a concept is one of system. Eadi element stands within a whole, under the influence of a whole, and remains subject to its compelling power, while the vari¬ ous elements mutually determine one another.

Nowadays it is not seldom that one comes across the word idea combined in phrasal con¬ nection with other words. A consideration of the more important of these cannot be out of place. Some psychologists speak of a dominant idea. They mean by this an imperative or in¬ sistent idea, such as besets the mind, and this in spite of all effort to inhibit it and in spite of one's assurance of its unreasonable char¬ acter. We may remark here that every idea considered, not as a mere feeling, but as a brain- movement fit to serve as an irritation to action will, if not inhibited, pass into an action, whether

it be connected with consciousness or not. Thus a persistent or obsessing idea may become dangerous to the one holding it. It is usually a train of thought which a subject can¬

not banish or escape, though he recognizes its falsity or triviality. Such imperative or dom¬ inant ideas exist in all degrees of intensity, from the (

By a free idea experimental psychologists understand an idea or representation which is dissociated from sense-perception or presenta¬ tion and from the organic impulses connected with sense-perception. A free idea is thus one which may take its place in an associative train, and may be used in the process of discrimina¬ tion.

By an implicit idea, Hoffding understands the idea or group of ideational elements that fuses with the presentation in the act of per¬ ception. It is thus the ideational associate that raises a datum of sensation to the rank of a per¬ ception. An extrinsic idea is a temporal or spatial idea. Spatial and temporal ideas are immediately distinguished from intensive ideas by the fact that their parts are united in a definitely fixed order. Ideas with such a fixed arrangement are called in general extensive ideas.

Thus no word in philosophy or psychology has been responsible for more confusion than the word idea. Yet what the word signifies is of utmost importance. Its sense in the minds of some philosophers is the key .to their entire system. . Nowadays it sometimes means merely an opinion; sometimes mental images; and we even find it employed merely as an element in a periphrasis (as in «to have an idea on®). It is thus one of the most important words in the history of thinking and at the same time one of the least understood- See Innate Ideas.

IDEA OF A UNIVERSITY, The. Car¬ dinal Newman's (Idea of a University) is a collective volume composed (1) of a course of nine lectures delivered (1852) to the Roman Catholics of Dublin, (2) of 10 occasional lec¬

*tures and essays addressed (1854—58) primarily to the members of the Catholic Universitv of Ireland while Newman was its rector. The tormei part is a consistent whole, dealing con¬ secutively with fundamental considerations of university teaching: with theology as a branch of knowledge, with the relations of theology to other knowledge, with knowledge consid¬ ered as its own end and in relation to learning, to professional skill, and to religion, and finally with the claims of knowledge upon the Church. The second part deals with the relations of Christianity to letters and to science, with the study of literature, with elementary studies, and with a few more special topics. * Of these 19 discourses the best known are (Elementary Studies/* which is largely in vivacious dialogue, and 'Literature,5 which is so persuasive and suggestive that it has been widely quoted both as counsel and as a model of style. The other discourses have more general interest than is immediately suggested by their titles. To dis¬ miss them as special in subject and audience is to ignore both the unfailing force and beauty of Newman's expression and the largeness of his philosophical conceptions. Educated him¬ self at Oxford, he was never provincial! v Eng-*

lish ; and during his maturity his associations in the Roman Church with men of Continental training widened his acquaintance with the practical problems of higher education. But his great claim upon the general public, a claim hardly second to his literary distinction, is that he deals, not with the technic of peda¬ gogy, but with university education as the de¬ velopment of the whole man. His conception of this total development as essentially moral, pervading his exposition, makes it both large and persuasive. Though the university as ((a place of teaching universal knowledge® has for its immediate object the intellectual rather than the moral, yet <(practically speaking, it cannot fulfil

its object duly . . . without the Church's assistance . . . the Church is neces¬ sary for its integrity.® Animated by this idea of the integration of university studies in the development of Christian manhood, his discus¬ sions embrace not only such practical matters as the relations of teaching to research, but the larger aspects of liberal education.

Charles Sears Baldwin.

IDEALISM. This word is not easy to define briefly, as it is used in many connections where the common element in the various sig¬ nifications it takes on are not at first sight apparent. We may say at once, however, that idealism is a fundamental attitude or point of view from which men interpret the world, or some special phase of human experience. Its essential characteristic is found in the fact that it interprets the reality with which it deals as having a meaning, an idea, apart from its sensible appearance, and assumes that in this inner significance its truth and ultimate essence consists. Not the outward show of things, not the fact of coexistence and sequence among sensible phenomena, but the meaning or <(idea® is for idealism the point of primary importance in understanding either the world as a whole, or any of its various parts. Now, as Plato perceived, this inner idea of anything is ulti¬ mately identical with its "good® i.e., what it is good for, its purpose or function in a rational system of things. Accordingly, the essence of idealism is found in its teleological mode of explanation. This point of view, when logically carried out, implies further that what is real is rational or intelligible, since its idea can be grasped. That means, in other words, that mind or intelligence is the ultimate principle in which things find their explanation. More¬ over, it of course follows that the material world with its mechanical laws is in some sense secondary and derivative. Idealism is thus di¬ rectly opposed to materialism (q.v.) and mechanicism, which takes matter or energy or some unintelligent form of existence as< the prius from which everything else

is derived. Realism, as a philosophical theory, affirming the existence of a reality apart from subjective experience, is not properly contrasted with idealism ; though, as we shall see later, these terms are used to denote opposing tendencies in literature and art. It is, however, a mistake to suppose that idealism denies objective reality and reduces the world to sensations and ideas in the mind of the individual. On the contrary, the more adequately the principle of idealism is grasped, the more completely is justice done to the objective side of experience.

Science, including philosophy, religion, art and literature, are all different ways of inter¬ preting life and existence, involving, indeed, varying attitudes of the self toward reality, and varying degrees of explicitness. Religion, art and literature differ from science and philoso¬ phy in not being reasoned interpretations of reality, but primarily expressions of the emo¬ tional or feeling aspects of experience. Yet the various sides of experience are not independent and isolated, but act and react on one another as parts of a functional unity. Consequently, the interpretations of religion, art_ and litera¬ ture presuppose more or less explicit theories about the nature of things. These, however, exist in the form of unexamined assumptions and uncritical standards of value. With regard to these interpretations, we can at once say that all forms of religion which rise above mere fetichism necessarily presuppose an idealistic view of the world. This is obviously true of a religion like Christianity. But even if a re¬ ligion denies individual immortality and the doctrine of a personal God, it cannot exist without assuming that the universe is to some extent governed by the ideas and purposes of a superhuman power (or plurality of powers), and that it is not therefore a mere play of mechanical phenomena. Art and literature, too, are naturally — at least in their highest forms — affiliated with idealism. For the emotional and aesthetic satisfaction at which they aim can be fully attained only on the assumption that the

ultimate nature of things is in har¬ mony with the demands of the human spirit, and that therefore these ideals are not vain illusions. There are, however, two causes which at certain periods bring about a reac¬ tion against idealism in these fields and give rise to what is known as realistic art and realistic literature. In the first place, the con¬ ceptions of science and philosophy are at cer¬ tain periods so prevailingly mechanical and naturalistic as to fetter the wings of imagina¬ tion and render impossible any idealistic inter¬ pretation on the part of art and literature. If the world is demonstrably unmeaning and me¬ chanical, there is no permanent artistic satis¬ faction in a false idealism. The imagination cannot be divorced from reason, but must find its satisfaction in representing things in har¬ mony with their true nature and known laws of action. But, again, realism in art and litera¬ ture may be the result of a one-sided idealism, which, by ignoring the aspect of things that science emphasizes, gives rise to the same di¬ vorce between the truth of fact and the truth of art. It is clear that if idealism is to prevail in these fields it must not ignore the facts and laws of the natural world, or run counter to them, but must do justice to these facts while its transcends, through its interpretations, the scientific standpoint. Mere idealism, then, is an unsatisfactory standpoint in art and litera¬ ture, and the reaction toward realism to which it gives rise is justifiable and necessary. In a somewhat similar sense, "idealist® is used popu¬ larly as a term of reproach to denote a person who ignores the facts and practical conditions of any situation, construing it in a one-sided way in terms of his own ideas of what ought to be. But idealism, to be adequate, must go beyond the uncritical ideas of the individual. The true idealist is the man whose ideas are

adequate to the situation in all its complexity and

concreteness, whose interpretation of what is and ought to be is derived from a penetrat¬ ing analysis of all the objective conditions.

What of the relation of natural science and philosophy to idealism? It is obvious that the very task of the natural sciences necessitates the adoption of conceptions which are funda¬ mentally different in character from those em¬ ployed by idealism for science is primarily concerned with the relations of particular phe¬ nomena. It is always concerned with the mech¬ anism of the parts, and knows nothing of the ideal purpose or significance of wholes. As Kant said, <(where mechanism ceases there ceases also the possibility of scientific explana¬ tion. w This is the ground of the long-standing quarrel between natural science on the one side and idealistic philosophy and religion on the other; the former can interpret the world only in mechanical terms, while the latter must read it in terms of teleology.

The history of thought shows that both these methods of explanation have steadily confronted each other in philosophy. Idealism and materialism were developed almost simul¬ taneously in Greece — the former by Plato and the latter by Democritus — and the division be¬ tween these opposing principles under one form or another persists until the present day. Al¬ though philosophical systems necessarily vary with the changing intellectual and social condi¬ tions of different periods, yet it remains true, as Fichte said, that in principle <(there are and can be only two systems of philosophy, ideal¬ ism and materialism, and that neither one can directly refute the other, since they are con¬ structed upon totally different planes.® Ma¬ terialism, as philosophy, adopts the conceptions and methods of the natural sciences, and differs from the latter only in the greater scope and generality of its problems. It aims to be (in Spencer phrase) <(completely unified science.® Idealism, as we have already seen, has a dif¬ ferent problem from that set by science, and states its conclusions in terms that are quite foreign to the latter.

It is usual to distinguish between subjective and objective idealism. The former is an in¬ complete and undeveloped form, and finds its best representative in Berkeley (q.v.). It re¬ solves material existence into a series of ideas in the mind of the individual, holding, in Schopenhauers phrase, that ((the world is my idea.® The proof that it offers for this posi¬ tion is based mainly on the epistemological thesis that we know and can know nothing but our own ideas. The difficulties and inconsis¬ tencies of this view are now generally recog¬ nized, and the idealism of the present day is known as objective idealism. This does not deny the existence of external reality, but finds implicit in it the same principles of reason and purpose that are present in the individual mind. Indeed, this is true of the great idealistic thinkers of all times — of Plato and Aristotle, no less than of Schelling and Hegel. As a philosophical system, idealism has, of course, to formulate its conclusions in a series of logical propositions and to furnish proofs of their validity. In doing this it does not depend upon the Berkeleian argument mentioned above, but rather proceeds by way of a criticism of the

standpoint and categories of natural science. That is, idealistic philosophy attempts to show that the scientific standpoint, when taken as philosophy, i.e., as an ultimate account of the nature of things, is in itself incomplete and in¬ consistent and that when the necessary supple¬ mentations and corrections are made it points the way to a view of the world as a rational and purposive system. To make our view of the world completely consistent, many idealists maintain, we are obliged to hold that all its parts are included in an all-embracing system of experience, which finds its unity and its ulti¬ mate reality in the ideals and purposes of an Absolute Mind.

Bibliography. — Compare Plato, especially the (Ph3edrus) and (Republic (Books VI, VII) ; Berkeley, Principles of Human Knowl¬ edge, > (Dialogues^ etc.; Webb, T. E.,*

(Idealism and Experience in Literature, Art and Life) (in (Essays in Philosophy, * Boston 1890) ; Watson, J., Christianity and Idealism* (New York 1897) ; Hyde, W. D., (Practical Idealism* (New York 1897) ; Brunschwicg, L., P'idealisme contemporain) (Paris 1905) ; Will- mann, Ceschichte des Idealismus) (Brunswick

1894-97).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell

University.

IDEAS, Association of. See Association of Ideas.

IDENTITY, meaning in general the state of being the same, can be predicated properly only of individual things. The philosophical consideration of identity has been undertaken from three different points of view. Identity was thus approached as :

(1) The logical law of identity; (2) the metaphysical concept of the identity of a thing; (3) the special psychological form which this concept takes in the case of a conscious being or person.

1. There are certain very general principles exemplified in all thought, and some have sup¬ posed the task of logic to consist merely in developing their implications. These principles are known as the law of identity, the law of contradiction and the law of excluded middle. We are concerned here only with the law of identity; the other laws have been named to reveal the position of this law among its cor¬ relatives in the science of thought. The law of identity may be formulated by saying that <(whatever is, is® ; or symbolically, that «A is A.® In other words, if we think about anything then we must think, according to the law of identity. that it is what it is. This so-called necessity of thought amounts really to the apprehension of a necessity in the being of things. The law of identity and the law of contradiction is meta¬

physical or ontological. In the case of the former law, this is because whatever is must be determinately what it is, — that one must think it is. The law of excluded middle is so far different as a disjunctive proposition ex¬ presses doubt, and doubt belongs to mind, not to things. Unless the primary laws of thought were laws of things as well, our thinking would be doomed by its very nature to misapprehend the nature of things.

The logical law which we are now consider-

ing in particular is best understood as simply the positive form of that axiom of all con¬ sistent thinking which the law of contradiction states negatively. Thus we are reminded by the latter that a judgment cannot be now true, now false. But if true at all, it must remain true always. For if the truth of a judgment fluctuated without any change in the subject matter of such judgment, all thought would amount but to confusion. All the functions peculiar to thought receive their differentiating characteristic only through a detachment from the flow of sense-presentation and by estab¬ lishing themselves as independent of it: the judgment presents its content as something fixed in contrast to the stream of presentations; it proclaims its connection of ideas to be some¬ thing that does not pass away with the act of connecting them, but persists in face of all the changes of the psychical life. Thus all truth is eternal.

2. Sir William Hamilton well observes that the identity is the relation between our cogni¬ tions of a thing, not between things themselves. Let us consider briefly the metaphysical rela¬ tions of the logical law of identity. It is meta¬ physical, we said, because whatever is must be determinate^ what it is, that one must think it so. Owing to considerations like these, philosophers find it difficult in admitting the possibility of an

absolute change — change when nothing remains the same. For in such a change one cannot say what it is that changes. In this spirit Kant remarked <(only the perma¬ nent can change.® May we not suspect, how¬ ever, that the great Konigsberg thinker here unthinkingly reifies, employing his favorite (Cthing-tin-

The metaphysical discussion of identity is concerned with a number of other questions

such as the foregoing. It would lead us too far afield to discuss them all here. (See Meta¬ physics). Philosophers discuss in this connec¬ tion besides the various senses in which identity is known from qualitative likeness, in particular the relation of identity to difference ; whether identity excludes difference, or on the contrary implies difference. Such questions are, on the whole, no doubt partly verbal, and partly psy¬ chological ; but they also lead very often back to very fundamental problems of philosophy.

(3) The psychological problem of personal identity was raised into prominence by the some¬ what paradoxical discussion of Locke in his (Essay Concerning Human Understanding.) These discussions David Hume, in his (Treatise on Human Nature, > subsequently followed up with an analysis in keeping with the skeptical bias of his thought. The difficulties of the notion of personal identity which appear in these early essays are even more complicated in modern psychology. Into psychological literature of late have been introduced the terms <(double personality,® (

A few observations on the situation as a whole will help us to grasp more easily the idea of a continuity underlying the notion of personal identity. First, a man is not the sum of the material particles of which at any given moment he consists. The material particles are not the really essential elements that makes a man what he is. For instance, all animals breathe the same air; but all animals are not therefore persons. In truth a man's

material existence is constantly undergoing change, and yet we re¬ main the same person to-day that we were yes¬ terday. But let us ask a question ; it will con¬ firm our notion that this is true. Let one ask, am I for that reason another person because I cannot think the same thought twice with the same molecules? Does the thought change be¬ cause the oxygen engaged in the first act of thinking has entered into new chemical com¬ bination and is soon to be discarded from the system as waste? One knows that to answer this in the affirmative is like declaring that the significance of a word changes when it is writ¬ ten once in pencil and once in ink. And yet it is not easy to discover the grounds of such conviction. For there are other considerations than materialitv which appear to go yet deeper, making us seek the position of the continuity which we suspect to exist, even at a lower,

more profound level. Says even Ernst Mach, whose achievements for psychology are by no means small : ((It would hardly be possible for there to be greater difference in the egos of different men than appear in the course of a year in one man. When, to-day, I look back upon my early youth, if the chain of recollec¬ tion were not present to my mind, I should have to believe (apart from a few special points) that the boy was another individual.® These and a number of equally interesting ob¬ servations leads him to declare that the ((ego is as little absolutely permanent as are bodies.® We are prevented, however, from assenting to this conclusion by the consideration that our ego is in reality more than a current of sense impressions, as Mach understands it. Some un¬ derstand by such words soul, ego, personality, etc., mere states of consciousness, and Mach here appears to be among them. It is apparent that a difference in terms is here the underlying difficulty. When Mach denies the independence and permanence of the ego, this is because he confuses the consciousness of the ego

with the living ego itself. Our very knowledge is shaped by our independent work. Moreover, it is necessary to call particular attention to the fact that above and beyond all intellectual proc¬ esses there develops an inner life, a life which exhibits, in spite of all manifoldness, a per¬ manent character, persisting through all changes and movements. Right through all his work and the complexities of his development man has always drawn further and further away from the mere life of his senses. He has more and more converted outward events into inner experience; more and more resisted th-> mere influx of sensations. And all this is no mere intellectual phenomena. It is the unfolding of a rich actuality, the nearest and surest of which we have any knowledge; and this alone teaches us how mentally to shape and reshape our sense impressions. There is thus a unity of a spirit¬ ual kind which persists with living force in the face of all the changes and obscurations of consciousness, as in sleep. As opposed to MacEs dissipation of the "ego,® there are thus experiences of the spiritual life which corrobo¬ rate Goethe's conviction :

"Und keine Zeit und keine Macht zerstuckelt Gepragte Form, die lebend sich entwickelt."

Which may be freely translated

"And neither Time nor Might dissolves Identity that life evolves."

But let us examine yet a little more clearly. We have alluded to the familiar fact that ma¬ terial particles of living beings are constantly changing. In anyone's body there persists no sameness of substance whatever. The identity of a living being is not maintained through the presence of a soul-monad, but through the pres¬ ervation of its form. By life we understand organization. By soul we understand the form of an organism. Mind, spirit, soul, ego, are synonyms. We_ speak of soul when we em¬ phasize the sentiments of a man ; of mind when we refer mainly to man's rational powers; of spirit and ego when thinking of the significance and

character of thought without reference to bodily conditions. That which pertains to soul is called psychical ; that which has meaning is called spiritual ; that which characterizes intel¬ lection is called mental. All the many subcon¬

scious and conscious memories which form the elements of our mentality are definite traces of former sense-impressions, reacting upon new sense impressions and embodying sentiments, and thoughts, the forms of which are preserved in the cerebral system, the substance of which is constantly changing. But man's personal identity consists not in any way in an identity of material particles, but in the sameness of soul-form which is preserved by the continuity of his existence. This we think is th ; whole secret of personal identity.

IDES, one of the threefold divisions of the Roman month. See Calendar.

IDIOCY, that condition in which there is permanent mental deficiency which has re¬ sulted from a disease or deficiency of develop¬ ment of the brain either before or at the time of birth or at an early period of life. It is thus academically distinguished from a psycho¬ sis, which is a condition of mental disturbance occurring in the developed brain. Idiocy is a term of very wide applicability owing to the fact that very many grades of arrested develop¬ ment occur. In a general sense it is applied chiefly to the worst of these forms, while the term imbecility is used to denote the milder forms. The distinction between idiocy and im¬ becility is thus a somewhat arbitrary one, for the two conditions shade into each other by almost imperceptible degrees. An idiot is un¬ able to attend to himself ; an imbecile may.

Causes — The causes which result in idiocy and imbecility are often very obscure. A large proportion of cases are congenital ; that is, they arise from causes acting in utero. The child is born with a brain already hopelessly impaired. Heredity is thus a very evident cause; defects in the

ancestral stock and vices in the parents and near progenitors are doubt¬ less very active. Alcoholism, syphilis and other chronic poisoning, chiefly lead, are certainly among these causes ; as well as consanguinity and various diseases in the parents. Injuries to the mother while pregnant may be responsi¬ ble. The subject of ante-natal disease is still a very obscure one, but evidence is not lacking to show that the foetus may suffer from dis¬ ease; and in the critical stage of development of the brain before birth this organ may suffer irreparable damage. The same may be said of the infant and very young child. Injury and disease may act most disastrously upon the un¬ developed brain. Thus blows upon and injuries to the head may cause idiocy; also injuries at the time of birth, due to difficulties in the labor, may act. The various infectious diseases of childhood are responsible for some cases; thus scarlet fever, measles, whooping cough and cerebro-spinal fever have been noted as causes of permanent arrest of development. No doubt in many cases it is difficult or even impossible to detect the active cause.

The following are the most universally recognized varieties of idiocy:

Microcephalus. — In this form the brain and its enveloping skull-case remain abnormally small. In extreme grades the deformity is very striking. These are among the lowest and worst forms of idiocy, and in some cases there is scarcely a spark of intelligence. The patient cannot be said to do more than vegetate. The original cause probabR acts in these cases at a

very early period in the ante-natal life, and determines an almost complete arrest of brain development.

Hydrocephalus. — In this form the natural cavities

or ventricles of the brain become enor¬ mously distended and the skull is correspond¬ ingly enlarged. The mental impairment varies within wide limits. In some cases the idiocy is almost if not quite as great as in micro- cephalus, but in other cases a fair degree of intelligence is preserved. There may be also various forms of paralysis, speech defect, epi- leptoid seizures and impairment of the special senses. Hydrocephalus probably depends upon closure of one or other of the outlets of the cerebro-spinal fluid between the ventricles of the brain.

Porencephalus. — Occlusion or stoppage of one of the main arteries of the brain at an early period of development, not necessarily ante-natal, may cause such an arrest of develop¬ ment of a portion of the brain-mass that a cavity results, and this is called porencephalus. Such a stoppage of an artery may be caused presumably by injury or by one of the in¬ fectious diseases. The symptoms are usually arrest of development of the mental faculties in various degrees, speech defects, paralysis, such as hemiplegia, athetoid movements and epilepsy.

Mongolian Idiocy. — In some cases the patient bears a real or fancied resemblance to certain racial types, as the Negroid, Mongo¬ lian, etc. The latter of these is the best marked, and is now included (after Langdon Down) in most descriptions. The patient's head is de¬ ficient in the posterior region; he is of short statue, has oblique and widely separated eyes and a flattened nose. The attempt is made by some writers to construct special mental fea¬ tures for the Mongolian idiot, but with not very great success. He is simply an idiot, with varying degrees of mental power, and his resemblance to a Calmuck is only accidental.

Paralytic Idiocy. — In the foetus and in the infant and very young child certain accidents or diseases may cause cerebral hemorrhages, which, just as in the adult, cause in turn various kinds of paralysis. The most common are hemiplegia or paralysis of the arm and leg on one side; diplegia, or paralysis of

both arms and legs ; and monoplegia, or paralysis of one limb. Such an accident in early life is apt to cause more or less idiocy or imbecility in add- tion to the paralysis. Some of these patients also have epileptic attacks.

Epileptic Idiocy. — A rather large propor¬ tion of feeble-minded children also have epilep¬ tic attacks. This symptom may be associated with paralysis of various kinds, as already said, or it may not be complicated in any way with marked physical defects. It is only too likely, however, to induce a progressive mental de¬ terioration ; or, to speak more accurately for some cases, to prevent a normal brain develop¬ ment. The epileptic child is usually feeble¬ minded — some more, some less.

Sensorial Idiocy. — In some cases the organs of sight or hearing, or both, may be defective or undeveloped, and the child's brain does not develop normally merely because it is deprived of these important avenues of sensation. Such children may have more brain capacity than at

first appears, and they can be educated. In some cases, however, as in some deaf-mutes, the mental faculties remain more or less unde¬ veloped.

Genetous Idiocy. — Ireland, a well-known authority, proposes this term for a certain class of congenital idiots, but it is not very distinc¬ tive. It includes feeble-minded children, usu¬ ally of a rather low grade, who are born with undeveloping brains. The term really applies to many members of the other groups already referred to.

High and Low Grade Idiots. — These terms and intermediate ones are often applied merely to designate feeble-minded children according to the approximate degree of their lack of de¬ velopment. While lacking in scientific pre¬ cision, such terms denote conveniently various grades of idiocy. There are many idiots who are not microcephalic, nor hydrocephalic, nor Mongolian, nor paralytic, nor epileptic, nor in fact to be included in any usually

accepted class, and yet they are unmistakably idiots, and often of low grade. The truth is, that all classifica¬ tions must remain unsatisfactory until we know more about the causation and pathology of the various forms. i

Cretinism. — A highly specialized form of idiocy is cretinism. This is always associated with defect in the thyroid gland; sometimes this gland is entirely absent, in others it is im¬ mensely hypertrophied, and thus practically de~ stroyed. Cretinism is endemic in some coun¬ tries, as in and about the Alps and Pyrenees. The cretin is both physically and mentally stunted. He is of low stature, of peculiar and characteristic physiognomy, of pale and un¬ healthy skin, usually beardless, sometimes sexually undeveloped, and with many defects in the skeleton and muscular system. Mentally he is usually an imbecile at least, and in some cases even quite idiotic. Cases vary very widely, however, in the degree of feeble-mind¬ edness. In the United States cretinism is only sporadic.

Pathology. — As already indicated, idiocy is due to a wide variety of causes, and therefore its pathology also varies extensive^. Among the processes found in the brains of idiots are sclerosis, atrophy, porencephalic defects, old in¬ flammations, occluded and destroyed blood ves¬ sels, distended ventricles and thickened mem¬ branes.

Treatment. — In recent years the effort has been made to train and educate the feeble¬ minded child, and to develop in it as far as possible the defective mental faculties. Train¬ ing schools for these patients now exist in this country and in Europe, and the most humane and enlightened efforts are being put forth to ameliorate the condition of these unfortunates, and to render the more hopeful of them useful members of society. It is needless to say, how¬ ever, that not much can be accomplished with feeble-minded children of low grade, and with the very lowest nothing whatever can be done. With the imbecile and demi-irnbecile, however, the results obtained sometimes justify the pains and

expense. For the vast majority of feeble¬ minded children asylum treatment is desirable, even indispensable. These unfortunate patients cannot associate with healthy children, and they require a special environment. The prospect for cure in most cases is quite hopeless.

Cretins may be cured by the use of thyroid gland. See also Insanity.

Bibliography. — Brush, 'Idiocy and Im¬ becility J (in Keating's 'Cyclopedia of the Dis¬ eases of Children) Vol. IV, 1890) ; Ireland, 'Idiocy and Imbecility* (1887); White and Jelliffe, 'Modern Treatment of Nervous and Mental Disease) (1913), and 'Diseases of the Nervous System* (3d ed., 1914) ; Seguin, 'Idiocy, and its Treatment by the Physiological Method) (1866) ; Tuke, 'A Dictionary of Psy¬ chological Medicine) (1892).

IDIOM, id'yum, a form of phrasing or terminology peculiar to a language. Its basis is in popular usage rather than in grammatical or logical construction. The same term is ap¬ plied to a dialect or general variation of a language. Idioms are not capable of literal translation into other languages, e.g., the French "?a m'est egal® is rendered by the English idiom "it's all the same to me.®

IDIOSYNCRASY, id'io-sm'kra'si, any in¬ dividual peculiarity, either mental or physical. Such peculiarities are frequently a sign of ab¬ normality or insanity, such as a peculiar ar¬ rangement of one's dress, pronounced antipathy to certain persons, constant obsession that at¬ tempts are being made to poison one, etc. Physical peculiarities arise mostly from abnor¬ malities in the metabolic system of the individ¬ ual, such, for instance, as a rash caused by eat¬ ing a small quantity of strawberries, lack of response to

certain stimulants, medicines, etc.

IDIOT. See Idiocy.

IDITAROD, e-de'ta-rot', Alaska, a mining town, located in the region of the Iditarod and upper Innoko valleys, 510 miles distant from Seward. It is a prominent gold-mining centre and has wireless telegraphic communi¬ cation.

IDO. The artificial language known as Ido had its origin in the work of the Delegation pour l' Adoption d'une Langue Auxiliaire Inter¬ nationale , founded in 1900. The Delegation de¬ voted seven years to an examination of more than 60 schemes for an artificial language and in 1907 appointed a working committee of 16 emi¬ nent representatives of all important language groups with the object of summing up the previous work of the Delegation and adopting an international auxiliary language capable of serving the needs of science, commerce and general intercourse. The committee, after ex¬ haustive consideration, decided to adopt in sub¬ stance the Esperanto (q.v.) of Dr. Zamenhof, because of its many excellencies, but with cer¬ tain important alterations, the chief of which were: (1) the replacement of certain letters requiring special type by Latin letters, thus al¬ lowing the language to be printed anywhere ; (2) suppression of certain useless grammatical rules in regard to the invariable use of an ac¬ cusative form and concord of adjectives; (3) regularization of word derivation, in order to make the language a more fit instrument for the expression of exact thought; (4) enrich¬ ment of the vocabulary by all words neces¬ sary to translate exact ideas, in accordance with the principle of maximum internationality. The initiation of most of these reforms was rhiefly due to Marquis L. de Beaufront, the Saint Paul of the Esperantist movement, who submitted them to the committee in a pamphlet

under the pseudonym of "Ido® (i.e., a deriva¬ tive) and which were voted on and unanimously adopted without knowledge as to the author. Rapport was

attempted with the leading Espe- rantists in the hope that they would carry out these necessary reforms. The Esperantists, however, then at the height of their success and for certain practical reasons, refused to con¬ sider any changes. There was then formed the Uniono di la A}niki di la Linguo Internaciona, with an academy for linguistic study and a directing committee, composed of such eminent scholars as the philologist, Otto Jesperson of Copenhagen, the philosopher and authority on international linguistics, Louis Couturat of Paris; scientists as L. Pfaundler of Graz, R. Lorenz of Zurich, and F. G. Donnan of Liver¬ pool, with the famous chemist, William Ost- wald of Leipzig, as president. A monthly journal, Progreso (Paris), was established under the editorship of Professor Couturat. The academy, with the criticism and suggestions of more than 100 other persons interested in the subject, continued the work along the lines laid down in the recommendations of the dele¬ gation committee and in 1914 had practically completed its labors. During the years 1915-16 there were printed the large revised Ido-French and Ido-German dictionaries and considerable work done on an English edition. Because in a formative period, no extensive propaganda of Ido has heretofore been attempted, yet the Uniono has received the adherence of several thousands and had brought about, prior to the war of 1914, the printing of about a dozen small journals in the language.

Ido is indebted to Prof. Otto Jespersen for the happy formula which best expresses its basic principle : "That international language is best which is easiest for the greatest number of men® (an adaption of Bentham's famous ethical formula).

The vocabulary of Ido is made up by adopt¬ ing as root-words that form of word most readily recognizable by the greatest number of Europeans and not merely by empirical selec¬ tion, as in Esperanto, or by counting each language as of equal importance without refer¬ ence to the numbers using it. as in Idiom Neutral. As a result, Ido is but the quintes¬ sence of existing European language without

the unnecessary duplications, rules and excep¬ tions. It can practically be read at sight by any educated European. To speak and write it properly demands considerable study, because of the numerous idiomatic phrases which exist in all natural language, yet it is beyond com¬ parison easier of acquirement than the like task of learning any foreign language. Because of the large proportion of Romance roots found in the English and the adoption of manv Latin derivatives into the Germanic and Russian languages, Ido has a predominately Romance appearance. The spelling is phonetic, with an avoidance of double letters, difficult diphthongs and heavy accumulations of consonants diffi¬ cult of pronunciation.

The grammar is entirely without the irreg¬ ularities which make natural languages so difficult and is very simple, though sufficient for all logical demands. All nouns end in -o in the singular, -i in the plural; adjectives in -a; adverbs in -e; gender follows the natural method of the English; the verb is invariable

in number and person ; the auxiliary verb esar is used for the passive and compound tenses ot the active, esas amata (is being loved) ; csas amanta (is loving) ; the indicative present, past and future is formed by adding -as, -is, -os; conditional, -us; imperative, -ez; infinitive present, -ar; active and passive participle, -anta and -ata.

The logical system of word derivation is chiefly the work of Professor Couturat. One has but to learn the root word and a limited number of prefixes and suffixes in order to give grammatical form to any idea which the root word is capable of expressing, or from any one grammatical form to work back logically to the other forms. This system of word-building wonderfully simplifies and enriches the

vocab¬ ulary, furnishing, as Professor Couturat states, aan instrument^ of precision for the analysis and exact, expression of thought, which is very superior, from the point of view of logic, to our traditional languages, encumbered as they are by confused and ambiguous expressions.®

The following sentence, translated from Lin¬ coln's Gettysburg address, may serve to indi¬ cate some general differences between Ido and Esperanto. The Lord's Prayer which follows is written in Ido. Generally speaking, all con¬ sonants are pronounced as in English ; the vowels having the values of a, as in father; e, as in vein ; i, as in machine ; o, as in soul ; u, as in rule :

ESPERANTO

IDO

Antau kvar dudekoj da jaroj kaj sep niaj praavoj kreis sur tiu chi kontinento no van naciono, naskitan en libereco kaj dedichitan a la pro- pozicio ke chiuj homoj estas kreitaj egaluloj.

Ante quar duadeki e sep yari, nia avi genitis sur ica kontinento nova naciono, koncep- tita en libereso, e dedi- kita a ta principo, ke omna homi esas kreita egala.

ORIGINAL

" Fourscore and seven years ago our fathers bought forth upon this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal."

lord's prayer

Patro nia qua esas en la cielo, vua nomo esez santigata; vua regno arivez; vua volo esez obediata, quale en la cielo, tale sur la tero. Nia singladi' panon donez a ni cadie; e remisez a ni nia debaji, quale anke ni remisas a nia deban ti; e ne duktez ni aden la tenteso, ma libeiigez ni del malajo. Amen.

Bibliography. — For the general problem, consult (Histoire de la Langue Universelle) and (Les nouvelles Langues international (par Couturat et Lau, Paris 1907) ; for the Delega¬ tion, Conclusions du Rapport sur l'etat present de la Langue internationale) (par Couturat et Lau, Paris 1907) ; for Ido, international Language and Science) (Ostwald et al., London

1910).

L. H. Dyer.

IDOL, in a sense now obsolete, or nearly so, an image (Greek ei Suhov) 0r likeness of anything; in later and chiefly present significa¬ tion, any image or likeness of a deity used or designed as an object of worship. By extension the term has also come to be applied to any¬ thing which is an object of adoration or of su¬ preme affection or regard. The Eastern custom of making statues of highly revered religious teachers has led many to conclude that the figures of Buddha, Brahma, Vishnu, etc., are idols, subject to worship. This is an error. Max Muller says : ((The religion of the Veda

knows no idols. The worship of idols in India is a secondary formation.® It may be questioned whether the images of various savage or half- civilized tribes, as the totem-poles of our Amer¬ ican Indians, are strictly idols. However, they become such when the popular idea places them in the position of God and they are worshipped as deities. (See next article).

IDOLATRY, the worship of idols in any sense ; in the restricted usage ordinarily ob¬ served, it is the worship of the Deity or of a deity under a visible form; and from the point of view of the Christian, or any other religion which rejects the worship of images, consists in worshipping as God what is not god. With regard to the origin and character of idolatry, there is a wide divergence of opinion. The Christian religion conceives idolatry as a declension from the one true God, sees in the

various forms of heathen worship only more or less complete degradations of an original revela¬ tion and ascribes to it the same origin as to sin. Some philosophical and historical writers on the other hand see in idolatry an innate searching after God and accordingly the first stage of human development, the necessary be¬ ginning of a knowledge of God. Idolatry may assume various forms. One nation seeks its god in the powers of nature, worships the heavenly bodies and the elements and creates for itself a nature-worship; another develops a hero-wor¬ ship and a third has merely an animal and image worship, the lowest form of which is fetishism (q.v.). To this last and rudest form of idolatry, that consisting in animal and image worship, the name of idolatry is some¬ times confined. See Image Worship.

IDRIA, e'dre-a, Jugoslavia, town in the province of Carniola, 25 miles west of Lai¬ bach. It is important as a mining-centre for quicksilver since 1497. Since 1580 the mining has been controlled by the state, which in normal times has limited the output to an average of about 500 tons a year. The town contains a bobbin factory, a factory for electric equipment and at trade school. Pop. 16,876.

IDRI.SI, Id're-se, or EDRISI, Abu-Ab- dallah Mohammed, Arabian geographer : b. about 1090; d. about 1160. He studied at the Moorish University of Cordova, traveled through various countries bordering on the Mediterranean, visited France and England and was then invited to the court of Roger II of Sicily, where he resided under the patronage of Roger and his successors till his death. He constructed at the request of Roger a terres¬ trial globe of silver, on which the figure of the earth was shown with as much accuracy as the state of geographical knowledge then permitted. He accompanied this with a descriptive treatise bearing the title (Nuzhat Almushtak,* com¬ pleted about 1150. An old manuscript of this work was discovered at Paris in 1820 and pub¬ lished in a French translation by Jaubert. The Latin translation (Geographia Nubiensis> (Paris 1619), is considered

more reliable. Under the title of MSS. are in the Bodleian Library at Oxford and two in the Bibliotheque Nationale at Paris. Idrisi's fame grows with the years, as he ap¬ pears the first to have recognized and recorded

the sphericity of the earth. Consult Brockel- mann, (Geschichte du Arabischen Litteratur>

(1898).

IDUMAEA. See Edom.

IDYA, a name of Britannia, long a favorite with the poets.

IDYL, or IDYLL (from a Greek diminu¬ tive meaning a (

IDYLLS OF THE KING, The.

in autumn; and Arthur passes from earth on the last night of the year. The poem gives a decorative panorama of the legend-cycle of King Arthur, which is the English national epic material. As each succeeding century presents the old stories in the form of its day so Tenny¬ son's figures in the (Idylls'* are ideal concep¬ tions of the 19th century. The blank verse in which the poem is presented is one of Tenny¬ son's great achievements and the figured poetry is also characteristic of the poet. Not only have we true picture, but abundance of pic¬ torial figure and pictorial suggestions. The poem has delighted the most naive story lover and the most earnest seeker after ideas in poetry. Studies of the c Idylls } will be found in most books on Tennyson, but they are more particularly treated in the books on the (Idylls* by H. Elsdale (1878); H. Littledale (1893); M. W. Maccullum (1894) ; C. B. Pallen (1904) ; and L. Dhaleine (1905). An authoritative and contemporary criticism is that of Dean Alford in the Contemporary Review (Vol. XIII,

104). This, with another, Tennyson himself considered the best reviews of the (Idylls.* He himself did not care to have his symbolism pushed too far, chiefly because he did not like to have his very concrete poems made into a series of abstractions. He said that the ^thought within the image® was more than any one interpretation. The (Life of Tennyson* by his son (Vol. II, chap. V) gives the poet's own thoughts on his work.

Edward Everett Hale.

IDYLS OF THEOCRITUS, BION AND MOSCHUS. See Theocritus, Bion and Moschus, Idyls of.

IDZU, e'dzoo, Japan, a province of the empire on the so-called Eastern Maritime Cir¬ cuit, or Tokaido, formed of a hilly peninsula bounded on the east by the Bay of Sagami and west by the Bay of Suraga. It is about 32 miles long and about half that in width. It is traversed by the Kanogawa. The highest mountain of the peninsula is Amagisan, which rises to a height of 4,800 feet. Silkworm cul¬ ture and allied industries form the chief occu¬ pation of the inhabitants. There are numerous hot springs and watering places. Mishima is the chief town and Shimoda the chief port. Consult Reim, (Japan* (London 1884) and Satow and Hawes, (Handbook for Travelers in Central and Northern Japan* (Yokohama

1881).

IERNE, i-er'ne, a name of Ireland (Eire, Hibernia, Juverna), found in ancient Greek writers.

IFNI, ef'ne, Morocco, a seaport, situated opposite the Canary Islands on the west coast. Since 1883 it has belonged to Spain. Pop.

6,000.

IFUGAO, i'foo-gou', a tribe of northern Luzon, Philippine Islands. They are of Malay origin, are head hunters and practise tatooing. T. hey are noted for their expertness in agri¬ culture, to which their rough hillsides are but ill-adapted. They have

terraced the mountain¬ sides more than any other native people and their plots are watered by an ingenious irri¬ gation system. They are good woodcarvers and work iron and steel.

IGBARA, eg'ba-ra, a negroid people of the Sudan. See Fulah.

IGLAU, Czechoslovakia, town of Moravia, on the Iglawa, 55 miles northwest of Briinn, on the border of Bohemia. It contains a Rat- haus, several ancient churches, military bar¬ racks and a cloth hall. It is an important in¬ dustrial centre, with woolen and cloth manu¬ factories, spinning factories, dye works, cigar factory, furniture work, tanneries, shoe fac¬ tories, potteries and sugar mills. It has a good trade in the products of all these establishments and also in lumber and agricultural products. Until the Thirty Years' War it was a silver¬ mining centre, but in that conflict it suffered greatly, being twice occupied by the Swedes. Pop. 38,369, including about 4,000 Czechs.

IGLESIAS, Jose Maria, e-gla-se-as, Mex¬ ican historian and publicist: b. City of Mexico, 5 Jan. 1823; d. 1891. He studied law in the University of Mexico, was appointed pro¬ fessor of jurisprudence there, became Secretary of Justice in 1857, and, after service as head of the Treasury Department, again held the post in 1853-67. In 1868 he was elected to Congress, in the same year was appointed Secretary of the Interior, in 1873 chosen president of the Supreme Court. After the fall of Lerdo de Tejada, he established a government which soon yielded to the superior power of Diaz. His publications include (Apuntes para la Historia de la guerra entre Mejico los Estados Unidos) (1852.) ; and

IGLESIAS, Miguel, Peruvian military offi¬ cer: b. Cajamarca 1822; d. 1901. After the usual career in

the army passing through the various grades he became Minister of War in 1880. In the following year during the war with Chile he made a heroic defense of Lima against the invaders. He was made prisoner, but effected his escape. He agreed to cede the southern provinces of Peru to Chile provided she would withdraw from the rest of Peru. In 1883 he became President of Peru and late the same year concluded the Treaty of Ancon with Chile. Political opposition to the treaty was very strong, however, and the party of General Caceres forced an agreement from Ig- lesias under which both retired pending an elec¬ tion. Caceres was elected and Iglesias quitted Peru.

IGLESIAS, Pablo, Spanish Socialist leader: b. Coruna, 1850. He became a printer and from his 18th year was prominent in trades union circles, which in Spain were of their very nature Socialistic. He was elected to the fed¬ eral council of the Spanish International in 1871 and was a member of the staff of the Socialist paper, La Emancipation. In 1878 he was one of the founders of the Socialist Labor Party and subsequently served as chief of the Printers' Association and the Federation of Ty¬ pographers. In 1885 he became editor of FA Socialiste, the official organ of Spanish Social¬ ism and for over 30 years labored strenuously to advance the position of his party. He was elected to the Cortes in 1910 and three years later became head of the Central Labor Union.

IGLESIAS, Sardinia, a southern city and episcopal see. The cathedral built by the Pisans dates back over 700 years. Mines of zinc and

lead furnish the city's chief industries. Pop. of city 10,411; of commune 20,000.

IGLOO, lg'loo. See Eskimo.

IGLOOLIK, Canada, a small island in the Arctic Ocean, near the east end of Fury and Hecla Strait in lat. 69° 21' N. and long. 81° 53' W. It is noted as the place where Parry win¬ tered in 1822-23.

IGNACIO, eg-na'the-o, Jose de Jesu Maria, German Jesuit: b. Paderborn, 1721 ; d. 1780. His family name was Herman Loes- sing. After some years in the Jesuit order he was appointed professor of rhetoric and philosophy at the College of Old Mexico. For over 10 years he collected antiquities, inscrip¬ tions, etc., of the ancient inhabitants of Mexico, which he brought back with him to Europe. In 1768 he was appointed librarian to the archbishop of Cologne. His published works include (De Arte Hieroglyphum Mexicano- rum) (1774) ; (Historia Novae Hispaniae) (1777); (Reisen in Neu-Spanien) (1778); (Historia Regni AztecorunP (1780) ; (Cosmo- graphia} (1780).

IGNACIO (eg-na'se-oo) ISLANDS, Mex¬ ico, a chain of islands in the Gulf of California, off the Bay of Topolobampo, in the state of Sinaloa. The chief are Macapule and Altamura.

IGNATIEFF, lg-na'tyef, Nikolai Pavlo- vitch, Count, Russian military officer and diplo¬ mat: b. Saint Petersburg, 29 Jan. 1832; d. 1908. In 1849 he received his commission as an officer in the Guards, took part in the war in the Crimea and in 1858 reached the rank of major- general. As diplomatic representative of the tsar he concluded the Treaty of Aigun with China in 1858; was subsequently sent to Bok¬ hara, and in 1860 was named Minister Plenipo¬ tentiary to Pekin. In 1863 he became chief of the Asiatic department of the Ministry of For¬ eign Affairs and from 1864 to 1877 was Russian Minister to Turkey. He did much to bring on the war of 1877 between Russia and Turkey, by fomenting agitation among the various Balkan peoples subject to the sultan. He was eclipsed for a time by his opponents but in 1881 he was appointed Minister of the Imperial Domains and later of the Interior. He persecuted the Jews relentlessly. He was dismissed from office in 1882.

IGNATIUS, lg-na'shi-us, Father. See

Lynne, Joseph Leycester.

IGNATIUS OF ANTIOCH, Christian bishop and martyr: b. Syria, c. a.d. 50; d. Rome, a.d. 110-117; was called in Syriac Nurana ; and probably received at baptism his second name, Theophorus, <(the God-bearer.® Of his early life nothing is certain. Origen, (Homil. vi in Luc., sec. V speaks of him as the second bishop of Antioch after Peter. Theo- doret, (Epist. 151, > says that ((Ignatius, who is known far and wide, received the high priest¬ hood by the right hand of the great Peter.® The (Chronicon) of Eusebius, in Saint Jerome's revision, groups Ignatius of Antioch with Papias of Hierapolis and Polycarp of Smyrna as disciples of John the Evangelist. The Mar- tyrium Ignatii, accepted as historical by Pear¬ son and Ussher but rejected by Lightfoot, is copious in its details of the martyrdom of Ig¬ natius. The authentic letters of the martyr

give the following account of the journey to martyrdom. Ignatius was condemned to death (Ephes. 12, Trail. 3, Rom. 4), and sent to Rome <(to make a Roman holiday.- He made no appeal to Caesar, as had Saint Paul. His chief desire is that no appeal be made in his behalf (Rom. 1, 2, 5, etc.). Likely the cause of the journey to Rome was merely the clamor of the Roman populace, during Trajan's reign, for the butchery of men as well as beasts in the arena. The martyr probably set sail from Seleucia, the port nearest to Antioch. His guard of 10 soldiers gathered in other victims as they proceeded toward Rome. The route was across Asia Minor, from a Cilician or Pamphilian port, to Philadelphia, on to Sardis, and thence to Smyrna. Here Ignatius was received by his friend Polycarp, and met by delegates from the churches of Ephesus, Tralles and Magne¬ sia. During this stay at Smyrna, the letters to the Ephesians, the Trallians, the Magnesians and the Romans were written. The guards seem to have been a brutal set. Ignatius speaks of them as ((ten leopards* (Rom. 5) ; and says he <(has been fighting*

with wild beasts From Smyrna the prisoner was taken to Troas, where he wrote his letters to Philadelphia, to Smyrna and to Polycarp. From the letter of Polycarp to the Philippians, we learn of the martyr's stay at Philippi ; and of the request made by that church for the letters of Ignatius. To this request and Polycarp's compliance, is probably due the first collection of the seven authentic Epistles of Saint Ignatius. His martyrdom is witnessed to by Origen, Homil. in Lc. vi; and is assigned by Eusebius, (Historia Ecclesiastica, iii, 36,) to the reign of Trajan. Seven of the Epistles of. Saint Ignatius are now quite gen¬ erally admitted to be authentic, those to the churches of Ephesus, Magnesia, Tralles, Rome, Philadelphia, Smyrna and to Polycarp. These are the collection witnessed to by Eusebius, Saint Jerome and many later Fathers, and ad¬ mitted by such critics as Lightfoot, Harnack, Zahn and Funk. Of doubtful authenticity are the letters to (1) Mary of Cassobola ; (2) Hero, deacon of Antioch; to the churches of (3) Tarsus, (4) Philippi, and (5) Antioch. Ad¬ mittedly spurious are two letters to John the Apostle, one to the blessed Virgin Mary, and one from her to Ignatius. The Epistle to the Romans is chiefly personal. It reveals the writer's enthusiastic devotedness, intensity of personal love for Jesus Christ and ardent yearning for martyrdom. The other six au¬ thentic letters are chiefly doctrinal. They teach the divine institution of the Church as a visible society (Philad. 3), her unity (ib., Magn. 13), holiness (Eph. 9), catholicity (Smyrn. 8), in¬ fallibility (Philad. 3), hierarchical constitution and priesthood (Magn. 13, Eph. 9), together with the primacy of the Roman see (Rom., Introd.).*

Bibliography. — The best editions of the Epistles of Saint Ignatius are: Zahn (1876); Funk (1901) ; Lightfoot (1889) ; Cf. Newman, J. H., (The Theology of Saint Ignatius^ in His¬ torical Sketches, I (1890) ; Gasquet, (Saint Ig¬ natius and the Roman Primacy in Studies*

(1904).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College, Maryland.

IGNATIUS BEAN, Saint. See Stry-

CHNOS.

IGNATIUS OF LOYOLA. See Loyola, Ignatius of.

IGNEOUS (lg'ne-us) ROCKS, the term applied in geology to those rocks the special structure of which is due to their having been once in a molten state, from which they were solidified into their present character. They include lava, basalt, granite (qq.v:), etc. Such rocks are not stratified, and may occur in con¬ nection with sedimentary rocks of any age, as the igneous rocks have usually been erupted from the heated interior of the earth and forced up toward, sometimes to, the surface. A detailed classification of igneous rocks is given in the section on Igneous Rocks in the article on Rocks.

IGNIS FATUUS, ignis fat-uus (Latin ignis, fire, fatuus, foolish), an atmospheric light or a luminous appearance sometimes seen in swamplands, in churchyards and over stagnant waters. The light usually appears shortly after sunset ; it is common in the north of Germany, in Italy, in the south and southwest of England, and the west of Scotland, and has been noticed in many other countries in undrained marshy districts.

The appearance generally resembles a flame ; seen closely, the color appears as bluish, red¬ dish, greenish or yellowish, merging into purple, but never a clear white. Sometimes the flame seems fixed in position, shining steadily close to the ground or a few feet above it; again, it appears in rapid motion, sometimes rising high in the air, at others separating into- smaller flames, which are seen advancing, retiring, re¬ combining, etc.

Some supposed appearances of the ignis fatuus are probably due to luminous insects, or to the

phosphorescence of decaying vegetable matter. By setting all such possible cases aside, both fixed and moving ignes fatui have been proved to exist, although the spectrum of the light seems not to have been fully observed. The common hypothesis that ignis fatuus is the flame of burning marsh-gas, CH4, is untenable, for although this gas is produced abundantly in many marshy places, it cannot ignite spon- taneouslv. The more plausible suggestion that phosphoretted hydrogen, PHa, which is sponta¬ neously inflammable, might be produced in churchyards or marshes where there is decaying animal matter does not account for some of the effects observed. The early supposition of a phosphorescent vapor is more reasonable, al¬ though exceoting that of free phosphorus, which could not occur in nature, no such vapor is known to exist. The phenomenon was un¬ doubtedly more common a century ago than it is now, and its disappearance in many localities may be directly traced to the draining of fens and marshes.

Popular names for the ignis fatuus — Will- o'-the-Wisp, Jack-a-Lantern, Spunkie, etc. — abound in folklore, and the superstitions re¬ garding it are connected with many stories of travelers mistaking the marsh-lights for those of cottage windows, and with tales of evil spirits decoying men into dangerous places, often to their doom.

IGNITION, in gas engines, the firing of the explosive mixture of gases — in the cylinder

of the reciprocating- engine; in the pressure chamber of the rotary engine. In the earliest types of gas engine ignition was accomplished by an outside flame kept burning before a slide door, which was opened when the cylinder had been charged. After compression of the gases was introduced, the ignition was secured by a platinum tube projecting into the cylinder, and heated red-hot by an outside

flame blown into it. In the modern gas engines ignition is ac¬ complished by a Mat" electric spark, produced either by a battery, a magneto, or a small dynamo. There are two systems of electrical ignition: the ((jump-spark," or high tension system; and the ((make-and-break" or low ten¬ sion system. In the first, the electric current is taken into the cylinder through a ((plug," at the inner extremity of which is a break, or C(gap" in the continuity of the metal conductor, across which gap the current is forced to leap. This gap ranges in width from one-third inch where a coil is used in' .the circuit, to one-sixty-fourth inch where there is no coil. The fact that the explosion of the gaseous mixture is not actually instan¬ taneous, but requires an appreciable time, has led to the use of two sparking plugs in cylinders of large capacity. In this case one of the plugs is a double pole member, and the firing current is sent first through this, going afterward through the ordinary plug. A gain of power ranging as high as 30 per cent has been noted as a result of this double firing.

The make-and-break system is in use chiefly in small marine or motorboat engines. Within the cylinder are two polar extremities of the battery conductor, and one of these is moved by a mechanism outside of the cylinder, so as to make contact with the other, and this con¬ tact is immediately and suddenly broken, when a spark is produced. This method does not re¬ quire as strong a current as that necessary to make the leap across the gap in the spark plug, but with a coil in the circuit the spark is big enough and hot enough to be entirely depend¬ able. See Airplane Engine; Automobile En¬ gine; Internal Combustion Engine.

IGNITION SYSTEMS. See Internal

Combustion Engine.

IGNORANCE OF THE LAW. Every person is presumed to know the laws of his own country, and what is termed ignorance of the law is a lack of understanding of those laws. Such want of understanding furnishes no

excuse for their violation and cannot be pleaded even in extenuation of their infraction. But this pre¬ sumption does not extend to the municipal laws of countries or states other than that in which a person resides. Such laws are regarded as foreign and a knowledge of them on the part of one who disregards them must be established by proof in the same manner as any other facts are proved. This applies only to a non-resident of such foreign state, and as soon as a person becomes even a temporary resident thereof he is presumed to know its laws and to yield obedience to them. He cannot plead his want of opportunity to become acquainted with them.

IGNORANTINES (Fratres Ignorantice) . See Brothers of the Christian Schools.

IGOROT, 1 'go-rot, the inhabitants of the districts of Bontoc, Benguet, Lepanto and Am- burayan of northern Luzon, They live by agri- vol. 14 — 43

culture and practise irrigation. Their dwellings are always found in groups and are roofed with grass or huge leaves. The Bontocs are head hunters. The total number of Igorots is placed at 211,500. Consult Jenks, (The Bontoc Igorot) (Manila 1905). See Philippine Islands.

IGOR'S (e'gorz) MARCH, Song of, an antique battle song, associated with the name of Igor, Prince of Novgorod, son of Prince Swajatoslaw II of Tchernigof. Igor in his 51st year is recorded to have engaged in an un¬ successful war with his neighbors (1202), and from that time has been looked upon as the national poet of old Russia, on account of a lyrical epic ooem, or ballad, called in Russian, (Slavo o Polku Igoreve) ((The Song of Igor's MarclP)- It has come down to modern times, somewhat like the songs of Ossian. The poem was probably produced by one of the followers of Igor, and in 1795 was found by Count Alexis Mussin- Putchkin in a cell of a mon¬ astery in Jaroslav. It was discovered among some 14th century MSS., and was first pub¬ lished by the Count at Moscow in 1800.

The original was lost in the fire of the Napoleonic campaign (1812), which destroyed the Count's fine library. Another copy with many variants was found in 1864 among the papers of Catharine II and published at Saint Peters¬ burg the same year. It has been translated into several European langauges. Consult Wolf- sohn, (Schonwissenschaftliche Litteratur der Russen) (1843) ; Wjasemski, (Bemerkungen zum Igorlied) (1875).

IGUALA, or IGUALA DE ITURBIDE,

e-gwa'la da e'toor-be'da, Mexico, town of the state of Guerrero. It is the largest town of Guerrero and is located in a thriving agricul¬ tural region, also remarkable for its silver mines, which have been worked from the earliest days- after the advent of the Spaniards. Here on 24 Feb. 1821 Iturbide announced the Plan of the Three Guarantees, known also as the Plan of Iguala. The town was severely shaken by an earthquake in 1907. Pop. 8,195.

IGUALADA, e'gwa-la'da, Spain, city in the province of Barcelona, on the Noya, 45 miles northwest of Barcelona. It is located in a mountainous region, but the surrounding land is fertlie nevertheless. It is surrounded by the ruins of its ancient walls, being once a strongly fortified place. The Benedictine monastery of Montserrat is in the neighborhood. Cotton, linen and other cloths are manufactured in con¬ siderable quantities. Pop. 11,754.

IGUANA, l-gwa'na, a large lizard of the typical genus of the family lguanidce. This family is distinguished by having pleurodont teeth, a thick, villous, nearly immobile tongue, a round pupil and by various skeletal char¬ acters. The 350 species belong to about 50 genera and, with the exception of a few in the Fiji Islands and Madagascar, are confined to America, in the warm parts of which they fairly swarm. Only one species {Sceloporus undula- tus) reaches as far north as the Middle States. They vary greatly in appearance and habits; most are arboreal, many terrestrial, and one, the Galapagos

Amblyrhynchus, is even marine; the majority eat insects, but some are herbiv¬ orous. The true iguanas, of which I. tuber- culata is the best known, are rather widely dis¬ tributed through the West Indies, Central and

South America. Owing to the high crest or fringe which extends along the back and tail, the deep, fringed, gular pouch, and the loose- fitting skin, these animals present a remark¬ able appearance. The trunk and tail are cov¬ ered with small gra-nule-like scales, and the head with larger plate-like ones; the feet are large and powerful ; the tail very long, slender and compressed; and the teeth hierh and finely serrated. A length of five feet or more is com¬ monly attained. The iguanas are arboreal, their mottled green color serving admirably to con¬ ceal them among the foliage; but when alarmed they have the habit, remarkable in a lizard, of letreating into the water of the streams along which they live. The 20 or 30 large eggs are deposited in a burrow usually dug in the bank of a stream or sometimes in a hollow tree. Notwithstanding its formidable size and aspect, the iguana is a timid, harmless creature, and the stories sometimes told of its ferocity are pure fabrications ; moreover, it is purely vege¬ tarian in its diet. The flesh is a favorite article of food with the natives, and many travelers have pronounced it to be white, tender and sweet, and is regularly brought to the markets. Consult Wallace, Muller, Bates, Belt, Gosse and other authorities on South and Central America. See Lizard.*

IGUANODON, a dinosaur (q.v.).

IGUAZtJ, e'gwa-soo', a river of Brazil, which takes its rise in Parana, near the Atlantic seaboard and flows in a general westward direc¬ tion for nearly 800 miles to its junction with the Parana. For part of its course it separates the states of Parana and

Santa Catharina, and also Brazil from Argentina. Its lower course is broken by rapids and falls which render navi¬ gation impossible; among these are the great Falls of Iguazu, among the finest in the world. For long stretches of its middle course the river is navigable. Consult Bernardez, Manuel, (De Buenos Aires al Iguazu } (2d ed., Buenos Aires

1901).

IGUVIUM. See Eugubine Tables.

IHRE, e're, Johan, Swedish philologist: b. Lund 1707 ; d. 1780. He received his education at the University of Upsala; subsequently made extensive travels in France and England, and, became assistant librarian to the Swedish Acad¬ emy of Science. In 1748 he was made pro¬ fessor of belles-lettres and political economy. The government gave him $10,000 to compile his great work, the (Glossarium Suiogothicum* (1769), which laid the foundation of Swedish philology. Many other works of his are extant, worthy in the form of academic disputations. The most valuable are those dealing with the gospels of Ulfilas.

II KAMON NO KAMI NAOSUKE,

ee-ee kah-mone no ka-mee, nah-w6-so6-kee, the Japanese statesman who succeeded in open¬ ing Japan to foreign trade and residence; b. 30 Nov. 1815; d. 24 March 1860. Descended from ancestors . (987-1011), who served the Mikado in subduing the Ainu aborigines. At 27, Ii was made the 14th lord of Ii-dani (valley of Ii), whose predecessors occupied a castle in the fief assigned Iyeyasu (q.v.). On 25 Dec. 1850, he was given the title of lord of Hokone, and on 4 June 1858, when the American envoy Townsend Harris (q.v.) was pressing the Yedo government for a commercial treaty, at a time

when internal politics were in turmoil, the shogun, a boy, and the Yedo and feudal sys¬ tems decadent, Ii was made premier. Although the Mikado Komei, and the Imperial Court at Kioto violently opposed the

idea, the Lord Ii, with the example of India and China before him — the French and British fleets being then in the neighboring Chinese waters — took the responsibility and signed the American treaty, which was soon followed by others, with Europeans. With an iron hand, wielding the jailer's and the execu¬ tioner's sword and without regard to name or rank, Ii overcame his most active opponents. He dispatched an embassy to the United States in the United States steamship Powhatan which, after arrival, made the tour of the American cities, being everywhere warmly welcomed and sumptuously entertained. On 4 March 1860, while on his way to the castle in a snow storm, a band of 18 ronin (q.v.) attacked his train. In the bloody battle that ensued, Baron Ii was beheaded and 29 men were killed or wounded. After a generation of obloquy and misrepre¬ sentation, Ii's name came to be held in universal popular reverence. The intensely strong op¬ position of the devotees of ultramikadoism long prevented a proper memorial to Ii from being reared in Tokio, where it should be; but in Yokohama a noble monument has been reared in- his honor. His son was educated in Brooklyn, N. Y. Consult Alcock (Capital of the Tycoon > (1863); Satoh, (Agitated Japan: The Life of Baron IF (1896) ; Griffis, Town¬ send Harris> (1906), and, in fiction, Maclay, (Mi'to YashikF (1889).

IK MARVEL. See Mitchell, D. G.

IKAO, e-ka'o, Japan, a summer resort in the province of ICotsuke, 88 miles from Tokio. It is located on the slope of Mount Haruna and contains several hot springs to which great numbers resort for curative purposes.

IKUNO, e-koo'no, Japan, town in the pre¬ fecture of Hyogo, 35 miles northwest of Kobe. It is situated in- a great silver-mining region, the mines being a government monopoly. Day and nighf Shifts are employed. Some gold is also produced. Pop. 3,000.

IL CORTEGIANO. The Cortegiano> of Baldassare Castiglione (1528) deals with the <(formation of t-

he perfect courtier.® The author represents these dialogues as a social (thus gives striking and authorita¬ tive portraits of leading personalities of the Italian Renaissance, and its vivid picture of society ranks, for scope and reliability, above the prefaces to Bandello’s tales and even above the autobiography of Cellini. In central intent the volume has a narrow- purpose : it is the handbook of the professional court gentleman, hard to distinguish from the perennial Italian adventurer. No inconsiderable portion of the maxims of Castiglione reflect that hard-headed materialism made so famous by Machiavelli in sociology and political theory. Castiglione is as free from delusions about human nature as the great # Florentine secretary. He is equally ex¬ pert in the psychology of malice. The Cor- tegiano) like The Prince) place's sagacity above

LIZARDS

REPRESENTATIVE IGUANID LIZARDS

1 Ring-tailed Iguana (Cyclura carinata) 4 Horned-toad Lizard (Phrynosoma cornutum)

2 Helmeted Basilisk (Basilicus americanus) 5 Galapagos Ssa-lizard (Amblyrhynchus cristatus)

3 Galapagos Land-lizard (Conolophus subcristatus) 6 Red-throated Anolis (Anolis carolinensis)

other virtues. The courtier’s business is to succeed in life, not by good intentions, but by a triumph of wits. But upon this aspect of Cas- tiglione s ethics, so .typical of his race and penod, the vast public which (The Cortegiano) has reached through the centuries has been loath to linger. In a broader sense the ((per- fect courtier» has been taken as the -model for any gentleman of the leisure class. The Italian tyrannies, in fact, of the early 16th century, reached the perfection of Italian social

life at a time when Italy, assimilating the best that hrench and especially Spanish chivalry had to otter, was leading the world in good manners and setting to a large extent the standards of cultivated elegance that have ever since pre¬ vailed. The Cortegiano> is the code book of this refinement, less naively detailed than the Galateo of Cardinal della Casa, but far more profound m theory; and specific enough in pre¬ cept, as Castiglione elaborates •his sound general premise that the fundamental problem of good form is to acquire a «sense of other people,® to strike a just balance between self-assertion and regard for others. What most engages in Castiglione, aside from his personal traits of urbane composure, a kindly, good-humored and deferential condescension, is the passion for dullness of life® both in action and in cultural attainment. His interlocutors frequently stand aghast at the demands they make on the ideal gentleman, and his partner, the ideal lady (Book III). The courtier must be expert in arms and statecraft, learned in (a book on manners so nobly and liberally con¬ ceived. For Castiglione would have his courtier incarnate the highest moral ideals and express the widest culture of his environment. In its review of the ethical, philosophical and aesthetic problems that preoccupied the cultivated people of its time, (The Cortegiano) possesses an ad¬ ditional and very special interest, as reflecting the astounding general culture of the aristo¬ crats of the Italian Renaissance. Among these discussions we may signalize the comparison of painting and sculpture (I), the richly illus¬ trated analysis and classification of types of humor (II), the development of the ((courtly® theory of the Italian national language, his¬ torically important (I), and the theory of con¬ traries applied to social criticism (II). But decidedly the most famous portion of the book is the treatise on Platonic love put into the mouth of Bembo, himself the author of Platonic dialogues entitled (Gli AsolaniP This theory of love is really a theory of knowledge : by love of the good and beautiful in woman or in man, we are brought to know and love the good and

beautiful in universal divine forms. This ^philosophy® of love may have a certain scien¬ tific basis in the relations of the religious and sexual instincts. But as a social fad, persistent •through all the old regime, it was never more than a justification and a pretext for sensualis tic idling and an excuse from serious thought on woman's status in society; though it did say many beautiful things on love and woman and

created a phraseology suggesting certain humane ideals. (The Cortegiano* did as much as any other one book to spread these Platonic notions and remains one of the most typical expositions of this kind of pseudo-thought.

Arthur Livingston.

IL P.ffiSE DI CUCCAGNA. See P/ese

DI CUCCAGNA.

IL PASTOR FIDO. With the in this latter respect realized the author's predominant purpose in composing it. Guarini belongs to the age before him in his acceptance of the canons of Aristotelian poetics. He be¬ longs _ to the age after him in the sense that he tried to criticize those canons, by demon¬ strating that the (was a work of ingenuity, aimed at proving that the tragic and comic elements, separated by Aristotle, could be legally® blended in a new <(species» of art to which the name ((tragi-comedy® came to be. applied. There is nothing remarkable, historically, about _ such a literary ambition! Poets before Guarini's time wrote dramas and epics to prove that the rules illustrated in the great classical poems could be applied to works in the modern national languages. Those of his day and after him went farther, and after discovering the new ((genres» in theory each tried also to compose the enduring masterpiece which would illustrate the new laws and be¬ come the model for all successive imitations. The main obstacle to success in such attempts was the envy of competing poets. The (Pastor Fido) made its way to the longed-for goal

only after polemics which lasted for several decades, though the author enjoyed the unusual lot of surviving them and in his own life time witness¬ ing the canonization of his poem.

What makes these old literary quarrels un¬ interesting now is that they view ((plot® as the principal subject for discussion. They throw no light on what are now regarded as true literary values. Even Guarini's treatment of the (Pastor Fido) itself, called by him the ^Handbook of . Tragi-comedy,> has little value as an aesthetic interpretation. In the history of dramatic technique, considered from the mod¬ ern point of view, the (Pastor Fido) would be classified as a play of the strict Italian Renais¬ sance tradition; the action is of little import¬ ance genetically. Faithful to the method of the Greeks, its dramatic method is to contemplate lyrically the psychological effects of the action, which is not produced by the psychological traits of the characters. As was true of the

A very just appreciation of the (Pastor Fido) may be found in Mr. Boulting's (Life of Tasso.) There is a translation by Fanshaw (London 1676). Arthur Livingston.

IL PENSEROSO. Some general remarks on HI Penseroso) will be found in the article on the companion poem (L'Allegro) (q.v.). (I1 Penseroso) presents the contemplative or thoughtful mood or humor. We need not think of these sketches of mood or humor as representing different people ; Milton probably recognized them both in himself, as many others may do. If he did, we must remember that the contemplative mood grew upon him with years and, indeed, was more nearly his real self. The poem begins by getting rid of Wain deluding joys.® We need not think of these as the joys of the cheerful,

active life cele¬ brated in (L'Allegro) ; they are rather the ex¬ travagance of the active humor, just as the Hoathed Melancholy® of

IL PIACERE. See Piacere.

IL SIGNOR IO. A tale rather than a novel, slight in form and in plot, HI signor

Io> ((Mr. Myself, y 1882), by Salvatore Farina, is one of the finest works of the Milanese novelist. Lit up by a gentle yet sympathetic humor, partaking both of the caricature of Dickens and the playful tenderness of Gold¬ smith, no more delightful picture of the petty domestic tyrant and unconscious egoist can be imagined than this Italian professor of phi¬ losophy, Marco Antonio Abate, whose love of creature comfort sacrifices first his wife and then his daughter to his gentle despotism. The first part of the novel is autobiographical. With a bland, almost childlike artlessness, Marcan- tonio's diary betrays his selfishness in uncon¬ scious self-indictment, a masterly portrayal of his egoism. In the subsequent part of the story, the lonesome father (his daughter long since driven from his heart and home) seeks solace in remarriage. With an unctuous humor the author shows Marcantonio under the as¬ sumed name of ((Mr. I. O.® advertising for a wife, alternately hoping and despairing as the replies come in, one of which by a trick on the part of the son-in-law brings about the reconciliation so inevitable in Farina's novels.

A past master in the portrayal of the petty incidents of domestic life, an artist in the treat¬ ment of simple characters, a great admirer of family ties and children, a writer possessing a graceful and charming style, Farina in the kindly optimism of (I1 signor Io) has succeeded in uniting the technical execution of the realist to the tenderness of the idealist. In Marcan¬ tonio he has depicted an ingratiating character, a sympathetic figure despite all his defects, lovable because so essentially human. Consult Croce, B., in La Critica (Vol. IV, 1906) ; Marc- Monnier, (Un humoriste italienp in La

Revue des Deux-Mondes (Paris 1882, pp. 405-438) ; The Scottish Review (Vol. X, 1887, with a translation of some extracts, pp. 235-266).

Alfred G. Panaroni.

ILES, George, American author: b. Gibral¬ tar, 20 June 1852. He received a secondary edu¬ cation in Montreal and from 1887 was em¬ ployed in literary work in New York. His original works include

ILEX, a tree often mentioned in the Latin classics, the evergreen oak or holly (Quer - cus ilex). See Aquifoliace^.

ILFRACOMBE, ll'fra-kom, England, a seaport and fashionable health resort in North Devon, on the Bristol Channel, 14 miles north¬ west of Barnstable. It has a fine harbor and promenade and the town, built in terraces on a hill, is noted for its picturesque situation and

the beauty of the surrounding scenery. Pop.

8,935.

ILI, il'e, a river of central Asia, flowing partly in China and partly in Russia. It takes its rise in the Tian-shan Mountains in Dzun¬ garia. flows west and northwest and empties into Lake Balkash by several mouths after a course of about 700 miles, about half of which is navigable. In its upper course it is called the Tekes.

ILIAD. Homer, as Horace says in the (Ars Poetical does not begin the tale of Troy with the egg of Leda ; that is, he does not frame his tale in a complete handbook of Greek mythology, but plunges into the midst of things and hastens to the event. Similarly a modern epitomizer must proceed at once to the story of the (Iliad. > The real siege of Troy may have been a contest for the trade of the East and

not an expedition to recover the beautiful Helen of Sparta, daughter of Zeus, wife of Menelaus, and sister of Castor and Pollux (consult Leaf, Walter, (Homer and History)- But the conjectures of modern scholarship add nothing to the story as told by Homer and by the excavations on the hill of Hissarlik.*

The Iliad conforms to Aristotle's prescrip¬ tion that an epic poem should not be a chronicle or a biography (as e.g., (The Life and Death of Jason)), but a unified action. The (Iliad) by its title is the poem of Ilium, the poem of the siege of Troy. But the first word menis, wrath, in¬ dicates the unity of the real subject — the quar¬ rel of Achilles with his overlord, the com- mander-in-chief, Agamemnon, and its fateful consequences for the course of the war and for Achilles himself. A few words suffice for the essential plot. In the 10th year of the siege Achilles in the assembly takes the part of the soothsayer Calchas who announces that Apollo has sent a pestilence upon the Greeks because Agamemnon has re¬ fused to return to her father, the priest Chryses, the girl Chryseis, his prize from the spoils of a captured Trojan town. After a fierce altercation, Agamemnon sullenly re¬ nounces Chryseis but threatens in revenge that he will deprive Achilles of the girl Briseis whom Achilles deeply loved although she was the cap¬ tive of his spear. Achilles does not overtly re¬ sist the authority of the overlord, but when Briseis is taken from him he renounces his al¬ legiance and remains in his tent (hut), eating his heart, aloof from the war. His mother, the sea goddess Thetis, hears his laments, rises from the sea, learns the story of his wrongs, and appeals to Zeus to punish Agamemnon by bringing defeat upon the Greeks in the absence of Achilles. Zeus, unable to resist the appeal of Thetis, who clasps his knees and reminds him of former benefits, gives the promise and confirms it by the nod of his head which in Homer's sublime description was the inspira¬ tion of Pheidias' colossal statue of the god at Olympia. The first book closes with a descrip¬ tion of the assembled

gods on Olympus in which the jealous spouse of Zeus, Hera, taunts him with his concession to Thetis, and her son, the lame Hephaestus (Vulcan), plays the role of peacemaker and provokes unextinguishable "Homeric" laughter by assuming the function of Hebe, the beautiful maiden cupbearer of the gods.

The subsequent action of the poem shows how when the promise of Zeus has been ful¬ filled, when the Greeks are driven back to their camp upon the shore, and Hector is firing their ships, Achilles so far relents as to send forth to the battle his dearest friend Patroclus at the head of his Myrmidons. Patroclus is slain by Hector, and in a frenzy of passion and grief Achilles hurls himself into the war, does terrible execution upon the Trojans, and after pursuing Hector thrice about the walls of Troy kills him in single combat. The ransom of the body of Hector by his father Priam, his burial, and the lamentations of Andromache, Hecuba and Helen for the chief defender of Tr.oy conclude the episode and the action of the poem, which occupies about 45 days.

If rigidly restricted to this outline the poem would be a menis or song of the wrath, an Achilleis or story of Achilles. It is an Iliad, an episode of the Trojan War built up about the unity of this central action. The broader compass is made possible by the retardation of the main action, the fulfilment of Zeus' promise, and the filling up of this time with episodes that familiarize us with the leading personages on either side, display the prowess of other Greek chieftains, yet reveal their inadequacy to supply the lack of the invincible Achilles, and heighten the dramatic suspense and deepen the moral lesson of the poem by portraying Achilles' implacable and eloquent rejection of a last de¬ spairing .appeal of the Greek chieftains. As an exercise in the abstract logic of plot con¬ struction, it is possible to extract from the (Iliad5 a swifter moving storv of Achilles that omits some or all of these things and narrates the wrath and nothing but the wrath. It would not be nearly so good a poem as the present (Iliad, and there is not an atom of evidence that it ever existed.*

Retardation and digression in reasonable measure have always been devices of the story teller's art, and there are no great poems and few great novels in the world that attempt to obey the prescriptions of Poe's un¬ deviating logic of the short story.

In the (Iliad) as we have it, digression, re¬ tardation or preparation fill the greater part of Books II-XI. Book II exhibits a debate in the assembly on the continuation of the war, a march out for battle, and a muster roll of the forces, the (Catalogue of Ships, a sort of domesday book of early Greece. In Book III a truce is arranged, and the issue is staked upon a single combat between Paris, the author of the war, and the injured husband, Menelaus. Helen and King Priam survey the Greek army from the walls of Troy and Helen's description introduces to us many of the leading personages of the poem. In the 4th book the breaking of the truce by the Trojans is distinctly in¬ terpreted by the poet as insuring the moral superiority and the ultimate triumph of the Greek cause. The exploits of Diomede and the confused fighting of the 5th book may seem a mere digression to modern readers, but would not offend hearers who are interested in Diomede and who enjoy vivid descriptions of fighting for its own sake. Diomede's suc¬ cess provides a fairly plausible motive for Hector's return to Troy in the 6th book to invoke the aid of Athena, guardian of the city. And this gives occasion for the meeting with*

his wife and the exquisite episode known as the parting of Hector and Andromache. Like the scene of Priam and Helen on the wall this may be justified as a device of poetic perspective. The poet had to bring within the action of 45 days whatever scenes were needful for our in¬ telligence of the story or to make it impressive to our feeling. The subsequent fortunes of Hector in the battle interest us infinitely more after we have seen him

Kiss his child and tossing high in air

Thus to the gods prefer a father's prayer,

and have overheard the ineffable tenderness and patriotic resignation of his farewell to his wife.

Hector's return to the battlefield is marked by what strict logic regards as a superfluous replica of the duel between Paris and Mene- laus — a similar single combat between Hector and Ajax, the mightiest Greek champion in the absence of Achilles. The general course of the fighting in books VII and VIII finally goes against the Greeks, who at the end of the 7th book build a wall to protect their camp, another instance perhaps of the unavoidable license of poetic perspective. All this prepares and supplies a motive for the episode of the 9th book, the embassy of Ajax, Odysseus and old Phoenix to offer atonement to Achilles on the part of Agamemnon and implore him to come to the rescue of his old companions in arms. Achilles' refusal was thought by Glad¬ stone to be the finest speech in the world. To¬ gether with the parting of Hector and An¬ dromache it should be meditated by critics who really believe that our enlightened age can feel only an historical curiosity about the rude and primitive art of Homer.

The 10th book relates how on the same night Odysseus and Diomede capture and kill the Trojan spy Dolon, and surprising the Trojan camp slay the newly arrived ally Rhesus, king of the Thracians, and drive away his white steeds. At the beginning of the 11th book the dawn of the 26th day ushers in a long and con¬ fused battle which lasts to the end of the 18th book. Near the end of the 11th book Achilles standing at the stern of his great ship observes the retreat of the Greek wounded, exults over their desperate need of him in language that literal minded critics have deemed incompatible with Agamemnon's offer of atonement in the 9th book, and dispatches Patroclus to learn the course of the battle. Various delays detain Patroclus in conversation with prolix old Nestor or in attendance on a wounded friend until after many alternations

the battle goes against the Greeks and Ajax makes a last stand against Hector endeavoring to fire the ships. Then at the end of the 15th book Patroclus hastens back, and with his reproachful appeal to Achilles at the beginning of the 16th book we enter into the main current of the dramatic action that moves swiftly to the tragic denoue¬ ment. The descriptions of the fighting in books XI to XV may be said to be strung together on the thread of Patroclus' mission, and are re¬ lieved by vicissitudes of fortune, splendid ex¬ ploits such as Hector's first breach in the Gre¬ cian wall (end of Book XII) and the mythologi¬ cal machinery (in Book XIV) of Hera's seduc¬ tion and beguilement of Zeus in order to give Poseidon opportunity to aid the Trojans.

In the 16th book Patroclus clothed in the

armor of Achilles goes forth to battle at the head of the Myrmidons, and after slaying the great Lycian champion, Sarpedon, is himself killed and stripped of Achilles' arms by Hector whose death he foretells as he dies. Another book of fighting, the 1 7th, recounts the contest for the corpse of Patroclus and the exploits of Menelaus. The 18th book tells — in Mrs. Browning's words —

How Achilles at the portal

Of the tent heard footsteps nigh,

And his strong heart half immortal

Met the Keitai [he lies dead] with a cry.

His lamentations as in the 1st book call his goddess mother from the sea. She promises to procure him new armor from Hephaestus., and meanwhile he steps unarmed to the trench and shouts so terribly that the Trojans give way and the Greeks recover the body of Patroclus. This is one of the two passages -that Tenny¬ son selected for experimental translation. The other is the description or simile of the shep¬ herds in the moonlight at the end of the 8th book —

in which Pope's translation so conspicu¬ ously failed and which is often used by critics to test the merits of new translations. The last 200 lines of the 18th book are occupied by a description of the scenes of Homeric life de¬ picted by Hephaestus' art on Achilles' shield — a wedding, a trial for homicide, a siege and an ambuscade and a battle, a harvest scene, a vintage scene, a fight with lions attacking a' herd, a dance.

The 19th book contains the formal renuncia¬ tion of Achilles' wrath, his somewhat indifferent reconciliation with Agamemnon, the return of Briseis, the preparations for another battle, and the final picture of Achilles driving forth in his car in all the terrors of the divine armor. The fighting of the 20th and 21st books, though re¬ lieved by some magnificent passages, does not quite meet the expectations of modern readers. The battle between the gods who descend to the Trojan plain was perhaps not taken altogether seriously by Homer. And Achilles' contest with the river god Scamander and his rescue from the pursuing waters by the fire god Hephaestus are fantasies in which the proportion of allegory is not easy to determine. The climax of the 22d book, however, in which Hector is slain, leaves nothing to be desired in natural pathos of human feeling, dramatic in¬ tensity and firmness of artistic composition. This is the book selected in Jebb's (Homer) for analysis as an illustration of Homer's style. When the Trojans are driven within their walls. Hector, whose overconfidence has been the chief cause of the disastrous rout, feels in honor bound to redeem his previous boast that he would not flinch from confronting Achilles' self. In spite of the piteous appeals of father and mother he remains without the gates, and though in a moment of uncontrollable panic he flees thrice around the sacred walls he had kept so well, he at last makes a brave stand and accepts the doom which he half foresaw when he parted from Andromache. Some modern critics have held that the poem should properly end with this climax. That was not the feeling of the Greeks nor apparently of Homer. An¬ dromache's

lament for Hector concludes the 22d book on a note of pathos which it would be impossible to sustain. The art of the poet,

therefore, interposes in the 23d book the relief of the long and interesting and sometimes slightly humorous description of the funeral games which Achilles held in honor of Patro- clus. In the 24th and last book we return to Hector, whose dead body Achilles maltreats, to the indignation of the gods, who arrange for its ransom. Priam, guided through the night by Hermes, finds his way to the hut of Achilles and endures what no mortal man hath ever borne, to put to his lips the hands that slew his son. In a scene of unequalled pathos the two, bethinking them of their dead, mingle their tears. Priam returns to Troy with the body of his son ; and the beautiful threnodies of An¬ dromache the wife, of Hecuba the mother, and of the guilty Helen, who now has no one left to say a kind word to her in all broad Troy, con¬ clude the poem. As a late Greek epigrammatist writes :

Hector whom Homer sings to every age,". .

The sole support of Ilium’s god-built walls,.

Thy funeral sealeth that immortal page;

The rest is silence when great Hector falls.

The appetite of unspoiled childhood will always relish Homer whether as the older gen¬ erations did in the rhetorical rhyme of Pope or as is the present fashion in the Biblical prose of Lang, Leaf and Myers. But -the sophisticated taste and the distracted attention of the adult reader can recover this freshness of apprecia¬ tion only by an effort. The effort is well worth making.

Of course regarded merely as documents the Homeric poems repay study. ((The multitude of things in Homer is wonderful,® says an older English critic. There are few books in the world that depict a life, a stage of civilization, so completely and so vividly as do the Homeric poems. And this interest is now doubled by the possibility of comparison with the immense array of facts brought to light by the excava¬ tions of Troy, Mycenae, Tiryns, Orchomenus and in Crete, and the enormous literature of speculation that has grown up about them.

There are greater obstacles to the unfeigned enjoyment of the

Homer's sustained art are lacking, and for con¬ tinuous perusal even the polished declamatory rhetoric of Pope will serve many readers better than the intolerable ruggedness and the un- Homeric conceits of the Elizabethan. Readers who cannot be at the pains thus to employ many aids in recovering something of the spell of the original may at least clear their minds of the conventional cavils of modernistic cant. If the excess of fighting wearies them, they are no more required to read the (Iliad' through con¬ tinuously than so to read the (Faerie Queen' or (Paradise Lost.' Having the main story in mind they may read in various versions the speeches of Achilles, the parting of Hector and Andromache, the description of the shield, the 22d book, the games, the ransom of Hector, or whatever attracts them most. And if modernis¬ tic or pseudo-scientific critics seek to mar our enjoyment by laying it down that the Homeric simile, the standing Homeric epithets, the repe¬ tition of certain formulas or motives are in themselves notes of a childish, a primitive, an inferior art, we have only to ask ourselves how do they know it? Is it true? Or may not these traits of Homeric style together with the roll of the Homeric hexameter be rather, as the over¬ whelming majority of the best informed modern critics from Sainte-Beuve to Quiller-Couch be¬ lieve, the effectively and consciously employed conventions of the noblest art of poetry that has yet been given to man ?

Paul Shorey,

Head of Greek Department, University of Chicago.

ILINIZA, or ILINISA, Ecuador, a moun¬ tain, 20 miles south-southwest of Quito. It is capped by two peaks, the southernmost, as de¬ termined trigonometrically by Reiss and Stiibel, being 17,406 feet high. Iliniza is presumably an extinct volcano, but there is no record of an eruption. The upper portion is covered with perpetual snow, and usually cloud-capped.

ILION, N. Y., village, Herkimer County, on the Mohawk River, the Erie Canal, and on the West Shore and the New York Central and Hudson River railroads, about three miles west of Herkimer and 12 miles southeast of Utica. Ilion is in the vicinity of the locations of some of the old ((castles" of the Indian tribes who inhabited the Mohawk Valley. White people lived here in the early part of the 19th century, but no permanent settlement was made until 1828. It is situated in an agricultural county, but the village is noted for its manufacturing industries. The chief manufactures are type¬ writers, firearms, sewing-machines, filing cases, bicycles, knit goods, flour and some dairy prod¬ ucts. Its export trade consists chiefly of the manufactured articles and farm products. It has a public library, municipal waterworks, electric-lighting plant and a number of fine public buildings. Pop. (1920) 10,169.

ILISSUS, il-is'us, Greece, a small river flowing through Athens, famous in the classical age, but now unimportant and often wholly dry.

ILITHYIA, il-ith-i'ya, in Greek mythology, the goddess who assisted women in childbirth. In after times she was according to one myth identified with Artemis, and according to an¬ other, with Hera,

ILIUM, or ILION, a name of Troy (q.v.), in Asia Minor, which was founded by Ilus.

ILIYATS, ihe- yats, a nomadic Moham¬ medan race of Persia, Khiva and Turkestan. The name Iliyat is the plural of iel (ell), a tribe equivalent to the Arabic kabilah. The Iliyats are mostly of Turkish, Arabic and Kurdish de¬ scent, and form an important portion of the population of Persia and adjacent countries; their actual numbers are not known, but it is said that the Iliyat tribes tributary to Khiva number 195,000. They live- in tents and have no settled habitations. They are of the Sunni sect, but are not very strict. The women are said to be chaste, and many of the best families in Persia are of Iliyat origin.

ILKESTON, il'kes-ton, England, a town of Derbyshire, 10 miles northwest of Derby. It first comes into history in 1251 when it was given the right to hold a fair, but it was not incorporated as a town until 1887. The gas works, water supply system, public market and cemetery are the property of the town. Nearby are coal mines and iron foundries. The town manufactures hosiery, lace and stoneware. Pop.

31,673.

ILLiENUS, il-le'nus. See Tribolites.

ILLAMPU, e-lyam'poo, or SORATA, a

mountain of Bolivia, in the eastern Cordillera, overlooking Lake Titicaca, 50 miles north-north¬ west of La Paz. It is about 21,500 feet in height, and is believed to be the highest moun¬ tain of the Bolivian Andes, though this distinc¬ tion is also claimed for Illimani (q.v.) ; it is probably exceeded by the Cerro de Huascan in Peru and by Aconcagua in Chile. Illampu is a magnificent mass, with three principal peaks, of which the most northern one which fre¬ quently is called Illampu by itself, has never been scaled. Seen from Titicaca it is the grandest mountain in America. Consult Con¬ way, Sir W. M., (The Bolivian Andes (New York 1901)*

; De Bonelli, L. H., (Travels in Bo- livia) (2 vols., London 1854) ; Forbes, D., (Geology of Bolivia and South Peru* (In Quar¬ terly Journal of the Geological Society , Vol. ■XVII, p. 7, London 1861).

ILLE-ET-VILAINE, e-la-ve-lan', a mari¬ time department, formed out of the northeast portion of northwest France, old province of Brittany; area, 2,699 square miles; pop. (1911) 608,098, mostly of Celtic race. It is watered chiefly by the Vilaine and its tributary, the Ille, which unite near Rennes, the capital of the department. Ule-et-Vilaine consists of a granite plateau traversed by ranges of low hills. It is agricultural, cultivation having been greatly improved during recent years. The cider of this district is the best in France; the butter of Rennes is celebrated; the horses of the department are noted for their endurance and are in great request for the army; and bee¬ keeping is prosecuted. Iron is mined; slates are quarried; and salt is extracted. Saint Malo is the principal seaport.

ILLEGAL PRACTICES. See Corrupt

Practices Acts.

ILLEGALITY, the condition which arises when an act is performed in violation of the law. Its principal effect is to deprive the act

of a legal status and if a contract, to render it unenforceable. A state of illegality results from positive statute expressly forbidding the act, such as gambling, or from general consid¬ erations of public policy. The law generally refuses to undo an illegal act, but innocent third parties may secure relief.

ILLEGITIMACY, the legal status of chil¬ dren born out of wedlock, is a subject discussed under three points of view, moral, legal and economic. As to what constitutes illegitimacy is variously defined in different countries where great variety exists

both in theory and prac¬ tice. As to the legal status of illegitimate chil¬ dren from the moral point of view, see Bas¬ tard.

Only in a few European countries are sta¬ tistics available to show the extent of illegiti¬ macy, and there are no statistics in Canada. In the United States there seems no efficient national system of registration of marriages and births. Some of the individual States re¬ cord the illegitimate births, but the figures are misleading, because incomplete. Thus, the State of Indiana, a few years ago, returned 38,- 370 legitimate and 560 illegitimate births — the illegitimate being only about 1.46 of the whole.

In the following table is shown the compara¬ tive prevalence of illegitimacy in the principal European cities :

Illegitimate Births to Every 1,000 Born.

Vienna . 449 Dresden . 208 Hamburg…. 138

Prague, . 439 Milan . 204 Frankfort…. 132

Munich . 439 Rome . 194 Turin . 132

Stockholm. . . . 396 Venice . 189 Antwerp. . . . 129

Moscow . 300 Breslau . 186 Cologne . 124

Budapest . 299 Bucharest… 175 Palermo . 101

Copenhagen… 279 Liege . 174 The Hague . . 99

Paris . 268 Christiania.. 162 Naples . 86

Petrograd . 236 Berlin . 154 Rotterdam. . 70

Trieste . 211 Ghent . 144 London . 64

Leipzig . 211

None of the above figures are presented as absolutely accurate. They can only be approx¬ imate in the best case, for in every country there must

always be a large number of bas¬ tards who either are not registered at all, or who are registered as legitimate. But as far as they go the figures are instructive. They do not, however, enable one to form any conclu¬ sion as to the causes of illegitimacy in respect either of religion, of education, of industrial occupation or of distribution of population. Neither can any theory be well evolved from a racial basis.

From the only available statistics the follow¬ ing table has been prepared showing the aver¬ age rate of illegitimacy in various countries :

Per cent of

Per cent of

illegitimates to

illegitimates to

total births

total births

England and Wales . .

. 4.60

Portugal .

14.00

Scotland .

. 6.80

Rumania .

5.00

Ireland .

. 2.60

Russia .

3.00

Austria (average) ....

. 14.10

Spain .

5.40

Lower Austria .

. 26.00

Sweden .

14.8.8

Upper Austria .

. 20.00

Norway .

7.90

Dalmatia .

. 3 . 50

Switzerland .

4.80

Hungary .

. 8.00

Brazil .

25.00

Belgium .

. 9.30

Canada .

Denmark .

. 10.00

Costa Rica .

24 00

France .

. 8.20

Guatemala — Whites

50.00

Germany (average) . . .

. 9.47

Indians

25.00

Upper Bavaria. . . .

. 15.67

New South Wales. . .

4 65

Prussia .

. 8.24

Victoria .

4.78

Alsace-Lorraine .

8. 10

Queensland .

3.97

Greece .

1.60

West Australia .

3 . 95

Holland .

3.22

Tasmania .

3.40

Italy .

. 7.45

New Zealand .

3.12

In Scotland, where education is general, and thrift national, the rate of illegitimacy is noto¬ riously high. And, as regards morals, it should be remembered that a high percentage of illegitimacy may mean that there is little or no prostitution. In Europe, generally, although not universally, there seems a tendency to de¬ crease in the rate of illegitimacy; but how far that appearance may be due to moral causes it is impossible to say.

ILLICHPUR. See Ellichpur.

ILLIMANI, el-ye-ma'ne, Bolivia, a vol¬ canic mountain mass of the East Andean Cor¬ dillera, about 20 miles south of La Paz. It is a serrated ridge with four principal peaks, the loftiest of which, Condor Blanco, is 21,149 feet above sea-level. Illimani signifies <(snow-moun- tain55 ; the line of perpetual snow commences at 15,000 feet, and there

are glaciers on the north side at an elevation of 16,350 feet. At an alti¬ tude of 15,950 feet there is a considerable lake also bearing the name of Illimani. Among the first Europeans to make the ascent of the high¬ est peaks are Wiener, Grumbhow and Ocampo in 1877 and Sir Martin Conway in 1898.

ILLINGTON, Margaret, American ac¬ tress: b. Bloomington, Ill., 23 July 1881. She was educated at Illinois Wesleyan University and studied at the Chicago Musical College. She made her debut in (The Pride of Jennico, 5 at the Criterion Theatre, New York, in 1900, played in Daniel Frohman's Stock Company at the Lyceum Theatre, New York, in 1902-03 and in the latter year created the leading role in (The Japanese Nightingale.5 Subsequently she played the leading roles in (1915— 16) ; (Our Little Wife5 (1916—17) and was a co-star with John Drew in 'The Gay Lord Quex) (1917-18). In 1903 she married Daniel Frohman, but later separated from him and in 1909 was married to Edward J. Bowes of San Francisco.

ILLINGWORTH, John Richardson, Eng¬ lish clergyman and author: b. London, 26 June 1848; d. Longworth, 22 Aug. 1915. He was graduated from Christ Church College, Oxford, in 1871. From 1872-83 he was tutor of Keble College and Fellow of Jesus College, Oxford. After 1883 he was rector of Longworth in Berkshire. From 1905 he was honorary canon of Christ Church, Oxford. He was select preacher at Oxford University in 1882, and filled the same office at Cambridge University in 1884 and 1895. In 1894 he delivered the Bampton lectures. He was the author of sev¬ eral volumes, (Sermons preached in a College Chapel5 (1888) ; 'University and Cathedral Scrmons) (1893); Personality, Human _ and Divine> (Bampton Lectures, 1894) ; 'Divine Immanence5 (1898) ; 'Reason and Revelation5 (1902) ; Christian Character5 (1904) ; 'The Doctrine of the Trinity5 (1907) ; (Divine Transcendance5 (1911); 'Gospel Miracles5 (1915). Consult (Life and Work of John Richardson Illingworth5 (ed. by his wife,

1917).

ILLINOIS, ll'li -noi' or -noiz, the eighth State admitted into the Union, and since 1890 the third in population, is one of the North Central States of the United States. It is widely known as the Prairie State.55 It lies between 87° and 35' and 91° and 40' W. longi¬ tude, and between 36° and 59' and 42° and 30' N. latitude. By the enabling Act of Congress, by virtue of which the State was organized, its boundaries were fixed as follows : ''Beginning at the mouth of the Wabash River, thence up the same, and with the line of Indiana, to the northwest corner of said State ; thence east with the line of the same State to the middle of Lake Michigan ; thence north along the middle of said lake, to north latitude 42 de¬ grees 30 minutes ; thence west to the middle of the Mississippi River ; and thence down along the middle of that river to its confluence with the Ohio River; and thence up the latter river along its northwestern shore, to the beginning.55

Topography, etc. — Illinois is practically surrounded by water. It is bounded on the northeast by Lake Michigan, on the north by Wisconsin, on the east by Indiana, on the south by Kentucky and on the west by Iowa and Missouri. It is separated from the two last named States by the Mississippi River, from Indiana by the Wabash and Ohio, and from Kentucky by the Ohio. Illinois has a gross area of 56,665 square miles, but 622 square miles represent water surface. Its extreme length is 385 miles and its extreme breadth 218 miles. It ranks twenty-third in size among the States of the Union. With the ex¬ ception of Georgia, its area is greater than that of any one of the original States of the Union. It comprises a territory larger than that of England, or of Belgium, Switzerland and Hol¬ land combined. The largest county, McLean, has an area of 1,166 square miles, and the smallest, Putnam, an area of 176 square miles. With two exceptions — Louisiana and Dela¬ ware — Illinois is the most level of the States. Its greatest elevation is 1,150 feet above the sea, and its mean elevation is 550 feet. The larger part of its surf ace. consists of level or

slightly undulating prairies, but a portion of the extreme northwestern part is hilly, and there are occasional bluffs upon the Illinois and Mississippi rivers. In the extreme south also there is a range of hills rising to a height of about 1,000 feet.

Soil. — The soil consists of a rich black loam, or mold, underlaid by drift deposits, in many places of great depth, and varying from 10 to 200 feet. There are three sources of the soil in this State. The residuary soil, resulting from the decay of the original rock layers, is the first. Before the visit of the first ice sheet the entire State was probably overlaid with thick layers of residuary soil. A second kind of soil came from the first ice sheet, which brought into the State great quantities of waste material from the regions around and beyond the lakes. This was left scattered over the State, but it soon weathered and with the addi¬ tion of humus made a black and rich prairie soil. After the disappearance of the first ice sheet and the making of the waste material into soil, there was a thick deposit of loess, which covered not only the glacial soil but also the residuary soil. After thousands of years there

was a second ice invasion which reached as far south and west as the line traced west and north from Paris. A second glacial layer of waste several feet thick was thus left upon the loess beds. Illinois consequently has soil whose source is the residuary rocks (the area being very limited), soil from the loess deposits and that from the last ice sheet in the northeastern counties. The soil of the river valleys is allu¬ vial and is especially fertile. The northern part of the State is especially well suited to the cul¬ tivation of hay, the north and central parts to Indian corn, the east to oats and the southwest to wheat.

Rivers, etc. — The water courses flow gen¬ erally

from the north and northeast to the south and southwest. The principal river of the State, the Illinois, is formed by the junction in Grundy County, 40 miles southwest of Chicago, of the Kankakee and Des Plaines. The last-named river takes its rise in Wisconsin and flows in a southerly direction, while the headwaters of the Kankakee are in northern Indiana. The Illinois is navigable for 245 miles and is con¬ nected by the Illinois and Michigan Canal with Lake Michigan. Other rivers in the State are the Sangamon, which flows in a westerly direc¬ tion into the Illinois; the Kaskaskia, which flows in a southwesterly direction and empties into the Mississippi near the ancient village of Kaskaskia, the first capital of the State ; Rock River, which flows in a southwesterly direction from Wisconsin and empties into the Missis¬ sippi not far from the city of Rock Island; the Little Wabash and the Embarras, which flow into the Wabash in the southeastern part of the State; and the Vermilion and the Fox, which are tributaries of the Illinois.

Climate. — Illinois lies between the isotherm of 55 on the south and 47 on the north. It is notable for extremes of temperature. Warm winds sweeping up the Mississippi Valley cause extreme heat; the Arctic winds from the north, unblocked by mountains, cause the ex¬ tremes of cold. The range of extremes is greater in the north than in the south. Thus at Winnebago extremes have ranged from 26° F. to 110° F., and at Cairo from 16° F. to 106° F. The mean temperature for Springfield, near the central part of the State, is 52° F. The variation is about 2° F. for each degree of latitude. The State is well watered. The number of inches of rainfall is about 40 for the south end of the State, but it decreases to about 34 in the north. The mean annual snow¬ fall increases from about 12 inches in the south to. about 40 in the north. The source of the rainfall is chiefly the revolving storms from the northwest. At Cairo in the south, except during February, the prevailing winds arc southerly, and as far north as Springfield they are southerly from April to

January. Through¬ out the northern half of the State, except along the shore of Lake Michigan, where they vary from northeast to southwest, the winds are mostly from the west or northwest from Octo¬ ber to March, and very variable for the rest of the year.

Population. — In 1810, one year after its or¬ ganization^ a Territory, the population of Illi¬ nois .was 12,282 ; in 1820, two years after its ad¬ mission as a State, its population was 55,211, and in rank it was the 24th State in the Union ;

in 1830. its population was 157,445 and its rank the 20th; in 1840, its population was 476,183 and its rank the 14th; in 1850, its population was 851,470 and its rank the 11th; in 1860, its popu¬ lation was 1,711,951, and its rank the 4th ; in 1870, its population was 2,539,891 and its rank the same as in 1860; in 1880, its population was 3,077,871 and its rank still 4th ; in 1890 its population was 3,826,351 and its rank the 3d; in 1900, its population had increased to 4,821,550 while its rank remained the same; in 1910, its population was 5,638,591 and its rank was still third. An analysis of the population as shown by the census of 1910 reveals the following interest¬ ing facts ; 2,600,555, or 46.1 per cent, were native whites of native parentage; 1,723,847, or 30.6 per cent, were native whites of foreign or mixed parentage; 1,202,560, or 21.3 per cent, were foreign born whites; and 109,049, or 1.9 per cent, were negroes. Of the total native population, 76.8 per cent were born in Illinois, and 23.2 per cent outside the State. Of the total white stock of foreign origin, Germany contributed 34.7 per cent ; the Scandinavian countries, 11.3; Ireland, 11.3; Austria, 9.6; Russia, 7.8; England, 5.8; Italy, 4; Canada, 3.7; Scotland, 1.8; Hungary, 1.8; and Holland, 1.1. Of the foreign born white population, Germans composed 26.5 per cent; Austrians, 13.6; Rus¬ sians., 12.4; Swedes, 9.6; Irish, 7.8; Italians, 6; English, 5 ; Canadians, 3.7 ; Hungarians, 3.3 ; Norwegians, 2.7; all other countries, 9.2. Of the negro population, 66.8 per cent were born outside of the State. In

most of the 102 coun¬ ties the proportion of foreign born whites is small, being less than 5 per cent in 40 coun¬ ties, and over 25 per cent in only six. Over two-thirds of the foreign born whites live in Cook County. Their percentage is 28.7 in the urban population and 9.5 in the rural; the percentage for the negroes is 2.5 in the urban and 1.1 in the rural districts. The male popu¬ lation predominates. In 1910 there were 2,911,- 674 males to 2,726,917 females or 106.8 males to 100 females; in 1900, the ratio was 105.3 to 100. Among native whites, in 1910, the ratio was only 101.5 to 100, but among foreign born whites it was 127.3 to 100. In the urban population there were 104.9 males to 100 females, and in the rural 109.9. These people occupied 1,006,- 848 dwellings and the total number of families was 1,264,717 or 125.6 families to 100 dwellings. The average number of persons per dwelling was 5.6, and the average number per family was 4.5. Cook county claimed 2,405,233 persons, Saint Clair County ranked next with 119,870, and Peoria County was third with 100,255'. Taking the State as a whole, it had 100.6 peo¬ ple to the square mile in 1910, as compared with 86.1 in 1900, and 68.3 in 1890. The population according to census estimates increased from 5,638,591 in 1910 to 6,152,257, in 1916, and its den¬ sity, from 100.6 to 109.8. Pop. (1920) 6,584,280.

Cities. — In 1920, 67.9 per cent of the entire population resided in incorporated places -hav¬ ing 2,500 inhabitants or over; in 1910, the per¬ cent was 61.7. In the same years the figures for the United States as a whole stood 51.4 and 45.8; for the New England States, 79.2 and 76.3; for Rhode Island, 97.5 and 96.7; for Massachusetts, 94.8 and 92.8. According to the last census there were 46 incorporated places in the State which had a population of over

ILLINOIS.

Estimated population, 6,152,257

COUNTIES

Pop.

04,588 Adams . CO

22,741 Alexander . G 11

17,075 Bond . G 8

15,481 Boone . HI

10,397 Brown . DO

43.975 Bureau . F3

8.610 Calhoun . D 7

18,035 Carroll . F 1

17,372 Cass . E 6

51,829 Champaign . 15

34,594 Christian . G7

23.517 Clark . J 7

18.661 Clay . H 8

22.832 Clinton . G 8

34.517 Coles . 16

2.405,233 Cook . J 2

26.281 Crawford . J 8

14.281 Cumberland . 17

33,457 Dekalb…., . H2

18,906 Dewitt . H 5

19,591 Douglas . 16

33,432 Dupage . 12

27,336 Edgar . X 6

10,049 Edwards . 19

20,055 Etllngham . H 7

28,075 Fayette . G7

17,096 Ford . 14

25,943 Franklin . H 9

49,549 Fulton . E 5

14,628 Gallatin . I 10

22,363 Greene . E 7

24,162 Grundy . I 3

18,227 Hamilton . H 9

30,638 Hancock . C5

7,015 Plardin . I 11

9,724 Henderson . D 4

4 1 .736 Henry . E 3

35,543 Il'oqouis . ... .J 4

35,143 Jackson . G lo

18,157 Jasper . 17

29.111 JelTerson . H9

13.954 Jersey . . . . E 7

22,657 Jo Daviess . E 1

14,331 Johnson . H 11

91,862 Kane . 12

40,752 Kankakee . J 3

10,777 Kendall . 12

46,159 Knox . E 4

55,058 Lake . I 1

90,132 LaSalle . H 3

22.661 Lawrence . 18

Incorporated Cities,

2,464 Abingdon . E4

269 Addievllle . G 9

579 Addison . J 2

155 Adeline . F 1

200 Akin . H 10

618 Albany . ,E 2

1,281 Albion . 19

2,144 Aledo . ,D 3

829 Alexis . D 3

642 Algonquin . I 1

433 Alhambra . F8

245 Allenville . H 7

379 Allerton . J 6

380 Alma . G 8

358 Alpha . E 3

1,328 Altamont . H 7

22,874 Alton . E 8

528 Altona . E3

551 Alto Pass G10

319 Alvin . J 5

1,749 Amboy . G 2

299 Andalusia . D 3

222 Andover, Henry… E 3

2,809 Anna . . . . . G 11

398 Annawan . F3

682 Antioch . J 1

581 Apple River . F 1

2,100 Areola . 16

518 Arenzvllle . E 6

519 Argenta . E 6

370 Arlington . . . G 3

1,943 Arlington Heights. .1 1

327 Armington . F 5

366 Arrowsmith . H 5

1,080 Arthur . 16

416 Ashkum . I 4

1,096 Ashland . F 6

913 Ashley . G 9

511 Ashmore . 16

779 Ashton . G 2

1,918 Assumption . G6

1 ,357 Astoria . E 5

1,340 Athens . F 6

805 Atkinson . E 3

1,367 Atlanta . G 5

659 Atwood . F 7

1,814 Auburn . . F 6

1,146 Augusta . . . . . G 5

34,204 Aurora . W2

780 Ava . F14

2.668 Avery vllle. Peoria. F 4

397 Aviston . F8

865 Avon. Fulton . E 5

144 Baalton. Stephenson F 1

358 Baldwin . F9

252 Barclay . F 6

335 Bardolph . D 5

1,444 Barrington . I 1

1.647 Barry . C6

344 Bartelso . F 8

408 Bartlett. Cook . J 2

1,536 Barton ville. Peoria. F 4

255 Basco . C 5

4,436 Batavia . I 2

300 Batchtown . D 7

4 75 Bath . E 5

385 Baylis . D 6

6.107 Beardstown . E 5

401 Beaverville . J 4

764 Beckemeyer . G8

543 Beecher . J 3

355 Beecher City . H .7

433 Belgium, Vermilion. J 5

404 Belknap . H II

87 Belle Prairie . H9

312 Bellerive . H 9

21,149 Belleville . F9

394 Bellflower . H5

550 Bellmont . I 9

943 Bellwood, Cook…J 2

7,253 Belvidere . H 1

1,530 Bement . H 6

205 Benbow City,

Madison . F 8

1,912 Benld . F 7

443 Bensenville, Dunage f

Pop.

27,750 Lee . G2

40,465 Livingston . H4

30,216 Logan . G 5

26,887 .McDonough . D 5

32,509 McHenry . I 1

68,008 McLean . 114

54,186 Macon . G 6

50,685 Macoupin . F7

89,847 Madison . I-' 8

35,094 Marion . H 8

15,679 Marshall . G3

17,377 Mason . F5

14.200 Massac . If 11

12,796 Menard . F5

19,723 Mercer . D 3

13,508 Monroe . E9

35,311 Montgomery . G7

34,420 Morgan . E 6

14,630 Moultrie . H 6

27,864 Ogle . G 1

100,255 Peoria . F4

22,088 Perry . G 9

16.376 Piatt . H 5

28,622 Pike . D 6

11 215 Pope . H 1 i

5.650 'Pulaski . G 1 1

7.561 Putnam 03

29,120 Randolph . F 9

15.970 Richland . 18

70.404 Rock Island . D3

119.870 St. Clair . F 9

30,204 Saline . H 10

91,024 Sangamon . F7

14.852 Schuyler . D 5

10,067 Scott . D 6

31,693 Shelby . H 7

10,098 Stark . F 3

36,821 Stephenson . FI

3 4.027 Tazewell . / ... F 5

21.856 Union . G 11

77.996 Vermilion . J 5

14,913 Wabash . J9

23,313 Warren . D4

18,759 Washington . G 9

25,697 Wayne . 19

23.052 White . 19

34,507 Whiteside . F 2

84.371 Will . J 3

4 5.098 Williamson . H 10

63,153 Winnebago . G 1

20.506 Woodford . G 4

Towns, and Villages

362 Benson . G 4

89 Bentley. . . C 5

2,675 Benton . H 9

251 Berlin, Sangamon. F 6

5,841 Berwyn, Cook . I 2

447 Bethalto . E8

859 Bethany . H8

400 Biggsville . D4

191 Bingham, Fayette. ,G 8

382 Birds . ,J 8

289 Bishop Hill . E3

987 Blandinsville . D 4

462 Bloomiugdale,

Dupage . 12

27,258 Bloomington . H 5

9,254 Blue Island . J 8

900 Blue Mound . G 2

766 Bluffs . D 6

485 Bolton . F 6

517 Bone Gap . J 1

162 Bonfield . 19

611 Bourbonnais . ,J 3

606 Bowen . C3

971 Braceville . 15

770 Bradford . . F 3

1,942 Bradley . J 3

1,958 Braidwood . 13

2.128 Breese . F8

2,703 Bridgeport . J 8

595 Brighton . F7

576 Brlmfield . F4

394 Bristol . 12

489 Broadlands . 1 9

246 Broadwell . G5

558 Brocton . f. . . .J 6

2,186 Brookfield. Cook.. J 2 1,569 Brooklyn, St. Clair F 9

1,443 Brookporc . H 11

398 Brookville . FI

470 Broughton . 110

551 Browning . E5

419 Browns . 19

415 Browns town . G 7

283 Brussels . ,D8

237 Bryant . : E 5

272 Buckingham . I 3

495 Buckley . 14

887 Buda . F 3

475 Buffalo . -G 6

1,046 Bunker Hill . E7

534 Bureau . F3

187 Burksville . E 9

282 Burlington, Kane.. I 2 328 Burnham, Cook. . J 2

565 Bush . G 10

2,619 Bushnell . E 4

233 Butler . F7

932 Byron . ,,G 1

321 Cabery . I 4

360 Cable . E 3

15,794 Cairo . G 11

323 Camargo . I 6

1,272 Cambridge . E 3

414 Campbell Hill …. F 10

1.148 Camp Point . C5

241 Campus . I 3

13,262 Canton . E 5

318 Cantrall . . . F 7

366 Carbon Cliff, R. I. D 3

562 Capron . H 1

5,411 Carbondale . G 10

820 Carbon Hill . 13

1,031 Cardiff . . .* . I 3

3,616 Carlinville . E7

1,982 Carlyle . G8

2,833 Carml . I 9

1.128 Carpenters ville. . . II

1.558 Carrier Mills . H 10

2.323 Carrollton . E 7

2,971 Carterville . G 10

2.373 Carthage . C5

679 Cary Station . I 1

2.157 Casey . J 7

613 Casey ville . F8

952 Catlin . J 5

306 Cayejn Rock .... I 11

Pop.

545 Ceaar Pt.. La Salle H 3 31 1 Cedarville . FI

287 Central City,

Grundy . I 3

1,179 Central City . G 8

11,538 Centralia . G9

876 Cerro Gordo . H 6

527 Chadwick . E 2

14,508 Champaign . I 5

884 Chandlerville . E 5

208 Channahon, Will. . .J 3

552 Chapin . E 6

5,884 Charleston . 16

666 Chatham . . F 6

1,112 Chatsworth . 14

590 Chebanse . .14

1,314 Chenoa . H 4

1,048 Cherry . 03

433 Cherry Valley ...HI

2,747 Chester . F lo

364 Chesterfield . E7

2.497,722 Chicago . K 2

21.693 Chicago Heights… J 2

1,851 Chillicothe . F4

1 193 Chrisman . . .J 6

1,825 Christopner . G 10

19,974 Cicero, Cook . 12

379 Cisco . II 6

373 Cisne . 19

652 Cissna Park . J 4

186 Claremont . .1 8

230 Clarke City . 13

837 Clay City . I 8

940 Clayton . C6

634 Clifton . 14

5,165 Clinton . . H 5

2.667 Coal City . 13

190 Coal Valley . D 3

262 Coatsburg . C 5

988 Cobden .... ."T. ... G 11

980 Coffeen . G 7

1,445 Colchester . D 5

965 Colfax . H 4

7.478 Collinsville . F8

217 Colona . E 3

2,076 Columbia…..... . E9

134 Columbus, Adams .C 6

387 Compton . G2

332 Cooksville . H 4

324 Cordova . E 2

536 Cornell . H 4

207 Cortland . H 2

949 Coulterville . F9

711 Cowden . G 7

446 Crainville . G 10

936 Creal Springs. . . .H 10 341 Crescent City . J 4

323 Creston . G 2

840 Crete . J 3

574 Crossville . 19

1,005 Crotty, La Salle. .. H 3

1,242 Crystal Lake. .....HI

2,019 Cuba . E 5

579 CUllom . I 4

324 Cutler . F 9

311 Cypress . G 11

654 Dahlgren . H 9

227 Dakota . FI

1.288 Dallas City . C 4

400 Dalton City . H6

949 Dalzell, Bureau. ,.F 3

254 Dana . G 4

410 Danforth . 14

593 Danvers . G 5

32,261 Danville . J 5

352 Davis . G 1

620 Dawson . G6

39,631 Decatur . H 6

332 Deer Creek . G 4

476 Deerfield . J 1

9,482 Dekalb . II 2

503 DeLand . H 5

1,175 Delavan . F 5

1,339 Depue . G3

644 De Soto . G 10

2,348 Des Plaines . J 1

127 Detroit . D6

220 Dewitt . G5

255 Diamond . I 3

493 Dieterich . .17

1,519 Divernon . F 6

7,216 Dixon . F 2

1,869 Dolton . J 2

702 Dongola . G 11

405 Donnellson . G7

346 Donovan . J 4

102 Dorchester . E 7

1 184 Dorrisville. Saline H 10

181 Dover Bureau…. F 3

2.601 Downers Grove …. I 2

351 Dubois . G 9

2.785 Dundee . 12

433 Dupo, St. Clair ...F 9

5,454 Duquoin . G10

527 Durand . . G 1

2,156 Dwight . 13

1,059 Earlville . G 2

584 East Alton . E8

446 East Brooklyn,

Grundy . 13

212 East Carondelet . , ,E 9

l ,253 East Dubuque ..... E 1 753 East Galesburg,

Knox . . . . E 4

2,665 East Moline . E 3

407 Easton . . F 5

i',493 East Peoria . F 4

74.708 East St. Louis _ E 8

367 East Wenona,

La Salle . H 3

400 East Wood River.

Madison . F 8

145 Eddyville . H 1

419 Edgewood . H 8

918 Edinburg. . . G 6

543 Edison Park. Cook . J 2

5,014 Edwardsville . F 8

3.898 Effingham . H 7

677 Eileen, Grundy ... I 3

613 Elburn . I 2

195 El Dara . D 6

3.366 Eldorado . I 10

241 Eldred . D 7

28,203 Elgin . I 1

703 Elizabeth . El

633 Elizabethtown. . ,.I 11

418 Elkhart . G 5

732 Elkville . G 10

371 Elliott . 14

252 Ellis Grove . F 10

218 Elllsville . E 4

2,360 Elmhurst . 12

1,390 Elmwood . ,...E;4

1,470 El Paso . H 4

267 Elsah . . E 8

Pop.

250 Elvaston . C 5

211 Elwood . 13

4 1 1 Emden . G 5

190 Emington . I 4

927 Enfield . 19

1,180 Equality . H 10

804 Erie . E 2

342 Essex . 13

1.525 Eureka . G4

28 591 Evanston . J 1

562 Evansville . F9

4 24 Evergreen Park,

Cook . J 2

317 Ewing . H 9

201 Exeter . D6

2.505 Fairbury . H 4

2.479 Fairfield . H9

847 Fairmount . J 6

482 Fairview . E 4

215 Fancher, Shelby.. H 7

774 Farina . H8

1,603 Farmer City . H5

533 Farmersville . G7

2,421 Farmington . E4

228 Fayettev’e, St. ClalrF 9

299 Ferris . C5

211 Fidelity . E7

227 Fieldon . E 7

499 Fillmore . G 7

827 Findlay . H6

850 Fisher . 15

386 Fithian, . J 5

590 Flanagan . H 4

840 Flat Rock . J 8

2.704 Flora . 18

385 Fordville,

Williamson. . . . G 10 392 Fordyce. Jackson G 10

306 Forest City . F 5

6.594 Forest Park, Cook .1 2

967 Forrest . 14

870 Forreston . F 1

90 Fosterburg,

Madison . F 8

400 Fox Lake . I 1

273 Frankfort…. . J 3

696 Franklin . F, 6

572 Franklin Grove … ,Q 2 683 Franklin Park . J 2

1,397 Freeburg . F9

19,568 Freeport . F 1

2,174 Fulton . E 2

745 Galatia . H 10

4.835 Galena . E 1

24,276 Galesburg . E4

2,498 Galva . E3

946 Gardner . I 3

290 Garrett . I 6

685 Gaskins City,

Saline . H 10

322 Gays . H 7

3,199 Geneseo . E 3

2,451 Geneva . 12

1,257 Genoa . •. . . .H 1

2,307 Georgetown . J 6

711 Germantown . F9

2,086 Gibson City . H5

268 Gilberts . 12

2,241 Gillespie . F7

1,305 Gilman . 14

1,891 Girard . F7

385 Gladstone . C 4

625 Glasford . F4

215 Glasgow . D 6

1,220 Glen Carbon,

Madison . F 8

1,899 Glencoe . J 1

1,763 Glenellyn, Dupage .1 2 652 Glen View, Cook . . J 2 581 Glenwood, Cook. . . J 2

68 Godfrey . E 8

194 Godley, Grundy. . .1 3

1,088 Golconda . H 11

579 Golden . . . D 5

311 Golden Gate . 19

361 Good Hope . D4

554 Goreville . H 10

1,116 Grafton . . .E 8

403 Grand Ridge . H3

873 Grand Tower . F10

15,142 Granite City . E 8

692 Grant Park . J 3

1,391 Granville . G3

603 Grayslake . J 1

1,940 Grayville . J 9

1,161 Greenfield . E7

1,224 Greenup . 17

921 Green view . F 5

3,178 Greenville . F8

750 Gridley . H 4

1,262 Grlggsville . D6

1,008 Gross Point, Cook. J 2 66 Hainesville, Lake…I 1

335 Hamburg . D 7

1,627 Hamilton . C 5

215 Hamletsburg. . . . H 11 492 Hammond . H6

697 Hampshire . II

348 Hampton . D2

650 Hanover . E 1

654 Hardin . D7

162 Harmon . F 2

5,309 Harrisburg . H 10

350 Hartsburg . G5

3,008 Harvard . H 1

396 Harvel . F 7

7.227 Harvey . J 2

3.525 Havana . E 5

644 Hebron . I 1

187 Hecker . F 9

171 Henderson . E3

451 Hennepin . G 3

364 Henning . J 5

1,687 Henry . G 3

618 Herrick . G 7

6,861 Herrin . G 10

461 Herscher . 13

306 Hettlck . E 7

681 Hey worth . H5

190 Hidalgo . I 7

2.675 TTighland . F 8

4.209 Highland Park . I 1

1,219 Highwood, Lake ..I 1

351 Hlllery. Vermilion. J 5

3,424 Hillsboro . G7

328 Hillside. Cook – J 2

309 Hillview . D 7

661 Hinckley . H2

498 Hindsboro . I 6

2,451 Hinsdale . T2

480 Hodgkins. Cook … .J 2 196 Holloway ville.

Bureau . F 3

1 .086 Homer,_v . v. .1 5

Pop

713 Homewood . J2

4.698 Hoopeston . I 5

586 Hopcdale . F 5

451 Hoyleton . G 9

375 Hudson . H 4

205 Huey . G 8

541 Hull . C 6

356 Humboldt . I 6

572 Hume . J 6

235 Hunt . I 7

773 Huntley . H 1

345 Hurst . G 10

722 Hutsonville . J 7

849 Illiopolis . G 6

484 Ina. Jefferson. .. ,TG 9

365 Indianola . J 6

580 Industry . D 5

652 Ipava . E 5

286 Iroquois . J 4

678 Irving . G7

223 Irvington . G9

333 Itasca, Dupage _ I 2

364 Iuka . H 8

436 Ivesdale . I 6

15,481 Jacksonville . E 6

237 Jeffersonville ...,H9

4,113 Jerseyville . E7

366 Jewett . 17

225 Johnsonville . H?9

3,248 Johnston . H 10

38.010 Joliet . 12

1,169 Jonesboro . G 11

734 Joppa . H 11

516 Joy, Mercer . D 3

300 Junction City 1 10

506 Kampsville . D7

521 Kane . , . . E 7

380 Kangley . H3

14,230 Kankakee . J 3

94 5 Kansas . J 6

142 Kappa . H 4

142 Kaskaskia,

Randolph . F 9

405 Keensburg . J 9

1,515 Keithsburg _ „.DJ

269 Kempton . 14

881 Kenilworth, Cook . .J 2

570 Kenney . G2

13,561 Kewanee . E3

670 Keyesport . G8

371 Kinderhook . C 6

424 Kilbourne . E 5

294 Kingston . H 1

492 Kingston Mines ... F 4

997 Kinmundy.. . H8

219 Kinsman . H 3

685 Kirkland . II 1

926 Kirkwood . D4

1,818 Knoxville . E4

1,495 Lacon . G 3

1,910 Ladd . G 3

287 I, a Fayette . E3

5,282 La Grange . J 2

1,131 La Grange Park,

Cook . J 2

1 .349 La Harpe . C 4

726 Lake Bluff . J 1

3.349 Lake Forest . .11

342 Lake Villa . I 1

304 Lake Zurich . II

555 Lamoille . F 3

1 175 Lanark . F 1

1,060 Lansing . J 2

187 La Prairie . D 5

155 La Rose . G 4

12.221 La Salle . H 3

438 Latham . G6

3.235 Lawrenceville . J 8

469 Leaf River . G 1

1,907 Lebanon . F8

599 Ledford . H 10

303 Lee . H 2

545 Leland . H 2

2,284 Lemont . I 2

1,168 Lena . F 1

463 Lenzburg . F9

203 Leonore . H 3

145 L'Erable . J 4

391 Lerna . I 7

1,702 Le Roy . H 5

2,312 Lewistown . E 5

1,318 Lexington . H4

1,724 Libertyville . I 1

797 Lima . C 2

11,838 Lincoln . F 5

197 Lisbon . 13

5,971 Litchfield . F7

358 Little York . D 3

1,092 Livingston . F 8

530 Loami . F 6

2,555 Lockport . I 2

603 Loda . I 5

883 Lombard . I Z

555 London Mills . E 4

239 Long Point . H 4

257 Longview . I 6

417 Loraine . C 5

4 58 Lostant . G 3

670 Louisville . 18

1,011 Lovington . H6

305 Ludlow . I 5

390 Lyndon . F 2

94 Lynnville . E 6

1,483 Lyons. Greene . . . . E 7

1,031 McHenry . I 1

707 McLean . G 5

1,796 McLeansboro . 19

285 Macedonia . H 10

725 Mackinaw . G 4

5,774 Macomb . D 5

683 Macon . G 6

5,046 Madison . E 8

284 Maeystown . E 9

368 Magnolia . G 3

565 Mahomet . I 5

400 Makanda . G 10

255 Malden . . . G 3

4 50 Malta . H 2

480 Manchester . E 6

443 Manhattan . J 3

218 Manlius . F 3

696 Manlto . F 5

681 Mansfield . II 5

1,229 Manteno . . . . . J 3

389 Maple Park. . . < . . . H 2

47 2 Maquon . . E 4

1,936 Marengo . H 1

329 Marietta . E 5

685 Marine . F8

7,093 Marion . H 10

2,004 Marissa . F#

1,025 Marks, Putnam ..G 3

1,160 Maroa . H 6

494 Marquette, Bureau F 3

3 291 Marseilles . H 3

sOneida

Independent

GRANT

lafaye]Htte

© GjREEN <0 ^Orangeville "™ **ovr Rock CityJ DakoUrf^TM yCedorvlll** D°

EkS0N

// Pccat<£

nquel

.E. Dubuque

reu^CI

|(cCojuielft

IANAN

Rockton.

DIE LA WARE

|O»J0 DAVIESS*

\ c Woodbine

l\ ^SjVHuz.bottF-

[ft \o TN. Hanoven

\V\ « **Hanover„ J** v^KL. Masebach,

DUBUQUE ^

|W a likes;

North, 'CbicogQ

fcnv

Eleroy’

NFreepor

CltjV'Bolton ! k Tlorenee, Shannon^/T

JaXeu orest l \ fort.SheridanX.

I"~gS

C«CWinaetka\\

- wMEBlW

Ridott ,

Montioello

Bellevue'

Nun da*

Viuluu

JACKSON

Union

JZ-JSiA

. Harper ^ $5mCnrroll I CARROLL danej

Genoa

r jn'iilersilUe ipehire n.L

iDavif j(

vv7^1:u|uoketi

'or res ton i

BENTON

Sabula

AtlinjtciNi, 1 .Heishta " ties Vta

Almora-

• woods ,

jQMDd

s HolCO^Vi

^Oregon _ ®/Kinj

|]f'^*0UhaoaJ [Of

| j, I 0

? Flag Centeryv. c

' ' Roohe^^"

Delinar

S) eaiu\»rw7 ’ ' — nrd jxlva otaj

J0 DE/KALB

V McOirr Blg'Rock V —

' —ik:

oy rl, tsr

/soo,0„ iN*j

i/dloj 0,,*bj

Coleman

u/3upTge^@

Jwnert Grove|c>o-f^g

rjjviw

f'f Willow jSprin«& (Norman-

U°wn Lci-ufo^Pal

WsSfTSB

Stanwood

Colcta

Geneva'1

5afnrV/i

Clinton

_ _ _ Ashton V

V Bldri'ia //^®c*r6or0 l

p\l^E J E *hjal

(^y/AmboyJi o x b 1 1 ry '

SubletteV 0 r.-L..

Dewitt\N.

Cro^'«t.g-

JOHNS'

Tipton

Elmira

iestert* n

JlaintteU

.Yorkville . ■KENDALL.y

w.ii,0at«JopIattvlll) birds Uti.lJ

Henkel

r do Totktoi

oRirkel,

gfej^Cyvp— ^«r jLIoopjiole

Atkinson'*—^;

^lYoriooH E N R Y V

aldf/^t^pL^Osoo | ^J,V

ft cn^olophiem KewnneeyS

o^4_4t^c% s jXw'vip 1 m

"4*°' T~\vSo.iT.~n

""* OilRig .AltonoJ^; N

nwn y*NX .,-0 /Y,.Lafn>«.u

&>T £\ .o'S'fLevta To

■Hobart

V»' all qU*''>''*v. Lamoille^ —

B lu R eXu

/Manliua Arlington

-/o' Malden's^

rrliioetoiiCs^pj.

ToiJf'ffrsna SMtonrjUr,

■^Ti,kisT-2oijt)ft

/Frankfort,

iManhattan V

WASHINGTON

Cj-oh n ^ . \l'olnl

Wi\iii(v7c

>Cl»4>

^ooflenow1

iJ'/cotone

indriSv-M. inertou ^ ztou (

|V asliingi

KEOKUK'

j^Carbon Hillo

MazotT>r^f£ V

■ona -^arhat^nlal, ^^%Gar

- GRUNDYt

£. Wilmington

Prulrie ,

f |

| \ o^Grand Ridge V ^ h Leo no re „ Kinsmam

^Tfetiy:nutl

, ^

Jf*1!-1 '"V C*

1 u""v- <

P/iMeNabb] . , N ..V^LostfantC 9_

Manteno.

Bradford ,

Putnam 1

Castleton

Winfield

HENRY '

iBroadmocr .

z HeoryJ

4 1 M AR'

Sparland/ /l

i. lcakee

k'an K^feE/E K

SH A L LT>< Lacou ^-+^5

"CT^y Reddickj me / '\ Cardiff^ C-aX)^c> Cumpuy^l

PsTo n

Wyoming/

CUediapolis[

[Milroj

''Lci-dj

[Rutlah

(Caber jCbebuhee

!& AonCU'*j°"|

ofvllle

A&j a lesb ui*s

v^VN-i' *- 'T s ff ° ■

\ X *'uje /•$ Prino<

o7 kSn\o x4*f ,

-[Dr O \ V Brinj kid/

Okonul- oVuj4011 | ,r

— iAbinjdoo

fc.'.loZ'^^W57^

bn jiiN>r«^s^or&tsa

b°VbtwMPl,iVrla"

'^'^Cuba/TnX

IslitMeiS BrlyaciViA

1 FULT\0/N

-V LenislonuY/

• Ipava m

— JJELJL^r^ Toluca

>tb v7F==rj^r — - -1

^/Washburn Y Minonki^T G]

ieZy v'/Lowpoint yr 1 I

^CazenoviaT ' Benson / * -fe/L '

Keusselfto*

Donow uu |

T^C-SaxonTi

VACuHomi'!

CnnrlottcG

?Win6,f

Aahkui

-Bvirlinstoii

^NCarthageC

DunlapV

EOR I A

_ p0„. Alt

VANBUREN

)anforthj

Jftr' TJ5»Y7:

S"”I7^S^T)'” ioX— I

kV|5'!i5'vTt WARREN <

‘ Jo^Strongburatp/RoBaville fl '>-! Deeoxra I, a/ , Ik

owa „ o I (Swan Creek « ,To'in;-ln'' X

i/r o a u

,/Onarga jJDclrey /

f/J Milforf

WHITE

) I S

[oodlan

Kt‘o»siu<]iia

.Eureka t.

aoJi,Cu^-J

•ppa c »/' f» J C.W >,a.o» y'Uxlnstoo W LSjYE A , N o^V

>otm»L^rr^etcher Gl

o^o.

'Bloomington ^

Fort >

.M.ulison

- J/RiBk Thav

^jStrawu T

iBibley " C

ahor Robert^

G„ lMelvin/

^ / WnfbrdlJcJ ^

Xe/£.i.\Wellingt'|ln •

Ari°0\ t *

pL?^M*olt(noi

«• £r?"i«c

Good Bop« , Bardolph, niiicoiub

\ Adrians jk^V-Xacr

\ ) I \ Fcrrisir^Bujrnside I

XX'X Vi. H a N?t;\o c(k I C"'!1

XXs u rl 1 (a o V

. \m "•»" sVpijmbuthHi

>/fSu""" Po"'t\ »\D.„virfL

lickory Rld^o »»l A Alugusla / | ;

- _ i^gL*,,

Lima ° cy/Wood\Aille 1/ Marcelline fr/Y Loraine \ / fLn Pr a Cs^nlendon . ^Uioldcft_

Jr | Fowler,

I Canton o

r

Tazewell!

i lazewclli

•E W E L L\

Hope lalc_ ^ \ ^ 1 nief 1

vanja Center ■

1/V'\ Armlngton,

Cheney v i

/E. Lynn \ U ooj

&/ruiiiiy *Va„,

Roseville JoV — /Ellis /A ,

f6.oA«OT /

VERlMIILIOfr

WARR

K. ihol.it c\

CLARK

Stanford

/^Ludlow

— YlCSntoulX

f Peniicld

1PAIGNJ

^Levorett .

Vj/Funka /Grove 0

McLean

^Jaepo\

Havnun^i^.-

^4^5 V Natrotial

elsev " /

M A s o nVsc

I Mason CW1 .

pAttlca'

port |

Emden

CANOE

Vermont

Farmer "CiT

Summum vAstorla A

^ .Wap.

3, de

|ut\4Vanc

less AtlantcK^S

/. L OVG A/N ,

XxA >Bell/Lawndaj v6 \v\/ Beaaonl

■Wjria

Fullerton

!knox

LEWIS!?

© L:

JUoiiticcllo

JL|Bath\

.lllbourne^

MONT

lakford

\Grerti

Saldoraf

[Veedersburf

'Tilton

£tn^r

'llO r SldneyS*-^;

Tulouo _

Bongard^

lonfe

Lenney

■"« "(Chandler'

C A SSS 'ill* ;

,ElkbartCli

(town

Maroa

>=4*lQ - ctaJ1011

c, ® Ml. SI

'* ^ Kellerville0

A D A M S|

ams0 ® Liberty

id 0V °;'^o'''''XC|C best (ine J

«t.PiflaBkl_

GOMERY

IVlorslmrg^-u j

[Vlrgiuia i / iAtlLu^ Phnadel/phT^c. M/Tallula

: _ xL. r D

IConcordTLitcrbcrrT >lal .Miaoi/^ini'lriir Brad ford ton^

v!feb.s0 !',1 'J 6V ' . «.\ct nei\^

•rlinf^, - Heramamc '

bro4

I Marden\ * Versailles' lamberaburg "

1'orrj/ o >

0'c> C fwM

M A]

hWnrreu

^-sLurg

[Ivesdale L Pcsotumt ind' llayes?

L-ood • j

MARION

(uut^

Palmyra

■ 1 oekriliej

? K E

g(City*\f I Dalton? (aeon. clt' alker „i

%/v x;; |^''",ar

Y7 Brocton^W Horace

I ED G\A R

Borton . _ \

CyvbedmoD

t /DOUGLAS '

ter

J -- cy -O

I Rardin/Oaklai 'Humboldt /^Bushtonl

COL/ES

Cliarlostfop'

ftot.L^olt.Autucdt I

^ ,VEJ inburg -J/ t— _

X^r-r^sTuylorville/l

4vm?nrS!»A-N- '

iotJc1/ * Millersville'^? / I

.%v*c/ Morr I ao n v i llo Pana\(^

, J>Icrritto'|

' I - M

Win chest el

._Wood3on/

HannsJlia)

" n-*v'"A

.Canton c £i Dara ^ Detroii'-

\ I'iUsiloldO ss\pj I K EMiltoo'

New London

„**5N

\Va."

Barrow \ /Kt.odbouBej 0Scotti irako°]/ Athena villa I l

"rKn e Tm,l'f

Berdan 1 "^q(righ.tfl c'cAi« Idred | GxeervB»ld/'"J^i^/j a(

Mov^*

Dudley

Ve»riullio'

Jporiin

•Coles /

Kansas

''`"■y Paris

MONROE

QulucyN^I^

LouisianaS

.atto*

•Westfield ijfiffitl Dll Field .

I Marsl

dartln6-^<'

Ivi

Hutton

indsorl

Belleview

^'CPA^'

Rowling OrreirvS'

, Middllesworth

E L B Y

(ad Slrnpibuig

Rosemond

•/ •>/ ° J Janesville

I^cumberiSand

-Nooga r .<

'lolpdo/jPar^^'

|J 41&zel,

Shurawa jj I Q^>c,'T^rb'' 'vrV -i^11 I

Ernst V

Jasry Sujdery 7'K)

CLARKl* »

Walnut PrairieT^ Vfl West UolonY'W'

papolls0 , WertTS C « Be 11 air > Y»rk/Jfe | Hutson ville/ '

Eaton o / ° X

I Trimble/0 x

' KobiuSOll /Pales th

^/THaivel Oh 1 man yitaymond vy(

(montgom^r'

4«rr. A.,

rXakewo

Ooonee

> Shell, ur//yL

^SULLWAti

uliivau_^

~»«oas|Qi ...

^W,

Altamfegfcjf —

Gilloaploj

rcLpsterp^

Piasa

iteT Dloterit

EFFINGHAM

itnunton.

'Watsott-

— .r/horento- - -

vXcSs-S^. Wobur

p

Gre eu v i 1 1 tyrr-^Tsm i

3/0 n\Do

Hiookdalel^

"New hern*

■ Avelnal V

St. Jan, I I

irstpwnl Yi | w

LooRooteei s Eilicewoc Ighobonier ulT aClede, i _
Sual'eter^ if

V / j Li« ingsiorTc>Wyirin'

ei* 1 |VYytdoiiit-a,XV-'1

iW | ,*o a^vDoujgln/

cV\'aX?yCarpcn Key

4 »t/y7y(hambraJ/(. •

A"D >syo N ..

'uCgttgk^rfVuit / Pooabontaj

/^JEdwardsvlIle ^.i^ierrou

/f\\rr — ■/Mnrine^/y JeCity/

A 'BrusselSa^TC^ ■ 1

CRAWFO'RD'

Flat Rock o

CAL LAWAY

^OEbor,! e tiJ— L r,J

-Y'-Bible Grovel Liberty]/ Cj

o . ° . I - - - %-r -

T Ingraham 0 to ADui

'\CVL A Y0

Eluora

Birds* ^Russellville

vf/Pinkstal b^NCE jWLawrei

C hauncey L?

'\LAWR

Harr r.Hon

WARREN

St. i i a r 1 f .

ST. CHARLES /!

(V ernon [Patoka f Alma

Sailor]

.ouisville i

Klnmui

AVIESS

•ville

'IXNOX

Keyes porfA

.Av ^,.V

I/O N 4

/Brubaker

Bridge\T ' port o\ Billet« 'Ruark o

^'/YTNoble .

claJU| c City \ Gallagher

Yinceune!

CqUinfliille.

r,»S-ton

it.Franci6ville

Lanclster o Allcndah

WABA!

> Patton /,

l Mt-.(

iCaruicIL

Pclerabupg

9 yelp .New >CT Mlnden^o ■^Addieville /

/tv-WVX

Vaf"'VG

ftollo C"lll" Prairie^ Aden0 j

^HAMILTON :

f \Deiah<'ld

m X. Thackeray

^Oakland City

(/ \^t. Vernon |b elle RireXJ

X Bona if Dalilgren^

ic/ller L' *■„

/Q | 'in Spring GarB. fees set hA Ewing o p/li) orSybittingtoi

FRANKLIN Rend ^ ^Benton

Siegert

J SON fe

) Harrison

llilibhuro A

(MiirPUlrir L Shoals F|*lv 1 Croesplllc^
iSpringer'onl /

lEnfield

WARRICK

•Ji?U8tom

2 Roouville

POSEY c:

' ^Evansville \

a/(n d o l p hn

—H o Stecleville

Steelville

SHINGTON

Macedonia aDale

^vans ville

New burg

Till jioie VforrU C it '

D.Aiintitun if /

oAkin

AV. FtanLf rt<

Poluai

I^VilLia ville

.Buckner

lBroughton k1

• .onvilla l»

\l i /w. v iS^stTP

tffif 0 Pwjmfi* ~?tTi

SB* A'pHt.b,i« s A i: LN' E\

\)f llarl;isl,iirg Poro".'"'

pX3Iui*iou Ledford/ pqu#

L-iV

aiosWt J

' ". 'Toiimha

k-o-^v

Elba to .

*do VRiiliwO \

galxlatin

jo^ljunotio^

ih neeloHuV/

CRA/WFORD

dltyVcrnuu

'd -^Campbell Poland AN>^Hill

J A C'K

v v*wkwuod ..\\\e/

^ v\Cora O'*5 /1

llockport

/ STE 0 'GENEVIEVE

Coffman^ fl'irUm c a/

'ERSON

Bismarck

IwcnshoriTj^

DAVIES^

MorguullolJ

WILLir

fcHud?enS

Grand To\

WE^ST ER

DIxouX *1

Llto PaasK "d Moore 0 VIa Rue]../un^ft-m Qj, Vi5 /
Cobden

\ U (Nil O N

vXw ^ Vi \Auna !'O.-nar0 IJ.Vnio.hoio

P/BVluelalnd Balc^m i T-tf Mill < '/reek 1°^^

'nside o Del wood;

X OPE

uo Eddy v ille

cRldgo ^

HARDIN 1

Cave In Rock

ILLINOIS

! IGlRARDEAU^e/

'JulksonA, jf f/j

n*

f - yJitpe»iirardeau^_'[IfTA

dolalre

CRITTENDEI

tProATdcnce

bill' iillil.l

l UU1 i/t

nvbud

/wnfl.lT

llurluu

Statute 31iles, 32 = 1 Inch

’] iudlbpnv ilic

!AC ^

qtfetropolli

rDWELLj

Rand McNally’s New'll x 14 Map of Illinois.
Copyright by Rand McNally A Co.

CRACKEN

%

1

42°

2

3

41°

4

5

4 0°i

0

7

39°

8

9

38°

10

11

2980

Pod

2.56U Alarshafl . j /

1.500 Martinsville. . J 7

312 Martinton . j 4

742 Marysville.

Vermillion . J 5

729 Maryland. Madison F 8

2.081 Mascoutah . F9

345 Mason . H 8

1,842 Mason City . F 5

401 Matteson . T 2

12,582 Mattoon . 10

512 Maunie . . I 9

10,520 Maywood . T 2

4 71 Mazon . 13

417 Mechanlcsburg. . . . G 0

220 Media . D 4

444 Medora . E 7

4,800 Melrose Park . J 2

509 Melvin . . 14

040 Mendon, . C 5

3.806 Mendota . G 2

951 Meredosia . DO

094 Metamora . G4

449 Metcalf. . . . . J 6

4.655 Metropolis City ,.H 11

7ol Mddletown . ,.F5

727 Milan . D 3

1.316 Milford . J 4

221 Mill Creek . G 11

630 Milledgevllle . F2

417 Millersburg . D 3

223 Millington . 13

700 Mill Shoals . 19

1.140 Millstadt . E 9

330 Milton . D 6

349 Mineral . F3

690 Mlnler. . . G 5

2.070 Minonk . G 4

361 Minooka . 13

298 Modesto . F7

359 Mokena, Will . J 3

27,451 Moline . D2

2.201 Momence . J 3

411 Monee . J 3

10,177 Monmouth . D 4

371 Montgomery . I 2

1,981 Monticello . 16

347 Montrose . 17

3,694 Morgan Park, Cook J 2

4,563 Morris . 13

2,410 Morrison . F 2

1,126 Morrisonville . G 7

1,004 Morton . G 4

836 Morton Grove . J 1

2,837 Mound City . G 11

1,686 Mounds . . G 11

194 Mound Station,

Brown .

. D 6

4 63

Mt. Auburn . . . .

. .G 6

6,934

Mt. Carmel .

1,759

Mt. Carroll .

. .F 9

299

Mt. Erie .

.19

276

Mt.GreeDwood„dCook ,

J 2

1,132

Mt. Morris .

3,501

Mt. Olive .

,.F7

1,511

Mt. Pulaski .

1,986

Mt. Sterling .

9,760

Mt. Vernon .

330

Mt. Zion .

. .H 6

1,513

Moweaqua .

716

Mulberry Grove.

. .G 8

251

M uncle .

. J 5

7.485

Murphysboro ...

.G 10

4 50

Murray ville .

3.449

Naperville .

457

Naples .

. . D 6

2.135

Nashville .

. .F 9

253

National City. SR

Clair .

. ,F,9

1.020

Nauvoo .

520

Nebo .

1 074

Neoga .

542

Neponset .

406

Newark .

1,131

New Athens .

,.F9

1.372

New Baden ....

690

New Berlin .

. .F 6

718

New Boston .

369

New Burnside . . .

, H 11

473

New Canton .

. .C 6

499

New Douglas . . .

. ,F 8

490

New Grand Chain.

Pulaski .

G 11

514

New Haven .

.1 10

387

New Holland . . .

. .F 5

1,264

Newman .

. .J 6

243

New Memphis.

Clinton .

245

New Minden . . .

260

New Salem .

. D;fl

Pop.

2,lu8 Newton . i 8

COO New Windsor . EM

085 N'iautic . „G 6

509 Niles, Cook . J 2

568 Niles Center . J l

401 Nil wood . F7

..618 Noble . 18

1,872 Nokomis . G 7

251 Nora . F 1

4,024 Normal . ,.H4

560 Norris . E 4

1,055 Norris City . E 4

352 North Aurora, Kane I 2 3,306 North Chicago ....J 1 911 North Chillicothe,

Peoria . F 4

689 North Crystal Lake,

McHenry . 1 1

317 Oakford . F 5

1,159 Oakland . 16

287 Oaklawn, Cook ...J 2

26,654 Oak Park* . J 2

423 Oak wood . J 5

1,482 Oblong . J 8

293 Oconee . G I

1,035 Odell . 13

1 ,400 Odin . G 8

2,018 O'Fallon…; . E 8

428 Ogden . J .5

527 Ohio . F 2

579 Okawville . 11 9

314 Old Marissa, St.

Clair . F 9

146 Old Ripley. Bond.G 8

288 Olmsted . G 1

5,011 Olney . 18

856 Omaha . 1 10

1,273 Onarga . J 4

589 Oneida . E 3

907 Oquawka . C4

370 Orangeville . Fl

2,180 Oregon . G 2

655 Orion . E3

369 Orland, Cook . J 2

.600 Oswego . 1 2

9, ‘535 Ottawa . G 3

179 Otterville . E 7

365 Owaneco . G7

1,144 Palatine . I l

1,399 Palestine . J 7

404 Palmer . G 7

873 Palmyra . E 7

6,055 Pana . G 7

708 Panama . F 7

108 Panola . G 4

183 Papineau . J 4

7,664 Paris . J 6

2,83 Parkersburg . J 8

2,0o9 Park Ridge, cooa..O 2

676 Patoka . G 8

1,399 Pawnee . F6

709 Pawpaw . G 2

2,912 Paxton . I 5

407 Payson . C 6

842 Pearl . D 7

485 Pearl City . F 1

1,022 Pecatonica . G 1

10,823 Pekin . F 4

71,458 Peoria . F 4

582 Peoria Heights,

Peoria . F 4

1,207 Peotone . J 3

1,033 Percy . F 10

649 Perry . D 6

7,984 Peru . G 3

376 Pesotum . I 6

2,587 Petersburg . E 6

105 Phillipstown . J 9

562 Philo . 16

679 Phoenix. Cook….J 2

2,722 Pinckney ville . G9

135 Pingree Grove,

Kane . I 2

663 Piper City . 14

2,095 Pittsfield . D 6

227 Pittsburg . H 10

1,019 Plainfield . 12

251 Plainville . C 6

1,627' Plano . H 2

576 Pleasant Hill . D 7

625 Pleasant Plains . . . F 6

829 Plymouth . D 5

749 Pocahontas . . . F 8

1,828 Polo . F 2

6,090 Pontiac… . H4

285 Pontoosuc . C4

297 Poplar Grove ….. H 1

642 Port Byron . E 2

3,194 Portland, La Salle H 3 343 Posen, Cook.;....J 2 719 Prairie_City . E_4

Pop.

511 Prairie du fiocner . E 9

4,131- Princeton . F3

982 Princeville . F4

1,083 Prophetstown . . . .F 2

592 Pulaski . G 11

36,798 Quincy . C6

238 Raleigh . I 10

769 Ramsey . G7

858 Rankin . J 5

370 Ransom. . H 3

1,384 Rantoul . I 5

143 Rapids City . E 2

881 Raymond . F 7

1,240 Red Bud . E 9

288 Reddick . 13

240 Redmon . J 6

658 Reeves, Williamson

G 10

241 Renault . E9

367 Reynolds . D3

554 Richmond . I 1

366 Richvicw . G 9

967 Ridge Farm . J 6

1.054 Ridgway _ …..110

173 Ridott . F 1

234 Ripley . D 5

917 Rlverdale . J 2

2,456 River Forest . J 2

418 Rlvergrove, Cook . ,J 2

1,702 Riverside . .1 2

1,911 Riverton . F6

312 Riverview, Cook…J 2

1.311 Roanoke . G 4

466 Roberts . 14

3,863 Robinson . J 7

2,732 Rochelle . G2

444 Rochester . F6

275 Rockbridge. . E 7

122 Rock City . F 1

1,101 Rockdale. Will _ J 3

358 Rockefeller . I 1

2,657 Rock Falls . F 2

55,185 Rockford . G 1

28,926 Rock Island . E 3

841 Rockton . G 1

140 Rockwood . F10

233 Rome . F 4

98 Romeoville, Will. .J 3

2.171 Roodhouse . E 7

229 Rose Hill . . .1 7

882 Roseville . D4

609 Rosiclare . I 11

1.422 Rossville . J 5

182 Round Lake . I 1

357 Royalton . G 10

138 Ruma . E 9

2.422 Rushville . D5

257 Russellville . K8

754 Rutland . G4

336 Sadorus . 1 6

388 Sailor Springs . 18

2,669 Salem . H 8

112 Saline Mines . I 10

1,563 Sandoval ,,.....G 8

2,557 Sandwich . Gil

446 San Jose . F 5

49 Sato. Jackson . . . G 10

357 Saunemin . H4

3,691 Savanna . E 1

445 Sawyerville,

Macoupin . F 7

805 Saybrook . H 5

388 Scales Mound . E 1

516 Schram City,

Montgomery . . . G 7

160 Sciota . D 4

301 Scottville . F, 7

236 Sears, Rock Island D 3

326 Seaton . D 3

1,370 Seatonville . G 3

358 Secor . G 4

1,292 Sesser . G 9

594 Shabbona . G 2

633 Shannon . F 1

1,863 Shawneetown .... I lo

1,009 Sheffield . F 3

3,590 Shelbyville . H 7

1,143 Sheldon . J 4

506 Sheridan . H 2

441 Shermejville, Cook J 2

906 Sherrard . D 3

395 Shiloh . F 9

392 Shipman . ; E 7

306 Shobonier . G8

291 Shumway . H 7

385 Sibley . 14

741 Sidell . J 6

481 Sidney . 16

308 Sigel . H 7

1,163 Sllvis . D 3

161. Simpsoe ..... . Hll

Pep-.

399 Sims . 1 9

301 Smithboro . G8

389 Smithfield . E 5

380 Smithton . F 9

591 Somonauk . H2

1,018 Sorento . F 8

552 South Chicago

Heights, Cook . . . J 2 580 South Elgin. Kane .1 2
1,065 South Holland,

Cook . J 2

2.403 South Wilmington. I 3

461 Sparland . F3

3,081 Sparta . F 9

308 Spaulding . F 6

24 9 Spillertown . H 10

119 Spring Bay, Wood¬ ford . G 4

418 Springerton . I 3

61,120 Springfield . G 6

334 Spring Forest.Cook J 2"

203 -Spring Grove . I 1

7,035 Spring Valley . F 3

1,065 St. Anne . J 3

187 St. Augustine . E4

4,046 St. Charles . .12

915 St. David . F 5

1,227 St. Elmo . H 7

1,391 St. Francisvllle. . . . J 8

534 St. Jacob . F 8

370 St. John . G 9

681 St. Joseph . I 5

328 St. Libory . F 9

450 Ste. Marie . 18

313 St. Peters . G 8

793 Standard, Putnam, G 3

525 Stanford . G 5

5,048 Staunton . F8

708 Steeleville . F 10

2,161 Steger . . .J 3

7,467 Sterling . F2

353 Steward . H 2

720 Stewardson . H 7

1,096 Stockton . F, 1

1,118 Stonington . G 6

488 Stoy . J 8

526 Strasburg . . .H 7

277 Strawn . 14

14,304 Streator . H 3

762 Stronghurst . D4

287 Sublette . G 2

2,621 Sullivan . H6

337 Summerfield, St.

Clair . F 9

949 Summit . J 2

1,413 Sumner . J 8

889 Swansea, St. Clair

F 9

97 Swedona . . . . D 3

3.926 Sycamore . H 2

157 Symerton . J 3

544 Table Grove . D 5

742 Tallula . F 6

9 1 0 Tamaroa . . G 9

400 Tamms . G 11

849 Tampico . F 2

380 Taylor Springs. ... G 7

5.446 Taylorville . G6

274 Tennessee . D 5

359 Tessville, Cook .. . ,J 2

592 Teutopolis . .1 7

318 Thaw ville, Iroquois J 4

1,012 Thayer . F 6

717 Thebes . F 11

321 Thomasboro . I 5

573 Thompsonville . F 7

487 Thomson . E 2

1,030 Thornton, Cook. . . J 2

774 Tilden . F 9

710 Tilton . . J 5

158 Time, Pike . D 6

309 Tinley Park, Cook..J 2

857 Tiskllwa . F 3

900 Toledo . 17

760 Tolono . I 6

2,407 Toluca . G 4

483 Tonica . G 3

130 Topeka . E 5

514 Torino. Will . J 3

1,208 Toulon . F 3

404 Towanda . H 4

1,040 Tower Hill . G 7

782 Tremont . F 5

1,694 Trenton. . F8

1.447 Troy . F 8

289 Troy Grove . H 3

2,453 Tuscola . 16

670 Ullin . G 11

432 Union . I 1

2,918 Upper Alton . E8

9.889 Urbana . 1 5

Ron.

» >6 TKica . . G 3

2.974 Vandalia . G8

406 Varna . 54

160 Venedy . F9

3,718 Venice . K 8

342 Vergennes . G 10

287 Vermilion . J 6

1.1 IS Vermont . G 8

333 Vernon . G 8

557 Versailles . D6

334 Victoria . E3

1,124 Vienna . H 11

1,828 Villa Grove. ..... I 6

760 Viola . D 3

4,000 Virden . F 7

1.501 Virginia . E6

270 Waggoner . F7

261 VValdron . J 3

763 Walnut . F3

169 Walsh ville . F7

4 98 Wapclla . G 5

1,331 Warren . Fl

504 Warrensburg . G 6

2,254 Warsaw . C 5

7" F Washburn . G4

1,530 Washington . G 4

444 Wataga . E 3

2.091 Waterloo . E9

398 Waterman . H 2

525 Watertown, Rock

Island . D 3

2,476 Watseka . J 4

330 Watson . H 8

368 Wauconda . II

20,244 Waukegan . J 1

1,538 Waverly . E 6

620 Wayne City,

Dupage . I 2

546 Waynesvllle . G 5

521 Weldon . H5

295 Wellington . J 4

1,442 Wenona . G 3

266 West Brooklyn .... G 2 2,378 West Chicago. ...12

905 Western Springs,

Cook . . J 2

927 Westfield . J 7

2,111 West Frankfort.. H 10 4,948 West Hammond,

Cook . J 2

292 West Point . C 5

725 West Salem . 18

2,607 West ville . J 6

218 Wetaug . G 11

1,593 Wethersfield,

Henry . E 3

3.423 Wheaton . I 2

255 Wheeler . 17

260 Wheeling . I 1

353 White Ash, William¬ son . G 10

421 White City,

Macoupin . F 7

2,854 Whitehall . D 7

480 Williamsfield . E 4

648 Williamson, Madi¬ son . . F 8

600 Williamsville . F6

1,082 Willisville . F 10

444 Willow Hill . I 7

4,943 Wilmette . J 1

1,450 Wilmington . 13

204 Wilmington, Greene.

E 7

1,639 Winchester . E6

987 Windsor . H 7

660 Windsor . D 3

415 Winnebago . G 1

3,168 Wlnnetka . J 1

439 Winthrop Harbor,

Lake . I 1

426 Winslow . Fl

2.170 Witt . G 7

175 Woodburn, Macoupin

F 7

692 Woodhull . E3

295 .Woodland . J 4

315 Woodlawn… . G9

84 Woodrlver . E 8

257 Woodson . E 6

4,331 Woodstock . H 1

1,082 Worden . F8

872 Wyanet . F3

1,506 Wyoming . F3

634 Xenia . H 8

586 Yates City . F.4

1 69 York . J 7

431 Yorkvllle . 12

4.789 Zion . J l

ILLINOIS

683

10,000.^ Chicago had 2,701,705; 17 others had over 25,000 blit less than 100,000 ; the rest had between 10,000 and 25,000. According to the census of 1920 the population of the five leading cities was: Chicago, 2,701,705; East Saint Louis, 66.767 ; Peoria, 76,121 ; Springfield, 59,183 ; Rock¬ ford, 65,651. Some of the other cities ranked as follows: Decatur, 43,818; Joliet, 38,442; Quincy, 35,978; Aurora, 36,397; Danville, 33,776 ; Evans¬ ton, 37,234 ; Elgin, 27,454 ; Bloomington, 28,725 ; Moline, 30,734 ; Galesburg, 23,834 ; Alton, 24,682 ; Belleville, 24,823; Waukegan, 19,226; Freeport, 19,669; Cicerotown, 44,995 ; Cairo, 15,203; Jack¬ sonville, 15,713; Kankakee, 16,753; Champaign, 15,873; Kewanee, 16,026; Mattoon, 13,552; La Salle, 13,050; Lincoln, 11,882. Within the last few years the following cities have passed the 10,000 mark ; Canton, Maywood, Ottawa, Ur- bana, Pekin, Murphysboro, Herrin, Granite and Forest Park.

Education. — Illinois has an excellent public school system. Education is free and compul¬ sory for children from 7 to 14. In 1860, Illi¬ nois had 464,304 pupils, 8,223 male teachers, 6,485 female teachers, and expended $1,512,211 in wages, and $2,259,868 for all school purposes. For the school year ending June 1915 Illinois had an estimated number of 1,493,473 children from 5 to 18; 1,064,221 enrolled, an average duration of 160 school days, 5,918 male teachers and 26,902 female teachers; she paid $23,179, 650 in salaries, and expended for school pur¬ poses $39,508,058. During this period the aver¬ age annual cost per pupil enrolled increased from less than $5 to about $40, and the average yearly wage of the teacher increased from a trifle over $100 to about $700. Religious edu¬ cation and training cannot be given in the pub¬ lic

schools, but they are fairly well cared for by the churches, which in the order of their strength are Roman Catholic, Methodist, Lu¬ theran, Baptist, Presbyterian and Disciples of Christ.

Higher education is provided for by a num¬ ber of normal schools, colleges and universi¬ ties. The public normal schools of the State are located as follows: The State Normal Uni¬ versity at Normal; the Southern Illinois State Normal University at Carbondale; the North¬ ern Illinois Normal School at De Kalb; the Eastern Illinois Normal School at Charleston; and the Western Illinois Normal School at Macomb. The Chicago Normal School, since 1896, has been maintained by appropriations made by the Chicago board of education. Most of the teachers of the State receive at least part of their training in these schools. In 1916 there were 147 male teachers, 171 female teachers, 1,893 male students and 7,548 female students in the six public normal schools. There were, in addition, four small private normal schools which contained 37 male teach¬ ers, 44 female teachers, 164 male students and 437 female students.

In 1915 Illinois had 32 universities, colleges and schools of technology. These employed 2,056 male professors and instructors and 485 female. In the preparatory departments there were 2,983 male students and 1,306 female; in the collegiate departments there were 8,764 male students and 7,247 female; the resident graduate students numbered 1,679 male and 1,017 female. The total receipts, exclusive of additions to the endowment, were $8,846,776.

Of these 32 institutions, four were exclusively for women and four for men. In 1916 the State had 15 theological schools with 1,656 stu¬ dents, 11 law schools with 3,136 students, 8 medical schools with 2,264 students, 3 dental schools with 1,294 students, 3 schools of phar¬ macy with 339 students, and 2 schools of veter¬ inary medicine with 650 students. The three great universities of the State are Northwest¬ ern, Chicago and Illinois. The latter

stands at the head of a liberal system of free public edu¬ cation. It was incorporated as Illinois Indus¬ trial University 28 Feb. 1867, and it was opened 2 March 1868 at Urbana. The name was changed in 1885. From 4 teachers and 77 pupils in 1868, i't increased to 54 teachers and 418 pupils in 1889, and to 868 teachers and officers and 6,828 students 21 Feb. 1917. About 558 of these students were in the schools of medicine, dentistry and pharmacy at Chicago.

Charitable Institutions. — Until recent times each charitable institution was under the con¬ trol of a separate board of trustees, managers or commissioners, with some supervision in most cases by an unpaid State Board of Public Charities. By the act of 1909, repassed in 1912 and in effect 1 July 1912, however, all the (

(see Government) again modified these arrange¬ ments. The department of public welfare now has charge of the charitable, penal and re¬ formatory institutions of the State. It per¬ forms the functions of the old Board of Admin¬ istration, three boards of commissioners and managers for the two State penitentiaries and reformatory and their subordinate officials, the board of prison industries, and board of par¬ dons. The Code makes provision for an alien¬ ist, a criminologist, a fiscal supervisor, a super¬ intendent of charities, a superintendent of pris¬ ons, a superintendent of pardons and paroles, and an unpaid board of public welfare, which takes the place of the present State Charities Commission.

In 1916 there were 21 charitable institutions under the management and control of the Board of Administration. They included the State hospitals or asylums for the insane at Chicago, Kankakee, Elgin, Moline, Jacksonville, Alton and Anna ; the hospital for the criminal insane at Chester; the school and

colony for the feeble-minded at Lincoln; the epileptic col¬ ony at Dixon ; the Psychopathic Institute with clinical laboratory at the Kankakee State Hos¬ pital ; the Soldiers' and Sailors' Home at Quincy; the Soldiers' Orphans' Home at Nor¬ mal ; the Soldiers' Widows' Home at Wilming¬ ton; the School for the Blind and the School for the Deaf at Jacksonville; the Training School for Girls at Geneva ; the School for Boys at Saint Charles; and the Charitable Eye and Ear Infirmary and the Industrial Home for the Blind at Chicago. Twenty-one thou¬ sand people were housed in these institutions, and 75,000 additional people received treatment annually at the Charitable Eye and Ear Infirm¬ ary in Chicago. Farms are operated in con¬ nection with most of the institutions, and over 1,500 head of cattle are maintained on the in¬ stitution farms. Kindness is practised towards the inmates, and the 3,500 employees are well treated. The latter have an eight hour day, and one day's rest out of seven. The cost of maintenance is about $5,500,000 yearly.

Penal Institutions— The Illinois State Re¬ formatory, located at Pontiac, has excellent buildings and appointments for the care of its inmates. Under the law no one can be ad¬ mitted who has reached the age of 21 at the time of the commission of the offense for which he is sentenced. Trade schools and a farm are provided for and every effort practicable is made to reform the inmates. The Illinois State penitentiary is located at Joliet and the South¬ ern Illinois penitentiary at Chester. The State legislature appropriated $2,803,014 for the State penal and reformatory institutions for the biennium beginning 1 July 1917. The latest statistics at hand show that on 1 Jan. 1910 Illinois had 5,111 sentenced prisoners in penal institutions or 90.6 per 100,000 of population. Of this number, 3,000 were supposedly native white, 1,197 foreign born white, 911 negro, and three other colored persons. During that year 27,942 were committed to prison, or 495.5 per 100,000 population.

Corporations. — The first corporation was the Bank of Illinois, located at Shawneetown and chartered 28

Dec. 1816. Within the 100 years since that time, over 93,000 corporations have been created. Between the adoption of the Constitution of 1818 and that of 1848, about

2,700 corporations were created by special acts. On 16 Dec. 1824 the first statute in the nature of a general corporation act was approved. Manufacturing companies could be created by filing articles of incorporation with the secre¬ tary of state at a cost of 75 cents. This statute, however, remained a dead letter. The Constitution of 1848 authorized the creation of corporation's by general law, and prohibited their creation by special act, except for munic¬ ipal purposes and in cases where the general assembly thought that the objects of the cor¬ poration could not be obtained under general laws. Corporations, nevertheless, were still created by special acts, and the double system lasted till 1870. Then, because of the numerous evils arising under the system, the new Con¬ stitution prohibited the legislature from creat¬ ing corporations by special act except for chari¬ table, educational, penal or reformatory pur¬ poses, and these corporations were to remain under the control of the State. The first cor¬ poration created under a general law was the Illinois and Mississippi Telegraph Company, whose articles were filed 2 May 1849. From that time until 1 July 1872, when the present general incorporation act went into effect, 2,200 corporations filed articles in the office of the Secretary of State. This was an average of less than 100 corporations a year. The average now is about 3,300 per year. On 1 May 1916, the total number of corporations licensed to do business at one time or other in the State was 93,908. Not over 5,000 of these were created in the first half century of the State's history, and only 30,380 were chartered in the first 75 years. In the last 25 years about 60,000 cor¬ porations have been registered. The greatest increase took place in the decade from 1882 to 1892, which showed a gain of nearly 300 per cent over the previous 10 years. The increase is now comparatively uniform, each decade

showing a gain of about 25 per cent. In 1915, domestic corporations paid fees amounting to $222,7 56.16 and foreign corporations paid $97,- 314.90. The law requires corporations organ¬ ized for profit to make a yearly report, and in Feb. 1915, 15,900 Illinois corporations and 2,280 foreign corporations reported to the secretary of state, making an apparent total of 18,180 corporations doing business then. These figures, however, do not include banks, home building and loan associations, which re¬ port to the auditor of public accounts, and insurance companies, which report to the superintendent of insurance. Moreover, annual reports are not required from railroads. For these reasons, it seems fair to assume that about 30,000 corporations are now active in the State.

Illinois now ranks next to New York and Pennsylvania in the paid-in capital for national banks. This system, established 25 Feb. 1863, was a success and achieved the purposes for which it was primarily created; the establish¬ ment of a market for government bonds, the establishment of a uniform currency, and the abolition of ((wild cat® currency. The National Banking system followed, in Illinois, the ((Free Banking Law® of 1851 under which 115 banks of issue were in operation just prior to the Civil War; these banks issued nearlv 1,000 dif¬ ferent kinds of bills and counterfeiting was easy. . The new law remedied these evils. Banking showed a steady growth, though slow

at first. From 14 Oct. 1900 to 31 Oct. 1915, 305 national banks with a total capital of $20,333,500 were organized. These banks fall into three general classes : those with a capital of $25,000, those with a capital of $25,000 to $50,000, and those with a capital of $50,000 or over. During the time indicated, 182 banks of the first class with a total capital of $4,500,000, 21 of the second class with a total capital of $733,500, and 102 of the third

class with a capital of $15,050,000 were organized. On 2 Sept. 1915, 470. national banks reported; their combined capital was $76,105,000. Other banks also are strong. Thus, on 23 June 1915, saving deposits in Illinois State banks and. trust companies ag¬ gregated $294,534,096.83.

Some provisions of the laws, other than the few indicated in the -historical sketch above, are : no State bank shall be created and the State shall not own stock in any corporation for banking purposes ; every stockholder in a bank¬ ing corporation shall be individually liable to its creditors for double the amount of his stock; the rolling stock and all other movable property of all railroads in the State are to be consid¬ ered personal property, and subject to execu¬ tion for the debts of such companies; railroad corporations are prohibited from consolidating with parallel or competing lines; all railroads in the State are declared to be public highways, and free to all persons for the transportation of their persons and property thereon, under such regulations as may be prescribed by law — the general assembly to establish reasonable maximum rates of charges for the .transporta¬ tion of passengers and freight; the right of eminent domain by the State against such cor¬ porations shall never be abridged; the general assembly by appropriate legislation shall prevent unjust discrimination and extortion in the rates of passenger and freight tariffs on all railroads in the State ; appropriate legislation is author¬ ized for the protection of producers, shippers and receivers of grain and produce; the general assembly is prohibited from releasing the Illi¬ nois Central Railroad Company from its charter obligation to pay the State the agreed percent¬ age of its gross earnings ; and no county, city, town or township is permitted to become a sub¬ scriber to the capital stock of any railroad, or private corporation, or to make donations to, or loan its credit in aid of any such corporation.

Transportation. — Illinois is especially favored for commerce. The early French settlers came to the

State by way of the Saint Lawrence River and the Great Lakes ; many of the English settlers came by way of the Ohio River and its tributaries. Nearly three-fourths of its boundaries are navigable rivers. It has 4,000 miles of river navigation. About 65 miles of the shore line of Lake Michigan lie within the State. The Mississippi River is connected with the Great Lakes by means of the Illinois and Michigan Canal, which extends from the Chicago River to LaSalle on the Illinois River, a distance of nearly 100 miles. The Chicago Drainage Canal, extending from Lake Michigan to the Des Plaines River and thence to the Illinois River, gives connection with the Miss¬ issippi. Still another canal connects the Illinois River at Hennepin, a few miles below LaSalle, with the Mississippi River.at Rock Island. The first railway constructed in the West was the Northern Cross Railroad from Meredosia on

the Illinois River to Springfield. This was completed in 1842, but in 1850 there were only 111 miles of railroad in the State. The Illinois Central Railroad was completed in 1856. Rail¬ ways . were constructed rapidly, and by 1870 Illinois had a greater railroad mileage than any other State in the Union. The first Railway and Warehouse Comrqission in the United States, with authority to fix freight and pas¬ senger rates, was established in Illinois in 1871. In 1907 the legislature passed a bill making it unlawful for any railroad to charge more than two cents a mile for carrying passengers be¬ tween points within the State provided tickets were bought before entering the cars ; other¬ wise three cents might be charged. In 1915, Illinois had over 12,000 miles of railroad and nearly 4,000 miles of electric railways. The roads having the longest mileage 30 June 1915, were the Illinois Central, 2,024; the Wabash' 669; the Cleveland, Cincinnati, Chicago and Saint Louis, 650; the Elgin, Joliet and Eastern, 327, and the Gan Dalia Railroad, 303.

Manufactures — Illinois is easily the most important manufacturing State west of the Alleghanies. Three factors have contributed largely to this — abundant

raw materials, cheap coal and adequate transportation facilities both by water and by rail.

In 1849, 11,559 wage-earners or 1.4 per cent of the population were employed in manufac¬ tures ; in 1879, 144,727 or 4.7 per cent; in 1909, 465,764 or 8.3 per cent. The gross per capita value of the products increased from $19.42 in 1849 to $340.38 in 1909, and the percentage which the manufactures represented of the total value of the products of manufacturing in¬ dustries in the United States from 1.6 in 1849 to 9.3 in 1909. Illinois ranked fifth in the value of manufactures in 1849, and third in 1909. In the last named, year, she had 18,026 manu¬ facturing establishments. These employed 561,- 044 persons, paid out $364,768,000 in salaries and wages, turned out products valued at $1,- 919,277,000 from materials costing $1,160,927,000, and thereby added a value of $758,350,000 in the process of manufacturing. These figures do not include the government arsenal at Rock Island, which, in 1909, employed 1,698 wage- earners and reported the value of its products at $3,114,338.

*In 1909, the 21 Lading industries with prod¬ ucts valued at over $20,000,000, with the num¬ ber of their establishments and the average number of workers employed were as follows : (1) Slaughtering and meat packing, $389,595,- 000 (28.4 per cent of the total product of the United States), 109 and 26,705; (2) foundry and machine shop products, $138,579,000, 1,178 and 52,266; (3) clothing, men's, including shirts, $89,473,000, 715 and 36,152; (4) printing and publishing, $87,247,000, 2,608 and 28,644; (5) iron and steel, steel works and rolling mills, $86,608,000, 24 and 17,584; (6) agricultural im¬ plements, $57,268,000 (39.1 per cent of the total product of the United States), 79 and 19,240 * (7) distilled liquors, $55,200,000 (27 per cent of the total product of the United States), 9 and 750; (8) flour-mill and grist mill products, $51,111,000, 461 and 2,464; (9) lumber and tim¬ ber products, $44,952,000, 814 and 16,567; (10) iron and steel, blast furnaces, $38,300,000. 6 and 2,493; (11) bread and other bakery prod¬ ucts $36,1 18,000, 2,099 and*

8,611; (12) cars and

general shop construction and repairs by steam railroad companies, $32,229,000, 73 and 23,131 ;

(13) liquors, malt, $28,449,000, 106 and 4,398;

(14) furniture and refrigerators $27,900,000, 267 and 13,575; (15) cars, steam railroad, not including operations of railroad companies, $27,- 001,000, 28 and 10,945; (16) electrical machin¬ ery, apparatus and supplies, $26,826,000, 143 and 9,641; (17) copper, tin and sheet-iron products, $22,823,000, 483 and 7,473; (18) tobacco manu¬ factures, $21,870,000, 1,944 and 8,034; (19) gas, illuminating and heating, $21,052,000, 78 and 6,301 ; (20) paint and varnish $20,434,000, 74 and 1,792; (21) soap, $20,181,000, 34 and 2,188. The average number of wage-earners in 1909 was 465,764. Of this number 382,691 were males 16 years of age and over, 76,156 were females 16 years of age and over and 6,917 were under 16 years of age. The percentages for the three were 82.2, 16.3 and 1.5. The proportion of wage-earners under 16 in all manufacturing in¬ dustries. combined was only one-half as great in 1909 as in 1899. There was a moderate increase during the decade, however, in the proportion of female wage-earners 16 years of age or over, while the proportion of males 16 years of age or over showed a slight decrease. In 1909, 84.2 per cent of the workers employed in the men's fur¬ nishing goods industry were females 16 years of age or over, 75.4 per cent of those in the millinery and lace goods industry were females 16 or over, and 67.4 per cent of the workers in the women's clothing industries belonged to this class. Other industries employing large numbers of female wage-earners 16 years of age and over were: printing and publishing, slaughtering and meat packing, and the manu¬ facture of clocks and shoes, electrical machin¬ ery, tobacco products and fancy and paper boxes. Of the wage-earners under

16, 46.9 per cent were employed in seven industries. These were the men's, clothing industry with an aver¬ age of 995; printing and publishing, with 739; the manufacture of fancy and paper boxes, with 410; the boot and shoe industry, with 334; the manufacture of pianos and organs, with 309; the confectionery industry, with 205; and foundries and machine shops, with 202. In the manufacture of patent medicines and com¬ pounds, the proportion of children in the total number of wage-earners was highest — 8.1 per cent — but the average number employed was only 151.

The . value, of the total manufactured product in Chicago alone, in 1909, was $1,281,- 171,000 or about two-thirds of the total. Peoria and Joliet held second and third place among the manufacturing cities. In 1914, Illinois had 18,388 establishments, 15,854 proprietors and firm members, 95,130 salaried employees, 506,943 wage-earners, and $1,943,836,000 invested capi¬ tal. These manufacturing industries paid $128,- 478,000 in salaries and $340,910,000 in wages, used material costing $1,340,183,000 and turned out products valued at $2,247,323,000, thereby adding a value of $907,140,000. The total value of the product has practically doubled within 15 years, the value being only $1,259,730,168 in

1899.

Agriculture, Mining, etc. — Illinois takes very high rank as an agricultural State ; 32,471,000 acres under cultivation being reported for 1910, as compared with 32,795,000 in 1900,

a decrease of 1 per cent. In 1910, the total number of farms in the State was 250,853; the estimated value of the land and buildings was $3,5 1 1, 194,000 as compared with $1,765,582,000 in 1900. The increase was 99 per cent. In 1900 the average value of a farm with its equipment was $7,600; in 1910, $15,505. The average value of the land per acre in the two census years was $46.17 and $95.02. The total value of farm lands was $1,514,114,000 and $3,081,564,000 or a gain of 104 per cent. The value

of farm build¬ ings in the two years was $251,468,000 and $429,- 630,000, and the increase was 71 per cent. The larger farms are generally in the north and the smaller in the extreme southern portion of the State.

The census of 1880 showed the number of tenant farmers in Illinois to be larger than in any other State of the Union, and quite a little capital was made of the (

Illinois has an active live stock industry. On 1 Jan. 1917, there were 1,452,000 horses (farm animals) valued at $153,912,000; 150,000 mules valued at $17,250,000; 1,057,000 milch cows valued at $71,876,000; 1,251,000 other cattle valued at $54,168,000; 898,000 sheep valued at $7,363,000 and 4,440,000 swine valued at $60,- 883,000. In 1916, Illinois produced 306,800,000 bushels of corn valued at $257,712,000; 172,- 095,000 bushels of oats valued at $87,768,000; 16,225,000 bushels of wheat valued at $26,771,000 (in 1915 the figures were 53,250,000 and $53,-

State Capitol at Springfield

200,000) ; 4,495,000 tons of hay valued at $50,794,000; and 7,250,000 bushels of Irish oota- toes valued at $12,978,000 (in 1909 the figures were 14,924,000 and $9,104,000). In 1909, Illi¬ nois produced 1,125,000 pounds of tobacco valued at $123,750; in 1916, the production was only 525,000 pounds and the value $52,000. In 1916, 1,616,000 barrels of apples (4,716,000 in 1915), 780,000 bushels of peaches, and 354,000 bushels of pears were produced. The wool pro¬ duction of Illinois in 1909 was 4,725,000 pounds, and the value of the product was $1,296,540. In 1915, 3,975,000 pounds were produced and the average price was 25 cents a

pound; in 1916, only 3,855,000 pounds were produced, but the average price was 30.1 cents and the value was about $1,160,355. At the time of the last census, Illinois was producing about 125,000 feet of lumber yearly at a valuation of over $2,500,000. At the same time, her fisheries employed about 5,000 persons and yielded a product valued at

$1,500,000.

In 1909, Illinois ranked next to Pennsyl¬ vania iii the value of the products of mining industries. The gross value was $76,658,974; the net value, $76,556,994. Bituminous coal mining with a product valued at $53,030,545 was easily the leader. The petroleum and natural gas wells with a product worth $18,- 883,102 ranked second. The output of zinc in 1913 was about 2,236 short tons and the value was $250,432 ; flour-spar was produced to the amount of 85,854 short tons and a value of $550,815; the limestone and sandstone output was valued at $4,140,953; and clay products (bricks, tiles and pottery) were valued at $15,- 195,874. In 1913 the total mineral product was valued at $131,825,221 ; the average year since the last census, however, has seen a product worth over $100,000,000. In 1915, 2,447,220 long tons of pig iron, 5,156,869 barrels of cement, $350,371 worth of natural gas, 24,942,701 bar¬ rels of petroleum, 1,686,998 short tons of coke, and 58,829,576 short tons of coal were produced. The coal fields of Illinois cover an area of about 42,900 square miles. Since 1882 very careful reports of coal production have been kept. In that year, 11,017,069 tons were produced, and 20,290 men employed ; in 1914 the figures stood 60,715,795 tons and 80,035 men. The leading counties in the latter year were : Williamson, 7,681,006 tons; Franklin 6,595,799; Sangamon, 5,723,046; Macoupin, 4,981,057; Saint Clair, 4,009,258. All were in the southern or south central part of the State.

Chicago is the great distributing and receiv¬ ing point, due partly to lake transport and ex¬ cellent railroad facilities. The former brings millions of

tons of iron ore, and millions of bushels of oats, wheat and maize every year. Receipts by lake transport for Chicago, in 1914 included 586,134,000 pounds of fresh beef, and the shipment, 1,027,327,000 pounds. During the year 1915, 107,471,640 dozen eggs, 180,303,840 pounds of butter, 9,063,000 barrels of flour, 4,648,u00 bushels of rye, 26,167,000 bushels of barley, 70,704,000 bushels of wheat, 95,357,000 bushels of corn, and 133,475,000 bushels of oats were received in Chicago. The value of the live stock received at the stock yard in the same year was $370,938,156. Shipments received by down-town packers increased the total to $379,- 099,642. The official valuation of livestock re¬

ceived at the Chicago Stock Yards that year was: Cattle, $192,116,472 ; calves, $5,714,075; hogs, $120,349,047; sheep, $23,044,562; horses,

$29,754,000.

Everything considered Illinois is one of the wealthiest States in the Union. In 1904, the estimated true value of all property and of specified classes of property stood as follows : Real property and improvements, $5,468,492,926; live stock, $268,731,540 ; farm implements and machinery, $48,593,486; manufacturing ma¬ chinery, tools and implements, $227,543,320 gold and silver coin and bullion, $150,074,503 railroads and their equipment, $805,057,000 street railways, shipping, waterworks, etc., $327,591,493; all other $1,520,471,923 ; total $8,816,556,191. For these same items, in the order named, the figures for 1912 stood: $10,-

056,319,512; $386,701,265; $79,473,427; $451 - 299,068; $205,185,274 ; $926,403,787 ; $784,713,-

023; $2,640,354,876; $15,484,450,232. In the first named year, New York and Pennsylvania were ahead of Illinois, but in 1912 Illinois stood second to New York.

Constitution. — Three constitutions have been in

force in Illinois since its admission as a State. The first was formed by a convention of 32 delegates from the 15 counties of the territory, which met at Kaskaskia in August 1818. This constitution, under which the State was admitted; remained the organic law of Illinois for 30 years, or until the adoption of the constitution of 1848. In the meantime, the State had gradually increased in wealth and in population. Many new counties had been organized, and the northern boundary of actual settlement had been extended from the county of Madison to the Wisconsin line. Chicago and other cities unknown to the framers of the first constitution had sprung into being. A futile attempt to procure the calling of a con¬ vention to frame a new constitution was made in 1823. In 1846, the question of calling a con¬ vention was again submitted by the legislature ; the returns showed a large majority favorable, and delegates were accordingly chosen in April 1847. This convention, consisting of 162 mem¬ bers, assembled at Springfield in June of that year and its work was concluded 31 August. Unlike the first constitution, this one was submitted to the people. It met with popular approval and by its terms went into operation on the first Monday of April 1848; it remained in force until the adoption of the present con¬ stitution. The latter was formulated by a con¬ vention of 85 members which assembled in Springfield, 13 Dec. 1869. This constitution was submitted to popular vote and approved, and since August 1870, has been the funda¬ mental law of the State. By a two-thirds vote in each House the general assembly may sub¬ mit to the electors, the question of calling a convention to alter or amend the constitution, to be voted upon at the next general election ; by the same vote in the general assembly pro¬ posed amendments to the constitution (without the intervention of a convention) may be sub¬ mitted to the electors for adoption or re¬ jection. One of the most important provisions of the present constitution is the division of the powers of the government into legislative, executive and judicial. The legislative power is prohibited from releasing the indebtedness, liability or obligation

of any corporation or

individual to the State or to any municipal cor¬ poration therein, and to authorize lotteries or gift enterprises for any purpose. Two impor¬ tant mandatory provisions upon the general as¬ sembly were incorporated in the constitution: One requiring legislation protecting coal miners, and the other the passage of liberal homestead and exemption laws. Under the former consti¬ tution, the State and people had suffered from special legislation. To cause the discontinu¬ ance of such legislation and the enactment of general laws when necessary, the general as¬ sembly was prohibited from passing local or special laws in any of the following cases, viz. : For granting divorces ; changing the names of persons or places ; laying out, opening, altering and working roads or highways; vacating roads, townplots, streets, alleys and public grounds; locating or changing county seats; regulating county and township affairs ; regu¬ lating the practice in courts of justice; regulat¬ ing the jurisdiction and duties of justices of the peace, police magistrates and constables; providing for changes of venue in civil and criminal cases; incorporating cities, towns or villages or changing or amending the charter of any town, city or village; providing for the election of a board of supervisors; summoning and impaneling grand or petit juries; providing for the management of common schools; regu¬ lating the rate of interest on money; the open¬ ing and conducting of any election or desig¬ nating the place of voting; the sale or mort¬ gage of real estate belonging to minors or others under disability; the protection of game or fish; chartering or licensing ferries or toll bridges ; remitting fines, penaltiesior forfeitures ; creating, increasing or decreasing fees, percent¬ age or allowance of public officers during the term for which said officers are elected or appointed; changing the law of descent; grant¬ ing to any

corporation, association or individual the right to lay down railroad tracks or amend¬ ing existing charters for such purpose; grant¬ ing to any corporation, association or individual any special or exclusive privilege, immunity or franchise whatever.

Government. — The supreme executive power of the State is vested in a governor, <(who shall take care that the laws be faithfully executed.® He must be 30 years of age and for five years next preceding his election a citizen of the United States, and of this State. His term of office is fixed at four years. Some of his powers are : Giving the general assem¬ bly information by message of the condition of the State at the commencement of each session, and recommending such measures as he deems expedient ; convening, by proclama¬ tion, the general assembly upon extraordinary occasions ; removing officers of his appoint¬ ment for incompetency, neglect of duty or mal¬ feasance in office ; and granting reprieves, com¬ mutations or pardons after conviction for all offenses. He is commander-in-chief of the military and naval forces of the State — ex¬ cept when they are called into the service of the United States. He has a qualified veto power upon all bills passed by the general assembly, but bills may be passed over his veto by a two-thirds vote of each House. In case of his death, resignation, or conviction upon impeachment, the duties of his office fall upon the lieutenant-governor, who acts as president

of the Senate. He, with the secretary of state, the attorney-general, the auditor of public ac¬ counts, the treasurer and the superintendent of public instruction, is elected in the same manner, and except the treasurer, for the same length of time as the governor; the treasurer's term is two years.

A significant change for efficient and eco¬ nomic government, which marks Illinois as the leader in this respect went into effect 7 March 1917. The primary object of the new law — <(The Civil Administrative Code® — of Illinois was to reorganize and consolidate the numer¬ ous state administrative

officers, boards and commissions into a limited number of state departments as in the national government. Nine principal departments — finance, agricul¬ ture, labor, mines and minerals, public works and buildings, public welfare, public health, trade and commerce, registration and educa¬ tion — are created. These departments will ab¬ sorb the functions of 40 executive officers, 50 boards and commissions, and a larger number of subordinate officials. All of the officials are appointed by the governor with the con¬ sent of the senate and for a term of four years (with the exception of the normal school board). Several new positions are created, and the more important officers receive larger salaries — the directors receive from $5,000 to $7,000 each. The net reduction in official positions, however, is about 100. Persons in the classified service are assigned to posi¬ tions in the new departments. At the head of each department is a director. Under the directors there are subordinate officials. These are : In the department of finance, four divi¬ sional heads; in the department of agriculture, besides a food standard commission, an assist¬ ant director and six divisional heads ; in the department of labor, besides an industrial com¬ mission consisting of five officers, an assistant director and three divisional heads; in the de¬ partment of mines and minerals, an assistant director, a mining board consisting of four officers and the director of the department, and a miners' examining board of three officers; in the department of public works and build¬ ings, an assistant director and eight divisional heads; in the department of public welfare, an assistant director and six divisional heads; in the department of public health, an assistant director; in the department of trade and com¬ merce, an assistant director and four divisional heads, besides the public utilities commission consisting of five officers ; and in the department of registration and education, an assistant direc¬ tor, a superintendent of registration and a nor¬ mal school board consisting of 10 officers with the director of the department

and the superin¬ tendent of the public instruction. Advisory and non-executive boards were created as follows ; A board of agricultural advisors and a board of state fair adyisors, a general board of free employment advisors and local boards, five ad¬ visory boards in the department of public works, a board of public welfare commis¬ sioners, a board of public health advisors, and two advisory boards in the department of edu¬ cation and registration. The qualifications, powers and duties of all directors, assistant directors, division heads and members of ad¬ visory boards are specified in the law. The salaries of the officers created are also specified,

l)ut it is provided that members of advisory and non-executive boards shall not receive salaries. The law specifies the hours during which all public offices are to be kept open. The director of each department has authority to prescribe all necessary regulations for the conduct of his office. The Civil Service Law was not repealed, but no director needs to or should retain more employees than are neces¬ sary. All fees and funds received by any state officer or department are to be paid into the treasury within 10 days after their receipt. The governor is to submit to the general as¬ sembly, within four weeks after its organiza¬ tion, a budget containing the amounts recom¬ mended by him for the respective departments, offices and institutions and for all other public purposes together with the estimated total rev¬ enues and the amount to be raised by taxation.

The judicial powers of the State are vested in a Supreme Court, circuit courts, county courts, justices of the peace, police magis¬ trates, and in such courts as may be created by law for cities and incorporated towns. The Supreme Court consists of seven judges and their term of office is nine years. The State is divided into 17 circuits, and the term of the circuit judges is fixed at six years.

Inferior appellate courts of uniform organization and jurisdiction, and composed of circuit judges, have been created. The legislative power of the State is vested by the constitution in the general assembly which consists of the senate and house of representatives. Senators must be 25 years of age, and representatives 21 ; both must be citizens of the United States and five years resident of the State. No person con¬ victed of infamous crime or a public defaulter is eligible as senator or representative or to any office of profit or trust in the State. In addition to the ordinary official oath, each sen¬ ator and representative is required to swear in substance that his election has in no way been secured by bribery. The number of senators is fixed at 51, and of representatives at 153; mi¬ nority representation is provided for in the election of representatives. Senators are elected for four years (about half retire every two years) and representatives for two. Their salary was fixed at $5 per day during the ses¬ sion by the constitution, but it may be and has been changed from time to time by legislative act. A majority of members elected to each house constitute a quorum. Bills may orig¬ inate in either house subject to amendment in the other. No act is to embrace more than one subject and that is to be contained in the title. Every bill must be read at large upon three different days in each house, and upon final passage the yeas and nays must be taken on each bill separately. No money may be drawn from the treasury save in the pursuance of an appropriation made by law. The general as¬ sembly is permitted to make appropriations for expenditures incurred in suppressing insurrec¬ tion or repelling invasion.

Local government is of two general types — rural and urban. In each county from 9 to 13 officers are elected. The most common offi¬ cers are the county clerk, the county judge, the county treasurer, the clerk of the circuit court, the State's attorney, the sheriff, the coroner, the county superintendent of schools and the county surveyor (a statutory officer). Any VOL. 14 — 44

county may adopt or discontinue the system of township organization, on petition and a popu¬ lar vote. Eighty-five of the 102 counties in Illinois have the township system. In the 85 counties there are 1,430 civil townships, with an average area slightly less than 36 square miles. Most of these townships are decidedly rural, with a population of from 1,000 to 2,000, but except in Chicago, where the townships have been practically abolished, they include cities and villages within their limits ; hence there are a number of townships which have from 10,000 to 60,000 people. Cook County, like those counties in which townships are not found, is governed by a Board of Commission¬ ers. These towns have limited powers, much less than in New England, for the important matters attended to by the towns there are looked after in Illinois by the cities, villages and school districts. The townships are vested with corporate capacity, however, and may levy local taxes, make by-laws for a few enu¬ merated purposes, vote to prohibit the granting of liquor licenses, and elect a number of offi¬ cials for road and judicial administration and for the assessment and collection of taxes. The annual town meeting — of little importance — is held on the first Tuesday in April for the election of officers and the transaction of busi¬ ness. The ordinary town officers are super¬ visor, town clerk, assessor, collector, three commissioners of highways, and two to five jus¬ tices of the peace and constables. Assistant supervisors are elected in the larger towns. The supervisor and assistant supervisors are members of the county board. The former acts also as town treasurer, and in many cases as overseer of the poor. The duties of the other officers are indicated fairly well by their titles. City government, until recently, was carried on largely under the authority of a mayor and a council, the former being an exec¬ utive with appointive and veto power and the latter a legislative body. Chicago has created separate municipalities for different functions. In 1915 it had 22 governments and its citizens voted for 250 officials. Besides the mayor and councilmen, Chicago voters elected the city clerk, city treasurer, 31

municipal judges, and the bailiff and clerk of the municipal court, which is an elective, but not a taxing body. There were 16 independent park commissions with taxing authority. Within the last decade, however, the older system has been replaced to a certain extent by a newer and more efficient government — the commission form. The law making this possible was passed in 1910. It provides that when in cities and villages not exceeding 200,000, electors equal in number to one-tenth of the votes cast for mayor at the last preceding election petition the county judge for the commission form of government it is his duty to submit the proposition at a special election to be called within 60 days, and at this election a majority of the votes cast determines the result. Within five years after its passage, 39 cities and villages, including the capital, adopted the new form ; many others have adopted it also within the last two years. The law abolishes the system of ward aldermen and the distinct powers of the mayor and council. The general authority and responsibility for the municipal government is entrusted to a council, consisting of a mayor and four com-

missioners elected at large. The executive and administrative work in cities under the commis¬ sion plan is divided among the five depart¬ ments, each assigned to one of the commission¬ ers. The mayor is in charge of the depart¬ ment of public affairs. The other departments are : Accounts and finances, public health and safety, streets and public improvements and public property. The council elects a city clerk, city attorney, treasurer and other munic¬ ipal officers as corporation counsel, comptroller, chief of police, chief of fire department and library trustees. In cities of over 20,000 the mayor and commissioners are required to devote at least six hours a day to their official duties.

Revenue. — The general assembly is em¬ powered to provide needed revenue by levying a tax, by valuation, so that every person and corporation pays a tax in proportion to the value of his, her or its property. Certain property, however, — religious, charitable, etc. — may be exempted by general law. The so- called ((general property tax,® which is the chief support of State and local government, is as¬ sessed upon real and personal property at a supposed valuation of one-third of its <(fair cash value.® In Cook County and the counties not under township organization, the assess¬ ment of taxes is largely a county affair; in other places it is entrusted to the town assess¬ ors. Assessments are subject to revision by a county board of review and the State board of equalization. The latter consists of 26 mem¬ bers, elected by congressional districts. There is also an ex officio State Tax Levy Board and a Court of Claims. Other sources of revenue for the State are the inheritance tax and a spe¬ cial tax on the Illinois Central Railroad — 7 per cent of the gross earnings. This tax in the first 51 years amounted to $24,400,446.27; for some time it has yielded over a million dollars a year. For municipal governments there are licenses and similar charges. In 1917 Illinois faced an increase of 33 1/3 per cent in the cost of State government for the next two years. The amount asked, $60,000,000, was just

twice . the amount appropriated six years ago, and $14,000,000 in excess of the appropriations made in 1915. It was cut down somewhat.

Suffrage. — The qualified electors are all male citizens 21 years of age, who have resided in the State a year, in the county 90 days, and in the district 30 days next before the election. Women have the right to vote for all officers in the State, State and local, not created by the constitution, and in national elections for the president. The president is voted for by elect¬ ors who are chosen as the State legislature may direct. On the other hand, senators and representatives in Congress are chosen by elect¬ ors qualified to vote for merribers of the most numerous branch of the State legislature — a constitutionally created State office. Voting is by ballot and persons convicted of infamous crimes are excluded from the right of suffrage.

Militia. — All able-bodied male citizens be¬ tween the age of 18 and 45 except those exempt by State or national law are subject to military duty and are designated as the Illinois State Militia. This body is divided into the organized and unorganized militia. The first is divided into the Illinois National Guard and the Illinois Naval Reserve. The Illinois National Guard forms the land forces in time of peace accord¬

ing to the statute of 1909, it may consist of not more than 1 major-general, 3 brigadier-generals, 24 battalions of infantry, 1 regiment of cavalry, a corps of engineers, 3 batteries of field artil¬ lery, a signal corps, and a field hospital and ambulance corps, with the needed line, staff and non-commissioned officers and the officers of the retired list. The act provides that the infantry be organized into eight regiments, com¬ posed of 12 companies with a maximum of 1,154 men, commanded by a colonel. Two or more regiments of infantry commanded by a brigadier-general form a brigade. The statute p»ovided that the staff be organized into the fol¬ lowing 10 departments: The adjutant-

general's department, the inspector-general's department, the quartermaster's department, the subsistence department, the ordnance department, the medi¬ cal department, the pay department, the judge-advocate's department, the corps of engineers and the signal corps. This organization was con¬ siderably altered by the executive order of the governor which went into effect 1 Jan. 1914. The whole division organization was abolished, the office of major-general was discontinued, the number of brigadier-generals was reduced to two, and the subsistence department was con¬ solidated with the quartermaster's corps. The Illinois Naval Reserve forms -the naval force in time of peace. As provided in the statutes, it consists of a ship's complement of 12 divisions, with the necessary line, staff, warrant and petty officers, and .the officers of the retired list. It is organized as a ship's crew, commanded by a captain. He is assisted by an executive officer known as the commander, a navigating officer of the rank of lieutenant commander, an ord¬ nance officer and an equipment officer of the rank of lieutenant. The crew is divided into 12 divisions, of which two are steam engineers and one a band. In 1912, 521 officers and 5,586 men were enlisted in the National Guard; in 1916, the figures were 500 and 6,099. In 1912, 50 officers and 587 men were enlisted in the Naval Reserve; in 1916, the figures were 39 and 628. The governor has authority to call out the military forces to suppress mobs, riots or dis¬ turbances, and on such occasions commanding officers may make arrests without process.

Politics. — Illinois is divided into 25 con¬ gressional districts, but she has 27 representa¬ tives in Congress, two being elected at large. The reason for this is that the Illinois legislature did not redistrict the State after the last con¬ gressional reapportionment. The electoral vote of the State at successive presidential elections, since >ts admission in 1818, has been cast as follow, viz. : In 1820, for Monroe ; in 1824, one vote for Adams and two for Jackson; in 1823 and

1832, for Jackson; in 1836 and 1840, for Van Buren; in 1844, for Polk; in 1848 for Cass; in 1852, for Pierce; in 1856 for Buchanan; in 1860 and 1864, for Lincoln; in 1868 and 1872, for Grant ; in 1876, for Hayes ; in 1880, for Gar¬ field; in 1884, for Blaine; in 1888, for Harrison- in 1892, for Cleveland ; in 1896 and 1930, for Mc¬ Kinley; in 1904, for Roosevelt; in 1908, for Taft; in 19T2, for Wilson; in 1916, for Hughes During this period the vote of Illinois in the electoral college increased from 3 to 29. Since the Civil War, the Republicans have met with well-nigh uniform success over their old rivals, the Democrats. Other parties, however, have sprung into existence, temporarily at least. In

1872, such men as Governor John M. Palmer, Senator Lyman Trumbull and Gustavus Koerner joined the Liberal Republicans. The National Grange or Patrons of Industry organized in 1869 for the object of uniting all agriculturists for the better securing of their rights as ship¬ pers and producers and for the social, moral and educational uplift of their children, entered politics in 1874. Aided by the Democratic Party and dissatisfied elements as the Independ¬ ent Reform Party and the Democratic Liberal Party they defeated the Republican candidate for superintendent of public instruction and elected many fusion candidates in the smaller divisions of the State. No party secured a majority of the legislature. The Greenback Party in 1876 and other cheap money parties later on developed some strength. The most powerful third partv movement, however, oc¬ curred in 1912, when Roosevelt as the standard bearer of the Progressives polled 386,478 votes as compared with 405,048 for Wilson, and 253,-593 for Taft. In the election of 1916, the vote of the parties was as follows : Republican, 1 , 1 52,549 ; Democratic, 950,229; Socialist, 61,304; Prohibition, 26,047; Socialist Labor, 2,488.

History. — The name of the State is derived from

((Illini,® an Indian word meaning "men?5 The euphonic termination added by the early French explorers gives the name ^Illinois.® In 1659, Pierre Radisson and Medard Chonart des Grossilliers seem to have reached the upper Mississippi, but the real history of Illinois be¬ gins with the coming of Marquette and Joliet. In June 1673, they landed upon the east bank of the Mississippi in what is now Illinois. They descended the Mississippi to a point possibly within 400 miles of its mouth. Marquette es¬ tablished a mission at the ancient village of the Kaskaskias. La Salle, Tonti and Hennepin were also early discoverers. The former is credited with building the first fortress in the State, Fort Creve Coeur, in 1679, and with dis¬ covering the mouth of the Mississippi River. Here, on 9 April 1682, he took formal possession of ((the Louisiana country® in the name of his master, Louis XIV of France. Permanent French settlements were made at Kaskaskia, Cahokia and Fort Chartres about 1720. At first <(the Illinois country® was the dependency of Canada but by decree of the Royal Council in 1717 it passed under the government estab¬ lished for Louisiana. A little later, in 1721, it became, by virtue of the same authority, one of the separate provinces into which the Louisiana country was then divided. A commandant and judge were duly appointed, and the seat of au¬ thority was transferred to Fort Chartres. Popu¬ lation meanwhile gradually increased in the great American bottom, then embracing the French settlements in Illinois. The French, however, claimed more than they had the ability to hold, and in the long continued struggle with their old rivals, they were decisively defeated on the Heights of Abraham at Quebec, 13 Sept. 1759. By the treaty of Paris, 1763, the Illinois country passed to Great Britain. British dom¬ ination in the Mississippi Valley, however, was of short duration. While the Revolutionary War was in progress George Rogers Clark at the head of a band of some 200 followers and bearing the commission of Patrick Henry, gov¬ ernor of Virginia, crossed the Ohio River, and landed near Fort Massac. After a perilous

six dayV march he surprised and captured Kas¬ kaskia, 4 July 1778, and soon the whole Illinois country acknowledged his authority. In the month of October, following the capture of Kaskaskia, the Virginia House of Delegates ex¬ tended civil jurisdiction over the territory. Courts were established at Cakokia and Kas¬ kaskia, and an election was held for civil of¬ ficers. John Todd was lieutenant-commandant of the Illinois country from 1778 to 1780. In 1783, the territory passed to the United States by treaty, and a year later Virginia magnani¬ mously ceded her claim to the national govern¬ ment with the understanding that the lands be sold to pay the war debts of the States.-

In 1787, the Ordinance for the Government of the Northwest Territory was passed. The commission of Arthur St. Clair, the first gov¬ ernor, bears the date of 1 Feb. 1788, and soon thereafter judges and other officers were ap¬ pointed, and the new government was duly or¬ ganized. In 1790, Governor St. Clair paid his first visit to Kaskaskia, the county bearing his name having been established meanwhile. Five years later out of its territory, the county of Randolph was created. The county seats of these two historic counties were Cahokia and Kas¬ kaskia. Pursuant to the provision of the Ordi¬ nance of 1787, the Northwest Territory having attained the requisite population, a general as¬ sembly was convened in Cincinnati in February 1799, and Illinois was now, for the first time, represented in a legislative chamber. In May 1800 Congress created Indiana Territory, which included the present States of Indiana and Illinois, and the seat of government was estab¬ lished at Vincennes. General William Henry' Harrison, later a President of the United States, was the first governor. By judicious treaties with the Indian tribes, he maintained peace and obtained the cession of valuable grants which in time became the homes of white emigrants. The fierce hatred of the Shawnee chief, Tecumseh, for the whites was, in part, the result of these grants. His own tribe allied with the Pottawattomies and the

Kickapoos failed to exterminate, as was the intention of Tecumseh, the white settlers, and ended with his own disastrous defeat at Tippecanoe in 1811, by which the power of these tribes was broken. The Fort Dearborn Massacre, 1812, also came about in part because of disputed land claims. From 1806 until 1809 a strong effort was made to organize Illinois as a separate territory. This movement succeeded in February 1809, and the capital was located at Kaskaskia. In 1812, a representative assembly was chosen, a territorial constitution adopted, and a territorial delegate in Congress was elected. Emigration from the older States had set in, and by 1818 the popu¬ lation of the territory was near 40,000. The general assembly in January of that year pe¬ titioned Congress for statehood. Nathaniel Pope was then territorial delegate, and through his influence the northern boundary was made 42° 30' instead of 41° 39', which seemed likely to prevail before his amendment. The bill, as amended, was passed, and on 3 Dec. 1818, Illinois was duly admitted as a State.

The social history of Illinois is intensely in¬ teresting. The first school was taught by Samuel T. Seeley in 1783 at New Design, in what is now Monroe County. The first Methodist church in Illinois was founded in 1793 at Shiloh in the

New Design settlement, and the first camp meeting was probably held near the same place in 1807. The first Baptist church in Illinois was also organized at New Design by David Badgley in 1796. One of the first Presbyterian churches was organized at Turkey Hill, a set¬ tlement four miles southeast of Belleville, 20 April 1820. Early missionaries and traveling ministers seemed disgusted with the religion and morals of early Illinois settlers, but the latter, it must be remembered, were typical frontiers¬ men. A Mr. Low, who was in Shawneetown in January 1818, describes conditions as follows: (<

Among its two or three hundred inhabitants there was not a single soul that made any pretentions to religion. Their shocking pro¬ faneness was enough to make one afraid to walk the street ; and those who on the Sabbath were not fighting and drinking at the taverns and grog shops were either hunting in the woods or trading behind their counters. A small audience gathered to hear the missionary preach. But even a laborer who could devote his whole time to the field might almost as soon expect to hear the stones cry out as to expect a revolution in the morals of the place.® Thomas Lippincott, for some time editor of the Edwardsville Spectator and later one of the trustees of Illinois College, said of Shawnee¬ town in 1818: ((We found a village not very prepossessing; the houses, with one exception being set up on posts several feet from the earth. The periodical overflow of the river ac¬ counts for this.® The first newspaper of the State was the Illinois Herald started at Kas¬ kaskia, 6 Sept 1814, by Matthew Duncan. In 1819, times were hard, prices were low and money was extremely scarce. A cow and a calf would not bring over $5.00; wheat was 35 cents a bushel, and corn was as low as 10 cents. The following prices prevailed at Albion in 1819: a fine turkey, 25 cents; chickens, 12 cents; beef, 5 cents per pound; eggs, \21/2 cents per dozen; cheese, 30 cents per pound; butter, 16 cents; bacon, 15 cents; flour, $9.00 per barrel; deer (whole carcass including the skin), $1.50; melons, 12^ cents; honey, $1.00 per gallon; whisky, $1.00 per gallon; fine Hyson tea, $2.00 per pound; moist sugar, 31 cents; coffee, 62 cents ; fish, 3 cents. During the first decade which followed the organization of the State, the habits of the people, in the main, were simple and their wants few. Barter in a large measure supplied the place of a medium of exchange. Commerce, in so far as it had any existence with the outer world, was by wagons across the Alleghanies, and by flatboats down the Ohio and the Mis¬ sissippi. The log cabin furnished protection to the pioneer from the winter's storm. With rude implements of his own construction, he culti¬ vated his fields, and with his rifle defended his loved

ones from the incursions of the savage. At the time of its admission, there were only 23 post-offices within the limits of the entire State. At the period indicated and for years afterwards, the frontiersman regarded himself as especially favored if located within a dozen miles of a post-office. The mails reached the settlements weekly or monthly upon horseback or by stage coach. The log cabin with its puncheon floor supplied the double purpose of temple of learning, and place for public wor¬ ship. Articles of apparel, were, with rare ex¬ ception, of home manufacture. Railroads, col¬

leges and universities were unknown. The first seminary in the State was organized at Rock Springs, 1 Jan. 1827 by John Mason Peck; it is now known as Shurtleff College and is lo¬ cated at Alton. Less than 10,000 persons were engaged in agricultural pursuits. Chicago had scarcely a place upon the map. Population drifted northward, however; in 1819 Vandalia had been made the capital, but in 1836 it was changed to Springfield. From 1818 to 1860, the most interesting internal questions were those relating to slavery, banking and internal im¬ provements. Northern Illinois had been largely settled by people from the free States; southern Illinois, by people from the slave States. In 1823 the legislature, by the necessary two-thirds vote, submitted to the people the question of calling a convention to revise the constitution. This was undoubtedly with the object of intro¬ ducing slavery. For 18 months the most in¬ tense excitement prevailed. Political leaders and newspapers were divided. Governor Coles, a Virginian and a former slave holder, Thomas Birkbeck, a gifted English writer, J. M. Peck, an influential Baptist minister, and Daniel P. Cook, an eloquent speaker, opposed the conven¬ tion. Jesse B. Thomas, Richard M. Young, John McLean, E. K. Kane, John Reynolds, Thomas Reynolds and Ex-Governor Bond took the stump for the convention. The Edwards¬ ville Spectator, the Illinois Intelligencer at Vandalia, and the Illinois Gazette at Shawnee¬ town opposed the convention ; the other two papers, the Republican Advocate at

Kaskaskia and The Republican at Edwardsville favored it. The election on 2 Aug. 1824 resulted in the de¬ feat of the convention by a vote of 6,640 to 4,972. The total vote cast was 11,612 as com¬ pared to 4,671 for presidential electors in No¬ vember of that year. Eleven counties out of 30 favored the convention. They were Alexander, Pope, Jackson, Franklin, Gallatin, Hamilton, White, Jefferson, Wayne and Fayette. Johnson was a tie. Union was against the convention by 27 votes. All these countries, except Fayette, were in what was then regarded as the South. Slavery sentiment still persisted, however, and on 7 Nov. 1837, Elijah P. Love joy was mur¬ dered by a pro-slavery mob at Alton for trying to publish an anti-slavery paper. After this, sentiment seemed to change, and in 1842 the Liberty Party was organized; in 1848, it united with the Free Soil Party. The Republican Party was definitely organized in 1856. Immi¬ gration from the northern States had out¬ weighed that from the southern States. As early as 1816 the territorial legislature had passed a law chartering banks at Shawneetown, Kaskaskia and Edwardsville. The charter in¬ corporating the State Bank of Illinois was passed in 1821, and was to continue 10 years. The capital was $500,000. The parent bank was to be located at Vandalia, and the branch banks at Edwardsville, Brownsville, Shawneetown and Albion. State bank bills were issued to the amount of $500,000, but they soon depreciated to 30 cents on the dollar. The State had lost at least $100,000 in this banking business, but after the expiration of the char¬ ter, in spite of bitter opposition, another State bank with a capital of $1,500,000 was created. The principal bank was located at Springfield with a branch at Vandalia. The Shawneetown bank was revived with a capital of $300,000.

In 1842, however, both the State Bank at Springfield and the Bank of Illinois at Shaw- neetown became

bankrupt. The following year both were forced into liquidation, and the for¬ mer was given four years to wind up its af¬ fairs. The wFree Banking Law® modeled after the New York Plan of 1838 was not passed until 1851. lhe State, however, lost heavily in other enterprises besides banking. In 1840 the people woke from their dreams to find that the State was $14,000,000 in debt, its bonds worth only 14 cents on the dollar, and with nothing to show for it except a 25-mile rail¬ road from Springfield to Meredosia. This was sold afterwards for $100,000 in State bonds. The question of repudiation was agitated, but Governor Ford's decided stand in favor of pay¬ ment without defalcation or discount saved the credit of the State. A large part of this in¬ debtedness was due to unwise internal improve¬ ments. In 1837 alone, a bill appropriating $10,200,000 was carried over the veto of the governor and the council of revision. This sum, with the exception of $400,000 for im¬ proving the Wabash, Illinois, Rock, Kaskaskia and Little Wabash rivers and the Western Mail Route, and $200,000 to pacify disappointed counties, was allotted for various railroads. It increased the debt from $271,276 to $6,668,784. The most important result of early internal improvements is the Illinois-Michigan Canal which was completed in 1848, after some 12 years of spasmodic work at a cost to the State of over $5,000,000. The Illinois Central Railroad was given its charter in 1851, and the road was completed in 1856. The total cost according to Mr. Ackerman, president in 1883 when the statement was made, was $40,000,000. Illinois has seen her share and borne her part in war. As the result of the Black Hawk War of 1831-32, Indian depredations ceased, and the remnants of the once powerful tribes disap¬ peared forever from the State. What is known in local history as ((the Mormon War® occurred in Hancock County on the Mississippi River. Nauvoo was the seat of Mormon authority and the site of a splendid temple. In 1844, Joseph Smith, the Mormon leader, was assassinated by a mob, and soon thereafter his followers left the State. Illinois furnished six regiments and some independent

companies during the Mexican War and 255.092 soldiers to the Fed¬ eral army during the Civil War. Strong op¬ position to the Federal policy, however, de¬ veloped in 1863 and 1864. The Knights of the Golden Circle, a secret organization, sym¬ pathized with the South. One of the ways in which they showed thir discontent was by try¬ ing to dissuade soldiers home on furlough from returning to their regiments at the end of their leave of absence. In the elections of 1864, nevertheless, the Republicans and Union Dem- crats united, and after an exciting campaign carried the day. In the Spanish- American War Illinois furnished nine regiments of infantry, one of cavalry and one battery of light artil¬ lery. In August 1917 the State was about 5,000 men ahead of her quota for the World War. Since 1865 the only additional questions that can be considered are those relating to labor and capital and improved highways. With the increasing importance of industry, so well re¬ vealed by the World's Columbian Exposition

held at Chicago in 1893, and with stronger or¬ ganizations the relations between labor and cap¬ ital have become more important. There are no authentic records for the beginning and growth of the Illinois State Federation of Labor prior to its seventh annual convention which was held in Jacksonville 14 Jan. 1890, but at that time there were 11 delegates who represented approximately 35,302 union men. At the convention held at Alton, 18 Oct. 1915, there were 596 delegates who represented 750,000 organized workers. Strikes have been common, and riots all too frequent. On 4 May 1886 a mob collected on Haymarket Square, Chicago, and when the police approached seven of the latter were killed by the explosion of a bomb. Eight men, termed anarchists, were tried for the crime; four were hanged, three were sent to the penitentiary and the other committed suicide. In 1894 the American Rail¬ way Union went out on a strike at Chicago. President Cleveland ordered Federal troops to the scene in order to preserve order and pro¬ tect the mail. On 14 Aug. 1908 a race riot broke out in

Springfield and for nearly two days lawlessness triumphed. Four regiments of militia were needed to restore order. Seven people were killed, more than 50 were wounded and property valued at over $100,000 was de¬ stroyed. Early in July 1917 an even more dis¬ astrous and disgraceful race riot occurred at East Saint Louis, due largely to the industrial and social discontent aroused by the rapid in¬ flux of negro workers. The roads of Illinois deserve mention. The Tice Road Laws, 1913 and 1915, established system in the matter of improving highways. The law provides that about 18 per cent of all public roads of the State shall be <(State Aid Roads.® These are to be constructed or improved by funds fur¬ nished by the State and the counties in equal amounts. Under this arrangement, when im¬ proved, the State undertakes to maintain them forever at its expense, provided they are con¬ structed of as good a type as concrete or brick. If the construction is of gravel or macadam the county shares equally with the State in the cost of maintenance; if the road is of earth, the cost of maintenance is borne wholly by the counties. The type of road to be con¬ structed is left to the county boards provided they can agree; if they cannot determine the matter, the State Highway Commission may select the kind. These roads reach into every community of the State. Thirty per cent of the citizens reside along the system of State aid roads and 75 per cent of the people live along or within a mile of these thoroughfares. Not a home in the State will be further than four and a half miles from these State aid roads. The following funds made available by equal appropriations from the Federal govern¬ ment and the State have been definitely allotted by the Department of Public Works and Build¬ ings, acting in conjunction with the board of highway advisers: (1) $1,413,000 to the Na¬ tional Old Trails road beginning at the In¬ diana State line and connecting Marshall, Greenup, Effingham, Vandalia, Greenville, Col¬ lins and East Saint Louis; (2) $1,020,000 to the Lincoln highway connecting Chicago, Wheaton, Geneva, De Kalb, Rochelle. Dixon, Sterling, Morrison and Fulton; (3)

$2,215,000

694

ILLINOIS— ILLINOIS CENTRAL RAILROAD

to the Chicago-Springfield road connecting Chicago, Joliet, Morris, Ottawa, LaSalle, Peoria, Mason City and Springfield ; (4) $958,- 000 to the Springfield-East Saint Louis road connecting Springfield, Carlinville, Staunton, Edwardsville and East Saint Louis; (5) $114,- 000 to the Dixie highway connecting Chicago, Chicago Heights, Mommence, Watseka and Danville ; (6) $400,000 to the road from Chi¬ cago to the Wisconsin line connecting Chicago, Waukegan and Zion City. These allotments cover the amount to be received up to and in¬ cluding 1 July 1920, available as follows: $1,326,000, 1 July 1917; $1,326,000, 1 July 1918; $1,765,000, 1 July 1919, and $2,209,000, 1 July

1920.

The governors of Illinois have been :

TERRITORIAL

Ninian Edwards .

STATE

1809-18

Shadrach Bond .

1818-22

Edward Coles .

u

1822-26

Ninian Edwards .

u

1826-30

John Reynolds .

u

1830-34

William L. D. Ewing. . .

u

1834

Joseph Duncan .

it

1834-38

Thomas Carlin .

it

1838-42

Thomas Ford .

u

1842-46

Augustus C. French. . . .

u

1846-53

Joel A. Matteson .

u

1853-57

William H. Bissell .

1857-60

John Wood .

u

1860-61

Richard Yates .

u

1861-65

Richard J. Oglesby. . . .

u

1865-69

John M. Palmer .

u

1869-73

Richard J. Oglesby .

a

1873

John L. Beveridge .

u

1873-77

Shelbv M. Cullom .

((

1877-83

John M. Hamilton .

u

1883-85

Richard J. Oglesby .

u

1885-89

Joseph W. Fifer .

u

1889-93

John Peter Altgeld .

1893-97

John Riley Tanner .

1897-1901

Richard Yates .

u

1901-05

Charles S. Deneen .

u

1905-13

Edward F. Dunne .

1913-17

Frank O , Lowden .

1917-21

Len Small .

« «

1921-

In 1918 the centennial anniversary of the entry of Illinois into the Union as the twenty- first State

admitted was commemorated by special celebrations.

Bibliography. — (American Year Book) (1916) ; (Report of 13th Census of the United States > ; (Chicago Daily News Almanac and Year Book* (1916) ; Hllinois Blue Book) (1915-16) ; (Stateman's Year Book) (1915— 16) ; (Statistical Abstract of the United

States) (1916); Wear Book of the Depart¬ ment of Agriculture) (1916) ; Hllinois His¬ torical Collections* ; Davidson and Stune, (History of Illinois > (Springfield 1874) ; Ford, (History of Illinois) ; Moses, (History of Illi¬ nois) (Chicago 1893) ; Robinson and Moore, (History of IHinois> ; Smith, (A Student's His¬ tory of Ulinois) ; Thompson, (A Study of the Administration of Thomas Ford> ; Waller, (A Brief History of Illinois > ; Fairlie, Commis¬ sion Government in Illinois Cities } ; Fairlie, County and Town Government in Illinois 5 ; Greene, (The Government of Illinois > (New York 1904) ; Judson, (The Government of Illi¬ nois } ; (Report of the Efficiency and Economy Committee) (1915).

N. H. Debel,

Professor of Economics, Gouchcr College.

ILLINOIS, University of, the. State Uni¬ versity, situated at Urbana. It was founded in

acceptance of the national land grant of 1862 (see Colleges, Land Grant) and was incor¬ porated in 1867 as the Illinois Industrial Uni¬ versity. It was opened 2 March 1868, with a faculty of three and about 50 students. In 1870 women were admitted; in 1877 the State legislature granted power to confer degrees; and in 1885 the name was changed to the Uni¬ versity of Illinois. It was the first American university to give shop instruction, a mechanical shop being equipped in 1870. It is governed by a board of trustees, consisting of three ex officio members, including the governor, and nine elective members. The undergraduate de¬ partment includes the

college of liberal arts and sciences, of engineering and of agriculture; corresponding graduate courses are given ; other departments of the university are the State library school, the school of music, the college of law, the college of medicine, the college of dentistry and the school of pharmacy, the three latter being situated in Chicago. The university has a number of valuable scientific collections ; the agricultural experiment station, organized under the Federal law of 1887, is controlled by the university trustees, and is supported by State and national appropriation; the general university library numbers 325,000 volumes besides pamphlets ; other libraries un¬ der university control are the library of State Laboratory of Natural History (8,000 volumes and 39,266 pamphlets), the library of the col¬ lege of law and special collections in connec¬ tion with the professional schools. The annual income amounts to $2,500,000, mostly from a one-mill tax; the number of students in all departments was 9,208 on 1 Nov. 1920, the number of faculty and administrative officers,

891.

ILLINOIS CENTRAL RAILROAD.

The history of the Illinois Central Railroad embraces many interesting episodes, some of which bore directly in itheir effect on the build¬ ing up of the nation, of the State of Illinois and of the city of Chicago. Prior to the incor¬ poration of this line, the State of Illinois had vainly endeavored -to establish an effective and profitable central railroad. In doing this, a large State debt accumulated and the outlook for wiping out that debt was not at all prom¬ ising when the act to incorporate the Illinois Central Railroad Company was approved by Governor French on 10 Feb. 1851. As events have proved, this act produced results more momentous in the history of the State and of the United States than any act approved by an Illinois executive before or since.

Ihe inception of this important enterprise dates

*back to 1835, when two of the State's most famous men, Hon. Sidney Breese and Hon. Stephen A. Douglas, first discussed pub¬ licly the advisability of penetrating the centre of the State by means of a railroad and thus opening up a vast territory which at that time was an uninhabited and partially unexplored wilderness. On 16 Jan. 1836, the State legis¬ lature passed an act incorporating ((The Illinois Central Railroad Company.** Two years later an attempt was made to start this road, which was intended to run 457 miles. The sum of $3,500,000 was appropriated for the route, but within a few. months the difficulties surround¬ ing the situation in the matter of actual track-*

laying became so great 'that, after an expendi- tuie of $506,000, principally on surveys and preliminary work, the plan was abandoned.

In 1843 a private corporation entitled <(The Great Western Railroad^ secured a charter and began work, but soon became discouraged and surrendered their charter. In 1849 this charier was renewed, only ito be again surrendered to make room for the road now operating and known as The Illinois Central Railroad. At the time the road was commenced by the present corporation it was estimated that the aggregate cost would be about $15,000,000. The actual cost for construction, including all ex¬ tension up to the present time, has been nearly

$50,000,000.

Original Charter Directors.— The 12 di¬ rectors selected in 1851, under the charter and known as the <(Charter Directors, w included nine prominent New York men and three well- known citizens of Boston. The directors from New York were Robert Schuyler, George Gris¬ wold, Gouverneur Morris, Jonathan Sturges, Thomas W. Ludlow, John F. A. Sanford, Henry Grinnell, Joseph W. Alsop and Leroy M. Wiley. Those

from Boston were Franklin Haven, Rob¬ ert Rantoul, Jr., and David A. Neal.

Population. — In 1850, shortly before the chartering of the railroad, Illinois stood 11th in population and 17th in wealth among the States. The marked difference during the fol¬ lowing 10 years is worthy of note as showing the direct effect of improved and extended rail¬ road accommodation. In 1860 Illinois stood fourth in population among the States, also fourth in wealth.

Railroad Conditions in 1851. — In 1851,

when the charter of the present road was granted, the population of Chicago was 30,000. That city had no railroad connection with the East nor in any other direction. In the same year the Hudson River Railroad, 140 miles, from New York to East Albany, was opened. Other events of importance during 1851 were the extension of the Baltimore and Ohio Rail¬ road to. Cumberland and the opening of an Erie Railroad line from Pierpont on the Hud¬ son of Dunkirk on Lake Erie. Wisconsin had 20 miles of railroad at that time. The rail¬ road mileage of Indiana was 228 miles, and of Kentucky 78 miles. Just prior to the charter¬ ing of the Illinois Central there were 111 miles of railroad track in the State. When the 50th anniversary of the road was held at Chicago in 1901 it was announced that the company was then operating railroads in 13 States.

Development. — The first section of the road, covering 705.50 miles, and running from Chicago to Cairo and from Centralia to Du¬ buque, was opened on 27 Sept. 1856, being about five and one-half years after the issuing of the charter. Since the opening of this main line other lines have been purchased, including part of the Saint Louis, Peoria and Northern rail¬ roads from Springfield to East Saint Louis, Illinois, in 1900. This purchase was followed by a number of other purchases and absorp¬ tions.

Roads Acquired by Purchase, etc. — From

Springfield to East Saint Louis, Ill. (part of the Saint Louis, Peoria and Northern) ; Peoria. Decatur and Evansville, extending from Pekin,

Ill., to Evansville, Ind., with a branch to New

Harmony, Ind.; Chicago, Madison and North¬ ern; Kankakee and Southwestern; Chicago and Springfield; Saint Louis, Alton and Terre Haute; Chicago, Havana and Western; Mound City; Chicago and Texas; Riverside and Plar- lem ; the parts of the Rantoul and Illinois and Indiana railroads lying in the State of In¬ diana, extending from West Lebanon to State line and from Switz City to State line.

Leased Lines. — The leased lines of the Illi¬ nois Central Railroad are Kensington and East¬ ern : South Chicago; Blue Island; Peoria and Pekin Union; Dubuque and Sioux City; Chi¬ cago, Saint Louis and New Orleans and the Canton, Aberdeen and Nashville railroads.

Mileage. (See Annual Report, p. 15).— The corporation now controls one of the most important groupings of railroad lines in the United States. The total mileage operated, ac¬ cording to the latest official report available, is

4. 766. . 93 exclusive of the Yazoo and Missis¬ sippi Valley Railroad (1,371.98 miles). The length of the main line, from Chicago to Cairo,

111., is given as 364.73 miles; Omaha Division, from Chicago to Council Bluffs, la., 513.96 miles; New Orleans Division, from Cairo to New Orleans, La., 547.79; Louisville Division, from Memphis, Tenn., to Louisville, Ky., 398.12 miles ; other lines owned or leased operated in the system, 2,549.12.

Additional Tracks. (See Annual Report, p. 15). — The length of line having two tracks is 799.62 miles; third and other additional main tracks, 194.49 miles; sidings, etc., 2,129.65. The gauge of this system is 4 feet 8^4 inches. The average weight of steel rails is 72.78 pounds.

Charter Tax.— The charter of the com¬ pany, reserved to the State of Illinois, calls for payment, in lieu of taxes, of 7 per cent of the gross receipts of the 705.50 miles of road originally built under that charter. The total amount paid to the State of Illinois under the provisions of this charter, from the opening of the road in 1855 to 30 June 1916, was about

$34,000,000.

Dividends. — Between the beginning of oper¬ ations in 1851 and 30 June 1916, the stock¬ holders received about $189,000,000 as dividends out of the earnings of the company.

Rolling Stock. — The rolling stock of the company, 30 June 1916, included 1,419 locomo¬ tives, 521 passenger and chair cars, 32 cafe dining cars, 165 baggage, mail and express cars, 43 postal cars (3 of these partly owned), and 61,048 freight cars, making a total, with minor items under this head, of 62,347 cars.

Earnings. — The earnings of the road, for the year ending 30 June 1916 amounted to $69,- 077,342.56, or $14,490.37 per mile. These earn¬ ings were divided as follows: Passenger traffic, $16,836,5 1 1 .03 ; freight traffic $46,457,388.45; miscellaneous earnings, $5,783,493.08.

Net Earnings, Receipts and Dividends.— The net earnings of the road for the year end¬ ing 30 June 1916 were $17,903,614.82.

Expenses. — Operating expenses of the road for the year ending 30 June 1916 amounted to $51,173,727.74, or $10,734.73 per mile. The amount paid for taxes (1915—16) was $3,724,-

020.73.

Bonded Debt. — The bonded debt of the road, including about 30 investments, aggregates $280,239,000. Of this total the last issue that matured was $88,000, issued in 1880 and ma-

turing in 1910. An issue of $2,800,000, placed in 1869, matured in 1917. The next, following in order, is an issue of $968,000 made in 1881 and maturing in 1921 ; an issue of $470,000 made in 1883 and maturing in 1923; an issue of $538,000, made in 1886 and maturing in 1931 ; an issue of $241,000, made in 1887 and due in 1932; an issue of $34,500,000, issued in 1895— 1905, and due in 1951 ; and $25,000,000 issued in 1892, and due in 1953.

Opening up of the State. — The beginning of active operations in establishing the line marked the beginning of State development throughout a vast area which, up to that time, had been inaccessible to traffic of any kind ex¬ cept by means of the most rural contrivances, utterly inadequate for any but the most re¬ stricted local demands. The new move toward opening up commercial possibilities immediately doubled the price of public lands. These tracts were readily bought up as conditions improved and steadily increased in value year by year.

At a critical juncture in the nation's history, when it became necessary to move regiments, brigades and divisions of western troops to the scene of active Civil War operations, the Illi¬ nois Central Railroad provided the only avail¬ able means of adequate rapid transportation. At the same time, the existence of that railroad and its excellent management made the prompt supply of rations and forage possible.

Payment of State Debt.— As mentioned in a previous paragraph, the attempt of the State to operate successfully a central railroad ended in utter failure. In 1851 the people of Illinois were under a burden of some $60,000,000 as the outcome of the experiment. The establish¬ ment and active operation, with ever continuing development of the road, enabled the whole of that debt to be paid off in due course with proper interest.

Other Benefits to State and City. — The

persistency of the railroad authorities in extend¬ ing their own lines and giving added vitality to smaller railroads made possible the cultivation of the Grand Prairie, previously waste, thereby raising the prestige of the State as a pro¬ ductive national factor of extraordinary im¬ portance. It is on record that over $3,000,000 has been expended since about 1836 by the rail¬ road company upon the construction of dikes, piers and breakwaters to protect the city against lake encroachments. Very great benefits, too, have been derived by Chicago from being brought into close commercial touch with prairie lands and the agricultural area of the Lower Mississippi Valley. Chicago has also gained an outlet by rail to the Gulf of Mexico. It is said, to the credit of the Illinois Central Company, that the extent and vigorous adminis¬ tration of its affairs during the period extend¬ ing from the inception of the World's Fair in 1893 until its close made the success of that enterprise possible by furnishing ample trans¬ portation within its jurisdiction for the im¬ mense passenger and freight traffic which im¬ pended there from start to finish.

Statistical. — The States in which the Illi¬ nois Central Railroad is now operating are Illinois, Indiana, Wisconsin, Iowa, Nebraska, Minnesota. South Dakota, Kentucky, Tennessee, Mississippi, Louisiana, Missouri and Alabama. The present total mileage of the road, includ¬

ing leased lines and the Yazoo and Mississippi Valley Railroad, is nearly one-half the rail¬ way mileage of the State. 'The total number of stockholders in the company, according to the latest report of the Interstate Commerce Com¬ mission, is 10,697. The par value of stock out¬ standing since 1908 was $109,296,000. The highest rate at which stock was quoted in 1904 was 159; lowest 125J4- The highest rate quoted for 1905 was 183; lowest 15224 at end of 1910, around 135.

Other, lines operating in Illinois are the Santa Fe;

Baltimore and Ohio; Chicago and Alton; Chicago and Northwestern; Chicago, Burlington and Quincy; Chicago Great West¬ ern; Chicago, Indianapolis and Louisville; Chi¬ cago, Milwaukee and Saint Paul ; Chicago, Rock Island and Pacific; Cleveland, Cincinnati, Chicago and Saint Louis; Erie; "Frisco Sys¬ tem^; Grand Trunk; Great Central Route; Iowa Central; Lake Erie and Western; Lake Shore and Michigan Southern; Louisville and Nashville; Michigan Central; Missouri Pacific; Mobile and Ohio; New York, Chicago and Saint Louis; Pennsylvania; Southern; Toledo, Saint Louis and Western; Vandalia; Wabash and Wisconsin Central.

ILLINOIS COLLEGE, an institution lo¬ cated in Jacksonville, Ill., the oldest college in the State, founded in 1829, largely through the efforts of the Wale Band," an eastern organi¬ zation of seven college men. The first presi¬ dent was Edward Beecher, brother of Henry Ward Beecher. In 1916 the total attendance was 370 students with 25 instructors. The endowment in that year was about $389,000; total value of endowment and plant being about $707,000. . The institution is coeducational and includes in addition to the college department, a conservatory of music, and the preparatory department, Whipple Academy. The college library contains about 19,000 volumes.

ILLINOIS INDIANS (Iliniwek , men), a confederacy of Algonquian tribes, formerly occupying southern Wisconsin, northern Illinois and sections of Iowa and Missouri. It comprised the Cahokia, Kaskaskia, Michigamea, Moing- wena, Peoria and Tamaroa. Early explorers dif¬ fer greatly in their estimates of the number of the confederation. They were almost continually at war with the Sioux, Foxes and other north¬ ern tribes. A struggle with the Iroquois about 1675 greatly weakened them and liquor obtained from the French well-nigh destroyed their morale. By 1750 they numbered about 2,000 which was greatly reduced in the war of ex¬ termination by the Lake tribes in revenge for the murder of Pontiac. In 1778 the Kaskaskia still numbered over 200 souls, while the Peoria and Michigamea together numbered 170. In

1800. there were only 150 left. In 1883 the survivors represented by the Kaskaskia and Peoria, sold their lands in Illinois and removed west of the Mississippi, and are now in the northeast corner of Oklahoma, consolidated with the Wea and Piankashaw. In 1905 their number was 195. The Illinois were tall and robust, with pleasant visages. They appear to have been timid, easily driven from their homes by their enemies, fickle and treacherous. They were excellent archers, and used also in war a kind of lance and a wooden club. Polygamy

was piactiscd and unfaithfulness in a wife was punished by cutting off the nose of the offender, it was not the custom of the Illinois, at the time the whites first became acquainted with them, to bury their dead. The body was wrapped in skins and attached by the feet and head to trees. It is supposed, however, that the skeletons were later placed in the earth. Prisoners of war were usually sold to other tribes. The huts of the northern tribes were made like long arbors and covered with double mats of flat flags or rushes sewed tightly to¬ gether. There were four or five fires to each cabin and two families to each fire. The towns were not inclosed. Cahokia, Kaskaskia, Match- inkoa, Moingwena and Peoria are among the villages of these tribes which were known to the white pioneers. Consult (Handbook of Amer-

1907)IndlanS> (V0L PP' 597~599’ Washington

ILLINOIS AND MICHIGAN CANAL.

See Canals.

ILLINOIS RIVER, the principal affluent of the Mississippi, formed by the confluence of the Kankakee, Des Plaines and Du Page rivers, in Grundy County, about 40 miles south¬ west of Chicago. Its entire course of nearly 500 miles is within the State, through a fertile, undulating country, rich in bituminous coal deposits. It flows first westward

to Ottawa and La Salle, at Depue bending southwestward past Lacon, Chillicothe, Peoria, Pekin, Havana and Beardstown, and near Naples turning due south and joining the Mississippi about 18 miles above Alton, at the mouth of the Missouri. The river is 1,200 feet wide at its mouth and is navigable throughout to La Salle where a ship canal about 120 miles long connects it with Lake Michigan at Chicago, thus ensuring a clear waterway from the Great Lakes to the Missis¬ sippi and the Missouri. The Illinois has nu¬ merous tributaries of which the Fox and Sanga¬ mon rivers are the chief.

ILLINOIS STATE NORMAL UNI¬ VERSITY, located at Normal, a suburb of Bloomington, Ill., was founded in 1857. It is the oldest State normal school in the Missis¬ sippi Valley, and has furnished principals or instructors for nearly all of the younger normal schools in the central and western States. Up till 1916 it had given instruction to 27,576 normal students, nearly all of whom have be¬ come teachers. Its graduates number 2,616. The school occupies five buildings upon a beautiful campus of five acres. It is well equipped with a library, laboratories, gym¬ nasium and apparatus for instruction in all the various branches of study. Its revenue, about $230,000 per year, appropriated from the State treasury, includes the interest derived from the college and seminary funds, granted by the Federal government in 1818. It is governed by the Board of Education of the State of Illi¬ nois, a body of 15 appointed by the governor. The State superintendent of public instruction is ex officio secretary of the board. Its sole purpose is to prepare teachers for the schools of the State; accordingly students are required to sign a pledge declaring their intention to teach. Tuition is free. The organization in¬ cludes the teachers' college with a full four- year course to prepare high-school teachers, principals and superintendents ; the normal

school to educate teachers for the elementary and rural schools ; the university high school and the elementary training school. The two latter serve for the practical training of student teachers. The

scope of its work includes the preparation of every kind of teacher needed in the public schools. The required work in¬ cludes courses in pedagagy, psychology and general method, history and philosophy of education, school management and the Illinois school system and one year of practical teach¬ ing in the training department. Along with these are provided courses in special method in the various branches of the elementary and high-school course. Special courses are pro¬ vided in manual training, art, vocal music, the household arts, commercial branches and agriculture. The attendance in 1916 was 2,806, besides 630 in the training department. The regular faculty of instruction numbers 61 ; 40 additional teachers are employed in the > summer school. The presidents of the institution have been Gen. Charles E. Hovey (1857-61) ; Richard Edwards (1862-76) ; Ed¬ win C. Hewitt (1876-90); John W. Cook (1890-99) ; Arnold Tompkins (1899-1900) ; David Felmley (1900-).

ILLINOIS WESLEYAN UNIVER¬ SITY, founded in 1850 under the auspices of the Methodist Episcopal Church, at Blooming¬ ton, Ill. The college courses provide for the degrees of B.A., B.S., LL.B. It has, also, a preparatory school and a law school. The num¬ ber of students is 640, professors 40, volumes in library, 12,000.

ILLITERACY, inability to read or write, or both. The basis of estimation is either a general census of the population over a certain age, the percentage of those unable to sign their marriage certificates, or the records of army recruits. The following table gives the per¬ centage of illiteracy in the several nations among those over a certain age, varying from 5 to 12. The dates are generally in the neigh¬ borhood of 1910.

Per cent

. . country Year illiterates

Austria . 1910 is . 7

Belgium . 1910 12 7

Bulgaria . . . 1905 65.5

England and Wales . C. 1910 5 8

France . 1906 14 1

Germany . C. 1900 0 11

Greece . 1907 57.2

Hungary . 1910 33.3

Ireland . 1911 9.2

Italy . 1911 37 '5

Malta . 1901 57.5

Netherlands . C. 1900 4.0

Portugal . .' . 1911 68^9

Roumania . 1909 60.6

Russia . 1897 69.0

Scotland . C. 1900 3.57

Serbia . 1900 78.9

Spain . 1900 58.7

Switzerland . C. 1900 0.3

United States . 1910 7.7

Native white, native parents, U. S . 1910 3.7

Native white, foreign parents, U. S . 1910 1 1

Foreign-born white . 1910 12.7

Negro, U. S . 1910 30.4

Argentina . 1895 54.4

Brazil . 1890 85.2

Canada . 1911 11.0

Chile . 1907 49.9

Cuba . 1907 43.4

Mexico . 1910 70.7

Australian . 1911 1 g

India… . 1911 92' 1

Philippine Islands . 1903 55.5

Union of South Africa . 1911 69^7

Illiteracy in the United States is taken on the word of the people being investigated among those 10 years old or over at the de¬ cennial census. The figures for 1910 are:

STATES Pef

cent

United States …..... 7.7

New England. . . 5.3

Maine. 4.1

N ew Hampshire ….. 4.6

Vermont …..... 3.7

Massachusetts . 5.2

Rhode Island . 7.7

Connecticut . 6.0

Middle Atlantic . 5.7

New York . 5.5

New Jersey . 5.6

Pennsylvania . 5.9

East North Central. ... 3.4

Ohio . 32

Indiana . 3.1

Illinois . 3.7

Michigan . . 3.3

Wisconsin . 3.2

West North Central …. 2.9

Minnesota . 3.0

Iowa . 1.7

Missouri . 4.3

North Dakota . 3.1

South Dakota . 2.9

Nebraska . 1.9

Kansas . 2.2

South Atlantic . ! 16^0

Delaware . 8.1

Maryland . 7.2

Dist. of Columbia …. 4.9

STATES Per

cent

South Atlantic — Coni' d Virginia. 15.2

West Virginia . 8.3

North Carolina … . 18.5 South Carolina …. 25.7

Georgia . 20.7

Florida . 13.8

East South Central … 17.4

Kentucky . 12.1

Tenessee… . 13.6

Alabama . 22.9

Mississippi . 22.4

West South Central . . 13.2

Arkansas . 12.6

Louisiana . 29.0

Oklahoma…; . 5.6

Texas . 9.9

Mountain . 6.9

Montana . 4.8

Idaho . 2.2

Wyoming . 3.3

Colorado . 3.7

New Mexico . 20.2

Arizona . 20.9

Utah . 2.5

Nevada . 6.7

Pacific . 3.0

Washington . 2.0

Oregon . 1.9

California . 3.7

Consult the various censuses of the United otates, the Annual Reports of the Commissioner of Education, and Bulletin No. 20 of the United otates Bureau of Education, entitled ^Illiteracy in the United States) (Washington 1913).

ILLUMINATED MANUSCRIPTS. See

Manuscripts, Illuminated.

ILLUMINATI, i-lu-mi-na'ti (<(the illumi¬ nated'), a name taken by or given to various groups of individuals existing during the past 2,000 years, who believed in and taught a doc¬ trine of illumination or inner light. The funda¬ mental idea of their, faith was that living a life of purity and service would open the inner senses, so that they would obtain spiritual sight or clairvoyance, becoming seers, etc., able to see and converse with the angels, discarnate intel¬ ligences or beings of higher planes. Many have thought that these associations, which are hinted at as existing at various periods since the time of Christ, were survivals of the Eleu- siman mysteries (q.v.). They had many ideas m common with the Hermetic and other old philosophies, but were specially characterized by a conviction that it was possible to do the things later recorded of Joan D'Arc and of Emmanuel Swedenborg, both of whom be¬ lieved that they were in regular communication with and directed by intelligences from the heaven world. In 1490 a reference is found of them under the title of Aluminados. In 1511 the Spanish Inquisition (consult (Los Hetero- doxes Espanoles,> Vol. V, 1881), considered a case of a woman of this order, who claimed to hold conversations with the Virgin Mary. She escaped, but at later dates the Inquisition se¬ verely prosecuted many who held such doc¬ trines. Among them were the Guerists, who flourished mainly

in France in the 17th cen¬ tury. The Illuminati were closely related to the Rosicrucians (q.v.), of which a modern organ¬ ization exists. There are many Freemasons who believe that their own organization was founded on an earlier body, perhaps more or

less identical with the Illuminati, as many of the teachings are similar. The Perfectibilists of Germany and the Marlinists of France were also sometimes known as Illuminati, from their teachings. Adam Weishaupt has written several German works that discuss the progress and beliefs of the Illuminati. Compare Mys¬ ticism. Consult Tschackert,

ILLUMINATING GAS. See Gas Illu¬

mination.

ILLUMINATING GAS ENGINE. Sec

Internal Combustion Engine.

IKE U Ml NATION. See Gas Illumina¬ tion ; Electric Lighting ; Street Lighting ; Lamps.

ILLUSION, in psychology and in epis¬ temology, a perception which fails to reveal tho true character, of an object perceived. The word illusion is used in three different ways i

(a) The mental construction, on the basis of data which are real in their own proper sphere, of a psychal object, which an illuded person ac¬ cepts as real, but. which is unreal or fantastic;

(b) a mental object thus constructed; (c) the general mental acceptance and substitution of what is unreal for real.

. short, an illusion is an error. An error lsr ^ojkhug more than a psychological condition or blindness to the truth. Bv truth may be un¬ derstood an inner assimilation of reality. The number of errors is unlimited, truth alone is one When in psychological literature the word illusion occurs, it conveys one of the two ideas which receive

definition respectively in defi¬ nitions a and b; the notion conveyed in above occurs less fiequently. Illusion is thus any mis¬ taken mental . construction which has reliable c ata as its point of departure. It always means a misinterpretation of the significance of a par¬ ticular sensory impression. A sensory impres¬ sion is the effect of an event upon a sentient being. But illusions occur in connection with not only the senses of taste, smell, touch, hear¬ ing and seeing, but also with certain other and moie obscure modes of consciousness. In truth it must be said that the senses represent reality neither wrongly nor rightly. All that science can say about the sense-organs in this connection is that under different circumstances they produce different sensations and percep- tions. So that the term sense-illusion is a very misleading expression. The circumstances which condition sensation are extremely vari¬ ous in character. They are partly external, be¬ ing inherent in the objects, partly internal, being inherent in the sensory organs, and partly in¬ terior, being confined in their activity within the central organs ; and therefore, it can some¬ times appear, when notice is taken of only the external circumstances, as if an organ acted dif¬ ferently under identical conditions. Thus it became customary to call the unusual effects sense-deceptions or sense-illusions. Consult Ernst Mach, Uber die Abhavgigkeit der Netz- hautstellen von einander> (in the (Vierteljahrs- ?£& hlr Psychiatrie,> Leipzig and Neuwied 1608). Indeed there are no such things as il- lusions of sense at all. Objects of sense ex¬ perience even when they occur in dreams, are the most indubitably real objects known. The truth is, that that which makes us call such ob-

jects unreal in dreams is merely the unusual connection in which they stand with other ob¬ jects of sense. Objects of sense are called real when they have the relation with other objects of sense which

experience has led us to regard as normah Failing this, we call them illusions. But what is deceptive or illusory is only the in¬ ferences to which they give rise. In themselves, they are every bit as real as the experienced ob¬ jects of waking life. And conversely, sensible objects of waking life must not be assumed to have any ntore intrinsic reality than sensible objects of dreams. It is only by some reality merely sensible that dreams can be con¬ demned. Illusion thus is a broad term. It cov¬ ers all those errors of the logical operations as well which are not of the persistence or of the indirect delimitation, in any system of beliefs, which characterize delusions.

In mental pathology it is necessary to dis¬ tinguish illusion from delusion (just used) and hallucination. In common parlance these terms are often confused, and many use them as if strictly synonymous. But this is not so among writers in psychiatry, for in this science these three terms are very clearly differentiated. And it is highly necessary that these distinctions should be observed, because these terms stand for very different phenomena in mental disease — phenomena of different value and im¬ portance, and each with its own special signifi¬ cance as to a patient's condition. An illusion is distinguished from an hallucination in a two¬ fold manner. In an hallucination the trust¬ worthy data are absent ; that is, the determining elements in the construction are either purely imaginative or of organic origin. Both these cases manifest themselves on the border, or over the border, of the pathological. Halluci¬ nation is narrower in application than the word illusion. It is confined to the perceptual — to objects of sense in contrast with the delusion of the higher mental processes. The limits of the three terms among themselves is however largely practical. The central processes of illusion and of hallucination, arising from organic causes, are one and the same. In most cases of either, the influence of the delusional elements are due to the earlier condition of the mind — notably,

*to emotional states. The cases of so-called pure sense-illusion, on the other hand, are really cases of perception, not of il¬ lusion at all ; since they are normal, constant and (contrary to the vulgar opinion) common to all individuals, and also exposed by resort to tests outside of the sphere of the particular sense concerned. Still a distinction between the usual and normal sense-deceptions and the ab¬ normal and unusual false interpretations of sen¬ sory impressions and stimuli is very desirable. Some misinterpreting mental attitudes or fac¬ tor seems necessary to the formation of the * ordinary illusion. In the abnormal type of illu¬ sion its aetiology and nature is not much dis¬ tinguished from hallucination. This fact is il¬ lustrated by the illusions of the insane. In the case of the insane, it is very difficult to decide whether there exists an illusion or pure halluci¬ nation, correlated with sensory and bodily ele¬ ments. Ordinarily, when the mind is acting in a perfectly normal way and there is nothing to confuse its impressions or to obstruct its proper perceptive powers, a sensation, whether of the eye, ear, taste or skin is conveyed to the con¬*

sciousness and is recognized correctly. Thus a sound, as the note of a bird or the voice of a friend; or the sight of some object, as of an animal moving in the distance, is properly con¬ veyed to the intelligence and is properly recog¬ nized. . But this process may be interfered with in various ways; Even the normal mind may make mistakes in the interpretation of sensa¬ tions, and still more so may the mind that is impaired. It thus happens that all illusions are not necessarily evidences of a diseased mind; this faulty action of the senses, or of the per¬ ception, may and often does happen in the cases of persons of sound mind. For instance, a per¬ son walking along a path in the dusk may mis¬ take a bush for an animal ; he simply misinter¬ prets an object and this object is not imaginary but has a real existence. So, too, the mirage which sometimes appears at sea, might lead a perfectly ignorant person to maintain that he saw a ship

inverted sailing in the sky. These are instances of illusions in which the normal mind may be temporarily deceived. But the normal mind tends to correct its illusions, and this it does sooner or later according to its op¬ portunity and its degree of knowledge. In this respect the insane mind differs from it; the il¬ lusions of the insane are usually firmly believed in; there is no spontaneous tendency on the part of the insane mind to correct its illusions. On the contrary, they are firmly embraced and are often made the starting point of a train of associated morbid ideas, whereby the mental disorder is all the more confirmed.

An hallucination differs from an illusion in the fact that it is entirely subjective. In a strict sense it is a disorder of perception in which the external sense organs do not participate and it leads to a belief on the part of the patient that he perceives some external object, whereas in fact there is no such object corresponding to the perception. In other words, it is a disorder of perception giving rise to a false belief in a sensation. For instance, a person believes that he hears the voice of an acquaintance speaking to him, when there is no voice either of the ac¬ quaintance or of anyone else ; or, again, a per¬ son thinks he has a vision of a deceased friend or of some other spiritual being, whereas there is no external object or person whatever giving rise to this or any other sensation. The whole process, therefore, is subjective or within the patient's own mind; it is without any objective equivalent.. It is thus readily seen that an hal¬ lucination is much more deeply seated than an illusion, and is a much more direct evidence of a disorder of the mind. Some authorities doubt indeed whether a true hallucination ever occurs in a normal person; what appears to be so in any given case would probably be found on strict inquiry to be an illusion. Although this may be an extreme position, the fact remains that hallucinations are very rare in the sane and very common in some forms of insanity; and that, as in the case of illusions the sane tend to correct

them, while the insane adhere to them with unswerving belief. The most common hallucinations of the insane are the visual and the auditory, and they are sometimes very grave symptoms. Auditory hallucinations are espe¬ cially dangerous, for they may lead the patient to commit acts of violence in response to their suggestions.

A delusion differs from both an illusion and

an hallucination in the fact that it is not a sen¬ sory disorder — but a derangement entirely with¬ in the intellectual sphere. It is an erroneous belief, but one which is due entirely to mental disorder. The latter part of this definition is essential, because a delusion is essentially some¬ thing more than a mere error of belief or judg¬ ment. It is an erroneous belief that is due to insanity, or to a disordered mind. Mere errors of belief may and do occur in persons who are sane: no person, in fact, is exempt. Such er¬ rors may be due to ignorance, prejudice or faults of education, but they are not evidence of insanity; otherwise the whole world would be insane. In the case, however, of an insane pauper who believes that he is a multi-million¬ aire, or that he is emperor of the United States, there is obviously something more than a mere erroneous belief in the sense of an error of judgment or opinion. Such a patient has de¬ veloped an idea which no sane man in similar circumstances could have developed; in other words, he has a delusion, and he is not insane because he has the delusion, but he has the de¬ lusion because he is insane. The insanity or mental unsoundness is the fundamental fact and is shown usually by other symptoms besides the tendency to form delusions. As in the cases of illusions and hallucinations, the insane cling to their delusions with great tenacity; no argu¬ ment, no logic moves them. The delusions of the insane are usually distinguished as systema¬ tized and unsystematized. In the former the delusion

has a certain consistence, coherence and endurance ; in the latter the ideas are more or less incoherent and changing. Delusions again may be expansive or depressive, accord¬ ing to the emotional tinge. See also Imagina¬ tion; Insanity.

ILLUSIONS, Optical. See Illusion.

ILLUSTRATION OF BOOKS. There

are two kinds of book-illustration: (1) an

artist's attempt to make visual representation of scenes, or characters, or objects described in the text; (2) decoration and ornamentation for the purpose of embellishing the page. In both cases the illustration of books has followed the de¬ velopment of graphic art and the mechanical de¬ velopments in the processes of book-making. The books that have been the most frequently illustrated are the Bible; the 'Arabian Nights5 ; '2Esop's Fables5 ; the 'Fables of La Fontaine5 ; the (Stories of King Arthur and his Round Table5 ; Dante's 'Divine Comedy5 ; Perrault's (Fairy Tales5 ; Grimm's (Fairy Tales5 ; Rey¬ nard the Fox5 ; and the plays of Shakespeare.

The earliest known illustrated work is the wonderful set of Egyptian papyrus rolls called ^The Book of the Dead,5 written 15 centuries before Christ. The pictures painted in colors ' prove, notwithstanding their stiff hieratic style, that the ancient Egyptians were expert draughtsmen and understood the art of pro¬ ducing direct illustration of very high pictorial quality. References in the writings of Latin authors show that illustrated books were very abundant in Rome in the libraries of the wealthy. These were manuscript books adorned by painters or by draughtsmen. The earliest specimen of an illustrated manuscript that may be seen by the public (and, perhaps, it may be the oldest Celtic manuscript extant), is the

famous 'Book of Kells,5 dating from the 7th century and preserved in Trinity College, Dub¬ lin. The

‘Book of Kells5 is not only a superb example of the scribe’s patient handwriting, but its abundant colored pictures and large decora¬ tive initial letters and borders of the pages show that Celtic taste was highly advanced and that Celtic fingers were highly trained in the art of book-ornamentation.

During the Middle Ages books were the luxury of the wealthy. Comparatively few per¬ sons could either read or write. Learning was almost confined to the monasteries. The book¬ ish man was usually a monk, for those who loved study usually entered the priesthood. Noblemen, as a rule, spent their time fighting or practising arms in the tilt-yard of the castle and their wives, daughters and sweethearts were occupied in household affairs or sat before their embroidery frames (see Embroidery). In the evening the household and guests assembled in the great hall of castle or manor-house, where often some strolling minstrel or trouvere would recite, or chant, a famous story. Perhaps this would be one of the great Arthurian group, such as ‘Launcelot of the Lake5 or ‘Tristan and Iseult5 ; perhaps one of the Charlemagne cycle, such as (Huon of Bordeaux5 ; or (Bertha with the Big Foot5 ; or one of the Crusader’s tales, such as ‘Baldwin, Count of Flanders.5 Such stories were called ((Romans5) and took the place of our modern novel. They were kept in cir¬ culation and made popular by these traveling minstrels and trouveres (as they were called in France), and would have been handed down orally, if .unrecorded. Happily, however, in the monasteries and in private households, monks, scribes and painters copied these famous works and illustrated them, finding models and in¬ spiration in. what they saw around them. These specialists in the art of <(illuminating55 were lavish with their work which was of beautiful style, .marvelous in minute detail ' and of exquisite finish. The small medallions, or pictures, called “miniatures,55 were sometimes 'done by one person and the decorative initial letters and borders by another worker, who also inlaid the gold leaf, whence the adjective illuminated.55 Bibles,

missals, breviaries, books of hours, books of music and dry chronicles were illustrated in like style throughout Europe. Wealthy lords purchased these superb books and specially ordered books for gifts from monasteries, when they did not keep their own artists. Rene d'Anjou had a staff of copy¬ ists and book-painters and his library was famed in the 15th century. Many of his sumptuous volumes are now owned by the Emperor of Austria. The Bibliotheque nationale in Paris owns the largest collection of illuminated manuscripts55 of the Middle Ages in the world. J.he British Museum also has a fine collection, including the (Harleian Ms,5 and so has the Bodleian, library in Oxford. The New York L^rair possesses some choice specimens of illuminated manuscripts55 and an excellent collection is permanently exhibited at the Met¬ ropolitan Museum in New York. A superb col¬ lection of illuminated manuscripts55 perished in u burning of the University in Louvain by me Germans in 1914 — an irreparable loss. Apart from their artistic beauty these illumi¬ nated manuscripts55 afford unlimited suggestion

to decorators for motives of design and original lettering. They are, moreover, a storehouse of information for the historian, because the an¬ cient illustrators depicted the scenery, archi¬ tecture, costumes and personages that they saw around them. Many an old Flemish and French town appears in a Bible in a gold-brightened miniature as the artist's idea of Jerusalem, or Bethlehem, and many a contemporary king or queen masquerades as a Biblical character. In the case of Froissart's Chronicles,* however, the painter depicted actual scenes and real por¬ traits. Therefore the pictures in an illuminated Froissart are often more valuable to the mod¬ ern student than even the vivid writing of the old French chronicler.

This particular kind of book-illustration came from

the Byzantine monasteries and spread throughout Europe. Old Persian manuscripts show that the art is of Oriental origin. The same style of decoration was followed in em¬ broidery; and church vestments were adorned with needle-wrought pictures similar to those in the "illuminated manuscripts.® See Em¬ broidery.

The fashion of book-illustration changed when printing was invented in the 1 5th century. Pictures drawn by the artist were now cut on blocks of wood by a special worker and in¬ serted in the page of type. Some of these old wood-cuts were crude and rough with coarse lines and some were colored in gaudy 'hues. English billed sheets, called "broad-sides,® and chap-books sold by peddlers for a few pennies were illustrated in this way.

The Italian artists with their refinement of taste and imaginative qualities made the illus¬ trated Italian books of the Renaissance veri¬ table works of art. They are highly prized by the book-collector. The decorative -title-pages, borders, vignettes, tail-pieces, initial letters and pictures produced by the Italians — particularly the Florentines — form a chapter by themselves in decorative art as well as in the art of book-illustration. The ornamentation of these Italian books can be compared only to the filagree- work of the goldsmiths of the Renaissance; and it is most natural that the designs should be similar, since many of the Florentine painters of the early years of the Renaissance were gold¬ smiths. Such was Sandro Botticelli (1444— 1510), for example, whose illustrations of Dante's (Divina Commedia, made in 1492 for Lorenzo di Pier Francesco, rank among the most wonderful of all engravings. One rarely thinks of Botticelli, the great painter of spring (and the (Madonna of the Magnificat,* as an en¬ graver; but these pictures for Dante's work, preserved, some in the Vatican and some in the Berlin Cabinet, show Botticelli as one of the greatest masters of the single line — almost Japanese in his simplicity and directness. These illustrations were sketched in silver print and finished with pen and ink. A few of*

them are in color. The style of the Rennaissance is to be found in every illustrated book of. the 15th and 16th centuries, whether published in Italy, France, Spain, England, the Low Countries, or in the Holy Roman Empire (which included the present Austria and Germany). Every title-page was ornamented with leafy scrolls, mermaids, sirens, cupids' heads, sea-horses and mythological figures or interlaced strap-work;

and every chapter and section began with a decorative initial letter and ended with a tail¬ piece. Even treatises on medicine and hand¬ books for the use of furniture-makers had such rich embellishments. On books of travel and geography the illustrators lavished all their skill. Maps appealed especially to the Renaissance illustrators and open to the student a vast field of information and to the decorator a world of design.

The books illustrated by Diirer (1471-1528) and Holbein the younger (1497-1543) are ex¬ amples of the Renaissance as interpreted by the German mind. Holbein had great influence upon contemporary English taste, as he resided in England and was a great friend of the leader of taste and literature — Sir Thomas More. In the decoration of books .the fash¬ ionable style of .the day is always to be found. Therefore, in the days of Louis XIV we see the influence of Berain and Lepautre taking the place of the Renaissance style. In the next period, that of the Regency and Louis XV, the styles of Watteau, Fragonard, Huet and Boucher are just as noticeable. Correspond¬ ingly in England the "Chippendale® style (de¬ rived from the Louis XV style) appears on many a title-page, exhibiting interlacing curves, rock-and-shell (rococo), dripping water, Chi¬ nese mandarins, pavilions and floral emblems. Then comes the pseudo-classic Louis XVI period, with its elongated ovals, slender lines, urns, trophies and classic ornamentation. It is only necessary for an expert to open a book in order to tell the period of its manufacture, even if there is no date on the title-page. Some of the most charming ideas and loveliest orna¬ mentation are to be found

in various editions of La Fontaine's Fables, Moliere's plays and, in fact, all the plays and novels of the 17th and 18th century authors. The French have always excelled in. the art of book-illustration, both in color and in black-and-white. Throughout the 18th century and until the last quarter of the 19th, when the half-tone process of reproduc¬ tion was introduced, the artist's work was reproduced by means of the wood-cut, or steel engraving, or copper-plate etching. (See En¬ graving). Nothing is more charming than the old wood-cut, which has a peculiar softness and delicacy. For the development of its technique Thomas Bewick (1753-1828), an Englishman, was largely responsible. Bewick was remark¬ able for his great precision of outline, his tint and his so-called "white line.® His illustration of (British Birds, * Gay's Cables* and 2Esop's Cables* are classic. His contemporary, Wil¬ liam Blake (1757-1827), was a remarkable in¬ stance of an inspired genius at creation and a master of technique. All artists study Blake's Ullustrations to the Book of Job) (1826). The next period of English illustrators is headed by George Cruikshank (1792-1878), who never quite gets away from caricature in which he was a master. Cruikshank is somewhat vulgar at times, but he has humor and often a delight¬ ful fancy. His illustrations of several old Cairy Tales) appeal to artists. One can hardly ever think of Dickens' works apart from Cruik¬ shank, who shares fame as a Dickens illustrator with John Leech (1817-64) and Hablot K. Brown (1815-82), known as (

It is interesting to speculate on how Thackeray would have treated the (Pickwick

Papers) if Dickens had given him the requested permission to illustrate them. William Make¬ peace Thackeray (1811-63), was almost as great a draughtsman as novelist. In his illustrations for

his own novels — (Vanity Fair,) for in¬ stance — he presents a world of humor, some¬ times direct and sometimes subtle, which ap¬ peals as strongly to artists as to lovers of literature. Thackeray evidently inspired the work of W. S. Gilbert (1836-1911), whose de¬ lightful illustrations of his own 'Bab Ballads) are unsurpassed in the field of humorous draw¬ ing- Like Thackeray, Gilbert gets marvelous effects with the greater economy of line. The pose of a dancer's foot, the sweep of a skirt, or the expression of the eye, are quite sufficient to excite laughter.

Of enormous influence in both England and America, as well as in his own France, was Gustave Dore (1833-83), a native of Alsace. Dore's chief illustrations were for editions of Rabelais (1854) ; Balzac's 'Contes drolatiques) (1856); Dante's 'Inferno) (1861); (Don Quixote } (1863) ; La Fontaine's (Fables } (1863); Milton's (Paradise Lost) (1866)' Tennyson's (Idylls of the King) (1867); and Coleridge's (Ancient Mariner) (1876). So popular were the pictures of this artist that there was practically a Dore cult for years. The next group of illustrators was headed by Sir John Millais (1829-96), who made success¬ ful pictures for an edition of Trollope's novels. Rossetti, Holman Hunt, Ford Madox Brown and others followed, and contemporary novels, stories and poems show the types and fashions of the day even better than the fashion-plates. Dante Gabriel Rossetti (1828-83) illustrated his own poem the (Blessed DamoseP and the pictures enjoyed great vogue.

Of extraordinary decorative quality is the work of Aubrey Beardsley (1872-88), who in an edition of Pope's (Rape of the Lock-* allowed his fancy free play but restrained his hand for a fine display of technical skill. He also made a remarkable frontispiece for Ben Jonson's 'VolponeP

For pure imagination, original treatment and magnificent technique nothing equals the illus¬ trations made by Sir John Tenniel (1820-1914), for Lewis Carroll's 'Alice in Wonderland) (1866) and '

Alice Through the Looking-Glass) (1870). Tenniel so perfectly realized Lewis Carroll's ideas of Alice and the strange creatures she saw in her dreams that these books present one of the happiest examples of the illustrator's art. Tenniel also illustrated the (Arabian Nights) (1863).

Hugh Thomson (1860), an English artist, has been nearly as successful as Austin Dobson in portraying the 18th century. His illustra¬ tions of Mrs. Gaskell's (Cranford,) Jane Aus¬ tin's novels, Charles Reade's (Peg Woffington) and Goldsmith's 'She Stoops to Conquer) are charmingly treated with a light, sympathetic touch.

Another devotee of the 18th centurv is Randolph Caldecott (1846-86), whose delightful humor and trained brush and pencil turned' to light work. He is best remembered in his series of nursery rhymes and ballads including 'John Gilpin,) (Elegy of a Mad Dog) and the 'Great Panjandrum Himself.) Caldecott also illus¬ trated Mrs. Ewing's stories (1878).

An illustrator who has had great influence

upon the art of book illustration is Kate Greenaway (1846-1901). Her excellent draw¬ ing, her exquisite color and her graceful orna¬ mentation are supplemented by a charming in¬ terpretation of the 18th century, resulting in a "Greenaway style.® Miss Greenaway's illustra¬ tions for Madame d'Aulnoy's 'Fairy Tales) (1871) are not so well known as her illustra¬ tions of the poems of Jane and Anne Taylor, Browning's 'Pied Piper) and many nursery rhymes.

Another English woman-illustrator, Beatrix Potter, attracted attention about 10 years ago for her lovely color and quaint fancy and humor. Her illustrations to her miniature 'Peter Rabbit) books are masterpieces. Among illustrators in color, Walter Crane (1845-1915), is conspicuous. His best work has been done in illustrated books for children, such as the 'Baby's Opera,) the 'Baby's

Bouquet,) 'Cin¬ derella,) 'The Three Bears,) 'Masque of the Flowers,) etc. Walter Crane has also done beautiful work in black and white, including an edition of Grimm's 'Fairy Tales.) The lat¬ est illustrator in color about whose great talent three countries are agreed is Edmund Dulac (1882), a Frenchman, who now resides in Lon¬ don. He brings out, year after year, the most artistic books. Dulac ranks among the great¬ est illustrators of the present day. He is noted for his splendid and harmonious treatment of color and his poetic ideas. Dulac has illus¬ trated the 'Arabian Nights) (1907) ; Shakes¬ peare's 'Tempest) (1908); the 'Rubaiyat of Omar Khayyam) (1909); 'Sleeping Beauty and Other Tales) (1910) ; Edgar Allan Poe's 'Bells and Other Poems) (1911) ; and Hans Andersen's 'Snow Queen and Other Tales)

(1912).

American illustrators have, generally speak¬ ing, followed the lead of English artists. One of the most original illustrators is F. O. Dar- ley (1822-88), a New York artist, who did an enormous amount of work for magazines and illustrated a great number of books. Darley was not only a fine draughtsman, but he pos¬ sessed vigor, style and fancy. Those who own editions of Washington Irving, James Fenimore Cooper, Nathaniel Hawthorne and Longfellow with pictures by Darley are fortunate. Dar- ley's technique was drawn from the English school, but he was thoroughly American in style and feeling. He was too American to catch the spirit of Dickens; consequently, his illustrations to Dickens's works fall below his own standard, as shown in his treatment of American authors.

The most famous American illustrator of the 19th century was Edwin A. Abbey (1852- 1910), whose sympathies turned to literary sub¬ jects. Abbey's illustrations to Shakespeare are admired in England as well as in America. He also illustrated many plays of the 18th century. Many American illustrators have attained just fame for skilful drawing and clever treatment of subject; and because

of this general excel¬ lence few. names stand out prominently and few Americans have attracted attention because of any single performance. Arthur B. Frost (1851—) , however, achieved a triumph with his illustrations in pen-and-ink for the first series of 'Nights, with LTncle Remus.) Frost caught the high imaginative qualities of Joel Chandler Harris and produced pictures that

show a wonderful blending of the negro and animal set forth amid realistic Southern scenes and they exhibit a delicious humor. They are as closely identified with the text as Tenniel's pictures are with the text of (Alice in Won¬ derland^

The invention of the half-tone process made the reproduction of photographs an easy matter. Illustrated books became more plenti¬ ful and cheaper, although, from an artistic point of view, the old woodcut, which gives a direct reproduction of an artist's work, take superior rank. In one particular, however, the half-tone photograph has fulfilled a mission in the illustration of books of travel. In olden days an album of pictures, drawn, or painted, by an artist — J. W. M. Turner, for instance, — and reproduced by steel engravings, was a gift book for the wealthy. Today, the more accu¬ rate camera and the quick and inexpensive half¬ tone have brought the illustrated book of travel within the reach of every purse.

Bibliography.— Crane, Walter, (London

1903).

Esther Singleton.

ILLYRIA, T-lir'i-a, or ILLYRICUM, a

name anciently applied to a considerable re¬ gion on the east side of the Adriatic Sea, the inhabitants of which were the ancestors of the modern Albanians.

In 228 b.c. it became a Roman province. After various vicissitudes under different rulers it formed part of the Franco-Napoleonic empire as the Illyrian prov¬ inces. In 1815 it reverted to Austria and be¬ came the kingdom of Illyria, a title it retained until 1849, when it was divided into the prov¬ inces of Carinthia, Carniola and the Coast-lands. The inhabitants are Slavs, Germans and Italians.

ILLYRIANS, the people who about the time of Herodotus dwelt on the eastern shores of the Adriatic Sea. Little is known of their racial origin. They were represented as a bar¬ barous people by the Greeks, but archaeological research shows the stages of their civilization from the Neolithic Age onward. Implements of iron and bronze, silver, amber and glass ornaments attest a high degree of culture. In Dalmatia they were mixed with the Celts, and Celtic place names are common there to the present day. The Albanian language is prob¬ ably derived from one of the two groups into which the ancient Illyrian tongues were di¬ vided. Consult Brugmann, K., (Kurze verg- leichende Grammatik der Indogermanischen SpracheiP (Strassburg 1904).

ILMENITE, or MENACCANITE, also known as titaniferous iron ore, is a black, heavy, mineral crystallizing in the hexagonal system. It is widely distributed, occurring in diorites and many other igneous rocks. It is an oxide of iron and titanium containing when pure 36.8 per cent iron and 31.6 per cent titanium, and is frequently associated with magnetite. Iron ore containing ilmenite occur in vast masses in the Adirondack region of New York, in Quebec. Canada, and in northern Minnesota, and ilmenite is a common constitu¬

ent of the black sands found on some ocean beaches. The presence of titanium decreases the fusibility of an iron ore, hence the failure of many attempts to work back sands in the blast furnace. It is likely, however, that the titaniferous iron ores will become important sources of iron by the development of special methods for their treatment. See

Titaniferous Iron Ores.

ILOCOS NORTE, e-16'kos nor'ta, Philip¬ pines, a province of Luzon, occuying the north¬ western part of the island; greatest length, 79 miles; area, 1,265 square miles (including the dependent island). Chief town, Laoag. Two mountain chains inland extend parallel with the coast ; the surface otherwise is much broken by foothills, but it is fertile and well watered. Among the natural wonders of the province is a grotto 39 acres in extent and of great beauty, situated in Lice Mountain. The products in¬ clude rice, cotton, chocolate, corn, sugar and a fair grade of tobacco ; there are deposits of iron and copper in the mountains, the latter having been worked by the natives. The chief industries are agriculture, horse and cattle raising, fishing and the weaving done by the women. Civil government was established in September 1901 ; the people of the province are among the most progressive and industrious of the native races. Pop. 179,000, mostly Ilocanos and Igorot.

ILOCOS .SUR, soor, Philippines, a prov¬ ince of Luzon, on the west coast, bounded on the north by Ilocos Norte and on the south by Union ; length 70 miles ; area 492 square miles (including dependent islands). Chief town, Vigan. The eastern boundary consists of a chain of mountains rising 4,150 feet in Nagupu and sloping toward the coast in terraces ; the rivers are small. The coast road runs through the province from north to south, connecting the important towns and villages. The soil is fertile, the principal products are rice, corn, sugar, indigo, chocolate, peanuts and vegetables; the chief industries, other than agriculture, are the weaving of cotton cloth, the manufacture of baskets, hats, card cases and pipes, and cattle raising. There is also considerable trade, carried on mainly through the native markets in the different towns, and some export. Civil government was established 1 Sept. 1901. Pop. 187,500, mostly Ilocanos.

ILOILO, e-ld-e'ld, Philippines, province of Panay, including the eastern and southeastern coast of the

island; greatest length, 111 miles; area, 2,102 miles (with dependent islands). A range of mountains follows the northern and western boundary lines ; the rest of the surface is undulating, sloping to the sea. There are several large rivers, the most important be¬ ing the Jalaur and the Jaro. This province has some of the best roads in the archipelago; the principal towns are connected with the capital, Iloilo, and some of the rivers are nav¬ igable for native boats to the foot of the mountains. The products include sugar-cane, corn, rice, coffee, chocolate, tobacco and hemp ; there are also in the province deposits of gold and iron, stone quarries and extensive forests. The chief industries are live-stock raising, the weaving of fabrics of pineapple fibre (pina) and cotton and the manufacture of sugar. In

1899 the United States troops occupied the province, immediately began operations against the insurgents who were located there with headquarters at Santa Barbara, and succeeded in dispersing their forces. In April 1901 civil government was established. The inhabitants are mostly of the Visayan race and are gen¬ erally Catholic, though some of the mountain tribes are still heathen. Pop. 423,500.

ILONGOT, i-lon'got, or IBALAO, e'ba- lou, a primitive people of Malayan stock, who dwell in northern Luzon, P. I. They are head hunters and are among the least known and least civilized tribes in the Philippines. Their dwellings are scattered and their social organ¬ ization is of the most primitive and simplest type. They number about 3,000.

ILOPANGO, e-16-pan'go, Salvador, Cen¬ tral America, a lake of volcanic origin, six miles southeast of the city of San Salvador, about 10 miles long by 6 miles broad. It has several islets, one of conical shape about 400 feet high, formed during a volcanic eruption in 1879-80. Fish abound, although the

waters exhale a disagreeable sulphurous odor, and are unpotable. The surface of the lake is 1,200 feet below the level of the surrounding coun¬ try; when ruffled by a breeze the waters have a singularly brilliant parrot-green color. It is regarded as one of the most beautiful lakes in Central America, and is a resort for the people of the capital.

ILORIN, e-lo'ren, or ALORI, a-16're. West Africa, the capital of a province in Brit¬ ish North Nigeria, 170 miles northeast of Lagos. It is encircled by an earthen dyke and has several mosques. The principal industries are leather-making, pottery, wood-carving and cloth weaving. Mohammedanism is the re¬ ligion of the majority of the inhabitants. Pop. about 60,000.

. IMAGE, in optics, the picture or impres¬ sion produced by the luminous rays from an object reflected or refracted in mirrors or lenses when they enter the eye of an observer as if they had proceeded from a representation of the object. More correctly, the image is the locus of the foci (or circles of least confusion. See Focus) of rays from consecutive points of the object. When the light ravs actually pass through the points of the image the image is real and may be thrown upon a white screen. If no screen is interposed the image can be seen by an eye placed in the pencil of rays which pass through it. When the light rays do not actually pass through the points of the image, but diverge from one another on leav¬ ing the mirror or lens, the image is said to be virtual, and cannot be thrown upon a screen; it becomes visible to an eye placed in the pen¬ cils of rays which appear to have passed through it. See Lens; Mirror; Optics.

IMAGE, Psychological. The term as em¬ ployed m psychology has two different mean¬ ings. Traditionally, the image is a copy or representation of a former perception, or a compound of such representations, as for ex¬ ample, the picture, we see when with closed eyes we recall or imagine some object. Such an image, however, is complex, and by analysis it reduces to a number of simple images

which synthetically combine to form an idea just as

a number of sensations combine to form a per¬ ception. A more careful terminology, there¬ fore, would regard the image as simple and would define it as (

It is a moot question whether the image differs psychologically from sensation. Some psychologists believe that the image is more filmy and faded out than sensation, and that its intensity and duration are character¬ istically less. But to this it is replied that these are differences in degree, and not in kind ; that sensations themselves show these differences. The only certain distinction, therefore, is logical rather than psychological ; we say that we have a sensation when the stimulus is present and an image when the stim¬ ulus is absent. In everyday life, of course, there are still other cues which are taken by the individual to mark off sensory from imaginal experience; images are frequently less distinct, they are of shorter total dura¬ tion, they fluctuate, they fade out and dis¬ appear, they do not belong to the situation in which at the moment we find ourselves, etc., but all these when taken as cues are mean¬ ings which we put upon the bare experience, and, therefore, we often find that we are wrong, that the experiences which we take to be perceptual are, after all, imaginal.

If, however, we compare different kinds of image, then we find some that are clearly more like sensations than others. One group contains images which are conditioned upon recent stimulation of the sense-organ. The positive after-image which has the same quality as the sensation which precedes it, the negative after¬ image which always appears in an antagonistic quality, and the memory after-image which is similar to the positive but has other conditions — all three occur upon the cessation of the stimulus, and are undoubtedly sensory in character.

There are others, which we may call con¬ comitant images because they fill out or occur concomitantly

with perception, that are not so obviously sensory as those in the first group. The memory color image by means of which we always see an object in the same color quality that is familiar to us in daylight; the <(tied image® which, for example, appears in mutilated letters or outline drawings as gray lines or patches of color, and thus fills out the lacunae in the. perception ; and finally the image of synaesthesia, the best known example of which is colored hearing (sound accompanied by color) — all of these have the marks of sensory experience as regards their relative stability, uniformity of occurrence in the same individual, and their concomitance with other sensory experience; but, on the other hand, they appear also to be conditioned upon associ¬ ative tendencies in the brain, i.e., we see ob-

jects according as they mean, or, as in synassthesia, there is probably some abnormality among the associative fibres. Images in this group are, therefore, peripheral in character but centrally initiated.

There remain still other images which are dependent neither upon recent stimulation, nor upon concomitant perception but only upon associative tendencies. There are two kinds of these <(free images, » the image of memory and the image of imagination. So long as the images are simple, psychology is unable to dis¬ tinguish them, but in the complex form they are accompanied either by the feeling of familiarity or by the feeling of strangeness. In the former case the idea comes to us as consciously familiar, and we call it the image of memory; in the latter the idea comes to us as new, and we designate it the image of imagination. When once we have learned to recognize them, however, we find that their life histories are not the same. The image of memory, for instance, is subject to change in the course of time — it may fade out, it may

approximate to a type, or it may be in¬ corporated into a new complex part of which is imaginal. The image of imagination, on the other hand, is more stable, it may maintain both form and quality for a long time and then it dies away. Furthermore, an image of memory may appear in different modes with¬ out change of meaning, e.g., a series of non¬ sense syllables may be learned visually and recalled verbally, whereas the image of imagi¬ nation cannot be replaced by imagery from another sense department.

All modes of sense experience may be represented in imagery ; But visual images are most common ; then, in descending order of frequency comes auditory, touch and tempera¬ ture, pain, taste and smell, and finally kinaes- thetic and organic images. Kinsesthetic im¬ agery is so similar to kinaesthetic sensation that it is distinguished with difficulty, and auditory imagery so frequently occurs con¬ comitantly with throat-kinaesthesis that the existence of pure auditory imagery has mis¬ takenly been called into question.

*Finally there is large individual variation in the nature and frequency of characteristic imagery. In some individuals imagery is clean cut and intensive ; in others indistinct and weak. Again, in some individuals nearly all forms are experienced; in others scarcely any imagery is to be discovered. It has been found, however, that an individual's imagery tends to conform to one of four types. There is first a versatile type which employs visual, auditory and verbal-kinaesthetic images without prefer¬ ence for any one. Secondly, there is a visual type in which visual imagery is predominant although verbal-kinaesthetic imagery * is also used. Thirdly, there is an auditory-kinaesthetic type, and finally, an almost purely verbal- kinaesthetic type. It should be remarked, how¬ ever, that these types are only approximations. The kind of imagery which an individual em¬ ploys at any given moment depends in large part upon such varying conditions as age, mental habits and the circumstances of that moment.*

Bibliography. — Binet, A., (The Psychology of Reasoning) (transl. by A. G. Whyte, Chi¬ cago 1899) ; Galton, F., inquiries into Human

Faculty and its Development (London 1883) ; James, Win., Principles of Psychology } (New York 1890) ; Koffka, K., (Analyse der Vorstell- ungen u. ihrer Gesetze) (Leipzig 1912) ; Lay, W., (Mental Imagery) (New York 1898) ; Meu- mann, E., (The Psychology of Learning) (transl. by J. W. Baird, New York 1913); Philippe, J., (Paris 1903) ; Titchener, E. B., (Beginner's Psychology }

(New York 1915).

H. P. Weld,

Assistant Professor of Psychology, Cornell U niversity.

IMAGES, Veneration of, the practice of venerating, worshipping and honoring in pub¬ lic or private graven or painted representations of sacred things or persons. Because of the general prevalence of idolatrous worship of images, the Jews in the Old Law were for¬ bidden the making of images, although evidence of the lawfulness of the practice is afforded in the positive command to ((make two cherubim of beaten gold on the two sides of the oracle, J) to ((make a brazen serpent and put it up for a sign.** Though the walls of the catacombs, which were the refuge of the first Christians in times of persecution, show many symbols, $uch as the anchor, palm branch, dove and fish, it was not those primitive believers who intro¬ duced images and pictures into the churches. Indeed, during the great struggle against heathenism, there was a strong opposition to any form of idolatry. It was not until after the period of the persecutions that the use of sacred images or paintings became open and undespised. The Council of Elvira (a.d. 306) decided against the use of pictures in churches, yet during the following 90 years pictures of martyrs and

saints were set up in sacred edifices. The representation of Christ in the form of a man was ordained at the Sixth Gen¬ eral Council (Constantinople 692), instead of, as heretofore, under the symbol of the Lamb. Images of the Holy Trinity were later sanc¬ tioned by the Second Council of Nice (787), though a distinction was laid down between adoration (latreia) and reverence (douleia), the latter to be paid only to the persons repre¬ sented, and not their images. With the spread¬ ing of the custom came the adoption of in¬ cense and candles. A school of iconoclasts — image-breakers — arose in the Eastern Church during the 8th century, entirely condemning not only the veneration paid to the images, but even the existence of them. In 726 the Emperor Leo III prohibited the practice and soon after (730) ordered the images to be destroyed. The Church split into two parties over the question, each in turn persecuting the other. The con¬ troversy, which lasted over a century, was ended under the Empress Theodora by a council at Constantinople in 842 declaring in favor of image worship among the Greeks. The decision was confirmed by another coun¬ cil in 869-70. In the modern Greek Church ikons or pictures are permitted, but no graven images ; in the Roman Catholic Church the use of images was continued. Though not accepted by the English Church of that period, images were later introduced. Consult Damas¬ cene, (Treatise on Holy Images, > translated bv M. H. Allies (1898).

IMAGINARY CONVERSATIONS.

Opinions may differ as to the relative position of Landor’s imaginary Conversations) among the major classics of English prose, but the right of the book to be numbered among them can scarcely be called in question. The (Con¬ versations } have never been popular in the broad sense of the term, nor did Landor intend them to be so. It was always his

endeavor, in the phrase of Bacon, (

Various attempts have been made to classify the Conversations,5 sometimes as to subject matter, sometimes as to the difference of man¬ ner or spirit in which they were written. Lan¬ dor, however, seems to have had no system in mind when he composed them. They were writ¬ ten at different times, in the end reaching a total of about 150, over a wide stretch of years, but they were not produced according to a program, and consequently cannot well be re¬ duced to one. Individual moments of life in¬ terested Landor most, not general states of society or complicated sequences of events, and therefore one would not look for a high de¬

gree of organization in the relation of the dialogues to each other.

Perhaps the least contestable merit of the Conversations5 is their possession of the virtue of style. It is customary to speak of Landor's style as classic, and so it is in its restraint and evenness, in its unfailing sense for dignity and beauty of form. It is not, however, the monu¬ mental and oratorical style of Roman prose that one thinks of in reading Landor, but rather Greek prose style, with its nice balance between colloquial ease and literary formalism. Landor passes lightly from familiar conversation or exposition to the language of poetry, often of restrained eloquence. Perhaps his most charm¬ ing passages are the short idyllic and lyric amplifications which are to be found in every Conversation5 the subject of which permits such graceful embroidery. More serious pas¬ sages are cast in severe but never elaborately artificial form. Indeed Landor's prose is al¬ ways easy, though never realistically familiar, always consciously artistic, though never pain¬ fully labored. It has neither the rapidity, nor the curtness, nor the concealed ingenuity not in¬ frequently found in later English prose. It is distinctly a 19th century prose style, but about it there still lingers some of the serene dignity of the literary ideals of the preceding century. In this sense also Landor's prose

may be desig¬ nated as classical.

_ George Philip Krapp.

Professor of English, Columbia University.

IMAGINARY QUANTITY. An imagi-

nary or complex quantity is an expression con¬ sisting of a pair of real numbers, or numbers which can be represented by positive or nega¬ tive terminating or non-terminating decimals. The pair consisting of a and b is written a + ib, which is in general different from b + ia. A complex quantity of the form a + t.O, is said to be real, but must not be confused with a number which is real in the primary sense, notwithstanding the many common prop¬ erties which the two possess. A complex quan¬ tity of the form 0 + ib is called a pure imagi¬ nary. If x be the complex quantity a + ib and y is the complex quantity c + id, x + y is defined as (a + c) + i(b + d), and „ry as bd) ~\~i(bc \ ad). Most of the theorems of arithmetic and algebra suffer no loss of validity by their transference to complex quan¬ tities, while, as was proved by Gauss, every algebraic equation in complex algebra has at least one root. For this reason, complex alge¬ bra- is the algorithm of mathematicians par ex¬ cellence.

0 + f.1, or i, as it is written, has the prop¬ erty that its square is —1, so that it is often

written V — h It cannot be defined as \f — 1, however,, for in ordinary algebra \/ — 1 is meaningless, and operating with meaningless symbols yield sheer nonsense. On the other hand, if we start with complex algebra, the * symbol i is usually one of the initial concepts.

The so-called Argand representation of the complex number (x + iy) is the point (x, y) on a Cartesian co-ordinate-nlane. If the angle between the .r-axis and the line from the origin to \x> y) be 0, and the distance from the origin to (x, y) be p, we get the result that x -\-iy — p (cos 0 f i sin 6). It may be

shown that [p (cos 6 + i sin 0)] [p'(cos 0 + i sin e') \

^ . ^os (0 "f- 0) + i sin (0 f O') j, so that the multiplication of two points on the Argand diagram is attained by adding their 0 s or arguments and multiplying their p's or ampli¬ tudes: The addition of two points results in a point which forms a parallelogram together with them and the origin.

IMAGINATION. Early in the history of psychology, imagination meant nothing more than the ability or power of having mental images. (See Image, Psychological). Later, a distinction was made between the imaging of previous experience (reproductive imagination), and the forming of new images from the old (productive imagination). Still later, the iormer was subsumed under the term (

This image, the image of imagination, ap¬ pears only in minds of a certain constitution and its mode varies, of course, according to differences in ideational type. In some cases the imaged object is so complete and distinct in form and so stable in quality that it serves as a guide to the artist who undertakes a formal expression of his new creation. Legouve, for example, is said to have remarked to Scribe, ((When I write a scene I hear, you see ; at each phrase which I write, the voice of the person who is speaking strikes mv ear. You, who are the theatre itself, your actors walk, act before your eyes ; I am the listener and you the spectator." ((Nothing could be more correct," Scribe replied ; <(Do you know where I am when I am writing a piece? In the middle of the parterre." We know also that Goethe and Dickens visualized their scenes

and that the latter heard his characters speak ; that Schubert, Mozart and Beethoven heard their music before it was expressed in notes and that some painters have had visual ideas so stable in form and

color as to serve as models.

The image of imagination is, as has been said, the characteristic feature of the imaginal consciousness. But like the patterns of thought and action, the imaginal is a determined con¬ sciousness , the ideas proceed in an orderly way. In passive imagination the images fol¬ low the course of perception as when we see the incidents related by a story-teller, or hear the character speak in the drama we read. In these cases, as Titchener says, ((a certain indefi¬ nite direction is given to our ideas by the presented stimuli; then the ideas as they come jn their predetermined order, are supplemented in this imaginal way." In constructive imagina¬ tion, on the other hand, the successive ideas not only have a direction, but they also drive for¬ ward to an end, namely, the new creation. The determining factors here are dispositions in the nervous system which may of may not find conscious representation. In the first place we have what Ribot calls the ^instinct of creation, the need of producing in a determined line." This, if mentally expressed, comes as a vague ambition or aim, and the disposition serves to restrict all ideas that do not fit in with the am¬ bition or aim. Then without warning but usu¬ ally after long incubation and as the result of some chance situation, or some grouping of associative tendencies, a new meaning, a happy thought, is born. If the new meaning is carried in consciousness by an image and if it has upon it the feeling of strangeness, then it is the image of imagination. Ihe feeling of strangeness, however, alternates with a feeling of satis¬ faction, of joy, sometimes of exaltation. It is not surprising that in view of the suddenness of its initiation, its unaccountableness, its feel¬ ing of strangeness and the joy which it brings, the new idea often seems to come as an inspira¬ tion from on high. Sometimes the new con¬ ception comes in its complete form. George Sand, for example, says of Chopin: ((Creation was spontaneous, miraculous ; he wrought with¬ out foreseeing. It would come complete, sud¬ den, sublime." But at other times and

more frequently, the new idea is vague, incomplete, or only in outline, and the period that follows is one of hard labor characterized by secondary attention, conflicting ideas and variable moods. This is the period when the painter cleans and recleans his canvass, the musician writes and rewrites his themes, the poet casts and recasts his lines. But all the while the image of imagi¬ nation serves both as model and as goal assist¬ ing the dispositions in keeping the imaginal consciousness true to its course.

There remains to mention a third feature of the imaginal consciousness, the feeling of empathy. There seems to be a natural tendency for an individual of the imaginal type to feel himself into a situation. It is not enough for the artist to picture the scene he creates; he becomes a part of it. He not only invents a character; he lives it. Scribe projected himself into the pit and watched his actors act; he might equally well have become the characters themselves, as Dickens became Little Nell and suffered as she suffered. Psychologically,

empathy is a conscious attitude that analyzes into images of imagination and kinsesthetic sensations. Its counterpart in perception and memory is imitation.

Bibliography. — To the titles under Image, Psychological, add Hobbes, T., < Leviathan > (London 1839) ; Lucka, E., (Die Phantasie, eine psychologische Untersuchung) (Leipzig 1908) ; Peillaube, E.,’(L’imagination; les images auditives5 (in Revue Philo so phique, III (Paris 1902-03) ; Ribot, T., (Essay on the Cre¬ ative Imagination > (Chicago 1906) ; Taine, H., (On Intelligence5 (New York 1889); Titch- ener, E. B., (Text-Book of Psychology5 (New York 1910) ; Wallaschek, R., (Psychologie u. Pathologie der Vorstellung (Leipzig 1905).

. . H. P. Weld,

Assistant Professor of Psychology, Cornell University.

IMAGO. See Metamorphosis.

IMAM, l-rpam, or -mam', a Mohammedan chief or leader; a title given to the four succes¬ sors of Mohammed, and to the 12 great lead¬ ers of the shfites. In Turkey, applied to. the functionaries who call the people to prayer from the minarets, perform circumcision, etc. They are chosen by the people, and confirmed by the secular authority, under whose jurisdic¬ tion they also are in criminal and civil affairs.

IMBECILE, weak or feeble in mind. The ordinary use of this term is to express a de¬ gree of mental weakness somewhat less than idocy. See Mental Defectives

IMBECILITY. See Mental Defectives.

IMBER, im'ber, Naphtali Herz, Hebrew poet: b. Zloczow, Galicia, 1854; d. 1909. In his boyhood he was well trained in the Talmud, and for purposes of study traveled in Turkey, Egypt and Palestine, becoming most proficient in Hebrew and other Oriental languages. He went to England and for some time was a col¬ laborator of Israel Zangwill. He came to the United States in 1892 and traveled about extensively, living successively in New York, Boston, Chicago, San Francisco and Los Angeles. He published several volumes of verse and contributed numerous articles to the Hebrew press. His works include

IMBRIANI, em'bre-a'ne, Vittorio, Italian

poet: b. Naples, 24 Oct. 1840; d. 1 Jan. 1886. He pursued historical and philosophical studies at Naples, Zurich and Berlin; later became a soldier, serving in the wars of 1859 and 1866; and had a political career marked by much antagonism caused by his passionate and fear¬ less temperament. The. best

known of his works are (Canti popular! delle provincie meri- dionali5 (1871-72) ;

IMBRICATED SNOUT-BEETLE. See

Snout-beetle.

IMBROS, an island in the /Egean Sea, west from- the entrance to the Dardanelles.

It is 18 miles long, east to west, 8 miles broad,

and terminates west in Point Auflaka, and east in that of Basse. Area, 87 square miles. It is mountainous, rising in its loftiest peak to the height of 1,959 feet; well wooded, and in¬ tersected with richly-fertile valleys, produc¬ ing wine, honey, oil, cotton and lead. It has only two towns — Flio and Castro. Pop. 8,000, mostly Greeks.

IMHOFFER, em'hof-er, Gustav Melchior,

Austrian Jesuit and explorer: b. near Graz, Styria, 1593; d. 1651. Entering the Jesuit order he was sent as missionary to Peru in 1624. In 1636 he crossed the Andes and reached the head waters of the Amazon. He was the first Euro¬ pean to make a connected account of the whole course of that river. It was first published at Madrid in 1640. The London edition of 1689 is entitled (A Relation of a Journey along the River Amazon.5 Subsequently Imhoffer was made director of the College of Bahia. The Society of Jesus published a number of' works by him on the peoples, languages and customs of the aborigines who came under his notice.

IMIDE, i-mid, or -mid, a chemical sub¬ stance derived from ammonia, NHs, by replac¬ ing two of the hydrogen atoms by a divalent radical. If all three of the hydrogen atoms of the ammonia are replaced by one trivalent radical, the compound is called a nitrile. When one or more of the hydrogen atoms of the ammonia are replaced by a corresponding number of monovalent radicals the compound thus formed is called an amide or an amine, according to the nature of the radical by which the hydrogen is replaced.

See Amide; Amine.

IMITATION. Imitation is the process of reproducing by one's own act the observed ac¬ tions of others. Its beginnings lie therefore in perception. It is the result of a desire to change from the role of spectator to that of actor. Imitation may be of two kinds (1), a primitive and (2) a developed form. The primitive form is an unconscious copying of some object of perception; and is simply a re¬ action in response to the outer stimulus which excites it. The best example of this kind of imitation is to be found in the sounds which a baby is wont to repeat when it has once heard them. It is a peculiar characteristic of the primitive imitation that the sound, for instance, when once imitated becomes in turn a new stimulus to start the process over again, the re¬ sult being that the imitated sound is repeated rapidly again and again until the organs are wearied, or the attention is diverted. The ex¬ ercise is evidently found to be pleasurable, and is. therefore continued indefinitely. Mr. Bald¬ win has given the name <(circular reaction55 to this kind of self-perpetuating process. The name also of <(suggestive imitation55 has been given to this class of acts which appear imita¬ tive to an observer, but are not consciously felt to be so by the imitator.

The second form of imitation is more com¬ plex, and marks a . more developed stage of con¬ sciousness. The imitation has now become a conscious act. The object perceived has aroused some degree of interest, and there is conse¬ quently a conscious effort to reproduce it with the original set before one as a model. In imitation which is of this form, we find the process intimately connected with the attention. In attention there is always a conscious striving

lor a more accurate knowledge of the object of

perception, and imitation serves to gratify this desire, inasmuch as one comes to closer quarters as it were with any act when one tries to reproduce it. Knowledge of it comes then from the inside. This means a concen¬ tration of attention, and a consequent result of more definite and satisfying knowledge. More¬ over, attention will vary as the interest, for that which one attempts to do himself is always far more interesting than merely that which is observed.

. In the development of consciousness imita¬ tion as a social factor plays a most conspicuous part. Through it a child acquires all of its social tendencies, and becomes a part of the social organism in which it is to live and move and have its being. Its education starts with the first rudimentary efforts at imitation; and is carried on from this initial stage to the very highest and most advanced forms in constant dependence upon the imitative tendencies. Through imitation the knowledge of one gen¬ eration is acquired by the succeeding, and a continuity in development is assured which makes for the progress of the race.

In this connection it is to be noted, how¬ ever, that with the imitative impulse there are two other tendencies which have free play and a wide scope. These tendencies must be reck¬ oned with also. They are the tendency to social opposition, and the tendency to inventive¬ ness. The tendency to social opposition is a desire for self-assertion, an impulse primarily to do something different from that which others are doing merely from a feeling of native opposition. This impulse is seen in very young children, and remains throughout life. It is often recognized as unreasonable, but nevertheless irresistible. It is a fertile source of the differences of opinion which so early develop in childhood. It prevents a slavish imitation and the loss of initiative in action. However in order to act in a manner which differs radically from one's social environment, there is implied a preliminary training of an imitative sort; for there must be a basis of common activity in order that a departure

from the accepted mode may have any significance, and there must be also a body of common beliefs, in order that there may be any such thing as real difference of opinion. The other tendency is a more pronounced and a more definite form of opposition to imitation; it is the tendency to inventiveness, not for the sake of. opposition, nor as the result of an in¬ evitable clash of opinion in one's social setting, but for the sake of producing that which is suggested from within, and not from without. It is the working out of one's own individual¬ ity without waiting for a copy or model. It is a shifting of the centre of interest from some object which is perceived, to some object of the inner sense, a fancy born within the brain, an idea which has its origin in the depths of one's own consciousness. This tendency is seen even in early acts of imitation, a tendency to depart from the copy, to introduce variations of design, to improve upon the model.

Here again in order that there may be in¬ creased power of independent production, there must be . a previous schooling in the art of exact imitation. The original artist is not one

who has never copied from a model nor studied the works, of the masters. It is the interplay of the imitative impulse with the tendencies to so¬ cial opposition and to inventiveness which make progress, possible. Progress is not repetition nor is it on the other hand activity which swings clear of any past. Where there is prog¬ ress there is imitation, but the kind of imitation which allows full range for inventive play and independent opinion.

There is a special form of imitation which appears on a large scale in the so-called mob impulse, where individuality seems merged in the tendencies of the mass, and imitation is in the nature of a reaction. The individual is swept , along with the crowd, not because he wills it necessarily, but because the action of the crowd carries him away as with a flood. This kind, of imitation has been given the name of <(plastic imitation.® Much study has been

devoted of recent years to the relation of imi¬ tative impulses in animals to congenital ten¬ dencies.. The instinctive furnishes a strong pre¬ disposition . to imitation, and in many of the early activities of animals it is most difficult to draw a line of distinction between instinct and imitation. See Imitation in Animals; Mimicry in Nature.

Consult Bagehot, 'Physics and Politics (New York 1873) ; Bain, A., (Senses and In¬ tellect (London 1888) ; Baldwin, 'Mental De¬ velopment in the Child and in the Race) (New York 1906) ; Bosanquet, B., 'History of Aesthetic* (New York 1892) ; Frazer, (The Golden' Bough) (London 1911); McDougall,*

(Social Psychology > (London 1908); Wundt, W.,

John Grier Hibben, President of Princeton University.

IMITATION IN ANIMALS. This is a somewhat technical phrase used in zoology to designate the fact that certain kinds of animals have acquired, by the gradual process of natural selection, a resemblance to other animals, which are said to be "imitated,® although, of course, no effort to become like them is consciously made. This is one of the two principal phases of what is called "protective resemblance® the other being an acquired and protec¬ tive likeness to some vegetable or inanimate object that causes it to be overlooked by its enemies ; this second phase is termed "mimicry,® and is described under that head. While the advantage gained by mimicry is that the animal is either overlooked altogether, or else mistaken by its enemy for something of no value to the latter, that gained by imitation is that the animal is avoided by predatory kinds because it is mistaken for something harmful or at least distasteful. The methods by which, according to the theory of Darwin and his fol¬ lowers, these conditions are matured are ex¬ plained in the article Natural Selection; but it should be said that other, or at any rate modified, views of the method have been advanced by other and later writers.

The most widely quoted and typical case of apparently advantageous imitation is that of the South American heliconid butterflies, which are evil-smelling creatures so distasteful to both, monkeys and birds that they are very rarely if ever eaten, and hence fly about in the

sunshine as carelessly as if they knew they were safe. Now, in the same situations are found butterflies of an entirely different family (Pieridce) that have none of the inedible quali¬ ties of the heliconids, and they, too, fly about freely and are rarely if ever caught, or at¬ tempted to be caught by creatures that prey on butterflies, although both are rather clumsy fliers. The conclusion then seems logical that the pierids are getting benefit from their mas¬ querade, however it may have come about. Similar cases of imitation among butterflies may be found in all parts of the world, in some groups a whole genus affecting a more or less close imitation of another genus or family, and elsewhere only a single species in a genus ap¬ proximating some unrelated form; further¬ more, cases occur where the female alone of a species will imitate another species, whereas the male acquires no such resemblance; this seems to follow the rule, so widely illustrated in all classes of animals, that nature provides for the preservation of the female far more carefully than for the male, who in the inferior ranks of life at least appears to be of little or no importance after he has performed the duty of fertilization.

Many notable illustrations of our theme may be gathered among the insects of the United States. A conspicuous one is the case of one of our large butterflies of the genus Basilarchia. All the species of this genus, with one exception, are dark-colored, with a light border containing blue spots round the margins of the wings, as in the common "mourning cloak® ; the single exception is

Basilarchia Hipparchus, which has a tawny brown color, diversified by black bands and marks. This brown basilarchia almost exactly copies our very common milkweed butterfly (Anosia plexippus) . Here there seems no ade¬ quate motive for, or advantage gained by, the apparent imitation, . and it suggests when it is closely studied various difficulties in respect to the whole subject.

But not all cases of this adaptation are con¬ fined to resemblances between two insects or other creatures of the same class. A certain butterfly becomes an almost precise duplicate of a dragon-fly; spiders in both North and South America take the form of ants, and a well-known small black wasp of our own coun¬ try is so ant-like that it is called the cow-ant or velvet-ant. Few town-bred persons go into the country in summer without mistaking for a hummingbird one or other of the big hawk- moths that poise on whirring wings before flowers very much after the manner of the bird, which is scarcely larger. These and simi¬ lar cases are ruled out by some thinkers on the ground that they are not imitations but cases of parallel development. Many kinds of insects imitate the stinging, and therefore dreaded, tribes of bees and wasps, including flies, beetles and so forth. One common Amer¬ ican fly (Volucella) "imitates the honey-bee so closely that one would hesitate to handle it even after being told that it is harmless®; and it profits by the deception to lay its eggs inside of hives. Other flies copy bumblebees so closely as to be remarkable, and they imitate their habits as well as their form and colors. (

((which imitates a honey-bee, has the same kind of buzzing flight, and when standing occasion¬ ally teeters its abdomen up and down, as is characteristic of the bees and wasps. Some of these mimicking flies even protrude and withdraw the tip of the abdomen, as does an angry bee or wasp,® threatening to use a sting it does not possess.

Hints have already been given that scientific men are not agreed on the interpretation of all these

phenomena, or the causes of them. An attempted discussion of the many questions in¬ volved is not possible here. Those who care to go more deeply into the matter should read the evidences and arguments in the books of such men as A. R. Wallace, H. W. Bates, Thomas Belt, Fritz Muller, S. H. Scudder, Lloyd Morgan, W. Bateson and others. A brief and excellent discussion of the matter will be found in (Animal Coloration,* by F. E. Beddard (London 1892), where many good references to other sources are given.

Ernest Ingersoll.

IMITATION OF CHRIST, The. Fon- tenelle the French philosopher said that the limitation of Christ is the most influential book that ever came from the hand of man, the Scriptures having come from the hand of God.® That seems much to say; yet it would be easy to confirm the expression out of the mouths of many of the most distinguished writers and thinkers of the nearly 500 years since the hook was written. Lamennais declared that the "Imi¬ tation has made more Saints than all the books of controversy. The more one, reads, the more one marvels. There is something celestial in the wonderful simplicity of it.® La Harpe the distinguished French dramatist and critic said after reading it in prison "Never before or since have I experienced emotion so violent and yet so unexpectedly sweet.® Nor was it only for Latin minds of preceding centuries that it had such a deep appeal, for in our time it has been the favorite reading of Chinese Gordon, Field Marshall Lord Wolseley, the late Emperor Frederick the Good, and Stanley the Explorer, while the greatest lawyer of our time, Lord Russell of Killowen, always carried a copy of it with him for daily reading.

Saints have praised it highly, for it is a gem in their collection. Saint Francis de Sales declared that "its author is the Holy Spirit.® Saint Ignatius Loyola recommended his Tesuits to read in it every day. Saint Philip Neri called it his "precious treasure.® Bossuet and Mas- sfllon Fenelon and John

Wesley, Dr. Johnson and Cardinals Newman and Manning made it their favorite reading'. Minds of very different tendency, however, leaders in modern thought with a drift far from conventional Christianity, were quite as emphatic in their expressions. Comte the founder of Positivism wrote, "It is an inextinguishable treasure of true wisdom® and he recommended its dailv reading to his disciples. Renan the rationalist was scarcely less fond of it. George Eliot rivalled Lamen¬ nais in her praise of it when she said, "It works miracles to this day, turning bitter waters into sweetness. . . Matthew Arnold declared it "the most exquisite document after the New Testa- ment of all that the Christian spirit has ever inspired. > Still more surprisingly with his ad¬ miration for the ancients, he added, "its moral

precepts are equal to the best ever furnished by the great masters of morals, Epictetus or Marcus Aurelius.® The little book that has thus deeply affected the spiritual and intellectual leaders of humanity for almost 500 years was no chance production. It was written, as after long controversy seems now quite certain, in the first half of the 15th century by Thomas a Ivempis (1380-1471), a member of the Brother¬ hood of the Common Life who spent some 70 years in the Monastery of Mount Saint Agnes of that order in the Rhine land. Among the students of the brotherhood were such men as Erasmus, Cardinal Nicholas of Cusa, Agricola, Alexander Hegius and Wimpheling. Thomas a Ivempis was the spiritual director of the mon¬ astery, and his conferences formed the basis of the Imitation of Christ. He wrote other books but none of the marvelous power of this one.

The original title of the Imitation is said to have been Ecclesiastical Music. Lamartine called it #<(the poem of the soul.® Its style in the original Latin has a rhythmic quality that makes it easy to

understand both designations. There are passages in it like that on love (Book III, Chap. 5) that if read beside a chorus from such a Greek tragedy as that has given the book its permanence. This quality permeates the work and makes every bit of it appeal to the human heart, hence doubtless the tradition that when opened at random the passage that the eye lights upon will always be responsive to the mood of the seeker. It is much more than the work of a great genius in psychology; it is the production of a seer, one who saw more deeply into human nature than is given to any but a very few among mankind. Probably our most satisfac¬ tory definition of a poet is that he is a seer, and that the author of the

The four books of (The Imitation> contain

(1) Admonitions useful for the spiritual life;

(2) Admonitions leading to the interior life;

(3) Of interior consolation; (4) A devout exhortation to Holy Communion. It might seem as though the contents then would be too mystical and impractical for men of affairs and of serious intellectual interests, and yet it is to many of these particularly that the book has had its special appeal. Dr. Johnson's favorite expression in it was <(If thou canst not make thyself such as thou wouldst be, how canst thou have another to thy liking?® Such aphorisms as <(Know that the love of thyself is more hurtful to thee than anything of this world®; or <(For all praise patience; but how few are there that desire to suffer?®; or <(Faith is required of thee and a guileless life, not lofti¬ ness of understanding, nor the depth of the mysteries of God,® taken almost at random from the three latter books are but typical examples of a Kempis' brief sentences which have the precious quality of applying almost directly to whatever a man has in hand at the moment when he opens the (Imitation. Consult Cruise, Sir Francis, (Thomas a Kempis) (Lon¬ don 1887) ; Kettelwell, (Thomas a Kempis and The Brothers of the Common Life) (ib.*

1882) ; Scully, (Life of The Venerable Thomas a

Kempis > (ib. 1901) ; Walsh, J. J., (London 1891).

James J. Walsh.

IMMACULATE CONCEPTION, the

privilege by which the Virgin Mary, according to. Catholic doctrine, was conceived without original sin. As this doctrine is distinctively Catholic, the following exposition is along the lines of the common teaching of Catholic theo¬ logians.

Meaning. — The dogma of the Immaculate Conception of the Mother of God was defined, by Pope Pius IX, 8 Dec. 1854, in the bull Ineffabilis Deus. The most important words of this definition are the following:

In honor of the holy and undivided Trinity, for the splendor and adornment of the Virgin Mother of God, to extol Catholic faith and increase the Christian religion, by the authority of our Lord Jesus Christ, of the blessed Apostles Peter and Paul, and by our own authority, we declare, pro¬ nounce and define that the doctrine, which holds that the most blessed Virgin Mary, from the first moment of her con¬ ception, by a singular grace and privilege of Almighty God, in view of the merits of Jesus Christ, Savior of the human race, was preserved free from all stain of original sin, is revealed by God and therefore to be firmly and constantly believed by all the faithful.

In the above definition the word conception does not refer to the act of conceiving, but to the term of that act. The body of Mary was formed in the ordinary and natural way. Just so soon as the newly created soul animated her body (probably the primordial cell wherefrom the full formed body was evolved), then and then only could the person be said to be con¬ ceived. Now, according to the ordinary course of fallen nature, Alary would at that very moment of her conception have been tainted

with original sin. Such is the teaching of Saint Paul : Just as through one man the sin, — i.e., original sin, — came into the world, and through the sin came death; so death passed unto all men, for that all men sinned. . . . Briefly then, just as through a single downfall the result was (sk) condemnation for all men; so, too, through a single decree of justification the result was (;«f) for all men that justification which meaneth life. For, as, through the dis¬ obedience of one man, the whole race was made sinful; so, too, through the obedience of one man, the whole race will be made just. (Romans v, 12, 18, 19). This ordinary course of fallen nature was by a special privilege not the course of Mary's nature. She is (

Defense of the Definition. — To the Cath¬ olic there is no need of any defense of the definition of the Immaculate Conception. He accepts the Church as his authoritative teacher

in matters of faith and morals. She cannot err in handing down the message of him who said:

''All power hath been given me in heaven and upon earth. Therefore go ye, make disciples of all nations, bap¬ tise them in the name of the Father and of the Son and of the Holy Ghost, teach them to observe all things whatsoever I have commanded you. And, lo, I am with you all days, even to the end of the world. (Matthew xxviii, 18-20).

When the Council of Trent, Session V, 17 June 1546, declared that it had no intention to include ((the blessed and immaculate Virgin Mary, Mother of God,® in its decree on the universality of the fall of man by Adam's sin, the immediate consequence was still greater motive of credibility of the doctrine of Mary's stainlessness, and still greater increase of Cath¬ olic devotion to her privilege of exclusion from Adam's taint. So that the definition of Pius X

caused no surprise. For five years his com¬ mission had studied the attitude of the whole Catholic world. The Immaculate Conception was found to be believed all the world over. All hoped and prayed for the definition that <(the doctrine is revealed by God, and therefore to be firmly and constantly believed by the faithful.1* All rejoiced, when the Vicar of Christ, speaking ex cathedra as the universal pastor of all the faithful, clearly indicated the defined article of faith. The definition was new; the doctrine was old, — as old as the de¬ posit of faith entrusted to the Church to guard and define. The Church cannot add to this deposit of revelation. Her part is to follow the injunction of Saint Paul: <(Guard the glorious deposit, by the help of the Holy Spirit who is within us® (2 Timothy i, 14). She receives no new revelations; but defines and guards the old. In every new definition of an old truth, she fearlessly takes her stand «in defense of the faith that has once for all been entrusted to the keeping of the saints.® (Jude iii).

And yet the dogma of the Immaculate Con¬ ception was at least implicitly contained in Holy Writ, and explicitly taught by the Fathers of the Church. To show such content is beyond the range of this brief article. Only the out¬ line of the argument may be indicated.

1. Gen. iii, 14-15, the curse of the serpent may be thus translated from the Hebrew:

Since this thou hast done,

Accursed art thou

Beyond all beasts and brutes of the wild,

All the days of thy life.

On thy belly shalt thou crawl,

Biting the dust.

Enmity shall I set

Between thee and the woman,

Between thy offspring And her offspring.

They shall smite thy head,

Thou shalt smite their heel.

In its literal meaning, this curse includes the victory of the woman and her offspring over Satan and his offspring. The woman is Eve; her offspring are all the just, — the phys¬ ical Christ and the Mystic Christ, or the Church. In its typical meaning, the curse in¬ cludes the complete victory of Mary over Satan. For Eve is the type of Mary. And yet such complete victory would not have been, had Mary ever been tainted with sin, — even with original sin.

2. Luke i, 28 :

Hail, full of grace, the Lord is with thee; blessed art thou among women.

These words of Gabriel's greeting mean such fulness of grace, such intimate union with God, such blessedness beyond all women, as to pre¬ clude all taint of sin, even of original sin.

3. The Fathers, who follow such an inter¬ pretation of these two passages of Scripture and defend the freedom of Mary from all sin, may be found in any of the works of our bibliography.

4. A fourth reason for the definition of the Immaculate Conception, given by the bull (

Bibliography.— Passaglia, C., (De immacu- lato Deiparae semper Virginis Conceptu1 (1854) ; Ullathorne, (The Immaculate Conception of the Mother of God) (1904) ; Terrien, (L'Immacu- lee Conception1 (1904) ; Le Bachelet, (Dic- tionnaire Apologetique de la Foi Catholique,1 s. y, <(Mariolatrie,® (1917); Kosters, (Maria, die unbefleckt Empfangene1 (1905); Mir y Noguera, (La Immaculada Concepcion1 (1905).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College,

Maryland.

IMMANUEL, or EMMANUEL, Hebrew name employed by the prophet Isaiah, the signification of which — <(God with us® — is not by itself proof that the child to whom it was to be given would be divine. But in Matt, i, 23, it is declared that the name had been divinely applied in a special prophetic manner to the child Jesus. The prophecy itself (Isaiah vii, 14) appears, to call for a fulfilment near at hand, and in accordance with the ordinary laws of nature, the mother of the promised child being unmarried at the time the prophet spoke. The birth of such a child in fulfilment of a special promise might be a sufficient sign for a deliverance from national calamity. But as the whole prophecy of Isaiah has supreme reference to a spiritual salvation (some mod¬ ern scholars to the contrary notwithstanding), the sign of the lower deliverance may have also an ultimate application to the higher; a woman unmarried pointing forward to the vir¬ gin mother, and an ordinary child taken as a prophetic emblem of the child Jesus miracu¬ lously conceived and born. That this is the true interpretation is argued from (1) the New Testament account of the Nativity, the inspired authority of which is established by independ¬ ent evidence; (2) by the Scripture exhibition of the character and works of Jesus in attesta¬ tion of His claim to be the Deliverer and Savior who had been foretold as to be sent forth from God. Consult McFadyen, John Ed¬ gar, (The Book of the Prophecies of Isaiah1 (New York 1912).

IMMENSEE. This touching little story by Theodor Storm was first published in 1850 and brought its author general recognition. In a quiet hour at twilight an old man, called Rein¬ hardt, sees his life — as far as Elizabeth, the playmate of his youth, is connected with it — pass before his inner eye. He sees the happy

scenes of their childhood, the light and shade of his student days stand out before him, he recalls his one and only visit to her, after she had married a friend of his, A mood of res¬ ignation gradually pervades his recollections, for he and Elizabeth had loved each other, and yet they had not been united. — (Immensee) is typical of Storm's early prose tales. It strikes the key of resignation, that resignation which consists on the one hand in an insuperable longing for happiness, on the other hand in that purity and quiet which distinguish men who, free from all bitterness, look at life with the realization that their innermost desires can never be satisfied and seek refuge in the recol¬ lection of more promising days of the past. The story is told in a series of only vaguely connected ^situations® which are to set forth such poetry as may be contained in every-day life and the lyric atmosphere of which crytal- lizes at certain points into finished poems. Con¬ sult edition of Theodor Storm's Works (Vol. I, pp. 1-38, G. Westermann, Braunschweig) ; Schiitze, P., (Theodor Storm) (2d ed., 1907, pp. 100-109) ; Schmidt, Erich, (Charakteris- tiken) (Vol. I, 2d ed., 1902, (Theodor Storm,* pp. 404-408).

Ewald Eiserhardt.

IMMERMANN, Karl Leberecht, German

dramatist and satiric novelist : b. Magdeburg, 24 April 1794; d. Diisseldorf, 25 Aug. 1840. His parents were the Kriegsrat Gottlieb L. Immer- mann and Friederike Wilhelmine, nee Wilda. The family was purely Prussian and national¬ istic in its convictions, which induced a patri¬ otic fervor in Immermann that was to last for some time. He studied law at Halle (1813— 17), but his course was interrupted by his par¬ ticipation in the wars of liberation, and a re¬ sulting illness, which prevented him from fac¬ ing the enemy until the

battles of Ligny and Waterloo. In Diisseldorf Immermann helped to found a Theaterverein (1832) and conducted model performances and lectures on dramatic art until 1837. As a poet, Immermann may be considered as a transition from romanticism to realism; he regarded himself now as a follower of Goethe and Tieck, now as a member of the Jung Deutschland movement. His two most famous works are novels of contem¬ porary life, (Die Epigonen) ((family memoirs,* Diisseldorf 1836), and (Miinchhausen, eine Geschichte in Arabesken) (Diisseldorf 1838- 39), in which latter he attempts to satirize the unnatural cynicism of the upper and middle classes of his day, in contrast to. which he in¬ serts the country tale

IMMERSION. See Baptism.

IMMIGRATION. Immigration into the Umted States viewed historically is but a con¬ tinuation of the movement of peoples from. the far east into southeastern Europe, then into Europe proper, and finally over seas to the two Americas and Australasia. Peoples, races and

groups have been in movement as far back as history records; they have drifted from place to place as the result of wars, conquests, famines, the opening up of new lands, and the changing of climatic and economic conditions. The wandering of the peoples following the incursion of the barbarians into Italy was an immigration movement. It differed from im¬ migration to-day in that the wandering of tribes was a movement of races rather than of indi¬ viduals and families.

Early Immigration to America. — Immigra¬ tion to America differs from the migrations of early peoples in that it is a movement of fami¬ lies and individuals rather than of nations, races and clans. It has been so from the very beginning. And the character of American immigration has changed with changing condi¬ tions in Europe on the one hand, and the changing industrial and economic conditions in America on the other. The first immigrants to New

England were driven to this country by religious intolerance. They made the first set¬ tlement. And the early settlers in New Eng¬ land, inspired as they were by religious mo¬ tives, have profoundly affected the subsequent migrations of the same people out of New Eng¬ land to the middle and the far West. We can trace the ethical influences of early Puritanism as far west as California; and individuals and groups made their way to Ohio, Iowa and even distant California.

But the primary motive of immigration to America is not religious. Only a handful of immigrants have been driven to this country in the search for either religious or political free¬ dom. The overwhelming majority of immi¬ grants have come to this country as a result of economic forces; economic forces at work in Europe, or the greater economic opportunities which America afforded. This is almost ex¬ clusively true of all immigration since the 17th century.

For nearly three centuries the immigration to America was almost exclusively from the British Isles, Germany and Scandinavia. There were Swedish settlements in New York and Delaware; Dutch settlements in New York; south German settlements in Pennsylvania and the South. But the great bulk of immigration up to very recent years has come from Great Britain and Ireland, the Scandinavian coun¬ tries and Germany. The migration from Ger¬ many was particularly strong from the revolu¬ tions of 1848 down to shortly after the Franco- Prussian War. There has been but little French immigration to America, and relatively few immigrants from Switzerland and Holland.

This is the ((old immigration,® so called. This is the immigration that gave America its Anglo-Saxon quality. It was unmixed with Latin, Slavic or Oriental peoples. From the very beginning it was a peasant immigration. It came in search of a new home in a country where free land could be had for the asking. And it built an agricultural civilization. For two centuries and a half civilization of the

United States was predominantly agricultural, just as it was predominantly Anglo-Saxon. The incoming waves of immigrants moved west just beyond the line of settlement. They picked up small farms of from 30 to 60 acres; only such farms as an individual could himself cul¬ tivate. Each oncoming generation moved west-

ward, settling New York, Ohio, Indiana, Ken¬ tucky, Tennessee. Illinois, Michigan and Wis¬ consin. Only a small portion of the immi¬ grants settled in the towns or cities. Up to the Civil War, and even as late as 1880, our immi¬ gration was not only predominantly of Anglo- Saxon, Scandinavian and Germanic stock, it was also predominantly agricultural.

During the three decades which followed the Civil War^ the American West was rapidly peopled. Kansas, Nebraska, Texas and the northwest were taken up by homesteads, or were divided into great estates as a result of the Pacific railway aid grants. In a few years' time western America was appropriated, and by the end of the last century the public domain and practically all of the free land in America had been appropriated. All over the West, even in California, Oregon and Washington, great stretches of land were held by the railroads, divided into great timber or grazing preserves, and by 1890 the possibility of absorbing immi¬ gration on the land, which had existed for three centuries, had come substantially to an end.

Changing^ Immigration. — This marks the end of the first great epoch in American life. This, definitely altered the source from which immigration came, as well as the economic con¬ ditions of America. The "old immigration® was a home-seeking, land-owning, agricultural immigration. It was primarily Anglo-Saxon, and primarily agricultural as well. The "new immigration,® so called, comes from south and

central Europe. It was primarily agricultural at. home ; it became almost exclusively indus¬ trial in America. It. came in response to economic conditions in this country, just as had the earlier immigration from the north. But the suction which drew the new immigra¬ tion was high wages in the rapidly expanding industrial and mining centres of the East. It did not go to the land ; not because it was un¬ willing to, but because the land was all gone. It was compelled to go to the cities and mining camps, where it congregates in race groups and settlements and remains more or less segregated from American life and institutions. The new immigration created the immigration problem and the movement for restriction, which was traceable to several things :

1. Race hostility and the protest of those descended from Anglo-Saxon and Teuton stock to the rapid increase of Italian, Slavic and Oriental peoples.

Z Religious protest against the large Catho¬ lic infusion from central and southern Europe.

3. Economic protest from American labor against the competition of cheap European labor willing to accept — temporarily at least — a lower standard of living than that to which American labor was accustomed.

Immigration Legislation. — The passing of free land, the economic pressure of vast num¬ bers of unorganized workers, together with racial and religious influences, led to a move¬ ment for the restriction of immigration. Other forces contributed. Mine owners, contractors and employers in the United States sent agents to Europe who brought in great bodies of men who broke strikes or destroyed the solidarity of labor; the steamship companies stimulated im¬ migration ; while European countries dumped undesirables of all kinds on America. But the most powerful forces behind the movement for

the restriction of immigration were economic and racial.

Early restrictive legislation was not in fact restrictive. It was selective. No attempt was made to limit the number of people who could come to this country; the attempt was to bar out those who were considered undesirable be¬ cause of economic, moral or political reasons. During the fiscal year ending 30 June 1914, 33,041 persons were debarred as feebleminded, tuberculous, afflicted with loathsome contagious disease; as beggars, paupers or likely to become a public charge ; as contract laborers, criminals, polygamists, anarchists, prostitutes and those coming for an immoral purpose; or for other reasons. Of this number the great majority were excluded on economic grounds : 15,784 being- excluded as paupers. or likely to become a public charge; 4,531 as imbeciles or afflicted with some, disease ; 2,793 as contract laborers ; 755 as criminals; 31 as nolygamists ; 1 an¬ archist; 385 prostitutes; 354 for attempting to bring in prostitutes or females for an immoral purpose, and 322 under the provisions of the Chinese Exclusion Act. There were 6,537 ex¬ cluded under surgeons' certificates for defective mentality or physical unfitness to earn a living. The excluded and debarred persons in 1914 constituted 2 per cent of the total immigration for the year.

Restrictive Legislation.— On 1 May 1917

a new law went into effect, passed 5 Feb. 1917, whose avowed purpose was to limit immigra¬ tion.. It was avowedly directed against immi¬ gration from southern, central and eastern Europe. Immigration was to be limited by the "literacy test,® which excluded all aliens "over 16 years of age, physically capable of reading, who cannot read the English language or some other language or dialect, including Hebrew or Yiddish.® There are many exceptions to the literacy test which permit the admission of otherwise inadmissible aliens, such as a father or grandfather over 55 years of age, wife, mother, grandmother, unmarried or widowed daughter, and children under 16 years of age. The law also mandatorily . excludes immigrants from a great part of Asia. In addition the head tax was increased from

$4 to $8.

10n?ld an

Italians (South) . ; . .

Italians (North) .

Hebrews .

Polish . ... !

Crotians and Slovenians .

Lithuanians .]

Magyars . .

Roumanians .

Russians . !!!!!!

Ruthenians . !!!!!!!.'!!!!'

Slovaks .

Spaniards .

Syrians . .

Bohemians .

Armenians . ’ *

Bulgarians, Servians and Montenegrins

251,612

44,802

138,051

122,657

37,284

21,584

44,538

24,070

44,957

36,727

25,819

11,064

9,023

9,928

7,785

15,084

45,881

Total

890,669

IMMIGRATION — IMMIGRATIONS

715

Immigration from the races of northern Europe was as follows :

Dutch and Flemish . 12 566

English . 5 1[7 46

Finnish . 12,805

French . 18,166

German . 79 871

Irish . .!!!!!!.’ 33 ,’ 898

Scandinavian . 36,053

Scotch . 18,997

Welsh . 2 558

Total . 266,660

At the outbreak of the European War there were nearly 15,000,000 persons of foreign birth in the United States. Of these the great majority were of the new immigration from southern and central Europe. And they were almost exclusively engaged in industry, and especially in the unskilled trades. The new im¬ migration, too, is. largely mban. It settled in the great industrial cities and in the mining regions. The population of New York, Cleve¬ land, Chicago, Boston and other industrial cen¬ tres, is from 73 per cent to 78 per cent of per¬ sons of foreign birth or those immediately de¬ scended from persons of foreign birth.

Illiteracy is very high in the countries from which the new immigration of recent years has come. Illiteracy of the population over 10 years of age is in Bulgaria, 65.5 per cent ; Greece, 57.2 per cent ; Hungary, 33.3 per cent ; Italy, 37 per cent ; Roumania, 60 per cent ; Rus¬ sia, 69 per cent ; Servia, 78.9 per cent ; Spain, 58.7 per cent. On the other hand illiteracy in Denmark falls to .2 per cent ; in England and Wales, 1.8 per cent; Germany, .05 per cent; Sweden, .2 per. cent ; Switzerland, .3 per cent. The new immigration law will automatically exclude immigration from those countries of southern and central Europe from which immi¬ gration in recent years has been particularly heavy.

Immigration and the War.— The European War suspended immigration. Whereas immi¬ gration in the years immediately preceding the war rose to the high-water mark of an average of 1,200,000 annually, after the outbreak of the war it steadily diminished in numbers. The total volume was as follows: In 1915, 326,700; 1916, 298,826; 1917, 295,403; 1918, 110,618. On 3 May 1921 Congress passed an act, limiting immigration by countries until 30 June 1922 to three per cent of the foreign-born population of 1910.

Frederic C. Howe,

Former Commissioner of Immigration for the Port of New York.

IMMIGRATION, Bureau of, a sub -section of the Department of Labor, charged with the administration of the Immigration Laws. The bureau is directed by a commissioner-general whose annual salary is $5,000. See United States — Immigration.

IMMIGRATIONS, Animal and Vegetal,

into America began in early geological times. At the dawn of the Age of Mammals, when the great Mesozoic reptiles were disappearing, and the Tertiary Era introduced the dominance of mammalian and other types of animal life, that became more and more modernized as time advanced, the circumpolar regions of the Northern Hemisphere seem to have been a con¬ tinuous mass of land. The climate was mild, and animals and plants had free space in which

to wander right around the northern world. The origins of the strange primitive creatures then prevalent are unknown ; but their scanty fossil remains show tl eir substantial identity in Europe, Asia and America. Before long — as geological time is reckoned — changes in the restless crust of the earth caused separation of North America from both Asia on the west and Europe on the east, and fossils of the Mid¬ dle Eocene show that local types speedily de¬ veloped in every continent. This independent and divergent adaptive modification continued until the Eocene had merged into the Oligocene, as shown by rocks of the White River forma¬ tion in eastern Wyoming. Land connection had been restored by a lifting of the Bering Sea region, and an isthmus thus formed between Alaska and Siberia. By this bridge came new forms from Asia, while American migrants wandered into the Old World; but the inter¬ change was very limited, bringing to us only certain small forerunners of the sabre-toothed <(cats,® of the mustelines of some early creodonts (as Hycenodon), and of primitive rodents.

At this time were introduced also the anthracotheres, short-legged, somewhat swine¬ like, hoofed animals, which have no near rela¬ tives in the modern world, but had been previ¬ ously well represented in Europe. There came also the earliest of the horses '(Eohippus), the first opossums and a few others. The Oligo¬ cene was followed bv the Miocene, a period of mild climate and wide-spread volcanic activity, in which land connection with Siberia, long interrupted, appears to have been restored, and when the first small forms of proboscidians en¬ tered this continent, on which subsequently they developed so extensively. ((The place of origin and ancestry of these animals,® says Prof. W. B. Scott, (

proved unprofitable and have been neglected. With the ships that brought these beneficent ad¬ ditions to our fauna and flora came many un¬ welcome visitors — true invaders in the modern sense of the word. Weeds innumerable began with the first settlements. Most of them were accidental importations, in seed, or in the dis¬ charged ballast of ships, or were attached to trees, shrubs and plants imported. Some were garden-flowers, controllable and harmless at home, but here flourishing inordinately and spreading into fields and highways ; others, weeds and grasses pestiferous everywhere; others the molds, smuts and similar bacteric or fungoid diseases afflicting grains and fruits. It was long before the government took any pre¬ cautions against such evils.

Simultaneously, and in a similarly careless way, various animals gained entrance and be¬ came pests, among them innumerable injurious insects. One of the most noticeable of the early invaders of this kind was the Hessian fly. The famous gypsy moth began here with escapes from an entomologist’s collection near Boston in 1869. Among higher animals the house-mouse and black rat came across the Atlantic in

early days, the brown rat previous to the Revolution, and these have become troublesome and even dangerous everywhere. (See Rat). Later, unwise persons imported the European ho se sparrow ("English® spar¬ row), about 1851. A few years later the sky¬ lark, European goldfinch and some other birds were introduced, but fortunately have not be¬ come naturalized. Starlings were set free in New York city in 1890, bred abundantly and threaten to become a costly nuisance. Rabbits are common in domestication, but by good fortune have not colonized wild, as has hap¬ pened so disastrously in Australia. Lapp rein¬ deer have been colonized in Alaska to the greatf advantage of the Eskimos there.

A few years ago the United States govern¬ ment, warned by naturalists, began to realize the danger in further invasions of this kind, and laws were passed requiring inspection of every plant and animal brought into the coun¬ try, to make sure that some new and harmful insect or disease did not come with them ; and prohibit'ons were made against the importa¬ tions of foreign animals, especially certain dreaded ones, as the mungoos. These precau¬ tions are in the hands of the Department of Agriculture, and have been highly beneficial in their purpose and effect.

It was formerly believed that human in¬ vasions had taken place in prehistoric times on a large scale. Some of the theories, as of ar¬ rival of peoples from Egvpt, or India, or Poly¬ nesia, or Japan, were highly fanciful; but more reasonable was the belief that this continent was populated by the invasion, thousands of years ago, of immigrants from Asia bv way of Siberia and Alaska. It is not to be denied that something of the sort may have taken place in the very remote past on an extended scale, but there is no direct evidence of it, either then or more, recently.

Bibliography. — Osborn,

Ernest Ingersoll.

IMMISCH, im'ish, Otto, German classical scholar: b. Wartha, Lusatia, 1862. He received his education at the University of Leipzig, was appointed lecturer there in 1889 and professor in 1896. From 1907 to 1913 he was professor at Giessen and in the latter year was appointed to a chair at Konigsberg. He published (Philo- logische Studien zu Plato) (1896; 1903); (Die innere Entwicklung des griechischen Epos) (1904) ; an edition of Susemihl's (Aristotelis Politica (1909) ; (Wie studiert man klassische Philologie?) (1909);*

(1911).

IMMORALITY, in general, a course of conduct at variance with the accepted standards of a community, and more especially those of a sexual character. Until recent times the law except in a few instances took no cognizance of immoral acts which in their consequences affect only the immediate participants, but the present tendency everywhere appears to be the extension of the law to regulate the private lives of persons, subjecting at the same time all offenders to legal penalties. See Adultery ; Drunkenness; Fornication; Gambling.

IMMORTALITY (Lat. immortalitas, in + mortalis, ((not mortal®). The doctrine that the soul continues to exist after death, or more specifically the doctrine of eternal personal sur¬ vival. To the question <(What becomes of the soul after death®? various answers have been given by different philosophers and civilizations. The most noteworthy of these answers may be grouped as follows: (1) Complete annihilation (the Materialists) ; (2) Survival of the soul for an indefinite period in a world of filmy shadows (Aboriginal) ; (3) Eternal existence in a moral world of retribution (Christian and certain idealistic philosophies) ; (4) Transmi¬ gration (Indie, as early as the Upanishads ; the Egyptians, Plato, the Pythagoreans, and sporadic amongst aborigines) ; (5) Absorption into an Infinite or Absolute Being (Pantheism; the Buddhistic Nirvana, where the individual is annihilated only in the sense that the seed is

annihilated in the fully developed plant, — the seed's life-goal) ; (6) The survival of the in¬ dividual in the form of the posthumous influence of his personality and achievement, which is scarcely more than a metaphorical use of the term Immortality (many Evolutionists and • Positivists; cf. also Ostwald, Miinsterberg) ; (7) Merging or diffusion of the psychic energy of the individual into an unseen hypothetical etheric energy (quasi-materialistic). "

Belief in some form of immortality is wide¬ spread, although not universal. It is found in all stages of civilization from the lowest form of aboriginal life to the highest Occidental cul¬ ture. The doctrine varies from a belief in an indefinite survival-period after death to the belief in eternal personal life, the latter being the legitimate use of the term Immortality.

Aboriginal Civilization.— Amongst primi¬ tive peoples, belief in the survival of the soul is due mainly to four things: (1) Their prevailing animism, which ascribes a soul to everything;

(2) The phenomena of dreams and apparitions;

(3) The instinctive will to survive and the in¬ stinctive aversion to annihilation; (4) The belief in the substantial character of the soul as an entity. "Looking at the religion of the lower

races as a whole, we shall at least not be ill-advised in taking as one of its general and prin¬ cipal elements the doctrine of the soul's future (Tylor> 'Primitive Culture, Vol. II, p. 19) By (*

make the doctrine of judgment and retribution paramount, spiritualize the conception of the soul and its future life, eliminate geographical definiteness from the soul's abode and corre¬ late the conception of immortality with a system of religion and ethics.

. The . Egyptians. — In the earliest known civilization of Egypt, the problems of religion and eschatology were central interests. In the remotest period of their history, the Egyptians believed in an invisible deity or deities and in the future life of the soul. The human soul is of the divine substance, an emanation from Ammon-Ra. At death it passes to the seat of judgment at the gateway of Amenti (the Hel¬ lenic Hades) and there it is adjudged by the 42 assessors (representing the 42 sins of which the soul must be innocent) of the dead, before the supreme tribunal of Osiris. The soul that is. proved pure at the judgment returns to its divine origin, while the soul that has led an im¬ pure life is condemned to reincarnation and passes into an animal life to attain purification (through probationary metempsychosis. The theory of the future life of the soul amongst the Egyptians is based on the metaphysical view that the soul is an emanation from an original cosmic soul, on the ethical view that the present life is a probationary period, and on the con¬ ception of the moral fitness of the soul for reabsorption into its original source, the sun- god Ra — the head-spring of all light and life. See Book of the Dead.

Hebrews. — Sheol, or the realm of shadows, appears in the early history of the Jews to be an amplification of the idea of the grave, as the dark abode of departed spirits, where souls dwell bodiless, unconscious, without feeling. The references in the early part of the Old Testament Scriptures to a future life are rare and vague, and the doctrine of the immortality of the soul is nowhere explicitly taught in the early books. The rites of necromancy were dis¬ couraged by the prophets and lawgivers of ancient Israel as antagonistic to belief in the God of life, whose realm excluded Sheol (or the realm of the dead), until post-exilic times. Eternal life belongs to God alone, and to those celestial beings who have eaten of the tree of life and live forever. In connection with the Messianic hope and under the influence of Greek and Persian ideas, the later Jews adopted a

*doctrine of resurrection of the body which made mom for belief in the soul's continuous life. The Cabalists took up the doctrine of trans¬ migration (Gilgul, ((rolling on** of souls) accord¬ ing to which the soul of Adam passed into David and shall pass into the Messiah, as is mystically set forth in the letters of that name (Ad[a]m). The Platonic doctrine of pre¬ existence is also found in the rabbinical philos¬ ophy. Immortality conjoined with the dogma of the resurrection is the prevailing conception in the post-exilic literature, the latter (resur¬ rection) becoming fixed in the Mishna and lit¬ urgy. Since the time of Moses Mendelssohn, who rehabilitated the doctrine of Plato in his (Phaedon,* progressive Judaism tends to lay less emphasis on the resurrection of the body, and greater emphasis on a purely spiritual immor¬ tality, the former dogma being discarded in the Reform rituals.*

The Greeks. — The origin of the doctrine of immortality amongst the Greeks is lost in the

remotest antiquity. It is found in the early traditions of the Orphic and Dionysiac mys¬ teries, in the poems of Homer and Hesiod, and forms a central tenet in the philosophy of Pythagoras, a contemporary of Buddha-Sid- dhattha and Lao-Tze. The view of Pythagoras includes the doctrine of transmigration, which may have been suggested to him by the theology of the Orphic mysteries or by Pherecydes, rather than by the Egyptians (Zeller, (Pre-Socratic Philosophy^ Vol. I, pp. 71,514). The great prob¬ lem of a mans life is moral purification, which he pursues in a divinely governed Cosmos, where his chief end is to become like God. The soul is imprisoned in the body because of sins committed in. a pre-existent state, and after death passes into a superior or inferior state, according as it has served Good or Evil. In the ascending stages of metempsychosis the soul is

prepared for moral redemption. Although the belief in some form of immortality prevailed amongst the Greeks, throughout their history, and probably came into their philosophy from their religion, it was not until Plato that a philosophic basis was furnished to the doctrine. The Platonic arguments for the immortality of the soul may be summarily stated as follows :

(1) The fact that the mind brings to the study of truth a body of interpretative principles and axioms with it, as part of its native endowment, shows that they can be only reminiscential and, therefore, derived from a pre-existent state;

(2) The soul is an ultimate unity (i.e., monadic

in character) and, therefore, not being composite or divisible, it cannot be disintegrated; (3) The soul ( ) means the <(principle of life,®

having the idea of life essentially immanent in it, and inseparable from it, and therefore it must exclude the opposite idea, death ; (4) The soul is self-moving, deriving its activity from within; consequently its motion and therewith, its life, must be perpetual; (5) The soul as an immaterial reality is essentially related to the immaterial, invisible, eternal idea; and as the former, is. akin to the latter in nature, so is it also akin in duration ; (6) The superior dignity and value of the soul argue for its survival of the crass, body, and even the crass body persists for a time; (7) The cyclical movement of nature shows everywhere the maintenance of life by opposition, as night, day; sleeping, waking; the dying seed, the germinating flower. This is an argument from, analogy: out of the decay and death of one living organism, a new life is generated; (8) The instinctive aspiration of the soul toward a future existence shows that the belief is founded in natural law; (9) Things that are destructible are destroyed by their peculiar evil or disease ; the peculiar evil of the soul is vice, which corrupts the soul's nature, but does not destroy its existence; (10) The world as a moral and

rational world demands a future, life, of rewards and punishments for the rectification of inequalities in this life, else the wrong would ultimately triumph, as in a bad play. This argument is based on the ethical claim that there must be a final equiva¬ lence between inner worth and external con¬ dition or reward. The views of the Greeks, and especially the views of Plato, have had a pro¬ found, an incalculable influence on Christian thought, on early theological formulae and on the sum of Occidental philosophy. Plato was not merely a framer of philosophy, an intellec¬

tual interpreter of reality, but still more a man of religion, a seer.

The question of the pre-existence or sur¬ vival . of the soul is not a scientific problem. Positive science is impotent either to prove or disprove the dogma. It is a problem for re¬ ligion, and its ultimate appeal is to faith. So long as science keeps within its borders, it is neither philosophy nor religion, and has no verdict to pronounce ppon ultimate reality. The dogma of immortality in the higher civi¬ lizations is largely based on the philosophical theory of the ideality of human life, and on the demand for an ideal completion of experience which involves a transexperiential world. It is a postulate of purposiveness, of teleology in the ethical realm.

The general tendency of modern biological science and cerebral physiology has been to discard the doctrine of immortality, although the relations between molecular movements of the brain, on the one hand, and thoughts and feelings, on the other, are known to science merely as concomitants, and in no case as products or effects. James ((Human Immor¬ tality, ; 1898) has endeavored to ((draw the fangs of cerebralistic materialism® by ascribing to the brain a "transmissive® function, instead of a "productive® function. Tait and Stewart ((The Unseen Universe, > London 1894) postulate an unseen world, from which the known visible world has arisen and to which we must resort for the origin of molecules as

well as for an explanation of the forces that animate these molecules ; and it is reasonable to suppose, as these physicists say, that the ultimate unseen universe is connected by bonds of energy with the visible universe and is capable of receiving energy from it and of transforming the energy thus received. To say that the visible world is either eternal or has the power of originat¬ ing life contradicts the result of observation and experiment (op. cit. p. 246). Therefore, the hypothesis of an eternal unseen universe is necessary to explain the evolution of the mat¬ ter and life of the visible world and the only method of avoiding a break in the continuity of reality. The law of the conservation of mass and of energy, the law of biogenesis (every living being presupposes an antecedent life), and the law of continuity (there is no break in reality, the universe is of a piece) make the assumption of an unseen universe the easiest mode of explaining the empirical. Fur¬ ther, the postulate of a rational cosmic energy is necessitated by the ordered character and inherent teleology of reality. The law of con¬ tinuity and conservation of energy necessitate the further conclusion that the psychic energy of the individual is not lost, but transmuted into the unseen world.

During the 18th century and the early part of. , the 19th, the dogma of immortality was widely discussed. The French materialists de¬ nied the doctrine in every form, regarding the psychic life purely as an organic function. In. the. system of Identity (Schelling) and Spmozism no place for the doctrine is found. In Fichte's idealism the creative Ego is not the individual, but the absolute Ego ; the individual Ego realizes, itself only by negating its individ¬ uality, by universalizing itself, and the Ego thus exemplifying the conceptual life of truth, con-

tinues to all eternity, as an indestructible part of

the reality of the Absolute Ego. Hegel paid little attention to the problem, but the early Hegehans split into two factions, the one af¬ firming and the other denying the doctrine (cf Feuerbach, Richter, Weisse, Goschel, Conradi)! f n Lotze s teleological idealism the immortalitv ot the soul (which is hardly more than casually mentioned) is based on the principle of value- that thing will continue forever which by reason of its excellence should be an abiding constitu¬ te e pait of the Cosmical Order, but one can- mu- SaJ that a11 human souls are immortal. I his idea of a conditional immortality, deter¬ mined by ethical value, reappears in later dis¬ cussions (cf. McConnell, (The Evolution of ImmortaLty-'), i.e., immortality is simply a moral achievement.

. According to Rant, scientific demonstration is not applicable to these three truths : the Ex¬ istence of God, the Freedom of the Will and Immortality. They are postulates of morality. The work of man as a moral being, with in¬ finite potentialities, i.e. infinite perfectibility, necessitates an infinite time for their realization. The laws of the moral life are drawn from a transcendental sphere, free from conditions of time and space, and so the very essence of man's moral being is invested with the eternal. Man is infinitely, progressive and perfectible in his moral and intellectual evolution, and this fact points indubitably to a further existence. If death were the end, the moral ideal would be illusory, and man would perish a fragment. An infinite moral imperative implies an infinite moral ability. Duty demands moral perfection. Further, the moral ideal is a character-ideal, an ideal of personal aim, which implies a per¬ sonal destiny, and the non-illusoriness of the moral life implies the possibility of realizing its ideal.

One may fairly say that since the time of Kant the dominant note in the discussion of immortality has been ethical. The main postu¬ lates on which faith in the dogma has been based in the late literature of the subject are the moral perfection of a World-Governor, the basic rationality of the universe, and

the worth of human life (cf. Gordon, immortality and the New Theodicy,5 p. 46).

The adv

The chief traditional arguments adduced in support of the doctrine are: (1) The ontolog¬ ical argument, which bases immortality on the immateriality, simplicity and irreducibility of the soul-substance; (2) The teleological argu¬ ment, which employs the concept of man's des¬ tiny and function, his disposition to free him¬ self more and more from the conditions of time and space, and to develop completely his intel¬ lectual, and moral potentialities, which develop¬ ment is impossible under the conditions of earthly life; (3) The theological argument; the wisdom and justice of God guarantee the self- realization of personal beings whom he has cre¬ ated; (4) The moral argument, i.e., the moral

demand for the ultimate equivalence of per¬ sonal deserts and rewards, which equivalence is not found in this life; (5) The historical argument; the fact that the belief is wide¬ spread and ancient, showing it to be deep- seated in human nature, and the historical fact of the resurrection of Christ and the statements of the New Testament Scriptures.

As to the attitude of men in the present time toward the doctrine, Osier ((Science and Immortality 0 happily groups them into three parties: (1) The Gallionians (cf. Acts of the Apostles,, xviii, 14), i.e., the Scientists who study the How of the universe and who regard the dogma as without the pale of science, neither affirming nor denying its truth, although tending to reject it; (2) The Teresians (Saint Teresa, 1516-82), i.e., the seekers of the Why of the universe, the mystics who <(live by faith® and have the ((will to believe,® who read a pur¬ pose in human destiny and teleology in the world; these are of the spirit of Plato; (3) The Laodiceans, who study neither the How nor the Why of the universe, who are absorbed in empirical problems and the sense-life ; these have no practical concern

with the doctrine

Bibliography.— Alger,

2 vols., Freiburg 1903) ; Royce, (The Concep¬ tion of Immortality5 (Boston 1900) ; Salmond, (The Christian Doctrine of Immortality5 (London 1897) ; Savage, (Life beyond Death5 (New York 1899) ; Seth, < Study of Ethical Principles5 (Edinburgh 1902) ; Stewart and Tait, (The Unseen Universe, or Physical Spec¬ ulations on a Future State5 (London 1894) ; Teichmfiller, (Ueber die Unsterblichkeit der Seele5 (Leipzig 1879) ; Tylor, (Primitive Cul¬ ture5 (2 vols., London 1871); Wheeler, Dio¬ nysos and Immortality5 (Boston 1899).

William A. Hammond, Sage Professor of Ancient Philosophy, Cornell University.

IMMORTELLE. See Everlasting Flow¬ ers.

IMMUNITY. It has been a common ob¬ servation that certain individuals are prone to the infectious diseases, and others not. Some children in a family always (

Natural immunity may be so modified as to be lost entirely, certain forms of disease pre¬ disposing the sufferer to ready secondary in¬ fection, as, for instance, is seen when tubercu¬ losis follows measles; or a partial immunity be' made more effective, or a new immunity con¬ ferred. This has been termed acquired im¬ munity. The evolutionary doctrine would tend to interpret natural immunity as an inherited acquired immunity. In the case of man im¬ munity sums up those powers of resistance which the body naturally possesses, or which it acquires in the struggle with infectious dis¬ eases, both in endeavoring to destroy the bac¬ teria — 'bacteriolytic power — and to counter¬ act the toxics — antitoxic power. Modern pathology has shown that the battle-field is a large one, and that the

opposing forces are nu¬ merous and their powers largely unknown ; and it must be remembered that the struggle has been going on for millions of years.

The observation that certain diseases — as measles, scarlet fever, smallpox — once ac¬ quired, confer a marked immunity, led up to vaccination, this inoculation against smallpox being the first conquest of disease by such means. It is certain that others will follow. Certain diseases — notably pneumonia, influ¬ enza, erysipelas — confer an immunity, but it is not lasting; thus demonstrating the principles of variability in the (*

Former theories for explaining the varied picture in this rapidly widening study have been numerous. They may be classed under the exhaustion theory of Pasteur, which assumed that the bacteria used up the available food-

supply and died; or, as the laity often express it, ((the disease wore itself out.® This theory has been thoroughly disproved. The retention theory — that the bacteria are killed by their own products — is also untenable. The me¬ chanical, humoral and phagocytosis theories, which teach that the bacteria are destroyed by'- the humors or cells of the body, are partly true, but do not convey the whole truth, which in fact may never be known. The most popu¬ lar theories of the present time are chemical, and that known as Ehrlich's side-chain theory is uppermost in discussion. This theory is ex¬ tremely elaborate, but its fundamental principle is that the blood-serum of man and other ani¬ mals may be so modified, in whole or in part — experimentally played upon, as it were — that it can be made to overcome the effects of infec¬ tions, of poisons, or of both. The development of the diphtheria antitoxin in the blood-serum of the horse, to counteract the effects of the toxin of the diphtheria bacillus in man, was the first important practical deduction of this great principle. It was the first illustration of the production of a successful passive immunity in human pathology. In the discovery of the diphtheria antitoxin it was hoped that all the infectious

diseases were conquered, but this hope was premature, as it was learned that other diseases involved other factors of a more elusive character than the simple toxin. The destruction not only of the bacteria within the body, but the neutralization of the poison as well, was found necessary, and hence the terms bacteriolytic immunity and antitoxic immunity. Ehrlich's side-chain theory tries to explain anti¬ toxic immunity in chemical terms. He assumes that the cell-body has a number of side-chains upon it — receptors, as they are termed. These are capable of combining with food-products for the metabolism of the cell. There are cer¬ tain receptors that can combine with toxic products as well, with damage to the cell. Anti¬ toxins, according to Ehrlich, consist of surplus receptors made by the cell and cast off in the blood-serum. These unite with the toxin in the serum, and thus save the receptors of the cell for their normal food-taking properties. Any surplus of receptors over and above those com¬ bined with the toxin molecules floating in the blood are available as free antitoxins in the treatment of toxin-caused disease.

The other phase of the subject of immunity is concerned with the ability of bodies them¬ selves to destroy bacteria — bacteriolytic im¬ munity. . It is known that if the blood-serum of certain animals is injected into an animal of a different species, the red blood-cells of the injected animal are destroyed. This process has been termed haemolysis, and is observed under other conditions, as in poisoning by drugs, such as acetanilide, sulphonal, etc. A similar action of blood-serum on certain bac¬ teria can be brought about by artificial means, thus, manufacturing a bacteriolytic serum for use in destroying given bacteria in the human body. The various terms that are used in elaborating this hypothesis may best be ex¬ pressed in the form of a chart, since in medical literature so many synonyms have been in vogue. See table next page.

As Prudden writes, ((there seems to be abundant ground for the belief that the pro-

tective agencies which are evoked in both nat¬ ural and artificial immunization are simply those which the body makes use of in its normal metabolism, exaggerated and diverted to dif¬ ferent ends, it is true, in the face of emergen¬ cies, but giving evidence of the birth of no new physiological capacities." ((The new methods of research and .the far-reaching conceptions which they have stimulated and fostered seem likely to mark a new era in physiological chem¬ istry, and to link more closely than any other extension of knowledge in our time some of the most subtle and urgent problems of medi¬ cine to the wider outlooks of general biology" See Pathology.

Virgin) ; the Assumption of the Virgin*; the the (Virgin Surrounded by Saints,* and three Madonnas are all in the gallery of the Museum. The cathedral of Imola possesses a (Virgin and Saint PauP ;

IMOLA, Italy, city in the province of Bo¬ logna, on the Santerno, 20 miles southeast of Bologna. It contains an ancient cathedral, two other interesting churches, several fine palaces, a communal library, a citadel, prison, lunatic

Table Showing Various Forms of Adaptation Products With Their Relationships and Synonyms. (From Prudden).

The body-cells in adaptation to alien substances of proto¬ plasmic origin may elaborate

The " Antibodies "

A

Antitoxins

Antiferments

Cytolysins

(Cytotoxins)

Agglutinins

Precipitins

Haemolysins

Bacteriolysins

Special Cytotoxins

Cytotoxins

Agglutinins

Precipitins

B

May lead to the formation of anti-antibodies.

Formed of two substances

Anticyto toxins

Anti-agglutinins

Antiprecipitins

COMPLEMENT Alexin Addiment Cytase AMBOCEPTOR Immune body Intermediary body Substance Sensibilatrice Copula Desmon

Anti-complement Ant i-amboceptor .

Consult Welch, (Recent Studies on Immu- nity> (Medical News, 18 Oct. 1902) ; Prudden (Medical Record, 14 Feb, 1903); Ritchie (Journal of Hygiene, Vol. II, Nos. 2, 3, 4, 1902) ; and for general works, Fliigge, (1903) ; Kolle and Wasser- mann, (1917).

IMOLA, e'mo-la, Innocenzo da, Italian

painter, who took the name of his native town Imola, where he was bom about 1480 and died about 1550. At

the time in which he flourished family names were not so much used as at present and it was quite a common occurrence to name a person familiarly and constantly from the place, district or country of his origin. So Innocenzo di Pietro Francucci was called and answered to the name Imola. He was one of the trade artists and decorators of his day and worked in the shops of several noted painters who contracted for large orders for decorative paintings for churches and occasion¬ ally for other purposes, including shipments of paintings to the Spanish colonies in America, more especially to Mexico. He seems to have learned from the various great painters with whom he came into contact, imitating one after another. Thus, at various stages in his life his work carries reminiscences of his different masters. In his later work his coloring is strongly in the style of Raphael. Imola's figures are graceful and his designs good and generally satisfying but they lack the originality and inspiration of the greater artists of his day. Among his paintings are the frescoes in the church of San Michele of the Wood, Bologna, which were for a long time painted over with water-colors. These fine paintings, which cover the walls and roof of the ancient choir of the edifice, represent the (Burial of the

asylum and an agricultural school. Its indus¬ trial establishments include silk mills, soap and leather works, brickyards and gunpowder works. Wine and vegetables are important items of trade. Imola is the Roman Forum Cornelii, a station of the Via ^Emilia. For centuries it was little heard of until the period of the as¬ cendancy of the Lombards. In 1480 it came into the possession of the lords of Forli and in 1500 was added to the states of the Church. Pop. 86,000.

IMPACT, the action which results on the coming together of two bodies, one or both of them in motion. If an ivory ball fall on a mar¬ ble table which has a thin coating of oil, after impact the

ball is found to have on its surface a patch of oil, which shows by its size that the bad must have been compressed at the moment of impact. When two bodies come into colli¬ sion they compress each other at the points that touch until they have each the same velocity; during this time of compression each body acts upon the other with exactly the same impulse, the momentum lost by the one being gained by the other; if now the bodies are perfectly in¬ elastic no further mutual rebound will take place ; if the bodies are elastic they will regain their old shape, and the mutual impulsive forces of restitution will cause separation. The im¬ pulsive forces of restitution are found to be less than those of compression; that is (see Im¬ pulse), the momentum lost or gained by either of the bodies during the second or restitution part of the impact is less than the momentum lost or gained in -the first or compression part of the impact in a certain ratio which is called the elasticity of the bodies. In a perfectly elastic body this, ratio would be equal to 1, in a perfectly inelastic body it is 0.

Thus, when one ivorv ball comes into direct collision with another of equal size at rest, the

first comes to rest and the second moves in the direction of motion of the first before impact, but with a slightly diminished velocity. When two equal ivory balls come together with equal and opposite velocities each returns on its old path with a velocity slightly lessened. When one perfectly inelastic body overtakes or meets another directly the common velocity after im¬ pact is equal to the sum or difference of momenta of the bodies before impact divided by the sum of the masses.

In a collision of two balls not perfectly elas¬ tic it may be shown that the total energy of motion (see Energy) of the two balls after collision is less than it was before, some of it having been converted

into heat.

IMPALE, in heraldry, the arrangement of two coats of arms on one shield and side by side with a pale marking the division. See Heraldry.

IMPANATION. See Consubstantiation.

IMPEACHMENT. A trial, usually of a public officer, for a high crime or other offense. In England the House of Commons is . the prosecutor and the issue is tried and determined before the House of Lords. Impeachment in England dates back to a very early day, and has continued, with some interruptions in the 15th, 16th and 17th centuries, to the present. It has now lost much of its former importance. The charges against the defendant are in the form of articles, and he may employ counsel to represent him and call witnesses in his defense. The vote of each peer on the question of the guilt of the defendant is taken separately, and if he is found guilty, the Commons may or may not move for judgment as they see fit, frequently refusing to do so, which amounts virtually to a pardon. Political offenders may be impeached when danger exists of their escap¬ ing punishment by the usual methods. Impeach¬ ment lies against persons of all ranks and for misdemeanors and crimes of all degrees. The practice of impeaching ministers has been rendered obsolete by the doctrine of ministerial responsibility to Parliament. Likewise the im¬ peachment of judges is no longer necessary, the power of removal existing in the Crown.

In the United States by the constitutions of most of the States impeachment proceedings are instituted in the Senate, although in a few States the ordinary courts of law have juris¬ diction of such proceedings. There is consider¬ able conflict of judicial opinion on the question of impeachment, particularly on the offenses for which it lies, whether a State officer is subject to impeachment after he has ceased to hold office, etc. An offender who has been impeached may, in certain cases, later be tried and pun¬ ished by the courts for the same

offense. By constitutional provision in many jurisdictions none but State officers are subject to impeach¬ ment, and this necessarily excludes county and municipal officers. Among some of the offenses which by constitutional provisions are subject to impeachment are treason, bribery, misconduct and maladministration in office, habitual drunk¬ enness, neglect of duty, common law and statu¬ tory crimes and corrupt practices and oppres¬ sive conduct by judges and others. The rules of evidence in impeachment proceedings are the same as those which prevail in criminal trials. To justify a conviction, therefore, the guilt of

the accused must be established beyond a rea¬ sonable doubt. Under the constitutions of some of the States no person may be impeached by a concurrence of less than two-thirds of the senators elected.

There is a marked difference in some particulars in impeachment proceedings in the United States and England. _ For instance, in the United States the only penalty after im¬ peachment is removal from office, while in Eng¬ land any legal penalty, even capital punishment, may be inflicted. In many of the States, by constitutional provision, cases of impeachment are excepted from the pardoning power, whereas in England, as stated above, the Com¬ mons have virtually the pardoning power in all cases. In England a commoner mav be arrested when impeached or he may be compelled to give security for his appearance, and a peer may be arrested for a capital offense, while in the United States there is no power of arrest in any case.

IMPEDIMENTS TO MARRIAGE. See

Marriage.

IMPERIAL, Cal., city of Imperial County, on the Southern Pacific, 25 miles south of Old Beach. It contains a meat-packing plant, creamery, cement works, cotton compress, a soap works and a stock yard. The water supply system is owned by the

municipality, which also maintains a public library and a high school. The city is situated in the famous Im¬ perial Valley, where irrigation is extensively practised. Pop. 1,250.

IMPERIAL CITY, a designation of Rome, for ages the mistress of the world.

IMPERIAL FEDERATION, a term in English politics for the consolidation of the British Empire, so as to combine its resources for the maintenance and defense of common interests, while leaving intact the existing rights of colonial parliaments in local affairs. The idea was first advocated by Thomas Pownall, governor of Massachusetts in 1764. In the 19th century one of its most out¬ standing colonial advocates was Joseph Howe, the Canadian statesman. The foundation of the Imperial Federation League by W. E. Forster in 1884 may be said to have marked the be¬ ginning of organized movement in this direc¬ tion. The celebration of the 60th year of Victoria's reign in 1897 was the occasion of a gathering in London of the prime ministers of all the self-governing colonies, who were entertained as the guests of the country. This was the third occasion of a meeting of repre¬ sentatives of the colonies, the first having met in London in 1887 and the second in Ottawa in 1894. After taking part in the queen's pro¬ cession and the attendant festivities the premiers met the Secretary of State for the Colonies (Chamberlain) in conference. The subject of Imperial Federation was discussed at one of these meetings ; and though more than one of the premiers directly advocated the representa¬ tion of the colonies in a council sitting in Lon¬ don, the opinion of the greater number was expressed in the observation that the colonies were very well as they were at present. Fur¬ ther conferences were held in 1902, 1907 and 1911. The 1902 conference agreed to co-operate with the imperial authorities as regards defense; Australia and South Africa offered to contrib-

ute to the cost of the British navy; a resolution was passed declaring that free trade within the empire was not practicable ; but favored inter-imperial preference. This conference was pre¬ sided over by Chamberlain, the strongest ad¬ vocate of reciprocal preferences. But in 1907, with a Liberal government in power pledged to the maintenance of free trade, the reaffirming of the resolution passed in 1902 on imperial preference was strongly dissented from by the representatives of the home government. The creation of an imperial general staff was ap¬ proved, as was a British resolution in favor of fiscal freedom to each part of the empire. In 1911 imperial preference was not brought up, and a resolution in favor of giving the self- governing dominions liberty to withdraw from most-favored-nation treaties was passed, but owing to the strong opposition of foreign gov¬ ernments no steps have been taken in this re¬ gard. These conferences, it may be said, are held every four years, the Prime Minister of Great Britain, the Colonial Secretary, and the prime ministers of the self-governing dominions being designated as the ex-officio members. The delegates, however, have no power to bind their respective countries. Partly as a result of these conferences various modifications in the fiscal policies of the dominions and colonies have taken place. In 1897 Canada granted uncondi¬ tional preference on British goods, and this was subsequently increased. The West Indies, Cey¬ lon, the Straits Settlements and New South Wales were accorded the preferential terms of the Canadian tariff in 1898. The South African Customs Union established a British preference in 1903, to which Canada was admitted a year later; and in the same year New Zealand granted a British preference on a limited list of imports. One of the most valuable results of the Imperial Federation movement and of the various imperial conferences has been in a co-ordinated scheme of defense for the whole empire and in the sharing of the burden. The outbreak of the

Great European War saw a rallying of all the dominions to the help of the mother country, and that although they were free to assist or to refrain from lending assistance.

Consult Chamberlain, imperial Union and Tariff RefornP (speeches) ; the proceedings of the several imperial conferences; Seeley, (The Expansion of EnglandJ ; Jebb, (The British Question: A Survey of Alternatives > ; Kirk¬ patrick, imperial Defence and Trade) ; Pol¬ lard, (The British Empire ; Amery,*

IMPERIAL GUARD, the name given to the consular guard when Napoleon I became emperor of France in. 1804. At first it was about equal to a division. It fought with good effect at Austerlitz and Jena. Afterward it was greatly increased, being subdivided into «01d Guard,® "Middle Guard® and (III on 1 May 1854, and took part in the Crimean War in 1855. In 1870 it surrendered at Metz to the Germans and was soon after abolished. Consult Houssaye, H., and others, ed., (La Vielle Garde Imperiale (Tours n.d.).*

IMPERIAL INSTITUTE. The Imperial Institute of the United Kingdom, the Colonies and India, designed to commemorate the jubilee of Queen Victoria (1887), aims at comprising complete collections of the products of the various parts of the British Empire, a commer¬ cial intelligence department for the promotion of trade and industry and a great school of modern Oriental languages (opened in 1890). In 1902 its management was transferred to the Board of Trade.

IMPERIAL SERVICE ORDER, The,

an order instituted by Edward VII, in 1902, and designed to honor those who have served the Crown at home or abroad continuously for a term of years. The term is usually 25 years, but those who serve in torrid or unhealthful regions of the colonies may receive the order after 16 years of service. The order comprises a sovereign and 425 companions. Of the latter 250 must belong to the Home Service and the remainder to the Colonial Service.

IMPERIAL VALLEY, a large section of country in the middle of Imperial County, Cal. The county is 84 miles long from east to west and 54 miles from north to south and has an area of 4,536 square miles or about 2,600,000 acres. Its southern boundary is the inter¬ national line between Mexico and the United States; its eastern line is the Colorado River; on the north is Riverside County, while on the west the San Jacinto or Coast Range of moun¬ tains separates it from San Diego County. The territory is below sea-level and some 300 feet below the level of the Colorado River to the east. In the northeastern part of the county is the Salton Sink or Sea, which has a water surface area of 247 square miles. The Imperial Valley section of this county is about 400,000 acres in extent, nearly one-sixth of the entire county area. It extends from the boundary line on the south 40 miles northward and has a width of about 30 miles. The climate of the section is one of great heat and dryness. Sum¬ mer temperature is sometimes as high as 112° or 116°, but there is a very low humidity. The winter is mild, the temperature rarely falling below, the freezing point. Precipitation is small and variable. The average annual rainfall at Imperial City for a period of five years was 4.45 inches.

The territory was part of what for genera¬ tions had been known as the great Colorado Desert, an arid land with temperature rising as high as 125° to 140°, a barren waste where neither man nor beast could live. The silt which had been deposited by the river had made a good soil, although scientists were slow to recognize this. But when the subject of the irrigation of Western lands in the United States assumed prominence after about 1890, . it was realized that this desert valley was a rich field for reclamation. Plans for irrigation were con¬ sidered before 1900 and were tentatively entered upon at once. Within six years from the be¬ ginning of irrigation there were 125,000 acres of productive farm land in the valley, 40,000 acres of alfalfa and 85,000 acres of grain and other crops, 20,000 head of beef cattle, 4,000 milch cows and much other

stock. The annual production of commodities for shipment reached the value of $2,000,000. The range of products is wide. The land is too valuable for grazing

or grain crops but an extensive system of farming fruits and vegetables is the best paying. Cantaloupes, asparagus, alfalfa, grapes, oranges, onions, honey, hogs, poultry and dairy products are the main dependence of the farmers. Dates are also being cultivated. Cotton culture has been introduced and a great success has been attained in the growth of the valuable long staple cotton.

Imperial was the first town established, located near the centre of the valley. The county-seat is El Centro. Brawley, termed the <(Garden City,® is the distributing and shipping point for 80,000 acres of rich farming county. Holtville on the banks of the Alamo River, Calexico, on the southern border of the county, and Heber, situated half way between Calexico and El Centro : these three complete the sex¬ tette of the valley towns, all which, except Heber, were incorporated towns of the sixth class in 1909.

The water that irrigates Imperial Valley is taken from the Colorado River at a point four miles north of the international boundary line near Yuma, Ariz. The headings there provide for the admission of water sufficient for more than two and a quarter million acres of land. The canal carries the water to the former chan¬ nel of the Alamo River leading northward toward the Salton Sea and the first 60 miles, over a semi-circular course, are in Mexico. Just before leaving Mexican territory and entering Imperial Valley the canal divides into four main branches and these main canals are in turn divided and subdivided again and again until the net work of waterways covers the entire valley, there being in all over 1,000 canal miles.

In 1905 the floods of the Colorado River breaking through a canal cut which had been made on Mexican soil, just south of the bound¬ ary line, widened and deepened until the entire flow of the river was turned west down the steep slope of the hills into the valley and the Salton Sink, threatening the destruction of farms and other property.*

The situation was serious and President Roosevelt took cognizance of it by action and by a subsequent message to Congress that raised what up to that time had been a matter of merely local interest and importance into a question of national concern. To aid in the efforts to close the break, the Southern Pacific Railroad, whose tracks were imperiled and whose traffic was seriously impeded, took charge of the situation. The break was closed in November 1906. A month later there was an¬ other runaway of the river and the water broke through the newly constructed levees, again forcing itself into the basin of the Salton Sink.

In this emergency President Roosevelt with¬ out waiting for congressional action arranged with the Southern Pacific Railroad to go on with the work of repairing the break and re¬ storing the river to its proper channel in order to save the valley and the Laguna Dam which was then in process of construction by the government. This work was successfully done and in 1911 Congress reimbursed the railroad company for the expenses which it had in¬ curred. This relief accomplished, measures were at once instituted for the permanent pro¬ tection of the valley from the annual floods of the Colorado River and for the meeting of its irrigation needs.

IMPERIALISM, the national policy which tends toward the expansion of national domina¬ tion and national ideas over a geographical area wider than that of national boundaries. As a policy, it is as old as civilization itself ; an em¬ pire was established by the Hvskos which ex¬ tended from Euphrates to the Nile, and a great Egyptian- empire was established by Thothmes III. Thus ancient Rome extended her dominion and system of government, her laws and lan¬

guage first over the whole of Italy, then over Sicily, northern Africa, Spain, Gaul, Britain, Greece and parts of Asia. Charlemagne's idea was to hold France, Germany and Spain under one imperial head. Napoleon wished his em¬ pire to comprise all Europe. English national¬ ism has been partly a wide scheme of coloniza¬ tion, and partly, as in India, a plan for bringing under British rule, a cluster of Oriental races, while leaving them free in regard to local laws, customs and beliefs. Nothing has been more remarkable within the last 40 years than the overseas expansions of territory on the part of the greater powers. Great Britain, France, Germany, Russia, Italy, Belgium, Japan and the United States have all engaged in the quest for territory. Germany's rise as a colonial power dates from 1880, with the founding of the Ger¬ man Commercial and Plantation Association of the South Seas and the first territorial acquisi¬ tion in Samoa. The impulse to expansion was given by the great wave of protection that fol¬ lowed after the Tranco-Prussian War, and by the desire to arrest the tide of German immi¬ gration to the United States by affording room for adventurous youth under its own flag. Land hunger, the control of markets for raw material and the exploitation of native races, the seeking oj outlets for surplus population, and the neces¬ sity for defensible and scientific frontiers, are among the motives which impel the powers to seek expansion. In the case of the United States, the succession to the colonial estate from which Spain was dispossessed as a result of the Spanish-American War, the shrinkage in the size of the world from what it was in the days of the Founders of the Republic, and the legiti¬ mate fear that the islancf outposts of the Americas, or even part of the South American continent, mierht be seized on by such an aggres¬ sive and overmastering power as the German Empire, has caused the departure from its former position of splendid isolation to be ac¬ quiesced in by the people of the United States. <(Bearing the white man's burden,® to quote Kipling; ((pegging out claims for posterity,® in the words of Lord Rosebery; and the arrogant image of the Emperor

Wilhelm II, (

– – 4"

•

Wv –

IMPEYAN PHEASANT (Lophopborus impeyanus)

>

jealousies excited by the scramble for markets and the passion to acquire colonial possessions have been a fruitful source of international suspicions and perturbations, and contributed not a little to the jealous and acquisitive temper that found its culmination in the disastrous struggle that broke on the world in August 1914. In the United States the term imperialism has been used in a more or less factitious sense. The avowed object of the government at Washington in the Spanish War was the liberation of Cuba from the Spanish yoke. The term "imperialism* was . employed as a political catch-word in the Presidential campaign of 1900, especially with regard to the purchase ot the Philippines. The other extra-territorial possessions of the United States are Alaska, Porto Rico, Hawaii, Guam, Samoan Islands and Virgin Islands of the United States (formerly Danish West Indies). The Supreme Court on 2 Dec. 1901 decided on the constitutionality of expansion. The principles settled by the de¬ cision are thus to be stated: (1) The Constitu¬ tion does not follow the flag till it is planted on new territory by special act of Congress. (2) The extension of the sovereignty of the United States to new territory guarantees the enjoyment of liberty, the right to property and the protection of the United States to the peo¬ ple thus affected in securing justice and public order and promoting peaceful progress. (3) The islands acquired from Spain by the Treaty of Paris are

"property of the United States* and Congress can dispose of these islands in any way conducive to the interests of the peo¬ ple of the United States and of these islands.

A corollary of these propositions finds ex¬ pression in the statement that the territory of the United States may be described under three heads: (1) The States. (2) Incorporated Ter¬ ritories. (3) Unincorporated territory, belong¬ ing to the. United States.

This gives to the nation three different classes of people dependent upon it: (1) Citi¬ zens vested with full political power, or the residents of the States. (2) Citizens of the incorporated Territories, who are not vested with full political power as long as they are residents of the incorporated Territories. (3) The people of the "territory belonging to the United States,* as such, who cannot become citizens of the United States till Congress ex¬ tends to such territory they occupy the privi¬ leges of the Constitution.

IMPETIGO, im-pe-ti'g5, popularly known as Pustular Tetter, Honey Scab and Honey Sickness, a skin disease found mostly in chil- fdren, consisting in an eruption of itching pus¬ tules, appearing in clusters, and terminating in a yellow, thin, scaly crust. They appear chiefly on the head and face, and sometimes on the hand. Feverishness and sensations of chilliness accompany the disease. The treatment is both external and internal, the former consisting in the application of ointments, as graphite. An incomplete diet is believed to be a prominent cause.

IMPEYAN (mTpi-an) PHEASANT, a

pheasant of the genus Lophophorus generally; specifically the species (L. impeycinus) of southern Kashmir, first brought to notice by Lord and Lady Impey. These are among the most splendidly clothed of birds, rivaling the humming birds in the brilliance of their metallic

hues. There are four or five species, each re¬ stricted to a particular region in southeastern Asia. The .Himalayan species or Monal (L . refulgens) is the best known and is often ex¬ hibited in zoological gardens. The male is per¬ haps the most gorgeous of the Phasianidce, pre¬ senting a wonderful combination of sparkling metallic purples, blues, browns and greens, with golden and coppery reflections and contrasting patches of snowy white and deep black; on the head is a crest composed of long racquet¬ shaped feathers. The female is plainly colored. High up in the mountains near the snow line the monal lives during the summer, breeding up to an elevation of 12,000 feet, but in the autumn, as the weather becomes cold, it gathers into flocks and descends to the deep woods or, in very severe weather, even to the cultivated lowlands. It both runs and flies swiftly, but is chiefly terrestrial, and feeds largely on roots and grubs dug from the ground. The impeyan pheasant has the black and white areas replaced by golden green.

IMPLEMENTS, Agricultural. See Farm

Machinery.

IMPORTANCE OF BEING EARNEST, The. If one were to select a single one of Oscar Wilde's plays which should best ex¬ emplify his contribution to English drama, one might well choose (The Importance of Be¬ ing Earnest,* although it is neither the most important nor the best known of them. This apparent contradiction is explained by the fact that, being a farce (his only one), the artificial conventionality of plot and the unreality of the characters which so obviously mar his come¬ dies, are not conspicuous faults in this gay trifle. Consequently one can give oneself up unreservedly to the enjoyment of the play of brilliant wit and delicate satire of which Wilde was a master. Here is "literary farce,* par excellence. The dialogue is a continuous suc¬ cession of sparkling epigrams, witty para¬ doxes, quick repartee and delightful, unex¬ pected turns of phrase. Even the title is a clever pun.

In plot and technical structure also, Wilde shows himself less conventional and more in¬ genious in this play, slight as it is, than in most of his others. In a very amusing scene between two young gentlemen in the first act it transpires that Jack, who lives in the country and is constrained to lead a very decorous life there on account of a young ward who lives in his household, has invented a scapegrace brother, named Ernest, whose supposed es¬ capades furnish the excuse for Jack's fre¬ quent visits to town. Algernon, on the other hand, has invented an elderly invalid friend in the country to whom he is touchingly devoted whenever he wishes to escape a tiresome en¬ gagement in town. These imaginary characters are utilized to build up a series of delightfully absurd situations in the second act for which the audience has been skilfully prepared but which are nevertheless unexpected.

/The Importance of Being Earnest * was written in 1895, shortly before its author's sensational trial and imprisonment, and was the last play that he wrote. It was first pro¬ duced at the Saint James Theatre in London in February 1895, and later in the same year at the Empire Theatre in New York.

Grace R. Robinson.

IMPORTS AND EXPORTS, taken to¬ gether, represent the foreign trade of a coun¬ try; and', as such, they are indicative of its commercial status among nations. Imports are classified as those for consumption by the pop¬ ulation, and those for re-export. In the classi¬ fication of exports, therefore, the re-exports appear again, along with the domestic produc¬ tion of the country. Generally speaking, a large volume and variety of imports for con¬ sumption are the mark of a prosperous people of many wants, and of means to buy to their sat¬ isfaction ; and large imports usually are accom¬ panied by large exports, the latter going to pay for

the former, as near as may be, the balance of the account being settled in gold.

The relative activities of populations may therefore be gauged in large measure by their

imports and exports. Thus, in Table A, the best showing is made by New Zealand's people, with a per capita export of $141, and a per capita import of $110. They not only paid with their exports for what they imported, but the balance of trade was in their favor by $31 per capita. Next in rank comes Switzerland, with a per capita of $122 export, and $118 import. Belgium and the Netherlands each show a total foreign trade of $221 per capita, although the balance of trade is against them. At the other end of the scales are Liberia, with a total for¬ eign trade of less than $1 ; China, with less than $3; and British India, with but little over $3.

The dates given in the table are the latest complete figures issued authoritatively by the individual countries named.

Table A

COUNTRY

Argentina 1916 .

Australia, 1916 .

Austria-Hungary, 1913 .

Belgium, 1913 .

Belgian Kongo, 1912 .

Bolivia, 1915 .

Brazil, 1916 .

Bulgaria, 1911 .

Canada, 1917 .

Central American States:

Costa Rica, 1915 .

Guatemala, 1915 .

Honduras, 1915 .

Nicaragua, 1916 .

Panama, 1916 .

Salvador, 1916 .

Chile, 1915 .

China, 1916 .

Columbia, 1915 .

Cuba, 1916 .

Denmark, 1914 .

Dominican Republic, 1916. . .

Ecuador, 1915 .

Egypt, 1916 .

The Sudan, 1916 .

France, 1916 .

Algeria, 1915 .

Tunis, 1916 .

French Indo-China, 1913

Other colonies, 1913 .

Germany, 1913 .

German colonies, 1912. . .

Greece, 1914 .

Haiti, 1913 .

India, British, 1916 .

Italy, 1916 .

Eritrea, 1915 .

Libia, 1913 .

Japan, 1916 .

Formosa, 1916 .

Chosen, 1915 . .

Liberia, 1913 .

Mexico, 1913 .

Montenegro, 1911 .

Morocco, 1914 .

Netherlands, 1915 . .

Dutch East Indies, 1915.

New Zealand, 1916 .

Norway, 1915 . .

Paraguay, 1915 .

Persia, 1915 .

Peru, 1916 .

Portugal, 1914 .

Rumania, 1913 .

Russia, 1915 .

Finland, 1914 .

Serbia, 1912 .

Siam, 1916 .

Spain, 1915 .

Sweden, 1914 .

Switzerland, 1916 .

Turkey, 1912 .

Union of South Africa, 1916. .

United Kingdom, 1917 .

British Colonies, 1914. . .

United States, 1917 .

Philippine Islands, 1917.,

Porto Pico, 1917 .

Uruguay, 1915 .

Venezuela, 1916… .

Population

8,066,000

4,875,000

52,368,000

7,658,000

15,000,000

2,890,000

26,542,000

4,753,000

8,075,000

431,000 2,119,000 562,000 704,000 400,000 1,268,000
3,641,000 336,042,000 5,071,000 2,628,000 2,921,000
725,000 2,000,000 12,566,000 3,381 ,000 39,700,000
5,564,000 1,939,000 16,990,000 25,242,000 68,059,000

13,068,000 4,950,000 2,500,000 315,156,000
36,546,000 450,000 1,000,000 ' 55,965,000 3,711,000
16,913,000 1,500,000 15,502,000 516,000 5,000,000
6,583,000 47,956,000 1,101,000 2,509,000 1,000,000
9,500,000 5,800,000 5,958,000 7,508,000 178,905,000
3,269,000 4,622,000 8,266,000 20,500,000 5,713,000
3,880,000 21,274,000 6,465,000 46,089,000 46,521
,000 105,015,000 8,918,000 1,231,000 1,346,000
2,816,000

Imports

$209,800,000 3 73,400,000 691,538,000 974,623,000
10,467,000 8,789, 000 195,998,000 38,474,000
845,331,000

4,479,000 5,072,000 5,874, 000 4,778,000 9,197,000
5,668, 000 55,992,000 427,755,000 17,364,000
215,962,000 213,137,000 11,664,000 7,008, 000
149,892,000 13,156,000 2,925,767,000 72,011 ,000
25,911,000 45,318,000 72,395,000 2,563,354,000
33,958,000 34,475,000 10,935,000 426,112,000
1,053,448,000 4,559,000 5,107,000 377,079,000
53,698,000 29,481 ,000 1,411 ,000 93,020,000
1,658,000 44,668,000 848,552,000 232,615,000 121
,883,000 232,615,000 4,489,000 41,268,000 42,257,000
74,877,000 113,872,000 586,360,000 73,372,000
20,476,000 32,582,000 241 ,418,000 194,811 ,000
459,051 ,000 193,024,000 188,622,000 4,141,101 ,000
51,983,000 2,659,355,000 51 ,983,000 53,545,000
36,276,000 20,634.000

Exports

$524,329,000 299 , 999 , 000 562,247,000 717,152,000
11,566,000 37,067,000 267,081,000 34 , 634 , 000
1,151,375,000

9,972,000 11,567,000 3,142,000 5,285,000 5,707, 000
9,970, 000 119,530,000 399,087,000 27,879,000
320,719,000 209,101,000 21,528,000 12,922,000
185,177,000 11,312,000 987,328,000 91,235,000
22,927,000 55,094,000 63,810,000 2,403,311 ,000
28,769,000 23,547,000 17,273,000 624,645,000
442,489,000 2,703,000 4,686,000 556,697,000

31,649,000 24,647,000 1,112,000 129,971 ,000 486,000
7,311,000 703,193,000 304,798,000 155,908,000
177,147,000 4,692,000 33,469,000 80,497,000
29,318,000 129,446,000 206,945,000 54,464,000
16,255,000 45,058,000 251,656,000 206,991 ,000
472,409,000 105,009,000 104,237,000 2,463,810,000
71,715,000 6,227,164,000 71,715,000 80,971,000
75,797,000 22,707,000

Table B gives the imports and exports of the United States for the fiscal years ending on 30 June of the several years quoted. With the values of imports are included the value of goods intended for re-export, which appear in another column. The last column shows the balance of trade from year to year, in all cases m favor of this country. The effect of the war upon the foreign trade of this country is plainly exhibited.

given to them which was called the Salon des Refuses (Salon of Rejected Works). One of the most striking pictures there was a land¬ scape at sunset by Claude Monet (1840) enti¬ tled an 'Impression.* The name was adopted for the new style ; and painters who worked more or less in the same manner were called Impressionists. This group of men led bv Manet, Monet, Edgar Degas (1834-1918), Paul Cezanne (1839-1906), Camille Pissaro (1831-

year

1880 .

1890 .

1900 .

1905 .

1906 .

1907 .

1908 .

1909 .

1910 .

1911 .

1912 .

1913 .

1914 . . .

1915 .

1916 .

1917 .

1918 .

Table B

Imports

$667,954,746

789,310,409

849,941,184

1,117,513,071

1,226,562,446

1,434,421,425

1,194,341,792

1.311,920,224

1,556,947,430

1,527,226,105

1,653,264,934

1,813,008,234

1,893,925,657

1,674,169,740

2,197,883,510

2,659,355,185

2,946,059,403

Re-exports

$11,092,305

12,534,856

23.719.511 26,817,025 25,911,118 27,133,044
25,986,989

24.655.511 34,900,722 35,771,174 34,002,581 3
7,377,791 34,895,123 52,410,875 61,305,306
62,884,344 81,125,963

Domestic exports

$823,946,253

845,293,828

1,370,763,571

1,491,744,641

1,717,953,382

1,853,718,034

1.834.786.357 1,638,355,593 1,710,083,998
2,013,549,025 2,170,319,828

2.428.506.358 2,329,684,025 2,716,178,465
4,272,177,579 6,227,164,050 5,847,159,678

Balance of trade

$167,683,912

68,518,275

544,541,898

401,048,575

517,302,084

446,429,653

666,431,554

351,090,880

188,037,290

522,094,094

551,057,475

652,875,915

470,653,491

1,094,419,600

2,135,599,375

3,630,693,209

2.982,226,238

IMPOST, in architecture, the plane or place at which a horizontal stone, beam, arch, etc., rests on the column, pier or wall. It is often marked by horizontal moldings. Imposts have received various names, according to their character. Thus, a continuous impost is one in which the moldings are carried perpendicu¬ larly down the pier, as in the later decorated Gothic; a discontinuous impost, one where the moldings abut and are stopped on the pier; shafted imposts are those in which the arch moldings spring from a capital and differ from those of the pier.

IMPOSTS. The word may properly be used to designate any tax or levy, but specifi¬ cally it signifies the

duties levied on the foreign trade of a country, both imports and exports. The United States Constitution forbids the sev¬ eral States to lay imposts except such as may be necessary to secure adequate execution of inspection laws ; and all moneys thus collected shall be turned over to the United States Treasury.

IMPOTENCY, a diseased condition of the male in which he is incapable of generation ; any incapacity to perform the generative func¬ tion, successfully. As such condition defeats the presumed object of marriage it is regarded as a bar, and cause for annulment, sometimes divorce, except when the natural result of old age. In the old common law failure to con¬ summate the marriage relation within three years is presumptive evidence, and constitutes a sufficient ground for divorce, or annulment of marriage. As a cause for annulment or divorce it is in the United States a matter of State legislation.

IMPRESSIONISM is the name given to a school of painting that began to manifest itself in Paris in 1863, when the works of Edouard Manet (1832-83) and his friends were rejected by the Salon jury of that year. The emperor, Napoleon III, liberally minded, demanded that these innovators should at least have the right to exhibit together and a special room was

1903), Alfred Sisley (1840-99); and Auguste Renoir (1841), received nothing but abuse and ridicule for 30 years. Their pictures, which now command enormous prices, were condemned for years by the Parisian critics and painters who led the taste of the period. A few far-sighted patrons, however, encouraged these great artists who worked industriously and patiently, producing an enormous number of works and obeying the creative instinct without any other dogma than the passionate observation of nature. The Caillebotte collec¬ tion, bequeathed by Gustave Caillebotte to the Luxembourg Gallery in Paris, and a special ex¬ hibition of their works at the Paris Exposition of 1900 compelled recognition. The public — in fact, the whole world — awoke (as it did to the sculpture of

Rodin) to the truth and beauty of the Impressionist masters. To-day their place in art is unquestioned and secure.

Impressionist ideas may be summ'ed up as follows: In nature no color exists by itself. The coloring of objects is a pure illusion. The only creative source of color is the sunlight which envelops all things. Our vision has formed the habit of discerning in the universe two things: form and color. Only artificially are outline and color distinguished one from the other. Light reveals the forms ; and, play¬ ing upon different states of matter, i.e., the sub¬ stance of leaves, the grain of stones, etc., the fluidity of the air, gives them dissimilar color¬ ing. When the light disappears, forms and colors vanish. Everything has a color; and it is by the perception of the different color surfaces striking the eye, that forms, i.e., the outline of these colors, are perceived. The idea of dis¬ tance, the idea of perspective and the idea of volume are given by darker, or lighter, colors. This is called in painting the sense of values; and values are the only means by which depth on a flat surface can be expressed. Color, being the irradiation of light, it follows that all color is composed of the same elements as sunlight, namely, the seven tones of the spec¬ trum. These seven tones appear different,

owing to the unequal speed of the waves of light. The colors vary with the intensity of light. There is no color peculiar to any object, but only more or less rapid variation of light. The speed depends, as is demonstrated by op¬ tics, on the degree of the inclination of the rays, which, according to their vertical or oblique direction, give different light and color. The colors of the spectrum are thus recom¬ posed on every object. According to the time of day, i.e., according to the greater or smaller inclination of the rays (scientifically called the angle of incidence), the green of a leaf and the

brown of a tree-trunk are modified. If a painter wishes to recall color to the beholder of a picture, the composition of the atmosphere which separates objects from the eye must be studied. Therefore, the atmosphere is the real subject of the picture, and whatever is repre¬ sented only exists through its medium. An¬ other principle is that shadow is not absence of light to be represented with ready-made tones of bitumen and black, but is light of a different quality and value. In a shadow the rays of the spectrum vibrate with different speed. The third conclusion resulting from this is that colors in the shadows are modified by refrac¬ tion. For instance in a picture representing an interior the source of light (a window) may not be indicated. The light in the picture will be composed of the reflection of rays whose source is invisible and all the objects in the room catching reflections will consequently in¬ fluence each other. Their colors will affect each other even if the surfaces be dull. A red vase placed on a blue carpet will lead to a very subtle but mathematically exact interchange be¬ tween this blue and this red; and this exchange of luminous waves will create between the two colors a tone of reflections composed of both. These composite reflections will form a scale of tones complementary of the two principal colors. The science of optics can work out these complementary colors with mathematical exactness. If for example, a head receives the orange rays of daylight from one side and the bluish light of an interior from the other green reflections will necessarily appear on the nose and in the middle of the face. Here we touch upon the very foundations of Impressionism. The painter must paint with only the seven colors of the spectrum and discard all the others : that is what Claude Monet has done boldly, adding to them only white and black. Instead of composing mixtures on his palette the painter places on his canvas nothing but the seven colors juxtaposed, leaving the indi¬ vidual rays of each of these colors to blend at a certain distance, so as to act like sunlight itself upon the eye of the beholder. Such, then, is the dissociation of tones, which is the main point of

Impressionist technique. It has the immense advantage of suppressing all mix¬ tures, of leaving to each color its proper strength and consequently its freshness and brilliancy. The difficulties are extreme. The painter's eye must be subtle. Light becomes the sole subject of the picture: the interest of the object on which it plays is secondary. Painting becomes a purely optic art, a search for harmo¬ nies, a sort of natural poem, quite distinct from expression,. style and design, which were the principal aims of former painting. It is only

natural that it is principally in landscape paint¬ ing that the Impressionists have achieved the greatness that, is theirs.

Impressionism is more than a school : It is a movement, a reactionary movement, against classic and romantic subject. It is anti-intel¬ lectual., protesting against every literary, psy¬ chological, or symbolical subject, and warring against historical painting, mythological paint¬ ing and false idealism, substituting for such subjects what might be summed up in the word character. To search for and to express the true character of a site, a human being, or an object, seems to the Impressionists more sig¬ nificant than to search for exclusive beauty. Before the days of Manet a distinction was made between noble subjects and genre (scenes of familiar life) subjects: the Impressionists consider all subjects worthy of the painter's brush, if nobly treated.

The Impressionists, coming immediately after the Barbizon School (Millet, Corot, Rousseau, Diaz, etc.), have had as much, if not more, in¬ fluence than those painters who worked in the Forest of Fontainebleau. Among the principal exponents' of Impressionism in other countries are the Americans, Childe Hassam, John S. Sargent, Henry Golden Dearth, J. W. Alex¬ ander and Mary Cassatt ; the Spaniards, Sorollo y Bastida, Zuloaga, Dario de Regoyos and Rusinol ; the Italians, Boldini, Segantini and Michetti ; the Danish, Kroyer ; the Belgians, Theo

van Rysselberghe, Claus, Verheyden, Heymans, Verstraete and Baertson ; the Nor¬ wegian, Thaulow; the Dutch, Jongkind; and in England the (

Esther Singleton.

IMPRESSMENT, the act of seizing (goods, etc.) for the public service, or of forcibly conscripting individuals for work in connection with war. When men are taken for the army or navy this is usually termed con¬ scription in the draft (q.v.). As an act of military necessity many persons are more or less forced into activities in a war in which they are not directly engaged, and their convey¬ ance, vessels, etc., may be commandeered in a very high-handed manner. Impressment was especially common in the English navy in the 16th and 17th centuries and well into the 18th. The merchant marine imitated the method in picking tip sailors in ports. The right of chang¬ ing ones natural allegiance (see Citizen; Em¬ bargo) was not acknowledged as a legal right in the 18th and early 19th century by any nation but the United States, which lacked power to enforce, it against the world. Great Britain denied it, and Chancellor Kent early in the 19th century admitted that the denial was common law. During the Napoleonic wars, that country in its struggle for life, especially on the seas, demanded the help of all its citizens; and not only refused to recognize any ceremonies of naturalization, but seized its alleged subjects wherever it found them, searching neutral ves¬ sels on the high seas and impressing into its service whoever were claimed as such. The naval officers were the reverse of particular

whether they made mistakes and kidnapped born Americans, and many hundreds of the latter were impressed in this way. Not only this, but the right of search in itself, were rasping grievances which worked up the national temper to the pitch of explosion, resulting in the War of 1812; the right

of search resulted in the bloody outrage of the Leopard on the Chespeake (q.v.), which was one of the chief agencies in bringing about the Embargo.

IMPRISONMENT is one of the three classes of punishment for crime, death and penal servitude being the other two. It has always been a power inherent in courts of justice to imprison for contempt of their au¬ thority, and under certain conditions for non¬ payment of debt. In criminal proceedings a person may, by a warrant of a justice of peace or magistrate, be imprisoned before trial, pro¬ vided the justice considers it is not a proper case for allowing bail ; and though in minor offenses an accused person may insist on being discharged on tendering sufficient bail, yet in more serious crimes it is in the discretion of the justice to accept or refuse the bail tendered, and on his refusal application may be made to judges of the common-law courts to accept bail. Imprisonment may be with or without hard labor, or it may be solitary. Penal serv¬ itude may be inflicted for life, or any shorter term, but in the case both of imprisonment and penal servitude the convict can at any time apply for commutation or remission. In the case of misdemeanors and other petty offenses tried summarily at common law and under a variety of statutes, imprisonment is usually awarded with the option of a fine. In the case of juve¬ niles they are often said to be ((detained® in a reformatory. Serious crimes as burglary, murderous assault, rape, counterfeiting, etc., receive long terms of imprisonment varying according to the laws of the States. The dura¬ tion of term of imprisonment is usually partially in the discretion of the judge who sentences, and various laws specifying "imprisonment for not less than (so many) years and not more than (so many).® Provision is made for re¬ duction of term in prison by reason of good behavior, and prison terms may be reduced by commutation of sentences or by subsequent pardon. In New York State one-year term means but 8 months and 20 days, if behavior is uniformly good, while a 10-year term can thus be reduced to 6 years, 1 month and 20 days and

a 60-year term to 22 years, 8 months and 10 days. The unlawful detention of the person by any one, or "false imprisonment,® constitutes a personal injury, and may be treated as a criminal or as a civil offense. See Debt; Penology.

IMPRISONMENT FOR DEBT is the re¬ straint of the liberty of a debtor in a civil action. An arrest for debt is usually made by some mandate of a court having jurisdiction, after the nature and amount of the debt has been established by due process of law. But sometimes a debtor is restrained of his liberty on a preliminary proceeding, by order of a court, for the purpose of holding him to bail. In the United States, imprisonment for debt is made only by virtue of statutory regulations, several States having constitutional provisions prohibiting it under certain circumstances, and

seven of them having absolutely prohibited re¬ straint in any form of personal liberty on account of debt, by such provisions; namely, Alabama, Georgia, Maryland, Mississippi, Mis¬ souri, Tennessee and Texas. Several of the States provide in their constitutions that there shall be no imprisonment for debt except in cases of fraud on the part of the debtor. In some of the States acts have been passed pro¬ viding for imprisonment founded on contracts deliberately entered into, while others have pro¬ vided that only absconding debtors shall be subject to imprisonment. The tendency of modern legislation is adverse to imprisonment for debt. Many of the States have provided in case of imprisonment that the restraint shall be made as free from indignity as is consistent with the safe-keeping of the debtor, and that his restraint shall be considered more in the nature of misfortune than as punishment for an offense.

IMPROVED ORDER OF RED MEN,

an American civic society, with benevolent and social characteristics, organized 14 Oct. 1833. Founded upon the manners, traditions and cus¬ toms

of the aborigines of the Western World, the Order adopted their unique figures of speech, which it transmits with historical accuracy. Knowing that some time the Indian race will become extinct it intends to occupy an original place in public interest as the repository of In¬ dian customs, Indian traditions and Indian nomenclature. The Order's motto is "Free- dom, Friendship and Charity.® Its interpreta¬ tion, as promulgated by official authority, may be concisely stated in these words: Freedom, in honor of that race to whom the forests, the plains, the hills and the valleys of this land were as free as the air to the eagle, and in memory of the early struggles to wrest these United States from dependency to foreign rule. Friendship, to commemorate the unswerving loyalty with which an Indian maintained a noble and unselfish affection for him to whom it was plighted, and which makes sweet and last¬ ing the relations that one member bears to an¬ other. Charity, the love expressed to a brother by those who meet around the brightly burn¬ ing council fire ; the sympathy which is pleased at his success, and the fraternal affection that grieves over his sorrows and disappointment.

Government.— The Order is organized along the familiar lines of civic societies. Its supreme power is the Great Council of the United States, and from this bodv emanates all authority for the establishment of local branches in towns and cities ; also Great Councils in States and Territories and in the Dominion of Canada. State and Provincial Great Councils, under restricted delegated authority, exercise governmental oversight, — within their respec¬ tive jurisdiction, — similar to that of the Great Council of the United States. Local branches of the Order are Tribes, Degree Councils and Councils of the Degree of Pocahontas. The Great Council of the United States has for its ' chiefs, or officers, the presiding and executive official, who is called the Great Incohonee; the Great Senior Sagamore, second in authority; Great Junior Sagamore, third officer; Great Prophet, who is often

a Past Great Incohonee; the Great Chief of Records, or Grand Secre¬ tary; the Great Keeper of Wampum, or Grand Treasurer; Great Tocakon, the messenger of

the presiding officer, or Grand Marshal; the Great Minewa, an officer in charge of the inner wicket; and the Great Guard of the Forest, guardian of the outer door. State Great Coun¬ cils have chiefs whose duties correspond to the officers of the supreme body, as follows: Great Sachem, presiding chief; Great Senior Saga¬ more, Great Junior Sagamore, Great Proohet, Great Chief of Records, Great Keeper of Wam¬ pum, Great Sannap, Great Mishinewa, Great Guard of Wigwam, Great Guard of Forest. The chiefs of a tribe are : The Sachem, who presides; Senior Sagamore, Junior Sagamore, Prophet, Chief of Records, Keeper of Wam¬ pum, Collector of Wampum, First and Second Sannap, four Warriors, four Braves, the Guard of the Wigwam and Guard of the Forest. In Degree Councils the chiefs governing them are similar to those of a tribe. The Councils of Pocahontas admit white women to membership, and those of the order who have attained to the Chief's Degree. The chiefs of the council, — whose duties are defined in an ornate ritual, — are: Pocahontas, presiding officer; Wenonah, Powhatan, Keeper of Records, Collector of Wampum, Keeper of Wampum, First and Sec¬ ond Scout, First and Second Runner, two Counsellors, four Warriors, Guard of Wigwam, and Guard of the Forest. Provision has also been made for the establishment of State Great Councils of the Degree of Pocahontas, similar in authority to those of the Tribal Branch, the officers of which run parallel with local coun¬ cils. The names of the chiefs have the prefix of ((great,® and these Great Councils are given jurisdiction over this degree, all under the sov¬ ereignty of the Great Council of the United States. After various attempts to organize a branch for the ((display element,® legislation created, in 1899, the Red Men's League, with a uniform resembling the ^Continental,® and a

perfect military code. Into this organization were merged prior uniformed bodies and bene¬ ficial councils. The adoption of consistent laws at once secured a continued increase in this branch of the Improved Order of Red Men.

Ritual. — The ceremonies of the Order are purely American. The ritual stands, and must ever stand, unique and distinct, growing more valuable as the only realistic demonstration of those mystic ceremonies of the aborigines, which otherwise might fade into oblivion. Founded, as has been stated, on the manners, traditions and customs of the American In¬ dian, it portrays an existence more fascinating the longer it is studied, and gives the keynote to those bursts of eloquence which were at once the wonder and the admiration of the early mis¬ sionaries, and of which the renowned (

Nomenclature. — The attention arrested by the recital of this Order's official life is greatly enhanced when its terminology is considered, the expressions used not only differentiate the Improved Order of Red Men from other civic societies, but these form links connecting it with prior organizations of Red Men. This is

further outlined in the ^history® following. Time is not computed as in the common era, but according to a phraseology that has a hidden meaning and significance to the <(initiated.® Up to 1865, the Jewish style, namely, the year of the world, was used in dating documents. This was superseded by a revised system and <(G. S. D.,® or Great Sun of Discovery, was adopted, the year 1492 being considered G. S. D. 1. For convenience the year begins with that of the common era, and the enumeration follows : A year, Great Sun; a month, Moon; January, Cold Moon; February, Snow Moon; March, Worm Moon; April, Plant Moon; May, Flower Moon; June, Hot Moon; July, Buck Moon; August, Sturgeon Moon; September, Corn Moon; Octo¬ ber, Traveling Moon; November, Beaver Moon; December, Hunting Moon; a week, seven suns; a day is a sun, and a night is a sleep. Morning is called the rising

of the sun; evening, setting of the sun; noon, high sun ; midnight, low sun; an hour is a run, and a minute a breath. Ex¬ amples : 30 July 1903 a.d. would be expressed as <(30th Sun, Buck Moon, G. S. D. 412,® 1903- 1491=412. «Tribes . . . shall, within two seven suns after the last council sleep in Hot and Hunting moons, transmit,® etc. Wam¬ pum Belt signifies treasury, and wampum or money is computed as follows: Fathom, one dollar; foot, a dime and an inch is one cent. To illustrate : <(In case the wampum shall at any time be reduced to a less amount than five feet for each member, or to less than 50 fathoms, the tribe,® etc. Non-members are called pale faces; tribal jurisdictions are hunt¬ ing grounds; Great Councils govern reserva¬ tions; opening and closing meetings consist of kindling and quenching council fires; minutes are called records; addresses or reports, talks or long talks; attending to business is following the hunt, and wronging another, crossing the path. Wigwam and tepee signify the halls of meeting, and council chambers, a room therein. Voting is called twigging.

History. — An attempt has been made to establish a succession from the patriotic so¬ cieties of the American Revolution to the Im¬ proved Order of Red Men, but without much historical . basis. That such organizations, founded in 1763, existed, there is no doubt. Moreover, the War of 1812, with England, served to foster the assembling and banding to¬ gether of men fired with patriotic ardor. It is quite likely these associations may have led to the formation of the societies of Red Men — possessing the terminology hereinbefore men¬ tioned, — known to have flourished between the years 1813 and 1830, of which fragmentary records have been preserved. The impulse also may have, come from the Tammany societies of the national period prior to 1812. A society of Red Men existed in Philadelphia, Pa., in 1824, and there were branches in other cities and States at earlier and later dates ; but the movement, which began in Baltimore, Md., in 1833-34,. really seems to be the authentic date of foundation. The Improved Order of Red Men was anti-

convivial in its character, and was first brought into public prominence by the observ¬ ance of Saint Tammany's Day (still on the cal¬ endar), 12 Mav 1837. The Order spread, and, on 20 May 1835, the Great Council of Maryland was instituted, and soon became an incorporated body. On 30 Jan. 1847 the Great Council of the

United States was. formed as the supreme gov¬ ernment, and this, in turn, became a corporation, by special charter from the legislature of Penn¬ sylvania, approved 30 March 1866. The policy of the Order has been to possess a legal stand¬ ing in the State ; and a brotherly hand extended early secured the adherence of the scattered bands of Red Men to the <(improved® institution, so that unity of effort soon promised much for the future. The fortunes of the ^Improved Order, ® however, were fluctuating at first, and, until 1881, when it began to assume its present proud proportions of over 479,000 members, em¬ bracing the entire republic, and reservations in Canada, and disbursing annually in benefits over $1,649,800, and since organization over

$34,612,000.

Consult (Official History, > edited by Charles H. Litchman, revised by Charles C. Conly (1893-99), and documentary History of New York* ; Constitutions and Digest, I. O. R. M.*

H. L. Stillson, Fraternity Historian.

IMPSONITE. A natural bitumen or as¬ phalt closely resembling albertite but only slightly soluble in turpentine. Brittle and burns without fusing. Occurs in Nevada and Okla¬ homa.

IMPULSE. This is a term used in me¬ chanics to designate the <(time integral® of a force. If the force is constant, the impulse it produces in a given time is the product of the force and the time

in question. If the force is variable, its time of action may be divided into an infinite number of equal intervals. Then the impulse will be the sum of the products of each variable value of the force by the common infinitesimal time interval just defined. Impulse is a quantity of the same kind as momentum; that is, it is the product of mass and linear velocity.

It should be observed that in the case of impulses in nature the forces are never in¬ finite and their times of action never infinitesi¬ mal, though it is sometimes convenient to adopt these fictions in analysis. (See Dynamics; Force). Consult Thomson and Tait's Natu¬ ral Philosophy* (Part I), and Gray, A., and J. G., (Treatise on Dynamics) (London 1911).

IMPUTATION, as a term in Protestant theology, is used to signify three things, first, the imputation of the sin of Adam to all of his posterity, second, –the reckoning of the sins of man to Christ, third, the reckoning of the right¬ eousness of Christ to believers. Thus, on the theory of imputation the sin of Adam is so attributed to each individual of the human race as to be considered in the Divine counsels as the act of that individual, who is thus rendered guilty of it. When sin is spoken of as imputed to Christ it is meant that the condition or state which was actually man's becomes by imputation judicially his, and thus in law Christ became fitted to be a sacrifice and sin offering for man. Had he not been man's substitute by the impu¬ tation of sin he could not have become his substitute in the endurance of the penalty of sin. The two are inseparably connected. In the very same sense in which Christ was made sin men are made the righteousness of God in him. According to this view he was made sin, not actually and personally, but by imputation; and men are made righteousness, not actually and

personally, but by imputation. Consult Brough¬ ton, L. G., (Salvation and the Old Theology* (New York 1908).

IMUS, e'moos, Philippines, pueblo of the province of Cavite, Luzon, eight miles southeast of Cavite, the provincial capital ; it is an import¬ ant road centre. In 1896 it was the stronghold of the insurrection, Aguinaldo and other chiefs having their headquarters in its principal build¬ ing. Pop. about 15,000.

IN-BREEDING, Evils of. See Breeding.

IN CCENA DOMINI, in se'na dom'i ni, a papal bull, so called from its first words, it being annually read <(at the Lord's Supper® on Holy Thursday. Its earliest form was that promulgated in 1363 by Urban V against all heretics and favorers of heretics. The bull was annually promulgated at Rome till the year 1770, when a much modified document took its place, this in its turn being withdrawn by Pius IX in 1869.

IN FORMA PAUPERIS (in the form of a pauper), legal term applied to a person who obtains leave to carry on an action at law with¬ out paying the fees of court and other costs.

IN MEMORIAM. Un Memoriam* by Tennyson is one of the great elegies of the English language. ^ycidas* and would probably both come to mind in compari¬ son, but neither is so widely known, nor does either answer so exactly to the spirit of the 19th century. (In Memoriam* expresses the grief of the poet over the death of an early friend, but with the expressions of personal grief there is also an interpretation of the problems of death and the future life. The poet himself said: ((This is a poem, not an actual biography. (P is not always the author speaking of himself, but the voice of the human race speaking through him.® Beside his own personal feel¬ ing, then, Tennyson in his poem gives voice to the sentiment of his time on Death and Immor¬ tality, — and in this effort he was remarkably successful. So capable a judge as F. W. Rob¬ ertson said: <(To my mind and heart the most satisfactory things that have ever been said of the future state are contained in this poem.® Many other such opinions might be quoted. F. D. Maurice thought

that the author had made a definite step toward the unification of the highest religion and philosophy with the progressive science of the day. Henry Sidgwick subsequently wrote of certain stanzas : ((I feel in them the indestructible and inalienable minimum of faith which humanity cannot give up because it is necessary for life.® Such opin¬ ions probably would not prevail to-day on the part of liberal and radical thinkers, but they serve to show how actually Tennyson's poem was something more than an expression of indi¬ vidual feeling. It expressed a very general sentiment of the race. This depth of thought comes in part from the fact that the poem was not written all at one time (like Browning's

with time. Four different stages are clearly shown by the three sets of stanzas describing the celebration of three returns of Christmas. The poem presents what has been called the ((The Way of the Soul® (A. C. Bradley), — a passing from the first stupor and confusion of grief, through a growing acquiescence often disturbed by the recurrence of pain, to an al¬ most unclouded peace and joy. The following main divisions are generally marked: (I) Absorption in grief; (II) Reflection on the idea of continued life and an advance from mere sorrow; (III) Resignation and Faith; (IV) Awakening of a new sentiment of the possibilities of life. The poem however is not chiefly noteworthy for thoughts which might have been expressed in prose. The ideas are themselves poetical, namely, the plain concep¬ tions. of philosophy on life transfused with imagination. The poem gives not so much argument as a way of thinking and feeling. The particular poetic expression is in a stanza- form which had been rarely used before, but which Tennyson in this poem made his own and indeed believed that he had Invented. The stanza-form is such a slight variation from a very common one that it seems remarkable that no one should have used it before, but it is so absolutely the right thing in

Edward Everett Hale.

IN OLE VIRGINIA, a collection of negro dialect stories published by Thomas Nelson Page in 1887, is a revelation of the life of the ante-bellum South as it was found in the best homes of Virginia. It is not the whole truth with regard to slavery, but it suggests the social atmosphere of the somewhat feudal state of society as it existed among the better classes of Virginia. The medium through which this social life is revealed is the old-time negro as he looks somewhat wistfully back to the good old times when the relations between the races were kindly and gentle. Through the mists of the years he recalls in picturesque words the South¬ ern colonel; the younger, more light-hearted young men, who threw themselves almost reck¬ lessly into the festivities and duelling of that era, and later became the most dashing and in¬ domitable soldiers of modern times ; the various types of Southern girls — the light-hearted, ten¬ der Polly, or Miss Charlotte <(comin' down de grand stairway, lookin' like she done come right down from de top of de blue sky and bring a piece of it wid her,® or Meh Lady in her bridal dress, <(white as snow from her head to way back down on de floh behine her, and her veil done fall roun' her like white mist, and some roses in her hair.® These types, all presided over by the dignified matron of the plantation — the gentle, classic, serious mother — are seen participating in fox-hunts, tourna¬ ments, weddings, harvest festivals, and above all the Christmas celebrations that have made Virginia social life famous throughout the world. Always in the background is the stately colonial mansion with its polished halls, grand

stairways and noble porticoes. In <(Unc' Edin¬ burgh Drownin'® we hear the infectious music of the banjos, the laughter of the dancers, the festive noise and merriment of the cabin and the mansion. In some of the stories, notably in <(Marse Chan,® we see the breaking up of the old order and the tragedy of the Civil War.

Edwin Mims.

IN PARTIBUS INFIDELIUM («in the regions of the unbelievers®). Titular bishops of the Catholic Church since the 13th century until 1881 were styled episcopi in partibus, etc. At first they were bishops without a diocese, and their titles were derived from places where there was no longer a bishop's see. The usage originated after the Greek schism, and became general in the time of the Crusades. The places conquered by the Crusaders in the East were furnished with Catholic bishops ; but when these conquests were again lost the popes con¬ tinued to appoint and consecrate the bishops to whom a special field of labor could not be as¬ signed in Europe. Hence coadjutors and mis¬ sionary bishops were consecrated to titular sees. Upon the re-establishment of the Catholic hierarchy in England in 1850, English bishops ceased being termed bishops in partibus. The term was abandoned in 1881 by order of Leo XIII, because many of these ancient sees had become the territory of Christian nations, ren¬ dering the old term inappropriate. It is now usual to term prelates consecrated to distant sees titular bishops.

IN PERSONAM, spoken of legal rights, means such as are maintainable only against a specific person and not against the whole world. (See In Rem). Rights in personam arise out of a specific engagement between individuals, or out of domestic or fiduciary relations.. But the majority of rights in personam spring from the violation of rights either in rem or in per¬ sonam. A right once violated, a right of action against the violator immediately arises. An action brought against the violator is also called an action in personam.

IN REM, spoken of legal rights, means such rights as are not only maintainable against a specific person (see In Personam), but can be maintained against the whole world. Nor are rights in rem limited to property rights, but include all rights, such as freedom from per¬ sonal assault, from causeless imprisonment, from trespass. The term includes the

right not only of suing for damages, but of seizing and detaining certain articles. In admiralty prac¬ tice this is a common resort, though in ordi¬ nary processes for the recovery of land or goods, it is rarely made use of nowadays.

IN THE TENNESSEE MOUNTAINS,

a collection of short stories published in 1884 by Charles Egbert Craddock (Mary N. Mur- free), reveals and interprets the primitive and elemental types of character to be found in the mountains of East Tennessee and western North Carolina. Many years before the South¬ ern people had awakened to the undeveloped human resources in these mountains, the author, who had been in the habit of spending her summers in the Cumberland Mountains, felt and depicted the humor the pathos, the kind¬ liness and tragedy of these contemporary an¬ cestors — men and women, who in their moun-

tain coves had let the tides of civilization sweep on past them, leaving them in a state of arrested development. The more savage and the more gentle elements of their character are revealed at country stores, in blacksmiths' shops, at still-houses and in various forms of social life such as hunting, dancing, playing cards, political campaigns and religious re¬ vivals. If we have the blundering brutality and strength of ignorance, we have also the noble and tragic self-sacrifice of such women as Cynthia Ware, whose lover is saved by her devotion from his prison life only to pass out of her life and that of the mountains into the more material civilization of the valley; or Celia Shaw, who has a revelation of a life of culture as contrasted with her own crude family life only to be made aware that she can¬ not share it. Throughout the stories we are made to feel that (

IN THE VALLEY (1890), by Harold Frederic, is eminentlv representative of the his¬ torical novels which, during the later years of the 19th century in the United States, contended, for a time successfully, with the prevailing vogue of realism. As in so many stories of the type, the hero — a Mohawk Valley Dutchman

— finds himself pitted against a brilliant villain

— of course a British officer — who for a time wins the heroine — thrown among "Tories® and British but steadfastly loyal to her native colony

— only in the end to lose her to the slow-witted though courageous and honorable Douw Mau- verensen, who is historian as well as hero of the tale. The book adheres to the New York tradition, early set down in Irving and Cooper, of respect for Dutch prudence, suspicion of British perfidy and active prejudice against all New Englanders, particularly those from Con¬ necticut. There are also faithful black slaves and ferocious Indians. So far (In the Valley accepts the conventions of its order, but it goes beyond them in other respects, for it lacks the customary tinsel of archaisms and pretensions, and is not always sentimental. Frederic, later distinguished by his energetic naturalism, was, in this romance, prophetically spare and terse. Years of preparation, he said, went to the mak¬ ing of the book, which is full of unobtrusive erudition regarding life in the Mohawk Valley and in Albany from 1757 to 1777, when the diverse nationalities of the region were draw¬ ing together into a common Americanism. For them it was both a civil and a foreign war; the battle of Oriskany, by checking the British and Indians, not only left the valley in the hands of the colonials but also prevented the junction of St. Leger and Burgoyne and so contributed to the decision reached at Saratoga. (In the Valley, > compact and dramatic throughout,*

comes to its fitting climax with the fight at Oriskany.

Carl Van Doren.

INAGUA, e-na'gwa, Great and Little, two

of the Bahama Islands in the West Indies, at the southern extremity of the group. Great Inagua has an area of 660 square miles, and Little Inagua 36 square miles. The largest town of Great Inagua is Matthew Town, and the entire population is not over 1,500.

INAJA (m-aj'a) PALM, a palm (Maxi - miliana regia), indigenous to the region of the Amazon, South America. It is noted for its strong stem which seldom exceeds 20 feet in height, and for its long drooping leaves which are often 15 feet long. Hunters use the spathes as cooking pots and the Indians as baskets and cradles. The fruits are eaten by the In¬ dians, who also make hats and ropes from the fibres of the leaves.

INAUGURATION DAY. When the Con¬ stitution had been ratified by the requisite num¬ ber of States the Continental Congress, by reso¬ lution of 13 Sept. 1788, set the first Wednesday of the following March (4 March 1789), as the (

INCA, or YNCA, the name of a tribe of Peruvian Indians — not exclusively that of a royal family or caste, as has been commonly asserted. The members of this tribe sometimes called their war-chief ((Cuzco,® meaning chief or lord of Cuzco, but probably more often ((the royal Inca,® or simply athe Inca.® (Consult (Royal Commentaries of the Yncas, by Gar- cilasso de la Vega, Lisbon, 1699, Part I, chapters 8 and 15). The latter usage was in the end adopted by Spanish chroniclers ; and Garcilasso, half Spaniard, half Indian, in the 15th chapter of his commentaries, which were written, he tells us, 71 years after the conquest, uses both the longer and the abbreviated forms — "Yncas Kings® and "Yncas® — though feeling that he must explain that he means by the latter the ((native kings of Peru.® Throughout the tribe mother-right prevailed, and marriages were contracted between members of different clans; therefore offices could not descend from father to son ; and especially the office of war- chief, or Inca par excellence, must usually have been filled by selection. The tribal dialect was called Quichua. See also Peru.*

INCA SEMI-CIVILIZATION, the state

of advancement in arts and learning reached by the most progressive tribe of South Amer¬ ican Indians, occupying a portion of the Andean Sierra, and exercising control, in the regions

now known as Peru, Ecuador and northwestern Bolivia, over many other tribes of the highlands and lowlands before the Spanish conquest.

In the articles Inca, Cuzco and Peru, ref¬ erence has been made to certain popular mis¬ conceptions touching Inca government, chro¬ nology and the tribal name. It is necessary to add that the evidence at present available is entirely insufficient to warrant such assertions as the following, which occurs in one of the leading works of reference: ((The Inca was the absolute but, in most cases, kindly ruler.

. . . In many respects the Inca government

will compare favorably with any which at that time existed in Europe® ; or this, from a popu¬ lar account published in December 1903: «The Inca race had developed in pre-Columbian times an astonishing and marvelous civiliza¬ tion.® Far from lending itself to such con¬ clusions, the evidence furnished by Spanish writers of the 16th and 17th centuries, when their works are tested and corrected by a com¬ parison with the results of modern archaeolog¬ ical research, points to social conditions which cannot be ranked above semi-civilization. Moreover the objects collected by archaeologists to illustrate or represent industrial and artistic activity in ancient Peru in point of fact illus¬ trate and represent the activities of a race very slightly elevated above semi-barbarism. In the customary treatment of. their dead a lack of higher symbolism made itself felt oppressively; the crouched position of the body, bound in a tawdry pack, and the commonplace offerings buried with it suggested nothing better than the petty comforts, or ignoble miseries, of a life forever limited to alternating phases of servile toil, crouching rest, sensual indulgence and childish diversions. The various tribes of the Sierra, from Quito to Lake Titicaca, were bound together by roads which ran from one highland village to another; the lowland Indians were held in subjection through fear alone, the Inca supremacy signifying to them a prolonged reign of terror.

Some of the war-chiefs may have been «kindly rulers®; we shall, in all probability, never know

whether they were or not. Cris- toval de Molina, who described the <(Fables and Rites of the Yncas,® and who, in order to gain the knowledge of those rites which he imparts, ^assembled a number of aged persons who had seen and participated in them in the days of Huayne Ccapac,® believed that some definite, if scanty, records existed. He says: <(It is so that these people had no knowledge of writing, but in a house of the sun called Poquen Cancha' which is near Cuzco., they had the life of each one of the Yncas, with the lands they con¬ quered, painted with figures on certain boards.® Another chronicler, Juan de Santa Cruz, who wrote about 1620, says: «I affirm that I have heard, from a child, the most ancient traditions and histories, the fables and barbarism of the heathen times.® Such as these are the sources of our knowledge of the story of the Inca rulers. . Some of the events in the lives of the war-chiefs were depicted, as valuable records or as parts of an ornamental design, in a (

that tradition retained most accurately the traits of the last two or three native chiefs, whom the ((aged persons had seen® ; and though we may not condemn the unknown by reason of the credibly reported misconduct of the known, we shall be obliged to suspend judgment, instead of accepting the easy platitudes now current with respect to the succession of war-chiefs from Manco down to Huayna. The shameless pri¬ vate life of Huayna Ccapac is set forth in the (Antiquities of PeriP by Juan de Santa Cruz. As for that great war-chief's still more famous son, we read in Garcilasso de la Vega's (Royal Commentaries of the Yncas) (Book IX, Chapters 35-37) that Atahualpa summoned all Incas of the blood royal to assemble at Cuzco, and put them to death. ((The cruelty of Atahualpa,® says this historian, himself half Inca, ((was greater than that of the Turks, for, not content with the blood of his own 200 brothers, the sons of the great Huayna Ccapac, he passed on to drink that of his nephews, uncles and other relations ... so that none of the blood royal might escape, whether legitimate or bastard. They were all murdered in different

ways.® The same fate was meted out to all the loyal captains of his rival Huascar: furthermore (

It appears to. be altogether improbable that the Inca semi-civilization, if it had not been interrupted by the coming of the Spaniards, would have reached the height of 16th or 17th century European civilization, or by native merit have kept abreast of the advancing nations of the Old. World. That the tribe had neglected to provide itself with a written language, and failed to develop high ideals in art, we' have already noticed. A third essential for progress was equally wanting: the Incas had no money, or any medium of exchange corresponding to the wampum of the Indians who lived near the North Atlantic coast. But it is impossible for any people de.prived of trustworthy records of human experience to construct a convincing system of morality; and without some con- venient medium of exchange an extensive and pacific , commerce is equally impossible. Both deductive and inductive methods of reasoning therefore, lead an unbiased student of old 1 eruvian institutions to the conclusions that, at home, inveterate and fully sanctioned practices made for degeneration; while steady blackmail, varied by occasional slave-raids, took the place of mutually beneficial dealings with neighboring, subject or independent tribes.

Limitations of the race's genius or experi¬ ence may be exemplified in the department of music. I he Inca musicians used drums which (were made by stretching a skin over a hoop of wood or over one end of a short section of the trunk of a tree which had been hollowed out to a thin cylinder.® (Compare (The Mu-

sical Instruments of the Incas,5 by Charles W. Mead, assistant Department of Archaeology, American Museum of Natural History). Other musical instruments of percussion in common use were copper bells, in form resembling sleigh-bells ; rattles, made of small

shells, gourds and nuts, often strung together and attached to the wrists, ankles or other parts of the body, in dancing; also cymbals of rudi¬ mentary form. Wind instruments were the syrinx or pan-pipe, consisting of reeds of graduated lengths, held in position by a cross¬ piece of split cane lashed to the reeds with a cord made of llama wool — the reeds being sometimes closed at the lower end, sometimes open, and occasionally arranged in double rows, yielding octaves ; flutes, made of cane or bone, <(simply tubes, open throughout their length, and all belonging to the class known as (end- blown, 5 55 not scientifically constructed and not attuned one to another ; resonator whistles, emitting several different notes ; trumpets, made either of terra cotta or of conch shells, — primi¬ tive instruments, producing only four or five distinct tones (as shown by actual test of speci¬ mens taken from the ancient tombs) ; a double musical water bottle, consisting of two pottery vessels connected near the bottom in such a way that water passes freely from one to the other, and in its passage (when the vessels are swung backward and forward) forces air through an opening near the top, producing a series of whistling sounds ; and finally the (

And, as in music a great volume of sound — not harmony — was the desideratum, so in architecture they neglected beauty and strove to attain resistant mass, with walls as solid and homogeneous as possible — the prime essentials in a country shaken by destructive earthquakes ; and their solicitude in this respect suggests that the tribe, before the migration to which old legends refer, may have dwelt in the volcanic western part of 'the Sierra. (See Peru). Hence the so-called "cyclopean55 walls of the temples and palaces, structures built to endure, for which the builders utilized enormous stones of irregular shapes, fitted together so skilfully that mortar was not required.

It is safe to say that nearly all features of the ancient industrial life of the tribes inhabit¬ ing the Andean S:erra and Peruvian coast strip are

either intimated or plainly shown by speci¬ mens in the archaeological collections of the United States and Europe. (See article Ancon). With the utmost care products which are not properly to be classified as Incan have been separated from those showing the activities of the dominant race ; and such care is obviously indispensable, for the Incan objects do not stand out from the rest quite unmistakably.

One finds practically nothing to support the theory that there was ever a nearly unrelated, or a wholly distinct and marvelously superior, Inca civilization. Especially instructive are the examples of the potter's art which have been secured in great numbers — representing such different social classes as the warrior, musician and water-carrier. Costumes, weapons, occupa¬ tions, etc., are depicted faithfully, though with¬ out artistic charm. Fabrics of cotton, or woven from the wool of the llama, vicuna and alpaca; looms, spindles and colored threads, bear wit¬ ness to the wide extension of the industry of weaving so often mentioned by early writers. Offerings made to the dead in the graves which have been discreetly rifled recall the fact that agriculture shared with warfare the distinction of being the chief occupation of able-bodied men. Inca women are shown to have been eminently domestic in their tastes and employ¬ ments, ruling supreme in the house, taking no part in public affairs. Gold and silver appear to have been not less abundant — perhaps they were even more abundant — in the lowlands than in the highlands : at any rate vessels formed from the precious metals are found more commonly in the burial places near the coast. It is not to be supposed that the natives failed to appreciate the beauty and utility of silver, gold and copper. An ingrained prefer¬ ence for the clumsy methods of barter pre¬ vented them from adopting any medium of ex¬ change or setting apart one or more of the metals to be used as (

Marrion Wilcox.

INCANDESCENCE. See Electric Light¬ ing.

INCANDESCENT GAS-LIGHT. See

Gas Illumination.

INCANTATION (from Latin incantare, to enchant), a musical formula chanted, sung or monotoned, and supposed to create a magical or beneficial influence. The mother's crooning lullaby of all ages is a typical incantation to soothe the child to slumber. The use of incan¬ tation is found among all nations back to the earliest historical records. Akkadian spells of the ancient Chaldeans have been disclosed. Homer and Theocritus among Greeks, Virgil and Horace among Romans, give the poetical formulae of incantations and they are found in Egyptian and Hindu literature. The Vedic mantras or incantations have their parallels in the Japanese majinahi. the Maori karakias and the matamanik of the North American Indians. In the British Isles, in Germany, in all Euro¬ pean countries their traces are found in local folklore. See Magic.

INCAPACITY, in law , the state of being unable to incur either a civil or criminal lia¬ bility. It may be due to several causes, such as the minority or infancy of a party, lunacy or drunkenness. It existed formerly to a cer¬ tain degree in the case of married women, but has largely been removed by legislation. Chil¬ dren under seven years are presumed incapable of committing crime of any sort.

INCARNATION (from later Latin, in- carnatio, first used by Irenteus, a.d. 180, derived from in and carnem, into flesh), the permanent assumption of human form or human nature by a divine personage. In the Christian religion,

the incarnation signifies the assumption of hu¬ man Nature by God in Jesus Christ. The classical statement is John i, 14, ((And the Word became flesh, and tented among us.® This is the central

teaching of the Christian religion, and the source of its claim to universal accept¬ ance and to finality. Very intimately bound up with it, though distinguishable from it, are the important teachings of the divine sonship of Christ, his sinlessness, his pre-existence and virgin birth and inevitable deductions affecting the Trinity (q.v.) and the atonement (q.v.).

I. Sources in the New Testament. — (a) The gospels show how the disciples became convinced of the incarnation as a fact. The impression of the greatness of Christ's person¬ ality; his miracles, which showed his sovereign power over disease and nature; his sinlessness, proved not so much by express declaration and outward conduct as by a combination of the most penetrating ethical insight and moral power with an entire absence of any sense of sin or moral failure or need of forgiveness ; the intimacy of his knowledge of God and communion with him ; his claims that moral character and future salvation were decided by relation to himself ; his assumption of au¬ thority to forgive sin, and his promises of rest to weary souls, who came to him ; the experi¬ ence of this forgiveness and rest in their own hearts — all predisposed the disciples to this belief. Yet the most powerful factor, taken in connection with the foregoing elements, was Jesus' claim to be the Messiah (q.v.), who had been prophesied in the Old Testament scriptures and was a familiar figure in the later current Jewish literature. This claim meant nothing less than that he would be the future judge of all men, the bringer of the super¬ natural kingdom of God, and king in that king¬ dom. This claim was acknowledged by Peter at Caesarea Philippi with Christ's joyful ap¬ proval, was constantly asserted by implications of more than human authority and by the use of the phrase, <(Son of Man,® which means nothing more nor less than Messiah, and was maintained, although Christ knew that it would cost him his life, in reply to the High Priest's question in the trial before the Sanhedrin. The resurrection, however, decisively and for¬ ever settled the matter in the

mind of the dis¬ ciples. After that event, they had no further doubts. John's gospel truly represents the growth of their faith to the climax, when Thomas calls the risen Jesus, <(My Lord and my God.®

(b) The early Church consequently pro¬ claimed Jesus the Messiah, sitting not on David's throne, but at the right hand of God, and cited the resurrection as proof. They called Jesus Lord, using the very word used of Jehovah in the Septuagint, and in connections which exclude any other reference. The open¬ ing chapter of the earliest Pauline Epistle, 1 Thessalonians, associates God and Christ on terms of practical equality. 2 Cor. iv, 4, 6, and Col. i, 15 assert that Christ is the image of the invisible God, cf. 2 Cor. v, 19. 1 Cor. viii, 6

and Col. i, 16—18 make Christ the mediator of creation. 2 Cor. iii, 17 identifies him with the divine Spirit, and, according to the best modern expositors, Paul in Rom. ix, 5 calls him <(God blessed forever.® The earliest epistles already

show that the pre-existence of Christ is no new idea to be explained and enforced, but the com¬ mon property of Christians, cf. Rom. viii, 3, 1 Cor. xv, 47, 2 Cor. viii, 9, Gal. iv, 4. These thoughts are developed at length in Phil, ii, 6-11 and Col. i, 15-20. The familiar and incidental reference to these teachings as matters of course in the belief of the Church dispose us to believe that they have their root in Christ's own declarations of pre-existence as recorded in John's gospel, John xvii, 5, 24; viii, 58; iii, 13; vi, 62, 33, 38; xvi, 28, etc. The other New Testament writers shared these views of Christ's pre-existence, cf. Heb. i, 1-3, and 1 John i, 1-4. The Prologue of John i, 1-18, is the climax of the development of the teach¬ ing in the New Testament.

Historically viewed then, the early Christians believed without any doubts in the incarnation on the basis of a synthesis of proofs derived from Christ's personality, his moral spotlessness and force, his miracles, his Messianic claims, his

resurrection and their own experience of his forgiving and renewing power, and not on the basis of the virgin birth, which is never mentioned outside the opening chapters of Luke and Matthew. This teaching, however, was welcomed by men, who believed the fact of the incarnation, as an explanation of its method, and is accepted by most believers to-day in the same relation. It is therefore not essential to the teaching of the incarnation, which might have taken place in other ways, but is the gospel-given history of the method adopted by God to bring the incarnation about, and, logi¬ cally considered, it is burdened by no more difficulties than any other possible method would probably be. It does not appear im¬ probable to those who already believe in the incarnation. The historicity of the virgin birth has recently been keenly attacked on the most diverse grounds, principally by those who elim¬ inate the supernatural. Its defenders are taking the position that though the reports of it were late in being disclosed, as shown by absence of mention of it in the rest of the New Testa¬ ment, they are in fact the most archaic Chris¬ tian documents. In support of this, they point to the Aramaic coloring of the narratives; their Hebrew background; their primitive Christian viewpoint; their simplicity, beauty and delicacy; the reasons which immediately suggest themselves why such a story should be withheld till Jewish opposition had decreased, and the principal actors had passed from the stage ; and their inexplicability on any other hypothesis than their truth.

II. The Church Doctrine. — The New Tes¬ tament fails to give any answer to the questions of the exact relationship of Father, Son and Holy Spirit, and of the manner in which the divine and the human in Christ were related to each other, and these matters formed the sub¬ ject of the first great theological controversy, during which the teaching of the incarnation was defined and developed principally in opposi¬ tion to misapprehensions of it by different par¬ ties and individuals within the Church.

(a) The earliest were the nearly opposite errors, Ebionitism (see Ebionites) and Docet- ism (see Docet,e), both of which began in the 1st century and flourished during the 2d. The Ebionites were a sect of Jewish Christians

who held that Jesus was naturally born, was merely a prophet, received an extraordinary en¬ dowment of the Spirit at his baptism, and was finally exalted to Lordship at his resurrection. It was merely Judaism in semi-Christian dress ; against it the Fathers asserted the full teaching of the incarnation, and it soon passed away.

(b) Gnosticism (q.v.), which started with the assumption of the inherent evil of matter, almost necessarily drifted into Docetism, the doctrine that Christ could have no real relation to matter, that his body was merely apparent, a vision and delusion, or at least of a spiritual nature different from a human body, and not subject to suffering and death. This view was held in different forms and was shared also by Manichaeism. (See Manich^eans) . It is a prac¬ tical denial of the possibility of the union of the divine and the human. Docetism was very early. It seems to be opposed in 1 John iv, 2, and 2 John vii. The apocryphal Gospel of Peter, discovered in 1886, is Docetic. It was attacked by Ignatius. The fathers met it by an insistence on the real humanity of Christ. After large in¬ fluence, it passed away with Gnosticism. Justin Martyr, Irenaeus, Clement of Alexandria, Ori- gen and Tertullian were the principal theo¬ logians who defended and developed the teach¬ ing of the Church during this period.

(c) With Sabellianism (see Monarchians, Sabeelius) condemned in 262, began the real contest. Sabellius urged that the Trinity is not a trinity of persons in one substance, but merely three different or successive forms of the reve¬ lation of the one

person. Christ was pre-exist¬ ent because the one person persisted under the change of revelation-form. The Patripassians were Sabellians, who logically asserted that it was the Father who suffered on the cross. Sabellianism, variously modified, has constantly reappeared, and is now known as' the doctrine of a modal Trinity. The controversy with Sabellianism did much to sharpen the definition of the Church.

(d) The greatest battle over the teaching of the incarnation was brought on by Arius (see Arianism ; Arius), a presbyter of Alexandria, about 318. Arius held that Christ was a pre¬ existent divine being, but of a different essence from the Father (heteroousios) , created by the Father out of nothing but himself the creator of the world, and the incarnate Saviour. The Semi-Arians taught that Christ was not of a different essence from the Father, nor, as the orthodox asserted, of the same essence (homo- ousios), but of a similar essence (homoiousios) . This was a very elastic and ambiguous view. The great defenders of the coequality of the Son and the Father were Athanasius (q.v.), the father of orthodoxy, at one time called, ((Athanasius versus mundum,® Basil, Gregory of Nazianzen and Gregory of Nyssa (qq.v.). The whole Christian world rang with the contest, which culminated, but did not end, with the decision of the Council of Nicsea, the first oecu¬ menical council, in 325 a.d., in these words, fWe believe in one God, the Father Almighty, maker of all things visible and invisible. And in one Lord Jesus Christ, the Son of God, be¬ gotten of the Father (the only-begotten, that is, of the essence of the Father, God of God), Light of Light, very God of very God, begotten not made, being of one substance (homoousios)

with the Father; by whom all things were made (both in heaven and in earth) ; who for us men, and for our salvation, came down and was incarnate and was made man ; he suffered, and the third day he rose

again, ascended into heaven; from thence he shall come and judge the quick and the dead.® After a renewed struggle, this creed, slightly enlarged, was re¬ asserted at the second oecumenical council at Constantinople, 381 a.d.

(e) Apollinarianism (see Apollinarians), as well as Arianism, was condemned at this lat¬ ter council. It was a reaction against Arianism, and taught that Christ had a human body and animal life, but that the pre-existent Logos took the place in Him of the human mind and spirit. Against this extreme, the Church protested that Christ had a real human soul as well as a real human body.

(f) Nestorius (q.v), bishop of Constanti¬ nople, objected to calling Mary ((the mother of God.® This position led him, however, to join the human and divine in Christ so loosely that he was accused, probably unjustly, of giving Christ not only two natures but making Him two persons, at best a man inhabited by God. He was irregularly deposed at Ephesus in 431 a.d., but the verdict was generally accepted that the Church must insist on two natures vitally united in one person.

(g) The opposite extreme was attempted about 448 by Eutyches (q.v.), an abbot of Con¬ stantinople. He maintained that Christ had only one nature, a fusion of the human and divine, and something different from either. This period of controversy was closed by the cele¬ brated formula of the Council of Chalcedon (see Chalcedon) 451 a.d. as follows: (

(h) Still it did not immediately end the con¬ troversy. Eutychianism revived in Monophysit- ism (see Monophysites), or the doctrine of one nature in Christ, which convulsed the Eastern Empire for more than a century; while its cor-

ollary, Monotheletism (see Monothelites), the

doctrine that Christ had one will, unfortu¬ nately induced the Church in the sixth oecu¬ menical council at Constantinople in 689 a.d. to assert that will belongs to nature rather than to person, that consequently Christ had two wills, never at variance. This completed the orthodox statement.

III. Modern Views. — Since the Chalcedo- nian formula (see g above) followed the lines recommended by Pope Leo I, it was accepted by the Western Church, although it subsequently fell somewhat into the background before the development of the idea of the Church as the body of Christ. Briefly, though the incarnation was discussed in the Middle Ages, no progress was made, and the great Reformed Churches made, and still make, their Christological dec¬ larations on the basis of the Chalcedonian formula.

(a) While the great creeds and the great mass of the Christian Church still rest here, many modern Protestant scholars insist on re¬ examining this great central doctrine as they do all others, seeking a restatement more in ac¬ cordance with modern points of view. There is an inclination, on the one hand, to magnify the incarnation as the great specifically Christian doctrine, and on the other, to object to the ancient definition of it as too fine-spun and metaphysical, going beyond what it is given men to know. These scholars insist on a revaluation of the Scripture statements and the historical facts on which the doctrine is based, especially on giving to the fact of Christ's growth in knowledge and wisdom, and to his true human¬ ity generally, its proper weight, on proceeding on the lines of history and ethics rather than on the lines of metaphysics. Many deem the ancient formulas full of bad psychology and impossible philosophy, and demand a restate¬ ment in line with the progress of human thought in other departments of knowledge. Many even of these, however, would agree that the general results of the earlier contest must be preserved as the expression of the universal faith of believers from the apostolic age to the present.

(b) The first of these attempts was made by the

Socinians (see Socinus) in Poland in the 16th century. They rejected the Trinity, and held Christ to be not divine, but more than a mere man, in that he was conceived of a virgin, was absolutely holy and was finally exalted to absolute power. The Socinians gave birth to the modern Unitarians (q.v.), who reject the deity of Christ, and in varying degrees look on him as the ideal of humanity, <(the best we know,® or, at least, as one of the prophets. This shades off into

(c) Pantheistic conceptions, to which Hegel gave a powerful impulse. There is an essential unity of the human and divine; humanity is itself divine. The pre-eminence of Jesus is seen in that he first awoke to the consciousness of this fact, and represents it in its purest and strongest form. The great body of Christian believers fail to find in the Unitarian or pan¬ theistic statements a sufficient explanation of the Christ of history and experience.

(d) The Kenotic theories propounded by Thomasius, Gess and Martensen, have a more orthodox origin and result. They are based on

Phil, ii, 6-8, especially the words <(he emptied himself® (ekenosen), and are inspired by the desire to present the full human development of Christ. The Kenotists in varying degrees declare that the pre-existent Christ at the incar¬ nation divested himself of the attributes of omnipotence, omniscience and omnipresence, and became man, retaining, however, the essen¬ tial attributes of truth, holiness and love. By thus depotentiating the divine nature to the level of the capacity of the human, it was hoped to overcome the dualism of the ancient state¬ ment. These theories have had wide influence, but are severely criticised as metaphysically im¬ possible.

(e) A theory of gradual or progressive in¬ carnation was matured by Dorner (q.v.). There is no self-limitation of the pre-existent Logos, but a limitation of his self-communica¬ tion to the human nature. Jesus Christ pro¬ gressively became

conscious of his divine nature and realized it fully only at the resurrection. Christ became conscious of his Godhood just as He became conscious of Iiis manhood. Its opponents hold that this theory is Nestorianism in a more subtle form and does not really do away with dualism.

(f) The present dominant German theo¬ logical school, the Ritschlian (see Ritschl, Albrcht), follows a new method of procedure. Instead of beginning to discuss the incarnation with a consideration of the self-witness of Jesus or of the apostolic testimony, it begins with the Christian's experimental knowledge of Christ as Redeemer, and consequently asserts that none but the possessor of a Christian ex¬ perience can have any real knowledge of his person. What the believer has learned of Christ in his experience leads him to call Jesus God, for none but God can do for the believer what Jesus has done. Christ is the full and perfect revelation of God in His Grace and truth : Christ's will, too, is the will of God, namely, the establishment of the kingdom of God, and to found this was Christ's unique vocation in the world, a vocation to which He was absolutely true; in all his life and suffer¬ ings He was absolutely independent of and superior to the world, and so gained unlimited sovereignty over it. But if we meet God in Christ so as to experience the divine power and presence, God himself must be in Christ and in some true sense Christ must be God. How this can be is a matter of metaphysics which is insoluble and does not concern us. Ritschlianism thus attempts to prove the deity of Christ from experience, and to free Chris¬ tianity from the entanglement of metaphysics on the one hand, and make it independent of the results of biblical criticism on the other. From such a viewpoint, it regards the doctrine of the two natures as a hindrance, and the virgin birth as a matter of indifference, something to be decided on the grounds of historical criti¬ cism. The tendency of the leading living theologians of the school is toward a personal pre-existence, and some form of the doctrine of the Trinity. Kaftan declares that

((Chnst's historical person stands in a connection of nature with God which is altogether unique and can never be repeated.® Consult Garvie, (The Ritschlian Theology, J Chap. 9.

(g) The modern conceptions of the universe,

and especially of evolution, have had their in¬ fluence on the modern belief in the incarnation. (1) In many different schools of thought, the idea gains currency that the incarnation was an ethical, not a metaphysical, necessity of God's nature, a necessity of His love and grace, and would have occurred in some form, even if sin had never entered the world. The incarnation was no afterthought to repair an unforeseen calamity, but has its place in the eternal purpose of God alongside of and conditioning the plan of creation which made sinning possible. (2) Theistic evolution suggests not only that Christ is the consummate flower of the race, <(the end and goal of the whole ascent of life, the perfect man beyond whom there can be none higher, }) but that this perfect man is raised to the throne of divinity. (3) It is also seen that the finality of the Christian religion can be guaranteed only on the ground of the deity of Jesus Christ; for if Christ was one like us, however superior to all who have yet existed, there is no certainty but that during the ages another may arise su¬ perior to Him. The incarnation is thus the cen¬ tral doctrine of Christianity, and its mainte¬ nance in some form or other is vital to its ex¬ istence. See also Christology.

Bibliography. — Liddon, (The Divinity of Our Lord and Savior, Jesus Christ,* Bampton Lectures (1866) ; Bruce, (The Humiliation of Christ) (1876); Gore, (The Incarnation of the Son of God,* Bampton Lectures (1891); Gore, dissertations on Subjects Connected with the Incarnation) (1895); Ottley, (The Doctrine of the Incarnation* (2 vols., 1896) ;

Ramsay, (Was Christ Born at Bethlehem?* (1898); Briggs, (The Incarnation of the Lord) (1902) ; Lob- stein, (The Virgin Birth of Christ* (1903) ; Knowling, (Our Lord's Virgin Birth and the Criticism of To-day) (1903) ; Andrews, (Man and the Incarnation) (1905). Also Schaff- Herzog, Encyclopedia of Religious Knowl- edge) (article, (Christology) by Schaff) ; and Hastings, (Bible Dictionary) (article Uncarna¬ tion,* by R. L. Ottley). Roman Catholic Au¬ thorities. — (Catechism of the Council of Trent,) pp. 37 sq. ; Divine, (The Creed Explained,* pp. 125 sq. ; Schouppe, (Abridged Course of Re¬ ligious Instruction,* pp. 139 sq. ; Morris, (Jesus the Son of Mary* (1851) ; Hunter, (Outlines of Dogmatic Theology) (Vol. II, pp. 421-544, 1896). For authorities on incarnations in other religions, see articles Hinduism ; Buddha ; Theosophy; Mythology, etc.

Frederick L. Anderson. Professor of New Testament Interpretation, Newton Theological Institution, Newton Centre, Mass.

INCE-IN-MAKERFIELD, England, a town of Lancashire, southeast of Wigan, on the Leeds and Liverpool Canal. It has large collieries, forges, iron foundries, cotton mills and railroad car shops. The water-supply sys¬ tem is owned by the municipality. Pop. 22,000.

INCENDIARISM, or ARSON (from Lat. incendere, to set on fire), the criminal malicious voluntary burning of the property of another. In common law the term is confined to the burning of houses or buildings of what¬ ever kind. In Roman law the penalty of death was provided for the incendiary; and in all civilized countries provisions have been made for the severe punishment of criminals of this

class. The Saxon law of England also pro¬ vided the death penalty for incendiarism; and even as late as the reign of King John the law remained, in this respect, unchanged. In Saxon times, and probably even later, the sen¬ tence of the court was carried out by burning, and later by hanging. Under the

Tudors, any one convicted of incendiarism was deprived of the right of clergy, and even in particular cases was held to have committed high treason. The English Malicious Damage Act of 1861 defined as incendiarism (and as such, felonies), the setting fire to any church, chapel, meeting¬ house or place of divine worship, to a dwelling- house, any person being therein, to a house, outhouse, manufactory, farm buildings or any other similar building, with the intention of defrauding any one; to buildings belonging to railways, ports, docks or harbors; or any public building. Any one convicted of any one of these crimes may be imprisoned for life, or for a shorter term, not however less than three years. The burning of grain fields comes under this act and provides for punishment of the same sort, not to exceed 14 years' imprison¬ ment at hard labor; but the penal servitude may be for life in case of the setting fire to peat or coal or stacks, provisions or stores of straw, grain and like products, at the dis¬ cretion of the court;, while if the coal be in mines, the extreme penalty is 14 years. Death is the penalty provided for maliciously and wilfully setting fire to government ships, docks, magazines, arsenals, ammunition stores or build¬ ings connected therewith. Other vessels, stores, and so forth, come under the Malicious Damage Act already mentioned. The laws against in¬ cendiarism in the United States are very much the same as those in England ; but each State has its own regulations on the subject. The death penalty is provided only in case death results from the crime, in which case the crimi¬ nal is prosecuted not for incendiarism, but for murder. In general, the laws of all of the States provide that something must actually be burned before the crime of arson may be charged. In the United States it is, in most States, not considered incendiarism or arson to burn one's own property even when it is clearly proved that the act was done with the intention of defrauding an insurance company or other interested party, or to get rid of goods or evidence. In this case special laws have been provided for the crime. But here again each State has its own particular laws on the

subject. Consult Holdsworth, (History of English Law) (London 1910) ; Pollock and Maitland, (History of English Law) (Boston 1899) ; Russell, (Treatise on Crimes and Misdemeanors) (Lon¬ don 1896) ; Stephen, (Digest of the Criminal Law> (London 1894).

INCENSE, a mixture of gums, spices, etc., constituting an aromatic compound burned in religious rites of remembrance and giving off a sweet odor. The custom of burning incense is ancient and widely spread, its earliest purpose having been the fumigation and purification of the animal sacrifices and fruit offerings of the altar. Among the Jews the rite was later enjoined as part of the memorial worship of the sanctuary (Ex. xxx, 27), the ingredients of the incense also being laid down, and it was to be burned on a special altar called the altar of incense. This altar was made of acacia

(shittim) wood, and was overlaid with gold, hence it was called the golden altar, as dis¬ tinguished from the altar of burnt-offering, which was made of brass. The incense was burned daily — morning and evening. The early Christian Church is not recorded as burning incense, but it came into use about the 5th century. Its use was abandoned in the Church of England in the reign of Henry VIII, but was revived by the High Church party late in the 19th century. It has always formed part of the ritual of the Catholic Apostolic Church (q.v.) founded by Edward Irving in 1835. Both the Greek and the Latin churches use incense in worship. Among Catholics it is used at every high mass, at consecration of churches, in processions, funerals, etc. In Europe frank¬ incense is commonly employed as incense, but in America the modern ingredients are usually benzoine, gum olibanum and styrax, and some¬ times balsam and powdered bark of cascarilla. This mixture is allowed to fall on hot charcoal in the censer and burns promptly.

INCEST, in law, cohabitation or sexual in¬ tercourse between persons so related that they cannot legally marry. It is a punishable of¬ fense in the United States and many other countries. Although incest is not an offense by the common law, sexual intercourse or an at¬ tempt thereat between certain near relatives is punishable in England by statute, passed in 1908. Until 1887 it was punishable in Scotland by death, but the usual sentence was imprison¬ ment for life.

INCH, James Robert, Canadian educator: b. Petersville, New Brunswick, 1835; d. 1912. He. received his education at Mount Allison University and from 1864 to 1878 was principal of Mount Allison Ladies' College. From 1878 to 1891 he was president of the University of New Brunswick and also served as superintend¬ ent of education of New Brunswick. He was vice-president of the Dominion Educational As¬ sociation in 1895. In 1906 he was prominent in the movement seeking to effect a union of the Congregationalists, Methodists and Presby¬ terians of Canada and in 1907 he took part in the Imperial Educational Conference at London. In 1909 he resigned the post of superintendent of education.

INCH, a lineal measure, the 12th part of a lineal foot, anciently said to consist of three barley corns. A statute of Edward II (1324) makes, "three barley corns round and dry,® the definition of an inch. The English inch is equal to 2.54 centimeters. The old Scotch inch was slightly longer than the English. The ordinary divisions of an inch are halves, quarters, eights, etc.; the Romans divided them into twelfths. For micrometer measurements divisions into hundredths and thousandths are customary, ten- thousandths being about the limit. Reduced to centimeters the square inch is 6.4516, and the cubic inch 16.387.

INCH-WORM. See Measuring-worms.

INCHBALD, Elizabeth Simpson, English actress, dramatist and novelist: b. Stanning- field, Suffolk, 15 Oct. 1753; d. London, 1 Aug. 1821. In 1772 she

was married to an actor named Inchbald, and the same year went upon the stage. She retired from this profession in 1789 and devoted herself to literature. Some of her plays, which belong to the class of high

comedy, still keep the stage, but her greatest success was the novel 'A Simple Story5 (1791), which was translated into several languages. She also wrote (Nature and Art,5 and among her plays may be cited (Such Things Are5 ; 'The Married Man5; (The Wedding Day5; 'The Midnight Hour5 ; 'Every One Has His Fault5 ; and 'Lovers' Vows.5 See A Simple Story.

INCHCAPE ROCK. See Bell Rock.

INCHCOLM, mch'kom (ISLE OF CO¬ LUMBIA), Scotland, a small island in the Firth of Forth, off the coast of Fife, from which it is separated by a channel about one mile wide. The island is about 1,000 yards long by about 600 in width and is rich in ecclesiastical ruins, especially an abbey of the Canons of Saint Augustine, founded here in 1123. The monastery suffered greatly in the wars between England and Scotland. Consult Simpson, 'Himona and the Islands of the Forth5 (Edinburgh 1861).

INCINERATION. See Cremation.

INCISED MEANDERS. See Meanders.

INCLINATION, Magnetic, or MAG¬ NETIC DIP. See Dipping Needle.

INCLINED PLANE. The inclined plane

is a mechanical device for overcoming a part of the weight in lifting or raising a heavy body. When the plane is level it supports or opposes the whole of the weight or attraction of gravitation exerted upon the body. As one end of the plane is raised the plane supports less and less of the weight, until, when the plane stands vertical, it supports none at all. To move a body up an inclined plane, and so raise it to a higher elevation, only such force is needed as to overcome that part of gravity which is

not supported by the plane. Therefore the smaller the angle of elevation of the plane from the horizontal, the less power will be needed to move it up the plane, and the longer the plane will have to be to raise it to a given height ; and, conversely, the steeper the plane, the more power must be used, but the quicker will the elevation be accomplished, and the shorter the plane required. The equation of the inclined plane is

Power X length = weight X height.

The principal of the inclined plane is most commonly and universally applied in the screw, which is no more than an inclined plane wrapped around a cylinder. Other applications are the cam and the wedge.

INCLO.SURE, in law, the fencing in of common lands by the lord of the manor, by which he extinguishes the common rights. (See Commons). Consult Gonner, 'Common Land and Inclosure5 (New York 1912).

INCO-ORDINATION, a lack of control

over muscular movements. In inco-ordination there may be (1) some interruption in the paths of the. motor impulses as sent from the motor areas in the brain to the muscle-centres in the spinal *cord; or inco-ordination • may result from (2) deficiency in the incoming sensory paths, thus causing an interference with the sense of muscular localization. One of the most familiar illustrations of inco-ordination is seen in acute alcoholism. In this condition the lack of motor control is largely due to inter¬ ference in the conduction-paths of motor im-

pulses. The intoxicated person is unable to control the movements of his hands to make them perform in their wonted fashion ordinary acts. In locomotor ataxia, a disease in which inco-ordination of the

movements is very strik¬ ing, the inco-ordination seems to result from a loss of muscle and joint sense, whereby the patient's mind is rendered unable accurately to realize just where his limbs are. Inco-ordina- tion *is a symptom of a number of different forms of poisoning, and is extremely character¬ istic in diseases such as locomotor ataxia, mul¬ tiple sclerosis, chorea and paralysis agitans. It also characterizes a number of infantile dis¬ eases.

INCOMBUSTIBLE FABRICS, asbestos cloth or ordinary cloths immersed in tungstate of soda, phosphate or sulphate of ammonia, or silicate of soda, so as to render them fire¬ proof. Such fabrics are used mostly for cur¬ tains and scenery in theatres and in most cities asbestos fire curtains are required in all theatres. Fire-proofing engineers, however, maintain that too much faith must not be placed in such materials as most of them lose their efficiency with the lapse of time after application. Con¬ sult (Fire Tests with Textiles) (in (Red Book No. 129,) issued by the British Fire Prevention Committee, 1908) and (Fireproofing Cotton Goods) (in Vol. VI, No. 2, Quarterly of the National Fire Protection Association, Boston).

INCOME. Superficially, nothing seems easier to define than a man's income. It is the money which he has to spend in a given period of time, say a week, a month or a year. Fundamentally, however, few things are more difficult to define. A spendthrift may easily spend more than his income, thereby depleting the fund of wealth previously accumulated either by himself or by some one else and put into his possession. His real income would not exceed such a sum as he could spend without depleting its source. Many a small business man and many a small farmer, though not classified as spendthrifts, may easily spend more than their income by failing to allow for the depreciation of their capital or the depletion of their spil.

A business man, however, may allow one form of capital to depreciate by failing to replace it,

preferring rather to spend the money which would be necessary for that purpose for some other form of equipment, thus maintaining the total amount of his capital intact. What he spends in order to maintain his capital cannot be considered as income. Similarly, a farmer may allow his soil to become slightly depleted, provided he spends the money which would be necessary to maintain it for some other form of equipment which then becomes a part of his capital. Many of our pioneer farmers found that method necessary in order to equip their farms with buildings, wells, fences, tools and live stock.

On the other hand, it is not uncommon for a man to live frugally and spend a part, of his income, not for purposes of consumption, but for the purpose of adding to his capital. Such increments of capital are usually called parts of his income, but some prefer to call them sources of deferred income. If, for ex¬ ample, a man should save $1,000 out of this year's receipts and spend it for new equipment,

adding that amount definitely to his total fund of capital, we should ordinarily say that his income for the year included that $1,000, in addition to the amount actually spent for pur¬ poses of consumption. Others would say that this $1,000 is not a part of this year's income, but that it becomes a source of income in future years, that, in short, he had deferred his income from this year until future years. The present writer does not approve of this usage, preferring to call the $1,000 a part of this year's income.

Before attempting a final definition of a man's income, it is necessary to distinguish be¬ tween his money income and his real income. His money income is the amount of money which he can spend in a given period of time, without increasing or decreasing his wealth, that is, leaving him at the end of the period with the same quantity of wealth as at the beginning. His real income is the quantity of desirable objects which his. money income will enable him to purchase. In a time of rising prices, he will find that his real income is fall¬ ing even

though his money income remains the same, and in a time of falling prices he will find that his real income is rising if his money income remains the same. His real income, therefore, is the quantity of goods which he may consume in a given period of time with¬ out increasing or decreasing his fund of wealth, whereas his money income is the amount of money which he may spend under the same conditions.

It is a common mistake to attempt to define the national income as well as the individual's income in terms of money. In a time of rising prices it may appear as though the national in¬ come is enormously increasing. Stated in terms of money, our national income was greater in 1917 than in any previous year. Yet fewer consumable goods were produced in propor¬ tion to the population than for many years. Our wheat crop was short of the pre-war average by at least 150,000,000 bushels, yet its total value as stated in terms of money was the greatest in our history. The same may be said of a large number of our most important products outside the list of war materials. In terms of consumable articles, or of articles which contribute anything to otlr national well¬ being in normal times, our national income is very small. In terms of money values it ap¬ pears to be very large, but this appearance is altogether deceptive. Needless to say, the well¬ being of society is not measured by the number of pieces of money which are handed about in the process of exchange. It is measured in terms of products. In short, our national in¬ come is that part of our national production which is left after we have replaced all deteri¬ oration or depletion of our national equipment. It is this which determines how well we may live without depleting our national wealth.

Thomas N. Carver,

Professor of Political Economy, Harvard Uni¬ versity.

INCOME TAX. Definition.— An income tax is a tax, the amount of which is determined with reference to the

income of the taxpayer.

The Income Tax as a Theory of Taxation. — The underlying theory of taxation has un¬ dergone many changes. But to-day the com-

monly accepted principle of taxation is that of faculty or ability — the principle that each in¬ dividual should be held to help the state in pro¬ portion to his ability to help himself. No one form of taxation entirely meets this theoretical test, but under modern conditions income is the best test and, in most cases, measures the abil¬ ity of the individual better than most other forms of taxation. Quite properly, however, no modern tax system relies entirely upon an income tax. The income tax is therefore a method of taxation which should form an im¬ portant part in any system of taxation, but which should not be the sole method of taxa¬ tion.

. Many perplexing questions arise in the prac¬ tical application of the income tax. What is income? Is it gross or net income? Are gifts, inheritances and .. speculative revenues in¬ cluded? Is money income only referred to, or, also, the equivalent of money income? Is in¬ come derived from labor or services to be put on a par with income received from invested capital, inheritances or speculations? Is the small income to be taxed in the same propor¬ tion as the large? Is the man of no family to be taxed in the same proportion as one having dependents? These questions not only bring out many of the perplexing questions which arise in. connection with the income tax but also emphasize the necessity of incorporating in a well-rounded system of taxation other tests of ability to pay, such as property, product, ex¬ penditure and even polls.

In addition to these more or less abstract questions as to the fairness of the income tax, we must

consider the practical question of as¬ sessment. The income, as a matter of fact, is notoriously the most difficult of all taxes to as¬ sess with scrupulous justice and accuracy.

II rightly drawn and efficiently administered the income tax is undoubtedly an indispensable part of any progressive system of taxation.

History of the Income Tax. — The income tax is not entirely a modern invention, although the part which it played in general taxation be¬ fore the. last century was an insignificant one. Fhe Italian cities of the Middle Ages, particu¬ larly Florence, developed an income tax. There are. some traces of the income tax in England during the 17th ^entury. . In France, however, the income tax was considerably developed be¬ fore the 19th century. The dixieme or 10th, en¬ acted in. 1710 by Louis XIV, was a real income tax, which finally failed and disappeared because of administrative defects. The development of the income tax. in Florence in the 15th century and in France in the 18th century was in each case the result of an advanced economic devel¬ opment and in each case failed because of de¬ plorably inefficient administrative methods.

(1) England. — Although the principle of taxing persons according to the size of their in¬ comes had existed in one form or another in England for many centuries, the first English income tax in the modern sense of the term was originated by William Pitt in 1799. It divided incomes into four main schedules and made al¬ lowances for children and life insurance pre¬ miums. This law was repealed in 1802.

In 1803 an income tax strikingly like the one now in existence was imposed, known as Ad¬ dington's Property and Income Tax. It pro¬ vided for particular returns from particular

sources and imposed a flat rate of one shilling on the pound, thus omitting entirely the pro¬ gressive principle. This law, primarily a war tax, was

repealed in 1815.

In 1842 Sir Robert Peel revised the tax and although continued for temporary periods and although there was much talk of abolishing it, Gladstone really established, it as a part of the fiscal system of England in 1855* It has re¬ mained in operation, with certain modifications, up to the present.

The classes of taxable income in the English income tax are as follows: (a) Income aris¬ ing from the ownership of lands and houses; (b) income arising from the use or occupation of land; (c) income from interest, annuities or dividends; (d) income from any profession, trade, employment or vocation; (e) income from public office or employment.

The tax is levied at the rate of 5 per cent on incomes exceeding £160 ($800). Certain abate¬ ments are granted, however, so that the tax is graduated in amount up to that on an income exceeding £700. On incomes less than £800 an abatement of £10 for each child is also given.

In the budget of 1909, David Lloyd George introduced the new principle into the income tax, that of a super-tax. This was fixed at 2j4 per cent .on those portions of incomes over £5,000 which exceed £3,000. There was also in¬ troduced the principle of differentiation, which covers that rate of tax on earned incomes as compared with unearned incomes.

The English income tax has been a success and is now an integral part of the tax system of the country. In the fiscal year 1913—14, it raised £47,249,000 or 23.8 per cent of the total revenue of the United Kingdom. Since the out¬ break of the war the income tax has become an even more important source of revenue. On 5 Dec. 1914, the rates were doubled. The reve¬ nue derived from the income tax for 1915-16 amounted to over £128,000,000, or more than 38 per cent of the total revenue. The Budget for 1916-17 estimates the amount to be derived from the income tax at £195,000,000.

In the budget for 1916-17 the rates of the in¬ come tax were still further raised and the scale now stands as follows:

Rates for earned income:

Not exceeding £500 .

Exceeding £500, but not exceeding £1,666.' . Exceeding £1,000, but not exceeding £1,500 Exceeding £1,500, but not exceeding £2,000

Exceeding £2,000 .

Rates for unearned income:

Not exceeding £500 .

Exceeding £500, but not exceeding £1 '666 Exceeding £1,000, but not exceeding £1,500 Exceeding £1,500, but not exceeding £2,000

Exceeding £2,000 .

Exemptions and abatements:

Not exceeding £130 .

Exceeding £130, but not exceeding £430. '

Per cent

. Hi

. 12*

. 15

. 181

. 25

. 15

. 171

. 20

. 22$

. 25

. . . Exemption Abatement of

Exceeding £430, but £100.

not exceeding £600.

Abatement of

Exceeding £600, but not exceeding £700. Abatement of

Several special war concessions have been made to compensate for reduction of income due to. the war. For example, instead of aver¬ aging income for the three years preceding the year of assessment, the latter may be included as one of the three. Again, anyone whose in¬ come is less by. 10 per cent than that for which he is assessed is entitled to a refund. Special reductions have also been made to persons

serving in the army or navy, the Red Cross Society or other similar organizations. Per¬ sons whose income does not exceed £700 ob¬ tain an abatement of £25 for every child under 16 years of age.

Life insurance premiums, up to an amount not exceeding one-sixth of the total income, may, with certain limitations, be deducted from income before assessment.

Other changes in the income tax have tended to smooth out the rough places and make it more easily workable and flexible.

The reasons for the success of the English income tax may be summed up as follows: (a) Blending of regard for local interests and fis¬ cal productiveness ; (b) ingenious system of ad¬

ministration ; (c) absence of inquisitorial pro¬ cedure; (d) system of stoppage at the source; (e) moderations of rate; (f) principle of dif¬ ferentiation; (g) principle of progression.

(2) Neiv Zealand. — New Zealand was the first of the British colonies to adopt a com¬ prehensive income tax. It was first adopted in 1891. The tax applies only to incomes above £300. The rate on the amount of income be¬ tween £300 and £1,300 is 2*4 per cent, and over £1,300 is 5 per cent. In 1913-14 the income tax yielded £554,271, or 4.5 per cent of the total rev¬ enues of the colony (but 9.4 per cent of the rev¬ enue raised by taxation). The total cost of as¬ sessment and administration was only 1.31 per cent. The total yield of the tax in New Zea¬ land is small because incomes derived directly from land are exempt from the income tax, land being the subject of a special tax assessed on capital value. Since the war began the rate of the tax has been increased by one-third.

(3) Australia. — Each of the six Australian colonies has an income tax. That in New South Wales was introduced in 1895; Queens¬ land in 1902; South Australia in 1884; Tasma¬ nia in 1902; Victoria in 1895; Western Austra¬ lia in 1907.

The laws in the various colonies are gener¬ ally similar. The chief difference is that some distinguish sharply between earned and un¬ earned incomes, or as it is sometimes put, in¬ come from property and income from personal exertion. In some of the colonies the income tax is closely connected with and complicated by the land tax. The amount of exemption varies from £100 to £200. The rate of taxation varies from 1 to 5 per cent. The maximum is usually 5 per cent, which is levied only on the highest incomes. In each of the colonies the income tax is fiscally important and in South Australia brings in as much as 55 per cent of the total revenues.

(4) Germany. — The German Empire, as such, does not levy any income tax. Each of the 26 German states

has a complete or partial in¬ come tax. The systems are extremely varied, but all partake to a considerable extent of the prevailing militaristic organization.

Prussia is not only the most important, but in some respects most progressive, and needs special comment, because the income tax there has many excellent features. The Prussian in¬ come tax was first provided for in the law of 1891. Incomes of less than 900 marks are ex¬ empt. Certain other exemptions are granted, such as military pay, sinking funds and some other special forms of income.

The tax is very finely graduated, beginning

at the lowest class at only .57 per cent. From this rate it increases by very small increments to 3.15 per cent in the class 9,500 — 10,500 marks. For higher incomes the rate is ap¬ proximately 4 per cent. For companies with limited liability the rate is very slightly higher. Persons having a taxable income of not more than 3,000 marks may deduct 50 marks for each dependent.

The method of administration is inquisito¬ rial in the extreme and a variety of checks are provided. Each person is required to make out a declaration, but the amount of income tax¬ able is decided by one tribunal for those having incomes of less than 3,000 marks and another for those of greater incomes.

In some municipalities local taxes are as¬ sessed on the basis of the royal tax returns, in some cases the taxes amount to 100 to 200 per cent of the government income tax. The gov¬ ernment, in order to meet certain deficiencies, has added a super-tax, varying from 5 to 50 per cent in various income clauses, and for per¬ sons and corporations.

The average annual yield of the Prussian income tax during the five years ending 31 March 1912, was 298,120,000 marks or 70.8 per cent of the income of Prussia from taxation. Later figures, owing to the

war, are not avail¬ able.

(5) Other Countries. — Practically every im¬ portant industrial and commercial country of the world has developed an income tax. If space permitted, it would be especially worth while to review the legislation of France, Italy and Switzerland. In practically every country where it has been tried the income tax has be¬ come a permanent and important part of the fiscal system.

In South America, however, the principle of the income tax has not been popular and the only country that has had an income tax for several years is Brazil. In Bolivia, there is a tax on dividends of certain corporations, but nothing in the nature of a comprehensive in¬ come tax law. In Uruguay there is a tax on revenue derived from certain rents. In one or two other countries the income tax has been proposed, but has not met with much favor.

The Income Tax in the United States. — Some difference of opinion exists among au¬ thorities on taxation as to whether certain early colonial taxes in this country were really income taxes in the modern sense of the term. In the 17th century the system of taxation in Massachusetts colony contained certain ele¬ ments resembling an income tax. Certain of these principles have continued in operation there even down to the present.

Similarly in the colonies of Connecticut, Rhode Island, New Hampshire, Vermont, Vir¬ ginia and South Carolina, there are to be found many expressions in their tax laws indicating that ^faculty® or ^ability® in income, was to be the chief measure in determining the amount of tax to be paid.

Since the formation of the Union, income taxes have been in force for varying periods in at least 20 States. This form of taxation has been tried in almost every known form. Wher¬ ever tried the State income tax has always been an almost unqualified failure. There has been just one exception to this general experience and that is in Wisconsin, where

conditions are

in many respects entirely abnormal. A study of the history of the income tax in our States leads to the conclusion that the failure of the tax has been due to the administration of the laws. This in turn may be attributed to four causes: (1) The method of self-assessment;

(2) the indifference of State officials; (3) the persistent effort of taxpayers to evade the tax; and (4) the nature of the income. State lines mean little in this country and usually income, both personal and corporate bears very little relation to State boundaries. Experience seems to teach, therefore, that the income tax cannot effectually be applied in this country on a State¬ hood basis.

(1) The Civil War Income Tax. — The first and practically the only experience of the Fed¬ eral government with income taxation was pri¬ marily as a war tax during the period of 1861— 72. The law as first passed provided for a tax of 3 per cent on incomes from *$600 to $10,000; of 5 per cent on those from $10,000 to $50,000 and of 7y2 per cent on those over $50,000. By later amendment these rates were changed, and the exemption was raised in 1867 to $1,000. The provision for the income tax, which was merely a part of the general revenue act, was not re¬ enacted in 1872 and ceased to exist as a revenue measure. Although little administrative ma¬ chinery was provided and despite the fact that the law was clumsily and unskillfully drawn, it may be said to have been fairly successful. Dur¬ ing the years 1863 to 1873 a total of $376,150,- 204 was raised, amounting to about 20 per cent of all internal revenue. In 1865, 28.3 per cent of the revenue was raised in this way. Even so, the tax probably brought out only a small proportion of the total taxable income.

(2) The Federal Income Tax of 1894. — The second income-tax provision in this country be¬ came a law on 28 Aug. 1894. It provided a tax of 2 per cent upon all incomes exceeding $4,000. There were many defects and incongruities in the act. For example (1) income of less than $4,000 from corporate dividends was taxed, in¬ come from other sources not taxed; (2) per¬ sonal property by gift or inheritance was taxed, inheritance of real estate was not taxed; (3) inheritance of personal property was taxed 2 per cent; (4) farmers were not taxed upon produce retained and consumed by them; (5) no provision was made for collection at the source; (6) no allowance was made for size of families.

Immediately the constitutionality of the tax was called into question in the case of Pollock vs. Farmers' Loan and Trust Company (157 U. S. 429; rehearing 158 U. S. 601). The con¬ stitutional provision involved was the follow¬ ing:

^Representative and direct taxes shall be ap¬ portioned among the several States, which may be included with this Union according to their respective numbers, which shall be determined by adding to the whole number of those bound to service for a term of years and excluding In¬ dians not taxed, three-fifths of all other per¬ sons.® *

((No capitation or other direct tax shall be

- Important decisions preceding the one in question on this point were: Hylton vs. U. S. — 3 Dallas 171 (1796); Pacific Insurance Co. vs. Soule — 7 Wallace 435 (1868); Veazie Bank vs. Fenno, 8 Wallace 533 (1889); Scholey vs. Rew — 23 Wal¬ lace 331 (1874); Springer vs. U. S. — 102 U. S. 586 (1880).

laid unless in proportion to the census herein¬ before directed to be taken.®

The court decided after a rehearing, by a majority of one, that the income tax as a whole was unconstitutional. The essential reasons as stated by

the court were as follows :

((First. We adhere to the opinion already announced that taxes on real estate being un- disputably direct taxes, taxes on rents or in¬ come of real estate are equally direct taxes. Second. We are of opinion that taxes on per¬ sonal property, or on the income of personal property, are likewise direct taxes. Third. The tax imposed by sections twenty- seven to thirty- seven, inclusive, of the act of 1894, so far as it falls on the income of real estate and of per¬ sonal property, being a direct tax within the meaning of the Constitution, and, therefore, unconstitutional and void because not appor¬ tioned according to representation, all those sections, constituting one entire scheme of tax¬ ation, are necessarily invalid.®

(3) The Sixteenth Amendment. — In a spe¬ cial message to Congress on 16 June 1909, Presi¬ dent Taft recommended that Congress propose ((an amendment to the Constitution, conferring the power to levy an income tax upon the na¬ tional government without an apportionment among the States.® The amendment as finally agreed upon by Congress for submission to the several States was as follows :

,((Congress shall have the power to lay and collect taxes on income from whatever source derived, without apportionment among the sev¬ eral States, and without regard to any census or enumeration.®

This amendment was ratified by 42 States and the seemingly impossible, an amendment to the constitution, had been accomplished. The amendment became a part of the constitution on 25 Feb. 1913.

(4) The Income Tax of 1913. — The income tax now in operation in this country became a law on 3 Oct. 1913. It marks a new era in the history of American finance. It aims to re¬ dress the inequality of taxation which was a predominant feature of the American fiscal system.

(a) Who is liable to the Income Tax? The law applies

to every American citizen, includ¬ ing those resident abroad. It applies to every person residing in this country. It applies to non-residents having incomes obtained from this country.

The law applies to every corporation, joint- stock company or business association (with a few exceptions) in the United States. Double taxation is avoided by permitting individuals to make deduction for income on which the tax has already been paid.

(b) What is taxable income? The law of 1913 states that net income ((Shall include gains, profits and incomes derived from salaries, wages, or compensation for personal services of whatever kind, and in whatever form paid ; or from professions, vocations, businesses, trade, commerce, or sales or dealings in prop¬ erty, whether real or personal, growing out of the ownership or use of or interest in real or personal property; also from interest, rents, dividends, securities, or the transaction of any lawful business carried on for gain or profit, or gains or profits and income derived from any

source whatever, including the income from, but not the value of, property acquired by gift, be¬ quest, devise, or descent.®

The term income in this connection is con¬ fined to actual money income. The general view is that income is regular and periodic and that irregular returns in the shape of inherit¬ ances should be reached by the inheritance tax. Profits from transactions in stocks and real estate are included only when realized. A clear distinction seems to be made between gross and net income.

(c) The Tax Rates. — The tax applies to in¬ dividual incomes only when they exceed $3,000 ; $4,000 in case of married persons. There is no minimum exemption in case of corporations. The tax is a

graduated one, and the rates are progressive. A tax of 1 per cent is imposed on all incomes exceeding the minimum, and an ^additional® tax is imposed on higher incomes in accordance with the attached schedule.

On amounts

And

exceeding

not over

$20,000

$50,000

50 , 000

75,000

75,000

100,000

100,000

250,000

250,000

500,000

500,000

(d) Stoppage at Source. — In respect to collection this law is unlike any preceding law in this country. It provides that all payers of income, whoever they may be, shall deduct the annual legal tax. There are three excep¬ tions only: (a) dividends on stocks of corpora¬ tions; (b) interest on bonds; (c) payments to a corporation.

(e) Certain Administrative Features. — It is specifically provided that no income return shall be divulged. Every person having an income in excess of

$3,000 must file on or before 1 March under oath a complete return of his in¬ come. Corporations are required to file this statement at regular periods. Delay or fraud are heavily penalized in the case both of indi¬ viduals and corporations.

(5) Amendments of 1916— In the revenue act of 1916, an entirely new income tax law takes the place of the one enacted on 3 Oct. 1913. Essentially the law is the same, but there are some modifications which are of consider¬ able importance. The most significant changes are a doubling of the ((normal® rate and in¬ creases in the ((additional® rates, especially those falling upon the very large incomes. The normal rate has been raised from 1 to 2 per cent. The following table compares the old and the new rates :

Part of Income to Which Applicable.

Tax,

Old law New law Per cent

$20,000 to $50,000

$20 , 000 to

$40,000

1

50,000 to 75,000

40 , 000 to

60,000

Z

75,000 to 100,000

60 , 000 to

80,000

3

A

100,000 to 250,000

80,000 to

100,000

4

XT

250,000 to 500,000 ,

100,000 to

150,000

5

500 , 000 to any excess

150,000 to

200 , 000

0

200 , 000 to

250,000

7

250,000 to

300,000

8

300 , 000 to

500,000

9

500 , 000 to

1 , 000 , 000

10

1 ,000,000 to 1,500,000

11

1,500,000 to 2,000,000

12

2 , 000 , 000 to any excess

13

A serious attempt was made in Congress to lower the $3,000 exemption, but this was finally

retained as in the original act. Under the old law it was held that profit, however made, must be included; the new law allows for losses in incidental transactions, not exceeding profits of a similar kind. Non-resident aliens are now required to pay the tax so far as it concerns interest on bonds with underlying assets situated in the United States.

The new law, then, aside from the increase in rates, makes no great changes in substance. Practically all of the changes that are made are for the better and represent a natural develop¬ ment following administrative experience. The changes in form are much more noticeable and extensive. The arrangement of the old law was unfortunately haphazard and unsystematic; ref¬ erences were unnecessarily difficult, various terms and phrases were ambiguous, and there was a looseness in the use of even technical terms that was very confusing. The recast law is a great improvement in regard to these matters.

(6) Critique of the Law. — The theory of the income tax as a part of our fiscal system may be accepted without further question. The ap¬ plication of that principle of taxation in the present law has,

however, been seriously criti¬ cised. Without argument, the main points of criticism may be briefly summarized as follows : (a) The exemption of incomes below $3,000, and for families below $4,000, is undoubtedly high. If the exemption were lowered, many ad¬ ditional persons would be added to those taxed, but it is doubtful if the amount received would be commensurate with the task of collection, (b) The stoppage-at-the-source provision throws much of the burden of collecting the govern¬ ment's revenues upon banks, trust companies, corporations and other agents. To meet this difficulty it was suggested that information-at- the-source be substituted for stoppage at the source. The law, however, remains unchanged in this respect. (c) Certain discrimination against incomes received in the form of cor¬ porate dividends. The phraseology of the law also requires double and even multiple taxing of holding companies, (d) There is double taxa¬ tion of both resident aliens and non-resident citizens, (e) The principle of differentiation be¬ tween funded and earned incomes, common in most other countries, is not introduced, (f) The monetary conception of income is almost exclusive and no account is taken of income in the shape of farm produce or house rent, con¬ sumed by the producer or owner.

(7) Practical Results of the Income Tax. — The success of any tax may be measured by the net amount of revenue collected, by the equality of assessment, and by the friction between the tax collecting authority and the tax payers. The federal income tax is as yet too new to warrant a final judgment. The amount of revenue col¬ lected has been considerable. The cost of col¬ lection has, however, been large. The friction between the tax collecting authoritv and the taxpayer has undoubtedly been greater than is warranted. It will undoubtedly decrease as the collectors gain experience and ability in levying the tax.

During the fiscal year 1915-16, 366,443 cor¬ porations reported. Of these, 190,911 showed an aggregate income of $5,184,492; 389 upon which there

was assessed income tax in the ag¬ gregate sum of $51,844,423.89; 175,523 returns

showed an operating deficit, or no taxable in¬ come. During the fiscal year 1915-16, there was actually collected $56,972,720.88.

The following comparison shows the in¬ creased efficiency of the tax and the administra¬ tion of it during the past two years :

1915 1916

Returns received . 299,445 366,443

Taxable returns . 174,205 190,911

Total taxes assessed. .. . $38,986,952.18 $58,549,081.91

Per cent increase . . 66.5

The results of the personal income tax were larger than those from the corporate income tax, and are extremely interesting in their range and distribution. Income tax collections from individuals amounted to $67,943,594.63 for the fiscal year 1915-16, as against $41,046,162.09, in the fiscal year 1914-15, and $28,253,534.85 for the fiscal year 1913-14.

The following table gives the amount of normal and additional tax collected in the last two years, 1915 and 1916:

come tax probably costs not less than $1,950,000 or 1.56 per cent of the amount taxed.

Bibliography. — Black, Henry C., (A Trea¬ tise on the Law of Income Taxation Under Federal and State Laws) (Kansas City, Mo., 1913; 2d ed., 1915); Blakey, R. G., (Amending the Federal Income Tax5

(Annals of the Amer¬ ican Academy, Vol. 58, pp. 32–43, March 1915) ; Bomboy, Rene, (L'impot sur le revenue en Prusse) (Paris 1908) ; Bullock, C. J., (Direct and Indirect Taxes in Economic Literature 5 (Political Science Quarterly, Vol. VIII, 1898) ; Bullock, Charles J., (The Origin, Purpose and Effect of the Direct–tax Clause of the Federal Constitution5 (Political Science Quarterly, Vol. XV, p. 217) ; Cohn, Gustav,

(Income and Property Taxes in Switzerland5 (Political Science Quarterly, Vol. IV, 1889, No. 1, p. 37) ; Caillaux, J., (L'impot sur le revenue5 (Paris 1910) ; Dovell, (Acts Re¬ lating to the Income Tax5 (6th ed., London 1908) ; Dunbar, C. F., (The New Income Tax5

Income tax, normal .

Income tax, additional:

Net incomes —

$20,000 to $50,000 .

$50,000 to $75,000 .

$75,000 to $100,000 .

$100,000 to $250,000 .

$250,000 to $500,000 .

Exceeding $500,000 .

Accepted offers in compromise, etc

Total .

1915

$16,559,492 93

4,106,673 36 2,500,890 33 2,102,927 01 5,949,104 55 3,328,423 78 6,439,004 54 63,645 59

$41,046,162 09

1916

$23,995,777 28

6,091,775 71 4,071,361 94 3,623,472 62 10,936,326 15
6,393,858 64 12,647,862 91 183,159 38

$67,943,594 63

Increase

$7,436,284 35

1,985,102 35 1,570,471 61 1,520,545 61 4,991,221 60
3,065,434 86 6,208,858 37 119,513 79

$26,897,432 54

Perhaps as interesting to the general student of economics and sociology, as to the expert in taxation, is the range of incomes from which the tax was collected. The following table gives the number of persons in each income group:

Income group

$3 , 000 to

$4,000…

4 , 000 to

5,000…

5 ,000 to

10,000. . .

10,000 to

15,000. . .

15,000 to

20,000. . .

20,000 to

25,000. . .

25,000 to

30,000. . .

30,000 to

40,000. . .

40 , 000 to

50,000. . .

50,000 to

75,000. . .

7 5 , 000 to

100,000. . .

100,000 to

150,000. . .

150,000 to

200,000. . .

200,000 to

250,000. . .

250,000 to

300,000. . .

300,000 to

400,000. . .

400 , 000 to

500,000. . .

500 , 000 to

1,000,000. . .

1 , 000 , 000 and over Married .

o— i f Men . . . . . .

smgle \ Women . _ .

Married women rendering separate return

Number

69,045

58,949

120,402

34,102

16,475

9,707

6,196

7,005

4,100

4,791

2,056

1,793

724

386

216

254

122

209

120

266,153

47,583

22,916

4,819

Total

336,652

The function of collecting the federal in¬ come tax is lodged in the office of the Commis¬ sioner of Internal Revenue. This office also collects revenues on liquors, tobacco, documents, proprietary medicines, playing cards, etc. It is, therefore, impossible to say exactly what is the cost of collecting the income tax. Allowing a reasonable overhead the collection of the in-

(Quarterly Journal of Economics, Vol. IX, 1895) ; Falkner, Roland Post, (Income Tax Statistics5 (Boston 1915; reprinted from Quar¬ terly Publications of the American Statistical Association, June 1915) ; Foster, Roger, (A Treatise on the Federal Income Tax under the Act of 19135 (Rochester, N. Y., 1913) ; Frost, Thomas Gold, (A Treatise on the Federal In¬ come Tax Law of 19135 (Albany, N. Y., 1913) ; Hill, Joseph A., (The English Income Tax5 (Economic Studies, Vol. IV, Publications of American Economic Association) ,. (The Civil War Income Tax5 (Quarterly Journal of Economics , Vol. VIII, p. 416), and (Income Tax of 1913 5 (Quarterly Journal of Economics, Vol. XXVIII, pp. 46-68, November 1913) ; Wield of the Income Tax5 (Journal of Political Econ¬ omy, Vol. XXII, pp. 696-698, July 1914) ; Kennan, K. K., (Income Taxation5 (Milwaukee 1910) ; Kiesel, K., (Die Gesellschaften mit beschranktey Haftung und ihre Heranziehung zur Staatseinkommensteuer in Preussen5 (Ber¬ lin 1905) ; Kinsman, Delos O., (Present period of income tax activity in the United States5 (Quarterly Journal of Economics, Vol. XXIII 1909, p.

296), (The Income Tax in the Common¬ wealths oi the United States5 (Publications of the American Economic Association, November 1903V (Inpome Taxation5 (Milwaukee 1910); Marce. Victor, (LTmpot sur le Revent en Autriche5 (1907); Mann and Jedlicka,

(Berlin 1884) ; Meyer, R., and others, (Die direkten Personalsteuern) (Vienna 1907) ; Meyers, H. D., (Income-Tax for Business Men) (London 1916) ; Moll, Bruns, (Zur Geschichte der englishchen und amerikanischen Vermo- gensstenern' (Munich and Leipzig 1912) ; Price, W. H., (British Income Tax) (Quarterly Journal of Economics, Vol. XX, February 1906, pp. 287-300) ; Robinson, (Law Relating to In¬ come Tax' (2d ed., London 1908) ; Schiff, M. L., (Some aspects of the Income Tax' (Annals of the American Academy, Vol. LVIII, pp.- 15-31, March 1915) ; Seligman, Edwin, R. A., (Essays in Taxation' (2d ed., 1895), Progressive Taxa¬ tion in Theory and Practice' (2d ed., 1908), (The Income Tax' (2d ed., 1914) ; Tivaroni, J., (Le imposte dirette sulla richezza mobiliare e sul reddito' (Rome 1904).

Edward E. Pratt,

Chief of Bureau of Foreign and Domestic Com¬ merce, Washington, D. C.

INCONNU, in-ko-nu', Fr. an-ko-nii', the French-Canadian name of a fish of the rivers that enter the Arctic Ocean (Stenodus mac- kenzii), intermediate between a salmon and a whitefish in its characteristics, and of great value as food for the people of that region. Specimens often weigh 10 to 15 pounds.

INCORPORATION, (1) the act of form¬ ing a legal corporation, or the body so formed. In England, incorporation is generally under the control of Parliament, corporations being created usually under

general statutes but some¬ times under special acts. They may be' created also by royal charter. In the United States they are created by Congress or the legislatures of the various States, usually under general statutes. The process of incorporation is sim¬ ple, consisting of filing a certificate of incor¬ poration with the proper officer, giving the names of the incorporators, directors, etc. By incorporation and compliance with other legal formalities, the association acquires rights sim¬ ilar to those possessed by a natural person. It can usually acquire and convey property, sue and be sued, make contracts, elect or remove officers or members, etc. It becomes a com¬ plete legal entity, distinct from the incorpor¬ ators or its members. The courts in the United States generally have power to determine whether any given petition for incorporation has met all legal requirements. The certificate of incorporation constitutes the charter of a corporation formed under general statutes, whereas in the case of a corporation formed by royal grant or special act, the grant or statute creating it constitutes the charter of the cor¬ poration.

(2) The act of uniting, as papers, by refer¬ ence in a will. Such papers in the case of a will are treated as part of it. See Corpora¬ tions, Legal

INCREMENT, The Unearned. See Sin¬

gle Tax.

INCUBATOR, a machine employed for the artificial hatching of chickens from eggs. Such devices were known to mankind from early ages. Pliny says that the Egyptians thus hatched 100,000,000 chickens a year. While artificial incubation was introduced into France and England during the 18th century, the in¬ cubator was brought to greatest perfection in the United States in the 19th century. The first

patented invention of the modern incubator was in 1847, but any practical success in such ma¬ chines cannot be met with before 1877, when Rouillier and Arnoult exhibited their hydro-in¬ cubators at the

Paris Exhibition.

There are two general classes of incubators, those in which hot air is used for the mainte¬ nance of heat and the application of it to the eggs, the other in which hot water serves this purpose. An automatic incubator of first-class make it equally efficient whichever of these two heating mediums is employed, but there are many different types of machine offered for sale, and the struggle between cheapness and efficiency sometimes leads to the sacrifice of the latter. There are certain essentials to an in¬ cubator which must be attained at any cost, and the machine that is deficient in any one of these is a failure, which means that it cannot guar¬ antee to yield of living chicks at least 80 per cent. The following may be enumerated as absolute requisites in a good incubator: (1) An egg chamber heated at a uniform temperature. It is best that the heat should come from above, when it is likely to be reverberated from the floor of the chamber and to more evenly affect the eggs, and may at once strike the germinal vesicle which from its lightness always rises to the upper surface of the yolk. (2) A source of heat which is self-regulative. The thermo¬ regulator in general use is actuated by an arm thrust within the egg chamber, and must be sensitive to an atmosphere of YD or at most 1° above that which is desired. (3) Good ventilation within the egg chamber, with some provision by which a certain degree of moisture may be maintained in the air. (4) Added to this, is a good turning apparatus. There are very many devices for effecting this purpose ; perhaps the best is that of a tray fitting exactly over the tray in which the eggs are laid, and by the turning of which the eggs may be replaced in a reversed position in the applied tray.

Of course the aim of a true incubator is to reproduce as accurately as possible by arti¬ ficial means the conditions of natural hatching under a setting hen. Thus the supply of heat and air must be conformable to a fixed standard. The temperature is to be kept unchanged at 100° F., or a little above that, by placing the incubator in a room not exposed

to draughts. To make accident in this respect impossible, a cellar, or specially built chamber, should be used, where no access of colder air may cause a fall in temperature, and a sensitive thermo-regu¬ lator furnish automatic means of preventing ex¬ cessive heat from destroying the vitality of the eggs. Moisture must be preserved in the air of the egg chamber that the eggs may not be shriveled by excessive evaporation. There must also be adequate ventilation, that no harmful gases sicken or kill the hatching chick. The turning of the eggs is considered necessary, be¬ cause the sitting fowl has the habit of so doing, but the eggs should not be disturbed after the 18th day, nor the incubator be opened after that date, until the hatch is completed. With regard to the moisture of the air, it has been considered proper after studying the progress of evapora¬ tion, as reckoned from the loss of weight in a fertile egg during the process of hatching, that a humidity of 45 per cent is the safest degree of saturation.

Various ways have been resorted to of tak¬ ing care of the chickens after they leave the in¬ cubator. They must at first be kept in an atmosphere of from 90° to 100°, at least for the first week, and heated places of shelter, known as brooders, must be prepared for them. There are many patterns and kinds of brooders, which are manufactured by the same firms as those which make incubators. The requisites for brooders are: (1) The temperature of the first week, as given above should be gradually low¬ ered. (2) The greatest diligence should be applied to secure and maintain cleanliness, dry¬ ness and good ventilation. (3) Their construc¬ tion should be such that newly-hatched chickens may always be in view. As the chicks grow to¬ ward fledging, facilities should ■be' afforded them to leave the brooder for exercise. See also Poultry. Consult Cooke, P., Successful In¬ cubation } (Los Angeles 1911) ; (Incubators and Chicken Rearers > (New York 1912) ;

Hawks, G. B., (Incubation and Brooding) (Clinton, Wis., 1909) ; Hurst, J. W., Successful Incuba¬ tion and Broodmg) (London 1911) ; Robinson, J H., Principles and Practice of Poultry Cul- ture> (Boston 1912).

INCUBUS (Lat. (

INCUMBRANCE, in general, any charge or burden upon real property held by any one other than the real owner. It thus includes judgments, leases, mortgages, mechanics' liens and even restrictive agreements. In a con¬ veyance of real property the seller usually agrees to a covenant against incumbrances un¬ der the terms of which he secures the buyer from any loss arising through any incumbrance upon the property at the time of the sale.

INCUNABULA, is a term applied by bibli¬ ographers to editions of books printed during the early period of the art, and is generally limited to works which appeared previous to 1500. The incunabula are divided into xylo- graphic and typographic, the former those printed from engraved blocks, the latter from movable types. Among the most highly es¬ teemed of the incunabula are those which are first editions of the ancient classics. See Bibliography.

INDAJA PALM. See Attalea.

INDEMNITY CONTRACT, a form of contract which, while not of recent origin, is becoming much more common than formerly. Such a contract is any form of written agree¬ ment between two parties whereby one party agrees to indemnify or save harmless the other party for loss or damage arising out of a particular transaction, or against some specified claim of a third party. It is an original con¬ tract and must be in writing in order to come within the statute of frauds. Such contracts are frequently made in the form of a mort¬ gage. But the substance and not the form is im¬ portant, and the courts have usually given them a liberal construction with the intent of fur¬ nishing the party to be indemnified with all of

the protection that was manifested in the minds of the contracting parties when the contract was signed. Indemnity contracts are not ad¬ verse to public policy; but they are not binding when they undertake to protect persons against the consequences of illegal acts. Like other contracts, they must be founded on a sufficient consideration, and furnish indemnity only to the party named as indemnitee, and do not extend to a person having only a contingent or collateral interest in the subject matter of the contract.

INDENTURE, in law, a form of deed be¬ tween two or more persons, usually executed in duplicate on one piece of paper or other similar material, and the parts separated by a notched or toothed cut. Indenting is seldom practised to-day, but the instrument retains the name. The term should be carefully distin¬ guished from a deed poll, which is now identical in form. An indenture is required only where the grantee or obligee assumes an independent obligation from the grantor or ob- ligor, whereas a deed poll is required where an obligation is assumed by one party only or by a number of persons in the same obligation.

INDEPENDENCE, Iowa, city and coun¬ ty-seat of Buchanan County, on the. Wapsipini- con River, 70 miles southwest of Dubuque, and on the Rock Island and the Illinois Central railroads. It is the centre of an extensive horse-breeding, farming and dairying region. There is located here the well-known Rush Park, with its kite-shaped race track, the State insane asylum for northern Iowa, public library and other buildings. Culverts and gas engines are manufactured and the electric-light plant and waterworks are owned by the municipality Pop. 3,683.

INDEPENDENCE, Kan., city and county- seat of Montgomery County, located on the Verdigris and Elk rivers, 85 miles south of Kansas City, on the Atchison, Topeka & Santa Fe and Missouri Pacific railroads. The city has interurban connections with all the principal cities and towns in this section. It is the centre and distributing point for a large

and rich agricultural district, has a number of large manufacturing plants, is the home of the Kansas Natural Gas Company, headquarters for the Mid-continent Oil and Gas Company, home of the Prairie Oil and Gas Company, whose building is the largest in the State. There is abundance of natural gas and oil in the sur¬ rounding territory. Some of the largest plants are cement mills, planing mill and revolving- door plant, sash and door plant, glass plant, oil refinery, rubber plant, iron foundries, alfalfa mills and creameries. There are also a num¬ ber of important smaller concerns. The citv has ? Public bbrary, federal building, municipal building, court house, and the finest and best hotel m the State Pop. (1920) 11,920.

INDEPENDENCE, Mo., city and county- seat of Jackson County, five miles from Kan¬ sas City, on the Kansas City & Indianapolis, Missouri Pacific, and the Chicago and Alton railroads. The city is considered a residential suburb of Kansas City. The town was settled in 1827, and in 1838 the Mormons' rendez¬ vous was located here, and from hence the Latter-day Saints pursued their journey to Utah.

It was the scene of exciting events during*

the Civil War, the capture of the Federal garri¬ son in 1862, and a Confederate defeat in 1864. Stock-breeding, fruit-growing and canning are the chief industries along with numerous do¬ mestic manufacturers. Under the charter of 1889 the city is governed by a mayor and city council elected every two years. The electric- light plant is owned by the municipality. Pop

(1920) 11,686.

INDEPENDENCE, Ore., city of Polk County, 12 miles southwest of Salem, on the Willamette River, and on the Independence and Monmouth, and the Southern

Pacific rail¬ roads.. Great quantities of hops are grown in the district and form an important article of trade. There is also a good trade in cereals and other agricultural products. Its industrial es¬ tablishments comprise a creamery, foundry and machine shops, saw mills and flour mills. Pop.

1,160.

INDEPENDENCE, Declaration of. See

Declaration of Independence.

INDEPENDENCE HALL, Philadelphia, a low plain brick building on Chestnut Street, begun in 1732, but not completed until 1747, as a state-house for the colony of Pennsylvania, as closely connected with great national events as Faneuil Hall or the Old South in Boston. It was occupied as a state-house while un¬ finished, in 1736; the tower was added in 1750. Afterits completion it was used by the assembly, the supreme court, and the governor's council of the province of Pennsylvania. Here the Continental Congress held its sessions; here Washington was appointed commander-in-chief of the Continental armies, on John Adams' motion; here the Declaration of Independence was adopted and was read from its steps to the assembled crowds in front. The Con¬ vention of 1787, which framed the Constitu¬ tion, was also held here. It is now main¬ tained as a museum of historical relics, espe¬ cially of the Revolution. In the tower is still kept the famous <(Liberty Bell® (q.v.). In re¬ cent years it has been carefully restored to its original appearance. Consult Belisle, D. W., ^History of Independence HalP (Philadelphia 1859) ; Etting, F. M., (An Historical Account of the Old State House, etcP (2d ed., Phila¬ delphia 1891).

INDEPENDENCIA, en -da-pan-dan'sya, on FRAY BENTOS, fri ban'tos, Uruguay, capital of the Department of Rio Negro on the Uruguay River. The chief industries are stock- raising, meat-packing and the manufacture of meat products. The city is well laid out and there are several fine modern buildings, includ¬ ing

government edifices, the hospital and schools. The river is navigable to ocean steamers, thus increasing the importance of the town as a business centre. Pop. about

10,000.

INDEPENDENT CATHOLIC CHURCH OF THE UNITED STATES, or OLD CATHOLICS, a Polish religious body organ¬ ized in Chicago, among disaffected Roman Cath¬ olics. Its founder, Rev. Anthony Kozlowski, at¬ tended one of the conferences of the Old Cath¬ olic Church in Europe and was there con¬ secrated a bishop. The church has acquired considerable property in Chicago and has estab¬ lished a hospital, dispensary, orphanage, home

for the aged, primary, grammar, high and in¬ dustrial schools. The society had in 1915 over 18,500 members, and 35 ministers and 41 churches.

INDEPENDENT METHODIST CHURCH. See Methodist Churches of the World.

INDEPENDENT MOVEMENTS IN POLITICS. See Vote, Voters, Voting.

INDEPENDENT ORDER OF ODD FELLOWS. See Odd Fellow.

INDEPENDENT VOTE. See Vote, Voters, Voting.

INDEPENDENTS. See Congregation¬ alism.

INDETERMINATE .SENTENCE. A

sentence to imprisonment without a fixed time for its termination. It is in accordance with the new principle of penology that the object of imprisonment is primarily the reformation of the offender- and consequently that he is to be released as soon as he has reformed and shown his fitness to again become a member of society. In practice, the indeterminate sentence has minimum and maximum limits. Thus a pris¬ oner may be sentenced for not less than four nor more than seven years. The indeterminate sentence was first applied in New York

to boys and was. not extended to adults until 1876, when the Elmira Reformatory was established. Mas¬ sachusetts and Ohio soon followed the example of New York and at present about half the States of the Union have adopted the indeter¬ minate sentence in their penal codes. European countries have not taken to the plan, mainly because of their century-old concepts of crime, punishment and vindictiveness which more properly belong to less enlightened age. See Parole System ; Prisoners, Probation of.

INDEX, a series of references arranged in alphabetical order usually placed at the end of a book. The need of indexing has become more and more apparent as the mass of material pub¬ lished has increased and the spread of education has increased by tens of thousands the numbers of people who wish to make use of this material. It was at one time seriously proposed, both in England and America to deprive an author who published a book without an index, of the privilege of copyright. In general there are two classes of books to be indexed — viz. books of facts and books of opinion. In indexing the former experience, care and comnron sense must be exercised, and the work must be sys¬ tematic and not casual. In the latter class the same qualifications are required and some¬ thing else — viz. the insight of the precis writer. The index maker must have a fair knowledge of the subject in hand and must also take into account the viewpoint of the reader and the needs of the latter. An index must be exhaus¬ tive in its indication of the various points of the book, and concise in expression, and in addition the indexer must be careful in the choice of his headings or leaders. The same subjects must be collected under one heading and must not be separated under synonyms. An author frequently uses periphrases to escape from the repetition of the same fact in the same form; but these periphrases will give little

information if inserted as headings in an index, and it is in this power of selecting the best catchword that the good indexer manifests his superiority over the commonplace worker. There are other kinds of indexes ; 'but these require an explanatory adjective, as classified, chronological, etc. In indexing names it is most important to specify the cause of reference, as a block list of references after a name is al¬ most useless. It is also important to bring all the references to one man under one heading, and not to separate them under the different names or titles he may have borne. There should be one index for a complete work and not a separate index for each volume. No classification should be allowed in an alphabet¬ ical index as the consulter is only confused and annoyed if he has to look in a succession of alphabets arranged under such headings as original articles, notes, correspondence, etc. The preparation of an index involves three operations : compiling, arrangement, and print¬ ing. Each index maker will find out the mode of procedure which is most suitable to himself ; a good way, now well nigh universal, is to make each entry on a separate slip, after which the slips are arranged in alphabetical order. Library supply firms supply different types of slips and alphabetical trays, which are an im¬ portant aid to the indexer. When the slips have been arranged care must be taken to see that there are no repetitions of the same sub¬ jects under various synonyms. Words spelled alike, but of different meaning must be repeated as headings. Now is the time to make the cross references, and here considerable judgment is required. When the entries are short and few, it is better to repeat them than to refer from one to the other; but in the case of long entries cross references are very advantageous and it is always well to refer to cognate headings. No reference to the contents of a general head¬ ing, which is without subdivision, should be in¬ cluded. If a general heading is divided into sections, and each of them is clearly defined, they should be ^cross-referenced,® but not other¬ wise. Alteration and revision of headings will be found necessary

frequently. The value of an index is greatly enhanced by the proper set¬ ting out of the entries with judicious use of different types. When a book is a complete treatise on a special subject, a well-made index will form an admirable key to the subject and be in itself intrinsically useful. The above gen¬ eral principles apply to indexes of separate books; but indexes are made to a particular subject in which the references relate to several books. The increase of these indexes is much to be desired as they form admirable helps to knowledge. Consult Clarke, (Manual of Prac¬ tical Indexing) (London 1905) ; Kaiser, Sys¬ tematic Indexing (New York 1911) ; Pether- bridge, (Technique of Indexing) (London 1904) ; Wheeler, indexing: Rules and Ex- amples) (Albany 1905; rev. ed., 1913).

INDEX, Cephalic, Cranial, etc. For some years anthropologists have taken special care in determining geometrically the forms and dimensions of the human cranium among the different races of mankind. The task is a diffi¬ cult one because the human cranium is not a rectangular box. Various procedures have come into general use to determine the measure of

the distances of the head, the skull, the facial cavities, and the brain capacity. Indexes are the terms used to define the relations existing between these linear distances and the follow¬ ing are the principal. The Cephalic index is the relation which exists between the transverse diameter of the head and the anteroposterior diameter. The latter is taken from the middle and lower part of the frontal bone to the furthest part of the occiput. The transverse diameter is the greatest line at right angles to the anteroposterior. In practice it is as¬ sumed that the length equals 100, and the width is represented as a percentage of this. The result is the index for which the formula is

greatest width X 100

- = cephalic index

length

This index is an important medium for classi¬ fying skulls. A low index indicates a great length as compared with the width, giving an elongated or oval skull. A high index in¬ dicates a rounded skull. A common classifica¬ tion of skulls on the basis of this cephalic index is the following:

Subdolicho cephalic . . Below 70

Dolichocephalic . 70 to 77.8

Mesoticephalic . 77.8 to 80.

Subbrachy cephalic . 80 to 83 . 3

Brachy cephalic . 83 . 3 to 85 .

Hyperbrachy cephalic . Above 85

It must be remembered that these divisions are arbitrary and vary slightly for the cephalic index, and even in different countries. As a general result of this classification we find that Eskimos, African negroes, Fuegians, Veddahs, Maoris, Fiji islanders, and certain peoples of northern Europe are dolichocephalic, while American Indians, Malays, Mongols, Lapps, Finns, Poles, Tyroleans are brachycephalic. British, French, Germans, Greeks, Japanese, Chinese are mesoticephalic. The cephalic index alone is insufficient for a proper classification of the skulls or heads of the different races. Recourse is had therefore to other indices which taken in conjunction with the cephalic, will give the shape of the head. The frontal index is the relation between the least frontal diameter and the greatest cranial diameter. By contrast¬ ing height with length a vertical index is ob¬ tained according to which we get platycephals, or low skulls; metriocephalic, or moderate; and acrocephalic, or high skulls. The facial index is that resulting from a comparison of the length and width of the face The length is measured from the root of the nose to the tip of the chin, the forehead being part of the cranium and

therefore excluded; the width is calculated by the projecting convexities of the zygomatic arches. High faces are those above and low faces those below 90. A nasal index is measured from its height and width, the latter calculated from the width of the nasal wings. According to the result a skull or head is leptorhine, or narrow below 48; mesorhine, or medium from 48 to 53; and platyrhine, or broad nosed, above 53. The orbital index is that resulting from the relation of the height and width of the orbit or pyramidal chamber which lodges the eye-ball. The width is calcu¬ lated from the dacryon on the inner wall to the most distant point on the outer edge of the

wall. The width being always greater than the height the formula for the orbital index is :

height X 100

— = orbital index

width

According to this index we have megaseme, or great orbits, above 89; mesoseme, from 84 to 89 ; and microseme, below 84. Other indexes are the pelvic, the sacral, the dental and the pilastric obtained by measurement and compu¬ tation similar to those described above. Methods differ widely according to the different schools of anthropologists. Consult Broca, instruc¬ tions generales pour les recherches anthropolo- gique) (Paris 1879) ; (Deniker, (Races of Man> (London 1900) ; Bertillon and Chervin, An¬ thropologic metrique) (Paris 1909) ; Livi, (An- tropometria) (Milan 1900) ; Ranke, (Der Mensch) (Leipzig 1911).

INDEX KEWENSIS, ku-en'sis, a work of reference giving the names of flowering plants, compiled under the direction of Sir Joseph D. Hooker, director of the Royal Gardens at Kew, London, by Benjamin Daydon

Jackson. With Bentham and Hooker's (Genera PlantarunP as a basis for the limitation of genera a record was made of every genus and species of phanerogamous plants published up to 1885, and the geographical distribution of each species was indicated. To each name, whether re¬ tained or synonymic, full reference to its place of publication was added, retained names, and not necessarily the first specified name, being the earliest under which they were published in the recognized genus. A first supplement brought the work down to 1895 ; a second sup¬ plement covering the years between 1896–1900 appeared in 1905; and a third supplement in 1913 covered the years 1901–05. . The index originated with Darwin, who supplied the funds for its operation. Its need arose from the dif¬ ficulty found in identifying many plant species. The work of Hugh Falconer on Indian plants and of Marianne North in all parts of the world was of great value in adding scientific accuracy to this important work.

INDEX LIBRORUM PROHIBITO¬ RUM. The Index of Prohibited Books, com¬ monly spoken of as the Index, — is a specific list of books which ecclesiastical authority pro¬ hibits Catholics from reading. This article will briefly give the history of the Index, the right of censorship claimed by the Catholic Church, and the exercise of that right.

I. History of the Index. — The first Roman Index appeared in 1559, under Paul IV, long after civil authority had instituted censorship and lists of prohibited writings. The latest Index is that of Leo XIII, a fifth edition of which was published in 1911, at the order of Pius X. Until recently this list of prohibited books was drawn up under the supervision of the Congre¬ gation of the Index; and a book was put on the Index by decree of the Congregation of the Roman Inquisition, or of the Holy Office, or of the Index. On 25 March 1917, Pope Bene¬ dict XV, by Motu i Proprio, merged the Congre¬ gation of the Index into that of the Holy Office. Hence this latter Congregation, whose purpose is to safeguard Catholic teaching in faith and morals, now

has charge of the editing of the Index. As a rule, the books contained in this authoritative list were written by Catholics.

Precisely because the authors were in com¬ munion with the Church, explicit condemnation by a Roman Congregation was called for. On account of the relatively small Catholic popu¬ lation in English speaking countries, very few books in that language have been put on the Index. In the general laws of the Church, ample provision is made against the reading of non-Catholic books opposed to Catholic faith and morals. To read books that have been put on the Index or otherwise prohibited by the Holy See, one must obtain either a general or a particular permission from the competent ecclesiastical authority. As the Index is only one element of the legal practice of the Catholic Church in the matter of censorship, it is im¬ portant here to state what right the Church claims in this sphere of her activity and how she exercises this right.

II. The Right of Censorship. (1) In Civil Society. — In every full formed society, the uni- tive principle is authority. This principle vivi¬ fies into a living whole, organizes into a social organic unity, the various elements that would else be independent, separate, disparate, hostile, mutually destructive entities. Authority has 'for its object those means, which are necessary to the very existence and well being of the social organism whereof it is the vitalizing and unifying principle. One such means is the cen¬ sorship of the press. Legitimate authority, in every full formed society, may exercise censor¬ ship of the press, as a necessary means to the end for which the social organic unity exists. This censorship is twofold, — anticipatory or repressive, — according as it is exercised before or after the publication of the matter censored. By anticipatory censorship, the authority of a nation at war prohibits the publication of all news that may help the enemy, requisitions wire¬ less stations, commandeers the cable and tele¬ graph, censors private letters, and dictates what things shall not be published by the

press. By repressive censorship, the same legitimate au¬ thority punishes as criminal the use of the mails for treasonable propaganda, and suppresses pub¬ lications that have printed prohibited matter. All this obtains in civil censorship.

(2) In the Church. — Ecclesiastical censor¬ ship is like to civil, but in a different sphere of activity. The Catholic Church claims to be not a civil society, but a full formed spiritual society, — a social organic unity, whose members have the same spiritual aim, no matter how they are at variance in civil aims ; a living social organism, unified and vitalized by the same principle of spiritual authority, no matter how they differ in the civil authority that unites them into civil societies. To the members of this spiritual society, supreme authority in mat¬ ters of faith and morals is an attribute of the Pope, the successor of Saint Peter in the Apostolic See. Upon this supreme authority, as upon an adamantine rock, is builded the whole fabric of the Church; unto this supreme jurisdiction is granted the tremendous divine power of binding and loosing, to be exercised either directly or indirectly in regard to all who belong to the spiritual organic unity of the Church. <(Thou art Kipha (a Rock), and upon this Kipha I shall build my Church; and the gates of hell shall not prevail against it. And I will give to thee the keys of the Kingdom o\ heaven. And whatsoever thou shalt bind upon

earili, shall be bound also in heaven ; and what¬ soever thou shalt loose upon earth, shall be loosed also in heaven.® (Matthew xvi, 18–19). This power of binding and loosing, be it vested supremely in the Pope or subordinated in any other member of the hierarchy, includes the right of both anticipatory and repressive cen¬ sorship of printed matter, as a means necessary to the attainment of the spiritual end proposed by the Church.

III. Exercise of Censorship. — Catholics do not frown upon the exercise of this right of ecclesiastical censorship as tyrannical. They deem that, if there be in such repressive meas¬ ures of the Church any seeming tyranny, it is the tyranny of love and not of hate. Just as a mother is narrow minded and will not allow her child to drink a solution of arsenic in water, merely because it looks harmless, so the Church is narrow-minded in protecting her children from poison in faith and morals. They may reject her motherly love, and give up member¬ ship in her community; but so long as they freely will to be her children and to share in the graces of her sacramental life, they must abide by her censorship in matters of faith and morals.

Ihe ecclesiastical laws now governing cen¬ sorship are given in the Codex Juris, canons 13847-1405. Twelve classes of prohibited pub¬ lications are enumerated in canon 1399; they are all such as would lead to the poisoning of the wells of doctrine in the matter of faith and morals. In keeping these wells pure, ecclesi¬ astical authority is only following out Saint Paul's injunction to Timothy: ((Guard the glori¬ ous deposit (of faith) by the help of the Holy Spirit who dwelleth in us® (2 Timothy 1-14). The laws, by which ecclesiastical authority guards the deposit of faith are binding upon all Catholics. To prevent the reading of cer¬ tain books, canon 2318 Codex Juris enacts the penalties incurred by violation of the more seri¬ ous enactments of ecclesiastical censorship. They are ipso-facto excommunicated from the Church, who publish <(books by apostates, here¬ tics and schismatics, that defend, apostasy, heresy or schism ; likewise they who defend, or wittingly and without due permission read or retain such books or other books that have been nominating prohibited by Apostolic Letter.®

Bibliography.— Hilgers, (Der Index der verbotenen Bucher 5 (1904) ; (Die Biicherver- bote in Papstbriefen5 (1907); Taunton, (The Law of the Church5 (1906).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College, Maryland.

INDEX NUMBER, a statistical method of showing the changes in the value of money and of investigating and measuring variations in the prices of commodities in general or of a special group of the latter. An index number is the result of a combination of several items, each of which is a ratio between the price of a cer¬ tain commodity at a particular time, and its price at another period which is taken as a standard. Such ratios are usually expressed as percentages. Thus the price of wheat in 1918

may according to a certain system be set down as 119, in comparison with its price from 1900 to 1910; that is the price of wheat in 1918 is to average price of wheat in the decade 1900–10 as 119:100. By some writers the term index num¬ ber is applied to each item, as well as to the combination. Percentages are usually made by striking an average of them, but a result of equal generality is obtained from their sum. A good method of constructing an index number is to take a number of articles, say 25, compare the price of each at the current date with its price at the period taken as e basis or standard and express the result as a percentage, placing the sum of these percentages as the index number. Such a process involves the following considera¬ tions : what commodities are to be considered? How are prices to be ascertained? How are ratios between the prices of each at the current period and the basic period to be combined? These problems vary according to the purpose in view. A general plan is to include articles of consumption rather than materials or imple¬ ments ; retail prices should be used, not whole¬ sale; general wages are excluded, but payments for personal services should be included. The proper combination of ratios is a weighted average. A general principle to be observed in assigning the weights is the importance of each to the consumer. A very extensive literature has grown up concerning index numbers and

the problems arising from them. Both the British Association for the Advancement of Science and the International Statistical In¬ stitute have gone into the question thoroughly. The question at issue is what average should be used in combining the index numbers for the individual commodities. If the weighted arithe- meUc mean is used, the question is wrhat weights are to be applied? Moreover, it is necessary to determine what commodities are to be included. The Economist table includes only 22, Sauerbeck 35, Falkner 223 and the United States Bureau of Labor 340. For these, in turn, various prices may be used (average prices or single quotations, wholesale or retail prices according to the plan followed), all of which again may depend on various sources such as trade journals, statements of merchants, government reports, etc. The standard year or standard period has also to be chosen. Mean index numbers may be utilized to determine other general tendencies besides the movement of prices. Thus the level of wages for large districts may be determined in this way, or the level of wages in a single great industry or special class of industries. The United States Bureau of Labor Statistics publishes an index number of wholesale prices and also indexes of retail prices. Consult bulletin of the United States Bureau of Labor Statistics5 whole No 181 (October 1915, pp. 6, 10, 11, 257-263) ; Boyley, Elements of Statistics5 (London 1901); Layton, W. T., (Introduction to the Study of Prices5 (London 1912) ; Secrist, Horace, 'Introduction to Statistical Methods5 (New York 1917) ; Zizek, Franz, Statistical Averages5 (New York 1913).

INDEX OF REFRACTION. See Light.

—

.

'

.

′

.

'

′

. > .

.

–

•

.

Vol. 15, INDIA TO JEFFERS

Americana

> » V -i

IpHg

KSflEiujS

t • wre,

HpfcLifc.- Hi’

W nR

gˆV

left wBh

«•

THE

ENCYCLOPEDIA

AMERICANA

jT

Ugmr

Vmneˆsal

JQoWLEDGEj

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK. CHICAGO

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 18 t922

©”.I.A654317

/VA-|(7

/

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XV

ALESSIO, GUILIO (Hon.)

Member of Parliament; Formerly Secretary of State for the Treasury; Professor of Finance, Royal University of Padua.

ITALY — ITALIAN FINANCE

ANESAKI, MASAHARU

Professor of the Science of Religion, Imperial University, Tokio

JAPAN — THE RELIGIONS OF JAPAN

ARCOLEO, GIORGIO

Professor in Ordinary of Constitutional Law, of Comparative Public Law, Royal University of Naples; Grand Official of the Italian Crown; ex- Deputy in Parliament for Six Legislatures; Senator of the Kingdom.

ITALY — CROWN AND PARLIAMENT

BABASINIAN, V. S.

Professor of Chemistry, Lehigh University

IODOFORM

BOGART, ERNEST L., Ph.D.

Professor of Economics, University of Illinois

INDUSTRIAL REVOLUTION

BRIGHAM, JOHNSON

Librarian, Iowa State Library, Des Moines

IOWA

BROWN, CHARLES RUFUS

Professor of Hebrew and Cognate Languages, The Newton Theological Institution, Newton, Mass.

TCiTAH

ISAIAH, BOOK OF

BUCKINGHAM, EARLE

Associate Member, American Society Mechanical Engineers

INTERCHANGEABLE PARTS

BUELL, MARCUS D., S.T.B., D.D.

Professor of New Testament Greek and Exegesis, Boston University School of Theology

JAMES, EPISTLE OF

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

ITALY — DIPLOMATIC RELATIONS OF

THE UNITED STATES WITH

JAPAN — DIPLOMATIC RELATIONS OF

THE UNITED STATES WITH

CAMMEO, FEDERICO

Professor of Jurisprudence, Royal University of Padua

ITALY — COMMUNAL AND PROVIN¬ CIAL ADMINISTRATION

CANDIANA, COUNT

Admiral of the Royal Italian Navy

ITALY — THE NAVAL MARINE

CASCIANI, PAOLO (Hon.)

Member of Parliament; Commendatore della Corona d 'Italia; Professor of Agronomy, Royal University of Rome

ITALY— AGRICULTURE IN ITALY

CHAMBERLAIN, ALEX. F.

Late Professor of Anthropology, Clark University.

LEONARD- STUART, CHARLES

Editorial Staff, The Americana

INDIANS, AMERICAN t

CHIAPPELLI, ALESSANDRO

Professor of Philosophy, Royal University of Naples; Commendatore della Corona d 'Italia; Author of " The Philosophy of Religion," etc.

ITALY — RELIGION IN ITALY

CORDARA, CARLO

Musical Critic of " Marzocco;" author of La Tentazione di Gesin," etc.

ITALY — ITALIAN MUSIC

COUMBE, CLEMENT W.

Technical Art Expert

IVORIES

JAPANESE CERAMICS JAPANESE AND ORIENTAL ARMS AND ARMOR

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

JANE EYRE

DARTON, NELSON H.

United States Geological Survey

INLAND WATERWAYS

DESSAU, B.

Professor of Physics in the University of Perugia

ITALY — NATURAL AND PHYSICAL SCIENCES IN ITALY

DOMINICIS, SAVER! O DE

Professor of Pedagogy, Royal University of Pavia; author of Works on Teaching in Schools and Universities

ITALY — EDUCATION IN ITALY

DRUM, WALTER, S.J., A.B.

Professor of Scripture, Woodstock College ‘

JANSENISM

DUNN, JACOB PIATT

Secretary Indiana Historical Society

INDIANA

Contributors to Volume XV — Continued

DUNN, JOSEPH, Ph.D.

Professor of Celtic Languages and Literatures, The Catholic University of America

IRISH SCHOOLS AND SCHOOLMEN OF THE MIDDLE AGES

FALLETTI, PIO CARLO

Professor of Modern History, Royal University of Bologna

ITALY — THE RENAISSANCE IN ITALY

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

INFANTRY

FAY, EDWIN WHITFIELD, Ph.D.

Professor of Latin, University of Texas

INSCRIPTIONS

FERRIS, RICHARD, C.E., D.Sc.

Editorial Staff of The Americana

INDIA RUBBER

FISKE, HALEY, A.M.

Vice-President of the Metropolitan Life Insurance Company

INSURANCE, INDUSTRIAL

FITZPATRICK, BENEDICT

New York City

IRISH ARCHAEOLOGICAL REMAINS

FORTUNE, WILLIAM

President Indianapolis Chamber of Commerce

INDIANAPOLIS, IND.

GARNER, JAMES W., Ph.D.

Professor of Political Science, University of Illinois

INTERNATIONAL LAW, CHANGES IN

GAUSS, CHRISTIAN, Litt.D.

Professor of Modern Languages, Princeton Uni¬ versity

JEAN CHRISTOPHE

GRAZIANI, AUGUSTO

Professor of Political Economy, Royal University of Naples; Honorary Professor, University of Siena

ITALY — ECONOMIC CONDITIONS IN

GREINER, A. F., M.E.

Assistant Professor of Mechanical Engineering, University of Michigan.

INTERNAL COMBUSTION ENGINE

GRIFFIS, WILLIAM ELLIOT

Author of “ The Mikado’s Empire ” and “ America in the East.”

JAPAN — HISTORY OF JAPAN, 1889-

1919

JAPAN — TAPANESE LANGUAGE, THE JAPAN — TAPAN IN THE WORLD WAR JAPANESE STUDENTS IN AMERICA JAPANESE WAIFS IN AMERICA

HALLER, WILLIAM, Ph.D.

Instructor of English, Columbia University

IRISH MELODIES

HAMLIN, A. D. F., A.M., L.H.D.

Professor of the History of Architecture, Columbia University

INTERIOR DECORATION

HANFORD, JAMES H., A.M., L.H.D.

Associate Professor of English, University of North Carolina

ISABELLA

IVANHOE

HAUSMANN, PHILIP W.

Albany, N. Y.

IRREDENTISTS

HAYFORD, JOHN F., C.E.

Director College of Engineering, Northwestern University

ISOSTASY

HOFFMAN, FREDERICK L., LL.D.

Statistician of the Prudential Insurance Company of America

INSURANCE, SCIENCE AND ECONO¬ MICS OF

HUNT, LEIGH

Professor of Art in The College of the City of New York

ITALY — ITALIAN ART IN THE 19th AND 20th CENTURIES

HUTCHINSON, J. I., Ph.D.

Professor of Mathematics, Cornell University

INTEGRAL EQUATIONS

IHLDER, JOHN

Executive Secretary, Philadelphia Housing Asso ciation

INDUSTRIAL HOUSING IN THE UNITED STATES INDUSTRIAL HYGIENE

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

INQUISITIVE WOMEN

JERNEGAN, MARCUS W., Ph.D.

Associate Professor of History, University of Chicago

INTERNATIONAL CLAIMS AND DISPUTES

JACKSON, ANDREW

JOHANNIS, ARTURO JEHAN DE

Director of the Royal Institute of Social Science, Cesare Alfieri, Florence

ITALY — ITALIAN INTERNATIONAL COMMERCE

Contributors to Volume XV— Continued

JONES, EDWARD D., B.S., Ph.D.

Professor of Business Administration, University of Michigan; author of “ Administration of Industrial Enterprises,” etc.

INDUSTRIAL DISTRIBUTION INDUSTRIAL ORGANIZATION AND ADMINISTRATION

KANEKO, KENTARO, VISCOUNT, LL.D.

Privy Councillor, Tokio

JAPAN — THE JAPANESE CONSTITU¬ TION

KAINS, M. G., B.S., B.S.A., M.S.A.

Horticultural Consultant

INSECTICIDE

INSECTS OF IMPORTANCE TO MAN

KASNER, EDWARD, Ph.D.

Professor of Mathematics, Columbia University

INVARIANTS AND COVARIANTS

KENNARD, JOSEPH S. Ph.D., D.C.L., LL.D.

Author of “ Italian Romance Writers,” etc.

ITALY — ITALIAN SOCIALISM ITALY — ITALIAN LITERATURE

KEYSER, CASSIUS J., Ph.D.

Adrain Professor of Mathematics, Columbia Uni¬ versity

INDUCTION, MATHEMATICAL

KLEIN, HENRI F. ‘

Editorial Staff of The Americana.

IRELAND IRISH REBELLION , ITALY AND THE WORLD WAR

KUKI, BARON RYUICHI

Privy Councillor and Custodian of the Imperial Art Treasures

JAPAN — HISTORY OF JAPANESE FINE ART

LADD, GEORGE TRUMBULL, LL.D.*

Emeritus Professor of Metaphysics and Moral Philosophy, Yale University; Lecturer on Educa¬ tion in the universities of Japan

JAPAN — MENTAL CHARACTERISTICS OF THE JAPANESE

LA FETRA, LINNAEUS EDFORD, M.D.

Associate in Diseases of Children, Columbia Uni¬ versity; Director of Children’s Medical Division, Bellevue Hospital

INFANCY

LENNOX, P. J., B.A., Litt.D.

Professor of English Language and Literature, The Catholic University of America

IRISH LITERARY REVIVAL IRISH LITERATURE IN ENGLISH

LEONARD, GEORGE E.

Executive Secretary and Treasurer, Jacksonville Chamber of Commerce

JACKSONVILLE, FLA.

LEONARD-STUART, C., B.A.

Editorial Staff of The Americana

SRINIVAS R. WAGEL

INDIA

MAAR, CHARLES

Insurance Department, State of New York

INSURANCE, CREDIT INSURANCE, FRATERNAL INSURANCE, LIFE, STATISTICS INSURANCE, MARINE INSURANCE LAW INSURANCE PATROL INSURANCE SUPERVISION

MAKINO, NOBUAKI

Ex-Minister of Education, Tokio

JAPAN — EDUCATION IN JAPAN

MANZONE, BENIAMINO

Director of the Historial Review of Italian Risorgi- mento

ITALY — HISTORY FROM 1815 TO 1907

MARAZZI, FORTUNATO, GENERAL

Member of Parliament, Formerly Secretary of State for War

ITALY — THE ITALIAN ARMY

MARIANI, LUCIO

Professor of Archaeology, Royal University of Pisa

ITALY — ART IN ANCIENT ITALY

MATSUKATA, MASAYOSHI, COUNT

JAPAN — FINANCE AND COINAGE SYSTEM IN JAPAN

McDonnell, john b.

Editorial Staff of The Americana

IRISH MUSIC

MEADER, JOHN R.

Labor and Service Department, Brighton Mills, Passaic, N. J.

INDUSTRIAL FATIGUE INDUSTRIAL PEACE, EXPERIMENTS IN

MIKAMI, SANJI

Professor of History in the Imperial University, Tokio

, JAPAN — HISTORY OF THE EMPIRE

TO 1889

MILES, H. E.

Chief of Training, United States Training Service, Washington, D. C.

INDUSTRIAL WORKERS, EDUCATION AND TRAINING OF

- Deceased.

Contributors to Volume XV — Continued

MONTICOLO, GIOVANNI

Professor of Modern History, Royal University of Rome

ITALY — HISTORY OF THE MIDDLE AGES IN ITALY

MOSCA, GAETANO

Professor of Constitutional Law, Royal University of Turin

ITALY — POLITICAL PARTIES IN ITALY

MURAKAMI, NAOJIRO

Commissioner of Historical Compilation, Imperial University, Tokio

JAPAN — FOREIGN RELATIONS

NEWELL, FREDERICK H.

Professor of Civil Engineering, University of Illinois

IRRIGATION

NICHOLS, WALTER S., A.M.

Former Lecturer on Insurance at Yale University, and editor of the “ Insurance Law Journal ” and “ Insurance Monitor ”

INSURANCE, LIFE

NITOBE, INAZO

Director of the First Higher School, Tokio

JAPAN — THE SAMURAI

ORLANDO, VICTOR EMANUELE

Minister of Justice of the Kingdom; Professor of Common Law, Royal University of Rome

ITALY — POLITICAL ADMINISTRA¬ TION

ORSI, PIETRO

Professor of Modern History, Royal Lyceum of Venice

ITALY — ITALIAN MODERN HISTORY

(1492-1815).

OSHIMA, K., LT.-GENERAL

Minister of War in the Terauchi Cabinet

JAPAN — THE JAPANESE ARMY

PARKER, ALTON B.

Formerly Chief Judge of the Coi rt of Appeals of the State of New York

JAY, JOHN

PARODI, E. G.

Professor of the Comparative History of the Classics and Neo-Latin Languages, Royal Institute of the Higher Studies, Florence

ITALY — ITALIAN LANGUAGE

PATRONI, GIOVANNI

Professor of Archaeology in the Royal University oˆ Pavia

ITALY — ITALIAN ARCHEOLOGY

PFEIL, STEPHEN*

Member of New York Bar

INTERNAL REVENUE SYSTEM

POLLOCK, HORATIO M., Ph.D.

Statistician New York State Hospital Commission

INSANE, STATISTICS OF

PUNTONI, VITTORIO

Rector of the Royal University of Bologna

ITALY — ITALIAN SCHOOLS AND UNIVERSITIES

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, Travelers Insurance Company

INDUCTION COIL

RODGERS, H. JAY

Secretary Jacksonville Chamber of Commerce

JACKSONVILLE, ILL.

SAKATANI, YOSHIRO, BARON

JAPAN — THE BANKING SYSTEM OF JAPAN

SACCHI, ETTORE

Member of Parliament; formerly Minister of Justice of the Kingdom; author of works on functions and limitations of Tribunals and Courts of Appeal

ITALY — DEPARTMENT OF JUSTICE

- j

SAITO, M., BARON

Admiral, Imperial Japanese Navy

JAPAN — THE NAVY

SALAZER, FANNY ZAMPINI, COUNTESS

Professor of English in the Royal Institute of Higher Learning for Women in Rome

ITALY — EDUCATION AND SOCIAL STATUS OF WOMEN IN ITALY

SAUVEUR, ALBERT, S.B.

Professor of Metallurgy and Metallography in Harvard University and the Massachusetts Institute of Technology

IRON, MANUFACTURE OF IRON AND STEEL, METALLOGRAPHY OF

IRON AND STEEL INDUSTRY IN THE UNITED STATES

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Author of “ America, Asia and the Pacific,” etc.

INDO-GERMANIC LANGUAGES

IRAN

IRANIAN

IRANIAN LANGUAGES AND LITERA¬ TURE

- Deceased.

Contributors to Volume XV— Concluded

SHERMAN, L. A., Ph.D., LL.D.

Professor of Literature, University of Nebraska

IRVING, WASHINGTON

SUYEMATSU, KENCHO, BARON

Privy Councillor, Shiroyamacho, Shiba, Tokio

JAPAN — JAPANESE LITERATURE

THOMAS, PAUL B,

New York City

INTERNATIONAL PEACE MOVEMENT, THE

TSUBOI, SHOGORO

Professor of Ethnology in the Imperial University. Tokio

JAPAN — ETHNOLOGY

UKITA, KAZUTAMI

Professor of History and Sociology, Waseda Uni¬ versity, Tokio

JAPAN — THE DEVELOPMENT AND CONSTITUTION OF SOCIETY IN JAPAN

VALETTE, MARC DE

Chef d'Etudes Economiques de la Banque de France

INSTITUTE OF FRANCE

VEDOVA, GIUSEPPE DALLA

Professor of Geograohy in the Roval University of Rome; Academician of the " Lincei," member of other scientific societies, etc.

ITALY — PHYSICAL GEOGRAPHY

VENTURI, ADOLF

Professor of the History of Art, Royal University of Rome.

ITALY — HISTORICAL SYNOPSIS OF ITALIAN ART

VOLTA, RICCARDO DALLO

Professor of Political Economy and Finance, Royal Institute of Social Science, Cesare Alfieri, Florence; Honorary Professor, University of Padua; author of works on economics

ITALY — ITALIAN IMMIGRATION

WALSH, JAMES J., M.D.

New York City

INFLUENZA

WELD, HARRY P., Ph.B., Ph.D.

Assistant Professor of Psychology, Cornell University

INSTINCT

INTENSITY OF SENSATION

WELLS, BENJAMIN W., Ph.D.

New York City

INSTITUTES OF THE CHRISTIAN RELIGION, THE

WHITE, WILLIAM A., M.D.

Superintendent Saint Elizabeth's Hospital, Wash¬ ington, D. C.

INSANE, THE

WIENER, LEO

Professor of Slavic Languages and Literatures, Harvard University

IRIDION

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

INDUCTION, IN LOGIC INFINITY

WILCOX, MARRION, A.M., LL.B.

Co-editor " Encyclopedia of Latin America "

JAMAICA

WILSON, GEORGE GRAFTON, Ph.D. LL.D.

Professor of International Law, Havard University

INTERNATIONAL LAW

WOLFF, SAMUEL LEE, Ph.D.

Instructor in English, Columbia University

INGOLDSBY LEGENDS, THE

WRIGHT, HERBERT F., Ph.D.

Division of International Law, Carnegie Endowment for International Peace

INSTITUTES OF ORATORY, THE

ZAMASAKI, NAOMASA

Professor of Geography in the Imperial University, Tokio

JAPAN — TOPOGRAPHY OF JAPAN

YOKOI, TOKIYOSHI

Professor of Agriculture in the Imperial University Tokio

JAPAN — AGRICULTURE IN JAPAN

YOKOI, TOKIWO

Member of the Imperial Diet, Tokio

JAPAN — RUSSO-JAPANESE WAR

ZANICHELLI, DOMENICO

Professor of Constitutional Law, Royal University of Pisa, Honorary Professor of the University of Siena

ITALY — THE PAPACY AND THE GOVERNMENT

KEY TO PRONUNCIATION.

a

a

far, father

fate, hate

n

Span, u, as in canon (can’yon), pihon (pen’yon)

a or a

at, fat

ng

mingle, singing

nk

bank, ink

a

air, care

a

ado, sofa

o

no, open

A

a

all, fall

o or o

not, on

ch

choose, church

• A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. e , as in de ; eu, as in neuf; and oeu, as in boeuf , coeur; Ger. d (or oe), as in okonomie.

oi

6 or oo

oil, soil ; also Ger. en, as in beutel

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, uiacht

u or u

but, us

hw

what

u

pull, put

I

i or 1

file, ice

him, it

ii

between u and e, as in Fr. sur , Ger. Muller

A

1

between e and i, mostly Oriental final syllables, Ferid-ud-din

in

as,

V

y

of, very

(consonantal) yes, young

•

J

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

h

Fr. nasal m or n, as in embon¬ point, Jean, temps

‘(prime),

“(secondary) accents, to indicate syllabic stress

NDIA, also called HINDUSTAN or IN- DO.STAN, derived from the Persian form of the Sanskrit sindhu, a river, and signi¬ fying ((the land beyond the Indus,® is a name used both in ancient and modern times with great latitude of signification. The main¬ land of India proper is bounded north by the main range of the Himalaya Mountains ; east by mountain ranges which divide it from Burma; southeast by the Bay of Bengal ; south by the Gulf of Manaar, which separates it from Cey¬ lon ; west by the mountain chains enclosing the valley of the Indus, which separates it from Afghanistan and Baluchistan, and by the Indian Ocean. Its length north to south is nearly 2,000 • miles ; its greatest breadth east to west about 1,800 miles. It extends between lat. 8° 5′ and 35° 15′ N„ and long. 65° 45′ and 97° E.

Political Divisions. — Legally ((British In¬ dia® means all territory governed bv the ((King- Emperor® or ((Kaisar-i-Hind,® as the monarch of Great Britain is designated in Hindustan, to¬ gether with any territories of native princes or rulers under the suzerainty of the king of Eng¬ land exercised through the governor-general and viceroy of India.

In 1912 administrative changes resulted in

the division of British

India into 15

provinces

as follows :

Area in square miles

Population

BRITISH PROVINCES

(1911)

in 1911

Aimer- Merwara .

2,711

501,395

Andamans and Nicobars .

3,143

26,495

Assam .

53,015

6,713,653

Baluchistan .

54,228

414,412

Bengal .

78 , 699

45,483,077

Bihar and Orissa .

83,181

34,490,184

Bihar .

42,361

23,752,969

Orissa .

13,743

5,131,753

Chota Hagpur .

27,077

5,605,362

Bombay (Presidency) .

123,059

19,672,642

Bombay .

75 , 993

16,113,042

. Sind .

46,986

3,513,435

Aden .

80

46,165

Burma .

230,839

12,115,217

Central Provinces and Berar .

99,823

13,916,308

Central Provinces .

82,057

10,859,146

Berar .

17,766

3,057,162

Coorg .

1,582

174,976

Madras .

142,330

41 ,405,404

North-West Frontier Province* 13,418

2,196,933

Puniab .

99,779

19,974,956

United Provinces .

107,267

47,182,044

Agra .

83,109

34,624,040

Oudh .

24,158

12,558,004

Total provinces . 1,093.074 244,267,542

- Districts and Administered Territories.

Delhi, 557 square miles, Pop. 390,000, a small enclave in the Punjab, was constituted a

province and a separate territory under a chief commissioner 1 Oct.

1912, and became the capital of the empire and the seat of govern¬ ment, removed there from Calcutta.

The Native States with numerous tribal subdivisions, ruled by native princes who are feudatory to British authority and responsible to the viceroy of India for their good govern¬ ment, are as follows :

STATE OR AGENCY

Area in square miles

Population,

1911

Assam State (Manipur) .

8,456

346,222

Baluchistan States .

80,410

420,291

Baroda State .

8,182

2,032,798

Bengal States .

5.393

822,565

Bihar and Orissa States .

28,648

3,945,209

Bombay States .

63 , 864

7,411,675

Central India Agency .

77,367

9,356,980

Central Provinces States .

31,174

2,117,002

Hyderabad State .

82 , 698

13,374,676

Kashmir State .

84,432

3,158,126

Madras States .

10,549

4,811,841

Cochir .

1,361

918,110

Travancore .

7,594

3,428,975

Mysore State .

29,475

5,806,193

N. W. Frontier Province (agen¬ cies and Tribal areas) .

25,472

1,622,094

Punjab States .

36,551

4,212,794

Raj pu tana .

128,987

10,530,432

Sikkim State .

2,818

87,920

U nited Provinces States .

5,079

832,036

Total Native States .

709,555

70,888,854

Total India .

1,802,629

315,156,396

Physical Features. — The natural bounda¬ ries of the peninsula of India, which forms a triangle washed on two sides by the sea and having its base in the great mountain chain which separates it from Tibet on the north, are completed by its three great rivers, the Indus,

the Ganges and the Brahmaputra. These all rise in the Tibetan Mountains beyond the Himalayas, and the first flowing west, the two latter east, descend in a southern direction to¬ ward the sea; the Indus discharging itself into the Indian Ocean ; the Ganges and the Brah¬ maputra, after watering in their separate course a large part of northern India, uniting to pour their waters together by numerous mouths into the Bay of Bengal. The mountains enclosing the basins of these rivers form the east and west boundaries of the northern part of the peninsula. The Himalayas, the loftiest moun¬ tain range in the world, with heights of upward of five miles above the level of the sea, descend by successive slopes to the elevated nlain of northern India. (See Indus; Changes; Brah¬ maputra; Himalaya). The entire peninsula is sometimes distinguished by three natural divi-

sions. The Vindhya Mountains, a range of about 3,000 feet in height, which extends ir¬ regularly across the peninsula from Gujarat to the basin of the Ganges, forms an anciently- recognized division into two parts under the names of Hindustan and the Deccan (South¬ ern Land). The name Hindustan, given in this restricted sense to the northern part of the peninsula, is frequently applied to the whole. The ancient division of the Deccan is again subdivided into two, the name Deccan being re¬ stricted to the northern part, the southern from the river Krishna or Kistnah, which flows from west to east almost across the whole penin¬ sula, being called southern India or India south of the Krishna. The portion of India watered by the Ganges and its tributaries is by far the most fertile and populous of the whole. At no great distance from the opposite extremities of the Vindhya Mountains two great ranges pro¬ ceed southward along the line of the coast. The Western Ghats, which attain a height of 5,000 to 6,000 feet, though at some parte much lower, proceed along the west coast to Cape Comorin, the southernmost point of India. They do not generally recede more than 40 miles from the sea, and rarely more than 70. On the sea side their descent is generally precipitous, forming a regular sea-wall. On the land side they de¬ scend gradually, and sometimes almost imper¬ ceptibly, to the elevated plains of the interior. The Eastern Ghats recede farther from the east coast, are less elevated and precipitous. Before reaching as far m their southern course as Mad¬ ras, they trend inward and unite with the trans¬ verse range of the Nilgiri Hills, which connects them with the Western Ghats. This mountain- formed triangle encloses an elevated table-land with a gradual slope eastward from the Western Ghats, and which is

continued beyond the East¬ ern Ghats to the sea. The elevation of the plain of southern India also increases toward the south. In the Deccan it is about 3,000 feet above the level of the sea. In the neighborhood of the Nilgiri Hills, which rise 3,000 feet above it, it reaches 7,000 feet.

Hydrography — The chief rivers of India besides the Indus, Ganges and Brahmaputra, al¬ ready named, are the Jamna, Ramganga, Gumti, Gogra, Gandak, Kusi, etc., tributaries of the Ganges; the five rivers of the Punjab, Satlej, Bias, Ravi, Chenab and Jhilam, tributaries of the Indus; the Nerbudda, enclosed on its north¬ ern bank by the Vindhya Mountains and the Tapti, which flow west into the Gulf of Cam- bay, the Mahanadi, the Godavari, the Kistna, North and South Pennar, Vellar, Kaveri, etc., all flowing eastward into the Bay of Bengal. The uniform direction of the great rivers south of the Tapti is explained by the inclination of the land already described. The coasts of India have very few indentations and consequently very few good natural harbors. The western coast is known by the name of the Malabar, the eastern by that of the Coromandel coast. There are no lakes of any extent in India — Chilka and Kolair near the east coast being the largest.

Geology. — All the great mountain ranges are chiefly composed of granite and of granitic rocks, which form also the base of the plateau of the Deccan. Both in the peninsula and in the Himalayas gneiss predominates, associated with micaschist, hornblende-schist, chlorite slate and primitive limestone. Syenite prevails in the

southeast of the peninsula. In the southern por¬ tion of the Western Ghats the granitic rocks are overlaid by an iron clay, which is continuous to the end of the peninsula, and reappears in the island of Ceylon. In the upper portion of the Western Ghats and adjoining ramifications of the Vindhya Range, basaltic trap in various forms overlies the granite to an extent un¬ paralleled elsewhere in the world. It entirely covers a large portion of the table-land of the Deccan. In this district, trap and granite fre¬ quently pierce the surface in isolated masses, forming flat-topped hills nearlv perpendicular, and which can only be ascended by steps, or winding, dangerous paths. These have been conyerted into strongholds from a remote an¬ tiquity. They are frequently crowned with forts and form a peculiar feature of the landscape. On the lower sides of the Himalayas regular strata of the Secondary and Tertiary periods are largely developed. Manv of the sandstones and shales of the Secondary period belong to the coal-measures. The Indian Tertiary forma¬ tions attain their greatest breadth toward Sind and the Punjab, where fossil

remains, including many of singular forms and gigantic dimen¬ sions, are abundant.

Mineral Resources. — The principal coal fields in India are found in the region bounded north by the Ganges, south by the Godavari, and stretching east and west from the neighbor¬ hood of Calcutta to the middle of the valley of the Narbada. Indian coal is distinguished by its excessive lamination. The annual production in India was 16,500,000 tons in 1913, from 427 collieries worked throughout Bengal, Hydera¬ bad, . Assam, Rewah, the Central Provinces, Punjab, Baluchistan and Burma. The most important mines are those of the East Indian Railway Company near Giridhi (Bengal) and the Singareni mine in Hyderabad. Of the coal used on the railways 95 per cent is Indian coal. Iron ore is abundant in many parts of India, but the amount produced is still small. The only large iron-works in India are at Sanchi and Barrakur in Bengal, but iron is manu¬ factured locally on a small scale in other parts of Bengal and in the central provinces. The chief obstacle to the successful development of the iron industry of India is the difficulty of finding the ore, fuel and flux sufficiently near to one another to make it profitable, but it is believed that iron-works near Calcutta, using Madras ore and Bengal coal, would succeed. The Tater Ironworks at Sanchi, lately started, is the largest in Asia. Gold is worked to some extent, more especially in Mysore, the total pro¬ duction in 1914 being 607,388 ounces. Copper, lead, antimony and other metals are fairly abundant. Burma yields a large amount erf petroleum annually, and smaller quantities are obtained from Assam and the Punjab The total output for 1913 was over 277,555,255 gal¬ lons, but much is still imported. There are valuable ruby mines in Upper Burma, and a few diamonds are still obtained in Central India. Salt is an important manufacture and source of revenue; its production is treated under the head of Finance.

Soils. — The alluvial deposits along the mountain valleys, and in the plains, and the soil composed of disintegrated rock masses on the plateaus, are especially rich and of great pro¬ ductivity. Their fertility is greatly enhanced

L,V aaid Ilunza

GilghitˆVˆ

ctfr K Bun;l>T

HaibakA /

INDIA

®iuiafaia

LJ s’

Cv_. S S 7?Aktagb

ˆC|SHERBRUM

,, . ?Brun«su

Kapalu A M M 7-

; • ci ,•« ?,*?• l ,

Chitral : nif K“1““,

iumnal.

As tori

175 Statute Miles = 1 Thch.

ˆ NANG A

*V r’rˆKABUL...

*T

Maiulrawar’

Jitiarnlaugl

Marol’

° Karbu

Churn lung 5 Tughat ‘■

t jv

»p JAvmbola 0fc,, / T< Muz/artarabid — X, 'Ajhottnbad ˆ3—
yHarlptfr tV

282 Kilometers = 1 Inch,

Jfre Namur Lake

Suui’la

Pamsal

Band McNally A Co.’s New 11 x 14 Map of India. Copyright by Rand McNally k Co.

I I British “Possessions.

I J Independent States and Colonies.

i i Feudatory States.

TIER,

Charol Cho

°’*;v

m-

JVjmW/l «#

Ru’lok

˚Chabuk Singa

[Budra»var

Nw4‘”’”“‘w»aC”N ‘

vDemchok ,, y$tdon Chaka ˚

Jasrota

tJLonkar-cho

‘Chain]

Bhera 5 N arL(

Kiwar

Zurmelau

Tliok Jalung

•> Taahi Bhup C.

I?/ ˆhusab /ˆghahpur

/PI Shahiwal/, J

‘/ $) ChlnIot_/o iS Darya 3/

(khan rfv.~.

O JS/ khiw*

/ Mankorn Y vyh*0*

_.r 9 Maahiana

./uuh p; u i

h mad pur Montgi miery£

Kot

Adu ’Tialambaˆ’-

ultanM Palipattan <

L-4:sCsiy;“oo,’“. 3

sKangra

Garin

iuUaiipur

.b: Ofr’- — *

Lang-bu-cho ‘ Ghalaring-cho

MLujang J SKV° Dshiachan

Takia.Dom»a\

Tede /V

iia-chc. • y

Parti/ra

Llja Tvljo RotV

‘SyK’parrnp-

Shekohpt

J M.nUi

Bllaspur,,,‘1

Dukmar

Data- r

(i akc Ngtwy abv Doho h.

fusnkhel’

[Flrot;

ia’•”” tVKuauli f) -s -f

:r. Tarogh-Clury Mariam La

N~-\5 Duitbamˆ”’

> ‘ Ludhiana,

LMuditi y

Farldk.

FaziIku/ˆ_ˆ

Talung o

i at h an a

r — ˆNabhaˆjˆAiai; mtinda Ttrnneawarl

ifatehabudjjKama

Tadum

iardwar”

aijUbabAcl

Kdw

Sarka

Labvanl

.» j Chandpˆriˆ \ \ d(Meerut

• j f J iMoradab

fl’ibnkot

o Dllawar

^^^‘JConcharnn

/tvi’At* Khanpur pˆj

V? Na««kot0 lilt i Birslluur

ˆIslamgarh _ y

Blkampurd 0 Kisbaagarh

o Kanod <

Shahgarh

liaalmer Pokaran

0 Shahpur ‘ Jacobabad

’linN\W,

-Delhi

[uianao\

V l\ /£G

rhAUwariy P

uia-J L -r;

Loharu vJ huru0 0 Raj gar h)

10 NarnauJ

o Nawalgarh

ar c Sikar Alwar,

Ctmumun

_ L , . 0

,Sdi7TblTar\ Jaipur \

5bir*ofe

..Jongˆ

iKoU-jˆBthjahangurjrˆi, t

ˆ llatdukKhairabaˆ 1 A YShb.Ula s*

• ? DW*W ild»i0feP

Bhartpur V\

iGonda

Debar’;

jFirozal

Bettin j

Cbdtrlaj

“Xh ‘ A ‘ N A

‘*£%x -1) (fUndaun15

: / KNˆsirabad / ” Raraull

Etawab

kanaujNMˆDaryabadˆs

ˆKNOWˆfiSrsD-liah \ \ \ A<,\W'

‘fiˆOUMioX Ral’

CaVi;. PORE. Bftrcll

t*.s’\ — v Rall,ur°

TF,hp ˆ J’h.i.u.d

4/®Sr»° joc

,rMOu,rir.

I

Umarkotl’C f ˆ

V’ Gur4o-F§-yv j

.Diana

BENGAL

Bbind0

.Gwalior

boMorarc

hltabpurˆ

AzauVgarl

KIhep“A

°S“vu*y

iMadahpuS

Beawai

ixaffarpur’

bˆ-Rnogpiif Darranglr

VParbatipUf 0 Xura

111 Lsawabarant’-—

Bit. /pfcjTc

Sabalgarb

Uhlbganj

‘OAMaldah.

jaH&apur

Tlhazlpur

ˆur Narwˆpd* } Sipri0 opbansl ˆyorchhl

K ultras

oRhulpur.

.llahabad

Banda

dSfieS*0*

yd Bundl /“d. ’ OJ / Sha

!>-rt r Kotflh

y j San goilˆ .

ˆflinjfe

CheUr o

Islamkot

°Diplar

rrr jUal ,VA4y Tan

l/Gaya S* \ J° oGoddˆTˆ o

jKergbatl > V-*

; Qowan V \ Dumka f —

Sarbˆˆ-MadhuuPˆA > \

Chatra GlrldhTYl V I <

P iLiribasWˆ KfwOl l

“aS“

a «

ˆ Vˆ- – hVBam anghˆl

Virawah

ihatarpur c

b

Shergarh

9 b＝v/.

/ leUoona

ˆAjaig!

-Panna |

‘Hull!*

W JawadV

5o,r*ˆ jitaˆv

I o Punearpur ’

Lampurˆ

°Deogat

Patan)

Shahhandar

‘rMalbar’

LJlvfc-kARIH

« VˆˆNartinghrirhˆJBˆhUo oMurwar

pSaraugpur_ _ _ Tpˆ _ (_

Sehore ■.＞ — VuhopaN’ TROPIC 0 \s

＞ral \ Mohpani

•C7 _ˆfHarda , ˆ

i ˆ \

tChandwa Betulo f 47i.\i

(isalnagar

hidpurˆ Rat lam

a Anjarfc

Suthri -VˆMandvi

GulfofˆCutchl Dnrl“Q\s~ˆLa Bbogah. G Ul

Chitrod

TqfX

fabalpur

ˆobagpuj

uadalmdVˆ\ˆj/pi,law,ui’

S.ˆoihr. V DiK

Anand Jhabun° kniaroda cih;’” L,J‘P”f ‘

A ˆ Katbi l “Bail

■luSwa* Rf‘jplpl“a,hˆ-

J Voi«chh*/-W-7 > S’“rPor -ˆ-P’.JWntnlv! YirdcPuL

i > eidraU3ˆ

\oRenda 0 Uj

U) RamgarH y-t(Ramaagar ˆMandla

Man \ f ‘ Kawardhaˆ0

MaD\pU« Kutabdia I.wYY

Mabh**1′ l’W ˆ Cox’s BazorU

Tamluk’l

Ratanj

l0Kotba

/ Dhandbutˆ J Gondal / pbo\«MChorand« —ˆBhaunagarˆ Broach-

~ˆ-LPalltadtt~fv7° ˆ

0 Pandaraˆ.

(Bllasputy-

vani Kherl- oBljagarh. ; Chopra Y

L\?%& #*

Am*»ˆr y 0Bˆ‘lrakh ˆ

Ic’CTrˆˆjpV wr4fl

1‘almyras 1 River

Pofbandar ‘X I>hoj ajiˆ

N aw i bands r ˆ T — T~ TWang roTvl Vera iv ol

kplabira :

SsWb-lpUT

irhanpur <»nVrrtgnrh— .

_S 0 Argaum° EJUchpur

ibandaraˆ

Nandgftt

Jafarabad,

1 8ltˆbsldi

lha

Kodinai

Bubar]

jso° Akola ■ Murtazapui

rdw..B E RAR

Patnˆ-Y

o Gorna

M.vnmnd .

.Hingdnghat -AW arofa

Noagarh

MahlmˆVShahij

BasaelbgVi:

o

oALSETTE 1 .(ff/T

BOM BAY aV

Allbaghb MurudL JanjiraSdˆ SrlwardhanV . Harnailˆ Anjantvelirˆ Jaygarhl Ratnagiri\

Rajaj

Vliiadrugc

Jalna

p»n»bpˆK“°1tc’

IpurWunˆb

Gumsur <

Makriˆi o OmOrkot >

ot Porngarh0 Si’ˆgapur.-f BmU[ˆs I RijSfruj.it) jˆd«ips?T \

o. Bobbin o

ar yˆMalkanglrl

NuS v

ˆtpurl

•k‘rAkola’

Pusud

Ap-ˆPuri •Chilka L.

Aurangabad T Palthanˆ

BURMA

Mahore * w

» Manikgafho X . Slrpt

lingoli”ˆ

±6. vˆ-ˆ/oHatta \

4??? iNandalr v

ir u*yXv-D- Nirmal o ■ .Bbarur K.n.UUatV

Mokhed J Indore Paf«irfa ‘ˆgir o ifauiaBoA Yel

4 -H-Y

\Waldru?. Bidbt ° S (Ml

\Ssh3iipit) A BoMun

oiAVrAiiLNˆ Fatehpur y

SCALE

C05 Statute Miles = 1 Inch.

Rahurl

foodalil %,9?,1“1,

\ //Gopal

U> Gumpur/jˆpur

/»jjtr*a i b Xj Pun’ll

＞3v^^Bˆliugapatain — ˆChlcacole ˆChantapilll llmllpatam

iKalyan Ahmsdn.g. VˆKarjat \ NY

Kannal;

Ramglr 0′

tRsjan.

iqmakun’d \ t.

fl*w»’\p’Dibri

knaknpidln

yvizaanpatam

taalddhi

iarpur’

[akuurX .

‘Qatr*

Maingkhwan

Nowgong

gj:

j 0 OauhatTN. ˆ

ii.canada

-Coringa

yˆMkamtl

JPPER,

Mogaung ˆ — T

Guntur

Mouth* of the Oodavari

Pangal

*ˆAV-4/5la3uUpatam

lNlMmi»JfsmjPoint Divy

.y Kindˆ / JtSMyndaung

pWadulˆ dinM Sh”’’

Gad.al

, Man wain)

‘engurla~

farkapur

‘Cumbum

/Bapatla

Gunillakan

igole

-qGooty

GOA (Port.)

Kandukur

lamiapatnam

BURMA

r“Tt0 Tbita.

Kavali

c\Allur

Kiliglrl

Kumptai Sorab ‘ Honawar

Pigeon lˆ’YyvSrˆ1 B.rkdr’Sja Kandapur b Roj

S Udipi L I ˆ

MulkVn

Mangalora/jo>

[arlbar phahnavaramˆ

Cuddapah

f o\ jChitaldril I Channaglrlyl

fKadur b_/Slra°

lyAvaNˆAnrarapura 9 f I* ‘A 7 1 Kyaukse (I „

yˆˆyiyinayoi \

MeiktUa j T Q

oYezon > IIlaIndet) LegyaQt Yamethin l \ ) oMor S

<\„\gO paoO

iurgarayapatnam Armagon take Pulicat

ikal’A U PonnerP

‘i.IwfeL-i;

iPulicat

-ftMadras

jSt. Thomas Mt’:

ijc uruiQ

Xfeadras jtogalpat live ram ‘Pondichery I (Pr.; mddalore Porto Novo

Harnhnlli *iaZZZmKV‘mV’iF

Chjeng-seif

BO KONGO lsJjl*Vi

Combermere . Bauˆ Kyaukpyu’fˆ RamrD Cueduba

liXCUAN I.’

Nsrediit

OntaHA MIAMI Rzer

Bekalˆ ‘ Caonarjoreˆ, Talliohenl

tonin” •“ V iDupur am I 1 /yK/. rturoifl

iitAMconE Reef .* ˆ—k

*r , Chitlao

I’aII, .* KtLTAN

Cardamom Euealps.ni PXREMOLFAR REEFtf * BaNK ‘

LACCADIVE

-PittieSand Bank.

lProme 1 \ Byu

‘erkad

Sandowa?

iw’iuw r, – oaien

Trr.J \ Uti»UamandVˆSˆ*TU~ _ /

CalicutXo MetUpollie’nˆˆankarrdˆ Bey pur 1ˆ Coimbatore\

To t>ˆ~iPalghat j ˆ\r‘ •

TrichSfeXsJˆ.

Kodungfthjro”.;,-ˆ— b – PaiavuˆTˆˆV’

> Cochinn.Vrˆaˆ

Sharretalai y ‘\ Vm ‘

VA Ailepp.yiˆ j

Kayenkolam*\p ‘/■

Quilon ˆ

Anjengo’V Trivandrum

Nugaik

Ml*. –

Chilambaram o Namakal ;

. Combacom

d layavaram

3U.nderoot

CXXy* Tranquebar Nn™r| Kyik»l

mjorqˆ Negapatain

jWˆ“jn|oint Culiinere

‘Palk Strait

AjJtrlubiiiyj ■ Bu.u.ˆ1

Gvwon 1/1 Amherst!

ˆTriehintfpol.T

Straits Settlements—

— — ■ ■ . 1 ~ ‘— V Lslands ‘t-‘

Cape N egrais l/ylfn

pai»odapt‘

1 Ira i«a‘l1 Prcparie North Channel

Kalpeni

Kalegauk 1.

Gulf of *

Pedro

Y/ˆatani’J

Mu,,nˆtebu?S,

Prepakir

Martaban ‘

Nohtii Moacos

Gh.ˆSl

VRf.dangN.

lTrengganu\

JX Civ® X

i dˆj Derhala -C,S. C.pc CC. G am o

Preparia .

South Channel ˆ ‘ s, . i Gr. Coco I.

Ss.ˆ- N

, Narcos

.1 Drort Cornwallis f>\zX. Andaman vs- ■h ANDAMAN 1 ‘\4Mio. Andaman |y “Barren .

ELANDS *• yST Andaman

ˆlUTLANP L

•Strait

’“Jj-Ltt. Andaman

Channel

“> ˆL’enkasi ( )f WYEhnevlUI <7

C’ˆiˆfVTiiuchto.liir .

Gulf Kalpitiy&rri of NarakaduT

Manar ChUtJ

Middle Moscoa** 7 South Moscoa J 1

Tnvoy Pt. Tavoy I

Vrippu

Ur. Nicobar

■ Foul Point

＞ndam I.

Batty Malv*

■dOC

Mini koi I,

Teressa v

MinerL

Kings I.

•luk.Ar

K atchallVˆJC an cow ry Channel

‘(fLlL Nicobar

r-TlGK*AT

Y IN icon a r ar Islands

Batticaloft

Ross 1. Qi ‘

W. Torres 1.

Bentincks 1.5V)

CEYLON

MERGU1 • a.

SuLUYANS*!^)

Archipelago; ^

Nicoi

Maldive Islands

Little BassaS

S JMATRA

St. Mathews Le

Great Babbas

Longitude East from Greenwich.

Gallop

Dondr ‘ D <

CI-.-rp.-l

Serin

no

Uks

INDIA

3

and maintained by an elaborate system of ir¬ rigation. See paragraph in this article on Canals and Irrigation.

Climate. — India extends 15]/2 degrees with¬ in north tropical latitudes, and \2l/2° within the temperate zone. Owing to modifying circum¬ stances, the climates contained within this range are not only extremely various, but distributed with great irregularity. One of the chief modi¬ fying circumstances is the distribution of mois¬ ture, the great regulators of which are the mon¬ soons. The northeast monsoon blows from October to March, the southwest from April to September. The latter surcharged with vapor from the Indian Ocean condenses in torrents on the heights of the western Ghats, and forms the rivers which flow to the east. Before jt reaches the Coromandel coast in the

southeast it be¬ comes a dry wind which scorches up vegetation. In the west, on the contrary, this wind passes over the low plains in the lower valley of the Indus, is arrested by the Himalayas, and fills the tributaries of the Ganges. The northeast monsoon runs a similar course in the opposite direction, but deriving less moisture from the Bay of Bengal, which is of less extent than the Indian Ocean, it has less influence on the cli¬ mate, and its season is in general the dry one. The great plain of Southern India being ex¬ posed to greater heat than that of Northern India, and not being watered by the snow-fed streams of the Himalayas, is naturally much less fertile. The seasons in India are divided into rainy, cool and hot. The periods of these different seasons vary according to latitude and modifying circumstances. On the Malabar coast the rain begins earliest to the south. At Calcutta rain falls from June to October; the cool season begins about November, the hot sea¬ son in February, the heat increasing gradually till May. In Calcutta where the mean annual temperature is about 79°, the range is from 50° to 85° F. In Bombay the mean annual tem¬ perature is about 82°, the range about 10° ; in Madras mean about 84°, range 7° to 8°. The annual rainfall in India is much greater than that of England; but it is distributed with great irregularity. The basin of the Indus, including all Sind and the half of the Punjab, is an arid region with an annual rainfall under 15 inches. The high plateau in the interior of South India has an annual rainfall generally under 30 inches. On the whole Malabar coast the rainfall is over 75 inches; at Kananor it reaches 128 inches. On the Coromandel coast it is very much lower, being 45 inches at Vizagapatam, 50 inches at Madras, while farther south it falls below 30 inches. Between the arid region of the Indus and the Ganges runs a dry zone of 100 to 200 miles wide, including Lahore, Delhi and Agra, with a rainfall between 15 and 30 inches. The valleys of the Tapti, the Nerbudda, the lower part of the Jamna, the Ganges and the Brah¬ maputra, are generally over 30. Along the slopes of the Himalayas from Cashmere east to the boundaries of India, and southeast to the mouths of the Mahanadi runs a belt of countrv with a rainfall over 60 inches, within which is included the lower course of the Ganges. With¬ in this is another belt, including a lower slope of the Himalayas, and the lower course of the Brahmaputra before its junction with the Ganges, in which the rainfall rises above 75 inches.

Forests.— The three most valuable timber trees of India are the teak (Tectona grandis), the sal or saul (Shorea robusta), and the deo¬ dar (Cedrus Deodara). The teak grows most luxuriantly along the Bombay coast, in Tra van core and Cochin and in Burma, but it is also abundant throughout much of Central India and elsewhere. The sal is

the chief forest tree of the Himalayan slopes, from the Satlej eastward to Assam, and it grows also in the forests of Central India and the Eastern Ghats. The home of the deodar is the northwestern Himalayas. Among the most valuable trees of the densely forested Western Ghats from Kanara to Travancore and Mysore are teak, blackwood, bamboos, sandal-wood, a kind of ebony and Calophylluni inophyllum, whose wood is prized for the spars of ships. In the United Provinces and neighboring districts the leading species are sal and several varieties of pines, and in the ex¬ tensive jungles of the Ganges delta the most useful wood is that of the sundari (Heretiera littoralis). The forests of Assam yield sal. Pinns Kasya, caoutchouc (Ficus elastica), and other useful species and plantations of teak, tun or toon (Cedrela toona), and sissoo (Dal – bergia sissoo) have been laid out. .Besides tP'k the Burmese forests contain ironwood and the cutch-tree (catechu). Before the formation of the Indian Forest Department the forests were recklessly destroyed by timber-cutters, nomadic cultivators and others, but large forest areas in all the provinces have now been marked off as reserved forests under the immediate care of the forest officers, and other forest areas have been brought under partial conservancy. Tim¬ ber-cutting and grazing have been either pro¬ hibited or restricted; and plantations of the more useful trees have been formed in many parts of the country. In every province a few of the most valuable timber trees are declared to be reserved trees, and can only be felled under special license. Forest revenue is raised by royalities on, or by the sale of, timber or other produce, and by the issue at specified fees of permits to graze cattle, or to extract for sale timber, firewood, charcoal, bamboos, canes, and other minor forest produce. The reserved forests now cover an area of more than 96,867 square miles, and the protected or partially con¬ served forests occupy other 142,000 square miles. Some of the native states, such as My¬ sore, Travancore, Baroda and Kashmir, have followed the example of the British government.

Flora. — Where moisture is plentiful, as in the valley of the Ganges, vegetation is super¬ abundant. The delta of the Ganges, in particu¬ lar, called the Sunderbunds, is covered with dense jungle full of the largest wild animals, and the excessive vegetation renders most of the mouths unnavigable. There are many other similar tracts of extensive forest and jungle. On the Coromandel coast, where the heat which

reaches 100° F., vegetation is not luxurious, and the delta of the Indus from the southeast of the Punjab to the Ran, or great salt marsh of Kach (Cutch), forms a great sandy desert, continuous across the river with the desert of Baluchistan, and with a wide band stretching across the whole continent of Asia to Central Africa. In the various altitudes

of the Hima¬ layas forms of vegetable and animal life belong¬ ing to all the various climates from tropical to polar are to be found. These as well as

the Western Ghats are magnificently wooded. Orchids, rhododendrons and other valuable flowers are common. Among the staple natural products of India are rice, maize, wheat, barley, cotton, flax, hemp, jute, rhea, indigo, tea, coffee, sugar-cane, opium, tobacco, ginger, pepper cardamoms, palms bearing nuts which are ex¬ tensively consumed, anise, dye-woods, etc. European fruits abound, and among indigenous fruits may be mentioned the mango, plantain, pomegranate, citron, date, almond, grape, guava, pineapple and tamarind. Palms, including the date, cocoanut, palmyra, betel-nut and other species, the banyan, and bamboo, are common features of the vegetation.

Fauna. — The elephant, the rhinoceros, the camel, the tiger, a few lions in the northwest, the leopard, bears, hyena, jackal, wolf and numerous smaller carnivora, the boar, antelopes, deer, wild ox, ass, sheep and goat, monkeys in great variety, and the greater number of Euro¬ pean quadrupeds are found! There are several large species of ox, such as the gaur or ˆbison® and the arnee or wild buffalo. Crocodiles, snakes (including the dreaded cobra), and rep¬ tiles in all varieties are very numerous; of birds, the eagle, vulture, falcons, peacock, parrots, king-fishers, mina-bird, partridge, quail, heron, stork, are characteristic species, and other varieties, both indigenous and common to other regions, are numerous. Fish are plentiful and in great variety, both on the coasts and in the rivers.

Land Tenure and Revenue. — In India the state, or the monarch, has always enjoyed a share in the rent or profits from the land. Be¬ fore the advent of the Mohammedans and the establishment of the Mogul Empire the almost universal unit for the purposes of revenue col¬ lection was the village community. In a village, community land was held, not by private owners, but by cultivators occupying it under the village corporation, and the land revenue was collected from the head-man as representing the com¬ munity. With the Mohammedan conquest new methods of revenue collection were introduced. The state claimed one-sixth of the gross produce of the soil as its share, and entrusted its collec¬ tion to persons who each agreed to pay a definite amount from the district assigned to him. These revenue

farmers, known as zamin- dars, were often local magnates under the old Hindu system.

The term ˆsettlement® is applied in Indian revenue affairs to the process of assessing the land revenue demand. Occasionally, in newly acquired or specially backward tracts, the land revenue is assessed for a short term of years on a general review of the circumstances and capa¬ bilities of the land and people concerned; such a process is called a summary settlement. But a regular settlement is a more complicated affair, and consists of many stages ; the revision is arranged to take place once every thirty years. In the first place, every separate estate or holding is demarcated by permanent marks on the ground; and disputes between neighbor¬ ing right-holders are investigated and decided. Every estate or holding is then surveyed and mapped, all boundary-marks, wells and buildings being shown on the field or cadastral maps. After the field maps are prepared, the next process is to classify or record each field ac¬ cording to its productive value, as evidenced by

its soil, the amount of its produce, or by the rent paid by the farmer to the landlord. A record is at the same time drawn up of all rents paid, and of all rights, whether landlord rights, or tenant rights, or rights of user, over all the ground, buildings, wells and trees shown in the map. Then the assessing officer (or settlement officer, as he is often called) compiles the in¬ formation obtained for all the lands in a circle of villages ; and on a review of all these data, of the past fiscal history of the tract, of the range of prices, of the accessibility of markets, and of other general considerations, he proposes government rent rates or revenue rates for the several classes of lands in the circle. The rent rates or revenue rates proposed by the settle¬ ment officer, and the grounds on which they were based, are then investigated by a superior officer, and are not adopted until they have been accepted or modified by the latter. The rent averages in most cases at one-half the gross produce of the land.

In provinces where the zamindari tenure pre¬ vails, that is, where single proprietors or pro¬ prietary brotherhoods possess large estates of several hundreds or thousands of acres, the state revenue is assessed at an aliquot part (usually about one-half) of the ascertained or assumed rental. The revenue, though it is fixed with reference to acreage rates on the land actually cultivated, is assessed on, and is payable by, each estate as a whole; the assess¬ ment remains unchanged for the 30 years, or other period of the settlement; the proprietor can bring as much as he likes of his waste and fallow land under the plough; and is only on reassessment at the end of the term

of the set¬ tlement that the state obtains any increase of revenue on account of the extensions of culti¬ vation during the settlement period. In provinces where the rayatwari tenure prevails, that is, where each petty proprietor holds di¬ rectly from the state, generally cultivates his own land, and has no landlord between himself and the government, the revenue is separately assessed at an acreage rate on each petty hold¬ ing, and land revenue becomes payable at once, or after a short term of grace in the case of uncleared lands, on all extensions of cultivation. The rayatwari proprietor is at liberty to throw up his holding, or any portion of it, at the be¬ ginning of any year, after reasonable notice; the zamindar, or large proprietor, engages to pay the revenue assessed upon him for the term of the settlement.

The land revenue assessment was fixed per¬ manently more than 100 years ago on the greater part of Bengal, about a third of Madras, and certain southern tracts of the Northwest

Provinces, paying in all about $14,250,000 a year. In the temporarily settled tracts comprising the rest of India, it is fixed periodically for terms of 12 to 30 years. In the nine chief provinces (Bengal, Bombay and Sind, Madras, the United Provinces of Agra and Ouah, Central Provinces, Punjab, Burma, _ Assam, Berar) the number of rayatwari holders is about 273,000, of whom none belong to Bengal, Punjab, and the United Provinces and Oudh. The total number of zamindars and village communities is about 318,500, of which only Sind and Berar have none. The total number of holdings is thus

about 591,500. In the greater part of Bengal

•

land is held by zamindars under a permanent settlement, but the tenants are protected by recent legislation. The rayatwari system is the prevalent one in Madras and in Bombay a sim¬ ilar system has been established. In the latter province the cultivators are now protected by law against the extortions of the money-lenders. The village community is still common in the United Provinces and the Punjab. In Oudh much of the land is held by talukdars, who have been granted, certain privileges which are denied to the zamindars.

Agriculture. — The total area accounted for in the agricultural returns

for 1913 was 748,868,- 885 acres, of which 80,851,369 are under forest, 146,386,852 not available for cultivation, and 163,784,575 culturable waste and current fal¬ lows. The net crop-yielding area is 224,165,602 acres, or, taking account of land cropped several times in a year, 300,000,000 acres. The three chief food-grains of India are rice, millet, and wheat. Rice is the staple food of about a third of the population, and was grown on 76,792,000 acres in 1915, but it is nevertheless essentially a local crop, which can be cultivated with profit only under exceptional circumstances. Of the total rice area 40 million acres belong to Bengal, where it is the staple crop, and about seven million each to Madras and Burma. Over 90 per cent of the cultivated area of Lower Burma is under rice, and it is grown on nearly three quar¬ ters of the area of Assam, about one-third of- that of the Central Provinces, a quarter of that of Oudh, while it is of importance also in the United Provinces and Sind. It is grown to a less extent in the Punjab and Bombay. Rice is also cultivated by hill tribes in all parts of India. In Bengal there are two chief rice harvests in the year, the dus or early crop, chiefly for local consumption, and the dnian or winter crop, chiefly for export ; but in Lower Burma, whence most of the exported Indian rice comes, there is but one harvest, corresponding to the Bengal winter crop. The total area under wheat was in 1915., 30,143,000 acres, mainly in the Punjab, (71/ 2 million), where it is the leading crop, the United Provinces of Agra and Oudh, the Cen¬ tral Provinces, Bombay, Central India and Ben¬ gal. The area under the various kinds of millet and maize, which constitute the food of poor people as well as cattle, is 43 million acres, chiefly-in Bombay (13p2 million), Madras, Pun¬ jab, United Provinces, Central Provinces, Sind, Oudh, – Bengal and Upper Burma. The chief varieties of millet grown in India are jodr, or jawdri , or cholarn, great millet (Sorghum vul- gare) ; bdjra, or kambu, spiked millet (Pennise- tum typhoideum) ; and ragi, or ndchani (Eleu – sine c'orocand) , grown chiefly in Southern India. About 8,000,000 acres are sown with barley, chiefly in the upper Ganges valley, the Hima¬ layan valleys, and the Punjab. Gram crops or pulses, especially chick-pea, green-gram, horse- gram, lentil and pigeon-pea, take up 10 million acres. The large native demand for oil has been reinforced in recent times by a rapidly-increas¬ ing foreign demand, and in consequence the cultivation of oil-seeds has greatly developed. They are grown in many parts as a second crop on ground from which rice or some other food crop has already been taken. The chief varieties cultivated are linseed, rape-seed, mustard-seed, sesamum (til or gingelly), ground nut and cas¬ tor-oil, and the total area occupied by them is

16 million acres, chiefly in Bengal, Bombay and Sind, Madras, Central

Provinces and Punjab. The area under ground-nuts in Bombay and Madras is about 1,663,000 acres. The cultivation of vegetables for household use is general, and near some of the towns it is carried on more extensively. Potatoes thrive best in the more elevated tracts. Among cultivated fruits are the mango, guava, orange, melon, citron, lime, fig, plantain, pineapple, pomegranate, tamarind, shaddock, jack, papaw and custard-apple. The area under sugar-cane is about 2,375,000 acres in Bengal (especially Orissa), United Provinces, Punjab, Oudh, Madras and Bombay. Jaggery sugar is made from the bastard date-palm which is grown for this purpose in the neighborhood of Calcutta and in northeastern Madras. The tea crop is one of great and increasing im¬ portance, and occupies about 636,000 acres, of which 400,000 are in Assam, the rest being in Bengal, Punjab, United Provinces, . Madras, Burma and native states. With the exception of a few hundred acres in Burma, Assam, etc., the whole of the coffee-growing area, amounting to about 280,000 acres, is in Southern India, in Mysore, Koorg, Madras, Travancore and Cochin. The chief cinchona plantations are the govern¬ ment ones at Darjiling and in the Nilgiris. The tree was introduced by the Indian government.

Cotton is one of the most valuable vegetable productions of India. The total area under the cotton-plant, including the Native states, is 17,- 967,000 acres in 1915, distributed thus : Bombay and Sind (5,000,000), Berar (2,500,000), Hyder¬ abad (1,700,000), Madras (1,400,000), Unite.d Provinces of Agra and Oudh (1,250,000), Pun¬ jab (1,750,000), Central Provinces (1,000,000), and smaller areas in Central India, Rajputana, Burma and Bengal. Next in importance to cot¬ ton among Indian fibres comes jute, which is cultivated in eastern Bengal along the valleys of the Ganges and the Brahmaputra, accounting for 2,377,000 acres. The cultivation of the mul¬ berry, for the rearing of the silk-worm, is chiefly carried on in eastern and northern Ben¬ gal, with Murshidabad as a centre. The indigo industry is one of the oldest in India, but it is at present in a languishing condition. The area under the plant is about 314,000 acres. The opium poppy is cultivated in Behar and the United Provinces of Agra and Oudh, in the Punjab and in the native* states of Rajputana and Central India, occupying in all about 200,- 000 acres. (See below under Finance). Tobacco is grown in every district for local consumption. Among the numerous minor cul¬ tivated vegetable products of India are turmeric, chillies, ginger, coriander, aniseed, black cum¬ min, fenugreek, pepper, cardamoms, betel-pep¬ per, areca or betel-nut palm, cocoanut palm, palmyra palm and date-palm. Experimental cul¬ tivation of rhea, rubber, sisal-hemp and other valuable economic plants has been carried out on the experimental farms maintained by

gov¬ ernment in various parts of the country.

Stockraising. — Horned cattle are used in agricultural operations throughout all India, ex¬ cept Sind and the Punjab, where camels gen¬ erally take their place. The total number of cattle in India is over 120,000,000, of sheep and goats 40,000,000, of horses, ponies, mules and donkeys, 2,500,000, and of camels about 250,000. There are large numbers of buffaloes in all parts of the country. A public veterinary department

attends to the improvement of the breeds of horses, ponies, mules and cattle, the prevention of disease among domestic animals and the pro¬ vision of veterinary instruction. Its operations are mainly confined to Northern India, where the conditions are most favorable for the breed¬ ing of horses for military purposes.

Commerce. — From a very early period down till comparatively recent times Western traders visited India in order to obtain the gold and silver, jewels, spices and other costly prod¬ ucts for which India was then celebrated, but the present foreign trade of India has developed under British rule and rests on an entirely dif¬ ferent basis. In the year 1700 the total value of the exports from India was under $5,000,000, in 1834 the value had risen to $50,000,000, and in 1913 goods and treasure to the value of about $800,000,000 are exported every year. In 1913 — 14 the total value of private imports by sea and government imports of stores, as well as treasure was $782,492,030. The total value of private exports of Indian merchandise, for¬ eign merchandise re-exported, government and treasure was $853,630,255, the total sea-borne trade being $1,636,122,285. The chief articles of import were : cotton woven goods, metals and hardware, oils, chiefly petroleum, sugar, railway material, machinery and mill-work, cotton yarns, chemicals, medicines, dyes, woolen goods, silk, raw and manufactured, provi¬ sions, liquors and apparel. The chief ex¬ ports were: jute, raw and woven, husked rice, hides and skins, oil-seeds, raw cotton, tea, opium, cotton yarns, wheat, indigo, cof¬ fee, raw wool and cotton woven goods. The proportion of trade directly with European countries is about 63ˆ4 per cent omitting the trade with Egypt much of which really goes to Europe. The trade with the United Kingdom is over 60 per cent of the trade with Europe and nearly 45 per cent of the total trade. Next to the United Kingdom the chief countries trading with India are China, Germany, United States, Straits

Settlements, France, Japan, Bel¬ gium, Ceylon, Austria-Hungary, Italy and Rus¬ sia. The figures for 1913-14 show that, while Indian imports of American goods were valued at about $15,967,000, Indian exports to America amounted to $72,500,000. The chief articles of export appear to be. gunny bags and cloth, of which latter America takes more than all other countries. The trade of India with America, however, is only of short standing, but wisely organized, is capable of being greatly expanded. Before the War, Germany supplied many things this country should furnish, particularly in the electrical and chemical lines, in which it at pres¬ ent holds the market. Other important articles of Indian export are tea, jute and jute manufac¬ tures, wheat, oil-seeds, rice, leather, wool, in¬ digo, coffee, teak-wood, cotton and lac. The share of the five chief seaports of India in the total foreign trade (excluding treasure and gov¬ ernment stores) in 1914-15 was as follows: Calcutta, $382,019,707 ; Bombay, $285,567,573 ; Rangoon, $69,813,963; Karachi, $95,020,424; Madras, $49,020,000. India has many other sea¬ ports of minor importance. The value of mer¬ chandise and treasure carried in coasting ves¬ sels during 1914-15 was $334,478,604. The trade across the land frontiers is steadilv in¬ creasing, the chief item among imports being

food grains, and among exports cotton goods. Much greater than her trade with foreign coun¬ tries is the internal trade of India, but no re¬ turns of its amount are available. It is mostly in the hands of natives, and to a large extent in those of particular groups or castes. It is still carried on, as it has long been, at village markets, town bazaars, religious fairs and sim¬ ilar gatherings, but the development of railway and canal communication and the transforma¬ tion in the system of agriculture have already altered its character in many ways.

Manufactures. — The domestic industries of India, such as weaving and spinning, pottery, brass-work, iron-work and art work of many kinds, continue to be practised after ancient methods all over the continent of India. But Indian fabrics and products, made on a small scale by workers at their homes, have for years past been giving way before the cheaper, less artistic, and often less durable cotton yarn and fabrics, and the iron or steel products of Brit¬ ish factories. Meanwhile an important manu¬ facturing industry has been growing up, and steam-power factories are at work, among which those for spinning and weaving cotton, for spinning and weaving jute, for making paper, for husking and cleaning rice, for sawing tim¬ ber, and for brewing beer, are the most im¬ portant. Steam power is also largely employed in factories, on tea gardens and indigo estates. In 1912 the number of cotton-mills in British India and native states was 241, containing 85,676 looms and 6,100,632 spindles, and giving employment to

240,513 persons. Of these mills 136 were in Bombay Province (80 in Bombay City), the rest being in Madras, Bengal, Central Provinces, United Provinces, Burma, Punjab and Berar, besides some of the native states. The number of jute-mills was 61 containing 34,033 looms and 708,716 spindles, and employ¬ ing over 204,092 persons. All the jute-mills are in Bengal, except one in Cawnpore, which is the chief manufacturing centre of the United Prov¬ inces. Four woolen mills produce blankets, serges and cloths worn by the army and the police. The largest brewery is at Murree, in the Punjab Himalayas. Among other indus¬ trial works of importance are silk-mills, soap-factories, tanneries, iron and brass foundries, sugar-factories, coffee-works, cotton-presses and ginning-factories, jute-presses, rope-favtories, oil-mills, cutch and lac factories, flour-mills, ice-factories, pottery and tile factories, bone¬ crushing works, tobacco, and cigar factories, silk filatures, glass-factories, dye-works, indigo- factories, printing-presses and dairy farms. The total number of persons employed in all these manufacturing industries is about 700,000. The daily wages of unskilled labor in a factory vary, according to locality, from 2 to 4 annas (4 to 8 cents).

Shipping and Navigation. — In 1913-14

8,617 vessels of 17,386,408 tons burden entered and cleared the ports in British India, as against 8,001 vessels of 12,910,823 tons in 1908-09. Of these 4,951 were of British nationality, 1,697 native, 503 British Indian and 1,466 for¬ eign.

Railways and Roads. — The first Indian railway, from Bombay to Thana, was opened in 1853. The main trunk lines constructed from that time till about 1875 were built and man-

aged by private companies on whose capital the Indian government guaranteed a fixed rate of interest, generally 5 per cent. The government in return for this assistance, exercised a general control over the companies, and reserved the right of buying the undertakings at specified dates on stated terms. In 1870 Lord Mayo in¬ itiated the policy of railway construction by di¬ rect state agency, but in more recent times several lines have been constructed by ((assisted companies. ® Several of these latter lines have been taken oyer by government. There are also native state railways constructed from cap¬ ital borrowed by native states, but generally worked by a staff

employed by the government of India or by the trunk railway companies to whose lines they serve as feeders.

The importance of railroads in India is largely increased, in a governmental sense, by reason of their forming strategical links be¬ tween the various military cantonments through which the vast Indian population is held in check by a comparatively small army of British soldiers. This, more than any other incentive, has. hastened the development of railways in India.

The main lines are four in number, and are known as the Bombay-Calcutta, Madras-Cal- cutta, Calcutta-Simla and the Bombay-Madras lines. The first crosses the great northern plain, . the last the great southern plain of India, and are both connected by means of- branch lines with all the large cities of the empire. These great trunk lines have also been extended to the farthest limits of India, and even into adjoining territories, as where the line which crosses the Indus at Sukkur enters Afghanistan, the terminus being not more than 60 miles from Kandahar. There is also the Burman line, which passes up the valley of the Irawaddy in the direction of the Chinese fron¬ tier. These three main lines, with their several offshoots, may be roughly sketched as follows : In the north, a direct line from Bombay on the west coast to Calcutta on the east coast; a line to Benares from Bombay; a direct line from Calcutta to Peshawar, on the Afghanistan border, by way of Benares, Delhi and Lahore; a line from Lahore to Karachi, with the branch line between these two cities to Kandahar. In the south, the main line between Bombay and Madras through Hyderabad; the line from Bombay to Goa, and from Goa to Madras, with lines connecting with Calicut and with the line from Madras to Tuticorin in the south. Since 1916 a railway built across (

The total mileage of railways in India on 31 March 1914 was: State lines, 25,832 miles; companies lines guaranteed under modern con¬ tracts, 32 miles; district board's lines, 155 miles; branch line companies receiving rebates from traffic interchanged with main lines, 1,388 miles; companies lines (a) subsidized by the govern¬ ment of India, 449 miles; (b) subsidized by local governments, 137 miles; (c) subsidized by

district boards, 302 miles; (d) and companies r tS ,r.ece*v*nS Dnd only from the government of India, 1,760 miles; unassisted companies lines, 74 miles; leased lines, 79 .miles; native state lines, 4,363 miles ; and foreign lines, 74 miles ; total, 34,645 miles. The total capital outlay of these railways till the end of 1913 was slightly over $1,500,000,000; the total number of passen¬ gers carried in 1913 was

457,717,000; and the totaj weight of goods and live stock carried 82,613,000 tons. The chief highways are well metalled with a kind of limestone called kankar, but in Lower Bengal and similar districts, where there is no available stone, roughly-made bricks are used for road-metal. Many of the roads are planted with avenues of trees.

Posts, Telegraphs and Telephones.— The number of post-offices in India in 1914 was 68,077. The total number of letters and post¬ cards and all pieces of mail was 1,080,908,000. The Indian telegraph system consisted in 1914 of 81,593 miles of line, 321,801 miles of wire and 283 miles of cable. The number of tele¬ graph offices is about 7,000 and the annual number of messages over 16,000,000. There are telephone companies at important towns, such as Bombay, Calcutta, Karachi, Madras, Maul- mam, Rangoon and. Ahmadabad. India is now in direct telegraphic communication with the Straits Settlements and the Australian colonies, with Europe via Suez, via Teheran and via Turkey,. with the East Coast of Africa and with China via Bhamo ; and there are several wire¬ less telegraphic stations under government control.

Canals and Irrigation. — In some parts of India, such as Sind, cultivation is impossible without irrigation, while, in others, such as much of Lower Bengal, irrigation may be re¬ garded as quite unnecessary; but in the greater part of all the provinces the rainfall is either insufficient for the proper cultivation of the soil, or so uncertain as to expose the agricul¬ turists to the constant risk of scarcity and even of actual famine. Hitherto irrigation has had only a secondary place in the governmental development of India, the attention of the ad¬ ministration having run more to railways. The profit on the railways is, on an average, 5 per cent, while the expenditure on irrigation works on which only $125,000,000 have been spent, the profit has averaged 8.22 per cent; on the Eastern Jumna canals the profits rise to 2o per cent. The annual irrigation expenditure under the present Indian budget comes to only $7,500,000 for major and minor works together.

Many of the irrigation works now adminis¬ tered by the Public Works Department are sim¬ ply old native works restored, and in some cases extended or improved. Tank irrigation is com¬ mon in some districts, especially in southern India, and the tanks are mostly of native origin. Many old tanks, however, have been repaired or improved by the British government, and new ones have been constructed in Madras (where there are now 60,000 tanks), the Bombay Deccan and Ajmir Merwara. In parts of Baluchistan, where the rainfall is scanty and capricious, water for irrigation purposes is drawn from underground

springs by means of tunnels driven into the hillsides. The most common method of irrigation in India, however, is that by wells, which prevails over large areas

in all the provinces. Canal irrigation was prac¬ tised to some extent by the native rulers, but all the important canals have been constructed since the British occupation. Irrigation canals are of two kinds, inundation and perennial. The latter are furnished with permanent headworks and weirs, and are capable of irrigating large areas throughout the year, independently of the local rainfall; while the latter, which are peculiar to Sind and the Punjab, are simply earthen channels supplied with water by the annual rise in May of the Indus and its afflu¬ ents. Many of the perennial canals are, either in whole or in part, used for navigation, and there are, besides, a few canals used for naviga¬ tion alone. In 1913—14 throughout India, 20,446,-248 acres were irrigated by canals ; 6,303,740 acres by tanks ; 13,866,918 acres by wells and 6,219,113 acres by other sources. State irriga¬ tion works accounted for nearly 25,000,000 acres in 1913-14. Aside from interest charges, the net revenue from these works was about $21,125,000, while the estimated value of crops was $271,250,000.

Money, Weights and Measures. — By an

act passed in 1835 a uniform monetary system was established throughout India, with the Madras silver rupee of 180 grains, .916 fine, as the monetary unit. The rupee was subdivided into 16 annas, and each anna into 12 pies (or four pice). Silver was made the universal standard of value, and the silver rupee and half¬ rupee were declared to be legal tender to any amount. The other smaller coins were made legal tender up to the value of one rupee; 100,000 rupees are called a lakh or lac, and 100 lakhs a crore. Under this system large sums are punctuated differently from the usual Euro¬ pean method. For instance, the Indian Post- Office Savings banks' statistics show that in 1913-14, 9,824 banks with 1,638,725 depositors had to their credit 231,675,467 rupees, or ac¬ cording to the Indian method 23,16,75 467 rupees, reading as 23 crores, 16 lakhs and 75,467 rupees.

The coins under this system are: Silver — Rupee, half-rupee, quarter-rupee and one-eighth rupee; Bronze or Copper — Three pies (or a pice) ; six pies, one pie. There are also gold coins called mohurs, but

they are not a legal tender, and there is no fixed ratio between them and the silver coins. The rupee was formerly valued at 48 cents, but it has fluctuated greatly, mainly downward. In January 1895 it was nearly as low as 24 cents; but since 1898 the sterling value of the rupee has been about 32 cents. In view of the steady depreciation of silver, and the consequent financial embarrass¬ ments and burdens to which the government of India was subjected in its dealings with gold-standard countries, an act was passed by the Governor-general's Legislative Council in 1893 providing for the closing of the Indian mints to the unrestricted coinage of silver for the public. Notifications were issued simul¬ taneously providing (1) for the receipt of gold coin and gold bullion at the mints in ex¬ change for rupees at a ratio of Is. 4d. (or 32 cents) per rupee; (2) for the receipt of sov¬ ereigns and half-sovereigns of current weight at treasuries, in payment of government dues, at the rate of 15 rupees for a sovereign and 7k 2 rupees for a half-sovereign; and (3) for the issue of currency notes in Calcutta and Bombay in exchange for gold coin or gold

bullion at the rate of one government rupee for Is. 4d. By a notification of 11 Sept. 1897, sov¬ ereigns and half-sovereigns of current weight are also received at the reserve treasuries, at the rate of rupees, 15 for the sovereign.

An act (XXII of 1899) declared the sov¬ ereign legal tender, 15 rupees to the sovereign. It was, however, decided not to coin gold in India, a proposal to coin gold is now under consideration.

The Coinage Act of 1906 provided for the in¬ troduction of a subsidiary nickel one-anna piece and the substitution of a bronze currency for the existing copper coins. The coinage of copper was accordingly discontinued with effect from 1 Aug. 1906. The issue of the nickel one-anna piece was commenced with effect from 1 Aug. 1907.

Since 1900 rupees have been coined as re¬ quired to meet public demands, the government purchasing the silver and paying for it mainly with the gold accumulated in the paper cur¬ rency reserve. The entire profit accruing to government on the coinage up to 31 March 1907, and during the year 1912-13, and half such profit for the years 1907-08 and 1908-09 were placed to the credit of a separate fund termed the gold standard reserve, with the object of ensuring the stability of the currency policy of the government. Any profit arising from this source in future will be. credited entire to the gold standard reserve, until such time as the gold and gold securities in the gold standard reserve shall attain to a total of 25,000,000 ster¬ ling. At 31

March 1914, the reserve amounted to about 25,5000,000 sterling, inclusive of 4,000,000 lacs of rupees held in India.

On 16 July 1861, an act. was passed by the government of India providing for the issue of a paper currency through a government de¬ partment of Public Issue, by means of promis¬ sory notes. Circles of issue were established from time to time, as found necessary, and the notes were made legal tender within the circle for which they were, issued, and rendered pay¬ able at the place of issue, and also at the capi¬ tal. city of the presidency. Subsequent legis¬ lation has relaxed the rigidity of the circle system. Notes of the values of 5, 10, 50 and 100 rupees are now legal tender throughout British India, and the limitation of currency to the circle of issue is confined to notes of higher denominations. There are now seven circles of issue with their headquarters at Cal¬ cutta, Bombay, Madras, Rangoon, Cawnpore, Lahore and Karachi.

By the Measures of Length Act of 1889 the British Imperial yard of 3 feet or 36 inches was made the standard of length for the whole of British India. The most important of the old native measures of length was the quz of Bengal, which was practically equal to a yard. An act was passed in 1871 to prepare the way for the adoption of a uniform system of weights and measures of capacity throughout British India. The unit and standard of weight established bv the act is the ser, which is equal to a kilogram or two and one-fifth pounds. The unit of capacity was declared to be a measure contain¬ ing one ser of water, at its maximum density, weighed in a vacuum, and is thus equal to a litre or one and three-quarters pint. Among native weights the most important are the tola (Bengal) of 180 grains, and the Imperial or

Indian maiind of 40 seers, equal to 82 2/7 pounds.

Government. — The government is regulated by the act of 1858, by which all the territories formerly possessed by the East India Company are transferred to the Crown, and all the powers of the said company exercised in name of the sovereign. By an act of December 1919 India received representative government and an in¬ creased share, in the administration of the country. His majesty's secretary of state for India is invested with the powers formerly exer¬ cised by the company or the board of control, and he must countersign all orders and warrants under his majesty's sign-manual. He is as¬ sisted by a council of from

10 to 15 members, two of whom are natives of India. The secre¬ tary for India fills up vacancies in the council. The members receive a salary of $6,000 a year payable out of the revenues of India, and they hold their office for 10 years. All orders sent to India must be signed by the secretary, and all dispatches from the Indian government must be addressed to him. The executive au¬ thority in India is vested in the governor-gen¬ eral or viceroy appointed by the Crown, and act¬ ing under the direction of the Secretary of State for India. He has a salary of 250,000 rupees, or about $83,500. The governor-general in council has power to make laws for all persons, whether British or native, within the dominions subject to the British Crown, and for all British sub¬ jects residing in allied native states. His coun-. cil consists of six ordinary members, of whom one is a native of India, and one extraordinary member, namely, the commander-in-chief. There are 10 departments — Home, foreign, finance, army, public works, revenue and agri¬ culture, commerce and industry, legislative, edu¬ cation and railways. The council is expanded into a legislative council composed of 38 official and 32 non-official members, the members have the right of supplementary interpellation. Bengal, Madras and Bombay are ruled by governors with legislative councils. The united provinces, Punjab, Burma, Bihar and Orissa are ruled by lieutenant-governors with councils. The Advisory Parliament of India under the act of 1919 was opened at Delhi by the Duke of Connaught early in 1921.

Finance. — The gross revenue estimated for 1915-16 was $401,734,500, and the gross expendi¬ ture charged against revenue $415,586,000. The total public debt of India on 31 March 1915, was $1,535,575,115, of which $650,251,330, repre¬ sented the debt in India, and the rest the debt in England. The largest item in the revenue is that derived from land, which amounted in the year 1915-16 to $110,248,000. The revenue from forests was $10,5/9,000, and the total amount of tribute received from native states was $3,066,500. The revenue from opium on exports amounted to £4,645,000 in 1908-09 and to £8,990,000 (estimated) in 1915-16. The opium revenue is raised partly by a monopoly in Bengal, and nartly by the levy of a duty on all opium exported*from native states. The cultiva¬ tion of the opium poppy is absolutely prohibited in British territory, except in certain parts of Bengal and the united provinces of Agra and Oudh, but a few thousand acres in the Punjab grow it for local consumption. The opium revenue is being reduced as the export to China is now entirely stopped. The revenue from salt

is $16,910,500. The salt revenue is raised by a duty on all salt imported into, or manufac¬ tured in India, the duty being now one

and one- half rupees (50 cents) per maund, except in Burma, where it is one rupee (32 cents) per maund The native sources of salt supply are the coast, especially the Rann of Cutch (Baragra salt) and Maurypur (Sind), the salt lakes and pits (especially Sambhar Lake) of Rajputana, and the salt mines (especially the Mayo mine) of the Punjab. Bengal and most of Burma import their salt by sea, much of it coming from England. Several native chiefs have entrusted the management of their salt sources to the British authorities in return for certain pay¬ ments. The excise accounts for $43,951,500 of the revenue from taxation. The only excis¬ able articles are intoxicating liquors (including toddy, palm-wines and rice-beer), and certain drugs (opium, ganja, bhang, charas), and the aim of the government in taxing these has been as much to reduce consumption as to raise revenue. The government treats the right to manufacture and the right to sell spirits as state monopolies, which are granted to indi¬ viduals on special terms. Throughout Bombay and the Punjab, the most populous tracts of Madras, the united provinces, Oudh and Burma, and in some parts of Bengal and the central provinces, the central distillery system in some form prevails, and a still-head duty is levied on all spirits manufactured at the recognized distilleries. Except in Madras and some other parts, these central distilleries »are government establishments at which private persons distil spirits. In other districts the spirit revenue is raised by farming out the spirit monopoly to the highest bidder, or by licensing the establish¬ ment of private stills, the latter method being called the out-still system. The Indian govern¬ ment is replacing the farming and out-still systems as far as possible by the central dis¬ tillery system. The customs revenue amounted in 1914—15 to $29,715,000. Import duties were abolished in India in 1882, but in 1894 they were reimposed, and now all goods, with the exception of railway material and industrial machinery, food grains, coal, jute, wool and other raw materials, gold and unset precious stones, and some other commodities, are sub¬ ject to import duty. The amount of the duty is generally 5 per cent, but petroleum is charged at the rate of one anna per gallon, and iron and steel are subjected to a duty of only one per cent. Since 1896 all cotton yarns imported into or manufactured in India have been duty-free, while all woven cotton goods imported from abroad, or manufactured at power-mills in India, pay and ad valorem duty of 3ˆ4 per cent. There is an export duty on rice and rice-flour of three annas per maund of unhusked rice. A countervailing duty on bounty-fed sugar came into force in March 1899. Revenue from stamps, was $25,535,500. Other important heads of revenue are: Post office, telegraphs and mint (est. 1915-16) net'$l 7,896.000 ; civil departments, $7,670,000; railways, $75,146,500 ; irrigation, $23,976,500; other civil public works,

$1,280,500. The chief elements in the expenditure are: Rail¬ ways, $69,250,000; army and marine services, $106,101,500; civil salaries, etc., $95,650,500; charges of collection, $39,683,000; mis¬ cellaneous civil charges (furlough and super¬ annuation allowances, pensions paid in Eng-

land, etc.), $39,683,000; irrigation, $25,542,000; famine relief and insurance, $4,860,000; post office, telegraphs and mint, $18,254,000; interest on public debt, etc., $16,532,000. Expenses for buildings and roads are not included.

Army and Navy. — • The army in India is under a commander-in-chief, who is under the control of the Indian government ; and is divided into a Northern army and a Southern army. The Indian army was composed before the Great War of 75,897 British troops and 161,085 native troops. The native troops are officered by Englishmen. Wherever European troops are stationed there is always a larger native force, and in many of the smaller and less important posts there is a native force only. Much money has been spent in recent years on defensive works and military establishments, strategic roads, etc. India has also a certain number of vessels for coast defense.

Ethnology. — India is inhabited by numerous peoples belonging to several distinct groups or families. Previous to the Mohammedan ascend¬ ency the dominant race were the Hindus, who, however, were not the aboriginal inhabitants nor even the first invaders. From the northwest of India, through Kashmir and down the valley of the Indus, and from Tibet through the passes of the Himalayas, the inhabitants of northern Asia from a yery early period migrated southward to the milder and more fertile plains of India. Two great successions of these invasions are recognized as having taken place before the period of authentic history. The first immi¬ grants, of dubious ethnological connections, but commonly known as the Tamil races, appear to have overspread the entire peninsula. Following them the Sanskrit-speaking peoples, called the Hindus, of Aryan speech, dispossessed the Tamil races, and superseded their language in the whole of India north of the Nerbudda. The Hindus subsequently descended into the penin¬ sula and penetrated as far as Cape Comorin ; but thoug'h their influence on the languages of southern India was considerable in the way of introducing new terms, the grammar and con¬ struction of. the Tamil languages maintained their place in the

districts south of the Ner¬ budda. The native tribes were not extermi¬ nated by these invasions, but are still to be found under various names, as Bhils, Catties, Coolies, Gonds, etc., inhabiting the fastnesses of the mountain-ranges in Bengal, the Vindhya and Satpura Mountains, the Ghats, etc. The hill tribes and other aborigines in all India are estimated at 70,000,000.

Population. — The first census of all India was taken in 1871-72, but it was not till that of 1891 was taken that a really reliable and com¬ prehensive statistical account of the people of India was available. In 1871-72 the total popu¬ lation of India was returned at 240,931,521, in 1881 at 253,793,514, in 1891 at 287,223,431, in 1901 at 294,266,701 and in 1911, 315,156,396, of which 244,267,542 were under immediate British authority. The total number of Europeans was only 135,995.

France still possesses in India Pondicherry, Karikal, and Yanaon, on the east coast of Madras ; Mahe, on the west coast of Madras, and Chandarnagore on the Hugh, north of Calcutta. To Portugal belong Goa, Damao, and the small island of Diu, on the coast of Bombay. These French and Portuguese pos¬

sessions have a total area of 1,754 square miles and a popuation of 852,752.

Education. — A system of education for In¬ dia was inaugurated in 1854 in conformity with the instructions of the home government, and the despatch of Sir Charles Wood (afterward Lord Halifax) of 19 July 1854 is the basis on which the educational system still rests. The fundamental principle of the despatch was that the native languages should be made the medium of communicating European knowledge. Ex¬ amining universities with affiliated colleges were to be founded, and English and vernacular ele¬ mentary schools were to be established. The despatch enumerated five government colleges in Bengal ; the Sanskrit College and Moham¬ medan Madrasa at Calcutta ; five colleges in the United Provinces; the Elphinstone Institution, Puna College and Grant Medical College in Bombay; the High School at Madras and sev¬ eral missionary schools, as proper to be at once affiliated to the universities. In 1857 the three universities of Calcutta, Madras and Bombay were formally incorporated by law as examin¬ ing bodies based on the model of the University of London as then constituted. A somewhat different university, with teaching powers, was established in 1882 at Lahore in the Punjab, and in 1887 a fifth university was founded at Allaha¬ bad for the northwest provinces. The Educa¬ tion Commission of 1882-83 extended the system of

Wood's despatch by placing education on a more popular basis and giving greater recogni¬ tion. to indigenous schools and the first pro¬ posals for extending education to Indian women were made by this commission. Educational in¬ stitutions in India are officially divided into two classes: (1) Public schools, in which the course of study conforms to the standards prescribed by the department of public instruction or by the university, and which either undergo in¬ spection by the department, or else regularly present pupils at the public examinations held by the department or by the university. These institutions may be under either public or pri¬ vate management, and among- them are many schools receiving grants-in-aid. (2) Private schools, comprising all which do not fulfil the above conditions. The three main grades of institutions through which the system of educa¬ tion operates are (1) Primary schools, which aim at the teaching of reading, writing and such elementary knowledge as will enable a peasant to look after his own interests ; (2) secondary schools, either English or vernacular; and (3) colleges, the students in which, having passed the matriculation examination of a uni¬ versity, are reading for the further examina¬ tions required for a degree. There are also many other colleges teaching special branches of knowledge, such as medicine, law, and en¬ gineering, and special colleges for sons of native chiefs and noblemen. In Burma primary education is still very largely in the hands of Buddhist monks. Outside of a few exceptional districts, female education is exceedingly back¬ ward in India, but slow progress is being made. There are schools of art in Madras, Calcutta and Bombay, and many of the chief towns have good museums. Many normal schools have been established for the special training of teachers.

The total number of colleges in India in 1913 was 174, of which only 11 were for females.

INDIA

Feasting the Idols

1 An Indian Singer, Madras 2 A High-caste Maiden, Madras

INDIA

INDIA

The State Elephant in India

INDIA

1 Jumma Musjid, Delhi

2 Government House, Calcutta

INDIA

11

The number of pupils in these colleges was 41,166. Secondary schools numbered 6,595, with 996,611 pupils, 68,154 of the latter being females. The number of primary schools was 127,798, with 4,435,105 male and 833,783 female pupils. The total number of training and other special schools was 6,907, with 197,183 pupils. Beside all these, there were 40,174 private institutions, with 591,754 male and 77,636 female scholars. The total number of educational institutions of all kinds was thus 181,659, of which 17,068 were for females, and the total number of persons under instruction, 7,173,343, of whom 1,008,281 were females. It has been estimated that 22.2 per cent of the boys of school-going age attend school, but for girls the percentage is only 2.3. In nearly all branches of education in India the missionaries have been the pioneers, although at present their work is not important. See India, Educational Progress in.

Languages, Literature, Art, Music.— See India, Language and Literature of; India, Art and. Architecture of; India, Music of.

Religions. — The religions of India like the races are numerous. The most important is the Hindu or Brahmanical, which is very ancient. The earliest period of the Hindu religion is called the Vedic, from the Vedas or sacred books in which its records are preserved. These exhibit several marked phases of transi¬ tion. The earliest date of the Vedic literature cannot be satisfactorily determined, either from philological or internal evidence. Its latest writ¬ ings are not more recent than the 8th century b.c. Each Veda consists of three parts, the Sanhita, a collection of mantras or hymns, the Brahmana, which contains the doctrinal and ceremonial development of the religion and the Upanishads. The worship represented in the greater number of the hymns is that of God as nature: Indra, the cloudless firmament; the Maruts, the. winds; Ushas, the dawn; Vishnu, Surya, Agni and other deities. These deities were invoked for assistance, and were reminded by the suppliants of their former glorious deeds. In the Vedas.no attempt is made to classify the gods and assign them particular ranks. In the Upanishads, a systematic attempt is made to solve the problems of creation, of the nature of the supreme being, and of his relations with the human soul. Some of the Upanishads are legendary in form

others doctrinal or exegeti- cal. These Upanishads, though not in form philosophical, being professedly founded on the Vedas, contain the germs of the great systems of Hindu philosophy which were afterward de¬ veloped.

A new era in the history of Hinduism begins with the composition of the two great epics, the Ramayana and the Mahabharata, the latter of which was the product of successive ages. The creed had by this time experienced the in¬ fluence of the theological and metaphysical speculations of the Upanishads, and had as¬ sumed a mystical unity. Brahma, Vishnu and Siva, the three emanations of the great soul Brahma, representing respectively the creative, preserving, and destroying principles, had be¬ come the leading objects of worship.

The third or Puranic period of Hinduism correspond with the period of the Christian Era. The Puranas are discussions upon religion and philosophy, in the form of dialogues conducted by sages. They are designed for popular in¬

struction. The epic legends are amplified and explained. The Vedanta philosophy, which had become the basis of the educated creed, still exercises a favorable influence on the popular worship. The creed of the Puranas is that of the masses in India.

Buddhism arose in India in the 6th century b.c. It prevailed there extensivelv. and spread itself through the. adjoining regions of Asia. It became extinct in India before the 12th cen¬ tury, but still flourishes in China, Japan and in the southeastern regions of Asia, as well as in Nepal and Ceylon. (See Buddha). The Jainas or Jains, whose religion is a mixture of the Buddhist and the Brahmanical creeds, are still numerous in Hindustan, and partic¬ ularly in Gujarat. There are two sects of this creed, called Digambaras and Swetambaras. Sikhism is another heretical form of Bra- hamanism prevalent in the Punjab. There are numerous other minor sects of Hinduism and worshippers of particular gods in the Hindu mythology. The Brahmo-Somaj (q.v.) is a modern Hindu theistic sect. The Parsees or fire-worshippers are descendants of the Persian followers of that religion, who took refuge from Mohammedan persecution on the western coast of India. Their principal emigration was to Surat, and is supposed to have taken place about the. end of the 8th century. They were well received in Gujarat. They are now to be found mostly in the mercantile towns in west¬ ern India, and are most numerous in Bombay. The Mohammedans of India are chiefly native converts, with a very small sprinkling of the descendants of its conquerors from Afghanis¬ tan, Persia, Baluchistan and Arabia. They are said to be more liberal-minded than the

Moham¬ medans of western Asia. There is among them a sect of Fakirs like those of the Hindus. There, are also numerous Tews in India. On Christianity in India see bdow under Christian Missions. Hinduism recognizes four castes — the Brahmans, or sacerdotal class; the Kshatriyas, or military class; the Vaisyas, or mercantile and agricultural class; and the Sudras, or servile class. These castes are heredi¬ tary. (See Caste). Such divisions are how¬ ever, now getting obsolete. Closely connected with the Hindu religion is the collection of laws commonly known as the Institutes of Manu. (See Manu). In the Indian census table of religions (1901) 8,584,349 people are returned as heathens or aboriginals, that is, devotees of some form of animism. Practically, for the purposes of the Indian census, all are classed as animistic who are not locally acknowledged to be Hindu, Mohammedan, Christian, Buddhist, Jew, Parsee, etc., but every stratum of Indian society is in reality more or less saturated with animistic conceptions. Of the total population of British and Native India in 1911, 217,586,892 were registered as Hindus, the greater number of these being in Bengal, the united provinces of Agra and Oudh, Madras, Bombay, Hydera¬ bad and Rajputana. There were 66,647,299 Mo¬ hammedans chiefly in Bengal and the Punjab, 10,721,453 Buddhists almost all in Burma; 3,- 876,203 Christians of whom two-thirds are in Madras and in the Madras States ; 3,014,466 Sikhs, chiefly in the Punjab; 1,334,148 Jains, chiefly in Rajnutana and in Bombay; 100,096 Parsees and 20,980 Jews mostly in Bombay. See Hinduism.

Christianity and Christian Missions in India — The introduction of Christianity into India is variously ascribed by tradition to Saint Thomas the Apostle; Thomas the Manichsean of the 3d century; and Thomas, an Armenian merchant of the 8th century. The earliest Christian church in India of which we have any definite knowledge was Nestorian, but after the Portuguese occupation these Nestorians came into the Roman obedience. In 1663, after the arrival of the Dutch, some of these re¬ nounced their allegiance to Rome. In 1665 these latter received from the Patriarch of An¬ tioch a Jacobite bishop known as Mar Gregory, and to this dav they have remained faithful to his Jacobite tenets. Thus, the ancient Nestor¬ ian church of southwest India is represented now by two bodies, namely: (1) Catholics of the Syrian Rite, owning the supremacy of the Pope, but retaining the Syrian language and ritual in their services; and (2) the Jacobite Catholics, rejecting the errors of Arius and Nestorius, and following

the Nicene creed, though not acknowledging papal supremacy. The spread of thˆ Roman Catholic faith in India was mainly the work of Jesuits from the 16th century onward, the first of these being the celebrated Saint Francis Xavier, who reached India in 1542. The Jesuits were suppressed in the 18th century, but since the re-establish¬ ment of the order in 1814 they have made great progress. The Roman Catholics of India are at present organized in seven archbishoprics (Goa, Agra, Bombay, Calcutta, Madras, Pon¬ dicherry and Verapoly), and 16 bishoprics (Daman, Cochin, Mailapur, Allahabad, Lahore, Poona, Dacca, Krishnagar, Hyderbad, Nagpur, Vizagapatam, Coimbatore, Mangalore, Mysore, Trichinopoly and Quilon), and there are also several vicars and prefectures apostolic. The earliest Protestant missionaries in India were the Lutherans,. Ziegenbalg and Plutschau, who arrived in the country in 1705 and began work at the Danish settlement of Tranquebar. The Lutheran missions were supported from the first by the Society for Promoting Christian Knowledge, and from 1719 till 1844 they were entirely maintained by that body. The cele¬ brated Christian Friedrich Schwarz worked under the auspices of this society from 1750 till his death in 1798. Kiernander, a Dane, was the pioneer of Protestant missionary enterprise in Bengal. He was allowed by the East India Company to settle at Calcutta in 1 7 58, but soon afterward the company changed its policy, and began to prevent missionaries from landing in the country controlled by it. When William Carey, the great Baptist missionary, arrived in 1793, he had to settle on Danish territory at Serampore, 15 miles from Calcutta, and it was not till 20 years later that the company's op¬ position to missions was withdrawn. Carey was followed at Serampore by Marshman and Ward, whose names will always be associated with his and with the wonderful literary activ¬ ity begun by him. Other celebrated Indian Protestant missionaries are Henry Martyn and Bishop Heber of the Anglican Church and Dr. Alexander Duff, at first of the Church of Scot¬ land, afterward of the Free Church of Scotland. The head of the Anglican Church in India is the bishop of Calcutta, and under him are the seven bishops of Madras, Bombay, Lahore, Rangoon, Lucknow, Chutia, Nagpur and Tra-

vancore. Many American missionaries also work in India.

Judiciary. — The law administered by the courts of India is chiefly based on the enact¬ ments of the Indian legislative councils, the statutes of the British Parliament relating to India, the Hindu and Mohammedan laws of in¬ heritance and their domestic law in cases affect¬ ing Hindus and Mohammedans, and the cus¬ tomary law affecting particular castes and races. Bengal, Bombay, Madras and the

united prov¬ inces have each a High Court supreme in civil and criminal cases (but with an ultimate appeal to the Privy Council in England, and some¬ what similar tribunals exist in the other prov¬ inces. There are numerous courts of different grades throughout the country, and many of the judges are natives of India. Various en¬ actments have been passed for the establish¬ ment of local government, and there are now upward of 712 cities and towns with municipal government in the different provinces under these acts, and local taxation for police and local improvements has been enforced.

Local Government. — All the provinces, ex¬ cept Madras, are divided into divisions, each under an official called a commissioner, and all, including Madras, are divided into sections dis¬ tinctively designated districts, the district form¬ ing the unit of administration. At the head of each district is an officer called a collector-mag¬ istrate or deputy commissioner, the former name implying the twofold nature of his duties, since he is not only a fiscal officer charged with the collection of the revenue from the land and other sources, but is also a revenue and criminal judge, both of first instance and of appeal. Po¬ lice, jails, education, municipalities, roads, sani¬ tation, etc., all come under his supervision ; and he is expected to be familiar with the social life of the natives in all its phases. The dis¬ tricts are sub-divided into lesser tracts, known in Bengal as sub-divisions ; in Madras and Bom¬ bay as taluks; in northern India generally as tahsils. The unit of police administration is the thana or police circle. An important portion of the administrative staff consists of persons who have received appointments in the Indian civil service, after being successful in competitive examinations held in England ; these form what is called the covenanted civil service. A certain section of the civil service, known as ((the statu¬ tory civil service,® consists of natives specially selected. The native states are generally gov¬ erned by hereditary princes, who exercise sov¬ ereign power within their own dominions. They are more or less controlled, however, by British influence, a British resident, agent or commis¬ sioner being stationed at their courts. They have no power to make war or peace, to send ambassadors to each other or to non-Indian states ; they can only keep up a certain specified military force, and they may be dethroned for misgovernment.

History. — Little is known of the political history of India previous to the expedition of Alexander to the Indus, 326 b.c. The 20th sat¬ rapy of the Persians comprehended, as Hero¬ dotus states, part of the northwest of India. Alexander did not penetrate beyond the tribu¬ taries of the Indus, and between his invasion and the Mohammedan conquest there is no authentic political history of India, although the

territory was divided among a number of

rulers of whom Asoka (q.v.), the founder of Buddhism, was one of the chief. At the time of the Mohammedan invasion a Hindu mon¬ archy was the dominant power in India. The conquest of Persia (632-651) brought the suc¬ cessors of Mohammed to the Indus, and they subsequently acquired a temporary hold of some parts of India, as Sind, which they conquered in 710 and lost in 750. The foundation of a more durable Mohammedan empire in India was laid some centuries later. The Kingdom of Ghazna, in Afghanistan, founded, according to Ferishta, by Alpetegin, an ex-governor of Khorassan, in 962, was declared independent by Mahmud in 999. This monarch, of whom as many as 12 expeditions into India are recorded, penetrated in one direction beyond the Jamna; in another he occupied Gujarat and captured Somnauth. He annexed the territory of La¬ hore to his kingdom, and nominally extended his dominion to the Ganges on the west, and to Gujarat on the south. His last expedition was to Gujarat in 1024. About the middle of the 12th century the Kingdom of Ghazna was divided, and Lahore became the capital of the Indian portion. The Ghaznavid Kingdom of India was overthrown in 1186 by Mohammed Ghori. On his assassination in 1206 Kutb-u-din, his governor in India, established the Afghan or Pathan dynasty at Delhi, and conquered Behar and Bengal. His successor Altamsh con¬ quered Sind (1225), and completed the sub¬ jugation of Hindustan. About this time Geng¬ his Khan overthrew the western empire of Ghazna, and founded a great Mongolian empire, which began to extend eastward, and came into collision with the monarchs of Delhi while these were still pushing their conquests to the south and east of India. The Delhi kingdom was, moreover, exposed to frequent commotions, both from the revolts of its own rajahs and from the predatory excursions of the hill tribes. A revolt of the rajahs was suppressed in 1250, and in 1265, after an extensive slaughter of the predatory tribes, a line of forts was constructed to check their incursions. But though fre¬ quently defeated the Mongols continued their incursions into northern India. In 1240 they reached Lahore, in 1244 they invaded Bengal ; the Punjab was subject to frequent invasions; in 1298 they were defeated at Delhi. A new dy¬ nasty, the Khilgi dynasty, arose under the usurper Jelal-u-din- in 1288, which was succeeded by a fresh dynasty in 1321, the house of Togh- lak. The invasions of the Mongols still con¬ tinued with greater or less success. During the reign of the last Toghlak king the celebrated Tamerlane invaded India at the head of a great host,

took and sacked Delhi in 1398, leaving behind him his deputy Khizr Khan, who now assumed the government. A period of anarchy ensued, which terminated in the conquest of India by the Mogul emperors. Ibrahim, the last of the dynasty of Lo ’i, the third in order from that of Toghlak, was defeated in 1526 by Baber, who established the Mogul dynasty in Hindu¬ stan. His grandson Akbar succeeded his father at the age of 14 (1556), and during a long reign of about 50 years, terminating in 1605, subdued nearly the whole of India, which, by introducing religious toleration, he succeeded in consolidating into an empire. At the death of Akbar his empire was divided into 15 subahs or vice-royalties, which indicate its extent,

namely, Allahabad, Agra, Oudh, Ajmir, Gujarat, Behar, Bengal, Delhi, Cabul, Lahore, Multan, Malwa, Berar, Khandesh, Ahmadnagar. His son Selim succeeded him under the title of Jehanghir. The Portuguese, as will be seen in another section, had already established their territorial dominion in India. In 1615, an Eng¬ lish ambassador appeared for the first time at the court of the Mogul emperor in Hindustan. Jehanghir died in 1623, and was succeeded by his son Shah Jehan, who had disturbed his father’s reign by rebellions, and during his own reign the country was filled with civil wars. He quarreled with the Portuguese, and expelled them from their settlement at Hugh. During his reign the Mahrattas or Marathas, under their chief Sivaji, began to be an important power in the Deccan. Shah Jehan was deposed in 1658 by his youngest son Aurengzebe, who also murdered his brothers. His reign was passed amid continual contests, both for extend¬ ing his dominion, and subduing the revolts of the numerous peoples under his sway, both within the limits of India and beyond the Indus. He made war successfully with the Afghans, the Rajputana tribes, and the rising power of the Mahrattas. The Sikhs, a Hindu sect which had been persecuted by the Moham¬ medans, formed a religious and military com¬ monwealth in the Punjab in 1675. Aurengzebe died at Ahmadnagar, in the Deccan, in 1707. On his death the Mogul Empire began to de¬ cline. The succession was disputed by his four sons. Bahadur Shah, who succeeded, died in 1712, and was succeeded by his son Jehundar Shah, who, in the following year, was put to death by Farokshir, a great-grandson of Aureng¬ zebe, who usurped the crown. He was deposed and put to death in 1718 by Hosen Ali. Mo¬ hammed Shah, grandson of Bahadur, was raised to the throne in 1718. His reign was disturbed by the insubordinate spirit of his viceroys, and through the defection of one of them, the Mah¬ rattas succeeded in subduing the Deccan. In revenge for an insult Nadir Shah of Persia in¬ vaded Hindustan in 1738, took possession of Delhi, and gave it up to be sacked and

plundered by his soldiers. The country west of the Indus was ceded to Nadir Shah in 1739. Mohammed died in 1748, and was succeeded by his son Nadir Shah. The empire was now tending to dissolu¬ tion. The new emperor called in the Mahrat¬ tas in 1751 to aid him against the Rohillas, who, in 1749, had defeated the last imperial army ever called into existence. The various states were seized by the former viceroys or by inde¬ pendent chiefs. The Mahrattas, now the most powerful people of India, possessed, besides the Deccan, part of Malwa, and the greater part of Gujarat, Berar and Orissa. The whole empire was at this time in extreme agitation and dis¬ order, every government fearing the attacks and intrigues of its neighbors. Ahmed Shah was deposed in 1754 by Ghazi-u-din, a former vizier of the empire, who set up Alamgir II. In 1757 Delhi was captured by the Afghans, against whom Ghazi-u-din called in the Mah¬ rattas. In 1759 the vizier assassinated the em¬ peror. His successor, Shah Alum, without the shadow of power, escaped from Delhi, and finally took refuge with the British. The rival powers of the Afghans and the Mahrattas, which had been brought into collision by the feebleness of the empire, now engaged in a

fierce struggle for the mastery over its ruins. This terminated at the decisive battle of Pani- put, fought 6 Jan. 1761, in the complete over¬ throw of the Mahrattas. The victor, Ahmed Shah, recognized the grandson of Alamgir as emperor by the title of Shah Alum II ; but the eimire was now only a shadow, and the native states, which had divided its powers, were destined soon to give way to the superior Euro¬ pean commercial organizations which the pur¬ suit of gain had brought to their shores. Henceforth the history of India follows the course of these European colonies, until it is merged in the Indian Empire of Great Britain.

The doubling of the Cape of Good Hope opened up the way by sea to India, and led the Portuguese to the possession of a kingdom in Asia. A few years after Vasco da Gama had landed on the coast of India they were already the most favored merchants upon the whole coast, and in spite of the active jealousy of the Mohammedans, who had hitherto monopolized the lucrative commerce of India, they formed settlements, and made commercial treaties with some Indian princes, in which the latter ac¬ knowledged the king of Portugal for their lord. By 1542 the Portuguese ruled from the Arabian to the Persian Gulf ; the few ports and islands on the coasts of Persia and India fell into

their power; they possessed the Malabar coast ports, and had settlements on the coast of Coromandel and the Bay of Bengal ; Ceylon was tributary to them ; they had factories in China; and the ports of Japan, to which a tempest had shown them the way, were open to their merchant ships. For 60 years they carried on their lucrative commerce without any con¬ siderable rivals. Portugal owed this power to a few able men, among others Francis of Almeida, and Alfonso de Albuquerque. But the successors of the men were not endowed with the same talents, and a revolting abuse of power excited the resistance of the natives, who be¬ came united by the sight of their common dan¬ ger. _ The union of Portugal with Spain, under Philip II, in 1580, decided the fall of their com¬ mercial power in India. The Portuguese, satis¬ fied with bringing the commerce of India to Lisbon, had allowed the Dutch to become the carriers between that port and the markets of Europe. But Philip II closed the harbor of the Portuguese capital to the Dutch ships on account of the revolt of the united provinces, and thus obliged that enterprising people to go to the sources of this commerce. Cornelius Houtmann in 1595 was sent with four ships to India to explore the coasts and gain informa¬ tion concerning the inhabitants and the com¬ mercial relations in that region. He returned with favorable accounts, for in this very first voyage treaties of commerce were made with the princes of the island of Java. The hatred of the natives against the Portuguese, who had at times landed here, assisted in the accomplish¬ ment of the enterprise. After the Dutch East India Company had formed settlements at Java and upon other points, and had made commer¬ cial treaties with several princes of Bengal, there began the long struggle with the rival Portuguese. The stronger and better-served navy of the Dutch enabled them to take one place after another from the Portuguese. In 1607 the latter were stripped bv their victorious rivals of the Moluccas; in 1641 of Malacca; in

1658 of Ceylon ; in 1660 of Celebes, where the Portuguese had settled after the loss of the Moluccas, to retain, by smuggling, some part of the spice trade; and after 1663 the most im¬ portant places on the coast of Malabar, where they had longest maintained themselves, fell into the power of the Dutch. The Dutch made Batavia the capital of their eastern dominions. Their power in India began to decline from the time of their wars with Louis XIV. The Eng¬ lish began to form commercial settlements in India about the same time as the Dutch. A settlement was formed at Surat in 1613, which became the chief station of the company on the west coast in 1615, and in 1657 the seat of a presidency. A grant of a small territory around Madras was received from the Rajah of Vijianagar in 1639, on which was erected

the fort of Saint George. Madras became a presi¬ dency in 1654, and till the rise of Calcutta com¬ manded the company's possessions in Bengal. Calcutta, the third presidency, and ultimately the seat of government in India, was settled in 1690, and became a presidency in 1707. The English acted as agents for the Rajahs and Nabobs. The English had to defend them¬ selves against the Mahrattas in Surat in 1664, and early came into collision with the Portu¬ guese and Dutch in the Indian seas. It was, however, the struggle with the French, who followed them, and who had acquired consider¬ able territorial possessions in India, and the alliances of both parties with the native princes, coinciding with the decay of the Mogul Empire, which brought about that long succession of almost unbroken successes by which this great empire was established. The claims of rival candidates for the governments of the Deccan and the Carnatic brought the two parties into collision at various points, and after a succes¬ sion of maneuvers Dupleix, the French com¬ mander, succeeded in compelling the English to take refuge in Trichinopoly. Here Clive, who had already distinguished himself in an unsuccessful attack upon Pondicherry, pro¬ posed to carry the war into the enemy's country. In 1751 he besieged and took Arcot, Tinnevelly, Conjeveranr and Arani. On his return to Fort Saint David he was despatched by Major Lawrence on another expedition, which he again conducted successfully. Lawrence at the same time gained other successes against the French and their allies. These successes led to the Treaty of Pondicherry in December 1754, in which the French and English agreed to divide their territorial possessions on a footing of equality, and abstain from interference in native affairs. This treaty procured for the English the cession from the French of the Four Cir-cars; nevertheless, they treated it as a dead letter, and immediately began to reduce Madura and Tinnevelly. The French, after vainly re¬ monstrating, followed their example in disre¬ garding the treatv. About this time important events took place in Bengal. Suraj-ud-Dowla, nabob of Bengal, in 1756 besieged Calcutta with a large army, when it was evacuated so sud¬ denly by the English that a considerable part of the garrison was left behind. These had no alternative but to surrender (20 June 1756). Clive, who was sent from Madras with an armament to Bengal, recovered Calcutta on 2 Jan. 1757. War had again broken out between France and England, but the French refused

the alliance of Suraj-ud-Dowla, and main¬ tained their neutrality.

Suraj again invested Calcutta, but Clive, though he failed in a night attack, inspired him with so much respect for his means of resistance that he restored the English factories and made peace. Regardless of the benefit he had received from the neutral¬ ity of the French, Clive, in spite of the opposi¬ tion of the nabob, determined to attack their settlement at Chandernagor, which he succeeded in taking. The nabob supported the French till he was attacked by the Afghans, when he be¬ came desirous of peace with the English. Clive, however, had determined to dethrone him and replace him by Mir Jaffier, his aunt's husband. In the battle of Plassey, 23 June 1757, the nabob was overthrown, and afterward assas¬ sinated by the son of his rival. Mir Jaffier bound himself to pay for his elevation a sum of over £2,500,000 sterling. This plunder was partitioned among the company and the com¬ pany's servants, with the exception of a small share assigned to the native allies.

While the English in the Carnatic were en¬ gaged as collectors for Mohammed Ali in re¬ ducing the districts of Madura and Tinnevelly, the French recommenced hostilities. An at¬ tack upon Trichinopoly failed (May 1757), but Bussy reduced Vizagapatam, and established the French superiority throughout the Deccan. Count de Lally, who had arrived with a formid¬ able armament in April 1757, besieged and took fort Saint David, 1 June 1758. He afterward besieged Tan j ore and Arcot, the latter of which he took. The want of funds, which crippled his operations, compelled him to engage with inadequate forces in the siege of Madras, which, after lasting two months, entirely failed in Feb¬ ruary 1759. The English took Conjeveram, to which the French retired, by assault. In the following campaign the French, after some successes, were totally defeated by Colonel Coote near Wandewash on 22 Jan. 1760. Their power was now completely b~oken, their fortresses one after another fell into the hands of the English, and the English fleet, which had the command of the seas, co-operated in the reduction of those on the coast. Pondi¬ cherry, their last stronghold, surrendered on 15 Jan. 1765. The English had now established themselves, as a formidable if not altogether a ruling power, both in west and south India; but in both they committed the mistake of greatly over-estimating the resources of the country, and their rapacity and extortion, though they ultimately led to the extension of their power, were the cause of serious and pro¬ tracted troubles. Mir Jaffier was deposed in favor of his son-in-law, Mir Cossim, who re¬ belled against English extortions, but, notwith¬ standing his skilful and vigorous preparations for a war he had anticipated, was worsted in successive engagements, particularly at Gheriah, 2 Aug. 1763, and forced to flee. In revenge he massacred his

English prisoners. . Sujah Dow- lah, the nabob of Oudh, who received him, was defeated and deprived of his dominions, with the exception of Corah and Allahabad, which were given to the Mogul emperor, who form¬ ally invested the company with the dewanee or collectorship of revenues and virtual sovereignty of Bengal, Bahar and Orissa, by a firman dated 12 Aug. 1765. The English came to terms with Nizam Ali, subahdar of the Deccan, who

opposed their occupation of them, by agreeing to pay him a rent for the territory, ancl assist him with their forces, but this agreement brought them in 1766 into collision with Hyder Ali, the powerful sovereign of Mysore. Nizam Ali afterward joined Hyder against the English, and both invaded the Carnatic, and, in spite of several defeats, laid waste the country to the gates of Madras. Finally, Nizam Ali deserted Hyder, and the latter concluded a treaty with the English, April 1769, by which their con¬ quests were mutually to be restored.

. Notwithstanding the protests and prohibi¬ tions of the directors, the administration of the company's affairs left much to be desired even during Clive's governorship, and during the ad¬ ministration of Verelst, who succeeded Clive in 1767, the company's affairs were in extreme embarrassment. Parliament took advantage of the discontent and clamor raised against the company's servants, and in 1773 remodeled the constitution of the company, and appointed Warren Hastings (q.v.) governor-general of India, with a salary of $125,000, and a council of four members, each of whom had $50,000.

His administration was marked by firmness and resourcefulness in upholding British inter¬ ests, and also .by his unscrupulous methods in raising money to carry out his proj ects. In 1778 war again broke out between France and Eng¬ land.ˆ The English captured Pondicherry and Mahe, the last port of the French on the Mala¬ bar coast. This place was considered by Hyder Ali as one of his dependencies. In revenge for its capture he seized the passes of the Eastern Ghats, invaded the Carnatic with an army of 120,000 men and laid waste the country. ~ Sir Eyre Coote was sent into the Carnatic to con¬ duct the war against him. Hyder Ali died in 1782, but the war was continued with his son Tippoo Saib, till 11 March 1784, when it was concluded by a treaty of mutual restitution. In 1784 Pitt's India Bill was passed. In 1786 Lord Cornwallis succeeded Hastings as governor-gen¬ eral. Cornwallis made various administrative reforms for the relief of the people from former exactions, but Tippoo Saib diverted his attention from these peaceful measures by at¬ tacking the Rajah of Travancor, now an ally of the British. Having made an alliance with the Mahrattas and the Nizam, Cornwallis invaded Mysore, besieged

Tippoo in his capital, com¬ pelled him on 9 March 1792 to conclude a treaty, by which he ceded half his territory and undertook to pay the expenses of the war. On the death of Mohammed Ali in 1795, Lord Hobart, governor of Madras, determined to assume the government of the Carnatic, but the plan was opposed by the supreme govern¬ ment and was not carried out. In 1798, Lord Mornington arrived in India as, governor-gen¬ eral, when Tippoo Saib was making arrange¬ ments to renew his enterprises against the Brit¬ ish and soliciting the alliance of France and of Cabul. Early in 1799, Lord Mornington invaded Mysore. On 4 May, he stormed Seringa- patam. Tippoo was killed in defending his capi¬ tal, and Mysore was divided among the British, the Mahrattas and the Nizam. Some time be¬ fore this (1775) Oudh had agreed to receive and subsidize auxiliary troops for the defense of their territory, and the fortress of Allahabad was ceded to the British, who undertook to de¬ fend Oudh against all enemies. Subsequently

in 1801 the subsidy was commuted for the ces¬ sion of southern Doab, Allahabad, and other territories. During the war with Tippoo, Lord Mornington, whose policy was to induce the native powers to accept British protection and mediation in their disputes, endeavored to in¬ duce his allies the Mahrattas and Nizam All to come under similar arrangements. The Nizam in 1798 agreed to dismiss his French troops and receive British auxiliaries. The Peshwa, the nominal head of the Mahratta Confederacy, forced by the contentions of the chiefs Holkar and Scindia, accepted the policy of the gov¬ ernor-general. Under the Treaty of Bassem, signed 31 Dec. 1802, Sir Arthur Wellesley re¬ stored the Peshwa, driven from his capital by Holkar. Scindia and the Rajah of Berar now entered into an alliance against the British. After a campaign in 1803 distinguished by the successes of Generals W ellesley and Lake, the former defeating the allies at Assaye, 23 Sep¬ tember, the latter at Laswaree, 1 November, Scindia was compelled to make peace. He ceded to the British, Baroach, Ahmadnagar, and the forts in the Doab (29 December) ; the Rajah of Berar ceded Cuttack (17 December). Scin¬ dia, thus weakened, accepted the British alliance, and received an auxiliary force to defend him against Holkar, 27 Feb. lpt. . A war with Holkar immediately followed, which the skill ot that chief in predatory warfare enabled him to sustain with some dexterity, and in 1805 he was joined by Scindia, but the British arms finally prevailed and he was forced to flee. The Mar” quis of Cornwallis succeeded Wellesley on 30 July 1805. He disapproved of the ensnaring alliances into which the former statesmen had drawn

the native powers, and although he* died before being able to carry out his views (5 Oct. 1805) Sir George Barlow, who succeeded him, adopted his policy. New treaties were made with Scindia, 23 November, and Holkar, 24 De¬ cember, restoring their territories and their in¬ dependence. The new policy was even carried so far as to abandon the petty princes who had trusted to the British alliance. Lord Minto suc¬ ceeded to the governor-generalship in 18U/. During his administration the chief enterprises of the English were directed against the insular possessions of the French and Dutch in the In¬ dian seas. The Moluccas, Java and other islands were taken; many of which were re¬ stored at the peace. Some disturbances took place during this period at Travancore, and among the British troops at Madras and else¬ where, which threatened at one time serious consequences. Travancore and Cochin were placed under British management. 1 he Lari ot Moira (Marquis of Hastings) succeeded to the governor-generalship in 1813. In 1814 a war broke out with Nepal, which was at first at¬ tended with some serious repulses, but was brought to a successful close by Sir D. Ochter- lony in 1815, and resulted in the cession of Kumaon, Hastings was also called upon to suppress the Pindaris predatory bands of the former troops of Holkar and Scindia , and the Peshwa of Indore rebelling against a treaty his capital was seized, he himself deposed, and the Mahratta Confederacy dissolved. His ally the Rajah of Nagpur, Scindia, who submitted, and Holkar, who was defeated, were compelled to accept alliances virtually placing them under British protection. This pacification was com¬

pleted in 1818, and greatly improyed the revenues of the districts affected by it. The Marquis of Hastings was succeeded in 1823 by Lord Amherst, under whom the first Burmese War was concluded in 1826 by a treaty ceding to the British the Aracan and Tenasserim provinces together with a large pecuniary indem¬ nity During the governor-generalship of Lord Wiliiam Bentinck (1828-35) various administra¬ tive reforms were effected, but no great political events took place. Lord Auckland assumed the governor-generalship in 1836. The Afghan W ar broke out in 1838, in consequence of long and complicated intrigues arising from the advance of Russia in the East, and the mutual jealousy of that power and Great Britain. War was de¬ clared on 1 October, the object of the British was to dethrone Dost Mohammed and restore Shah Sujah, a former ruler. It was at first at¬ tended by great disasters, particularly the famous massacre of the Khoord Cabul Pass. It was terminated in 1842, under the governor-gen¬ eralship of Lord Ellenborough, by the evacua¬ tion of Afghanistan by the British, after they had relieved their captives and vindicated the superiority of their arms by the capture of Cabul. Sind

was annexed to British India after a war conducted by Sir Charles Napier in 1843. After a brief war, arising out of a disputed succession, the dominions of Scindia lay at the mercy of the British, and were disposed of by a treaty dic¬ tated by the governor-general at Gwalior in January 1844. While he was thus engaged Lord Ellenborough was recalled and superseded by Sir Henry Hardinge (May 1844), who was soon engaged in one of the most formidable wars the British had yet had to encounter in India. The Sikhs, a politico-religious sect already men¬ tioned, had, under their leader, Runjeet Singh, conquered the Punjab about the beginning of the century. Runjeet Singh, who had always maintained friendly relations with the British, died in 1839, and the government fell into a chaotic state; the army, being without a head, began to commit disorders and threaten en¬ croachments on the British territory. In De¬ cember 1845 the Sikh army crossed the Sutlej in great force, and in the short war which fol-. lowed the Sikhs were defeated by Sir Hugh Gough and Sir Henry Hardinge at Moodkee, Ferozeshah, Aliwal and Sobraon. Peace was made at Lahore, by the surrender of the Sikh territories on the left of the Sutlej, and between the Sutlej and the Bias (Jalindar Doab), and the payment of an indemnity. During the gov¬ ernor-generalship of the Marquis Dalhousie, 1848-56, a new war broke out with the Sikhs, and after their final defeat by General Gough at Gujarat, 21 Feb. 1 849, . the Punjab was an¬ nexed to the British dominions. This was im¬ mediately followed by the second Burmese War, ending in the annexation of Pegu, 20 June 1853. Sattari, Jhansi, Nagpur and Oudh were, on the failure of the native succession, also annexed to the British possessions, 1852-56. During Lord Dalhousie' s administration the extensive scheme of Indian railways and telegraphs was planned and inaugurated, the Ganges Canal opened, and the Punjab Canal began. His last important act as governor-general was the annexation of Oudh, 7 Feb. 1856. The annexation of Oudh, and other provinces, combined with a general feeling of unrest brought about the mutiny of the native army. (See Indian Mutiny). He

was succeeded by his friend Lord Canning; in less than a year after the arrival of the new governor-general, a mutiny of the native troops took place at Meerut, on Sunday afternoon, 10 May 1857. The main incidents of the Indian mutiny are the massacre at Cawnpur; the de¬ fense of Lucknow, under Sir Henry Lawrence; the taking of Lucknow, by General Havelock; and the siege of Delhi, 14 Sept. 1858. The mutiny sealed the fate of the East India Com¬ pany, after a rule of

more than 250 years, and brought about the transfer of the country to the direct authority of the Queen of England. The Royal Proclamation was read at a grand durbar at Allahabad, 1 Nov. 1858.

The subsequent history has been one of steady advance and general prosperity under the rule of viceroys appointed by the British government.

1 Lord Canning became the first viceroy of India. He left India in March 1862, and died shortly after his arrival in England.

2 The Earl of Elgin, became viceroy in 1862, and died in India November 1863.

3 Sir John Lawrence, afterward created Baron Law¬ rence, 1864-69. Reformed the finances. Bhutan war. Orissa Famine, 1866.

4 Viscount Mayo, 1869-72. Received Amir Sher Ali Kehan of Kabul in great state at Umballa 1869. Assassinated by a convict in the Penal Settlement at Port Blair.

5 Earl of Northbrook, 1872-76. The Prince of Wales, later King Edward VII, visited India. A famine in Bengal. The Guikwar of Baroda deposed.

6 Earl of Lytton, 1876-80. Famine in South India. The invasion of Afghanistan. The proclamation of the Queen of England, as Kaisar-i-Hind, or Empress of India, 1 January 1877.

7 Marquess of Ripon, 1880-84. Extension of munic¬ ipal government. Various reforms in favor of the natives.

8 Marquess of Dufferin, 1884-88. Third Burmese War. The annexation of Upper Burma with the Shan States. The “ Scientific Frontier ” of India defined and strengthened.

9 Marquess of Lansdowne, 1888-93. The strength¬ ening of the army and the defences of India. Reform in currency, closing the free coinage of silver. Reconstruction of the provinces of India.

10 Earl of Elgin, 1894-98, son of a former viceroy. British control of the northwest frontier of India strengthened. Earthquake in Anam 1897. Cholera, plague, and famine 1895. Frontier War. Celebration of the Queen-Empress’s Diamond Jubilee.

11 Viscount Curzon, 1899-1905. Dispatched 8,000 British troops to S.

Africa 1899. About 20,000 sent to China 1900. One of the worst Indian famines on record. A period of reform and reconstruction. King Edward pro¬ claimed Emperor of Delhi 1 Jan. 1903. Political mission to Tibet 1904. Seven earthquakes April 1905. Resigned August 1905.

12 Earl of Minto, arrived in India November 1905. A descendant of a former Governor-General of India. Partition of Bengal Province 1905. Visit of Amir Habib Ullah Khan of Afghanistan January 1907. The New Councils act was passed giving the natives a much larger share in the government of the country than they ever had before.

13 Lord Hardinge arrived in 1910. He instituted several new reforms. King Edward died and George V was proclaimed King in 1911. Delhi Durbar held in 1911 at which King George and Queen Mary were present. The capital was transferred from Calcutta to Delhi where 22 Dec. 1912, Lord Hardinge made his vice-regal entry.

14 Lord Chelmsford arrived as Viceroy, March 1916.

15 Lord Reading succeeded as Viceroy, 1 April 1921.

The Nationalist Movement. — Supplement¬ ing what has already been written under Land Tenure and Revenue, is this quotation from a report by Lord Lawrence, Viceroy from 1864-69 :

“The people of India are capable of administering their own affairs and the municipal feeling is deeply rooted in them. The village communities, each of which is a little republic, are the most abiding of Indian institutions.”

This statement furnishes the keynote of a modern Nationalist movement which strongly suggests the similar movement in Ireland. In¬ sisting that the Indian national spirit has never died but is steadily growing, the desirability,

the justice, the necessity of Indian self-govern¬ ment, is persistently advocated by different types of Nationalists — Extremists who do not recognize the British government, Nihilists, Religious Extremists, Mother Worshippers, Vedantists and Advocates of Organized Re¬ bellion, the Hardayalists, followers of Har Dayal. All these factions have different opinions as to religion, politics and economics, and while most of them would be glad to have self-gov¬ ernment established within the empire in the near future, there is practical unanimity among them as to the goal most to be desired for India —

complete independence. The organized Nationalist movement began to make its power felt when on 16 Oct. 1905 the old province of Bengal was partitioned by Lord Curzon. The years 1905, 1906 and 1907 were years of passive resistance, during which anti-British propa¬ ganda was carried on by means of the press and platform, but force was not used. During this time many Nationalist editors and publishers were sent to prison without any diminution of the campaign. In 1907 the Nationalist party split into two sections, one favoring force and the other passive resistance. The first shot was fired in December 1907, and the first bomb thrown in 1908. Rigorous action on the part of the authorities kept the disaffection under, but the propaganda continued and the lives of several high officials were attempted. In 1911 the king modified the partition of Bengal and ordered the transfer of the capital to Delhi, an action regarded as a triumph of the Nationalist agita¬ tion. On 22 Dec. 1912 a bomb was thrown at Lord Hardinge, the Viceroy, -who was wounded, and an attendant killed, when he made his first state entrance into Delhi, the new capital. The revolutionaries still continue active, under Mo¬ handas Karamchand Gandhi, who preaches the policy of non-resistance, but insists at the same time on non-co-operation with the English in India, hoping to drive them out by boycotting.

Bibliography. — Adye, (Sir) J., Hndian Frontier Policy) (London 1897) ; Baden- Powell, B. H., Rand Systems of British India) (3 vols., Oxford 1892), and (The Indian Village Community* (London 1899) ; Bevan, E., (Indian Nationalism* (London 1913) ; Curzon (Lord), (The Plac.e of India in the Empire> (London 1909) ; Dubois, J. A., (Hindu Manners, Customs and Ceremonies) (Eng. trans., 3d ed., Oxford 1906) ; Elwin, E. F., Hndia and the Indians> (London 1912) ; Forrest, G W., (History of the Indian Mutiny) (4 vols., Edinburgh 1904-14) ; Fuller, (Sir) B., (The Empire of India) (Lon¬ don 1913) ; Ubert, (Sir) C. P., (The Govern¬ ment of India) (2d ed., Oxford 1913) ; Kale, V. G., (India Administration (Poona 1914) ; Lee-Warner, (Sir) W., (The Native States of India* (London 1910) ; Matthai, J., (Village Government in India) (London 1915) : Muir, R., (The Making of British India, 1756—1 858> (Manchester 1915) ; Rai, L., (Young India. History of the Nationalist Movement from Within (New York 1916) ; Wadia, A. S. N., Reflections on the Problems of India* (Lon¬ don 1918).

Charles Leonard- Stuart, Editorial Staff of The Americana, and Srinivas R. Wagel.

INDIA, Art and Arclrtecture of. Al¬ though considerable light has been thrown on

INDIA

Indian art and architecture, a great part of the knowledge that exists at present is vitiated by the fact of the subject having been approached from a very unsympathetic point of view. The fundamental of Indian art is symbolism and foreign students and critics have ignored this fact altogether. As a matter of fact, efforts have been almost altogether directed toward disproving the fabulous antiquity claimed for Indian art by tradition. It is only in very recent times that sympathetic critics have attempted to treat the subject from the right point of view. There is no doubt that the oral traditions in India have built up an absurd halo about the age of the temples ; but, to a student of art, age must be a secondary consideration.

Twenty centuries of internecine warfare, the sweeping of the country by foreign hordes, and the several conquests, have naturally contributed to reduce all vestige of art to buildings that cannot be easily destroyed. We have very tew examples of the development attained in com¬ paratively ancient periods in the country. Of ancient paintings, we have only a few frescoes in the cave temples of Ajanta, Karli and Ellora. The literature abounds with descrip¬ tions of magnificent paintings, carved works in wood and ivory and all the paraphernalia ot artistic expression. Ancient Indian history shows that there were cities which could well vie with the magnificence of modern cities, and possessing all the expressions o

artistic luxury. . A

We must judge of ancient Indian art by the temples — the mammoth structures that have existed for centuries. Whether these temples existed before the Christian era, or whether they owe anything at all to ancient Greek, Per¬ sian or Roman, are points not worth discussing. All that we know is that the inspiration is not foreign, and that the principles upon which they have been constructed were unknown to any other people. As a matter of fact, some of these structures that exist to-day are mar- velous from an engineering point of view.. I he art of construction of some structures is not only lost, but baffles the engineering science of

Europe and America. ‘ .

There is general agreement on the point that Indian art owes its existence to Buddhism (qV.). Ancient Brahminism had no temples, and

the idea of any worship, but that of God in the form of nature was contrary to the in¬ terpretation then put on the Vedic texts. Bud¬ dhism was the religion preached by Buddha, hence there arose the necessity for deifying Buddha and worshipping him. The Brahmins fought such deification, and the erection of temples as being unholy. When the country turned away from Brahminism, and when more than 75 per cent of the people be¬ came Buddhists, under the powerful pro¬ selytizing influence of Asoka, the Brahmins retained their positions by practically incor¬ porating the latter religion into their own. In that process, they took also the temples and developed them. Within a few centuries, they made sure that no Buddha was left in the tem¬ ples and the images were renamed. In that manner, the worship of the countless Hindu deities became the vogue. To-day, there are at least a thousand mammoth temples in the country, while there are hundreds of thousands of small temples.

It would take too much space to detail the evolution of the temple. The Buddhists began with the construction of topes, in order to com¬ memorate some event or to show that the spot was sacred. Most of these topes were con¬ structed in the form of towers. The most not¬ able of them being the Sanchi tope — the diameter of which is 106 feet. In the ancient Buddhistic period, there were besides topes, temples and monasteries. We have very few examples of monasteries at present, because with the down¬ fall of Buddhism in India, the monastic order died out, and the buildings allowed to go to destruction. The earliest extant temples are the rock-cut cave temples — the date of whose construction is variously put from the 2d cen¬ tury b.c. to the 8th century a.d. There are three notable examples of these, at Karli, at Ellora and at Ajanta. The most wonderful of these are at Ellora. They are a series of caves sunken in the solid rock, extending a distance of three to four miles. The most notable caves are simply halls supported on massive piers, with level epistyles. The piers are richly carved with figures and friezes, and have a sort of cushion capitals and square abaci, and stand round forming a kind of atrium. The Indra court, the court dedicated to that deity, is open *to the sky ; within the court is a small shrine or temple in the solid rock are two halls — one larger than the other. The Visvakarma cave is a quadrangle open to the sky and sur¬ rounded by pillars. It leads into the atrium with three aisles and an apse. The most mag¬ nificent of all existing structures and significant as a purely Hindu work, is that part called the Kailas, which means literally, Heaven. The Kailas chambers and halls are sunk into the rock, and occupy a space 270 feet deep and R0 feet wide. The roofs are solid rock, supported by pillars, or rest on the walls or on the divi¬ sions of the assemblage of chambers. There is

a porch, on each side of which, are two col¬ umns. This leads into the hall supported on 16 such columns, leading into a sort of adytum, around which is passage space and five cham¬ bers. The whole forms a temnle with its usual appendages, exactly like one built on the ground, and around this is a wide ©pen space with a colonnade or cloister encircling the whole. A great part of it is open to the sky for the sake of light and air but the work is entirely cut out of solid rock.

A distinctive architecture was that of the Jains. The Jain temple has a distinctiveness of its own, and the most famous example of an ancient temple is the Vimala-Sah on Mount Abu. The Jains, the Buddhists and later on, the Brahmins, all adopted the tower as the es¬ sential of the temple. The tower developed out of the dome, and the Indian dome has no bous- soirs radiating from the centre, as in European architecture. The courses are all horizontal, and the domes are necessarily pointed in sec¬ tion, for they would not stand if circular. It requires no abutments and has no lateral thrust.

Although, the principles on which these tem¬ ples have been reared are more or less the same, there is a marked distinction between the temples of southern India, and those of the north. At present, south India has more mag¬ nificent structures than the north. This is due probably to the fact that owing to the lateness of the Mohammedan incursion, the temple

Hall in Temple, Madura

The Great Hall in the Hindu Temple on the Island of Rameswaram

INDIA

buildings were saved from destruction. The most famous of the southern temples are the temple at Tiravalur, the one at Taniore and the one at Ramasvaram. The one at Ramasvaram has a hall 700 feet long and 150 feet wide, and it is so built that, although the light enters through one opening, there is not a dark corner in the whole of the building. The Tanjore temple has a tower 200 feet high, and resting on a base 83 feet square, and it is so constructed that it throws no shade. All the pillars of the southern temples, as well as the towers, are richly ornamented with carvings in relief. Among the most notable

of northern buildings is the Black Pagoda Of Kannaruc. The temples at Barolli and at Benares also need particular mention. The designs are great and the orna¬ mentation profuse.

It is curious that, perhaps the most inspiring, and the greatest specimens of Indian art should be found outside of India. The Aughor Wat in Indo-China, and the temple at Mathura in Java are known to be the wonders of the world, and even those who have no appreciation of Indian art are inspired by the vastness of the structures, the greatness of the design, and the profuseness of ornamentation. These two structures cover very wide areas, and are now in ruins. They were reared by the Hindus when they ruled over those territories ; and the tem¬ ples fell into ruins when the Hindu conquerors had to leave those countries and come back to India.

The architecture of Siam and China, as well as that of Japan is wholly Indian. The Siamese wats and temples were reared by the Indian architects and resemble more closely the tem¬ ples of India than those of Burma. The Chinese, who were great painters, never de¬ veloped architecture, as their buildings were almost altogether in wood. The introduction of Buddhism into China was followed by the in¬ troduction of temple architecture, and the Chi¬ nese took to building with great avidity. The Japanese architecture has been purely employed in building temples to Buddha, and is still pre¬ eminently Indian.

It should not be imagined that there was only temple architecture in ancient India. There have been magnificent buildings, great from the point of view, both of size and height. Very few of them, however, are left, and such build¬ ings as exist to-day have all been of a later date. The one notable building which is now in ruins is the University of Nalanda, near Patna, which flourished before the 11th cen¬ tury. The ruins are still to be seen, and it is stated that the university housed 20,000 students, Later Indian art of the best kind js to be seen only in southern India. The hall in the palace at Madura is an example of pure Indian ar¬ chitecture. In the north the Mohammedans brought with them the Saracenic art; and in course of time, the native Hindu and the Saracenic art blended well and produced a new type. The most noted example of this blending is the Taj Mahal (q.v.) said to be one of the nine wonders of the world. It is built of the purest marble on the banks of the River Jumna, and is described as a dream in marble. The Jumna Masjid in Delhi, and the several palaces that exist in different parts of the country also exhibit the result of the blending of the two styles. The basis of all architecture in India

has, however, been the old Indian style, and the craftsmen have always been Hindus.

There are some buildings of distinctive Saracenic architecture, which are mostly mosques, or the places of worshio of the Mohammedans, who form one-fifth of the popu¬ lation of India. The Indian mosques have, however, a very distinct touch of the Hindu craftsmen, especially with respect to capitals and the ornamentations. Saracenic architecture is distinctive for the elaboration of detail, and the Hindus took it and developed it. Possibly as the effect of Saracenic influence, later Hindu temples have almost a surfeit of detail work. In the temples of southern India, it is a com¬ mon sight to see columns 15 feet high and 4 feet snuare, having as many as 10,000 figures carved in relief — every figure being distinctive. A column in the temple of Kumbakonum has the whole story of Ramayana carved in relief.

The secular buildings of later date are mostly halls and palaces. The Mohammedans revived the art of the dome, which had perished shortly after the Buddhistic period. A hall at Bijapur has a dome with a diameter of 100 feet, resting on columns without any support. There is not a piece of wood or steel in the whole structure, and it is constructed out of brick and mortar. The dome has been standing for at least 400 years, and is as good and strong as if it were built yesterday. Except in the , wealth of detail, which varied with different centuries, the principles of India architecture have undergone no modification.

The art of statuary in India consists prin¬ cipally of casting the figures of the deities in bronze and similar alloys, and cutting the figures in stone. An elaborate science of statuary was built up, and at one time it appears to have been a serious study; but craftsmanship in India has always been a tradition, handed down from father to son. With the elaborate develop¬ ments of the caste system, artistic knowledge became the possession of a body of people whose claim was based on birth. The technique of the art was considered a secret and kept in the family, as it were. As the religion allowed free play to the art of statuary, and as the kings and people of wealth considered building temples a passport to heaven, there was room for any number of images of deities. Later Hindu texts, especially the Puranas, gave room for the in¬ finite play of fancy. Gods and goddesses in all shapes and forms were introduced, and imagi¬ nation had the freest play. For instance, Siva, the favorite deity of the south, is represented with several hands and feet. Art critics of Europe have considered these statuaries — monstrosities ; but recently the symbolism is being better understood. The Hindu considers his gods as being without human

limitations, and the only way in which he could express this thought was by t/he creation of extraordinary attributes. Once this symbolism is understood, statuary in India will take a very high place in art. The making of alloys was known in India long before it was known in other parts of the world. The Iron Pillar at Delhi is a striking example of the engineering skill of ancient India.

Ancient works show that in ornamental work in gold and silver ancient Indians were adept. We have, however, not many examples of these at present, principally because the jewelry of the

temples in the north has been looted by the invaders. Even the tools appear to have been lost, although at present, some of the works done by gold and silver-smiths are in no way inferior in design and finish to those made in Europe or America.

For a number of centuries, painting in India has remained a lost art. The frescoes in the cave temples are recognized by art critics as representing a very high stage of development of the art of painting. There is a very long gap until we arrive at the Mohammedan period, during whidh time, noteworthy paintings saw the light. The special characteristic of Indian painting has been its magnificent detail, although some consider it a fault that a great number of subjects and figures should be crowded in a single canvas. It has also been customary to paint, on the walls of temples, the mythological stories. As a rule, these paintings have not been of high order.

Recent developments in painting have been very satisfactory. A distinctive school has sprung up in Bengal, and it shows traces of European influence. The most noteworthy painters are Nandalal Bose and Ganguly, who have also gone for their principal subjects to Hindu mythology. Most of the principal centres have native India artists, who are suc¬ cessfully developing a new school. Owing to the want of support, and the ignorance about Indian art, progress is very slow at present.

Bibliography. — Coomarasamy, Dr. A., ‘Vis- vakarma* (London 1914) ; Elwin, E. F., ‘India and the Indians* (London 1912) ; Ferguson, T., ‘History of Architecture> (London, new and revised edition. 1911) ; Hall, H. F., ‘The Soul of a People* (London 1902) ; Havell, E. B., ‘Indian Painting) (London 1913) ; and ‘Indian Architecture) (London 1913) ; Hunter, Sir W. W., ‘History of British India* (London 1899-1901) ; Quatremere, ‘Dictionnaire Historique d’Architecture* (1825); Smith, Vincent, ‘His¬ tory of Fine Art in India) (Oxford 1911).

Sri nivas R Wagel.

INDIA, Educational Progress in. The

work of engrafting a system of modern edu¬ cation, essentially of an English standard, on the Indian Empire could not be hurried in view of the enormous labor involved and the vast population to be reached. The original Hindu system imposed upon every one of the higher caste the obligation to teach, primarily instruc¬ tion was oral. Separate schools of law, of religion, astronomy, astrology and medicine came later. The villages were centres for schools in industrial art for which the Indian natives were adapted. The village boys were taught the vernacular and received ethical foundations in proverbs, stories and verses from the lips of the teacher. The Buddhists were no less exacting in their schools. It was the province of the Mohammedans as early as the 11th century, by their more democratic educa¬ tional methods, universally established in the shadow of the mosque, to modify the rigid caste notions of India, their power being aided by the establishment of the Mogul Empire in the 16th century. With the rise of Christian influence in the 18th century and for a century later the missionary was the teacher. In 1813 on the re¬ newal of the charter of the East India Com¬ pany, an educational grant was included, al¬ though in 1780 and 1791 two private institutions

were founded in Calcutta and Benares. A greater impetus was given to education in 1835 on Lord Macaulay’s arrival, to promote the knowledge of European literature and science through the English language, and all agencies, missionary and private, municipal, provincial and governmental, were quickened in their ac¬ tivities. In the following decades, however, it was realized that the movement failed to prove popular — it seemed to be utilized by natives who desired government offices, but not bv the masses of the people. Hence special commis¬ sions were appointed in 1882 and 1894 to im¬ prove the system from a practical point of view with the best results. While before the new century primary education readhed the

mere fringe of the population, in 1908 a marked ad¬ vance was made. In 1907-08 the primary pupils in all the 10 provinces numbered 5,708,138, a 22 per cent increase over the previous year, and similar growth was noticed in every grade from the highest to the lowest.

The government's wisdom was shown in 1901 when an inspector-general of agriculture, with a staff of experts, was appointed. In 1903, a gift by Mr. Henry Phipps made possible the Imperial Agricultural College and Central Re¬ search Institute at Pusa in Berar. In 1905 the government set aside * 20 lakhs of rupees ($644,000) was devoted to agricultural research and instruction. In a few years 60 experi¬ mental farm schools, in addition to demonstra¬ tion plots, were established. Schools were be¬ gun and a state technical school, with scholars to be sent, abroad for thorough instruction. A further evidence of progress in education is the national awakening toward the need of uni¬ versities for Indian young men and women under their own auspices. Early in 1916, the University of Mysore was opened, the first of its kind in that part of India which belongs to the Indians and is ruled by them. It is signifi¬ cant that education is compulsory and free throughout this state, in which at latest reports with a population of six millions were 5.436 in- situtions, six colleges for men and one for women. The school pupils numbered 214,397, with 26,371 secondary and 934 collegiate. The new university is not an examining bodv but has a regular university lecture and tutorial system, with the Maharaja as chancellor. In¬ struction is given in the vernacular current in the state. The course is for three years. In February 1916 Lord Hardinge laid the founda¬ tion stone of the new Hindu University at Benares. No candidates are debarred on the score of religion. Instruction in the Hindu re¬ ligion is compulsory for Hindus! The central Hindu College, of Benares organized by Mrs. Annie Besant in 1898, was the nucleus of the new institution. Its aim is to promote the study of the Hindu Shastras and of Sanscrit literature generally as well as to advance tech¬ nical, scientific and professional knowledge, with practical training, to encourage the indus¬ tries and develop the resources of the country. Large sums were collected from all classes of educated Hindus, with the capitalized value of the recurring grants reaching £675,000. Women will be admitted. The Mohammedans at Hydera have founded a university called Nizamia after the Nizam or prince of that province, to teach the literature and science of Islam. The Mo¬ hammedans of Aligarh expect to have a charter

for a university. Similar institutions are de¬ sired by the Indians in the Sikh states, in Cochin and Travonare. About the same time as the Mysore University was opened, the Indian Women's University began its work at Poona. Instruction is given in Marathi, with English as second language, and compulsory courses in domestic science. Besides the generous sums given for such colleges, recently large amounts have been- donated by Indians to Calcutta Uni¬ versity, to the Institute of Science at Bangalore, and elsewhere.

Since 1900 the public outlay for education trebled, amounting to £7,388,000 in 1915-16. In the same period, the number of schools rose from 148,000 to 189,000, and of pupils from 4,500,000 to 7,620,000, the girls showing a large increase. According to the census of India in 1910, 93.8 per cent of the population of British India were illiterate. The ruler of Baroda has made education free and compulsory and his example has been imitated by the Indian rulers of four states, with others to follow in due course. Consult Pandya, T. R., (A Study of Education in Baroda) (India 1916) ; Education Supplement, London Times, 2 Jan. 1912, 7 March 1915; (Progress of Education in India,; Quinquennial Review (Calcutta Government Printing Office) 1881-82, et seq. ; London Con¬ temporary Review, January 1918. India, Education.

INDIA, Farther, or Further. See Indo- China.

INDIA, French. See East India Compan¬ ies, and India under History.

INDIA, Languages and Literature of.

Although it is generally stated that more than a thousand languages are being spoken in India, and that the country is practically a babel of tongue's, the principal vehicles of thought are less than 10. The languages now spoken in In¬ dia are principally the dialects founded upon the corrupt Sanskrit, which is the parent of the Indo-European family of languages, and which has been a dead language for more than 25 centuries. Sanskrit bears the same relation to the Indian languages as Latin to modern Eu¬ ropean, with, however, certain important modi¬ fications. While Latin has furnished the roots and, to a certain extent, the grammar, San¬ skrit in India to-day, is considered part and parcel of the spoken languages. Every word in Sanskrit can legitimately be used in any lan¬ guage, and the grammar is exclusive Sanskrit, except in southern India. Tamil, which is the language of southern India, is considered as an independent language spoken by the people whom the Aryans conquered ; it has certain pe¬ culiarities, and a grammar which differs from the Sanskrit grammar. The

conquest of the Aryans has been so complete as to metamor¬ phose even Tamil and make it, for all practical purposes, a dialect of Sanskrit. The origin of the Indian languages must be directly attributed to Prakrit. Even in the time of Alexander the Great, Sanskrit had been superceded bv Prak¬ rit, which is the dialect of Sanskrit. This dia¬ lect took local color, as it were, in the different places and new languages were evolved. Be¬ sides the influence of Sanskrit, the incursion into India of vast foreign hordes left a very marked trace on the languages. Persian and Arabic, which were the languages of the Mo¬

hammedan conquerors, brought a large number of words and exercised an influence on litera¬ ture.

The principal languages spoken in India may be divided into three distinct groups. The northern-Indian languages are the Hindi, spoken by 98,000,000 people; Bengali, spoken by 48,500,000; Punjabi, spoken by 16,000,000; and Rajasthani and Kashmiri, spoken by 10,000,- 000. Hindi is the language closest to the Prak¬ rit and is spoken by as large a population as that of the United States. It is very rich in poetic literature and is growing in influence. Bengali is the language of Bengal, and next to Hindi has the closest affiliation with Prakrit. Up to a certain time, it was purely a spoken language, but during the last half-century, a great mass of literature has been built up — some of the works being recognized as the peers of the best in the world. The Punjabi, Rajasthani and Kashmari languages are, at present, more or less spoken languages and have yet to develop a literature. Punjabi has a great mixture of Persian and Arabic. Be¬ sides these languages, Hindustani or LTrdu is spoken throughout northern India. This lan¬ guage is principally Hindi, mixed with Persian and Arabic and was the language of the Mo¬ hammedan conquerors — which is still favored by the British government because of its re¬ maining the lingue Franca, in spite oi the growth of English. The percentage of Persian and Arabic words in Hindustan is less than five, and for purposes of classification, it may be identified with Hindi. The central-Indian languages are the Marathi, spoken by 20,000,000 people; Gujarati, by 11,000,000; and Oriya, spo¬ ken by 10,000,000. Although both northern and southern languages are spoken in central India, the above three are distinctive. Marathi has the closest relation to Sanskrit next to Hindi, and Oriya has a great number of aboriginal words and extraneous influences. The south- ern-Indian languages are the Telegu, spoken by 23,500,000 people; Tamil, spoken by 18,000,000; Kanarese, spoken by 10.500,000 people ; and Ma- layalam, spoken by 6,500,000 people. These four languages form a distinct group, in that, al¬ though dominated by Sanskritic influences,

they have a non-Sanskritic base. Besides these principal tongues, there are a number of sub¬ sidiary languages like the Assamese, Shan, Sindhi and Pushtu, spoken by small bodies of people.

The golden age of Indian literature has, un¬ fortunately been in the past, but all literature was then in Sanskrit. Up to the Renaissance in Europe, Latin was considered the only fit me¬ dium for literature ; all the spoken languages were considered just mere mediums for ordi¬ nary communication. A similar sentiment pre¬ vailed in India, and even up to very recent times, Sanskrit was used by the learned to ex¬ press their' thoughts. Just^ as literature was practically confined to religion and philosophy up to the Renaissance, so Indian literature, up to recent times, has been mainly religious and philosophic. Long anterior to the rise of Buddhism in India, there was a great mass of secular literature. Dramatists like Kalidasa flourished during that period. Later on, the country was degenerating, until it became an easy prey to the Mohammedan conquest.

Beginning with the later years of the Moghuel rule, the Indian vernaculars began to be used as vehicles of thought, principally for religious and devotional purposes. Kabir-Das and Tulsi-Das were the pioneers in northern India, in making the vernacular respected as a literary language. Owing to the internecine strifes and the several Wars which raged in the country for 200 years, until India came completely under British rule, there was no room for developments, and for all practical purposes, the hands of the clock were turned back. Only after the consolidation of the British Empire in India, the people be¬ gan to see the possibilities of the development of the languages of their home. Indian society is so constituted that all attention was paid, and importance attached, to Sanskrit, as the lan¬ guage of their faith. The Brahmins, who have remained for over 30 years the custodians of the faith and literature of India, naturally had a much more than sentimental attachment to Sanskrit. It has been the practice to consider the spoken languages as corruptions and lan¬ guages of convenience. The other classes of people simply follow in the wake of the Brah¬ min. Therefore, except on a few occasions, when the vernaculars revolted, as it were, against Sanskrit, no effort at all was made to improve them. The Brahmin, again, was fight¬ ing for his supremacy in the country. Any at¬ tack on Sanskrit he considered an attack on himself. Without meaning it, he has been the cause of the stagnation in the literary life of India. With the advent of British rule

and long anterior to it, the Brahminical class was not purely sacerdotal. It devoted its attention to mundane pursuits and fought with other classes in the country for the amenities of life. Gradu¬ ally it was devoting less and less attention to the study of Sanskrit. In the early decades of the 19th century, a very large percentage of the Brahmins all over the country were ignorant of Sanskrit. Instead of holding that the use of language of the home and intercourse in busi¬ ness as a vehicle of literary thought was some¬ thing beneath their dignity, the Brahmins be¬ gan to take real interest in the vernaculars. It has been the practice in India, that as soon as the Brahminical class takes interest in anything, the other classes are urged to pay attention to it. When a common interest was thus created, the rise and improvement of vernacular litera¬ ture became just a matter of course. .

It is not to be understood that during all the centuries intervening, there was no literature at all in the vernaculars. Sporadic attempts were made to create literatures, although the sum total of the efforts were very few works worthy of note, and most of them religious and devotional. The few that remain became, how¬ ever, the classics; and the first successful effort was made in Bengal. Bengal was com¬ pletely ruled by the British, while constant fighting was going on in other parts of the country. Moreover, the impact of Western civilization was greater in Bengal than in other parts of India. The reform movements, social and political, originated in that province, and the vernaculars were more freely used than be¬ fore. The great reformer, Ram Mohun Roy, who was the founder of the new cult known as the Brahmo-Samaj, used the Bengali to dissem¬ inate his doctrines.

An event of great importance in the history

of literature in India was the passing of the Education Act. When Lord Macaulay was fighting for the introduction of the English lan¬ guage, as a medium of education in the coun¬ try, he did not for a moment imagine that the result would be what has happened to-day. H. H. Wilson, the great Sanskrit scholar, was all for Sanskrit as the medium of education; and his argument was sound in that he believed that such a step would be in accordance with tradition. The British government was, how¬ ever, concerned with the supply of sufficient clerical aid to carry on the work of administra¬ tion, and decided in favor of Lord Macaulay's proposal. For a time, the people of India, in their eagerness to assimilate the new knowledge, paid little or no attention to either Sanskrit or the vernaculars. When, however, education was advanced sufficiently to make the new scholars judges

of the relative merits of English litera¬ ture and their own ancient literatures, they found that they had been extraordinarily fool¬ ish in neglecting what they were entitled to call their own. The complete subjection and the improvement in the facilities of communication brought the different peoples in close touch with each other and made them feel that they had a common heritage which they were selling for a mess of pottage. A new nationalistic spirit be¬ gan to prevail in the country and efforts were directed toward finding expression for such spirit. Sanskrit was unknown to a great mass of the people, and English was only known to a very small minority. Therefore, the only me¬ dium for expression, which could be at all ef¬ fective, was rightly considered to be the ver¬ naculars. The regeneration of the country had to be effected by the dissemination of as much of Western thought as possible. The leaders also found that they must work on the new lines, if there was to be any salvation for the country. The result was a flood of literature in the different vernacular languages, and credit should be given to Bengal for initiating the movement. The men and women, who were in the front of the movement, had a genuine Eng¬ lish scholarship, and hence were able to give the people something which was novel. The chief writers of Bengal were Iswara Chandra Vidyasagar, Madhusudan Dutt and Bankim Chandra Chatter jee. Vidyasagar was the father of Bengali prose. Previous to hig ad¬ vent, there were no prose works of any length or merit in the whole of that province. He was a great reformer and flooded the country with literature of the rarest kind, which had an elec¬ trifying effect on the population. Few thought that the language could possess such prose works. Dutt was as unfortunate in life as Ed¬ gar Allen Poe, and his career was a romance of misery. He studied for the bar in England and had published some poems. They were consid¬ ered by English critics as considerably above the average. Having been converted to Christian¬ ity when he was a youth, he was shunned by both the Hindoo and European communities. After a long period of domestic and financial unhappiness, he turned back to his old faith as a solace and began to write poems in his native tongue. When they appeared in print, Bengal was loathe to ascribe them to any modern writer and thought that it was the work of a genius or of an ancient sage. It is the irony of Fate that Madhusudan, the Christian, should

nave given the first rendition of Ramayana, in his native tongue. His work is a classic, and will remain a classic. Chatter jee was a gov¬ ernment official and a sincere patriot. The two cannot go together in a

country like India. He was fired by the enthusiasm of a visionary and was anxious to do something great. He wrote the first novels in the Bengali language, and he took for his guide Sir Walter Scott. He made the episodes of the fights for freedom, which his people waged against the inrushing hordes of Mohammedans, live. His descriptions and characterizations are almost unique, and such European writers as have studied his works in the original are unstinting in their praise. It is a curious fact, that a battle hymn from his ((Durgesanandini,® called <(Bande Mataram,® meaning, ((Hail Motherland® has become the national song of India to-day. Thousands of men and women have been prosecuted and sen¬ tenced by the government, during the past few years, for just crying, (

There have been numerous writers in Hindi, Punjabhi, Gujarati and Marathi among north¬ ern Indian languages ; but few have had an international reputation, with the exception of the late Behramji Malabari and Bal Gangadhar Tilak. Mr. Tilak has been more in the lime¬ light as a politician, and will be remembered by his people as a master of Marathi prose. The activity, however, in these languages has been not even a small fraction of that in Ben¬ gali, and for various reasons has been frittered away in journalism. The vernacular journal¬ ism in Bombay is much more powerful and more modern than similar journalism in other parts of India.

The most interesting of the Indian languages is Tamil, which is the language of the southern half of Madras. It is closely affiliated with the three other languages spoken in the presidency, and being the language of the provincial metrop¬ olis is more influential than the rest. This lan¬ guage claims to be nearly as old as Sanskrit. It has a distinctive grammar, an alphabet which is found in no other language in the world, and a tradition which is older than that of any other modern Indian language. There is no doubt that the original Tamils were the inhabi¬ tants of the country, prior to the conquest by the Aryans. To-day, in spite of the fact of 25 centuries of intermingling, we find traces of people who are as distinct from the Aryans, as the negroes are from the white Americans. Culture and literature, however, is not in the hands of the original inhabitants. The language has, as it were, been taken up by the Aryans and remodeled. Although there are works which are undeniably known to be 15 to 16

centuries old, we have as yet no trace of Tamil literature without the influence and admixture of Sanskrit. The earliest works show Buddhis¬ tic influence. Evidently, Buddhism lasted longer in the south, than in the north, before it was driven out or incorporated into Brahminism. A fairly large number of classics of an early era is

available in this language. Rural, Mani- mehalai and Silappathiharam are said to have existed anterior to the 8th century. Kambara-mayanam, Naladiyar and Bharatam are at least 400 years old. Southern India was disturbed by the Mohammedan invasion only late in the day; and even after the Mohammedans came down south, life and literature were less molested than in the north. Since the British admistration, the same influences that have led to a Renais¬ sance in Bengal, have also exerted a powerful influence in connection with Tamil. A number of young writers have produced works which can compare favorably with those of Europe and America.

A treatment of Indian literature will be very incomplete if sufficient attention is not paid to the press. The vernacular press in India is growing powerful every day, and as a rule contains much that is usually published in book form in Europe and the United States. The reason is obvious. The people, as a whole, are too poor to spend a great deal on books, and there is no regular market for literature, espe¬ cially as the government places every obstacle in the path of the development of indigenous thought and writing. . The papers published in the native languages in India are watched very carefully, and are. the only means of support for those who choose a literary career. There¬ fore, they are on a much higher plane than the greater part of newspapers in any part of the world. There is, again, the satisfaction of mak¬ ing innovations and many of the subjects that are daily being discussed have never been treated in any manner in the past. These papers have a much wider circulation than their sub¬ scription lists disclose. Owing to the extraor¬ dinary apathy of the authorities in educating the people, and the very low percentage of liter¬ ate people, the newspapers are usually read to the people. In a village, for instance, about 20 or 30 people will club together to buy a num¬ ber of papers, and pay one man to read it to them. Just as people discuss affairs in the clubs of Europe and the United States, world politics is read and discussed in the village temple or the grove. In 1912, Bombay had' 359 papers ; Madras and the nearby states 256 ; Bengal, 258; the United Provinces, 223; and Punjab, 211, — all told 1,447 papers and maga¬ zines in the country. It is certainly a ridicu¬ lously low number for the extent of the country, but considering that it is an innovation, and that the vernacular press is fettered with all sorts of restrictions by the government, and the writers live in constant dread of being marched to jail any moment, it is indeed a matter for surprise, that so many should exist at all. Con¬ sult Grierson, linguistic Survey of India' (Calcutta 1903 et seq.) ; Schmidt, P., (Grund- ziige einer Lautlehre der Mon-Khmer Sprachen' (Vienna 1906).

Srinivas R. Wagel.

INDIA, Music of. Music was a science in India long before it was considered so in other

countries and the Hindu Scriptures are the first in recorded history to mention music as a science. The Rig Veda mentions musical instruments like the drum, the lute and the flute. The Sama Veda, as it was chanted in those ancient days, and as it is chanted even to-day, most conclusively proves that the science of vocal music was developed to a considerable extent. In ancient Ind.a the function of music was to assist in the performance of religious ceremonies. Even to-day most of the daily de¬ votional duties of the Hindu are performed in chant or in rhythmical movements of the body. Strabo admits that the greater part of the science of Greek music owes its origin to India. The system of notation, which was perfected in India before 350 b.c., <(passed through the Persians to Arabia and was from there intro¬ duced into European music by Guido d'Arrezzo at the beginning of the 11th century,® states Montstuart Elphinstone, the English historian of India.

Hindu music is divided into seven chapters as follows: (1) Sur-Adhya treats of tones, semi-tones, etc. ; (2) Rag-Adhya treats of tunes and melodies; (3) Taal-Adhya treats of time;

(4) Ast-Adhya treats of musical instruments ;

(5) Nirt-Adhya treats of dancing; (6) Bhao- Adhya treats of actions and movements in rhythm with singing and dancing, and (7) Arth-Adhya treats of comprehension of tunes and times.

The scale of Hindu music has seven notes, just like Western music. They are Sa (shudja) which corresponds to the European note C; Ri (Rishaba) to D;.Ga (Gandhara) to E; Ma (Madhyama) to F ; Pa (Panchama) to G; Dha (Dhaivata) to A, and Ni (Nishada) to B. Each of these notes is considered to be presided over by a deity of the Hindu pantheon : Agni (god of fire), presides over Sa; Brahma (god of creation), over Ri; Saraswati (goddess of learning), over Ga; Mahadeva over Ma; Vis'hnu over Pa; Ganesh over Dha, and Surya over Ni.

Instead of the 12 tones and semi-tones of the European scale, the octave of Hindu music is divided into 22 quarter tones and thirds of a

tone. That is the main reason why unac¬ customed Western ears cannot, at first, ap¬ preciate Hindu music. It is so delicate that it does not sound like music at all ; it sounds rather like a jumble of notes without the least aesthetic significance. <(But,® says a European critic, <(the Hindu music has attained a theo¬ retical precision yet unknown to Europe.®

From the scale of 22 notes and quarter- notes the Hindu divides certain groups into Ragas. There are six Ragas, one for each season of the year. Sri Raga is for the winter, Vasanta for the spring, Bhairava for the sum¬ mer, Megh for the rainy season, . and Natana- rayan for late autumn. The six Ragas are male, and there are 36 Raginis.

The Hindu masters of music have set aside different Ragas for different hours of the day. And it is improper to sing a song that is not suited to that hour of the day. As for ex¬ ample, Bhairava is sung from 4 a.m. to 8 a.m.; Megh from 12 noon to 4 p.m.; Dipak from 8 p.m. to midnight.

Again, the atmospheric conditions also go to decide on the Raga to be sung. When it rains

the Hindu sings the Megh-Makar, and it makes you feel wet and hear the gentle raindrops fall. Near a fire or in an exceedingly hot hour of the day he would s.ng Dipak, a Raga that would make you feel a kind of burning sensation. According to Prof. Inayat Khan there are 400 main ryhthms in Hindu music.

Before singing the song itself the Hindu musician sings Alap. Alap is a kind of prelude to the song. There are no words to an Alap. It simply prepares the ground and creates an atmosphere for the ensuing song. Then, when the singer begins to sing, he is free to im¬ provise as he wishes. He must, of course, con¬ form to the general rule of the Raga, but he improvises according to the mood and the environment he is in, and the audience he is singing for. The master musician does not care much for the words of ‘the song. He often sings one line, and then improvises it in a hundred different ways by repeating the same line a hundred different times. (

What words fail to convey to human mind, music does with perfect ease. Music begins when words end.® This is certainly the spirit of Hindu music.

Unlike the music of the West, Hindu music is purely melodic. And yet the use of such words as Vadi (principal note), Samavadi (note

subordinate to it) and Vivadi (discordant) in the Vedas plainly show that at least some of the rudimentary rules of harmony were understood by the musicians of the Vedic age. But it must be admitted, however, that Hindu music is essentially melodic. In other words, it is produced by. successive sounding of single tones of different pitch, whereas the Western harmonic music is produced by the simultane¬ ous sounding of single tones of different pitch. The melodic nature of Hindu music helps to lend itself easily to improvisation.

There are a thousand and one different kinds of musical instruments in India. For full par¬ ticulars of which the reader should refer to the works of Raja Sourindra Mohon Tagore, and for a fuller account of Hindu music the reader must consult (The Music of Hindusthan) by H. H. Fox-Strangways and

INDIA, Native States of. See India un¬ der Political Divisions, Local Government and History.

INDIA, Portuguese. See East India Companies, and India under History.

INDIA INK, a black pigment, consisting commonly of lampblack, gelatine and water. The usual basis of India ink is a finely divided solid carbon, mixed with a size to hold it in suspension when the ink is prepared for use by mixing it with water, the depth of the shade being regulated by the quantity of water used in the mixing. This ink was originally made in China and Japan, where the ink is applied with a brush both for writing and drawing. In Europe and America it is now used chiefly for black-and-white drawings.

. INDIA RUBBER, a colloidal substance ob¬ tained from the milky juice of several widely different plants, and otherwise known as

caoutchouc or gum-elastic. The most important sources are : Hevea Braziliensis and Castilloa elastica, two trees native to South America but cultivated in many other sections ; Manihot Glaziovii, Ficus elastica, several vines of genus Landolphia, and the Mexican guayule plant, Parthenkim argentatum. Some of the proper¬ ties of india rubber musit have been known to the natives of America at a very early period, because balls made by the Haytians of the gum of a tree, bouncing better than the wind-balls of Castile, are mentioned by

Herrera in his account of Columbus' second voyage. In a book published in 1615, Juan de Torquemada mentions the tree which yields it in Mexico, describes the mode of collecting the gum and states th?it it is made into shoes; also that the Spaniards use it for waxing their canvas cloaks to make them resist water. More exact information was furnished by M. de la Condamine in 1735. India rubber was at first known as Elastic Gum, and received its present name from the dis¬ covery (about 1770) of its use for rubbing out black-lead pencil marks, for which purpose it began to be imported into Britain in small quantities about the end of the 18th century. Its application to the manufacture of water¬ proof cloth first gave it commercial importance. About the same time a method was discovered of fabricating articles of various kinds by cast¬ ing india rubber in molds. Until very recent years the india rubber of commerce was ob¬ tained chiefly from South America, but the larger part of the present market supply comes from the cultivated rubber plantations of Brit¬ ish India and the Indian Archipelago, and a considerable and increasing quantity from the west coast of Africa and the Mauritius.

The sap as gathered from the rubber-yield¬ ing plants holds in suspension the globules of rubber, each being surrounded by a protective envelope of a proteid substance. In order to secure the coalescence, of these globules, various methods are employed in different localities and with different rubbers. The most common proc¬ ess is by exposing thin layers of sap to the heat and smoke of an open fire, but a method of chemical coagulation is employed in some localities following a condensation by a centrif¬ ugal treatment of the fresh sap. As it reaches the market, crude rubber is a very uncertain substance, containing from 15 to 50 per cent of impurities, much of which is simply dirt, as sand, bits of wood and clothing, leaves, plant fibres, etc. Other impurities which are normal to the sap are resins, sugars of several kinds, albumen, essential oils and a percentage of water, often very considerable. On < some plantations of cultivated rubber the gum is care¬ fully cleaned and washed before it is marketed, but generally the manufacturer's first operation is to wash the crude material. The lumps of raw rubber are first steeped in warm water until soft and then sliced into thin sections under water and run between deeply corrugated rolls, also under water until they are in thin wavy sheets resembling crepe. They are then dried in the air or in a vacuum chamber, being care¬ fully protected from light which has a tendency to set up injurious chemical changes, espe¬ cially oxidation. By the vacuum process the drying is completed in an hour and a half; by the air-dr.ying method several days are re¬ quired. As rubber is hygroscopic, the drying

operation is one demanding skilled attention, for the vulcanizing of the rubber depends very largely upon the content of moisture.

Pure india rubber has the composition CioHie. It is insoluble in water, in the esters, and in the ethers — all of which, however, are readily absorbed by rubber, causing it to swell. The solvents used in the arts are turpentine, dipentine, petroleum spirit, carbon disulphide, benzene and chloroform. The solvent most fre¬ quently used is petroleum spirit, on account of its cheapness. As a matter of fact the usual phenomena of solution are not observed with rubber. The gum absorbs the solvent, becom¬ ing first a jelly, later assumes a viscous condi¬ tion, and as more of the solvent is added it finally takes a freely liquid form. India rubber is highly distensible, and this property increases with the increase of temperature. If the degree of heat is carried to 200° F., the distension be¬ comes permanent. Pure rubber is used to but a limited extent in the arts, but for all general purposes it is first vulcanized. Two grades of vulcanized rubber are prepared, one hard and horny in its texture, the other soft and elastic. In the case of the former the caoutchouc is mixed with about one third of its weight of sulphur and heated for several hours, the temp¬ erature finally rising to fully 300° F. For the soft kind of vulcanized rubber, on the other hand, a much smaller proportion of sulphur is required — viz., from 2ˆ4 to 10 per cent, and the heat to which it is subjected in the vulcanizing chamber is considerably less. Usually, too, with this latter kind, the articles are made before the rubber is heated. The sulphur is commonly added in the ground state, but sometimes the rubber is treated with some solution containing this element, such as the bisulphide of carbon.

Hard vulcanized rubber, termed vulcanite, and sometimes ebonite, is made into a great many small articles, such as combs, chains, bracelets, boxes, penholders, paper-knives, knife-handles, buttons, etc., as a substitute for materials like horn, bone, ivory and jet. .Like these substances themselves, it is formed into various objects by molding, cutting, carving, polishing and other processes. Vast numbers of these articles are now sold. The black color of vulcanite ornaments has still a tendency to turn gray, but the brittleness which was a fault of combs made of it a few years ago has been overcome.

Manufactures from india rubber turned out from the factories of the United States in 1914 amounted to a value of $300,994,000. Of this total a value of $53,822,000 was in the form of boots and shoes. So great is the demand for india rubber, for use in manufacturing, that not only has the importation grown from 2,000,000 pounds in 1862 to over 200,000,000 pounds an¬ nually at the present period, but in

addition to this the forests of the East Indies are called upon for several million pounds annually of a substitute for gutta-percha, known as ((gutta- joolatong,® while at the same time the high¬ ways and byways of Europe and other coun¬ tries are ransacked for cast-off rubber manu¬ factures from which the rubber is ˆreclaimed® and re-used in conjunction with the new rubber from the forests of Brazil, Africa and the East Indies.

The industry of importing and ˆreclaiming® india rubber for re-use in manufacturing is a

comparatively new one, and while it utilizes large quantities of worn-out rubber boots and shoes and other articles of this character from the scrap heaps of the United States, it has only taken in other parts of the world in recent years.

Importation. — The effect of the Great War in Europe on the rubber importations of the United States was remarkable. In 1913, the last year in which the figures can be con¬ sidered as normal, the quantity of rubber im¬ ported was 113,384,359 pounds, valued at $90,- 170,316. In the fiscal year ended 30 June 1916, the importation was 267,775,557 pounds, valued at $155,044,790. Of the great total, 125,532,067 pounds came direct from the East Indies; 72,- 459,408 pounds from England — part of this be¬ ing East Indian and Part South American pro¬ duction ; 54,968,2 27 pounds from Brazil and 6,265,387 pounds from Peru and other South American countries; and 4,599,042 pounds from Mexico and Central America. In addition, the United States imported in the fiscal year 1914 — 15, 3,188,449 pounds of gutta-percha (1,204,406 pounds in 1913), nearly all from Straits Settle¬ ments; in 27,858,335 pounds of gutta-joolatong (45,345,338 pounds in 1913), of which 90 per cent came from Straits Settlements ; .2,816,068 pounds of guayule rubber from Mexico (10,- 218,191 pounds in 1913) ; and 16,371,573 pounds of scrap or refuse for remanufacture (43,385,- 456 pounds in 1913), principally from Canada and England.

See also Caoutchouc; Rubber Manufac¬ tures, American; Rubber Trees.

Consult Brown, H., (Rubber: Its Source, Cultivation and Preparation > (London 1914) ; Pearson, H. C., (Rubber Machinery > (New York

1915) ; Potts, H. E., (The Chemistry of the Rubber Industry* (London 1912) ; Schidro- witz, P.,

Richard Ferris.

INDIA RUBBER TREE, the name gen¬ erally given to the Hevea Brasiliensis, the rub¬ ber tree par excellence. It is indigenous to the region of the River Amazon and in the tributary areas of Peru, Bolivia, Ecuador, Colombia and Venezuela. The tree has been recently planted with great success, especially in Ceylon and Malaya. It is a large tree, of slow growth and long life. It has been found 12 feet in circumference. It requires low-lying, rich, deep soil and abundant moisture. It grows wild in Brazil over an area estimated at 1,000,000 square miles; there, however, it does not grow in clumps, being found rather scattered through the tropical forest, but it is well adapted to cultivation as has been demon¬ strated within recent years in the East Indian Islands. There are several other trees which produce rubber, including the Manihot, which produces the Ceara rubber of commerce, but its habitat is a high, stony, and arid country. This is also a native of Brazil, but of the region south of the Amazon. Castilloa, next to Hevea, the best known rubber producer, has its princi¬ pal range in Central America and southern Mexico. Other trees which furnish rubber are the Hancomia speciosa, which produces the Mangabeira rubber of Brazil and species of

Sapium, also the Ficus clastica of Assam, the Funtumia elastica of Africa and vines of the genera Laudolphia, C litandra, C arpodinus and the guayule plant (Parthenum argentatum) .

INDIAN. See Indians, American.

INDIAN AFFAIRS. In former years an idea was prevalent that the national govern¬ ment had always striven to dispossess the In¬ dians from the lands they occupied, or had S3rmpathized with such efforts. This was the exact reverse of the truth. From its foundation until now history presents an unbroken record of quarrels between Indians and bordering or interdwelling white settlers, in which the gov- efnment has been slowly and reluctantly pushed on to interfere; sympathizing with and justify¬ ing the Indians against its own citizens, its commissioners usually reporting in their favor and even its generals in later days blaming the whites for the troubles ; its courts deciding in their favor; attempting pacification amid local outcries against them, rebuffing appeals for aid and only using its armies to reduce the Indians and its administrative power to remove them when it was no longer politically possible to leave them in possession. Even then, it

has meant to deal righteously by them ; but the complexity of the problem — one may say its insolubility till the country was very strong and the Indians very weak — along with the universal curse of “spoils** in the administra¬ tion — hindered success. Until 1887, there was no consistently formulated plan, but there has followed a sequence of government panaceas in a steadily descending line. First, there was to be one vast Indian reservation, large enough to give them all the hunting-room they needed and so far from the United States that our growth would never reach to them and create more troubles ; then three great reservations, to prevent so formidable an Indian district and internecine Indian wars ; then a number of small ones, to segregate hopelessly hostile tribes, enable better training for civilized existence, and protect them from depredations; lastly, no reservations, but severalty ownership and indi¬ vidual citizenship. These changes of policy have been due not to fickleness or visionary causes, but to broadening experience and vary¬ ing conditions.

The policy of removing the Indians west of the Mississippi was first formulated by Jeffer¬ son, who in a proposed constitutional amend¬ ment (1803) set off the Louisiana Purchase north of the Arkansas as a pure Indian country, in which no land was to be sold to whites. This was carried out, on a much reduced scale, In the formation of Indian Territory (q.v.) by act of 30 June 1834; by another act of same date a superintendent of Indian affairs was ap¬ pointed; no one to trade or settle in the Indian country without permission from him or his agents. Previous to this#the Indian. matters had been under the War De’partment ; in 1849 they were transferred to the new Department of the Interior, of which they still form a bureau. Under the Commissioner of Indian Affairs are eight inspectors and a large variety of subordi¬ nate officials and employees. The Indian agents, though under his control, are appointed by the President for four years, with bonds; on their action depends often peace or war to great white populations, but in too many cases form-

erly they were the football of politics and some¬ times scandalously unfit for their places.

The legal theory, for some time, was that each tribe was a nation, but not a foreign nor independent one ; a <(domestic dependent na¬ tion, but with which, nevertheless, all inter¬ course was to be conducted through special commissioners appointed by the President. In 1871

Congress abolished this method of pro¬ cedure, and substituted immediate Congressional control, but the fiction of Indian nations re¬ mained ; nor, indeed, could any other system well be applied so long as the Indians were recognized as national wards, and could not be made a part of the regular republican system or thrown into the current of unrestricted com¬ petition. It was the general plan to let the larger and better advanced ones, the Cherokee, Chickasaw, Choctaw, Creeks and Seminoles (qq.v.), the five ˆnations® of the Indian Terri¬ tory, govern themselves and thus develop polit¬ ical life, including a full judiciary system. But the smaller ones could not be thus left, even in leading-strings ; and in all, the govern¬ ment has recognized its duty to watch over their ignorance, improvidence and savage in¬ stability of will and emotion from either vio¬ lence or cunning on the part of the whites. Traders with them must have certificates of good character and be licensed by the Indian commissioner, and the goods they sell are sub¬ ject to regulation; no one can hunt, cut timber or pasture cattle on Indian lands without the agent's permission ; intoxicating liquors may not be sold to them. Still more important and beneficial is the educational work, which has not only been carried on by churches, missionary societies and private individuals from early times, but has been actively forwarded by the government. The five civilized nations of In¬ dian Territory had their own school system, of considerable extent ; but for others, and even for those where needed, the President was em¬ powered in 1865 to appoint instructors of Indian children in reading, writing, arithmetic and agriculture, and in 1882 to appoint an in¬ spector of Indian schools. See Indian, Edu¬ cation OF THE.

From 1877, when a $20,000 appropriation was made for Indian schooling, to 1900, when over $3,000,000 was appropriated, over $35,000,000 had been thus expended by the government. It had spent since its foundation nearly $400,- 000,000 on the Indians, outside of the cost of wars against them; and the present expenditure is about $10,000,000 a year.

On 8 Feb. 1887 an act was passed, amended in 1890, to sweep away as soon as feasible, the system of tutelage and pauperization, in the belief that abolition was best for Indians and whites alike. All reservations were to be surveyed; all Indians who wished to take up lands in severalty to a certain. amount might do so — and by the act become citizens, as well as all who had previously done so under treaties and Congressional enactments, over 10,000 in number. About 2,000 a year comply with the permission and many of these new citizens are made voters by their States; in 1915 there were over 24,000 such in the United States.

The total Indian population of the United States, exclusive of Alaska, on 30 June 1915 was 333,010. Exclusive of the five civilized tribes, including freedmen and intermarried

whites (101,521), the number was 231,489 dis¬ tributed as follows :

Indian Population by

States and Territories

Alabama .

909

Idaho .

. 4,200

Arizona .

. 42,336

Illinois .

. 188

Arkansas .

460

Indiana . .

. 279

California .

. 15,034

Iowa . .

. 364

Colorado .

890

Kansas .

. 1,375

Connecticut .

152

Kentucky .

. 234

Delaware .

5

Louisiana .

. 780

Dist. of Columbia.

68

Maine .

. 892

Florida .

578

Maryland . . . . .

. 55

Georgia .

95

Massachusetts .

. 688

Michigan .

. 7,514

Oklahoma .

. i 118,358

Minnesota .

. 11,723

Oregon .

. 6,481

Mississippi .

1,253

Rhode Island . .

. 284

Missouri .

313

South Carolina

. 331

Montana .

. 11,329

South Dakota.

. 21,082

Nebraska .

. 3,917

Tennessee . . . . .

. 216

Nevada .

. 7,819

Texas .

. 702

New Hampshire. .

34

Utah .

. 3,210

New Jersey .

168

Vermont .

. 26

New Mexico .

. 22,007

Virginia .

. 539

New York .

. 6,185

Washington. . .

. 11,423

North Carolina. .

. 8,047

West Virginia.

. 36

North Dakota. . . .

. 8,710

Wisconsin ….

. 9,889

Ohio .

127

W yo.ming .

. 1,705

1 Exclusive of

Five Civilized Tribes in

Oklahoma and

scattered Indians

under Government jurisdiction, except

where indicated.

The total area of Indian lands amounts to 68,102,691 acres in 224,713 allotments of which 34,768,430 acres are allotted, 33,33 4,261 are un¬ allotted and 7,470 allotments comprising 1,077,- 257 acres, are public domain. The total annual income of 309,911 of the Indian population on reservations for the fiscal year ending 30 June 1915 was $23,193,046, comprising $4,790,968 of crops raised by Indians, $2, 114,623 of stock sold, $1,177,000 worth of weaving, basketry, etc., manufactured by 27,297 Indians, $1,446,021 of cut timber, $2,304,339 worth of wages earned, $499,585 of rations and miscellaneous issues, $2,975,526 from leases, $3,571,855 from sales of lands, $2,125,787 interest on trust fund, $630,560 treaty and agreement obligations and $1,556,182 of Indian moneys, proceeds of labor and mis¬ cellaneous.

The progressive tendency of the present day has been reflected in the vigorous activity of the Indian Service branch of the Department of the Interior dealing, as it does, with the intricate complexities involved in the lives of over 333,- 000 members of the race, both as to the in¬ dividual and to every phase of their social and industrial functions. Thoroughly convinced that their material and industrial prosperity is more closely attached to their landed interests, the development of agriculture and stock rais¬ ing has been given an impetus never before undertaken. Not only their own moneys but reimbursable funds made available from appro¬ priations by Congress

have been invested in thousands of cattle and other live stock. The Indians are being taught how to make the best use of this wonderful asset and rapidlv are realizing that from the farm and the range their material salvation must be obtained. A. happy correlation of the instruction given in the schools is being made with the future environ¬ ment of the boy and girl. The mere acquisition of knowledge is subordinated to the practical teaching of facts and laws which bear directly on everyday life on the farm and in the home. Poverty or dependence on others saps the ener¬ gies of any individual. The Indian is no excep¬ tion and the greatest work of the Indian Serv¬ ice is placed on his material advancement. As his herds increase and his lands produce, the

Indian becomes better prepared to assimilate the knowledge which comes from the study of books Love of home and domestic happiness follow as a natural consequence. In 1916, ac¬ cording to the report of the Commissioner of Indian Affairs, the birth rate among the Indians exceeded the death rate for the first time in half a century. The prime factors in bringing about this result are up-to-date hygiene and sanitation, modern methods of combating pre¬ ventable diseases and the disappearance of the <(medicine man.® Better habitations are now provided and the infants of the race are safe¬ guarded from birth according to the principles of modern science; hospitals of modern type are provided, displacing the medicineˆ man and his incantations. In consequence of what is beine done in educating the Indian to the im¬ portance of modern sanitation, tuberculosis, trachoma and other preventable diseases that formerly ravaged the tribes, are fast disappear¬ ing. In academic and vocational schools, equal to those of the most progressive white com¬ munities, the Indians are being taught the usual school subjects, the common trades, the prin¬ ciples of the government under which they live' good manners, proper living and the niceties of refined society. Consult Sells, C., (84th An¬ nual Report of the Commissioner of Indian Affairs to the Secretary of the Interior> (Washington 1915). See also Cherokee; Chickasaw; Choctaw; Creeks; Seminole Indians; Indians, American; Indian Reser¬ vations.

Bibliography. — Treatment of Indians : Bourne, H. R. F., (The Aborigines Protection Society: Chapters in its History 5 (London 1899) ; Casas, B. de las, (Brave relacion de la destruccion de las Indias Occidental (Phila¬ delphia 1821) ; Child, L. M. F., (An Appeal for the

Indians5 (New York 1868) ; Howitt, W., Colonization and Christianity: A Popular His¬ tory of the Treatment of Natives by Europeans in All Their Colonies) (London 1838) ; Beeson, J., (A Plea for the Indians) (New York 1857) ; Beeson, J., (Frauds and Cruelties Practised Upon Indian Tribes: Measures Necessary to Protect the Indians5 (Philadelphia 1861) ; Huntington, F. D., (Two Ways of Treating the Indian Problem5 (New York 18 —) ; Leupp, F. E., (In Red Man's Land5 (New York 1914) ; McCoy, I., (The Condition and Prospects of the American Indians5 (Washington 1831) ; Methrose, P. F., Civilization and the Indian: the Assassination of Sitting Bull5 (New York 1891) ; Tibbies, T. H., (Hidden Power: A Secret History of the Indian Ring5 (New York 1881) ; Rand, J. H., Che Indians of North Carolina and Their Relations with the Settlers5 (Chapel Hill 1913).

Government Relations: Abel, A. H., Che American Indian as Slaveholder and Secession¬ ist5 (Cleveland 1915) ; and Che History of Events Resulting in Indian Consolidation West of the Mississippi River5 (Washington 1908) ; Barrows, W. D., Che Indian's Side of the In¬ dian Question5 (Boston 1887) ; Blanchard, N. C., Che Indian Question5 (Washington 1891) ; Burleigh, W. A., Undian Affairs5 (Washington 1869) ; Butler, E., Cur Indian Question5 (New York 1882); Condict, T. E., (Is There Any Justice for Indians?5 (New York 1874) ; Copway, G., Crganization of a New Indian Territory East of the Missouri

River5 (New York 1850) ; Indian Rights Asso¬ ciation, Uts Objects, Achievements and Needs5 (Philadelphia 1887) ; (A Crisis in Indian Af¬ fairs5 (1891) ; (A Dangerous Assault Upon the Integrity of the Civil Service Law in Our Indian Service5 (1893); Jackson, H. M. F. H., (A Century of Dishonor: the United States Government's Dealings With Some of the Indian Tribes5 (Boston 1913) ; Leupp, F. E., Che Indian and His Problem5 (New York 1910) ; McKenzie, F. A., Che Indian in Rela¬ tion to the White Population of the United States5 (Philadelphia 1908) ; Welsh, H., Che Murrain of Spoils in the Indian Service5 (New York 1898); and Undian Office: Wrong-doing and Reforms Needed5 ; Wharton, S., (Plain Facts: An Examination Into the Rights of the Indian Nations5 (Philadelphia 1781) ; United States Adjutant General's Office, Chronolog¬ ical List of Actions, etc., with Indians. From 1 January 1866 to January 1891 5 (Washington

1891).

INDIAN ASBURY UNIVERSITY. See

De Pauw University.

INDIAN BEAN, a catalpa (q.v.) ; specifi¬ cally the large southern tree (Catalpa catalpa), now planted as a shade or ornamental tree all over the country on account of the beauty of its masses of spring flowers and the quaint ap¬ pearances in autumn of its long, bean-pod-like fruit.

INDIAN BIBLE, the first Indian transla¬ tion of the Bible in the New England colonies. This translation was made in 1663 by John Eliot, Che Apostle to the North American Indians.55 It was in the dialect of the Naticks, a Massachusetts tribe of the Algonquins. A second revised and corrected edition was printed in 1685, only 12 copies of which are known to exist. An edition with notes by P. S. Du Poneau, and an introduction by J. Pickering, was published in Boston in 1822. When the original edition was issued, 20 copies were ordered to be sent to England. A copy of the edition of 1663, with the Epistle Dedicatory, was sold in 1882 for $2,900.

INDIAN BREAD-ROOT, a plant of the

genus Psoralea ; the Uarge55 was P. escnlenta\ the <(small55 P. hypogcea. See Bread-root.

INDIAN CORN. See Corn, Indian.

INDIAN DAY. Indian Day was observed for the first time in the United States in 1916. It is a recognition of the Indian race and in¬ tended to be of benefit to them in numerous ways. The census of Tune 1915, showed that there were 333,010 Indians in the United States. Only seven States have an Indian population of 10,000 or over. They are Arizona, California, Minnesota, Montana, Oklahoma, South Dakota and Washington. Oklahoma leads with 118,358. The expenditures of the United States on ac¬ count of the Indians in the fiscal year ended 30 June 1915, were $20,592,322.48. The govern¬ ment spent over $4,500,000 alone for the main¬ tenance of Indian schools. Records show that 85 per cent of the total number of gainfully employed Indians are in seven occupation groups. The groups consist of agricultural laborers, farmers, stock raisers, lumbermen, raftsmen, woodchoppers, laborers in manufac¬ turing and transportation, basket makers,

weavers, launderers and laundresses, servants and waiters.

INDIAN FIG. See Prickly Pear.

INDIAN FIRE. See Bengal Light.

INDIAN FOLK TALES AND MYTHS.

See Folk Tales and Myths of the American Indian.

INDIAN HEAD, Canada, town in Sas¬ katchewan, 40 miles east of Regina, on the Canadian Pacific Railroad. It has extensive grain-growing interests and numbers among its industrial establishments planing mills and lum¬ ber yards. The Dominion government main¬ tains here an agricultural experiment station and a forestry school. Pop. 1,285.

INDIAN HEAD, (1) New Jersey, the high¬ est point of the Palisades, 550 feet ; so called be¬ cause it resembles somewhat the head of an In¬ dian. It is in Bergen County, on the Hudson River opposite Hastings, N. Y. (2) The name of a village in Fayette County, Pa. (3) A small town in Maryland, on the Potomac River, below Washington, the seat of a naval station.

INDIAN HEMP. Sometimes called Can¬ ada hemp. See Apocyanaceˆe.

INDIAN HIPPO, an American plant. See Bowman's Root.

INDIAN HUMPED CATTLE, a species of East Indian oxen (Bos indicus), now known only in the domesticated state, distinguished by a high fatty hump on the withers, by the prev¬ alent ashy gray color, large drooping ears, enormous dewlap and several structural pecu¬ liarities. They vary in size from those as large as a European ox to the smallness of a half- grown calf. They are the working cattle and draft animals all over India and eastward, more or less locally, to China. They are venerated by the more pious sects of Hindus, especially certain privileged bulls, called Brahma or Brahminy bulls, which wander about the bazaars of cities unharmed and unchecked in their depredations upon market produce.

Humped cattle are known in Madagascar and in Abyssinia, and it has been suggested that the species were originally African. The Abys¬ sinian form is a large animal with huge horns called (

INDIAN MADDER. See Chay-Root.

INDIAN MUSIC. Every public ceremony and every important act in an Indian's life was accompanied by song. For each ceremony there

existed a special class or type of song and songs for individual celebrations were similarly classi¬ fied. An Indian can determine at once the class of a strange song by the rhythm of the music. In structure, the Indian song follows the out¬ line of the form which obtains in our own music — a short melodic phrase built on re¬ lated tones which are denominate ctiord lines, repeated with more or less variation, grouped into clauses and correlated into periods. The compass of songs varies from one to three octaves. Some songs have no words, vocables being used instead and when once set to a melody they are never changed. Plural singing is generally in unison, on the plains and else¬

where, the women using a high, reedy falsetto tone an octave above the male singers. Men and women having clear resonant voices and good musical intonation compose the choirs • which lead the singing in ceremonies. Songs are the property of tribes, societies and indi¬ viduals. Societies are most careful not to change a word of a song. Indian songs show the development of music, and as such, a study of them is of great historic value. Moreover, they offer to the composer a wealth of melodic and rhythmic movements, and that peculiar in¬ spiration which heretofore has been attained solely from the folk songs of Europe.

Drums vary in size and structure and cer¬ tain ceremonies in some cases evolved a peculiar type. Whisiles of bone, wood or pottery are employed in some ceremonies. Pipes are of recent introduction but are now favorites. The flageolet is widely distributed and is played by young men during courtship, it also accom¬ panies the songs of certain ceremonies. Rat¬ tles were universal and of many types. Con¬ sult Baker, (Ueber die Musik des Nordamer- ikanischen WildeiP (1882); Cringan, (Iro- quois Folk-Songs> (Toronto 1902) ; Burton, F. R., (American Primitive Music) (New York 1909) ; Tiersot, T., (La musique chez les peuples indigenes de l'Amerique du Nord> (Paris 1910).

INDIAN MUTINY. The British occupa¬ tion of India had been largely aided by native troops called Sepoys, who were enrolled under British officers in the service of the East In¬ dia Company. At the close of Lord Dalhousie's swray in 1856, when the whole of India seemed to have been either reduced directly under British rule, or if retaining its native princes to have placed itself under British protection, the Sepoy mutiny, a contingency for which the gov¬ ernment ought not to have been altogether un¬ prepared, occurred. Previous symptoms of dis¬ affection had not been wanting. Mutiny had on several occasions broken out in the native army, in a way to indicate how easily,

through causes which Europeans, from their defective sympathy with native thought and feeling, could not anticipate these troops mignt be alienated; but, on the other hand, the general fidelity of the Sepoys merited confidence, and this feeling pre¬ vailed over any ˆrounds of suspicion which might have been formed from isolated occur¬ rences. The Sepoys in Bengal were mostly either Mohammedans, or Hindus of the Brah- manical or military castes. The recent annex¬ ations had alarmed the native chiefs, while the fanatical Hindus had been deeply offended by reforms, including the successive abolition of various rites of their worship. Two European regiments had been drafted off for the Crimean War, and had not been replaced. , Others had been sent to Burma, and in the beginning of 1857 fresh regiments were despatched to Persia, so that only eighteen regiments were left in all Northern India, of which nine were in the Punjab. In Oudh, where, from its recent an¬ nexation, disaffection was rife, there was only one British regiment, and Delhi and Allaha¬ bad, the two chief arsenals, were guarded by native troops. To add to these favorable cir¬ cumstances a Hindu devotee had prophesied the termination of British rule at 100 years after the battle of Plassey. A slight incident sufficed

to give point and direction to a spirit of dis¬ affection which so many circumstances, tended to favor. At this time the Enfield rifle was introduced into the Bengal army. This rifle was loaded with a greased cartridge, the end of which required to be bitten off at the time of loading. By a natural inadvertence the au¬ thorities had neglected to consider how this seemingly trifling requirement might affect the easily excited sensitiveness of the Hindus in re¬ gard to caste, and this insignificant circum¬ stance removed the last security, against a united movement of disloyalty among the native troops, by establishing a bond of sympathy between the Mohammedans and Hindus. A report got abroad that the cartridges were to be soaked in cow and pork fat. The prejudices of Hindus and Mohammendans were thus equallv involved, and as this rumor rapidly spread, the excited imagination of the Sepoys conceived a con¬ spiracy on the part of the government to co¬ vert them forcibly to Christianity, by compelling them to violate the laws of their own religion. When this grievance was explained it was at once removed, the manufacture of greased car¬ tridges at Dumdum was stopped, and the men were instructed to grease them themselves with materials produced at the bazaars. Suspicion once aroused, however, was not to be allayed, and easily found a new object of contention. The paper of the new cartridges was

glazed, and it was again alleged that grease was used in its manufacture. The spirit of disaffection be¬ came too deep-rooted for any measures of con¬ ciliation. Conferences among the disaffected gave rise to ambitious schemes and the original grievances became a pretext in the hands of unscrupulous leaders, whose excesses debarred them even from the plea of patriotism, to extir¬ pate the British power in India. . On 26 Febru¬ ary the first overt act of mutiny took place at Berhampur, when a regiment refused to re¬ ceive their cartridges. Another dangerous out¬ break took place at Barrackpur on 29 March. The arrival of a British regiment from Burma and the disbandment of the disaffected regiments was thought to have ended the trouble, but it soon became evident that disaffection, which had1 only wanted an occasion, was spreading rapidly not only among the Sepoys, but among the Hindus generally. Another outbreak took place on 2 May, near Lucknow, when a regi¬ ment of cavalry were, by some oversight of the government's instructions, ordered to bite their cartridges. Sir Henry Lawrence succeeded by a show of force in disarming it. A more for¬ midable outbreak occurred about the same time at Meerut, 35 miles northeast of Delhi, when the mutineers, with the assistance of the native inhabitants, indiscriminately massacred the Euro¬ peans and escaped to Delhi. The advance-guard of the mutineers reached Delhi on 11 May, and at once entered the city, where they were as¬ sisted by the king's servants in massacring the Europeans. The native troops cantoned outside the city in the meantime joined the main body of the mutineers, and assisted in massacring their European officers. About 50 Euro¬ peans sought refuge in the palace and placed themselves under the protection of the king, who had placed himself on the throne of the Moguls. These, after some days, were coolly murdered in an open court in presence of a general concourse of spectators, conspicuous

among whom was Mirza Mogul, the king's eldest son, who had assumed the title of com¬ mander-in-chief. The magazine at Delhi had been blown up by its defenders; but the ex¬ plosion was only partial, and most of its con¬ tents fell into the hands of the mutineers. European troops were now summoned from all quarters. Several regiments were detached from an expedition which was proceeding under Lord Elgin to China, and the Persian War having been concluded, the troops en¬ gaged there were immediately recalled. When intelligence of these events reached the Punjab, the mutinous spirit which prevailed among the large body of Hindustani troops there was promptly subdued by disarmament. The Sikhs, though the Punjab had been so recently an¬ nexed, continued faithful. But the revolt had spread rapidly elsewhere, and British authority was almost

extinct, throughout the Bengal presidency. Everywhere the mutiny was at¬ tended with savage excesses — women were outraged, and Europeans, without distinction of age or sex, barbarously murdered. Sir Hugh Wheeler, at Cawnpore, was betrayed by Nana Sahib, maharajah of Bithur, who after offer¬ ing aid, took the mutineers into his pay, and raising the Mahratta standard, besieged Cawn¬ pore. The siege, or rather bombardment, lasted from 7-24 June, when a capitulation was agreed to, on a sworn promise of Nana Sahib to allow the garrison to retire to Allahabad. But as the embarkation was proceeding the boats were at¬ tacked by the Nana's troops and the men in¬ discriminately massacred. The women and children were for the meantime made prisoners. Sir Henry Lawrence was besieged in Lucknow, where he died on 4 July, from a wound re¬ ceived in a sortie.

Meanwhile mutineers had been converging on Delhi, and British reinforcements were hasten¬ ing to the besieging camp on the ridge above the city. After protracted operations and re¬ peated reinforcements on both sides, Delhi was taken by assault, 14—20 September. Sir Henry Havelock, who had been engaged in the Per¬ sian campaign, had arrived in Calcutta, and immediately set out for Allahabad, to commence operations for the relief of Lucknow and Cawn¬ pore. While his force was victoriously advanc¬ ing on Cawnpore, Nana Sahib on 15 July bar¬ barously massacred his prisoners, consisting of 210 women and children. Havelock was suc¬ ceeded in the command, at Lucknow, by Sir James Outram, who held it till relieved by Sir Colin Campbell, on 17 November. At first it was feared that the mutiny might extend to the Bombay and Madras presidencies, and from this cause and the occupation of the troops in Bengal, the mutineers had been left unchecked in Central India. At length columns organized in these presidencies entered Central India, and were united under Sir Hugh Rose. By the operations of these commanders the brave Rani of Jhansi, who died fighting at the head of her troops, was defeated, and Tantia Topi, whose military capacity had prolonged Nana Sahib's resistance, was captured and the mutiny was finally suppressed. The war was substantially closed by June 1858, although the complete paci¬ fication of Oudh was not effected till the end of the year. During the mutiny the Sikhs and Gurkhas remained loyal ; and the bulk of the population was at least passively so. The sup-

pression of the revolt was followed by a full amnesty to the rank and file who had not borne a hand in the massacre of Eurooeans, and by the transfer to the British government of the powers possessed by the East India Company. (See India, East India Company). Consult the histories of the Mutiny, by Forrest (1904) ; Holmes, (1898); and Malleson (1878-80).

INDIAN OCEAN, that body of water which has Asia on the north, the East Indian Islands, Nicobar and the Andaman Islands, Australia and Tasmania on the east, Africa on the west, and the Antartic continent on the south. The Cape of Good Hope and the south¬ ern extremity of Tasmania may be considered its extreme limits from east to west. Its length from north to south somewhat exceeds 6,500 miles, its breadth varies from 6,000 to 4,000 miles. Its gulfs are the Red Sea, the Gulf of Aden, the Persian Gulf, the Gulf of Oman, the Arabian Sea, the Bay of Bengal and the Great Australian Bight. Its islands are Ceylon, Madagascar, the Laccadives, Maldives, Socotra, Andamans, Nicobar, Mauritius, Bourbon, Ker¬ guelen's Land, etc. The Ganges, Brahmaputra, Irrawaddy, Indus and Euphrates, empty into the Indian Ocean from Asia, and the Zambezi and Limpopo from Africa. The ' southeast tradewind blows between the 10th and 28th parallels of south latitude from April to Octo¬ ber, after which date its limits are contracted; south of these are the northwest winds which prevail almost in the same latitude, in the Atlantic and Pacific. The monsoons are mainly in the north, from the continent of Asia to about latitude 8° S., and from the Mozambique Channel on the west to the western shores of Australia and the Sea of China. They blow for six months, changing about the equinoxes. North of the equator the northeast monsoon prevails from October to April, the southwest from April to October; while south of that the northwest monsoon blows while the north¬ east is blowing on the north side; and the south¬ east prevails during the time of the southwest monsoon north of the equator. In the hot season, likewise, when the southeast trade-wind recedes south, the northwest monsoon blows between the equator and the 12th south parallel. The hurricanes of this ocean usually range be¬ tween lat. 9° and 35° S., extending from Mada¬ gascar to the Island of Timor. They usually come from the northeast, and travel southwest and south, returning again east. Their season is from December to April.

According to the most recent soundings the mean depth of the Indian Ocean is 2,300 fath¬ oms, or somewhat greater than that of the Atlantic. The greatest depths are in the east¬ ern part to the south of the equator, where it is estimated that there are fully 50.000 square miles with a depth of over 3,000 fathoms. The deepest sounding has been recorded off the southeast coast of Java, 20,340 feet. Over

13,000,000 square miles lie between the depths of 2,000 and 3,000 fathoms.

The area of land draining into the Indian Ocean is estimated at 6,813,600 square miles, and the rainfall on this land amounts to 4.379 cubic miles of water annually. The rivers flow¬ ing from the Asiatic continent are by far the most important, and they carry a vast amount of detritus into the Bay of Bengal and Arabian

Sea, these forming immense deposits of blue mud. Along the African coasts, in depths from 100 to 1,000 fathoms, there are glauconitic sands and muds, and on these as well as other coasts, coral muds and sands, and blue and green muds in the shallower depths. In the deeper parts of the ocean, far from land, there are deposits of red clay, radiolarian-ooze, and glo- bigerina-ooze. Toward the Antarctic continent the ocean bed is covered with a diatom-ooze.

The temperature of the surface waters varies much in different parts of the ocean, at different seasons, and under the influence of different winds. In tropical regions the tem¬ perature usually varies from 70° to 80° F., and the yearly range is 7° or 8° F. Off the Cape of Good Hope and Cape Guardafui, the annual range may be from 20° to 30° F. Sudden changes of temperature are often noticed off Cape Guardafui when the wind blows off shore.

The cold and deep water is thus drawn up along the coast to take the place of the warm surface water which is driven east by the wind.

The temperature of the water at the bottom is very uniform and subject to little, if any, annual variation. In the Bay of Bengal and Arabian Sea temperatures of 33.7° F. and 34.2° F. have been recorded ; these are only very slightly higher than those recorded by the Challenger in lat. 50° S. It is certain, there¬ fore, that this deep cold water is slowly drawn into the Indian Ocean from the Antartic to supply the place of the warm surface currents that are driven south by the winds.

The currents of the Indian Ocean are less constant than in the other oceans, being largely controlled by the monsoons. Some characteristic coral atolls and islands are found toward the central part, such as the great Maidive group, the Chagos, Diego Carcia, and the Cocos Islands. The tropical shores are generally skirted by fringing and barrier reefs which render navi¬ gation dangerous. Christmas Island is coral formation, while Saint Paul's, Manuritius, Rodriguez and others are of volcanic origin, and Madagascar, Ceylon, and Socotra, conti¬ nental

islands.

The Indian Ocean was little known to the ancients. The first Europeans who explored it seem to have been the Phoenicians, who in the 7th century b.c., held the thalassocracy, or ma¬ rine domination, of the Mediterranean. Necho, an Egyptian monarch who flourished about 610 b.c., is reported by Herodotus to have sent some of his vessels, manned by Phoenicians, into the Indian Ocean, then known as the Erythraean Sea, to circumnavigate Africa. This they did, starting from the Arabian Gulf and regaining Europe by the Columns of Hercules. In the 6th century b.c. this sea was traversed by Hanno, a Phoenician admiral of Carthage. There is still extant his account of the voyage which is translated into Greek under the title (Hanno's Voyage of Circumnavigation.) The Greek historian Arrian has given us an account of the coasting voyage of Nearchus, one of Alexander's generals, from the Indus to the mouth of the Tigris and Euphrates.

Hippalus, an Egyptian navigator who flour¬ ished about the beginning of the Christian era, was the first to observe the regular monsoons of the Indian Ocean, and to profit by them. In the 9th century the Arabs made frequent

voyages across the Indian Ocean. In 1486 the Portuguese rounded the Cape of Good Hope, and in 1498 Vasco da Gama reached the coasts of India by the same route. In 1521 a ship of Magellan's squadron crossed the Indian Ocean in completing the first circumnavigation of the world, and has since been habitually traversed in a direct line between Arabia and Hindustan.

INDIAN OIL TREE. See Butter Tree.

INDIAN PAINT, the name of two Ameri¬ can plants: (1) the golden seal (q.v.) or orange- root, which furnishes a yellow color; and (2) the bloodroot. See Sanguinaria.

INDIAN AND PERSIAN LACQUER- WORK. See Lacquers and Lacquerwork.

INDIAN PHYSIC, an American plant. See Bowman's Root.

INDIAN PIPE, or CORPSE-PLANT,

a smooth, waxy-looking, fleshy herb (Mono – tropa uniflora) , of the family Monotropacece, widely distributed in dark, rich woods almost

throughout North America and in eastern Asia. It is said to derive some of its food from the roots of other plants, but much is obtained from decaying vegetable matter. From a matted mass of fibrous rootlets the white scaly stems rise to a height of perhaps eight inches, and bear solitary, nodding, white, inodorous flowers during the summer, followed by erect many-seeded fruits.

INDIAN RED, an impure oxid of iron, used as a pigment by painters. It was origin¬ ally imported from India, but is now chiefly prepared by roasting ferrous sulphate. The sul¬ phuric acid is expelled by the heat, and the red oxid of iron remains behind. It is very per¬ manent, and the color varies from purplish to a yellowish red.

INDIAN RESERVATIONS. When the settlers from Europe came to realize that the Indians had human rights, and ought not to be enslaved or exterminated, the rule was generally adopted of confining the tribes to reservations, both for their own protection from unprincipled whites, and for the security of the white popu¬ lation. New York, Massachusetts, Connecticut, Rhode Island and other States enforced this policy in the colonial period and after inde¬ pendence, and the United States government has carried it out from an early date. South¬ ern tribes east of the Mississippi were removed to the Indian Territory, which since 16 Nov. 1907 has become a part of the State of Okla¬ homa. Designated by solemn pledge of the Na¬ tional government as a permanent home for their race, there some of the tribes achieved a high degree of civilization, gained considerable wealth and merged into American citizenship. They are largely intermarried with whites, and to some extent with negroes, whom thev form¬ erly held as slaves. Other tribes, chiefly from the southwest, were gathered into the Indian Territory, but large Indian reservations, mainly of Sioux, are still maintained in the northwest, and altogether the various tribal reservations in the different States and Territories number 115. The reservations are carefully guarded against intrusion by unscrupulous whites, and provision is made for the intellectual and physi¬ cal welfare of the Indians, and for leading them to adopt civilized methods of self-support, in-

stead of depending on the chase, which now offers only the most precarious returns, or on government aid, which, however, is not with¬ drawn under any circumstances while an Indian is in need of it. The sale of intoxicating liquor to Indians is severely punished when detected, but the law is frequently evaded. See Chero¬ kee; Chickasaw; Choctaw; Creeks; Indian Affairs ; Indians, American ;

Seminole In¬ dians.

INDIAN RIVER, a long lagoon in the eastern part of Florida, in Brevard and Volusia counties. It connects with the Halifax River at Titusville and extends 100 miles southeast to the ocean at Indian Inlet. Its width varies from 300 feet to 3 miles and it is navigable for vessels drawing five feet. The Indian River is famous for the excellent oranges grown along its banks.

INDIAN SCHOOLS, in the United States, are schools especially established either by pri¬ vate or denominational means or by the national government, for the education of children and youth of the Indian population of this country. For particulars concerning these schools see Indian Affairs; Indians, Education of the.

INDIAN SHOT. See Canna.

INDIAN SUMMER, the name given to a period of mild and pleasant weather which gen¬ erally occurs toward the end of autumn. The term first made its appearance in the last de¬ cade of the 18th century. During the next decade the phrase was ftsecond summer.® This indicates that the spell of weather known by this name was not generally noticed much be¬ fore 1800. The term Indian summer became established about 20 years after its first appear¬ ance, which was in western Pennsylvania, and spread to New England by 1798, to New York by 1799, to Canada by 1821, and to England by 1830. The term, is, then, not an Americanism ; to write in praise of Indian summer is now a literary convention of three continents.

It is by no means easy to account for the origin of the term. The principal characteristics of the season which it describes are haziness, smokiness, and high temperature. Some ex¬ planations of the origin of the term are (1) that the Indians predicted such spells of weather ; (2) that the smokiness was produced bv Indian fires; (3) that this was the last season of Indian attacks on the settlements of the whites; (4) that the season partook of the Indian character of deceptiveness; (5) that the name was given because one of the seasons of East India was similar in character. Horace Walpole used the term in 1778, not in reference to America, but in relation to weather in the tropics. <(Squaw winter® was a name for the spell of cold weather preceding the Indian summer, and perhaps the key to the nomenclature is to be sought in this latter term. Analogous terms in use in Eng¬ land and Germany are : ((Saint Martin's Sum¬ mer,® (XXX, pp. 19-29; 69-79, Washington 1902).

INDIAN TERRITORY. See Oklahoma.

INDIAN TURNIP, a plant, Ariscema tri- phyllum . of the Arum family, known also as Jack-in-the-pulpit. It is one of the best known spring flowers of eastern North America, bios-

soming in April or May. The leaves are cop- pound, each composed of three large entire leaflets ; the ˆflower* really consists of a club-shaped spike of small greenish flowers sur¬ rounded by a large, hooded, corolla-like spathe, usually green striped with purple. In summer a spike of bright red berries is produced. The root is bulblike and contains a very acrid juice.

INDIAN or WILD TOBACCO, one of

the North American lobelias (Lobelia inflata), also called asthma-weed and gag-plant ; compare Kinnikinick.

INDIAN YELLOW, known in commerce

as Puree, a pigment of unknown origin which is exported from India, China and probably Arabia.

INDIANA («The Hoosier State®), a north- central State of the United States (No. 19 in order of admission) bounded north by Michigan, south by Kentucky, east by Ohio, west by Illi¬ nois ; extreme length 276 miles, extreme breadth 177 miles; area (No. 34 in United States) 36,- 350 square miles, 440 water ; pop. 1920, accord¬ ing to the official returns of the United States Census Bureau, was 2,930,390. The State bound¬ ary in Lake Michigan is an east and west line 10 miles north of the extreme southern point of the lake. The Ohio River runs along the south¬ ern boundary, but, by a provision of the Virginia cession of Northwest . Territory, Indiana ex¬ tends only to low-water mark on the north bank of the Ohio. In consequence all islands in the Ohio belong to Kentucky, the Supreme Court having recently held this as Green River Is¬ land (Indiana v. Kentucky. 136 U. S.) which, although an island at the time of the cession, became connected with Indiana shore by allu¬ vial deposits, and had been governed and taxed as part of Indiana for many years.

Topography. — The surface of the State is comparatively level, the highest point, in Ran¬ dolph County, in the centre of the eastern tier

of counties, being estimated at 1,285 feet above sea-level, and the lowest, at the southwest cor¬ ner of the State, being 313 feet above sea-level. The Ohio at the southeast corner of the State is 436 feet above sea-level, and Lake Michigan at the northwest corner is 585 feet above sea- level. From the table-land of the east central part of the State, and western Ohio, radiate low water-sheds separating the drainage basins of Indiana. The northern part of the State is quite flat, the central part slightly rolling, and the southern part rather hilly on account of the valleys cut out by water. There are no moun¬ tains, and no large lakes, but there are hun¬ dreds of small lakes, chiefly in the northern part of the State.

River Systems.— The southern parts of the State are drained to the Ohio River by the Whitewater and smaller tributaries. The cen¬ tral part of the State — about four-fifths of its area — is drained by the Wabash and its tribu¬ taries, the most important of which are the White, Tippecanoe, Eel, Salamonie and Missis- sinewa Rivers, and Wild Cat Creek. The north¬ eastern corner of the State is drained by the Saint Joseph's and Saint Mary's Rivers ; these unite at Ft. Wayne to form the Maumee, which flows into Lake Erie. The extreme northern part of the State is drained by another Saint Joseph's, the Calumet and smaller streams, into Lake Michigan. A part of the northwestern VOL 15 — 3

section is drained by the Kankakee and its tribu¬ taries to the Illinois River. The Wabash is navigated to a limited extent, by small boats, as high as Terre Haute, and also the lower part of White River. The remaining streams are not navigated.

Climate. — The climate of Indiana is mild, ranging from an average of 31° F.. in the winter months to an average of 76° in sum¬ mer. The mean temperature is 53°. The aver¬ age annual rainfall is 43 inches, that in the southern part of the State being slightly in ex¬ cess of that in the northern part. Serious droughts and destructive storms are rare. In earlier years parts of the State were malarial, but with the clearing of the forests and the drainage of lands this condition has almost wholly disappeared.

Geology. — The earliest geological forma¬ tion that outcrops in Indiana is the Hudson and Trenton limestone, of the Silurian Age, which appears in the southeastern corner of the State, throughout the Whitewater Valley and the ad¬ jacent region. West of this is a belt of Niagara limestone, which broadens at the north and ex¬ tends entirely across the State, covering all of a dozen counties and large parts of as many more. On the west of this, and also extending to the State line

on the north, are belts of Hamil¬ ton limestone and sandstone of the Devonian Age. The remainder of the State — the south¬ western corner and a broad belt to the north reaching beyond the Wabash — is of the sub- carboniferous and carboniferous formations. The northern and central parts of the State are covered by glacial drift, which in some regions is of a depth of 400 feet.

Soils, Agriculture and Forests. — The soil of the State varies in character, but for the most part is fertile. Originally the southern part of the State, and as far north as the Wa¬ bash, was covered with a very heavy growth of forest, mostly of hardwood trees. North of this were low prairies interspersed with sand ridges and dotted with hundreds of small lakes. This region is now found very productive of cucumbers, melons and small fruits in the sandy parts. The richest lands are the alluvial valleys of the streams and the drained prairies. The forests have so far disappeared that the State is now encouraging tree planting. Agriculture is the chief industry of the State, although statistical returns show the products of manu¬ factures greater than those of agriculture. This is partly due to the fact that the profits of manu¬ factures are greater, partly to the fact that new material which is largely agricultural product enters into the value of manufactured products, and partly to the fact that statistics of agricul¬ tural products do not include the large amount that goes into the (

Minerals and Mining Industries— About one-fifth of the surface of Indiana is underlaid by coal, workable veins having been found in 19 counties. There are at least 7 distinct veins of workable thickness, varying from 3 to 11 feet. The coals of the State are of two classes — caking or bituminous, and non-caking or block coal. The latter can be burned in blast fur¬ naces without coking. The production in 1914 was 15,696,921 tons, valued at over $16,000,000, the State ranking sixth in the Union as to quan¬ tity and seventh as to value of the product. The number of people employed in coal mining was 20,702. Another important mineral product is petroleum, the production of which is a com¬ paratively a new industry. In 1908 the oil prod¬ uct of the State was 3,283,629 barrels, valued at $3,203,883. It largely increased — over one- third — after 1902, but has since fallen off, the production in 1914 being about 1,500,000 barrels, valued at $1 per barrel. Next in value to coal of the mineral products of the State is building- stone, of which the chief varieties are the oolitic limestone, the blue Devonian limestone, the gray Niagara limestone, and

sandstone. The oolitic so-called because composed of minute fossil shells resembling a mass of fish eggs, has be¬ come celebrated throughout the United States on account of its superior qualities. In 1901 In¬ diana was first in rank in the Union in the pro¬ duction of limestone for building purposes, and fifth in rank as to building-stone of all kinds, the product being valued at $3,028,145. The production of building stone in 1914 was $3,500,- 000; and there was a further quarry product of about $2,000,000, used for cement, lime, road¬ making, etc. There is also a large production of cement and lime. Good clay is abundant throughout the State, and brick and tile making are extensive industries. Kaolin and glass sand are also found in quantity in several counties, and are profitably mined. Natural gas has been found, by sinking wells, throughout a large part of the State. The supply at one time reached a daily flow of 900,000,000 cubic feet. It served to draw many manufactories to the State, but the pressure is now decreasing. In many places its cessation has been followed by a flow of petroleum. Many other minerals have been found in Indiana, but not in quantities of com¬ mercial importance.

Manufactories — The manufactures of In¬ diana are chiefly a development of the past 40 years. In the earlier period manufacturing was confined almost wholly to supplies for domestic consumption, and was chiefly conducted at the homes of the people. In 1914 there were re¬ ported 8,022 manufacturing establishments in the State, employing 197,503 wage-earners, and producing goods of the value of $730,795,000. The nine leading industries, ranked according to value of products in 1914, were: (1) iron and steel works, product $58,883,000; (2)

slaughtering and packing, product $51,066,000; (3) foundries and. machine shops, product $48,- 881,000; (4) distilling and brewing, product $43,420,000, of which about three-fourths is credited to distilled liquors; (5) railway car construction and repair, product $42,156,000;

(6) flour and grist mills, product $37,488,000 ;

(7) automobiles, product $29,390,000; (8) car¬ riages and wagons, product $21,569,000; (9) lumber and timber, product $21,034,000.

The value of flour and grist mill products and lumber and timber products have remained nearly stationary for the last decade, but slaugh¬ tering and packing have increased. The no¬ table increases, however, have been in iron and steel work, machinery, and various forms of vehicles. The central position of Indiana gives facilities for

distribution which will presumably cause a continued advance in manufacturing industries.

Commerce and Navigation. — About one- tenth of the people of Indiana (in occupations) are engaged in commerce and transportation. The navigation of the State is limited, being confined to the Ohio River on the south, with the lower Wabash and a small part of the White River, and Lake Michigan on the northwest. The canals of the State are practically aban¬ doned except for water-power. The railroads furnish the chief means of transportation. Com¬ merce is chiefly domestic, but both exportation and importation are steadily increasing.

Fisheries. — Indiana has no fisheries of com¬ mercial importance, though it has waters that might be made valuable. Recently laws have been passed for the protection ,of fish, and some interest is being shown in their propagation.

Railroads and Street Railways.— The rail¬ road mileage of Indiana, in 1914, was 7,232 miles, exclusive of second main and side tracks. In 1850 it was 228 miles; in 1880, 4,320. Rail¬ road lines extend through all but three counties in the State. The chief railroad centre is In¬ dianapolis, from whidh 14 lines radiate. These are connected outside of the city by a belt railway. The valuation of railroad property for taxation in 1914 was $208,941,570. There are street railways in all of the cities and larger towns, the total aggregating 195 miles. In 1899 there began an extraordinary development of electric interurban lines. By the close of 1902 about 400 miles of these were in operation, and 500 miles were under construction, while new lines aggregating over 1,000 miles were pro¬ jected. The interurban mileage in 1914 was 2,085 miles, and the total valuation $26,965 ,732, which is about one-seventh of true value. These lines have made a material change in the trans¬ portation of both passengers and freight, and will apparently furnish large competition with the steam railroads. One of these lines operat¬ ing between Indianapolis and Columbus, Ohio, has added sleeping-cars to its equipment.

State Finances. — The assessed valuation of the State in 1914 was $1,96/, 434, 189, of which $1,291 ,549,845 was for realty property and the remainder for personal and corporations. In¬ dividuals are permitted to deduct bona fide mortgage indebtedness from their schedules to the amount of $700. The total number of polls is about 450,000. The State tax levy for general State government was seven cents on $100, and 50 cents poll ; for the benevolent institutions 10 cents ; for sinking fund 1.5 cents; for State tuition — which is

distributed to the school dis¬ tricts for support of the common schools — 13.6 cents and 50 cents poll ; for State institu¬ tions of higher education seven cents ; voca¬ tional education one cent, making a total State levy of 40.1 cents and $1 poll. The reduction of the State debt was begun in 1889, when it amounted to over $10,000,000. On 31 Oct 1902 it had been reduced to $2,887,615.12, on which

INDIANA.

Estimated population, 2,816,817 COUNTIES

Pop.

21.840 Adams . H 3

93,386 Allen . G 2

24,813 Bartholomew . F6

12,688 Benton . C3

15,820 Blackford . G4

24.673 Boone . E4

7,975 Brown . E 6

17.970 Carroll . D 3

36,368 Cass . E 3

30,260 Clark . F8

32,535 Clay . C 6

26.674 Clinton . E4

12,057 Crawford . D8

27,747 Daviess . C 7

21,396 Dearborn . H6

18,793 Decatur . F 6

25,054 Dekalb . G2

51.414 Delaware . G4

19,843 Dubois . D8

49,008 Elkhart . FI

14.415 Fayette . G6

30,293 Floyd . F8

20,439 Fountain . C 4

15,335 Franklin . G 6

16,879 Fulton . E 2

30,137 Gibson . B 8

51,426 Grant . F4

36,873 Greene . D6

27,026 Hamilton . E4

19,030 Hancock . F5

20,232 Harrison . E8

20.840 Hendricks . D5

29,758 Henry . G 5

33,177 Howard . E4

28,982 Huntington . F3

24,727 Jackson . E 7

13,044 Jasper . C 3

24,961 Jay . G 4

20,483 Jefferson . G7

14,203 Jennings . F7

20,394 Johnson . E 6

39,183 Knox . C 7

27,936 Kosciusko . F2

15,148 Lagrange . G1

82,864 Lake . * . C 2

45,797 Laporte . D 2

Incorporated Cities,

Pop.

416 Advance . D 4

161 Aetna . C 1

209 Alamo . C 5

1,289 Albany . G 4

1.213 Albion . G 2

5,096 Alexandria . F4

161 Alton . E 8

349 Altona . G 2

359 Ambia . B 3

521 Amboy . F 3

23,996 Anderson . F 4

957 Andrews . F 3

2,610 Angola . HI

990 Arcadia . E 4

1,088 Argos . E 2

639 Ashley . G 1

876 Atlanta . E 4

3,335 Attica . C 4

3,919 Auburn . H 2

4,410 Aurora . H 6

579 Avilla . G 2

449 Bainbridge . D 5

2,151 Batesville . G6

443 Battle Ground …. D 4

10,349 Bedford . E7

568 Beech Grove . E 5

1,316 Berne . H 3

2,794 Bicknell . C 7

439 Birdseye . D 8

2,069 Bloomfield . D6

528 Bloomingdale . C 5

11,383 Bloomington . E 6

4,987 Bluffton . G3

3,934 Boonville . C8

122 Boston . H 5

814 Boswell . C 3

1,163 Bourbon . E 2

336 Bowling Green,

Clay . C 6

10,315 Brazil . C 5

2,008 Bremen . E 2

535 Bristol . FI

770 Broadripple . E 5

300 Bronson, Randolph

H 4

1,067 Brook . C 3

572 Brooklyn . E 5

150 Brooksburg . G7

907 Brookston . D3

2,169 Brookville . G6

876 Brownsburg . E 5

1,492 Brownstown . E 7

469 Bryant, Jay . G4

j 668 Bunker Hill . E3

489 Burnettsville . D3

1,818 Butler . H2

209 Cadiz . F 5

2,237 Cambridge City .. . G 5 557 Camden . E 3

Pop.

30.625 Lawrence . D7

65,224 Madison . F4

263,661 Marion . E 5

24,175 Marshall . E 2*

12.950 Martin . D 7

29,350 Miami . E 3

23,426 Monroe . D6

29,296 Montgomery . D4

21,182 Morgan . E 6

10,504 Newton . C 3

24,009 Noble . G2

4,329 Ohio . H 7

17,192 Orange . D 7

14,053 Owen . D 6

22,214 Parke . C5

18,078 Perry . D 8

19 684 Pike . C 8

20 540 Porter . C 2

21 670 Posey . B 8

13 312 Pulaski . D 2

20.520 Putnam . D 5

29 013 Randolph . G4

19,452 Ripley . G 6 •

19,349 Rush . G 5

84,312 St. Joseph . El

8,323 Scott . . F 7

26,802 Shelby . F6

20,676 Spencer . D 8

10,567 Starke . D 2

14,274 Steuben . G 1

32,439 Sullivan . C6

9,914 Switzerland . G 7

40,063 Tippecanoe . D4

17,459 Tipton . E 4

6,260 Union . H 5

77,438 Vanderburg . B 8

18,865 Vermilion . C 5

87,930 Vigo . C 6

26,926 Wabash . F3

10,899 Warren . C4

21,911 Warrick . C8

17,445 Washington . E7

43,757 Wayne . G 5

22,418 Wells . G 3

17,602 White . . . . .D 3

16,892 Whitley . F2

Towns, and Villages

Pop.

666 Campbellsburg …. E 7 [ji.[300 Cannelburg,

Daviess . C 7

2,130 Cannelton . D9

jif493 Carbon . C 5

t.ˆ850 Carlisle . C 7

626 Carmel . E 4

1873 Carthage . F 5

1194 Castleton . F 5

[911 Cayuga . * . B 5

185 Cedar Grove . H 6

1414 Center Point . D6

1,019 Centerville . G 5

513 Chalmers . D 3

[864 Charlestown . F8

[285 Chesterfield . F 4

f 1,400 Chesterton . D 1

[524 Chrisney . D 8

870 Churubusco . G 2

990 Cicero . E4

463 Clarks Hill . D4

2,743 Clarksville, Clark. .F 8

1,213 Clay City . C6

408 Claypool . F 2

jgj, 380 Claysburg, Clark. .F 8

” 497 Clayton . E 5

205 Clermont . E 5

210 Clifford . F 6

6,229 Clinton . C5

624 Cloverdale . D5

472 Coatesville . D 5

801 Colfax . D 4

103 College Park, Hunt¬ ington . G 3

33,448 Columbia City . F 2

9,241 Columbus . E6

7,738 Connersville . G 5

1,164 Converse . F 3

318 Corunna . . . . G 2

1,703 Corydon . E 8

2,069 Covington . C4

[133 Crandall, Harrison. E 8

’1,1 64 Crawfordsville …. D 4

520 Cromwell . F 2

1,038 Crothersville . F7

2 526 Crown Point . C 2

810 Culver . E 2

610 Cynthiana . B 8

583 Dale . D 8

£81748 Dana . C 5

“ 1 ,640 Danville . D 5

[780 Darlington . D 4

4,471 Decatur . H3

1 2,161 Delphi . D3

f 1,070 Diamond, Parke . .C 5

ft 425 Dillsboro . G6

,(>704 Dpblin . G 5

f 1,226 Dugger . C 6

p 3,031 Dunkirk . G4

Pop.

181 Dunreith . F 5

545 Dyer, Lake . C 2

609 Earl Park . C 3

28,743 East Chicago . Cl

706 East Connersville,

Fayette . G 5

484 East Gary . C 1

302 East Germantown,

Wayne . G 5

1,428 Eaton . G 4

2,040 Edinburg . E 6

438 Elberfeld . E 8

238 Elizabeth . F8

350 Elizabethtown…. F 6

21,858 Elkhart . FI

676 Ellettsville . D6

961 Elnora . C7

11,028 Elwood . F 4

583 English . D8

431 Etna Green . E 2

76,078 Evansville . . B 9

2,506 Fairmount . F4

630 Fairview Park,

Vermilion . C 5

1,115 Farmersburg . C 6

907 Farmland . G 4

827 Ferdinand . D 8

188 Fishers Station,

Hamilton . E 4

1,386 Flora, Carroll . D 3

111 Forest Hill . F 6

1,182 Fort Branch . B 8

1,174 Fortville . F5

76,183 Fort Wayne . G2

448 Fountain City. . . . H 5

1,491 Fowler . C 3

293 Fowlerton . F 4

729 Frances ville . D 2

407 Francisco . B 8

9,596 Frankfort . E 4

4,502 Franklin . E 6

936 Frankton . F 4

271 Fredericksburg. ...E 8

694 Fremont . HI

1,803 French Lick . D7

296 Fulton . E 3

658 Galveston . E 3

4,149 Garrett . G2

16,802 Gary . Cl

3,224 Gas City . F3

638 Gaston . G 4

1,140 Geneva. . . H 3

383 Gentryville, Spencer

D 8

331 Georgetown . E8

266 Glenwood . G 5

1,105 Goodland . C 3

8,955 Goshen . FI

776 Gosport, Owen …. D 6

735 Grandview . C 9

3,790 Greencastle . D 5

697 Greendale, Dear¬ born . H 6

4,448 Greenfield . F5

250 Greensboro, Henry G 5

5,420 Greensburg . G6

1,166 Greentown . E 4

227 Greenville, Floyd. .F 8

1,608 Greenwood . E 5

275 Griffin . B 8

523 Griffith . C 2

936 Hagerstown . G5

579 Hamlet . D 2

26,171 Hammond . B 1

356 Hanover . F7

254 Hardinsburg . E8

6,187 Hartford City . G4

358 Hartsville . F6

648 Hazleton . C 8

821 Hebron . . C 2

304 Highland . C 1

528 Hillsboro . C4

1,753 Hobart . Cl

1,223 Hope . F 6

390 Hudson . G 1

2,464 Huntingburg . D8

10,880 Huntington . F3

197 Huron . ; . . . . D

1,515 Hymera . C

271,708lndianapolis . F

322 Ingalls . F

690 Jamestown . D

3,295 Jasonville . D

2,196 Jasper . D 8

10,412 Jeffersonville . F8

1,573 Jonesboro. . F 3

213 Jonesville . F 6

141 Judson, Parke . C 5

600 Kempton . E 4

4,981 Kendallville . G 2

449 Kennard . F 5

1,209 Kentland . C3

728 Kewanna . E 2

242 Keystone, Wells. .. G 3

535 Kingman . C 5

699 Kirklin . E

2,008 Knightstown . G

1,081 Knightsville . D

1,644 Knox . D

20,930 Kokomo . E3

683 La Fontaine . F 3

82 Laconia, Harrison. E 8

1,148 Ladoga . D 5

21,286 Lafayette . C4

ff 1 , 7 7 2 Lagrange . G 1

ˆ463 Lagro . F 3

Pop.

227

290

1,045

13,202

503

3,930

690

5,474

401

446

1,338

2.173

556 5,906

195

197

224

21,046

2,154

1,235

917

297

993

320

6,934

686

19,834

820

334

4,529

688

279

710

372

728

521

21,512

395

600

1.174

557 814 169 638 428 211

586

601

16,385

3,438

261

1,184

334

630

910

260

1,537

511

2,168

2,786

94

455

424

1,608

667

927

622

167

231 142 148 5,563 25,424 543 2,260 354 23; 629 134 455 1,097 612 13,241 105

1,229

1,038

334

145

450

246

341

732

‘350

464

296

5,073

1,122

1,143

681

2,428

569

2,915

2,370

608

1,064

956

1,079

420

1,367

1,169

661

Lakeville . E 1

Lanesville . F 8

Lapel . F 4

Laporte . D 1

Laurel . G 6

Lawrenceburg …. H6

Leavenworth . E 8

Lebanon . D 4

Leesburg . F 2

Lewisville . G 5

Liberty . H 5

Ligonier . F 2

Linden . D 4

Linton . C 6

Little York . E 7

Livonia . E 7

Lizton . D 5

Logansport . D 3

Loogootee . D 7

Lowell . C 2

Lynn . H 4

Lynnville . C 8

Lyons . C 7

Macy . E 3

Madison . G 7

Marengo . E 8

Marion . F 3

Markle . G 3

Marshall . C 5

Martinsville . D 6

Matthews . G 4

Mauckport . E 8

Medaryville . D 2

Mellott . C 4

Mentone . F 2

Merom . B 6

Michigan City . D 1

Michigantown . E 4

Middlebury . FI

Middletown . G 4

Milan . G 6

Milford . F 2

Milford, Decatur. .F 6

Miller . C 1

Millersburg . FI

Millhousen, Decatur

F 6

Milltown . E 8

Milton . G 5

Mishawaka . E 1

Mitchell . D 7

Modoc . G 4

Monon . D 3

Monroe . H 3

Monroe City . C 7

Monroeville . H 3

Monterey . D2

Montezuma . C 5

Montgomery . D 7

Monticello . D 3

Montpelier . G 3

Moorefteld . G 7

Mooreland . G 5

Moores Hill . G 6

Mooresville . . . E 5

Morgantown . E 6

Morocco . C 3

Morristown . F 5

Mount Auburn,

Wayne . H 5

Mount Ayr . C 2

Mount Carmel . . . . H 6

Mt. Etna . F 3

Mt. Vernon . B 9

Muncie . G 4

Munster, Lake. . . C 2

Nappanee . E 2

Nashville . E 6

New Albany . F 8

New Amsterdam .. E 8

Newberry . C 7

Newburg . C 9

New Carlisle . El

New Castle . G 5

New Chicago, Lake

C 2

New Harmony. . . . B 8

New Haven . G 2

New Market . D 5

New Middletown ,.E8 New Palestine .... F 5 New Pekin, Wash¬ ington . E 7

Newpoint . G 6

Newport . C 5

New Providence,

Clark . F 8

New Richmond . . .D 4

New Ross . D 5

Noblesville . F 4

Normal City. Dela¬ ware . G 4

North Judson . . . .D 2 North Liberty . . . . E 1 North Manchester.. F 2

North Salem . D 5

North Vernon .... F 7

Oakland City . C 8

Oaktown . C 7

Odon . D 7

Oldenburg . G 6

Oolitic. Lawrence. E 7 Orestes, Madison . . F 4

Orleans . D 7

Osgood . G 6

Ossian . G 3

•

‘

A

.

\

!

-

Wheato

Sturgis \ t’a*H

New Buffalo

Granger,

arwick

-aky York !

nrfiaˆVj

0£U1|

B E N .|

er l

Lindley]

[XT/ ./>

Iklinrt V

WlHUunsypiji y(- Lake’

ˆGoshfii

IA-R T.o

Norman town

Pralr“‘ L-‘ * **WxL,port** st*- ;//? ■yLftporte aUxS >r-cT7 ;WJ oˆOim Cr

V Heights

| Metz ! Montpeli

N G E

Mt. Pisgah 0 Stroh0

V*Woo8ˆ

M/jler 1 1

jjO S E P H

/Nutwood

, Salem C

Dunllpsˆˆˆ

ELKH

Waterford Mill!

Jx’McCooia. Wheeler p .

Joliet

WAB,

idiunut

Center

Dillon

X — B Albion 0\ Alb,®

I-

| Wolflttke0V&ir0Z/ia*«Av,llaYjV/>

[oWUmot GreCn Center LaottAlˆCed ’ Merriam o /

‘Palrfltld

Butler,

HaskelTT

Waterloo

►a raise?

‘•Beatrice

Tjne’ˆx

onoldaonp 7”*

111 arris

8. i ,

Wawnscei*.

North

ˆWebster®

-rjlurlbi

Hebron*

(Cedar Lakeˆ1 \Lowelf

Leesburg

,re ˆ-sWebS

c|ii j s”k

Warsaw

Peotone

AyliaworthˆF uˆ|

In w i l l ie I =ˆ_o\«nr\oa’

OA®» \

Oruiaa Lorane o

- *k0 Collins

’/ Pieroeton°ˆˆJˆLarwlll ˆ

L\>ˆ ColTriiiI,lˆToTyˆGˆˆ_ˆ-C W.-H | T L E Y.

V Roe. Uill’/XfX’l1 H’hllhdt’oTt

Ml»» UuUo ... ˆtfNorth [Manchester _ Al

ake VToto «

r AˆfTK E

cNorth J udaon

”?dtODOt<

/o Otf»

jrGiojd

Corners

AcademJ

Churubusco

I unter town jlielle

Manteno

y m “Of*

jWTburman’Nj.

fWalnpt

J/ San Pi

ˆZadoo 11,

Tiosa?” JˆvastojiJoˆ

fvirgWˆBVhˆ SS>jS Gifford IXFalr Oake <■

|V0a*

Parr V

Conjrad ‘ village

layrdiff Jo.

MederjTiUe °.\Blpb7!

o P U L A M I. , F ranees- W i namacyx fry tile 0

crlake

Rochester

ilua ViUnians]

XakeA

BructM

Kents

UavilandFT’

Buckingham

Baldwin

Ambler

Showley

Mono!

Molnroevillo

Nine

iBolW*1

tin GohleBTille/

£ Roanoke/^- 1 Sheldon

iHoagland 4

W

\Williame

lv pulaaki

j Lake ton*

$t/ t/J/1 LX , . E Hi

■pc Spoichera/o . .

| Boann fK, /iniii I Wabash

: 5/ab\a s h

Linoolnville o , • TreatfA

vL-, Pioneer \Banqi

Morocco

(JUeado

fjtar CltyA ThornhopeN

**l Fulton' 'Gras&creek.t^

U\

Jrooir

Marklo

jJlSHT MoCojsburg

Lucerne

ImooohJ Y „od, »

C\ 5oSllk“^

li”bu

Pet rsqnvi*

nh <

I Monroe 5j?

6l A M S

Liar lansburg

Rockcreek

I HUNTINGTON

• a o Riyer •

SU Etna oPlumt

Pleasant Plain nntalne° Warren ^-7

Loganspor^t

Lock port

!etal’o liu/ow rvv(5S

|S\/ c I

/vfUelphi I0- Doer Creek]

CS/iM R RIO L L ; 0 America ?UUM]

■a/T/ -y Deer Creek Carroll 01 ’0DuckreIl \ 7

/.►loifej’L KoI‘o,“oX

i’T VtfVWW’U? K#,’»J-._C«Sk/a »tbj ^ — ,V’j Hi S/w

Anoka

Remington

Smithson’

,ub ‘sTsheff y-T”

I 7%-k i

[Gravel HlllXc rn?

1 >-‘/ FowlerVo , ,B E NN

p»r]l r’] Q0 Atkinf

1 W adena

Berne

Ponotoi

JioiPj,

, Lochiel k Barca- — ˆ

It o. n

Chalmers

igrora

tjureo —a – v ~ t i’

«n° MoNattS Ruth J

£*% Oft

0 Roll/Mont jielier Twall0 ‘

o Slocnta lM\HU Corner

Silas /Mollies 3 \ Vt ®

1 Mil ford

V N. OrirXˆ &ooWiwpec

Geneva

lianfield >e’on p

k*c\w®

Brookston

(New Cory don 1 a Bryant 0 I I Dick I (Ample® J

Portland |

Coldwater

- Plevm T. ST. It

ICissna Jo. •

/Clssna

cet|°a Octagon Aiaeric Battleground i

i6T°

-SA Suiaaiitk|5<\f

11

JˆPP EC AvtN

0 Wcatpoint /o ‘TVea ta oFartnersI Conroe’ ˆ1 institute Y Clark Romney Ssr 0»i wn T..vV* svvˆ a

ˆJonesboro1

AG R

PtXlsabel

*eae»|r

4 TRennerBUflyCKFO Hartford’ CityTsfri* V o Trask

HFowlertin Millgrove’

Handy

I :u — 1 1

_ oKor0> ‘NeW

te Rpsavilleˆ®1‘11 ‘ aY j ® G oetlngavU\o ˆ {& CaTnbrˆa\ Moran 0

Beard

ESfeMulbeixy i KEmore .

/‘kManson \jf Cyclone^v f – KlrUli-

rick y*— \ – mTr

/j VThorntown xex

^^“ijarlmgton y^Bowera V ^ pike < > ^

Mancbcitcr Xllazelrigg 5 o

\ Avt^^Sbannondale BAQ4 ON cwTrnWou °\ Lebanoip^^S; 0NTS£R?jy Orth c

Boope*

:uaslavillo\OaX^° 1 Wiles \ A

Fairmoui

Minster

jalamoula0

It. Pleasant

Roseville Jc.

‘Foreaf’v

Leisure

rindfaii^v.

T| O • N >

Jordan1

o Granville I

AUmojX

Powers’

Fair view.

J New Pit J1

jXDeerfield 11 •

» Union Cityˆ iJ f I HarrlsvUlcˆ I

\p (L P H \ >r\A ˆartonia0j

Spartanburg 0 I

r’ˆCn Crete\o Inisoiˆb oAxba!

‘TAˆRol

vfAttlca

iHinsport

I JN”

u”lr‘jcyˆ>—

‘J ˆˆ//•Marshfieliˆ .Arstate LineˆX . yVireeserˆˆˆ/ˆ — Poster y.°’

A. 4 Gilmsmˆ> r -i\Frahkton

M A DjfSO N

C.W.& M* JC roe a. or •an HandleMˆYorl

cioˆ i.Vndeiˆo|i

cal1ys£«ff7?=§Si

,Ue Pendlelon sulphur

-x ˆ 1 * ®c * p * * •

O Phillips 0h. Medford r \o |

IlJaal o OatHJ Xl

ˆ Tilt. Sum in it .‘T

ialtopjo

Ptakaripj— !

l“! Arcadia iote Sheridan j

«d ° I cl“ro ,

Wiuˆh rta M I L\T 6 N c”

Aroma

Greenvillo

(F O U

jfrrjBville / f Cates / ‘ickason/

Yeddo

Westvllle

Falrmount

Jc.

[Bethel0 1 ij White-] \ watero j Q8ˆ*Cots|

‘sT’MilU

(Econou

ˆdvancO-

Caruiel,

MttklniM lngalla |9 A

■Cadiz Faync^” J07

nˆMo“’«sirw L1,b lorT^’«Av2ˆ

Ross Shepherd1

x >Jattevi]|le° p ˆWhitellnk-a Royalton\zjonavllle _

Forty 111

3 1 let on /

Russell] Mills

alnut Grove b

ˆNYew/iort Lu! • N !„* Marshall.

1 ho mlu p Onlo

J liiz t on’o — op*

L – — CV/. | » Pj I Minn 4

gaveland’ _CT . ‘ jL.fOˆc. p\tt3bor° ˆ~

Xˆo’”ˆS*ˆap1cwoˆSˆc,| Flncastle / / NewfMnyBvllle

[xJaJloxtonS’nllnbrldˆH ENDRIC1

rp-ssrJ !n;dl>ˆˆv

PUT NLA ˆ

IriTall. ClovSJTr

If.iiaXˆA 7 w. Fillmore’s StileBvlleˆ ti

/Limedale L-J> Center

ft/ \Broadpark J Hazelwood0 P 1 /«;/Uamrict Bffie TSW

| /La 0 Manhattan ° Vr>>nitlepolii<

■Wl.viU.0V“ˆ«r% %*°Uppl« t “8& >‘aOUy..onrf

‘GraensForTˆSˆ1 Bast Haven’

£PiCambridge Citrˆ>

ˆ•ˆAˆNew Paris

itorville

\V\t> v I N

ftVcl| Abington t Doaton

a / Greenfield V/ ,

AJˆOLIS « Westland/ Mays’ Jˆ-Ofew Palestine ltˆCarthage imakc?
>ˆCarao1lUlˆNK0wˆ0 1 /’ LurvlonIaˆxPvˆ%iiv“’>aR\, Moral oUordl C

London ˆ /Arlingtonˆ-

K; /»«» .1

Alezan’

‘erndalej Uncaa /

ktllcy Mills\Pc«cll*Tv.ve

ZU«\™\lT-

f f SluthporA, J>1 *“ jwoodl Actonˆoˆ

lie j? TGre’enw|od|K, f vStonea Crossing 1 1 •k BargersA fr’, ˆ0-lviUeAwhltednd,

J 0[H N S\0 Nkf ‘

Franklin Xj enˆ[‘ V,jBnnab/§S- J* /ft., .X a’\ Ami j/L-‘TAmlty / j Nineveh < A Ma

Philomath iUe oClifton XˆKitchel1

LUi ■

U N I O’N

Cottage GroveA s |BiHing6°vllle i“M MixersvUlei

4. WtMenwoouvrj » pˆy,

ˆ4Kˆllej°0nu*g° ‘

/New Salem •

f 0 ‘

| Andcraonvil|T Richland

[Carlisle’

Fran klip

Kansas

birnett 81

Middle!

Laurel Fairfield (Aˆeonard-] .

[stipe HllVyT Jlrookviile j 0 MotompW > ~~®

F R A’tJk

. 0 H-mlmr* 0«k ioi

lor1!ei,sburgoldMl”‘je 8,.

1 Enochshurg ets0 \ New Point‘0— — t — – — j- – –

< T (tJ R Batesvilleˆˆ NAahtonl on

_ myrn > o. > ˆ

ri. ˆ-ˆoNapol \ o Lockspring \

Charleston

Moscow

JFenna > > r M aid run” Sulphurhill

‘Jordan \lllage \

Goaport

Marshall Jc.

Jt. Paul V, A dam s

Marshall

tCedar

ˆAtkinsonvlllo

Winterroud

Williams Croeaing c‘

JFrultdale Edinburg)

Patrickshurg . Spencer >

is °Godsey

IClifford/ Hope

Rameltrm ■ Cletjna

A StlneaV’c villc \

X- EUatfiVnifl

iter Branch

Greenup

/ˆilartsvilU Newbern 0 1

sOMEW 0®T

: C Coal City ,Ueb .Coalmont AJasonvirleˆ.

Alsace

/“Needmore Noshvl vyUmimville Mu Liwtj

imington g r q W N

)oe® y o Belmont 0 Kelp

Cooper °

i ‘/L:

2a* | ■> Lockmao

|-~lt I U.U8U.O .

Freedom!

Jubbeiy

BARTi

(l.awreneebn

[sioole. Hill

labethto’

Ogilvllle

lot, i es Hill

iEARBOR

\ Aurora /

‘d/\Vˆorthington (C . Newark ˆ

r\He?e £ˆpr Nebraoka Butler-

Cˆ|jQueensvilleT\/. / a villeˆ

■ —j i North Vernoi

‘Cincinmvt

Co»ingtVi

Burlington \

0 (

Wayntesville’

Joneavllle

Coldspring,

Dillfiborˆ

New Marion

ˆiburg lobbievllle

1 Paxton

TituivUl

)ˆ/ o Be treat”

Laughery

Using 9unˆ

H i o if

iPleasantvllle

Robison’

oSt. Magdalenˆ aTj Cross Plainˆj

|leehunter i Marco /

. Mooney ° Cose Mill ■•p Ewing

Brownsto ujv

ˆ?r > o

Marble o Corner

t Hicks o 1

lpath o Canaan 0Bellevlew [J*. WrltX*? China o i

‘ J E F F E\R S O NMoor1

o Creswell0 W Zion B ˆ

Madlsongˆdkcˆ V •

i Hanover o !

0 Bwanvulle \ ˆ

- \ Lexington 0Yˆvi \

* <)S o| Salada

Iieltonvilje

Bigger

:ui land 3 Owenaburg l*4™ Mctii — 4pdon

Gardner oFalrvli 0 Pleasant °i

SWITZEFj

K1 Markland ksburg Tevarx! | Craig

ew Patriot L Enterprise c

LAND

Florence

iktown/

Free land Yille*‘r^’°‘T

Paris Crossing Cana^^V. GntlS i 7 ^ UeputV

Fayetteville Q ^xniodford

^^eQn{sJ^ A^WjR > \E. N C

crV\B»u!

-t n Rlvor Vaj^ph^f

m MltchellVPJtxJv nitV Sprlngeo^/TL • \

- KT ;“GeorS’a \ o/) H uron

, I™” 0 Bonds fBocock

‘H1?* uri«“‘h5ir l° – 0R»“‘4ey/ Co^

icbj LiakXv-x/ Puoli Br» !,T /ORANGE

■^^Hlllhom – t •

• rpT^lFort Ritnei* Crp

y | JJduaeatatuck .

\ (“jrMiUportT 0

“VT 1 > 0l“’-ru,t <

;! Kossuth

“ckTl Kushcreek Valley Littl ;

r-4 > W ASHINGTf

,beH6 > “tt cT~ – /all~1^ _ New

borne, L01“JStm”li^b^o,,,

o I Hooker I.

- 0 Blue ttivei

Livonia 1

o Rosebud , \x’

Haloo.ˆ-

f—Burns Cy.ˆ J Bramble ˆ

Ragleav llec

ˆMontgomery TSbuals

rn„„ Mo i » oCornmg ˆ Wisdom Aliordavllle / °Fi

l E*st > °k

ˆ “‘TKˆReeveˆO]

P urtera v il le-ˆ33Duboi?\

V*1 Ellawortl laaper Elm

.jVerneˆo- –

Monroe City Thomas yjv\l8 !

ona ar > ?

KlVcy Q’tj

liarreU 0 Bedford

ft TRIMBLE \

St. Franolsville’

li rysville ,,ilenry v

Henzej

Decker,

IvaL

v/Tutersburg

/ C

| K E Ireland h ire ins 1 o w J ’

J Hartwell ry-

Igel Arthu*J ‘^x^Duff oCoe ^anwell oVA 0 Clay bank y o Spurgeon

Hlo° Johnsb

ales villa 0 ° r~— rri

L Herncnwayo 8«»“» II Folsomvilla ° Heilmu

rHaxleton i L o Union ^c-j Clark

’Borden

Youngs — a- ,, — –

o Creek Valeene

Owen 2.

,»/(;i-aoge

Seller%imrg r mfra ^ScottsvilM Brad ord oGalena/ \

t FLO Y/D ,

lie ui?&^ Sanderson °X/

° WSsou.

Albion

Marengo

Princeton

Schnellville ° Anthony Birdseye^

Huntlngburg,°°^,f/«

Milltowi

CRAWFORD

, Grantaburgo

0Weat Fork oXow

l/°]£ulpbur„ Wj.nluLiu

•r»it ; ” Lalvoni.orfbSe’

1 le o /Oriole n |Fredo%/Y

f. Anchorage

. — M t. Vernon Jc.

jˆijFort Branch ttoum, Buekekin/ , .. .iHaubatadt fP ˆthm,aˆoT _C

1ˆ [“kStaser/ˆ y > £]

°OtT

Holla

•any

ineavill

.Louisville

7 Me Inrad f Dale ° Lincoln City

Aldrich J

ˆOliver

P Oi5;E Y Jf’ˆV,Erwln st. p

l C «rianey

SPENCER

;JC;‘ Hot Paradise

.New burg

Jell Cit > © Clvde \ . Vo Deer Ci

\© Ganiic 1 ton

i-Oˆ C ul lock ‘

p o L«Vi Gran uikeetown

fl«w KoekporL

GALLATINˆ

tsburg\ˆ

[Clot lerjwrl BRECJ?E NRIDGE

HANCOCK

\lIt‘iiderHon|

TM-nllioro

2990

r

Eaton I “cel

J _ Grayvllle

INDIANA

SCALE

BULLITT

Statute Miles, 24 = 1 Inch.

10 20 30 4

Rand McNally's Now 11 **x L4 Map of Indiana** Copyright by Rand McNally & Co.

Longitude West from Greenwich.

INDIANA — Continued

Pop.

C 3

652

Otterbein .

1,237

Owensville .

. B 8

1,010

Oxford .

.C 4

252

Palmyra .

. E H

1,278

Paoli .

. E 7

409

Paragon .

. D 6

800

Parker .

.G 4

657

Patoka . . .

. B 8

340

Patriot .

.H 7

1,293

Pendleton. .....

. F 4

800

Pennville .

.G 4

12,410

Peru .

. E 3

2,170

Petersburg .

C 8

817

Pierceton .

. F 2

352

Pine Village .

C 4

408

Pittsboro .

1) 5

1,303

Plainfield .

F, 5

3,838

Plymouth .

F, 2

308

Poneto, Wells ….

.G 3

1,060

Port Fulton, Clark

F 8

524

Porter .

.C 1

5,130

Portland .

. H 4

780

Poseyville .

.B 8

6,448

Princeton .

. B 8

1,714

Redkey .

.G 4

982

Remington .

C 3

2,393

Rensselaer .

C 3

377

Reynolds .

.D 3

24,697

Richmond .

.11 3

440

Ridgeview, Miami

.E 3

1,302

Ridgeville .

G 4

1,513

Rising Sun .

.H 7

1,505

River Park, St. Joseph .

.E 1

863

Riverside, Delaware

G 4

849

Roachdale .

D 5

447

Roann .

.F 3

699

Roanoke .

G 3

3,364

Rochester .

.E 2

2,736

Rockport .

C 9

1,943

Rockville .

.C 5

1,166

Rosedale .

C 5

677

Rossville .

. D 4

909

Royal Center ....

D 3

4,925

Rushville .

G 5

443

Russellville .

D 5

169

Salamonia . .

.H 4

2,283

Salem .

.E 7

162

Saltillo, Washington . .

E 7

445

Sandborn . .

C 7

410

Saratoga .

H 4

1,669

Scottsburg .

.F 7

1,188

Seelyville .

C 5

676

Sellersburg .

.F 8

350

Selma .

G 4

6,305

Seymour .

F 7

2,055

Shelburn .

.C 6

10,965

Shelbyville .

F 5

1,768

Sheridan .

. E 4

1,519

Shirley .

.F 5

375

Shirley City, Allen G 2

1,015

Shoals .

D 7

783

Silver Grove, Floyd

F 8

493

Silver Lake .

.F 2

68,946

South Bend .

.E 1

352

Southport .

. E 5

866

South Peru, Miami

E 3

1,176

South Whitley . . .

.F 2

Pop.

2,150 Spencer . D 6

622 Spiceland . F 5

122 Spring Grove,

Wayne . H 5

391 St. Joe . H 2

261 St. Leon . H 6

538 St. Meinrad . D 8

194 State Line . C 4

746 Staunton, Clay. ...C6

497 Stinesville . D 6

234 Straughn . G 5

4,115 Sullivan . C 6

209 Sulphur Springs. . . F 4

1,387 Summitville . F4

353 Sunman . G6

836 Swayzee . F3

1,379 Syracuse . F 2

3,369 Tell City . D 9

371 Tennyson . C 8

66,083 Terre Haute . C 6

1,508 Thorntown . D4

4,075 Tipton . F4

510 Troy . D 8

3,209 Union City . H4

189 Uniondale . G 3

102 University Heights,

Marion . E 5

1,080 Upland . F 3

6,987 Valparaiso . C2

1,189 Van Buren . G 4

1,75? Veedersburg . C4

133 Vera Cruz . G 3

453 Vernon . F7

486 Versailles . G 6

1,256 Vevay . G 7

17,645 Vincennes . C7

8,730 Wabash . F 3

859 Wakarusa . E 2

1,003 Walkerton . D 2

116 Wallace . 4

579 Walton . E 3

1,189 Warren . . .G 3

4,430 Warsaw . F2

7,854 Washington . C7

1,167 Waterloo . H 2

676 Waveland . D 5

734 Waynetown . D 4

700 Westfield . E 4

746 West Baden . D 7

432 West College Corner,

Union . H 5

281 West Harrison,

Dearborn . H 6

,867 West Lafayette. ,,D4 642 West Lebanon ,...C4

675 Westport . F6

3,083 West Terre Haute. C 6

503 Westville . D 1

357 Wheatfield . C 2

343 Whiteland . E 5

112 Whitewater . H 5

6,587 Whiting . Cl

1,243 Williamsport . C4

1,607 Winamac . D 2

4,266 Winchester . G4

899 Windfall . F4

446 Wingate . D 4

932 Winslow . C8

873 Wolcott . C 3

627 Wolcottville . G 2

1,732 Worthington . D 6

833 Woodruff, Marion E 5

840 Zionsville . E 4

the annual interest charge was $101,565. The bonded debt (1914) was $604,548, all domestic debt to State educational institutions.

Banks. — In 1914 there were 250 national banks with $21,450,000 of capital and $145,000,- 000 deposits ; 365 State banks whose deposits were $78,443,762 ; five savings banks, with $12,- 864,355 of deposits; 141 loan and trust com¬ panies transacting bank business, with $75,387,- 001 of deposits and 199 private banks, which are not required to make returns by the State, having $25,762,876 deposits. The clearing-house organizations in the State are at Indianapolis, Evansville, Fort Wayne, South Bend, Gray and New Albany, and the earnings average about

$600,000,000.

Education. — Indiana has always given much attention to education and especially since the adoption of the present school law in 1852. At that time there was created a public school fund, the interest on which was to be distrib¬ uted to the various school districts. The prin¬ cipal factor in this was the profits which the State had derived from the State Bank of In¬ diana, amounting to about $3,500,000, to which was added $573,000 of the surplus revenue dis¬ tributed by Congress in 1836, and several smaller funds. To this additions have been made by fines and other public receipts, until in 1914 the common school fund amounted to $11,- 677,456.65, in which is included the Congressional township fund, derived from the sale of school lands donated by the national government, amounting to $2,479,467.72. This total fund of $11,677,456.65 is held bv the several counties, and the interest on it is applied to the support of the public schools. Added to this is a State tax of 13.6 cents on each $100, and 50 cents on each poll, the proceeds *of State liquor licenses and dog licenses, and local taxes assessed by local authorities. From all these sources the actual revenues raised for the public schools in 1914 amounted to $17,322,994.03. The enu¬ meration of children of school age — 6 to 21 years — was 766,383 (of whom 16,515 were colored). A large number of these attended private schools and1 the attendance in the public schools for the year was 441,168. The revenue was therefore nearly $40 to each child in at¬ tendance. There were employed 18,449 teachers, and the average number of days, of school was, in townships 142, in towns 163, in cities 179, in the State at large 155. Owing to the concen¬ tration of schools, the number of school houses in the State has decreased more than 1,000 in the past 15 years, though their value has doubled, and the quality of accommodation has increased still more. In 1914 there were 38 concrete school buildings, 87 stone, 4,610 brick, 3,948 frame and 3 log. The value of buildings and apparatus was $49,224,88 2. In these figures are included 803 high schools, which are a part of the public school system. There are also a large number of private schools, notably those maintained by the Roman Catholics and Lutherans for children of all ages., and a num¬ ber of academies, seminaries, institutes, board¬ ing-schools, military institutions, colleges, nor¬ mal schools, etc., for intermediate education.

There are three institutions of higher educa¬ tion that receive aid from the State, Indiana University at Bloomington, the State Normal School at Terre Haute, and Purdue University at Lafayette. Indiana University has an in¬

come of about $385,000 derived from a State tax levy and the interest on an endowment fund of $600,000 raised by State taxation. It has

more than 2,000 students. The State Normal is also supported by a State levy of $192,000, and the city of Terre Haute pays one-half the ex¬ penses of keeping the buildings in repair. It has 3,049 students. Purdue has an income of $492,447 derived from State tax levy and inter¬ est on endowments, and including $57,000 paid to it annually by the United States government as an agricultural school. It has 1,867 students.

Among the private institutions for higher education the more important are Wabash Col¬ lege (Presbyterian), University of Notre Dame and Saint Meinrad's College (Roman Catholic), DePauw University (Methodist), Earlham Col¬ lege (Societyˆ of Friends), Franklin College (Baptist), Hanover College (Presbyterian), Northern Indiana Normal (non-sectarian), and the University of Indianapolis. The last named was formed by the union of Butler Col¬ lege (Christian) with the Medical College of Indiana, the Indiana Dental College, and the Indiana Law School, all of which are located at Indianapolis.

An important branch of educational work in Indiana is the development of libraries. A. fea¬ ture of the school system adopted in 1852 was the establishment of a free public library in each township in the State. The State expended $273,000 for books, and the system was received with great public favor, but no provision was made for maintaining or increasing the libraries, and in the pressure of the war times they were allowed very generally to fall into ruin. To some extent these have been replaced as school adjuncts by the libraries of the Young People's Reading Circle, which are found at many of the schoolhouses of the State. These libraries con¬ tain about 500,000 volumes. There has also been a notable development of town and city libraries, 138 towns having accepted donations from Andrew Carnegie, aggregating $2,097,000, agreeing to maintain libraries in the buildings thus provided. There are 33 others that are maintaining libraries in buildings provided by themselves. The general supervision of library work is lodged in the Public Library Com¬ mission, which has charge of a system of travel¬ ing libraries furnished by the State. It also maintains a school for the training of librarians engaged in the work in Indiana.

Churches. — The principal religious denom¬ inations of Indiana in the order of their strength are the Methodists, Roman Catholics, Disciples or Christians, Baptist, Presbyterians, United Brethren, and Lutherans.

Charitable and Penal Institutions. — The State maintains 10 charitable and six penal in¬ stitutions, at an annual cost of over $1,500,000. Of

the former five are hospitals for the insane located respectively at Indianapolis, Logansport, Richmond, Evansville and North Madison. These contain in varying numbers, about 5,000 inmates. The annual cost of maintenance is about $1,025,000, or $205 per capita. The other charitable institutions are the School for the Blind, Indianapolis, inmates 121, per capita cost $358.96; School for the Deaf, Indianapolis, in¬ mates 298, per capita cost $314; Soldiers' and Sailors' Orphans' Home, Knightstown, inmates 448, per capita cost $251 ; Soldiers Home, Lafayette, inmates 909, per capita cost $216;

School for Feeble-Minded, Fort Wayne, in¬ mates 1,263, per capita cost $148; Village for Epileptics, New Castle, inmates 218, per capita cost $263.69; Tuberculosis Hospital, Rockville, inmates 119, per capita cost $468. The correct¬ ional institutions are the State Prison, Michigan City, inmates 1,158, per capita cost, $152, earn¬ ings, $67,438; Indiana Reformatory, Jefferson¬ ville, inmates 1,004, per capita cost $208, earn¬ ings $82,568; Women's Prison, inmates 116, per capita cost $257, earnings $4,795 ; Girls' School, Clermont, inmates 288, per capita cost $278, earnings $119; Boys' School, Plainfield, in¬ mates 552, per capita cost $215, earnings $939.

The legislature of 1913 made provision for a State farm, for male offenders not felons, and a tract of 1,584 acres was purchased near Put- namville, in Putnam County. In September 1915, there were 604 prisoners at the farm and the institution was recognized as on a success¬ ful footing. The Robert W. Long Hospital at Indianapolis, established under a bequest to the State by Doctor Long, was opened 15 June 1914. It has a State appropriation of $50,000 a year, in addition to receipts from pay patients. The State has the convict-contract-labor system, but the legislature of 1909 provided for its abolition in 1920. The convict labor is all done within the prisons. The State has the indeter¬ minate sentence system with commutation of time for good behavior. In addition to the State institutions each county maintains a poor asylum. In these, and the Marion County asy¬ lum for the incurable insane, there is an annual population of about 3,500 inmates, of whom about two-thirds are men and one-third women. Of these inmates some are classed as insane and others feeble-minded. There are in the State 33 orphans' homes, in which there are annually about 1,800 inmates, of whom 1,300 are boys and 500 girls. At the same time the Board of State Charities reports 2,989 orphan children maintained in private homes, without public ex¬ pense.

State Government. — The elective State offi¬ ces are held for periods of two years, with eligibility restricted to four years in any period of six years, except as to the governor, lieu¬ tenant-governor and geologist, whose terms are four years. No' one is eligible to the office of governor or lieutenant-governor for more than four years in any period of eight years. The governor's salary is $5,000, with an allowance of $1,800 for house rent. The governor's veto power extends to all laws passed by the legis¬ lature, but the veto may be overthrown by a majority vote in both houses. The legislature meets once in two years and may be called in special session by the governor; regular ses¬ sions are limited to 60 days and special sessions to 40 days. The Senate is composed of 50 mem¬ bers elected for four years each, and the house of 100 members elected for two years each. The members receive $6 a dav while in session, and $5 for each 25 miles traveled in reaching the capital and returning home. The State is required to be redistricted for legislative purposes every six years. The pre¬ sent Constitution was adopted in 1851, and is very generally considered unsatisfactory, es¬ pecially as to legislative representation and the location of the appointing power. It can be amended only by the majority vote of both houses of two consecutive legislatures, followed

by a majority vote of the electors of the State.

Congressional Representation. — The State has 13 representatives in Congress.

Population and Divisions. — The popula¬ tion of Indiana territory in 1800 was 5,641, but only about 2,500 of this was within the bound¬ aries of the State. In 1810 the population of the territory, with practically the same boundaries as the State, was 24,520. A territorial census taken in 1815 showed 63,897 inhabitants. After the admission of the State the census returns were as follows: 1820, 147,178; 1830, 343,031 ;

1840, 685,866; 1850, 988,416; 1860, 1,350,428; 1870, 1,680,637; 1880, 1,978,301; 1890, 2,192,404;

1900, 2,516,46 2. Of the population in 1900, 142,- 121 were foreign born, and 57,505 were negroes. The tendency of the negroes is to gather in the cities, more than one-fourth of the entire num¬ ber being found at Indianapolis, and an eighth at Evansville. In 1920, 2,930,390.

The State has 92 counties, whose names and county-seats are as

follows:

Adams, Decatur.

Allen, Ft. Wayne. Bartholomew, Columbus. Benton, Fowler. Blackford, Hartford City. Boone, Lebanon.

Brown, Nashville.

Carroll, Delphi.

Cass, Logansport.

Clark, Jeffersonville.

Clay, Brazil.

Clinton, Frankfort. Crawford, English. Daviess, Washington. Dearborn, Lawrenceburg. Decatur, Greensburg. Dekalb, Auburn. Delaware, Muncie. Dubois, Jasper.

Elkhart, Goshen.

Fayette, Connersville. Floyd, New Albany. Fountain, Covington. Franklin, Brookville. Fulton, Rochester. Gibson, Princeton.

Grant, Marion.

Greene, Bloomfield. Hamilton, Noblesville. Hancock, Greenfield. Harrison, Corydon. Hendricks, Danville. Henry, Newcastle. Howard, Kokomo. Huntington, Huntington. Jackson, Brownstown. Jasper, Rensselaer.

Jay, Portland.

Jefferson, Madison. Jennings, Vernon. Johnson, Franklin.

Knox, Vincennes. Kosciusko, Warsaw. Lagrange, Lagrange. Lake, Crown Point. Laporte, Laporte.

Lawrence, Bedford.

Madison, Anderson.

Marion, Indianapolis. Marshall, Plymouth.

Martin, Shoals.

Miami, Peru.

Monroe, Bloomington. Montgomery, Crawfordsville. Morgan, Martinsville. Newton, Kentland.

Noble, Albion.

Ohio, Rising Sun.

Orange, Paoli.

Owen, Spencer.

Parke, Rockville.

3erry, Cannelton.

Pike, Petersburg.

Sorter, Valparaiso.

Posey, Mt. Vernon.

3ulaski, Winamac.

Putnam, Greencastle. Randolph, Winchester. Ripley, Versailles.

Rush, Rushville.

Scott, Scottsburg.

Shelby, Shelbyville.

Spencer, Rockport.

Starke, Knox.

Steuben, Angola.

St. Joseph, South Bend. Sullivan, Sullivan. Switzerland, Vevay. Tippecanoe, Lafayette. Tipton, Tipton.

Union, Liberty.

Vanderburg, Evansville. Vermilion, Newport.

Vigo, Terre Haute.

Wabash, Wabash.

Warren, Williamsport. Warrick, Boonville. Washington, Salem.

Wayne, Richmond.

Wells, Bluffton.

White, Monticello.

Whitley, Columbia City.

Chief Cities. — The largest city in Indiana is the capital, Indianapolis, with a population (1920) 314,194. Next in size are Evansville (85,264), Fort Wayne (86,594), Terre Haute (66,083), and South Bend (70,983). Each of these cities has a charter specially made for it, though under guise of a general law. These charters are of recent creation — The oldest made in 1891 — and establish advanced forms of city government. Of cities of secondary im¬ portance may be named Muncie (36,524), New Albany (22,992), Anderson (29,767), Richmond (26,765), Lafayette (22,486), Marion (23,747), Logansport, (21,626), Elkhart (24,277), Gary (55,378), East Chicago (35,967), Hammond (36,004), and Kokomo (30,067).

History. — The first-known visits of white men to Indiana were those of Sieur de la Salle, who followed the Ohio River along its southern boundary in 1669-70, and crossed its northwest¬ ern corner by way of the Saint Josephs-Kanaka- kee portage in 1671. There were no Indians living below the Wabash at that time and prob¬ ably not many in the northern part of the State, but those there were LaSalle induced to join his confederacy against the Iroquois, and they all removed to the Illinois River, leaving Indiana practically uninhabited. After some years they began moving to the East, reaching Detroit by 1712, and shortly afterward located at points along the Maumee and Wabash rivers. The Delawares, who afterward lived in the central part of the State, on White River, came there about 1750. It is probable that the French first placed representatives at the Indian villages near the site of Fort Wayne, and next, about 1720, at Ouiatanon — on the north side of the Wa¬ bash just below Lafayette — and that there were stockade forts at these places, but there is noth¬ ing to indicate a permanent settlement at either place. The post at Vincennes was established in 1731, largely under the influence of Father De

Beaubois, a Jesuit who had been stationed at Kaskaskia. . Families located there soon after¬ ward, and it remained a permanent settlement, though there is but one land grant recorded of date prior to 1736. The French posts were small and unimportant, and the history of the region under French and British rule presents no very striking features. In 1778 Vincennes was surrendered to representatives of Gen. George Roger Clark, and the Wabash country was brought under American control. A re¬ capture by the British was followed by a second taking by Clark in 1779. The region was ceded to the United States by the treaty of 1783, and was included in the territory northwest of the Ohio River, by the ordinance of 1787. It was thus governed until 1800, when Indiana Terri¬ tory was formed, including all of the Northwest Territory except Ohio. From Indiana Terri¬ tory, Michigan Territory was cut off in 1805, and Illinois Territory in 1809, leaving it with practically the present State boundaries. By act of Congress of 19 April 1816, Indiana was au¬ thorized to form a State government, and the State was formally admitted by Act of 11 Dec. 1816. In the meantime a State Constitution had been adopted on 29 June ; State officials had been elected, and the State government had been actually inaugurated on 7 November.

There was almost continuous Indian troubles in the Ohio Valley from 1788 to 1795, when, after General Wayne's successful expedition, peace was made at Fort Greenville. After that date the American immigration began and there was no material trouble with Indians until the formation of Tecumseh's confederacy in 1811. The Indians were overwhelmed at the battle of Tippecanoe (q.v.) on 7 November of that year, by the troops under General Harrison, and sued for peace, but when the war with England came on there were Indian hostilities of minor im¬ portance continuing until the close of the war in 1815. After that year there was a gradual extinction of Indian titles, the Indians being concentrated in the northern part of the State and finally removed west of the Mississippi. The last removals occurred in 1836 and 1838.

The sobriquet Hoosier, commonly used to

designate the State and its people, was first ap¬ plied to them about 1830. It was not coined for that purpose, as is commonly supposed, but was ' a slang word signifying an uncouth rustic, which was in common use in the South at the time, and is still commonly used there in that sense.

The history of the State after its admission was chiefly that of peaceful development — clearing, lands, opening roads, building towns and

cities and establishing industries. The most notable feature was the disastrous internal improvement enterprise on which the State en¬ tered in 1836. It contemplated transportation routes on seven main lines, involving the con¬ struction of 1,289 miles of railroads and canals. That the routes were fairly well chosen is shown by the fact that they are now practically all occupied by successful railroad lines. The chief defect was that the improvements were mostly high-line canals, and the breaks in these before completion caused such great damage that the estimated cost was enormously increased. The financial panic of 1837 added to the diffi¬ culties, and the effects of this were aggravated by the general entering of the States on such enterprises on borrowed capital. The total debts of the several States swelled from about $13,000,000 in 1830 to $207,894,613 in 1842. In 1839 Indiana was unable to realize on the sales of her bonds, and was forced to default interest on those already issued. The canals and roads being unfinished, did not furnish the revenues anticipated. Compromises were effected by which the work done was turned over to cred¬ itors, but the State was left with a debt of about $10,000,000 without any property to represent it. In all, Indiana built 453 miles of canals, at a cost of $7,72 5,262, all of which are now aban¬ doned so far as transportation is concerned. But under private management, and more favor¬ able conditions, the transportation lines de¬ veloped rapidly, and in 1849 the one railroad originally contemplated was paying 8J2 per cent dividends on its stock. In 1860 there were 2,126 miles of railroads in successful operation in the State.

In the war with Mexico, Indiana furnished troops to the number of 4,470. Of these there were killed and wounded 183, and died of other causes 218. When the Civil War began the State occupied an important position, and its resources were utilized to the uttermost by its war governor, Oliver P. Morton. The State furnished 196,363 men for the war, and 784 paid for exemption, or in other words supplied 74.3 per cent of her total population capable of bear¬ ing arms, by the census of 1860. Only one State in the Union surpassed or equaled this record, Delaware being credited with 74.8 per cent of her military population. But of the supply credited to Delaware nearly one-tenth was in money commutation for exemption, and nearly one-tenth of the men in actual service was colored. On the basis of white troops fur¬ nished for three years or more of service, In¬ diana supplied 57 per cent of her military popu¬ lation of 1860, and on this basis was surpassed only by Kansas, which is credited with 59.4 per cent. Of the troops sent by Indiana 7,243 were killed or mortally wounded in battle, and 19,429 died of other causes, making a total death loss of over 13 per cent of all troops furnished. One feature of the war period

in Indiana, and some

adjoining States, was the formation of secret treasonable societies known as Knights of the Golden Circle, and later Sons of Liberty. These attracted much attention at the time, and much comment later, but in reality they were neither extensive nor dangerous. They were organized with a system of <(circles within circles,® with mysterious rites and blood-curdling oaths, but the masses of the members understood that they were merely for mutual protection, and the treasonable designs were affairs of the inner circles. Among their members there were a number of government detectives who kept the authorities informed as to every movement, and at the final exposure the chief witness for the government was Felix Stidgers, a detective who had become so prominent in the order that he was made ((Grand Secretary for Kentucky,® and knew all of the secrets of the order. As is aptly stated by Governor Morton's biographer, (

The list of governors of Indiana is as fol¬ lows :

Territorial

William H. Harrison ....

1800-11

John Gibson .

1811-13

Thomas Posey .

State

1813-16

Jonathan Jennings .

Democrat-Republican .

1816-22

Ratliffe Boone (acting) . .

1822

William Hendricks .

u a

1822-25

Tames B. Ray .

u (l

1825-31

Noah Noble .

a a

1831-37

David Wallace .

Whig .

1837-40

Samuel Bigger .

U

1840-43

Tames Whitcomb .

Democrat .

1843-48

Paris C. Dunning (acting)

U

1848-49

Joseph A. Wright .

1449-57

Ashbel P. Willard .

Abram A. Hammond

1857-60

(acting) .

u

1860-61

Henry S. Lane .

Republican .

1861

Oliver P. Morton .

1861-67

Conrad Baker .

a

1867-73

Thomas A. Hendricks. . .

Democrat .

1873-77

James D. Williams .

U

1877-80

Isaac P. Gray (acting) . . .

u

1880-81

Albert G. Porter .

Republican .

1881-85

Isaac P. Gray .

Democrat .

1885-89

Alvin P. Hovey .

Republican .

1889-91

Ira J. Chase .

1891-93

Claude Matthews .

Democrat .

1893-97

James A. Mount .

Republican .

1897-1901

Winfield T. Durbin .

u

1901-05

J. Frank Hanly .

u

1905-09

Thomas R. Marshall ….

Democrat .

1909-13

Samuel M. Ralston .

a

1913-17

James P. Goodrich .

W. T. McCray .

Republican .

1917-21

1921-25

Jacob Piatt Dunn,

Secretary of the Indiana Historical Society.

INDIANA UNIVERSITY, the State uni¬ versity located at Bloomington. In accordance with a provision of the State constitution, the legislature passed an act in 1820 providing for the establishment of a State seminary, which was opened in 1824 under the name of Indiana Seminary; in 1827, it was raised to the dignity of a college, and in 1838 the name was changed to Indiana University. In 1867 the university was opened to women, and has since been coeducational in all its departments. The uni¬ versity is the head of the public school system of Indiana, and no tuition fee is charged; the government, is by a board of trustees which re¬ ports biennially to the governor. Courses are offered in languages, science and history, gradu¬ ates receiving the degree of A.B. or B.S. The degrees of Ph.D. and A.M. are given for graduate work; there are also a school of law and a school of medicine connected with the university. There is a biological experiment station on Winona Lake, under university con¬ trol, and a summer session is maintained. In 1915 the university reported: faculty, 113; students, 2,644; volumes in library, 101,000.

INDIANAPOLIS, Ind. capital of the State, county-seat of Marion County, the largest city in the State and the 21st in the United States; situated on the west fork of White River. It is 60 miles from the centre of population of the United States. It is the centre for 16 radiating railroads, which connect it with Chi¬ cago, 184 miles northwest, Cleveland, 283 miles northeast, Saint Louis, 240 miles southwest,

Louisville, 110 miles south, Cincinnati, 111 miles southeast, Columbus, 181 miles east, New York, 819 miles east, and other termini in Ohio, Michigan, Illinois and Indiana. Its area is 39.45 square miles.

The site was selected in 1820 as the location of the capital by a legislative commission and

State Capitol at Indianapolis

Soldiers' Monument

its name was adopted by the legislature in ses¬ sion at Corydon, 6 Jan. 1821. The first plat included a square mile, which was laid out with broad rectangular streets and avenues radiating from a central circle. The character of the plan was undoubtedly influenced by l'Enfant, the designer of the city of Washington, D. C., for one of the surveyors who made the town plat had aided in the work at the national capi¬ tal. While the additions to the city have not been developed upon the same broad lines, most of them have been treated liberally and the city is noted for its wide streets, well paved and beautifully shaded. The city is very level, nearly all of its area being 700 to 800 ft. above sea-level. There are 550.6 miles of platted streets, of which 255 miles are paved, 133 miles with asphalt, 80 miles with brick, 23 miles with wooden blocks and 12 miles with macadam. The chief business streets are Washington street, which is a section of the old National road projected and partly completed to run from Baltimore to Saint Louis; Market, Mary¬ land and Georgia streets, all running east and west ; Meridian, Pennsylvania, Delaware and Illinois streets, running north and south, and Massachusetts, Indiana, Virginia and Kentucky avenues, which are diagonals, radiating from the circular Monument Place. This central circle contains the State's monument to its soldiers and sailors, perhaps the most success¬ ful of the innumerable monuments erected by towns, cities, societies and states in commemo¬ ration of the nation's defenders, and gener¬ ally regarded as one of the greatest in the world from an artistic point of view. The finest resi¬ dence streets are Delaware, Meridian, Wash¬ ington Boulevard, Maple Road and Pennsyl¬ vania. Several other

residence districts are particularly well designed and cared for, such as Woodruff Place — a residence park, with esplanades, fountains, statues, etc., — which has a town government of its own, though com¬ pletely surrounded by the city; Morton Place, Meridian Heights and Irvington.

Public Service. — The first water supply and the first sewer system were constructed in 1870 to 1875 and but little else was done in the way of comprehensive public improvements until after the adoption of the present efficient charter in 1891. Prior to that year the city government had been by mayor and council. Public-spirited citizens who recognized the im¬ possibility of securing comprehensive public improvements, through the Commercial Club agitated the adoption of the new charter, which separated the legislative and admin¬ istrative functions of the city govern¬ ment, making the mayor and his appointees fully responsible for the latter. The first Board of Public Works devised a broad system of improvement, including sewerage, paving and street cleaning, which was supplemented in 1895 by a Park Commission. Under these two boards the progress in the establishment of municipal public works adding to the beauty and convenience of the city has been rapid. As a step preliminary to the era of improvement which began in 1890 a paving exposition was held for the purpose of educating the people of the city regarding paving materials and methods. It was the first ever held in America and attracted attention throughout the country. Official delegations were sent to it from about

500 cities. Prior to 1890 less than two miles of pavements had been laid. The amounts expended after the adoption of the new charter in 1891 to the year 1902, inclusive, were as follows : for pavements of asphalt, $2,726,668.01 ; brick, $1,011,214.39; wooden block, $969,652.82; macadam, $154,522.91; gravel, $757, 1 12.50 ; for alley improvements, $46,655.26; for cement walks, $879,610.21 ; for brick walks, $65,995.41 ; making a total for paving of $6,611,431.51. The amounts expended up until 1 Jan. 1916, were as follows: for 133.13 miles of asphalt pavements, $5,217,493; for 80 miles of brick pavements, $2,550,409 ; for 23 miles of wood block pave¬ ments, $1,385,409; for 16.76 miles of bituminous concrete pavements, $583,039; for 8.58 miles of macadam pavements, $321,803; for 139 miles of gravel roadway, $1,593,311; for 467 miles of cement sidewalks, $2,267,990, and for 25 miles of brick sidewalks, $65,995, making a total of $13,985,000. The city has 377.78 miles of sewers which were constructed at a cost of $6,003,- 446.15. The grand total of expenditures for permanently improved highways, walks and sewers up until 1 Jan. 1916 was in excess of $20,000,000. The

waterworks owned by the Indianapolis Water Company have been de¬ veloped with the city. The system of pumping by direct pressure is used and a system of filter beds to purify the water taken from White River is operated in conjunction with the sys¬ tem of pumping from driven wells. The com¬ pany maintains four pumping stations with a daily capacity of 110,000,000 gallons. The daily average pumpage for 1916 was 23,000,000 gallons. For fire service the company in¬ creases its pressure from 100 to 110 pounds. The company maintains 3,400 fire hydrants for the city at an annual rental of $45 each, or at a total cost of $153,000 a year. Electric lights are in general use, the household rates being 6 cents per kilowatt hour. Open flame arcs of 500 candle power are used almost exclusively for street lighting, although the city maintains 700 gas lights of the boulevard type at an annual cost of $15 each. The total appropriation for street lighting for 1916 was $160,000 for which the city was rendered lighting service under contract as follows: 2,800 arcs at $41.98 a year each; 2,100 undergro nd-wired pedestal boule¬ vard incandescents at $27.71 a year each; 100 overhead incandescents at $17.83 a year each and 700 gas boulevard lights, maintained by the city, at a cost of $15 a year each. The police department contains 435 men and is main¬ tained at a cost of $511,771.47 a year. The police court, city clerk, detective and police departments are housed in a handsome build¬ ing and the city and county maintain a work- house where prisoners are sentenced for short terms. Four police substations are maintained. The fire department contains 360 men and costs for maintenance $478,407.68 a year. Thirty stations are maintained in addition to the new central fire station. The department has 76 pieces of apparatus as follows: 13 horse-drawn steamers; four combination motor pumps; eight motor hose wagons ; 23 horse-drawn hose wagons; three horse-drawn chemical wagons; two motor squad wagons; five motor chiefs' cars ; one tractor aerial truck ; one tractor water tower; four motor service trucks; eight horse- drawn service trucks and two motor telegram repair wagons. The Indianapolis Salvage

Corps, financed by insurance companies, main¬ tains two motor salvage squads that are oper¬ ated in conjunction with the fire department. There are 75 miles of underground conduits used by the telephone, telegraph and electric light companies and 170 miles of street car lines owned by the Indianapolis Street Railway Company and operated under lease by the Indianapolis Traction and Terminal Company. The city is the most prominent interurban centre in the

world. It has six interurban sys¬ tems, made up of 13 lines, which in 1914 car¬ ried 7,912,763 passengers to and from the city, an average of 19,213 a day, 712 passenger cars being handled each day in the largest and most pretentious interurban station in the United States. Freight cars to the number of 23,500 are handled out of this station, owned by the Indianapolis Traction and Terminal Company, each year.

During the two-year period dating from 1914 to 1916 notable public improvements were either completed or under the process of con¬ struction. To eliminate such disasters as be¬ fell the city during the flood of 1913 a concrete flood prevention levee was constructed for more than a mile along the west bank of White River. The levee is 40 feet high and on the river side is faced with a concrete apron. On its crest is a 60-foot roadway, which makes a valuable addition to the city's boulevard system. This levee, which was financed under a special act of the Indiana General Assembly providing for the issuing of long term bonds, cost $1,- 350,000, and was completed in 1916. A move¬ ment to elevate the railroad tracks throughout the city was started by the Commercial Club Elevated Track Commission in 1894, and after 10 years of contention in courts and legislatures the work was begun. In 1914, at a cost of $1,000,000, the city made an immense sewer out of Pogues Run, a small stream run¬ ning through the business district, that the tracks might be elevated successfully. > Plans have been completed for track elevation and the work which will cost approximately $7,000,000 was well underway in 1916. It is expected that it will be completed in 1920.

Parks and Cemeteries. — The public park system includes 16 parks of 1,735.13 acres in area. Riverside Park, purchased in 1898, con¬ tains 934.6 acres and is valued at $1,277,000. Other parks, their area and estimated values follow : Fall Creek Parkway, 207.93 acres, $523,570 ; Garfield Park, 128.52 acres, $304,723 ; Brookside Park, 93.05 acres, $180,000; Pleasant Run Parkway, 93.48 acres, $180,000; White River Parkway, 45.55 acres, $82,000; Woollen's Garden, 44 acres, $50,000; Ellenberger Woods, 40.95 acres, $40,000; Brookside Parkway, 34.16 acres, $64,500; Rhodius Park, 33 acres, $47,000; Military Park, 17.3 acres, owned by the State of Indiana; Willard Park, 14.71 acres, $100,- 000; Burdsal Parkway, 11.49 acres, $43,000; Spades Place, 10.4 acres, # $24,000; Greenlawn, eight acres, $60,000; University Square, four acres, owned by the State of Indiana ; High¬ land Square, 3.98 acres, $25,000 and Saint Clair Square, three acres, owned by the State of Indiana. The total value of park lapd owned by the city is estimated at $2,981,293. The city street railway company owns two parks of unusual beauty a short distance from the city. Since the park

commission was established in

1895 the city has expended $4,419,395.31 on park property, the sum of $1,299,435.82 having been expended in park maintenance; $1,586,- 863.39 for improvements and $1,533,096.10 for the acquisition of additional park property. The first cemetery of the the city, Greenlawn, has not been used as such for many years and is kept in park form by the board of park com¬ missioners. Crown Hill cemetery, one of the notable cemeteries of the country, embraces over 540 acres. There are also Roman Catholic. Lutheran and Jewish cemeteries.

Notable Features of City. — It is in popu¬ lation, transportation facilities and volume of business transacted the largest inland city, not on a navigable body of water, in the United States. It has three direct steam roads to coal fields of Indiana. It has two direct roads to the Bedford or oolitic stone fields of Indiana; in the output of automobiles it is the second city of America and the Indianapolis Motor Speedway, a 2p2-mile oval track paved with brick, is the greatest and first speed course of its kind in the world. The city has 200 whole¬ sale and jobbing houses, representing all lines of trade. The Citizens' Gas Company, operating 550 miles of mains, provides the householder with fuel at 55 cents a thousand feet, the scale decreasing to 40 cents for large consumers. It has 25 modern office buildings and 63 hotels. A total of $60,000,000 worth of live stock is handled at the Indianapolis Stock Yards annu¬ ally. The city is the centre for the manufacture of quartered oak veneer. An automatic tele¬ phone system was installed for the entire city in 1916.

Buildings. — The Indiana State House, cost¬ ing $2,000,000, and built of Indiana oolite stone, is perhaps the most notable building. With its grounds it occupies two large blocks. The county building was completed in 1878 at a cost approximating $1,750,000. The Federal build¬ ing, containing the post office, custom-house and United States courts cost $2,400,000. Other municipal buildings of note are the city hall, which cost $500,000, and the police building, the public 'library and some of the new public school buildings. Tomlinson Hall, a bequest by Dr. J. M. Tomlinson, is a public building, its lower story being used as a market. The Indian¬ apolis Art Association owns an art museum and school. Notable among the city's business build¬ ings are the Indiana National Bank, Fletcher Savings and Trust, the Merchants Bank, the Law building, the Lemcke, the Lemcke Annex, the Hume-Mansur, the Newton-Claypool, the Indiana Pythian building, the Odd Fellows building, the Meridian Life building, the State Life building, the Kahn building, the News building, the

Occidental building, the Claypool, Severin and Washington Hotels, the Majestic building, the Indianapolis Board of Trade and the Indianapolis Chamber of Commerce build¬ ings, the Murat Temple, containing the Murat Theatre, the Masonic Temple and the buildings occupied by the department stores of the Wil¬ liam H. Block Company and L. S. Ayres & Company. During the five or six years prior to 1916, the city enjoyed an unprecedented building growth. Other buildings of large proportions are under process of construc¬ tion. The Columbia Club building is an important feature of one quadrant of Monu¬ ment Place, which surrounds the Indiana State

Soldiers and Sailors' monument. This massive shaft is the central and most notable decorative feature of the city. It is 285 feet high, in¬ cluding the bronze statue, and its base is ornamented with symbolic groups of statuary and reliefs in stone and bronze. It was de¬ signed by Bruno Schmitz and cost over $500,000. Four epochs in the history of the State are commemorated by the statues of George Rogers Clark, William Henry Harrison, James Whit¬ comb Riley and Oliver P. Morton, which are grouped about its base. The width of Wash¬ ington street, 120 feet, and of the streets of the original plat, 80 and 90 feet, give space for the best possible display of architectural features. Plans were completed in 1918 by H. Van Buren Magonigle, architect, of New York, for an extensive educational centre on the former United States arsenal grounds of 76 acres, comprising 18 buildings, to include a stadium seating 29,000, an auditorium seating 9,000, high schools, industrial shops, etc., esti¬ mated to cost approximately $9,000,000.

Transportation. — Indianapolis is the centre of trade for the State. With the completion of the Indianapolis Southern Railway every county in the State except three, which are on the Ohio River, could be reached by railroad in less than one day's travel. Consolidations have placed most of the railroads in two systems. One of these, the Pennsylvania lines west of Pittsburgh, now operates the Madison and Jeffersonville lines, which reached the city in 1847, and the Vincennes line, completed in 1868; the Indiana Central to Columbus and the East, completed in 1853, and the Terre Haute and Richmond, later the Vandalia, completed in 1852, and now reaching Saint Louis; also a line to Chicago, partly over the Lake Erie and Western. The other, the Big Four system, operates the Belle- fontaine road to Cleveland, completed in 1852 ; the Indianapolis and Cincinnati, which reached the city in 1850; the Indianapolis and Lafayette, of 1852, now

reaching Chicago; the Indianapolis, Bloomington and Western to Peoria, finished in 1870, its eastern extension to Springfield, Ohio, completed about 15 years later; the Indianapolis and Saint Louis, completed in 1876. Through trains are also run to Benton Harbor, Mich., and to Louisville, over branches of these lines. The Cincinnati, Hamilton and Dayton Railroad Com¬ pany operates the Cincinnati and Indianapolis Junction road, completed in 1868, and the In¬ dianapolis, Decatur and Springfield road to Springfield, Ill. The Indianapolis, Cincinnati and Louisville operates a line to Chicago, which was completed about 1880. The Lake Erie and Western Railroad Company operates the old Peru and Indianapolis road, completed in 1854, and reaches Michigan City Toledo and Peoria.

These roads, which offer unusual facilities for handling both freight and passenger traffic, now are operated under 12 systems as follows: The Belt Railroad and Stock Yards Company; the Central Railroad of Indianapolis; the Chi¬ cago, Indianapolis and Louisville Railway Com¬ pany; the Cincinnati, Hamilton & Dayton Rail¬ way Company; the Cincinnati, Indianapolis and Western Railway; the Cleveland, Cincin¬ nati, Chicago and Saint Louis Railway; the Illinois Central Railroad; the Indianapolis Union Railway Company, which operates the ˆbelt® or city switching system ; the Lake Erie and Western; the Pennsylvania and Vandalia

Lines; the Pittsburgh, Cincinnati, Chicago and Saint Louis Railway and the Vandalia Railroad Company.

The construction of the system of inter¬ unban roads began about 1890 with the Broad Ripple line, now a suburban line owned by the Union Traction Company of Indiana. The next to be constructed was the Indianapolis and Columbus line in 1900, now reaching Co¬ lumbus. This line now is known as the Indian¬ apolis, Columbus and Southern, has been ex¬ tended to Louisville, Ky., and is operated by the lessees, the Interstate Public Service Company. It was followed quickly by the Indianapolis and Eastern, which now connects with Columbus, Ohio, and other eastern points. This line was extended to Terre Haute, and now is known as the Terre Haute, Indianapolis and Eastern. The Union Traction Company of Indiana entered the city from its centre in Anderson in 1901 and in 1903 completed a line north to Logansport, Tipton, and Kokomo, and other northern points. Lines entering the city in 1903 were the Indianapolis and Martinsville, the Indianapolis and Plainfield and the Indian¬ apolis and Northern, extending to Crawfords- ville and Lafayette. The Indianapolis and Cincinnati Traction line was completed east to Rushville in 1905 and since that time the line has been extended to Conners- ville. The right-

of-way has been purchased to extend this line through to Cincinnati. This company also operates another line extend¬ ing from Indianapolis to Shelbyville and Greens- burg. The steam railroads are served within the city by the Union Railway Company owning the Union passenger station and the belt railway for facilitating the transfer of freight. The inter- urban electric roads are in like manner served by the Indianapolis Terminal and Traction Company owning a large terminal station and belt lines for passenger and freight business.

Manufactures.— During the brief natural gas era in Indiana, Indianapolis benefited largely by the cheap fuel. Since the failure of the gas supply the superior shipping facilities of the city and cheap coal fuel have attracted many more manufactories, and more than 160 industries are carried on in about 2,000 estab¬ lishments. According to United States statis¬ tics covering business conditions in the city during 1916 the capital invested in 887 manu¬ facturing establishments was $87,724,000, or an average capital of $99,000. The cost of the material used in all of the establishments dur¬ ing the year was $91,432,000, or an average cost of $98,000. The value of products manufac¬ tured in the city during 1916 was $140,346,000 or an average per establishment of $158,000. The number of employees was given as 37,956; the number of proprietors and firm members, 554, and the number of horsepower in oper¬ ation, 65,266. Among the most important in¬ dustries are slaughtering and meat packing; pharmaceutical and biological products; iron work; automobiles and accessories; carriages and wagons and material therefor; iron work of all kinds; furniture; malt liquors; printing and bookbinding; clothing; veneers; saws and lumber and lumber mill products.

Finances and Banking. — The assessed valu¬ ation of the city in 1870 was $24,656,460. In 1891 at the beginning of the era of public im¬ provements it was $93,595,930, and in 1915 it

had increased to $244,217,280. The tax rate for State, county, township, city and school pur¬ poses was $2.53 in 1915. The net public debt was $4,602,500. The city's expenses for 1915 including money spent for track elevation and flood prevention, were $4,390,484.29. The pos¬ tal receipts for 1915 wrere $1,631, 79a. 52. The value of imports for 1915 was $535,821 and thˆ. total customs receipts were $262,603.57. The city has a total of 27 national banks, State banks and trust companies with total resources amounting to

$111,823,921.44. It has six na¬ tional banks with capital and surplus amount¬ ing to $9,700,000; 12 State banks with capital and surplus amounting to $606,900, and 9 trust companies with a capital and surplus of $6,UUU,- 000, the total capital and surplus of these in¬ stitutions being $16,403,554. The deposits m the national and State banks aggregated in 1918 $50,000,000, while the savings deposited with trust companies amount to $22,904,453.60. There are about 90 building, loan and savings associations in various stages of progress and

liquidation. . .

Churches. — Indianapolis is the seat of a Roman Catholic bishop, with an auxihaiy bishop, and of an Episcopal bishop. Including missions there are 17 Roman Catholic churches in the city, 52 Methodist, 20 Presbyterian, 7 Episcopal, 54 Baptist, 5 Congregational, 9 Luth¬ eran, 20 Christian, 4 German Evangelical, 3 Evangelical Association, 3 Friends, 3 United Presbyterian, 5 German Reformed and 71 of other denominations. There are 7 Hebrew congregations. . 1C ,

Charities — In the city there are 15 hos¬ pitals, State, county, college, church, chari¬ table and private, 4 homes for the aged, 10 in¬ dustrial schools and orphan asylums, 4 homes for women and girls, more than 60 organized charitable and relief societies, and such institu¬ tions as the Red Cross, Y. M. C. A., Y. W. C. A., Friendly Inn, Humane Society, Day Nur¬ sery. The township trustee is a source of offi¬ cial relief. The charities of the city are effi¬ ciently administered, as a result of co-oper¬ ation between organizations largely brought about through the efforts of Rev. Oscar C. Mc- Cullouch. In 1894 a plan of relief for the un¬ employed, whereby over 5,000 people were pro¬ vided with the necessaries of life throughout winter without pauperizing influences resulting, became widely known as the ((Indianapolis Plan of Relief.® The plan was devised and carried out on behalf of the people of the city by a Commercial Club committee composed of Hugh H. Hanna, Col. Eli Lilly and William Fortune. In 1918 a fund of approximately $3,000,000 was raised by voluntary contribu¬ tions for purposes of war relief and local chari¬ ties, to be disbursed under the authority of the War Chest Board of Indianapolis. This board in 1918 undertook with the assistance of experts to reorganize the philanthropic work of the com¬ munity under plans for centralized direction.

Education.— There are 80 public school buildings, including 3 high schools, one giving manual training, in which about 1,000 teachers are employed, with a total enrolment of about 45,000 pupils; 28

Catholic schools, 2 Lutheran schools, 25 private schools and academies, be¬ sides the schools in connection with institu¬ tions. The city is the home of several institu¬ tions of importance, Butler College, supported

by the Christian Chuich, and the Indian Uni¬ versity School of Medicine being among these. Other important schools are the Benjamin Har¬ rison Law School, the Indiana Law School, the Indiana Dental College, and a large num¬ ber of business, music and art schools. In addition there are several girls' schools sup¬ ported by private funds or by religious denomi¬ nations. Free kindergartens are operated under the Free Kindergarten Association, and 51 kindergartens and a normal school are maintained largely from public funds, besides a number of private kindergartens. The Art Association of Indianapolis maintains the John Herron Art Institute, including art gallery, school and museum. The Propylaeum is a building erected by an association composed exclusively of women.

Libraries— The most notable libraries are the public library with about 200,000 volumes, under the control of the board of school com¬ missioners, and the State library with about 75,000 volumes. The State law library with 50,000 volumes, and agricultural and horticul¬ tural libraries in the State House, and the county library and bar association s library in the court-house may be noted. There are 12 branches of the public library and many small special libraries of schools and associations.

Newspapers and Literature. — Indianapolis has 7 daily papers, 23 weeklies, 38 month¬ lies, a total of 72 publications of all classes. The list of trade and class papers published in the city is particularly notable. Indianapolis is the home of many writers whose names are familiar to the public, notable among whom are James Whitcomb Riley, Booth Tarkington and Meredith Nicholson. In recent years In¬ dianapolis has become an important western book-publishing centre.

Organziations. — The development of the city has been markedly influenced by organized work in various directions. There are a great number of literary, art and musical societies, and largely as a result of this activity there is a high standard of cultivation in such matters. This has had a notable influence in establishing in the social life of the city a standard of merit rather than determining the standing of the individual on questions of lineage or wealth. There are many social clubs, among the most notable being the University, Country, Wood-stock, Dramatic, Contemporary and Woodruff Clubs, the Athseneum and the Mannerchor, while the Columbia, Marion and Indiana Dem¬

ocratic Clubs are political organizations, estab¬ lished in comfortable homes. The Columbia Club building, located on the Circle, is one of the finest club-houses in the United States. The Commercial Club, now the Chamber of Commerce, with a membership of over 2,500, which owns as its home an eight-story office building, was a dominant force in the new era of progress and development which started in 1890, and devotes itself to the welfare of the city. The Board of Trade, an older organiza¬ tion with a membership of about 700. has also been active in this direction. The Red Cross has a membership of over 100,000 in Indian¬ apolis, and expended more than $1,000,000 in 1917-18. Organizations of various kinds, com¬ mercial, trade, fraternal, social, literary, art, musical and miscellaneous, number over 1,000.

Government. — All city elective or appointive

officers hold a four-year term of office. The administrative department is in the hands of the mayor and the boards and officials ap¬ pointed by him. The city council consists of nine members, one being elected from each of the six councilmanic districts, and three at large. The council is composed of six mem¬ bers representing the party in power and three members of the next largest political party. The city clerk and police judge also are elected for four-year terms. The mayor's appointees are the corporation counsel, the city controller, the chief of police, the fire chief, three mem¬ bers of the board of public works, the three members of the board of public safety, the four members of the board of park commissioners, and four members of the city board of health. Other city officials, serving in departments sub¬ sidiary to those set forth above, are appointed by the mayor through the boards having the supervision of these departments. The board of school commissioners consists of five mem¬ bers elected by popular vote. The board is non-partisan, women being eligible to member¬ ship. The affairs of the school city are sepa¬ rate from .those of the municipality proper, the board having control over its finances, which are provided by special tax levies under State law. Notable improvements in methods of municipal administration are in progress, as a result of a survey and recommendations of the New York Bureau of Municipal Research, made under the direction of the Chamber of Commerce in 1917 and the establishment by the Chamber of a Municipal Bureau in 1918.

Population. — Beginning with two or three families in 1819 or 1820, Indianapolis has shown a steady and rapid growth, having a population of 1,085 in 1830; 2,698 in 1840 ; 8,- 091 in 1850; 18,611 in 1860; 48,244 in 1870; 75,- 056 in 1880; 105,436 in 1890; and 169,164 in 1900. Since 1900 the increase in population has been still more rapid, the census of 1910 show¬ ing a population of 233,650, making an increase of 38.1 per cent over the figures given in the last official enumeration. The population in 1916 was estimated as 285,000; in 1918 at more than 300,000. In 1890 Indianapolis was 26th in population, and in 1920 it was 21st in the United States with a population of 314,194.

History. — The first settler, George Pogue, arrived in March of 1819 or 1820. The legis¬ lature of Indiana, meeting at Corydon, by com¬ mittee selected, in 1820, the site for a State capital, and named it Indianapolis, 6 Jan. 1821. Another committee laid out the plat. Lots were slowly sold for several years, and the government was actually removed to the new capital in 1824, the first session of the legisla¬ ture being held there in 1825. The first State House, modeled after the Parthenon, was com¬ pleted in 1835. A town government was insti¬ tuted in 1832 under three trustees, a town coun¬ cil was established in 1838, and a city govern¬ ment under mayor and council in 1847. The present metropolitan form of government, with the mayor as the responsible administrative officer and the council as the legislative branch, was adopted in 1891. A volunteer fire depart¬ ment was formed in 1826, which had much help from the State when the capitol building was completed. The first fire chief was appointed in 1853, and the department was changed to a corps of paid men in 1859. The police depart¬

ment was first established in 1854. The new town began to support a newspaper in January 1822, and a church in 1823. The first railroad reached the city in 1847, and several others were completed in the next four years. Their effect upon the town is seen in the large in¬ crease in population. The State capital was the centre of great activity during the War, and there was great expansion in business and manufactures as well as increase in popula¬ tion, most of which was retained. The city did its full share in raising regiments for the War, and is said to have expended a million dollars in contributions, bounties, and war ex¬ penses. Camp Morton, on its outskirts, was first a camp for training soldiers, and later for prisoners of war. The free school system now cited as a model by educational experts, was begun in 1853 with the accumulations of sev¬ eral years of special taxation spent in buildings and grounds. The Citizens' Street Railway charter was granted 18 Jan. 1864. The slaugh¬ tering and packing business,

now so large a factor in the city's trade, began its great ex¬ pansion in the same year. Public improve¬ ments were but few in number until the adop¬ tion of the new charter in 1891.

Indianapolis has numbered among her prom¬ inent citizens Benjamin Harrison, Thomas A. Hendricks, Charles W. Fairbanks, Thomas R. Marshall and others high in the affairs of the government.

William Fortune,

President Indianapolis Chamber of Commerce.

INDIANOLA, Iowa, city and county-seat of . Warren County, 18 miles south of Des Moines, on the Chicago, Burlington and Quincy and the Chicago, Rock Island and Pacific rail¬ roads. A large and increasing trade in grain, butter, eggs, fruit, live stock and garden prod¬ ucts is carried on. The Simpson Methodist Episcopal College was established here in 1867. The electric light plant and waterworks are owned by the city. Pop. (1920) 3,628.

INDIANS, American. Columbus, when he discovered America, believed he had reached a part of Asia or of India, and in a letter of February 1493 wrote of «the Indians (in Span¬ ish, Indios) I have with me.® Thus the abo¬ rigines of the New World came to be called ˆIndians® (French Indiens, German Indianer, etc.), or, to avoid confusion with the natives of India, ((American Indians,® for which rather cumbrous term 'the word « Amerinds,® suscep¬ tible of many modifications by means of prefix and suffix, and easily adaptable to the exigencies of modern European and other civilized lan¬ guages, has been suggested by an eminent Amer¬ ican lexicographer and is used more or less by a number of anthropologists and other writers. The word ((American,® originally applied to the Indians, is still somewhat in use, and Dr. D. G. Brinton styled his comprehensive sketch pub¬ lished in 1891, (The American Race) ; but its employment to designate the white population of the continent seems to bar its ethnological application to the aborigines without some qual¬ ifying term. By some writers the Indians are called the ((Red Race,® and, more popularly, ((Redskins® (in French Peaux-Rouges, in Ger¬ man Rothdute), or (

and many European ethnologists continue to separate the peoples who created the civiliza¬ tions of Mexico, Central America, Peru, etc., from the Indians, while others, exclude the Eski¬ mo, and others, again, the

“Mound-Builders.® But somatic, cultural and linguistic evidence justifies the conclusions of Powell and Brinton in using the term “American Indians® to include not only the aborigines now existing, or known to have existed since the discovery, but also all the pre-Columbian peoples of America concern¬ ing whom we have little data — the most di¬ vergent are no more than sub-varieties of Amer¬ ican man. This unity is the great ethnic phenomenon of American aboriginal history. The study of Indian languages, archaeological remains, arts and industries, games, social and religious institutions, mythology and folk-lore indicates a general psychic unity, while the so¬ matic diversities do not transcend those observ¬ able in the other great races of mankind. Whether one investigates, as McGee has so ad¬ mirably done, the Seri of the Gulf of Cali¬ fornia, who represent about the lowest type of savage culture on the North American conti¬ nent, or the Mayas of Yucatan, whose approach to a phonetic system of writing touches the high-water mark of Amerindian achievement, one receives the same impression : that it is a question not of very recent civilized or semi- barbaric intruders from Asia or from Europe, but of a race (whatever their remoter origins may be) who have dwelt for ages in an Amer¬ ican environment, which has shaped them into the peoples met with by the whites at the time of Columbus’ discovery. The limited effect of the “discovery® of the Norsemen may be held to discount any “discoveries® by Europeans be¬ fore them ; while, on the other hand, the Amer- ican-Asiatic contact revealed by the investiga¬ tions of the Jesup North Pacific expedition is as much American as Asiatic, and the “Bering Sea® culture is a local phenomenon no more fundamentally indigenous to the Old World than to the New. The arguments in favor of a trans-Pacific Malayo-Polynesian influence upon primitive America are no stronger than those that can be adduced to support the con¬ trary opinion. The culture of the “Mound- Builders® does not in any way transcend the possibilities of what the American Indian was and is yet capable of, nor is it necessary to assume the presence of foreign culture-elements to explain the civilization of Mexico, Yucatan, Colombia and Peru. Since very primitive times America has been essentially the “ethnic island® of Brinton, Keane and other investi¬ gators. The impress of America has been upon the aborigines so long that physically, socially, linguistically they have been “Americanized® in so marked a fashion that their right to be con¬ sidered one of the “races® of mankind is not to be dismissed without cause. To group them merely as a branch of the Mongolian, or, again, of the Malay “race,® is to obscure many points of great importance in the prehistory of Amer¬ ica or to ignore them altogether. The Ameri¬ can Indian is in too many respects a modified (and anciently so) variety of mankind to be thought of as

expressing in any serious degree the type of the Mongolian or the Malay.

Language and Culture. — The ethnic isola¬ tion of the American race has already been

noticed. The apparent independence of the cul¬ ture-centres of North and South America is another interesting fact. With the exception of a few possible traces of the presence of tribes of Arawak lineage in ancient Florida and the spread of art-motifs of the Caribbean type over a portion of the adjacent Gulf region, no direct evidence of the influence of South Amer¬ ica upon North American culture is forthcom¬ ing. The independent origin of Mexican and Peruvian civilizations seems certain, and con¬ vincing proofs of the community of origin of Peruvian and Chibchan and even of Mexican and Mayan are lacking. The possibility of inter-cultural relations having once existed is, however, not to be denied. The Pacific coast, from the Gulf of California to the Argentine and Chile, has been a nursery of culture just as the Mediterranean area was for the Eurafrican peoples. There has been a Mexico and a “greater Mexico,® a Peru and a “greater Peru,® while the Mayas and the Chibchas have also had their extensive spheres of influence. To the Pueblo culture north of Mexico corre¬ sponds the Calchaqui culture south of Peru. On the northern borders of Mexico still lie the savage Seri and Yaqui, and the culture areas of Colombia and Peru have also their primitive frontages — and this was so in the time of the ancient Montezumas and the Incas. This juxtaposition of civilization and savagery is one of the characteristic facts of American ethnology, as it was once likewise of the history of the Mediterranean area in the Old World. In both areas we meet with a large number of peoples who rose above savagery, but, for some reason or other, failed to develop high stages of culture. That the more material evidences of civilization should be so confined to the Pacific coast is, to some writers, a significant fact sug¬ gestive of Asiatic relations ; but the intellectual power of such Atlantic peoples as the Iroquois and some of the Muskhogean tribes of North America, and the moderate but distinct progress made by a few of the Brazilian tribes of the Atlantic area relieve us from any such theory, environment and historical incident in America quite sufficing to account for the phenomena in¬ volved. (See Ethnology). Certain other re¬ semblances and contrasts in the various aspects of aboriginal culture in America merit attention here. At the extreme north of the continent, one stock, the Eskimo, with closely related forms of speech, kindred mythology and folk¬ lore, similar customs and social institutions, etc., extends in a narrow line from east to west, even overflowing into Asia, while at the ex¬ treme south (much less

extensive) the Fue- gians,. numbering altogether less than 10,000, are divided into three distinct linguistic stocks (Yahgans, Onas, Alikulufs). Eastern and northern North America and the corresponding regions in South America are areas of wide distributions of single stock. The Pacific Coast of America, as compared with the Atlantic, is a place where, in diverse spots, languages seem to pullulate. This region (including the nar¬ row limits of Mexico and Central America) contained probably more independent tongues than all the rest of the continent. Indeed, within the present bounds of the State of Cali¬ fornia alone 22 such tongues are found, with several others in Nevada, and in Prof. Cyrus

Thomas list of the stocks of Mexico and Central America, made in 1902, nearly 30 are recognized.

The multiplicity of languages in primitive America has called forth explanatory theories of various sorts, among them Horatio Hale's suggestion of the origin of linguistic diversity through the spontaneous language activity of the child. As Gatschet has noted, the very ex¬ istence of.such a multitude of tongues all over America is proof that neither in ancient nor in later times has this continent been the scene, on a vast scale, of the suppression and exter¬ mination of peoples one by the other, which have been characteristic features of Old World history. In spite of the common belief to the contrary, mutual destruction was probably never so rife as when the coming of the white man introduced new means of warfare, and, crowd¬ ing the natives for subsistence, led them to attack each other more effectively. The recent studies of Dixon and Kroeber in California have strengthened the view of a certain par¬ allelism of language and culture.

That some culture-elements, however, have spread from tribe to tribe is shown by the dis¬ tribution of certain inventions discussed by Mason, the northward movement of such plants as maize, the use of tobacco, the transmission of many themes and incidents of myths and legends (as demonstrated by Boas), the modes of occurrence of certain art-forms, etc. Inter- minglings of culture of a more or less local, though often of an extensive, character, have taken place in the Bering Sea area, in the Co¬ lumbia River region, in the habitat of the Pu¬ eblo Indians of New Mexico and Arizona, in the southeastern part of the United States, in the Isthmian region of Central America, in

Ecuador, in the Pampean country of the Ar¬ gentine, etc. — larger and more significant inter¬ mixtures have, perhaps, taken place in earlier times in Mexico, the Mayan country, Colombia and Peru. A number of the borrowed culture- elements may be explained as the result of trade and commerce, by means of which useful or artistic objects, food, plants, etc., were easily conveyed long distances under primitive condi¬ tions. The widespread custom of adoption would also account for not a few instances of alien culture-grafts. So, too, with the exogamic marriage, when the women are culture-bearers. Where language-mixture has taken place it is more or less easily detectable in most American Indian stocks and tongues. When families of the same stock possess, in the one case (Algon- kian), dialects which differ as much as Micmac and Blackfoot, in the other (Iroquoian), as much as Cherokee and Mohawk, we are justi¬ fied in looking for culture-differences as well in such widely separated peoples. Doubtless the results of careful somatological, sociological and other investigations of the various tribes of American aborigines will furnish us ultimately with diverse ways of classifying them. At pres¬ ent, however, the most serviceable classifica¬ tion is a linguistic one, the result of the labors of Major J. W. Powell and the Bureau of American Ethnology, supplemented by the work of Dr. D. G. Brinton.

Linguistic Stocks. — The Bureau of Ameri¬ can Ethnology has issued the Powell map showing the extent of the 58 linguistic stocks

north of the Mexican boundary line ; that is, of families or forms of speech, so independent of one another as to be catalogued as distinct stocks ; apparently no more closely related than the Aryan and the Semitic families of the Old World. For South America no such authori¬ tative map is extant. The exact number of such linguistic stocks in America has not yet been determined with certainty, but the follow¬ ing list probably represents the best view of the matter to-day :

1. Adaizan (Louisiana)

2. Algonkian (northeast

North America)

3. Alikulufan (Tierra del

Fuego)

4. Andaquian (Colombia)

5. Arauan (northwest Brazil)

6. Araucanian or Aucan (Chile)

7. Arawakan (Central and N. E. South America)

8. Atacamenan (S. Boli¬ via)

9. Atnapascan (N. W. Canada, etc.)

10. Attacapan (Louisiana)

11. Aymaran (S. Peru, N. Bolivia)

12. Barbacoan (S. Colom¬ bia)

13. Beothukan (Newfound¬ land)

14. Betoyan (Colombia-Venezuela)

15. Caddoan (Texas)

16. Calchaquian or Cata-marenan (N. Bolivia)

17. Canichanan or Cani-sianan (N. Bolivia)

18. Carajan (S. Brazil)

19. Cariban (N. E. South America)

20. Cayubaban (N. Bolivia)

21. Charruan («N. E. Ar¬ gentine)

22. Chetimachan (Louisiana)

23. Chiapanecan (Central America)

24. Chibchan (Colombia and Isthmian region)

25. Chimakuan (Washing¬ ton)

26. Chimarikan (California)

27. Chinantccan (Oaxaca, Mexico)

28. Chinookan (Washing¬ ton)

29. Chiquitan (N. Bolivia)

30. Chocoan (N. W. Co¬ lombia and Isthmus)

31. Chumashan (California)

32. Churoyan (Colombia-Venezuela)

33. Coahuiltecan (Mexico-
Texas, mouth of Rio Grande)
34. Coconucan (S. Colom¬
bia)
35. Copehan (California)
36. Costanoan (California)
37. Cunan (Isthmus of Pan¬
ama)
38. Doraskean or Chan-
guinan (Panama and Nicaragua)
39. Eskimoan (Northern
fringe of North Amer¬ ica)
40. Esselcnian (California)
41. Guahiban (Venezuela)
42. Guaraunian (Venezuela)
43. Guaycuruan (Gran
Chaco, Paraguay-Bo- livia)
44. Huavean (Isthmus of
Tehuantepec)
45. Iroquoian (Ontario-
Erie region, with offshoot in S. E. United States)
46. Itonaman (Bolivia)
47. Jivaroan (Peru, Ecua¬
dor)

48. Kalapooian (Oregon)

49. Karankawan (Texas)

50. Kechuan or Quechuan

(Peru)

51. Keresan (New Mexico,

Pueblos)

52. Kiowan (Nebraska-

W yoming)

53. Kitunahan (S. E.

British- Columbia, N. Idaho)

54. Koloschan (Alaska)

55. Kulanapan (California)

56. Kusan (Oregon

57. Laman (Peru)

58. Lencan (Central Amer¬

ica)

59. Lulean (Gran Chaco)

60. Lutuamian (Oregon)

61. Mainan (Ecuador, N.

W. Brazil)

62. Mariposan (California)

63. Matacoan (Gran

Chaco)

64. Matagalpan (Nicara¬

gua)

65. Mayan (Yucatan, Chi-

a p a s, Guatemala, etc.)

66. Mocoan (Colombia)

67. Moquelumnian (Cali¬

fornia)

68. Mosatenan (Bolivia)

69. Moviman (Bolivia)

70. Muskhogean (S. E.

United States)

71. Natchezan (Louisiana)

72. Onan (Tierra del

Fuego)

73. Otomian (Central

Mexico)

74. Otomacan (Venezuela-

Colombia)

75. Palaihnihan (Califor¬

nia)

76. Paniquitan (Colombia)

77. Panoan (Peru)

78. Payaguan (Gran

Chaco)

79. Payan (Honduras)

80. Peban (Peru)

81. Piman (S. Arizona, N. W. Mexico)

82. Piaroan (Colombia-Venezuela)

83. Puinavan (Colombia-Venezuela)

84. Pujunan (California)

85. Puquinan (Peru)

86. Quoratean (California)

87. Salivan (Colombia-Venezuela)

88. Salinan (California)

89. Salishan (British Co¬lumbia, etc., to the south)

90. Samucuan (S. Bolivia)

91. Sastean (California)

92. Serian (N. W. Mexico)

93. Shahaptian (Oregon-Idaho)

94. Shoshonean or Uto-Aztecan

95. Siouan (Carolinas and Missouri Valley)

96. Skittagetan (Q. ChaR-

lotte Is.)

97. Subtiaban (N i c a –

ragua)

98. Tacanan (Bolivia)

99. Takilman (Oregon)

100. Tanoan (New Mexico, Pueblos)

101. Tapuyan (S. Central Brazil)

102. Tarascan (Michoacan, Mexico)

103. Tequistlatecan (Oaxa¬ ca, Mexico)

104. Ticunan (N. W. Bra¬ zil)

105. Timotean (Venezuela)

106. Timuquanan (Florida)

107. Tonikan (Louisiana-Mississippi)

108. Tonkawan (N. W. Texas)

109. Totonacan (Vera Cruz, Mexico)

110. Tsimshian (British Co¬ lumbia)

111. Tsonekan (P a t a •

gonia)

112. Tupian (E. Central

Brazil)

113. Uchean (Georgia)

114. Ulvan (Nicaragua)

115. Waiilatpuan (Oregon)

116. Wakashan or Kwa-

kiutl-Nootka (Brit¬ ish Columbia)

117. Washoan (Nevada-

California)

118. Weitspekan (Califor¬

nia)

119. Wishoskan (Califor¬

nia)

120. Xicaquean (Honduras)

121. Xincan (Guatemala)

122. Yahganan (Tierra del

Fuego)

123. Yakonan (Oregon)

124. Yanan (California)

125. Yaruran (Venezuela)

126. Yukian (California)

127. Yuman (Lower Cali¬

fornia, Arizona)

128. Yucan (Peru)

129. Yurucarean (Bolivia)

130. Zaparoan (N. W. Bra¬

zil)

131. Zapotecan (S. E. Mex¬

ico)

132. Zoquean (S. E. Mexico)

133. Zunian (New Mexico)

Of the stocks enumerated, 51 belong to South America and 56 to North America north of Mexico. The status of investigation is such that the number assigned to South America is approximate only, and may ultimately be con¬ siderably increased or reduced. Some stocks, like the Adaizan, Beothukan (exterminated by whites), Chetimachan, and a few of the minor stocks in South America, are extinct or nearly so. A goodly number — including, for example, many of the stocks on the northwest Pacific Coast, the Texas-Louisiana country, parts of Central America and the Pacific region of South America — were or are of limited area; others, like the Eskimoan, Athapascan, Algonkian, Siouan, Shoshonean, Arawakan, Cariban, Tu¬ pian, etc., are noteworthy by reason of the extent of their domain. Some, like the Kootenay, con¬ sist of practically a single language, while others, like the Algonkian, Siouan, Athapascan, Salishan, Aztecan, Mayan, Arawakan, Tupian, Cariban, etc., have developed numerous dialects, sometimes only remotely resembling the mother tongue. Doubtless, with the perfection of lin¬ guistic research, some changes will be made in the list of stocks or perhaps a method of groups may be devised in which stocks showing certain resemblances other than those of a lexical na¬ ture may be classed together. The studies of Dixon and Kroeber indicate the possibility of this for the numerous Californian stocks, and a similar result may be predicted for certain other regions of the continent. As said, all the American Indian stocks are far from being of the same significance, many of them having hardly any historical importance. A few words about some of the most typical and most im¬ portant must suffice here.

North American Stocks. — The Eskimoan stock is noteworthy by reason of being the first of all the aboriginal peoples of America to be visited by representatives of European culture — the Norsemen in the

10th century, etc. It is also the only primitive people who, unaided by civilized races, occupy a portion of both hemi¬ spheres, for the Eskimo stretch from Labrador to a considerable distance within the borders of northeastern Asia. They illustrate the victory of man over a difficult environment, for they are a merry and sociable people in spite of the inclement and depressing character of their Arctic surroundings. They have also a marked

sense of humor, as the institution of nith- song, or settlement of disputes by public judg¬ ment of the comparative merits of the two parties in competitive singing would indicate — the themes of the singing being the dispute and sarcasm at the expense of the opponent. The Eskimo are also very skilful carvers and engravers of ivory, their spirited drawings of animals, etc., resembling in marked fashion the similar art-products of prehistoric man of the French river-drift, a likeness which has induced some authorities (Dawkins, De Mortillet) to assume a racial connection between these two peoples. Mason has recently suggested that these drawings owe a good deal to the contact with Europeans (introduction of iron tools, etc.), but Boas considers that their close resem¬ blance to the bark and rock pictographs of the Indians forbids the conclusion that these draw¬ ings are of other than native origin. The unity of language and (to a considerable degree) of custom, mythology, etc., among the various Eskimo tribes is remarkable when one remem¬ bers the extent of their distribution. The use of the Eskimo dog with the sledge, the kayak, the harpoon, the snow-house (iglu) and the invention of many mechanical devices, show them to be gifted with native intelligence.

The Athapascan stock is notable for the contrasts in culture and diversities of culture- capacity presented by its members. Some of the Athapascan peoples of northwestern Canada and Alaska are among the lowest types of American man, and a few of them have hardly yet come to knowledge of the white man, the advent of the fur-trader being, according to J. M. Bell, a matter of the last few years in part of their domain. To this stock belong also the Apaches, once the terror of the civilization of the South¬ west, whose depredations, in earlier times, dis¬ turbed the peace of the native civilization of Old Mexico. It is fair to say, however, of them that individual Apaches (Dr. Montezuma, for example) show good capacity for adopting the chief elements of white American culture. Several small tribes of Athapascans are scat¬ tered through Washington, Oregon and Cali¬ fornia, the most noteworthy being the Hupa, on Trinity River, the ((Romans of Calif ornia,® as they have been called. The Navaho, who have assimilated to a considerable extent the culture of the whites, were good agriculturists before the coming of the Spaniards, from

whom they adopted the sheep, a fact which modified their environment and their response to it. The con¬ trast between the rude tribes of the ((Barren Grounds® of Canada and the Navaho of New Mexico and Arizona is, as Horatio Hale pointed out, one of the most remarkable instances of culture-change by process of environmental variation on record. The recent loan-word Klondike comes, from an Athapascan dialect.

The Algonkian stock, members of which were found from Labrador to South Carolina, and from the confluence of the Ohio and Mississippi northwesterly to the foot of the Rocky Mountains and the borders of the do¬ main of the Athapascans, is of interest for many reasons. The great area over which it is spread has brought members of this stock into contact with many other Indian peoples, — the Naskopi, Crees, and northern Ojibwa with the Eskimo; the Micmacs with the Eskimo and

AMERICAN NATIVE RACES

1. Labrador Eskimo Woman. 2. Mexican of the coast. 3. Mexican of the highlands. 4. Yucatan Indian Woman. 5. Ecuador Indian. 6. Peruvian Indian. 7. Brazilian Indian (Ipurina). 8. Dakota (Sioux) Indian. 9,10. Apache. 11. Bellacoola (N. W. Coast). 12, 13. Pueblo Indians (New Mexico). 14, 15. Indians of Zapoteca, Mexico. 16. Bororo. 17. Caraja. 18. Botocudo. 19. Umaua or Omagua (16-19 of Brazil), 20. Araucanian (Chile). 21, 22. Indians of Tierra del Fuego, with a child. 23. Patagonian.

.

Beothuk; the Ojibvva and related tribes of New England, New York and Pennsylvania, the Lenape of New Jersey, the Nanticokes, Powhat- ans, etc., of Maryland, Virginia and the Caro- linas with the Iroquois (who, both north and south, form an enclave in the Algonkian terri¬ tory) ; the western Ojibwa, etc., with the Siouan tribes in the upper Mississippi region, and in the southern Mississippi country the Illinois and kindred peoples with the Caddoan and other stocks ; the Blackfoot in the extreme northwest of the Algonkian area with the Athapascan Sarcees and the Kootenay. The aberrant Cheyennes and Arapaho (recently studied by Kroeber) belong to the Algonkian stock. Another evidence of the importance of this stock is the fact that many other

stocks and tribes are known to us by names of Algonkian origin: Eskimo, Athapascan, Siouan, and pos¬ sibly also Iroquoian and Muskhogean ; Chip- wyan, Assiniboin, Mohawk, etc. Of all the Indian stocks of North America none have made a greater impression upon the whites (French and English) than the Algonkian. This is seen when we remember that Powhatan and Pocahontas, King Philip, Pontiac, Tecumseh, Black Hawk, etc., the Indians who have ap¬ pealed most to our historians, novelists and dramatists, have all been of Algonkian lineage. This stock has also contributed to the vocabulary of spoken and written American- English some 140 words, of which many are hardlv felt to be of Indian origin : Carcajou, Caribou, Caucus, Chipmunk, Hickory, Hominy, Manito, Maski- nonge, Menhaden, Moccasin, Moose, Mugwump , Opossum, Pappoose, Pemmican, Persimmon, Powwow, Pung, Raccoon, Sachem, Skunk, Squash, Squaw, Tammany, Terrapin, Tobog¬ gan, Tomahawk, Totem, Tump, Tuxedo, etc. A people who have contributed to such a cos¬ mopolitan tongue as English important words like Caucus, Mugwump , Tammany and Totem, deserve more than passing mention. Our civilization owes to them also more material things than these, — tobogganing and lacrosse, canoeing (in large measure) and numerous de¬ vices of agricultural and domestic industry adopted by the early colonists from the aborig¬ ines. From the Algonkian Indians the whites also learned how to make maple sugar and maple syrup.

The Iroquoian stocks are famous through the confederacy of the <(Five (afterward Six) Nations® and the great ((League of the Iroquois® (so sympathetically studied by Morgan). Their physical characteristics at the time of the war of 1861-65 were such that they exceeded the recruits of all other races (white included) in points of excellences demanded by military re¬ quirements. The high position occupied by woman among the Iroquois lifts them above many of their Amerindian kindred. The story of the Iroquoian statesman of the 16th century, Hiawatha, and his founding of the league that was to end all war and unite all the nations in one lasting bond of peace is a historical fact, which Longfellow's confusion of the Iroquoian patriot with the Algonkian demi-god Mana- bozho cannot altogether obscure. In political and social organization the Iroquoian tribes at¬ tained a position that was largely sui generis. The tale of their long struggle to preserve their independence against the whites will be found in Morgan and Parkman, while the Jes¬

uit Relations) contain their reaction to the ef¬ forts of the missionaries to convert them to the Christian faith, as well as the account of the fratricidal strife resulting in the extermination of the Hurons. The fame of the Iroquoian tribes (for example, Mohawks) as fierce war¬

riors has caused the general public to neglect them in other respects. Through the researches of Horatio Hale and others it has been shown that the Cherokee of the Carolinas (recently so well investigated by Mooney) belong to the Iroquoian stock, together with several minor tribes in the south Atlantic region. This stock has produced a number of eminent men: Hia¬ watha, Red Jacket, Joseph Brant and Dr. Oron-hyatekha (qq.v.), of the Independent Order of Foresters; J. N. B. Hewitt, of the Bu¬ reau of American Ethnology at Washington, is also of Iroquoian blood. Sequoia, the half-blood Cherokee, who invented the alpha¬ bet now in use by his people, deserves men¬ tion here likewise. As compared with the prominent part played by them in the French- English and colonial wars, and in the Revolu¬ tionary War, War of 1812, etc., the Iroquoian people left little impression upon the culture and the speech of the English in America, — the words from their language which have crept into our own have been originally place-names : Chautauqua, Conestoga (horse), Saratoga (trunk), etc. To the French of Canada they have given a few more words. In the place- names of the region about Lakes Ontario and Erie (Ontario, Niagara, Erie, Cataraqui, Os¬ wego, Cayuga, Seneca, Onondaga, Tuscarora, Oneida, Ticonderoga, Tonawanda, Genesee, Ohio, etc.), the Iroquoian peoples are gener¬ ously remembered, while their Cherokee kins¬ men in the south have likewise left their im¬ press upon the topographical nomenclature of the country. In both New York and Ontario, where considerable numbers of Iroquois still live, with no immediate danger of dying out, but particularly in the latter province on the Grand River Reserve, the pagan and Christian¬ ized Iroquois hav existed side by side in the same community for so long a time as. to make this phenomenon, the details of which have been pointed out by David Boyle, of great value to sociologists. See Indians, Canadian.

The Muskhogean stock (Choctaws, Chick- asaws, Creeks, Seminoles, etc.), as their subse¬ quent career in the ((Civilized Nations® of the Indian Territory with the Cherokee has shown, are among the most gifted intellectually of the aborigines of America. Gatschet notes as char¬ acteristic of this stock: Their color-symbolism for peace and war, their totemic system, the use of the ((black drink,® the doctrine of the (

The Siouan stock (Crows, Mandans, Assini- boins, Hidatsa, Sioux, Winnebagos, Omaha, Tu- telos, Catawbas, Biloxi, etc.), are noteworthy by reason of their migration from the Atlantic slope in the region of the Carolinas to the trans- Mississippian and Missouri country, where their culture was conditioned by the presence of the buffalo and the adoption (from the whites)

of the horse. Their wars with the surround¬ ing tribes, particularly the Algonkian, and their subsequent numerous collisions with the whites (Minnesota massacre of 1862, the troubles in which Sitting Bull figured, etc.), are matter of history. The use of buffalo-skins made it pos¬ sible for some of the Sioux tribes to develop pictography to a high degree. The researches of J. Owen Dorsey and Miss Alice Fletcher have shown the Omaha in particular to be gifted with a religio-social consciousness of a marked character, reflected in their name-giving and the ceremonies associated with the passage from childhood to manhood, in which indi¬ viduality is much emphasized. That, their capacity for producing men of ability is not confined to those of the primitive type (Sitting Bull) is indicated by the way in which indi¬ vidual members of this stock (Dr. Eastman, La Flesche, the collaborator of Dorsey, etc.), have responded to the stimuli of modern culture. The Dakotan federation is well remembered by the names of the twin States of the Northwest; Minnesota, Nebraska, etc., are terms of Siouan origin ; while the minor place-nomenclature of the Northwestern States contains a multitude of names from the same source.

The Shahaptian stock is noteworthy on ac¬ count of the Nez Perces and the famous chief Joseph, one of the most remarkable Indians of any age, whose “retreat” in 1877 has been com¬ pared to the celebrated march of the Ten Thousand of old.

The “Pueblo” Indians, as they are called from their village life, have risen in New Mexico and Arizona above the stage of savagery into a state of semi-civilization, repre¬ senting the triumph of man over the adverse conditions of the desert and the inroads of fierce enemies of the lowest culture. Their re¬ lations to the so-called “Cliff-Dwellers” has been the subject of ethnological speculation. (See Pueblo Indians). Diversity of culture among the Pueblos is not as great as that of speech. Besides the Moqui or Hopi, who belong to the Shoshonean stock, there are found in the Pueb¬ los group three other distinct linguistic stocks, — Keresan, Tanoan and Zunian. The Pueblos culture has apparently been developed independ¬ ently in several local centres, and the studies of Bandelier, Hodge, Fewkes, Cushing, etc., have thrown much light on the origins and interre¬ lations of stages of culture largely the reflex of environment.

The Shoshonean or Uto-Aztecan stock offers the most wonderful

contrasts in its members of any Amerindian stock. Linguistic and other evidence appears to justify the conclusion that not only certain peoples of the Sonoran coun¬ try (Cahitas, Coras, Tepehuanas, etc.), some of whom achieved a sort of half-civilization in contact with their more cultured neighbors, but the Bannacks, Shoshones and Utes (even the wretched “Root- diggers”) are kith and kin with the ancient Aztecs upon whose civilization Cortes intruded, and the tribes of Nahuatl line¬ age who carried that culture more or less from central Mexico to beyond Lake Nicaragua. The change from the low type represented by the Utes to the high type of the old Mexicans may have been due in large measure to environment. Intermediate stages are represented by some of the Sonoran tribes. The Mexican or Aztec branch of this stock has furnished to English

and other civilized languages a number of in¬ teresting and valuable words: Axolotl, choco¬ late, coyote, cacao, taniato, ocelot, chilli, copal, chinampa, jalay, etc. The Moqui group of the Pueblos Indians belong also to the Shoshonean stock.

The Mayan stock (Cakchiquels, Huastecs, Tzotzils, Kekchis, Quiche, Tzendals, Mayas, etc.), creators of the civilization destroyed by the Spaniards in Central America, left, besides graven monuments in large numbers, other evi¬ dences of their having invented a system of “writing,” which is the nearest approach by any of the aboriginal peoples of America to a pho¬ netic method of record, — the solution of the Mayan hieroglyphics is perhaps the question of American archaeology. Their calendar-system, nagualism in religion, and the important role of women in religious and social functions, de¬ serve especial notice. The explorations of the Peabody Museum (Cambridge) resulted in many new discoveries.

Central and South American Stocks. —

The Chibchan stock, whose culture varied from that of the savage Aroacos of the mountains of Santa Marta to the civilization of the country about Bogota, represents a rise from barbarism independent of that to the south in Peru, etc. There is some reason to believe that the “gold- culture” of the Chiriqui country and allied re¬ mains in the same region to the borders of Nicaragua may be due to the Chibchan stock, — the Talamanca, Guaymi, and a few other dia¬ lects of Costa Rica, etc., show affinities with Chibchan tongues. Their use and working of gold were of a high order, but neither in archi¬ tecture nor in pictography could they compare with the Peruvians, the Mexicans and the Mayas. They had a characteristic hero-legend of Bochica, and a tale of the great flood. The shrine of Lake Guatavita was a famous

re¬ ligious resort. Some of the famous “El Dorados” were in their territory. The Que- chuan stock, which is best known through the civilization of the Incas, superimposed upon an older, wide-spread culture,. represents but one phase of higher human activity in the Peruvian area. The extension of Quechuan language es- pecially von Tschudi and Brinton agree in at¬ tributing not to the military achievements of this people, which antedated the coming of the Spaniards by only a few centuries, but to in¬ tellectual and culture influences millenniums old. The marks of their language can be traced from near the equator on the north to the Pam- pean tribes on the south. Common in the Peruvian area seem to have been a highly de¬ veloped agriculture (stimulated, as in the south¬ western United States, py the necessity for irri¬ gation and artificial treatment of the soil), — maize, tobacco, potatoes, cotton, etc., the breed¬ ing of the llama and the paco, the making. of pottery (useful and . artistic) , metal-working of a fine and ingenious sort, stone architecture more massive and imposing than artistically beautiful, or of the highest order as regards decorative art. The Inca form of government was never probably so far removed from the system common to most of the American stocks as some writers have believed. The Incasic conquest has caused the Peruvians to be styled the “Romans of America,” but the analogy is misleading. Beyond the use of picture-writing and the employment of the quipu (knotted

colored strings) for purposes of record, the Peruvians had not advanced, and the semi- phonetic system, like that of the Mayas, was not developed by them. Ancestor-worship and sun-worship (state religion) were professed by the Peruvians, but the most far-sighted of their thinkers touched almost upon monotheism. The hero-god of the Peruvians was the sea¬ born Viracocha, about whom centred a rich and imaginative mythology. The mixture of races in the production of ancient Peruvian culture is indicated by the diversity of cranial type among the skulls from the old burial grounds and mummy-caves. North of the Quechuas, on the coast about Trujillo, were the Yunca-Chimus, etc., whose civilization is represented by the ruins of Gran Chimu and other remains in the valley of Trujillo, which preceded the period of Inca domination. Southeast of the Quechuan culture was that of the Aymaras on the Andean table-lands. To them are usually assigned the ruins of Tiahuanaco, near Lake Titicaca, which in their completeness were probably the most imposing structures raised by the hand of aboriginal man in America, — in architecture they differ

in several notable ways from the buildings of Inca origin. Dr. Uhle has very recently sought to show the “succes- sion of cultures” at Pachacamac, Trujillo, and their relations to that of Tiahuanaco. The Peruvian tongues have furnished modern Eng¬ lish, etc., many words : guano, condor, alpaca, pampa, paco, llama, coca, quinine, jerked (beef), vicuna etc.

In the northern part of the Argentine Re¬ public (province of Jujuy, etc.) the architectural and archaeological remains brought to light by recent investigators (Am’brosetti in particular) indicate the presence of a “civilization,” — vil¬ lage life in a desert environment, offering strik¬ ing analogies with the culture of the Pueblo Indians of Arizona and New Mexico. This Cal- chaqui culture is evidently much more than the mere reflex of Quechuan-Aymaran conquest which it was formerly considered to be. Its origin and growth, however, remain to be clearly demonstraed.

The Araucanian stock, whose language has been studied by Lenz, are famous for their long resistance to the Spanish arms (the story of the “conquest” has been written by Guevara), part of which gave rise to De Ercilla’s epic of (La Araucana> (q.v.). To the Araucanian stock belong tribes on both sides of the Chilean Andes and a number of the nomadic peoples of the Pampas, where they seem to be intruders rather than aborigines. Chilean Spanish has borrowed many expressive terms from Araucanian.

The Patagonians, Tzonek, or Tehuelche, have been famous since the time of Pigafetta as “giants” (many of them exceed six feet and some are said to reach seven). To them be¬ longs the “Setebos” of Shakespeare’s ‘Tempest. >

The Tapuyan stock of Brazil is looked upon by some authorities as the oldest people of the continent — some would affiliate with them the Fuegians, in this respect — representing a race once inhabiting a great part of South America. The man of the caves of Lagoa Santa and the man of the remarkable sambaquis or shell-heaps of the Brazilian coast are by many authorities considered to have been related to the Tapu- yans. Characteristic modern Tapuyans are the VOL. 15 — 4

Botocudos, so called from the labret they wear in the lower lip. According to Ehrenreich, some of these ancient men of Brazil show af¬ finities with prehistoric man of eastern Europe.

The Tupian stock (or Tupi-Guaranis, as they are also called) , whose language was much used by the missionaries for general intercourse

with the natives and is the basis of the ligoa geral, or “common language” of the region of the Amazons, was perhaps the highest in culture of the Brazilian tribes, having the elements of agriculture, village life, pottery (well developed and rather artistic), urn-burial, etc., but nothing beyond the Stone Age. Intermixture with both whites and negroes has taken place in the Tupi area, and the rich and imaginative tales of animals, etc., belonging to Tupi mythology have thus been given a wider extension, while negro and white influences have made themselves felt, both on the language and the literature of these people. According to Hartt, the Tupi language has influenced the Portuguese of Brazil quite as much as has the latter the former. Tupi-Guarani speech has furnished to the various European tongues a considerable number of words — to English, ipecacuanha, jaguar, tapioca, tapir, toucan, etc.

The Cariban stock were long famous for their cannibalism (the word cannibal is a cor¬ ruption of one of their ethnic names), real and attributive, and their skill in making and using canoes. The shaman, or medicine-man, had great power among them, and they practised the curious and remarkable custom of the couvade. Rock-inscriptions and pile-dwellings are found in their territory. Some of them have been reduced to sad straits by the contact of the whites, but some of the Venezuelan tribes of this stock are still good, typical representatives of the American Indian.

The Arawakan stock, through its representa¬ tives (the Bahamian Lucayans, the natives of Haiti, Porto Rico, Cuba, etc.), was the first of the aboriginal peoples of the New World (exclusive of Greenland and Labrador) to come into contact with the white race, and likewise the first to come under its devastating influence. Many of the tribes of this stock were of a mild and gentle disposition, good agriculturalists, pottery-makers, workers in stone, wood and gold, and excellent canoe-men (the word canoe comes from an Arawak dialect). They were users of cotton, and to them we owe the first Indian invention adopted by the whites (ham¬ mock , both name and thing are Arawak). From the Arawaks, too, the Spaniards first learned the use of tobacco. Like the Caribs they practised the couvade. The name of the stock is said to mean “flour-eaters,” on account of their use of cassava, which has also passed over to the white. The Arawak and Carib stocks have furnished to English and to the other civilized languages of Europe a large number of important words, the exact ethnic distribution of which is not easy to determine with exactness : Agouti, anotto (and French roucouyenne) , barbecue cacique, caiman, cannibal , canoe, cassava, colibri, hammock, hurricane, iguana, macaw, maize, manati, potato, tobacco, etc. And with these names has gone the use of many of the

things indicated and made known for the first time to Europeans. The debt of the Spanish and Portu¬ guese settlers of South America and the West Indies is in these respects very great, for, nat-

u rally new fruits, plants, trees, etc., and many of their products came to be known by their aboriginal names or by corruptions of them Thus a number of “balms® and “balsams® and other medicinal products retain in the pharma¬ copoeia names of American Indian origin — copaiba, tolu, etc. Timber-trees, ornamental and dye-woods, have also largely kept their native appellations throughout Central and South America — the list would run into the hundreds. Large also is the catalogue of birds and other animals bearing Indian names

Original Habitats.— The question of the original habitats of the important aboriginal stocks is one of the most interesting in American ethnology and archaeology. The researches of j ink and Boas in particular seem to have demonstrated that the primitive home of the Eskimo was in the region west of Hudson Bay whence they spread northward and west¬ ward to Alaska, etc., and eastward (north and south) to the Arctic islands, Greenland and Labrador. See Eskimos.

. The earliest habitat of the Athapascans was in northwestern Canada, to the westward of the home of the Eskimo. From there they migrated over the lake country, across the Rockies to the southward, leaving colonies along the Pacific to northern California, and sending out, through Arizona and New Mexico to the borders of the Nahuatl territory, the important branches of the Apaches and Navaho — the raids of the Apaches often reaching, far into Mexico.

The original habitat of the Algonkian stock was, as Brinton and Hale have assumed, “some¬ where north of the Saint Lawrence and east of Lake Ontario,® while that of the Iroquoian lay “between the lower Saint Lawrence and Hudson Bay. The final result of the migrations and wars of these two stocks was to leave the Iro¬ quois of the Ontario-Erie country entirely sur¬ rounded by Algonkian tribes. From ‘ their primitive home the Algonkian sent out numerous branches west, south, southwest, etc., making the extent of territory covered by them very large, and bringing them into immediate contact with many other Indian tribes and with the white settlers over a vast area. The Iroquois (in the Cherokee and the kindred tribes of the south) had branches, which were so separated from their northern kin as to be

long taken for non-Iroquoian peoples.

The Muskhogean stock, according to Gat- schet, have been from time immemorial inhabit¬ ants of the country between the Appalachian Mountains, the Atlantic, the Gulf of Mexico and the Mississippi. The scene of their earliest development was in the neighborhood of the Mississippi, or possibly even beyond it.

The chief migrations of the Caddoan (Paw¬ nee) peoples have taken place in historical times northward and southward from the Platte River, from which region they expelled in part the Siouan tribes, etc. If their own traditions are reliable, their primitive home lay farther to the south, on the Red River of Louisiana.

The primitive home of the Siouan stock (characteristic Plains Indians since the intro¬ duction of the horse) was eastward in the region of the Carolinas. This fact has been revealed by the study of the Tutelo and Catawba languages belonging to this eastern area, and by inspection of the traditions of the various Siouan tribes. The main bodies of Siouan

migrants followed the Ohio and the Missouri far to the north and west; the Mandans, As- siniboins, etc., reaching to within the borders of Canada. Other minor bodies traveled to the southwest, their representatives still existing in the Biloxi, etc., of southeastern Mississippi. The Siouan tribes seem to have followed the buffalo, in its retreat westward, and their migration from the Carolinas is of considerable sociologi¬ cal interest. At one time their trans-Missis- sippian habitat included practically all the territory between the Arkansas and the Sas¬ katchewan from the great river to mid-Montana, with the Winnebagoes jutting out on Lake Michigan. Their forays and trade-excursions led some of them from time to time across the Rocky Mountains.

The original habitat of the Shoshonean or Uto-Aztecan stock, which embraces the Ute, the Sonoran and the Aztecan (Nahuatl) peoples, and has representatives from the north of Idaho t° the Isthmus of Panama, was probably some¬ where in the northwestern section of the United States. The primitive home of the Shoshonean section was “somewhere between the Rocky Mountains and the Great Lakes,® and the tradi¬ tions of the other two branches bring them from the far north, as compared with their present southern abode.

tionof Central America, according to their own

traditions, came from somewhere to the north _

the position of the Huastecan branch of this stock north of Vera Cruz suggests that the Mayan emigrants from the home-land skirted along the Gulf of Mexico from some region considerably to the north.

The ˆrawakan stock (including the natives of the Bahamas and the Antilles, except the intrusive Caribs) had an extension in South America comparable only to that of the Algon- kians and Athapascans in the northern half of the continent — from the high Paraguay to the Uoajiran Peninsula in Venezuela, and in its greatest expansion from the Xingu to the Amazon and Orinoco. Its primitive habitat was in some part of the Brazilian interior, probably between the Xingu and the Paraguay, the gen¬ eral trend of their migrations having been north¬ ward. The Cariban stock, another very exten¬ sive people, who at the time of Columbus' discovery were to be found in the smaller West Indian islands, and the northern part of the con- tinent from the Essiquibo in Guiana to about the Isthmus of Panama, came originally as the presence of the Carib Bakairi on the' Xinrf indicates, from the high interior of Brazil at the sources of the Xingu and Tapajos.

The Tupian stock was widely extended at the time of the discovery along the Atlantic Coast region from La Plata to the Amazon,

JT1 at jnˆes scattered along the Paraguay and the Madeira to the foot of the Andes. Their primitive home, Brinton, with reason, assumes to have been in the central highland country to the east of Bolivia. The general direction of the earliest migrations of this stock was there¬ in6 southward (down the Paraguay to the Atlantic), after which the Tupi branch 'followed the coast to the Amazon. The Tapuyan stock who once occupied the region between the ngV and the Atlantic Coast (from the latter they have been driven by the Tupis), are prob¬ ably the oldest human residents of part of this

area, their tenure of the seacoast reaching far back into prehistoric times.

The Chibchan stock, to which was due the civilization of the Bogota region of Colombia, had their original habitat in the Andean high¬ lands of central or southern Colombia, whence they wandered northwest into the Isthmus of Panama and northeastward up the Magdalena.

The Quechuan stock, authors of the most remarkable of South American civilizations, according to their own traditions spread from very small beginnings in the country about Lake Titicaca; but von Tschudi and Brinton, for linguistic reasons chiefly, find the primi¬ tive home of this people to have been in the extreme northwest of their characteristic area. The Aymara stock, which some authorities consider to have been a branch of, or perhaps an old member of the Quechuan, had its original habitat to the southeast of the latter. The relation of the Aymaran stock to that which produced the Calchaqui civilization of the northern Argentine is not clear.

Language and Writing. — Although the lan¬ guages of the American aborigines con¬ stitute so many independent families of speech, the vocabularies of which are entirely divergent one from another, nearly all (if not all) of them possess certain general grammatical characteristics which justify us in classing them together as one great group of human tongues. Brinton enumerates as points of resemblance : Development of pronominal forms, fondness for generic particles and for verbs over nouns, and incorporation — the in¬ clusion of subject or object (or both) in the verb, etc. Most American Indian tongues may be called “holophrastic,® from the practice of compressing a whole “sentence® into a “word,® the length of which is sometimes very remark¬ able. As an example may be cited the Micmac (Algonkian) yaleoolemaktawepokwose, <(I am walking about carrying a beautiful black um¬ brella over my head.® This word, according to Rand, is derived from pokwoson, “an um¬ brella® ; maktawde, “I am black® ; wolae, “I am beautiful® ; ydled, “I walk about.® From the Kootenay language may be cited : Ndtltldmkine, “he carries the head in his hand® (n , verbal particle ; dtl, “to carry® ; tldm, composition form of aaktlclm, “head® ; kin, “to do anything with the hand®; ine, verbal); hinupqandpine, “thou seest me® (hin, “thou,® subject pronoun; upqa, “to see®; ap, “me,® objective pronoun; ine, ver¬ bal). As typical incorporative languages the Iroquoian and Eskimo may serve. All the in¬ corporative forms of speech in America do not, however, proceed upon identical lines; and some that do incorporate, like Kootenay and Es¬ kimo, often have one or more cases. According to Dixon and Kroeber many Californian lan¬ guages do not possess the feature of incorpora¬ tion at all (such are, for example, Maidu, Porno, Yuki, etc.). As types of incorporating lan¬ guages less complete than Iroquoian we have Kootenay, Siouan, Aztecan. Some of the Central and South American tongues seem also to have little incorporation. Otomi and Maya appear to be evolving in somewhat the same direction as modern English, away from in¬ corporation and grammatical plethora. Many of the Amerindian

tongues are both prefix and suffix languages; others prefer prefixes, others, again, suffixes. Some possess, and some do not,

a plural form for nouns ; a dual ; gender-dis¬ tinction in pronouns ; a high development of demonstratives ; reduplication ; syntactical cases, etc. A few possess grammatical gender and some exhibit differences in the words used by men and women. In the matter of phonetics the languages of the American aborigines are remarkably divergent, some being extremely harsh, guttural and consonantic, others equally smooth, soft and vocalic. The absence of cer¬ tain consonant sounds and the equivalence of certain vowels and consonants characterize some forms of American speech. Euphonic changes are of major or minor importance. Sentence-construction differs greatly in various tongues. The position of the adjective is not always the same. The Haida language has even a distinction like that between our shall and will. Careful investigation of the many Indian lan¬ guages, as yet studied imperfectly, if at all, may reveal other interesting linguistic phenomena. How much has been written about and in some of the languages of primitive America may be seen from the bibliographies of Pilling! Our knowledge of them varies from a brief vocabu¬ lary of the Esselenian to the exhaustive dic¬ tionary of Yahgan compiled by Bridges. The native literature runs from the unrecorded tales of the northernmost Athapascans to the poetry of the ancient Mexicans and Peruvians, some of which has been handed down from pre- Columbian times. The only actually phonetic (syllabic) alphabet now in use among the In¬ dians (except the syllabaries introduced by missionaries among the Athapascans, Crees, etc.) is post-Columbian — the invention of a half-blood Cherokee. A sort of alphabet has, however, sprung up more recently among the Winnebagos. The development of picture¬ writing varied very much among the numerous tribes, as may be seen from Mallery's classic study of the subject. Sometimes, as is the case with the Kootenays, ability to draw does not seem to have been accompanied by exuber¬ ant pictography. The Walum Olum of the Delawares, the "calendars® of the Kiowa, Sioux, Pima, etc., are special developments of primi¬ tive records, the highest form of which is seen in the manuscripts ("books®) of the Aztecs and Mayas of a religio-historical character. The pictographic records of the Ojibwa "medicine men® have been studied by Hoffman, and the rite-literature of the Cherokee by James Mooney. The native literature of primitive America has been the subject of special mono¬ graphs by Dr. D. G. Brinton. The Spanish- American countries have furnished several writers and investigators of Indian descent.

There might be mentioned here also the "Chinook Jargon® of the

Columbia River re¬ gion, the “Ligoa Geral® of Brazil, and the minor jargons and trade languages of other sections of the continent, which prove how the Indian has compelled the white man, more or less, to use his language in some form or other for the purposes of friendly or commercial intercourse.

Religion. — The mythology and religion of the American Indians have received particular treatment at the hands of Muller, Brinton, Powell, etc. Perhaps the most general myth of importance is that of the divine hero, teacher and civilizer, who, after accomplishing his labors, leaves the earth, promising to return

at some future time. This myth is found in Mexico (Quetzalcoatl), Yucatan (Kukulkan), Colombia (Bochica), northeast North America (Manabozho, Gluskap, etc.). Somewhat analogous is the myth of the twin reformers of the primitive world among the Pueblo Indians, Navahos, etc. The Iroquoian stock have the myth of the contest of the good and bad mind. The Algonkians have a myth-circle of the rabbit, the tribes of the northwest Pacific coast one of the raven and thunder-bird, the Rocky Alountain peoples one of the coyote, the Bra¬ zilian Indians one of the jaguar, etc. Some of the tribes are very rich in animal myths and, as Mr. Mooney asserts, the characteristic tales of ((an (Uncle Remus) nature® found among the Cherokee and other peoples have not, as many suppose, been borrowed from the negroes of the South. Even the famous (

The (

family mark, — of certain Algonkian tribes has given rise to theories of ((iotemism,® concern¬ ing which there is much dispute in the world of science. “Fetishism,® as exemplified in the Zunis, has been investigated with some detail by Cushing. Cannibalism (the word cannibal is the corrupted form of a South American tribal name) has been rarer in America than is generally believed. Outside of its occurrence through necessity in ways known to civilized peoples, it was chiefly partial and ceremonial. Epicurean cannibalism flourished along the coast of South America and on some of the Caribbean islands ; ritual cannibalism among certain tribes of the northwest Pacific coast, in ancient Mexico, etc. The almost extinct Tonk- aways of Texas have the reputation of being the “last of the cannibals,® while the Attacapas owe their name to this practice attributed to them

by their neighbors. In the legends of the Cree and Ojibwa tribes of the Algonkian stock, a cannibal giant (wendigo) figures, and a horror of human flesh eating is expressed at the pres¬ ent time, whatever may have been the case in the past. From the condition of human bones and other remains in the shell-heaps of various parts of the coast, some authorities have come to the conclusion that cannibalism did exist in prehistoric ages among some of the Indian tribes. Religious ideas approximating to mono¬ theism are attributed by some chroniclers and investigators to some of the more enlightened aboriginal rulers of Mexico and Peru. In these regions of the continent, as also in Cen¬ tral America, architecture and the arts of com¬ memoration and record were at the service of religion. See American Mythology; Folk¬ tales and Myths of American Indians.

Amusements.— The games of the American aborigines, some of which, like lacrosse, have passed over to their conquerors, are of socio¬ logical and religious significance in many in¬ stances. Stewart Culin has made a special study of the games of the North American Indians, and rejects the theory favored by Tylor and others, that many of them (for example, Mexi¬ can patolli), are imports from Asia. The games of the civilized Aztecs seem to be but (

Arts and Inventions.— The arts and inven¬ tions of the American Indians correspond to the extent and variety of their environment. The mass of the inhabitants of the continent at the time of its discovery were hunters and fish¬ ers, or agriculturalists of the Stone Age, most of whom had some knowledge of pottery-mak-

ing. The house followed the lines of climate and culture, from the snow iglu of the Eskimo and the rude wickiup of the Utes to communal houses of the Mohegans, the Iroquoian <(long- house,® phalansteries of the Pueblan and Cen¬ tral American areas, and the stone dwellings of a more or less pretentious sort of the civil¬ ized peoples of Mexico, Central America and Peru. The cavate lodges and cliff-dwellings of Arizona and New Mexico, the wooden (sometimes underground) houses of the north¬ west Pacific coast, the skin-tents of the plains tribes and the wigwams of the Algonkians, the earth-lodges of the Mandans, etc., correspond to environmental stimuli. A like variation may be seen in the cradles of the American aborig¬ ines, studied by Mason, and in their means of transport on the water, — kayaks, <(bull-boats,® woodskins and balsas, dug-outs, canoes of

pine and birch bark, large and small, and of all vari¬ eties of design and finish. In North America the Algonkians and Iroquois, and in South America the Indians of the great Brazilian water-ways, have made themselves celebrated for their skill in navigation. So too has the Eskimo with his kayak and the Peruvian with his balsa. The Algonkian Etchemins are liter¬ ally (

As Mason has pointed out, the Amerindian traps and other devices for the capture of wild animals indicate intellectual skill and marvelous adaptation to the habits and actions of these creatures. The Eskimo harpoon and its appur¬ tenances, the simple and composite bow, the arrow-poisons of some North American and many South American peoples, the manufac¬

tures of obsidian and jade in ancient Mexico, cotton weaving and dyeing in the more south¬ ern regions, maguey-paper making in Mexico and Central America, stone carving (from Mexico to the Argentine), feather-work (in the southern United States, Mexico, Central Amer¬ ica and parts of South America), gold working (in the Isthmian region, Colombia, etc.), the hammocks of the Venezuelan tribes, the fish¬ poisoning devices of many peoples of South America in particular, the fine pottery of many regions of the continent, the quipus or knotted record-strings of the ancient Peruvians, the primitive drum-telephone of certain Brazilian Indians, the blow-gun (southeast United States and South America), cassava preparation (northern South America), the bolas of the Pampean tribes, etc., represent the diversity of invention and manufacturing skill among the American aborigines. The lamp of the Eskimo and some of the Indian tribes of northwestern North America is sui generis (its importance has been emphasized by Hough). Methods of computing time, season, etc., vary from the slanting stick of the Algonkian Naskopi to the elaborate calendar systems of Mexico and Cen¬ tral America. Of musical instruments, the drum, the flute, the pan-pipe, and the (

some tribes tobacco was more or less of a sa¬ cred plant, also the mescal.

Position of Woman. — The relation of wo¬ men to agriculture gave them a higher standing with certain tribes than would otherwise have been the case. With the Iroquois the position of women was very high and to them was allotted a considerable share in the government,

peace negotiations, etc., and female chiefs were by no means unknown — women were the “mothers of the nation.® . Among the Mayan peoples of Central America woman’s position was also high. Many of the priests were Women, and they were also commonly the lead¬ ers of their tribes in rebellion against the Spaniards — the most famous was Maria Can¬ delaria, <(the American Joan of Arc,® who led the insurgent Tzendals in the 18th century. In ancient Mexico and Peru the position of Woman was perhaps not quite so high. Among some tribes the position of woman was very low, and her sexual peculiarities added to the disesteem in which she was held, as for ex¬ ample, among the Tacanan Araunas of Bo¬ livia. The Athapascan tribes vary much in their treatment of woman — with some she is little better than a slave or servant, while with at least one Alaskan people of this stock fe¬ male chiefs existed at times. The “purification® of women at the period of their menses, and the segregation of girls at the time of puberty, were accompanied with many rites and cere¬ monies among various tribes from the rude Athapascans to the civilized Aztecs. The curi¬ ous custom of the couvade (imitative child-bed on the part of the husband) prevailed among many Venezuelan, Guianian and Brazilian peo¬ ples. The relations between environment and the share of the sexes in culture has been investigated by Mason; according to whom the zenith of virile Amerindian art is reached in Peru, while in Colombia we find woman as farmer, weaver and potter. In the Oregon- California region one art, basket-making, reaches its acme of development in the hands of woman. A large female influence in reli¬ gion is noticeable among the Pueblo Indians. Among some tribes, for example, the Hurons, the weregild for killing a woman was greater than that for a man. Some sort of matriarchal system, with maternal descent, prevailed very commonly in pre-Columbian America; among certain of the Koloschan Indians, for example, a man was considered to be in no sense related to his father, his sole parent being the mother. Besides this extreme form, numerous other varieties occur among the tribes now existing, the system in vogue among the Iroquois, etc., being more complicated and adapted to social needs. The systems of marriage known to the American Indian varied from the absence of any particular rite or ceremony to selection of the wife by the old women of the tribe, as among the Hurons, or the uniting of the couple by the “medicine men.® Some of the tribes of the Brazilian forests, ranking very low in cul¬ ture, are strictly monogamous ; while peoples of higher civilization, like the Chibchans, Mexi¬ cans, Peruvians, etc., were polygamous or con- cubinative, or both. Marriage by purchase was found over a large area of America; but here as in other parts of the globe, the “money® received was often rather a compensation to

the parents for the loss of their daughter than a real sale of her to a suitor. Divorce, in many forms, is known to the primitive Amer¬ icans, both by mere word of the husband and according to set forms and rites. Consan¬ guineous marriages were strictly avoided by many tribes ; but among a few, such as some of the lowest Athapascans, incest was not con¬ demned. In the matter of the sex-relations, as in many other fields, the American Indians exhibit almost all possible phases from the monogamic chastity of some of the lowest peo¬ ples to the unnatural indulgences of the Peru¬ vians. Runaway matches and marriages for love, in spite of the contrary opinion entertained by some authorities, have been by no means un¬ common throughout the continent. Suicide on account of unsuccessful wooing by both sexes is also not at all rare. Some peoples, too, have developed love-songs of a romantic order, for example, the yaraveys of the Quechuas.

Government. — The systems of government of the American Indians and their tribal organ¬ izations range from the simple democracy of the Kootenays and some of the Brazilian Indians to the elaborate state institutions of the ancient Mexicans and Peruvians, which in several re¬ spects resembled the corresponding institutions of Mediaeval Europe or the ancient classic world. The power of the chief, however, seems everywhere to have had limitations, and some tribes distinguished the permanent peace chief and the temporary war chief. Chiefs were gen¬ erally elected, either from the body of the tribe or from certain specified families. “Totemism® and secret societies are not found to any extent, if at all, among certain tribes (the Kootenay, for example) ; while with many of the peoples of the northwest Pacific Coast they are perhaps the chief feature of aboriginal society, as Boas has recently shown. Property rights are represented in many stages, from the semi-anarchic Eskimo to the Aztecs of Old Mexico and other peoples of Central and South America. Slavery existed among many tribes, and on the northwest Pacific Coast a sort of traffic in human chattels had arisen. See Slavery.

Trade and Commerce.— Within the spheres of the culture-centres of Mexico, Central Amer¬ ica, Peru, etc., trade and commerce were well developed. The Columbia River region was the scene of a less developed trade; while the south¬ eastern United States, the region of the Great Lakes and country west and south of them, had also their important distributing points. The region of Bering Strait was likewise an Asiatic- American commercial centre.

Education. — With the lower tribes gener¬ ally, such education as was imparted to the children was given by the father to the boys and by the mother to the girls. People like the Iroquois, the Siouan Omahas,

etc., used the instruction of tales, legends and proverbs. The ancient Aztecs and some of the other semi- civilized peoples of Mexico and Central Amer¬ ica had schools for boys and others for girls, in which the duties proper to each sex were taught under the supervision of the priests.

Physical Characteristics. — The physical characteristics of the aborigines of America mingle uniformity with diversity. The skin color, popularly styled “red® or “copper,® is

-

1

, ^

designated by Mantegazza, <(burnt coffee,® and by Brinton, ((brown of various shades, with an undertone of red.® This but varies from rather dark to rather light. Among the lighter tribes have been reckoned the Koloschan Tlinkit, the Bolivian Yurucari, etc., and among the darker the Charmas of the Gran Chaco, the Bolivian Canisianas and a few other tribes of South and Central America. The hair is generally termed ((black,® but, as Brinton notes, there is in it <(a faint under-color of red,® which shows up more in childhood and seems much more prominent with certain tribes than with others. Red hair is known among American Indians, but in some cases (certain South American tribes, for example), its occurrence may be due to infusion of white blood. The eyes of the Indi¬ ans are, with rare exceptions, dark brown. The stature varies from rather low to rather high, represented on the one hand by some of the shorter Brazilian tribes and on the other by the Patagonian ((giants.® Among the peoples presenting many individuals of tall stature may be mentioned the Yumas and Pimas, some of the Muskhogean tribes, some of the Crees, Ojibwa and eastern Algonkians, Pawnees, Iro¬ quois, Siouans, Huaveans, Ramas, some of the Cariban tribes, Yurucari, Cayubabas, Guaycu- ruans, Patagonians, etc. So far as is known no dwarfish people comparable to the dwarf races of the Old World existed in America, although the skeletons from certain Peruvian tombs prove the existence of a dwarfish element in the gen¬ eral population; and the stature of many indi¬ viduals among certain

Brazilian tribes is so low as to induce some authorities, with Kollmann, to predicate the former existence of a dwarf race. In the relations of trunk and limbs and in the relation of one limb to another many variations occur among the Indians, due to occupation (canoeing, etc. — and, since the advent of the whites, horse-riding). In primi¬ tive America all the chief forms of skull (often with artificial flattening, etc.) are found. Among the dolichocephalic (long-headed) peo¬ ples are the Eskimo and Iroquois generally, some of the Muskhogean tribes, Otomis, Aymaras (partly), Tapuyas and Tupis (largely), etc. Of the brachycephalic (broad-headed) may be mentioned the Araucanians, Caribs, Arawaks, Patagonians, Mayas, many of the tribes of the Pacific Coast region of North America, etc. The civilized peoples of Mexico, Central Amer¬ ica and Peru appear to have been of stature below the average and of varied skull form tending to brachycephalic, indicating mixtures of types. In the Columbia River region type- mingling is indicated also by both stature and skull-form. The Peruvian region is another centre of race-mixture, as evidenced by skull- form. The oldest skulls discovered in pre¬ historic burial-places or in geological situ are not distinct from the American types — the latest found, the ((Lansing skull,® is quite In¬ dian. The skull capacity of the Indian is below that of the white in general, but many excep¬ tions occur. The brains of the less cultured Indian peoples (Fuegians, Eskimo), show no decided anatomical inferiority to those of civilized Europeans. Great varieties of build and set of body are found among the American Indians, from the half-starved Fuegians to the well-fed and corpulent Iroquois. Small feet

and hands are very common. Among many tribes in various parts of the continent hand¬ some men and women of considerable beauty are to be found. In the case of women, an admixture of white blood often enhances their beauty.

Race-Fusion. — The intermingling of the American Indians with the intruding white race has been much greater than is generally be¬ lieved. The extent of this fusion of races varies from certain parts of North America with their classic Pocahontas examples to Uruguay, in South America, where 90 per cent of the popu¬ lation are said to be of mixed blood. The Eskimo of Greenland have intermarried with the whites (Danish fathers, native mothers), so that except in the parts remote from settlements no pure-blood Eskimo exists; and the same is true of a good deal of Labrador, where the contact has been with fishermen of English descent. The M'icmac, Abnaki and related Algonkian tribes of Maine, New Brunswick, etc., have a large admixture of white blood (French fathers, native mothers), and all over Canada and the northwestern United States in the early days of colonization

and exploration the French traders, trappers, voyageurs and coureurs des bois mingled freely with the native women, par¬ ticularly those of the various Algonkian peoples of the Great Lakes and the West. The Hud¬ son's Bay Company, by introducing employees of English and Scotch descent into the Can¬ adian Northwest, made possible other metis, of which those of Scotch descent on the father's side are said to be healthy and sturdy speci¬ mens of humanity with more than ordinary capacities. As indicated by the present condi¬ tion of the Iroquois on the reservations in Quebec, Ontario and New York, some infusion of white blood has taken place from very early times. Here the combination of white mother (often an adopted captive) and native father is more common than is usual ki race-mixture. The Cherokee had an admixture of white blood in ante-Revolutionary days, to which Mooney attributes much of their culture-achievements since that time. In Mexico, Central America and South America generally, as Talcott Wil¬ liams has very recently noted, the half-breed element is very large indeed, for the native population was never exterminated by the whites as some histories still teach. Of the 40,000,000 inhabitants of South America it has been estimated that less than 10,000,000 can lay any claim to pure white blood. There is reason to believe that the future of some of the South American countries will be as much in the hands of the Indians as in those of the whites. In Mexico, parts of Central America, Colom¬ bia, Peru and Chile, the strain of Indian blood represents able and intellectual aboriginal peo¬ ples. In certain parts of South America, and, sporadically in northeastern North America, in¬ termingling of Indians and negroes has oc¬ curred, giving rise to the so-called Cafusos, etc., of Brazil, and a few other small groups. The mixture of white-Indian-negro is also found here and there. In some of the Spanish- American countries there is a special vocabu¬ lary to designate the numerous degrees of metissage. In the Canadian Northwest the half-breeds have taken a prominent part in the development of the country (one noted metis,

Norquay, was premier of the province of Mani¬ toba), and they are likewise noteworthy in the annals of the northwestern United States. In Mexico and Central America, not alone the metis but the Indians themselves have pro¬ duced celebrated men. Juarez, the liberator of Mexico, a really great man, was a full-blood Zapotec and President Barrios of Guatemala a Cakchiquel (Mayan stock).

Treatment by Whites. — The ill treatment of the American Indian by the whites has often been such as to stamp with eternal dis¬ honor the conquering race. Massacres, broken treaties, land-robbing, commercial swindles, etc., mark the path of advancing civilization. English, Dutch, French, Portuguese and Span¬ ish have all been guilty at some time or other. The English in Newfoundland, the Americans in the West, the Castilians in northern Mex¬ ico and Yucatan, have exterminated or sought to exterminate whole tribes. We must, how¬ ever, believe that the accounts of the early chroniclers concerning the ˆmillions® of In¬ dians slaughtered by the Spaniards were the customary exaggerations of those who sing the victor's deeds. Peru and Mexico, for exam¬ ple, would not contain so many Indians to-day were those stories literally true. Against the centuries of dishonor in the treatment of the Indians by the whites we may place the efforts of missionaries of all faiths, from the good Las Casas in New Spain to Duncan of Met- lakahtla. The Jesuits among the Iroquois and Algonkians in North America, the Moravians among the Eskimo and some of the Algon¬ kians and Iroquois, have all done good work, which only the incapacity or worse of govern¬ mental authorities has made null. The missions in California and the deductions® in various parts of South America (Paraguay in particu¬ lar) might have succeeded- in keeping the In¬ dians gentle and loyal sons of the Church had the good fathers been forever in charge, but the oncome of the more strenuous life of the whites doomed them to helplessness. The story of the Paraguayan experiment is one of the most interesting in the annals of mankind, but also one of the most disheartening. Against such failures a few bright spots may be set, — the Fuegian mission for example. A better treatment of the Indians still within the borders of the United States has been in progress for several years. See Indian Affairs.

Influence on Civilization. — The contribu¬ tions of the aborigines of America to the world's stock of civilizing factors and influences are much more numerous and of greater im¬ portance than is generally thought. Besides the innumerable place-names in all parts of America of Indian origin, the Algonkian, Peruvian, Brazilian, West Indian, Guianian, Venezuelan and Mexican words in English, French, Spanish and Portuguese (whence many of them have spread into all the civilized lan¬ guages of the world) are able remembrancers of the conquered race. The literature of the Spanish-American countries and of Brazil has been more or less affected by the stimuli of native theme and treatment. Many of the old dances and folk-customs still survive even where Christianity has been at least outwardly accepted and have sometimes been adopted by the descendants of the European colonists. The (Hiawatha) of Longfellow and the tales and

dramas based upon the deeds, adventures and romantic episodes in the lives of King Philip, Pocahontas, Pontiac, Tecumseh, etc., to say nothing of the novels of Cooper and his suc¬ cessors, indicate that the Aryan mind of the Anglo-Saxon order has found treasure in the Amerindian soil. In Mexico and other parts of Spanish America the cathedrals and other religious edifices, by intention or by happy chance often occupy sites sacred to pagan dei¬ ties ages before Columbus' discovery — so the new religion gathers strength from the old, and the dislocation of faith so common in Protestant countries is avoided to a very large extent. Of more material things, we owe largely to the Indian the paths over which our highways and our railroads run, while many of our cities and towns have only sprung up on the old camp-sites of our predecessors. The great importance of some of these <(Indian ways® in the history of the United States has been pointed out by Hulbert. The Indians* knowledge of the great water-ways of the country, of portages and trails through forest and over mountain, has made possible coloniza¬ tion and settlement otherwise utterly out of the question. Indian hunters and fishers, scouts, guides, canoe-men, carriers and packers, in all sections of the American continent, have been indispensable to the progress of white civiliza¬ tion. Nor have Indian slaves and servants been few or without social significance in some quarters; while French, Spanish and English have at times availed themselves of the services of Indian warriors, — the Iroquois enlisted for the North and some of the Cherokee for the South in the Civil War, and then the govern¬ ment has sometimes set one tribe off against another. In Canada and part of the northwest of the United States, where commingling of the races has taken place, the civilization of the land owes even more to the half-breed,, voyageur, coureur des bois, etc, than to the Indian himself. See Canada — Population; Racial Distribution and Immigration.

Throughout the continent — more especially, however, in parts of South America — devices for hunting and fishing and appliances in wood¬ craft, primitive agriculture, etc., were trans¬ ferred to the European colonists during the period of settlement, and many of them are still in active use. Fish-poisoning by narcotics, the use of the blow-gun for killing birds and small animals without damaging the skin, methods of stalking beasts of the chase, cer¬ tain traps and snares, etc., belong here. In connection with agriculture we have menhaden-manure, guano, etc., the planting of corn and beans or pumpkins together, the burning over of land before tillage, etc. But it is upon the food-supply of the world that the American Indian has exerted the greatest influence. Potatoes (common and sweet, both), maize and the

tomato, now in use by all the civilized world, were first cultivated bv him and taken over by the whites after the discovery. Cacao, vanilla, jalap, the kidney bean, several varieties of squash and pumpkin, manioc, Jerusalem arti¬ choke, coca, agave, quinoa, persimmon, and perhaps also the peanut, came to us from the Indians. Maple-sugar and maple-syrup, pem- mican, jerked beef, etc., are from a like source. Tobacco, the great narcotic, was one of the first gifts of America to the Old World. Of

drinks the American Indian has given us Paraguayan mate, <(Labrador tea® and several other like concoctions, chocolate, Mexican pulque and a considerable number of oth.er in¬ toxicating beverages from South America.

Many medicines and medicinal plants were made known to the whites by the Indians, and in the era of settlement and colonization the (

Antiquity of Man in America. — The ques¬ tion of the antiquity of the American Indian culture is difficult to settle satisfactorily. Time must be allowed for the divergence of the origi¬ nal stock into numerous (more numerous in pre-Columbian eras) tribes and peoples inhab¬ iting America at the time of its discovery, — time for the production of the Eskimo and the Iroquois, the Carib and the Patagonian. Time, again, must be allowed for the development of the Aztec from the primitive Shoshonean, the Mayan from the rude stock of that people, the Chibchan from the savage .Bolivian, the Peruvian from the ancient barbarian of equa¬ torial America. Then the civilizations of Mex¬ ico, Central America and South America as such probably took ages to rise and flourish. Town and village life, with all its social and religious implications, the differing architectural monuments of the various centres of American civilization, etc., did not spring up in a day, any more than did the culture of mediaeval Europe. The domestication of the dog, the llama, etc., the change of maize, tobacco, the squash, the tomato, the potato, the pineapple, etc., from wild to cultivated plants, require a long lapse of time. Moreover, it is now known

that American Indian languages do not now change and have not in the past changed at the fast rate once assigned to them by philologists. So, while one may not believe that America was the original habitat of the human race, he may be certain that very many millenniums have elapsed since the ((Red Man® began his career as the autochthone of

the New World. There seems every reason to believe that at the close of the Glacial Age man had spread over a considerable portion of both North and South America and was contemporary with European man of an early epoch. To calculate man's residence in the American environment by years is impossible on present evidence. Dr. Stoll assures us that the linguistic phenom¬ ena met with in the Mayan dialects alone re¬ quire thousands of years for their evolution, and some of the results deduced from the Mayan hieroglyphs by certain investigators imply the existence of civilization of the Cen¬ tral American order for very many millenniums. Perhaps it is fair to say that man has been in America at least 25,000 years and not more than 200,000, and that the civilizations of Mex¬ ico, Central America and South America were probably as long-lived as those of Rome, Greece, 'etc. They were also in many respects just as typical of human attempt and achieve¬ ment, for the American Indian was a man as we are men.

Bibliography. — Bancroft, H. H., (The Native Races of the Pacific States of North America> (New York 1875-76) ; Bandelier, A. F. A., (The Romantic School in American Archaeology) (New York 1885) ; Bates, H. W., (Central America, the West Indies and South America) (London 1878) ; Brinton, D. G., (The American Race) (Philadelpia 1901) ; Brownell, C. De W., (The Indian Races of America) (Boston 1855) ; Burke, E., (An Account of the European Settlements in America) (Dublin 1762) ; Cady, A. C., (The American Continent, and its Inhabitants Before its Discovery by Columbus) (2 vols., Philadelphia, 1893-94) ; Catlin, G., (North and South American Indians) (New York 1871) ; Delorme, S., (Les aborigenes de America* (Madrid 1894) ; Wil¬ liams, E. L., (An Alphabet of Indians) (New York 1900).

Anthropology : Campbell, J., (The Present Position of American Anthropology) (Ottawa 1895) ; Hrdlicka, A., (Beauty Among the Amer¬ ican Indians* (New York 1906), and (Physical Anthropology in America) (Lancaster 1914) ; Jenks, A. E., (Anthropology in the Western Hemisphere and the Pacific Islands) (Washing¬ ton 1913).

Origin: Adair, J., (History of the Amer¬ ican Indians* (London 1775) ; Bradford, A. W., (American Antiquities, and Researches into the Origin and History of the Red Race> (New York* 1842) ; Campbell, J., (Origin of the Aborigines of Canada * (Quebec 1881) ; Ken¬ nedy, J., (Probable Origin of the American Indians) (London 1854) ; McIntosh, J., (Origin of the North American Indians) (New York 1859) ; Short, J. T., (The North Americans of Antiquity* (New York 1880) ; Townsend, M. I., (Prehistoric Structures of Central Amer- ica) (Troy

1895) ; Wood, N. B., (Lives of Famous Indian Chiefs) (Aurora 1906).

Social Life: Catlin, G., (Life Among the Indians) (London 1874) ; Eliot, G. F. S., (The

Romance of Savage Life) (Philadelphia 1908) ; Hulbert, C., (Museum Americanum) (Shrews¬ bury 1823).

Miscellaneous : (Relations des Peres Jesu-

itesj (1902) ; Reports of Ontario Archaeo¬ logical Museum* ; (Reports of Committee of British Association on Northwestern Tribes of Canada* ; (Reports and Memoirs of Peabody Museum. * The Publications of the Bureau of American Ethnology,* embracing original mon¬ ographs by eminent specialists, are a lasting monument to the founder of the Bureau, the late Maj. J. W. Powell, to whom all students of the aborigines of the New World owe a debt of deepest gratitude.

Alexander F. Chamberlain, Late Professor of Anthropology, Clark Uni¬ versity. c. Leonard Stuart,

Editorial Staff of The Americana.

INDIANS, Canadian. There is no figure in history so picturesque as that of the North American Indian. The stormy life of the vari¬ ous nations or tribes, the concentrated cruelty of individual character combined with loyalty and honor in tribal relations ; the almost constant and bloody struggles between the tribal units, and the prolonged conflict with the white in¬ vaders of the continent; the complexity of the savage temperament in its mingled simplicity and guile, its courage and endurance, its treacherv toward foes and cruelty in war, its pride and prudence alternating with periods of insane recklessness and a humility akin to that of a beggar, its self-restraint and moments of unbridled rage, its strange conjunction of great¬ ness and littleness ; stamp the American aborig¬ ine as a most extraordinary human product. See Indians.

Character of the Indian. — History has yet to do him justice.. Cold and hard, passionate and revengeful, ignorant and superstitious, keen and quick in thought, he has yet in pre¬ civilization days never been guilty of the effemi¬ nate and meaner vices which destroyed peoples such as

the Romans or the Aztecs. Love of liberty in its wilder forms, and contempt for all arbitrary rule or personal control, he carried to an extreme greater than can be elsewhere paralleled. Sleepless suspicion of others was a part of his environment of war and treachery. As with nearly all savage races, his strategy was that of surprise, followed by ruthless and unhesitating slaughter. A product of primaeval conditions, he could not change his character without deterioration, or his mode of life with¬ out physical and mental injury. Civilization indeed has destroyed the Indian. In curbing his wilder passions it has usually developed the meaner ones, and the destruction of the environ¬ ment which made him the barbarous yet noble owner of a boundless domain has cramped his intellectual acuteness, starved his wonderful physical qualities, and fatally affected the code of morality which he undoubtedly possessed. Agricultural pursuits and a veneer of Chris¬ tianity may fit the survivors for life amidst new conditions, but the result of this development, in Canada at least, no more typifies the Indian of past centuries than the Greek of to-day is the true heir of Leonidas at Thermopylˆ or the modern native of Rome the just inheritor of imperial valor.

Distribution of the Indian Tribes. — When the first discoverers and explorers found their

way amidst the wilds of Canada, they came into collision with various Indian nations. The great family of the Algonquins extended right up through the centre of the continent. They formed the chief central race of early Canada, and reached in scattered masses from the At¬ lantic to Lake Winnipeg and from the Caro- linas to Hudson Bay. Cartier met them when he ascended the Saint Lawrence; the early Eng¬ lish settlers encountered them along the coasts of Virginia; the people of New England fought them under King Philip. William Penn made peace with them under the trees of the Key¬ stone State, and the French Jesuits and fur- traders found the same race in the valley of the Ohio, on the shores of Lake Superior and at the rapids of Sault Sainte Marie.

Of this race were the Delawares and the Shawnees. The latter were a strange and wan¬ dering people, whose location it was always difficult to fix, but who are known to have more than once come into conflict with the French of Quebec. They eventually settled on Cana¬ dian soil and played a brief but imuortant part under Tecumseh in the War of 1812. The for¬ mer were at one time conquered by the Iroquois and compelled to bear the opprobrious Indian name for women, but in one of the French and English wars they recovered at once their courage and their position by espousing the side of the

French. Other branches dwelt along the Canadian shores of the Atlantic and in the wastes north of Lakes Michigan, Superior and Huron. The latter tribes included the Ojib- ways, Pottawatamies and Ottawas, who at one time formed a sort of loose union and offered a temporary but for the time being an efficient check to the course of the Iroquois conquest. In this region also were the Sacs, the Foxes and other smaller divisions of the Algonquin race. Other branches in Nova Scotia were known as the Micmacs, in western New Bruns¬ wick as the Etchemins, in Quebec as the Montagnais, and in the Far North as the Nipissings.

The Iroquois or Five Nation Indians stretched across what afterward became the State of New York into Ontario and Quebec, and included the Mohawks, Oneidas, ' Onon- dagas, Cayugas and Senecas. Though united in a sort of loose confederacy and by a system of clanship, they seem to have had no clearly de¬ fined and continuous ruler, but to have trusted their joint affairs to the central. council at Onon¬ daga. And, though numbering only about 4,000 warriors in their day of greatest power, they were able to make the name of the Five Nations a word of terror to all the tribes from Quebec to the Carolinas and from the Far West to the Atlantic shores. To the French and the American colonists they were a continuous source of dread, while to the English forces in Canada at a later period they became an arm of military strength a little difficult to define in degree.

A people not inferior in courage but not nearly so aggressive in character as the Iro¬ quois were the Hurons, whose name is so well known through their intercourse with the French Jesuit missionaries. Their population is estimated by Parkman as having been about 10,000 souls, though other writers place the number at double that figure. In the superior nature of their dwellings, in their manners, cus-

Indians at Calgary, Alberta, Canada

STONY INDIANS WEARING RICH OTTER AND ERMINE TROPHIES

toms and superstitions, they closely resembled the Iroquois. They met destruction at the hands of that great confederacy, and after 1680 disappear from view, except in a few isolated settlements under French protection. The Neutral nation, living along the north shore, of

Lake Erie and remaining for a long period neutral between the Hurons and the Five Nations; the Andastes, dwelling in fortified vil¬ lages in the valley of the Susquehanna; the Eries, living in the vicinity of the lake which bears their name, were all of kin to the Iro¬ quois, and were all in time conquered and practically destroyed or incorporated by that most powerful of the savage nations of North America. Then followed the conauest of the Delawares, or Lenapes, and the expulsion of the Ottawas from the vicinity of the great river which bears their name. In 1715 the Iroquois were strengthened by the admission of the Tuscaroras, a warlike people of admitted kin¬ ship, to the confederacy, as a sixth nation.

The original population of these various tribes and races and nations of kindred origin can, of course, only be estimated. Garneau, in his (History of French Canada,* puts the Al¬ gonquin total at 90,000 souls, the Hurons and Iroquois together at about 17,000, the Mobiles of the Far South at 50,000, and the Cherokees, of what is now the centre of the United States, at 12,000. His total is 180,000 for the greater part of the continent, and in view of the constant condition of warfare in which they were in¬ volved, and the statements of travelers like Car- tier, Joliette, Marquette, De la Jonquiere, etc., it is probably not underestimated. Even as it is, however, the fact of the dominating power of a few thousand Iroquois during so many years affords an interesting illustration of the effects of military skill and preparedness under savage conditions.

Habits, Customs and Appearance.— In

conduct it should be remembered the early In¬ dian was kind and hospitable to the exploring European. The Jesuit and Recollet mission¬ aries, in what is now Canada, bear testimony in many cases to this fact. Hakluyt, in his account of Cartier's first visit to Hochelaga (1535), says that ((the Indians brought us great store of fish and of bread made of millet, casting them into our boats so thick that you would have thought it to fall from Heaven." The personal appear¬ ance of the Indians, their customs and beliefs, have been often described, and with most vary¬ ing degrees of accuracy or the reverse. The fact is that changing conditions brought about frequent changes in manners and appearance. The Huron, or Wyandotte, in days when he was a successful rival of the Iroquois, could hardly be recognized in the fearful and unag- gressive convert of the missionaries during the years of his final struggle and disappearance. The Delawares, in their period of active life and power, were not the same people as the subject slaves of the Iroquois, nor were the latter in their earlier times of peace and trade like the fiery savages whose conquering warwhoop

be¬ came a signal of death from the Great Lakes to the Mississippi.

The Indian races of Canada were emphat¬ ically the product of nature, however, and amongst them all were similarities which stamped them as of the same origin and as possible descendants of Migrating Tartars from

the Steppes of central Asia. They were as a rule tall and slender and agile, in form, with faces bronzed by sun and rain and winds. Their expression was stern and sombre, seldom or never marked with a smile. Their heads had high cheek-bones, small sunken and keenly-flashing eyes, narrow foreheads, thick lips, somewhat flat noses and coarse hair. The senses of sight and sound and feeling were developed into a sort of forest instinct which seemed almost superna ural to the first white settlers. Their costumes of deer-skin and moc¬ casins, their necklaces of wampum, beads or shells, their ornaments of feathers and claws and scalps are well known, as is the vermilion paint with which they delighted to daub their faces and bodies. The only weapons they pos¬ sessed before the Europeans came were the arrow and tomahawk. Hunting and fishing were their occupations, war their pastime. All these pursuits made permanence of dwelling very difficult and involved naturally a life of almost ceaseless wandering.

Religions and Superstitions of the Indian. — Their religion was always a peculiarly mixed quantity. Champlain states that the Micmacs had neither devotional ideas nor ceremonies. Other tribes assured him that each man had his own god whom he worshipped in silence and secrecy. They seem, however, to have all worshipped something — whether the spirit of good, the spirit of evil, the spirit of storm, the god of war, the spirit of the mountains or a spirit of the waters. Sacrifices were not un¬ common, and Father Jogues is authority for having seen at least one human sacrifice amongst the Iroquois. How far they really worshipped one Great Spirit is a matter of un¬ certainty, and it has been claimed that the early missionaries suggested to their minds an idea which they were quick to absorb through the questions and answers naturally given. However that may be, there can be no doubt of their intense belief in spiritual manifesta¬ tions and interventions. They peopled the very air with friendly or hostile spirits, and raised amongst themselves those powerful manipula¬ tors of superstition — the medicine men — to control the surrounding demons of storm and famine, disease and death. To the same men were given the care of the sick, and mixed up with much that was harmful, there were no doubt many simple remedies used supple¬ mentary to a mass of incantations and supersti¬ tious mummery. Dreams they put great faith in, and oratory held a place of

honor secondary only to personal prowess. But the chief of all important customs of the Indians turned upon war and its occasionally brief concomitant, peace. A struggle between two tribes of nations could be brought on by the most trivial cause, or by almost any ambitious and restless individual. When determined upon, it became the source of uncontrollable joy, of wild dances, of eloquent harangues, of multitudinous prayers and sacrifices, of feasts and endless bravado and boasting.

Relations with the French and English. —

In the wars between the French and English and Americans which devastated parts of North America during nearly 300 years, the Indians exercised a large influence and, had they been united, might more than once have expelled the white invader altogether. The Indians

found the French more congenial, but preferred the English to trade with, as they paid better prices. In their efforts to secure the suppres¬ sion of the liquor traffic, the French bishops and missionaries were brought into conflict with the traders, who on their part urged that if they did not obtain brandy (and orthodoxy) from the French they could obtain rum (and heterodoxy) from the Dutch and English. Roughly speaking the Algonquins and Hurons stood by the French, the Iroquois and some minor nations by the English. When the Five Nations had beaten the Algonquins and destroyed the Hurons, they turned their atten¬ tion to the French, and several times brought the settlements on the Saint Lawrence to the very verge of destruction. After the suprem¬ acy of England seemed finally established there existed for some years a sort of brood¬ ing trouble. The New England colonists had never treated the Indians upon their borders well, and the result had been a long series of reprisals and wasting war. Greedy traders and unscrupulous speculators in land had robbed the Indians of their intellect by brandy, and of large tracts of land by fraud. The American Colonies, indeed, claimed the whole soil, and without British permission, though in the king's name, made frequent and large grants of Indian territory and then seemed surprised when the tomahawk and scalping-knife were used in re¬ sponse by the untutored savage. Finally, land regulations were made by the home govern¬ ment which to some extent stopped this sort of lawlessness, and were respected in Canada, though more or less disregarded in the

Thirteen Colonies as the spirit of local revolt developed. Sir William Johnson, of the Mohawk Valley in New York, was appointed superintendent-gen¬ eral of Indian affairs, and he did his best to enforce these regulations.

When the Thirteen Colonies plunged into revolution the majority of the Indians stood by Great Britain. Those who did not take an active part with the Iroquois stood aloof — with the exception of the Oneidas and Tuscaroras — and refused all the efforts of Congress to obtain their co-operation. At the close of the war (1783) the Iroquois were given large grants of land by the British government and, under the guidance of Joseph Brant — Thayendanegea — the brilliant chief who had led them throughout this period, settled in various parts of the new province of Upper Canada. In 1812 many served again under the British flag, while other nations and tribes were brought together by the martial spirit and influence of Tecumseh — a leader who fills an interesting place in Ca¬ nadian history. Since then the Indians of Canada, with the exception of a very few who were led astray by Louis Riel in the Northwest troubles of 1885, have lived at peace amongst themselves and with the white men, and have been trying to become accustomed to a life of monotonous civilization and, to them, somewhat degrading labor.

Indians of the West. — The Western In¬ dian, under the long and reasonably wise ad¬ ministration of affairs in what are now the provinces of Manitoba, Saskatchewan and Al¬ berta, by the Hudson's Bay Company, acquired characteristics different from those of other parts of the Dominion. They were not in such a state of tutelage as in Ontario; they were

trusted in the matter of supplies and the trust was rarely abused; they became an easy-going, light-hearted people, with something of the white man's shrewdness in trade and all of the native's agility on foot or in a canoe. When the old order passed away in 1871 and the country was acquired by Canada, there was much ferment, but it gradually gave way before the wise treaties, made from time to time, allotting on behalf of the Crown certain reserves which were selected by joint action, on a basis of 640 acres for each family of five, and administered with, upon the whole, fairness and justice by government officials. These treaties were as follows :

Indians

No. Year District, etc., dealt with concerned

I. 1871 Province of Manitoba. . . 3,270

II. 1871 Lake Manitoba, Souris and Moon

Mountain . 2,185

III. 1873 Lake of the Woods, etc. (55,000 square

miles) . 2,673

IV. 1874 Lake Winnipeg to Cypress Hills

(75,000 square miles) . 6,886

V. 1875 Lake Winnipeg and river Saskatche¬ wan (100,000 square miles) ..... 3 , 182

VI. 1876 Plain and Wood Crees. Upper Sas¬ katchewan (120,000 square miles) . . 6,622

VII. 1877 Blackfeet of Bow River (35,000 square

miles) . 7,681

VIII. 1899 Peace River Valley (342,700 square

miles) . 3,733

IX. 1905-06 Indians of the Albany River and James Bay and north of watershed

of Lakes Superior and Huron . 2 , 047

X. 1906 Crees and Chippewayans of northern

Saskatchewan . 723

These Western Indians were, and are to some extent, divided into a series of loose confed¬ eracies — the Blackfeet, including the Bloods, Piegans and Blackfeet; the Sioux, including the Stoney or Assiniboine tribe and various branches of the Sioux; the Cree, including the Plain Crees, the Wood Crees and the Muske¬ gon Crees; the Ojibway Confederacy. In Brit¬ ish Columbia the Indians at the present time number about 25,000 and are lowest in the scale of the Canadian tribes. They include the Coast Indians and the Mountain Indians and are divided chiefly into the Tinne and Thlinkit tribes and various subdivisions such as the Shuswaps, the Tahlkill, the Tahltan, the Taku,

the Kaska, etc. With the Indians of Canada, as a whole, there have been some 1,540 treaties made from time to time and involving the exchange, or sale, of lands, or the relinquish¬ ment of claims. The Indian population of Canada as at 31 March 1916 was 105,561, divided as follows : Alberta, 8,682 ; British Columbia, 25,737 ; Manitoba, 11,935; New Bruns¬ wick, 1,874; Nova Scotia, 2,119; Ontario, 26,305 ; Prince Edward Island, 302 ; Quebec, 13,348; Saskatchewan, 9.962; Northwest Terri¬ tories, 3,769; Yukon, 1,528.

INDIANS, Catholic Education of the.

Upon the discovery of America in 1492, the various religious orders of the Roman Catholic Church hastened to send missionaries to the new field. A small school for the education of the natives was an accompanying feature of each mission, station, and after Cortes had con¬ quered Mexico, Franciscans, Dominicans and Jesuits in course of time educated and con¬ verted the natives to Christianity, and founded missions and schools which exist there to-day, and in California, now an integral portion of the United States, but formerly part of Mexico. North and south the missions and schools were

established and as germs of diocesan organi¬ zations bore fruit in the foundation of the see of Caracas in Venezuela in 1531 ; that of Lima, Peru, in 1539; of Chiquisaca, Bolivia, in 1551; and of Santiago, Chile, in 1561. Brazil was en¬ tered in 1500 by Franciscans who were followed half-a-century later by Jesuits. The first Bra¬ zilian see was founded at Bahai in 1561 ; in La Plata, now Argentina, the see of Cor¬ dova was founded in 1570, and there in course of time the Jesuits built up a magnifi¬ cent college. In Central America, Franciscans began their work of education and conversion in Costa Rica in 1560, and during the last 30 years of the century friars labored successfully in Guatemala, teaching the arts of civilized life along with the doctrines of salvation. Early in the 17th century, Jesuit fathers entered Acadia (Nova Scotia) and Canada, and in 1659 the first episcopal diocese in the region was organized at Montreal. Torture and martyr¬ dom did not deter these brave champions and pioneers of Christianity and civilization, and the development of the United States followed the pioneer growth of Catholic congregations and schools among the native Indians. In the first half of the 19th century, the Indian na- tions. of the Rocky Mountains and Northwest Territories (American and Canadian) were pagan. The Jesuit Father De Smet made the long

and dangerous journey from Saint Louis, Mo., to the headquarters of the Flathead nation in Montana, inaugurated the introduction of Christianity and prepared the way for the ad¬ vent of younger members of the order. See Catholic Indian Missions in the United States.

INDIANS, Education of the. Indian edu¬ cation as formerly conducted in the United States was in no way the outcome of any de¬ liberate plan on the part of the Federal govern¬ ment, but was directly descended from the first attempts to teach the Indians of Virginia, and particularly from like beginnings in Massachu¬ setts, where the remarkable results of John Eliot (q.v.) were achieved.

Eliot's Work. — Eliot was actuated dv high motives, and his simple measures were chosen with consummate wisdom. Having familiarized himself with the language, disposition and char¬ acter of his Indians, he secured their confidence and respect. Those who would follow him he gathered in towns, where he taught them the liberties and responsibilities of township gov¬ ernment and the devices and institutions of civ¬ ilized life, among which the Church and the school naturally occupied places of honor. A number of ((choice Indian youths® he induced to attend English schools that they might prepare themselves for missionary work among their own people. He was warmly supported by (

work under the direction of John Cotton and Richard Bourne in Plymouth colony shared the same fate.

Other Endeavors. — Followers of Eliot in the 18th century were John Sergeant at Stock- bridge, Mass., and Eleazer Wheelock in Con¬ necticut and New Hampshire. The work of Sergeant, which involved the establishment of day schools, of a boarding-school and an ex¬ perimental ((outing system,® was almost ideal in conception, but ended with the deportation of his Indians to the West. Dr. Wheelock's labors led to the establishment of an effective training school and, indirectly, to the creation of Dart¬ mouth College (

Surviving Influences.— But in spite of ex¬ ternal failure, the spirit and much of the form of these early enterprises persisted. Their im¬ press was until recently observable in almost every prominent feature of the Indian-school organization of the United States, notably in the establishment of day schools in or near Indian villages as a means of domestic and in¬ dustrial uplifting of Indian family and village life; of industrial boarding-schools in territory occupied by Indians, to introduce among the young a taste for the refinements, duties and

responsibilities of civilization ; of advanced training-schools in civilized English-speaking communities for the fuller equipment of (

Wrong Departures. — On the other hand, it is to be deplored that a number of valuable features of the early schools were later aban¬ doned, and even supplanted by opposite tenden¬ cies — the unintelligent warfare against the Indian idiom ; the introduction of certain brutal¬ ities of military discipline ; an equally mistaken effort to wean Indian youth from Indian asso¬ ciation by throwing contempt upon the Indian and by stimulating a feeling akin to hatred of Indian family ties; and in general a policy of compulsion and repression, rather than a spirit of development and benevolent helpfulness. Serious harm came to government schools be¬ cause patronage entered as a factor in the ap¬ pointment of officers and employees. Thanks to the Indian Rights Association, the Mohonk Conference, and a number of other societies, in 1893 civil-service rules were applied to em¬ ployees of the Indian schools.

History of Organization. — The successive steps in the organization of Indian schools have been as follows : After the Revolution little heed was paid to Indian education for 30 years.

Only minor appropriations are recorded on the basis of treaties with a few tribes. But in the first quarter of the 19th century a religious revival directed attention to Indian education as a Christian and national duty. Congress responded in 1819 with an appropriation of $10,000 in addition to certain treaty obligations. In 1820 the President was authorized to apply this sum annually in aid of societies and in¬ dividuals engaged in the education of Indians. In 1823 $80,000 was expended in 21 schools maintained by missionary bodies, $12,000 having been granted by the government. In 1825 the number of such schools had risen to 38, their entire expenditure to $202,000, of which the government, directly and indirectly, had con¬ tributed $25,000. In 1848 there were reported in operation 16 manual-training schools, 87 boarding-schools and other schools. These schools continued to increase in number and efficiency up to 1873, under the control of mis¬ sionary bodies, with scanty aid from the govern¬ ment, which had established only a few small day schools directly under treaty provisions. After 1873, however, the government entered upon an era of great activity in the establish¬ ment of strictly government schools. In 1877 Congress appropriated for schools,

outside of treaty provisions, $20,000; in 1880, $75,000; in 1885, $992,800; in 1890, $1,364,568; in 1895, $2,060,695; in 1899, $2,638,390; in 1900, $2,936,-

080; 1901, $3,083,403.65; 1902, $3,251,254; 1910,

$3,757,909; 1916, approximately $4,500,000. The expenditures have doubled within 20 years, and trebled within 25 years. During the quarter century the average attendance rose in more than like ratio. Increased appropriations natu¬ rally stimulated a desire on the part of the government to control expenditures. Moreover, the Constitution, by implication at least, for¬ bids the appropriation of public funds for de¬ nominational purposes. Conclusions unfavor¬ able to government support of missionary schools were further strengthened by the fact that the Roman Catholic Church had gradually outstripped the Protestant missionary bodies and was absorbing the lion's share of govern¬ ment support. In 1893 the Methodist Episcopal Church withdrew from participation in govern¬ ment aid, but without abandoning its schools. In 1895 this example was followed by the Pres¬ byterians and Congregationalists ; in 1896 by the Friends; and in 1897 by the remaining Protest¬ ant denominations. This left only the Cath¬ olics in the field with an appropriation, and in 1901 it was withdrawn from them also. In 1894 Congress had declared its policy of abandoning all support of denominational schools, and this policy has gradually been fol¬ lowed out.

The Schools of To-Day. — The present In¬ dian schools under government control are day schools, reservation boarding-schools and non¬ reservation boarding-schools. These in 1916 numbered 324, including both boarding-schools and day schools; pupils are also maintained by contract in white public schools.

Day Schools. — Day schools in Indian vil¬ lages or settlements are, as a rule, in charge of a male teacher and his wife, or, as in the Pueblos of New Mexico and in the Indian villages of southern California, of a white woman teacher and an Indian housekeeper. These teachers are usually employed for 10

months in the year; the male teacher's wife acts as housekeeper. The children spend five to eight hours during the five days of the week under the care of these employees, and return to their homes in the evening. The instruction is of the simplest character. The children are taught to speak, read and write English within narrow limits, to cipher, to draw and to sing. They get some rudimentary notions of geog¬ raphy, of natural history and of United States history. The

methods are borrowed largely from the kindergarten and from object-teach¬ ing and much stress is laid upon habits of cleanliness and order, mutual kindliness and prompt obedience. The boys receive some in¬ struction in the use of tools, in gardening and in some instances in the care of cows. The girls are taught sewing, cooking and other arts of housekeeping. In the poorer Indian communi¬ ties a noon-day lunch of a few simple articles is furnished. While these day schools accom¬ plish comparatively little in conventional school¬ room work, they serve as concrete illustrations of a civilized Christian home which the Indians learn to respect and, in an appreciable degree, to emulate. Moreover, they reconcile the In¬ dian with the idea of sending his children to school, and render him more willing in due time to entrust them to the care of boarding-schools, as well as more ready to appreciate and to ac¬ cept the lessons of civilization. The most suc¬ cessful of 215 such schools in 1916 were located in Wisconsin, North Dakota and South Dakota; the least successful, probably, among the pueb¬ los of New Mexico, where the Indians live in a state of half-civilization which they owe to their Mexican and Spanish antecedents, and which fully satisfies their ideals.

Reservation Boarding-Schools. — There were 74 of these in 1916, averaging 136 pupils. They are in charge of a superintendent who also has charge of the reservation activities and is as¬ sisted by a matron and such teachers, industrial and domestic helpers as the capacity and char¬ acter of the school may require. In some cases a principal is in direct charge of the school, relieving the superintendent of the detail of management. In addition to regular teachers, the school is provided with a cook, a seamstress and a laundress, whose office it is not only to supervise their respective departments, but also to instruct the girls in these arts. For instruc¬ tion of the boys there is a farmer, an industrial teacher, and, at larger schools, a tailor, a shoe and harness maker, a carpenter and a black¬ smith. An experiment to provide for more methodical instruction in the use of tools, by expert manual-training teachers, failed because the Indian office would not afford a salary for this position sufficient to attract competent men. In 1894 the experiment of connecting kinder¬ gartens with these schools was tried, and proved eminently successful. At the present time there are 26 kindergartens connected with boarding- schools, and the use of kindergarten methods and material has entered the primary classes in practically all these schools with similar good results. In the kindergarten the children spend from one and a half to two hours each half¬ day. In most of the other schools children spend half a day in the schoolroom, and the other half-day in domestic or industrial work of a character suited to their age. Experience has proved that

half-day instruction, at first

forced upon the schools as an expedient, is commended by ks good results.

The aim of the schoolroom work is to teach reading and writing within the usual limits of primary work; arithmetic for the needs of ordi¬ nary daily life; rudimentary geography and United States history; drawing and singing; the laws of hygienic living; garden and orchard work; and familiarity with the simpler require¬ ments of agricultural and domestic industries suited to the locality. Moreover, in a few of the larger schools, the older boys have much opportunity to acquire skill in carpentry, black- smithing, tailoring and shoemaking. These in¬ stitutions are to the children not only school, but home and community. The institution gives them shelter, food and clothing; it ac¬ customs them to habits of cleanliness and de¬ cency; it cultivates their aesthetic tastes; it labors to secure right moral attitude, and in its Sunday-school seeks to stimulate the religious life of the children.

In 1893, under civil-service regulations, there came some improvement. Still with reference to minor employees the superintendents, and even the Indian office, were powerless and fre¬ quently good superintendents were forced out of service by combinations against them among the appointees of the agent, or through the aid and influence of unscrupulous partisan inspectors or supervisors. But in 1896 all employees of the school service were placed under civil-service protection, and since that time there has been marked improvement in the conditions and work of these schools. To a certain degree these evils still persisted, however, because of the power and political bias of the agents; but of late the government has adopted the policy of replacing the agents with bonded school super¬ intendents. There has been decided gain in the equipment, in the sanitary condition, in the gen¬ eral character of employees and in the conduct of the schools. For the Indian office, relieved of attention to office-seekers and their patrons, has been enabled to pay increased attention to the schools themselves. In the reservation boarding-schools instruction continues through 40 weeks ; but often some children are kept at the school throughout the year.

Course of Study. — In 1916 a decided step forward was taken by the

adoption of a new course of study for Indian schools, covering 10 grades. The predominant feature under this course of study is industrial instruction. The first three years of the course are devoted to primary work. The next three years are spent in prevocational training, and the last four years to vocational training in which in¬ struction in agriculture and allied subjects and household arts is given a prominent place. As a general rule the work of the day schools is limited to the first three years of the course, that of the reservation boarding-schools to the first six years, while in only some of the non¬ reservation schools is the full 10-year course, with its allied vocational training, given.

Non-Reservation Boarding-Schools. — Of these there are 25. The superintendents of these schools are bonded and directly respon¬ sible to the Indian office. The schools are, as a rule, located at a distance from the Indian country, and in the vicinity bf American towns which afford contact with the amenities of civilized life. Members of many different

tribes are also brought together, and tribal antagonisms are broken down. The pupils are older than those at reservation schools, and some have had previous training in day schools or reservation boarding-schools. Because far away from their Indian homes, and near to English-speaking communities, they gain a bet¬ ter control of English ; classroom work reaches far into the advanced grammar-school courses of study, with special stress upon language practice, arithmetic, geography, history, nature study, drawing and civil government. Instruc¬ tion in domestic and industrial arts is made effective by frequent opportunities directly to observe their practical applicability and value. The principal reservation schools are at Carlisle, Pa.; Lawrence, Kan. (Haskell Institute); Chilocco, Okla. ; Albuquerque and Santa Fe, N. M. ; Phoenix, Ariz. ; Riverside, Cal. (Sher¬ man Institute); Chemawa, Ore.; Tacoma, Wash. (Cushman) ; Rapid City and Flandreau, S. D. ; Genoa, Neb.; Pipestone, Minn.; and Tomah, Wis.

Contract Schools. — In addition to maintain¬ ing these strictly government schools, the In¬ dian office up to 1901, as before said, paid by contract for the education of many hundreds of Indian pupils distributed in Catholic mission boarding-schools, at Lincoln Institute, Philadel¬ phia, and at Hampton Institute, Hampton, Va. In the appropriation for that year, the aid was withdrawn from all but the last-named, where 120 pupils were contracted for. Besides these, the government since 1891 has endeavored to place Indians in white public schools where there are many whites and few Indians, as the

most rapid means of civilization. The antag¬ onism of local or State authorities to this coeducation has been gradually overcome and the number of children so enrolled is rapidly increasing.

Supervision.— Direction of the Indian schools rests with the Indian office, which is under the supervision of the Secretary of the Interior. In the Indian office the details of the work are entrusted to the education division, to which all reports are made, and by which all directions and orders are drafted and is¬ sued. The education division is aided in its work by a force of supervisors and by 21 supervising superintendents. The supervisors act in a general inspecting capacity, and the su¬ pervising superintendents are charged with the direct supervision of the schools and the work of the new course of study, particularly the industrial instruction. These supervisors and supervising superintendents have an advisory rather than an administrative status. They consult with the superintendents and employees charged with the duty of giving instruction and report to the commissioner of Indian affairs the extent to which the various schools reach or fall short of reaching the ideals of the course of study, at the same time making recommen¬ dations as to the changes needed to raise the standard of the schools.

Schools. — The schools of the so-called <(Five Civilized Tribes® of Oklahoma are not included in the above sketch. The five tribes in 1916 included 41,824 Cherokees, 26,828 Choc¬ taws, 18,774 Creeks, 10,966 Chickasaws and 3,127 Seminoles. Missionary zeal had early availed itself promptly of this field for its efforts. Substantial boarding-schools were.

erected, more particularly by the Presbyterians, Methodists and Baptists. In due time, however, the Indian authorities began to make appropria¬ tions for these schools. Ultimately they took entire charge of them. Unfortunately, adminis¬ trative affairs were largely in the hands of whites, who, by intermarriage or bribery, had been adopted into the tribes and there came over the schools, as well as over all other pub¬ lic interests, the blight of extreme partisanship and nepotism, which rapidly degraded them in character and efficiency. In 1898 the govern¬ ment at Washington assumed supervisory con¬ trol over the affairs of all these tribes except the Seminoles. The conduct of the schools and orphan asylums in the four tribes involved was placed under the direction of a superintendent of schools in Indian Territory,

appointed by the Secretary of the Interior. Under him there was for each of the tribes or nations a super¬ visor of schools, whose duty it was to inspect the educational institutions in his district and to assist in their organization and conduct. The superintendent reported to the commissioner of Indian affairs at Washington through the United States inspector for the Indian Ter¬ ritory, who was his immediate superior. The initial report of this superintendent showed in the four tribes 24 boarding-schools, with an enrolment of 1,758 pupils and an average at¬ tendance of 1,480, taught and cared for by 234 employees at an annual expense of $236,824. These schools have now been made a part of the general system of schools, except that with the exception of the Cherokee Indian Training School, they are supported by tribal funds of the different tribes and are under the direct supervision of a supervisor for the Five Civil¬ ized Tribes. In 1916 there were 10 such schools, enrolling 1,227 pupils in charge of 147 em¬ ployees. In 1916 there were also 590 pupils enrolled in schools maintained in the Five Tribes' territory and known as mission schools under contracts calling generally for a per capita of $108, but in the cases of two such institutions of $120.

INDICAN, a colorless substance chemically related to indigo, found in wood, in most plants yielding indigo-blue, and in human urine.

INDICATOR, in steam engineering, an instrument invented by James Watt, to record, graphically and automatically, the pressure in an engine cylinder at every point of the stroke. By means of the diagram that the indicator draws, it is possible to determine whether the valves of the engine are working correctly or not, and it is also possible to estimate the horse power that the engine is developing with con¬ siderable accuracy. Commercially, the steam- engine indicator may be had in many forms; but all are based on the same fundamental principle, which will be understood by refer¬ ence to the diagram presented in Fig. 1. The paper upon which the Indicator diagram is to be drawn is here supposed to be secured, flat, to a carriage which travels back and forth upon a track; the motion of the carriage correspond¬ ing precisely to the motion of the piston of the engine. In practice it would be inconvenient to have the carriage travel a distance equal to the whole stroke of the engine, and hence some form of reducing motion is used, so that the motion of the carriage may follow the motion

of the engine piston accurately, but with ma¬ terially reduced velocity. The indicator diagram is drawn by means of a pencil-point carried on the piston rod of a small steam cylinder which is situated below the carriage, and which opens freely into the cylinder of the

engine from

Fig. 1.

which the diagram is to be taken. The piston of the indicator is pressed downward by means of a spring whose strength is accurately known, so that the increase of pressure corresponding to a rise of one inch in the position of the pen¬ cil-point is known. When the indicator is in operation, the pencil rises and falls propor¬ tionately to the pressure of the steam in the

Fig. 2.

0

engine cylinder, and the carriage, with its at¬ tached paper, travels back and forth horizon¬ tally, at the same time, keeping pace precisely with the motion of the piston of the engine. Under these circumstances the pencil-point

traces a diagram somewhat like that shown in the illustration. In practice, the paper upon which the diagram is drawn is usually wrapped about a cylindrical drum, which by rotating pre¬ sents a new surface of paper for a new dia¬ gram. It follows the motion of the engine piston just as the carriage here shown. In Fig. 2 an enlarged view of an indicator card (or diagram) is given, together with the tech¬ nical names of some of its more important parts. The arrows show the direction in which the pencil travels as the diagram is drawn. The <(admission line® is the part that is drawn While the engine is in full communication with the boiler, and drawing steam from it. The angle marked ((cut-ofP corresponds to the instant at which the steam supply is cut off, and the expansion of the steam begins. The “expansion line® is drawn during the expansion of the steam ; and on the return stroke, after the exhaust valve has opened, the ((exhaust line® is drawn. When the exhaust valve has closed again, the steam remaining in the engine cylinder is compressed until the end of the stroke, the indicator meanwhile drawing the “compression line.® The “atmospheric line® is the straight, hori¬ zontal* line drawn by the engine when the con¬ nection is broken between the engine cylinder and the indicator cylinder, and the latter is open freely to the air. The “vacuum line® is the line that would be drawn by the instrument under like circumstances, if a perfect vacuum

could be maintained in the indicator cylinder. The “vacuum line,® of course, must be drawn in by hand. It is parallel to the* “atmospheric line,® and at a distance below it corresponding to a pressure of about 14.7 pounds per square inch, on the scale to which the diagram is drawn. The diagram shown in Fig. 2 refers to a condensing engine. In a non-condensing en¬ gine, the exhaust line would not be lower than the atmospheric line, and would, in fact, be above it, if there were any sensible back-pres¬ sure in the engine during exhaust.

A considerable number of other mechanisms are termed indicators, as the stock-indicator, a receiving telegraph instrument that prints on an endless tape the figures, etc., of stock sales telegraphed; telegraph indicator, a telegraphic instrument having a vertical needle making in¬ dications on a dial, called also needle telegraph ; circuit indicator, an upright galvanometer or the like for indicating the presence and char¬ acter of an electric current; speed indicator, a gauge having usually a dial and pointer for in¬ dicating visually the speed of a machine, etc. ; track-indicator, a registering device for mount¬ ing on a railway car or locomotive to record the variations of the track from accurate level and alignment.

For detailed information concerning the steam-engine indicator and its uses, consult Pray,

INDICTION, a period or cycle of 15 years. The origin of indiction as a chronological period is not known. Several writers have propounded theories explanatory of its origin, none of which are supported by any evidence. In the time of Athanasius it came into favor vol. 15—5

among ecclesiastical writers. Being adopted by the Popes, it came into general use during the Middle Ages. The time from which reckoning by indictions began is, according to some, 15 Sept. 312; according to others, 1 Sept. 312; but when this method was adopted by the Popes, it was ordered to be reckoned as beginning 1 Jan. 313. The latter only is now used, and is called the Papal Indiction. If we reckon back¬ ward to the beginning of the Christian era, it will be found that 1 a.d. corresponds to the fourth year of an indiction — hence, if to any given year of the Christian era three be added, and the sum divided by 15, the remainder will give the position of that year in an indiction— e.g., 1918 was the first year of the 108th Papal Indiction.

INDICTMENT, in-dit’ment, a formal writ¬ ten charge made before a legal tribunal against an accused person or persons. The essential requisites of a valid indictment are — first, that the indictment be presented to some court hav¬ ing jurisdiction of the offense stated

therein; second, that it appear to have been found by the grand jury of the proper county or dis¬ trict ; third, that the indictment be found a true bill, and signed by the foreman of the grand jury; fourth, that it be framed with sufficient certainty; for this purpose the charge must contain a certain description of the crime or misdemeanor of which the defendant is ac¬ cused, and a statement of the facts by which it is constituted, so as to identify the accusa¬ tion ; fifth, the indictment must be in the Eng¬ lish language, but if any document in a foreign language, as a libel, be necessarily introduced, it should be set out in the original tongue, and then translated showing, i'ts application, 6 Term. 162. The formal requisites of an indictment are: First, the venue, which at common law should always be laid in the county where the offense has been committed, although the action be in its nature transitory, as in case of a bat¬ tery. The venue is stated in the margin thus:

"City and County of – , to wit.® Second, the

presentment, which must be in the present tense, and is ordinarily expressed in the follow¬ ing formula : "the grand inquest of the State

of – , inquiring for the city and county

aforesaid upon their oaths and affirmations pre¬ sent®. Third, the name and addition of the de¬ fendant; but in case an error has been made in this respect, it is cured by the plea of the defendant: Fourth, the names of third persons, when they must be necessarily mentioned in the indictment, should be stated with certainty to a common intent, so as sufficiently to inform the defendant who are his accusers. When, however, the names of third persons cannot be ascertained, it is sufficient, in some cases, to state "a certain person or persons to the jurors aforesaid unknown.® Fifth, the time when the offense was committed should, in general, be stated to be on a specific year and day. In some offenses, as in perjury, the day must be precisely stated, but although it is necessary that a day certain should be laid in the indict¬ ment, yet in general the prosecutor may give evidence of an offense committed on any other day previous to the finding of the indictment. Sixth, the offense must be properly described. This is done by stating the substantial cir¬ cumstances necessary to show the nature of the

crime, and next the formal allegations and terms of art required. As to the substantial circumstances : the whole of the facts of the case necessary to make it appear judicially to the court that the indictors have gone upon sufficient premises should be set forth; but there should be no unnecessary matter, nor any¬ thing which on its face makes the indictment repugnant, inconsistent or absurd.

According to the rules of pleading in crim¬ inal actions at common law there are certain terms of art used, so appropriated by the law to express the precise idea which it entertains of the offense, that no other terms, however synonymous they may seem, are capable of filling the same office ; such, for example, as traitorously in treason; feloniously in felony; burglariously in burglary ; maim in mayhem, etc. In New York, and in nearly all of the States which have adopted the code system, the common-law rules of pleading in criminal actions have either been greatly relaxed or en¬ tirely abolished. Many of the statutes of the subject are similar to the New York statute, Code Crim. Pro. § 273, which in substance pro¬ vides that all common-law rules of pleading are abolished, and the forms of pleading pre¬ scribed by the code shall be substituted, and § 275 of the same code provides that all an indictment must contain is the title of the ac¬ tion, specifying the name of the court to which the indictment is presented, and the names of the parties, together with a plain and concise statement of the act constituting the crime, without unnecessary repetition. It is also pro¬ vided in § 283 of the New York Code Crim. Pro. that words used in a statute to define a crime need not be strictly pursued in the in¬ dictment ; but other words conveying the same meaning may be used.

INDIFFERENTISM, a system or state of indifference; specifically in metaphysics and ethics, the theory of a school of philosophers that the human will acts in utter indifference to all motives, and chooses merely as a judge de¬ cides. It is opposed to determinism. See Ethics ; Free Will.

INDIGESTION. See Dyspepsia.

INDIGIRKA, in'dye-ger'ka, a river of Si¬ beria, in the government of Jakutsk. It rises in the Yablonoi Mountains and after a northerly course, estimated at 850 miles, through a frozen desert past a few villages, falls into the Arctic Ocean in lat. 71° N., and long. 150° E.

It is closed to navigation during the winter months.

INDIGO, the name of a genus of plants, and of the blue coloring

matter obtained from them. The indigo plants are tall herbs of the pea family, forming the genus Indigofera, of which there are several color-yielding species in various warm parts of the world. The one yielding the indigo of commerce, and formerly extensively cultivated, is I. tinctoria, which is native to India, grows five feet high and has pinnate leaves. The coloring matter most abounds in the leaves, and especially at the time of flowering, and that is the time when the crop is gathered by cutting down the plant, and making immediate use of the green stems or foliage, or by drying them for subsequent treat¬ ment. This coloring matter is a chemical sub¬

stance called indican, the glucoside of indoxyl, which is converted by oxidation into indigo. Until the discovery of the sea-route to India the only blue vegetable dye available in Europe was that derived from the woad (q.v.), which was limited and costly; this dye-substance was therefore regarded as one of the most valuable of new commodities and a large capital was soon invested in its cultivation in India, Cey¬ lon, China and other regions, where a profitable industry continued until after the middle of the 19th century. The indigo is obtained by mac¬ erating the leaves and stems in vats for several hours. Fermentation arises and the water be¬ comes clear yellow. It is then run off into a lower basin, where it is subjected to incessant agitation and gradually turns green, whereupon the indigo begins to form in flakes and settle. The residuum is then thoroughly boiled, filtered through linen, •molded into small cakes, and dried. The best quality comes from Bengal and eastern India. Indigo plantations were made with more or less success in Brazil, Cen¬ tral America and Mexico; and one of the fore¬ most inducements held out to settlers in the southern colonies, from Maryland to Louisiana, was the probability of its successful cultivation there. The experiments never yielded results of much importance, partly because crops of tobacco, cotton and foodstuffs were more profit¬ able. Since the discovery of cheap methods of forming blue dyes from coal-tar the cultiva¬ tion of indigo has declined greatly, but still supplies a steady demand from cloth-dyers who wish an imperishable blue of certain tints.

The wild indigo of the United States is any of several species of a closely related genus Baptisia, which flourishes especially in the Southern States. The best known is the yel¬ low-flowered false indigo (B . tinctoria), or in¬ digo brown, from which country people obtain a blue dye and a domestic medicine.

Indigo Dyeing. — Before it can be employed in dyeing, the indigo must be brought into solu¬ tion ; and as indigo itself is insoluble, it must be first transformed into a soluble substance, so that it can

penetrate the pores of the cloth, where it is subsequently again restored to the form of indigo. To bring the indigo into solu¬ tion it is ground up to a soft paste with water, after which it is thrown into vats along with ferrous sulphate, slacked lime and water. The ferrous sulphate reacts with the lime to form calcium sulphate and ferrous oxide, the latter being immediately oxidized at the expense of part of the oxygen of the indigo, which in its turn is reduced to a substance called indigo- white. This dissolves in the presence of excess of lime, and the fabric to be dyed is dipped into the vat after the liquid in it is clear. On removing the fabric the indigo-white which has penetrated its pores is reoxidized by the air to indigo-blue ; and by repeating this treat¬ ment a shade of blue of any desired depth may be obtained. The dyed fabric is finally passed through dilute acid to remove any adhering lime or ferric oxide. Indigo appears to exist in the plant in the form of a glucoside known as “indicant which has the formula C52H62N2O34, and to be developed from this glucoside in the course of the fermentation by the action of a special bacillus, which closely resembles the bacillus of pneumonia. Indigo is now made artificially, the total production of synthetic

indigo being probably about one-fourth of the world’s consumption. Although artificial in¬ digo-blue appears to have the same chemical formula (CwHioNaCb) as the natural product, and to be identical with it in every way, it is more expensive than the natural product at the present time. If it could be made more cheaply it would work as great a revolution in dyeing as did the introduction of alizarin in the place of madder. See Coal Tar Colors and the references there given.

INDIGO-BIRD, a numerous and beautiful North American finch (Passerina cyanea), the male of which is dark greenish blue, while the female is grayish brown. They are migratory, but in summer spread over most of the United States, placing their neat nest and unspotted bluish eggs in garden bushes as well as in wild thickets. The male has one of the brightest and most persistent songs of any American bird, and he is easily habituated to captivity.

INDIGO SNAKE. See Gopher Snake.

INDIRECT DAMAGES, claims for dam¬ ages not directly inflicted by the illegal act complained of, but by other causes themselves due to that act. The great historical case is that of the United States claim for

many hundreds of millions of dollars' worth of loss, resulting from Great Britain's bad faith or carelessness in letting the Alabama (q.v., and Alabama Claims) escape from her ports to prey on our commerce. It was alleged that aside from the actual loss to our shipping and cargoes, we had been damaged to a far greater extent by the resultant effects, chiefly of three sorts: (I) The prolongation of the Civil War due to the encouragement given to the South and the straitening of the North. (2) The de¬ struction of commercial lines and relations, which took long to recover after the war. (3) The raising of the rates of marine insurance. As these claims exceeded the cost of a war plus the indemnity we should have exacted if victorious, Great Britain refused to consider them ; and the commission threw them out al¬ together as contrary to international law.

INDIRECT ELECTIONS. See Elec¬ tions; Electoral Qualifications; Congress.

INDIUM, in organic chemistry, a metallic element of a silver-white color, discovered by Reich and Richter through spectroscopic analy¬ sis during 1863 in the Freiberg arsenical ores. It is very rare. It is related to cadmium and zinc, and both are associated with it in nature; but it is found in many ores beside, although especially in zinc blende. This metal is ob¬ tained by heating the oxide with carbon and by other methods. It is soft, malleable and easily fusible. Its distinguishing . property, however, and the characteristic which led to its discovery, is the indigo-blue line which all its compounds — so far as investigated — show in the spectroscope. The spectrum of indium exhibits two characteristic lines : one violet line a, and another blue line /?; and besides these two fainter blue lines are visible if the burner in which the metal is volatilized be fed with hvdrogen instead of coal gas. This metal is obtained by heating the oxide with carbon and by other methods. Its specific gravity is 7. 1-7.4; its symbol In; and its atomic weight 114.8. It melts at 174° C. (=345° F.).

Chemically, indium resembles aluminum and gallium, being chiefly trivalent.

INDIVIDUAL PSYCHOLOGY. This

term is applied to that branch of psychology which deals with the mental variations of in¬ dividuals from one another. It is thus contra¬ distinguished from general psychology, which undertakes to determine the facts and laws of conscious processes as a whole and without special reference to their peculiar manifesta¬ tions in any particular persons or group of per¬ sons. The field of individual

psychology may be regarded as a part of the larger field of varia¬ tional or differential psychology in which are to be included studies upon special races and upon social groups of various sorts. Such studies are carried on with special reference to detect¬ ing and describing the characteristic mental traits of such groups, but often with little em¬ phasis on typical variations from other similar groups. Obviously the range of problems in individual psychology must be as broad as mind itself, for persons may vary in regard to any mental characteristic. It will only be prac¬ ticable to mention a few of the problems thus far investigated, e.g., mental type, tempera¬ ment and genius, the psychology of special mental defect, the psychology of the criminal, the psychology of sex, and that of professions or classes with their peculiar variations of men¬ tal constitution.

To exhibit more concretely the kind of material with which individual psychology works we may comment briefly on the first three of these topics. The determination of mental type is a problem of individual psychol¬ ogy in the narrow sense of the term in so far as it has to do with the ascertaining of the characteristic features of the mind of any par¬ ticular person. In so far as it bears on the problem of discovering what actually are the typical groupings of such characteristics among people in general, it obviously belongs to the broader field of variational psychology.

1. Minds may differ from each other as re¬ gards the delicacy or sensitiveness with which they respond to stimulations of the sense organs. One may be more sensitive than an¬ other to slight variations in temperature, in color, in tone, etc. As a matter of fact, among normal persons such differences of sensitivity are relatively slight when the conditions of training and discipline are similar. As a gen¬ eral rule the higher mental functions show more variation than the lower one such as sensitivity. Minds may differ as regards the special form of sense material toward which they manifest a predilection, e.g., the musically minded person not only finds sounds of greater emotional interest than the unmusical person, but he also has a better memory for auditory experiences and his conscious processes in their entirety are likely to be much more influenced by auditory factors. A further development, of such mental preference for one or another kind of sense material is found in the fact that cer¬ tain individuals carry on most of their thought processes in terms of visual images, whereas others employ auditory images, and still others . motor images. Probably the normal condition is represented by an admixture of various forms with some particular group dominating slightly over the others. Again, in memory we

meet striking differences in addition to those of the imagery type already mentioned. For example, certain persons learn very rapidly and also forget rapidly. Others learn with diffi¬ culty but retain well that which they have learned. Occasionally we find persons who combine ability to learn quickly with capacity to retain permanently. It seems certain from psychological investigations that individuals supposed to possess particularly good memories are generally proficient only in certain direc¬ tions. A universally efficient memory is rarely, if ever, found. People differ also very mark¬ edly as regards their ability to concentrate their attention. Some persons can concentrate very intensely for a short time but must then rest. Others are able to focalize for more extended periods, and still others find it all but impossible ever to secure any intense concentration. Variations of a striking kind are also disclosed in the formation of judgments. Certain per¬ sons judge almost entirely in accord with the objective facts presented to their notice. Others are influenced in various degrees by subjective influences and show themselves peculiarly sus¬ ceptible to suggestion. It is a matter of com¬ mon observation that persons vary radically as regards temperament and feeling. One of the most practically important variations is represented by the difference in the rate at which the conscious processes proceed. Just as certain persons naturally walk and talk more rapidly than others, so do the mental processes vary as regards the speed with which they occur. Psychologists have demonstrated a rather characteristic daily variation as regards both rate and efficiency of mental activity. Many persons work best at night. Others are morning workers and still others afternoon workers.

2. The old familiar classification of tempera¬ ment recognizes the four types : sanguine, melancholic, choleric and phlegmatic. Both the choleric and the sanguine are supposed to be subject to rapid oscillations of emotional in¬ terest, but with the sanguine individual, interest is rarely intense, whereas with the choleric it is rarely anything else. The melancholic and the phlegmatic represent the more persistent and dogged forms of interest but, like the previous pair, are distinguished by differences in the intensity of the interest, the phlegmatic person being less, the melancholic more, intense. These classifications are likely to be extensively revised by current investigation.

3. The modern study of genius has not only contributed to a more definite conception of the nature of genius and the general mental char¬ acteristics of the remarkable individual, but it has also revealed the hereditary character of marked intellectual superiority, and the rela¬ tion between certain types of genius and mental defect.

Galton has gathered statistics to show that the frequency of genius is related in a definite and orderly way to the total number of persons in any given group. He has also shown that the genius appears with a background of hered¬ ity which affords a reasonable explanation of his peculiar characteristics. The view often urged by such writers as Lombroso that genius is essentially a morbid and degenerate mental phenomenon seems to be sound only in so far

as concerns the liability of persons of remark¬ able mental qualities to nervous derangement of various sorts. That insanity itself and genius are in any intrinsic sense identical is not generally granted. Among the interesting problems which deserve further study in the case of genius may be mentioned the deter¬ mination of the extent to which the genius owes his superior endowment to heredity, as contrasted with education and favorable nurture; the ascertainment of the conditions which hinder or encourage the development of genius ; the discovery of the general mental types to which the various remarkable individ¬ uals conform.

Bibliography.— Binet and Henri,

James Rowland Angell, President, Yale University.

INDIVIDUALISM, a regard for and em¬ phasis of the individual. A belief in personal independence and self-sufficiency. In ethics, those doctrines which dwell upon individual welfare rather than social welfare, and deter¬ mine their standards of conduct by the dictates of individual feeling. Under these views, it is taken for granted that if each individual seeks his own highest welfare, social welfare will take care of itself. Individualism is opposed to socialism and finds defense in the works of John Stuart Mill and Herbert Spencer. It be¬ comes the duty of the state, under this con¬ ception, not to interfere with the individual ex¬ cept when it is necessary to preserve the op¬ portunity for action. _ The function of the state is regarded as an artificial restraint, while indi¬ vidual initiative is a natural factor in evolution. From an economic point of view individualism favors the policy of laissez-faire (q.v.). Con¬ sult Domisthorpe, Undividualism : A System of Politics > (London 1889) ; Eliot, C. W., (Con¬ flict between Individualism and Collectivism in a Democracy) (New York 1910) ;

Fite, W., (Individualism > (ib. 1911) ; Fourniere, (Essai sur rindividualisme) (Paris 1901) ; McKechnie, (The State and the Individual > (Glasgow 1896) ; Tufts and Thompson, (The Individual and his Relations to Society, as Reflected in British Ethics> (Chicago 1898).

INDIVIDUALITY, a separate and distinct

existence. The fact that one thing may be dis¬ tinguished from all others gives individuality its meaning. Whether the distinction is only rela¬ tive or is absolute is disputed among philos¬ ophers. The problem arises out of the difficulty of thinking of any distinctive character of an individual, except its location in space or time, without using general concepts. With Plato the universals alone were real. With Aristotle reality was found in the concrete individual and the universal stood only for an abstraction. The same problem occurs in mediaeval times, in the discussion of the relation of God, Trinity and man, and in modern times in the question of the relation of the individual to society. For other views of individuality consult Driesch, (Science and Philosophy of the Organism*

(London 1908), and Huxley, (The Individual in the Animal Kingdom > (Cambridge 1912).

INDO-CHINA, the southeastern peninsula of Asia, formerly known as Farther India, in¬ cluding Anam, Burma, Cambodia, Cochin-China, French Indo-China, Tongking (qq.v.) and other districts.

INDO-CHINESE, generic name of the na¬ tive population of Farther India, most of whom belong to the southern branch of the Mongol division of mankind, and speak monosyllabic toned languages of the Indo-Chinese linguistic family. They came partly from the Tibetan plateau (Burmese, Arakanese), and partly from South China (Shans, or .Laos, Siamese, An- namese). Besides these there is a considerable Caucasic element, numerous especially in Cam¬ bodia, where the dominant people are the Khmers of polysyllabic untoned speech. To the same element belong also the Chams of Lower Cochin-China, perhaps the Talaings of Lower Burma, and numerous smaller groups on the eastern coast range, and along the up¬ lands between the peninsula and South China. Like Hindustan, Farther India has a history of primitive civilization. (For details see Anam; Burma;

Cochin-China; Siam). Consult Clifford, H. C., (Farther India* (New York

1904).

INDO-EUROPEANS. See Aryan Race; Aryan Languages; Indo-Germanic Lan¬ guages ; Iranians ; Iranian Language and Literature.

INDO-GERMANIC LANGUAGES com¬ prise that group of languages which took their rise in India and Iran and which now, by com¬ mon consent, with a few slight exceptions, in¬ clude all the tongues spoken in Europe. There are seven principal branches coming under that head, namely: (1) Germanic; (2) Slavo-Let- tish ; (3) Celtic; (4j Italic; (5) Greek; (6) Iranian; (7) Indie. It is beyond question that all these idioms together are descended from one common root, the Aryan proper. Internal evidence in favor of this statement is too strong to be rejected. The structure shows it ; the stock of words shows it; the number of features in common show it; and finally the sounds them¬ selves show it. Comparative philology has dem¬ onstrated beyond cavil that only by assuming a common origin can the fact be accounted for that the most ordinary words and the basic part of grammar — the rough framework of language so to speak — are practically identical; such as the personal pronouns, nouns like mother, father, brother and sister, the earliest domesticated animals and the most indispen¬ sable primitive foods and appliances, as the plow ; the most necessary verbs, particularly the aux¬ iliaries. The differences between the several languages belonging to the Indo-Germanic, or Aryan, group, as, for instance, between Russian and German, Polish and English, Italian and Lithuanian, are many, in varying degree, but are simply somewhat greater than those, let us say, between cognate idioms, such as Dutch and German, French and Italian, Czech and Jugo¬ slav, or Hindu and Persian. Or rather, the de¬ gree of similarity differs. But the structural similarity between all is undeniable. All Indo- Germanic languages, too, are inflectional.

It is agreed that the entire body of the Aryan languages is derived originally from monosyl¬

labic elements, and that of these there were two classes, verbal and pronominal, and that combining these two grammatical forms there arose gradually the rudiments of grammar and of vocabulary. In some of the Aryan tongues there have lingered forms which in the others had disappeared at an earlier date, such as the dual ; the future of the verb came later and was made up with auxiliaries ; the imperative ex¬ isted at first only in the second person. Verbs in all of these idioms

were originally of primi¬ tive structure ; some of the refinements of grammar, such as the subjunctive, are doubtful in their derivation ; declensional inflections, on the other hand, were in olden days rather more complicated, having three numbers and eight cases, including one denoting instrumentality and one locative ; sex distinctions, too, were indicated by the endings of cases. From this complex stage the tendency has been through¬ out toward simplification. Relative pronouns were late in appearing, growing out of demon¬ stratives or interrogatives ; articles came to view not until a late period ; numerals for long ran only up to 100. Of all the Indo-Ger¬ manic, or Aryan, tongues Sanskrit has pre¬ served most of the original standards. Many, nay, the largest part of the changes wrought were due to phonetic influences, such as in English sing , sang, sung , song; or as in Latin fid, fido, foedus; in the Greek Xenru, eXltzov AeXoLira.

Necessarily, the close correlation of the Indo-Germanic idioms presupposes a common origin, the existence at some remote period of one united, and in numbers and territory held, rather limited mother tribe, within which the root idiom must have had time to grow and develop. Not only is there linguistic proof of this of the strongest kind, but the further fact that there was a common cycle of sagas, myths and legends of prehistoric heroes, of folklore and of archaic godlike beings worshipped, tends altogether in the same direction. Again, that the Indo-Germanic race derives from the same parent tree is proved by the indisputable fact that it is this race which throughout all historical time has been pre-eminent ; first, the Persian, next the Greeks and Romans, and then the nations of modern times. In the main they did this because possessing the same set of qualities.

All the records, however, available do not go farther back than about b.c. 3000, and indi¬ cate the Pamir region or the Punjab as the pristine home of the Indo-Germanic stock. The Vedas in their most ancient portions are not older than 2000 b.c. A number of Indo-Ger¬ manic idioms amalgamated with others, or dis¬ appeared, like Gallic, Etruscan, Burgundian, Scythian, Mesapian, Pelasgian.

Bibliography. — Brugmann, K., (Kurze ver- gleichende Grammatik der indogermanischen Sprachen* Strassburg 1902-04) ; Brugmann, K., and Delbriick, B., (Grundriss der vergleichen- den Grammatik der indo-germanischen Sprach- en* (ib. 1897 et seq.) ; Brunnhofer, U., (Arische Urzeit* (Bern 1910) ; Curtius, G., (Griechische Etymologie) (Berlin 1892) ; Del- briick, B., (Einleitung in das Studium der in¬ dogermanischen Sorachcn* (Leipzig 1908, 5th ed.) ; Fick, Th., (Vergleichendes Worterbuch der indogermanischen Sprachen* (Gottingen 1890-1900) ; Grierson, G. A., (Thc Pisaca Lan-

guage) (London 1906) ; Hehn, Victor, (Kultur- pflanzcn und Haustiere) (7th ed., Berlin 1902) ; Jevons, F. B., (Prehistoric* Antiquities of the Aryan Peoples> (London 1890) ; Meillet, A., introduction a l'etude comparative des langues indo-europeennes5 (Paris 1908, 2d ed.) ; Mul¬ ler, Max, and Whitney, W. D., (Lectures on Language) (Oxford 1888) ; Muller, Fried, (A11- gemeine Ethnographie) (Leipzig 1887) ; Muller, Sophus, (Urgeschichte Europas) (Ger. ed., Strassburg 1905; French ed., Paris 1907); Penka, K., (Origines Ariacae5 (Leipzig 1883) ; Ripley, W. F., (Races of Europe > (London

1900) ; Schleicher, Bald., Compendium der vergleichenden Grammatik der Indo-German- ischen Sprachen> (Berlin 1871) ; Sergi, G., (The Mediterranean Race) (English ed., London

1901) ; Taylor, I., (The Origin of the Aryans5 (London 1890).

Wolf von Schierbrand. Professor of German Language and Literature ; formerly Secretary to American Minister to Teheran, Persia.

INDO-IRANIAN LANGUAGES. See

Iranian Language and Literature.

INDOOR BASEBALL, a variety of the regular game, played indoors as the name in¬ dicates. It is played in a hall at least 40 X 50 feet in extent, with a white ball not over 17Bt inches in circumference. If space does not permit, two outfielders are dispensed with, leav¬ ing seven men on a side. The maximum diam¬ eter of the bat is 1J4 inches. The rules are similar to those governing the outdoor game with the exception of the limitations imposed by the walls, floor, etc. The special sizes of bat and ball are designed to make the chances and conditions in the game approach as closely as possible those of the regular game. The National Indoor Baseball Association formu¬ lates the special rules governing the sport. Con¬ sult (Indoor Baseball Guide) (in Spalding's Athletic Series.5 New York, annually).

INDORE, in-dor', India, a Mahratta native state in the Central India Agency. It has an area of 9,469 square miles, covered with great forests, in which many large wild beasts roam. It is watered by the Nerbudda River and is crossed by a portion of the Vindhya mountain range. The land produces, in addition to the valuable timber of the forest areas, cotton, to¬ bacco, sugar-cane, maize and wheat. Opium is

also produced in large quantities. Title to the land rests in the state, which rents it to the population. A portion of the population, the Bhils, is the wildest and least cultured of India. The state is ruled by the Holkar. The chief centres of population are Rampura, Mehadpur, Mhow and Bhampura. Pop. 1,004,569. The capital is Indore, a city 440 miles east of Bom¬ bay, at the confluence of the Khan and Saras-wati rivers. It contains the palace of the Holkar, government buildings, a mint, military barracks and Daly College. It has a good water-supply system and a modern sewage sys¬ tem. Cotton is manufactured. There is a large trade in opium, grain, tobacco and other prod¬ ucts of the region. A region in the suburbs has been allotted by treaty to the British resi¬ dent agent and his staff. Pop. 44,947.

INDORSEMENT, in law, the act of writ¬ ing or printing on the back of a written in¬ strument, or that which is written or printed

thereon. It is more particularly applied to the signature usually on the back of a negotiable instrument by which the title thereto is passed. Such signature must be that of the legal holder of the instrument, which must be delivered, or else be acquired by a bona-fide holder, to make it valid. A holder who places an indorsement on a negotiable instrument thereby assumes the obligation to pay the amount therein named if payment has been refused after being duly demanded, provided due notice is given him of the previous dishonor of the instrument. An indorsement is in blank when the indorser signs his name only; an indorsement is special when it specifies the person to whom or to whose order the amount named in the instrument is to be paid. An indorser can avoid personal lia¬ bility by adding Svithout recourse55 to his in¬ dorsement.

INDRA, a Hindu deity especially worshipped in the Vedic period of the Hindu religion, but had great legendary popularity also in the Epic and Puranic periods. In old Vedic poetry he is represented as a mighty ruler of the bright firmament and his principal feat is the conquest of the demon Vr'itra, a symbolical personifica¬ tion of the cloud which obstructs the clearness of the sky, and withholds the fructifying rain from the earth. Indra is the upholder of heaven, earth and firmament and the god who has <(engendered the sun and the dawn® — the Jupiter Pluvius of India. See India-Religion ; Vedic Literature; and consult Dawson, (Hindu Mythology) (London 1879) ; MacDowell, (Vedic Mythology 5 (Strassburg 1897), and Wilson, (Hindu Mythology5 (new ed., London 1900).

INDRE, France, a department of central France, once included in the old divisions of Berry, Orleanais, Marche and La Touraine. It has an area of 2,664 square miles ; is watered by the Indre, the Creuse, the Anglin and the Vienne. A great part of the area is reclaimed land and about 80 per cent of the total area is cultivated. Barley, wheat and grapes are the principal crops. Stock-raising also is important. Cloths, hosiery, paper, porcelain and farm im¬ plements are manufactured. Iron is mined in small quantities. The capital is Chateauroux. Pop. 287,673.

INDRE, France, a river which rises in the department of Creuse, flows in a northwesterly direction through Indre and Indre-et-Loire and debouches into the Loire 15 miles below the city of Tours. Its total length is 136 miles, for 40 of which it is navigable for light-draught vessels. La Chatre, Chateauroux and Loches are the principal towns along its banks.

INDRE-ET-LOIRE, France, an inland de¬ partment of the republic, formed out of the ancient provinces of Touraine, Pitou and Anjou, northwest of Indre (q.v.). It has an area of 2,377 square miles of which about 1,300 are arable. It is traversed or watered by the Loire, Cher, Indre and Vienne, all navigable for ves¬ sels of light draught. Levees protect the land from the overflow of the Loire. The southern part is mostly waste land. Wine is the chief industry. Iron, powder, textiles, leather and silk are manufactured. There are three arron-dissements — Tours, Chimon and Loches. Tours is the capital. Pop. 341,205.

INDUCTION, in logic, that method of reasoning which establishes general laws or

specific predictions of future, present or past facts on the basis of individual experiences. It is the type of argument by which, let us say, the law of universal gravitation is demon¬ strated on the basis of observations as to the mutual attraction of certain given bodies, or by which an insurance company is able to determine a safe price for future policies on the basis of past statistical tables, or by which the geologist may describe the history of a certain drainage system through his knowledge of the present status of the system and of the modi¬ fications taking place in the drainage systems of the present

time. Induction differs from deduc¬ tion not only in that it starts from particular facts rather than general laws, but also in that the propositions derived by an induction (not covering every single case of the law it sets out to establish) never even appear to have that apodictic certainty which we naturally attribute to the results of correct deduction from indis¬ putable premises. An induced conclusion is only probably true; furthermore, if it is at all precise in its terms, it is in general only ap¬ proximately true. The probable correctness of the successive digits of a decimal fraction ob¬ tained by inductive reasoning falls off with amazing rapidity. A number, the first nine digits of which are all but absolutely certain, may well have a highly probable 10th digit, a likely 11th and an absolutely worthless 12th.

Induction, then, is the probable and approxi¬ mate demonstration of laws or predictions on the basis of concrete experiences. It is not what it has been considered by Hume and the other 18th century British empiricists: the for¬ mation of general ideas — i.e., universals — from mere particulars. In the first place, a universal is not. a universal law, nor is a fact a particular. But furthermore, we do not form the notion of red by looking at this red thing and that, and abstracting from them their, common quality, nor by associating with the image of one red thing all our past experiences of red objects. There are an endless number of attributes pos¬ sessed by a group of things, and even exclu¬ sively possessed bv this group. Redness can only be one of these. When we see the group we recognize redness either as the color quality they possess in common or as their simplest common attribute, or because redness is the property that most attracts our attention. In all these cases we must have a concomitant or ante¬ cedent consciousness of a universal — of color, simplicity or redness itself. The process de¬ scribed by the British empiricists simply does not exist, and every formation of a general notion from experience involves an existing awareness of general notions.. That is, not¬ withstanding the contrary opinion of the nomi¬ nalists, the general notions of qualities and rela¬ tions which enter into the presentment of in¬ ductive laws are not mere mosaics of particular sense data. In a like manner, the inductive laws themselves are not mere mosaics, of partic¬ ular facts. A very common expression among inductive logicians, due to J. S. Mill, is rtthe uniformity of nature. We are justified in pro¬ ceeding from this fact and that fact and the other fact to the general law subsuming, them all because nature is uniform. This principle of the uniformity of nature has two very dif¬ ferent meanings. Tt may be little more than a tautology or it may be the cardinal law of

natural science — or all science, for the matter of that. If the uniformity of nature means simply what it says, it means merely that two occurrences can never agree in all but one aspect and disagree in that one. Now, as even an approximately complete inventory of the aspects of an occurrence is never at our dis¬ posal, and since moreover the temporal and spatial position of an occurrence must be con¬ sidered in enumerating its aspects, this law tells us, for all practical purposes, absolutely noth¬ ing. Nature might be perfectly uniform, even though the jumping of a flea should determine the motions of the planets; the establishment of astronomical laws, however, would be a some-' what difficult pursuit.

The uniformity of nature, as the scientist understands it, is much more than th's. It could be called more appropriately the continuity of nature. Perhaps it is best to consider it in the form which it assumes in the Newtonian physics. In the Newtonian physics, the world is completely described when the density of the matter occupying each point of space at some instant is known, together with the magnitude and direction of its velocity. The investigations of physics consist then in determining the actual form of the relation between quantities repre¬ senting time, space, local density, direction and magnitude of velocity. In the attempts to dis¬ cover the function which the time forms of the remaining seven variables, one assumption is always made — that this function is in general (i.e., in the language of the mathematician ex¬ cept at a set of points of zero measure) what the mathematicians term analytic. One conse¬ quence of this is that the function is continuous — i.e., by making sufficiently small changes in the seven variables, we may make the difference of time that results smaller than any assigned quantity, and keep it smaller. Furthermore, if we take a large number of experimental deter¬ minations of the time and the other seven vari¬ ables, it is possible to construct a unique func¬ tion of the seven variables which will represent the time at each of these points and which, by simply increasing the number of experiments, may be made to differ from the function repre¬ senting the actual course of phenomena by less than any assigned quantity over any desired period of time. Two things follow: first, sufficiently slight errors in the observations only mean slight errors in the law cover¬ ing the observations ; secondly, by increas¬ ing the number of observations, it is pos¬ sible to render the maximum error in the law formulated to cover them less than any given value. These facts assure us that by taking a sufficient number of observations, and by exer¬ cising a sufficient amount of care in each obser¬ vation, we may approximate as near to the truth as we desire. That the amount of labor in obtaining a reasonable approximation is not be¬ yond all

human powers is. an article of faith which may be said to constitute a part of what we mean by the law of the uniformity of nature. Other important elements have to do with the spatial distribution of phenomena. Not only the very small, but also the very remote, is inac¬ cessible to observation and measurement. The existence of a scientific physics depends on our ability to neglect the phenomena at sufficiently great astronomical distances. Similar proposi¬ tions assuring us of the negligibility of that

which is sufficiently difficult to observe are basal for other aspects of physical theory.

The law of the uniformity of nature in physics then involves something like the follow¬ ing aggregate of statements: (1) There is a single equation subsisting between the time, the density of matter at every point of space at the time, and the direction and magnitude of veloc¬ ity at that point. (2) This equation is such that each of the unknowns involved is in gen¬ eral an analytic function of all the rest — that is, among other things, that sufficiently small changes in the other unknowns produce only slight changes therein. (3) The error as to the occurrences near us made by con¬ sidering only those physical phenomena within a sphere of finite radius with ourselves at the centre ultimately decreases very fast as the radius of the sphere increases.

If these statements are taken together with rough estimates of the order of magnitude of the change that the changes of some of the physical phenomena mentioned in 2 and 3 entail in others, we have the barest outline of the law of the uniformity of nature as it is found in physics. This law is very far from being a tautology — it is not even obvious. Furthermore, it is specifically a law of physics, and has only been established since the time of Newton by inductive physical researches. Other disciplines, such as psychology, have related but different laws of uniformity. Thev all involve statements of the continuity of certain concrete phenomena. It appears, then, that induction de¬ mands antecedent universal propositions that are not identically true — ex puris particularibus nil concluditur is not confined to deduction. These synthetic propositions, a priori at. least in part, go back and back until in the last analysis they are due simply to a general consonance between the human mind and the facts of nature. This consonance, which consists largely in a prefer¬ ence for

continuity both on the part of the mind and of nature, is continually rendered more perfect by the attrition of our imaginings in the places where they disagree with our observa¬ tions. The history of science consists in a gradual remodeling of each theory in the points where it is wrong, in a mathematical treatment of the errors of the last mathematical treat¬ ment. It will be seen that in the theory here developed the distinction between induction and deduction is not absolute, but is rather one of degree and attitude. The stages of an induc¬ tive research are: (1) the imagination of a theory to fit the facts; (2) the deduction of the consequences of the theory; (3) the verifi¬ cation of these consequences and the observa¬ tion of their errors; (4) the imagination of a theory to account for the errors of the original theory or the formulation of a new theory avoiding these errors. The process runs through a regular never-ending cycle. Stages (1) and (2) are identically those of the mathematician in his purely deductive reasoning. Stages (3) and (4) may be paralleled in a mathematical re¬ search where the object is the formation of an algorithm which will subserve an especial end. The onlv difference is that the verification which the mathematician makes is complete, that of the physicist incomplete.

The importance given to continuity in this article may be expressed by saying that the chief inductive method of the scientist is what Mill

calls the method of concomitant variations. Mill's canon for this method is : ((Whatever phenomenon varies in any manner wherever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation. »

It will be noted that Mill gives a causal interpretation to the method. It has always been the custom of the philosopher, and almost never the custom of the scientist, to interpret the laws of nature under the aspect of cause. A law of nature is simply a more or less precise formula to which occurrences conform. Some¬ times, and only sometimes, the correlated phenomena will have a temporal order, and we may talk of antecedents and consequents. In such a case the antecedents may be called causes and the consequents effects. This implies no obscure effective force emanating from the cause and proceeding to the effect — Hume de¬ molished that notion long ago. A causal in¬ terpretation of the universe, then, consists merely in selecting one especial type of induc¬ tive correlation and elevating it to the type of all induction whatever.

Causal language is particularly adapted to vague, ill-defined

phenomena, about which we can assert little but their presence or absence. Accordingly Mill's remaining canons of induc¬ tion deal with such phenomena. The method of agreement argues a causal relation between A and B when two trains of circumstances are known which begin in A, and have nothing else in common except their termination in B. The method of difference concludes that A causes B if a train of events is known which contains A and ends in B, while a train of events pre¬ cisely similar except in that it does not contain A likewise fails to contain B. The joint method of agreement and difference is what its name would imply. The method of residues is that in which the unexplained parts of a nexus of events are linked up with one another. Not one of these methods is without grave dangers except in the hands of the scientist with a con¬ crete knowledge of the field where he applies it. The artificial division or antecedent and consequent alike into a jig-saw puzzle of yes and no occurrences is vicious in the extreme.

Induction has been a method of human reasoning from time immemorial, and has especially characterized those centuries since Francis Bacon. Aristotle, who was the first to recognize induction as a scientific method, gave a very scant account of induction other than that by a complete enumeration of instances. Bacon followed him in this excessive restriction of inductive reasoning. The beginning of the 17th century marks a period when the progress of science had forced a consciousness of the inadequacy of the Aristotelian logic upon the world of learning. The accepted theory of de¬ ductive reasoning began to be supplemented in practice by a meth Mology, but no approximately adequate treatment of this methodology was de¬ veloped until the middle of the 19th century. In 1840 Whewell (q.v.) published a work in which for the first time due credit was given to the function of imagining and speculation in inductive reasoning. Soon afterward Mill pub¬ lished his (Logic,) in which he formulated the five methods of inductive research that have already been mentioned, and expressed the

theory, also mentioned above, that every in¬ duction in a syllogism with the uniformity of the nature as its major premise. Since the time of Mill the growth of inductive logic and methodology has been extremely rapid. (See Law in Science and Philosophy; Logic; Mill, John Stuart). Consult Aristotle, (Organon J ; Bacon, F., (Novum OrganunP ; Joseph, H. W. B., introduction to LogicJ (Oxford 1906) ;

Mill, J. S., (System of Logic) (London 1843) ; Russell, B. A. W., (Our Knowledge of the External World > (Chicago 1914) ; Welton, (Manual of Logic) (Pt. 11, London 1896) ; Whewell, W., ‘Philosophy of the Inductive Sciences) (London 1840).

Norbert Wiener,

Editorial Staff of The A mcricanai

INDUCTION, in physical science , the process by which a body having electrical or magnetic properties calls forth similar prop¬ erties in a neighboring body without direct con¬ tact; in short, electrical influence. It is a familiar fact that an electrified or magnetized body causes electrical or magnetic disturbances in other bodies in its vicinity, when it is not in direct and visible connection with them, and this, in particular, illustrates the process known as induction. The word induction as employed by physicists occurs in combination with a number of other words, and involves, as well some other peculiar terminology, at which it may be not inadmissible to glance. Thus :

Statical or electrostatic induction is ap¬ plied to the production of an electrical charge upon a body by the influence of another body which is charged with statical electricity. It can be shown by experiment that the inductive in¬ fluence is transmitted through a non-conduct¬ ing medium which may be considered as in a state of strain or tension. It is found, further, that the character of the medium determines the amount of induced electricity. The power of a non-conducting substance to transmit an influence of this kind, as compared with that of dry air, is known as its specific inductive capac¬ ity or dielectric capacity.

The principle of statical induction is in¬ volved in the electrophorus, in the Holtz and also in other influence or induction apparatus; and in the condenser, as in a Leyden jar, voltaic or electrodynamic induction, it is the production of an electric current, or rather an electric motive force, by the influence of an electric current. This latter is called self-induction when upon its own circuit; but mutual-induc¬ tion, if it is the induction of a current upon another circuit. By current is here understood a definite quantity of electricity per second. When the current is induced by the action of a magnet, or when a magnetic condition is in¬ duced by an electric current, the result is alluded to as an example of electro-magnetic induction. Magnetic-induction is the production of magnetic properties in a magnetic substance, as in a soft-iron bar, by a near-by magnet, or by an electric current. Mutual induction is the reaction of two electric currents upon each other, a

phenomenon due to the variations . in distance between them. Peristaltic induction is applied by Thomson and others to mutual electrostatic induction between the wires of a multiple cable. Flow of induction across an element of surface in magnetism is the product

of the surface of the element by the perpen¬ dicular component of induction.

Faraday disclosed the existence of the power and action of electric currents in neighboring conducting circuits to the world. His re¬ searches on induction, named by him ((voltaic- electric induction,)y were published in the Philo¬ sophical Transactions) during 1831-32. Joseph Henry, in 1832, observed that when contact was broken in a long galvanic circuit, a bright spark occurred, which did not appear, when the circuit was short. This was shown by Faraday, in 1834, to be due to the extra current induced by the various parts of the circuit in each other. Bachhoffner, and also Sturgeon, in 1837, demonstrated that superior action, in induction apparatus, of a bundle of iron wires to that of a solid bar of iron. Henry, in 1841, studied the inductive action of induced currents of dif¬ ferent orders. De la Rive designed, in 1843, an electro-chemical condenser, consisting of a pri¬ mary coil, which, by means of an extra current, could enable a single galvanic cell to decompose water. The same decomposition, however, had been effected by White in 1840. Ruhmkorff constructed, in 1850 or 1851, the first so-named ˆinduction-coil,® the excellence of which was owing chiefly to the proper insulation of the secondary coil. Fizeau, in 1852, increased greatly the power of the coil by providing it with a condenser. This electrical instrument consists of two coils of wire wound one over the other upon a core consisting of bundles of iron wires. One of its circuits is called the primary circuit and the other the secondary circuit. These coils are employed for physio¬ logical purposes and also in connection with the telephone. But it is in connection with high- frequency electric currents for Rontgen ray work and wireless telegraphy that one finds the employment of the induction coil most often used at present. Of late years, coils of great power have been constructed, rivaling, if not exceeding, the most powerful electric machines in length and power of spark.

In considering induction, mention may be made to the interesting theory of Ampere. (Ampere’s theory) is applied to an electrody¬ namic theory proposed by Andre Marie Am¬ pere. According to it, every molecule of a magnetic substance is supposed to be traversed by a closed electric current. Before magnetiza¬ tion the combined effect of these currents is zero. But by the magnetizing process they are supposed to be brought more or less fully into a parallel position.

Then their resultant effect is said to be equivalent to a series of parallel currents traversing the exterior surface of the magnet in a plane perpendicular to its axis, and a certain definite direction, which, when the south pole is turned toward the observer, is that of the hands of a watch. ‘ These hypo¬ thetical currents are called Amperian currents. This theory is based upon the close analogy between a solenoid traversed by an electric current and a magnet. Ampere thus conceived that the magnetic action of the earth is the result of currents circulating within it, or at its surface, from east to west, in planes parallel to the magnetic equator.

The ultimate mechanism of induction is still somewhat obscure, but something has been learned of its general nature. In the early days of physical science it was believed that bodies

can act upon one another even across spaces that are absolutely void, and at the present time it is sometimes convenient to assume them to act in this manner, in forming mathematical equations for the treatment of physical prob¬ lems. It is no longer believed, however, that this is what actually happens in nature ; the phenomena of electric and magnetic induction being now attributed to motions or stresses in the ether which transmits light. (See Ether). Newton was of the opinion that induction is an ether-phenomenon, and in the first half of the 19th century Faraday may be said to have estab¬ lished the ether hypothesis upon a substantial experimental foundation. In later years Max¬ well developed Faraday’s conceptions mathe¬ matically, and added much more evidence that was partly theoretical and partly experimental ; so that at the present time there are few or no physicists who doubt that induction is a mani¬ festation of some form of activity in the light¬ bearing ether. Opinion is still divided, however, as to the precise nature of this activity. In fact, we cannot hope to gain any very precise information on this point until much more is known about the constitution of the ether itself.

The charging of a condenser is a phenome¬ non in electrostatic induction. If the condenser consists of two parallel plates (for example), of a given size and set at a constant distance from each other, and we charge it to a. given poten¬ tial, the quantity of electricity that must be put into it in order to charge it in this manner depends to a considerable extent upon the na¬ ture of the dielectric (or insulating material) which separates the plates. If the charge that

is required when air is the dielectric is taken as unity, then with plate glass as a dielectric the charge will have to be 8.45 (according to Hopkinson), in order to bring the potential of the condenser up to the same value as before. If the space between the plates is filled with com¬ mon turpentine, a charge 2.23 times as great as that required with air as the dielectric must be communicated to the condenser. It is evi¬ dent, from these facts, and from others of the same nature, that electric induction depends, to a large extent at any rate, upon the nature of the medium which separates an electrified body from the other bodies upon which the in¬ ductive influence is felt. The constants that are given above are known as the ((specific inductive capacities^of the dielectrics to which they refer.

Electrodynamic induction is the basis of practically all of the electrical machinery that has been found serviceable to man. The funda¬ mental fact of electrodynamic induction may be stated as follows : If a closed electrical circuit, such as might be formed by joining the two ends of a copper wire, is placed in a magnetic field, then no current will be produced so long as the circuit is everywhere stationary, and the strength of the magnetic field remains every¬ where invariable. If the intensity of the mag¬ netic field is increased, a current of electricity will flow around the circuit while the intensity of the magnetism is changing, the intensity of the current being proportional to the rapidity with which the intensity of the magnetism varies. As soon as the magnetism again be¬ comes constant, the current in the circuit ceases. If the intensity of the magnetic field be dimin¬ ished instead of increased, a current will also

be produced in the closed circuit, but it will be opposite in direction to that produced by in¬ creasing the magnetic field. Currents produced in this manner are called ^induced currents.® Instead of varying the magnetic field' while the circuit is fixed in position, we may move the circuit about in the magnetic field. If the mag¬ netic field is everywhere uniform in all respects, and the circuit is moved so as to always remain parallel to itself, then no induced current will be produced; but if the circuit is moved from a region where the magnetism is strong to one where it is weak, or vice-versa, a current will be induced in the circuit, just as if the circuit were kept stationary and the intensity of the magnetism varied. Induced currents are also produced when, instead of being translated from one region to another, the circuit is rotated in a magnetic field, in such a way that the number of lines of magnetic force passing through it is either increased or diminished. In the induc¬ tion coil the intensity of the magnetic field is varied, while the circuit in which the induced current is to be produced is kept stationary. In dynamos, on the other hand,

the magnetic field is maintained sensibly constant, while the circuit in which the induced current is to be pro¬ duced is rotated or otherwise moved about.

A current moving in a closed circuit pro¬ duces a magnetic field in the space above it, and this magnetic field, when it varies on ac¬ count of the variation of the current that pro¬ duces it, causes the production of induced cur¬ rents in any closed circuit that may happen to be near. Let us conceive two closed circuits. A and B, to be situated near each other, and let there be a current produced by any means in the circuit A. So long as the current in A is constant, no current will be produced in B ; but if the current in A is variable, an induced current will be observed in B, whose intensity depends upon the rate at which the current in A is varying, upon the resistance of the cir¬ cuit B and also upon a certain numerical factor, whose value depends upon the sizes and shapes of the two circuits, upon their positions with respect to each other, and upon the nature of the medium (air, oil and whatever it may be) in which they are placed.

If a pair of circuits, A and B, are near each other, and A is carrying a constant current of intensity G, while B is carrying a constant cur¬ rent of intensity G, then the displacement of either circuit, relatively to the other, would cause induced currents to flow in both ; and hence (in general) neither circuit can be moved without the energy of the system being affected. The difference between the energy of a pair of coils that are near together, and the energy of a similar pair of coils that are conveying identi¬ cally the same currents but are infinitely remote from each other, is equal to MGG, where M is a numerical factor whose value depends upon the. sizes and shapes of the two circuits, upon their relative positions and upon the medium in which they are placed. The factor M is called the ˆcoefficient of mutual induction® of the pair of circuits.

The various parts of a single circuit act upon one another inductively, just as separate circuits do ; and a circuit that is wound upon a spool, or otherwise coiled so that its parts come near together, possesses greater energy than the same circuit would have, if it was not so coiled.

I his fact is expressed by saying that every cir¬ cuit has a certain amount of ((self-induction.)) The energy that a circuit possesses in

virtue of its self-induction is proportional to the square of the current that it is carrying, and to a cer¬ tain numerical constant called the ˆcoefficient of self-induction,® whose value depends upon the size and . shape of the circuit, and upon the medium in which it is placed. Like the co¬ efficient of mutual induction of a pair of circuits, the coefficient of self-induction of a single cir¬ cuit can be computed, for certain simple cases, by methods given by Maxwell, in his (Treatise on Electricity and Magnetism) ; but in the gen¬ eral case the computation is exceedingly difficult, and altogether impracticable ; so that the values of these coefficients for given circuits are usually determined experimentally, except when a very rough estimate will serve.

The general subject of induction is essen¬ tially mathematical in its character, and cannot be properly explained nor understood without the use of the calculus. Consult Nipher, Elec¬ tricity and Magnetism) ; Maxwell, (Treatise on Electricity and Magnetism. > See also the arti¬ cles Electricity and Magnetism, in this ency¬ clopaedia.

INDUCTION, Mathematical. Despite the age-long tyranny exercised by the Aris¬ totelian logic — a tyranny having, at least in the domain of science, scarcely a match except in the case of Euclid's elements — the forms of thought, those diagrammatic representations of the orderliness of the reasoning processes, sus¬ tain to-day perhaps even greater interest than ever before (see Symbolic Logic). The mathe¬ matician's interest in these forms is twofold, attaching to them both as norms for testing the validity of arguments and as constituting exceedingly subtle matter for mathematical in¬ vestigation.

Of all argument forms, there is one which, viewed as the figure of the way in which the mind gains certainty that a specified property belonging but not immediately by definition to each element of a denumerable (see Assem¬ blage Theory) assemblage of elements does so belong, enjoys the distinction of being at once perhaps the most fascinating, and, in its mathe¬ matical bearings, doubtless the most important, single form in modern logic. This form is that variously known as reasoning by recur¬ rence, induction by connection (De Morgan), mathematical induction, complete induction, and Fermatian induction — so called by C. S. Peirce, according to whom this mode of proof was first employed by Fermat. Whether or not such priority is thus properly ascribed, _ it is certain that the argument form in question is unknown to the Aristotelian system, for this system allows apodictic certainty in case of deduction only, while it is the distinguishing mark of mathematical induction that it yields such certainty by the reverse process, a move¬ ment from the particular to

the general, from the finite to the infinite. See Assemblages, Theory of.

Of the various designations of this mode of argument, ˆmathematical induction® is undoubt¬ edly the most appropriate, for, though one mav not be able to agree with Poincare (see Bibliog¬ raphy below) that the mode in question is characteristic of mathematics, it is peculiar to

that science, being indeed, as he has called it, Mathematical reasoning par excellence.®

The nature of mathematical induction as it is ordinarily understood may be made clear by an example. Perhaps the simplest application of the method is found in the proof of the theorem :

(a) 1+2 + 3+ . + n — in(n +1)

where n denotes any positive integer whatever Suppose it ascertained by observation or other¬ wise that

(1) 1 + 2 = i2(2 + 1),

(2) 1 + 2 + 3 — 13(3 + 1).

Facts (1) and (2) justify the suspicion that (a) may be a fact. The proof by mathematical induction that (a) is indeed true runs as fol¬ lows: It is assumed that (a) is true for some definite but unspecified integer n. Then by adding n + 1 to each member of the assumed equation, n having the same meaning as in the assumption, one finds that

(13) 1+2 + 3+ .... + n + w + 1

= i(n + 1) (n + 2).

So it is seen that, if (a) be true for some in¬ teger n, it is true also for the next greater integer » + 1. But by (2), (a) is true when n is 3; it is, therefore, true for 3 + 1, or 4; there¬ fore, for 4+1, or 5. The argument is then usually closed by saying (

The nature and the role of the foregoing et cetera, ((and so on,® demand consideration. Without it, the argument as stated seems obvi¬ ously incomplete. But how is the et cetera to be logically justified? By reference to some axiom or principle of thought? If so, what? Or can the phrase be in some way dispensed with without damage to the argument?

Before attempting to answer them it may be well to show the inevitableness of the questions by a further analysis. Suppose it established, in regard to some property p (where, for ex¬ ample, p might signify the validity of the bi¬ nomial theorem for some integral exponent) : (1) that p belongs to the integer 1, that is, referring again to the mentioned example, the theorem is valid for the exponent 1 ; (2) that, if p belong to an integer n, it belongs to n + 1. Propositions (1) and (2) furnish the means of generating, one after another, a se¬ quence of syllogisms by which one proves first that p belongs to 2, then to 3, then to 4, and so on. Note that in order to ascertain by this analytic (syllogistic) methodˆ whether p belongs to a specified integer m, it is necessary to de¬ termine in advance the same question for each

of the integers 2, 3, . , m — 1, in the order

as written, a process requiring a number of syllogisms which is greater the greater the number m. Accordingly this method, of suc¬ cessive deductions, is not available for deter¬ mining whether p belongs to each in the (in¬ finite) totality of integers. Equally powerless to that end is experience (including observa-

tion), for this can take account of the individ¬ uals of a finite assemblage of objects at most. Either analysis or experience may avail if a sequence be finite, but if it be infinite both must fail. Not less vain is it to invoke finally the aid of induction as the term is understood and employed in the physical sciences, for this latter, resting upon a purely assumed order in the external universe, is confessedly inductio imperfecta, and, being such, can yield approxi¬ mate certainty only.

Nevertheless, despite the inadequacy of the means mentioned, as soon as hypotheses (1) and (2) are admitted and the indicated se¬ quence of deductions is begun, ((the judgment imposes itself upon us with irresistible evi¬ dence® that p is a property of all the integers. Why? That is, how justify the ((and so on®? It appears to be clear that the answer must be the adduction or invocation of an additional presupposition of formal thought, a presup¬ position whose formulation shall mark a con¬ scious extension of the domain of logic by affirming as axiomatic that apodictic certainty can and does transcend every limited sequence of deductions or observations. Such presup¬ position, which may be called the axiom of in¬ finity, is

stated by Poincare, in answer to the foregoing question, <(why,® as follows : <(It is the affirmation of the power of the mind which knows it is capable of conceiving the indefinite repetition of a same act as soon as this act is found to be once possible.® The act or opera¬ tion, which cannot indeed be indefinitely re¬ peated, but which by the axiom can be con¬ ceived as so repeated, is, in the present case, the construction of the syllogisms of the se¬ quence above mentioned. .

The et cetera in question is capable of justi¬ fication without appealing, apparently at least, to the axiom of infinity, namely, by use of the so-called indirect method of proof, the method known as reductio ad absurdum. Thus let it be supposed that the argument sought to be indefinitely extended by means of the phrase <(and so on® does not admit of indefinite exten¬ sion along the ordered sequence of integers. There will, then, be a first integer, say m + 1, for which the property p fails. As, by hypoth¬ esis, m + 1 is the first integer for which p fails, p belongs to the preceding integer m; but since p belongs to m, it also belongs, by (2), to m T 1. Hence the supposition that the argu¬ ment does not admit of indefinite extension is false ; and the conclusion is obvious. This procedure is convincing, but it is plainly less a natural completion than an ((unindicated® forti¬ fication of the process it supplements. . It is, besides, not entirely clear that the axiom of infinity is not surreptitiously subsumed by it.

By far the most penetrating investigation of the nature of mathematical induction was made originally by Richard Dedekind. (See Bibliog¬ raphy below). His procedure and result are, in brief, as follows : Let N denote a system of elements (things of any kind) such that there is a scheme of law 9 of depiction by which N may be depicted upon itself, that is, a scheme by which each element e of N may be thought as corresponding to one and but one element e' of S' and so that no two elements of S shall be thought as corresponding to a same element of S'. The correspondent e' of e is called the picture or image of e. Every part

of S' (including S itself as a special case) thus depicted upon itself is named chain under 9- Denote by A an arbitrary part of S' and by Ao the assemblage of all the elements common to all the chains (in S) that contain A. It is obvious that, S' and 9 being given, there is one and but one A0 for a given part A of S. Ao, which is easily seen to be itself a chain, is described as the chain of A under 9- Now let 2 denote an assemblage of elements. Dede¬ kind proves the following

Theorem. — In order to prove that Ao is part of 2 it is sufficient to prove: (1) that A is part of 2; and (2) that, if an element Ao belong to 2, the image of that element belongs to 2.

Dedekind's proof, simplified, runs thus: Let Aoˆ Ai + As where Ax denotes the assemblage of all those elements of A0 that belong to 2. By (2), Ax is a chain, and, by (1), contains A. Hence, by definition of A0, A 2 has no element, whence A0 = Ai. Such is the beautiful and marvelously fundamental theorem which its author characterizes, perhaps a little extrava¬ gantly, as <(the scientific basis® of mathematical induction. It is at any rate a basis, and by virtue of it, as shown below, proof by mathe¬ matical induction need have no recourse to an et cetera consisting of an endless sequence of syllogisms.

It will be instructive to apply Dedekind's theorem to the completion of the proof by mathematical induction of the binomial theorem.

(a) {a --b)ˆ—aˆ --nan — dt – f- .

for positive integral exponents. Let it be granted that

(jd) (a + b)l — a b,

and supposed it established in the usual way that (y), if (a) be valid for some integer, as n — 1, then it is so for the next, n. Denote by N the sequence of integers,

SEE 1, 2, 3, . , n — 1, n, . ,

by 9 the scheme by which each number in S except 1 is the image of its predecessor, and let A be 1. Then A0 is S identically. Let 2 de¬ note the assemblage of positive integers for which (a) is valid. The reader will now ob¬ serve that Dedekind's theorem enables one to prove by a single stroke, so to speak, that (is valid for all positive integers. For, by (/3),

(a) is valid for 1, that is, A is part of 2 and (1) is satisfied; and, as A0, or 10, is S, it fol¬ lows from ( ) that (2) is satisfied; y hence S is part of 2.

With the modern increasing interest in the philosophy of mathematics, mathematical induc¬ tion has steadily gained in interest and ac¬ knowledged importance. Certain questions re¬ specting its presuppositions and field await definite answers. It is agreed that every argu¬ ment by mathematical induction is a mathe¬ matical

argument, no matter what the subject- matter, but there is difference of opinion as to whether every mathematical argument is mathe¬ matical induction either in terms or in dis¬ guise. Were this converse true, mathematics (see Mathematics) would, be definable in terms of this mode of ratiocination. This and kindred questions are considered in the works cited bekrw.

Bibliography. — Dedekind, (Was Sind und Was Sollen die Zahlen) (also in English) ;

Poincare, (Sur la nature du raisonnement mathematiqueP Revue de Methaphysique e de Morale (Vol. II) ; Schroder, (Algebra der Logik) (Vol. Ill) ; Russell, (The Principles of Mathematics) (Vol. I) ; Keyser, Concerning the Axiom of Infinity and Mathematical In¬ duction } (Bulletin of the American Mathe¬ matical Society, Vol. IX).

Cassius J. Keyser,

Adrain Professor of Mathematics, Columbia University.

INDUCTION BALANCE, in physics, an apparatus designed for measuring and indicat¬ ing the electrical conductivity of metals. It is based upon the principle of induction. The mere proximity of a metal, especially a metal that is a good conductor, will induce or draw magnetization as electrification from a charged wire, battery, etc. An induced current is al¬ ways opposite in positivity to the near side of the charged source of current. In its most familiar form it consists essentially of four coils of fine wire, an electric battery, a circuit breaker and a telephone. Let the coils be desig¬ nated, respectively, by the letters A, B, C and D ; A being similar to B in all respects, and C being likewise similar to D. Coils A and B are placed in circuit with the battery, and coils C and D are placed in circuit with the tele¬ phone. The coils are disposed in pairs, A be¬ ing placed near C, and B near D. If the cur¬ rent through A and B is rapidly interrupted, an induced current will, in general, flow through C and D, at each make and break; its presence being indicated by the sounds that it produces in the telephone that is in circuit with C and D. It is possible, however, to dispose the coils and their connections so that the current that A induces in C shall be sensibly equal and opposite to that which B induces in D. When the balance is perfect no sound will be heard in the telephone. If a piece of metal be now brought near the coil A, the

inter¬ mittent current in A will induce currents in the mass of the piece of metal, and these, in turn, will act upon the coil C, producing in¬ duced currents in this coil which are not com¬ pensated by similar currents in D. The loss of balance will be at once indicated by the re¬ currence of sounds in the telephone ; and in this way the metal fragment will betray its presence. The induction balance has been used successfully for locating bullets in the human body. The intensity of the sounds produced in the telephone depends not only upon the size and position of the disturbing piece of metal, but also upon its specific electrical resistance; and hence the balance may be used to com¬ pare the specific resistance of metals. When an induction balance is arranged for making measurements of electrical resistance it is usually termed an induction bridge.

INDUCTION COIL, one of the early

electrical instruments, that simply illustrates the principle of induction, consisting of an iron core about which two wires are differ¬ ently coiled: now used mainly for study, and in connection with high frequency currents, radiography and X-ray investigations. (See Induction). The essential features of the in¬ strument are represented, diagrammatically, in the accompanying cut. A soft iron core is surrounded by two coils of wire, the finer one

outside of the other. The outer coil is the one in which the high tension induced currents are produced; it is called the (

especially when they are to be run with the commercial current used for incandescent lighting, where the potential difference that is used is something over 100 volts. In the Weh¬ nelt interrupter the primary coil on the iron core is made of a few turns of relatively thick copper wire, its purpose being solely to effect the magnetisation of the core ; but the sec¬ ondary coil, in which the induced currents are generated, is made of fine wire, and in order to multiply the inductive effect as far as possi¬ ble, the secondary is made of great length, often containing many miles of wire. In the celebrated Spottiswoode coil the secondary con¬ tained no less than 280 miles of wire. The primary coil, being wound directly upon a soft iron core, commonly has a very considerable amount of self-induction, so that when the circuit is broken by the interrupter the current does not suddenly cease, but continues to flow across the interval at the break for an ap¬ preciable fraction of a second, as is readily seen by the strong sparking that occurs at the moment of interruption. In order to reduce the sparking as far as possible, a condenser of suitable capacity is provided, so that when the break is made in the circuit, the “after-current® due to the

self-induction of the primary can

discharge into the condenser, instead of passing across the break in the circuit and causing a spark. The condenser causes the interruption of the current in the primary coil to be much more sudden, and it materially increases the potential that is developed in the secondary coil, since this is proportional to the rate of variation of the magnetism of the core, and is much greater when the magnetism falls off abruptly than when it persists for an appre¬ ciable fraction of a second after the break has been made.

The induction coil was brought into some¬ thing like its present form by Ruhmkorff, and is frequently known, in consequence, by his name. Improvements in the winding of the secondary coil were introduced by Ritchie of Boston about 1857. Ritchie's most important improvement consisted in disposing the sec¬ ondary wire in sections, which were so related to one another that the risk of internal dis¬ ruptive discharge through the coil itself might be reduced to a minimum. Induction coils are very generally used in studying the discharge of electricity through gases, for exciting X-ray tubes and in connection with the high potentials required in wireless telegraphy. Consult Bon- ney, Undeletion Coils) ; Alsopp, Undeletion Coils and Coil-Making) ; Wright, (The Induc¬ tion Coil in Practical Work.*

Allan D. Risteen,

Director of Technical Research, Travellers

Insurance Company.

INDUCTION MOTOR. See Electrical Terms.

INDULGENCE. An indulgence is a par¬ tial or total remission by the Church, through an extra-sacramental channel, of the temporal punishment due for sin after its guilt and eternal penalty have been removed by the sacra¬ ment of penance. The theological basis upon which the doctrine rests is that all the acts of Christ, the God-Man, were of infinite value, that the acts of the Saints are his acts because vivified by divine grace, and from this treasury of divine, supereminent merit the Church is able, so to speak, to pay the debt of temporal punishment for the repentant sinner.

Certain cardinal principles of Catholic life are requisite to obtain a correct idea of the Catholic doctrine of indulgences. Growth and adaptation have characterized the Christian organism from the Apostolic Council of Jeru¬ salem to the CEcumenical Council of the Vat¬ ican. The development of doctrine, upon which such explicit emphasis was laid by the late Cardinal Newman, is of prime significance . for the student who would institute a comparison between the teaching and practice of the Church in the matter of indulgences at the present day and during apostolic times. We may observe in passing that the principle of doctrinal development is in perfect harmony with the scientific spirit of the present age. Growth and adaptation are now believed to be distinguishing features of every living and pro¬ gressive organism. We should not, therefore, expect to find the Catholic system of indul¬ gences, in all its complex details, flourishing in the primitive Church. In harmony with the law of development, essential to every organ¬ ization among men, we believe that the Church's

((proud boast of semper cadem ** is not defeated by calling attention to the richness, variety and flexibility of the outer forms of its polity and liturgy, or to the varying emphasis given to special dogmas in the course of its history, in response to the needs of particular eras. Unity in diversity is the Church's most appropriate motto. The doctrine and practice of indul¬ gences, therefore, which obtain throughout the Catholic world at the present time must be sought for only in germ in Sacred Scripture and in the practice of the primitive Church, just as the bole, the branches and the foliage of an oak tree, ((the monarch of the forest, existed potentially in the acorn from which it sprung.

Indulgences being the remission of the tem¬ poral punishment due to sin, the interpretation of the true character should start from the Christian idea of the nature and purpose of punishment. It is therefore strange that writ¬ ers of all schools of opinion concerning indul¬ gences should fail to correlate the two con¬ cepts. At the present day the conviction pre¬ vails almost universally among non-Catholic students of penology that punishment is ex¬ clusively disciplinary and correctional. No theory could be more alien to the spirit of the entire Old Testament or to the mind of the early Christian Fathers. The inflexible and rigorous justice of God making death the wages of sin appears in almost every page of the history of his covenant with Israel. The New Testament, founded on the atonement by Christ, only mitigates this view by impressing on the minds of men the possibility of vicarious satisfaction for their transgressions. Butˆ al¬ though Christ's atoning and vicarious sacrifice was all-sufficient in itself, or objectively con¬ sidered, to satisfy the offended justice of his

Heavenly Father, nevertheless the Christian economy of redemption demands each individ¬ ual's co-operation at every stage in order to appropriate Christ's merits and make them sub¬ jective to himself. The opposite view (that is, the belief), that the creature has no active part in his sanctification and salvation, inclines toward Pantheism, robs good works and the Christian sacraments of genuine value, and differentiates the Lutheran from the Catholic position. According to Catholic teaching the guilt of sin is cleansed from the soul by the application of the merits of the precious blood of Christ through the instrumentality of the Sacraments, whose efficacy, in the case of adults, depends on the subjective disposition of the recipient. The eternal punishment due to sin disappears with the guilt to which it is annexed. But, besides having these super¬ natural and eternal relations and consequences, sin viewed even within the circumscribed limits of man's natural life on earth is an act of treason against God in His own kingdom involving forfeiture of all rights to life and all the good things with which God's prov¬ idence has so bountifully enriched it. This temporal consequence of sin calls for a tem¬ poral reparation. The canonical penalties there¬ fore imposed on the Church during the first centuries were intended to pay this temporal debt to the Divine justice, and were not merely disciplinary or correctional ; and the sinner, in submitting to them, or in seeking mitigation

from them through the intercession of the martyrs, recognized the necessity of his own personal act to satisfy the justice of God. either directly or vicariously by appropriating through the charity of the Church the super¬ abundant merits of Christ and His Saints.

An indulgence granted to the living is an act of jurisdiction, or exercise by the Church of the power of the keys conferred on it in the well-known words of the Gospel of Saint Matthew : ((And I will give to thee the keys of the Kingdom of Heaven, and whatever thou shalt bind on earth, it shall be bound in Heaven, and whatever thou shalt loose on earth, it shall be loosed in Heaven.® Every Church, in so far as it is a visible organization, claims in some degree a power of the keys, that is, the right to admit or exclude mem¬ bers — to determine fellowship. But the antith¬ esis so emphatically expressed in the text be¬ tween heaven and earth proves that the king¬ dom of heaven there spoken of is more com¬ prehensive than the visible Church of Christ. It is proclaimed that the power of binding and loosing on earth bestowed upon the Apostles and their successors, is ratified in its

every act by the supreme tribunal of God in the Church triumphant. In accordance with a well-known principle of Catholic exegesis, the best interpre¬ tation of a text of Sacred Scripture is furnished by the universal tradition of the Church from the age of the Apostles to the present time.

Saint Paul, in his epistles to the Corinthians, describes how he imposed punishment on the incestuous Corinthian and how he subsequently remitted it. The penalty was not merely an ecclesiastical censure of excommunication in¬ flicted primarily for the purpose of safeguard¬ ing the flock of Christ. The Apostle expressly states that the chief motive which actuated him was anxiety for the individual salvation of the transgressor. Nor could it have been (as has been already shown) a mere disciplinary meas¬ ure to impress upon the sinner the gravity of his crime or to test the sincerity of his repent¬ ance. Having no organic relation to confes¬ sion, whether public or private, and no expressed or implied connection with perfect contrition, it was not a part of any conceivable Chris¬ tian ordinance for the remission of the guilt and eternal punishment of sin. According to Catholic reasoning, it was therefore an exercise of the power of the keys by the Apostie to remit a temporal debt due to God for the offense; and since, according to universal Jew¬ ish and Christian belief, the Divine Justice rig¬ orously demanded either direct or vicarious satisfaction, the Apostle could only concede that ˆindulgence® by appropriating to the indi¬ vidual sinner the superabundant merits of Christ and the Saints out of the treasury of the Church.

It will be observed that the Apostle of the Gentiles granted the first recorded indulgence in the form of an absolution. Indulgences usu¬ ally took this form in the primitive Church. The early Fathers frequently refer to their be¬ ing thus conceded by bishops on the presentation of a <(Libellus Supplex® given to the penitent by some Christian martyr on the eve of suffer¬ ing an heroic death for Christ. It is interest- fng to note that the present practice of never granting those favors except to persons who

are in full communion with the Church, and who have received the Sacrament of Penance, was substantially insisted upon by Saint Cyprian. He demands that the martyrs should not grant <(Libelli® except to persons who had abandoned their sinful career and given ample evidence of heartfelt contrition and sincere conversion. In¬ dulgences in the first centuries of the Church having implied a diminution of the period of canonical punishment — the name by which this act of leniency was then known was

We find in the writings of Saint Augustine reference to the remission, in return for alms¬ giving, of temporal penalties imposed for minor ecclesiastical offenses. Thus there gradually grew up the custom of granting indulgences un¬ der the form of commutation. Under this form they were especially conspicuous during the period of the Crusades. Every person who confessed his sins in a sincere and contrite spirit, received Holy Communion and joined the Crusade for liberating the holy places from the infidels was declared to need no other penance. (< Iter Mud pro omni Pcenitcntia reputetur ® was one of the decrees of the Coun¬ cil of Clermont, held under Urban II in the year 1095. The system of commutation for almsgiving afforded opportunity for abuse, as was evident in the practice of farming out® to laymen the collection of alms in return for indulgence. Thus, for example, in the case of the famous indulgence granted by Leo X, in 1517, to the Catholic faithful on condition that they would contribute to the completion of Saint Peter's basilica in Rome, the right of collecting the money was conferred, in the first instance, on Albert, bishop of Maintz, and then sold by him to an Augsburg banker. Circum¬ stances like these gave occasion to the Prot¬ estant party to charge the Church with the (has called forth from the ablest Protestant historians and the-

ologians of Germany, have proved that the first Apostle of the Protestant Reformation was an epoch-maker by reason of conditions, not be¬ cause he possessed in any high degree the quali¬ ties of the Uebermensch. Yet the nailing of his 95 thesis on the doors of the castle church of Wittenburg in protest against the indulgence granted by Leo X, and preached by Tetzel, sub¬ delegate of Albert, bishop of Maintz, set all Europe aflame and destroyed the dogmatic unity of Catholic Christendom.

Opposition to the doctrine of indulgences arose at different times, not because of their alleged novelty or repugnance to the religious sense of the Christian people, but because they did not always approve of the object for which alms were obtained by the preaching of indul¬ gences, or because of the personal defects of those entrusted with their promulgation. It should be distinctly noted that these purposes were not always strictly religious. They were frequently philanthropic, such as the construc¬ tion of bridges, the erection of hospitals, etc., and in such cases received the unqualified ap¬ proval of princes and people. In order to comprehend the outburst which Luther was able to evoke against the indulgence granted by Leo X we must bear in mind, besides the ques¬ tionable motives that are alleged to have partly inspired the action of that pontiff, also the bitter memories that tarried in the minds of European monarchs after their defeat on the question

of investitures, and the death-blow. dealt thereby to the feudal system. The entire antipathy aroused, for this and other reasons, against the Holy See in the time of Leo X found vent in the attack initiated by Luther on indulgences.

An indulgence may be acquired directly by the living and applied by them, with the consent of the Church, to the souls of the faithful de¬ parted. All Catholic theologians are unanimous in the opinion that an indulgence should not be granted without grave and substantial reasons, since the ordinary Christian economy demands that each individual should make personal rep¬ aration for the temporal debt due for his sins. Moreover, in order to participate fruitfully in an indulgence, certain conditions and disposi¬ tions are necessary on the part of the subject. He must be in the state of grace, have a genuine desire to gain the indulgence, and perform cer¬ tain acts prescribed by the Holy See.

The application of indulgences to the dead is not a judicial act of the Church, whose juris¬ diction is limited to the members of the mili¬ tant or visible Church on earth. Remission of the temporal debt due to God for sin by the suffering members of Christ's mystical body in Purgatory is communicated to them by the Church by way of suffrage or supplication. . In other words, she authorizes the living to join their petitions with hers that God may gra¬ ciously accept the indulgences which they gain and in the measure in which they gain them, in behalf of the souls of the faithful departed. Indulgences are now dispensed partly by way of absolution and partly by way of commuta¬ tion. The well-known distinction between partial and plenaty indulgences should be un¬ derstood in an objective sense. The degree in which any indulgence is actually gained or subjectively appropriated by the individual de¬ pends on his subjective disposition, according to the theological maxim: whatever is received

is received according to the measure of the re¬ cipient. The most solemn of all plenary in¬ dulgences is that which is granted on the occa¬ sion of a jubilee such as that which was pro¬ claimed for 1904 by His Holiness Pius. X to mark the 50th anniversary of the definition of the Immaculate Conception by Pius IX.

Thomas E. Judge, S.T.P.,

Formerly Professor of Mental and Moral Phi¬ losophy, Saint Patrick's College, Maynooth, Ireland; afterward Professor of Dogmatic Theology in The Saint Paul S eminary, Saint Paul, Minn.

INDULGENCE, Declaration of. See

Declaration of Indulgences.

INDULINES, dyestuffs, blue, bluish-red to black in shade. They were discovered in 1863 by J. Dale and H. Caro, and carry an English patent (No. 3307). They are formed by the interaction of para-amino azo compounds with primary monamines in the presence of a small quantity of mineral acid.

INDULT, a papal license, as when the Pope authorizes the bishop to grant certain re¬ laxations during the Lenten fast required by physical necessity.

INDUNA, a word (Zulu-Bantu) signify¬ ing officer.

INDUS (Sanskrit, Sindhu), the chief stream of the northwest of India, and one of the great rivers of the world. It has a length of about 1,900 miles, and drains an area of more than 360,000 square miles. It arises in Tibet on the north of the Himalaya Mountains, nearly 100 miles northwest from the sources of the upper Brahmaputra (q.v.), on the north side of the mountain mass of Kailas, 18,000 feet above sea-level. In the upper part of its course it takes a northwesterly direction along the northern foot of the main Himalayan range, enters the Kashmir territories, passes through Ladak, below the capital of which, Leh, it receives the Zanskar, farther on the Dras, after which it enters Baltistan. Here it receives, on the right, the Gilgit, from a glacier of the Karakoram, the largest tributary that joins it in the Himalayan regions, and takes the name of Indus or Sind. About 100 miles below this it takes a sudden bend toward the southwest, and after a course of about 180 miles more in this direction it leaves the loftier regions. At the British fortress of Attock in the Punjab — where it is crossed by a great railway bridge carrying the line to Peshawar — it is joined by the Kabul from Afghanistan, and here, 950 feet above the level of the sea, it is nearly 800 feet wide and from 30 to 60 feet deep according to the season. For the rest of its course (about 900 miles) it continues its southwesterly direction till it enters the Indian Ocean. At Kalabagh, 110 miles below Attock, it has a breadth of over 1,400 feet. Arriving in the low-lying country, its waters become charged with mud, and in the rainy season, and by the melting of the snow in the moun¬ tains, it overflows its banks. Near Mithankot it receives on the east the Panjnad, or united stream of the Five Rivers of the Punjab. Below the confluence it has a width of over 1,900 yards when the water is low. In Sind it gives off several extensive arms or canals, which are of great value for irrigation; and

below Hyderabad it divides into a number of shifting mouths or estuaries, the most nav¬ igable of which is at present the Yatho mouth. The delta, formed by the enormous amount of alluvium brought down by ‘the river, has a coast-line of about 130 miles, and the point or head of it at Tatta is 70 miles from the sea. The tide rises to this distance. The Indus loses much water from passing through dry and desert regions, and much is also drawn off for irrigation; accordingly it brings down much less water to the sea than the Ganges. Vessels drawing more than seven feet of water cannot generally enter any of its mouths ; but steamers of light draft ascend from Hyderabad to Mul¬ tan. A railway ascends the valley of the Indus from the important port of Karachi to Peshawar.

INDUSTRIAL ACCIDENTS. See Ac¬ cidents; Mine Accidents.

INDUSTRIAL ARBITRATION. See

Arbitration, Industrial.

INDUSTRIAL COMBINATIONS. See

Combinations, Industrial.

INDUSTRIAL AND COMMERCIAL LIBRARIES. See Libraries, Industrial and Commercial.

INDUSTRIAL CORPORATIONS. See

Corporations.

INDUSTRIAL CRISES. See Crises, Eco¬ nomic.

INDUSTRIAL DEMOCRACY. See

Democracy.

INDUSTRIAL DISTRIBUTION. The

title Industrial Distribution, as here used, re¬ fers to the agencies and policies used by manu¬ facturers in the marketing of their goods. If a comprehensive discussion of modern market¬ ing methods were contemplated it would be in order to define the functions of the various in¬ stitutions which serve in common all branches of

commercial activity and then to set forth the practices used for the distribution of agri¬ cultural products, the methods used by manu¬ facturers, and the organization and manage¬ ment of wholesale and retail trade. This all refers to the merchandising of movable com¬ modities and takes no account of the interest¬ ing methods which have been devised for the sale of other goods, such as real estate, trans¬ portation, securities, professional services, en¬ tertainment, etc.

The Institutes of Trade. — In considering the manufacturer's problem specifically, it is worth while to begin with mention of the un¬ derlying institutes of trade. The first of these is the accepted system of weights and measures. Based in part upon legal enactment, and in part upon custom, the commercial meas¬ ure is the unit to which price is usually at¬ tached. If it be in any degree vague, repre¬ sentative trading is discouraged and the cum¬ bersome methods of lot inspection and of dick¬ ering and bargaining prevail. Modern trade *c carried on with a system of weights and measures which is in part antiquated and in whole heterogeneous. The defects of the sys¬ tem have long stimulated reformers to work for a comprehensive and logical plan, such as the metric system appears to present. The trading community, however, is wedded to cus-

tom and is mindful of the inconvenience of the transitional period, of the capital invested in scales, containers, etc., and of the obso¬ lescence which would overtake existing records if a change were made.

The System of Grades. — The second in¬ stitute of trade is the system of grades, by which differences in quality are made definite and expressed. Without the foundation of legal enactment, which stabilizes our weights and measures, and with only so much public control as will prevent the grosser forms of fraud, the system of grades used in commerce is elastic. Old grades are continually being dropped and the names and definitions for¬ gotten, while new grades with appropriate words or phases to designate them are intro¬ duced as advances in the manufacturing art re¬ quire. The terminology of commercial grad¬ ing is enormous : a book of large size is re¬ quired to define the better-known kinds of tex¬ tile fabrics. The legitimate terminology of grading is further overlaid by a vast variety of expressions used by traders either as a part of the game of trade puffery or as an en¬ deavor to coin a trade name and get it intro¬ duced into the language as an indispensable trade term. Practically all of our s3ˆstems of

grades took their general form in an earlier day when few qualities were offered, and those were decidedly distinct from each other in physical properties. The need for a finer gra¬ dation of the quality scale has given rise to split grades or intermediate grades. In addi¬ tion to these legitimate grades, the market has to cope with the skin grades of dishonest traders. Skin grades are qualities pitched so slightly below the recognized standard grades that while they may pass for what they are among traders and at an appropriate abate¬ ment of the standard-grade price they are ex¬ pected to deceive consumers and sell at full prices to the general public.

Prices. — The third institute of commerce, and the most important, is price. A price is the exchange value of a commodity expressed in terms of money. The common expression is that price marks the equilibrium of demand and supply. The factors which determine price are not simply the primary supply of producers and the ultimate demand of consumers, but all those speculative activities of traders who, in anticipation of the future increase or decrease of supply or demand, alternately hold back goods from the market or throw reserves upon it. Since the manufacturing industry is rea¬ sonably stable in its productive capacity and the retail and wholesale industry likewise in its distributive capacity, and since the habits of consumers tend to remain reasonably con¬ stant over short periods of time, if left un¬ disturbed by outside conditions, we must look elsewhere for the factors of change which are responsible for price fluctuations. Two of the chief causes of these fluctuations are changes in the weather, which influence the production of raw materials, and derangements in the credit mechanism of industry. These factors of change the manufacturer should learn to watch as barometers predicting future market movements.

The Market. — The fourth and final insti¬ tute of commerce, to be here mentioned, is the

market. A market is an assembly of traders actively engaged in trade, and so limited by location, by the class of articles dealt in and by the average size of sales that the action of any one trader promptly influences the action of others. From this interdependency of ac¬ tion there results the chief circumstance which characterizes a market, namely, that upon it a commodity has but one price at a given time. Discrepancies of price will of course result from imperfect

competition, but a process of mutual value adjustment is the essence of mar¬ ket action. What is an efficient market? To answer this question it is necessary to recall that among the essential conditions for the ef¬ ficient purchasing and selling of commodities there are required assortments to select from, protection for perishable articles, reliable measures of quantity and quality, transporta¬ tion facilities, fair prices and flexible credit facilities. Assortments are judged by pur¬ chasers with reference to the market as a whole rather than as to the stock of any one firm. A city has the proper stocks only when its merchants go beyond the usual process of stocking what is called for, and make syste¬ matic study of the resources and requirements of the adjacent trade territory. Measurement of quality and quantity requires a variety of agencies, such as the grading rules and in¬ spection service of produce exchanges. Effi¬ cient transportation is secured only in cities which plan comprehensive terminal facilities. Storage calls for special types of warehouses tied into the transportation system rather than, as is usually the case, operated as an annex to the buying and selling process. The formula for fair prices is to bring to bear upon each purchase and sale transaction all possible ele¬ ments of supply and demand which are logic¬ ally related to it. This means to bring the past and future supply of an article to bear upon the present price by warehousing. It calls for bringing diverse commodities to bear upon each other in so far as they are related, either in the productive sequence as raw ma¬ terials and manufactured derivatives or as sub¬ stitutes. The sequence can be drawn upon in the forward direction only where the convert¬ ing (manufacturing) interests are active. The formula requires further that the price of the use of money for a period of time (which is interest) be brought to bear upon the prob¬ able fluctuations of the price of goods during that period. As the price of money for brief periods is chiefly the cost of appraising the security offered, those markets have the steadi¬ est commodity prices where loanable capital is plentiful and where there exist the grading, measuring, storing, insuring, credit reporting and other facilities which make it safe to loan on stocks of merchandise. Finally, the prices of different markets should be brought to bear upon each other by an adequate system of re¬ porting. From all of this it is evident that a market is a complex thing. A good market is rare. It does not just grow, as Topsy did. It is the result of intelligent joint effort on the part of its members.

The Manufacturer's Price Problems.-—

The manufacturer has his own characteristic relation to all of the institutes of commerce. It may perhaps be said that his chief commer¬

cial problems revolve around the subject of price. There are three of these problems which merit brief presentation. They are, first, the question of varying the price with the quantity sold; second, the effort to protect dealers' profits by charging different prices to different classes of buyers; third, the project of further protecting such profits by control¬ ling the prices of resale or the prices charged by dealers when they sell to consumers.

Quantity Prices. — It has long been a cus¬ tom of trade to give to trade buyers who pur¬ chase large quantities (case lots, car lots or en¬ tire output) a lower price than is accorded to the small buyer. This is justified as a re¬ bate to the large buyer of a portion of the saving in agency expense, bookkeeping, collec¬ tion expense, etc., which his large order in¬ volves for the manufacturer. Upon this sav¬ ing rests one of the well-known types of econ¬ omy of production on a large scale. To take advantage of it, a variety of trading organiza¬ tions has been developed in the United States in recent decades. In the wholesale trade the great interstate jobbers have grown up to hunt for the larger orders, leaving in¬ tensive work with the .small retailers to the local wholesalers. To equalize the competitive advantage the small wholesalers have, . many of them, combined more or less loosely into buy¬ ing groups pooling their orders in the hands of syndicate buyers. The syndicate buyer maintains buying offices in the larger markets. He either pools the orders sent to him by his patrons into large consolidated orders, or he peddles out large purchases which the finan¬ cial embarrassments of manufacturers enable him to make at bargain prices. In the retail trade quantity prices have led to the growth of department stores which aim at local mass retail distribution. They have led, also, to the growth of mail order houses, which aim at national mass retail distribution. Finally they have led to the organization of chain store sys¬ tems which aim to combine mass buying and local small-scale retail distribution. The re¬ tail institutions just mentioned not only work for quantity prices but to a considerable ex¬ tent eliminate the jobber.

The result of the appearance of these quan¬ tity-buying, direct-purchasing institutions is that the regular trade — sometimes called ˆlegitimate® — comprising the local whole¬ salers and the single-line and country-store retailers — has been awakened to hostility. This hostility has taken the form of expressions of opinion on the part of associations of whole¬ salers and retailers, and of more or less ex¬ clusive trading arrangements of the small re¬ tailers with those wholesale houses who do not sell to mail order houses and chain stores. It has also taken the form of discrimination against such manufacturer's goods as appear on the shelves of such stores.

Inasmuch as the regular trade comprises the overwhelming ma¬ jority of the merchandising business of the country, these hostile moves have been given respectful attention by the manufacturers. The answering policy of many manufacturers has been to charge one price to all trade buy¬ ers, regardless of the quantity purchased. This puts the small store upon an equality, in the first cost of merchandise, with its department

store neighbor. Some manufacturers have adopted very elaborate policies for the protec¬ tion of the small dealer, and have stimulated the antagonism of the small dealer against the large one, in order to pose as a friend and get the business.

It can be seen that excessive reductions of price for quantity tend to concentrate the buy¬ ing function, as contrasted with the selling end of merchandising. By it buyer and sales¬ man are forced apart. So the local store unit of the retail trade loses flexibility in assem¬ bling such stocks as the locality requires. Its stock, as illustrated by the chain-store stock, becomes standardized and a matter of safe staples chiefly. Quantity price operates to the disadvantage of the village and the. sub-cen¬ tres in the outskirts of cities. It is to the advantage of the large stores in down-town metropolitan districts. On the other hand the opposite policy of one price, regardless . o.f quantity, prevents the large city from enjoying the advantage its mass of business entitles it to, and prevents the capable dealer who has built up a large business on merit from enjoy¬ ing a portion of the advantage his large pur¬ chases give to those who supply him. It tends, therefore, to keep alive a large number of small, incompetent establishments based upon the principle of proximity to the consumer.

Classification of Customers. — The sec¬ ond price problem of the manufacturer, to which we have referred, has to do with the necessity of maintaining dealers' profits. Goods flow up hill in price, as water flows down hill. The difference between the price paid by a wholesaler and that paid by his customer who is a retailer is a spread, out of which must come the wholesaler's costs and profits. If a manufacturer sell to a retailer on the same terms as to the wholesaler who has been sup¬ plying him, it is obvious that the wholesaler cannot continue to patronize that manufacturer. If in a typical distributive chain we have manu¬ facturer, commission merchant, wholesaler and retailer, there will normally be four price levels, each

higher than the other, and each maintained at a certain spread with reference to the others by the normal operation of com¬ petition. Into this normal situation a disturb¬ ing influence has been introduced by the ab¬ normal growth of certain retail and wholesale institutions, in response to the economy of quantity prices, and in response to superior managerial talent. These large institutions have very naturally tried to change their class as buyers and purchase on the same terms as institutions prior to them in the distributive chain. So we see everywhere retailers who advertise themselves ˆwholesalers and retail¬ ers » to facilitate an approach to manufac¬ turers. It has been found difficult to frame, a satisfactory definition of what a wholesaler is. Inasmuch as manufacturers are commonly ad¬ mitted to buying privileges with other manu¬ facturers and with wholesalers, all small shops and local repair men are anxious to be classed as manufacturers and to buy either from manu¬ facturers' catalogues, or at least from the same traveling salesmen as serve the neigh¬ boring retailers. Hotels, likewise, are priv¬ ileged buvers : therefore restaurants and boarding-houses put themselves forward as much as possible for the same privileges.

Dealers and agents are usually advanced one class in the distributive chain : therefore an in¬ numerable number of persons acquire agencies for the sale of wagons, automobiles, windmills and manufactured specialties, for the purpose of purchasing their private supplies at better advantage. Against this tendency to break down the classifications of trade merchants have been obliged to interpose an influence. This they have done by drawing up lists of classified buyers. Such lists are usually formed by the joint action of two trade associations and are promulgated to govern the conduct of the members with reference to the trade classes covered by the definitions.

Control of the Prices of Resale. — A third price problem has been forced upon man¬ ufacturers as a result of the intensitv of com¬ petition between retailers. One of the mod¬ ern tricks of retail selling is to offer one arti¬ cle or a few articles at a very low price, and feature the prices of these by advertising as ˆleaders.® The psychology of the leader is that the customer will infer from the few low prices quoted that all prices in the store are equally moderate. In practice, the leader is supposed to bring the customer into the store where his cravings will be so intensified by the sight of merchandise that he not only purchases the leader, after which he came, but pur¬ chases a variety of other articles as well. These latter carry a good profit and recoup the loss on the leader, so that the result of the total transaction is a profit for the store. The best articles to choose as leaders are those

branded or trade-marked articles which are known to be identical in whatever store they may be found. These will bring out in full force the price comparison, free from any possible ar¬ gument that the quality may be better where the price is higher. When, therefore, a manu¬ facturer builds up a reputation for uniform quality, and his goods become well known, his merchandise best serves the dealer as a leader. It might be concluded that if the dealer low¬ ered the price he would simply sell more goods and so would confer a favor upon the manu¬ facturer. The history of a leader is, however, that after it has served a temporary purpose of attracting attention, it is dropped. As it is impossible to at once restore normal prices for the article, the dealers who once featured it exclude it from stock, or if it have too well an established position with the consumer for this, relegate it to the background so that the losses on it will be as small as possible and push other things in preference to it. Distri¬ bution falls off, therefore, and the manufac¬ turer is aroused to action. The action which manufacturers have taken has been along the line of endeavoring to dictate to wholesalers and retailers at what price they may sell, and to whom they may sell, and then to enforce these dictates by cutting off the supply of goods from those dealers who disobey orders. These efforts have brought manufacturers within the pale of the Federal laws which forbid con¬ tracts in restraint of trade. A considerable variety of devices has been invented by manu¬ facturers in the endeavor to encumber the title to a movable chattel with restrictions,, in connection with its sale, and without creating a bona-fide relation of principal and agent These devices have been uniformly declared

null and void by the United States Supreme Court.

Miscellaneous Elements of Manufactur¬ er's Distributive Campaigns. — Of the many- minor distributive problems of the manufac¬ turer, embracing such matters as the design and use of trade-marks, trade-names and brands, and the significance of packages as brand carriers and as a means of specializing an article out of its competitive class, there is not room to speak. Likewise the purport of style as a trade device for rendering goods in consumer's hands obsolete ; of agency systems, such as prevail in the automobile and agricul¬ tural implement businesses ; of list-price svs- tems, used in the construction of catalogues ; and of the trials encountered in administering discounts for cash and of preventing the can¬ cellation of contracts can only be alluded to. In other articles the functions of advertising

and of salesmanship as general aids to distri¬ bution are given appropriate attention.

Edward D. Jones,

Professor of Business Administration, Univer¬ sity of Michigan; Author of (Administration of Industrial Enterprises ,y etc.

INDUSTRIAL EDUCATION. See Edu¬

cation, Industrial.

INDUSTRIAL EXPOSITIONS. See

Expositions, Industrial.

INDUSTRIAL FATIGUE. No phase of industrial efficiency is attracting greater atten¬ tion, both in this country and in Europe, than the question of fatigue. While comparatively little thought was given to this matter prior to the war, except by a few progressive manufac¬ turers and exponents of scientific management, the necessity of meeting war-time emergencies led to a careful investigation of the subject of fatigue with a view to increasing the industrial output to the highest degree possible without making too great demands upon the health and strength of the workers.

A study of industrial fatigue was one of the purposes for which the British Health of Munition Workers Committee was appointed, in September 1915, and the (Memorandum) pub¬ lished by the special committee entrusted with the investigation of this subject emphasized the importance of the effect of injudicious effort upon the character of the work performed. Among the conclusions of the committee were:

«The committee are bound to record their impression that the munition workers in gen¬ eral have been allowed to reach a state of re¬ duced efficiency and lowered health, which might have been avoided without reductioh of output by attention to the details of daily and weekly rests. The signs of fatigue are even more noticeable in the case of managers and foremen, and their practical results are probably more serious than in the case of the workmen.

«It is of great importance to note that a special and strenuous voluntary effort in indus¬ try, if it be maintained under a badly arranged time-table of work and rest, does not neces¬ sarily bring increased output over a long period, nowever praiseworthy the intention or effort may be. Under wrong conditions of work, with

excessive overtime, it is to be expected, indeed, that some deliberate ‘slacking* of the workers might actually give an improvement of

output over a period of some length by sparing wasteful fatigue, just as the Cursing1 of a boat crew over a part of a long course may improve their performance. It can not under such circumstances be said that a workman so restraining himself, consciously or unconciously, is doing more to damage the output, on the whole, than the employer who has ar¬ ranged overlong hours of labor on the baseless assumption that long hours mean high output.®

In the United States, the Council of National Defense recognized the importance of this sub¬ ject soon after preparation? for war began and started investigations in factories engaged in the manufacture of war supplies to determine how a maximum output might be obtained with¬ out unnecessary fatigue. The results of this series of studies and experiments was published in January 1918 by the sub-Committee on In¬ dustrial Fatigue. Like the British report, it draws the conclusions that while <(it is often possible to increase output temporarily by in¬ creasing the work of the employee . . . such a method, if carried far, quickly defeats itself and in the long run is not profitable,® as <(fatigue is the greatest single obstacle to a maximum output.®

The committee naturally lay emphasis upon the distinction between the harmless fatigue that is the normal effect of bodily activity and the unnatural fatigue that is the result of badly arranged hours of labor and other improper industrial habits, and it recommended various methods for the reduction of the latter, not only without decreasing the output but <(even in some cases with an increase of it.® These methods include :

1. Adjusting Hours of Labor. — While it

is obvious that the length of working day that avoids fatigue varies with different kinds of work and can be determined only by careful study, the tendency to increase hours and introduce overtime work has not always proved profitable. <(A man can do more work in two hours than in one hour,® say the committee, but ((it does not necessarily follow that he can do more in twelve hours than in ten, or more in ten hours than in eight. In fact, whenever the work is of such duration that fatigue begins to be pronounced, it has been shown again and again that shortening the working-period ac¬ tually increases the amount of work done.®

2. Discouraging Overtime. — The commit¬ tee’s investigations seem

to justify the dis¬ couragement of overtime on the ground that, if the ordinary day's work has been properly ad¬ justed, it will stop just short of undue fatigue and the overwork necessitated by overtime will produce injurious results by diminishing the worker's efficiency, in lessening the output and increasing the amount of spoiled work.

3. Eliminating Sunday Work.— In advo¬ cating the elimination of Sunday work as a dangerous expedient, the committee's findings agree with the report of the British Health of Munition Workers Committee, who found that ((seven days' labor only produces six days' output,® and, they added, <(the evidence before the committee has led them strongly to hold that if the maximum output is to be secured and maintained for any length of time, a weekly period of rest must be allowed.®

4. Bad Effects of Night Work. — While the committee recognized the necessity of operating

many factories on day and night shifts to in¬ crease the output of war supplies, they felt that in the long run night work will prove detri¬ mental to the health of the workers, and they recommended a consideration of the plan to alternate day and night work, changing the shifts at intervals, say every other week. The report called attention to the fact that the British committee made a careful statistical study of the output under both systems and found that <(where the same night-shift con¬ tinues to be employed the total output is less than where there is an alternation of day- and night-work.®

5. Rest Periods. — The introduction of rest- or recess-periods during the ordinary working hours has also been found effective in reducing fatigue and improving the quality of the output. In many plants all workers engaged intensively during the entire work-period are compelled to take two recesses, one in the morning and one in the afternoon. Such rest-periods are not optional but compulsory. The workers are forced to leave their machines and to move about and relax. In some cases a little food or a cup of tea or cocoa is provided.

6. Providing Seats. — The committee advised that, wherever possible, seats be provided in order that operatives mav not have to stand all day ; and suggested that, instead of being of uniform height, the ((seats should be adjusted to the individual worker,® and, ((where the worker's feet cannot reach the floor, foot-rests should be provided.®

7. Value of Motion Studies. — The commit¬ tee also recognized the value of motion studies and the importance of the element of variety in the work performed, a conclusion that is in harmony with the theories of scientific manage¬ ment. In 1916, Richard A. Feiss, general man¬ ager of the Clothcraft Shops, Cleveland, Ohio, speaking before the American Public Health Association, declared that (

8. Sanitation and Ventilation.— The com¬

mittee found that fatigue diminishes and effi¬ ciency increases in keeping with the improve¬ ment of the sanitary conditions of the factory and the ventilation of the workroom. Exces¬ sive heat and humidity should be avoided as far as possible and the air should be kept in motion. Lighting facilities, the supply of drinking water, providing lunch-rooms and rest¬ rooms and the general sanitary condition of the toilets and wash-rooms, all play a part in the general plan for the elimination of fatigue. See Industrial Hygiene; Industries, Wel¬ fare Work in. John R. Meader.

INDUSTRIAL FRUITS, those products of the soil which are sown and planted and upon reaching maturity are garnered or har¬ vested, such as grain, vegetables and other crops. They are distinct from the natural fruits, such as trees, grass, etc., and are con¬ sidered as personal and not real property. See Growing Crops, Law Concerning.

INDUSTRIAL HOUSING IN THE UNITED STATES. Industrial housing is usually understood to mean housing of workers by employers. The growth of the co-partner¬ ship movement in England and the strong ad¬ vocacy of its introduction into the United States before the European War, and the federal gov¬ ernment's own experiment in house building for wage-earners during the wrar compel a broader definition. Industrial housing to-day is housing which contributes to industry, no mat¬ ter by whom erected or managed.

Using the term in its older sense, however, industrial housing has a history in the United States which begins with the establishment of industries outside the home. The first Ameri- ca-n cotton mill was erected at the falls of the Pawtucket in 1790. Its successors in Rhode Island and Massachusetts were scattered along the streams that furnished their motive power. Compelled to plant the mills at a distance from established seaboard and commercial towns, the pioneer manufacturers were also compelled to build houses to shelter their employes. So be¬ gan the New England mill villages, some of the

earliest of which still remain along the little rivers that empty into Narragansett and • neighboring bays.

The houses in these villages were well built, and even to-day, when sanitary conveniences and a public water supply have been added, most of them meet modern requirements. More¬ over, they are far from unattractive with their grassy open spaces, their gardens and their fine old trees. It was necessary in the days of pioneer industry to build good houses, ‘for the only available labor was the Yankee farmer’s boys and girls who had been prejudiced against factory work by the tales brought from Eng¬ land of the horrors of industrial life. So the early industrial villages of America were de¬ signed to prove that industrial life here need not duplicate that of the Old World.. Nor were the employers satisfied with the erection of good dwellings, they gave even greater care to. the management of those dwellings. Especially were the dormitories or boarding houses of the girls and unmarried women kept under most careful supervision, and rules were enforced that would satisfy strict Puritan parents. Even the family dwellings were kept under a close supervision which limited considerably the free¬ dom of the tenants.

In the early days, however, this regulation, which went far into the details of life, was accepted not only because it assured a good moral tone for the new communities whose in¬ habitants were in the main young people, but also because the employers or their chief repre¬ sentatives were a part of the community and shared its life democratically. The factory girls of the day became the manager’s guests in the evening. This combination of democratic pa¬ ternalism did not last, however. Even before the advent of coal and of immigrants from

Ireland and the continent of Europe the system had begun to break down. Employees became restive at having the same man both employer and landlord. The strict regulation which was necessary at the beginning became irksome as the villages developed into established com¬ munities.

The use of coal as a source of power caused some of these villages to develop into cities, Lawrence, Lowell, Pawtucket; it caused others to disappear, the owners finding it advisable to move to a place where railroad or water trans¬ portation was more accessible. When the vil¬

lages grew into towns or the mills were moved to towns, the commercial builder appeared. To him the employees frequently turned with relief even when his houses were not so well built or cost more than those of the mill.

The mill owner also frequently welcomed this opportunity to drop the role of landlord. For there had been gradually developing a gulf between employer and employed. Though in the early days an owner often lived in Boston or Providence, the common traditions of. a New England ancestry served to bridge this distance. But with the coming of the Irish with their different traditions and their different standards of living, the bond was weakened. When to the Irish succeeded Poles and Italians and even peoples of the Levant, the old democratic fel¬ lowship in the enterprise usually vanished en¬ tirely. The Lawrences of the new era became

But this sharp cleavage of interests also proved impractical. With no community of in¬ terest there could be little or no mutual under¬ standing, and labor troubles increased. Coin- cidently housing standards declined. The specu¬ lative builder, having no motive other than to secure the greatest amount possible for his property, developed the wooden three-deckers in place of the cottages and crowded them so close together that in some of the mill cities not only did gardens and yards disappear, but the windows of one house were practically boarded up by the walls of its neighbors, and what were once alleys became the thorough¬ fares giving access to solid lines of rear dwell¬ ings. The mill owners and their chief lieu¬ tenants, living far away from these conditions, persuaded that the matter was no concern of theirs, left the community without its natural leaders.

Then again the pendulum began to swing back toward its starting point. Compared with the suffocating, swarming, ill-regulated indus¬ trial towns and cities, the remaining old spacious mill villages had a new attraction. In some of them were the descendants of the. original op¬ eratives. So new industrial villages were founded, some by employers who thought that in this way they would prevent labor troubles, some by men inspired by the more altruistic mo¬ tive of rescuing their workers from intolerable living conditions. The spirit of the founders varied from the extreme paternalism of Pull¬ man, which led to disillusion and failure, to the

liberality of H. O. Nelson at Leclaire, which is still bearing fruit.. This new group of indus¬ trial villages contains several which are notable for their beauty.

At the time the World War began not only was the number of industrial villages increasing rapidly, but discussion as to methods of financing and management were producing re¬ sults that promised to do away with most of the dissatisfaction under the old regime. The old method of individual home ownership was falling into disuse and organized labor had definitely pronounced against it. Direct owner¬ ship of the employee's home by his employer had satisfied neither party. A first step away from this was taken by the incorporation of sub¬ sidiary companies so that the dwellings were no longer managed from the factory office. A further step had been taken in two or three instances by an adaptation of the English co¬ partnership plan by which the tenants were gradually to become stockholders in the com¬ pany that owns the houses. Then came America's entrance into the war.

During the years 1917-18 the United States government embarked upon a great experiment, the erection and management of wage-earners' dwellings. The signing of the armistice in No¬ vember of the latter year left the experiment far from complete. One of the Federal agencies, the Emergency Fleet Corporation, had carried some of its developments to a point approximat¬ ing physical completion, a small proportion of its dwellings were actually occupied. The other Federal agency, the United States Housing Cor¬ poration, handicapped by a later start, had not 3ret housed a single workingman's family. Neither agency had worked out a plan of man¬ agement, though they had agreed for the time being not to sell any of their holdings. The Emergency Fleet Corporation controlled its properties through subsidiary corporations of the various shipbuilding companies through which it operated. The Housing Corporation owned its properties itself. The signing of the armistice led to some curtailment of the Fleet Corporation's housing developments, though in the main these were carried through, as ship¬ building did not cease with the war and the new dwellings were needed to hold the work¬ ers. The Housing Corporation, however, not only curtailed its projects, but wherever possi¬ ble without too great loss, cancelled them en¬ tirely.

In spite of the failure to carry this great experiment to completion it exercised a consid¬ erable influence in various ways. First and most important it gave a notable impetus to the movement for government aid which before the war had been making only a slow and uncer¬ tain progress, Massachusetts being the only State in the Union which had committed itself, and it had done so only to the extent of $50,000 with which a small group of houses were built at Lowell. The war, however, demonstrated clearly both the vital importance of good hous¬ ing to productive industry and the inability of private builders

to meet the need. Second, it brought into the service .of the wage-earner some of the leading architects, engineers and landscape designers of the country, who both because of lack of private work and the call of patriotism, for the first time turned their

thoughts to the needs of men of small means.

The reverse side of the shield was financial. The need for the houses was urgent. Good planning, good designing, took little more time than no plan or design, perhaps rather less as they practically compelled an orderly procedure which prevented confusion and false starts. But speed forced into the background all thoughts of economy. The houses, with the ex¬ ception of those in a few of the earlier devel¬ opments, were good, but when completed their cost was high. This left a financial problem which cooled the ardor of many who otherwise would have been tempted to imitate the govern¬ ment's villages.

Yet the effect was notable, not alone in that these government-built villages have set a high standard by which to measure other industrial housing developments, but by breaking the taboo which had prevented government aid to hous¬ ing in America, almost universal, though this long had been in other parts of the world.

In this article nothing has 'been said of the mining villages, which form a group by them¬ selves. As with the pioneer industrial villages, the mining towns were of necessity built by the companies because they must be located with reference only to the mine. With them, how¬ ever, there was the additional reason that their life was uncertain, depending upon the time it might take to exhaust the mine. This second reason also led to a policy of making these towns as cheap as possible, so they became a by -word for their squalor and ugliness. Yet before 1914 the new interest in industrial towns had affected them and great improvement had begun. See also City Planning; Garden Cities

Bibliography.— Meakin, Budgett, (Model Factories and Villages * (Philadelphia) ; Tay- lor, Graham R., 'Satillite Cities' (New York 1915); (Living Conditions for Employees* (in

Proceedings and pamphlets of the National Housing Association.

John Ihlder,

Executive Secretary, Philadelphia Housing Association.

INDUSTRIAL HYGIENE. The policy of providing healthful and comfortable working quarters for employees in commercial and man¬ ufacturing establishments has been developed within comparatively few years. Previously little thought was given to such matters and, in factories especially, operatives were crowded together in any kind of a shop that chance or a desire for economy might provide and the fact that many of these working places were both dismal and unsanitary had but little weight with the average employer.

To-day these conditions are changing so rapidly that poorly lighted, inadequately heated, improperly ventilated or otherwise unhealthful workshops are coming to be the rare excep¬ tions to the rule. Instead, in the average shop, adequate toilet and washing facilities are now provided, problems of lighting and ventilation are solved by expert engineers, even such questions as the regulation of heat and humidity being given serious consideration, and every effort is made to see that the working conditions are such as not to impair the health and effi¬ ciency of the employee.

While the matter of hygienic and sanitary equipment has been fixed to a great extent in New York, New Jersey, Pennsylvania, Massa¬ chusetts and Wisconsin, where the legislatures have enacted laws setting a standard, not only for industry as a whole but, in many instances, for particular branches of industry, the im¬ provements in these directions are in no sense confined to establishments that have been com¬ pelled by statute to adopt more modern meth¬ ods. Even in communities that are unregulated by law or industrial code, similar improvements are constantly being made, for experience has so clearly demonstrated that these changes in working conditions quickly pay for themselves in the character of the service performed by the working force that even those employers who feel that they owe no such moral obligation to their employees have learned the lesson that proper hygienic and sanitary workshops make for greater and better production, and are

Type

Located

Number

Accessories .

Plumbing .

Special features

Note

Lavatories

Toilets

Drinking

fountains

Lockers

Individual

In central building near lockers.

1 for 15 men .

Hot and cold water, liquid soap, paper towels.

Open type, plain. Porcelain .

Average time per man at washbasin 2£ minutes.

All porcelain; no wood

Substations near workers.

1 for 20 men

Automatic flush

Must have forced air ventilation.

Compartments should not have doors as easier to keep clean.

Bubbling type, ar¬ ranged so lips do not touch metal.

Where convenient to workers.

1 for 30 men .

In clean, light places.

Perforated metal, slanting top to prevent accumulation of refuse.

In central building.

1 per man. If possible, one compartment for work and one for shop clothing.

Locked. Forced hot air ven¬ tilation to dry wet garments.

It is advisable to arrange locker so that men coming off work at same time have every second or third locker to pre¬ vent crowding.

If lockers are near washbasins a larger number can use both without waiting.

taking the steps necessary for the adoption of the methods that are everywhere proving so mutually advantageous.

In fact, these questions have assumed pro¬ portions of so great importance that, in several instances, employers' associations have con¬ ducted thorough surveys and adopted standards for the improvement of working conditions, even in communities unaffected by legislative statute. For example, the Welfare Managers' Group of the Detroit (Mich.) Executives' Club made a survey which included all of the important plants in that city, and, as a result, the preceding sanitary arrangements were sug¬ gested as necessary for the proper equipment of a manufacturing plant.

The committee also reported:

<(The objections to paper towels, (that we do not get our hands dry enough to prevent chapping,* can be done away with by a well-ventilated, warm dressing room, where the hands will dry while dressing. Where there are corners into which waste paper and refuse are thrown this can be largely eliminated b>T painting these corners white and lighting them well. One does not throw waste into clean corners. Tile floors should be laid in all wash¬ rooms, etc., where possible; otherwise, cement, well drained. Oily floors should be swept and scraped daily. Where cement floors are used, rubber pads for the men to stand on will help in increasing comfort and efficiency. All scrap metal should be kept clear of the workers.®

The Detroit committee also included <(good lunch room and recreation facilities among our prophylactic treatment,® on the ground that properly prepared, carefully selected food and healthful recreation are important factors in the development of an effective hygienic and sanitary program.

In plants where workers are exposed to dangerous dusts or noxious fumes the installa¬ tion of a lunch room is regarded as most essen¬ tial, as all authorities agree that the cold lunch¬ eon eaten in the workroom, or in an unpleasant environment, must have a direct effect in re¬ ducing the physical fitness necessary to produc¬ tion. Where lunch rooms are not provided, it is advised that gas stoves or steam tables on which foods brought from home may be heated should be installed, and it is declared that even the policy of furnishing nothing more than milk, coffee, tea or soup at a nominal charge has invariably been found an economy to the employer. Where lunch room facilities are provided, however, care should be taken to see that the food served is of excellent quality, both in material and method of cooking, for otherwise it would be difficult to overcome the temptation to hurried eating, but it has gen¬ erally been found that where food is selected for its nutritive value and is prepared with a view to ready digestion, satisfactory improve¬ ment in the health of the working force is noted, with a corresponding reduction of time lost through illness and intemperance.

While the part played by fresh air in the prevention of occupational disease is generally admitted, the vague character of the standards in vogue in different States has proved a great handicap to the manufacturer who is desirous of adopting the system best suited to the needs of his operatives. As Roach points out (Indus¬

trial Management , October 1917) : <(The terms

Expensive systems of air conditioning are naturally unnecessary in the ordinary workroom where nothing more than fresh air is needed, and they are rarely installed except where the process of manufacture requires absolutely dustless conditions or a stable degree of humid¬ ity. For ordinary purposes, draft deflectors placed at both top and bottom of windows afford satisfactory ventilation.

While plants with non-dusty processes often find this window equipment all that is neces¬ sary for ventilation, it is admitted that it cannot be depended upon where noxious vapors or excessive humidity have to be considered. The same objection can be made to so-called <(nat- ural draft® ventilators, which, while they often work

satisfactorily when there is a sufficient breeze present, fail to accomplish their purpose on humid days when the noxious air lies close to the floor.

Where industrial dust or vapors must be removed from the air the adoption of the most approved dust exhaust system becomes neces¬ sary. In this connection Roach says :

((The usual and inexpert practice in building a dust exhaust system, such as is required for buffing, polishing or grinding wheels, is to pro¬ portion the main section pipe so that at all cross-sectional points it only equals the com¬ bined areas of the entering branch pipes ; while the inlet of the exhauster used on such a sys¬ tem has an area that but equals the combined areas of all the branch pipes used on the system. For example, for 25 4-inch branch pipes the lar¬ gest diameter of main pipe and exhauster would be 20 inches. A 50-inch exhauster would have an inlet 20 inches in diameter; if it were neces¬ sary to get a suction-head at each branch pipe sufficiently strong to displace 2 inches of water in a pressure gauge (commonly called a U- shaped tube) it would require an actual veloc¬ ity of 4,000 lineal feet per minute in the branches, and it would be necessary for the ex¬ hauster to handle 8,720 cubic feet of air per minute. It would require approximately 16 horse power to obtain these results, which in itself is an important item.

<(This kind of a system should no longer be permitted. Standards based on actual working tests and experience prove that efficiency re¬ quires for 25 4-inch pipes a main pipe with an area 20 per cent larger at all its cross-sectional points, than the combined areas of entering branch pipes. The inlet of the exhauster at¬ tached to the system must have an area 20 per cent larger than the combined areas of all the branch connections on the system. This kind of system would require a 55-inch exhauster having a main pipe 22 inches in diameter and, to obtain a suction sufficient to displace 2 inches of water in a U-shaped tube, the air in each branch pipe would be obliged to have a velocity of 4,000 lineal feet per minute. The exhauster would handle 8,720 cubic feet of air a minute and would take about 12 horse power to operate it.®

In many plants the hygienic and sanitary

control is in the hands of the industrial physi¬ cian whose duties comprise a more or less close supervision over the physical condition of the operatives from the day they enter the employ of the company. Many concerns have adopted the policy of examining all applicants for em¬ ployment before engaging them, with a view to determining the physical fitness of the man for the job which he is to be expected to per¬ form ; a smaller number of establishments in¬ sist upon periodic re-examination, in order that his physical defects may be detected as quickly as possible and he may be assisted in remedying them, while all employers who employ the phy¬ sician have found that his services in accident prevention and general health supervision have proved of sufficient value to more than offset the cost of the service. So well established has this fact become that even plants that are too small to employ a permanent physician have es¬ tablished dispensaries, where they meet all re¬ quirements for first-aid through a plant nurse, the physician being called upon for examina¬ tions, or, when necessary, for more important services.

According to the report of the committee of the Detroit Executives' Club, a plant employing from 1,400 to 2,000 persons should devote three rooms to hospital purposes — a reception room, an examining room and a surgery or dressing room.

<(The furniture needed in a reception room is enough chairs so that patients will not have to stand, and a stretcher. The examining room should have a rest cot, scales and other instru¬ mental equipment, with two or more booths to facilitate examinations. The surgery room needs an operating table, an instrument case with necessary first-aid instruments, drugs and dressings, one or two pedestal wash basins and one waste can.®

So general has health supervision become in industry that the physicians engaged in such ac¬ tivities have organized an association, the Con¬ ference Board of Physicians in Industrial Prac¬ tice, and it was in their behalf that Magnus W. Alexander, in August 1917, published his report on the <(Cost of Health Supervision in Industry.®

The purpose of this report, as its compiler stated, was to inform employers of the actual cost of health supervision in the different indus¬ tries. ((To this end, the data were secured from plants engaged in many industries, in light, me¬ dium and heavy work, in comparatively safe as well as hazardous occupations, and in shops of various sizes and character, located in vari¬ ous parts of the United States. . . . The

chief significance of these data, from a general viewpoint, is that it is possible to give such a large amount of medical and surgical service at a cost which averages only $2.21 per em¬ ployee per year. . . . Where the average

cost appears to be unusually high . . . the size and character of the medical staff is usu¬ ally the determining factor. In some cases the cost is influenced greatly by the number of in¬ juries treated in private or public hospitals, in others, by the amount of care given to all in¬ juries, whether serious or slight, or by the ex¬ tension of the service to include physical ex¬ amination of all employees, treatment of sick¬ ness of employees at the plant and at home, and

even by medical care of employees' families, or by a combination of all these features.®

Mr. Alexander concludes his report with the statement that <(convincing proof of the eco¬ nomic value of health supervision in industry is afforded by the fact that it was found that no employer had abandoned the health super¬ vision activities established in his plant. On the contrary, the prevailing tendency has been to invest even more money in extending the service.®

A summary of the report is as follows :

INDUSTRY

No. of establishments

reporting

Total average number

of employees

Total cases of all

kinds

Total medical and

surgical cost

Average annual cost

per employee

Metal trades ....

47

294,646

1,988,991

$541,771

$1 84

Rolling mills .

Smelting and re-

7

49,317

358,574

137,047

2 78

fining .

1

1,270

2,832

6,932

5 46

Light and power .

7

24,921

49,046

92,601

3 72

Transportation.. .

5

35 , 795

81,591

69,633

1 95

Chemicals .

6

10,572

78,744

34,797

3 29

Food .

5

13,650

69,565

39,875

2 92

Rubber .

5

27,462

234,069

76,089

2 77

Textiles .

4

8,939

67,380

24,177

2 70

Paint .

2

4,023

10,255

29,635

7 37

Leather .

2

3,026

9,440

6,102

2 02

Publishing .

2

3,358

6,742

3,473

1 03

Coal mining .

1

2,454

2,842

4,637

1 89

Gold mining .

Coal and iron

1

2,500

62,126

35,590

14 24

mining .

1

11,000

131,898

130,000

11 82

Miscellaneous.. . .

3

2,611

11,019

6,126

2 35

99

495,544

3,165,114

$1,238,485

$2 50

In several plants in this country, health su¬ pervision includes the care of the teeth and eyes, examinations being made by specialists in the employ of the firm ; subsequent treatments usually being at the expense of the employee, though at greatly reduced rates.

The adoption of sanitary standards was the means taken to overcome the ((sweat-shop® conditions that had operated so injuriously to several branches of the tailoring industry and, wherever there has been sufficient organization to adopt and enforce such regulations effective results have been reported. The standards adopted by the Joint Board of Sanitary Con¬ trol in the cloak, suit and skirt industry of Greater New York forbid cellar shops and tend to prevent the establishment of work¬ rooms under conditions that might prove in¬ jurious to health. They provide that shops lo¬ cated in buildings more than one story in height must have fire-escapes properly equipped with ladders to an adjoining building or with care¬ fully adjusted full-length drop ladders. Where automatic sprinklers are not provided, there must be a sufficient number of chemical extin¬ guishers or fire-buckets, and special caretakers should be appointed in each shop to see that the fire-buckets are kept filled and are ready for use in case of fire. No smoking is per¬ mitted in the workshops, doors must not be

locked during working hours, signs marking exits and fire-escapes are to be conspicuously placed about the shop, fire-proof receptacles with tin lining and covers must be provided for

rubbish, all openings and exits to fire-escapes must be left unobstructed by tables, machines, partitions or iron bars, and stairs are to be provided with secure handrails and safe treads.

As to lighting, the regulations stipulate that there shall be sufficient window space to ensure that the shop shall be well lighted from 9 a.m. to 4 p.m. ; where artificial illumination is needed, arc-lights or incandescent mantles shall be used for gas, and all lights should not only be well shaded, but should be placed above the opera¬ tives and not too near them.

In the matter of ventilation it is provided that at least 400 cubic feet of space, exclusive of bulky furniture and materials, shall be pro¬ vided for every person within the shop, and all work-rooms are to be thoroughly aired, before and after work hours and during the lunch hour, by the opening of both windows and doors.

Other regulations provide that (1) no coal shall be used for direct heating of irons, and where stoves are used for this purpose they must be surrounded by a metal sheet at least five feet high; (2) walls and ceilings of shops and toilets should be kept clean; the floors to be scrubbed weekly, swept daily and kept free of refuse, while the toilets should be flushed. It is advised that a special caretaker should be designated to oversee this work. (3) A sufficient number of water-supplied wash¬ basins are to be provided in convenient and light locations; (4) separate dressing rooms are to be provided for the sexes, with suitable hangers for the street clothes of employees; (5) there shall be separate toilet arrangements, with solid partitions from floor to ceiling, as well as separate vestibules and doors, and (6) all seats provided in the work-rooms are to have backs. John R. Meader.

INDUSTRIAL INSURANCE. See In¬

surance, Industrial.

INDUSTRIAL ORGANIZATION AND ADMINISTRATION. In the consideration of the organization and management of manu¬ facturing establishments let us, after glancing at the evolution of

American, business admin¬ istration, divide the subject into three parts, namely, the handling of finances, the admin¬ istration of the manufacturing processes, and the control of the personal relations. .The management of the selling and advertising functions, which should be considered in a gen¬ eral review of the subject, are treated under the heading Industrial Distribution.

Historical Review. — In the early decades of American business, the organizations used for administrative control were of the sim¬ plest character. Private and family-owned en¬ terprises or small partnerships operated plants which might be described as shops. The first large undertakings, which required the cor¬ porate form, and which necessitated any con¬ siderable formality of financing, were the toll- roads, canal companies and the railroads. The chief factor which caused an increase in the size of businesses during the half-century 1840-90 was the invention of machinery. The large-scale operation which machinery and the use of mechanical sources of power sug¬ gest has been realized because of the enor¬ mous domestic market, the ample capital avail¬ able, the freedom of the country from tradi¬

tion and the existence of a spirit of daring. By the decade 1895-1905 these experiments had sufficiently developed the technical aspects of manufacturing, that engineers could boldly plan groups of specialized plants under united control. Meantime the accountants had learned how to keep untangled the most heterogeneous affairs ; and the distributive or marketing machinery was devised for handling the entire domestic market in a single campaign. Since the possible economies from the elimination of competition were very large, there occurred the so-called (

Departments of Business Administration. — The ordinary functions of business adminis¬ tration fall into four classes: (1) Financing — in charge of the chief officers, working in close relations to the board of directors. (2) Manu¬ facturing — in charge of a general manager or superintendent, directing a corps of foremen in the shops. (3) Selling — under the direction of a sales manager, with district agents and salesmen. (4) Personnel Relations — in charge of an employment manager or superintendent of personnel.

Financial Organization and Management.

— If the inauguration of a business take the usual course of large modern enterprises, there will first appear upon the scene a promoter,

who discovers undeveloped properties or poorly- managed concerns, forms a plan for their de¬ velopment, secures options upon them and puts his project before capitalists. Capital may be represented by a syndicate manager, who acts for a group of banks and large private invest¬ ors in investigating the projects presented. If a project be found meritorious, its financing will be taken over on conditions which ensure adequate control of the subsequent operations of development. A corporation will then be formed which, under its charter powers, elects officers, enters into contracts, issues securities, receives funds, secures plant and equipment and otherwise prepares to do business.

The liabilities of a business corporation may be briefly listed as bonds, short-term notes, preferred stock, common stock, commercial paper and open accounts. The bonds of manu¬ facturing enterprises (unless the business of certain public utilities be included therewith) should represent but a small fraction of the total capital, for the reason that the earnings of such businesses have, in the past, been sub¬ ject to violent fluctuations. Preferred stocks are a business man's risk. They may be de¬ scribed as intermediate in security between bonds and common stocks. They will, in many cases, represent the cash and property contrib¬ uted to the business by the group of interests connected with its organization and develop¬ ment. Common stocks receive dividends only after interest on the bonds and dividends on the preferred stock have been paid. There is no margin of safety to protect them. Their hazard is not so much the correctness of the process of valuing assets as it is the skill of the management in earning income. They are an appropriate investment only for men of means who are intimately associated with in¬ dustrial management.

The financial authorities of a business are responsible to allot the funds raised from the issue of securities as advantageously as possible to the various requirements. A portion will go into buildings and equipment and other relatively permanent forms. This may be designated as fixed capital. Another portion must be reserved for raw materials, finished stock, pay roll and credit advances to cus¬ tomers. This is circulating capital. Fixed capital loses value slowly as a result of wear and tear. Circulating capital changes its form of investment rapidly. A balance in the bank last week mav have been paid out as wages and be now represented by goods in the ware¬ house. Next week, if the goods are sold, it may take the form of a credit advance to a customer.

As fixed capital is relatively enduring, a large amount of funds should not be put into such a form until it is certain that the enter¬ prise is to be of a permanent nature. Fixed capital may be of various degrees of specializa¬ tion. The more specialized the form the more difficult it is to sell, and the more its selling price depends upon the hazard of a single set of market conditions. The degree to which it is proper to specialize capital is a function of the conference felt in the soundness of the project. The utilization of fixed capital is a process requiring the continuous supplying of circulating capital. Materials and labor must be provided to support the process of produc¬

tion. A plant is valueless when not in motion. To keep it under headway money must be constantly poured into it in amounts which in the average case may equal the total capital of the business annually. It is a somewhat common error of business finance to place an unduly large proportion of the assets in fixed form. The homely caution of Poor Richard may well be remembered, ((It is easier to build two chimneys than maintain one in fuel.® The financial organization of a private business con¬ nects with the general financial machinery of the country through the company's published reports, through the certified public accountant who vouches for the report he signs and through the general banking system. It is further connected by the investment bankers who purchase the securities after investigation and sell them to the investing public, by the stock exchanges which exert some slight con¬ trol over the probity of the methods of the corporations whose securities they admit to list¬ ing privileges, by State commissions which are rapidly taking over the functions of authoriz¬ ing security issue and by the general machinery of law.

Administration of Manufacturing Proc¬ esses. — The highest authority in a business, on matters pertaining to productive processes, may be known as the general superintendent or works manager. In the initial stages of the business this officer will have the leading in¬ fluence in determining the location of plants, the layout and character of buildings and the selection of machinery. When preliminary plans result in the construction of a mechanical automaton, and it becomes necessary to add men and materials and to indicate methods of production, in order that the enterprise can be¬ come a going concern, the general superintend¬ ent will take on a much expanded range of responsibilities. He will be expected to keep the physical equipment and productive proc¬ esses up to standard and to employ an adequate force of foremen, laborers and skilled men of the various crafts. He will control the progress of work in relation to the demands of the sales department by a schedule and. a system of orders, which

control all productive labor and the use of material. The design of articles and the accuracy of manufacture is effected through a designing department and a system of inspectors. As a means of improve¬ ment he will use time studies and motion stud¬ ies. The information thus accumulated he will embody in standards, which will be pro¬ mulgated as the prescribed methods. The ideal is standardization, which is such an effective control of performance that every case con¬ forms to the rule laid down. These prescribed methods will be communicated by general or standing orders and by shop orders. In a business of any size, orders should be written. The standing orders, when gathered together, will compose a (

The planning room is the chief service aid of the superintendent and the foreman on tech¬ nical matters. It may, in a typical instance, contain a routing or order-of-work clerk in charge of the planning board, an instruction card clerk, a clerk in charge of time slips and cost records ; and it will probably serve also as headquarters for the engineer who calculates the proper speed of machinery, and the time study man who studies manual opera¬ tions.

From the foregoing statement of duties it can be seen that the general superintendent has a very wide range of responsibilities. To be able to function efficiently, in the face of the enormous evolution of science and tech¬ nique which has taken place in recent years, he should confine himself to general supervision, entrusting details to a staff of specialists. There has grown up in the best-managed busi¬ nesses a number of service departments or staff aids for the express purpose of relieving the general superintendent. Such are the tool room, the stores department, the engineering department, the designing and drafting room, the inspection department and the planning room. Usually also the cost department and the employment department will be answerable to him. To a considerable degree the differ¬ ence in efficiency of manufacturing enterprises depends upon the ability of the superintendent to comprehend the functions of service depart¬ ments, and his success in organizing about him a staff of specialists who relieve him and his foremen. An executive blockade ex¬ ists in many businesses because the general superintendent and foremen are overloaded. The remedy is to apply the principal of special¬ ization and division of labor in administration, as it is applied among the craftsmen and com¬ mon laborers in the shops.

Administration of Personnel Relations. — Within the last 15 years, the attention of busi¬ ness executives has been increasingly drawn to the problem of employment management, or as it is sometimes called, (

wage systems, safety first, hygiene and medical aid, and the use of the committee system of shop management. The functions of the em¬ ployment department are, for the most part, not new in industry. They are now being gathered together under one authority so that they may be handled in a more expert manner, that they may be harmonized into a consistent policy, and that they may be made the definite responsibility of competent officers. Among the causes which are responsible for the atten¬ tion now being given to personnel supervision is the extension of cost accounting to the fac¬ tors which influence labor efficiency. The cost of labor turnover is being calculated. The cost of accidents, of sickness, of absenteeism, of improperly placed men and of strikes is being studied. The employment manager is, in one sense, a labor-cost accountant. The organization of an employment department does not involve an increase in the cost of doing business. On the contrary, it means an economy, by reason of a reduction in the number of persons to be trained, a saving of foremen's energy, a reduction in accidents and a gradual increase in the average skill and experience of employees. Proper employment conditions attract superior workmen, and gen¬ erate a co-operative spirit ; this affects favor¬ ably the rate of production, the waste of stock and the quality of output. See Labor Turn¬ over.

The employment manager is necessary to apply the art of mental testing and vocational guidance in ascertaining the fitness of pros¬ pective employees. He best can direct indus¬ trial training to provide the talent which the employment records show to be most needed. He knows the process of establishing fair base rates of wages, of working out wage scales, of checking minimum rates against the local cost of living, and of planning simple and spe¬ cific production bonuses. The employment manager has come in with safety first, because it has been found that three-fourths of the accidents arc due to the carelessness or igno¬ rance of the working force. His department works along the lines of hygiene, sanitation, medical aid, canteens and health education, to cut down accidents, reduce fatigue and cure antagonism of mind. Employment supervision represents a movement, in the direction of the democratic shop, in which a voice is given to labor in determining the working conditions. It is a means of applying that conception of truth and service which has revolutionized sell¬ ing and advertising. As the customer is <(sold® goods — that is to say is thoroughly convinced and satisfied — so a workman is (

The employment manager is coming in as a new staff man to relieve general executives. Staff or service departments are already famil¬ iar in the form of accounting departments, statistical departments and the like. This prin¬ ciple of staff service is now being carried over into the field of human engineering. General executives are demanding well-chosen men, men who are free from accidents and in sound health, men satisfied with their pay, and men

so treated that they form a permanent and contented force, ready to co-operate loyally in the general plans of the enterprise. Of all the standardized agencies a service depart¬ ment can furnish to a general executive, the greatest is a first-class man. In a somewhat analogous way the employment manager repre¬ sents a step in specializing the work of the foremen. His coming makes the foreman less of a jack of all trades, just as the coming of the tool room, the stock room and the design¬ ing department did. Under the new system, the foreman can no longer sell jobs, or protect pets, or cover up his own incompetence by dis¬ charging a man. When the foreman becomes accustomed to the new system he finds it a great relief. He gets a more even and depend¬ able run of men than he could provide for himself, and he is free to become an expert in shop processes. See Employment Mana¬ ger; Employment Management.

Edward D. Jones,

Professor of Business Administration, Univer¬ sity of Michigan; Author of (Administration of Industrial Enterprises,) etc.

INDUSTRIAL ORGANIZATIONS, For¬ eign. See Labor Departments, Foreign ; Labor Legislation, Foreign; Labor Organiza¬ tions, Foreign.

INDUSTRIAL PEACE, Experiments in.

The desire to find a common ground of understanding between capital and labor with a view to reducing the enormous financial wastage resulting from needless labor strikes, is the purpose back of every experiment in in¬ dustrial peace that has been inaugurated dur¬ ing the past 20 years. The first efforts in this direction assumed the form of some type of profit-sharing, the idea being that the prospect of sharing in the profits of the employer would appeal to the self-interests of the workers and so inspire more loyal and efficient service. Theoretically, the idea appealed to many practi¬ cal men, and various

developments of the profit- sharing scheme have since been carried out. The failure of many of these projects has not had a permanently discouraging effect upon those who favor some such form of co-opera¬ tive business effort, chiefly because of the fact that, in at least a majority of cases, the lack of success can be traced to local causes which proved stronger than the principles involved. Thus, the attempts of employers to use the profit-sharing ideal for advertising purposes or as a means of evading appeals for increases in wages, have invariably proved disastrous. At , the same time, some of the largest concerns in the country have adopted this form of reward¬ ing their employees, and with such satisfactory results that it is still in force. One reason why the number of failures charged against the profit-sharing idea is so great is that so many schemes that cannot properly be called profit- sharing have been classified under this desig¬ nation. Thus, numerous forms'of co-operative effort, including plans for participation in stock ownership through instalment purchase, bonus systems, pension schemes, and various projects of a welfare character have erroneously been classed as profit-sharing®

The term profit-sharing® was first defined by the International Co-operative Congress,

which was held in Paris, in 1889, and was stated to be <(an agreement freely entered into by which the employees receive a share, fixed in advance, of the profits,® while the term (

The National Association of Corporation Schools reported, in November 1918, that a recent survey of profit-sharing schemes showed that 39 plans had been abandoned, 10 because of labor troubles and strikes; seven because the employees were dissatisfied; five because the employers found that they operated un¬ satisfactorily; five because of failure under diminution of profits; four on account of lack of appreciation on the part of employees ; two because of changes in business management, and one because the employees sold out their stock on a war market. The reasons for eight abandonments was not stated.

The Corporation School Bulletin states (November 1918) that while it is difficult to eliminate all the obstacles enumerated, they may be gotten around, and (

it will be possible to determine just what the share of each class of employee should be in producing the desired results and to reward accordingly — a decision which, in its turn, must lead to the reward of individuals in each class in proportion to the individual results obtained by workmen, foremen, superintend¬ ents, salesmen and managers, together with a greater confidence on the part of both em¬ ployers and employed in the intrinsic justice of the movement itself.®

A comparatively recent development of the profit-sharing ideal is in operation in Louis¬ ville, Ky., where, in addition to paying em¬ ployees as good compensation as would be paid for the same class of work in any other in¬ dustry, all workers receive a division of the total net profits, 50 per cent being placed to the credit of the regular surplus or reserve fund from which dividends for the stockholders are declared, while the remaining 50 per cent is divided in three equal parts : One-third being allotted to the executives, one-third to the manu¬ facturing and recording division and one-third to the sales division. In distributing the allot¬ ment to the workers and clerical force, the weekly or monthly wage of the individual i$ used as a basis for calculation, the assumption being that a man who is paid a weekly wage of $25 is of more value than the man who re¬ ceived $18 a week, and, therefore, is entitled to a proportionately greater share in the profits. This is, perhaps, one of the simplest and most generous forms of profit-sharing reported. From this 50 per cent participation plan the rate of distribution ranges down to about 2 per cent of the earnings of the employee.

The Rockefeller plan for the maintenance of industrial peace developed as the result of the serious labor troubles which were encoun¬ tered by the Colorado Fuel and Iron Company, in 1913. To prevent a repetition of these dis¬ turbances, John D. Rockefeller, Jr., representing the Rockefeller interests, the largest stock¬ holders in the company, visited the mines, quarries, steel works, timber properties and other activities of the corporation, and, after familiarizing himself with actual conditions, with the assistance of the company's sociological department, drafted a plan for a form of in¬ dustrial democracy that has operated so success¬ fully that a similar system of workers' repre¬ sentation was provided for the employees of the Standard Oil Company, in March 1918. The unique feature of the Rockefeller plan is that it provides the machinery through . which griev¬ ances and suggestions as to working conditions may be brought to the attention of the proper executives. While this is a matter that can more easily be arranged in smaller concerns,. it represents one of the most serious problems with which large corporations have to deal, and Mr. Rockefeller is the authority for the statement that this method

of meeting this difficulty has operated satisfactorily to the operatives as well as to the officers of the company. Under this plan, employees are given representation through delegates elected by secret ballot, and these representatives are not only empowered to settle with the officers of the company any grievances which may arise from time to time, but also participate in the regulation of all mat¬ ter of welfare through joint committees on in¬

dustrial co-operation and conciliation ; safety and accidents; sanitation, health and housing, recreation and education. Regular district conferences between the employees' representa¬ tives and the company's officers are held, and it is guaranteed that, on these occasions, all mat¬ ters of concern to the workers shall be. dis¬ cussed The plan provides elaborate machinery by which the rights of an employee who has a grievance may be properly safeguarded, means being arranged through which disputes that cannot be settled otherwise may be taken as far as the president of the company, if neces¬ sary. The discharge of employees is also ar¬ ranged under agreement with the employees' representative and can be only for causes pre¬ viously agreed upon and posted where each worker may become familiar with the condi¬ tions. These include :

(1) Violation of the law; (2) Violation of prescribed safety rules and regulations; (3) Insubordination or use of profane or abusive language; (4) Absence from duty without notice except for sickness or other causes beyond the operative's control; (5) Harboring disease that may endanger the health of others; (6) Changing working places without orders or prowling around the works from assigned places; (7) Falsifying or refusing to testify in investigations of accidents or for false statements at time of application or physical exam¬ ination; (8) Neglect or carelessness resulting in damage to railroad equipment; (9) Robbing railroad journal boxes of waste; (10) Wilful neglect in care or use of company's prop¬ erty; (11) Obtaining material on fraudulent orders.

The results of the operations of this plan are reported by Mr. Rockefeller (in 1918) to be as follows :

(1) Uninterrupted operation of plants and increased output; (2) Improved working and living conditions; (3) Frequent and close contact between employees and offi¬ cers; (4) Elimination of grievances as a disturbing factor; (5) Good-will developed to a high degree; (6) The creation of a community spirit.

Mr. Rockefeller also declares that the <(rep- resentatives of the men

in the camps and mills have assured me that all grievances have been adjusted to the satisfaction of the employees, are in process of adjustment or the employees have been convinced that their grievances were not well founded. The representatives have ex¬ pressed their own unqualified endorsement, ap¬ proval and appreciation of the plan, which at¬ titude, they say, is that very generally of the rank and file of the men, who constantly value the plan more highly as they understand its working better.®

The application of this plan of co-operation to the Eagle (New Jersey) works of the Stand¬ ard Oil Company occurred in 1918. At an election held on 27 March, 14 delegates were elected to represent the employees and the first meeting between these representatives and the officers of the company was held on 1 April. At the election, 92.2 per cent of the total number * of wage-earners voted.

As in the West, the operation of the plan in Bayonne, N. J., is supposed to guarantee to each worker full justice and protection in all his rights. Future wage adjustments will be made in joint conference between the repre¬ sentatives of the workers and the company s officials, while discharges and suspensions are permitted only under similar conditions as those which exist in the Colorado Fuel and Iron Com¬ pany, and any employee who feels that he has been unjustly treated or who thinks he is sub¬ jected to unfair conditions may through his elected representative appeal to the general

superintendent, or even to higher officials of the company.

The so-called profit-sharing plan of the Ford plants has been in operation since 12 Jan. 1914 and has proved successful, not only by increasing the stability of the working forces but also by bringing about a marked im¬ provement in the morale of the organization. At the time this plan was adopted, it was widely announced that Henry Ford had estab¬ lished a minimum wage of $5 per day, but this statement was not strictly true as participation in the new rate of wage was confined to those who, in the opinion of Mr. Ford, were capable of using it (

To assure each operative just treatment under the new wage scheme, a large corps of specially trained investigators was employed to carry out the follow-up work upon which continuance in the . profit sharing

necessarily depended, and so successfully has the plan operated that, by the spring of 1916, about 90 per cent of the entire force were receiving their share of the profits. This naturally means that there has been a great improvement in the personnel of the organization. Thrifty habits have been developed ; intemperance has largely ceased to be a considerable factor ; domestic conditions have materially improved, while the increase in physical attributes is shown, not only in the reduction of the number of ab¬ sentees but also in the productive achieve¬ ments of the workers.

The concern that has most recently adopted a plan designed to afford employees a share in management is the Bethlehem Steel Corpora¬ tion, and the idea is to be put in operation in all of the subsidiary companies, including sev¬ eral of the large shipbuilding corporations of this country. The principles of representation adopted by the company will, it is hoped, give all employees a voice in regard to the condi¬ tions under which they labor and provide an orderly and expeditious procedure for the pre¬

vention and adjustment of any future differ¬ ences, as well as to anticipate the problem of continuous employment.

The plan provides that employee's represen¬ tation shall be on the following basis: Plants employing under 1,500 persons, one representa¬ tive for each 100 employees; where 1,500 to 10,000 persons are employed, one representative for each 200 employees ; when plants employ more than 10,000 persons, one representative to each 300 employees. Representatives are elected for a term of one year and shall be deemed to have vacated office upon severing connections with the company. Any employee who has been on the payroll for not less than six months, who has reached his majority and is either an American citizen or has secured first papers is entitled for election as represen¬ tative, while employment by the company for 60 days gives an operative the right to vote on questions of representation. The company ap¬ points a management's representative whose duty it is to keep the management in touch with the representatives.

As in the Standard Oil plan, most of the detailed work of the organization is performed through various committees, which include : Rules ; Ways and Means ; Safety and Accident Prevention; Practice, Methods and Economy; Employees' Transportation; Wages, Piece Work, Bonus and Tonnage Schedules; Em¬ ployment and Working Conditions; Health and YVorks Sanitation; Education and Publica¬ tions ; Pensions and Relief ; Athletics and Rec¬ reation, and

Continuous Employment and Con¬ dition of Industry.

The company by agreement guarantees that a representative shall be free to discharge his duties in an independent manner, without fear that his standing with the management will be affected by any action taken by him in his official capacity, and, to assure such independ¬ ence of action, he is given permission to take a question of alleged discrimination against him on this account to any superior officer, to the president of the company, and, failing re¬ lief, to the State Department of Labor or to the secretary of labor of the United States.

Grievances which may occur in the future are to be handled by means of the machinery provided for this purpose. For example, where an employee is unable to adjust any matter with the foreman of the works where he is em¬ ployed, it may be taken, either by the employee himself or, if he prefers, by his representa¬ tive: (1) to the superintendent of the depart¬ ment; (2) with the management's representa¬ tive, and (3) with one of the superior officers of the company, who will endeavor to effect a settlement, or who may, with the approval of all parties concerned, refer the question to the proper joint committee, consisting of the committee of employees' representatives with the addition of the same number of company's representatives, named by the management. If this method fails to effect adjustment within a reasonable time, the matter may be referred to the general joint committee on appeals, and if this settlement proves unsatisfactory, the president of the company shall be notified, and -the question in dispute may thus be referred to an arbitrator, or arbitrators, to be deter¬ mined by the nature of the controversy.

Another experiment in industrial peace through democracy in management was started in the Middle West in June 1914, and, as re¬ ported by the United States Denartment of Labor, the plan has proved so effective that all such questions as wage bargaining, hours of labor, discipline, discharges and adjustment of all grievances have now been put upon a col¬ lective basis.

Under this plan, all phases of management in which the employees are directly interested are handled through three separate bodies, known respectively as the senate, the cabinet and the house of

representatives. The senate and cabinet represent the interests of the firm, while the members of the house of representa¬ tives are elected from among those employees of the company who have been in continuous service for at least six months, the election being by popular vote, in the ratio of one repre¬ sentative for every 15 employees, with the ex¬ ception that a department having less than 15 operatives is given a representative.

Both the senate and the house of represen¬ tatives have the power to initiate a proposition that is of interest to the employees, and may discuss and act upon all matters affecting their welfare. In case of disagreement in the ac¬ tions of these two bodies, the matter is referred to a joint conference committee composed of an equal number of members from each body, and the results of their deliberations are finally submitted to the cabinet — composed of mem¬ bers of the executive board of the firm — for approval.

Much of the detailed business of the indus¬ trial congress is transacted by joint standing committees, including the betterment committee, which hears all complaints and adjusts griev¬ ances, the welfare committee, which deals with questions affecting the health and comfort of the workers, and the wage committee, the func¬ tions of which are: (1) To recommend and pass upon general changes in wages; (2) to suggest and pass upon minimum and maximum rates to be paid for the various operations ac¬ cording to skill involved, length of service and steadiness in attendance; (3) to sit with the planning board of the company for the pur¬ pose of passing upon individual increases in wages, and (4) to receive complaints of indi¬ viduals to whom increases were denied. See Arbitration, Industrial; Profit Sharing.

John R. Meader.

INDUSTRIAL RELATIONS COMMIS¬ SION. A commission created by act of Con¬ gress 23 Aug. 1912, for the purpose of inquir¬ ing into the general condition of labor in the principal industries of the United States, in¬ cluding agriculture, and especially in those in¬ dustries which are carried on in corporate forms; into existing relations between em¬ ployers and employees ; into the effect of in¬ dustrial conditions on public welfare and into the rights and powers of the community to deal therewith; into conditions of sanitation and safety of employees; into the growth of associations of employers and of wage earners ; into the extent and result of methods of col¬ lective bargaining; into any methods which have been tried in any state or in foreign countries for maintaining mutually satisfactory relations

between employees and employers ;

into the methods of mediation and conciliation; into the scope, methods and resources of exist¬ ing bureaus of labor, and into possible ways of increasing their usefulness; into the question of smuggling or other illegal entry of Asiatics into the United States or its insular posses¬ sions, and of the methods by which such Asiatics are gaining admission, and to report to Congress recommendations for remedying existing difficulties. The commission consisted of nine members, including three employers of labor, three representatives of labor organiza¬ tions and three representatives of the public at large. It separated its work into two large division: (1) public hearings ; (2) research and investigations; and published valuable reports. Its final report was presented at the first session of the 64th Congress. It expired in August

1915.

INDUSTRIAL REPUBLIC. See Indus¬ trial Peace, Experiments in.

INDUSTRIAL REVOLUTION, The.

Down to* the middle of the 18th century few mechanical invention had been made and peo¬ ple were still using the appliances in use at the time of the Pharaohs. The people of western Europe continued to till their fields with crude implements, harvest their grain with, a sickle and thresh it with a flail, weave their cloth on hand looms, and saw and plane their boards by hand as their forefathers had done for 3,000 years. Means of transportation and com¬ munication had shown similar stagnation. As an illustration of the backwardness of inven¬ tion we may take the textile industry, which was carried on in every home. From the days of Penelope in the time of Homer down to 1760 only three improvements had been made in the method of making cloth, and only one of these introduced any considerable change. The first was in the process of fulling the cloth : instead of throwing it into a brook and having it trod into the mud by the bare feet of chil¬ dren it was now fulled by means of a water fuller run by water power. A second really significant change was made in tne 15th cen¬ tury. It was the substitution of the spinning wheel for the distaff and spindle; but while the spinner could spin much more rapidly, she was still unable to spin more than one thread at a time. The third change was the “fly-shuttle,*’ invented by John Kav in 1738, by which the weaver could manipulate his loom more rapidly and easily.

Industrial Revolution in England. — Sudr

denly, however, a series of inventions was made in England, beginning about 1760, which com¬ pletely revolutionized the existing methods of industry and introduced a new industrial era. Greater and more far-reaching mechanical changes occurred in the next few decades than in all the world's history before. Machinery was substituted for hand tools, the factory system supplanted the domestic system of home works, and# industry gradually assumed tC shape that is familiar to us. This series oi changes is known as the Industrial Revolu¬ tion, a name first applied by Arnold Toynbee about 1880, but which is now in general use.

. Just why the Industrial Revolution should have occurred at the time when it did, or why it should have taken place in England rather than on the Continent, are difficult questions to

answer. Necessity seems to have preceded in¬ vention in this case as generally, for the need of improved mechanical appliances was keenly felt in England, France, Germany, Switzerland and other countries, and considerable progress had been made in the physical and chemical sciences. England took the lead in industry for several reasons. In the first place she possessed the most important raw materials either at home (wool, coal and iron) or in her colonies (sugar, iron, cotton, dye and other woods). All of these were of such a character that they could best be worked up in quantity ; there was there¬ fore a demand for machinery for this purpose in England. Her insular position and the con¬ sequent ease of waterway communication — which was the quickest and cheapest — gave her command of larger markets than any of the continental countries. The political situ¬ ation in England was such as to ensure domestic tranquillity and the security of property rights, which were essential to the development of manufactures. In this connection might be men¬ tioned also the breaking down of the restraints of the guild system and the development of a good system of patent law. Capital was already accumulating in England, much of it won from the colonies by trade, there was a sufficient sup¬ ply of skilled labor, and under the domestic system there had grown up a class of middle¬ men or enterprisers who could conduct business on a large scale. The conditions were ripe in England for a rapid industrial development, and when a series of technical improvements was made after the middle of the 18th century, adjustments in organization quickly followed.

The first important inventions occurred in the textile industry. Under the domestic sys¬ tem, where the processes of spinning and weav¬ ing were both carried on by hand, a principal difficulty had been to provide enough yarn, as it required the work of from 5 to 10 spin¬ ners, each spinning a single thread, to keep one weaver occupied. In 1767 James Hargreaves invented a machine known as the jenny, which operated eight spindles instead of one; this number was later raised to 80. The follow¬ ing year Richard Arkwright patented a ma¬ chine in which the threads passed through two sets of rollers, of which the second pair was driven at a higher speed and thus drew out the wool or cotton into thread. This roller ma¬ chine was known as the water frame because it was operated by water power. It had, how¬ ever, one drawback, in that it did not twist the fibre tightly enough to make fine thread. But this difficulty was met in 1779 by Samuel Crompton, who combined the best features of the two earlier machines into one, which be¬ cause of its hybrid origin was named the <(mule.* As a result of these improvements in spinning machinery the traditional relations be¬ tween the spinners and the weavers was re¬ versed and more yarn could be produced than the hand looms could weave into cloth. In 1784 Dr. Edward Cartwright turned his atten¬ tion to the construction of a power loom, which he succeeded in perfecting some three years later. Other improvements were made in the processes of printing and bleaching the cloth, but it remained for an American, Eli Whitney, to complete the series of improvements by his in¬ vention of the cotton gin in 1792. Whereas

only a pound of cotton could be cleaned of its seeds in a day by hand, with the aid of the gin a man could clean 300. Unlimited cheap raw material was thus assured cotton manufac¬ turers. The effects of these inventions upon the textile industry were revolutionary.

But in order that the new inventions might be made serviceable and machinery utilized to the utmost, it was necessary that it be driven by some non-human power. Indeed it cannot be too strongly emphasized that the vital feature in the Industrial Revolution lay in the substi¬ tution of power for human muscles. As long as man was confined to the use of hand tools his powers of production were strictly limited by the number of human hands available for this purpose, but as soon as machinery was invented and was driven by non-human power, there was no limit placed upon his powers of production through physical limitations. It depended now upon his ability to make the machines and to develop the power. Windmills were well known, but were unsatisfactory for this purpose, and at first water power was resorted to. But not until the steam engine was perfected did man have a really

efficient instrument for this purpose. With this inven¬ tion mankind entered upon an entirely new phase of development, and one that opens new vistas for the future.

The expansive power of steam was known to the ancient Greeks, but not until the 18th century was it put to practical use. In 1705 Newcomen constructed a practicable engine for pumping water out of the mines, and it was while repairing one of these crude affairs that James Watt in 1769 invented the improvements that made it a modern machine. It was now made adaptable for driving spinning machines, power looms and other mechanical devices. Its first use, however, was for pumping water, which had previously been a great ‘menace, out of the coal mines, and hoisting the coal to the surface. This gave a great impetus to coal mining, which was further hastened by the invention of the safety lamp. The art of smelting iron by coal was made available about 1750, and in 1784 Corte discovered the process of “puddling.® Other improvements were made in the blast, the substitution of rollers for the hammer, and in appliances for handling heavy castings. These changes reacted power¬ fully on the iron industry and the manufacture of machinery, as the new processes made iron stronger and at the same time more malleable and easily worked up. There was now no limit to the supply of strong and powerful machines, for which the demand seemed unceasing.

Results. — The effects of the Industrial Revolution were momentous and far-reaching, and resulted in a veritable social revolution. The most striking result was the great increase of productive power of a society equipped with these new appliances. Unfortunately, however, the benefits of this increase in output and wealth were very unequally distributed ; the landlord and the capitalist class profited greatly, but the mass of the wage-earners gained little if any by the new inventions. Indeed for a while it seemed as if they suffered only loss, for the use of machinery permitted the use of the labor of women and children on a large scale and rendered valueless the painfully

acquired skill of the former hand workers. A second result was the destruction of the do¬ mestic system of production and the substitu¬ tion therefor of the factory system. Under the former system industry had been carried on within the home by the domestic artisan, who generally owned his tools. Now, however, the new machines were much too expensive to be owned by a cottage workman, and it was

more¬ over impossible to operate them in the home, as they were driven by power. It became neces¬ sary to bring both machines and workmen to¬ gether in factories, where the building, the machinery and the materials were owned by the capitalist enterprisers. This brought about a sharp distinction between the two classes of workers involved, the capitalists on the one hand and the wage-workers on the other. Due to the need of capital in order to undertake manufacturing under the new conditions, the worker became more dependent upon the capi¬ talist for employment. These facts brought to the front questions of labor and capital, which have become increasingly important as time has passed. See Factory System.

Industrial Revolution in the United States. — ■ The term Industrial Revolution has usually been applied to the sudden and remarkable series of changes that occurred in industry in England between 1760 and 1790, though it took another generation for them to work them¬ selves out. The old domestic system of in¬ dustry was completely transformed and a revolution wrought in the economic and social life of the people. It is interesting to raise the question whether other countries have ex¬ perienced similar changes and whether we can apply the term to other periods than that just mentioned. The nearest approach to an indus¬ trial revolution in the United States probably occurred in the 30-year period beginning with 1808, when a series of political and indus¬ trial events led the people to develop manu¬ facturing by the factory system in addition to agriculture and commerce. This did not lead to any revolutionary changes as in England, since there had never been any widespread de¬ velopment of the domestic system of manu¬ factures before this time. The transfer from one system to the other was therefore accom¬ plished without any painful readjustment or suffering. A similar industrial transformation from agricultural to manufacturing conditions occurred in France between about 1820 and 1850, and in Germany after 1870.

Conclusion. — It is unlikely that we shall again have such a sudden and complete revo¬ lution in industry as occurred in England at the end of the 18th century. And the reason is not because of the absence of change, but rather because change is a normal condition of modern industry. Manufacturers to-day ex¬ pect new inventions and take into account the obsolescence of their machinery as naturally as they do its depreciation. Change is constant but just on that account it is less felt than was the Industrial Revolution, because there is con¬ stant adjustment. New inventions or changes in transportation or other factors may and often do completely revolutionize a business within a decade, but such changes are now regarded as a condition of progress.

Being anticipated, they are met and bring no train of

disasters such as made the English Industrial Revolution famous in history. See Great Britain — Industrial Revolution; History, Modern.

Bibliography. — Baines, E., ˆHistory of the Cotton Manufacture in Great Britain) (London 1835) ; Beard, C. A., (The Industrial Revolu¬ tion (London 1902) ; Hobson, J. A., Evolu¬ tion of Modern Capitalism* (London 1894; rev. ed., 1907) ; Thurston, R. H., (A History of the Growth of the Steam Engine) (New York 1878) ; Toynbee, A., (Lectures on the Industrial Revolution of the Eighteenth Cen¬ tury in England) (London 1884) ; Warner, G. T., landmarks in English Industrial History> (London 1899).

Ernest L. Bogart,

Professor of Economics, University of Illinois.

INDUSTRIAL SCHOOLS, an English

term variously applied ; sometimes synonymous with the so-called Ragged Schools, in which mechanical arts are taught ; sometimes desig¬ nating ordinary elementary schools in which agriculture, domestic science or some other industrial art is taught during a portion of the school day. The term is becoming obsolete, having fallen into disfavor because of its ap¬ plication to reformatories.

INDUSTRIAL SERVICE. See Indus¬ tries, Welfare Work in.

INDUSTRIAL TERMS. The following list embraces many of the important terms that are used technically in the several commercial industries. Such terms as are usually regarded as self-explanatory, as well as those that have no general application, have been omitted. Those that are of more than ordinary im¬ portance will be found defined more fully under their appropriate heading.

Abb. — In wool-sorting the quality of the wool is denoted by the terms: “fine abb,” and “coarse abb.”

Acierage. — In engraving, the deposition of a very thin layer of steel on the face of an engraved copper plate, to increase its durability under the stress of printing. Annealing. — The process of treating substances by heat to remove their brittleness and yet make them tough and inclined to be elastic.

Anthichlor. — A term used in bleaching to denote the method

employed to remove or neutralize the injurious effects of the free chlorine left in some bleached materials. Arch. — When a portion of a lode is left standing, in mining, because it is too poor to work or is needed as a support, it is called an “ arch.”

Ashlaring.— In carpentry, the placing of upright studs to form vertical walls of a room constructed under the slopes of a peaked roof.

Asterism. — A term in printing denoting the three asterisks sometimes placed before a sentence to call attention to it. Attemperation. — Regulating the temperature of the beer- worts in brewing.

Attenuation. — The decrease in density of the beer-worts in brewing is termed “attenuation.”

Autogenous Soldering. — Joining pieces of the same metal by fusing them together by a melting heat applied at the juncture.

Avivage. — A process for clearing and brightening the colors in dyeing.

Back. — (a) In metal-mining, the portion of the lode that lies between the level and the one next above it; (b) in coal-mining, the inner end of a heading where work is being conducted; (c) the thickest and best hides are termed “ backs ” in the leather trade.

Back-casing. — A wall of dry brick sunken through sand or gravel in mining. o

Backlash. — In coal-mining, the backward suction after an explosion of firedamp.

Back-stay. — In printing, the leather strap used to check the carriage of the press; in lathes, a support to prevent the work from springing away from the cutting tool. Balk. — When a bed of coal suddenly thins out it is termed a “ balk.”

Ballooning. — In spinning, the bellying outward of the thread while it is being wound on the bobbin.

Band. — A layer of rock that is interstratified with coal.

Barney. — A small car used in mining to push the mine-car up a slope;

the pit from which it runs is termed the “ barney-pit.”

Barrel-work. — Pieces of native copper too small to be handled as mass-copper, but large enough to be shipped in barrels.

Bastard. — ■ (a) An impure brown sugar made from the refuse of previous boilings; (b) the large mold into which the sugar is drained is also called a “ bastard;” (c) in printing, any type whose face is out of proportion to the size of its body is termed “ bastard ” type.

Bastard Flatting. — In painting, the “ egg-shell ” semi¬ gloss surface produced by using three times as much turpentine as oil in the paint mixing.

Bating. — The process of steeping hides and skins to render them soft and fit for tanning.

Battery. — The timber structure that is used to prevent coal from sliding down a shute.

Bay. — In mining, an open space for waste in a long-wall working.

Beaming. — ■ (a) Winding the warp-yarn on a loom in the manufacture of cloth; (b) working hides with a slicker over a beam in the leather trade.

Beater. — – (a) A machine used in cotton manufacturing to open and clean the cotton before it passes to the carder; (b) a knife used for breaking flax or hemp; (c) the batten of the loom used for weaving.

Beaumontage. — The filling material used to stop small holes in wood or metal work; in the first instance made of varnish thickened with chalk and resin, in the case of iron, with a mixture of iron filings and sal ammoniac.

Benching. — A term applied to the process used in getting the coal after it is holed.

Black-liquor. — A crude acetate of iron used, in dyeing, as a mordant.

Bleed. — (a) In bookbinding, to trim the margin too closely; (b) in dyeing, extracting the coloring matter.

Bleu-de-roi. — The term used to denote the cobalt-blue color in European porcelain.

Blick. — The iridescence appearing on gold and silver at the end of

the refining process.

Blooming. — Clouding of a varnished surface usually through the absorption of moisture.

Blue-cap. — In mining, the bluish or brownish halo which, when it appears around the flame of the safety lamp, indicates a dangerous quantity of fire-damp, is termed the “ blue-cap.”

Boards. — The hard paper-stock inserted between the printed sheets in a press to remove an indentation of impression; often called “ press-boards.”

Bone. — The term used to define the slaty portions in a coal mine.

Bonnet. — The shield used to protect a mine shaft from substance which might otherwise fall into it.

Border. — The rim fixed about the bed-plate used in milling to prevent the meal from falling off before it reaches the proper opening.

Bossing. — The working of lead sheets into hollow forms by pressure, without cutting and soldering.

Box Calf. — Chrome-tanned calf-skins, which bear square markings due to rolling the skins lengthwise and from side to side while still damp.

Boxing In. — In printing, the enclosing of special reading matter with a frame of rule.

Branning. — A term that is applied both to the process of steeping cloth before or after it is dyed, and to the steeping of skins before tanning.

Brood. — The term applied in mining to all heterogeneous mixtures found with copper or tin ore.

Brush. — An instrument constructed of several small trees, like the birch, and used by farmers instead of a harrow in covering grain, or small seed after sowing.

Buck. — The breaking of ore into small pieces for jigging.

Buddle. — In mining, to wash ore free from earthy matter the water is run over an inclined hutch which is termed a “ buddle.” . /

Bulling-bar. — In mining, the bar used to ram clay fillings into open cracks before blasting.

Bully-head. — The name by which the sledge-hammer used by miners is popularly known.

Bultow.— In the fishing industry, the practice of stringing many hooks on one line, used in fishing for cod off the Banks. ...

Bunchy. — Used in mining to denote that the ore is irregu¬ larly distributed through the lode in small masses, or “ pockets.”

Bundle. — (a) In paper-making, 2 reams of printing, or brown paper; (b) in spinning, 20 hanks, or 6,000 yards of linen yarn.

B untons. — The timbers put across a mining shaft to divide it into compartments.

Butt. — A hide of sole leather in which the belly and shoulders have been cut off.

Cade. — A term of measurement in the fishing trade, denot¬ ing either 500 herrings, or 1,000 sprats.

Cage-seat. — The framework at the bottom of a shaft, so arranged as to reduce the jar when the cage drops upon it.

Calf.— A term applied to a bookbinding in calf-skin. This binding is of several grades: Divinity calf, a dark-brown binding, with blind stamping and no gilding; half-calf, in which the backs and corners only are of calf-skin; mottled calf, a calf binding of pale color in which the decorations have been made by the sprinkling of acid; smooth calf, or plain, undecorative leather; tree calf, a bright, brown calf binding stained by acid to imitate the trunk and branches of a tree.

Camber. — In building, the amount of curvature upward given a horizontal beam; for cast iron f inch for each 10 feet of span; for steel, ˆ inch for the same span.

Cancels. — – In printing, the pages of a book which have been reprinted because of error in copy or type. They are marked usually by an asterisk in the bottom margin of the page.

Canch. — A term used to denote that part of a floor or roof of a gangway that is removed to equalize the grade because of a fault, or break in the strata.

Cant Brick. — A brick cut at any angle other than a right angle.

Cannel. — A form of weaving that produces a corded or rep tissue.

Cap. — A term denoting certain sizes and shapes in paper: Double cap, 17 x 28 inches; exchange cap, a fine quality paper, used in printing bills of exchange; flat cap, or full cap, 14 x 17 inches; foolscap, usually 12 x 15 inches; legal, or pot cap, 13 x 16 inches, etc.

Carcase. — In building, the rough structure of a building (or a ship) before finishing work is begun.

Carding. — The disentangling of wool, cotton or other fibres with a card, preparatory to spinning. See Comb¬ ing.

Carriage. — In building, the inclined timber structure which supports the staircase.

Carrot. — In the fur trade, to dress a pelt to preserve it from insects.

Carrots. — Rolls of tobacco after they have been so pre¬ pared that they require only to be ground and sifted to be made into snuff.

Case. — (a) A shallow wooden tray, the partitions making the small boxes in which the various characters of type required by printers are kept in order for the use of com¬ positors. (b) A book cover that has been made separately from the book for which it is intended.

Case-hardening. — Producing a thin surface layer of steel upon soft iron articles by heating them to cherry-redness in contact with charcoal or other carbon.

Casse-paper. — The wrinkled, broken, or otherwise imper¬ fect paper rejected by the trade.

Cassette. — The utensil in which china ware is baked ; some¬ times called the “ coffin.”

Cast. — (a) The water used in the preparation of beer. The quantity that is first placed in the mash-tub is termed the “ first cast; ” that which is subsequently added, the “ second cast,” “ third cast,” etc. (b) In bee culture, an after swarm led by a maiden queen.

Catchword. — In printing, the setting of the first word of the following page at the lower right-hand corner of the page form — found only in old books.

Catgut. — Strips cut from the specially treated intestines of sheep and horses.

Certosina Work. — A term used to denote the inlay of certain light materials — like ivory or satinwood — upon dark woods like walnut.

Chase. — In printing, a square, open framework of iron into which the type forms are fastened to facilitate moving and working on the press.

Chase Mortise. — In building, a mortise with one side on a bevel to allow the easier entrance of the tenon.

Chemical Pulp. — Wood pulp in which the fibres have been separated by chemical process instead of by mechanical means.

Chilled Castings. — Iron castings with hardened surface produced by casting in metal molds which conduct away quickly the heat of the molten iron.

Chop. — (a) In milling the product of the first crushing of the wheat; (b) also used to denote the brand and quality of tea import ed!from China, as “ first chop,” etc.

Chrome Leather. — Leather tanned with chromium salts instead of vegetable tanning agents.

Cissing. — In painting, the appearance of small dull spots in a varnished surface due to underlying oil or grease.

Clearcole. — A coating of glue size and chalk laid upon plaster walls before painting them.

Clicker. — • The workman who cuts the uppers and soles for boots and shoes.

Clog. — The short pieces of timber used in mines to prop the roof.

Closing-machine. — (a) A machine that sews heavy cloth or leather with a lockstitch, alike on both sides; (b) appa¬ ratus used in rope-making to twist the already made strands into rope.

Cobbing. — In mining, a process of breaking the ore that the better parts may be sorted out.

Cockle. — (a) A large stove used in the making of porcelain, to dry the biscuit-ware after its glazing preparatory to burning; (b) the kiln used for drying hops.

Cold Bend. — In iron specifications, the angle at which iron bars or plates break when bent cold.

Color. — (a) In gold mining, the particles of gold that are shown when auriferous sand is washed out; (b) in printing,

the evenness of distribution of ink in an impression.

Combing. — In spinning, the removal of short fibres from the carded textile before it is spun.

Commercial. — ■ A term used to denote the shape and size of paper: Commercial letter, 11 x 17 inches; unfolded com¬ mercial letter, small, 10ˆ x 16£ inches; commercial note, 8 x 10 inches, unfolded.

Companionship. — In printing, a number of compositors employed in setting up a quantity of copy under the direction of one leader.

Compost. — A mixture of various manuring substances used by agriculturists in fertilizing land.

Concentrator. — A machine used, chiefly in mining in the United States, to separate the ore from the rock with which it was associated in the lode.

Conditioning. — In spinning, the dampening of cotton fibre to restore its natural percentage of moisture before spinning.

Cop. — The cylindrical form in which cotton yarn is built up when spun on the mule. There are three sizes: Pin cop, bastard cop and twist cop. Woolen cop is of conical form.

Cord. — (a) In fancy weaving, the interval between two vertical lines of the design is termed a “ cord; ” (b) the same term is used in bookbinding when a book is tied firmly between two boards to assure its drying smoothly. The term “ Maitland cord ” is used in weaving to denote the cord which extends along the wooden shafts of leaves to which the heddles are secured.

Cording. — The term denoting the arrangement of the treadles in a loom by which they are made to move in such clusters and time as the production of the pattern may necessitate.

Core-piece. — The yarn running through the centre of a rope to assure its solidity.

Corner. — The triangular tool used in bookbinding to deco¬ rate the corners of a book.

Couch. — (a) The operation, in brewing, of spreading the steeped grain upon the floor to convert it into malt; (b) in paper-making, the act of removing the paper from the mold upon which it has been formed that it may be placed upon the felt.

Couch Roll. — In paper making, a felt-covered roll which squeezes out the surplus water from the sheet of wet pulp as it leaves the wire.

Counter-lode. — A term used in mining to denote a lode running in such a direction in relation to the main lodes that it crosses or intersects them.

Counts. — In spinning, the relative diameter of threads, as measured by the weight of a stated length. Single thread counts in cotton are the number of hanks of 840 yards in 1 pound: That is, a 20-cotton thread is 20 hanks to the pound. In worsted, the basin is 560 hanks to the pound. In wool, it is the number of one-yard skeins in 1 dram.

Coursing. — The method of regulating the ventilation of a mine by conducting the air through various doors, stopings, etc.

Crabbing. — In woolen manufacture, a treatment of the cloth with live steam through a perforated roll; the object being to prevent subsequent wrinkling.

Cradle. — (a) A movable hanging scaffold used by painters and builders, supported from above, and operated by ropes and pulleys; (b) in mining, a rocking tray for washing out placer gold.

Cram. — In weaving, a warp that has more than two threads in each split of the reed.

Crawling. — In painting, the wrinkling of varnish, due to too heavy a coat or a sudden rise in temperature while the varnish is drying.

Crazing. — In the pottery industry, when the glaze separates from the body and forms blisters.

Creaser. — A tool used in bookbinding to define the width of the bands of a book, and to fix the position of the lines on the backs and

sides.

Creasing. — A course of tiles projecting on each side of a wall at the top, to prevent the soaking in of water falling upon it.

Creep. — If the pillars of a mine are not sufficiently large, or the roof is not Sully supported the pressure of the super¬ incumbent strata sometimes causes a bulging or rising of the under-clay. Colleries have been entirely destroyed by “ creep.”

Creeping. — The movement backward of a rubber tire when it is too loose on the rim.

Crizzling. — In glass manufacture, a blemish of the surface due to using cold tools upon it while in the plastic state.

Crop. — An untrimmed hide, struck for sole-leather, is termed a “ crop,” or “ crop-hide ” in the trade.

Cropped. — In binding signifies that the margins of the pages have been trimmed too close.

Cropping. — In cloth making, a machine process for shearing the nap of cloth.

Crup Butt. — In leather work, the oily part of a horsehide which covers the loin of animal, used especially for the uppers of hunting and fishing boots.

Crutch or Crutcher. — A term used in soap-makmg to denote the perforated instrument with which the various ingredients are kept mixed while cooling.

Gullet. — In glass manufacture, clean waste and broken glass from previous meltings and castings added to a raw batch to initiate the fusion.

Cure. — In leather making, the substance used to prevent decomposition in raw hides and skins. The commonei cures are salt, arsenic, boracic acid and some of the coal- tar carbolic products.

Cut. — The block upon which a picture is engraved and from which it is impressed in printing.

Cutter. — Usually applied, in mining, to a joint or crack which crosses a better defined system of cracks in the same rock.

Dabber. — The use of the “ dabber ” by printers has largely ceased since the introduction of the ink roller, but the same term is now applied to instruments used by etchers and stereotypers. The former is used to ink the surface of engraved blocks or plates; the latter to dab the back of the damp paper used in the papier-mache process of stereo¬ typing, in order that it may be driven into the interstices of the type.

Dabbing. — The term applied to the process in stone-work¬ ing by which the surface of the stone is covered with small indentations, after having been made uniform.

Dam. — The term applied to the underground wall frequently constructed to hold back water, air or gas.

Damping. — A process used in bleaching to add a certain amount of moisture to a fabric, after it has been starched, that it may be properly finished.

Dandy. — The running-out fire for the melting of pig-iron in tin-plate manufacturing.

Dandy-roll. — The wire-gauze cylinder beneath which the web of water-pulp is passed in paper-making to drain it partially of water and impress the watermark.

Dash-pot. — A controlling device for checking sudden move¬ ments in mechanisms, consisting of a cylinder filled with oil or water in which moves a loosely fitted piston.

Dash-wheel. — The partially submerged wheel used in cotton manufacturing to wash and rinse calico in the piece.

Dead Ground. — In mining, those parts of the vein which do not contain ore.

Dead Melting. — In foundry practice, heating metal to a temperature considerably higher than its melting point.

Deck. — Used in mining to denote the loading or unloading of cars upon the cage.

Deckle-strap. — The contrivance used in paper-making to define the width of the sheet by regulating the flow of pulp.

Dele. — A term used in proofreading to direct the com¬ positor or

printer to remove a letter, word or phrase.

Demy. — A standard size in paper sheets. Printing demy is 22\ x 17£ inches; writing demy, 20 x 15ˆ inches; draw¬ ing demy, 22 x 17 inches.

Dentelle. — In bookbinding, a style of finishing with deli¬ cate lace-like tracery in gilt.

Depth of Focus. — The capacity of a lens (q. v.) to focus on one plane images of objects located at widely differing distances from the lens. This capacity is enhanced by the use of smaller stops.

Derby Float. — In plastering, a tool for smoothing freshly laid plaster. It consists of a longish board with a peg handle near each end. See Float.

Devil. — (a) An errand-boy employed in a printing-office; (b) a plumber's fire-pot for heating solder and lead.

Dip Crank. — A crank formed by bending a rod to crank form instead of building it up from separate pieces, or cutting it from a forging.

Dipping. — A process in ceramics by which a coarse clay body is coated with fine enamel by being plunged into the liquid which constitutes the coating.

Discharge. — In dyeing, the process by which white patterns are produced on colored grounds by a chemical bleaching or release of the color.

Discovery Claim. — In mining law, the portion of ground held by reason of the first discovery of its mineral deposits.

Dished. — The form given to wheels or discs where the centre is in a hollow as compared with the plane of the rim.

Distribute. — A term used in printing for the process of returning dead matter (type no longer required) to the cases; " thrown-in " is another term used to define this process.

Doctor. — (a) A term in wine-making, used to indicate that the character of the wine has been changed by the addition of another liquor; (b) to alter any commodity for purpose of deception.

Doff. — A term that has several distinctions in the textile

manufacture: (a) The process of stripping the cotton or wool from the cards preparatory to spinning; (b) the act of mending broken threads; (c) the removal of full bobbins to give place to the empty ones.

Dolly. — (a) A soft polishing mop rotated at high speed for putting the final surface on metal work to be plated; (b) in mining, a heavy tool, sometimes of wood for crushing soft materials.'

Dongola. — As applied to leathers, skins which have been tanned by both the vegetable and mineral tanning agents successively.

Dossil. — The roll of cloth used to clean the ink from an engraved plate prior to printing.

Double. — A term used to denote the size and quality of paper: Double medium, a printing paper, 24 x38 in.; double royal, a printing paper, 26 x40 in.; double demy, 35 x 22} in.; double imperial, 44 x 30 in.

Double-dyeing. — A method of dyeing mixed goods by which the wool and cotton are dyed separately with colors that have no affinity for the other fibre.

Double-milled. — A term applied to denote that cloth has been fulled twice to make it finer in quality.

Doubler.— (a) A machine for doubling and drawing silk; (b) a still made to intercept and redistil the vapors of distillation; (c) a felting placed between the fabric and the press before printing.

Downcast.— A term used to denote the system of ventila¬ tion used in mining, the shaft down which the air passes into the mine being called the " down-cast."

Draft. — In weaving, a chart or plan showing the cording of a loom or the arrangement of the heddles.

Drag. — (a) A light iron-rod tool with a tapering spiral end. used by miners in cleaning out bore-holes before introduc¬ ing the blasting charge; (b) the device that guides wood to the saw in saw-milling; (c) also applied in printing to denote the thickened impression on one side of the letters produced by the scraping of the sheet on the type.

Draw. — In cotton spinning, the extent of the outward and inward run of a mule carriage, usually 63 or 64 inches. The speed of the mule is designated by the number of draws per minute.

Drawing-paper. — A term used commercially to describe a variety of stout papers manufactured expressly for use in drawing. The regular sizes are as follows: Cap, 13 x 16 in.; demy, 15} x 18$ in.; medium, 18 × 22 in.; royal, 19 × 24 in.; superroyal, 19 × 27 in.; imperial, 21}x29 in.; elephant, 22} x 27} in.; columbier, 23 x 33} in.; atlas, 26 x 33 in.; theorem, 28 x 34 in.; double elephant, 26 x 40 in.; antiquarian, 31 × 52 in.; emperor, 40 × 60 in., Uncle Sam, 48 x 120 in.

Drawing Rolls. — Rolls used in spinning machinery set in successive pairs, each of which turns more rapidly than any previous pair, the sliver (q.v.) passing through them in succession.

Draw-boy. — Formerly the weaver's assistant; now, a mechanical device used in drawing the heddles to form the pattern of the cloth to be woven. The machine upon which this figure- weaving is done is known as the " draw loom."

Drawn. — A term denoting the method of freeing sub¬ stances from all particles of iron and steel by use of a magnet.

Dresser. — (a) The workman employed in type-foundries to remove all defects from the types in preparing them for sale; (b) the tool, or machine employed to cut and dress the furrows on a millstone; (c) a mallet used by plumbers for flattening sheet-lead; (d) one of the picks used in mining.

Drift. — A term used in mining to describe the nearly horizontal passage ways frequently excavated in working a mine; sometimes called a " drive."

Drill. — (a) In agriculture, when a field is not sown broadcast, but in rows, it is said to be in " drills"; (b) also the machine for sewing in this way.

Drift-joint. — When two sheets of metal used in roofing have been joined without soldering by a step-down, so that the joint forms a water-conductor the arrangement is known as a " drip-joint."

Drop-bar. — A term applied to the bar or roller on a printing-press that regulates the passage of the paper sheets to impression.

Drop-finger. — In some cylinder printing-presses the rods that are

employed to hold the sheets in place until they can be seized by the grippers are termed the “ drop- fingers.”

Dropper. — A term used in mining to denote a branch or spur that connects with the main lode but does not materially enrich it.

Dropping. — A term used to denote a defect in the product of the glassmaker. It is caused by the accidental dropping of crude glass or furnace lining into the molten glass in the melting vessel.

Drop-roller. — Used in printing to denote the roller that drops at specified intervals to supply the printing ink for distribution on the ink table.

Droving and Striping. — A process in stone-cutting by which the shallow parallel grooves are made along the length of the rough-hewn stone.

Drunken Saw. — A “ wobbling ” circular saw. set oft at right angle on its arbor, used for cutting a groove in timber, the width of the groove being governed by the aberrance from a right angle.

Drying-off. — A term denoting the process by which an amalgam of gold is evaporated.

Drying-plates. — Used in brewing to denote the series of frames m the malt kiln. They are placed one over the other, and, being covered with woven wire, the hot an ascends through them in such manner as to dry the malt.

Dummy. — In plumbing, a wooden rod having a lump of lead at the end, used for ramming out dents in lead pipe.

Dump. Used in printing to denote the act of removing types from the stick to place them on a galley.

Dung-bath. — In some processes of dyeing and calico- printing the cloth is subjected to a “ dung-bath,” com¬ posed of warm water, animal’s dung, etc., for the purpose of removing the superfluous mordant.

Easing. In weaving gauze, the motion by which the tension of the warp is slackened during the formation of the cross-sheds.

Egg-shell. — A term used commercially to denote the thinnest and most translucent of china or porcelain.

Egg-shell Finish. — See Bastard Flatting.

Elbow-plate.— In paper-making, the cutter of the rag¬ cutting machine when bent to an angle in the middle.

Electroplating. — The process of coating articles with silver or other metal by means of electrolysis.

Electrotyping. — The process of making plate copies of any engraved or molded surface by means of electrical deposition.

Ensilage. — – An agricultural term used to denote the process of preserving fodder, etc., in a green state by storing the materials under pressure in silos or in pits dug in the ground.

Entasis. — The slight convexity in the upright outline of a pillar or column; more pronounced in Roman architecture than in Greek types.

Face. — In coal-mining, the working, or portion of the seam that is being mined.

Fascet. — A rod, or basket of wire used in carrying the bottle from the mold to the leer in glass-manufacture.

Fat-color.— Paint which has been long mixed and has become thickened and greasy.

Fat Liquor.; — ■ In leather manufacture, an emulsion of fish or other oils with soap, and, usually yolks of eggs, used as addressing for skins.

Fat-Work. — In printing, when copy is particularly profit¬ able to the compositor owing to the fact that it has much open space that may be filled with quads, or that in other ways favors rapid execution, is termed fat-work. To beat, or ink “ fat ” in printing means that a form of type has been given an excess of ink.

Feeding. — In printing, a term denoting the method of placing the sheets of paper in such position that they are ready to meet the requirements of the press.

Feints. — The first products of distillation which come over from a pot-still when making whisky.

Fettling. — The operation of removing fins, etc., from castings.

Figging. — In soap making, a spotty appearance of the soap due to undissolved specks of potasium stearate; considered a mark of

excellence. It is simulated by the addition to common soaps of flecks of clay or talc.

Filature. — In silk-culture, a reel by which the silk is drawn from the cocoons. Also used as to the quality of the raw silk marketed on these reels.

Fillet.; — (a) In weaving, a strip of card-clothing; (b) in dairying, a perforated curb used to confine the cheese- curds; (c) a wheel-shaped tool used in bookbinding to impress a gilt line, or decoration upon the covers of books; (d) in printing, a rule fixed with lines that may be used as a border.

Filling. — (a) The term by which the woof or weft thread of a woven fabric is known; (b) in soap making, the treat¬ ment through which the soap is made to carry an excess of water or other adulterant.

Filling Can. — In rope-making, the can in which the sliver is condensed and wound after coming from the doublers.

Fine-drawing. — The term applied to the finishing process in cloth manufacture. By exposing the cloth to a strong light all the minute holes due to breaks are discovered so that they may be repaired with a needle, by the intro¬ duction. of sound yarns in the place of those that have proved defective.

Fining-Roller. — A cylindrical sieve of wire cloth used in paper-making to retain the coarse fibres and knots so that they cannot pass through with the finely ground stuff.

Fire-gilding. — A process of gilding by the application of an amalgam from which the mercury is afterward driven by the heat of a muffle, leaving a fine film of gold.

Fixing Bath. — (a) In tanning, the catechu-bath is followed by another known as the “ fixing ” bath. It consists of water sufficient to cover the skins, acidified with nitric acid, modified with a little glycerine; (b) in photography the chemical bath used to dissolve from an exposed plate the silver salts not changed by the action of light.

Flashing. — (a) A strip of sheet lead, zinc, or copper used to make a watertight joint between a roof and the chimney passing through it, or in the valleys formed by angular intersections in a roof; (b> in glass manufacture, the laying upon glass of a thin coating of glass of another color.

Flatting. — In painting, the laying of a coat of paint with a dead surface.

Flesher. — The tool used in leather manufacture for the purpose of fleshing hides, that is, removing adhering flesh or fat.

Flight. — The series of steps between a floor and a landing. Flitch. — The piece of wood or metal added to a beam, to strengthen it. The beam is thence termed a hitched

beam. . , , ,

Float. — (a) The flat metal tool used by masons tor smoothing the surface of fresh plaster; (b) in weaving, the passage of the shuttle crosswise above or below the threads but without intersecting them.

Flong. — The combination of moist tissue paper and paste used in stereotyping by the papier-mache process to form the mold or matrix from composed types or engraved surfaces.

Floor. — In brewing, each steeping is known as a floor

or “ piece.” . . . ,

Flooring. — Used in brewing to denote the operation ot spreading the grain on the malt-floor, that it may bo kept at an even temperature, to check germination.

Flow. — A term used in ceramics to denote the flux that is used to make the colors run and blend in firing- Flue Work. — In pipe organs, those “stops’ which pro¬ duce their tones by the vibration of air columns,ˆ and not by reeds. They include the ‘ ‘ principal, flute, and “ stopped ” groups.

Fluffing. — In leather manufacture, the process ot smooth¬ ing a leather surface on an emery wheel.

Flurry. — A term used in calico printing to denote the condition of frothiness which is sometimes developed by the colors during the process of printing.

Fly. — (a) One of the arms of a spinning-frame which revolves around the bobbin to twist the yarn as it is wound upon it; (b) in cotton and

wool spinning, the term, applied to the fibre collecting on the carding rolls; (c) in weaving, a shuttle with wheels driven through the shed by a jerk; (d) in printing, the mechanism which receives and delivers the separate sheets as they are printed on the press; (e) in piano-making, the hinged board with which the keys are covered when not in use; _(f) in clocks, the fan which controls the speed of the striking train.

Fly-Nut. — A nut with wings by which it may be turned with the fingers. .

Folio. — While the word “folio” is used to denote the size of a book it is also applied as a. descriptive term for several sizes of paper, each of which is designated by a specific name: Pot folio, 7} x 12} in.; foolscap folio, about 8 x 12}in.; flat-cap folio, 8* x 14 in.; crown or post folio, 9} x 15 in.; demy folio, 10} x 16 in.; medium folio, 12×19 in.; royal folio, 12} x 20 in.; superroyal fo ho, 14 x 22 in.; imperial folio, 16×22 in.; elephant fouo, 14 x 23 in.; atlas folio, 16} x 26 in.; columbier folio, 17} x 24 in.; double elephant folio, 20×27 in.; antiquarian folio, 26} x 31 in.

Foolscap. — A term applied to a writing paper varying in size from 12×15 to 12}xl6 inches. The term was derived from the water-mark, a fool s cap, which formerly appeared upon all the papers that bore this name. Footline. — A term used in printing to denote the last line of a page of type. It is usually left blank, although it sometimes contains the number of the page or the signature on the sheets.

Foots. — The impure residues left after the refining of oils, fats, waxes, and greases.

Format.— In printing, the plan of the page form of a book;

as folio, octavo, etc. . .

Forwarder. — A term used in bookbinding to designate the workman whose duty it is to receive the sewed book, put on its back, cover, etc., and prepare it for the finisher. Frizing. — In leather manufacture, the removing of a very thin layer from the grain (hair) surface of a skin. Full-faced. — A term used in printing to describe a type with the thick lines that make it print extremely black. Furniture. — The term “ furniture ” in printing denotes the pieces of wood or metal that are placed around the pages of type, not only to keep them the necessary dis¬ tance apart but to assist in fastening them securely in the chases. When the furniture has been systematically cut into various standard lengths and widths, so that they may be easily combined, the pieces

are known as “ labor-saving furniture.” _

Fustain. — The term applied to a short twilled cotton fabric, usually a cloth having a short pile, like corduroy, velveteen, etc.

Gaging-thread. — In weaving, a thread introduced tem¬ porarily to stop the weft-thread at a specified point. Galley. — An oblong, shallow tray, now usually made of brass, but sometimes of wood, used in printing by com¬ positors as a place to deposit the type they have set. Galleys in which the type may be locked are known as proof-galleys. Standing galleys are inclined frames fitted with cleats on which the type galleys rest. A proof taken from types being held on galleys is termed a “ galley- proof.” .

Gassing. — In textile manufacture, the process of singeing off loose fibres and fluff from thread by passing it through a gas flame.

Gathering. — (a) In glass-making, the method of coiling the molten glass on the end of an iron tube preparatory to the work of blowing; (b) in book-binding, the collecting of the printed and folded sheets in their proper con¬ secutive order.

Giggering. — A process in bookbinding by which the burnished lines are laid by a sliding or rubbing movement, upon covers decorated in antique fashion.

Gigging.— The process of finishing cloth by drawing the loose ends of wool in a fabric to the surface to form a nap. After the work of napping is completed the fabric is ready to be finished by shearing.

Gilling.— A term denoting a process for making all fibres level and even in the manufacture of woolen yarns or

Gingerbread- work. — A phrase used, somewhat as a term of contempt, in describing the fanciful shapes ot the ornate wood-work and carvings seen in the ornamentation

of houses, furniture, etc. ,

Glair.— In book-binding, a foundation applied where gilding is to be laid, made of whipped white of egg and

a very little vinegar. . . , . .

Glance. — A term used in mining to designate those ores in which a peculiar lustre and color indicates that they are of metalliferous

combination.

Glory Hole. — A small furnance used to reheat glass in process of manufacture. .

Glossing. — A term denoting the operation of twisting the hanks of silk, in silk-manufacture, after they have been dyed and dried. This process is sometimes termed 44 stringing/

Glyptograph. — An engraving or carving on a precious

Goods. — The raw oils, fats and greases employed in soap

making. . . . ˆ

Gothic. — A term used by American printers to describe a style of square-cut printing-type very similar m appear¬ ance to the old Roman mural letter. In England this title is given to a boldface antique type. .

Graining.— In leather manufactures, the impressing ot skins with a fictitious grain or surface, to imitate more

valued leathers. , . .

Grain Tin. — Tin of the finest quality produced m this form by striking it a sudden blow when it is heated to near its melting point. Being brittle at this temperature, pure tin falls into a mass of grains.

Grating. — In spectroscopy, a surface ruled with very fine lines, 5,000 to 40,000 to the inch; if on glass, it is called a Transmission Grating; if on metal, a Reflection

Grating. „ ,

Gravel. — Used in brewing to denote the appearance of the beer when yeast-cells are floating about in it in the form of fine “ gravel.”

Gray Pig. — Pig iron which shows a dark gray crystalline fracture, due to its content of graphitic carbon; as dis¬ tinguished from white pig, which is a definite carbide of

GraT’Sour. — In cotton bleaching the dilute hydrochloric acid bath, employed to dissolve out the lime soaps formed in the lime boiling. .

Grizzle. — A brick which has been slack-burned but is hard enough to hold its shape.

Grizzlies. — An arrangment in the mine sluice to receive and cast aside all the large stones brought down by the current during the process of washing the auriferous gravel.

Guards. — In book-binding, the narrow strips of paper bound in with the leaves at the back of the book to allow for pasting in material, as in a scrap-book.

Gullet. — The hollows between the teeth of a circular saw The filing out of these hollows as the teeth wear down is called gulleting. .

Hackling. — In flax-manufacture “ hackling ” is the process of preparing the flax for spinning by the removal of all foreign substances and smoothing and equalizing all the lengths of fibre. . , .

Half-Bound. — A style of binding for books in which the V-.Qi-‘Vc nnrl mrners are of leather: as half-calf, half¬

morocco.

Half Plate. — In photography a standard size of glass plate, measuring 4} by 6} inches-.

Half-tone. — A term used to designate a photographic process in which a screen made either of netting or ruled glass, is interposed between the lens and the sensitized plate, and from the image thus produced, a positive image is made upon the prepared metal plate. This is etched into relief by the use of acids.

Hall-mark. — A term used industrially to designate any official stamp that has been placed upon an object of trade to denote genuineness.

Hard-cured. — A term used in the fishing industry to designate that the fish specified has been cured by being thoroughly dried in the sun after salting, a process by which all the moisture has been evaporated.

Hardening. — A process used in hat manufacturing, by which the bodies of the hats are rubbed and pressed hard for the purpose of felting the material as well as to diminish the size and render them more dense. A harden¬ ing-kiln is a kiln in which the transfer printing process in pottery is completed: The pottery being relieved from all superfluous oils by exposure to a low heat.

Harness. — The term applied to the apparatus in a loom by the operation of which the warp-threads are shifted alternately to form the shed.

Hessian. — A coarse cloth made of a combination of hemp, and jute and used for bagging is known as “ Hessian ” by the trade.

High-proof. — Commercially all highly rectified spirits are termed “ high-proof.”

Hogging. — The curvature upward of a beam between its ends — the reverse of sagging.

Hollander. — In paper making, a special type of machine for beating up rag pulp.

Hollands. — A term which, while formerly applied only to linens imported from the Netherlands, is now used to designate the glazed and unglazed linen cloths that are made in many places. ” Brown Hollands ” is a cloth that maintains much of the original color of the retted flax-fibre, it having been subjected to but little bleaching or boiling.

Honeycombing.— In cloth-manufacture, a term applied to designate a thin fabric in which the stitches, running diagonally across the material, have been drawn tight in such a manner that the spaces between them are puffed or in relief.

Hop-jack. — A term applied to a vat with a false bottom used in brewing. It is so arranged that it retains the solid substances in the mash-tubs, but allows the wort to flow away after it has been boiled and the hops have been added.

Hopper. — Used, in milling, to denote the inverted-cone¬ shaped trough through which the grain passes on its way to the shaking-shoe.

Horse-power. — A term used as a unit of measurement in every industry in which power machinery is used. Although several values are assigned to this unit the prevailing value, both in America and England, is Watt’s horse-power, which places it at 33,000 foot-pounds of work per minute, or 7,460 megaergs per second about three-quarters of the actual power of a horse. Indicated horse-power, commonly abbreviated I. H. P., is the actual work performed by the motive power, as calculated from the indicator diagram of cylinder pressures.

Host. — In plant industry, an animal or plant which sustains the existence of a parasite.

Hot Metal. — In smithing, metal which is at forging or welding heat.

Hot Short. — Applied to iron which contains so much sulphur as to be brittle when hot. Also called “ Red Short.”

Housing. — In carpentry, a joint in which the whole dimensional body of one piece of lumber is let into another piece; as with the treads and risers in a staircase.

Imposition. — The act of laying pages of type, etc., upon a smooth stone slab to secure them in the chases and prepare them for the press.

Indention. — A term used in printing to denote that a certain amount of blank space has been left before the line, or a specified number of lines of type. An indenting of every line after the first, with an increasing blank constantly shortening on both sides is termed ” diamond ” indention. An indenting of every line except the first, that being of full width and so overhanging the others, is termed “ hanging ” indention.

Infusion. — A term used in brewing to denote the process of preparing the mash by treating the bruised malt with water at a temperature of from 70° to 75°.

Inversion. — The alteration of dextrorotatory cane sugar into laevorotatory fruit sugar through the action of dilute acid. The product is termed “ invert sugar.”

Japanning. — The process of coating the surface of metal, wood, etc., with varnish which is immediately hardened by exposure to high temperature.

Jigger. — (a) In mining, a mechanical appliance for sorting ore; (b) in pottery, the vertical lathe on which is made flat ware, like plates and saucers.

Jolley. — In pottery, a machine used in the manufacture of cups, jugs, and other hollow ware.

Jumper. — In mining, a heavy hand-drill resembling a crow¬ bar, having a chisel edge, and operated by jumping it up-and-down in the drill hole, either by hand or machinery.

Kerfing. — (a) The process of preparing wood for bending without breaking by making a series of small cuts in it with a sawing-machine; (b) in cloth-manufactui'c, the process of removing the wool by passing it through a shearing-machine .

Kettlestitch. — In book-binding, the chainstitching at the head and tail of a book, holding the sections firmly to¬ gether previous to binding.

Kip Leather. — Leather made from the skins of young cattle raised in India.

Kippering. — In the fish trade, the process of curing fish by cleansing them, dressing them with pepper and salt, and curing them, either by drying them in the open air, or, artificially, by subjecting them to the smoke of some prepared substances.

Knop Yarn. — In textile manufacture, a kind of yarn which has been twisted in such a way as to form knops or bulging spots.

Lacquer. — A form of varnish made with an evaporable solvent; drying by evaporation and not by oxidation and resinification as do true varnishes.

Lagging. — The non-conducting material with which boilers and steam pipes are covered to prevent waste of heat. The term is also applied to the operation of applying such covering.

Laminated Work. — In carpentry, the beams or ribs built up from thin layers fastened together.

Lap. — In woolen manufacture, the fleece as it is delivered by the condenser.

Larrying. — Bedding the inside bricks of a thick wall in thin mortar.

Law Calf.- — In book-binding, the calfskin commonly employed in binding law books. As a rule it is not dyed, and has a whitish appearance.

Layer. The vat in which hides are left to lie for six to ten months in a strong solution of tannin, towards the end of the tanning process.

Laying. — The term is applied to two distinct stages in rope-making: (1) the twisting of three or more yarns to form a strand; (2) the twisting of three strands to form a rope. The machine that performs this operation is termed a " laying machine," the wooden cone placed

between the strands to prevent a slack twist is termed a “ laying-top.”

Line. — In linen manufacture, the best part of the flax fibre after hackling. If the roots and tips of the stems are cut off, it is more valuable, and is called “ cut line.”

Lingoes. — Lead weights varying from 12 to 20 pounds, steadying the harness in silk looms.

Lock Nut. — A thin ‘auxiliary nut screwed down upon an ordinary nut to prevent its loosening.

Louver. — A ventilating opening built like a Venetian blind, but with the slats not movable. It excludes rain, but admits air freely.

Lute. — The refractory cementing material used to fill joints and cracks in high temperature furnaces.

Maceration. — The softening of substances by soaking them in a fermenting liquid of a warmish temperature.

Mackled. — In printing, the effect on a printed sheet which has dragged on the inked type at the moment of impres¬ sion.

Manifolding. — A term used in business circles to denote the process of making several impressions of a single letter or document by one operation, as by means of a manifold- ing-machine, or by the use of carbon paper.

Mash. — Used in brewing and distilling to describe the mix¬ ture of ground grain that has been infused in warm water.

Mellowing. — In tanning, the aging of the tanning liquors through fermentation. The term is applied also to a similar process which goes on in harsh leathers, when dampened and laid in a pile.

Mercerizing. — Treatment of cotton cloth with a cold solu¬ tion of caustic soda while stretched taut, the soda being dissolved away by acid before the tension is released. The cloth becomes stronger, takes dye more readily, and acquires a silky lustre.

Milling. — (a) The process of manufacturing cereals into flour or meal. There are two methods of milling: (1) low milling in which the grain is ground but once before being bolted, and (2) high milling, in which it is ground repeatedly; (b) in pottery, the operation of grinding and mixing the slip; (c) the process resorted to in tanning to open and

soften the pores of hides; (d) in cloth manu¬ facture, the process of felting cloth to thicken it; (e) the machining of metals with revolving cutters; also the cor¬ rugating of the rims of discs, coins, etc.

Morocco. — In book-binding, a fine quality of tanned goat¬ skin.

Muffler. — An arched oven-like furnace in which crucibles are heated without direct exposure to the flames.

Mule. — In spinning, a reciprocating machine which draws and twists the thread when moving in one direction, and winds it on spindles on the return.

Nigger.— In soap making, the dirty, watery layer which settles in the soap pans during the manufacture of filled soaps.

Nipple. — A short piece of pipe having a right-hand thread cut its entire length on the outside surface.

Nobling.— The squeezing and hammering of a mass of spongy iron from a puddling furnace, to weld it into solid metal.

Noils. — Small masses of clustered wool fibres removed from wool fleece by the combing machines.

Paddling. — A method of tanning light skins in a vat in which a revolving paddle keeps liquor and skins in con¬ stant motion.

Panning. — In placer mining, the gentle rotary shaking of a mass of gravel and water in a miner's pan so as to facilitate the settlement of the gold particles to the bottom. The fine sand and float with some of the water is allowed to slop over during the panning.

Paste Wash. — In book-binding, a dilution of paste with water, used as a surface on which to lay the glair (q.v.) previous to gilding.

Patina. — The delicate green incrustation which gathers on the surface of copper and bronzes after long exposure to the air. The finest patina is formed on those bronzes in which tin is in large proportion, and little or no zinc. It is imitated by immersing bronze in acetic acid.

Picking. — In weaving, the throwing of the shuttle by the picker, or driver.

Piece-goods. — The trade name for fabrics that have been woven in lengths suitable for retail sale by linear measure.

Pig. — (a) In glass manufacture, the grooved iron support for the blowpipes or working rods at the mouth of the glass furnace; (b) the form in which newly melted iron or other metal is cast for marketing.

Pitting. — A defect in varnish work showing tiny holes scattered over the surface, due to varnishing upon a damp or greasy surface.

Place Bricks. — Soft bricks of use only for interior walls where they will be covered with plaster.

Plus Thread. — A thread cut on a bulge of a bolt or rod which has been made thicker where the thread is located, so that the diameter of the substance of the rod is not reduced by the depth of the thread.

Pocket. — In mining, a cavity containing a mass of ore which is not connected in any way with a vein or lode.

Point. — The unit of measurement in types, each point being about one seventy-second of an inch. The various types in use in the United States and their relative sizes in " points " are as follows: Excelsior, 3 points; brilliant, 3£; semi-brevier, 4; diamond, 4§; pearl, 5; agate, 5?; non¬ pareil, 6; minion, 7; brevier, 8; bourgeois, 9; long primer, 10; small pica, 11; pica, 12; English, 14; two-line brevier, 16; great primer, 18; paragon, 20; two-line small pica, 22; two-line pica, 24; two-line English, 28; four-line brevier 32; three-line pica, 36; double paragdn, 40; four-line small pica, 44, and four-line pica, 48 points.

Pointing. — In masonry, a neat finishing of joints between bricks or stones; accomplished by scraping out the rough edges of the original mortar and filling in carefully with a finer grade of mortar, which is often colored.

Poling. — In metallurgy, the reduction of copper oxide in molten blister copper, by the inserting into the liquid metal a pole of green wood. If too much wood is used the copper is said to be overpoled; if too little wood, it is underpoled.

Ponty. — In glass manufacture, an iron rod tapered for part of its length, used in working molten glass. In some localities it is called a " working iron."

Porgie. — The raw material, largely menhaden, and much of it offal, from which fish oil is extracted.

Porter. — In metal working, a bar attached to a fagot of rods or a forging, by which it is held and guided during the process of hammering.

Pot Arch. — In glass manufacture, a small furnace in which the glass pots or crucibles are fired before being used in the melting furnace.

Potsher. — In paper manufacture, a machine for breaking and bleaching pulp.

Pot Metal.— An alloy of copper and lead, with sometimes small additions of zinc and tin, used as a cheap substitute for brass.

Priming. — (a) The first coat of paint applied upon new work as a foundation for the subsequent coats. It is rich in oil, and has enough white lead to make a firm attachment; (b) the technical name for the foaming or frothing of water in a steam boiler, caused by greasy or dirty water, or by forcing the fire.

Proof Bar. — In metallurgy, a rod of steel laid with a charge in a cementation furnace, and withdrawn at inter¬ vals to give evidence of the degree of progress of the operation.

Proof Spirit. — That grade of dilute alcohol or alcoholic liquor which contains 50 per cent by weight of absolute alcohol. A larger percentage is “ overproof,” a smaller, “ underproof.”

Puddling. — (a) In metallurgy, the conversion of pig iron into malleable iron by burning out the carbon, sulphur and phosphorus in association with free atmospheric air; (b) the stopping of leaks and crevices in a reservoir with a ” puddle ” of clay with a little water.

Pugging. — The rough plaster or slag wool filling placed between the beams of a floor as a deadener of sound.

Pug Mill. — In brick making, the mill in which the ingred¬ ients are mixed together. Also used as to a cement mixer.

Quarter-plate. — A term used in photography to denote the size of a plate. Thus, a quarter-plate measures 3j x 4| in.; a half-plate, 4* x 6£ in.; a whole plate, 6J x 8§ in.

Quenched Steel. — Steel which has been hardened to an extreme degree by plunging it when red hot into cold water.

Quicklime. — Lime fresh from the kiln which has not absorbed

moisture from the air and become air -slaked.

Quincunx. — A method of setting a group of fruit trees so that four of them stand at the corners of a rectangle and the fifth at the intersection of its diagonals.

Rabbling. — The stirring process in puddling iron, effected with a bar with a hooked flat end, called a rabble.

Racing. — A sudden increase in speed of an engine when released from its load; as when the propeller of a steam¬ ship is lifted from the water by wave motion in stormy weather.

Racking. — – In liquor making, the aging of the liquor by allowing it to flow in small streams or a very thin sheet from one vessel to another, thus exposing it to the air.

Rag Bolt. — An iron bolt with barbs or an enlarged end for embedding in masonry so it cannot be withdrawn.

Raglet. — The groove cut in a wall into which the flashing (q.v.) is imbedded.

Raising. — In woolen manufacture, the operation of drawing out a nap of fibre on the cloth by means of teazles; as in beavers, meltons, and pilot-cloth, and in blankets.

Rectify. — To redistil, as in making whisky, which is said to be rectified when it has been twice distilled.

Red Short. — See Hot Short.

Reducing Furnace. — A furnace in which the metallic elements are separated from their ores; as in a blast fur¬ nace.

Reedy.— In weaving, a streaky appearance due to the threads of the warp rolling in the splits of the reed.

Reef. — In mining, the outcrop of a vein of ore.

Regenerating Furnace. — A furnace in which the heat of the waste gases is used to heat the incoming air-blast. Where gas is used for fuel this also is heated by the hot waste.

Register. — In printing, the accurate adjustment of type and paper so that the second page of a leaf is printed exactly on the back of the first page imprint.

Rendering. — The first coat of plaster laid on a brick wall.

Retting. — The treatment of flax by soaking it in water in which certain bacteria carry on a fermentation which releases the fibres.

Roan. — A tanned and dyed sheepskin used in book-bind¬ ing. It resembles Morocco, but is cheaper and not so durable.

Roasting. — The process of heating certain ores to a tem¬ perature lower than the reducing point. It secures oxida¬ tion and the elimination of sulphur, and thus simplifies the subsequent reduction.

Roving. — • In textile manufacture, the tape-like band of sliver after preliminary twisting, and previous to spinning.

Rumble. — A revolving cylinder in which small castings are placed so that they may be cleaned of adhering sand and mould by chafing against each other.

Russia. — In book-binding, a leather made of the skins of young cattle treated on the flesh side after tanning with the oil of birch, from which it acquires its characteristic odor. Cheaper grades are made of goat or sheep skins.

Rust Joint. — A joint made in iron piping by filling the gap with a mixture of iron filings and sal ammoniac, which in a short time forms a compact hard and waterproof mass.

Safety Plug. — A plug of fusible metal set into the shell of a boiler, and which melts when the rising pressure raises the temperature to the danger point, allowing the steam to blow off.

Salt a Mine, To. — A swindling operation by which a mine is made to seem more valuable than it really is by the surreptitious introduction of ores obtained elsewhere.

Screed. — A narrow strip of plaster laid accurately to the required surface, and used after hardening as a guide for the floats.

Setting. — In leather manufacture, the smoothing and stretching of a hide until all creases and wrinkles are obliterated.

Seven Pound Lead. — In plumbing, sheet lead of such thickness that one square foot weighs seven pounds.

Skiver. — In book-binding, the thin grain split of sheepskin used for

cheap leather bindings.

Shells.— Those parts of the lay in weaving in the grooves of which the reed fits. They are of two classes and are termed “ upper ” and “ under ” shells.

Sliver. — The textile fibres gathered into a tape-like strand preliminary to roving and spinning.

Smudge. — In plumbing, a mixture of lampblack with other substances, smeared over a piece of work to prevent the solder from taking hold where it is not wanted.

Soaking. — In metallurgy, cooling slowly a freshly cast ingot of steel in a soaking-pit — a hole in the ground fitted with brick chambers to receive the ingot and allow its heat to escape gradually

Sod Oils. — – The oils obtained by pressing skins which have been curried with cod, whale, or olive oils. When refined, sod oils are highly esteemed for watches and other delicate machinery.

Souple. — Silk fibre from which about half of its natural gum has been removed, rendering it lighter in weight and softer in feel.

Souring. — In leather making, the treatment of leather with weak organic acids, to remove stains and bleach the sur¬ faces preparatory to dyeing.

Spinning. — In metal working, the formation of round hol¬ low ware by pressing sheet metal into a mold revolving on a lathe.

Split.— A skin which has been split into two layers parallel with its surface; usually effected by a cutting machine.

Stove Screw. — A bevel-headed screw with the thread cut close up to the head; used particularly for holding parts of stoves together.

Striker.— A pronged lever set astride a driving belt for shifting it on or off the driving pulley

Stripping. — The tearing or breaking off of the threads of a screw or the cogs of a gear-wheel.

Suint. — The natural grease of sheep’s wool. When refined, it is called

lanoline.

Sump. — In mining, an excavation below the level of the mine floor, in which water collects.

Tacky. — The condition of the surface of paint or varnish before it is quite dry, so that it is slightly sticky when touched gently with the dry finger.

Tap. — In pipe-fitting, the tool which cuts internal or female threads. The tap first used in this operation is slightly tapered, and is called the “ taper tap.”

Tempering. — In pottery, the mixing and working of the clay into proper condition for molding.

Tooling. — In book-binding, the ornamentation of a book cover by pressing lines into it with heated tools. They are “ blind lines ” if without gilt. A book so ornamented is said to be tooled.

Torching. — The coat of plaster applied on the under side of a roof of tiles laid on battens.

Tossing.’ — In metallurgy, the oxidation of impurities in melted tin by lifting the metal in ladles and pouring it slowly back from a height, thus exposing it to the air. Touter. — Industrially, a person who makes it his business to solicit trade for a shop.

Tow. — The short and twisted fibres of flax separated out in the process of combing. It is carded and spun into coarse rope yarns.

Trebles. — Sheet iron of gauges 25 to 27 in the Birming¬ ham wire scale.

Tree Calf. — In book-binding, a brown calf which has been stained and squeezed to produce a conventional tree¬ like pattern on its surface.

Tup. — The principal mass of iron in a steam hammer head to which is attached the steel face piece.

Tuyere. — The nozzle through which the aii -blast enters a blast furnace.

Union. — In textile manufacture, a cloth in which the warp is of one kind of fibre, and the weft of another.

Valley. — The V-shaped hollow between two intersecting roof surfaces.

Vamping.— In leather making, the undue swelling of a hide during the liming process.

Venice Turpentine! — An oleo-resin obtained from the sap of the larch. It dries very slowly and with considerable body.

Waling. — The horizontal pieces which support the plank¬ ing at the sides of a trench.

Wall. — Used in mining to denote the surfaces of the rock between which the ore is inclosed. If the vein is inclined at such an angle that the ore is over the miner's head it is termed a "hanging" wall; if it is beneath him it is called a " foot " wall.

Warble. — In leather manufacture, a small hole in the hide pierced by the bot-fly.

Warp. — (a) In agriculture, the operation of fertilizing a poor piece of land by artificial inundation from waters which have large quantities of earthy matter; (b) in weaving the threads that extend lengthwise in a loom. The roller upon which the threads are wound is termed the " warp- beam" ; the machine which treats them with size before they are wound is the " warp-dresser," while the machine which draws the warp threads through the dye beck is termed the " warp-dyer."

Wash. — Used in mining to denote the process of separating the ore from earthy and other matter by the employment of water. The fermented wort from which the spirit is extracted in distilling is also termed the " wash."

Water Gas. — A fuel-gas produced by blowing steam over a bed of red-hot coals. It carries about 40 per cent of carbon monoxide, and is a deadly and quick poison. It is sometimes used for illuminating with Welsbach mantles, and is sometimes carburetted so as to give the ordinary yellow gas-flame. Its use in house lighting is forbidden in many communities. _ . .

Weft or Woof. — In weaving, the thread which is carried by the shuttle, and is laid transversely to the warp. Winning. — The work of developing a. mine preparatory to the work of mining is termed " winning."

Wiped Joint. — In plumbing, a joint made to connect two ends of lead

pipe which abut each other. One end is slightly expanded so the the other will set into it, and the joint is then encased in plastic solder, which is shaped by continually wiping it with a cloth until it has set. Working Iron. — See Ponty.

INDUSTRIAL VOCATIONAL TRAIN¬ ING. See Education, Elementary.

INDUSTRIAL WORKERS. Education and Training of. Industrial education is that form of education, whether given in a school, a factory or elsewhere, the controlling pur¬ pose of which is to train for wage-earning, or to advance the power of wage-earning in the trades and industries. It must be considered from the standpoint of education as

well as of industry. Education is the fitting of the individual to take his place and do his part in the life of his community and his time. Industrial education is, then, the fitting of those who are in industry effectively to serve and to achieve in and through their field of activity. There are 9,000,000 wage-earners in the fac¬ tories of the United States, supporting directly and indirectly including themselves upward of 30,000,000 people. They are working in 275,791 factories. Their educational and economic de¬ velopment are of utmost consequence from whatever standpoint it is viewed. The joy of life, if not its purpose, is service, self-expres¬ sion, achievement. The daily task may be easy or difficult. If it is simple, that is no reason for allowing the worker to do it poorly. If he can be taught to do it with proficiency in a week or a month, not to say a year, without loss of wages meantime, he has as great right and need of this brief training as a professional man to the 10 or 12 years of additional training which the public rejoices to give him without charge after the period at which the working boy leaves school.

Great as have been the faults of Germany, she so thoroughly developed the industrial in¬ telligence of her workers as to surprise the world. Sixty-five per cent of the men in the topmost places in her industries, in both the managerial and technical fields, came from the ranks of her working boys, who quit the regu¬ lar schools at from 12 to 14 years of age, but by industrial education, which interpreted their daily tasks and made clear the ways of ad¬ vancement, in apprenticeship and continuation schools (wherein education is “continued® after leaving the common schools), these boys, as men, surpassed most of the graduates of her higher technical institutions in the attainment of high industrial positions.

Joy in work comes from mastery of work. We like to do what we can

do well. We dis¬ like to do what we fail to understand or do poorly. The dislike of work of many who labor is due in great measure to the state's neglect educationally in not teaching the mastery and the dignity of labor. "The latest gospel in this world is, know thy work and do it. All true work is sacred; and in all true work, were it but true hand labor, there is something divine.® (Carlisle). It is the inherent right of every person to be taught to express himself ef¬ fectively and happily in some field of the world's work, small or large, and by mastery therein to serve himself and society to best advantage. Never taught one thing only that he may rest with that, but so that through the mastery of one thing and the learning of another, he may rise to the limit of his abilities. However much a nation develops its natural resources, it is economically blind if it fails fully to develop its human values, which are the one natural resource which gives value to all others, and the only one that increases with use. The economic value of the human efficiencies of the working people of the United States is esti¬ mated at more than $200,000,000,000, or five times the value of. all other natural resources combined. The spiritual values, the happiness and self-respect, that come of developed effi¬ ciency are incalculable. It is for these and other considerations that each community in the

United States spends upon public education about one-third of all its tax receipts, making a national total of about $650,000,000 annually, aside from an investment of more than a billion dollars in school plants, and both items rapidly increasing. But all this is apparently with the college as the aim, although only 3 per cent of the people take the college course. About $5,000 of public funds are spent upon anyone who fits himself for a profession, but scarcely a dollar especially to fit in his occupation any one of the 96 per cent of the people outside the profes¬ sions.

Education is a state function. Whatever is done must be by the several communities under the requirement and supervision of the state. Most states require attendance at the pub¬ lic school of all children from the 7th to the 16th year, with, however, the important provision that after the 14th year any child may secure, if he wishes, a working certificate permitting him to leave school forever, with the further provision, in some States that he has completed the sixth grade of the common school, and in other States simply that he is able to read and write the English language acceptably, this latter provision often being

carelessly regarded.

Only one child in 30 graduates from the high school ; only one in five enters the high school ; only one in three finishes the high school ; and only half the children who enter school finish the 6th grade. By the end of the 6th grade children have learned little or nothing of fractions, nothing of decimals, only a little local geography and nothing of the rights and obligations of citizenship and the social order. Investigation indicates that the great majority of that half of all American children who leave school by the 6th grade and the 14th year of age are not compelled to by financial circumstances. They leave because they have reached the period of adolescence, at which time the will and the creative faculties assert themselves and nature impels them to ((do things,® unconsciously to imitate Him who in the six days made the world. This impulse is especially compelling with concrete- or hand-minded children. Those who continue in school are mostly the imaginative children to whom the world of books is often very real.

The mind of man is said to be <(hand-made.® Through the hand the race has learned a great part of all it knows. Work must be inter¬ preted and made an instrument of education for the vast number who apparently will be educated, if at all, only in and through the life of labor. Legislation might compel these workers to remain in the common schools away from labor and income for a short period longer, often without advantage, sometimes to their hurt, and never to their adequate educa¬ tion, as education must be made available throughout the better years of life.

It is coming to be generally realized that each state must, following the best practice of the countries of Europe, set up and foster, financially and otherwise, educational facilities for the effective advancement of the millions of wage . earners in the industries and else¬ where, with their daily needs and experiences as the centre of interest in their educational activities. The foremost industrial nations of Europe by apprenticeship and otherwise have

for generations so trained their industrial wage earners. It is commonly conceded that Ger¬ many took the lead in the year 1885 in a series of legislative provisions which in the following years have developed a system of industrial education as< effective for her wage-earners as are the provisions common to all countries for professional training. She finally came to re¬ quire in great sections of that empire that every working child under 16, and in the best prac¬ tice under 18, shall be released by the employer for from 8 to 12 hours per week

during work¬ ing hours, while fresh and vigorous, for train¬ ing in his occupation or in a better one if need be.

We speak of ˆblind-alley® and hopeless jobs as the lot of our working children. .Ger¬ many discovered that there is no such thing as a ˆblind-alley® job; that there is no job but may lead to high accomplishment under intelli¬ gent direction. Consequently 85 per cent of American working children are in <(blind-alley® jobs, from which their elders see no way out, while in Munich 85 per cent of the working children are trained in connection with their work in ways that lead readily to high places.

France, Switzerland, Denmark and other na¬ tions have legislated in effect like Germany but less extensively. England, impressed by the Continental practice, and especially by German methods and success, planned so to legislate in 1914 but was deterred by the World War. She paused, however, at the height of the conflict, on 8 Aug. 1918 to enact educational meas¬ ures requiring every child to attend the regular schools from the 5th to the 14th year of age and empowering local authorities to increase the compulsory period until the 15th year. Com¬ pulsory day continuation schools must be es¬ tablished for all young persons, unless they are being otherwise educated, up to the age of 16, and after 1925 up to the age of 18. The mini¬ mum number of hours of attendance per year at continuation schools shall be 280 and a'fter 1925 shall be 320. Thus England, formerly the most backward of the great European nations in vocational training, takes an advanced posi¬ tion, far ahead of the United States.

Of all these nations, Germany failed to re¬ quire the teaching of citizenship, of the rights, duties and obligations of the worker as a mem¬ ber of society. In 1903 her greatest authority, Dr. Kerschensteiner, lamented that her indus¬ trial schools ((did not contain a single subject of instruction which serves any other purpose than the acquisition of technical skill and knowledge, or the promotion of trade effici¬ ency.® _ Since that time, a poor beginning was made in this training but in a way regretted by many of her own leaders in that it did little more than inculcate a false exaltation of her ruling classes and a blind obedience in all oth¬ ers. What we sow, we reap. To fail to edu¬ cate in efficiency is to suffer inestimable eco¬ nomic loss. Not to teach the duties and obli¬ gations of citizenship, is to endanger the de¬ mocracy of the world.

In the United States in the last 15 years the legislatures of several States have enacted per¬ missive legislation authorizing local boards of education to require the attendance of all work¬ ing children under

16 upon part-time or con¬ tinuation schools, but in all these States only

one city, Boston, had the courage to act in 1916, with New York city following later in a less extensive way.

State legislation which merely authorizes a local community to require the attendance of its working children upon continuation schools is therefore shown to be inadequate and vir¬ tually useless. It is a shirking of legislative responsibility as respects the lives of working children. If the State as such will not safe¬ guard its children, single communities will not.

In 1911 Wisconsin required that every work¬ ing child in cities of 5,000 population or more attend continuation school for four hours a week until 16 years of age for eight months an¬ nually, which provision was later extended to eight hours per week for 10 months until 17 years of age. This legislation proved entirely practicably. It was readily accepted by em¬ ployers and all others as of high social and eco¬ nomic advantage and is evidence that any State can thus serve its working people. In 1915 Pennsylvania required that every working child under 16, in whatever occupation, attend con¬ tinuation school for eight hours weekly during working hours. All-day trade schools have proved ineffective as a means of general indus¬ trial education. They were tried and generally abandoned in Continental Europe long ago. Working people either cannot or will not at¬ tend such schools and forego income and the experiences and hopes that lie in the field of labor for the years required for training in such schools. From 1880 to. 1910 there was much agitation for the establishment of these schools in the United States. In those 30 years, however, only 13 such schools were established with a total attendance of less' than 2,000 stu¬ dents, being not more for the whole country than should receive industrial training in the average manufacturing city of 50,000 people. The training in these schools is so general in character as to lack immediate interest and not to fit for the specific tasks their graduates enter upon. The cost to the public averages from $150 to $200 per pupil per year. There are 2,000,000 working children under 16 in the Uni¬ ted States in industry, agriculture and com¬ merce and more than 5,000,000 under 18. All these children have equal right and need of training in their occupations. There are 30,000,- 000 older wage-earners to whom the

oppor¬ tunity for training for advancement should be open, many of whom would avail themselves of it. In a single typical industrial, city, Mil¬ waukee, it was estimated that a relatively, small number of superior wage-earners in her indus¬ tries in 1910 were sending $80,000 annually . to correspondence schools for such industrial train¬ ing as they could so secure. It was then that Wisconsin provided that her wage-earners should have education in their occupations in continu¬ ation schools directly adapted to their, circum¬ stances even as her university provides for those who are more fortunately circumstanced. Said the Pennsylvania superintendent of schools, «t

schools with the work in the factory makes both work and school educational.

The cost of superior continuation school training in Europe is about $25 per pupil year. It sometimes costs less in the United States because it is not yet of the European quality. The increased interest and efficiency of the work¬ ers in the factory should equal or exceed this cost. Because of this increase in efficiency in the factory many great manufacturing institu¬ tions in the United States introduced training departments at their own expense during the war period for the training of new workers and the up-grading of old employees, spending in several instances as much as $50 per learner. By this expenditure the employer se¬ cured a more contented worker, reduced labor turnover greatly and reduced the wastage of materials. Since the war many of these estab¬ lishments are continuing these training depart¬ ments and other manufacturers are introduc¬ ing them as an essential means of development for the vast production of peace times.

Among the essential provisions for indus¬ trial training for all who need it may be noted : First. It must be part-time or continua¬ tion, therefore, not requiring the worker to ab¬ stain from work and income. Second. At¬ tendance must be made compulsory by the State for all working children under 16, or bet¬ ter 18, during working hours and readily available to all older persons through life at their option so that any worker may continually uplift himself by securing at all times what¬ ever instruction he needs to qualify for the next step forward. Compulsion in the matter of school attendance of young children is only the recognition of the right of the child and the duty of the State, and this recognition ex¬ pressed in terms of agreement and action. Wherever tried it finds ready acceptance. Third. Industrial schools, and equally those for agriculture and commerce, must be under the control and direction of special State and community boards

whose personnel is directly representative of industry and labor. The lead¬ ing nations of Europe after trial of all other methods insist upon this practical direction and place this education in the Department of Com¬ merce or Labor and not in the department of general education. Only those with life-long and successful experience in industry can know when industrial education is truly industrial and make it so. Wisconsin accepted this principle in establishing a State Board of Vocational Education consisting of three employers, three wage-earners and the State superintendent of schools, the latter being the link between the general and the industrial schools. She also provided that the general board of education in each city appoint a board of vocational edu¬ cation consisting of two representative em¬ ployers, two wage-earners and the city super¬ intendent of schools, with full authority, sub¬ ject only to the State board of vocational edu¬ cation. The Federal government, upon advice of the leading organizations of wage-earners, employers and others accepted this principle in making the Federal board of vocational edu¬ cation consist of the Secretaries of Labor, Ag¬ riculture and Commerce and one lay repre¬ sentative each, from labor, agriculture and commerce. This Federal board is advisory to

State boards of vocational education and dis¬ tributes Federal aid in amounts increasing an¬ nually until 1925 and thereafter when it ag¬ gregates $7,000,000, being $3,000,000 each for industry and for agriculture and $1,000,000 for the training of teachers, but limited in each case to not more than one-half the total spent by a State for these purposes. In Massachu¬ setts and Connecticut a limited number of in¬ dustrial schools have been highly developed under the supervision of the general State Board. This Board, however, is composed principally of, and in industrial matters domi¬ nated by the judgment of, especially qualified manufacturers. In American States where aca¬ demic school influences control in the direction of industrial education, as formerly in Europe, this education is remote, impractical, lacking in “production® sense and ineffective. Fourth. Training in industrial schools must be upon pro¬ duction, i.e., the making of real things for com¬ mercial use in the same manner as they are pro¬ duced in factories. In Massachusetts it is re¬ quired that industrial schools “shall conduct a productive shop which conforms in all desirable factors with commercial standards. The work on which pupils are trained shall be planned and perfected with reference to its commercial value and shall be judged by commercial standards.®

“The most effective shop work is that done on a commercial basis for an out¬ side customer. Work done to fill pupils’ or¬ ders is least satisfactory.® “The general at¬ mosphere, system, standard, practice and ad¬ ministration of the school shall be that of a good industrial shop.®

It has been objected to this method that it commercializes education and takes bread out of the wage-earners’^ mouths by supplying the market from public institutions. The value of school products, however, is inconsequential, being about one-third of the salaries of the teachers who are taken out of industry, or from one-fifth to one-tenth of what these teachers would produce were they left in in¬ dustry as wage-earners. The leaders of labor support this position in all communities where it has been well worked out. Fifth. Teachers of processes and operations must have had exten¬ sive practice and successful experience in fac¬ tories. They should have that developed “sixth sense® common to the professions, indi¬ cating thorough appreciation and understand¬ ing of the intricacies and methods of the pro¬ duction. Only the related academic instruc¬ tion may be given by instructors whose shop experience has been less extensive. Sixth. Every trade must be taught, that of the baker, jeweler, barber, tin-smith, potter, watchmaker, decorator — every trade requiring developed skill — and not the four or five trades only that are commonly taught in old-time trade schools. In Munich there are some 60 schools teaching 50 trades, besides 15 schools for the least intelligent workers who must follow the unskilled trades. These workers are taught to keep personal accounts, how best to use their slender incomes and the fundamentals of citi¬ zenship. Seventh. Instruction must be di¬ rectly correlated with the daily tasks and ex¬ perience of the learner. Boys and men learn¬ ing the butcher’s trade must be taught to cut

all kinds of meat and figure on shrinkage, waste, etc. A butcher shop cannot be in a pub¬ lic school. Consequently a local commercial shop must be used. A large city can have a commercially operated bakery in its industrial school. Smaller communities can readily ar¬ range to use for a few of the dull hours of the day the facilities of a local baker, he giving the practical instruction and advising concern¬ ing the related instruction.

Instruction in citizenship should make much of. local institutions, social and industrial, as a point of contact.

Mathematics and English should in each case be taught in terms of the learner’s occu¬ pation.

The following brief excerpt from Indus¬ trial Continuation Courses are illustrative :

(a) From, a course for boys from 14 to 18 in a school in a tannery;

Monday — Review of Chrome re- tan and Combination

TANNAGE:

I. Chrome re-tan.

1. Solution for re-tan.

a. 2 per cent tannoline to 100 lb. leather.

b. Run in drum two hours.

c. Horsed five hours.

2. Purpose.

a. To tan green spots.

b. To make leather firm and solid.

II. Combination 10 hours.

1. Cossack only has combination tannage.

2. Chrome re-tanned first.

3. Horsed 10 hours instead of five hours.

4. Solution.

a. Extracts used are quebracho, hemlock, spruce,

gambier.

b. About 100 lb. extract to 1000 lb. leather.

c. Run in drum five hours.

5. Horsed 10 hours.

Tuesday — Lecture of Foreman of Stuffing Depart¬ ment.

I. Definition of stuffing.

II. Purpose of stuffing.

III. Kinds of leather and processes.

1. Hemlock tannage.

- * *

(b) From outline course in painting Painting: Sample exhibit from outline

8. Filler.

a. Silex.

9. Wax.

a.

10. Water paints.

a. Kalsomine.

b. Whiting.

c. Chalk.

d. Lime.

e. Colors and binders.

C. Color study.

1. Pigments and colors.

a. Primary.

b. Secondary.

c. Intermediate.

d. Complimentary.

2. Quality of color.

a. Value of tone.

b. Degree of light

which color reflects.

c. Tints and shades.

d. Intensity.

3. Color analysis.

a. As to hue, value

and intensity.

b. To enable indi¬

vidual to qual¬ ities indicated • above.

4. Color harmony.

course.

11. Supplies.

a. Pumice.

b. Patten stone.

c. Curled hair.

d. Sand paper.

e. Steel wool.

f. Sponges.

g. Chamois.

h. Cheese cloth.

i. Muslin.

j. Cotton waste.

k. Burlap.

Design.

1. Shape.

2. Harmony of proportion.

3. Rhythm or interrelation. E. Commercial practice.

1. Reading plans and speci¬

fications.

2. Methods of buying.

3. Preventing waste and

losses.

4. Forms for doing business.]

5. Building codes.

6. Laws relating to

a. Contracts.

b. Liens.

c. Bonds.

d. Insurance.

D.

- * *

INDUSTRIAL WORKERS

109

(c) Civil government. Tentative outline of suggestive nature common to all students.

I. Home.

A. Purpose.

Social, civil, educational.

B. Organization.

1. Father.

2. Mother.

3. Children.

4. Relatives.

C. Operation.

1. House.

2. Facilities.

a. gas.

b. water.

c. light.

d. food.

e. heat.

-

D. Maintenance.

Source of:

1. Occupations:

a. Father.

b. Mother.

c. Brother.

d. Sister.

e. Relatives.

E. History.

- *

II. Industry. (Select prominent industry in locality).

A. Purpose.

1. To the individual.

a. Provides occupations through which to

develop ability and opportunity for service.

b. Provides income.

2. To the community.

Production.

B. Organization.

1. Directors or owner.

2. General manager.

3. Superintendent.

4. Foreman.

5. Assistant foreman.

6. Other employees.

5. Regulation of industry.

a.

b.

c.

Hours of labor.

Wages. Insurance. Accident. Sickness. Old age.

d.

Education.

Part-time — day. Apprenticeship. Evening schools. Dull-season schools.

- * *

IV. Community Management — Cont'd.

c. Streets.

d. Parks.

e. Play-grounds.

f. Fire houses.

g. Jails.

h. Hospitals.

5. Maintenance.

a. Taxation.

Land.

Improvements.

Personal property.

Poll tax.

Corporation tax.

Income tax.

Inheritance tax.

Liquor.

Tobacco.

b. Licenses.

Occupations.

Privileges.

Ownership (automobiles, dogs, etc.).

C. History.

Develop history of above topics in your locality.

D. Maintenance.

1. Labor.

a. Kinds (to be obtained by children from

particular industries studied;.

b. Rates of payment.

c. Opportunity for advancement.

d. Quality of — skilled or unskilled.

e. Supply of and demand for.

f. Annual pay-roll.

2. Product.

a. Nature.

b. Amount by physical units.

c. Market.

d. Value.

e. Total sales per annum.

3. Overhead — Expenses, such as light, heat, in¬

terest, insurance, rent, depreciation, non¬ productive labor, etc.

E. History of.

1. Location.

2. Establishment.

3. Development.

(Note: Apply foregoing outline under II to several local industries).

III. The Industrial Revolution.

A. The primitive family as the industrial unit.

B. Combinations of families.

C. Development of specialization in industry.

D. Concentration in cities for

1. Power.

a. Water.

b. Steam.

c. Electricity.

d. Gas.

2. Shipping facilities.

a. Water.

b. Railroads.

(Note: Trace out the industrial development of your locality along these lines).

E. Effects upon the community.

1. Home life.

2. Employment of

a. Men.

b. Women.

c. Children.

3. Wages.

a. Day work.

b. Piece work.

c. Bonus.

d. Profit sharing.

e. Co-operation.

- * *

IV. Community Management. (City, state and nation.

Work out first for your city according to outline, and then for state and nation).

A. Purpose.

1. Discussion — bring opinions from homes.

B. Organization.

1. Mayor-council system.

2. Commission system.

Commission manager or council manager system.

3. Departments.

a. Justice.

b. Education.

c. Public works.

d. Fire.

e. Police.

f. Charity.

4. Operation.

a. City Hall.

b. Schools.

Eighth. Most of this training for work¬ ing children must be given in public schools and a large part of it for older workers. Schools or training departments must, how¬ ever, be set up in factories under State su¬ pervision for that great part of the 9,000,000 factory workers who do not need or will not take an extended course in training in the in¬ dustrial schools.

The development of industrial training de¬ partments in factories for the quick intensive fitting of new workers to their tasks and the upgrading of more experienced workers has been one of the interesting experiences of the great war. Such training departments are also known as vestibule schools. France and Eng¬ land found these factory training departments a war necessity for replacing enlisted, skilled men by women and for developing in old em¬ ployees the high technical skill required in war production. The French Ministry of Muni¬ tions early in the war required every manu¬ facturer employing 300 workers or more to in¬ stall these training departments. The British Ministry of Munitions in many of its contracts for war supplies required this of her manufac¬ turers. In the United States the Council of National Defense through its section on indus¬ trial training assisted manufacturers in their development of

training departments in the earlier months of the war. The United States Training Service, established in August 1918, then became the Federal agency in this field. Since the armistice so many factories are using this method as to give promise of a great im¬ provement in American productive methods and of happier and greater production by the

wage-earners. It is estimated that 25 per cent increase in production is secured through fac¬ tory training departments. Of the 9,000,000 in¬ dustrial workers, nearly one-half are in 3,000 factories; 1,613,000 are in 833 factories of 1,000 or more employees each. The desirability of developing in these factories inexpensive and intensive industrial training highly acceptable to wage-earners and employers is evident. The* fast developing appreciation of industrial edu¬ cation available to all who need it of whatever age, and of using to this end the resources of the public schools and the vaster and infinitely varied facilities of the factories of the coun¬ try upon the invitation of their owners is one of the better omens of the new democracy. See Education, Industrial. E. Miles,

Chief of Training, United States Tradning Service, Washington, D. C.

INDUSTRIAL WORKERS OF THE WORLD, or I. W. W., a labor organization of revolutionary character, with tenets similar to those of the Syndicalists. The strike of the Western Federation of Miners at Colorado in 1903 brought to a head the grievances of labor and its need for new centralization. A con¬ ference of labor leaders was held at Chicago in 1904, which resulted in a general convention of labor delegates a few months later at which the leading principles of such an organization were outlined. Another convention took place in 1906. The many factions which constituted the labor revolutionists fought for supremacy, and several schisms widened and separated the groups. The ˆrevolutionaries® opposed the ˆreactionaries® ; the Apolitical® and (

The I. W. W. is composed of 535 recruiting stations ; industrial unions having a total mem¬ bership of 85,000; and five national adminis¬ trations at Hawaii, Australia, New Zealand, Great Britain and South Africa respectively. The constitution and by-laws provide for membership of local industrial unions directly federated, with headquarters, local recruiting unions, industrial councils and

individual mem¬ bers. The membership of these last mentioned

fluctuates considerably, depending on disturbed conditions and strikes for increase. Recently the I. W. W. has made tremendous efforts- to reach the agricultural laborers. All alliances with political parties are refused. The organi¬ zation has trained strike leaders and propa¬ gandists throughout the country who have been conspicuous in notorious campaigns, notably the Lawrence, Mass., strike in 1912, the strikes in the mines at Bisbee, Ariz., Mesaba Range at Minnesota and Everett, Wash., 1916. The organs of the movement are Solidarity, the official English paper; the Industrial Worker published at Seattle, Washington and papers in foreign languages including the Hungarian, Polish, Lithuanian, Spanish, Yiddish, Swedish, Slavonian. Defense of imprisoned leaders has become one of the points for concerted effort among this group of revolutionists.

At the convention held on 20 Nov. 1916, a pertinent war declaration was adopted. “We condemn all wars and for the prevention of such we proclaim anti-militarist propaganda in time of peace, thus promoting solidarity among the workers of the entire world; and in times of war, the general strike in all industries.® The unpatriotic efforts of the I. W. W. in this latter direction after the United States entered the war in 1917 were suppressed by the government with severe measures of im¬ prisonment and fines. (See Syndical¬ ism). Consult Brooks, J. G., (American Syn¬ dicalism; the I. W. WP (New York 1913); Brissenden, S. F.,

INDUSTRIALISM, a term of somewhat vague significance, employed in different senses by different writers. With some it is a type of social organization; with others it means our present system in which industry predomi¬ nates as militarism did in past centuries. Ac¬ cording to Spencer it is a theoretically possible form of society purely industrial in all its ac¬ tivities. The last is the sense mostly frequently attacked by preachers, pseudo-reformers and others.

INDUSTRIES, Welfare Work in. An in¬ teresting and valuable feature of modern indus¬ trial life is the attention given by many em¬ ployers to the safety, comfort and health of workers. The new impetus in this field takes its origin not only from philanthropic and paternalistic motives, but from the demands of modern business for scientific management and industrial efficiency. In addition to reform legislation making many such measures effec¬ tive, an increasing number of employers have found it expedient to adopt various methods for safeguarding and protecting their employees. The result has been manifest not only in the improvement of the immediate

working en¬ vironment and the creation of numerous safety devices, but in the provision for lunch and rest rooms ; recreation facilities, rest periods in monotonous work; medical inspection and at¬ tention which includes all arrangements from

simple first aid to elaborate hospitals, factory physicians, sanitariums, home care by nurses; social organization and education of workers ; housing facilities ; insurance, pension, etc. A welfare secretary is often employed whose duties consist in caring for the general personal interest of the employees, and in addition, the engaging and readjusting of labor, the meeting of complaints and solving the problem of dis¬ cipline. The principle of the entire work is the most economic use of the energy available by the right adjustment between the worker and the machine and the adaptation of both to the general work. The result from the em¬ ployer's point of view has been a marked in¬ crease of output because of the lessening of fatigue, the adjusting of the ((man to the job® and the heightening of interest on the part of the employed. In connection with the Euro¬ pean War, studies of the labor problems have established the fact that such measures for in¬ dustrial betterment heighten human efficiency and lessen the fatigue and monotony conse¬ quent to excessive demand for labor on dimin¬ ished physical forces. (See Labor Legislation in the United States). Consult Proud, E. D.,

(Welfare Work) (1916) ; Cadbury, E., Experi¬ ments in Industrial Organization (London 1912) ; Hoxie, R. F., Scientific Management and Labor> (New York 1915) ; Whitney, A. L., (Rest and Recreation Rooms and Rest Periods for Employees) (in monthly review of United States Bureau of Labor Statistics, Vol. V, Octo¬ ber 1917, No. 4) ; id., (Medical, Surgical and Hospital Treatment for Employees) (id., Sep¬ tember 1917, pp. 59-67) ; Goldmark, Josephine,

(Fatigue and Efficiency* (1912).

INDY, nn'de', Paul Marie Theodore Vin¬ cent d\ French composer: b. Paris, 1851. His early instruction on the piano was received from his mother under whose tutelage he mastered the instrument before his 14th year. Subsequently he studied under Diemer, Lavignac, Marmontel and Cesar Franck. He served in the army during the war with Germany in 1870_71. He entered the Conservatory of Paris after the war and in 1873 was a member of the organ class there.

Subsequently he was em¬ ployed as choirmaster by the Societe des Con¬ certs du Chatelet. He was made manager of the National Musical Society in 1885, and presi¬ dent five years later. He served also as in¬ spector of music in the Paris schools and managed several choral societies. In 1896 he was one of the founders of the Schola Cantorum. He visited the United States in 1906 and there conducted his own works with the Boston Symphony Orchestra. He has written the operas (FervaaP (1897) and (L'Etranger> (1903) but is pre-eminent as a composer of in¬ strumental music. He has written (Jean HunyadeP (La foret enchantee* and (Wallenstein,* symphonic poems; two orchestral suites, (Le chant de la cloche, > a dramatic legend; or¬ chestral pieces, some chamber music, choruses, piano and organ pieces. He published biographies of Cesar Franck (1906) andˆ Bee¬ thoven (1910). In collaboration with Serieyx he wrote (Cours de composition musicale* (3 vols., 1902-12). Consult Borgex, L., (Vincent d'Indy; sa vie et son oeuvre> (Paris 1913) and Serieyx, A., (Vincent d'Indy) (ib., 1914).

INEBRIETY. See Alcoholism.

INERTIA, in physics, denotes the mechan¬ ical continuance, or persistence, of energy in existence. The German language has two words for our word inertia.® An explanation of these should serve as an illustration of the way in which inertia is used in a dual sense by English-speaking physicists. Beharmng, the better of the two German terms, because it is a positive expression, has been defined above. The other German word is Trdgheit, — a literal German translation of what we commonly mean by inertia. But there are some experimental as well as theoretical considerations which reveal that whenever one understands by in¬ ertia the non-appearance of new energy, or motion, or activity, — and this is the meaning of Trdgheit — one does so by laying all the em¬ phasis on a merely negative characteristic of inertia. A gentleman of Vienna, J. Popper, alluded while conversing with Prof. Ernst Mach, a distinguished physicist, to an interesting parallelism subsisting between the meaning of inertia as used in physics and the meaning of heredity as employed by biologists. Mach's version of Popper's remarks was given in an inaugural address delivered on assuming the rectorate of the University of Prague, from which we quote as follows: ((Take a body in motion ; the body retains the velocity acquired in (or inherited from) the interval of time just preceding, except it be changed in the next moment by an accelerating force. In the case of the body in motion the change of velocity (abanderung) was looked upon as a matter of course, while the discovery of inertia (or per¬ sistence) created great surprise; in Darwin's case, on the contrary, the heredity (or per¬ sistence) was taken for granted, while the principle of variation (abanderung) appeared novel.® From this is revealed the notion of continuity or persistence underlying both the idea of heredity and the idea of inertia. In¬ ertia thus places emphasis on the idea that so long as nothing interferes to bring about change everything in nature will remain as it is. The law of inertia indeed explains itself. Wher¬ ever we meet with it, it need not be accounted for. An explanation becomes necessary only when inertia appears to be lacking.

The term is thus used to denote the law of the material world that all bodies are absolutely passive or indifferent to a state of rest or motion, and would continue forever at rest, or persevere forever in the same uniform recti¬ linear motion, unless disturbed by the action of some extrinsic force. Even in ancient times thinkers attributed to matter a certain in¬ aptitude, reluctance or renitency to motion. But that a body in motion required the opera¬ tion of an extrinsic cause (potential or actual) to bring it to rest was first discovered by Galileo. He wˆas led to this discovery through his examination of the principle of the height of ascent. Kepler, conceiving the disposition of a body to maintain its motion as indicating an exertion of power, prefixed vis) and the compound expression vis inertia ((

under contribution by Galileo. Huygens writes: ((If gravity did not exist, nor atmos¬ phere obstruct, the motions of bodies, a body would keep up forever the motion once im¬ pressed upon it, with equable velocity in a straight line.-0 It may be mentioned in passing, that the principle respecting the heights of ascent employed by Huygens in this connection, is identical with the principle of excluded per¬ petual motion. Newton showed that if the property of inertia is possessed to an equal de¬ gree by two different substances these sub¬ stances will have equal heaviness or weight. So it appears that that part of the principle of in¬ ertia involving continuance in rest if undis¬ turbed was known even to the ancients, and by them attributed to a certain repugnance of mat¬ ter to motion. It was thus reserved for Galileo to show that the remaining portion of the principle was equally true and general.

The word inertia occurs in compounds; viz., as in moment of inertia. The moment of in¬ ertia of a body, or a system of bodies upon or round an axis is the sum of the products ob¬ tained by multiplying each element of mass by the square of its distance from the axis. But with regard to a plane or point, the moment of inertia is the sum of the elements of mass each multiplied by the square of its distance from the given plane or point. There are other compounds, and phrases, in which the word inertia conveys a specific meaning. All, like the above, are defined in the better works on physics.

We gain our first conception of inertia by the attempts that we make to move bodies that are at rest, or to stop those that are in motion. As to the underlying notion of continuity in¬ herent in the idea of inertia,

we can hardly say more, philosophically speaking, than, that nothing in the known world is inconsistent with the hypothesis that all changes are really continuous. Indeed if the a priori belief in per¬ manence or continuity had not existed the same laws which are now formulated in terms of this belief might just as well have been formu¬ lated without it. In a hypothetical sense con¬ tinuity may be allowed to be the necessary condition if two appearances are to be classed as appearances of the same thing. Even if bodies are suspended freely, so that fractional forces are negligible, we find that their state of rest or motion cannot be modified without the exercise of a certain amount of muscular force; and by abstracting our own personality in the case,, we gradually come to the conception of inertia as a physical property inherent in all bodies. . Inertia has been popularly described as a .“passive resistance* to change of motion; but this expression is objectionable because it is entirely inaccurate. Freely suspended bodies (that is, bodies that, are free from frictional force) cannot be said to “resist* forces that are applied to them. On the contrary, they yield instantly to the smallest force; but a small force, when exerted upon a given body, for a given length of time, does not produce as great a change of motion as would be produced by a large force acting upon the same body for the same length of time. The conception of inertia shades insensibly into that of “mass* ; the mass, of a given body being proportional (by definition) to the velocity that is communi¬ cated to the body by a force of standard in¬

tensity, acting upon it for a standard length of time. See Mass; Matter; Molecular Theory.

INEZ DE CASTRO. See Castro, Inez de.

INFALLIBILITY, exemption from the possibility of error. The word is used as ap¬ plied to arguments, statements, reasoning or the formation of judgments, and does not include impeccability or exemption from the error of sin. The infallibility of the Church as believed by Roman Catholics means that “the Church can neither deceive or be deceived in matters of faith and morals*; and she is limited to the definition of truths already contained in Scrip¬ ture and tradition. The seat of infallibility rests in the Pope as successor of Saint Peter (Matt, xvi, 18) and in the bishops in communion with the See of Rome, whether dispersed or united in a General Council. In the acts of the Vatican Council, held in Rome in 1870, the following is the text defining the nature of the infallibility of the Pope: “The Roman Pontiff, when he speaks ex cathedra, that is to say, when in the exercise of his office of pastor and teacher of all Christians; he, in virtue of his supreme apostolic authority defines that a doctrine on

faith and morals is to be held by the whole Church, by the assistance of God promised to him in the person of blessed Peter, has that infallibility with which it was the will of our Divine. Redeemer that His Church should be furnished in defining a doctrine on faith or morals, and that therefore these defini¬ tions of the Roman Pontiff, of themselves and not through the consent of the Church, are irreformable* The Greek Church, the Church of England and the Protestant Episcopal Church which is its representative and in com¬ munion with it in the United States, believe that infallibility resides in the universal Church in accordance with Christ's promise of the Spirit that should guide His followers unto all truth. Consult Allies, (See of Saint Peter) ; Ballerine, (De Primatu) ; (De Potestate Summ'. PontifP

INFAMY and INFAMOUS CRIMES, in

common law the first means disqualification from giving legal evidence as a result of having committed the second, the theory being that a person capable of such crimes is incapable of speaking the truth. Both in Great Britain and generally in the United States this disqualifi¬ cation has been abolished by statute, and previous convictions for crime have been con¬ sidered to affect a person's credibility without impairing his legal capacity to give ' evidence. Infamous crimes are strictly those which en¬ tailed punishments. The fifth amendment to the Federal Constitution speaks of "capital or otherwise infamous crime* and we read in 2 Dane, Abridgment, 569, 570: "Punishments clearly infamous are death, gallows, pillory, branding, whipping, confinement to hard labor and cropping.* Infamous punishments include imprisonment in State prison or penitentiary with or without hard labor, and crimes which entail such punishments are undoubtedly to be considered infamous crimes, in the sense im¬ plied in the fifth amendment to the Constitu¬ tion.

INFANCY. The term infancy is used vari¬ ously by different writers to include a shorter or longer period of the earliest stage of human

existence. By most writers it is limited to the first 12 or 14 months, extending to the time when the baby begins to walk and to talk, and so is synonymous with a ((babe in arms® ; many medical authors would make it include the whole period of the first dentition, or up to about two and a half years. The characteris¬ tics of the period are utter helplessness, rapid growth of body, gradual development of

mus¬ cular functions and great impressibility of the nervous system. In mankind this helplessness is more marked and the period of dependence is longer than in any other of the higher ani¬ mals. It has been pointed out by John Fiske that the present elevation of man above other animals is due largely if not entirely to this lengthened period of plasticity, — to his pro¬ longed immaturity. Man is born with only a few of the lowest vegetative capacities fully de¬ veloped, such as digestion, respiration and cir¬ culation ; the muscular and nervous functions are latent and only gradually develop; while the higher functions of the mind go on evolv¬ ing until the fifth decade of life. A long in¬ fancy or period of immaturity means a great capacity for development.

Birth and Heredity. — The infant comes into the world with a fixed sum total of vital force, along with certain hereditary tendencies in development toward health and, perhaps, toward disease. These hereditary tendencies are all modified by the physical, social, intellectual and moral status of the child's family and surround¬ ings : in a word, they are vastly influenced by the child's environment. Heredity was for¬ merly regarded as the most important factor in the child's life ; but heredity is really only one of three great factors, — the others being the nutrition of the child, and his physical, intellectual and moral environment. During the plastic years of infancy, childhood and. adolescence, a bad heredity can frequently be overcome by proper management ; on the other hand, the capital of a good heredity can be squandered. Nature always tends toward the normal or healthy, so that there is always the possibility for a bad heredity to be obliterated if only the natural tendency is assisted. More then depends on the nutrition and environment of the infant than upon its heredity.

Nutrition: Breast-Feeding. — The best

method of nourishing the infant is nature's way — to have it nursed by the mother. But for various reasons this is often impossible. Mod¬ ern life — and especially city life. — has in some way rendered a certain proportion of women incapable of producing breast milk for their offspring. Every encouragement, however, should be given to the young mother ; for it frequently happens that a second baby can be successfully nursed after failure with the first. Again, in not a few instances, the infant does not thrive upon the breast-milk, even though it may be abundant. In both these classes of cases some form of artificial or substitute feed¬ ing is a necessity. Good wet nurses are so difficult to procure in the United States that artificial feeding is generally preferable unless the baby is premature or feeble and failing:

then the services of a wet nurse may be needed to save the infant's life.

Artificial or Substitute Feeding.— The best available substitute for human milk is an adaptation of fresh, clean unadulterated cow's vol. 15 — 8

milk. The milk should be diluted and other¬ wise modified to suit the infant's feeble diges¬ tive powers, and it should be given preferably, without being scalded or sterilized. In summer, or when there is any doubt as to the freshness of the milk, the cleanliness of the dairy or the careful handling of the milk, ˆPasteurization,® or heating the food to a temperature of 155° F. is advisable. Details as to milk modification and Pasteurization can be found in any book on ((Infant Feeding.® Ready-made infant foods, — the canned or bottled proprietary foods- — do not contain the right ingredients for properly nourishing the infant, and their prolonged ex¬ clusive use is nearly always followed by some form of malnutrition — especially scurvy and rickets. These proprietary foods contain large proportions of sugar or starch, and so make fat babies, but such infants are generally pale, have feeble powers of resistance, and are prone to succumb to disease of the lungs or of the di¬ gestive tract. When the prepared infant foods are used as additions to milk they are less objectionable, and may at times be of ad¬ vantage.

Weight and Development. — The infant that has been properly nourished before birth and is born at full term weighs on the average about seven and a half pounds — boys being somewhat heavier than girls.

During the first few days, while the nour¬ ishment from the mother is insufficient, the baby regularly loses from six to eight ounces; but it soon begins to gain, and if the nutrition is normal and the infant remains well, there will be a steady increase in weight throughout the first two years. The gain during the first year is more regular however, as well as more rapid than that during the second year. Dur¬ ing the first three months the increase in weight each week is about half a pound: from the third to the sixth month the weekly gain is somewhat less, from four to six ounces: from the sixth to the ninth month about four ounces, and after the ninth month a little more, usually a weekly increase in weight of from four to six or even eight ounces. By the end of the fifth month the baby that has been perfectly well and is being properly nourished should have doubled its birth-weight and weigh about 15 pounds : at the end of the 15th month it should weigh three times its weight at birth. In many instances the baby will treble its

original weight by the end of the first year; but 21 pounds may be considered the average weight for the end of the 12th month. Infants that were very large at birth do not increase so rapidly; while small or premature babies are apt to make a gain that is greater in proportion to their original weight. ((Hand-fed® or ((bottle® babies should weigh on the average about the same as breast-fed babies, — provided that they have had no disturbance of their digestion ; the food must, however, have been perfectly adapted to the infant, and this is often a very difficult problem.

Height and Other Measurements. — At

birth the length of the average baby is about 20 inches ; during the first six months there is an increase of four to six inches, and during the second six months from three to four inches more ; by the end of the second year the height is 3 iy2 inches, a growth of over a foot since birth. By the end of the third year the stature

is one-half of the adult height. The head grows very rapidly during infancy and early child¬ hood. The circumference of the head at birth is from 13 to \4l/i inches; by the end of the sixth month it is 16ˆ or 17 inches; at the end of the first year 18 inches and at the end of the second year it is 19 inches. By seven or eight years the circumference of the head almost equals the adult size of 21 inches. This is visible evidence that during the first months and years of life the brain is increasing in volume more rapidly than any other organ in the body, — the head or brain-box expanding to conform to the enlarging brain. The soft spot or <(fontanel® usually closes between the 15th and the 20th months. The chest is smaller than the head at birth (13 inches), but its circum¬ ference increases rapidly, so that at 18 months that of the chest and the head are equal. After this the chest grows steadily but gradually until puberty, when there is a very rapid increase for four or five years. Aside from the regular increase in weight and measurement, the healthy infant shows other signs of well-being. The baby's flesh is firm, and the skin is satiny and elastic : the color is pink, and the body and ex¬ tremities are well rounded. Very fat babies are not necessarily stronger or healthier than those that weigh less : as has already been noted they are apt to be pale, flabby and of weak resistance to disease. The healthy baby is happy and playful when awake, and sleeps from 16 to 20 hours out of the 24, — longer the younger the baby. It is desirable that the grow¬ ing child have a nap

during the day up to the time when kindergarten work is begun ; with nervous or poorly nourished children the prac¬ tice should be continued until the seventh or eighth year.

Muscular and Mental Development. —

These begin with the entrance of the infant into the world, but are slow in unfolding. At first the grosser movements performed by the muscles working over the larger joints, next more complex movements, and during later childhood and early adolescence the finer move¬ ments requiring nice adjustment and delicate co-ordination. Hence it is that occupations or accomplishments requiring great manual dex¬ terity, such as violin or piano-playing, should be taken up early,—' "before the hand gets stiff,® as the phrase is. The first movements are those of the legs, arms and neck: they are not pur¬ poseful but merely reflex. By the sixth week the infant can hold up its head, when the back is supported, but very unsteadily until about three months old. At some time in the third or fourth month the infant makes its first vol¬ untary movement, grasping at some object in the range of vision. Within a month or two later the baby can co-ordinate the muscles of the eyes, arm and hand sufficiently to take firm hold. Sitting alone is an accomplishment of the seventh or eighth month, and creeping also be¬ gins at about this time, if the baby is ever to creep at all. During the eighth or ninth month the baby begins to stand, having made the at¬ tempt for many weeks before ; at ten or eleven months the infant can stand alone, and shortly after the twelfth month the first tottering steps are taken. It is some months before the baby is secure upon the feet, the maintenance of the equilibrium requiring nice control of many groups of muscles. Healthy infants differ

greatly as to the time when they can walk alone, some walking at as early as ten months, while others may not walk until 18 months. Very fat babies walk late, but, in some instances, an excess of caution seems to be a factor. If a child is far behind in performing any of these muscular functions a physician should be con¬ sulted so that careful examintion may be made for signs of rickets or of disease of the brain or of the spinal cord.

Development of Special Senses. — For the

first few days the newly-born infant avoids the light, and for many weeks cannot endure a direct bright light. Perception of light soon develops, the color first attracting attention being red. Clear perception of objects comes during the fifth month. Hearing is in

abeyance for several days, a baby at birth being prac¬ tically deaf; but after a week or ten days this function begins, and later hearing becomes very acute, the infant being able to recognize the mother's voice or a footstep at about three months. Loud sounds cause the baby actual pain, so severe are their impressions on the delicate auditory apparatus. The sense of touch (contact) is early developed, especially in the tongue and lips ; but sensitiveness to pain is very dull during infancy. Heat and cold are recognized from an early period, the vari¬ ation of a few degrees in the temperature of the food causing the baby to refuse it. Taste and smell also are present at birth, taste being very discriminating.

Development of Speech.— Speech is very closely related to the higher functions of the brain, and is therefore- the last of the simple functions to develop. Usually a baby begins to say <(Mamma® and ((Papa,® with clear knowl¬ edge of the meaning, toward the end of the first year. Next names of objects and persons are learned and soon two words are put to¬ gether. Then verbs are used, and about the end of the second year little sentences are made. Pronouns are regularly the last of all the parts of speech to be used. During the third year speech develops very rapidly, the baby bringing out some new term or expression almost daily. There are great variations in the time when children begin to talk; and for this there are many reasons. Girl's generally talk earlier than boys by two or three months : babies that asso¬ ciate in the nursery with other children talk earlier than only children. If, however, a young child reaches the age of two years without attempting to talk, mental backwardness or organic brain disease is apt to be the cause. Tongue-tie is seldom the cause of backwardness in talking, although it does produce imperfect articulation.

Dentition — Teething.— The first teeth ap¬ pear about the sixth of seventh month, but a perfectly healthy baby may have no teeth until 10 or 11 months old, or on the other hand may cut the first tooth at four months. The regular order is as follows : lower central incisors, upper central incisors, upper lateral incisors, lower lateral incisors — each pair coming at intervals of three to six weeks : at about the fourteenth month the front double teeth (an¬ terior molars) appear in the two jaws, and four or five months later the canines, known popu¬ larly as the «eye and stomach teeth.® Finally, the last four molars appear sometime between the twenty-fourth and the thirtieth month, and

these complete the 20 teeth of the first den¬ tition. Teething babies are apt to be fretful, they have a reduced resistance against disease, and they are prone to slight disturbances of digestion. To attribute most of the ills of infancy to the process of teething is a great mistake ; usually some other and better cause for the disturbance can be found if the baby is carefully examined. During the time when the successive pairs of teeth are coming through the gums, the usual food should be largely diluted, so as to prevent any serious indigestion.

Fever. — Sudden hisih temperature is read¬ ily produced in young children by slight causes, inasmuch as the heat-regulating centre in the brain is but poorly developed. Again, the tem¬ perature in disease is erratic and is apt to be higher than in adults suffering from the same ailment. Only persistent high temperature need cause anxiety.

Convulsions. — A characteristic of infancy is the easy excitability of the motor side of the nervous system. Hence convulsions or spasms are much more frequent and less serious than in adults. The immediate cause of the motor explosion may be an overloaded stomach, fright or mental excitement, or the fever of an oncoming disease. Severe earache, intestinal worms or a paroxysm of whooping cough may also serve as an exciting cause. Underlying or predisposing causes are a nervous heredity, malnutrition, or rickets ; or there may be or¬ ganic disease of the brain or the kidneys. The spasm usually begins with a turning of the eyes to one side and twitchings or grimaces of the face; there may be frothing at the mouth; then the arms and legs are rapidly contracted and relaxed; later the body stiffens out, the breathing becomes noisy and labored, the face, — especially the lips — becomes livid. Shortly afterward the body relaxes, the breathing be¬ comes easy, and spasm ceases for the time being — ‘having lasted anywhere from five to thirty minutes. Until the physician arrives certain simple measures are of value. The in¬ fant should be undressed, wholly or partially, and put into a warm bath (not warmer than 105° F.) to which a handful of mustard flour has been added, and the baby should be rubbed all over while in the tub for about five minutes. Then remove from the bath and lay between blankets, putting a warm bottle at the feet and an ice cap or cold compress on the head. If the baby can swallow, a full dose of castor oil should be given. Most convulsions are due to the presence of decomposing food-remains in the alimentary tract, and the spasms usually cease when the stomach and bowels have been thoroughly evacuated.

Linnaeus Edford LaFetra, M.D., Associate in Diseases of Children, Columbia University ; Director of Children's Medical Division, Bellevue Hospital.

INFANT, in law. By the common law per¬ sons come to majority at the age of 21 years, until which time they are called in law infants, but by common usage in the United States the word minor prevails. This rule is practically universal, by statute, for males, but many States fix the age at 18 years for females. Infants cannot, in general, bind themselves by contracts, as they are supposed not to have sufficient discretion and ability for this pur¬

pose. But this is their privilege, and their contracts are accordingly held in general not to be void, but only voidable at their election ; and they may elect to avoid their contracts in relation to personal property either after or during their minority, except such as they may have entered into for necessaries suited to their condition in life, but they cannot confirm any contracts so as to be bound by them until their majority. Contracts affecting realty are usually held not to be avoidable by infants until after their majority. Infants may possess property, but it must be under the management and con¬ trol of a guardian. They have not the right of citizens as to voting and discharging other political functions. But in regard to crimes and punishments, and trespasses and private wrongs, their conduct iS regulated by the same laws as that of the other members of the community, in case of their being of sufficient age and dis¬ cretion to understand their duties and obliga¬ tions. And for this purpose no general limit can be assigned, as some children are much more intelligent than others of the same age ; and it will again depend, in some degree, upon the nature of the offense committed, or the wrong done, whether a child of any given age can be considered legally guilty of it, since some offenses and wrongs can be more easily under¬ stood to be such than others. The law, in gen¬ eral, has a tender regard to youth, and does not permit them to be convicted and punished for offenses and trespasses unless it appears clearly that they have sufficient knowledge and dis¬ cretion to distinguish them to be such. There are exceptions to the incapacities of minors as to contracting, and these exceptions are made for their benefit. Thus an infant not sufficiently furnished with necessary clothes, food, lodging, medical services, or instruction, by his parent or guardian, and not being under the immediate superintendence of the parent or guardian, may make a valid contract, in respect to those sub¬ jects, and such contract may be enforced against him. However, an infant who has con¬ tracted for and received necessaries is liable for their reasonable value only, and not neces¬ sarily for the agreed price. Infants require

the consent of parents or guardians to marry. The jurisdiction in respect to infants is gen¬ erally vested in either probate or orphans' courts. These courts appoint guardians to take charge of the property of infants, and, in case of the decease of the father, to take charge of their persons; but during the life of the father he ordinarily has the guardianship and control of the persons of his children until they are 21 years of age.

Blackstone thus treats the subject infant: (< Infants have various privileges, and various disabilities ; but their very disabilities are privi¬ leges, in order to secure them from hurting themselves by their own improvident acts. An infant cannot be sued but under the protection and joining the name of his guardian, for he is to defend him against all attacks as well by law as otherwise ; but he may sue either by his guardian, or by his prochein ami, or alone for wages in the county courts. In criminal cases an infant of the age of 14 years may be capi¬ tally punished, but under the age of seven he cannot. The period between 7 and 14 is sub¬ ject to much uncertainty; for the infant shall,

generally speaking, be judged prima facie inno¬ cent ; yet if he was doli capax, and could discern between good and evil at the time of the offense committed, he may be convicted, and undergo judgment and execution of death, though he has not attained to years of puberty or discretion.®

INFANT JESUS, Daughters of the Con¬ gregation cf the, is an order in the Roman Catholic Church. It owes its origin to Anna Maroni a native of Lucca, who having come to Rome entirely destitute, succeeded by her industry in securing a competency. In more ad¬ vanced years, her charitable feelings prompted her to establish an institution where poor girls should be instructed in such work as would enable them to earn a livelihood. The clergy approved of her plan, and afforded her much assistance, and it was finally established as a regular institution. In 1673 Pope Clement X acknowledged the existence of the society, gave it by-laws, and endowed it with sundry privileges, under the appellation of ((Daughters of the Infant Jesus.® The number of the (

INFANT MORTALITY. See Vital

Statistics.

INFANT SCHOOL. See Education; Froebel ; Kindergarten.

INFANTE, Jose Miguel, Chilean states¬ man: b. Santiago de Chile, 1778; d. 1844. He took part in the War of Independence in 1810 and subsequently served as president of the Junta. 1817 he was dispatched as special en¬ voy to Argentina. He always acted from pure and disinterested motives, refusing public office whenever he felt that conditions were safe with¬ out him, and opposing the granting of arbitrary authority to individuals. He founded El Val- diviano Federal in 1821 and remained its editor until his death. Many progressive measures were sponsored by him, notably the emancipa¬ tion of the slaves and the founding of the Chilean educational system. He was offered the post of Chief Justice of the Supreme Court in 1843 but declined to serve.

INFANTE, Spanish title of all princes of the blood royal with the exception of the heir to the throne, who is styled El Principe de las Asturias. The title is also bestowed on consorts of royal princesses and was used similarly in Portugal before that country became a republic.

INFANTICIDE, the murder of a child born alive, is a crime of frequent occurrence. The main cause of the crime is shame, induced by a dread of the social disgrace attaching to mothers of illegitimate children ; though in many instances infanticide has been the result of violence produced by puerperal insanity. The morbid disposition to kill the newly born has also been observed in certain of the lower

animals. The sanctity of human life, from its beginning to its close, is a maxim of modern civilization, and the law treats as a murderer whoever wilfully terminates it at any stage. According to the law of England every woman who employs means to procure criminal abor¬ tion is guilty of felony, and liable to penal servitude for life, or not less than three years; and severe penalties are inflicted on those who aid women to procure miscarriage. The con¬ cealment of birth is a misdemeanor, and may be punished with imprisonment for two years. In the United States, when a child's death is oc¬ casioned by an illegal act, such act is considered either murder or manslaughter according to the circumstances. The crime, however, is rarely punished, and in large cities many cases occur each year which are never reported to the authorities.

Infanticide was prevalent in Greece and Rome. In modern times many barbarous peo¬ ples are guilty of wholesale child-murder. Among some of the Pacific Islanders and ab¬ original Australians there is a great destruc¬ tion of infant life. The Hindus used to de¬ stroy female

children without compunction. In China infanticide is said to be very common. See Abortion.

INFANTILE PARALYSIS. See Polio¬ myelitis.

INFANTRY, name given to soldiery serv¬ ing on foot and using small arms and equipped for marching and fighting on foot. Modern combat demands the highest order of training, discipline, leadership and morale on the part of – the. infantry. Modern war requires but one kind of infantry— good infantry— and this must take the offensive to gain decisive results. In the local combats which make up the general battle the better endurance, use of ground, fire effi¬ ciency, discipline and training will win. It is the duty of the infantry to win the local suc¬ cesses which enable the commanding general to win the battle, and it must have the tenacity to hold every advantage gained, the individual and collective skill needed to master the enemy's fire, the determination to close with the enemy in attack, and to meet him with the bayonet in defense. It must be trained to bear the heaviest burdens and losses, both of com¬ bat and march.

Among the ancient nations of Europe, in¬ fantry or foot soldiers constituted the chief strength of armies. In the days of the Grecian and Roman states, battles were won mainly by the force and discipline of the phalanges and legions, and the number of the infantry in the field far exceeded that of the cavalry. The cavalry were then, as at present, employed chiefly in protecting th'e wings of the army, and in completing a victory gained by the in¬ fantry. The ancient Franks, when they left the forests of Germany, were accustomed to march and fight on foot; and they persevered in this , practice even after they had obtained possession of the country of the Gauls, which abounded with horses. But soon after the time of Charlemagne, institutions of chivalry were generally adopted in the kingdoms of Europe. These led to frequent exhibitions of martial exercises on horseback in presence of the sov¬ ereigns and assembled nobles ; and the interest inspired by the achievements of the knights on

those occasions was naturally followed by a high regard for that order of men. By degrees the cavalry, which was composed of persons possessing rank and property, and completely armed, acquired the reputation of being the principal arm, while the foot-soldiers, badly armed and disciplined, were held in compara¬ tively small estimation.

This continued 400 years, and although war was the principal oc¬ cupation of mankind, military science fell into neglect. But rulers were forced by the power of ˆ feudalism to make an alliance with the de¬ spised class of foot-soldiers, and in 1214 we find that some of the German infantry was recognized to be <(very good and trained to fight even against cavalry.® The cavalry of France was routed at Courtrai by the infantry during the next century, and the Austrians suffered defeat by the efficient work of the Swiss pike at Morgarten (1315), Sempach (1386) and Nafels (1388). At Cressy and Poictiers (1346-56), the knights of England dismounted to fight beside the successful in¬ fantry. The principal weapons of the infantry before the invention of gunpowder were long¬ bows, halberds, cross-bows, spiked clubs, axes, pikes, straight-swords, shields, corselets, mail-jackets, helmets and partisans. In the 16th century, however, these weapons were replaced by firearms, and in the 18th century, the musket was in general use. It became customary during the Thirty Years' War to form bat¬ talions of infantry composed of 500 men, which were massed into dense columns during battle in spite of the deadly effect of the enemy's artillery. The absurdity of this formation was first exposed by Gustavus Adolphus, who recog¬ nizing the destructiveness of firearms, arranged his battalions with a view to increasing the effectiveness of the fire of his troops, while avoiding exposure to that from the enemy. His tactics were so successful at Breitenfeld and Lutzen (1631-32) that they were soon afterward universally adopted. Frederick the Great made many improvements till then com¬ paratively unknown. The rapidity with which his infantry troops performed their evolutions during battle contributed largely toward his famous victories in the Seven Years' War. In fact the Prussian infantry have ever since his time served as models for other European countries. The superiority of this arm consists in the troops being able to act on ground which cavalry' cannot, and it is obvious that the latter must be nearly useless in the attack on fortified towns.

Co-operation with Other Arms.— The at¬ tack of intrenchments is hopeless without the aid of artillery. With reference to the amount of artillery to be used, the opinion is general that there cannot be too much. Artillery and infantry without modern equipment exist only in name.

The infantry should designate objectives for the artillery, since it is this arm that appreciates the danger points and knows definitely where fire should be directed. The eyes of the artillery are the observers, who should be with the in¬ fantry in the trenches. The artillery should place the guns where it pleases but the com¬ mander

and the observers, the brain and the eyes, must preserve the most intimate contact with the infantry. The attacking infantry re¬ quires two things: (1) To know where to go

and to see how to go ; (2) to receive the great¬ est possible assistance from the artillery before, during and after the assault. The most dan¬ gerous period of all for the attackers is after the position is taken when the enemy concen¬ trates his fire upon it and makes a counter as¬ sault. Surprise action by concentrated artillery fire is to be sought. The maximum effect in the shortest period of time should be striven for, as this naturally renders the surprise more complete.

It is a grave mistake to try to fix in advance the time of duration of the artillery fire. The fire should continue until in the opinion of the commander of the attacking force, it has ac¬ complished its purpose. When the infantry ad¬ vances to the assault the artillery protects it with a curtain of fire to the front and both flanks.

To guarantee a close co-operation between the artillery and its own infantry, artillery offi¬ cers should accompany the advanced infantry lines. The infantry commander has not always the time to communicate to the artillery ob¬ server everything that is wanted from the artillery. The observer, by reason of his techni¬ cal knowledge, can be of great assistance in advising the infantry commander as to the best methods to pursue to bring about effective ar¬ tillery support. But in order to carry out a mission of this kind, the observer should have a thorough knowledge of the details of the infantry combat to appreciate what is happen¬ ing around him.

Infantry Machine Guns. — Three machine gun platoons form a part of each regiment of French infantry. In order to avoid premature exposure to hostile fire the platoon advances under cover to a position for unpacking, from which the guns, after being prepared for ac¬ tion, are carried forward to a position in readi¬ ness. Great care in reconnoitering and taking up the firing position is enjoined, in order that the position of the guns may not be disclosed.

The regulations recognize three methods of fire : Distributed fire, the normal method, which calls for sweeping the designated target from flank to flank with 100 rounds once or twice; continuous fire, in which the fire continues until interrupted from time to time by the chief of piece as the target disappears momentarily; and unit fire, which is delivered by using the gun substantially as a rifle, thus stimulating rifle fire and preventing the premature disclosure of the presence of a machine gun.

Normally only one of the two guns of the platoon is fired. Firing with both guns at the same time is exceptional and is justified only against a particularly threatening portion of the hostile force ; that is, against a deep, broad and only momentarily visible target.

Machine guns are a valuable aid to infantry engaged at close ranges. They are to be re¬ garded as a movable fire reserve. In order that they may be concentrated at the time and place at which fire superiority becomes essential, they should not be put into action prematurely.

The machine gun is valuable mainly at short and mid ranges, and becomes especially effective when it may be used in enfilading a line or in rolling up a flank. Its value is com¬ paratively small against a target of little depth or a line with great intervals.

Machine guns are placed to the best ad-

vantage immediately in rear of a flank or in rear of intervals in the most advanced line. To fire over infantry or other troops by way of supporting them is to be thought of only when the terrain renders possible two or more lines of fire, one above the other.

Infantry Attack. — In the operations before Verdun, the German army corps nearly always attacked with their divisions side by side. Only in exceptional cases, as when the extent or im¬ portance of the zone assigned to a single corps pcrniitted only the employment of a single division, d:d the other remain behind in sup¬ port of the first.

The front of the zone assigned to a division of three regiments (7,200 rifles) varies between 1,000 and 2,500 meters, according to the im¬ portance and number of the successive ob¬ jectives assigned to it.

In respect of the disposition for attack of its units, if the zone of action be narrow and the. objective varied, the division places two regiments in the first line, side by side, with the third in reserve. But if the zone be wide, with only one objective, then the three regi¬ ments form in one line, separated by intervals varying with the nature of the ground.

Whatever be the disposition taken by the division, the regiments place in general one battalion in the first line and keep two in re¬ serve, echeloned in depth at distances depend¬ ing on the nature of the ground. The more advanced of the two reserve battalions is al¬ ways

in readiness to advance, either to sup¬ port the attack against the first objective, or to carry it on beyond. The other reserve battalion is at ease ; its duty is, at the right moment, to relieve the exhausted units of the first line.

The German infantry in general turns out its battalions in two lines. The first is almost invariably composed of two companies side by side; these deploy for the assault either in the most advanced trench or in the last shelter. The second line remains in the supporting trenches either in shelters or under some covering obstacle.

The procedure of attack is always that of successive lines of men, and rests upon the fol¬ lowing general principles :

1. lo each line of attack is always assigned a limited and well-defined objective, no wider than the front of attack, and never deeper than the distance between two successive lines of trenches.

2. The assaults open only after the artillery has thoroughly swept the trenches and de¬ stroyed the obstacles, in order to compel the defense to abandon all idea of resistance.

3. The assault proper is preceded by thorough reconnaissance of the objective sought, in order to make sure that the artillery has produced the desired effect. These reconnaissances in reality constitute the first wave of the assault; the succeeding waves are held back until the first shall have made progress.

In respect of details, the various methods of assault are more or less of the following pat¬ tern : the successive waves are three, separated by some 20 or 30 paces. The first of these makes the reconnaissance mentioned above, it is formed by one or two squads from each platoon, is accompanied by scouts carrying tools, and by grenadiers, and is deployed at wide inter¬ vals. The second wave consists of a dense

line of rifles, and comprises the principal part of each platoon. This line's duty is to occupy the trenches. Finally, the third is composed of the remainders of each platoon, and constitutes a new echelon, whose business it is to fill the gaps that may be produced. With it goes a reserve of munitions and materials in order to hold the captured trenches.

Infantry Against Cavalry. — A cavalry charge can accomplish little against infantry, even in inferior numbers, unless the latter are surprised, become panic-stricken, run away, or cannot use their rifles.

A charge from the front is . easily checked by a well-directed and sus¬ tained fire.

If the charge is directed against the flank of the firing line, the supports, reserves, or machine guns should stop it. If this disposi¬ tion is impracticable, part of the line must meet the charge by a timely change of front. If the cavalry line passes through the firing line, the latter will be little damaged if the men retain their presence of mind. They should be on the watch for succeeding cavalry lines and leave those that have passed through to friendly troops in rear.

In a melee, the infantryman with his bayonet has at least an even chance with the cavalryman, but the main dependence of infantry is rifle fire. Any formation is suitable that permits the free use of the necessary number of rifles. Ordi¬ narily there will be no time to change or set sights. Fire at will at battle sight should be used, whatever the range may be. It will usu¬ ally be unwise to open fire at long ranges.

An infantry column that encounters cavalry should deploy at once. If attacked from the head or rear of the column, and if time is pressing, it may form a succession of skirmish lines. Infantry, by deploying 50 or 100 yards in rear of an obstacle, may check cavalry and hold it under fire beyond effective pistol range. In any situation, to try to escape the issue by running is the worst and most dangerous course the infantry can adopt.

In attacking dismounted cavalry, infantry should close rapidly and endeavor to prevent remounting. Infantry which adopts this course will not be seriously checked by delaying cav¬ alry. Every effort should be made “to locate and open fire on the led horses.

Infantry Against Artillery.— A frontal at¬ tack against artillery has little chance of suc¬ ceeding unless it can be started from cover at comparatively short range. Beyond short range, the frontal fire of infantry has little effect against the artillery personnel because of their protective shields. Machine guns, because their cone of fire is more compact, will have greater effect, but on the other hand they will have fewer opportunities and they are limited to fire attack only. As a rule, one’s own artil¬ lery is the best weapon against hostile artillery.

Artillery attacked in flank by infantry can be severely damaged. . Oblique or flank fire will begin, to have decisive effect when delivered at. effective range from a point to one side of the artillery s line of fire and distant from it by about half the range. Artillery is better pro¬

tected on the side of the caisson.

Guns out. of ammunition, but otherwise se¬ cure against infantry attack, may be immobilized by fire which will prevent their withdrawal or by locating and driving off their limbers. ’ Or

they may be kept out of action by fire which will prevent the receipt of ammunition.

Artillery when limbered is helpless against infantry fire. If caught at effective range while coming into action or while limbering, artillery can be severely punished by infantry fire. In attacking artillery that is trying to escape the wheel horses are the best targets.

Trench Warfare. — In the present warfare, trenches play a most important role, and in order to obtain success, it is necessary to em¬ ploy only infantry which is morally fit and thoroughly trained. The two factors, C(fire ac¬ tion and advance w have been recognized by all belligerents as not having the same meaning as heretofore. Success will not be brought about by these two factors alone, on account of the extensive use of obstacles. In order to win, the infantry attack must be preceded and must be accompanied by powerful means of destruc¬ tion, such as fire action in all of its forms, grenades, mines, aerial torpedoes, asphyxiating gases and burning liquids. During the advance, the attacking lines are confronted with three kinds of powerful obstacles : barbed wire en¬ tanglements, machine guns and the artillery curˆ tain of fire.

The French tactical unit is the infantry division. Every military movement demands that the division be complete in itself. It should have heavy artillery, field artillery and trench artillery. Under the classification of trench ar¬ tillery are included cannon of less than 7.5 mm. calibre, or those having a shorter range than the present field pieces.

No definite rules can be laid down for trench warfare. New lessons are being taught, and each belligerent is constantly changing his meth¬ ods of warfare, at least in the manner of execution. There is no greater mistake than to undertake attacks, the necessity of which has not been clearly demonstrated.

The attack on an enemy’s trench should never be undertaken except

after a careful study of the situation ; but, once launched, the objec¬ tive must be gained, with the minimum amount of losses and with this one idea in mind, of holding the ground captured. The assault must be of short duration. It cannot be so, unless the attack has been well prepared, well ar¬ ranged, and every detail attended to beforehand. Between any advantage that may be gained through surprise, which is not possible in trench warfare, and a careful preparation by the sup¬ porting artillery just before the attack, the lat¬ ter method is preferred by the infantryman. To attack blindly a line of trenches is a thing of the past. To believe that if the difficulties of an attack are known to the infantry, its offensive spirit is reduced, is nothing but a fallacy. See Artillery ; Cavalry.

Bibliography. — Black, William, (Infantry Tactics-* (Leavenworth 1911) ; Lloyd, E. M., (Review of the History of Infantry* (New York 1908) ; (Infantry Drill Regulations*. of the United States War Department (Washing¬ ton 1911) and (Field Service Regulations) (ib., 1913) ; (The Infantry Journal* (ib., 1911-12) ; Stewart, M. B., (Physical Development of the Infantry Soldier) (Plattsburgh, N. Y., 1913) ; Upton, (Military Policy of the United States) (Washington 1913).

Edward S. Farrow,

Consulting Military and Civil Engineer.

INFANTRY, Mounted, soldiers trained to act as foot and cavalry soldiers and usually equipped with rifles from which fact they are frequently designated mounted riflemen. Their supreme advantage over ordinary infantry con¬ sists in their greater mobility. This arm is but little known at present, but was favored by many expert soldiers during the American Civil War and the following decades. In the struggle between the North and South the so-called cavalry was little better than mounted infantry, all their training being along the lines laid down for the latter. Mounted infantry appear to have been first introduced by Marshal de Brissac in 1600. In 1672 they were introduced into the British army. Napoleon I and his gen¬ erals appreciated the possibilities of this arm. In the 19th century the value of mounted in¬ fantry for outpost duty, for covering retreats, for sieging, holding or destroying bridges, and for other works of destruction, such as remov¬ ing telegraphs, etc., were generally recognized. In this way this arm rendered efficient service in the Civil War. The chief action of such troops must always be as infantry, the horses of the dismounted men being held by their comrades. Mounted infantry differ essentially from cavalry, the latter depending little or

not at all on fire-arms, but almost entirely on lance or sabre and the shock of the charge. Mounted infantry on the other hand, depend on the rifle and their mounts are merely intended to give them a maximum degree of mobility. The in¬ troduction of aircraft in modern armies has dispensed in great part with mounted troops for purposes of reconnaissance, and motor trans¬ port is being increasingly used for the rapid transfer of troops to points where the line is hard pressed. Modern trench warfare, also, has to a very great extent eliminated all mounted troops. It is too early, however, to draw general conclusions from the Great War of 1914-18, in which mounted troops played but a small part after the first few weeks of open fighting.

INFECTION, the introduction of disease- producing micro-organisms in the body. Infec¬ tion may result in a number of different ways. Micro-organisms may be introduced by means of direct injury. When a person falls and cuts the hand, the bacteria of pus-production or of tetanus may be so introduced, and blood poisoning or tetanus may develop. Many infec¬ tions come by means of the intestinal tract. Thus typhoid is commonly obtained from milk or drinking-water. The intestinal worms, tape¬ worm, roundworm, are contracted in this man¬ ner, and a number of other parasites, particu¬ larly the trichina, may come from infected food taken into the alimentary canal. Infection may also occur by means of the air-passages. The bacillus of tuberculosis is most often taken into the body in this way, and finding suitable soil, it causes the development of the dread disease. The bubonic plague is frequently contracted through the disease-germ entering the air-pas¬ sages. At the present time it is deemed not unlikely that a number of infectious diseases, notably influenza, diphtheria, scarlet fever, mea¬ sles, whooping-cough, are contracted through the respiratory tract by infection with the ex¬ citing cause. Occasionally direct contact seems necessary for infection, as in gonorrhoea and

syphilis. In malaria, and probably in yellow fever, the active agent that causes the disease is introduced into the body by the bite of an insect, the mosquito. In malaria one particular genus (Anopheles) serves as an intermediate host in the developmental history of the para¬ site, in a manner analogous to the history of the development of a number of the intestinal worms. It is not unlikely that a large number of diseases may be disseminated by the bites of insects of one

kind or another. In all the infectious diseases the element of a real, live, and active contagion should never be overlooked. Infectious diseases do not spring out of nothing. There must be some sort of contact in order that a person become infected. A most impor¬ tant part of the treatment of all infectious diseases is the protection of other people by proper care of all one's own excretions during' sickness. The doctrine so frequently taught by some that sickness is ignorance is an important half-truth. But for the ignorance of people concerning the proper care of those afflicted with infectious diseases with reference to the protection of others, measles, diphtheria, scarlet fever, whooping-cough, typhoid fever, consump¬ tion, and a number of other maladies would be entirely eradicated from civilized communities.

INFERENCE, the mental process of de¬ riving a new judgment from certain premises or assumptions. It is a familiar fact that the mind passes naturally from given facts to more or less assured conclusions based upon them, as when we expect that rain will follow a change in the appearance of the sky. When such mental transitions become explicit so as to be susceptible of being arranged as a series of propositions, we have inference. Inference is more or less experimental, and therefore sub¬ ject to test by certain rules with regard to its correctness. See Deduction ; Fallacy ; In¬ duction.

INFERNO. See Divine Comedy, The.

INFIDEL, in modern parlance, one who deliberately rejects the Christian faith after obtaining knowledge of it. In former times a man might be an infidel who had never heard of Christianity. Infidelis in ecclesiastical lan¬ guage means ˆunbelieving,® and is applied to unevangelized heathen as well as doubters and apostates. Thus in the Roman Catholic Church a bishop in partibus infidelium merely means a bishop whose diocese is set in heathen coun¬ tries.

INFINITE SERIES. See Series.

INFINITESIMAL CALCULUS. See

Calculus, Infinitesimal.

INFINITIVE, the indefinite mode in which the verb is represented without a subject. As the verb expresses an action, or a state, it generally belongs to a subject whose action or state is expressed; but if we wish to express the mere idea of this action or state we use the infinitive, which, therefore, in many languages is employed without

further chance as a sub¬ stantive — for instance, in Greek and German — only preceded by the neuter article ; but as the verb expresses an action or state under cer¬ tain conditions of time, the infinitive can also express the action or state in the present, past, or future, though these conditions are not ex¬ pressed in all languages by peculiar forms.

Some languages express it by some grammatical contrivance, as is the case in English, where it is denoted by to prefixed to the general unin¬ flected form of the verb, as to love — Latin amare ; to have loved — Latin amavisse. The infinitive may be regarded as the point of tran¬ sition from a verb to a substantive, and is often used as the subject of a proposition.

INFINITY, a notion which has assumed the most varied forms, characterized by few common characteristics except the transcendence of our customary notions of boundedness and limit. The chief types of infinitude which come to the attention of the mathematician and philosopher are cardinal infinitude, ordinal in¬ finitude, the infinity of measurement, the 00 of algebra, the infinite regions of geometry and the infinite of metaphysics.

Cardinal infinitude pertains to assemblages and only to assemblages. An assemblage is finite if it can be exhausted by taking member after member from it. It is what is called re¬ flexive if it can be paired off in a one-one manner with a class derived from it by the removal of one term. Whether all non-finite classes are reflexive is not known, as all sup¬ posed demonstrations of this statement rest in the insecure basis of Zermdo's axiom. (See Assemblages, General Theory of). The set of all classes which can be paired off in a one-one manner with a given class or assem¬ blage is known as a cardinal number. The cardinal numbers of reflective classes are known as transfinite cardinal numbers. Reflec¬ tive classes are perfectly definite and bounded, though their manner of limitation is not sus¬ ceptible of being based on an enumeration, as is the case with finite classes.

Ordinal infinitude is a property of well-or¬ dered series. A series is an order which estab¬ lishes a definite and unique precedence between any two terms which it concerns, and which is such that if it makes a precede b and b precede c. it makes a precede c. A series is well or¬ dered if every series generated by an operation included in its ordering operation has a first term. A well ordered series is infinite if it contains a cardinally infinite number of terms. Two well ordered series are ordinarily similar if their terms can be put in a one-one corre¬ spondence in such a manner that corresponding terms always

bear the same relation of pre¬ cedence or succession to corresponding terms. An ordinal number is the set of all well ordered series similar to a given series. It is trans¬ finite or infinite if it is the number of an infinite series.

Infinitude enters into a system of measure¬ ment in two different ways : as infinitude of subdivision and as infinitude of distance. A scale of measurement is a system of entities such that every pair has a corresponding real number, which is regarded as the distance separating the members of the pair. The in¬ finite divisibility of a distance is the fact that the distance can be regarded as the sum of a chain of distances stretching from one point •to the other, and of as small a magnitude as may be desired. This is preconditioned by the fact that between every two real numbers there lies another real number. The infinite extent of a system of measurement consists in the fact that starting from any point it is ‘possible to

find another point removed from it by a dis¬ tance of arbitrarily great magnitude.

Strictly speaking, the symbol 00 has no meaning except in some such context as f (°°). f (°°) is an abbreviation for the limit of f Or) as | x | increases without limit, and is only significant when f (x) — f (x ’) can be made arbitrarily small if f x | and | | are only

chosen larger than some number A. f (°°) may also be written lim f (x). f (J °o) or

x — cc

lim f (x) means the limit of f (a j ib) * = + »

where a and b are real and a increases through positive values without limit, f (— °o) and lim f (x) have the analogous meaning, f

X— – 00

(+ 00) and f (— oo) may exist when f (co) is meaningless.

In ordinary Euclidean geometry parallel pairs of lines and intersecting pairs of lines exhibit many important analogies. The con¬ venient expression of these is rendered pos¬ sible only by the adjunction to

the ordinary points, lines and planes of certain entities, called points, lines and planes at infinity. The method of this adjunction differs in the several mathe¬ matical disciplines, for it is dictated by con¬ siderations rather of convenience than of logi¬ cal necessity. In solid projective geometry (q.v.) the adjoined points form a plane cutting every ordinary line or space in one point. This enables the universal law to be formulated, that every two lines intersect in one point, and only in one point. In the theory of the functions of a complex variable (q.v.), on the other hand, it is much more convenient to regard the en¬ tire infinite region as a single point, lying on every line.

The infinite of philosophy, corrupted though it is with much undigested and misunderstood mathematics, contains a motive of its own. It is that which lacks external relation, not merely in so far as it is of a spatial, temporal or numerical character, but in any manner at all.

The idea of the infinite is as old as the Ionian philosophy, when Anaximander (610 b.c.) declared that the one in the many, the basis of being in Nature, was to aneipov t the infinite. The reality of infinitude has been the source of much controversy, and the tendency of many modern philosophers is to deny it, for there is unquestionably a difficulty in the entrance of the unrelated into the cognitive relation. The discursive nature of knowledge makes us bring every object into a context. This difficulty of finding a context for the in¬ finite is the basis of those antinomies of Kant (q.v.) which concern it. <(An infinite number,® says Bosanquet, <(would be a number which is no particular number, for every particular num¬ ber is finite. It follows from this that infinite number is unreal.® On the other hand F. H. Bradley states the contrary, in the clearest terms, <(We may be asked whether Nature is finite, or infinite. ... if Nature is infinite, we have the absurdity of a something which exists; and still does not exist. For actual existence is, obviously, all finite. But, on the other hand, if Nature is finite, then Nature must have an end, and this again is impossible. For a limit of extension must be relative to an ex¬ tension beyond. And to fall back on empty space will not help us at all. For this (itself a mere absurdity) repeats the dilemma in an ag¬

gravated form. But we cannot escape the con¬ clusion that Nature is infinite. And this will be true not of our physical system alone, but of every other extended world that can possibly exist. . . . Every physical world is, essentially and necessarily, infinite.®

It seems as if Aristotle had a clearer and more logical view of infinity, to aneipov than many moderns such as Bosanquet. He says, Xelnerai

ovv Svvapei eivai to aneipov. He means of course, that, with regard to finite human in¬ telligence, the infinite remains unrealized, al¬ though logically it could be realized, and of course, when we speak of infinite time, or in¬ finite creative change in nature, we speak of something which potentially exists, but is only gradually becoming actual. In other words, we can transcend whatever relations we choose, so long as we do not transcend Relation.

Professor Royce of Harvard has undertaken the task of vindicating the concept of the actual Infinite against the charge of self-contradiction. He is controverting Mr. F. H. Bradley of Ox¬ ford, who while he admits "we cannot escape the conclusion that Nature is infinite,® expresses also his belief that such an assertion is a con¬ tradiction in terms. Professor Royce attempts to accomplish this vindication by proving the following theses:

1. The true Infinite, both in multitude and in organization, although in one sense endless, and so incapable in that sense of being com¬ pletely grasped, is in another, and precise sense, something perfectly determinate. Nor is it a mere monotonous repetition of the same, over and over. Each of its determinations has indi¬ viduality, uniqueness and novelty about its own nature.

2. This determinateness is a character which, indeed, includes and involves the endlessness of an infinite series; but the mere endlessness of the series is not its primary character, but simply a negatively stated result of the self¬ representative character of the whole system.

3. The endlessness of the series means that by no merely successive process of counting, in God or in man, is its wholeness ever ex¬ hausted.

4. In consequence, the whole endless series, in so far as it is a reality, must be present, as a determinate order, but also all at once, to the absolute experience. It is the process of suc¬ cessive counting, as such, that remains, to the end, incomplete, so as to imply that its own pos¬ sibilities are not yet realized. Hence, the re¬ current processes of thought reveal eternal truth about the infinite constitution of real Be¬ ing, — their everlastingly pursued Other; but themselves, — as mere processes in time — they are not that Other. The true Other is, there¬ fore, that self-representative system of which they are at once portions, imitations and ex¬ pressions.

5. The Reality is such a self-represented and infinite system. And herein lies the basis of its very union, within itself of the one and the

many. For the one purpose of self-representa¬ tion demands an infinite multiplicity to express it ; while no multiplicity is reducible to unity except through processes involving self-repre¬ sentation.

6. Nevertheless, the Real is exclusive as well as inclusive. On the side of its thought the Absolute does conceive a barely possible infinity,

other than the real infinity, a possible world, whose characters, as universal characters, are present to the Absolute, and are known by virtue of the fact the Absolute thinks.

The Royceian theory of the infinite is based on the analogy of cardinal infinitude, and pre¬ supposes that there is such a thing as a com¬ plete universe. Certain paradoxes discovered by Russell and Burali-Forti tell very strongly against the existence of a complete unity em¬ bracing all lesser unities. Royce's work pos¬ sesses value rather as an account of the po¬ tential infinity of a universe capable of indef¬ inite enlargement than as a description of a given, complete infinite. Furthermore, it is clear that systems of much less extent than the Royceian infinite may possess the self-reflecting property of cardinal infinity. (See Assemblages, General Theory of). Consult Bosanquet, B., (Leipzig 1896) ; Coutural, (De l'infini mathematique) (Paris 1896) ; Geissler, 'Die Grundsatze und das Wesen des Unendlichen in der Mathematik und Philosophy (Leipzig 1902) ; Hegel, 'Wissenschaft der Logik) (Ber¬ lin 1841) ; Russell, B. A. W., 'Principles of Mathematics) (Cambridge 1903) ; Royce, J., 'The World and the IndividuaP (New York 1900-01) ; Whitehead, A. N., and Russell, B. A. W., 'Principia Mathematica) (Cambridge 1910).

Norbert Wiener,

Editorial Staff of The Americana.

INFLAMMATION, a term long used to indicate the phenomena that follow mechanical, chemical or physical injuries to living tissues. These changes have been described for centuries as rubor (redness), calor (heat), dolor (pain) and tumor (swelling), which are the phenomena particularly seen on surface inflammations. At the present time the idea is 'becoming fixed that inflammation is a conservative process, the phe¬ nomena attending nature's effort to rid the tis¬ sue of harmful substances. In the normal proc¬ ess of repair of an injury there are changes which closely resemble the milder types of in¬ flammation; but when to a mechanical, chem¬ ical or physical injury there is added a growth of micro-organisms, the reply on the part of the body-cells differs from the ordinary repair of injury. The changes

witnessed depend upon the strength and kind of invading micro-organ¬ ism and the particular tissue invaded. The first change is hypcrcemia, a suffusion of the part with blood from capillary dilatation; following this the liquid part of the blood, the serum, is poured out into the tissues and offers its resist¬ ing powers to the poisonous substance. If these measures be insufficient, the white blood-cells called phagocytes congregate in the tissues, de¬ stroying the invading organisms, by actually consuming them and neutralizing their toxic products. During this struggle there is more or less death of the cells, called “degenera¬ tion® ; large masses “slough® ; the remnants of the cells and the phagocytes killed form the thick fluid called pus. When an inflammation goes on to the formation of pus, it is spoken of as purulent or suppurative. Certain poisons cause a peculiar reaction on the part of the tis¬

sues, characterized by the formation of new tissue that is unable to carry on the function of the part. This tissue is the same as the con¬ nective tissues, .and the process is called produc¬ tive inflammation. The poisons that continue to act for a long time are particularly apt to cause this reaction, and the inflammation is called chronic because of its permanency. Ca¬ tarrhal inflammations are these same processes when they occur in mucous membranes ; the appearance of these catarrhs, however, is differ¬ ent, owing to the peculiar structure of mucous membrane and to the fact of the epithelial cov¬ ering offering excellent resistance to invasion. When death of cells occurs they can readily be cast off. Croupous inflammation is the term used to describe those in which there is con¬ siderable destruction of the superficial layers of the mucous membrane, which, with the fibrin of the blood, forms a coating or “false mem¬ brane® on the surface. Granulation tissue (q.v.) is the name applied to the tissue formed during the repair of an injury. Names are given to certain types of inflammation having a characteristic appearance to the naked eye, but microscopically there is nothing absolutely distinctive in these except their arrangement. Particular examples of these are tubercular and syphilitic •inflammations.

The majority of the diseases of the body that we recognize as entities are due to inflam¬ mation in some tissue or organ, but the picture depends on the various changes in the functions of different parts of the body. The kind and virulence of the generated poison, together with the reaction on the part of the body-tissues, makes the complete picture that we seek to recognize. The treatment of .inflammation is, in large part, the practice of medicine and surgery. Efforts to help the tissues combat against invasion are made with more success as knowledge is gathered of the peculiar invading forces and the natural

modes of defense. It is not that we wish to combat the inflammation per se, but rather to make it unnecessary by helping it to a successful issue. The actual de¬ struction of the bacteria by drugs introduced into the body is of little use, for they would be apt to cause as much destruction of the body-cells as of the invading cells; but their toxines, which cause the actual damage, we are learning to neutralize by the administration of artificially prepared .antitoxins, and by placing the body and its special tissues under the most favorable conditions for developing its natural forces of resistance.

In exposed parts of the body, where anti¬ septics may be applied, the toxic germs may be killed, and various measures that change the blood-supply may be advantageous. Where death of tissue takes place, nature may require help in its removal. It has long been the rule to evacuate pus wherever it is formed, unless its escape from the tissues is easy.

The treatment of chronic inflammation is en¬ tirely different, as this is a process where actual structure is changed beyond repair in many in¬ stances. The all-important question is whether the tissue can carry on its proper functions; for if it can, the body need not suffer. The inflam¬ matory process is arrested in its progress by the removal of the irritating cause, by improving the blood-supply of the part and the vitality of

the body generally. These constitute the meas¬ ures in general applied for the cure of chronic inflammations, it being understood that the en¬ deavor is to place the tissues in such a condi¬ tion that they may carry on their functions for the good of the whole organism ; and the failure of these measures shows either that they are at fault or that the tissue-change has gone too far. Inflammation of any part is indicated by add¬ ing the suffix <(itis” to the name of the organ or tissue. (See Bronchitis, Colitis, Laryngitis, Meningitis), etc. Consult Delafield and Prudden, (Textbook of Pathology’ (9th ed., New York 1911), and Smith, A. H.,

INFLAMMATION OF THE LUNGS.

See Pneumonia.

INFLECTION. See Inflexion.

INFLEXION (Latin, inflexio, a bending), that process in grammar which modifies words when placed in relation to other words in a sentence; the act or process of varying the form of words, as by altering the endings or suffixes, so as to express grammatical relation¬ ship. It was primarily called bending, evidently because the word was bent to a new shade of meaning. It includes both declining and con¬ jugation, and it is interesting to note that de¬ clining also carries out this same idea of bend¬ ing down the word. In the grammatical term ((case," from the Latin cado, to fall, there is also the same idea of falling away. Hence, it is well to regard inflexion, in grammar, as the allowing of a word to fall away in a different manner to express some relationship. We say ((I love," <(he loves," ((I am loved" and some¬ times (

To conjugate means primarily to join in couples or pairs, but it has been extended in meaning ((to state the principal parts of a verb." Conjugation is a connected process of giving the entire series of inflexions of a verb, that is, all its forms in person, number, mode, tense and voice. Many conjugations seem

tedious and' unnecessarily prolix, but other languages may be more difficult in this respect, as Arabic, in which verbs have 15 conjugations, in theory if not always in practice. In English the common auxiliary verbs am, do, have, shall, will, may, can, asserting respectively existence, action, possession, obligation, volition, liberty, power, assume the function of inflexions and are themselves inflected to denote past time. In French the same inflexional law exists, the con¬ nection between the auxiliary and the root being closer than in English. Aimer-ai, I have to love, that is, I shall love, is compounded of the infinitive aimer, to love, and at, I have, the first person present indicative of avoir. The same is the case in Italian and Spanish. '

Pronominal and predicative roots are com¬ bined to form one word in the Semitic and Aryan tongues, which are therefore called in¬ flexional, a process impossible in monosyllabic languages like the Chinese or in languages of the agglutinate order like those of the Turanian family. The Semitic and Aryan families of languages, which admit of phonetic corruption both in root and the terminations, are called organic or amalgamating languages. The pro¬ nominal termination varies according to the person or number. Thus the Sanskn mi, si, ti, the endings of the three persons singular of the present of the verb, are perhaps from the per¬ sonal pronouns ma, sva, ta and the persons of the plural indicate the plural number by the form of the pronominal affixes. The plural of masculine and feminine Greek and Latin nouns of the third declension is probably a contrac¬

tion of the duplication of sa, the pronoun of the third person. See Grammar.

INFLUENCE GF THE WAR ON LIT¬ ERATURE, ART AND MUSIC. See Lit¬ erature, Art and Music, Influence of the World War on.

INFLORESCENCE, INFRUCTES- CENCE, botanical terms referring respec¬ tively to methods of flowering and fruit-bearing. The flowering shoot, says Strasburger, frequently bears only a solitary, either axillary or terminal flower. In many cases, however, the metamor¬ phosis of the generative region, which results in the production of flowers, has led to the forma¬ tion of a special system of fertile shoots termed an inflorescence or, after the fruit is formed, an infructescence. (See Flower; Fruit). Such inflorescences are wanting or ill developed among the Gymnosperms, while in the Angio- sperms they are often well differentiated, con¬ stituting unities of a higher order. The modifi¬ cations exhibited by the fertile shoots of such an inflorescence are due, partly to a difference in their mode of branching, partly to the reduc¬ tion or the metamorphosis of their leaves. These changes are the result of an adaption to pollination, in the endeavor to aggregate and at the same time render the flowers more con¬ spicuous by the reduction of the foliage-leaves. Sometimes the whole system of fertile shoots is converted into an attractive apparatus, as in the Araccce, where the axis and the subtending leaf of the inflorescence have assumed the function, usually exercised by the perianth, of enticing insects. Viewed from a purely mor¬ phological standpoint, two types of inflores¬ cences may be distinguished, the Botryose (racemose, monopodiale) and the Cymose.

INFLUENZA. The word is derived from the Italian influenza di freddo, influence, ef¬ fect of cold. The other common name is grippe or grip, from the French agripper, to at¬ tack, or from gripper, to grip. The French name dates from 1712. Influenza is a febrile affection involving the respiratory tract often- est, but attacking almost any set of tissues, es¬ pecially the mucous membranes. It usually oc¬ curs as a pandemic, that is, an infection spread¬ ing to every people. It has been seen as a pan¬ demic often since the early 16th century and there are accounts of it before. The epidemic of 412 b.c., mentioned by Hippocrates and Livy, is considered to have been influenza. The first American epidemic was in 1647, when some 6,000 deaths occurred in the Barbadoes and Saint Kitts. Cromwell is said to have

died from it some 10 years later. There were four pandemic influenza periods in the last century — 1830-33; 1836-37; 1847-48; and the one re¬ called the best, that of 1889-90. This began in Turkestan in June 1889. By the end of the year it was as far west as the Pacific. It crossed the Pacific to rage in India the follow¬ ing spring and in a year and a half it had circled the globe. The disease probably always origi¬ nates in the East at a time when crowded popu¬ lations are suffering from want and therefore lack resistive vitality against the specific mi¬ crobe which gains in virulence as the result of having such favorable material to multiply in. The affection usually attracts the attention of the medical world in some European country intimately in touch with the East. It rages with virulence and receives as an epithet the name of that country for a time. The epidemic at the end of the 19th century, first noted in Russia, was for some time called Russian in¬ fluenza. The epidemic of 1918-19 was, for a similar reason, called Spanish influenza.

The duration of the disease in any locality is usually under two months. There is probably no disease which attacks so large a proportion of the inhabitants of infected territory. Often one-fourth, sometimes even more than one- third, of the population catch the disease. Un¬ like most other diseases, adults from 20 to 40 suffer most. Infants are almost immune; the old, particularly if they have gone through a previous epidemic, seem to be protected to a great extent. Some protection is undoubtedly afforded by a previous attack, though a few persons seem to be thus predisposed to subse¬ quent attacks. The mortality of uncomplicated influenza is low. In the German army in 1889- 90, out of some 60,000 cases the mortality was not more than one-tenth of 1 per cent. The deaths from pneumonia and other complica¬ tions make the disease serious. Most of the deaths during an epidemic are due to pneumo¬ nia. The disease is much more fatal at the be¬ ginning of the epidemic in any locality and deaths may take place even in strong, young, healthy adults, within two or three days after the first symptoms are manifest. The index that the epidemic is about to wane is that the disease becomes much less severe in its symp¬ toms and less fatal. It is usually not until after this that the number of patients attacked be¬ gins to reduce and then the mortality drops rap¬ idly. The latest epidemic followed all these rules rather closely.

The cause of the disease is not known for

certain. The so-called influenza bacillus, found by Pfeiffer (1892), is practically always pres¬ ent in the disease and is considered by a great many good authorities to be the cause, but the etiology is not

definitely settled. Other micro¬ organisms supposed to be concerned in the causation of special epidemics have been de¬ scribed, notably a filterable virus, that is, a mi- crobic agent so small that it passes through the pores of a laboratory filter, but this has not been confirmed with any degree of certainty up to the present time. The presence of this agent was noted in many cases during the re¬ cent epidemic. The disease does not spread through the air but is a true contagion requir¬ ing for transmission contact, direct or indirect, with an individual suffering from the disease. The bacillus of Pfeiffer has been found in a very great many cases in large numbers in the secretions of the nose, throat and lungs, though the supposition that it must produce catarrhal symptoms, running from the eyes and nose, has not been confirmed in the present epidemic. It is found to exist luxuriantly in the back of the throat, growing in and between the cells and being distributed from here through the body to produce the respiratory or gastro-intestinal symptoms. The infection may readily occur therefore from the hands in eating, and one of the most important precautions against the dis¬ ease is thorough cleansing of the hands before meals. The bacillus may be scattered around for considerable distances by coughing or sneezing, so that it is important to insist on the use of a handkerchief, or still better, of some waste cotton material or soft paper that can be burned, to be placed before the nose and mouth during sneezing and coughing.

The best protective against the disease is a state of vigorous health. The respiratory or¬ gans particularly should be kept in the best pos¬ sible health and that is secured by plenty of outdoor air, especially in the sunlight. People who are run down in health should avoid com¬ ing in contact with patients affected by the dis¬ ease, though apparently the presence of tuber¬ culosis in the lungs, in spite of its consumptive effect, helps to protect against rather than pre¬ dispose to the disease, for tuberculosis patients do not suffer much from influenza. The mouth and nose should be kept clean, but rough cleans¬ ing or the use of strong antiseptics will prob¬ ably do more harm than good. The cells of the mucous membrane of the mouth and nose may be rendered less capable of resisting invasion. The use of chemical protectives and the car¬ rying of camphor and other odoriferous mate¬ rials with the thought that they protect against the disease is without confirmation in experi¬ ence. The treatment of the disease is that of fevers in general but with an abundance of fresh air. During the epidemic of the ’90’s the coal-tar products, antipyrin, acetanilid and other similar materials were used in large quantities because they reduced the fever and made the patient more comfortable by their anodyne ef¬ fects. They have a tendency to favor

the de¬ struction of red blood corpuscles and as the dis¬ ease has a similar tendency, the combined re¬ sult was often serious for the patient. They probably did much more harm than good. The pains in the bones at the beginning of influenza represent the effect of the disease on the blood forming marrow of the flat bones and the con-

sequent blood deterioration predisposes to heart and other complications, hence the necessity for rest, once the fever declares itself, which should be continued until the extreme feeling of pros¬ tration often associated with the disease is re¬ lieved. The individual must be helped by gen¬ eral supporting treatment until the tissues are able to throw off the disease. Without com¬ plications the fever usually comes down on the fourth or fifth day, but the patient often has to stay in bed for nearly a week longer. When pneumonia occurs it is lobular, attacking tihe lobules and not the lobes of the lungs and ends by lysis, that is, by gradual absorption of the effusion, and not by crisis as in ordinary pneu¬ monia. Supporting treatment is extremely im¬ portant. The bowels must be kept regular so as not to interfere with movements of the dia¬ phragm, and above all, the patient's mind must be set at rest as far as possible. Discourage¬ ment is a serious element for the prognosis and patients must not be told of the death of rela¬ tives or friends. Alcohol has been used with reported benefit, but the only good effect it may have is by lessening the dread of the af¬ fection which in some people's minds amounts to a serious pathological factor.

After previous epidemics of influenza, the disease has always become endemic, that is, sporadic cases of it have occurred years after¬ ward, sometimes almost in epidemic form. This will almost surely happen at this time also, so that respiratory affections, especially in the changeable seasons of the year, will take on a special influenzal character. The particular strain of the bacillus whose evolution has been fostered by war conditions will gradually lose virulence, but continue with us for some time.

James J. Walsh, M.D.

INFORMATION, a proceeding for some offense, usually against the government, differ¬ ing from an indictment in not being found by a grand jury. It is usually brought by an au¬ thorized public official and is in use in the Uni¬ ted States and England. The use of the in¬

formation in the United States is restricted to misdemeanors in criminal cases, and it is al¬ lowed in certain civil cases, as to bring a person into court who has assumed the duties of a civil office to show by what authority he so acts, or to arraign a corporation for failing to observe the provision of its charter, etc. In England to-day information in criminal cases is brought by the Attorney-General or Solicitor-General, but not ‘for treason, misprision of treason or felonies. However, it is rarely used there except for aggravated offenses, such as sedition, or crimes that are pernicious, as at¬ tempting to bribe public officials. In addition, informations are filed in the Court of Ex¬ chequer in revenue cases. In the United States also, in some jurisdictions, violations or attempted violations of the revenue laws are proceeded upon by information. The term is also applied to the written sworn statement made, as before a committing magistrate, prior to the issuance of a summons or complaint against a person charged with certain offenses.

INFORMER, a person who sues for a penalty against those who have infringed any law or penal statute. To encourage the appre¬ hending of certain felons, guilty of offenses not so much criminal as bordering on criminality,

many English statutes, from 1692 downward, granted rewards to such as should prosecute to conviction. The penalty in whole or in part in¬ flicted in the case of a successful conviction and immunity from certain troublesome parish offices were the inducements held out to in¬ formers. In many cases this practice has been resorted to in modern statutes. But the insti¬ tution of a Crown prosecutor in England and of prosecuting attorneys in the United States has nullified the importance of informers to a great extent. In the United States one who informs the government of the whereabouts of smuggled goods, counterfeit money, etc., is re¬ warded by a fee of 10 per cent of the net value of the confiscated goods. In criminal law (q.v.) an informer is said to turn state’s evi¬ dence.

INFRALAPSARIANISM, in soteriology, the characteristic theological tenet and practice of those Calvinists and even also of some Ro¬ man Catholics, who maintain the dogma of ab¬ solute divine decrees of election and approba¬ tion and consider the decree of election as con¬ templating the apostasy as a past event, and the elect as being at the time of election in a fallen and guilty state. Infralapsarianism is really synonymous with sublapsarianism, and is opposed to supralapsarianism. Sublapsarian¬ ism conveys the general idea of having been <(done after the time of the fall of man® ; and this too is the meaning, considered etymologi¬ cally, of infralapsarianism also.

The Infra- lapsarians suppose that God in predestinating had respect to man, not merely as a fallen be¬ ing, but specifically as either also redeemed through union with Christ, or as condemned through final impenitence. This, it need scarce¬ ly be said, amounts to an assertion that God decrees men to suffer His wrath on the ground of their foreseen guilt. This is the ultra-Cal¬ vinism of the Gomarist school. And it is con¬ sciously or unconsciously, implicitly or explic¬ itly, presupposed — that an all-loving God somewhere in His Word appears as Creator of men simply with the sovereign purpose of then damning them eternally! It assumes likewise that believers are elected on the ground of foreseen faith and obedience, whereas the finally impenitent are predestinated to perdition by a damnatory decree on the grounds of their foreseen impenitency. This rigid Christianity refers the eternal election of men and their rep¬ robation by God to his foreseeing, rather than his positively decreeing, that all men would fall in Adam, and thus would deserve repro¬ bation; and thus the election of grace becomes conceived as simply a remedy for existing evil. Out of the entire mass of mankind thus fallen, God in his sovereign grace freely elects a cer¬ tain number to life; and by virtue of the same electing act, He in an equal exercise of his sov¬ ereignty leaves others, non-elect, to the death which their sins deserve. Some, calling them¬ selves Preteritionists, hold a modified — can it be said a less gloomy? — view on this subject. These reject the dogma that God has deter¬ mined in the exercise of his authority to elect any, but to blessing. Yet they nevertheless contend for the decree of preterition, in virtue of which God has determined to pass by those who are not saved. Can it be necessary more than to allude to the gross fatalism inherent in

all these dogmas? Here the Bible takes on the aspect of a gloomy epic, terrible and grand as the elder (Edda,} a book to plunge man into melancholy; the prophets thunder out doleful menaces ; men burden their minds with the piti¬ less doctrines of Calvin. Fancy, if you can, the effects of such ideas on solitary and morose minds ! An anthropomorphic superstition per¬ vades them all. Admitting for a moment that God decrees anything at all (which, seriously, is to look upon him as Zeus, or even as a hu¬ man legislator, making enactments) — might one not logically adopt the principle that He decrees in respect of what He does, but not in respect of what He does not do; and conclude that He decreed, by an absolute decree, to save the saved, but did not decree not to save the lost? And, obiter dicta, in

all fatalism, whether (said to be) Christian, Mohammedan, Hellenic, Old Norse, Roman or Teutonic, whether Mate¬ rialistic, Socialistic, Individualistic or Intellec- tualistic — and all are variations on a single theme — there is involved a fictitious idea both of causation and of necessity. Man's will is free. And it is no more logical — and this all determinists do, whether openly or tacitly — to presuppose that prevision creates the future, than to presuppose that memory creates the past.

INFRINGEMENT, a breach or violation of an agreement or right, especially the infrac¬ tion of the copyright, patent rights or trade¬ mark of another. The usual method of proce¬ dure for the injured party is to secure an in¬ junction restraining the infringement and to enter an action for the damages sustained. See Copyright; Patents, etc.

INFUNDIBULUM. See Pituitary Body.

INFUSION, in pharmacy, an aqueous so¬ lution of a medicinal substance obtained by treating with water, usually without the aid of boiling. The water may be either hot or cold, varying with the object to be obtained. Ac¬ cording to the directions of the United States Pharmacopoeia, infusions are generally pre¬ pared by pouring boiling water upon the drug and macerating in a tightly closed vessel until the liquid cools. The active principles are in this manner extracted more rapidly and, as a rule, in much larger portions than if the solution is colder. Heat is not advisable if the active prin¬ ciples are volatile. If an infusion is desired of a greater degree of concentration than that ob¬ tained by the process of maceration, it is fre¬ quently prepared by percolation, in which op¬ eration the drug is sliced or broken up into small fragments, packed in a percolator, and the water, either hot or cold, is passed through. Infusions are sometimes made with the aid of other liquids than water, but this is the excep¬ tion rather than the rule. Infusions do not keep well, and therefore they should be made extemporaneously and in small quantities.. In household medicine, infusions are very widely employed. These may be made at home or made by the pharmacist. It is essential to re¬ member that if they are made in hot weather in large quantities they must be sterilized.

Infusion of saline solution into the blood¬ vessels is a very important procedure in medi¬ cine. It is employed largely in the treatment of shock and in severe hemorrhage, especially following operations or childbirth. The solu¬

tion that is used is known as a normal salt- solution and consists of about one teaspoonful of common salt to a pint of water. This solu¬

tion should be boiled carefully for one-hall to three-quarters of an hour, the amount of evapo¬ rating water being made up as the boiling pro¬ ceeds, and after being made it should be kept in large bottles provided with cotton plugs for stoppers. In severe cases of hemorrhage, in¬ fusion has often saved life, as it provides a body of fluid on which the heart and blood¬ vessels can act. The salt-solution is usually in¬ troduced into one of the large veins of the arm at a temperature of one to two degrees above that of the body temperature. See Blood; Transfusion.

INFUSORIA, protozoa or organisms of the primary division of the animal kingdom, consisting of single cell or groups of cells, of the classes FlageUata and Ciliata, so-called from propagating and abounding in infusions of or¬ ganic matter. While the term, first used in 1763, is now restricted to the ciliate protozoans, it often includes the flagellate protozoans as well. The latter are represented by the monads. These are exceedingly minute, round or pear- shaped animals, which move by one or two lash-like processes called flagella. They contain a nucleus and contractile vesicles. Some of them are fixed by a stalk, and are provided with a collar, as in Codosiga, out of which the flagellum projects. One of the simplest monads (Heteromita) is obtained by placing a cod's head in water at a temperature of about 70° F. In a few days the water will swTarm with these monads. The young germs will live in boiling water, but perish at a temperature of from 212° to 268° F., while the adults are destroyed at 142° F.

In the ciliata infusoria the body is more or less flattened and covered with cilia (Para¬ mecium , etc.). They have on the under side of the body a slightly defined mouth (or cyto- stome), which is permanently open, and the food is swept into it by the action of the cilia around it. The mouth leads into a funnel- shaped throat or cytopharynx, which ends in the protoplasm of the body. The food-particles swept into this throat and pressed into the protoplasm form a small enlargement which finally sinks farther in forming the ((food vac¬ uole, J) which, by the flow of the protoplasm, is carried about the body, while the digestible por¬ tions are absorbed and the waste matter is cast out at a fixed point, — a sort of vent (cyto- pyge). The fresh-water forms have contractile vesicles, and in certain species the animal pos¬ sesses so-called stinging rods (trichocysts), which are very minute and are placed vertically to the surface of the cortex; by some students they are supposed to be tactile rather than sting¬ ing structures. What correspond to the mus¬ cular fibres of the higher animals cause the quick convulsive movements observed in these creatures. Two important organs are present in all ciliate infusoria, that is the nuclei.

The larger nucleus (macronucleus) is an oval, rod¬ like or spiral body, which appears to control the processes of feeding and motion. The other nucleus (micronucleus) is much smaller and is concerned with reproduction. Reproduction oc¬ curs usually by self-division, and more rarely the infusorians contract into a ball and divide

into spores, which grow to become adults. The periods of fission are at times interrupted by the process of conjugation, which only differs from sexual reproduction in the fact that two individual infusorians meet and fuse together and then separate, the result being a process of fertilization which leads to a complete new formation of the nucleus, and thus to a new organization of the animal.

The more specialized infusoria are Stcntor and V orticella. The former is large enough to be seen without a lens. It is purplish, and under the microscope shows itself to be a beautiful creature. It is trumpet-shaped, with a spiral tract of thicker cilia around the mouth-end. The most highly organized infusoria are the bell-animalcules (car che slum , etc.), which are compound bell-shaped forms, forming colonies with forked branched stalks. The nucleus is sausage-shaped, and near it is the micronucleus. They form a white mass like mold on the stems and leaves of aquatic plants. Some of the infu¬ soria are parasitic in the digestive and circula¬ tory organs of the higher animals. For a more detailed and illustrated account, consult, W. Saville-Kent's 'Manual of the infusoria, in¬ cluding a description of all known flagellate, ciliate and tentaculiferous protozoa, British and foreign, and an account of the organization and affinities of the sponges) (London 1880-82).

Bibliography.— Bennett, J. H., (On the at¬ mospheric germ theory and origin of infusoria) (Edinburgh 1868) ; Ehrenberg, C. G., 'Verbreitung und Einfluss des mikroskopischen Lebens in Slid und Nord-Amerika) (Berlin 1843) ; Jennings, H. S., (Behavior of the lower organ¬ isms^ (New York 1906) ; Lund, E. J., 'The relations of bursaria to food) (Baltimore 1914); Pritchard, A., (History of Infusoria) (London 1861) ; Stein, F. von, 'Der Organismus der Infusionstiere) (Leipzig 1859-83) ; Stevens, N. M., 'Studies on the ciliate infusoria licno- phora and boveria) (Bryn Mawr 1903) ; Smith, I. F., (The Infusoria of Kansas) (University of Kansas 1914) ; Woodruff, L. L., (Study on the life history of hypotrichous infusoria) (Baltimore 1905).

INFUSORIAL EARTH, a term often but incorrectly applied to diatomaceous earth. See Diatoms.

INGALLS, in'galz, James Monroe, Ameri¬ can soldier: b. Sutton, Vt., 25 Jan. 1837. He served in the Civil War, participating in the Atlanta campaign, and remained in the South during the Reconstruction period until 1871. In the following year he was graduated at the Ar¬ tillery School, Fort Monroe, Va. In 1882 he founded the department of ballistics at the Uni¬ ted States Artillery School, Fort Monroe, and was principal instructor there until the school suspended operations in April 1898, on the out¬ break of war with Spain. He was retired from the army 25 Jan. 1901 and was advanced to the rank of colonel, retired, by act of 23 April 1904. He has written on professional topics for encyclopedias and in the Journal of United States Artillery and the volumes 'Exterior Bal- listics) (1883; 1885; 1886) ; (Ballistic Machines1 (1885) ; ' Handbook of Problems in Exterior Ballistics J (1890; 1901); Unterior Ballistics1 (1894; 1911); 'Ballistic Tables1 (1891; 1900); 'Ballistics for the Instruction of Artillery Gun¬ ners1 (1893).

INGALLS, John James, American lawyer: b. Middleton, Mass., 29 Dec. 1833; d. Las Vegas, N. Mex., 16 Aug. 1900. He was grad¬ uated from Williams College in 1855, and was admited to the bar in 1857. In 1858 he moved to Kansas and established a law prac¬ tice there, first in Sumner, and in 1860 in Atchi¬ son. _ In 1859 he was a delegate to the First Con¬ stitutional Convention. He was secretary of the territorial council in 1860, and of the State senate in 1861, and in 1862 was elected a mem¬ ber of the senate. During the Civil War he acted as judge-advocate of the Kansas militia (1863-65) and for three years edited the Atchison Chainpion. In 1873 he became a Re¬ publican member of the United States Senate, and was re-elected in 1879 and 1885. Charges that bribery had been practised in connection with his election in 1879 were made in and in¬ vestigated by both the Kansas house of repre¬ sentatives and the United States Senate. They were found to be partially true, but Senator In¬ galls himself was entirely exonerated and the claim to his seat was fully sustained. He was president pro tern, of the Senate from 1887-91. In 1891 he was again a candidate f.or senator, but was defeated by the Farmers' Alliance. During his service in the Senate he was known as one of its most eloquent members. From that time till his death he devoted himself chiefly to lecturing and writing. His writings were published by Conelley, W. E., ed., 'A Col¬ lection of the Writings of J. J. Ingalls1 (Kan¬ sas City 1902). Consult Inman, H., (J. J. In¬ galls1 (in 'Distinguished American Lawyers,1 H. W. Scott, ed., p. 457, New York 1891) ; Kan¬ sas Bribery Investigation Committee, 'Report of the

Special Committee of the Kansas House of Representatives, etc.1 (Topeka 1879) ; Taft, G. S., ‘Compilation of Senate Election Cases1 (49th Congress, 1st Session, Senate Misc. Doc., No. 47, Washington 1885).

INGALLS, Melville Ezra, American rail¬ road president: b. Harrison, Me., 6 Sept. 1842; d. 11 July 1914. He was educated at Bowdoin and at Harvard. He practised law successively at Gray, Me., and at Boston, Mass. In 1867 he was elected to the senate of Massachusetts. Becoming interested in railroads he was, in 1870, president of the Indianapolis, Cincinnati and Lafayette Railroad and in the following year was appointed its receiver. After effecting a thorough reorganization he added other roads which together are known as the “Big Four,11 the Cleveland, Cincinnati, Chicago and Saint Louis Railroad. He was chairman of the sys¬ tem until 1912 when he retired. He was also for many years executive head of the Chicago and Ohio Railway Company and in. 1905 was chosen president of the National Civic Federa¬ tion.

INGALLS, Rufus, American soldier: b. Denmark, Me., 23 Aug. 1820; d. New York city, 15 Jan. 1893. He was graduated from West Point in 1843, fought in the Mexican War and was brevetted first lieutenant for gal¬ lant and meritorious conduct. In 1854-55 he was a member of Steptoe’s expedition to the Northwest. At the outbreak of the Civil War he defended Fort Pickens, Fla., then became quartermaster of the Army of the Potomac, and was present at many of the important en¬ gagements, was twice brevetted for gallant and

meritorious conduct, and at the close of the war had attained the rank of major-general. In 1867 he became successively quartermaster of the military division of the Atlantic, Pacific and the Missouri, quartermaster-general of the United States army, and brigadier-general in 1882 and was retired in 1883.

INGE, inj, William Ralph, English clergy¬ man and author: b. Crayke, Yorkshire, Eng¬ land, 6 June 1860. He was educated at Eton and at Kings College, Cambridge, where he won many honors. He was assistant master at Eton, 1884-88. At the same time, 1886-88, he was Fellow of Kings College. In 1889-1904 he became Fellow and tutor of Hertford College, Oxford. He was vicar of All Saints, Ennis- mere Gardens, London, 1905-07, Margaret pro¬ fessor of divinity,

Cambridge 1907-11, and since 1911 dean of Saint Paul's, London. He was select preacher at Oxford 1893-95, 1903- OS; at Cambridge in 1901, 1906 and 1910. In 1899 he delivered the Bampton Lectures, and in 1906 he delivered the Paddock Lectures in New York City. In 1915 he was lecturer at Sion College. In 1902 he was examining chap¬ lain for the bishop of Lichfield. He is the author of several school books and is an author¬ ity on the subject of mysticism. His works in¬ clude (Society in Rome Under the Caesars5 (1886); (Christian Mysticism5 (1899); (Faith and Knowledge5 (1904) ; Selections from the German Mystics5 (1904) ; Studies of English Mystics5 (1906) ; (Truth and Falsehood in Re¬ ligion5 (1906) ; (Personal Idealism and Mystic- ism) (1907) ; (Faith5 (1909) ; Speculum Animas5 (1911) ; (The Church and the Age5 (1912) ; (Authority and the Inner Light5

(1913) ; (Types of Christian Saintliness5 (1915).

INGELOW, Tn'je-16, Jean, English poet and novelist: b. Boston, Lincolnshire, 17 March 1820; d. Kensington, London, 20 July 1897. Her first published work appeared anonymously in 1850 under the title (Rhyming Chronicle of Incidents and Feelings.5 It was followed by (Allerton and Dreux : or the War of Opinion5 (2 vols., 1851), a story, and (Tales of Orris5 (1860) ; but not till the publication of (Poems,5 in 1863, did Miss Ingelow become famous. This volume won the enthusiastic praise of critics and the instant approval of the public, and by 1879 had passed through 23 editions. The most widely appreciated poems in it are (The High Tide on the Coast of Lincolnshire5 ; (Songs of Seven5 ; (Divided5 ; and

children's stories, even though her popularity during her life was based chiefly on her poetry. The latter contains some few very excellent pieces, but the bulk of it has not stood the test of time. In her own days, however, she was greatly admired for her songs, and many of her poems, indeed, have considerable lyrical merit. Consult Anon., (Some Recollections of Jean Ingelow and her Early Friends5 (London 1901) ; Stuart, G. B., (Personal Recollections of Jean Ingelow-* (in Lippincott' s Monthly Magazine, Vol. LXXVII, p. 306, Philadelphia

1906).

INGEMANN, ing'e-man, Bernhard Sev- erin, Danish poet and novelist : b. Torkildstrup, on the island of Falster, 28 May 1789; d. Soro, 24 Feb. 1862. He was educated at the Univer¬ sity of Copenhagen, and it was while a student there that he published his first (Poems5 (1811- 12), of a dreamy, melancholy nature, showing the influence of German

romanticism, and dis¬ playing the unhealthy state of his body and mind. In 1814 he published a long allegorical poem, (The Black Knights,5 which showed a marked advance. The next six works which he produced were plays, the tragedy (Blanca, 5 brought out in 1815, being the most popular and successful, though (The Miraculous Child Reinald5 (1816) was undoubtedly the best. (The Subterranean Ones, a Story of Bornholm,5 his first prose work, was written in 1817, and the following year he started on a tour of the Continent, returning in 1819. On his return he wrote his (Stories and Miraculous Tales,5 which was published in 1819, followed in 1820 by two volumes of poems, (The Travel Lyre,5 and in 1821 by a comedy, Magnetism in a Barber's Shop,5 which, however, was unsuccessful, and thereafter he confined himself to prose work. In 1822 he accepted the chair of Danish language and literature at the Academy of Soro, and then began his voluminous writings on his¬ torical subjects, his novels probably being in¬ spired and copied from the Waverly novels, by Scott. The subjects and characters were taken from Danish history, and, while they were to a great extent inaccurate, were possessed of such strong nationality that they became of great interest. Among these historical romances were (Valdemar the Victorious5 (1826) ; (Erik Men- ved's Childhood5 (1828) ; (King Erik and the Outlaws5 (1833) ; (Prince Otto of Denmark and His Time5 (1835); (Queen Margaret5 (1836) ; (Holger Danske5 (1837). From 1837— 39 he wrote a collection of (Evening and Morn¬ ing Songs, 5 which became very popular on account of their great beauty of religious ex¬ pression. From this time until his death his writings were mainly religious and the last of his works, (The Apple of Gold,5 was published in 1856. A number of his works have been translated into English and many of them into German. His collected works in 41 volumes were published in Copenhagen (1843-65). He left an autobiography which was edited by Gals- kjot (1862). His correspondence was pub¬ lished in 1879, edited by V. Heise, and his letters to Grundtvig were edited by S. Grundtvig (1882). Consult Brandes, G., (Essays5 (Copen¬ hagen 1889) ; Norregaard, J., (B. S. Ingemanns Digterstilling og Digtervserd5 (Copenhagen 1886) ; Petersen, R., Mindeskrift over B. S. Ingemann5 (Copenhagen 1889) : Schwanen-

flugel, H., (Ingemanns Liv og Digtning) (Copenhagen 1886).

INGENHOUSZ, mg'en-hous', Jan, Dutch physician and scientist : b. Breda, Holland, 8 Dec. 1730; d. Bowood, the seat of the Marquis of

Lansdowne, England, 7 Sept. 1799. He studied medicine at Louvain, Leyden, Paris and Edinburgh, and after practising in his own country for several years removed to London in 1764 or 1765. In 1769 he was appointed aulic councillor and body physician to the Austrian Empress, Marie Theresa, and to Joseph II, in¬ troducing vaccination against smallpox in Vienna. After serving for nine years in that capacity he returned to London, where he be¬ gan his scientific researches, later becoming a fellow of the Royal Society, and publishing in its Philosophical Transactions) several treatises and essays. From 1780-89 he again resided in Vienna, devoting himself chiefly to experiments in chemistry, physics and botany. From 1789-99 he lived in England. His works include Experiments on Vegetables, Discovering Their Great Power of Purifying the Common Air in Sunshine, but Injuring it in the Shade, or at Night' (London 1779; Leipzig 1780; Paris 1787-89) ; (Respiration of Plants' (Vienna 1786) ; cMiscellanea Physico-Mcdica' (Scherer, J. A., ed., Vienna 1795) ; Essay in the Food of Plants and the Renovation of Soils' (Lon¬ don 1796). Collections of his scientific papers were published in German (Vienna 1785) and in French (2 vols., Paris 1785-89). Dr. Ingen- housz is credited with being the discoverer of carbonic acid, assimilation of plants, and he also invented the plate electrical machine. Con¬ sult Weisner, J., (Jan Ingen-Housz' (Vienna

1905).

INGERSOLL, ing'ger-sol, Charles Jared,

American statesman, lawyer and author ; son of Jared Ingersoll (q.v.) : b. Philadelphia, 3 Oct. 1782; d. there, 14 May 1862. After finishing his collegiate course he studied law, was admitted to practice, traveled in Europe and became at¬ tached to the American embassy to France. In 1812 he was elected to Congress, taking his seat in May 1813. In 1815 he was appointed United States district attorney for Pennsyl¬ vania, an office which he held until 1829. Shortly after he was elected to the legislature of Pennsylvania. He was a member of Con¬ gress 1841-47 as representative of one of the districts of which the county of Philadelphia was then composed. He was the author of the poem (Chiomara' (1800), of the tragedy Edwy and Elgwia' produced in Philadelphia (1808), of Julian' (1831); and of Unchiquin — the Jesuit's Letters on American Literature and Politics' (1810) ; (Historical Sketch of the Second War between the United States and Great Britain' (4 vols., 1845-52), etc. Con¬ sult Meigs, W. W., (Charles Jared Ingersoll' (Philadelphia 1898).

INGERSOLL, Ernest, American natural¬ ist: b. Monroe, Mich., 13

March 1852. He studied at Oberlin College and in the Lawrence Scientific School and Museum of Comparative Zoology of Harvard University, where he was a pupil of Agassiz, and in 1874 and 1877 was connected as naturalist with the Hayden survey. He was also an expert on the United States Fish Commission, and later became known as a popular writer and lecturer on

scientific subjects. In 1901 he was lecturer in zoology at the University of Chicago. Among his works are (Nests and Eggs of North Amer¬ ican Birds' (1880-81) ; (Oyster Industries of the United States' (1881); Enocking 'Round the Rockies' (1883) ; (Country Cousins' (1884) ; (The Crest of the Continent' (1884) ; (Down East Latch-Strings' (1887); (Wild Neighbors' (1897); (The Book of the Ocean' (1898); (Nature's Calendar' (1900) ; (Wild Life of Orchard and Field' (1902) ; (The Life . . . of Mammals' (1906) ; and several popular juvenile tales, notably (The Ice Queen.' He is editor of the Earmer's Practical Library,' secretary of the Authors Club (New York), and an officer of the National Association of Audubon Societies.

INGERSOLL, Jared, American politician: b. Milford, Conn., 1722: d. 1781. Upon the passage of the Stamp Act he was appointed, in 1765, a stamp agent in Connecticut and ac¬ cepted the post by the advice of Franklin. This subjected him to the personal abuse and insults from which all colonial stamp agents suffered, and finally he was forced to resign ; later, in 1770, becoming an admiralty judge. He was the author of a pamphlet called (The Stamp Act' (1776).

INGERSOLL, Jared, American lawyer: b. Connecticut 1750; d. Philadelphia, 21 Oct. 1822. Having been graduated at Yale College in 1766, he went to London, was entered of the Middle Temple and passed five years in the study of law. The American Revolution breaking out while he was still in London, he espoused the cause of the colonies, although the son of a Loyalist. He went from London to Paris, where he remained for 18 months, making the acquaintance of Franklin. Returning home, he took up his residence in Philadelphia, where he won almost immediately a prominent position as a lawyer. In 1787 he was chosen one of the representatives of Pennsylvania in the conven¬ tion which framed the United States Constitu¬ tion. Twice attorney-general of the State, he was United States district attorney for Penn¬ sylvania, presiding judge of Philadelphia County District Court and in 1812 the Federal candidate for Vice-President of the United States.

INGERSOLL, Leonard Rose, American educator: b. New York, 1 June 1880. He was graduated at Colorado College in 1902 and re¬ ceived the degree of D.Ph. at the University of Wisconsin in 1905. In 1905-08 he was in¬ structor, in 1908-10 assistant professor, and since 1910 associate professor of physics at the University of Wisconsin. He is a Fellow of the American Association for the Advancement of Science and member of the American Physical Society. He was a member of the Smithsonian expedition to Mount Wilson, Cal., for solar in¬ vestigations in 1905, 1906 and 1909. With O. J. Zobel he published (An Introduction to the Mathematical Theory of Heat Conduction' (1913). He has contributed many articles to scientific journals, chiefly on subjects con¬ nected with the electro-magnetic theory of light.

INGERSOLL, Robert Green, American lawyer, lecturer and author: b. Dresden, N. Y., 11 Aug. 1833; d. Dobb's Ferry, N. Y., 21 July 1899. He received a common school education

in various towns in Ohio and Illinois where his father, a minister, held charges and was ad¬ mitted to the bar at Mount Vernon, Ill., in 1854. He soon became prominent in the courts and in Democratic politics. In the Civil War he recruited the 11th Illinois Cavalry and en¬ tered the army as its colonel. He was in the battle of Shiloh and saw considerable fighting in Tennessee. On 18 Dec. 1862, while trying with a force of 600 men to intercept a Con¬ federate raiding party, he was captured by a force of 10,000 men but was soon paroled and given command of a camp in Saint Louis. He soon afterward resigned. After the war he became a Republican, and was made attorney-general of Illinois in 1867. He was a delegate to the Republican National Convention in 1876 and placed in nomination for President James

G. Blaine, whom he termed (

H. A., (The Age of Unreason) (New York 1881) ; Curtiss, S. I., Hngersoll and Moses) (Chicago 1880) ; Dement, R. S., (Ingersoll, Beecher and Dogma* (Chicago 1878) ; Duganne, A. J. H., Unjuresoul; a Satire for Science) (New York 1884); Goldthwaite, V., XIII, p. 23, East Aurora 1903) ; Kittredge, H. E., < Ingersoll; a Biographical Appreciation* (New York 1911) ; Lambert, L. A., (Notes on Inger¬ solP. (Buffalo 1883) ; McClure, J. B., ed., Mis¬ takes of Ingersoll, etcP (Chicago 1879) ; United States War Department, (The War of the

Rebellion. (Official Records) (Series I, Vol. XVII, Washington 1886-87).

INGERSOLL, Royal Rodney, American

naval officer: b. Niles, Mich., 4 Dec. 1847. In 1868 he was graduated at the United States Naval Academy. He was promoted through the various grades, attaining that of rear-ad¬ miral in 1908, and retired the following year. He has served as naval officer in all parts of the world. During the war with Spain he commanded the Supply and in 1905 was in command of the Maryland. He was member of the General Board of the Navy at the time

of his retirement. On 7 July 1917 he was again placed on duty in the Bureau of Ordnance. He has published (Text-Book of Ordnance and Gunnery) (1887); (Exterior Ballistics) (1891); (Elastic Strength of Guns) (1891).

INGERSOLL, Canada, town in Oxford County, Ontario, on the Thames River and the Grand Trunk Railway, 19 miles northeast of London. It is the marketing centre for a rich grain and fruit-producing section, and has an important trade in lumber, grain, cheese and general country produce. It has manufactures of iron products, machinery, agricultural imple¬ ments, woolen goods, woodenware, lumber and creamery products ; banks, and weekly news¬ papers. Pop. 4,763.

INGHAM, ing'am, Benjamin, English evangelistic leader: b. Ossett, Yorkshire, 11 June 1712; d. Aberford, 1772. He received his education at Batley School and at Queen's Col¬ lege, Oxford, where he graduated B.A. in 1734. In 1735 he was ordained, and, becoming asso- ciated'with John and Charles Wesley, went with them to Georgia, remaining two years. In 1738 he went with John Wesley on a visit to the Mo¬ ravians in Germany and became so strongly at¬ tached to their doctrines that he broke with the Wesleys and founded in Yorkshire several con¬ gregations of what were known as "Moravian Methodises,® but more commonly as "Ingham- ites.® He endeavored to unite in this organiza¬ tion the chief doctrines of the Moravians and Methodists, and so successful was he as bishop or general overseer that in a few years there were 84 of these congregations in England. He moved to Aberford about the time of his mar¬ riage with a daughter of the Earl of Hunting¬ don in 1741 and succeeded in converting the whole surrounding neighborhood to his faith. In 1760, however, the greater part of his fol¬ lowers deserted him after he adopted many of the mystical views of Robert Sandeman (q.v.). Only about 13 of the Inghamite churches fol¬ lowed him into the

Sandemanian sect. The rest were absorbed by other sects, especially by the Methodists. He wrote (A Discourse on the Faith and Hope of the Gospel) (Leeds 1763). Consult Tyerman, L., (The Oxford Methodists* (London 1873).

INGHAM, Charles Cromwell, American painter: b. Dublin, Ireland, 1796; d. New York, 10 Dec. 1863. He was a pupil of William Cun¬ ning at the Dublin Academy, came to New York in 1817, was there a founder of the Na¬ tional Academy of Design (1826), and its vice-president in 1845-50. He painted many por¬ traits and miniatures of beautiful women and children, as well as of prominent men ; amongst the latter are to be mentioned portraits of De Witt Clinton and Lafayette. His works in¬ clude (Day Dream* ; (The White Plume> ; (The Flower GirP ; (The Death of Cleopatra. *

INGLE, Richard, English sea captain of the 17th century. When the civil war arose in England Ingle was engaged in the tobacco trade in Maryland. He espoused the cause of the Parliament against Charles I and in 1645 ex¬ pelled Governor Calvert from Maryland. The latter, however, gathered forces and again took possession of the province late in 1646. During the 20 months of his rule Ingle committed many outrages and plundered several of the inhab¬ itants. Charges were made against him in Eng-

land which he defended on the ground that he acted from religious motives and plundered only “Papists.55 When the proprietary government was restored Ingle was not included in the gen¬ eral amnesty granted to other rebels. On 14 Nov. 1653 he petitioned for a share of prize money and thereafter disappears from history. Consult ‘Captain Richard Ingle, the Maryland Private and Rebel, 1642-53) (Baltimore 1884).

INGLEBY, in’g’l-bi, Clement Mansfield,

English author and Shakespearean critic: b. Rdgbaston, near Birmingham, 29 Oct. 1823 ; d. Ilford, Essex, 26 Sept. 1886. After graduating from Trinity College, Cambridge, he entered into partnership with his father, but in 1859 gave up his law practice and moved to Ilford, where he began writing for the magazines on scientific and metaphysical subjects. His best- known works are his Shakespearean studies, among which are (The Shakespere Fabrica-

tions > (1859) ; (Shakespere Controversy)

(1861) ; (Shakespere's Centurie of Prayse, etc.5 (1874) ; 'The Still Lion'' (1874; new edi¬ tion 1875, entitled 'Shakespere's Hermeneu¬ tics5) ; 'Shakespere: the Man and the Book5 (1877-78). He also wrote 'Outlines of Theo¬ retical Logic5 (1856); (An Introduction to Metaphysics5 (1864-69), etc.

INGLEFIELD, Sir Edward Augustus,

English admiral and explorer: b. Cheltenham, 27 March 1820 ; d. 5 Sept. 1894. He was edu¬ cated at the Royal Naval College, Portsmouth; went to sea at 14, and participated in the naval operations on the coast of Syria in 1840. He became commander in 1845. He com¬ manded the yacht Isabel in 1852 on a cruise to Smith Sound in search of Franklin. He pub¬ lished a narrative of this cruise, 'A Summer Search for Sir John Franklin5 (1853). As com¬ mander of the Phoenix he afterward made three voyages to the Arctic ; in 1854 he rescued part of the Belcher expedition and later in the same year made a last futile attempt to find Sir John Franklin. He took part at the siege of Sebastopol during the War of the Crimea. In 1877 he was knighted and two years later was made admiral. He invented the anchor known by his name and a hydraulic steering-gear. He was also a competent marine artist.

INGLIS, mg'lz, Charles, American Angli¬ can bishop : b. according to some authorities New York, according to others Ireland 1734; d. Halifax, Nova Scotia, 1816. After teaching school for a few years near Lancaster, Pa., he was ordained in England. He was at first as¬ signed to a missionary post at Dover, Del., and in 1765 became assistant minister at Trinity Church, New York. About 1770 he became one of the governors of King's College, now Columbia University. A stout Loyalist, he re¬ fused to omit from the service the prayer for the king and royal family, and upon the occupa¬ tion of New York by Washington retired for a time to Long Island. In 1770 he received an honorary M.A. degree, and in 1778 that of doctor of divinity, both from Oxford Univer¬ sity. In 1777 he was chosen to the rectorship of Trinity, and in 1783, at the evacuation of New York by the British, went to Halifax in the emigration of the United Empire Loyalists. He was consecrated in 1787 bishop of Nova Scotia (with jurisdiction over the other North American provinces), and was the first colonial

bishop of the Church of England. In 1809 he became a member of the Council of Nova Scotia. He published sermons and pamphlets. Consult Dix, M., (A History of the Parish of 1 rinity Church in the City of New

York5 (4 vols., New York 1898-1906) ; Eaton, A. W. H,, 5 Bishop Charles Inglis and his Descendants5 (in Acadiensis, Vol. VIII, No. 3, p. 183, Saint John 1908) ; O'Callaghan, E. B., ed., docu¬ mentary History of New York5 (4 vols., Al¬ bany 1850—5 1) ; Perry, W. S., 'History of the American Episcopal Church5 (2 vols., Boston 1885) ; Sabine, L., (Loyalists of the American Revolution5 (2 vols., Boston 1864) ; White, H. V., (Charles Inglis, our First Colonial Bishop5 (Dublin 1899).

INGLIS, John, Canadian bishop: b. New York 1777; d. London, England, 1850. He was a son of Bishop Charles Inglis (q.v.), graduated at King's College, Windsor, Nova Scotia, and was consecrated third bishop (Anglican) of Nova Scotia, 25 March 1825. He was a bene¬ factor of King's College and viewed with dis¬ favor the Anglican "test55 imposed as a condi¬ tion of entrance to that institution.

INGOLD, Augustin Marie Pierre, French clergyman and author : b. Cernay, Haute Al¬ sace, 21 April 1852. He was educated at Col¬ mar, Alsace, and at Saint Sulpice and the Sor- bonne, Paris. In 1873 he joined the French Oratorians and three years later was ordained to the priesthood. He was successively libra¬ rian, archivist and professor of history and exegesis in the Paris scholasticate. Since 1899 he has been editor of the Revue d' Alsace. In 1914 he was made chaplain to the 30th Army Division. He has published about 200 works on Jansenism, Alsatian history and the history of the Oratorians. He collaborated in Vacant's, (Dictionnaire de Theologie Catholique5 ; Vi- gouroux's (Dictionnaire de la Bible5 ; Band- rillart's (Dictionnaire d'histoire et de geographic ecclesiastiques5 ; and Cabral's (Dictionnaire d'archeologie chretienne et de liturgie.5 He con¬ tributed to (The Catholic Encyclopedia5 and with Duchesne founded the Bulletin Critique.

INGOLDSBY LEGENDS, The, or MIRTH AND MARVELS (1837ˆ10), by the Rev. Richard Harris Barham (<(Thomas In- goldsby55), a collection of tales, mostly versified and nearly all laughable, sets the standard for its kind. Other English humorous narrative verse may equal or surpass it in one quality or another — Thackeray's (Ballads 5 in the delight¬ ful employment of vulgarisms; (John Gilpin5 and the (Elegy on a Mad Dog5 in simplicity; the 'Ballads of Bon Gaultier5 in thinly veiled satire; 'Hudibras,5 'The Fable for Critics,5 and much of Browning's serious verse in tours de force of whimsical rhyming; the 'Bab Ballads5 in bouffe irresponsibility of theme and in sureness of rhythm ; Thomas Hood's poetical tales in the mingling of grim pathos with humor; but none other combines these qualities so uniformly and in so large a body of verse. Ingoldsby has other merits of its own. Its verve is unfailing. Its literary sources are extraordinarily various,

ranging from saints' legends, mediaeval chronicles and Kentish local traditions, down to La Fontaine's 'Contes,5 Goethe's 'Zauberlehrling,5 and De la Motte Fouque's 'Undine5 ; so that it offers the richest antiquarian farrago of witchcraft,

ghosts, magic, and demonology, with legal, genealogical, heraldic, ecclesiastical, and gas¬ tronomic history and anachronisms. Its care¬ ful technique in the details of narrative and de¬ scription is in the tradition of Sterne; and its rollicking masculine fun is the peculiarly Eng¬ lish fun of a by-gone day of roast-beef, pud¬ dings, and ale, a hierarchical social order, and a gentlemanly acquaintance with the classics. Its defects are the often flippant handling of themes essentially serious; the rarity of its genuine wit or humor — their place being gen¬ erally occupied by fun and volubility; its em¬ ployment of digression beyond the point where digression ceases to amuse and begins to bore ; and its outworn insularity and prejudices. These penalties it pays for smacking so racily of its time and its land ; Ingoldsby takes the gauge of early Victorian England relaxing over the nuts and wine ; yet, all deductions made, does it so excellently well as to make itself the permanent model of its genre. Va¬ rious editions are illustrated by Cruikshank, and by Leech and Tenniel. Early issues are now in request. Consult

Samuel Lee Wolff.

INGOLSTADT, Bavaria, town situated at the confluence of the Danube and the Schutter, 52 miles north of Munich. It contains an an¬ cient ducal palace, now used as an arsenal, old university buildings, theatre, a Gothic Frauenkirche, a Franciscan convent and nun¬ nery, ammunition works, a school of military engineering, gun powder works, cloth factories and breweries. It was a royal villa in the 9th century and received its charter as a town before 1255. In 1539 it was fortified. It suf¬ fered severely in the wars incident to the Ref¬ ormation; wras ceded to Austria in 1743 and in 1800 was taken by the French and its fortifi¬ cations were dismantled. Since 1870 it has ranked as a fortress of the first-class and im¬ proved defensive works have since been erected. Pop. 23,745. Consult Gerstner (Geschichte der Stadt Ingolstadt5 (Munich 1853).

INGOT, a small bar of metal formed by casting it in molds. The term is chiefly ap¬ plied to the bars of gold and silver intended for coining,

although both iron and steel are molded into ingots.

INGRAHAM, mg'gra-am, Duncan Na¬ thaniel, American naval officer : b. Charleston, S. C., 6 Dec. 1802; d. there, 16 Oct 1891. He entered the navy as midshipman in 1812, served during the War of 1812 and in the Mexican War before Vera Cruz and Tampico, and be¬ came a captain in 1855. While in command of the sloop-of-war Sant Louis he arrived at Smyrna 22 June 1853, and under instructions from the American Minister at Constantinople, took action in the case of the illegal arrest by order of the Austrian counsel, of Martin Koszta, an American citizen of Hungarian birth, which assumed considerable international importance. (See Koszta Affair). After his return he acted for more than four years as chief of the bureau of ordnance and hydrography of the navy department. In 1860 he resigned from the United States Navy, entered the Con¬ federate service and became a commodore, serv¬

ing as chief of ordnance at Richmond, Va., and as naval commander at Charleston, S. C.

INGRAM, ingram, Arthur Foley Win- nington, Anglican bishop: b. 26 Jan. 1858, Wor¬ cestershire, England. He was educated at Marl¬ borough College and Keble College, Oxford. He was a private tutor 1881-84; the next year he served as curate of Shrewsbury; 1885-89 he was private chaplain to the bishop of Litch¬ field; in 1889 he was chaplain to the arch¬ bishop of York and to the bishop of Saint Albans, at the same time he was head of Ox¬ ford House, Bethnal Green ; rector of Bethnal Green 1895; rural dean of Spitalfields, 1896; canon of Saint Paul's, London, 1897-1901 and bishop of Stepney for the same period. Since 1901 he has been dean of the Chapels Royal and bishop of London. He has a wide reputa¬ tion as a preacher. He is author of (Work in Great Cities } (1895; 5th ed. 1909); (The Men who Crucify Christ5 (1896); (Christ and His Friends> (1897) ; (Banners of the Christian Faith5 (1899) ; (The Gospel in Action) (1906) ;

(Early English Colonies> (1908) ; (Joy in God5 (1910); 'Secrets of Strength5 (1911); At¬ tractiveness of Goodness) (1913) ; 'Eyes of Flame) (1915) ; 'Church in Time of War5 (1916) ; 'Day of God) (1916) ; (Gospel of the Miraculous5 (1916) ; 'Under the Dome) (1916); (Call of the Father) (1917); 'Potter and the Clay5 (1917).

INGRAM, John Kells, English educator and author: b. County Donegal, Ireland, 7 July 1823; d. Dublin, 1 May 1907. He was educated at Trinity College, Dublin, and was appointed professor of oratory and English lit¬ erature there in 1852, Regius professor of Greek in 1866,

and librarian in 1879. At one time he was vice-provost of the college, and also held the presidency of the Royal Irish Academy. His ‘History of Political Economy,5 originally printed in the 9th edition of the Encyclopaedia Britannica,5 was separately published in 1888 and widely translated. He further wrote ‘A History of Slavery and Serfdom5 (1895); ‘Sonnets and other Poems5 (1900); ‘ Human Nature and Morals according to Auguste Comte5 (1901), etc.

INGRASSIA, Giovanni Filippo, Sicilian

physician: b. Palermo, 1510; d. there, 6 Nov. 1580. He studied at the University of Padua, where he received the degree of doctor in medicine in 1537. He taught with great suc¬ cess in Naples. He made several important anatomical discoveries. In 1563 he was named first doctor of Sicily by Philip II of Spain, and during the pestilence which devastated Palermo in 1575 he acquired the lasting esteem of its citizens by his work in suppressing the plague. He was granted a pension of 3,000 gold crowns. His more important works are ‘ Jatropologia, liber quo multa adversus bar- baros medicos disputantur5 (1558) ; ‘De tumoribus prseter naturam5 (1553) ; ‘Ragiona- mento sopra l’infermita epidemica del 15585 (1560); (Methodus curandi pestiferum con- tagium5 (1583) ; ‘In Galenum librum de ossibus doctissima et expertissima Commentaria5 (1603). Consult Eloy (Dictionnaire historique de la Medicine.5

INGRES, Jean Dominique Auguste, zhon

do-me-nek o-giist ang-r, French historical

painter: b. Montauban, 29 Aug. 1780; d. Paris, 14 Jan. 1867. Placed in the school of David he made such rapid progress that in 1800 he gained the second, and in 1801 the first prize of the Academy of Fine Arts. In 1806 he de¬ parted for Italy, where he passed nearly 20 years first at Rome and then at Florence, abandoning, under the influence of a close study of Raphael and the old masters, the dry, classic style acquired from David. After his return to Paris he opened, about 1824, a studio where he taught. From 1834—41 he was director of the French Academy at Rome. In 1845 he was made a commander and in 1855 a grand officer of the Legion of Honor. In spite of these honors, he was at times excessively attacked on account of his artistic principles. His works are numerous, and comprise generally serious

historical and classical subjects; in the great exhibition of 1855 at Paris an entire salon was appropriated to them and he was awarded a gold medal. Many are in Louvre, on the ceiling of one of the apartments of which is painted his (Apotheosis of Homer.) He painted the portraits of many distinguished personages, including that of Napoleon I. The art of In¬ gres is adjudged to hold a middle place be¬ tween the classic and the romantic schools. His weakest point was his coloring, his strong¬ est his drawing. Amongst his best known works are (CEdipus and the Sphinx* ; (Christ Delivering the Keys to Saint Peter* ; XIIP ; (Francesca da Rimini*; (Joan of Arc at the Coronation of Charles VIP ; Portraits of Cherubini, Charles X, himself, etc. Consult Amaury-Duval, E. E. P., (L' Atelier d'lngres* (Paris 1878) ; Blanc, C., Hngres. Sa Vie et ses Ouvrages) (Paris 1870) ; Boyer d'Agen, R., (Ingres d'apres une Correspondance inedite* (Paris 1880) ; Chesneau, E., (La Peinture Frangaise au 19e Siecle, etc.* (Paris 1862) ; Cortissoz, R., (Art and Common Sense) (New York 1913) ; Delaborde, H., (Ingres, etc. * (Paris 1870) ; La Forge, A. de, (La Peinture Contemporaine en France) (Paris 1856) ; Lapauze, H., (Ingres, Chef

cTEcole, 1824-34* (in Nouveau Revue , Ser. Ill, Vol. XX, p. 453, Vol. XXI, p. 19, Paris 1911) ; id., Hngres dans l'Atelier de David, etc., 1797 — 1806* (in Grande Revue, Vol. LXVI, pp. 72, 304, 749, Paris 1911) ; Merson, O., (Ingres) (Paris 1867) ; Mirecourt, E. de, Ungres* (Paris 1856) ; Mommeja, J., Collection Ingres au Musee de Montauban) (Paris 1905) ; Moore, G., (Modern Painting) (London 1893) ; Saunier, C., Exposition Ingres> (in Les Arts, Paris, July 1911); Silvestre, T.,

1907).

INHALATION, in medicine, a mode of applying remedies directly to the respiratory tract. Either steam alone, steam charged with drug-vapors, or drugs finely subdivided in sprays, are breathed into the air-passages as deeply as possible. This method of medication is useful only in relieving inflammations of the upper air-passages and possibly the trachea and larger bronchi. The air in the smaller bronchi is not changed by breathing, but by the diffu¬ sion of gases, so that substances in aerial sus¬ pension are deposited on the surface before reaching the smaller divisions of the bronchial

tubes. Steam does not penetrate far, but is cooled, and deposits moisture as far as the trachea. The old-fashioned croup-kettle and many devices for carrying out the same idea are used for the first stages of laryngitis. Many substances, s.uch as tincture of benzoin, etc., are added to the boiling water, but render it no more efficacious. Instead of conducting the steam directly to the mouth and nose by a

funnel or tube, it may be well to place .the patient in a simply enclosed tent, formed of bedclothes, and to allow the steam to charge the confined air. This method is particularly ad¬ visable #for infants and older children.

INHAMBANE, e'nyam-ba'na, Portuguese East Africa, a station on the coast just south of the tropic of Capricorn. It has verv many European buildings, churches, etc., and dates from the 16th century. It has a trade in ivory, copal, wax, nuts, rubber and other products of the colony. Pop. 4,000, a motley collection of Arabs, Banyans, half-castes and negroes, with about 150. Europeans.

INHERITANCE, in law, a perpetual or continuing right to an estate invested in a per¬ son and his heirs. There are nine ((canons of inheritance® ; three may be quoted: (1) That inheritance shall, in the first place, descend to the issue of the last purchaser in infinitum ; (2) that the male issue shall be admitted be¬ fore the female; (3) that where two or more of the male sex are in equal degree of con¬ sanguinity to the purchaser, the eldest only shall inherit, but the females of the same de¬ gree all together.

INHERITANCE TAX, an assessment laid upon those made heirs of property, either b>' distribution or descent. Sometimes this as¬ sessment is confined to collateral heirs, when it is called collateral inheritance tax. The rais¬ ing of public funds in this way has been sanc¬ tioned by legislation from the beginning of Roman law, and in England and other countries is a large and steady source of revenue, al¬ though such taxes have been stigmatized by certain economists as ((death duties.® During the Civil War taxes of this kind were made part of the internal revenue system of the United States, but abolished soon after the struggle ended. . The rate and method of as¬ sessment vary in different countries, and in different States of the Union. The English inheritance tax ranges from a 1 to a 10 per cent assessment, in accordance with the amount of the inheritance and the degree of relation¬ ship of heirs. In the United States lineal, col¬ lateral and succession inheritance taxes have been instituted in several States, as a source of domestic revenue. In Connecticut the assess¬ ment on inherited property is graded from 1 to 8 per cent, according to degree of relation¬ ship and valuation. In California, there is $10,000 to $24,000 exemption to near relatives, and then a graded tax from 1 to 15 per cent; distant relatives, $2,000 exemption and 3 to 25 per cent tax. In Delaware the assessment ranges 1 to 5 per cent, according to the amount of property left, and the degree of relationship. In Illinois, 1 per cent on values over $20, OCX) to lineal descendants ; 2 per cent above $100,000, and 2 per cent to 5 per cent on all amounts to

collateral relations. In New York, near rela¬ tives exempt to $5,000; 1 to 4 per cent on

larger bequests; non-relatives exempt to $1,000, above that graded from 5 to 8 per cent. In Ohio and Virginia, near relatives exempt, others 5 per cent on all values over $500. Nearly similar laws exist in Maryland, Mis¬ souri, New Hampshire, Pennsylvania, Vermont, Virginia and Delaware. In Alabama, District of Columbia, Georgia, Mississippi, New Mexico, Rhode Island and South Carolina, there is no inheritance tax. The tendency to place a large tax on bequests to near relatives is illustrated by the laws of Arkansas, where it is 24 per cent on $1,000,000; Ida*ho, 15 per cent on $1,000,000; Indiana, Wisconsin and West Virginia, 15 per cent on $500,000; Nevada, 25 per cent above $500,000; North Carolina and North Dakota, 15 per cent above $50,000; Texas, 12 per cent above $500,000, and Washington, 12 per cent above $100,000. Inheritance laws have in the United States occasioned much discussion and litigation, but their justice and utility have been testified to by experience and the decision of the law courts. The economists of the present and other periods have seen the scientific pro¬ priety of such legal provisions, and have noted the uniformity with which they deal with all classes of the financial community.

INHIBITION, (1) a writ from a higher to a lower court, as an ecclesiastical court in England, forbidding further proceedings ; also, in English law, a command, as from a bishop, to a minister to cease performing ministerial functions. (2) In Scots law, an order restrain¬ ing an heir from contracting debts affecting injuriously the rights of others in the heritable property. It is sometimes used also in Scots law in the sense of an order secured by a hus¬ band forbidding the giving of credit by another to his wife. It was formerly used in English law as synonymous with writ of prohibition.

INIA, a genus of toothed cetaceans similar to dolphins, but placed on structural grounds in the allied family Platanistidcu , with the fresh¬ water dolphins of the Ganges and the La Plata. The single species (I. groffrensis) is called bouto and tucuxi, and is found in some of the upper tributaries of the Amazon, and in the lakes near the Cordilleras. It measures about eight feet in length, has a long cylindrical snout with stiff hairs, and a very slight dorsal fin. It feeds chiefly on fish, and is hunted for the sake of its oil.

INIGUEZ. See Garcia Iniguez. INITIAL DIP. See Dip.

INITIATIVE. The initiative and the op¬ tional referendum, which originated in Switzer¬ land, were introduced in the United States to obtain for the voters as a whole a more direct participation in legislation and a more imme¬ diate control of the business of government; the movement gained headway rapidly because the opinion prevailed in many sections that State legislatures were no longer representative of the people but were dominated by political rings and moneyed interests. While the refer¬ endum (q.v.) is effective in killing pernicious legislation and acts as a preventive to the enact¬ ment of such laws, the initiative affords a rem¬ edy for a legislature's indifference to public needs and its persistent refusal to pass legisla¬ tion urgently required, if opposed by a corrupt¬ ing lobby or other hidden influences. The ini¬

tiative has long been in operation in Switzer¬ land, originating in the (

INJALBERT, an'zhal'bar, Jean Antoine,

French sculptor: b. Beziers, 1845. He received his artistic education under Dumont and in 1874 was awarded the Roman Prize for his (Douleur d'OrpheeP In 1877 he exhibited at

the Salon a huge has relief (La Tentation,* and in the following year a (Christ on the Cross,* now in the Rheims Museum. Inj albert has the gift of imparting life to his work and a won¬ derfully rich imagination. His (Titian) sur¬ mounts a great fountain at Beziers. His (Hip- pomene* is in the Luxembourg. Other works are (L'Herault, l'Orb, le Lez,* in the vestibule of the prefecture of Montpellier, the two groups of (Enfants aux lions) also in Mont¬ pellier; the fagade of the theatre of Beziers; figures on the Pont Mirabeau of Paris; the Moliere monument at Pezenas ; the (Fronton du Petit Palais) at the Paris Exposition of

1900.

INJECTOR, a mechanism for feeding water into a steam boiler while it is in operation, through the force of its own steam. The ac¬ tion of this device is based on that principle of hydrodynamics in virtue of which the velocity of a moving body of water or other liquid may be

transmuted into pressure, and vice-versa, by proper arrangements of conduits and apertures.

In the injector a jet of steam, issuing from the boiler at a velocity of from 1,500 to 3,500 feet per second (depending upon the boiler pressure), is passed through a conical nozzle, indicated in the diagram by the letter A, from which it passes into another cone-shaped tube B. The open space O around the cone A is connected freely with the water-supply pipe D. This space may be filled with water by gravity

from a reservoir above its level; or the action of the injector may be so arranged that through the exhausting of the air in B and O by the jet of steam a vacuum is produced and water may be thus ˆsucked® up from a well below, if the lift is not more than 15 to 18 feet. The rush of steam through the conical <(combining tube® B drags along with it a conical shell of water lying next the walls of B and encasing a cone- shaped body of steam in its centre. As the

moving steam and water are choked at the apex of B, the steam is compressed, in part condensed and in part absorbed by the water, which takes up its velocity to a large degree and rushes into the apex of the conical tube C. Here the flare of the cone is in the opposite direction and as the column of water moves forward into this tube its velocity lessens as the tube grows larger, and is resolved into pressure, which presently becomes greater than the steam pressure in the boiler by which the

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

Body (back part)

Body (front part)

Body Screw Yoke

Yoke Gland Yoke Packing Nut Yoke Lock Nut Steam Valve Disc and Nut

Steam Valve Spindle Steam Valve Handle Steam Valve Rubber Handle

Steam Valve Top Nut

Monitor Injector with Names of Parts.

13. Jet Valve Disc and Nut

14. Jet Valve Spindle

15. Jet Valve Bonnet and

Nut

16. Jet Valve Gland

17. Jet Valve Lever Handle

18. Jet Valve Top Nut 18a. Jet Tube

18b. Lifting Nozzle

19. Water Valve 19a. Eccentric Spindle

20. Water Valve Bonnet 23. Water Valve Lever

Handle

25. Steam Nozzle

26. Intermediate Nozzle

27. Condensing Nozzle

28. Delivery Nozzle

30. Line Check

31. Line Check Valve

32. Stop Ring

33. Overflow Nozzle

33a. Overflow Chamber with Nut

34. Heater Cock Check

35. Heater Cock Bonnet

and Nut

36. Heater Cock Spindle

37. Heater Cock T Handle

38. Coupling Nut, Steam

End

38a. Tail Piece, Steam End

39. Coupling Nut, Water

End

39a. Tail Piece, Water End

40. Coupling Nut, Delivery

End

40a. Tail Piece, Delivery End

check valve V is kept closed. The valve V then opens and permits the water in C to flow through. At this instant the varying pressures throughout the injector come to an equilibrium, based on the condition of that pressure at which the water flows freely from the injector into the boiler — and that condition continues indefinitely as long as the steam pressure in the boiler remains uniform. Previous to

the establishing of the steady flow, that is, before sufficient pressure obtains, steam and water es¬ cape into the casing space S and make their way out through the overflow valve F, which is normally held closed by a spring. When the flow into the boiler is established the overflow ceases.

The injector for any particular boiler is re¬ quired to be of certain dimensions to suit the pressure of steam with which it must work. However, there are adjustments which may be made to cover the variations to be expected in the normal use of the boiler in question. Thus, steam issuing at the boiler pressure of 65 pounds may be made by the proper configura¬ tion of the conical tubes of the injector to exert a pressure of 90 pounds at the check valve into the boiler. While this pressure is too high for the feeding in of a normal supply of water — that required to replace the water which the boiler evaporates into steam from hour to hour — the pressure in the injector may be modified to a degree by the needle valve N in the steam supply pipe, and the dis¬ charge of the injector into the boiler regulated to a nicety.

The injector works well with water of a moderate temperature, that is, about 75° ; with water above 110° it will not work at all.

The injectors most in use are of the non¬ automatic type, although the automatic sorts are coming more and more into favor. There are also some forms with two injector tubes working into the one discharge chamber which feeds the boiler. This latter type is preferable where the injector is operated with the ex¬ haust steam (of high-pressure engines) which requires a larger steam supply and a larger area in the steam orifices to do the work.

The accompanying diagram is intended only to show clearly the principles on which the injector is able to perform its duty. For a study of the adaptations of these principles the reader is referred to (The Practice and Theory of the Injector, > by S. L. Kneass (New York 1910), or Kent's (Mechanical Engineers' Pocket Book> (New York 1916). Consult also Nagel, O., 'The Transportation of Gases, Liquids and Solids) — by jet machines (New York 1909).

INJUNCTION, a writ issued by a court of equity, bidding, or forbidding, a person or per¬ sons to do a certain thing. The injunction orig¬ inated in Roman law, and was anciently known as an interdict, a name it still bears in Scottish practice. It was introduced as a remedy for some of the abuses of common law, and as a preventive, when evasion of common law pro¬ visions seemed possible. It is to-day one

of the most potent of the legal remedies of an equi¬ table character which stand on the statute books.

There are three main divisions in the pur¬ poses for which a writ of injunction is issued. A writ may be prohibitive, protective, or restorative. In the first place it may forbid the commission of certain acts of a civil nature

which are charged with injustice. Second, it may be so framed as to protect such civil rights of an individual or a corporation as seem to be threatened. Third, it may order the restitu¬ tion or restoration of such rights as have un¬ lawfully been taken away from an individual or a corporation. These characters of the writ have been clearly expounded by Blackstone, as follows :

“This writ may be had to stay proceedings at law, whatever stage they may have reached; to restrain alienations of property pendente life, and tenants for life and others having limited interest from committing waste. It may be granted to restrain the negotiation of bills of exchange, the sailing of a ship, the transfer of stock, or the alienation of a specific chattel, to prohibit assignees from making a dividend, to prevent parties from removing out of the juris¬ diction, or from marrying, or having any inter¬ course, which the court disapproves of, with a ward. The infringement of a copyright or a patent frequently calls for the exercise of this beneficial process ; which may also be had to restrain the fraudulent use of trade marks, or of the names, labels, or other indiciae of the makers or vendors of goods and merchandise, and in a large class of cases, far too numerous to be mentioned here.ˆ

The first two kinds of injunction are most commonly used, and a familiar example of the prohibitory writ is that which orders the abate¬ ment of a nuisance. A railroad which lays tracks without first gaining the right of way may be compelled by injunction to remove them. By such a writ patent rights, copyrights and trade marks are secured from infringement, or proceedings in a court of law are stayed. Some¬ times a court of equity issues an injunction pro¬ hibiting litigants within its own jurisdiction from prosecuting a suit in another jurisdiction; for example, a United States court may restrain creditors for suing in State courts for the en¬ forcement of their claims against a bankrupt, and reserve the disposition of his estate to its own jurisdiction. A court of equity only issues a writ of injunction when a remedy of law ap¬ pears inadequate to give the wronged party the complete relief to which he is entitled. Thus in recent cases the courts have issued writs for¬ bidding labor agitators and others from induc¬

ing or coercing workingmen, in such a way as to bring on a strike to the injury and damage of employers, who might thus be induced to sacrifice their rights in order to escape ruin or irreparable loss.

An. injunction in the United States mav be preliminary or perpetual. A preliminary writ is sometimes styled interlocutory, as it is issued pendente life. The preliminary writ may be made perpetual, if, after arguments made and heard, the court decides that the grounds ad¬ vanced for the continuance are valid, and have been so proved by evidence. Failure to obey' an injunction is punishable as a contempt of court (q.v.). Consult Beach, C. F., 'Treatise on the Law of Inj unctions) (New York 1895) ; High, J. L., 'Treatise on the Law of Injunc¬ tions as Administered in the Courts of the United States and England) (Chicago 1905) ; Joyce, H. C., 'Treatise on the Law Relating to Injunctions* (3 vols., Albany 1909) ; Kerr, W. W., 'Treatise on the Law and Practice of In¬ junctions* (4th ed., London 1903).

INJUNCTION, Government by. See

Government by Injunction.

INJUNCTION, Theatrical, a term applied to a mandate issued by a court of »equity, to compel or prevent the performance of some act for which money damages would not prop¬ erly compensate the injured party. Relief by injunction in matters pertaining to theatricals is probably more frequently sought than in any other business or profession, and prece¬ dents in law established in this class of cases have become of considerable importance. At first, courts of this country and England re¬ fused to grant injunctions against actors for the purpose of compelling them to perform their contracts, a learned justice saying: <(The court could not regard as law the old adage that (a bird that can sing and will not sing must be made to sing.) y) But latterly, when the service of an actor became recognized and it was made to appear clearly that an actor or singer, by intelligence, education and other artistic accom¬ plishments and talents, was of extreme im¬ portance to one who had invested money in the production of a play or opera it was held that a court of equity would by injunction enforce a covenant in a contract. But this has simply gone to the extent of compelling a fulfilment of the contract, or forcing the artist to remain idle during its term. The services of every actor will not be enjoined. He must actually possess some exceptional

merit, so that his services' may be termed special, unique and extraordinary, and it must be shown they can¬ not be fulfilled by any other person without injury to the employer. In the case of Lumley v. Wagner, the courts of England enjoined Johanna Wagner, a prominent prima donna of the early 50's from appearing at Covent Garden Opera House, London, in violation of her contract with Lumley; and then for the first time the British courts asserted their authority over contracts of actors, and granted an injunction forbidding her rendering pro¬ fessional services for any but her original employer.

In the United States, the Federal courts recognized the right of a manager to have the exclusive services of his employee, and in Mc¬ Call v. Braham an injunction was granted which prevented Lillian Russell from violating her contract. In the State courts, the case of Augustin Daly v. Fanny Morant Smith (49 How. Pr. 150), Superior Court Justice Freed¬ man also appreciated the fact that the ancient rule had been abrogated and the modern one compelling actors to live up to their agreements, as other individuals, was there enforced. The contract must unquestionably be fair.' The rights of both parties to it must be equal. In other words, if the contract gives the manager the right to terminate it by giving notice before the expiration of the contract, a like right of termination must also be given the actor; and as stated before, the actor's services must be special, unique and extraordinary. In this latter connection, it seems uncertain where to draw the line. In the case of Carter v. Fergu¬ son the court refused to grant an injunction to Mrs. Leslie Carter against William J. Ferguson, an actor, saying that his services were not so special and unique as to warrant a court of equity's interference. In Charles Hoyt v. Loie

Fuller, the court granted an injunction against the dancer, holding that a serpentine dance in the performance of which she became famous, warranted the court's interference by injunction. 1 9 George Edwardes, the London manager, v. Cissie bitzgerald, the New York Supreme Court granted an injunction against Miss Fitzgerald, on the theory that a certain wink of her eye used in a play was of special merit, and a draw¬ ing card. In Harris v. Sparks, an injunction was granted against John Sparks, the Irish comedian, the ground being that his portrayal of an Irish character was special, unique and extraordinary. While in the still later case of Shubert Brothers v. Aimee Angeles, imitations given by the performer were considered so spe¬ cial, unique and extraordinary as to warrant the granting of an injunction. Each case, however, must be determined by its own peculiar circum¬ stances. In the Harrison Grey Fiske v. Tyrone Power case, the court refused to grant an in¬ junction against Tyrone Power, although his ability as an actor was exploited in the news¬ papers, on

the ground that his services were not so special, unique and extraordinary as to justify an injunction. But in guarding the rights of an actor, the courts will see that no advantage has been taken of him by the man¬ ager, and that the manager for whom he is to perform is of such financial responsibility as to insure the salary of the actor. In the case of Rice v. D'Arville, Edward E. Rice, the theatrical manager, sought to restrain Camille D'Arville from performing for others; but on the defense that Rice was insolvent and in¬ debted to her on a previous contract, Justice Oliver Wendell Holmes, then of the Massachu¬ setts Supreme Court, would not compel her to perform for Rice.

Injunctions in the theatrical profession are not confined to actors and actresses, but are often invoked to prevent the piracy of a play or the use of a name. Where a play or a scene from a play has been copyrighted, the Federal courts alone have jurisdiction of the matter, and will by injunction prevent anybody from per¬ forming or producing it as their own. When there has been no copyright the common law protects the work, as well as its title ; and the use of a similar name, or a name which is apt to deceive the public into the belief that it is the one already used by an author, will likewise be enjoined. An instance is the case of Charles Frohman v. Arthur Fraser, where the use of the title (

INJURIES, Industrial. See Accidents, Causes and Prevention of; Workmen's Com¬ pensation.

INJURY, in law, an act by which the rights of another person or of the state are violated and for which the party whose rights are so invaded may institute action for damages against the perpetrator. Wrongs called damna absque injuria are those acts while injuring another do not permit the latter the right to enter an action, there being no remedy for such acts. See Crime; Criminal Law; Equity; Tort.

INK, a colored liquid used for writing and printing. It comprises various classes, as writ¬ ing and copying, black or colored, India, print¬ ing and lithographing inks.

For long ages past the best black writing- ink has been made by mixing together solutions of nutgalls and of ferrous sulphate of iron, known as green vitriol, and holding in colloidal suspension, by aid of

a gum, the colored sub¬ stance produced. The gallo-tannic acid present in a freshly prepared solution of galls, upon exposure to the air, changes gradually largely into gallic acid, and the protoxide of iron changes into peroxide. The color of this changed product is much deeper than that of the original mixture. It has been found that the permanency of the writing is greater if the ink is used before this conversion is fully com¬ pleted. The change is held in check by having present in the ink a slight amount of some free volatile acid, such as hydrochloric. The trace of acid also serves to hold the iron color in the state of colloidal suspension or solution. The moulding to which such an ink is liable is checked by adding to it a trace of some anti¬ septic, such as carbolic acid. All known com¬ mercial substitutes hitherto used for nutgalls in black writing-ink produce a fluid somewhat inferior to that from nutgalls.

An exhaustive scientific investigation of the chemistry of ink to determine the best ingre¬ dients and the proportions to be used of the same for the producing of the most permanent black writing-ink has been made in Germany by Osw. Schluttig and Dr. G. S. Neumann, and published in their work on (Die Eisengallus- tinten,* issued by Zahn & Jaensch of Dresden in 1890. Their conclusions were followed in pre¬ paring the specifications for the official (

It must be a gallo-tannate of iron ink, not inferior in any essential quality to a typical standard for comparison which has been properly prepared after the following formula, in which all the ingredients are of the quality prescribed by the United States Pharmacopoeia, and the per cent of true acid present in the sample of tannic acid used has been determined by the Loewenthal and Schroeder method.

Take of pure, dry Tannic Acid, 23.4 parts by weight; crystal Gallic Acid, 7.7 parts; Ferrous Sulphate, 30.0 parts; Gum Arabic, 10.0 parts; diluted Hydrochloric Acid, 25.0

parts; Carbolic Acid, 1.0 part; Water, sufficient to make up the mixture at the temperature of 60° F. to the volume of 1000. parts by weight of water.

Inks submitted will be subjected to the following tests, as compared with the typical normal standard ink described above: (1) A fluid ounce allQwed to stand at rest in a white glass vessel, freely exposed in diffused daylight for two weeks to the light and air, at a temperature of 50° to 60° F., pro¬ tected against the entrance of dust, must remain as free from deposit upon the surface of the ink or on the bottom or sides of the vessel. (2) It must contain no less iron, and

must have a specific gravity of 1.035 to 1.040 at 60° F.ˆ (3) It must develop its color as quickly. (4) After a week's expos¬ ure to diffused daylight the color must be as intense a black when used upon the standard record paper, and it must equally resist changes from exposure to light, air, water, or alcohol. (5) It must be as fluid, flow as well, strike no more through the paper, nor remain more sticky immediately after drying.

To such an ink a slight amount of some one of the water soluble coal-tar colors is usually added to give the desired initial color to the ink when used in writing.

Cheaper grades of black writing-ink are pro¬ duced by substituting for the nutgalls other tannin containing substances, or by using log¬ wood. In these other iron salts, or salts of other metals are sometimes used, as of copper, aluminum or chromium. For special purposes some of these have certain advantages. For copying, for instance, the ink made from log¬ wood with alum cake and chromate has the highest efficiency known. This ink, however, fades out after a few years' exposure to the open air and daylight.

Within modern times colored liquid solu¬ tions have come much into general use as inks, made up with aniline and other dyestuff colors. They are easily and cheaply made, flow nicely from the pen, and allow of a great variety as to choice in coloring, but none of them have the permanency of the ancient nutgall iron ink on exposure to light and air.

The usual basis of commercial marking inks, for use on textile fabrics, is some salt of silver. The permanent color of this ink is developed through the action of light, heat or some chem¬ ical, after the ink has been applied. The usual basis of India ink is an exceedingly finely di¬ vided solid carbon, mixed with a size to hold it in suspension when the ink is prepared for use by being ground up with water. (See India Ink). Printing ink consists of dry pigment, black or colored, ground very fine and mixed with varnish and a few minor chemicals as it may be desired for various purposes. For black printing ink, lampblack and linseed oil were originally employed, but gas-black has taken the place of the former, and the scarcity and high cost of linseed oil has led to much substitution; one of the most common is rosin oil. For pigments, the inorganic or earthy bases are preferred, but of late years a line of coal-tar products has been evolved that yield exceedingly brilliant colors though less per¬ manent than the earth bases. Pigments require very careful grinding. The mills are water- cooled, but nevertheless heat under the pressure and friction on the rolls when grinding is

con¬ tinued too long, to remove the last vestige of grit ; the ink thickens, and becomes so pasty that it has to be thinned down before it will flow through the fountain of a printing press. This thinning process tends to lighten the color, that is render a dense black slightly gray. Manufacturers of printing inks are required to produce very thin, cheap ink for rapid printing on newspaper presses, and whole series of better

grades of black adapted to presses operating at speeds varying from 500 to 20,000 impressions per hour. They are also called upon to supply all conceivable shades of color in all qualities, and adapted to all varieties of paper. The re¬ sult is an almost infinite number of grades and kinds of ink for typographic and lithographic work. The temperature of a press room much affects the working of ink. A desirable ink must not dry readily on the type from the ink rollers, but must dry quickly on the paper. To hasten drying, the ink makers insert material called a (

Bibliography. — Astle, (Origin and Progress of Writing* (1803) ; Carvalho, (Forty Centuries of Ink) (1904) ; Champour and Malepeyre, fabrication des Enc.res) (1895) ; Dieterich, (Pharmac. Manual > (1904) ; Fehling, (Hand- worterbuch Chemie (Vol. VII, 1903) ; Francis, ˆPrinting for Profit) (1917).

Bennett F. Davenport, M.D., Expert on Written Documents , the Writing, Ink and Paper.

INK DRAWING. See Art Drawing.

INKBERRY, or WINTERBERRY, an

evergreen shrub ‘(Ilex glabra) of the holly family native to the Atlantic coast from Massa¬ chusetts to Florida, also to Alabama and Mis¬ sissippi. Its slender and flexible stems are two to four feet high and its leaves, about an inch in length, are lanceolate, of leathery texture, and present a shining upper surface. It bears small, very black berries which are valued for decora¬ tion. Formerly its bark and leaves were used medicinally, especially in fevers.

INKERMAN, ink-er-man’, Russia, a vil¬ lage on the site of a ruined towrn in the Crimea, at the head of the harbor of Sebastopol, 35 miles by rail southwest of Simferopol. It gives its name to the sanguinary

battle fought on the heights overlooking the town, on 5 Nov. 1854, when the Russians unexpectedly attacking the British camp were repulsed with great slaughter, losing in killed 3,000 and in wounded 6,000, the loss of British and French allies being 850 killed and 3,500 wounded.

INLAND WATERWAYS. Detailed de¬ scriptions of the navigable streams, lakes, bays and canals of the United States are given else¬ where in this Encyclopedia under Waterways of United States. Most of these waterways have been utilized for a long time, and in fact, had greater use in years past than under present conditions of competition of rapid railway serv¬ ice. However, the United States Congress in every session makes large appropriations in the River and Harbor Bill for waterway improve¬ ments and there is great general interest in pro¬ viding suitable ship canals to develop water traffic in various directions. One of the most prominent projects is that of a continuous in¬ land water route along the Atlantic Coast from Massachusetts to the Gulf of Mexico. The <(Atlantic Deeper Waterways Association" with large and influential membership has yearly con¬

ventions (9th in 1916) to urge that the govern¬ ment should make provision for this project. The plan is to deepen canals now in existence and dig some new ones, about 131 miles in all at an estimated cost of $50,000,000. There can be no question as to the importance of such a waterway to facilitate coastwise commerce and in time of war it might be a most useful avenue for the movement of supplies especially if off¬ shore traffic should be menaced by an enemy.

The advantage of such an inland route is well shown by the cost of shipwrecks along the Atlantic Coast in the decade from 1900 to 1910; it is estimated that there were 4,700 wrecks in this time with loss of 2,200 lives and destruction of about $40,000,000 of property. The unfor¬ tunate congestion of freight on railroads in 1916 — 18 has done much to revive interest in inland waterways and brought conviction that they are a necessary addition to our transporta¬ tion facilities. Much of the desire for speedy transit of freight is unwarranted and wasteful of fuel and energy. Railways and waterways must work in accord. Suitable legislation can remove hurtful railroad competition so that capital can be safely invested in waterway pro¬ jects with prospects of reasonable profits. Canada and New York State both present ex¬ cellent object lessons of the great advantage of inland waterways for the development of local commerce. Europe with her many exten¬ sive canal systems has long since demonstrated the utility of waterways. Low cost of trans¬

portation is a most important factor in com¬ petition along nearly all commercial lines and many industries are crippled by expense of long land hauls of supplies or products. The low cost of wheat transportation mainly by water from the great fields of western Canada to Europe gives Canada considerable advantage in this item alone.

The Inland Waterways Commission created by President Roosevelt on 14 March 1907, con¬ sisted of Sen. Theo. E. Burton, Chairman, Sen. F. G. Newlands, Sen. Wm. Warner, Hon. John H. Bankhead, Gen. Alex. Mackenzie, W. J. McGee, F. H. Newell, Gifford Pinchot and H. Knox Smith. Its purpose was to prepare a report on a comprehensive plan for the im¬ provement of the rivers of the United States to increase their usefulness as navigable water¬ ways. The investigation of conditions for flood control and water power development were important features of the work. Various reports were prepared and Congress was recommended to make provision for various im¬ provements, some of which have been incor¬ porated in subsequent river and harbor bills. It is estimated that there are on the mainland of United States about 25,000 miles of navigated rivers and this amount could be doubted by im¬ provement. There are 2,500 miles of canals, many thousand miles of regularly navigated waters in lakes and bays, and more than 2,500 miles of sounds, bays and bayous. Some of these water bodies can be connected by canals to form inner passages paralleling the Atlantic and Gulf coasts.

In the last few decades in the United States most inland waterways have not been economi¬ cally successful excepting in giving access to certain ports. Long distance river and canal transportation under the blighting effect of railroad opposition has steadily declined. Most

of the canals have passed into the control o.f railroad companies and the rivers -are closely paralleled by railroad lines. The general desire for fast freight service has had a powerful in¬ fluence. Proper regulation of this competition and the deepening and other improvement of the waterways so that they can be utilized more economically will change this condition and they will become an important factor in cheap trans¬ portation. Canada with a 21-foot waterway from ocean to Great Lakes has a notable com¬ mercial advantage. The great railroad con¬ gestion in 1917-18 could have been avoided or greatly diminished by waterways suitable to carry

part of our great freight burden. It has been estimated (by Mulhall) that in Europe there are more than 77,000 miles of navigated waterways of which 13,293 miles are canals, the latter costing considerably more than $1,000,- 000,000. South America has important inland waterways and for centuries China has had thousands of miles of canals which afford cheap transportation over a large part of the country. Floods are an adversary of river waterways, mainly in damage they cause to the channel but they can be controlled by reservoirs and re¬ forestation. These latter features of develop¬ ment also have great economic advantage in affording water power and adding to lumber resources. Another incidental improvement in some areas is the drainage and reclamation of swamp lands, affording increased acreage for farming and bettering health conditions.

Bibliography. — Report of Inland Water¬ ways Commission, 60 Congress, 1st Session, Document 325 ; Report of Commission on Water¬ ways from Delaware Bay to Chesapeake Bay, 59th Congress, 2d Session ; Senate Document 215, 1907 ; Report of Special Board of En¬ gineers, New York Bay to Chesapeake Bay, 63d Congress, 1st Session; House Document 196, Washington 1918; Report of 9th Convention of Atlantic Deeper Waterways Association, Phila¬ delphia, 12-15 Sept. 1916, Philadelphia 1917; Quick, Herbert, American Inland Waterways* (New York 1909) ; Hepburn, A. Barton, Arti¬ ficial Waterways of the World) (New York 1914) ; Report of Army Engineers, Lakes-to- the-Gulf deep water way, published in 1909 ; Johnson, Emory R., (Ocean and Inland Water Transportation* (1911).

N. H. Darton,

United States Geological Survey.

INLAYING is the art of producing an or¬ namental surface by inserting varicolored forms and substances and reducing the whole to a smooth uniform condition, but with a pattern formed by the contrasting material introduced. Its essential difference from mosiac work (q.v.) is that mosaic is mainly made up of very small surfaces, while inlaid work is additional to a surface, as of wood on ivory, already existing,

to add to its beauty. Various kinds of metal or wood, or pearl, ivory, etc., are employed in this process, which is now applied chiefly to the production of ornamental articles of fur¬ niture. When wood of one color is inlaid with others of different colors, as in ornamental de¬ vices in flooring, it is generally called parquetry, the various pieces of wood being usually dis¬ posed in regular geometrical figures.

Marquetry or marqueterie is simply the French term for inlaying. The art of inlaying iron or steel with

other metals, as gold or silver, is called dam¬ ascening. Buhl and reisner work, once highly prized, have lost much of their celebrity. The former took its name from Buhl, an Italian resi¬ dent in Paris in the reign of Louis XIV, and the latter was designated after Reisner, a German who not long after settled in the same city. Buhl for the most part inlaid brass on tortoise¬ shell, Reisner a dark wood on a tulip-wood ground. The usual instrument for cutting out veneers for inlaying is a fine saw, mounted in a bow or arched handle, and worked in short quick movements. Three or four veneers are sometimes cut simultaneously in this way. In¬ laying with stone, in which the Florentines have long excelled, is called pietra dura, and differs from mosaic in having the holes not cut through the ground, which is commonly of black marble, but only to a regulated depth. An Indian variety of inlaying, in which the inlaid metal occupies more of the surface than that which forms the ground, is called Kuftgari; and in another variety, Tutenague or Bederywork, small pieces of silver are hammered into spaces previously cut in the ground, which consist of one part of copper to four of pewter, and is thus both hard and easily cut.

INLIER. See Outlier.

INMAN, Henry, American artist : b. Utica, N. Y., 20 Oct. 1801 ; d. New York, 17 Jan. 1846. From early boyhood he manifested a taste for art, and in 1814 J. W. Jarvis, the portrait painter offered to receive him as a pupil, and he was bound an apprentice for seven years. Upon the conclusion of his apprenticeship he devoted himself to portrait painting. In 1832 he married and settled at Mount Holly, near Philadelphia. He was one of the founders of the National Academy of Design and one of its vice-presidents. Among his most character¬ istic portraits are those of Chief Justice Mar¬ shall, Lafayette, William Penn, Martin Van Buren, Fitz-Greene Halleck, J. J. Audubon, Horace Binney, Nicholas Biddle and Bishop White. Many of his portraits are to be found in public buildings in New York, Albany and Philadelphia. He painted also landscape, genre and history. The best known of these are

INN, a river of Europe which issues from a lake at the foot of the Piz Longhino in the Rhaetian Alps, at an altitude of about 8,000 feet, forms a series of small lakes, the best known of which is that of Saint Moritz, then flows

northeast through the deep and narrow valley of the Engadine, in the Swiss canton of the Grisons, enters the Tyrol at Martinsbruck, passes Innsbruck, Hall, and Kufstein, and shortly after enters Bavaria. At Miihldorf it turns east till it receives the Salza, where it be¬ gins to form the boundary between Austria and Bavaria, and joins the right bank of the Dan¬ ube at Passau, after a course of over 300 miles. On account of its rapid current it is of little importance as a navigable river, but it is used extensively to bring timber rafts down to the Danube from the well-wooded mountain regions of its upper section. Consult Greiuz, R., (Von Innsbruck nach Kufstein Eine Wan- derung durch das UnterinntaP (Stuttgart

1902).

INN AND INNKEEPER. In Great Brit¬ ain inns are houses where travelers are fur¬ nished, for the profit of the provider, with food and lodging, and may be set up without license by any person, provided he refrains from selling excisable liquors, which, of course, require a license. Hotels, public-houses, tav¬ erns, victualing-houses and coffee-houses are all inns when the keepers of them make it their business to furnish travelers with food and lodging; otherwise they are not. In the United States the equivalents of inns are the road¬ houses, hotels in cities and saloons in rural districts. See Hotel; Hotels in America; Taverns.

INNATE IDEAS, in epistemology *and in metaphysics, are ideas as of right, wrong, free¬ dom, immortality, and of God, supposed by some to inhere in the mind, in which case they are opposed to acquired ideas, and synonymous with inborn or inherited ideas. But innate has also another meaning. Not infrequently it is understood as synonymous with natural, essen¬ tial, necessary, abstract, pure, a priori, trans¬ cendental, or with universal. > In the sense of inborn, innate conveys a notion of something temporal. At the outset of this article, it may be admitted, without hesitation, that no inborn ideas exist at all. But likewise, it must be granted that innate ideas, as synonymous with the Kantian a priori, as of God, etc., not only exist, but they have both objective validity and are among the most certain cognitions grasped by the mind of man. For the formal sciences, pure mathematics, logic and pure natural sci¬ ence, are not inborn or inherited, but yet are most certainly a priori, and therefore innate in one (the legitimate second sense) of the word. The term innate as

applied to ideas was not, as some say, first employed by the phi¬ losopher Descartes. Long before his works appeared, innate, as applied apparently to inborn ideas, was in common use in England, and it is to be found in a poem of Sir John Davis, published four years before Descartes was born. The title of this poem tells us expressly that there are innate ideas in the soul. Then with the taunting question put to Descartes the ques¬ tion of innate ideas enters modern philosophy. The prevailing misapprehension with respect to the doctrine usually ascribed to this philosopher can only be accounted for by supposing that the opinions of Descartes have been more fre¬ quently judged from glosses of his nominal followers than from his own works. Among those who seem to have misunderstood Des¬

cartes was the lively but superficial philosopher Voltaire. As Descartes not only has been mis¬ understood by Voltaire, but also by a number of others, it may not be amiss to quote him (as the passage in which his elucidation of his conception occurs is very rare), and let the reader judge for himself.

((When I said that the idea of God is innate in us, I never meant more than this, that Nature has endowed us with a faculty by which we may know God; but I have never either said or thought that such ideas had an actual existence, or even that they were species dis¬ tinct from the faculty of thinking. I will even go further, and assert that nobody has kept at a greater distance than myself from all this trash of scholastic entities, in so much that I could not help smiling when I read of the numerous arguments which Regius has so in¬ dustriously collected to show that infants have no actual knowledge of God while they remain as yet unborn. Although the idea of God is so imprinted on our minds, that every person has within himself the faculty of knowing God, it does not follow that there may not have been various individuals who have passed through life without making this idea a distinct object of apprehension, and in truth, they who think they have an idea of a plurality of Gods, have no idea of God whatever.® ((Cortesii, Epist.,* Pars. I, Epist. xcix). For Voltaire's misrep¬ resentation of this idea of Descartes the reader may turn to Voltaire's ((Letter 13,® in his bet¬ ters on the English Nation. J A number of Dutch divines whose opinions differed widely from those of Descartes, found it convenient to shelter their solemn nonsense under his estab¬ lished name. No doubt some of Voltaire's strictures might have found an application there. It is probable too, as Hume says, that no more was meant by those who denied innate ideas than that all ideas were copies of our impressions. Dr. Cudworth, who felt that there are some ideas of the mind not stamped upon it from sensible objects without, and therefore which arise from the innate vigor and activity of the mind,

enumerates a rather complete group of such innate ideas. He divides them as follows into two groups: (1) Ideas of wis¬ dom, folly, prudence, imprudence, knowledge, ignorance, verity, falsity, virtue, vice, honesty, dishonesty, justice, injustice, volition, cognition, ((nay,® he says ((of sense itself® as a species of cognition, and which is not perceptible as an idea by any sense. (2) Ideas of cause, effect, means, end, order, proportion, similitude, dis¬ similitude, equality, inequality, aptitude, inapti¬ tude, symmetry, asymmetry, whole, part, genus, species, and the like.

Perhaps no word in philosophy has been responsible for more confusion than the word idea. In Plato what in logic is called an uni¬ versal, that is the common nature which thought recognizes in different particular things. Nowadays it sometimes means an opinion, sometimes mental images and sometimes it ap¬ pears merely as an element in a paraphrasis as in (

Some of the greatest names in European philosophy are associated with the discussion of the question of innate ideas. Besides those already mentioned are Newton, Clark, Male- branche, Lord Shaftesbury, Hobbes, Locke,

Hume, Leibnitz, Cousin and Kant. What the followers of Cousin term universal, necessary and absolute, those of Descartes designate as innate ideas. The difference between the phi¬ losophers is more verbal than real. Hobbes, indeed, in his zeal against Descartes, appears to have been not conscious of the fact that his conception of time as the mere (

INNER LIGHT, The, or INWARD LIGHT. A doctrine especially emphasized by the Quakers. The teaching is that within every soul there is a revelation of God. There is a revelation of God in Nature, there is a revela¬ tion of God in the Bible, but there is also the Inner Light revealing God. It may be only a seed and may not come to perfection, for its call may be denied. It differs from the Metho¬ dist doctrine of the witness of the Spirit in that it is recognized as always residing in the heart, while the witness of the Spirit comes from without through experience. It differs from the conscience, because its function is not to determine the difference between right and wrong but to illume the soul and make it aware of the presence of God. Consult Barclay, Rob¬ ert, ‘An Apology for the true Christian Di-

vinity) ; Bradford, Amory H., ‘The Inward Light* (1905).

INNER RHODES, or INNERRHO- DEN. See Appenzell.

INNES, in’es, Alexander Taylor, Scottish jurist: b. Tain, Ross and Cromarty, Scotland, 18 Dec. 1833; d. Edinburgh, 27 Jan. 1912. He was educated at Edinburgh University, and was admitted to the Scottish bar in 1870. He was an authority on Scottish Church law and wrote (The Law of Creeds in Scotland) (1867, and brought down to date in 1902) ; ‘Church and State: A Historical Handbook* (1890); (Studies in Scottish History) (1892); ‘The Trial of Jesus Christ> (1899); ‘Scottish Churches and the Crisis of 1907. J

INNES, Cosmo, Scottish lawyer and an¬ tiquary: b. Durris, 9 Sept. 1798; d. Killin, 31 July 1874. He received his education at the Edinburgh High School and at Glasgow and Oxford universities. In 1822 he passed as a Scottish advocate, became sheriff of Moray in 1840, and subsequently was appointed clerk to

the Second Division of the Court of Session. In 1846 he was elected to the chair of history in the University of Edinburgh. He is best known, however, as the author of ‘Scotland in the Middle Ages) (1860) ; ‘Sketches of Early Scotch History * (1861) and volume I of ‘Acts of the Scottish Parliament.* He pub¬ lished also a volume of lectures on ‘Legal Antiquities* (1872), and was the author of several memoirs, including one of Dean Ram¬ say. Consult the memoir by his daughter, Mrs. Hill Burton (1874).

INNES, Thomas, Scottish historian: b. Drumgask, Aberdeenshire, 1662 ; d. Paris, 28 Jan. 1744. At 15 he was sent to Paris, where he studied at the College of Navarre and the Scots College, of which latter body his eldest brother was principal after 1682. Thomas re¬ ceived priest’s orders in 1692, and after three years of mission work at Inveraven, Banffshire (1698-1701), returned to Paris, and became prefect1 of studies in the Scots College. To pursue his researches he paid a visit or two to England and Scotland; and Wodrow, who saw him at Edinburgh in 1724, describes him as “a monkish, bookish person, who meddles with nothing but literature.® Withal, he was a staunch Jacobite, but no Ultramontane, and is said to have been tainted with Jansenism. He may justly be looked on as the precursor of Niebuhr and Niebuhr’s successors; for his ‘Critical Essay on the Ancient Inhabitants of Scotland) (2 vols. 1729) is much the earliest of all scientific histories. It was meant for an introduction to a ‘Civil and Ecclesiastical His¬ tory of Scotland,* one volume of which, com¬ ing down to Columba’s death, he prepared for the press, while another,

bringing down the narrative to 831, was left incomplete. Both were edited for the Spalding Club by Grub (Aberdeen 1853). The aim of the whole work was “to counteract the inventions of former historians (Hector Boice), and to go to the bottom of the dark contrivances of factious men (George Buchanan) against the sovereignty of our kings® ; and though he thus wrote with a purpose, his honesty and acumen were such that the work retains a permanent value. Con¬ sult ‘Memoir) by Grub; Chambers’ ‘Biograph¬ ical Dictionary of Eminent Scotsmen* (Glas¬ gow 1837) ; ‘Dictionary of National Biography * (Vol. XXIX, London 1892) ; Forbes. ‘An Ac¬ count of the Familie of Innes) (compiled 1698; first printed, Aberdeen 1864).

INNESS, George, American painter : b. Newburg, N. Y., 1 May i825 ; d. Bridge of Allan, Scotland, 3 Aug. 1894. His art educa¬ tion began in boyhood and when 16 years of age he learned map engraving. He first at¬ tempted nature sketching in 1843, when he showed such promise that he was admitted into the studio of Regis Gignoux, New York; but soon opened a studio for himself and through the liberality of a patron was enabled to visit Europe. After spending 15 months in Italy and one year (1850) in France he finally made his home at Eagleswood, near Perth Amboy, N. J. He was looked upon as the first among Amer¬ ican landscape painters, and was not only a clever and imaginative interpreter of the scen¬ ery among which he lived, but a man of intel¬ lect, a thoughtful yet bold theorist on art sub¬ jects and an incisive critic. He had a keen

appreciation of American scenery, and the sky and atmosphere of the eastern States were sympathetically portrayed with an earnestness that recalls the sentiment of the Fontainebleau- Barbizon school. His early paintings are dis¬ tinguished by conscientious care for detail, vivid perception of color, and the panoramic breadth of a bold and unconventional original¬ ity. After 1878 his style had ripened, and his technique grew simpler and less highly elabor¬ ated. He was willing to sacrifice all cleverness of touch in handling detail for the sake of portraying the emotion, or transitory effect of light and cloud in a landscape, the perturba¬ tion of storm or wind, the pageant of sunset, or the magic calm of a moonlight scene. In such productions his command of color was very remarkable. His pictures are much prized by connoisseurs, and when offered for sale com¬ mand high prices. Five of them are in the Metropolitan Museum of Art, New York. Among the finest are ‘Under the Greenwood) ; 1 Close of a Stormy

Day> ; ‘Pine Groves of Barberini Villa) ; (An Autumn Morning) ; (Autumn Gold) ; ‘The Edge of the Forest* ; ‘Passing Storm) ; (Moonrise) ; ‘Winter Morn¬ ing, Montclair, New Jersey. > Consult Caffin, C. H., ‘American Masters of Painting) (New York 1902) ; Daingerfield, E., ‘George Inness, The Man and his art> (New York 1911), and ‘Fifty Paintings by George Inness) (New York 1913) ; Trumble, A., ‘George Inness, a Memorial > (New York 1895).

INNESS, George, Jr., American painter: b. Paris, France, 5 Jan. 1854. He is the son of George Inness (q.v.), the landscape painter, whose pupil he was at Rome in 1870-74, and of Bonnat at Paris in 1875. He began to exhibit at the National Academy in 1877, and became a member of the National Academv of Design in 1899. In 1899 he obtained a gold medal at the Paris Salon. His manner is forcible, and skilful in color. His work includes landscapes and animal subjects, among them ‘The Pride of the Dairy> (1878); ‘Pasture at Chemung*; ‘A Mild Day* (1887), and ‘Morning on the River) (1902). A great deal of his later work has appeared in the Century Magazine with which he has been connected since 1913. He wrote ‘The Life, Art and Letters of George Inness> (1917).

INNISFAIL, or Isle of Destiny, the name frequently applied to Ireland by the bards and sometimes also by Anglo-Irish writers.

INNISKILLING. See Enniskillen.

INNOCENT, tihe name of 13 popes, as fol¬ lows :

INNOCENT I, Saint: b. Albano; d. 12 March 417. He succeeded Anastasius I as bishop of Rome in 402. He supported Saint Chrysostom (q.v.) when the latter was driven from his see of Constantinople through the machinations of the Empress Eudoxia. Rome was pillaged by Alaric in 410, during his pontifi¬ cate. He is commemorated by the Roman Catholic Church on 28 July. His correspond¬ ence is edited in Migne, ‘Patrologia Latina)

(Vol. XX).

INNOCENT II (Gregorio de’ Papi, or Papareschi) : b. Rome; d. 23 Sept. 1143. He was elected Pope in 1130 by a part of the cardinals, while the others elected Peter of

Leon, who took the name of Anacletus. Inno¬ cent fled to France, where he was acknowledged by the Council of Etampes, by Louis VI, and soon after by Henry II of England; also by the Emperor Lothaire, who conducted him in 1133 to Rome, where he occupied the Lateran,

while Anacletus occupied the Castle of Cres- centius, the church of Saint Peter, and a large part of the city and maintained himself against Innocent until his death in 1138. He held the second Ecumenical Council in the Lateran, which condemned Arnold of Brescia and his heresy, declared all the decrees of Anacletus null, and excommunicated Roger of Sicily, who had supported the latter. Roger, however, obliged Innocent to acknowledge him as king, absolve him from excommunication, and invest him and his heirs with Apulia, Calabria and Capua. His letters are published in Migne, 'Patrologia Latina> (Vol. CLXXIX, Paris

1844-64).

INNOCENT III (Giovanni Lothario Conti) : b. Anagni, Italy, 1161 ; d. Perugia, Italy, 16 July 1216. On the death of Celestine III (1198) he was unanimously elected at the age of 37. Innocent, in the vigor of manhood, en¬ dowed by nature with all the talents of a ruler, possessed of an erudition uncommon at that time, and favored by circumstances, was better qualified than any of his predecessors to elevate the Papal power. By his clemency and pru¬ dence he gained over the inhabitants of Rome, obliged the imperial prefect to take the oath of allegiance to him, and directed his attention to every quarter where he believed that a papal claim of property or of feudal rights existed. He concluded treaties with many cities of Tus¬ cany for the mutual protection of their liberties and those of the Church, and soon obtained possession of the ecclesiastical states in their widest extent. He excommunicated Philip Augustus, king of France; laid the kingdom under an interdict in 1200 because Philip had repudiated his wife Ingeburga, and obliged the king to submit. He was still more decided in his treatment of John, king of England, who refused to confirm the election of Stephen Langton as archbishop of Canterbury. Inno¬ cent laid the kingdom under an interdict, and in 1212 formally deposed him. John was finally obliged to submit, resigned his territories to Rome, and received them as a papal fief from Innocent. All Christendom acknowledged the Pope's spiritual sovereignty; two Crusades were undertaken at his order, and his influence extended even to Constantinople. Innocent was one of the greatest popes and rulers. It has been said of his rule, as of that of Gregory VII, whom he most resembles, that in those times the power of the Pope was salutary as a bond of union for Europe, in which the still firmer bond of a common civilization and knowledge did not, as at present, exist. In 1215 he held a council, the fourth Lateran and twelfth general which passed the decree making confession and communion obligatory at Paschal time. Frederick II was acknowledged as German emperor, and the Franciscan and Dominican orders were confirmed.

His corre¬ spondence is in Miene (Vol. CXIV-CXVIII). Consult Von Hurter, ‘Geschichte des Papstes Innocenz III und seiner Zeitgenossen* (4 vols., 3d ed., Hamburg 1841-43) ; Luchaire, ‘Innocent IIP (Paris 1904-08) ; Mann, ‘Lives of the

Popes in the Early Middle Ages’ (London

1914).

INNOCENT IV (Senibaldi di Fieschi) : b. Genoa; d. Naples, 7 Dec. 1254. He was Pope from 1243-54 and was perpetually at feud with the German emperor Frederick and his successors. They came to terms in 1244, but these were misinterpreted and Frederick set out to capture Innocent. The Pope fled to. Lyons where he called a general council to decide the issue (1245). It was not until after Freder¬ ick’s death that Innocent was able to return to Rome (1253). Conrad IV, Frederick’s succes¬ sor, continued the strife, for which he was ex¬ communicated in 1254. He died a few weeks later, and his cause was espoused b}’ Manfred, his natural son, who, placing himself at the head of Moorish troops, defeated the Papal. army in December of that year. Innocent survived this defeat by five days. He published a commen¬ tary on the Decretals of Gregory IX, first printed at Strassburg (1477). Consult Weber, cDer Kampf Zwischen Papst Innocent IV und Kaiser Frederick IP (Berlin 1900).

INNOCENT V (Pietro Idi Tarentasia) : b. Savoy, 1225; d. Rome, 22 June 1276. He was of the Dominican Order, taught at Paris, and became Archbishop of Lyons (1271). Shortly afterward he became Cardinal. His pontificate lasted only from 20 January to 22 June of the year 1276. The struggle between the Guelphs and Ghibellines occupied his short reign, as well as efforts to reclaim the Eastern Church for Rome. Innocent V published com¬ mentaries on the Bible and on the sentences of Peter Lombard. Consult Gregorovius, F., (His¬ tory of the City of Rome in the Middle Ages’ (Vol. VI, London 1898) ; Pastor, L., (History of the Popes’ (Vol. I, London 1906) ; and.Car- boni, (De Innocentio V, Romano Pontifice’ (Rome 1894).

INNOCENT VI (Etienne d’ Albert) : b. Mons, France; d. 12 Sept. 1362. His pontificate extended from 1352 to 1362, and during this period the Papal residence was at Avignon. He was a man of great learning, and encouraged education and literature. Petrarch lived at his court

for a time. Consult bibliography under Innocent V, above, and Pastor, L., (Innocent VI et Blanche de Bourbon, lettres du pape' (ed. by Daumet, Paris 1901).

INNOCENT VII (Cosmo de' Migliorati) : b. Sulmona, Abruzzi, Italy, 1366; d. Rome, 6 Nov. 1406. He was Pope from 1404 till his death, but was opposed by the antipope, Bene¬ dict XIII, who held his court at Avignon. Con¬ sult Gregorovius, F., (History of the City of Rome in the Middle Ages' (Vol. VI, London

1898).

INNOCENT VIII (Giovanni Battista Cibo) : b. Genoa, 1432; d. 25 July 1492. He was descended from a noble family of Genoa. Paul II made him Bishop of. Savona, and he was appointed cardinal by Sixtus IV. He became Pope in 1484 and was for some time at war with Ferdinand of Naples and held the sultan Bajazet's brother Zelim a prisoner. He showed marked favoritism to the various members of his family. He made his natural son, who had been born to him before he began his ecclesi¬ astical career, ruler of several towns near Rome, and married him to the daughter of Lorenzo

de'Medici. For this favor on the part of the Medicis, he made the 14-year-old Giovanni de'Medici a cardinal. Consult Scrdonaii, (Vita e fatti d'Innocenzo VIII' (Milan 1829).

INNOCENT IX (Giovanni Antonio Fac- chinetti) : b. Bologna, Italy, 1519; d. 30 Dec. 1591. He studied law, and later was appointed bishop by Pius IV. After the Council of Trent, he became nuncio at Venice, which post he held for six years. Under Gregory XIII, he was cardinal, and was well favored by this pope's successors. He occupied the papal chair only from the 29th of October preceding his death. He published a number of works on philosophy and politics.

INNOCENT X (Giovanni Battista Pam- fili) : b. Rome, 7 May 1574; d. 6 Jan. 1655. In 1629 he was elevated to the cardinalate and became Pope in 1644. Under him the temporal and spiritual power of the papacy was greatly increased. In 1651 he condemned the Treaty of Westphalia and he formally condemned Jan¬ senism in 1653. Consult Ciampi, Unnocenzo X Pamfili e la sua corte' (Rome 1878) ; Hergen-rother, (Katholische Kirche und christlicher Staat' (Freiburg 1872).

INNOCENT XI (Benedetto Odescal- chi) : b. Como, Italy, 1611; d. 12 Aug. 1689. He served in his youth as a soldier' in Germany and Poland, took orders later and rose through many important posts,

became cardinal in 1645, and was elected Pope in 1676, on the death of Clement X. He was eminent for his. probity and austerity; zealously opposed nepotism and simony, and restrained luxury and excess. He condemned the New Testament of Mons and several other Jansenistic works. He also an¬ athematized sixty-five propositions drawn from the works of modern Causists and condemned Molinos and the Quietists. He determined to abolish the right of asylum exercised in Rome by foreign ambassadors; but Louis XIV would not yield to so just a claim, occupied Avignon, and imprisoned the papal nuncio in France; in consequence of which the authority of the Pope received a severe blow by the IV Propositiones Cleri Gallicani in 1682. These disputes were highly favorable to the English Revolution, as it induced the Pope in 1689 to unite with the allies against James II, in order to lower the influence of Louis XIV. Consult Gerin, (Le pape Innocent XI et la revocation de l'Edit de Nantes' (in Revue des questions historiques, Paris 1878) ; id., (Innocent XI et la revolution anglaise de 1688' (Paris 1876) ; Immich, *Papst Innocenz XI' (Berlin 1900) ; Bryce, (Holy Roman Empire' (New York 1911).

INNOCENT XII: b. Naples, 13 March 1615; d. 27 Sept. 1700. He became archbishop of Naples, a cardinal in 1681 and Pope in 1692. During his pontificate Louis XIV and the French bishops revoked the declaration of the French clergy, and submitted to the. judgment of the Holy See in the matters in dispute dur¬ ing the pontificate of Innocent XI. Consult von Ranke, Leopold, (History of the Popes' (Vol. II, London 1908).

INNOCENT XIII (Michelangelo Conti) : b. Rome, 15 May 1655; d. 7 March 1724. In 1695 he was made archbishop of Tarsus, and became a cardinal in 1707. He was also made

bishop of Viterbo in 1712 and succeeded Clement XI in the papal chair in 1721.

INNOCENTS, Feast of Holy, variously styled Innocent's Day and Childermas, a festi¬ val generally observed on the 28th, but in the Eastern Church on 29 December, in commemo¬ ration of the massacre of the children at Beth¬ lehem, ((from two years old and under," by the order of Herod, with the purpose of destroying among them the infant Saviour. The Church of England at the Reformation retained it in its ritual among its anniversary festivals. Saint Cyprian refers to

these children as martyrs, as does Saint Augustine with still greater explicit¬ ness. It is to them that the hymn of Pruden- tius, (Salvete Flores Martyrum,* is addressed.

INNOCENTS ABROAD, The, a famous book of travels, by Samuel L. Clemens (((Mark Twain”). In a vein of highly original humor this widely-read book records a pleasure ex¬ cursion to Europe, the Holy Land, and Egypt, in the sixties. Descriptions of real events and the peoples and lands visited are enlivened by more or less fictitious dialogue and adventures.

INNOMINATE ARTERY. See Aorta. INNOMINATE BONE. See Pelvis.

INNS OF CHANCERY. Originally build¬ ings or building groups in London set aside as residences for the clerks of the chancery courts. They were 10 in number but have long since ceased to exist as public offices, being now merely incorporated societies. See Chancery.

INNS OF COURT are certain societies in London exclusively invested with the right to call to the bar in England. The colleges of the English professors and students of common law are called inns, the old English word for the houses of noblemen, bishops and others of extraordinary note ‘being of the same significa¬ tion as the French hotel. Societies of lawyers, which before the Conquest held their chief abodes for study in ecclesiastical houses, began to be collected into permanent residences soon after the Court of Common Pleas was directed to be held in a fixed place, — a stipulation which occurs in the great charters both of King John and Henry III. In these houses exercises were performed, lectures read and degrees conferred. The Inns of Court are each self-governing and all have equal privileges, and they are officered by benchers — members of standing at the bar — and stewards, and possess the power of dis¬ barring members in case of serious misde¬ meanor. The inns have extensive ranges of buildings with suites of chambers generally oc¬ cupied by barristers. Each inn maintains a chapel, the Inner and Middle Temple having the joint use of the Temple Church. The four inns of court are: the Inner Temple and Middle Temple (formerly the dwelling of the Knights Templars, and purchased by some professors of law more than three centuries since) ; Lin¬ coln’s Inn and Gray’s Inn (ancienty belonging to the earls of Lincoln and Gray). King’s Inn, Dublin, the legal school in the Irish capital, and the Faculty of Advocates in Edinburgh, the Scottish law incorporation, perform analogous functions with the English inns of court in their respective countries.

INNSBRUCK, Ins’brook, or INN.SPRUCK

(ancient CEnipontum ; locally called Schpruck),

Austrian town and capital of the Tyrol, beauti¬ fully situated at an elevation of 1,880 feet, 59 miles south of Munich, on the banks of the Inn, near its confluence with the Sill, and almost in the centre of the valley of the Inn (Innthal), the sides of which are enclosed by mountains several miles distant, but so lofty (7,000 to 8,500 feet) as apparently almost to overhang the town. It consists of the town proper, sit¬ uated on the right bank of the river, and of five suburbs. It is for the most part well built. The houses are generally of a limestone breccia and from four to five stories high, and built in the Italian style. The buildings most deserving of notice are the Hofkirche, containing the tomb of the Emperor Maximilian I, one of the most splendid monuments of the kind in Europe, though he himself is not interred in it; and the tomb of Hofer; the church of Saint James, with a painting by Lucas Cranach; the Jesuit church, considered the handsomest in the town ; the Capuchin church, with good paintings; the new palace, built by Maria Theresa, a very extensive edifice, with gardens which stretch along the side of the Inn and form an excellent promenade; the old- palace, in which the arch¬ dukes of Tyrol and several of the German em¬ perors used to reside; the university, founded in 1677 and re-established in 1826, well endowed, provided with a great library of 260,000 volumes, botanical garden and cabinet of natural history and attended by about 1,300 students; a gym¬ nasium and several other important educational establishments; and the museum, called Ferdi- nandeum, rich in all the productions both of art and nature within the limits of the Tyrol. The manufactures include woolen, silk and cot¬ ton tissues, gloves, mosaics, glass, etc. As the capital of the Tyrol, Innsbruck is the place of assemblage for its states and the seat of su¬ perior appeal, civil and criminal courts and of many important public offices. Many of the spots in the immediate vicinity have become memorable for the noble exploits which the Tyrolese peasantry performed in the War of Independene. Pop. 53,194, and mainly com¬ posed of German-speaking Roman Catholics.

INNUENDO, in’u-en’do, in law, an inter¬ pretation of words held to be injurious; specifi¬ cally, in an action for libel or slander, an aver¬ ment by the plaintiff that written or spoken words of the defendant, though apparently not actionable, are in reality defamatory. This clause is used in a declaration to explain the meaning of words only when they are ambigu¬ ous in meaning or application. If not iustified by preceding averments, it may be rejected as superfluous. See Libel;

Slander.

INNUITS, m'u-its. See Eskimos.

INO, daughter of Cadmus and Harmonia, second wife of Athamas (q.v.), king of Bceotia, who drew upon herself the anger of Hera by nursing Dionysus, the son by Zeus of her sister Semele. In order to favor her own children she projected the murder of her stepchildren, Phryxus and Helle, who saved themselves by flight. Hera, still more highly incensed, made Athamas, the husband of Ino, mad, and he dashed Learchus, his eldest son bv Ino, against a rock. Ino fled with her youngest son, Melicer- tes, and threw herself with him into the sea. Ino and Melicertes were made sea deities at the prayer of Dionysus. Ino was worshiped

under the name of Leucothea. There are a number of variations of this legend. It formed the basis of lost tragedies by yEschylus, Soph¬ ocles and Euripides, as well as by other Greek and Roman writers. Consult Gruppe, O., (Griechische Mythologie und Religions- geschichte) (2 vols., Munich 1906) ; Preller, L., (Griechische Mythologie) (2 vols., 4th ed.,

1887).

INOCARPUS, I-no-kar'pus, a genus of leguminous plants, having unifoliolate leaves and yellow flowers in axillary spikes. I. edulis is the South Sea chestnut, native of Tahiti. It is a large tree, with luxuriant foliage, the deli¬ cate evergreen leaves being six inches or more in length. It furnishes seeds or nuts much valued in the South Sea Islands, the inhabitants gathering them while green and mashing them for food.

INOCULATION. See Infection; Vac¬ cination.

INOFFICIOUS TESTAMENT, a testa¬ ment under which no provision is made by the testator for his issue and in which no reason is assigned for the omission. In nearly all jurisdictions such a testament is considered void. See Heir; Succession; Testament.

INOSIT (CeHˆOe), from Greek is, inos, a nerve, a muscle), a saccharine substance found in the muscular tissues of the heart, as well as liver, brain, kidneys, etc. It appears both in health and, to an abnormal amount, in disease. It exists also in a number of plants, such as foxglove, potato, kidney-bean, acacia, asparagus, cabbage. See Glucose.

INOUYE, e'no-oo'ya', Kaoru, Marquis, famous Japanese statesman: b. 1835; d. Tokio,

1 Sept. 1915. As a young man he was violently opposed to the intrusion of foreigners at the time when Japan first sanctioned the building of foreign legations in Tokio. Together with his friend Ito, afterward Prince Ito, he set fire to the newly-built British legation as a protest. A secret visit to England in 1864, however, completely changed the ideas of Inouye and Ito. It was forbidden then for Japanese to leave their country, hence visits to foreign lands had to be carried out surreptitiously. The en¬ larged views which Inouye and Ito took back home brought them into collision with their countrymen and led to a murderous attack on the former. The new ideas spread, however; the great clans of Satsuma, Tosa and Choshu rallied to the cause of national regeneration. Inouye was one of the most prominent leaders in the great reform movement that culminated with extraordinary rapidity in the revolution of 1867 and brought Japan at a bound from a condition of Oriental mediaevalism into the front rank of nations. Bows and arrows were still used in the army. In 1870 Inouye became Vice-Minister of Finance in the Okuma ad¬ ministration, his first official appointment. Down to 1898, when he retired from public life, he had held the portfolios of Foreign Affairs, Home Affairs, Finance, Agriculture and Com¬ merce. In every department he displayed re¬ sourcefulness, courage and energy, gaining a reputation, as a great statesman and a builder of modern Japan. In 1894, after the Japanese had driven the Chinese out of Korea, Inouye

was sent to Seoul to reorganize the Korean administration and to superintend the introduc¬ tion of much-needed reforms. At the outbreak of the Russo-Japanese War Inouye, though in retirement, was commanded by the emperor to attend all important councils and to advise the Minister of Finance. He was created a count in 1884 and marquis in 1907. See Japan.

INOWRAZLAU, e'no-vrats'laf, Prussia, town of the province of Posen, 20 miles south¬ west of Thorn. It contains a gymnasium, Kur- haus

and a mediaeval church. Its industrial establishments comprise iron works, sugar re¬ fineries, flouring mills, brickyards, salt works, etc. It has also a large trade in the agricul¬ tural products of the district of which it is the centre. Pop. 26,141.

INQUEST, in law, a formal legal inquiry into special matters, as a death, lunacy, an undefended lawsuit or the like; also, the jury making such inquiry. The term had its origin in remote antiquity. It has been in use in Eng- gland for various purposes for many centuries. It was used not only for official investigation into judicial matters but administrative matters as well.

One of its most important functions, to¬ day, both in American and in English law, is to investigate deaths under certain circum¬ stances, as in prison, where violence is sus¬ pected, etc. The inquest is usually in charge of an officer known as the coroner, but some¬ times it is conducted by a medical inspector, as in some jurisdictions in the United States. The evidence at inquests is taken under oath, after the jury has viewed the body. Often medical experts are called in and a post-mortem exami¬ nation made of the body. If the verdict of the jury in attendance finds any person guilty of homicide, he is committed to prison to await trial. See Coroner.

Another function of the inquest is to deter¬ mine whether the government is the lawful owner of lands or goods by forfeiture or lands by escheat. This proceeding is known as <(inquest of office® or <(office found.® In the United States generally this proceeding is held by a commissioner, or similar official, under the direction usually of the Attorney-General. Still another function of the inquest is to de¬ termine, under the direction of the sheriff of a county and a jury, the amount of damages due from a defendant to a plaintiff in cases in which the defendant failed to appear or answer and judgment was by default. The procedure is also common in cases of garnishment, re¬ plevin and attachment to decide who is entitled to the property in dispute.

INQUILINE, in'kwi-lin, a term applied in zoology to animals which live as tenants within the nests or homes of other animals. The use of the term is almost entirely confined to en¬ tomology and then often restricted to the cases in which the rightful and the intruding tenants are closely related. Similar cases among other animals are commonly designated as commen¬ salism (q.v.), but these and similar terms are used rather loosely. Examples of the inquiline relation occur among the termites, ants and bees, but are known especially among the gall¬ flies (Cynipidco) ; indeed, one entire division, comprising more than

500 species, is named

Inquilin&j because of the predominance of this mode of life. These insects differ but little in structure from the true gall-flies, but they lack the power to produce galls and consequently deposit their eggs within those of other species. They infest certain species of galls, as those of the blackberry and some oak-galls, in large numbers and sometimes more than one kind occur in a single gall. Perhaps the most re¬ markable feature of these inquilines is their frequent close resemblance to the insect which produces the gall which they infest.

INQUISITION, a tribunal or system of tribunals instituted by the Roman Catholic Church for the discovery, examination and con¬ viction of heretics and their punishment by the secular arm. Under the successors of Constan¬ tine in the Roman Empire the repression of heresy, or rather the enforcement of the de¬ crees of Church councils and synods, was a function of the imperial government, which inflicted temporal penalties upon the propa¬ gators of religious beliefs that contradicted the creeds approved by the state. When the reign¬ ing emperor was a favorer of Arianism or any other of the heterodox creeds, the orthodox bishops and their flocks were persecuted; when he was of the orthodox party the heterodox sects were put under the ban. In executing the decrees of the councils the imperial officials, called in the laws of Theodosius and Justinian ˆinquisitors® (inquisitores) , were assisted by the bishops ; but the tribunals were the ordinary secular courts, and judgment was rendered in the name of the state, not the Church. But in the 12th century, when the supremacy of the ecclesiastical power was universally recognized in western Europe, the initiative in the work of repressing heresy was taken by the Church as of course, and the discovery, trial and con¬ viction of the offenders were functions of the ecclesiastical power solely: the secular power simply executed the judgments of the Church tribunals. Boniface VIIFs definition of the respective powers and the mutual relations of Church and state was not proclaimed till the close of the 13th century; but had a similar definition been promulgated in the 12th century it would have expressed the universal sentiment of princes and peoples at the time. The cele¬ brated bull, Unam Sanctam, defines that <(Both swords, the spiritual and the temporal, are in the power of the Church ; yet the one is to be wielded for the Church's behoof, but the other by the Church herself : the one by the hand of the priest, the other by that of the king and the soldier, though at the

will and sufferance of the priest ad nutum et patientiam sacerdotis. And sword must be subordinate to sword — oportet gladium esse sub gladio, and the tem¬ poral authority subject to the spiritual power — temporalem auctoritatem spirituali subjici potestati .®

The first step toward the establishment of courts of inquisition would seem to have been taken, in 1179 when the third Council of the Lateran issued a decree of excommunication against the adherents of the heretical sects of southern France, who are charged not only with holding abominable heretical tenets but also with practising ((unheard-of cruelties against the Catholics,® demolishing the churches and massacring widows and orphans. The Council grants wan indulgence of two years to

those who shall make war on them.® This decree was re-enforced by the Council of Verona (1184) over which Pope Lucius III presided and at which the Emperor Frederic I assisted ; the Council directs the bishops to bring to trial persons accused of heresy and to inflict fit punishment on the guilty. The fourth Council of the Lateran (1215), held in the reign of Innocent III, imposed on the bishops the duty of making a visitation of their dioceses twice or at least once a year either personally or by delegates to see that the Church's laws be enforced. Bishops are authorized to bind the inhabitants of a district by oath to search out heretics and bring them to trial. By the Council of Toulouse (1229) in the pontificate of Gregory IX the search for heretics (inquisitio luzreticce pravitatis) was systematized. The bishops are to name for each parish two or three respectable laymen who shall take oath zealously to search out heretics and to deliver them up to the baillis. Whosoever knowingly conceals a heretic loses all his goods. If heretics are discovered on the estate of a landowner, he incurs the penalties: the house of the heretic shall be torn down. Heretics who recant have to seek a new abode and must wear on their clothing two crosses of different colors until the Pope or his legate permits them to assume the ordinary garb. Whoever abstains from use of the sacraments is held suspect of heresy. A person convicted or suspected of heresy is de¬ barred from the practice of medicine. Lest the ordinary Church authorities should be remiss in carrying out this system Gregory IX named (1232) as <(pontifical inquisitors® monks or friars from outside, chiefly Dominicans; shortly after the pontifical inquisitors were chosen from the order of the Dominicans exclusively. Thus the duty of inquisition was taken out of the hands of the bishops and was discharged by officials, responsible only to the Pope; from the judgments of the inquisitorial tribunals there was no appeal but only to the Holy See : in 1263 Urban IV appointed an inquisitor-general for Provence, as a means of lowering the flood of appeals to Rome. The

institution passed from southern France into the other provinces of that kingdom and into Italy, Germany and Poland. The Inquisition in England was di¬ rected by the metropolitans and their suffragans without being responsible to any inquisitor-gen¬ eral ; but as long as Lollardism disturbed the peace of the Church the search for heretics was prosecuted rigorously: bishops and arch¬ deacons were required twice a year to make inquisition of suspects : any man might be compelled under penalties to inform against persons suspected of heresy; the statute de hceretico comburendo was enacted by the Par¬ liament in 1396.

In Spain the Inquisition, as set up in 1481 by Ferdinand and Isabella, was as much (or more) a political as an ecclesiastical institution : the officials from highest to lowest were appointed by the sovereigns and its action was directed by them without responsibility to the Holy See : Ranke calls the Spanish Inquisition ((a royal tribunal furnished with spiritual weapons® ; Llorente admits as much. The number of per¬ sons put to death under sentence of the In¬ quisition in Spain is put by Llorente at 31,000 from first to last, that is, during 330 years. But Llorente made it impossible to check his state-

ments by burning the original documents. Ranke impeaches his honesty; Prescott says that his estimates are <(most improbable." Cath¬ olic historians call attention to the fact that not only heresy but many other offenses against the laws were judged by the courts of inquisition in Spain, viz. : polygamy, seduction, unnatural crimes, smuggling, witchcraft, sorcery, false personation, etc. At the time when the Inquisi¬ tion flourished, persecution for heresy was a universal practice amongst all Christian peoples, and the methods of punishment inflicted were general throughout Europe. Protestant Eng¬ land persecuted as harshly and vigorously as Catholic Spain, and in both countries denial of the state religion was equivalent to treason.

INQUISITIVE WOMEN ((Le Donne CurioseC, an opera in three acts by Ermanno Wolf-Ferrari (libretto adapted by Luigi Sugana from a Goldoni comedy) first produced in Munich in 1903. The first dramatic work of the composer to secure more than local notice, this opera, or <(musical comedy," as he terms it, quickly achieved world-wide success by reason of its vivacity and delicate charm. # Of German and Italian parentage, Wolf-Ferrari is an eclec¬ tic. The artistic lineage of (Le Donne Curiose) is plainly traceable to Mozart, though both

eistersingeU and , well adapted to the slight tale of harm¬ less intrigue which it accompanies. There are several easily recognized numbers — the trios in the first act, the quartet in the second, Rosaura's love soliloquy and the succeeding pages of al¬ most Mozartean simplicity, the prelude to the last act, the barcarolle chorus and the final en¬ semble. There is no great emotional intensity, nor intellectual depth, but means and end are fitted in a thoroughly artistic and satisfying way.

Lewis M. Isaacs.

INSANE, Institutional Care of the, in the United States. — Previous to the 19th cen¬ tury there was practically speaking no such thing as care of the insane and no hospitals in which to care for them. The mentally ill were either permitted to roam at large, to subsist on begging, and other charities, or indifferently confined with paupers in poorhouses or with criminals in prisons, or perhaps more frequently were cared for as best they could be by their people at home. This latter type of care was often not much better than the care that they received in prisons and in poorhouses because their folks were equally ignorant of how to minister to them.

Previous to the beginning of the 19th century there are recorded here and there laws ad¬ dressed to the problem of the care of the insane. In 1676 a law of Massachusetts delegated the care of the person and the estate of the de¬ pendent insane to the selectmen. In 1798 a law was passed in the same State which provided for the commitment to the house of correction of lunatics who were ((furiously mad." In 1811 the Massachusetts General Hospital was incor¬ porated and the McLean Hospital established

and subsequently opened in 1818. As early as 1650 in Rhode Island we find the Puritan, Roger Williams, making an urgent appeal on behalf of Mrs. Wilson, urging provision for her, whom he describes as a distracted woman. In 1725 a law was passed permitting inland towns to build houses of correction for vag¬ rants and also for <(mad persons." In 1742 the care of all the insane and imbeciles was given to the town council with power to appoint guardians for their estates. In 1828 the Dex¬ ter Hospital was opened and in 1847 the ((Butler Asylum for the Insane." Similar records of legislation are found in a number of the other States, more particularly States along the At¬ lantic Coast. The earliest action in this country providing for the special care of the insane in specially constructed hospitals was taken by the <(Religious Society of Friends" in 1709 and this action resulted in the foundation of the Penn¬ sylvania Hospital in 1751. A portion of this hospital was set apart for the insane and the first patients were admitted in 1752. The first State hospital, however, for the exclusive care of the insane was established in Virginia and is now

known as the Eastern State Hospital, at Williamsburg, Va. It was incorporated in 1768 under the name of the ((Public Hospital for Persons of Insane and Disordered Minds" and its first patients were admitted in 1773. In 1806 an authorization to a hospital in the city of New York was granted to erect additions and provide suitable apartments for maniacs adapted to the various forms and degrees of insanity. Other important dates in the early part of the 19th century were the opening of an institution for the care of the insane at Frankfort, Pa., by the Society of Friends in 3817, the founding of the Hartford Retreat, in Hartford, Conn., in 1824, the opening of the South Carolina State Hospital for the Insane in 1824, of the Eastern State Hospital at Lexington, Ky., in 1824, of the Western State Hospital at Staunton, Va.,. in 1828, of one of the buildings of the Blockley Almshouse for the dependent insane in Philadelphia from 1830 to 1834, the Maryland State Hospital for the In¬ sane in 1832, and the New Hampshire State Hospital for the Insane at Concord in 1842.

From this period on the erection of State hospitals went rapidly forward in the different States of the Union. The first law for the creation of a State hospital in New York was passed in 1842. The Utica State Hospital was opened approximately in 1850. The creation of this hospital, as of many others, was largely the work of Dorothea Lynde Dix (1802-87) whose broad philanthrophy extended over many States of the Union and in Europe as far as Constan¬ tinople. It was through her efforts that insti¬ tutions were erected in Massachusetts, Pennsyl¬ vania, New Jersey, Rhode Island, North Carolina and the District of Columbia. Some 32. institutions in this country owe their existence, in whole or in part, according to her biographers, to her efforts.

These laws and the founding of these hospi¬ tals as above noted show the origin sporadically of those activities which were addressed toward the more humane and intelligent care of the in¬ sane. From the beginning of the 19th century on these activities became more numerous and the demands for better care gradually increased. For the most part, however, throughout the

first half of the century and during a consider¬ able period of the latter half, the insane were cared for in a desultory and unintelligent way, largely by local communities, more especially in the.various

county houses throughout the States. This county house care of the insane placed them on a social par with the paupers, and it not infrequently became a matter of pride to see how cheaply the county could care for these unfortunates. Not only was this true, but the mentally sick patients in the almshouses re¬ ceived practically no medical attention what¬ ever. except as they might be visited occasion¬ ally by the physician who was employed to look after the almshouse patients and who almost always was a practitioner in a nearby town and only spent a brief period at intervals at the almshouse or came out on emergencies when requested. He practically never had any ex¬ perience or any special knowledge of mental illnesses and did little more than look after the physical condition of his patients, generally in a very crude way. The quarters where the mental cases were kept were usually presided over by persons who had no idea of the nature of their problems, were ignorant, often cruel and unsympathetic, so that the lot of these poor people was indeed miserable. They were prac¬ tically prisoners shut out from all intercourse with their fellows, confined in quarters that were often filthy, dark, unsanitary and un¬ hygienic in every particular, dominated by ignorant and not infrequently cruel caretakers, cheaply fed and clothed, with no medical super¬ vision worthy of the name, and without any effort being made in any direction to bring about an improvement or to effect a cure. The most important move toward the latter part of the century which was made for the better and more humane, more intelligent and scientific care of the mentally ill, was the movement in¬ augurated in many of the States for State care, namely, provision by the State of public hospitals for the insane, with the consequent removal from the almshouses of this class of patients and transferring them to the State hospitals.

This was the only solution of the neglect and inefficiency of the county care system. The most fundamental defect of the county care system was that the county was too small a political unit to undertake the problem. It had not enough money to properly equip an insti¬ tution nor did it have a sufficiently broad vision to secure the services of persons competent to handle the problem. All these matters were changed in the State hospitals. The State hos¬ pital was well built, well equipped and for the most part well officered, and the improvement in the care of the insane as a result was very great.

In the first period of State hospital care the main effort was to get away from the abuses of the county system and was directed toward humane and philanthropic efforts. The dealing with the mentally deranged patients as though they were sick and trying to effect a cure was as a matter of fact in the minds of the early hospital

superintendents, but did not prevent them in many instances from making the mis¬ take of creating enormous asylums for the so- called chronic insane and setting apart single institutions for the care and treatment of the acute cases, thus making out of the asylums

places where all hope was lost for those who entered, and overcrowding and overworking the acute reception hospitals beyond their capacity. For many years, for example, the Utica State Hospital at Utica, N. Y., was reserved for the acute cases of the State, while other insti¬ tutions, as they were built, were reserved for the chronic, incurable class. The next move¬ ment was to make out of all of the State insti¬ tutions hospitals in the real sense of that word, places where the patients would be dealt with as actually ill and an effort made to cure them. The first efforts in this direction were crude, consisting largely in endeavors to treat the patients as patients were treated in general hospitals by keeping them in bed, making ob¬ servations upon their general physical condition, taking their pulse, temperature, respirations, examining urine, the internal organs, etc., and treating the physical disease which might be found as a result of such examination. This movement did much toward getting better sur¬ roundings for the patients, it was contempo¬ raneous with the establishment of training schools for nurses in the State institutions, and its general result was a vast improvement in the quality of care.

Throughout this latter period the hospitals had more or less actively been engaged in a study of the problems of mental disease with a view to discovering their scientific bearings. These researches led to the definite establish¬ ment in connection with well-organized State institutions of scientific departments, usually consisting of a laboratory for clinical pathology, and generally also a laboratory for research in pathology. In these laboratories the autopsy material was studied with a view to discovering the correlation between the mental symptoms of the patient and the changes that were found to have occurred in the brain.

Beginning with the latter portion of the 19th century the several States began to appreciate the great extent of the economic problem that was involved in the care and treatment of the insane in their large public hospitals, and there began to be a more or less consistently directed attitude of study of these problems together with a study of methods of administration and control which would look toward higher effi¬ ciency and greater economy. The result has been that in most of the States where there are several institutions for the care of the insane that these institutions are controlled by a cen¬ tral body, a lunacy commission or a board of control, usually appointed by

the governor. Sometimes these boards of control have still larger powers and include all of the charitable institutions. The details differ in the different States, but central control is the thing aimed at. Along with this central control the scientific departments of the institutions increase in im¬ portance and in some instances, as in New York, Massachusetts, Illinois, there are central re¬ search departments for all of the hospitals.

The changes in the outlook for the care of the insane largely as a result of all this scien¬ tific work have been very great. Interest no longer centres in the autopsy room in attempts to correlate pathological findings, and mental symptoms. The interest now is in the hving patient and the scientific institutions have elabo¬ rated their departments of clinical pathology

for the purpose of studying the processes that are going on in the living patient, while psy¬ chological investigations, are becoming much more in vogue with the development of definite interests in psychotherapeutics.

The large housing problem which confronts the several States is still dealt with by the State hospitals, none of which are longer considered, however, as institutions for the chronic insane. All of the hospitals are equipped for taking care of all varieties of illness, mental and physical, acute and chronic. It is recognized, however, that in large centres of population there should be easy access to wards where mental illness could be intelligently handled. The result has been the creation of psychopathic wards or in¬ stitutions in a number of cities : Albany, N. Y., Boston, Ann Arbor, Mich., Baltimore. These institutions care for the great stream of men¬ tal cases which come from large urban popula¬ tions and which ordinarily would be distributed in other wards of the city hospital. For exam¬ ple, the alcoholic wards of Bellevue hospital are under the immediate charge of the psychia¬ trist in charge of the psychopathic pavilion. Thus are the problems of general medicine and psychiatry coming to be considered together and their respective specialists are coming to be of mutual assistance.

As mental disease has come to be considered more and more a matter of defective psycholog¬ ical adjustment and methods of psychotherapy have been more and more applied, the hospitals have reached out into the communities which they serve and through the

intermediation of dispensaries and social workers have endeav¬ ored to extend aid to these communities and also endeavored to assist the discharged patients in rehabilitating themselves in the community. The State hospital, therefore, has come in the past hundred years from a condition in which it was merely a place to confine <(mad)) persons, to be a centre for education in matters pertain¬ ing to mental illness and for the rehabilitation of failures and defects in adjustment for the community in which it is located.

As outlined, the problem of the care of the insane has been gradually evolving as it became progressively larger, first a matter for villages and townships, and for counties, and finally a matter for individual State hospitals, receiving patients from a certain number of counties, then a matter for the State as a whole, govern¬ ing its several State hospitals by a central board. Beyond that there has never been any recog¬ nized statutory central control. The superin¬ tendents of all of the institutions for the care of the insane have been organized into a medi¬ cal society which has now been in existence since 1844, originally known as the Assocation of Medical Superintendents of American Insti¬ tutions for the Insane. Since 1893 it has been known as the American Medico-Psychological Association. This association has through the years been the clearing-house to which annually was brought all institutional problems and has served most eminently in helping along the work of the care of the insane in several States of the Union. This until recently has been the only agency which in any way correlated the work of the several institutions throughout the country. _ In 1909, however, there was organized the National Committee for Mental Hygiene

under the stimulus and as a result of the un¬ ceasing efforts of Mr. Clifford W. Beers. Mr. Beers had himself had a serious attack of men¬ tal illness in the course of which he had been a patient in more than one institution. As a result of his experience he felt convinced of the need of an organization which was independent either of political influence or financial or other personal consideration which would help various hospitals to deal with their problems to better advantage. As always happens in large prob¬ lems the individual elements of which are dis¬ persed over a wide territory, many of the insti¬ tutions and some of the States remained very backward in their care of the insane. There were no members in their hospitals of the cen¬ tral organization, The American Medico-Psy¬ chological Association. As some of the State institutions were as badly off as had been the county asylums, it became the function of the National Committee to endeavor to improve these bad spots throughout the country and in doing so it took an attitude of helpfulness rather than one of criticism

and as a result almost always found that defects in methods were due to ignorance, many primitively conducted insti¬ tutions really believing that they were giving the best possible service that medical science could suggest. Such institutions were quick to avail themselves of the help of the National Committee and a great deal of improvement throughout the country has resulted from its activities. This has been the work of the Na¬ tional Committee until the beginning of the European War, when it turned its attention practically entirely to war work. The great importance, however, which the conduct of this war of necessity attached to mental problems will result in great benefit to this particular department of medicine.

William A. White,

Superintendent Saint Elisabeths Hospital Washington , D. C.

INSANE, Statistics of. Statistical data relating to the insane in the United States are found principally in Federal census reports, the reports of State commissions charged with the supervision of the insane, reports of individual State hospitals and special studies. In 1904 and i-n 1910 the United States Census Bureau issued a special statistical volume relating to the in¬ sane and feeble-minded. Prior to 1904 the data concerning the insane were made a part of the general decennial census report. Beginning with 1850 and continuing to 1890 an. attempt was made at each decennial census of the population to secure a complete enumeration of the insane by inserting a question relative to insanity in the general population schedule. The results down to 1880 were unsatisfactory as it is gener¬ ally believed that only a small portion of the people suffering from mental disorders were enumerated as insane. At the tenth census, 1880, the returns of the enumerators were sup¬ plemented by special reports from physicians The latter reported about 17 per cent of the total number of insane enumerated in that year. In taking the census of 1890 no attempt was made to secure supplemental data from phy¬ sicians. Consequently, the number of insane enumerated in that year did not show an increase commensurate with the growth of the population. In the census of 1900 and of 1910

the question relating to the insane was omitted from the general population schedule. In” 1904 a census of the insane in institutions

was taken by special enumerators appointed for.such pur¬ pose. A similar census was taken again in 1910. In 1917 the National Committee for Mental Hy¬ giene made a special census of the insane in institutions, the data being obtained from schedules filled out by hospital superintendents.

These various enumerations of the insane, while in part incomplete, give a general view of the increase in insanity in the United States since 1850. The following tabulation shows the total insane enumerated at each of the several censuses, together with the number of insane per 100,000 of the population :

Total insane enumerated

Per 100,000

YEAR OF CENSUS

Number

population

1017* .

234,055

227.6

1910* .

1904* .

187,791

150,151

204.2

183.6

1890 .

106,485

170.0

1880 .

91,959

183.3

1870t .

1860f .

1850t .

37,432

24,042

15,610

97.1

76.5

67.3

- No enumeration of insane outside of institutions. _

J Enumeration believed to have been seriously deficient.

The data for the years 1904, 1910 and 1917, which relate to the insane in institutions only, show a remarkable increase of this class of unfortunates as compared with the increase of the general population. The ratio of the insane in institutions to the general population in 1904 was 1 to 545, in 1910, 1 to 490 and in 1917, 1 to 439. It is probable that the actual increase in insanity has not been as great as these figures would indicate. During the last 15 years the practice of placing the insane under institu¬ tional care has been greatly extended. As the institutions for the care of the insane have im¬ proved they have won a greater degree of pub¬ lic favor, ‘and more mild cases of mental dis¬ order have been admitted thereto. As the inci¬ dence of mental disorder’increases with advanc¬ ing age, the lengthening of the average period of human life in recent years has increased the insanity rate by bringing a larger proportion of the population into the advanced age periods. The rate of insanity is found to be much higher in cities than in rural districts. The trend of the population from country to city during the last three decades have therefore been an im¬ portant factor in causing the upward trend of the rate. After all allowances have been made, however, it is believed by those who have, given careful attention to the subject that the

insane are increasing more rapidly than the general population, but that the difference in rate of increase is too slight to be alarming.

Insanity in the Several States.— Owing to various factors, such as institutional provision for the insane, distribution of urban and rural population, the composition of the population with respect to age, nativity and race, marked differences in the ratio of the insane to the general population are found in the various States. The following table shows the insane in institutions in the United States by divisions and States in 1910 and 1917, together with the number per 100,000 of general population in each of the two years :

Insane in Institutions in the United States by Divisions and States 1 Jan. 1910 and

1 Jan. 1917.

Rate per 100,000 of general Number population

1 Jan. 1

Jan. 1

Jan. 1

Jan.

DIVISIONS AND STATES

1910

1917

1910

1917

United States .

187,791 234,055

204.2

227.6

New England .

19,580

23,542

298.8

326.7

Maine .

1,258

1,493

169.5

192.7

New Hampshire .

909

1,098

211.1

247.6

Vermont .

990

1,110

278.1

304. 7

Massachusetts .

11,601

14,096

344.6

376. 1

Rhode Island .

1,243

1,565

229. 1

252.4

Connecticut .

3,579

4,180

321.1

333.1

Middle Atlantic .

52,380

65,145

271.2

296.9

New York .

31,280

38,117

343.2

367.7

New Jersey .

6,042

7,592

238.1

254.7

Pennsylvania .

15,058

19,436

196.4

226.2

East North Central . . . .

41,246

49,686

226.0

251.1

Ohio .

10,594

12,307

222.2

237.5

Indiana .

4,527

5,769

167.6

204. 1

Illinois .

12,839

16,354

227.7

264.0

Michigan .

Wisconsin .

6,699

7,377

238.4

239.9

6,587

7,879

282.2

313.4

West North Central. . . .

22,683

27,516

194.9

219.8

Minnesota .

4,744

5,857

228.5

255.1

Iowa .

5,377

6,367

241.7

286.2

Missouri .

6,168

7,512

187.3

219 6

North Dakota .

628

1,079

108.8

143.4

South Dakota .

864

1,059

148.0

149.6

Nebraska .

1,990

2,485

166.9

194.5

Kansas .

2,912

3,157

172.2

171.5

South Atlantic .

. 19,952

24,758

163.6

185.0

Delaware .

441

484

218.0

225.9

Maryland .

3,220

4,035

248.6

294.9

District of Columbia

2,890

3,082

872.9

840.6

Virginia . . . . . .

West Virginia .

3,635

4,398

176.3

199.7

1,722

2,127

141.0

152.0

North Carolina .

2,522

3,446

114.3

142.5

South Carolina .

1,541

1,642

101.7

100.5

Georgia .

3,132

4,062

120.0

141.2

Florida .

849

1,482

112.8

163.8

East South Central . . . .

9,759

11,231

116.0

124.9

Kentucky .

3,538

4,348

154.5

182.2

Tennessee .

2 , 204

2,518

100.9

109.7

Alabama .

2,039

2,341

95.4

99.7

Mississippi .

1,978

2,024

110.1

103.0

West South Central. . .

8,413

11,971

95.8

116.1

Arkansas .

1.092

1,628

69.4

92.9

Louisiana .

2,158

2,552

130.3

138.5

Oklahoma .

1,110

2,758

67.0

122.8

Texas .

4,053

5,033

104.0

112.5

Mountain .

3,574

4,887

135.7

148.8

Montana .

697

1,083

185.3

232.3

Idaho .

388

540

119.2

123 . 6

Wyoming .

Colorado .

162

1,199

220

1,613

111.0 150. 1

120. 7 165.4

New Mexico .

219

302

66.9

72.4

Arizona .

337

411

164.9

158.3

Utah .

342

474

91.6

108.0

Nevada .

230

244

280.9

224.4

Pacific .

10,204

15,319

243.4

283.8

Washington .

Oregon .

1,987

1,565

3,312

2,309

174.0

232.6

211.5

272.0

California .

6,652

9,698

279.8

325.0

Insane in Foreign Countries. — Available statistics of the insane in foreign countries are very unsatisfactory. The classifications of mental

disorders in the various nationalities are dissimilar and wide variations exist in the provision made for the care of the mentally afflicted. In some cases the insane are enumer¬ ated with the feeble-minded and epileptic and the number of the separate classes is not given.

On account of shell shock and the stresses of armv life, it is believed that insanity has greatly increased in the belligerent countries of Europe since the beginning of the present war, but the conversion of hospitals for the

insane into military hospitals has reduced the number of civil insane in institutions in these countries. Current statistics of the civil in¬ sane in the European countries at war are therefore misleading.

According to the report of the Commis¬ sioners in Lunacy, published in 1914, the insane in England and Wales increased from 36,762 in 1859 to 140,237 in 1914, an increase of 281.5 per cent. During the same period the general population of these countries increased 89.5 per cent. The ratio of insane to the general population in England and Wales on 1 Jan. 1914 was 1 to 266, or 376 per 100,000. During the year 1913 there were 18,407 first admis¬ sions and 3,896 readmissions to institutions, for the insane in these countries. The rate of first admissions during 1913 was 49.9 per

100,000.

The report of the Inspectors of Lunatics for Ireland for the year ending 31 Dec. 1915 gives the number of insane in institutions in Ireland on 1 Jan. 1915 as 25,180, or a ratio of 575 per 100,000 of estimated population. The number of first admissions in 1914 was 2,798, a ratio of 64 per 100,000 of estimated popu¬ lation. The readmissions numbered 730.

In Scotland, on 1 Jan. 1914, there were 18,- 682 insane patients in institutions, a ratio of 394 per 100,000. The admissions in 1913 num¬ bered 2,908, a ratio of 61.4 per 100,000 of esti¬ mated population.

In Australia, on 1 Jan. 1913, there were 16,- 439 insane persons under care, a ratio of 347 per 100,000 of estimated population.

In the Netherlands, on 1 Jan. 1914, there were 13,975 insane persons

in institutions. The admissions during the preceding year num¬ bered 2,897.

The following . table gives a comparison of the increase of insane patients under treat¬ ment in various countries from 1890 to 1910, together with the ratio of the insane to the general population in 1910. Owing to the rea¬ sons above stated the ratios must be taken with some allowance.

Comparison of Increase of Insane Patients under Treatment in Various Countries.

1890-1910.

(Compiled from official yearbooks and census

reports).

Number

T .... Per

Insane m institutions 100,000

‘ – * – > of popu-

1 Jan. 1 Jan. 1 Jan. lation COUNTRIES 1890 1900 1910 in 1910

United States . 74,028 *150,151 187.791 204

England and Wales. . 86,067 106,611 130,553 262

Scotland . ** . 15,229 17,792 376

Ireland . 16,139 21,014 24,269 553

C ranee . 57,418 64,938 74,404 188

Prussia . 30,686 52,503 86,007 217

Italy . $24, 118 $36,845 §45,009 130

Belgium . 10,515 14,603 18,182 245

Netherlands . 6,079 8,139 11,746 200

Norway . 1,369 1,707 2,679 112

Sweden . 2,555 4,269 6,897 125

Switzerland . 4,454 6,648 8,910 238

Australia . ** . $12,427 15,565 285

- 1904. ** Data not available. + 1892. $ 1902. § 1908

Switzerland on 1 Jan. 1916 was caring for 9,916 insane patients in its 24 hospitals. The admissions of the preceding year totaled 4,070.

In Sweden, in 1914, the 18 hospitals for the insane housed an average patient population of 9,610. In 1910 the average number housed

was 7,866. There were 1,978 admissions in 1910. •

In Denmark, on 31 Dec. 1916, the insane in institutions numbered 4,644, a ratio of 168 per 100,000 of the general population.

The insane in public and private institutions in Germany increased from 78,155 in 1891 to 120,872 in 1901. Since 1901, the data in the German yearbooks concerning the insane have included feeble-minded, epileptics, etc.

The total population of the hospitals for the insane in France on 31 Dec. 1912 was 77,237.

Sex of Insane. — The total number of in¬ sane enumerated in institutions in the United States on 1 Jan. 1910, included 98,695 males and 89,096 females ; the total number of insane admitted during the year 1910 included 34,116 males and 26,653 females. The rates per 100,- 000 of the general population were: Males, 72.1 ; females, 59.7; total, 66.1. The ratio of males to females among patients in institutions was 110.8 to 100; and among admissions, 128 to 100. In the general population of the United States in 1910 the ratio of males to females was 106 to 100.

In New York State where the sexes are nearly equally distributed in the general popu¬ lation, on 30 June 1917, there were 18,422 males and 20,342 females in institutions for the insane, a ratio of 90.6 males to 100 females. Among the first admissions to all institutions for the insane in the State in 1917, there were 3,878 males and 3,462 females, a ratio of 112 males to 100 females.

The excess of males among first admissions is largely due to the greater prevalence of general paralysis and alcoholic insanity in this

sex. As patients with general paralysis have a high rate of mortality and patients with alcoholic insanity improve rapidly, the average duration of hospital life is less for males than for females. In the New York civil State hospitals in 1917 the average duration of the hospital life of the male patients who died in the hospitals was 5.5 years, and of the female, 7.2 years.

Age of the Insane.— Mental diseases occur principally during the period of adult life, the rate of incidence increasing with advancing age. The age distribution of the 6,877 first admissions to the New York civil State hos¬ pitals in 1917 as compared with the age dis¬ tribution of the general population of the State in 1910 is given in the following table;

Comparison of Age Distribution of First Admissions, 1917, and of the General Popu¬ lation of the State, 1910.

Per cent

Per cent

First

of total

of general

admissions

first

population

AGE

1917

admissions

of New York

1917

1910

Under 15 years .

12

0.2

27.3

15 to 19 years .

317

4.6

9.2

20 to 24 years .

10.5

10.3

25 to 29 years .

833

12. 1

9.7

30 to 34 years .

835

12.1

8.4

35 to 39 years .

797

11.6

7.8

40 to 44 years .

639

9.3

6.6

45 to 49 years .

604

8.8

5.5

50 to 54 years .

518

7.5

4.6

55 to 59 years .

405

5.9

3.2

60 to 64 years .

342

5 0

2.6

65 to 74 years .

490

7.1

3.2

75 years and over. . .

332

4.8

1 4

Unascertained .

32

0.5

0.1

Total .

. . . 6,877

100.0

100.0

INSANE

153

Causes of Insanity. — Causes of mental diseases are multiple rather than single. Sev¬ eral factors may operate together to cause the onset of a psychosis. Alcohol has always been a prominent factor in the causation of mental disease but its influence seems to have declined in recent years. Syphilis is the primary cause in all cases of general paralysis and of psychoses with cerebral syphilis. Opium and its derivatives, cocaine and other habit- forming drugs cause psychoses in compara¬ tively few cases. Arteriosclerosis by shutting off the blood supply to important parts of the brain prevents this organ from performing its natural functions and thus causes various forms of mental disorder. Blows on the head cause insanity in a similar way bv injuring brain tissues. Fevers and exhausting physical dis¬ eases often give rise to mental disease.

Insanity may also be due to mental causes, such as fear, joy, anger, grief or anxiety.

Abnormal mental make-up in either the temperamental or intellectual sphere is a pre¬ disposing cause in many cases. The abnormal mind gives way to unusual stress while the nor¬ mal mind is able to withstand it. When the stress is prolonged or of extraordinary severity, as in army life, even the normal mind may give way.

The following table shows the relative prominence of the principal definite causes among males and females as reported by the New York State hospitals.

Causes of Mental Disease among First Admissions to the Civil New York State Hospitals for the Insane, for the Year Ending 30 June 1917.

CAUSES

Number of Cases

Per cent

Males

Fe¬

males

Total

Males

Fe¬

males

Total

Alcohol .

655

209

864

18.2

6.4

12.6

Syphilis .

750

212

962

20 8

6.5

14.0

Drugs .

5

12

17

0. 1

0.4

0.2

A b n o r m a

make-up .

1,047

1 ,037

2,084

29.0

31.7

30.3

Injury to head .

30

6

36

0.8

0.2

0.5

Physical illness .

55

73

128

1.5

2.2

1.9

Senility .

247

371

618

6.9

11.3

9.0

Arteriosclerosis .

462

334

796

12.8

10.2

11.6

Epilepsy .

78

73

151

2.2

2.2

2.2

Pregnancy,

childbirth and

lactation .

122

122

3 7

1 8

Death in family.

25

123

148

0.7

3.8

2.2

Loss of employ-

ment and

financial loss .

71

46

117

2.0

1.4

1.7

Disappointment

in love .

18

24

42

0.5

0.7

0.6

Other specified

causes .

212

523

735

5.9

16.0

10.7

Unascertained. .

696

821

1 ,517

19.3

25.1

22.1

Total first ad-

missions. . .

3,605

3,272

*6,877

- As each cause reported was enumerated, the number of causes exceeds the number of patients.

Insane Classified with Reference to Psy¬ choses. — No nation-wide census of the insane in the United States with reference to psy¬ choses of mental diseases has ever been taken. The accompanying table gives the result of a census of the 36,357 patients in the New York

State hospitals taken by psychoses on 1 July 1917. As the patients of the New York State hospitals have been carefully classified with reference to psychoses for the past 10 years this census may be considered representative of the distribution of insane patients in institu¬ tions in the various clinical groups. As the duration of hospital life of patients in some groups is much longer than in others the dis¬ tribution of the patients in the hosoitals with respect to psychoses varies considerably from that of the newly-admitted cases. This is shown clearly in the accompanying table.

Distribution by Psychoses of Insane Pa¬ tients in Civil State Hospitals in New York State and of First Admissions to such Hospitals in 1917.

PSYCHOSES

Patients in civil State hospitals,

30 June 1917

First

admissions year ending

30 June 1917

Num¬

ber

Per

cent

Num¬

ber

Per

cent

Traumatic .

53

0. 15

18

0.3

Senile .

With cerebral arterioscle-

1,238

3.41

585

8.5

rosis .

469

1.29

395

5.5

Dementia paralytica .

1 ,370

3.77

866

12.6

With cerebral syphilis . . . . With Huntington’s chorea.

122

0.34

43

0.6

24

0.06

10

0. 1

With brain tumor .

With other brain or nerv

14

0.04

8

0. 1

ous diseases .

127

0.35

38

0.5

Alcoholic .

1,788

4.92

594

8.6

Drug and other toxic .

29

0.08

15

0.2

Infective-exhaustive .

Allied to infective-exhaus-

52

0.14

99

1.5

tive .

27

0.07

20

0.3

Autotoxic .

15

0.04

19

0.3

Manic-depressive .

2,716

7.47

833

12.1

Allied to manic-depressive.

1,116

3.07

303

4.4

Involution melancholia . . .

785

2.1(3

201

3.0

Symptomatic depressions .

25

0.07

17

0.3

Dementia precox .

19,544

53.76

1,475

21.5

Allied to dementia precox . Paranoic conditions and

1,273

3.50

311

4.5

paranoias .

1,634

4.49

135

2.0

Epileptic .

1,223

3.36

142

2 1

Psychoneuroses .

162

0.45

77

1 1

Constitutional inferiority .

503

1.38

108

1.6

Mental deficiency .

1,319

3.63

179

2.7

Unclassified . .

705

1 94

297

4.3

Not insane .

24

0.06

89

1.3

Total .

36,357

100.00

6,877

100.0

Movement for Uniform Statistics of the Insane.— As previously pointed out, statistics of the insane until recent years dealt prin¬ cipally with the number enumerated in various States and countries without regard to the kinds of mental disease with which they were afflicted. In fact, the absence of a generally accepted classification prior to 1917 prevented the collection of national statistics of mental diseases. The first bureau of statistics for the study of mental diseases was established in 1908 by the New York State Commission in Lunacy (now the State Hospital Commission). The Commission adopted a

uniform classifica¬ tion of mental diseases for use in its 13 State hospitals, and required the medical officers of each hospital to submit to the Commission's statistician a statistical card report concerning each case admitted, readmitted, discharged or deceased. From such cards yearlv statistical reports have been prepared and published, and

the cards have been filed according to identifi¬ cation number and psychosis. Ihe Commission now (1918) has a file of uniform cards of about 60,000 first admissions — the largest col¬ lection of systematic data concerning mental diseases in the world. By combining the cards received from all the hospitals for a series of years, the bureau is able to make intensive studies of the separate mental diseases.

The success of New York's pioneer work led the American Medico-Psychological Asso¬ ciation to undertake a movement for uniform statistics of the insane throughout the United States. At the meeting of the Association held in Niagara Falls in June 1913, a special committee was appointed to devise ways and means of securing uniform statistical reports from institutions for the insane. This com¬ mittee, after prolonged conferences, submitted its final report to the Association at the annual meeting held in New York in May 1917. The report recommended the adoption of a new classification of mental diseases and submitted outlines of 18 statistical tables for use in the annual reports of institutions for the insane. The committee stated that ((the lack of uni¬ formity in hospital reports at the present time makes it absolutely impossible to collect com¬ parative statistics concerning mental diseases in different states and countries, and extremely difficult to secure comparative data relative to the movement of patients, administration and cost of maintenance and additions® ; and that the ˆimportance and need of such uniform data have been repeatedly emphasized by offi¬ cers of the association, by statisticians of the United States Census Bureau, bv editors of psychiatric journals and by administrative offi¬ cers in various states.® ((Such data,® the com¬ mittee adds, <(should serve as the basis for con¬ structive work in raising the standard of care of the insane, as a guide for preventive effort, and as an aid in the progress of psychiatry.® The report of the committee was unanimously adopted and a standing committee on statistics was appointed to secure the adoption of the new classification and statistical system by Federal and State authorities. In February 1918, such standing committee affiliated with the National Committee for Mental Hygiene which had received a

special gift for statistical work.

Through the co-operative work of the tAVO organizations a uniform. system of statistics of mental diseases was put into operation in nearly all the State hospitals for the insane in the United States during the summer of 1918. The surgeon-general of the army, in September 1917, adopted practically the same system for use in the Division of Neurology and Psychiatry.

The Association's classification of mental diseases which forms the basis of the new statistical system consists of 22 groups of principal psychoses, some of which are sub¬ divided into more or less distinct types. The classification is not regarded as final, but it constitutes the first successful attempt to secure uniformity in the designation of mental diseases in the United States.

Bibliography. — Census reports, Insane and Feeble-minded in Institutions, 1904 and 1910; (Insane, Feebleminded, Epileptics and Ine¬ briates in Institutions in the United States, Jan. 1, 1917, > by Horatio M. Pollock, Ph.D.,

and Miss Edith M. Furbush, A.B., B.S. ; New York State Hospital Commission Reports 1908 to 1917; Report of Committee on Statistics of the American Medico-Psychological Associa¬ tion, 1917; Statistical Manual for use in Insti¬ tutions for the Insane, published by the Bureau of Statistics of the National Committee for Mental Hygiene, 1918; Statistical yearbooks of foreign countries.

Horatio M. Pollock.

INSANE ASYLUMS, Cottage System or Village Plan. A form of construction for in¬ sane asylums and charitable institutions, in which large buildings are replaced by detached cottages. The cottages vary in size from those which will accommodate six to a dozen patients to larger ones which will accommodate 20 or more. They are usually constructed either in groups or along streets and avenues as a vil¬ lage. In the former, the several groups are given up to a particular industry as a farm group, where the patients are employed at farming, and others, as the garden, the brick yard, shop industries, etc., all of these being a part of one institution on a single large estate. In the village plan the institution is laid off in streets and avenues, and has the appearance of an ordinary village, each cottage having a flower garden in front, shade trees, etc. In either plan, there is conveniently located near the centre of the plant an administration build¬ ing, a hospital for the sick and those requiring special care, a bakery, a

laundry and other utility buildings. The cottages may be con¬ structed of wood or other material, and the cost of construction is small as compared with the old plan of asylum construction. It is, be¬ sides, more homelike, more convenient for ad¬ ministration and permits of indefinite expan¬ sion. Some of the best-known institutions constructed on this plan are Alt-Scherbitz near Leipzig; Gabersee near Munich, Germany; the Saint Lawrence State Hospital at Ogdensburg, N. Y., and the Craig Colony for Epileptics at Sonyea, N. Y.

INSANITY. This is a purely legal term.

Its use as a medical term should cease as it leads to interminable confusion and defeats the ends of justice. The confusion is very old however and will take time to eradicate. Insanity then simply represents certain legal situations which by reason of one or another disease, chiefly involving the brain, render the individual responsible or not responsible for a criminal act, an act of contract making or of making a will. If, according to the evidence adduced before a properly constituted legal tribunal, it is decided that the individual's acts in question were not responsible, or he did not have contract capacity, or he did not possess testamentary capacity, because of some disease, injury or defect of the brain, then the indi¬ vidual in question has thrust upon him a legal status — insane. It is necessary to insist upon the purely legal character of the situation — because the tests for responsibility for contract capacity, for testamentary capacity vary with every jurisdiction. Thus a man may be insane in New York and sane in New Jersey, or vice-versa. He only has to step over the line. Certainly this is not a medical concept of a disease. No disease can change by crossing a territorial line. Thus it must come about that the word insane — insanity, etc., must be con-

i Purely, to its legal usage — or better abolished entirely.

The confusion arose in the days of the Roman law, and law is such a conservative in¬ strument it is hard to eradicate old conceptions. In Roman days all brain diseases were lumped mto one. The Romans despised Greek subtleties, they said, just as most stupid people despise their superiors in intelligence. The Greeks had separated various brain diseases and gave them different names. They were really a scientific people. But the Romans had a pas¬ sion for organization. They lumped all of these very diverse diseases and called them Insania ,®

To them insania was a brain dis¬ ease. What are really different brain diseases, they called “forms of insanity.® This is a false and nonsensical concept and leads to much mischief in our present law court practice. Thus in New York State the legal test for re¬ sponsibility is whether the individual knows nature and quality of an act and knows whether it is wrong. There are a number of very severe and chronic mental illnesses which totally destroy an individual’s responsibility, but such individuals may still retain this purely intellectual test. New York State would electro¬ cute such seriously sick individuals and commit an act of gross injustice. In New Jersey — another feature is added to this test — namely, the capacity to resist an impulse, and in other States other tests. The whole test business is largely a farce, and is founded on the totally erroneous idea in the minds of law givers that there is such a disease as “insanity® and that it has different (

INSANITY, in the legal sense, such a de¬ gree of mental unsoundness as to call for the restraint of the person afflicted or to justify the authorities in depriving him of the management of his property and affairs. An insane person comes in contact with the law (1) when he suffers from such unsoundness of mind that it is necessary for his own or the public welfare that his liberty be restricted; (2) when he is incapable of managing himself or his affairs, or of directing their management; and (3) when a plea of insanity is entered on his behalf in answer to a criminal charge. Insanity in a

legal sense includes only questions of life or property, competency and responsibility, and ability to transact the affairs o*f life. Accord¬ ing to the law of the United States, the modern view is that whether a person is or is not in¬ sane is in every case a question of fact.’ The courts are quite liberal in attempting to sustain wills of persons who are not wholly insane. If a person has sufficient understanding to com¬ prehend the nature of. the testamentary act, knows the nature of his property and shows clearly that he could decide why he wanted his property to go to the beneficiaries named, his will is usually received and probated. An insane person is responsible for his torts. He is crim¬ inally responsible for his actions, unless from defective mental power or from mental disease he cannot understand the nature of his acts, or does not know that his act is wrong, or is un¬ able to. control his conduct — unless, in the last case, his want of control arises from his own fault. An insane person must sue or defend an action through his guardian ad litem. A per¬ son confined against his will as insane is enti¬ tled to a writ of habeas corpus and a judicial inquiry as to the legality of his detention.

INSCRIPTIONS. The term inscriptions comprises, in its widest sense, all words or word-signs engraved (or painted) on relatively durable materials such as natural cliffs, wrought stone, baked clay, metal or even wood. For reasons of practical convenience, however, cer¬ tain sorts of inscriptions are grouped apart; for example, legends on coins and the lettering Pn painted vases. The etymological sense of inscription (Latin inscriptio, <(in-scratching®) is not to be taken so strictly as to exclude raised lettering. The. role of inscriptions in modern times accords in general with the ancient use, but is much less extended. Then, copies of offi¬ cial and religious documents were frequently promulgated in the form of inscriptions, a usage that no longer survives, though commemora¬ tive and titular inscriptions are still plentifully employed. In general, inscriptions serve one of two purposes: (1) they constitute a record, and the material containing them is wrought for the express purpose of receiving the inscription (example, known from literature only, Moses' stones tables that held the decalogue) ; (2) the object on which the inscription is engraved ful¬ fils a purpose of its own, while the lettering in¬ dicates the name, nature,, purpose, maker or owner of the material object (commemorative column, mirror, ring, etc.). To. these may be added another class, (3) the incidental inscrip¬ tion, a notice or entry upon an object not prepared to receive it.

Inscriptions furnish materials of value to students in many fields. To the historian — and we must understand history to be the life- record of the nation and its citizens — they supply evidence of great value, all the more valuable because nearly always contemporane¬ ous with the facts recorded. The incidental as well as the formal record may bear testimony. An example of this sort has been found on the leg of a colossal •statue at Abusimbel in Nu¬ bia, whereon Greek mercenaries who had as¬ cended the Nile under the leadership of Psam- metichus — more probably the second (594-589 b.c.) than the first (654-ˆ617) of that name — traced a brief notice of their expedition. The

incidental inscription is particularly apt to fur¬ nish details valuable for social history. To the archaeologist inscriptions of the second class furnish testimony of value for topography (witness the fragments of the marble Forma Urbis,- an ancient inscribed plan of the chief buildings of Rome) and for the precise identi¬ fication of statues and other works of art. The discovery of inscriptions is among the express tasks of the excavating archaeologist, who thus supplies the raw

material, so to speak, for the historian or philologian. To the philologian inscriptions yield the key to the history of writ¬ ing and, if his interests lie in the comparative and historical study of words, give him a fuller knowledge of their form. To the philologian of literary interests, inscriptions yield a knowl¬ edge of historical fact or of vocabulary that may lead to a correct interpretation of a dif¬ ficult literary passage. For example, the Greek historian, Thucydides, records (6.54) an altar inscription set up by Peisistratus (527-510 b.c.), which, he says, was still <(in clear evi¬ dence,® but <(in dim letters.® The identical in¬ scription was found in 1877, with lettering per¬ fectly distinct, and the literary interpretation of <(dim® had to be revised and brought into accord with the facts. Meantime, the archae¬ ologists had learned that red or blue paint was employed to bring out more clearly the let¬ tering of Greek inscriptions, and it was easy to infer that not the incision but the coloring of this inscription was dim in the time of Thucydides. Inscriptions previously known from literary works have for the philologian the added value of yielding testimony con¬ cerning the reliability of the manuscript tra¬ dition. Thus the best manuscript of Thucy¬ dides is of the 10th century a.d. and, as the last in a long chain of copies, must have been exposed to a great deal of corruption in trans¬ mission. The fact that a treaty recorded by the historian (5.47) corresponds almost ex¬ actly with the (fragmentary) inscription re¬ cording the alliance is reassuring for the MS. tradition. The litterateur even, may be con¬ cerned with material furnished by inscriptions. One of the most considerable fragments of the poet Simonides, for example, has reached us in a copy on stone of an epitaph (epigram) in honor of the Megarians who fell in the Persian VVar. Some literatures have survived only as inscriptions.

It is safe to declare that inscriptions are as widely diffused as the art of writing. Even a primitive picture, if painted to convey a mes¬ sage, would constitute an inscription. Hiero¬ glyphics (conventionalized picture writing) constitute the most primitive type of writing, and inscriptions of this sort, in the Maya lan¬ guage, are found in Yucatan. Though prob¬ ably not earlier than the discovery of America, these represent, as regards writing, the same stage of culture as the hieroglyphics of Egypt (4700 b.c.) . Chinese inscriptions — the Chinese being a highly conventionalized ‘hieroglyphic script — of 1200 b.c. are also extant. The Mayan (and Aztec) system, is still very im¬ perfectly understood. Egyptian hieroglyphics were likewise long undeciphered, but in 1822 the Rosetta Stone (q.v.), a trilingual in Greek, demotic Egyptian, and hieroglyphics whereon the names Ptolemy and Cleopatra were of fre¬

quent occurrence, furnished a clue to the hiero¬ glyphics which had been conventionalized, through a syllabary, to a pure phonetic system.

- This means, to invent an instance, that

a picture (symbol) representing motion [— (to) go] comes to be used for the syllable go in a proper name like Goshen (this step was taken by Aztec hieroglyphics), or in a word like gopher: and that in the last stage the

syllable sign go reduces to the letter g. –

The decipherment and interpretation of Egyp¬ tian inscription belongs to the science called Egyptology. See Egypt.

The cuneiform script, invented by the Ac- cadians of Chaldaea, found its way to the Se¬ mites of Babylonia and Assyria. This was a syllabary, developed from an earlier pictorial system, and such it remained in those coun¬ tries, where not only small objects like seals and cylinders, but whole libraries of clay tablets (reaching back into the 4th millennium b.c.), have been found. These tablets contain genu¬ ine literary works as well as the documents and announcements commonly included under the term inscriptions. The University of Pennsylvania is in possession of some 35,000 cuneiform documents, a collection particularly rich in fourth and second millennium records, and outnumbered only by the British Museum and the Louvre collections. The Tell-el-Am- arna Letters are historically among the most noteworthy cuneiform inscriptions. Found by an Egyptian peasant woman in 1887, the collec¬ tion is now split up between the Berlin and British museums, though a part remains in Egypt. These tablets contain a correspondence between three kings of Egypt (15th century b.c.) and the rulers of Babylonia, Assyria, Armenia, the states of Asia Minor, Syria and Palestine. Of transcendent importance for the early political history of western Asia, this correspondence is also accounted to confirm the validity of the Hebrew Scriptures as an historical record. It is noteworthy for the history of culture that the petty chief of every town could command the services of a scribe able to write a letter in Assyrian — the common correspondence language, it would seem, of all those countries. The sci¬ ence of Semitic Cuneiform belongs to Assy- riology (q.v.).

Fortunately the Assyrian syllabary, after being borrowed by the Medic Aryans, was con¬ verted into an alphabetic system. King Darius (521 b.c.) caused an Old Persian (Protomedic) inscription of 413 lines, averaging 6 feet each, with versions in Neo-babylonian and Neo-ela-

mitic, to be inscribed on the Great Rock of Behistun, at a height of 400-500 feet. The same script had been observed on another short in¬ scription found at Persepolis, which evidently contained proper names chiefly. As early as 1802 Grotefend allocated the names Darius, Xerxes and Hystaspes to certain script groups in these brief formulae, and correctly isolated nine of the 13 symbols concerned. In course of time the entire Protomedic cuneiform alpha¬ bet was identified and subsequently the more complex Semitic syllabaries were worked out, resulting in the decipherment, of the older cuneiform. In the Behistun inscription Da¬ rius, following precedents of Assyrian kings, summed up the history of his accession and

reign. _ Copied in 1844 by Mr. H. C. Rawlin- son, it has been carefully inspected again (1903) by the American scholar, Mr. A. V. W. Jackson.

Farther west, the Phoenicians, also Semitic, developed, perhaps from Egyptian hieroglyphics, a true alphabet, out of which sprang, on the one hand, the scripts used by the Hebrews, Arabs, Persians and Hindus, and on the other the Greek (and Roman) type. The most not¬ able early inscription in alphabetic Semitic is the Moabite Stone (q.v.) (9th century b.c.), which recounts the victory of Mesha, king of Moab, over Israel. The language used differs but slightly from that of the Hebrew Scrip¬ tures, of the historical validity of which the Moabite Stone, like the Tell-el-Amarna Let¬ ters, is held to be in general confirmatory. [For facsimile, transcript and translation consult Hastings' dictionary of the Bible> (III, p. 405 seq.)]. Phcenician-Greek bilinguals from Cyprus, belonging to the 4th century b.c., are extant; also Phcenician-Cypriote, which furnished the key to the Cypriote syllabary. Punic inscrip¬ tions proper are chiefly of the dedicatory sort, and relatively late, all after the Greek period. Aramaic dockets on Assyrian contract tablets (8th century b.c.) form another instance of early alphabetic Semitic.

India also has its inscriptions. The oldest (250 b.c.) and most interesting are the religious edicts of King Piyadassi, known as the Asoka Edicts, which are engraved on rocks and pil¬ lars. They inculcate the religion and morals adopted by this king after his conversion to Buddhism. These inscriptions, in two un¬ known alphabets (Karosthi and Brahml), were deciphered chiefly by James Prinsep, who, in the winter of 1837-38, single-handed, unraveled the Brahml script. He guessed that in certain brief Brahml inscriptions,

plainly of a votive character, a frequently recurring final group of letters must stand for the notion (

Greek and Roman inscriptions have been more studied and are accordingly more sys¬ tematized for study than any others. The an¬ cient Greeks were themselves conscious of the importance of inscriptions. Herodotus used them as sources, and Thucydides and Xeno¬ phon quoted them. Decrees are sparingly mentioned by Isocrates, but freely quoted by Demosthenes, who probably made use of the papyrus originals from the department of ar¬ chives, not all decrees being promulgated on stone. Euripides alludes to the custom of in¬ scribing formal compacts on tripods and dedi¬ cating them in temples. Greek antiquaries and scholars even made collections of inscriptions and Polemon (300 b.c.), who was neither the first nor the last of these collectors, owing to his zeal as an inscription hunter, got the nick¬ name of stelokopas, ˆtablet-picker.® Roman writers also — Cicero, Livy, Pliny the. Elder, Suetonius — occasionally mentioned inscrip¬ tions of historical interest. Varro, the anti¬ quary, and the lexicographer, Verrius Flaccus, commented on the diction of inscriptions; while Polybius, the Greek historian of Rome, actu¬

ally cited inscriptions, making a fuller use of them than Livy. But no interest in collecting inscriptions, comparable to the Greek interest, ever developed among the Romans. From the Revival of Learning on, scholars were not lack¬ ing to show an interest in classical inscrip¬ tions, but the modern impulse may be said to have had its point of departure in the first quar¬ ter of the 19th century when the Prussian Acad- emy, under the promptings of August Boeckh, inaugurated the great collection known as the (Corpus Inscriptionum GnecarunP (4 vols., 1825-56), which contained nearly 10,000 num¬ bers. But fresh inscriptions are ever coming to light — dies diem docet — and in 1891 the number was estimated at 50,000. There has been a steady increase ever since. Excavations are now pursued in Greece and Grecian coun¬ tries with a diligence and at an outlay never before known. Almost all the great nations have established archaeological institutes in Athens, and all of these issue some form of learned journal devoted in part to the publica¬ tion of the new inscriptions discovered; for ex¬ ample, (Papers of the American School of Clas¬ sical Studies at Athens,* American Journal of Archceology, Bulletin de Correspondence Hel- lenique, Ephemeris Archaiologikd, Journal of Hellenic Studies, Mittheilungen des deutschcn Archceologischen Institut, Archceologisch-Epi- graphische Mittheilungen aits Oesterreich, etc. Further great collections like Boeckh's have been issued, for example, the (Corpus Inscrip¬ tionum Atticarum* and the (Sammlung Dia- lekt-Inschriften* (in progress). A similar ac¬ tivity

has been exhibited at Rome also, with the same establishment of archaeological institutes. In 1863 the first volume of the (Corpus Inscrip- tionun Latinarium,* also supported by the Prussian Academy, was issued. Since then 15 volumes, with numerous supplements, have been published, . new inscriptions being first provi¬ sionally printed in the (Ephemeris EpigraphicaP In all, some 150,000 Latin inscriptions are now accessible in print.

Classical inscriptions require two classes of . investigator, the field collector and the closet student. A knowledge of Greek and Latin ac¬ quired from printed books does not equip the student for field collecting. It is true that the decipherment of the known script of classical inscriptions does not present problems like those solved by the ingenuity of Grotefend and Prinsep but, for all that, training is needed for the accurate reading and copying of the in¬ scription. Absolute accuracy in copying is difficult of attainment, but a ˆsqueeze® made of (unsized) paper, wetted and packed into every crevice, or a copy made by covering the in¬ scription with a sheet of dry paper and rub¬ bing the same with powdered graphite secure excellent results. America has produced one collector of large and successful experience, Mr. J. R. Sitlington Sterrett, whose collections are to be found chiefly in the (Papers of the American School.* After correct copies have been secured it remains intelligently to divine words and letters lost by mutilation and to ex¬ pand the abbreviations, but the latter have been so thoroughly listed in works on epigraphy (= the science of inscriptions) as now to present little difficulty. The same works have so clas¬ sified the script-forms as greatly to simplify the act of reading the inscription, and their topical

arrangement of the subject matter of inscrip¬ tions is a great aid to interpretation.

Greek official inscriptions were chiefly re¬ corded on marble, Roman on bronze. The lat¬ ter material, being available for so many uses, proved the less enduring. But marble slabs were also converted into building material or foundation stones of ramparts, and at Rome many an inscribed stone was calcined into lime. So many were the hazards to which inscriptions were exposed that it is exceptional to find an important one in its original location. For pur¬ poses of study the modern habit of gathering inscriptions into museums is highly convenient. In Greece, besides public squares and build¬ ings, temples

were a favorite repository for inscriptions, such as state treaties, tribute and treasure lists; dress, armor, weapons and other offerings of gratitude — all with dedicatory in¬ scriptions — made the temple a sort of museum; images of afflicted parts of the body that had been cured, with accounts of the case inscribed thereon, were offered to gods of healing, form¬ ing a sort of nucleus of an anatomical collec¬ tion and a medical library. Commonest of all forms was the sepulchral inscription which be¬ gan with simple announcements but grew into sounding eulogies. Among the Greek inscrip¬ tions none has been found so comprehensively important for history as the Great Rock of Behistum, but Mr. C. T. Newton, in his es¬ says (On Greek Inscriptions) [Contemporary Review (December 1876) ; Nineteenth Century (June and August 1878, reprinted in (Essays on Art and Archaeology, 5 p. 95, et seq.)], has set forth with great charm their collective value for history and the things pertaining to religion. At Rome, Augustus caused a succinct account of his deeds to be engraved in bronze and set up before his mausoleum. This inscription, widely diffused in the Augustus temples throughout the empire, was discovered at Ancyra (now Angora). The Monumentum Ancyranum constitutes an extensive historical document of the very first importance. The , Edict of Diocletian (303 a.d.) has quite a mod¬ ern ring, being a law to control mercantile ˆcombinations in restraint of trade® by fixing a maximum price for provisions and other com¬ modities. The Acta Fratrum Arvalium form an important memorial of a religious guild. A fragmentary black cippus unearthed in the Ro¬ man Forum (1899), supposedly near the grave of Romulus, aroused great enthusiasm. Its early date (550 b.c.) has been held to make for the credibility of the traditional account of Roman history as given by Livy rather than to give countenance to the skeptical method cur¬ rent since Niebuhr's time. _ Unfortunately, save for a few words of great interest for the com¬ parative grammarian, the inscription admits of no more definite elucidation than the conviction that the words probably belonged to a religious prescript. The graffiti (wall-scratchings) of Pompeii form a large and interesting class of incidental inscriptions which comprises quota¬ tions, paraphrases, catchwords, proverbs ; lov¬ ers' messages, complaints, tarryings, rendezvous ; names and greetings. Among them the painted inscriptions (dipinti) contain election notices chiefly. The dialects of Latin are known almost entirely from inscriptions. The chief remains of the Umbrian language (dialect) are the Tabulae Iguvinae, seven bronze tablets found at

Gubbio in 1444. They contain long ritual pre¬ scripts. Some 250 inscriptions, few of great importance save to the grammarian,

represent the Oscan dialects. Etruscan inscriptions in considerable number have been found in Italy — one (supposedly) as far to the east as the island of Lemnos — blit, pending the discover}'- of a long bilingual, these, though written in a well- known alphabet, still await definitive interpre¬ tation. The same is true of Iberian inscriptions (some 75 in number, several of between 50 and 150 letters). Runic inscriptions, in an alphabet derived from the Greek and Latin, have been found in Scandinavia and in England ; the old¬ est (300 a.d) being engraved on the utensils found at Thorsbjerg, others on stone monu¬ ments, rocks, weapons, ornaments and coins ; the longest containing 16 words. See Runes.

Bibliography. — The general reader may consult to advantage Taylor, (The Alphabet > (New York 1900) ; Kenyon, article ((Writing® (in Hastings' Dictionary5) ; Whitney, lan¬ guage and the Study of Language) (5th ed., p. 450) ; the histories of Egypt by Budge (Lon¬ don 1902) and by Petrie (London 1897-) ; de¬ cent Lights on Ancient Egypt) (Quarterly Re¬ view, 200, 1904, 48-75) ; essays by Boscawen (Harper's, 88, 190) ; Petrie (Contemporary , 69, 617); Mahaffy (Nineteenth Century, 36, 268) ; Price, (Monuments of the Old Testament) (Chi¬ cago 1900), containing facsimiles of the Rosetta Stone and other hieroglyphics, the Moabite Stone, Behistun Rock, a Tell-el-Amarna tablet and other cuneiform documents; Rogers, his¬ tory of Babylonia and Assyria) (New York 1900) ; Smith, (Chaldean Account of Genesis5 (1880)-; Schrader, (Cuneiform Inscriptions and the Old Testament5 (London 1885) ; Sayce, essay in The Living Age (212, 1897 ; 360) ; Ro¬ setta Stone5 (Open Court, 18, 531) ; (Tell-el-Amarna Letters,5 edition with translation by Winckler (1896) ; essays in The Living Age, (197, 771) and The Scottish Review (17, 292) ; (Behistun Rock,5 text and translation in Raw- linson's JHerodotus,5 ii, 490-514) ; (Asoka Edicts5 (Rhys Davids, (Buddhism, 5 pp. 220- 228, London 1894) ; Smith, (Asoka, the Buddhist Emperor of India5 (London 1901) ; (Story of the Greek and Latin Inscriptions5 (Macmillan's Magazine, 69, 1893, 286; reprinted in The Ec¬ lectic, 122, 475) ; Mau-Kelsey, (Pompeii,5 indices and bibliography (this volume illustrates the historical value of apparently insignificant in¬ scriptions) ; (Monumentum Ancyranum,5 essay by Call in Fortnightly Review (6, 200).

Of a more special character are the follow¬ ing: Brinton,. (Primer of Mayan Hieroglyph¬ ics5 (University of Pennsylvania Publication) ; Budge, (First Steps in Egyptian5 (London 1895) ; Bertin, (Grammar of the Cuneiform In¬ scriptions5 (London 1888) ; Weissbach und Bang, (Altpersischen Keilinschriften5 (Leipzig 1893) ; (Grundriss d. Iranischen Philologie5 and (Grundriss der indo-arischen Philologie5

(Strassburg, in progress) ; the Greek and Latin epigraphies in Mueller's (Handbuch der klassis- chen Altertumswissenschaft5 (Bk. 1) ; Roberts, (Greek Epigraphy5 (Cambridge 1887—') ; Rein- ach, (Traite d'epigraphie grecque5 (Paris 1885) ; Solmsen, Hnscriptiones Graecse Selectae5 (Teubner) ; Roehl, (Imagines (facsimiles) Inscriptionum Graecarurn5 (Berlin 1894) ; Hicks and Hill, (Greek Historical Inscriptions5 (Ox¬ ford 1901) ; Egbert, (Latin Inscriptions5 (New

York 1896) ; Cagnat, (Epigraphie Latine> (Paris 1898) ; Lindsay, (Handbook of Latin Inscriptions.*

Edwin Whitfield Fay, Professor of Latin, University of Texas.

INSECT POWDER. See Insecticides and Fungicides.

INSECTA. See Insects.

INSECTICIDE, any agent which destroys insects. This definition includes natural as well as artificial means of control, the latter being those operated by man. The most important of the former are adverse temperatures, excessive or insufficient moisture, fire, bacteria, fungi, mites, spiders, fish, reptiles, insects and birds. The artificial controls may be grouped accord¬ ing to their mode of action. Two principal groups are recognized: those intended to reach the alimentary tract through which they act, and those that act through the respiratory ap¬ paratus. The former are effective only with such insects as bite off and swallow pieces of plant tissue ; the latter more or less also with these, but most frequently used upon insects which suck the plant juices from beneath the punctured epidermis. Beetles and their larvae, caterpillars, grasshoppers, the larvae of various saw flies (e.g., the currant worm), etc., all chew their food and have been most effectively controlled by arsenate of lead, Paris green, hellebore, etc., applied to the foliage before it becomes badly infected either as a spray or as a powder. Plant-lice, plant-bugs and other sucking insects are checked best by kerosene emulsion, whale-oil soap, tobacco extract or other substances that choke the breathing- pores in the insects' bodies. Some of these sucking insects are dreaded because of their great prolificacy, their small size and resistance to treatment. Gases are often used under favorable circumstances to reach insects trouble¬ some in stored grain, among clothes, upon plants, in greenhouses, and even upon plants in the open air — these last being

covered with tents or boxes while being fumigated. Since the de¬ velopment and use of the lime-sulphur wash which is an effective fungicide, San Jose and related scale insects have been more economi¬ cally and conveniently held in check than by fumigation methods, though in California and other sections where citrous fruits are grown commercially, fumigation is still popular. Various chewing insects which tunnel through the tissues cannot be controlled by sprays, and are usually beyond the reach of gases. The leaf- miners, which burrow just beneath the epider¬ mis of leaves and green stems, have never been effectively controlled, though the adults are sometimes held in partial check by sweetened poisoned sprays. Some borers (currant-borer) can be kept in check by burning the twigs they infest, by cutting them out of their burrows (peach-borer and squash borer), the method be¬ ing suggested by the nature of attack. Other chewing insects (plum curculio) are jarred into kerosene. Lastly there are various oils and greases which are used upon animals and man to destroy fleas, lice, etc. Fir-tree oil in water and carbolic acid are also similarly employed.

Formulae and Methods of Application. —

Paris green and arsenate of .lead if to be used wet should be mixed with a little water to form

a creamy fluid, and then added to water or Bordeaux mixture (see Fungicide), the former at the rate of one pound to 200 to 250 gallons. If to be used dry, use one part to 200 or 100 of finely sifted plaster, air slaked lime, road dust or wood ashes and mix thoroughly before apply¬ ing. Arsenate of lead, the most popularly used poison may be applied in strength varying from 4 to 10 pounds to 100 gallons of water, depend¬ ing on the kind of insect to be controlled. These poisons are often sprayed on short clover or grass which is cut toward evening and spread thinly on bare ground to kill cut worms which destroy transplanted plants. A little molasses makes the bait more attractive. Hellebore may be mixed with water (1 ounce to 3 gallons) and a little glue or flour paste to increase adhesive¬ ness. Each of these may be applied as a powder sifted on the plant, through a salt sack or blown upon them through a powder-gun. A little flour aids the sticking quality. Pyrethrum made from flower heads of certain plants of this genus is useful dry or in solution but soon loses its ef¬ fectiveness. When powders are used, the plant should still be wet with dew or rain. Tobacco extract in several commercial forms is highly effective in controlling plant lice (aphis), if used before these insects have crumpled the leaves. Lime-sulphur wash, the best and most extensively used insecticide for scale insects, has also fungicidal

properties. It is made by slaking and then boiling 20 pounds of quick lime with 15 pounds of sulphur in an iron kettle for one hour, then diluting with water to make 50 gallons and applying preferably while hot. There are various other formulae. Because of the discomforts of making the mixture, com¬ mercial brands, of which there are many, are preferred by small growers of fruits. Miscible oils of many brands are very effective against San Jose and other scale insects. They are used at the rate of one part to 10 or 12 of water and are useful only on dormant deciduous trees when the temperature is above freezing and the trees not wet. Kerosene emulsion is made by intimately mixing a solution of hard soap (one pound to two gallons of hot water) with four gallons of kerosene, and diluting as needed for use with from 30 to 60 gallons of water. Pure kerosene and crude petroleum can be safely applied only to dormant plants, and then only upon bright breezy days, which will hasten evaporation. They have almost wholly given place to lime sulphur wash applied in winter. W hale oil soap is mixed with water (1 pound to 1 or up to 10 gallons), and applied as a wash or spray, Carbon disulphide may be used in confined receptacles where there is no danger of its inflammable fumes coming in contact with fire. An ounce is sufficient for from 50 to 75 cubic feet of air-tight space; and the exposure should be for 24 hours or longer. Hydrocyanic acid gas is prepared by adding cyanide of potassium (98-99 per cent pure) to water and sulphuric acid, one and one-half ounces for every 250 cubic feet of greenhouse; 100 cubic feet of nursery stock room and 125 feet of dwelling-house rooms, flour mills, trees, etc. Exposures may be from 30 to 60 minutes for trees, the former time being for plants in active growth, the. latter for dormant ones ; from 12 to .24 hours is usual for rooms, granaries, etc. Since these gases are violent poisons the greatest care should be exercised

in their application. Oils and greases are merely rubbed on infested animals and man. Boiling water is effective in destroying both lice and eggs in clothing, but the clothing must be boiled for hours to destroy the eggs of the body-louse and the crab-louse. Dust, tobacco- dust, etc., are useful in poultry houses for the birds to wallow in. Carbolic soap is the favorite remedy for insects or pet animals. But with all stock, poultry, pets and man, cleanliness is the great preventive.

For information concerning insecticides and their use consult bulletins of the various State Agricultural Experiment Stations and of the Bureau of Entomology of the United States De¬ partment of

Agriculture and Farmers' Bulletins of this department; also the following books: Smith, (Economic Entomology J (Philadelphia 1896) ; Johnson, (Fumigation Methods> (New York 1902) ; O'Kane, Unjurious Insects) (New York and London 1912) ; Sanderson, (Insect Pests of Farm, Garden and Orchard) (New York 1912) ; Slingerland and Crosby, (Manual of Insects* (New York and London 1914) ; Herrick, Unsects Injurious to the Household and Annoying to Man* (New York and London 1914) ; Unsects of Economic Importance* (New York 1915) ; Chittenden, Unsects Injurious to Vegetables) (New York 1907).

M. G. Kains, Horticultural Consultant.

INSECTICIDES AND FUNGICIDES.

See Agricultural Chemistry.

INSECTIVORA, an order of mammals, all of small size, usually five-toed, more or less plantigrade, and as a rule possessing clavicles. (

INSECTIVOROUS PLANTS, a collec¬ tive name for plants that entrap insects and other small animals, feeding on the captures by a process of true digestion, or absorbing the results of decomposition. The best known is the Venus' fly-trap (Dioncca muscipida) of the order Droseraceae. It is a native of the peat bogs of the Carolinas. The halves of the leat blade are movable on the mid-rib, and furnished on each margin with teeth. On each half of the

blade are three sensitive hairs, and the whole surface is thickly set with digestive glands. Immediately an insect touches one of these hairs the blades close, the teeth interlock, the glands exude their digestive juice on the insect, and the products are absorbed. In the common sun¬ dew (Drosera rotundifolia) the same result is obtained by means of stalked glands, which also function as tentacles, bending over to secure the prey; and in the butterwort (Pinguicula vul¬ garis) the margins of the leaf are the agents of capture, while the digestive juice is excreted by stalked and sessile glands on the. leaf blade. Aldrovandia vesiculosa , an aquatic plant of southern and central Europe, has leaves which function like those of Venus' fly-trap. Droso-phyllum lusitanicum, a native of Portugal and northwestern Africa, has stalked glands as well as sessile, but they do not bend over to confine prey. Their viscid secretion acts as a digestive ferment as well as a means of capture. Blad¬ der-wort (U tricularia) is a floating plant com¬ mon in lakes and pools. The traps or blad¬ ders, found on the submerged branches, are modified leaf organs, and present a general

re¬ semblance to the commonest prey water-fleas. The trap is entered by a door, which opens in¬ ward, but not outward, so that escape, is im¬ possible. The products of decomposition are absorbed by the cross-shaped cells lining the inner surface of the bladder. In the pitcher plants compound leaves are modified into pitcher-like receptacles, sometimes with a lid, as in the common Sarracenia purpurea and the southern N. flava, both growing in bogs. The attractions for insects are bright colors, and glands secreting nectar. Beneath the sweet bait is a slippery surface, affording insecure foot¬ hold, and insects pitching thereon fall into the secretion at the bottom. In the Old World genera Nepenthes and Cephalotus there appears to be a true digestive process ; in the group of which the American genus Sarracenia is the only type, the products of decomposition are absorbed, and in the genus Dischidia, from India and Australia, pitchers store water for use by the plant. Consult Darwin, (Insectivorous Plants.* See Carnivorous Plants.

INSECTS (Lat. insectum), a class of Arthropoda characterized by the body being divided into three regions, that is, a head, thorax and hind-body or abdomen, and by the presence, in all but the more primitive and certain degraded forms, of wings, and of three pairs, of thoracic legs. The body of insects consist of 21 segments (somites) of which six are used together to form the head, while there are three thoracic and from 10 to 12 abdominal segments. To the head are appended five pairs of jointed appendages, that is, the antennae, mandibles and two pairs of maxillae, while in the embryo of certain insects and in the adult Campudea, there has been detected a pair of vestigial appendages. Besides these appendages, there are two compound eyes, one on each side, and usually three simple eyes (ocelli) situated in the middle of the head. While the antennae are undivided the first maxillae are subdivided into three branches, an inner (lacinia), a middle (galea), and outer (palpifer), bearing the pal¬ pus. The second maxillae are fused together, forming the under lip or labium ; each second maxilla is composed of a lacinia, the palpus, while

PROTECTIVE MIMICRY AMONG INSECTS

‘

-

vestiges of the galea occur in certain forms. In bees certain accessory appendages called para- glossae are present. Besides the maxillae, the so- called tongue or hypopharynx is present, being highly developed in bees ; it lies on the under side of the mouth, just above the labium; in caterpillars it receives the end of the salivary duct, and is called the spinneret. Attention should also be called to the upper lip or labium, on the under side of which is the epipharynx, which bears minute taste-pits. The thorax consists of three segments, which can be easily distinguished in the primitive wingless forms (Campodea) and in the cockroach and locust, but in the more specialized forms as beetles, moths, bees and flies, the segments are more or less fused together and, owing to the movements of the wing muscles, are subdivided into many separate pieces. In the wasps and bees the basal abdominal segment becomes toward the pupa state transferred to the thorax. The legs as a rule end in five jointed tarsi, the last joint bearing a pair of claws with a cushion (pulvillus) between them. Insects are enabled to walk on glass, etc., by means of a sticky fluid exuded from the ends of hollow hairs fringing the cushion. They climb by means of their claws.

Insects differ from all other animals except birds and bats in possessing wings, and their presence, especially that of the muscles of flight, have greatly modified the shape and structure of the thorax. The front pair of wings is at¬ tached to the middle thoracic segment (meso- thorax) and the hind wings to the metathorax. In the two-winged flies (Diptcra) the second pair of wings ard reduced and modified to form the balancers (halteres). The wings are flat sac- like outgrowths of the skin, and are strength¬ ened by the ˆveins® which form hollow rods. These veins contain a trachea, so that there is a space between the air-tube and the outer wall. When the insect emerges from the nymph or the pupa, the vein is filled with blood. The spaces enclosed by the veins and their cross¬ branches are called cells, and their shape often affords valuable generic and specific characters. In the more primitive insects there are numer¬ ous cross-veins, and such wings as in locusts, etc., are sa:d to be net-veined. In the Lepidop- tera there are few cross-veins. In the Diptera and Hymenoptera the number of veins is lim¬ ited, the cells also being few. The skin of insects is hard, dense and elastic, due to the deposition of chitin.

Internal Anatomy. — One of the distinctive characteristics of insects is their mode of res¬ piration. This is effected by an intricate sys¬ tem of internal air-tubes (tracheae), which are filled with air by openings (spiracles) in the sides of the body; of these spiracles there are from one to two pairs in the thorax, and eight pairs in the abdomen. The tracheae are kept permanently open by a series of threads (taeni-

dium) each of which makes from three to five turns around the thin tube ; in this way the entire tracheal branch is provided with what at first was supposed to be a continuous spiral thread. The slit-like openings of. the spiracles are guarded by a grate of stiff hairs to prevent the ingress of dust, etc. It should be borne in mind that no insect breathes through its mouth, but trough the spiracles. Hence the efficacy

%T)I.. 15 — 1 !

of all oily or greasy substances in destroying every kind of insect in whatever stage of growth; wherever the oil touches the body a thin film spreads over it, covering the air-open¬ ings so that the insect soon dies by asphyxiation. Though insects have a delicate pulsating tu¬ bular heart, they have no arteries and veins, since the air in the tracheae seeks the blood in the remotest parts of the body. The blood is thin and colorless. The aquatic larvae and a very few perfect insects breathe by external tracheal gills, the spiracles being in such cases often absent. The genital opening is always situated near the end of the body, in front of the vent on the under side. Besides a com¬ plicated digestive canal, insects have urinary tubes opening into the end of the intestine.

The nervous system consists, besides the brain, of a chain of ganglia the greatest number of which is 13, but which become more or less fused in the more specialized groups, especially in the flies. The brain is remarkably complex, in accordance with the varied and complicated movements of the segmented body and jointed appendages, all capable of different kinds of motions.

Sense of Sight. — The compound or facetted eyes (ommatea) are composed of numerous simple eyes called ommatidia, which vary in number from 12, in Lepisma, to 20,000 in the dragon-fly (JEschna) , and even 25,000 in a beetle (Mordella). Yet notwithstanding the wonderful complexity of these compound eyes, most insects are near-sighted, and perceive rather the movements of other animals than their exact outlines; the dragonfly and butter¬ fly can see for a considerable distance. The simple eye probably only enables the insect to distinguish daylight from darkness, or at most very near objects. Insects, like bees and butter¬ flies, have the color-sense, and prefer certain colors to others.

Sense of Smell. — Insects are chiefly guided by the sense of smell. This resides in the an¬ tennae, in which there are microscopic pits filled with fluid; to this pit goes a fine nerve whose fibres end in staff-like

sense cells. The number of these olfactory organs is in some insects enormous ; thus in the European cockchafer there are 39,000 in the leaves of the male anten¬ nae, and about 35.000 in those of the female; in a single antennae of the hornet (Vespa crabro) are about 13,000 to 14,000. In the cock¬ roach the abdominal cerci or feelers also pos¬ sess such pits.

Sense of Hearing. — The auditory organs of the locust are drum-like ears situated one on each side of the base of the abdomen, directly behind the first abdominal spiracle ; in the green grasshopper, katydids, etc., a little auditory sac is lodged in the fore-legs (tibia). It is sup¬ posed that most insects are destitute of the sense of hearing, at least auditory structures have not yet been detected; yet all sound-pro¬ ducing insects must have ears to hear.

Sense of Taste. — The taste organs are little pits or papillae which resemble the olfac¬ tory organs, but which occur on the inside of the upper lips, on the epipharynx, or at the base of the proboscis and maxillae in the bee.

The Egg and Growth of Insects. — The eggs and the fertilizing fluid of the male are produced in glands which open near the end of the body on the under side. The eggs are de-

posited by the female in the earth or in wood, leaves, etc., by means of the ovipositor, an apparatus composed of three pairs of hard ap¬ pendages, and which in the wasps and bees form the sting. Most insects die on the ap¬ proach of cold weather, when they lay their eggs, the species being represented in the win¬ ter by the eggs alone. The eggs hatch in spring, the embryo passing through remarkable changes.

Metamorphoses. — Most insects after hatch¬ ing pass through a remarkable series of changes called a metamorphosis. The small flies, moths or beetles are not the young of large ones, but adult insects, while the most primitive insects have no marked metamorphosis, the mature locust only differing from the young in having wings; the more specialized forms as beetles, moths, wasps, bees and flies, pass through two stages of growth, that is, the larva and pupa, before becoming winged and sexually mature.

Larva. — The name was first given by the ancients to the caterpillar

because they thought it masked the form of the perfect insect. Swam¬ merdam supposed that the larva contained within itself (

The larvae of nearly if not all the meta- bolous animals are probably secondary in their origin. Fritz Muller (q.v.) pointed out that this is the case with the larvae of the higher insects. The larva of a beetle is popularly called a grub; that of a fly a maggot. The young of the more primitive insects, such as the cockroach, locust, all bugs, etc., which un¬ dergo an incomplete metamorphosis, is called a nymph. See Larva.

Pupa. — The word pupa is Latin, meaning baby. Linnaeus gave it this name from its resemblance to a babv which has been swathed or bound up, as is still the custom in southern Europe. The term pupa should be restricted to the resting, inactive stage of the holometabolous insects, that is, those with a complete metamor¬ phosis. The typical pupa is that of a moth or a butterfly, popularly called a chrysalis. A lepi- dopterous pupa in which the appendages are more or less folded close to the body and sold¬ ered to the integument, was called by Linnaeus a pupa obtecta; and when the limbs are free, as in Neuroptera, Mecoptera, Trichoptera, and the lepidopterous genus Micropteryx, it is called a pupa libera. When the pupa is enclosed in the old larval skin, which forms a pupal covering (puparium), the pupa was said by Linnaeus to be coarctate. The pupa of certain Diptera, as that

of the orthoraphous families, is nearly as much obtected as that of the tineoid families of moths, especially as regards the appendages of the head, the legs being more as in pupae liberae. The pupae of Coleoptera and of Hymenoptera, though there is, apparently, no near relationship between these two orders, are much alike in shape, and, as Chapman pertinently suggests, those of both orders are helpless from their quiescence, and hence have resorted for pro¬ tection to some cocoon or shell. But it is quite otherwise with the pupae of Lepidoptera and Diptera, which vary so much in adaptation to their surroundings, and hence afford important taxonomical and phylogenetic characters. This, as regards the Lepidoptera, was almost wholly overlooked until Chapman called attention to the subject, and showed that the pupae had characters of their own, of the greatest service in working out the classification, and hence the phylogeny of the different lepidopterous groups. The pupse of the Neuroptera, Coleop¬ tera and Hymenoptera differ structurally from the imago, in the parts of the head and thorax being less differentiated. Thus in the head the limits of sutures between the epicranium and clypeus, and the occiput and gula, are obscurely marked, while the tergal and

pleural sclerites of the imago are not well differentiated until the changes occurring just before the final ecdysis. It is easy, however, to homologize the appen¬ dages of the pupse with those of the imago of all the holometabolous orders except in the case of the obtected pupse of the Lepidoptera (and probably of the obtected dipterous pupse), where the cephalic appendages are soldered together.

Classification of Insects. — The number of

known species of insects is from 200,000 to 300,000, but it is estimated that there are up¬ ward of a million species now living. In fact, the class of insects vastly outnumbers all other groups of animals. This is probably due to their being winged, and to their great fecundity. At present the class of insects is divided into two subclasses, that is, the (1) Synaptera, rep¬ resented by the wingless orders Thysanura and Collembola; and (2) Pterygota, comprising 15 winged orders and which may be thus tabu¬ lated

Series 1. — Heterometabola, with an incomplete or variable though slight, degree of metamorphosis. No distinct larva or pupa state, the young being nymphs.

Order 1. Dermaptera. (Earwig).

“ 2. Orthoptera. (Cockroach, locust, grasshopper,

stick insect).

” 3. Platyptera. (Bird lice, Perla, white ant).

“ 4. Odonata. (Dragonfly).

“ 5. Plectoptera. (Mayfly).

” 6. Thysanoptera. (Thrips).

“ 7. Hemiptera. (Bugs).

Series 2. — Holometabola, or with a complete metamorphosis.

Order 8. Neuroptera. (Corydalus, lace-wing fly, ant- lion).

“ 9. Mecoptera. (Panorpa, Boreus).

“ 10. Trichoptera. (Caddis flies).

“ 11. Coleoptera. (Beetles).

“ 12. Lepidoptera. (Moths and butterflies).

“ 13. Siphonaptera. (Flea).

” 14. Diptera. (Mosquito, fly).

“ 15. Hymenoptera. (Saw-fly, ant, wasp, bee).

Fossil Insects. — About 3,000 species of fossil insects have been described, of these from 200 to 300 are Palaeozoic, 500 Mesozoic and the re¬ mainder are Tertiary. The oldest fossil insect- remains is the wing of a supposed bug (Proto – ciniex) from the Ordovician of Sweden. The wing of a cockroach (Palceoblattina) has been

Figs. 1 8 Termites 9 Cockroach 10 Mantis 11 Leaf Insect 12 Cricket 13 Mole-cricket 14 Grasshopper 15 Locust 16 Earwig 17 Psocus 18 Perla Bicaudata 19 Ephemera 20 Dragon-fly 21 ThriDS 2? Fish«r»l«

23 Glacier-flea 24 Bird-tick 25, 26 Ant Lion 27 Inocellia 28 Scorpion-fly 29 May-fly 30 Xenos 31, J. Coleoptera 33 Carabus Coriaceus 34, 35 Carabus Auratus and Larva 36 Tiger-beetle 37 Great Water-b“etle 38 Whirlwig 39 Hydrophilus 40 Rove-beetle 41 Claviger 42 Hister 43 Larva of Carrion-beetle 44 ourying-beetle 45 Scaphidium 46 Nitidula 47 Colydium 48 Cucuius 49 Dermestes 50 Pill-beetle 51 Ground-beetle 52, 53, 55 Dung-beetle 54 Cockchafer, Larva and Pupa 56 Chalcophora 57 Agriotes Segetis 58, 59 Cebrion 60 Glow-worm 61 Clerus Formicarius 62-66 Death-watch and Larva

‘ .

.

detected in the middle Silurian of Calvados, France. From the Devonian shales of Saint John, N. B., nine species of primitive net-veined insects have been collected. The coal measures are characterized by cockroaches, primitive dragon-flies, May-flies and grasshop¬ per-like forms, phasmids, etc., also occurring. All of the Palaeozoic insects known are very primitive. Modern forms, those having a com¬ plete metamorphosis, begin to appear in the Triassic and Jurassic, where remains of beetles, a saw-fly and a moth occur.

Ants, bees and butterflies date from the Oligocene and Mio¬ cene Tertiary. See Fresh-water Insects; Marine Insects, and the names of groups and. species, as Flies, Hymenoptera, Moths, etc.

Bibliography. — The latest general works on insects are Carpenter's (Insects, their Structure and Life) (London 1899), and Sharp's (1898), and (Guide to the Study of Insects) (1889) ; Comstock's (Manual for the Study of Insects) (1895) ; Unsects and Crustacea) (Vol. II, Standard Natural History 1884) ; Howard's (The Insect Book} (1901). The last named contains a copious bibliography, especially to the voluminous publications of the Entomolog¬ ical Division of the United States Department of Agriculture.

INSECTS, Eggs of. See Egg.

INSECTS, Fungi Affecting. See Fungl

INSECTS, Injurious and Beneficial. See

Entomology, Economic.

INSECTS, Propagation of Diseases by.

See Filiarisis ; Flies ; Mosquitoes ; Myiasis, etc.

INSECTS AND FLOWERS. See Flowers

and Insects.

INSECTS OF IMPORTANCE TC> MAN. Startling as it may at first seem, it is nevertheless a fact that insects comprise the largest group not merely of all land animals but of all living creatures. The late C. V. Riley, curator of insects in the United States National Museum, estimated that the world's insect cen¬ sus contains 10,000,000 species. Later estimates, however, considerably reduce this number but the most conservative figure is 2,000,000 of which more than 350,000 have been named and described, including more than 25,000 native to North America. These latter figures are being increased at the rate of several thousand an¬ nually through the taxonomic work of entomol¬ ogists.

Since the habits of insects vary widely it is natural to expect to find many species that directly or indirectly affect human interests. Of these the most useful are those (1) that fer¬ tilize the flowers of plants whose fruits or seeds or the crops grown from these are employed by man for food or other purposes; (2) those that manufacture or secrete

or whose bodies consti¬ tute products similarly utilized; (3) those that prey either as parasites or predaceous enemies upon other insects or animals which destroy cultivated plants or plant products, domestic animals or their products; (4) those that act as scavengers of dead animal and vegetable matter, including the excrement of other ani¬

mals; (5) and those that directly or indirectly change the character of the soil in which they pass at least part of their life history.

The first group includes a great many minute and a smaller number of large sized in¬ sects that affect man little or not at all in any other way. Were it not for them, however, very few plants, as Darwin and other noted investigators have proved, would form seeds or bear fruits. Most conspicuous perhaps of all these is the blastophaga or fig-wasp, upon which the caprification or fertilization of the Smyrna fig depends and for lack of which this choicest of all figs has until very recently failed to set fruit in America. Most con¬ spicuous in the second group are bees which, according to Herrick, are kept by 3,000,000 beekeepers in the United States and yield honey to the value of over $25,000,000 annually — $2,000,000 in New York State alone. These insects also supply large quantities of beeswax which is used in the arts. In the second group are also the scale insects which supply certain fine waxes, cochineal, lac and its accompanying purple dye and some other ma¬ terials. In the third group (predaceous and para¬ sitic insects) are countless species belonging to the orders Hemiptera (for instance, assassin- bugs and water striders), Neuroptera (lace winged flies and ant lions), Orthoptera (pray¬ ing mantis and cockroaches), Odonata (dragon¬ flies), Diptera (robber-flies and tachina-flies), Coleoptera (lady-bird beetles and tiger beetles) and Hymenoptera (ichneumon flies and spider wasps). In group four are many species of scavenger beetles and flies the larvae, and in many cases also the adults, of which mimic the role of turkey buzzards, vultures and other creatures that feed on carrion. In group five are the larvae of many beetles (June bugs) and moths (cutworms) which live in the soil.

While these directly or indirectly useful in¬ sects include some of the greatest benefactors of the human race, they number at most only a few hundred species, while those that play harmful roles may be numbered by the tens of thousands. The great majority of these, the most destructive and often the most spectacular in their performance, are those that destroy cultivated crops. Martatt in the Year Book of the United States Department of Agriculture (1904, page 461) declares that the losses caused by insects in the United States alone nearly equal the then running expenses of the national government and were

more than the annual cost of the schools of this country. Accord¬ ing to Sanderson, who in his book, (Insect Pests of Farm, Garden and Orchard,* goes into detail, the annual damage done by insects to cereals is $300,000,000; to animal products an equal amount ; to products in storage $200,- 000,000; to forests and their products, $100,000,- 000; to cotton, $85,000,000; to hay and forage, $66,500,000; to truck crops, $60,000,000; to fruits, $30,000,000; to farm forests, $11,000,- 000; to tobacco and miscellaneous crops, each $10,000,000; to sugars, $9,500,000, an annual total of $1,182,000,000. Other estimates differ widely from these figures. For instance, Quaint- ance places the annual loss to deciduous fruit interests at more than $66,000,000. Texas loses annually $25,000,000 through the Mexican cot¬ ton boll weevil, an insect which has been spread¬ ing to other parts of the cotton belt and which,

it is figured, will sooner or later cost this area at least 10 times this amount annually. Webster totals the losses of cereals for- 15 years due to the work of chinch bug at $350,000,000. Herrick says that the codling moth whose larvae make wormy apples and pears destroys more than $12,000,000 worth 9f fruit a year.

These are but a few typical direct losses. To them must be added the cost of fighting destructive insects. To spray apple trees for the codling moth alone $4,000,000 is spent an¬ nually, to combat the San Jose scale $10,000,000. The New England States and the national gov¬ ernment have already expended $7,000,000 to check the ravages of the brown tail and the gypsy moth and are spending $1,000,000 an¬ nually in this warfare. And so on almost ad infinitum; for every important crop has its insect enemies. Nearlv 300 prey on the apple, on clover and grape each 100, on sugar beet 70, on cherry and plum each 50, to mention only a few instances.

Another important group of destructive in¬ sects includes those species that attack domes¬ tic animals, scarcely one of which but has its parasites. Some of these insects feed more or less indiscriminately upon several species of animals; others are specific to one species or a few closely related ones. Often horses, cattle and sheep are so seriously parasitized that they die, to say nothing of being weakened when less seriously attacked. The stomach and in¬ testines of the horse are frequently so in¬ fested with botfly larvae that it is a wonder the animal lives, much less works. The hides of cattle are

often ruined because cattle botfly larvae feed beneath the skin on the animals' backs. When the nasal passages and other head parts of sheep become densely populated by another species of botfly the animals often go insane and die. In addition to these are horn- flies, gadflies, screw worm flies, lice, fleas and many other domestic animal pests, some of which may not directly cause death but all of which reduce vitality, thus wasting energy and food necessary to keep the animals in good con¬ dition. At the same time these pests may carry the germs of disease.

All this damage wrought by insects to culti¬ vated crops and to domestic animals implies inestimable money losses. But to it must be added the also inestimable injuries to manu¬ factured products. Naturally the first thought concerns the injuries to foods; these un¬ doubtedly suffer most for nothing is safe unless stored in receptacles through which insects can¬ not burrow or thrust their eggs. But many other articles manufactured from organic ma¬ terials are destroyed by insects. Certain species of insects attack wood whether used in the construction of buildings, furniture or imple¬ ments. In some tropical countries termites or white ants, working always beneath the sur¬ face, devour wood until collapse occurs, thus furniture and even houses that become infested with them soon cease to be safe for human uses. In short everything of organic origin has its enemies; even books and drugs do not escape.

There are yet other important roles which insects play — those in which they attack man directly or infect him with disease, the germs of which they carrv upon or in their bodies. Because of commercial intercourse scarcely any

habitable region of the globe is free from such insects as house flies, fleas, mosquitoes, bedbugs and others equally or more annoying and dan¬ gerous. Some of these species attack by means of jaws (fleas), by beaks (lice and bed¬ bugs), by ovipositors (wasps, bees and the stinging species of ants), in most of which cases a poison is injected into the wounds though in others the mere bite or puncture is enough to produce irritation of the injured part. In other cases the insects are pro¬ vided with hairs which produce a nettling or urticating effect as in the case of many caterpillars, notably those of the brown tailed moth. Again, some beetles when crushed blister the skin, for instance "Spanish fly," or cantha- rides used in medicine. Bees and wasps though capable of inflicting considerable pain, and, in extreme cases of highly nervous persons, even death, rarely attack human beings unless in defense of themselves or of their homes. In such cases the immediate application of an alkali such as ammonia is the best

remedy.

Important as the direct attacks of insects upon man are, they are however less serious in their effects than the indirect ones; for insects which prey upon man or as in the case of the house fly, often play more important indirect roles than on account of their mere bites or stings or contact with the human skin or with food. Certain species of Oriental mosquitoes carry such maladies as the filaria diseases of the East (chyluria, elephantiasis and lymph scrotum), others impart malaria, yellow and dengue fevers. House flies in Egypt and the Fiji Island carry purulent conjunctivitis; in other parts of the world they also spread typhoid fever and Asiatic cholera ; tiny hippe- late flies disseminate “pink eye” in the southern United States ; fleas are said to snread bubonic plague ; tabanid and stomoxyd flies are charged with disseminating anthrax by means of specific bacilli just as cucumber beetles spread the wilt or blight of cucumbers and canteloupes and as bees and other nectar feeding insects spread the fire blight of pears, apples and quinces. From these few examples, therefore, the importance of insects to man assumes a very threatening aspect. Taking this list as a whole the housefly is probably the worst offender simply through its world-wide distribution. Because of its filthy habits (the larvae being developed in manure, the adults carrying this matter upon their bodies), and because it not only soils the surfaces upon which it alights but pollutes the human food upon which it feeds in the adult state, it is fought by cleanly housewives the world over. The cost of keeping it out of American homes is estimated by Herrick to be $10,000,000 annually. To this figure must be added the cost of fly traps, poisons and other methods of control. Similarly the cost of control of such filth carrying insects as roaches, and of such parasites on human beings as bed¬ bugs, fleas and lice doubtless equals this enor¬ mous figure.

In spite of these expenditures, however, the number of species of our insect foes is on the increase. One cause of this is the change of conditions due to cultivation of crops. Con¬ spicuous among the innocuous insects that have developed destructive habits is the Colorado potato beetle which in its native condition fed upon nettles and other plants of no consequence

to man, but transferred its appetite to the Irish potato and the egg plant when these were introduced into its original habitat. Though

now the principal insect enemy of these crops and though largely held in check by systematic spraying with poisons, it still costs the country millions of dollars in reduced crops and in expenditures for materials, machines and labor to keep it in check.

A more important factor than change of habit in the increase of our insect foes lies in commercial intercourse with foreign countries, more especially those of Europe, whose insect pests are thus accidentally imported or ex¬ ported. Herrick is authority for the state¬ ment that out of 73 of our worst insect pests 37 or more than half have been imported from foreign countries. Conspicuous among these are San Jose scale from Australia, cotton boll weevil from Mexico, gypsy moth, currant worm, wheat midge, clover midge and Hessian fly and many others from Europe. In similar manner, but to a much smaller extent, America has. disseminated insects in foreign countries. Most conspicuous among these is probably the phylloxera or root louse, which, for over 200 years, as discussed in (Evolution of Our Native Fruits) by Bailey, was a leading agent in preventing the successful commercial culti¬ vation of European grapes in the eastern half of the United States and thus indirectly led to the development of our native species of grapes, and which when accidentally exported to Europe wrought havoc among the established vineyards, particularly of France, and thus led to the practice of grafting European varieties on American stocks, thereby not only saving the French wine industry, but also making it possible to grow European varieties on a com¬ mercial scale in the United States and perhaps in Canada. Such cases as these being possible of repetition at any time have led to the estab¬ lishment of national and State regulations with respect to interstate and international trans¬ portation of nursery stock and the employment of trained men to examine such stock where grown and at ports of entry. Not only have the United States and Canada passed such laws and appointed inspectors, but many other coun¬ tries are now similarly provided.

Because insects in all these enumerated ways and many others profoundly affect human interests, especially those which relate to agriculture, to manufactured organic materials, to health and to the products of such species as bees and scale insects, it is but natural that the new branch of economic entomology should have been developed as probably the most important division of biology, certainly of the animal side of this great subject. In no country of the world has the necessity for such development been so great as in America, es¬ pecially in the United States. This is not only because of the enormous area of this nation, the great variety of products grown, nor the differences of climate, nor even a combination of all these factors, but

also largely because the country is comparatively new, because the insect pests introduced from other countries have generally been brought in without the natural enemies that kept them more or less under control where they were indigenous, and finally because many of our native species have left their original food and developed tastes

for the new plants, animals or the products of such brought within tempting reach of them. While economic entomology had its inception in Europe, necessity and American progressiveness and inventiveness have so fostered and en¬ couraged it on this side of the Atlantic that the United States not only leads the world in its insect investigations and successful methods of control, but it employs a larger force of official economic entomologists than do all other countries of the world put together.

Still further, economic entomology is one of the leading subjects in the curriculum of all leading agricultural colleges and schools be¬ cause it is required that all teachers and in¬ vestigators of agriculture, all farm bureau or county agents, all agricultural extension specialists, and all inspectors of nursery stock, must have as thorough a grounding in this subject as in botany, chemistry and physics in order to hold staff positions in the National Department of Agriculture, those of the respec¬ tive States, or in the colleges and schools which teach agriculture from the practical standpoint. Herein lies another item of expenditure that ag¬ gregates millions of dollars annually and thereby increases the enormous figures pre¬ sented. But all this expenditure and study is necessary and justified because it is essential to man's well being that these foes shall be destroyed in order that man may have his right¬ ful dominion over the earth and its creatures.

For methods of controlling insects (see In¬ secticide) under which title will also be found a list of important books and other writings which deal with the control of these creatures by natural and artificial means.

M. G. Kains, Horticultural Consultant.

INSESSORES, m-se-so'rez, a discarded term in ornithology designating a group styled "perchers,® which included the majority of the smaller and more familiar birds. The term has been abandoned because the group denoted by it is a purely arbitrary one.

INSIDIOUS F L O W E R – B U G. See

Flower-bug.

INSIGNIA. See Military Insignia.

INSKIP, John S., American clergyman, evangelist and editor: b. Huntington, England, in 1816; d. Ocean Grove, N. J., 7 March 1884. He was brought to America in 1820, the family settling first at Wilmington, Del., and then at Marshallton, Pa. In 1836 he entered the min¬ istry of the Methodist Episcopal Church, join¬ ing the Philadelphia Conference, and serving prominent churches in that Conference, the Ohio, the New York East and the New York Conferences. When pastor at Springfield, Ohio, he introduced the custom of having families sit together. Previous to this men sat on one side of the church and women on the other in Methodist worship. He was tried and censured by his Conference, but appealed to the General Conference of 1852 which exonerated him. He was chaplain of the Brooklynˆ 14th regiment the first year of the war but resigned on account of poor health. From 1873 until his death he was editor of The Christian Standard and Home Journal of Philadelphia. He was one of the founders of the National Campmeeting Association and personally con¬ ducted more than 50 camp meetings. He was

an evangelist of unusual ability. In 1881-82 he took an extended evangelistic tour, con¬ ducting meetings in England, India and Aus¬ tralia, traveling in the year 31,000 miles, con¬ ducting over 500 public services, and witnessing over 5,000 conversions. He wrote more than 160 columns of editorial matter for his paper on the trip and conducted an extensive cor¬ respondence besides. He was the author of (Methodism: Explained and Defended* (Cin¬ cinnati 1851) ; (Songs of Triumph) (Philadel¬ phia 1882). Consult McDonald, William, (Life of John S. Inskip) (Boston 1885).

INSOLATION, heating by direct exposure to the sun’s rays. In geology it has signifi¬ cance in the process of weathering by heating and cooling of rock surfaces with resulting ex¬ pansion and contraction and shattering of the rock mass. See Exfoliation.

INSOLVENCY. In a popular sense the word insolvency applies only to persons with¬ out property or means sufficient to satisfy their creditors. The legal definition embraces all who are unable to pay their debts at maturity in the ordinary course of business, even though they may possess assets exceeding their lia¬ bilities. A failure to meet overdue obligations renders a person liable to proceedings against him

in a court of insolvency, in which his assets may be taken into the possession of the officers, marshaled and distributed to his credit¬ ors. Should there be an amount in excess of what is required to pay the creditors and the expenses of administration, the balance so re¬ maining is the property of the debtor. From a very early period in the history of civil gov¬ ernment, laws have existed providing for pro¬ ceedings by creditors against insolvent debtors, by which the debtor's property could be taken from his possession, to be held by another as a trust fund to be applied to the payment of his just debts. In case of an insufficient amount to pay all debts in full, provisions are usually made for a pro rata distribution. These laws have generally provided for classes of preferred debts, payments of which were to be made in full, even though such payments exhausted the entire assets. Preferred claims commonly in¬ cluded all claims of the government or state, and often claims for labor to a limited amount, and claims for the necessaries of life. Pro¬ visions are usually made for the exemption of certain articles to the use of the debtor, not to be included in the assets. The Constitution of the United States provides that Congress may establish uniform laws on the subject of bankruptcy throughout all the States, and the first act upon that subject was passed in 1800, since which time there has been some Federal bankruptcy law, with brief interregnums. A uniform national law upon the subject now exists. The < first act of Congress upon this subject provided for proceedings by the cred¬ itors only, but in 1841 an amendment provided for voluntary proceedings by the debtor, by which he could surrender his property and ob¬ tain a discharge from all of his debts, provided he had been guilty of no fraud. In the absence of a national law on the subject of insolvency, the States all have authority to enact and en¬ force laws upon that subject. The Federal act now provides for voluntary proceedings by the debtor, as well as proceedings against him bv

the creditors, with provisions for his discharge. The various State acts have usually contained such provisions. The Federal act during its continuance suspends all State insolvency laws covering the same ground. See Bankruptcy Law's.

INSOMNIA, a disordered condition of the body characterized by sleeplessness. It may be due to toxic condition, mental or physical ex¬ haustion, or other causes. The usual treat¬ ment is directed to removing the cause. Hot baths, hot food, applying heat to the soles of the feet are also applied with considerable success in many cases. See Sleep.

INSPECTOR, or INSPECTOR-GEN¬ ERAL, in military affairs, terms of

somewhat vague significance. There are inspectors-gen- eral of cavalry, infantry, artillery, engineers, aviation, militia and volunteers, whose duties are really those which their names infer — viz., the periodical inspection of the several corps of their respective arms, and the pointing out of de¬ ficiencies, the corps being under command, how¬ ever, of its own officers, and not of the in¬ spector-general. The inspectors-general of musketry and gunnery instruction are charged with the direct superintendence and ordering of such instruction throughout the army. In the medical department the inspectors-general of hospitals constitute the highest grade of sur¬ geons. See Army Organization.

INSPIRATION, in theology, the commu¬ nication by the Holy Spirit, to writers and speakers, of a portion of the knowledge and feeling of God, in such fashion that they can be communicated to other men ; especially used in relation to the Bible. On the fact of inspi¬ ration rests all attribution of divinity to the sacred writings above any others; but theories of its method and extent have necessarily changed with the advance of critical knowledge. They have never had an authoritative pro¬ nouncement even from the Catholic Church which allows liberty of judgment on this; the Bible not holding the supreme place there as in Protestant bodies, and the latter being too divided for a credal statement on this point, by the very causes which call for one. All theories rest not only on the necessary implication of divine character in the Bible, but on two specific passages: 2 Tim. iii, 16; <(A11 Scripture is given by the inspiration of God, and is profitable for doctrine® (Revised Version, ffEvery Scripture inspired of God is also profitable for teaching,® which does not relinquish the claim of inspira¬ tion) ; and 2 Peter i, 21, <(Holy men of God spake as they were moved by the Holy Ghost® (Revised essentially the same). The Scriptures were the Old Testament.

The early Church did not generally dwell on theories of inspiration, regarding it as a pas.- sive “ecstasy® in which divine truth was com¬ municated, but rarely going on to its effects on the inspired writings or the methods which produced them. Origen, however, the great builder of doctrinal framework, formulated an exact theory of “plenary® or entire inspiration, which preserved the writers from all faults of memory, and left no iota either incorrect or superfluous in Scripture. But others held that all believers were inspired in different degrees; as this made all believers infallible interpreters of the Scriptures, the perilous nature of such a

doctrine led to the opposite one, that there was an inspired official depositary of interpretation as well as an inspired canon of writings. The mediaeval schoolmen evolved the theory that there were two kinds of inspiration in the Scriptures : direct, found where moral and doc¬ trinal truths are directly taught; and indirect, in historical passages, whence ethical truths can only be derived by allegorical interpretation.

Regarding inspiration not as a purpose but a method, there are three explanations within the limits of orthodox Christianity: the (

In the early uncritical ages of the Protestant churches, the universal and obvious theory of inspiration was the plenary. The original text of the Bible was dictated word for word by the Holy Spirit, the writers being merely penmen, or media on whom were impressed certain phrases, which must not be varied on peril of distorting the divine revelation. The words of Scripture thus transmitted are God's words, to each reader as if spoken directly to him by the Deity, and no matter to what subject they relate, be it doctrine or history, the origin of man or the duty of man. That there are different styles, corresponding to different writers, means only that God has accommodated his expressions to their natures, for his own utilities. Hence the least particle in the Scriptures is surcharged with meaning, and if anything seems in conflict with science, history, or other portions of the Bible, it arises from corruption of text, bad translation or other change from the actual re¬ vealed language. This is the only theory with perfect logical continuity; unhappily it can only be maintained, in face of the increasing body of knowledge of texts, facts and natural ethics, by those willing to abnegate their own right of criticism wholly in favor of their own infalli¬ ble interpretation. Indeed, the chief argument for the latter is that the divine purpose would be defeated, if its intention in giving the reve¬ lation were made null by the misunderstanding of fallible human faculties.

The dynamic theory is the first step outside this bulwark enforced by the impossibility of maintaining verbal inspiration and relegates the divine agency to an indirect function. In place of its dictating the exact phraseology and the precise facts, the writers are so filled with divine force that for all purposes of conveying the essential divine purpose, that of showing the truths of sin and danger and the path of salvation, they are a portion of the divine and incapable of error. Under this theory the writers are left a free hand, according to their own limitations and those of their age, in deal¬ ing with narrative

facts or their own guesses at them; but are guided explicitly in all matters of faith and morals. In order to be received, the revelation had to be accommodated to the

mental conditions of different ages ; and men of each received guidance from God to present it so that it was true in relation to them, and re¬ mained so for all ages under all conditions. The warrant of the Bible is its incomparable and superhuman system of ethics, and its proof of divine origin is that evident superiority to all human devices.

The PradianU theory is a recent one, and a step farther from the old claim of entire divinity. In this view the record as such has no divinity, nor infallibility of any kind. There is a divine revelation, but it acts by generating moral ideas in certain great selected men, and which, once generated, are left to fight their way and take their chance like the other useful ideas of the world, and undergo disbelief and mutilation, with the certainty that according to God's purpose, truth will prevail at last. The proof of divinity in Christianity lies in the fact that its moral truths are the greatest in the world, and were original with it.

Another theory is based on evolution, in this both revelation and inspiration are dis¬ pensed with, and there is retained only that enlightenment which comes with all develop¬ ment through environment and the laws of variation. In human progress lies the real di¬ vine revelation. The Bible is a purely human book, but the greatest of all books, and as such should retain its place as the foundation of our religious structure.

Bibliography. — Briggs, (The Bible, the Church, and Reason) (New York 1892) ; Delitzsch, (De Inspiratione Scripturae Sacrae quid Statuerint Patres Apostolici et Apologetae Secundi SaeculP (Leipzig 1872) ; Dodds, (The Bible: Its Origin and Nature) (New York 1905) ; De Witt, (What is Inspiration?) (ib. 1893) ; Gibson, (Inspiration and Authority of Holy Scripture> (ib. 1912) ; Ladd, (Doctrine of Sacred Scripture) (2 vols., ib. 1883) ; Orr, James, (Revelation and Inspiration (ib. 1910) ; Ray¬ mond, G. L., Psychology of Inspiration^ (ib. 1908) ; Rohnert, Pie Inspiration der heiligen Schrift und ihre Bestreiter) (Leipzig 1889) ; Row, Unspiration : Its Mode and Extent) (London 1864) ; Sanday, 'Inspiration* (ib. 1893) ; Schultz, 'Old Testament Theology* (Edinburgh 1892) ; Seeberg, 'Revelation and Inspiration (New York 1909) ; Simon, (The Bible an Outgrowth of Theocratic Life) Edinburgh 1886).

INSTALLATION, the act of giving pos¬ session of an office, rank or

order with the ac¬ customed ceremonies, applied especially to the ministerial or pastoral office in the church.. The term is now generally used for a formal intro¬ duction to any office.

INSTERBURG, Prussia, town in the prov¬ ince of East Prussia, at the confluence of the Angerapp and Inster, 57 miles east of Konigs- berg. The town church is famed for its wood carvings. Other churches are three Evangel¬ ical, one Roman Catholic and a synagogue. Its industrial establishments include iron found¬ ries, flax-spinning mills, machine shops, cement works, leather works, etc. It has a good trade in cereals, flax, vegetables, lumber, etc., and horse-breeding is extensively carried on. The town was founded in the 14th century by the Knights of the Teutonic Order. In 1583 it re¬ ceived civic privileges and thereafter grew

apace. It was besieged by the Swedes in 1679. A fire nearly destroyed it in 1690 and a pes¬ tilence decimated its population in 1710. Pop. 31,627. Consult Tows, (Urkunden zur Ge- schichte des Hauptamts Insterburg) (Inster- burg 1895-97).

INSTINCT. Every organism is born with a number of tendencies to behave in certain specific ways when confronted with stimuli to which they are adequate. These tendencies not only increase in number and complexity as we pass from the protozoa to the primates, but also vary similarly within a single organism. The amoeba inherits three simple reactions ; tendencies to move toward certain stimuli, to turn away from others and to engulf still others for food. Man, at the other extreme, has innumerable innate dispositions, and they vary in complexity, as, for example, tendencies to cough and to sneeze, to fear and to become angry, to associate with his kind and to think to a conclusion. All these tendencies are instinc¬ tive, and instinct may be defined as <(the general name for these innate tendencies® (Titchener), or as a <(congenital mode of behavior depend¬ ent unon inherited dispositions within the lower bra:n centres® (Morgan), or again as <(a combination of congenital responses unfolding serially under appropriate stimulation® (Wat¬ son). Despite differences in emphasis and systematic treatment these three definitions are in agreement as regards essentials, and all three ultimately refer instinct to the nervous system. It is a mistake, therefore, to suppose, as is popularly supposed, that instinct is a faculty provided by Providence to direct the actions of animals and opposed to the faculty of reason

furnished for the guidance of man. Such a view purports to explain but, in fact, explains nothing, and it overlooks the fact that man probably has more instincts than the lower animals. If, then, an instinct is a tendency •which in the final analysis belongs to the nerv¬ ous system, then it follows that we must go to biology, particularly physiology, for a de¬ tailed description. Nevertheless, instinct has also a psychological aspect, instinctive acts are accompanied by mental processes, and some mental patterns have as their physiological cor¬ relates certain instinctive tendencies. Much needless controversy has arisen through a con¬ fusion of the biological and psychological points of view, and confusion can only be avoided by considering the two aspects separately.

Biology. — The biologists have as yet done little more than to clear the ground for future work; the detailed study of instincts is yet to come. Furthermore, no classification of in¬ stincts has thus far found general acceptance. Instinct may, however, be roughly marked off from the physiological reflex on the one hand and from habit on the other. The former, of which the knee-jerk, heart-beat and eye-wink will serve as examples, is as a rule confined to a single group of muscles whereas instinct usually involves the entire organism. Habit is a tendency which is acquired during the life¬ time of the organism. We cannot, of course, push these distinctions too far; there is no sharp line of demarkation between reflexes and instincts, and not only are many habits based upon instinctive tendencies but many in¬ stincts are not perfected at their first appear¬

ance. The results of the experimental investi¬ gations may be summarized as follows: (1) Not all instincts make their first appearance at birth; in the vertebrates, at least, new tend¬ encies appear at different stages of growth par¬ ticularly between birth and puberty. In white rats, for example, the instinctive act of Mace washing® does not appear until the 12th day, play about the 15th day and sexual activities about the 65th day; the monkey does not as a rule begin to walk before the third week, to make characteristic vocal sounds before the ninth week and the sexual instincts do not ap¬ pear until the end of the first year. (2) We have seen that instincts are not always per¬ fected when they make their first appearance. When this is the case, it sometimes happens that the characteristic act of a species may be modified or even completely inhibited by sub¬ sequent experience. Baltimore orioles reared in captivity and in isolation developed a song quite different from the usual song of their kind ; English sparrows reared with canaries gave up the chirp of the sparrow for the peep of the canary; the tendency of a pike to strike at a minnow was completely inhibited after successively bumping

against a glass plate in¬ serted in the aquarium and in front of the minnow. (3) The less selective instincts like rest, sleep and play are extraordinarily persist¬ ent although in the human organism they may repeatedly find new forms of expression ; others, however, which seem to be conditioned upon the bodily state of the organism as, for example, the various instincts of the mother in caring for her young, may wane and fade out. (4) Yerkes has found that some instincts like savageness, wildness and timidity in rats, and the direction of whirl in the dancing mouse are hereditary traits.

Psychology. — We turn to the psychological aspect of instinct. Here, although even less is definitely known than on the biological side, three problems stand out in bold relief. We have to investigate the mental processes that are present in the instinctive act (the action consciousness), to describe other mental states which are conditioned upon instinctive tend¬ encies, and to work out the relation of in¬ stinct to meaningful experience. As regards the first, work on the human organism seems to show that the instinctive is of the same type as the sensori-motor act, i.e., the perception of the object touches off the reaction, there is necessarily no conscious representation of the determination to act or of the action's end. We have no reason to suppose, therefore, that, for instance, the wren is in the least aware of what it is doing or. why it is doing it when it builds its nest. This does not mean, however, that, accompanying the instinctive act, there is no psychological experience. On the contrary we may safely assume that even in the lowest forms of animal life some sort of sensory experience releases the disposition and to an extent determines the subsequent course of the action. Secondly, psychologists are agreed that, particularly in the case of the grosser emotions, the emotive is an instinctive con¬ sciousness, and the psychology of the emotions is, therefore, in a sense a psychology of in¬ stincts. In fear, for example, the vaso-con- striction, the rapid heart-beat, the spasmodic

respiration, the glandular secretions are touched off by instinctive tendencies, and the correlated patterns of organ'c sensations and feelings form the core of the mental experience. Aside from this general statement little is established as regards either a detailed description of the emotions or of their number and variety. It is, perhaps, because of their instinctive basis that psychology has found it difficult to bring the emotive instincts under experimental con¬ trol. Finally, the more we learn about in¬ stinctive tendencies the more

apparent it be¬ comes that the situations from which they proceed are meaningful, but we need not sup¬ pose that the organism is necessarily aware of the meaning. The chick in the egg feels (we may only guess as to its nature) a vague dis¬ comfort, and the complicated reaction by which it makes its egress from the shell is released. How this particular tendency to react thus to this Particular situation originated is a question wh ch cannot be answered until biology has given us a satisfactory theory of the origin and transmission of instincts — a task that must await a more detailed description of the nervous correlations involved. Consult Baldwin, J. M., (Mental Development } (New York 1906) ; Hobhouse, L. J., (Mind in Evolution) (London 1901) ; Jennings, H. S., (The Behavior of Lower Organisms> (Washington 1904) ; James, W., Principles of Psychology) (New York 1890) ; McDougall, W., (Social Psychology > (London 1908) ; Morgan, C. L., (Instinct and Experience* (New York 1912) ; Titchener, E. B., 'Beginner's Psychology) (New York 1915) ; Watson, J. B., (Behavior) (New York 1914) ; Wundt, W., 'Lectures on Human and Animal Psychology* (New York 1901).

Harry P. Weld,

Assistant Professor of Psychology, Cornell U niversity.

INSTITUTE OF FRANCE, The, official name for a group of learned societies in France, having for object the fostering of some branch in art, literature, science or philosophy. At present it consists of five sections, the official names of which are: (1) L'Academie Fran- qaise; (2) L'Academie des Inscriptions et Belles Lettres ; (3) L'Academie des Beaux

Arts; (4) L'Academie des Sciences; (5) L'Academie des Sciences Morales et Politiques. The creation of the Institute of France was decided on by the Convention in the Const'tu- tion of the year III (1795) ; Section 298 of that Constitutional Law reads as follows : <(There is, for the Republic', a national Institute en¬ trusted with the care of collecting all discov¬ eries, and furthering the progress of arts and sciences.® The Charter of Foundation, how¬ ever, admitted only three sections: (1) ((Sciences Physiques et Mathematiques ; (2) Sciences Morales et Politiques; (3) Litterature et Beaux Arts,® avoiding the denomination of Academy, which was considered as reaction¬ ary by the new-born republic. Among the 144 members of the Institute. 66 belonged to the first section, which, at that time, was deemed the most important of the three. One-third of the members were appointed by a decision of the Directory: these first 48 members chose themselves a new cont'ngent of 48; and finally these 96 elected

the third and last contingent, also of 48 members. The Directory granted to

each of these an annuity of 1,500 francs ($300) which was then deemed sufficient to keep a man above the poverty line. To-day, although it is no longer deemed sufficient, as every visitor to Paris must know, this annuity has not been raised, although Napoleon wished to increase it to 5,000 francs ; in fact, it amounts only to 1.200 francs, as 300 francs are deducted every year in order to create a fund which is redis¬ tributed, under the form of jetons de presence (attendance fees), to the members who attend the sittings of their respective academies. The Institute of France was introduced to the pub¬ lic in the Salle des Cariatides, of the Louvre, which was splendidly decorated for the cere¬ mony, which took mace on the 15th Germinal of the year IV (4 April 1796) and was attended in great solemnity by the State Ministers, the Diplomatic Corps and a magnificent crowd ; from the speeches which were delivered, from the grandiose ceremony of inauguration, (XVIII in 1816; and the Academies were restored to their own former charters ; since 1870, the five of them meet together every year in a solemn public assembly, on the 25th of October. On that occasion some of the prizes granted by the Institute are delivered to the winners. In its present condition, the Institute has 231 ordinary members (membres titulaires) to whom must be added 296 correspondents ; some of the lat¬ ter are foreigners, and we may mention among the Americans who are Correspondents de Vlnstitut : Edward Charles Pickering, George Ellery Hale, William Morris Davis, Albert A. Michelson, Paul Wayland Bartlett, James Mark Baldwin, Charles William Eliot. The most im¬ portant of all the prizes which are given by the Institute is the Prix Osiris (triennial), which amounts to 100,000 francs. This prize was es¬ tablished by Baron Osiris, “for the purpose of rewarding the most remarkable work in science, or in letters, or in industry and generally in whatever concerns public welfare.® The Prix Osiris was granted in 1903 to Dr. Roux in consideration of his researches on serums and transferred immediately by him to the Institut Pasteur of which he is the director; in 1906 the prize was awarded to M. Albert Sorel in consideration of his historical researches. Many other prizes have been offered to the Institute by rich individuals : the oldest of these liberal¬ ities was made as far back as 1819 when Baron de Montyon bequeathed an annuity of 37,000 francs for the purpose of rewarding <(the most virtuous actions and the books which may best further the progress of morality.® In 1886 the

Chateau tie Chantilly with its very valuable library (Musee Conde), was given to the In¬ stitute by' the Due cTAumale; in 1897 the Chateau de Langeois, one of the finest types of French architecture, was given by M. Jules Siegfried; in 1906 the private house of M. Thiers, first President of the 3d Republic, was bequeathed by Mile. Dosne, his niece; in 1900 M. Jean Debrousse bequeathed 1,000,000 francs (

Let us now examine each of the five Acade¬ mies.

I. The Academie Frangaise (such was the original name), was founded by Cardinal de Richelieu, Minister of Louis XIII, in 1635. A few years before, the poet Antoine Godeau and his cousin Conrart, secretary to the King, used to meet every week at the latter's house which was situated at the corner of Rue Saint Martin and Rue des Vieilles-Etuves, with a few dis¬ tinguished friends of literary taste. When Richelieu, in 1635, inquired of these gentlemen whether ((they would not like to be formed into a company under the authority of the state,® they could not but accept such direct invitation. Richelieu understood from the beginning the important part which the new-born Academy could play in the development, unification and purification of the French language; and his ambition, among others, was that French should acquire the same perfection, importance and power of domination as Latin and Greek. As early as 1634, that is to say one year before it was officially constituted the Academy decided to prepare a (Dictionnaire de la Langue Fran- qaise) ; the first edition of which was published only in 1694. Since that time seven revised editions have been published; the second in 1718, the third in 1740, the fourth in 1762; the fifth, under the convention which had first sup¬ pressed it ; the sixth and the seventh in 1835 and 1877. The Academy is now preparing the eighth edition. When Richelieu died in 1642, the Academy chose, as patron, Chancelier Se- guier, who invited the members to hold their weekly meetings in his own private hotel. But, when Seguier died, the Academy did not seek a patron among state ministers, or great per¬ sonages who might perhaps become an obstacle to its independence; it applied directly to the king himself, believing, which was right enough, that the king as a patron would remain a stranger to all coteries and petty intrigues

which were more or less favored bv ministers. In fact under the protection of Louis XIV, during 42 years, the Academy enjoyed great freedom, independence and even privileges such as a right to two invitations at all official fes¬ tivities at the court, the right of appeal

direcl to the king without the medium of his state ministers Besides, it was invited by Louis XIV to make its permanent abode in the Louvre, the king's own palace, from which it was removed only in 1793 by the convention. The rooms occupied by the Academy were sit¬ uated on the ground-floor and are at present part of the French Sculpture Gallery, (Salles du Puget and Salle des Coustou). Toward 1693, when La Bruyere was elected, the Academie Franqaise was composed of a most brilliant Pleiad of writers who greatly co¬ operated in making the reign of Louis XIV one of the most glorious and in giving to the history of French literature an unparalleled splendor; if indeed Corneille and Colbert were dead there were still Bossuet, Flechier, Fene- lon, Racine, La Fontaine, Boileau, Perrault, Fontenelle. The next generation of Academi¬ cians was not so brilliant : the <(Grande Seig¬ neurs,® great dignitaries and other personages of high station, finally considered that certain seats in the Academy belonged to them or their caste as a sort of birthday right : three dukes de Coislin, for instance, were Academicians ; even to-day the (XVIII restored it to its former name of

Academie Frangaise which has been retained ever since. About the same time (1819), Baron de Montyon left by testament to the Academy an annuity of 37,000 francs which is distributed every year in the form of two prizes (prix Montyon destine aux outrages les pine utiles aux moeurs ; and prix de vertu, fondation Montyon'). Since that time many prizes have been instituted by the Academy, thanks to the numerous gifts, donations and legacies which have steadily increased its financial power. The following list of prizes, although incomplete, distributed by the Academy, will give an idea of its social and literary importance :

Prize

Francs

Montyon .

Souriau .

Marie Lasne .

de Sussy .

Camille Favre .

Lelevain .

Emile Robin .

Lange .

Buisson .

Louise Varat-Larousse .

Savourat-Th6nard .

P6rou .

Bausa-Gessiomme .

Agemoglu .

Rigot .

Jules Favre .

Passemard .

Anonymous .

Anonymous .

Peyrard-Beaumanojr .

Broquette-Gonin .

Alexandre Broquette-Gonin .

Tremblay .

Bigot .

Baron and Baronne L6opold Davillier. . . .

Argut .

Cavelan .

37,000 yearly 1 , 000 “ 1,800 “ 8,000 “ 13,500 “

1.500 “ 1,000 “

6.500 “

3 . 500 “

4.500 “

5.500 “ 1,000 “

• 2 , 500 triennial 1 , 900 yearly 3 , 200 “

1,000 “ 1,000 “ 1,000 “

4.500 biennial 3 , 000 yearly

12,000 “ 8,000 “

1 , 000 biennial

6,000

6 , 000 yearly 4,000 “

6,000 “

All these prizes are generally awarded, ac¬ cording to the wishes of their founders, to such persons, male or female, as live an exceptionally virtuous and laborious life, and are considered as having reached a high level of family, social or moral perfection. Nearly all prizes are awarded annually : the following conditions are required of the competitors ; the action eventually to be rewarded must have been con¬ tinued into the last two previous years. A de¬ tailed memorandum, with approved certificates, signed by local authorities, and giving full in¬ formation concerning the competitor’s eventual right to a prize, must be sent to the Chef du Secretariat de VInstitut. Such memorandum must not be signed nor sent by the competitor himself. The latter’s name, Christian name and place of residence must be placed at the head of the memorandum. The number of academi¬ cians is 40. Whenever one of the seats becomes vacant, the Academy elects another member to take the place of the deceased. The new mem¬ ber is formally admitted into the ((illustre com- pagnie® at a solemn and pompous meeting; on such occasion each (

if not his literary works; in a harmless, humorous and half innocent manner, he un¬ loads upon the newcomer a number of appro¬ priate remarks in which the audience takes a great . delight. Perhaps one of

the most in¬ teresting ((discours academiques ® in that respect, was the one delivered by M. Ernest Lavisse at the reception of Monsieur Raymond Poin¬ care, the President of the French Republic (in 1909).

The following is the list of the living mem¬ bers of the Academy in order of seniority:

Othenin P. de Cleron, Comte d'Haussonville

Charles Louis de Saulees de Freycinet

Louis Marie Julien Viaud (Pierre Loti)

Ernest Lavisse Paul Bourget

Jacques Anatole Thibault (Anatole France)

Gabriel Hanotaux Henri Leon Emile Lavedan Paul Deschanel Edmond Rostand Fr6d6ric Masson Rene Bazin Etienne Lamy

Alexandre Felix Joseph Ribot

Maurice Barres

Jean Richepin

Raymond Poincar6

Eugene Brieux

Jean Aicard

Ren6 Doumic

Marcel Prevost

Monseigneur Duchesne

Henri de R6gnier

Denys Cochin

Hubert Lyautey

Emile Boutroux

Alfred Capus

Pierre de la Gorce

Henri Bergson

II. The Academie des Inscriptions et Belles-Lettres was created by Colbert in 1663. It was known first under the name of La Petite Academie, then of L' Academie des Medailles, then of L'Academie Royale des Inscriptions et Medailles in 1701, and finally under its pre¬ sent name since 1716. It was temporarily suppressed by the Revolution and revived when the Institut de France was created in 1795. The Academie des Inscriptions is interested mainly in historical studies and investigations concern¬ ing numismatics, all sorts of ancient documents and inscriptions, living and dead languages. Every year it distributes many prizes to the students and writers whose historical researches appear to be useful. The prix Gobert (10,000 francs, yearly), for instance, is intended to reward (

III. The Academie des Sciences was also created by Colbert under Louis XIV, in 1667. The meetings were held first in Colbert's li¬ brary and, from 1699 to 1793, in the Louvre. It consists of 78 members; like the Academie Frangaise and the Academie des Inscriptions et Belles Lettres, it was temporarily suppressed by the Convention and revived when the Institut was created in 1795. It is divided into the fol¬ lowing sections : geography and navigation, geometry, statistics, mechanics, astronomy, bot¬ anies, medicine and surgery. The Academy of Science offers many annual prizes ranging be¬ tween 500 to 10,000 francs. One prize (Prix Pierre Guzman) of 100,000 francs will be awarded to any one who will discover the means of communicating with a star other than the planet Mars, that is to say, who will make a sign to a star and receive an answer to that sign. Another prize of 100,000 francs will be awarded to the person who will discover the means of curing Asiatic cholera.

IV. L'Academie des Beaux-Arts was cre¬ ated in 1648 by a famous artist, Charles Le Brun, under the patronage of M. de Charmois, an influential courtier, under the name of

Academie Royale de Pcinturc et de Sculpture. The 12 initial members of that company opened a school (ficole du Nu) ; later on, in 1656, the king invited them to hold their meetings in the Louvre where they remained until their academy was temporarily suppressed by the Convention. In 1666 the Academie de France a Rome, a school where

French artists com¬ pleted their studies, was created by the Acad¬ emie Royale de Peinture et de Sculpture with the co-operation of Colbert. That, school is located at present in the Villa Medicis; the ficole des Beaux-Arts. in Paris, is under the control of the Academie des Beaux-Arts. There are 51 members in the Academy of Fine Arts which consists itself of the following sec¬ tions : painting, sculpture, engraving, music. Numerous prizes are awarded every year to artists, students, etc. ... in order to encourage the progress of fine arts and, at the same time, to guide public opinion which is sometimes slow in recognizing the merits of. artists.

V. L 'Academie des Sciences Morales et Politiques was created under the name of Classe des Sciences Morales et Politiques in 1795, as one of the sections of the Institute. It was suppressed quietly in 1803 by Napoleon who did not give any reason for his decision. It may be that the inquisitive spirit and criti¬ cisms of that Institution on political matters, social and religious controversies did not please a despotic sovereign ; nobody, however, has been able to discover any proper justification of such sudden suppression. It was restored under its present name by Louis-Philippe, in 1832, when it joined the four other academies in the Palais de lTnstitut. It is divided into five sec¬ tions : (1) Philosophy, (2) Morals, (3) Legis¬ lation and Jurisprudence, (4) Political Econ¬ omy, Statistics and Finance, (6) General and Philosophic History. The number of Acad¬ emicians is 51. Some important prizes are awarded every year, some of them amounting to 10,000, 12,000 and 15,000 francs; the prix Frangois Joseph Audiffred (15,000 francs), was awarded, in 1917, to Cardinal Mercier, the great unconquerable Belgian prelate who has deserved universal admiration. The list of these prizes increases steadily from year to year, thanks to the generosity of rich individuals. Anybody interested in the prizes awarded by the In- stitut de France may have full particulars regarding the conditions, the subjects proposed, etc., by applying to the Secretaire Perpetuel .of any one of the five academies. The Institute publishes also every year a booklet giving the names of all the members and correspondences of each academy, under the title of 'Annuaire de lTnstitut. J

Marc de V alette.

INSTITUTE OF SOCIAL SERVICE, American. See Social Service.

INSTITUTES OF THE CHRISTIAN' RELIGION, The ('Christianae Religionis In¬ stitution, by which John Calvin laid the foun¬ dations of Calvinism, stands unique among books that have had immediate, deep, wide, and lasting influence on Christian thought and life not

alone for the author's youth, the com¬ parative brevity of the theological studies that preceded it, and the speed at which it was completed, but also for the fulness with which

the system it presents was elaborated at the work's first appearance in 1536. For though revised and extended, more logically and inclu¬ sively presented, in the edition of 1539, still further revised in 1543 and 1550, and reaching its final form only in 1559, it shows throughout no sign of change of position, still less, of re¬ traction. Begun in 1534. when Calvin was barely 25, the book was practically completed when in August, 1535, Calvin addressed the re¬ markable letter to King Francis I, with which it opens. As this letter shows, the Institutes were composed, or at least completed, to meet a present necessity, to correct an aspersion on his fellow reformers. The French king, wishing to suppress the Reformation at home yet un¬ willing to alienate the reforming princes of Germany, had sought to confound the teachings of the French reformers with the attacks of Anabaptists on civil authority. "My reasons for publishing the Institutes,® Calvin wrote in 1557, "were first that I might vindicate from unjust affront my brethren whose death was precious in the sight of the Lord, and next that some sorrow, and anxiety should move foreign people, since the same sufferings threaten many.® Therefore he wrote in Latin,, but he proceeded immediately to translate his work into French, and in both forms it gained quickly wide circulation.

((The hinges on which oUr controversy turns,® says Calvin in his letter to the king, (

The 'Institutes5 in this first form were not merely a logical and felicitous exposition of Reformation doctrine; they proved the inspira¬ tion to a new form of Christian life. Their debt to Luther in the treatment of Faith and Sacraments, to Martin Bucer in what is said of Divine Will and Predestination, and to the later scholastics for teaching involving unsus¬ pected implications of freedom in the relation of * Church and State, has been clearly traced. Yet the 'Institutes5 were justly felt to be as a new voice, and before the year was out there was demand for a second edition. This came in 1539, amplifying especially the treatment of the Fall of Man, of Election, and of Reproba¬ tion, as well as that of the Authority, of Scrip¬ ture. It showed also a more irenic temper toward Luther in the section on the Lord's Supper. The edition of 1559, claiming to be

“almost a new work® is in fact a complete re¬ casting of the old institutes } into four books and 80 chapters, on the basis of the Apostles’ Creed. In this form the work was translated into French and Dutch in 1560, into English in 1561, into German in 1572, into Spanish in 1597. Seven other editions and four abridgments ap¬ peared in English before the end of the 16th century. A judicious summary of the teach¬ ings of the (Institutes) is to be found in W. Walker’s (John Calving pp. 409-429. No book of its century showed such power to spread ideas and to unify the strivings for reform. That cardinal period in Christian development found in this book the most logical, clear, characteristic presentation of what reformers prized as truth, and, though its teachings are nowhere held to-day in their fulness, the place of the

Very important in their apparently unreal¬ ized implications were the teachings of the (In¬ stitutes > on civil government. They counted it the function of an ideal state to see that no “offenses against religion break out or be dis¬ seminated.® It was, indeed, a duty to submit to rulers negligent in this regard; but <(if they command anything against God, let us not,® says Calvin, (

Changes from the teaching of the (Insti- tutes) among those who most cherish Calvin’s memory are notable in the matter of church discipline and in regard to the duty of civic rulers to guard the purity of the church. Changes are seen also in the doctrine of the Scripture, of election, reprobation and human depravity. This is natural. The appeal of the Unstitutes) was to the intellect, and these very changes are in large part the result of the vigor¬ ous thinking which the (Institutes) demanded and of which they were so eminent an exemplar. The standard edition of the

Benjamin W. Wells.

INSTITUTES OF ORATORY, The (

- INSTITUTIONAL CHURCH

the ordinary handbooks of rhetoric, while his own theory is based on his own experience and the best views of different authorities, espe¬ cially Dionysius of Halicarnassus, Caecilius, Chrysippus, Cicero (upon whom his exposition is mainly founded and from whom he seldom differs and then only with reluctance), Cornu- ficius and Celsus. Quintilian insists that the orator must be of good moral character as well as versed in rhetorical accomplishments. His illustrations are drawn mainly from the classical writers and he attacks the style of his

own day, at the same time warning the pupils also against the early writers. Especially interesting is the 10th book, which treats of literary criticism as regards the Latin and Greek prose writers and poets useful to the orator. The chief manu¬ scripts of the I-IV, Leipzig 1798-1816), C. G. Zumpt (Vol. V, 1829) and E. Bonnell (Vol. VI, containing lexicon and indices, 1834), but the pincipal edition is that of C. Halm (Leipzig 1868), revised by F. Meister (Prague 1886-87). Book X has been separately edited by J. E. B. Mayor (pt. I, London 1872), E. Bonnell and F. Meister (5th ed., Berlin 1882), G. T. A. Kruger and G. Kruger (3d ed., Leipzig 1888) and W. Peterson (Oxford 1891). The (Institutiones) have been translated several times into several of the con¬ tinental languages and an English translation by J. S. Watson (2 vols., London 1902-03), with notes based on Spalding, appears in the (Bohn Classical Library*.

Herbert F. Wright.

INSTITUTIONAL CARE OF THE IN¬ SANE. See Insane, Institutional Care of.

INSTITUTIONAL CHURCH, a non- credal organization of Christians, to supplement the regular church methods and nr.nistrations — preaching, prayer-meetings, Sunday school, and pastoral visitations — by helpful social work in the community. The moving spirit is the same as in the Y. M. C. A., University Settle¬ ment, Salvation Army, Rescue M'ssions,. Chris¬ tian Endeavor societies, etc. ; but <(with the emphasis on Church, not Institution.® The prime object is to reannex to the church the functions which other bodies have been com¬ pelled to fill by its neglect of its duty; and strengthen it by gathering potential Christian elements which under the old system do not come to it, as well as by combining in itself all the claims to public gratitude and interest now shared between the purely ecclesiastical and the purely social institutions, or the half¬ way houses like the Y. M. C. A. It differs from the latter in not merely furnishing a reli¬ gious atmosphere which may lead to church membership, but enrolling members at once in a real church of Christian work by absorbing the secular features of the other; in a word, to do, without vows or uniforms, what the Catholic Church has alwavs done with its chari¬ table functions — make them an integral por¬ tion of the church organization. Hence, it is not by itself a church in the sense of the Roman Catholic or the Methodist Church, but in a broad sense a description of anyˆ church which adds educational or social work; in general use, a title of any which throws into this work its predominant vitality. Free pews are an es-

sential accompaniment, as the social aristocracy fostered by rented pews contradicts the basal democratic principle of institutional work ; hence it is sometimes called Free Church, but preferably Open Church. The present name originated with President Tucker of Dartmouth College, who applied it to Berkeley Temple, Boston.

The movement started chiefly with the High Church element in England, modeled on the Catholic idea; it flourished for two generations in that country before reaching the United States, about 1880. Now a large number of churches — Episcopal, Congregational and Bap¬ tist in the forefront, but also Methodist, Pres¬ byterian, Unitarian — have adopted the idea with increasing vigor, besides the work of this class always performed by the brotherhoods and sisterhoods of the Roman Catholic Church. One of the earliest of these was Plymouth Church of Indianapolis, inspired by the memory of Mr. Beecher. Notable among others are the Saint Bartholomew, Saint George, Saint Paul and Judson Memorial of New York, and the Tabernacle of Jersey City; Berkeley Temple, Parker Memorial, and Ruggles Street Baptist of Boston; Grace and Bethany of Philadelphia; Ninth Street of Cincinnati, Pilgrim of Cleve¬ land; Plymouth Tabernacle of Detroit; People's of Saint Paul; and the Denver Tabernacle. In 1894 the Open and Institutional Church League was organized in New York; it held several conventions in Eastern cities (1895-1901), and for three years published the (Open Church) as its organ, but has practically lapsed, being merged in the (National Federation of Churches and Christian Workers.* The total of its work, however, is not shown by its nominal member¬ ship; the same spirit has infected outside churches, and their methods are being more and more adopted as a general basis of work.

The platform of the League stated that it aimed to save all men by (

duties, such as pastoral visiting, reception and welcome of strangers, canvassing for the vari¬ ous activities of the church ; and there are not only sub-pastors, but deaconesses, sisters and nurses. The purely secular side embraces all departments of culture, physical, intellectual and moral, as well as direct charities. Morally, the church work above should be sufficient. The charitable departments include not only direct aid to the poor, but wood-yards, em¬ ployment bureaus, etc. ; personal endeavor to provide employment for those willing to work; dispensaries, hospitals and creches ; and en¬ couragement to thrift by

savings funds. Spe¬ cial buildings are often erected.

That the movement is liable to perversions is admitted; such is the case with every institu¬ tion. Secularization is one ; but unless it can be faced, the churches cannot influence or draw in these outside them, for the simple reason that the latter cannot be brought within hearing. Sensationalism, to draw in hearers to be bene¬ fited, is a graver one, and ill-judged; as one of its chief workers puts it, <(a camp-stool congre¬ gation neither pays nor repents,® and a lasting work must be content wTith slower processes. Consult Burr, A. R., (Russell H. Conwell, Foun¬ der of Institutional Church in America1* (Philadelphia 1905) ; Forbes, J., (Social Ideas of a Free Church) (Boston 1913) ; Thwing, C. F., (The Working Church* (New York

1913).

INSTITUTO HISTORICO E GEO- GRAPHICO BRAZILEIRO (Brazilian His¬ torical and Geographical Institution), a Brazilian society devoted to the advancement of historical and geographical knowledge, founded at Rio de Janeiro in 1839. Under its auspices and with its aid many historic documents relating to the early history of Brazil have been printed and thus made available to historical students throughout the world. The society publishes many such documents, also accounts of geo¬ graphical explorations, etc., in its periodical A Revista T rimensal.

INSTRUMENT, in law, a written docu¬ ment evidencing an agreement or acknowledg¬ ing a claim, as a deed, grant or will. The term has been held to mean also, in its widest sense, any written document, as a statute or record, but scarcely to apply to accounts, memoranda, or ordinary letters.

INSTRUMENT OF GOVERNMENT,

the written constitution under which Oliver Cromwell governed Great Britain and Ireland from 16 Dec. 1653 to May 1657. It consisted of 42 articles, and vested the legislative power in the hands of ftone person and the people as¬ sembled in parliament.® The executive power was placed in the hands of Cromwell as Lord Protector of the Commonwealth; his office was made elective and he was to be assisted as executive by a council of state of from 13 to 21 members. Councilors were appointed for life. A new parliament was to be called every third year, and a parliament could not be dis¬ solved in less than five months except at its own request. There were 460 members in the single chamber — 400 for England and Wales and 30 each for

Ireland and Scotland. The distribution of seats was altered. A property qualification of £200 was placed on voters.

Roman Catholics and those who had opposed parliament during the Rebellion were disfran¬ chised. This constitution contained several ele¬ ments of weakness and its downfall was as¬ sured as soon as it dared assert its independ¬ ence of or opposed the Lord Protector. Con¬ sult Gardiner, Constitutional Documents) (Ox¬ ford 1889; and Jenks, Constitutional Experi- ments) (London 1891).

INSTRUMENTAL MUSIC. See Music;

Musical Instruments; Orchestral Music.

INSTRUMENTALISM, in philosophy, a system, akin to pragmatism, according to which thought is considered an organic function, the object of which is to maintain the even tenor of experience, restoring the latter when it is interrupted or confronted by a special situation. See Epistemology; Pragmatism.

INSTRUMENTATION, in music, the ar¬ ranging of music for a combined number of instruments. The nature and character of the musical ideas must determine whether the in¬ strumentation shall be simple or artistic, and perhaps complex ; the latter being the case when some of the instruments take a more prominent part than others. For both purposes, a thor¬ ough knowledge of every instrument in the orchestra is absolutely necessary, as without this instrumentation becomes only a deafening mass of sounds. The stringed instruments, from their nature, in most cases, form the principal parts of a score, around which the other instruments move, without depriving them of their importance. The wind instruments represent, more or less, a subordinate chorus, which may again be divided into two kinds, viz., the wood instrument and the brass, which, with the stringed instruments, give three essen¬ tially different choral effects, that may be mixed together in endless variety. A knowledge of the art of instrumentation is acquired only by great experience ; at the same time much may be learned by consulting the best works on the subject such as Sundelin, (Die Instrumentirung fur das Orchestra5 ; Berlioz, (Traite d’ Instru¬ mentation5 ; Gassner, (Partiturkenntniss.5

INSTRUMENTS, Engineering. See En¬

gineering Instruments.

INSTRUMENTS, Musical. See Musical

Instruments.

INSUBRES, a Celtic people of northern Italy. In the 4th century b.c. they settled in the region between the Alps and the Apennines. They were frequently at war with the Romans after 222 b.c., and in 194 their capital Mediol¬ anum (Milan) was taken and they were finally brought under the yoke of Rome. Consult Hol¬ der, A., (Altkeltischer Sprachschatz5 (Vol. II,

1904).

INSULAR CASES, a series of legislative problems created by the aaccretion55 to the United States of insular possessions following the Spanish- American War in 1898. They arose over President McKinley s recommendation in his message on the convening of the 56th Con¬ gress, 3 Dec. 1899, that ˆlegislation should be enacted establishing a civil government in Porto Rico,55 and involved the status of the citizens of our insular possessions and the constitutionality of an intra-national revenue tax. The Foraker Act, 11 April 1900, defined the relation of the

island to the United States, by placing it on a status outside of the Constitution and also out¬ lined a scheme for the government of depend¬ encies that obligated the nation to a new and united policy. This gave rise to the Insular Cases which debated the question of the right to demand duty for commercial articles im¬ ported into the United States from Porto Rico. On appeal the Supreme Court decided that the insular possessions were obtained under the clause regulating the making of treaties, and <(that the power to acquire territory by treaty implies not only the power to govern such terri¬ tory, but to prescribe upon what terms the United States will receive its inhabitants, and what their status shall be.55 See Porto Rico; Cuba; Hawaii; Philippine Islands.

INSULATION, non-vibrating or non-con¬ ducting material designed to cut off or check the spread of some form of vibration, as heat, sound, electricity, etc., also the process or act of surrounding a body with such non-conduct¬ ors. The term is sometimes extended to cover insulating material. For shutting out sounds and for keeping in heat, a closed air-space is a simple and effective medium. It is made use of in house-walls, thermos bottles and in refrig¬ erating appliances. For

insulating a boiler asbestos or mineral wool is commonly employed, because it will bear the heat. To resist the passage of electricity, glass, shellac, resins, sulphur, ebonite, paper, lead, gutta-percha, silk and baked wood are notable insulating mate¬ rials. To prevent the lateral passage of elec¬ tricity from one wire coil to another the wires are usually covered with silk and shellac. In¬ sulators on telegraph poles, to which the wires are attached, are usually made of porcelain, glass or stoneware. Underground telegraph wires are usually of copper, insulated by means of a coating of some composition of gutta¬ percha and protected by tape or iron \yire, metal tubes or wooden troughs filled with bitu¬ men. See Electricity, Conductors and Insu¬ lators.

INSURANCE, a contract by which one party, for a stipulated consideration, under¬ takes to indemnify or compensate another party against loss by certain specified risks. The party undertaking to make the indemnity is usually called the insurer or underwriter, the other the insured or assured; the agreed con¬ sideration is termed the premium ; the written contract, a policy; the events or causes of loss insured against, risks of perils ; and the thing insured or the subject to be protected, the in¬ surable interest. Marine insurance relates to property and risks at sea ; insurance of property on shore against fire is called fire insurance; life insurance, in its widest sense, is a contract entered into by the insurer to pay a certain benefit contingent upon the duration of one or more lives. Besides these classes of insurance there are many others ; the traveler may insure himself against loss entailed from damage by rail or sea; the farmer from the inroads of disease among his live stock; the employer from the fraud of a dishonest cashier, etc.

The practice of marine insurance seems to have long preceded insurances against fire and upon lives. It is impossible to state the precise period of its introduction, but it* is probable that it dates from about the beginning of the 15th

century; though it is contended, on the author¬ ity of certain ancient writers, that traces of this form cf insurance are to be found among the Romans. Some Anglo-Saxon guilds insured their members against loss from fire, water, robbery, etc. Commercial insurance, however, seems to have originated in Flanders about 1300, although priority is claimed for both Italy and Spain. It is probable that insurance was intro¬ duced into England by the Lombards early in the 16th century,

but few court cases pertaining to it are found till the middle of the 18th cen¬ tury.

In Great Britain fire insurance has been practised for over two centuries, but on the Continent its introduction dates considerably later. The history of life insurance, as well as that of various other forms now in practice belongs to a still later time. For the history and development of the principal insurance sys¬ tems in America, see Accident Insurance; Auto¬ mobile Insurance; Burglary Insurance; Com¬ mercial Life Insurance; Group Insurance; Health Insurance; Insurance, Industrial; Insurance, Life; Insurance, Life, Statistics; Insurance, Marine; Insurance, Science and Economics of; Insurance Law; Insurance Supervision; Insurance Fraternal; Old Age Insurance and Pensions; Social Insurance; Workmen's Compensation, etc.

INSURANCE, Credit. This is a contract issued to jobbers, manufacturers and wholesale dealers guaranteeing indemnity for losses sus¬ tained through insolvent debtors in excess of their normal trade loss as shown by the in¬ sured's records or as agreed with the insurer. Such a policy commonly runs from year to year and covers only such sales of merchandise as are shipped and delivered.

Credit insurance was first authorized by statute in New York in 1886, in New Jersey in 1889 and in other States shortly after these dates. The first company to undertake such risks in America was organized in New Jersey in 1888 under the title United States Credit System Insurance Company. Other special cor¬ porations of this character followed, in Louisi¬ ana in 1891, in New York in 1892 and in Minne¬ sota in 1893. The field being new, these earlier ventures suffered from lack of experience on which to base the business and all but one came to an end within a few years. The general casualty corporations, already assuming varied lines of this character, were shortly qualified to assume credit risks, but the field has been left so far to a few companies which perform an increasingly useful function for the greatly expanded business credit system of the present time. The business is handled almost entirely by one New York company and the United States branches of two foreign companies.

The plan of operation for credit insurance was devised by the actuary of the first com¬ pany organized and has been followed by its successors, experience affecting mainlv the mat¬ ter of rates and the selection of risks.

The basis of the whole scheme of this class of insurance is the generally accepted mer¬ cantile ratings, as evidencing the financial

strength and reliability of the debtors con¬ cerned. The insurer, however, undertakes to give indemnity ' for only the excess of credit losses beyond the ordinary percentage experi¬

enced by the insured's business, not including single sales or transactions but the average loss sustained during not less than one year.

This insurance is not only confined to risks on parties having mercantile ratings, but the amount of sales covered is limited to a per¬ centage of a debtor's lowest capital rating as given by mercantile agencies. A policy may be had to apply to debtors of the first and sec¬ ond grade commercial ratings, or for a larger premium the policy will cover in addition parties with lower ratings.

Credit policies state minutely the conditions of the contract and define liberally when a con¬ dition of solvency exists and in what manner a claim shall be set up. Reckless management combined with inexperience to demoralize the business during the earlier years, and technical defenses were often resorted to as an offset to claims. In later years credit insurance became settled on stable and conservative lines and has prospered. The passage of a general bank¬ ruptcy act by the federal government in 1898 materially aided in placing credit insurance business on solid ground.

The table here given sums up the results of all this class of business transacted in America as far as reported in the best authori¬ ties, showing the early period of uncertainty separately, then the five-year periods to the end of 1916, and lastly the year 1917 by itself.

Credit Insurance in America.

Ratio

Premiums Losses per cent

1889-1896 . $2,297,917 $1,174,491 51.1

1897-1901… . $2,543,296 $656,259 25.8

1902-1906 . 9,867,731 4,258,707 43.1

1907-1911 . 9,835,400 6,446,803 65.5

1912-1916 . 7,405,227 4,084,458 51.1

Total, 20 years . . $29,651,654 $15,446,227 52.1

1912 . $1,611,352 $1,195,839 74.2

1913 . 1,496,826 923,292 51.7

1914 . 1,487,506 732,139 49.2

1915 . 1,395,713 939,765 67.3

1916 . 1,413,830 293,423 20.7

1917 . $1,665,915 $96,676 5.8

The table shows, that, when trade condifions were normal, premiums were sufficient to pay losses and leave an ample margin for expenses and profits, but that during times of stringency and emergency, as in 1907 and 1914, greatly in¬ creased losses followed. This dangerous uncer¬ tainty can be met only by an ample surplus accumulated out of the years of plenty for the years of leanness that are sure to recur, whether caused by crop failure, financial disturbance, contagion, war or abrupt economic changes, as it is precisely against such surprise contingen¬ cies that credit insurance must demonstrate its highest utility.

From the statement of an official long ex¬ perienced in this line of protection, the benefits of credit insurance may be summarized as follows :

It serves as a reserve to the insured's cap¬ ital, equal to face of the policy, to offset un¬ expected losses.

It serves as collateral security to accounts against misfortunes that may befall even pre¬ ferred customers.

It projects profits against unexpected and unavoidable losses.

Joined with the other forms of insurance it completes the chain of commercial protection.

It is readily seen that the function of credit insurance is that of all insurance — not to re¬ lieve the creditor of responsibility for his ac¬ counts or to invite debtors to repudiate their honest indebtedness, but

to provide against those uncertain and unforeseeable events which commercially embarrass the latter and jeopar¬ dize the enterprise of the former. By a prop¬ erly conducted credit insurance such losses are widely distributed among creditors in similar business circumstances, so that no one is seri¬ ously burdened.

Charles Maar,

Insurance Department, State of New York.

INSURANCE, Fraternal. This term ap¬ plies to a large class of societies that has come into existence in America since the Civil War, whose primary object is to provide a substan¬ tial death benefit for the families or depend¬ ents of the members on the co-operative plan. These orders are to be distinguished from the older class of secret societies, comprising the Masons, Odd Fellows and Foresters, which originated for the most part in Europe and have primarily social and benevolent objects; and also from another large class of societies that has come into being during the past half century or more and which combine good-fel¬ lowship with stipulated sick and funeral bene¬ fits, although some of the first-named orders afford sick or other benefits, in one way or an¬ other, in addition to death benefits.

It is well known that all fraternal societies, as known in America and now numbering many hundreds, have distinctly moral and religious foundations, are educational and tend to de¬ velop character, good citizenship and the spirit of co-operation and mutual helpfulness. The Masonic bodies afford charitable relief gener¬ ously where the need is made evident, but in other fraternities the kind and measure of the benefits are stipulated and become the right of members on the basis of their dues or assess¬ ments and good standing, irrespective of a ne¬ cessitous condition.

History. — Mutual benefit societies for one object or another are found back as far as the dawn of history. Whatever was necessary or desirable to people in common might be se¬ cured by co-operation when the chances of life or the hazards of death rendered the individual helpless. Burial societies were common among the Greeks ˆand Romans, because ceremonial sepulture was indispensable to the repose of the spirit in the land of shadows — the underworld. Among the Teutonic nations, guilds flourished not only for relief against misfortune but for co-operation and protection in daily affairs.

From its earliest rise in Europe the Chris¬ tian Church was a centre of charitable relief to all whom its benevolent activities could reach. Not

only the teaching of its founder, but its own hard early experiences, empha¬ sized charity as the highest of the graces of human character. In Great Britain the system of Church relief was swept away in the gen¬ eral seizure of endowments under the reforma¬ tion enforced by Henry VIII and in its place under Elizabeth was substituted a system of public relief by poor-rates which has continued with changes to the present time. The old guild spirit, however, came to the surface vol. 15 — 12

again during the reign of Charles I, although the guilds had gradually fallen into decay dur¬ ing and after the Elizabethan period. The re¬ sult was the rise of the English friendly socie¬ ties for co-operation among people in moderate circumstances who were not satisfied to fall back upon the tender mercies of the poor-rates but endeavored in a self-respecting way to forefend the ills of life and the mischances of affairs by provisions for sharing the hazards among themselves — a principle that is at the bottom of all modern insurance.

Little or no historic connection is apparent between the guilds or friendly societies of Great Britain and the fraternal beneficiary or¬ ders of America. The latter clearly took their rise out of the new social and co-operative spirit that was developed by the Civil War, which drew together for the first time on this continent millions of people in a vast undertak¬ ing, and by the very necessities of the task drew forth and trained their faculties for joint action to a degree there had not been occasion for before. The pioneer period of America called for the individual hardihood and personal self-reliance that subdued a broad continent and carried settlements from coast to coast. The Civil War indicated an excess of individ¬ ualism, or at least the approach of a new era which called for an abundant measure of un¬ selfish social co-operation to save the nation from futile division and the continent from antagonistic civilizations. $

Between the time of the Revolution and the Civil War such fraternities as the Odd Fel¬ lows and the Ancient Order of Foresters and the Ancient Order of Hibernians had been transplanted to America from Great Britain, and certain native societies, like the Tammany Society, the Red Men, the United American Mechanics, the Good Templars, Sons of Tem¬ perance, and a number of others with clear political or moral objects, had come into exist¬ ence, all of which afforded a measure of chari¬ table relief to their members ; but the credit is accorded to John Jordan Upchurch, the found¬ er of the Ancient Order of the United Work¬ men, at Meadville, Pa., in 1868, for the initia¬ tion of the movement toward the organization of a new class of fraternal orders that was to make the provision of a substantial death

bene¬ fit their primary object. Upchurch's effort was linked with a desire to bring together in rela¬ tions of mutual help and good understanding the large group of workers that the ranid ex¬ pansion of manufacturing industry during the Civil War had centred in many of the Amer¬ ican cities. He sought to meliorate trade trou¬ bles the while joining the new craftsmen in an effort for self-help, socially and intellectually, and against the one greatest certainty and un¬ certainty of life, to wit, the contingency of death, which was apt to leave the worker's de¬ pendents helpless in a strange place awav from even the meagre living that the widow and or¬ phan could find in village and rural communi¬ ties.

Characteristics.— In each decade since the close of the Civil War period scores of new fraternal benefit orders have been formed, with differing plans of oneration but with the same general character. Some have been spur¬ ious and sought to make fraternalism a source of private profit. Many have remained local in-

stitutions, while many others have become gen¬ eral and have extended over the United States and Canada. A number are sectarian or racial in their constituencies, being confined to Prot¬ estants, Catholics or Hebrews. To most of the orders men alone are eligible ; yet not a few are open to both sexes and a few are purely women's societies. Some of the earlier moral or political orders have in the interval since or¬ ganization adopted a plan of death benefits, and most of the later organized trade unions have such a benefit. The genuine fraternal benefit orders use the lodge system, with the social and moral influence of its ritual and form of initiation and its fraternal bond, to carry out the object of co-operative insurance.

The earliest orders, in addition to certain moral and physical tests, called for a uniform contribution from each member to meet bene¬ fit claims as these arose. This was pure char¬ ity in essence if not in form and left the fu¬ ture utterly without provision, under the as¬ sumption that there would always be members enough and willing to meet demands on call. The United Workmen in particular was organ¬ ized under independent State jurisdiction. This proved a source of weakness to the order and disclosed the insufficiency of its financial plan sooner than with others which began with a general jurisdiction and so had the younger lodges to share the inevitably increasing claims of the older.

At this .period scientific practice of life in¬ surance had not yet been fully worked out and such business corporations as were operating in America did not cater to the man in moderate circumstancess, whereas the lodge appealed to him and met his needs for social sympathy and relaxation and for a warm helping hand in emergency, especially in our migratory Amer¬ ican life. The movement toward fraternal in¬ surance was strongly accelerated during the decade following the panic of 1872 by the fail¬ ure of a large number of business companies that were insecurely organized or badly man¬ aged.

Learning from experience that was some¬ times costly, even as the business corporations before them, the fraternal benefit orders soon passed from the first crude idea of a uniform contribution and came to depend on a closer medical selection and a contribution graded ac¬ cording to the member's age at entry; but even so they fell short of a condition essential to permanence in not realizing that sufficient in¬ come must be had for both current needs and for a reserve accumulation to meet future obli¬ gations, since under a purely mutual scheme the members who pass away first must contribute to not only their own but to the benefits of those who pass away later.

Doubtless a better understanding with the students and leaders of actuarial science would have saved much confusion and loss, but fra¬ ternal leaders in the end have profited by their experiences and the fraternal orders have been an acknowledged educational influence that has made America of to-day the best insured por¬ tion of the world. A table of mortalitv built upon fraternal experience, adopted in 1899, has become a standard for rates and since that date a continuous effort has been made to bring fra¬ ternal insurance to a scientific basis.

Development. — Looking back over the less

than 50 years of fraternal insurance, a steady improvement in plans and methods is to be noted, as well as an amazing expansion of the idea, as shown in the accompanying table. Ig¬ norance and error may be freely acknowledged, but none the less it was an altogether natural event and thrilling now to contemplate that the great democracy of the West, after gaining a new consciousness of solidarity from four years of civil strife, should launch on a great co-operative effort touching that event of life which deprives the great majority of families of their chief support.

To the splendid record of financial benefits provided, hundreds of

thousands of families that would otherwise have been left nearly destitute, must be added the incalculable moral, social and educational influence the lodges have had upon American life during the past half- century. The benefit orders are a true expres¬ sion of democracy and a fruit of the self-re¬ spect and self-reliance for which popular self- government stands.

Owing to the insecurity of the earlier plans and in some cases to poor business methods numbers of benefit orders have come to grief, while others have found it advantageous to amalgamate. Those that have wisely fore¬ stalled trouble by increasing rates and better¬ ing methods, and the younger orders that prof¬ ited by the experiences of predecessors in the field, have entered upon a new era of develop¬ ment which will be marked, not so much by large numbers as by strength and quality.

The nearly two decades of the 20th century have been troublous for the fraternal orders owing to the agitation and uncertainty attend¬ ing discussion of rate changes and the elimina¬ tion of tfie endowment or short-term certifi¬ cate, which latter proved as deceptive as the tontine forms of old-line policies and is no longer offered by any reputable society ; yet according to the completest showing available, that of the Spectator Year-Book,* the follow¬ ing table represents conditions on Jan. 1, 1917:

Summary of 560 Fraternal Orders of United States and Canada at the Close of 1916

Certificates in force 1 Jan. 1917 . 9,191,860

Number of lodges . 124,912

Income for 1916 . $178,867,638

Disbursements . 141,280,882

Claims paid . 116,769,888

New insurance written . 1,182,642,577

Assets 1 Jan. 1917 . 319,392,839

Liabilities . 81,846,123

Results of 180 of the Leading Orders at the Close of 1917

Net gain in certificates . 168,904

Benefits paid, 1917 . $113,763,279

T otal insurance in force . 9,634,662,126

Assets 1 Jan. 1918 . 344,618,330

Liabilities . *84,116,631

- Includes $62,529,414 reserves.

About 100 minor orders are not included in this tabulation. Of the 560 societies included, 380 have $1,000,000 or over of insurance in force. A compilation made by another reliable authority, the Fraternal Monitor , gives the ag¬ gregation of death benefits paid since organi¬ zation by American benefit societies, to the end of 1917, as $2,344,738,818. The amount of sick, hospital and funeral benefits paid by local lodges is not available but the aggregate of

such benefits paid by the larger benevolent orders offering them is $624,866,506.

The fraternal beneficiary orders have in re¬ cent years had a yearly addition of 1.000,000 new members, the yearly payment of over $100,000,000 in death benefits, the yearly in¬ crease of over $1,000,000,000 in insurance in lorce, and a substantial increase in assets over immediate liabilities.

• Some of the larger orders have latterly pro¬ vided old age and disability benefits and many of the local lodges have from the first had in operation special sick, hospital and funeral benefits for such of the membership as wish to share them.

New .Standards Set. — A long and definite advance in fraternal history was registered in 1886, when, pursuant to a call fathered by the Supreme Lodge of United Workmen, 16 of the leading orders met at Washington, D. C., and formed a federation, entitled the National Fra¬ ternal Congress, with which others soon affili¬ ated. In 1901 a number of orders formed a separate organization, the Associated Fraterni¬ ties of America. The two bodies, by means of yearly gatherings and discussion, proved a good influence in setting

standards and develop¬ ing uniform and business-like methods.

The efforts of these federations, not always harmonious at first, at length made for unity of purpose and brought them to actual unity in 1913. The results of many years of experience, criticism and agitation found fruition in 1910, under the guidance of the National Convention of Insurance Commissioners held at Mobile, Ala., in a model fraternal code, which was slightly modified in 1912 at New York. This so-called Mobile bill, or the later New York Conference bill, was promptly enacted into law by a number of States, and now controls in 37.

During the years when the necessity for more adequate rates was becoming apparent, as some orders made provision for an increase rather than resort to more than the monthly calls that had come to prevail, their action was contested by individuals in a number of cases. The State courts in Iowa, New Jersey and New York rendered decisions adverse to the right of particular orders to adjust their rates, while Connecticut and Texas rendered favorable de¬ cisions. A case was in due course carried up to the United States Supreme Court, which in 1916, in Green v. The Royal Arcanum, gave decision at the hands of Justice Hughes practi¬ cally securing this right to the orders on the ground that a benefit certificate is not a mere business contract but an agreement among the holders for no other consideration than that mutually provided and which all were bound to make good.

By means of the uniform code the charac¬ teristic features of fraternal benefit orders are now written into statute law generally as soci¬ eties having a lodge system, with ritualistic form of work and a representative form of government and making provision for mortu¬ ary benefits, to which may be added benefits in case of sickness, accident and old age, provid¬ ing disability benefits do not begin under the age of 70. Besides provisions for the more responsible conduct of their business and a closer public supervision, the uniform law pro¬ vides for a standard of valuation to be used

from 1917 and to which each order must attain by progressive improvement, or else by the end of three years adopt increased rates for new members and hold the funds for such members in a separate class.

Whole Family Protection. — A new devel¬ opment in fraternal circles is a plan for extend¬ ing fraternal insurance to the minor children of members. The orders have hitherto allowed membership of one or both parents and of minors at the age of 18. The States of Con¬ necticut, Iowa, Kansas, Maine. Massachusetts, Michigan, Missouri,

Nebraska, New Hampshire, New York, North Carolina, Ohio, Oklahoma, Oregon, Rhode Island, Texas, Utah and Wis¬ consin had by the first part of 1918 provided for the insurance of the children of members of fraternal orders. A uniform bill for whole family protection, adopted by the National Con¬ vention of Insurance Commissioners in 1916, has been followed in general. The plan of the industrial companies is used with a separation of funds in a juvenile department. Whole family protection is in wide use among the friendly societies of Great Britain.

Charles Maar,

Insurance Department, State of New York.

INSURANCE, Group. See Group Insur¬ ance.

INSURANCE, Guaranty. See Guaranty Insurance.

INSURANCE, Health. See Health In¬ surance.

INSURANCE, Industrial. Industrial in¬ surance may be defined as retail family insur¬ ance. While in scientific principles it does not differ at all from ordinary life, or ((annual premium, M insurance, in practice its distinctive features are: (1) That instead of having its policies written for $1,000 and multiples thereof at varying premiums according to mortality tables, its policies call for premiums of five cents, or some similar unit, and multiples thereof, the amounts of insurance varying ac¬ cording to age; (2) the premiums, instead of being payable annually, or semi-annually, or quarterly, are payable weekly; (3) these pre¬ miums are called for weekly by collectors, in¬ stead of being remitted by mail ; (4) the amounts of insurance payable are based upon mortality tables drawn from experience in in¬ dustrial insurance, and these tables differ very widely from the tables used by the ordinary companies; (5) the insurance is taken upon lives between ages 1 and 65, without distinction as to sex. Industrial insurance is so called because it is the insurance of the working classes, and for this reason it has grown very rapidly.

History. — For its origin industrial insur¬ ance must point to the guilds of the Middle Ages, whose place was taken in England, after the Reformation, by burial societies or clubs. These were voluntary associations, meeting per¬ iodically and collecting dues and undertaking to bury members out of the fund so paid in. The dues were the same for all ages, and the management was so bad that up to 1867 about 14,000 of the clubs out of 38,000 had collapsed and a

large majority of the existing remainder were insolvent. In 1849 the first industrial life

insurance company was founded in England, called the Industrial and General ; three years later an offshoot, called the British Industry Life Insurance Company, was formed; two years after this, in 1854, the Prudential Assur¬ ance Company, which had been in existence six years as an ordinary company, took up the industrial business and soon absorbed the Brit¬ ish Industry. At the outset the business was experimental, as actuaries had insufficient data upon which to base calculations ; and several tables of benefits for the weekly premium of a penny succeeded each other, widely differing in amount. The first table ran from ages 10 to 50; age 10 was found too high for practical working and the table was run down to age 7 ; then a demand arose from the people for insur¬ ance at younger ages, which was first met privately by an agent of the Prudential on his own account. His fine business record attracted the attention of the officers, who found it arose from his practice of himself insuring the younger members of the family. This discovery led to the company's making its system a real family insurance. It was not successful until all ages were accepted. Therefore the busi¬ ness grew rapidly, so that at the end of 1917 the Prudential had 21,730,468 industrial policies in force, secured by £53,602,348 of assets cred¬ ited to the Industrial Branch, besides £53,642,- 748 assets credited to the Ordinary Branch. The Board of Trade exhibit of regular indus¬ trial insurance (that is, excluding friendly so¬ cieties) in Great Britain shows the steady and rapid growth of the business, as will be seen from the following table :

Industrial Insurance in Great Britain.

YEAR

Number

of

companies

Number of policies in force

Insurance in force

1890 .

8

9,432,778

£86,203,873

1900 .

14

18,653,846

181 , 135,538

1910 .

14

29,149,924

292,689,157

1915* .

19

38 , 004 , 956

433,900,645

- During the progress of the war these tabulations were discontinued.

The number of policies in force in the in¬ dustrial companies of Great Britain exceeds four-fifths of the population of the country.

In America the first weekly premium ex¬ periment of importance was the connection of the Hildise Bund, a society which received premiums weekly and used them to pay to the Metropolitan Life Insurance Company to be credited upon quarterly premiums on policies issued by the company on the lives of the mem¬ bers of the Bund. A large business was done on this plan for several years after 1869, amounting at one time to $7,500 per week. There were other similar societies in name, but they seem not to have done much business. The English experiment had attracted a good deal of

attention in America, and various in¬ dustrial insurance companies were formed which, however, never got to the point of issu¬ ing policies. There was a good deal of literary discussion which culminated in a state renort in 1874 by Commissioner Clarke of the Mas¬ sachusetts Insurance Department, describing the

work of the English Prudential Company and setting forth the principles of industrial insur¬ ance. In 1875 the Prudential Insurance Com¬ pany of America, then a small corporation in Newark, N. J., known as the Widows' and Orphans' Friendly Society, changed its name to the Prudential Friendly Society and in Novem¬ ber began the industrial business on the lines of the London company, after which it was named. Before it attained much growth the . John Hancock Mutual Life Insurance Com¬ pany of Boston, the Germania Life Insurance Company of New York (which, however, soon ceased writing industrial insurance), and the Metropolitan Life Insurance Company of New York, old line companies of experience, began the industrial business. The progress of this system of insurance in the United States has been wonderful. Its first policy was issued in America only 43 years ago ; at the end of 1918 there were in force in the United States and Canada nearly forty-one millions of in¬ dustrial policies against thirteen millions of annual premium policies (1917) — the amount insured thereby being respectively about $5,600,-000,000 industrial insurance and $23,000,000,000 annual premium insurance (1917). About 91 per cent of the industrial business in America is in three companies — the Metropolitan Life of New York, the Prudential of Newark, N. J., and the John Hancock of Boston.

The following table shows the rapid growth of the business :

Industrial Insurance in the United States

and Canada.

YEAR

Number

of

companies

Number of policies in force

Insurance in force

1880 .

3

228,357

$19,579,780

1890 .

9

3,875,102

427,882,964

1900 .

17

11,115,908

1,450,324,885

1910 .

22

23,044.162

3,179,489.541

1918 .

31

41,000,000

5,600,000,000

The following table shows how extensively the working classes take out this insurance, by a comparison of the population of five large cities, as estimated by the Census Bureau, with the number of industrial policies in force in three companies (other companies are doing business in most of these cities) :

CITY

Estimated

population,

1 July 1917

Number of industrial policies in three companies in force 31

Dec. 1917

Greater New York .

5,737,492

3,995,708

1,910,516

866,875

681,430

Philadelphia .

1,735,514

Saint Louis .

768,630

Baltimore .

594,637

Cincinnati .

414,248

425,495

There are in the United States over 35,000 agents writing industrial insurance and the head office clerical force numbers several thousand. The industrial claim payments in 1918 were about $90,000,000.

Industrial insurance was introduced in Australia in 1884, but was not vigorously prose¬ cuted until 1887. By the end of 1915 there were nine companies, with 623,790 policies in force, assuring £14,357,173. In New Zealand the gov¬ ernment started the business of industrial in¬ surance in 1875 but quickly discontinued it. In 1881 the government revived the work of the Industrial branch of its Insurance Department, but finally abandoned it in 1887. Among other British possessions there are a few small com¬ panies in South Africa and at least one office has been opened in India.

The business flourishes best in Anglo-Saxon countries. It has not attained large proportions anywhere else, except in Germany, where in 1914 there were 17 companies having nearly eight millions of policies in force for $375,000,- 000. The business is transacted on a limited scale in Austria-Hungary, Holland, Belgium, Denmark, Sweden, Norway, Finland, Switzer¬ land and Brazil.

Policy Contracts. — We have said that the tmit in industrial insurance is the five-cent pre¬ mium or some similar unit ; the amounts of in¬ surance vary with the age of the insured and, during the infantile period, with the duration of the policy. The curve in the mortality table descends from birth to age 12 and then ascends and the companies for the same premium in¬ crease the amount of insurance each year after issuance of the policy, up to age 10. The amount of insurance thereafter does not de¬ crease, for the policies are, like the annual premium policies, constructed with a level premium.

Policies are issued on various plans of in¬ surance, efforts being constantly made to meet what appears to be the popular demand. For several years past a great majority in this country have been issued on the whole life plan with premiums ceasing at about age 70 or 75. The following table of the largest of the companies, which has in force nearly 42 per cent of the American business, shows the bene¬ fits payable on children for a five-cent premium under the company's principal infantile table:

Infantile Whole Life

Payment of premium ceases on first anniversary of date of issue after insured reaches age 74.

Amount payable provided death occur after policy has been in force for the following periods.

FOR A WEEKLY PREMIUM OF FIVE CENTS

Age

next

birth¬

day

Un¬

der

6

Mos

6

Mos.

1

Yr.

2

Yrs.

3

Yrs.

4

Yrs.

5

Yrs.

6

Yrs.

7

Yrs.

8

Yrs.

2. .

25

25

34

40

48

58

70

110

150

214

3. .

25

34

40

48

58

70

110

150

208

4. .

25

40

48

58

70

110

150

201

5. .

25

48

58

70

110

150

194

6.

29

58

70

110

150

187

7. .

35

70

110

150

180

8. .

55

110

150

173

9 .

75

150

167

No policy issued under this plan at a higher premium than

five cents.

It will be noticed that the amount payable increases materially after the policy has been in force for several years. The reason is that in the early years insurance is not needed in

so large amounts and the unearned part of the premium charged is used to increase the amount of insurance in the later years. Technically in industrial insurance adult insurance begins at age 10 because the old actuarial tables were not carried below that age. Above 10, at each ad¬ vancing age at entry, the amount of insurance for the same premium decreases, as can be seen in the next paragraph.

Notable increases in benefits have character¬ ized the tables issued in recent years. In the largest American company there have been three' substantial increases in the benefits under the whole life table, in 1907, 1909 and 1916 re¬ spectively. In 1906 the insurance for five cents for a person entering at age 10 was $120; now it is $162. For a person entering at age 20, the amount has increased from $87 to $113; at age 30, from $67 to $82; at age 40, from $50 to $58; at age 50, from $35 to $38. Moreover, the policies issued prior to 1907 did not contain the present provision for cessation of premium payments on the anniversary after age 74. For age two at entry, weekly premium

five cents, the present benefit, after age 10 is reached, is $214; under the 1907 table the amount was $173; while in 1906 the amount was $120 after age 10, increasing by guaranteed additions to $138 at age 49, at which age the policy became an endowment. The amount in benefit below age 10 has in many instances been doubled. These increased benefits have been made possible by the improvement in general mortality, satis¬ factory earnings from investments and marked reductions in the expense rate.

Beside whole life, some of the companies issue other forms of policies, such as endow¬ ments maturing at age 80, and 20- and 25-year endowments. Twenty-payment life policies are little in demand. The largest of the com¬ panies issues in considerable numbers a novel and attractive contract known as the ((Con- vertible® policy, which is a life policy with premium payments limited to a comparatively short period, after which the insured, if he desire to continue payment of premiums for additional short periods, may convert the policy into an endowment whose date of maturity is successively brought nearer and nearer as pre¬ mium payments are continued. Twenty-five per cent of the Industrial business of the com¬ pany mentioned is written on this convertible plan. Industrial insurance on the “group® plan has also been offered to the public, but the results have been negligible.

The provisions of the policies in industrial insurance do not differ in principle from the annual premium policies. They are usually incontestable after one or two years and free from restrictions as to residence and travel. Because of the small premium payable weekly and the rather superficial medical examination, full benefit is usually deferred six months oi* a year. In the principal American companies, only one-half is paid if death occur within six months, with full benefit thereafter. In Great Britain the first year benefits are rather less liberal than in America. The insurance under industrial policies is payable immediately upon receipt of proofs of death; and these proofs are prepared by the companies’ agents without charge. The intention of the insurance being mainly to provide for expenses of sickness and

death, everything is done to facilitate the pay¬ ment of the premiums to the company and of the claims to the insured. Collectors call weekly for the premiums ; the companies have local offices convenient

to the policyholders, for the payment of death claims and the service of policyholders generally.

Special Concessions. — Four weeks' grace are allowed in the payment of premiums, within which time claims are paid even if premiums have not been. In one of the largest companies, policies with premiums not more than twenty weeks in arrears are revived without regard to the health of the insured, and this practically has the effect of extending the grace period to twenty weeks. In the two other principal companies a similar concession is granted for thirteen weeks. Paid-up or extended insurance is granted upon lapse after three years, the pro¬ vision usually being automatic — that is, no action being requred of the policyholder. Cash surrender values are usually granted after five or ten years. The weight of opinion is against early cash values, not only because they are small, but because they unduly tempt the policy¬ holder in slightly straitened circumstances to give up his much-needed insurance. In cases of real need, howeyer, the companies have adopted a liberal policy in the matter of cash values. Revivals are freely granted in cases of lapsed policies and where policies have been long lapsed, so that payment of arrears is diffi¬ cult, the companies loan the amount of arrears on the security of the policies. Special allow¬ ances are made in cases of long strikes and lockouts, or of widespread suffering through calamities such as fire, flood or earthquake, death-claims usually being paid even if policies are lapsed.

Some of the companies grant full immedi¬ ate benefit under adult policies in case of acci¬ dental death. The two largest of the American companies provide in their policies that in event of certain forms of total and permanent disability one-half of the insurance is immedi¬ ately payable and a fully paid-up policy for the •balance is issued at the same time.

Critics of the comparatively high cost of industrial insurance generally overlook the fact that much of this cost is incurred in the serv¬ ice that is rendered to the policyholder in sending an agent to his home weekly to collect the premiums. This fact is strikingly illus¬ trated by a clause that has been incorporated in the policies of the largest American company for several years past and that has been made retroactive as to all of its existing nolicies, under which a premium allowance of 10 per cent is granted to any policyholder who has paid premiums continuously for at least one year direct to the home office or one of the district offices of the company. In this way the policyholder who is willing to forego the service of the agent is given the benefit of the saving of expense to the company.

Mutuality. — Prior to 1915, most industrial policies were issued as non-participating con¬ tracts. A change, however, came in 19i5, one of the most notable years in the history of the business. On 6 January of that year the Metro¬ politan was converted from a stock to a purely

mutual company and later in the year the Prudential of Newark also became in effect a mutual company, mutualization having been accomplished except for the non-assent of a very small minority of the stockholders. The mutualization of the Metropolitan was called by the Superintendent of Insurance in New York State in his annual report, "by far the most noteworthy event of the insurance year." The mutuality of the Metropolitan, Prudential and John Hancock (long a mutual company) means that all but a comparatively small por¬ tion of the industrial policyholders in America now have — along with the annual premium policyholders — the right of control and the title to the profits of the business.

The fact that policies issued prior to 1915 were non-participating, however, had not de¬ terred the directors of the larger companies from turning surplus earnings over to the policyholders. In 1897 the Metropolitan sur¬ prised the insurance world by voluntarily de¬ claring dividends — or "bonuses," as they were subsequently called, to distinguish them from dividends paid as a matter of contract — amounting to over half a million dollars to its industrial policyholders. These voluntary pay- mentsˆ were continued each year, with import¬ ant additions from time to time, finally reach¬ ing the sum of $6,000,000 yearly, and the com¬ pany has the remarkable record of having paid or credited to industrial policyholders during the years 1897-1915, with no stipulation in the policies, expressed or implied, over forty-nine millions of dollars in its various forms of bonuses, while the additional cost of conces¬ sions in reserve liability exceeded four and one- half million dollars. The Prudential similarly paid or credited over twenty million dollars prior to mutualization. The mutualization of the companies, which extended participation to existing as well as new contracts, simply means that dividends to industrial policyholders, which in 1918 alone amounted in this country to over nineteen million dollars, have now become a matter of contract, rather than of purely vol¬ untary action. Dividends and bonuses to in¬ dustrial policyholders have taken the form prin¬ cipally of cash payments or credits on premi¬ ums, of additions to death claims or maturing endowments, and of relief to aged policyhold¬ ers, either by maturing the policies as endow¬ ments or by waiving collection of premiums

Mortality.— When the cost of industrial insurance is considered, the

first thing to be noted is the increased mortality among the in¬ dustrial classes. Let us compare the number per thousand dying at each of several specified ages according to (a) a United States Life Table compiled by Prof. James W. Glover from census returns for the eleven original regis¬ tration states covering the deaths reported in the years 1909, 1910 and 1911- fb) the Medico- Actuarial Table, excluding the first four years of insurance, based on a portion of the experi¬ ence of the principal American life insurance companies during the years 1885-1909 under annual premium policies, which table was used as a standard by the Joint Committee in charge of the recent Medico-Actuarial Mortality In¬ vestigation; and (c) death rates based on the experience of the Metropolitan Life Insurance

Company during the seven years 1907-1913 on its standard industrial risks.

Deaths Per 1,000

AGE NEXT BIRTHDAY

Glover's United States life table

Medico-

actuarial

table

(ultimate)

Metropolitan

industrial

experience,

1907-1913

25 .

5.4

4.7

7.2

30 .

6 3

4.9

9.2

35 .

7.7

5.0

11.2

40 .

9. 1

5.5

13.3

45 .

11.0

7.0

15.5

50 .

13.8

9.8

19.2

55 .

18.5

14.6

25.3

60 .

26. 7

21.9

35.3

65 .

38.2

35.4

53.3

While the above tables are not in all re¬ spects strictly comparable, they afford a rough comparison of the mortality under industrial policies with that under annual premium poli¬ cies and with the general population. A glance at these tables will show that the mortality under industrial policies at the above ages ranges from 150 to over 240 per cent of that under annual premium insurance. Industrial policies have shown a notable improvement in mortality in recent years — more so than annual premium policies — but it is likely that even at the present time, the mortality is at many ages more than double that for annual premium policies.

The comparison of industrial mortality with general mortality shows a less, but still large, percentage of difference. It is reasonable that it should be so, because, in the first place, in¬ dustrial insurance in this country has not yet reached, in proportionate amounts, the agri¬ cultural and rural population, which is so large a percentage of the whole population. In the second place, the mortality of the working people in cities is large, because of the ex¬ posure, the mode of life, the hard toil and con¬ finement, the carelessness of self which the ob¬ servation of everybody must have noted among working men and women. To some extent there is also a selection against industrial companies, often unconscious, which is the correlative of the unconscious selection against whole life as compared with endowment policies in annual premium companies. A man vaguely conscious of low vitality will insure himself more readily than his opposite, just as one vaguely conscious of superior virility will prefer endowment to whole life insurance.

Insurance of Children. — The insurance of children has been the subject of much discus¬ sion in England and America and legislation against it has been proposed; but no law of prohibition has been passed in any State where the business has been well established. In England the law has remained for many years permitting the insurance of children within the limits previously adopted and maintained by the companies; and this after repeated Parlia¬ mentary investigations. In America, New York State in 1892 adopted as part of the insurance code a provision authorizing the insurance of minors according to the table of benefits in use by the companies. The< New Jersey legislature also passed a permissive law in 1907. The

Province of Ontario, Canada, adopted a similar table at about the same time as New York State and within the past few years the Provinces of Quebec, Saskatchewan and Alberta have taken like action. In upward of 20 States, as well as in the United States Congress, pro¬ posed legislation forbidding the insurance of children has been defeated — in many States repeatedly. In Massachusetts in 1895 the joint legislative committee took six weeks to investi¬ gate the subject, examining hundreds of wit¬ nesses, resulting in a vote of 143 to 29 against the prohibitive bill. Colorado is the only State which forbids the business and the law was passed there without a hearing of the company which had only recently begun business in the State — in other words, in anticipation of, not after experience of, evils. A bill introduced by the insurance department permitting child insurance is pending. So France, which is without experience of industrial insurance, and Belgium, where the experience has been very limited, have passed prohibitive acts, while in Australasia, where such insurance has been written for years, New Zealand has passed a law ori the lines of the English permissive act. Under the law of New York State the maxi¬ mum insurance permitted on a child under age two is $30; age three, $34; age four, $40; age five, $48; age six, $58; age seven, $140; age eight, $168; age nine, $200; age 10, $240. From the above and from the table of benefits previ¬ ously printed, it will be apparent that at the earlier ages the insurance is simply burial in¬ surance, while at the older ages it may amount to a very respectable sum. No case of child murder or abuse for insurance has ever been shown in the United States. In England the matter is thus summed up by Dr. Jones of the Royal Southern Hospital in Liverpool (where child insurance is most common and has been for many years) in a book (On the Perils and Protection of Infant Life* : ((The incentive to child neglect and child murder is not the prospective receipt of insurance money.® In America, in 1905, the Armstrong Committee appointed by the Legislature of New York State, after the most searching

investigation of life insurance ever conducted in this country, declared: ((It may be added that the committee is also without facts which would warrant the prohibition of insurance of children. ... In the absence of further evidence the committee believes that legislation would be unwise.® In fact, as time has gone on and industrial insur¬ ance has increased in magnitude and become better known, the realization seems to have come that criticism of child insurance has been founded on a very shadowy basis, for agitation against it, once so widespread, has in recent years practically ceased.

The companies usually limit the amount of child insurance to the amounts fixed by the New York statute, printed above; and the rule in case of over-insurance is either for all com¬ panies to cut down the payments proportionately or for the companies issuing the latest policies to return the premiums. No specialty of child insurance is made. Industrial insurance is, as we have said, family insurance. This is strikingly shown by comparing the percentage of population at various groups of ages, as shown by the last United States census, with

the percentage of premium-paying policies in force at the same ages in the largest industrial company :

AGES

Percentage

of

population census, 1910

Percentage of policies in force,

1910

1 to 4,

inclusive .

9. 17

7.58

5 to 9,

U

10.63

11.23

10 to 14,

U

9.92

12.15

15 to 19,

a

9.87

11.79

20 to 29.

u

18.78

18.60

30 to 39,

u

14.56

13.76

40 to 49,

ii

10.60

10.42

50 to 59,

a

7.28

8.09

60 to 69,

a

4.30

5.02

Expense. — Like everything else sold at re¬ tail, the cost of industrial insurance is high. Its cost, however, is scientifically adjusted. The loading on the net premium is necessarily much higher than that used in annual premium com¬ panies ; and, as we have seen that the mortality is double at some ages, the cost of industrial insurance is necessarily great compared with annual premium insurance. The expense ratio is high because of the system of weekly collec¬ tion of premiums, because of the large number of policies for small amounts which have to be recorded and cared for at the head office and the district offices and because of the heavy lapse rate during the early existence of the policies. As the premiums are payable weekly there are 52 opportunities each year for laps¬ ing as against one to four in annual premium companies; and in the first year of insurance the lapse ratio is high. All of these early lapses are a pecuniary loss to the companies ; and this partly accounts for the high expense ratio. Of the business lapsed within the first three years, more than one-third goes off within the first three months — much of it with only one or two weeks' premiums paid — and three- fourths during the first year of the life of the policy. The lapses in industrial insurance, while they cause a heavy loss to the companies, do not usually represent any serious loss to the insured. The premiums are weekly and the policies are carried on grace for four weeks after lapse, with a practical extension of the grace period to a term of from 13 to 20 weeks in the principal American companies, as previously described. Policies lapsing for non-payment of premiums can usually be revived upon evi¬ dence of insurability within one year, as a matter of policy contract, and after longer periods under the practice of the principal com¬ panies. Here there is no loss to the insured. In case the policyholder is unable to pay his arrears in cash, provision is generally made that they may be charged against the policy in the form of a lien. _ The largest company has recently offered special facilities for

the revival of family groups on this plan. Here, again, the insured Joses nothing. If the lapsed policy is not revived, but new insurance is taken, the amount of insurance at each advancing year of age is very little less than at the preceding age. If the policy is kept in force for three years, the insured is entitled to extended insurance or paid-up insurance for a reduced amount, the provisions varying in the different companies.

After ten years, cash surrender values are available under policies now being issued — in one company, after five years.

It goes without saying that in all these cases lapses are no great source of loss to the insured. There can be no doubt that the lapses in in¬ dustrial policies are very largely by those who subsequently take new insurance, suffering no loss at all in case of revival, and otherwise suf¬ fering only the small loss arising from partial benefits during the first year and the small de¬ crease of benefits by reason of advanced age. The fact is there are many who insure and lapse and reinsure, according to their disposition of mind and their resources, with small loss to the holders but large loss to the company, which is put to the expense of commissions for placing the business and the large expense of caring for it. After three years the business is very per¬ sistent, comparing favorably with annual pre¬ mium business. The average duration of the policies in force in the largest English com¬ pany is nearly 14 years, and that of the policies of the largest American company (which has been in business for 25 years less than the English company) about nine and one-quarter years.

The proportion of lapsed policies has been very greatly decreased as the business has de¬ veloped. This is forcibly shown by tabulations which were'made by the largest company, whose business amounted to 42 per cent of the in¬ dustrial insurance in this country, showing the lapse rate, during the first year, of industrial policies issued during various periods :

Industrial Lapse Rates

POLICIES ISSUED DURING

•

Per cent of issue lapsed during

First

three

months

First

six

months

First

nine

months

First

twelve

months

1896 .

38. 17

52.71

58.58

61.87

1903 .

26.96

39.90

46.03

49.89

May, 1909 .

22.34

32.08

37.50

41. 10

December, 1911 .

15.86

26. 18

31.86

35. 13

1916 .

10.79

18 90

23.19

26 04

1917 .

8.71

16.21

20.15

22.66

This company has for the last few years shown a remarkable record of the lapse of in¬ dustrial policies compared with the lapse record of other large companies which do not do any industrial insurance business. In 1918 its per¬ centage of terminations of industrial policies less revivals to the mean number of . policies in force was 5.35. The corresponding percentage of the largest ordinary company which issues no industrial policies was 6.50. The industrial insurance company named showed 88ˆ4 per cent of the industrial insurance written in 1918 in force at the end of the year. Notwithstand¬ ing the weekly opportunity for lapse of in¬ dustrial insurance, this was only six points less than the rate of persistence of policies in the ordinary department of the same company.

This decrease in lapses has been one of the contributing causes to a very remarkable reduc¬ tion in the expense rate of industrial

insurance, vjjˆph has been effected through increasingly efficient management. In the largest of the com-

panies the expense rate since 1895, exclusive of welfare expenditures, has been as follows:

1895 .

1900 .

. 43.84

U

a u

1905 .

. 42.80

u

a u

1910 .

. 36.07

u

a «

1915 .

. 33.40

a

a tt

1918 .

. 33.22

u

ti u

The increased economy of conducting the business has not been effected, however, at the expense of the agents ; on the contrary, the average earnings of the agents in the company mentioned have more than doubled during the last 15 years, and the personnel of the agents has improved accordingly.

Intermediate Policies. — The expense of insurance to the industrial classes has been greatly reduced by the introduction of what are known as intermediate policies. These are policies which in 1896 the two largest indus¬ trial companies designed and issued for the working classes. They are policies for an even amount of $500 each, premiums payable yearly or in half or quarter years. The pre¬ miums are based on special tables of mortal¬ ity compiled from the accumulated experience of risks of this class and the loading is less than that used by many companies for annual premium policies. The result is a moderate priced ordinary policy contract issued on all the usual forms — whole life, limited payment and endowment — with participation in sur- plus> earnings. A working-man who has got beyond the necessity of making small weekly payments and can afford to pay dollars annually where he has been paying cents weekly, finds in these policies insurance whose cost does not differ greatly from that his rich neighbor buys. In fact, in many instances, particularly under endowment policies, which constitute most of this business, intermediate insurance has ac¬ tually proven cheaper than other ordinary in¬ surance. There were at the end of 1917 about 1,250,000 intermediate policies in force in the United States and Canada, insuring over $600,000,000. The English Prudential had at the same date 929,618 ordinary policies in force, of which a very large proportion is endowment, averaging about £112 per policy, the premium averaging a little under £6. The English Pru¬ dential policies are also as a rule participating. The industrial companies on both sides of the water claim that by the issue of this class of policies they have perfected the system of in¬ dustrial insurance and have performed their full duty to the wage-earners by furnishing in¬ surance adapted to the condition, means, habits of life, and requirements of all; weekly pre¬ miums for those who can afford no better, and for those of an age unsuitable for large insur¬ ances ; annual premiums for small policies with dividends as earned, bringing the cost down as nearly as possible to the cost of ordinary in¬ surance as purchased by the well-to-do.

Moreover, industrial or intermediate insur¬ ance is often merely a stepping-stone toward ordinary insurance for larger amounts. Great numbers of persons insured under industrial policies, adult as well as infantile, later on be¬ come financially able to carry the usual forms of ordinary insurance, and their industrial policies have educated them to the value of insurance, which they might not otherwise have realized It was almost inevitable that the in¬

dustrial companies should develop an extensive ordinary business. As a matter of fact, the growth of ordinary insurance in the industrial companies has been one of the notable features of recent years, the amount of ordinary insur¬ ance in force at the end of 1918 (including in¬ termediate) in the three principal industrial companies in America having reached the re¬ markable total of $4,237,809,39 2.

Welfare Work. — Few organizations have the opportunity of reaching and influencing so many people as the industrial insurance com¬ panies. The great force of agents going weekly into millions of homes affords a direct means of communication from the company to the policyholder, and the frequency of the agent's visits tends to make him the friend and coun¬ selor of the families from whom he collects.

The exceptional opportunity for social ser¬ vice thus afforded has not been overlooked by the companies. They have been active, partic¬ ularly in recent years, in many branches of wel¬ fare work. The principal media of communi¬ cation between the companies and their policy¬ holders, aside from the agents themselves, are the magazines which are issued by most of the companies several times a year for distribution among policyholders. It has been the object of the companies through these magazines to stim¬ ulate better physical, mental and moral develop¬ ment. Special attention is given to the dissem¬ ination of information and advice in matters pertaining to health and general welfare. In addition to the magazines, some of the com¬ panies issue health literature in the form of leaflets or pamphlets for distribution among not only policyholders but the general public.

The industrial companies have unusual fa¬ cilities not only for distributing information but for obtaining it. The great number of policy¬ holders under observation, along with the close relations between the agents and the policy¬ holders, give the companies the opportunity to collect information of great social value rela¬ tive to such matters as mortality, morbidity, unemployment, etc., and some of the larger companies have experts who devote their ener¬ gies to the study of these sulbjects.

The Metropolitan Life Insurance Company of New York, which in recent years has spe¬ cialized to an unusual degree in welfare work, has distributed over 187,000,000 copies of pam¬ phlets and leaflets, has maintained a free nurs¬ ing service for the benefit of its industrial policyholders, under which more than 1,400,000 visits were made in 1918, has conducted exten¬ sive sickness and unemployment surveys — the latter in co-operation with the United States government, — has given numerous welfare ex¬ hibits at fairs, expositions, etc., and has ren¬ dered invaluable assistance to State, county and municipal health bodies, through the co-oper¬ ation of its agency force and otherwise, in their efforts to improve the public health, such as "clean-up" and "baby-week" campaigns, educa¬ tion relative to tuberculosis, Spanish influenza and to health laws, and the distribution of cir¬ culars in support of proposed health legislation.

Relation of Industrial Insurance to the War.— Two facts stand out prominently in connection with the Great War One is the inherent soundness of the industrial companies, even under the most trying conditions, and the other is their opportunity for usefulness. The

severest test has been, of course, of the Euro¬ pean companies, which have had to contend with war conditions since 1914. The British companies almost without exception waived all war restrictions on policies issued prior to the beginning of hostilities. Up to the end of 1917 the Prudential of London had paid over 160,000 war claims, exceeding £3,400,000, by far the larger portion of which was on industrial poli¬ cies. In spite of the excessive death losses and of the depreciation in securities and heavy war taxes, the company remains in sound financial condition. There has naturally been a reduc¬ tion in the dividends to policy-holders and stockholders. The British companies have ren¬ dered noteworthy service in ambulance and other Red Cross work, and in many other war activities.

In the United States, war restrictions in in¬ dustrial policies were likewise waived on poli¬ cies issued prior to entrance into the war. Even the policies subsequently issued are free from war conditions up to a certain amount of in¬ surance. In one company the amount is $300. Following the armistice, the $300 limit was re¬ moved. Valuable service has been rendered to the United States Government by the agency and home office forces in such essentials as food conservation, recruiting, classification of mili¬ tary census forms, Red

Cross and other war re¬ lief work, distribution of a wide variety of liter¬ ature, and the selling of government securities issued to carry on the war. The United States Treasury Department appointed Mr. James E. Kavanagh, fourth vice-president of the Metro¬ politan Life, as assistant to the chairman of the National War Savings Commission, and Mr. Kavanagh was made the organizing head of the government's campaign to organize War Savings Societies and sell $2,000,000,000 of War Savings Stamps. The larger industrial com¬ panies, through their agents and home office staffs, inaugurated an active campaign for the sale of the stamps, and the Metropolitan fixed its goal for the year 1918 at $65,000,000. This was passed at the end of August, and the total sales at the end of the year were over $112,- 000,000, besides over $21,000,000 in the Fourth Liberty bonds, the campaign for which was interjected into the War Savings Stamp cam- paign.

Both in Great Britain and the United States the industrial companies have subscribed very largely to the various war loans issued by the government. It has been stated that at the end of 1917 the London Prudential held over £25,- 000,000 of the British 5 per cent war loan. In this country the Metropolitan has taken about $100,000,000 of United States Liberty Loans and Canadian War Loans; the Prudential of Newark nearly $90,000,000, and the John Han¬ cock over $13,000,000.

Haley Fiske,

Vice-President of The Metropolitan Life In¬ surance Company.

INSURANCE, International. — At the be¬ ginning of the European War in 1914 a plan was proposed for extending the application, of insurance to international affairs by means of a fund realized from the contributions of a community of nations joining to provide indem¬ nity against certain common general hazards, such as earthquakes, volcanic eruptions, migra¬ tory pestilences, tropical diseases, destructive

storms, famine, crop failure, marine disaster, and, above all, the hazard of war and losses falling in war time on private property belong¬ ing to citizens of neutral states. The absorp¬ tion of public attention by the war prevented a wide discussion of the proposal, but a new and surprising development of the insurance idea may easily result from the conference for a world peace that alone can settle the World War. Consult (War and Insurance> by Josiah Royce.

INSURANCE, Life. Life insurance is the application of insurance to loss

or injury caused by death. It'may be defined as a contract under which one party called the insurer, in consid¬ eration of certain stipulated payments, termed premiums, agrees to pay to another a moneyed benefit upon the happening of a contingency dependent on the duration of a human life. The person whose life is the subject of the con¬ tingency is termed the insured, and the party receiving the benefit the beneficiary, while the benefit itself is called the insurance money. The contract when in writing is known as a policy. In practice the contingency involved is either the death or the continued survival of the in¬ sured. If the benefit is to be paid upon the death of the insured, it is known as a strictly life insurance contract, if upon his survival to a given age, it is called an endowment. The issue of such contracts is confined to companies incorporated for the purpose and to benevolent and fraternal associations. The fundamental object of life insurance is the protection of families and dependents, or of business inter¬ ests from the pecuniary loss which is liable to result from the death of the party insured. It furnishes a method of at once providing a fund which shall be available in case of such misfor¬ tune, by means of a series of limited payments made during the continued life of the insured. The latter is able for a small consideration to secure the benefit of an immediate investment payable upon the expiration of the contract, in¬ stead of awaiting the slow and uncertain pro¬ cess of accumulating a capital which may be de¬ feated by his untimely decease. The business man is thus enabled also to protect his cred¬ itors or his business as well as those dependent on him. In case of the endowment the policy¬ holder is able to unite such protection with a fund available for his own use should he sur¬ vive during a stipulated period. In short, Jife insurance may be regarded as a method of pur¬ chasing immunity against moneyed misfortunes liable to result from death, and appeals with special force to those whose chief dependence is on their daily or yearly earnings. It offers peculiar advantages, too, because it can be placed beyond the reach of creditors and need not be involved in business misfortunes, while the pol¬ icies themselves can be hypothecated or sold like ordinary commercial securities.

The policies are issued by the companies upon written applications from the purchasers, in which detailed statements are required re¬ garding the health, habits and family history of the applicant, accompanied by the certificate of a physician based on a careful examination. The policy stipulates as to the amount and char¬ acter of jhe benefit to be paid, the party to whom it is payable and the premium payments to be received, together with such other provi¬ sions as may be needed to express the complete

contract with the applicant. The premiums are usually payable annually or at shorter intervals in advance. The business is done almost en¬ tirely through agents who solicit the applica¬ tions, collect the premiums and otherwise act as intermediaries.

History. — Life insurance in its more mod¬ ern form was practically unknown until it was introduced into England by the establishment of the Amicable Society in 1696. Other companies were gradually started there. But for many years afterward it was prohibited on the conti¬ nent of Europe as immoral. Modifications of the system, however, known as annuities and tontines had long been familiar, and the former had been employed as a basis for national loans, it was not until the 17th century that suffi¬ ciently reliable observations on human life were compiled to furnish a satisfactory foundation for the business, and that the commercial ele¬ ments of society attained an importance suffi¬ cient to give it the needed support. Companies thereafter multiplied in Great Britain and the business gradually extended to the continent of Europe.

Life insurance was introduced from Great Britain to America, and the first society was organized in Philadelphia in 1759 for the relief of Presbyterian ministers and their widows and children, followed 10 years later by a similar corporation for the benefit of Episcopal clergy¬ men and their widows. Their operations, how¬ ever, were confined to the classes named. The first company to attempt a general business was the Insurance Company of North America, organized in the same city in 1796. A number of other companies gradually followed in that and other important cities during the earlier part of the 19th century. All these earlier offices, however, combined fire or marine insur¬ ance, or banking and trust business, as well as annuities with life insurance, and gradually abandoned the latter. Popular prejudice proved to be too strong, and the economic condition of the country to be too little developed to make its prosecution successful. The real beginning of modern life insurance in the United States dates from the organization of the Mutual Life Insurance Company in New York in 1843, which was quickly followed by that of others, both there and elsewhere, some of which had already secured charters for the purpose. The business of these new companies was confined to life insurance, and their success led to the gradual multiplication of such companies until within 20 years it had attained proportions which made these corporations among the most important financial institutions of the land. The business has since continued to expand until the enor¬ mous sums now invested in life insurance in America

far exceed those in any other country. Its leading institutions are unrivaled in their size elsewhere, and several are transacting busi¬ ness in every quarter of the globe.

Insurable Interest. — Every form of insur¬ ance presupposes some pecuniary interest in the subject insured, without which it would, be a mere speculation or gamble and a temptation to crime which public policy does not permit. Where the insurance is on property, such inter¬ est on the part of the insured must usually be commensurate with the amount of the insurance. The insured is restricted in his recovery on the policy to a sum which will indemnify him

for his loss. This doctrine, however, is relaxed in case of life insurance, since no strictly moneyed value can well be placed on a human life. The principle of indemnity goes no farther here than a requirement that the party procur¬ ing the insurance shall have such an interest in the life insured as shall prevent the contract from being a mere gamble on its survival. Any reasonable expectation of pecuniary advantage from the continuance of the life is deemed suffi¬ cient, such as dependence or the pa}unent of a debt. Every person, too, is assumed to have an interest in his own life, which he may insure to any amount, and may make the policy payable to any beneficiary whom he may elect so long as the scheme is not a mere cover for gambling.

Classes of Companies. — Life insurance is carried on by two distinct classes of institu¬ tions. One consists of those which treat it as an ordinary commercial or financial business, the other, of those which deal with it as a form of benevolence or fraternal aid. The former may be again divided into those in which the premiums are definite in their amount and time of payment, and those which depend on assess¬ ments from their policyholders to pay claims as they become due. Life insurance as a business, however, is chiefly carried on by the first men¬ tioned, which are known as old line or legal reserve companies. It has been found the only business method which has successfully stood the test of experience. Two systems have been adopted in this class of companies. One is the mutual, in which the policyholders are regarded as the owners of the corporation, and all profits or surplus arising from the business are dis¬ tributed among them. Such surplus performs the functions of an ordinary capital. The choice of directors or trustees and consequent management of the company is usually placed in the hands of the members. The majority of companies in the United States are conducted' on this system. The other is the stock plan, in which the company is owned and controlled by stockholders, who deal with the policyholders simply as customers

and divide the profits of the business among themselves. Higher pre¬ miums are charged for mutual policies for the purpose of creating a surplus, which may. be eventually returned in dividends to the policy¬ holders. In the stock policy, on the contrary, the holder sacrifices the right to dividends in exchange for a lower premium rate. Some of the companies combine both features, mutual offices issuing also stock policies, known as non¬ participating, at lower rates of premium. Often, too, a stock capital is added to a mutual com¬ pany which is restricted by the charter to the amount of dividends which it can receive. When the stock is allowed to share in the profits in excess of its legitimate earnings as an. in¬ vestment, the system is known as the mixed plan. Sometimes, too, the election of directors is apportioned between the stock and policy¬ holders, or, in a company otherwise mutual, may be restricted to the former. In many of the States a capital stock is required by law in the organization of a mutual company until it can be replaced by surplus belonging to the policyholders. The distinctive feature of the legal reserve company, apart from its .fixed premiums, is that it must at all times maintain a reserve fund adequate to the payment of its

future obligations, less the future premiums which it will receive; in other words, it must in a commercial sense be financially solvent. It is also known as an old line company because conducted on the principles which have always characterized life insurance as a business until the introduction of the assessment plan.

Assessment companies were started in the United States over 50 years ago for the purpose of furnishing life insurance at lower rates than those charged by the regular old line companies. Instead of a fixed premium, assessments were levied on the policyholders to pay the losses as they occurred. Various methods were adopted for levying such assessments, and, as the policy¬ holders were in theory liable for whatever assessments were needed, they only became in¬ solvent when unable to meet their claims. The plan was an adaptation of methods employed by fraternal orders, and for a while was exceed¬ ingly popular among those seeking a cheap form of insurance, since the actual cost of insurance being low in the early years, the assessments were correspondingly light. But the increased cost as time went on ultimately so increased the assessments that it was found impossible to enforce them, and most of the companies were compelled to retire or change their methods. Comparatively few now

remain, and the system itself has been condemned by many of the State authorities. Many of the companies were accustomed to assume the character of benevo¬ lent organizations in their operations.

Stipulated premium insurance is a combi¬ nation of the assessment and legal reserve sys¬ tems with a view to correct the defects of the former. The premiums, as in the old line com¬ pany, are definite payments, supplemented, if needed, by assessments, and a moderate re¬ serve is carried tc reduce or render such assess¬ ments unnecessary. It has been employed by some of the assessment companies as a method of establishing their business on a firmer foundation. But life insurance as a business in the United States, as well as in other countries, is chiefly done by old line legal reserve com¬ panies, whose definite contracts, financial strength and scientific business methods give to such contracts a commercial standing unat¬ tained under any other system.

Industrial insurance is a branch of the legal reserve designed to furnish burial funds for the poorer classes, and especially children. Its principles do not differ from those of ordi¬ nary insurance, but its methods are essentially different in many respects owing to the small size of the policies and the character of the applicants. The premiums are payable weekly or at short intervals, and are collected by agents through house-to-house visitations. It was in¬ troduced into the United States from Great Britain about 50 years ago, having been an out¬ growth of the burial clubs and friendly society system of that country, and has attained enor¬ mous proportions in America, as well as Great Britain. See Insurance, Industrial.

Fraternal and benevolent societies have been popularly associated with assessment com¬ panies owing to the similarity of their methods. But they are a distinct class, having the char¬ acter of social clubs solely for fraternal or benevolent purposes, with a form of insurance as merely one, though it may be their most im¬ portant, feature. They are strictly mutual in

their character. Their general type of organ¬ ization is that of the ordinary society or club known as a lodge, whose members meet for social or fraternal purposes. The society is formed of a combination of such lodges, through chosen representatives, into a single grand lodge, by which the insurance is carried on, the subordinate lodges acting the part of agents in securing members and collecting the payments. The insurance itself is simply a death benefit allowed to the members under provisions in the constitution, and not a busi¬ ness contract secured by the purchase of a policy. The premiums are paid in the

form of dues and assessments, much after the. manner of assessment companies, the dues being used for expenses and other incidental features.- Efforts are being made to scientifically adjust the payments and benefits of these societies accord¬ ing to the cost of insuring the various members, as is done in the legal reserve companies. The insurance which they furnish is regarded as a species of fraternal aid to the members and their dependents, and their operations are not subject to the same legal constraints as those of business corporations. See Insurance, Fra¬ ternal.

Mortality Tables. — The life or mortality table, from which the premiums must be deter¬ mined, is at the foundation of the business. The tables mostly employed are constructed from the experience of the companies them¬ selves with insured lives which have been found to have a mortality distinct from that of the population at large. Such a table in its simplest form consists of a statement of the number surviving at the beginning of each suc¬ ceeding year out of a given number living at any age, from which the number of deaths and percentage of mortality at each age are readily determined. The latter is the important func¬ tion employed in life insurance. In America the two tables which are chiefly used, and which have been recognized by the various States as standards for determining the liabilities of the companies, are the Actuaries or Combined Experience and the American Table. The for¬ mer was constructed from the experience of 17 prominent English offices, and was published in 1843. Its general accuracy has since been confirmed by later observations. The Ameri¬ can Table was constructed from the experience of the Mutual Life Insurance Company of New York, and came prominently into use about 1868. It was found to represent the actual ex¬ perience of American companies better than foreign tables which had been employed. Many other mortality tables have been constructed which have obtained a recognized standing. Prominent among them were the Northampton and later the Carlisle Table, both of which were framed from mortality returns of English towns, and were successively used both in Eng¬ land and America, until replaced by the Actu¬ aries' Table. Farr's Tables, constructed from the census returns in Great Britain and pub¬ lished in 1864, have been much used for certain purposes. Various tables, too, have been con¬ structed from observations in other European countries and employed there as standards. The three requisites of such tables for insurance purposes are that thev should be safe, should be properly graduated, and should fairly rep¬ resent the mortality to be expected.

Premiums. — The premiums, which must equal the cost of insurance, are computed from the risk of death, as shown by the mortality table ; and since the former are usually fixed sums, while the risk increases with age, it is necessary to charge more than the actual cost in the early years in order to offset the deficiency later on. This excess above the cost is accu¬ mulated at compound interest by the company, and constitutes its reserve fund. The rate of interest assumed in the calculation is such as the company is justified in expecting will pre¬ vail during the continuance of the contracts. In the United States 4 per cent was formerly considered a safe rate, but the continued fall in interest has led to a general substitution of 3 or per cent for newer contracts. The pay¬ ments, which, when thus accumulated will be sufficient on the average to meet the claims on the policies as they fall due, are known as the net premiums, to which additional sums are added for expenses and other contingencies. When thus loaded they are known as gross or office premiums, and are the real amounts charged by the company. These loadings may vary from a trivial addition to 40 per cent or more of the net premium, according to the character of the contract. Premiums in ordi¬ nary insurance are usually payable annually in advance, and are then known as annual pre¬ miums. Frequently the payments are restricted to a certain number or term of years. These are known as limited payments. Sometimes the entire payment is made at the start. This is known as a single premium payment. The annual premiums, too, are sometimes payable in instalments at shorter intervals to suit the con¬ venience of the policyholder.

Expenses. — The expenses of a life com¬ pany are chiefly made up of two classes, the cost of securing the business and the office ex¬ penses incident to its care. The principal ele¬ ment in the former is the commission or other compensation paid to the agents, which also varies with the character of the contract. It is usually a large percentage of the first premium paid, and a more moderate percentage, in the nature of a collection fee, for those succeeding. The office expenses aside from the salaries of the officers and employees include taxes, fees, rents and those numerous items involved in the care and investment of funds and the conduct of the business.

Legal Reserve. — The legal reserve is the measure of an ordinary life company’s liablity on account of its insurance contracts to which, in addition to any other liabilities, its funds must be equal in order that it may be legally solvent. The process of estimating this reserve is known as valuing the policies. Two methods of valuation are used, known as

net and gross, dealing respectively with the net. and gross premiums charged. The former is generally employed in the United States, and is the one usually adopted by. the State authorities. It consists in determining what fund the company must have in its possession in addition to the future net premiums which it expects to receive in order to meet future claims on its policies. This fund is the net or legal reserve. It as¬ sumes that all other expenditures are cared for by the premium loadings. The gross valuation, on the contrary, deals with the gross or office premiums, and a certain deduction is made from

the resulting fund for assumed future. expenses. The latter method is regarded as furnishing the surest test of a company's actual condition, and is sometimes employed when the question of legal solvency is in doubt. The former has the advantage of compelling the use of the pre¬ miums for the purposes assumed by the com¬ pany in their computation.

As in the case of the premiums, the compu¬ tation of this reserve depends on the future rate of interest which is assumed. In most of the States 4 per cent, as in the case of pre¬ miums, was formerly regarded as a safe rate, and even per cent was at one time allowed, but during recent years 3 or 3*4 per cent have been insisted on in the case of new contracts by many of the States.

The mortality on which the sufficiency of the premium depends is lighter in the case of insured lives, owing to their careful selection, than among the general population or that called for by the mortality table for a number of years after the policy has been issued. The cost of insurance in mutual companies is re¬ duced to the policyholders by this lighter mor¬ tality. In American companies the mortality among lives that have not been newlv selected remains nearly stationary after age 20, or in¬ creases but slightly until age 40 is reached, when it is not far from 1 in 100, increasing more rapidly with each age thereafter until it is about 2 per cent at age 50 years and 4 per cent 10 years later.

Form of Contract. — As before remarked, policies may be either participating or non¬ participating, the chief difference being that smaller premiums are charged in the last and no provisions are included for sharing the profits. Policies for short terms are more fre¬ quently made non-participating. The classes of policies most in use are three in number, whole life, term and endowment. In the first the in¬ surance is simply against death and covers the whole term of life, while in the second it runs only for a certain term of years. The pure endowment is an insurance payable at the end of a certain term of

years only in case the in¬ sured is alive, and is the reverse of a term policy. The ordinary endowment which is al¬ most exclusively used, however, and which has of recent years largely supplanted the whole life policy, is a combination of the pure endow¬ ment and the term policy. The insurance money is payable to the insured if alive at the end of the endowment period, or to some beneficiary in case of his previous death. Such endow¬ ments are usually issued for periods of from 10 to 30 years.

The annuity is a contract frequently com¬ bined with life insurance in which the life insurance principle is reversed. The purchaser buys outright a contract under which he is to receive an annual payment during life. Annu¬ ities have been familiar since an early period, and before life insurance became understood was the principal form of contracts dealt in by this class of companies. It secures a fixed in¬ come during life to those who may wish to sur¬ render their capital for that purpose.

Still another form of contract is the tontine, in which the funds of a body of subscribers are pooled and the accumulations are divided among the survivors after a certain time. Societies of this kind were formerly common in Europe

and were occasionally found in the United States, though few, if any, remain.

All these different contract forms are now frequently combined in various ways in the or¬ dinary life policy, in order to increase its at¬ tractiveness or to better meet the requirements of policyholders. Various methods of premium payments and of paying dividends are also com¬ bined for the same purpose. Great ingenuity has been displayed by the companies in making these combinations, and an almost innumerable variety of contracts have resulted. Among those more familiar in the United States are the tontine or deferred dividend policies, in which dividends are accumulated and divided among the surviving policyholders after a certain period; limited payment policies, in which the premiums are limited in number; and instalment policies, in which the insurance money, instead of being payable in a single sum, is converted into a series of annual payments, as an annuity. Besides, there are policies insuring the life of more than one partv. When they are payable upon death of either of the parties

insured, they are known as joint life insurances; when payable only on the death of all they are sur¬ vivorship insurances. The greater part of the business in the United States is written either in the form of continued payment life, 20-pay¬ ment life, or 20-year endowment insurance. Renewable term insurance is another plan for reducing the cost of insurance during the early years and avoiding the accumulation of a re¬ serve. The premium is only sufficient to pay for the temporary cost of insuring and in¬ creases with age. The policies are written for a single year or term of years, with the right to renewal at the increased premium. The subse¬ quent increase of cost, however, has been found a serious obstacle to the plan. Preliminary term insurance is also insurance for a single year, but with a right of renewal for the entire period at the same rate of premium. The ob¬ ject of such policies is to enable the company to use the fund which, under the law, must otherwise be added to the reserve during the first year of insurance to meet the cost of securing the business, and has been a favorite method with young companies having a limited surplus.

Dividends. — Dividends are apportioned from the accumulated surplus according to the equitable share of each policy. Many different methods of determining this share have been devised. That chiefly employed in the United States is what is known as the Contribution Plan. The surplus is treated as made up of gains from a lower mortality and expense and a larger interest earning than those assumed in computing the premiums, and the contribution of each policy to the fund is estimated. Divi¬ dends are applied according to the provisions in the policy in various ways. They may be used as single premiums to increase the amount of insurance, which is called a bonus addition, or to shorten the term of the insurance, or to the payment of the premium, or may be re¬ ceived in cash. When, as in tontine dividends, they are to be apportioned among a special class, the share of surplus belonging to that class is separately dealt with. Sometimes a minimum future surplus earning, which can be relied on, is made the basis for guaranteeing the payment of a certain dividend in the policy.

But as such earnings are uncertain, the usual estimates of these amounts, as given by the companies, are simply expectations and not ob¬ ligatory as promises. The fall of interest rates has tended to reduce dividends during recent years. At an earlier stage of life insurance, dividends were payable at intervals of five years or more. Afterward, as the business be¬ came better understood, the practice of declar¬ ing annual dividends in the United States be¬ came universal. The subsequent introduction of deferred or tontine dividend policies

lengthened the distribution period of the classes to which they were applicable and for a while such policies became exceedingly popular, but the resulting abuses led to their prohibition and a compulsory return to annual dividends. Notes were at one time received by many of the com¬ panies in part payment of premiums, but the practice has been for the most part abandoned.

Policy Loans. — Practically all forms of life insurance in which a level nremium is paid involve an investment or savings bank element, which is represented by the reserve and is now treated by the law and the contract as belonging, in a sense, to the policyholders. This is the basis of the policy loans which are so generally granted. The portion of the reserve fund be¬ longing to the individual policy, or a portion of it, may be borrowed by the policyholder as a loan bearing interest, on his own note with the policy as a collateral, and is deducted from the insurance money when the policy becomes payable.

Termination of the Contract. — The life in¬ surance contract is terminated either by becom¬ ing a claim, which is usually payable at once after satisfactory proofs have been furnished, or by previous lapse or forfeiture through a violation of its conditions, especially non-pay¬ ment of the premium, or through a voluntary surrender. Policies usually provide for their surrender and allow the insured to receive back a large part of the reserve held against them, called the surrender value, either in the form of paid-up insurance for such an amount as this value will purchase, or insurance of the original amount for such a term as it would pay for, called extended insurance, or else in the form of cash. Statutes in many of the States require similar returns in case of lapse for non-pay¬ ment of premium, and such provisions are also usually incorporated in the policies. Non-for¬ feiture laws, as these statutes are called, are designed to prevent the assumed hardship or injustice entailed on the insured through the forfeiture of the money standing to his credit in the reserve fund. This money is regarded as a saving bank accumulation for his future benefit, which is in a sense his property and which should be restored after reserving a surrender charge to compensate the company for his loss. Since healthy lives are most likely to lapse and the cost of insurance to be made greater for those who. remain, the selection against the com¬ pany, as it is termed, is an important element in determining the surrender charge.

Insurance for the Benefit of Wife and Children. — The fundamental object of life in¬ surance as a family protection is liable to be defeated if the policies can be attached for debt. Therefore, statutes have been enacted in many of the States exempting from the claims of creditors

policies up to a certain amount

made payable to wives and children. The in¬ terests of such parties, too, have been held un¬ assignable, at least without their consent. The life insurance contract, except in the case of benevolent societies, is held to be the property of the party who is the beneficiary, when not otherwise stipulated, and not of the party who may pay the premiums, and can usually be as¬ signed as collateral or sold outright by the owner. Policies not protected by statutes, as above, may, like other personal property, be at¬ tached for debt to the extent of their surrender value ; and where, , as in endowments, two in¬ terests are sometimes involved, the interests may be severed.

Medical Examinations. — Medical examina¬ tions of applicants for insurance are essential to prevent an inroad of unsound lives that would wreck the company, whose mortality rates are based on the acceptance only of healthy lives. For this purpose medical exam¬ iners are employed, who report the health, phys¬ ical condition and habits of the applicant and the life history of his near relatives. These reports are passed upon by the medical directors of the companies to determine whether the life is up to the normal standard fixed by the com¬ pany, otherwise the application is rejected.

Sub-Standard Insurance. — Parties who may not be seriously diseased and yet who are not insurable as healthy lives, on account of constitutional weakness or predisposition, are known as sub-standard or under average lives and are insured by some companies as a sepa¬ rate class under special rates of premium, or under special policy conditions, according to the defects of each applicant.

Limitation of the Risk. — Formerly many restrictions were imposed in the policy as to the residence, travel and personal habits of the in¬ sured, and military employment and suicide were debarred. These have been gradually modified or removed, until it has become cus¬ tomary with some companies to issue so-called indisputable policies, which in the absence of fraud, can only be forfeited by failure to pay the premiums.

Moral Hazard. — The moral hazard in the business arises from deceptive representations as to health, the temptation to insure as a mere speculation lives in which no insurable interest exists, in the

expectation of an early death and the temptation to destroy life through suicide or murder in order to secure the insurance money. The ability of an average applicant to judge of his future health is shown in the higher death rates among those classes of poli¬ cies where an early death would profit the appli¬ cant and is an element of the moral hazard.

Legislation and Supervision. — Until about 1860 little or no supervision was attempted over life insurance by the various States. Leg¬ islation concerning it was chiefly confined to taxation of the companies or. restrictions on their operations. The multiplication of irre¬ sponsible corporations, the growing magnitude of the business and the recognition of the dan¬ gers involved in its mismanagement, led to the creation of special departments for its super¬ vision, and the enactment of laws for its con¬ duct by the States of Massachusetts and New York. Their example has been followed by most of the other States. The fundamental aim of these laws is to compel the companies so

to utilize and apply the moneys which they re¬ ceive as properly to carry out the contracts with their policyholders. This is accomplished by re¬ quiring the funds in the company's hands to be at all times sufficient, together with its future accumulations and the future premiums and their accumulations receivable from its policy¬ holders, to meet its future claims as they arise. Since the proper investment of these funds is also essential, this becomes an important part of the investigation, as well as the general manner in which the business iias been con¬ ducted. Annual statements are required from the companies, embodying the facts essential to such an inquiry, and may be supplemented, if necessary, by a personal examination of the company on the part of the State official. Fail¬ ure to meet the required test may be followed by a prohibition against additional business until the defect is remedied, or, if actual future in¬ solvency is threatened, by proceedings to close the company. Within the last few years these legal restraints have been greatly increased in many of the States and the companies have been closely restricted as to their forms of contract, expenditures and business systems.

Theory of Life Insurance. — The funda¬ mental problem in life insurance is to find the average premium at each age, which, with its accumulations, will be just sufficient to meet the promised future payment. This is done by first finding the present value of that future payment, or the sum which, invested immediately at compound interest, will, on the average, with its accumulations, meet this pay¬ ment when due. The probability of death oc¬ curring, and

consequently the payment becom¬ ing due, during any subsequent year is deter¬ mined from the mortality table. This proba¬ bility, multiplied by the sum which accumulated to the end of that year would equal the required payment, is the present value of the payment if made that year. The aggregate of such values computed for each successive year of life, is the entire present value of the future payment to which the present value of the premiums to be charged must be equal. These premiums are in effect so many annuities receivable by the company, and their present vUue is the amount which, at once invested at compound interest, would reproduce them. The problem, therefore, now becomes the determination of the present value of an annuity at any given age. The process is analogous to that already described. The value sought is the aggregate of the amounts which, at compound interest, would provide the annuity at the beginning of each year, multiplied by the probability of the in¬ sured being then alive to pay it. Having de¬ termined the present value of any given annuity it is easy to find the annuity which has the value required. This annuity is the net pre¬ mium.

Life Insurance a Science. — This brief ex¬ planation will serve to illustrate the general character of the problems involved in the theory of life insurance, many of which are exceedingly complicated and require a knowl¬ edge of the theory of compound interest and of the calculus of probabilities, which, when com¬ bined, form the mathematical basis of life in¬ surance. The calculus of finite differences has also an important place, and even the infinites¬ imal calculus has been utilized to advantage,

especially in preparing mortality tables. This whole subject has been developed into a special branch of mathematics termed actuarial science, which has become a recognized profession, whose members, known as actuaries, direct the mathematical computations required for the business. A special class of symbols has been devised in connection with this science, by which the processes involved in its various calculations are readily expressed in the shape of ordinary algebraic formulas. Life insur¬ ance computations have been greatly facilitated by an ingenious device known as commutation columns, through the use of which the calcula¬ tions are much simplified. Published tables of premium and annuity rates and policy values, in connection with the more important benefits, too, relieve much of the. office work.

Walter S. Nichols, A.M., Former Lecturer on Insurance at Yale Uni¬ versity, and Editor of the (Insurance Law Journal > and (Insurance Monitor J

INSURANCE, LIFE, Statistics. The

growth of life insurance and its large place in modern affairs can best be appreciated from a tabulation of the aggregate results since its be¬ ginnings in America three-quarters of a cen¬ tury ago. Starting in Great Britain near the opening of the 18th century, the idea took a small hold in tne American colonies shortly after the middle of the same century but came to real utility 100 years later, since which time the American business companies and fraternal insurance orders have far outstripped the Old World in their extension of life protection.

The first corporation to attempt life insur¬ ance in America, the Presbyterian Ministers' Fund, was chartered in 1759 and is still in flourishing existence. It began on the assess¬ ment plan, but changed some years ago to the legal reserve plan. This is not, however, a general business company. Several annuity companies started later, but business insurance took its first earnest start with the Mutual Life Insurance Company of New York, which began operations in 1843. The New England Mutual followed a year later, the Mutual Bene¬ fit two years later and the New York Life, also mutual, a few weeks after the last named.

Thereafter the number of companies in¬ creased steadily but slowly until the close of the Civil War, when life insurance organiza¬ tion was seized with a speculative craze and companies multiplied rapidly; but the panic of 1872 exposed the weakness of scores that were insecurely founded or poorly managed. The number of companies doing business in New York State rose from 14 in 1859 to 71 in 1870, and fell back to 29 bv 1881. The amount' of business outstanding decreased about 30 per cent between 1870 and 1881.

The next period of expansion set in with the legislative investigations of 1905. Most of the larger companies have been or have re¬ cently become mutual. Many of the newer companies in the southern, central western and far western sections of the United States are capitalized and the total of capital employed rose from $22,724,130 in 1906 in 138 companies to $54,764,732 in 241 companies in 1916; the dividends to stockholders increased from $956,- 520 to $5,149,076 as between the two dates.

Table I shows that a large proportion of

companies existing in 1917 were still young as compared with those that survived the stress oi the 70's. A list of 309 American companies that have failed, reinsured or retired is given in the 1917 Spectator Year Book, > from which the following data are gathered.

Table I. — Age of Existing American Life Insurance Companies to 1917

DATE OF ORGANIZATION

Number

of

companies

Years

in

business

1847

1857

1867

1877

1887

1897

nr hefore .

8

70 or over

U

17

60

u

29

50

fi

36

40

u

37

30 “

u

41

20 *

1902

u

60

15 “

1905

u

87

12

1907

u

114

10

1917

if

248

1 “

Table II exhibits the aggregate of results since organization of 194 of the existing life companies and gives the principal items, not including assessment societies or fraternal orders. The showing is impressive from a financial as well as an economic point of view In recent years business assessment societies have greatly declined, while fraternal orders have advanced. Adding the nearly two and a half billion benefits paid out by these societies and orders to the death claims shown in the table, it appears that altogether over six and one-half billion dollars have been paid out to this account during the past 75 years by Ameri¬ can corporations. Imagination can hardly ex¬ aggerate the economic blessing of this provi¬ sion to hundreds of thousands of families which would have been left embarrassed other¬ wise, if not in want.

Table II. — Aggregate Results of American Life Insurance Companies from Organ¬ ization to 1 Jan. 1917

Ordinary Industrial

Companies included. ... 194 23

Policies issued . 25,129,454 119,458,205

Amount issued . $50,372,022,815 $16,470,439,452

Premium receipts …... . $10,491,426,066 $3,077,502,361

Interest, rents, etc . 3,419,706,328 449,491,110

Total receipts . $13,911,132,394 $3,526,993,471

Death claims . $3,299,977,594 $869,208,184

Endowments, annuities. 994,710,950 44,437,317

Purchases, surrenders. . . 1,475,395,177 124,380,618

Dividends . 1,419,027,146 156,562,771

Paid policyholders. . $7,189,110,867 $1,194,588,890

Table III is designed to exhibit the amazing growth of life insurance within the last 10 years. The pruning resulting from the 1905 investigation made by several State legis¬ latures eliminated the false growth of tontine insurance and brought the business back more largely to its true function of life protection. All forms of endowment policies combine the element of saving with insurance, but the re¬ turn to a larger use of whole-life policies shown in the table is a good symptom. It ap¬ pears that, considering business companies alone, the use of life insurance in America nearly doubled in the 10 years exhibited. With

the business of 1917 added, the items for 11 years will show easily twice the amounts of

Table III. — Aggregate Combined Results of Ordinary and Industrial Business from Organization to the End of 1906 and of

1916

Companies included …. Capital stock .

1906

138

$22,724,130

1916

241

$54,764,732

Premium income .

Interest, rents, etc ...*..

$526,594,898

140,590,694

$847,983,760

269,876,568

Total income .

$667,185,592

$1,117,860,328

Paid policyholders .

Expenses, etc .

$287,325,629

139,535,734

$566,386,275

220,013,372

Total outgo .

$426,861,363

$792,399,647

Assets — admitted .

— not admitted. .

Liabilities .

Surplus .

$2,924,253,848

26,479,236

2,557,049,863

367,203,985

$5,536,607,483

30,724,057

4,966,580,921

570,026,562

Insurance in force —

Whole life .

Insurance in force —

Endowment .

Insurance in force — Other .

$7,374,135,263

2,918,489,140

960,569,674

$13,582,986,343

3,914,915,117

2,370,368,965

Total .

$11,253,194,077 $19,868,270,425

Table IV gives the aggregate results for the year 1916 and the financial standing on 1 Jan. 1917, of ordinary, industrial and assessment and fraternal business separately. The item of death claims shows that over $350,000,000 were paid to dependents during 1916, and over $300,- 000,000 returned to policyholders in one form or

INSURANCE, Marine. Indemnity cover¬ ing vessels and their cargoes is the most an¬ cient form of insurance, and is found in some form as far back as the records of commerce go. If, as seems probable, the persons of mari¬ ners were in some cases also covered, marine insurance originally included all the hazards that are now separated in their wider recogni¬ tion on sea and land into fire, life and casualty lines.

Marine insurance as now known and prac¬ tised is a development among Western nations in connection with their commercial activities by sea which had only a limited counterpart among the nations of the East in ancient times. Before the rise of civilization in Italy and Greece, the Phoenicians at the east end of the Mediterranean Sea are

found in active trade bearing the products of the continents of Africa and Asia behind them to the sea- coast lands of the West as far as the British Isles.

When political and commercial power passed to Asia Minor, to the iEgean Island, to Greece and then to Rome, the same routes of trade persisted, overland from the Orient and by sea to southern and western Europe, and the control of the carriage meant wealth successively to the Greek and the Roman states. After the eclipse of the Roman Empire, trade from the East suffered decline or was diverted to the then flourishing Moslem lands of south¬ western Asia and northern Africa. With the reawakening of Europe after the Crusades, the free cities of Italy came to riches and power as intermediaries of trade, but only to

Table IV. — Aggregate Results of American Life Insurance Companies for 1916

Companies included .

Policies in force 1 Jan. 1917 . Amount in force 1 Jan. 1917

Premium income, 1916 .

Interest, rents, etc .

Total income .

Death claims paid, 1916. . . .

Endowments .

Annuities and disability …. Purchases, surrenders, lapses Dividends .

Paid policyholders .

Expenses, etc . , .

Total outgo .

Assets 1 Jan. 1917 .

Liabilities .

Surplus .

Assessment

Ordinary

213

10,698,452

$19,868,270,425

Industrial

28

35,674,683 $4,811,041 ,900

and fraternal

603

9,247,550

$9,519,372,376

$572,651,985

214,012,103

$275,331,775

55,864,465

$140,585,821

13,850,894

$786,664,088

$331 , 196,240

$154,436,715

$179,911,345

56,779,801

7,745,828

99,740,034

100,867,621

$76,499,389

6,753,694

1,373,584

12,296,941

24,418,038

$111,410,432

*464,017

$445,044,629

142,857,673

$121,341 ,646 83,155,699

$111,874,449

25,417,185

$587,902,302

$204,497,345

$137,291,634

$4,328,465,583

3,821,365,424

$1,238,865,957

1,145,215,497

$261,188,654

39,258,394

$507,100,159

$93,650,460

$221,930,260

- Sick benefits.

another. The other items, particularly the as¬ sets, liabilities and surplus, exhibit the strength of the life insurance as an institution. This vast scheme for the protection of human life and its interests is bound to have a tremen¬ dously increasing influence. It is something very modern and illustrates better than any other element of progress how modern civiliza¬ tion has broken away from the ancient grip of fate and circumstance and dared to forestall the hazards of life — and to cheat even death of its economic disaster.

Charles Maar,

Insurance Department, State of New York.

decline before the advance in Europe of the Turks, who blocked the ancient caravan routes and thus forced the eyes of mariners westward and brought about the discovery of the Ameri¬ can continents. Thus also was sea traffic widened and thd centres of trade and wealth shifted step by step from the Mediterranean to Spain and Portugal, the Low Countries and the northwestern coast of Europe.

There is no doubt that water-borne com¬ merce was protected against the “perils of the sea^ from very early times, as traces of some form of indemnity are found in the sea regula¬ tions of Greece and Rome as well as in the

Code of Justinian and in the port ordinances of the Italian free cities. Only in recent centuries has insurance come to such importance as to fall under general public regulations ; hence the scarcity of records -of the simple business ar¬ rangement that sufficed earlier.

In place of the modern policy of insurance on a ship and cargo for a sum paid over by the insured, the ancient practice was more like a silent partnership on the side of the insurer, since, for instance, the Roman patricians who shunned open relations with trade were wont to loan money privately on sea ventures at the good rate of 10 per cent on the condition of repayment if the voyage was safely accom¬

plished, but of no return whatever if ship and cargo were lost. The principal owner, being the mariner, had the larger interest in the suc¬ cess of the venture, and thus the silent partner had a fair chance of profit.

In contrast with this narrow sharing of the hazard, modern marine, like all other insur¬ ance, rests on a wide distribution of loss, and the basic premium or cost is determined from the average of loss gathered from experience for each type of vessel and class of voyage and is modified by the immediate considerations and circumstances of the time, such as season of the year and state of war.

For the past 200 years the business of ma: rine insurance has centred in the Lloyds of London, first incorporated in 1871 as an ex¬ change for the regulation of marine underwrit¬ ing after the manner of other commercial ex¬ changes. As far back as the days of the Com¬ monwealth, seafarers were wont to gather in the coffee houses near the London docks to fraternize and transact their business. One Edward Lloyd kept such a house and shrewdly catered to his clients by affording facilities and supplying intelligence as to shipping and mari¬ ners. In the course of time he contrived to have news from all over the world drift his way and then to establish sources of informa¬ tion in all the leading ports.

The first simple plan of Lloyds was for a mariner to post a slip recording his vessel, cargo and prospective voyage, and those who signed up — perhaps to the number of 50 or 100 for £50 and upward, whatever each was willing to assume on the risk — were the under¬ writers. More than any other branch of insur¬ ance, marine business depends on entire honor between all parties and a well-developed judg¬ ment as to shipping, trade, times and seasons. Marine underwriting judgment depends funda¬ mentally on marine information, which Lloyds has aimed to supply most completely. Its sev¬ eral publications give particulars as to vessels and mariners and fullest intelligence as to their location and fortunes as they fare over the seas. Business is placed to-day largely by agents or brokers, and as they present their papers an underwriter, representing himself or a company, must be ready at short notice to decide for or against participation. There vs no opportunity for particular inspection of risks. The rating of the vessel, according to age and build, and the standing of the owners and the mariner are his main reliance.

Since the first quarter of the 18th century, British joint stock companies have competed with Lloyds and now transact the larger half

of the marine business done in Great Britain, and the two together carry the bulk of the world's marine insurance. The stock com¬ panies depend on Lloyds for the intelligence essential to their operations. By means of the cables, a great deal of insurance flows into London from all over the world, owing to the advantages possessed and cleverly used by the London underwriters in the way of world-wide banking and trade facilities, as well as marine intelligence. In fact,' London marine under¬ writing has achieved a clear monopoly, so that it can afford to underbid competitors to secure patronage.

American marine insurance began in colonial times with personal, private underwriting at the several Atlantic ports, much on the early plan of Lloyds. Under the rigid laws of the mother country, the larger traffic was confined to English bottoms, which as always loyally carried English insurance, but a lively coast¬ wise and West India trade existed in America up to the Revolution and men of means were to be found in every port able and willing to finance and underwrite adventures on the sea, as such trade was profitable enough to yield an ample return for all concerned.

The War for Independence increased the hazard of traffic by sea sufficiently to cut off the form of private insurance that was in practice, but the opportunities for privateering more than compensated the extra risk for the bolder American mariners. As commerce began to re¬ vive under the new national life inspired by the adoption of the Constitution in 1789, the de¬ mands of a world trade that opened to Ameri¬ can shipping with its unlimited supply of ship¬ building timber, called for an amount of secu¬ rity that could be met only by organized capital. Attempts to copy London Lloyds at several times failed. Our long seaboard, the lack of communication and the separate interests of the States did not afford the unity of action needed to promote success.

Hardly was American marine insurance thus started in a larger way, when the Napoleonic wars worked it disaster. During the winter of 1793-94 about 600 American vessels were seized and detained in British ports, lest out- mariners should supply the enemy French with necessities. It took the better part of a year and sometimes years to get news and to make settlements, and the companies waited long years for a settlement of their consequent claims against government. This vexatious state of affairs continued in spite of protest and threat of war and the War of 1812 brought no better security to American shipping. Between 1803 and 1812 nearly 1,600 American vessels were captured by British, French and other European powers.

The American marine made a slow recovery after the settlement of European peace in 1815, but from 1830 to 1860 enjoyed a large growth. This was the era of the clipper ships, when the American sails and sailors outsped all competi¬ tors. Vessels left our ports in numbers even for the Far East. Importing firms owned their craft and sent their representatives to dispose of the cargo and to buy for the return trip the silks, tea, coffee, spices and other products of China, Japan and India. The voyage took many months. Insurance rates were necessarily

high, but the business was uniformly placed with American companies and marine business prospered with the prosperity of the importer.

The Civil War demoralized a large Ameri¬ can oversea trade and American marine insur¬ ance shared the disaster. The national ener¬ gies were called home and such traffic as still ventured forth was liable to fall victim to Con¬ federate raiders that were fitted out in Europe. While the conflict was on between North and South, the change from wood to iron construc¬ tion and from sail to steam-power went on apace. When American trade was able to look out again upon the sea, after the close of the war, British shipping everywhere had the ad¬ vantage in speed and capacity and the Lloyds of London clinched the situation by means of its power to make ratings, to supply quick in¬ telligence and to afford political and financial backing to its clients.

Insurance, like trade, follows the flag. The vicissitudes of the American marine and of American marine insurance may be appreciated from the fact that the registered tonnage in¬ creased from 762,838 tons in 1840 to 2,496,894 in 1861, and declined so as to rise only to 888,- 624 in 1904. Lloyds Register of 1 July 1913 showed that all American vessels, steam and sail, including those of the Great Lakes and the island possessions, numbered 3,249 and the tonnage 5,892,638. This was about 28 per cent of the British, while the British then had one- quarter of the world's shipping and one-third of the world's tonnage.

The superior advantages possessed and used by British marine insurance companies, in con¬ junction with British shipping and banking, was demonstrated after 1870, when they began to establish American branches. Under our laws they entered the States to do business under easier conditions than domestic companies en¬ joyed.

By vigorous rate cutting the foreigners made such inroads upon the natives that many of the latter were soon compelled to abandon the field. As shown in the accompanying Table I, the 72 native companies doing marine

had 108 fire and marine companies doing marine business.

Marine business cannot be reported fully as considerable American shipping is covered by Lloyds and foreign companies writing di¬ rectly and therefore making no returns. No complete statistics are available and such re¬ turns as exist include inland navigation and certain automobile coverage ; still the companies authorized in New York State do the great bulk of American marine business and the showing made in Table I gives a fair idea of the growth and importance of this line of insur¬ ance. The years covering the period of the European War reflect the rising shipping values and premium rates occasioned by the commerce raiding of the first year and the submarine war¬ fare of the subsequent years ; and reveal also a substantial increase of marine business placed in America. The figures for the Federal war risks on shipping are not available and must be added to exhibit the whole increase.

Table II exhibits the large increase of pre-

Table II. — Premium Receipts of Marine Com¬ panies Authorized in New York State

year	Amount
1914 .	$38,752,353
1915 .	53,838,772
1916 .	76,961,727
1917 .	119,987,416

mium receipts, since the opening of the Great War, of the marine companies authorized in New York, which however do a small amount of inland and motor vehicle business. The amounts should, it is said, be increased by a third for unreported business. During the first two years given the foreign companies did one- third, and during the last two years nearly three-fourths, of the business.

As the Civil War threw American ocean trade into European hands, so the World War seems destined to give American shipping an

opportunity to recover itself and acquire a proper share of the world's carrying trade. Future American prosperity will depend vitally

Table I. — Marine and Inland Navigation Business of all Insurance Companies

Authorized in New York State

YEAR

1870 .

1880 .

1890 .

1900 .

1905 .

1910 .

1911 .

1912 .

1913 .

1914 .

1915 .

1916 .

Number of companies

Premiums

American

Foreign

Risks written

received

Losses paid

72

$1,330,250,786

$16,300,621

$7,046,097

47

11

1,906,475,177

16,954,195

9,277,853

40

16

2,636,614,231

16,767,993

6,874,333

24

15

5,226,446,147

18,587,451

7,132,179

20

21

5,689,771,934

23,469,212

9,073,592

23

22

12,595,997,689

46,515,014

13,062,156

28

26

13,425,879,616

49,887,214

12,301,865

31

30

15,781,957,187

59,716,335

15,372,153

35

32

16,174,370,673

63,521,450

19,005,239

38

33

16,686,909,623

70,962,392

19,471,413

48

37

21,526,601,714

101,538,966

26,452,956

64

44

31,784,377,087

149,640,212

35,547,118

business in 1870 dwindled to 47 by 1880, and during the same period 11 foreign corporations entered the American field. The number of native companies doing marine business had de¬ creased to 20 by 1905, but since then has steadily increased with the increase in importance of American shipping. The number of foreign companies has also steadily increased and they have done and still do not only the larger pro¬ portion, but also the more profitable part of American marine insurance. In 1918 New York

on commerce, and commerce depends on an intimate alliance of shipping, banking and in¬ surance for the foreign market. Henceforth the world will be organized internationally and America must prepare the instruments for in¬ ternational trade, of which marine insurance is one of the most important, since a foreign monopoly in this can and will inevitably make our ocean shipping and trading unprofitable.

Books are available in libraries to those who wish to learn particulars as to policies

and rates, and the intricacies of marine trans¬ actions and loss settlements, as also the history of marine insurance development.

Charles Maar,

Insurance Department, State of New York.

INSURANCE, Old Age. See Old Age

Insurance.

INSURANCE, Science and Economics of.

Insurance, to-day, forms an integral element of our social and commercial life. From crude beginnings, the principle of providing, by the contributions of the many to a common fund against the financial consequences of individual losses due to the inherent uncertainties in hu¬ man affairs, has been perfected until the modern practice of insurance includes all the more im¬ portant contingencies affecting human welfare. In both science and economics insurance holds a most important position, which becomes more readily apparent as the practice and results of the business are inquired into and considered in their relation to individual and national well¬ being. As a business insurance holds rank as one of the foremost enterprises of the age, equal in importance to banking and transporta¬ tion. It would, without exaggerating, be as difficult to think of commerce without insur¬ ance as of transportation without railroads or the transmission of intelligence without the tele¬ graph. Modern life has become so completely interwoven with the idea of insurance that there are few contingencies affecting life and property to which the principle of insurance has not been more or less successfully applied.

The scientific basis of insurance is the same in all its branches, that is, the laws of chance and probability. In considering any future event we are confronted by the uncertainty whether such an event will or will not happen, but from the facts of experience upon a large scale it is now possible to calculate with sufficient accuracy the monetary equivalent required to meet the risk assumed by an insurance company. The recognition of insurance as a science dates from 1747, when Corbyn Morris published his classical (Essay Toward Illustrating the Science of In¬ surance^ wherein he attempted to ((fix by pre¬ cise calculations several important maxims upon this subject.* Accuracy and precision is the essence of all scientific method which in its practical application to insurance does not differ in any important essential from the method which underlies all other scientific processes. The larger the mass of facts considered, the more definite must be the resulting conclusions, which for practical purposes are the equivalent of natural laws and confirmed by subsequent experience

verifying the truth of the theory assumed.

Insurance science has thus far found its chief development in the department of life contingencies, due, no doubt, to. the fact that the average duration of human life and its pe¬ cuniary value require to be determined with the greatest possible accuracy, since the con¬ tracts made dependent thereon extend, as a rule, over many years. In other forms of in¬ surance, such as fire, marine and accident, the contracts are generally for short periods, sel¬ dom of longer duration than a single year. Hence most of the scientific discussions and the numerous dissertations upon the subject

relate chiefly to life contingencies, but there has been a decided improvement in this direc¬ tion during recent years. The deliberations of associations of actuaries and insurance mana¬ gers extending over many years, in particular the Institute of Actuaries of Great Britain, are fully entitled to rank, in thoroughness of re¬ search and grasp of fundamental principles, with the deliberations of other scientific bodies. It is, no doubt, due to this fact that insurance was included in the most recent classification of the sciences as represented at the Interna¬ tional Congress of Arts and Science at Saint Louis, held in connection with the exposition of 1904.

Insurance as a science is a branch of eco¬ nomics, although only a few of the more recent writers on the subject have given careful atten¬ tion to the theory of risk and insurance in its relation to public welfare. A fairly complete explanation of the economic theory of insur¬ ance is to be found in an essay by Allan H. Willett, published by Columbia University in 1901. He holds, and very properly so, that <(as a general rule uncertainty exercises a re¬ pellent influence in human life, and the exist¬ ence of risk in an approximate static state causes an economic loss, while (on the other hand) the assumption of risk is a source, of gain to society.* From this point of view the business of insurance does not differ essen¬ tially from general commercial enterprises. Risk is assumed in mining and agriculture in much the same manner as risk is assumed in the business of insurance, but in life insurance, for illustration, the assumption of a risk and the equivalent premium payments required are determined by the theory of probability and the established laws of human mortality and ob¬ served experience. In general commercial enter¬ prise the risk assumed is, as a rule, created, while in insurance the risk is pre-existing. This marks the broad division between gambling and insurance. Insurance is not <(in the nature of a bet,* for in insurance an effort is made to eliminate an existing individual risk by its assumption on the part of the many, while in gambling a non-existing

risk is created with resulting uncertainty and needless, loss to society.

Insurance companies are chartered institu¬ tions with their powers of existence and rights of transacting business derived from the State. They are subject to supervision by special de¬ partments in charge of commissioners or super¬ intendents of insurance, who have ample power to inquire into every important detail of office administration. At first the burdens of State supervision were light, since the companies transacted but little business outside of their home State, but within the last generation the business operations of most of the companies have of necessity been extended to other States and Territories. There has, as a result, been developed a vast system of over-supervision, accompanied by an immense amount of over¬ legislation, much of which is inimical to the highest and broadest development of the busi¬ ness. The position of the commissioner is, as a rule, a political one, subject to the changing fortunes of the parties, and new men have frequently come forward with radical ideas, which, if carried to the extreme, would' have

resulted disastrously to the companies and their policyholders. It has been very ably pointed out by Senator John F. Dryden, in an address on (The Regulation of Insurance by Congress,* that ˆInsurance is to-day a universal institution reaching all classes and affecting more or less all commercial interests. It is an essential ele¬ ment of human progress and a method and means for the uplifting of the masses to a higher level of economic security. It has be¬ come national in character, and few companies confine their operations to a single State; in fact, if operations were so limited they might prove disastrous and make the conduct of the business impossible. w

The taxation of insurance is a difficult prob¬ lem and a matter of serious concern to the com¬ panies. In its final analysis the incidence of insurance taxation falls upon the policyholders and the cost of insurance is correspondingly increased. The fact is overlooked that insur¬ ance itself is in the nature of a tax and that additional tax burdens are a needless hindrance to the largest development of the business. In 1914 life insurance alone paid in taxes, fees, etc., not far from $16,000,000 and the proportion of taxes to income is constantly increasing, due to additional burdens placed upon the companies as a convenient source of public revenue. A tax upon premiums is an unjust burden upon the business, and is both inexcusable and un¬

scientific. This tax falls alike upon new pre¬ miums for risks just incurred and upon renewal premiums upon risks assumed years ago. Since risks assumed years ago were calculated to produce a certain result on the assumption of a known mortality and 4 per cent interest, taxes upon premium payments must necessarily and considerably decrease the returns to participat¬ ing policyholders, and increase, in consequence, the cost of insurance. If carried to the ex¬ treme, especially in the case of companies which issue only non-participating policies, it is pos¬ sible that the companies may ultimately be unable to meet their obligations in consequence of a policy on the part of the State which is as unwise as it is unnecessary.

Insurance by government is not a new propo¬ sition, but it is only during the last half century that there has been an effective effort to estab¬ lish an insurance department by government in active competition with private companies. In life insurance the experiments of England and New Zealand are the most valuable because the results are, on the whole, fairly comparable with those of non-governmental institutions. Post-office life insurance in England was estab¬ lished in 1864, and the Life Insurance Depart¬ ment of New Zealand in 1869. The former employs no agents or solicitors, while the latter, in all essentials conforms to the methods and usages of private companies. The premium rates and the results to policyholders have been about the same, averaging fairly with those of regular companies of good standing. The busi¬ ness results in England have been insignificant, while in New Zealand a fair measure of success has been achieved. In New Zealand at best and at most, the results have not been better, fhe cost has not been lower and the security has not been superior to that offered by private in¬ stitutions, which have increased their business in force at the rate of 82 per cent during the period 1902-12, against an increase of 20 per

cent for the government department. The pri¬ vate companies are graduallv gaining on the government, and while in 1894 49 per cent of the total policies in force were with the govern¬ ment, in 1912 the proportion was only 34 per cent. To those who believe that the govern¬ ment which governs best is the government which governs least, and that t'he limit of state duties is unduly enlarged by state trading in such directions as these, the New Zealand ex¬ periment is conclusive evidence that govern¬ ment effort in the field of life insurance is not likely to produce results superior to those which have made commercial life insurance the most successful business of the age.

As distinct from voluntary insurance by government or private

companies, the so-called system of compulsory insurance for workmen holds a unique and important place in the social economy of certain European nations, particu¬ larly Germany. The term compulsory insurance is seriously misleading, for, as a matter of fact, the system is not insurance at all, but a state provision for workmen against the financial con¬ sequences of accidents, sickness, invalidity and old age. In its inception the German system of government insurance was a measure de¬ signed to counteract the socialistic tendency in opposition to the monarchy. In its development it has been made to include nearly the entire body of workmen and as a theory of govern¬ ment and social reform it has unusual attrac¬ tions. Critically examined, the system is little else than poor relief under another name, and inadequate in many respects as all methods of compulsory thrift must necessarily be. It is insurance in name, but not in fact, for it is not by the sole contributions of the beneficiaries * that the required funds are provided, but by the joint and compulsory payments of em¬ ployer and employee, plus a state subsidy or grant from the general revenue raised by taxa¬ tion. The evidence as to the economic and social results of this system is so involved and conflicting and subject to such different inter¬ pretations that no final conclusion for or against the system can be advanced at the present time. This much, however, it is safe to say, that the anticipated benefits have not materialized, and the socialistic agitation, although much modified and of a somewhat different character, is to-day more pronounced in Germany than ever before. Nor has compulsory insurance solved the labor problem and brought about a substantial im¬ provement in the relation of capital and labor. The most serious economic aspect is the burden of the system upon German industry and the resulting handicap upon competition in inter¬ national trade. In the opinion of Professor Farnam of Yale, an impartial student of the subject, ((the supporters of the German sys¬ tem are claiming for it more than the facts of the case as they now stand warrant, ˆ and that ((The' German experience with this kind of insurance seems to show that, while it is possible with a highly trained intelligent admin¬ istration to carry through a scheme which will compel provision against various contingencies, it has thus far been impossible to create the instinct of forethought and care which is im¬ plied where insurance is voluntary. There are many facts which go to create a strong pre¬ sumption that the result of this governmental care is actually to make people less careful of

the future, and less judicious in their expendi¬ ture."

Insurance had its origin in private enter¬ prise and it has attained its commanding position as*a world force for the betterment of the social condition of mankind through the initiative, ability and courage of a group of men as much deserving of immortal fame and glory as any other class of benefactors of the human race. State trading in the field of insurance has never advanced the cause by a single important inno¬ vation or by a new theory or by a material im¬ provement in practice. The necessary reforms and changes as dictated by experience have been brought about by the companies and it is due to these and these alone that the insurance business has become one of colossal magnitude and world-wide extent.

The World's Insurance Congress of 1915, held in San Francisco in connection with the Panama-Pacific International Exposition, proved a. memorable event in the annals of insurance in all its branches, and foreshadowed broader national and international conceptions of the business which now ranks foremost among the institutions making for human betterment. The essential facts and phases of insurance as a social and economic institution were presented by eminent members of the insurance profes¬ sion. Among the addresses were (

No other business so completely enjoys pub¬ lic confidence and has so successfully stood the test of long experience. As the scientific prin¬ ciples of insurance are examined and the highly specialized administration of the companies is considered and the results are measured by a fair standard of benefits in proportion to cost, the verdict of science and economics will agree with that of the mass of mankind that our social and commercial progress would have been im¬ possible without insurance. Resting upon this broad foundation of human experience and pub¬ lic confidence, the colossal business of modern insurance challenges the admiration of the world.

Bibliography. — Insurance has a literature of its own and a most interesting history ex¬ tending over more than four centuries, with suggestions of at least a conception of the in¬ surance idea among the most ancient people of whom there is a recorded history. The limi¬ tations of this article preclude more than a brief reference to the more recently published works, among which may be mentioned Willett,

(Economic Theory of Risk and Insurance) (New York 1901) ; the Wale Insurance Lec¬ tures1* (2 vols., New York 1904) ; Alexander, (The Life Insurance Company> "(New York 1905) ; Young, (Insurance) (London) ; Dean, Wire Rating as a Science1* (Chicago

1901) ; Phelps, (History of American Insurance During the Last Decade) (American Under¬ writer, New York 1904) ; Vance, (Handbook of the Law of Insurance) (Saint Paul, Minn., 1904) ; Wolfe, (Investments of Insurance Com- panies) (New York 1905) ; Hoffman, (Insur- ance Science and Economics) (New York 1911) ; Dunham, (The Business of Insurance > (New York 1912). These are but a few of the many books on insurance which have been published during recent years. In addition

there are the insurance yearbooks on life, fire and miscellaneous insurance, the annual re¬ ports of insurance commissioners, some of which contain critical observations on insur¬ ance problems of the day, the annual pro¬ ceedings of underwriters' associations, and the national conventions of insurance com¬ missioners, the special publications of insur¬ ance companies, their histories, etc., the dis¬ cussions on State supervision and Federal regu¬ lation of insurance, of which the two more important are an address by John F. Dryden, president of the Prudential Insurance Company of America (1904), and a report of the Com¬ mittee of the American Bar Association on In¬ surance, by Ralph W. Breckenridge, chairman, Omaha, Neb. (1905). But the chief source of information regarding insurance practice, the progress of the business, the organization of companies, etc., is to be found in the technical and general insurance periodicals, the Insurance Monitor, The Spectator, the Weekly Under¬ writer and the Insurance Press of New York the Baltimore Underwriter, of Baltimore, the Standard, of Boston, the Economic World, New York, and many others.

Frederick L. Hoffman. Third Vice-President and Statistician of the Prudential Insurance Company of America.

INSURANCE, Social. See Social Insur¬ ance.

INSURANCE, Workmen's. See Work¬

men's Compensation.

INSURANCE LAW. A body of statutes

controlling the business of insurance has grown with the growth of insurance in modern times in all civilized lands. As an element of trade, insurance necessarily came under certain regu¬ lations from its earliest use, and with its ex¬ pansion from local to national and international proportions and from almost private utility to a general social and commercial necessity, pub¬ lic control has increased to

cover almost every detail of the business.

The insurance of vessels and their cargoes at sea was the earliest line to attain import¬ ance, and the practice of individual owners sharing losses seems to have been an ancient one. Naturally certain customs and ordinances covering these transactions came first to be recognized and established at the larger sea¬ ports. Before the fall of Constantinople in 1453, the world-trade routes lay east and west from the great seaports of the Mediterranean Sea — Florence, Venice and Genoa. The traffic east was by land, and west by sea. When the conquering Turks shut off the overland traffic east, it became necessary to search out another route, with the resulting discovery of the way around the southern point of Africa by the Portuguese and of a new western world by Columbus. The seaports of Portugal, Spain and the Netherlands now became busv distribut¬ ing centres of trade from the Far East and West to north and and central Europe. The longer sea voyages made desirable a better security against loss, and this involved more government regulation.

In the 14th century, when trade flourished at the ports of Italy, of the Spanish Peninsula and . at Bruges in Flanders, the practice of sharing losses among the interested individual owners called forth simnle ordinances to de-

fine the practice and to outline the necessary agreement or policy form. In more recent times the trade centres of Europe have drifted largely to northern Europe, but in the London Lloyds is found the ancient practice of indi¬ viduals, under certain regulations, underwriting sea risks to the largest amounts. Since the opening of the 19th century, however, there have come into being corporations which underwrite marine contracts as a business venture on the basis of average loss, such as now underlies all other forms of insurance, and both the world's increasing need and the formation of purely business companies to meet the need for the protection of water-borne commerce have made necessary a larger public control of marine insurance.

In America a similar development occurred to that in the Old World. As the sea trade of the northern-eastern Atlantic ports sprang up, during the later colonial period, interested in¬ dividuals shared the risk of the traffic as inter¬ insurers, until at length the expanding need

of the independent States of the Union called for the larger service of capitalized companies, through which the business of insurance was more and more brought into the purview of

law. i r i

Meantime the demand arose also for other

forms of protection, — insurance against the hazard of fire, and death, and more recently against sickness, accident and the numerous other hazards commonly grouped as casualty insurance. The great London fire of 1666 em¬ phasized the necessity for insurance against fire and shortly after the beginnings of fire insur¬ ance the first forms of modern life insurance

began to appear. .

In each case, individual sharing of losses, or the principle of mutuality, was brought into use, but eventually each line has come to ex¬ tensive application under organizations of joint- stock corporations, although in America life insurance is transacted mostly bv companies without capital stock. Public regulation was at first concerned with the term of the con¬ tract, called a policy, but with the expansion of the service came the necessity for securing the integrity of the corporate insurer, by regu¬ lations covering the investment of its funds and providing for an adequate reserve against

future obligations. . _ . . t

The first legal restraint, under British regu¬ lation, was one designed to check a tendency to gamble on marine risks, resulting in the es¬ tablishment of the principle of insurable inter¬ est. Experience and study combined to fur¬ nish a scientific foundation for insurance din¬ ing the 18th and 19th centuries in the matter of adequate premiums and reserves, and during the latter century the competition of numerous small companies tended to . develop business and to find new fields for its application, so that to-day insurance enters every part of our commercial and social structure.

When the business of insurance was largely local, public opinion influenced its control, but with the later growth of companies extending their operations over wide areas, it became necessary to define closely by statute all the conditions, in order to secure equitalde tieat- ment to the insured and to conserve the funds necessary to meet future obligations. As the result of. public control this far, there has

emerged a decided tendency to uniform stand¬ ards, methods and requirements that may in the end develop a uniform code of insurance in the United States, where now 52 diverse local codes have often hampered the transaction of interstate insurance by varied and conflict¬ ing or duplicative requirements. .

The present State laws covering the essen¬ tials of insurance organization, methods of business and standards of solvency have, under the pressure of business demand, become so much the same that a development toward Federal control of interstate insurance would naturally follow an acceptance of such insur¬ ance as an element or instrument of com¬ merce. This is asserted by insurance leaders to be in line of progress and would open the way for a Federal code that would serve as a model to all the States and Territories.

The entry into the United States of a large number of foreign companies, during recent years, will likewise tend to bring interstate in¬ surance under national control. At the present time nearly 100 such corporations are doing business in New York. Matters relating to American companies abroad and to national supervision found place in President Cleveland's second and third messages, and in President Roosevelt's fourth and fifth messages. Shortly after the declaration of war against Germany in 1917 the Federal government took charge of the business of all enemy corporations in the

United States. .

American laws recognize uniformly the practice of rigid separation of fire, or com¬ bined fire and marine, from life, health and accident insurance, and both from the general casualty lines, and require separate organiza¬ tions for their transaction, herein differing from practice in Europe, where several lines may be covered by one company, though usually with a separation of funds.

Charles Maar.

INSURANCE PATROL, also known as fire patrol, protective department and salvage corps, is an organization now existing in all the larger cities under the support and control of local boards of underwriters but closely asso¬ ciated with fire departments, with the object of protecting property from theft and damage during a fire. They operate mostlv in business districts and are now generally equipped with high power motors carrying fire extinguishers and waterproof coverings, the latter to be used to protect merchandise and furniture in cases where removal may be impossible or unneces-

This service has grown from small begin¬ nings and has been the means of largely reduc¬ ing losses for the supporting companies. In New York city, as early as 1835, the associated fire companies employed four men at the yearly salary of $250 each. This city's force now consists of nearlv 200, divided into seven com¬ panies. The Chicago patrol has a chemical engine and eight companies. Boston began in 1849 with six oiled cpvers and now has three well-equipped companies. . ,

A valuable incidental service is performed by the patrols in investigating the origin of fires and their reports afford an accurate basis for underwriting statistics. In 1892 a national association of superintendents and captains was formed to promote friendly relations and

gather statistics. Yearly conventions have since been held.

Charles Maar.

INSURANCE SUPERVISION. While insurance was mostly concerned with marine risks little public regulation was required, as each transaction was completed in the course of a few months, or about a year at most, and the practice of interinsurance between owners required no accumulation of funds. With the advent of fire insurance after the Great London conflagation of 1666 and the beginnings of life insurance a generation later, the conditions of insurance as a business became more complex and the accumulation and security of funds necessary. All insurance is based on average loss as shown by experience, but a policy of fire or life insurance may remain in force for a series of years. Public supervision has con¬ cerned itself, on the one hand, with the terms of the policy contract to secure fairness and equity, and, on the other hand, with the busi¬ ness integrity of the insurer; and the intimate oversight of all forms of insurance is justified by the fact — not at first realized, but now universally admitted — that the insurer acts in a fiduciary capacity toward the multitude of its policyholders.

In recent years, with the application of in¬ surance to a multitude of business relations, covering many hazards of persons and prop¬ erty, it has come to pass that the world's com¬ merce and trade and the welfare of society de¬ pend vitally on insurance as an arch depends on its keystone. A truly tremendous respon¬ sibility, therefore, has come to rest upon super¬ visory officials.

Owing to the local nature of early»insurance and the provision for local incorporation when corporate insurance began, State supervision came into being. Before the middle of the 19th century the interests involved called for little more than a yearly financial statement, but by the end of this period an era of rapid growth and vigorous speculation in insurance as a business set in. The increasing interests and erratic tendencies combined to demand closer and more special public inspection. A department of insurance was created in Massa¬ chusetts in 1855 and under the direction of Elizur Wright, a genius in insurance science, developed great efficiency and set high stand¬ ards. The same can be said of the New York department, organized in 1860 under the guid¬ ance of William Barnes, Sr. Connecticut and Indiana established insurance departments in 1865, California in 1868 and

Missouri in 1869. Gradually all the States have assumed a measure of supervision over the insurance business within their separate borders, in some cases at the hands of one of the regular State officials, but most generally by means of a specially appointed superintendent or com¬ missioner.

Although the insurance business in all lines has long since become national and even inter¬ national in its scope, supervision has remained localized in the States under the influence of a number of decisions of the United States Supreme Court adverse to insurance being an element or instrument of commerce, which precludes Federal oversight. The first case bearing pn this point, Paul vs. Virginia, was decided in 1868. Classes of fire, life, accident

and health companies or societies doing a local business must necessarily remain under State supervision, but there is no longer room to doubt that the corporations doing interstate business could be much more economically and efficiently supervised by the national govern¬ ment. To accomplish this desideratum in the face of the decisions mentioned, an amendment to the national Constitution is necessary.

The possibility of conflicting authority among the 52 insurance departments in the United States has been obviated to a large de¬ gree by the influence of the older States in es¬ tablishing methods and standards and also by the yearly conference of officials which began in 1870 in the National Convention of Insur¬ ance Commissioners. This body has been the means of unifying opinion and of securing the adoption of uniform financial statement blanks and standard policy forms or conditions, as also uniform laws covering certain phases of insurance, such as fraternal orders, casualty reserves and standards of solvency. It is per¬ haps too much to hope for a uniform insur¬ ance code as the final outcome, but some de¬ gree of Federal supervision is a near pos¬ sibility and this will produce an immense sav¬ ing of expense by eliminating the varied and duplicative requirements of the local authori¬ ties on interstate insurance.

The cost of supervision is made a charge upon insurance companies in the form of fees and taxes, which have come so far to exceed expense requirements as to constitute a sub¬ stantial source of State revenue. This charge ultimately falls upon the policyholders and is criticised as a tax on thrift. The contention that insurance of every form is such a social and economic necessity as to deserve encour¬ agement, rather than made a source of revenue, would appear just.

Charles Maar.

INSURANCE TAX, a levy under the War Revenue Law which became effective 1 Nov. 1917, whereby individuals or corporations issuing insurance policies are required to pay within the first 15 days of each month on (a) life insurance, except reinsurance, eight cents per $100 of policy; (b) life insurance policies of $500 or less issued on weekly payment plan, 40 per cent of the first weekly premium; (c) fire, casualty, liability and all other insurance and renewals, except reinsurance, one cent on each $1 of premium. For general taxation of insurance, see Insurance, Science and Economics of.

INSURANCE TERMS in general use in the transaction of life and marine insurance business :

Abandonment. — A term used in marine insurance to denote that all property saved has been relinquished to the under¬ writers in order that the insured may claim indemnifica¬ tion for a total loss.

Abordage. — A term used in marine insurance. If a colli¬ sion between two vessels happens on the open sea and the damaged ship was insured the persons insuring her must pay the loss, although they are entitled to relief at civil law against the party causing the damage.

Acceptance. — A term usually used, in marine insurance, in cases of abandonment. It is this process which per¬ fects the rights of the insured in the recovery of his loss. Actuary. — An officer of an insurance company whose skill in the application of the doctrine of chance to financial affairs enables him to make the computations necessary to determine the valuation of contingent liabilities, as shown in the compilation of tables, the computation of risks, etc,

Agreement. In insurance the contract issued prior to the delivery of the official policy is known as the “ agreement.” Annuity. A fixed amount paid each year, whether in one sum, or periodically, in instalments. When an annuity is continued for a specific number of years it is termed a certain ” annuity. If the period of its continuance is uncertain it is called a “ contingent ” annuity. When payment has already commenced it is an “ annuity in possession,” but when such payment does not begin until a specified period has elapsed, or a definite event has taken place it becomes known as a “ reversionary ” or “ deferred ” annuity.

Assessment. — In insurance, an assessment is made (1) as an apportionment in general average upon the articles at risk for contribution for damage and sacrifices purposely made for escape from impending peril, and (2) also upon premium notes given by members of mutual companies as a substitute for the investment of the paid-up stock. Average Bond. — A bond in marine insurance under which the consignees of cargo subject to general average guar¬ antee payment of their contribution as soon as ascertained in order that their goods may be delivered at once. Barratry. — In marine insurance, the commission of any fraudulent act in the management of a ship, or its cargo, by which the owners, consignors or insurers are subject to injury.

Casualty. — A term frequently used in insurance as a synonym for accident.

Coinsurance. — A form of insurance in which the insured, in view of a reduced rate of premium, agrees to maintain insurance upon a certain specified percentage of the total value of his property, failing which he becomes his own insurer for the difference, a fact which makes him jointly responsible with the assuring company in case of partial loss.

Constructive Total Loss. — A term used in marine insur¬ ance when the thing insured and damaged, wnile not entirely a total loss, is so nearly so that it is practically beyond recovery or repair. In such cases a notice of abandonment is served upon the insurers by the owners, after which the “ constructive total loss ” may be recov¬ ered.

Decrement. — A term used in insurance, usually in the sense of the “ equal decrement of life,” or the doctrine of annuities upon which assurance companies base their exist¬ ence. It is the theory that in a given number of lives there should be an equal number of deaths within a given period. Deferred Insurance. — A form in which the liability of the company does not begin until a certain specified date in the future.

Deviation. — A term used in marine insurance to denote the voluntary departure of a vessel, without necessity or reasonable cause, from the usual course of the voyage for which she was insured. All unreasonable delays are also involved in the same law. which releases the underwriter from all risks.

Double Insurance. — A term used among insurance com¬ panies as a synonym for over-insurance. Thus, where divers insurances are made upon the same interests against the same risks in favor of the same

assured, in proportions exceeding the value of the subject, the party insured may sue upon all the policies although he is entitled to but one satisfaction.

Endowment. — A term used in life insurance to describe a policy in which the face value, with accrued earnings, is payable to the insured at, or after a stated period, or in which the face of the policy is paid to his representatives should he die prior to the expiration of that time.
Floating Policy. — In marine insurance a policy covering certain interests wherever located, even in vessels unknown to the insured or the insurer.

Graveyard Insurance.— A term used to designate a method of swindling insurance companies by the substitu¬ tion of a person of robust health for the bad risk actually insured. Also used to describe other kinds of insurance swindling, or crimes committed in the collection of insur¬ ance moneys.

Insurable Interest. — It is essential to the insurance con¬ tract that the insured should have a legal interest in the object for which the insurance was taken. In France the laws annul all policies that exceed the insurable interest of the assured at the time of the subscription.

Insurance. — A term used to describe a contract whereby for an agreed premium one party undertakes to compen¬ sate another party for loss in a specified subject by specified perils. There are several kinds of insurance companies in operation, but nearly all are either ” stock ” or “ mutual ” companies, while the risks covered include, life, accident, fire, health, marine, burglary, live-stock, plate-glass, etc.

Joint-life Policy. — A policy issued to husband and wife payable to the survivor upon the death of either. The husband is required to show that he has an insurable interest in the life of the wife. This policy is of special utility in cases where either husband or wife possesses a life interest in property or funds.

Loss, Amount of. — An insurance term denoting the dim¬ inution or destruction of the values of, or of the charge upon, the insured by the direct consequence of the opera¬

tion of the risk incurred, according to its value in the policy, bee Total Loss.

Open Policy. — In insurance, a policy in which’ the value of the subject insured has not been fixed, but has been left to be determined in case of loss, or because it has been left open to permit of the

addition of other things when¬ ever occasion demands.

Partnership Policy. — One issued to a firm in which each the partners is insured for the amount of his capital which is thus safeguarded for the use of the firm in case of the death of the insured.

Surrender. A term in insurance to denote that the party insured has abandoned all right in his policy in considera¬ tion of having received a portion of the premiums already paid to the company. The percentage of premiums returned is known as the " surrender value " of the policy. Term Insurance. — That issued for a given period to cover a particular or extra risk.

Time Policy. — A form of marine insurance covering vessel or cargo, or both, for a specified time only.

Tontine Policy. — In insurance, a policy in which the insured agrees that no money shall be received by him from the insuring party, either in the form of dividends, return-premiums, or surrender- value, for a specified term of years, but that, instead, the entire surplus shall be per¬ mitted to accumulate until the end of that period when it may be divided between those who have kept their policy in force.

Total Loss. — In marine insurance, total loss may mean that the subject insured has been absolutely destroyed by the peril against which it was protected, or it may mean that the loss by damage, seizure or other causes has been so great as to be practically absolute. In the latter case it is often termed a " constructive total loss." Valued Policy. — A term used in insurance to show that a policy is one in which the value has already been set upon the subject insured, the insertion of which fact in the policy, with the amount agreed upon, makes proof of damages in case of loss unnecessary.

Voyage Insurance. — That covering goods or vessel only during the specified voyage from one designated port to another.

Wager Policy. — In insurance, a policy in which the insured has no insurable interest, and, being generally regarded as a form of gambling, such policies are not valid except in places where the validity of a wager may be recognized.

INSURRECTION, the act of rising against governmental authorities, active opposi¬ tion to the power of the State. In the United States, power to suppress insurrections by em¬ ploying the militia is given to Congress by the Constitution, Art. I, Sec. 8, Clause 15. In 1792 and 1807 acts were passed giving the President power to call forth the

militia when notified by an associate justice of the Supreme Court or a district judge that the execution of the laws is obstructed, and on application of a legislature or a governor, when the legislature could not be convened, and to employ also the land and naval forces of the United States. The Whisky Insurrection (q.v.) was directed against the Federal au¬ thority and the President employed force to suppress it on notification by the Federal judge. During the Buckshot War (q.v.), in 1838, be¬ tween the Whigs and Democrats in Pennsyl¬ vania, the governor of that State asked for assistance, but it was refused. The governor of Rhode Island made a similar application during the Dorr Rebellion (q.v.) and the regu¬ lars were held ready for action, but their aid proved unnecessary. These last two cases came under Art. IV, Sec. 4, of the Federal Constitution, which provides ((that the United States shall protect® each State on application of the legislature, or of the executive, against domestic violence.

When the Civil War began the President was obliged to take prompt steps in calling out the militia, though no application had been made to him as required by the acts of 1792 and 1795. His action was justified by Art. II, Sec. 3, of the Constitution, providing that (

and made legal all of President Lincoln s previ¬ ous acts, proclamations and orders. The Force Bill (q.v.) of 20 April 1871 gave the President special power to use military force in certain contingencies. In the South during the recon¬ struction period, and in the North, during strike riots, Federal troops have been used.

INTAGLIO, a method of cutting a stone or gem by which the design is cut or hollowed out — not raised, as in a cameo. In art, the term means the opposite of relief, denoting the representation of a subject by hollowing out a gem or other substance ; so that an impression from the engraving has the appearance of a bas-relief. Intaglio letters have been effectively used in printing in recent years, and much of the effectiveness of colored printing is due in large measure to a process or processes closely akin to intaglio.

INTEGRAL CALCULUS, a branch of infinitesimal calculus, treating of the methods of deducing relations between finite values of variables from given relations between con¬ temporaneous infinitesimal elements of those variables. It is thus the inverse of the differ¬ ential calculus. Its object is to discover the primitive function from which a

given differen¬ tial coefficient has been derived. This primi¬ tive function is called the integral of the pro- posed differential coefficient, and is obtained by the application of the different princi¬ ples established in finding differential coeffi¬ cients and by various transformations, lo illustrate — with the integral calculus one may discover the relations connecting finite values of variables, as * and y, from the relation connecting their differentials, as dx and dy. tegral calculus is thus the doctrine, of the limit of the sum of infinitesimals of which the num¬ ber increases, while the magnitude decreases, both without limit, yet according to some law. The more proper concern of the integral calcu¬ lus is besides the finding and discussion of inte¬ grals, with such matters as the theory . of spherical harmonics, the theory of residuation, and parts of the theory of functions. The sign of integration is "/," which is a form derived from the old or long «r.» It is the initial of the word "sum," and came into use owing to the conception that integration is the process of summing an infinite series of infinitesimals. Before even the notation of the differential cal¬ culus and its rules were discovered by Gottfried Wilhelm von Leibnitz (1646-1716), he had in¬ vented the notation and had found some of the rules of the integral calculus. Leibnitz first used the now well-known sign "/" or long as° as short for the "sum of" when considering the sum of an infinity of infinitesimals as is done in the method of indivisibles. Leibnitz himself at¬ tributed all his mathematical discoveries to his improvements in notation ; and the fact that we still use and appreciate Leibnitz's "/" (and one must add his «rf») even though our views as to the principles are very different . from those of his school, is perhaps the best testimony to the question of notation. The integral cal¬ culus may be distinguished from the differential calculus by another feature than inversion; namely, by the greater importance in it of imag- inaries. The integral calculus is frequently called the indirect or inverse method of fluxions, the analytic processes by which a function may

be found such that being differentiated it shall produce the given differential. By writers on "fluxions" this function is called the "fluent" or the flowing quantity. By writers on the infini¬ tesimal calculus it is called the integral of t.ic proposed differential, 4 he origin and constitu¬ tion ' of quantities is called "fluxions" in the scheme of Sir Isaac Newton (1642— 1727), be¬ cause conceived to express the manner of gen¬ eration of quantities by the motion of other quantities. In the scheme of Leibnitz the lan¬ guage employed is "infinitesimals" or "differen¬ ces" ; because they are conceived to express the constant addition of one indefinitely small quantity to another. In the scheme of Newton, or "fluxions," the finding of the

sum of all dif¬ ferences is called the “inverse” or the “indirect method.” It is thus that this method of obtain¬ ing the quantity generated is identical with the method of finding the “fluents.” And this same method in the language of Leibnitz is called “integration” or the finding of the “integrals. The two systems are therefore in no respect whatever different except in their origin and in their language; their rules, principles, applica¬ tions and results are for all practical purposes the same. In Newton’s system an “/” or / is used to express the “fluent.” f

To find the integral of a differential is to integrate that differential, and this process by which this integral is found is called integra¬ tion. With the integral calculus a mathemati¬ cian endeavors to transform the given expres¬ sions into others which are differentials of known functions, and thus deduce formulas which may be applied to all similar forms. The number of such formulas is said to be unlim¬ ited. The collection of Meyer Hirsch is a well arranged and though originally published long ago at Berlin is still useful.

Sir Isaac Newton (1642-1727) undoubtedly arrived at the principles and practice of a method equivalent to the infinitesimal calculus generally much earlier than Leibnitz, and, like Roberval, his conceptions were obtained from the dynamics of Galileo. He considered curves to be described by moving points. An “arc” thus became the “fluent” of the velocity of the point with which it is supposed to be described. Newton’s notation (it must be admitted) for the “inverse method of fluxions” was far clum¬ sier, even, and far inferior to Leibnitz’s the long “j.” And it was owing to the long acrimonious dispute between Newton and Leib¬ nitz, mixed up with insinuations anent what is sometimes mistakenly called “patriotism,” that for considerably more than a century British mathematicians failed to perceive the great su¬ periority of the “notation” of Leibnitz. In fact it was not until the beginning of the 19th cen¬ tury that there was formed, at Cambridge, a society to introduce and spread the use of Leib¬ nitz’s notation among British mathematicians.

“It may be said” (we quote Sophus Lie) “that the conceptions of differential quotient and integral, which in their origin certainly go back to Archimedes, were introduced into modern science by the investigations of Kepler, Des¬ cartes, Cavalieri, Fermat and Wallace. . . .

The capital discovery that differentiation and integration are inverse operations belongs to Newton and Leibnitz” (in Leipziger Berichte XLVII, 1895, Math.-phys. Classe, p. 53). And

indeed iii the opinion of one who has con¬ tributed much to the advancement of Ameri¬ can mathematics as well as of Britain (indeed, of the world!), J. J. Sylvester, <(it seems to be expected of every pilgrim up the slopes of the mathematical Parnassus, that, he will at some point or other of his journey sit down and invent a definite inte¬ gral or two toward the increase of the com¬ mon stock.® (See Calculus, Infinitesimal and consult his (Notes to the Meditation of Poncel- let's Theorem, > Mathematical Papers, Vol II, p. 214). Consult also Archimedes of Syracuse (On Method* ; with an introduction by David Eugene Smith and an English translation by Lydia G. Robinson (Chicago) ; Cavalieri, (Geo- metria Indivisibilium* (1635) ; Cheyne, (Fluxi- onum Methodus Inversa) (1703) ; Condorcet, (1615); La Place, (1736); Price's ˆInfinitesimal Calculus * (2 vols., 1854) ; Picard, Emile, (Traite d'analyse* (4 vols., 1891) ; perhaps the most extensive and one of the most advanced treatises that has as yet ap¬ peared; Roberval, (Traite des Indivisibles,) Mem. de l'Acad. des Sciences (1666) ; Tod- hunter, Isaac, (A Treatise on the Integral Cal- culus) (Cambridge 1868) ; Wallis, (Arithmetica InfinitorunP (1655).

INTEGRAL EQUATIONS. An integral equation is an equation connecting two vari¬ ables, an independent variable x, and. a depend¬ ent variable u, in which u occurs (in at least one term) under the sign of integration. An example of such an equation is

(1) f(x) = g(x)u(x) K(x, t)u(t) dt,

in which f(x) and g(x) are given functions of x, K (x, t) is a given function of x and t, and a, b are known functions of x, one or both of which may be constant. The above equa¬ tion is called linear, since u enters to the first degree only. It is homogeneous when f(x) is identically zero. It is the most general form

of linear equation. The fundamental problem connected with eq. (1) is to solve it for the unknown u ; that is, to express u as a known function of x.

The theory of integral equations is the most recent development of importance in the domain of pure mathematics. The foundation for a general theory of such equations was laid by Volterra in several papers published in Italian scientific journals in 1896. Since then this new field has developed with great rapidity and already has an

extensive literature. In spite of this rapid growth the magnitude and diffi¬ culties of the problem in its general form are such that only the simplest cases have been worked out with any degree of completeness. These cases group themselves under the fol¬ lowing four types :

I. Volterra's equation of the 1st kind:

f(x) = j qK(x, t)u(t)dt;

II. Volterra's equation of the 2d kind: f(x) = u(x) + xj' K(x, t)u(t)dt;

III. Fredholm's equation of the 1st kind

/(*)

■/:

K(x, t)u(t)dt;

IV. Fredholm's equation of the 2d kind: f(x)—u(x) +7 | K(x, t)u(t)dt.

The function K(x, t) is called the kernel of the given equation (It., nucleo; Fr., noyau; Ger., Kern) ; \ is an arbitrary constant.

These types include the equations that natu¬ rally present themselves in connection with other branches of mathematics or in the solu¬ tion of physical problems. It was, in fact, from such sources that integral equations began to claim the attention of mathematicians and to press for a systematic investigation. The first attempt to solve an integral equation occurs in a memoir by Abel, published in 1823 in connec¬ tion with the following mechanical problem : To determine the arc of a curve situated in a vertical plane such that a heavy particle start¬ ing at rest from the highest point P of the arc and moving by the attraction of gravity along the curve to its lowest point O, shall make the descent in a time f(h) which is re¬ quired to be a given function of the vertical altitude h between O and P. This problem leads to the integral equation

u (y) dy

, _ Ch u (y) d

V2 */W = J0y] = :

in which 2 g is the acceleration due to gravity, approximately 32, and u(y) is the unknown

function

and y being the rectan¬

gular coordinates of a variable point on the required curve. It will be observed that Abel's

equation is of Type I, with K(h, y) = y *

Abel found the solution of this equation to be

u (y) =

V 2g d C y /W dh

yj o

7 T

dyj o V y — h

The simplest case is that in which f(h) is con¬ stant. This is the celebrated problem of the tautochrone, which may be stated as follows: To find an arc of a curve such that a heavy particle descending along it under the action of gravity shall arrive at the lowest point in the same time, from whatever point of the curve the point begins to fall. The above solution readily leads, in this case, to an in¬ verted cycloid with its vertex at the lowest point.

Abel was the first to perceive the essential character of integral equations and to make some effort to develop a method for their solu¬ tion. He applied his ideas to the more general equation

h > °

for which he obtained a solution by the aid of infinite series. This method is not regarded, however, as satisfactory and cannot therefore be considered as affording a basis for a gen¬ eral theory. In the interval between Abel's first paper and Volterra's fundamental work, several writers had occasion to solve integral equations in connection with problems of mathe¬ matical physics. In particular, Lionville (1832), who was the next after Abel to consider this subject, and who apparently was unaware of the work of his predecessor, was led to

Abel's equa¬ tion in connection with various physical prob¬ lems. He introduced the method of successive substitutions which has recently been made ap¬ plicable to much more difficult equations. The first attempt to solve an equation of the Fred¬ holm type was made by Neumann (1877) in his celebrated method for the solution of Dirichlet's problem. This consists in develop¬ ing n(x) in increasing powers of 7. But Neu¬ mann's development, while converging in the case of Dirichlet's problem, does not converge in the general case. Neumann's method was applied with success, however, by Volterra to the general equation of Type II. In a brilliant memoir published by the Swedish mathema¬ tician, Fredholm, in 1903, a general method for solving equations of types III and IV was given, thus completing, at least in outline, the theory for linear equations.

While integral equations have found their greatest usefulness in the field of applied mathe¬ matics, they are of importance also in connec¬ tion with other lines of pure mathematics, such as Theory of Functions, Calculus of Varia¬ tions and Differential Equations. In the first of these, mention has already been made of the fundamental problem of Dirichlet: To deter¬ mine the values of a harmonic function within a region bounded by a closed curve, . given the value of the function at every point of. the boundary. It is with differential equations, however, that this subject has the closest con¬ tact. In many cases a single integral equation is the equivalent of a differential equation to¬ gether with certain auxiliary equations of con¬ dition. Lionville, in 1837, solved a differential equation by means of an integral equation in order to express the desired solution in the form of a series which should converge with sufficient rapidity. In dealing with equations containing more than one independent variable, the integral equation has this advantage over

the corresponding partial differential equation, in that the extension from one variable to several variables offers no appreciable increase in difficulty in the former case, while the diffi¬ culty is seriously augmented in the latter case. There has also been developed a theory of integro-differential equations which involve not only the unknown function u(x) but its deriv¬ atives as well. These are likewise of import¬ ance in physical problems.

For a detailed exposition of the theory of integral equations, the reader is referred to the following admirable works: (An Introduction to the Study of Integral Equations, > by Bocher (Cambridge 1909) ; by Volterra (Paris 1913) ; (Elementi della teoria delle equazioni integrali lineari,* by Vivanti (Milan 1916).

J. I. Hutchinson,

Professor of Mathematics, Cornell University.

INTEGRAPHS. See Integrators. INTEGRATORS and INTEGRAPHS, instruments for ascertaining the area and mo¬ ments relative to any axis of any figure by trac¬ ing its outline. They facilitate finding displace¬ ment, moments of stability and inertia, centre of gravity, etc., of ships ; the tensile strength, re¬ sistance and safe load of beams, girders, cables and the contents of embankments, cuts, etc. The

Mechanical Integraph.

integraph plots the integral curves as the operator traces the outline of the figure. The value of the ordinate of this curve can be measured off on paper or read on a finely gradu¬ ated bar. This value multiplied by the constant of the instrument gives the area of the figure. By tracing the new curve in the manner that the outline of the figure was traced the integral curve of the next higher order is drawn by the instrument, the ordinate of which, multiplied by the constant gives the moment of the original diagram. By repeating the operation the mo¬ ment of inertia and moments of the 4th, 5th, etc., order can be found. This instrument is of great value in shipbuilding and various kinds of construction.

INTEGUMENT. See Skin.

INTELLECT, in philosophy and in psy¬ chology, the thinking principle of a mental con¬ stitution. The word is derived from the Latin intellectus, discernment by the senses, from in- tellegere or intelligere ; intellectus — a, — tim is derived from inter between and legere to gather, or to collect, or to choose ; and thus conveys the general idea of ((that which has power to choose between. In modern psychology intellect is the designation of the whole cognitive power as distinguished from feeling, sensation, volition and conation. See Psychology.

INTELLECTUALISM, in philosophy, theories which emphasize the intellect as con-

trasted with the affective and volitional aspects of consciousness. In philosophy it applies, for example, to Herbart’s doctrine of

presentations, in which cognitive experiences are made primary in the explanation of mind. The historical antithesis between sensation and intellect gives the term intcllectualism to theories which find the ultimate nature of reality in some form of thought or reason. By some reality is reduced to intellectual relations. In aesthetics the view of intellectualism regards the ideas suggested by an object as the important factors in beauty. Recent philosophic thought, however, is de¬ parting from the crass intellectualism of even a few years ago. Bergson is the greatest figure who has opposed intellectualism in our day.

INTELLIGENCE. See Intellect.

INTELLIGENCE IN ANIMALS. See

Animal, Mind in the Brute.

INTENSITY OF SENSATION. Every sensation has at least four attributes : Quality, clearness, duration and intensity. No one of these can be further defined than to say it is an aspect of immediate experience. By intensity of sensation, therefore, is meant that aspect of experience which, for example, we ascribe to tones as loud or faint, to colors as bright or dull, to pressures as heavy or light, to tastes and smells as strong or weak. It is important to distinguish between intensity of a sensation and intensity of stimulus. The latter is physical, and is always measurable by some physical unit ; the physical intensity of tones, for example, may be measured by amount of physical energy, weights by number of grams or ounces, lights by so much candle power, etc.

Intensity of sensation is partially conditioned upon intensity of stimulus. There are stimuli, however, which do not give rise to sensation ; some tones are too faint to be heard, some weights too light to be felt, some solutions too weak to arouse taste, etc. We have then, as a first problem, to determine the intensity of stimulus which will just produce a sensation. Such a determination, to be valid, must be made under rigorously controlled conditions ; the pos¬ sibilities of error on the part of the observer are so numerous that the same type of methodi¬ cal procedure is as necessary for its determina¬ tion as for the just noticeable difference. (See Discrimination, Sensible). The magnitude representing the stimulus which just arouses a sensation is known as the stimulus-limen, or RL. This may be defined as that stimulus which, in 50 per cent of a large number of observations, is reported as “present,® while in the remaining 50 per cent it is reported as “not present.® It is a calculated value ; and like the DL, it

is an ideal, a most probable value.

We may, nevertheless, think of the RL as a point somewhere on the scale of stimulus-in¬ tensity. The lower limit of this scale is zero intensity and it is, therefore, below the RL; the upper limit is infinity, since theoretically we may. gradually increase the energy of a tonal vibration, add candle power to candle power, pile gram upon gram without end. The in¬ tensity of sensation which corresponds to the RL is, on the other hand, the zero point of the scale of sensation-intensities; theoretically, the upper limit of this scale is again infinity; but practically it is subject to the capacity of the sense-organ.

We have seen that the unit of the stimulus scale is some physical unit like the gram or candle-power. What now is the unit of the sensation scale? The answer to this question is fundamental to the larger problem of mental measurement. Until- the middle of the last century philosophers had said that mental meas¬ urement was impossible because there was no unit of measurement in terms of sensation itself. Nevertheless, the astronomers had already di¬ vided the stars into six magnitudes, and it has since been found that the difference in intensity between a star of the first and one of the second magnitude is approximately equal to that be¬ tween stars of the second and third, third and fourth, fourth and fifth and fifth and sixth. Each magnitude is, then, a point on a scale, the points are equi-distant as measured by dif¬ ferences in intensity, and the difference between any two continguous points may be taken as the unit of the scale. We may say, therefore, that the difference between stars of the first and sixth magnitude is five times the difference be¬ tween the first and second magnitudes. Such a unit, which we may call a supra-liminal dif¬ ference, is, of course, an arbitrary one, but it has proved to be adequate to the measurement of intensity in nearly if not all sense depart¬ ments. A unit which gives less direct measure¬ ments but which has a greater range of appli¬ cability, because its magnitude is expressed in terms of the stimulus, is the just noticeable difference or the DL. We cannot assume off hand, to be sure, that all least differences are equal, that least steps at various parts of the scale are equal steps, but the experimental evi¬ dence is, on the whole, favorable to this assump¬ tion.

What now, it may be asked, is the relation between the two scales, the one of stimulus differences, the other of intensity differences? Do equal differences in intensity of sensation correspond with equal differences of intensity of stimulus? In seeking the answer to this problem we may employ either of our two units of sensation. We have only to determine the physical intensity of every point on the supra¬

liminal scale, and then see whether the physical differences are or are not equal to the sensation differences ; or, employing the other unit, to take a number of DL's from some portion of the scale and then compare the differences be¬ tween their magnitudes. Since these magnitudes are expressed in terms of the stimulus, the rela¬ tion of their differences will furnish an im¬ mediate answer to our question.

We find, whichever unit we employ, that the two scales do not correspond point for point, that equal differences in intensity of sensation correspond rather with relatively equal dif¬ ferences in the intensity of stimulus. Let us suppose, for example, that the points on the sensation scale form an arithmetical series like 1, 2, 3, 4, etc., then the points on the stimulus scale to which these will correspond will form a geometrical series like 2, 4, 8, 16, etc., or like 3, 9, 27, 81, etc.; the exponent of the geometrical series varies with the sense department — for noise it is 4/3, for light 101/100. This law, which is known as Weber's Law (q.v.), ex¬ plains many phenomena of everyday life which, however, are so common that they often fail to excite our notice. The relation of black print to the white page seems always the same, yet

the intensity of sunlight changes with every hour of the day; the painter is able to simulate a natural scene, yet he cannot begin to reproduce the actual intensities of light and shadow by means of his pigments; the same musical com¬ position may be rendered by orchestra and again by piano without loss of dynamic effect, yet the intensity of the former is much greater than that of the piano. All these result from the fact that the sense impressions depend not upon their absolute but upon their relative like¬ ness. Consult Delboeuf, J., Elements de psychophysique } (Paris 1883) ; Ebbinghaus, H., (Grundzuge der Psychology (Leipzig 1905) ; Fechner, G. T., (Elemente der Psychophysik> (Leipzig 1899) ; Kiilpe, O., Outlines of Psy-chologyˆ (New York 1910) ; Myers, C. S.. (Textbook of Experimental Psychology (Lon¬ don 1910) ; Nagel, W., (Handbuch der Physio¬ logic des Menschen, IIP (Braunschweig 1905) ; Titchener, E. B., Experimental Psychology, IP (New York 1905) ; (Textbook of Psychology> (New York 1910) ; Wundt, W., (Grundziige der physiologischen Psychology (Leipzig 1908).

Harry P. Weld,

Assistant Professor of Psychology , Cornell

University.

INTENT, Common, a law term: in the rules of legal construction, the natural sense given to words. It is the rule that when words are used which will bear a natural sense and an ‘artificial one, or one to be made out by argu¬ ment or inference, the natural sense shall pre¬ vail. It is simply the rule of construction and not of addition. Common intent cannot add to a sentence words which have been omitted. (2 H. Blackst. 530). – In pleading, certainty is re¬ quired; but certainty to a common intent is sufficient ; that is to say, what upon reasonable construction may be called certain, without re¬ curring to possible facts. (Co. Litt. 203-a, Dougl. 163).

INTENT, INTENTION or INTEND¬ MENT, in criminal law and in the law of evi¬ dence : the purpose; formulated design; a re¬ solve to do or forbear a particular act ; aim ; determination ; end ; object, — which a person may have. It is not synonymous with motive, attempt, or, as some think, with promise. In its literal sense, the stretching of the mind or will toward a particular object.

To render an act criminal or wrongful, in¬ tent must exist. And with this intent must be combined a wrongful act, mere intent is not punishable. And generally, perhaps always, intent and act must concur in point of time. But wrongful intent may render criminal an act otherwise lawful.

Intent is in a certain sense essential to the commission of a crime, and in some classes of cases it is necessary to show moral turpitude, but there is a class of cases where purposely doing a thing prohibited by statute may amount to an offense though the act does not involve moral wrong. When shippers pay a rate when under honest belief that it is the lawful rate when it is not, we have an instance of this.

Some jurists incline to a somewhat James- like (see Intent in psychology) interpretation of Intent, even in law. Intent <(is the exercise of intelligent will, the mind being fully aware of the nature and consequences of the act which is about to be done, and with such knowledge,

and with full liberty of action, willing and electing to do it.® Among such interpretations see Burrills (Circ. Ev. 284, and notes). To accept this method, however, appears to mean the acceptance of (

A wrong done to the person or property of another is punishable at law without considera¬ tion of the intentions of the person

committing the violence or trespass. But when an engage¬ ment has been made by person, or a written disposition of property executed, the intention of the person making the engagement or sign¬ ing the deed is fair matter for legal inquiry. In this connection a subsequent stipulation by word of mouth is not competent to nullify or modify the terms of a written engagement. In¬ tent also forms an important part in suits for defamation, fraud and negligence. Negligence must have intent to make it criminal, so must defamation and fraud and malicious mischief. Consult Thayer, Preliminary Treatise on Evi¬ dence^ (1898) ; Black, Construction and Inter¬ pretation of Laws) (1896) ; Hardcastle, Pules which govern the Construction and Effect of Statutory Law) (1900).

INTENT, or INTENT OF CON¬ SCIOUSNESS, in psychology is virtually identical with the goal of conscious endeavor at a specific moment in time. In German the word meinen is probably the nearest equivalent to our word Intent, though either Sagenwollen, or the phrase in Sinne haben might answer the purpose equally as well. French psychology employs ^intention® ; Italian, <(intento.® Modern Eng¬ lish ((Intent® may also be compared with M.E. the Fr. and O.F. ((entent,® attention, purpose. All these words, except those of German psy¬ chology mentioned above, are in ultimate origin from the Latin word (

The psychologist James employs <(intent® in a manner peculiar to his system of psychology, to designate what intelligent consciousness <(means or intends.® As stated it is not usually employed in this sense by psychologists. Its usual sense is implied in the definition given at the. beginning of this article, and this is a sense which marks a certain point of view from which one may regard an <(object.® It is almost a law, that in any conscious process having unity of interest there must also exist a corresponding unity of object. This is shown by Baldwin. Exceptions are rather apparent than real. Par¬ tial presentations, of course, come before con¬ sciousness as appearances, but as appearances, always of one and the same total object, which consciousness is endeavoring to know in its completeness. If our interest be merely attain¬ ment of . knowledge, fuller, more definite, or more vivid, the object, as it becomes more per¬ fectly known, is identical with the object as pre¬ viously less perfectly known. For it is, says Baldwin, what the mind consciously means or intends. While one's attention is constantly employed upon an object, the end pursued be¬ comes progressively defined in the process of its achievement. And in so far as such an object remains" indefinite, or partially developed in consciousness, it is an intent. The result of a

concrete mental determination, that state in which any specific process in consciousness issues and completes itself, is known as <(End- state® (the German Enzu-stand, the French etat final, and the Italian stato finale).

Bradley employs ˆcontent® in a sense anal¬ ogous to that in which intent is understood under the definition of it given at the head of this article. Content in this sense, however, is peculiar to Bradley. For as ordinarily applied, content (of consciousness) means all special modifications of conscious experience, what¬ ever may be their nature, and not merely ob¬ jects of consciousness. Pleasure or pain are thus part of the content of consciousness, but neither are always an object or an intent of consciousness.

Intent is the consciousness, obiterdicta, of the general nature of the end-state, and is men¬ tal progress toward an ideal we have successive stages of intent.

INTERCALARY (ˆcalled or proclaimed between®), the day added to February in leap- year, also the month or days occasionally in¬ serted in the calendar to make it correspond with the solar year. In botany, the term is applied to the growth of the cell-wall when a new deposition takes place in such a manner that an interposed piece of cell-wall from time to time appears. See Calendar.

INTERCESSION, Doctrine of, a theo¬ logical tenet founded on the Scriptural repre¬ sentation of Christ, who having made the re¬ demption an accomplished fact on earth as¬ cended to plead with his heavenly Father for the sinners redeemed by the shedding of His blood. We are not to suppose that God needs to be interceded with in the sense that he is reluctant to pardon sinners, or that he becomes more disposed to do so through the pleading of Christ. Since it is evident from the whole tenor of the New Testament, as well as from a multitude of special passages, that the sacri¬ fice of Christ on Calvary for the reconciling of sinners unto God was itself the offering jof God's own love to the world (John iii, 16-17), we must regard the intercessory work of Christ rather as illustrating the eternal holiness of God and the changeless love of the Saviour, and as intended to keep continually in view the sac¬ rifice of atoning grace whose tender mercy it develops. This doctrine is common alike to Catholics and Protestants. Catholics, however, believe that the Blessed Virgin and the saints intercede indirectly through the Saviour, who alone has the ear of the King of the universe. Mohammed is regarded as a powerful

inter¬ cessor by his followers.

INTERCHANGEABLE PARTS, of in¬ dustrial or military implements, are the key to all the vast expansion of modern manufactur¬ ing. Without these, only a small fraction of it. and consequently of new population human or animal, agriculture, engineering and industrial civilization in general, could have come into being. A glance at its implications will show that this seemingly extravagant proposition is sober fact.

The principle of interchangeability affects production in two ways : through the original manufacturing, and through repairing. In manufacture it makes possible the turning out. in separate departments, in vast masses at full

speed, in exact shape for immediate assembling, of all the individual parts used in great num¬ bers in complicated machines, from the screws of a watch to the rivets of a giant steamship. Without this, the different parts would re¬ quire an army of fitters to make them work with each other, and indefinitely more time for assembling, hence a much diminished produc¬ tion and higher expense. In repair, if every re¬ placed part of a watch or sewing-machine, a gun or a reaper, had to be individually filed or hammered or reforged into adjustment, the delay and expense would greatly decrease the articles' use and the work done by their means; and for military service, repair would involve so much remanufacturing on the field as to make modern warfare quite impracticable. Now, reflecting that the multiplication of men is conditioned by that of goods and employ¬ ment, of food by farms and transportation, of the latter by engineering, and so on, the conclusion above is easily substantiated.

Owing to mechanical niceties to be ex¬ plained later, the principle did not attain much close accuracy in use till toward the middle of the last century; and as might be expected, was first developed in making firearms, where masses of lives were involved and the highest of stakes to be won. The Springfield, Mass., armory was the first to bring it to a high grade of embodiment. Somewhat later, the Waltham Watch Company applied it, under much more difficult conditions, to the minute, sometimes almost microscopic, parts of its watches. The constant effort of all large implement manu¬ facturing for many years has been toward perfecting its application ; and its success largely gauges the increased use of machinery in place of men, and of mechanical utilities.

The first requisite is obviously that each part shall come within very

small limits of variation, neither stick nor <(shuck® ; the one stopping or slacking movement and increasing frictional wear and heat, the other making movement ineffective and irregular and break¬ ages likely. Or if, say, a fuse, its cavity must hold pretty closely the same amount of ex¬ plosive to determine time and goal. Hence the standards of accuracy and craftsmanship must be kept very high ; in the loner run it is most economical if worth attempting at all. Any saving on expense by slighting severe require¬ ments is more than sunk on increased cost in assembling, to say nothing of rejected work and impaired reputation.

While every step must help to ensure this uniformity, it must be frankly accepted that there is a certainty of some error in each; and the proper course is not to attempt eliminating it wholly — an impossiuie task, and beyond a certain limit costing more than it is worth, — but to determine the limits up to which it is neglectible, and hold it within them. Con¬ stant accurate measurement for those limits is therefore the basic need; and the limits them¬ selves depend on the class of work and close¬ ness of adjustment required. Thus, if a piece is to be one inch in a given dimension, with an ordinary steel scale we are sure of it within about 1/100 inch; with a micrometer, about 1/4000; on a measuring machine, about 1/100,000. The latter is not available in most small establishments; and when the standard of accuracy must be held high, the best means of

guarding against discrepancies from inde¬ pendent measurements is by the establishment of a model. All measurements are then com¬ parative instead of direct, and correct within much smaller limits of error. If this be neglected, its lack will be a constant hindrance to the high standard requisite in all the better classes of implements; and no other system so economical and reliable has yet been devised within the general reach. An example is the 36-inch bronze bar in government archives as a legal standard of length. Drawings of each part for general shop reference should also be provided, with all dimensions and tolerances clearly shown.

Next must be established the allowable de¬ viations from the model. These are controlled mainly by two factors : first, the proper func¬ tioning of the whole, — thus the largest shaft must always assemble into the smallest bearing; second, how small a variation can be main¬ tained in manufacture. This done, means of testing the accordance of

the parts with these standards must be furnished; namely, gauges representing the largest and smallest permis¬ sible size for each important dimension. An inspection organization should be carefully trained to use these, and throw out any piece not conforming to them, to save further labor on it or mischief in assembling, and prevent more of its sort being made. Such a service can retrench much useless expense; in fact, if in any large plant it does not save* far more than its cost in a year, something is very wrong.

But further uniformities than size, which gauges and drawings concern solely, are called for. Physical characteristics must conform also. This is effected by specifications dealing itemwise with strength, hardness and finish, composition of materials, and vital points to be watched most closely in course of making; and prescribing both frequency of tests (enough to establish sure accuracy) and manner of manufacture, also in detail any special treat¬ ment contingently called for, as heat treatment of steel.

Equipment to obtain results simply and in¬ expensively is a business necessity. It must be carefully suited to the special requirements of . the product, as a type of appliance very satisfactory in one class of manufacturing may be quite unfit for another.

These steps are indispensable for inter¬ changeability. _ The model should remain fixed till a new or improved design is devised. The tolerances are subject to some experimental change, but should be put on a fixed basis at the earliest feasible moment; and never altered to suit inaccuracies in manufacturing methods or other temporary convenience, as the ultimate loss outweighs the saving. The specifications of course change with new methods or materials. All these are so essen¬ tially interwoven that slighting any one makes the rest unsure, and every change should be carefully considered as to affecting the whole system. A well-balanced whole will give far more efficient results than one with some ele¬ ments much in advance of the others.

The Model. — This affords for all dimen¬ sions a direct comparison against a physical standard, the most uniform method available with the usual measuring equipment. The

whole object will be to reproduce it in quantity as closely as possible, and such reproduction should be carefully kept in mind in developing it. To aid in this, no operations on it should be performed by hand tools (as a file), because such cuts are hardest and costliest to re¬ produce. All cuts should be machining cuts.

But its development consists of far more than merely producing a piece of work as a standard for other production. Every cut taken should be governed, where possible, by some profile plate, size block, angle plate, form tool or master plate that will be available later for construction of the manufacturing equip¬ ment. This will eliminate much of the neces¬ sity for several independent settings to repro¬ duce the same sizes or shapes, ensure much greater uniformity throughout, and in the long run prove a real economy. Every step must be considered as to how it affects not only the model itself, but the reproduction of these same sizes, profiles and locations in the work¬ ing tools and equipment.

To make the model, as often done, an in¬ dependent unit merely for comparison of meas¬ urements, is a wasteful economy far over¬ balanced by increased expense of making the necessary tools. The more intricate the model, the greater the economy in liberal use of master plates, templets and all other useful special equipment. It should be very carefully kept, not handled or hit, and used only in cases of question and for verifying tools and gauges as needed. It must not be confused with the ex¬ perimental models ; the work is assumed to be past the . experimental stage. This ultimate standard is in a class by itself, and must be done by skilled craftsmen of the highest type. At present the manufacturers of firearms are the leaders in this branch.

The Tolerances, or Allowed Variations. — Several factors are involved in establishing these.. First, they must never be so great as to injure the operation of the mechanism; yet since expense of manufacturing increases very fast with severity of requirements, economy demands as large a tolerance as consistent with proper functioning. Second, those on one piece must not overlap the sizes fixed for com¬ panion parts. The extreme sizes must be compared with each other; so that, for example, the largest pin will always enter the smallest hole, the smallest never be too loose in the largest hole. Third, it must always be kept in mind that the only dimension on any part controllable within close limits is the distance between where it is supported and the surface being machined by the cutting tool. Thus the method of holding the work determines the correct locations of the dimensions; or, vice- versa, those locations determine the holding points for machining. Fourth, the accuracy of the machining facilities available determine' the actual possibilities of closeness, and hence should be carefully considered in the original design. The actual extent of tolerances will be a matter of experiment or experience. The same care should be exercised, and the same factors considered, in altering a tolerance as in establishing it.

The Drawings.— These have been used since very early times, and in many cases to¬ day are the only standards ; models not being in universal use. Even with models, they are

always an invaluable aid for shop reference; while since the invention of cheap duplicating processes such as blue-prints, photostats, etc., their frequent use is actively encouraged. They mostly show each part in detail, give all re¬ quired dimensions and usually the tolerances. (Treat care must be exercised in placing the dimensions on them. These should be shown between the points intended to hold certain relations to each other. In no case should the location of any point be given with limits from more than one point in the same straight line; otherwise the tolerances will be mislead¬ ing, as it is impossible to control the variation between more than two such points at once. W herever possible, a working point or surface should be established in each plane, and all points located from this only; much expense and confusion will be eliminated. Whenever the drawing itself does not give sufficient in¬ formation, notes should be added.

The Gauges are measuring instruments of fixed dimensions ; and where tolerances are established, show two sizes, maximum and minimum, differing by the smallest amount at¬ tainable in practice. For example, the gauge for the size of a hole would consist of two cylinders, the smaller just entering the hole and the larger not. The wear on gauges is considerable, and they should be frequently and carefully inspected; preferably by com¬ parison of measurements with a duplicate set of master gauges, themselves carefully checked against the model, and standards of the allow¬ able variations from it. Their design depends upon their purpose. Wherever possible, they should admit of ready repair or correction. It is often possible so to construct them that the parts which control the gauging sizes will re¬ ceive no wear, thus keeping the maintenance cost very low and insuring the duplication of the original sizes.

Owing to the inevitable factor of error above noted, it is impossible to make any two gauges exactly alike; and to make them within 1/100,000 inch of each other would cost a hundred times as much as within 1/10,000. With this variation, however slight, and with work going through several successive inspec¬ tions, much difficulty will be met unless proper precautions are taken. No matter how closely several sets of gauges are made to each other, after very short use a

variation develops, due to difference in amount of wear and in methods of handling them. When working to gauges, the work will always follow the gauges. The setting of a tool is not changed, a tap or a reamer is not replaced, as long as the work passes the gauges used. So if they wear ex¬ cessively and are not set right, the work gets farther and farther away from its original standard, and discovery is perhaps made by loss and discredit. The following practice, if strictly adhered to, will almost eliminate these difficulties, and reduce the entire problem to whether the combination of operator, machine and tools is suitable to produce duplicate work:

First, a set of master gauges, duplicates to the working gauges, and checked closely to whatever standard is used. These must under no circumstances be employed to gauge a piece of work; only as standards to check the work¬ ing gauges.

Second, a positive limit of error for gauges,

governed by the tolerance on the given part and the cost of the gauge; all to be inside the total tolerance allowed on the part. For ex¬ ample, a maximum plug gauge could be smaller but never larger than the master, a minimum larger but never smaller.

Third, the sets of gauges should be sorted ■ into groups, according to requirements of in¬ spection. Assuming a shop inspection and a • final inspection, three groups would be needed; one for the operators, one for shop inspectors, °ule r or . naˆ inspectors. Again assuming that the final inspectors will use two sets constantly, the shop inspectors three, and the operators four, nine sets will be in use at the same time. All gauges should be graded according to size; the two of each type closest to the masters will be sent to the final inspectors; the next three, varying a little more inside the limits, to the shop inspectors; the last four, with the greatest but still allowable variation, to the operators. Each operator should hold his work to the gauges furnished him, regardless of any variance from those of other operators.

Fourth, all gauges in use should be checked periodically against the masters, and discarded, repaired, or regraded according to condition, re¬ gardless of which job they were returned from. The frequency of this will be determined by practice, as a- capable gauge man will soon determine how many pieces a gauge will meas¬ ure in given hands without losing its size. Some can be used only on a few hundred pieces before wearing appreciably, others will measure several

thousand. Work manufactured con¬ tinuously needs a duplicate outfit. All gauges of any one type, or the duplicates of any one master, to be used during the same period, should be checked at the same time, to permit of proper grading and comparison.

Fifth, all persons who use the gauges should be carefully instructed and trained in their use.

A gauge is an expensive and comparatively delicate instrument, and a careless operator can spoil one on the first piece he gauges ; or a foreman with one in his drawer can ruin it by knocking around or mishandling. The final inspectors should set the standard of handling and use, and instruct all others as far as pos¬ sible to use them likewise.

Work must be held to slightly closer toler¬ ances than the maximum allowable, since it is impossible to work to a maximum without sometimes exceeding it; so the operator has the gauges allowing the smallest working toler¬ ances, as his normally receive the greatest amount of wear.

The Specifications. — Only on very simple or familiar mechanisms do the drawings, gauges, etc., give sufficient information for in¬ telligent manufacture. Specifications should form an integral part of the equipment. As said above, they should explain clearly and definitely the requirements and desired results, character and composition of materials, the chief functioning points and sizes, class of workmanship demanded, and any unusual manufacturing methods required; with the character and method of inspection. In fact, any information of value in the process should find here a permanent record. If any require¬ ments are unimportant, and economy is the main factor, that fact should be stated also. These specifications may be incorporated on the

drawings, if desirable and they are simple ; otherwise be kept as an independent record, and revised to keep abreast of current practice. They are as yet a rarity in general establish¬ ments, but their value and help are becoming more widely acknowledged. The best examples are in government supplies, as munitions.

The Manufacturing Equipment consists of the tools, jigs, fixtures and machines re¬ quired. A jig or fixture is a device for holding a piece in

proper position while some machin¬ ing operation is performed upon it. Each oper¬ ation usually needs a special jig. Its general type or design depends entirely upon the part to be wrought. One factor, however, remains constant, and must always be kept in mind for satisfactory results; the locating points for any operation should always be those from which the machined surface is dimensioned. A strict observance of this fundamental principle will eliminate many manufacturing difficulties.

If a model has been suitably developed, many size blocks, master plates and other valuable accessories will be available, that will not only ensure greater accuracy in the equip¬ ment and a corresponding uniformity in the product, but greatly decreased expense in equip¬ ment costs. In any event, if a model is avail¬ able, all equipment should be carefully tested to it before being forwarded to the production departments.

The Production, a general mechanical busi¬ ness, need not be dealt with ‘here ; the next step is

The Inspection. — This department has the responsibility, and should have the power, of maintaining the standards of accuracy and quality. It should be entirely independent of the production department, whose duties are in¬ compatible with its own, and too often held and performed as hostile. It must be provided with all needful testing and checking apparatus ; and its duty is to see that all work is up to the mark before passing from machine to machine, or department to department. Its detailed duties depend upon the nature of the product ; but in any case its personnel should be individuals of good judgment, intimately acquainted with the requirements, and well trained in the use of the testing facilities.

The Assembling furnishes final proof whether due attention has been paid to the factors of size; unhappily, the test for quality of material mostly lies in use, and detection of neglect comes too late. If the parts may be as¬ sembled without fitting or further machining, and the mechanism performs its functions properly, it is conclusive evidence that the dimensions have been kept true. On the other hand, if fitting or other modifications are neces¬ sary, it is equally conclusive proof that some vital factor has been overlooked, and investiga¬ tion to locate and correct the trouble should follow. In truly interchangeable work, no machining will be performed in the assembling room.

Interchangeable manufacturing requires many types of skilled workmen. As operations are simplified, the needed skill becomes less;

but a corresponding increase is required in preparation work and supervision. The basic principles remain fixed, but their application must be modified to suit particular factors of

product, class of equipment available and type of workmen employed.

Earle Buckingham,

Associate Member, American Society Mechani¬ cal Engineers.

INTERCOASTAL, or INTRACOASTAL, CANAL, The, of Louisiana and Texas, a government project in process of construction for the purpose of providing an inland water¬ way around the coast of those States, and con¬ necting the Mississippi River with the Rio Grande. An act of Congress of 3 March 1873 ordered a survey with a view to connecting the Mississippi River with the Rio Grande by cuts and canals, joining the lakes, bays, bayous and lagunas along the margin of the Gulf of Mexico. No action was taken on the report by Congress at that time. The project was re¬ vived by Texas and Louisiana interests and a new survey was authorized by the act of 3 March 1905 and the examination from the Mis¬ sissippi River at Donaldsonville, La., to the Rio Grande was made by Maj. Edgar Jadwin, of the United States Engineers. Subsequently the Donaldsonville exit was changed to Plaque- mine by reason of the locks at that place. The Mississippi-Rio Grande waterway is divided by the United States Engineers into sections as follows — each section being considered as a distinct project: Mississippi River to Bayou Teche, Bayou Teche to Mermentau River, Mermentau River to Sabine River, Port Arthur, Tex., to Galveston Bay, Galveston to Brazos River, Brazos River to Pass Cavallo, Pass Cavallo to Aransas Pass, Aransas Pass to Brazos Santiago, Brazos Santiago to the Rio Grande. The section between the Mississippi River and the Sabine River embraces practically all of southern Louisiana and lies well within the region of alluvial deposit made by the Mississippi River. It consists of wide areas of marsh, numerous cypress swamps and many lakes which are from one-half to 30 miles in length. Many bayous, having a general north and south direction, intersect and these bayous are all deep, most of them having 20 to 30 feet for miles in succession. There are no eleva¬ tions, thus making it possible to construct a tide-level canal across the entire section. Al¬ though the bayous are deep, the bays and lakes are usually shallow, ranging from 6 to 12 feet in depth. From the Sabine River to the Rio Grande the route follows mainly the lagunas, or bays, lying behind the islands which parallel the Texas mainland. The canal passes through the cypress, salt, sugar, rice, oil and pine sections of Louisiana and serves the great sulphur mines of Louisiana as well as

those of Texas at Free¬ port. These two mines, the Louisiana deposit being found at Sulphur in Calcasieu Parish, furnish practically the entire supply of sulphur to the United States. The status of the canal is as follows: Mississippi River to Mermentau River completed with a ruling depth of five feet, reached either through the locks on the Mississippi River at Plaquemine, La., to the Atchafalaya River, or through one of the pri¬ vately owned canals opposite New Orleans. Mermentau River to Sabine River, work in progress; depth, Mermentau-Calcasieu stretch, seven feet; Calcasieu-Sabine, 12 feet. Sabine River to Port Arthur and Port Sabine, 25 feet. Sabine to Galveston, approved on a depth of

nine feet. Galveston to Corpus Christi, com¬ pleted on five foot depth. Corpus Christi to Brazos Santiago, not yet undertaken. Brazos Santiago to the Rio Grande at Brownsville, Tex., work in progress. The five foot depth has a bottom width of 40 feet; the seven foot depth a bottom width of 75 «feet and the 9 and 12 foot depths have a bottom width of 100 feet.

With the completion of the canal all the markets of the Mississippi and its navigable tributaries can be reached safely and cheaply, and the communication afforded opens to the Mississippi River more than 1,000 miles of the navigable rivers of Louisiana and Texas. The commercial need of the waterway has been well established; its military value is obvious.

In the marsh areas of southern Louisiana are many so-called islands which are fertile strips of higher land in the marsh ; these are served by the waterway and railroad construc¬ tion is impractical. The best proof of the need and practicability of the canal is found in the fact that many private canals exist and are ex¬ tensively used, serving a triple purpose — trans¬ portation, irrigation and reclamation. The last feature has been greatly stimulated by the in¬ tercoastal canal, and in southern Louisiana there are more than 50 extensive reclamation districts embracing a total area of over 300,000 acres. The appropriations made by the United States thus far are in excess of $2,000,000. It is esti¬ mated that $10,000,000 more will be required to complete the work. In some sections of Louis¬ iana the local community has contributed to the cost and in all sections the rights-of-way, 300 feet in width, are furnished without cost to the United States.

INTERCOLLEGIATE ATHLETICS.

See Educational Athletics.

INTERCOLONIAL CONTROVER¬ SIES. See Boundaries of the United States.

INTERCOLONIAL RAILWAY. This railway and the Prince Edward Island Railway are owned and operated by the government of Canada as part of the government railways. They are under the charge of the Department of Railways and Canals, which is presided over by the Minister of Railways and Canals, who is a cabinet minister. The intercolonial extends through the provinces of Quebec, New Brunswick and Nova Scotia, connecting the cities of Montreal and Quebec with the cities of Saint John, Halifax and Sidney on the Atlantic Coast. Its length, including branches, is 1,562 miles.

The history of the Intercolonial is interest¬ ing, but there is space here for only a brief out line. The construction of a railway from the Atlantic Ocean to the Saint Lawrence River at Quebec, through the British provinces, was proposed in 1832. An exploratory survey from Point Levis, opposite Quebec, to Saint Andrews on the Bay of Fundy, was made, with the assistance of the British government, in 1836, and a practicable route was found, but nothing further was done at that time because of representations from the United States gov¬ ernment that part of the survevs were in ter¬ ritory claimed by the State of Maine. Other explorations were subsequently made until 1846, when the Royal Engineers, under instructions from the British government, commenced the

survey of several routes from Halifax to Que¬ bec. These surveys were completed in 1848, and the route recommended by the engineers was, generally speaking, that adopted when the Intercolonial was constructed many years after¬ ward. The surveys showed that there were sev¬ eral routes by which such a railway could be constructed, but the provinces considered that the work was too great and costly for their unaided resources; under these circumstances the greater project was laid aside for a time and each of the provinces in its own way, and independently of the others, turned its atten¬ tion to the construction of railways which were destined afterward to form parts of the Inter¬ colonial.

The province of Canada in 1849 passed an act affording assistance to railway companies by guaranteeing their bonds, and the Halifax and Quebec Railway was particularly mentioned in this act. In 1852 the Grand Trunk Railway Company was incorporated and subsidized. An¬ other company was also incorporated and sub¬ sidized, in the same

year, to build a railway from opposite Quebec to Trois Pistoles. This company was amalgamated with the Grand Trunk Railway Company, and the latter built the line from Point Levis, opposite Quebec, to Riviere du Loup, 126 miles, which was opened in 1860. The company did not build as far eastward as Trois Pistoles.

The province of New Brunswick in 1853 also commenced railway construction, and built, as a government work, a line from Saint John to Point du Chene on the Gulf of Saint Law¬ rence, 108 miles. It was opened in 1860, and was called the European and North American Railway. In 1865 the province entered into a contract for an extension of this railway east¬ ward to the boundary of Nova Scotia, and this was completed and opened in December 1870.

The province of Nova Scotia commenced in June 1854 the construction of a government railway, and in December 1858 it was opened from Halifax to Truro, 61 miles, with a branch to Windsor, 32 miles. It was called the Nova Scotia Railway. The province afterward ex¬ tended this railway from Truro to Pictou on the Gulf of Saint Lawrence, 52 miles, this ex¬ tension being opened in May 1867.

The people still desired complete railway communication between the provinces, and in 1864 and 1865 a survey was made of a route to connect Truro, Nova Scotia, with Riviere du Loup, Quebec, the link which remained to be constructed.

On 1 July 1867 the provinces of Canada, Nova Scotia and New Brunswick were, by an act of the Parliament of Great Britain, united in a confederation called the Dominion of Canada. By that act the railways already men¬ tioned, owned by the provinces of Nova Scotia and New Brunswick, became the property of the Dominion. That act also provided that an intercolonial railway connecting the river Saint Lawrence with the city of Halifax should be immediately constructed by the government of Canada ; and by another act of the same Parlia¬ ment, in the same year, the British government was authorized to guarantee the interest on a loan, not exceeding £3,000,000 sterling, to be raised by Canada, for the purpose of construct¬ ing the railway between Riviere du Loup and

Truro. These arrangements were carried out, the work of construction of the Intercolonial was commenced without delay and prosecuted

without intermission, and on 9 Nov. 1872 the division extending from Truro to Amherst, 76 miles, was opened. This division formed the connection between the Nova Scotia Railway and the European and North American Railway, and completed railway communication between Halifax and Saint John. The three railways, a total of 370 miles, were on the above date consolidated under the name of the Inter¬ colonial Railway. These three railways form¬ ing the Intercolonial had been built with a gauge of 5 feet 6 inches, and they remained that gauge until 18 June 1875, when they were changed to 4 feet 8j4 inches, the gauge in general use on this continent, and which had been adopted for the Intercolonial. Other extensions have been made from time to time, the following being the lines taken over within recent years: In 1911, the line from Ferrona Junction to Sunny Brae (Nova Scotia) was purchased (13 miles) ; in 1914, the New Bruns¬ wick and Prince Edward Island Railway (36 miles) began to be operated in connection with the Intercolonial; and in 1915, the Saint John and Quebec Railway, from Gagetown to Cen¬ terville, New Brunswick (105 miles). The Intercolonial Railway of New Brunswick, from Campbellton to Saint Leonards, New Bruns¬ wick, and the Maine border, has been operated since 1914 by the Intercolonial with the option of purchase within a five-year period. Receipts for year to 30 June 1915: Passengers, $3,947,- 891; freight $7,187,449; gross receipts, $11,259,- 710; operating expenses, $11,348,756. At 30 June 1915 the system had 411 locomotives, 500 passenger cars and 13,407 freight cars. The total cost of lines was $109,221,080.

The Intercolonial Railway was built, not as a commercial but as a political undertaking, and it has never paid, and was never expected to pay, interest on the capital investment. It has the disadvantage of having a circuitous route nearly 250 miles longer than that of the Canadian Pacific between Montreal and Saint John.

INTERCOLUMNIATION (from Lat

inter, between, columna, column), in classical architecture, refers to the clear space between two columns of a peristylos, or system of roof¬ supporting columns, though sometimes it means the distance measured at the lower parts of shafts, between their centres, and referred to in terms of diameter of a column at its base. A Roman architect and engineer, Vitruvius, a contemporary of Augustus, enumerates five varieties of intercolumniation, assigning by means of the foregoing scale of measurement, definite proportions to each. They are as follows :

1. Pycnostylos (Gr. ttvkvoq, ˆthick,® and orvAff, column, implying

thick arrangement), in which the spacing equals one diameter and a half. 2. Systylos (Gr. ow , with, and gtvPioc, column, that is, with columns harmoniously ar¬ ranged), where columns are two diameters apart. 3. Eustylos (Gr. ev, well, and orvloq column, as the derivation implies, a style pre¬ ferred, and meaning with columns a due dis¬ tance apart). Some authorities say the propor¬ tion was two diameters and a quarter; others,

two diameters and a half. 4. Diastylos (Gr. dia, through, and orvloq column, implying col¬ umns wide apart), in which the space between the columns consisted of three, or even, accord¬ ing to some authorities, of four diameters. 5. A neostylos (Gr. apaiog, wide, and arvAoc, col- • umn, implying columns sparsely ranged), that style in which the distance between the columns used is four and sometimes five diameters, — the former distance being however that to which the name is in strict usage applied. It is suited only to the Tuscan order, and the span is possible only when the epistylium or archi¬ trave is of wood. A sixth arrangement is also known, the Araeosystylos (Gr. apaiog, wide, ovv, with, gtvTioq, column), in which the inter-columniations are alternately systylos and araeo- stylos. This way of building places four col¬ umns in a space equal to eight diameters and a half. The central intercolumniation is equal to three diameters and a half, and the others on each side only half a diameter, so that coupled columns are introduced.

In the ruined remains of fine architecture which have survived down to the present time, ancient intercolumniation rarely if ever illus¬ trates the Vitruvian dimensions, which there¬ fore have, by some authorities, been regarded as arbitrary. He appears to have spoken only of Roman forms, or only of those of the Greek style, with which he became acquainted through such reports about Hellenic temples, as he had among his authorities. In the Doric examples, such as the Parthenon and the temple, of Diana Propylsea at Eleusis, the proportion is said to be one and one-quarter (1ˆ4) diameters. Tem¬ ples of the Ionic and Corinthian order resemble each other. The proportions in these are, on the whole, greater ; they average about two diameters. But it would be a mistake to over¬ look in this connection the relative proportion of height to diameter in a column, and to disre¬ gard the width of the peristyle. In one temple of the Ionic order, that of Apollo Smintheus, in Asia Minor, the peristyle is of double width, and the intercolumniation is just one and one- half diameters. To the ancients, the eustylos was the most correct as well as the most beau¬ tiful arrangement; and the author of (De Archi-tectura) preferred this proportion to that of any of the others, declaring it at one and the same time the strongest and the most

convenient. Consult Vitruvius, (De Architectura) (trans. by Morgan, Prof. Morris H., as (Vitruvius: the Ten Books on Architecture) (Cambridge, Mass., 1915).

INTERDICT, an ecclesiastical decree which forbids the performance of certain acts of pub¬ lic worship. When an interdict was laid upon a town, district or country, all the churches were closed, the bells were, silent, the sacra¬ ments, except infant baptism and extreme unction (and sometimes even these), were with¬ held, the rites of burial were not performed and all the public ceremonies of religion were suspended. Interdicts . may be. general, as ap¬ plied to a country or city; particular,- as applied to a parish or diocese; personal, as applied to a person, or some class of persons. The bishops seem to have anciently exercised the right of miblishing interdicts; for in 870 Hin.cmar, bishop of Laon in France, issued one against a parish in his diocese. One of the earliest ceil-

sures of this sort on record was imposed upon the city of Rouen in the 6th century on account of the murder of the Archbishop Pretextatus by order of Queen. Fredegonda. In 997 Gregory V laid the kingdom of France under an inter¬ dict because King Robert had married his consul, and the king was abandoned by most of his court. The same penalty was inflicted upon the kingdom of England under Stephen (1147) by Eugenius III, under John (1207) by Innocent III, under Henry VIII (1535) with little effect by Paul III and under Elizabeth (1587) by Sixtus V. Adrian IV laid Rome under an in¬ terdict for the purpose of compelling the Romans to drive out Arnold of Brescia. Greg¬ ory IX made use of the same instrument of compulsion in his quarrel with the Emperor Frederic II. During the Middle Ages the inter¬ dict was a powerful engine of attack for the popes in their contests with sovereigns, as the popular dread of its effects was so great that kings were often forced by rebellions to submit to almost any conditions in order that it might be taken off. From the time of the Reformation general and local interdicts have become rare. When Paul V laid Venice under an interdict in 1606, the churches were not closed, and only a minority of the bishops submitted to it.

INTERDICT, in Scottish law, an order issued by the Court of Session to stay or prohibit a person from an act presumed to be illegal or wrongful. It is similar to the injunction in English and American procedure. Consult Er- skine, John, (Institute of the Law of Scotland*

(Edinburgh 1773; new ed., 1898).

INTERDICTION, in Scottish law, a process for protection from imposition of persons of imbecile minds. It is similar in process and effect to the American commission in lunacy. In Louisiana and Quebec the practice is similar to that of Scotland, these states having derived their legal system from the Roman law.

INTERES.SE TERMINI, in law, the in¬ terest held by a lessee after the grant of the lease and before his actual entry. This interest has been held alienable at common law, and upon the death of the lessee it goes to his exec¬ utors. Such an interest at common law, how¬ ever, required an actual entry by the lessee to create an estate in him, but if the interest has been created by a conveyance under the Statute of Uses, the estate vests in the lessee at once without actual entry by him.

INTEREST. Interest is commonly defined as the return for the use of capital. It is made to include not only that which is paid by the borrower to the lender for the use of borrowed capital, but also that which the owner receives as a return for his own capital when he uses it in his own business. Even though the business man does not in his own thought divide his in¬ come up into parts, there seem to be excellent reasons for holding to this definition. . That which he takes out of his business as income may all look alike to him, buj if he is an econ¬ omist he will pay some attention to the sources from which different parts are derived. If he puts in all or a part of his own time in his business, he will see that a part of his income is the earnings of his own labor. His income would certainly be less if he had to hire some one else to do this work which he himself does.

If he owns a valuable building site, he will see that a part of his income is the rent of his land. His income would clearly be less if he had to rent the land from some one else. If he owns his own equipment free from debt he will see that a part of his income is interest on the capi¬ tal invested. If he had borrowed the capital and paid interest to some one else, his income would obviously be less. Again, if he owns patents, possesses trade secrets or is in any way situated so as to benefit through special advantages, he will see that a part of his income is profits. Thus, his income would be divided into four parts, wages, rent, interest and profits.

The question of the source and cause of interest has been the subject of more contro¬ versy than any other single question in eco¬ nomics. The Socialists generally follow Karl Marx who contended that interest

was the result of the cheating of the laborer, that if the laborers were paid the full value of their work there would be nothing left for the capitalist in the way of interest. Economists without exception reject this view, but they are divided among themselves as to the real explanation. Some are disposed to deny that capital is pro¬ ductive, but no one would deny that tools and equipment are useful. Since capital consists of nothing in the world except tools and equip¬ ment, capital is evidently useful. So far as any one has ever been able to explain, it is use¬ ful only in production. In short, the industrial community can produce somewhat more when it has an adequate supply of tools and equip¬ ment, that is, capital, than when it has not.

There is no industrial community to-day which could not advantageously use more cap¬ ital than it has. So long as a community needs more of anything than it has, it will be willing to pay a price for it, or a reward to the per¬ son who supplies it. This applies to capital a s well as to anything else of which a community had less than it needs.

Capital comes into existence, partly because some one spends money to buy tools and equip¬ ment. To be sure, the tools and equipment are made by labor and enterprise, but there would be no inducement to produce them unless some one were willing to buy them. When one buys tools rather than articles of consumption one may be said to postpone consumption, or to save. A farmer might, for example, buy a pleasure automobile or a farm tractor. If he decides to buy the farm tractor he postpones his enjoyment of an automobile which he may not be able to buy until the tractor has at least paid for itself. At the same time he has in¬ creased his power to produce food and that is a good thing for the rest of the community. It is better for the community that he should buy the tractor than a pleasure automobile, wliile, for a year or two, he will have less pleasure.

If the farm tractor merely paid for itself and nothing more, he will gain no advantage from its purchase. He will not be able to buy a better automobile later on than he might have bought at once. Meanwhile he will have lost a year or two of pleasure. If, however, the tractor will return him more than its cost, he will gain something by waiting to help com¬ pensate for the year or two of postponed enjoy-

ment. He may buy a better automobile, or buy something else in

addition to an automobile.

Whatever the tractor returns him over and above its cost is interest. Nothing could be further from the truth than to say that interest in this is the result of cheating laborers. The farmer conferred a benefit on the community by buying the tractor rather than the pleasure automobile and at the same time he suffered a postponement of enjoyment. If he did not earn something as a result of this operation it would be difficult to find any member of the com¬ munity who ever earned anything.

It is always advantageous to the community for any one to buy tools and equipment which are needed in production rather than articles of consumption which benefit him alone. It turns the productive energy of the community toward the making of tools and equipment rather than toward making articles of pleasure. The com¬ munity's power of production is increased in the one case and not in the other.

But the purchase of productive instruments rather than of articles of pleasure does not, in every case, involve any genuine postponement of enjoyment. In the first place, the farmer may really derive as much joy from the run¬ ning of a tractor as from the running of an automobile, though he would be a somewhat exceptional man if that were so. Nevertheless, the benefit to the community is as great as though running a tractor was irksome to him, and the community is willing to reward him as liberally. In the second place, a man may have such a large income as to be able to pur¬ chase practically everything in which he could possibly take any pleasure, and still have money enough left to invest in producers' goods, that is, in tools and equipment. In this case, his purchase of tools and equipment cannot be said to occasion any postponement of enjoy¬ ment. Nevertheless, so long as the community needs anything it is usually willing to pay for it whether it costs any sacrifice to the person who supplies it or not. This applies to capital as well as to anything else.

From the standpoint of the community, in¬ terest is paid because it is advantageous to have more capital than the community has got, in short, because capital is scarce relatively to the need for it. It is scarce primarily because men do not as a rule like to wait or to postpone enjoyment. They will postpone enjoyment if there is a prospect of more enjoyment in the future than in the present. They would rather have their articles of pleasure in the present than to have articles of production in the present unless, as a result of buying articles of production they will have larger means of enjoyment in the future. Though some waiting or buying of articles of production would

doubt¬ less be done for other reasons than the expec¬ tation of a surplus, not enough would be done to supply the community with all the capital it needs. In order to induce still further saving and purchasing of articles of production a sur¬ plus must be allowed as an inducement to those who would not save and invest for other reasons. This surplus is interest.

Thomas N. Carver.

INTEREST, as employed in psychology and pedagogy, is a term conveying at least two or three distinct ideas. The word also, in the

vulgar sense, applies loosely to what is meant by personal advantage ; as, for example, it is wto a man's interest® to obtain this or that. Etymologically, interest conveys the idea of a condition of being concerned about, or having a share in anything, in which sense also we find it used as a legal term. Perhaps its most defi¬ nite meaning is that of the psychological law of interest, the law or principle that those elements of a past experience the most effective for recall are those which at the time of the experience received the greatest share of atten¬ tion or aroused the highest degree of interest. Thus the great French psychologist, T. Ribot, uses the term. He remarks that ((the influence of emotional states must be stated as a prin¬ ciple, but not as an exclusive cause. It is summed up in what Shadworth Hodgson has called the Law of Interest.® (Psychology of the Emotions*). The word interest, derived from the Latin interesse, literally <(to go be¬ tween,® to make a difference, to concern, to be of importance, yielded in the course of a long evolution all the meanings of interest, both legal and psychological, as used in English.

Psychologically, interest may be broadly de¬ fined as the <(consciousness which accompanies mental tendencies of any sort, so far as they terminate upon mental objects or stimulate to construction of them.® (Baldwin). It is also from another point of view a phase of feeling, an intellectual feeling. It is always manifested by voluntary attention. Its opposite is the feeling of alienation and repulsion that accom¬ panies a presentation of matter that is foreign to the experience of a student, or other person. By attention one understands the ((conscious activity of the mind.® Thus psychologically, interest and attention are closely allied events. Baldwin remarks that interest may be con¬ sidered either as a stimulus or as a result of voluntary attention. Perhaps it is more pre¬ cise to say that interest and attention are the subjective and objective aspects, respectively, of the same mental activity. This amounts to say¬ ing that the effective assimilation of new ma¬ terial into the course of experience is interest

when viewed from the standpoint of the mental affections, — the emotion and personal attitude that accompany it. It is attention when viewed as the active outgoing of mental habits in grasp¬ ing and in mastering the subject matter before one. All views of the relation subsisting be¬ tween interest and attention acknowledge, at least, the intimate connection of the two; and it is precisely this connection which becomes significant in pedagogy. Like attention, inter¬ est as a state of the mind depends upon the proper balance of the old and new in experi¬ ence. Neither interest nor mental activity ap¬ pears to be the conditions of attention. Interest is either a general name for the subjective conditions of attention when ascribed to the object or it is used to designate a mood which accompanies all attention. Mental activity is really also bodily activity — a mass of sensa¬ tions that comes from the contraction of muscles in different parts of the body. The contractions result from motor innervations winch accompany attention. The interest of curiosity, the desire to know, may be defined as a primary form of interest, as distinguished from custom and habit and preference. Bald-

win regards the former as being more of the nature of a stimulation to the intellectual func¬ tion ; the latter he regards as the resultant of a frequent performance of the function. This latter aspect, he* tells us, is that which also underlies the popular use of the term in the plural, ˆinterests® meaning one's prevailing and permanent disposition.

Where the material is almost entirely novel, there is an excess of stimulation if there is interest at all. The responsive power of the mind under such conditions is not infrequently overwhelmed and confused, and as a result we have sometimes discouragement or aversion. These truths have their importance for peda¬ gogy, as well as for the psychologist. As a feeling we may well remind ourselves that interest is the feeling that something, the object of the feeling, concerns one. As the word aversion implies, on the other hand, there is in it a strong tendency of the mind to turn away and devote itself to a more congenial and rewarding object than the one which should concern it. Even when this tendency is over¬ come in part, it means divided, and conse¬ quently wasted, energy, as compared with uni¬ fied, whole-hearted activity, where interest is naturally and directly sustained. On the other hand, what is thoroughly familiar denotes the mastered, the habitual. This state of affairs awakens tendencies that work automatically and mechanically. If there is also a new factor about

which habits may play, these habitual tendencies will furnish a foundation for intense and concentrated interest. But, it is a matter of common knowledge, if there is no stimula¬ tion beyond that evoking the established habits, the result will be ennui, monqtony, routine; the effect is that of walking in a treadmill where nothing new is achieved. A certain degree of difficulty, a certain amount of obstacle to over¬ come, enough to set the problem of a readjust¬ ment of habit, is necessary for sustained interest. The self must be allowed to proceed with thoroughly awakened powers ; and this is impossible without a challenging difficulty. The fact just stated throws light upon the relation between desire, or interest, and effort, and helps to place the relation of the doctrine of interest to that of discipline. The doctrine itself is in pedagogy a sort of expression for a number of different motives. As long as a child lives in the mere present he is absorbed in his im¬ mediate concerns only. All its powers are directed and discharged upon the immediately present stimulus. There are for the child few if any ends, or conceived results, to be reached, after an intervening time, through the controlled adaptation of conditions as means. And when¬ ever there is an end it usually lies in such a near future that but little thought has to be given to the management of the intermediate conditions. The state of immediate interest characterizes the play activities. In this sense only can one look upon interest as a forrn of amusement, a stimulus through the play-instinct to induce intellectual effort. When, however, more remote ends are to be reached by con¬ sistent and sustained maintenance of a series of acts that, of themselves lack immediate interest, but, that are of interest because of their importance for the remoter end in view, we have mediate interest. Mediate interest being dependent on an idea, a purpose, a con¬

scious aim, involves an intellectual interest in a way in which the emotional element accom¬ panying direct absorption does not. The medi¬ ate interest is dependent upon the persistence of an idea, a conscious aim, — and this involves the thought of the bearing of the immediately present upon the attainment of this end. Con¬ trol of the activity and the source of interest, reside in what is conceived — a thing always physically absent when it is a thing and not in perception when non-physical. The remote¬ ness of the end in time means of course the in¬ crease in the number of difficulties to be dealt with, one after another. Therefore we may be certain that the seriousness, the depth of the interest of the self in its objective — its aim — is continually confronted with tests. Under these conditions, while physical effort will go to the means for reaching the end, the moral and the inellectual effort will be directed to sus¬ taining the idea of a

purpose in such force as to give it motive power. All the elements of apparent conflict of interest and effort, with im¬ mediate attractiveness, immediate agreeableness, immediate pleasurableness, on the side of inter¬ est, while serious and important values are all on the side of effort — is what disturbs some well-meaning educators. Hence the situation has been completely misinterpreted in theories of education, with respect to both its moral and other higher implications. In this way interest has been regarded by some as inherently un¬ worthy, objectionable as a factor; some appear to assume that it operates only as a temptation away from the objectively important. Identified thus with the attractive and swerving power of the immediately pleasurable and placed over against what reason shows to be really worth while, it has been the source of much misery to both pupil and teacher. Its logic is bad; and its results are worse. Logically, it implies that the objectively valuable end is totally devoid of interest, so that sheer effort of the will has to be relied upon as the sole motive for keeping the self in its right course — – for keeping it struggling against the seductions of interest. The previous analysis it is to be hoped will re¬ veal the fault of this conception. For in truth what sustains effort is not sheer appeal to will power, but interest in an end, an interest, both indirect, intelligent, and at times, even moral, as distinguished from that which is immediate, purely personal, emotional, sensuous. We do not mean to imply that some ends should be im¬ moral ; it is intended above to take cognizance of the fact that there is a realm of the mor¬ ally indifferent. The genuine educational need is therefore not to eliminate interest, but to foster indirect interest, the interest that is not immediate but mediate. Yet it would be well to remember that immediate interest also has its claims: it remains a fundamental trait of all aesthetic and artistic life. In either case whenever a pupil becomes intensely and sin¬ cerely interested in an end which reflection holds up, the sense of separation between means and end tends to disappear from consciousness. Consult Arnold, F., (Attention and Interest, a Study in Psychology and Education (New York 1910) ; Boggs, S. P., (Halle 1901); Dewey, J., (Interest as related to the WilP (Bloomington, Ill, 1896) ; De Garmo, C., (Interest and Educa-

tion) (New York 1902) ; Ostermann, W., in¬ terest and its Relation to Pedagogy* (Trans, by E. R. Shaw, New York 1899).

INTEREST, Relation of Capital to. See

Capital.

INTERFERENCE, in physics, a name ap¬ plied to the mutual action of “waves® of any kind upon one another, a phenomenon by which under certain condition the vibrations and their effects are increased, diminished or neutralized. A wave, obiter dicta, in the sense of the word as here employed, should convey the idea of a “forward-moving form of motion® (like waves in a wheat field), and should not convey — in a way productive of much error in the past — a notion of a “forward-moving mass of mat¬ ter.® (Consult Mach, (Popular Science Lec- tures) 1910). Motion, finally is a change of place; a transformation, changing of forms in¬ volving displacements ; a new arrangement of parts in space is the main result of motion.

As a word, interference was formed on the false analogy of such words as “difference® ; it was derived from interfere, which in the Latin original ferire conveyed the idea of a horse striking one foot or ankle against an opposite foot or ankle, while moving along. Thomas Young in Philosophical Transactions) (1801) first introduced the term and the idea under¬ lying it into optical studies, when he employed it in his Bakerian lecture on the (Theory of Light and Colours.* Since Young’s time, the idea of interference has been extended so as to describe any kind of coming together of “waves,® whether those of snow, sand, water, light, sound, heat or electricity; in short, wher¬ ever the wave-motions exhibit a collision. Inter¬ ference may be observed when two different trains of waves come together upon the surface of water or any other liquid. Where the crest of a wave belonging to one system coincides with the crest of a wave of the other system, the elevation of the water surface is sensibly equal to the sum of the heights that the separate waves would have if each existed in the same place alone. When a crest of one of the waves coincides with the trough of another, the dis¬ turbance of the water surface is reduced, and the elevation (or depression) which results is equal to the difference between the elevation of one of the component waves and the de¬ pression of the other one.

The kinds of interference that are of the greatest practical importance in physics are those which occur among sound waves or among waves, of light. The phenomena in these cases are ultimately of the same general sort as those observed upon the surface of water. A familiar result of the interference of sound waves is the production of “beats® when two or more trains of waves, having but slightly dif¬ ferent wave-length, come together while the two are moving in nearly

the same direction. This phenomenon is exhaustively treated in Helmholtz's (Sensations of Tone,* and it also receives a more or less adequate treatment in all of the better works on physics.

The more familiar of the interference phe¬ nomena that are afforded by light are those which are observed in connection with soap bubbles and with very thin olates of transparent solids. Light, upon striking the soap bubble or the thin plate, is reflected toward the eye

from both surfaces, and the trains of light waves that reach the eye from these two sources, since they have a slight difference of phase (which varies, moreoyer, from point to point of the bubble or the plate), interfere with one another so as to produce effects that are often very beautiful and striking. A soap bubble, when viewed by monochromatic light, often appears to be covered with dark striae; the dark lines being due to the fact that at the points that appear dark the two trains of light¬ waves, coming respectively from the inner and outer surfaces of the soap bubble, nearly or completely neutralize each other. When the bubble is viewed by white light, we do not commonly see the dark striae, their places being taken by bands of color. This is because the different colors that compose white light have different wave-lengths, so that at any given point in the bubble only a portion of the colors are destroyed by interference, leaving the re¬ maining constituents of the white light to pro¬ duce their full chromatic effect upon the eye. For further information consult Cornish, V., (Waves of the Sea and other Water Waves) ; the same author's (Waves of Sand and Snow) (both Chicago 1915) ; Michelson, (Light Waves and their uses) (Chicago 1903) ; the book of Helmholtz, mentioned; Herz, H., (Electrical

Waves) (New York 1915), whose experiments laid the foundation of wireless telegraphy.

INTERIM, in the history of the Reforma¬ tion, the name of several compromises forced on the German Protestants by edicts of Charles V, especially that of 1548, regulating religious and ecclesiastical matters "in the meantime,® till they could be decided by a general council. The Ratishon Interim was drawn up in 1541 by a commission which included Eck, Bucer, Pflug, Gropper, Pistorius and Melanchthon. Many doctrinal points were smoothed over, but the differences in regard to the ecclesiastical power and the sacraments were too great to be reconciled. By the Protestants in general, the whole movement was looked on as a scheme to entrap them into a formal return to the Roman Church. In 1548 at Augsburg the emperor ap¬ pointed Agricola, Helding and Pflug to prepare a new interim. It conceded to

the Reformers communion in both kinds, and the marriage of priests. Great opposition developed in North Germany and the pact was revoked in 1552. Elector Maurice of Saxony secured the adop¬ tion of the Leipzig Interim in 1548, according to which the Protestant creed remained intact, with an admixture of the old ceremonial; the papal and episcopal powers were also recog¬ nized to a limited extent. This compact failed to reconcile a great number of the Reformers, and it was the cause of division among them. Consult Lindsay, T. M., (History of the Ref¬ ormatioˆ fVol. I, New York 1906-07).

INTERIOR, Department of the, one of

the executive departments of the United States government whose heads are cabinet secretaries. The “home department.® long existent in all European governments, was constituted in the United States by act of 3 March 1849. Its functions had been exercised by bureaus or officials of nearly all the other departments : patents, copyrights, public documents and the census belonged to the State Department ; pub¬ lic lands, mines and judicial accounts, to the

lreasury; Indian affairs, to the War Depart¬ ment; and pensions to the War and Navy, each for its own pensioners. By later laws the In¬ terior was given charge of education, public surveys (including the Geological Survey; but the Coast and Geodetic Survey belongs to the l reasury), subsidized railroads, Territories, na¬ tional parks and reservations, returns of public contracts made by several other departments, some charitable institutions .in the District of Columbia, and a number of other matters. The Secretary makes an annual report of the num¬ ber of public documents received and dis¬ tributed. He has a salary of $10,000 and two assistant secretaries. All patents issued by the United States must be signed by him. The first Secretary was Thomas Ewing of Ohio. The list of secretaries since 1900 is Ethan A. Hitch¬ cock of Missouri, James R., Garfield of Ohio, Richard A. Ballinger of Washington, Walter A. Fisher of Illinois and Franklin K. Lane of California. Besides the assistant secretaries and chief clerks, the Department of the Interior includes among its officials commissioners of Land Office, Pensions, Education, Indian Affairs, Patents, and directors of the Geological Sur¬ vey, Reclamation Service and Bureau of Mines. In the annual report for 1915 the Secretary of the Interior calls attention to what he terms the ˆfoundations of power® of the United States. The country possesses every mineral of

importance needed in industry, and is the only country so fortunate. We produce 66 per cent of the world's petroleum, 60 of copper, 40 of coal and iron and 32 of lead and zinc. We can build a battleship or an automobile (ex¬ cepting the rubber tires), a railroad, or a fac¬ tory with the products of American mines and forests. To feed the soil we have plenty of phosphorus, some potash, and have learned to extract nitrogen from the air, having cheap hydro-electric power in abundance. We can produce all the grains, fruits, vegetables and fibres known to the temperate zone, and many tropical plants. And we have unlimited water power, besides two hundred and odd million acres of public lands ; if we add Alaska, that is 400,000,000 more acres. We issue 200 patents a day to American inventors; of important patents granted by the United States since 1875, three-quarters are to American citizens. The great American desert, as we used to call it, is disappearing under the wise system that utilizes the money received from sale of public lands for irrigation works to reclaim the dry areas. The Secretary thinks the largest task awaiting our government is the proper dyking, damming and utilization of our rivers.

INTERIOR BALLISTICS. See Gunnery.

INTERIOR BOUNDARIES. See Bound¬ aries of the United States.

INTERIOR DECORATION. Under the general designation of interior decoration are included all the various applications of the Decorative Art (q.v.) to the adornment of the interiors of buildings. The subject com¬ prises monumental interior decoration, which is largely architectural and has to do with the decorative treatment of the floors, walls and ceilings of important buildings; and domestic interior decoration, which has to do with the furnishings as well as the architectural treat¬ ment of rooms and halls in private residences.

The decoration of hotels and clubs occupies a position intermediate between the two divisions, partaking of one or the other character accord¬ ing to the architectural importance of the build¬ ing. In the first division we are chiefly con¬ cerned with the architectural design of the interior, with columns, arches, pilasters,- en¬ tablatures, moldings, niches, vaults, domes, ceilings, wainscoting, panelings and pavements ; with the arts of mural painting, decorative sculpture and carving, mosaic and inlay, and stained glass. In the second division these ar¬ chitectural elements are less conspicuous and there enter considerations of furniture, carpets, rugs, tapestries, hangings and wall-papers, and of the comfort and manner of life of the dwellers in the house. The fundamental prin¬ ciples of art are the same in both divisions, but the applications are widely different.

Monumental Interior Decoration; Methods and Resources. — In order to make the interior of a great building — as a hall, church or theatre — decoratively pleasing, the artist may employ the resources of pure form or of color, or of both together, as is most often the case. Anyone who has seen the interior of Grant's tomb at New York realizes that its decoration is wholly one of form; of architectural features and paneling, executed for the most part in white plaster. At the other extreme is the Sistine Chapel of the Vatican at Rome; an in¬ terior almost absolutely devoid of architectural embellishment, made glorious by the decorative painting of its walls and ceilings by the great¬ est artists of the Renaissance. But in general, form and color are combined, as in the great basilica of Saint Peter, near by; in the superb Camera della Segnatura by Raphael in the Vatican; or, to take a modern instance, in the gorgeous staircase hall of the Opera in Paris. Fergusson in his (History of Modern Archi- tecture) (Introduction, p. 15) draws an in¬ teresting comparison between the interiors of the Sistine Chapel and of King's College Chapel at Cambridge. The last named depends chiefly for effect on the richness of its structural and architectural features, the former on its in¬ comparable frescoes. Which is the higher and nobler sort of decoration? The answer will vary, according to the taste and point of view of the answerer, and still more according to the quality and success of the artist's performance with one or the other method. Fergusson con¬ siders the Sistine Chapel as exemplifying the ' higher type of decoration, but objects to figure¬ painting on the horizontal parts of ceilings. The Arena Chapel at Padua, painted by Giotto (q.v.), he considers superior in method to the Sistine, however inferior in performance and technic of painting. One element in our judg¬ ment of the two systems must inevitably be that of the more sustained, varied and intel¬ lectual interest inspired by noble mural paint¬ ings as compared with richness of architectural detail. The content of mere architectural de¬ tail is soon apprehended, owing to its depend¬ ence on repetition of similar forms, and its novelty of interest is therefore soon exhausted. See Mural Painting.

The resources of interior decoration of a monumental character are, then, first of all architectural forms or (collectively) member- ing; secondly, carving and sculpture ; thirdly, the use of fine or semi-precious materials of

rich natural color, such as marble, porphyry, onyx, highly polished

woods and the like ; fourthly, the applied arts of inlay and mosaic and the kindred art of stained glass; and fifthly, mural painting, which includes the painting of ceilings and vaults and ranges from the sim¬ plest harmonies of flat coloring on the various surfaces, through all varieties of painted or¬ nament to the highest forms of allegorical, symbolic and historic painting. To these re¬ sources should be added the decorative treat¬ ment of the accessories and fixed furniture of the building, such as grilles and gates and rail¬ ings in metal, pulpits, choir-screens and sedilia in stone and marble and wood, and other like essential features of the interior equipment. All these resources may be called into service in a single interior to produce almost over¬ whelming effects of richness and splendor, as in the original state of the church of the Divine Wisdom (Hagia Sophia, now the mosque of Aya Sofia) at Constantinople, built in the 6th century ; contemporary descriptions of this in¬ terior, in prose and in verse, exhaust the re¬ sources of language in the effort to portray the glories of that marvelous edifice. The interior of the Camera della Segnatura at Rome, men¬ tioned above; of the cathedral of Sienna; of Saint Mark's at Venice; of the Taj Mahal (q.v.) at Agra (India) and of some of the Mogul palaces of that country; of certain halls in the Alhambra at Granada (Spain) ; of the staircase hall and foyer of the Opera at Paris ; of the Pantheon and parts of the Hotel de Ville of that city; of the Public Library at Bos¬ ton, Mass., and of the Congressional Library at Washington, D. C., illustrate in varying ways and degrees such combinations of architecture and the applied arts respectively in mediaeval, Reniassance and modern times.

Historical Survey; Pre-classic Decoration. — Certain caves in France and Spain have pre¬ served to us the remarkable efforts of primitive man to adorn these interiors with paintings of animals. (See Aboriginal Art). These date back probably to an antiquity of at least 25,000 years. Then follows a hiatus of many millen¬ niums preceding the earliest extant Egyptian interiors of tombs and temples, with which his¬ toric art in interior decoration may be said to begin. In the temples the solemnity of pillared hypostyle halls and of the sanctuaries was re¬ lieved and enriched by pictures and bands of hieroglyphics, cut into the stone in. outline or carved in low relief, and painted in brilliant colors. The pictures represent gods and kings, sacrifices and sacred vultures, with conventional . ornament executed in the same wray. The walls of the tombs were adorned with scenes from real life, sometimes painted on plaster, some¬ times cut in low relief on the stone (Tomb of Perneb in the Metropolitan Museum, New York). As ancient as some of these Egyptian works are the remarkable paintings of walls in Crete, especially at Knossos ; while somewhat

later in date (9th to 6th century b.c.) are the decorations in the palaces of the Assyrian kings. Low relief pictures on alabaster or limestone slabs formed a high wainscot in the halls of these palaces ; above were probably borders in encaustic tile and tapestries or other hangings. In places even the pavements were of alabaster carved with ornaments in low relief.

The Classic Period. — Of the Greek interiors almost nothing has survived to our time ; all the “restorations” shown in books and models arc conjectural. We. know from literary sources that mural painting was practised; the Stoa Poikile at Athens was a public colonnade whose wall behind the columns was covered with such paintings. At Olympia there was found a beautiful fragment of decorative pave¬ ment executed in hard stucco in black and white. Since color was freely used on the ex¬ teriors of temples it is probable that the interior columns and walls were painted and the wooden ceilings richly painted and gilded, per¬ haps paneled somewhat like the stone ceilings of the exterior colonnade or pteroma.

It wras the Romans who, of all antique peoples, developed interior decoration to its greatest splendor by recourse to. new methods and materials and processes. The Roman dec¬ orative system was that of a dress or sheathing or facing of fine material applied to a massive core-construction of coarser materials, such as rubble, concrete or brick. This was faced with stucco, or sheathed with marble and adorned with columns, niches, recessed arches, moldings, entablatures and panels, for which provision was made in the more massive primary con¬ struction. Columns were of polished granite, porphyry or marble ; capitals and entablatures were richly carved; there was much ornament of stucco molded in relief and brilliantly painted, and ceilings and vaults were deeply paneled, with rich ornaments in relief painted and in parts gilded. The lower parts of the walls were wainscoted with precious marbles, and the floors were of marble in patterns of various colors or in mosaic of opus Grecanicurn. (See Mosaic). The vastness of the Roman in¬ teriors of temples, baths and basilicas unem- cumbered by columns, and the majesty of their lofty vaulted ceilings, produced effects of in¬ ternal grandeur never before dreamed of, which were greatly enhanced by the splendor of the materials employed. The Pantheon re¬ mains to-day a marvelous example of this splendor, though deprived of the former en¬ richments of its majestic paneled dome. The brilliant wall paintings of Pompeii (q.v.), the Pompeiian and Roman painted reliefs in stucco, and many Roman mosaic floors, preserve for us examples of Roman interior decoration of a less monumental sort.

The Mediaeval Styles. — With the fall of

Rome, the leadership in the arts passed to Con¬ stantinople, where the Byzantine style rapidly developed in the 6th century to its culmination in Hagia Sophia, the church of the Divine Wisdom. It was pre-eminently a style of in¬ terior decoration, not of external splendor. De¬ riving from Roman precedents the system of massive vaulted construction with surface fac¬ ing of marble sheathing and applied decoration, it introduced two new and transcendently im¬ portant elements — the dome on pendentives and the use of pictorial and ornamental mosaic in brilliant colors on a gold ground, to cover all vaulted surfaces. Fine surface-incised carv¬ ing was used sparingly and effectively, but the main effect was of rich and harmoniously-blended colors upon every visible surface. Fresco-painting (see Fresco) was employed in some cases instead of mosaic on walls and vaults, at least in the later churches. The

Byzantine mosaic-workers and other artists found wide employment in Italy, and when in 1047 the Venetians set about the reconstruc¬ tion of the church of Saint Mark, it was built upon the model of the church of the Apostles at Constantinoole, largely by artificers from that city. Though much smaller than Hagia Sophia, and though some of its mosaics are of a much later age than the 11th century, it is to-day one of the richest and most splendid in¬ teriors in the world. Of much earlier date are the two basilicas of San Apollinare at Ravenna (6th century) with fine mosaics, those of San Apollinare Nuovo being particularly impressive. The baptistery of the Orthodox and the domical church of San Vitale at Ravenna also offer striking examples of Byzantine interior decora¬ tion in marble and mosaic.

The Romanesque period in western Europe, ‘ from the 8th to the mid-12th century, produced little of importance in interior decoration ex¬ cept in Venice as just noted, and in Sicily where a blending of Oriental and Byzantine in¬ fluences has left to the world a number of re¬ markably beautiful and impressive interiors in churches and chapels at Palermo and in the neighboring cathedral of Monreale. The pave¬ ments of these are patterned in colored marble, the walls wainscoted with marble crested with Arabic patterns, the walls and domes and apses glow with impressive symbolic pictures in mosaic, and the timber ceilings were painted in brilliant colors The baptistery of Florence (10th century) and the neighboring church of San Miniato

are exceptions to the general rule of severity of interior effect of the Roman¬ esque architecture.

For the remarkable styles of interior decora¬ tion of the Arabs, Moors and other Mo¬ hammedan peoples — styles in which pictorial representation and sculpture were excluded by religious prejudice and geometric and conven¬ tional ornament in brilliant colors in plaster, tiles and inlay developed to their utmost splen¬ dor during the Middle Ages, see Mohamme¬ dan Art.

With the development of Gothic architec¬ ture, first in France, later in northern and cen¬ tral Europe, and finally in Italy, wholly new resources were brought to the service of in¬ terior decoration. Structural forms were mul¬ tiplied and enriched, to enhance the decorative effect of the lofty vaulted naves and aisles. To the splendor of clustered shafts, grouped moldings, carved capitals, molded vaulting-ribs and intricate traceries were added symbolic sculptures and grotesques, and color was intro¬ duced in the blazing glory of the stained glass windows. To a . limited extent also painting was resorted to in certain parts of the archi¬ tecture and even of the sculpture, ar> decora¬ tive pavement-tiles in browns, blacks, dark reds and yellows were used with discretion .on the floors of choirs and chapels ; but the chief color effects were in the windows, whose bril¬ liant hues tended to kill the soberer tones of painted walls and moldings. Mosaic and marble were not favored outside of Italy, and the vaults were seldom painted at. all. The English interiors, less lofty and majestic than the French, were on the other hand far richer in decoration, with multiplied complexities of shafting in black Purbeck marble, finer and more numerous moldings, and, above all, mag¬

nificent vaults in complex patterns of vault- ribs. In Italy, in contrast with western and northern Europe, the mediaeval builders of the Gothic period depended upon color rather than architectural membering for interior effect. They often painted both the walls and the vaults ; splendid inlays of black, red and white marble adorned the floors; mosaic was fre¬ quently applied to restricted places or features, and the fixed furniture was of great decorative magnificence. Stained glass, however, was not much used ; the Italian windows were small and far apart, and offered no such field for blazing transparent color as the clear stories and aisle windows of the North. The 14th century wit¬ nessed the culmination of this Italian mediaeval art, above all in Florence, Assisii, Padua and Sienna. The mural paintings of the chapels and cloisters of Santa Croce and Santa Maria Novella at Florence, and the works of Giotto and his followers in Florence, Assisi and Padua are unsurpassed for pure decorative propriety and richness.

(See Giotto; Mural Paint¬ ing). The Upper and Lower church of San Francesco at Assisi offers the most com¬ plete and perfect example of consummate in¬ terior decoration effected solely by the brush of the painter without any aid from architec¬ tural embellishments, to be found anywhere, with the sole exception of the Sistine Chapel of the Vatican at Rome.

Renaissance Decoration. — The Renais¬ sance ushered in a new age and a new spirit in art. Not only were the fine arts thence¬ forward no longer confined almost exclusively to the service of the Church, but they were also transformed by two influences — a new and enthusiastic study of nature in all its aspects, leading to a new realism previously unsought ; and a new inspiration from the arts and culture of antiquity. There was great increase of pri¬ vate luxury, and a marvelous broadening of the scope of painting and sculpture as well as architecture. Palaces were made as splendid as churches, and churches were adorned with new splendors in marble, stucco, painting and gild¬ ing. The dome became the dominant internal feature in church design, and often received a specially rich decoration of paneling and paint¬ ing or mosaic. Delicate relief-ornamentation in stucco was combined with color, after ancient Roman models. Mural painting reached its highest development. Ceilings, whether vaulted or horizontal, were treated with esoecial mag¬ nificence, with rich paneling or painting or both combined. Rome especially abounds in splendid examples of this consummate art of the 16th century, as in the Loggie (arcades) of the Vatican, the Camere or Stanze (apartments) of that palace, the Villa Madama, and of course the incomparable Sistine Chapel. The vaults and dome of Saint Peter's and many other ceilings are noteworthy; while in Venice the walls and ceilings of the hall of the Great Council and of many other superb rooms dis¬ play the master works of Titian, Tintoretto, Paul Veronese, Palma the Younger and others of the Venetian masters of oil painting. (See article Painting). With the close of the 16th century and throughout the 1 7th, decorative art declined — not in splendor but in taste. The love of display, the toleration of sham, the abuse of stucco, of gilding and of strong-colored marbles, and the introduction of theatrical and attitudi-

nizing sculpture, led to great extravagance and excesses of effect, destructive of real dignity and solemnity. Much of the interior decoration in Saint Peter's and nearly all that in the Jesuit churches of

the 17th and 18th centuries, both in and out of Italy, is of this meretricious character. In Germany this “Baroque® style of interior decoration was especially riotous and uncontrolled by architectural propriety, though often amazingly clever and effective. In France the Renaissance style, introduced by Italian artists at first, ran a somewhat similar course, but never reached the extremes of artistic extravagance noted in Italy and Ger¬ many. Church interiors were much more severe, more sparing in applied decoration, and retained much more of structural expression and truthfulness. French palace decoration re¬ ceived under Louis XIV and XV a peculiar progressive development, making much use of white and gold, and of delicate though increas¬ ingly fantastic and capricious detail, as will be later noted. Under Louis XVI and under Napoleon (((First Empire®) the tendency to¬ ward fantastic originality of detail was reversed, and interior decoration became more and more classic, restrained and finally severe.

The 19th century witnessed the almost total eclipse of true and sincere work in interior decoration, as in all the arts, for at least the first half of its course. Under Napoleon III (“Second Empire®) there began in France a notable revival of all the arts, and, partly through French influence, this revival gradually made its appearance in other countries. The progress of archaeology, the development of machine-manufacture, the immense expansion of commerce and industry, all tended, however, to lead artists astray and to hamper the de¬ velopment of original creation. On the other hand, the multiplication of schools of art and of museums and the growth of wealth and taste have given the arts a new stimulus and new opportunities. Among notable interiors of the last century in Europe may be mentioned in London the Houses of Parliament and the mosaics of Saint Paul’s Cathedral, in Paris, the stair hall and foyer of the Opera, the stair hall and Salle des Fetes of the Hotel de Ville, and the mural paintings in the Pantheon. Examples in the United States will be noted later.

Present-Day Monumental Interior Deco¬ ration. — Outside of the United States, which form the subject of a separate section of this article, interior decoration has followed the general movement of modern art since 1900. As to style, two distinct currents are observable ; one conservative and classic, tending to the revival or imitation and development of old- time traditions; the other, revolutionary and romantic, seeking new forms and methods of expression and striving to break away from tra¬ dition. These currents are equally discernible in architectural decoration and in decorative painting, and appear in the interior decoration of all the European countries in varying de¬ grees. The decorators of the first group are

subdivided broadly into the classicists and the medievalists, according as thev seek to repro¬ duce the decorative effects of Greek or Roman types on the one hand or of Byzantine. Roman¬ esque or Gothic art on the other. The multi¬ plication of books, prints and photographs of

historic art, the ease of modern travel and the greatly increased mechanical and material re¬ sources of our time have made such revival and imitation perfectly practicable and even rational. The practice in the best work is not to copy, but to design upon the basis of a thorough mastery of the principles and methods of . the historic styles. The decorators o' the second group, while they must of necessity start with something of the knowledge and experience accumulated by the centuries, consciously strive to avoid any suggestion of the forms, combina¬ tions and types of the past, and to devise in their place new and original media and forms of artistic expression. The movement of which their efforts are the result began in Paris near the end of the last century, and made a sensa¬ tional appeal to the world-public in the great exhibition of 1900. It has been variously called "Art Nouveau® (New Art), "Moderne Kunst® (Modern Art) and "The Secession,® and has been carried to the furthest extremes in Germany and Austria, especially in Bohemia. But its most not¬ able productions have been rather in do¬ mestic interiors and the minor arts than in monumental interiors, and these for the most part in hotels, restaurants, theatres and other places of amusement rather than in churches and the more stately works of interior design.

Modern ecclesiastical interior decoration has generally followed, more or less closely, the traditional styles of the past ; either the Gothic (or less frequently the Byzantine or the Romanesque), or the Italian Renaissance. Mural painting is less often depended upon than architectural enrichment and conventional ornament, the richest decoration being bestowed upon the chancel or choir or "Sanctuary® of the church.

Domestic Interior Decoration. — The pur¬ pose of the interior decoration of a dwell¬ ing is to effect a harmonious combination of form and color not only in the architecture of each room and hall, but also in its furnish¬ ings and accessories, with due reference to the size and scale of the house, and to tlie comfort, convenience and tastes of the occupants. The house as a whole must present a harmony of effect, and each room must present a pleasing harmony within itself. The house- interior differs from the 'interior of a great hall, church or theatre not only in its much smaller scale, which brings every feature of its decoration within a few feet of the spectator's eye, but also in its

more intimate and personal character. The interior of a church or great public building, moreover, is designed to impress and clease a miscel¬ laneous public, no member of which occupies it for more than a few hours at a time ; and it must be decorated in a manner looking to permanence, in a style which will not soon lose its public appeal. In the house, on the other hand, quite other conditions must be met. The house is to be lived in ; its decoration must be the constant companion and environment of its occupants. These, moreover, are a family, for whose personal pleasure the decoration is designed, and their personal tastes must of necessity control the design. With a change of occupancy, all too frequent in our modern shift¬ ing society, it is lilcelv that much or all of the decoration will be changed. Hence domestic

interior decoration is at once more personal and less permanent than the greater art of monu¬ mental decoration.

House decoration is in all countries subject to divers influences. There are in the first place the architects, who in designing the residence not only shape its plan, construction and ex¬ terior, but also give to certain parts of its in¬ terior a definite architectural character by the treatment of walls and ceilings, window-trim and door-trim, wainscots, chimney-pieces and cornices. Generally their work stops there, and the householder calls in a ˆdecorator® to make the empty architectural shell more ornate and more habitable. The decorator directs the painting and gilding of certain parts, devises a color-scheme for each room and selects fur¬ niture and draperies, rugs and tapestries to complete the scheme. The owner may or may not have a voice in the production of the ensemble. He may be himself an art con¬ noisseur, possessing fine furniture, rugs, hang¬ ings, bronzes and bric-a-brac which the deco¬ rator must work into his scheme. Or he may be a nouveau-riche with plenty of money and no artistic training, in which case he gives the decorator a free hand. It is largely to this latter sort of householders that we owe the rise of a large class of commercial decorating concerns, which take contracts fcr the entire decoration of a great house ; and also of another large class of individual decorators who combine a keen sense of commercial ad¬ vantage and acquaintance with market costs, with just enough artistic knowledge to impress their clients. It is rarely that a discriminating client, distrustful of his own taste and judg¬ ment, has the courage to call in a truly great artist to beautify his house. Such an artist may

generally be trusted to seek his client's inter¬ est, to work in sympathy with his particular problem and to subordinate questions of mere personal gain to the higher artistic ends of his work. If the house be one of great archi¬ tectural importance, he will work in conjunc¬ tion with the architect. It is always desirable to establish some such collaboration at the very outset of any important architectural undertak¬ ing, whether public or private. The only hope of suppressing the charlatanism and the com¬ mercialism that infest the practice of house- decoration to-day lies in the gradual raising of the popular standards of taste. In this respect there has been undoubted progress in the last 20 years and further progress may be looked for in the future. The greatest enemy of good taste in the home is in all countries the love of luxury and display, and the constant desire to imitate the splendors of houses more costly than one's own. The passion for "period®

rooms — that is, for rooms each decorated in the fashion and style of some bygone art- period — is evidence of a common misdirection of taste ; it is an affectation which, it is true, may in competent hands produce highly artistic results ; but it more often converts the. home into a sort of museum of imitations. Simplic¬ ity and restraint are too often sacrificed to dis¬ play; but there is observable in the best do¬ mestic interiors of our time, both in this, coun¬ try and abroad, an increasing recognition of the value of simplicity, of quiet dignity and of that harmony of form and color which gives the impression of restful domesticity.

The "periods® most frequently employed in elaborate house interiors are four from the French Renaissance and four from the English Renaissance. The Louis Quatorze style is that which was developed under Louis XIV (1643- 1710) in the palaces of Fontainebleau and Versailles and in the many sumptuous resi¬ dences of the nobility of France. White and gold predominate; the walls are paneled in gilt

framing-moldings; a richly ornamented coving, with or without a bracket-cornice, frames the ceiling; the doors and wainscot in rectangular paneling are adorned with delicate painted ornaments. The marble fireplace supports a huge mirror in a sumptuous gilded frame. The seat-furniture of gilded wood is upholstered with specially woven tapestries, and the cabi¬ nets, tables, etc., are of mahogany or other dark wood inlaid with brass and tortoise-shell orna¬ ments. The tapestries, curtains and hangings are of richly patterned materials of formal design. In the Louis Quinze style (under Louis XV, 1715-74) all rectangular and formal lines disappear; curves predominate in all panels, in the chimney-pieces and in all the lines of the furniture.

Paintings of Cupids and of pastoral scenes occupy panels in covings and sometimes on walls, and the ornaments are of shells, scrolls and foliage of singularly ragged and contorted forms, yet (in the best examples) so delicate in execution and so playful in line as frequently to disarm criticism. The style, wholly lacks structural expression and dignified restraint, but lends itself to the intimacy of a lady's boudoir or the abandon of a ballroom. The style of Louis Seize (Louis XVI, 1774-89) represents a reaction from these extravagances. The swaying curves disappear, structural pro¬ priety reasserts its claims ; a delicately-refined severity of line is observed. Nearly all the furniture is of gilded wood with specially- woven upholstery, the gilded brasswork trim of the larger furniture is almost Greek in its purity of detail, and wreaths of flowers replace the restless foliage and scrolls of the preceding style. The Empire style followed, with dark, almost sombre draperies and massive furniture of dark wood, built on Roman lines.

The two earlier English periods — the Elizabethian and Jacobean are not always easy to distinguish. Both employ high wainscoting in wood, flat relief "strapwork,® open work wooden balustrades, flat plaster ceilings with "all-over® paneling and ornaments in relief. But the Jacobean has none of the Gothic reminiscences that are met with in the Eliza¬ bethan; it employs pilasters and other classic details and especially the gaine or sheath-shaped pilaster, and the Jacobean chimney-pieces and furniture are more elaborate than the Eliza¬ bethan. The Georgian styles are those various phases of the English classic Renaissance which were outgrowths of the Italian rajladian in¬ fluence of Inigo Jones, Wren and Gibbs; they are specially notable for a certain sober dignity

and formality of detail, with richly carved woodwork, and constitute the parent style of our own Colonial. The Adam style, named from the Adam brothers, Robert and James, belonged to the closing period of the 18th cen¬ tury, and is the counterpart of the French Louis Seize ; notable for delicate detail particularly in the plaster work and furniture.

Interior Decoration in the United States.

— During the Colonial and early Republican periods the interior decoration of our few public buildings followed Georgian and Adam

precedents, depending almost wholly on painted wood and white plaster. There was almost no color employed, and we possessed no mural artists capable of monumental decorative paint¬ ing. There followed in the 30's and 40's a period of Greek revival, producing cold but dignified interior effects in some cases, but al¬ ways without the aid of color. The earliest efforts at decorative color in public buildings seem to have been in New Orleans, where a nephew of Canova adorned the rotunda of the Hotel Saint Louis with colored panels and medallions in painted stucco-relief, and a French artist decorated the Opera House in rather staring colors which still remain. Shortly after this Brumidi, a second-rate Italian mural painter, with an assistant, Castigini, was employed in 1855 to decorate the drum and dome of the National Capitol with allegorical paintings, and continued to labor on this com¬ mission until 'his death in 1880. But the real beginnings of American decorative painting date from 1876, when the late John La Farge was entrusted with the interior decoration of Trinity Church in Boston, then approaching comple¬ tion under the direction of its chief architect, Mr. H. H. Richardson. La Farge's work con¬ sisted in the designing of the entire color- scheme of the interior, including the flat color¬ ing and the conventional ornament, as well as the mural paintings of religious subjects. Assem¬ bling a small corps of enthusiastic young artists

— many of them since then famous — all inex¬ perienced like himself in such work, and com¬ pelled to work in a hurry under every possible embarrassment, he achieved a triumphantly suc¬ cessful result, which profoundly influenced decorative art in America. His groups of (Christ and the Woman of Samaria > and (Christ and Nicodemus) are notable works, and launched him on a career that placed him at the head of American decorative painters. His <(Ascension® in New York (church of the As¬ cension) ; his other religious paintings and some magnificent windows in various churches (among these windows being three in the Saint Paul's Chapel of Columbia University), and his allegorical paintings in the Capitol at Minne¬ apolis and Court House at Baltimore, are all works of great artistic value in themselves, not merely as pictures, but as truly decorative ele¬ ments in the interiors they adorn. Meanwhile (about 1874) the late William Morris Hunt had painted directly on the walls of the Assembly Chamber of the Capitol at Albany two vast and impressive allegories — (The Discovered and

During th? period 1876 to 1886, the artistic awakening started by the influence of the Cen¬ tennial Exhibition at Philadelphia had spread in a remarkable manner through the nation, and not only the architecture but all the decora¬ tive arts and industries had been

transformed. Strong artistic personalities began to emerge; it became possible to produce in our own cities mosaics, carvings, metalwork and stained glass of the highest quality. Not only public bodies charged with the erection of State capitols.

city halls, court houses and public libraries, but also private corporations building theatres and hotels began to realize the importance of en¬ trusting the interior decoration of such build¬ ings to great artists, and the wealthy builders of great houses followed their example. Very important was the influence of the Columbian Exhibition at Chicago (1893), in which many artists were employed to decorate parts of the buildings with paintings; but still more import¬ ant was the work done about 1895 in two li¬ brary buildings, the Public Library at Boston and the Congressional Library at Washington. In the first-named the great French mural painter, Puvis de Chavannes, adorned the stair¬ case hall ; the late Edwin A. Abbey, the loan- room, and John S. Sargent, the second floor corridor. The three works are in wholly dif¬ ferent styles : the first, in light pale tones, is purely mural (see Mural Painting) ; the sec¬ ond is almost purely pictorial in brilliant colors; the third is sui generis, the most original, mys¬ tically symbolic and magnificent decorative work in the country, representing by an extraor¬ dinary series of compositions the great reli¬ gious conceptions that have come from the East and the development of Christianity. This work has been only recently completed. The Washington decorations — of stairhall, corridors and reading-room — are by a large group of painters — Blashfield, Vedder, Reid, Dodge, Walker, Pearce and others — very varied in treatment, partly historic, partly al¬ legorical, producing on the whole a powerful impression of refined beauty, enhanced by the dignified decorative architecture of the interior, the work of E. P. Casey, and decorative statues by Adams, French, Bartlett and others. The Criminal Court building in New York, and later the Appellate Court in the same city, the Walker Art Gallery at Brunswick, Me. (Bowdoin Col¬ lege), the new State Capitol at Madison, Wis., and a long list of public buildings and churches throughout the country, the library of the Uni¬ versity Club and several great hotels in New York, and the Great Hall of the New York City College, possess decorative paintings by E. H. Blashfield, Kenyon Cox, Edward Sim¬ mons, H. Siddons Mowbray and others of the artists named, and by others whom there is not space to enumerate.

The most notable example of American ecclesiastical decoration, with the exception of Trinity Church in Boston, is the church of the Paulist Fathers in New York, in which Mr. W. Laurel Harris, with the assistance of other artists, has for some years been engaged upon an

elaborate and highly effective scheme in which mural painting, stained glass and mosaic are combined in a highly impressive manner.

As already observed, the architects and sculp¬ tors as well as the producers of mosaic carving, decorative stucco-work and metalwork, have all shared in the artistic revival and contributed to the success of the interior decoration of both public and private buildings. In the early 80's a group of men and women in New York calling themselves the ((Associated Artists® collaborated in decorating the company rooms of the Seventh Regiment Armory and the charming little Madison Square Theatre, with draperies, embroideries, mosaic, metalwork and carved woodwork, upon quite original lines apart from classical traditions — a veritable

American art nouveau. For a number of years decoration of this sort, by color and ornament and effects produced by novel treatments of surfaces in wood, plaster, glass, stuffs, hang¬ ings, mosaic, marble and onyx, was the most characteristic form of decorative art in the Uni¬ ted States. The greatest artist in this line was Mr. Louis C. Tiffany, who has developed entirely new products in glass, of great artistic splendor, both in decorative stained glass win¬ dows and in exquisite objects of small size, to¬ gether with the arts of the mosaicist and inlayer. Mention should also be made of the decorative work, chiefly ecclesiastical, of the Lamb family in New York, in stained glass, mural painting, etc.; of Mr. Friederang's work in tempera and true fresco; of the beginnings made in tapestry-weaving, and of the great advances in recent years in decorative furniture, dra¬ peries and metalwork in the United States. And the great art of monumental interior dec¬ oration with the aid of mural painting, although for a long time the great success of the works in Trinity Church, Boston, and in the Albany Capitol, already alluded to, remained almost without fruit, has since made such rapid prog¬ ress that in this field the United States has no longer any occasion as formerly for mortifica¬ tion at the scarcity of notable examples.

The lesser art of house decoration advanced at first more rapidly than the major art sketched above. The "Centennial® at Philadelphia opened the eyes of multitudes to the possibil¬ ities of beauty in the home through the har¬ monious combination of artistic draperies and furniture, and revealed especially the marvelous decorative fabrics and products of Japan. The first results were, no doubt, such as would

arouse wonder and amusement to-day, but they were the sincere if blundering expression of a newly awakened artistic hunger. Under all the handicaps of commercial exploitation, inade¬ quate training, and, above all, the absence of an artistic environment and inheritance such as Europeans enjoy, the arts of domestic interior decoration have made steady progress. Hand¬ work and artisanship have been stimulated by guilds and exhibitions; artistic manufactures, such as the weaving of brocades, rugs and hang¬ ings of genuine artistic value, and the making of artistic furniture (see Furniture), have all been raised to a high plane of excellence. The architects of our houses are now in taste and competence the equals of their European con¬ freres, and give to the interior design quite as much attention as to the exterior. Most im¬ portant of all, the general level of taste of the public has been materially raised. Museums of fine and applied art, schools of decorative design, exhibitions, lectures and books on dec¬ orative art, have been greatly multiplied.ˆ The two great defects of the American taste in this field are, first, an often undiscriminating love of splendor ; and secondly, a tendency to follow passing fashions and fads in decoration. Sim¬ plicity and repose are often sacrificed to rich¬ ness and display. “Period® decoration and textual reproductions of historic styles, well enough in their way in certain cases and in mod¬ eration, militate against a more natural, per¬ sonal and original expression of taste. Bitt there is no denying that the artistic quality* of even this sort of decoration has been steadily improving, and there is hope that with the

maturing of our national character under the sobering effects of the World War, there will grow up in this field a national art having dignity, restraint, propriety and domestic ex¬ pressiveness, appropriate to the American char¬ acter and life.

Bibliography. — Consult the book-lists at the end of articles Decorative Art; Furniture; Mosaic; Mural Painting; Ornament; Paint¬ ing; Tapestries; Textiles. Also Adam, R., and J., Architecture, Decoration and Furni- ture) (London 1880) ; Berain, J., (Decorations interieures, Style Louis XIV> (Paris 1849) ; Blanc, Ch., (Grammaire des arts decoratifs: Decoration interieure de la maison) (Paris 1882) ; Brunner and Tryon, ‘Interior Decora¬ tion (New York 1891) ; Champeaux, A. de, ‘Histoire de la peinture decorative* (Paris 1890) ; Cutts, E. L., (Essay on Church Furni¬ ture and DecoratiotP (London 1854) ; Daly, C., ‘Motifs historiques d’architecture, etcP (Paris 1870-80) ; Dresser, C., Principles of Decora¬ tive Design* (London 1873) ; Eastlake, C. L., Pints on Household Taste* (London 1869) ; Elliott, C. W., (The Book of American. Inte¬ rior (Boston 1876) ; von Feldegg, F., Pod- erne Kirchendekorationen* (Vienna 1892) ; Fleck,

W., ‘Burgerliches Wohnzimmer* (Ber¬ lin 1892) ; Gruner, W. H. L., ‘Fresco Decora¬ tions and Stuccoes ... in Italy* (London 1841) ; Havard, H., ‘L’Art dans la maison* (Paris 1884) ; Hirth, G.„ Pas deutsche Zim¬ mer der Renaissance) (Munich 1882) ; Home Interiors (Annual, Grand Rapids, Mich., the Dean Hicks Co.) ; Haw, S., ‘Indoors* (New York 1894) ; Mackson, I., American Archi¬ tectural Interiors and Furniture* (Boston 1900) ; Mayeux, H., ‘La Composition decora- tive) (Paris 1885) ; Nash, ‘The Mansions of England in the Olden Time® (London 1839- 49) ; Percier and Fontaine, (Recueil de decora¬ tions interieures* (Paris 1812) ; Polley, G. H., ‘The Architecture, Interiors and Furniture of the American Colonies, etc.* (Boston 1914) ; Pullan, R. P., ‘Remarks on Church Deco- ration) (London 1878) ; Rouyer, (La Renais¬ sance de Frangois Ier a Louis XIII, decorations interieures, etc.* (Paris no date) ; Riickwardt, H., ‘Innen Architektur und Dekorationen der Neuzeit* (Berlin 1885) ; Smith, J. M., ‘Orna¬ mental Interiors, Ancient and Modern) (London 1887) ; Sturgis, R., (A Study of the Artists’ Way of Working, etcP (New York 1905) ; Tanner, H., Jr., ‘English Interior Woodwork of the 16th, 17th and 18th Centuries) (London 1902). a. D. F. Hamlin,

Professor of Architecture, Columbia University.

INTERJECTION, a word thrown in to express some sudden emotion or passion ; an exclamation ; e.g., ah ! alas ! ouch ! d — n ! They are hardly considered parts of speech, and never form grammatical parts of a sentence ; and seem more akin to the sounds uttered by the lower animals than to articulate language. For attempts to read other meanings into them con¬ sult Delb ruck, ‘Grundfragen der Sprach- forschung) (Strassburg 1901), and Paul, ‘Prin- zipien der Sprachgeschichte) (4th ed., Halle

1909).

INTERLAKEN, in’ter’laH-en (“between the lakes®), Switzerland, village in the canton, and 26 miles southeast of the town of Berne, one mile southeast of Unterseen, beautifully

situated near the left bank of the Aar, in the valley of Boedeli, between the lakes of Thun and Brienz. It contains a beautiful old castle and numerous hotels. It is visited annually by 80,000 to 100,000 tourists. Pop. about 3,750.

INTERLOCKING DIRECTORATES.

A term used to designate the method by which the interests of many companies normally in competition are controlled by the election into their directorates of a few men acting in the interest of the combination to which they be¬ long. Obviously, the success of the interlock¬ ing directorate system is predicated upon a cer¬ tain betrayal of trust toward the individual company which the director is expected to serve with singleness of purpose, for he is placed there by the combination to serve the latter's interests. In a recent official investigation it was shown that a large steel manufacturing concern was the owner outright of several rail¬ roads, and the directors of the steel company were also directors in 29 other railroads, oper¬ ating in the aggregate more than half the rail¬ road mileage in the United States and in 12 of the* largest street-railway companies. Con¬ trol was thus exerted over the purchasing de¬ partments of all this great body of steel users, and, of course, in the ultimate interest of the steel company, and not of the railroads which these directors were intended to serve. The control of this steel company was traced also in a number of gas, oil and water companies, and in telegraph and telephone companies, large users of iron and steel products, through the same system of interlocking directors, and it was shown that the assets o'f the companies thus controlled in the interest of the steel company totaled the prodigious sum of $16,000,000,000.

The reaction of public opinion to these dis¬ closures was so prompt and vigorous that one of the largest banking houses in the country voluntarily withdrew its members, men of the highest financial standing, from upwards of 30 directorates of railway, industrial and banking concerns. The system is now thoroughly dis¬ credited, and the unadulterated responsibility of the director to his individual company has been emphasized both in legislation and by the courts.

INTERLOCKING SIGNALS. See Block

Signal System.

INTERLOCUTORY JUDGMENT. See

Judgment.

INTERLUDE, a light entertainment given between the parts of another, usually between the plajr and the after-piece. The term also designates a particular form of early English dramas occupying a place intermediate between the miracle plays and moral plays. In church

music, the interlude designates a short melodious phrase played between stanzas. Consult Collier, (Hi$tory of English Dramatic Poetry) (Vol. II, London 1831), and Ward, (English Dramatic Literature) (Vol. I, ib. 1875).

INTERMARRIAGE, marriage between persons of the same family or at least between persons closely related by blood. From a very early period we find traces of a general belief that such marriages were generally followed by degenerate children. Thus the deterioration of the American negro, of the Cretins, the Mar- rons and the Cagots of Europe is laid to this

practice. Such an opinion, however, may be refuted by adducing the Jewish race in which intermarriage has not led to this result, the good physical condition of several Indian tribes despite their common practice of intermarriage and the flourishing condition of many native tribes of India. (See Breeding; Consanguin¬ ity; Mendel's Law). Consult (New Encyclo¬ pedia of Social Reform> (New York 1910).

INTERMEDIATE STATE, in theology, is the presumed condition of the soul between death and resurrection. As nothing definite is known — or can be known — with regard to the progress of the human soul after death, prac¬ tically all systems of religion have developed more or less elaborate theories on the subject. In Christianity there are two broad lines of cleavage — that of the Protestant side which be¬ lieves that <(The souls of believers are at their death made perfect in holiness, and do imme¬ diately pass into glory® (answer to Question 37 in the Shorter Catechism) ; and that of the Roman Catholic faith, wherein the view is held that there is an intermediate state (Purgatory) between or antecedent to heaven and hell. In this state, it is believed, the soul awaits and is gradually prepared for its final destiny. This belief is also held in the Greek Catholic or Orthodox Church, while it is not admitted by Protestants. Indications can be drawn from Scripture that at death the soul passes into some state of weal or woe, and that this state is not final.

INTERMEZZO, a dramatic interlude, con¬ sisting either of an instrumental or vocal piece performed between the acts. Intermezzi were features of early Italian drama and opera, and gradually developed their own independent form as Opera Buffa, which were later given separate performance, the ballet divertissement thereafter serving as intermezzi for grand opera. Consult Grove, dictionary of Music) (Vol. II, London 1910).

INTERNAL COMBUSTION ENGINE.

I. Definitions. — An energy transformer, which converts chemical energy stored up in solid, liquid or gaseous combustible matter into heat and then into mechanical work, is called a Heat Engine. The heat is produced l3y the com¬ bustion of the fuel in air, and if this combus¬ tion takes place within the cylinder of the engine itself, the latter is generally termed Internal Combustion Engine, working on the principle of either the reciprocating engine or the turbine. While the external combustion engine, i.e., the steam engine, receives its work¬ ing medium, the steam, ready made, and depends therefore on such auxiliaries as the boiler and furnace, the internal combustion engine has to produce its own working medium — hot high- tension gases, and moreover must do this in a fraction of a second. Hence the internal com¬ bustion engine fulfils the functions of the steam engine and the steam boiler with furnace combined, and is simpler than the latter; but it is just this simplicity which presents much more difficult and diverse problems in the design and construction of the internal combustion engine than in the steam engine. The ability of the internal combustion engine to utilize almost any kind of fuel and its broad field of application to stationary and automotive power generation have brought into use such easily

definable and special names as Illuminating Gas Engine, Producer Gas Engine, Blast Furnace Gas Engine, Coke Oven Gas Engine, Natural Gas Engine, Alcohol Engine, Gasoline Engine,

1. The Cyclic Functions, i.e., the Admis¬ sion, Compression, Ignition and Combustion of the Charge within a fixed space, called Com¬ bustion Chamber, thus producing Expansive

f/gi

FIG. lo

pness.

F/G. 3

FIG 3a.

FIG. 4

FIG. 4a

” * —

f ■ ■

/

fXk

— J

*4

F/G. S.

Heavy Oil Engine, Automobile Engine, Truck Engine, Tractor Engine, Marine Engine, Air¬ craft Engine.

II. Fundamental Principles. — Whatever the fuel or the field of application may be, every internal combustion engine has to satisfy the following main requirements:

VOL . IS — 15

Power, and finally the Exhaust of the Burned Gases.

2. The Transmission of the Power from the Combustion Cylinder to the Shaft.

3. The Control of the Temperature of the Mechanical Elements by means of Cooling Devices.

4. The Adaptation of the Power Supply of the Engine to the Load Demand upon the Engine by means of Governing Methods.

5. The Mixing of Fuel and Air by means of Carburetors and Atomizers.

These problems are of a chemico-physico- mechanical nature, and are intimately inter¬ woven. Each of the requirements cannot, how¬ ever, be realized, to its highest degree. For instance, with regard to stress conditions, it is very desirable to keep the cooling medium at the lowest possible temperature ; yet the low-

1. Cyclic Functions. — In order to satisfy the above five basic

requirements, the internal com¬ bustion engine has to pass through a definite ((Cycle of Operation® ; that is, its piston has to make a number of single strokes to gain one “Power® or <(Impulse® stroke, known as the <(Working stroke.® To-day the four-stroke cycle and two-stroke cycle are most commonly used, and are briefly called four and two cycle, respectively.

(a) Four-Stroke Cycle. — In the diagrams,

f=/G. 7

QtR,

F-IO, 8

f^/O. 9

‘os.

n& to

Exhau

GAOE. S

FJG. 6

AJR. VALVC-

oil

HOT &VLCS

‘O

FJO. 8 a.

th

f*/6. 9 cl

est fuel consumption is attained only at a fairly high temperature of the cooling water. Thus in all practical cases there can be only an ap¬ proximate solution, which must necessarily be a happy balance between contradicting condi¬ tions. Furthermore, the location of the engine as well as the kind of service causes still more difficulties, and indeed difficulties of a special nature. The problems of the air-craft

engine, for instance, are decidedly different from those of the automobile engine, while the latter re¬ quires features of design which are seldom embodied in the stationary type of engine.

Figs. 1 to 4, a four-stroke cycle single acting gas engine is briefly illustrated.

Fig. 1 represents the engine with the piston on the suction stroke, or its first out-stroke. During this stroke a charge of gas and air, previously mixed in the mixing chamber, is taken in through the inlet valve. In Fig. 2 the piston is starting on its first in-stroke or com¬ pression stroke. The inlet valve is closed and the charge compressed. At or near the end of the stroke, ignition occurs. Fig. 3 shows the piston, just after the ignition of the gases, at the beginning of the working stroke, which is

now the second out-stroke. Due to the com¬ bustion of the mixture within the cylinder, both the temperature and the pressure of the gases increase suddenly. The high-tension gases thus produced drive the piston out, and while doing this useful work gradually expand to nearly atmospheric pressure. At the end of this stroke the exhaust valve is opened and the inert gases are forced out of the cylinder during the fourth stroke, Fig. 4, known as the exhaust stroke, at or near the end of which the mixture inlet valve is opened, starting the cycle over again. The changes of pressure within the cylinder during the different strokes are represented in the pressure-stroke or pressure-volume dia¬ grams, Figs, la, 2a, 3a, 4a; in Fig. 5 these pressure-volume diagrams are developed. Dur¬ ing the first, second and fourth strokes the engine performs the functions of a pump, de¬ riving its power from the excess energy stored up in the flywheel during the power stroke. The power is automatically adapted to the load demand by a governor acting on the gas inlet throttle value. During the cycle, a cooling medium^ usually water, flows through the jacket surrounding the cylinder to carry away the heat transmitted through the cylinder walls, thus preventing overheating of the latter.

(b) Two-stroke Cycle. — To illustrate the two-stroke cycle principle, a two-stroke cycle single acting oil engine has been selected. See Figs. 6 to 10.

In Fig. 6 the piston is in its outer dead centre position. The ports for

both the scav¬ enging air and the exhaust are uncovered by the piston, while the air inlet valve in the crankcase is closed. The cylinder as well as the crankcase is filled with air at atmospheric pres¬ sure. The piston on its in-stroke (Fig. 7) slides over the air inlet port, cutting off the cylinder from the crankcase. This causes the pressure in the latter to fall below that of the atmosphere, thereby opening the automatic air inlet valve and admitting fresh air to the crank¬ case. Further sliding of the piston then cuts off the exhaust port from the cylinder and com¬ pression starts. Before the piston reaches the inner dead centre (Fig. 8) the fuel is sprayed into the combustion space, which in this case is the hot bulb, where it is vaporized, mixed with air and ignited near dead centre; the first operation in the two-stroke cycle — the compression stroke — is now completed. The temperature and the pressure of the gases within the cylinder increase quickly, and the high- tension gases, expanding gradually, force the piston out (Fig. 9), thus doing useful work. At a point where the piston has yet to travel about 15 per cent of its stroke, the exhaust port is uncovered by it and the exhaust gases are discharged. Further sliding uncovers the inlet port (Fig. 10), and the air in the crank¬ case, being compressed slightly above atmos¬ pheric pressure, rushes into the cylinder and sweeps out or scavenges the inert gases. This completes the cycle. Figs. 8a, 9a and 10a illus¬ trate again the changes of pressure within the cylinder during the cyclic events. One further feature to be noted is the necessity of a fuel pump for the two-stroke cycle engine. During the compression stroke, the excess of energy which was stored up in the flywheel during the power stroke, is consumed. The power is

adapted to the load by the action of the gov¬ ernor on the fuel pump. To assure continuous operation some heat is transmitted through the walls and carried away by the cooling medium passing through the water jacket.

(c) Four-Stroke versus Two-Stroke Cycle. — Even though the two-stroke cycle is theoret¬ ically superior to the four-stroke cycle, yet the latter predominates. We can very readily see by comparison why this is true. The main ad¬ vantages of the four-stroke cycle are its simple construction, high speed and low cost for small engines ; its disadvantages being the varying torsional moment, heavy flywheel, small specific output, large dimensions and contamination of the new charge by the burned gases. As to the main advantages of the two-stroke cycle, they are a specific output which is about 75 per cent to 90 per cent larger than in the four-stroke cycle; the size of the engine is about half of that of a four-stroke cycle engine for the same power output, hence it has lower weight ; good scavenging with a correspondingly purer mix¬ ture and larger unit charge ; elimination

of valves by using slots or ports in cylinder walls, thus assuring a more reliable construction; more uniform torque; ease of reversibility; large overload capacity; ratio of cooling surface to displacement volume larger, hence better cool¬ ing effect and higher compression than in the four-stroke cycle. On the other hand, we have disadvantages which may be stated as follows : the charge must be moved through two cylin¬ ders, hence greater frictional resistance and lower mechanical efficiency; low speed; heat losses during the power stroke larger than in the four-stroke cycle. Quite recently, however, the two-stroke cycle has come into wider use, especially for high power units operating on crude oil as fuel. Among experts it is a doubt¬ ful question as to the superiority of the one over the other, the more so as the two-stroke cycle engine is not yet fully developed. Only the future can tell which of the two will be the final victor in the race for supremacy in design, construction, operation and economy.

(d) Constant Volume and Constant Pres¬ sure Cycle. — In both the four-stroke and two- stroke cycle engines, ignition with consequent combustion of the charge, or the introduction of heat into the cycle, may take place either at ap¬ proximately constant volume with pressure in¬ creasing rapidly (Fig. 11), or at approximately

Fig. 11. — Average Pressure-volume diagram of Otto Engine

at Full Load.

constant pressure with volume increasing grad¬ ually (Fig. 12). In the first case the engine is usually spoken of as an “Explosion* or “Otto* engine, while the constant pressure en¬ gine is usually called a “Combustion* or “Diesel* engine. The late August N. Otto of

Cologne, and the late Rudolph Diesel of Munich were the first successful builders of the con¬ stant volume and constant pressure engines, re¬ spectively.

There have been many other cycles invented and more or less successfully applied (see His¬ torical Development) , yet the fact remains that almost all internal combustion engines in prac¬ tical operation to-day are running either on the Otto cycle or on the Diesel cycle, the former being the older and considerably in the lead.

Fig. 12. — Average Pressure- Volume Diagram of Four-stroke Cycle

Diesel Engine at Full Load.

In comparing these two cycles as to theo¬ retical thermal efficiency, it is assumed that: (1) the gas used follows the law of a perfect gas ; (2) the ratio of the specific heats <(k)) is con¬ stant; (3) the cylinder in which the cycle takes place is absolutely heat tight, i.e., adiabatic heat conditions exist; (4) the inlet and outlet valves open and close exactly at dead centre; (5) the work consumed during the suction and the exhaust strokes is neglected.

Otto Cycle. — Referring to Fig. 13, we can follow through the different operations of the

vz*v3

Vol u roe

- M-v—

Fig. 13.

Cl* Qr

cycle. Suction occurs along the line 0-1 ; adia¬ batic compression along 1-2 ; ignition and com¬ bustion at constant volume and addition of heat, Qa, along the line 2-3, with a resulting in¬ crease of the absolute temperature Ti to T3 and pressure />2 to p3; adiabatic expansion along 3-4 ; and exhaust along 4-1-0, whereby heat, Qr, is rejected along 4-1. This completes the cycle and the heat Q — Qa -Qr has been transformed

into work represented by the area 1—2—3 — 4 — 1. As the efficiency is the ratio of the output over the input we can write the expression:

, X Q Qa Q-r

1) m = Qa=ˆT

i Qr X~Qa

According to the laws of thermodynamics,

2) Qa — Wcv(Ts-TQ = heat added;

3) Qr = Wcv (T*-Ti) = heat rejected; where IV is the weight of the charge and cv the specific heat at constant volume. Then, since

4)

and for adiabatic curves

1 1 1 4

7j

r2

» \ vj

5)

form

la) m = l —

k — 1

Pi

equation 1 assumes the

r*-

1

= theoretical thermal efficiency

of the Otto cycle, ((r® being the ratio of com¬ pression, — 1 . Thus the thermal efficiency of

V2

the Otto cycle increases with the compression ratio S*®, as wˆell as wdth the ratio of specific heats <(k». Since the latter is a function of the mixture ratio of gas to air, the efficiency de¬ pends also on the mixture ratio. Lean mix¬ tures give higher values of * and better effi¬ ciencies than rich ones. For instance, for Vi

- r = 2 and « — 1.2, vt = 13 per cent while

V2

for

Vi

-r = 10, Vt = 60 per cent.

Diesel Cycle. — As in the Otto cycle, we can determine the thermal efficiency from the the¬ oretical card. Referring to Fig. 14, suction takes place along 0—1; adiabatic high compres¬ sion of the air along 1-2; spraying of fuel into the cylinder bv means of highly compressed air, self-ignition and combustion along 2-3, thus adding the heat, Qa, to the cycle; adiabatic expansion along 3-4; exhaust along 4-1-0 whereby heat Qr is rejected. The cycle is thus completed, the heat [Q = Qa — Qr, being trans¬ formed into work represented by the area 1-2-3-4-1. Using the same notation as above, we have,

7) Qa — WcP (Tr-TO =heat added;

8) Qr — IV Cv(Tt-Ti) = heat rejected:

<(L® being the ratio of the loads or ratio of cut¬ off volume to compression volume.

7j (V»\ k Tx \ Vt)

10)

L*

Equation 6 takes the form

1

6a) vt — 1 —

n c-

1 L/c — 1

rxˆxLˆr

giving the theoretical thermal efficiency of the Diesel cycle. The thermal efficiency of the Diesel cycle thus depends not only on the ratio of compression r, and the ratio of specific heats /c, but also on the ratio of the loads L.

For instance,

for r — 13, * = 1.41, L = 1.5, we get Vt — 61.5 per cent

and for r= 13, * = 1.41, L = 3; vt= 54 per cent.

This shows that the thermal efficiency of the Diesel cycle decreases with the increase of the ratio of loads.

maximum combustion pressures, ps, are about the same.

2. Transmission of Power from Cylinder to Shaft. (A) Indicated Efficiency. Indicated Horse Power. — The thermal efficiency as com¬ puted above can never be realized in practice since many factors upon which it depends can¬ not be mathematically considered. Thus the assumption that compression and expansion curves are adiabatic in character is not true. There must be heat losses due to cooling, radia¬ tion, incomplete combustion and several other reasons. The degree of variation of the spe¬ cific heats with a change in temperature or pressure or both is still an open question. The combustion lines are never true constant-vol¬ ume or constant-pressure lines. Fig. 16 shows

lume

Fig. 14.

In Fig. 15, the efficiencies of the Otto as well as of the Diesel cycle are graphically repre¬ sented for equal ratios of compression, r, heats, K> and loads, L. From these diagrams it is evi¬ dent that at equal compression ratios, the Otto cycle is superior to the Diesel. In practice, how¬ ever, the Otto cycle is limited in regard to the compression ratio 0 = 8), in order to pre¬ vent pre-ignition, while the Diesel engine must essentially use a high compression, r being in this case approximately 16. At a low ratio of load, L— 1.5, the Diesel engine ‘has the higher efficiency. At full load however, L being ap¬ proximately 3, the thermal efficiency of both cycles is about the same, in which case their

Fig. 16.

the theoretical diagram representing the heat Q, and the actual diagram representing the in¬ dicated heat, Q i, actually converted into work. The difference of the two areas gives the ac¬ tual loss due to the factors cited above. The . Qi

ratio -q has a value from .5 to .8 and is some¬ times called the card factor.

The theoretical efficiency, Vt, is thus re¬ duced to : (Vt ˆ) = Vi the Indicated Efficiency

»& = r,atio or- coMPR-e-aaiort

4 t» 0 10 12 14 tft 2o 22 14 tL 2ft $o

Fig. 15. — Thermo -theoretical Efficiency ot the Otto and Diesel Cycles.

32 U

The Indicated Horse Pozver, denoted by the symbol Ni, is the work actually developed within the cylinder.

It is in direct proportion to the area of the pressure-volume or indicator diagram as actu¬ ally obtained by means of an indicator, and can be computed by means of the formula

Ni =

pi S A X

33,000

indicated

horse power,

in which pi is the mean indicated pressure from the indicator diagram in pounds per square inch, S the length of the engine stroke in feet, A the net area of the piston in square inches, X — the number of power strokes per minute, and 33,000 the number of foot-pounds per min¬ ute in one horse power.

(B) Brake Horse Power. Mechanical Effi¬ ciency. — The Brake Horse Power or Effective Horse Power, denoted by the symbol N e, is the actual work delivered from the main shaft of the engine to the power consumer. Ne is less than Ni to the amount of the friction horse power, N j, lost in the engine due to friction. It is calculated by use of the formula

Ne =

2 rr l nW 33,ooo

= Brake Horse Power, in which

/ is the length in feet of the lever arm of the absorption brake used in measuring the power of the engine, n the number of revolutions per minute, and W the net weight in pounds on the scales used in weighing the load on the brake.

The Mechanical Efficiency, Vm, is the ratio of the brake horse-power, and is expressed as

Test results show an increase in Vm

with an increase of the ratio of loads, but a decrease of Vm with an increase of the ratio of compression if pi does not change materially.

(C) Over-all Efficiency. — The product of ViXVmXVw = Over-all Efficiency, commonly called (

value of any internal combustion engine with regard to fuel economy may be measured.

This economical efficiency, Vw, varies with the load of the engine, as shown in Fig. 1 7, which is the heat-balance diagram of a 15 HPe (effective) Diesel Oil Engine. At nor¬ mal output, 15 H.P. of the engine, 30 per cent of the available heat is converted into useful work, while the remainder is lost in friction, cooling water, exhaust gases and radiation, as illustrated in the heat-balance diagram Be¬ tween half and maximum load, the economy of

Fig. 17. — Heat Balance Diagram of 15 H P. Diesel Motor.

the Diesel Oil Engine varies only slightly, in which respect it is superior to the Otto engine which shows a more rapid decrease in economy.

(D) Essential Mechanical Elements. — The power developed within the cylinder may be transmitted to the rotating shaft either accord¬ ing to the turbine or the reciprocating engine principle. As, to-day, gas turbine power is not in practical use for internal combustion engines, the latter only will be considered. Fig. 18 il-

Fig. 18, — Internal Combustion Engine.

lustrates the mechanical elements of a single- acting, horizontal gas engine.

In the cylinder, A, is a close-fitting trunk piston, B, a long open-ended piston, fitted with piston rings, Bi, held in position in their grooves and prevented from revolving by means of small pins, placed at different position for each ring, so that the joints of the rings cannot work in line and allow the gases to blow past them. One end of the connecting-rod, Ct, is held to the piston by the wrist pin, B6, which is rigidly fixed in the body of the piston. The other end of the connecting-rod engages the crank-pin, E. The horizontal, straight-line movement of the piston is thus transformed, by the pendulum motion of the connecting-rod, C, into rotary motion of the crankshaft, F. On this crank¬ shaft, which is supported by the main bearings, F2, is fixed the flywheel, F, which gives the en¬ gine a more regular and uniform motion. From the main shaft, F, by gear transmission, the

essary and the piston and its rod must 6e cooled. All modern small and medium-sized engines are of the single-acting type. Only in such cases where the highest possible cylinder capacity is required do manufacturers attempt to produce the double-acting engine. At the present time, the record capacity per cylinder of the double-acting two-cycle type is about 2,000 horse power; of the four-cycle, about 1,500 horse power.

(F) Multi-Cylinder Arrangements. — In the course of its development and branching out into the various fields of application, the in¬ ternal combustion engine has been subjected to so many requirements and influenced by such factors as space, weight, uniformity of rota¬ tion, economy, reliability and flexibility, that it appears to-day in many types, the best known of which are given in diagrammatic form fol¬ lowing (Figs. 20 to 31).

In Fig. 25, a rather peculiar type is illus-

Horizontal, Four-Cycle, Single-Acting; Gas Engine, One Cylinder.

cam or timing shaft, G, is driven, and upon trated, the Oechelhauser-Junkers, single-acting,

this shaft are fixed the cams, Gh for operating double-stroke, two-cycle engine. Two single-

the inlet valve, H, and the exhaust valve, Hi. acting, opposed pistons,

work in one cylinder

The cam shaft also operates the magneto provided with inlet and outlet slots. A trans-

shown in Fig. 19, which, at the proper instant, verse yoke and three connecting rods transmit

produces a spark at the terminals of the spark the, power developed in the cylinder to a three-

plug, A, in the combustion chamber of the throw crank shaft, thus freeing the cylinder

cylinder, A. Power is . distributed from the of all stresses but those to the radial action of

gas engine to the shafting belt or rope trans- the combustion pressures. Furthermore, the en-

mission from the flywheel, by geared drive gine is well balanced and therefore well suited

from the main shaft, or by an electric generator for marine purposes.

may be mounted on an extension of the main It must be especially mentioned that the

shaft. vertical, single-acting four-cycle, four and six

(E) Single- and Double-Acting Engines— In cylinder, all in line. Figs. 26 and 27, as well

a single-acting engine, Fig. 20, work is done at as the eight cylinder, Fig. 31, and 12 cylin-

one end of the. cylinder only, while the other, der, Fig. 35, V-type, the latter occasionally

the crank end, is open and exposed to the sur- called the twin six, have become the most pop¬ rounding air, thus giving a cooling effect. The ular engine types in automobile, marine and

piston usually serves as a cross-head. In a aircraft practice. The reason for it is that

double-acting engine, Figs. 23 and 24, work is these types give a more

equal flow of power

done at both ends of the cylinder. Here a and weigh less per unit power than the one

stuffing box and a separate cross-head are nec- cylinder type. When the first automobiles in

Fig. 20. — Single Acting, Four Cycle, One Cylinder.

Fig. 21.* — Twin, Single Act¬ ing, Four Cycle, Two Cylinder.

Fig. 22. — Tandem, Single Acting, Four Cycle, Two Cylinder.

Fig. 23. — Double Acting, Four Cycle, One Cylinder.

Fig. 24. — Korting Double Acting, Two Cycle, One Cylinder.

Figs. 26, 26a. — Single Acting, Four Cycle, Four-Cylinder, All in Line.

I .

FlGS. 27, 27a, 27b.— Single Acting, Four Cycle, Six Cylinder, All in Line.

Fig. 28. — Single Acting, Four Cycle, Two Cylinder, Op¬ posed. (Completely Bal¬ anced).

Fig. 29. — Single Acting, Four Cycle, Seven Cylinder (also Gnome Type).

Fig. 30. — Single Acting, Four Cycle, Five Cylinder, Fan Type.

i

Fig. 31. — Single Acting, Four Cycle, Eight Cylinder, V-type.

America were made, the gasoline engine used for propelling it was of the one cylinder, four cycle, horizontal, slow speed type, Fig. 20. The heavy vibrations due to the irregular torque caused discomfort to the

passengers and damage to the vital parts of the engine and vehicle. To avoid this, automobile designers have grad¬ ually adopted the vertical, high-speed, multi¬ cylinder type, in which the power is obtained by high rotative speed rather than by large bore and stroke. To illustrate this, in Figs. 32, 33 and 34 the pressure-volume curves have been drawn for four-stroke cycle engines of one, four and six cylinders, respectively. From these curves it is evident that in the one cylinder type the power impulse is followed by a long idle period; in the four cylinder engine a small gap only remains, due to the early opening of the exhaust valve, while in the six cylinder type the torque curves overlap, thus causing a continuous flow of power with no periods of

PeCSGVttMXL'MEL GO&VE&.

idling. This factor is a requisite in the opera¬ tion of airplanes and very desirable in auto¬ mobiles, since flexibility and performance of the motor is appreciated by any driver, espe¬ cially in heavy traffic.

(G) Main Dimensions of Internal Combus¬ tion Engines. — Among the many methods of computing the main dimensions of the internal combustion engine, not one is wholly reliable or exact. The one giving the best practical re¬ sults is that of a German authority, Hugo Gueldner. It is based on the practical amount of air, Lh, required in one hour, if the fuel consumption per hour is Ch, both Lh and Ch being in cubic feet for gaseous, and in

pounds for liquid fuel. Using the former equation,

Vw = Vi X Vm, we have

Vw =

Ne 33,000 X 60 Q 778

IVe2545

Vw Ch H ' .

where H is the lower heat value in British Thermal Units of the fuel consumed. Con¬ sidering that the actual charge volume drawn in during one suction stroke consists of the

Ch

fuel, Cst = ˆ w~~ and a corresponding amount

of air, Lst

30 Xn

ChXL : 30 Xn,

the sum of the two, Vst, D2tt

is equal to the piston displacement,— X S, times

the volumetric efficiency, Vv, which is the ratio of the actual charge volume to the piston dis¬ placement volume. The equation for the de¬ termination of the main dimensions will then be

D2jr X 5 Vst Cst + Lst

4 Vv ~ Vv

From equation (a) :

Ne X 2545

Ch =

H X Vw

and from this we get Lst —

Ne X 2545 X L HXVwX30Xn

D ˆ 84,8 Ne (1 + L)

°f 4 ‘ nXHXVvX Vw’

Hence:

(b)

D

108 Ne (1 + Z.) S n H Vv Vw

= the effec¬

tive diameter of the cylinder for a four stroke cycle engine, measured in feet, and

5 =

108 Ne (1 + L) D2 n H Vv Vw

— stroke in feet;

n

108 Ne (1 + L)

Di S H Vv Vw

= number of revolutions

per minute. For two cycle engines, it is obvious that the factor 54 would be used instead of 108. In the above equations L is the air in cubic feet actually used to burn one cubic foot of the gaseous, or one pound of the liquid fuel, while Ne is the effective horse power for one cylinder end only. In view of the amount of experimental data available, a selection of L, H and Vw can easily be made. For this purpose the tables 1 and 2 are inserted.

Table No. 1. Volumetric Efficiency.

from .93 to .88 for slow speed engines, mechanic¬ ally operated inlet valve; from .87 to .80 for slow speed engines, automatic¬ ally operated inlet valve; from .85 to .80 for high speed engines, mechanic¬ ally operated inlet valve; from .75 to .65 for high speed engines, automatic¬ ally operated inlet valve; from .65 to .50 for extremely high speed engines, automobiles and air-craft engines.

•

TABLE NO. 2

Column /vo

/

2

3

A-

s

6

7

6

9

ˆjrucL

LONER

heat/hg

VALUE H

are per

A/R REQUIRED

Co //SUMPTION OF ruEL “C “PER 3 HP PER Hr OR THE BASIS OF 29”Hy A NO S9‘F THERMAL EFFICIENCY AT BRAHE 7jw IF N„ *

7’fieor’C/— / CO// y

Ac/Oo/

z

5 BLH.P

/O BMP

25 BMJ?

SO BM P

760 BMP

200 BHJ?

c

c

7{~

C

7?w

C

7-

C

C

F/3

/bs.

Ft3

/bs

Alt3

/bs

Ft*

/bs

Fp

/7 > S

F?3

/bs

Ft3

/bs.

Ft3

JEs.

Ft3

/bo

SOS

SO

7S

225

22

20 7

24

/? +

£6

733

£7

/7.9

ze

/7.4-

OQ

■*7,

Si/

—

S

to

—

f

to

—

20 +

—

.22

/ 06

24

/ 7.2

—

£6

/69

—

27

/&./

— ■

£8

/S.6

£b

e/s

-

L

1

/S6

22

122

24

/S3

/S.4

.27

/SJ

20

/43

£9

67 +

60

3.0

/7.0

.22

/s.e

24

/4.S

££

/AO

£7

/A3

2d

73/

29

,

—

X

—

1.349

US

/■/»

./7

/.OCX

./9

J39S

2/

as

£2

——

/+o

— –

9-/./

—

/.S

—

—

—

—

96.3

/

.79

960

£/

709

■ —

£3

7S.2

£4

7LC

—

£6

X

/.TSZ

./A

/.2S

uc

/./2

./&

/ oos

.20

.92

£2

—

1

/29

/.zs

/o+

./9

9J.L

.2/

360

.23

823

£+

73.9

.25

mmm

dC7C

/■63

98

.20

/.+/

.2/

L34-

.22

.

-LB ■

LLJ

/29

—

9 -/O

—

/.s

—

—

— —

—

—

- –

df.6

—

.22

66.C

— –

23

8E3

709

- –

.25

/06 >

—

US

—

9-/.

/OO.

—

£4

95.

—

£S

9/J

—

£6

SOS

—

5-3

7.

— –

— –

—

— –

—

—

—

—

—

«—

2/S

—

£3

/9.9

—

.26

/A6

— —

£7

-

X

/eS

— {

2SC-

U/7

./z

//03

./3

395

./S’

‘ ’

- –

X

/76

— i

zee-

320

— –

.54

26

—

＋92

29

—

.4＋7

■ 32

—

A25

S3

—

/PS

.A/3

X

- ’ -

/AS

— 1

2 VO-

. < 25

.20

.532

J22

.23

272

—M Ll_

”’”’

m—m

— —

X

■i , |

96 S

— (

/£&■

/9i

/F>7

.23

/XX>7

AS

.962

.26

1 ™

1,11 ” ’ ‘

X Tnc/vc/m j /o

/s7.

of

/Ac

A,

V ˆ

o //i/

a/

z err

SiS/7-.

/oF/

70

/Sr

/rtf

of

a .

70S

a a/

‘cc.

-

Tc/

M

c /

uyA

/ /

S //

<*m

i’

£ ˆ

7

‘S ,

Trr/C

f+F

Example. — A four-cycle, single-acting, one- cylinder anthracite producer gas engine is to develop 170 horse power, at a piston speed of 800 feet per minute and a stroke-diameter ratio

5

2J—1.35. What are its main dimensions?

Solution. — From Table No. 1 use %= =.90;

From Table No. 2 use Vw=.26\ H = 140 B. T. U. L — 1.5 cube feet.

And since

U 2 S

800

2.1D

Revolutions per minutes. These values substituted in equations (b)

and solving for D = jˆX/f.q + L)

S X n X H X Vw X Vv

N

108X 170(1 + 1.5) X2. 7

1.35 X 800 X 140X.26X.9

n =

1.877 feet — 22.5 inches. 1.35 X 22.5 = 30 inches.

800

2 X 30

166 Revolutions per minute.

3. Cooling.—

developed within bustion engines is dent that neither any other metal could resist such more, pre-ignition of the elements

- The maximum temperature the cylinder of internal com- 2,500° F., or more. It is evi- cast iron and cast steel nor known at the present time high temperatures. Further- of the charge and distortion exposed to such high tem¬

peratures would occur. To prevent this, some method of cooling must be resorted to. Water is the cooling medium most commonly used. In small engines, however, air may serve the purpose. Usually only such parts that are sub¬ jected to high temperatures, such as the cylin¬ der, cylinder head and exhaust valve, are cooled, and this is done by

surrounding these parts with water jackets; in engines above 120 horse power, cooling should also be provided for the piston, the piston rod, exhaust pipes, bearings and crosshead guide. It is very de¬ sirable to have the circulation of the water such that the parts of the engine exposed to the greatest heat are surrounded by the coldest water. Since the heat carried off by the cool¬ ing medium cannot be converted into useful work, it is evident that there must be a certain loss due to this cooling of the engine. The amount of this loss, see Fig. 17, depends on many factors, such as type and load of engine, size of cylinder, temperature of cooling water, and so on, and varies from 25 per cent to 50 per cent of the heat developed within the cylin¬ der. However, there is danger from over¬ cooling as well as from under-cooling. If the engine is over-cooled, the clearance between the piston and cylinder is decreased, the lubri¬ cating oil gets more sluggish, and there will be a large increase in mechanical friction, with a corresponding decrease in mechanical efficiency. On the other hand, if the engine is not suffi¬ ciently cooled, there is danger from pre-igni¬ tion, excessive expansion of parts, and at very high temperatures, actual failing of the cylinder and piston.

Each of the cooling systems has its ad¬ vantages and disadvantages. The main ad¬ vantages of air cooling are simplicity, light weight, no charge for the cooling medium, and no danger of cracking the cylinder by freezing; the disadvantages which may be cited are applicability to small engines only, no positive control over the temperature, burning of the cylinder lubricating oil, and in most cases high fuel consumption. In the standard method of water cooling, we have such advantages as the control of the temperature regardless of weather conditions, the possibility of cooling internal parts of large engines and the regula¬ tion of the clearance' space between the cylinder and piston, which in turn means the partial control of the piston friction and also the prevention of the escape of gases into the en¬ gine room. On the other hand, there are cer¬ tain disadvantages of the water-cooled engine. There is an increase in weight which is a most

metal which abstracts heat from the water. Gradually cooling off, it flows down through the radiator to the suction pipe of the pump (illustrated in Fig. 35), which again forces it back into the jacket. A thermostat may be added (see Fig. 36), and the flow of the water so regulated that the temperature of the water is constant at all speeds of the engine. Some manufacturers do not use a pump at all, but resort to

the natural method of water circula¬ tion — the thermo-syphon system — which, how¬ ever, requires a larger amount of water and space.

Small and medium sized stationary engines are provided with a large water tank (see Fig. 18) ; the top of the tank is connected with the top of the water jacket, and the bottom of the tank with the bottom of the jacket. In small farm engines, this tank is an integral part of the cylinder jacket, thus eliminating piping en¬ tirely. In large, high-powered engines, the

Figs. 35 and 36.— Water Circulating System of Packard 12 Cylinder "V" Type Automobile Engine.

undesirable feature in engines for automotive purposes; danger of freezing in winter; col¬ lection of mud and formation of scale which will clog up the water passages ; and the failure of the feed pump where forced circulation is used.

In automobiles, trucks, tractors and air¬ planes, it is necessary to reclaim the water. In this case the water is circulated through a so-called radiator, Fig. 35.

This consists either of a great number of round tubes with fins to radiate the heat,, or flat tubes through which the water flows in thin sheets. In addition, air is forced against these tubes by the forward movement of the vehicle and by a fan. The water, forced by means of a small pump into the jacket of the cylinder, gradually becomes warmer while passing up¬ ward, and finally is discharged into the top of the radiator. There it is divided into thin streams and directed against comparatively cold

quantity of cooling water generally varies from 30 to 70 pounds per horse-power hour, depend¬ ing upon the type and fuel used. A 6,000 horse-power engine would therefore require about 420,000 pounds of water per hour. Where such a quantity of clean water cannot be secured at a very low cost, the cooling water must be reclaimed. In the simplest design, the hot water is piped to a cooling pond where the heat is dissipated by radiation and evaporation. In such plants where ground area is limited, the pond is generally displaced by a cooling tower.

For all cases cited above, the cooling water must be clean, for if impurities settle in the water jacket, the cooling, especially of the cylirider walls, becomes defective, the tempera¬ ture rises, and pre-

ignition, caused by incan¬ descent deposits of carbon within the combus¬ tion chamber, is likely to occur. Again, the film of lubricating oil between the piston, pis¬ ton rings and cylinder walls is rendered so thin

that it loses its sealing power; the exploding gases then blow past the piston rings and the oil is burned and charred, thus destroying its lubricating value. Heavy wear, loss of power and even “freezing® of the parts are the in¬ evitable results.

(B) Quality Governing. — The quantity of the charge in this method is constant (see Figs. 37 and 38), and the power stroke occurs regu¬ larly; but here the impulse is diminished by lowering the quality of the charge or the mix¬ ture ratio of fuel to air. This is effected by

Fig. 38.

4. Governing Methods. — It has already been pointed out that the working fluid for the internal combustion engine must be produced in the cylinder of the engine. Accordingly, the output of the engine depends on so many factors, besides the heat content of the charge, that it is next to impossible to design such a governing system as we might find, for in¬ stance, in a steam engine wherein a certain position of the governor corresponds to a

(1) changing the lift or the timing of the fuel valve; (2) changing the lift or the timing of the air valve; or (3) drawing back into the cylinder a portion of the exhaust gases. This method allows a constant compression pres¬ sure but the charge burns slowly and imper¬ fectly, thus decreasing the efficiency when oper¬ ating at less than full load.

(C) Quantity Governing. — In this method of governing, the quality of the mixture or the

definite load of the- engine. Nevertheless, engineering skill has managed to devise very satisfactory methods, the best known of which are given below.

(A) Hits and Miss Governing. — In the “hit and miss® type of governing, the engine operates under a constant quality and constant quantity charge. Explosions are cut out at irregular intervals by

keeping either the gas inlet valve

Regulation. Fig. 40.

ratio of air to gas, is constant (see Figs. 39 and 40) ; the power stroke occurs regularly. The work done during the impulse stroke is decreased by (1) forcing part of the charge back into the suction pipe; (2) earlier cut-off of the incoming charge; or (3) throttling of the charge during the suction stroke. Al¬ though in this system the compression pressure, and consequently the efficiency drop (see Fig.

closed or the outlet valve open. Although the method is to be noted for its economy and simplicity, it is used only in small and medium sized engines and in such cases where an irregular speed of rotation is permissible.

40), the mechanical efficiency increases with the decrease of the output. In practice, quantity governing proves to be superior to quality gov¬ erning.

(D) Combination Quality — Quantity Gov¬ erning (illustrated in Figs. 41 and 42), is

effected by using between maximum and half the load, the quality, and below half the load, the quantity method, thus combining the good features of these two methods.

(E) Automotive Engines , if running on light oil, such as gasoline, are generally governed by

throttling the charge, and varying the time of ignition.

(F) Diesel Engine governing differs slightly from the quality method above. The engine works at all loads with full air charge and full compression pressure, but the amount of oil is adapted to the load in different ways, the best known of which is to force the surplus of oil, drawn in during the constant suction stroke, back through the suction valve into the suction pipe. The suction valve is under the control of the governor. Pressure-volume dia¬ grams regulated by this method are shown in Fig. 43.

5. Ignition Systems. — The charge in the cylinder of an internal

combustion engine, after being compressed, may be ignited by (a) Hot Tube; (b) Hot Bulb; (c) High Compression; (d) Electric Spark. The ignition point should be surrounded by a pure charge, and located in the centre of the combustion chamber which, for best economy, should be spherical in shape. The time of ignition must be adjustable. When the combustion chamber is annular or pocketed, two or more ignition points must be provided to get good combustion.

In the hot tube ignition system (see Fig. 44),

Fig. 44. — Hot- Tube Ignitor.

a small tube of nickel, platinum or porcelain about three inches long and about one-quarter inch bore is fixed to the combustion chamber; the tube is heated by an external heat source. During the compression stroke, the charge is forced gradually into the tube, and as soon as it reaches the glowing zone, ignition occurs.

Timing is effected by shifting the external heat well. This method is very simple and effective, but its short life and external flame carrier soon caused it to be displaced by fuller ignition systems.

In the hot bulb system (see Fig. 8), a spher¬ ical or oval-shaped cast iron bulb serving as combustion chamber is fixed to the cylinder. It is heated by an external flame only for starting, and as long as the engine is cold. This method is very successfully used in oil engines. The fuel is sprayed into the bulb during the suction stroke in four stroke cycle engines, and during the compression stroke in two stroke cycle engines. There it is vaporized and then ignited by the compression temperature. In most cases timing is con¬ trolled by spraying water, in proper quantities, into the bulb.

In the high compression system of ignition such as we find in the Diesel engine, pure air is compressed to about 500 pounds per square inch, thus heating the air to such a degree that any oil, if properly atomized and sprayed into the cylinder at the right moment, readily

ignites. Timing is effected by adjusting the spray-needle valve. Although very efficient and reliable, this method has one main drawback: for the production and storage of the spraying air, an air-compressor and high pressure stor¬ age tanks with their piping are necessary.

The most convenient and clean ignition system for gas and gasoline engines is that

using the electric spark. Of this system there are two types: the low tension or break con¬ tact type (see Fig. 45) and the high tension or jump spark system (see Fig. 46). The former

involves the motion of a rocker-shaft, nt with a contact hammer li, acting on a stationary elec¬ trode, e. The two parts coming together are necessarily subject to wear, which thus prevents the formation or deposit of carbon on the con¬ tact faces; in this way the gases have free access to the spark at the moment of break of contact and this system is well suited for large low speed engines where a hot, “fat,ˆ spark is most desirable.

The jump spark igniter (Fig. 46), called the spark plug, has no moving parts. It consists of a shell, s, containing e, one of the electrodes, screwed into the combustion chamber wall, and a porcelain insulator, p, carrying in its centre the second electrode, e. . The two electrodes must have a proper gap, about one-thirty-sec¬ ond inch, and be soot proof. To jump this gap, the electric current must have a high pressure, about 10,000 volts, produced by a secondary or induction coil, and a breaking device in the pri¬ mary coil. Thus the jump spark has electrical complication and mechanical simplicity, while the break spark has mechanical complication and electrical simplicity. They are, however, equally efficient in service, and may be connected with any source of electric current such as the elec¬ tric cell, the magneto, the dynamo, or a com¬ bination of these.

III. Starting the Internal Combustion En¬ gine. — Before the internal combustion engine is able to furnish power, i.e., before the power stroke can occur, the explosible charge must first be drawn in and compressed. During the actual running of the engine, this work is usu¬ ally done by the energy stored up in the fly¬ wheel ; with the engine at rest, however, no energy is available from the wheel. Hence, to start the engine, an external power source is necessary. Small engines working with low compression pressure may be started by hand. Nothing more than a hand crank is used for this. It is attached directly to the crankshaft. High-powered engines and those working on high compression pressures may be started either by compressed air or by an electric motor. In the first case, a small air compressor con¬ nected to the engine furnishes compressed air to a storage tank during the regular operation of the engine. To start the engine, compressed air is then admitted, through a hand or me¬ chanically

operated starting valve, into the work¬ ing cylinder where it expands. As soon as the engine has the proper speed and momentum, the starting valve is cut out and the regular inlet and outlet valves set in operation. There must be no fuel admitted to the cylinder during the starting period. Electric motor starting is ex¬ tensively used in automobiles. The electric current is drawn from an accumulator during the starting period. At a certain speed of the engine the electric motor, instead of using elec¬ tric current, produces it, that is, it is converted into a dynamo which again recharges the ac¬ cumulator.

IV. Fuels. — Almost any kind of fuel, irre¬ spective of impurities or of heat value, can be utilized in the internal combustion, engine to¬ day. Fuel gases and fuel oils form ready mix¬ tures with air and burn without considerable residue. Where gas is not available as a nat¬ ural product or as the main or by-product of

the industry, it can be economically produced from solid fuel in a special apparatus called a producer.

(A) Gaseous Fuels. — Small and medium-

size gas engines are operated by one of the fol¬ lowing kinds of gas — natural gas, illuminating or city gas, producer gas. Of these, the last two are artificially made. Large gas engines utilize mostly blast furnace gas, coke oven gas, and sometimes producer gas and natural gas. The heat values of these gases differ widely, as may. be seen from table No. 2.

(a) Natural Gas is found in the oil districts of Pennsylvania and West Virginia. It exists in the earth in pockets and is reached by wells which are drilled to the pockets. In its natural state it is dry, clean and highly inflammable. For this reason it makes an ideal gas engine fuel when it can be obtained at low cost.

(b) City Gas is made from bituminous coal by dry distillation. After impurities, such as tar, have been carefully removed, it makes an excellent fuel for gas engines up to 50 horse power.

(c) Producer Gas can be manufactured from almost any kind of fuel, such as anthracite coal, bituminous coal, coke, lignite, wood refuse and peat. If the engine ˆdraws® from the gas pro¬ ducer the gas required for its operation, the gas is called Suction Producer Gas. If air and steam are “blown3* into the producer, and the gas thus made is under pressure, the latter is termed Pressure Producer Gas. Suction gas producer plants are by far in the lead in the United States and are

mostly operated by an¬ thracite. Their size rarely exceeds 200 horse power. The suction producer gas is cheaper than city gas, but on the other hand contains impurities which are liable to cause trouble in the operation of the plant. In Fig. 47 the con¬ struction of a suction producer plant is illus¬ trated.

Air is drawn in through the generator, 1, filled with fuel, 3, the lower position of which is incandescent over the grates, 2. Water passes through the pipe, 4, into the evaporating pan, 5, surrounding the generator. This water is vaporized by the heat of the burning coal, 3. The steam thus formed passes down through pipe, 6, and together with air enters the gener¬ ator through the grate, rising through the fuel and producing gas. The warm gas escapes through pipes, 7 and 8, into the lower part of scrubber, 10. Some of the impurities drop into the water trap, 9. Others are absorbed by the porous and bulky coke, 11, with which the scrub¬ ber is filled. A water spray entering at the top of the scrubber cools and purifies the rising gas. From a pipe, 12, the cooled gas passes through a tar separator, 13, into a small gas tank, 16, from which the gas is drawn by the engine as required. In starting, a hand oper¬ ated blower is used for furnishing an air blast. During that period, the gas is directed by means of valve, 19, through the testpipe, 18, into the atmosphere. After having reached the proper quality, the gas is directed to the scrubber by turning the valve, 19, into the position shown.

Pressure producer gas plants range from 200 to 2,000 horse power. Mostlv bituminous coal or lignite is used as fuel. The cleaning apparatus of such a plant must be more effi-

cient than in the suction producer gas plant. In larger plants it is very economical to install a by-product plant for the treatment of the tar from which sulphate of ammonia and other products are obtained, thus helping to lower

sprayed over the coke, cooling and purifying the rising gas. Through pipe, 12, the gas passes first through the tar separator, 13, then the dry¬ ing filter, 14, filled with sawdust, and finally, after having gone through a second tar sepa-

the cost of operation. Figure 48 illustrates a typical pressure producer gas plant.

Steam is produced in a separate boiler, 19, from which it passes through pipe 6 into pipe 5 were it is mixed with air, previously heated in

rator, 15, enters the gas tank, from which it flows, under slight pressure, to the engine. In case of a lignite plant, a steam boiler is not necessary, as the lignite contains sufficient moisture.

Fig. 48. — Pressure Producer Gas Plant.

tank, IB. Steam and air together enter the generator, 1, through the grate 2. Rising through the incandescent fuel, 3, they form gas which is forced through pipes 7 and 8 into the scrubber, 10, filled with coke. Cold water is

(d) Blast Furnace Gas— A blast furnace is, with regard to the production of gas, a huge pressure gas producer. The gas coming from the blast furnace contains a great quantity of impurities such as limedust, iron oxide, soot

Fig. 49. — Blast Furnace Gas Plant.

and sulphur. The quantity of impurities varies from 12 to 25 grams per cubic meter of gas, which must be reduced to .01 to .03 grams per cubic meter of gas, as a greater amount will cause deposits in the engine cylinder, excessive wear of the moving parts and danger to the engine. A blast furnace gas cleaning plant is illustrated in Fig. 49.

After leaving the. dust trap, 1, the gas passes through the pipe, 2, to a larger dust catcher, 3, continuing through pipe, 4, to the scrubber, 5. A cold water spray entering at the top of the scrubber cools and purifies the rising gas which passes out at the top, then down through pipe, 6, leading it into a rotary washing plant, 7, which removes nearly all the solid impurities. From the cleaning plant the gas is conveyed through large gas mains, 8, to the engine.

(e) Coke Oven Gas is produced from bitumi¬ nous coal during the production of coke. A portion of the gas is used in the coke oven, but the remainder or surplus gas can be used for operating gas engines. This gas contains coke dust, tar and sulphur, and, consequently, must be purified in a way similar to the one outlined above for the pressure producer plant.

(B) Liquid Fuels and Their Atomization Methods. — The liquid fuels commonly used to-day are : Gasoline, kerosene, crude oil, ben¬ zol, alcohol and tar oil. The first two are dis¬ tillates of crude oil, which is a native, generally liquid, combination of various hydrocarbons and as such usually consists of 80 to 85 per cent carbon and 15 to 20 per cent hydrogen. There is also a small percentage of impurities. Location and geologic age have an influence on the relative proportions of the constituents, as may be seen from the following analyses:

Hydro- Impuri- Heating Specific Carbon, gen, ties, value gravity % % % B. T. U. at 32°

Heavy crude, West

Virginia . 83.5 13.3 3.2 18,324 .873

Heavy crude,

Pennsylvania… 84.9 13.7 1.4 19,210 .886

Crude oil is a mixture of several kinds of oil of different boiling points. These oils can be, by fractional distillation, separated into three main groups, namely: volatile oils, 10 per cent ; illuminating oils, 80 per cent ; and heavy oils. The first group contains besides other oils, gasoline with a boiling point of 160° to 200° F. and a specific gravity of .65 to .70. It is gasoline on which Otto engines, especially of the high speed automotive type, operate so successfully. With the number of automobiles rapidly increasing the time is not far distant, when the critical point in the production of gasoline will be reached. Man)'- attempts have been made to utilize the kerosene oils of the illuminating gas group, with a boiling point of about 300° F. and more, and a specific gravity of .78-.86, in the Otto engine. At slow speeds fair results have been achieved, while at high speeds kerosene has not yet proven to be sat¬ isfactory. It is right here where we can get a true conception of the immense value of the E)iesel engine which not only can burn volatile oils, but kerosene, heavy oils, residuum oils, crude oil and tar oil, in short, any kind of liquid fuel, and this with an efficiency which is high above that of any other type of heat engine.

For best economy of the fuel, i.e., for its quick and complete combustion, it is absolutely necessary to surround each of its particles with a sufficient number of air particles. In engines, operating on gaseous fuels, this may be accom¬ plished by adjusting the air throttle and gas throttle valves for the proper gas-air ratio, and by directing

the gas and air streams in such way that they meeˆ at right angles, thus assur¬ ing a thorough mixing of the gas with the air. This is illustrated in Fig. 50. To ac¬ complish the same aim with liquid fuel, the lat¬ ter must be first atomized, assuring a more thorough amalgamation of the oil and air parti¬ cles. Although almost any device which per¬ mits a current of air to pass over or through a volatile oil will serve the purpose, modern

gasoline-air mixing devices, termed carbure¬ tors, are called upon to deliver a mixture to the cylinders, which is not only of accurate proportion, but also of proper composition at all engine speeds. The details of the modern carburetors differ largely, yet the underlying

A constant height of the gasoline in the spray- nozzle connected with the float chamber is automatically maintained by the float. The suc¬ tion created by the pistons causes air to enter the mixing chamber through the primary and auxiliary air inlets. In passing through the

principle is mostly still that of the pioneer (< spray-jet }> automatic float feed carburetor evolved by Maybach about 35 years ago. A single spray-jet automatic float feed carburetor as used by ‘the Packard Motor Car Company of Detroit is illustrated in Fig. 51. Gasoline flows into the float chamber through a needle valve. vol. 15 — 16

venturi tube the primary air assumes a speed of more than 7,000 feet per minute. It con- sequently draws gasoline from the spray-nozzle and atomizes it. ‘ The proper gasoline-air mix¬ ture, at all engine speeds, is maintained by the auxiliary air valve, the lift of which increases with the vacuum in the mixing chamber or with

V£ SPR//V6

VALVE STEM

VALVE U

HVLET VALVE or

BLAST EUR RACE GAS E/Y6//VL

C7a 30-

_ _ _ tiOZs, _

VALVE HOUSING

THROTTLE VALVE

Cos

MR

242

INTERNAL COMBUSTION ENGINE

the speed of the engine. Many attempts have been made to atomize kerosene by the methods described above, but they failed entirely in high speed engines. In small, slow speed, stationary engines, kerosene can be used with a fair de¬ gree of success. The chief difficulty which pre¬ vents the substitution of kerosene for gasoline is the fact that the latter does not vaporize readily at ordinary temperatures. This calls for special vaporizing devices, such as hot bulbs (see Fig. 8). In hot bulb engines, the kero¬ sene is sprayed, by means of a small oil pump, into the red hot bulb where, due to the high temperature, it vaporizes and mixes with the air forced into the bulb during the compression stroke of the engine. Crude oil, the fuel of the

countries, where gasoline and even crude oil are at a premium, benzol, alcohol and tar oil have come into extensive use. Benzol, a by¬ product in the manufacture of illuminating gas and coke is in its crude form a foul-smelling liquid. After the refining process it has a color similar to that of water and can be atomized and burnt in the same way as gaso¬ line. Its slow flame propagation, however, lowers the flexibilitv of the engine. Its carbon content is about 90 per cent, its specific gravity equals .886, and its heating value 17,000 B. T. U. per pound. To prevent carbon deposits in the cylinder and freezing of the oil at a tempera¬ ture below 32° F., it must be mixed with alcohol.

AirT/yotf/e

Throttle Vafv

tD/xjng Chamber

Chamhar f7oaf from Oaso//o

Fig. 5!

tUP

Auxiliary Air \hive

Primary Air /n/af

Diesel engine, requires for its atomization three essential auxiliaries : the fuel pumps, the fuel needle and the air compressor. The most im¬ portant one of the three is the fuel needle, an illustration of which is shown in Fig. 52. The 1 uel pump forces the oil under high pressure through the oil canal, into the distribution chamber surrounding the needle and filled with a number of annular, perforated, plates. Nearly at the end of the compression stroke, the needle is slightly lifted, and the highly com¬ pressed air, furnished by an air compressor through the air canal, forces the oil through the spray nozzle at a very high speed into the combustion chamber where a thorough mixing of the oil and air particles takes place. Hence the needle valve has two main functions : the distribution and the atomization of the oil. In

Alcohol is produced by the fermentation of grape sugar, or the raw material of the latter like potatoes or grain. Waterfree alcohol has a boiling point of 172° F., a specific gravity of .79, and a heating value of about 12,000 B.T.U. per pound. It can be atomized like gasoline, and is used in slow speed, small, stationary engines only.

With the advent of the successful design and manufacture by German engineers of a heavy type, horizontal, tandem, double acting Diesel engine, a new fuel has entered the market, tar oil. Of what importance this fuel is may be seen from that fact that Germany uses more than 500,000 tons a year in stationary engines. Tar oil is like benzol, a by-product in thv, manufacture of coke and gas. Its boiling poW is about 600° F., its specific gravitv about l.CL

and its heating value about 17,000 B.T.U. per pound. All parts of the engine coming in contact with this fuel, like the fuel pump and spray needle valve, must be made of special material, as ordinary steel will be easily des¬

troyed by it. To increase its flame propagation, ignition oil is sometimes, used.

V. History. — The history of the internal combustion engine falls into

two period? (1) the period of invention and speculation, 1678- 1860; and (2) the period of development and application, 1860 to date.

As early as 1678, Hautefeuille advanced the idea of the vacuum gun-powder pump. Through the explosion of gunpowder in a closed chamber provided with valves and the subsequent cooling of the gases of combustion, a vacuum is created, which is used for the drawing of water. In 1680, the same principle was applied by Huyghens in *his vacuum gun¬ powder engine, in which atmospheric pressure was used for the operation of a piston. Such an engine was constructed and actually tested by Papin in 1688. For slightly more than a hundred years nothing was done, at least no records are available showing the contrary. The invention and successful application of illuminating gas toward the. end of the 18th century seems to have again stimulated the interest of inventors in the field of the internal combustion engine. John Barber took out a patent on a gas turbine in 1791. Gases produced from solid or liquid fuels and mixed in a special chamber with air and a little water are ignited and the resulting impulse . is to be utilized for the operation of a turbine wheel. In 1794, Robert Street invented the oil engine. Liquid fuel is evaporated in a cylinder and mixed with air taken in during the first half of the stroke. The mixture is ignited by a con¬ tinuously burning ignition flame at the middle of the stroke and the piston is driven outward by the gases. From 1800 to 1860 many in¬ ventions along the internal combustion engine line have been made the most important of which are : the double acting illuminating gas

engine of Lebon, 1801 ; the double acting ex¬ plosion engine of Wright, 1833; the explosion engine with compression of Barnett, 1838; the hot tube engine of Drake, 1842, exhibited in Philadelphia in 1847 and having an output of 20 horse power at 60 R.P.M. and 103 pounds per square inch explosion pressure ; the hydro¬ gen gas engine of Reithmann, 1852, actually in operation in Munich until 1858; the atmospheric free piston engine of Barsanti and Matteucci, 1854; the gas engine with compression of De gran de, 1858.

Since 1860 the development of this type of prime mover was so rapid and its application so broad that it is impossible to mention here even the names of all the men who devoted their lifetime to this problem. Only the fore¬ most ones can be considered. In order to give a better survey of this second period, the dif¬ ferent engines are taken up in groups. Thus we have :

A. Gas Engines.

(a) Without compression.

(1) Direct acting.

Example — Lenoir engine.

(2) Atmospheric engines.

Example — Otto and Langen free piston engine.

(b) With compression.

(1) Constant pressure engines.

Example — Brayton engine.

(2) Constant volume (explosion) engine.

Example — Otto engine.

B. Gas Turbines.

Example — Holzwarth gas turbine.

C. Gas Pumps.

Example — Humphrey gas pump.

D. Oil Engines.

(a) Without compression.

Example — Otto and Langen engine.

(b) With compression.

(1) Constant volume (explosion) engine.

Example — Otto- Daimler gasoline engine; standard automobile engine.

(2) Constant pressure engine.

Example — Diesel oil engine.

E. Coal Dust Engines.

Example — Diesel engine.

Examples.

Lenoir Engine. — In a paper published by M. M. Lefevre of Paris in 1864 the following was stated : (

Otto and Langen Free Piston Engine — Among the most zealous of those who tried to improve the gas engine was a young merchant, N H. Otto of Cologne. Through experiments in 1861 and 1862 he learned that cooling the gases caused a great decrease in volume, and consequently a partial vacuum. Otto endeavored

to use this for the generation of power. After many tedious experiments he and his partner, E. Langen, to whom we owe the systematic de¬ velopment of this engine, succeeded in perfect¬ ing an engine, shown in Figs. 53 and 54. The striking feature of this engine is the use of a free piston connected with the flywheel shaft, a, by means of rack, i, and pinion, o, which runs freely on the shaft while the piston is on its upward stroke, but, by an ingenious clutch ar¬ rangement, it grips the shaft on the down stroke. The valve, e, by one in- and out-stroke, causes the exhaust, intake and explosion in the order named. It is moved by rod, d, connected to crank, c. The elastic connection, d, is unique and is worth notice. Levers / and g lift the piston and the charge enters through slide valve, e. After the piston has made a stroke

for 10 years, several thousands being con¬ structed in that period.

Brayton Engine. — This engine is an Ameri¬ can product and was introduced to the public by Brayton at the exhibition in Philadelphia in 1878. It is of the single acting, two cycle type with a working stroke at every revolution. Gas and air are compressed ‘by a separate pump and then delivered to the motor cylinder where, on entering, they are gradually ignited by a con¬ stantly burning flame. There is not an ex¬ plosion but a combustion at constant pressure. At a certain point the supply of power is cut off and the hot gases expand to almost atmos¬ pheric pressure before discharge. There is a wire gauze fixed behind the flame to prevent the flame from striking back into the charge pipe. If this happens a serious explosion fol-

Figs. 53, 54. — Otto and Langen Free Piston Engine.

of a few inches the valve, e, carries the ignition flame to the inlet port

causing a sudden com¬ bustion of the charge within the cylinder. The power developed drives the piston upward with a maximum velocity of over 2,000 feet per minute. Due to over expansion and cooling of the gases a vacuum is created below the piston, and, on the down stroke of the piston, work is done by the atmosphere and the weight of piston and rack. This free piston engine was exhibited at the Paris Exposition in 1867. Lay¬ men were even afraid of the instantaneous ascent of the rack, and experts criticized se¬ verely the awkwardness and noise of the engine. After a competitive test with 14 other gas engines, in which it showed an over-all effi¬ ciency of 15 per cent, opinions suddenly changed. It completely crushed Lenoir, and held almost the sole command of the market

lows, stopping or wrecking the engine. On this account Brayton abandoned the use of gas and substituted light oils. Although the danger of explosion was thus removed, new difficulties arose due to the rapid accumulation of soot in the cylinder which cut the latter. A great num¬ ber of Brayton engines have been built by the Ready Motor Company of New York. The over-all efficiency of this engine was about 6 per cent.

Otto Engine. — Otto's aim was to use the en¬ tire stroke for the explosion and expansion. To obtain this he built an experimental machine in which the engine turned forward for the in¬ take ; then the yalves were closed and the fly¬ wheel turned backward to compress the mix¬ ture, which was then ignited by hand. The effect was surprising. The ignited mixture, on account of the compression, exploded with such

violence that the wheel rotated for some time at high speed. This was the more surprising, since, when the engine was operated without compression, it ran at a low speed. So by these experiments, 1861-62, Otto arrived at the com¬ pression of the charge before explosion, igni¬ tion at the dead-centre and the accomplishment of the charging, compression, combustion and discharging events in one cylinder — in short, he came onto the cycle which is the very foundation of the internal combustion engine development. Great mechanical difficulties, however, prompted Otto to drop his work on this engine and to devote his time to the de¬ velopment of the free piston engine described above. Fifteen years later, in 1877, Otto again took up the work on the four-stroke cycle and succeeded in perfecting the engine

so favorably known throughout the world. One of the first new Otto engines is shown in Fig. 55. It is a

has opened the gas valve, g, so that gas and air enter the cylinder simultaneously at the end of the stroke. Now the slide valve, b, closes the port, i, and the charge is compressed into the clearance space by the returning piston. Dur¬ ing this time the slide valve, b, has moved to the right, and the ignition port, h, is opposite the port, i, so that the flame is carried through, i, into the clearance space, a. Ignition occurs on dead centre and combustion takes place at almost constant volume. At the end of the ex¬ pansion stroke the valve, c, is opened and ex¬ haust occurs during the next stroke. The burnt gasses in the combustion chamber cannot be ex¬ pelled, but remain and become a part of the next charge. Governing is by the (

Fig. 55. — Otto Engine, built 1884, 8 B.H.P. at 170 R.P.M.

horizontal, one-cylinder, four-stroke cycle gas engine, consisting of cylinder with water jacket, piston, piston-rod, crosshead, connecting-rod, crankshaft, flywheel, frame and timing gears. The cylinder has a clearance space, a, of about two-thirds of the piston displacement. The en¬ trance of the gas and air, as well as the ignition, is controlled by the slide valve, b. Exhaust takes place through the valve, c, both valves be¬ ing operated from the half-speed shaft, /, by means of the crank, d, and the cam, e, respec¬ tively. The gas valve, g, is operated by the cam g1. At the beginning of the intake stroke the exhaust valve, c, is closed, while the slide valve, b, has moved its air canal to communicate with the channel, i, of the cylinder head. Air alone is drawn in for the first part of the stroke, which is supposed to force the burnt gases of the clearance space against the receding piston. In the meantime the valve, /, has moved far enough to open the gas inlet, while the cam, g' ,

capacity of cylinder and improvement of con¬ struction. To-day Otto engines show over-all efficiencies of 28 per cent to 30 per cent. In 1878 the largest engine sold was 4 horse power ; 1880, 20 horse power; 1885, 80 horse power; 1889, 100 horse power; 1893, 200 horse power; 1900, 1,000 horse power; in 1912, 6,000 horse power in the double-acting four cylinder units were delivered. Fig. 56 illustrates a double- acting, four cycle, high-powered gas engine of American make.

Holzwartli Gas Turbine. — The recent great success of the steam turbine has aroused not less interest in the internal combustion turbine again, while from a thermodynamical point of view the

problem of the gas turbine is not worse and not better than that of the recipro¬ cating gas engine, however, the mechanical aspects offer less encouragement. The com¬ bustion of fuel in the gas turbine may take place at constant volume without or with com-

pression of the charge or at constant pressure. The only gas turbine of considerable size which has yet appeared is the one systematically de¬ veloped by Hans Holzwarth. It is of the ex¬ plosion (constant volume), compressed charge type with a nominal output of 1,000 horse power at 3,000 revolutions per minute, gas and air are separately compressed by compressors and forced into a number of combustion cham¬ bers arranged annularly around a vertical shaft, on which a horizontal turbine wheel is fixed. Each combustion chamber contains gas and air inlet valves, spark plugs and a nozzle valve. The latter is closed during the charging period. The explosion pressure forces it open, thus enabling the high-tension gases to pass through the small nozzle on the turbine wheel at high velocity. After having given up their energy to the wheel the burned gases escape into the at¬ mosphere. Governing is effected by throttling the gas or by cutting out the spark. The over¬ all efficiency is said to be 4 per cent. This low value is mostly due to the mechanical complica¬ tion inherent in this type of internal combus¬ tion engine.

Humphrey Gas Pump. — During the Brussels Exposition in 1910 there was exhibited a new type of pumping engine, using the work de¬

veloped by the explosion of a gas-air mixture for the lifting of water. It is known as the Humphrey Gas Pump. Since that time this gas pump has gained a world-wide reputation. It has been introduced into this country and greatly improved by American designers. Its operation can best be understood by reference to Fig. 56. The pump consists of a vertical gas cylinder, A, with inlet and outlet valves, B and C. These valves interlock with each other. On the water side of the pump there is a suction pipe, D, a number of suction valves, S, and a

pressure pipe, E, connecting the cylinder with the pressure tank, F. The water column, G, forms a gas-tight piston. To start the engine the combustion chamber must be filled with an explosible gas-air mixture, having the pressure, p2. This mixture is ignited and the pressure, due to the combustion, suddenly increases to pi. While this takes place the volume will scarcely change so that combustion practically occurs at

constant volume. The water column, owing to the increased pressure on its surface, is rapidly accelerated and the gases expand to volume Vo and pressure po.

As soon as the gas pressure has become less than that of the atmosphere the exhaust valve on the top of the cylinder and the suction valves on the water inlet tank begin to open auto¬ matically. The inflowing water follows the moving water column and fills the gas cylinder up to volume Vi, thus partly replacing the burned gases. The hydrostatic pressure from the water tank reverses the water column closing the water inlet valves and forcing the inert gases out through the exhaust valve. Reaching the exhaust valve, the water seals the outlet and consequently the remaining gases are compressed to the volume Z4 and the pres¬ sure. p*. Now the water column reverses again. Re-expansion of the compressed gases takes place and the pressure falls below that of the atmosphere. The mixture inlet valve, B, opens and a new charge is taken in until the volume Vi is filled. The water column reverses again and compresses the charge to volume v2 and pressure pi. Ignition occurs and the cycle is started over again. The engine works on the four-cycle principle, the expansion and com¬ pression occurs, theoretically, along adiabatic curves, and the cycle is carried on by the oscilla¬ tion of the water column due to the changes of pressure. The action of the pump is not altered if instead of delivering into the ele¬ vated tank it is discharged into an air vessel. The pump has the advantage of being capable of handling enormous quantities of water. In the large pumps installed near the city of Lon¬ don, 15 tons of water are discharged at each working stroke.

Daimler Engine. — All important gas engine inventors, as Otto and Brayton, modified their engines in order to use liquid fuel. It re¬ mained, however, for Daimler, the pioneer auto¬ mobile engineer and former manager of the Otto Gas Engine Works, to develop the first gasoline engine of the Otto type for automotive work. The main characteristic of the Daimler engine was its high speed. Contemporary gas engines were running at 150 revolutions per minute, while Daimler increased the speed to 800 revolutions per minute. This meant a con¬ siderable reduction in weight at equal power output, yet, on the other hand, a higher strain was set up in the various parts of the engine, necessitating better materials of construction. Thus the Daimler engine incidentally gave also the impetus for the development of high-grade materials without which the present day auto¬ motive engines would be impossible. Daimler's first engine, built in 1884, was of the horizontal one-cylinder type, and differed from the orig¬ inal Otto engine only in speed, weight, fuel and valve gear mechanism. Later he constructed vertical engines pf the twin cylinder V-form,

Fig. 56 Two Double-Acting, Twin Tandem, Gas Engines

Fig. 58 Part Sectional View of a Four Stroke Cycle Automobile Engine

Fig. 63 520 Brake Horse Power — Diesel

Fig. 64 Type B stationary engines have a single box frame for the entire set, as shown in the illustration, with a multiple-stage air compressor for the fuel injection driven directly from a crank on the end of the main shaft

and the four cylinder all in line type. The latter has gradually been developed to the stand¬ ard automobile engine of to-day (see Fig. 58), running at a speed of 600 revolutions per minute to 3,000 revolutions per minute. Start¬ ing at the left and upper part, cylinder No. 1 is the outside view. Cylinder No. 2 is cut away at the front, showing the poppet valves, H and Hi, controlling inlet and outlet of gases, re¬ spectively; the valve chamber, Hi and Hz', the valve seats, Ho and Hi ; the spark plug Ji ; valve springs, S ; the push rods, Hz and Hz', the push rod guides, H » and Hz', and the cams, G3 and G4. Cylinder No. 3 is cut through its centre, thus showing the piston, B; the wrist- pin, Bz', the connecting rod, C; the cylinder, A; the waterjacket, K; the combustion chamber, As and the cylinder head At. The crankshaft, F, is a high grade steel forging and has three main journals, Fz, and four crankpins, E. The valve timing or half-speed cam shaft, G, driven through gear, Gz. by pinion, Fi, on crankshaft, F, has three main bearings, Gz. The four in¬ let cams Gz, and the four outlet cams, Gi, are fixed to this shaft. At the lower end of each of the connecting rods, C, is a splasher or oil dipper, Cs. The crankcase, M, encloses the base of the engine. Splash troughs, L, are in the bottom of the crankcase beneath each con¬ necting rod, C. The oil reservoir, or sump, Mi, is located beneath the crankcase. The parts requiring lubrication are the crankshaft bear¬ ings, crank-pin bearings, piston pin bearings, cam-shaft bearings, timing gears, cams, valve- lifter guides, pistons, piston rings and cylinder walls.

In almost all gasoline* engines the intake of fresh gas to the cylinder and the exhaust of the

Spark

Plug

Intake

Manifold

Piston

Piston Con¬ necting Rod

Crankshaft

Outer Sleeve

Inner Sleeve

Connecting Rod, to Operate Outer Sleeve

Connecting Rod, to Operate In¬ ner Sleeve

Eccentric

Shaft

Fig. 59. — Sectional View of Cylinder in Willys- Knight

Motor.

inert gases from the combustion chamber are governed by clashing <(poppet® valves. These valves are rather nois}r To eliminate this noise in automobile engines, Charles Y. Knight invented (

advantages, have proved to be noiseless. Two cylindrical sliding valves glide silently up and down between the cylinder wall and the piston, one working within the other. Ports or open¬ ings in these sleeves register with each other and with the cylinder ports at proper inter¬

vals, forming large and unobstructed passages for intake and exhaust gases. The operation of the sleeve valves is clearly explained in the accompanying illustration, Fig. 59. Fig. 60 shows a four cylinder four-cycle gasoline en¬ gine as adapted to airplane requirements. The weight of the engine has been reduced to three and one-half pounds per horse power. At a normal speed of 2,100 revolutions per minute the engine develops 125 horse power with a bore of four and three-quarter inches and a stroke of seven inches. By means of a gear reduction, the speed of the propeller shaft is reduced to 1,210 revolutions per minute.

Diesel Engine. — Dr. Rudolph Diesel of Munich, Bavaria, published in 1893 a book : ((The Theory and Design of a Rational Heat Engine,® in which he described the principles of an ideal internal combustion engine, for the efficient operation of which he formulated the three main requirements. (1) Creation of the highest temperature in the cycle by mere com¬ pression of pure air and not by combustion of the charge. (2) Gradual introduction of atomized fuel into the highly compressed and consequently highly heated air in such a way that the temperature of the charge remains constant. (3) Proper selection of the air-gas ratio to allow a practical operation of the en¬ gine without using a waterjacket.

The compression pressure of this ideal en¬ gine was 250 atmospheres and the thermal effi¬ ciency 73 per cent. Dr. Diesel expected con¬ siderable trouble due to the high pressures, consequently he proposed another <(approxi- matively ideal® cycle with lower compression pressure and efficiency. Patents granted to Diesel enabled him to form a partnership with the Maschinen Fabrik Augsburg and Friedrich Krupp of Essen. After several years of very difficult and tedious experimental work, Diesel found out that his ideal engine could, not be realized. The oil engine, however, which was developed bv him and his associates between 1893 and 1898 showed an over-all efficiency of 32 per cent, and thus turned out to be by far the most efficient heat engine yet built.

In Figs. 61 and 62 an early type of Diesel engine working on the four-stroke principle is illustrated. The main parts of the engine can be clearly recognized in the transverse section Fig. 61. They are the crankcase, the frame

bearings, the vertical shaft, c, driving the hor¬ izontal camshaft, H, and the governor, M , the air inlet valve, E, and the exhaust valve, A. The air furnished bv the air compressor at a pressure of about 1,000 pounds per square inch

with waterjacket; cylinder liner and cylinder cover, the piston with the wristpin, connecting rod and crankpin, the two-stage air compressor, L, driven by the connecting rod by means of a walking beam, the camshaft, H, with the cams,

must be cooled before it is stored in the air flasks. . By means of pipes

the compressed air is carried from the flasks to the starting valve, F, and the fuel needle, B. To start the engine the piston must be moved slightly out of dead

Fig. 65.— 170 H.P. Two-Cycle Diesel Engine, One Cylinder, Horizontal Type.

S, and the fuel pump (not shown), the starting valve, F, and the fuel needle, B, operated by the levers D and V, respectively. In the longi¬ tudinal section Fig. 62 there are shown the crankshaft with flywheel and pulley, the three

centre and the hand lever, G , laid down in the horizontal position. This throws the needle valve out of action and brings the lever arm D in contact with the starting cam, thus put¬ ting the starting valve in operation and allow-

ing compressed air to enter the cylinder. The piston begins to move down and the speed of the engine increases. After the latter has made several revolutions the hand-lever G is turned back into the vertical, the operating position, in which the fuel needle is in regular operation and the starting valve at rest.

In this country the Busch-Suker Bros.- Diesel Engine Company is the original and was, from 1898 to 1911, the only company manu¬ facturing Diesel engines in America. It owns all United States patents granted to Dr. Ru¬ dolph Diesel, and is closely associated with the old firm of Sulzer Brothers of Winterthur, Switzerland, with which it is in intimate co¬ operation. After the original United States Diesel patents had expired in 1912, many other engine concerns took up the manufacture of the Diesel engine. Figs. 63 to 65 illustrate some re¬ cently designed Diesel engines of American make.

Bibliography.— Clerk, Dugald, (The Gas, Petrol, and Oil Engine) (New York 1909) ; Giildner, H., (The Design and Construction of Internal Combustion Engines5 (New York 1910); Dubbel, H., (High Power Gas Engine: Theory, Operation and Construction (New York 1914) ; Carpenter, R. C., and Diederichs, H., (Theory, Construction and Operation of Internal Combustion Engines) (New York 1909) ; Heldt, P. M., (Gasoline Motor: Its De¬ sign and Construction (Nyack, N. Y., 1916) ; Diesel, R., (The Development of the Diesel En- gine) (Berlin 1913); Supino, G., (Motori Diesel: Theory and Construction (London 1913); Chalkley, A. P., (Diesel Engines for Land and Marine Work)

(New York 1912) ; Holzwarth, H., (The Gas Turbine: Theory, Construction, and Records of the Results Obtained from Two Actual Machines1* (Philadelphia 1912) ; Supplee, H. H., (The Gas Turbine5 (Philadelphia 1910) ; Latta, N., (American Producer Gas Practice5 fNew York 1905) ; Junge, F. E., (Gas Power: A Study of the Evolution of Gas Power5 (New York 1908).

A. F. Greiner,

Assistant Professor of Mechanical Engineering, University of Michigan.

INTERNAL REVENUE DISTRICT.

See District.

INTERNAL REVENUE SYSTEM. The

system of taxation in the United States, which goes by this name, was the outgrowth of neces¬ sity and of the administrative genius of Alex¬ ander Hamilton. The law of 2 Sept. 1789, creating the Treasury Department, had been drawn by him, and with such precision and comprehensiveness that but few changes have since been made in its substance or language. The young Secretary considered it to be the duty of the new national government to assume the obligations incurred by the States in the prose¬ cution of the War of Independence. Notwith¬ standing the void in the Federal Treasury and the straitened finances of the country at large, he had prevailed on Congress, after a bitter struggle, to become responsible for the pay¬ ment of about $24,500,000 of debt, which the States were unable to meet and had practically repudiated. The new government itself was little better off. The revenues from customs were inadequate ; the nation was poor and im¬ ports were small. Hamilton's suggestion was to

place an excise on domestic distilled spirits. Though there was as yet no formal differen¬ tiation of political parties, the antagonism be¬ tween the broad and strict constructionists of the Constitution was already manifesting it¬ self. The design of the Secretary to exercise, within the States, as well as at ports of entry, the taxing powers which he believed to reside in the Federal government, met with strong re-sistence. from the Anti-Federalists, who regarded the project as unwarrantably intrusive into the domestic affairs of the States. Moreover, the opposition obtained the support of powerful business interests and of a considerable body of public opinion. There were about 100 dis¬ tilleries in Massachusetts alone, most of them in

Boston, where West Indian molasses (ex¬ changed by Yankee traders for their exports of fish and lumber) was converted into New England rum. In the West and South whisky was made from grain at hundreds of stills in commercial quantities. Rum and whisky were articles of general consumption. The first bill, introduced in Congress in 1790, was defeated; but before the end of the session, by the act of 3 March 1791, Hamilton had secured a meas¬ ure imposing a tax on distilled spirits, gradu¬ ated from 11 to 30 cents per gallon, according to alcoholic content and the origin of the raw material, domestic or foreign. Although the impost weighed more heavily on rum, made from imported molasses, than on whisky made from home-grown corn, the demonstrations against it became particularly violent in the Alleghany and Cumberland mountain regions. In September 1791 a revenue officer was tarred and feathered in western Pennsylvania, as a defiance of the government. The incipiency, progress and suppression of the Whisky Re¬ bellion (q.v.) it is not proposed here to dis¬ cuss. Suffice it to say that, when it collapsed in September 1794, it left the right of the Fed¬ eral government to levy excise on domestic products and within the States firmly estab¬ lished. The right to tax whisky was never thereafter questioned, except by the ((moon- shiners55 of the Appalachian highlands, whose conflict with the <(revenuers55 has continued to this day.

Having obtained recognition for the prin¬ ciple, Secretary Hamilton proceeded to give it wider application. An excise laid in 1794 on carriages used for pleasure or ostentation was assailed as unconstitutional ; but the Supreme Court (Hylton v. U. S., 3 Dallas, 171) sus¬ tained the act. The objection that the tax, being direct, should have been apportioned among the States according to population, evoked from the court the remark, that the only taxes it could conceive to be direct were head taxes and land taxes. In 1794 also laws were passed imposing excise taxes for selling at retail foreign wines and liquors ; an excise of 8 cents a pound was laid on snuff; an internal revenue duty of 2 cents a pound was laid on sugar refined in this country, also a tax on sales by auction. By the law of 6 July 1797, ((stamped vellum, parchment or paper55 was re¬ quired to be used for a great variety of legal documents and negotiable instruments. In these several laws the internal revenue system, as it ultimately took form, was broadly outlined. All of these enactments were repealed, however, on 6 April 1802, little more than a month after

the inauguration of Jefferson as President and the ouster of the Federalists. The revenue derived from internal taxes in the few years they were actually collected amounted to $6,325,- 000, besides which about $700,000. though as¬ sessed remained unpaid at the time of the repeal. The financial necessities of the govern¬ ment, occasioned by the War of 1812, com¬ pelled recourse once more to forms of taxa¬ tion other than customs dues. Nearly all the excises of Hamilton's internal revenue system were reimposed in 1813 and, for the first time, home industries other than the distilleries and snuff factories were taxed. There was a new tax on carriages, now including the harness; on boots and leather, beer, candles, caps and hats, parasols and umbrellas, paper, playing cards and saddles and bridles ; also on watches, jewelry, gold, silver and plated ware. Stamped paper was required for bonds, bills, notes and other commercial instruments. Here are all the incidences of taxation, which have become characteristic of the internal revenue system ; but its mainstays, then as later, were the whisky and tobacco taxes. After the war they were all repealed and, thenceforward, until 1861, the ordinary revenues of the Federal government were derived exclusively from the customs.

The act of 5 Aug. 1861 was primarily in¬ tended to (temporarily) increase duties on im¬ ports ; though it also imposed a direct tax of $20,000,000, to be assessed on land and col¬ lected for the government by the States. The law of 1 July 1862, however, which is entitled: <(An act to provide internal revenue for the sup¬ port of the government and to pay interest on the public debt,® was a conscious effort to establish a new system of Federal taxation. It created the office of Commissioner of Internal Revenue in the Treasury Department and pro¬ vided for an organization of colP tors and in¬ spectors, which has been maintained sub¬ stantially as first organized up to the present time. The tax on whisky was fixed by the Internal Revenue Law, as the act was called, at only 20 cents per proof gallon, probably fol¬ lowing the precedent of the law of 1813 ; but this tax was increased by three successive en¬ actments in 1864, first to 60 cents, then to $1.50 and, finally, to $2 per gallon, where it remained until 1868. The newly developed oil industry received marked attention, for quite as heavy a tax was placed on illuminating and lubricating mineral oils (20 cents per gal¬ lon) as was originally placed on whisky; more¬ over, refiners of oil were subjected to all the provisions applicable to distillers of spirits with respect to special (license) taxes, bonds, re¬ turns, assessments and removals to and with¬ drawals from warehouses. All other illuminants then in common use, such as gas and candles, were likewise taxed, but this accorded with the general policy of the act to obtain revenue from

everything in sight. It taxed bar, hoop and sheet iron, steel, wire, wood screws and cut nails ; locomotives and marine engines and boilers ; brass tubing and lead pipe, textile fab¬ rics, clothing and trimmings, felt hats, silk hats and bonnets, hides, leather and factory-made shoes, hoopskirts, diamonds, jewelry, watches and gooseberry wine ; also sugar, ground spices, chocolate and drv mustard. The products of domestic agriculture, cotton ex¬ cepted, went free and farmers were unlicensed ;

but special, or license, taxes were placed on practically all other occupations. The butcher, the baker and candlestick maker (this is a literal truth) had to pay, and so did the doctor and lawyer. The stamp taxes were expected to yield $20,000,000 a year, but they produced twice that amount. All legal documents, all kinds of commercial instruments, including checks and receipts, bonds, insurance policies, conveyances and mortgages had to be stamped; and, if un¬ stamped, the law declared them void and for¬ bade them being placed on record or used as evidence. The law also imposed dues on suc¬ cessions and legacies, and a tax of from 3 to 5 per cent, graduated to their amount, on incomes. Most of these were, and so intended to be, war taxes. Reductions began to be made in 1866 by the first Congress that met after the restora¬ tion of peace. Many of them were abolished in 1867 and 1868 and practically all of them, including the tax on incomes (but excluding the stamp taxes and the excises on whisky, to¬ bacco and beer) were lifted by the law of 14 July 1870.

The Internal Revenue Act and its successful enforcement had demonstrated the wide scope of the taxing powers of the Federal govern¬ ment. Its right to lev}r tax on incomes was not successfully assailed until 1914, when the Su¬ preme Court declared the Income Tax Law passed that year to be unconstitutional. Most of the stamp dues were abolished in 1872, the long¬ est to continue being those on checks, toilet arti¬ cles, patent medicines and playing cards. The taxes on whisky, beer, manufactured tobacco and cigars became the enduring features of the Federal system of internal taxation ; and they were the most productive. The largest amount collected under the Internal Revenue Law of 1862 in any year was in 1866, before any of the war taxes had been abolished, when $310,000,- 000 was turned into the Treasury from this source. The total collections in the 30 years following 1864, when the original act of 1862 obtained its final form, amounted to approxi¬ mately $4,550,000,000, of which two-thirds was derived from whisky, beer and tobacco. By the act of 13 July 1866, stamps were first re¬ quired to be affixed to beer kegs as evidence of payment of the tax on the contents. The result was so satisfactory, in this particular, that two years later tax-paid stamps

were re¬ quired to be affixed to the original packages of distilled spirits when taken out of bond, and to each box or other container of cigars and manufactured tobacco before the goods left the factory where they were made. As a sub¬ stitute for, or as an additional check on, the •elaborate systems of accounting employed to prevent frauds on the revenue, the tax-paid stamp has abundantly proved its usefulness. Its efficiency came into question in 1875, when the ((Whisky Ring® trials disclosed a jugglery with distillers' and rectifiers' stamps (which are not tax-paid but merely certify the contents of the packages) whereby the government had been defrauded of many millions. The success of the frauds was due, however, to the corruption of revenue officers as well as to defects in the stamp laws. Since the introduction of new checks, suggested by the experience with the <(Whisky Ring,® there have been no serious losses in the collections. This is remarkable in view of the fact that the tax on distilled spirits,

which was finally set at $1.10 per gallon, where it remained fixed for 40 years, amounted to about four times the first cost of the product. The internal revenue system be¬ came one of the most productive taxing systems of the world. The collections steadily increased and in ratio to the growth of the nation in population and wealth ; and for the fiscal year ended 30 June 1914, the last under normal conditions, they amounted to $305,491,548. This was exclusive of the new in¬ come tax, for the laying of which authority had to be obtained by amendment of the Con¬ stitution. The collections from customs in the year mentioned amounted to $292,320,015 — about $13,000,000 less than the internal revenue taxes. The administration of the Internal Re¬ venue Law is complicated and requires the em¬ ployment of a large field force of inspectors, gaugers, etc., besides the office forces at Wash¬ ington and in the numerous collection districts. Nevertheless, the cost of administration or¬ dinarily does not exceed 2Y\ per cent of the amount collected, which is about two-thirds of the cost of collecting the customs. The inter¬ nal revenue system on all occasions has proved its adaptability to national emergencies. Dur¬ ing the Spanish War the collections from this source were readily increased from the normal of $170,900,641, in 1898, to $273,437,161, in 1899, to $295,327,926, in 1900, and $307,180,683, in 1901. In the American fiscal system the inter¬ nal revenues took the place occupied by the in¬ come tax in the calculations of British budget makers. Though the increase of internal rev¬ enue taxes is not as

simple as the addition of a penny to the pound to the income tax rate, our system has been fairly elastic. It obtained its flexibility by the raising and lowering of the taxes on beer and tobacco, as occasion required, and the imposition and remission of stamp duties. The income tax has now become a permanent source of revenue for the Federal government, and this tax alone has the elas¬ ticity necessary to meet a situation in which calls for hundreds of millons are superseded by calls for billions. Notwithstanding one may discern in the newly imposed taxes on war in¬ dustries, excess profits, pleasure vehicles, amuse¬ ments, jewelry and dispensable luxuries, and in the stamp dues, the old concepts of the originator of the system, though enlarged to a colossal scale.

Stephen Pfeil, Member of the New York Bar.

INTERNATIONAL ARBITRATION.

See Arbitration, International.

INTERNATIONAL BOUNDARY TRI¬ BUNAL. See Alaskan Boundary Commis¬ sion.

INTERNATIONAL BROTHERHOOD OF MAINTENANCE-OF-WA.Y EM¬ PLOYEES, an American labor union, having a department of fraternal insurance. It was founded at Demopolis, Ala., in 1887 and in July 1914 had an American membership of 7,291 and a Canadian membership of 7,415 ; total 14,706. Since its organization it has disbursed more than $500,000 in death and disability benefits. It has secured increased wages for maintenance- of-way employees to the amount of $6,000,000 annually. It was actively engaged in the great strike on the Canadian Pacific Railway in 1901.

The strike was settled after a struggle lasting 11 weeks, with the understanding that all mem¬ bers of the brotherhool would be reinstated in their former positions within two weeks; the question of wages to be left to arbitration. Sir John A. Boyd, chief justice of Ontario, was chosen chairman of the board of arbi¬ tration and awarded the employees an increase of 20 per cent over previous wages. The brotherhood holds a charter of affiliation with the American Federation of Labor and pub¬ lishes the Advance Advocate, a magazine de¬ voted to the interests of maintenance-of-way employees.

INTERNATIONAL CLAIMS AND DISPUTES. The organization of the world into national states, their close interdependence and the

conflicting interests arising during a war, have often led to disputes or the commis¬ sion of some act or injury by a foreign gov¬ ernment, or its citizens, against the United States. In some cases trouble has arisen be¬ tween a citizen of the United States and one of a foreign country. This may take on an in¬ ternational character when officially recognized and prosecuted by our government. In either case claims arise which often involve a money payment. Settlement is made either through diplomatic agencies, treaties, conventions or by referring the matter to a court of arbitration.

The first important claims made by the United States against a foreign power were provided for in the treaty concluded by John Jay with Great Britain, 19 Nov. 1794. Pro¬ vision was made for three arbitrations involv¬ ing, first, questions relating to boundaries ; second, the claims of Great Britain on account of confiscated debts; and third, the subject of neutral rights and duties. Commissions were appointed, the first giving its decision 25 Oct. 1798, declaring the river Schoodiac, under the name Saint Croix, to be the one intended as the boundary between the United States and Canada. The second commission met at Phil¬ adelphia, but came to no decision regarding the claims of British subjects as to their con¬ fiscated debts. This matter was settled later by treaty concluded 8 Jan. 1802, with an award of £600, 000 to Great Britain in satisfaction of its citizens' demands. The third tribunal sat at London and decided the case of each Ameri¬ can claimant on account of captures made under the Orders in Council, and the British claims against the United States on account of the latter's failure to enforce its neutrality. American claimants recovered $11,650,000, while the aggregate of the awards against the United States appears to have been $143,428. 14. Simi¬ larly the Treaty of Ghent, 24 Dec. 1814, pro¬ vided for three arbitrations between the United States and Great Britain relating to the owner¬ ship of certain islands and to boundaries.

The most famous of the claims of the United States against Great Britain was the so-called Alabama claims. This case was brought before the Geneva tribunal (1872). The claims were based on accusations respect¬ ing the failure of Great Britain to enforce strict neutrality during the Civil War by allowing the Confederate government to have vessels constructed in British ports; by failing to pre¬ vent their departure and seizure ; and by allow¬ ing them to be fitted out as privateers, with

equipment and supplies obtained in British ports and conveyed to them in other vessels. As a result many American vessels were captured or destroyed. Great Britain at first denied that she had been guilty of any neglect. In Janu- uary 1866, Secretary Seward proposed that the Alabama claims be submitted to arbitration, and in 1869 a convention provided for a general arbitration of the claims of the United States against Great Britain. This proposal was re¬ jected by the Senate. Finally Secretary Fish arranged, in 1870, for the appointment of a joint high commission to settle all differences between the United States and Great Britain. Each government appointed five high commis¬ sioners, who met at Washington, 27 Feb. 1871, and after discussion signed the Treaty of Wash¬ ington 8 May 1871, providing for arbitration of the Alabama and other claims. Great Britain apologized for the escape of the Ala¬ bama and other Confederate cruisers from Brit¬ ish ports. She admitted that a neutral govern¬ ment was bound to use ((due diligence in the

performance of its duties.® The claims for damages were to be submitted to five arbi¬ trators. The United States was represented by Charles Francis Adams. The other arbi¬ trators were appointed by the queen of Eng¬ land, the king of Italy, the president of the Swiss Confederation and the emperor of Bra¬ zil. The arbitrators met at Geneva and found that there had been negligence on the part of Great Britain, especially in respect to three Confederate cruisers, the Alabama, the Florida and the Shenandoah and awarded the United States $15,500,000.

Another dispute with Great Britain was over questions affecting the free use of the seas, involving the fur seal arbitration. The United States claimed jurisdiction over the Bering Sea, with power to protect seals outside the three-mile limit. Great Britain disputed both claims. Negotiations for arbitration led to the Convention of 29 Feb. 1892, which referred the controversy to a tribunal of seven arbi¬ trators. This tribunal met in 1893 and decided that the United States had no property rights -n fur seals outside the three-mile limit, and prescribed regulations for the protection of seals for five years, by joint action.

Other disputes with Great Britain were those of the Northeastern Boundary, settled by the Webster-Ashburton Treaty in 1842; the Alaskan Boundary, settled by a commission 20 Oct. 1903, largely in favor of the United States, and the North Atlantic Coast Fisheries, settled by The Hague Court, 7 Sept. 1910.

The United States has had several disputes with France involving principally the question of claims arising from the destruction or cap¬

ture of American ships during the Napoleonic Wars. On 22 April 1793, Washington issued his proclamation of neutrality, but it was con¬ stantly violated by the fitting out of privateers, the condemnation of prizes by French consuls sitting as courts of admiralty and by the capture of vessels within the jurisdiction of the United States. The matter was complicated by the varying interpretations given to the treaty with France made in 1778, by Genet, the French Minister, and by the American government. Be¬ sides the claims arising from the destruction of vessels within the jurisdiction of the United

States some of our ships were captured or destroyed on the high seas by French privateers. James Monroe was appointed Minister to France by Washington in 1794 with instructions to demand compensation for captures and spoliation of property of Americans by French cruisers. Monroe was recalled and in 1796 Charles Cotesworth Pinckney was appointed Minister with instructions to press the claims for spoliation, but the Directory then in power refused to recognize a Minister from the United States. Meantime captures, confiscations and condemnation of vessels and cargoes occurred. A special mission was appointed by President Adams iff 1797 consisting of Charles Cotesworth Pinckney, John Marshall and Elbridge Gerry, who were instructed to secure a settlement of the spoliation claims, but theyr were unsuccess¬ ful.

Finally the mission composed of Elsworth, Davie and Murray, appointed 25 Feb. 1799, was instructed to secure compensation for all cap¬ tures and condemnations of vessels contrary to the law of nations. Napoleon appointed plenipotentiaries to negotiate and a convention was signed 30 Sept. 1800, providing for a future settlement and this was finally ratified by the Senate and the French government. In con¬ nection with the treaty of 30 April 1803, ceding Louisiana to the United States, two conventions were signed, one of which provided for the settlement of the spoliation claims. Commis¬ sioners were appointed, 18 May 1803, who sat at Paris, examined the claims and made awards. This was known as the French Indemnity of 1803. The amount finally paid by France was

$3,750,000.

The various decrees issued by Napoleon in retaliation for England's Orders in Council, especially those of Berlin, Milan and Ram- bouillet, resulted in the capture or confiscation of a large number of ships and their cargoes. The loss to Americans in consequence of the Rambouillet decree has been estimated to have been no less than $10,000,000. Between 1816 and 1829 several attempts were made by Ameri¬ can Ministers to France to settle these spoliation claims.

Finally the American Minister, Mr. William C. Rives, succeeded in persuading France to agree to the payment of 25,000,000 francs in six instalments, with interest on each from the date of the convention. Ratifications were exchanged at Washington, 2 Feb. 1832, and three commissioners were appointed by Act of Congress, 13 July 1832, to receive and examine claims. The labors of the commission proved to be very onerous and the whole period of its duration was about three years and five months. It reported, 7 June 1834, a list of claims presented, 3,148, of which 1,567 were allowed and 1,581 disallowed. Considerable difficulty and delays arose in connection with the payment of the six annual instalments by France, which led to threats by Jackson and recommendation of reprisals and finally to the breaking of diplomatic relations between the two countries. Friendly relations were re¬ stored, however, and the amount finally re¬ ceived from France with interest was $5,558,-

108.07.

The United States has had several disputes with the South and Central American republics, most of them growing out of filibustering ex-

peditions fitted out in the United States to aid in revolutions, Isthmian canal projects, bound¬ ary disputes and destruction of property of American citizens. An example of the first class' was the effort of the Central American repub¬ lics to checkmate the filibustering expeditions of William Walker, 1855-58, and their endeavors to induce the United States to take notice of his violation of neutrality laws. A second example was the dispute with Colombia over Canal Zone. A convention was negotiated 22 Jan. 1903, with Colombia, giving the United States the right to construct a canal across Panama, then a state in the Colombian Federation, to¬ gether with the <(use and control® of a zone of territory along the routes. For this privilege the United States was to pay $10,000,000 down and $250,000 each year, from 1913 on. Colom¬ bia failed to ratify the treaty. But four days after the Colombian Congress adjourned, a revolution occurred in Panama. American troops were landed and Colombian troops were prevented from landing. A few days later, 6 November, the United States recognized the Republic of Panama. On 18 Nov. 1903, a simi¬ lar treaty was negotiated with Panama, recog¬ nizing the United States <(as the sovereign over the territory® in question, a strip across the Isthmus 10 miles wide. By a treaty made January 1909, between Colombia and Panama and Panama and the United States, the latter granted Colombia $250,000 a year which had originally

been agreed upon in return for the rights granted in connection with the Panama Canal.

The United States has also been drawn into disputes with foreign countries involving South and Central American republics, because of the Monroe Doctrine; for example, the dispute be¬ tween Great Britain and Venezuela respecting the boundary of British Guiana. President Cleveland in 1895 insisted that under the Mon¬ roe Doctrine it was the duty of the United States to see that Great Britain did not take any Venezuelan territory that she was not en¬ titled to. Venezuela appealed to the United States and the latter offered its services as arbitrator. Great Britain at first refused either to recognize the right of the United States to be heard or to submit the question to arbitra¬ tion, but under pressure agreed to arbitrate, and in February 1897, an agreement was reached which granted to Great Britain most of the territory in dispute.

Claims of American citizens or corporations have frequently been made against South American republics, because of confiscation or destruction of property, especially in time of civil war.

A dispute with Italy arose, 15 March 1891, out of the shooting by a mob of several Italians in jail at New Orleans. They were awaiting trial for the murder of Mayor Hennessey, who had been investigating the operation of the Mafiosi, a famous secret society. The Italian government demanded punishment and indem¬ nity, though jurisdiction was with the State of Louisiana and recalled her Ambassador. Finally in 1892 the United States voluntarily paid an indemnity of $24,000 to Italy and friendly re¬ lations were restored.

Bibliography. — – Moore, John Bassett, his¬ tory and Digest of the International Arbitra-

tions to Which the United States Has Been a Party) (6 vols., Washington 1898), (A Digest of International LawJ (7 vols. and index vol., Washington 1906), and (The Principles of American Diplomacy) (New York 1918) ; Latane, John H., (The Forcible Collection of International Debts) (Atlantic Monthly , 98: 5421) ; Malloy, William M., (Treaties, Conven¬ tions, International Acts, Protocols and Agree¬ ments Between the United States and Other Powers, 1 776—1909 } (2 vols., Washington 1910) ; Garfield, Charles, Supplement to the above, 1910-13 (Washington 1913). For extended bibliographies consult Griffin, A. P. C., (List of References on International

Arbitrations) (Washington 1908).

Marcus W. Ternegan,

Associate Professor of History , University of

Chicago.

INTERNATIONAL CODE. A code of international law published in 1910. See Code, International.

INTERNATIONAL COPYRIGHT. See

Copyright.

INTERNATIONAL CORRESPOND¬ ENCE SCHOOLS. See Supplemental Edu¬ cation.

INTERNATIONAL DATE LINE. The

imaginary line at which dates change, being made later by one day by those who cross the line from east to west and earlier by one day by those crossing it from west to east. It is a somewhat irregular line drawn through the Pacific Ocean in a general northerly and south¬ erly direction and separating the islands of the Pacific Ocean in such a manner that all those lying to the east of it carry the same date as the United States, while all those on the west of it carry the same date as Japan and Aus¬ tralia. If a person start at midday, that is, when the sun was shining perpendicularly on the meridian that passes through the place of starting, and travel westward, keeping pace with the sun, thus keeping the sun directly over the meridian of the place at which he might be, he would make a complete journey around the globe in twenty-four hours and return to his place of starting at noon the next day. Twenty- four hours would have passed, but to the trav¬ eler the sun would have been shining perpen¬ dicularly as at noon all the time ; and the ques¬ tion arises, when or at what point did the trav¬ eler change from noon of one day to noon of the next? For instance, if he should start at Monday noon and keep the sun in the zenith, he would arrive at the place of starting Tues¬ day noon — it would be noon-day to him dur¬ ing the whole journey of 24 hours. Monday noon would change to Tuesday noon without an intervening night; where would the change occur? It is to him apparently still Monday noon and to obtain the correct date he must drop a day. The reason for dropping a day can be more fully shown as follows: Remem¬ bering that the earth makes one complete revolution on its axis in 24 hours and thus the sun in its apparent diurnal revolution moves over 360 degrees of

space in 24 hours, it thus moves over 15 degrees of space in one hour, from which it is evident that the difference in longitude which causes the difference in the relative time, may be estimated in time, allow-

ing 15 degrees to an hour, or one degree to four minutes. Therefore, suppose a man start¬ ing from any given point travel one degree west, his watch, instead of marking 12 o'clock at noon, according to the correct time at that place, would mark four minutes after 12. Let him travel west 15 degrees, and he will find that one o'clock by his watch will be noonday by the sun. Let him go on to 120 degrees and when the sun is in the zenith his watch will indicate eight o'clock p.m. Completing his journey around the globe, he will have gained, in this manner, 24 hours. From this it will be seen that in order to obtain the correct date 24 hours must be subtracted from his time. On the other hand if a person could travel east¬ ward at the same speed with which the sun apparently travels westward (the same rate of speed with which the earth revolves on its axis), if he should start on his journey at noon¬ day, he would meet the sun when exactly on the opposite side of the earth from the place of starting and continuing the journey would again meet the sun at the place of starting, thus seeing three noondays within the 24 hours, or apparently gaining a day. This we know to be impossible, since only 24 hours of time have passed, while in reality an extra period of light has been gained and thus to obtain the correct local date a day must be added to your time. From this we see that, for every time a person travels around the earth in either direc¬ tion there is a difference in time of one day and the result is the same regardless of the rate of speed. To avoid the confusion of dates which must necessarily result from this con¬ stant gain on one side and loss on the other, it has been proposed to determine upon some line at which eastern bound travelers shall add one day and westward bound travelers shall drop a day from their reckoning and thus prevent a disagreement in regard to the day of the week. The line at which this addition or subtraction shall be made is what is meant by the date line.

The dates in use upon most of the Pacific Islands and groups of islands are those which result from those carried by the first European or American colonists, these dates differing according as the colonists came from the east or the west. But, this is not time universally, because arbitrary changes are known to have been made in a number of cases, such as Alaska, the Philippines, etc. When Alaska was first

colonized by the Russians it had the Russian date. When American settlers moved there, they carried with them the date of the United States which led to considerable con¬ fusion, the Sunday of the Americans being the Monday of the Russians. In 1867, when the United States purchased Alaska from Russia, the date in use there was made to conform to that used in the United States.

INTERNATIONAL INSTITUTE OF AGRICULTURE, a world organization, with headquarters in Rome, Italy, founded in 1905, and having for object the collection and dis¬ semination of knowledge relating to agriculture in the various countries represented in the institute. In 1904 the idea of such an institute came to Mr. David Lubin (q.v.) of Sacra¬ mento, Cal., and his project found favor with the king of Italy. The latter gave a building m Rome and an annual income of $60,000. The

king called the first congress in 1905, and dele¬ gates attended from 40 countries. At the con¬ gress a treaty was formed making the institute a permanent organization and defining its scope and activities. The government of the institute is vested in the general assembly of delegates from affiliated countries, meeting every two years, and in a permanent executive committee, on which there is one representative from each country. This permanent committee has direct charge of the institute. The general officers are the president, who is also chairman of the permanent committee ; the vice-president and the secretary-general. The work of the insti¬ tute is divided among four bureaus: (1) The bureau of the secretary-general ; (2) the bureau of general statistics; (3) the bureau of agri¬ cultural intelligence and plant diseases, and (4) the bureau of economic and social institutions. The bureau of the secretary-general has charge of the personnel, financial and other routine business, the building and its equipment, the printing and distribution of publications, the library and general bibliographical work, and, as a more recent service, the preparation and publication of an annual compilation of agri¬ cultural legislation in the different countries of the world. The bureau of general statistics col¬ lects, collates and publishes statistics of pro¬ duction and commerce in agricultural products, both animal and vegetable, throughout the world. The bureau of agricultural intelligence and plant diseases collects and publishes in¬ formation regarding the progress of scientific and experimental investigations and practical experience in agriculture throughout the world and, as a branch of this work, gives special at¬ tention to the diseases of plants and to en¬ tomology. The bureau of economic and social institutions collects and publishes statistics and general information regarding agricultural co¬ operation, insurance and credit, together with other

matters relating to the economic and social organization of rural communities.

Those publications of the institute which have a bearing on the formation of the price of the staples (such as crop reports and data on exports, imports and stocks) are based ex¬ clusively on official information, supplied direct to ‘the institute by the adhering governments. The other publications are produced from the following sources: (a) Information officially communicated by the governments; (b) original articles contributed by eminent authorities des¬ ignated by the adhering governments ; (c) ex¬ cerpts and abstracts of articles translated from the 2,225 official and unofficial periodical pub¬ lications of the world received by the institute.

The institute prints and publishes two an¬ nuals and three monthly and one weekly bulle¬ tins, together with a considerable number of monographs on special subjects. The annuals deal with agricultural statistics and legislation, respectively; the monthly bulletins are on (1) agricultural statistics; (2) agricultural intelli¬ gence and diseases of plants, and (3) economic and social institutions, and the weekly bulletin is bibliographical. The monthly bulletins are published in French, German, English, Spanish, Italian and Hungarian. French being the official language of the institute, the editions in that language are paid for from the funds of the institute. Provision for the edition in the other languages is made by the countries

interested. The Congress of the United States has made an annual appropriation of $5,000 for translating and printing the English edition, the rest of the expense being borne by Great Britain and her colonies. The institute has col¬ lected a great library of the world’s best in agricultural literature. As the institute becomes more firmly established and its value as an international clearing-house on economic in¬ formation is more generally recognized it is met with a constantly increasing demand for the extension of its service along the many lines included in the broad movement of our day for agricultural advancement. The annual budget of the institute is now $250,000, con¬ tributed by the adhering governments, on the basis of units; thus the contribution of the United States is on the basis of 16 units. Con¬ sult (Senate Document No. 196, 63d Congress, First Session* (Washington 1913), from which the preceding account has been compiled, and (L’Institut International d’ Agriculture* (Rome

1912).

INTERNATIONAL JOINT COMMIS¬ SION. See Lake-to-Sea Commission.

INTERNATIONAL LANGUAGE, gen¬ eral term applied in modern times to artificial languages designed for facilitating intercourse between peoples whose national languages or mother speeches differ one from the other. These artificial languages aim toward facility of acquirement through general rules which admit of no exception although some are little less complicated than English for example. In this ‘encyclopedia the principal artificial lan¬ guages are treated under their own headings, as Soldrisol, Esperanto, Volapuk, Ro, etc. (qq.v.).

INTERNATIONAL LAW. In the judg¬ ment on appeal in the case of the Zamora the judicial committee of the English Privy Council said on 7 April 1916, that ((A court which ad¬ ministered international law must ascertain and give effect to a law which was not laid down by any particular state, but originated in the practice and usage long observed by civilized nations in their relations with each other or in express international agreement.® Practice and usage and international agreement are main sources of international law.

The statement that international law is not law is sometimes made on the ground that international law is not laid down by a sovereign state. It is nevertheless recognized as law by the highest courts of sovereign states. Such recognition is found not merely in recent but in early decisions. Lord Mansfield of Eng¬ land, in 1761, quotes Lord Talbot who says, <(That the law of nations, in its full extent, was a part of the law of England.® “That the law of nations was to be collected from the practise of different nations, and the authority of writers.® (Triquet v. Bath, Burrage, reports, 1478). Lord Russell of Killowen, the Lord Chief Justice of England, in 1896 defined international law as <(The sum of the rules ac¬ cepted by civilized states as determining their conduct toward each other, and toward each other’s subjects.® Later in 1905 Lord Alver- stone, the Lord Chief Justice, in the case of the West Rand Central Gold Mining Company said, “It is quite true that whatever has received the common assent of civilized nations must

have received the assent of our country, and that to which we have assented along with other nations in general may be called international law, and as such will be acknowledged and ap¬ plied by our national tribunals when legitimate occasion arises for these

tribunals to decide questions to which doctrines of international law may be relevant.® What is true of other states is. true of the United States. In 1796 Mr. Justice Wilson of the Supreme Court said, in the case of Ware against Hylton, ((When the United States declared their independence, they were bound to receive the law of nations, in its modern state of purity and refinement.® In 1900, in the case of the Paquete Habana, fol¬ lowing in this respect the case of Hilton v. Guyot of 1894, the Supreme Court of the United States said, “International law is a part of our law, and must be ascertained and ad¬ ministered by the courts of justice of appro¬ priate jurisdiction, as often as questions of right depending upon it are duly presented for determination.® It must be granted, therefore, that for the courts there exists international law and that this has been recognized for many years and is still recognized.

Naturally international law did not develop till the political entities called states had be¬ come fairly well established, as states are neces¬ sary parties to international relations. Evi¬ dences of some practices which have later re¬ ceived the sanction of international law are found in very early records of the countries of the East. As relations of states became closer, through the spread of commerce and the inter¬ course developed by the Mediterranean civili¬ zation, laws upon matters of common interest were accepted as necessary for the continuance of relations which were regarded as advanta¬ geous. In these early laws there was little of what might be called regard for theoretical rights of states. These laws usually grew out of the recognition of practical advantages in a certain line of conduct toward other states. As Rome became dominant there appeared in the law about the Mediterranean a unity due to the concentration of power at a single seat of government. This certainly furnished an ex¬ ample of the possibility of a degree of unity of law for different peoples. This law particularly reached to the relations of individuals in selling, buying, travel, etc. Under Roman jurists theoretical concepts gained influence. Jus gentium and jus naturale were expounded. The latter as embodying the law in harmony with the fundamental principles of existence had large influence upon the development of the theory of international law in later days and many books combined in their titles the law of nature with the law of nations.

Before Grotius (1583-1645) there were many who wrote upon matters relating to interna¬ tional affairs. Among these are the well-known names of Victoria (1480-1575), Ayala (1548— 84), Suarez (1548-1617) and Gentilis (1552- 1608). The great work of Grotius, (De jure belli ac pacis) (1625), formulated and clarified much of what is now called international law. From this foundation Grotius gained

the title of Father of International Law. His work in¬ fluenced the leaders in international affairs almost immediately and the Treaty of West¬ phalia at the end of the Thirty Years War, 1648, embodied ideas of this great master. To

Ar

be

Grotius all writers acknowledged their in¬ debtedness.

From the days of Grotius different schools began to develop. One school, sometimes called the ˆnaturalists,® particularly followed the natural law theories, theories in their harmony or agreement with the inherent forces of the universe. Another school, the ((Positivists® looked particularly to customs and treaties for the sources of international law. Aside from those who were commentators upon the work of Grotius, the main contributions were from writers upon special topics, such as the writings of Bynkersholk (1673-1743). The systematic work of Vattel (1714— 67) had wide circulation in Europe and in America as did that of the American, Henry Wheaton (1785-1848). With the increase in the number of court decisions involving principles of international law, there has arisen a clearer definition of the field of international law and a recognition of its bind¬ ing character.

Treaties, particularly since the Treaty of Westphalia of 1648, have embodied international law. Where the same clause occurs in a large number of treaties or when a large number of states are parties to one treaty the principle or principles tend to be generally accepted as law. Such was the case in regard to some parts of the Treaty of Utrecht of 1713 which were re¬ peated in other treaties of the 18th century. The doctrine of the balance of power in Europe as a basis of peace clearly set forth in this treaty was accepted as a fundamental principle in the diplomatic negotiations in Europe for many years. According to Talleyrand a hun¬ dred years later in 1813 the balance of power was <(a combination of the neutral rights and interests of the Powers, by means of which, Europe aims at securing the following objects:

(<1. That no single Power, nor any union of Powers shall have mastery in Europe.

<(2. That no single Power nor union of Powers shall be able to infringe the actual pos¬ session and recognized rights of any other

Power.

t(3. That it shall no longer be necessary, in order to maintain the established state of affairs, to live in a state of imminent or actual war, and that the proposed combination shall secure the peace and repose of Europe against the efforts of a disturber by diminishing his chances of success.®

If all that had at times been hoped for from the acceptance of this doctrine of balance of power had been realized, law in international relations would have developed much more rapidly.

Another principle that has been embodied in many treaties following the Treaty of Utrecht was in its brief form <(free ships make free goods® and there was also coupled with it the principle that ((enemy ships make enemy goods.® This was a step in advance of earlier practice, particularly of the 17th century, which did not acknowledge that innocent enemy goods under a neutral flag were free from capture. A hun¬ dred years later Napoleon claimed that these doctrines of the Treaty of Utrecht had (

Progress has, however, been made in inter¬ national law as in other law and in general

there has been a tendency to free commerce from restraints. In respect to the treatment of goods upon the sea, the United States which had in the late 18th century but recently come into the family of nations as the first member from outside of Europe, endeavored to obtain complete exemption from capture of innocent private property even if belonging to enemy persons. In the last quarter of the 18th cen¬ tury the principle was even embodied in certain treaties made by the United States, but it did not receive general approval.

While the precedents of the long negotiations leading to the Treaty of Westphalia of 1648 established some clear lines of diplomatic prac¬ tice, there were many points upon which dis¬ putes were common. The disputes sometimes led to personal encounters. As the diplomatic agent was regarded as embodying in the foreign state the dignity of the state which he repre¬ sented, he endeavored to obtain for himself the place of greatest prominence. He strove for the highest place at the table, the chair at the right of the sovereign on ceremonial occasions, and by fair means or foul to gain precedence. Bribery of officials was common and some of the books of the early 18th century explain the principles of its use. The rivalry of states be¬ came at length so keen that it seemed desirable to lay down laws for the

precedence of diplo¬ matic agents. The Congress of Vienna of 1815 embodied a conventional agreement which with an addition at the Congress of Aix-la-Qiapelle in 1818 made the grade of diplomatic repre¬ sentatives as follows:

1. Ambassadors, legates and nuncios.

2. Envoys and ministers.

3. Ministers resident.

4. Charges-d'affaires.

This fixing of the grades removed friction that had long existed, as states were expected to exchange representatives of equal rank. The United States did not, however, send abroad agents of the grade of ambassadors till after the Act of Congress of 1 March 1893, authorizing such action on the part of the President.

As freedom of action was essential for the performance of the functions of the diplomatic agent, the principle of inviolability was ex¬ tended not merely to the person of the diplomat but to his suite, family and hotel or official resi¬ dence with all the personnel and equipment which might be necessary or reasonably con¬ venient for the proper performance of his func¬ tions. He was also entitled to certain honors, such as salutes according to his grade. His prerogatives, if an ambassador, extended to the right to ride in a coach with six horses and outriders and to remain covered in the presence of the sovereign if the sovereign did not remove his hat. Other grades were entitled to lesser marks of respect. The establishing of these rules removed the causes of the ancient con¬ tests over rank and dignities and enabled the diplomatic agents to live in harmony and trans¬ act the business of the state, receiving the honors not as personal but as for the states which they represented. Each state in sending its representative and in determining his grade determined his rank at the court to which he was accredited. Minor differences have arisen, but for the most part the controversies as t(

rank which were common before 1815 have come to an end.

Other problems which were once perplexing in international relations, as for instance, the regulation and later the suppression of the slave

trade have likewise disappeared.

Some have taken new form as the use of private vessels in the time of war after the abolition of privateering, and new problems have arisen, as in the regulation of the use of the air. To meet these changes the interna¬ tional law development of the 19th and 20th centuries has tended to become more and more conventional.

The conventional international agreements were at first generally incidental to some other international act as in the agreement fixing the grades of diplomatic . agents. The same was true of the Declaration of Paris of 1856 in which it was stated that the plenipotentiaries who signed the Treaty of Paris "considering that maritime law had long been the subject of deplorable disputes . . . cannot better re¬

spond to the intentions by which their govern¬ ments are animated, than by seeking to intro¬ duce into international relations fixed principles, in this respect.® They accordingly made ((the following solemn declaration :

"1. Privateering is and remains abolished:

"2. The neutral flag covers enemy's goods, with the ex¬ ception of contraband of war:

"3. Neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag.

"4. Blockades, in order to be binding, must be effective — that is to say, must be maintained by force sufficient really to prevent access to the coast of the enemy."

The United States and several other powers did not adhere to this declaration, though its principles were generally recognized. The United States wished in 1856, as in earlier and later days, to secure the general exemption from capture of private property at sea.

Agreements reached by states assembled for the- purpose of formulating what may be called international law gradually became common. It would seem but natural that the destruction of life without advantage to any state would be one of the early matters of attention as a sub¬ ject for a formulated international agreement. Yet the first international agreement relating to this matter to receive general assent was con¬ cluded in 1864, and known as the Geneva Con¬ vention for the Amelioration of the Condition of Wounded in

Armies in the Field. The rep¬ resentatives of 12 European states stated in the preamble their purpose to be to mitigate <(the evils inseparable from war, to suppress useless severities, and to ameliorate the condition of soldiers wounded on the field of battle.® It was a long time for the world to wait for such legislation. This Geneva Convention of 1864, which provided for the immunity of the hospital corps, was not immediately ratified, however. The United States did not adhere to this con¬ vention till 1882, and this was the only interna¬ tional agreement of general scope and relating to war to which even the United States became a party before the end of the 19th century.

The Conference of Saint Petersburg fol¬ lowed in 1868 and was attended by representa¬ tives from 17 European states, and these agreed upon the Declaration of Saint Petersburg, which denounced among the signatories ((the employment by their military or naval troops of any projectile of a weight below 400 grammes, vol. 15 — 17

which is either explosive or charged with ful¬ minating or inflammable substance's.®

The Geneva Convention of 1864 and the Declaration of Saint Petersburg of 1868 related particularly to a state of war. Soon other mat¬ ter became increasingly the subject of interna¬ tional conferences, and before the end of the 19th century, general conventional agreements had been made and signed by a large number of states acting together upon such matters as an international Bureau of Weights and Meas¬ ures® (Metric System), 1875; international Protection of Industrial Property,® 1883; "Pro¬ tection of Submarine Cables® (in time of peace), 1884; "Exchange of Official Documents, Scientific and Literary Publications,® 1886; "Re¬ pression of African Slave Trade,® 1890; "For¬ mation of an International Union for the Pub¬ lication of Customs Tariff,® 1890; and "Regula¬ tions of Importation of Spirituous Liquors into Certain Regions of Africa,® 1899. Such inter¬ national agreements became a part of the writ¬ ten law of nations, but covered only a very small part of the entire field of international relations in peace and war.

There was developing toward the end of the 19th century a belief that by agreement among the states of the world a basis of conventional law could be reached which would do much to alleviate possible friction and even to avoid war. The extent to which this belief was real¬ izable was to be put to the test. While the United States and Spain were still at war, at the diplomatic reception of 12 Aug. 1898, at Saint Petersburg, Count Mouravieff, Russian Imperial Minister of

Foreign Affairs, delivered to the representatives of the Powers a com¬ munication from His Majesty the Czar. While the nature of the document gave rise to surprise, its character and source demanded immediate attention. Mentioning the competi¬ tion in development of means of international combat and the effect of this competition upon the states of the world, he proposed an inter¬ national conference, saying that:

"To put an end to these increasing armaments, and to find means for avoiding the calamities which menace the entire world, that is the supreme duty which lies upon all nations."

The United States replied that :

"Though war with Spain renders it impracticable for us to consider the present reduction of our armaments, which even now are doubtless far below the measure which prin¬ cipal European powers would be willing to adopt, the Presi¬ dent cordially concurs in the spirit of the proposal of His Imperial Majesty."

On 11 Jan. 1899 another circular was pre¬ sented to the Powers containing a tentative program. This program suggested agreement upon (1) limitation of armaments; (2) restric¬ tions upon new methods of warfare; (3) prohi¬ bition of firing from balloons; (4) prohibition of submarines and rams; (5) adaptation of principles of Geneva Convention of 1864 to naval warfare; (6) neutralization for vessels saving those overboard after battles at sea; (7) revision of rules of war on land; and (8) ac¬ ceptance of principles of mediation and arbitra¬ tion with a view to preventing armed conflicts. Of these eight topics suggested, seven look to furthering peace by limitations upon the con¬ duct of war, and the last topic suggests a quasi-legal method of furthering the movement toward peace.

Following the suggestion of the Czar, repre-

sentatives of 26 Powers met on 20 May 1899, in the House in the Wood at 4 he Hague, and remained in session a little more than two months. This is known as the First Hague Peace Conference. The Conference drew up three conventions, three declarations, one reso¬ lution, and six wishes: Conventions: (1) for the pacific settlement of international dis¬ putes by means of good offices and media¬ tion, commissions of inquiry and arbitration; (2) regarding the laws and

customs of war on land; (3) adaptation of Geneva Convention of 1864 to maritime warfare. Declarations: (1) prohibiting the discharge of projectiles from balloons; (2) the use of projectiles for the dif¬ fusion of deleterious or asphyxiating gases; (3) the use of expanding bullets. Resolution affirm¬ ing the desirability of the restriction of mili¬ tary budgets. Wishes for further consideration of various matters upon which the Conference had not reached agreement. The last topic upon the program suggested by the Czar had become the first convention of the First Hague Conference, or the furtherance of the aim of peace by means quasi-legal in character assumed a foremost place in the results of these deliber¬ ations at The Hague; and the first item in the program, the attainment of international peace through the restriction of the means by which each nation had hitherto maintained its rights, viz., effective armament, became the subject of a resolution and a wish. The Conference as¬ serted its confidence in the law as the method for settling international disputes.

Following this conference of 1899 there was a wider interest in the possibility of law for the world. While the Russo-Japanese War of 1904- OS was still in progress, a request was made by those interested that President Roosevelt call another conference. He had already taken the first steps toward such action when advised that the Czar of Russia desired to call the confer¬ ence and at the close of the Russo-Japanese war the Czar carried out the plan. It was now fully admitted that the work of the First Hague Conference of 1899 had been of great value for the world.

Eight years later, in 1907, a Second Hague Conference further elaborated and formulated conventional agreements, and to this Conference representatives of 44 of the states of the world came, giving ample evidence of the tendency to accept the principle of international legislation. Some of the conventional agreements have been tested in the course of years. The court estab¬ lished for the settlement of international dis¬ putes attained a recognized standing. Cases affecting all parts of the world have already been decided and the awards accepted. The Second Hague Conference extended the scope of the law. Among its propositions which have not been adopted as yet into the law of nations was that to establish an international prize court. This proposition was generally approved in principle though a satisfactory method of selection of judges was not devised. To sup¬ plement this prize court convention an attempt was made by 10 maritime nations in 1908-09 at the International Naval Conference at London to formulate the laws which the court should apply. The Declaration of London of 1909 embodied the labors of this Conference. This Declaration has not been ratified. It is not merely in

these broad national matters that the

formulation of the law has progressed, but in recent years many such matters as the follow¬ ing have become subject of general international agreements: literary and artistic copyrights, 1902; sanitary measures, 1903; white slavery, 1904; potent drugs, 1906.

Rights, persons and property, and jurisdic¬ tion on land and sea earlier had received atten¬ tion ; in more recent years the use of the air has been the subject of international regulation, as in the conventions of 1906 and 1912. .To the last of these conventions the representatives of about 40 non-American political unities affixed their signatures, many of the larger states al¬ lowing here, as in some other conventions, par¬ ticipation in the formulation of the law to the divisions of which the state entity was com¬ posed. The legislation thus rested upon a broader base than in many conventions of ear¬ lier years.

In the application of the law for nations the progress has been exceedingly rapid. Cases which have defied the best efforts of diplomacy for generations, as the North Atlantic Fisheries dispute, have been settled by due process of law in a few weeks. Cases which might have re¬ sulted in long and disastrous international con¬ tention have been resolved in the light of law. Where recourse to legal settlement of disputes was in earlier times the last resort, it has become the first, and not merely the parties to the controversy may begin the action, but third parties may of right suggest or even try to bring the parties to submit the case to the decision of the court.

It requires only a review of the conventions since 1899 to show how rapid is the formulation of the law for nations. These international laws, in addition to many private matters, cover the pacific settlement of international disputes, limitation of the employment of force in the collection of contract debts, laws for war on land, rights and duties of neutral powers and persons in war on land, status of enemy mer¬ chant ships at the outbreak of hostilities, the transformation of merchant ships into war¬ ships, the laying of automatic contact sub¬ marine mines, bombardment by naval forces in time of war, care of sick and wounded in time of war, rights and duties of hospital ships, exercise of right of capture in maritime war, prohibition of discharge of projectiles from balloons, rights and duties of neutral powers in time of war, the establishment of an inter¬ national prize court and the law for its guidance.

Not merely had the law developed and be¬ come somewhat widely

the subject of formal international acceptance, but many of the con¬ ventions embodying the law had been put to severe tests. Probably few more serious tests could be imagined than that which one part of the convention for the Pacific Settlement of International Disputes received in 1904 during the Russo-Japanese War. In this convention there had been placed a section providing for a sort of international grand jury called a Commission of Inquiry to investigate the facts in case of a dispute between nations when agreement to resort to such a procedure could be reached. On the night of 21 Oct. 1904, a division of the Russian fleet under Admiral Rozhdestvensky, on its way from the Baltic Sea to the Far East, while passing through the

North Sea near the Dogger Banks, fired on the British fishing fleet. The fishermen suffered the loss of one trawler, five were damaged and two men were killed and six wounded. Great Britain was an ally of Japan and the sympathy in the British Isles was generally with the Japanese. When the news of this disaster spread the demand for action was urgent upon the British government. Orders were issued by the Admiralty to the Mediterranean, Chan¬ nel and Home fleets, and the British Foreign Office announced on the 25th of October that it had made known to Russia <(that the situ¬ ation is one which in the opinion of His Ma¬ jesty's Government does not admit of delay.® The 'Same day the Czar in a message to the king said ((he would take steps to afford com¬ plete satisfaction as soon as the circumstances of the case were cleared up.® On the following day the Russian fleet arrived at Vigo and re¬ ported that the reason for the firing was the presence of Japanese torpedo boats among the fishing vessels. This the fishermen denied. The demand in England for war had a little time to subside and fortunately the method for honorable submission of such a dispute existed in the Convention of 1899, to which Great Britain and Russia were parties, and it was agreed to submit the dispute to a Commission of Inquiry. The commission was composed of admirals from the American, Austrian, French, British and Russian navies. The report of the commissioners was adverse to the Russian contentions and the incident was closed by the immediate payment of £65,000 to Great Britain. Thus a dispute which might have been regarded as an ample cause for war was by peaceful methods settled promptly and honorably.

This provision for commissions of inquiry was elaborated in 1907, that it might, if occa¬ sion arose, become even more serviceable.

Another Convention of 1899 prohibited the discharge of projectiles or explosives from balloons for a period of five years. While this period expired during the Russo-Japanese War, both Russia and Japan continued to'observe the spirit of the prohibition.

The rules for war on land were also tested and further changes were found necessary in

1907.

Not merely was there made in 1899 provision for a commission of inquiry but also for a court of arbitration. It was thought for a time that this court would never perform any func¬ tion. It remained for two American republics to first test the court of arbitration, for which provision had been made in the Convention of 1899. In 1902 the United States and Mexico took before the court its first case.

This was the case of the Pious Fund of the Californias, which had been in dispute from the annexation of Upper California in 1848 by the United States. An arbitral award in 1875 had granted to the United States claim¬ ants 21 years' interest on one-half the Fund which had originally been given to the mission¬ aries for their work in the Californias. The interest for subsequent years had not been paid and it was claimed by the Catholic Church of California. The contention of the United States was upheld by the court and the pro¬ tracted dispute was at an end.

Other cases came to The Hague court after this first award and it soon became customary for states to request that in case of dispute "the matter be referred to The Hague.®

The next case related to the preferential treatment for the powers which had blockaded Venezuelan ports in order to enforce the pay¬ ment of debts due their citizens. Here not two but ten states were involved, representing Europe, North America and South America. This case was quickly followed by one in which Germany, Great Britain and France appeared against Japan in the matter of the perpetual leases in that country, thus introducing Asia also before the court. Another case involving Asiatic interests was the case of the right of the Muscat Dhows to fly the French flag, which was a subject of difference between Great Britain and France.

These four cases were before the court at The Hague between 1902 and 1905. In 1907, at the Second Hague Conference, the conven¬ tion relating to the court was amended and extended to meet the needs

which experience had demonstrated.

The first case under the revised convention was settled in 1909, the Casabianca case, which had brought France and Germany to the verge of war. The same year the controversy over the maritime boundary between Norway and Sweden was adjusted.

In 1910 the court attempted to settle the dis¬ pute between the United States and Great Britain over the North Atlantic Fisheries. This dispute had continued in varying forms for about 100 years. Diplomatic negotiations had failed many times. Within a few weeks a decision accepted by both parties was reached by the court.

Questions of national honor and funda¬ mental rights were considered in such cases as the case of Savarkar in 1910, the case of the Manouba and of the Carthage in 1913, and vari¬ ous aspects of financial claims in those of the Orinoco Steamship Company in 1910 and the interest on Russian indemnities in 1912. In June 1914 The Hague Court made an award settling the land boundaries in the island of Timor.

The range of cases settled by the court is accordingly very wide. The frequency of re¬ sort to the court was rapidly increasing. In¬ terests involving the Americas, Europe, Asia, Africa and the area near Australia had been considered. Seventeen of the 44 states repre¬ sented at the Second Hague Conference had appeared at least once and some six times before the court at The Hague. The awards of the court had in every instance been accepted in good faith and observed.

Such progress in the substitution of law for other means of settling disputes was a marked evidence of the advance of the early 20th cen¬ tury. While other methods may for a time be tried, the decision in the case of the Zamora before the judicial committee of the English Privy Council on 7 April 1916, seems to show that the only sound basis for international rela¬ tions is in respect for international law. See Arbitration, International; Armed Neutral¬ ity; Blockade; Declaration of London; Dec¬ laration of War; Merchant Vessels, Neu¬ tral, Rights of; Neutrality.

Bibliography. — Bonfils, H., (Droit Interna¬ tional Punlic) (6th ed., Paris 1912) ; Davis, G. B., (The Elements of International Law* (4th ed., New York 1916) ; Fiore, P., (Le droit international codifie* (Antoine, Paris 1911) ; Hall, W. E., international Law* (7th ed., Hig¬

gins, London 1917) ; Halleck, H. W., (Elements of International Law) (4th ed., London 1908) ; Hershey, A. S., ˆEssentials of International Public Law) (New York 1912) ; Lawrence, T. J., Principles of International Law* (5th ed., Boston 1916) ; Moore, J. B., international Law Digest* (8 vols., Washington 1906) ; Oppen- heim, L., international Law* (2d ed., London 1912) ; Scott, J. B., (Cases on International Law* (Saint Paul 1906) ; Stowell, E. C., and Munro, H. F., international Cases1* (New York 1916) ; Ullmann, E.,

George Grafton Wilson, Professor of International Law, Harvard Uni¬ versity.

INTERNATIONAL LAW, Changes in.

During the 50 years preceding the outbreak of the European War in 1914, international law, which originally consisted of a more or less indefinite mass of custom, usage and opinion, underwent a remarkable development. Much of that which was unwritten and uncertain was reduced to writing, embodied in conventions and given the character of definiteness and pre¬ cision. Many new rules dealing with matters hitherto unregulated by custom were also elab¬ orated and embodied in international treaties and conventions. The Declaration of Paris (1856) and of Saint Petersburg (1868), the Geneva Conventions of 1864 and 1906, the 16 conventions of the two Hague Conferences of 1899 and 1907 and the unratified Declaration of London of 1909, constituted a great body of written law, embodying not all, but the larger portion of the rules of conduct observed by states in their relations with one another, both in war and in peace.

At the outbreak of the European War, the most important of these international acts, the conventions of the Second Hague Conference, had been ratified by all the important powers of the world, although in some instances cer¬ tain states had reserved their ratification of particular articles. Several of the conventions, however, contained a stipulation that their pro¬ visions should not apply in time of war, except between the contracting parties, and then only when all the belligerents were parties thereto. Among the belligerents in the recent Euro¬ pean War, Bulgaria, Italy, Montenegro, Serbia and Turkey have not ratified the conventions, in consequence of which they were not legally binding on any of .the powers involved in the war. There was a general feeling, however, that the failure of a few states, most of which were petty powers, to ratify the conventions should not be allowed to defeat their purpose, and it does not appear that any belligerent took advantage of the fact that the conventions were not legally binding upon it to avoid the obligations which they created.

Thus the British prize court has uniformly taken the position that although it was not legally bound by the terms of The Hague Conventions for the

reasons mentioned above, it would nevertheless act as if they were binding, and would therefore in dealing with the claims of German subjects accord them the benefit of any convention which Germany had ratified.

While happily there was no disposition among the belligerents to take advantage of the circumstance that The Hague Conventions were not technically binding to escape the ob¬ ligations which they impose, many of the pro¬ visions of the conventions, to say nothing of customary rules which had become firmly es¬ tablished, were disregarded on the pretext of military necessity or on the theory that the changed conditions of warfare and the intro¬ duction of new methods and agencies had ren¬ dered them obsolete or made conformity to their prescriptions no longer obligatory. The deliberate violation of the neutrality of Bel¬ gium by Germany and the characterization of the Belgian neutrality treaty as a “scrap of paper® was soon followed by various other acts which created the impression that Germany pro¬ posed to disregard every rule of international law which stood in the way of her military success. Other belligerents refused to be bound by certain rules of international law on the theory that the obligation to conform to its prescriptions are reciprocal, and consequently the refusal of one to observe the law released its adversaries from the duty of obedience. Still other violations were defended on the alleged right of retaliation. So numerous were the instances of non-conformity to The Hague Conventions as well as the unwritten usages and practices of the past that many persons publicly asserted that the whole body of inter¬ national law had broken down if it had not actually ceased to exist. It is true that the period of the war was a crisis for international law; never before had it been subjected to so severe a test, but in a war of such gigantic proportions, characterized by the most extreme bitterness, and conducted largely according to new methods and with new agencies, it was inevitable that many rules formulated for the conduct of war under widely different condi¬ tions should have been disregarded if not re¬ pudiated outright by the belligerents. Never¬ theless, this constituted no valid ground for holding that the whole fabric of international law had collapsed any more than arguing that a breakdown in the administration of a criminal law involves the subversion of the entire crim¬ inal code. While all the belligerents un¬ doubtedly contravened certain of the well-estab¬ lished rules of international law during the European War, the most flagrant violations were committed by a

single power, and not even it went so far as to repudiate those rules or deny their existence. Their existence was indeed readily admitted, but their binding effect was denied on grounds of military neces¬ sity, changed conditions or the alleged refusal of the enemy to conform to their prescrip¬ tions. The great body of international law, therefore, although strained and disregarded in many instances, still remains intact, and no bel¬ ligerent has ever proposed that it be thrown overboard and war conducted without regard to the established conventions and usages. As Mr. Coleman Phillipson, a well-known English writer, well says : “International Law has not

been destroyed. Despite the numerous breaches we need not despair of its future. Its inherent vitality will never, and never can be entirely destroyed. Notwithstanding the many wounds inflicted upon it, it will rise again helped and invigorated and will assume its inalienable dominion over the society of states. Its rules rest upon the permanent necessities of inter¬ course between nations.® Indeed, there is good ground for believing that one of the results of the tremendous conflict which has so rudely shaken the structure will be an infusion of new life and strength into its body. Speaking on this point before the American Society of International Law in March 1916, ex-Senator Elihu Root said:

((Vague and uncertain as the future must be, there is some reason to think that after the ter¬ rible experience through which civilization is passing there will be a tendency to strengthen rather than abandon the law of nations. What¬ ever the result may be, the world will have received a dreadful lesson of the evils of war. The sacrifice of millions of lives, millions home¬ less and in poverty, industry and commerce destroyed, overwhelming national debts, — all will naturally produce a strong desire to do something that will prevent the same thing happening again.®

Mr. Root added that the return of peace will find us living in a different world. <(Universal mourning for the untimely dead, suffering and sacrifice, the triumph of patriotism over selfishness, the long dominance of deep and serious feeling, the purifying influences of self- devotion, will surely have changed the hearts of the nations, and much that is wise and noble and for the good of humanity may be possible that never was possible before.®

Under these conditions may we not expect, instead of a desire to repudiate a system by which differences may be settled peaceably or to throw overboard the body of law by which the rights and obligations of nations are de¬ fined and guaranteed, that a more widely diffused and strengthened sentiment in favor of a more effective and enforceable body of law will be created throughout the world?

Although it may be confidently assumed that the great body of international law will emerge from the welter and chaos of the war in the main intact, it is true that the war has revealed in a striking manner some of its in¬ herent weaknesses and deficiencies, as no pre¬ ceding conflict ever did. It has been shown that <(a decent respect for the opinions of man¬ kind® and the obloquy which comes from non¬ conformity to the established rules, in short the desire of belligerents to have the approval of the public opinion of the civilized world, is not yet an effective sanction of international law. It has been shown that the rules of in¬ ternational law like the rules of municipal law must have sanctions behind them, that is, their violations must be followed by punishment. There must be some power stronger than the violator which is capable of bringing him to book and of punishing him for his unlawful acts. Article 3 of Convention IV of the Sec¬ ond Hague Conference undertakes to fix a responsibility for the violation of the rules laid down by the convention. It declares that ((the belligerent party who violates the provisions of the said reglement shall be held to make an

idemnity, if there is a place for it® and that (

Unfortunately, however, the convention provides no machinery or indicates no method of enforcing the responsibility thus proclaimed. If, therefore, the purposes and objects of in¬ ternational law are to be fully realized, some means of enforcing its prescriptions and of compelling states to fulfil the obligations which it imposes must be found. What under the strain of a world-wide conflict has proved to be little more than a code of etiquette must be transformed into a body of real law, vio¬ lations of which by particular states may be effectively punished. This is the great task to which publicists and international jurists will have to turn their attention after the close of the war if international law is to be strengthened and made to fulfil its purposes.

One proposal that has been widely discussed since the outbreak of the war is the organization of a league of states to enforce the preservation of peace and the observance of international obligations. This proposal contemplates a re¬ sort to commercial boycotts, non-

intercourse measures and possibly the application of force against a state which commits a breach of the peace, commits an aggression against a member of the league, or otherwise violates its international duties. It is quite true that there have been instances in which a com¬ bined policy of non-intercourse against a powerful state would have deterred it from making an unjust attack against another power or from disregarding its international obliga¬ tions, but there have been other instances when it would have probably proved ineffective. The application of force against a delinquent state is an even more extreme measure. It neces¬ sarily implies the maintenance of an inter¬ national police force to compel states to ob¬ serve the rules of international law. As. such it involves serious difficulties, for obviously the force required to coerce effectively any one of the great powers of Europe with their huge powerful military establishments would neces¬ sarily have to be larger than anything we are accustomed to think of under the term ((police.® It is well known, for example, that France, single handed, held out for more than 20 years against a coalition of all the great powers of Europe and although finally overcome, emerged from the contest with her national boundaries little diminished.

A form of sanction recently proposed by a group of French jurists contemplates the ap¬ plication of the criminal law to individual vio¬ lators of the rules of international law. Thus if a military or naval commander is charged with allowing those under his command to com¬ mit pillage, maltreat prisoners, kill non-com¬ batants, sink a merchant vessel without warn¬ ing or with violating other well-established rules of war law, he shall be traduced before the criminal courts and tried according to the procedure of the criminal law, or in case he does not fall into the hands of the authorities he will be tried in absentia and in case he is subsequently captured the punishment pre¬ scribed by the criminal law will be imposed. Like the other proposals suggested, this one would prove of doubtful efficacy in practice,

and grave practical difficulties would be en¬ countered in the effort to apply it.

One truth has been clearly established by the results of the European War, namely, that a different attitude should be adopted by the nations toward violations of the rules of inter¬ national law by a

particular state. This atti¬ tude should be that which the community adopts when its own law has been transgressed by an individual. In that case the injured victim is not left to redress his own injury, but the community which has itself been injured by the violation of the law intervenes and punishes the act. Heretofore nations, however, have acted on the theory that when a rule of inter¬ national law has been violated it is of no con¬ cern to any state except the particular one immediately wronged, and therefore they are strangers to the controversy. As ex-Senator Root has well said : ((If the law of nations is to be binding, if the decisions of tribunals charged with the application of that law to in¬ ternational controversies are to be respected, there must be a change in theory, and violations of the law of such a character as to threaten the peace and order of the community of nations must be deemed to be a violation of the right of every civilized nation to have the law maintained and a legal injury to every nation. When a controversy _ arises between two nations other nations are indeed strangers to the dispute as to what the law requires in that controversy, but they cannot really be strangers to a dispute as to whether the law which is applicable to the circumstances shall be observed or violated. . . . International

laws violated with impunity must soon cease to exist and every state has a direct interest in preventing those violations which if permitted to continue would destroy the law. Wherever in the world the laws which should protect the independence of nations, the inviolability of territory, the lives and property of their citizens, are violated, all other nations have a right to protest against the breaking down of the law. Such a protest would not be an inter¬ ference in the quarrels of others. It would be an assertion of the protesting nation's own right against the injury done to it by the de¬ struction of the law upon which it relies for its peace and prosperity.®

Until this change of attitude has been adopted by the world, nations will be free to observe or disregard at will the prescriptions of international law without fear of punish¬ ment except such as the particular aggrieved state may be able itself to impose. Under modern conditions the existing theory is wrong in principle, for the subversion of the law by one state necessarily destroys the protection which the law intended to provide for all states.

While the idea advanced by some persons of high repute that the whole body of inter¬ national law has been discredited if it has not actually collapsed under the strain of the Great War cannot be admitted, it is nevertheless true that the war has conclusively demonstrated that certain of its rules will need to be altered while

others will have to be abandoned because they have become obsolete. The introduction of the submarine, the mine, the torpedo, aerial craft and wireless telegraphy as instruments of warfare, to say nothing of other changes in the methods and conditions of conducting war,

will necessitate a revision of the war code along various lines. Thus the employment of the submarine and mine in naval warfare has demonstrated the impracticability of the old form of close blockade with its cordon of ships in the immediate offing of the blockaded port. The American Secretary of State in a note of 5 March 1915, to the United States Ambassadors at London and Paris, stated that the govern¬ ment of the United States was prepared to ad¬ mit that modern methods of naval warfare, and particularly the use of the submarine for de¬ fensive purposes, might make the institution of a blockade according to the old rules a physical impossibility. In other words, the “long range® blockade in which blockading craft is permitted to remain out so as to be beyond the range of torpedo boats or mines will have to be recog¬ nized as legal. Moreover, it is not altogether improbable that if the right of belligerent blockade is to be retained, a belligerent whose adversary is so circumstanced that he may easily draw oversea supplies through the ports of an adjacent neutral country, must be allowed a limited power of blockade in respect to such neutral ports, otherwise with present railway facilities the right of blockade if restricted to enemy ports will in many cases be useless. Thus the World War has shown that if the British right of blockade had been confined strictly to the ports of the enemy it would have been of little value to Great Britain because Germany could import unlimited supplies from America through the neutral ports of Holland, Denmark and Sweden.

Likewise, the old rules relating to contra¬ band will need alteration. The results of the World War have largely demonstrated the un¬ soundness if not the ineffectiveness of the ex¬ isting rules in respect to the carriage of con¬ traband, and particularly those governing the destination of conditional as opposed to abso¬ lute contraband. Most of the rules formulated in the Declaration of London in regard to hos¬ tile destination are vague and some of them are illogical and rest upon no sound principle of reason or expediency. So the old rules gov¬ erning the right of search have broken down in practice. According to the contention of the American government in the controversy with Great Britain in regard to British re¬ straints on American commerce, the right of search can be exercised only on the high seas at the time and place of capture, and ships cannot be taken into port for further ex¬ amination on suspicion not amounting to con¬ clusive evidence. But the recent war has shown that with the increased size of ships and

the magnitude of their cargoes, effective searches in many cases cannot be made on the high seas' and the vessels must therefore be carried into port where their cargoes can be un¬ loaded and each parcel carefullv examined. A new practice which may be confidently ex¬ pected will be the furnishing of neutral vessels with certificates bv representatives of the gov¬ ernment under whose supervision the loading is done, declaring that the cargo is innocent. This done, the necessity for harassing searches, deviations to distant ports and ruinous delays to shippers will disappear.

The employment for the first time on a large scale of submarine vessels, submarine mines, asphyxiating gas and aerial craft has

raised new and difficult problems, for the regu¬ lation of which there are either no existing rules or rules which are inadequate. One of the tasks which the war will bequeath to the international jurists of the future, therefore, will be the formulation of new rules or the modification of such rules as exist, in respect to the employment of these agencies.

The failure of the powers to ratify the Declaration of London leaves the law in respect to the transfer of flags, domicile, nationality and other matters largely in a chaotic state and further international legislation dealing with these matters will be necessary. The unpre¬ cedented encroachment upon the rights of neutral states which has marked the conduct of the World War should and doubtless will lead to the adoption of new and more effective rules for safeguarding neutral rights. The American Institute of International Law at its first meeting held in Washington in 1916 adopted a series of declarations defining the attitude of the American countries in respect to the rights of neutral states.

The wholesale internment in concentration camps by the belligerent states of the alien enemy population found within their territo¬ ries at the outbreak of the war — a measure without precedent in the wars of the past — has given rise to the question of the treatment which a belligerent may legitimately mete out to such persons. This matter is unregulated by convention and should receive attention when the time arrives for revising and amplifying the existing rules of international law.

_ It is impossible within the brief compass of this article to discuss all the possible changes in the law of nations which will be made neces¬ sary or desirable in consequence of the new conditions of warfare and the employment of new methods and agencies of combat. That they are numerous and important must be evi¬ dent to every student of the history of the war on its international law side. There is one con¬ tention, however, that must be emphatically re¬ jected. It is the claim put forward in Ger¬ many in connection with their methods of sub¬ marine warfare, namely, that the resort to a forbidden practice is lawful provided the in¬ strument used is of such a character that it cannot be used in conformity with the rules of law ; in short, that a military or naval com¬ mander who owing to the peculiar construction of the agency which he employs cannot con¬ form to the established law and practice is re¬ lieved from all obligation to observe the rule.

The invention of new instruments and methods of war will undoubtedly necessitate certain modifications in the existing body of war law, but it must be confidently assumed that the world is not prepared to admit that the long established rules of law devised in the interest of the sacred principles of humanity must be sacrificed in order to enable bellig¬ erents to employ agencies of destruction which cannot be employed without violating those rules. Whatever changes are made in other respects, the laws of humanity and justice which have received the common assent of mankind must remain unaltered and the em¬ ployment of new inventions must conform to those laws or they must be discarded. Condi¬ tions are always changing and new and more powerful agencies of destruction are constantly

being invented. If the rules of international law founded on considerations of humanity cease to be binding whenever conditions change or whenever new agencies of warfare are in¬ vented, it would be a play upon words to describe such a body of rules as a system of law. The same opinion must be held in regard to the contention put forward in Germany that military necessity knows no law, that

whenever a. belligerent interest conflicts with an estab¬ lished rule of law the rule may be disregarded. This doctrine of Kriegsraison as it is known in Germany is based on the view that a bel¬ ligerent is bound by the laws of war only so long as they interpose no obstacle to the ac¬ complishment of the objects of the war. If this theory should be admitted and sanctioned by international agreement by the powers it would be a surrender of much which civiliza¬ tion has gained during the past two centuries. There is no likelihood that it will be done. Consult Phillipson, C., international Law and the Great War> (New York 1916).

James W. Garner,

Professor of Political Science, University of Illinois.

INTERNATIONAL PEACE CONFER¬ ENCE. See Hague Court, The.

INTERNATIONAL PEACE MOVE¬ MENT, The. A world-wide movement aim¬ ing at the abolition of war, more especially in¬ ternational war. While fighting has always been one of the chief occupations of mankind; while ideas of national greatness are largely associated with battles, campaigns and sieges; and while the heroes of poetry, history and monumental art are mostly famous soldiers; in modern times, nevertheless, the opinion has rapidly gained ground all over the world that war is a terrible evil which ought to be pre¬ vented as far as possible, and sooner or later to be done away with altogether. Some writers, notably in Germany, defend it as a biologic necessity, contending that it is a phase of the universal struggle for existence and hence a part of nature's plan for securing race hardi¬ hood and keeping the growth of population within bounds. (See Malthusianism). Others, again mainly Germans (particularly Prussians), even glorify it as the noblest of human ac¬ tivities, a divinely ordered means of preventing the inhabitants of the world from becoming effeminate, pleasure-loving and morally flaccid. To this argument, however, the opponents of war reply that co-operation is just as much a part of nature's law as fighting, and that inter¬ tribal slaughter is a human specialty virtually unknown to the lower animals, among whom individuals attack and kill one another only for food. As for the moral benefits of war, more¬ over, it is urged that these come also from fire, flood, famine, earthquake and pestilence, which nobody thinks of listing among the good things of life; to a certain extent, also, good by-products come from dueling and private brawling, which almost everybody admits it is well to have got rid of.

Aside from the few extremists who extol war as a good thing, and

those at the other pole who denounce it as the sum of all villian- ics and something to be avoided at any cost, the great mass of thoughtful men regard it as indeed an evil, but as sometimes a necessary

and praiseworthy alternative to still greater evils. They hold that slaughter and destruction on a large scale, with all of the attendant suffering and misery, constitute ethically the most inhuman, rationally the most absurd, and economically the most expensive mode of set¬ tling international conflicts of opinion and in¬ terest. Accordingly, they are working.to bring about a form of world-organization in which the nations shall co-operate to abolish this an¬ cient scourge and at the same time find a moral equivalent for its valuable by-products. In the year 1910 the well-known philanthropist, Mr. Andrew Carnegie, whose generosity, rendered possible the creation of the great institution; known as the Carnegie Endowment for Inter¬ national Peace, summed up the present-day attitude toward war by calling it ((the foulest blot upon our civilization® — a characterization amply warranted by the colossal struggle of the World War, unless that struggle shall eventually prove to have been indeed a war against war.

This new attitude of aversion toward war is a part of the great humanitarian movement which set in shortly before the French Revolu¬ tion. War violates the Rights of Man — the right -to life, liberty and the pursuit of happi¬ ness. Its immediate effect is the destruction on a large scale of life itself, which has come to seem more precious than it used to seem, and also of many of the values, both material and spiritual, which ennoble life and make it worth living. It replaces the orderly construc¬ tive processes of society with an orgy of de¬ struction, treating the common man as mere cannon-fodder, while its immediate benefits fall to only a few leaders who get their reward in ((glory® or increased wealth and power, that is, in the gratification of their vanity.

In spite of all that, however, it is generally recognized that a brief frenzy of successful war may avert from a whole nation a long era of dependence, oppression, humiliation and economic misery. Hence war, particularly de¬ fensive war, sometimes justifies itself to the humane and philosophic mind as a preparation for a better time to come — it is a paroxysm in which the men and women of a particular nation and epoch sacrifice themselves for the sake of their descendants. Consequently sen¬ sible and conscientious peace-workers

have no sympathy with the doctrine of ((peace at any price,® but look upon peace rather as a by¬ product of freedom and justice, a state of af¬ fairs rendered desirable not merely by the ab¬ sence of war, but by the presence of conditions that make for human welfare and happiness — conditions oftentimes not to be established by any other means than war itself. In his book entitled (A World in Ferment* Dr. Nicholas Murray Butler expresses himself regarding peace as follows : <(Peace is not an ideal at all ; it is a state attendant upon the achieve¬ ment of an ideal. The ideal itself is human liberty, justice, and the honorable conduct of an orderly and humane society. Given this, a durable peace follows naturally as a matter of course; without this, there is no peace, but only a rule of force until liberty and justice revolt against it in search of peace.® It is necessary to distinguish, therefore, between the practi¬ cally minded workers for international peace,

who seek definite remedies for definite dangers and evils, and the radical pacifists, who con¬ demn and denounce all war under all circum¬ stances. In 1918 the sentiment of the influential and far-sighted peace-workers of the nations allied against Germany was almost unanimous in favor of a vigorous prosecution of the war to a victorious conclusion, that being considered the shortest and surest road to an enduring peace.

In view of the fact that war is only a means of overcoming a difficulty that exists between two more or less powerful groups, its abolition of course presupposes the substitution of some other means to that end. For we have no rea¬ son to expect that controversies between na¬ tions will ever entirely cease to arise, any more than we have reason to suppose that quarrels between individuals will ever come absolutely to an end. The fact of the matter is, indeed, that man is naturally a fighting animal; his instinct impels him to attack any fellow-being who provokes him or stands in the way of the realization of his desires or the obtainment of what he considers his rights. History and ex¬ perience prove, moreover, that destructive wars, no less than private quarrels, sometimes origi¬ nate in trivial causes which might have been removed.

Thus the International Peace Movement takes it for granted that controversies between nations are inevitable, and concerns itself with creating a state of affairs wherein nations will not hastily resort to war for the purpose of settling their disputes or achieving their ends. Its aim, in other words, is to gain time for discussion and the cooling of passion, and then to provide peaceful, legal and therefore honorable ways of adjusting differences. This is frequently done by diplomacy,

many immi¬ nent wars having been happily averted by peaceful negotiations conducted by duly author¬ ized representatives of the opposing groups. But diplomacy usually involves compromise, which, in turn, implies a willingness on the part of the disputants to make reciprocal con¬ cessions in the interest of peace. When a com¬ promise cannot be effected and diplomacy is unable to bring about a settlement, the opposing groups have but three alternatives to choose from: (1) they can leave the question(s) at issue unsettled; (2) they can go to war; (3) they can submit the question (s) to an impartial court of arbitration for a decision in accord¬ ance with the principles of justice and reason. The first is always unsatisfactory, sometimes dangerous and not infrequently impossible; the second is coming to be considered more and more a hideous anachronism; and the third is the primary object of the movement under consideration.

The sentiment of the world at large against war is by no means of recent origin, although it has been greatly quickened during the past generation by reason of the fact that armed conflicts between nations involve no longer rel¬ atively small numbers of fighting men, but whole vast populations, combatants and non- combatants alike, with the result that they are more destructive and calamitous than ever be¬ fore. It is true, however, that there have al¬ ways been individual writers, Utopian dreamers, who were opposed to the settlement of contro-

versies by force, not only because they were shocked by the suffering thus caused, but also because they saw that war outraged justice and substituted might for right. But while denunciations of war on these and other grounds have come down to us from the earliest days of recorded history, and are of comparatively frequent occurrence in ancient, mediaeval and early modern literature, suggestions as to effica¬ cious means of avoiding it, that is, as to ac¬ ceptable substitutes for it, are relatively few and far between. The idea of resorting to arbitration has been envisaged by many high- minded and public-spirited men, but only here and there do we find feasible schemes for putting that idea into practice. Moreover, even if a few projects not altogether hopeless were proposed, they could not be put into effect until a large public sentiment was created in their favor. For as long as the popular masses remained ignorant of or indifferent to the evils of war, regarding it as glorious or as con¬ cerning a comparatively small number of lead¬ ers and fighting men, it was

impossible that sporadic proposals looking toward the peaceful settlement of controversies and emanating from a few enlightened leaders of thought should lead to any practical results.

It is not strange that mankind has been very slow to realize that any controversy or difficulty which can be settled at all can be settled by law as well as by force. It has taken countless ages to do away with private brawling, and the world is by no means en¬ tirely rid of it yet. The truth is that war, in a certain sense, is a <(time-honored institution, that is, nations have always been in the habit of attacking one another whenever they have con¬ sidered such action either necessary or desir¬ able, whenever the war-passion has been aroused. Ancient action-patterns have devel¬ oped in the nerve-substance of the human animal, so that when a stimulus is offered in the form of a real or imagined danger, or an insult, or a provocation of any kind whatso¬ ever, we clench our fists or seize our weapons and get ready to fight, just as another sort of stimulus will move us to eat, or to tremble with fear of ghosts, or to seek the gratification of our sexual instinct. It has been shown that most wars, historically, result from land-crowd¬ ing, need of expansion-room, but according to modern conceptions of right and wrong a na¬ tion which seeks to acquire territory belonging to another nation by force commits a crime analogous to that of the individual who steals his neighbor's corn and justifies the theft on the ground that he was hungry. However that may be, it is not to be denied that fighting is an ingrown habit and not a rational activity, and that the impulse to fight can be counter¬ acted only by a long and slow process of, edu¬ cation ; at the same time, however, that educa¬ tion must provide a moral equivalent for war, lest enduring peace shall result in converting men from lions into sheep.

However we explain the phenomenon or account for its development, the fact remains that the sentiment against war has of late be¬ come more general and more insistent, with the result that at the present time the advocates of peaceful settlement are found in all classes of society and are becoming numerous enough

to exert an important influence upon national and international affairs. Not only are en¬ lightened peace-workers of many kinds (states¬ men, philosophers, juris-consults, economists, journalists, historians, poets, scholars) con¬ stantly giving oral and written expressions to their views all over the world, but whole parties and sects have adopted the abolition of war (universal disarmament) as one of the main planks in their platforms. Moreover, constructive minds are everywhere engaged in* advocating measures and

developing plans for bringing about the substitution of a peaceful and legal procedure for war as a means of settling differences that threaten to involve na¬ tions; and the increasing number of interna¬ tional congresses and conferences held for the purpose of effecting a general agreement con¬ cerning all sorts of economic, commercial, polit¬ ical and social questions bears witness to the success of the efforts that are being put forth to the end of removing the causes known to be responsible for disastrous conflicts resulting in the wholesale destruction of life and property.

Since the beginning of the 19th century numberless peace societies of one kind and an¬ other have been created in different parts of the world, most of them without sufficient re¬ sources at their disposal for carrying on very extensive propaganda, but some of them large and wealthy enough to make their influence felt in the counsels of world politics. These peace societies, the first of which was founded in New York in 1815, and the second in Lon¬ don in 1816, may be called the mainspring of the International Peace Movement, since their membership includes the most prominent work¬ ers in all countries, and since they are consti¬ tuted for the express and exclusive purpose of dealing with questions of war and peace. To a considerable extent they co-operate with one another, and while their policies and methods differ more or less, their objects, generally speaking, are identical and may be summarized as follows: (1) to educate public opinion re¬ garding the evils of war and the advantages of peaceful settlement; (2) to advocate friendly agreement and co-operation in the regulation of matters affecting the family of nations; (3) to promulgate and popularize plans for the abolition of war and the perpetuation of peace; (4) to create in favor of such plans a public sentiment such as will incline responsible states¬ men to apply them, with the necessary modifica¬ tions, to the existing political conditions; (5) to bring about, ultimately, the establishment of an International Council or a Permanent Court of Arbitration to which all questions arising between nations shall be submitted by compulsion for adjudication on the basis of a universally accepted International Law.

It would be extremely difficult, if not im¬ possible, to make out a complete list of the peace societies that have sprung into existence all over the world in the course of the last few decades, and especially since the beginning of the great World War in 1914. The fact of the matter is, indeed, that almost every little town, especially in the United States, has its peace society, so that there are literally hundreds of them. (The International Peace Year-book* (1915), published by the National Peace Council (established in England in 1905

by the Second National Peace Congress of Great Britain and Ireland <(to effect a closer union of the [British] societies, and to assist them in a sincere and earnest promotion of the world's peace") contains a list of peace societies covering some 40 pages ; most of these mentioned do not claim an international char¬ acter, however, while many of those which claim it scarcely possess it. Suffice it to say, accordingly, that there are at least 10 or 12 •larger organizations, of which the Carnegie Endowment for International Peace may be called one of the most important, whose mem¬ bership comprises the leaders of the peace move¬ ment in all countries of the civilized world, and whose activity is therefore truly inter¬ national.

The question as to whether the world will ever be entirely rid of war is one which nobody can answer. It is (

Paul B. Thomas.

INTERNATIONAL UNION OF MINE, MILL AND SMELTER WORKERS. See

Western Federation of Miners.

INTERNATIONAL UNIONS FOR THE PROTECTION OF PROPERTY. (1) International Union for the Protection of Industrial Property, an organization with headquarters at Berne, Switzerland, which dates from 1880, and its first conference that year held in Paris, followed by another in 1883; Rome, 1886; Madrid, 1890 and 1891, and Brus¬ sels, 1899-1910. The work of the Union was brought prominently before public notice in the United States when the delegates met at Wash¬ ington, 15 May 1911, to consider amendments and revision to the Treaty of Paris of 1883. President Taft selected five men prominent in the world of patents to represent the United States : Hon. Ed. B. Morse, Commissioner of Patents; Mr. F. B. Fish, Mr. Charles Duell, Mr. Melville Church and Mr. Robert H. Park¬ inson. The deliberations of the conferences are secret, and final texts of treaties as amended are not given out until ratified by the various nations represented.

The convention 'signed at Washington 2 June 1911 was ratified by representatives of Austria-Hungary, Dominican Republic, Spain, United States, France, Great Britain, Italy, Japan, Mexico, Norway, Netherlands, Portugal, Switzerland and Tunis. Five governments ad¬

hering to prior c6nventions which did not ratify were Belgium, Brazil, Cuba, Denmark and

Sweden. Twenty other nations had been in¬ vited to take part and become adherents to the Paris Treaty of 1883 and its subsequent amend¬ ments, but did not respond. There was, how¬ ever, evidence of increasing interest in the Union on the part of non-adhering countries. The date of the next conference to be held at The Hague was postponed indefinitely on ac¬ count of the great European War.

(2) International Society for the Protec¬ tion of Private Property. — A society reported 17 July 1916 as formed with headquarters in Zurich, Switzerland, to look after the interests of persons who own property in enemy coun¬ tries which is liable to confiscation or enforced administration by the governments of warring nations. The Society pledges itself to try and persuade the respective governments to release the requisitioned property of enemy subjects, and also to take care of the interests of their colleagues, whenever possible. The members of the Society include a great many rich persons threatened with impoverishment in both of the warring groups, and several leading jurists in neutral countries interested in the problem that has arisen of private property having to pro¬ tect itself against the state, which, according to current belief, should be the first protection of private property. The Society does not limit its activities to mere protests, but uses the most radical measures in case of necessity.

INTERNATIONAL WATERWAYS COMMISSION. See Lake-to-Sea Commis¬ sion.

INTERNATIONAL WORKINGMEN'S ASSOCIATION, an organization of the work¬ ingmen of all countries for the advancement of the interests of labor and the emancipation of the working classes. It grew out of a visit of French workingmen to the World's Exposition at London in 1862. In 1864 an organization was formed in London, and an

leaders of the Commune were Internationalists, and its principles and aims were defended by the International. In the United States the Social party, a socialist political organization, was affiliated with the International in 1868, and later some individual trades-unions were also affiliated; finally the North American Fed¬ eration of the International was formed and held its first national congress in 1872; its organization was in local sections of

at least 10 members, with a Federal Council of nine elected by the annual congress. Shortly after the trans¬ fer of the General Council to New York the Internationalists took a prominent part in the eight-hour day demonstration in New York. The formal organization of the International was dissolved in 1875 ; in Europe the Social Democratic parties of the different countries grew out of it, and in the United States the Socialists-Labor party. The anarchist faction in the United States split into two organiza¬ tions, the International Workingmen's Associa¬ tion and the International Working People's Association. The International was important in the history of the labor movement as being the first expression of the recognition, of the common interests of labor in all countries, and as being the means of spreading widely the knowledge of the principles of the Marxian so¬ cialism. Consult Brooks, J. G., (The Social Un¬ rest > (New York 1903), and (American Syndi- calism) (New York 1913) ; Ely, R T., (French and German Socialism (New York 1883), and (The Labor Movement in America* (New York, new ed., 1905) ; Kelly, E., twentieth Century Socialism* (New York 1910).*

INTERNODE, in a plant, the portion of the stem between two nodes or leaf-buds; a portion of any elongated body between two nodes or thickenings. See Stem.

INTEROCEANIC SHIP CANAL. See Nicaragua Canal; Panama Canal.

INTERPARLIAMENTARY UNION FOR INTERNATIONAL ARBITRA¬ TION, an association composed of members or ex-members of the legislatures of the world, formed to promote a peaceful settlement of in¬ ternational disagreements. It was organized at Paris in 1889, but the United States did not send representatives until 1897.. In the early 90's its work was so earnest in the interest of international peace and arbitration that an international court was proposed, with juris¬ diction in such matters. The Hague Tribunal was the outcome. The later activities of the association have been aimed to secure the adoption between nations of permanent treaties of arbitration. See Arbitration Inter¬ national; Hague Tribunal, The.*

INTERPELLATION, in law, the act of demanding an official explanation of a member of the government, as in France and some other European countries. It is used more frequently in Italy and France than elsewhere. After due notice, any member of the particular legislative body may interpellate the ministry, and this often results in a general debate. Frequently a ministry resigns as a result of an interpella¬ tion. The right of permitting or refusing an interpellation rests with the legislative body, not with the ministry. An interpellation is fol¬ lowed usually by a vote of confidence or of want of confidence in the government.

*INTERPLEADER, in law, a procedure by which a person having goods, money or the like in his possession may have the ownership thereof judicially determined in case of dis¬ pute between two or more claimants. Usually such a suit is brought in equity. It is called <(multiplepoinding** in Scots law. One seeking this remedy must show that two or more per¬ sons claim against him the same thing, obliga¬ tion, etc. ; that he is not in collusion with any of such parties ; that he has no beneficial in¬ terest in the subject matter of the suit; that he cannot decide without danger of prejudice to his rights who is the rightful claimant, and must show that he is willing to meet his obligation to the lawful owner. Originally this action was restricted to a limited number of cases, but it has been extended so that to-day it may be brought in all claims in which the right or obligation is identical. It is of importance in modern practice, both in Great Britain and in the United States, in the relations involving bailor and bailee, landlord and tenant, common carrier and shipper, tax-collector and land-owner, agent or consignee and principal or consignor, sheriff and party claiming goods levied upon, etc.*

*INTERPOLATION, a word, line, verse, sentence, part of a sentence or whole passage, inserted usually with a view to secure respect for some opinion by the apparent support of antiquity, or of those whose authority is great¬ est. Many instances of interpolation are well known, and others are with great probability suspected, in which the works of early Chris¬ tian writers have been tampered with, to make them yield support to novel doctrines and prac¬ tices. In mathematics the operation or method of finding, from a few given terms of a series, other intermediate terms. Interpolation is fre¬ quently resorted to in astronomical calculations. Consult Doolittle, C. L., (Treatise on Political Astronomy as Applied to Geodesy and Naviga¬ tion * (4th ed., New York 1903).*

INTERPRETATION, in law, the art of determining the meaning of a speaker or a writer or of the parties to a written instru¬ ment, as a contract, deed or the like. Courts of equity, in their interpretation and construction of instruments, follow the same rules as courts of law. The terms interpretation and construc¬ tion, while frequently used interchangeably by some writers, should be differentiated according to others. In interpretation, they contend, the court decides simply the meaning of words and sentences, whereas in construction the court decides what is their legal effect. Interpreta¬ tion is merely logical reasoning, while construc¬ tion is legal reasoning, these writers insist. The two terms, nevertheless, in practice at least, are generally used with identical meaning. The rules for interpretation vary to some extent with the particular class of instrument in dis¬ pute. For instance, wills are liberally con¬ strued, as the testator is not presumed to know the legal signification of all the terms he em¬ ploys, but is held to use such in their popular meaning. On the other

hand, a deed is gen¬ erally construed strictly and against the maker when there is ambiguity. A contract must not be strictly nor liberally construed, but the in¬ tention must be drawn in the light of surround¬ ing circumstances, as customs of the place or

time, social conditions, etc. Statutes abrogating the common law, as well as penal statutes, must be strictly construed. The same rule is applied to statutes affecting private rights. On the other hand, statutes designed to prevent fraud are liberally construed, and statutes must gen¬ erally not be construed so as to operate ret¬ rospectively.

Some general rules of interpretation are as follows: (1) The meaning of a word, clause or other part of an instrument must be con¬ strued in the light of the whole instrument. Such disputed part may have its ordinary mean¬ ing entirely changed by this rule. (2) The meaning of the maker of an instrument is to be taken from what is therein contained and also from what may be fairly implied by custom or the like. (3) Due weight must be given to the construction placed upon the instrument by the parties themselves. (4) Words are to be taken in their ordinary meaning unless the writing or the attending circumstances indicate a contrary intention. (5) Where two interpre¬ tations are possible, that is to be preferred which is fair and reasonable. (6) Usually am¬ biguous language is to be construed against the maker of a private writing, as a contract or a deed. (7) When the language of an instrument is clear and unambiguous, interpretation is not needed. In other words, a court will not. read into an instrument a meaning it does not ex¬ press, even if the court does not believe the language expresses the meaning of the maker. (8) As between two interpretations, one of which follows the law and the other does not, the former is to be preferred. (9) A writer cannot be allowed to vary, contradict or add to an instrument by oral evidence to show his act¬ ual intention.

In addition to the foregoing list, which is not complete, a large number of special rules have been framed to fit particular cases.

Sometimes the interpretation of an instrument is left to a jury, but the usual rule is that the court decides. For instance, a jury may decide the signification of a written word which has a local or a trade meaning, and similarily a jury may decide the meaning of an oral contract or other oral declaration. In criminal libel cases in the United States, and in all cases of libel and slander in England, the jury like¬ wise decides the meaning of the

language en- ployed by the. defendant. This forms an im¬ portant exception to the rule above enumerated.

Interpretation is particularly important in four classes of instruments: deeds, wills, con¬ tracts and statutes.

A highly technical classification of different methods of interpretation has been recognized by some authorities, such as liberal, close, re¬ strictive, extravagant, strict, etc., but the first and last are the ones generally used.

An important doctrine, known as that of cy pres, has been developed in the interpretation or construction of wills and statutes. Under this doctrine so much of the writing will be given effect as is possible. For instance, if an illegal direction is given in a will, so much of the will must be given effect as is legal, if this part is separable, and the remainder ignored. This doctrine is in effect both in Great Britain and in most of the States in this country.

In the interpretation of constitutions, the

courts endeavor to harmonize different parts that seem to conflict, and should lean in favor of a construction which will render every word operative, rather than one which may make some idle and nugatory. (8 W. Va. 320). The rule for the construction of Federal and State constitutions is radically different. Consult 102 Tex. 11; 9 Wheat. (U. S.) 1.

INTERRACIAL MARRIAGE. See

Cross-Fertilization in Animals and Man.

INTERSTATE COMMERCE COMMIS¬ SION. See Commerce, Interstate.

INTERSTATE COMMERCE LAW.

See Commerce, Interstate.

INTERSTATE COMMERCE LEGIS¬ LATION. See Commerce, Interstate.

INTERSTATE CONTROVERSIES. See

Boundaries of the United States.

INTERVAL, in music, is the distance or difference of pitch, arithmetically expressed, between any two tones of a given scale. Occi¬ dental nations, including America, employ the diatonic scale (see Scale), an octave compris¬ ing five tones and seven semitones, named after the first seven letters of the alphabet. The affix of a flat or sharp before a note denotes its

quality but does not affect its name, and the eighth note being in unison commences a new octave. Taking the scale in the key of C major, the various intervals are: minor second = E-F or B-C; grave major second = C-D, F-G, A-B ; grave minor third = D-F ; minor third = E-G, A-C, B-D; major third = C-E, F-A or G-B; perfect fourth = C-F, D-G, E-A, G-C, or B-E' ; acute fourth = A-D' ; acute augmented fourth = B-F ; grave diminished fifth = B-F' ; grave fifth = D-A; perfect fifth = C-G, E-B, F-C\ G-D', A-E ; minor sixth = E-C', A-F', B-G'; major sixth = C- A, D-B, G-E'; acute major sixth = F-D' ; grave minor seventh — D-C', G-F', B-A' ; minor seventh = E-D',

A-»G; seventh = C-B, F-C'; octave = C-C', D-D', etc. By taking various notes of the dia¬ tonic scale as starting points and measuring known intervals from these, we arrive at inter¬ mediate notes of the scale, of which the follow¬ ing are. examples : C# minor third below E; D# minor second below E; Eb minor third above C; Ab minor sixth above C; Bb minor seventh above C; B# 3 major third above C. The difference of pitch between C and C# or between D and D# is called a semitone, and an interval increased or diminished by a semitone is said to be .augmented or diminished. This applies especially to the interval of a fourth or a fifjth, which with the octave are said to be perfect, because any augmentation or diminu¬ tion mars their consonance. The major sixth or third may, however, be diminished to a (

INTERVENTION, in international law, the meddling of one state in the internal affairs of another either for the protection of its own rights or those of its citizens or for some pur¬ pose usually humanitarian. It may take place under the form of representations to the Am-

bassador of the country against which it is directed, or that of armed interference. Its essence is illegality and it is only justified by its success. Intervention has been frequently resorted to, especially in Europe during the 19th century, when it often became necessary to secure the balance of power. It is safe to say that armed intervention is not favored except in extreme cases, e.g., the expedition to China during the Boxer Rebellion of 1900. Inter¬ vention on humanitarian grounds has at times been resorted to to cover the real object. In¬ terventions under treaty guarantees have not been uncommon. Recent instances of interven¬ tion are that of the United States in Cuba in 1898 and England in the Great War because as a signatory to the treaty guaranteeing the in¬ dependence of Belgium, which was ruthlessly violated by Germany. Consult Moore, J. B., (Digest of

International Law> (1906).

INTESTACY, the legal state of a person dying without having disposed of his property by last will and testament. In Great Britain intestacy does not affect real estate, which is disposed of in accordance with the rule of de¬ scent. The effect of intestacy in Great Britain is merely that no directions have been left for the distribution of personal property. The ef¬ fect of intestacy in the United States varies in accordance with the laws of inheritance fixed by each of them. Intestacy may be complete, as when a valid will is not left by the dead pro¬ prietor ; or partial, when the extant will only provides for the distribution of part of the property. In these cases the property passes to the heirs or next of kin of the decedent in accordance with the laws of the place where the property is. See Descent; Heir; Inher¬ itance.

INTESTINE, BOWEL, or GUT, the ali¬ mentary tube, in the higher animals limited to that portion between the stomach and the out¬ let at the anus. The human intestine is divided into the small and large intestine, the two parts varying in structure, movement and function. The small intestine starts at the pylorus of the stomach, as the duodenum, and the first 8 or 10 inches are so distinguished. This portion is the widest and most deeply placed of the parts of the small intestine. About three or four inches below the pylorus the ducts of the gall-bladder and pancreas open conjointly into the bowel. The duodenum emerges from the cover of the peritoneum and becomes the jejunum. The re¬ mainder of the small intestine constitutes the jejunum (about two-fifths) and the ileum. Be¬ tween these divisions there is little difference, except that the jejunum is more freely movable, occupies the upper left portion of the abdomen more than the lower and right, and has thicker walls. The lumen of the small intestine grad¬ ually grows less from the duodenum, where it is two inches and a half in diameter, to little more than an inch where the ileum empties into the large intestine. The ileum is inserted sev¬ eral inches above the actual beginning of the large intestine, so that a blind pouch is formed below the point of juncture; this pouch, called the caecum, gives off the appendix vermiformis (see Appendicitis) from its lower and back part. From the caecum the large bowel passes up to the under surface of the liver as the ascending colon (see Colon), thence across the

abdomen below the lower border of the stomach as the transverse colon, turns down to the iliac fossa as the descending colon, forms a peculiar S-shaped curve, the sigmoid flexure, which passes over the brim of the pelvis, where it is called the rectum (q.v.). The large bowel is about six feet in length. Both bowels have four coats, the mucous coat, the submucous, the mus¬ cular, and over most of the bowel an invest¬ ment of peritoneum forming the serous coat In the small intestine the mucous membrane is

thrown up into permanent folds, each extending over half-way around the inside of the bowel. In this way a large surface is exposed for the absorption of food. Furthermore, the inner surface is covered with finger-like projection called villi, each having a large absorbing ves¬ sel in its centre. At the bases of the villi are tubular (of Lieberkuhn) and branching glands (of Brunner) that dip down into the mucous

b

I

d

Section of the Ileum and Caecum; a, ileum; b, caecum; c, ileocaecal valve; d, opening of the appendix; e, ap¬ pendix.

»

membrane. Scattered over the surface there are tiny collections of lymphoid tissue, called soli¬ tary follicles, and here and there collections of these follicles into groups one to three inches long, called Peyer's patches. It is these spots that are attacked and ulcerated in typhoid fever. The muscular coat consists in an inner layer running around the bowel and an outer longi¬ tudinal coat. The large bowel differs from the small in the absence of the folds and villi, and is but slightly movable within the abdomen, be¬ ing bound down to the abdominal wall pos¬ teriorly by the peritoneum. See Physiology.

Diseases of the Intestine.— These may be disturbances of the function of the bowels without actual, inflammation, or they may be inflammations in different parts and of different kinds; but with inflammations there is neces¬ sarily' a disturbance of the various functions, and differentiation frequently becomes a matter of difficulty. Diarrhoea and constipation (qq.v.)

are symptoms of many different conditions, as are also deficiencies of secretion and absorp¬ tion. The nervous mechanism of the bowels may be changed, giving rise to abnormal sensa¬ tions and disturbances of all the functions. True inflammation of the intestines is the most common cause of abnormal action, and there¬ fore is described in detail.

Acute Intestinal Catarrh is an inflammation of the mucous membrane that

varies much in its symptomatology with the part of the bowel affected and the causative agent. Among the causes may be mentioned the eating of tainted fruits and other foods; the overeating of any food ; overdrinking, particularly of very cold liquids; the injection of chemical or mechanical irritants ; ((catching cold® ; and the poisons of the infectious diseases. The bowel is inhabited by numerous forms of micro-organisms, many of which are entirely harmless; but when any of the various agencies mentioned above affect the mucous membrane, the micro-organisms are able to attack the damaged surface. Many forms of bacteria produce particular types of disease when they find such lodgment, because they invade the system with their peculiar products. (See Cholera Infantum ; Cholera ; Dysentery) . But to the growth of bacteria must always be ascribed some of the symptoms in any intestinal catarrh. The attack usuallv 'starts in acutely with fever, general bodily discomfort and abdominal pain. If the inflammation be confined to the upper part of the small intes¬ tine there may be constipation ; but this is un¬ common, and diarrhoea is the rule. Inflamma¬ tion of the small intestine is spoken of as en¬ teritis, but this is usually associated with more or less inflammation of the large bowel, called colitis, although it may occur alone even in its last portion, the rectum. The pain in colitis is apt to be confined to the sides of the abdomen, and when the inflammation is low down there is constant desire to defecate, pain accompanying the act. Passage of mucus alone also indicates an inflammation low down in the rectum. The stools in acute intestinal catarrh vary much with the cause of the trouble ; in some observed cases of dysentery the dis¬ charges are like rice-water. Treatment of these conditions depends upon the severity and loca¬ tion of the inflammation. The mild cases, with ordinary loose movements, recover without medication with abstinence from food fqr 24 hours. Castor-oil or small doses of calomel will cleanse the intestine of irritating sub¬ stances. The more severe cases are kept in bed and allowed small amounts of milk after the first day, and are given small doses of castor- oil or mixtures of bismuth, opium and other sedative drugs. If the large intestine is found to be involved, irrigation with common salt ;n water (teaspoonful to the quart) is valuable. Great care must be used in the selection of diet for some time.

Duodenitis occurs associated with acute gas¬ tritis (q.v.), and has the same symptoms, ex¬ cept for the presence of jaundice due to the closure of the bile-ducts. The disease runs its course ordinarily in a few weeks without any treatment except rest in bed for a few days, simple diet and mild cathartics to relieve the constipation.

Chronic Intestinal Catarrh results from a severe attack of acute inflammation in which

the mucous membrane is left with permanent changes, or from repeated attacks of inflam¬ mation. Cases of chronic inflammation may occur without previous evidence of acute at¬ tacks. The symptoms vary much in kind and intensity, but pain, flatulence and disturbance of the bowels are usually complained of. There may be pronounced constipation, alternating constipation and diarrhoea, daily unformed movements not distinctly diarrhoeal, -or, what is most common, a constant diarrhoea. More or less admixture of mucus in the stools is usually observed. Sooner or later there is apt to be a loss of flesh and strength. Wh°n the large bowel is much involved in such a process there is usually a coating of the stools with mucus, or the passage of clear mucus.

In the treatment it is best to rely mainly on carefully regulated life — exercise, baths, fresh air, sufficient rest, avoidance of exposure and properly selected diet. In diet the objects sought are the regulation of the bowels and the avoidance of irritation. When there is diar¬ rhoea it is wise to avoid fruits, salads, cabbage, coarse-fibred breads, sugars, honey, pastry, sour and sweet wines and carbonic beverages. In cases attended with constipation most of these may be allowed, but sausages, rich dressings, cucumbers, cabbage and very coarse-fibre breads should be forbidden. Mineral waters are fre¬ quently used with success, such springs as Carlsbad and Vichy for the diarrhoeal cases, and such as Marienbad, Hathorn and Congress for those attended with constipation. Chronic catarrh of the large bowel is treated with small doses of castor-oil and irrigations of the bowel with water, to which may be added antiseptics or astringents.

Intestinal Hemorrhage, or blood passed from the bowel, may be due to piles, tumors, dysen¬ tery, colitis, typhoid fever, tuberculosis of the intestinal tract, ulcers of the duodenum, portal obstruction as in cirrhosis of the liver, hemo¬ philia, purpura and the hemorrhagic forms of the infectious diseases. When blood coming f rom the stomach or high up in the small intes¬ tine is passed by rectum it is changed to a tarry appearance This is due to the action of the digestive juices and bacteria. The farther down the intestine the blood starts, the brighter red is it found when passed.

Intestinal Obstruction is a term that in¬ cludes a great variety of conditions in the ab¬ domen having the common feature of obstruc¬ tion to the passage of the contents along the bowel; and in addition there is in the acute condition some injury to the bowel resulting in special symptoms. Two varieties are differen¬ tiated, the acute and the chronic. Acute intes¬ tinal obstructions are caused bv foreign bodies, gall-stones and hardened or large collections of faeces in the canal ; by contracting scars, or tumors of the wall, twists of the gut (volvu¬ lus), intussusceptions (invagination of a por¬ tion above into the part below) ; bv adhesions of the peritoneum,

causing constricting bands ; and by strangulations of portions of the bowel contained in hernia. Besides these causes, from local or. general per'tonitis there is apt to be a condition of paralysis of a portion of the bowel, giving rise to the same state. The symp¬ toms vary considerably with the cause of the obstruction and the part of the bowel affected, but in general the symptoms are pain — fre-

quently of a colicky sort — constipation, inabil¬ ity to pass gas — with resulting tympanites — vomiting, first from the shock, and later from reversed peristalsis, until at length the vomitus is bilious and finally even faecal. Because of these symptoms and the injury to the nerves of the intestine resulting in ˆshock,® there is a gradually increasing prostration. Certain features indicating that the obstruction is in the small intestine are early vomiting, the pas¬ sage of faeces from the lower bowel and the greater swelling of the centre of the abdomen. Absolute constipation from the first is apt to mean an obstruction low down in the large bowel. The cause of the obstruction may be indicated by the presence of a tumor, or by something in the previous history. Intussus¬ ception is the most common cause of the ob¬ struction in children ; a tumor may be felt on the outside, or the bowel may be felt in the rectum. Faecal impaction is indicated by a long history of constipation, and rectal examination shows the hardened masses. If intestinal ob¬ struction be not relieved, the patient may die of shock, with gradual exhaustion, from gangrehe of the bowel — the blood-supply being usually shut off — and sometimes from peritonitis.

Medical measures for the relief of most forms of the malady are not successful, and temporizing is attended with danger; but rest of the body as a whole and especially of the intestinal tract must be absolute. Some au¬ thorities advise the use of opium for further quieting the intestine when the diagnosis is certain. Lavage of the stomach rs of great value, and large enemata may be curative when the cause of the trouble is intussusception, for¬ eign body or hardened faeces. Most forms of obstruction require the opening of the abdo¬ men, search for the cause of the obstruction, and attempts at removal. Results depend on the quickness with which operation is under¬ taken ; death may ensue, in spite of the removal of the obstruction, if interference be too long postponed. Chronic intestinal obstruction is caused by about the same conditions as the acute variety The symptoms include various digestive disturbances, flatulency, constipation, and, when due to malignant growths, the gen¬ eral loss of flesh and strength

Intestinal Parasites. — Three principal forms of these affect man — tapeworms, roundworms and pinworms (qq.v.). The list of symptoms attributed to the presence of tapeworms in the human intestine is long and varied, but even loss of nutrition from such a parasite's pres¬ ence is usually slight. Finding the worms or their eggs in the stools is the only convincing symptom. Treatment of this condition consists first in the preparation of the intestine by light diet for 24 hours before the taenifuge is given and six or eight hours before, allowing a lib¬ eral diet of onions, salty herring and garlic; this rather loosens the worm's hold. Mild pur¬ gatives may also be given at this time. Early on the following morning the selected drug is taken, and this may be either male-fern, pomegranate, pumpkin-seed, kousso or kamala. Afiter about 12 hours a brisk cathartic is taken and the worm is passed. Careful search must be made for the head, for unless it is passed treatment must be started again while the worm is yet weak. Santonin and purgatives effect expulsion of roundworms. In 'the treatment of

pinworms it is customary to take advantage of the fact that the females deposit their eggs in the large intestine and rectum. Santonin and cathartics aid in gathering the worms where they may be killed by injections of ben¬ zine (20 drops to the pint of water), or by solutions of quinine, though further catharsis may be necessary.

INTIMIDATION. See Corrupt Prac¬ tices Acts.

INTONING, the practice of delivering prayers in the recitative form. Intoning differs little from chanting: in the latter case the cadence is more developed, the divisions more rhythmical and the music in continuous har¬ mony. In intoning the greater part of the prayer is recited on one note and then sung by several voices in unison, the closing words of the sentence being sung to the proximate notes of the scale and in harmony. The practice of intoning prevails in the Greek, Roman, Anglican and Lutheran churches.

INTOXICATION (literally poisoning, commonly restricted to poisoning by means of alcohol, for a discussion of which latter see Alcoholism). Intoxication in the sense of poisoning may result from poisons having their origin outside of the human body (exogenous poisoning), or from poisons which may be de¬ veloped within the body itself (endogenous poisoning, or auto-intoxication). Some of the most important problems connected with the infectious diseases concern themselves with the study of the intoxications that result from the formation of toxins by specific bacteria dis¬ tributed throughout the human body during the course of a disease. From the same point of view many af the most complicated intoxica¬ tions result from variations in the normal metabolism of the 'body. Thus in

diabetes mellitus (q.v.) there is developed an acid in¬ toxication (diabetic coma), which is due to the inability of the body properly to neutralize by its alkaline salts the excessive amounts of acid produced as a result of the perverted metabol¬ ism of this disease. Similarly in Bright's dis¬ ease a type of intoxication (uraemic poisoning) results from failure of the kidneys to eliminate poisonous products from the human body. It seems not unlikely that a number of diseases such as migraine (sick headache),, some forms of epileptic convulsions, different types of skin-eruptions and some of the mild insan¬ ities result from auto-intoxication (q.v.). See Toxicology.

INTRA, Italy, town of Piedmont, province of Novara, on the western shore of Lake Mag- giore, 12 miles north of Arona. It. has good water-power facilities which are utilized by its cotton and silk mills, foundries, hat factories, leather works, etc. Its industries are largely the property of the Swiss who inhabit splendid villas along the lake front. Pop. 8,000.

INTRANSIGENTE.S, or INTRANSI- GEANTS, in France, Spain and Italy, extreme radical republicans; the party of irreconcilables. In Spain the Intransigentes combined with the Internationals in an extreme communistic move¬ ment of insurrection in 1873 against the federal republic.

INTRENCHMENT, in fortification, any work, consisting of not less than a parapet

and a ditch, which fortifies a post against the attack of an enemy. As a means of prolong¬ ing the defense in a regular work of permanent fortification, intrenchments are made in various parts, to which the defenders successively retire when driven in from forward works. Bastions are ordinarily intrenched at the gorge by a breastwork and ditch, forming either a re¬ entering angle or a small front of fortification. An army in the field often strengthens its posi¬ tion by intrenchments, as by a continual line of parapet and ditch, or by a line with intervals, consisting of detached works of more or less pretension flanking each other. The war in Europe, which began in 1914, was marked by an unprecedented system of intrenchment, with shelters, dug-outs, barbed wire obstacles, etc. See Fortification; War, European.

INTRODUCED SPECIES. A long cata¬ logue might be made of species of animals and plants which have been transferred by accident or design from their native country or locality to other regions. Sometimes, as in the case of salmon in New Zealand, rabbits in Australia, the European house-

sparrow in America and elsewhere, or Western fishes in Eastern waters, this is done by design; but in the great major¬ ity of cases the introduction is accidental and unwelcome, as in the case of the hundred and more species of injurious insects brought into the United States from foreign lands (or the fewer sent abroad from here), and the very many species of <(weeds® naturalized on our and other shores. Such introductions are in the main accidental, the eggs or seeds or grown individuals passing from one region to another in ships or railway trains, or cargoes or dis¬ charged ballast ; so many plants have been in¬ troduced by the latter means that botanists class the group of alien weeds as <(ballast plants.® See Acclimatization; Immigration, Animal and Vegetal.

INTROSPECTION, observation as ap¬ plied to the phenomena of mind. While in essentials it is like all other observation, it is especially interesting because of certain diffi¬ culties which it encounters. Though these have been minimized by the experimental psycholog¬ ist, they certainly burden psychological research with a very considerably greater degree of falli¬ bility than that found within the natural sciences. As was pointed out by Kant, the chief obstacle, to introspection is the fact that the phenomena forming the object of introspection are liable to profound modification by the act of introspection itself. It is indeed by no means inconceivable that objects within the mind may be as unmodified by the observation of an in¬ dependent part of consciousness as non-mental objects. The difference between observation and introspection is thus in a sense merely one of degree ; none the less it is not negligible. The crude introspection of common sense — which furnishes the only possible starting point for the refined introspection of experimental psy¬ chology — indicates to us that experiences are actually changed by a change in the direction of our attention. If one thinks intensely of the tip of his forefinger he will experience pressure sensations, temperature sensations, etc., which seem different from the casually remem¬ bered sensations experienced with a different direction of attention. If he listens to a par¬

ticular instrument in an orchestra he will hear it aa distinctly louder than if he listens to the orchestra as a whole. Now while the experi¬ ences which form the basis of our observation of nature are subect to change by our change of attention, in a manner not unlike our intro¬ spection, there is a fundamental distinction be¬ tween the two cases. This distinction resides in the fact that whereas the apparatus of physical research reduces the experiences and phrases of experience involved to those which by their simplicity are not subject to much altera¬ tion by a change in the attention, all the instru¬ ments of the psychological laboratory cannot reduce by one iota the complexitv and multa- bility of the objects of introspection, for these constitute the entire content of the mind. Be¬ fore this content can be studied by fragments with the aid of the apparatus of the psy¬ chological

laboratory, it must be demonstrated by introspection that these fragments are really fragments of the more complex experi¬ ences. Introspection, therefore, can never free itself from a subject matter that changes with the direction of the attention by a mere choice of its objects. Now, introspection is itself a change of attention from the natural object of the experience to the experience itself. By its very nature, then, it may be expected to induce profound modifica¬ tions in its objects. In order to avoid this, the psychologist trains himself to make intro¬ spection a more or less automatic act, requiring a relatively slight diversion of attention. While this is unquestionably the only method to gather a large mass of introspective data with relatively slight modifications 'by the method by which they are recorded, it is subject to grave dangers of its own. A prolonged training in laboratory introspection is likely to give one a somewhat narrow repertory of introspective terms bor¬ rowed largely from the senses of vision and hearing, and possibly inadequate to the tasks of introspection which are likely to be under¬ taken. The schematization of the process of introspection may well be inseparable from a schematization of its dicta. That mental phe¬ nomenon known as suggestibility makes it scarcely a matter of doubt that in many cases the introspection of one trained in the methods and doctrines of some special psychological school will contain artifacts, not present in the actual mental occurrences.

Besides the difficulties dependent on the at¬ tention and on suggestion, another obstacle to introspection is the privacy and inaccessibility of every experience. While no single observa¬ tion in physical research can be repeated as such, or shared by several observers, the ob¬ servation of several experimenters with re¬ spect to a given occurrence possess a certain equal weight and direct comparability, while the history of physics shows that it is possible to repeat many an experiment in practically all its significant details. While psychological ex¬ periments can be repeated, and many times with valuable results, as soon as the more complex processes — and particularly those of affection — are involved, the variation in the mental content and background from time to time be¬ comes an obstacle that can only partially be cir¬ cumvented. Physical experiments in heat and electricity can only be repeated by virtue of the existence of thermal and electric insulators.

Chemical experiments demand apparatus that is inert to the reagents. Now, there is no thor¬ oughly satisfactory way of insulating an ex¬ perience of any degree of complexity from its mental background, nor of enclosing it, as it were, in an inert container. Thus it is difficult to repeat an

introspective situation in such a manner as to duplicate all the features which are important from a given standpoint. The impossibility of sharing an introspection 'needs no comment. It has been said that every intro¬ spection is retrospection. This is true in a sense, for manifestly no complete view can be taken of a time-consuming experience — and all experiences, as far as we know, consume time — until the beginning of it is in the past. However, the knowledge of an occurrence in the immediate past need not be a matter of memory, for it appears that the direct cognitive relation can bridge brief intervals of time. This direct nature of immediate retrospection permits the psychologist to make many valuable introspections on chance states, the excitation of which in the laboratory would be difficult or impossible. The result of the foregoing dis¬ cussion, then, is : Introspection is the funda¬ mental method of psychology and is a valid type of observation but is subject to certain grave and peculiar difficulties which are at any rate less apparent in other types of observation. These are in part alleviated, in part aggravated, by the methods and practices of the psychological laboratory. These methods and practices have at best a limited scope and cannot be said to have supplanted the older method of introspec¬ tion upon the psychological phenomena of daily life. (See Psychology). Consult James, W., Principles of Psychology5 (New York 1899) ; Klemm, O., (History of Psychology5 (ib. 1914) ; Kulpe, O., (Outlines of Psychology5 (tr., ib. 1901) ; Titchener, G. B., (Text-Book of Psy¬ chology5 (ib. 1910) ; Wundt, (Essays5 (Leip¬ zig 1906).

INTRUSION. See Volcanism, and sec¬ tion on Volcanism. in article on Geology.

INTUBATION, the introduction of a tube into an orifice or an organ, as the larynx, to keep it open. Specially designed tubes for such a purpose are sometimes used in cases of croup, diphtheritic obstruction, etc., as a substitute for tracheotomy.

INTUITION, in philosophy, immediate knowledge, attained without deliberation or reasoning, as opposed to empirical knowledge which is built up by experience. The term has wide use in connection with intuitional systems of ethics which set forth conscience as a func¬ tion which gives direct recognition of right and wrong, either in a choice between two acts, or between two principles of action. In the theory of knowledge intuition is the immediate apprehension of truth, whether that be sensory truth or necessary forms of thought, or ulti¬ mate knowledge of the nature of God, etc.

INTUITIONISM, a term used to desig¬ nate loosely a wide range of philosophic theo¬ ries in metaphysics, ethics and aesthetics, among which the common feature is an insistence upon the existence of direct, immediate

apprehension of truth, beauty or right, without any neces¬ sary dependence upon experience. In general such philosophic tendencies are set over against

empirical theories. The latter have generally carried the day in modern philosophy ; in so far at least as concerns the recognized necessity for the action of experience in order to give solid foundation for belief, opinion and theory of every kind. In modern literature the term has its most important bearing in ethical affairs. See Empiricism ; Epistemology.

INTUSSUSCEPTION, the reception of one part within another, as of a oV/ ord in a sheath ; as applied to the bowels, it expresses the slipping of one portion of the intestines into and constriction of another. It is a rather common form of intestinal obstruction, espe¬ cially in infants, among whom over 25 per cent of all cases occur. It is fatal unless removed by surgical operation. In plant physiology, the term signifies the growth of a cell-wall by tak¬ ing up new matter throughout, instead of laying it on by opposition.

INULIN, a substance resembling starch, but intermediate in nature between that body and the gums. It occurs in the roots of ele¬ campane, dandelion and certain other plants, and also in the Jerusalem artichoke and the common potato. When pure it is a tasteless white powder consisting of spherical particles. Its chemical formula is probably a multiple of CcHioOs, though C72H124O62 has been suggested. It is insoluble in alcohol and but slightly soluble in cold water, although it is very hygroscopic. It dissolves freely in hot water. It melts at 320° F., becoming thereby converted into a different substance known as ((pyro-inulin.55 It is not fermentable and does not reduce Feh- ling's solution. Iodine renders it brown or yellow.

INUNDATIONS, floods caused usually by the overflow of a river or by the ocean, some¬ times by the giving way of a dam or other barrier. Since the dawn of history no century and scarcely any large country have been free from floods. The region of the Nile in Egypt, and of the Hoang-Ho, or Yellow River, in China, have suffered most from this cause; and the Nile stands alone as at once a terribly de¬ structive and a beneficial agent, for its over¬ flows have not only irrigated the surrounding dry country, but greatly enriched it by spreading over it the fertilizing sediment collected and conveyed in the stream. In recent years sani¬ tary science has greatly reduced the danger of pestilence that always follows a great flood, and that formerly was often as destructive of human life as the floods themselves.

The following are some of the most noted inundations of record: 245, the sea swept over Lincolnshire, England, and submerged thou¬ sands of acres

; 353, a flood in Cheshire, Eng¬ land, destroyed 3,000 lives and a great number of cattle; 738, an overflow of the Clyde drowned 400 families in Glasgow; 1014, a num¬ ber of seaport towns in England and the Neth¬ erlands were destroyed; 1100, the coast of Kent, England, was deluged and the Goodwin Sands bank formed by the sea; 1108, Flanders was submerged by the sea and the town and harbor of Ostend completely covered; 1134, a large part of Flanders was again submerged; 1164, a considerable part of the coast of Fries¬ land was swallowed up; 1170, manv miles of country in the northern part of Holland were engulfed with great loss of life; 1219, the break-

ing of the dykes along the Zuyder Zee caused great destruction of life and property; 1277, 44 villages in Holland were destroyed; 1282, 72 towns and villages in Holland were submerged and 100,000 persons drowned; 1287, another breaking of the dykes caused a loss of 80,000 lives; 1362, 30 villages on the coast of Nord- strand were destroyed; 1377, 50 miles of terri¬ tory and 72 villages in Holland were swept away and the course of the Maas and Rhine rivers changed; 1421, by the breaking of the dyke at Dort 10,000 people in the town and 100,000 in the vicinity were drowned; 1530, a general failure of the dykes caused an over¬ flow of the low lands and a loss of life esti¬ mated at 400,000, and of property in proportion ; 1570, Antwerp, Bruges, Hamburg, Rotterdam and Amsterdam were submerged and 30,000 in¬ habitants drowned; 1617, 50,000 persons were drowned in a flood in Catalonia, Spain ; 1634, a flood swept away several villages on the Nordland coast of Denmark, and drowned 11,- 000 people and 66,300 cattle and 10,800 people and 90,000 cattle were drowned at Hamburg, Bremen and Oldenburg; 1717, the Christmas flood along the entire north coast and in Eng¬ land totally destroyed 5,000 dwellings, and 3,500 partially; 1787, mountain torrents drowned 2,000 persons in Navarre, France; 1811, 24 villages near Presburg and nearly all their inhabitants were swept away by an overflow of the Danube ; 1813, large provinces of Austria and Poland were flooded and many lives lost (6,000 in Silesia, and 4,000 in Poland), and 2,000 Turkish soldiers on an island near VViddin were drowned by a sudden overflow of the Danube 1816, the overflow of the Vistula River laid 119 German villages under water, and caused great loss of life and property; 1829, the same river broke through the dyke at Dantzig, drowned a large number of people and destroyed 4,000 dwellings and 10,000 cattle ; 1830, an overflow of the Danube at Vienna flooded the homes of 50,000 inhabitants ; 1833, 10,000 horses were swept away, and 1,000 persons drowned in Canton alone during the great October flood; 1840, a rising of the Saone river, France, and the bursting of its banks,

caused 60,000 acres to be submerged and many houses destroyed in Lyons, Avignon, La Guillotiere, Voise, Mar¬ seilles and Nismes ; 1846, by the Loire flooding the centre and southwest of France, 820,000,000 damage was sustained; 1849, 160 squares and 1,600 buildings were flooded in New Orleans; 1852, the Hoang-Ho, in China, burst its banks, cut a new bed into the Gulf of Pechili and wrought tremendous losses ; 1855, Hamburg was half submerged and suffered enormous property damage; 1861, Bengal, India, suffered great loss of life and. property by a deluge in its most fertile districts, and famine and pestilence fol¬ lowed; 1866, the north of England was visited extensively by floods; 1870, Rome, Italy, suf¬ fered great loss; 1874, the bursting of a badly constructed dam caused the destruction of sev¬ eral villages in the valley of Mill River, Mass., and loss of 144 lives ; 1876, destructive flood occurred in France and Holland; 1882, many persons were drowned and much property de¬ stroyed by overflows in the Mississippi and Ohio valleys ; 1887, the Hoang-Ho, China, broke its banks, deserted its natural bed, spread over a thickly populated plain, cut an entirely new road to the sea, washed away 300 villages, and

submerged the lands around 300 more between Cheng-Chou and Chung-mon, submerged more than 1,500 villages south of Kaifeng, rendered 2,000,000 people homeless and caused a loss of life estimated from 1,500,000 to 7,000,000; 1889 (31 May), the giving way of the Stony Creek dam in the Conemaugh Valley, Pa., caused the total destruction of the city of Johnstown and several neighboring towns, and caused a loss of about 5,000 lives and more than $20,000,000 of property. The same year was marked by very disastrous floods in China and Japan. In 1890, the levees of the Mississippi gave way in many places, and the waters flooded large areas of land in Mississippi and Louisiana. The worst crevasse was caused by the giving way of the Morgansea, near Bayou Sara. In 1903 there was a great rising of the Kansas, Missouri, Mississippi and Des Moines rivers; several large cities, including Kansas City, Des Moines and Topeka, were inundated, the loss of life was over 300, and of property about $10,000,- 000. In the same year Paterson, N. J., and the entire Passaic Valley were flooded, about $3,000,000 damage being done in Paterson. In 1912 the Mississippi inundated 15,000 square miles with a damage to property estimated at $45,000,000. In March-April 1913 a most de¬ structive flood occurred in the Ohio Valley, due to an excessive rainfall within a short period, 400 lives were lost and the damage to prop¬ erty reached $180,000,000. The city of Dayton was almost destroyed. Consult Stoney, (Ex¬ traordinary Floods in Southern India) (Lon¬ don 1898) ; Williams, (Effects of Land Floods in a Tidal River) (London 1891) ; Valles, (Etudes sur les inondations, leurs causes et leurs effets) (Paris 1857) ; Mississinpi River Com¬ mission (Reports. }

INVALIDES, Hotel des, an establishment

in Paris where wounded veterans of France are cared for at the public cost. Its foundation, dates from 1671, under Louis XIV ; at first it was a place of retirement for the aged servants of court favorites as well as for invalided sol¬ diers, but this abuse was ended by St. Germain in the reign of Louis XV. With its high gilded dome, under which are the tombs of Napoleon, Turenne, Vauban, Jerome and Joseph Bona¬ parte, and Marshal MacMahon, it is one of the most conspicuous monuments of Paris. The buildings, which cover about 30 acres, were be¬ gun in 1671 and completed in 1675. They fur¬ nish accommodation for 6,000 inmates. The fagade of this last structure is 660 feet in length. It stands about 600 vards back from the Seine, facing the Esplanade des Invalides, a fine open place about 900 feet wide, contain¬ ing several rows of trees and extending to the river opposite the Champs Elysees. In 1789 the private property of the institution was alienated and it has since been supported from the public revenue. The body of Napoleon rests in the crypt of the dome.

INVAR, an alloy of nickel and steel with exceedingly small coefficient of heat expansion, only one-twenty-fifth that of steel. It is used for measuring-rods in geodetic work, for pen¬ dulums and other purposes where liability to heat expansion vitiates accurate work. It con¬ tains 36 per cent of nickel. The name is a condensation of the word invariable. See Clock and Geodesy.

INVARIANTS AND COVARIANTS

275

INVARIANTS AND COVARIANTS.

1. These terms were introduced and are still ordinarily employed, in connection with a special mathematical theory, namely, the theory of the linear transformation of algebraic forms de¬ veloped by Cayley and Sylvester during the middle third of the 19th century. The central idea, however, is a very general one, which has been applied in recent years to almost all branches of mathematics. It deserves, in fact, to be ranked with such fundamental concepts as function and group. We therefore divide our sketch into three parts as follows: (1) The general concept of invariant; (2) the theory of algebraic forms, or invariants in the narrow sense; (3) other invariant theories.

The General Concept.

2. The suggestion for the formation of the concept comes from the familiar observation, at the bottom of all science and philosophy, that, while the world about us is in a continual state of change, there are yet certain

aspects or properties which are unaltered. To find the permanent in the changing is the most general statement of the problem of invariants. Ab¬ stractly, the idea may be explained more de¬ finitely as follows: Consider a set of objects or elements O of any conceivable kind, finite or infinite in number ; and a set of operations or transformations T , each of which interchanges the objects in a definite manner. Then a prop¬ erty of an object O is said to be invariant, provided it holds for all the objects obtained from the given O by the transformations T. Similarly, any relation between a number of O's which holds for the transformed O's is said to be an invariant relation, that is, an invariant relation of the given objects with respect to the given transformation.

The idea of covariant involves nothing essen¬ tially new. An object O is said to be a covari¬ ant of a given number of objects 0 i, 0 2, etc.,

provided O is invariantly related to 0 1, O 2,.... In this case, if any one of the transformations

T converts O into O', Oi into Ox, Oi into O/, etc., then the relations connecting O' with Ch, Oi, etc., are the same as those connecting O with Ox, O 2, etc..

3. The idea is best illustrated by examples from geometry. Consider a number of points Pi, Pi, ..., connected with a solid body. When the body is displaced, its points take new

positions, Pi, Pi, _ Many such positions

are possible, since the displacement may be made in an endless number of ways. But in every case, of course, the distance between Pi and Pi is the same as that between Pi and Pi. That is, distances between points are invariant with respect to rigid displacement.

Suppose next that the solid carrying the points is not only displaced but is magnified (or diminished) according to any scale. (We may, for example, picture such a change as produced by subjecting the homogeneous solid to a higher or lower temperature). The solid is then converted into one of different size but of the same shape, that is, a similar solid. Dis¬ tances are changed in the same ratio. Hence Pi Pi /Pi Pi = PiPjPiPi. That is, the ratio of any two distances is invariant with respect to similitude transformations.

4. In both examples, points on a straight line are converted into points on a straight line. Collinearity is then a relation which is in¬ variant with respect to displacements and simili¬ tude transformations. A more general type of transformation for which this is true is the homographic or projective transformation. We consider, for simplicity, only the case of

*figures drawn in a plane M. From a fixed point (termed the centre of projection) outside of M draw lines to the various points of M until they intersect a second plane M' . Thus, every point P in M is associated with a definite point P' in M' . The operation of passing from a figure in M to the corresponding figure in M' is termed projection. Concretely, we may think of the centre of projection as a source of light and the figure in M' as the shadow of that in M.**

If we consider three points Pi, Pi, P3 on a straight line in M, they are converted, by projection, into points P/, P /, P / on a straight line in M' . But in general the distances and also the ratios of distances will differ. In fact, three points have no invariant, since they may be converted into three points at arbitrarily assigned distances by a suitable projection. If, however, we take four points (on a straight line) it may be shown that, for any projection,

PiPz. PiPl_ P/P/ Pi' Pi'

PzPi' PiPi P/P / P/P/'

In each member of this equation we have a combination of the distances between four points which is termed their cross ratio (an- harmonic ratio). Hence the cross ratio of four collinear points is invariant with respect to projective transformation.

*5. Let the figures considere * be all the ellipses of a plane. With respect to displace¬ ment an ellipse has two invariants, the major and the minor axis. With respect to similitude transformation, there is one invariant, the ratio of the axes, or what is essentially the same, the eccentricity. Finally, in the projective theory there are no invariants, since one ellipse may be converted into any other (and even into any proper conic).*

In this connection we may illustrate the notion of a covariant. The centre of an ellipse is a covariant with respect to displacement and magnification, but not with respect to pro¬ jection. For if the plane containing an ellipse E and its centre C is displaced or magnified, so that ellipse E is converted into another ellipse E' and the point C is converted into a point C' , then C' is necessarily the centre of E' ; while under projection this is not the case. A similar result holds for the centre of gravity of any figure, plane or solid.

*6. Another well-known type of transforma¬ tion is that known as inversion. Take a fixed * circle F with centre C and radius r, and sup¬ pose that any point P of the plane is converted into the point P' situated on the line CP, so that CP-CP'—P. The points P, P' are then said to be inverse with respect to the circle F. By the inverse of a curve is meant the locus of*

the points inverse to the points of the curve. The collinear relation of points is no longer in¬ variant, for a straight line (not passing through C) is converted into a circle. An arbitrary

- *It is however necessary to include the ideal shadow formed by producing the rays away from M.*

circle is converted into a circle, but the centre of the circle is not a covariant point. The most important property of the transformation is this : the angle at which any two curves inter¬ sect is equal to the angle at which the inverse curves intersect. Angles are invariant with respect: to geometric inversion.

7. We pass now to a few simple examples of the general definition in No. 2, in which the objects and transformations are analytic in¬ stead of geometric.

Let the objects O be functions of .any num¬ ber of variables, and let the operations T per¬ formed on these functions be the permutation of the variables involved. A function written down at random, for example x 2 + 2yz, changes its form when say x and y are interchanged. There are exceptional functions, like x2Jry2Jrz 2 and xy+yz+xz, which are not altered by inter¬ changing the variables in any way, and are termed symmetric. The symmetric functions are invariant with respect to permutation of the variables.

In the differential calculus it is shown that the exponential function ex has the property of being its own derivative. The only functions which are invariant with respect to the process of differentiation are in fact those of the form ae, where a is a constant. It is obvious that if the first derivative is equal to the original function, all the higher derivatives will also be equal to the function.*

The trigonometric functions have a period of 2ft or 360°. Such a function f(x) is un¬ altered in value when x is replaced by x~Y2ft.- It is obvious that the double application of the operation, that is, the replacing of x by •'+47r, will also leave f(x) invariant. The periodic character thus involves the invariance of the function with respect to all the operations (x, xJr2kft) (this denotes the replacing of x by x ~Y2kft), where k is any integer. We note here that if one of these operations, say that of adding 2k' ft to the angle, is followed by another, say that of adding 2k" ft, the result is the same as the single operation of adding 2{k'--k") ft, which is a*

member of the set. The set of operations thus possesses the essential property of a group.

8. In general, if an invariant is found with respect to certain operations, Ti, 7%, the invariance also holds for all combinations of these operations. Adding these combinations to the original operations, a set is finally ob¬ tained with the group property; this is then termed the group generated by the given opera¬ tions.

Thus, in connection with No. 6, since angles are unaltered by inversion with respect to any circle, it follows that they are unaltered by successive inversion with respect to a number of circles. The inversions themselves do not con¬ stitute a group; but the totality of combina¬ tions is the important group of circular trans¬ formations which are expressed analytically by the linear transformations of a complex variable and of its conjugate.

9. The general problem of the mathematical theory of invariants may now be restated as follows : Given any group of transformations, and any set of configurations (mathematical objects) which are converted into one another by these transformations, to find the properties of the configurations which remain unaltered.

There are thus as many types of invariant theories as there are types of groups and types of configurations. The distinction according to groups is the more fundamental.

10. The relation between the concepts in¬ variant and group is thus very intimate. Suppose that instead of assigning transforma¬ tions and seeking invariants, the question is inverted: Given a property or a function, find the transformations which leave it invariant.

Thus, if space is to be deformed so as to leave the distance between every pair of points unaltered, the deformation must be simply a displacement. The totality of displacements forms a group; for if one displacement is fol¬ lowed by a second, the effect is the same as that due to a single displacement. In general the totality of transformations defined by one or more invariants is a group. Many groups are defined in this way.

11. In connection with any group this ques¬ tion may be asked: Given two configurations, is it possible to convert the one into the other by a transformation belonging to the assigned group? If this is the case, the configurations are said to be equivalent with respect to the group.

Thus, two figures are equivalent with respect to the displacement group when they are con¬ gruent ; they are equivalent with respect to the similitude group when they are similar. The study of equivalence with

respect to the pro¬ jective group is the main object of projective geometry; its systematic analytic treatment depends upon the theory of algebraic forms considered below.

The importance of the notion of equivalence depends upon the fact 'that equivalent configu¬ rations necessarily have the same invariant func¬ tions and properties. Thus in studying the pro¬ jective properties of (proper) conics, it is suffi¬ cient to consider the case of a circle. The cir¬ cle may thus be taken as the type or canonical form of the class of conics.

The Theory of Algebraic Forms.

12. This part of modern algebra deals with the invariants of algebraic forms with respect to the group of linear transformations. It has been variously termed the theory of forms, the algebra of quantics, the algebra of linear trans¬ formations, the linear or projective invariant theory. Traces of the idea may be found in papers by Lagrange, Gauss and Cauchy; and simple results on quadric forms were given by G. Boole (1841) ; but the construction of the systematic theory begins with the memoirs of A. Cayley (1845-) and J. J. Sylvester (1851—) . The recent developments are due mainly to German and Italian mathematicians.*

13. The objects considered are algebraic forms. A form or qnantic is a rational integral homogeneous function of any number of varia¬ bles. Forms are classified according to the number of variables and the degree in which they are involved. A binary form involves two variables; a ternary, three; a quaternary, four; in the general case of p variables the adjective p-ary is employed. The degree in which the variables enter is termed the order of the form ;

**Most of the technical terms employed (including invari¬ ant, covariant, form) are due to Sylvester, who gloried in the title of "The Mathematical Adam."*

we denote it in general by n. If n is one, the form is linear; if two, quadric (or quadratic) ; if three, cubic; if four, quartic (biquadratic); etc.

Thus the binary cubic form is axZJr bx2y + cxy2 + dys,

where x, y are the variables and a, b, c, d the coefficients. It is usual, however, to distinguish the variables and the coefficients by subscripts, a notation which has the advantage of generality and symmetry; also

binomial coefficients are introduced. Thus the above form is written

aoxZJr?>a\X?X2Jr2>(hXiX2JrazX2.

The ternary quadric is

anXi+anx2 + chzx2 + 20-3X2X3+ 2a uXuU +4012X1X2.

The general binary form is

ft

(1) a<>xin+-^ xin~ lX2

fl(fl – 1)

*H — —pi — x'n~2x*2 + • • • + anX2n.*

14. The group employed consists of the totality of linear transformations of the varia¬ bles. A linear transformation from the original variables xt. x2, ... x to the new variables Xi, X2, . . XP is defined by p equations of the

first degree, as follows :

x i—liiXi+li2X2+ . . . +h pXp,

X 2= = =/ 21^C 1 ~ h 1 22X 2"f . . . --hpXp,

Xp = IpiXl f — f— . . . f IppXp.

The determinant

A — \Uj\y

whose elements are the p 2 coefficients in these equations, is termed the modulus of the trans¬ formation. It is assumed that A does not vanish ; for in the latter case the X's cannot be expressed in terms of the .r's, that is, the transformation is not reversible.

We shall deal mainly with binary variables and then employ the simpler notation

(2) Xi~hXi+miX2, x2— 12X1+012X2.

The modulus is A =hm2 — hmi.

15. When a linear transformation is carried out on a form, the latter is converted into a form of the same order containing the new variables. The

coefficients of this transformed quantic depend of course upon the transforma¬ tion employed. Thus if in the quadric

/ = anXi + 2aiXiX2 + a2x 2

we make the substitution (2), the result is a new quadric,

F = A0X12 + 2 A 1X1X2 + A2X2 2,

where

A0 — h2ao + 2hl2ai + l2a2,

Ai = liniiao + (/a + /2Wi)Oi + l2m2a2f A 2 = mi2 ao + 2miin>ai + m2a2.

It is easy to verify that

A0A2 — A2 = (hm2 — l2nh)2 (a0a2— at2) .

According to the general definition in No. 2, the function aoa2 — a 2 is not an invariant func¬ tion, since it is not equal to A0A2 — A2; but the relation ao a2 — cti2 = 0 is invariant, since its fulfilment necessitates AoAz — A2=0. This is sometimes expressed by saying that the func¬ tion is a relative invariant.

It is usual, however, to modify somewhat the general definition as follows : A function of the coefficients of a quantic is said to have the invariant property when it is equal to the same function of the coefficients of the transformed quantic, except for a factor depending only upon the coefficients of the linear transforma¬ tion. Thus if 0 (a) is such a function, where a denotes the coefficients collectively, and if A denotes the coefficients in the new form, then

(3) 0G4)=M0(a),

where M depends only on the transformation coefficients.

All such functions can be expressed in terms of rational integral functions with the same property. These are termed simply invariants. Thus an invariant is a rational integral function of the coefficients with the property expressed by (3).

16. A covariant of a quantic differs from an invariant only in that it involves both the co¬ efficients and the variables. Its defining prop¬ erty is expressed by

(3') $(A, X) = M(p(a, x).

Thus the binary cubic

aoxS + ZaiXiX2 + Za2XiX2 + a3×2 has the covariant

(a0a2 — a2)xi + (a0a3 — aia2) XiX2 + (cˆa.-i — a2l)x22 ;

for when the cubic is linearly transformed, it is found that the corresponding expression

(AoA2 — A12)X12 + (A0A3 — AiA2)X1X2

+ (AiA3 — A2)X2,

built from the new coefficients and variables, reduces to the original expression multiplied by (hm2 — /2Wi)2.

17. Invariants and covariants are collectively termed concomitants or, more simply, comitants. We give now a few of their important general properties.

A comitant is homogeneous in the coefficients (a) and in the variables (x) . Its dimension in the former is termed its degree (d) ; its di¬ mension in the latter, its order (m). For an invariant, of course, m — 0.

The factor M produced by the linear trans¬ formation is for every comitant an entire power of the modulus A. Hence

(4)

The exponent w is termed the weight of the comitant.

The proof of the first theorem depends on the use of linear transformations of the special type xi = pXi, x2 = pX2; that of the second theorem depends on the group property of* linear transformations and the fact that A is not factorable.

18. The weight w, order m, and degree d of any comitant of a binary n-ic are connected by the relation

2 w = nd — m.

This holds in the example given in No. 16, where n = 3, m = = 2, d = 2, w — 2.

Taking m = 0 and n odd, we have the corol¬ lary. A binary form of odd

order cannot have an invariant of odd degree.

When n is even, so is m. Hence a binary form of even order cannot have a covariant of odd order.

19. The preceding definitions and theorems may readily be extended to simultaneous corni-

tants, that is, invariants and covariants of two or more forms.

*20. An important process for the formation of simultaneous comitants depends on this principle: If in an invariant 0(ao, ch, . . . an) of a single form f, we substitute a0 + *b0 for Oo, ai + *bi, for ah etc., and expand the result according to powers of k, the first term is the original invariant 0(a), the coefficient of is the corresponding invariant and the remain¬ ing coefficients are simultaneous in variants of f and g. .*

For example, when this principle is applied to the invariant a0a2 — Oi2 of a quadric f — a0Xi + 2aiXiXi + a2× 22, we have

(cto } ˆ bo) (a2 + ˆbi) (cii “b K-bi) 2

—dociz — ai2 f n(aob2 — 2d\bi--d

It follows that a< >&2 — 2ai&i + a2bo is a simul¬ taneous invariant of f and g = b0Xi + 2b1×1×2 + b2x/ .

The coefficient of the first power of «, by Taylor’s theorem, is

,60, ,30, I A d0 b°toe + b’tol + ‘— + bndan-

0

Hence if the operation Sot- + ˆ

is applied to an invariant of a single form, the result is an invariant of two forms. The oper¬ ation is known as the Aronhold process.

21. In the domain of simultaneous comi¬ tants the distinction between invariants and covariants may be said to disappear. All the covariants of a form f may be obtained from the simultaneous invariants of f and a linear form ihXi + u2×2 by the substitution of dr2 for Ui and — Xi for u2.

22. Geometric Interprctotion. — If a binary form / of wth order is equated to zero, the re¬ sulting equation, by the fundamental theorem of algebra, determines n values of the ratio Xi : x 2. Taking Xi : x2 as homogeneous co¬ ordinates of a point on a straight line, we thus obtain a definite set of n points corresponding to the form f. Conversely, if a set of n points is given, the form / is determined (except for a numerical factor).

Linear transformation of Xi, x2 has the same effect upon the points of the line as the pro¬ jection of the given line upon a second followed by the displacement of the second line upon the first. Hence an invariant of f equated to zero represents a projective relation between . the corresponding n points, that, is, a relation not altered by the process of projection. Simi¬ larly, a covariant of order m represents a set of m points projectively related to points defined by /.

Thus, the vanishing of the invariant dod2 — ax of a quadric form means that the two root points coincide. Again, the vanishing of dob2 — 2dibi \ d2bo, derived in No. 21, means that the pairs of points represented by the two quadrics are situated harmonically.

The interpretation often suggests the in¬ variant character of complicated algebraic func¬ tions. For example, the resultdnt of two equations, / = 0, <7 = 0 (that is, the expression which vanishes when and only when the equa¬ tions have a common root), is a simultaneous invariant of f and g. The condition that the

equation / = 0 shall have equal roots leads to an invariant termed the discriminant of /.

23. Absolute Invariants — By considering fractional instead of integral functions of the coefficients, it is possible to obtain absolute in¬ variants, that is, functions which are unaltered by linear transformation. The factor M in (3) is then unity. An absolute invariant is neces¬ sarily the ratio of two (relative) invariants hay¬ ing the same weight. We give an example in connection with the form of fourth order. Here there are two invariants I and J with weights 3 and 2 respectively. Linear transformation af¬ fects them as follows: V—PI, J'—d2J. Hence I'3 / J,?i — P/ J2. That is, P/P is an absolute invariant.

Geometrically, every absolute invariant of any number of forms is expressible in terms of cross ratios of the corresponding points.

24. The Symbolic Notation. — The most powerful method for attacking the general problem of our subject, the determination of all the comitants of any number of forms and their interrelations, is the so-called symbolic

method. The origin of the method is to be found in Cayley's hyperdeterminants (1845), but the sym¬ bolic notation itself is due to Aronhold (1859). The general theory was developed by Clebsch and Gordan (187(F).

A binary form of «th order is represented by the nth power of a linear form, f = (ai£i 4~ a2×2) n.

Here the a's are merely symbols which have a

real meaning only in the combinations

a{n = (jo, a1n~ia2 = ai, «in — 2a# = a2, . . . , a2n = an-

The Roman letters denote, real coefficients and the Greek letters symbolic coefficients. The latter were termed umbrae (shadows of quanti¬ ties) by Sylvester.

A combination of «'s of dimension

represents both aoa2 and a/. This ambiguity is removed by introducing several . equivalent sets of umbral quantities, each entering in pre¬ cisely the nth dimension. We abbreviate by writing axx\ -f a2×2 =ax, [Sxi + fl2×2 = Ar, etc. The

given form is then

f = axn = (ixn = yxn , etc.

The fundamental theorem is as follows : Every comitant of binary forms f is expressible symbolically as a combination of determinants of the type (af3) = a,/32 — a2(3i and linear factors of the type ax=a1×1 +a2×2. In the case, of inva¬ riants, only the determinants are involved. Conversely, all combinations of these two types (in which each set of symbols is involved in the proper dimension) represent comitants.**

Thus the quadric f = ax 2 = fix2 has the in¬ variant (afi)2. Expanding, we have

(ax fit — «2/?i)2 = at fit — 2«i«2/^i/?2 + at fit

= aoa2 — • 2flifli j a2i io,

which is simply twice the discriminant

dod2 — On .

25. Transvectants. — Among the comitants of two forms, / = axnf g — ftxm (here a and fi are

- Sylvester observed certain formal analogies between '.his symbolism and that employed in chemistry, and developed a so-called chemico-algebraic theory. Consult Grace and Young. 'Algebra of Invariants,' (Cambridge 1903. p 366).

non-equivalent symbols), those represented by (aft)Kaxn—K[ixm~n are of special importance, since

they are of the first degree in each set of coeffi¬ cients. They are termed the transvectants of / and g and are denoted by (/, g)«, Gordan has shown that all comitants may be derived by the repeated application of the process of trans- vectioii.

The first transvectant of two forms is termed their Jacobian; its non-symbolic value is

tete-'te'te- The (/./). is

termed the Hessian of f ; its non-symbolic value

oi a*/

IS

dxi* Ox#

(JL)

\dx1dx2)

26. Complete Systems. — In general, a set of forms has an infinite number of comitants. Thus any entire power of a comitant, or a product of powers of two comitants, is also a comitant. It is evident, however, that there cannot exist an infinite number of algebraically independent comitants, since all are functions of a finite number of coefficients and variables. The fol¬ lowing result is fundamental in the systematic theory: For a given set of forms there exists a finite number of comitants such that every comitant of the forms is a rational integral function of the selected comitants. The latter constitute the complete system of the given forms.

The proof was first given by Gordan (1870) by means of the symbolic method. It has since been simplified and generalized by numerous investigators — in particular, Hilbert.

27. We now give the complete systems for the forms of order 1, 2, 3, 4:

Linear form. No invariant; the only covari¬ ant is the given form / = ax.

Quadric form. One invariant (the discrimi¬ nant) D — (a/3) 2; one co variant J = = «x2.

Cubic form. The only invariant is the dis¬ criminant R = (a, 5) 2 (ay) (/34) (yd)2; in addition to f = ax 3, there are two covariants, H= (aft)mxftx (the Hessian of f) and Q = {oft)i{ay)ftxyx^ (the Jacobian of f and H) .

Quartic form. Two invariants, I — (aft)4, J = (a/3) 2(/3y) 2(70)2; three co variants, the given form/ = ax4, its Hessian H= (a8)mx2ftx2y and the Jacobian of / and H, namely, T = (a/3) 2 (ay) axftxryxs-

Every invariant of the quartic form is thus a rational integral function of / and /; every comitant is a rational integral function of I,

J, f, H, T.

28. The systems given are irreducible ; that is, no member of a system can be expressed as a rational integral function of the other mem¬ bers of the system.

Complete irreducible systems have been cal¬ culated for single forms up to the order 10 and for pairs of forms up to the order 4. The system of the quintic contains 23 members.

While the finiteness of the system is assured, no general formula for the exact number of irreducible comitants is known.

29. Ternary Forms. — Many of the results stated for the binary case apply with little change to ultrabinary forms. There are, how¬ ever, certain aspects of the general theory which are disguised when only the binary case is studied.

Consider a ternary form f(x lf x2, x3) of nth order. (The symbolic representation is axny where ax = al%\ + a2×2 + azxJ) . If Xi, x2, x3 are taken as the homogeneous co-ordinates of a point in a plane, the equation / = 0 defines a curve of nth order. The vanishing of an in¬ variant denotes a projective property of the curve. A covariant defines a

curve which is projectively related to the original curve.

The principle of duality suggests the intro¬ duction of line co-ordinates Ui, u2, u3. When the jr's undergo a linear transformation, the u's undergo another linear transformation, which is said to be contragredient to the first. A func¬ tion involving the u's and having the inva¬ riant property is termed a contravariant of /. Geometrically it represents a curve considered as the envelope of its tangent lines. A mixed comitant is one involving both point co-ordi¬ nates and line co-ordinates ; geometrically it defines a so-called conncx.

The complete system of the ternary quadric / = «x2 consists of the covariant /, the invariant D = («/3y)2, the contravariant F = (pftu)\ and the so-called identical form ux. Here (a/3y) represents a determinant of third order {aiP2yt). Geometrically, f = 0 represents a conic con¬ sidered as a point locus, F — 0 represents the same conic regarded as line envelope, and D — 0 denotes that the conic degenerates to a pair of straight lines.

30. Quaternary Forms. — Here the essen¬ tially new feature is that in addition to point co-ordinates (xh x2, x3, x4) and the dual plane co-ordinates (ui, u2, u3, iu) , it is necessary to consider line co-ordinates (pi2, p43, pu, p34, p42, p2 3). Comitants may contain, besides the coefficients of the given form, any combination of these types of variables. Little advance has yet been made in the complete treatment of even the simpler cases.

31. Gordon's method for proving the exist¬ ence of a complete system applies only to binary forms. The proof for forms of any kind (including multiple forms containing two or more sets of variables) was first given by Hilbert (1890). The basis of his method is the following theorem, which has many important applications :

In any assemblage containing an infinite number of forms it is possible to select a finite number of members F%, F2, . . ., Fr so that every member can be written F — P\FX + P2F2 + . . . + PrFr> where the P's are forms not be¬ longing necessarily to the given assemblage.

Other Invariant Theories.

32. Special Linear Transformations. — Forms have been treated with respect to linear trans¬ formations of special type. Thus the trans¬ formations xi = aXi + ft, yi — aY 1 lead to the so-called seminvariants of binary forms.

Again, the formulas for passing from one system of rectangular co-

ordinates to another,

(5) x — X cos d — Y sin 6 + h,

y — X sin d \ Y cos 6 + k,

constitute a special linear group. Invariants with respect to this group are termed Cartesian or metric or orthogonal. In the case of the conic ax2 + bxy + cy2 + dx + ey + / = 0, there are three such invariants, a + c, b2 — 4 ac, and the discriminant. The latter is the only one which is invariant in the projective theory.

If a + c = 0, the conic is a rectangular hyper¬ bola; if b 2 — 4ac = 0, it is a parabola.

For any number of variables the linear trans¬ formations which leave a given quadric form unchanged constitute a type of group which arises in many applications (line and circle geometries, geometry on a quadric surface, etc.).

33. The general method of finding the in¬ variants of any continuous group involving a finite number of parameters is due to Sophus Lie. An r parameter group is generated by r independent infinitesimal transformations ; these determine a set of r partial differential equa¬ tions whose solutions are the invariant functions.

34. A differential invariant is one that con¬ tains the derivatives of the variables. Thus

y

is a

for the group (5) the expression ^ ^ ^3

differential invariant. It represents in fact the curvature of an arbitrary curve at a point ; this is obviously independent of the system of axes to which the curve is referred.

35. Special theories of invariants have been constructed in connection with differential equa¬ tions. Thus an ordinary linear equation,

dny

dxn

+ pi(x)

dn—iy

dx”—1

+ . . . + pnipc) — 0,

is converted into an equation of the same kind by the substitution x—(X), y= Yp(X). The totality of substitutions here forms an infinite continuous group, since and ip are arbitrary functions. By an invariant of the equation is meant a function of the coefficients pi, p 2 . . . and their derivatives, which retains its value (except perhaps for a factor depending on the transformation) when formed from the coeffi¬ cients of the new equation.

36. Differential Forms. — In the theory of surfaces the distance between two consecutive points of the surface is given by the formula

v)du2Jr2F (u, v) du dvYG(u} v)dv2.

The second member is a binary quadratic dif¬ ferential form. Such forms possess a theory of invariants with respect to arbitrary change of variables. Any change is expressed by u =

37. Arithmetical Theory of Forms. — In this theory, inaugurated by Gauss, the coefficients and variables involved are supposed to be whole numbers. Attention has been confined mainly to the binary quadratic ax2+2bxy-Ycy2. The transformations are defined by x = aX \ ft Y y— yX + 3 Y, where the coefficients a , ft, y, 6 are integers such that aS — fty =4= 0. In this case then, the group is discontinuous.

38. Automorphic Functions. — Such discon¬ tinuous groups arise also in the theory of func¬ tions. Thus in No. 7 it was seen that the trigo¬ nometric functions are unaltered by the substi¬ tutions x= =X--2krr. Similarly, a doubly periodic function (of a complex variable) is invariant with respect to z—Z.Y’kcwiYksw-i, where Wi, w-> are the given periods and ki, k2 are arbitrary in¬ tegers. The modular function is invariant with respect to the linear group 2 = («Z + ft) / (yZ f 3) ,

where. «, ft, >’,3 are integers such hata3 — ft-) = 1, The problem of finding all functions which ad¬ mit an infinite discontinuous group of linear transformations is one of the most important in recent investigation. Such functions _ are termed automorphic. They have been classified by

Poincare into Fuchsian and Kleinian accord¬ ing as the defining group involves real or com¬ plex coefficients.

Bibliography. — Andoyer, (Theorie des forms (Paris 1898) ; Boole, Cambridge Jour¬ nal of Mathematics (Vol. Ill, 1841) ; Cayley,*

(Memoirs upon Quantics (1854—78), Collected Papers, Cambridge; Clebsch, (Theorieˆ der binaren algebraischen Formen* (Leipzig 1872) ; Clebsch-Lindemann, (Vorlesungen fiber Geome- trie) (Vol. I, Leipzig 1875, new edition 1907) ; Elliott, (Algebra of Quantics) (Oxford 1895) ; Gordan, (Vorlesungen fiber Invariantentheorie* (2 vols., Leipzig 1885-87) ; Grace and Young,*

*(Algebra of Invariants * (Cambridge 1903) \ Hilbert (Mathematische Annalen) (Vol. XXX, 1890); Meyer, (Bericht fiber die # Fortschritte der projectiven Invariantentheorie, Berichte Deutsche Mathematiker-Vereinigung) (Vol. I, 1892) ; Salmon, (Lessons introductory to the Modern Higher Algebra) (Dublin, 1st ed., 1859, 4th ed., 1885) ; Study, (Methoden zur Theorie der ternaren Formen* (Leipzig 1889) ; Sylves¬ ter, (Calculus of Forms* (1852-54), Collected Papers (Cambridge 1903).*

Edward Kasner,

Professor in Mathematics, Columbia University.

INVASION, the entry into a country by a public enemy. As early as 1795 Congress pro¬ vided by law for protection against the invasion of the United States by any foreign nation or Indian tribe. The act made it lawful whenever there should be an invasion, or imminent dan¬ ger of one, for the President to call out such number of the militia of the State or States convenient to the place of invasion as he might think necessary to repel it. This, strengthened in some respects by amendments, has been in force ever since. An invasion has usually all the elements of war, and the invaders may be dealt with as persons at war with the country invaded, in accordance with usages of warfare without the declaration of war by Congress. The Supreme Court of the United States has decided that a State is invaded when there is a domestic rebellion within its territory, and that the same rules of law may be enforced as in the case of an invasion by external foes. This de¬ cision practically abolishes all distinction be¬ tween invasion and insurrection, and the same rules which furnish a remedy for invasion can be applied in the suppression of an insurrection or local rebellion. In case the State militia is not sufficiently strong, or not easily available, the standing troops of the United States may be ordered out by the President, if indeed it be necessary to call upon the State troops before resorting to the regular troops of the United States. It is not necessary that

actual armed violence shall be resorted to in order to consti¬ tute insurrection. Any combination of persons too powerful to be suppressed by the ordinary course of judicial proceedings is tantamount to insurrection, and warrants the use of the effec¬ tive measures provided for by law for its sup¬ pression.

As regards the rights of the invader many rules have been laid down, carefully distinguish¬ ing between invasion and conquest, especially with respect to private and public property. It is now held that public money, military stores and public buildings with their contents are lawful sources of plunder, and telegraph and railway property may be used as needs require. The unwarranted burning of the Capitol and other public buildings in Washington by the British in 1814; the removal of the Palatine libraries during the Thirty Years' War; the confiscation of the astronomical instruments in the Observatory of Peking by the Germans dur¬ ing the operations of the Allies against the Chi¬ nese capital — all these were in direct violation of the accepted rules of invasion. The levying of supplies, labor, forage, transportation facili¬ ties, etc., upon the native people is strictly within the lawful confines of invasion ; for example, during the wars of Frederick the Great, both the Austrians and the Prussians were mainly supported by these enforced contributions of supplies. Napoleon was probably the greatest exponent of the belief that a war should sup¬ port itself, either during the conflict, or by im¬ posing a large indemnity, or both ; hence we see that he exacted of Prussia, after the battle of Jena, more than a hundred million francs, and Spain was forced during the Peninsular War to pay a similar amount. The pillage of private property is prohibited, but should the owners give aid to their country, the property may be sold at the discretion of the invading general.

INVENTION OF THE CROSS, a festi¬ val held in honor of the finding of the true cross, on which Christ was crucified, by the Em¬ press Helena a.d. 316, on Mount Calvary, cele¬ brated on 3 May. Since 1895 the festival is called ˆRitrovamento® as celebrating the re¬ finding of the cross, which was identified and buried in the 1st century by Empress Protonice. See Cross.

INVENTIONS. The progress of the world in its numerous vast industries and arts has been founded, to a very large extent, upon inventions and discoveries and their subsequent development. Under the American patent law and system, inventors all over the world are stimulated to make public their inventions by reason of receiving in exchange a monopoly in the form

of a patent on the invention for a period of 17 years. The remarkable increase in the number of protected inventions is shown by the records of the United States Patent Office, as follows : At the end of the first year (1790) 3 patents were issued. In the year end¬ ing 1902, 27,136 patents were granted; in 1916, 43,970. The total number of patents issued from April 1790 to the end of 1918 was over 1 ,125,000. Carriages and wagons have been the subject of the greatest number of United States patents, nearly 40,000.

An invention is recognized to be any new or useful mechanical contrivance or article, method, discovery, composition of matter, or system not previously known or used, or any improvement on any known machine, art, method or system. Below is given in chrono¬ logical order a list of important inventions and discoveries beginning with the 16th century, with the title of the invention, the year it was made, the name of the inventor and his nativity:

INVENTIONS

Date

Inventor

Nativity

Discoveries of Elec-

/ 1560

trical Phenomena . .

\ 1603

William Gilbert

England

Won the title of

- *‘ founder of the*

science of electric-

ity.”

Screw printing-

press .

1620

Blaew

Germany

Spirally grooved rifle

barrel .

1620

Koster

England

Iron furnaces .

1621

Lord Dudley

England

The use of steam ....

1630

David Ramseye

England

The first authen-

tic reference in

English literature to

the use of steam in

the arts.

Bay Psalm Book,

first book published

in the Colonies ….

1640

Mass.

Barometer .

1643

Torricelli

Italy

Steam engine, atmos-

pheric pressure ….

1663

Thomas Newco-

England

Machine for generat-

men

ing electricity .

1681-86

Otto von Gue-

Germany

First paper mill in

ricke

America .

1690

W illiam Ritten-

Penna.

First steam engine

house

with a piston .

1690

Denys Papin

France

The manufacture of

plate glass estab-

lished .

1695

France

First to discover dif-

ference between

electric conductors

/ 1696

and insulators .

\ 1736

Stephen Gray

England

The first practical ap-

plication of the

steam engine .

1702

Thomas Savery

England

First newspaper in

America Boston

N ews Letter .

1704

John Campbell

Mass.

First to produce elec-

J 1708

trie spark .

\ 1716

Dr. J. Wall

England

Thermometer .

1709

Fahrenheit

Danzig

Electrometer, the well-

J 1718

known pith ball. . .

\ 1772

John Cantor

England

The “ Franklin ”

printing-press .

1725

Benj. Franklin

Utd. States

Stereotyping .

1725

William Ged

Scotland

Electrical glass plate

J 1727

machine .

\ 1772

Martin de Planta

France

First to discover that

electricity is of two

kinds .

1733-39

Cisternay du Fay

France

Flying shuttle in

weaving .

1733

John Kay

England

Rotary 3-color print-

ing-press (Multi-

Color) .

1743

Platt & Keen

England

Electric or Leyden

jar .

1745

Kleist

Germany

Substitution of coke

for coal in melting

iron .

1750

Abraham Darby

England

Lightning conductor .

1752

Benj. Franklin

Utd. States

Spinning jenny .

1763

James Hargreaves

England

Piano forte, played in

public in England

in .

1767

England

Drawing rolls in a

spinning machine . .

1769

Richard Ark-

England

wright

The introduction of

the “Hollander”

or beating engine

for pulping rags in

the manufacture of

paper .

1773

The mule spinner ….

1774

Samuel Cramp-

England

ton

Cut nails .

1775

Jeremiah Wilk-

Utd. States

inson

Circular wood saw. . .

1777

Miller

England

Embryo bicycle .

1779

Branchard &

France

Magurier

Steam engine, the

basis of the modern

engine .

1782

lames Watt

Scotland

Gas balloon .

1783

J. E. & J. M.

France

1

Montgolfier

Puddling iron .

1783-84

Henry Cort

England

282

INVENTIONS

INVENTIONS

Plow, with cast iron mold board, and wrought and cast

iron shares .

Power loom .

First steamboat in the United States. . Steam road wagon . . .

(First automobile). Grain threshing ma¬ chine .

Uranium discovered. . Hobby-horse, forerun¬ ner of bicycle .

Rotary steam power printing-press, the

first idea of .

Wood planing ma¬ chine .

Power platen printing

press .

Gas first used as an

illuminant .

Cotton gin .

Art of lithography.. . . Machine for making continuous webs of

paper .

Steam coach .

Wood mortising ma¬ chine .

Pattern loom .

First fireproof safe. . . Steamboat on the Clyde, Charlotte ; Dundas .

First photographic ex¬ periments .

Planing machine .

The application of steam to the loom.

Steel pen . .

Steam locomotive on

rails .

Application of twin screw propellers in steam navigation . . Process of making malleable iron cast¬ ings .

First life preserver. . .

Electro-plating .

Knitting machine, the latch needle in the Steamboat navigation on the Hudson

River .

Percussion or deto¬ nating compound . . First street gas light¬ ing in England ….

Band wood saw.. ... . .

Barium, strontium

and calcium .

Polarization of light

from reflection .

Voltaic arc .

First steamboat to make a trip to sea,

the Phoenix .. . .

Homeopathy intro¬ duced .

Revolving cylinder

printing-press .

Breech-loading shot¬ gun

Storage battery .

Dry pile (prototype of dry battery) ....

First practical steam rotary printing press, paper printec on both sides ……

First locdmotive in

Scotland .

First circular wooc saw made in this country . .

Date

1784

1785

1786

1787

1788

1789

1790

1790

1791

1791

1792 1794 1796

1800

1801

ai

1801

1801

1801

1802

‘

1802

1802

1803

1803

1804

1804

1804

1805

1805

1806

1807

1807

1807

1808

1808

1808

1808

1808

1810

1810

1811

1812

1812

1814

1814

1814

Inventor

Nativity

INVENTIONS

Date

Inventor

Nativity

Heliography .

1814

Jos. N. Niepce

France

Discovery of cyano-

gen .

1814

Gay Lussac

France

James Small

Scotland

Kaleidoscope .

1814

Sir David Brew-

England

James Cart-

England

ster [Davy

wright

Miner's safety lamp. .

1815

S i r Humphry

England

Seidlitz powder .

1815

John Fitch

Utd. States

Dry gas meter .

1815

S. Clegg

England

Oliver Evans

Utd. States

Morphine, first or-

ganic alkaloid

known .

1816

Sertuner

Germany

Andrew Meikle

England

Knitting machine. . . .

1816

Brunei

England

Klaproth

Germany

“ Draisine ” bicycle. .

1816

Baron von Drais

Germany

“ Columbian ” press,

England

elbowed pulling bar,

number of impres-

sions per hour, 200

1817

George Clymer

Utd. States

Wm. Nicholson

England

Stethoscope .

1819

Laennec

France

Electro – magnetism

Samuel Bentham

England

discovered .

1819

H. C. Oersted

Germany

Lathe for turning ir-

I. Treadwell

Utd. States

regular wood forms

1819

Thomas Blan-

Utd. States

The theory of elec-

chard

Wm. Murdoch

England

tro-dynamics first

Eli Whitney

Utd. States

propounded .

1820

Andre Ampere

France

Alois Senefelder

Germany

Quinine .

1820

Pelletier &

France

Caventon

Electroscope .

1820

Bohenberg

Germany

Louis Robert .

France

The conversion of the

Richard Trevith-

England

electric current in-

ick

to mechanical mo-

tion .

1821

Michael Faraday

England

M. J. Brunei

England

Galvanometer .

1822

Schweigger

Germany

M. T. Jacquard

France

Multi-color printing. .

1822

?. Force

Utd. States

Richard Scott

England

Calculating machine.

1822

Charles Babbage

England

Silicon .

1823

ames Berzelius

Switzerl'd

Discovery of thermo-

William S y m-

England

electricity .

1823

°rof. Seebeck

England

ington

Liquefaction and so-

[Davy

Edification of gas . .

1823

Michael Faraday

England

W edge woo d &

England

Water gas, produc-

J. Branch

England

tion of .

1823

Ibbetson

England

Portland cement .

1825

. oseph Aspdin

England

William Horrocks

England

First passenger rail-

Wise

England

way, opened be-

tween Stockton and

Richard Trevith-

England

Darlington, Eng-

ick

land .

1825

Electrical spur

John Stevens

Utd. States

wheel .

1826

3arlow

England

Bromine .

1826

VI. Balard

France

First railroad in

Lucas

England

United States, near

John Edwards

England

Quincy, Mass .

1826

Luigi Brugnatelli

Italy

The law of galvanic

circuits formulated

1827

George S. Ohm

Germany

Jeandean

France

Friction matches. . . .

1827

John Walker

Utd. States

The reduction of

aluminium .

1827

Frederich Wohller

Germany

Robert Fulton

Utd. States

Law of electrical re-

sistance .

1827

George S. Ohm

Germany

A. J. Forsyth

Scotland

Improved rotary

printing-press Lon-

F. A. Winsor

England

don Times, 5,000

Newberry

England

impressions per

hour .

1827

Cowper & Ap-

England

S i r Humphry

England

plegarth

Davy

Hot air blast for iron

E. L. Malus

France

furnaces .

1828

J. B. Neilson

Scotland

S i r Humphry

England

Wood planing ma-

Davy

chine .

1828

William Wood-

Utd. States

Tubular locomotive

worth

John Stevens

Utd. States

boiler .

1828

Sequin

France

Prism for polarizec

S. C. F. Hahne-

Germany

light .

1828

Nicol

England

mann

Spinning ring frame

1828

John Thorp

England

Frederick Koenig

Germany

Type casting and

setting machine. . . .

1828

Wm. Church

Utd. States

Thornton & Hall

Utd. States

The “ Washington ”

J. B. Ritter

Germany

hand printing press

1829

Samuel Rust

Utd. States

Papier-mache stereo-

Zamboni

typing .

1829

Genoux

France

First steam locomo-

tive in Unitec

States, “ Stour-

Frederick Koenig

Germany

bridge Lion ” .

1829

Double fluid galvanic

George Stephen-

England

battery .

1829

A. C. Becquere

France

son

Magnesium .

1829

Adam Bussey

France

First portable stean

Benjamin Cum-

Utd. States

fire engine .

1830

Brathwaite &

England

mings

Ericsson

INVENTIONS

INVENTIONS

Date

Inventor

Nativity

INVENTIONS

Date

Inventor

Magneto-electric in-

Sewing machine .

1846

Elias Howe

duction .

1831

Michael Faraday

England

Suez Canal started. . .

1846

De Lesseps

Chloroform .

1831

G. J. Guthrie

Scotland

Ether as an anaesthetic

1846

Dr. Morton

First conception of

Artificial limbs ….

1846

electric telegraph

1832

Prof. S. F. B.

Utd. States

Gun cotton .

1846

Schonbein

First magneto-electric

Morse

First pianoforte key-

machines .

1832

Saxton

Utd. States

board player . .

1846

Debain

Rotary electric motor

‘1832

Wm. Sturgeon

England

Chloroform in sur-

Chloral-hydrate .

1832

Justus von Lie-

Germany

gery .

1847

Or. Simnsnn

Locomotive, “Old

big

Nitro-glycerine .

1847

Sobrero

Ironsides ” built. . .

1832

M. W. Baldwin

Utd. States

Time-lock .

1847

Savage

Link-motion for loco-

Hoe’s type-revolving

motives .

1832

Sir Henrv James

England

cylinder printing-

Adoption of steam

press .

1847

Richard M. Hoe

whistle for locomo-

Match-making ma-

tives .

1833

George Stephen-

England

chinery .

1848

A. L. Dennison

son

Breech gun-lock, in-

Reciprocating saw-

terrupted thread . . .

1849

Chambers

tooth cutter within

Magazine gun .

1849

Waiter Hunt

double guard fin-

Steam pressure gauge

1849

Bourdon

gers for reapers. . . .

1833

Obed Hussey

Utd. States

Lenticular stereo-

“ McCormick ” reaper

1834

Cyrus H. Me-

Utd. States

scope .

1849

Sir David Brew-

Cormick

ster

Rotary electric motor

1834

M. H. Jacobi

Russia

Latch needle for

Carbolic acid discov-

knitting machine. . .

1849

J. T. Hibbert

ered .

1834

Pmnge

Germany

“ Corliss ” engine. . . .

1849

G. H. Corliss

Horse shoe machine . .

1835

H. Burden

Utd. States

Printing-press, curved

Constant eiectric bat-

plates secured to a

tery .

1836

J. P. Daniell

England

rotating cylinder. . .

1849

Jacob Worms

Acetylene gas dis-

Mercerized cotton . . .

1850

John Mercer

covered .

1836

Edmund Davy

England

Collodion process in

The revolver; a de-

photography .

1850

Scott Archer

vice " for combin-

American machine-

ing a number of

made watches .

1850

long barrels so as

Electric locomotive. . .

1851

Dr. Page

to rotate upon a

Self-raker for har-

spindle by the act

vesters .

1851

W. H. Seymour

of cocking the ham-

Gordon job printing

mer .

1836

Samuel Colt

Utd. States

press .

1851

Geo. P. Gordon

The screw applied to

/ 1836

Breach loading rifle . .

1851

Maynard

steam navigation . .

\ 1841

G LUi v9 Ld UUb

Icemaking machine . .

1851

T. Gorrie

The galvanizing of

The Rhumkorff coil

1851

Rhumkorff

iron .

1837

Henry Craufurd

England

Fire-alarm telegraph .

1852

Channing &

Indicator-telegraph. . .

1837

Cooke & Wheat-

England

Farmer

Photographic carbon

stone

Reticulated screen for

printing .

, 1838

Mungo Ponton

France

haif-tone photo-

Babbitt metal .

1839

Isaac Babbitt

Utd. States

graphic printing . . .

1852

Fox Talbot

Vulcanization of rub-

Soda process of mak-

ber .

1839

Charles Good-

Utd. States

ing pulp from wood

1853

Watt & Burgess

The first boat elec-

year

Laws of magneto-

trically propelled. . .

1839

Tacobi

Germany

electric induction . .

1853

Michael Faraday

Daguerreotype .

1839

Louis Daguerre

France

Laws of electro-

First to produce

statics .

1853

Michael Faraday

a direct photograph-

Electrolysis .

1853

Michaei Faraday

ic positive in the

Duplex telegraph ….

1853

Gintl

camera by means

First efficient type-

of highly polished

setting machine. . . .

1853

W. H. Mitchell

silver surfaced

Photographic roll

plate exposed to

films .

1854

Melhuish

the vapors of iodine

Diamond rock drill. . .

1854

Herman

and subsequent de-

Fou,r motion feed for

velopment with

sewing machines . . .

1854

A. B. Wilson

mercury vapor.

Magazine firearm. . . .

1854

Smith & Wesson

Making photo-prints

Fat decomposed by

from paper nega-

water or steam at

tives .

1839

Fox Talbot

England

high temperature,

(First production

since largely used

of positive proofs

in soap making. . . .

1854

R. A. Tilghman

from negatives).

Safety matches .

1855

Lundstrom

Photographic p o r –

Iron-clad floating bat-

traits. (Daguerreo-

teries first used in

typR process! .

1839

Draper & Morse

Utd. States

Crimean War .

1855

Pneumatic caissons. . .

1841

M. Triger

France

Cocaine .

1855

Gaedeke

Pianoforte automati-

Process of making

cally played .

1842

M. Seytre

France

steel, blowing air

Steam hammer .

1842

James Nasmyth

Scotland

through molten pig-

Typewriting machine

1843

Charles Thurber

Utd. States

iron .

1855

Sir Henry Bes-

First telegram sent. . .

1844

Prof. S. F. B.

Utd. States

semer

Morse

Dryplate photography

1855

J. M. Taupenot

The use of nitrous

Bicycle .

1855

Ernst Michaux

oxide gas as an an-

Sleeping car .

1856

Woodruff

aesthetic . .

1844

Dr. Horace

Utd. States

Aniline dyes .

1856

Perkins

Wells

Printing machine for

The electric arc light

the blind (contains

(gas retort carbon

elements of the

in a vacuum) .

1844

Leon Foucault

France

present typewriting

Automatic adjust-

machine) .

1856

Alfred E. Eeach

ment of electric arc

Regenerative furnace

1856

Wm. Siemens

light carbons .

1845

Thomas Wright

England

Refining engine in

Double cylinder print-

paper pulp making

1856

T. Kingsland

ing-press .

1845

R. Hoe & Co.

Utd. States

Coal-oil first sold in

Pneumatic tire .

1845

R. W. Thompson

England

the United States. .

1857

Stout & Hand

✓

Nativity

Utd. States France Utd. States

Germany

France

Scotland Scotland Utd. States

Utd. States

Utd. States

Utd. States Utd. States France

England

Utd. States Utd. States

France

England

England

Utd. States Utd. States

Utd. States

Utd. States Utd. States Utd. States Germany Utd. States

England

Utd. States

England

England

England

Austria

Utd. States

England Utd. States

Utd. States Utd. States

Utd. States Sweden

Germany

England

France Utd. States England

Utd. States England

Utd. States

Utd. States

284

INVENTIONS

INVENTIONS

First seagoing iron¬ clad war vessel, the

Gloire .

Ground wood pulp . . . Inclined elevator and platform in the

reaper .

Cable car . .

Breech loading ord¬ nance .

Feed injector for

boilers . . .

Storage or secondary

battery .

Singing telephone …. Ammonia absorption

ice machine .

Improved stereotyp¬ ing process . .

Shoe sewing machine. Driven well, a tube with a pointed per¬ forated end driven into the ground …. Passenger elevator. . . Barbed wire fence in¬ troduced. . . .

Calcium carbide pro¬ duced .

Revolving turret for floating battery …. First iron-clad steam battery Monitor..

Gatling gun .

Smokeless gunpowder Pneumatic pianoforte player (regarded as first to strike keys by pneumatic pock¬ ets) .

Explosive gelatine . . . Rubber dental plate. . Automatic grain bind¬ ing device . . .

Process of making fine

steel .

Antiseptic surgery . . . Web-feeding printing

press. . . .

Automatic shell eject¬ or for revolver .

The Atlantic cable

laid .

Open-hearth steel

process . .

Compressed air rock

drill .

Torpedo . . .

Dynamo electric ma¬ chine .

Sulphite process for making paper pulp

from wood .

Disappearing gun car¬ riage .

First practical type¬ writing machine . . .

Dynamite . . .

Oleomargarine .

Water heater for steam fire engine. . .

Sulky plow .

Railway air brake. . . .

Tunnel shield (oper¬ ated by hydraulic

power) . . . . .

A curved spring tooth

harrow . _ .

Dynamo-electric ma¬ chine .

Celluloid .

Rebounding gun-lock. The Goodyear welt shoe – sewing ma¬ chine . . .

Photographic gelatino bromide emulsion (basis of present rapid photography) Continuous web printing-press .

Date

Inventor

Nativity

1857

France

1858

rlenry Voelter

Germany

1858

T. S. Marsh

Jtd. States

1858

£. A. Gardner

Jtd. States

1858

Wright & Gould

Jtd. States

1858

Giffard

Jrance

1860

Gaston Plante

Jrance

1860

Philip Reis

Germany

1860

J. P. E. Carre

France

1861

Charles Craske

Utd. States

1861

George McKay

Utd. States

1861

Col. N. W Green

Utd. States

1861

E. G. Otis

Utd. States

1861

Utd. States

1862

Frederich Woeh- ler

Germany

1862

Theodore Timby

Utd. States

1862

John Ericsson

Utd. States

1862

Dr. R. J. Gatling

Utd. States

1863

J. F. E. Schultze

Prussia

1863

M. Fourneaux

France

1864

A. Nobel

Sweden

1864

J. A. Cummings

Utd. States

1864

Jacob Behel

Utd. States

1865

Martin

Utd. States

1865

Sir Joseph Lister

England

1865

William Bullock

Utd. States

1865

W. C. Dodge

Utd. States

1866

Cyrus W. Field

Utd. States

1866

Siemens-Martin

England

1866

C. Burleigh

Utd. States

1866

Whitehead

Utd. States

1866

Wilde

England

1867

Tilghman

Utd. States

1868

Moncrief

England

1868

C. L. Sholes

Utd. States

1868

A. Nobel

Sweden

1868

H. Mege

France

1868

W. A. Brickell

Utd. States

1868

B. Slusser

Utd. States

1869

George Westing- house

Utd. States

1869

Alfred E. Beach

Utd. States

1869

David L. Garver

Utd. States

1870

Gramme

France

1870

J. W. & Isaac Hyatt

Utd. States

1870

L. Hailer

Utd. States

1871

Goodyear

Utd. States

1871

R. L. Maddox

England

1871

|Hoe & Tucker

Utd. States

INVENTIONS

Grain binder . ._ .

Compressed air rock

drill . .

Positive motion weaving loom . .... Theory that light is an electric phenom¬ enon ..... .

Automatic air brake. .

Automatic car coupler The photographic platinotype pro¬ cess. Prints by this process are perma¬ nent .

Quadruplex tele¬ graph .

Twine binder for harvesters ……..

Gelatino bromide photographic emul¬ sion. (Sensitiveness to light greatly in¬ creased by the ap¬ plication of heat) . . Self-binding reaper. . . Barbed wire machine Siphon recorder for submarine tele- graphs .

Store cash carrier …. Illuminating water

gas . . .

Roller flour mills …. Middlings purifier for

flour .

Ice making machine. . Speaking telephone. . .

Electric candle .

The first satisfactory web perfecting printing press ….. Continuous machine for making tobacco

cigarettes .

Steam feed saw mills The first Portland cement plant in

U. S .

Phonograph .

Gas engine .

Carbon microphone . . Telephone transmitter of variable resist¬ ance .

Carbon filament for

electric lamp .

(Beginning of the incandescent vac¬ uum electric light.) Half-tone engraving

process .

Rotary disc cultiva¬ tor .

Decided advance in the “ Expression ” o f self-playing

pianofortes .

Automatic grain

binder .

Kathode rays discov¬ ered .

Steam plow .

Magazine rifle .

“ Blake ” telephone

transmitter .

Hammerless gun .

Storage battery or ac¬ cumulator . .

Typhoid bacillus iso¬ lated .

Pneumonia bacillus

isolated . .

Button hole machine . Improvement in “ Ex¬ pression ” of self¬ playing pianofortes Hand photographic camera for piates . . Tuberculosis bacillus isolated .

Date

Inventor

Nativity

1871

3. D. Locke

[Jtd. States

1871

3. Ingersoll

Utd. States

1872

r. Lyail

Jtd. States

1872

1872

1873

Elerk Maxwell George Westing- house

E. H. Janney

England

Utd. States

Jtd. States

1873

Willis

England

1873

T. A. Edison

Jtd. States

1873

M. L. Gorham

Utd. States

1873

1873

1874

Charles Bennett Locke & Wood

G 1 i d d e n &

Vaughan

England

Utd. States Utd. States

1874

1875

Sir William Thompson

D. Brown

England

Utd. States

1875

1875

T. S. C. Lowe

F. Wegmann

Utd. States Utd. States

1875

1875

1876 1876

Geo. T. Smith

R. P. Pictet Graham Bell

Paul Jablochkoff

Utd. States Switzerl'd Utd. States Russia

1876

Andrew Campbell

Utd. States

1876

1876

Russell

D. C. Prescott

Utd. States Utd. States

1876

1877 1877 1877

T. A. Edison

N. A. Otto

T. A. Edison

Coplay, Pa. Utd. States Utd. States Utd. States

1877

Emil Berliner

Utd. States

1878

T. A. Edison

Utd. States

1878

Divided

1878

Mallon

Utd. States

1878

Gaily

Utd. States

1879

J. F. Appleby

Utd. States

1879

1879

1879

Sir Wm. Crookes W. Foy

Lee

England Utd. States Utd. States

1880

1880

Blake

Greener

Utd. States Utd. States

1880

Camille A. Faure

France

1880

Eberth & Koch

Germany

1880

1881

Sternberg

Reece

Utd. States Utd. States

1882

Schmaele

Utd. States

1881

Wm. Schmid

Utd. States

1882

Robert Koch

Germany

INVENTIONS

285

INVENTIONS

Date

Inventor

Nativity

INVENTIONS

Date

Inventor

Nativity

Hydrophobia bacillus

Shoe-last lathe for dif-

isolated .

1882

Louis Pasteur

France

ferent lengths ….

1 893

Kimball

Utd. States

Cholera bacillus iso-

Kinetoscope .

1893

T. A. Edison

Utd. States

lated .

1884

Robert Koch

Germany

Process for making

Diphtheria bacillus

carborundum .

1893

E. G. Acheson

Utd. States

isolated .

1884

Loeffier

Germany

Calcium carbide pro-

Lockjaw bacillus iso-

duced in electric

lated .

1884

Nicolaier

France

furnace .

1893

Thos. L. Willson

Utd. States

Antipyrene .

1884

Kuno

Utd. States

Argon, a chemical

Linotype machine. . . .

1884

Ottmar Mergen-

Utd. States

element .

1894

Lord Rayleigh and

England

thaler

Process for liquefying

Sir Wm. Ramsay

The rear-driven chain

air .

1895

Carl Linde

Germany

safety bicycle .

1884

George W. Marble

Utd. States

Electric locomotive,

Chrome tanning of

B . & O. Belt Tunnel

1895

Utd. States

leather . . .

1884

Schultz

Utd. States

X-Rays .

1895

Prof. W. C. Roent-

Germany

Process of reducing

gen

aluminum .

1885

Cowles

England

Acetylene gas from

Gas burner .

1885

Carl Welsbach

Austria

calcium carbide ….

1895

Thos. L. Willson

Utd. States

Hydraulic dredge. . . .

1885

Bowers

Utd. States

Motorcycle .

1895

Wolfmuller and

Germany

First electric railway

Geisenhof

in United States,

Steam disc plows ….

1896

Hardy

Utd. States

Hampden and Bal-

System of wireless

timore, Md ….

1885

telegraphy .

1896

G. Marconi

Italy

Contact device for

Foundation laid of

overhead electric

science of radio-

trolley .

1885

C. J. Van Depoele

Utd. .States

activity, i.e., em-

Graphophone .

1886

Bell & Tainter

Utd. States

anation of penetrat-

Electric welding .

1886

Elihu Thompson

Utd. States

ing rays from lu-

Combined harvester

minescent bodies . .

1896

Henri Becquerel

France

and thresher .

1886

Matteson

Utd. States

Machine for blowing

Band wood saw .

1887

D. C. Prescott

Utd. States

g»ass bottles .

1896

Utd. States

Cyanide process of

Use of ultra-violet

obtaining gold and

rays in treating dis-

silver .

1887

M cA r t h u r &

Utd. States

eases .

1896

Niels R. Finsen

Denmark

System of polyphase

Forrest

Nernst electric light. .

1897

Walter Nernst

Germany

electric currents . . .

1887

Nicola Tesla

Utd. States

Method of ren-

Incandescent gas

dering a clay com-

light .

1887

Carl A. von Weis-

Austria

pound capable of

The formation of

bach

conducting elec-

a cone-shaped in-

tricity and thence

terwoven mantle of

becoming brilliantly

thread coated with

incandescent with-

a refactory rare

out a vacuum.

earth and rendering

Internal combustion

the same incandes-

engine .

1897

Diesel

Germany

cent by the heat

Thermit process .

1897

Goldschmidt

Germany

rays of a Bunsen

Ore-unloader .

1898

G. H. Hulett

Utd. States

gas burner regard-

Radium discovered. . .

1898

Madame S. Curie

France

less of how the gas

Mercury vapor elec-

is produced.

trie light .

1900

Peter Cooper

Utd. States

Process of annealing

Hewitt

armor pi a t,p.

1888

Harvey

Utd. States

Auto plate .

1900

H. A. W. Wood

Utd. States

“ Kodak ” snap-shot

Ocean – going sub-

camera

1888

Eastman &

Utd. States

marine .

1900

Credit divided

Constructed t o

Walker

Electrolytic steel …

1900

Rjellin-Heroult

use a continuous

High speed steels ….

1900

Taylor & White

Utd. States

sensitized ribbon

Ocean wireless teleg-

film.

raphy .

1901

G. Marconi

Italy

Process of making

Air-ship .

1901

M. Santos- Du-

France

artificial silk .

1888

H. DeChardonet

France

mont

Hertzian waves or

Automobile mower. . .

1901

Deering Harvester

Utd. States

electric wave radia-

Co.

tion .

1888

Heinrich Hertz

Germany

The first passenger

First practical "horse-

steam turbine ship,

1889

Serpollet

France

Edward VII .

1901

Denny & Brothers

England

Electrolytic refining. .

1889

Weston et al.

Utd. States

Nitrogen from air. . . .

1903

Birkeland

Norway

First rotarv cement

Nickel storage

kiln

1889

Coplay, Pa.

battery .

1903

Edison

Utd. States

Nickel steel .

1889

Schneider

Utd. States

Aeroplane .

1905

Wright Brothers

Utd. States

Process of making

Gyroscopic compass. .

1906

Anschutz-Kampfie

Germany

aluminum .

1889

Chas. M. Hall

Utd. States

Caterpillar tractor,

Electric plow .

1890

W. Stephens

Utd. States

predecessor of the

Improved linotype

War “ tank ” .

1906

D. Roberts

Utd. States

machine .

1890

Ottmar Mergen-

Utd. States

Removable auto-tire. .

1907

Disputed

Bicycles equipped with

thaler

Cracking oils for

pneumatic tires ….

1890

gasoline .

1908

Divided credit

Krag- Jorgensen mag-

Kinemacolor moving

1890

Krag- Jorgensen

Utd. States

pictures .

1911

Urban-Smitn

England

“ Coherer ” for receiv-

Metal-spraying plat-

ing electric waves . .

1891

Edouard Branly

England

ing machine .

1913

M. U. Schoop

Swiss

Rotary steam turbine

1891

C. A. Parsons

England

Air-cooled gun .

1914

I. N. Lewis

Utd. States

Cement lined paper

Phonopticon .

1915

F. C. Brown

Utd. States

pulp digester .

1891

G. F. Russell

Utd. States

70-mile gun .

1918

Germany

Round bale cotton

press .

1891

Brown

Utd. States

Microphone .

1891

Emile Berliner

Utd. States

It is interesting to note

that between the

years 1872

Power loom .

1891

Northrup

Utd. States

and 1915 there were on what may be termed the honor

Commercial applica-

roll of inventors over 40

inventors each ot

whom had

tion of Formic-aide-

received over 100 patents.

A few ot the most important

hyde .

1892

J. J. A. Trillat

France

include Thomas A. Edison, 977; Francis H. Kichards, 84/;

Wireglass .

1892

Frank Shuman

Utd. States

Elihu Thompson, 617; Charles E. Scribner, 437; George

Gasoline motor .

1892

Otto Daimler

France

Westinghouse, 340; Edward Weston, 1W.

286

INVENTORY — INVERSION

In the preparation of the foregoing statis¬ tics, credit is given to L. H. Campbell, of the United States Patent Office, for valuable assist¬ ance.

Frederick C. Beach, Ph.B., Late Editor of (The Scientific American P

INVENTORY, a detailed written schedule or list of chattels, goods, merchandise, debts, credits, lands, tenements, etc., made either for commercial purposes, or for legal proceedings, such as bankruptcy, etc. It began in Roman law, under which the heir, on filing an inven¬ tory of the decedent's estate, was not liable for the latter's indebtedness beyond the sum which descended to him. In nearly all modern legal systems executors and administrators are obliged to make an inventory of the property in their charge in order to secure it to the persons entitled to it. Guardians and curators in some jurisdictions are obliged to file inventories of the estates held in trust by them for their wards.

INVERARAY, Scotland, royal and munic¬ ipal burgh, capital of Argyllshire, situated on Loch Fyne, at the mouth of the Aray, 4C) miles northwest of Glasgow. The town contains an obelisk in memory of the Campbells who were hanged here without trial in 1685, an ancient market cross and a church. Herring fishing is the principal industry. It became a burgh in 1472 and was made a _ royal burgh in 1648. Inveraray. Castle nearby is the seat of the dukes of Argyll. Pop. 533.

INVERCARGILL, New Zealand, city, situated on New River, South Island, some 17 miles inland and 140 southwest of Dunedin. Owing to its proximity to Foveaux Strait, the town enjoys considerable maritime prestige. It has three outlying towns on the Bluff, called North Invercargill, South Invercargill and East Invercargill. It is situated in a rich agri¬ cultural district, has manufactures of woolens and flour and saw mills.

Pop. including suburbs

15,858.

INVERNESS, Canada, town of Inverness County, Nova Scotia, on the Inverness Railway and on Big River, 150 miles from Sydney. In the neighborhood are found coal, gypsum, copper and fire clay. Pop. 2,719.

INVERNESS, Scotland, a royal, municipal, police burg and capital of the county of the same name, chief town of the Highlands, situ¬ ated at the mouth, and mostly on the right bank, of the river Ness, on the Highland Railway, 109 miles west northwest of Aberdeen. Its environs, well cultivated and beautifully wooded, are almost surrounded by mountains and hills of various heights, forming a pictur¬ esque and interesting landscape. Inverness, is a very ancient town, and was one of the Pictish capitals. It has a quite modern appearance with wide streets, beautiful suburbs and fine villas. The first charters of Inverness as a burgh were granted by King William the Lion. In 1411 the town was burned by Donald, Lord of the Isles, on his way to the battle of Harlow and in 1427 a parliament was held here by James I. In High street stands the famous town cross and the Clach-na-cuddin, an ancient stone. In the same street are the town hall and the exchange. The town contains the Raining's School, a royal academy, Saint An¬

drew's Cathedral, a public library, infirmary, asylum and observatory. The industrial estab¬ lishments comprise shipyards, woolen factories, foundries, tanneries, soap works, railway shops, saw mills, thread mills, etc. There is a consider¬ able coasting trade. Pop. 22,216. Consult Grant, (The Commissariat Record of Inverness) (Edinburgh 1897) and Mackintosh, Unvernes- siana) (Inverness 1875).

INVERNESS-SHIRE, Scotland, the lar¬ gest county of the kingdom, includes Badenoch, Glenroy, and the valley of the Spey on the east, Lochaber on the south, Glenelg, Glen Garry, Arisaig. Moydart and Frazers County on the west, Glen Urquhart and Glen Morriston to¬ ward the centre. It includes also Strathglass on the north ; and several of the western is¬ lands, viz., Skye, Harris, North and South Uist, and Barra, Eigg, etc. The mainland por¬ tion is bounded on the east by Aberdeen Banff, Elgin and Nairn, west by the Atlantic and Ross, north by Ross and Cromarty and south by Perth and Argyll. Its area is 4,211 square miles, of which more than two-thirds consist of barren heath. The wildest and most moun¬ tainous portion is toward the west, comprising a tract 70 miles in extent, designated the (

INVERSION, a change of order whereby the first becomes last and the last

first. (1) In rhetoric, a reversal of the natural order of words for the sake of euphony, emphasis or the like; also the turning of one's own argu¬ ment against him by an opponent in discussion.

(2) In chemistry, a change in molecular struc¬ ture which is usually induced by fermentation or by heating with a dilute acid, as in the case of starch, sugar, etc. Thus starch and dextrine are changed into glucose, cane-sugar into invert sugar, and maltose into glucose.

(3) In geology, the overturning or folding over of strata by igneous agency, so that the order of their succession seems reversed. (4) In mathematics, the operation of changing the order of the terms, so that the antecedent shall take the place of the consequent and the reverse, in both couplets. Thus, from the proportion a : b : : c : d, we have, by inversion, b ; a

: : d : c. (5) In music, the transposition of certain phrases having a common root, (a) The change of a chord by making one of the inner notes act as a bass note, by which means as many inversions can be made as there are actual notes in the chord, not counting the root, the harmony in such inversions remaining the same, though the order of component parts is changed ; (b) alteration of intervals by making that which was the upper note the lower, and the reverse, the inversion of an interval within the octave being readily found in the difference between the figure 9 and the interval known; (c) the alteration of a subject produced by inverting the intervals of which it consists.

INVERTASE, or INVERTIN, an enzyme occurring in many fungi, notably in certain yeasts (for example, the saccharomyces), and also in the seed-plants. It transforms cane- sugar into a mixture of dextrose and levulose; this mixture being called invert-sugar because it turns the plane of polarized light to the left, while the cane-sugar from which it is obtained turns it to the right. According to some writ¬ ers, a yeast cannot invert cane-sugar except by secreting invertase; but Monilia Candida ef¬ fects the inversion, and yet produces no inver¬ tase. In this case the action is probably due to some other enzyme, hitherto unidentified. Invertase probably plays a very important part in vegetable chemistry. Like other enzymes, it can apparently perform an unlimited amount of chemical work, without sensible diminution of its own substance. (See Fermentation). Invertase is most active at a temperature of from 120° to 140° F., and in a slightly acid medium. It has been isolated in the form of a powder.

INVERTEBRATES, a collective term for the lower divisions or phyla of the animal series, which agree in not having a vertebral column or back-bone, used in contradistinction to the highest group of the animal kingdom, to which the name Vertebrata or vertebrate animals is given. In the system of Cuvier the Invertebrata were divided into the Radiata, Articulata and Mollusca. Further study re¬ vealed that these names did not distinguish natural groups; and the term Invertebrata has no longer any definite significance in classifica¬ tion.

INVESTITURE, the act of investment implying the right to give possession of an office, honor, benefice or manor. In the medi¬ aeval or feudal law, it was the open delivery of a feudal or a right to lands and hereditaments, by a lord to his vassal, thus, by external proof, affording evidence of proprietorship. To use the words of Blackstone, ((Investitures, in their original ruse, were probably intended to demon¬ strate, in conquered countries, the actual posses¬ sion of the lord, and that he did not grant a bare litigious right, but a peaceable and firm possession. At a time when writing was seldom practised, a mere oral gift, at a distance from the spot that was given, was not likely to be long or accurately retained in the memory of by-standers, who were very little interested in the grants For this reason investiture was performed by. the presentation of some symbol to the person invested, as a branch of a tree, etc. In the primitive church, after the election of

a bishop, and his consecration, the early Chris¬ tian emperors claimed a right of confirmation. Charlemagne is said to have introduced this practice, and to have invested the newly con¬ secrated bishop by placing a ring and crozier in his hands. Gratian, indeed (Distinct. 63 cap. Adrianus), directly affirms that Pope Adrian positively conceded to the emperor the power of electing, even to the papacy, in 774; but neither Eginhard nor any other contemporary writer mentions this fact.

The custom, however, existed, nor does it appear to have been objected to or opposed during the lapse of two centuries from his reign. The disorderly state of Italy, which succeeded the death of Charlemagne, frequently interrupted the exercise of this right by the Carlovingians ; but even so late as 1047, when the empire had passed to another line, Henry III received an explicit admission of his pre¬ rogative, and repeatedly used it. The investi¬ ture in the lesser sees followed as a matter of course. Alexander II issued a decree against lay investiture in general, which was revived by Gregory VII (Hildebrand), who, having suc¬ ceeded in annulling the prerogative of the em¬ perors to nominate or confirm popes, sought to disjoin entirely the ecclesiastical from the civil rule. It was not, however, until the papacy of Calixtus II, in 1122, that the question was ter¬ minated, as it appears, materially to the advan¬ tage of the holy see. In France, even under the

papacy of Hildebrand, the right of investiture does not appear to have been made a subject of open quarrel. In spite of the protests of the holy see, the kings exercised the power, but at length relinquished the presentation of the ring and crozier, and contented themselves with conferring investiture by a written instru¬ ment, or orally, upon which they were left in peaceable possession of the power. But in Eng¬ land Paschal II was engaged in a contest little less fierce than that which he maintained with the emperor. Anselm, the primate, refused to do homage to Henry I for his see. The king seems to have asserted an unqualified right of investiture, which the Pope, who was appealed to, as unqualifiedly denied. After a protracted struggle, and continued threats of excommuni¬ cation, the controversy ended in England, as it did afterward in Germany, by compromise. Paschal offered to concede the objections against homage provided Henry would forego the cere¬ mony of investiture. To this he agreed (1107).

INVESTMENT BANKERS ASSOCIA¬ TION. See Banks and Banking — Bank¬ ers' Associations in the United States.

INVESTMENT BANKS AND BANK¬ ING. See Banks and Banking — Investment Banking.

INVINCIBLE ARMADA. See Armada,

INVINCIBLES, an Irish secret society of 1882, an off-shoot of the Fenians (q.v.). One of the objects of the Invincibles was to <(re- move® or assassinate government .officers or others who might incur the displeasures of the association or its leaders. On 6 May 1882 the society succeeded in ((removing)) Lord Frederick Cavendish, who had just arrived from England as Secretary for Ireland, and Thomas A. Burke, the under-secretary, in the Phoenix Park at Dublin. The plot was directed against the lat-

ter gentleman, and the former, interfering to protect his friend, shared his fate. On 20 Feb. 1883 20 persons charged with complicity in the Phoenix Park murders were put on trial; on 14 July, Joseph Brady, who had been convicted of actual perpetration of the murder of Mr. Burke, was executed, as were others subse¬ quently. The leading witness, who revealed all the secrets of his fellow conspirators, wasi James Carey of Dublin. He was shot dead near Natal, on 29 July, by an Irishman, O'Don¬ nell, who was subsequently tried, and executed for his crime.

INVIOLABILITY. See International Law.

INVOICE, a list or bill of goods; a de¬ tailed statement of merchandise in stock, or to be shipped. Very frequently an invoice accom¬ panies a shipment of goods along with the bill of lading from the consignor to the consignee. An invoice is a memorandum and is not a docu¬ ment of title nor a contract of sale, and has no value in law other than memoranda. Invoices of foreign goods must be verified at tariff head¬ quarters of some countries.

INVOLUCRE, in botany, a group of bracts surrounding flowers in their unexpanded state, and occupying a place on the floral axis beneath them after their expansion. The bracts which form an involucre are generally grouped in a whorl. The cup of the acorn, hazel-nut, etc., may be regarded as an involucre.

INVOLUTION, in mathematics, the rais¬ ing a quantity to any power. Involution is the converse of evolution, in which the root of a quantity is extracted. See Algebra ; Arith¬ metic; Geometry; Calculus, Infinitesimal.

IO, I'o, in Greek mythology, a daughter of Inachus ; according to others of Iasus or Peiren. Zeus (Jupiter) fell in love with her. Hera (Juno) perceived the infidelity of her husband and resolved to be revenged on both. Zeus, to protect Io from the jealousy of Hera, changed her into a beautiful white heifer. Hera was not deceived and set a gad-fly to torment her, and persecuted her without a moment's rest through the world. The wanderings of Io in this con¬ dition were a favorite subject with the poets of ancient Greece. Also, in astronomy (1) the first satellite of Jupiter, discovered by Galileo in 1610. (2) The name of the 85th asteroid,

discovered by Peters at Clinton, N. Y., 19 Sept.

1865.

IODINE, To-dm or -din, a non-metallic ele¬ ment, analogous in its general properties to chlorine and bromine. It was discovered by Courtois in 1811, in the mother-liquor of kelp that had been used for the production of sodium carbonate ; occurring there in combination with sodium and magnesium. It is still obtained from the ashes of certain seaweeds, but the principal supply is now obtained from ((caliche,® a crude nitrate of sodium that occurs in im¬ mense quantities in northern Chile. _ In the preparation of the commercially pure nitrate of soda from caliche, the mother liquors, after the removal of the nitrate by crystallization, are found to contain large quantities of iodine, chiefly in the form of iodate of sodium, NaI03; and it is from this substance that the iodine of commerce is now chiefly prepared. The

richest caliche contains about 3.5 pounds of iodine per ton.

In its ordinary form, iodine is a solid sub¬ stance, melting at 237° F., and boiling at about 380° F. In a vacuum, iodine sublimes without melting. Solid iodine is soft and dark gray in color, with a metallic lustre. The vapor is vio¬ let in color, from which circumstance the ele¬ ment takes its name (Greek, <(like a violet®). Chemically, iodine has the symbol I, and an atomic weight of 126.92 for O = 16. Solid iodine has a specific gravity of about 4.95 at ordinary temperature and a specific heat of about 0.05412. Its volume increases, on account of thermal expansion, by about 0.00013 of its own value for a rise of temperature of 1° F. At temperatures not far above its boiling point, the vapor of iodine has a specific heat (at constant pressure) of 0.03369; and in the same region of temperature the ratio of its specific heat at constant pressure to the specific heat at constant volume is about 1.294. Iodine shows an important change in its vapor density at high temperatures. Thus, below about 1,200° F. the vapor has a density about 126 times as great as that of hydrogen under the same con¬ ditions of temperature and pressure ; but as the temperature rises the density of the vapor, relatively to hydrogen, falls off, until it is only about 68 at 2,700° F. It is believed that this change in density indicates that the molecules of iodine vapor split in two as the temperature rises; a molecule, just above the boiling point, containing two atoms, while at the higher tem¬ perature the molecules are monatomic. Iodine is freely soluble in alcohol, ether, carbon di¬ sulphide, chloroform and glycerin. It is only slightly soluble in pure water, but dissolves readily in aqueous solutions of the iodides. It is also soluble in benzine, acetic acid and nu¬ merous other organic fluids. Iodine is a non¬ conductor of electricity.

With hydrogen, iodine forms the important compound HI, known as hydriodic acid. (See Hydriodic Acid). With the metals it forms binary compounds called (

Iodine forms two important oxy-acids, known respectively as iodic acid, HI03, and

periodic acid, HIO4 + 2H2O. These are anal¬ ogous, in their chemical deportment, to chloric and perchloric acids. It also forms the inter¬ esting chlorides IO and ICI3.

Free iodine combines with starch to form a remarkable deep blue compound, whose pro¬ duction is a well-known test for the presence, in a

given substance, of either starch or free iodine. To detect the presence of iodine in a solution, a few drops of thin, clear starch paste are added to the solution to be tested (which should be cold), and hydrochloric acid is added until the reaction is acid. A couple of drops of a concentrated solution of potassium nitrite are then added, when the dark blue color of iodide of starch will instantly be produced, if iodine is present. This test may readily be modified so as to serve for the detection of starch. The reaction is not given by dextrin, nor by other isomers of starch.

Iodine is used medically in a compound solution with KI, in alcoholic solution or as a component in an ointment. These preparations are valuable counterirritants and antiseptics. A preparation of iodine and wood tar is used in ringworm. See Hydriodic Acid; Iodine in Medicine.

IODINE AND IODIDES IN MEDI¬ CINE. Iodine and its iodides — especially those of sodium and potassium — have been used in medicine since the Chinese are supposed to have introduced them, 2000 b.c. or earlier. The exact method of action of the iodides is fiot clear, but it would seem that iodine, being a normal constituent of the human body, is a very essential element in normal metabolism. It is found in comparatively large quantities in the thyroid gland, which is known to exercise a very important action in the general body- metabolism, and it is probably by means of the stimulation of the general metabolism of the body that the iodides manifest their beneficial action. The iodides are freely absorbed from watery solutions by mucous membranes throughout the body, particularly in the stomach and intestine. They are taken up into the blood, pass through the tissues, stimulating the lymph- flow, and are excreted in the urine in the form of salts. The iodides are likely to irritate the digestive system. Iodine itself possesses a local irritant action. It is soon converted into the iodides when taken internally, and causes similar internal changes.

When the iodides are taken in large doses, or even in small doses for a long time, a form of chronic poisoning known as iodism results. In this the chief symptoms, found in the air- passages, consist of a catarrh, especially of the nose, with profuse watery secretion, sneezing and sometimes bronchitis. There is usually swelling and irritation of the throat and tonsils, and salivation. Nausea and gastric discomforts are common, and skin-eruptions are frequent. There is usually loss of weight, and if the iodide has been taken for a very long period a condition of cachexia, characterized by a great loss of flesh, weakness, depression and restless¬ ness, may result. The chief use of the iodides in medicine is in the treatment of tertiary syphilis, on which it has a specific effect. It is also useful in actinomycosis, metal poisoning, high arterial tension, arteriosclerosis, aortic aneurism, colloid goitre and rheumatic affec-

tions. It is also very useful in the various joint-pains of a chronic character, usually known as chronic rheumatism. Iodine is valu¬ able in the treatment of those diseases known to result from thyroid insufficiency, notably in myxoedema (q.v.), and in cretinism, its allied form in children. For stimulation of the respiratory and nasal passages, as in chronic bronchitis, asthma and dry nasal catarrh, the iodides are of great value.

IODOFORM. Tri-iodomethane, CHI3, was discovered by Serullas in 1822. It is formed by the interaction of ethyl alcohol and iodine in the presence of caustic alkalis. Acetone, acetaldehyde and many other compounds may also yield varying quantities of iodoform when treated with iodine and caustic alkalis or car¬ bonates. Iodoform has also been obtained from derivatives of acetylene; and of late years it has been formed, from ammonium iodide in the presence of potassium hypoiodite, potassium carbonate and ammonia.

On a commercial scale iodoform is prepared by the addition of iodine to an aqueous solu¬ tion of sodium carbonate in the presence of ethyl alcohol. The temperature of the reaction mixture is maintained at 70°-80° C. The main portion of the iodine is converted into iodoform, which being insoluble forms a yellow precipi¬ tate. The remainder of the iodine dissolves in the reaction mixture as sodium iodide. From the latter the iodine is recovered by the use of chlorine, and converted into iodoform with an additional quantity of sodium carbonate and alcohol. A repetition of this process will in¬ crease the yield of iodoform. In this method acetone may be substituted for ethyl alcohol, and potassium carbonate for sodium carbonate.

A second process, extensively employed at the present time, consists in the electrolysis of a water solution of potassium iodide, alcohol or acetone, and an alkaline hydroxide or car¬ bonate, at a temperature of 65° C.

Iodoform crystallizes in lemon-yellow plates. It has a persistent unpleasant odor, melts at 119° C. and dissolves in absolute alcohol, ether, carbon bisulphide and other solvents. With alcoholic potash it yields potassium formate and potassium iodide. In the presence of arsenious acid and sodium hydroxide it is converted into methylene iodide, and with phosphorus penta- chloride it yields chloroform. With dry silver nitrate iodoform forms an explosive mixture.

Iodoform was first employed in the treat¬ ment of wounds in 1880. When brought in contact with wounds or sores it acts as a good antiseptic and promotes healing. The action is probably due to the liberation of iodine and

other products at the temperature of the body. It is extensively used in the treatment of scrofula, goitre, cancer and in syphilitic and tuberculous ulcerations. When iodoform is taken in large doses into the system, it may pro¬ duce symptoms of poisoning, nausea and vomit¬ ing, headache, sleepiness, hallucinations and even death.

The objectionable odor of iodoform has been masked by combining it with a variety of substances such as volatile oil of camphor, balsam of Peru and paraformaldehyde. A number of good iodoform substitutes have been prepared. Some of these are related to iodo¬ form both in composition and in their mode of

decomposition. Iodoformin, for example, is a compound of iodoform and hexamethylene tetramine; it liberates iodoform when it is used as a dressing on wounds. Iodol (tetra- iodo-pyrrol), and aristol (dithymol di-iodide) are also more or less related to iodoform. Among other substitutes for iodoform may be mentioned europhen, vioform, xeroform, noyi- form, loretin and airol.

V. S. Babasinian,

Professor of Chemistry, Lehigh University.

IODYRITE. A native iodide of silver Agl, with 46 per cent of silver. Occurs in Lincoln and Mineral counties, Utah, and at Lake Valley, New Mexico.

I OLA, I-6'la, Kan., city and county-seat of Allen County, on the left bank of the Neosho River, about 40 miles west of the Missouri line and about 100 miles south of Kansas City. The town is reached by the Atchison, Topeka and Santa Fe, the Missouri, Kansas and Texas and the Missouri Pacific railroads. It was laid out by the Iola Town Company in 1859. In 1865 it became the county-seat of the county, and grew steadily, although slowly. In 1896 natural gas was discovered on the town site, and the town began to grow rapidly, with the location in and near Iola of nine large zinc smelters, a number of brick factories, two Port¬ land cement plants and other manufacturing enterprises attracted to the place by the cheap fuel which the large field of natural gas sup¬ plied. The leading church denominations are the Presbyterian, Methodist Episcopal, Chris¬ tian, Baptist, Episcopal, Reformed and Catholic. The city is well supplied with schools, its high school being one of the best in the State. There are two daily papers, the Journal and the Register. The city is surrounded by a well- settled and prosperous agricultural community, but the chief business*

is derived from the manufacturing industries. The population is almost wholly American, the exceptions being a few Poles and Swedes employed in the manu¬ facturing plants. An electric road connects Iola with a number of suburban towns, increas¬ ing the population to 14,000. Pop. 8,513.

IOLITE, a mineral, the formula of which is Mg2AhSi50i8. It crystallizes in the ortho¬ rhombic system, in the form of short columns of a hexagonal tendency. It is blue but shows dif¬ ferent tints under different lights, and conse¬ quently known as dichroite. Its hardness is 7-7.5, its specific gravity 2.6. Some of the aluminium may be replaced by iron. Since water is found on the analysis of fresh speci¬ mens, the formula is sometimes written H2Mg4Al8Siio037. It is an essential component of many gneisses, and is found in Bavaria, Fin¬ land, Connecticut, Ceylon and Spain. Deep blue specimens are known as lynx sapphire ; light blue ones may be known as saphir d'eau or water sapphire.

ION OF CHIOS, Greek author: b. about 500; d. about 422 b.c. In 478. he came to Athens where he made the acquaintance of the leading men of the time including Cimon, Peri¬ cles, T£schylus and probably Sophocles. He is the author of ' E7 nfirjfiiai,' a volume of which we possess but a few fragments. It was used extensively by later Greek historians. He also wrote tragedies, lyrics and other verse. Con¬

sult Muller, (Fragmenta Historicorum Graeco- rum) (1853) ; Allegre, (De lone Chio) (Lyons 1890) ; Nauck,

IONA, or ICOLMKILL, Scotland, an island on the west coast, one of the Inner Heb¬ rides, in the county of Argyle. Iona is about three miles long by one and one-half miles broad; area, 2,000 acres, of which 600 acres are under cultivation, the remainder being hill pasture, morass and rock. The island is celebrated for its history and its ancient ruins, and epecially from its connection with Saint Columbia, who took up his resi¬ dence here after the middle of the 6th cen¬ tury (565). The existing ruins are all, how¬ ever, of a much more recent date. Forty-eight kings of Scotland, four kings of Ireland and eight kings of Norway are said to have been buried on Iona Island, among them being King Duncan, made famous by Shakespeare. About 1900 the Duke of Argyle conveyed the entire island to the Church of Scotland under certain conditions of preservation and restoration.

IONE, i'on, Cal., village in Amador County, on the Southern Pacific, 40 miles southeast of Sacramento. The surrounding region is well adapted to agriculture and has extensive coal deposits. The village is the seat of the Pres¬ ton School of Industry. Its industrial estab¬ lishments are limited to flouring mills and a creamery. Pop. 1,550.

IONIA, i-o' nia, Asia Minor, that part of the seaboard which was inhabited by Ionian Greeks, a beautiful and fertile country opposite the islands of Samos and Chios, which also be¬ longed to it. According to tradition, the Greek colonists came over from Attica about 1050 b.c., and founded 12 towns, which, though mutually independent, formed a confederacy for common purposes. These included Phocsea, Ephesus, Miletus., etc., and latterly Smyrna. Commerce, navigation and agriculture early rendered them wealthy and flourishing, but the country was made tributary by Croesus, king of Lydia, and later by Cyrus, king of Persia (557 b.c.). With an interval of independence they remained under Persia until this empire was overthrown by Alexander the Great, 334-331 b.c., when they became a part of the Macedonian Empire. Ionia, at a later period, became part of the Roman province of Asia. It was afterward totally dev¬ astated by the Saracens, so that few vestiges of its ancient civilization remain.

IONIA, Mich., city and county-seat of Ionia County, on the Grand River, and the Detroit, G. H. and M., the Pere M. and the Grand Trunk railroads, 34 miles east of Grand Rapids. It contains the State house of correc¬ tion, the State asylum for the dangerous and criminal insane, large railroad repair shops, and manufactories of pottery, furniture, machinery, edged tools and clothing. The industrial inter¬ ests are greatly promoted by excellent power furnished by the river. The city has a public high school, library, several daily and weekly periodicals and an assessed property valuation of about $4,500,000. Under the revised charter of 1897, the government is administered by a mayor and city council elected annually. Ionia

was settled in 1833 and incorporated in 1873. Pop. (1920) 6,935.

IONIAN ISLANDS, a number of islands belonging to the kingdom of Greece, in the Ionian Sea, off the coast of Albania and the western and southern shores of Greece, the most southern, Cerigo, and its dependent islets being off the southeastern extremity of the Morea. The principal islands, seven in number, are, reckoning from north to south, Kerkyra (Corfu), Paxos, Levkas (Santa Maura), Ithaki (Ithaca), Kephallenia (Cephalonia), Zakynthos (Zante) and Kythira (Cerigo). To each of these larger islands a number of smaller, scattered along their respective coasts, are attached and included in their several local jurisdictions. Area of the whole, 1,117 square miles. Pop. about 226,590. All these islands be¬ long to the great calcareous formation of Greece. They are extremely mountainous, and do not contain enough arable land to produce the corn

required by the population; and were it not for the vine, olive and currant, all of which they produce, they could support but a small num¬ ber of inhabitants. The climate is even more temperate than that of the neighboring main¬ land. Snow often falls in the winter and lies on the mountains, but rarely on the plains. The staple exports are oil, currants, valonia, wine, soap and salt. The few manufactures are chiefly textile and ornamental. The religion is that of the Eastern Greek Church, to which four-fifths of the population belong. Each island has its own bishop, and at the head of the whole is an exarch or primate. In 1867 a series of disastrous earthquakes took place. The Ionian Islands, so called from lying in that part of the Mediterranean anciently known as the Mare Ionicum or Ionian Sea, often figure in the ancient history of Greece, but only singly, not collectively. In 1809 all the islands were captured by the British troops except Corfu, which did not come into their hands till it was assigned to them by the Peace of Paris in

1814, possession being finally fixed and regu¬ lated by another treaty concluded at Paris in

1815. The seven islands were then formed into a republic, under the protectorate of Great Britain. In 1857 a desire was expressed by their representatives for reunion with Greece, and the islands, with the consent of the other European powers, were transferred to the king¬ dom of Greece in 1864. See Greece.

IONIAN PHILOSOPHY, early Greek hylozoism and henism of the thinkers of the Ionian School (q.v.). The 'term hylozoism is apt to be misleading, the term henism to be misunderstood, and we may therefore give them passing notice. First, hylozoism is not synonymous- with materialism. Materialism is that world-conception which attempts to explain all phenomena from matter and motion, which in a radical form materializes even things im¬ material. Not so with hylozoism. To some, of course, it suggests theories which deny the separate reality of life and spirit. And, indeed, in the days of the first Ionian thinker, Thales, and even far later, it cannot be denied that the distinction between matter and spirit had not been keenly felt, still less formulated in such a way that it could be either definitely affirmed or denied. But the uncreated, indestructible reality of which Ionian thought concerns it¬

self was a body, or even matter if we choose to call it matter: but it was not matter in the sense in which matter is opposed to spirit. Hylozoism thus is characteristic of any system which explains all life, whether physical or mental, as ultimately derivable and derived from animated matter. Ionian hylozoism con¬ sisted chiefly in an inquiry after the first prin¬ ciple^ or element, regarded as animated, out of which the sense-perceptible world is

construc¬ ted. Thus Thales, Anaximander, Anaximenes, Heraclitus, Anaxagoras and other Ionian think¬ ers, on account of their having followed one general tendency, possess, intellectually con¬ sidered, another common characteristic. In thought they are henistic. By henism is to be understood those philosophic efforts to subsume everything under one general notion, be it mo¬ tion, or matter, or spirit, or matter in motion, or evolution, or an unknown substratum, like the Kantian "thing-in-itself® and the Spencerian ˆunknowable.® Henism is, briefly, one-notion, single-idea philosophy. All Ionian philosophers asked: From what did the world come? The growing body of thought which may be traced through successive representatives of the Ionian school is always that which concerns a pri¬ mary substance. The astronomical and other theories are, in the main, peculiar only to the individual thinkers of the school. Greek philos¬ ophy thus began as it ended, with the search for what was abiding in the flux of things.

Philosophy arose in Greece as elsewhere in the attempt to discover the laws of outward phe¬ nomena, and the origin and successive stages of the world's development. The earlier think¬ ers stand in closer relation to the previous religious or mythical views ; they seek to sub¬ stitute an intelligible hypothesis, based on real things, for the myths of the poets. Even the myths, however, which described the generation of the gods and the origination of worlds, im¬ plied, at least, a view of a single connected world-process, and of an inclusion of all in the universe within that process. Sky, earth, sea, days, seasons, in short, all detached phenomena were given unity and relation even in the Greek poets, in such beings as Gaia (earth) and Oura- nos (heaven) and similar deities. Thus, most in touch as were the earlier Ionian thinkers with the Olympian religion, with its deities of the sky and the ocean, their task was to sub¬ stitute for such personifications actual concrete substances, a work they sought to complete through closer contact with nature. All sought to explain the material universe as given in sensory experience. The chief aim was to secure an answer to the inquiry: What is the one original element, if indeed it is only one, or what are the original elements, if more than one, of which the universe consists? The philosophers found ready to hand in the mythic cycles the 'conception that the world was one. From what did it come? Their answers were usually given in terms of. matter, movement and force. Concerned mainly with the onto¬ logical or metaphysical problem, the. thought of the Ionian thinkers was in its chief char¬ acters cosmological. The other problems of the philosopher, epistemological, logical,, ethical and sesthetical, receive, when they receive any at¬ tention, only passing notice from the Ionians. The characteristic work which distinguishes the

speculations of this school is the endeavor to refer all sensible things back to one original principle in nature. And as their efforts be¬ gan with a search for laws, so were those ef¬ forts rewarded by the earliest conception of what became the most fruitful idea evolved in the whole body of Ionian thought, namely, the notion of <(rational law® or logos, and ˆjustice® which controls a world

process and regulates allotted changes. When the regular course of nature was first realized by members of the Ionian School no better word for it could be found than <(£ 4/07 .» It is the same metaphor which still lives on in our expression ((natural law.® Here we see the de¬ cree of Zeus, the destroyer of the gods, the social and religious law of justice, becoming the central conception for viewing the physical process, an achievement which could not dis¬ pose of all those implications, like for example fatalism, which cling to the modern term law even in the science of to-day. A law of changes gave a union of the <(one® and the <(many® to the thought of some of these early thinkers. All the members of the school were one in method and in aim. The one great principle which underlies all Ionian thought, though it is first put into words by Parmenides, is that <(nothing comes into being out of nothing and nothing passes away into nothing.® Their acute penetration into the philosophical prob¬ lem is testified by the fact that they attempted to recover not only the beginning of all things, but the eternal ground of all things for thought. And it is true that important beginnings of a theory of evolution are to be found in the spec¬ ulations of the earliest Grecian school of philos¬ ophy.

(cNothing is born, of nothing® (Parmenides of the Eleatic School). From what then did the existing world come? In the history of •the Ionian School (q.v.) two principal ways of viewing nature, a dynamical and a mechanical way, present themselves at its very beginning and proceed side by side to its very close. The dynamical theorist proceeds on the supposition of a living energy which in its development spontaneously undergoes continuous alteration both of form and quality and consequently con¬ siders all generation in nature as explicable by successive transmutations of energy. The mechanist, on the other hand, rejects all gen¬ eration in the proper sense of the word and all alteration of the qualities and forms in nature, and accounts for all appearances by certain changes in the outer relations of space. Here a theorist proceeds, therefore, on the assumption of certain permanent material ele¬ ments, which change place in obedience to motion, either originally inherent or extrin- sically impressed; and thus it is a theoretical explanation of the world which if carried out in all its implications will lead to the conclu¬ sion that all apparent generation of natural forms and qualities is educed by the various combinations into

which material elements of originally distinct forms mutually enter. The two theories rest on views directly opposed to each other. With the exceptions of Anaxag¬ oras, Anaximander and Archelaus, the Ionian hylozoists all show an inclination to adopt the dynamical explanation of the world. By all, excepting the three philosophers named,

nature is regarded as naively animated, alive, and its successive changes as so many spon¬ taneous developments of life. And by them it was accepted as a principle that a single elementary substance passes through a series of transformations, by means of expansions, condensations and other modifications con¬ sidered as processes of life. Thus those who admitted one rather than a plurality of ele¬ ments were obliged to endow it with a prin¬ ciple of vitality to account for existing variety. They thus adopt dynamism, a rather crude form of henism. Archelaus, Anaximander and Anaxagoras, on the contrary, believed in a plurality of elements, two or more, and con¬ sidered mechanical interaction of these as suffi¬ cient to account for the existing state of things. What is the original element, if only one, or, what are the original elements, if more than one, of which the universe consists. Two periods can likewise be distinguished in the development of the reply to this question owing to its reformulation and the manner in which different thinkers in the school approached it. Prior to the advent of Heraclitus attempts were made to find a material substance of which all things consist. What were the materials out of which all things arose and into which they will again return? What is the sub¬ stratum of things seen? Thales, Anaximenes, Diogenes and other dynamists as well agree in regarding the universe as the result of a single principle, element or power. All sensible things are modifications of this principle, real only in reference to their ultimate ground, a substance of which all things consist. After the time of Heraclitus the question became: How did the sensible world become what it is? Of what nature is the motive force? Here the germs of a more philosophic doctrine is ap¬ parent. Heraclitus, indeed, retains the sim¬ plicity of an original element, his ((fire,® but it is apparent that this fire is only a sensible symbol, used only to present more vividly to the mind the idea of an energy of a vital prin¬ ciple, the ground of all outward appearances. He with his principle of universal flux gave thinking a new turn and proceeded to explain everything in terms of force and motion, or dynamic energy. It would indeed be a mistake to regard philosophers of the Ionian school as materialists. They distinguish between law operating in the external world and the appre¬ hension of phenomena ; and vaguely also be¬ tween subjective and objective. But we meet with thinkers of the mechanistic tendency. Anaxagoras and Anaximander agree in this respect, that they consider the world to be made up of numberless small particles of differ¬ ent kinds and various shapes by the change in whose relative position all phenomena are to be accounted for. This

hypothesis is combined by Anaxagoras with the Supreme Reason, au¬ thor of all that is regular and harmonious in the disposition of the particles or elementary atoms. Out of what did the existing world proceed? Thales, the first Ionian philosopher, answered out of water, which Anaximander denied and replied that the ground of all being is the boundless, the infinite or the all-embrac¬ ing. Pherecydes of Syra believed that the primal substratum of all things was earth; but both Anaximenes and Diogenes contended

that the existing state of things proceeded out of air. Heraclitus said the original element was fire; Anaxagoras, however, that the world came into being through the motor energy of intelligence; while Archelaus, the teacher of Socrates, believed that primordially the ele¬ ments were two in number, fire and water, sense-perceptible symbols of heat and cold which can be felt but not seen. And to Hermotimus, whose existence, however, some deny, deeming him mythical, others credit the original formu¬ lation of the doctrine of the supreme regulative intelligence, an idea which he is said to have taught his pupil Anaxagoras.

Aristotle believed that the view of Thales had its origin in the observation that all that grows appears to have its nourishment in moisture and the observation that germination seems to owe its existence to the presence of water. Aristotle adds • further that Thales maintained the world to be full of gods and that all motion indicated their presence and the presence of souls. Thales believed that be¬ hind infinite multiplicity there was unity. This unity he symbolized with water. Anaximander sought for the primal substance of all things; and postulated an entity intermediate between air and fire on one hand; between earth and water on the other. This entity he called the infinite. To him all differences being finite, these differences have emerged out of the infinite. This infinite has been always and will remain throughout all eternity. Change, growth and decay are explained on the principle of compensation. All things proceeded out of the infinite. All will at some time return to it. According to all appearances, Anaximander's "infinite® is equivalent to the "chaos® of other philosophers and of the myths. "Nous,® ac¬ cording to him, is the most pure and subtle of all things. It has all knowledge about all things and also infinite power. Anaximander's theory is thus only one step from pure theism. With him the work of the eternal begins with a kind of providence, not with creation. He did not allow that objects had taken their shape through the accidental or through blind fate. They received 'their form through the agency of a shaping spirit or Nous, infinite, or bound¬ less, self-potent and unmixed

with anything else. The infinite always preserved its unity; its parts alone underwent changes. Thus he tells us that there are an infinite number of worlds, a product of infinity, and that corrup¬ tion proceeds from separation. Anaximenes made the first principle of things to consist in air, an entity considered as infinite, and pos¬ sessed of perpetual motion. All things pro¬ ceeded from this air; all are definite and cir¬ cumscribed ; and divine power resided in air and agitated it. Coldness and moisture, heat and motion rendered this substance visible. Likewise they gave air forms, according to the different degrees of condensation. All ele¬ ments thus proceed from heat and cold. Diog¬ enes contradicted the pluralism of Heraclitus and claimed that all things were at bottom the same, or interaction he claimed would be im¬ possible. The substrate confirming the opinion of Anaximenes, he declared, was air; and gave it out that the attributes of this substrate were infinity, eternity and intelligence. This intelli¬ gence alone, according to Diogenes, would

produce unaided the orderly arrangement which is observable in nature ; and it is likewise the foundation of human mentality, which originates simply by inhalation. Anaxagoras may be considered the first who clearly and broadly distinguished between mind and matter. By isolating reason from all else, by represent¬ ing it as motor-energy of the Cosmos, in pop¬ ularizing the terms which suggested personality and will, Anaxagoras gave an impetus to ideas which were the starting point of Aristotelian philosophy in Greece and in Europe at large. Before Anaxagoras no one can be said to have postulated clearly a creative intelligence. In nature this thinker imagined that there are as many kinds of principles as there are species of compound bodies. He was the first to super¬ add mind to matter, opening his work with the pleasing language: "All things were confused. Then came mind and disposed them in order.® Heraclitus felt that charge is the essential fact of experience. That this is, what it is, in virtue of its perpetually changing relations. Fire, symbol of the primary substance, is that out of which all came, into which again all will return. It is a divine, rational process, the harmony which constitutes the universe. Here follows the doctrine of immortality. The individual, like the phenomena of sense, comes out of the infinite and is again merged in it. While we live our souls are dead within us. When we die our souls are restored to life. For then they approach most nearly to perfection when least differentiated from the elemental fire. This is at once the assertion and the denial of self — resembling a fundamental principle in Bud¬ dhism. See Greek Philosophy; Philosophy; Philosophy, History of.

IONIAN SCHOOL, at times called also

the Ionian Sect, was the oldest among the an¬ cient schools of Greek philosophy. It originated in Asia Minor under Thales of Miletos, about 600

years before the beginning of the Christian era. Diogenes Laertius places the birth of Thales during the 35th Olympiad, that is, be¬ tween 640 b.c. and 636 b.c. ; and the philosopher died, according to Apollodorus, in his 78th year, but according to Sosicrates, in his 90th year. The other most famous exponents of Ionian thought after the advent of Thales of Miletos were Anaximander of Miletos, Phere- cydes of Syra, Anaximenes of Miletos, Herac¬ litus of Ephesus, Diogenes of Apollonia and Anaxagoras and Hermotinius of Clazomenae. It is a most interesting fact in the history of Greek thought that its birth took place not in Greece but in its colonies on the eastern shores of the Higean Sea. The first name in the list, not alone of Ionian, but indeed of European, thought, is Thales. From Asia _ Minor the spirit of Ionian philosophy passed into Greece, at first under Anaxagoras, then afterward under Archelaus, the master of Socrates. The interval between Thales and Archelaus amounted to a period of not less than 150 years. Thus Athens, taught from Ionia, became in turn the headquarters of philosophy and the parent of the most celebrated Greek schools. The labors of the Ionian School cleared the way for all those schools which at a later period undertook to explain the physical world and served at once as a model and as a starting point for Leucippus, Democritus, Empedocles, Aristotle

and Epicurus. In truth most of the schools which arose in Greece from the time of Thales to the time of the great thinker Socrates — roughly speaking during the period between 600 b.c. and 400 b.c. — and constituted the first philosophic period, were in some sort so many offshoots of the Ionian School. Pythagoras, born at Samos, became the pupil of Pherecydes ; Xenophenes, the founder of the Eleatic School, was a native of the Ionian city of Colophon; Abdera, the birthplace of Leucippus and De¬ mocritus and the seat of the school which they founded, was a colony from Phocsea; and be¬ sides, Democritus was the pupil of Anaxagoras. In the course of its development, the Ionian School was contemporary with other Greek schools, among which the Abderitan and Eleatic schools and the systems of Empedocles and Pythagoras were the most important.

The Ionian Philosophy (q.v.), notwithstand¬ ing the celebrity of its first professors, most of whom are named above, soon failed in classical Grecian schools and in Greece never afterward recovered its ancient reputation and authority. This was owing to _ the suspicion of impiety under which it lay in Athens ; to the early growth of new branches from the Socratic stock; and to the rise and spread and vigor of the Eleatic and the Epicurean mode of thought. Ionian philosophy thus dis¬ appeared in

antiquity for the first time owing to the dual opposition of sullen, unlearned bigotry and the incissive critique it received at the hands of its more profound rivals, like, for example, the Socratic Philosophy.

History has preserved the record of numer¬ ous attempts that have been made to form a rational conception of the whole world of phenomena and to recognize in the universe the action of one sole active force by which mat¬ ter is penetrated, transformed and animated. These attempts are traced in classical antiquity in those treatises on the principles of things which emanated from the Ionian School and in which all the phenomena of nature were sub¬ jected to hazardous speculations based upon a small number of observations. By degrees, as the influence of great historical events has favored the development of every branch of science supported by observation, that ardor has cooled which formerly led men to seek the essential nature and connection of things in purely rational principles. In recent times the mathematical portion of natural philosophy has been remarkably and admirably enlarged. The method and the instrument (analysis) have been simultaneously perfected. That which has been acquired by means so differ¬ ent by the ingenious application of atomic suppositions, by the more general and intricate study of phenomena and by the improved con¬ struction of new apparatus — is now the com¬ mon property of mankind.

Thales and the earlier members of the school stand in closer relation to the previous mythic and religious cosmologists than the later members. And they seek to substitute intelli¬ gible hypothesis, based on real things or events, for the myths of the poets. The first attempt to disenthrall the philosophic intellect from the all-personifying religious faith and to con¬ stitute a method of interpreting nature dis¬ tinct from the untaught inspiration of in¬

ferior minds is to be found in Thales in the 6th century before the Christian era. It is to Thales and to a small number of other inde¬ pendent Greek thinkers that philosophy owes the substitution of an impersonal nature for the personified cosmos, conceived as the proper object of study. The Greek word,

IONIAN SEA, that part of the Mediter¬ ranean Sea communicating with the Adriatic Sea or Gulf of Venice by the Strait of Otranto, and having Greece and part of Albania on the east, Sicily and part of southern Italy on the west. This sea, divided from the Adriatic Sea by a submarine ridge rising in the Strait of Otranto, has a shoal or submarine ridge, already referred to by Strabo, which joins Sicily and Tunis, as the true geological boundary of its basin on the west. Over this shoal the waters of the Mediterranean do not rise much more than 100 fathoms, a narrow flood

connecting two divisions of the main sea. Its greatest breadth is between Cape Passero in Sicily and Cape Matapan in the Morea, which is about 400 miles. This waste of water washes all the shores of the Ionian Islands excepting those of Cerigo. From the more elevated spots in one of these historic islands the prospects are magnificent. From the high places in Corfu the view takes in two seas, and in clear weather one may discover the faint line of the Italian coast, near the city of Otranto, more than 70 miles away.

Dry cold winds passing over the snows upon the Albanian hills and those of Greece impart to the islands and the surrounding Ionian Sea a chill more piercing-cold than is common even in regions more to the north. The sirocco of southeast wind blows over the sea and its isles during 126ˆ2 days annually.

The deepest points in the whole stretch of the Mediterranean waters have been found to lie beneath the surface of the Ionian Sea. Near its centre, say about 36° N. and 18° W. of Greenwich, soundings reveal 2,170 fathoms of water. Then due south of the land of the Morea there is an abrupt fall, in about 36° N., and the greatest depth beneath the surface of the whole watery surface of the Mediterranean is found to lie. The Gulf of Taranto and Squillace, wash¬ ing the shores of Italy, and the Gulf of Arta, Patros and Arcadia on the coasts of Greece, are among the more important inlets of the Ionian Sea. And the Gulf of Patros is con-

nected with the waters of the historic Gulf of Lepanto. The ebb and flow of tides so marked at Venice are on the whole little perceptible on the shores of the Ionian Sea. In some places it does not rise an inch.

The origin of the Roman designation, Ionium Mare, is very doubtful. The term is found first in the works of the poet 2Eschylus, who died 456 b.c., though exactly what meaning he attaches to it cannot be clearly ascertained. By this poet, and the ancients generally, the name is usually derived from the ((sore-wasting® wanderings of Io, daughter of Inarchus, the river-god of Argos, and its first king. But it is more probable that the sea obtained its name from the Ionian colonies which settled the island of Cephallenia in the Ionian Sea, along with other islands off the coasts of Greece in the same locality. According to Theopompus, Strabo tells us, the name "Ionian® itself was derived from an ancient chieftain's name, Ionius, a native of ancient Issa, now Lissa, a small island in the Adriatic Sea. Pliny, Mela and Tacitus use the words Ionium Mare. Ptolemy, Ioviov

Tceloyog ; Ovid, Ionium 2Equor; Horace, Ionium Sinus, — all words equivalent to Ionian Sea. Herodotus, born 484 b.c., and Thucydides, born 471 b.c., both talk of the Ionian Gulf, which as they describe it can only mean the Adriatic Sea of to-day. Strabo, born 64 b.c., appears to have used Ionian Gulf in the same way. Herodotus also alludes to the Ionian Strait, indicating by that term the modern Strait of Otranto. In course of time a wider but vague and indefinite meaning was attached to Ionian Sea. It is perhaps in the works of Polybius, born 204 b.c., that one meets with these words employed in a way approximating most nearly to modern usage. He employed them, however, in a narrower sense than a modern would, to indicate that part of the Mediterranean Sea extending from the entrance of the Adriatic southward to the Peloponnesus, now the Morea. At a later time Pliny, born 23 a.d., included under the term both the Sicilian and Cretan seas besides the modern Ionian Sea. Later still all these arbitrary divisions of the Mediterranean were merged in the exten¬ sion of the term "Adriatic® which comprised them all. The modern usage of the term Ionian Sea has already been explained. In its ancient and widest signification Ionium Mare must at one time have been understood to mean not the seas of Sicily and of Crete, but even also the far-away waters of the ancient Icarian Sea, a sheet of water nowadays always considered as a part of the historic 2Egean.

In modern times many keels have stirred the dark blue waters of the Ionian Sea. From the island of Malta branch out in many di¬ rections different steamship routes. From this island one may embark for Brindisi, Patros, Constantinople, Beyrout, Port Said, Alexandria and Bengazi — all of which ship-lines pass over the Ionian Sea. The route from Naples to Athens involves a passage over it. The trip from Athens to Tripoli includes it. And the voyage from Port Said to Brindisi runs through it. Cable lines dropping down into its greatest depths likewise connect its shores. The main among these begin at Malta and unite that island with Zante, Athens, Alexandria and Tripoli.

IONIC DIALECT. See Greek Lan¬ guage.

IONIC ORDER, a style of architecture, so named from the district of Ionia, in ancient Greece, where it originated. Its most marked difference from other orders is seen in the capital of the column, in which spiral ornaments or volutes predominate. From the Doric it also differs in providing a base for the column. A dentil band on the cornice is also proper to the Ionic, in which it was first employed. These Ionic peculiarities appear to be of Eastern origin, probably Assyrian, as is indicated by the employment of the honeysuckle ornament so frequently met with there. Excellent examples of this style are the temple of Fortune at Rome, that of Minerva Polias and that of Erechtheus in Athens.

IONIC THEORY, another name for the Arrhenius Electrolytic Dissociation Theory. For further discussion of this theory the reader is referred to the articles on Arrhenius ; Elec¬ trolysis ; Solutions.

IONIZATION. See Electrolysis; Elec¬ tron; Solution.

IONTOPHORESIS. See Electrothera¬ peutics.

IORGA, yor'ga, Nicolae, Rumanian his¬ torian: b. Botoshani, 1871. He received his edu¬ cation at Iashi, Paris, Berlin and Leipzig and became professor of history at the University of Bucharest in 1894. He was elected member of the Rumanian Academy in 1910. He took an active interest in politics and was soon made leader of the National Democrats. His works include (Philippe de Mezieres et la croisade au XlVe siecle1 (1896); (Notes et extraits pour servir a l'histoire des croisades) (1899-1902) ; (Geschichte der Rumanen) (1905) ; (History of the Byzantine Empire) (1907) ; (Geschichte des Osmanischen Reiches) (5 vols., 1907-13) ; (History of Rumanian Literature in the 18th Century* (1901) ; (History of Rumanian Lit¬ erature in the 19th Century 5 (1902-09).*

ios, r os, an island in the 2Egean Sea, one of the Cyclades, said to have been the birth¬ place of Homer. According to the ancients his mother was born here, and the poet's grave was likewise located here. It is situated about 13 miles. south of Naxos. The principal occupa¬ tions are the cultivation of cotton, olives, wine and cattle, raising. Pop. about 2,000.

I o u, a written acknowledgment of debt, usually made in this form : ((To A. B. I O U Ten Dollars. — C. D. May 12, 1891.® In Great Britain when the name of the creditor is stated, such a document is evidence of a debt of the amount stated due to him by the person whose signature it bears. It is not treated as a promis¬ sory note, for the reason that it contains no promise to pay. In the absence of the name of the creditor the document is prinia facie evidence of such a debt being due to the holder of the document. It is not negotiable. The letters I O U are of course used instead of the words ((I owe you® on account of the similarity of sound. In the United States it has been declared negotiable by the decisions of some courts, and it can everywhere be sued upon as an account stated without proof of the origin of the debt.

IOWA, i'o-a ((

Topography. — Iowa is a part of the great central plain, and is chiefly

undulating prairie, rising in gentle swells from the Mississippi River to a divide running diagonally, from a height of 1,694 feet in the northwest to a slight elevation in the southeast, with a parallel sub¬ divide in the southwest. There are now no swamps and few natural forests. The only rough spots are the sharp bluffs where the rivers have cut their paths through 'the glacial drift; the only woods, those along the streams — altogether about 7,000 square miles of wood¬ land, with oak, elm, hickory, black walnut, ma¬ ple, cottonwood, linden, ash, box-elder, pine, cedar, etc. The eastern watershed, two-thirds of the whole State, is drained to the Mis¬ sissippi by a series of streams, nearly all of which are parallel and have a southeastward course. The western part is drained to the Mis¬ souri by shorter and swifter rivers, flowing first southwest and then sputh as the Missouri turns eastward. The chief Mississippi affluents are the Upper Iowa, the Turkey, the Maquoketa, the Wapsipinicon, the Iowa and the Cedar (the "main® stream, the Iowa — 375 miles, its "tributary,® the Cedar, 400 miles, the two form¬ ing the second largest interior system of the State and joining not far from the mouth of the Iowa), the Checaqua, or Skunk, and lastly the Des Moines with its numerous affluents, far the greatest and commercially the most im¬ portant as well as the finest scenically, rising in Minnesota and running diagonally across the entire State in a course of 550 miles, with a basin of 14,500 square miles. The State is pro¬ longed by a southeastern corner to include the entire channel of the Des Moines. The north¬ ern part of the State has a continuation of the many small, clear, pebbly lakes of Minnesota in glacier-scored pits; some of them- — the Walled Lakes — surrounded each by a natural wall of loose stones. The largest are Spirit Lake and the two Okoboji lakes in Dickinson County, and Clear Lake in Cerro Gordo County, all popular summer resorts. West Okoboji, of great depth, lies between wooded hills, and is indented by several picturesque "points® or promontories.

Climate. — The winter climate is somewhat severe because of the location of the State in the midst of a great continent, such severe winters being experienced in all mid-continental climates in middle and northern latitudes. The severity is tempered by freedom from ex¬ cessive moisture. The State is one of the healthiest in the Union, several of the streams in the northeast having rocky channels, and none having the miasmatic bottom-lands found farther south. The dry, pure air of its roll¬ ing prairies affords a valued sanatorium for

consumptives. The average annual temperature is 47.4°. The average monthly temperature ranges from 18° in January to 74° in July. Ihe absolute range of temperature during the 26 years of record — 1890 to 1915, inclusive — is 160°, the highest being 113°, in July, 1901, and the lowest 47° below zero, in January 1912. The average precipitation, rain and melted snow, is 31.97 inches, of which 80 per cent falls during the

seven months, April to October, in¬ clusive, and more than 52 per cent of the an¬ nual amount falls during the critical crop months, May to August, inclusive.

Geology. — No less than five separate sheets of glacial drift cover the State, giving a re¬ markable variety of productive soil, as well as clays for industrial purposes. The underlying rocks are inclined from northeast to southwest over the greater part of the State, and many of them outcrop in the eastern part of the State in lines which extend from northwest to southeast. The oldest formation is the Sioux Quartzite, which is exposed in the northwest¬ ern corner. In the eastern and southern parts of the State from northeast to southwest are found Cambrian, Ordovician, Silurian, Devo¬ nian and Carboniferous in succession. Creta¬ ceous deposits overlie the older formations generally through the northwest part. The most valuable mineral beds are the fields of bituminous coal which cover about one-fourth of the entire area of the State and which yielded in the year 1917 9,049,806 tons, valued at $21,096,408; employing 15,464 persons. It is the leading coal State west of the Mississippi except Colorado, and coal is a great factor in all the northwestern industries. Its limestone, a fine grade of building stone, near Marshall¬ town, Anamosa and other points, was quarried to the extent of $610,534 in 1916. Its gypsum, from the rocky hills in the vicinity of Fort Dodge, is the basis of a fast increasing manu¬ facture of stucco, hard wall plaster and paint. The output of gypsum in 1917 was worth $1,811,432. Iowa also lias high grade clays for pottery, fire and building brick, sewer pipe and drain tile. The State ranks, seventh in the United States in the value of its clay products. Its output of clay products in 1916 amounted to $7,375,716. Considerable mineral water also is consumed, that from the Colfax Springs being in the lead. The total number of gal¬ lons in 1916 was 148,732. Iowa's output of sand and gravel in 1916 amounted to $980,272. The output of cement in 1917 realized $6,870,863. The value of the total mineral production for 1916 was $29,158,908.

Agriculture. — Iowa is unsurpassed in the quality and extent of cultivated land. It pre¬ sents mainly a friable black loam on the top, from one to. five feet deep; is easily worked, is in the main . free from stumps and stones, and requires little commercial fertilizer. It has three main varieties, the principal being the alluvial mud of the river bottoms, the glacial drift of the prairies, covering most of the State, a sand and clay loam, and the loess, a rich yellow deposit containing much carbonate of lime, found at great depth on the Missouri slope and along the streams in the central and eastern portions. There is now almost no waste land in the State. In 1915 the number of acres included in farms was 32,951,056 — a decrease

Estimated population, 2,220,321 COUNTIES

Pop.

14,736 Adair . I' 5

11,131 Adams . E 4

17,298 Allamakee . A 11

30,548 Appanoose . F8

12.590 Audubou . 0 4

24.591 Benton . C9

53.409 Illackhawk . C9

29,696 Boone . C 6

16,968 Bremer . B 9

19,333 Buchanan . CIO

17,212 Buena Vista . B 3

18,014 Butler . B 8

17,808 Calhoun . C 4

20,997 Carroll . C4

19.787 Cass . E 4

17,623 Cedar . Dll

31,734 Cerro Gordo . A 7

1 6,591 . Cherokee . B 2

16,089 Chickasaw . A 9

1 1,028 Clarke . F 6

14,056 Clay . A3

25,129 Clayton . B 11

45.839 Clinton . D 12

20,581 Crawford . C 3

25,610 Dallas . D 5

13,177 Davis . F 9

17.148 Decatur . F 6

18,564 Delaware . C 11

35,650 Des Moines . F 11

9,465 Dickinson . A 3

60,975 Dubuque . C 12

1 1,360 Emmet . A 4

29,257 Fayette . B 10

18,213 Floyd . A 8

15,841 Franklin . B7

16,067 Fremont . F2

16,339 Greene . Co

14.051 Grundy . C 8

18,416 Guthrie . D 4

20,514 Hamilton . C6

13,886 Hancock . A 6

22,484 Hardin . C7

24,327 Harrison . D 2

17.807 Henry . F 10

13.929 Howard . A 9

13,013 Humboldt . B 5

11,656 Ida . C 2

18,666 Iowa . D 9

20.604 Jackson . C 12

27,496 Jasper . D 7

l'op.

10,922 Jefferson . E 10

27,330 Johnson . Dll

19,143 Jones . C 10

21,225 Keokuk . ,.E9

24,200 Kossuth . A 5

38,101 Lee . F 11

70,153 Linn . C 10

12,912 Louisa . E 11

15,120 Lucas . E7

15,362 Lyon . A 1

15,394 Madison . E 5

29,314 Mahaska . E8

23,972 Marion . E 7

32.994 Marshall... . C7

14,916 Mills . E 2

14,435 Mitchell . A 8

17,387 Monona.. . C 2

25.906 Monroe . F8

17,297 Montgomery . E3

28,663 Muscatine . E 11

18.582 O'Brien . A 2

10.169 Osceola . . . A 2

24,773 Page . F3

14.965 Palo Alto . A 4

23,767 Plymouth . B 1

15,635 Pocahontas . B4

129.121 Polk . D 6

56.896 Pottawattamie.,. .E 2

19.965 Poweshiek . D8

13,280 Ringgold . F5

17,039 Sac . C 3

65,645 Scott . D 12

16.692 Shelby . D3

25,340 Sioux . A 1

25,787 Story . C6

22,806 Tama . C8

16,549 Taylor . F4

17,168 Union . F 5

14.907 Van Buren . F 10

37,980 Wapello . F 8

18,277 Warren . E 6

20,004 Washington . E 10

16,243 Wayne . F7

38,811 Webster . C5

13,564 Winnebago . A 6

22,283 Winneshiek . A 10

82,315 Woodbury . C l

11, 188 Worth . A 7

19,654 Wright . B 6

Incorporated Cities. Towns, and Villages

Ackley . B 7

Ackworth . E 7

Adair . E 4

Adel . D 5

Afton . . E 5

Agency . E 9

Ainsworth . E 10

Akron . B 1

Albert City . B 3

Albla . E 8

Albion . C 8

Alournett . C 10

Alden . B 7

Alexander . ■. . . B 7

Algona . A 5

Allerton . F 7

Allison . B 8

Alta . B 3

Alta Vista . A 8

Alton . B 1

Altoona . J

Alvord . A 1

Ames . -Co

Anamosa . C H

Andover . D 13

Andrew . C 12

Angus . U 5

Anita . D 4

Ankeny . D 6

Anthon . C 2

Aplington . B 8

Arcadia . C 3

Archer . A ..

Arion . U 2

Arlspe . -F 5

Arlington . BIO

Armstrong . A a

Arnolds Park ... .A 3

Arthur . C 2

Ashton . A 2

Aspinwall. ..... D 3

Atallssa . D 1 1

Athelstan . F 4

Atlantic . F 4

Auburn . . . . .C 4

Audubon . . D 4

Aurelia . ■} B •»

Aurora . G 10

Avenarius,

Dubuque . C 12

1,648 Avoca . F 3

300 Ayrshire . A 4

222 Badger . B5

466 Bagley . D 5

*226 Bailey . -A**

257 Baldwin . C 12

893 Bancroft . A a

384 Barnes City . L8

152 Barnum . B 5

132 Bassett . A 8

605 Batavia . E 9

688 Battle Creek . C 2

572 Baxter . D7

706 Bayard . D 4

489 Beacon . E8

163 Beaconsfleld . F a

239 Beaman . C8

1 37 Beaver . C 5

1 .950 Bedford . F 5

3,668 Belle Plaine . D 9

1,708 Bellevue . C 12

1,419 Belmond . B 6

320 Bennett . D 11

213 Benton . F5

141 Bentonsport . F 10

117 Berkley . D5

143 Berlin . C 8

1 10 Bernard . C12

1,376 Bettendorf . I) 12

581 Birmingham . F 10

298 Blalrsburg . C 6

584 Blairstown . C 10

330 Blakesburg . F 8

422 Blanchard . F3

jf 07 Blencoe _ _ D.J!

1.2S9

113 1.011 1 .42.5 1,007 374 432 1,235 417 5 138 477 169 806 302 3,593 1,015 535 1,078 364 988 520 363 5,091 2.822 68 332 248 1,210 526 758 510 381 139 237 127 787 753 408 259 597 108 205 148 5,039 410 2.084 654 293 94

640 Blockton . T 4

2,282 Bloomfield . F9

22 7 Blue Grass . D 12

428 Bode . B 5

643 Bonaparte . F 10

302 Bondurant . D 7

11,185 Boone . . . C 6

204 Bouton . D 6

225 Boxholm 05

314 Boyden . A 2

326 Rraddyville . F 3

207 Bradgate . . B 5

349 Brandon . C 10

197 Brayton . D4

413 Breda . C 4

362 Bridgewater . E4

1,023 Brighton . E 10

338 Bristow . B 8

1.445 Britt . A 6

1.485 Brooklyn . D9

111 Brunsviiie . B 1

193 Buckeye . C7

92 Buckgrove . D 3

493 Buffalo. . . E 12

908 Buffalo Center. . . . A 5

25,030 Burlington . F 11

624 Burt . A 5

655 Bussey . . . E 8

393 Calamus . D 12

398 Callender . C 5

952 Calmar . A 10

208 Calumet. . B 2

647 Camanche . D 13

683 Cambridge . D 7

4a5 Cantril . F 9

304 Carbon . E 4

633 Carlisle . E 6

144 Carpenter . A 7

4.0.31 Carroll . C4

656 Carson . E 3

1.316. Cascade . C12

801 Casey . D4

262 Castalla . A 10

441 Castana . C2

6.284 Cedar Falls . C8

37,308 Cedar Rapids. . , .D 10 232 Center Junction. .C 11

910 Center Point . CIO

7,803 Centerville . F 8

735 Central City . C 11

98 Centralia,

Dubuque 12

5,235 Charlton . F 7

6,374 Charles City . A 8

334 Charlotte. ..... D 12

799 Charter Oak . C 2

135 Chatsworth . B 1

582 Chelsea . D 9

4,704 Cherokee . B 2

290 Chester . A 9

193 Chilticothe . E 9

694 Churdan C 4

1,629 Cincinnati . F7

284 Clare . . B 5

671 Clarence . D 11

4,478 Clarinda. . . F 4

2,553 Clarion . B 6

965 Clarksville . B 8

141 Clayton . B 11

6j5 Clearfield . . F 4

2,/ 41 Clear Lake . . . .A 7

2/0 Cleghorn . B 2

245 Clemons . C 7

714 Clermont . . B 10

65 Cleveland . F 7

27,386 Clinton . ,D 13

264 Clio . F 6

201 Cloverhill, Polk.. . D 6

276 Clutier. . . C 9

176 Coburg . F 3

569 Coggon . C 11

665 Coin . F 3

320 Colesburg . Bll

2,607 Colfax! . D 7

585 College JSjypjg-S.-. . • • F 3

Pop

569 Collins . 15 7

536 Colo . . D 7

390 Columbus City . . . E 11 i;i07 Columbus Jet …. E 1 1

332 Conesville . E 11

620 Conrad . C 8

277 Conway . F 4

1,218 Coon Rapids . D 4

Ill Coppock – E 10

148 Coralville, jonnson

. D 10

1.884 Corning . F4

1,056 Correctlonville. . . . D 2

577 Corwlth . B 6

1.757 Corydon . . F7

134 Cotter . E 10

307 Coulter . B 7

31,484 Council Bluffs . . . .E 2

135 Craig . B 1

323 Crawfordsville ...E 10

3,199 Cresco . A 9

7,572 Creston . E 5

179 Cromwell . E 5

177 Crystal Lake . A 6

574 Cumberland . E4

173 Curlew . B.4

286 Cushing . C 2

161 Cylinder . A 5

447 Dakotah . B 5

856 Dallas Center . D 6

213 Dana . .C 5

578 Danbury . C 2

280 Danville . F 11

48,811 Davenport . D 12

636 Davis City . F 6

306 Dawson . D 5

806 Dayton . C 5

341 Decatur . F6

4,021 Decorah . A 10

436 Dedham . D 4

516 Deep River . D 9

491 Defiance . D3

438 Delhi . C 1 1

553 Delmar . D 12

266 Delolt . C3

721 Delta . E 9

3,455 Denison . D3

4 78 Denver . B 9

323 Derby . F 7

101.598 Des Moines . D6

298 De Soto . D 6

1.877 Dewitt . D 12

810 Dexter . D 5

492 Diagonal . F 5

291 Dickens . . A 4

379 Dike . C 8

219 Dixon . D 12

108 Dolliver . A 4

85 Donahue . D 12

425 Donnellson . F 10

612 Doon . A 1

282 Dougherty . B 8

571 Dow City . D 2

1,001 Dows . B6

273 Drakesville . F8

39,873 Dubuque . C 12

582 Dumont . B 7

476 Duncombe . C 6

300 Dunkerton . B 9

1,393 Dunlap . D2

59 Durango . B 12

729 Durant . D 12

1.885 Dyersvllle . C 11

937 Dysart.. . C 9

4,038 Eaglegrove . B 5

749 Earlham . E 5

397 Earllng . D 3

582 Earlville . C 11

534 Early . C 3

300 East Peru . E 6

1,046 Eddyville . E 8

451 Edenville. Marshall C 7

625 Edgewood . B 11

339 Elberon. . . D 9

2,030 Eldon . F9

2.720 Eldora . C 7

236 Eldridge . D 12

611 Elgin . B 10

1,213 Ellrader . B 11

527 Elknorn.. . > . D 3

161 Elkhart.. . D6

210 Elkport . . . . B 11

558 Elliott E3

212 Ellston . F a

530 Ellsworth . C6

871 Elma . A 9

182 Ely . D 10

464 Emerson . E 3

2,647 Emmetsburg . A 4

452 Epworth . C 12

797 Essex . F 3

4,123 Estherville . A 4

472 Everly . A3

842 Exira . . . D 4

651 Exllne . F8

629 Falrbank . B 10

6,113 Fairfield . F 10

729 Farley . C 11

280 Farmersburg . B 11

1,194 Farmington . F 10

355 Farnhamville . C 5

51 1 Farragut . F 3

1,175 Fayette . B 10

304 Fenton . A 5

- *161 Ferguson . D 8*

232 Fertile. . . A 7

253 Floris. . . F 9

362 Floyd . A 8

1,106 Fonda . B 4

868 Fontanelle . E 4

2,135 Forest City . A 6

305 Fort Atkinson ... .A 9 538 Fort Des Moines. .E 6

20,648 Fort Dodge . B 5

9 507 Fort Madison . . . . F 11

129 Foster . F 8

146 Post jria . •, . . . A 3

133 Franklin . F 11

520 Fraser. . . C 6

635 Fredericksburg ...B9

204 Frederika . B 9

520 Fremont . E 9

185 Galt . B 6

478 Galva . C3

128 Garber . B 11

741 Garden Grove . F6

368 Garnavillo ..... B 11

1,226 Garner . A 6

489 Garrison. . C9

513 Garwln . C8

205 Geneva . B 7

704 George . . A 2

426 Germania . A 5

252 Gilbert . . . , .C 6

477 Gilman. .* . D 8

93fT~GiUnore City . B 4

959 Gladbrook . C 8

3,291 Glenwood . E 2

913 Glidden . C4

7.48 Goldfield . B 6

241 Goodell . B 6

113 Goose Lake. ...D 13

955 Gowrle . C5

743 Graettinger . A 4

74 Graf . C 12

199 Grafton . A 7

984 Grand Junction ...D 5 4il Grand Mound ... D 12

3 >3 Grand River . F 6

375 Grandview . Ell

2/5 Granger . D 6

314 Grant . . . . ,'E 3

177 Grant City . C4

4 15 Granville . B 2

54) Gravity . F 4

184 Gray . . . D 4

370 Greeley . B 11

1.315 Greene . B 8

1,624 ureenfield . E 4

127 Green Island . C 13

351 Grimes . D6

5,061 Grinnell . D8

1,148 Griswold . E 3

1,629 Grundy Center _ C8

1 10 Gruver . . A 4

177 Guernsey . D 9

1,678 Guthrie Center. ... D 4

1.886 Guttenberg . Bll

168 Halbur . D 4

2.204 Hamburg . F2

398 Hamilton . E 8

3,025 Hampton . B7

264 Hancock . E 3

180 Hanlontown . A 6

303 Harcourt . C 5

2.825 Harlan . ,D 3

257 Harper . . E 9

315 Harpers Ferry .. .A 11

308 Harris . A3

238 Hartford . E 7

1,115 Hartley . A 2

113 Hartwick . D 9

490 Harvey . E 8

432 Hastings . E 3

278 Havelock . . . . B 4

2,045 Hawarden . A 1

614 Hawkcye . B 9

507 Hazleton . B 10

926 Hedrick . E 9

238 Henderson . E 3

112 Hepburn . F 3

210 Hills . D 10

291 Hinton . B 1

152 Holland . C8

I, 137 Holstein . <.,C2

134ˆHoly Cross,

Dubuque . . , . ,C 12

91 Hopevllle . F6

836 Hopklnton . Cll

309 Horntck . Cl

557 Hosper . . A 2

663 Hubbard C7

41 1 Hudson . C 9

768 Hull . A 1

2,061 Humboldt . B 5

1,034 Humeston . iF7

357 Huxley . D 6

2,090 Ida Grove . C 3

314 Imogene . F3

3,683 Independence. .. ,C 10

3,495 Indianola . E7

713 Inwood . A1

291 Ionia . B 9

II, 413 Iowa City . D 10

3,716 Iowa Falls . C 7

670 Ireton . B 1

347 Irwin . D 3

151 Jackson Junction. A 10

403 Jamaica . D 5

313 Janesville . B 9

3,103 Jefferson . D 5

789 Jesup . C 10

1,074 Jewell . C 6

172 Joice . A 6

246 Jolley . . ■ .C 4

514 Kalona . E 10

268 Kamrar . C6

516 Kanawha . B 6

584 Kellerton . F 6

619 Kellogg . ■' D 8

222 Kelly . D 6

430 Kensett . ,A7

166 Kent . F 5

559 Kenwood Park ,.D10

15,239 Keokuk . . ,.F11

1,018 Keosauqua . F9

1,071 Keota . E 10

359 KeswicK . E 9

493 Keystone . D9

350 Klmballton . D 4

1,052 Kingsley..,. . .B 1

152 Kinross . E 10

198 Klrkman . D 3

278 Kirk vllle . E 8

239 Klron . C 3

404 Klemme . B 6

193 Knierlm . C4

181 Knowlton . F 5

3,541 Knoxville . E7

526 Lacona . E 7

215 Ladora . D 9

2,224 Lake City . C 4

1,480 Lake Mills . A 7

709 Lake Park . A3

814 Lakevlew . C3

1,778 Lamoni . F 6

592 Lamont . B 10

298 La Motte . C 12

306 Lanesboro . ;C f

1,655 Lansing.. . All

l ,54 1 Laporte City . C 9

476 Larchwood . A 1

192 Larrabee . B 2

357 Latimer . B 7

43 Lattners,

Dubuque . C 12

194 Laurel . £8

848 Laurens . B4

656 Lawler . B 9

190 Lawton . . U 1

688 Le Claire . D 13

2 40 Ledyartl . A ;>

364 Le Grand . D8

1,290 Lehigh . Co

129 Leighton . E H

188 Leland . A »>

5,070 Le Mars . g J

1,320 Lenox . £ j

2,199 Leon . . . t u

221 Le Roy, . I' •

P0P2 74 tester . A 1

456 Letts . E 11

652 Lewis . E4

176 Lidderdale . C 4

547 Limespring . A 9

324 Linden . D 5

752 Lineville . F 7

320 Linn Grove . B 3

879 Lisbon . D 11

307 Liscomb . C 8

206 Littleport . B 11

634 Little Rock . A 2

452 Little Sioux . D 2

634 Livermore . B 5

203 Locxridge . F 10

1,641 Logan . D 2

6.46 Lohrville . C 4

8)9 Lone Tree . Ell

146 Long Grove . D 12

711 Lorimor . . E 6

577 Lost Nation . D 12

521 Lovilla . . E 8

630 Lowden . D M

262 Low Moor . D 13

168 Luana . A 11

625 Lucas . L 7

l it Luther . g. 6

560 Luverne . £ jj

161 Luzerne . D »

120 Luxemburg . B iz

453 Lynn ville . . • .g 8

238 Lyoton . C 4

292 McCallsburg . -C ‘

110 McCausland.. . .D 13 144 McClelland . • E f

1,244 McGregor . B 11

5X9 Molntire . • A 9

390 Macedonia . E 3

304 Macksburg . E 5

1,449 Madrid . D 6

297 Magnolia ..... D 2

426 Malcom . D 8

384 Mallard . B 4

119 Maloy . ,F 5

1,254 Malvern . F 2

3,102 Manchester . CIO

1,124 Manilla . D 3

982 Manly. . A 7

1,611 Manning. . . D 3

1,309 Manson . . . C 4

1,200 Mapleton . C 2

3,776 Maquoketa . C 12

581 Marathon . B4

535 Marble Rock . B 8

987 Marcus . B 2

2,037 Marengo . D9

4,675 Marlon . D 11

297 Marne . E 3

14,360 Marshalltown . D7

181 Martelle . D 11

288 Martinsburg . E 9

216 Marysville . . . .E 7

14,457 Mason City . A 7

268 Masonvllle . C 10

546 Massena . E 4

76 Matlock . A 2

307 Maurice . B 1

856 Maxwell . D 7

426 Maynard . B 10

58 Maysville . .E 7

816 Mechanicsvllle . . . D 11

867 Medlapolls . F 11

359 Melbourne . D 7

560 Melcher . E 7

469 Melrose . F 7

278 Melvin . A 2

437 Menlo . D 5

263 Meriden . B 2

5.36 Merrill . B 1

257 Meservey . B 7

421 Meyer . .A 8

106 Middletown . F 11

316 Miles . C 13

823 Milford . A3

197 Millersburg; . D 9

607 Milo . E 7

9 47 Milton . F 9

430 Mlnburn . D 5

429 Minden . E 3

305 Mingo . . D 7

3.764 Missouri Valley . . .D 2

225 Mitchell . A 8

816 Mitchellvllle . D7

406 Modale . D 2

452 Mondamln . D 1

88 Moneta . A3

224 Monmouth . D 12

966 Monona . B 11

926 Monroe . D 7

1,326 Montezuma . D9

2,159 Montlcello . Cll

413 Montour . D8

702 Montrose . F 11

381 Moorhead . D 2

1 57 Moorland . C 5

741 Moravia . F 8

904 Morning Sun . E 11

218 Morrison . C 8

1,352 Moulton . F 8

273 Mt. Auburn . C 9

1,708 Mt. Ayr . F5

4,089 Mt. Pleasant . F 11

243 Mt. Sterling . F 10

200 Mt. Union . E 11

1,568 Mt. Vernon . DU

801 MovlUe . C 2

847 Murray . E 6

17.500 Muscatine . E 11

2,695 Mystic . F 8

1,282 Nashua . B 8

977 Neola . E 2

2,686 Nevada . D7

613 New A1 bln . All

787 Newell . B 4

248 Newhall . C 9

2,664 New Hampton. . . . A 9

474 New Hartford ,,..B8 116 New Liberty … .D 12

1,162 New London . F 11

737 New Market . F 4

249 New Providence. . ,C 7

1,225 New Sharon . E 8

5,16.5 Newton . D8

211 New Vienna . B 11

409 New Virginia . E 6

425 Nichols . E 11

359 Nodaway . F 4

1,148 Nora Springs . A 7

219 Northboro . F3

16 4 North Buena Vista

Clayton . B 11

933 North English ... .D 9 186 North Liberty… I) 10 575 North McGregor .All

.

«J . v

HOUSTON

llouston^^Vv

*Worthington**

JacksoiTY

A C K S O

IOWA

Burroak-

KeAdallvlll

^Kock

Rapids

'lluntiaglton

[Mona

*IIS' Around "jllake ° 8e*rvnie|*

i WINNEBAGC

Dorchester

Iowa/

Lime Spring'

^"\Bona*

l ^Saratoga

RloevlHo i Cresco V H Olw A R D klX\Acme .

- – Istacy vUle<

*Co Lit. Cedar y\ **

Hlgblandvllle Locust 3 °

, Sattre0 t

ESHIEK ,yK) Churchr'"1'®), C }JP ' Lycurffus o Vlllaei^*

*. Ridgewa^^. j ' ! : ALLAMAKEE"0^*

< ,/T)De

\Vashi/ngt\on Prairie cl £ Elon

VCr\/ i Nofdnee | Maud> — ^Harpers*

^ X CalmarlS o, W atervlUeX^Ferr

IFraukville Rossville 0 JM

o^NA)»8lan I Waukon Jc.Wrf

ZZj T„0«®C-il?stV,'V WatsQurll

V/v'stlK r\l>olHver.*

.tranto St

ilclutire <

.Ooboyedan

'Ledyurd

ft'VOlroboj!

IjNSOf

,m Arnolds 1

SCALE

Statute Miles, 27 = 1 Inch.

w Alvordˆ Y;*

n JoiSeYo fLoland I Y \ Hanladtowir

East

elgh Ualfa Wallingford

Kensett

Bancroft

Ashton

In wood

Terri 1

Mil ford I

Manly

ingstod

.Plessii

F/osturia

[Grnettinger

Protlvin

I > ei f,oVacysT~

Tent« u

*Osgood u Dj**

jiFniinets-

Xbmg

rW'NiCjUMir

*V^toN^*

Rand. McNally's New 11 x 14 Map oflowa. Copyright bj Raai McNally A Co.

rock yTltonka

jtte Crook part

K Q S SHU T_,H t.

- «J8feitt"V«W»l. ° Saudc I k |N \ CHICKASAW Ft,ltkm(Washington 0 Yfc T^'XtOP*

ol Ts°r\ixix^^^4

Bassett d>

fK VVl

MUler | (

, Veutura _ – c

Uiiiruer le">- ,

\ i Burchlnal

Moncta^ Prlmgjiat I E N \ I

\ Gaza > |

*fit***?*

Sioux Center

' y HospersJ

nsre

.11 owCqrnes

KM.. ratio

[Call iupe

.

McGregor]

U\n”7uvr g – — rk

v’a or Ernio P.0 r v

fordK F LOYD

- /

H/A N i ˆStilsoB- .Corvnth

Lucas

Monona .....

mont Beniahy f ; Mc. – WH vi _ o FroelichW ,cG, (fill G under — !n

1ˆ. Faruiersburg/’ˆf 0 livw 8t.01af A National \P’ Gyrus vUloe

a/y t o n n

-M.lkuder «

s?¥r//

*r-*ˆv_/: Douglassˆ JJnion R.®tf’lj*

I IrVlon‘7> —

cˆ\/ Mauticˆ

fChatflX|rt»r

Curlew

- Xarrvllleˆ

rble- Nashua]

,ck Powcrsville

iemtuei

LCajlerflvilU

Sw aledale /o' – A'j

! yRockwolli

—f Tiuiraton 1

fGalhraitl

IOWA

/cr > < Mineral

Fredericksburg'1

©Republic

Cornell <

.Calumet ■

Mallard,

iWest Bend

Brainard'

nLima I

•S^OWadi

irerne'

Ottosen

JlFrathon PloverV -y'

^^Grcene |

AredalefJ?dbNhPaekard

.1 \

Meservey

Shetbeld (

c»*vV]

JJ Frcderlkoˆ fpllainficld \ \ Ilorton f

u\˚S .

».\kron

Ueln ond.

Lancaster

Arnold /

U M B/o\l D

(Cliorokeei

I Onawa JcJ

/herok;

Qnimby jy

ˆ * XJPocah ou t as

\GiluioreCyAl Hi

. pocahoXntas ,U

A arina \ A n;

\ Palmer\ LjU.

\ Fonda \ J \ Clare VBlandˆn \? (

St.ˆ

Sebald

Platteville

Westfield

Latimer

• MajnardNvdˆ

Arllngtou S.

ygO

nk X^-^Aun^ VLamont^ iBryantliurg ‘

MancsL

QH A N A’N I

\ ‘OT U^‘jueton

Millnerville.

Elkport0′ Strawberry Point ;.WOOd

,-c’CouIter

n\B U T L E \k«i.t s“tek

t. \ >. ».averIy

Vs,

I^lk_Point

LAFAYETTE

Graham

Hinton.

*.Denver^*

tJenevaW’

*Bradford^*

Faulkner’

dette

vLuxemliurg C

■ *7 SpechtsFei*

few Vienna

. , [Durango,

Edge wood‘1

Dundee

Shulls- burg «

Colesburg

) Greeley I

V k\vooTai s* .

James.

VC* Vincent V. Badger > idulstry

Wuslita

ˆlia tleton Lltt’ otonˆi

30 =

Bunkerton

Woolstock

Pierson

I’u\inecoy

Nemahi

Benson; \ Ccdarl FrXˆsville

3ˆ°° Manson

Holstein1

Stout

Dubuque/o

&TnnC”‘

Moville

ˆrgfeant U/,

N ovniaPN—

1 WilsonV/ W

.hudgon/AV ashX l»< yP burn x .

u /blackhVwk

^^TJewar

AV aterk

floves

” Peosta

StfU BUQUE

\V orthington

1.ˆ.V*

1 Kncirar !

M j\L T O N,

‘Bronson]

Mburg DlkPS

U N D Y

X Holland

*: Vl Morrison

’lugatadl 11 omen

SiGft jo

WFoaviess,

Owafia*

eU

ˆ-ˆSherwooM

XALHO'UN

l'ohr*liik/_

ˆlender.

|Donatu8° ˆ l Lamotte

ˆAuthon ˆBattle Cr< [Oto

untjoat

'Shady groveV» Rowley H. a Brandon

1 Climbing 3 Hill

Jtlora,

Lubbardi (

Voorhies

ibinsoD]

ˆJWbltten

Laporte City

jyitio \l*un

Relnbcck

Wall Laˆ Herring pf /

?T»'.I unction * • \ (.Switch

urioburg V Montloello ' I>ang-

wurthyv' –

*/ ' r: Scotch G

ˆ y AmberA QoutC-j

A i i a 1 1 losivˆT

Trtiy'Mjlle- NJCuggonl Paris °w/Vv\ ^_ V Central

- Rogcrfi^V v'ib»'"">,/w.„fc!rk'2s fV Le/l N N \

S I Tod/uille Whittiero?

4lo| By^n-yf

< c. v.iief?..

Belle v

A JACKSON

Springbrooko '

'x«*l. Canton /Fu''01' o Green l8land/\ ; 1 ron Hills]}

o* UursUilleo^V'^-^XjT/^ & .

rHortiick /fsmbhland

, BucUingl nedale

fw Providence'

Lanyon\

Randall

Urbana

Union

Mt. Auburn

Berlin

Lancs boro S' $•'

9 \ Adaza

Center Paint

N o Mineral Ridge

PJlot Mound \ |

/IS r c

Tracr

Liscomb

HALL

I Albion

[apletoT

Vinton

Puton\Do*i'olm

Cnurdan

Gladbrook

Liddcrdalo

HURSTOfs

/ RolamT rTfXtN

? /Gilbert Antbo

. \S . T O R I Y Cl

ynt\ar'° Fern aid? ^

~4lAn>es,,, w »A,.8ui«

Garrison P- c

. B..E N T

V*** K

.Furl in

\y

.O \Clutiet

\c»arwin

MiViutain

nRˆSsL L

[albur— ,4-— 3CV

’Castana

W.estsikle

Wyoming

ˆul(.r v-

nnruf $ = ?

Gladstone] ruˆlrvlng’

Oenlsoii-

ST. Pickerinj

ˆ7 Ue’crlK 0-c.

laltlai Elj\c < »%ˆ

■ *v^t..-.‘1’Y) C L l\N T 0 Nˆ*L]*

A ! R“iV.”SU > PˆvmlIot!”

|ton |x

— A)ixunl

ˆShipley

HdW’ASJvX

j Luther

rMoorhead

lunbor

iilman

‘Angus

Lmtle Sioux o/y a ˆOrsou ({[<

*‘(Wood bin ej//**

j Magnolia M -Jj

‘harri sjo n

.Modu’e ioja,

Pei;

*WY **’ Yorkshi ij][A/ Rodo*

*>**A** Stan wood*

[g xishcr,

iniap y VManctW I

„ Twin

ma/ ° //) Kirkman

J/S H E 1//B Y

Poplar

F/Portsmouth/TˆV. .

//f ZPlLHarlau

“Jo/‘Tennjfant a

cJySV1”-” /v OI ˆˆElk Hor

VˆFan8lor8ˆr\ ‘ 1 Wichita °U

Ion G U XjH RA[GuthrieXˆ io Center V

0 Ben rgro v e

L. Monteith

I x Glendou

To kuuiuh

*’uton *q*

*°OarJin*r ^*

ie

Granger

tosxtaTX-N^,

harenpo

ll.adora^yg

*Moo**

nbue^v. /0t0,0 /»_ J

EldridgeV ‘ u-,

..S C b T Tci.fcJ

v.iuy jag.

f ‘ r. -Jffifsi.

■ *Solon*

Xodar^BlulT

\ \ xi°f »« DlmiraVr^-CT’llt°:^\ r oyXOasls Ced\r Valley

Ilartwlck

/ POWESHIEK I

- J Brook! vii J

‘Malcom’

North

Liberty0

Tiffin

Mondaj

A lid ii I)'

BON

yUamlln I

o Goddard

ConroJ

YVIctor

Pallas- l Center

ˆVost DramliX Sunbury' 0 Springdale

,PT

JMoicom- CaruW'

Guernseyˆ

EwartXˆ' villo N i Searsboro 1

Xstilwoll

Williamsburg

IKimballton'

"| Exira

*.\,C Prairie '**

Tirmount -s. iunnclls >

WASHINGTON

Downey1

West]

Parnell

[Stocktonˆ

KiTldufF\i,^r

Mont<,*/,tbnJi

\D*«l> R>r,,\ jMlllc \ Tilton [y 1 N

! ray ton

.Loveland

Stuart

Adair

>rah ‘ Anita

Palntor^^X^Y r’New Sharon’

— 0rlV‘

■W^pP^Cummlag

— ll

X D I S O N c-5T

Neola f yy’ | T Honey Croek #y’^lQdcn P j ^Underwood /S /-s’ t)a

- ce^cnt yy. JM

%’ P.Q^T/A W K T Tf/k N

>NW>^McClellfd If/oakt

OV^LXCs/Guiok Tajlor^K’i [wn*. j oTreyfioi <■.

PK®°c/| Bljffs ^

(J -r ,

•o

k \ / /Webate

V What C/beer

\Vke6 ku

iscatin€

o Canby

*! o A D A I R *

t Berea

ireenlleld

anelle

ˆ> e > Richmond N

WASHINGTON u

■alley raml/XST w0,0′ c

/ SunnMsfM f Hill oPalh Indlanc Tdiworth VMilo

Xwiota

Lilt iC

jantrllia’

Syherrard

_LˆHu»ck l»laod Or1 g # 1 V A Wick. • St. Marys St. Charles

Leftts

Fredonla /?’

dougl/aˆ

ˆ Onm

Middle River’

•xville

r Cisexj?r7nc,]

AUicao j’Evori! j BumovL*

,irkae/:

S.N1 ._oiik

1 Havreˆ ˆra2£oTd»

L 0S»%SJ A X

V jvnft00CairoXbˆ' 1ˆ1

/ovI-.oC

Mclcher]

V Carson Macedonii

l'ring

Hebron'

q Macks burg Zion vl1 • Muclwburg

Liberty Center o * N i New Virginia Ucona'

PˆC*dar

Truro

■o /tTyi .y H.B.iUmyV f ˆCenlvy V

KV'-//0'

oyi'ortniˆ.

X Papillylon S A/R R.

iRams.liuttom liarue? ,

Folsom/

»/t lEddyfllU

'o' ptakorˆy; Cottllb-l4f£

® Briscoe

Ncvinvllle ®,

Spaulding 'x

ˆ“‘Xtou

AftonˆTˆ

Jamison

Lovllia

’Abingdon JPerlee i

JEFffER/SON

Henderson

oiˆmori

I Oakley

L U

ILueasˆ—

JBolinda M O

ˆfStennetl P] /GOMERY h/< Red Oak/ .

C A/S

Andlanola Jo.

jˆCharitoi

[t. Union’

Ashland

Dahlonegai

Ottuimv

Carbon

ˆConsol

Georgetown

: ‘Medial

LV'v,..w — Mount I'lcasan

l Ncwˆ.

I ° pˆ~\ London'

((X

Salem /\T\ rJ-0W •ulii 1 1 b] boro w X\l> '^^T.ilttnmvood V Xaiouehton
* ■ ,11 or M/X-L pilot Grove .ill P.oFqj Demnurl

Tuctc > > a«s.

L ' fTT'

Franklin

Prescott I

Louigvil/ie

flevelai

MVoodburi

TJTdwelf

White Y

ˆ o A,5p«rrJ

jantgrove cMultvJo,

U DES MOb£

&& '

til X* gt°t]Q.

rto'N

Life o Augusta I

°ckˆng0 £)) <.

• M rn 4 ni'toˆfoˆFˆr

C L AfR IC E

Hopeville \ .

Moi'T"

/ W A P 0 lTSOA

Blakesb.irgj/ Eulˆjv

'Coburg

[County line!

Nodaway

c\ijiiiningham

'Moravia

Guss

•Selma

Tabor

logene.

A h grov»°

Weldon

iliumeston

AP-P-A

*I)»rby*ilro*

b ..l.F ... /

'-''oˆ-yTTW J

- °Tudog« / Conway

,„T A Y/O R ,

**o Blockton AthelstanSˆ*

Hepburn'

Floris

StocknortSˆ ˆ

*| Kllbourn** <*

Zion

N&;;

((uy' uh. Bentons

E. Burlington

HENDER- SON '

| Tburman

Perolval .

Knox ®

?/ Abingdon

WA/RREN

Beaoousfleld'

R I NGGOl/D

. j) Benton /

Belknap

unurove

orydoirii

WAV/NE

Ailertonˆ Jiˆj

ood.andˆ

'Shenandoah

d/ˆa ?\v

Jkg?

West Grove

Sid lie;

l Decay ur

u Leon ,C A//T U R

/ / Blookly

0i,J.

*Bona port cx *' °ri/'otr Fannin gtt*

ft oulton

Numa

Riverton

Tuske a o'

Af Deiphos / Redding / 'atterson®/

mour

P-

Sewal

DonnpUioˆ

Monterey

Exllnj

CAleg'*

Kyt-ltrs.

I :: .... i .1

Hopkins ville J

"TDallaX

*i*disou*

1 Caledon! Lee o _

Cantrll

rthboro

icinn util

Stiles

Iain burg

‘jentanton I]]!’_

ishnell

Crotoih

Taltnage

ˆLancaster

\ tAUalland n

Macomb

Grant City

nt\ Prairie or Vlnoeˆ/nes P.

LOUrl,neu

ATCHISON

J1 Rock port

Fcrri9

\ Carthaj e |

in\esville

l/S O N

MCDONOUGH

’i-inceton

Kuhoka

UYLER

rest frouyGrecnwicb

ˆ0tlGO North Tabor, Mills

£ 2

123 North Wash¬ ington . A 8

1,525 Northwood . A 7

359 Norwalk . E 6

493 Norway . D 10

*738 Numa . F **

1,196 Oakland . E 3

416 Oakville . E 11

725 Ocheyedan . A3

1,236 Odebolt . • C 3

7,137 Oelwein . B 10

1,403 Ogden . ■ D

163 Olds . E 10

706 Olin . D ll

341 Ollie . E 9

2,210 Onawa . C 1

145 Oneida . B 11

231 Onslow . C 12

1,417 Orange City . A 1

141 Orcnard . A 8

496 Orient . E 5

135 Orleans . A 4

2,779 Osage . AS

2,714 Osceola . E 6

9,624 Oskaloosa . E8

853 Ossian . A 10

97 Osterdock . B 11

366 Oto . 0 2

153 Ottosen . B 5

24,334 Ottumwa . . F 9

577 Oxford . D 10

852 Oxford Junction .Dll

82 Oyens . B 2

660 Pacific Junction. . .!■ 2

295 Packwood . E 9

222 Palmer . B 4

222 Palo . C 10

168 Panama . D 2

1,107 Panora . D5

1,027 Parkersburg . C8

3 30 Parnell . D 10

359 Paton . C 5

132 Patterson . E 6

875 Paullina . B 2

3,096 Pella . E 8

5,455 Perry . Do

382 Persia . D 2

534 Peterson . B 3

4 99 Pierson . C 2

347 Pilot Mound . C6

108 Pioneer . B5

403 Plsgah . . D 2

325 Plainfield . B9

265 Pleasanton . .r b

172 Pleasant Plain… E 10 825 Pleasantvllle . . . .“E 7 374 Plymouth . A 7

1 194 Pocahontas . H4

257 Polk City . D 6

935 Pomeroy . “ 4

*Pop. * Pon-*

238 Pope joy – 7 y-u

338 Portsmouth . i> «’ ?,o21

1 003 Postvllle . A 11 ˆ oio

227 Prairleburg . C 11 339

M7 Prairie City . D7 M56

452 Prescott . F 4 110

654 Preston . C 13 162

923 Prlmghar . -A 2 680

428 Princeton . D 13 567

278 Promise City . F 7 902

185 Protivtn . A 9 207

456 Pulaski . . F ® 507

466 Quasqueton . CIO 2,146

286 Qutmby . B 2 298

77 Quincy, Adams… E 4 289

729 Hadcllfle . C 7 166

231 Rake . A 6 1,035

200 RalstoD . . • • -C o 623

141 Randalla . ..BIO 226

320 Randolph . F 2 3,323

622 Rathbun…. . F 8 829

319 Readlyn . B 9 605

205 Roasnor . D 7 5,637

292 Redding . F5 122

669 Redfield . D5 1,755

5,601 Red Oak . E3 L074

1,257 Relnbeck . C8 2,109

228 Rembrandt . B 3 483

1,098 Remsen . B2 ,£209

483 Renwlck . B6 67, 078

945 Rlcevllle . A 9 1,023

619 Richland . E 10 670

95 RickardsviUe, Du- 588

buque . C 12 335

143 Ricketts . .C 3 244

389 Ridgeway . A IQ 441

156 Rinard.. . C 4 178

447 Ringsted . A 5 343

403 Rlppey . D5 4,176

656 Riverside . E 10 314

654 Riverton . F3 1.602

125 Robins . C 10 101

108 Rock Falls . AS 130

1,138 Rockford . H8 85

2,031 Rock Rapids ..... .A 1 637

1,300 Rock Valley . A 1 852

726 Rockwell . B7 218

1.864 Rockwell City . C 4 455

161 Rodman . B 4 146

175 Rodney . . . . Cl 145

691 Roland . / ■ . • C 6 62

l 115 Rolte . -B 4 696

1 163 Rome . F 10 357

257 Rose Hill . E# 160

326 Rowan . B 7 705

312 Royal . A 3 547

448 Rudd . A 8 1,037

390 Runnells . E7 414

660 Russell . F 7 363

744 Ruthven. . A 4 121

235 Rutland . . . .B 5 3,158

483 Ryan . C 11 1,576

Sabina . :C r»

Sac City . C 3

Salem . F 10

Sallx . C 1

Sanborn . . . . . ‘A 2

Sandy vllle . E 7

Scarville . A 6

Schaller . C 3

Schleswig . C 2

Scranton . D 4

Searsboro . D 8

Sergeant Bluff . C 2

Seymour . F 7

Shambaugh . F 4

Shannon City . F 5

Sharpsburg . F 4

Sheffield . B 7

Shelby . D 3

Sheldahl . D 6

Sheldon . A 2

Shell Rock . B 8

Shellsburg . ..CIO

Shenandoah . . F 3

Sherrill, Dubuque C 12

Sibley . A 2

Sidney . F 2

Sigourney' . K 9

Silver City . ,.K 2

Sioux Center . A 1

Sioux City . B 1

Sioux Rapids . B 3

Slater . D 6

Sloan . C 1

Smithland . C 2

Soldier . D 2

Solon . Dll

Somers . C 5

South English . . . . E 9

Spencer . A 3

Splllville . A 10

Spirit Lake . A3

Spragueville . C 12

Sprlngbrook . C 12

Spring Hill . E 6

Springville . C 10

St. Ansgar . A 8

st. Anihony • • — . c ”

St. Charles . E 6

St, Lucas . B 10

St. Olaf . B 11

St. Paul. Lee. . , . F 1 1

stacy vllle. . . A 8

Stanhope. . . . . C 6

Stanley . B 10

Stanton . .F 3

Stanwood . D 11

State Center . D 7

Steamboat Rock . ,C 8

Stockport . F 10

Stockton . D 12

Storm Lake . B 3

Story Cltv . r. ?

Pop

I 7 Stout . D S

601 Stratford . .0 6

1,157 Strawberry Rolnt B 11

160 Struble . g 1

1,849 Stuart. . . E £

346 Sully . D 8

1,585 Sumner . B 9

188 Superior . A 4

812 Sutherland . g ”

207 Swaledale . g 7

271 Swan . E 7

595 Swea City . A 5

1.048 Tabor . F –

2.621 Tama . • • D »

276 Templeton . D 4

452 Terri 1 . A3

188 Thayer . F 6

565 Thompson . A 6

297 Thor . . • • • g »

221 Thornburg . E «

311 Thornton . B 7

357 Thurman . FZ

196 Tiffin . -D 10

411 Tingley . • F ®

2,176 Tipton . D U

353 Tltonka . A o

1.721 Toledo . L 8

141 Toronto . D 12

1,378 Traer . C 9

205 Treynor . E 2

854 Tripoli . g 9

322 Truro . . . E t>

202 Turin . D 2

192 Udell . . . F 8

295 Underwood . L2

60o Union . • • – - C 7

435 University Paik ... E 8

393 Urbana . C 2

560 Ute . C 2

685 Vail . D 2

92 Valeria . D 7

3.026 Valley Junction. .. D 6

505 Vanhorn . D 1

472 Van Meter . E 6

469 Van Wert . F 6

245 Varina . B4

754 Victor . D 9

2.132 Villlsca . F 3

183 Vincent . . B o

164 Vining . D 8

3,996 Vinton . C »

456 Volga City . B 11

279 Wadena . B 10

461 Walcott . D 12

526 Walker . C 10

188 Wallingford . A 4

726 Wall Lake . C 3

1,008 Walnut . E 3

1.532 Wapello . E 11

4,544 Washington . E 10

432 Washta . B 2

35.559 Waterloo . L »

Pop

192 Watcrville . A 1

449 Wauconm – - – - B

354 Waukee . D

2,168 Waukon . A 1

3,561 Waverly . ...H

560 Wayland . El

185 Webb. . . B

126 Webster . E

5.834 Webster City. . C

289 Weldon . F

839 Wellman . E 1'

385 Wellsburg . C i

75 Wei ton . D 1

466 Wesley . A

701 West Bend . B

712 West Branch . . . . D 1 1,091 West Burlington .F 1 233 Westchester . . . . E L

198 Westfield . B

266 Westgate . . . . B

1,760 West Liberty . . . D X 138 West Mitchell. . . .A •

564 West Point . FI

401 Westslde . C

1,773 West Union . B 1

1.805 What Cheer . E

558 Wheatland . D 1

642 Whiting . C

588 Whittemore . A

236 Whitten . C

71 Willey. Carroll. . . .C

550 Williams . C

1,157 Williamsburg . D

1,176 Wilton . D 1

1,007 Winfield . E 1

2.860 Wlnterset . E

564 Wlnthrop . C 1

246 VVlota . E

1 63 Woden . A ‘

1,613 Woodbine . D

389 Woodburn . F

820 Woodward . D

337 Wooistock . B

327 Worthington . C 1

707 Wyoming . D 1

305 Yale . D

132 Yetter . C

212 Yorktown . F

536 Zearing . C

85 Zwingle . Cl

of 277,000 in 10 years, the decrease largely due to growth of cities, suburban residences and parks and a steady increase in the area of tim¬ ber land. With remarkable fertility and a steady and sufficient rainfall, the State has for many years been first in the Union in value of its products derived exclusively from the soil. The total value of its agricultural products in 1914, exclusive of livestock was $437,225,662, an increase of 76 per cent in 10 years. The total value of its live stock (farm, animals and poultry) in 1914 was $350,621,975, an increase of 76 per cent in 10 years. Its great crop is corn; it varies, in bushels, from 346,577,988 in 1904 to 397,117,376 in 1914, a gain of nearly 50,000,000 bushels in 10 years ; value in 1904, $117,688,099, in 1914, $223,680,692. More than a fourth of Iowa's surface is covered with corn¬ fields. Its second crop is oats, with a total in 1904 of 134,150,609 bushels; in 1914, 178,330,591 bushels; its value in 1904, $34,225,390; in 1914, $72,433,992. Its third crop is wheat, in 1904, 5,859,747 bushels; value $4,787,042; in 1914,

$132,174,507. Total horses, mules, etc., in 1905, 1,284,251; value $82,817,016; in 1915, 1,464,993; value $135,924,253. Total cattle in 1905, 4,755,- 041, value $91,019,753; in 1915, 4,188,956, value $140,978,731. Total hogs in 1905, 6,447,630; value $34,464,153; in 1915, 6,683,476; value $57,-

Number and Value Live Stock on Iowa Farms, 1 Jan. 1918.

Number head Total value

Swine . 10,307,000 $249,429,000

Horses . 1,583,000 164,632,000

Mules . 69,000 8,004,000

Milch cows . 1,405,000 107,764,000

Other cattle . 2,919,000 139,820,000

Sheep . 1,224,000 16,891,000

Total value . $686,540, 000

019,987. Total sheep in 1905, 500,743; value $1,- 987,364; in 1915, 575,074; value $2,866,848. Total fowls in 1905, 23,471,063; value $8,083,184; in 1915, 28,115,683; value $13,800,363. It will be noted that with 566,085 fewer cattle in 1915 than in 1905, their total value was about $50,000,000

Tabulated Crop Summary 1917.

CROP

Acres

Average yield

Average

price

Total yield

Total, value

Corn .

10,337,700

34.4 Bu.

$1 23

356,677,000

$438,712,710

Oats .

5,526,500

40.2 “

64

222,192,500

142,203,200

Spring wheat .

580,400

18.2 “

1 99

10,584,600

21,063,354

Winter wheat .

197,270

19.9 “

2 02

3,920,810

7,920,036

Barley .

340, 100

31.3 “

89

10,649,200

9,477,788

Rye .

50,040

18.1 “

1 48

905,850

1,340,658

Flax seer! .

8,687

10. 1 “

3 26

87,450

285,087

Timothy seed .

156,750

4.3 “

4 27

673,025

2,873,817

Clover seed .

23 , 480

1.5 “

19 74

35,220

695 , 243

Potatoes .

97,210

77.8 “

1 32

7,564,600

9,985,272

IT ay (tame) .

2,502,620

1 . 3 tons

19 57

3,3 57,100

65,697,448

Hay (wild) .

491,590

1.2 “

16 00

594,580

9,513,280

Alfalfa.. ‘. .

116,040

2.8 “

23 93

329,110

7,875,602

90,000,000

20,000,000

•

3 . 0 tons

15 00

6,000,000

Pon mm fest.imat.edl .

18,805

19.5 Bu.

4 16

366,700

1,525,472

F 1 1 r Ifwh eat. f estimated) .

16,000

15.3 “

1 70

244,800

416,160

6,000,000

8,500,000

Sugar beets for manufacture (estimated) .... Miscellaneous (estimated) .

7,000

10.0 tons

9 00

70,000

630,000

11,500,000

Total . .

Total value of soil products for 1917 was

$862,215,117

822,061,291

16,455,265; value $14,733,138; barley, in 1914, 7,463,395; value $4,199,810; rye, in 1914, 1,025,- 201; value $839,208; and buckwheat, in 1914, 30,355; value $25,971. Iowa's cereals alto¬ gether occupy nearly half of its area. It also raises considerable flaxseed. Its hay product in 1914 was 6,337,139 tons; value $50,746,183. Its garden crops are also of great importance. In 1914, potatoes 8,453,843 bushels; value $4,422,4 38, also 135,247 bushels sweet potatoes; value $93,487. Total vegetables, in bushels, 8,691,571 ; value $3,898,440. Iowa also has considerable fruit, especially apples ; in 1914 the value of its orchard products was $1,149,305, besides $515,113 of small fruits and berries. Iowa's egg product increased from 79,456,462 dozen in 1904 to 120,930,552 in 1914; value in 1904, $10,794,193; in 1914, $20,593,720. Iowa's dairy products increased in value from $30,687,274 in 1904 to $38,779,869 in 1914.

Stock Raising. — Iowa's live stock looms large. In 1905 its total value was $2 18,447,468; in 1915, $350,621,975, a gain, in 10 years of

more than it was 10 years before. The im¬ provement in the breed of cattle in Iowa, with the advance in prices, accounts for the apparent discrepancy.

Manufactures. — The State's fast-growing population and prosperity and its abundant and almost inexhaustible supply of bituminous coal

have, together, within the last decade given a rapid impetus to manufacturing. Small fac¬ tories have enlarged and many new factories have sprung up. Not a few of these are assum¬ ing large proportions. Iowa's manufactured products in 1914 aggregated $310,750,000, an

increase of 93.5 per cent over the total in 1904, — a gain 16.5 greater than the increase in the value of Iowa soil products during the same periods. During the decade, 1904—14, the wages in Iowa factories have increased 73.5 per cent ; the number of employees has increased 27.5 per cent and the number of factories has in¬ creased 17.3 per cent. Factories, 5,614; wage- earners, 63,113; total of wages in 1914, $39,- 860,000. The products of the slaughtering and

the 33 meat-packing establishments in 1914 were valued at $74,289,000, giving employment to 4,430 men, their wages aggregating $2,740,000. The second industry, butter, cheese and con¬ densed milk, numbers 518 establishments, with 2,182 employees, their products valued at $27,- 606,000. There are 264 foundry and machine shops, employing 5,571 men ; their wages aggre¬ gating $3,887,000; their products valued at $16,- 606,000. There are 1,076 printing and publish¬ ing establishments, with 4,948 employees, their wages aggregating $3,336,000; their products valued at $15,934,000. There are 227 flour and grist mills, with 790 employees who are paid $486,000 wages ; their products valued at $14,- 337,000. Among the fast-growing industries of Iowa are artificial stone, with 384 plants, em¬ ploying 809 workmen, and having an output of $2,082,000; button-making, with 81 plants, 2,406 employees and products valued at $3,255,000 ; men's clothing and shirts, with 22 plants, 954 employees, and products valued at $1,670,000; copper and tin products, with 86 plants. 558 • employees and products valued at $2,489,000 ; gas, illuminating and heating, with 113 plants, 768 employees, and products valued at $4,066,- 000 ; pharmaceutical preparations, with 94 plants, 418 employees and products valued at $4,828,- 000 ; canning and preserving, with 64 factories, 1,209 employees and an output valued at $3,255,- 000; agricultural implements, with 34 factories, 1,164 employees, and products valued at $5,- 216,000. These turn out cultivators, equalizers, harrows, hoes, plows, seeders, drills, harvesters, hay-carriers, hay-forks, horse hay-rakes, manure spreaders, separators, etc. Cedar Rapids has

the largest oatmeal mill in the world. Dubuque has the only ship-building plant in the interior. Among the larger cities, Des Moines leads in brick-making, proprietary medicines, book and job printing and binding, and hosiery; Sioux City, Ottumwa, Cedar Rapids and Des Moines in meatpacking; Davenport, Dubuque, Burling¬ ton, Des Moines and Ottumwa in foundries and machine works ; Dubuque, Council Bluffs, Grin¬ ned and Des Moines in carriages ; Burlington, Davenport, Des Moines, Dubuque, Ottumwa, Keokuk and Oskaloosa in cigars ; Sioux City,

Des Moines, Cedar Rapids, Fort Dodge, Mason City, in flour and other food products ; Des Moines, Ottumwa, Grinned, Newton, Fairfield and Fort Madison in farm and other machinery.

Transportation and Commerce. — Several of the interior rivers are navigable for small boats, the Des Moines for 100 miles, the Mis¬ souri for fair-sized steamers its whole length, and the Mississippi for large ones to Saint Paul. But steamers have, in the main, been superseded by railroads ; the shifting channel, sand bars and snags of the Missouri make its navigation dangerous and slow. Only the Mississippi remains in practical use. The State, lying in the main path of transcontinental com¬ merce, and originating much well-distributed local traffic, is a vast network of railroads, seven of the great trunk lines crossing it. Every one of the 99 counties has at least one railroad. The farthest distance between railroads at any point in the State is 13.79 miles. Iowa has 10,016 miles of steam railroad and 477 miles of interurban. There is a rapid but steady in¬ crease in the mileage on intern rbans. The chief cities of interurban lines are Des Moines and Cedar Rapids.

Banking. — Iowa has the largest number of banks of any State in the Union. On 6 July 1915, it had 1,625 banks, national, 348; State, 323; savings, 832; private, 102; loan and trust, 20 ; total capital, $67,732,586.67 ; total deposits, $483,521,440.05. In 10 years the savings banks of Iowa have increased in number from 429 to 831 ; in capital from $13,471,000 to $24,845,- 100; in deposits from $100,232,071 to $223,975,- 413 ; percentage of increase in capital 87, in deposits 123.

State banks have increased in number from 248 to 340; in capital from $10,625,800 to $16,- 889,700; deposits from $46,261,287 to $101,837, 298 ; percentage of increase in capital 58, in deposits 120. National banks have increased in number from 281 to 348; in capital from. $17,- 665,000 to $23,777,270; in deposits from $69,709,- 000 to $140,995 ,227 ; percentage of increase in capital 34, in deposits 102. Private banks have decreased in number from 139 to 102; in capital from $3,045,166 to $1,893,717; percentage of de¬ crease 37, of deposits 13.

Insurance. — Iowa's insurance corporations are many and extensive, their operations ex¬ tending to all parts of the Union. While life insurance is the larger interest, fire and casualty companies are growing in number and volume of business. At the beginning of the year 1916 its fire organizations were: stock companies, 4; mutual companies, 3 ; State mutual associations, 31 ; county mutual associations, 160. The seven companies show assets amounting to $4,674,867 and net premiums received $2,347,533.64. The 31 State mutual associations show assets, $2,- 406,510.82 ; income

$1,708,291.61. The 160 county mutual associations show assets $1,502,400.05; income $1,167,718.39. At the beginning of the year 1916, combined assets of Iowa's six casu¬ alty companies $2,101,368.43; income $1,173,- 618.38. At the beginning of the year 1916 there were 14 Iowa companies, 3 Iowa associations and 12 fraternal societies engaged exclusively in life insurance. Of the 14 Iowa life insur¬ ance companies, the total assets at the begin¬ ning of 1916 was $53,524,298.10; total income $19,148,606.28; of the three associations the total assets at the beginning of 1916 were $3,- 536,518.80; total income $2,222,531.04. Of the 12 fraternal societies, the total income was $7,439,498. ip.

Education. — In 1910 Iowa ranked second among the States in literacy, with 1.7 per cent of illiterates; in 1915 it regained its first place, with only 1 per cent of illiterates. These fig¬ ures are doubly significant when given in con¬ nection with the fact that, by the last Federal census, the average of illiteracy in the United States is 7.7. In 1910 there were 29,889 illiter¬ ates in the State; in 1915 there were 18,739. Attendance on common schools in 1915, 76.2 per cent; attendance on high or preparatory schools, 13.6 per cent ; attendance at college 6.6 per cent. Total number in attendance in schools and colleges in 1914, 519,814. In 1904-05 Iowa expended on her educational institutions $916,- 598.71 ; in 1913-14, $2,682,540.97. Its total of expenditure for schools and colleges in 1914 was $17,585,341.88. Iowa's investment expendi¬ ture during the 10 years ending with 1914, for its State Teachers College was $538,616,88; for its State University, $2,081,964.73; for its State College of Agriculture and Mechanic Arts, $2,- 483,565.42 ; for school sites and schoolhouses

State Capitol at Des Moines

$11,298,853.20. In 1915, Iowa had 20,946 schools, a gain of 169 since 1906. Since 1906 there has been, along with the increase in schools and expenditures a slight dimunition in the number of teachers. There has been a wide variation in the total enrollment, during the last five years, from 496,045 in 1910 to 522,423 in 1915. In 1915, the total value of Iowa's schoolhouses was $37,061,740; of apparatus $1,915,701; vol¬ umes in school libraries, 1,264,291 ; male teachers 2,628; female teachers 24,163; average school attendance 391,132; teachers' salaries $11,174,- 715 ; average compensation of teachers $59.21 ; average months of school 8.7 ; percentage of attendance to enrollment 75 ; schoolhouses built in 1915

232; permanent school fund $4,805,598. The number of graded schools has been steadily increasing since 1870. From 1906 to 1915 the value of Iowa's schoolhouses increased over $14,000,000. In 1915 there were 155 consoli¬ dated school districts in the State, the result of a movement toward the township unit be¬ gun in 1897, — a movement resulting in the closing of 429 one-room schools. In the fiscal period 1914—16 the State gave a bonus for the encouragement of consolidated schools giving- special vocational instruction as follows : for consolidated schools $134,750; for aid in normal training in high schools $238,125. The State provides instruction for its dependents as fol¬ lows : for the deaf 216, the blind 135, orphan's home 573, industrial school, for girls, 178, for boys 434, for feeble-minded 1,467. There were in Iowa, in 1915, 155 private schools with an enrollment of 23,628. There are 27 colleges and universities unsupported by the State, most of them in part supported by churches. These colleges have land, buildings and equipment valued at over $7,000,000 and have an income of nearly $1,500,000. The combined faculty number 571 ; students 10,148. The State di¬ rectly supports three institutions for higher education, under the supervision of a board of education, — which also supervises the col¬ lege for the blind. These four institutions have property, including endowments, aggre¬ gating $12,050,529 as will be seen by the follow¬ ing statement :

$2,500,000. During the decade closing with 1915, the State invested in land, buildings and equipment for these institutions over $5,000,- 000. In that decade the faculty in the three institutions for higher education increased from 345 to 692, and the enrollment from 5,694 to 10,127. The record of graduation in 1914—15 was: University (Iowa City) 561; State College (Ames) 413; Teachers' College (Cedar Falls) 385. The student body has increased as fol¬ lows: University, in 1906, 1,815; in 1915, 2,996: State College in 1906, 1,398; in 1915, 3,629: Teachers College, in 1906, 2,490 ; in 1915, 3,502. The principal institutions of higher education exclusive of those supported by the State are :

Status in 1915 Pro- Stu-

fessors dents

Drake University, Des Moines, Disciples of

Christ . 47 1,061

Highland Park College, Des Moines, Pres¬ byterian . 31 994

Cornell College, Mt. Vernon, Methodist. . 40 683

Grinnell College, Grinnell, Congregation-

alist . 36 664

Simpson College, Indianola, Methodist… 30 616

Morningside College, Sioux City, Metho¬ dist . 25 577

St. Joseph College, Dubuque, Catholic… 31 517

Coe College, Cedar Rapids, Presbyterian. . 21 503

Des Moines College, Des Moines, Baptist. . 21 470

Wesleyan College, Mt. Pleasant . 18 346

Upper Iowa University, Fayette, Metho¬ dist . 16 246

The beginning of the year 1919 found the principal institutions of higher education in Iowa rapidly recovering from the confusion incident to the brief invasion of the Student Army Training Corps mustered out soon after the amnesty of 11 Nov. 1918.

Libraries. — Iowa had 131 free public li¬ braries in 1916. Eighty-eight of these in as many different cities and towns occupied build¬ ings erected by Andrew Carnegie, and in 1916 eleven others were in process of erection There is only one endowed free public library in the State, the Kendall Young library in Webster City. The State has 31 college and academy libraries, also 14 in State institutions under the board of control, and eight in other State institutions; 50 association and subscrip¬ tion libraries, and four miscellaneous, making

♦ Value of Property, 1 July 1918.

State

University

Iowa

State

College

Iowa State Teachers College

College for the Blind

School for the Deaf

Total

Real estate .

Buildings .

(a) $500,000

2,600,000 25,000 800,000 360,000 150,000

(. b) $250,000

2,700, 000 60,000 800,000 265 , 000 255,000

(c) $25,000

1,000,000 25 , 000 200,000 50,000 75 , 000

(d) $20,000

300 , 000

(e) $43,000

300,000

$838,000

6,900,000

110,000

1,820,000

769,000

494,000

Equipment of departments .

General equipment .

Furniture . .

10,000 33 , 000 3,000

10,000

61,000

11,000

Total value of property .

Permanent Endowment Fund 30 Tune 1918

$4,435,000

275,000

155,000

$4,330,000

**689,529*

$1,375,000

$366,000

$425,000

$10,931,000

964,529

155,000

Gifts, etc .

Total .

$4 , 865 , 000

$5,019,529

$1 ,375,000

$366 , 000

$425 , 000

$12,050,529

(a) Includes all real estate located in Iowa City and all unsold State University lands, 120 acres, located in various parts of the State. (b)

1,338.88 acres, including campus. (c) 40 acres, including campus. (a) Real estate, 50j acres. (e) Real estate, 212 acres.

They have an annual income, from ap¬ propriations, State and Federal, and from interest, tuitions, fees, etc., amounting to over

a total in the State of 239. The total number of volumes in the public libraries of the State in 1916 was 1,126,073. In the association

libraries, 59,508. In institutional libraries un¬ der the board of control, 39,225. In other State institutions 437,647. In colleges and academy libraries, 300,103. Total of volumes in the li¬ braries of the State are 1,962,556.

Churches and Church Membership.— There were in 1915, 4,218 church organizations in Iowa, a gain of 397 in 10 years; member¬ ship in 1915, 928,417, a gain of 346,577 in 10 years; value of church property in 1915, $47,- 717,451, a gain of $22,894,852 in 10 years. The principal denominations show the following membership in 1915: Methodist, 325,959; Catho¬ lic, 206,701 ; Lutherans, 107,523 ; Disciples of Christ (Christian) 60,720; Presbyterian, 47,059; Baptist, 39,321 ; Congregationalist, 35,538; United Brethren, 10,366; Latter Day Saints (mono¬ gamous) 10,216; United Presbyterian, 9,049; German Evangelical Synod, 8,084; Christian Scientists (estimated) 7,500; Protestant Episco¬ pal, 7,233; Friends, 6,629; Evangelical Associa¬ tion, 5,236. Other denominations : Adventists, Dunkers, United Evangelical, Jews, Mennonite bodies, other Methodist bodies, Reformed bodies (Bohemian, etc), Salvation Army, Uni¬ tarians, Universalists, etc.

Charities and Penal Institutions. — Iowa has 17 institutions under a board of control, in which over 10,000 persons are cared for by the State ; six for correction and reformation, viz : one penitentiary, two reformatories, two indus¬ trial schools, one custodial or convict farm ; four hospitals for the insane ; one for tubercu¬ losis patients; one for epileptics; one for vic¬ tims of drugs and intoxicants ; one home for soldiers and sailors and their wives ; one school for the deaf ; one home and school for orphans ; one home for the mentally deficient. In 1916 the hospital for epileptics was nearing comple¬ tion, the custodial farm was in partial use, and the reformatory for women was in process of equipment. The inmates of these 17 institu¬ tions increased in number from 8,312 in 1906 to 9,309 in 1914. The cost of maintenance has increased from $1,893,590 — or $179.48 per capita

— in 1906 to $4,545,468 — or $400.93 per capita — in 1914. The State has 10,397.05 acres of land in use with these institutions, as against 4,189 acres in 1898 when the board of control assumed their management. The property was then appraised at $8,380,718; its appraised value in 1915 was $12,487,150.44.

State Government. — The constitution was adopted in 1857. By law, the electors must vote once in 10 years on calling a convention to revise the constitution, which convention the legislature must call if so voted. All amend¬ ments must receive a majority vote of both houses in two successive legislatures, and then be passed by popular vote. The only amend¬ ment to the constitution since 1857 was in 1868, when the word "white® was eliminated. The proposed amendment extending the suffrage to women was voted down 5 June 1916 by a ma¬ jority of 10,341. An amendment prohibiting the sale of intoxicating liquor as a beverage was carried in 1882 by a majority of 29,759, but was declared invalid by the Supreme Court. An amendment to the same effect was sub¬ mitted in 1915 and 1917. On 15 Jan. 1919, both houses of the General Assembly — by a vote of 42 to 7 in the Senate and 86 to 13 in the House — passed a joint resolution ratify¬ ing the prohibitory amendment to the Constitu¬

tion of the United States, thus summarily dis¬ posing of the question. The Senate has 50 four- year members, the House 108 two-year members; legislative sessions are held biennially in the odd-numbered years. Bills must have a major¬ ity of all members elected to both houses — not merely present. A two-thirds vote overcomes the governor's veto. Executive officials are elected for two years — half in one year and half in the alternates, with the exception of the railway commissioners, who are elected for three ; the railroad commission has power to regulate rates, etc. The judiciary consists of a Supreme Court, with a chief justice who is such by reason of priority of election, six as¬ sociate judges, chosen every year; also 53 dis¬ trict judges in 20 districts, each serving four years. Women may vote only on school ques¬ tions involving the expenditure of money, and on municipal questions involving the issuance of bonds. All incorporated towns of 2,000 people and over are ianked as cities; all platted but unincorporated towns are villages. The number of representatives in Congress is 11. In politics the State has been Republican since the organization of the party, except in the years 1890-94, when the advocacy of prohibi¬ tion drove it into retirement. The prohibitory amendment, adopted in 1882 and pronounced unconstitutional by the Supreme Court of the State, was succeeded by prohibitory laws which after several years' trial were in turn succeeded by a local option law under which 54 of the 99 counties of the State were reported in 1903 as wholly free from saloons. In 1915 the local option law was repealed, leaving the entire State under a prohibitory law.

Finances. — The finances of the State for the biennial period ending 30 June 1916. show: Balance 1 July 1914, $737,860.82; revenue to 30 June 1916, $15,252,530.36; total, $15,990.- 391.18. Disbursements, 1 July 1914 to 30 June 1916, $15,172,565.93; balance, 30 June 1916, $717,825.26. All property in Iowa, assessed at actual value, was placed at $2,490,954,700 in 1905 ; in 1906 it rose to $4,055,607,770. Local taxation is limited to 1 per cent of valuation for current expenses, but this may be exceeded for waterworks, sewers, schools, etc. The State cannot incur a debt of more than $250,000 ex¬ cept for war purposes. Counties and towns cannot incur a debt of over 5 per cent of their actual valuation.

Population and Divisions. — Iowa in 1920 ranked 16th among the States in population. The population was 43,112 in 1840; in 1850, 192,- 214; in 1860, 674,913; in 1870, 1,194,020; in 1880, 1,624,615; in 1890, 1,911,896; in 1900, 2,231,853; in 1910, 2,224,711; in 1920, 2,404,021. The original population was part of the Free- State movement which peopled the Central States. Of the entire population (1915), 264,- 169 were foreign-born. Of these 88,450 were from Germany; 64,812 from Scandinavia, or nearly three-fifths from the Teutonic nations; besides several thousands from German Aus¬ tria and Switzerland. From England 15,681, Canada, 10,980; Ireland, 14,299; Holland, 12,- 638 ; Greece, 4,678 ; Italy, 6,261 ; Russia, 9,896 ; China and Japan only 133. Total white popu¬ lation 2,341,322; colored 16,744. In 1915 the census showed an increase in population of 133,289 in five years and 148,010 in 10 years. The capital, Des Moines, on the river of the

*same name, is the largest city in Iowa with a population in 1920 of 126,468. On the same river to the north is Fort Dodge, an old frontier fort and settlement (19,372), and below it Ottumwa (23,303) and Keokuk (14,423). The Mississippi River business is chiefiy represented, from north to south, by Dubuque (39,141) the first settled in the State, Clinton (24,151), Davenport (56,727), Muscatine (16,068), Burlington (24,- 057), Fort Madison (12,066), Keokuk (14,423), the <(Gate City,® at the mouth of the Des Moines, Sioux City (71,227), in the extreme west, near the mouth of the Big Sioux and Council Bluffs (36,162), opposite Omaha, the old terminus of the Union Pacific, represent the Missouri River; Cedar Rapids (45,566) and Waterloo (36,230), the valley of the Cedar River; and Marshalltown (15,731), the valley of the Iowa River. > **

Defense. — The State militia, or National Guard, was organized under a strict military code of the State and in harmony with the United States

Army regulations. The gover¬ nor is commander-in-chief, and directs the guard through the adjutant-general and staff. On 1 Jan. 1916 the guard consisted of staff de¬ partments, 6; commander first brigade and staff, 6; medical department, 176; engineer company, 72 ; first squadron cavalry, 299 ; first battalion field artillery, 415; first, second and third infantry, 2,465; first separate company, 64. Total, 3,503. In the summer of 1916 the main body of Iowa's National Guard responded to the call of the government for troops on the Mexican border, taking the national oath. In the winter of 1916-17, the Iowa troops re¬ turned to their homes but were not mustered out. On 1 March 1917 the First Iowa regiment was called to service in anticipation of the President's declaration of war with the Ger¬ man Empire. On 15 July following, the entire National Guard of the State was called out and sworn into Federal service, under the Na¬ tional Defense Act of that date. These troops rendered valiant service with the American Expeditionary Force in France, and were among the first that turned back the German advance on Paris, and their loss in killed and casualties was extensive. While every able- bodied man between 18 and 45 is subject to call as a member of the State militia, the beginning of the year 1919 found but one regiment of the Iowa National Guard, the Fourth Iowa Infan¬ try, in existence in the State. The troops in actual service on their return were mustered out and restored to their civil status.

History. — The territory now included in Iowa was originally inhabited by the Ioway and Illinois tribes of Indians, which were driven out by the Sacs and Foxes. In 1761 the <(Ioway® or Iowa tribes were on the east side of the Missouri River and near the headwaters of the Des Moines; but in 1805 they were oc¬ cupying land on the south side of the Des Moines River. In 1846 they left the vicinity of the Des Moines, some going to the reserva¬ tion of the Sacs and Foxes beyond the Mis¬ souri. The missionary, Father Marquette, and Joliet, the fur-trader, were the first white men known to have touched foot upon Iowa soil. In 1673 they landed near the mouth of the river now known as the Des Moines. In 1788 a

**The figures above are obtained from the United States census of 1920.*

party of 10 white men under Julien Dubuque established the first white settlement on the site of the present city of Dubuque. They were attracted by the lead deposits in the vicinity. They opened and in a small way operated mines, but after the death of Dubuque, in 1810, his associates were compelled by the Indians to abandon the settlement. All that portion of country drained by the Mississippi was claimed by France because of the explorations made by Marquette and some of his companions, and because of settlements made by other French¬ men. France's claim to this territory was ceded by treaty to Spain in 1763, but the country was returned to France in 1800-01. In 1803 all the territory now known as the Louisiana

Purchase (q.v.) was bought of France by the United States government. The territory now the State of Iowa was part of the Territory of Louisiana in 1805; of Missouri in 1812; of Michigan in 1834; of Wisconsin in 1836. Iowa became an independent territory in 1838, and was admitted as a State in 1846. The Indian claims to lands within the boundaries of the State were purchased by the United States gov¬ ernment before its admission as a State. The last purchase was made in 1843. Remnants of the Sacs and Foxes occupy a reservation, 419 acres, in Tama County, and still receive annui¬ ties from the government. In 1832 a settlement was made at Fort Madison, an abandoned gov¬ ernment post, and soon after Burlington was founded, and in 1830 a settlement was again made at Dubuque. In 1857 the Indians attacked the settlers living near the Okoboji lakes and Spirit Lake, in Dickinson County, and about 30 whites were killed and nearly all the houses burned. This action on the part of the Indians retarded for some years the growth of that section of the State. Burlington was first selected for the Territorial capital. Iowa City became the State capital in 1846. In 1857 the capital was removed to Des Moines. Iowa had in the Federal army during the Civil War 75,839 men, which was about one-tenth of her population. Some of this number were in regi¬ ments belonging to other States.

Territorial and State Governors.

TERRITORIAL

Robert Lucas . 1838-41

John Chambers . 1841-45

James Clark . 1845-46

STATE

Ansel Briggs .

Stephen Hempstead. . James Wilson Grimes.

Ralph P. Lowe .

Samuel J. Kirkwood . . William M . Stone ….

Samuel Merrill .

Cyrus C. Carpenter . . Samuel J. Kirkwood . . Joshua G. Newbold. .

John H. Gear .

Buren R. Sherman. . . William Larrabee ….

Horace Boies .

Prank Darr Jackson . . Francis Marion Drake Leslie Mortimer Shaw Albert B. Cummins. .

Warren Garst .

B. F. Carroll .

George W. Clarke …. William L. Harding . . N. E. Kendall .

Democrat .

it

Whig and Free-Soil

Democrat .

Republican .

it

u

a

u

u

tt

u

tt

tt

Democrat .

Republican .

tt

a

u

tt

u

u

u

u

1846-50

1850-54

1854-58

1858-60

1860-64

1864-68

1868-72

1872-76

1876- 77

1877- 78

1878- 82 1882-86 1886-90 1890-94 1 894-96 1896-98 1898-1902 1902-08

1908- 09

1909- 13 1913-17 1917-21 1921-23

Bibliography. — Aldrich, (Annals of Iowa' ; State Historical Society publications ; Sham

302

IOWA — IOWAS

baugh, documentary Material Relating to the History of Iowa) ; Monette, (History and Dis¬ covery of the Mississippi Valley) ; Iowa .Geological

Survey publications ; Shambaugh, (History of the Constitutions of Iowa,' (Mes¬ sages and Proclamations of the Governors of Iowa) ; Gue, (History of Iowa' ; Brigham, (Iowa; its History and its Foremost Citizens' (1919 ed.).

Johnson Brigham, Librarian , Iowa State Library.

IOWA, State University of, an educational institution forming an integral part of the pub¬ lic school system of the State, situated at Iowa City. It was first opened in 1847, receiving con¬ trol of lands given by the Federal government. (See Colleges, Land Grant). The university is controlled by a State board

(Studies in Medicine) ; (Aims and Progress of Research' ; (Studies in Language and Litera¬ ture' ; 'Studies in Education.' • The State ap¬ propriates over $700,000 annually to the univer¬ sity, and the total income amounts to over $950,000 annually. In 1921 the number of stu¬ dents was 4,933; the number of professors and instructors, 440.

IOWA CITY, Iowa, city and county-seat of Johnson County, on the Iowa River, and the Burlington, Cedar Rapids and Northwestern, and the Chicago, Rock Island and Pacific rail¬ roads, 54 miles west of Davenport. _ The city is pleasantly built on a succession of plateaus, rising one above another froni steep river banks. The first plateau is laid out as a public promenade, and the third, which is about 30 feet higher than the first, is crowmed by a handsome Doric edifice 120 feet long and 60 feet wide, of a beauti¬ fully marked stone quarried in the vicinity called "bird's-eye marble." This building was originally intended for the State capitol, but, on the removal of the seat of government to Des Moines, was appropriated to the State Univer¬ sity. From 1839 to 1854, this was the seat of the Territorial and State governments. It is the seat of the State University of Iowa, the Iowa State Academy, the State Historical Society and Library, the Homoeopathic, Allopathic and Mercy hospitals. It is the farming trade centre for Johnson, Cedar and Iowa counties ; has ex¬ cellent power provided by the Iowa River; and manufactures flour, iron, woolen goods, per¬

fumery, gloves, jewels, fencing and linseed oil. The city has electric light and street railroad plants, waterworks on the Holly system and numerous churches. Besides its manufacturing interests the city has an extensive stock-raising and meat-packing industry. Pop. (1920) 11,267.

IOWA COLLEGE. See Grinnell Col¬ lege.

IOWA FALLS, Iowa, city of Hardin County, 50 miles east of Fort Dodge,

on the Chicago, Rock Island and Pacific, the Chicago and Northwestern, and the Illinois Central rail¬ roads and on the Iowa River. Ellsworth Col¬ lege is situated here. The city has a Carnegie library, internal combustion engine works, drainage machinery, tile works, etc. There is a large trade in agricultural produce and in build¬ ing stone. In 1914 the city-manager plan of government was put in force. Pop. (1920) 3,954.

IOWA RIVER, in the State of Iowa, rises in Hancock County, near the Minnesota State line and flows southeast into the Missis¬ sippi River, north of Burlington. It is 300 miles long, and is navigable to Iowa City, 80 miles from its mouth.

IOWA STATE COLLEGE OF AGRI¬ CULTURE AND MECHANIC ARTS, at

Ames, Iowa, is a co-educational and techincal institution with five main divisions of work : agriculture, engineering, home economics, in¬ dustrial science and veterinary medicine. The college was founded in 1868. With campus and farms it covers 1,339 acres; the land is valued at $208,979.50; and the buildings cost $2,715,085. The college library contains over 50,000 vol¬ umes. The enrollment of students, collegiate and non-collegiate for 1915-16, including the summer and winter sessions was 5,502. The college has over 4,000 graduates and bases its strongest claim to success as an educational institution on the work of these men and women in their vocations throughout the United States and the world. The college is supported by Acts of Congress known as the Morrill Acts (1862 and 1890). The support funds for 1915— 16 amounted to $1,347,294.

IOWA WESLEYAN COLLEGE, Mount

Pleasant, Iowa, a coeducational institution founded in 1844 under the auspices of the Methodist Episcopal Church. Admission is nonsectarian. The faculty numbers 26; the average annual attendance of students is 500; tuition fees amount to 90; living expenses to $300. The productive funds total $650,000 the annual income including tuition fees and inci¬ dental charges is $32,085. There are over 12,- 000 volumes in the library. The number of graduates since organization is 1,058. The col¬ lege colors are white-purple.

IOWAS, a tribe of American Indians of the Algonquin family. In 1800 the Iowas lived in Minnesota and soon after moved southward. They were called Palinchas, or ((Dusty Noses," in their own tongue. Lewis and Clark, the ex¬ plorers, designate them as the Ayanways, and the early French traders called them the Ajowes. In 1836 they moved to the Wolf River region west of the Mississippi, and in 1861 ceded 16,000 acres of land to

the United States. The rem¬ nants of the tribe, less than 500 in number, ar present live on reservations in Oklahoma and Kansas. (See also Indians, American; Iowa),

Consult Aliner, W. H., (Io\va Indians: A Sketch of their History > (Cedar Rapids, Iowa 191 2 ˆ.

IPECAC, or IPECACUANHA, a South American plant of the order Rubiacece vari¬ ously called by botanists Cephcelis ipecacuanha and Psychotria ipecacuanha. The plant, which is found mainly in moist shady forests in Brazil, is a creeping herb or sub-shrub with mostly bare stems, only the extremities pro¬ ducing leaves. The small white blossoms, which are borne in heads with long stalks, are fol¬ lowed by dark purple berries. The rather fleshy more or less divided roots were in medicinal repute among the South American Indians, and gradually found their way into European medi¬ cine under the name "ipecacuanha.® They have been considered emetic, nauseant, diaphoretic and expectorant, and in large doses are poisonˆous. They appear in commerce in various grades (gray, brown and red), which are de¬ pendent mainly upon the season at which they are gathered, the way they are dried, the age of the plants, etc. The chief supplies are col¬ lected during January, February and March by the Indians. Owing to the slow growth of the plant and the low price the roots command, ipecac is not cultivated commercially; it has, however, been successfully grown in various parts of the world. It is a constituent of Dover's powder. The roots of several other plants are substituted for those of true ipecac among the best known being those of Tylophora asthmatica and Sarcostemma glaucum (Vene¬ zuelan ipecac), both of the natural order Asclepiadacece. Other species of Psychotria and certain species of Richardsonia are simi¬ larly but unofficially employed.

Wild or American ipecac (Gillenia stipu- lacea) of the rose family, is a common plant in the southeastern United States and as far north as western New York. It is a perennial herb about three feet tall, bearing paniculate corymbs of white or pale rose colored flowers. It is hardy, of simplest culture and being graceful is frequently planted for ornament in flower bor¬ ders where the soil is of good quality.

IPEK, Montenagro, town situated on the White Drin (Bitritsa), near the Serbian fron¬ tier. It is famed for its ancient monastery, founded in the 13th century and until 1690 the seat of Patriarchs of Serbia. The town is well built. Silk is raised and spun in considerable quantities and fire arms

are manufactured. Un¬ til 1913 the town was in Turkish territory, in the vilayet of Kossovo and sanjak of Novi- bazar. Pop. 10,500, mostly Serbs and Albanians.

IPHICRATES, I-fik'ra-tez, Athenian com¬ mander : b. and d. in the 4th century b.c. Of humble origin, he raised himself to eminence by his courage and talents. In the war of Corinth (393-92 b.c.) he opposed with success Agesilaus, the warlike king of Sparta. He was sent to the Hellespont to act against Anaxibius, but in spite of his victory was unable to prevent the conclusion of the shameful Peace of Antalcidas (387 b.c.) . In 369 b.c. he was appointed to the command of the troops sent by the Athenians to the assistance of Sparta, on the invasion of Epaminondas, but allowed the Theban general to retreat from the Peloponnesus. In the So¬ cial War (357-55) he was one of the com¬ manders of the fleet fitted out by the Athenians

for the recovery of Byzantium. Being accused of treachery and neglect of duty in the battle at the Hellespont, by one of his colleagues, Chares, and put on trial, he was acquitted, while his colleague Timotheus was fined 100 talents ; but though he lived to a great age, he did not again engage in active service. Iphicrates was the au¬ thor of some improvements in Greek arms and accoutrements. He was accustomed always to fortify his camp in the field even in a friendly country; "Because,® he said, "if, contrary to probability, I should be attacked, I may not be obliged to make the disgraceful excuse that I did not expect it.® Consult the life by Cornelius Nepos and Bauer, cDie griechischen Privat-und KriegsaltertumeD (2d ed., Munich 1893).

IPHIGENIA, in Greek legend, a daughter of Agamemnon and Clytemnestra (according to some an illegitimate daughter of Theseus and Helen), who was to have been sacrificed to Artemis (Diana) at the advice of the prophet Calchas, when the goddess, enraged with Agamemnon, Stained the Greek fleet in Aulis by a calm. Under pretense that she was to be married to Achilles, Iphigenia was led to the altar. But in the moment when the priest was about to give the death-blow Iphigenia dis¬ appeared, and in her stead a beautiful hind was substituted, whose blood gushed out on the altar. Artemis had relented, and conveyed her in a cloud to Tauris, where she became the priestess of the goddess. Conformably with the law of the country, she was obliged to sacrifice every Greek that landed there. While serving as priestess her brother Orestes came to take away the image of Artemis, as he had been ad¬ vised by an oracle to do, that he might get rid of the madness to which he had been subject since the murder of his mother. Iphigenia hav¬ ing recognized him as her brother, the two con¬ trived a means of escape, and carried off with them the image. The story is first told in the 'CypriaP a Greek poem describing the events preceding the

Iliad, and is depicted on vases, sarcophagi and wall paintings. The story of Iphigenia was dramatized by Euripides who composed two plays upon the subject — (Iphi¬ genia in Aulis) and 'Iphigenia in Tauris) ; by Goethe (1789) under the title Hphigenie auf Tauris, } and by Racine as (2d ed., Boston 1911) ; Hall, F. A., 'Iphi¬ genia in Literature> (Saint Louis 1911).

IPHIGENIA IN AULIS, opera by Christ toph von Gluck, produced in Paris in 1774 and 1779, respectively, the latter being a continua¬ tion of the first. The plot is based on the Greek legend of Iphigenia, daughter of Agamemnon and Clytemnestra. To avert the wrath of the goddess Artemis (twin-sister of Apollo), whom Agamemnon had angered by killing a conse¬ crated hind, Iphigenia was demanded as a sac¬ rifice on the altar, pending which Artemis held the Greek fleet destined for Troy in the harbor at Aulis. Calchas, the High Priest of Artemis tells Agamemnon that a favorable wind will come only after the sacrifice. Iphigenia is prepared to immolate herself, but her lover, Achilles, forces his way through the crowd to save her, when she is miraculously conveyed in

a cloud to Tauris to become a priestess to Artemis there in the temple of the barbarous Scythians. In the second opera Iphigenia has served 15 years in performing the rites of offering human sacrifices when her brother Orestes falls into her hands, together with his friend Pylades. She does not know her brother, nor that he had slain his mother and fled, pur¬ sued by the furies. Just as she is about to stab Orestes, he declares himself, and the knife falls from her hand. Thoas, king of the Scythians, rejects her entreaties and commands that both she and her brother shall die. His design is frustrated by the return of Pylades — who had been suffered to depart — with some of his countrymen, and the king is slain. Diana inter¬ venes with her protection and permits brother and sister to return home. The Tauris is by many critics considered to be Gluck's master¬ piece.

IPHIGENIA IN TAURIS. Goethe's Uphigenie auf Tauris) (1787) was first written in prose in 1779 and was performed by members of the court of Karl August, Goethe imperson¬ ating Orestes. For the conception of the sub¬ ject we therefore look to the circumstances of Goethe's life in Weimar at the end of his fourth year there. He had outgrown his "storm and stress,® he had acquired discipline and learned self-denial, and he had come to reverence in Charlotte von Stein a woman to whom he felt so spiritually akin that in a previous existence, he said, she must have been his sister or his wife. Withal, he had enough to regret of ear¬ lier misdeeds : he

could fully enter into the tor¬ tured soul of the matricide Orestes. But the traditional Iphigenia was born again in his drama into the saintliness of pure and re¬ deeming womanhood. Not unwilling to be guided by her brother, she nevertheless by her mere human presence restores him to sanity. Unwilling — as no Greek would have been — to outwit even a . barbarian, she inspires a disappointed king with magna¬ nimity and converts a nation from cruelty, merely by telling the truth. The versifiedform which, with little alteration of the original prose, Goethe gave to his (Iphigenie) in Italy makes this drama an exquisite example of com¬ position in what he himself, in a little essay written in the following year, denominated "style®: creation such as Nature would exem¬ plify under perfect conditions, and such as art attains when, without sacrifice of individual reality, it suggests and typifies the universal. Translated by Anna Swanwick, London, 1850. Edited by L. A. Rhoades (Boston 1896).

IPIALES, e-pya'las, Colombia, town in the Department of Cauca, on the frontier of Ecu¬ ador. It is among the highest towns of the world being situated at an elevation of 10,000 feet above sea level. It has a customs-house. Pop. about 10,000.

IPOMiEA, ip-5-me'a, a genus of plants, in¬ cluding several hundred species, of the family Convolvulacec v, consisting mostly of twining or prostrate herbs, widely distributed in warm re¬ gions. The species of most importance is /. purga, which yields the jalap of commerce. Some are cultivated for the beauty of their flowers, and are known to gardeners as convol¬ vuli. /. purpurea, the common morning-glory, is the best known garden species. See Jalap.

IPPOLITOV-IVANOV, ep-pol'e-tof-e- vanof Michail Michailovitch, Russian com¬ poser b. Gatchina, 19 Nov. 1859. He studied at the Conservatory of Saint Petersburg under Rimsky-Korsakov, removed thereafter to Tiflis where he became director of the conservatory and the opera and also conductor of the sym¬ phony orchestra. His stay in the South resulted in tHe publication of a standard work on the folk-songs of Georgia entitled (The Georgian Folk- Song. > He was made professor of com¬ position at the Moscow Conservatory in 1893 and in 1906 was made director. In 1899 he became conductor of the Moscow private opera and did much in that capacity for the struggling composers of the new Russian school. Ippoli- tov-Ivanov has written the operas (Ruth) (1887);

IPSWICH, Australia, town in Stanley County, Queensland, on the Bremer, 22 miles west of Brisbane. It is located in a thriving agricultural region, also favored with extensive coal deposits. It has iron foundries, woolen mills and lumber yards, railroad shops, etc. Pop. 14,028; with suburbs 25,000.

IPSWICH, England, a market-town, par¬ liamentary and municipal borough and river- port in Suffolk, on the Orwell River at its con¬ fluence with the Gipping, 10 miles northwest of Harwich and 68 miles northeast of London. The older parts of the town have narrow crooked streets, some of the old houses of which are ornamented with curious carved work. It con¬ tains numerous churches and benevolent insti¬ tutions, a town hall, art museum, mechanics' institute, corn exchange and an ancient mansion of the Tudors. Of its educational establish¬ ments the principal is the grammar school founded by Cardinal Wolsey and endowed by Queen Elizabeth. Ipswich is a large industrial centre, manufacturing railway supplies, agri¬ cultural implements, clothing, shoes, soap, ships, etc. About everything made of metal is turned out in Ipswich. There are municipal baths, wharves, library and markets. It sends two members to Parliament. Ipswich has some Roman remains. It was pillaged by the Danes in 991 and again in 1000. Pop. 73,932. Consult Wodderspoon, John, (History of Ipswich } (Ips¬ wich 1850) and (Victoria County History: Suffolk. }

IPSWICH, ips'wich, Mass., town in Essex County, on the Ipswich River near its mouth and on the Boston and Maine Railroad, 27 miles northeast of Boston and 9 miles south of New- buryport. As Agawam, it was settled in 1633 by John Winthrop and 12 others. The name was changed to Ipswich (after Ipswich, Eng¬ land), in the following year, by resolution of the Massachusetts General Court. As early as 1634 it had a meeting-house, while in 1642 the first free school in the town was established. Ipswich was among the foremost towns of Massachusetts in resisting the arbitrary taxa¬ tion introduced under Governor Andros in 1687 and a number of its citizens suffered punish¬ ment in consequence of this action, which fore¬ shadowed the stand to be taken later, by this town and the colonies generally, against similar

policies on the part of the British government. The town has various industries, among the ar¬ ticles manufactured being grist-mill products, hosiery and underwear, bricks, lumber and boxes, carriages, cabinet-work, soap, isinglass, heels, etc. The Manning high school, the Ips¬ wich Historical Society and the excellent pub¬ lic library give the town rank and influence in educational and literary affairs. Pop. 6,272.

IQUIQUE, e-ke'ka, Chile, a seaport in the province of Tarapaca, holding the first position among all Chilean cities in the matter of ex¬ ports and the third (surpassed only by Val¬ paraiso and Talcahuano) in respect to imports. It owes its prosperity largely to the export of nitrate of soda and

borax, the former of which especially is found in great quantities in the pampa of Tamarugal. In 1868 and again in 1877, the town was almost entirely destroyed by an earthquake. In 1879 it was bombarded and captured by Chile from Peru; and in 1891 it was much damaged by insurgents. Pop. in 1917 about 70,000.

IQUITOS, e-ke'tos, a native tribe in Peru, residing at Loreto, on the left bank of the Mara- non, about 75 miles above the mouth of the Rio Napo. The settlement has an active trade, valued at $2,000,000 annually; the imports are exchanged mostly for india rubber. In 1900 they numbered about 12,000.

IQUITOS, Peru, city, river-port and cap¬ ital of the department of Loreto, on the upper Amazon, near the mouth of the Nanay, 2,500 miles from Para, Brazil. It is 350 feet above sea-level and has a healthful climate with a mean annual temperature of 75° F. There are really two towns, one of which is inhabited by the Iquitos Indians. Ocean-going vessels ascend the Amazon to this point, and the river is navigable for lesser craft for 425 miles fur¬ ther up. Iquitos is the second port of Peru, having three ocean lines making regular voyages thither. Its annual foreign trade amounts to $10,000,000. Rubber is the largest item of ex¬ port. The city has machine shops, ship yards, hat and hammock manufactures and fish-curing. In 1908 wireless communication was installed with Puerto Bermudez; the latter place having a land line over the Andes to the capital. Iquitos was founded in 1863, but did not grow very rapidly until the Amazon was opened to navigation, since when Iquitos is the trade centre of eastern Peru. A United States consul is stationed here. Pop., municipal 6,000; dis¬ trict 12,000.

IRADE, l-ra'de, a Turkish decree or com¬ mand of the Sultan, directed to his grand vizier, whose duty it is to announce it to the public.

IRAK-ARABI, or IRAK EL ARABI,

the ancient Babylonia, now comprised in the Turkish vilayets of Bagdad and Basra. It is part of the alluvial plain in the valley of the Tigris and Euphrates. Its western part js sandy desert, and part is also swampy. Within its borders are the ruins of Babylon, Seleucia and Ctesiphon. It includes also the modern Bagdad, Basra and Kerbela. It was crossed by the British forces in 1917-18, just previous to the collapse of Turkey in the War of 1914- 18. Turkish sovereignty was not fully ac¬ knowledged throughout this region and ma¬ rauding bands of tribesmen frequently molest vol. 15 — 20

the caravans passing through. The population of the entire region is

estimated at 3,000,000 probably 30 per cent too high.

IRAN, e-ran, Asia, a general name applied to a great table-land stretching in the North from Caspian Sea, Turkestan and the foot¬ hills of the Caucasus on, from the Indus River in the East, to the Tigris River in the West, as far South as the Persian Gulf and the Indian Ocean. Politically this whole vast region is divided into Afghanistan, Persia, Baluchistan and Kafiristan and it also includes some of the border lands of British India. Persia, how¬ ever, claims for itself alone, politically and otherwise, the appellation of Iran. The popula¬ tion forms the Iranian branch of the Aryan race. In the Pehlevi inscriptions of the famous Sassanide ruler, Shapur I (a.d. 242-72) the country is called A'iran, i.e., the land of the Aryan, in distinction from Aneran, land of the ncn-Aryan ; the latter since the days of Firdusi is termed Turan.

The extremes of climate over this wide area were just as pronounced in ancient as in modern times. As witness the modern Persian saying: Iran h'efte klimat dared, i.e., Iran has seven climates. Along the Persian Gulf in the districts of Busheer and Mohammerah, it is very hot, in the Elburz range intensely cold. Very diversified also have always been its characteristics and features. However, both in the remote past and in more recent times Iran, though a rather ill-defined unit, has been of enormous influence, not only geographically and ethnologically, but in its bearing on history, in the diffusion of the Indo-Germanic idioms. Topographically considered the immense area is surrounded on all sides by high mountain ranges, these aiding materially in keeping out invaders and preserving within the enclosed territory a homogeneity of language and customs. Thus, despite the numberless vicis¬ situdes undergone by the Iranian stock during immemorial ages, all the accounts that have come down to us seem to agree in ascribing to the people of Iran a set of traditional habits and customs as well as a physical makeup which tally in the main with those still observ¬ able in the Persians of to-day.

The earlier travelers and authors, notably Eratosthenes and Strabo, limited the appella¬ tion of Ariana (or Iran, Eran) to its south¬ eastern portion, excluding Persia proper, Media and Bactria. Pliny confounds in his description Ariana with Aria, Areia, i.e., the district of Herat. But Strabo admits that many writers gave to Ariana a more extended meaning, com¬ prising the Persians, Medes, Bakhtrians and Sogdians, as they all spoke the same language, with slight dialectic variations.

The whole enormous area, of which the Persia of to-day with its 628,000 square miles is but about one-third, is rather poorly watered, lacks adequate rainfall in large sections of it, and presents vast stretches of salt-impregnated, wholly arid and barren land. The great desert domain of

Iran, in fact, extends right across the high plateau, going from a northwesterly in a southeasterly direction, and dividing the fertile provinces of the whole into two groups. This desert is continuous from the southern base of the Elburz Mountains (overlooking in the north the Caspian) to the arid ranges of

Makran, bordering on the Persian Gulf. It is about 800 miles in length, but varying greatly in width. The indigenous name for this desert is Dasht-i-Lut, and of it the saline swamps and the salt area are known as the Dasht-i-Kavir.

From the foregoing it may easily be seen that in productiveness, too, Iran varies enor¬ mously. It is believed to be the original home of the peach, the melon, the cucumber, the cherry and the rose, the wheat plant and the poplar. In general, on its territory grow the trees, the fruits and the cereals of the temperate and of the subtropical zones. There are dis¬ tricts, such as, for example, Masanderan and Ghilan, the neighborhood of Shiraz and Shus¬ ter, etc., where the yield is enormous. Wherever the rainfall is abundant, such as along the shores of the Caspian and parts of the southwest, and where woods are still remaining and rivers are flowing in a permanent bed, there is also fer¬ tility, and wherever these conditions do not subsist the contrary prevails. . Some districts, like those of Busheer and Jesk in the south and around the entire shore of the Caspian Sea, have plenty of rain. Iran, however, suffers unavoidably in its prosperity from the almost total absence of large and navigable rivers.

The population of Iran — using the term in the widest sense — seems to have been much greater in antiquity than at the present time. Undoubtedly incessant warfare, deforestation and a deficient system of tilling the soil prac¬ ticed for thousands of years and pursued down to our own days, as well as unwise administra¬ tion and laws, are largely responsible for this.

In historical times Iran (Eran) and Fars (Persia, Farsistan) were for long periods al¬ most identical. This refers not merely to the exploits and religion of Iran, but also to its art, science, language and literature.

Bibliography.— Gutschmid, H. von, XXIV pp. 323-415, Berlin 1879) ; Spiegel, F., (Eranische Altertumskunde) (3 vols., Leipzig 1871-78).

Wolf von Schierbrand, Author of (America, Asia and the Pacific etc.*

IRANIAN, a name applied to racial groups of people speaking the Iranian

stock of lan¬ guages. In historic times the Iranians appear oh the shores of the Oxus and of the rivers of upper Sogdiana, and thence spread southwest through Balkh and Badakshan. It is probable that, in the flourishing ages of the Persian empire the Iranic races were spread much far¬ ther, to the Kur and even beyond. Colonies of Iranians were to be found in the Crimea and mingled with the Thracians. It is thus established that the Iranians were in ancient times the connecting link between the Aryan races of Asia and of Europe. At an early period the Iranians and the Indians probably formed but a single group of races. In antiq¬ uity the chief components of the Iranic peo¬ ples were the Medes and Persians, as well as the inhabitants of those provinces designated as Ariana; but beside them there were also the ancient nomadic hordes of Iranic stock, the Daha or Dahans, who afterward mingled with the Turanians that occupied the steppes of Turkestan as far as the Sarmatians and Scy¬

thians of the present south of Russia. That the latter, though, were conscious of their Aryan and Iranian descent is proved by the names borne by the Scythian (Scolot) kings, such as Ariantas and Ariapeithes (Herodotus). In our day, under the head of Iranians, may be classed the Persians and the Parsis, scattered throughout Persia and India; the Tadjiks, who speak Persian and follow agriculture or com¬ merce, in Afghanistan, Baluchistan and Tur¬ kestan ; then the Koords and Lures, the Afghans, the Ossetians in the Caucasus, the Tais in the region of Baku, the Goorans in Kurdistan, the Galtchas and Pathans on the Pamir plateau and, perhaps, the Armenians. All these populations and tribes stand on very different levels of culture and are also greatly distinguished physically from each other, owing to admixture of foreign elements — such as the Uzbeks and Sarts in Central Asia, influencing the Tadjiks; the Dravidas doing the same with the Beloochees, and the Semitic neighbors in the West playing a similar part. Generally speak¬ ing, the Iranians are dolichocephalous and swart, while the Ossetians, Galtchas, etc., are brachycephalous and fair.

The system of religious worship developed by the Iranians started, of course, with that of the Aryans as a whole. With the latter they shared the myths of Ahura, Mithras, the dragon- slayer Verethreghna. (Indra), Apam — Napat (lightning) ; they believed in the divine afflatus brought about by soma and its preparation ; in the injunction to (

altered reincarnations of the old Iranian gods, now discarded and cursed as ((Evil Workers.® Zoroaster asks each man to ponder and choose his position with regard to the fundamental problems of life and religion. From

his teach¬ ings sprang a priesthood, the Magians, en¬ trusted with the task of administering to the needs of the believers. Zoroastrianism was still strong in the early part of the Christian era, and under the Sassanides, about 220 A.D., there canˆe a revival. This we see from a polemic against the Christians (Armenians) during the reign of Yezdegerd II. about 450 a.d., the de¬ tails of which have 'been preserved by the Armenian historian, Elishe. The creed of Zoroaster, however, .toppled and fell an easy prey to Islam during the early caliphate in the 7th century. Iran, it is true, for the larger part embraced Shiah, and thus became the in¬ veterate foe of the Sunnite Arabs and Turks; but it nevertheless became Moslem, fanatically so, and buried its ancient national faith for¬ ever. The modern Iranians have, however, retained the chief marks of their fathers — a great suppleness of mind, a joyous, lively tem¬ perament, a taste for and skill in poetry, the arts and artcraft, an extraordinary politeness and suavity of manners, coupled with rather loose morals, dislike of frankness and an enor¬ mous racial pride.

Bibliography. — Darmesteter, James, (Etudes Iraniennes) (2 vols., Paris 1883) ; Geiger, Lazarus, (Grundriss der iranischen Philologie) (in Geiger and Kuhn's ˆeitschriftp Strassburg 1902) ; Tomaschek, X. F., (Centralasiatische Studien) (Vienna 1880).

Wolf von Schierbrand, Author of (America , Asia and the Pacified etc.

IRANIAN LANGUAGES AND LIT¬ ERATURE. The dead and living languages of Iran together form, with some sporadic ver¬ naculars existing outside its strict boundaries, the Iranian family of the Aryan or Indo-Germanic speech. Among them are, however, several that have strongly deteriorated or else show considerable mingling. Thus, Afghan is greatly intermixed with Sanskritic elements ; hence it is classed with the Indie by some writers. The earliest type of Iranian we know of is the Zend or Early Bactrian, and this again shows two subdivisions, a more remote and a less remote one. Both of these we only became acquainted with from the surviving fragments of the Zendavesta, as well as from the Gathas, a species of psalms, the latter being much the oldest of the two. The ancient tongue perished on the destruction of the Persian Em¬ pire by Alexander the Great. This ancient Zend is indubitably closely related to Sanskrit and is wholly devoid of the Semitic gutturals with which modern Persian abounds ; and with its wealth of vowels (notably the flat and high ((a® and ((o®) is both melodious and virile. Only slightly younger is Early Persian, the tongue in which cuneiform inscriptions of the Achae- menids are couched. These inscriptions, found in Persepolis, Behistun and elsewhere, which by reason of their similarity to Sanskrit and Zend, and further by reason of frequent par¬ allel columns in Zend, are most interesting from a philological viewpoint. Early Persian and San¬ skrit,

have been wholly deciphered, reach down to the 4th century b.c. and show plain indica¬

tions of the development of the Persian, or Iranic, idioms. Old Persian seems to have been mostly current in the west, Zend in the east of Iran. The next degree of internal change is perceived in Pehlevi, or middle Persian, for in this nearly all the former distinctive case endings and tense forms of the verb, etc., disappear. Pehlevi, nevertheless, for four cen¬ turies became the court idiom during the whole of the Sassanide dynasty. With the Arab con¬ quest, in the latter part of the 7th century, and the enforced introduction of Islam, Pehlevi dis¬ appeared, together with the ancient faith. The remaining adherents of Zoroastrianism, the so- called Parsis or Parsees, scattered throughout Persia or found a refuge in India. And the Parsees up to this date still utilize Zend or Pehevi for ritual purposes.

Finally, however, with Firdusi's (Shah Namehp the great national epic of Persia, the last stage, New Persian, is reached. And New Persian transcends the Pehlevi (or Middle Per¬ sian) both in its purity of idiomatic diction and in its paucity of grammatical forms. New Persian, in fine, knows no grammatical gender, no case endings whatever, and expresses the various tenses of the verb by making extensive use of auxiliaries and prepositions. It is, there¬ fore, next to English, most deficient in gram¬ matical forms;' but to compensate for this loss it possesses a great vocabulary and a rich and nicely developed syntax. However, since the days of Firdusi (1021 a.d.) modern Persian has again changed quite considerably, in that it has adopted innumerable words, even whole phrases, from the Arabic (losing thereby much of its one-time wealth of vowels) and in broadening its scope of word and syllable combination, such cases as a compound word made up of a noun and an adjective or of part Arabic and part Persian being by no means rare. Only the provincial dialects still spoken extensively have kept themselves freer from such whole¬ sale borrowing, and in a sense the purest Iranic is to-day spoken in the province of Masanderan, near the Caspian. Closely related to New Persian are also the Koordish dialects, the Pashtoo (Afghan), which latter likewise pre¬ vails in the northwestern provinces of India; the Baluchi, and the idiom of the Ossetians (who call themselves Iron, Iranians) in the Caucasus. The speech of the ancient Scythians, who dwelt on the shores of the Euxine, like¬ wise showed Iranian type. The great hiatus between the flourishing era of Zend, during and before the Achaemenid dynasty, and the final re-establishment of a native Persian Empire under the Sassanides, was due to the rulers of foreign blood. Again, the ancient sacred liter¬ ature was largely destroyed when Islam was introduced with fire and sword by the Arab invaders, although Zoroastrian worship sur¬ vived to some extent in Yezd, Kerman, etc., and was also introduced in India by fugitives. The remains of the holy books extant at the time of the Arab conquest are

still preserved, partly in the original language, but mostly in an ancient translation. The vehicle used in this translation was Huzvaresh, the literary form of Pehlevi. Sir William Jones (1789) was the first to identify Pehlevi as next of kin to Sanskrit, himself following in the foot¬ steps of his French forerunner, Anguetil-

Dupcrron (1771). However, a whole genera¬ tion passed before thorough progress was made in the reintegration of the language. Schlegel and Bopp first put Sanskrit on a sound philo¬ logical basis by their extensive labors, and simultaneously the fundamental study of the allied Iranian languages also gained ground rapidly. Burnouf, Olshausen, Brockhaus, Spie¬ gel, Haug, Lagarde, Justi, Lassen and Wester- gaard did much to that end. It deserves mention that our knowledge of Huzvaresh is wholly derived from the translations of the Avesta and of the Gathas, as well as through a few other religious works, such as the Bun- daheesh ; furthermore, through inscriptions, coins and gems. It was not always of the same type ; rather it differed considerably at different times and places, according to the larger or smaller infusion of Semitic words.

Bibliography. — Geiger, Lazarus, 'Oste- ranische Kultur> (Erlangen 1882) ; Gray, L. H., Hndo-Iranian Phonology'. (New York 1902) ; Gutschmid, H. von, (Geschichte Irans' (Tubin¬ gen 1888) ; Rawlinson, Sir Henry C., 'Five Great Monarchies of the Eastern World) (3d and 4th vols., London 1865) ; Spiegel, F., (Eranische Altertumskunde5 (3 vols., Leipzig

1871-78).

Wolf von Schierbrand, Author of c America, Asia and the Pacific ,' etc.

IRAPUATO, e ra-pwa'to, Mexico, town in the State of Guanajuato, 32 miles from Guana¬ juato, on the Mexican National Railway. . It contains several convents and churches dating from the Spanish colonial period. The climate is very mild and certain crops are grown throughout the year. Pop. 21,000.

IRAWADI, ir-a-wad'i, or IRRAWADY,

the chief river of Burma. One branch of it rises near the eastern extremity of Assam, an¬ other branch rises in East Tibet, the two branches uniting about lat. 26 . It has gener¬ ally a south course, being deflected west, and its total length is over 1,200 miles. There are three rocky defiles in which its channel is sud¬ denly contracted, the lowest near Mandalay ; but from

that point downward to its delta it has generally a breadth of from 1 to 4 miles. About 140 miles from the bay of Bengal which it en¬ ters by numerous mouths, the delta commences. The current of the Irawadi is generally slow — even in its upper part being no more than at the rate of two miles an hour ; except during the inundations, when it flows so rapidly that no sailing vessels could navigate it but for the as¬ sistance of the southwest monsoon. It is navi¬ gable from the sea upward for steamers of five feet draft to the Chinese frontier, 900 miles from the sea. Artificial embankments extend¬ ing 100 miles protect the delta lands from inun¬ dation. From Rangoon to Bhamo, crossing a bridge at Mandalay, a railroad runs parallel with the valley.

IRBIT, Russia, town in the government of Perm, on the Tiver Irbit, 110 miles northeast of Ekaterinburg. Since 1643 an annual fair is held here which lasts throughout February and at which all kinds of merchandise and manu¬ factures are sold. It is estimated that over 20,000 people attend and goods to the value of $20,000,000 change hands. The town was founded by the Tatars. Pop. 20,000.

IREDELL, Ir'del, Janies, American jurist : b Lewes, Sussex, England, 5 Oct. 1750; d. Edenton, N. C,, 20 Oct. 1799. He was ap- pointed comptroller of customs at Port Roa¬ noke, now Edenton, where he arrived in 1768, retained this office several years, and meanwhile studied law. He was admitted to the bar in 1771. He was appointed by the attorney-gen¬ eral his deputy in 1774, and in the same year was appointed collector of the province , in 177/ he was placed by the legislature on the bench of the Supreme Court, then just organized under the State constitution. He resigned in June 1778, and in the following year was made at¬ torney-general of North Carolina. This UP" pointment, too, he resigned in 1/82. In 178/ he was designated by the general assembly, a member of the State council and sole commis¬ sioner to collect and revise the acts of previous assemblies, which were to be considered in force in North Carolina. This collection of. the laws, now referred to as "Iredell's Revisal, was published in 1791. In February 1790 he be¬ came one of the justices of the Supreme Court of the United States, and held that office till his death. He was a stanch supporter of the fed¬ eral cause and worked hard for the acceptance of the new Federal' constitution by^ North Caro¬ lina One of the counties of his State was named after him in 1788. The 'Life and Cor¬ respondence'' of Iredell was published in 1857. Consult Connor, H. G., 'James Iredell (in University of Pennsylvania Law Review, Vol. LX, p. 225, Philadelphia 1912) ; Davis, J., 'Al¬ fred Moore and James IredelP (Raleigh 1899) ; McRee, G. J., 'Life and Correspondence of Tames IredelP (2 vols., New York 1857—58).

IREDELL, James, American lawyer, son of the preceding: b. Edenton, N.

C., 2 Nov. 1788; d. there, 13 April 1853. He was gradu¬ ated at Princeton in 1806, and was later ad¬ mitted to the bar. In the War of 1812 he raised and commanded a company of volunteers. He served for 10 years in the house of commons of his native State, and twice as speaker, in a house of which the majority were politically opposed to him. In 1819 he was appointed .a judge of the Superior Court, but resigned in 1820. In 1827 he was governor of North Caro¬ lina, and from 1828 to 1831 a member of the Senate of the United States. He. afterward resumed the practice of his profession at Ral¬ eigh, where he was also for many years reporter of the decisions of the Supreme Court of North Carolina. In 1833 he was appointed by Gover¬ nor Swain one of three commissioners to col¬ lect and revise all the statutes in force in North Carolina. The result was the work known as the 'Revised Statutes5 (Raleigh 1837). He afterward published a 'Treatise on the Law of Executors and Administrators5 (Raleigh 1837). His reports of cases in the Supreme Court and of equity cases were pub¬ lished in 21 volumes (Raleigh 1841-52). He also published 'A Digest of all the Reported Cases in the Courts of North Carolina, 1778- 1845 5 (Raleigh 1839-46) ; 'A New Digested Manual of the Acts of the General Assembly of North Carolina, 1838-50, etc.5 (Raleigh 1851).

IRELAND, Ir'land, Alleyne, American

author and lecturer: b. Manchester, England, 19 Jan. 1871. He was educated at the Univer¬ sity of Berlin, traveled widely, lectured on trop-

ical colonization at Cornell University in 1899, and in 1900 was appointed lecturer in politics at the University of Chicago, where his subjects were tropical colonization and Chinese foreign relations. He was afterwards successively lec¬ turer at the Lowell Institute, Boston, one of the private secretaries of Joseph Pulitzer, and joined the editorial staff of the New York World in 1911. Besides contributions to period¬ icals, he has written Georgetown, Deme- rara5 (1897); (Tropical Colonization5 (1899); (The Anglo-Boer Conflict5 (1900) ; (The Far Eastern Tropics5 (1905) ; (The Province of Burmah5 (2 vols., 1907) ; (Joseph Pulitzer5

(1914).

IRELAND, John, American Roman Cath¬ olic prelate : b. Burnchurch, County Kilkenny, Ireland, 11 Sept. 1838; d. Saint Paul, Minn., 25 Sept.

1918. He came to America in 1849 and attended the Cathedral school at Saint Paul, Minn., and in 1853 went to France and studied theology in the seminary of Meximieux and subsequently in that of Hyeres, remaining there till 1861, when he returned to Saint Paul and was ordained priest on the 21st of December. During the early part of the Civil War Father Ireland tendered his services as chaplain of the 5th Minnesota regiment and later became rector of the cathedral, Saint Paul. An ardent advo¬ cate of temperance, he devoted much time and energy to promoting the cause, organized tem¬ perance societies and traveled about the country lecturing on the subject. For a time he was secretary to Bishop Grace of Saint Paul, whom he represented at the V atican Council, Rome, 1870-71, and later became his coadjutor, being consecrated Titular Bishop of Maronea, 21 Dec. 1875. He was likewise very diligent in advanc¬ ing Roman Catholic colonization in the north¬ west and not only founded colonies but became a director in the National Colonization Associa¬ tion. Later, in 1887, Bishop Ireland acconi- panied Bishop Keane to Rome to consult with Pope Leo XIII upon the necessity of erecting a Catholic university in Washington, D. C., and on returning from Europe in 1888, he was made first archbishop of Saint Paul. At one time he endeavored to consolidate the Catholic paro¬ chial schools and the public schools. The plan was tried at Faribault and Stillwater, Minn., but after a time was abandoned in deference to Rome. He founded the Hill Seminary to which he gave his valuable library. He was a distin¬ guished lecturer and pulpit orator. As a speaker he was direct and magnetic, with a sav¬ ing sense of humor. One of the phrases which has often been quoted as characteristic of his particular endeavor in life was this: (

IRELAND, William Henry, English liter¬ ary forger: b. probably London 1777; d. there, 17 April 1835. He imposed spurious Shakes¬ pearian MSS. upon his father, Samuel Ireland, a bookseller and engraver, who was a Shakes¬ peare enthusiast, and also upon other men of let¬ ters, and produced two ˆShakespearian55 plays, (Vortigern5 and (Henry II5 the former of which was purchased by Sheridan and acted at Drury Lane, but was a complete failure. The criticisms of Malone led to the exposure of the fraud, which was acknowledged by Ireland in (Authentic Account of the Shakespearian Manuscripts5 (1796). He wrote various novels, poems, etc., besides his (Confessions5 (1805), containing an account of his forgeries. (Vorti- gern5 and (Henry II5 were published in 1799 and (Vortigern5 again in 1832. Ireland's career forms the basis of a novel by James Payn, (The Talk of the Town5 (1885). His father's corre¬ spondence concerning the forgeries, as well as some of the specimens of the latter are in the manuscript division of the British Museum. A large number of pamphlets were published at the time of the discovery of the forgeries. The most important of these will be found listed in Lowe, R. W., (A Bibliographical

Ac¬ count of Theatrical Literature5 (p. 185, London

1888).

IRELAND, the most westerly and smaller of the two principal islands of which the United Kingdom of Great Britain and Ireland is com¬ posed, extends from lat. 51° 26′ to 55° 21′ N. and long. 5° 25′ to 10° 30′ W. ; its greatest length is 302 miles; greatest breadth, 174 miles; area, 32,583 square miles. It is separated from England by Saint George's Channel and the Irish Sea, and from Scotland by a narrow passage, the North Channel. Ireland is on the continental shelf, or submarine plain, which borders the continental land mass of Europe, hence it is physically part of Europe.

Topography. — The coast line is irregular ; from Dundalk Bay to Wexford Harbor on the east there are less indentations than on any other part of the coast; Dublin Bay, an arm of the Irish Sea, is the only indentation of any size on this part of the island. Galway, Sligo and Donegal bays are the largest on the western coast. The Atlantic currents, which beat against the western coast, have worn away the land in many places, thus causing fiords such as exist on the coasts of other countries subject to similar wave-action. Some of the many islands which fringe the coast have been formed by the washing away or the submergence of the land. The capes, promontories, and peninsulas have been formed largely by submergence. Some of the islands, all small, are Aran, Achill, Clare, and Rathlin. The chief ports are Cork, Dublin, Belfast, Waterford, Londonderry and the arti¬ ficial harbor of Rosslare. There are 14 harbors which will accommodate the largest ocean steamers

The highlands are chiefly along the coast; the greater part of the interior is a plain. The mountains, more rounded hills than mountains, are short ranges with little or no connection ex¬ cept the several ranges in the southwest. Some of the mountains are Mourne, in County Down, the Wicklow Mountains, Knockmealdown and Gaily in the south ; Caha, Stack and other ranges in Kerry; Slieve Boughta in Galway, a num-

ber of short ranges in the counties of Mayo, Leitrim, Donegal and Londonderry, and the Slieve Bloom between Queens and Kings coun¬ ties. The majority of the peaks are less than 3,000 feet in height; Carrantuohill (Carrantual), in Kerry, near the Lakes of Killarney, is 3,414 feet, and Galty Mountains, in Limerick, are 3,015 feet. The plain in the interior is about 500 feet above sea-level.

Hydrography. — The rivers of Ireland, like those of England and Scotland, are small streams. The Shannon, the largest river in the British Isles, has its rise in the northeastern part of the province of Connaught, flows east, south, and west, forming quite a curve before entering the Atlantic Ocean, between the counties of Kerry and Clare. It passes through several lakes, the largest of which are Ree, Allen and Derg. The estuary at the mouth is about 70 miles long; the whole length of the river is about 250 miles, 130 of which are navigable for large steamers. Its importance for transporta¬ tion has been increased by the canals Royal and Grand, which connect it with Dublin. In the southwest, in County Kerry, is a short mountain stream called Roughly River, with a long, broad estuary called Kenmare River. The Liffey, which flows into the Irish Sea at Dublin, the Lee which flows into Cork Harbor, the Boyne with its tributary, the Blackwater, are all short streams which have been made famous in his¬ tory and literature. The Foyle, Erne, Lagan, Moy, Slaney, and others reach the ocean through broad estuaries or bays. Lough Neagh (183 square miles) in the northwest is the largest lake of the British Isles. A number of the lakes of Ireland occur along the river courses, but are really basins, and not merely expan¬ sions of the rivers. Lakes Conn, Foyle, Bel¬ fast, Strangford, Carlingford, and others on the coast are estuaries or fiords, but the land-locked mouths entitle them to be called lakes, like Maracaibo in South America. The famous Lakes of Killarney are in County Kerry, in the southwestern part of the island. There is scarcely a place in Ireland that is more than 25 miles distant from water communication with the ocean.

Geology. — A limestone stratum belonging to the basal portion of the Carboniferous system underlies a large part of the interior plain. The upper Carboniferous rock has been destroyed by erosion except in a few places. Silurian rock underlies nearly all of the northern part, but the Cretaceous, Triassic, and Permian formations exist and appear at the surface in several places. Some of the cliffs of the north are of basaltic formation. The Giant's Causeway (q.v.) on the north coast of Antrim is basaltic. Its 40,000 or more, perfectly formed polygonal columns constitute remarkable specimens of this formation. Crystalline rocks form the axis of the mountains of the province of Connaught, and the highlands of Leinster. Old red sand¬ stone and carboniferous limestone are found in the southwestern counties. Marble exists in large quantities in the county of Kilkenny and in parts of the adjacent counties coal of an anthracite variety is found, but not in large quantities; iron-ore exists in nearly every county. Copper of an excellent quality is in the western mountains, also gold and silver in small quantities.

Soil. — The erosion of the limestone rock which has been going on for ages has contrib¬ uted largely to the fertility of the soil of Ire¬ land. The igneous rocks, the red marls, and other mineral formations, have added to the richness of the soil, and all have been distrib¬ uted, by the gradual

removal of the ice-covering, over a large area of the plain. After deducting the area, about one-fifth of the whole, which is covered by bog, mountain, and moorland, there is left a vast extent of arable surface covered with a deep friable loam of remarkable rich¬ ness. In addition to the decomposed trap and the calcareous matter derived from the lime¬ stone, there is a large amount of vegetable mold which forms one of the most important ingredients of the soil. The bogs, useless for tillage, furnish peat for fuel. The Bog of Allen is the largest one in Ireland.

Climate. — The warm moist winds from the Atlantic blowing over Ireland affect its climate more than any other cause except its latitude. The mean temperature is from 20° to 30° F. higher than other places in the same latitude on •the eastern coast of America or the interior of Europe, and a few degrees higher than places in the same latitude on the west coast of Amer¬ ica. The summer temperature is modified by the surrounding waters, being lower by a few degrees than inland places of the same latitude. The moisture brought by the winds from the ocean causes a heavy annual rainfall, and much . fog, mist and general dampness. The low mountains serve to some extent as condensing agents, so that the greatest rainfall is near the coast.

Vegetation. — The climate and soil are very favorable for vegetation. Its mild temperature and humid atmosphere enable several delicate plants, which usually in the same latitude can be cultivated only in sheltered gardens, to flour¬ ish here with vigor in the open air; and fre¬ quently forest trees continue to retain their foliage after similar trees have lost their leaves in the warmest parts of England. The condi¬ tions would naturally indicate forests, and it seems that in early times, large tracts of mag¬ nificent timber were spread over its surface; but waste and mismanagement have prevailed, trees have almost disappeared except from the parks of the wealthy land-owners, and what ought to be among the best is about the worst wooded country in the middle latitudes of Europe. More attention is now being given to the subject of forestry; in 1901 there were 309, 741 acres in Ireland under forest, a por¬ tion of which was a new growth. During that year, 1,740 acres were planted with trees, mostly fir, spruce, and larch. In 1917 the acreage was only 292,684, a decrease of 17,057 acres. Grass grows luxuriantly in nearly all parts of the island.

Animals. — The fauna of Ireland consists now of birds and small rodents. Animals once found here and mentioned in the ancient liter¬ ature, as the deer, bear, wildcat, wolf, beaver, cattle peculiar to the island, and certain birds (including the garefowl), have all disappeared. There are no snakes nor toads in Ireland. Fish arc plentiful in the streams and on the coasts.

Fisheries. — The salmon fisheries are very valuable, and are increasing in

value every year. With an increased supply of fish, high prices

*C»mpt>e'to*n>*

SHEEP I ' Samoa

Mull of Kintyre

. <%'\ '• A, M.liA 0 J*

*%\ * fltallyllffinˆ*

. J) (*-' l y Carndonngh0 <«eeac*y(*

*Ayr fV 1 Porwalon INISHOWEN P*A*

Z\ˆ(fS

X ˆTuˆU \ • "/,m a. /Red Castleˆˆ

MJranford; Buncrknsi,? CarrowkeeL/' ~

*/ w JRathmullan a'**1.1 / ,aJ***

Mlllfordo / S\ J'.Muff0/

Kilmacrenai

Bushmills

r' Coleraine7 >Bcllarena

*f ˆ Ards Begˆ > 'Q*ib Derr(jbcg %, * NˆBunbeg*

Creeftl fugh'

Balljnioncys

M actin'

Umavady

NAj/ˆf/y

— '-T -Sew ;town l£>*

i&i-Yˆrommelin – d- — T,

At c»i° Milltovrn ,

Bally Welly

Dunloy

Tarland

) Garvagh^

DERRY-

Killagai

U&N D O N D E R R Y *

A'ELONUO

jr-o&r

JL- 0 – /

°/- i? n'j Dunnamanagb-j >

A Stral.ane -A

\Edenaearnan

Burton 'portf^s

tf^S^Dunglow

C^hery s4yf^

Ha

Rash a r kin

^Dungivcn F

Carn^tSyatra! cny y 1,1 " Portglenonej

firaperalo

A .. /" ^ Magher&felt

•ASs(4f

lobnstowm > > . Ru);*

Carncastlc

allymen.i urnecˆr\ˆ

fiSSS? Y) >

*I Whitebj)U8eggtXˆ? > 7 *i*

l BELFASTˆ . ll4tAV.

-SwnfT” > T

ngf \a0/ RAi,i«. 7b6i

-2 I Aran’lllan 5

*„«. <• Yhw, A! Av,*ˆHnu»«ousb js.int6eU 0v > “ˆAj’o«ail%n~jter01’ I “‘J/ Rmjioash,*

i water u > wh\J Qllfovd v’Dromjfcao] CroB6gar v J

r~ rSUun YVX A D CX W N

*— TttDd«r*ge®° y-f, . „ I j Annacloy 1*

*lr»iaVl. Banbndge • HUlbead Downp*trlc¥ˆ ®*

vH.‘pte.

/&XT ˆ

‘J\inn Clog

Naran w Glenties

Ballybofey

Sion IvjIHbA Victoria Bridge;

jftbky

XltamullaniˆIˆvˆ4 $ie’

K“% \ A .A

w-Brumquin0

/efl«fAlvn5eS^^ 5® A/Jara$ty

■r>L Glen Colutrtfkille ■

CogUBl. >’■ A CQ6tletXOW tx%A \ >7Carricko^;£^; ^

Deg’^K ilcaro *

;aD

Muolvi>s)<’y'ie8 v ^ vs c

*r’” A4‘At

“Fu//. OO1 YA,,s<

Sfe BundorMA^w

**N Ags;-<

0e

e//F*0/ CGt»r.«-i|Urfvrtoi.rLcll

> .. ° Gortin •:

Lr’i‘1 GrcencaBtlc^ * 0 Ryiacb

I) Bally waiter ^IWcA Abb«J ‘

‘ •Wlt^bnjh»lb«rt

X,i»oi!t«ferry

niBallyquint’n Pt- ^ L Mill Quart*? nan9TKUlard Point

/ Guns I.

3>rdgla6B ’ KW-ousjh Bay £

, Pomeroy

OmaghrAo^

Coal

Island

iiamilecrosi

BlackfortV^ Beragh ,r£-^- — -V Fintona .(iv

■SJlH* Si*^

anamallttfd ‘£t

p° v’»vA^^cl0?ber

GHAf^u).. W1

»”»”*%r„ok.bo’ro4tf QlMi»»gWrTfF”“

;Dungannons Carnteel j oAughnacloy

Church Hillo\A > arrison u Q Derrygonnelly5

, F K RM A

‘WjEnnUWIlcn

r’A1 Belco.^ ✓ — •

Klltyclogher

;?o* °Renf«f

— \V. t ^ V

^oSton-field »

_ . Ballyoastle1^.

J Palmer riowo^

.* Caetlereaeh ^

r CarKowmorc L. „

Bangor ^ \ ^t,Ca«tleconer

‘ ^nnycmmellaAp;

5 N EPHjf > (R CrosBmollnaAw iTlJaUinnf ^jL

Y?

ˆprutn’cli

losses C

uiiahi ;«»

bt. John’s Pt. ‘«»< £oy

/ Drdjmore.

0 Kilglass ‘Inishcrone

Derkraoreˆe

Dromard

Corraun Point*

Inibhkea North

■ I.Y <(' r \ 0Drd«ii/';r

f \ yYYfr ˆ©tumsoJiY

Bally

/ / o AchonrV ‘ •’,, Bully fafnanˆ

ˆ ATobercurryˆL.

Banuda J ˆ Ballinafuil

$ BallyconnelH /ˆ ■

A’ Belturbetl Mlltown«ˆs

L!\M!,Uery

P* Killasbandrayˆ‘«

yS Drumoˆ ˆ

‘ ° Bally baiBe

Imshkea Souths

Black Rock •

*Castleblayney**

MtS.

Cavan

Stradone

Acblll Head

ercook \ , 0 — A

CrnVm.c.o,. . l(uthrV

Hh A- LOUTH

l, A ˆ °/\ˆAˆeev

Carrigallen

Foxford

Aˆ/Carrick on) y/

e~X xˆSluinuoH f ˆ

„ — nK yvyDrumpnft

1Mcf0,

*Bodcro jA /oUO Elpbin Jjj-AlyDromot ■*v 0 rJri\ Dtumllsh V*

Gran«d ‘

Yf> .StpolceatowtBb jScwtown Forbes °

, T.riMnjr.rrrJJ 1.LONGFORD,

O rp Jv1″ >aJLongfor(l

ly> Cl>K-tn.:iunr .

O A a’?,?Ao5A

■». >/UnMborjusb «or I

Dromlekin

ICostlebeUingbam

Vˆinagussan

Dunany 1 o Drumjjar

Achili/1.

[Vk Castletlilvn*

/jBoltra Lough 1.

’A Bellananagh Bailieborm

j/Crosedoney A I

LDrumhoima -7 f~s j Ybbj fi.lljj»nit!

7 o- / ° Ttfv\C®n’

W-AH

■7 / Cool. (.CroMakegln .Steit Jp

‘ywAA- ci®ntael1

.thpAven Wral,ara/i ,-ˆv A \Multy farnhftm’ˆ . De 7

WESMEATHˆ

MiillingJirˆ – - ˆ >A-

»llyinorA RiUuoaUˆˆ— —

Newport Bayc

Cleiv Bay

.Castlebar

‘ˆvAManulla’

Balko

We6tport.Qviay-

“LsBara

\ IierrinkeeAj (

Ballindineˆ – ‘ ˆ Bally moA1ˆ\B0a0(.

Stonetown

\ Iˆnmoreo ° o RosdavTiA

AlVIilltown Glennamaddy cioonee^li X Rabeeno .(,«f

VX Athleaˆ

uv -M HVV c?

•*

ˆ Cashel OˆVˆfrato*

Iidstone . Tfc Cj

Imshask 1

Cleggan Bay

High I.

Omet

Ardboar JiajL

MannirijyD

Buny<&n*

« 81yne Head* .•» \T

x Ballyconneoly B

Sbrule,

Clifdjjn’

Ilcttdford

Ccrrti

iillttbtg

Kilioom o ^ * ^ Daily &

Beltura A

[•‘gbn ‘

*9 ° Dundonnell

A

g Moore o

«m* Mount Dollevi ° ‘ «C

Dallyglunln CasUeblakeoey 1

\ c Ryehill ^

A, a.

\Mouivea ^ /Woodlawn- Attymo n^kotSuT^t^-

A ‘ Maynootn Carbury ^bridge

(■ ^KllbeggaiC-^5Yuo‘”

/ Edenderry *T

S’f ” ^ ^ A Ballyleakin0 v

/S V PblflpBtown0 XTnllamore^ Eskero C

XING’ sAC-9 U N T Y A

F«„kford – f

luijigbdowri

JyTClaiegalway Mtnlough

Kalnayf _ A

‘7‘oOranmore \S’ Bullaui

^ – /^\Craugh#ell

^Lougbrei

*Leitrim © *

:snYr

° KilUnpy •'

*r**o&*

*'Moyasc^*

.MoycuKen

Clane

Robertstown o Rnthangan N ewbrldgey^\A^ 6

Ferbane

Sbannonbrldge] o Klltormer

Eyrecourto ^ JKilllmor

. ^ sCfrT

Costelloe

*t** Z.vA&J*

*North Sound nock Is.**

Inishmore IAw

Aran Is"5;

Or^l

Mpttom l- t Tawin I. < = a^ Kinvarra B.

Vn/O Cl0£

(^'bbannef

^Banazher)

Corgarve

Newtown

Ardrahan-

Kildare

■*‘d’rMount-*

Aspii

l^g/’ T

*Kinnitty^*

i/uAorrha

Terryglass

H’

XUffisi.

AStradbailyi

Kllmacduagji,

Lisdoonvarna

SNGlo&tey,/

k\ Ballitore-

iFisheratrcet

Mountrath

Kilfenora

*a 7^* *)feG%5/*

*Mm?dlSbafco^*

*luanirtl’b’ **

/ TomgraneyT^Avj

A r’

*X oQuin ^Broadford^L Balling/ ,AV,GxY^*

cX-~l \ 1 n 1 OP °F ” o Silver mil

) Nfew Marlct }’ ° Hj Slt-V E RiyiAJN E |JV

l, V-sixmilebridge /V ‘MT/i _ >• .Bunratty/;›,^.’ L^i^^^nnell^

Borrisokane^yJ-^ i c’/’Cloghjordair S^Dromineer

:S COUNTY ^

Jssory / « Timahoe

L Abbey lei x

Ballylaan y7

Hags Head £)’■’-? _

Liscttnnor Bay rtf Lehlnch

Eunistimon

/Ardmore Point Y ‘jack’s Hoi* Britia 9 Bay

\ Rosen *J|inkerxji

laf ,X ’ X iRatbdrutnR

.r-Y’x./ Y8*” ji* 4 ?- Ki.1t™.

0 Av g!

’V C Tinabely/^-^^^’^N-

Castledj

lallybrophy Rathdowncy, Burrow °

f /Milltown _. f Mai bay . Q

Kllmurry o Mullagb

i^^^eygall

Spanish Point, Mutton I . < = * Doonbeg Bay Donegal Point Moore Bay CKilkee

Arklow Ark low

5/ Crtt^hJL

‘poonbeg

Leighllnbridce

Fresh fordo Wrliueford °

Paradi sello X/’, Killadysert 0*^$ Kilrush ^.Labnslieeda ^

stle warren o ^ Baunboy

‘TliurleB

\IjIiuc»*Ick\ —

i^-Cilherconlish 0 y^v^at. Patrickswell Palla/ (

T M “‘K’llosilital / O

Emreejf „ KllsSnYlH „ > ll|lX ‘Gal^allyr^ Uallylanders o Y ^ larleville ^jii’mcMnA.

agoul o ^riY^elstpwny Bol]

Pallaskenry

‘Askeaton

lilin 0 Shanagolden Ardagh

Adare

iTarben

OolaX i • XcOs. ,j-J

> “u/Limerick. •

Jc. JGo ^wperilry

y///l(bfBxl ly Ippby!

— “* , : T*t

‘yurnco’lrt IV

Boljyporecn k Gian worth)

, o Kilworthv;l,ir^\y,(

i Mullinahohe

°CaBhel

en oRo8Cgreen q ^ S^a'

- PetbordY '

•°Nr»lB» I

If —

Vr, > c'6'Me«!A/G'H"MTS...„ <

vArdmpnan^'tfnjuiY^nuY-portlaw'^ Cloglicen \4^v, —

" 'rfA lt\w 'v° Ballynamult; i

Fr.fc«R.fFyf) R T) Tramoi

Kilmore Point

Newcastle

Rosbercon

*MullinavatY oPilltown. | Fiddown Imacow *

shford

[om colli her

>, Tr;il^e,v

^Blcnhcrville

*,TVn\^*

_'_S Rosslare Broadway –

\ uk

"^Newmarklt

Klngwilliamsiowi (Y – Ij

‘ — s/ – 3 \ Jloherhoy”

(LUheeti ° Reale.

Paesagci

Duncabnon

Kanturk [jilack to

“‘ater

ˆ6Wot«

Ro8sbeh’

pt. r

:es of KUlarney\ˆ2Sˆˆ/tf]

ˆ5o3-~ˆTF I lead ford »\il////> ˆ.V

Tallow4

- .Kisungdrvan

Ringed kˆBap

TMACGI LUCUDD·YS

,‘W «-EEks L.Lca,

ˆgMcARWTUˆV

8; jj

Clashmoro

DinSˆ

Doulut Hd.

r«Lnlid //dr r.‘

/‘YwX_ˆ-=Ballyvoi V’&« CT

rionoughmore

Rathduffy

igan ˆC- Youghal.

tlemavtyl jrra, IV

\ yt- ‘o’, °a oˆ“

Yk % V

ilGlanmire x-„ – “‘tmu

% . vst O ” n

cCloym

/-CToYXghada A

Sva. y •« I’Rohmare *

Knight’

Valenti a 1.

-»4S£

Coach ford

‘,!‘er

Kilcrea

J b’«T’,v‘

J’ˆTnchigeelagh

Castletown 1 ° illyneen

*■ft’ * ,yi.*

Cod’a HeadyˆZˆHˆ Ballydonegan ˆ DˆrlGx

ˆZJ0ˆ¥4 »

I \ ■! §‘Un,ˆa?wa7,*

ˆ Donovan /

^^Durrus^^dJ/Zum^^Dromd:

Blal r^GoVe Vw / *

‘ O.J / Leapft.

Upton,

Bandon

kL

Kilbrittain \

-^rr\mol«^ue

C^illagh.

.LlslevaneX, ^

Longitude West from Greenwich.

VSr*\ . s, A > uW’*

^ X > Jj

MUI Wo

Bkll‘“1* f*.

Y r .v ° Scotatown ^ a ry vF A (7FI BallyroneF* . _ _ | o . /

0, \MaguSre s Bridge, » J V. AiYS1 rL^/katbfr5land’,V^“)®5l1fe”i

S^fe,rt 1¥&)

N CroHsmaelen/ A" ra’^At o, Ball v mar tin

Dooegt Camporf jBa^S Kildavn. .Achullbeg

Clare 1.^1 ^ vbu’ll’cs/port «b:

- LouisGurglK 1P-‘

CroBsmaglen/j V’ ; oylialljmartin

Broomfield o’do C vxlloviUfB- ‘ ^MlUfel chill n X-l* ^ Carlingford^L* ^^Anoastle .

Mweelaun I. Caher 1. i.YlSHTURK I.£2 ‘ 1»18HDALLA I.® iNISHBOriN I. Killary

_ Carriesfholt

Tull ‘P PoinJ/^ ~~ ^XScaTTERY i’ .lo»puJ-i Baa’Pt-

v I

BnBylongford

Riv&r 3 ,.u

l’ hnnn.n{r\

Listowcl

Kerry Head,

Xixnaw

X XClogher Heat

-‘■“““Tfcon™ \J^™°$%±da

f Slane \,/del>*-<-i-\lorningtoa

KeUs v\a^\ 7l-ALa3i0Vin Bali

Bohermeen’ —

“to. . u. ° XivYv> v /Tvideek Jtlormanstowa

^ .Kilme8satVr/’^” Skerrier?\Lou? chinny

lFo0r ne r IVitn \ Dunshaughlin_ o01dtLu°ko=^j

oLaraoorXv o — ^v-.y ei$i Ku— ^La.mba v 1.

v’s oSprlng’Y alley “ – >N_-«Vp,1rtra ue

Suramerhill V: / S’T0rd6oXih>ajnlahj(ij,

r,,-bx*£^-°brA ..^uBTfN^zr

Llilvrth Head

^(Jlontiirf

Dublin Bay

Tj SSPSSES Mfer Tilwc ˆr.-».E£,\iis 1,1

ifKilloughter

Vlcklow) > Wicklow Head

■XMizen Head

Head

Kilmichacl Point

A. X- ^^u/iy/ict^^llyhcige/ , > ”Abiˆy feale

\

7 %

. . %/ , XC oKilmalkedar

\A >

[nibhtoobkert . .ˆDinele A…‘1’

I. ®

Great Blabket I

\»n)}K ” 5FA*ft’“ 0H«

Clonegall JX /(I* rnew /

fBagenalstown _ _ ˆ Gorey ˆDurrcAPiul’K Rocks

VNKcwtownbarry / j -ˆCourtown Harbour

V – - J -v«-sYˆ- > o 2JGore6brid-ei > ‘ rS Caniolmˆ<)L/ iRivercliapel

.t;

1. Y f R‘PYE R A R \ ) I BennettsbridgeU” ‘ tXN, . , /’ V\F«roa ., ‘ ,,\ 8 .,

lsr»ShGi,.»)t * Yip fi X “K.benaY. v K I L KRNN Y /fV °Kir,JS\(/ˆ S) 4

T U// h 1 – – ,X»-&ˆGTl1o™,a.ˆ™ga«p!wh X/ EUrndaW” /

Gallon 7VJiˆ‘n f / – Euhiicoitliy /x oularto rora

Y >Bnoaktophrr-V/. ” ‘ – X

Dursey

I . A O

ˆ !«X% ˆ

, v A V X ˆr.„ %

M,Vt \ V t

> •>?■ . ˆ \

. v *{•

\ ■

IRELAND

SCALES

Stntutc Miles, 24 – 1 Inch.

Kilometres, 38 = 1 Inch.

Rand, McNally & Cw.’» New.Hx.14 Map »f Ireland.’ Copyright by Rand _.MoN ally & Co,

are maintained owing to the improved means of communication from remote districts with the best markets. In spite of this, however, these fisheries are not cultivated to anything like so high a degree as they might be. Still, the num¬ ber of men engaged in the salmon fisheries in Ireland is over 13,000, the estimated value of the salmon exported being from $700,000 to $950,000 annually. The principal sea fisheries of Ireland are those of herring and mackerel. The herring fisheries in the Irish waters are prosecuted chiefly on the east coast by Irish boats from Howth, Arklow and other places on the Irish Coast, and by a fleet of vessels from Cornwall, Scotland, and the Isle of Man. The number of boats engaged in this branch

of the sea fishery is much smaller than in Scotland, from which considerable quantities of cured herrings are im¬ ported. The total number of vessels engaged in the sea fisheries (1914) was 5,290, with a total net tonnage of 27,880; the number of men and boys employed being about 18,000. The native fishermen successfully compete with their rivals, yet the sea fisheries of Ireland on the whole have much declined, as shown by the decrease from 55,630 hands and 13,483 boats employed in 1860, to the figures just given. A large number of Irishmen are employed in the fish¬ eries around the British coasts. See Great Britain — Fisheries.

Agriculture and Stock Raising. — The chief occupation is agriculture. The richness of the soil, its lightness that makes tillage easy, the large percentage of arable land, the amount of rainfall and the mildness of the climate all com¬ bine to make Ireland an agricultural country. Despite the great extent of moorland-wastes and the large amount of bog-land, few countries raise, in proportion to the area, such a large amount of food products year after year. But with natural advantages above the average, agri¬ culture as a system has not progressed as in many other countries. The holdings, or farms, originally too small to be occupied by farmers of capital and enterprise, were in many cases subdivided until they were reduced to the smallest 'patches, on the produce of which a family could barely sub¬ sist. One result of this poor policy was that the holders were obliged to raise as much as possible each year, for immediate use, without regard to the ultimate effect of this mode of farming upon the land. Competent authorities say that this over-cropping has had a most deleterious effect upon the land. Yet by rota¬ tion of crops and the use of fertilizers the soil has been restored to a considerable extent. Statistics show that a change in the kind of crops has been gradually taking place ; a de¬ crease in the acreage under cereals and green crops and an increase in the area under meadow and clover. The following figures show the distribution of the cultivated area, given in acres, for 1917: Corn crops, 1,774,227 ; green crops, 1,138,913; flax, 107,566; fruit, 17,024; hay, 2,532,723. Pasture lands amounted to 11,- 500,000 acres. The value of food products im¬ ported in 1914 was over $136,000,000. The prin¬ cipal exports are live stock, bacon and hams, butter, poultry, eggs, potatoes, vegetables and flax, hides, skins, wool and feathers. Imports at Irish ports in 1915 were valued at $439,751,- 580, an increase of $69,777,920 over the previous

year; exports were $422,317,040, an increase of $35,000,000 over 1914. During 1915 Ireland ex¬ ported 17,808 horses, 841,587 head of cattle, 489,657 sheep and 179,058 pigs.

The number of holdings recorded in Ireland for 1916 was 572,045, held by 560,313 occupiers ; of these, 195,285 were in Ulster, 134,237 in Munster, 124,866 in Leinster and 117,657 in Connaught. Of holdings not

exceeding one acre, there were 107,807 ; between one and five acres, 48,900; between 5 and 15 acres, 127,775 ; from 15 to 30 acres, 124,097 ; from 30 to 50 acres, 72,304; from 50 to 100 acres, 57,510; from 100 to 200 acres, 23,192; from 200 to 500 acres, 8,435 ; above 500 acres, 2,025. These statistics are more reliable than those published in former years, when a holding that extended into several townlands was returned as so many different properties, though being in reality only one.

The Land Act of 1870 greatly improved the conditions of tenure in Ireland. The chief aims of the act were to provide compensation to ten¬ ants for arbitrary eviction, and especially for improvements effected by them on their hold¬ ings in case of their being disturbed in their possession by the landlords, and to afford facil¬ ities to tenants for the purchase of their hold¬ ings. The act legalized what is called the Ulster tenant-right custom in all the districts in which it prevailed, and decreed the amount of com¬ pensation to be awarded in absence of such cus¬ tom. In 1881 it was supplemented by a more thorough and comprehensive measure. The ben¬ efits conferred on Irish tenants by this act were briefly summarized under the terms ((fair rent,® <(fixity of tenure,® and ((free sale.® By the first of these every tenant who objected to his rent, or the rent the landlord wished to exact, was entitled to have a (

not less than $733.50, was entitled by writing to contract himself out of any of the provi¬ sions of this act, or of the act of 1870. Another act passed in 1885 extended the privileges con¬ ferred by the act of 1881, the Imperial govern¬ ment advancing $50,000,000 for land purchases. Another act passed in 1896 went farther in the same direction. The Purchase of Land (Ire¬ land) Act of 1891 supplied the Land Commis¬ sion with further funds for advances to tenants to enable them to purchase their holdings. But the Land Purchase Act of 14 Aug. 1903, whereby the tenants may buy the farms and become in¬ dependent of the landlords, was a great begin¬ ning toward a readjustment of agricultural con¬ ditions. The new law provided that the actual tenants or persons, or persons who had been tenants within 25 years, could purchase all the land they occupied or desired at prices varying according to the condition of the property, to be paid for upon the installment plan, the seller accepting a mortgage for a term of years, the government guaranteeing the payment at the ruling rate of interest. Further improvements were introduced under the Land Act of 1909, by which the Congested Districts Board was created, and by the Laborers (Ireland) Act of 1906 for the erection of laborers' cottages, for which purpose $22,934,105 had been advanced up to 31 March 1917,*

while the total amount advanced for land purchase up to that period stood at $492,658,055, of which $8,385,365 has been paid back by purchasers, leaving a sum of

$484,272,690

Stock-raising has increased remarkably dur¬ ing recent years, and Ireland is to-day one of the best-supplied countries for its size in Europe in regard to live stock. In 1900 there were 491,156 horses, 4,608,550 head of cattle, 4,386,- 876 sheep, and 1,268,521 pigs. During the first war year Ireland exported 30,940 horses to Great Britain, as against 8,662 v/hich came from the rest of the world; 945,410 head of cattle, as against 2,234 from elsewhere; 539,107 sheep, 147,924 pigs, 48,457 tons of bacon and over 6,000 tons of hams. Throughout the war Ireland contributed heavily in food¬ stuffs to Great Britain and her allies. In spite of this enormous drain on her live stock, Ire¬ land possessed, in 1917, namely 600,000 horses, 24,746 mules and jennets, 228,628 asses, 4,907,- 466 cattle, 3,744,453 sheep, 947,572 pigs, 268,853 goats and over 22,000,000 poultry. England is the principal market for the cattle raised in Ireland. The breeds of horses vary with the locality; ponies are numerous in Connaught; hunters in the north of Leinster; and draught horses in nearly all the counties on the eastern coast. The reports of the Irish Agricultural Organization Society indicate that the agri¬ cultural co-operative movement is growing steadily and rendering valuable service. At the end of 1916 there were 1,040 co-operative farmers' societies, comprising creameries, credit banks, poultry keepers' societies, etc., with a membership of over 100,000 and a business turn¬ over exceeding $30,000,000. The society has spent over $500,000 of private contributions in spreading co-operative organization among Irish farmers. The Department of Agriculture and Technical Instruction supplies traveling lec¬ turers who give instruction in all branches of agriculture, dairying, bee-keeping and stock¬

raising. Besides numerous agricultural col¬ leges and schools there are three agricultural stations for farm apprentices, while special classes are held in the winter months on rural domestic economy. Consult (Ireland, Industrial and Agricultural) (Department of Agriculture and Technical Instruction for Ireland) ; Smith- Gordon and Staples, (Rural Reconstruction in Ireland) (London 1918).

Manufactures and Trade. — The linen man¬ ufacture early took root in Ireland, and still continues to be its most important staple ; and in every article, except lace and cambric, competes successfully with all other countries. It has in¬ creased in a remarkable manner within the last 40 or 50 years, and Belfast, its centre, has now become the first city of Ireland in population as well as in manufacturing industry. The linen manufacture,

indeed, is of importance; a large number of the factories are in Ulster. The cot¬ ton manufacture has had a very different his¬ tory, the number employed in this industry hav¬ ing declined steadily from 1868. The woolen manufacture appears at the outset to have out¬ stripped that of linen. It had at least made such progress as to alarm the woolen manufacturers of England, who, in a spirit of petty jealousy, petitioned the English parliament for its dis¬ couragement, and succeeded. The Irish were prohibited from sending their woolens abroad, and could not even send them into England without paying an oppressive duty. Had the manufacture been suited to the country it might have surmounted all this absurdity and in¬ justice; and, at all events, when these ceased to operate, would have revived. But the woolens of Ireland continue to be of very secondary importance, and indeed the manufacture seems to have much decreased in recent years. The tweed has retained its popularity. The manu¬ facture of Irish poplins (of woolen and silk, or woolen and flax or cotton) is very flourish¬ ing. There are about 20 mills engaged in paper making. The brewing of beer and dis¬ tillation of whisky form important items in the national production. The making of shirts and other clothing for men is a growing in¬ dustry. During the later years of the 19th cen¬ tury shipbuilding became quite prominent. The largest yards are at Belfast, where some 14,000 men and boys are employed. The vessels of the White Star line are all built in Belfast, where 21 vessels were launched in 1914, with a gross tonnage of 239,819, not including warships. Later statistics are not available. Shipbuilding and repairing are also carried on at Dublin, Londonderry and Haulbowline. Home in¬ dustries still flourish ; and the Irish hand-made laces and embroideries are still popular.

Commerce. — That of Ireland is not at all proportioned to her natural capabilities, and to the admirable facilities afforded by the excellent harbors situated on her coasts. The laws made by the British government to destroy the com¬ merce of Ireland account in a large measure for the present condition of trade. The most im¬ portant articles of export find a market in Great Britain. They consist, beside agricultural prod¬ uce, of manufactured articles, particularly linen, but as the bulk of such articles is very small in comparison with their value, the trade, or at least the shipping connected with them, holds only a secondary place. The trade with foreign

IRELAND

1 Albert Memorial, Belfast

2 St. Stephen's Green Park, Dublin

1 Blarney Castle

2 Innisfallen, Lake Killarney

countries is also inconsiderable. The principal imports are colonial produce, woolen and cotton goods, wheat, wool, coal and salt. Of the shipping employed in this trade only a mere fraction is Irish. Belfast, Cork and Dublin are the chief shipping ports. In 1913, the last normal year, the total tonnage of British and foreign shipping entered at Irish ports was as follows: Cork, 1,140,578; Belfast, 516,654; Dub¬ lin, 237,080; cleared, Cork, 572,945 ; Belfast, 132,906 ; Dublin, 34,363. These figures do not include coasting trade. See Great Britain — Commerce.

Transportation. — The rivers of Ireland form excellent navigable channels. In several of them, however, when the water was low, the navigation became seriously impeded by rocky shoals. In removing these, or in making arti¬ ficial cuts for the purpose of avoiding them, vast sums have been expended. Improvements of equal importance have been made by the con¬ struction of canals ; but since the introduction of railroads, canals have in Ireland, as else¬ where, sunk to a position of secondary import¬ ance. There are 848 miles of canals, mainly owned by railway companies. Close on a million tons are carried annually over these waterways, producing a revenue of about $700,000. The principal canals are the Grand Canal, 1655-4 miles in length ; the Royal Canal, 96*4 miles ; the Barrow Navigation, 42*4 miles; the Newry Navigation, 35 miles; the Lagan Navigation, 26ˆ4 miles. With the exception of the Barrow Navigation, the Grand Canal and the Lagan Navigation, the dividends paid by the Irish canals in the possession of public companies are almost nominal. The Royal Canal yields a profitable return, but it is merged in the Mid¬ land Great Western Railway. The Grand and Royal canals connect the important systems of the Shannon Navigation, in all 158 miles in length, with Dublin. The railroad system of Ireland has attained a considerable development. The roads are all constructed on a gauge of five feet three inches, which is compulsory. The average cost of construction, including car ¬ rying stock, is about $80,000 per mile. The principal railroads are the Northern Counties Railway, with a total length of 250 miles ; the Dublin and South Eastern Railway, 170 miles in length; the Great Southern and Western, 1,092 miles; the Midland Great Western Railway, 546 miles (including the Dublin and Meath, Great Northern and Western, etc.) ; and

the Great Northern of Ireland, 540 miles (including the Dublin and Belfast Junction). The most profitable of them are a short one connecting Dublin with Kingstown, and the Northern Counties. The total length of railways open for traffic in January 1914 was 3,409 miles. The capital of Irish railways at the end of 1916 was $198,385,000; receipts for that year $26,555,000.

Public Works. — Large sums have been ad¬ vanced in loan by the sanction of the imperial Parliament under various acts for public works and improvements in Ireland. The Irish Board of Public Works has charge of such grants and their expenditure; the objects to which they are applied include landed improvements and drain¬ age, fishery piers and harbors, roads, bridges and public buildings, tramways, , light railways and certain lines of inland navigation and the preservation of ancient monuments. The com¬ missioners have authority to lend for the pur¬

pose of any work for which county or borough councils are authorized to borrow. The largest item of their expenditure has been devoted to the improvement of lands, river drainage and navigation, while numerous grants are made for the upkeep of public institutions, roads, bridges and docks, reclamation of lands, dwell¬ ings for the poorer classes, teachers' residences, dispensaries, public health service, etc.

Money, Weights and Measures are the same as in Great Britain.

Banks. — The Bank of Ireland has a royal charter and lends money to the government. It manages, free of charge, all the public debt of Ireland. There are nine joint-stock banks with 693 branches in Ireland, all of which have adopted limited liability. On 31 Dec. 1915 the deposits in these banks amounted to $334,015,000. There are two kinds of savings banks in Ireland, one being the trustee savings bank, which has been in existence since the first years of the 19th century, and the other, the postal savings bank, instituted in 1861. In the former the deposits (at 31 Dec. 1915) amounted to $12,450,000; in the latter, $58,905,000. At the same time the amount of government stocks on which dividends are payable at the Bank of Ireland was $234,680,000, an increase of $24,470,000 in the year. The only clearing¬ house in Ireland is in Dublin. See Great Britain — Banking.

Finances. — In the financial year 1913-14 the total revenue contributed by Ireland amounted to $55,672,500 and the local expendi¬ ture to $61,785,000, showing a deficit of $6,112,500. In 1916-17, owing to increased war taxation, the total revenue rose to $118,832,500, while the local expenditure was $63,430,000, leaving a surplus of $55,402,500 available for imperial expenditure. The Civil Service Esti¬ mates for 1918

—19 provided for the following expenditure on Irish administration: Salaries, $2,972,535 ; law courts, land commission, police, prisons, reformatories, etc., $14,481,330; educa¬ tion, universities, National Gallery, science and art, $12,777,660. Under the Old Age. Pension Acts 1908—1 1, there were 198,938 pensioners in Ireland, or 59,506 more than in Scotland and Wales put together. The amount paid on old age pensions in Ireland is approximately $12,500,000 per annum.

Charities. — The Poor Law, which regulates the system of public charities, is about the same for Ireland as for England and Scotland. It provides for relieving the needy in their own homes or for placing them in charitable insti¬ tutions. The law is administered by the local government board through boards of guardians elected for the purpose. The number of indoor poor who received assistance for the year end¬ ing March 1916 was 32,095, and of outdoor paupers 36,658, representing one in every 63 of the estimated population of the country, as com¬ pared with one in 43, 11 years earlier. The total expenditure on poor relief for the year amounted to $6,789,190. In January 1915 the total number of adult able-bodied poor (indoor relief) was 3,437; all others in the same class were 29,757; those in receipt of outdoor relief numbered 38,072; in asylums, 1,653; total. 72,919. A large amount of aid is dispensed through private means; but a strong effort is being made to remove the causes, which are about the same in all countries and which usually result in

poverty. Efforts are being made to improve the methods of 'work and to foster habits of economy.

Emigration. — In 1851 the government be¬ gan to collect emigration statistics for Ireland, and the total number of emigrants who left Ireland from that year to the end of 1916 was 4,316,602, almost equally divided between males and females. The years of greatest emigration were 1851-54, 1863-65 and 1883, the total for each of these years being over 100,000. The following are the figures from 1900 to 1916:

1900, 45,288; 1901, 39,613; 1902, 40,190; 1903, 39,789; 1904, 36,902; 1905, 30,676; 1906, 35,344; 1907, 39,082; 1908, 23,295; 1909, 28,676; 1910. 32,457; 1911, 30,573 ; 1912, 29,344; 1913, 30,967;

1914, 20,314; 1915, 10,659; 1916, 7,302. Of the last-mentioned year, 1,515 were from Leinster, 1,056 from Munster, 2,733 from Ulster and

1,998 from Connaught. The largest proportion went to the United States, 485 to Canada, 100 to Australia, 27 to New Zealand and 19 to South Africa.

Government. — Ireland, by the Act of Union, became an integral part of the United Kingdom and shares in its legislation by means of 28 rep¬ resentative peers in the House of Lords and 103 representatives in the House of Commons. The representative peers are elected for life by the whole body of Irish peers. The Lord-Lieu¬ tenant, who represents the sovereign, holds his court in the castle of Dublin. He is appointed by the Crown, receives $100,000 per annum and holds office during the continuance of the gov¬ ernment under which he is appointed. Although the Lord-Lieutenant is the official head of the executive government, the Secretary of State for Ireland, who # usually sits in the Cabinet, virtually controls all Irish administration, while the Inland Revenue, Customs and Excise, and the Post Office are. controlled from their re¬ spective headquarters in London. The Treasury Remembrancer's Office in Ireland, the Irish Board of Public Works and the Irish Valuation Office are under the Imperial Treasury, which also controls the Irish Commission under the National Insurance Act The Board of Trade has branches in Ireland to deal with the mer¬ cantile marine, the Royal Naval Reserve and the employment exchanges. Since 1898 great changes have been made in the manner of ad¬ ministering the local government. Previous to that date the chief authority in the county was the grand jury, and all local affairs pertaining to the government and local laws were attended to by the grand juries and presentment sessions. The act of 1898 provides for a council, elected by the people, for a term of three years, women being equally eligible with men. The government of the boroughs, rural and urban districts, is also vested in an elective council. The unincorporated boroughs are governed by commissioners.

The government of the incorporated bor¬ oughs is vested in a mayor, aldermen and coun¬ cil. The large cities are now county boroughs. The chief secretary, the under-secretary and four commissioners, who are appointed by the Lord-Lieutenant, constitute the local govern¬ ment board, which has supervisory authority over the local council. This board approves or rejects nominations made by the local authority, decides upon salaries and has the whole local government in charge to a certain extent.

The judiciary of Ireland is similar in many respects to that of England. The highest tribunal is the Supreme Court of Judicature, composed of the High Court of Justice and the Court of Appeal. Other courts . are the Court of Bankruptcy, the Land Commissioner's Court and the High Court of Admiralty. The English municipal law is administered by the courts of Ireland. The remaining public serv¬ ices in Ireland are cither wholly or

partly under the Irish government; their official heads, whether paid or unpaid, are appointed by the Crown or by the Lord-Lieutenant, and with few exceptions are wholly maintained or as¬ sisted out of the annual parliamentary votes. With the eventual introduction of Home Rule (q.v.), considerable changes will occur in the system of administration.

Population.— Since the census of 1841, when the inhabitants of Ireland numbered fully 8,000,000, the population has almost steadily decreased. In 1846-47 a frightful famine, occa¬ sioned by the potato disease, broke out, and was followed by a visitation of fever and cholera. The population was in consequence greatly re¬ duced, and since then emigration has taken the place of famine and disease in reducing it further. (See above, Emigration). From the causes just referred to the total population of Ireland, which might by natural increase have been 10,000,000, has dwindled away to 4,390,219 according to the census of 1911. In the 70 years the population per square mile had fallen from 251 to 135. The estimated population at 30 June 1916 was 4,337,000. The last decennial census revealed 2,192,048 males and 2,198,171 females. Of the adults 1,191,142 were or had been married, the numbers being 589,861 males and 601,281 females, while 91,523 males and 204,740 females were widowed, a total of 296,263. Those who were born in Ireland made up 96.4 per cent of the population. The re¬ ligious distribution was as follows :

		Per¬ centage
Roman Catholics .	3,242,670	73.9
Church of Ireland .	576,611	13.1
Presbyterians .	440,525	10.0
Methodists . .	62 , 382	1 . 4
Other denominations .	65,652	1.5
Not stated. . .	2,379	0.1
	4,390,219	100.0

The population by provinces in 1911 was as follows: Leinster, 1,162,044; Munster, 1,035,495; Ulster, 1,581,696; Connaught, 610,984. There were six county boroughs with popula¬ tions as follows: Dublin, 304,802; Belfast, 386,947 ; Cork, 76,673 ; Limerick, 38,518; London¬ derry,

40,780; Waterford, 27,464.

Education. — The present difficulties in estab¬ lishing a public system of education in Ireland had their origin in the times following the efforts to make the people abandon the Roman Catholic Church. As a consequence, the parents refused to patronize the government schools. The laws of the time of William III and Queen Anne made it a crime for Catholics to teach or to have their children taught by Catholics, or to send them abroad where they would be educated in Catholic schools. The rigid enforcement of these laws resulted in a large proportion of illit¬ eracy among the Roman Catholics, although they had established schools abroad which were

attended by those with wealth sufficient to live in a foreign country. (Consult (History of Irish Schools and Scholars of the Middle Ages)). The principal educational institutions in Ireland are Dublin University (Trinity College), the National University of Ireland (with three constituent colleges at Dublin, Cork and Galway) and the Queen's University of Belfast. Saint Patrick's College, Maynooth, is a recognized college of the National University, which was founded in 1908. The Royal College of Science for Ireland was established under the authority of the Science and Art Depart¬ ment, London, in August 1867. Together with the Metropolitan School of Art and the Irish Training School of Domestic Economy it is controlled by the Department of Agriculture and Technical Instruction. Its object is to supply a complete course of instruction! in science applicable to the industrial arts and to aid in the instruction of teachers for the local schools of science. There are professors of physics, chemistry, botany, zoology, agriculture, mining, geology, applied mathematics, etc. There are also several theological colleges for the training of Roman Catholic and Protestant clergy; the General Assembly's Theological Col¬ lege, Belfast, the Magee College, Londonderry, a Presbyterian college opened in 1865 and em¬ bracing in its curriculum literature, science and theology, the College of Saint Columba, near Dublin, founded for the purpose of establishing a system of instruction preparatory to the university.

*The Catholic University in the city of Dub- * lin, established in 1854, granted degrees in the¬ ology and philosophy, and after 1883 was under Jesuit control. In 1908 it was reorganized as a constituent college of the National University and is now known as University College. There are additional, in different cities and towns, about 40 Roman Catholic colleges and seminaries for men and a large number of academies or secondary schools for women. There are numerous non-sectarian schools, some of*

them of royal and private founda¬ tion and endowed, but the most prominent are those established since 1831 under the super¬ intendence of the commissioners of national education. These schools are open to the children of parents of all denominations. The pupils are not required to attend any religious exercises or religious instruction of which their parents or guardians disapprove, and oppor¬ tunity is given to pupils of each religious per¬ suasion to receive separately at appointed times such religious instruction as their parents or guardians may approve of. Of these schools there were 8,118 in operation in 1916, with 679,762 pupils on the rolls. The average daily attendance was only 494,318. The number of principal teachers was 7,687, with 5,734 assist¬ ants and junior teachers. In 1892 an act was passed by which a beginning was made of free education and a modified system of compulsion.

In 1878 an act was passed for the promotion of the intermediate secular education of boys and girls in Ireland. By this act about $5,000,000 from the Irish Church surplus fund was set apart, being invested in commissioners who are to apply the revenue arising from it to the purposes of the act, these being (1) the carry¬ ing on of a system of public examinations; (2) the awarding of exhibitions, prizes and

certificates to students; and (3) the payment c 1cre-suˆs ˆee? to managers of schools fulfilling certain prescribed conditions. The schools referred to in the act are of secondary or high school grade. The subjects of examina-tion are Latin and Greek, modern languages, Irish, natural science, mathematics, etc.

Considerable attention is given to technical instruction. In all the convent schools the young girls have regular courses in domestic science, and in several trades are taught. The Department of Agriculture and Technical In¬ struction, which now controls this branch of education, has an advisory board of technical instruction. In 1901-02 the course of experi¬ mental science had been adopted in 152 schools with. 6,412 science pupils. Throughout the provinces the work is being organized by the councils of county boroughs, urban districts and counties. See Great Britain — Education.

Language and Literature. — The predomi¬ nant in the Irish literature is the heroic, pathetic, love of nature, romance, virtue and through all runs the traditional. Although the Ogham, a system of writing, was introduced into Ireland about 13 centuries before Christ, yet the literary productions were transmitted orally.. Hyde says, ((The love of literature of a traditional type, in song, in poem, in saga, was more nearly universal in Ireland than in any other country of Western Europe.ˆ

The modern literature of Ireland, or the lit¬ erature produced by Irish writers of the last centuries, has been included under English lit¬ erature because the language used is English. See Celtic Languages; Celtic Literatures; Gaelic Literature; Irish Literary Revival; Irish Literature in English ; Irish Schools and Schoolmen of the Middle Ages.

Music. — See Irish Music.

Architecture. — Many of the ancient types of architecture extinct in other lands may still be found in Ireland. Their buildings and home life remained practically undisturbed for centuries; no ancient Roman architecture is found on the island. When Christianity was introduced, the change in form of the Druid temple was for several centuries in accordance with the natural development of the people, ex¬ cept the addition of the small cross, the win¬ dows facing the east and the altar. When the building became too small a new one was erected beside it. Some of the existing ancient specimens are a group of stone buildings on Skellig Michael, a rock rising precipitously out of the sea to the height of 700 feet, and about eight miles due west of the nearest headland in the County Kerry. The approach is by a flight of stone steps. Dry rubble masonry forms the walls, and in this group, as in others, the ab¬ sence of the arch shows its ancient origin. It is oval outside, bee-hive in form, but rectangu¬ lar within. The door has a horizontal lintel, above which is a small cross worked into the stone wall. The six cells in the interior, the common room for prayer (choir), the chapel, all show it was occupied by monks. The doors, with inclined jambs and horizontal lintels, ante¬ date the arch. A wider lintel above, or the double lintel, indicates progression in architec¬ ture, a method of relieving the pressure of the roofs. The roofs of the ancient buildings were of stone. There are many of these ancient ruins, some in a good state of preservation.

Off the coast of Sligo, at Inishmurray, on the Isles of Aran, on islands off the coast of Kerry, and in many places are found buildings of dry rubble masonry. The change shows itself when cement is used and the walls become perpendic¬ ular as at Gallarus, in Kerry, and a further ad¬ vance is shown in Saint Declan's oratory, in Ard¬ more, with square perpendicular towers, or more properly, supports at the corners. Some of these were erected in the 6th, 7th and 8th cen¬ turies. Saint Colum-Cille's monastery at Kells was built about 807 a.d. In the (Annals of the Four Masters) mention is made of the church Saint Kevin, founded in about 1108, and which is still in existence, at Glendalough. The Ro¬ manesque

style makes its appearance in the 11th century; the earliest example is in Saint Flan- nan's, at Killaloe. Brian Boroimhe is said to have built churches at Killaloe, in County Clare.

A church built about this time, at Freshford, the ancient Achadh-ur, eight miles northwest of Kilkenny, is still in use. At Clonfert Cathedral, in County Galway, there is a fine example of an Irish Romanesque doorway. This church is said to have been founded by Saint Brendan, "the navigator.® The inter¬ laced patterns on the piers, the ornamented col¬ umn, are all most beautiful. ((There is not, says Mr. Brash, "a square inch of any portion of this beautiful doorway without the mark of the sculptor's tool, every bit of the work being finished with the greatest accuracy.® I he Cathedral at Ardmore, County Waterford, shows another advance in its decoration ; here may be seen The Judgment of Solomon, Adam and Eve, The Magi bringing their gifts, the stable indicated by a cow, etc. Many of the modern cathedrals are most beautiful.

The <(Round Towers® of Ireland have been for years subjects of study and discussion. There exist in Ireland, in whole or in part, about 100 of those towers; 18 are in a perfect condition. Many claim that the Round Towers are of pre-Christian origin, and cite the simi¬ lar towers, two in Scotland, seven on islands off the coast, one on the Isle of Man and a few on the Continent as examples of pagan architecture. Their average size is 100 feet in height, circumference at base, 50 feet, walls at door lintel, 3j4 feet. The interior is divided into from four to eight stories. Petrie, who has studied the subject with care, claims that the towers are of Christian origin and were used both as bell towers and as safes or places in which to deposit the Church treasures. The Irish name for the towers, Cloigtheach, which means "house of a bell,® supports the theory of Petrie and others. Petrie advances other and strong arguments in support of this theory. The (Annals of the Four Masters) mentions the bells in some of the towers. One of the finest examples of a Romanesque doorway in a Round Tower is at Kildare. Some of the ancient pottery shows skill and artistic merit. In designing and coloring the ornamentation of the old Celtic manuscripts show great artistic power. The initial letters are most beautiful, especially in the (Book of Kells,) a copy of the four Gospels in Latin, and in (Annals of the Four Masters. > The symbolism used by other early nations is not found in the works of the ancient Irish. The designs are geomet¬ rical patterns, interlaced ribbon work, diagonal and spiral lines, strange animals, peculiar birds

and the key pattern. The ancient metal work shows unique and beautiful designs; the bell shrines, the brooch of Tara and many pieces o old metal work may be seen in museums. 1 he laces of Ireland, revived the last of the 19th century show most intricate and charming pat¬ terns. Sculpture and

oil painting are modern arts in Ireland, and in both many of Irish birth have excelled.

Art. See Irish Art. . ,

Religion.— The first authentic account of the introduction of Christianity into Ireland was in the 5th century, when Pope Celestinc sent Germanus, bishop of Auxerre, and latei, in 431, Palladius as bishop. Both Germanus and Palladius found on the island believers m Chris¬ tianity, but no organized body of Christians. However, the chief work of conversion and organization was accomplished by Saint Patrick, who, good authorities state, was sent to Ireland by the same Pope. Killpatrick, a town of Scot¬ land, is said to have been Patricks birthplace, but some authorities claim that he was a native of France. He had been consecrated bishop before coming to Ireland as a missionaiy, and he selected Armagh as his see. A large number of converts were made, so many that even be¬ fore Patrick died he had other bishops and a number of priests to assist him. The Roman Catholic Church in Ireland has four archdio¬ ceses and 23 dioceses. The archdioceses are Armagh, Dublin, Cashel and Tuam. The Ro¬ man Catholic clergy and churches are all sup¬ ported by voluntary contributions. the col¬ lege at Maynooth, for the education of those studying to become priests, was founded in 1795. There are several other Roman Catholic ecclesiastical seminaries and colleges. See Great Britain — Churches of England, etc.

The Reformation never made much progress in Ireland, and though the Church of Ireland (Protestant) was established by law, it was only the church of a small minority. In 1869 it was disestablished. Previous to this time the clergy were supported by a tithe rent-charge, the pro¬ ceeds of the church lands, etc., the total annual income of the Church, including the value of houses and lands in occupation, being about $3 068,920, while its entire capital was estimated at $70,000,000. By the above act, taking effect from 1 Jan. 1871, the position of the Church and clergy was entirely changed, though those holding benefices at the time of its passing have not suffered loss. All real and other property formerly belonging to the Church are now vested in commissioners, who pay to all de¬ prived of income by the act, so long as they continue to discharge the duties of their offices, such an annual sum of money as they would otherwise have received, deduction being made of curates' salaries and other outgoings to which the parties would have been liable, and regard being paid to the prospective increase of incomes by the falling in or cessation of such charges ; or instead of an annual sum, an equiv¬ alent single payment has been paid to such as have commuted their claims in that manner. The Church of Ireland accordingly is no longer a state church, and none of its bishops have now a seat in Parliament. It is still a vigorous and flourishing institution, how¬

ever, and possesses funds amounting to over $47,000,000. Of this, upward of $30,- 000,000 have been voluntarily contributed

by friends of the Church since it was disestablished. While disestablishing the Irish Church, the act at the same time declared the cessation of the Maynooth grant and the Regiuni Donum. Maynooth College received $1,900,000 compensation for loss of the grant. The affairs of the Church of Ireland are now managed by the diocesan synods and by the general synod in conjunction with the representative body. The supreme legislative powers reside in the gen¬ eral synod, which meets in Dublin, and is com¬ posed of the archbishops of Armagh and Dub¬ lin and the 11 bishops, and of lay and clerical representatives from the different dioceses; the lay representatives being more than twice as numerous as the clerical. The represen¬ tative body incorporated in 1870 consists of the archbishops and bishops ex officio, 39 lay and clerical elected members (three for each dio¬ cese), and 13 co-opted members elected by the other two classes conjointly. This body is em¬ powered by its charter to hold church property, subject to the regulations of the general synod. The Church uses the Book of Common Prayer, as revised in accordance with statutes passed by the .general synod, and furnished with a preface containing an exposition of its formu¬ laries in the sense in which they are understood by the Church. .

The Presbyterian Church of Ireland is chiefly confined to the province of Ulster, where it may be said, more especially in the counties of Down and Antrim, to be the leading religious denomination. Its ministers are supported by voluntary contributions, seat-rents and church funds. They were formerly aided by an annual grant from government, called the Regium Do¬ num, the amount of which, paid in 1869, was $202,735. This annual grant, however, was abolished, as already mentioned, by the Irish Church Act of 1869, and was commuted to a single sum of $3,506,860 paid to the church. For religious statistics see above — Population.

History.— The beginning of the history of Ireland is, like that of all European nations, enveloped in fable. Among the ancients it was known at least as early as the time of Aristotle, who calls it lerne. In Diodorus Siculus it is called Iris; in Strabo, lerne; in Pompomus Mela, Iverna; in Pliny, Hybernia. Plutarch calls the island Ogygia, meaning very ancient, and says: ((They drew their history from re¬ mote antiquity, so that of other nations is new compared with them.® Yet the information to be found about Ireland in the works of the ancient geographers and historians is altogether very scanty. The bardic historians of the coun¬ try speak of

Greek and Phoenician colonies, and lists of kings, for which there is some probable foundation. The vernacular language of the Irish proves that they are a part of the great Celtic race which was once spread all over Western Europe. The first probable rec¬ ords of the Irish people show that for the times they were advanced in civilization. The ancient bards were called Filidhes or Feardanos. Caesar mentions in his (Gallic Wars> their advance¬ ment. Pliny, Caesar, and other authors say that the Druids who inhabited Ireland were learned; they knew philosophy and the sciences. In the Irish chronicles we find that in the reign of Eochy the First, more than a thousand years before the birth of Christ, (

fied into seven grades, each marked by the num¬ ber of colors in its dress, and that in this classi¬ fication men of learning, that is, eminent schol¬ ars, were by law ranked next to royalty.® An¬ other proof of the existence of an ancient civil¬ ization, marvelous for its time, was the institu¬ tion of Feis Teomran or the Triennial Parlia¬ ment of Tara. The monarch, Ollav Fola, who reigned as Ard-Ri, or high-king, of Erinn, about 1,000 years before Christ, established this par¬ liament. The subordinate royal princes or chieftains, constituted one branch; the Ollavs or scholars, and bards, law-givers, judges and his¬ torians, another branch; and the third consisted of the military commanders. Under the Ard- Ri, or high-king, were the kings of the prov¬ inces, and under each king were the clans who were governed locally by a chief, each clan select¬ ing its own. Wars were frequent, as fighting and bloodshed were common pastimes throughout the then known world. The battle was the final court of appeal, and in most instances the first court of trial. A cause of dissension in Ire¬ land, as in Great Britain and other countries, was the antagonism existing among people of different races. The Milesians, the Tuatha de Danaans, and the Firbolgs (q.v.) were distinct races centuries after the Milesians landed in Ireland. The differences among themselves seem not to have seriously affected their union when attacked by a common foe; as at the birth of Christ, when Rome was mistress of nearly all of Europe, she had never gained pos¬ session of Ireland. The introduction of Chris¬ tianity into Ireland was not attended with blood¬ shed as in many other countries : indeed, after¬ ward the nation seems to have enjoyed a sea¬ son of repose from strife, although southern Europe was being overrun with the Germanic hordes. This repose favored the growth and expansion of Christianity and the progress of learning. The schools and monasteries founded by Saint Patrick and his bishops in the 5th century became the centres from which went forth many scholars; and even as early as the 6th century, Ireland became the seat of Western learning; and its monasteries were the schools from whence missionaries who disseminated the Christian faith throughout continental Europe proceeded. In the 8th and 9th centuries the scholars of Ireland were among the most dis¬ tinguished at the courts of the kings,

especially at that of Charlemagne, but when the Northmen commenced their descents some of the schools were destroyed and the monks dispersed. The ravages of the Danes at this period had results different from the attacks of the Romans. The continued attacks for nearly two centuries fos¬ tered internal dissensions, when in the begin¬ ning of the 11th century Brian Boroimhe (Brian of the Tribute) united the greater part of the island under his sceptre, restored public tranquillity, and subdued the northern invaders. After a contest of about 20 years he conquered Malachy, the brave warrior who ((wore the collar of gold® won from the Danish invader, and became Ard-Ri of all Erinn. After the death of Brian, the island became a place of dissension; frequent wars rendered it weak against a foreign foe. This condition was largely the result of the divisions, made by Brian, of the island among his three sons. At this time Henry II of England, professing love

for Ireland and a great desire to restore peace, sought to gain possession of the island. This was the beginning of the Anglo-Norman in¬ vasion of Ireland. Henry II claimed to have received from Pope Adrian IV a bull authoriz¬ ing him to take possession of Ireland. (The authenticity of this bull is very doubtful). After some delays occasioned by internal trou¬ bles in England, Henry attempted to gain pos¬ session of Ireland. For many years after the history of Ireland was a record of persecution, confiscation of lands, and attempts to wrest from the people inalienable and hereditary rights' So great was the resistance that in the 14th century, at the time of Richard II, the au¬ thority of England extended practically over only a small portion of country on the eastern coast, called ((The Pale® (q.v.). This was gov¬ erned by various nobles subject to a viceroy. The subjection was, however, sometimes little more than nominal. The nobles quarreled among themselves, and were very often at open feud. The beginning of the reign of Edward III (1327) was marked in Ireland by the out¬ break of civil strife in every part of the Eng¬ lish ((Pale,® advantage of which was taken by the Irish for a general rising, which threatened the safety of the English colonies, and which the government found itself unable to subdue, until it yielded to the demands of the barons in Ireland, by granting them complete civil and military jurisdiction in their own districts. During the wars with France some Irish troops served in the English armies, and the common sympathies induced by that circumstance seemed likely to promote a better state of feeling be¬ tween the two races, when the breach was made wider than ever by the celebrated statute of Kilkenny (1367), framed under the viceroyalty of Lionel, duke of Clarence, son of Edward III, forbidding, under severe penalties, inter¬ marriages between English and

Irish, the as¬ sumption of Irish names by persons of English blood, the use of the Irish language, the native (Brehon) law, etc. In consequence of this the disturbances between the Irish and English in¬ habitants of Ireland increased so greatly that the English viceroy found it necessary to pro¬ tect The Pale by payments of money to the Irish chiefs, and this state of matters continued dur¬ ing the reigns, of Richard II, Henry IV and Henry V, until, in that of Henry VI, when Richard, duke of York, was appointed governor of The Pale and succeeded by his politic meas¬ ures in restoring peace. In the reign of Henry

VII (1495) was passed Poyning's Act (so called from Sir Edward Poyning, lord-deputy of Ireland), which provided that all former laws passed in England should be in force in Ireland, and that no Irish Parliament should be held without previously stating the reasons on ac¬ count of which it was to be summoned, and the laws which it was intended to enact. The power of the English government in the Pale was thus strengthened, but nothing was done to improve the condition of the Irish, whom the oppressive severity of the English yoke em¬ bittered without subduing. At the beginning of the 16th century the greater part of the island still remained unconquered by the English. The Irish still lived according to their old con¬ stitution under their own chiefs. In 1541 Henry

VIII received from the Irish Parliament the title of King of Ireland; but he did nothing

to extend the English sway, or to improve the social circumstances of the people. The Ref¬ ormation which took place in England during this reign took but a slight hold upon Ireland even in the English districts ; but the monas¬ teries were suppressed, and the trihute to the Papal see abolished. Elizabeth's reign was marked by a series of risings, which finally ter¬ minated in a general war against England, usu¬ ally called the Rebellion. Hugh O'Neil, who had been raised by the queen to the dignity of Earl of Tyrone, was the leader in this war, which, though successfully begun, ended with the complete defeat of the insurgents, and the reduction of the whole island by the English (1603). More than 600,000 acres of land were taken from the Irish chiefs, and for the most part distributed among English colonists. The reign of James (1603-25) was somewhat favora- able to Ireland; the arbitrary power of some of the chieftains was restrained, and the adminis¬ tration of justice improved, etc.; but the means which he took to effect some of these improve¬ ments were tyrannical. He demanded from every Irish chief the document upon which he rested his claim to his property, and if it were not to be found, or contained even any formal error, his lands were forfeited to the Crown. Of 800,000 acres of land which in this way came into the hands of the king in the north of the island, a large share was entirely withdrawn from the Irish, and divided

among Scotch or English settlers. In addition to this, the Catho¬ lics, on account of the oath of supremacy by which all public officers were required to acknowledge the king as head of the church, remained excluded from all official appoint¬ ments. The Roman Catholic hierarchy estab¬ lished in the 5th century was still in existence. Various circumstances led, in 1641, to an at¬ tempt to shake off the English yoke. Dr. Lin- gard says of this insurrection that it has been usual, for writers to paint the atrocities of the natives, and to omit those of their opponents, but that revolting barbarities are still recorded of both, and that if among the one there were monsters who thirsted for blood, there were among the other those who had long been ac¬ customed to deem the life of a mere Irishman beneath their notice. After the death of Charles I, Cromwell was appointed (15 Aug. 1649) lieu¬ tenant of Ireland. With great cruelty, he re¬ duced the whole country within nine months. All the possessions of the Catholics were confis¬ cated, about 20,000 Irish were sold as slaves in America, and 40,000 entered into foreign ser¬ vice, to escape the severity of the conqueror. (See Drogheda). Charles II restored a por¬ tion of the lands, but fully two-thirds remained in possession of the English or of Irish who had become Protestants. Under James II some changes were made ; under his viceroy, Earl of Tyrconnell, Catholics were given a fair repre¬ sentation in Parliament. In the English Revo¬ lution of 1688, the Catholics of Ireland sided with James, and the Protestants with William III. For a time the army favoring James was fairly successful; but the landing of William in Ireland changed matters. The battle, 1 July 1690, at the Boyne, won by William, proved a turning point, as it encouraged the English and in a great measure discouraged the Irish. Sars- field's gallant defense of Limerick, the last place in Ireland that held out for James, saved that

city from capture by William's troops; but on 3 Oct. 1690, the city capitulated, a treaty being concluded with General Ginkell on behalf of the English, according to which the Irish were to be allowed the free exercise of their . religion, as had been granted by Charles II. More than 12,000 Irish that had fought on the side of James went into voluntary exile. The Treaty of Limerick was not kept by the English, a fact which is commemorated by the name which the Irish still give to the place at which it was con¬ cluded, ((The City of the Violated Treaty.® By a decree of the English Parliament upward of 1,000,000 acres of land were now confiscated and divided among Protestants. In order to keep down every movement of the Catholic popula¬ tion, cruel penal laws were passed against those who* adhered to that form of religion. By these laws the higher Roman Catholic ecclesias¬ tical dignitaries were banished from the island; the priests were not allowed

to leave their coun¬ ties ; no Roman Catholic could hold a public office, acquire landed property, enter into a mar¬ riage with a Protestant, etc. Such suppression and persecution naturally led to the formation of secret organizations whose object would be an overthrow of those in power, in order to secure freedom and justice. <(Whiteboys,® ˆLevellers,® and a number of kindred organiza¬ tions were formed, whose methods were not always fair; but who were brought into exist¬ ence by force of circumstances. All this, how¬ ever, did not ameliorate the general condition of the country, and it was not till the American War of Independence taught the English gov¬ ernment the folly of attempting to govern a people by coercion, that the severity of the laws relating to Ireland was mitigated. In 1778 the penal laws against the Catholics, although not repealed, were made much more lenient. Cath¬ olics were henceforth permitted to acquire landed property, to erect schools, and to observe their own religion under fewer restrictions. In 1783 Poyning's Act was repealed.

The outbreak of the French Revolution had naturally a great effect on the minds of the Irish people. Out of a corps of volunteers which had been formed in 1779, but which had been dissolved a few years later, a society was formed calling itself the Society of United Irishmen, which included in it many Protes¬ tants, and which sought to make Ireland an independent nation. The Catholics at the same time took advantage of the embarrassment of the British government to demand equal rights with the Protestants, and the government gave in to this demand so far as to remove the hin¬ drances which had been placed by the law in the way of Irish trade and industry, and to repeal nearly all that remained of the penal laws against the Catholics, who now received the right of acting as counsel be¬ fore the court, and of entering into marriages with Protestants. When further demands were refused, the Society of United Irishmen allowed its revolutionary aims to become more apparent, and the government then determined to quell the movement by force. The Habeas Corpus Act, which had been introduced into the country in 1782, was repealed; the towns were strongly garrisoned, and the society dissolved and dis¬ armed. But the conspirators, trusting to ex¬ pected aid from France, were not discouraged. At the close of 1796 a considerable French fleet

did actually appear off the Irish coast bearing 25,000 land troops, under the command of Gen¬ eral Hoche; but owing to adverse winds, and the incompetence of the commanders, it was obliged to return without having accomplished anything. The only effect of this expedition was to induce the government to take still stronger measures in Ireland, the whole of which was placed under military law. The United Irishmen were thus prevented from tak¬ ing any open steps for renewing the society, but they continued to pursue their ends in se¬ cret, and devised for themselves a very skilful military organization. At its head was a direct¬ ory of five men, whose

names were known only to those at the head of the provincial com¬ mittees. In January 1798 the society already numbered more than 500,000 members, when a treacherous member gave information regarding the society to the government, and several of the leaders were seized. In consequence of this the conspirators, not knowing the extent of the revelations that had been made, resolved to anticipate any further preventive measures on the part of the government, and rushed into premature action. In May 1798, simultaneous risings took place at different parts of the island ; but the government was fully prepared, and the main body of the insurgents, who made a brave fight, suffered a decisive defeat at Vinegar Hill on 21 June. Flying columns traversed the island, and checked by the most violent measures any further outbreaks. In August a French squadron appeared in Killala Bay with 1,500 men on board, under General Humbert ; won a victory over the garrison at Castlebar, but were compelled to surrender at Ballinamuck. Another French expedition which approached the Irish coast in September was overtaken and attacked by Admiral Warren, and nearly all the ships composing it were captured. Several subsequent attempts of the French were similarly frustrated.

*The events of this insurrection brought the British government to form the resolution of uniting the Irish and English Parliaments, since in the state of feeling which that movement too plainly manifested as prevailing among the peo¬ ple, it was seen that the independence of legisla¬ tion enjoyed by the country fostered the desire of political independence and*it was feared that new revolutionary efforts might thence derive a legal sanction. The first proposal to this effect which was made in the Irish Parliament was re¬ jected with indignation. The government then resorted to bribery to secure its purpose, and $8,000,000 was spent in buying up the rotten boroughs which had the majority of seats in the Irish House of Commons. The Irish land¬ lords were from the first favorable to the pro¬ ject. By these means an act providing for the legislative union of the two countries passed the Irish Parliament on 26 May 1800, and the British Parliament on 2 July in the same year, in virtue of which the union was effected bn 1 Jan. 1801. But although this measure bound the destinies of Ireland still more closely to those of England, yet it was far from putting an end to the religious and political troubles which had so long divided the two countries. In order to gain the masses the enlightened Pitt had promised a complete political eman cipation of the Catholics ; but the bigote> George III could not be induced to make thr*

concession. Enraged at this great breach of faith the Catholics in 1802 formed a Catholic Association, having for its object the accom¬ plishment of this end ; but it was not till the period of O'Connell's agitation, favored by a change of public opinion in England, that the government was induced to bring in an Eman¬ cipation Bill, which after passing both houses of Parliament, received the assent of George IV on 13 April 1829. A new oath, which could be taken by Catholics as well as Protestants, was substituted for the one previously required from members of Parliament, and the Catholics were thus enabled to take a seat in the House. They were also allowed to fill all public offices except that of lord-chancellor and lord-lieuten¬ ant of Ireland, disabilities under which they still suffer.

This victory was greeted by the Irish Catho¬ lics with great joy; but they wanted more than emancipation which meant permission to hold certain offices ; they wanted an independent Parliament. The efforts of the national party were now directed to the repeal of the Union, for which purpose O'Connell founded the Re¬ peal Association, which caused the Grey minis¬ try in 1833 to bring before Parliament the Irish Coercion Bill. When this bill became law the Lord-Lieutenant of Ireland was empowered to forbid all assemblies of the people, and to pro¬ claim military law throughout the island ; and in order to give force to the act an army of 36,000 men, besides 6,000 armed police, was sent over. The Coercion Act was indeed soon repealed, and from 1835, under the viceroyalty of Lord Mulgrave, a bet¬ ter feeling seemed to be growing up between the people and the government. But when the Tories came again into power in August 1841, O'Connell began anew the repeal agitation, and with such boldness that in 1843 the authorities caused him to be apprehended on a charge of conspiracy and sedition, on which he was con¬ victed and condemned to pay a fine and suffer imprisonment for a year. These proceedings were, however, declared illegal by the House of Lords, and O'Connell was released. Soon after the terrible famine which visited Ireland in the autumn of 1845, and still more severely in the summer of 1846, cast all other interests into the background. The. spirit of the people seemed broken, and many of them sadly left their native land and by hundreds of thousands emi¬ grated to America. In the midst of this crisis O'Connell died, and the place of the party which he led was taken by one still more advanced which received the name of Young Ireland. In these circumstances of political excitement the French Revolution, which took place in Febru¬ ary 1848, had a great effect upon Ireland. The leaders of the Young Ireland party, Smith O'Brien, Mitchel, Davis, Meagher and others, entered into relations with the provisional gov¬ ernment at Paris, and the people .generally be¬ gan openly to provide themselves with arms, and to exercise themselves in the use of them. But the measures of the government frustrated the designs of the conspirators. The Habeas Corpus Act was

suspended, the insurrectionary newspapers suppressed, and Smith O'Brien, who had been hailed by the people as King of Munster, and a number of his associates were arrested and condemned to death. This pun¬ ishment was afterward commuted to transporta¬

tion. In a short time peace was restored ; but the material distress remained undiminished. Famine and disease decimated the population. The agricultural holdings were deserted, whole districts remained uncultivated, and a constant and overflowing stream of emigration directed itself toward the United States.

After a time agriculture revived, and the manufacturing industries of the island began to compete with those of England. In 1849 were chartered the Queen's Colleges, offering the same advantages to Catholics as to Protestants : but these institutions were taken comparatively little advantage of by the former. The history of those institutions made the Catholics fear they were meant as a menace to their faith. In 1852 telegraphic communication was opened with Great Britain. In 1853 an industrial .ex¬ hibition was held at Dublin, resembling that held two years before in London ; another exhibition was held in 1865. The latter year witnessed the discovery of a new conspiracy designed to effect a separation between England and Ireland. This had its origin in America at the time of the Civil War in the United States, when the friendly Irish in that country saw an opportunity in England's friendly attitude toward the seced¬ ing States. This conspiracy, originating among the members of a secret society calling them¬ selves Fenians (q.v.), soon spread to Ireland, but before the Fenians could take any overt action in that island their design was stifled by govern¬ ment action from the moment a riot broke out at the Rotunda in Dublin on 22 Feb. 1864. The troubles continued, and British statesmen were driven to make some amends for the wrongs of their predecessors in Ireland. With this object in view an act was passed in 1869 to disestablish the Irish Protestant Episcopal Church, and another in 1870 to improve the tenure of land. An agitation for Home Rule was carried on resulting in the final enactment into law of a measure of self-government in 1914. In 1880 Ireland became the scene of an agita¬ tion carried on mainly by a body calling themselves the Land League. Various severe laws were passed to ((coerce,® but further con¬ cessions were made, and to redress Irish griev¬ ances a land act was also passed in August 1881, under which substantial reductions on rents were made, exorbitant or rack rents, as they were called, being the cause of the great agrarian agitation. The Land League was sup¬ pressed after wielding a reign of terror and a new body called the National League was soon organized in its place (1882). Over 4,000 agrarian outrages were committed by the Land Leaguers during 1881 : many murders were perpetrated and close on to 2,500 persons were arrested, including several Irish members of Parliament. On 6 May 1882

Lord Frederick Cavendish, the new chief secretary for Ireland, and Mr. T. H. Burke, permanent under-secre¬ tary, were both stabbed to death in Phoenix Park, Dublin, by four men of the Irish <(In- vincibles.® A reward of £10,000 was offered by the government for the discovery of the mur¬ derers. Through the agency of informers the criminals were brought to justice and executed. A long, melancholy series of riots, murders and consequent executions prevailed for a period of 30 years, from 1860 to 1890. Judges, jurymen, government officials and peasants, including women, were the victims of attacks by <(moon-

lighters, " who shot peaceful farmers in their cottages through the windows at night and in¬ troduced the system (1880) of ostracism known as "boycotting." In 1885, 86 Nationalist mem¬ bers, headed by C. S. Parnell, were returned to Parliament, and their pressure on the govern¬ ment led to the introduction of a bill by Gladstone in 1886 by which Ireland was to re¬ ceive a Parliament of her own and the Irish members were to be withdrawn from the Im¬ perial Parliament The measure was defeated by an overwhelming majority in June and led to the great ((Home Rule split" A (

and agrarian outrages continued; conflicts between police and tenants ; imprisonments of Irish members of Parliament for sedition and inciting to violence. In April 1904 King Edward laid the foundation stone of the new buildings of the royal college of science in Dublin. During 1905 the board of national education, which controls and administers the whole system of primary education in Ireland, was confronted with a formidable agitation organized by the Gaelic League to apply the re¬ sources of the state to the development of the Irish language and the national propaganda of the league. With the accession of the Campbell- Bannerman administration in January 1906 Mr. James (now viscount) Bryce became chief sec¬ retary for Ireland. He began the work — com¬ pleted by Mr. Birrell in 1908 — of creating the National University of Ireland in which it is possible for Roman Catholics to secure higher education without being subjected to any re¬ ligious test. During 1907-09 there was a re¬ crudescence of riots and agrarian outrages, the latter principally in the form of "cattle- driving" Shortly after the coronation in 1911 King George and Queen Mary paid a visit to Ireland.

The introduction of the third Home Rule bill by Mr. Asquith in 1912 opened another stormy period in Irish politics. Uncom¬ promising opposition arose on the part of the (

munition from Germany were landed. In the midst of this turmoil when civil war appeared imminent, the European crisis which culminated in the great war placed the Irish problems in the background. Sir Edward Carson was soon afterward rewarded with a seat in the Cabinet and General French was made Commander-in- chief of the Expeditionary forces.

The ill-starred Irish rebellion of 1916 was attributed to the lax administration of the chief secretary (Mr. Birrell) and the Lord Lieu¬ tenant, Lord Wimborne. See Birrell, A. ; Fenians; Great Britain: Ireland; Home Rule; Irish Rebellion; Redmond, John; Sinn Fein.

Bibliography.— Amery, L. S., (Union and Strength5 (London 1912) ; Bodkin, M. M., (Famous Irish Trials) (1918); Bryant, S., 'Celtic History5; Bryce, Two Centuries of Irish History5 ; Cambray, (Irish Affairs and the Home Rule Question5 (1911) and Ureland of To-Day) (1913) ; Childers, E., 'The Frame¬ work of Home Rule) (London 1912) ; Connell, 'The Irish Union) ; Cooke, J., 'Handbook for Travellers in Ireland5 (London 1902) ; D'Alton, E. A., 'History of Ireland from the Earliest Times to the Present Day) (London 1910) ; Davitt, M., 'The Fall of Feudalism in Ireland5 (London 1904) ; Duffy, Sir C. G., 'Young Ireland) (London 1896) ; Dunlop, R., Ureland under the Commonwealth5 (Manchester 1913) ; Figgis, D., 'The Historic Case for Irish Inde¬ pendence5 (pamphlet; Dublin 1918); Flood, J. M., 'Ireland: Its Saints and Scholars) (London 1918) ; Froude, J. A., 'The English in Ireland in the 18th Century5 (London) ; Gannon, J. P., 'Review of Irish History, etc. 5 (London 1900) ; Green, Mrs. A. S., 'The Making of Ireland and Its Undoing5 (1909), and 'Irish Nationality5 (1911) ; Gwynn, S., 'The Fair Hills of Ireland5 (1906), and 'The Famous Cities of Ireland^ (1915); Johnson, C., 'The Isle of the Shamrock5 (London 1901) ; Joyce, P. W., 'Social History of Ancient Ireland5 (London 1914) ; Keating, 'History of Ireland) ; Lawless, Lady E., 'The Story of Ireland) ('Story of the Nations) series, New York); Lecky, W. E. H., 'History of Ireland in the 18th Century? (London 1892), and 'Leaders of Public Opinion in Ireland) (1903) ; Lynd, R., 'Home Life in Ireland) (1910); M'Carthy, J. H., 'Outlines of Irish History5 ; McCarthy, M. F.]., 'Five Years in Ireland5 (1901); 'Priests and People in Ireland5 (Dublin 1902) ;

' Gallo wglass or Life in the' Land of the Priests5 (1904), and 'The Irish Revolution5 (London 1912) ; Morris, M. O.'C., 'Hibernia Hodierna5 (1898); 'Ireland 1798-18985 (1898), and 'Ireland 1494-19055 (Cambridge 1910) ; Murray's 'Handbook for Ireland5 (London 1912) ;

Murray, Alice E., 'History of the Commercial and Financial Relations be¬ tween England and Ireland5 (London 1907) ; Murray, 'Revolutionary Ireland and its Settle¬ ment5 (1911); O'Brien, G., 'The Economic History of Ireland in the 18th Century5 (1918) ; O'Brien, R. B., 'Life of Charles S. Parnell5 (London 1898), 'A Hundred Years of Irish History5 (London 1911), and 'Studies in Irish History5 (Dublin 1904) ; O'Brien, W., 'Recollec¬ tions5 (London 1905), 'Local Government in Ireland5 and 'The Great Famine in Ireland5 (London 1896) ; also 'An Olive Branch in Ireland and its History5 (1910); O'Connor,

'The Parnell Movement5 ; O'Donnell, F. H., 'The Ruin of Education in Ireland and the Irish Fanar5 (London 1902), and 'A History of the Irish Parliamentary Party5 (London 1910) ; O'Hegarty, P. S., 'The Indestructible Nation5 (1918) ; Olden, T., 'The Church in Ireland5 (1892); Orpen, 'Ireland under the Normans5 (1911) ; Paul-Dubois, L., 'Contem¬ porary Ireland5 (Dublin 1908) ; Plunkett, Sir H., 'Ireland in the New Century5 (1904) and 'Home Rule and Conscription5 (1918) ; Rosen¬ baum, S. (editor), 'Against Home Rule: The Case for the Union5 (London 1912) ; Russell, T. W., 'Ireland and the Empire 1800-19005 (London 1901) ; Sigerson, G., 'The Last In¬ dependent Parliament of Ireland5 (Dublin 1918) ; Smith, Goldwin, 'Irish History and the Irish Question5 (London 1906) ; Smith, R. J., 'Ireland's Renaissance5 (Dublin 1904) ; Somer¬ ville and Ross, 'Irish Memories5 (1917); Stevenson, B. E., 'The Charm of Ireland5 (1916); Valera, E. de, 'Ireland's Case against Conscription5 (1918); Walpole, 'Short His¬ tory of the Kingdom of Ireland5 ; Webb, J. J., 'Municipal Government in Ireland, Mediaeval and Modern5 (London 1918) ; Wells and Mar¬ lowe, 'A History of the Irish Rebellion in 19165 and 'The Irish Convention and Sinn Fein5 (1918) ; Wilson, P., 'The Beginnings of Modern Ireland5 (1912).

Henri F. Klein,

Editorial Staff of The Americana.

IRELAND, Church of. See Ireland.

IRELAND, Language of. See Celtic Lan¬ guages; Celtic Literature; Gaelic Litera¬ ture.

IRELAND ISLAND. See Bermuda

Islands.

IRENzEUS, i-re-ne'us, Saint, one of the Greek Church Fathers : b. Asia Minor : d. Lyons, France, about 202. He was a learned and zeal¬ ous man, a pupil of Polycarp and Papias. He actively opposed the Gnostics,

and especially the Valentinians. His works are lost, except his 'Libri V adversus Haereses,5 of which there are fragments in the original Greek, and a Latin version, made, it is supposed, toward the end of the 4th century. According to tradition he suffered martyrdom at Lyons, of which he was bishop, in the persecution under Septimius Severus.

IREN.E, i-re'ne, empress of Constantinople : b. Athens, about 752 a.d. ; d. Lesbos, 15 Aug. 803, In 769 she married Leo IV, after whose death, caused, as is generally believed, by poison ad¬ ministered by her, she raised herself (780) and her son Constantine VIv then but nine years old, to the Imperial throne. When Constantine came of age he refused to permit her to par¬ ticipate in the government, and seven years later was arrested at the order of his mother, blinded and at last murdered. Irene was the first woman who reigned over the Eastern Empire. Her triumphal entrance into Constantinople, her liberality, the f reedom bestowed on all prisoners, and other artifices employed by her, were not sufficient to secure her from the consequences of her criminal accession. She had ordered many nobles into banishment, when Nicephorus, her treasurer, who had secretly been made em¬ peror, exiled her in 802 to the Isle of Lesbos. Her zeal for image-worship has caused her to be regarded as a saint by the Greek Church

IRETON, ir'ton, Henry, English general and statesman: b. Attenton, Nottinghamshire, 1611; d. Limerick, Ireland, 26 Nov. 1651. He was graduated at Trinity College, Oxford, and brought up to the law ; but when the civil con¬ tests commenced joined the parliamentary army and by the interest of Cromwell, whose daugh¬ ter Bridget he married in 1646, became commis¬ sary-general. At the battle of Naseby he com¬ manded the left wing, which was defeated by the furious onset of Prince Rupert, and was himself wounded and made prisoner. He soon recovered his liberty, and took a prominent part in all the transactions which threw the Parliament into the power of the army. He had also a principal hand in framing the ordi¬ nance for the king's trial, and was one of the judges. I reton accompanied Cromwell to Ire¬ land in 1649, and was left by him In that island as lord-deputy. He reduced the natives to obedience with great vigor, but not without cruelty. He was buried in Westminster Abbey, and after the Restoration his body was taken up, suspended from the gallows with that of Cromwell, and buried in the same pit.

IRGENS, Johannes, Norwegian statesman and diplomat : b. Aas, 1869. He received his education at the Universit}' of Christiania and entered the public service soon after his gradua¬ tion. In 1892-95 he was in the

consular service at Bordeaux and Antwerp; from 1895 to 1905 he was engaged in the practice of law at Chris¬ tiania ; in 1906 was appointed Secretary of Legation at London and in 1908-10 was Nor¬ wegian Minister to England. He held the port folio of Minister of Foreign Affairs from 1910 to 1913.

IRIARTE, e're-ar'ta, Juan de, Spanish poet: b. Orotava (Tenerife, Canary Islands), 15 Dec. 1702; d. Madrid, 23 Aug. 1771. Edu¬ cated in the College of Luis el Grande in Paris, he went to Madrid in 1724, where he became clerk in the Royal Library (1729) and ultimately librarian (1732). There he spent all his spare time in literary labors and research wTork. Owing to his linguistic ability he was appointed official translator to the Secretary of State (1742) ; and the following year he was elected a member of the Academia Espanola. So excellent was his command of Latin that he wrote as perfect poems in it as in Spanish. After his death a fine edition of his works was published by his wealthy admirers in Mad¬ rid (1774). He covered a wide range of sub¬ jects from Latin grammar and Greek pale¬ ography to hundreds of epigrams and sonnets. His work in bibliography was both excellent and extensive. On account of his philological and grammatical studies he is considered, in Spain, as one of the great authorities on the Spanish language and is so classed by the Academia Espanola. Consult Vol. LXVII of the (Biblioteca de Autores Espanoles) (Riva- deneiro) .

IRIARTE, Tomas de, Spanish poet: b. Orotava (Tenerife, Canary Islands), 18 Sept. 1750; d. Madrid, 17 Sept. 1791. He was a nephew of Juan de Iriarte (q.v.) and was edu¬ cated under the direction of his elder brother, Fray Juan Tomas de Iriarte, and later in Mad¬ rid with his uncle under whom he studied Latin literature, mathematics, natural sciences,

Greek, history, English, French and Italian. At the age of 17 he wrote a drama (in verse), (Hacer que hacemosC and at this early age he began translating dramas from French for the theatres of the city. So successful was he at this work that some of his original dramas were produced. On the death of his uncle, Juan de Iriarte, he succeeded him as official translator in the office of the Secretary of State (1771); and five years later he was ap¬ pointed archivist to the Supreme War Council. In 1787 his works were published in six vol¬ umes in Madrid. A goodly part of his energies was taken up in quarrels with the critics of the day and with some of his literary con¬ temporaries, the most notable of which was Juan Pablo Forner, who in turn, lashed him without pity, and sometimes without reason. Through the intrigues of his enemies Iriarte was summoned before the Inquisition in 1786, on the charge of propagating French heretical doctrines. But he was able to satisfy the ecclesiastical authorities as to his orthodoxv. Iriarte did much translation and wrote poems and dramas, and

attempted other forms of literary work, but his fame to-day rests on his fables in verse, which are counted by far the best of their kind in Spanish. Their ex¬ cellence is due not so much to the poetic talent of the author, which was not very great, as to the interesting form in which the fables are thrown, the ingenuity of many of them, their simplicity, vivacity, grace and ap¬ pearance of naturalness supported by fertility of invention. These

IRIARTEA, a genus of palms, all South American, marked by smooth, tall stems and pinnate leaves with somewhat triangular leaflets. The best-known species is the pashuiba palm (/. exorrhiza) , which has aerial roots. The wood is very hard, is in demand for floors, harpoons, etc.

IRIDEiE, or IRIDACE.ZE, a natural order

of endogenous plants, mostly herbaceous, though a few are somewhat shrubby. They have generally either root-stocks or corms. The leaves generally are sword-shaped, in two rows and equitant. The perianth is six-partite and often very beautiful, in some regular, in others irregular. There are three stamens with the anthers bearing outward. The fruit is a three-celled, three-valved capsule. Almost 600 species are known, the greater number natives of warm countries. They are abundant in South Africa. Iris, gladiolus and crocus are familiar examples of the order. Saffron is the principal economical product. Acridity is a prevailing characteristic, and some species are medicinal ; but the corms and root-stocks of some are edible.

IRIDESCENT GLASS. See Glass.

IRIDION (Polish Irydyon). The dis¬ memberment of Poland, still more, the dis¬ astrous Polish revolution of 1830, had bred the

sentiment of national hatred against the op¬ pressors, but Krasinski, in all his poetry, cau¬ tioned his people against hate as an expression of patriotism and preached inner perfection as a means of obtaining the highest good for his country. (Iridion, which appeared in Paris in 1836, is a poem-drama of exquisite beauty, based on Krasinski's reading of Montesquieu, Gibbon and Niebuhr. In this poem he wished to give a picture of the fall of pagan Rome and the triumph of Christianity, and tried to show that it was not Greek hatred, but Chris¬ tian humility, that renovated the Roman world. In the days of the domination and corruption of the Caesars, Iridion, who is represented as of Greek ancestry, sought vengeance against the Rome that had betrayed Athens and throttled Corinth. His*

mother was a priestess of Odin, and after her death he gave his sister to Heliogabalus, so that she might unsettle the emperor's mind. Iridion, as prefect of the Pretorians, urges Heliogabalus to conspire against Rome. The African Massinissa, versed in magic, persuades him to arm the Christians. Iridion, in the Catacombs, falls in love with a Christian maiden, who thinks that he will bring about the millenium. But just as he appears to be victorious, the bishop of Rome denounces his militancy. He returns to the northern gods of his mother. Heliogabalus and his sis¬ ter perish. Massinissa tauntingly tells Iridion that Christ will some day rule over Rome, and puts him into a lethargic sleep. He does not awraken until 1835 in the north, but he now loves Christ's cross and has abandoned all ideas of revenge. Hridion was translated from the German and French by Martha Walker Cook, in (The Undivine Comedy and other Poems, bˆ the anonymous poet of Poland, Count Sigismund Krasinsky* (Phila¬ delphia 1875).*

Leo Wiener.

IRIDIUM, a metallic element resembling platinum in its general properties, and occur¬ ring in nature in the metallic form, alloyed, usually, with platinum and osmium. The com¬ mercial supply comes chiefly from the Ural district, from Brazil, and from Borneo. Small amounts have also been obtained from Cali¬ fornia. The existence of iridium was first recognized, in 1802, by Tennant, who observed that an insoluble residue remained behind after dissolving platinum ore in aqua regia. In 1804 he showed that this residue contains two new metals, to which he gave the respective names "iridium® and "osmium.® The separation of iridium from the other metals of the platinum group is a matter of some difficulty; and for details of the processes employed the more ex¬ tended treaties on metallurgy and the chemis¬ try of the metals must be consulted. Iridium is frequently obtained in the form of a spongy gray mass, or a p-ray powder; but by heating either of these to whiteness, and subjecting them to compression, the metal may be brought into the form of a compact, lustrous mass re¬ sembling steel. In this form it is harder than iron, and somewhat malleable when hot, though brittle when cold. At ordinary temperatures it has a specific gravity of about 22.4, being among the heaviest substances known. Its specific heat is about 0.0323 at ordinary tem¬ peratures, and its coefficient of linear expansion (Fahrenheit) is about 0.0000039. Its melting

point is very high, the estimates given by various authorities ranging from 3,600° F. to 4.500° F. Compact iridium, after being strongly heated, is insoluble in all acids, and is not affected by air or moisture. The metal has the symbol Ir. and an atomic weight of 193.1 if 0—16. It forms numerous salts, but these are of no practical importance. The name "iridium® (from Greek, "rainbow,®) refers to the varied colors exhibited by the salts of this

element, as they pass from one state of oxida¬ tion to another. Metallic iridium, either alone or alloyed with other metals of the platinum group, is used in the arts to a limited extent, where a hard, non-corrosible metal is needed. The standard meter at Paris is a 10 per cent alloy of iridium with platinum. In particular, it is used for the tips of gold and stylographic pens, for the construction of standards of length, and for standard electrical resistance coils. Chemically it is related to osmium and platinum and more distantly with rhodium, ruthenium and palladium.

IRIDOSMINE, lr-i-dos'min, or OS- MIRIDIUM, a natural alloy of iridium and osmium in varying proportions, is a hard slightly malleable mineral, crystallizing in hexa¬ gonal prisms. It occurs as irregularly flattened grains, and contains some platinum, rhodium and other metals of the platinum group. It is found associated with platinum in the Ural Mountains, in South America, and elsewhere. It is also found in the black sands on the ocean beaches of northern California, and a small amount is recovered yearly by placer miners in the Sierra Nevada. Iridosmine is used to a small extent for pointing gold pens.

IRIGA, e-re'ga, Philippines, pueblo of the province of Ambos Camarines (Sur), Luzon, on the Buhi River, 23 miles southeast of Nueva Caceres. It is on the main road, is a military and telegraph station, and one of the most im¬ portant towns in the province. Pop. 19,297.

IRIS, i'rls, in Greek mythology, daughter of Thaumas and Electra, sister of the Harpies, the fleet golden-winged messenger and servant of the Olympian gods, especially of Zeus and Hera. Iris was originally the personification of the rainbow, though she does not appear in the Homeric poems as the goddess of the rain¬ bow. She is sometimes represented as a beautiful virgin with wings and a variegated dress, with a rainbow above her, or a cloud on her head exhibiting all the colors of the rain¬ bow. Iris is the name of a planetoid.

IRIS. See Eye.

IRIS FAMILY, a family of monocotyledon- ous herbs, mostly perennials with tubers, corms or rhizomes, and usually with an acrid flavor. About 800 species belonging to more than 50 genera have been described from temperate and tropical climates, mostly from South Africa and tropical America. They are char¬ acterized by two rows of leaves, the outer of which fit over and protect the inner (equitant) ; regular or irregular perfect flowers which are frequently handsome; perianth six-parted, the other floral organs in threes ; and many-seeded, three-celled fruits (capsules). Some species have been used as food in countries where they are native ; others furnish rootstocks which are used for making perfumes, especially

orris; some few have been employed to a limited ex-

tent in medicine but the species most widely popular are cultivated for ornamental purposes. Of these last the most important genera are Iris (fleur-de-lis), Gladiolus, Freesia, Crocus, Tigridia, Tritonia, Sisyrinchium, Ixia and Belamcanda, elsewhere described.

The. plants of the genus Iris constitute one of the chief ornaments of the northern regions of the globe, and usually grow in wet places, bearing flowers of various colors, but the pre¬ vailing tint is blue. The common wild iris or flag (/. pseudacorus) , common in Europe and also found in the eastern United States, has yellow flowers of large size and long sword¬ like leaves. The gladdon or stinking iris (/. foctidissima) is a British species, with bluish flowers. Among favorite garden species are the English iris (I. xiphioides) , the Persian iris (/. persica), the common iris (7. germanica) , and the Chalcedonian iris (/. susiana). Prob¬ ably the favorite species in cultivation is the Japanese iris, 7. Icevigata. Orris root consists of the rootstocks of the white-flowered 7. florentina and some other species. Among the species found in the United States are the larger blue flag (7. versicolor) , common from the At¬ lantic coast to the Mississippi, the slender blue flag (7. prismatica), and several dwarf species.

IRISH. See Celtic Languages; Irish Lit¬ erature.

IRISH ACADEMY, Royal, a literary and archaeological association founded in Dublin, Ireland, in 1786. Its object is to promote the study of literature, antiquities and science. The library founded and owned by the asso¬ ciation contains a large number of Irish manu¬ scripts and documents of public interest. It has a fine collection of antiquities which have been loaned to the National Museum, Dublin. In 1870 the academy began the publication of an ancient Irish MSS.

IRISH ARCHAEOLOGICAL REMAINS.

Ireland has been called the wonder of Europe for the wealth and beauty of its relics of the past. Those relics range in scale from cyclopean structures like Dun Aenghus on the isle of Aran and Staigue Fort in the ancient kingdom of Kerry, that awe the mind by their massive strength and the evidences of their vast antiquity, to dazzling collections of gold ornaments the chief characteristic of which is their delicate minuteness of finish. Between these there is a multitude of other memorials, some of them unique and remarkable. There are for example the solemn burial places of great

chieftains like the City of Tombs in the valley of the Boyne, the great stone circles like those of Carrowmore, and the remains of royal seats in which Ireland is very rich. From Ireland's distant pagan period cairns, dumas, tumuli, moats, menhirs, dolmans, cromlechs, earthworks, beehive cells, kistvaens, pillar stones and Ogham stones have been preserved to us in great numbers. From both the pagan and the early Christian period there have been counted as still existing over 2,000 chambered and un¬ chambered mounds piled up by human hands, «the circular raths and princelv palaces of earth® of the Irish epic tales. The early Christian period introduces us to an Ireland honeycombed with monasteries and schools, dominated by great monastic universities such as those of Armagh, Clonard and Clonmacnois.

*In architecture, in sculpture, in met?l work and in the production and ornamentation of manuscripts, Irishmen were then the chief exponents and teachers, and the material evi¬ dences of their superior skill, despite the ruin of centuries, may be still gazed upon and handled to-day. It was during this period that the decorated high crosses and round towers, that are among the chief glories of Ireland, began to rise over the land. Earlier than the round towers are the tiny stone churches, cyclopean in construction and primitive in char¬ acter, like those of Maghera and Banagher, Temple Cronan, Devenish, Saint MacDara's Isle, Inishmurray and numerous others. There is hardly an Irish isle indeed that does not carry some memorial or ruin belonging to that prolonged mediaeval period when Ireland was the school of the West and the quiet habitation of sanctity and learning. For that period in¬ deed we have to look for Irish memorials not merely in Ireland but in almost every country in Europe, for it was the period of Irish mis¬ sionary enterprise when Irishmen carried their art and learning over all the West. Heinrich Zimmer has counted over 200 Irish manuscripts in libraries on the continent dating from before the 11th century. There are probably many more. * But these manuscripts represent only part of the valuables formerly carried out of Ireland. When the reign of peace, covering more than a thousand years of freedom from foreign invasion, finally was broken in the 9th century by the Danish wars, much that was precious began to be carried for safety across the seas, so that in some directions Irish art may be represented better abroad than at home.*

Gold Articles. — Foremost in interest to many among the heirlooms bequeathed by Irish antiquity are the truly marvelous collec¬ tions of solid gold ornaments to be seen in the Royal Irish Academy and elsewhere. Some 500 golden ornaments of old times have been there gathered together in the last 80 years ; their weight is 570 ounces against a weight of 20 ounces in the British Museum from all Eng¬ land, Scotland and Wales. If these Irish re¬ mains represented the total wealth of gold of the Bronze Age in the

island, the amount, as Sir Hercules Reid points out, would probably exceed that of any ancient period in any coun¬ try, except perhaps the republic of Colombia in equatorial America. But the known remains can only be a small portion of the original wealth of Ireland. Vast quantities must have been discovered from mediaeval times onward, nearly all of which would be melted down and carried out of the country. Sir William Wilde, as he testifies in his (Catalogue, } knew indi¬ vidual jewelers through whose hands passed large quantities of Irish gold, the amount in one case being valued at $50,000. Attention has often been drawn to the fact that up to the 15th century in the literature of no country are there as many references to gold as in Irish literature. Thus we read in the < Annals of the Four Masters > at the year 1169 a.d. that <(Donough Ua Cearbhaeil, Lord of Airgialla, died after bestowing 300 ounces of gold, for the love of God, upon clerics and churches.® Ireland's wealth in gold from the Bronze Age onwards, if stated in sober figures, says Sir Hercules Reid, would appear so enor¬ mous as hardly to be credited. In the collec-

tion in the Dublin Museum may be seen circlets, fibulae, diadems, torques, bracelets, rings, garters, crescents, brooches, braid balls, tiaras, ear-rings, etc., all of pure gold and the most exquisite workmanship.

Side by side with the gold ornaments in the National Museum in Dublin are relics of the Stone, Bronze and Iron Ages in Ireland — stone and bronze discs and axes, decorated spear heads, daggers, swords, etc., showing a development covering several thousand years.

Sepulchral Monuments. — Belonging to the same distant age that produced this wealth in gold are the great sepulchral monuments that rise above so many Irish landscapes. The vast incised tumuli of New Grange, Knowth and Dowth are among the most remarkable in the world and rank after the pyramids of Egypt in the stupendous labor that must have been expended in their erection. They are the lead¬ ing elevations in the assemblage of artificial moats, cairns, forts, chambers, catacombs, caves, crypts, monolith circles and pillar stones, figur¬ ing in Irish literature as the royal cemetery of Brugh-na-Boinne, the burial place of the first authentic kings of Ireland of the Tuatha de Danaan. Here, near Slane, on the north bank of the River Boyne, nearly a score of the habitations of Ireland's royal dead are spread over an area three miles long by over a mile broad. At Dowth the general plan is of three central chambers, from the largest of which a long corridor leads to the world outside. Round the tumuli are the remains of circles of giant sentinel stones, after the plan of the Celtic me¬ morials at

Stonehenge. The names of the royal personages interred at Brugh-na-Boinne are given in an Irish tract, the Senchas-na- relec, or History of the Cemeteries, contained in the celebrated vellum compilation, ((Leabhar na h'Uidhre,® or <(Book of the Dun Cow,® a 12th century work copied from older Irish manuscripts. The cemetery of Croghan is- called in the old documents Relig-na-Rig, or Burial Place of Kings, and has numerous sepul¬ chral monuments. Tailtenn also figures in Irish literature as a royal seat and cemetery, and is still more celebrated as the scene of the Irish Olympics, the annual fairs and funeral games on the lines of those in Greece. Ceme¬ tery, palaces, raths, stadia, sporting greens, beds of artificial ponds, etc., have been nearly obliter¬ ated, and one large rath is the chief remnant of Tailtenn's former grandeur. At Ballylochloe in West Meath there is still a vast and won¬ derful moat, the chief relic of a pagan ceme¬ tery, and another near Clonard, visible for miles around. Of many of the others the material evidences remain, but the history is lost. There is, for example, a remarkable city of the dead on the ridge of the Loughcrew hills near Oldcastle in Meath. It comprises a truly marvelous collection of giant tumuli, cairns, cromlechs, funeral chambers, stones mystically carved and stone saucer-shaped sarcophagi of the same general character as those of Brugh- na-Boinne. Yet not a word about this sepul¬ chral assemblage is to be found in the old Irish books.

Royal Seats and Strongholds. — No less remarkable than the remains of these habita¬ tions of the dead are the ruins of the habita¬ tions of the living, and among these the great

strongholds and residences of the Irish mon- archs are of primary interest. Almost all the ancient residences of the high kings as well as of the minor kings, are known at the present day, and as there were many kings of several grades, and as each was required by the old Irish laws to maintain at least three separate establishments, the royal houses were numerous. Teimar or Tara was pre-eminently for cen¬ turies the capital and chief royal seat in Ire¬ land, and was at its zenith in the reign of the monarch Cormac, the son of Art, who reigned from 254 a.d. to 277, and is accounted among the greatest of Ireland's kings. Cormac is credited with founding a university, having three separate colleges, and one reputed prod¬ uct of his pen, the (Teagasg FlathaC or (In¬ structions to a Prince, y written for the benefit of his son, Cairbre, who succeeded him, has been preserved to us. On the northern slope of the hill are the remains of the great Ban¬ queting Hall, where the Feis or Parliament of Tara held its sessions, the only structure in Tara that is not round or oval. The founda¬ tions and ramparts of other buildings cele¬ brated in Irish history are still to be seen — the Duma na Giall or Mound of the Hostages, the Rath Laegaere, the Rath Grainne, the Rath Caelchon, the Rath of the Kings, 'the House of Cormac, the Foiiad or Forum, the Rath na Sea- naid or Rath of

Synods, as well as wells and crosses, and the junction of the ancient national highways that led through the five provinces. Ailech of the Kings, a residence of the kings of Ulster, was another Irish royal seat of the first rank. Better preserved than Tara, it remains one of the most important ruins of Europe, with a great circular stone cashel of dry masonry, with walls 13 feet thick at the base and sloping gradually inwards. It is in¬ teresting to observe that Aileach is one of the few spots in Ireland marked in its proper place by the geographer, Ptolemy of Alexandria, who flourished in the 2d century. Aileach is dis¬ tinguished by Ptolemy as a royal residence. Another Irish royal seat is represented now by the ruined palace of Emain, now called Navan (N-Emain) Fort. It was for 600 years the residence of the kings of Ulster and attained its greatest glory in the 1st century of the Christian era during the reign of Concobair (Connor), the son of Nessa. It was the centre round which clustered the romantic tales of the Red Branch Knights, chief among whom was the youthful Cuchullain, the Achilles of the great Tain Bo. The imposing remains, con¬ sisting, of a great fortified mound surrounded by an immense circular rampart and fosse, the whole structure covering about 12 acres, lie two miles west of Armagh. They are typical of the condition of the other royal seats throughout the five principalities of Ireland, such as Cruachan, the chief palace of the kings of Connacht ; Ailenn, now Knockaulin, one of the highest forts in Ireland, Dinnrigh, Nass, Liamhain (Leevan), Belach-Chonglais or Bal- tinglass, the more important residences of the kings of Le'inster, in all of which the great circular raths remain. There is another class of ancient palace, more patently strongholds than royal residences, and these are almost the earliest of all — great stone cashels or circular walls of immense thickness, enclosing large

spaces, unmortarea, in which there are great quantities of masonry. Around their summits a chariot might be driven, within the area en¬ closed horse races might be run. The most singular and imposing of these is Dun Aenghus on Inishmore, the chief of the Aran Islands, one of the remarkable ruins of the world. Inishmore, the most westward of the Aran Is¬ lands, is fretworked from one end to the other with ruins and memorials of pagan and early Christian times. There is hardly a place in western Europe of similar area enclosing a like multitude of archaeological records; its nearest parallel is Carnac in Brittany.

Early Christian Edifices. — Of the earliest. Christian stone edifices in Ireland, Gallerus re¬ mains ; and the Skelligs, where the very cliffs are worked into the scheme of architecture, preserve both church and cell

almost perfect. From the 7th, 8th and 9th centuries there are numerous examples of oratories, some with stone roofs. Such churches can still be seen at Aran and Inismurray, on the islands of Lough Derg, Lough Ri, and in many other places. When larger churches were built the earlier structure was sometimes used as a chancel, as at Inis-na-ghoill in Lough Corrib, at Glendalough, at Inis-cleraun in Lough Ri, at Clonmacnois, at Iniscaltra and elsewhere. From the early Middle Ages onward we find the most elaborate carvings on door and arch and window, equal in skill to that found in book and metalwork. This same style of Irish architecture is likewise found in Scotland and England where it was introduced by the Irish missionaries who evangelized both countries as in the early churches at Monkwearmouth, Hexham, Bradford-on-Avon, and elsewhere. Venerable also are the remains of the great monastic universities and academies so cele¬ brated in history. Of some of the oldest of them, such as Armagh, Bangor and Clonfert, hardly a vestige of the ancient edifices remains. Of others such as Clonmacnois, Kells, Mon- asterboice, Saint Enda of Aran, and Glenda¬ lough of the Seven Churches, the ruins are im¬ portant, including round towers, decorated high crosses, oratories, beehive cells, stone churches, Ogham stones and a great number of other slabs and headstones bearing inscriptions written in Irish minuscules both in the Irish and Latin tongues. Ogham stones and pillar stones bear¬ ing inscriptions in Irish and in Latin carved in mediaeval Irish minuscules and semi-uncials are likewise found in Scotland, Wales and Corn¬ wall, and in England as far east as Hampshire, wherever indeed the Irish Gael established a military colony. To the Irish series must be added the important ruins on Iona, which dur¬ ing the 1,000 years of its existence remained an Irish establishment. Iona is a Scottish isle, but Scotland's historic character as an Irish province is not generally realized. The original Scoti were the Irish; the original Scotia was Ireland, modern Scotland, called Caledonia by the Romans, acquiring the name of Scotia Minor or Lesser Ireland, after the Irish had conquered and colonized it. Wherever the words Scotia, Scotus and Scoti occur in Latin literature from the third to the 13th century — though the alternative term, Hibernia, was also employed, as in the phrase Hibernise Scoti — Ireland and the Irish are meant. Ignorance of this elementary fact has led to numerous his¬

torical errors. As time went on great abbeys arose all over Ireland, adorned with all the splendor that the Romanesque art and wealth of the period could bestow. Cashel, the most famous of them all and once a stronghold of the Irish kings, is one of the architectural wonders of the world. Rising up suddenly into sight on a high rock crowned with buildings, the simile of a Christian Acropolis at once suggests itself. As numerous as the abbeys are the stone Irish castles, Milesian and Nor¬ man in origin, 'built often on the foundations of ancient duns.

Towers and Crosses. — Of the celebrated round towers about 70 now remain, but the number formerly ran into hundreds, forming a vast architectural colonnade, that had no counterpart anywhere else in the world. The round towers, the later examples of which are richly decorated, are all on ecclesiastical sites and range in height from 60 to 150 feet, and from 13 to 20 feet in external diameter at the base. The tops are conical. The interior is divided into six or seven stories each lighted by a window with the exception of the top story, which has usually four windows. Inti¬ mately associated with the round towers are the sculptured crosses, of which the High Cross of Monasterboice is the chief. About 55 of these stone crosses still remain in various parts of Ireland, their dates extending from the 9th to the 13th century. All are orna¬ mented with the Opus Hibernicum and contain groups of figures representing biblical scenes. No two crosses are alike, and what the towers have in perfection of masonry and construction the crosses have in artistic carving and sym¬ bolical design.

Metal Work. — The pagan Irish, as has been indicated, practised from time immemorial the art of working in bronze, silver, gold and enamel. From the beginning their art was ex¬ quisitely simple and refined in its decorative designs. These designs, as in their multitudi¬ nous gold ornaments, were based very largely upon the use of spiral or curving lines, arranged with the finest artistic skill, and showing in their delicate modulations of swelling or taper¬ ing forms a perfect mastery of the art of draw¬ ing. In Christian times a new motive came in. Greater richness and complexity of effect was aimed at and was attained by the use of what has been called ˆinterlaced® designs, in which the lines of the design are interwoven with each other in patterns of great intricacy. The Cross of Cong, the Shrine of Saint Patrick's Bell, the Lismore Crozier and the Shrine of Saint Lactan's Arm, all dating from early in the 12th century, are unsurpassed examples of the interlaced pattern, which were so supremely developed in the hands of the Irish craftsmen as to be called Opus Hibernicum. These pat¬ terns were probably first used in illuminated manuscripts and they lend themselves admir¬ ably to treatment in color. An example of the combination of the exquisite spiral wreath and curves of the Pagan period and the later inter¬ laced designs is seen in the wonderful Ardagh Chalice. The Tara Brooch and the Ardagh Chalice are perhaps the most beautiful speci¬ mens of ancient metal work to be found in the world. Both specimens are considered as be¬ longing to the 8th century and their extraordi¬ nary delicacy and beauty have to be seen to be

appreciated. But they by no means stand alone. The National Museum in Dublin has numerous other striking examples of metal work. They supply us with a wonderful and intimate pic¬ ture of the fashion and habits of the higher classes in Irish society in the period when Ire¬ land was at the pinnacle of its wealth, dignity and learning. Among examples of Irish metal work on the Continent the 8th century Tassilo Shahie at Kremsmunster is perhaps the most interesting.

Ancient Manuscripts. — The chief evidences of its highly developed culture in that period are to be found in the ancient Irish manuscripts which have been more studied and written about than any other reliques of Irish antiquity. This was a field in which Irishmen long led the world. In the Middle Ages the richest libraries in Europe were in Ireland, and the richest libra¬ ries on the Continent were organized by Irish¬ men on Irish foundations. Thus Bobbio, founded by Columbanus in 612 a.d., long pos¬ sessed the richest library in Italy. The nucleus of its library was formed by books brought out of Ireland by Irish monks and by treatises writ¬ ten by Columbanus and his fellow countrymen, and by the large gift of books made by the later Dungal. Similarly Saint Gall, possessing the richest library in northern Europe, was an establishment founded by Gall or Ceallach, an¬ other Irishman; its library was enriched by the donations of Marcus, and the transcriptions of the school of Abbot Grimoald, both Irishmen. Saint Gall, Bobbio, and Rebais and Corbie, two other Irish foundations, proved the great treas¬ ure houses of the ancient classics. When we consider the systematic destruction of Irish books that has gone on for centuries, and when we remember in the face of that fact that Irish manuscripts, whether in Latin or in Irish, re¬ main still among the oldest and most valuable in the world, we acquire considerable respect for the ability of the Irish scribe. The illumi¬ nated manuscripts of scripture, by reason of their obvious beauty and singularity, are the best known. The Book of Durrow is the old¬ est specimen of Irish illumination, and the Book of Kells, some of the initial letters of which cover a whole page, is the most magnifi¬ cent. The Book of Armagh, the Gospels of MacRegol, the Gospels of MacDurnan, the Book of Lindisfarne, this last executed in England, the Liber Hymnorum, the Garland of Howth, the Stowe Missal and the Gospels of Saint Chad are some of the other miracles of Irish mini¬ ature painting. The illuminated gospels and liturgical books handed down as heirlooms in the English Church are all of them true prod¬ ucts of Irish art, having been transcribed and ornamented on Irish foundations, such as Lin¬ disfarne, Whitby, Melrose and Malmesbury by Irish scribes and their English pupils. Still more valuable on many grounds are the other classes of Irish manuscripts, the chief merits of which lie in their literary features. The Leabhar na "h'Uidhre® or <(Book of the Dun Cow® is the oldest big book in the Irish lan¬ guage. This book among other things has an

important version of the Tain Bo, poems by Flann of Monasterboice, and many pieces of historical romance referring to the Tuatha de Danaan. The Book of Bally- mote is another immense vellum compila¬ tion, whose chief interest lies in the

pedigrees of the great Milesian families with the various minor clans and the families branch¬ ing off from them. The Leabhar Breac or Speckled Book; the Great Book of Leacan ; the Domnach Airgid, a book shrine of great beauty and antiquity, containing a fragment of the four gospels written in Latin which Petrie considered must have belonged to Saint Pat¬ rick himself ; the Cathach or Book of the Battle, a highly ornamented book shrine enclosing a fragment of the Psalms in Latin, the heirloom of the Clan Conail, handed down from Saint Columbkille, who wrote it with his own hand ; the Book of Leinster, containing poems, geneal¬ ogies and calendars of the heroic period ; the Annals of the Four Masters, compiled from older manuscripts; the Yellow Book of Lecan, a collection of ancient historical pieces, secular and ecclesiastical, in prose and verse ; these are all preserved in library collections in Ireland and some of them are the chief sources and authorities for old Irish literature. Apart from these there is an enormous number of other Irish books, on vellum paper, existing not only in Ireland, but in numerous continental libraries, most of them in Irish, many in Latin, a few in Greek, of which language Irishmen alone in western Europe possessed a knowledge in the early mediaeval period, many of them crowded with valuable scholia, which have been made the basis of a critical literature all its own. Irish archaeology, Irish history and Irish literature are still comparatively untilled fields, yielding to intelligent labor virgin fruits that can no longer be looked for in the well- beaten classical grounds. Outside of the Greeks and Romans the Irish alone of Western peoples have handed down to the modern world a literary represen¬ tation of the life of their ancestors during the period of antiquity. The results of Irish archaeological research may thus be compared, corrected and supplemented by the lessons of Irish literature, and in so far as this has been done the discoveries have been remarkable. As a result of such comparative study Prof. William Ridgeway has thrown new light on both Greek and Roman history, showing the Celt as a leading figure in the early stages of both, and it has already become a truism among international students of history that a knowl¬ edge of Irish history, literature and archaeology is necessary to a proper study of the early his¬ tory of Europe.

Bibliography.— < Proceedings of the Royal Irish Academy (Dublin) ; Proceedings of the Society of Antiquaries* (Dublin) ; Ulster Journal of Archaeology (Old Series and New Series) ; Petrie, Pound Towers and Ancient Architecture of Ireland* (Dublin 1845) ; Stokes, 'Early Christian Art in Ireland* ; Joyce, (Social History of Ireland* (2 vols.) ; O'Curry, E.,*

(Manuscript Materials of Ancient Irish His¬ tory ; Westwood, (The Book of Kells) ; British Museum, 'Bronze Age Guide* ; Coffey, (Bronze Age in Ireland) ; Wilde, 'Catalogue of the Royal Irish Academy's Collection* ; Gougaud, 'Reper¬ toire des Fac-similes des manuscripts irlandais* (Paris 1913); Ridgeway, 'Date of the First Shaping of the Cuchulain Saga* (in Proceed¬ ings of the British Academy, Vol. II) ; Brash,*

(Ogham Inscribed Monuments of the Gaedhil (1879) ; 'Bibliography of Irish Philology and of Printed Irish Literature* (Dublin 1914).*

Benedict Fitzpatrick.

IRISH ART — IRISH CHURCH

329

IRISH ART. At a very early period the Irish showed themselves not only capable of inventing a style of architecture for thems'elves, but perfectly competent to carry it to a success¬ ful issue when the proper occasion arose. Dur¬ ing the troubled centuries preceding the Anglo- Norman invasion the Irish built round towers and oratories of a beauty of form and with an elegance of detail that charm even at the present day. Their metal work showed a true appreciation of the nature of the material, and an artistic feeling equal in kind to anything in the best ages of Greece or Italy; and their manuscripts and paintings exhibit an amount of taste which was evidently capable of reaching great artistic heights, did not the invasion of the Normans banish that peace and sense of security which are indispensable for the cul¬ tivation of the softer arts. The early churches were extremely small, and appear to have been used principally as oratories, where the priest could officiate, and to which a small square chancel was attached. The naves were covered writh barrel vaults, over which was a hollow chamber called an overcroft, covered by a steep pitched roof, generally of stone, as at Cormac's Chapel, Cashel, probably the finest example in Ireland, Saint Kevin's Kitchen, Glendalough, and other places. Windows appear to have been unglazed. The monasteries form another class of building, and Professor Stokes refers to a group of seven small churches found at Inch- leraun, similar to some in Asia Minor and else¬ where. The monastic cells at the Skellings are peculiar, being of beehive form, with domed stone roofs in horizontal courses, as in the early work in Greece at Mycenae and elsewhere.

The Round towers, generally detached and placed near the church, have been a subject of much controversy; one view is that they were used as treasure houses, refuges, bell towers and for displaying lamps at night time. They all taper slightly toward the summit and are generally crowned with

either a conical cap or battlemented covering. The entrance door¬ way was several feet from the ground. As architectural objects these towers are singularly pleasing. Their outline is always graceful, and the simplicity of their form is such as to give the utmost value to their dimensions. Few can believe that they are hardly larger than the pillars of many porticoes and that it is to their design alone that they owe that appear¬ ance of size they all present. They are among the most interesting of the antiquities of Europe.

Within the English Pale the influence of Continental art was felt during the Middle Ages, but few monuments of importance were erected. The cathedrals of Dublin, Kildare and Cashel were the most important, but the absence of parish churches is remarkable. The mon¬ asteries and friaries, principally Franciscan, are small, usually having a nave and choir, prob¬ ably sometimes divided by a wooden screen, a transept and southern aisle, cloisters and a tower. The best known are those at Cashel, Kilconnell and Muckross.

Owing to the disturbances in Elizabethan times there is no domestic architecture of note, but the earlier castles built by the chieftains are interesting. The great crosses scattered through¬ out Ireland are important as examples of sculp¬ tural art of an advanced type. The crosses

are of Christian origin and bear on all their sides reliefs representing incidents of the New Testament story.

In the working of gold early Ireland pos¬ sessed skilled craftsmen and the museums of Ireland and England contain many fine speci¬ mens of brooches, nins and other jewelled orna¬ ments. Swords, knives, etc., of the pre-Nor¬ man period show special skill in design and workmanship. The existing body of manu¬ scripts is very large and exhibits some wonder¬ ful work in the art of illumination. The famous (Book of Kells) is one of the world's choicest manuscripts. After the Norman invasion Irish art declined and it is only since the beginning of the present century that a healthy national life bids fair to create a new artistic era for Ireland. (See Crosses; Irish Music; Irish Archeological Remains; Manuscripts, Illu¬ minated). Consult Champney's Hash Ecclesi¬ astical Architecture5 ; Stokes, M., (Early Chris¬ tian Architecture in Ireland5 (1878) ; Dun- raven (Eard of), (Notes on Irish Architec¬ ture5 (1877).

IRISH CATHOLIC BENEVOLENT UNION, a fraternal organization founded in Dayton, Ohio, in 1869. It has 149 subordinate societies and 15,000 members. The benefits dis¬ bursed since organization have amounted to over $2,650,000, and during the year 1913 amounted to $54,000. The membership in the union is confined to persons of Irish

extraction who are communicants in the Roman Catholic Church.

IRISH CHURCH, The. Although the in¬ troduction of Christianity into Ireland is usually reckoned from the mission of Saint Patrick, there is ample evidence that it had found its way there much earlier, probably through intercourse with Britain and the Con¬ tinent. Palladius, a bishop of Britain, was sent in 430 by Pope Celestine ((to the Scots believing in Christ,55 but he accomplished pratically noth¬ ing and returned to Britain almost immediately. Two years later Saint Patrick, who had been consecrated bishop by the same Pope, arrived in Ireland with authority to preach Christianity and established the hierarchy. He landed in Wicklow and traversed the entire country; he baptized the ard-ri, or high king, and many of his subjects, and achieved his mission with comparative ease and without bloodshed. His first native priests and bishops were chosen from among the chieftains, brehons (judges), ollavs (poets) and other leading men of the people, and they were ordained and consecrated with but little training. But with the organization of the hierarchy completed, he established schools, the first at Armagh, under Benignus and others at Kildare and Louth. By the end of the. 5th century these schools were sending forth trained priests. By the 7th century paganism had dis¬ appeared and the old bardic schools had been supplanted by the monastic schools.

The activities of the Irish Church may be traced along two distinct lines • the mainte¬ nance of the faith in Ireland, and the spreading of the doctrines of Christianity in other lands. The missionary work of the Irish monks from the 6th to the 10th centuries, and even later, was wide-spread on the continent of Europe, and even as far away as Iceland. The up¬ heaval in Europe following the downfall of the

Roman Empire had left Ireland practically un¬ touched, and monastic schools there continued to flourish and send forth missionaries to the barbarous nations that had overrun southern and western Europe. Saint Columbanus, Saint Gall and many others went through the Con¬ tinent evangelizing in spectacular Celtic fashion, and establishing monasteries which became in time centres of learning and industry.

In the 6th century Saint Columba and a few companions crossed to Caledonia and es¬ tablished the monastery on the island of Iona, whence they went to evangelize the Piets in the north of Britain. From Iona, too, went Aidan and his companions to work among the Anglo-Saxons.

Practically all of Saxon Eng¬ land, except Kent, was won to Christianity by the labors of Irish monks, and the monasteries of Whitby and Jarrow in Northumbria, estab¬ lished by them, were the schools which pro¬ duced the first literary efforts of Christian England.

In Ireland the monastic schools multiplied and continued to flourish until the time of the Reformation. Protestantism made little head¬ way there and although the churches and mon¬ asteries were confiscated and turned over to the Established Church, and the proscriptive laws caused great hardships, the Church has maintained its hold on a large majority of the Irish people. '

need only be noted that these points of differ¬ ence are in minor matters of practice, while in the essential matters, the unity of doctrine and the unquestionable authority from Rome under which Saint Patrick established the Irish Church, the evidence contradicts the theory of a separate origin.

Bibliography.— Montalembert, (Monks of the West (Vol. IV, books 11 and 12); Bury, (Life of Saint Patrick (London 1905) ; Healy, Ireland's Ancient Schools and Scholars*; D' Alton, (History of Ireland) (New York 1907) ; Zimmer, (The Irish Ele¬ ment in Mediaeval Culture) (tr. Edmands, New York 1891).*

Thomas Gaffney Taaffe.

IRISH DEER. See Elk.

IRISH ELK, an erroneous name of the extinct giant fallow-deer of Europe. See Fallow-Deer.

IRISH HARP (Irish emit; Welsh, erwth; English, crowde). The emit was originally a small harp or lyre, plucked with the fingers as in the case of the Roman fidicula; it was sub¬ sequently played with a bow, and is mentioned by an Irish poet who flourished about 400 b.c. It is justly regarded as the progenitor of the Crotta. Saint Venantius Fortunatus (530-609 a.d.) calls the emit a Crotta ; and we learn from Gerbert that it was an oblong-shaped in-

Most Ancient Form of

Irish Harp. The Cruit. The Clairseach.

The term ((Irish Church® has been used for a long time by a certain school of Anglican controversialists in support of the theory of the separate origin of the Church of England. Their contention is that the Church of Ireland was never in affiliation with the Church of R

strument, with a neck and finger-board, having six strings of which four were placed on the finger-board and two outside it — the two open strings representing treble G, with its lower octave. In fact, it was a small harp, and was generally played resting on the knee, or some¬ times placed on a table before the performer.

The large harp was termed the Clairseach, the festive or heroic harp of the chiefs and ladies, as also of the bards,® having from 29 to 58 strings, and even 60, but as a rule 30 strings. Its normal compass was from CC (the lowest string on the violoncello) to D, in all 30 notes, that is, almost four octaves. It was gen¬ erally tuned in the scale of G, but, by altera¬ tion of one string a semitone (effected by means of the ceis or harp fastener), the key might be changed to C or D. In those keys the diatonic scale was perfect and complete, similar to ours now in use The ancient Irish played the treble with the left hand and the bass with the right.

Among early representations of the Irish

harp we find one in a manuscript of Saint Blaise, quoted by Gerbert, dating from the close of the 9th century. Another one is on the panel of a sculptured cross at Ullard County, Kilkenny, dating from the 10th century, and which is ((the first specimen of the harp with¬ out a fore-pillar that has hitherto been found outside of Egypt.® There is a good repre¬ sentation of an eight-stringed harp on the metal shrine of Saint Maedhoc, dating from the 9th century. The so-called ((Brian Boru's Harp,® though not dating from the time of Brian, has a venerable antiquity, and belonged most certainly to the royal family of O'Brien. It has 30 metallic strings, having a compass from C below the bass stave to D above the treble stave.

The 19th century saw the introduction of chromatic harps with pedals and in recent years an improved harp in two sizes has been built by the American, Melville A. Clark. Consult Armstrong, R. B., (The Irish and the Highland Harps (Edinburgh 1906).*

IRISH LAND LAWS. Under the Brehon laws, when the people of Ireland were divided into tribes, the land was usually the property of one of the four or five tribes which were the strongest in Erin. A large portion was given to the king or chief of the tribe, then divided among the clans that made up the tribe. Here again a large portion was given to the chief of the clan and then divided among the septs. The chief of the septs received the largest portion of the amount set apart for the sept. The free tribesmen, after the chief, received the greater part of the sept lands.

Some of the tribesmen, the Ceil, owned cat¬ tle, some, the Daer and Saer, were loaned cattle by the chief. The Fuidhir were the tenants who performed the manual labor.

When a chief died, the tribesmen distributed his land among his descendants, and when a tribesman died, the chief distributed his prop¬ erty. After England took possession of Ire¬ land, the land tenure in a large part of the island continued to be administered under the communal basis of Brehon laws; but within <(The Pale® -the English feudal system pre¬ vailed; there the king alone owned the land and the tenants derived ownership from him. Grad¬ ually England forced her land laws upon Ire¬ land. This was done by driving the "rebellious Irish® out of certain counties, King's, Queen's, then out of all Ulster, when the Ulster plantation was established, in 1607. Other confiscations and dispossessions took place until all Ireland came under the English law. Cromwell took forcible possession of the best lands of Munster and Leinster and a large part of Ulster, and divided the whole among his soldiers. Al¬ though some of these lands were restored later, more was retaken, by act of Parliament, under William III. The chiefs and leaders among the people of Ireland were deprived of their lands and the friends of the king of England or of the English government, were given Irish possessions as a reward for military or political services. Thus the problem associated with the Irish land question virtually began with the en¬ trance of Henry II into Ireland. In later times under the penal laws no Catholic could own land, and that in a country predominantly Catholic. The effect of this proscription on a proud and sensitive race need not be described.

With the Irish owners deprived of their lands there was instituted the system of ˆlandlordism® which has been a hindrance to Ireland's prog¬

ress. The majority of those who owned the land did not live upon it, and usually the money received for rent was spent in a foreign coun¬ try. This absentee proprietorship, involving the total lack of personal contact between owner and tenant, was a further root of bitter¬ ness. The landlord owned only the land ; the houses had to be built and all improvements had to be made 'by the tenant and at his own expense. The more a holding was im¬ proved, the more rent was demanded. The "middle men® who held lands under the owner and sublet to tenants were the means of in¬ creasing the burdens of the unhappy peasantry. The commission under Lord Devon, in 1843, to investigate conditions in Ireland, revealed an alarming state of affairs, and the famine of 1846-48 brought the Irish land question to the notice of the whole civilized world, even many of the English statesmen who had censured what they had regarded as Irish shiftlessness being astonished when they learned the nature of the land laws which gave power of eviction without any remuneration for improvements; and the wonder was that. so much thrift and industry existed. In 1847 Lord John Russell endeavored to pass an act to protect the tenant against loss by eviction. This measure failed, and others accepted by Parliament later proved ineffectual. Two years after the terrible dev¬ astation by famine, the Tenant Right League was organized in Dublin, and its members began a systematic campaign to elect to Parliament members pledged to support measures for the relief of the tenants. The Land Acts of 1860, under the Palmerston ministry, may be said to have resulted from the agitation kept up by the Tenant Right League. Various other organ¬ izations for the betterment of the people of Ireland were established, and among them were ((physical force® societies. In 1870, under the Gladstone ministry, the first of really ameliora¬ tive measures was passed, under which three principles were established : that a tenant could not be evicted if his rent were paid; that this non-payment must be for at least three years; and that if the tenant chose, he might sell his improvements. This purchase of improvement clause was a great advance in favor of tenants' rights. The next act was passed by Gladstone in 1881, giving the tenant a possessory right to his holding except for the non-payment of rent, and established a land commission to fix fair rents. The Land League in various parts of the world, especially the United States, con¬ tinued the agitation and brought the remaining grievances of the Irish tenants before the whole world. The Ashbourne Act of 1885 provided for the purchase of the lands by the tenants and nearly $25,000,000 was set aside for that purpose. Later a like amount was added. A comprehensive scheme of land purchase was an integral part of Gladstone's abortive Home Rule bill of 1886. In 1891 the Balfour land purchase bill was passed and nearly 8150,000,000 was provided for purchase. In 1896 this law was improved; but for various reasons all the laws enacted by Parliament proved effective only in so far as the bringing of the matter to the notice of fair-minded statesmen. (See

Lanp League). With the culminating act in

the series definite settlement may be regarded as having been reached, when the land pur¬ chase bill was enacted 14 Aug. 1903, whereby the tenant may purchase and own land and the government will, under certain and fair condi¬ tions, be responsible for the payment. To George Wyndham, who as chief secretary for Ireland, prepared the bill, the credit is largely due for the passage of the act. (See Wyndham, George.) Consult Reports on the <(Land Pur¬ chase" acts for relief of Ireland; Hansard's Parliamentary Debates' ; Grinnell,(The Brehon Laws'; Maine, (Lectures on the Early History of Institutions' ; Fisher, 'History of Landhold¬ ing in Ireland' ; Richey, 'The Irish Land Law' ; Godkin, /The Land War in Ireland'; Richey, (The Irish Landlord'; (Report of the Devon Commission' ; Cherry and Maxwell, 'Irish Land Purchase Acts, 1880-1904' ; Bonn, 'Modern Ireland and Her Agrarian Problem' (trans. by Rolleston) ; McCarthy, (Irish Land and Irish Liberty.' See Great Britain — The English Land Laws ; Home Rule.

IRISH LANGUAGE, Society for the Preservation of, an organization established first as the Philo-Celtic Society in 1873, in Boston, Mass. The object is to foster the study of the Gaelic language so that it may again be one of the spoken languages of the Irish people. The headquarters are now in Dublin, where the organization was established in 1876. It has a number of branches in different parts of the United States.

IRISH LEAGUE OF AMERICA. See

United Irish League of America.

IRISH LITERARY REVIVAL, the

name given to that particular development of the Celtic Renaissance which, toward the end of the 19th century and during the 20th cen¬ tury up to the present date (1918), resulted in the production of a large, valuable, and char¬ acteristic body of literature, written in English by Irishmen and Irishwomen, primarily for their own people, , on subjects mainly but not exclusively Irish in character. Put in another way, it may be said that the Irish literary re¬ vival means the creation of a distinctively na¬ tional Irish literature, expressed in the English language. The success attained amply demon¬ strates the Dossibility and even the advantage of the employment of that medium for the purpose. This splendid efflorescence of literary activity manifested itself in the usual forms of poetry, drama, short-story,

novel, and essay.

It should be noted that it synchronized with a general uplift not only in intellectual emanci¬ pation but also in economic progress, agrarian reform, improvement in agricultural methods, and the revival of industry — in a word, with a more hopeful outlook on life.

While there is no doubt that the increasing attention focused by the Celtic Renaissance on old. Irish legends and traditions, on the ancient pagan gods and other supernatural beings of Erin, on the hero tales and love episodes of the Red Branch and Os- siamc cycles of romance, and on Irish fairy lore and folk-lore, coupled with the other revelations made by scholars concerning the wealth of literary material stored up in the almost forgotten manuscripts of the past, was the general cause of the Irish Literary Revival, it is difficult to assign a specific date or a

given work as its starting point and proximate cause. At no period, even before the publica¬ tion of Zeuss's 'Grammatica Celtica' in 1853, was old Irish literature or the themes it sug¬ gested entirely neglected. Macpherson's 'Poems of Ossian' (1760-63), forgeries though they were in whole or in part, achieved a European reputation, and Charlotte Brooke (c. 1750-1803), a patient delver in the mines of antiquity, had, in her 'Reliques of Irish Poetry' (1789), unearthed treasures, dating back to the 3d cen¬ tury of our era, before which she stood en¬ raptured. Other collectors were James Hardi- man, Rev. Dr. Drummond, Thomas Crofton Croker, Patrick Kennedy, Lady Wilde, Jere¬ miah Curtin, Lady Ferguson, and Douglas Hyde. Credit must also be given to various learned societies, whose transactions' show consistently solid results, and to a number of individual scholars, whose researches covered with accuracy an extensive field.

This, however, was all pioneer work, scholarly and necessary, but, as far as most of it was concerned, not belonging to the domain of literature proper. Thomas Moore's ' Irish Melodies' (1808 et seq.), although primarily produced for English consumption, were per¬ haps the first real revelation of the Irish spirit in English literature. Moore's services in this respect have been sometimes strangely under¬ rated; but it should not be forgotten that he not only sang of the episodes of the struggle between Saxon and Celt and of the earlier glories of Malachy and Brian the Brave, but that he also helped to keep alive enthusiasm for the memory of a still remoter past by cele¬ brating the coming of the Milesians to Ireland, and those later but still olden periods when skilled generals led the Red Branch Knights to battle and when Tara was as yet the seat of

J?remiah Joseph Callanan 0795-1829) and Edward Walsh (1805-50) also caught to some degree the peculiarly Irish note. In one limited sense it

may be said that the Revival dates from the Young Ireland party, for its members endeavored in their weekly organ, the Nation (1842—48), to reawaken the fast decaying spirit of Irish nationality, and as a means to that end, taught that Ireland must be conscious of its past. The Nation writers, however, were in general too much engrossed in political strife and in the revolt against English domination to go back be¬ yond the Anglo-Norman invasion of the 12th century for their subjects. Their view was bounded by the struggle of Ireland against con¬ quest in the past and its then existing struggle against Anglicization ; though here again it ought to be noted that one of the most versatile of them, Thomas D'Arcy McGee (1825-68), found it in him to sing of the mighty race which flourished in Ireland more than 2,000 years ago. The greatest of the Nation poets was James Clarence Mangan (1803-49), and his voicing of the spirit and much of the manner of Celtic Ireland makes him one of the direct forerunners of the literary movement now under notice. Another forerunner was Sir Samuel berguson (1810-86), a distinguished

r i'C holar as we as a P°et, whose 'Lays of the Western Gael' (1865),

and Poems' (1880) tended strongly to that restomtion of ancient legend as a groundwork and a theme for literature which later became

one of the distinguishing marks of the Revival. A potent force in the same direction was that of Dr. George Sigerson (b. 1839), a man of protean intellect, who was both a herald of the new movement and an active participator in it when it came. His special standing is as a translator of the old Gaelic poets. As far back as 1860 he published the text of some 50 Irish poems, with a metrical rendering into English, the whole forming the second part of the (Poets and Poetry of Munster, the first volume of which, contributed by Mangan, had made its posthumous appearance in 1850. Dr. Robert Dwyer Joyce (1830 — 83) was also early in the field. His (Ballads, Romances, and Songs) came out in 1861. His*

Hitherto the literary labor in the field of Ireland's past had been largely individual : soon it was to take on a more concerted form. Among the Irish in exile there is often a stronger national feeling than among the Irish at home. It is not, therefore, surprising that it is in the centre of English power, in London

itself, that we find the first nucleus of an abiding Anglo-Irish literary organization. Out of the Southwark Junior Irish Club, which in the early

*80's had achieved more than local fame because of the interest taken in it by a few enthusiastic young Irishmen settled in the world's metropolis, there was developed in 1883 the Southwark Irish Literary Club. True to its motto, ((Spread the light,® this body carried on for several years a highly successful propaganda, and attracted to its meetings many of the leading literary workers of the day. In January 1892, it was formally decided to en¬ large the scope of the organization, and accord¬ ingly the Irish Literary Society of London came into being and, under the new name, began in that year its eventful career. Its inaugural lecture, however, was not delivered until March 1893. The lecturer was Rev. Stop- ford Augustus Brooke (1832-1916), and he chose as his subject ftThe Need and Use of Getting Irish Literature into the English Tongue.® This discourse, afterward published as a booklet, is a manifesto of the object and aims of the Society. Sensing the future, Brooke laid emphasis on the necessity of trans¬ lation, so that the coming Ireland might have ready to her hand all the materials for an Irish literature, written in English, and thus be able to ((send another imaginative force on earth which may (like Arthur's tale) create Poetry for another thousand years.® Thereafter the Society was very active. One effect of Brooke's advice was the formation of the Irish Texts Society and the Irish Folk Song Society, be¬ sides the enterprise of Sir Charles Gavan Duffy in publishing the books which constitute the ((New Irish Library.® Not only to Greater London but also to other parts of Great Britain did the passion for literary organization spread. Similar, though smaller, Irish literary societies were set up in rapid succession at different British centres. Ireland itself was not behind¬ hand. At Belfast, the Young Ireland Society, established in 1883, rendered notable service. At Cork, the Historical and Archaeological So¬ ciety, founded in 1891, regularly produced a monthly Journal, which was a marvel of re¬ search. A similar society was organized at Waterford in 1894. At Dublin, the Pan-Celtic Society was founded in 1888, and speedily secured a band of earnest workers. (The Lays and Lyrics of the Pan-Celtic Society, * con¬ taining contributions from many of its mem¬ bers, made its appearance in 1889. The Pan- Celtists held together for a few years. Eventu¬ ally, most of them joined the National Literary Society, originated by John T. Kelly and Wil¬ liam B. Yeats, and formally established at Dub¬ lin in June 1892. In August, the inaugural ad¬ dress, on < Irish Literature: its Origin, Environ¬ ment, and Influence,* was delivered by Dr. George Sigerson, and gave the keynote of the purpose of the organization.*

The year 1892, which saw the foundation of the two great societies at London and at Dub¬ lin, may be taken as the definite date of the focus of Irish co-operation for literary objects. By that time the events following the fall (1890) and the death (1891) of Parnell had abstracted the Irish mind from that all-absorb¬ ing attention to politics in which for the 20 previous

years it had been almost exclusively engrossed, and things literary and artistic had

therefore a fairer chance of receiving due con¬ sideration.

Already, however, as we have seen, there was very definite evidence of concerted action in 1889, when the Pan-Celtists brought out their book, and the year before that, 1888, had seen the publication of the (Poems and Ballads of Young Ireland, > which may be regarded in a sense as one of the first fruits of the revival. The latter-men tioned little book, dedicated to John O Leary and the Young Ireland societies, contained pieces by Sigerson, Hyde, Todhunter, T. W. Rolleston, Katherine Tynan, Ellen O'Leary, Rose , Kavanagh, and Yeats.

. ˆ Sigerson s first permanent contribution to literature in 1860 did not attract all the atten¬ tion it deserved, he yet never lost heart or hope. Not only did he collaborate in the production of (Poems and Ballads of Young Ireland' but also in (The Revival of Irish Literature) (1894). His second great unaided work, < Bards of the Gael and Gall' (1897), was accorded a gener¬ ous reception. This wonderful volume contains 141 poems, going back to the very days of the Milesian invaders and coming down through all the great epochs of Irish history to the 18th century. It is preceded by a learned in¬ troduction of 91 pages, in which the claims of the early Irish poets to the invention of an independent system of versification and to sev¬ eral metrical devices, subsequently copied by other nations, such as rhyme, assonance, allitera¬ tion, blank verse, and the burthen, are, appar- ently, successfully vindicated. In his transla¬ tions Sigerson has not only caught the spirit but he also reproduces the manner of the originals, and illustrates in practice the intricate and complicated technique of Gaelic verse. From whatever angle viewed, (Bards of the Gael and GalP is a noteworthy book. As re¬ cently as 1913, Sigerson published (The Saga of King Lir.' Dr. Douglas Hyde (b. 1860), president of the Gaelic League for nearly a quarter of a century from its inception in 1893 and since 1909 professor of Modern Irish at University College, Dublin, is better known as a Gaelic than as an English writer, but his work in _ English is by no means negligible. Besides, jt must always be borne in mind that the Gaelic movement proper exercised an un¬ doubted stimulus on the Anglo-Irish revival Hydes first volume of folk-tales, published in 1889 was written in Irish; but (Beside the Fire (1890), folk-tales in prose, had not only

'jae i? . but: also a translation into Hiberno-English idiom, effectively

employed, as

had the poems, (1903), and (The Religious Songs of Connacht' (1906). Three poems, and (The Fate of the Children of Tuireann,' appeared as (The Three Sorrows of Storytell¬ ing' in 1895. In addition to his plays in Irish, Hyde wrote several plays in English. The same year (1888) which saw the (Poems and Bal- lads of Young lreland' saw also the first book o I distinctly Irish verse by Dr. John Todhunter (1839-1916), namely,

land,' Thomas William Hazen Rolleston (b. 1857) contributed to both series of

?i1SnnS?edTTn

• iVAii- N nguics ui me reevivai

is W illiam Butler Yeats (b. 1865). Pressman essayist, storyteller, poet, playwright, and prop¬ agandist, he was already well known in the literary world, when, in 1889, he broke entirely new ground with the publication of (The Wan¬ derings of Oisin and other Poems.' This book is not, as has been sometimes stated the starting point of the Revival, but it re¬ vealed a new personality and opened up a new world of material for poetry. It is written in a style, to use its author's own wrords, ((mu- sical and full of colour," it is highly artistic

aˆdJtii.s remarkable for the true voicing of the Celtic spirit. There followed in 1892

in 1891. The Celtic Twilight,' a collection of ghost and fairy lore, was published in 1893 and was reissued with additional matter in J° 1897 belong the various tales entitled (The Secret Rose' and 'The Tables of the c Storles of Red Hanrahan,' taken from iotm Nose,' was published separately in

1904, and the two were brought out in one volume with Rosa Alchemica' in 1913 He re¬ turned to poetry in 1899 with 'The Wind among the Reeds,' in which he reaches the high-water mark of that mystic symbolism with which his name has been associated This

]s™n}inued (In the Seven Woods' (1903), Ihe Green Helmet and other Poems'

(1910), and, to a less extent, in Cesponsibil- ities) (1914). His latest book is (Per Arnica Silentia Lunae> (1917). As well as con¬ tributing to (Literary Ideals in Ireland (1899) and to Udeals in Ireland* (1901), he wrote many other essays, including (Ideas of Good and Evil* (1903), (Discoveries* (1907), (Poetry and Ireland* (1908), (J. M. Synge and the Ireland of his Time* (1911), the last three, with other essays, constituting (The Cutting of an Agate* (1912). He published many critical and propagandist articles in Beltaine, the organ of the Irish Literary Theatre (1899-1900), and in Samhain and The Arrow, which were in turn the <(occasional periodical** of the Irish Na¬ tional Theatre (1901-08). Yeats's plays are based either on the myths and legends of the Heroic Age of Ireland or on peasant and fairy lore. The first of them to be performed was (The Land of Heart's Desire,* produced at the Avenue Theatre, London, in 1894. His most successful one, (Cathleen ni Houlihan,* a folk-drama in prose, was staged in Dublin in 1902 by the Irish National Dramatic Company. Others of his plays are (The Countess Cathleen* (1892, performed 1899)* (The Shadowy Waters* (1900, performed 1901), (Where there is No¬ thing* (1903, rewritten by Lady Gregory as (The Unicorn from the Stars,* 1907), (The King's Threshold* (1903), (On Baile's Strand* (1904), (The Hour Glass,* a morality (1904), (Deirdre* (1906), (The Golden Helmet,* a farce (1908). In collaboration with George Moore he wrote (Diarmuid and Grania,* pro¬ duced in 1901, and with Lady Gregory, (The Pot of Broth* (1903). In 1911, in recognition of his services to literature, Yeats was granted a Civil List pension of £150 a year.*

Another of the great names of the Revival is that of George W. Russell (b. 1867), mys¬ tic, painter, poet, essayist, economist, and leader of thought, who is generally known by his di¬ minutive pseudonym, JE. Beginning his career as a bookkeeper in a Dublin department store, he became in 1897 an organizer, and later assistant secretary, of the Irishˆ Agricultural Organization Society, and in 1905 he was ap¬ pointed editor of The Irish Homestead, the official organ of that body. His earliest collec¬ tion of poetry, (Homeward: Songs by the Way, appeared in 1894, and was followed by (The Earth Breath and other Poems* (1897), (Nuts of Knowledge* (1903), (The Divine Vision* (1904), (By Still Waters* (1906). His Collected Poems* came out in 1913. The World War having inspired him afresh, he produced (Gods of War and other Poems* in 1915. T is a mystic and a pantheist. In his creed, man is of divine origin, and the soul in its quest for union with the spirit of life tends always to return to the Oversoul, to be absorbed in the Universal Spirit. , His poetry, which appears to be absolutely sincere, is the record of the ecstatic states which come to the soul in its search for the Infinite, ((the high Ancestral Self,** and consequently shows im¬ patience with modern social conditions, and is*

in one sense a poetry of protest. It is, how¬ ever, mainly pantheistic, for, in its author's con¬ ception, nature is divine and deity is everywhere. It is therefore essentially a poetry of nature, and delights to chant the beauty and the glory of the world around us. In common with

*((John Eglinton,** William Larminie, and Yeats, he contributed to (Literary Ideals in Ireland' (1899) and, with Hyde, Yeats, Standish O'Grady, and George Moore, to (Ideals in Ire¬ land* (1901). His other prose works include a brochure containing a reprint of two essays from The Irish Theosophist, namely, (The Fu¬ ture of Ireland and the Awakening of the Fires* and Udeals in Ireland: Priest or Hero?**; (The Mask of Apollo,** a volume of mystic stories (1904) ; (Some Irish Essays* (1906) ; (The Hero in Man* (1909) ; (The Re¬ newal of Youth* (1911) ; and the booklet, Co¬ operation and Nationality* (1912), which, ex¬ hibiting as it does the essence of his social teach¬ ing, is sometimes termed the bible of the Irish co-operator, and was ultimately expanded into (The National Being: Some Thoughts on an Irish Polity* (1916), in which he endeavors to show that none but a co-operative common¬ wealth is suited to a nation like Ireland. (Im¬ aginations and Reveries* (1915) is a repre¬ sentative but not complete collection of his prose. Hi's solitary dramatic work is (Deirdre,* a three-act play in prose.*

William Larminie (1849-1900) published two volumes of verse, cGlanlua and other Poems and (Fand and other Poems.* He also brought out a collection of (West Irish Folk Tales.* He left in manuscript a translation of the Latin writings of John Scotus Erigena. At his best Larminie takes high rank as a poet. Lionel Johnson (1867-1902), though born in England, was of Irish family, and, on that account and because of the character of most of his works, he is usually classed among the writers of the Revival. Like Rolleston, Todhunter, and Yeats, Johnson was represented in both series of (The Book of the Rhymers' Club* (1892 and 1894). His other works are (Poems* (1895) ; (The Art of Thomas Hardy* (1896) ; (Ireland, with other Poems* (1897); the posthumously pub¬ lished volume of essays (Post Liminium* (1911) ; and Collected Poems* (1915). A con¬ vert to Catholicity in 1891, Johnson shares with Katharine Tynan Hinkson the distinction of having written excellent religious poetry. Al¬ fred Perceval Graves (b. 1846), so well known as the author of the rollicking and humorous ballad-song, (Father O'Flynn,* published (Songs of Killarney* as early as 1873, and during a long literary life devoted himself to Irish themes. Patrick Joseph McCall (1861-1919), a Dublin merchant, is author of several books of racy verse, including (Irish Noinins* (1894),*

(Songs of Erinn (1899), (Pulse of the Bards* (1904), and Urish Fireside Songs* (1912). His fairy legends, (The Fenian Nights' Entertain¬ ments,* are extremely interesting. Elinor Mary Sweetman published (Footsteps of*

the Gods and other Poems (1893); (Palms*; and (The Wild Orchard* (1911). Francis Arthur Fahy (b. 1854) wrote some delightful lyrics, many of which, like (The Ould Plaid Shawl,* Cong of the Irish Fiddler,* and (The Irish Lullaby,* were set to music. A collection of his verse, under the title of Urish Songs and Poems,* appeared in 1887. Alice Furlong published a slender volume of poems, of much promise, Coses and Rue* (1899). She also wrote serial stories and a book of Irish fairy narratives, entitled (Tales of Fairy Folk, Queens, and Heroes* (1907). Dora Sigerson Shorter (d.*

*1918), daughter of Dr. George Sigerson, mar¬ ried in 1897 Clement K. Shorter, editor of The Sphere. Something of a painter and a sculptor, she was also a voluminous writer and published several books of poetry, as well as novels, short stories, and fairy tales. Her poems won the enthusiastic praise of George Meredith. Thomas Boyd (b. 1867) brought out, in 1906, a collection of (Poems, * which were greatly ad¬ mired. One of his finest single pieces, (The Lianhaun Shee,* was made famous by being copied into William Sharp's 'Lyra Celtica,* Brooke and Rolleston's 'Treasury of Irish Poetry, * and other anthologies. William A. Byrne is the author of many graceful verses, collected in 'A Light on the Broom * (1901). James H. Cousins, an Ulster poet, wrote sev¬ eral books of verse. His poetic drama, 'The Sleep of the King,* and his tragedy of the sea, (The Racing Lug,* were among the early pro¬ ductions (1902-03) of the Irish National Dra¬ matic Company. A collection of the poems of Frances Wynne (1863-93) was published under the title of 'Whispers* in 1890. William Rooney (1873-1901) was a constant contributor of both verse and prose to Dublin and Belfast papers. His 'Poems and Ballads) were col¬ lected and published in 1902, and his 'Prose Writings* in 1909. Nora Hopper (Mrs. W. H. Chesson, 1871-1906) published 'Ballads in Prose) (1894), 'Under Quicken Boughs* (1896), (Songs of the Morning) (1900), and (Aquamarines * (1902), as well as several novels. Her lyric, (The King of Ireland's Son,* was adjudged by Fiona Macleod to be one of the "three loveliest and most typical lyrics of our time,® the other two being Yeats's 'Innisfree* and Moira O'Neill's 'Corrymeela.* "Moira O'Neill® (Mrs. Nesta Higginson Skrine), au¬ thor of 'An Easter Vacation) (1893) and 'The Elf Errant* (1895), sprang into sudden fame with (Songs from the Glens of Antrim * (1900), a small book containing 25 short poems. Its popularity arose from the fact that it voices, in the natural language of the peasant, the peasant's discontent with strange surroundings and his homesick longing for the scenes of his former daily life. She showed that the Hiberno- English spoken in the northern province was as applicable*

to literature as the better known varieties of the south and the west. <(Ethna Carbery's® posthumously published book, 'The Four Winds of Eirinn) (1902), is also distin¬ guished for its folk-poetry, written in the lan¬ guage of the people and addressed to a- strictly Irish public. She displays the most ardent patriotism and a great love for the traditions of her country. "Ethna Carbery® was the pen- name of Anna Isabel Johnston (1866-1902), whose greatly regretted death occurred a few months after her marriage to Seumas Mac- Manus. Her short stories and sketches were collected and published in two small volumes, (The Passionate Hearts) (1903) and (In the Celtic Past) (1904). Charles Weekes has two books of verse to his credit, Reflections and Refractions) (1893) and 'About WomerP (1907), the first mystic, the second satiric. Frederic Herbert Trench wrote 'Deirdre Wed and other Poems) (1900), 'New Poems) (1907), and 'Lyrics and Narratives (1911). Darrell Figgis, critic, poet, and politician, and in the last-mentioned role destined by fate to*

*strange and stormy vicissitudes, published many volumes both of verse and prose, including 'A Vision of Life) (1909), (The Crucibles of Time and other Poems) (1911), (Jacob Elthorne) (1914), and 'The Mount of Transfiguration **

(1915).

*A signal service was rendered to literature by JE when, in 1904, he edited a small vol¬ ume entitled (New Songs, * containing selec¬ tions from eight young Irish poets, many of them members of the Hermetic Society and most of them at that time but little known to fame. These were Alice L. Milligan, Eva Gore- Booth, Susan L. Mitchell, Ella Young, Padraic Colum, (*

poets, Francis Ledwidge (1891-1917), known as ((the peasant poet of Meath/ had a great variety of experiences in his all too short career. In October 1914 he enlisted in the Inniskilling Fusiliers, and he was killed in action in Flanders on 31 July 1917. His two books of verse, (Songs of the Fields) (1916) and (Songs of Peace } (1917), were great in performance and still greater in promise. He gave every evidence of being one of those poets who are born, not made.

Owing to extrinsic, as well as intrinsic, causes, the most widely known feature of the Irish Literary Revival is undoubtedly its drama. In its initial stages, the dramatic movement was not of entirely Irish origin. It owed much to the influence of Ibsen, and still more to the face that plays of a

certain type had no chance of being produced on the so-called ˆcommercial" stage of London. One of the sufferers from this policy of exclusion was Edward Martyn. Being a man of independent means and anxious to secure the presentation of his plays, (The Heather Field) and (Maeve/ he joined forces with Yeats, George Moore, Lady Gregory, 2E, ((John Eglinton/ and others, and founded the Irish Literary Theatre in 1899, under the auspices of the National Literary Society , of Ireland. A company of English actors and actresses, having been assembled in Lon¬ don, made their rehearsals there, crossed the channel, and produced on 8 May 1899, in the Antient Concert Rooms, Dublin, Yeats's play, (The Countess Cathleen/ The following evening Martyn's cThe Heather Field was put on. During the second season (1900) the venue was the Gaiety Theatre, Dublin, and there Moore's (The Bending of the Bough> (adapted from Martyn's (The Tale of a Town'), Martyn's (Maeve/ and Alice Milligan's (The Last Feast of the Fianna) were staged. The third season (1901) had the advantage of the direction of F. R. Benson, and saw the produc¬ tion of (Diarmuid and Grama/ a heroic play in prose, written in collaboration by Yeats and Moore. Douglas Hyde's (Casadh-ant-Sugain) (The Twisting of the Rope), a one-act play in Irish, was presented by a specially trained com¬ pany of Gaelic speakers, with the author in the principal role.*

In the meantime William G. Fay and his brother, Frank J. Fay, actors of considerable experience, had been training a company of Irish amateur players, known as the Ormond Dramatic Society ; and on the conclusion of the third season of the Irish Literary Theatre, Martyn and Moore withdrew, and the Fays, Yeats, and Lady Gregory formed the Irish Na¬ tional Dramatic Company out of the Ormond Dramatic Society. The first performance of the new company was given at Saint Teresa's Hall, Clarendon street, Dublin, on 2 April 1902, the bill consisting of Yeats's (Cathleen-ni- Houlihan and Hi's (Deirdre/ Later in the same year they moved to the Antient Concert Rooms, and there produced again the same two plays, as well as four new ones, namely, (The Sleep of the King) and (The Racing Lug/ by James H. Cousins, (A Pot of Broth/ by Yeats and Lady Gregory, and (The Laying of the Foundations/ by Frederick Ryan. In 1903 con¬ trol passed from the Fays, who. still, however, remained with the company, and The Irish National Theatre Society, with Yeats as presi-*

dent, was formed, and gave performances in 1903 and 1904 in Molesworth Hall. There they produced, among other pieces, Yeats's

The soft, carefully trained, and beautifully modulated voices of 'the players, the use of the minimum amount of gesture, and the absence of

elaborate scenery were all startling innovations, which thoroughly justified themselves. _ Many of the plays, too, were couched in the Hiberno- English idiom of the peasants, especially those of the west, and this, being a language full of life and reality, proved an added charm. The success of the Abbey players and their various predecessors gave a strong impetus to dramatic production, and dramatic societies sprang up all over the country, putting on home-made plays, to the output of which there seemed to be no end. There were the Ulster Literary Theatre at Belfast, the Cork Dramatic Society at Cork, the Theatre of Ireland and at least half a dozen similar societies at Dublin, and others at Galway and Waterford. In fact, practically every town of any size in Ireland had its own dramatic class, its own players, and its own playwrights. Many Gaelic societies produced plays in Irish by Douglas Hyde, Pierce Beasley, Thomas Haynes, Canon Peter O'Leary, and others, and at the Oireachtas held each year at Dublin prizes were offered for new plays. Under such conditions a plethora of playwrights arose. Many of them have, for convenience, been al¬ ready treated in the course of this article, when their names occurred in some other connection ; some few, who fall more strikingly under the category of novelists, will, for the same reason,

be dealt with later ; the remainder, who may be regarded as dramatists more than anything else, will now be considered.

*Edward Joseph Martyn (b. 1859) published in 1890, under the pseudonym of "Sirius,** a long satirical novel, (Morgante the Lesser,* in which he displayed a strong imagination and great powers of caustic criticism of modern materialism and of various social tendencies. His psychological dramas, (The Heather Field) and cMaeve, * which no London theatrical man¬ ager would touch, were published in 1899. When produced by the Irish Literary Theatre in 1899 and 1900, respectively, each of them made an excellent impression. His satiric play, (The Tale of a TownJ deemed not to be suit¬ able for the Irish Literary Theatre, was made over by Moore into (The Bending of the Bought which was staged in 1900. (The Tale of a TownJ in its original form, was published with (The Enchanted Sea,* a tragedy, in 1902. (The Place Hunters,* a one-act satiric and farcical comedy, was published in 1902, and was followed, at a long interval, in 1907, by (Romulus and Remus,) an extravaganza ridi¬ culing the folk-play, by*

Lady Gregory was attracted to the theatre from the inception of the movement, and proved herself easily the most prolific of modern Irish

playwrights. She also took an active part in the management of the Abbey Theatre. It is by her comedies, some of them bordering on farce, like spreading the News, (The White Cockade,* (The Canavans,* (The Workhouse Ward,* and (The Image,* that she is best known. (Kincora* is a melodrama;*

traditions of Ireland. She was not the first to employ that idiom — the credit for that be¬ longs to Hyde — but she cultivated it assidu¬ ously, and in the use of the Kiltartan dialect, so called from the place of that name where she heard it spoken, she was highly successful.

Of all the dramatists of the Revival the name that stands out most prominently is that of John Middleton Synge (1871-1909). He owes his eminence, in the first place, to the un¬ doubted merit of his dramas, and, in the sec¬ ond place, to the angry protests and discussions, and even the riots, which some of his works, notably (The Playboy of the Western World, provoked when produced in Ireland and in the United States of America. His first play was (In the Shadow of the Glen,* a tragedy (1903), and it was followed by (Riders to the Sea,* also a tragedy (1904), (The Tinker's Wedding,* a farce, written 1902, published 1907 and acted 1909, (The Well of the Saints,* a tragi-comedy (1905; performed in German at Berlin, 1906), (The Playboy of the Western World,* a tragi¬ comedy (1907), and (Deirdre of the Sorrows,* a tragedy, unfinished at his death and produced, in 1910, exactly as he had left it. The first two are in one act, the third in two acts, and the others in three acts. Of them all, (Riders to the Sea* .is perhaps the one that acts best. None of his plays have any moral or any d.dacticism. There is a wonderful charm in his diction : he gives it great attention, perhaps, as his prefaces tend to show, unduly exalted its importance, and the result is the Hiberno-English idiom in excelsis. In content, his plays are a revolt against the legendary, mystic, and lofty productions of Yeats, and are therefore highly realistic, and characterized, most of them, by an almost savage irony. That they represent the true life of rural Ireland may be legitimately doubted, but, nevertheless, they set the fashion of that peasant drama which ulti¬ mately became a distinctive feature of the Abbey Theatre. Synge also wrote (Poems and Translations* (1909), some critical essays, and two volumes of travel-sketches, (The Aran Islands* (1907) and (In Wicklow, West Kerry, and Connemara* (1910).*

Padraic McCo rmac Colum (b. 1881) is in the main a realist and an exponent of the peasant drama. He was a member of the orig¬ inal company of the Fays, for whom he wrote a playlet, (The Children of Lir. His plays are (The Saxon Shillin'* (1902, performed 1903), (The Kingdom of the Young* (1902),* ***The Foleys,*** *(Eoghan's Wife,* (Broken Soil* (1903, afterward rewritten as (The Fiddler's House,* 1907), (The*

Miracle of the Corn (1904), (The Land,* an agrarian comedv (1905), (Thomas Muskerrv* (1910), (The De¬ struction of the Hostel* (1910),*

entation of Irish life and character, and 'The King of Ireland's Son' (1916). William Boyle (b. 1853) in his four plays, 'The Building Fund' (1905), 'The Eloquent Dempsey ' (1906), 'The Mineral Workers' (1907), and 'Family Failing' (1912) deals with Irish country lile. They are all in humorous vein. Both 'The Building Fund' and 'The Eloquent Dempsey' proved very popular. He also wrote 'A Kish of Brogues' (1899), a volume of racy Irish stories and poems. W. F. Casey is the author of two well-liked plays, 'The Man who Missed the Tide' and 'The Suburban Groove.' Thomas C. Murray (b. 1873), a schoolmaster in County Cork, places the scene of his two grim tragedies, 'Birthright' (1910) and 'Maurice Harte' (1912), in that county. They are well constructed, and show an understanding of the class of people with whom he deals. He is also the author of 'The Wheel .of Fortune' (1909) and of a quantity of magazine verse. "F. Norreys Connell" is the nom de guerre of Conal Holmes O'Connell O'Riordan (b. 1874), who succeeded Synge as a director of the Abbey Theatre in 1909. He is the author of 'The Piper' (1908), a short and clever play, con¬ taining a mordant and scarcely veiled satire on present-day Irish political life, which, like 'The Playboy,' provoked a riot when first produced. He also wrote a morality play, 'Time' (1909). His 'Shakespeare's End' (1912) is a play in verse, and 'Rope Enough' (1914) is a social comedy. O'Riordan is a well-known litterateur, and wrote not only verses but also several much discussed novels, such as 'In the Green Park' (1894), 'The House of the Strange Woman' (1895), and 'The Fool and his Heart' (1896). Seumas O'Kelly wrote two strong dramas of a tragic cast, 'The Shuiler's Child' (1909) and 'The Bribe' (1914), as well as 'The Match¬ makers' (1907), 'The Flame on the Hearth' (1908), 'The Stranger' (1912), and 'The Homecoming' (1912), and also a novel, 'The Lady of Deerpark' (1917). Seumas O'Brien produced a side-splitting farce in 'Duty.' R. J. Ray is the author of 'The White Feather' (1909), 'The Casting out of Martin Whelan' (1910), and 'The Gombeen Man' (1913). George Fitzmaurice wrote a tragedy, 'The Moonlighter' (1914), and four comedies. 'The Country Dressmaker' (1907), 'The Piedish' (1908), 'The Magic Glasses,' and 'The Dandy Dolls,' all published as 'Five Plays' in 1914. They deal with life in County Kerry. 'The Country Dressmaker,' in particular, won great praise. St. John Greer Ervine, manager of the Abbey Theatre, a native of Belfast, wrote 'Mixed Marriage' (1911), a tragedy in which the religious intolerance among the artisans of the north is finely portrayed. 'The Orange¬ man' (1914) is a slighter study of a somewhat similar theme.

'The Magnanimous Lover' (1912) is a highly effective one-act play, which, however, was the occasion of a "Playboy" riot when first produced, because it was supposedly a reflection on Irish morality. 'The Critics' (1913) is a skit in dialogue on the reviewers who found 'The Magnanimous Lover' im¬ moral. In 'Jane Clegg' (1914) the scene is laid in England. This is a well-constructed play, with a good plot, excellent characteriza¬ tion, and natural and forceful situations. 'John Ferguson' (1915), a powerful tragedy, has its scene laid in County Down. Besides

these six plays, Ervine is the author of three highly successful novels, 'Mrs. Martin's Man' (1915), 'Alice and a Family' (1915), and 'Changing Winds' (1917), and of a volume of miscellaneous sketches entitled 'Eight O'Clock and Other Studies' (1915). The plays of S. Lennox Robinson deal with the southwest. They are 'The Clancy Name' (1908), 'The Cross Roads' (1909), 'Harvest' (1910), 'Patriots' (1912), and 'The Dreamers' (1915). They are all naturalistic and of a gloomy and tragic cast, and some of them are highly critical of conditions in Ireland. He also wrote a novel, 'A Young Man from the South' (1917). Edward John Moreton Drax Plunkett, eigh¬ teenth Baron Dunsany (b. 1878), displayed won¬ derful powers of imagination and created a new theogony in 'The Gods of Pegana' (1905) and its sequel, 'Time and the Gods' (1906). Other stories followed: 'The Sword of Welleran' (1908), 'A Dreamer's Tales' (1910), 'The Book of Wonder' (1912), 'Fifty-one Tales' (1915), and 'Tales of Wonder' (1916). In the meantime, he was also writing plays. His first volume, in this order, entitled 'Five Plays,' containing 'The Gods of the Mountain,' 'King Argimenes and the Unknown Warrior,' 'The Glittering Gate,' 'The Golden Doom,' and 'The Lost Silk Hat,' appeared in 1914. His second, 'Plays of Gods and Men,' contained 'The Laughter of the Gods,' 'The Queen's Enemies,' 'A Night at an Inn,' and 'The Tents of the Arabs.' All these plays are in prose. 'The Glittering Gate' and 'King Argimenes and the Unknown Warrior' were staged at the Abbey Theatre, the former in 1909 and the latter in 1911. .'A Night at an Inn' was presented for the first time at the Neighborhood Playhouse, New York, on 22 April 1916. His plays are all distinguished for their irony, and some of them are highly humorous. In fact, 'The Glittering Gate' and 'The Lost Silk Hat' are farces. Lord Dunsany's style has a beautiful cadence and swing.

The Ulster Literary Theatre was started in 1902 and was formally inaugurated in Decem¬ ber, 1904. Its organ was Uladh, which ran for four quarterly numbers. The first plays per¬ formed were 'The Reformers,' a satire on mu¬ nicipal politics, by Lewis Purcell, and 'Brian of Banba, ' a heroic drama, by Bulmer Hobson. In 1905, 'The Little Cowherd of Slainge,' by Joseph Campbell, and 'The Enthusiast,' by Lewis Purcell, were staged. The next year, 1906, saw the presentation not only of Lewis Purcell's amusing comedy, 'The Pagan,' but also of 'The Turn of the Road,' the first

play of the greatest of the northern dramatists, Rutherford Mayne, all of whose important work was associated, in the first instance, with the Ulster Literary Theatre. "Rutherford Mayne" (S. Waddell), an actor by profession, wrote four plays, collected under the title of 'The Drone and other Plays' (1912). The first, as we have just seen, was 'The Turn of the Road,' a faithful portraiture of life in the country districts of Ulster. The second, _ produced in 1908, was 'The Drone,' a sardonically humor¬ ous comedy in two acts, but later extended into three. 'The Troth,' produced in . 1908, and 'Red Turf,' the setting of which is in Galway, produced in 1911, are tragedies in one act. "Mayne" afterward wrote 'If!' (1915), a

farcical comedy in three acts. He is also

author of (The Gomcril (1909) and of a tragedy of middle class life, entitled (The Cap¬ tain of the Hosts. * He is rather deficient in plot, but lie is very successful in characteriza¬ tion, and his diction is generally beautiful.*

The novel, the short-story, and the essay are not quite so fully represented in the Revival as poetry and the drama, but, none the less, all three forms were fairly extensively cultivated, as part of what has been already written in this article shows. Something more under those headings remains now to be noted.

George Moore (b. 1852), though born in Mayo, does not belong by any means exclu¬ sively to Ireland: rather is he cosmopolitan. Yet, had it not been for his interest in the literary movement in his native land, he would not have paid an 11 years' visit to Dublin, and we should probably be without Evelyn Innes) (1898), and certainly without its sequel, (Sister Teresa (1901), as well as (The Untilled Field) (1903), (The Lake* (1905), and the three volumes, (Ave* (1911), (Salve) (1912), and (Vale) (1914) which make up the indiscreet but fascinating book known as (Hail and Fare¬ well^ In earlier life, he had written poems and criticism, as well as novels so frankly naturalistic as to make the judicious shiver. After his departure from Dublin, he wrote (The Brook Kerith' (1916), a novel dealing with the supposed later life of Jesus and pre¬ senting a revolutionary interpretation of the founder of Christianity. Moore's plays, in ad¬ dition to those written in collaboration, are (The Strike at Arlingford) (1893) ; (The Apostle) (1911), a scenario on which is based (The Brook Kerith) ; a dramatized version of his own novel, Esther Waters-* (1912) ; and Eliza¬ beth Cooper) (1913). A scorner of conven¬ tion, an*

exponent of realism raised to the nth power, a waywrard, many-sided, interesting genius is George Moore. Hon. Emily Lawless (1845-1913), daughter of the third Lord Clon- curry, achieved a certain amount of notoriety with (Hurrish (1886), a story of the Land League. She also wrote historical novels, (With Essex in Ireland* (1890) and*

H. A. Hinkson (d. 1919), has to his credit a few well-known novels, mostly semi-historical, like (Up for the Green and (The King's Deputy.' Shan F. Bullock is a serious novelist, a realist, dealing in the main with the petty country gentry, the small farmers, and the peasants of the Orange counties of the north. Of some dozen works, (The Awkward Squads* (1893), (The Red Leaguers* (1904), and (Thomas Andrews* (1912), may be selected as typical. (Ring O'Rushes* (1896) and (Irish Pastorals* (1901) consist of short-stories or sketches. William Buckley also deals in a realistic way with life in Ulster. His novels are (Croppies Lie Down* (1903) and (Cambia Carty* (1907). Seumas MacManus (b. 1870) wrote some*

verse, but he gained greater celebrity as a lecturer and story-teller than as a poet. Among many books of his, (Through the Turf Smoke (1899) and < Yourself and the Neighbors* (1914) may be particularized. Jane Barlow began her career as a poet with (Bogland Studies* (1892) and she afterward wrote other books of verse, but it is as the author of short-stories and sketches illustrative of certain phases and aspects of peasant life in Ireland that she built up her undoubtedly high reputa¬ tion. Her publications in this class, beginning with (Irish Idylls* in 1892 and continued to the present date (1918), are alarmingly numerous. Among them may be named (Kerrigan's Quality* (1893), (Strangers at Lisconnell**

(1895), and (In Mio's Youth (1917). James Stephens (b. 1882) rose suddenly into fame as a great novelist in 1912, but he had already made his reputation as a poet. His poetical works are Unsurrections* (1909), (The Hill of Vision* (1912), (Songs from the Clay* (1915), (The Rocky Road tp Dublin* (1915), (Green Branches* (1917), and (Reincarnations* (1918). His novels, which rank in a high class, are cThe Charwoman's Daughter* otherwise known as (Mary, Mary* (1912), (The Crock of Gold* (1912), 'Here are Ladies* (containing essays and short stories, 1913), and (The Demi-Gods* (1914). His book, 'The Insur¬ rection in Dublin* (1916), is an account by an eye-witness of the Easter week rising in that year. Patrick MacGill (b. 1891) also won fame in the first instance as a writer of verse with (Gleanings from a Navvy's Scrap-Book* (1911), from which came his sobriquet of <(the navvy poet.** Others of his verses are 'Songs from the Dead End* (1912) and 'Soldier Songs* (1916). He wrote two starkly realistic and much talked-of novels, 'Children of the Dead End* (1914) and its sequel, 'The Rat Pit* (1915). 'The Brown*

Brethren (1916) is one of his books concerning the war. It deals with the doings of a section of the London Rifles at the front in France. Other novelists and novels are Purdon, K. F., (The Folk of Furry Farm* (1914) ; Joyce, James, 'Dubliners* (1914), and (A Portrait of the Artist as a Young Man* (1917): also a play, Exiles* (1918) ; <(Dermot O'Byrne** (Arnold Bax), 'Children of the Hills,* realistic short stories (1913) ; also author of 'Seafoam and Firelight,* poems (1910), and (The Sisters and Green Magic* (1911) ; Lepper, John Heron, 'A Tor}r in Arms* (1916) and 'The North East Corner* (1917); Doyle, Lynn, (Mr. Wildridge of the Bank* (1916) ; Butler, Mary Lambert (Mrs. Thomas O'Nolan), 'The Ring of Day.* Two*

volumes of beautiful stories for children are 'Celtic Wonder Tales) (1910), by Ella Young, and (Heroes of the Dawn) (1913), by Violet Russell. Besides his 'History of Ireland5 (1878-1880), Standish O'Grady in later life wrote a number of historical romances, dealing with various epochs in his country's chequered story. Some of these are 'Red Hugh's Cap¬ tivity } (1889), (Finn and his Companions>

(1892), 'The Bog of Stars) (1893), 'The Com¬ ing of Cuculain> (1894), (In the Wake of King Tames) (1896), 'The Flight of the Eagle) (1897), 'In the Gates of the North > (1901). So politically unclassifiable as to be dubbed with the paradoxical titles of "Radical Aristo¬ crat® and "Fenian Unionist,® O'Grady yet took his own part in Irish politics with his essays, 'The Crisis in Ireland5 (1882), 'Toryism and the Tory Democracv) (1886), and 'All Ireland5 (1898) /in all of which he uses a vigorous and beautiful prose far transcending that usually associated with political disputation. He col¬ laborated in 'Ideals in Ireland) (1901). In 1900 he founded The All Ireland Review, and carried it on for six years. He had other journalistic activities, his latest being in con¬ nection with The New Age and its advocacy of National Guilds and the abolition of the wage-system. A special word must here be said of Eleanor Hull's work, 'The Cuchullin Saga in Irish Literature) (1898). The history of the hero is set out in 14 stories of a fine literary type, while the introduction and notes, as well as the careful collating of texts, give it a distinctly scholarly character. In this respect, it is in marked contrast with Lady Gregory's 'Cuchulain of Muirthemne.5 The whole story of the epic, 'The Cattle Spoil of Cooley, > in which Cuchulain figures so prominently, was done into English prose from the most ancient manuscripts for the first time in 1913 by Joseph Dunn.

Because an essayist is generally something more than that, most of the essayists of the Revival have been already treated under other headings. There are, however, a few who deserve separate mention. Very Rev. Canon Patrick A. Sheehan (1852-1913) wrote three very remarkable books of essays, 'Under the Cedars and the Stars, > 'Parerga,5 and 'The In¬ tellectuals. } Thomas Michael Kettle (1880- 1916) joined the British army in 1914 soon after the outbreak of the great war, and became a second lieutenant in the Dublin Fusiliers. He died from wounds received at Ginchy on 8 Sept. 1916, during the Somme advance. He translated 'Contemporary Ireland) (1908) from the French of L. Paul-Dubois. He also pub¬ lished a volume of essays, 'The Day's Burden5 (1910), dealing with politics, literature, and economics, and two booklets, 'Home Rule Finance> (1911) and 'The Open Secret of Ire- land) (1912). 'Criticism and Courage,5 by Frederick Ryan, author of 'The Laying of the Foundations,) contains some remarkable views, vigorously expressed. Sir Horace Plunkett's 'Ireland in the New Century) (1904) drew forth many angry protests, especially from Irish priests. None of these were abler than Right Rev. Monsignor Michael O'Riordan's 'Catholicity and Progress in Ireland) (1905). Here mention should also be made of 'The Glories of Ireland5 (1914), a series of essays by some of the leading writers of the Revival

and other scholars and litterateurs, setting forth in a unique way and in a manner never before attempted the various activities of the Irish race during 2,000 years. The most distinctive essayist of the Revival is perhaps "John Eglin- ton® (W. Iv. Magee). He is known to and ap¬ preciated by the elect, but he is assuredly rather caviare to the general. He was described by Moore in 'Ave) as "a sort of lonely thorn- tree,® and in his attitude toward some of the manifestations of the Revival he was as the voice of one crying in the wilderness. Sceptical and ironically detached, he was apparently out of touch with the movement of which, never¬ theless, he was an important component part. The distinction he draws between the Modern Irishman (that is, the Anglo-Irishman) and the Mere Irishman, his allusion to Brian Boroimhe, an incontestably great historic figure, as a shadowy person, his flippant and patronis¬ ing attitude toward what he calls "the grand old tongue,® and his denial that the Island of Saints ever produced a saint, by which term he understands a religious genius, would certainly tend to jar the sensibilities of the great majority of his fellow-countrymen, and cause one to doubt whether "John Eglinton® is exactly the man to accomplish the task he proposes, namely, "to introduce new and unassailable ideals of nationality, to sink the wells, of thought beneath the barren surface of tradition, and to bring Ireland into political and spiritual unity.® He has, however, much to say that Irishmen .may find it useful to ponder. His style is beautiful : in the words of Yeats, it is full of "orchestral harmonies.® His matter is not so much literary or social — although it is

something of both — as it is philosophical. Both, for style and matter he makes delightful reading, even for those who may not agree with his tenets. He wrote poems, some of which, of consider¬ able merit, are to be found in .'The Book of Irish Verse) (1895), but he did not attempt either the novel or the drama, and it is as an essayist that he will go down to posterity. His books are 'Two Essays on the Remnant5 (1896), 'Pebbles from a Brook) (1901), 'Some Essays and Passages) (1905, edited by Yeats), 'Bards and Saints) (1906), 'Anglo-Irish Es- says) (1917). He also edited the review Dana during its brief existence from March 1904 to April 1905, and contributed to 'Literary Ideals in Ireland) (1899), there . taking his stand, as he does elsewhere also, in favor of cosmopolitanism as against nationalism in liter¬ ature. He has been called "an Irish Emerson,® and from manv points of view the appellation is an apt one. Stephen Lucius Gwynn (b. 1864), distinguished as poet, novelist, and critic, was elected member of Parliament for Galway in 1906. During the war he joined the British army as a commissioned officer. Two volumes of his verse are 'The Queen's Chronicler and other Poems> (1901) and 'A Lay of Ossian and Saint Patrick (1903). He collaborated with Thomas M. Kettle in producing 'Songs of the Irish Brigade.5 One of his noted novels is 'The Old Knowledge.5 'To-day and To-mor¬ row in Ireland5 (1903) is a collection of his essays on Irish subjects. He wrote the mon¬ ograph on Thomas Moore in the 'English Men of Letters5 series, as well as 'Highways and Byways in Donegal and Antrim,5 'The Decay of Sensibility and other Essays,5 'Tennyson: a

*Critical Study, > 'Memorials of an Eighteenth Century Portrait Painter,) (The Repentance of a Private Secretary,) and 'Robert Emmet.**

Ever since John Mitchcl by his 'Jail Jour- naP popularized that form of writing, there have not been wanting imitators (teste, for ex¬ ample, Michael Davitt), and what may be called In Vinculis literature has its recognized place in the history of Ireland. Recent events have stimulated productivity of this type. We have, amonc other books, 'With the Irish in Frongoch) (1917), by W. J. Brennan Whit¬ more, Frongoch being the Welsh hamlet where some 1,800 Sinn Fein prisoners were confined after the rising of 1916; 'Memories of Mount- joy J (1917), by Sean Milroy, Mountjoy being the name of a Dublin prison which has had an unenviable notoriety thrust upon it; and 'A Chronicle of Jails (1917), by Darrell Figgis, full of hiatuses caused by the deletions of the censor, but*

nevertheless brimful of experiences, because the author suffered three political im¬ prisonments in rapid succession in the short space of two years.

Bibliography. — Hardiman, J., (Irish Min¬ strelsy, or Bardic Remains of Ireland (Dub¬ lin 1831) ; Joyce, P. W., Introduction to 'Old Celtic Romances* (London 1879) ; Larminie, Wfflliam, Introduction to 'West Irish Folk Tales and Romances) (ib. 1893) ; Ryan, W. P., 'The Irish Literary Revival : Its History, Pio¬ neers and Possibilities> (ib. 1894) ; Siger- son, Geo., Introduction to 'Bards of the Gael and GalP (London 1897) ; Gwynn, S. L., 'To¬ day and To-morrow in Ireland) (ib. 1903) ; Yeats, W. B., 'Ideas of Good and EviP (ib. 1903) and 'The Cutting of an Agate* (New York 1912) ; Borsa, M., 'II teatro inglese con- temporaneo) (Milan 1906) ; Paul-Dubois, L., 'L'lrlande contemporaine* (Paris 1907) ; Kell¬ ner, L., 'Die englische Literatur im Zeitalter der Konigin Viktoria) (Leipzig 1909) ; Moore, G., 'Hail and Farewell) (New York 1911-14) ; O'Donoghue, D. J., 'The Poets of Ireland: a Biographical and Bibliographical Dictionary* (Dublin 1912) ; Gregory, Lady, 'Our Irish Thea¬ tre* (New York 1913) ; Weygandt, C., 'Irish Plays and Playwrights) (Boston 1913) ; Jack- son, H., 'The Eighteen Nineties) (New York 1914) ; Mayle, T., 'La litterature irlandaise con- temporaine) (Paris 1913) ; Monahan, M., 'Nova Hibernia* (New York 1914) ; Dunn, T. and Lennox, P. J., 'The Glories of Ireland) (Wash¬ ington 1914) ; Joy, M., 'The Irish Rebellion of 1916 and its Martyrs* (New York 1916) ; Boyd, E. A., 'Ireland's Literary Renaissance* (ib. 1916), 'The Contemporary Drama of Ireland) (Boston 1917), and 'Appreciations and Depre- ciations) (New York 1918) ; Morris, L. R., 'The Celtic Dawn} (ib. 1917) ; The Irish Book Lover, a Monthly Review of Irish Literature and Bibliography (London 1909-18).*

P. J. Lennox,

Professor of English Language and Literature, The Catholic University of America.

IRISH LITERARY SOCIETY, an organ¬ ization established in 1892, in London. Its ob¬ ject is to promote the study of Irish literature, music, art and history. Some of the leading Irish literary men and women of England and Ireland are active or honorary members, and strive in many ways to promote the work of the society. The society provides lecture

courses on topics pertaining to literary Ireland, and it has a large library which may be used by any of its members.

IRISH LITERATURE IN ENGLISH.

The beginning of Anglo-Irish literature can be traced to at least the 14th century. Michael of Kildare (Michael FitzBernard) , a mendicant friar, wrote a collection of poems in Latin and English or Anglo-Norman, and, as one of them has reference to the building of the walls of Ross in 1265, a late date in the 13th century, or an early one in the 14th, may reasonably be assigned to him. Friar Clyn, who died at Kil¬ kenny in 1349, wrote 'Annals,) which are use¬ ful for the happenings of the 25 years preced¬ ing that date. 'The Pride of Life,' a morality play, one of the earliest of its class in the Eng¬ lish language, was written in 1345, and there is ample evidence that mystery and morality plays were performed at Dublin and Kilkenny at dif¬ ferent times in the 14th century. About 1390 Lionel Power wrote the first treatise on music in English. Some annals belong to the 15th century. Bishop Bale of Ossory wrote and pro¬ duced at Kilkenny in 1552 a tragedy and a comedy. Father William Good, an English Jesuit located at Limerick, wrote in 1566, at the request of Camden the antiquarian, a 'Description of the Manners and Customs of the Wild Irish. A little later, Richard Stani- hurst (1547-1618), who was born at Dublin, wrote for Holinshed's 'Chronicles,* published in 1577, a ' Description, * and part of a 'His- tory) of Ireland. In 1582 Stanihurst translated four books of 'Virgil his Aeneis) into quanti¬ tative hexameters on the false prosodic model which Gabriel Harvey and his friends were at that time trying to introduce into English versi¬ fication. James Usher, (1581-1656), a nephew of Stanihurst, was, in intellect and scholarship, one of the greatest men that Ireland ever produced. He was "learned to a miracle® (Selden), the "great luminary of the Irish church® (Johnson), "not unworthy to rank with Duns Scotus® (D'Alton). One of the earliest students of Trinity College, Dublin, he became bishop of Meath, and was afterwards promoted to be archbishop of Armagh and primate of Ireland. His magnum opus is the 'Annales Veteris et Novi Testamenti,* written, like most of his books, in Latin. His works in English are mostly on theological or controversial sub¬ jects. Thomas Campion (1567-1620) is also said to have been born in Dublin. A versatile genius — lawyer, physician, composer of music, and litterateur — he wrote four masques and some really excellent lyrics. Sir John Denham (1615-69), another Dubliner by birth, is still remembered for his poem, 'Cooper's Hill, } in which occurs the celebrated apostrophe to the river Thames. WAntworth Dillon, Earl of Roscommon (1633-84), wrote many transla¬ tions and occasional verses. His best known work is his poetical 'Essay on Translated Verse. * Son of the "great® Earl of Cork, Hon. Robert Boyle (1627-91), one of the most famous experimental philosophers of his age and one of the founders of the Royal Society, was born at Lismore, County Waterford. His writings are voluminous, but are mostly of a technical character. His 'Occasional Reflections on Several Subject s* supplied hints to the two great satirists, Butler and Swift. His brother,*

Roger Boyle (1621-79), who became in turn Lord Broghill and Earl of Orrery, played an important part both in Irish and in English his¬ tory. He was the author of six tragedies and two comedies, of a romance, 'Parthenissa, * and of a (Treatise on the Art of War. * Charles Leslie (1650-1722), son of the bishop of Raphoe and Clogher, abandoned law for the ministry, and became a noted controversialist. Many years of his life were spent in disputes with Catholics, Quakers, Socinians, and Deists. His well-known work, 'A Short and Easy Method with the Deists,* had an immense vogue. Wil¬ liam Molyneux (1656-98) was the only member of the Irish House of Commons to protest against the ratification of that act of the Eng¬ lish Parliament (1698), which was meant to destroy the Irish woolen industry, and suc¬ ceeded in its object. He followed up his pro¬ test by the publication of his 'Case of Ireland being bound by laws [made] in England Stated. * This book, which is now regarded as a classic on the constitutional relations between Ireland and England, was ordered by the English Par¬ liament to be burned by the common hangman. It is noteworthy that Molyneux begins his argu¬ ment by enunciating, in almost the same words, the principles which 78 years later were placed in the forefront of the American Declaration of Independence. John Toland (1670-1722), the Deist, born near Redcastle, County Derry, was the possessor of a pointed and vigorous style. He wrote many books, of which the most famous is Christianity not Mysterious. * This work started the deistical controversy, which plays so prominent a part in the English liter¬ ature of the first half of the 18th century. The Irish Parliament ordered the hangman to burn it. Thomas Southerne (1660-1746), born at Oxmantown, near Dublin, gave up law for the drama and then entered the army, in which he rose to the rank of captain. His prospects of further advancement being cut off by the Revo¬ lution of 1688, he once more turned his atten¬ tion to production for the stage. He has. 11 plays to his credit. His comedies, while amusing, are, in accordance with the taste of the times, of the gross order. His tragedies, (Isabella, or the Fatal Marriage,* and 'Oroonoko,* are pow¬ erful and pathetic. He was the first writer in the English language to denounce the slave trade. George Farquhar (1678-1707) was born at Derrv. From being an actor, he became a playwright, and he has left us eight sparkling comedies, of which the last, 'The Beaux' Stratagem, * is the best. Nahum Tate (c. 1652-1715)," born at Dublin, and Nicholas Brady (1659-1726), a native of Bandon, published in 1696 their joint metrical version o£ the Psalms, which in time took the place of the older trans¬ lation by Sternhold and Hopkins. In 1692 Tate succeeded Shadwell as poet-laureate. He wrote most of the second part of 'Absalom and Achitophel,* with a very good imitation

of Dryden's manner. Toward the end of his life Tate fell on evil days, and he died, a prisoner for debt, in the Mint. Brady wrote a tragedy and a 'History of the Goths and Vandals.) He also translated the '2Eneid into blank verse.*

In the 18th century the volume of Anglo- Irish literature is greatly increased. The first great names that strike us are those of Jona¬

than Swift, Sir Richard Steele, and George Berkeley (qq.v.). Thomas Parnell (1679-1718), member of a family which has played a promi¬ nent part in Irish affairs, was born in Dublin. Entering the Church he became archdeacon of Clogher and rector of Finglas. He contributed to the Spectator and Guardian, and was one of the original members of the famous Scriblerus Club. He wrote much verse. 'A Hymn to Contentment, 'A Night-piece on Death,* arid 'The Hermit* are the best remembered of his works. Francis Hutcheson (1694-1746), born in County Down, was elected a professor at the University of Glasgow in 1729. He occu¬ pies a leading place in the history of 18th cen¬ tury philosophy. His 'Inquiry into the Original of Our Ideas of Beauty and Virtue-* and his 'Essay on the Nature and Conduct of the Pas- sions) gave him a great name among his con¬ temporaries, and his writings have exercised a profound influence on others coming after him, like Hume, Adam Smith, and Reid. Charles Macklin or MacLaughlin (c. 1700-97), born in County Westmeath, was an actor who re¬ mained on the boards for the extraordinary term of 70 years. He wrote a tragedy and many comedies and farces. His masterpiece is 'The Man of the World,) a farcical comedy, in which is introduced Sir Pertinax MacSyco- phant, one of the traditional burlesque char¬ acters of the English stage. Thomas Amory (c. 1691-1788), probably born in County Clare, is still remembered for his eccentric book, 'The Life of John Buncle, Esq.* Another of the bizarre figures of this period is Laurence Sterne, author of 'Tristram Shandy) and (A Sentimental Journey.) Hugh Kelly (1739-77), born at Dublin, the son of a publican and him¬ self at first a staymaker, had a varied career, being successively attorney's clerk, newspaper writer, dramatic critic, essayist, novelist, play¬ wright, and barrister-at-law. His novel is 'Louisa Mildmay, or the History of a Mag¬ dalen. } His first comedy, 'False Delicacy,* which was a great success on the stage and a still greater one in book form, raised him from poverty to comparative wealth, and gave him a European reputation when translated into Ger¬ man, French, and Portuguese. His later come¬ dies and a tragedy were failures, nor did he, on retiring from stage-work for the last three years of his life, achieve any great success at the bar. Charles Coffey (d. 1745) wrote several operettas and burlesque operas, the best known of which is 'The Devil to Pay, or the Wives Metamorphosed.* John Cunningham (1729-73) wrote a successful farce, 'Love in a Mist,* when he was only 17. He also wrote elegies and pastorals. Isaac Bickerstaffe*

(1732-1816), a name made famous by Swift and later by Steele, was born at Dublin, and was probably the son of a locksmith. He was a page to Lord Chesterfield and afterward an officer in the army. He produced between 1756 and 1805 a number of musical farces, comic operas, com¬ edies, farces,- and burlettas, and also an oratorio, ‘ Judith.) In his comic opera, ‘Love in a Vil¬ lage, occurs the well-known song, ‘We all love a pretty girl — under the rose.* Henry Brooke (c. 1703-83) was born at Rantavan, County Cavan. He was a very voluminous writer of verse and prose. He is now best remembered for his celebrated novel, ‘The Fool*

of Quality.5 His tragedy, ‘Gustavus Vasa,5 was barred from production in London, but was afterward put on the stage in Dublin as ‘The Patriot.5 His daughter, Charlotte Brooke (c. 1750-1803), was a pioneer of the Celtic Renaissance, for she endeavored to revive in¬ terest in the native literature of Ireland by the publication of her series of translations entitled ‘The Reliques of Irish Poetry) (1789). She also published in 1795 at least one number of a Gaelic magazine, Bolg Tsolair, and a volume of Translations, (Laoi na Sealge.5 She wrote a tragedy, ‘Belisarius,5 and a novel, (Emma, or the Foundling of the Wood.5 Charles Johnstone (c. 1719-1800), a County Limerick man, was the author of several satirical ro¬ mances, of which (Chrysal, or the Adventures of a Guinea,) had the greatest reputation. Samuel Johnson read this work in manuscript and .advised its publication, and Sir Walter Scott a few years later said that the author of ‘Chrysal5 deserved to rank as a prose Juvenal. Johnstone also wrote a picaresque novel, ‘The History of John Juniper, Esq., alias Juniper Jack.5 Arthur Murphy (1727-1805), born at Clooniquin, County Roscommon, was biog¬ rapher, translator, poet, and playwright. Edu¬ cated at Saint Omer, he became in turn a clerk, a journalist, an actor, and a barrister. Among his tragedies are (The Orphan of China, 5 (The Grecian Daughter,5 and ‘Arminius.5 His com¬ edies and farces, such as ‘The Apprentice,5 (The Upholsterer,) ‘The Way to Keep Him,5 and (All in the Wrong, 5 are excellent. He was appointed in 1798 a commissioner of bankruptcy. Oliver Goldsmith, who in Johnson’s well-known phrase, tried nearly every kind of writing and touched none that he did not adorn, Edmund Burke, great orator and political philosopher, and Richard Brinsley Sheridan (qq.v.), eloquent speaker and famous playwright, hold, each of them, a pre-eminent rank among the Irish writers of English. Rev. Philip Francis (c. 1708-73) made something of a name as a trans¬ lator of Horace and Demosthenes and as an author of tragedies. His son, Sir Philip Fran¬ cis (1740-1818), is the reputed author of the sensational ‘Letters of Junius, 5 which appeared in the Public Advertiser between 21 Jan. 1769 and 21 Jan.

1772. William Drennan (1754- 1820), born in Belfast and son of a Presby¬ terian clergyman, took an active part in found¬ ing the organization of the United Irishmen, and was prosecuted for sedition, but escaped punishment. His stirring lyrics were extremely popular and had a widespread effect. His 'Erin5 was considered by Moore to be one of the most perfect of modern songs. This is the piece that first gave to Ireland the title of the Emerald Isle. Mary Tighe (1772-1810), daugh¬ ter of Rev. William Blachford, was born in Dublin. Her (Psyche, or the Legend of Love,5 an adaptation of the story of Cupid and Psyche from the (Golden Ass) of Apuleius, is writ¬ ten in the Spenserian stanza, which she handled with great freedom and ease. This and her other poems won her a considerable reputation. Moore paid her a delicate compliment in 'Tell me the witching tale again, 5 and Mrs. Hemans bewailed her untimely death in 'The Grave of a Poetess.5 John O'Keeffe (1747-1833), the most prolific of Irish dramatists, was born in Dublin. He wrote comedies, musical pieces,

comic operas, pantomimes, interludes, burlettas, pastoral dramas, and poems. His comedy, (Wild Oats,5 had something enduring in it, for, after more than 100 years, it still keeps the stage. Some of his songs, like (I am a Friar of Orders Grey5 and (The Ploughboy,5 are famous. O'Keeffe was meant to be a painter, but gave up that profession in order to become an actor, and then developed into a playwright. For many years of his long life he was totally blind. In 1826 he was given a pension of 100 guineas a year from the king's purse. Among the great Irish orators of the end of the cen¬ tury were Henry Flood (1732-91), Henry Grat¬ tan (1746-1820), and John Philpot Curran (1750-1817). Andrew Cherry (1762-1812), born at Limerick, became an actor and afterward an actor-manager. He wrote some comedies, of which the best-known is perhaps 'The Soldier's Daughter.5 His songs, 'The Green Little Shamrock of Ireland,) 'The Bay of Bis¬ cay/ and Tom Moody, the Whipper-in,5 bid fair to be immortal.

Other famous song-writers and songs, of different periods, are Thomas Duffett (fl. 1676), author of (Come, all you pale lovers) ; Arthur Dawson (c. 1695-1775), 'Bumpers, Squire

Jones,5 one of the best Bacchanalian ditties in the language; George Ogle (1742-1814), (Molly Asthore) and (The Banks of Banna5 ; Richard Alfred Milliken (1767-1815), the grotesque (Groves of Blarney5 ; Edward Lysaght (1763- 1809), (Our Ireland5 and 'Kate of Garnavilla5 ; Henry Brereton Code (d. c. 1830), 'The Sprig of Shillelagh5 ; Charles O'Flaherty (1794-1828), 'The Humour of Donnybrook Fair5 ; George Nugent Reynolds (c. 1770-1802), (Kathleen O'More5 ; James Orr (1770-1816), 'The Irish¬ man5; Rev. Charles Wolfe (1791-1823), (If I had thought thou couldst have died5 and (The Burial of Sir John Moore5 ; Rev. Luke Aylmer Connolly, (d. c. 1833), (By Rathlin's Isle I Chanced to sail5 ; Louisa

Crawford (c. 1790- 1858), (Kathleen Mavourneen5 and (Dermot Astore5 ; James Tighe (1795-1869), 'He sleeps in the vale, near the brook and the willow5 ; John Augustine Wade (1796-1845), 'Meet me by moonlight alone5 and 'I've wandered in dreams5 ; Garret Wellesley, Earl of Morning- ton (1735-81), (Here in cool grot5 and 'Come, fairest nymph5 ; Leonard McNally (1752-1820), 'The Lass of Richmond Hill5 ; Samuel Lover (1797-1868), 'Barney O'Hea,5 (The Low- backed car,5 and (I'm not myself at all5 ; Thomas Quinton (1797-1860), (Fill a cup5; Joseph O'Leary (c. 1801 — c. 1845),

91), and 'The Irish Lullaby.'

The spread of education and the increasing use of the English language instead of the Irish in the 19th century produced a correspond¬ ingly increased output of literature, to which, in addition, a wonderful impetus was given by the great political events, like the move¬ ments for Catholic Emancipation in the 20's and for Repeal of the Union in the 40's, the risings of '48 and '67, and the Home Rule and Land League agitations of the 70's, 80's and 90's. The establishment of the Nation news¬ paper in 1842 was another potent factor in stimulating Irish writers of English. Toward the end of the 19th and the beginning of the 20th century, the influence of the Celtic Re¬ naissance made itself perceptibly felt in Ire¬ land, resulting in the foundation of the Gaelic League and of various literary societies, in the establishment of the Sinn Fein and Irish- Ireland parties, and in the start of the Irish literary revival, all of which tended to pro¬ mote a marked activity in Anglo-Irish literature.

The novel-writers of the earlier part of this period may be said to be headed by Maria Edgeworth (1767-1849), who, although born in England, is, from family connections, long residence in Ireland, and the tone and temper of her principal works, usually classed among Irish authors. She wrote 'Moral Tales,' 'Pop¬ ular Tales,) 'Tales of Fashionable Life,' 'Belinda,' and many more, but she is now principally remembered for her works dealing with Irish life and conditions, especially 'Castle Rackrent' and 'The Absentee.' Even these have rather gone out of fashion, but they were a revelation at the time of their production. They impressed Sir Walter Scott so much that he decided to try to do for Scotland what she had done for freland, and at a later period they inspired Turgenev to do similarly for Russia. Elizabeth Hamilton (1758-1816), born at Belfast, wrote songs and poems and various novels, of which latter 'The Cottagers of Glenburnie' was the most popular. The mem¬ ory of Regina Maria

Roche (c. 1764—1845), born at Waterford, is still kept alive by 'The Children of the Abbey.' The Rev. William Hamilton Maxwell (1794-1850), born at Newry, originator of the novel of military life, wrote exciting and popular stories like 'Wild Sports of the West,' 'Hector O'Halloran,' 'Captain Blake,' and 'Stories of Waterloo.' The Rev. Charles Robert Maturin (1782-1824), born at Dublin, was the author of several stories, the most famous being 'Melmoth the Wanderer' and 'The Albigenses.' He also wrote three tragedies, 'Bertram, or the Castle of Saint Aldobrand, ' 'Manuel,' and 'Fredolfo.' Michael James

Whitty (1795-1873), born at Wexford, wrote 'Tales of Irish Life,' a very successful book, which was translated into French and German. His son, Edward Michael Whitty (1827-60) was author of the remarkable novel, 'Friends in Bohemia.' Matthew Archdeacon (c. 1 800— 1853 or 1862), born at Castlebar, County Mayo, wrote 'Legends of Connaught,' 'Connaught in 1798,' 'The Priest Hunter,' and 'Everard.' William Carleton (q.v.) occupied the centre of the Irish literary stage for the long period from 1830 to his death in 1869. Great, however, as were his claims on the reading public, there were others who pressed him close. Gerald Griffin (1803-40), born at Limerick, went to London to seek his fortune, retired from the world when he had begun to attain success, and died as a Christian Brother in his 37th year. His powerful story, 'The Collegians,' afterward dramatized by the Dublin-born Dion Boucicault (1822-90) as 'The Colleen Bawn,' and later turned into an opera as 'The Lily of Killarnev,' is by some critics claimed to be the greatest Irish novel. Other stories by Griffin are 'Hol- land-tide Tales,' 'Tales of the Munster Festi¬ vals,' and 'The Invasion.' He also wrote a tragedy, 'Gisippus,' and some beautiful short poems. John Banim (1798—1842) and his brother, Michael Banim (1796-1874), wrote jointly 'Tales of the O'Hara Family,' and, besides, each wrote several novels separately. John Banim's best stories are perhaps 'The Boyne Water' and 'The Nowlans' ; Michael's, 'Crohoore of the Billhook' and 'The Croppy.' Furthermore, John Banim wrote several trage¬ dies and essays and a long and elaborate poem, 'The Celt's Paradise.' His lyric, 'Soggarth Aroon,' is celebrated. Samuel Lover (1797— 1868), born in Dublin, was a versatile genius — novelist, poet, painter, musical composer, ed¬ itor, and public entertainer. His novels, 'Handy Andy' and 'Rory O'More,' are well con¬ structed and sparkle with wit and humor. He wrote about 300 songs, including those already named, and composed the music for most of them. Besides, he wrote a burletta, 'll Paddy Whack in Italia,' and an extravaganza, 'The Happy Man,' as well as several comic dramas and metrical tales. Charles James Lever (1806-72), born at Dublin, was one of the most popu¬ lar and prolific, as well as one of the most humorous, of Irish novelists. Scattered here and there through his books are numbers of rollicking songs. 'Harry Lorrequer,'

‘Charles O’Malley,’ and ‘Tom Burke of Ours,’ to name only three out of a large total, may be taken as among his typical novels. Lady Morgan (c. 1778-1859), daughter of Robert Owenson or MacOwen, wrote many novels, such as ‘The ‘Wild Irish Girl, ‘O’Donnell,’ and ‘Florence McCarthy,’ besides a comic opera, books of travel and many poems. Capt. Thomas Mayne Reid (1819-83), born at Crosskilt, County Down, emigrated to America in 1838, served as a captain in the Mexican War, and had a very adventurous career. He is still considered one of the best writers of stories of adventure for boys. His books are very numerous. The best known are perhaps ‘The Rifle Rangers,’ ‘The Scalp Hunters,’ and ‘The White Chief.’ Joseph Sheridan Lefanu (1814-73), born at Dublin, was a grandson of Alicia Lefanu, sister of Richard Brinsley Sheridan. Lefanu’s novels,

such as ‘Uncle Silas,’ ‘The House by the Churchyard,’ and ‘In a Glass Darkly,’ are weird and powerful, nor are they wanting in humor. His Irish historical novel, ‘Torlogh O’Brien,’ is one of the best of its class. He was the owner of several Dublin newspapers and did much political writing. His poems, ‘ Shemus O’Brien’ and ‘Phadrig Crohoore, ’ are still popular recitations. Many of Lefanu’s sketches, stories, and poems were collected after his death and published under the title of ‘The Purcell Papers.’ Marmion Wilmo Savage (c. 1805-72), who is said to have been the inventor of the phrase ‘Young Ireland,’ wrote some witty and caustic novels, among which are ‘The Bachelor of the Albany,’ ‘The Fal¬ con Family,’ and ‘Reuben Medlicott.’ Myles Gerald Keon (1821-75), born at Keon Brook, County Leitrim, wrote novels, like ‘Dion and the Sibyls ’ and ‘Harding, the Money-Spinner,’ which had a great but rather ephemeral reputa¬ tion. In ‘Realities of Irish Life,’ William Stewart Trench (1808-72) produced a clever but somewhat unfair work. Charles Joseph Kickham (1828-82), born at Mullinahone, County Tipperary, was on the staff of The Irish People at the crisis of the Fenian movement, was arrested and tried for treason-felony, and was sentenced to 14 years’ penal servitude. His novels, ‘Sally Cavanagh,’ ‘For the Old Land,’ ‘Knocknagow,’ and ‘Elsie Dhuv,’ contain de¬ lightful pictures of Irish life and are brimful of humor and pathos. ‘Knocknagow’ is ranked as one of the really great Irish novels. It has been translated into Irish. His ‘Rory of the Hill’ is one of the best known Irish “rebel” poems. Justin McCarthy (1830-1912), born at Cork, was for the greater part of his life a journalist. He became a member of the British House of Commons in 1879 and was chairman of the Irish Parliamentary party from 1890 to 1896. He was a prolific and successful writer of novels, which are generally skilful m plot, incident, and character drawing, show traces of a gentle satire, and are written in a beautiful style.

'Dear Lady Disdain,' 'A Fair Saxon,' 'Donna Quixote?' and 'My Enemy's Daughter' are perhaps the best known. He was also poet, essayist, biographer, and his¬ torian. His 'History of Our Own Times' is his most important historical work. His son Justin Huntly McCarthy (b. 1860) is also well known as poet, novelist, historian, and play¬ wright. His farcical comedy, 'The Candidate ' was a great success. Other good plays of his are 'My Friend, the Prince' and 'If I Were King.' He has also made a fine rendering of the 'Rubaiyat' of Omar Khayyam. The Very Rev. Canon Patrick A. Sheehan (1852-1913) made a great^ name as a delineator of clerical life in 'My New Curate' and 'Luke Delmege,' and, in addition, he wrote other novels, as well as poems and graceful essays. Other novelists are Miarguerite Powei, Countess of Blessinston (1789-1849) ; Mrs. S. C. Hall (1800-81) ; Rosina, Lady Lytton (1802-82); Jemima Montgomery Baroness Tautphoeus (1807-93); John Fisher Murray (1811-65), 'The Viceroy'; Mrs. Bell Martin (1815-80) ; Frances Brown (1816—79) • Lady Emily Ponsonby (1817-77); Julia Kava- nagh (1824-77); Annie Keary (1825-79) Castle Dalv' ; Frances Marcella O'Brien (1840- 83); Katharine Mary Murphy (1840-85), 'Shane the Proud'; Charles Anderson Read

(1841-78), 'Ailcen Aroon' ; Elizabeth Casey (c. 1845-94); Charlotte Grace O'Brien (1845- 1909), 'Light and Shade'; Richard Dowling (1846—98), 'The Mystery of Killard' ; Hester Sigerson (d. 1898), 'A Ruined Race'; Char¬ lotte O'Conor Eccles (d. 1911), 'The Rciuvena- tion of Miss Semaphore' ; Katharine Thurston; Mrs. Cashel Hoey (b. 1830) ; Mrs. J. H. Rid¬ dell (b. 1832); James Murphy (b. 1839), 'The Forge of Clohogue' ; Mrs. Margaret T. Pender; Mrs. Sarah Grand, 'The Heavenly Twins' ; Rosa Muiholland, Lady Gilbert (h. c. 1850), 'The Wild Birds of Killevy' ; Clara Mulhol- land ; William O'Brien (b. 1852), 'When We Were Boys' and 'A Queen of Men'; Richard Ashe King (b. c. 1852), 'The Wearing of the Green'; Edmund Downey (b. 1856), 'Through Green Glasses' ; and Very Rev. Canon James Owen Hannay ("George Birmingham"), 'The Seething Pot' and 'Spanish Gold.'

The Irish poets of the 19th century are very numerous. In its earlier part all are more or less dwarfed by the outstanding genius and immense productivity of Thomas Moore (q.v.). Rev. Henry Francis Cary (1772-1844) is well known as the translator of Dante, Aristophanes, Pindar, and several early French poets. Thomas Dermody (1775— 1802), born at Ennis, County Clare, brought out two volumes of poetry dur¬ ing his lifetime. After his death, his collected poems were published under the title of 'The Harp of Erin' in 1807. Sir Aubrey De Vere (1788-1846), born at Curragh Chase, County Limerick, was the author of ' Lilian the Apos¬ tate,' a dramatic poem; 'The Duke of Mercia,' a historical drama; 'The Lamentations of Ire¬ land'; and 'A Song of Faith, Devout Exer¬ cises, and Sonnets.' After his death, his 'Mary Tudor,' a historical drama, was

published. His son, Sir Stephen De Vere (1812-1904), trans¬ lated the 'Odes' of Horace and wrote several songs, including 'The Snowy-breasted Pearl ' already mentioned. Sir Stephen's brother Au¬ brey Thomas De Vere (1814-1902), was the most distinguished of a highly literary family. He wrote a great deal of poetry, some of it excellent. His best known works are 'Innis- fail,' 'May Carols,' and 'Legends of Saint Patrick.' He was also a clever craftsman in the sonnet. His prose works include 'English Misrule and Irish Misdeeds,' 'Picturesque Sketches of Greece and Turkey,' and two vol¬ umes of 'Essays.' John Martin Anster (1793- 1867), born at Charleville, County Cork, wrote an 'Ode to Fancy and other Poems' and sev¬ eral translations from Goethe, Schiller, and De

Toao'7x °Jte Fou9uˆ Thomas Furlong (1794- !827), born at Scarawalsh, County Wexford, wrote The Misanthrope,' 'The Plagues of Ire¬ land,' and 'The Doom of Derenzie. ' Many of his translations from the Irish appeared in Hardiman's 'Irish Minstrelsv' in 1831 lere- miah Joseph Callanan (1795-1829), born at Cork, who has been described as "the first of the really Irish writers of English verse," was an admirable poet. He wrote 'The Recluse of Inchiaony and other Poems.' Some of his short pieces, like 'The Lay of Mizen Head,'

A vo n dh u,' and, especially, 'Gougane Barra,'

VoJAbˆCOme fˆm,°Vs- George Darley (1795- 846), born at Dublin, was not onlv a poet but ajso a first-class, mathematician, and he pub¬ lished some scientific books. Among his poetical works are 'The Errours of Ecˆtasie >

a dramatic poem; (Labours of Idleness';

(Sylvia, or the May Queen,' a lyrical drama;

(Nepenthe ' ; (Thomas a Becket' and (Ethel- stan,' both dramatic chronicles; and (lhe Lammergeier.) Darley was considered by some of his distinguished contemporaries to be an excellent poet. John Francis Waller (1809-94), born at Limerick, was a prolific verse writer and general litterateur. He was editor of The Dublin University Magazine, and wrote largely for annuals and monthlies. His publications include (The Slingsby Papers,' in prose and verse; (Ravenscroft Hall and other Poems'; (The Dead Bridal, a Tale of Venice' ; (Peter Brown, Poet and Peripatetic' ; and (Festival Tales.' Many of his songs were set to music bv distinguished composers. Sir Samuel Fer¬ guson (1810-86), born at Belfast, is among

the best of the Irish poets, and there are not want¬ ing good judges who class him as the greatest of all. He was a barrister, but ceased to prac¬ tise law when, in 1867, he was appointed deputy- keeper of the public records in the Irish Record office. He made his poetical reputation in the first instance with (The Forging of the Anchor,' published in Blackwood' s Magazine. This was followed by (Lays of the Western Gael' ; /Con- gal,' an epic poem in five books; and 'Deirdre, a one-act drama. (Hibernian Nights Entertain¬ ments' is a collection of prose stories varied bv verse. His humorous prose work, Father Tom and the Pope,' had an immense popularity.

Thomas Osborne Davis (1814— 45), born at Mallow, County Cork, made a profound impres¬ sion on his own and succeeding generations ox. Irishmen He joined Sir Charles Ga\an Duff}' and John Blake Dillon in founding the Nation newspaper in 1842, and in the short interval that elapsed before his death he came to be recog¬ nized as the national poet par excellence, and the real leader of the Young Ireland party. Some of his pieces, like (My Land, < Fonte- noy,' and

(1823-1907); Thomas Devin Reilly (1824-54); Michael Joseph McCann (>c. 1824—83) ; Ihomas D'Arcy McGee (1825-68) ; Richard Oulahan (c 1825-95) ; Mary Anne Kelly l((Eva»], afterward Mrs. Kevin Izod O'Doherty (c. 1825-1910); Jane Francesca Elgee 1 <(Speranza" J, afterward Lady Wilde (c. 1826-96), mother of the cele¬ brated Oscar Wilde (1854-1900) ; Ellen Down¬ ing [((Mary"I (1828-69) ; Joseph Brenan Q828- 57) ; John Cashel Hoey (1828-92) ; John Charles Fitzgerald (fl. 1842) ; John Coen (fl. 1842) ; M. J. O'Keeffe (fl. 1843-48) ; J. S. O'Sullivan (fl. 1843) ; and Thomas Dillon (d. 1852).*

James Clarence Mangan (1803-49), born at Dublin, was the greatest of the poets of the Young Ireland party and one of the greatest Anglo-Irish poets. He translated from many languages. His (Dark Rosaleen' and c Twenty Golden Years Ago' are very well known, but many others of his lyrics are just as well de¬ serving of mention. Denis Florence McCarthy (1817-82), born at Dublin and professor of English literature for many years at the Catho¬ lic University there, translated into pure and beautiful English verse the dramas of Calderon, and was awarded the medal of the Royal Acad¬ emy of Spain. Besides, he wrote many original poems, such as (The Bell-Founder, (The Bridal of the Year,'

other papers, was imprisoned in 1867 for his par¬ ticipation in the Fenian

movement. He died in his 24th year, and it is said that 50,000 persons attended his funeral. His (Rising of the Moon) is a stirring "rebel? poem. His love-poems, like (Grade og Machree/ (Maire, my Girl/ and (The Colleen Rue/ approach those of Burns.

The Irish historians and biographers of the 19th century are headed by Rev. John Lanigan (1758-1828), whose learned Ecclesiastical His¬ tory of Ireland/ published in four volumes in 1822, is an enduring monument to his fame. Sir William Napier (1785-1860), himself a soldier, wrote a valuable (History of the War in the Peninsula/ Rev. James Wills (1790-1868) was author of (The Irish Nation, its History and Biography/ as well as of many poems. Richard Robert Madden (1798-1866) contrib¬ uted greatly to the elucidation of historical, bio¬ graphical, and literary details by his (Lives of the United Irishmen/ (Life of Lady Blessing- ton/ (History of the Penal Laws/ (History of Irish Periodical Literature/ and Eiterary Re¬ mains of the United Irishmen/ He also wrote much verse. John Cornelius O'Callaghan (1805-83) wrote (The Irish at Home and Abroad/ (History of the Irish Brigades in the Service of France/ and (The Irish in the Eng¬ lish Army and Navy/ He was also author of (The Green Book/ in prose and verse. (The Cromwellian Settlement of Ireland/ by John P. Prendergast (1808-1893), is a work of great research. John Mitchel (1815-75), in his < Jail Journal/ (The Last Conquest of Ireland (Per¬ haps)/ and the (Apology for the British Gov¬ ernment in Ireland/ has made a clever' but bit¬ ter arraignment of English maladministration in his native country. Sir Charles Gavan Duffy (1816-1903), who was one of the leaders of the Young Ireland movement and afterward rose to a position of eminence in Australia, left mono¬ graphs, valuable because of his first-hand knowledge, on (Young Ireland) and Eour Years of Irish History/ He also wrote a (Life of Thomas Davis/ Some of his poems are still quite popular. Very Rev. Canon John O'Hanlon (1821-1905), scholar and hagiologist, was author of (The Lives of the Irish Saints/ Over the signature of "Lageniensis" he pub¬ lished some volumes of verse. Thomas D'Arcy McGee (1825-68) was a very remarkable man, equally renowned as statesman, orator, historian, and poet. He took an active part in the Young Ireland movement, but his attitude toward the Fenian rising of 1867 brought about his assassi¬ nation. He wrote numerous historical works, the chief of which are (Irish writers of the Sev¬ enteenth Century/ (History of Ireland/ (His- tory of the Irish Settlers in America/ and Eife of Art McMurrough/ He also wrote a great deal of verse. Patrick Weston Joyce (1827- 1914), an indefatigable toiler, produced several valuable works, including (Origin and History of Irish Names of Places/ (A Short History of Ireland/ and (Social History of Ancient Ire¬ land/ William John Fitzpatrick (1830-95), in (The Life and Times of Dr. Doyle) and other biographies, rendered highly useful service. Another writer of interesting

biographies was Joseph Fitzgerald Molloy (1859-1908). The greatest of modern Irish historians is undoubt¬ edly William Edward Hartpole Lecky (1838- 1903). His J Leaders of Public Opinion in Ire¬ land J and his (History of England during the

Eighteenth Century' (which includes five sepa¬ rate volumes on Ireland) are in a class by themselves. His (History of European Morals from Augustus to Charlemagne' is a standard work. Richard Barry O'Brien (1847-1918) wrote Lives of C. S. Parnell, Lord Russell of Killowen, and Thomas Drummond. His (Fifty Years of Concessions to Ireland' and other his¬ torical works show a painstaking investigation of the vexed -relations between Great Britain and Ireland. Other historical writers are Wil¬ liam Cooke Taylor (1800-49); Martin Haverty (1809-87), (History of Ireland'; Rev. Charles Patrick Meehan (1812-90), (Fate and Fortunes of Tyrone and Tyrconnell' ; and Alexander Martin Sullivan (1830-84), (The Story of Ire¬ land' and (New Ireland/ Eminent archaeolo¬ gists were George Petrie (1789-1866) ; Rev. James Henthorn Todd (1805-69) ; and Sir John Thomas Gilbert (1829-98).

The principal essayists were James Fintan Lalor (d. 1849), whose theories on the private ownership of land, contributed to the Nation and the Irish Felon, were afterward given a wide circulation in the writings of Henry George; Rev. Joseph Farrell (1841-85), author of the delightful Essays of a Certain Profes¬ sor;' and Frances May Synge, afterward Mrs. James Owen (1842-83), whose posthumously published book, Essays and Poems/ contains papers on Shakespeare, Wordsworth, Browning, and other poets. The two great wits and schol¬ ars were William Maginn (1793-1842) and Rev Francis Sylvester Mahony, "Father Prout," (1804-66). Maginn was for several years one of the regular contributors to Blackwood' s Magazine , and later became editor of Fraser's Magazine. It was he who conceived the idea of the (Noctes A.mbrosian3e' and wrote much of it. His parodies, stories, essays, reviews, etc., were collected and published as ˆThe Maxims of Sir Morgan O Doherty' and (Shakesperean Papers — Pictures Grave and Gay/ He also wrote (Homeric Ballads' and seVeral noveis Mahony was a priest who abandoned his sacer¬ dotal functions and became a journalist. He wrote for many magazines, such as Fraser's Bentleys Miscellany, and the Cornhill. His works are contained in Eeliques of Father Prout' and (Final Reliques of Father Prout.'

Other later writers are dealt with in the arti¬ cle on the Irish Literary Revival.

Bibliography.— O'Donoghue, D. J.,

. r- J- LENNOX,

ˆ tofpsso? of English Language and Literature The Catholic University of America.

MELODIES. Thomas Moore j ’ though of humble Irish extraction

and a Roman Catholic, made a social success in London as a young man by his charming personality and his ability in singing his own Odes of Anacreon.’ To continue this success le composed Irish Melodies’ at intervals be¬ tween 1808 and 1834. He was not disappointed in his venture. These songs augmented his welcome in society, and when published, eventu¬ ally with the express stipulation that the author sing them in great houses, brought him £12 810

IRISH MOSS — IRISH MUSIC

349

Yet (Irish Melodies) do not owe all their fame to Moore’s playing minstrel for himself. 1 he captivating music supplied by Sir John Steven¬ son, the themes of the songs and their author’s poetic skill were greater reasons for success. Moore, who had known Robert Emmet and had sympathized with the United Irishmen, deftly turned the hopes and wrongs of Ireland, with the usual admixture of love, war and honor, to picturesque and sentimental, but never to dangerous or revolutionary purposes. No subjects are more popular, especially among comfortable people, with no occasion to use the stern virtues with which the poet adorns his song. Moore owed much also to his melodious, if facile and insipid, verse, and to his ease in handling the conventional romantic imagery. This skill appears at its best in such splendid openings as ((Oh ! breathe not his name,® with its reference to the fate of Emmet, l

William Haller.

IRISH MOSS, an edible dulse or seaweed. See Carrageen.

IRISH MUSIC. Guided by the authority of Irish ecclesiastical and secular literature, we are able to follow with certainty the general history of Irish music to a period much earlier than the introduction of Christianity into Ire¬ land. In the ancient records of Ireland music blends itself so intimately with the life of the people that its history is as old as the history of the Irish race itself.

The old Irish musicians, so far as we are aware, used no musical notation. It is certain, indeed, that the airs forming the great body of Irish music are of very remote antiquity; but we are not able to trace their exact form and setting farther back than the time when they first began to be written down.

In this respect the Irish are in exactly the same posi¬ tion as their Scotch neighbors. _ The ancient Irish evidently possessed a music constructed upon the old gapped quinque-grade scale, ob¬ tained from a circle of fifths, and possessing, no doubt, the peculiar rhythm which is still characteristic of Irish melody. The introduc¬ tion of the Cantus firmus by the Church made the Irish musicians acquainted with the diatonic scale As this scale also originated from a circle of fifths, it only differed from the gapped scale by the addition of two notes. The seculai and church music being thus constructed in similar keys, it follows that, with the exception of the rhythm, there was nothing in old Irish secular music foreign to the system of the church music. Hence the latter influenced the former to such an extent that, in the case of many of the best Irish airs, it is difficult to say whether they were composed according to the old gapped quinque-grade scale or in one of the church modes. The polish and artistic style which distinguish genuine Irish harp airs

are unquestionably due to the influence of the ecclesiastical chant. Indeed it is traditionally remembered that religious hymns were sung to many of the finest old Irish airs.

In the Middle Ages the music of the Irish was strictly homophonous, and remained essen¬ tially of the same character down to the ex¬ tinction of the Irish harp about the time of the famine of 1847, as is proved by the use of the old keys of the gapped quinque-grade scale, more or less modified by the diatonic system of the old church chant and by the maintenance, even to the present time, of one of the most marked and antique characteristics of Irish music — the omission of the semi-tones. It requires no discussion to show that the prin¬ ciples of the harmony which grew up during the 14th, 15th, 16th and 17th centuries, and which have created a gulf, as it were, between modern and ancient music, could not have been applied to Irish music without obliterating all traces of the antique characteristics above mentioned, and otherwise profoundly modifying its whole character. But if the Irish Timpan resembled the Welsh Crwth of the 18th century, as has been very probably the case, the Irish must have been acquainted with the rudiments of harmony. We have no means of knowing to what extent this rude harmony was used or when it was first introduced. It was probably the primitive Organum introduced into Ireland from the Continent and not a species invented in Ireland itself. It may safely be assumed that the practice of harmony was of ecclesias¬ tical origin and could only have grown up where the artistic music of the Church was not only performed but noted. Meagre as are the references to polyphonous music in Irish manu¬ scripts, we may be sure that each successive advance in harmony became known in Ireland. Norman minstrels brought the music, the in¬ struments and the dances of France into Ire¬ land in the 13th and 14th centuries. During the same period Anglo-Norman ecclesiastics intro¬ duced

the polyphonous church music, then be¬ ginning to assume great importance in the churches of France and Flanders. There is reason to believe that Discant was known among Irish ecclesiastics. The Burdoon method of singing, which still persists in remote parts of the Gaelthacht, or Gaelic-speaking portion of Ireland, is a species of Organuni, or har¬ monic accompaniment apparently derived from a French source.

Even where social and political conditions were favorable to the growth of art, the prac¬ tice of the complicated artistic polyphony of the 14th and 15th centuries required resources which could only be found in the courts of princes, in large cathedrals or in rich abbeys. Notwithstanding the great intercourse between Ireland and France and the Low Countries at the period when Flemish polyphony was at its zenith, the unhappy political and social state of Ireland was wholly incompatible with the artistic cultivation of music. The introduction of Protestanism arrested the fusion of the native Irish and the English colonists, and the growth of those political institutions which would have been the necessary outcome of such a fusion; it also completely isolated Irish music. Irish harpers no longer wandered over Europe; French jongleurs and minstrels had indeed al-

ready ceased to visit Ireland, according as Eng¬ lish supplanted French as the language of the Norman nobility. The Catholics, deprived of their cathedrals and abbeys, and ultimately for¬ bidden all public worship, could no longer use even the simple chants of the Church. The new harmonic music, which received in one direction so powerful an impulse from Protes¬ tantism, was introduced into the Protestant churches of the cities ; but it exerted no influ- enceˆ whatever on the popular music, owing to the impassable gulf which existed between the Iiish people and the whole Kn,glish system, political and religious.

At the beginning of the 18th century the native Irish were for the moment effectually crushed ; the Catholic gentry were either pau¬ perized or in exile. At the cost of the intel¬ lectual death of the majority of the Irish people, the minority at home purchased a certain kind of tranquillity, and this in turn led to the par¬ tial revival of art and learning among the Protestant Irish gentry. Protestant hvmnology, and especially the fine choral service of the English Church, created a taste for artistic music, . and the works of foreign composers accordingly found their way into the circles of the wealthy. The influence of this foreign music is perceptible in the Irish music which was composed or modified about this time. Carolan, the best known composer of Irish airs m the 18th century, is a good

example, being influenced by Geminiani, Corelli, Vivaldi and others of his contemporaries. This influence is especially perceptible in his (Planxties, > or dance tunes.

It would appear that the transformation of the Irish homophonous music into harmonic music really began about this period. But the change was soon arrested. For while on the one hand the political and social slavery of the majority of the nation — of that part who pos¬ sessed and cherished the tradition of the Irish past — rendered the rise of a school of genuine Irish music impossible, on the other hand the increasing wealth and facilities of traveling brought the Irish gentry more and more under English and foreign influences, and diminished day by day that. taste for Irish music which they had begun to imbibe during the brief period of their previous seclusion. The Irish harper, no longer meeting with the same welcome at the festive board, gradually became extinct, and Irish music found a last refuge in the homes of the peasantry. But this isolation, while pre¬ serving it for some time longer from beino- transformed like the popular music of other countries, also shut it out from all true artistic development, and left it entirely in the hands of itinerant pipers and fiddlers.

Harmonic music has now penetrated the last retreat of Irish music. The piper, like the harper, is gradually becoming extinct, and in a few years more every sound of the old music of Ireland will be extinct. The irresistible in¬ fluence of the opera and of harmonized sacred music, which have now penetrated into every part of Ireland, would have been sufficient of themselves to rapidly eject old Irish music; the more so, as a modification in the esthetic feeling of the people has been slowly taking place dur¬ ing nearly a century. Another patent influence has been the introduction of bands. Since the

music of a modern band must necessarily be harmonized, the popular car is being gradually trained by these bands to harmony.

This disappearance of Irish music before harmonic music is as inevitable as the disap¬ pearance of the red man before the ever en¬ croaching white.

A few Irish melodies figure in modern operas; as for example (Eiblin a ruin,) which under the name of (Un air ecossais,) constitutes the principal theme in the overture of Boiel- dieu's (La dame blanche, > and (The Last Rose of Summer, } in Flotow's < Martha. The com¬ pass of the harps was from C to d'". Their scale was sometimes C, but mostly that of G. It has been proved that the old harpers played with their nails, not the fleshy tip of the fingers.*

Examples of almost all the church modes are to be found in Irish airs, as in those of Great Britain, France and other countries. The old Irish bagpipe was blown by the mouth, like the Scottish,. but the later bagpipe, the Uillean or Union pipe, blown with a bellows became popu¬ lar in Ireland. From this cause, and the deli¬ cacy of its reeds, the tone is softer. Burney remarked upon the perfection of the' intervals of the Irish chanter, or melody-pipe, which he had never met with in the pipes of North Brit¬ ain. The scale of the Irish bagpipe is from C below the treble stave to C above it, with all the semitones. The Irish instrument is also fur¬ nished with a sort of tenor harmony of chords.

wr

!r_ _ &

ˆ— –

fr*—

W~

w –

The pipe of Scotland has nothing of this sort, and its scale is only nine notes in extent, and does not correspond with the normal diatonic scale.. I here generally are two drones in the Scottish pipe, A and its octave; and three in the Irish instrument, generally C, c, and c. The ancient Irish bagpipe, like that of Scotland, was an instrument of shrill and warlike tone, by which the natives were animated as other people are by trumpets.. The bagpipe, perhaps the old¬ est and most widely known instrument in the world,, still subsists in Ireland; the harp, how¬ ever, is almost extinct; both have been in a great degree superseded by the violin and flute which are cheaper, more readily repaired, more portable.; most of the ancient minstrels of Ire¬ land maintained attendants to carry their harps. From 1775 to 1782 the Volunteer Bands did much toward the cultivation of music in Ire¬ land, and during the 19th century the bands of the Father Mathew societies, the semi-military organizations and the political organizations have made brass and reed bands popular. Choral classes are now popular in all parts of the country. Among the ancient Irish wind instru¬ ments were: the Ben buabhal, or wild-ox horn • the Buine, a kind of oboe, the Guthbuine, a type of bassoon, the corn, a pipe; the Stoc , a small trumpet; the Sturgan, a trumpet; the Feadan or fife, the. tympan, played with a bow, and the craobh ceoil, or musical branch. All pipes were curved no straight pipes have been found in Ireland The harp was the instrument most highly developed, and the specimens of th is in-

strument which arc extant show a wide variety, thus the so-called Harp of Brian, in .Trinity College has 30 strings, the Robin Adair harp, now at Holybrook, County Wicklow, 37 strings ; and the Fitzgerald harp, of 1621, 52 strings. Among the great performers on the harp were Rory Dali O'Cahan, Miles O'Reilly, Thomas and William O'Conellon (1640) ; Cornelius Lyons; O'Carolan (1670); Charles Byrne (1712); Mongan (1715); Kane. (1720). The last-named traveled on the continent and per¬ formed before the Pretender, and was hos¬ pitably received by the exiled Irish in Spain and France.

It may be interesting to give some, estimate of the total number of Irish airs which have been preserved. Buntings' three volumes (1796, 1809, 1840), contain about, 295 airs; Petries' 'Ancient Music of Ireland\ 182 ; . Hoffmann's edition of another part of the Petrie collection, 202; Joyces' 'Ancient Irish Music, 100; The Stanford edition of Petrie contains 1,000 airs not printed elsewhere. There are 2,851 airs in Francis O'Neill's two volumes on Irish folk music and 842 in Joyce's (01d Irish Music and Songs.) Allowing for duplications a safe sum total of about 3,100 different Irish airs are now preserved in these printed collections. There remain in known MSS. hundreds of airs, which require careful examination to avoid duplica¬ tion.*

Bibliography. — Consult the collections men¬ tioned in preceding paragraph; Grove, 'Dic¬ tionary of Music) (Vol. II, New York 1906) ; the journals of the Irish Folk-Song Society; Levey, R. M., 'The Dance Music of Ireland (London 1870) ; Grattan-Flood, W. H., (His- tory of Irish Music (London 1905).*

John B. McDonnell, Editorial Staff of The Americana.

IRISH PALE. See Ireland — History.

IRISH PRESBYTERIAN CHURCH, formerly called the Synod of Ulster. Its mem- bers are mostly descended from the Scotch Presbyterians, who migrated to Ireland by invi¬ tation of James II, between 1609 and 1612, to colonize Ulster. They number (1917) 440,525. There are two Presbyterian colleges, one at Bel¬ fast which is theological only, and one at Lon¬ donderry which has also literary and scientific departments.

IRISH REBELLION. The Irish Rebel¬ lion of 1916, an abortive attempt to throw off British rule in Ireland and to establish a repub¬ lic, was a phase and an issue of the Home Rule (q.v.) movement since 1912. In April of that year Mr. Asquith had introduced the third Home Rule Bill, which met with violent opposi¬ tion from the Ulster Orangemen. A secret force entitled the "Ulster Volunteers® had been formed to resist by force the application of the Home Rule Bill to that province. In July 1913, the force was formally inaugurated, and its objects openly avowed. Arms were imported under cover and training camps formed. As a counterblast to the movement, the Home Rulers formed the Nationalist Volunteer Force, which rapidly grew in numbers and received the for¬ mal recognition of Mr. Redmond in June 1914. Hence, at the outbreak of the European War, there were in Ireland two unofficial, unauthor¬ ized, and certainly illegal, "armies,® with dia¬ metrically opposite aims. They were, more¬

over, drilled and fairly well equipped. So much inflammable material could

not fail to bring about disastrous results. Only a week before the European crisis had reached its cul¬ minating point in declarations of war between the Great Powers, the Nationalist Volunteers had landed some 3,000 rifles, when the police, who had intercepted the Volunteers on their march back to Dublin, came into conflict with a crowd of nationalist sympathizers, who began to throw stones and other missiles. The troops (Scottish Borderers) were called out and a volley was fired. Four persons were killed and many injured. The assistant commissioner of police, Mr. Harrel, who had called out the troops, was immediately suspended, and the British Government ordered an inquiry into the case. On 3 Aug. 1914, the day before Great Britain declared war on Germany, Mr. Red¬ mond made a declaration in Parliament that the government might safely withdraw all their troops from Ireland and leave it to be defended by the Nationalist and Ulster Volunteers work¬ ing loyally together.

Events soon proved, however, that Mr. Red¬ mond's sincere optimism was ill-founded; a defi¬ nite split appeared in the ranks of the Volun¬ teers. Hardly had the Irish statesman assured the House of Commons that the British Empire could count on Ireland's solidarity in regard to the war, when the first rumblings of the ap¬ proaching storm could be heard. Just before Premier Asquith visited Dublin on 5 Sept. 1914, the extremist majority of the Volunteer leaders published a manifesto in which they attacked Mr. Redmond in the following unmistakable terms : "Ireland could not with honor or safety take part in foreign quarrels other than through the action of an Irish Parliament,® and that they repudiated "the claims of any man to offer up the blood and lives of the sons of Ireland and Irishmen while no National government which could act for the people of Ireland is allowed to exist.® On 25 Oct. 1914 this attitude was even more definitely expressed in the following declaration of principles adopted by a conven¬ tion of the extremists: (.1) "To maintain the right and duty of the Irish nation to provide for its own defence by means of a permanent armed and trained Volunteer Force; (2) .to unite the people of Ireland on the basis of Irish nationality and of common interests; to main¬ tain the integrity of the nation, and to resist any measures tending to bring about or perpet¬ uate disunion or the partition of the country; (3) to resist any attempts. to force the men of Ireland into military service until a National government is empowered by the Irish people themselves to deal with it; (4) to. secure the abolition of the system of governing Ireland from Dublin Castle, and the establishment of a National government in its place.®

With few exceptions the leaders of the revo¬ lutionary section of the Volunteers were com¬ paratively unknown men. They were nearly all of the "intellectual® class, idealists, scholars, men of letters, or artists. Patrick H. I eaiˆe, "Commandant-General® and "President of the Provisional Government® of the "Irish Repub¬ lic,® was an educator

conducting a boys' school in which Irish was spoken, Saint Enda's, at Rathfarnham near Dublin. He was also known as a poet of considerable force. John MacNeill, President of the Vounteers, but in the end not

an active participant in the rebellion, was a pro¬ fessor of ancient and mediaeval Irish history in the National University. He was one of the foremost Celtotlogists and a frequent contrib¬ utor to reviews. Thomas J. Clarke was a revo¬ lutionist from early youth; he had served 15 years in prison for a political dynamite outrage, and in later years owned a newspaper and to¬ bacco store in Sackville street, Dublin. Thomas MacDonagh was a member of the fac¬ ulty of University College, Dublin, and one of the most powerful of the younger Irish poets. Joseph Plunkett, a son of Count Plunkett, was a writer and editor. Edward Kent was con¬ nected with the Dublin Corporation and was also known as a writer. James Connolly was a socialist and a labor leader, author of (Labour in Irish History. } Sean MacDearmada was the editor of Irish Freedom. Sir Roger Casement was a retired member of the British Consular Service who had won knighthood as well as international fame by his investigations into the rubber atrocities in the Belgian Congo and in the Amazon Valley of Peru. (See Case¬ ment, Sir Roger). Major John MacBride fought on the side of the Boers with an Irish brigade in the South African War. He married the beautiful Miss Maude Gonne, who gained a brief notoriety by her violent anti-English prop¬ aganda during the same war.

It was due especially to the efforts of Sir Roger Casement that the Irish extremists re¬ ceived extensive financial and moral support from Irish-American organizations who were in sympathy with their policy. In December 1914 he proceeded to Germany and there, through previously established connections, suc¬ ceeded in gaining financial support and promises of actual assistance with arms and men from the German government. In the meantime his co- w.orkers in Ireland had concentrated their ener¬ gies to improving the organization of the Vol¬ unteers. As many arms and as much ammuni¬ tion as could be bought and smuggled into Ire¬ land were assembled and distributed. The men were drilled and manoeuvres were held, which naturally did not escape the attention of the au¬ thorities. But the latter underestimated both the extent and strength of the movement and did nothing to suppress it. Late in March 1916 the police at Tullamore, King's County, at¬ tempted to disarm the local Volunteers as a result of a hostile demonstration made before their meeting place. A few days later the Council of the Volunteers issued the following manifesto, which practically amounted to a dec¬ laration of war, though

even that failed to arouse the authorities at Dublin Castle or the Chief Secretary, Mr. Birrell,. in London ; <(With regard to the recent proceedings of the govern¬ ment towards the Irish Volunteers, the Council . . . wish to warn the public that the gen¬

eral tendency of the government's action is to force a highly dangerous. situation . . . the

Volunteers cannot submit to being disarmed either in numbers or detail without surrender¬ ing and abandoning the position they have held at. all times since their first formation. The raiding for arms and the attempted disarming of. men, therefore, in the natural course of things can only be met by resistance and blood¬ shed.. None of the Irish Volunteers recognize, or will ever recognize, the right of the govern¬

ment to disarm them or to imprison their offi¬ cers and men in any fashion.® The manifesto also suggested that the hostile demonstrations by crowds were carried on under government approval. As an offset to this it may be said that the government, having its hands full with the war in Europe, was most anxious above all things to prevent any rupture in Ireland, and made no single move whatever that might lead to any outbreak by provocation. They deliber¬ ately shut their eyes and refused to see the smouldering volcano that was soon to burst into fierce eruption.

By 12 April 1916 Sir Roger Casement had completed his arrangements with the German authorities and set out from Wilhelmshaven in a submarine, accompanied by another submarine and the steamship And, bearing arms and muni¬ tions. The British government was fully ad¬ vised of his activities and plans ; he was seized shortly after landing on Good Friday, 21 April 1916, near Ardfert on the southwest coast of Ireland. The Aud was stopped by a British patrol boat, and when about to be taken into Queenstown was abandoned by her German crew after being scuttled. The vessel sank, her entire crew was captured, and the submarines made their escape. As soon as the news of Casement's capture and the failure of his expe¬ dition was received at Dublin Castle, a meeting of the executive authorities was held on Satur¬ day, 22 April, at which it was decided to issue warrants for the arrest of all the Sinn Fein leaders of the Volunteers. These warrants were promptly signed by the Lord Lieutenant, Lord Wimborne. The authorities were natu¬ rally well aware that the arrests, which were to be accompanied by the wholesale seizure of the Volunteer headquarters and the confiscation of arms and munitions, could not be accom¬ plished without considerable fighting. As the number of troops available at the time in Dub¬ lin seemed insufficient for the purpose, it was decided to postpone the execution of the plan for a few days until reinforcements should ar¬ rive. It appears that every move decided on by

the British authorities promptly found its way to Volunteer headquarters, but direct news about Casement's failure was still lacking. A party of Sinn Feiners had been sent from Dub¬ lin in an automobile to meet Casement; on their arrival at the coast they learned (Jf Casement's arrest and immediately set back for Dublin at full speed. The car, however, came to grief on the road and every occupant excepting only the chauffeur was killed.

While the officials were deliberating in Dub¬ lin Castle, the Volunteer leaders were also gathered in conclave on 22 April. Opinion was divided as to the most desirable step to be taken next. The majority, apparently advocated carrying through the original plan — the instant mobilization of all the Volunteer forces throughout Ireland. What was actually de¬ cided upon at that meeting cannot be stated with any degree of certainty, but on the. fol¬ lowing day, Saturday, John MacNeill published over his signature in the Irish newspapers an order that ((Owing to the very critical position, all orders given to Irish Volunteers for to¬ morrow, Easter Sunday, are hereby rescinded, and no parades, marches or other movements of Irish Volunteers will take place. Each indi-

vidual Volunteer will obey this order strictly in every particular.® At the eleventh hour it seemed that wiser counsels would prevail, but at another meeting of the leaders on that Sun¬ day the bellicose majority carried the day, and it was decided to go ahead regardless of con¬ sequences. In face of the confusion that was sure to result from MacNeill's order, and in spite of the knowledge that this order would practically cancel whatever uprisings had been planned in the districts outside of Dublin, the decision for immediate action was largely in¬ fluenced by the feeling that MacNeill's pub¬ lished order would mislead the authorities and throw them off the scent. In this assumption the Sinn Feiners were justified by results, for when the rebellion actually broke out it caught the British authorities entirely off their guard. In order to lull them still further into a false feeling of security, another command was pub¬ lished over the signatures of MacDonagh and Edward de Valera which read: ((As publicly announced the inspection and manoeuvres ordered for this day are canceled. All Volun¬ teers are to stay in _ Dublin until further orders.® On the morning of Easter Monday, however, the following order was issued: (

A few minutes after 12 o'clock noon on Easter Monday things began to happen in Dub¬ lin. An unarmed policeman on duty outside Dublin Castle was killed by a -shot from a Volunteer rifle. Immediately after the general

post office on Sackville street was rushed and occupied by the rebels. There the ˆProvisional government of the Irish Republic® was estab¬ lished. The colors of the new republic — green, orange and white — were run up over the building and the following proclamation posted on the main entrance :

THE PROVISIONAL GOVERNMENT OF TEIE IRISH

REPUBLIC.

“ TO THE PEOPLE OF IRELAND:

“ Irishmen and Irishwomen ! In the name of God and of the dead generations from which she receives the old tra¬ ditions of nationhood, Ireland, through us, summons her children to her flag, and strikes for her freedom.

“ Having organized and trained her manhood through her secret revolutionary organization, the Irish Republican Brotherhood, and through her open military organizations, the Irish Volunteers and the Irish Citizen Army, having patiently perfected her discipline, having resolutely waited for the right moment to reveal herself, she now seizes that moment, and supported by her exiled children in America and by gallant allies in Europe, but relying in the first on her own strength, she strikes with full confidence of victory . We declare the right of the people of Ireland to the ownership of Ireland, and to the unfettered control of Irish destinies, to be sovereign and indefeasible. The long usurpation of that right by a foreign power and government has not extinguished the right, nor can it ever be extinguished except by the destruction of the people. In every generation the

Irish people have asserted their right to National freedom and sovereignty; six times during the past three hundred years they have asserted it in arms. Standing on that fundamental right and again asserting it in arms in the face of the world, we hereby proclaim the Irish Republic as a Sovereign Independent State, and we pledge our lives and the lives of our comrades in arms to the cause of its freedom, of its welfare, and of its exaltation among the nations. _

“ The Irish Republic is entitled to, and hereby claims, the allegiance of every Irishman and Irishwoman. The Republic guarantees civil and religious liberty, equal rights and equal opportunities to all its citizens, and declares its resolve to pursue the happiness and prosperity of the whole nation and of all its parts, cherishing all the children of the nation equally, and oblivious of the differences carefully fostered by an alien government, which have divided a minority from the majority in the past.

“ Until our arms have brought the opportune moment for the establishment of a permanent National Government, representative of the whole people of Ireland, and elected by the suffrages of all her men and women, the Provisional Government, hereby constituted, will administer the civil and military affairs of the Republic, in trust for the people.

“ We place the cause of the Irish Republic under the pro¬ tection of the Most High God, Whose blessing we invoke upon our arms, and we pray that no one who serves that cause will dishonour it by cowardice, inhumanity or rapine. In this supreme hour the Irish nation must, by its valour and discipline, and by the readiness of its children to sacrifice themselves for the common good, prove itself worthy of the august destiny to which it is called.

“ Signed on behalf of the Provisional Government.

“ Thomas J. Clarke.

“ Sean MacDearmada. Thomas MacDonagh.

“ P. H. Pearse. Eamonn Ceannt. (Edward Kent).

“ James Connolly. Joseph Plunkett.”

The rebels immediately proceeded to fortify the general post-office and to occupy houses commanding the corners of various streets leading into Sackville street. Another body of Volunteers commanded by Countess Markievicz (q.v.) entrenched themselves in Saint Stephen’s Green, a small park facing the Catholic University College and the Royal University grounds. The four courts on the banks of the river Liffey, Liberty _ Hall, the South Dublin Union, Jacob’s Biscuit Factory and Boland’s Mills at Ring[s End were seized by other detachments. Various private houses all over the city at strategic points where troops might approach were also occupied and fortified. Three of Dublin’s five railroad sta¬ tions were likewise occupied or else lay well within the area controlled by the Volunteers. Despite warnings and premonitions the British authorities were totally unprepared to deal with the situation. Officers and men of the garrison were away at a local race meeting, and Dublin Castle ((mustered half a dozen men with blank cartridges.® All the telegraph wires at the post office were cut, but the rebels did not seize the central telephone exchange, a fact that enabled the authorities to maintain communications with the rest of the city and its environments. Before the evening of the first day of the rebellion the entire centre of Dublin was in the hands of the rebels, as well as a carefully chosen cordon of positions in the outlying districts beyond. The only ex¬ ception was Trinity College and the adjoining park. Here a group of the

Officers' Training Corps located at the college, reinforced by a small number of soldiers who happened to be passing, barricaded the doors of the college and put the buildings in a state of defence. This position, which was afterward of great value to the British troops, was held by the small force of defenders until it was relieved bv the soldiers. It was primarily due to the fire which could be directed from Trinity College in the direction of the most important business streets

that the Volunteers were unable to gain a foot¬ ing in them, and those streets were therefore safe from destruction when the British troops attacked with artillery to drive out the rebels. The Volunteers had also seized an ammunition magazine in Phoenix Park, but this was the first position regained by the troops.

During the night the Custom House, com¬ manding the approach to the docks, was oc¬ cupied by British troops, and steps were taken to relieve the Castle. On Tuesday, 25 April, martial law was proclaimed in the city and county of Dublin, and on Wednesday this was extended to cover the whole of Ireland for a period of one month. On the same day another proclamation ordered all persons to keen within their homes between the hours of 7.30 p.m. and 5.30 a.m. ; also, the right to trial by jury was susoended in Ireland. Reinforcements of British troops arrived in Dublin on Tues¬ day; communication was re-established with the Castle and the small force holding Trinity College. In order to secure the safety of the Castle it was first necessary to expel the rebels from a number of buildings and houses com¬ manding the Castle Yard, among which was the City Hall. This was accomplished only after desperate fighting; a military cordon was then thrown around the northern part of the city. Meanwhile more British troops were arriving from England, and on Wednesday they were in sufficient strength to assume the offen¬ sive. During Wednesday severe fighting oc¬ curred, especially in the vicinity of Trinity Col¬ lege. The troops encountered the most de¬ termined resistance everywhere and the losses on both sides were heavy. On that day Liberty Hall, the headquarters of the Volunteers, was attacked with guns and demolished. This was accompanied by bitter fighting in the Sackville street section. During the following night the first of a long series of fires in that part of the city broke out, creating enormous damage. Some 200 buildings weie destroyed before the end of the week. Tne British government, now thoroughly alive to the danger, continued to pour troops into Dublin; Gen. Sir John Maxwell, who had been placed in supreme com¬ mand, arrived on Friday from England. On Thursday the Sackville street section had been

surrounded with a strong cordon of troops, that was held continuously for two days. The position of the rebels was rapidly becom¬ ing more and more hopeless ; the various cordons were gradually drawn tighter and the Volunteers were driven back step by step in spite of desperate resistance. This (

they have taken no part whatever in the present disturbance; (c) All other men who present themselves to the said examining posts must surrender unconditionally, together with any arms and ammunition in their possession.® Both Pearse and Connolly — the latter had been wounded — issued proclamations on Friday the tenor of which indicated that the end was ap¬ proaching. That of Pearse foreshadowed failure, while the document from Connolly gave an entirely wrong estimate of the situa¬ tion ; he referred to <(our Allies in Germany® and wound up with (

number of about 3,000, to a prison camp in England. Here they were carefully sifted; many were released after a short detention. About 2,000 were interned in Wales, but within three months 70 per cent of these were set at liberty. A particularly painful episode of the rebellion was the shooting of three innocent men, Mr. Francis Sheehy-Skeffington, an earnest pacifist, Mr. Dixon, an editor, and Mr. McIntyre, also a journalist. They were ar¬ rested on 5 April and taken to Portobello Bar¬ racks, where they were shot by order of Cap¬ tain Bowen-Coulthurst without any trial. The Captain responsible for this deed was after¬ ward court martialed, found to be insane, and incarcerated in a lunatic asylum. Sir Roger Casement was brought to trial for treason be¬ fore the Lord Chief Justice and a jury. He was convicted, deprived of his titles and honors, and hanged on 3 Aug. 1916.

The rebellion and its collapse brought some remarkable political consequences in its train. On 3 May 1916 Mr. Augustine Birrell, Secre¬ tary of State for Ireland, resigned his office, confessing the total failure of the principles on which he had endeavored to govern Ireland for nine years. Sir Mathew Nathan, the Under¬ secretary in Ireland, also resigned, to be fol¬ lowed in the same course a few days later by Lord Wimborne, the Lord-Lieutenant of Ire¬ land. The resignation of the latter was not accepted. Strong charges were made in the House of Commons in regard to the operation of martial law, and public opinion in Great Britain was highly incensed against the officials who were declared to have "bungled® Irish affairs. Mr. Asquith decided himself to visit Ireland; he returned with the opinion that "Castle Government had entirely broken down.® A Royal

Commission, consisting of Lord Hard¬ ing of Penhurst, Mr. Justice Shearman and Sir Mackenzie Chalmers, was . ppointed to in¬ quire into the causes of the rebellion. The general conclusions drawn in their report (4 July 1916) were to the effect "that the main cause of the rebellion appears to be that law¬ lessness was allowed to grow unchecked, and that Ireland for several years past had been ad¬ ministered on the principle that it was safer and more expedient to leave the law in abey¬ ance — if collision with any faction of the Irish people could thereby be avoided.® Tne Lord-Lieutenant was absolved from respon¬ sibility, but the Commission found that "the Chief Secretary, as the administrative head of your Majesty's Government in Ireland, was primarily responsible for the situation that was allowed to arise and the outbreak that oc¬ curred.® Sir Mathew Nathan was blamed be¬ cause he did not sufficiently impress upon the Chief Secretary, during the latter's prolonged absence from Dublin, the necessity for more active measures to remedy the situation in Ireland, which in December last in a letter to the Chief Secretary he described as "most serious and menacing.® On 19 Oct. 1916 Mr. Redmond moved a vote of censure in Parlia¬ ment, demanding the abolition of martial law in Ireland and the immediate release of 500 Sinn Fein prisoners who still remained in¬ terned, the treatment of the sentenced rebels as "political® offenders, and the trusting of the people bv putting the Home Rule Act into force. The government replied that Ireland

could have Home Rule if Irishmen themselves agreed to it, but Ulster blocked the way ; that two-thirds of the arrested Sinn Feins had al¬ ready been released and that a considerable number of others could be released on giving an assurance not again to engage in rebellion. The vote of censure was defeated by 303 to 106 votes. In November Sir John Maxwell left Ireland and was succeeded by Gen. Sir Bryan Mahon.

Bibliography — Boyle, J. F., (The Irish Re¬ bellion of 1916) (London 1916) ; Jones, F. P.,

(History of the Sinn Fein Movement and the Irish Rebellion of 1916) (New York 1917) ; Joy, M. editor, (The Irish Rebellion of 1916 and its Martyrs) (New York 1916) ; Norway, Mary L. (The Sinn Fein Rebellion as I saw it) (London 1916) ; Redmond, J. E., (Strong Words from Mr. Redmond (London 1916) ; Redmond-Howard, L. G., (Six Days of the Irish Republic (London 1916) ; Stephens, J., (The Insurrection in Dublin* (New York 1916) ; Wells, W. B. and Marlowe, N., (A History of the Irish Rebellion of 1916* (Dub¬ lin and London 1917).* *See also Casement: Markievicz; Birrell; Home Rule.*

Henri F. Klein,

Editorial Staff of The Americana.

IRISH SCHOOLS AND SCHOOLMEN OF THE MIDDLE AGES. Christianity was introduced into Ireland in the 4th century and, after the year 432, the date of the arrival of Saint Patrick, spread with extraordinary ra¬ pidity. Within the generation after the death of the Apostle, monastic schools were founded with a view toward providing the people with a native ministry. The oldest and at the same time one of the most famous of these schools was founded in 450 at Armagh, the site of the religious metropolis of Ireland. Toward the end of the 5th and during the following cen¬ turies several colleges were established, the most celebrated being Noendrum, founded by Saint Mochua, Louth, by Saint Moctha, and Kildare, by Saint Brigit, in the 5th century ; Clonfert, founded by Saint Brendan the Navi¬ gator, Clonard, by Saint Finnian, called "Magis- ter Sanctorum Hiberniae,® Clonmacnois, by Saint Ciaran, Arran, by Saint Enda, Bangor, by Saint Comgall, Glendalough, by Saint Kevin, in the 6th ; and Lismore, founded by Saint Carthage, in the 7th century.

These communities were in reality little vil¬ lages or Christian colonies, consisting simply of a collection of stone huts gathered around one or more diminutive churches. Each com¬ munity was under the authority and guidance of some man remarkable for holiness or learn¬ ing or both. While their chief function was doubtless originally religion, each establishment had one or more schools appended to it, wherein religion and science were blended as perhaps never before nor since. The love of learning among the early Christian Irish was intense, and no nation ever devoted itself to the things of the soul with so much ardor. There is not a life of an Irish saint that does not praise his love of learning. In the words of an 11th century writer, Ireland had become "virorum doctissimorum officinam,® a workshop of learned men.

These schools were intended for two classes of students — monks and laymen. The schools

for the latter were really public schools to which the sons and sometimes the daughters, not only of the rich and noble but also of the poor and strangers, were admitted. The Ven¬ erable Bede gives eloquent testimony to the generosity of the Irish in providing students with free tuition, board and even the necessary manuscripts. Legal provision was made for secular teaching, and after the Convention of Druimceat in 890 the public schools were organ¬ ized on a new and better basis, and the remuner¬ ation,

rights, obligations and number of the professors were fixed by law. There were also bardic schools and professional schools of law and a traditional medicine, with the result that education was more widespread in early Chris¬ tian Ireland than elsewhere in those days in Europe, and at least a certain amount of learn¬ ing was almost as much a part of the training of an Irish chief or warrior as of an ecclesiastic.

Considerable information as to the regime of the early Irish schools is to be had in the lives of Irish saints. From them we learn that instruction was mostly oral and conducted in the open air, as far as possible. At first the teaching was in the hands of the founder him¬ self or the superior of the monastery, but when the educational system became better organized it was delegated to a special officer called in Irish fer legind. The students took notes on wax tablets or, if more permanency was de¬ sired, on parchment.

The studies embraced in general those known on the Continent as the trivium and the quadrivium, in other words the seven liberal sciences, though the courses of instruction no doubt differed according to the profession which the student intended to follow, stress being laid in all the schools upon the principles of Christian doctrine, genealogy and the history, legends and lore of Ireland. Some of the pupils of those schools were distinguished for their knowledge of geometry and also of phi¬ losophy ; Dicuil the Geographer had been edu¬ cated at Clonmacnois ; Colgu, who came from the same school, was the master of Alcuin, the most distinguished scholar of his time in Europe. The dispute about the paschal com¬ putation and the determination of the other movable feasts and cycles gave the Irish schol¬ ars the occasion to show the extent of their learning and their knowledge of mathematics and astronomy, which was amazing for the time. Many of the most distinguished men of science and religion also cultivated poetry and wrote hymns ((ad canendum digna,® as in the case of Saint Columbanus. The study of music and the illumination of manuscripts were also fos¬ tered, not only in Ireland but also in the Irish establishments on the Continent. In those two arts the Irish had no superiors. The Saint Gall music school, for example, an Irish foun¬ dation in Switzerland, became the most famous in Europe. Much attention was also given to the more or less pastime studies, such as swim¬ ming, the handling of arms and horsemanship, and a game resembling chess, called fidchell.

The centre of learning, however, was the¬ ology, which comprised of course the study of the Holy Scripture, the Fathers and the lives of saints, especially of Saint Martin of Tours. Never have the sacred books been regarded with greater affection nor their meaning more

searchingly studied. Skilful and learned schol¬ ars commented upon them, at home and abroad, wherever they founded schools, the Irish scholars drew from them their inspiration and laid in them the foundation of all learning. The so-called (Vetus Itala) was the version of the Bible in use in early Ireland, and the favor¬ ite Gospel seems to have been that of Saint John. The Book of Psalms ih particular was the vade-mecum of praise and prayer. It was the first reader put into the hands of an Irish schoolboy, and many of the Irish saints were said to have learned the entire psalter by heart and recited the (

Irish no doubt was the language in which instruction was given, but there is abundant proof that the native scholars were equally at home with Latin. This is shown for example by the large number of treatises on Latin gram¬ mar glossed in Irish. Latin was studied chiefly with a view to the understanding of the Bible and the Church Fathers, and as a preparation for those who contemplated entering Holy Orders. Irish Latin is not always in the best taste, being often marred by affectation, a bom¬ bastic style, abuse of antithesis and exaggera¬ tion, but these were largely the faults of the period. Columbanus was by far the best Latin writer of his century, and the ease with which the Irish scholars wrote Latin shows that it must have been a living speech to them.

It is not quite certain how widely a knowl¬ edge of Greek was diffused in the schools of early Ireland. There has been much exagger¬ ation on the subject. Some writers pretend that all the monks who accompanied Columbanus to the Continent had a fair knowledge of Greek, could transcribe Greek manuscripts and read the Gospels in that language. Some Irish au¬ thors of the 7th century quote such writers as Philo, Eusebius and Origen, but there is no serious proof that they knew them in the orig¬ inals. Columbanus himself clearly knew Greek. His biographer states that he was a (

tinent, knew considerable Greek. They may have acquired it in the course of their travels, especially in France, and more particularly at Narbonne, where some Irish students had set¬ tled down and where Greek was spoken as a living language from early times. But that assumption is not necessary, for it is known that during the 6th and the three following centuries there was an influx into Ireland of Greek-speaking merchants from Bordeaux and other cities in the south of France. In an old Irish poem on the Fair of Carman, we find mention of <(the great market of the foreign Greeks, where gold and noble clothes were wont to be.® Many Greek ecclesiastics

also had taken refuge in Ireland at the time of the barbarian conquest of Gaul, and as late as the 1 7th cen¬ tury there was a church at Trim which still kept the name of ((lhe Greek church,® or, ac¬ cording to another authority, ((the school of the Greeks.® In a letter of Saint Cummian of Clonfert and Durrow, written in the year 634 to the Abbot of Iona, are found quotations from Greek writers like Origen, Cyril, and Da¬ mascus, which shows that the range of read¬ ing in Greek was wide and not ecclesiastical merely but chronological, astronomical and philosophical. A collection of sayings called of Lactan- tius several Greek words are explained, and in other Irish works such as Cormac's Glossary (9th century) and the (Coir AnmamP (The Fitness of Names), are found Greek paradigms, declensions, and derivations, all of which give evidence of a certain knowledge of the lan¬ guage. Greek words also occur in an alpha¬ betical hymn on Saint Comgillus, beginning <(Audite pantes ta erga,® and in a hymn in honor of Saint Patrick and Saint Brigit. In a manu¬ script at Laon is a Greek fragment of the Gos¬ pel of Saint John transcribed in Latin letters by an Irishman of the 8th or 9th century, which is proof that from very early Christian times there was at least a copy of the Greek text ot the Gospel of Saint John, and perhaps of the entire New Testament, current in Ireland.

The Irishmen Sedulius and John Scotus Eri- gena, who flourished in the middle of the 9th century, were good Hellenists. The latter was the most learned man of his day in Greek and, at the request of Charles the Bald, translated from Greek into Latin for the newly founded Abbey of Saint Denis the apocryphal works of Dionysius the Pseudo-Areopagite, a feat that probably no other scholar in western Europe was capable of performing. He also wrote whole verses in Greek and seems to have read Plato's (Timaeus) in the original.. Even as late as the 10th century, when education had fallen

very low in Ireland, we find King Cormac, Abbot-Bishop of Cashel, praised for his knowl¬ edge of Irish, Latin, Greek, Hebrew, Welsh, Anglo-Saxon and Norse.

A few Hellenisms are also found in the writ¬ ings of Columcille and Adamnan. In the

Many more instances might be cited to show that a knowledge of Greek existed in the early schools of Ireland. With the exception of a few conspicuous cases, however, that knowledge was not characterized by accuracy of scholar¬ ship or by a wide acquaintance with Greek liter¬ ature. But enough has been said to prove that it was much more than an acquaintance with the Greek alphabet and a few technical terms and quotations picked up at second hand and pep¬ pered here and there in his

Latin text to en¬ hance the writer's reputation for learning. Greek survived in Ireland long after it had al¬ most perished in the rest of Europe and wher¬ ever we hear of anyone knowing Greek in France or still more in Germany in the. course of the 9th century he was almost certainly an Irishman or had gone to school to one.

The fame of the Irish schools for their teachers, their libraries and their system of education, all of which was far in advance of what was current at that day, attracted not only native students, but also great numbers from abroad who, coming to Ireland to complete their education, brought with them the manners and customs, and the learning, such as it was, of their native lands, so that while Ireland, was giving of her best she was constantlv receiving fresh elements of strength from without. The attributed to Oengus, who is said to have flourished about the beginning of the 9th century after Christ, gives the names of Britons, Saxons, Piets, Gauls, Germans, Romans and Egyptians buried in Ireland. ˆOne of the . most famous of these foreigners was Willibrord, the apostle of the Frisians, in the first

half of the 7th century, of whom it is ex¬ pressly stated that he spent 12 years in Ireland. The tomb of the Seven Romans is still to be seen in the churchyard of Saint Brecan in the isle of Aran. Many Breton saints are said to have received their education in Ireland. Men¬ tion has already been made of the church or school of Trim commonly known as the Greek church or school because served by Greek ecclesiastics. The Venerable Bede tells of a Frank named Agilbert, the future bishop of Paris in the middle of the 7th century, who for the sake of reading the Scriptures passed a considerable time in Ireland. Dagobert II, afterward king of Austrasia, sought and ob¬ tained education and entertainment at Slane in Ireland for many years previous to his call to the throne. Nor were foreign women unmind¬ ful of the educational advantages to be had there : Gertrude, Abbess of Nivelles, in the 7th century, for example, is said to have sent there for books and to have had the Irish Saints Foil- lan and Ultan as ' r advisers.

But of all the foreigners who flocked to the Irish schools, whether for the purpose of ac¬ quiring wisdom or of leading a life of stricter discipline, the students from England were the most numerous. In fact during the entire 7th and 8th centuries the Anglo-Saxons regarded Ireland as their university. Bede's Ecclesi¬ astical History) is our greatest source of in¬ formation on this subject. The Irish, we are told, received 'the English with

true Irish hos¬ pitality, and they were all, rich and poor, sup¬ plied gratuitously with food, books and educa¬ tion. Consequently whole troops and ship loads, <(Catervatim . . . classibus advecti,® says Ald- helm, of the English youth crossed the Irish Sea. In those days the Irish were most friendly toward the English ; the Saxon, not the Celt, was the recipient not the giver, and wher¬ ever we read of an Anglo-Saxon of a superior education in the 7th and 8th centuries we may be sure that he must have spent a time in Ire¬ land. With the beginning of the English regime, however, Irishmen had to go abroad for an education.

Under Benignus, Patrick's successor, the at¬ tendance at the great School of Armagh so increased that it was necessary to divide it into three parts, one of which was devoted entirely to students of the Anglo-Saxon race. Among those students were some who were destined to be 'the most eminent teachers and preachers of North Britain. The most famous of all was Aldfrid, King of Northumbria at the end of the 7th century, who, though a king, could not ob¬ tain sufficiently trained teachers at home. Some others were Ecgberct (Egbert) who, in the 7th century lived in the Irish cloister of Rath- melsigi, or Mellifont, in the County Louth; Ceadda or Chad, one of the Fathers of the Anglo-Saxon Church, and Oswald, King of Northumbria, who not only learned Christian civilization in Ireland, but even the Irish lan¬ guage to the extent, it is said, of being able to act as interpreter in it. It is in the life of Saint Ecgberct that the often quoted passage occurs, namely, that at the time of the great plague in 664 many of the English nobility and the lower classes received at the Irish schools their daily food, instruction and books with¬ out any pay at all.

The most frequented of these early schools were those of Bangor and Clonard, each of which, before the close of the 6th century, is said to have had 3,000 students. It is not to be supposed, however, that in these and similar cases all the students resided in one place. The students were in the habit of migrating from one famous school to another, attracted by the reputation of its professors and the excellence of its equipment. The piety of the Irish saints and scholars was not so narrow as to exclude the pagan authors from their curricula. The monastic code of Columbanus shows that the humanities entered largely into his plan of edu¬ cation, and, judging from his own writings, he seems to have given more attention to classical literature than to philosophy. He left Ireland at the age of 40 and his life on the Continent was one of constant activity, of rough, vigorous, absorbing effort, spent in building monastries, governing them and preaching the Gospel. Con¬ sequently no time was left for reading, and he must have acquired his classical education be¬ fore leaving his native land. The breadth of that education is easily seen to have been far greater than that of his celebrated contempo¬ rary, Gregory of Tours, for example. He wrote poems in classic measure in which there are reminiscences of Greek

mythology, and he seems to have been familiar especially with the works of S'allust, Seneca, Virgil, Horace and Ovid.

Virgil and Ovid were the pagan authors most read in the Irish schools and not so much for themselves and their poetic beauty as for the light they could throw on ancient history and on the understanding of the Bible. The ease and rapidity with which the Irish scholars acquired an acquaintance with the language and literature of ancient Rome is to be explained, partly at least, by the fact that from the earliest historical times there existed in Ireland a class of men devoted especially to the cult of letters and to the study of their own complicated lan¬ guage and highly intricate verse-forms.

But, what is more important, the Latin au¬ thors were not only read with enthusiasm, they were copied with zeal and diligence in the Irish cloisters. Adaptations or translations were made of some of them and others were pro¬ vided with glosses in Irish ; sometimes even the names of lost Latin authors or quotations from their works are known to us through Irish literature. While in other lands monks de¬ stroyed manuscripts when pagan or used precious copies of Plautus or Cicero on which to write copies of monastic chronicles, Acts of Councils, or texts of the Vulgate, the Irish monks, appreciating the importance of preserv¬ ing these monuments of classical antiquity, copied them for posterity. The world owes a debt of gratitude, therefore, to the early Irish scholars for their great services in this direc¬ tion. Moreover, the role they played as the link between antiquity and the later Middle Ages and as the forerunners of the Renaissance has never been adequately treated. But the ad¬ miration which the Irish scholars had for the classic authors was not at the sacrifice of the literature of their own country. Practically all the extant manuscripts dealing with the ancient literature and mythology of Ireland were made by scribes attached to cloistral schools, and

whatever is known of the old Irish language is derived from the glosses which they made to Latin texts and from hymns of praise which it was the practice of the Irish Church to sing in Irish as well as in Latin.

In order to provide their students with the tools of learning it was necessary for the Irish scholars to multiply books and collect libraries. Consequently in every monastic school the copy¬ ing of manuscripts was the principal task of many of its members and regarded as a most meritorious occupation. The Irish scribes were famous not only for the number of manuscripts they transcribed, but also for the wonderful degree of elegance

with which they ‘adorned them. The forms of the letters of their alpha¬ bet had been introduced into Ireland by British missionaries and are about the same as those found in Latin manuscripts in Romance lands in the 5th and following centuries; the Anglo- Saxons afterward learned their letters from the Irish. Certain monastic schools acquired a veritable reputation for their caligraphy. The position of scribe was held in the greatest honor and importance and the title of scribe is some¬ times found added to enhance the celebrity of an abbot or bishop. Saint Columcille was a noted copyist and is said, though perhaps with exag¬ geration, to have made 300 copies of the psalms or gospels. The same is told of Bishop Dagda, who was called «Scriptor librorum peritissimus,® and who passed his nights in copying manu¬ scripts. The scribe of (Leabhar na hUidhre) (The Book of the Dun Cow), the oldest manu¬ script in the Irish language, was bishop of Clonmacnois, and another bishop, Find of Kil¬ dare, who died in 1060, was closely associated with the writing of the next oldest manuscript, the Book of Leinster. The (Annals of the Four Masters > name 61 remarkable scribes as having flourished before the year 900, 40 of whom lived between 700 and 800. Somewhere in the Irish laws it is stated that the same penalty was inflicted for killing a bishop, an abbot, or a

scribe. .

There is no mention of a library in an Irish school before the 11th century, but it is reason¬ able to suppose that they existed. The learning of the Irish scholars and the references they employ in their writings prove that the range of books they had access to must have been extensive. In the libraries the books rested not on shelves, but were kept in leather satchels which hung on hooks or pegs around the wall. One of the distinguishing marks of the Irish scholar or teacher traveling on the Continent was, besides his strange dress, the leather bag in which he carried his tablets and handbooks. In this way no doubt many valu¬ able manuscripts written in Ireland reached Continental libraries and some of them remain there. Some of these travelers must have owned the books they brought with them, but it is on record that a book called the fLebor Gerr) (the Short Book), which was at Mon- asterboice in 1050, was missing after that date, for a student had feloniously abstracted it from the library and carried it off to the Continent. The number of manuscriptˆ in the Irish hand on the Continent dating from the 7th to the 11th century is about 200, of which some 33 are more or less in the Irish language. . In every monastery founded by Trish missionaries on the Continent the library was, next to the church,

most important, and those very schools w1hich were either of direct Irish foundation or most strongly under Irish influence, such as Bobbio, Saint Gall, and Reichenau, and which may be regarded as peculiarly representative of Irish culture, were most conspicuous for their li¬ braries.

The flourishing period of the Irish schools and the golden age of Irish civilization syn¬ chronizes roughly with the 300 years which are known as the darkest period in the history of European civilization. The waves of barbar¬ ism had spread over the entire Continent and it seemed as if they were to engulf it in the abyss of ignorance. Through that dark night Ireland was the principal sanctuary of civiliza¬ tion and the storehouse of classical antiquity and theological learning. Her schools and scholars kept alive the feeble spark of learning and drew the attention of the world to Ireland whose fate it has been so often since to attract attention to her because of her unparalleled suf¬ ferings. As Dr. Johnson observed, Ireland <(was the school of the West, the quiet habitation of sanctity and literature® She had teachers in every branch of knowledge, sacred and profane, and it was they who planted the foundation of western civilization which we enjoy to-day and on which our times are building.

From the earliest period the Irish scholars, not satisfied with educating their own youth and attracting students from abroad, sent forth disciples who were to scatter her treasures of learning. Many of these scholars were no doubt compelled to take up their books and flee from Ireland because of the Scandinavian in¬ vasions, which greatly disturbed the peace of the Irish schools, but it is a mistake to suppose that that was the sole reason of th'eir exodus. Their own energy and the need of trained teachers abroad forced them forward to wider fields of action. From Iona they went to Northumbria, a land which above all owed its Christianity to the Irish and whose monastic and episcopal capital, Lindisfarne, was in di¬ rect literary relations with Ireland. They reached the Scandinavian lands and even Ice¬ land. From the end of the 6th to the end of the 9th century, crowds of Irish missionaries went to Gaul, Germany, Italy and Spain and by the end of the 7th and beginning of the 8th century a wide circle of their monasteries had arisen from the mouth of the Meuse and the Rhine to the Rhone and the Alps and even be¬ yond the Rhine in the eastern settlements of the Franks and the Bavarians, among the ruined heaps of Roman settlements and in forests, deserts and mountains where until then only wild beasts found shelter. Ten centuries later some of those abbeys in southern Germany were still called Schottenkloster.

The Irish scholars who first brought Irish culture to the Continent, beginning at the end of the 6th century, came rather as missionaries than as teachers, and they came willingly, im¬ pelled only by religious ardor. But there were some great scholars among them. Their coun¬ trymen who followed 200 years later came as fugitives seeking rest and protection in the establishments founded by their predecessors. Some of them were mere wanderers and have left only a trace of their presence in the hospices where they lodged as pilgrims. The others settled down as teachers. As their repu-*

tation stood very high throughout western Europe (they were spoken of everywhere as <(Peritissimi ScottP*), they became teachers of the clergy, the aristocracy, and the common people and counselors of kings and emperors. In a word, they became the schoolmasters of Europe. Every school had its Irish teachers. Charles the Bald brought Scotus Erigena, the founder of scholastic philosophy, to Paris, and Charles the Great surrounded himself with such Irish scholars as Clement and Joseph Scotus, the friend and disciple of Alcuin. There were at least five distinguished Irish scholars named Dungal in France in the time of Charlemagne. In fact, the two first universities of Europe, those of Paris and Pavia, owed their founda¬ tion in no small degree to Irish professors.

The number of Irish monks living on the Continent appears to have reached its height in the 11th and 12th centuries. While the names of many of them 'are known to us, there were, no doubt, some who have not left sufficient evidence to enable us even to connect them with the land of their birth, and others of whom the continental records make no mention whatsoever. It is likely, however, that among anonymous works composed during that period there were some which are to be added to the credit of the Irish scholars. The names of some of the most distinguished among them have already been mentioned. To them may be added Fursey at Lagny, Fredolin at Glarus, Frigidian at Lucca, Livinus who underwent martyrdom in Flanders, Arbogast who occupied the see of Strassburg, Killian, the apostle of Franconia, Saint Fiacre, Saint Virgilius and Cathaldus. Many of these men no doubt had but little originality, and only Scotus Erigena could claim to have opened up a new path in science, yet they were all leaders in the moral and intellectual movement of their time and bearers of a higher culture than was then to be found among the other nations of Europe.

Bibliography. — Healy, Ireland's Ancient Schools and Scholars) (Dublin 1896) ; Joyce,

(Social History of Ancient Ireland) (Dublin 1903) ; Gougaud, Wes Chretientes Celtiques) (Paris 1911); D' Alton, (History of Ireland) (Dublin 1910) ; Montalembert, (Monks of the West* (Edinburgh 1861) ; Moran, (Irish Saints in Great Britain (Dublin 1903) ; Stokes, M., (Six Months in the Forests of France* (Lon¬ don 1895), and (Six Months in the Apennines> (London 1892) ; Ulster Journal of Archceology, Vol. VII (Belfast 1859) ; Hogan, Articles in Irish Ecclesiastical Record (1894—95) ; Edmonds and D'Alton, Articles in the (Glories of Ire- land) (Washington 1914).

Joseph Dunn,

Professor of Celtic Languages and Literatures, The Catholic University of America.

IRISH SEA, the body of water between England and Ireland. It is connected with the Atlantic Ocean on the north by the North Chan¬ nel, and on the south by Saint George's Chan¬ nel. The north shore of Wales and the south¬ west shore of Scotland are washed by this sea. It is almost circular in form, about 140 miles north and south, and the same east and west. The largest arms of the sea are on the west shore, The Morecambe Bay on the coast of England, and several large fiords. Dublin and Dundalk bays are the most important on the

west coast. The only large islands are the Isle of Man in the north, about midway between England and Ireland, and Anglesey off the northwest coast and a part of Wales.

IRISH TERRIER, a rough-coated, strongly built terrier, resembling the Welsh and Scotch terriers. See Dog.

*IRISH TEXTS SOCIETY, an organiza¬ tion established in London in 1898. Its object is to promote the study of Irish literature, — * that is, of literature in the Irish text. It fosters societies and issues publications to aid the work. By 1914 the society had issued some 12 valuable works.*

IRITIS, I-rl'tis, inflammation of the iris, the colored curtain that shows the pupil in its centre. This disease follows several types, de¬ pending on the kind and virulence of the causa¬ tive agent. In the serous form there is an ex¬ udation of blood-serums into the space in front of the iris, and more or less fibrinous matter that tends to glue the parts together. Pain shoots through the whole eyeball, and vision is dimmed by the turbid fluid. Persistent ad¬ hesions to the lens are formed, causing a per¬ manent distortion of the shape of the pupil. Another form is the plastic, in which the pupil is actually occluded by the fibrinous deposits. Rheumatism and syphilis are the two most fre¬ quent causes of the malady, but many constitu¬ tional diseases — as gout, diabetes, anaemias and menstrual disorders — may be factors in caus¬ ing the disturbance, and it may also be sec¬ ondary to diseases in other parts of the eye, or even in the other eye, as in sympathetic ophthalmia. The treatment consists of dilating the pupil by dropping solutions of some drug, as atropine, into the conjunctival sac, treating the constitutional disease at the seat of the malady, and in relieving the pain by hot fomen¬ tations, blood letting and the administration of drugs that are sedative. Syphilitic iritis is a lesion of the third stage of syphilis, where tiny spots called gummata grow in the

substance of the iris.

IRKUTSK, ir kootsk, Russia, a provincial government of eastern Siberia, separated from China by the Sayan Mountains. It has an area of 280,499 square miles, and is traversed by the Trans-Siberian Railway. The country is gen¬ erally mountainous, but produces rye, barley, oats and vegetables. The most important rivers are the Angara, Lena and its tributary the Vitim. Gold, iron and salt figure foremost among the mineral products. Agriculture, cat¬ tle-breeding and the transport of goods to and from China are the chief occupations of the people. Pop. 821,000 (one-third exiles and forced colonists), 2.5 to the square mile. The capital city is Irkutsk (q.v.).

IRKUTSK, Asiatic Russia, capital of the government of the same name and the finest city of Siberia, at the confluence of the Angara and the Irkut, 3,385 miles by rail from Moscow. The old city was almost entirely destroyed by fire in 1879, and the modern city is well laid out and well-paved, with wide streets. The winters are very severe, in this latitude, but the climate is healthful owing to the elevation. It contains a library, a museum, a theatre, a school of medicine, numerous primary and secondary schools, a meteorological station, a cathedral

with five domes, Lutheran and Roman Catholic churches. It is the residence of the governor- general of eastern Siberia; the seat of an arch¬ bishop of the Orthodox Greek Church, and of a national court of appeals. Its manufactures are few and unimportant and are consumed lo¬ cally. The commerce is of great importance, however, as the city is one of the chief centres of the tea trade and an important point on the Siberian Railway. There is an annual fair in December at which assemble merchants from all parts of Russia. It was founded by Cos¬ sacks in 1653, created a town in 1686 and soon developed into the chief centre of the Russo- Chinese tea trade. Pop. 129,700, including about 5,000 exiles.

IRON, Ralph, nom-de-plume of Olive Schreiner (q.v.).

IRON, a common and exceedingly useful metallic element, which has been known and used in the arts for many centuries. Articles made of iron found in the pyramid of Cheops are believed to be 5,000 years old. It occurs in nature in the metallic form, both in meteor¬ ites and in certain lavas and volcanic rocks; but the commercial supply is obtained by the reduction of the oxides (or other ores) of the metal, by strongly heating them in a blast fur¬ nace with carbon. Iron is grayish in color, with a marked lustre. If

cooled slowly from a molten condition it is grayer; if rapidly, it is whiter. It crystallizes in the isometric. system, usually in the form of cubes, sometimes as octahedra. The melting point of iron varies to a considerable extent, according to the impuri¬ ties with which the metal is associated, and also, apparently, according to the physical con¬ dition of the iron itself. Pictet gives it as about 2900° F. for iron that is sensibly pure. The specific gravity of the metal also varies to a considerable extent, the determinations rang¬ ing from 6.95 to 8.2. The specific gravity of pure iron, at 60° F., may be accepted as 7.85. The specific heat of the metal is about 0.112 at ordinary temperatures, and its coefficient of ex¬ pansion (on the Fahrenheit scale) is about 0.0000068. Taking the electrical conductivity of mercury (at 32° F.) as unity, the conductivity of iron is about 9.68 at 32° F., and 6.19 at 212° F. Chemically pure iron is not found in commerce, the nearest approach to it being electrolytic iron, which is about 99.95 per cent pure. Even the most carefully made iron of the laboratories has some admixture or alloy which cannot be dislodged. The common com¬ mercial forms of iron are wrought iron and cast iron. The former is measurably free of carbon, and is known also as ((soft iron® and <(malleable iron.® It contains a small percentage of slag and minute proportions of phosphorus, sulphur, silicon and manganese. It is obtained from cast iron (pig iron) by first melting and boiling the pig metal, then allowing it to cool till in a pasty condition, and then "puddling® it into balls which are hammered to remove the slag content. Cast iron is the product of the blast furnaces in which iron ores are smelted. It is commonly called pig iron. It contains from 1 1/2 to 4 per cent of carbon in the form of carbide of iron, or of graphite. Where the carbon is in the form of carbide, the iron, is hard and brittle ; when in the form of graphite the iron is soft and tough. Frequently both

forms exist in the same sample in varying pro¬ portions. Other common constituents are sil¬ icon, from 0.2 up to 18 per cent; phosphorus from 0.02 up to 3 per cent; a minute percentage of sulphur, and manganese, which may run up to 20 per cent, when the compound is called ferro-manganese. On the market pig iron is graded as follows: No. 1, when very gray and with large crystals; No. 2, the same, when with small crystals; No. 3 and No. 4 are closer grained types of No. 1 and No. 2; "mottled,® when of white and gray iron mingled. Nos. 1,

2 and 3 are used in foundry work. No. 4 is used generally for puddling into wrought iron and also for the production of heavy castings and for chilled castings. Mottled iron is added to the other types to give density and hardness. Repeated meltings of iron increase its hardness. Iron is the most magnetic substance known. Soft iron is capable of being magnetized very highly when surrounded by a solenoid of wire that is conveying an electrical current ; but its magnetization persists only while the electric current is flowing, falling off, upon the cessa¬ tion of the current, to a

value that is prac¬ tically negligeable. It is upon this property of temporary magnetization that the action of the telephone, the telegraph and many other useful electrical inventions depends. (See Magnet¬ ism ; and for a full discussion, of the phenomena of Magnetization, consult Ewing, (Magnetic In¬ duction in Iron and Other Metals). Hardened steel, when magnetized by the action of the electric current (or otherwise), retains a large proportion of its magnetism permanently. Iron becomes nonmagnetic at a red heat, but regains its magnetic possibilities upon cooling again. Wrought iron, when pure, is malleable to a cer¬ tain extent at all temperatures ; but it yields to the hammer with special readiness when heated to whiteness, and it may then be forged and welded without difficulty. The presence of any considerable proportion of sulphur or phos¬ phorus makes the metal "short® or brittle. When phosphorus is present in too great a pro¬ portion, the iron is brittle in the cold (that is, "cold-short®) ; while if sulphur is present in excess it is brittle when hot (that is, it is "hot- short®).*

Chemically, iron is a dyad. It has the sym¬ bol Fe (from "ferrum,® the Latin name for the metal), and an atomic weight of 56 if 0 = 16, or 55.6 if H— 1. It forms two basic oxides,

(1) ferrous oxide FeO, which gives rise to a series of salts known as "ferrous® salts, and

(2) ferric oxide (or ferric sesquioxide), Fe203, which gives rise to a corresponding series of "ferric® salts. A third oxide, having the. form¬ ula FeaCh, is also known, which is magnetic, and occurs in nature, either amorphous or crystal¬ lized in octahedra, as the mineral "lodestone.® This oxide is black in color, and is known as the black oxide, magnetic oxide, or ferroso- ferric oxide. It may be prepared, artificially, by oxidizing iron at a high temperature, either in air or in steam, or by heating carbonate of iron to 650° F., in a current of carbon dioxide. It is not readily attacked by acids or other chemical agents, and for this reason a coating of it is often formed on articles of iron to pro¬ tect them from further oxidation. The Russia iron that is used for stove-pipes is coated in this way, by a secret process. When in mass, iron does not readily decompose water at ordi-

nary temperatures, though it does so at high temperatures. Finely divided iron decomposes water at 212° F., and at lower temperatures ac¬ cording to some authorities. When in a suffi¬ ciently fine state of subdivision, iron will burn in the air or in oxygen, with the formation of a mixture of Fe203

and Fe304. Iron forms alloys with many metals, and combines directly with chlorine, bromine, iodine, fluorine, sulphur, carbon, boron, silicon, phosphorus and arsenic. Melted iron dissolves carbon to some extent, and when the molten mass is cooled the carbon is largely deposited in the graphitic form, al¬ though a part of it remains in the iron, com¬ bined with it in the form of a carbide; and it is believed that the presence of varying quanti¬ ties of such carbides has much to do with the physical qualities of iron and steel. When melted iron that is saturated with carbon is allowed to cool under great pressure, the car¬ bon is partly deposited in the form of minute crystals of diamond (q.v.) ; but the manufac¬ ture of the diamond by this method has not yet been made commercially practicable.

*Feirous Compounds. — Ferrous oxide, FeO, has not yet been prepared in a state of absolute purity, but it may be obtained approxi¬ mately pure by reducing ferric oxide, Fe203, by heating it to 600° F. in a stream of pure hydro¬ gen. It is black in color, and absorbs oxygen with great readiness, passing into the higher oxides. Ferrous sulphate, otherwise known as protosulphate of iron, green vitriol, or copperas, is prepared by dissolving iron wire in dilute sul¬ phuric acid, and crystallizing by evaporation. It has the formula FeSo4 + 7H20, and is green¬ ish in color. It is soluble in water, but the solution oxidizes readily, the salt becoming con¬ verted into ferric sulphate, Fe2(So4)3. Ferrous sulphate is largely used in the manufacture of certain black dyes, in the preparation of writ¬ ing ink, Prussian blue and other pigments. Ferrous chloride, FeCl2, may be prepared by heating excess of iron wire or iron filings in chlorine, or by passing dry hydrochloric acid gas over hot metallic iron. It crystallizes in white, lustrous, six-sided scales, is deliquescent, and is volatile at a yellow heat. In air it oxi¬ dizes readily to a mixture of ferric oxide and ferric chloride. Ferrous carbonate, FeCo3, is an insoluble compound, occurring in nature as ((spathic iron ore,** and constituting a valuable source of iron. Ferrous sulphide, FeS, is a lustrous black or grayish-black body, which may be prepared by melting sulphur and iron together in the proportion of 56 parts (by weight) of iron to 32 of sulphur, and stirring with a white-hot rod of soft iron. It is insolu¬ ble in water, but dissolves readily in dilute acids, with copious liberation of sulphureted hydrogen gas. Ferrous sulphite has been found in some meteorites, as the mineral Hriolite.® See Chemical Analysis.*

Ferric Compounds.— Ferric oxid, Fe203, occurs native as hematite (q.v.), and it may be prepared artificially by heating ferrous sulphate to redness. Ferric hydrate, Fe (OH)3 is pre¬ cipitated as a brownish-red powder when am¬ monia or caustic potash is added to the solution of a ferric salt. Ferric sulphate and ferric chloride are prepared by dissolving this hydrate in sulphuric and hydrochloric acids, respectively. The chloride is used as a

disinfectant for sew¬ age, and the sulphate in dyeing cottons. Ferric

nitrate is used as a mordant in producing buffs and blacks in dyeing. In general, a ferrous salt, when in solution, is converted into the corresponding ferric salt by the action of oxi¬ dizing agents ; and the ferric salts, conversely, are reduced to ferrous salts by the action of certain reducing agents. Ferrous salts give a white precipitate with caustic alkalies, and, with potassium ferrocyanide, a light-blue precipitate which quickly turns black. Ferric salts give a reddish-brown precipitate with caustic alka¬ lies, and a deep blue precipitate with potassium ferrocyanide. See Cast Iron; Steel. Consult Howe, H. M., (The Metallography of Steel and Cast Iron) (New York 1916) ; Hudson, O. F., and Bengough, G. D., (Iron and SteeP (New York 1913) ; Sauveur, A., (The Metal¬ lography of Iron and SteeP (New York 1912).

IRON, Manufacture of. The metallic products extracted from iron ores for use in the arts are generallv divided into three classes: (1) pig or cast iron, (2) wrought iron, and (3) steel.

Although the minerals in which iron occurs are very numerous, the only ones from which the metal can be extracted under economical conditions — that is, the only ores of iron • — are those in which the iron is present as an oxide, as in magnetites, hematites and limonites, or as a carbonate as in siderites. (See Iron Ores). When carbonate of iron, moreover, is heated to a sufficiently high temperature either at an early stage of the process of manufac¬ ture or in a preliminary operation (the cal¬ cining of the ore), the carbonic acid which it contains is expelled as a gas and the iron is reduced, to the condition of an oxide; hence the operation of extracting metallic iron from its ores always consists in the deoxidation or reduction of iron oxide.

In order to reduce oxide of iron two condi¬ tions are essential: (1) contact with a reducing or deoxidizing substance, and (2) a high tem¬ perature. By heating iron oxide in contact with some carbonaceous fuel these two neces¬ sary conditions are realized, the carbon acting both as the needed fuel and as the needed re¬ ducing body, for at a sufficiently high temper¬ ature it has a ‘stronger affinity for oxygen than iron and therefore deprives the latter of that element.

Iron ore, however, never consists of pure oxide of iron; even in the richest varieties the iron oxide is associated with at least a small amount of other minerals, generally of an earthy character, such as quartz, clay or lime¬ stone, called the gangue or vein stuff. In the majority of cases the gangue is silicious, that is, made up chiefly of silica or quartz. Silica is per se a very infusible compound, but when brought in contact with iron oxide at a high

temperature it combines readily with it to form a silicate of iron, a readily fusible substance or slag.

Besides the earthy matters which constitute the gangue, iron ores generally contain other minerals in which are present such elements as phosphorus, sulphur, manganese, etc. See Iron Founding, Chemistry of.

Filially, if metallic iron be kept in contact with incandescent carbon for a sufficient length of time, a considerable amount of that element will be absorbed by the metal. The conditions

are then said to be carburizing. This affinity of iron for carbon plays a most important part in its metallurgy, chiefly because of the marked influence of carbon upon the melting point of the metal. Pure or rather carbonless iron re¬ quires a very high temperature to be melted (about 2,750° F.), necessitating the use of spe¬ cial furnaces and implements capable of pro¬ ducing intense heat. By the introduction of some carbon in the iron, however, its melting point is greatly lowered, from which the im¬ portant conclusion is to be drawn that if the metallic product of the metallurgical operation be highly carburized it will be produced and maintained in a liquid state much more readily than if it were freer from carbon. If the iron contains but a small amount of carbon and if we lack the means of producing an intense heat, the product of the operation will be pasty and not molten.

The Primitive or Direct Methods. — The

simple operation outlined in the preceding para¬ graphs which consists in heating iron ore in contact with carbonaceous fuel was the one conducted in the direct or primitive methods which for ages were the only ones used for the production of iron and steel. Charcoal was the fuel employed and the simple furnace required, called a forge or bloomery, resembled a smith's forge.

So simple is the operation required for ex¬ tracting a small mass of malleable iron from some rich ore that it seems highly probable that man became acquainted with the use of iron at a very early period of his existence. A fire accidentally lighted by a primaeval man upon the ground where iron ore occurred near the surface would have resulted, under suitable conditions, in the production of some metallic iron. Indeed, the first iron furnaces of which we have any record consisted in a single ex¬ cavation dug preferably on the side of a hill, facing the prevailing wind,

and with suitable openings at the bottom for the necessary draft. Artificial blast was later introduced and the construction of the furnace improved. . It will suffice to mention here two representative types of this class of furnaces: (1) the old Catalan furnace or forge, and (2) the American bloom¬ ery, a modern adaptation of this primitive forge.

The Catalan forge takes its name from the province of Catalonia, in Spain, where at one time it contributed a large proportion of the world's production of iron, and where, indeed, it is still in operation, as well as in other locali¬ ties adjacent to the Pyrenees. In its more mod¬ ern form it consists of a shallow hearth made up of .thick iron plates, with the exception of the back, which generally consists of masonry lined with fire clay, while the bottom is fre¬ quently made of a movable block of granite. The blast was undoubtedly at first supplied by crude bellows, but was later produced by a water blower or <(trompe.):> The furnace is kept filled with charcoal and small lumps of rich iron ore until a pasty mass of metallic iron is obtained weighing some 350 pounds, called .a <(hloom® and which contains much slag. It is then removed from the furnace and much of the slag expelled by hammering or squeezing.*

For many years a direct process known as the American bloomery process was extensively used in those localities of the United States wihere suitable ore and an abundant supply of

charcoal were available. This process does not differ in any essential feature from the Catalan method, which has just been described, but in details of furnace construction and in manipu¬ lations there are many points of difference be¬ tween the two methods.

The hearth of the bloomery is kept full with burning charcoal and coarsely pulverized ores until a bloom of iron weighing some 300 or 400 pounds has been produced, an operation which generally requires three hours. The loss of iron is said to be about 20 per cent and the fuel consumption some iy2 tons of charcoal per ton of iron produced.

These methods are called direct because they yield iron by the direct treatment of the ore in a single operation, in contradistinction to the modern methods in which at least two distinct treatments are required for the production of ir,on and steel, the first operation yielding, as will be seen presently, an impure product called cast iron, which must be refined or purified in order to convert it into iron or steel.

While these methods are now obsolete, hav¬ ing been replaced by the more modern indirect processes, they are still in use in some coun¬ tries, although only to a very limited extent.

According to James M. Swank, in 1902 and 1903 there were no forges in operation in the United States for the manufacture of blooms and billets from, the ore. In 1901 the blooms and billets so made amounted to 2,310 gross tons, against 4,292 tons in 1900, 3,142 tons in 1899, 1,767 tons in 1898, 1,455 tons in 1897, 1,346 tons in 1896, 40 tons in 1895, 40 tons in 1894, 864 tons in 1893, and 2,182 tons in 1892. All the ore blooms produced after 1897 were made by the Chateaugay Ore and Iron Company, of Plattsburgh, N. Y., at its Standish Works, which, however, have been idle since 1902.

The Blast Furnace. — In order to prevent the great waste of iron previously alluded to resulting from the combination of the gangue of the ore with some of the metallic iron, it is necessary to provide a substance with which the" silica of the gangue will readily unite, forming with it a fusible slag, and as silica is an acid it is necessary to supply a base to that effect.

Limestone (a carbonate of lime) is the most readily obtainable and cheapest substance for •such purpose. It is either burned or calcined in a preliminary operation by which it is con¬ verted into lime, the carbonic acid escaping as a gas, or if used raw, as is customary, it is likewise changed to lime at an early stage of the metallurgical operation by the heat to which it is exposed.

The substances which are thus added for the purpose of forming a fusible compound with the gangue of the ore or with other impurities are called fluxes.

The use of fluxes constitutes one of the most important improvements ever introduced in the manufacture of iron, for it made it pos¬ sible to extract the metal, under economical conditions, from- the enormous amount of rela¬ tively lean ores which occur in nature, and to do so at a relatively very low cost. Previously to the use of fluxes it was unprofitable to treat ore containing less than some 60 per cent of metallic iron, while with their assistance iron ores with a\s little as some 25 per cent of iron have been profitably smelted.

With the addition of lime, however, it is no

longer possible to carry on the operation in the very simple furnace or forge previously used, because the resulting slag or silicate of lime is a much more infusible substance than the sili¬ cate of iron produced without the addition of lime and a sufficiently high temperature to fuse this lime slag

could not be produced in the forge furnace.

The very high temperature required to fuse the lime slag necessitates the use of a very dif¬ ferent type of apparatus (a high, chimney-like furnace), together with the necessary appli¬ ances for the production of the needed heat; in other words, the reduction of the ore must be carried on in the modern blast furnace. The blast, furnace was gradually evolved from the primitive forge or bloomery by a mere increase in height, such furnaces as the ˆOsmund,® the ((Stiickof en,® and the ˆBlauofen® forming as many steps in this evolution. The exact date of the origin of the blast furnace, that is, of an apparatus in which cast iron alone could be produced — and it might be added with addi¬ tion of flux — is not positively known but it is generally believed that it originated in the Rhine provinces about the beginning of the 14th century.

The operation conducted in early blast fur¬ naces consisted chiefly in smelting iron ore with the necessary amount of charcoal for fuel and of limestone to flux the gangue of the ore. The waste gases which contained a large amount of carbon monoxide were allowed to escape and to burn freely at the top, of the furnace. The molten cast iron was allowed to collect at the bottom of the furnace until a sufficient quantity had accumulated, when it was withdrawn by opening a tap ho'le at the bottom in the front part of the furnace. The slag was permitted to escape as soon as formed by flowing through an opening and over a stone on one side of the furnace known as the damstone. The blast was at first created by rude bellows, later by blowing cylinders, and finally by steam- or by gas-blow¬ ing engines, while no attempt was made at pre¬ heating it.

The following improvements introduced in blast furnace practice, outside of mere improve¬ ments in construction, marked the most import¬ ant steps which have led to the modern blast¬ furnace operations. They are mentioned in a chronological order: (1) Use of coke instead of charcoal introduced by Abraham Darby in 1735; (2) the heating of the blast first proposed by James Beaumont Neilson in 1828; (3) the closing of the top of the furnace and utilization of the waste gases by P. Taylor in 1840; (4) the heating of the hot blast stoves by the waste gases of tbe furnace successfully accomplished between 1833 and 1845 by Faber du Faur and James Palmer Budd; (5) the cup and cone ar¬ rangement for closing the top of the furnace invented by G. Parry in 1850; (6) the use of the waste gases for generating steam by James Palmer Budd in about 1855; (7) re¬ generative stoves for heating the blast intro¬ duced by E. H. Cowper in 1860; (8) use of blast furnace slag for the manufacture of ce¬ ment; (9) use of gas-blowing engines utilizing the waste gases.

The important and numerous improvements in construction cover every

part of the furnace as well as every appliance connected with iron

making. To attempt even to mention them would occupy an amount of space which is not here available.

Modern American blast furnaces generally measure from 90 to 100 feet in height and from 20 to 30 feet in diameter at the widest part, while the hearth diameter frequently measures 12 or 15 feet, giving a capacity of from 20,000 to 30,000 cubic feet. The bosh walls which ex¬ tend from the hearth to the widest part of the furnace are cooled by hollow rings of cast iron or bronze built in sections and inserted into the brick work, and through which water is con¬ stantly flowing. The water required for cooling purposes often exceeds 3,000,000 United States gallons in 24 hours. Two down-comers con¬ duct the gas from the top of the furnace to the dust-catchers, from which it is, by means of a gas main, led to the stoves and the boilers or to cleaning and washing towers preliminary to its use in internal combustion blowing engines. Another main leads the blast from the stoves to the furnace. Before connecting with the bustle pipe surrounding the furnace the hot blast main frequently divides in order to better equalize the pressure around the complete circle. Explosion doors are provided at the furnace top, and whenever possible in all pipes and chambers carrying gas.

Blast at the rate of 40,000 to 60,000 cubic feet per minute is forced into the furnace through pipes or ˆtuyeres,® varying between 12 and 20 in number, under a pressure of 10 to 15 pounds per square inch and preheated by its passage through the stoves to a temperature of 1,000 to 1,500° F. The output of these furnaces frequently averages 400 to 600 tons of pig iron in 24 hours and is occasionally considerably greater, the furnace being tapped six times a day and some 75 to 100 tons of iron being obtained at each cast. The tapping hole is frequently opened by means of compressed air drills and closed by means of a tapping hole gun which forces clay into the hole. The fuel consump¬ tion varies between 1,500 and 2,000 pounds of coke per ton of pig. iron, according to conditions.

Tbe raw materials are conveyed to the top of the furnace by an inclined plane and skip cars, which discharge the raw materials auto¬ matically into a receiving hopper provided with a bell and placed over the main hopper. The use of an upper bell acting as a seal while the material is introduced into the furnace pre¬ vents the escape and waste of the gases during this operation, resulting in further economv. Uniform distribution of the raw material as it enters the furnace is sometimes promoted by means of rotary or other distributing mech¬ anism.

Modern steam-blowing engines supplying the blast to the furnace are constructed both hori¬ zontal and vertical and are generally compound and condensing. They frequently have a capac¬ ity of some 30,000 cubic feet of air per minute which they can deliver under a pressure of 25 pounds or more per square inch if needed. Two such engines are generally employed for each furnace.

Internal combustion blowing engines utilizing the waste gases of the furnace were first con¬ structed and put into successful operation at the Cockerill Steel Works at Seraing, Belgium. They are now extensively used. In 1904 the

American metallurgist James Gayle}'- conceived the idea of depriving the blast from its atmos¬ pheric moisture before introducing it into the furnace, thereby preventing the strongly endo¬ thermic reaction by which steam is decomposed into its elements, from taking place within the furnace, with corresponding loss of heat, and therefore increased consumption of coke. The saving of fuel proved to be considerably greater than was expected from purely theoretical cal¬ culations. It amounted to some 20 per cent, while the output of the furnace was increased some 15 to 20 per cent. The method consists in passing the blast through a refrigerating appa¬ ratus in which the moisture is solidified. Not¬ withstanding the remarkable results reported, the method has not been widely adopted, partly at least because of the great cost of the appa¬ ratus needed.

The modern stoves employed for heating the blast before it enters the blast furnace consist, roughly stated, in high cylindrical chambers filled with bricks placed some distance apart The waste gases from the furnace are admitted at one end of these chambers together with sufficient air to burn them, and the hot products of the combustion on their way to the chimney heat the brick work to a very high temperature. After the stove has thus been properly heated, the supply of gas and air is shut off and the cold blast from the engine is admitted. The heat which has been stored up in the brick work is now imparted to the blast, which in this way is highly preheated. After the stove has cooled down to a certain temperature the blast is shut off and the stove is again heated by the waste gases. Modern furnaces are generally provided with four of these stoves, the blast passing in succession through each stove for one hour, while the three others are being heated. With such regenerative system of heating the tem¬ perature can readily be maintained at 1,400° F., which results in a considerable economy of fuel in the furnace.

It was for a long time the universal practice, after opening the tap hole, to allow the iron to run into sand molds, prepared for that pur¬ pose on the floor in front of the furnace, and this method is still widely used. The metallic mass filling each mold is called a pig, while the metal filling the channels connecting a number of molds is called a sow. The pigs are, of course, fastened to the sow, and, after solidifica¬ tion, must be broken loose, generally with sledge-hammers. When the cast iron is to be used for conversion into steel by the Bessemer process the metal as it flows from the furnace is frequently received in large tanks or «ladles" mounted on wheels, which are afterwaid taken to the steel mill, where the metal is con¬ verted into steel without being allowed to solidify, thus saving the cost of remelting the pig iron. Molten pig iron direct from the blast furnace or from a ˆmixer" is also used some¬ times in the open hearth furnaces. . In later

years casting machines have been introduced to save the heavy labor connected with the handling of the pigs, and to otherwise expedite the casting operation. Nearly all these devices consist in an endless chain, the links of which are made of small iron molds, which are filled in succession by passing under the stream of molten metal. The chain then carries the par¬

tially solidified pigs or ˆchills® under water to promote their cooling and discharge them auto¬ matically on cars, the empty molds returning to the ladle again to be filled, and so on.

In the modern furnace the slag tap hole or ((cinder notch" is kept closed, as well as the iron tap hole, being opened only at stated intervals, generally a short time before the casting of the iron. In the latest American practice the slag is generally received in ladles which carry it away to the dumping place, or discharged in a tank of water known as a granulating pit where under the action of a stream of water the molten slag is broken into small fragments, in which form it is suitable for the manufacture of cement and for other uses.

The Products of the Blast Furnace. — Owing to the extremely high temperature at which the operation must be conducted and to prolonged contact between the reduced iron and the incandescent carbonaceous fuel, the conditions in a blast furnace are strongly car¬ burizing, the metal absorbing a large amount of carbon (generally between 3 and 4 per cent). Moreover, owing to the fact that highly car¬ burized iron is much more fusible (melting generally between 2,100° and 2,400u F.) than iron containing little carbon, and to the intense heat of the furnace, the extracted metal, instead of being obtained in a semi-fused, pasty condi¬ tion, will be perfectly liquid and on account of its high specific gravity will settle at the bot¬ tom of the furnace. The slag also, will be melted, and being lighter than the iron will float as a separate layer above the metallic bath. The molten slag and the molten iron are with¬ drawn separately from the furnace through tap holes provided for that purpose at suitable levels, thus effecting their complete separation.

The following table illustrates the rapid in¬ crease of the world's production of cast iron since the beginning of the last century, as well as the steadily increasing proportion contributed by the United States.

Production in Tons.

United

YEARS

i xnn .

Total

. 825,000

States

1810

53,908

1 830

1,825,000

1850 .

1870 . .

. 4,750,000

. 12,053,000

563 , 755 1,665, 000

1880

... 18,547,000

2,729,000

1890 .

27,630,000

4,658,000

1 900 .

. 40,198,000

14,009,000

1901 .

... 40,889,000

16,132,000

1902 .

1903 .

. 45,557,000

... 47,022,000

18,106,000

18,297,000

1 904 .

. 45,419,000

16,790,000

1905 .

. 54,054,000

23,360,000

1906 .

. 59,166,000

25,706,000

1907 .

60,679,000

26,193,000

1908 .

. 48,507,000

16, 190,000

1 909 . . . .

. 61,213,000

26,208,000

1910 .

.. 66,352,000

27,636,000

IQH .

... 63,251,000

24,027,000

1912 .

75,029,000

30,202,000

1913 .

80, 172,000

31,461,000

1914 .

62 , 845 , 000

23,332,000

191 .

64,516,000

29,916,000

1916 (estimated) .

75,000,000

39 , 435 , 000

This highly carburized iron produced in the blast furnace is called pig iron, or cast iron. Owing principally to the large amount of carbon which it contains, the properties of cast iron are very different from those of wrought iron and steel.

Owing to the intensely reducing conditions

prevailing in a blast furnace, many impurities, such as phosphorus, sulphur, manganese and silicon, which are always present in greater or less amount in the ore, flux and fuel, are partially or wholly reduced to the metallic state and in this condition are retained, in part at least, by the molten cast iron. Cast iron, there¬ fore, is not simply an association of iron and carbon, but contains also varying amounts of the impurities just mentioned.

The Refining of Cast Iron or the Indirect Methods for the Production of Wrought Iron and Steel. — Cast iron is not malleable — it can¬ not be forged ; that is, it cannot be shaped into finished implements by mechanical pressure such as that exerted by hammering, rolling, etc. Cast iron, therefore, can only be used as such for casting purposes, which means that cast iron implements can only be obtained by pouring the molten metal into molds having exactly or very nearly the external shape of the objects we de¬ sire to manufacture. Cast iron, moreover, is brittle and lacks both strength and toughness, which further greatly limits its useful applica¬ tion. To produce a metal which is forgeable, which possesses more strength and toughness and other valuable properties absent in cast iron, and, therefore, a much more useful metal, it is necessary to subject cast iron to a refining operation by which it is converted either into steel or into wrought iron.

This indirect method of producing iron and steel is the prevailing modern method, for, in spite of strenuous efforts made to improve the older or direct method, it remains by far the cheaper of the two.

The refining of cast iron or its conversion into wrought iron or steel consists essentially in eliminating a large proportion of the im¬ purities which it contains, especially carbon and silicon. In order to expel . these impurities we must bring the cast iron in contact with a substance, either solid or gaseous, possessing more affinity for them than the iron itself, and here again heat is required for such reaction to take place. Oxygen has a very great affinity both for carbon and silicon, and in general for the other impurities present in cast iron, and it is upon this element that we shall depend for the elimination of the impurities. We may for that purpose use either atmospheric oxygen or the oxygen of some oxidizing substances. The oxidizing agents generally used besides at¬ mospheric oxygen are rich iron ore or rich slag from some previous operation, or the slag pro¬ duced in the refining operation itself. These substances are composed essentially of oxide of iron, which is an oxidizing compound, for it readily parts with some of

its oxygen which is taken up by the carbon of the cast iron.

When cast iron in order to be purified is exposed at a sufficiently high temperature to the action of atmospheric oxygen or of some other oxidizing substance, the silicon which it contains combines with some oxygen, being converted to silica. Some, of the iron itself will be oxidized and the resulting oxide of iron will in turn enter into combination with the silica to form a fusible silicate of iron or slag.

The carbon present in the cast iron also combines with some atmospheric oxygen, or more frequently with some of the oxygen held by the slag or by some iron ore purposely added, and is converted into carbonic oxide or

carbonic acid gas, in which Condition it escapes from the furnace. By being deprived of its oxygen the iron ore added in some of these re¬ fining operations is reduced to the metallic state and incorporated into the refined metal.

The Products of the Refining of Cast Iron. — As was the case in the treatment of the ore, the nature of the metal resulting from the refin¬ ing of cast iron will likewise greatly depend upon the temperature at which the operation is conducted. If the temperature be low the re¬ fined metal will be obtained in a semi-fused or pasty condition, and will on that account in¬ clude a relatively large amount of slag, while it will generally be quite free from carbon. In other words, the product of the refining opera¬ tion conducted under these conditions will be wrought iron, or, if the conditions be made slightly more carburizing, steely iron. These are the conditions prevailing in the old forge refining of cast iron or "finery method,® as well as in the more modern puddling process for the manufacture of wrought iron, which methods will be outlined briefly.

The Finery Methods for the Production of Wrought Iron. — When the ironmaster of the 13th or 14th century, through the gradual devel¬ opment in height of its Catalan or other forge, so increased the carburizing conditions that he finally obtained a small amount of molten cast iron, he was confronted with the necessity of refining this brittle, unforgeable metal in order to convert it into malleable iron, and he quite naturally endeavored to conduct this refining operation in furnaces similar to the low hearths or forges which for so many centuries had been the only apparatus used for the direct extraction of iron from its ores. In these forges, known as "fineries,® the pig iron was melted in contact with charcoal and under the oxidizing influence of a blast issuing from a single tuyere. While the details of the finery operation and of the furnace differed much in various countries, and even in different sections of the same country, their essential features were identical. Four of these processes attained especial

prominence and have not been entirely driven out of exist¬ ence by the puddling process nor later by the Bessemer process ; they are the Walloon process as still conducted in Sweden, the Franche Comte process, the Lancashire process still used in England, the United States and some other countries, and the South Wales process which was for many years extensively used in South Wales for the production of iron plates for tinning. In recent years, however, soft Besse¬ mer and open hearth steel have taken the place of wrought iron for such purpose and this once flourishing industry is now quite, if not alto¬ gether, extinct.

These charcoal hearths or fineries are also frequently used for the remelting of iron and steel scrap resulting in the production of wrought, iron of high quality. The operation consists in filling the hearth with charcoal, upon which the scrap is placed and covered with ad¬ ditional charcoal and the charge melted. The slag produced in this operation is very basic and therefore promotes the removal of the phos¬ phorus and sulphur which are eliminated to a notable extent.

The iron manufactured or remelted in these hearths is mainly used for the manufacture of plates, sheets, skelp rods, etc., which are used

in the manufacture of. boiler tubes, boilers, screws, rivets, wire, etc.

According to J. M. Swank, the iron blooms produced in forges from pig iron and scrap in 1903, in the United States, and which were for sale and not for the consumption of the makers, amounted to 9,940 tons, against 12,002 tons in 1902, 8,237 tons in 1901, 8,655 tons in 1900, 9,932 tons in 1899, 6,345 tons in 1898, 7,159 tons in 1897 and 6,494 tons in 1896. All the pig and scrap blooms made in forges from 1895 to 1903, and for sale, were made in New York, Penn¬ sylvania and Maryland.

The Puddling Process. — The finery methods described in the preceding paragraphs were the only ones available for the conversion of cast iron into wrought iron until an Englishman by the name of Henry Cort invented the puddling process in the year 1784, a date which marks a very important epoch in the metallurgy of iron. It has been seen that in the finery processes the pig iron is heated in contact with solid fuel, and this necessitates the use of charcoal, because this fuel alone is sufficiently pure to yield wrought iron of good quality. If the at¬ tempt were made to use inferior tuels, such as coal or coke, it would be found that the iron absorbed so much impurity from. the coal, notably sulphur, as to be of inferior quality. The necessity

of using such an expensive fuel as charcoal, and a large amount of it, is a serious limitation of the finery processes, greatly increasing the price of the iron. To make the use of more impure but cheaper fuel possible, Cort proposed to conduct the refining of the pig iron in the hearth of a reverberatory fur¬ nace, that is, out of contact with the fuel itself, thereby preventing the contamination of the iron by the impurities of the fuel. . In a rever¬ beratory furnace the fuel is burned in a separate fireplace, the substance to be treated coming in contact only with the flames and gases resulting from the combustion of the fuel. In the pud¬ dling furnace, moreover, the labor required per ton of iron was greatly reduced and it was pos¬ sible to treat in one operation a considerably greater amount of pig iron.

The puddling operation as originally con¬ ducted by Cort and others is now known as the ((dry puddling process,® while the more modern method of conducting the operation, which. in¬ volves some important alteration of the original method, is known as the «wet» or «pig boiling® puddling -process. Only the latter will here be

described. _ , ˆ

The Wet or Pig Boiling Puddling Process.

— In the original or dry puddling process, while the oxidation of the caubon, silicon and other impurities was brought about to a certain extent by the oxide of iron formed during the opera¬ tion, we depended mostly for their elimination upon the oxygen of the air, and this necessitates for reasons which cannot here be explained the use .of white or refined pig iron. . The modifica¬ tion about to he described was introduced into the puddling process for the purpose of making it possible to treat gray cast iron at once m the reverberatory furnace, doing away with the pre¬ liminary refining operation and otherwise hastening the process. It is said to have been first used bv Toseph Hall, of the firm of Bar- rows and Hall, of Tipton, England, about the

year 1830. . , , .

The modern puddling furnace employed tor

the conduct of the pig boiling process resem¬ bles in its general lines the earlier puddling furnaces, the essential difference being in the nature of the lining of the hearth. The bot¬ tom of the hearth and the sides are made of iron plates which are protected by a thick layer of oxide of iron, called the ((fettling® of the furnace. The substances used for fettling purposes consist of pure hematites (ferric oxide) crushed or ground to the desired size and

of slags or scales obtained in the production or working of iron, and which are very rich in oxide of iron, such as roasted tap cinder or (

The bath is constantly stirred or "rabbled® so as to promote contact of all portions, with the oxidizing lining and with the iron oxide of the slag, thus hastening the oxidation of the silicon and carbon. As the carbon is ex¬ pelled the mass becomes pasty, the metal hav¬ ing now ((come to nature.® The spongy mass of wrought iron is then divided into balls weighing some 60 pounds, which are withdrawn from the furnace and worked in the usual way.

The whole operation lasts usually about lf/2 hours, but may be longer or shorter, according to the purity of the metal treated. The loss varies from '5 to 10 per cent, being chiefly de¬ pendent upon the. amount of impurity in the pig iron. According to Turner, the consump¬ tion of coal in the puddling furnace per ton of puddled bars amounts generally to about 2,600 pounds. The following interesting comments are from Prof. H. M. Howe:

"While the yearly production of wrought iron in the United States more than doubled be¬ tween 1870 and 1890, yet since the latter year it has shrunk very much, probably nearly to that of 1870; and between 1870 and 1900 the proportion which the production of wrought iron bears to that of steel diminished very a- reatly. Of the combined annual production of wrought iron and steel in the United States that of wrought iron formed 95 per cent in 1870, 63 per cent in 1880, 37 per cent in 1890, and probably not far from 15 per cent in 1899. The corresponding numbers for Great Britain are 34 per cent for 1890 and 19 per cent for 1899, and 16 per cent for 1901.. In the year 1899 the average number of British puddling furnaces in operation is reported as 1,149 out of a total of 1,320 in existence. Thus in 19

years the position of wrought iron changed from that of the chief product to one of secpndary importance.®

Albert Sauveur,

Professor of Metallurgy and Metallography in Harvard University, and the Massachusetts Institute of Technology.

IRON AGE, (1) in mythology, the last of the four great ages of the world, supposed to be characterized by abounding oppression, vice, and misery. (2) In archaeology, an age, the third in succession, in which weapons and

many other implements began to be made of iron, stone having been used for these purposes in the first, and bronze in the second. See Arche¬ ology.

IRON CAP. See Secondary Enrichment.

IRON CROSS (Eisernes Kreuz), Prus¬ sian military decoration, instituted 10 March 1813, by Frederick William III, and conferred for distinguished services in war. The decora¬ tion is an iron Maltese cross with silver mount¬ ing and is worn at the neck or at the button¬ hole. The grand cross, a cross of double the size, is presented exclusively to the upper of¬ ficers for the gaining of a decisive battle. The order lapsed in the middle of the 19th century but was revived in 1870. In the great war be¬ ginning in August 1914 very great numbers of men in the German army and navy received the Iron Cross from Emperor William II.

IRON CROWN, the crown of the ancient Longobardian kings, given, according to an un¬ authenticated tradition, by Pope Gregory the Great to Queen Theodolinda and preserved till lately in the cathedral of Monza. Henry, in 1311, is the first German emperor known to have worn it. It was removed by the Austrians to Vienna after 1859, but was presented to the King of Italy in 1866. The outer part of the crown consists of a golden hoop, with enameled flowers and precious stones, in form like an ancient diadem, within which is a thin plate or fillet of iron, which is declared by tradition to have been hammered from one of the nails of the true cross. Consult Bombelli, (Storia della corona ferrea5 (Florence 1870) and Hodgkin, Thomas, (Italy and her Invaders5 (Vol. VI, Oxford 1880).

IRON FOUNDING, Chemistry of.

Chemistry is the science which deals with the composition of material things the chemistry of iron founding or iron casting is the science which deals with the composition of cast iron. Cast iron implies by that title a quality of iron which can be melted and poured into molds and which will take the shape of the molds. The three properties which make cast iron valuable for casting are fluidity, low shrink¬ age, and mutability of hardness. Pure iron does not have these essential characteristics, consequently the casting properties of cast iron must be due to other substances present with the iron. The chemistry of iron founding must therefore deal with these substances and their reactions in making iron a casting metal. The substances which occur with iron are carbon, silicon, phosphorus, sulphur, and manganese, and each of these has a decided effect upon the iron with which it is combined.

Carbon.

*Carbon. — Carbon is the controlling ele¬ ment; in fact, iron could not be cast iron with¬ out carbon. Iron as it comes from the blast furnace, in the form known as pig iron, con¬ tains from 3 to 4ˆ2 per cent carbon. Cast iron as it comes from the cupola generally retains from 3 to 4 per cent carbon; special grades sometimes contain as low as 2*4 per cent and as high as 4ˆ4 per cent.*

Condition of Carbon in Cast Iron. — Chemically, all the carbon which does not dis¬ solve when the iron is placed in a certain strength of nitric acid is classed as Free Carbon, while the carbon which dissolves in this acid is designated as Combined Carbon.

Free Carbon. — Free carbon occurs as pure carbon interspersed in appreciable-sized particles between the crystals of iron. While the iron is in a molten condition it will hold in com¬ bination up to about 4.6 per cent of carbon, which is the saturation point. As the tempera¬ ture lowers the saturation point drops, and the excess of carbon separates out. Chromium and manganese in the iron raise its saturation point for carbon; silicon reduces it. Free carbon is subdivided according to its structure and mode of formation into Graphitic Carbon and An¬ nealing Carbon.

Graphitic Carbon. — Graphitic carbon is the crystalline or flaky form of carbon existing in all soft pig and cast iron which has been al¬ lowed to cool slowly from a molten condition.

Annealing Carbon. — Annealing carbon is an amorphous modification of graphite which is developed in white iron by continued annealing at a high temperature.

The difference between Graphitic and An¬ nealing Carbon is a physical one and is due to the mode of formation.

Combined Carbon. — Combined carbon ex¬ ists in cast iron in two forms, Hardening Car¬ bon and Carbide Carbon. Neither is visible to the naked eye, but each gives to iron a definite physical structure which is discernible under the microscope. Chemically, they may be separated by treating the iron for a long period with a weak non-oxidizing acid in a non-oxidizing atmosphere.

Hardening Carbon. — Carbon is held in the

hardening condition by rapidly cooling iron from a high temperature. The condition in which it remains is considered that of solution. (See Alloys). This alloy of iron and carbon is known as Austenite. The limit of carbon which will remain in perfect alloy is 0.89 per cent.

Carbide Carbon. — Carbide carbon is the carbon which exists in the carbide of iron Fe3C, also known as Cementite.

Factors Controlling the Condition of the Carbon. — There are three factors which con¬ trol the condition of carbon in cast iron. First, the percentage of carbon in the iron; second, the rate at which the iron cools ; third, the percentage of other elements present with the carbon in the iron. Thus: (1) The more car¬ bon there is present in molten cast iron when it begins to cool, the greater will be the per¬ centage of carbon which will separate out in the free condition during cooling. For example — a 4 per cent carbon iron would contain a greater percentage of free carbon than a 3 per

cent carbon iron, provided both were cooled under similar conditions and carried the same amount of other elements. (2) The slower cast iron cools the greater will be the percent¬ age of carbon present in the free condition, and conversely, the faster an iron is cooled, the greater will be the proportion of the car¬ bon present in the combined condition. If a portion of molten cast iron of a correct com¬ position is poured into cold water the carbon will be retained in the combined condition ; if another portion of the same iron is cooled very slowly, all the carbon will separate out into the free condition. (3) The condition of the carbon in cast iron is controlled by the per¬ centage of carbon present and the rate of cool¬ ing, consequently any elements which affect these two reactions will affect the relation of the free to the combined carbon. Silicon, sul¬ phur, phosphorus and manganese take a promi¬ nent part in one or both of these reactions and consequently exert an important influence upon the condition of the carbon. (This is discussed later under the individual elements).

Effect of Carbon on the Physical Proper¬ ties of Cast Iron. — Free carbon makes iron soft and is instrumental in prolonging the fluidity, decreasing shrinkage and regulating strength. Hardening carbon and carbide carbon increase the hardness and strength of cast iron; they prevent the decrease in shrinkage which would occur if their carbon was present in the free condition; they lower the melting point of cast iron.

Action of Carbon in Affecting the Physical Properties of Cast Iron. — As cast iron cools from a molten condition the carbon separates out as free carbon, unites with the iron as carbide carbon, and is retained in the form of hardening carbon. Cast iron in the molten state is a solution of carbon in iron ; as the tempera¬ ture decreases the ability of the iron to hold carbon in solution decreases, and the carbon begins to separate out as graphitic

carbon. Heat rendered latent in the solution of the carbon in the iron will be given up when the carbon separates out from the iron, and this evolved heat will prolong fluidity and conse¬ quently will give a longer time for the separa¬ tion of free carbon, thus increasing the softness and decreasing the shrinkage of the iron.

When cast iron cools, the carbon which did not separate out as free carbon tends to unite with the iron as carbide carbon in the com¬ pound Fe3C. This occurs while the iron is passing through the zone of temperature in the neighborhood of 1300° F. The remainder of the carbon, which neither separates as free carbon nor unites with the iron as carbide carbon, re¬ mains present as hardening carbon.

Silicon.

Silicon. — Silicon is of value to cast iron on account of its influence upon the carbon. Sili¬ con of itself would add no beneficial quality as its effects are indirect and through the carbon. Pig iron generally contains from two-tenths of 1 per cent to 12 per cent silicon. The lower silicon grades are hard charcoal, basic, or oil bessemer irons, while the extremely high silicon irons are special softeners made to mix with other irons to increase the percentage of silicon. A low proportion of silicon gives a hard cast iron of white fracture: a high proportion gives vol. is — 24

a soft iron of grey fracture. Cast iron carries from 0.4 of 1 per cent to 1 per cent silicon for chilled work and from 1 to 3 per cent for different grades of grey iron.

Condition of Silicon in Cast Iron. — The condition of silicon in cast iron has not been fully determined. Certain silicides of iron have been separated from cast iron, but their com¬ position is so indefinite and they are so easily broken up that their condition exerts no import¬ ant influence upon cast iron.

Effect of Silicon on the Physical Proper¬ ties of Cast Iron. — Silicon through its action on the carbon softens cast iron, reduces its shrinkage, increases its fluidity, and regulates its strength.

The effect of silicon as a softener is limited, and when too much silicon is present its soften¬ ing action ceases and it begins to harden iron. The same is true with regard to its effect on fluidity and strength. Cast iron with 3^2 per cent silicon will retain almost no carbon in combination, consequently any silicon in excess of this amount exerts a direct effect upon the iron and renders it unfit for use as a cast product.

Action of Silicon on Carbon. — The im¬ portance of the action of silicon

on carbon is due to the fact that silicon reduces the solu¬ bility of iron for carbon. An iron containing silicon will dissolve less carbon than an iron ˆcontaining none. At a given temperature, then, the more silicon an iron contains the less carbon will the iron retain in the dissolved or harden¬ ing condition, consequently when an iron cools from a high temperature the amount of carbon that will separate out from solution is regulated by the amount of silicon present. The higher the silicon the less carbon will the iron hold in solution, and the more will separate out as free carbon.

Phosphorus.

Phosphorus. — Phosphorus confers both beneficial and harmful properties on cast iron. Cast iron generally contains from 0.2 to 1.5 per cent phosphorus, but on account of its injurious effect it should be kept below 1 per cent for light thin castings, and below 0.5 per cent in heavy castings.

Condition of Phosphorus in Cast Iron. —

Up to a proportion of 1.7 per cent, phosphorus dissolves in iron forming an alloy. Above this proportion free iron phosphide is formed, and at 15.6 per cent of phosphorus, the entire mass of the iron has been converted into iron phos¬ phide. Between the two percentages named, the grains of the iron-phosphorus alloy become coated with a pellicle of iron phosphide, de¬ cidedly weakening its structure. The presence of carbon also in the iron militates against the presence of the contained phosphorus, and may eject it altogether; so that it is common to find both free iron carbide and free iron phos¬ phide in a sample of cast iron. A percentage of 0.89 carbon is compatible with the maximum of 1.7 per cent of phosphorus in alloy with the iron. In strong castings the proportion of phosphorus is held down to 0.4 per cent ; in ordinary castings 0.7 per cent is allowed.

Effect of Phosphorus on the Properties of Cast Iron. — Phosphorus makes iron fluid, or at least prolongs the fluidity, and thus aids the iron in taking the exact form of the mold. It

makes iron weak, brittle and liable to break un¬ der shocks. It is advantageous in light, thin castings where fluidity and exactness of outline are important and where strength can be neglected. It is very detrimental in large ir¬ regular-shape castings, especially where strength is required.

Action of Phosphorus on Cast Iron. — •

Phosphorus by prolonging the fluidity of the iron gives the graphite a further opportunity to separate and thus tends to reduce shrinkage. By

prolonging the iron in a plastic condition just after it sets, phosphorus allows the separating graphite to force the iron into the minutest corners of the mold. The phosphorus prolongs the cooling of the iron as it crystallizes out and thus allows it to separate into larger crystals, which weakens the iron and causes it to be brittle. When phosphorus is present in large quantities it forms a eutectic with the iron which fills up the crevices between the particles which have previously solidified. When the eutectic solidifies later it causes strains in the iron which makes it short and liable to break under shock.

Sulphur.

Sulphur. — Sulphur acts in two ways in cast iron. First through the carbon and second by uniting directly with the iron. On account of its injurious action sulphur is generally kept below 0.15 of 1 per cent, and for light work below 0.08 of 1 per cent.

Condition of Sulphur in Cast Iron. — Sul¬ phur exists in cold cast iron as a sulphide of iron, as a compound of this sulphide with iron, and when manganese is present, as a sulphide of manganese. In molten cast iron it is prob¬ ably dissolved as gaseous sulphur.

Effect of Sulphur on the Properties of Cast Iron. — Sulphur makes iron hard, red short, weak and liable to contain blow holes. Its only beneficial effect is to give a hard wear¬ ing quality to iron subjected to frictional wear.

Action of Sulphur on Cast Iron. — Sul¬ phur by shortening the time of cooling of cast iron, prevents the separation of graphitic car¬ bon. The carbon which has not been able to separate as free carbon remains in the combined condition, and consequently sulphur tends to harden the iron. It is moreover heavily affected by the content of silicon. It is customary with iron founders to add silicon to iron with a sulphur content above the normal, with the effect of releasing the carbon which the sulphur retains in the iron.

When cast iron solidifies sulphur is still in a gaseous condition and surrounds each particle of iron with a covering of gaseous sulphur. When the iron is sufficiently cold, the sulphur solidifies, or unites with the iron as a sulphide of iron. In this condition it occupies less space than in the gaseous condition and thus leaves the crystals surrounded by minute spaces which makes the iron verv brittle and weak.

Manganese.

Manganese. — Manganese acts in two op¬ posite ways on cast iron. It

increases the power of the iron to hold carbon in solution and conse¬ quently tends to increase the combined carbon and hardness. It unites with the sulphur and forms a sulphide of manganese which separates out before the iron sets and thus prevents the

sulphur from exerting a hardening effect. Pig iron contains from 0.2 of 1 per cent to 3ˆ2 per cent manganese, while cast iron ordinarily runs from 0.1 of 1 per cent to 1 per cent in manganese. Owing to its affinity for carbon, manganese is also found as iron-manganese carbide. To this same affinity must be ascribed the fact that iron with a high manganese con¬ tent has as a rule a high carbon content. The carbide assumes a very hard granular form causing hard spots in the iron very difficult to machine.

Condition of Manganese in Cast Iron. —

Manganese exists in three conditions in cast iron. In the molten condition it tends to unite with the sulphur as manganese sulphide. As the iron cools through the critical temperature the manganese unites with the carbon to form a carbide Mn3C. Any manganese not so united alloys with the iron.

Effect of Manganese on the Properties of Cast Iron. — Manganese by its action on the carbon tends to harden cast iron, while its effect on sulphur tends to soften cast iron. Whether the hardening effect with the carbon or the softening effect on the sulphur predominates depends upon the relative amount of manganese and sulphur present.

Action of Manganese on Cast Iron. —

Manganese unites with the sulphur and forms a manganese sulphide at a temperature above the solidifying temperature of cast iron. Con¬ sequently this manganese sulphide has no more detrimental effect on the iron than so many small particles of any neutral impurity, and eventually reaches the slag, unless ferrous oxide is present. In this case it is apt to form a layer between the molten iron and the slag. Manganese therefore prevents the bad effect of the sulphur, and hence in the case of high sulphur irons it acts as a softener. However, the combination of manganese and sulphur takes place only at very high temperatures, and then but slowly, so that sufficient time must be al¬ lowed for such clearing out of the sulphur. The manganese, in excess of that which unites with the sulphur unites with the carbon to form a carbide Mn3C. This carbide hardens the iron, for it of itself is an intensely hard substance. Consult Keep, W. J., (Cast Iron) (New York 1902) ; Kirk, E., (A Practical Treatise on Foun¬ dry Irons5 (Philadelphia 1911) ; Moldenke, R,, (The Principles of Iron Founding5 (New York

1916).

IRON GATES (Turkish, Demir-Kapit) , a narrow gorge, about two miles long, in the Transylvanian Alps through which the Danube flows. It is situated near Orsova, just without the border of Hungary. In the last decade of the 19th century the obstructions to navigation at this point were removed by great blasting operations. The current is very rapid through the gorge and navigation is rendered dangerous in consequence.

IRON AND STEEL INDUSTRY IN THE UNITED STATES. It is not known whether the mound-builders or other contempo¬ raneous inhabitants of the United States were acquainted with the use and manufacture of iron, nor is it on record that any iron imple¬ ments were ever found in the ruins of the ancient civilization of America. It is stated by

Prescott that iron was not used by the natives of Mexico and Peru at the time of the conquest although at that time they were the most ad¬ vanced in all the arts of civilization. It is like¬ wise believed that at the time of the discovery of America the Indians were unacquainted with the use of iron. Hammered implements and ornaments of meteoric iron, however, have been discovered notably in the ancient mounts of Ohio. »

Iron ore was first discovered within the lim¬ its of the United States in 1585 in North Caro¬ lina by an expedition organized by Sir Walter Raleigh but no use was made of it at the time. The first export of iron took place in 1608 when in April of that year a boat of the Vir¬ ginia Company of London (the first permanent English colony) loaded with iron ore and other products of the soil sailed for England from Jamestown, Va.

The first iron .works in the United States were erected at Falling Creek, Va. (near Rich¬ mond), in 1619 by the Virginia Company, but Indian troubles and the revocation of the char¬ ter of the company in 1624 caused this first at¬ tempt at manufacturing iron in the States to end in disaster. Doubt even exists as to iron hav¬ ing ever been made at these works. Nor is it known whether they included a blast furnace and refinery or only a bloomary. The first suc¬ cessful Iron Works in the United States were located on the Saugus River, near Lynn, Mass., where iron ore had been discovered in 1629. The works were built in 1643 by John Win- throp, Jr. (the son of the governor), and 10 other Englishmen forming the "Company of Undertakers for the Iron Works.® They prob¬ ably included a blast furnace, and seven to eight tons of pig-iron were produced weekly. It is

believed that they were discontinued in about 1688 owing to lawsuits over the overflow of water and unpopularity caused by a fear that they would cause a scarcity of timber. It is at these works that the first iron casting was made consisting in a small iron pot. The pot is still in the possession of some of the descendants of one of the owners of the land on which the works were erected.

In 1647 Joseph Jenks built at the Lynn plant a forge for the "manufacture of scythes and other edge tools,® and it is at these works also that in 1652 were made the dies for the first silver pieces coined in New England at the mint established that year at Boston, as well as, for the city of Boston, the first engine made in America.

In about 1646 the Lynn Company built a furnace and a forge at Braintree, some 10 miles south of Boston, where, however, operations ceased in 1653 for lack of suitable iron ore.

In 1652 iron works were built near Taunton, Mass., being put in operation in 1656. Bar iron was made directly from the ore in a bloomary. These works were still active in 1865, at which time they consisted of four forge fires, two hammers and two water-wheels. They were soon after abandoned and dismantled.

Other iron enterprises in Massachusetts fol¬ lowed those that have been mentioned, notably at Topsfield, near Ipswich, in 1677, at Boxforcl in 1680, on Strong Brook and at other places near Taunton in 1696. It is. apparent, there¬ fore, that Massachusetts remained, for over 100 years after its settlement the chief centre of

iron manufacture in the United States. The works consisted chiefly of bloomaries although they included some blast furnaces for the direct production of castings but not for the making of pig iron. The iron was derived from bog and pond ores, charcoal was used as fuel and water power utilized.

The names of the New England settlers Winthrop, Jenks and Leonard and of some of their descendants are closely associated with these early enterprises.

The first iron works in Connecticut were erected at New Haven in 1658 by Thomas Clarke, John Winthrop and others. They con¬ sisted of a blast furnace and a refinery forge.

In Rhode Island iron was made at Paw¬ tucket in 1675, that is soon after its settlement (1636) where a forge was erected by Joseph Jenks, Jr.

There is no evidence of iron having been made in Miaine, New Hampshire or Vermont before the 18th century. During the latter part of the 18th century, however, numerous forges were in operation in New England and its iron industry was very prosperous.

Iron works were built in New Jersey at Tinton Falls, near Shrewsbury, in 1682 by Henry Leonard of Massachusetts, where mag¬ netic iron ores from northern New Jersey were probably smelted. Other works were erected near Morristown and at several other places between 1710 and 1770. A forge at Troy was still in operation in 1860. These works consisted chiefly of bloomaries.

During the latter part of the 17th century and the beginning of the 18th, Massachusetts and New Jersey were the chief producers of iron. In the latter State the manufacturing conditions were exceptionally favorable because of its deposits of rich magnetic ores, its wooded hills and its many mountain streams. Bloomaries were chiefly used and in some of them the blast was created by the trompe or water blast. During the second half of the 18th century many blast furnaces and other iron works were built in New Jersey and its iron industry was very active.

In 1802 there were 150 forges in New Jer¬ sey, yielding about 3,000 tons of iron yearly, while pig iron Was made in 13 blast furnaces. Four rolling and slitting mills were also in operation, chiefly for the manufacture of nails. The last charcoal blast furnace was built in 1862, but was soon abandoned, anthracite hav¬ ing by this time replaced charcoal as a blast furnace fuel. Bloomaries no longer exist in New Jersey, but in 1890 several forges were still in operation for the manufacture of blooms from pig iron and scrap.

Not until 1692 do we find any mention of iron having been manufactured in Pennsylvania. In 1717 a forge was erected on Manatawny Creek in Berks County, and another known as the Coventry Forge on French Creek in Chester County. The latter was still active in 1856 making blooms from pig iron, but was dis¬ mantled in 1870. The ruins of this early Penn¬ sylvania forge still exist. In about. 1720 the Colebrookdale furnace in the township of that name on Ironstone Creek, north of Pottstown in Berks Countv, was built and was still in operation in 1793. The Durham furnace on Durham Creek in Bucks County was erected in 1727. This furnace was between 35 and 40 feet

square and about 30 feet high. It made from the start pig iron to be converted into bar iron. It remained active until 1791 and was torn down in 1829. In 1848 and 1851 two furnaces were built at Durham using anthracite as fuel. They were torn down in 1874 and replaced by a large blast furnace. Many forges and fur¬ naces were built in Pennsylvania during the first half of the 18th century, notably in the Schuylkill Valley and in the eastern portion of the State. Among these may be mentioned the Glasgow Forge near Pottstown, the Spring Forge in Berks County, the Green Lane Forge 20 miles above Norristown, the Pine Forge and the Mount Pleasant Furnace, respectively, 5 and 13 miles above Pottstown, the Oley Forge on the Manatawny, the Reading Furnace and the Warwick Furnace both on French Creek. The Warwick Furnace remained in operation until 1867. Guns were cast at this furnace during the revolution for the Continental army. The Vincent Steel Works were erected on French Creek in 1750, and the Windsor forges on Conestoga Creek near Churchtown in about 1742. The latter were still in operation in 1848. The Mount Joy Forge at the mouth of East Valley Creek was in operation in 1751, when it was using pig iron supplied by the Warwick Furnace. The Valley Forge and other mills were built soon after the Revolutionary War near the Mount Joy Forge. They were abandoned in 1824. To complete this short sketch of early iron making in Pennsylvania, the following works should be mentioned. A forge built in 1740 on Hay Creek, the Hopewell Furnace on French Creek which continued its operations until 1883, the Roxborough, later known as the Berkshire Furnace, built at Heidelberg in 1760, a rolling and slitting mill and a nail factory at Birdboro about the time of the revolution, the Charming Forge in Berks County in 1749 which remained active until 1887, the Moselen Forge in Berks County, the Gulf Forge in Montgomery County, the Union and Pottsgrove forges in the Schuyl¬ kill Valley, the Oley Furnace built in 1765 north of Reading and which remained in operation until 1886, a forge on Crum Creek near Ches¬ ter erected in 1742, the Sarum Iron Works in Delaware County, built in 1742, to which was later added a rolling and slitting mill.

Two steel furnaces for the production of blister steel were in operation in 1750 in Phila¬ delphia.

After the early failure at manufacturing iron in Virginia, already noted in these columns, no further efforts were made until nearly 100 years later. In 1716 a furnace was in operation near Rappahannock, while in 1732 a blast fur¬ nace 30 miles southwest of Fredericksburg was making 20 tons of iron per week, and blast furnaces were in operation in Spottsylvania County and in Stafford County, the latter fur¬ nace, called the Accokeek Furnace, using iron ore from <(England's Iron Mines,® so called from the riame of the manager but situated on land owned by the father of George Washing¬ ton. At the same period an air furnace, the Spotswood's, for the

melting of pig iron and the casting of sundry articles, was in operation at Massaponax.

During the second half of the 18th century many other furnaces and forges were built in the Valley of Virginia. It is stated that pre¬

vious to 1856 at least 88 charcoal furnaces, 59 forges and bloomaries and 12 rolling mills had been built in the Virginias, seven of the rolling mills being located near Wheeling. The char¬ coal furnaces, of which several are in existence to-day, were stone constructions built against a bank at the same level as the tunnel-head ; they used a cold blast created by water power and wooden tubs.

In later years the manufacture of iron in the Virginias was given a fresh impetus through the discovery of valuable iron ore deposits and the manufacture of excellent blast furnace coke from Pocahontas coal.

The first iron works in Maryland, consisting probably of bloomaries, are believed to have been erected in 1716 in Cecil County on Chesa¬ peake Bay.

In 1722 the Principio Company, owners of the Accokeek Furnace in Virginia, built a fur¬ nace on Principio Creek in Cecil County, and in 1744 the Kingsbury Furnace in Baltimore County. The Lancashire Furnace situated close by was purchased by the company in 1751 which thus became the owner of four furnaces and two forges. It is said that one-half of the pig iron exported to England before the revo¬ lution was made by these furnaces. Captain Washington and later his son, Lawrence, a half brother to George Washington, were part own¬ ers of these works. They were confiscated as British property in 1780. Iron works have never ceased to be in operation at Principio and North East. A charcoal furnace was built in 1837 and it is here also that the important works of the McCullough Iron Company are situated.

Between 1723 and 1730 the Baltimore Com¬ pany built a blast furnace near Gwynn's fall and the Mount Royal Forge at Jones's Falls. A furnace and two forges were constructed at an early date at the head of Gunpowder River.

During the latter part of the 18th century many other iron works were erected in Maryland.

It is believed that iron works were built in Delaware, in New Castle County, previous to 1730. Emmanuel Swedenborg in his (De Ferro, > printed in 1734, mentions the existence of iron works on the Christiana River built by Sir Wil¬ liam Keith. One of the furnaces was known as the Abbington

furnace. In 1763 a furnace was erected near Concord in Sussex County, and in 1769 a forge on Nanticoke River. The Pine Grove Furnace was built in 1764 near Concord and the Unity Forge on the Nanticoke River in 1771. The latter remained active until 1816. A rolling mill was in operation in Dela¬ ware in 1787 near Wilmington. Other iron works were built at later dates, but no iron or steel is at present manufactured in the State of Delaware.

Iron works were probably built in North Carolina previous to 1730 near the coast in the neighborhood of bog-ore deposits. It is certain that iron works were in operation in that State before the revolution. The following may be mentioned: furnace and iron works on Deep run, iron works in Guilford County, including the Troublesome Forge, the Buffalo Creek Fur¬ nace, two furnaces, four forges and two bloom¬ aries in Lincoln County, the Union Forge in Stokes County, etc. Practically all these

works as well as those built later have now been abandoned.

Connecticut is believed to have been the first of the colonies to make steel. This was in 1728 in Hartford County and undoubtedly by the cementation process.

A bloomary was erected in New York State in 1740 in Columbia County on Ancram Creek, and to this was added in 1750 a blast furnace and a forge. The Sterling Iron Works were built about 1751 in Orange County. They are said to have made the anchors for the United States frigate, Constitution, and also the first steel produced in the province. A second Sterling furnace was built in 1777, and in 1806, near the same locality, the Southfield furnace which is still standing. Modern furnaces have now replaced the first two.

In the second half of the 18th century addi¬ tional furnaces were built in Orange County, namely the Forest of Dean Furnace, some iron works on the Ramapo, the Queensborough Fur¬ nace and a furnace near Craigsville.

Iron works were in operation at the time of the revolution in Dutchess, Westchester, Rock¬ land and Suffolk counties. In 1800 the Cham¬ plain iron district began to be developed and in 1801 iron works were erected in Essex County for the manufacture of anchors. The iron in¬ dustry of the State became afterward more

prosperous. # .

Iron works are said to have been erected in South Carolina in 1773, while the Era and Etna furnaces in York County were built respectively in 1787 and 1788. Other furnaces were built later, but they have now all been abandoned and the manufacture of iron in that State has ceased

The making of iron in Tennessee began only in 1790 when a bloomary was built at Embre- ville, in Washington County. Other bloomaries were erected soon afterward in Carter, John¬ son, Greene and Jefferson counties. A large furnace and forge was built in Sullivan County and a bloomary about 1795 near the mouth of the Watauga. In 1792 the Cumberland furnace was erected in Dickson County. During the 19th century and since the iron industry in Ten¬ nessee has made great progress.

The Bourbon Furnace, built in 1791 in Bath County, Kentucky, is the only one erected in that State during the 18th century Other iron works, however, were erected in the following century.

In Georgia iron works were built probably in about 1790, in Elbert and Chatham counties and others in the 19th century .

Ohio, Alabama, Missouri, Illinois, Indiana, Michigan, Wisconsin and Texas made no iron in the 18th century, but some of these States became important producers of iron in the following century.

In the following States the manufacture of iron was not begun until the second half of the 19th century ; Minnesota, Arkansas, Kansas, Iowa, Colorado, Wyoming, Utah, California, Oregon and Washington territory. It is be¬ lieved that no iron has ever been produced in the States and territories not mentioned in this

brief sketch. .

For a more detailed description of the early

iron and steel industry of the United States the reader should consult the excellent history written by James M. Swank from which most

of the data needed for this article has been obtained.

The development of the iron and steel indus¬ try in the United States during the 19th cen¬ tury has been marked by many events, some of which will be briefly mentioned.

In 1801 the development of the iron mines from the Champlain district in New York re¬ sulted in the erection in that State of many forges, furnaces and even, later, of rolling mills. As late as 1883 there were 27 forges for

the direct reduction of iron ores and the manu¬ facture of blooms; in 1890 only 14 were in operation and in 1900 but a single one was still active. Many forges were also built in New Jersey, nine of which now remain.

In 1811 the first rolling mill was built at Pittsburgh. It was known as the Pittsburgh Rolling Mill.

In 1816 wire fences -were manufactured by White and Hazard at their works at the falls of Schuylkill. The same year the first puddling furnace was built by Isaac Messon in Fayette County, Pennsylvania. The first boiler plates made in the States were rolled at the Brandy¬ wine Rolling Mill at Coatesville, Pa., some time previous to 1825.

Bar iron was first made in New England at the Boston Iron Works in 1825.

Crucible steel was for the first time manu¬ factured on a commercial scale in 1832 by the Garrard brothers in Cincinnati at their works called the Cincinnati Steel Works.

Hot blast for making pig iron was first used in the United States at the Oxford Furnace in New Jersey in 1834. Cast iron pipes were util¬ ized being heated by the waste heat of the fur¬ nace at the tymp. The temperature of the blast was raised to 250° F. and the output of pig iron increased by about 10 per cent. Later arched cast iron pipes were placed at the top of the stack and heated by the flame from the tunnel- head, the temperature of the blast reaching by this means 500° F.

Coke as a blast furnace fuel was first suc¬ cessfully used by Williams Firmstone at Mary Ann Furnace in Huntington County, Pa., in

In the same year Henry Burden of Troy, N. Y., patented machine-made horse shoes and in 1840 the Burden rotary squeezer. e

Probably the first successful use in the States of anthracite in the blast furnace was by Benjamin Perry at the Pioneer Furnace at Pottsville, Pa., in 1839, and by David Thomas at the Lehigh Crane Iron Company at Catasau-

qua, Pa.

Iron ore was discovered in the Lake Supe¬ rior region on 16 Sept. 1844 in northern Mich¬ igan by William A. Burt, a deputy surveyor of the general government. The Jackson Mining Company was organized the following Tune at Jackson,' Mich., and the ore from the Jackson Iron Mountain used in some neighboring

bloomaries. .

The manufacture of heavy iron rails was undertaken in 1844 at the Mount Savage Roll¬ ing Mill in Allegany County, Md Here also the first T rails rolled in the United States were manufactured, although it is claimed by some that this honor is due to the Montour Rolling Mill of Danville, Pa. The production of iron rails was 21,712 tons in 1849. It reached its

highest figure in 1872 when "808,866 tons were manufactured. In 1900 but 695 tons were rolled.

Bituminous coal was successfully used in blast furnaces in 1845 in a furnace located in Mercer County, Pa., and in 1846 in a furnace expressly built for that purpose at Lowell, in Alahoning County, Ohio.

The first shipment of iron from Lake Supe¬ rior was made in 1850 to New Castle, Pa.

Wire nails were first manufactured in the United States in 1852 by William Hassall at New York.

In 1852 David Thomas of Catasauqua, Pa., constructed for his furnace powerful blowing engines, thereby greatly increasing the blast pressure and increasing the output of pig iron. Lake Superior ore was first used in a blast furnace at the Sharpsville Furnace, Mercer County, Pa.

Rolled wrought iron beams were made in 1854 by Peter Cooper at Trenton, N. J.

In 1855 more pig iron was made with an¬ thracite than with charcoal.

It is believed that 30-foot rails were first rolled at the Cambria Iron Works, Johnstown, Pa., in 1855.

In 1859 the first blast furnace was built in Allegheny County, Pa. It was known as the Clinton Furnace.

As late as 1860 there were about 200 Catalan forges or bloomaries, south of the Ohio and Potomac rivers, making bar iron directly from the ore and blown by the trompe or by wooden ˆtubs® operated by water power. At the end of the century but one of these was in operation.

In 1862 Samuel J. Reeves of the Phoenix Iron Company, Pa., invented the

wrought iron and steel columns now so widely used for bridges and many other structures.

Bessemer steel was first made in the United States by William F. Durfee in 1864 at Wyan¬ dotte, Mich., by the Kelly. Pneumatic process. Bessemer's steel patents were acquired in 1864 by John F. Winslow, John A. Griswold and Alexander L. Holley of Troy, N. Y. In Feb¬ ruary 1865 Bessemer steel was successfully pro¬ duced at Troy by Mr. Holley. The first Bes¬ semer steel rails made in the United States were rolled in May 1865 at the Chicago Roll¬ ing Mill. ˆ

In 1867 John A. Griswold and Company of Troy, N. Y., constructed the first generative Siemens gas furnace in the United States and used it as a heating furnace in their rolling mill.

In 1868, Cooper, Hewitt and Company built and put in operation, at their works of the New Jersey Steel and Iron Company, Trenton, N. J., the first open hearth furnace for the manufacture of steel.

In 1869 the output of pig iron made with raw bituminous coal and with coke exceeded for the first time the production of charcoal pig iron. In 1869 a Siemens regenerative fur¬ nace was used by William F. Durfee for the puddling of iron at Bridgeport, Conn. Iron ore was imported ˆ from Canada in considerable quantity in 1873 and the following years. In 1879 importation started from Mediterranean countries, chiefly Spain, Algeria and Elba. Im¬ portations from Cuba, so important at the present time, did not begin before 1884.

Natural gas was used for the first time for the manufacture of iron in 1874 at the Siberian Rolling Mill in Armstrong County, Pa.

In 1875 the output of pig iron made with bituminous coal exceeded for the first time that made with anthracite.

The Edgard Thomson Steel Company rolled in 1875 the first 60-foot rails made in the United States. The same year Whitwell fire-brick hot- blast stoves were used at the Rising Fawn Furnace, Dade County, Ga.

The first steel wire nails were made in 1875 by Father Goebel at Covington, Ky.

Siemens-Cowper-Cochrane fire-brick hot- blast stoves were erected in 1877 at the Crown Point Furnaces, Crown Point, N. Y.

The Brooklyn suspension bridge which was in process of construction between 1869 and

1883 was built entirely of American made steel wire cables, John A. Roebling being the engi¬ neer.

Basic steel was first made in this country in

1884 at Steelton, Pa., by the Pennsylvania Steel Company in a Bessemer converter.

Armor plates to be made in America were first contracted for in 1887 by the Navy De¬ partment with the Bethlehem Iron Company.

Basic open hearth steel was first manufac¬ tured in the States in 1888 at the Homestead Steel Works of Carnegie, Phipps Company, Ltd., at Homestead, Pa.

The progress made in the iron and steel in¬ dustry during the 20th century to date consists in important manufacturing improvements that have resulted in economy and in increased pro¬ duction. They include the mining, handling and treatment of ores, blast furnace construc¬ tion and operation, coke making and steel manu¬ facture. Improvements resulting in the produc¬ tion of new steels or of steel of better quality have also been recorded. These were generally brought about through a more scientific treat¬ ment of the metals made possible by remarkable progress in the science of metallography.

The advance in the handling and treatment of iron ore includes improvements in mining methods, in land and water transportation, in appliances for transferring the ore from rail¬ way cars to vessels, to railway cars again and to furnace top and its introduction into the furnace. These operations are described by John Brikinbine as follows:

<(The bulk of the domestic iron ore used in the LInited States is not touched by the hand of man from the time it leaves the mine until it is converted into, forms for sale, as rails, structural shapes, wire rods, sheets, merchant bars,, etc., and in many of the operations the ore is dug by power shovels, or

man directs the movement of machinery and touches but little of the ore. .

((Railway cars, with their loads o) iron oie, convey it to blast furnaces, or, as is the custom with most Lake Superior ores, to docks pio- vided with pockets, into which the ore drops through the opened bottoms of the cars,

while spouts connecting with the dock pockets de¬ liver the ore by gravity into holds of ves¬ sels specially constructed for the iron ore trade. At the end of the vessel's trip, mechanical de¬ vices remove the ore and deposit it in cais or

on stock piles. _

«As lake navigation is suspended for five months in the year on account of ice, stock piles are accumulated at the mines, at lcceiving docks at lower lake ports, and at blast furnaces, where elaborate mechanical equipment facili¬ tates the handling of this ore when used.

«When the furnace is reached to which the ore is consigned the railway cars are run onto

Much progress has been made in the bene- ficiation of ores including magnetic separations and agglomerations (briquetting, nodulizing and sintering) by which enormous deposits ot fine ore, of ore containing much moisture, too rich in sulphur or phosphorus or too lean are now converted into excellent smelting material, with the frequent additional advantage of doing away with the cost of transportation from mine to furnace of a great weight of gangue, of moisture or of combined waters. # .

The rapid growth of the production ot iron ores in the United States as well as some other features are shown in the following statistical

tables :

Production of Iron Ore in Lake Superior

District.

YEAR

Tons

YEAR

Tons

year

Tons

1855

1 ,449

1900

19,059,393

1913

52,518,158

1860

114,401

1905

34,353,456

1914

33,629,613

1870

859,507

1910

43,442,397

1915

46,994,254

1880

1,948,334

1911

32,793,120

1916

64, /34, 198

1890

9,003,725

1912

46,483,798

1917

62,498,901

It will be seen that over 80 per cent of the iron ore mined in the United States are ob¬ tained from the Lake Superior district.

United

States Importations and Exporta¬ tions of Iron Ores (in tons).

years Importations Exportations

1880

1890

1900

1905

1910

1911

1912

1913

1914

1915

1916

1917

501,000 1,267,000 912,000 860,000 2,632,000 1,841 ,000 2,139,000 2,594,970 1,351,368 1,341,281 1,325,736 971,663

780,900

1,214,430

707,641

1,183,952

1,141,048

Of the iron ores now imported in the United States more than 60 per cent come from Cuba and the balance chiefly from Sweden, Canada and Spain.

Furnaces in Blast and Out of Blast on

31 December.

YEARS

Active

Idle

Total

1873

. 413

244

651

1880

446

255

707

1890

. 311

251

562

1900

. 232

174

406

1905

. 313

111

424

1910

206

267

473

1911

. 331

234

465

1912

. 313

153

466

1913

. 191

275

466

1914. .

. 154

312

466

It is evident that the number of furnaces

Iron Ores by Countries (in tons).

YEARS

1870

1880

1890

1900

1905

1910

1911

1912

1913

1914

1915

1916

1917

United States

England

France

Germany

World's

production

3,080,000

7,234,000

16,293,000

26,382,000

43,207,000

57,803,000

41,646,000

56,035,000

62,972,000

41,439,761

55,526,490

75,167,672

75,324,000

14,601,000 18,314,000 14,001 ,000 14,282,000 14,824,000 15,470,000 15,768,000 14,012,000 16,254,000 15,115,375 14,464,196 13,811,920

2,614,000

2,874,000

3,472,000

5,448,000

7,395,000

14,606,000

16,639,000

19,160,000

21,918,000

3,879,000

7,239,000

11,406,000

18,964,000

23,444,000

28,710,000

29,879,000

33,734,000

35,941,000

28,274,000

43,324,000

56,997,000

86,523,000

112,218,000

139,425,000

132,168,000

153,841,000

170,255,000

.

.

.

It will be seen that the United States in 1890 mined more iron ore than England and than Germany. In 1913 it mined nearly four times more ore than in 1890, nearly four times more than England whose production had re r mained nearly stationary and nearly twice more than Germany. It contributed in that year 37 per cent to the world's production.

active in any one year gives no indication as to the production of pig iron in that year. The 446 furnaces active in 1880 produced but 3,8 /,- 000 tons of iron or 8,738 tons per furnace, while in 1913 with but 191 active furnaces the produc¬ tion of pig iron was 31,361,000 or 164,700 tons per furnace, a production per furnace nearly 20 times greater.

Shipments of Lake Superior Iron Ore by Ranges (gross tons).

YEARS

Mesabi

Marquette

Gogebic

Menominee

Vermillion

1860. .

114,401

1870 .

830 , 940

1880 .

1,384,010

524,735

1890 .

2,993, 664

2,847,786

2,282,237

880,014

1900 .

7,809,535

3, 457^522

2 i 875^295

3 ^ 661 i 221

1,655,820

1905 .

20,158,699

4,215,572

3,705,207

4,495,451

1,677,186

1910 .

29,201,760

4,392,726

4,315,314

4,237,738

1,203,177

1911 .

22,093,532

2,833,116

2,603,318

3,911,174

1 ,088,930

1912 .

32,047,409

4,202,308

5,006,266

4,711 ,440

1,844,981

1918 .

34,038,643

3,966, 680

4,531 ,558

4,965,604

1 ,566,600

1914 .

21,465,967

2,491 ,857

3,568,482

3,221,258

1 ,016,993

1915 .

29,756,689

4,105,378

5,477,767

4,982,626

1,733,595

1916 .

42,525,612

5,396,007

8,489,685

6,364,363

1,947,200

1917 .

41,445,211

4,874,150

7,981 ,684

6,045,750

1,530,692

The Mesabi range which was not exploited the Lake Superior district and considerably in 1890 produced over 40,000,000 tons in 1917 more than half the total United States pro- or nearly 70 per cent of the total production of duction in that year.

Iron Ores by Kinds (tons).

YEARS

Hematite

Brown ore

Magnetite

Carbonate

Totals

1860 .

2,919,000

3,893,000

7,234,000

16,293,000

27,993,000

43.200,000

57,927,000

44,579,000

56,032,000

1870 .

1880 .

2,280,000

10,696,000

23,071,000

38,168,000

52,189,000

40,269,000

52,167,000

1,950,000 2,601 ,000 3,283,000 2,581,000 3,042,000 2,065,000 1,640,000

2,168,000

2,612,000

1,562,000

2,428,000

2,674,000

2,238,000

2,215,000

836,000

384,000

77,000

23,000

22,000

16,000

10,000

1890 .

1900 .

1905 .

1910 .

1911 .

1912 .

The production of hematite ores 1912 nearly five times greater than while during the same period the mil brown ores was reduced by 40 per cent, magnetites remained practically unchanˆ

Pig Iron Produ

was in the production of in 1890 down to 10,000 tons • „ Over 90 per cent

ˆ the States are, tl

that of variety. They gei

?ed and and 65 per cent oi

carbonate ores dwindled

of the ores now mined in lerefore, of the hematite lerally contain between 50 metallic iron.

tons).

ction by Countries (gross

YEAR

United States

England

France

Germany

World's

production

1870 .

1,665,000 3,897,000 9,353,000 14,009,000 23,360,000 27,636,000 24,027,000 30 , 202 , 000 31,461,000 23,332,244 29,916,213 39,434,797 38,647,397

6,061,000

7,875,000

8,033,000

9.003,000

9,746,000

10,380,000

9,874,000

8,891,000

10,649,000

9,005,898

8,793,659

9.047,983

9,572,190

1,178,000

1,725,000

1,962,000

2,715,000

3,076,000

4,038,000

4,470,000

4,939,000

5,122,000

5,025,000

4,750,000

1 ,400,000 2,729,000 4,658,000 8,520,000 10,987,000 14,793,000 15,579,000 17,869,000 19,309,000 14,389,547 11,790,199

12,053,000

18,547,000

27,630,000

40,198,000

54,054,000

66,352,000

63,251,000

75,029,000

80,172,000

62,844,609

64,515,928

1880 .

1890 .

1900 .

1905 .

1910 .

1911 .

1912 .

1913 .

1914 .

1915 .

1916 .

1917 .

In 1890 the United States produced more England, one and two-thirds that of Germany, pig iron than England and twice as much as while contributing that year nearly 40 per cent Germany. In 1913 its production was roughly to the world's production. During the last three three times that of 1890, three times that of years it produced more than 100,000,000 tons.

Pig Iron Production by States.

1912

1913

1914

1915

1916

1917

Pennsylvania .

Ohio .

Indiana, Illinois and Michigan .

Virginia and Alabama .

New York, New Jersey and

Maryland .

Other States .

12,753,000

6,911,000

4,732,000

2,153,000

2,231,000

1,422,000

13,162,000

7,244,000

4,779,000

2,437,000

2,517,000

1,322,000

9,733,369

5,283,426

3,404,806

2,098,151

1,755,458

12,790,668

6,912,962

4,433,998

2,300,799

2,356,828

Total .

30,202,000

31,461,000

23,332,244

29,916,215

.

*The State of Pennsylvania contributes more Indiana, Illinois and Michigan combined 15 oer than 40 per cent to the total production of pig cent, New York, New Jersey and Maryland 7*4 iron, the State of Ohio nearly 25 per cent, per cent, Virginia and Alabama iy2 per cent.*

Production of Pig Iron by Grades, 1900-17.

YEARS

Basic

Bessemer

Foundry

Malleable

Forge

All other

Total

(gross tons)

1,072,376

4,105,179

9,084,608

8,520,020

11,417,886

12,536,693

9,670,687

13,093,214

17,684,087

17,671,662

7,979,327

12,407,116

11,245,642

9,409,303

11,664,015

11,590,113

7,859,127

10,523,306

14,422,457

13,714,732

3,376,445 4,758,038 5,260, 447 4,468,940 5,073,873 5,220,343 4,533,254 4,843,899 5,553,644 5,328,258

173,413 635,236 843,123 612,533 825,643 993 , 736 671,771 829,921 921,486 1,015,579

793,092 727,817 564,157 408,841 469,183 324,407 361,651 316,214 348,344 345 , 707

394.589 358,994

305.590 229,910 276,337 300,860 235,754 309 , 659 504,779 571,459

13,789,242

22,992,380

27,303,567

23,649,547

29,726,937

30,966,152

23,332,244

29,916,213

39,434,797

38,647,397

1900

1905

1910

1911

*1912 * 1913*

1914

1915

1916

1917

In 1917, therefore, over 31,000,000 tons of pig iron or about 80 per cent of the total pro¬ duction were converted into steel, chiefly by the acid bessemer and by the basic open hearth processes. Although the production of basic pig iron was not greatly superior to that of

bessemer pig iron, it implies a much larger tonnage of basic open hearth steel because of the large proportion of scrap used by that process. Indeed, in 1917 the production of open hearth steel was more than three times that of bessemer steel.

Steel Production.

YEARS

United States

England

France

Germany

World's

production

1880 .

1,267,000 4,346,000 10,382,000 20,354,000 26,512,000 24,054,000 31,751 ,000 31,801,000 23,513,030 32,151 ,036 42,773,680 45,060,607

1,320,000

3,637,000

5,130,000

5,983,000

6,106,000

6,565,000

6,904,000

7,786,000

8,550,015

9,196,457

9,752,326

389,000

684,000

1,642,000

2,241,000

3,390,000

3,668,000

4,075,000

4,419,000

624,000

1,613,000

6,645,000

10,066,000

13,698,000

15,019,000

17,301,000

18,949,000

4,274,000

12,450,000

28,342,000

44,295,000

60,200,000

61,000,000

72,000,000

75,000,000

1890 .

1900 .

1905 .

1910 .

1911 .

1912 .

1913 .

1014

1 0 1 c

1 0 1 A

1017

In 1913 the production of steel in the United States, France and Germany was roughly three times greater than in 1900. In England, how¬ ever, it had only increased by about 50 per

Steel Ingot Production in the United States by Kinds (tons).

YEARS

Bessemer

ingots

Open-hearth

ingots

Crucible

Total

1900

6,678,303

3,220,644

96,579

9,995,526

1905

10,919,272

8,444, 836

99,072

19,463,180

1910

9,354,437

15,641,158

158,492

25,154,087

1911

7,890,753

15,027,459

111,267

23,029,479

1912

10,259,151

19,909,875

115,656

30,284,682

1913

9,465, 200

20,689,715

125,215

30,280,130

1914

6,220,846

17,174,684

89 , 869

23,513,036

1915

8,287,213

23,679,102

113,782

32,151,036

1916

11 ,059,039

31,415,427

129,692

42,772,680

1917

10,479,960

34,148,893

126,716

45,060,607

The total production of steel in 1913 was three times that of 1900. In 1917 it was nearly twice that of 1914. In 1900 the production of bessemer steel was twice that of open hearth steel, but in 1917 the production of open hearth steel was more than three times that of besse¬ mer steel. The production of crucible steel shows little variation.

cent. During the last decade the United States have each year contributed about 40 per cent of the world's production of steel. In 1917 the percentage was probably considerable greater.

United

States

tions

I M portations and of Pig Iron (tons).

Importa-

Exporta-

Exporta-

YEARS

tions

tions

1875 .

. 76,112

8,370

1880 .

. 711,832

1,901

1890 .

. 137,067

16,597

1900 .

. 53,388

291,173

1905 .

. 214,000

49,991

1910 .

. 241,000

129,000

1911 .

. 149,000

123,000

1912 .

. 131,000

277,000

1913 .

. 122,500

282,000

1914 .

. 141,218

116,330

1915 .

. 91,303

226,891

1916 .

. 137,528

617.012

1917 .

. 78,022

665,815

Barring the abnormal conditions prevailing during the war the tonnage of pig iron im¬ ported or exported is relatively very small and shows little tendency to increase. The totality of the pig iron produced in the United States is practically used for 'home consumption and is sufficient.

Pig Iron Production According to Fuels

(gross tons).

YEARS

Anthracite

Charcoal

Coke

Total

1854

303

067

305,623

48,647

657,337

1860

463,

581

248,510

109,132

821,223

1870

830,

357

325,893

508,929

1,665,179

1880

1 ,613

974

479,963

1,741 ,254

3,835,191

1890

2,186

411

628,145

6,388,147

9,202,703

1900

1,677,

048

384,482

11,727,712

13,789,242

1905

1,674

515

352,928

20,964,937

22,992,380

1910

649

082

396,507

26,257,978

27,303,567

1911

229

575

278,676

23,141,296

23,649,547

1912

247

179

347,025

29,132,733

29,726,937

1913

277

347

339,981

30,348,973

30,966,301

1914

170

000

260,000

22,800,926

23,230,926

1915

84

753

296, 152

29,535,308

29,916,213

1916

217

788

372,411

38,844,598

39,434,797

1917

381

048

376,525

37,889,824

38,647,397

The following conclusions may be drawn : (1) The production of pig iron in 1910 and in 1917 was respectively three and four times that of 1890; (2) the production of charcoal pig iron has varied little since 1900, it was smaller in 1914 and 1916 than in 1854; (3) the pig iron made with anthracite exceeded 2,000,000 tons in 1890, but was less than 400,000 tons in 1917; (4) in 1890 coke pig iron contributed about 66 per cent to the total production and in 1917 over 95 per cent.

Albert Sauveur,

Professor of Metallurgy and Metallography in Harvard University and the Massachusetts Institute of Technology.

IRON MASK, The Man with the, a

famous personage who was kept a prisoner in two or three French prisons in the time of Louis XIV, and who excited a curiosity correspond¬ ing to the care with which his identity was con¬ cealed. His first prison was the castle of Pig- nerol, of which Saint-Mars was governor. In 1686 he was carried by Saint-Mars to the isles of Saint Marguerite ; and the same precautions were observed as upon his first journey. Saint- Mars having been appointed governor of the Bastile in 1698, carried the prisoner with him there, but still masked. An apartment had been prepared for him more convenient, and furnished with more care than those of the other unfortunate beings who inhabited this sad abode. He was not permitted to take off his mask even before his physician. In other re¬ spects the greatest attention was shown him, and nothing which he requested was refused him. His education appeared to have been carefully attended to ; and he amused his leisure by read¬ ing, and playing upon the guitar. This unknown person died 19 Nov. 1703, at 10 o'clock in the evening, without having undergone any severe sickness. He was buried the next day in the • afternoon in the cemetery of the church of Saint Paul. He was, it was said, about 60 years of age, although the register of burials for the church of Saint Paul, in which he is mentioned under the name of Marchiali, makes him only about 45. It is said that orders were given to burn everything which had been employed in his service; that the walls of the chamber which he had occupied were rubbed down and white¬ washed ; and that the precautions were carried so far, that the tiles of his room were removed, in the fear that he might have displaced some

of them to conceal a letter behind them. Con¬ jecture exhausted itself to discover who this mysterious personage might be.

At the time of the destruction of the Bastile, in July 1789, there were not wanting curious persons, who sought, in the archives of this fortress, to discover some notices which might throw light upon this historical problem. But to no purpose. A widely-accepted conjecture was first thrown out in a letter written in 1770 . by Baron D'Heiss to the Journal Endyclopedi- que. According to this view the Man with the Iron Mask was Count Girolamo Magni, or Mat- tioli, first minister of the Duke of Mantua, who had betrayed the interests of Louis XIV by failing to secure for him, as he had pledged himself to do, in consideration of a large bribe, possession from his master of the fortress of Casale. For this offense he was lured to jhe French frontier, secretly arrested and im¬ prisoned in the fortress of Pignerol in 1679. The secret was preserved so carefully, on the supposition that Mattioli was the prisoner, be¬ cause his seizure and detention were flagrant violations of international law. In a more re¬ cent investigation by M. Jung, (La Verite sur le Masque de Fer> (1873), an attempt is made to

identify the Mask with a gentleman of Lor¬ raine, who was connected with an association for the assassination of Louis. Others at vari¬ ous times have tried to prove that he was a twin brother of Louis XIV, a natural son of the king, the English Duke of Monmouth, etc. Funck-Brentano in 1894 revived the view that Mattioli was the mysterious prisoner, and many now consider the controversy settled and this view established. Much of the material on which all the books, written in large numbers on this subject, are based is purely conjectural and it is doubtful if the true facts will ever be established. Around the story of the Mask, Dumas built one of his novels, (Viscomte de Bragelonne. Consult Barnes, A. S., (The Man of the Mask* (London 1908) ; Brocking, W., (Zur Forschung fiber die Eiserne Maske* (in Historische Vierteljahrschrift, Vol. XV, p. 363, Leipzig 1904) ; Delort, J., (Histoire de l'Homme au Masque de Fer) (Paris 1825) ; id., (Histoire de la Detention des Philosophes* (3 vols., Paris 1829) ; Funck-Brentano, F., T'Homme au Masque de Velours Noir Dit le Masque de Fer) (in Revue Historique , Vol. LVI, Paris 1894) ; Hopkins, T,, (The Man in the Iron Mask0 (New York 1901) ; Jung, M., (La Verite sur la Masque de Fer) (Paris 1873) ; Lair, L, (Paris 1751).*

IRON MOUNTAIN, Mich., city, county- seat of Dickinson County ; on the Chicago, Mil¬ waukee and Saint Paul, the Wisconsin and Michi¬ gan and the Chicago and Northwestern rail¬ roads ; about 47 miles southwest of Marquette and 57 miles west by north of Escanaba. It was settled in 1879 and chartered in 1888. It is the commercial centre for a large mining section in Michigan and for a farming section in Wisconsin. It has a Carnegie library. The

city government consists of a mayor and council, elected annually. Its trade is principally in iron- ore, lumber and farm products. Pop. 9,216.

IRON MOUNTAIN, Mo., the southern spur of the Saint Francois Mountains, a low range in the eastern part of the State. Tins mountain, which is really a hill or knob, is in Saint Francois County, about 60 miles south¬ west from Saint Genevieve, the nearest point on the Mississippi River and 80 miles south of Saint Louis on the Iron Mountain Rail¬ road. It is about 300 feet above the sur¬ rounding land and about 2,000 feet above the sea. It covers an area of 500 acres. It is famous for its remarkable mineral deposits, specular or hematite iron-ore, the purest iron-ore in the United States. The average eleva¬ tion above the land around is 550 feet, and the area it covers is about 500 acres. Large oak trees flourish on its slope, their roots embedded in soil composed largely of fregments of

per¬ oxide of iron. Excavations were begun in 1845. An artesian well was sunk to the depth of 152 feet, with the result that the beds passed through from the surface were as follows: Iron ore mixed with clay, 16 feet ; sandstone, 34 feet ; magnesian limestone, 7}4 inches ; gray sand¬ stone, I/2 inches; hard blue rock, 37 feet; pure iron ore, 5 feet; porphyritic rock, 7 feet; iron ore, 50 feet to the bottom. It would seem that nearly the whole mountain was a mass of mag¬ netic iron ore. The adjacent valleys are under¬ laid with magnesian limestone in horizontal strata. Pilot Knob (q.v.), about six miles south of Iron Mountain, also contained an extensive deposit of iron ore; Shepherd Mountain, a short distance southwest of Pilot Knob, is the largest of the iron mountains in that immediate vicinity. See Iron Ores.

IRON ORES. Although iron is the most abundant of the useful metals, forming 5 per cent of the earth's crust, it is rarely found na¬ tive — one famous native occurrence of it, how¬ ever, being at Ovifak on the west coast of Greenland. The iron ores of chief commercial importance are hematite, magnetite, limonite, siderite and pyrite. Pure hematite contains 70 per cent iron ; magnetite 72.4 per cent ; limonite 59.89 per cent; siderite 48.27 per cent; pyrite 46.6 per cent. Iron ores, however, are prac¬ tically never mined pure, but as mined in quan¬ tity, averages over 10 per cent less iron than above stated, the principal impurities being silica, alumina and lime.

Hematite, ferric oxide (FeiOs), by far the most important iron ore, varies greatly in phys¬ ical characteristics. Specular hematite is black, with a brilliant metallic lustre. Hematite yields 90 per cent of our supply of iron, in the United States. Martite is a variety of hematite. Mag¬ netite, a ferro-ferric oxide (Fe0.Fe203), is black, magnetic, and crystallizes in octahedra, but as mined it is usually massive or granular. Ilmenite, an oxide of iron and titanium, is not yet an ore of commercial importance. Frank- linite, an oxide of iron, manganese, _ and zinc, found at Franklin, N. J., is used in making spiegeleisen, an alloy of iron and manganese after the zinc has been removed by roasting. Limonite or brown hematie, hydrated ferric oxide (2Fe203.3H;0), is brown or yellow in color and occurs in massive, earthy or in

botryoidal forms. Bog-ore is a variety of limonite. Goethite, differing from limonite in crystalline form and containing less water, is found in large quantities in Minnesota. Siderite, or spathic iron, ferrous carbonate (FeCOs), is white to gray when pure, and crystallizes in rhombohedra. As mined, it varies much in ap¬ pearance, owing to oxidation. Clay iron stone is siderite mingled with clay. Blackband ore is siderite mixed with more or less bituminous matter. Pyrites, ferric disulphide (FeS2), often called (

Origin of Iron Ores. — Many of the large bodies of magnetite in the Adirondacks and in Sweden are believed to be magmatic segre¬ gations (q.v.), having solidified out as great masses of igneous rock cooled. Most of the hematite ores are believed to have been laid down as beds of sedimentary rock. The iron ore£ of the Clinton (q.v.) age extending in patches from New York to the Birmingham district in Alabama, are believed to have been laid down as beds of hematite in the ocean. The vast deposits of the Lake Superior region and the still larger deposits of Brazil are thought by many to have been laid down in the' ocean as very thick beds of iron carbonate and iron silicate. As the region was uplifted and eroded they weathered to hematite. Limonites in many places seem to have resulted from the weathering of rocks in which there was but little iron. During the weathering process .the insoluble iron remained behind, be¬ coming richer by the removal of soluble impuri¬ ties. This also is believed to be the origin of the great Cuban deposits of hematite. In some places limonite is also accumulating in swamps, where it is called bog iron ore® (q.v.). Similar deposits are now in process of forma¬ tion in the Three Rivers District of Quebec. In smelting an ore the silica, lime and alu¬ mina are removed as slag. Ores high in silica require more limestone in the furnace-charge for fluxing, that is, for combining with the sil¬ ica. Some ores contain silica and lime in such proportions as to be self-fluxing. The higher the iron content of an ore, generally speaking, the greater the yield per ton of material put through the furnace, and the lower the cost per ton of the iron made.

A very hard ore must be broken into small lumps to give best results in the furnace. Hematites often smelt easier than magnetites. A fine granular ore makes trouble in smelting, and a certain proportion may be lost as dust, which clogs furnace-flues. The really injurious impurities most often found in iron ores are sulphur, phosphorus and titanium. Sulphur can be largely removed by roasting the ore be¬ fore smelting; phosphorus cannot, and all the phosphorus in the ore goes into the iron. For making steel bv the Bessemer process an ore should contain less than 1-1,000 of its amount of iron ; thus, to be classified as Bessemer, an ore containing 61 per cent iron should contain less than .061 per cent phosphorus. For mak¬ ing steel by the basic process, high phosphorus ores are used.

The present development of the world's iron mines is the outcome of many factors. Gen-

erally speaking, it is cheaper to bring the ore to the fuel than the fuel to the

ore, hence, coun¬ tries or districts that have great supplies of iron ore may be insignificant producers of pig- iron. Low-priced fuel has been the chief factor in determining the location of iron and steel industries, while the chief factors in the development of iron mines are the quality of the ore and the cost at which it can be put down at the furnace.

Iron-Ore Supplies of the World. — The

*iron industry in Asia is several thousand years old, but the annual output of iron ore is small. China has vast but little-developed deposits of limonite and hematite. Japan is very poor in iron ores. The iron industry of Australia is not of importance. The only ores exported from Africa are mined in Algeria, where the annual production has fallen to about 150,000 tons. Europe has famous ore fields. The ores of Elba and those of Styria were worked by the Romans. Certain Swedish mines have been worked almost continuously since 1300. The German output now comes chiefly from so-called minette beds of Lorraine and Luxem¬ burg. The ore, a low-grade limonite high in phosphorus, is used in making steel by the basic process, and the present annual output is over 7,000,000 tons annually. The total ore supply left in the field is estimated at nearly 2.000,000,000 tons. The iron fields of Great Britain have passed their greatest productive¬ ness. The principal districts are Cleveland in North Yorkshire, yielding clay ironstone con¬ taining about 30 per cent iron ; Cumberland and Lancashire, yielding red hematite con¬ taining 50 to 60 per cent iron ; and Lincolnshire, Leicestershire and Northampton, yielding cheaply-mined low-grade hematite. The black- band ores of Scotland are of much less im¬ portance than formerly. The principal Spanish mines are in the Bilbao district in the province of Biscay, the productive field being 15 miles long and 2*4 wide. The ores are red and pur¬ ple hematite, limonite, and carbonate, the iron content in the crude ores running from 45 to 56 per cent. The district has produced to date about 95,000,000 tons. The greater part of the Russian ore supply comes from the Ural Moun¬ tains, the ores on the east side of the range being magnetite, and on the west side limonite and carbonate. Near Krivoi Rog, in the Cau¬ casus, are mines of hematite and magnetite. Fully 80 per cent of the iron ore of France is obtained from the minette beds of the Moselle that extend into Lorraine and Luxemburg. Most of the French ores are limonites. The principal Austrian iron mines are in Styria, the Styrian Erzberg having one of the largest de¬ posits of siderite in Europe, yielding yearly about 1,000,000 tons of carbonate ore, contain¬ ing 40 per cent of iron. In Bohemia are mines of magnetite, limonite and siderite. Sweden has immense deposits of iron ore, chiefly mag¬ netite with some specular hematite. The most imnortant deposits are at Grangsberg in Cen¬ tral Sweden, where are specular hematite and magnetite ores containing 62 to 64 per cent iron and 0.9 to 1.5 per cent phosphorus, and at Gellivare, 100 miles from the Gulf of Bothnia, where*

are huge bodies of magnetite that run from 68.69 iron and 0.05 phosphorus to 60 per cent iron and 1.5 per cent phosphorus. The ores from this field and the neighboring dis¬

tricts of Kurunavara and Luossavara will be of great importance to British iron-masters.

The total production of iron ore of the en¬ tire world for 1912 (the latest }'ear for which the figures are reasonably complete) was 148,- 663,995 gross tons. The production of the prin¬ cipal mining countries for 1913 was as follows:

Gross tons

United States . 61,980,437

Germany and Luxemburg . 26,771 ,598

France . 21,572,835

United Kingdom . 15,997,328

Spain . 9,706,366

Russia (about) . 8,500,000

Sweden . 7,357,845

Austria-Hungary . 5,018,109

Cuba . 1,582,431

The iron ore supplies of South America are known to be very extensive, but lack of trans¬ portation facilities have delayed development. One of the largest ore bodies in the world is the great hematite deposit in the state of Minas Geraes, Brazil, estimated to be three times as large as the Lake Superior deposits. It shows an iron content ranging from 55 to 65 per cent with so low a phosphorus content as to make it of Bessemer grade. All along the western slopes of the Andes are iron deposits as yet of undetermined extent. The only con¬ siderable development has been in Chile, where an ore body of hematite and magnetite testing 100,000,000 tons has been located and is being worked. Mexico and Central America have numerous iron deposits but they have been worked only upon a limited scale.

In the province of Santiago, Cuba, are de¬ posits of high-grade hematite, with an admix¬ ture of magnetite, estimated to contain 1,000,- 000,000

tons, on the south shore, and very large deposits of brown ore on the north shore. From there about 800,000 tons are exported to the United States annually. At Belle Isle, N. F., one of the world's largest deposits of hematite is being worked on a large scale. In Ontario, Quebec, and British Columbia are deposits of good hematite and magnetite, and the Dominion will eventually be a large producer. The iron ore reserves of the known deposits of the world are estimated at 90,000,000,000 tons, calculated to contain about forty billion tons of metallic iron.

The United States leads the world in the production of iron ore. The ores mined range from low grade limonite to the highest grade hematites and magnetites. The iron ore mined in the United States in 1915 amounted to 55,- 526,490 gross tons, an increase of 34 per cent over the 1914 production, but 10 per cent less than the record output (61,980,437 gross tons) of 1913. The value of the ore at the mines was $101,261,528, an average of $1.83 per ton ($1.81 in 1914). Iron ore was mined in 23 States in 1915 (in 27 States in 1914). The principal yields were : in Minnesota, 32,545,236 tons ; in Michigan, 13,664,437 tons; in Alabama, 5,134,- 955 tons; in Wisconsin, 1,125,269 tons; in New York, 931,745 tons. As regards the variety of ores mined, 52,227,324 tons were hematite; 1,807,002 tons were magnetite; 1,488,709 tons were brown ore ; and 3,455 tons were carbonate. All the Lake Superior ore is hematite ; the Bir¬ mingham (Ala.) ores are 80 per cent hematite and 20 per cent brown ore ; the magnetite comes chiefly from the Adirondack region of New York, from northern New Jersey, and from

southeastern New York. The carbonate is mainly from Ohio. The purest ore ever mined in the United States in quantity was probably the magnetite from the Lovers Pit at Mineville, N. Y., which ran 72 per cent iron in carload lots, though the Lake Angeline mine at Ishpe- ming, Mich., has shipped hard hematite running 68 per cent iron and 0.008 phosphorus in thou¬ sand-ton lots. The chief centre of iron ore production in the United States is in the Lake Superior region, where the ores occur along five mineral belts or "ranges,® in Pre-Cambrian rocks. The Marquette range, in Michigan, was opened in 1856; the Menominee, mostl}r in Michigan, but partly in Wisconsin, in 1887 ; the Gogebic, in Michigan and Wisconsin, in 1884 ; the Vermilion, in Minnesota, in 1884; and the Mesabi, in Minnesota, in 1892, and the Cuyuna in 1911. The ores shipped are nearly all red hematite. The Marquette produces some mag¬ netite. As much of the ore is hauled long dis¬ tances to a furnace, 60 per cent iron was once about as low grade ore as could be shipped profitably, but now some mines

ship Bessemer ores containing but 45 per cent iron. The ore- bodies are sometimes of great size. . The Cha¬ pin mine, on the Menominee range, is working lenses 100 feet wide and 600 feet thick in the middle, and 2,500 feet long. The Mesabi depos¬ its are flat-lying, covered by a varying depth of clay, sand and boulders. By stripping off the surface and working the granular ore with steam-shovels, an enormous output is possible.

Iron Ore Districts. — The chief iron ore regions of the United States are usually classi¬ fied by the United States Geological Survey as shown in the following table, which gives for 1915 the proportion of our total production credited to each.

Lake Superior region . 83.4 per cent

Birmingham district, Alabama . 8.5 per cent

Chattanooga district, Tennessee . 1.0 per cent

Adirondack district, New York . 1.3 per cent

New Jersey and South New York . 1.2 per cent

Other districts . . . 4 . 6 per cent

The Lake Superior region is in turn divided into several ranges, and their proportion of the total Lake Superior production is tabulated below.

Marquette range, Northern Michigan …... 8 per cent

Menominee range, Michigan and Wisconsin. 10 per cent Gogebic range, Michigan and Wisconsin …. 11 per cent

Vermilion range, Northern Minnesota . 3 per cent

Mesabi range. Northern Minnesota . 66 per cent

Cuyuna range, Northern Minnesota . 2 per cent

In the year 1915 there was taken from the Mesabi range 30,802,409 tons of ore — an in¬ crease of 56 per cent over the 1914 yield; an amount equal to 66 per cent of the ˆyield of the whole Lake Superior region, and 55 per cent of the entire yield of the United States. The Menominee range yielded 4,665,465 tons, an in¬ crease of 27 per cent over 1914. The Gogebic range yielded 4,996,237 tons — 9 per cent in¬ crease; the Marquette, 3,817,892 tons — 15 per cent increase; the Vermilion, 1,541,645 tons — 13 per cent increase; the Cuyuna, 1 ,120,606 tons — 44 per cent increase. The total yield of the Lake Superior region for 1915

was 46,944,254 tons — 84.54 per cent of the year's yield for the whole United States. The record production of individual mines surpass any in the < world. ˆ In 1915 the Mahoning mine, at Ilibbing, Minn.,

took first place with an output of 2,311,940 gross tons. The Hull-Rust mine, adjoining the Ma¬ honing, stood second, with 2,307,195 tons. The Red Mountain mines at Bessemer, Ala., which stood first in 1914, was third, with 2,138,015 tons. The individual records of 167 of the principal mines in the United States are to be found on pages 287-289 of "The Mineral Re¬ sources of the United States: Part I® for 1915, published by the United States Geological Sur¬ vey, in 1917.

In the South there are three important iron¬ mining centres — one near Birmingham, Ala., another in southeastern Tennessee, and the third in southwestern Virginia. The ores are red hematites and low-grade limonites. The growth of the Alabama industry is due to cheap ore, limestone and cooking-coal being found in close proximity. Pennsylvania produces some limonite. Of the western States, Colorado pro¬ duces limonite, and in Utah and Wyoming are great deposits of magnetite and hematite, des¬ tined to be of importance in the future. The famous specular hematite mines at Pilot Knob and Iron Mountain, Mo., are practically ex¬ hausted. Texas has large deposits of ore, and several other States are or will be important producers. Various estimates of the apparent reserves of iron ore in the United States range from 5,200,000,000 tons to 7,550,000,000 tons. This supply is being drawn on to the extent of about 55,000,000 tons a year. Besides the great production of its own mines the United States imports annually a considerable quantity of foreign ores. In 1915 this importation amounted to 1,341,281 gross tons, valued at $4,181,645. Of this, 831,618 tons came from Cuba; 204,632 tons from Sweden; 153,600 tons from Chile; 84,124 tons from Canada; 42,092 tons from Spain; and 21,825 tons from French Africa. The exports of the United States for the same year were 707,641 gross tons, valued at $2,181,629.

Mining and Handling Iron Ores. — Some extraordinary records of cheap mining and transportation have been made in the Lake Su¬ perior iron-ore trade. Large ore-bodies, effi¬ cient labor, and excellent management have been the factors in reducing mining costs, while the long lake-water haul, nearly 900. miles, in specially designed vessels, has made it possible to put down Lake Superior ores at Pittsburg, over 1,100 miles from the mine, at a total trans¬ portation cost of under $2 per ton. On the Mesabi range, in some large mines steam- shovels load the ore directly upon the cars, one shovel having loaded 170,000 tons in 26 days, or at the rate of over 6,500 tons per day. The shovels are each operated by five men, and the labor cost for mining and loading averages but dbout 16c per tons, and at one mine which dug and loaded 293,651 tons in 174 days, the labor cost was only

4c per ton. The loaded ore-trains go 50 to 115 miles to a shipping port. There they are run on to long, high docks hav¬ ing large pockets or bins into which the ore runs through openings in the bottom of the cars. From these pockets the ore passes by gravity down along chutes into the hold of the vessel, so that no hand-labor is required. The ore- pockets hold about 160 tons each, and number from 90 to 384, according to the length of the dock.

In unloading the ore from the vessels the

use of labor-saving machinery is even more notable. A series of steel bridges, easily moved along the docks, is supplied with hinged arms which can be lowered into the hatch of the ves¬ sel. Along each arm and across the bridge runs a trolley-train to which are attached automatic grabs similar to a double scoop. The grab or scoop holds about five tons of ore, and when it begins to draw together it digs into the ore. The grabs can remove over half of the cargo without any assistance, and the remaining half is brought directly under the hatch by use of a scraper, operated by similar machinery. The grabs are so controlled by the engineer that he can drop them at any point over the hold he may wish, and after a grab seizes its load of ore it is raised at full speed, carried rapidly along the trolley to any given point, and dumped into railroad cars or on stock piles. This 5-ton grab has a hoisting speed of 100 feet a minute, and can run along the bridge at the rate of 1,000 feet a minute. The bridges to which the arms with their grabs are attached are worked by electricity. By such a device 26 men can do the work of 300 under the old system. Another unloading device, the Hulett unloader requires even fewer men and takes out a larger proportion of the cargo without aid.

See Goethite; Hematite; Ilmenite; Limo- nite; Magnetite; Mining; Ore Deposits. Consult Eckel, C. E., (Iron Ores (New York 1914) ; (The Mineral Industry* (annually New York) ; and files of the Engineering and Min¬ ing Journal and Engineering Record (monthly New York).*

IRON SKELETON CONSTRUCTION,

a modern system of constructing high buildings, by which architects and builders are enabled to plan and erect buildings as high as 15 or 20 stories on plots of ground 20 to 30 feet wide. By the use of this system the thickness of walls is considerably reduced, thus giving a larger floor space, a very desirable consideration, es¬ pecially in office buildings. Iron and

steel columns are carried up from foundation to roof, and then covered in with bricks or stone. Thus a carrying capacity equal to that of walls of much greater thickness is produced. A 12- story building in New York City thus con¬ structed upon a lot 25 by 100 feet means a saving in floor space of thousands of feet. See Building in the United States.

IRON AND STEEL, Electric Produc¬

tion of. See Electrochemical Industries.

IRON AND STEEL, Metallography of.

As the study of the constitution of rocks, based, in part at least, upon microscopical examina¬ tion, is known as petrography, so the study, by similar methods, of the constitution of metals and alloys has been called by analogy metallog¬ raphy, for it was discovered that alloys and im¬ pure industrial metals were made up of con¬ stituents bearing close resemblance, in many respects, to the minerals of nature. This new department of metallurgy has been actively de¬ veloped for the last 20 years in all metallurgical countries and notable progress made.

In order to examine the structure of metals through the microscope, it is necessary to pre¬ pare surfaces almost absolutely free from the minutest scratches. To accomplish this, it is quite evident that the sample must be rubbed

*successively over various abrasive substances of increasing fineness. Supposing the surface to be examined has been filed with a smooth file or ground on an emery wheel, the marks left by the tool or wheel could not be removed and a perfectly specular condition imparted to the surface in a single operation. The transforma¬ tion must be gradual. The file marks must be effaced by rubbing the sample over a properly selected polishing substance, and replaced by finer markings. These, in turn, must be re¬ moved by a second rubbing with a finer abrasive agent, being replaced by still finer marks, and so on, until finally, the last operation removes the very minute marks from the previous treat¬ ment and leaves the surface quite, if not abso¬ lutely, free from scratches. Emery powder of various degrees of fineness is the abrasive sub¬ stance which naturally suggests itself, at least for the first treatments. The powders may be used in the shape of emery wheels, emery cloths or papers, or even spread loose over a suitable support, in which case they are kept wet during the rubbing. Emery may, of course, be re¬ placed by carborundum for these operations. The polishing powder known as ˆjeweler's® or <(gold** rouge suggests itself for the final polish¬ ing. It is generally spread over a piece of wash leather or some other cloth having a soft and smooth texture, which in turn is*

fastened to a block of wood or to some other suitable support. Washed alumina is also widely used. The powder is generally kept wet during the rubbing. The details of the manipu¬ lation vary greatly with different operators, but it may be said that they all use emery (or car¬ borundum) in some form for the rough polish¬ ing and jeweler's rouge or washed alumina for the final treatment. Tripoli powder may be used with advantage immediately before the last polishing.

The polishing may be done entirely by hand, or it may be hastened by the use of some sim¬ ple power-driven machine consisting of revolv¬ ing emery wheels and discs upon which the vari¬ ous powders are spread.

Many treatments have been tried to develop the structure of polished samples of iron and steel, i.e., to make their structure apparent when examined under the microscope. To do this, it is necessary to impart unlike appearances to the various constituents. The most successful meth¬ ods consist in etching the polished surfaces with highly diluted aqueous solutions of nitric or picric acid or preferably with alcoholic solu¬ tion of these acids. Absolute alcohol contain¬ ing some 10 per cent of nitric acid or 5 per cent picric acid are the etching reagents most widely used.

Microstructure of Pure Metals. — When a

properly prepared sample of a pure metal is examined under the microscope it is generally found to be made up of irregular polyhedric grains as shown in Fig. 1, which represents a drawing of the structure of pure gold under a magnification of 50 diameters.

It will be noticed that many of the grains are hexagonal, which strongly suggests that gold crystallizes in the regular cubic system, these hexagonal grains being probably due to inter¬ fering cubes and octahedra.

Many pure metals, including iron, crystal¬ lize in the cubic system, and exhibit, therefore, a structure similar to that of gold.

The dark net work shown in Fig. 1 marks the junction lines between adjacent grains. It is made apparent by suitable treatment of the polished surface, generally by immersing it in some acid, the acid corroding the metal more deeply between the grains than over their sur¬ face.

Fig. 1. — Structure of Pure Gold Magnified 50 Diameters

(Andrews) .

These grains of which pure metals are com¬ posed are not single-crystals. If the polished sample be etched more deeply and examined under higher power, it will be found that each grain is made un of a great number of small crystals, frequently cubic. It will be found, moreover, that all these small cubes which make up a single grain are oriented in the same di¬ rection in the same grain, but that their direc¬ tion changes as we pass from one grain to an¬ other.

The size of the grains varies with the nature of the metal, some metals being made up of much larger grains than others, even when cast and solidified under exactly the same con¬ ditions.

The presence of impurities, sometimes of an extremely small amount, frequently exert a powerful influence on the size of the crystal¬ line grains, some impurities increasing it, others reducing it.

The size of the grain in the same metal is also greatly affected by the temperature to which the metal is heated and from which it is allowed to cool, and by the rate of cooling. Generally speaking, it may be said that the higher the temperature, the larger the grain, and also that the slower the cooling the larger the grain. These results might have been an¬ ticipated, if it be considered that slow cooling from a high temperature are conditions favor¬ able to the formation and growth of crystals.

Undisturbed cooling is a necessary condi¬ tion to the free development of crystals. If the metal be agitated while solidifying, and worked — that is, subjected to powerful mechan¬ ical pressure — while cooling from a high tem¬ perature, the formation of the crystalline grains will be greatly hindered, if not altogether pre¬ vented, the metal assuming an amorphous-like structure, hence the important influence of work upon the structure of metals.

The Microstructure of Pure Iron. — Pure iron is not a commercial product. It can only

be obtained in small quantities by carefully con¬ ducted laboratory manipulations, and. even with the most refined care it is quite impossible to produce it absolutely pure. The purest com¬ mercial iron is of Swedish origin and may con¬ tain as much as 99.8 per cent of iron.

When a sample of this iron is properly pre¬ pared and examined under the microscope, some regions may be found which are absolutely free from slag and from carbon, and which exhibit, therefore, the crystalline structure of pure iron, or, at least, of carbonless iron. (See Fig. 2). It will be noted that

this structure is very similar to that of gold shown in Fig. 1. Like gold, it is made up of polyhedric grains, generally hexagonal. Iron like gold and like many other metals crystallizes in the cubic sys¬ tem.

Ferrite. — Pure iron, or rather carbonless iron, considered as a microscopical constituent, has been called ferrite, a name which suggests its nature and which was: proposed by Prof. Henry M. Howe. This constituent necessarily makes up the whole mass of carbonless iron, while in low carbon steel and in gray cast iron ferrite occurs in decreasing amounts as the per¬ centage of combined carbon increases.

The physical properties of ferrite are evi¬ dently those of carbonless iron. It is, there¬ fore, soft, being easily scratched by a needle, a test which will occasionally be found useful by the metallographist. It is moderately strong, having a tensile strength of some 50,000 pounds per square inch. It is very ductile, its elonga¬ tion amounting to 20 or more per cent. Ferrite does not possess any hardening power since carbonless iron cannot be(hardened by sudden cooling from a high temperature.

The Microstructure of Commercial Wrought Iron. Longitudinal Section. — The

Fig 2. — Structure of Carbonless Iron, Magnified 150 Diameters Ferrite (Longmuir).

microstructure of the longitudinal section of a wrought iron bar is shown in the accompany¬ ing illustration (Fig. 3). The ground mass or matrix of the metal will be found to be made up of polyhedric crystalline grains similar in every respect to the crystalline grains of pure iron and of pure metals in general. Many

irregular black lines, varying much in thickness and length,, but all running in the same direction, will also be noted in Fig. 3. These lines indi¬ cate the location of the slag which is always present in commercial wrought iron, and which assume the shape of streaks or fibres running

Fig. 3. — Structure of a Longitudinal Section of Wrought Iron, Ferrite and Slag (Longmuir).

in the direction of the rolling or forging, thus imparting a fibrous appearance to the metal. Wrought iron then is made up of a mass of ferrite, as might have been anticipated, assum¬ ing its characteristic

crystalline structure, and of numerous elongated particles of slag.

It was thought for many years that wrought iron actually had a fibrous structure, and in¬ deed, the number of persons who still hold this view is surprisingly large. Many valuable properties were attributed to puddled iron on account of its ((fibrous structure® which were denied to steel because of the <(crystalline struc¬ ture® of that metal. The miscroscope has sum¬ marily disposed of this erroneous belief in showing that the ferrite which constitutes the bulk of wrought iron is in no way different from the ferrite forming the bulk of low carbon steel. Both are equally crystalline.

The presence of carbon in wrought iron re-

Fig. 4. — Structure of a Transverse Section of Wrought Iron Ferrite and Slag (Longmuir).

suits in the occurrence of another constituent (pearlite) to be described later.

Transverse Section. — The microstructure of the transverse section of a wrought iron bar is shown in Fig. 4. Like the structure of a

longitudinal section (Fig. 3), it consists in a mass of crystalline grains of ferrite. The slag, however, which in the latter section occurred as fibres running in a direction parallel to the rolling, here assumes the shape of irregular, dark areas, which correspond to the cross-sec¬ tions of the slag fibres.

The Microstructure of Low Carbon Steel. — If a small amount of carbon be introduced into molten iron and the resulting product cast, the metal is converted into what is known as low carbon steel. From the fact that it was ob¬ tained in a molten condition it will follow that, unlike wrought iron, it is quite, if not alto¬ gether, free from slag. The absence or pres¬ ence of slag constitutes the most distinct dif¬ ference between wrought iron and low carbon steel, for these two metals may otherwise have identical chemical composition and very similar, if not identical, physical properties.

The microstructure of very low carbon steel is illustrated in Fig. 5. It will be noted that it consists in a mass of ferrite; that is, of car¬ bonless iron, made up of polyhedric crystalline grains very similar to the ferrite constituting

Fig. 5. — Structure of Low Carbon Steel. Carbon 0.08 per cent Ferrite and Pearlite (Arnold).

the bulk of wrought iron. At the junction lines of many ferrite grains,

however, some dark areas will be seen, which indicate the pres¬ ence in the metal of another constituent. Since ferrite does not contain any carbon, it is evi¬ dent that all the carbon present in the steel has segregated into these small dark masses, and thus we arrive at the interesting conclusion that in low carbon steel the carbon is not dis¬ seminated all through the mass, as might rea¬ sonably have been expected, but that it gathers in small particles embedded in a mass of iron.

Pearlite. — Speculating as to the nature of this new constituent, we know that it cannot consist of pure carbon ; for it is known that the carbon present in steel does not exist in the free state, but is combined with some iron, forming the carbide or iron Fe3C. This iron carbide must necessarily be located in the dark areas, but are these made up exclusive of this carbide? To assist us in determining the char¬ acter of this constituent, let us examine it under a high magnification. We then find that each dark particle breaks up into two components

(Fig. 6), which occur as small /parallel plates al¬ ternately bright and dark. As to the nature of these components, it is evident that one of them is the carbide Fe3C and the other must neces¬ sarily be iron or ferrite; for these are the only two constituents which, to the best of our knowledge, are present in unhardened steel.

Dr. Sorby, who was the first observer to describe the appearance of this interesting con¬ stituent, proposed for it the name of "pearly constituent, M because it frequently exhibits a display of color very suggestive of mother of pearl, especially when viewed by oblique illu¬ mination. Later Professor Howe suggested the name of pearlite, which has been universally adopted.

Cementite. — The carbide Fe3C has been called cementite, also by Professor Howe, be¬ cause it occurs abundantly in cemented steel, merely owing to the fact that this steel is gen¬ erally' a high carbon steel. Pearlite then is a mechanical mixture of ferrite and cementite after the fashion described in the preceding paragraphs.

It should be stated here that pearlite does not always assume such a distinctly laminated structure. In many instances its structure re¬

mains ill-defined or assumes a granular rather than a lamellar appearance, this being due chiefly to the treatment to which the steel has

been subjected. , .

A high magnification is required for the resolution of pearlite, generally not less than 200 diameters. The samples should also be very carefully etched

The Microstructure of Medium High Carbon Steel.-— The microstructure of steel containing 0.38 per cent of carbon is illustrated in Fig. 7 under a magnification of 100 diameters. It will be noted in comparing this structure to that of low carbon steels (Fig. 5), that the introduction of more carbon in the iron has re¬ sulted, as should be expected, in the presence of a greater amount of pearlite and of a cor¬ respondingly smaller proportion of ferrite. The pearlite occupies now roughly, about one-third of the total area. Under sufficiently high power the pearlite areas exhibit the characteristic lamellar structure illustrated in Fig. 6.

On further addition of carbon, the amount of pearlite, which is evidently proportional to the percentage of carbon, increases correspond¬ ingly, as shown in Fig. 8, which illustrates the microstructure of steel containing about 0.59 vol. 15 — 25

per cent of carbon. The pearlite occupies here over one-half of the total area. It will be noted that the ferrite areas are not resolved into polyhedric grains, apparently because the fer¬ rite now occurs in particles often too small to be made up of several crystalline grains. The

Fig. 7. — Structure of Medium High Carbon Steel. Carbon 0.38 per cent Ferrite and Pearlite (Arnold).

internal structure of these small masses of fer¬ rite, however, is still made up of small cubic crystals as previously described. A high- power photomicrograph of this steel would re¬ veal the laminations of the pearlite shown in Fig. 6.

The Microstructure of High Carbon Steel.

— It has been shown that the introduction of an increasing amount of carbon in steel results in the formation of a correspondingly increasing proportion of pearlite and decreasing amount of ferrite. A degree of carburization, therefore, must necessarily be reached, when the whole mass will be made up of pearlite, the ferrite having finally disappeared. This critical point

Fig. 8. — Structure of Medium High Carbon Steel. Carbon 0.59 per cent Ferrite and Pearlite (Arnold).

in the structure of steel is attained when the metal contains about 0.85 per cent carbon. In exceptionally pure steel a little more carbon may be required to cause the complete disappear¬ ance of ferrite, while in the

presence of much impurity a smaller percentage may be sufficient.

Steel made up exclusively of pearlite is sometimes said to be saturated, it is also called "eutectic,® or "eutectoid,® steel, the latter term having been suggested by Professor Howe. If it contains less than 0.85 per cent carbon,

Fig. 9. — Structure of High Carbon Steel. Carbon 0.89 per cent Pearlite (Arnold).

and, therefore, an excess of ferrite, it is called under-saturated or "hypo-eutectoid® steel, while if it contains more than this amount of carbon (and therefore, as will be seen, an excess of cementite) it is called over-saturated or "hyper- eutectoid® steel. The use of the terms eutectic and eutectoid implies that steel is considered as an alloy of two constituents, ferrite and ce¬ mentite, which, upon cooling, gives rise to the formation of a third constituent, pearlite, made up of small particles of both components. Many alloys contain a constituent possessing the same characteristics and which is called <(eutectic alloy.®

The structure of steel made up exclusively of pearlite is shown in Fig. 9. The magnifi-

Fig. 10. — Structure of High Carbon Steel. Carbon 1.20 per cent Pearlite and Cementite (Arnold).

cation is not sufficiently high to show clearly the laminations of pearlite.

Let us now consider what effect a further addition of carbon will have upon the structure of the metal. Fig. 10 is the reproduction of a

drawing showing the structure of a steel con¬ taining 1.20 per cent carbon, or much more carbon than the amount required to convert the whole mass into pearlite. It will be noted that while the bulk of the metal is still made up of pearlite, it now contains also another constituent, which in Fig. 10 occurs chiefly as a light net work surrounding the meshes of pearlite. This structure recalls that of medium hard steel and an inexperienced eye might be led to infer that this light constituent is fer¬ rite. This net work, however, consists of ce¬ mentite which is now present in excess over the amount required to form pearlite, just as in the case of low carbon steel, ferrite was in excess.

Cementite has a more metallic lustre than ferrite and remains bright and

structureless even after prolonged etching, while ferrite is colored and resolved into grains after such treatment. Cementite is extremely hard and stands in relief in the structure, while ferrite is soft and is depressed by the polishing. Fer¬ rite is readily scratched by a needle, while ce¬ mentite cannot be marked. The excess of ce¬ mentite, however, does not always assume the shape of a fine net work, its mode of occur¬ rence depending upon the treatment to which the steel is subjected.

With further increase of carbon, the amount

*(LI 0 * OJ 0.A O.C Oil Oil o!» 1.00 1. 10 t.W 1.10 1.40 1.40 1.40 1.10 UK) l.»0 V.00* ***.10*** *«. > 3J09.40 ».*0 2.603.10 2ˆ0*303X0*

Fig. 1 1 . — A Graphical Representation of the Relation Between the Carbon Content and the Structural Composition of Iron-Carbon Alloys.

of cementite will necessarily increase and the proportion of pearlite decrease correspondingly.

The structure of unhardened carbon steel just described may, for our purpose, be ac¬ counted for as follows : The carbon present in the steel unites with a portion of the iron to form the carbide Fe3C or cementite (which con¬ tains 6.67 per cent carbon). The remaining iron, or ferrite, and this cementite then unite structurally in definite proportion to form pearlite, leaving, as the case may be, an excess either of ferrite or of cementite, the former in low carbon steel, the latter in highly carburized steel.

The changes in the structural composition of steel, due to changes in the percentage of carbon, may be represented graphically as shown in Fig. 11.

This diagram clearly illustrates the fact that if no carbon be present the whole of the metal is made up of ferrite, and that by introducing increasing amounts of carbon, pearlite is formed in increasing quantity, while ferrite decreases correspondingly. With 0.85 per cent of carbon the whole mass consists of pearlite. Further addition of carbon results in the introduction of cementite in the structure, which then in¬ creases in amount with the carbon, while the proportion of pearlite decreases.

In our description of the structural compo-

sition of steel we have purposely ignored the effect of impurities, because

while their influ¬ ence is not to be overlooked, quantitive infor¬ mation on this point is lacking

The Microstructure of Cast Iron. — Cast iron may be sharply divided into two classes : (1) White cast iron and (2) Gray Cast Iron, that is, into cast iron free from graphitic car¬ bon and cast iron containing graphitic carbon. The microstructure of these two varieties of cast iron will be considered separately.

The Microstructure of White Cast Iron. — Like steel, white cast iron is free from graphitic carbon ; it contains the whole of its carbon in the combined condition, that is, as the carbide Fc3C or cementite. We should, therefore, ex-

Fig. 12. — Structure of White Cast Iron Magnified 150 Diameters Pearlite and Cementite (Longmuir).

pect to find the microstructure of white cast iron very similar to that of high carbon steel, that i$, made up of pearlite and a large excess of free cementite. In Fig. 12 is shown under a magnification of 56 diameters the structure of a sample of a white cast iron, and it will be seen that, as just anticipated, it is composed of pearlite and cementite, roughly in equal pro¬ portions. This iron contained about 3.50 per cent of combined carbon, which theoretically would call for about 45 per cent of free cemen¬ tite. A higher power would as usual be re¬ quired to resolve the structure of the pearlite areas.

*„ o., .JU, 1.50 1.00 *S° is°*

FiG.» 13. — A Graphical Representation of the Relation Between Percentage of Combined Carbon and the Structural Composition of Cast Iron.

The close analogy which exists between the structure of steel and that of white cast iron is, therefore, evident. Indeed it is not possible to distinguish high carbon steel from white cast iron by the examination of the structure of

these metals ; nor is this possible by any other test. To distinguish between high carbon steel and white cast iron, we must necessarily adopt an arbitrary rule, consisting, for instance, in calling steel, all carburized iron containing less than 2 per cent carbon and cast iron, those prod¬ ucts which are more highly carburized. Start¬ ing with carbonless iron and gradually increas¬ ing the carbon content, we produce, in succes¬ sion, low carbon steel, medium high carbon steel, high carbon steel, and finally white cast iron, without any suggestion as to when the metal ceases to be

steel and becomes cast iron. The changes of structure and of properties caused by this gradual increase of carbon are contin¬ uous and do not indicate any abrupt transforma¬ tion. As the carbon increases the strength of the metal increases until the carbon content reaches about 1 per cent and then it decreases ; the hardness increases and the ductility and weldability decrease continuously; the malle¬ ability decreases and finally disappears, but these changes occur gradually as the carbon increases and not abruptly upon reaching the composition of white cast iron.

To sum up, white cast iron may be consid¬ ered as forming the most highly carburized member of the steel series.

The Microstructure of Gray Cast Iron — Gray Cast Iron free from Combined Carbon. — Perfectly gray cast iron does not contain any combined carbon. It should, therefore, be made up of a mass of carbonless iron (ferrite) and! of a certain amount of graphitic carbon. The graphite occurs as numerous plates irregular in shape and size, disseminated through the iron, and breaking up its continuity. (See Fig. 14). It is because of this breaking up of the continuity of the metallic mass that the original ductility and malleability of the iron is so completely destroyed by the presence of a sufficient amount of graphite.

Gray Cast Iron Containing Combined Car¬ bon. — Gray cast iron is seldom free from com¬ bined carbon. It generally contains from 0.10 to 1 per cent and even more of carbon in the combined condition, and it is well known that this percentage of combined carbon depends chiefly upon the amount of silicon present and upon the rate of cooling of the casting. Vari¬ ous proportions of combined carbon, and, there¬ fore, of graphitic carbon impart different ap¬ pearances to the fracture of cast iron, which was, and still is to a considerable extent, classi¬ fied accordingly into the various grades aNo. 1, 2 and 3 Foundry, » «mottled,» ˆforge,® etc.

The presence of some combined carbon in the iron must necessarily imply the presence of some pearlite in its structure. The metallic matrix which in perfectly gray iron consists of ferrite now possesses the structural character¬ istics (and therefore the properties also) of a low carbon steel. Gray cast iron containing a small amount of combined carbon may be con¬ sidered as a low carbon steel whose continuity is destroyed by the presence of numerous plates of graphite. Such an iron would correspond to

a No. 1 Foundry. .

The presence of a larger proportion of com¬ bined carbon must necessarily result in a cor¬ respondingly greater amount of pearlite in the structure.

By increasing the percentage of combined carbon in cast iron, we convert its metallic

matrix into steel of a correspondingly higher carbon content. We must necessarily reach a point, therefore, when the matrix will become a mass of pearlite, or, in other words, when it will assume the character of a saturated or eutectoid steel. This will occur when the metal contains about 0.70 per cent of combined car-

Classified by its fracture, a cast iron of this character would correspond to a No. 3 or 4 Foundry.

A further increase of combined carbon would result in the presence of some free cementite in the structure. Such cast iron is known, from the appearance of its fracture, as

Fig. 14. — Gray Cast Iron free from Combined Carbon, Magnified 100

Diameters (Langenberg) .

bon. It will be remembered that in the case of steel some 0.85 per cent of carbon was required to convert it into a mass of pearlite. In the case of cast iron, however, the amount of iron

Fig. 15. — Gray Cast Iron Containing Combined Carbon, Magnified 500 Diameters.

to be saturated is less (because of the space occupied by the graphite) and requires a corre¬ spondingly smaller amount of carbon, namely, some 0.70 per cent.

ˆmottled® iron. The structure of gray cast iron is illustrated in Fig. 15; it consists of a matrix of pearlite, numerous plates of graphite and of a white constituent which in iron con¬ taining considerably less than some 0.70 per cent combined carbon would correspond to ferrite, while in iron containing a considerably greater percentage of combined carbon it would indicate the presence of cementide.

Relation Between the Structure of Cast Iron and the Percentage of Combined Car¬ bon. — The relation between the structural com¬ position of cast iron and the proportion of com¬ bined carbon may be clearly illustrated by the diagram of Fig. 16, in which the percentage of total

carbon (graphitic carbon plus combined car¬ bon) has been assumed to be 4 per cent and to remain constant. The plan followed is the same as that used to illustrate the changes of struc¬ ture-in steel and will therefore be readily under¬ stood. By comparing this diagram with that of Fig. 11, the close analogy between the constitu¬ tion of steel and that of cast iron is strikingly brought out. That the properties of steel and cast iron, in spite of this similarity, differ so much is due to the presence of graphitic car¬ bon which by breaking up the continuity of the steel mass greatlv decreases its strength and ductility, and deprives it of its malleability.

The structure of iron and steel briefly described in the foregoing paragraphs is that

assumed by these metals on slow and undis¬ turbed cooling from a sufficiently high tem¬ perature. It may be called the normal struc¬ ture, time and opportunity having been given for the formation of the final and, generally, stable constituents. The treatments, thermal and mechanical, to which iron and steel are so frequently subjected, however, in the manu¬ facture of finished implements may alter these structures very profoundly by preventing, in part or in all, the formation of the normal constituents and causing the formation and re¬ tention of new constituents, thereby imparting to the metals widely different properties. In¬ deed it is this sensitiveness of steel to thermal treatments that makes possible the manufacture of implements varying so widely in properties — from extreme hardness to great softness, from great strength combined with little ductility to moderate strength combined with great tough¬ ness and ductility, etc.

Metallographical studies include also the construction and interpretation of thermal curves and equilibrium diagrams, the application of the phase rule to metallic alloys, as well as other closely allied scientific determinations.

Albert Sauveur,

Professor of Metallurgy and Metallography in Harvard University, and the Massachusetts Institute of Technology.

IRONBARK TREE, an Australian tree (Eucalyptus siderophloia’) , so named because of its very hard bark. The tree reaches a height of from 80 to 100 feet and about 3. feet in diameter at the base. The wood is highly prized for shipbuilding, having the requisite qualities of durability and hardness to a very high degree.

IRONCLAD. See Armor-plate.

IRONCLAD OATH, The, an act passed

by the United States Congress in 1866, which had the effect of excluding voters, in the States lately in rebellion, from the franchise. The act practically disfranchised all Southerners over 25 years of age. It was repealed shortly after its passage.

IRONDALE, i'ern-dal, Wash., a place in the northeastern part of Jefferson County, a few miles south of Port Townsend. The first blast-furnace on the Pacific Coast was erected at this place in about 1880. The furnace was in operation about 12 years, and was then abandoned because of the great expense . in¬ curred in production. The ore was obtained from Texada, an island belonging to British Columbia, and 130 miles distant. The last of the 19th century the Pacific Steel Company, a corporation in which practical iron-makers .of Pennsylvania are the chief owners, began in¬ vestigations as to the nature of the ore, and the possibility with improved machinery, to manu¬ facture iron at Irondale or vicinity at paying rates. As a result the Pacific Steel Company took up the work abandoned by the Puget Sound Iron Company. The works were so im¬ proved as to be practically new, and 20 brick charcoal kilns were erected for the use of the company. Coke is obtained in Washington.

IRONS, or BILBOES, shackles of iron into which the ankles of a prisoner are fixed, and which slide on a long iron bar. Refractory prisoners, who evince violent behavior, are

commonly put in irons. In case of extreme violence, the wrists may be similarly treated. The punishment of ((putting in irons" has been abolished in the United States navy.

IRONTON, Tern-ton, Ohio, city, county- seat of Lawrence County; on the Ohio River, and on the Detroit Southern, the Norfolk and Western, and the Cincinnati, Hamilton and Day- ton railroads about 100 miles directly southeast of Columbus. The Chesapeake and Ohio Rail¬ road, in Kentucky, maintains a ferry for pas¬ sengers and freight, which gives the city the benefit of four important railroads. Ironton was settled in 1832, and for some years was known as a river-trading town. It was incor¬ porated in 1849, and owns municipal water¬ works. It is situated in a section of country noted for its clay (suitable for pottery), iron ore, and bituminous coal. Its chief industrial establishments are foundries, rolling-mills, blast-furnaces, machine-shops, nail-works, fur¬ niture factories and planing-mills. It has also among its manufactures doors and mantels, stoves, boilers, cement and fire-bricks. The clay in the vicinity is much used

for pottery. The parks, River View, Lincoln and Beech- wood, are attractive. Some of the principal buildings are the Briggs Public Library, the Kingsbury school, Odd Fellows' Hall, Masonic Temple, City hospital and several churches. Ironton was the home for some time of the artist Sarah Cotter-King. Pop. (1920) 14,007.

IRONWEED, a genus, V erononiа, of tall, coarse, composite plants, several species of which grow abundantly in woods and along roadsides throughout the eastern and southern parts of the United States. They bear heads of magenta-colored flowers somewhat like mini¬ ature thistles. The most conspicuous species (V. altissima) is often 10 feet high, and blooms in August and September. A large number of species occur in the tropics of North and Soutn America and of Africa.

IRONWOOD, Mich., city in Gogebic County, on the Wisconsin Central and the ChL cago and- Northwestern railroads; about 12 miles south of Lake Superior and 33 miles southeast of Ashland. It was settled in 1884 and incorporated in 1887. It is situated in a region rich in iron ore and timber ; the section is known as the (

IRONWOOD, a popular name for many trees whose timber is very hard and heavy. Probably the best known species in America is also known as leverwood, Ostrya virginiana, of the family Betulacece, indigenous from Nova Scotia to Florida and westward to Minnesota and Texas. It is a medium sized tree with fur¬ rowed bark, birch-like foliage, pistillate flowers in catkins resembling the female flowers of hop,

hence its popular name hop-hornbeam. The name ironwood is also • sometimes applied to Carpinus caroliniana, of the same family. (See Hornbeam). Among foreign <(iron woods,® per¬ haps the most widely known is Mesua ferrea, an East Indian tree planted around Buddhist temples for its fragrant flowers, which are used to decorate the images of Buddha. Another Asiatic species is Metrosidcros vera, from which the Chinese and Japanese make rubbers. In Australia and South Africa various species of Olea, Melaleuca, Sideroxylon, Notelaea, and Myrtus are valued for their timber, locally called ironwood, employed where great tough¬ ness is desirable and weight no obstacle.

IRONY, a peculiar mode of thought and expression in which the meaning of the speaker is contrary to his words. It is a delicate species of sarcasm and when skilfully used is one of the most crushing and irresistible figures

of rhetoric. Instances are frequent in history and literature. One of the most celebrated is that recorded in Scripture, where Elijah taunts the discomfited priests of Baal on Mount Carmel. In philosophy the term has been used as a rule to characterize either the Socratic attitude whereby the only criterion for the aesthetic worth is found in the consciousness of the artist himself.

IROQUOIAN FAMILY, a linguistic stock

of North American Indians deriving their name from the form Iroquois (q.v.), the name given to the ((Five Nations.® The Saint Lawrence River was probably their first habitat, and from there they gradually spread to the Great Lakes, primarily because of the hostility of the Algonquins. Cartier found, in 1535, a people living between Montreal and Quebec whose language showed them to be Wyandots, but 100 years later these had entirely disappeared and the Algonquins occupied their territory. The Iroquoian stock is divided into four groups: the northern' — Wyandot, Tionontati, Wenro- rono, Tohotaenrat, Neuter, Hochelaga ; the cen¬ tral — Mohawk, Oneida, Cayuga, Onondaga, Erie, Conestoga, Seneca; the southern- — Tus- carora, Meherrin, Nottaway, Chowan'oc, Coree; the Cherokee — Elati or Lower Cherokee, Mid¬ dle Cherokee, and Atali or Upper Cherokee. The tribes of the Iroquoian stock were all agri¬ cultural, and were noted for their houses and fortifications. They have also made consider¬ able advance in education. The whole popula¬ tion is about 46,000, of whom 12,000 are in Canada. The major portion of the population are Cherokee. See Iroquois ; Cherokee; Wyan¬ dot; Seneca and Oneida.

Bibliography.— Bancroft, H. H., (Native Races> ; Berghaus, Heinrich, (Physikalischer Atlas) (Gotha 1852) ; Gatschet, A. S., (A Mi¬ gration Legend of the Creek lndians) (Phila¬ delphia 1884) ; Keane, A. H., (Ethnography and Philology of America (London 1878) ; Latham, R. G.,*

IROQUOIS, or MATILDA, Canada, port of entry in Dundas County, Ontario, on the Grand Trunk Railway and the Saint Lawrence River, 20 miles southwest of Cornwall and 45 miles southeast of Ottawa. It is one of the ter¬ mini of the Iroquois Canal. Pop. 849.

IROQUOIS (ir-6-kwoi') LEAGUE, the

name given by the French to the confederacy of North American Indians, called by the Eng¬ lish the "Five,® and afterward the <(Six Na¬ tions.® By the Delawares they were known as the Mingwe; by the Algonquins as Nadowa; by the Powhatan as Massawomekes. The Mo¬ hawks, Oneidas, Onondagas, Cayugas, Senecas, and Tuscaroras, after they were driven from their hunting-grounds in North Carolina in 1712, were the members

of this confederacy. They called themselves Ongwanonsionni, (

waga and Saint Regis. In the Revolution the Iroquois as a league were neutral, but the sep¬ arate tribes took up the warfare generally in favor of the British, the Oneidas and some of the Tuscaroras being the only ones who sided with the Americans. Brant led the Mohawks and Cayugas into Canada, where, at the end of the war, the Canadian government gave them several reservations, and where a majority of them are at the present time. The reservations for the Iroquois in the United States are mostly in New York, where all now live except a part of the Oneidas, who in 1820 migrated to Wis¬ consin, and a small band of Senecas, who have a small reservation in the Indian Territory. According to the United States census, and a Canadian report, the total number of the Iro¬ quois in 1902 was about 17,000, of whom about 8,000 were in the United States. Since then the Iroquois have increased somewhat. Numbers of them have left the reservations and gone out to take their place in the world. Those still classed as Iroquois are Gibson (Ontario, Can¬ ada) 140; Mohawks of Bay of Quinte (Ontario, Canada) 1282; Oneidas (Thames, Canada) 776; Grand River Six Nations (Ontario, Canada"! 4,195; Caughnawaga (Quebec) 2,082; Saint Regis Iroquois, 1,435; Two Mountains Indians, 399; New York reservations, 4,918; Wisconsin Oneidas, 2,107; Oklahoma Senecas, 215. See Six Nations, The; Iroquoian Family.

Bibliography. — Beaucamp, W. M., (New York Indians) (Albany 1907) ; Bush, E. H.,

(Iroquois Past and Present (Buffalo 1901) ; Chadwick, E. M., (People of the Longhouse> (Toronto 1897) ; Colden, C., (History of the Five Nations of Canada* (1747) ; Hale, Hor¬ atio, (The Iroquois Book of Rites) (Philadel¬ phia 1883) ; Hewitt, J. N. B., (Historic League of the Iroquois) (Washington 1894) ; Miller, A. C., (The Iroquois) (New York 1855) ; Mor¬ gan, L. H., (League of the Iroquois) (New York 1851) ; Parker, A. C., (The Constitution of the Five Nations* (Albany 1916) ; Uroquois Uses of Maize and Other Food Plants* (Albany 1916) ; Root, Elihu, (Th© Iroquois and the Struggle for America* (Albany 1910) ; School¬ craft, H. R., (Notes on the Iroquois) (Albanv 1847) ; Stiles, S. H., (Economics of the Iro- quois) (Lancaster, Pa. 1905) ; Weiser, C., (A Tour of Ohio) (1848).*

IRRADIATION, in physics, an apparent enlargement of a bright body when seen against a background darker than itself. A simple method of observing

this phenomenon is to view a bright sky through the spaces between a grating. If the breadth of the opening can be made equal to the breadth of the bars of the grating it will be seen that, when viewed from a little distance the bars look narrower than the spaces between them. This is obviously owing to the encroachment of the light upon the dark spaces around it. The first question to arise and one which was long discussed was whether the encroachment was due to an excitation of the nerves of the retina outside the limits on which the light fell upon the nerves, or \Vhether it was necessary that the light should actually fall outside of its geometrical limits. The lat¬ ter view is found to be the correct one, unless in cases of extreme brilliancy of the light.

The phenomenon was explained bv Plateau as due to the extension of the impression upon

the nerves of the retina beyond the outlines of the image. Helmholtz, however, has ascribed it to the want of a perfect accommodation in the eye, leading to the formation of a diffiusion images about the proper image of a bright ob¬ ject, so that it encroaches upon the dark space about it, and hence appears larger than it really is. Still another explanation is offered: Irradia¬ tion is almost entirely in the nature of an optical defect or aberration of light. It begins with the atmosphere, which, when light passes through long stretches of it, slightly deflects the rays, so that a point is no longer seen as such, but as a small ill-defined waving surface. No lens ever brings the rays from a point to ex¬ actly the same focus. The lenses of the eye itself have defects which everyone who con¬ sults an oculist is acquainted with. The re¬ sult of all these imperfections is to produce the enlargement we have described.

Irradiation is a notable subject in the history of astronomical observations. It was necessar¬ ily larger with the imperfect telescopes of former times than with the improved ones of pur own period. Total eclipses of the sun, the transits of Venus and Mercury were especially productive of the phenomenon. The enlarge¬ ment of the moon resulted in a star appearing as if within the bright disc of the moon when its light was really only grazing the surface. The sharp points or horns, of light formed by the limb of the sun during the transits of Venus and Mercury were rounded off, so as to present quite an illusory view of their form. Just at the beginning and end of total eclipses of the sun the phenomenon known as Bailey's beads, really enlargements of the last points of light from the sun's limb, which could be seen before the sun was quite covered, looked like a string of beads. Many learned memoirs have been written on the subject, but the consensus of opinion to-day is toward the simple and comprehensive theories above mentioned. ((Ir- radiation® is also a name applied to the act of emitting beams of light, illumination, brightness emitted, and by

extension, en-lightenment.

IRRADIATION, in physiological psychol¬ ogy, a term borrowed from physics and ex¬ tended to include cases of nerve stimuli, and the impulses of these stimuli from the normal path. As a word, ˆirradiation® is equivalent to the German word Ausstrahlnng , the French term irradiation, the Italian, Irradiazione, and the Spanish word, irradiacion. All these fornis except the German were derived from the (quasi) Latin irradiatio (n) , from Latin ir- radiare, meaning <(to irradiate.® More fully de¬ fined, irradiation is the lateral diffusion of nervous stimuli out of the path of normal nervous stimulated discharge, as a result of which the excitation of one peripheral end-organ may excite other central organs more than those directly correlated with it or anatomically related to it by direct nervous connections. Where it takes place is not yet certainly known. Dogiel has shown that in skin areas subject to great irradiation, the end organs of one order are connected by communicating rami, suggest¬ ing peripheral irradiation. There are also in¬ dications of excessive stimuli in the spinal cord. It has been suggested by Herrick that irradia¬ tion (or at least a verv nearly ; similar and analogous process), is at thc.fouqd.atiotiof most

pleasurable sensations. Consult Dogiel, A. S., (Die Nervenendigungen . . . des Menschen) (in Arch f. mikr. Anat. XLI, 1893) ; Herrick, C. L., (Modern Algedonic Ideas) (in Journal of Compar. Neural, V, March 1895).

IRRATIONAL NUMBERS, those which are not integers or fractions ; numbers which are

incommensurable with unity. This V 2 is an irrational number. The ratio n of the circum¬ ference of a circle to the radius is an ir¬ rational number — 3.1415. Incommensurable

roots of numbers, like V 2, are called surds. The irrational numbers are divided into alge¬ braic, involving only extraction of roots, and transcendental, involving higher processes. Consult Dedekind, ˆEssays on Number, > trans¬ lated by Beman (Chicago 1901).

IRRAWADDY. See Irawadi.

IRREDENTISTS, an important modern Italian patriotic and political movement hav¬ ing for its avowed aims the “freeing® of alleged Italians and lands near Italy, and the incor¬ poration of both within the Italian

political dominion. The English word "Irredentists® is derived from an Italian name "Italia irre¬ denta,® or "unredeemed Italy® which natives apply to that territory and its inhabitants.

Irredentism, the principles, policies and the practice of Irredentists, gained an ascendency in Italian politics for the first time during the five or six years following 1878. Among its ardent disciples were members of the older Italian Radical and Republican parties, ad¬ herents whose main activities in support of Irredentism are confined, chronologically, within the last quarter of the 19th century. Having attained this temporary recognition, the forces behind Irredentism subsided, and after 1881 a long period of unruffled repose followed, save that manifest in specious oratory or political fanfaronade. Politicians from time to time circulated a resurrected form of Irredent¬ ism ; but their procedure in these cases was based upon an affected fear of Austrian, French, or other aggression. The revival of present day Irredentism took place in 1908, dur¬ ing which year the ambitious ideal, "L'Idea Nazionale,® first saw light. "L'Idea Nazionale® is the end toward which the new Italian patriotic party of the Nationalists tend: and "these Nationalists have restored the Irredentism of their fathers, and it re-emerges from the past in union with elements which its former upholders never knew, again to court the ad¬ herence of Italians. Irredentism is the core of "L'ldea Nazionale.®

Dante, pioneer of the Italian classical Renaissance, early treated his fellow country¬ men to a magnificent vision of a united Italy. He helped to prepare their minds for' the recep¬ tion of Irredentism and L'ldea. After the Russo-Turkish War a conference of the powers was held at Berlin, and the award they made to Austria in 1877 disappointed Italy keenly. The vision of Dante was fresh in Italian memory: and in 1878 Irredentism appeared. Its ad¬ herents were to unite — they said — all por¬ tions of Italy, even all those parts which of old had passed beneath the sway of foreign power. In language they asserted they had found a touchstone which would reveal what

belonged to Italy, what to a foreign power. Resting their claims upon this doubtful criterion, they suggested that France, Austria, Switzerland and England should surrender such territory to Italy. In this way they in¬ cluded all within the confines of Gorz, South Tyrol or Trentino, Istria, Trieste, Tessino, Nice, Corsica and Malta. Their test appears, however, to have been applied in an arbitrary manner and even in cases where it was not ap¬ plicable. For the Italian language is not spoken universally in South Tyrol, Gorz and Istria; while Malta has its own dialect ; and Dalmatia is non-Italian, although it once acknowledged the dominion of the old Venetian Republic.

Austria did not yield to the Irredentists, and retained Trieste and the Southern Tyrol. In 1866 the great Italian general Giuseppe Gari¬ baldi had temporarily conquered Trentino: and on this fact united with their linguistic principle they of Irredentist conviction found sufficient inducement to direct most of their operations against Austria. Over these terri¬ tories both Italians and Austrians adopt the same opinion. Both with equal plausibility urge that the Trentino is a weak point in the armor of the owner, and "enclave,® and a terri¬ tory which if wholly abandoned by one power to its neighbor, must expose the power making such surrender to the possibility of a danger¬ ous attack upon its integrity.

When in 1881 France, to the chagrin of Italy, occupied Tunis, Italian operations against Austria subsided. Thereupon the Italian gov¬ ernment entered into those relations with Austria and Germany which originated the Triple Alliance, and Irredentism entered upon a period of repose which lasted a generation.

The great European crisis of 1908 culmi¬ nating in Austria's annexation of Bosnia-Herze- govina marks the awakening hour of "L'ldea Nazionale.® "L'Idea® is the aspiration, really, of a refined Imperialism ; it engenders aggres¬ sion and expansionist ideas. So profound is the hold of "L'Idea® upon the heart of its votaries, that it finds expression even in such unsuspected avenues as those offered by art. Its spirit enlivens such highly artistic produc¬ tions even as that of Gabrielle d'Annunzio, who wrote his (La Nave,} or the /Ships, to extol the might and the glory-making conquests of fallen Venice. In contrast with the Irredentism out of which it has developed, the new spirit em¬ bodied in "L'Idea® exhibits features such as no Irredentist ever knew. Irredentists were not _ quintessentiallv Imperialists, but the Nationalists are. Nor did Irredentism glorify war, as war. Professor Corrodini, a noted Nationalist, is proud in that he is a "profound admirer of war!® Georgio del Vecchio, another great Nationalist grows ecstatic over "the goodness of war!® While the Nationalist, Prof. Scipione Sigbele, one of the party's most respected spokesmen, points out the course for his followers in words like these: "The war question is for Nationalists the pri¬ mordial question. The warlike virtues are for us the primordial virtues!® It is interesting to note that all the foregoing utterances were made prior to the late great European conflagration.*

The last two decades have witnessed a whole series of acute eruptions of human energy. It is quite possible that these have affected the sub-

stitution of ((LTdea Nazionale® for the older Irredentism.

Professor Sighele finds reason to character¬ ize the new spirit as a ((voluptuousness of self- sacrifice, w while another Nationalist eulogizes his followers because: ((L'Idea Nazionale® is a purely ˆrealist and integral valuation of inter¬ national relations in absolute antithesis to the sentimental tendencies of the old Radical and Republican Irredentism which looked to the abandonment of the Triplice and the rapproche¬ ment of Italy with the parliamentary powers of the west.®

It may be mentioned, however, that while the above claim advanced by Signor Federzoni may be capable of substantiation, it obviously stands in need of it. For to an impartial ob¬ server the pronounced syndicalism of a wing of the Nationalist party amounts to a betrayal. And it is sufficient to call attention to it that their subjective individualism is anything rather than a genuine, an objective realism. The most pronounced distinction making Irredentism dif¬ fer from its successor, finds sharpest expres¬ sion, probably, in the grounds and methods assigned for their respective efforts. No citizen of a power whose territory is involved in the intentions of these Italian parties can be expected to see in these intentions any profound difference. And because these intentions are the same, Sighele recalls how the party to which he belonged welcomed their ideal ((vibrant with an enthusiasm at first judged ridiculous.® No thoughtful independent observer can expect a Realism in any genuine sense to proceed from the co-operation merely of the moods and of the emotions.

After the Tripolitan expedition in 1911, a congress of Nationalists gathered at Florence. Here they codified their characteristic doctrines, and in a sensational manifesto established their central organ, L'Idea Nazionale. Then they banded themselves together in a definite body, <(L'Associazione Nazionalista.® And as the storm impended over Europe prior to the ar¬ rival of the great European War of 1914, an an¬ nouncement appeared in L'Idea Nazionale which reveals how the Association met the crisis. On 10 May 1915, the paper told its readers:

<(Italy desires war in order to obtain Trent, Trieste and Dalmatia. The Nation desires it. A nation which has opportunity to free its lands should do so as a matter of imperative necessity.®

Let one note the phrase to <(free its lands,® the Jands in question being meanwhile identified with Trent, Trieste, Dalmatia. The intentions of Nationalism are those of Irredentism, and one party is a continuation of the other.

During the war <(L'Idea® once came near realization. Cadorna's

victorious soldiers had swept 122 communes constituting 10 political districts clean of Austrian troops. Eight dis¬ tricts were organized and functioning before the close of 1916. They were under a Commis- sario or civil representative of the Italian su¬ preme military command. After Caparetto the territory was again in Austrian hands until vacated by the latter under the terms of the armistice which went into effect 4 Nov. 1918. See Italy and the War.

Bibliography. — Coolidge, A. C., 'Origins of the Triple Alliance> (New York 1915) ; Do- minian, L., (Linguistic Areas of Europe fin*

*American Geographic Society Bulletin, Vol. XLVII, June 1915) ; Freeman, E. A., (Race and Language) (in historical Essays, * 3d series, London 1879) ; Haymerle, Col., 'Italicse res) (Vienna 1897); Jackson, T. G., (Dalmatia the Quarnero, and Istria* (Oxford 1887) ; Parato, A., 'Storia Tempi moderni* (Vol. Ill, 'Storia d'ltalia,* New York 1909) ; Powell, Maj; E. A., (Italy at War, and the Allies in the West) (New York 1918) ; Speranza, G. de, (Italia Redenta* (in the Outlook, Vol. CXXII, New York, January- April 1916).*

P. W. Hausmann.

IRRIGATION, the watering of land by artificial means to increase crop production. This method of agriculture is widely practised in the western or arid portions of the United States, as well as in the drier parts of the Old World. It necessitates the application of many of the principles of hydraulic engineering (q.v.) and in addition requires for success a knowledge of agriculture and related economic matters. The western third of the United States, as well as the greater part of Mexico on the south and portions of Canada on the north, has an average annual rainfall of less than 20 inches, with the result that relatively few crops can be raised by dependence upon the natural supply of moisture. There is on the whole a far larger extent of dry land than can ever be provided with sufficient water for maturing crops. Thus land values, in a large way, depend upon the ability to obtain water ; many other industries besides agriculture can be developed only in localities where an arti¬ ficial water supply can be had. Large invest¬ ments have been made in irrigation works in the arid West with the result that there has been a steady increase in the area of land made useful. Beginning with a few hundred thou¬ sand acres in 1880, by 1890 the irrigated area had increased to approximately 4,000,000 acres, in 1900 to 8,000,000 acres, and in 1910 to 15,000,000, representing a total investment of approximately over $300,000,000. The hydraulic works for conserving and distributing the scanty water supply have been built to a point where all of the easily available sources of water have been utilized. Future progress must neces¬ sarily be relatively slow and

expensive because of dependence upon works of increasing magni¬ tude and cost per acre served. This cost, be¬ ginning originally with $15 or $20 per acre from small canals built by farmers, has increased to an average of about $50 per acre for supplies obtained from the larger and more difficult undertakings such as the Roosevelt Reservoir in Arizona and the Arrowrock Dam in Idaho.

The most notable advances in irrigation de¬ velopment were made possible by the passage of the Reclamation or Newlands Act, cham¬ pioned by Senator Newlands of Nevada and signed by President Roosevelt on 17 June 1902. (See Reclamation Laws). The necessity for this act arose from the condition that a great part of the land to be reclaimed belonged to the national government; also from the fact that investments in the large privately owned irrigation works requiring water storage had not proved profitable. Under the terms of this act the proceeds from the disposal of public lands are set aside in a fund to be used in sur¬ vey, examination, construction and maintenance

of irrigation works for the reclamation of arid and semi-arid lands. Under the terms of this act over $100,000,000 have been expended in construction of reservoirs, canals, hydro-electric plants and related works in the Western States. See United States Reclamation Service.

Water Supply.— Nearly 95 per cent of the lands irrigated in the United States obtain their water supply by gravity from surface streams. A relatively small, but valuable area, is watered from wells by means of pumps driven by steam, gasoline or hydro-electric power. Most of the streams of the arid region have their source in the high snowcapped or forested mountains from which they flow with rapid descent, passing usually through a series of upland valleys or parks and then cut their way through rocky defiles entering upon the lower valleys. In these the streams spread out and usually lose the greater part of their water in broad, sandy channels. The most effective development of the stream therefore is that in which the water is diverted near the upper edge of these lower valleys and carried out in channels so built as to conserve the supply which would otherwise be lost in the sandy channels.

Water is ordinarily diverted from the stream, not by lifting or pumping from the stream as sometimes inferred, but by taking advantage of the slopes of the country. For example, the streams on issuing from the mountains have a rapid fall of from 10 to 50 feet per mile or more. Water

will flow with moderate rapidity in a well-built canal having a fall of one foot per mile or even less. Assuming then that the stream enters the valley on a descending grade of 10 feet per mile and the canal is started out alongside the stream with a fall of one foot per mile, at the end of 10 miles the canal will be 90 feet above the river and must necessarily have swung back away from the river to be upon supporting ground. Thus it results that the canal departs rapidly from the river and, following the contour of the slopes of the foot¬ hills, is in position to discharge water toward the river over or through the lands which lie below the canal.

In order to facilitate the taking of water from the river into the canal, it is usual to provide a low overflow dam or weir which extends from the head gate of the canal across or diagonally into the channel of the stream. If the topographical conditions are favorable, this weir may be omitted, or in case of small irrigation canals where the owners are unable to provide a permanent dam, it is customary on the approach of the low-water season to build a temporary obstruction of stone and brush, turning the water toward the head gate. As the water continues to fall this is made more nearly impervious by adding straw, earth or sand bags. It is necessary to provide some form of head-gate to control the amount of water which enters the canal. Otherwise in time of flood the excess might overtop the canal banks and wash them away. Head-gates are also needed to regulate the quantity in accordance with the needs, of the irrigators. These usually consist of stout walls and frame built of timber, masonry or concrete with sliding gates of wood or steel. The water enters usually under the gates, the quantity being ■controlled by raising or lowering these. _

The canals leading from the head-gates usually pass through a rocky or rough country, involving large expense in construction before the more nearly level open land is reached. In this upper part of the course it is sometimes necessary to carry the water in tunnels through projecting cliffs or to provide suitable timber, metal or masonry flumes to take it across rough country. When once the canal is out upon the agricultural land it is usually excavated with broad, shallow sections keeping the water sur¬ face as high as possible consistent with safety, so that water may be diverted to the adjacent fields on the lower side of the canal. The fall or slope of the canal, taken in connection with the cross-section, is so proportioned as to give a velocity in ordinary earth of a little over two feet a second — not enough to erode the sides and bottom nor so stagnant as to deposit silt usually carried by mountain streams. Con¬ siderable skill and experience is required on the part of the designing engineer to lay out the canal system and its laterals or distributing branches so as to avoid erosion and sedi¬ mentation.

When the fall of the canal is so great that it is impracticable to allow the

water to flow freely down the slope, devices known as drops are introduced. These consist of timber, concrete or masonry foundations and walls within which the water can drop to a lower level without injury to the canal. Drops are usually built with a sharp overfall edge and a low dam or obstruction below the fall in order to maintain the pool or water cushion. Occasionally they are made in the form of an incline, with a pocket at the bottom to break the force of the falling water.

It is necessary in the construction of nearly every irrigation canal to take water across a depression at some point in its course. This is usually done by means of a wooden or metal lie flume or long box, usually rectangular or semi-circular in cross-section and supported above the ground by a frame or trestle of timber or metal. Such flumes are often used across rocky or sliding ground where it is impracticable to maintain a canal. This is particularly the case near the head, where the wrater, after being taken from the river, is often carried along a narrow, steep-walled canon. Here the foundation for a flume is prepared along the rocky cliffs, supports being devised to suit the inequalities of the ground. One type of flume is that having a semi¬ circular section and built of narrow planks or staves laid side by side and held in place by iron bands run around the flume, joined by nuts and threads by which the bands can be drawn up and the staves brought together. In crossing very deep depressions it is necessary to have a correspondingly high trestle in order to carry the flume across the grade. Such high trestles are expensive and liable to destruction from storms. In their place there have been built inverted siphons, made of wooden stave-pipe, or aqueducts of other form. The stave- pipes are similar in construction to the semi¬ circular flumes of narrow plank, beinp- carefully wrought to a given dimension and held in place by circular iron bands or hoops.

In some portions of the arid region when an abundant supply cannot be had from, surf ace streams or reservoirs, it may be practicable

to obtain some of the needed water by digging or boring wells, especially at points near stream-channels or along the foot-hills. Out on the broad valleys it may be necessary to go to a depth of from 100 to 300 feet or more before reaching moisture. Where the supply of water from wells is ample, various devices have been employed, such as windmills, gasoline and steam engines and electric power for bringing it to the surface. It is very important to continue the well borings through the water¬ bearing sands or gravel, so as to take advantage of the full thickness of the pervious

deposits. Perforated pipe is often driven into the layers of coarse gravel and adds greatly to the capacity of the well. Artesian or flowing wells may be found wherever water is held under pressure in pervious material overlaid by clay or tight shale. In such a well the water will rise to a height equal to the line of saturation of the gravel or pervious stratum in its outcrop in the surrounding country. Artesian conditions occur in nearly every State, but they do not extend over any considerable portion of the country, excepting on the Great Plains and in the broad valley of central California. Wherever they occur the water has especial value on account of the convenience incident to its rising above the surface. In some places, as the James River Valley of South Dakota, the pressure is 100 pounds or more to the square inch, throwing the water to a consider¬ able height and enabling the wells to be used as sources of power. The quantity of water to be had from deep wells is governed by the diameter of the well, the structure and thick¬ ness of the water-bearing rocks and the pres¬ sure sustained by the water. With relatively dense rocks a slight head of water will throw only a feeble stream, but from thick layers of open gravel or sand rock large volumes are delivered. It frequently occurs that a four- inch pipe will deliver all of the water which can reach this point, and increasing the diam¬ eter of the well will not alter the flow.

While the volume of well water used in irrigation is small compared to that obtained by gravity from flowing streams, yet, as re¬ gards value, it may be said that some of the most important sources of irrigation supply are utilized through pumping. The force of flowing water itself is frequently employed to bring water up to the level of the irrigable land, the bucket-wheel having been utilized from the earliest historical times up to the present. An important source of power for pumping water is the wind. Over the broad valleys and plains of the arid region the wind- movement is almost continuous for days and weeks. It is a comparatively simple and in¬ expensive operation to sink a well into the water and erect a windmill, attaching this to a suitable pump. A windmill once erected on the plains is operated day and night by the wind, bringing to the surface a small but con¬ tinuous supply of water. This small stream if. turned out on the soil would flow a short distance, then disappear into the thirsty ground, so that irrigation directly from a windmill is usually impracticable. To overcome this diffi¬ culty it has been found necessary to provide small storage reservoirs or tanks, built of earth, wood or metal, to hold the water until

it has accumulated to a volume sufficient to permit a stream of considerable size to be taken out for irrigation. Such a stream, flow¬ ing rapidly over the surface, will penetrate to a distance and cover an area much greater than is possible with the small flow delivered by an ordinary pump. One disadvantage con¬ nected with the use of windmills is that most of them are constructed to operate only in moderate winds. As the strength

of the wind increases, the wheel begins to revolve, increas¬ ing in efficiency until the velocity of the wind is about 8 or 10 miles an hour. At greater speed the mills are usually so constructed that the efficiency decreases rapidly ‘ as the wind becomes more powerful. When it approaches a gale, the mill stops completely.

Although there are in use large numbers of windmills in pumping water for irrigation of small tracts, the aggregate area is small com¬ pared with the extent of lands watered by more powerful devices, such as those made possible by the development of hydro-electric power. Within the past decade much attention has been given to this matter, particularly in con¬ nection with the use of power developed for municipal and manufacturing purposes and which is available for farm use at seasons or times of day when not needed for the principal industry. It is possible at such times to obtain power at low rates and to utilize it in pumping water for agricultural purposes.

Application of Water.— The methods of irrigation practised in various parts of the United States differ according to the climatic conditions and soil, and especially with the early habits or training of the irrigators. Water is applied to the irrigated field usually in one of three ways — by flooding, by furrows and by sub-irrigation.

Flooding — This is done by the check sys¬ tem or by wild flooding. By the latter process the irrigator turns the water from a lateral or distributing irrigation ditch over a level field and completely submerges it. Perfectly level fields are, however, comparatively rare, and the first step in primitive agriculture by irriga¬ tion has been to build a low ridge around two or three sides of a slightly sloping field, so that the water is held in ponds. These low banks are commonly known as levees or checks. In construction they are frequently laid out at right angles or more often following the con¬ tour of the ground dividing the land into a number of compartments. Water is turned from the irrigation ditch into the highest of these compartments, and when the ground is flooded the bank of the lower side is cut or a small sluice-way opened, and the water passes into the next field, and so on until each in turn is watered.

Furrows. — Irrigation in checks has grad¬ ually decreased in relative importance owing to the expense of leveling and leveeing the ground. With experience the irrigator has be¬ come able to apply water to crops which are cultivated in furrows without resorting to such expensive means. The furrows are plowed in such a direction that the water when turned into them from the lateral ditches will flow freely down them without washing away the soil. When the water has completely filled the furrows, and has reached the lowest points,.

the little streams are cut off and turned into another set of furrows. The methods of doing this differ. Sometimes the irrigator simply cuts the bank of the distributing ditch with a shovel and then closes the opening after sufficient water has escaped. A more sys¬ tematic. method is employed in California. Water is carried to the upper end of the fur¬ rows in a small box-flume with openings about one inch square in the side. These openings are closed by shutters and a number can be opened at once, permitting a certain quantity of water to escape into each furrow. The slope given the furrows determines to a certain extent the amount of water received by the soil. If the fall is very gentle, the water moves slowly and a large portion is absorbed while the furrow is being filled. If steep, the water quickly passes to a lower end and the ground does not absorb so much. When the entire field has been watered the furrows are usually plowed out and a thin layer of the top soil stirred to make an open, porous covering or mulch, preventing excessive evaporation and allowing the air to enter the ground. Without such cultivation a hard crust may be formed. The loosening of this crust breaks the capil¬ lary connection with the moisture beneath and thus lessens the loss of water. For irrigating small grain the fields, brought to a uniform surface, are thoroughly cultivated, and after the grain has been sown, small parallel lines are made similar to furrows, but smaller and nearer together. These tiny channels are made either by a suitable drag or by a roller upon which are projections so arranged as to make small grooves in the soil. These are made in the direction of the desired slope, so that the water can flow down the marks through the grain as it would in furrows through a cornfield. The rapidly growing grain shades the surface and prevents the for¬ mation of crust, rendering subsequent cultiva¬ tion unnecessary. In order to cause the water to spread from the lateral ditches into the fur¬ rows through the ground, use is made of a canvas dam or tappoon — a small sheet of metal of such shape as to fit across the ditch. This can be forced into the soft earth, making a small dam and causing the water to back up and overflow the field of grain.

Furrow-irrigation is usually employed in watering trees and vines. In some localities, however, basin or pool irrigation is practised. Where water is especially scanty and corre¬ spondingly high-priced, the supply is conducted in cement-lined ditches and by wooden flumes as near as possible to the trees and vines and is then turned out into the furrows ploughed around or near as possible to the trees and vines. The water issuing from small aper¬ tures in the side of the wooden box falls into the furrows and is immediately conducted to the vicinity of the trees. Care is usually taken that the water shall not actually touch the tree trunks and

that it reaches the extremities of the roots to encourage these to spread out¬ ward. After the water has traversed the fur¬ rows to the lower end of the orchard, the supply is cut off and the ground is tilled as soon as the surface dries sufficiently.

Sub-irrigation. — Attempts have been made to conduct the water beneath the surface im¬

mediately to the roots of the trees, thus pre¬ venting waste by evaporation from the sur¬ face of the ground. Few devices have been successful, owing to the fact that the roots of the trees rapidly seek and enter the openings from which the water issues, or, surrounding the pipe by a dense network, cut off the supply. Porous clay tiling has been laid through or¬ chards and also iron pipes perforated so as to furnish supply of water along their length. In orchards where sub-irrigation has been un¬ successful because of roots stopping-up minute openings beneath the surface, the system has been reconstructed and water has been brought to the surface at or near each tree by means of small hydrants. Vertical pipes are placed at short intervals leading to the level of the ground, and in these are small iron gates or shutters so arranged that the flow can be cut off in the buried pipe and forced to rise and overflow the surface of the ground near each tree. For annual or root crops sub¬ irrigation I as been successfully practised by the use of tile or of small metal pipes partly open at the bottom, allowing a small amount of water to escape. These are laid 12 inches or more beneath the surface and are connected with lines of tile or clay pipes leading from the reservoir or source of supply. As the crops are removed each year and the ground cultivated, the roots have no opportunity to stop up the pipes. The term sub-irrigation is occasionally applied to conditions occurring in nature where water percolates freely beneath the ground for a considerable distance suf¬ ficiently near the surface to supply the need of crops. Where the sub-soil transmits water freely, irrigation ditches may sub-irrigate large tracts of country without rendering them marshy. Thus farms may obtain an ample supply of water from ditches half a mile or more away without the necessity of distribut¬ ing small streams over the surface. In the San Joaquin Valley, Cal., vineyards in cer¬ tain localities are thus maintained in good condition, although water has not been visibly applied for many years.

Quantity of Water. — The amount of water required for raising crops varies according to the character of the soil. The plants themselves need a certain minimum supply, but a far larger quantity is required to saturate the surrounding soil to such a degree that the vitalizing proc¬ esses can continue. Agricultural investigators have found by direct measurements that from 300 to 500 pounds of water or even more are required for each pound of dry matter pro¬ duced. When the ground is first irrigated a large

quantity of water is sometimes required to saturate the subsoil. The water turned upon the surface and absorbed during the first year

*or two has frequently been equivalent to an * amount sufficient to cover the ground to a depth of 10 or 20 feet, and in many cases an amount equal to a depth of five feet or more per annum has been thus employed for several years. Grad¬ ually however the dry soil is filled. The pio¬ neers of irrigation usually apply too much water to their fields, often to their disad¬ vantage.*

The quantity of water used in irrigation is usually stated in one of two ways: (1) In terms of depth of water on the surface; (2) in

IRRIGATION

1 Irrigating a Prune Orchard, Santa Clara Valley, California

2 Irrigation in Pajaro Valley, California

IRRIGATION

1 Scene in Southern California, Showing the Furrow Method of Irrigation

2 Desert Land Reclaimed by Irrigation, Showing Recently Planted Orchards

IRRIGATION

Copyright, Underwood & Underwood, N. Y.

SHOSHONE RIVER DAM, 328 FEET HIGH. SHOSHONE CANYON, WYOMING One of the many big dams used in the irrigation and reclamation of former untillable land in the Northwest

Tv r

quantities of flowing water through the irri¬ gating season. In the humid regions the rain¬ fall is usually from three to four inches per month during the crop season. In the arid re¬ gion, where the sunlight is more continuous, and the evaporation greater, there should be for the ordinary crops at least enough water dur¬ ing the growing season to cover the ground from four to six inches in depth each month or from a third to half of an acre-foot. The second method of stating the- quantities neces¬ sary for irrigation is of convenience when con¬ sidering a stream upon which

there is no stor¬ age. It is estimated that one cubic foot per second, flowing through an irrigating season of 90 days, will irrigate 100 acres. One second- foot will cover an acre nearly two feet deep during 24 hours, and in 90 days it will cover 180 acres one foot deep, or 100 acres to a depth of 1.8 feet, or 21.6 inches. This is equivalent to a depth of water of a little over seven inches per month during the season of 90 days or about one and three-quarters acre feet. Suc¬ cessive years of deficient water supply notably in southern California have served to prove that, with careful cultivation, crops, orchards and vineyards can be maintained by using very small quantities of water. In some cases an amount not exceeding six inches in depth was applied during the year, this being conducted directly to the plants and the grounds kept carefully tilled and free from weeds. As esti¬ mated by various water companies in southern California, one miner's inch of water will irri¬ gate from 5 to 10 acres, the miner's inch equal¬ ing 12,960 gallons in 24 hours, or almost exactly 0.02 second-foot, this being the amount deliv¬ ered under a four-inch head, measured from the centre of the opening. Under this assump¬ tion one second-foot should irrigate from 250 to 500 acres. If it is assumed that one miner's inch is allowed for 10 acres, or one second-foot for 500 acres, this quantity of water flowing from May to October, inclusive, will cover the ground to a depth of a little over seven-tenths of a foot. With alfalfa flooding is practised, using upwards of half an acre foot to an acre; with small grains the water in less quantity is run in furrows; while with orchards the water is sometimes applied directly to each tree, or in furrows, four or five being plowed in paral¬ lel lines between two rows of trees.

Duty of Water. — The amount of land which can be irrigated with a given quantity of water, or the relation which these bear to each other, is commonly expressed by the term duty of water. The investigation of the duty of water is one of the most complicated problems of irrigation. There is such a difference in meth¬ ods of measurement, soils, crops, climatic con¬ dition, ways of application of water, and fre¬ quency of watering that the statements made by different persons are almost irreconcilable. In general, more water is used, or the duty is less, on the newer land than on that which has been cultivated by irrigation for some years. The rainfall also affects the quantity used, and as this is exceedingly irregular, the amount of water applied each year fluctuates. Seepage likewise complicates matters, for a field may often receive considerable water indirectly and require less by direct application. The duty of water is quoted at from 50 to 500 acres or more to the second-foot. For convenience the unit

of 100 acres to the second-foot has been consid¬ ered as indicating careful irrigating, although in the more southwestern portion of the arid region this would be considered low, and in the northern part high.

Since the value of water per second-foot varies largely with its duty, it will be recognized that this value is exceedingly difficult to esti¬ mate. However, it is necessary to arrive at certain averages in order to approximate the possible values of a river, or of a reservoir, in the future development of the country. It has been estimated that a perpetual water-right is worth from $25 to $50 per acre in a grain or grazing country, and as high as from' $100 to $500 per acre for fruit land, rising in southern California for the best citrus lands even to $1,000 or more per acre. Assuming an annual supply of water as being worth $50 per acre irrigated and a duty of 1 second-foot to 100 acres, this quantity would be worth $5,000 and a stream furnishing a steady supply of 500 second feet would have a value to the com¬ munity of $2,500,000. Considering stored water as having a value of $100 per acre of reclaimed land, producing fruit or other valuable crops and with a duty of two and one-half acre feet of stored water to each acre, then a storage reservoir holding 250,000 acre feet would jus¬ tify an expenditure of $10,000,000.

Alkali and Drainage. — The excessive use of water in irrigation above referred to is a source of injury not only through the loss of the valuable life giving fluid but because this when in excess produces swampy conditions, reducing or preventing crop growth and, in many localities, causing a development of alkali upon the surface. Taking the arid region as a whole from 15 to 20 per cent or more of the agricultural lands formerly irrigated have been abandoned because of waste of water, much of which was largely preventable. The alkali con¬ sists of mixtures of various kinds of earthy salts in different proportions, the most common of these consisting mainly of sulphate of lime or gypsum, known as white alkali or of sodium carbonate generally known as black alkali be¬ cause of the burned appearance of the soil where it has been brought to the surface. In addition there are usually found in the alkali the ordinary table salt, chloride of sodium, salts of magnesium and similar minerals. These have been set free by disintegration of rocks, but owing to the scanty rainfall have not been washed away or leached out of the soil as has happened in more humid regions.

The accumulation of alkali in irrigated lands presents one of the most serious problems en¬ countered in this method of agriculture. The injuries from the presence in excess of earthy salts are usually evident in the corrosive action on the tender bark, especially at the rootcrown. Experiments made in California show that apple trees are severely injured by the presence of 3,000 pounds of common salt per acre, this amount being disseminated through four feet in depth. On the other hand, the olive thrives where the soil contains as high as three tons of salt per acre, and the date palm flourishes on a soil so alkaline that hardly any other vege¬ table survives. Alfalfa, when young, is easily killed by alkali, but it has

been found to thrive in soil containing as much as 6,000 pounds of common salt, 3,000 nounds of carbonate, and

over 1,000 pounds of sulphate, per acre, distrib¬ uted through six feet of depth. Sugar-beets also have been known to grow well where a large amount of alkali is present. Grapes ap¬ parently are little affected by small amounts of alkali, while peaches and lemons are more sus¬ ceptible to injury because of its presence. The recently introduced saltbush is notable for its ability to grow in alkaline lands, and sorghum and alfalfa, especially when the latter has reached maturity, are almost equally vigorous.

The most effective way of removing alkali is by under-drainage through tile laid at a depth of from three to five feet, the drainage- water being allowed to escape into a stream, or into a well from which it can be removed by pumping. The troubles caused by alkali yield to careful treatment. The tiling of land for relief from surplus water and for washing out the alkali costs little more than drain-tiling as practised on eastern farms. In the govern¬ ment demonstrations at Salt Lake City, Utah, where the percentage of alkali was very high, the lines of tile are 150 feet apart. The water descending into the soil dissolves large quanti¬ ties of alkali near the surface and carries it off in solution. Land so tiled, even if badly alka¬ line, can be returned to profitable cultivation in time, if heavily irrigated, and within one year can be used for the production of some crops suited to the climate. Large areas of alkali land in the West may be reclaimed at a cost below the actual increase in the value of the land. Drainage-works are a necessary adjunct of irrigation. On bench-lands or gently sloping hillsides the water which escapes from one man's farm should be caught and used by his neighbor below, under good management none being left to stagnate, the surplus from the cul¬ tivated lands being often of great value in watering the lower meadows. There are many conditions where the question of disposing of the water is as important as that of obtaining it, particularly on the nearly level lands, where the subsoil has been filled to saturation by the water which has no opportunity to escape.

Cost of Water.— The first cost of water and the annual cost of maintenance form a very considerable item in the budget of the irrigator. As an equivalent for this expenditure he musj; expect to receive a return per acre for his crops greater than that obtainea by the so-called dry farmer. As a matter of fact, he can raise few, if any, crops without irrigation, but with it he should be able to obtain a yield far in excess of the ordinary production because of his ability to control the water supply and

to use it on a land upon which the sunshine is not cut off by frequent rain clouds. The cost of water is usually considered under two heads, first , that of the original investment in obtaining water by reservoirs, canals and distributing works, and second, the annual cost. The first cost ranges from $10 to $15 per acre, in case of the older and more easily built ditches, up to $50 or $75 per acre or even more where it has been nec¬ essary to provide expensive storage reservoirs or to overcome natural obstacles by building tunnels or masonry and concrete conduits. The average first cost of water in the United States is not far from $50 per acre. The com¬ mercial enterprises which have undertaken to build irrigation works have usually attempted to control the land reclaimed and to sell land

and water together at a price of $100 per acre or more including some improvements in the nature of removing the native vegetation, level¬ ing the soil and planting alfalfa. Without such control of the land, investments of this kind have rarely been profitable. In case of works built by the government the right to the use of water is sold at from $25 to $50 per acre or more according to local conditions, payable in 20 annual installments without interest. In' a relatively few cases the land owners do not own a perpetual right, but rent water annually, but this condition, unfavorable for permanent devel¬ opment, is being done away with.

All irrigation works must be operated and maintained at an annual expenditure, this being a notable item especially where it is necessary to clean the canals and banks of large quanti¬ ties of accumulated mud, weeds and so-called moss, and to make repairs of more or less tem¬ porary structures or to meet extraordinary conditions such as damages from floods or cloud-bursts. On the simpler individual or community systems, the cost may be 50 cents per acre per annum especially where the owners of the canals do the work them¬ selves and are willing to submit to many inconveniences and occasional crop losses. On the larger, better managed systems where the works are kept in good condition, opera¬ tion and maintenance may be from $1 per acre up to $1.50 or $2 per acre each year. In apportioning this charge it should be placed as nearly as possible on a metered basis, the payment for operation and maintenance being in proportion to the amount of water used in order to insure economy. As a rule too much water is put on the ground and it has been found that the least amount of water applied, consistent with fair plant growth, the larger and better the crop yields and less injury by seepage to the lands in the vicinity.

Crops. — In considering the character and value of the crops produced on irrigated land in the arid States and Territories, hav and for¬ age form the most important item, being over one-third of the whole. Cereals — principally wheat, oats, rye and barley — come far below the forage crops;

and next to these in order are vegetables, orchard fruits and small fruit. In California the orchard fruits surpass the forage crops in value. The large production of hay and forage under irrigation illustrates the fact that in these States irrigation is, to a large extent, an adjunct of stock-raising. The pro¬ duction of cereals under irrigation is relatively small. The total value of all the cereals pro¬ duced under irrigation in the United States is less than that of those produced in almost any one of the humid States of the East ; in New York, for example, though it is not con¬ sidered a farming State, the value of the cereals raised is more than double that of the entire amount produced under irrigation in the. whole country. In many localities the irri¬ gation of cereals and staple crops has been brought about by local conditions, such as dif¬ ficulty of transportation and consequent heavy cost of importation. The irrigated cereals in such localities are raised almost wholly for local consumption, and do not enter the markets of the world.

Users' Rights. — The first settlers frequently laid claim to the whole flow of the stream.

Soon after the first irrigation ditch was built others were constructed a few miles above or below. As long as the stream is of sufficient volume to fill each of the ditches, no difficul¬ ties from this arise; but sooner or later the increasing size and number of ditches and canals result in diminishing the flow in the river to such an extent that it becomes almost dry and water does not reach the ditches farth¬ est downstream.

The result has been that in many parts of the arid region owing to scarcity of water, lawlessness has prevailed, and every man has endeavored to obtain for his own crops as much as possible of the scanty supply. Usually the irrigators elected a watermaster to appor¬ tion to each claimant a certain amount of water, or assign certain days or hours upon which water can be used. Often the quantity of the water has been settled only after vexa¬ tious lawsuits or neighborhood quarrels. In most parts of the arid region, the States have undertaken the regulation of disputes, and have created special boards or tribunals to consider the matter and to apportion the water. See Water Laws.

Economic Consideration. — Throughout the arid regions of the world irrigation is essential to agriculture and developments may be ex¬ pected to proceed to the limits of the available water supply. In the more humid regions where occasional droughts reduce the crop value, it is being

practised as an insurance. The developments have been slow, however, because of the fact that during wet years the tendency is to neglect the maintenance of the works and when drought conditions develop, the time has passed when water can be applied to the best advantage. The extent to which irrigation may be developed in the United States is being investigated by tl e United States Geological Survey through its systematic measurements of streams and studies of under¬ ground water. Not all of these sources can be utilized because of the great expense involved in building reservoirs, canals and other works, but with the settlement of the country and with greater skill and experience acquired in raising and marketing the crops there is a correspond¬ ing advance in land values and in the ability to pay for expensive undertakings. All of the easy or cheap schemes have been entered upon beginning with those which have cost only a few dollars per acre for the water and later increasing to expenditures of upwards of $50 or more per acre. These more expensive undertakings have not proved financially profit¬ able to the investors because of the fact that the values created by the investment in canals and reservoirs have been widely diffused and have not been recoverable by the men who furnished the money. Because of this fact future development in irrigation must rest largely upon obtaining public funds or upon utilizing the credit of the communities which are benefited by the works — the direct losses of interest or profit on the investment being more than balanced by the indirect gains.

Frederick H. Newell,

Professor of Civil Engineering, University of Illinois.

IRRIGATION BILL, or RECLAMA¬ TION ACT, a Federal measure, approved 17 June 1902, for the reclamation by irrigation of

arid and semi-arid lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Okla¬ homa, Oregon, South Dakota, Utah, Washing¬ ton and Wyoming. The expenditures were to be met from the receipts from the sale and disposal of public lands in these States. Since the passage of the original act parts of it have been amended and repealed. Under this law there were expended up to 1916 some $100,000,- 000, resulting in the operation of 25 irrigation projects, capable of delivering water to more than 1,500,000 acres of which about 1,000,000 acres actually used irrigation. (See Irrigation). Consult James, G. W., declaiming: the Arid West> (New York 1917) ; Teele, R. P., ir¬ rigation in the United States > (New York 1915) ; United States, Department of the In¬ terior, General Land Office, 'Laws and Regu¬ lations Relating to the Reclamation of Arid Lands by the United States> (Circular No. 102, Washington 1912).

IRRITABILITY, in plants, term desig¬ nating phenomena, very interesting and curious, but very little understood. Such are the phenomena of what is usually called the sleep of plants; the motion of the spores of many cryptogamic plants by means of cilia; the mo¬ tions of Oscillatoriae, Diatomaceae and others of the lowest Algae; the successive approaches of the stamens of Parnassia palustris to the pistil ; the movements of the leaves of the Mov¬ ing Plant of India; and those caused by agita¬ tion or by the touch of a foreign body in the leaves of sensitive plants of the Dionoea or Venus's Fly-trap, etc., in the stamens of the Barberry, Shizanthus, etc., and in the stigmas of Mimulus, etc. Many explanations have been proposed of these phenomena, but none satisfactory. Of the existence of anything analogous to the nervous system of animals, which has been imagined, there is not the slightest proof.

IRTISH, ir'tish, or IRTYSH, a river of Asia, which rises in China, in the Altai Moun¬ tains, and after expanding into Lake Zaisan, flows through the Russian territory of Semi- palatinsk, then through part of West Siberia, passes the town of Tobolsk, and finally, after a course of about 2,000 miles, joins the Ob near Samarova. It is navigable for a great part of its length and is ice-free for about one-half of the year. Its principal affluents are, on the right: Bukhtarma, Om and Tara; on the left: Ishim, Konda and Tobol. The principal ports are Semipalabinsk, Omsk, Tara and Tobolsk.

IRTYSH. See Irtish.

IRUN, Spain, town on the frontier, in the province of Guipuzcoa, on the Bidassoa, and on the Spanish Northern Railway, about five miles inland from the Bay of Biscay. It is a port of entry and has the largest custom house in Spain for overland trade. It is served by several small mining railways and tramways which join it with the mines of Guipuzcoa and Navarre. It has also several medicinal springs and is a great clearing point for travelers. Its indus¬ trial establishments are numerous and thriving; they include iron foundries, tanneries, paper mills and potteries, brickyards, etc. Its most noteworthy buildings are the town hall and a parish church in the Renaissance style. Pop.

10,629.

IRUS, nickname of the beggar of Ithaca who served the suitors of Penelope as a mes¬ senger. His real name was Arnaeus. He was slain by Odysseus. Immortalized in the 18th book of Homer's (Odyssey,' he becomes the

typical beggar of later literature.

IRVINE, er'vin, Frank, American lawyer: b. Sharon, Pa., 15 Sept. 1858. After studying at Cornell University and at the National Uni¬ versity at Washington he was admitted to the bar in 1883. For about one year he was assistant United States attorney. In 1884 he removed to Omaha, Neb., where he practised law and was appointed judge of the 4th dis¬ trict of Nebraska (1891-93) and Supreme Court commissioner (1893-99). In 1901 he be¬ came professor of pleading and practice in the Law College at Cornell, and dean of that faculty (1907-14). Since 1914 he has been a member of the Public Service Commission of the second district of New York.

IRVINE, William, American Revolutionary general: b. near Enniskillen, Ireland, 3 Nov. 1741; d. Philadelphia, 29 July 1804. Having graduated at Dublin University, he studied medicine and surgery, and was appointed sur¬ geon on boarU a ship of war, serving during a part of the war of (1756—63) between Great Britain and France. On the declaration of peace he emigrated to America, and in 1764 settled in Carlisle, Pa. At the opening of the Revolution he took the part of the colonies, was a member of the provincial convention assem¬ bled in Philadelphia, 15 July 1774, until he was appointed by Congress, 9 Jan. 1776, colonel of the 6th battalion of the Pennsylvania line. He was sent with his command to Canada and in June 1776, was captured as the result of the disastrous engagement near Three Rivers. Ex¬ changed 21 April 1778, he was promoted on 12 May 1779 to the rank of brigadier-general, and assigned to the command of the second brigade of the Pennsylvania line. In the autumn of 1781 he was ordered to Fort Pitt, to take com¬ mand of the troops on the western frontier, and continued to fulfil the duties of this post, until after the war had closed. He was early in 1785 appointed by the State agent under an ((act for directing the mode of distributing the donation lands promised to the troops of the commonwealth.® About this time he suggested to Pennsylvania the purchase from the United States of the tract of land known as ((the tri¬ angle,® thus giving to the State an outlet upon Lake Erie. He was a member of Congress under the confederation (1787-88) and of the Third Federal Congress (1793-95). In 1794 he was assigned to the command of the Pennsyl¬ vania troops for the purpose of quelling the ((whisky insurrection,® and in all the most im¬ portant movements in connection with this sub¬ ject took an active part. In 1797 he was one of the 13 presidential electors from Pennsylvania who elected John Adams President of the United States. In 1801, after Thomas Jeffer¬ son's election to the presidency, he was ap¬ pointed intendant of military stores, having charge of arsenals, ordnance, army supplies and Indian affairs. He was president of the State society of the Cincinnati at the time of his death. Consult Butterfield, C. W., ed., (Wash- ington-Irvine Correspondence)

(Madison 1881) ; Montgomery, T. L., ed., Pennsylvania Ar- chives> (Series V, Vol. II, Harrisburg 1906).

IRVINE, ervin, Scotland, royal, municipal, police burgh and seaport of Ayrshire, on the Irvine estuary, and on the Caledonian Railway, 30 miles southwest of Glasgow. Its public buildings include the town hall, academy, and fever hospital. It has also two old Norman castles. The chief industries are iron founding, shipbuilding, manufaciure of machinery, soap, chemicals, bookcloth, etc. Coal, iron, and chemical products are exported. The harbor had become silted up by 1875, but has since been dredged and new wharves have been installed, and the volume of its sea trade has greatly increased. The water-supply system is the property of the burgh. Pop. 10,180.

IRVING, er'ving, Edward, Scottish

preacher, founder of the religious sect known as Irvingites: b. Annan, Dumfriesshire, 4 Aug. 1792; d. Glasgow, December 1834. He was graduated at 'the University of Edinburgh in 1809, taught school for some eight years, mean¬ while becoming, 1815, a licentiate of the Church of Scotland and, in 1819, Dr. Chalmer's assist¬ ant in Saint John's parish, Glasgow. During these years he formed an intimate friendship with Carlyle whom he introduced to his future wife, Jane Welsh. Irving himself had been in love with the latter, but, having become en¬ gaged some years before to a Miss Martin, finally married this lady. In 1822 he became minister of the Caledonian Asylum chapel in Cross Street, Hatton Garden, London. Here he soon attracted very large congregations by the force and eloquence of his discourses, and the singularity of his appearance and gesticula¬ tion. The greatest orators and statesmen of the day crowded with the wealthy and fashion¬ able to hear him. The appearance of the preacher — tall, athletic, and sallow — display¬ ing a profusion of jet-black glossy hair reach¬ ing to his shoulders, with a singuar obliquity in one of his eyes, and a stern calm solemnity of aspect, enhanced the interest and excitement produced by his discourses. His phraseology was one of the peculiarities which gave him eclat with the public, for he expressed his ideas in the language of Milton, Hooker, and Jeremy Taylor. At London he began to publish books in which he broached novel theological views.

(Sermons, Lectures, and Occasional Discourses, ' in which his theological divergences were first distinctly enunciated, were published in 1828. In the beginning of 1832 his inferences, espe¬ cially in connection with the so-called (

IRVING

(1864-65). (See Catholic Apostolic Church). Consult Anon., (E. Irving and the Catholic Apostolic Church) (London 1856) ; Oliphant, Mrs., (Life of E. Irving) (2 vols., London 1862) ; Wilks, W., (E. Irving' (London 1854).

IRVING, Sir Henry (originally John Henry Brodribb), English actor: b. near Glas¬ tonbury, 6 Feb. 1838; d. Bradford, 13 Oct. 1905. He was a clerk in London, but adopted the theatrical profession, his first appearance being at Sunderland in 1856. He appeared first in ••London at the Princess' Theatre, in 1859; later went to Manchester and other provincial towns where he remained for five or six years, but returned to London in 1866, where his first marked success was as Digby Grant in Albery's 'Two Roses) (in 1870), which was followed by his powerful impersonation of Mathias in (The Bells.' This began, in 1871, his long associa¬ tion with the Lyceum Theatre. His next note¬ worthy parts were Charles I, Eugene Aram, and Richelieu, in the plays so named. In 1874, at the Lyceum Theatre, 'he sustained the part of Hamlet so successfully as to raise himself to the first place among English actors. His chief Shakespearian parts were Macbeth, Othello, Shylock, and Richard III. In 1878 he leased the Lyceum Theatre for himself, and later put on the stage in excellent style 'Othello,' 'The Merchant of Venice, ' 'Much Ado About Nothing,' (Romeo and Juliet,' 'Twelfth Night, ' 'Faust,' 'Macbeth,' (Henry VIII,' 'King Lear,' etc., playing in them the principal character with Miss Ellen Terry as his leading lady. His appearances in the prov¬ inces were equally successful with those in London, and he met with like favor in his repeated visits to the United States. Of his last great roles may be cited Becket in Tenny¬ son's play of that name (1893), King Arthur in a play of that name (1895), Napoleon in 'Madame Sans-Gene' (1897), the title role in his son's play of (Peter the Great' (1898), and Robespierre in a play of that name (1899), especially written for him by M. Victorien Sardou, and the title role in 'Dante' by the same author (1903). He was knighted in 1895, being the first actor to receive this honor, and the universities of Dublin, Glasgow and Cam¬ bridge conferred on him the honorary degree of LL.D. Although critics by no means agreed as to the merits of his acting, it must be ad¬ mitted that he excelled in originality, versatility and intellectuality of his interpretations prac¬ tically every actor of his times. His manner¬ isms of expression and deportment frequently lowered the value of his work, the sincerity of which, however, could not be decreased even by these handicaps. As a manager, too, he was a leading figure, both in respect to his elaborate productions and to the quality of his supporting companies. He was buried in Westminster Abbey. Some of his public addresses have been published, notably 'The Stage) (London 1878) ; 'The Stage as It Is) (London 1881) ; 'English Actors) (Oxford 1886) ; 'The Drama) (London 1893). Consult Archer, W., 'Henry Irving, Actor and Manager) (London

1883) ; Brere- ton, A., 'The Lyceum and Henry Irving) (Lon¬ don 1903) ; Id., (Life of Henry Irving' (2 vols., London 1908)- Child, H. H., 'Sir Henry Irving' (in dictionary of National Biography,' 2d Suoplement. Vol. tl. London 1912) ; Drew,

irOL. 15 — 26

E., (Henry Irving on and off the Stage' (Lon¬ don 1889) ; Fitzgerald, P., (Sir Henry Irving' (London 1906) ; Forshaw, C. F., ed.. 'Tributes to the Memory of the late Sir Henry Irving' (London 1905) ; Hiatt, C., 'Henry Irving' (London 1899) ; Marshall, F., 'Henry Irving, Actor and Manager' (London 1883); Menpes, M., 'Henry Irving' (London 1906) : St. John, C., 'Henry Irving' (London 1906) ; Shaw, G. B., 'Dramatic Opinions and Essays' (London

1907) ; Stoker, Bram, 'Personal Reminiscences of Henry Irving (2 vols., London 1906) ; Terry, Ellen, 'The Story of My Life' (London

1908) ; Winter, W., 'Henry Irving' (New York

1855).

IRVING, Henry Brodribb, English actor- manager, son of Sir Henry Irving: b London, 5 Aug. 1870. He was educated at Marlborough College and at New College, Oxford. He ap¬ peared first on the stage at the Garrick Theatre in 'School,' 1891 ; was called to the bar in 1894, but within a short time gave up the law for the stage. In 1895 he played at the Comedy with Comyns Carr and later in the same year toured the provinces with Ben Greet. The following year he appeared at the Saint James's. Since 1900 he has become one of the most successful London managers. In 1908 he became the lessee of the Shaftesbury Theatre and in 1909-11 was lessee of the Queen's. He toured America in 1906, Australia in 1911-12 and South Africa in 1912-13. Since the latter year he has been lessee of the Savoy Theatre. He has published 'The Life of Judge Jeffreys' (1898); 'French Criminals of the 19th Century' (1901); 'Oc¬ casional Papers' (1906); 'The Trial of Franz Muller' (1911) ; 'The Trial of Mrs. Maybrick'

(1913).

IRVING, Isabel, American actress : b. Bridgeport, Conn., 28 Feb. 1871. In January 1887 she made her debut as Gwendolyn Haw¬ kins in 'The Schoolmistress' with the Rosina Vokes Company. From 1888 to 1894 she was a member of Augustin Daly's company. Subse¬ quently she was leading woman at the Lyceum Theatre, New York, and in John Drew's com¬ pany for several years. Miss Irving has played leading roles in England also; created the role of Lady Jocelyn Leigh in 'To Have and to Hold.' She starred under the management of James K. Hackett in 'The Crisis.' She played Louise in the all-star cast of 'The Two Or¬ phans,' in 1905, under the management of Lieb- ler and Company. She was engaged by Fitch to play in 'The Toast of the Town,' in 1906; in 'Susan in Search of a Husband,' and 'The Girl who Has Everything,' in 1907. In the follow¬ ing year Miss Irving created the title role in 'Mater' at the Savoy Theatre, New York. She played the leading woman's role in 'The Flag Lieutenant' ; and leading role in 'The Commanding Officer' (1909). She also played the comedy role in 'Smith' with John Drew at the Empire Theatre, New York, and on tour in 1909-11. In 1913 she had the title role in the 'Mollusc,' with Kyrle Bellew, and later in the same year was leading woman with Leo Dietrichstein in 'The Concert' and 'The Tempermental Journey.' In 1914-15 she played the comedy role in 'Under Cover' in Chicago and San Francisco and in 1916-17 co-starred with Tom Wise and Constance Collier in 'The Merry Wives of Windsor.' In the latter year

she played (Mistress Page) at the Park The¬ atre, New York. Consult Strang, L. C, fam¬ ous Actresses of the Day in America) (New York 1900).

IRVING, John Duer, American geologist: b. Madison, Wis., 18 Aug. 1874; d. 27 July 1918. Graduated at Columbia University in 1896. He was geologic aid in 1899-1900 ; assistant geolo¬ gist, in 1900-06; and geologist in 1906-07 of the United States Geological Survey. At the Uni¬ versity of Wyoming in 1902-03, while on a special leave of absence he was acting professor of mining and geology and' in 1906 was pro¬ fessor of geology at Lehigh University. From 1907-18 he was professor of economic geology at the Sheffield Scientific School of Yale. In 1907 he was employed as geologist by an Alaska syndicate. He was editor of Economic Geology and author of Economic Resources of the Northern Black Hills. >

IRVING, Lawrence (Sydney Brodribb), English actor, son of Sir Henry

Irving: b. 1872; d. 31 May 1914. He received his educa¬ tion in Marlborough College, the College Rollin, Paris. He was intended for the diplomatic ser¬ vice and for three years studied in Russia. His theatrical debut took place at Dundee in 1893 in a Shakespearean role. From that time to 1900 he starred in provincial companies appearing in such plays as CrilbyP (A Bunch of Violets, and (Under the Red Robe.* From 1900 to 1904 he was a member of his father's company. Soon after he appeared as Crawshay in ˆRaffles.* In 1908-09 he visited America where he appeared in his own plays. In 1910 he pro¬ duced (The Unwritten Law) at the London Gar¬ rick. In 1912 he again appeared in a Shakes¬ pearean role — I ago in Tree's company at His Majesty's Theatre, Montreal. He lost h's life on the Empress of Ireland, when that vessel was rammed and sunk by a collier in the Saint Law¬ rence. Irving wrote (Peter the Great,* (Bonnie Dundee,) (Richard Lovelace. 5 (The Typhoon,* and a translation of Gorky (The Lower Depths **

(1912).

*IRVING, Washington, American author: b. New York, 3 April 1783; d. Tarrytown, N. Y., 28 Nov. 1859. His father, William Irving, mer¬ chant, came to New York from the Orkneys in 1763, having married Sarah Sanders, daughter of Cornish parents, two years before. Wash¬ ington was the youngest of their 11 children. His school training was far from thorough, and was not directed toward academic culture — though two of his brothers had beep sent to Columbia College — a decision of his father that he much regretted in maturer years. He made up for his lack of interest in school sub¬ jects by enthusiastic reading in English authors, particularly Chaucer and Spenser. At 16 he entered a law office, and in 1802 began author¬ ship by contributing humorous sketches, over the name of "Jonathan Oldstyle,** to The Morn¬ ing Chronicle, a daily edited by his brother Peter. Developing symptoms of consumption, he sailed in 1804 for France, and spent two years in travel, on the continent and in Eng¬ land, which restored his health. On return he was admitted to the bar, but instead of prac¬ tice began, in 1807, with his brother William and James K. Paulding, the issue of (Salma¬ gundiˆ the success of which determined his career, and the immediate character of his*

writing. At the close of the next year he set about reshaping the burlesque history of New York, which he had begun, with Peter Irving, some time before on a different plan. While in this work he met with the great affliction of his life, the loss of his betrothed, Matilda Hoff¬ man, daughter of a prominent lawyer of the city, in whose office he had finished his legal studies. The completion of the book, (Dietrich Knickerbocker's History of New York, pub¬ lished in 1809, was the only solace that he per¬ mitted himself in the first months of seclusion and grief. In 1810 he wrote a short*

life of the poet Campbell, and was received into partner¬ ship by his brothers Peter and Ebenezer, who were founding an importing house, and wished to provide Washington the means, without con¬ tribution of time or labor to the business, of preparing himself more fully for his chosen work. In 1813 and 1814 he edited the Analectic Magazine, published in Philadelphia, and con¬ tributed biographical articles upon some of the naval commanders in the war then in progress with Great Britain. After the burning of our national capital in 1814 he offered his services to his native State, and was made aide-de-camp to Governor Tompkins, with the rank of colonel. At the close of the war he sailed for England, and was received with distinction by the American artists Allston and Leslie, and by Scott, Campbell, Moore and other literary men. In 1818 the firm of P. and E. Irving and Co. failed, and Washington's pleasant rambles in England and Scotland came to an end. He de¬ clined a post in the navy board, at home, and set himself at work in London with his pen. Early in the next year he sent over for publica¬ tion in New York and Philadelphia the first number of the (Sketch Book, containing (The Voyage,* (Roscoe,* (The Wife* and*

the first volume of (Crayon Miscellanies, in 1835. The second volume, Abbotsford and Newstead Abbey,* and the third, 'Legends of the Conquest of Spaing followed in a few months. He now bought the little Van Tassel farm at Tarry town, and began to enlarge its Dutch cottage and improve the grounds. To this home, called "Sunnyside,** he soon removed from the city, and eventually brought to it the brothers who had aided him in earlier years. In 1836 he finished 'Astoria,* with the help of his nephew, Pierre M. Irving, from materials furnished by John Jacob Astor. The next year he published (The Adventures of Captain Bon¬ neville, * properly a continuation of the preced¬ ing. He then began a history of the conquest of Mexico, but on learning that W. H. Prescott was at work on the same subject resigned the task to him. In 1839 he engaged to write for the Knickerbocker Magazine , and furnished monthly articles for about two years. In 1842 he was appointed Minister to Spain, and for the next four years wrote little. On return he arranged with G. P. Putnam for a complete edition of his works, in 15 volumes, to which he added (1849) the (Life of Goldsmith,* and (1850) (Mahomet and his Successors.) The way was now open for the (Life of Washing¬ ton, * which had long been contemplated. In 1855 appeared 'Wolfert's Roost,* mainly a re¬ print of the Knickerbocker papers, and two volumes of the (Life. } The work told*

on his strength, and the fifth and last volume, finished in March 1859, left him a broken man. His death was from heart disease, in his 77th year. He was buried by the side of his mother, whose tastes he had inherited and whose sympathy and nurture had made him what he was. His authorship was the outcome of his personal character, and was little modified by the litera¬ tures of the world. With all his graces of ex¬ pression he lacked the gift of deep insight, and failed to achieve much vigor of style. The best biography is still the 'Life and Letters> by his nephew, Pierre M. Irving (1863). (See Sketch Book, The; Knickerbocker History of New York). Consult also Warner, (Washington Irving) (1881) ; Laun, ' Washington Irving: Ein Lebens- und Charakterbild (1870) ; Richard¬ son, American Literature) (1887-88) ; Wen¬ dell, A Literary History of America* (1900) ; Boynton, H. W., 'Washington Irving> (New York 1911).*

L. A. Sherman, The University of Nebraska.

IRVINGITES. See Catholic Apostolic Church.

IRVINGTON, N. J., a town in Essex County, adjoining Newark on the southwest. It is a pleasant residential subufb of that city, and has a number of manufactories, smelting- works and establishments for. making wall¬ paper, pocket-book frames, linoleum, tools, brushes, rules, etc. The town was incorporated in 1898, although its settlement as Camptown dates back almost to 1660. Its governmental affairs are in the hands of a commission. Pop.

(1920) 25,480.

IRVINGTON, N. Y., village in Westchester County, on the Hudson River, and the New York Central and Hudson River Railroad, 23 miles north of New York and a short distance south of Tarrytown; named in honor of Wash¬

ington Irving. It is mainly a residential village of recent growth and is noted for its beautiful dwellings and grounds, with fine situation on the river-bank. These are largely the homes of New York business men and their families. The Guiteau Library and the town hall are among its most noteworthy buildings. The vil¬ lage is a place of great interest as being the location of "Sunnyside,® for many years the home of Washington Irving. The house, half a mile north of the railroad station, "is a many- gabled, vine-clad cottage, covered with stucco, and shadowed by grand trees.® It has been re¬ built and enlarged. Pop. (1920) 2,701.

IRWIN, May, American actress : b. Whitby, Ont., Canada, 1862. She made her debut at the Adelphi Theatre, Buffalo, 26 May 1876. Coming to

New York the following year she became a member of Tony Pastor's company, remaining until 1883. For the next four years she was a member of Augustin Daly's Com¬ pany. Subsequently she appeared in the 'Junior Party, 'His Wedding Day,* 'Poets and Puppets,* 'A Straight Tip,* etc. Later she starred in 'The Widow Jones,* 'The Sweil Miss Fitzwell,* 'Courted into Court,* 'Kate Kip-Buyer,* 'Sister Mary,* 'Belle of Bridge¬ portˆ 'Mrs. Black is Back,* 'Mrs. Wilson- — Andrews,* 'Mrs. Peckham's Carouse,* 'Getting a Polish,* 'She Knows Better Now,* 'A Widow by Proxy,) 'No. 33 Washington Squared Consult Hapgood, N., 'The Stage in America* (New York 1911) and Strang, L. C, 'Famous Actresses of the Day in America) (ib.*

1900).

IRWIN, Wallace, American journalist and author: b. Oneida, N. Y., 15 March 1876. In 1900 he was special writer on the San Francisco Examiner and in the following year edited the News Letter of that city. In 1903 he wrote burlesque sketches for the Republic Theatre ; for the next two years he wrote topical verse in the New York Globe, and in 1906-07 was on the staff of Collier's Weekly. He has published 'The Love Sonnets of a Hoodlum (1902) ; 'The Rubaiyat of Omar Khayyam, Jr.* (1902) ; 'Fairy Tales Up to Now* (1904) ; 'Nautical Lays of a Landsman* (1904) ; At the Sign of the Dollar) (1904) ; 'Chinatown Ballads) (1905) ; 'Random Rhymes and Odd Numbers* (1906) ; 'Letters of a Japanese Schoolboy > (1909) ; 'Mr. Togo, Maid of All Work) (1913) ; 'Pilgrims into Folly* (1917). In 1917 Mr. Irwin was appointed a member of the Com¬ mittee on Public Information.*

IRWIN, William Henry (Will Irwin), American author and journalist: b. Oneida, N. Y., 14 Sept. 1873. In 1889 he was graduated at Stanford University. Entering journalism in San Francisco, he was assistant editor of the Wave in 1899 and editor in 1900. In 1901 he joined the staff of the Chronicle as reporter and was its Sunday editor in 1902-04. From 1904 to 1906 he was a reporter on the New York Sun, and in 1906-07 managing editor of McClure's Magazine. In 1907-08 he was en¬ gaged as a writer for Collier ' s, since when he has devoted himself to general magazine writ¬ ing. He served as war correspondent with Ger¬ man, Belgian and British armies for various American publications and for the London Daily Mail in 1914-15. He also was member of the executive committee of the Belgian Re-

lief Commission in 1914-15, and war corre¬ spondent of the Saturday Evening Post in 1916- 18. In 1918 he was made chief of the foreign department of the Committee on Public In¬ formation. His publications include Stanford Stories, with C. K. Field (1900) ; (The Reign of Queen Isyl,* with Gelett Burgess (1903); (The Pickaroons,* with G. Burgess (1903) ; (The Hamedryads* (1904); 'The City that Was) (1907) ; 'Old Chinatown) (1908) ; (The Confessions of a Con Man* (1909); (Warrior the Untamed) (1909) ; (The House of Mystery) (1910) ; (The Readjustment) (1910) ; 'The Red Button) (1912) ; c Where the Heart Is) (1912) ;*

(Beating Back,) with Al. Jennings (1914) ; (Men, Women and War) (1915) ; 'The Latin at War) (1915) ; (A Reportor at Armageddon) (1918) ; also pamphlets, (The Babes of Bel¬ gium) (1915), and (The Splendid Story of Ypres) (1915).

ISAAC, Hebrew patriarch, son of Abraham and Sarah. The name in its Hebrew original denotes Slaughter,)) because when the promise of a child was made to him the year previ¬ ously, Abraham had laughed. He was 100 years old at the child's birth, and Sarah, who had been childless, was 90, and had also laughed in her incredulity, as standing at the tent's door, she had heard the angel repeat the promise (Gen. xvii 17). His initiation into the cove¬ nant when eight days old was one of the many incidents in Isaac's life which the Bible men¬ tions and which gave him a national import¬ ance to which his nomadic pastoral life and quiet character would not perhaps entitle him. The dismissal of Hagar's son, whom Sarah had seen mocking Isaac, the offering of Isaac as a sacrifice (Gen. xxii) which was providentially averted, being only a test of faith and obedi¬ ence ; his marriage to Rebekah, the Aramean in his 40th year, the birth of the twins Esau and Jacob after 20 years, their opposite traits, later to develop into strife, Isaac's dream and God's promise to him of future enlargement, — are all portrayed at length in Scripture. Then comes the story of his old age, which was less happy than might have been expected from one of his temperament and qualities. Blindness added to the weakness of years, while the open enmity between his two sons increased his anxieties. How in anticipation of his own death he bade Esau bring him some venison to receive his blessing, how Jacob urged by Rebekah who had heard Isaac's request, appeared as Esau be¬ fore the blind father to receive the blessing promised to his brother, how Esau learned of Jacob's action and how Jacob had to flee from Esau's wrath — are episodes that have become "twice told tales® and preserve after thousands of years their dramatic interest, while for the pulpit of all creeds they retain their power. At the age of 180 Isaac died at Hebron, cheered by the return of Jacob and his family from Mesopotamia, and was buried by both of his sons in the cave of Machpelah beside Abraham and Sarah.

The early rabbis in the Midrash make fre¬ quent reference to Isaac. His name is made a compound of two Hebrew words denoting ((Law was issued.) In the Hebrew letters of his name allusion is found to the ten words (deca¬ logue), and the respective ages of Sarah and Abraham at his birth. To silence evil tongues*

on the occasion of Isaac's weaning, Abraham's features were imprinted on his face, so that the likeness between father and son was very great. The sacrifice of Isaac furnishes a fertile field for Midrashic reflection and becomes a special feature of the Jewish liturgy. Isaac is stated to have instituted the traditional afternoon prayer and to have had extraordinary attributes. In Mohammenden legend, Ishmael appears sub¬ stituted for Isaac as offering and other points of similarity with the rabbinical Midrash are to be observed.

ISAAC I, Comnenus, Byzantine emperor : d. 1061. He was the son of Manuel Commenus, an eminent general under Basil II, emperor of Constantinople, and was the first of his family to assume the purple. He had distinguished himself as a soldier and commander in the wars against the Arabs, in Asia Minor, and had mar¬ ried a captive Bulgarian princess. In 1057 he succeeded to the throne upon the deposition of the aged and incompetent Michael VI. He abdicated in 1059 on account of sickness and spent the remainder of his life in the monastery at Studion where he had received his educa¬ tion as a youth. During his short reign he fought successfully against the Hungarians and Petchenegs who were threatening the northern borders of the empire. He also improved the financial conditions of the country, though his measures in this direction were very unpopu¬ lar. He appointed a relative, Constantine Du- cas, as his successor. His interests were not purely military or political; he left a manu¬ script, still in existence, on Homer, entitled (Scholia.) He also wrote two other works on the same subject 'Characteristics) and 'On the Works of Homer.) Consult Gibbon, E., 'History of the Decline and Fall of the Ro¬ man Empire) (Vol. V, London 1898) ; Finlay, G., 'History of the Byzantine and Greek Em¬ pires, 1057-1453) (Edinburgh 1854) ; Id., 'His¬ tory of Greece (Vols. II, III, IV, Oxford*

1877).

ISAAC II, Angelus, Byzantine emperor: d. 1204. He became sovereign of the East as successor of Andronicus I in 1185, and reigned 10 years. During his rule the Bulgarians and Vlachs revolted a number of times. After promising free passage through his empire to the crusaders under Frederic I Barbarossa (q.v.) of Germany, he treacherously formed an alliance against them with Saladin (q.v.) and was compelled to keep his promises only through force of arms. Isaac was a vicious and cowardly prince, and was

dethroned, blinded, and imprisoned by his brother Alexius in 1195. Eight years later he was restored to the throne and reigned for six months, when he was again dethroned, and soon after died in prison. Consult Gibbon, E., 'History of the Decline and Fall of the Roman Empire) (Vol. V, London 1898) ; Finlay, G., 'History of the Byzantine and Greek Empires, 1057-1453 (Edinburgh 1854) ; Id., 'History of Greece* (Vols. Ill, IV, Oxford 1877).*

ISAAC OF ANTIOCH, Syrian churchman and author: b. probably at Edessa, early in the 5th century. He removed to Antioch about 450 a.d. and for very many years was abbot of a monastery near that city. Many of his works are lost, but about 190 extant metrical

homilies are attributed to him. Of these some most certainly are the work of another Isaac, (bee Syriac Literature). Consult Bedjan, 'Hormhae S. Isaaci> (Paris 1903) and Brockel- mann, (Die Litteraturan des Ostens> (Vol. VII Giessen 1907).

ISAACS, Rufus Daniel. See Reading of Earley.

ISAACS, .Samuel Myer, Jewish editor: b. Leeuwarden, Holland, 4 Jan. 1804; d. New York, 19 May 1878. Coming to England in his early childhood, after work as educator in Lon¬ don, he was called to the ministry of the Elm Street synagogue in New York (1839). Eng¬ lish sermons were then a novelty and his influ¬ ence rapidly spread. In 1847 he was chosen minister of Wooster Street synagogue, with which he remained until his death. In the formative period of American Judaism, he was ceaseless in his activity — founding (1857) the Jewish Messenger, which he edited until the close of his life. His suggestions gave rise to many local and national institutions in educa¬ tion and charity ; he was one of the founders and first vice-president of the Mount Sinai Hospital and universally esteemed for his genuine piety and usefulness.

ISAAKS, Jorge, HorHa e'saks, Colombian novelist and poet b. Cali, State of Cauca, Co¬ lombia, 1843 ; d. 1895. He was the son of an English Jew who had married a Spanish woman and was taken to Bogota in childhood, and ever after made it his. home. He held various polit¬ ical offices, but is best known for his literary work. He published a volume of poems in 1864, and in 1867 his masterpiece, the novel, 'Maria, a story of domestic life in Colombia, told with consummate skill and tender sim¬ plicity. An English translation of it was pub¬ lished by R. Ogden (New York 1890). He also*

wrote various other novels, none of which, however, achieved the fame of his first one.

ISABELA, e-sa-ba'la, Philippines, province of Luzon, on the northern Pacific Coast of the island with Cagayan on the norfh and Principe and Nueva Ecja on the south; length 118 miles; area, 5,395 square miles (including dependent islands), the largest province of Luzon. The Sierra Madre mountain range runs parallel to the coast, a short distance inland; the rest of the surface is. broken by low hills; the Grande de Cagayan River traverses the entire length of the province; and the main highway from Aparri to Manila parallels this river. Rice, sugarcane, chocolate, coffee, corn and vege¬ tables grow with little cultivation ; tobacco is extensively raised and its growth and treatment is the most, important, industry. Cattle raising is also an important industry. Civil govern¬ ment was established in 1901. Pop. 76,431.

ISABELA, P. I., town in the province of Negros Occidental, Island of Negros, 35 miles south of Bacolod. Pop. 12,800.

ISABELLA, ISABEAU, or ELIZABETH OF BAVARIA, Queen of France: b. 1370; d. September 1435. In 1385 she was married to Charles VI of France, to whom she bore several children. She soon came under the in¬ fluence of the dissolute court and when the king became insane in 1392 Isabella consorted with the king's brother, the Duke of Orleans. She was several times regent of the kingdom and

on each occasion used her office to her own profit. After the assassination of the Duke of Orleans in 1407 she led a very scandalous life. She supported one political party after another and in 1417 was imprisoned. John the Fearless liberated her and in 1420, by the treaty of Troyes, Isabella surrendered the kingdom of France to the English. She gave her daughter in mar- nage to Henry V of England. After the Treaty ˚f 1 royes, Isabella was despised and hated by the French. She lived a lonely life of poverty in Pans. Consult Thibault, 'Isabeau de Ba- viere (Paris 1903).*

(iz-a-bel'a) (I) OF CAS- 1 ILK, Queen of Spain, daughter of John II, King of Castile and Leon and his second wife Isabella of Portugal : b. Madrigal, 22 April 1451 ; d. Medina del Campo 26 Nov. 1504. She mar¬ ried, 19 Oct. 1469, Ferdinand V, King of Ara¬ gon (q.v.), surnamed "The Catholic.® After the death of her brother, Henry IV in 1474 she ascended the throne of Castile, to the exclusion of the latter's daughter, Joan, who was claimed to have been illegitimate. After the kingdoms of . Aragon and Castile were thus once more united, Ferdinand and Isabella assumed the royal titles of Spain. She was always present at the ˆtransaction of state affairs and insisted that her name, should be placed beside that of her

husband in public ordinances. The con¬ quest of Granada, after which the Moors were entirely expelled from Spain, was in' a great degree her work; and the encouragement she gave Columbus, when everybody else doubted the feasibility of his plans, assisted him to the discovery of. America. The broadness of her political vision , and the strength of her character were chiefly responsible for the foundation of Spain's greatness. In all her undertakings Cardinal Ximenes was her as¬ sistant. In 1492 Pope Alexander VI confirmed to the royal pair the title of «Most Catholic,® already conferred on them by Innocent VIII. The zeal for the Roman Catholic religion, which procured them this title, unfortunately brought about the introduction of the In¬ quisition, which was instituted in Spain in 1480, at the suggestion of their confessor, Torque- mada. (See Ferdinand V, Ximenes, Spain and' Columbus). Consult Clemencin, D.,*

(Precis Historique sur la Reine Catholique Dona Isabelle- (Paris 1847) ; George, A., 'An¬ nals of the Queens of Spain, etc.* (2 vols., New York ISoO) ; Hare, C., 'Queen of Queens and the Making of Spaing (New York 1906) ; Howard, O. O., 'Isabella of Castile> (New York 1894) ; Hume, M. A. S., 'Queens of Old Spain* (New York '1906); Lea, H. C., 'The Mo.riscos in Spain> (Philadelphia 1901); Id., 'History of the Inquisition o (Paris 1892) ; Nervo, G. D., 'Isabella, the Catholic* (trans. by T. Temple-West, London 1897) ; Prescott, W. H., 'History of the Reign of Ferdinand and Isabella, the Catholic (3 vols Philadelphia 1873) ; Sela, G., 'Politica Inter- nacional de los Reyes Catolicos) (Madrid*

1905). '

ISABELLA II, ex-queen of Spain, daugh¬ ter of Ferdinand VII and his fourth wife, Maria Christina of Naples: b. Madrid, 10 Oct! 1830; d. Paris, France, 9 April 1904. She sue-

ceeded her father in 1833, her mother, Queen Christine, acting as regent. The early years of her reign were disturbed by a rising in favor of her uncle, Don Carlos, who, if the Salic law had not been set aside, would have ascended the throne instead of her; but this was quelled in 1839. She was declared of age in 1843 and in 1846 was married to her cousin, Don Fran¬ cisco d'Assisi (q.v.). She possessed few of the qualities that might have made her a suc¬ cessful ruler. She was bigoted, pleasure-loving, easily influenced and without political acumen. Her reign was so erratic and despotic that it resulted in many revolutions, the last of which, in 1868, finally drove her from the country. From then on she lived most of the time

in or near Paris. She resigned her claims to the Crown in favor of her son Alfonso, who as¬ cended the throne in 1875 as Alfonso XII (q.v.). Consult Abbott, J. S. C., 'Kings and Queens, Etc. (New York 1848) ; Cambronero, C., 'Las Cortes de Isabel II* (in Espana Moderna, Vols. XXII-XXIII, Madrid 1910- 11); Gribble, F. H., 'The Tragedy of Isabella IP (London 1913) ; Jarnar, A., ed., (Les Rois Contemporains> (Bruxelles 1849) ; Molloy,*

*J. F., 'The Romance of Royalty) (2 vols., New York 1904) ; Zopfe, H., 'Historical Essay Upon the Spanish Succession * (London 1840). See Spain.*

ISABELLA. 'Isabella, or the Pot of Basils written by John Keats in 1818 and published in the same volume with 'Lamia and 'The Eve of Saint Agnes) in 1820, is a romantic tale in verse, founded on the fourth novel of the fifth day in Boccaccio's ' Decameron. * It tells of the love of the Florentine maiden Isabella for Lorenzo, a humble servitor in the establishment of her cruel and haughty brothers. Discovering her passion they treach¬ erously murder her lover and bury his body in a forest. Lorenzo's spirit appears before the languishing Isabella and tells the story of his death. She, in her passion, digs up the body of the slain, cuts off the head and buries it in a garden pot, watering the basil plant which grows above it with her tears and dying of grief when it is stolen by her brothers. The revolting details of the story are not avoided by the author, but they are rendered tolerable by the rich poetic beauty with which they are invested. Love, which outlives death and can thrive on the "wormy circumstance® of dis¬ solution, is the essential theme of the poem. The characteristic atmosphere of languishing beauty and decay is well rendered in Alex¬ ander's familiar painting, "Isabella.® . The poem represents a considerable ' advance in art over Keats's earlier 'Endymion* ; it is nevertheless inferior to his more mature and exquisite treat¬ ment of the theme of romantic love in 'The Eve of Saint Agnes.) For references consult article 'Ode on a Grecian Urn.*

James H. Hanford.

ISABELLITA. See Butterfly-fish.

IS ABE Y, e-za-ba', Jean Baptiste, French portrait painter: b. Nancy, 11 April 1767; d. 18 April 1855. He studied painting with David with the intention of applying himself to his¬ torical work, but began his art career with crayon portraits and achieved a wide renown as a miniature painter. His painting of Napol¬

eon I reviewing his troops in the court of the Tuileries won the friendship of the Emperor and the appointment of court painter. The chief personages of

Europe sat to him. His 'Napoleon at Malmaison) is considered the best portrait of that ruler. Besides a large number of portraits, he painted two notable historical and portrait-group works — the 'Tableau des Marechaux) (Napoleon and his principal gen¬ erals), and the 'Conference at Vienna after Napoleon's abdication. Consult Basili-Cal- lemaki, 'J. B. Isabey) (Paris 1909).*

IS ABE Y, Louis Gabriel Eugene, French painter; b. Paris, 1803; d. 1886. He received his artistic training from his father, Jean Baptiste Isabey, and in 1830 accompanied the Algerian expedition as painter. He exhibited regularly at the Salon until 1878. He excelled as a marine artist. His best known works are 'The Harbor of Honfleur (1827); 'Battle of the TexeP (1839) ; 'View of Boulogne Har- bor) (1843; not at Toulouse); 'Ceremony in the Church of Delft) (1847); 'Marriage of Henry IV) (1848) ; 'Embarkation of De Ruy- ter and De Witt* (1850) ; 'The Roadstead of Saint-Malo,* in the Luxembourg collection; 'The Banquet Hall,* in the Metropolitan Mu¬ seum, New York.*

ISAEUS: b. about 420 b.c. ; d. about 350 b.c. one of the "Ten Attic Orators,® though prob¬ ably a native of Chalcis, made his home in Athens, and there, in the first half of the 4th century b.c., we find him actively engaged in the profession of a speech-writer (logogra- pher) for clients in the law courts. It is be¬ lieved that he was a pupil of Isocrates (q.v.). In Attic oratory he represents the transitory period between Lysias (q.v.) and Demosthenes (q.v.). He seems also to have taught rhetoric, to Demosthenes among others, according to one tradition. We have from him a dozen orations dealing with inheritance cases, two of them in a fragmentary condition, although it is known that he wrote at least fifty. They are valuable not qply as specimens of Attic For¬ ensic style, but also as sources regarding early testamentary and private law and regarding the social life of ancient Greece. There are quite a number of manuscripts of his speeches, the best of which is known as 'Crippsianus A in the British Museum. Of the many edi¬ tions of his speeches the following should be mentioned: Aldus (Venice 1513) ; Bekker, I., (Oxford 1823) * Dobson, W. S., (London 1828) ; Baiter, J. G., and Sauppe, H., (Zurich 1838-43) ; Schomann, G. F. (with commentary, Greifswalde 1831) ; Scheibe, C., (Leipzig 1860) ; Bürmann, H., (Berlin 1883) ; May, A., (Leip¬ zig 1892); Wyse, W. (Cambridge 1904). The best edition is that of H. Buermann (Ber¬ lin 1883). There is an English translation by W. Jones, (London 1779) ; 'The Speeches of Isaeus) ; a German translation by G. F. Scho¬ mann, 'Isaus der Redner> (2 vols., Stuttgart 1830) ; and a French translation by R. Dareste, 'Les Plaidoyers d'Isee (Paris 1898). Consult Baden, W. W., 'The Principal Figures of Language and Figures of Thought in Isaeus, Etc.* (Baltimore 1906) ; Belin de Balu, J. N., 'Histoire Critique de l'Lloquence chez les Grecs* (2 vols., Paris 1813) ; Blass, F.. 'At- tische*

Bcredsamkcit (2 vols., Leipzig 1887-93) ; Christ, W. von, 'Geschichte der Griechischen*

Litteratur5 (5th ed., 3 vols., Munich 1908-13) ; Hitzig, H., (Studien zu Isaeus, Etc.J (Bern 1883) ; Jebb, R. C., (Attic Orators from Anti¬ phon to Isaeus) (2 vols., London 1876) ; John¬ son, A. C., (A Comparative Study in Selected Chapters in the Syntax of Isaeus, Isocrates, Etc.' (Athens 1911); Moy, L., (Etude sur les Plaidoyers d'Isee) (Paris 1876) ; Roeder, W., (Beitrage zur Erklarung und Kritik des Isaios) (Jena 1880) ; Volkmann, R., (Rhetorik der Griechen und Romer) (Berlin 1872).

ISAIAH, i-za'ya or i-za'ya, one of the great Hebrew prophets. The name Isaiah, more exactly Ye shd^ya and Ye shd{ydhu, is derived from two Hebrew words and means ((Jehovah saves.® It refers to the general burden of the prophet's message. The prophet, who was the son of Amoz (q.v.), a man otherwise unknown to us, was born probably at Jerusalem, and this place, the scene of his life work, and in his thought synonymous with his country, engrosses his attention. The year of his birth must have been about 760 b.c., his known activity begins in 739 and continues to 701 b.c., at least. He was married not far from the time of his call in 739, for in 735 a son of his, with a name sym¬ bolic of his prophetic message to Judah, Shear- yashubh, ((a remnant shall turn® (i.e., to Je¬ hovah), was of an age suitable to accompany his father in his walks. Another son, Maher- shalal-hash-baz, was born in 734, and his name also is symbolic of predicted events in the national history, namely, the fall of Damascus and Samaria, and means <(hastening to booty, speeding to prey.®

It is to be remembered that Amos (750 b.c.), and Hosea (q.v.) (735 b.c.), are the only ca¬ nonical prophets that preceded Isaiah and these had their work in the northern kingdom, though Micah (q.v.) prophesied in a country district of Judah during the middle and later periods of Isaiah's ministry. It is next to cer¬ tain that Isaiah was of high rank, if not of the nobility in Judah, and at times might be as bold as he chose in his utterances to the court. We cannot be certain whether the Jewish tra¬ ditions that he was the nephew of King Amaz- iah (Megilla, 10b), that he was slain by Manas- seh (Jebamoth, 49b), and that he was sawn asunder OThe Ascension of Isaiah, Ethiopic version; cf Justin Martyr, (Dial. c. TryphoP chap, cxx), have a basis in fact or not.*

The principal crises of the country in Isaiah's time occurred in 735, 734 (during the reign of Ahaz), and in 701 (during Hezekiah's reign). The

occasion of the first was the union of Da¬ mascus and north Israel against the Assyrian over-lord, Tiglath-pileser III (745-727) and their attempt to overcome Judah. The occasion of the second crisis was the attempt of Judah and her neighbors to avoid tribute to Assyria and their alliance with Egypt against her. At this time Sennacherib was on the throne of As¬ syria (705-681). Besides these, there were moderate political disturbances in Judah during the reigns of Shalmanassar IV (727-722), and Sargon (722-705), for both of these warlike kings in these times were in the west country for conquest and subjugated north Israel, as well as the Philistine territory.

In meeting these crises, Isaiah showed him¬ self the most consummate statesman and the most brilliant theological teacher in Israel in

the times before Christ. His hold of truth was strong, his presentation of it was uncompromis¬ ing, his oratory was superb, and the variety and finish of his discourses and the aptness of his illustrations, as well as the measured flow of his thought, were inimitable. It is of course true that in his teaching he built upon his prede¬ cessors, Amos and Hosea, but he put such a stamp of genius upon the ideas he cherished, that his influence has been the greatest of all the Hebrew prophets.

In general it may be said that Isaiah's mes¬ sages had to do with the safety of the capital in the warlike times in which he lived, with the character of God in his sublime holiness and righteousness, and with the duty of his fellow- citizens to cultivate the righteous life, and, for¬ saking human political wisdom and alliances with the nations, to depend absolutely upon the Lord God. With him, religion and politics go hand in hand, and theological thinking is the kernel of his most practical and stirring ad¬ dresses. Incidentally he has given us a view of the circumstances of his time, its social relations and habits, the fashions, the commotions and rumors, in times of peace and war, in seasons of prosperity and distress ; in all showing him¬ self the most vivid and powerful preacher of the olden time.

The convictions of Isaiah are due to his faith in God and arise out of the circumstances of the time. Jehovah is the Holy One of Israel, hence he must punish Jerusalem for her injus¬ tice to men and her falseness to God, and this he will do through the instrumentality of the most potent political powers of the age; but since Jerusalem is the throne of His glory, and the seat of true religion, however formal the people have made their worship, therefore, a portion of the Judeans will be spared, and the city will prove invincible. Indeed, his own be¬ loved capital is destined to become the centre of religious truth for the nations, and is to have a new and perfect ruler, who will reign in wis¬ dom and might, and will bring righteousness

and peace to the people. See Isaiah, Book of.

Charles Rufus Brown, Professor of Hebrew and Cognate Languages, The Newton Theological Institution, Newton, Mass.

ISAIAH, Book of. It must be premised that the old prophets of Israel, for the most part, gave themselves to oral utterance, and made little use of the written roll. In the case of some of them, the issue of written discourses was an after-thought, and the latter assumed forms revised to suit the practical needs of the readers, just as the first forms had been adapted to the needs of the audience that listened to the preacher's spoken words. This is undoubtedly true of the phophet Isaiah, who appears to have felt that by changes in phraseology he could the better meet the advancing needs of the men for whom he labored. In other words, the prophet's interest was not historical ; he did not reproduce his sermons with the thought of pre¬ serving them for the world exactly as they were delivered, but he had the practical aim of moving a new circle of people to that faith in God which he had previously inculcated. This example was not lost upon the disciples and ad¬ mirers of the prophets, and in the book of Isaiah the old messages have received modifica-

tions at different times to suit the conditions of successive generations. Indeed Isaiah in the pre-Christian centuries was held in such honor that authors added to his writings other dis¬ courses and historical material that were cal¬ culated to produce the results aimed at by our prophet, and in much of this material there is not even a kernel of Isaian authorship. It is true that such procedure is not in accord with modern ideas of literary ownership, but there is reason to suppose that in ancient times the name of the author of new material was of little con¬ sequence, and his work was often hidden in the product of some distinguished predecessor, the delivery of an exigent message being all im¬ portant.

The book of Isaiah contains 66 chapters from various sources, being a combination of several collections of oracles, and divides itself naturally into seven grand divisions, viz. : chap¬ ters i-xii, xiii— xxvii, xxviii-xxxiii, xxxiv-xxxv, xxxvi-xxxix, xl-lv, lvi-lxvi.

1. Chapters i-xii contain several small sec¬ tions or series of addresses, mostly by Isaiah himself. From the time of his call to the pro¬ phetic office in 739 b.c., he probably made notes of his discourses, and about 734, perhaps, he be¬ gan to issue combinations of these, first for his disciples,

and then doubtless for a larger circle of readers. Chapters vii, 1-ix, 7, composed of discourses delivered to Ahaz and the people of Judah in 735, 734, is probably the first of these combinations, and not long afterward this was increased by prefixing to it the inaugural vision, chap, vi, and by affixing ix, 8-x, 4 (with v, 25- 30, now misplaced), the prophetic interpretation of north Israel's unhappy history and the appli¬ cation to Judah. Subsequently the prophet ap¬ pears to have added the woe on Assyria, the instrument of Jehovah's anger against his peo¬ ple (x, 5-34), and a prophecy of the righteous king, to whom he had already referred, and of the restoration of Israel (chap. xi).

He, or some disciple of his, prefixed to the book ii, 1-iv, 1 ; chap, i ; v, 1-24, series of dis¬ courses that present in most vivid manner the social conditions and the debased life of the age of Jotham and Ahaz, as well as the evil consequences to follow, ere the kingdom of God could be established. Chap, i, called by Ewald <(The Great Arraignment, is a general introduction to this part, and was composed after 734, possibly several years afterward, chap. i:l, being an editorial note to introduce all the prophecies of Isaiah. Chap, iv, 2-6, chap, xii, are probably post-exilic additions to this divi¬ sion of Isaiah.

2. Chapters xiii-xxvii may be called the book of woes. The genuine Isaiah passages are in substance : xiv, 24-27, the removal of the As¬ syrian yoke, xiv, 28-32 woe on the Philistines, both delivered during the domination of Sargon or Sennacherib; xvi, 13-14, on Moaib, delivered perhaps in 711; xvii, 1-11, the fall of Damas¬ cus, 735; xvii, 12—14, the repulse of Assyria, 701 ; chap, xviii, the message to Ethiopia con¬ cerning the disaster to Assyria, 701 ; chap, xx, on Egypt, 711; xxi, 11, 12, on Edom, and xxi, 13-17, on Arabia, of uncertain date, may have been readapted to the exilic situation in 545 b.c. ; chap, xxii, against Jerusalem and one of its prominent statesmen, belongs to 702, 701 ; the substance of chap, xxiii (on Tyre), espe¬

cially vss. 1-14, was given about 702 b.c. Upon these as a nucleus have been grafted oracles from various epochs and authors; namely xiii, 1-xiv, 23, the fall of Babylon, composed in Babylonia about 549 b.c. ; xv, 1-xvi, 12, an old oracle quoted by Isaiah himself, possibly in 711 ; chap, xix, on Egypt, is a post-exilic oracle, but in vss. 1-15 there may be an Isaiah kernel, from 720, 711 or 702; xxi, 1-10, on Babylon, is exilic, dating from about 545 b.c. ; chapters xxiv-xxvii form a long post-exilic apocalypse, concerning the judgment on tlhe world and the future blessedness of Israel, and may be as¬ signed with probability to the later Persian period.

3. Chapters xxviii-xxxiii are substantially from Isaiah's hand, and belong chiefly to the time of his later activity. In chap, xxviii, Isaiah's earlier

message against Samaria (vss. 1-6, before 722) is reiterated with reasons, in or about 704. In chapters xxix— xxxii we have in several paragraphs a representation of the straits to which Jerusalem was put just before 701 b.c., the futility of reliance on Egypt for help, the weakness of the Judean politicians, the indifference of the women of the capital, the ultimate deliverance of the city, the fall of Assyria, and the coming of the Messianic age (the latter in three passages, xxx, 18-26; xxxii, 1-8, 15-20; chap, xxxiii) is supplementary to this, contains a woe upon some power hostile to Jerusalem, and the prediction of Judah's deliv¬ erance. This is probably a post-exilic expan¬ sion of Isaiah's utterances in 701 b.c. The sec¬ tions xxix, 16-24; xxx, 18-26; chap, xxxii, have been assigned by some writers to exilic or post- exilic times, and they may contain some ele¬ ments from these periods.

No further prophecies in the book can be assigned with probability to our prophet.

4. Chapters xxxiv-xxxv form a post-exilic prophecy of 450 b.c., or later, and treat of Israel's victory over Edom and of the joyful circumstances of Israel's restoration.

5. Chapters xxxvi-xxxix are historical chap¬ ters taken in large measure from 2 Kings. The Isaian passage omits 2 Kings-xviii, 14-16, and introduces the song of Hezekiah (Isa. xxxviii. 9-20) before 2 Kings xx, 12.

6. Chapters xl-lv are a long and developed prophecy, and comprise the great exilic predic¬ tion of about 540 b.c. concerning the return of Israel from Babylonia, through the instrumen¬ tality of Cyrus. Omitting subdivisions, of which there are many, Skinner and others di¬ vide about as follows :

Chapters xl-xlviii, the restoration: (1) xl, 1-11, the theme; (2) xl, 12-31, the infinity of God; (3) chap, xli, the historical situation, as it has been brought about by God for his servant. Israel; (4) xiii, 1-xliii, 7, the work of Jeho¬ vah's ideal servant (xiii, 1-4) for Israel and the world, and the contrast with the servant Israel as he is; (5) xliii, 8-xliv, 5, the witness of Israel's history to the divinity of Jehovah, and the salvation of Israel and the nations through the divine interposition; (6) xliv, 6-23, the folly of idolatry; (7) xliv, 24-xlv, 25, the mission of Cyrus, the anointed of Jehovah, for Israel and for a world-wide religion ; (8) chaps, xlvi, xlvii, the fall of Babylon ; (9) chap, xlviii, the closing argument, and the joyful summons to Israel to depart from Babylon and to de-

claie to the world their redemption by their God.

Chapters xlix-lv, the glorious future of Israel; (1) xlix, 1-13, the mission of the ser¬ vant (vss. 1-6) to the world; (2) xlix, 14-1, 3, consolation for afflicted Zion; (3) 1, 4-11, the perfection of the servant through suffering; (4) li, 1-lii, 12, the Israelites encouraged to accept the promises; (5) lii, 13-liii, 12, the ser¬ vant's sacrificial work and his exaltation; (6) chaps, liv, Iv, the felicity of Israel and the gra¬ cious call to accept the promised deliverance.

7. Chapters lvi-lxvi are probably for the most part of post-exilic origin, as they appear to contain detached messages of condemnation and promise to a people living in Palestine. Here there are details concerning the moral, social and religious duties of the people, and worship in the new temple appears to have been established. We divide: (1) Ivi, 1-8, the ad¬ mission of foreigners and eunuchs to the Israelifldsh community; (2) lvi, 9-lix, 21, a series of rebukes to several classes, interspersed with promises for fidelity; (3) chaps, lx-lxii, the Jerusalem ; (4) lxiii, 1-6, the divine hero m Edom; (5) lxiii, 7-lxiv, 12, confession of s\n; (6) chaps, lxv-lxvi, the contrasted futures of true servants of God and apostates.

. The principal idea of Isaiah, besides that of judgment, common to the prophets, was the de¬ liverance from the foes, of Jerusalem of the remnant of Israel, meditated by ,a righteous king- The principal ideas of Isaiah xl-lv are the deliverance of Israel from exile through Cyrus, and the deliverance of the people from sin and the impartation of spiritual graces through the suffering servant of Jehovah. Hope, therefore, is the keynote of this prophecy and comfort is the opening word. In connec¬ tion with the theme, the prophet declares, in turn, after turn of speech, the reliability of God in bringing to pass his promises, the sublime grandeur of the Holy One, his creative power, the absurdity of idolatry. The writer makes it clear that the absolute and sole sovereign in the. earth is Jehovah, the God of Israel. In Isaiah lvi-lxvi there is no advance upon these ideas, but many of them are reiterated there.

Bibliography. — Besides the appropriate sec¬ tions in Encyclopedias, Old Testament His¬ tories, Old Testament Introductions, Old Testa¬ ment Theologies, works on Old Testament Prophecy and Messianic Prophecy, Dictionaries of the Bible, Histories of Assyria, Babylonia, Persia, Egypt and Syria, the following selected works may be consulted. For fuller lists the reader is referred to the articles in the Bible Dictionaries, and for the later books, to the lists of current • literature in (The Biblical World.* In the present list, works written in other languages and translated into English,

are given in the translation only.

1. Commentaries. — Calvin 0850) ; Vitringa (1714—20, Latin); Lowth (1778); Gesenius (1821, German); Hitzig (1833, German); Ewald (1876-81); Henderson (1840); Umbreit (1846, German) ; Drechsler (1851-54, German) ; Alexander (1865); Delitzsch (1892); Reuss (1876, French) ; Nagelsbach in 'Lange (1878) ; Birks (1878) ; Cheyne (1889) ; von Orelli (1889) ; G. A. Smith (1888, 1890) ; Duhm (1892, German); Skinner (1896, 1898); Guthe and Ryssel in 'Kautzsch* (1896, German) ; Mitchell*

(chaps, i-xii, 1897); Kittel's 'Knobel-Dill- mann (1898, German) ; Marti (1900, German) ; Whitehouse (1905).*

?'S!ˆier Works. — Driver, 'Isaiah, His Life and Times (1893) ; Davidson, 'Theology of Isaiah xl-lxvi* ('Expositor,* 1883-84); 'The¬ ology of Isaiah* ('Expository Times* 1894) Guthe, 'Das Zukunftsbild des Jes* (1885) Giesebrecht, 'Beitrage zu Jes, Kritik* '1890), JJer Knech't Jahves des Deuterojes* (1902);*

Zukunftserwartung des Jes Oonc< ; Che3™e, introduction to Isaiah* rrri > ' /Ton*

(Expositor , May 1888) ; Lane, 'Die Ebed-Jahwe Ljgder 0898); Bertholet, 'Zu Jesaya LIII (1899); Fullkrug, 'Das Gottesknecht des Deu¬ terojes* (1900).*

Charles Rufus Brown, Erofesso? of Hebrew and Cognate Languages, The Newt oil Theological Institution, New¬ ton, Mass.

ISAR, or ISER, a river of Germany, rising in the iyrol, north of Innsbruck, entering Ba¬ varia, then, flowing generally north and north¬ east, and joining the Danube at Deggendorf after a course of about 180 miles. Munich and Landshut are on its banks. In the first part of its course, it is an impetuous mountain torrent; and even after it leaves the Alps, it has many rapids and islands, but for much of its course it is navigable for boats. Much wood is floated down the Isar from the mountains.

ISARD, or IZARD, the chamois of the Pyrenees. It is smaller and redder than its cousin of the Alps. See Chamois.

. ISAROG, a mountain peak of Luzon, P. I., in the Province of South Camarines. It is an extinct volcano and rises to a height of 6,450

feet from a base about 35 miles in circumfer¬ ence.

ISAURIA, in ancient geography, a district ot Asia Minor, bounded north by Phrygia, east by Lycaonia, south by Cilicia, and compris¬ es a barren upland plain with mountains in the south. The district is supposed to have contained but few towns, chief of which was Isaura, the capital, which was rebuilt by Amyu- tas. Extensive ruins, consisting of a massive wall with hexagonal towers, a triumphal arch, and. tombs, are still seen near the town of Hajilar, 45 miles west of Karaman. The people believed to have been a daring lawless race, owing allegiance to either the Persian or Mace¬ donian monarchy, appear in history as having been driven to their mountain strongholds and forced to submission bv the pro-consul P. Ser- vilius ; as giving the Roman empire so much trouble that it was decided to leave them alone; as being a second time subjugated in the reign of Justinian ; and as giving two occupants to the Byzantine throne, Zeno (474-495) and Leo III (717-41). Consult Ramsay, Sir W. M., 'Historical Geography of Asia Minor (Lon¬ don 1890) and 'Nova Isauria* (in Journal of Hellenic Studies, ib., 1905).*

ISCA DAMNONIORUM, the Roman

name of the Celtic Cser-Isc, the modern Exeter, Devonshire (q.v.), England.

ISCHIA, is'ke-a (the ancient JEnaria), an island between the Bay of Naples and the Bay of Gaeta, about 27 square miles in area and seven miles from the mainland. Ischia is a favorite summer resort, and is noted for the excellence of its mineral waters, and numerous springs, great richness of soil, exquisite flavor of its fruits and wines, and enchanting scenery. Its highest point is the volcanic Monte Eoomeo, 2,588 feet above sea-level, of which the erup¬ tions have been disastrous, especially that of 1302 The Lake of Ischia occupies an extinct crater of the volcano, and abounds in fish. Casamicciola, Forio, Borgo d'lschia and Lacco Ameno are the principal towns. In 1881, Casa¬ micciola was nearly destroyed by two earth¬ quake shocks. A still more dreadful catas¬ trophe befell it, 28 Sept. 1883, when the town was utterly overwhelmed, only four or five buildings being left standing. Pop. 28,000. Consult Beloch, J., (Campanien> (Breslau

1890).

ISCHL, Austria, market-town and summer resort of Upper Austria, 55 miles southwest of Linz, at the confluence of the Ischl and Traun. It is picturesquely situated in the mountains about 1,500 feet above sea-level. It contains a fine church built by Maria Theresa, an imperial villa, a kurhaus, theatre, etc. There are a number of saline and sulphur springs, also brine

and brine-vapor baths. There is a large salt mine in the vicinitv which has been worked for 800 years. The salt in¬ dustry is considerable. The imperial family and the nobility were accustomed to spend their summers here. Pop. 28,611.

ISE, Japan, a central province of the em¬ pire. See Japan.

ISEGHEM, Belgium, a town in the Prov¬ ince of West Flanders, five miles east of Roulers and 10 miles north of Courtrai. It has manufactures of lace, linens, and woolen cloths. Iseghem suffered severly in the Great War of 1914-18, being taken by the Germans in the autumn of 1914. It was practically razed by the bombardments incidental to the attack by the Allied forces, in Sept.-Oct. 1918 and was freed from the invader before the armistice was signed (11 Nov. 1918). Pop.

14,000.

ISEO, Lake, or LAGO SELINO, a lake

*of northern Italy, between the .provinces of Bergamo and Brescia. Its extreme length from north to south is 1 7*4 miles and is three miles wide in the broadest portion. . Its greatest depth is said to be 984 feet, and it is 607 feet above sea-level. On its banks is the town of Iseo. The lake is fed by the rivers Oglio and Borlazzo. The surrounding scen-ery is . very interesting, broken into picturesque heights, and studded with fine villas, vineyards and olive-gardens. Sardine and eel-fishing are car¬ ried on.*

ISERE, France, department of the south¬ east, part of the old province of Dauphine, bounded north and west by the Rhone, east by Savoy, south and southeast by Drome and Hautes-Alpes. Its area is 3,179 square miles, about 50 per cent of which is arable and 20

per cent forest land. The surface is level in the north, but becomes very mountainous to¬ ward the south, where the scenery is magnifi¬ cent. It is drained by the Rhone, and its tributary streams, the Isere, Drac and Roman- che. The department is rich in minerals. Goal, iron, lead, silver, gold and marble are mined and the forest products are far from negligible. Gloves, paper and silk are manufactured. Grenobile is the capital. Pop. 559,900.

ISERE, e'zar, a river of the southeast of France, which takes its rise in Savoy at the foot of Mount Iseran, flowing generally south¬ west through Savoy and through the depart¬ ments of Isere and Drome, and joining the Rhone about six miles above Valence. Its entire length is about 190 miles,

for the last 70 of which it is navigable.

ISERLOHN, Prussia, town in the prov¬ ince of Westphalia, on the Baar, 30 miles north¬ east of Barmen. It is a thriving manufactur¬ ing centre, having numerous foundries, brass, iron, steel and bronze mills, wire, needle, pins and hook works, silver and nickel ware fac¬ tories, chemical works, furniture and machine works. Mines beneath the town produce zinc and cadmium. The town has a technical school. Pop. 31,294.

ISERNIA, Italy, city in the province of Campobasso, 80 miles north of Naples. It con¬ tains several medicinal springs and is situated at an elevation of 1,495 feet. . In the neighbor¬ hood are the ruins of the ancient Samnite town. Linen and pottery are the only manufactures of any consequence. Pop. 9,284.

ISEULT, ISOLD, ISOLDE, ISOND, ISOUD. See Tristan.

ISHAM, Samuel, American artist: b. New York, 12 May 1855; d. 12 June 1914. In 187d he was graduated at Yale LTniversity; studied law and was admitted to the bar. He soon turned from the law, however, and went abroad to study art at the Julian Academy. Paris. He frequently exhibited at the Paris salon and also in America. In 1906 he was made a National Academician. His fame, however, rests not on his artistic productions but on his (History of American Painting (New York 1905), the best work which has appeared on this subject, remarkable for its sympathetic and just appreciation.*

ISHII KIKOJIRO, e-she-e' ke-ko-je-ro, Ambassador from Japan to the United States: b. at Chiba in 1866. Educated in the Imperial University in Tokio, he was graduated from the School of Law in 1890. Entering upon a diplomatic career, he acted as attache and sec¬ retary of the French legation. Was consul at Chemulpo, Korea, in 1896. Transferred to the secretaryship of the legation in Peking, he was in the siege by the Boxers; and by the Chinese troops — after the allied fleets had opened fire on the Taku forts. After holding other offices, was sent to San Francisco and Vancouver in connection with the anti- Japanese riots. Served as Vice-Minister of Foreign Affairs in 1908, and was Ambassador to Paris, but was recalled to be Minister 1915-16. In 1917 he was dis¬ patched to the United States, forming, the Lansing-Ishii agreement, and was appointed Ambassador to Washington in 1918. Besides being versed in French, he is 3 fluent speaker

and writer in English. Greatest of all his achievements was his early discernment and penetration of Germany's purposes in the Far East and in the world. In this field his activity in exposing the reality to his countrymen has been remarkable. His speeches at Fairhaven and Boston1, Mass., in July 1918 were master¬ pieces.

ISHIM. (1) A town of western Siberia, government of Tobolsk, 180 miles northwest of Omsk, on the Ishim. It is the seat of a great fair and has a large trade in flour and grain. It was founded in 1630. Pop. 7,000. (2) A river of Siberia, a tributary of the Irtysh. It rises in eastern Akmolinsk, flows first toward the west, then the northwest to its juncture with the Irtysh. Its total length is about 1,000 miles, of which only 100 are navigable. It is ice-bound for over five months each year. At Petropavlovsk it is crossed by the Trans- Siberian Railway.

ISHMAEL, ish'ma-el, from Hebrew, signi¬ fying (

In the Midrash, the rabbis show how Sarah's disposition to Hagar was at first kindly but that Hagar's actions compelled a change. Ishmael's intercourse with Isaac is told with considerable minuteness at times, as when he invites his five year old brother to a contest with the bow. and arrow and aims at the child in his duplicity. When Ishmael was at the point of death, God heard his prayer and caused a well to bubble forth that later was to refresh the Israelites on their journey through the wilderness. Beer's (Leben Abraham > gives these and other anecdotes of the kind. His marriage, Abraham's first visit to his son and how the son's wife repelled him and its consequences for her; the second visit three years later and how Ishmael at last went to Canaan and settled with his father; all. this and more is narrated with an imaginative skill peculiar to the Midrash. In Arabic legend Ishmael is no less a picturesque figure and the Koran adds to his importance for it calls him. a prophet (Koran XIX, 55). His son Kedar is reported to have been an ancestor of Mo¬ hammed. It is characteristic of Mohammedan tradition that Ishmael should be. offered as a sacrifice instead of Isaac. (Weil's 'Leg. der Musel, pp. 85-93). It is doubtless due to the fact that Mohammed is claimed to be a de¬*

scendant of Abraham that Ishmael and the Ishmaelites received such exaggerated atten¬ tion. Early associated with the caravan trade between Africa and southern and western Asia, we cannot tell historically how far the descendants of Ishmael entered Arabia and settled there, with its mixed population of thousands of years. Possibly the Bedouins in the deserts between Sinai Peninsula and the Persian Gulf are more entitled to claims of Ishmaelitish origin with their primitive and patriarchal form of life and ancient traditions.

ISHMAELITES. See Ishmael.

ISHMAILIS, ish-ma'ies. one of the 72 heretical sects of Mohammedanism (q.v.).

ISHPEMING, ish'pe-ming, Mich., city in Marquette County ; on the Duluth, South Shore and Atlantic, the Chicago, Milwaukee and Saint Paul, and the Chicago and Northwestern rail¬ roads; about 14 miles west of Marquette. It was settled about 1856 and received its first charter in 1857. It is situated in the great iron ore region of Michigan, and is the centre of the iron ore mining industry of the State. Gold and marble are found in the vicinity and an excellent building stone. The manufactures are chiefly the machinery used in mining. There are several church edifices, large school buildings, hospitals, a Carnegie library and municipal owned water¬ works. Civic affairs are administered by a mayor and city council of 20 members elected annually. The population is composed mainly of Scandinavians and English. Pop. 10,500.

ISHTAR. See Babylonia.

ISIAC TABLE, monument much esteemed and quoted by archaeologists previous to the discovery of hieroglyphics, being a flat rect¬ angular bronze-plate, inlaid with niello and silver, about four feet, eight inches long by three feet high. It was sold by a soldier of the Constable de Bourbon to a locksmith, and bought of the same by Cardinal Bembo, in 1527, passed after his death to Modena, and finally to Turin, where it is now deposited. It consists of three rows of figures of Egyptian deities and emblems. Its object was long sup¬ posed to have been votive ; but it is now recog¬ nized as a very late or spurious monument.

ISIDORE OF SEVILLE, Saint. See

ISIDORUS.

ISIDORUS, Spanish ecclesiastic: b. Cartha- gena, between 560 and 570 ; d. 4 April 636. As bishop of Seville (from about 600) he played a leading role in all affairs of church and State, and in his influence upon the thought and literature of the whole Middle Ages he is to be ranked as second only to Boethius and Cassiodorus Senator. Among his numerous theological, historical and grammatical writ¬ ings, the LXXVIII, 1860). Consult also Niemeyer, H. A., (De Isidori Pelusiotoe Vita, Scriptis et Doctrina) (Halle 1824).

ISINGLASS, i'zm-glas, a form of gelatine (q.v.), whitish, firm in texture, and of great purity, prepared mainly from the sounds or air-bladders of different species of fish, especi-

ally of the Russian sturgeon and, in this coun¬ try, of cod, sturgeon, hake, etc. In some cases the skins are also used for this purpose. Be¬ sides Russia, from which it had been principally obtained, the United States and Canada, Brazil and the East Indies furnish considerable quan¬ tities to commerce, as do also Manila and the West Indies. It is the basis of the Russian glue, preferred to all other kinds for strength. Isinglass receives its different shapes in the fol¬ lowing manner: The sounds are taken from the fish while sweet and fresh, slit open, washed from their slimy matter, divested of a very thin membrane which envelops the sound, and then exposed to stiffen a little in the air. In this state they are formed into rolls about the thick¬ ness of a finger, and in length according to the intended size of the staple; a thin membrane is generally selected for the centre of the roll, around which the rest are folded alternately, and about half an inch of each extremity of the roll is turned inward. Boiled in milk, it forms a mild nutritious jelly, and is thus sometimes employed medicinally. It is used in making court-plaster, cement, mock pearls, and many other articles, also in clarifying fermented liquors for improving soups, jellies, etc., and as sizing for linens, silk, gauzes and other fabrics.

ISIS, the principal goddess of the Egyp¬ tians, the sister and wife of Osiris, representing the moon, as Osiris did the sun. The Egyp¬ tians believed that Isis first taught them agri¬ culture. She is represented in various forms. In one she has the form of a woman, with the horns of a cow, as the cow was sacred to her. She is also known by the attributes of the lotus on her head, and the sistrum in her hand, a musical instrument which the Egpytians used in the worship of the gods. She is often ac¬ companied by her infant son Horus. In one celebrated Egyptian statue she was shown with her face veiled. It was she who, by wiles, learned the name of the great Re which no one else knew. She is also represented in legends as mourning for Osiris with her. sister Neph- thys. Herodotus identifies her with the Greek Demeter. The same author states that the worship of Isis and Osiris was the only com¬ mon ritual throughout Egypt. She was par¬ ticularly worshipped in Memphis, but at a later period throughout all Egypt. From Egypt her worship passed over to Greece and Rome, in about the third century b.c. The initiation of the novitiates and the celebrations, of the mys¬ teries of Isis were great dramatic spectacles. Traces of the cult have been found in Great Britain, also. In Italy, it was not suppressed until after the 5th century b.c. Consult Budge E. A. W., (Gods of the Egyptians* (London

1904).

ISIS AND SERAPIS, Temple of, a struc¬ ture of ancient Rome, situated in the Campus Martins. It was erected from Egyptian mate¬ rials and in Egyptian style and the approach was lined with many monuments brought over from Egypt. Of these there remain in Rome 4 three obelisks, and the Nile statuary group,. the latter in the Vatican Museum. The Tiber statue reposes in the Louvre since 1803. Vari¬ ous smaller pieces have been recovered.

ISKANDERUM, Turkish form of Alex- andretta, a city of Syria (q.v.).

*ISLA, es'la, Jose Francisco de la, Span**

ish literary man and ecclesiastic : b. Vidanes, in the province of Leon, 24 April 1703; d. Bolonia, 2 Nov. 1781. His father was governor of the district and a man of some importance. Jose was a boy of very superior ability, the develop¬ ment of which the father encouraged, with the result that the son received his bachelor's de¬ gree in law at the age of 12. Four years later he entered the Jesuit order, and after three years' study of theology and associated sub¬ jects, he went to Salamanca to continue his ecclesiastical studies. On leaving Salamanca he became a teacher of theology and philosophy in various Jesuit colleges. He was noted as a preacher and his fame as an orator rapidly spread. The Jesuit authorities gave him plenty of opportunity in this line. Isla translated into Spanish, from Latin, French and other lan¬ guages, numerous devotional and other works with such success that often the translation proved better than the original. He also de¬ voted much of his time to historical and other investigations and original writing. Of these the most notable is (Fray Gerundio de Cam- pazas) a satire on the extravagances of the preachers of his day (Madrid 1758). The ridicule cut so deep that it was never forgiven by some of his fellow preachers; and they raised up for him powerful enemies who finally succeeded in having the sale of (Fray Gerundio) prohibited, not however, until it had become popular throughout Spain and had been trans¬ lated into several languages of Europe, among them, English, French, German and Italian. Notwithstanding the ecclesiastical censure which prohibited the publication, reading, possessing or even discussing the book, it continued, to be printed in Spain and abroad, and an edition of 1,500 was sold out in three days in Madrid alone. Among the excellent translations of Islas are friendship and Old Age (Cicero), and < Satires* of Lucretius. In 1767 he was exiled from Spain wiith the rest, of the Jesuits by royal decree, and took up his residence in Italy. There he was arrested and imprisoned for de¬ fending the Jesuits (1773). Three years later satisfaction was given him and he returned to Bolonia.*

Among the other published works of Isla are (Cartas de Juan de la Encina) (satire) ; (Car- tas Familiares> ; (Several volumes of sermons> ; and (Reflexiones Cristianas. Among his most popular translations was (The Adventures of Gil Bias de Santillana.**

ISLA DE LEON, island on the south

coast of Spain, in the Atlantic Ocean, belong¬ ing to the Province of Cadiz, and separated from the mainland by San.ti Petri channel. It is 10 miles long and two wide, and contains the cities of Cadiz and Isla de Leon, the latter known also as San Fernando, the capital of Spain under the regency in 1810, and the scene of the constitutional movement, of 1820. The old capital has good fortifications, hospitals, an observatory, convents, etc., and manufactures leather, salt, soap and spirits. Pop. of the island about 18,000.

ISLA DE PINOS. See Isle of Pines.

ISLAM, a term which signifies the Mo¬ hammedan religion ; complete submission of body and soul to God, His will and His service, as well as faith in all those articles of profes-

sion, commands and ordinances ordained by Mohammed. See Mohammedanism.

ISLAND, a body of land entirely sur¬ rounded by water. Islands are of very differ¬ ent extent and surface, and some are so large that physical geographers have doubted whether they should 'be called continents ; this, however, is a mere matter of definition. The great masses of land forming the Eastern and West¬ ern _ Continents are in reality islands. A con¬ venient distinction is established by restricting the application of the noun, continent to Nortlu Central and South America, Europe, Asia and Africa; designating Australia as a continental island; and classing Greenland (estimated area 826, 0(K) square miles) as simply the largest of the islands, strictly so called. The following table shows the relative areas of other large islands :

Area in

Islands sq. m.

New Guinea . 303,000

Borneo . 284 , 000

M adagascar . 227, 000

Sumatra . 162,000

Honshu . 86,500

Great Britain . 83,700

Celebes . 76,500

New Zealand —

(S. Island) . 58,500

(N. Island) . 44,467

Java . 49,000

Cuba . 44,164

Newfoundland . 40,200

Luzon . 40,000

Iceland . 40,300

Area in

Islands sq. m.

Mindanao . 37,000

Ireland . 32,600

Haiti . 28,800

Tasmania . 26,200

Ceylon . 24,700

Nova Zembla —

(N. Island) . 19,300

Tierra del Fuego …. 18,500 Nova Zembla —

(S. Island) . 15,700

Formosa . 15,000

Hainan . 14,000

Sicily . 9,800

Sardinia . 9,000

A cluster of several islands is called an archipelago. The principal clusters in the At¬ lantic are the West Indies, the Azores, the Canaries, the Hebrides, Orkneys, Shetlands, etc. But the great world of islands is in the Pacific, and some modern writers consider them as forming a fifth division of the world, includ¬ ing the Eastern Archipelago, Polynesia and Australia, to which they have given the name of Oceania. A large island is a continent in miniature, with its chains of mountains, its rivers, lakes, and is often surrounded by a train of islets. The rivers of islands are in general little more than streams or torrents, and the smaller islands are often uninhabitable from want of water; but they serve as haunts and breeding-places of innumerable sea-birds. There are islands in rivers and lakes as well as in the sea. In rivers they are often formed by the division of the stream into various branches, and often by accumulations of earth brought down and deposited around a rocky base. Ex¬ amples are not wanting of floating islands, which are formed by the roots of plants and trees in¬ terlacing with each other, and thus constituting a support for deposits of successive layers of earth. The Pacific contains a great number of low islands having their basis formed of coral reefs, these reefs being produced by the labors of innumerable coral-animals or zoophytes. See Coral and Coral Islands.

ISLAND BOUNDARIES. See Bound¬ aries of the United States.

. ISLAND NUMBER 10, a former island in the Mississippi River, near the northwestern corner of Tennessee, and about 40 miles below Columbus, Ky. Since the Civil War it has been washed away. It was the tenth in a suc¬ cession of islands lying below Cairo, Ill. Early in 1862, having been fortified by the Confed-

Craite\?enera^ it was commanded by Gen¬

eral Mackall, who had about 7,000 troops of Beauregard s army. It was bombarded for three weeks by Commodore Foote, command¬ ing seven federal gunboats, and surrendered / April 1862. The evacuation was forced by Polk with a large land force. He, under cover of a vigorous fire from two gunboats, which had run past the island by night, brought his

men across the river in transports. The de¬ fenders ot the batteries fled, and were pursued into the swamps. Over 6,000 prisoners were taken, together with an immense quantity of ammunition and supplies. The Federal forces lost only a few men. Consult the Century Company s Battles and Leaders of the Civil War, > (Vol. I. New York 1901).

ISLAND OF SAINTS AND SCHOLARS,

(Insula Sanctorum et Doctorum) a name fre¬ quently applied to Ireland in the early Middle Ages, because of the great number of mis¬ sionaries and learned men who at that time left her shores to evangelize and teach the peo¬ ples of western Europe.

T.J£tANDS 0F THE BLESSED, or FORTUNATE ISLANDS, according to Greek mythology and legend an isxand group on the edge of the western ocean, where dwelt those fortunate beings on whom the gods be¬ stowed immortality. Heriod mentions the groHP as do Iater authors. It is supposed that the idea of this paradise on an island group is due to the remembrance of an unrecorded voyage to Madeira and the Canary Islands, these being called Fortunate Islands in some mediaeval maps.

ISLAY, an island on the west coast of Scotland, belonging to the group of the Inner Hebrides, and to the county of Argyll. It is west of the peninsula of Cantyre, about 15 miles southwest of Jura, from which it is divided by Islay Sound. It is 24 miles long with an extreme width of 17 miles, and an area $ >f 220 square miles. In the north the surface is hilly, the east is marked by a high ridge while the central and western parts of the island are rolling or table-land. Great quantities of whisky are distilled. Pop. 6,274.

ISLE OF MAN, in the Irish Sea, 16 miles south of Burrow Head, Wigtownshire, the largest island in the English seas. Area, 145,- 325 acres. A range of mountains crosses from northeast to southwest, culminating in Snaefell (2,034 feet), to the summit of which there is a railway. In the southwest the coast is ru§)?ed and precipitous. There are valuable lead ore mines, and the fisheries are very pro¬ ductive.

The principal towns are Douglas, Castle¬ town, Ramsey and Peel. Castletown is the ancient capital, but Douglas (pop. 21,183) is the chief town and the seat of government, which is (

the Stanleys (afterward Earls of Derby) in the 15th century; was captured

by the Par- liamentary forces in 1651 after a heroic resist¬ ance by the Countess of Derby; was given to General Lord Fairfax but possession by the Derby family was resumed at the Restoration; by inheritance it passed in 1736 to the Dukes of Atholl ; and in 1829 was purchased by the Crown. The island is the most popular holi¬ day resort in the British Isles. Pop. 52,016.

ISLE LA MOTTE, Vt., in the northern part of Lake Champlain, the northern point about eight miles from Rouse's Point, N. Y., on the Canadian border ; the southern point about 15 miles north of Plattsburg, N. Y. It is about seven miles long and two miles wide. The island was a resort for the Algonquin and Iroquois Indians ; at the south end was once an Indian village. It was discovered by Samuel de Champlain in July 1609 and was named after a French officer, Sieur La Mothe. In 1665 a wooden fort called Fort Sainte Anne was built on the south shore. The (Jesuit Relations } contain numerous references to Fort Sainte Anne, Isle La Motte, and the visits made to this island by the early missionaries. The chapel of Sainte Anne, erected near the ruins of Fort Sainte Anne, was consecrated 16 July 1893 by Bishop De Goesbriand of the diocese of Burlington, and it is now a place of pilgrim¬ age. On 8 Aug. 1776, Benedict Arnold, after engaging the Indians in the British service on 6 August, at the Bouquet River, fell back to Isle La Motte, where his fleet remained anchored until 19 August, when he sailed south toward Cumberland Head. Isle La Motte was settled in 1785 by Ebenezer Hyde, Enoch Hall and William Blanchard and was organized as a town in 1790. It has large marble quarries, two public schools, a Methodist church, town hall and a government lighthouse.

ISLE OF PINES (fsla de Pinos, es'la da penos), a small island belonging to Cuba, 40 miles southeast of Pinar del Rio. Area, about 840 square miles; pop. 3,300; chief towns, Nueva Gerona the capital on the north coast, and Santa Fe. It is in effect two islands con¬ nected by a marsh, the one on the north being somewhat broken by hills, the one on the south low, flat and sandy. The climate is healthful, the soil fertile producing citrus fruits, pine¬ apples and potatoes, and the mineral resources extensive. Large marble quarries are worked. Cattle raising is the chief occupation of the inhabitants. The local industries are largely in the hands of Americans, and the island had prominent political significance prior to Cuban independence from the attempts of local agita¬ tors to br;ng it under the control of the United States. For administrative purposes the island is a municipal district of the province of Havana.

ISLE ROYALE, rol-al, (Fr. elrwayal), Michigan, an island in Lake Superior, 45 miles long, 9 'miles wide with an area of 229 square miles. Valuable mineral deposits are found here.

ISLE VERTE, Canada, town on the Saint Lawrence at the mouth of the Isle Verte, op¬ posite the island of the same name, in Temis- couata County, Quebec, and on the Intercolonial

Railway. Most of its population are French- Canadians. Pop. 2,169.

ISLE OF WIGHT, wit, England, the

second largest island in the English seas, near the Hampshire coast. Its extreme length from the Foreland to the Needles, is about 23 miles, and its extreme breadth, Cowes to Saint Catharine's Point, is about 13 miles. The area is calculated at 145 square miles.

ISLES OF SHOALS, New Hampshire, a group of eight barren islands in the Atlantic Ocean, 10 miles southeast of Portland, Maine, from which a daily steamer plies during the summer months. The three principal islands are Appledore (400 acres); Star (150 acres) and White (55 acres). There is a revolving government light on the last named, 87 feet above the sea. On Star and Appledore islands are several large hotels for summer visitors.

A few fishermen are numbered among the permanent inhabitants. •

ISLET A, New Mexico, an Indian pueblo or town on the Rio Grande, below Albuquerque.

It is inhabited by Indians of Tanoan stock. They still retain much of their ancient social organization; .are peaceable, industrious and cultivate the land by a primitive irrigation sys¬ tem. Pop. 956.

ISLINGTON, izTing-ton, England, a metropolitan and parliamentary borough of London, two and one-half miles north of Saint Pauls. Area, 3,091 acres. The Agricultural Hall in Liverpool Road is the second largest hall in London with a capacity for 50.000 per¬ sons. London Fever Hospital and Holloway prison, are within the borough, which returns four members to Parliament. Pop. 327,403.

ISLIP, Iz'lip, N. Y., town in Suffolk County, Long Island; on the Great South Bay and on the Long Island Railroad, 44 miles east of New York. The town comprises several small vil¬ lages and covers an area 20 miles long and 10 miles wide. Here are the Manhattan State Hospital for the Insane, Saint Joseph Convent (Roman Catholic), and a large fish hatchery, owned by the State. The town is popular as a summer resort and has many fine hotels along the shores of the bay. Fire Island lighthouse, 166 feet high, is located eight miles from the mainland. Blue Point oysters are shipped from the town in large quantities. The government is vested in a town supervisor and town board, elected every two years. Pop. (1920)

20,704.

ISMAIL I, Khedive of Egypt: b. Cairo, 31 Dec. 1830; d. near Constantinople, 2 March 1895. He was a son of Ibrahim Pasha; was educated in Paris; opposed Abbas Pasha, who succeeded his father in 1848 and was succeeded by Said Pasha in 1849. Ismail became com¬ mander of the Egyptian army in 1862; suc¬ ceeded to the vice-royalty on 18 Jan. 1863 and by increasing his tribute and aiding the Sultan with his army in the Cretan insurrection of 1866, he secured from the Sultan the direct succession of his line, and in 1867 the titles of highness and khedive. . Ismail increased his army, assumed jurisdiction over the Upper and White Nile, and sought to establish him¬ self as an independent monarch in 1868- 69. He was forced to reduce his army, recall orders for war-vessels and cease

contracting loans in Europe. Subsequently he obtained concessions from the Sultan which mads him practically independent. He was one of the most zealous promoters of the Suez Canal, became very wealthy by growing cotton during the American Civil War, and improved Egypt vastly, but at a cost which destroyed the country's credit and brought about the intervention of England and France in Egyp¬ tian affairs. Ismail was deposed, 26 June 1879, and retired to a palace on the Bosporus where his remaining years were spent in virtual imprisonment.

ISMAIL, Rumania, capital of the district of Ismail, Bessarabia, on the Kilia, on the old fron¬ tier of Russia. It contains flour mills, a tannery, brickyards, potteries, etc. It has steamer com¬ munication with ports on the Danube and the Black Sea. Its trade is very large, especially in agricultural produce, grain, etc. The city has had an eventful history, being successively the prey of Turk, Cossack, Slav and Russian. Pop.

35,700.

ISMAILIA, Egypt, town on the Isthmus of Suez, the central station on the Suez Canal, 50 miles from the Mediterranean and 93 miles northeast of Cairo by rail. It dates from 1863 during the construction of the canal. It is well laid out and has wharves, warehouses, etc. Pop. about 10,000.

ISOBAROMETRIC LINES, lines con¬ necting on a map the places which exhibit the same mean difference between the monthly extremes of the barometer. These oscillations are greater in some countries, as Hindustan and Newfoundland, than in others, as western Europe and the Antilles.

ISOCLINES. See Folds.

ISOCRATES, I-sok'ra-tez, one of the 10 Attic orators : b. Athens, 436 b.c. ; d. there, 338 b.c. His principal teachers were Tisias, Gor- gias, Prodicus and Protagoras. On account of his weak voice and natural timidity he was re¬ luctant to speak in public, but gave lessons in the art of eloquence, and composed orations for others. His school was opened about 392 b.c. and quickly gained a great reputation. People from many parts of Greece and even from Sicily and still more distant regions streamed to it. Isaeus, Ephorus, Lycurgus, Hyperides were amongst them. He thus made consider¬ able profit, for he received twenty talents ($14,- 375) for a speech that he wrote for Nicocles, king of Cyprus. He was the first who saw the value of oratory in public life. By basing it on sound moral principles he rescued it from the abuses of the Sophists. He was distinguished for a polished style and a harmonious construc¬ tion of his sentences. The composition, revi¬ sion and repeated polishing of his speeches oc¬ cupied so much time that he published little. His celebrated panegyric on Athens (Panathe- naicus) employed him 10, or according to others, 15 years. As all his speeches were modeled after the same pattern, their sameness excited weariness, although his subjects were the most important points of morals and politics. Dur¬ ing the rule of the Thirty Tyrants he lived at Chios. His patriotism was sincere, and his de¬ sire for the freedom of Greece so intense, that he starved himself to death in his ninety-eighth

year from grief at the battle of Chseronea, "fatal to liberty.55 Isocrates left an indelible impress on the cultural and political develop¬ ment, not only of Greece, but of the whole world through the purity of his style, the lofti¬ ness of his political ideas and ideals, and through the influence which he exerted over such men as Demosthenes, Cicero, etc. In Plu¬ tarch's time 60 orations went under his name, not half of which were, however, deemed genu¬ ine. Twenty-one now remain, of which the principal are the (Panegyricus5 (an oration in which he exhorts the Greeks to concord, and to war against the Persians), the (in Journal of Philology, Vol. XXX, p. 1, London 1907) ; Blass, F., (Attische Beredsamkeit5 (2 vols., Leipzig 1887-93) ; Id., (Die Rhythmen der Attischen Kunst- prosa5 (Leipzig 1901) ; Burgess, T. C., (Epideic- tic Literature5 (Chicago 1902) ; Christ, W. von, (Geschichte der Griechischen Literatur5 (5th ed., 3 vols., Munich 1908-13) ; Gomperz, H., (Isokrates und die Sokratik5 (in Wiener Stu- dien, Vol. XXVII, p. 163, Vol. XXVIII, p. 1, Vienna 1905-06) ; Hubbell, H. M., (The Influ¬ ence of Isocrates on Cicero, Dionysius and Aristides5 (New Haven 1913) ; Jebb, R. C., (Attic Orators from Antiphon to Isaeus5 (2 vols., London 1876) ; Johnson, A. C., (A Com¬ parative Study in Selective Chapters in the Syntax of Isaeus, Isocrates, etc., (Athens 1911) ; Kessler, J., (Isokrates und die Panhel- lenische Idee5 (Paderborn 1910) ; Oncken, W., < Isokrates und Athen5 (Heidelberg 1862) ; Pohlman, R. von, (

Isokrates und das Problem der Demokratie,5 (Munich 1913) ; Preuss, S., (Index Isocrates5 (Leipzig 1904) ; Robbins, Hsocrates5 (in Bibliotheca Sacra, Vol XXXV, pp. 401, 593, Andover 1878) ; Sanneg, P., (De Schola Isocratea5 (Halle 1867) ; Spengel, L., Hsokrates und Platon5 (in Konigl. Bayer. Akad. der Wiss., Abhandlungen, P kilo s- Phil ol. Kl., Vol. VII, pt. 3, p. 729. 'Munich 1855); Thomp¬ son, W. H., (On the Philosophy of Isocrates and his Relation to the Socratic Schools5 (in (The Phaedrus of Plato,5 London 1868) ; Volkmann, R., (Rhetorik der Griechen und Romer5 (Ber¬ lin 1872) ; Wendland, P., (Konig Philippos und Isokrates; Isokrates und Demosthenes5 (in Nachrichten von der Konigl. Gesellschaft der

Wissenschaften zn Gottingen, Philolog.Hist Kl. , Gottingen 1910).

ISODIMORPHOUS SERIES. See Iso¬

morphism.

ISODYNAMIC LINES, lines of equal force, equal inclination and equal declination; three systems of lines which being laid down on maps, represent the magnetism of the globe as exhibited at the earth's surface in three classes of phenomena, the varying intensity of the force, the varying dip or inclination of the needle, and its varying declination from the true meridian. See Magnetism, Terrestrial.

ISOETALES, i-so-e-ta'lez. See Ferns and Fern-allies.

ISOLA GROSSA or ISOLA LUNGA,

one of the many islands off the west coast of Dalmatia, in the Adriatic Sea. It extends be¬ tween 43° 51′ and 44° 11′ north latitude. Its greatest length is 27 miles, greatest breadth, three miles. Figs, grapes and olives are pro¬ duced and the fisheries are important. Sale is the chief town and port. Pop. 4,000, mostly Croats.

ISOLA DEL LIRI, Italy, town of Cam¬ pania, in the Province of Caserta, on the Rome- Naples Railroad, 15 miles northwest of Rocca- secca, on the Liri. It has an interesting 12th century church and ample water power from the falls on the river. Manufactures are unimpor¬ tant. Pop. (town) 2,400; (commune) 8,244.

ISOLATION, applied in common par¬ lance to the act of secluding, and of

making ˆpure® ; and also to the state of being alone, of being separate ; to the states of exclusion, se¬ clusion, or of insulation, and thus of being free from influences such as are incident to contact and conjunction, — in short, a state of ((purity® — is a word which has several specific meanings in science.

A. In philology. — (1) To denote that process by which a word-form receives a character which distinguishes it as a compound from the parts of which it was composed, and also from any other group of words connected merely in some syntactical relation. Latin magnopere, for instance, was isolated from its component ele¬ ments magno and opere by its vowel contrac¬ tion, here the cause of the process. So also was the Homeric nav ijuap or <(all-day-long,® isolated owing to the circumstance that the neu¬ ter when used independently takes a long (

construction of nouns. Even the ancient lan¬ guage of the Veda is said to show in this re¬ spect a further degree of development than the so-called Irish infinitive; (3) To denote that characteristic device of juxtaposing words in a definite order in some languages (of the so- called isolating type) to express relational con¬ cepts, all words themselves remaining un¬ changed and unchangeable units, and thus re¬ ceiving their various relational values, not from grammatical modifications, but from the position which they occupy in the sentence. Chinese affords a classical example of such a language. And it is a most interesting fact that English itself has ceased to be a clear example of the so-called inflective type, and may be said to be an example of an isolating language in the making. When comparative grammarians had succeeded in subjecting the entire content of mankind's linguistic power to careful scrutiny and critical examination, three main types of speech emerged. These groups were found to be co-ordinate; and tongues were thereafter dis¬ tinguished as isolating, agglutinative, and as in¬ flective for taxonomic reasons. This resulted when special regard was paid to the inner coher¬ ence of words, a characteristic produced in all tongues by the operation of various specific grammatic processes. In all such investigations attention was directed in particular to the rela¬ tive degree of unity which the stem or unmodi¬ fied word plus its various grammatical incre¬ ments or modifications possesses, emphasis being always laid on the degree of unity which grammatical processes bring about between the stem and the increments which express rela¬ tional concepts. On the basis of this formal criterion, emphasis being laid on the characters called inflection, agglutination, and isolation re¬ spectively, all the languages in the world can be classified into three main divisions or types, as inflectional, agglutinative and isolating types respectively.

B. In chemistry, isolation refers to the state of any substance when separated from all for¬ eign elements ; and also to the act or method of

obtaining such a substance in a free state, or of rendering it pure.

C. In physics it has a similar meaning. It was in this sense that the classical experiments of R. A. Millikan, by which he succeeded in isolating an ion, were performed.

D. In phytogeny (theories of descent and in ontogeny (developmental history), isolation conveys in general the idea of freedom from crossing with the parent, or other, stocks, in the broader meaning which has been given to the term since the days of Charles Darwin. In this sense isolation is synonymous with biolog¬ ical and ecological separation; and also with habitudinal segregation. Isolation and all its synonyms, signify that the descendants of one ancestral form living amid a definite set of eco¬ logical, or environmental conditions, begin to adapt themselves to different sets of conditions, as a result of which, they become ecologically separated or segregated. Isolation with three other factors may enter into any process of speciation, — the latter name being applied by O. F. Cook to the process, the operation of which brings about the differentiation of one species into several coexisting species by the prevention of free crossing between groups

existing at the same time. It is above all the setting of individuals in groups, the members of each group intergenerating, and so securing racial generalization, or fundamental unity of inheritance, within each group, while between the groups there is prevention from free cross¬ ing. Reflexive selection, on the other hand, is applied to that kind of selection which may be described as depending on the relations of the members of a species to each other. Its most familiar forms are sexual selection and social selection. Now isolation is in its very nature the suspension not only of one form, but of all forms of reflexive selection between the separated portion of a species. Isolation as one of the four main factors of evolution, im¬ plies that the process of transformation is a very complex affair. We, on accepting isola¬ tion, recognize, by implication, in evolution the ultimate outcome of a number of factors, each of which has its own special efficacy, and each of which may also at times operate in a manner antagonistic to all of the others. This view, eclectic in its nature, is perhaps to be regarded as the most satisfactory explanation of the or¬ ganic world and its upbuilding that has yet been put forward. But it must be repeated that it recognizes of the various factors thus engaged, the following four as the most potent and the most essentia], and also as co-ordinate: The two Lamarckian factors, variation and inherit¬ ance, the Darwinian factor, natural selection, and the factor first postulated by Moritz Wag¬ ner, or

isolation. Even Lamarck recognized that distinct organic types could not be main¬ tained without some form of isolation, and such Neo-Lamarckians of to-day as Professor Pack¬ ard have been even more emphatic in insisting on this principle as being among the essential conditions for any genuine divergent evolution. Charles Darwin used isolation as equivalent to geographical separation while later writers have come to use it as equivalent to independent gen¬ eration. Isolation differs from selection in that the latter denotes the exclusion of certain kinds from opportunity to propagate, while the former denotes the division of those that propa¬ gate into classes that are prevented from inter¬ generating. Isolation, or the prevention of in¬ tergeneration, whether it be through separation or segregation is also called independent gener¬ ation. Charles Darwin endeavored to explain the origin of species by the agency of natural selection plus the Lamarckian factors, variation and inheritance, and found in Wallace, Huxley and Haeckel, along with many other naturalists, ingenious supporters. On other sides, however, the specifically Darwinian explanation encoun¬ tered vehement opposition. Moritz Wagner, for example, regarded free intercrossing as an insurmountable obstacle to the establishment of new modifications and contended very ably that the isolation of a few individuals, a condition which would occur most frequently during mi¬ grations, was a necessary postulate in account¬ ing for the origin of each new variety or spe¬ cies. In these contentions Wagner showed the great value of migration and the intervention of geographical barriers in accounting for the process of speciation. The absence of in¬ terbreeding, as that resulting from geographical isolation, — what August Weisman calls amixia, — is substantially the prevention of free inter- Vol. 15—27

crossing, and thus a form of isolation. And Hugo de Vries, while his classical investigations resulted in the demonstration that it is possible to produce species, or true breeding forms, out of mutations by pedigree culture, still he failed to see that the essential factor is not the qual¬ ity of the material he worked with (the muta¬ tions), but that it is the pedigree — culture, and that this corresponds to the well-known factors, selection and isolation. The importance of iso¬ lation as a co-ordinate factor with selection in the evolution of species is now gaining wide recognition. George J. Romanes insisted that ((without isolation, or the prevention of free in¬ tercrossing, organic evolution is in no case pos¬ sible. ® And he even went so far as to urge that isolation <(has been the exclusive means of modification, or more correctly, the universal condition of it.® But here it is to be remembered that Romanes failed to discriminate clearly be¬ tween selection and isolation. It was the cus¬ tom when he wrote to describe any influence that tends to transform species as a form of selection. For instance : Romanes says of in¬ fertility between varieties of the same

species : (

The mode of operation and the forms as¬ sumed in the operation of the principle of isolation, has made a classification of the various forms in which it manifests itself es¬ sential; and most of the remaining portion of this article will devote itself to the definition of these various manifestations of this prin-

ciple. Isolation itself has already been suf¬ ficiently defined. The principle immediately reveals two forms: (1) Autonomic isolation, which stands in contrast with heteronomic isolation, includes both endonomic isolation, produced by industrial, chronal and migrational isolation, and reflexive isolation, produced by sexual and social instincts, by impregnational incompatibilities, and by institutional require¬ ments; (2) Heteronomic isolation, is that form of isolation determined by conditions out¬ side of the organic group, for example, by geological subsidence, or other causes resulting in the transportation to an isolated position. In the four forms of environal isolation (see below), namely in transportational, geological, fertilizational and artificial isolation, hetero¬ nomic influences prevail. Treated from another point of view one may distinguish the follow¬ ing co-ordinate divisions of the principle of isolation: (a) Reflexive isolation, compre¬

hending conjunctional, impregnational and in¬ stitutional isolation (for which see below); (b) environal isolation, where the relations of the group and its environment are determined by conditions within the group. The import¬ ance of this form lies in the fact that it often opens the way for the entrance of more funda¬ mental forms of segregation; (c) regressive isolation, or the amalgamation of races; (d) indiscriminate isolation, which results in the divergence in the aptitudes and innate char¬ acters of isolated groups, especially when at the time of the first setting apart, the group is represented by but one, or a few, individuals, and so producing initial racial segregation. It is usually attended with the loss of power to reproduce the average of the innate characters of the original stock.

Of the forms of reflexive isolation one may next distinguish: (1) Conjunctional isolation, which includes sexual and social isolation; (2) impregnational isolation due to the need of co¬ ordination between the size, structure, sexual elements and functions of each sex and the related characters of the other sex, in any intergenerating group; (3) institutional isola¬ tion, due to the differences of language, re¬ ligion and education, a

prevention to free as¬ sociation, will also prevent intermingling of races.

Of the forms of environal isolation may likewise be distinguished co-ordinate with the three foregoing: (1) Endonomic isolation, an example of which is presented, when varieties of the same species of plant occupying the same areas are prevented from crossing by flowering at different seasons, and among ani¬ mals, when there occurs the cyclical isolation between the broods of the periodical cicada even when they succeed each other in the same district. And other forms of isolation so far as they are determined by the diversity of habits or instincts of the members of species, are forms of endonomic isolation; (2) herteronomic isolation, for which see above. It remains now to describe the following nearly co-ordinate sub-divisions of isolative influence.

The two forms of conjunctional isolation are (1) sexual isolation which arises between groups of the same species that have been separated by geographical barriers for several generations, and have in the meantime attained

divergent forms of inherited characters by which they recognize each other, and also dif¬ ferent methods of calling and winning each other; (2) social isolation which arises when¬ ever two groups of a species have been separated by geography for many generations and in the meantime gain divergent social habits and instincts, rendering them unfit for being associated in one intergenerating group when brought together in one district. It is important to notice here that geographical isolation has ceased but the groups continue as separate groups through the influence of social isolation.

The eight forms of impregnational isolation are :t (1) dimensional isolation, of which there is an example when local varieties of birds or of mammals that have become ver.y divergent in size are brought together in the same dis¬ trict; (2) structural isolation, which arises when local varieties that have become so far divergent in structure as to be incompatible are brought together into the same district; (3) potential isolation, of which there are two forms: (a) Complete potential isolation which exists between types when their sexual elements are incapable of union in fertilized germs under any conditions; (b) Prepotential isola¬ tion which exists when cross-fertilization is possible if the alien fertilizing element has been applied sometime in advance ; but which if the fertilizing element of the same species is applied at the same time, or in some cases, at any time during the several hours that follow, mixed fertilization is prevented by the pre- potence of the pure fertilizing element; (4) segregate fecundity, the relation in which the species or the varieties stand to each other when intergeneration of members of the same species or varieties

results in higher fertility than the crossing of different species or varie¬ ties ; (5) segregate vigor, the relation in which species or varieties stand to each other when the intergeneration of members of the same species or variety produces offspring of more vigor than those produced by crossing with other species or varieties ; (6) segregate adapta¬ tion, the relation in which species or varieties stand to each other when the intergeneration of individuals of the same species or variety produces offspring better adapted than the off¬ spring produced by crossing with other species or varieties; (7) segregate freedom from com¬ petition, the segregate access to unused re¬ sources which results when the pure offspring have freer access to unused resources than do the cross-breeds or the original stock; (8) segregate escape from enemies arises when¬ ever the pure offspring of a divergent variety are able to occupy a position freer from enemies than that occupied by the original stock.

The three forms of endonomic isolation are (1) industrial isolation, arising from the activities by which an organism protects itself against adverse influences in an environment, or by which it finds and then appropriates special resources in the environment; and hav¬ ing three forms: (a) Sustentational isolation, arising from the use of different methods of obtaining sustentation by members of the same species; (b) protectional isolation, or isola¬ tion from the use of different methods of

protection against adverse influence in the environment; (c) nidificational isolation, the prevention of free interbreeding between the different sections of a species by diversity of industrial habits, — the separation of the in¬ dividual from the mass of the same species by an industrial habit; (2) chronal isolation, isola¬ tion arising from the relations in which an organism stands to times and seasons ; it is of two kinds: (a) Cyclical isolation, arising from the fact that the life-cycles of the different sections of a species do not mature simul¬ taneously; (b) Seasonal isolation, produced whenever the season for reproduction in any section of the species is such that it can not interbreed with other sections of the species;

(3) migrational isolation, caused by the powers of locomotion in an organism.

The four forms of heteronomic isolation are; (1) transportational isolation, caused by the activities in the environment that distribute the organisms in different districts; (2) geo¬ logical isolation, caused by geological changes which divide the territory occupied by a species into sections; (3)

fertilizational isolation, a segregative rather than a separative form, in that it perpetuates a segregation previously produced, depending on divergence of char¬ acter already clearly established, and therefore on some form of isolation that has preceded. The forms of isolation that precede fertiliza¬ tional isolation are in the majority of cases local, but may be chronal or impregnational ;

(4) artificial isolation arising from the rela¬ tions in which the organism stands after an attempt has been made to rationalize its environment.

Attention having been given to other fea¬ tures other groupings of these various sorts of isolation is possible. Thus potential isola¬ tion, segregate vigor and segregate fecundity might be brought together as forms of physiological isolation, in the sense in which Romanes uses the term in his work (Darwin and after Darwin. And thus, too, all forms of environal and regressive isolation, including as environal isolation does, all forms of en- donomic and heteronomic isolation, — might not unreasonably be brought under a single caption as forms of coincident isolation. All these forms of isolation are talked about by natural¬ ists who saw a necessity to specify the modes of operation manifest in the behavior of bionomic isolation, which, with three other principles, already spoken of, serves to ex¬ plain the process of organic evolution.*

Through such isolation the swamping or leveling effects of free intercrossing, or mix¬ ing with allied varieties or incipient species, are prevented. As a consequence, variations or nascent species become fixed or localized, be¬ ing prevented from spreading by some geo¬ graphic or topographic barrier, with the result that there are many thousands of local races, varieties and species ; indeed, probably over half of the number of known species are such forms. Not only species, but genera and higher groups are thus isolated. Thus the marsupials of Australia are, with one or two exceptions, confined to that continent, the connection once existing with Asia having been cut off.

Examples of Isolation. — These are found among cave animals (q.v.) where animals con¬

fined to the nether world, living in total dark¬ ness, are prevented from breeding with their ancestors of the upper world. The deep-sea fauna is another such assemblage, living in gloom and in water at the freezing point, al¬ though at the surface the winter temperature of the sea may be 80-85° F. Other examples of the result of isolation are the assemblage of animals peculiar to certain islands, to basins walled in by mountain chains, valleys, deserts and Alpine summits. Interesting cases of isolation on islands are the gigantic moa birds of New Zealand; the local species of birds confined to

the different islands of the Gala¬ pagos archipelago, also the land shells living in the different valleys of Oahu, one of the Hawaiian Islands.

Consult Dewar and Finn, (The Making of a Species (London 1909) ; Gulick, J. T., (On Diversity of Evolution under One Set of Ex¬ ternal Conditions) (in Linnean Society of Lon¬ don, Journal of zoology, London 1872); id., (Divergent Evolution and the Darwinian Theory) (in American Journal of Science, New Haven, January 1890) ; Hutton, F. W., (Evolution: Racial and Habitudinal* (Wash¬ ington 1905) ; Jordan, isolation as a Factor in Organic Evolution) (in (Fifty Years of Dar¬ winism, * New York 1909).*

ISOMERISM, i'zo-mar'izm (Gr., <(having equal parts®). Chemists formerly assumed that two bodies must be identical in chemical nature, in all respects, provided they consist of the same elements, combined in the same propor¬ tions. This view was long ago found to be untenable, and many substances (mostly com¬ pounds of carbon or nitrogen) are now known, which exhibit widely different properties, al¬ though possessing the same empirical formula. Bodies which possess this peculiarity are said to be (

Bodies are ((polymeric® when they have the same percentage composition, but have differ¬ ent molecular weights. Acetic acid, C2H402, and grape sugar, C0H12O0, for example, are polymeric with each other, because they consist of the same elements, combined in the same proportions, and yet the molecular weight of grape sugar is three times as great as that of acetic acid. In this particular case there is no specially close relation between the polymeric substances, and the polymerism is therefore said to be ˆaccidental.® When a close relation does exist between the bodies compared, the poly¬ merism is said to be ˆgeneric.® Ordinary acetic aldehyde affords a good example of generic polymerism. Aldehyde has the formula C2H4O, but when treated with a mineral acid it becomes transformed into paraldehyde, which has the formula CaHˆCb; and the reverse transforma¬ tion (of paraldehyde into aldehyde) may be effected by the application of heat.

Compounds are said to be ((metameric® when they have the same empirical formula, but dif¬ fer structurally by containing different radicals, joined by a polyvalent element such as oxygen, nitrogen, or sulphur. Ethyl ether and propyl- methyl ether, for example, both have the em-

pirical formula GH10O ; but ethyl ether con¬ tains two ethyl radicals, united by an oxygen atom, and propyl-methyl ether contains a propyl radical and a methyl radical united by oxygen in the same manner. Thus these two meta- meric bodies have the structural formulae

gH:>0 and q^7->0, respectively.

Metamerism is manifested, most commonly, by the ethers, esters and amines.

Isomerism in its narrower sense or <(true isomerism,® embraces those cases in which the bodies compared have the same empirical form¬ ulae but have different structural formulae and do not (like metameric bodies) consist of defi¬ nite carbon radicals united by oxygen sulphur, or nitrogen. True isomerism may be of two kinds: (1) (

CH3— CH— ch3.

its structural formula being

These two substances, — normal butane and iso¬ butane — are said to manifest <(nucleus isomer¬ ism,® since they differ by the mode of arrange¬ ment of their fundamental carbon chains. As the number of carbon atoms in a compound in¬ creases, the possibilities of nucleus isomerism becomes enormous. Thus the general empirical formula of the saturated fatty hydrocarbons (or paraffins) is CnH2n + 2. We have seen that in the case of butane (for which n = 4) two nuclear isomers are possible. If the same kind of reasoning is applied to the higher members of the series regarding each member as derived from the preceding one by the substitution of a methyl radical (CH3) for a hydrogen atom, we shall find that there are 3 pentanes (n = 5) possible : 5 hexanes (n =6) ; 9 heptanes (n = 7) ; 18 octanes (n = 8); 35 ennanes (n — 9); 75 decanes (n = 10); 159 hendecanes (n— 11); 355 dodecanes (n=12); and no less than 802 tridecanes (n=13).

In that kind of true isomerism which is called <(isomerism of position,® the isomeric bodies contain substituted atoms or radicals, which occupy different positions in the main chain. Thus a paraffin may be converted into an alcohol by substituting a hydroxyl radical (OH) for one of the hydrogen atoms, and the resulting alcohol will have different properties according to the position of the hydrogen atom that was replaced. For example, four butane alcohols are possible. In normal butane, the structural formula of which is given above, the

hydroxyl radical may be substituted for one of the terminal hydrogen atoms, in which case an alcohol is obtained which has the structural

formula

CHs — CH2 — CH2 — CH2 — OH and is known as ((normal primary butyl alco¬ hol.® If the hydroxyl is substituted in the place of one of the interior hydrogen atoms, an alco¬ hol is obtained which has the structural formula

CHa — CH — CH2 — CH3

I

OH

and is known as ˆsecondary butyl alcohol.®

Proceeding, now to the consideration of isobutane, we note that two essentially different substitutions of the hydroxyl radical are here possible. We may replace a hydrogen atom in one of the three CH3 groups, or we may replace the one in the CH group. In the first case the alcohol has the structural formula CHa— CH— CHr- OH

I

ch3

and is known as (

OH

I

CHa— C— CHa

I

CHa

and is known as <(tertiary butyl alcohol.® All of these four alcohols have been actually pre¬ pared. (For isomerism of position as mani¬ fested in the aromatic compounds, and for the nomenclature used in distinguishing the various isomers that those compounds can exhibit, see Aromatic Compounds).

Certain compounds are known which pos¬ sess not only the same empirical formula, but the same structural formula also, and yet mani¬ fest distinctly different properties either chem¬ ically or physically. Fumaric and maleic acids (see Fumaric Acid) are examples of this. In such cases the provisional

hypothesis is made, that the geometrical structures of the molecules of the two substances are related to one another in something like the same manner that the im¬ age of an object in a mirror is related to the object itself, and the isomerism is said to be <(geometrical.® See Stereo-Chemistry.

With reference to isomerism in general, consult Hjelt, Principles of General Organic Chemistry ; Lothar, Meyer, (Modern Theories of Chemistry.)*

ISOMETRIC PERSPECTIVE, in me¬ chanical drawing, a species of mechanical draw¬ ing in which three sides of an object are shown. Most mechanical structures can be referred to an including parallelopipedon. If a point be taken at or near the centre of a sheet of paper and three lines be drawn radiating therefrom, one vertical and downward, and two upward and oblique, making angles of 120° with each other they may be taken as representing three edges of a parallelopipedon. The object to be drawn is referred to this. Its vertical dimen¬ sions are laid off on lines parallel to the front vertical. Its horizontal members on one side are laid off parallel to one of the oblique lines, and the corresponding members on the other side parallel to the other oblique line. Thus

three faces of the object are seen. All dimen¬ sions parallel to the directing lines are on a true scale. Of the two side faces, the horizontal and vertical dimensions are given on a true scale, the diagonal dimensions being incorrect. It is a kind of false perspective that is easily drawn, and that has the great advantage of permitting the use of a true scale on certain controlling parts.

ISOMORPHISM, i'so-mor'fizm, signify¬ ing a similarity in form between things, is a term employed in (1) Crystallography, Mineral¬ ogy and in Chemistry; (2) Biology; (3) Mathe¬ matics.

In crystallography, mineralogy and in chem¬ istry, "isomorphism® is a similarity of crystal¬ line form between substances of analogous com¬ position or atomic proportions. Sometimes the term is extended to mean similarity of crystal¬ line form between substances of unlike compo¬ sition or atomic proportions; but this sort of similarity should more properly be designated homoeomorphism. Used, however, in a double sense isomorphism proper is distinguished as • isomer.ous or isonomic isomorphism; while homoeomorphism is distinguished as heteromer- ous or heteronomic isomorphism. Isomorphism, as, a word, originated from the

Greek isos (ioos), equal, and morphe (pop

Mitscherlich long ago tried to show that crystalline form is independent of the chemical nature of the atoms, and that it is determined solely by their groupings and relative position; the same number of atoms combined in the same way always producing, he asserts, the same crystalline form.

Isomorphous bodies can form homogeneous mixed crystals; and each one is capable of growing in a saturated solution of the other, fresh crystals being gradually amassed around the original body as a nucleus. The presence of the same chemical elements of composition in substances does by no means imply isomor¬ phism and substances of very varying compo¬ nents may yet be isomorphous. The isomor¬

phous elements in isomorphous salts, as, for instance, the metals, are generally of the same or related groups of elements. In some in¬ stances a combination of elements occurs crys¬ tallized in two or more series of crystal forms which are notably separate and distinct and fre¬ quently present the symmetry of different sys¬ tems. This gives rise to two (sometimes three) species of identical chemical composition and is known as dimorphism (or trimorphism where three species are concerned). Carbonate of calcium, which crystallizes in orthorhombic forms as the mineral aragonite and in the hexagonal system as the mineral calcite, pre¬ sents an excellent example of dimorphism. Yet both aragonite and calcite stand at the head of isomorphous groups of carbonates, also. To illustrate this :

Carbonates of calcium, known as calcite, magnesite or magnesium, siderite or iron, rho- dochrosite or manganese, smithsonite or zinc, respectively symbolized as CaC03, MgC03, Fe C03, MnC03 and ZnC03, form together an iso¬ morphous group. All crystallize in the rhombo- hedral system, and with nearly the same angles, — the angles of cleavage in rhombohedra, vary¬ ing from 105 to 107p2. Between the members of an isomorphous group "intermediate com¬ pounds® may occur, regarded as isomorphous mixtures of two unlike molecules. Thus dolo¬ mite, the carbonate of calcium, and magnesium may be considered as formed by the union of the calcium carbonate molecules with those of magnesium carbonate.

Isodimorphism is isomorphism between the two forms, severally, of two dimorphous sub¬ stances. Isothrimorphism is isomorphism be¬ tween the three forms, severally, of two isotri- morphous substances. (See Crystallography). For further study consult Dana, J. D., (System of Minerology) (New Haven 1837 and later editions) ; Moh, F., (Grundriss der Mineral- ogie) (Dresden, n.d.) ; Naumann, C. F., (Lehr- bach der Krystallographie) (Leipzig, n.d.) ; Goldschmidt, V., (Index der

Krystallformen der Mineralien> (Berlin, n.d.) ; Whitlock, H. P., (Critical Discussion of the Crystal Forms of Calcite> (in Proceedings of the American Academy of Arts and Sciences, Vol. I, No. 12, August 1915).

Isomorphism in biology is a similarity in organisms of different ancestry. The similarity here results from convergence, or the develop¬ ment or possession of similar characters by animals or plants, explained as due to similarity in habits, or in environment. Consult Darwin, (Origin of Species, on "convergence.®*

Isomorphism in mathematics is the Theory of Groups, the quality of groups rendering them similar in form, or isomorphic.

ISOPODA, T-sop'o-da, an extensive and varied group of Crustacea (q.v.) usually ranked as a suborder of the Arthrostraca or sessile¬ eyed Malacostraca. The body is broad and flattened, and either short or elongated; the carapace is absent or little developed ; the thorax long with seven free segments, each bearing a pair of walking limbs; the abdomen more or less shortened and bearing lamellar branchial appendages. The Isopoda are classi¬ fied in several tribes and more than 30 families, embracing an enormous number of species. They vary greatly in form and mode of life but

all are of relatively small size and retiring habits. The vast majority are marine, but a few are inhabitants of fresh water or terres¬ trial; the latter are familiar to everyone under the names wood-lice and pill-bugs. Most of the marine forms live a free life but conceal themselves in crevices or among sessile animals and plants, others bore into wood, some, as the gribble and its allies, being destructive to piling; many are commensal or parasitic, among the latter being the Cymothoidce, which infest fishes and whales, and the greatly degenerated Bopyridce, which live in the branchial chamber of prawns and similar crustaceans. Consult Packard, (Zoology) (1887) ; Leichmann, Georg, (Beitrage zur Naturgeschichte der Isopoden) (Cassel 1891) ; Richardson, H., (Key to Isopods of North America (in Proceedings United States National Museum, Vols. XXI and XXIII, 1899, 1901) ; Id., (Isopods Collected at Hawaiian Islands by United States Steamer Albatross) (Washington 1903); id., Contribu¬ tion to the Natural History of the Isopoda) (ib., 1904) ; id., (Monograph on the Isopoda of North America) (ib., 1905) ; id., Usopods Col¬ lected in the Northwest Pacific) (ib., 1906).*

ISOSPONDYLI, I-s6-pon'di-lI. See Ich¬ thyology.

ISOSTASY, i'sos-ta'se. The word isostasy expresses an idea which has been developing gradually in definiteness for a century.

Pratt, an English geodesist, reached the con¬ clusion early in the 19th century that the deflec¬ tions of the vertical apparently produced by the Himalayas are much smaller than they would be if those mountains and the material beneath them were of the same average density as the material beneath the plains of India. Pratt's reasoning was based entirely upon the well established law of gravitation, namely, that the attraction between any two small portions of matter is proportional to the product of their masses and inversely proportional to the square of the distance between them. He computed roughly the attraction, due to the mass of the Himalayas, which would act upon a plumb bob hung at various points over the plains of India and computed the deflection of the plumb line which would be produced by this nearly hori¬ zontal attraction tending to pull the bob toward the mountains. The deflections of the plumb line as observed at these points by geodetic methods were much smaller than the deflections which Pratt thus computed. He offered the possible explanation that the material under¬ lying the mountains is of smaller average den¬ sity than that underlying the plains, or, in other words, that the excess of mass visible in the mountains is compensated by a defect of den¬ sity, and therefore of mass, in the material be¬ low the mountains. This was the beginning of the idea now called isostasy.

Many years later various American geolo¬ gists noted, as they believed, a prevailing tend¬ ency for large portions of the earth's crust to rise as load was removed from the surface by erosion, or to subside as load was added by de¬ position. They reasoned that such a sensitive¬ ness to change of load indicates that there is a close approach to equality in the total load un¬ der the various equal areas of the earth's sur¬ face. Their idea may be roughly expressed by saying that the total weight of any conical

mass of matter having the earth's centre for its apex, and any one square mile of the earth's surface as its base, is nearly the same as that of any other similar conical mass having some other square mile for its base.

Maj. C. E. Dutton, in an address before the Philosophical Society of Washington in 1889, coined the word isostasy, and then and there presented the idea which the word repre¬ sents so clearly and marshalled the evidence in favor of the validity of the idea so skillfully as to attract general attention. From that day to the present the discussion of the idea and of its numerous important relations to geology and geodesy has been continuous and increasing in vigor.

From about 1898 to date (1918) the geodetic evidence that the condition called isostasy exists has been steadily gathered in a continuous in¬ vestigation by the United States Coast and Geo¬ detic Survey, — an investigation which is more vigorous in this line than that carried on in any other country. Two methods are used in that organization. The first is a refinement and extension of the method used by Pratt which has already been mentioned. The other method of observation consists in measuring with great accuracy the acceleration due to gravity at various points on the earth's surface by swinging invariable pendulums. It is evi¬ dent that if the material under the observing station is of very low density the gravitational force acting on the pendulum bob will be smaller, and it will swing slower, than it would if the material were of normal density. Simi¬ larly over material of high density the pendu¬ lum will swing faster than over material of normal density. By properly refined methods of observation and computation the pendulum serves to indicate variations in density of the material underlying the region of observation. Geodesists in various countries have been espe¬ cially active since about 1906 in developing the evidence in regard to isostasy.

An approximate definition of isostasy is in¬ dicated by the historical statement already made An exact definition is given in the few paragraphs which immediately follow this.

If the earth were composed of (homogeneous material, its figure of equilibrium, under the in¬ fluence of gravity and its own rotation, would be an ellipsoid of revolution.

The earth is composed of heterogeneous ma¬ terial which varies considerably in density. If this heterogeneous material were so arranged that its density at any point depended simply upon the depth of that point below the sur¬ face, or, more accurately, if all the material lying at each equipotential surface (rotation considered) was of one density, a state of equi¬ librium would exist and there would be no tend¬ ency toward a rearrangement of masses. The figure of the earth in this case would be a very close approximation to an ellipsoid of revolu¬ tion.

If the heterogeneous material composing the earth were not arranged in this manner at the outset, the stresses produced bv gravity would tend to bring about such an arrangement. But as the material is not a perfect fluid, as it possesses considerable viscosity, at least near the surface, the rearrangement will be imper¬ fect. In the partial rearrangement some stresses will still remain, different portions of

the same horizontal stratum may have some¬ what different densities, and the actual surface o! the earth will be a slight departure from the ellipsoid of revolution in the sense that above each region of deficient density there will be a bulge or bump on the ellipsoid, and above each region of excessive density there will be a hollow, relatively speaking. The bumps on this supposed 'earth will be the mountains, the pla¬ teaus, the continents ; and the hollows will be the ocean. The excess of material represented by that portion of the continent which is above sea level will be compensated for by a defect of density in the underlying material. The continents will be floated, so to speak, because they are composed of relatively light material; and, similarly, the floor of the ocean, will, on this supposed earth, be depressed because it is composed of unusually dense material. This particular condition of approximate equilibrium has been given the name isostasy.

flhe compensation of the excess of matter at the surface (continents) by the defect of density below, and of surface defect of matter (oceans) by excess of density below, may be called the isostatic compensation.

Let the depth within which the isostatic com¬ pensation is complete be called the depth of compensation. At and below this depth the condition as to stress of any element of mass is isostatic; that is, any element of mass is sub¬ ject to equal pressures from all directions as if it were a portion of a perfect fluid. Above this depth, on the other hand, each element of mass is subject in general to different pressures in different directions • — to stresses which tend to distort it and to move it.

In terms of masses, densities and volumes, the conditions above the depth of compensa¬ tion may be expressed as follows: The mass in any prismatic column which has for its base a unit area of the horizontal surface which lies at the depth of compensation, for its edges vertical lines (lines of gravity) and for its upper limit the actual irregular surface of the earth (or the sea surface if the area in ques¬ tion is beneath the ocean) is the same as the mass in any other similar prismatic column hav¬ ing any other unit area of the same surface for its base. To make the illustration concrete, if the depth of compensation is 76 miles below sea level, any column extending down to this depth below sea level and having one square mile for its base has the same mass as any other such column. One such column, located under a mountainous region, may be two miles longer than another located under the seacoast. On the other hand, the solid portion of such a column under one of the deep parts of the ocean may be three miles shorter than the col¬ umn at the coast. Yet, if isostatic compensa¬ tion is complete at the depth of 76 miles, all three of these columns have the same

mass. The water above the suboceanic column is understood to be included in this mass. The masses being- equal and the lengths of the col¬ umns different, it follows that the mean density of the column beneath the mountainous region is two parts in 76 less than the mean density of the column under the seacoast. So, also, the mean density of the solid portion of the sub- oceanic column must be greater than the mean density of the seacoast column, the excess be¬

ing somewhat less than three parts in 76 on account of the sea water being virtually a part of the column.

This relation of the masses in various col¬ umns, and consequently of the densities, fol¬ lows from the requirement of the definition of the expression <(depth of compensation® that, at that depth, each element of mass is subject to equal pressures from all directions. In order that this may be true the vertical pressures, due to gravity, on the various units of area at that depth must be the same

The geodetic evidence now available proves that the condition called isostasy exists in the earth. It is certain that there is isostatic com¬ pensation for continents as a whole, and for their larger features, and that the compensation is a fair approximation to being complete and perfect. In the same way there is isostatic compensation for the ocean basins.

The evidence indicates that the depths within the earth at which the isostatic compensation is approximately complete and at which, there¬ fore, each element of the mass is subject to equal pressure from all directions, is about 76 miles (122 kilometers). There are great in¬ herent difficulties in determining this depth with accuracy. It is certain, however, that the depth of compensation is much less than the radius of the earth. Seventy-six miles is less than one- fiftieth of the radius. In other words, it is cer¬ tain that isostatic compensation may properly be considered as a surface condition of the earth, rather than an interior condition.

It has already been indicated in this article how the geodesist and the geologist each reached the idea of isostasy. In the paragraphs de¬ fining the word isostasy it has been indirectly suggested that the physicists might independ¬ ently have reached the idea if they had con¬ sidered with sufficient care the tendency to re¬ arrangement of the material within an earth composed of heterogeneous material which is neither perfectly fluid nor absolutely rigid.

A fourth point of view, stated below, which may be called the engineering point of view, also leads inevitably to the conclusion that there must be some isostatic compensation beneath the earth's surface. Consider the

continents and great mountain ranges to be loads on the earth's surface in the sense that a railroad em¬ bankment across a plain is an added load, and consider the great ocean basins to be excava¬ tions, or negative loads comparable to canals or railroad cuts. On this basis compute the strength which the material composing the earth must have in order that the irregular surface of the earth may be maintained unchanged. It then becomes evident that the necessary strength is far in excess of that possessed by the materials of which the earth is made. Under the condition stated, that is without isostatic compensation, even if the whole earth were made of the strongest granite known, the con¬ tinents must necessarily slump down into the oceanic basins and partially fill them. With approximate isostatic compensation the condi¬ tion is one of approximate equilibrium, and the maximum stresses within the earth material are demonstrably within maximum limits which are not far from the known limits of strength of the materials accessible at the earth's surface. Thus from an engineering point of view

isostasy furnishes an explanation of the ob¬ served semi-permanence of continents and oceanic basins.

John F. Hayford,

Director College of Engineering , N orthwe stern

University.

ISOUARD, Niccolo, Italian composer: b. Malta 1775; d. 1818. He was destined for the navy by his parents, but preferred a commercial life which he followed for a short time. Going to Paris he studied under Pin. He subse¬ quently studied in Malta and Italy under various masters. At the age of 20 he brought out his opera (L'Avviso ai maritati.5 Soon afterward he became chapel-master to the Knights of Saint John of Malta. He went to Paris about 1800 and there in 1802 appeared his great suc¬ cess, (Michel Ange.5 He was engaged as writer by the Opera Comique, in which relation he remained until piqued by Boieldien's popularity he abandoned himself to a career of dissipa¬ tion which within a year resulted in his death from phthisis. In all he wrote 33 operas, the best known of which are (Le medecin turc) (1803) ; (L'Intrigue aux fenetres5 (1805) ; ˆe siege de Mezieres5 (1814), and (Aladin, ou la lampe merveilleuse,5 left unfinished at his death.

ISPAHAN, is-pa-han', or ISFAHAN,

Persia, city and former capital, 210 miles south of Teheran, in the midst of an extensive plain watered by the broad river Zendeh, here crossed by five bridges. In the time of Chardin (q.v.), from 1664 to 1681, the walls were 24 miles in circuit, and contained 162 mosques, 48 colleges, 1,802 caravansaries and 273 public baths, and the population was then estimated at 600,000. A great part of the city is at present a mass of ruins. Under the caliphs of Bagdad it be¬ came the capital of the province of Irak. Situ¬ ated in the centre of the empire, and surrounded by the most fertile territories, it soon became a place of great population, wealth and trade. In 1387 it was taken by Tamerlane and the citizens were given up to indiscriminate mas¬ sacre ; 70,000 are said to have perished. In 1722 it was taken 'by the Afghans, when the capital was removed to Teheran; but in 1727 it was retaken by Nadir Shah, since which it has not been a royal residence. The great palace built by Shah Abbas is said to have been five miles in circuit, a great part of which space, however, was laid out in 10 gardens, adorned with summer houses. The square called Maidan Shah was one-third of a mile in length, and was formerly encircled by a canal bordered with plane-trees. The principal buildings still standing are the Chehel Sutun or Hall of Many Columns, the palace of Hasht Behest or Eight Paradises, two mosques and the 18th century medresseh (school) and caravansary. The streets are narrow, winding, irregular, unpaved and very dusty. When Ispahan was in its prosperity its suburbs were distinguished for their extent and beauty. The manufactures of the city are still extensive, including trinkets, fire-arms, sword-blades, glass and earthenware. The textile fabrics range from the most ex¬ pensive velvet and satin to the coarsest nan¬ keen and calico. The present population is about 75,000.

ISRAELITES. See Jews and Judaism.

ISRAELS, Joseph, Dutch painter : b. Groningen, 27 June 1824; d. 1911. He was a pupil at Amsterdam of Kruseman and at Paris of Picot, and established his studios first at Amsterdam and later at The Hague. Having essayed historical painting with no marked suc¬ cess, he turned his attention to genre work. He found his subjects among fisher folk and the humbler classes, whose existence, particu¬ larly in its more serious or tragic phases, he depicts in a style likened to that of Millet. Very many of his pictures are in the United States and he is well represented in all con¬ tinental galleries. The Metropolitan Museum, New York, has his (Expectation, } (A Frugal Meal,5 (A Dutch Interior) is in the Walters Collection, Baltimore. Other works are (The Cradle,5 (Katwijk Orphan Asylum> (1867) ; (The Silent House> ; (Alone in the World5 ; (A Son of God's People5 ;

ISSACHAR, the ninth son of Jacob, and the fifth by his mother Leah; also the name of the tribe of Israel descended from him. The tribal territory was

south of that of Zebulun, Naphtali, Asher and Dan, in the plain of Esdraelon. See Israelities.

ISSOUDUN, France, town and capital of an arrondissement in the department of Indre, on the Theolle, 20 miles southwest of Bourges. It contains a college, museum and library and has manufactories of machinery and textiles, parchment, beer, brushes, etc. The town is very ancient, but there are little or no historical remains. Pop. 10,200.

ISSUE, in law, the descendants of a com¬ mon ancestor, or in pleading, a point affirmed by one party in a suit and denied by the other. In the latter sense an actual issue is one formed in an action regularly brought to try a question of right; a collateral issue is one formed in a matter only indirectly in the line of the plead¬ ing; a feigned issue is one formed in a fictitious action, under authority of a court, to try a question of fact before a jury; a formal issue is one formed according to the rules required by law; a general issue denies the whole declara¬ tion in direct terms ; an immaterial issue is formed on some nonessential matter which will not determine the merits of the cause; an in¬ formal issue arises when a material allegation is improperly traversed; a material issue deter¬ mines the merits of the cause when decided; a special issue is a single point selected by the defendant on which he rests his whole cause; a common issue is one formed on the plea of non est factum to an action of covenant broken.

ISSY, a suburb of Paris, situated on the left of the Seine less than two miles above Paris, in the department of the Seine. It con¬ tains a castle, a museum, a Sulpician seminary and an asylum for the aged. Chemicals, paints, oils, cement, shoes and silk are manufactured.

The town suffered greatly during the siege of 1870-71. Pop. 20,000.

ISTEL, Edgar, German musician and

author : b. Mainz, 1880. He was educated at the Gymnasium of Mainz and studied music under Volbach. He removed to Munich in 1898, and there studied at the university, meanwhile pur¬ suing his musical studies under Thuille. He is the author of the operas (Der fahrende Schuler* (1906) ; (Des Tribunals GeboP (1914), and several choruses, songs, etc. His literary works are

ISTHMIAN (is'mi-an) CANALS. See

Nicaragua Canal; Panama Canal.

ISTHMIAN GAMES, so called because they were celebrated on the Isthmus of Corinth. Here was a famous temple consecrated to Po¬ seidon, near which the Isthmian games were celebrated. On one side of the temple were the statues of the victors in these games and on the other was a grove of pines. In the temple stood four horses, gilded all over, with the exception of their ivory hoofs; by the side of the horses were two Tritons, the upper parts of which were gilt and the rest of ivory. Be¬ hind the horses was a car, with the statues of Poseidon and Amphitrite, of gold and ivory. Not far from the temple were a considerable theatre, and the stadium, of white stone, in which the games were celebrated. The whole isthmus was sacred to Poseidon, who was thence called Isthmius. According to the com¬ mon opinion the Isthmian games were founded in honor of Palaemon or Melicertes, by Sisyphus, king of Corinth. When there was war between the states of Corinth and Athens a sacred truce was concluded, and the Athenians were solemnly united to attend the celebration of the games. They were cele¬ brated with the same splendor as the Olympian and other public games, in the first and third years of each Olympiad, probably in autumn ; the athletic exercises were the same. The vic¬ tors were at first adorned with wreaths of pine-leaves, but afterward with wreaths of dry and faded ivy. The pine wreaths were after¬ ward resumed. Victory shed a lustre not only over the individual, but over his family and the community to which he belonged. See Greek Festivals.

ISTHMUS, a neck of land uniting two larger portions or uniting a peninsula to the mainland. By the ancient Greeks the word was often used alone, without any additional word, to designate the Isthmus of Corinth, just as in America one hears frequently the term so ap¬ plied to the Isthmus of Panama. The Isthmian games were celebrated on the Isthmus of Corinth. See Greek Festivals.

ISTHMUS OF PANAMA. See Panama,

Isthmus of.

ISTIB, or SHTIPLIE, Serbia, town in the southeastern part of the kingdom, 110 miles south of Nish. It contains several mosques. Until 1912 it belonged to the Turks, but in that year it was captured by the Serbians and was fully ceded to them by the Treaty of Bucharest the year following. If has a large

trade. Pop. about 13,000, of varied types and nationalities.

ISTLE, Is'tl, or TAMPICO, a structural fibre, produced from several species

of small Mexican agaves, chiefly Agave Lecheguilla. The plants grow wild over a wide area from west¬ ern Texas to New Mexico and southward. Centres of the fibre industry are located in the states of Coahuila, Tamaulipas, Nuevo Leon and San Luis Potosi. About 10,000 tons worth about $650,000 is imported into the United States annually. In Mexico it is used for rough cordage, saddle girths and sacks. It is derived from the cogolla, or central spike of unopened leaves, these 'being separated by hand and each leaf scraped on both sides with a dull edged knife to release the fibre, which lies just under the epidermis. The yellowish white filaments are harsh, stiff, but smooth. After drying, the fibre is put up in bundles of about 75 pounds and transported by pack animals to the neigh¬ boring towns, where it is sorted, baled and sent by rail to Tampico for shipment, hence the commercial name ((Tampico.)) See Cordage; Cordage Industries; Fibre; Mexico.

I.STRIA, former Austrian margraviate, which until 1918, with the county of Gorz and Gradiska, and the town and territory of Trieste, formed the crownland of Kiistenland. It con¬ sists of a peninsula projecting into the north¬ east corner of the Adriatic Sea, together with the adjacent Quarnero Islands. It has an area of 1,908 square miles. The surface is moun¬ tainous with off-shoots from the Julian Alps. Two-thirds of the people are of Slavic race and about one-third Italian. Istria was originally inhabited by a tribe of Illyrian pirates and re¬ sisted the Roman arms till 177 b.c. After the fall of the Western Empire it formed part of various kingdoms till Austria acquired it in 1797. In 1805 Austria was forced to yield it to France; but retook it in 1813, and held it until October 1918. It is now included in Italy. Pop. 403,260.

ISVOLSKY, is'vol-ske, Alexander Petro- vitch, Russian statesman : b. Moscow, 18 March 1856. At the age of 22 he was sent on a mission to Pope Leo XIII, from which later resulted the establishment of a Russian legation at the Vatican. After passing through a suc¬ cession of minor offices he was appointed Am¬ bassador to Japan in 1900 and to Denmark in 1902. In Tokio he exerted himself to heal the grievance still rankling in Japan against Russia over the treaty of Shimonoseki. During Count Witte's tour of inspection over the Manchurian Railway in 1901, Isvolsky endeavored to induce him to make the short journey from Dalny and visit Japan. This Witte refused to do, not¬ withstanding that the Japanese government had decided — in the event of such visit — to receive the Russian Finance Minister with the honors accorded to royal personages. Within less than three years Russia and Japan were at war. In May 1906 Isvolsky succeeded Count Lamsdorff as Foreign Minister. The Austrian annexation of Bosnia-Herzegovina in 1908 aroused his strongest protests against the proceedings of Count Aehrenthal (q.v.) ; in the diplomatic crisis that followed, the intervention of Ger¬ many in 1909 forced Isvolsky to

withdraw from his position and accept the annexation as a fait accompli. His prestige had suffered a defeat;

he retired from the Foreign Office in September 1910 and in the following month succeeded M. Nelidoff as Ambassador to France. He re¬ signed in June 1917 and settled in Biarritz. A brilliant scholar and linguist, he is described as a man of impetuous character with a fond¬ ness for unraveling complicated situations. To his credit must be placed the Anglo-Russian Agreement of 1907 and the Russo-Japanese Agreement of 1910.

ITACOLUMITE, l-ta-kol'u-mlt, also known as flexible sandstone, is a mineral curiosity. It is a light colored, laminated- granular schistose quartzite containing besides quartz grains, mica, talc and chlorite. Usually thin bedded, pieces an inch thick or more have considerable flexibility. It derives its name from the Brazilian mountain Itacolumi. It is found in Brazil where it is usually associated with diamonds.

ITAGAKI, Taisuke, ti-soo'ka e-ta-ga'ke, Count, Japanese statesman: b. Tosa province, island of Shikoku, 1837. He received a mili¬ tary education, and in the War of the Restora¬ tion (1868) was prominent in the imperial army. From 1871 until his resignation in 1873 he was a privy councillor to the emperor. He then became the centre of a movement for con¬ stitutional government which in 1877 addressed to the government a memorial asking for a representative assembly and broaching popular rights. Itagaki aimed at a system based on that of Great Britain or the United States, as opposed to the system based on that of Ger¬ many, drafted by the Marquis Ito and promul¬ gated in 1890. But he would have been satis¬ fied at first, it is said, with an assembly which quite excluded the popular element. He organ¬ ized the Jiyuto, or Liberals, the first Japanese political party, which rapidly increased in num¬ bers. In 1878 he became Minister of Public Works, in 1880 Minister of the Interior, and in 1898 the Liberals united with the Progressists, led by Count Okuma, to form the so-called Con¬ stitutional party, which had a large majority in the lower House of Parliament. At the Mikado's request Itagaki and Okuma formed a cabinet, with Itagaki as Minister of the In¬ terior. The cabinet resigned after six months, and the Constitutional party was separated into its original parts. In 1887 he was made a count. Itagaki was not only the founder of the first political party in Japan, but the most steadfast propagandist for political freedom and a liberal constitutional government in Japan. In 1882 an unsuccessful attempt was made to assassinate him, and although severely wounded, his remark <(Itagaki may die but liberty

will live® became an inspiriting rallying cry. A bronze statue representing the count in modern attire was unveiled to his memory at Gifu in 1918. (See Japan). Consult Fitzgerald, W. G., (Some Japanese Statesmen of To-day) (in Putnam's Magazine, Vol. Ill, p. 405, New York

1908).

ITALA, Latin versions of the Bible cur¬ rent in Italy previous to the Vulgate of Saint Jerome. (See Bible). Consult Schanz,

ITALIAN ARCHITECTURE. See

Architecture.

ITALIAN FURNITURE. See Furni¬ ture, Medieval.

ITALIAN SOMALILAND, the colony and protectorates of Italy in Somaliland (q.v.). They extend along the eastern coast of Africa, from British Somaliland (q.v.) to the course of the Juba. They cover an area of 139,430 square miles. The protectorates comprise North Somaliland; the territory of the Nogal from Cape Gabbel to Cape Garad; the Sultanate of Obbia; and the ((Somalia Italiania Meridion- ale,® formerly called Benadir. The principal towns are Mogadisho, pop. (13,000) ; Brava, (8,000); Mahaddei (5,000) ; Baidoa (2,000). The government is in the hands of a civil gov¬ ernor, whose headquarters are at Mogadisho. The principal occupations are cattle-raising and agriculture. The country exports ivory, cotton, gum and cattle products. Steamers connect the colony with Italy. The boundaries were determined by treaty with the natives between Italy and Abyssinia in 1908, and the Anglo- Abssynian frontier was established in 1897. There are wireless telegraph stations at the principal coast and inland towns which are in communication with Italy. Pop. about 450,000.

ITALIAN TAPESTRY. See Tapestries.

ITALIC LANGUAGES, a group of lan¬ guages supposed to have been at an early date in their history, confined to Italy, and 'the group of languages developed out of these. It is usual to divide the Italic languages into two sub-groups, generally designated as the Latin- Faliscan and the Oscan-Umbrian, both of which belong to the Indo-European or Aryan (Indo-Germanic) family of languages. To a very con¬ siderable extent most of these tongues have acted and reacted upon one another in recent times, within the boundaries of their original habitat in the regions to which they were sub¬ sequently extended. The two great groups al¬ ready mentioned seem also to have been influ¬ enced or modified by more aboriginal languages that preceded them in the Italian territory. There is very much

uncertainty still existing with respect to this very early period of the Italic languages, which belongs to the years following the time when their possessors first made their way into the Italic oeninsula. But though much relating to this early period is left in obscurity, yet enough has been drawn out of the shadow of the past to show the relationship of the various Italic dialects to one another.

Not only were the two great groups of Italic tongues apparently modified by the lan¬ guages existing in the country when they first entered it, but they were again subject to modi¬ fications caused by influences exercised from without. So great was the introduction of Greek words at a certain period in the growth of the Italic languages that earlier philologists were led thereby to look upon Greek and Latin as very closely allied tongues, a conclusion not sustained by more recent investigations.

Throughout what is modern Italy there were, at the beginning of the earliest historical records of the country, various dialects. Two of these, approaching one another, formed the great Italic sub-division, Oscan-Umbrian. The Oscan tongue included the Samnite tribes, the Campania country and southern portion of the Italic peninsula, with the exception of the ex-

treme south. The Umbrian tongue covered the greater part of the north and centre of Italy. The latter, though including a comparatively large extent of the isthmus, was much more homogeneous and much less dialectically in¬ clined than the other local tongues of Italy. The Oscan-Umbrian group of Italic languages consisted of eight distinct dialects: the Oscan, Paelignian, Marrucinian, Marsian, .Tfquian, Sa¬ bine, Volscian and Umbrian in the 4th century b.c. All these dialects, though differing con¬ siderably from one another, differed still more notably from the tongue of Classical Latin, which gradually came to dominate, in the course of time, all the other tongues of central Italy, and extended its influence well toward the north and the south. The evidence, however, does not go to show that Classical Latin ever be¬ came the speech of the masses of the inhabit¬ ants of Italy to the south or the north though the literary tongue was everywhere the speech of the educated, especially when treating with the Roman officials or having intercourse with Roman society.

Latin-Faliscan. — This group of Italic lan¬ guages is usually credited with being the mother of the Romance tongues. To a very great extent this is true yet there seems to be no doubt that all the dialects of Italy, every one

of which furnished soldiers for the Roman army, con¬ tributed some part to the upbuilding of the Romance languages which became heirs to the Latin official tongue throughout the Roman Empire. Yet the influence of the Oscan-Um¬ brian dialects was probably greater on the pop¬ ular speech of Italy in Roman days than upon the subsequent speech of any of the Roman provinces. In Italy, however, the result was quite different; for here the dialects remained the speech of the masses of the people long after Rome had become a great city and the centre of an extending empire; and so strong was their virility that they imposed many of their own tribal words on literary Latin, while hundreds of others passed current in the daily speech of the imperial city, where this vernacu¬ lar became early known as Italian to distinguish •it from Classical Latin. But to this popular tongue the dialects of Latin-Faliscan contrib¬ uted very much more copiously than did those of the Oscan-Umbrian group. This was quite natural because the four sub-divisions of the Latin-Faliscan group (Latin, Lanuvian, Praenes- tine and Faliscan) were much more closely re¬ lated to one another than to the Oscan-Umbrian dialects. Latin gradually absorbed the other three members of its own group, which may be said therefore to have dropped completely out of the linguistic theatre (except in so far as their influence on the popular Latin tongue is concerned) before the Romance languages be¬ gan to differentiate themselves from Classical Latin, which had become the single representa¬ tive of its group, and of Roman dominion, cul¬ ture, organization and government. For this reason it has been called the mother of the Romance tongues, for out of it all of them have sprung. The Oscan-Umbrian group of Italic dialects, on the other hand, did not alto¬ gether disappear in many districts; and even to-day their influence is seen in numerous local¬ ities in the rural speech, more especially in the mountainous regions of the north. This influ¬ ence extends very little beyond the borders of

modern Italy, however, and that only in the one direction already indicated, the mountain¬ ous country to the north, and perhaps parts of eastern. France and Spain.

Latin Tongues. — When the Roman Em¬ pire broke up it left its various domains in possession of the Latin tongue, modified greatly it is true, in the popular speech in different districts by all-compelling local conditions, yet still essentially Latin in its vocabulary, idiom- atic expressions and grammatical structure. Out of this inheritance of the Latin language sprang a whole family of new tongues which are now known as the Romance languages. These differ very considerably from one another; yet their general Latin characteristics are so strong that the mastery of one Romance tongue is the key to the facile acquirement of all the others. The term Romance is expressive of the close rela¬ tionship. of these languages to one another. I he Latin language was primarily the language of Rome. But, as

we have seen, the language of the Roman Empire, in so far as the vast body of the people constituting its populace was concerned, had been enriched and materi¬ ally strengthened by an extensive vocabulary borrowed from all the dialects of the Latin-Fal¬ iscan group of Italic languages. During the Middle Ages the name Romania was applied to the Roman Empire, and its speech was called the. Roman tongue, a term used sometimes to designate Classical Latin, and, at others, to signify the more popular and somewhat cor¬ rupted speech of the Roman populace, more especially in Gaul. A knowledge, therefore, of the relation of the various members of the modern Latin or Romance group of languages to one another, demands complete familiarity with the origin, growth and external and inter¬ nal influences brought to bear on each member of the group from the earliest days of the con¬ tact of Latin and aboriginal cultures in the region bounding each of the other members of this sub-group of closely related tongues. This Romanic tongue welded into a more or less homogeneous mass in the city of Rome itself, had become the speech of the masses of the Imperial city and gradually that of the Roman army and of the colonies. Thus there was, from the very beginning of the Roman colonial policy, some difference between Classical Latin and popular Latin. Already there had begun the disregard of unaccented syllables and the contraction of the longer and more sonorous words of the classical tongues. This process of contraction continued and extended to the in¬ flection of Latin itself. The disappearance of most of the latter called for a pronounced analytical construction which found its most rigid form in French.

All these changes were encouraged, hastened and intensified by the influences brought to bear on the Roman or popular tongue after it be¬ gan to extend from Italy into the surrounding country, with the success, of Roman arms and the extension of the dominion of Rome. Even within the confines of Italy itself it was sub¬ ject to similar influences, the effects of which are seen to-day in the dialectic and phonic dif¬ ference existing between the spoken tongue of southern, central and northern Italy. These home changes were due to native dialects and Greek and Carthagenian influences at an early stage in the history of the peninsula and tc

Germanic and other influences at a later period. But in the colonies still other influences were at work. Before noting these it is necessary to take a glance at the linguistic conditions pro¬ duced by the dissolution of the Roman Em¬ pire. This event broke up the Latin or Roman tongue into nine or ten distinct languages gen¬ erally designated as Rumanian, Rhaeto-Romanic, Italian, Spanish, Portuguese, Catalan (Proven- gal), French,

Dalmatian and Sardinian. Of these, Dalmatian disappeared at an early period in the history of these languages, owing to the fact that it had practically no native literature and that it was overrun by the Slavs, and the Roman tongue and culture were practically wiped out.

Southern Italy, under Greek influence, de¬ veloped a distinct form of the Latin speech which was still further modified by other in¬ fluences. The Rumanian tongue also strongly subjected to Greek influence, has developed along similar lines to that of southern Italy. France or Gaul, whose populace was prin¬ cipally Celtic, witnessed a terrific onslaught on the unaccented syllables of the Latin languages and a general shortening of the words of the vocabulary, coupled with a radical reconstruc¬ tion of the construction of the Latin sentence, and the introduction into the common speech of many Celtic words. This was followed by a strong Germanic influence in the formation of the vocabulary of French in many of the offices of life.

Oscan-Umbrian. — The Umbrian tongue was spoken throughout central Italy ; here too was the ancient habitat of the Picentes, Vestinians, Marrucinians, Paelignians Marsians, Sabines, Volscians and others, all with their own peculiar dialects, of which greater or less re¬ mains are extant in the form of inscriptions.

Umbrian. — Of the great Umbrian tongue there has come down to us more extensive re¬ mains than those of any other Italic tongue out¬ side of Latin. The greater part of this body of linguistic remains is contained in the Iguv'inian tablets, found at Gubbio, the ancient Iguvium, in the year 1444. The tablets average about 19 X 12 inches in size ; they were originally nine in number, but in the 16th century two were lost while in transit to Venice and have since been lost to view. Seven of the tablets are inscribed on both sides, and the complete vocabulary has a range of almost 5,000 words. Two alphabets were employed : the Latin and the epichoric, a derivative of the Greek, through the medium of the Etruscan. The tablets very probably date back to the second century b.c. The contents consist of the acts of a certain guild or corporation, self-styled the Atiedian Brothers, and like the (Acta Arvalium, of a similar Roman brotherhood, the Fratres Ar- vales, made up of precepts for sacrifice, purifi¬ cation, taking of auspices, etc. The Umbrian dialect, while sharing in the special character¬ istics of the Oscan-Umbrian group, shows many secondary developments, some of which are paralleled by those witnessed in Latin within historical times. Such are the reduction of diphthongs to monophthongs and the loss of final d. Characteristic of Umbrian are further assibilation of k before light vowels as in fasia — Oscan. fakiiad, Latin faciat ; the change of intervocalic a! to a sound represented in*

Latin by rs, in the epichoric by a special sign transcribed d or r, as in piri, pirsi — pid-i (Latin quid 4 «).

Oscan. — The remains of this language are found throughout Samnium, Campania, Luca- nia, North Apulia and neighboring regions. These regions were the dwelling-place of the Samnitic stocks, and here we are evidently dealing with the cultured language of the Sam- nites. In calling this language Oscan rather than Samnitic we are following the usage of the great Latin writers, as when Livy relates how in one of the Samnite wars the Roman consul sent out spies who were acquainted with the Oscan language. This usage is to be attributed mainly to the fact that the Oscans of Campa¬ nia were the first people speaking the language in question with whom the Romans came in contact. But aside from this, the Oscans were far more advanced in civilization than the Samnites of the mountains, and if, as would appear from the highly cultured aspect of the language, an Oscan literature once existed, it must have taken its rise and found its standard of expression in Campania. In this case the designation Oscan would have more than an in¬ cidental foundation. As the Samnite people was Rome's only contestant for the hegemony of Italy, so their language was at one time the most widely spoken of all the Italic dialects, and speculations as to the result of a Samnitic victory upon Italy and the world are scarcely less interesting from a linguistic than from an historical standpoint. The Romans knew more of Oscan than, for example, of Umbrian, and the well-known remark attributed to Ennius, himself a native of Calabria, that he had three souls since he could speak Greek, Oscan and Latin, seems to imply that Oscan was- regarded as something more than a mere dialect or patois. The 200 odd inscriptions, which, together with the glosses of Roman grammarians and lexi¬ cographers, represent all that is left us of the Oscan dialect, range in date from the second half of the 4th century b.c. to the second half of the 1st century of our era. Three alphabets are in use : epichoric, Latin and Greek. Of the in¬ scriptions four are of considerable length. These are: (1) the Cippus Abellanus, in¬ scribed on both sides with the terms of an agreement between the two cities of Nola and Abella. The stone was found in 1685 and is now preserved at Nola; (2) the dedicatory in¬ scription of Agnone, a bronze tablet found at Agnone and now in the British Museum; (3) the Curse of Vibia, a leaden roll found at Ca¬ pua in 1876. This is an execration, such as are often found in graves where they have been placed in order to make the curse, or devotion to the avenging gods of the lower regions, more effective; (4) the Tabula Bantina, a frag¬ ment of a bronze tablet, found near the site of Bantia in 1793. The inscription, of which about one-sixth is preserved, consists of a decree in regard to municipal government. Next in im¬ portance to these four are a series of road- makers' tablets and dedications found at Pom¬ peii, and the so-called ˆjovilse® inscriptions found at

Capua. Coins with Oscan legends are numerous, and among them are the earliest re¬ mains of the language. Notwithstanding its in¬ feriority to Umbrian in amount of extant ma¬ terial, Oscan is of all the Italic dialects the most important to the philologist. In relative

antiquity it is to the Italic branch what Gothic is to Germanic and Old Bulgarian to Slavic. In conservatism and transparency its vowel-sys¬ tem is rivaled by the Greek alone in the whole Indo-European field.

In Oscan diphthongs are preserved intact in all positions (cf. deivinais — Latin, divinis; li- gatuis — legatis, etc.) ; the weakening of vowels U! unaccented syllables is, with certain possible bmitations, unknown, as also in Umbrian (cf. Anterstatai— Interstitae), and the finer nuances of pronunciation are expressed by a highly- developed and consistently employed ortho¬ graphical system. The qualitative difference between long and short vowels (except the a- vowels), a difference which the Romance lan¬ guages show to have existed in Latin, is more marked in Oscan than elsewhere. Short e is denoted by the c-character, but the long e has become so close, in pronunciation as to be rep¬ resented by the f-character (cf. sounds of e and 'i i'n modern Greek). So too, long o is regu¬ larly denoted by u, not o, or by u. Compare Estuch Latin, Esto ; liqudˆ" Latin, lege,' pud — Latin, quod.

Minor Languages of the Oscan-Umbrian Group. — As already stated, in central Italy, midway between the Umbrians and the Sam¬ ites, dwelt the small stems of the Picentes, Vestinians, Marrucinians, Paelignians, Mar- sians,. Sabines, Volscians, 2Equians and the Hernici. Of their dialects the Paelignian is the best known, being represented by over 20 in¬ scriptions. It shows a striking similarity to Oscan, even in cases where the point in ques¬ tion is a departure from, rather than a reten¬ tion of, the original. But variations from Oscan are not. wanting. The dialect of the Marru¬ cinians is represented by one well-preserved in¬ scription and a fragment. This, too, is more closely related to Oscan than to any other dia¬ lect, but . in the accusative plural iaf ˆeas® agrees with Umbrian (eaf) rather than with Oscan (cf. viass = yias). Volscian is known through only one inscription, the bronze of Velletri. It shows a number of secondary changes, such as the conversion from diphthongs into monophthongs, loss of final d, assibilation of k before light vowels, which give it a stronger similarity to Umbrian than to Oscan. The Marsian and Vestinian dialects have also dispensed with diphthongs.

Bibliography.— Ascoli, G. I., (Italia dia- lettale) (Turin 1885) ; Buck. Charles Darling, 'Grammar of Oscan and Umbrian,) a standard, ieliable work by an eminent authority, a veri¬ table treasure-house of information on the Oscan-Umbrian group (Boston 1904) ; id., (Vo- calismus der Oskischen Sprache) (Leipzig 1892) ; D'Ovidio and Meyer-Liibke, (Gram- matica storica della lingua e dei dialetti d'Italia) (Milan 1906) ; Grober, G., 'Grundriss der romanischen Philologie) (Strassburg 1904) ; Conway, R. S., (The Italic Dialects) (2 vols., Cambridge 1897), containing texts, commentary and vocabulary; Ernont, (Les elements dialeetaux du vocabulaire latin) (Paris 1909) ; Breal, (Les tables Engubines) (Paris 1875) ; Zvetaieff, 'Sylloge inscriptionum OscarunP (Leipzig 1878) ; 'Inscriptiones Italise mediae dialecticae) (Leipzig 1884) ; Unscriptiones Italiae inferioris dialecticae) (Moscow 1886); Von Planta, 'Grammatik der oskich-umbri- schen Dialekte) (2 vols., Strassburg 1892-97).

ITALY, kingdom of southern Europe,

comprising the whole of the great Mediter¬ ranean peninsula extending southeast from the Alps together with Sicily, Sardinia and some smaller islands. The name Italia was applied m ancient as in modern times to the peninsula, which on the west and south is bounded by the Tyrrhenian Sea and by France, on the north by Switzerland and Austria-Hungary, and on the east by the Adriatic and Ionian seas. Italy is the mother of. the Latin nations for it was there that the. civilization, which we term Latin, had its beginnings. The artistic, linguistic, polit¬ ical and religious development of Italy are among the most interesting and most important in the history of mankind. These topics, to¬ gether with the geography, social customs, mod¬ ern educational systems and commercial life of modern Italy from the downfall of Rome are here treated under the following heads :

1. Physical Geography.

2. Italian Archaeology.

3. History of the Middle

Ages in Italy.

4. The Renaissance in Italy.

5. Italian Modem History.

6. Italian History from 1815

20. The Education and Social

Status of Women in Italy.

21. Italian Language.

22. Italian Literature.

23. Art in Ancient Italy.

to 1907.

7. History from 1907 to

1919.

8. Political Administration.

9. The Crown and Parlia¬

ment.

10. Communal and Provin¬

cial Administration.

11. Department of Justice.

12. The Papacy and the

Government.

13. Political Parties.

14. Italian Socialism.

15. The Italian Army.

16. The Naval Marine.

17. Religion in Italy.

18. Education in Italy.

19. Italian Schools and Uni¬

versities.

24. Historical Synopsis of

Italian Art.

25. Italian Art in the 19th

and 20th Centuries.

26. The Natural and Physi¬

cal Sciences in Italy.

27. Italian Music.

28. Economic Conditions in

Italy.

29. Agriculture in Italy.

30. Italian International

Commerce.

31. Italian Finance.

32. Italian Emigration.

33. Italy, Diplomatic Rela¬

tions of the United States With.

34. Italy and the War.

1. PHYSICAL GEOGRAPHY. Geo¬ graphical Position. — Italy lies in the south of Europe and is in the middle of the two other southern peninsulas — Spain and Greece, forming the extreme European extensions to¬ ward Africa and Asia. Italy is almost in the middle of the Temperate Zone.

The distance of its various portions from the equator (latitude) is about the same as the distance from the equator of the New Eng¬ land States of America, of New York, Penn¬ sylvania, New Jersey, Maryland and Virginia, its position being between 36° 38′ and 46° 40′ lat. north and 6° 30′ to 18° 30′ long, east of the Greenwich meridian.

As to its distance from the United States, between Rome and New York there are 4,172 miles. In time there is a difference of 5 hours 45 minutes, so that when it is midnight in New York it is 5.45 a.m. in Rome.

Perimetric Configuration. — Italy, which by reason of its characteristic form in the atlas has been compared to a boot, is divided geo¬ graphicalˆ into three parts: (1) Continental Italy, partially bounded by the Alps to the north, by the Ligurean Sea to the west and by the Gulf of Venice to the east, is wider from east to west than from north to south; (2) Peninsular Italy, a little more extensive than the Continental portion, situated from north¬ west to southeast, bounded on three sides by the Mediterranean Sea, which takes the dis¬ tinctive name of Tyrrhenian Sea on thp west; of Ionian Sea toward the southeast and

of Adriatic on the east; (3) Insular Italy, which comprises, besides numerous smaller islands, the large islands of Sicily, Sardinia and Corsica, which enclose the Tyrrhenian Sea on the south and west.

Historical Position. — On account of its situation in the midst of the Mediterranean, into which it extends from the continent of Eu¬ rope like a natural mole, 621.4 miles long, from northwest to southeast, and flanked at an in¬ considerable distance by two other peninsulas, it was most favorably situated to play a prom¬ inent part in the history of human progress, and particularly until the discovery of America, i.e., during the many centuries in which, before the conquest of the Atlantic Ocean, there were concentrated in the Mediterranean the most successful efforts and the most glorious annals of human history. No country of Europe can compete with Italy in worthy historical mem¬ ories, both in the ages of antiquity and in the Middle Ages; and from the middle of the 10th century to the present time, after the cutting of the Isthmus of Suez, the importance of the Mediterranean has again greatly increased ; and as the unification of all the Italian states into one nation occurred about this time, there be¬ gan for Italy a new historical period in which are already evidences of new progressive growth in the country.

Boundaries. — The boundaries of Peninsu¬ lar Italy are the three seas already mentioned; but on the continental and insular portions there are different opinions. There is no ques¬ tion regarding the political boundaries, since Italy is politically bounded by the confines of the kingdom, which were recognized in the last treaties, and liable to be changed by subsequent treaties. The difficulty arises in regard to what are called natural boundaries, for the reason that various authors start from different stand¬ points — some taking purely geographical lines; others ethnographical, or linguistic; others mil¬ itary, or historic boundaries, etc. On this point Italian writers differ not only with foreign au¬ thorities on

the subject, but they also differ among themselves. And this is not unnatural. Along the boundary line between Italy and the European Continent there have been through the ages so many historical happenings and so many different races, that the distinguishing traits of nationality and language are no longer clearly defined, but are blended in promiscuous belts, which must account for the varied opin¬ ions of the writers. But it must be remem¬ bered that the ethnographical, linguistic, mili¬ tary and historical data referring to the past, present or future distribution of tongues, and political or social institutions belong properly to anthropological and sociological geography, whilst physical geography, of which alone we are treating at present, deals with nothing but the physical characteristics of a country. There¬ fore the clearest and simplest way of treating of a peculiarly mountainous region is the oro- hydrographic point of view by which we begin by tracing on the immense extent and variety of forms of the Alps the dividing line between the water-sheds of the opposite regions. This leaves well defined the principal part at least, if not all of the northern boundaries along the Alps, following the line which separates the water-sheds of the Rhone, the Rhine and the Danube, which have nothing to do with Italy,

from those of the Po, the Adige and other Alpine rivers which undoubtedly belong to Italy. But even in regard to these physical boundaries there is a difference of opinion as to where should be fixed the extreme limits of the east and west boundaries of the continental portion and the exact limits of the fluviatic basins.

Other uncertainties may arise, and for the same reason, although in lesser proportion, even in the insular portions of Italy which gave rise to controversy regarding the assignment to Italy of certain islands in the Dalmatian Arch¬ ipelago and in the Sicilian Sea. As for the re¬ maining islands, both large and small, geog¬ raphers as well as geologists assign them to geographic Italy, on account of their proxim¬ ity to the mainland, as well as to their geologi¬ cal formation, to the shallowness of the water between them and the mainland, etc.

Extent. — The 'natural, or geographical, ex¬ tent of Italy computed according to this stand¬ ard is 321,570 square kilometers (124,157 sq. m).

Of this extent of area 40 per cent belongs to Continental Italy; 42 per cent to Peninsular portion and 18 per cent to the islands. The kingdom of Italy comprises 89 per cent of this — practically 117,982 square miles; and the area of the Italian colonies in 1916 was 601,200 square miles. Italy's area in Europe alone is exceeded by that of Russia, Rumania, Germany, France, Spain and Sweden. The kingdom of Italy amounts in area to only the 25th

part of that of the United States of America, and exceeds slightly the area of the New England States and New York combined.

Sea Coast. — By reason of its special shape and position, of its extending into the midst of the sea and of the many islands which belong to it, geographical Italy has a very extended coast line, of which only 51 per cent belongs to the mainland and the rest to the islands. On that account the length of the coast line is suf¬ ficient to enclose a circular area more than four times as large as the area of Italy. And that is why, owing to this superabundance of coast, which is one of the fundamental conditions for the development of maritime activity, Italy has no naval superior in Europe, except in Great Britain.

However, the historical or sociological value of these coasts is very diverse. In the first place they are not sufficiently indented, as for instance are the coasts of Great Britain. More¬ over, there are long stretches of coast without natural landing facilities or harborage for ves¬ sels of considerable tonnage.

The northerly portion must be excepted, as it carries on an extensive internal and foreign commerce, which by its exports and imports greatly stimulates maritime activity.

The uniform coasts of the Adriatic are es¬ pecially poor in good harbors, as are the steep¬ er and more varied coasts of the Ionian Sea, of Tyrrhenian Calabria and of the more westerly isles.

With all this there are more favored tracts of coast, especially along the Tyrrhenian Sea, where the coast is often precipitous and forms an uninterrupted series of gulfs with high promontories beneath which the beach curves in large semi-circles. But the most favored of all are the small but attractive Gulf of Spezia, best adapted by nature to the military require¬ ments of the country; the splendid Bay of

oTafetti

Castel la Cecchlna o Mang.nl .

X jMatreJ,#

Landeqk'

ligenˆTut

'Glfitrus

Lienz

Vaechereccl al

*\ r~ ~Tr R **

Gpschei eja? ^Airolo

5f / v

Lake Geneva'

tmw

*N^Barimb^*

- *$ v«*

•Tirano 1

Fort,

Braschifl

/^/Gles

'ort Tlburtlna

\ChiavennaN ^ SondriO^^ rA ~ –

Stein

*-.WMahiagftnv^*

The yatic Ft. o \ Valcanuta \ 0

jCanobblo1

T. Scblail

Pordenoi

3bu jjl

Tprenestina ^ l Fort Preneitln Avilla CertOB**

Villa j jamphilj i

Ft./Aurelia

jAntica

Bk«Ban«/\ˆyPort<)6ru&ro

Uolgo J.‘vVENICE TR

/ p»,lu“] f GULF

V E N I

•egnago l jiVyefˆˆJlChlogglA

loeffˆSaloˆ Sv Garc/al

Gottachee’

|>//J >’%■

Vigna Buccil

o Villa , Acquarl

JaprlnA,’

W ioenza ,

nlVoroim/

U/Chlarl

Villa/Nert

Gasilina

ercellil

[S. Paolo

illafrauca)

ˆII/S 2®F

ParenzJ _

i Villa Consorte

fSlUvoll)

“Bozz olo’IZive-,

Firt Ardeatina< >

ICarmagnc

lacoonigi

‘San l>onning’

fiore

(omaoobio

Valchetta

Ponte Bottero

Carlopago’

ˆ Sa«siiolo\A Modem!)

lAuiUja- | /yg.

Statute Mile, 3ˆ = 1 Inch.*

Ravenna

Environs of ROME

avona

GULF OF GENOA

iCervla

Rimini

Sarajevo

■*ˆˆbneglia Porto MaurUlo*

San lit mo

RINO

W’NU > r Sanˆ Pe8a

X o’yifefeW

1) ?) V rMetauroˆJk l‘4-IX.Jtdl Caataia |7\

ˆSsˆenigallia tr lnaldˆˆˆ*A r oOesi)ˆ\

VRCHESˆ

rabriano HX,

iNCONA

Gorgon a I. ,

> OLTA

.Siena

v — -‘s ˆTerontola jfi * Tfe

ChiuBdlno n) TtdI“

i„y Tri»i.a£Ol Pe?uqia!

Q* o MontepulcbmoNˆ — “

caStraila ˆ rfhl“*1 S’/Wlgno ■seall Radicofanl fTT ° Groeseto %
%Orvlitx >

I ° Scanoanqˆ

J\ Lake Iiole(na\ 1 JˆaOrbetello’; Montetiaaoom

ˆ > ˆOBcanclln Viterbo V\N\ Ronciglione

« Corniw«o ..VˆoSutrlˆ;

V\ Tolfa) \

Lakc’Brac°cianJ(~\ °Camjy Ch ita V ecohiaˆVy— T A’ˆT Trˆt

LE81NA 1

Metkovio.

Camplglia Marittli ^Capraja'I. J Piombinoltf

C. Corse >gliano\®

MaBsa

Marittii

W T " p'd"°\

Visio' Ainandola n Xecoli Pioeno^^Jft.

'"' oArq-del Tr\nto

Amatrlce*^ At'riJ\

6neBBft% Cftta^Sant 'Angelo ^ [aAntrbcLoco p ° a,-

Follonica

CURZOLA l.

Ragusa,

Nonza^

He Rousse

CORSICA

CFRANCEij

Gulf of Port , xs-jj—gA

C. Rosso*^^ Cortejl

Gulf of SagoneX Bocogpano

Meleda.1.

Laoosta 1.

Hast! a

■"^Spoleto

It. Florent*

itnclia

Talam

Calvi

Pi a 508 a I.

J’escara

i Giguo I.

-Monte Cristo

irtona ˆP-aglieta ° _nVasto

‘Caraoli CelanosVˆ-_ v_ At< ?/v

*! VˆSpintogˆAN D \

Giannuti

Ternioli

Bastelicai

^°‘Tivol| oSul

San Buono o ,0oU« Gugiionesˆ

C3oRoUlVieste ucapnola Carpino ˆ . . .

Ai°Aprlcena Jlunte Sant Angelo

> A. ° >

SaikSevero ˆManfredonia

« \ „ <(Gulf of

o – J «ets<»\Man/redoma

j* J-7 ˆNSˆNjiarlctta .] AJetl«?»o,a_ -ˆ&>ˆTrani

Scannoi

Gulf of AjacSolˆ J AGplb C.JMujoCv?r/

. PaleBtrina 1 W AUtri

Arpino’

Porto Vecchio

“S. Ceocanoi ■Sex :• e Plj^erooN ^

^nifacio

facia

, W °Q C Al’ K E K A-JI

/ ‘F**

iplo

nnla Sj .Tavolara I.

Anzitr

C. >ertu Strait C. Ttf

^.Cala d’Qlivai Gulf of S\ Asinara. J I

Formla

[olfctta

/ (Candela //>Cor*to°

f mt

A / TA Venoaa v^plnaxtoift

• ^.(‘r ^] -A – ^ Xinvii

vlva^Monopofl ^jvFasano iioja dal CoHC^dant iartiua F r anca°^\T^—«-»B r l n dlsl, C^Ue’MenapEMV rMaaBafra Oria-^r /”{ ia^o \ ^^^^Parantu “‘d Campl oNT^r

v^»^40 Mandurl* ^

-V-w-^Nardo V

o Zannone I. ^ ’0>ZA I.

Vbntotenb I t’

Aversa-;

Palmarola

Altaim

Portotorres’R-ˆMT. LIMBˆ‘r’a

*C. Argentiera*C ‘CiˆSassari C. Caccia»IˆAIgherˆ kBonorn*

’C. Coda Cav&llo

del Pugani ,,.»»Haoi Saleiino- ‘■Npr

ITCBU l£J”’ j Capri L

’OTENZrvˆr. Latent

v_ ‘ -ri J o (

KSSStettfe

\ \ ASX? Bernaldao_ˆ/

Tegglano Vfelˆ- “ˆStigllano piRtlo < }| K

‘Oziefi

•iniscola

‘ˆAlVo

G«//o/V4f

Salerno \y Agropoljn Tallo del\L

ˆ70 rose i Gulf of Orosei

fabomer

MT. URTli

C. Manna –

GULF Gallipoli/

inargentu

imendolara

OF

TARANTO

[Tortoli

C. San Marc.ˆT ‘Grislanof J,

Gu!/%°ˆd \ i-4< i

\ IsiliX 5

V \ Sanluri I

ˆ-LapgTo

\6arigliauo Calabro —gvV I

la

Ci 6o»enin Saˆelli 1

- J

10 ; P;Mii(Petllia-Pol

Martiranp’/|,, °

df cfi- X ‘ Cutroˆ

-U CATANZA50

Bclvederfeb

i. ˆan % 0 Villa, [gleaias 1

Muraverˆ.

lomannu

ˆgliari

- JT°

AtfFiETR o’ Lfn Carlofortfej Sanx Anxioco I.

trongoli I tro

5 Cot rone

M

ievera,

C. Carbonara

Nocera Tirlnesˆ

JJicasl

**’ \1 V| v/y. .*

C. Teuladaˆ C.

TJ. Rizzuto

ˆStromboi

ssssw- ˆ II

f)° Nlcotera ˆ ■ w ■polfr’tenaˆO f CajJ/ox’ i’Clttaoo’.r’ˆRocceU..*

‘ˆScUla.ˆt’- ˆ13 q race

.Reggio’fdi/ˆCalabrla)

I’rf’ Bianco _

.IN A I. LlPARl I.

.Aureal I.

Fe LICU 01 1. ISLANDS

VULCANO I.

EXPLANATORY KEY

*T4ˆ.~Area ceded to Italy. ˆ_*

16. Area disputed by the Serb-Croafe State and Italy.

JHarittimo 1.ˆˆ

Favionana r ˆ .Marsala!

[£dl Porto Salvo

AliBtretta- G«gl Troina

‘ Nicosia0 B

nibiCˆMT. _

Vbeon fort e 0x..(n

, r Y

/; vCastroeinyanui’

\filt .iii-ftta — ˆ

/ c0“w%ˆ*

Butera Viziinj/?

Iscemi

Sovene

Ludazzo,

*LLnguagloBB**

FGiarre

‘Aclreale

Salem! o

Prlzzi’

M a /arSˆ!

del Valle’

taltalwlloita,

Tut an in

‘Augusta « Syracuse

»Avola

loto

’achino

C. Passer©

iKelibia

Pantelleria I.

lenzel Heurr

ITALY

[Naoeul

/ˆHammamet / Gulf of fllammumet VHergla

Statute Miles, G7 = 1 Inch.

.Valetta

Linosa

Kilometres, 110 = 1 Inch.

Mt.iiastir

■*3j-ainta*

Rond McNally b Co.’s New 11 x 14 Mop of Ital£ Copyright by Ran

Iampei

Longitude East from Greenwich.

&s.

0DofriS

tntenne ˆ

. NKˆ-/CaBtel del Paxil

P A

J)vill» Jl

4 art la ®

£s$L 7?

*| r**

JAR'OaiS

h

SC. js A

Livna

Q

ˆSpalato

Mobtarh /jˆ X '

j

2

3

44°

4

5

42°

0

7

40°

9

38°

10

11

ITALY — PHYSICAL GEOGRAPHY (1)

Naples, the richest in natural attractions, the centre of the greatest agricultural and fishing industries, toward which are attracted the com¬ mercial interests of almost the whole of south¬ ern Italy; and the spacious Gulf of Genoa, with its magnificent Riviera, of Levante, and of Ponente, almost without any lowland, particu¬ larly the Levant Riviera, which is cultivated like a garden. From this Gulf of Genoa extend the principal thoroughfares to the chief indus¬ trial provinces of Italy, and toward the richest European countries outside of Italy. On the Adriatic Sea the opening of the Suez Canal re¬ stored the old-time international value of the Brindisi coast, and that of the less ancient, but much larger, Venetian coast. And the fisheries of the same gulf and its lagoons give a still greater value to certain small inlets and inden¬ tations in the coast, which suffice for the mod¬ erate needs of fishing boats.

Oro-Hydrographic Conformation.— The surface of Italy is chiefly mountainous. The largest Italian plain, slightly above sea-level, ex¬ tends through the continental portion, i.e., in northern Italy. This plain has an area about equal to the combined areas of New Hamp¬ shire and Vermont.

Peninsular Italy, and especially the islands, is covered for the most part with mountains and hills, between which are numerous valleys diverse in appearance and extent; some quite large, particularly along the lower course of large rivers and in the vicinity of the sea coast. In the regions traversed by the largest chains of the Apennines there are some vast and high valleys entirely enclosed by opposite chains of mountains, such as the tableland of Aquila (Aterno), of Rieti (Velino) and of Perugia (Alto Tevere) . But all the plains of Italy, taken together, represent but a third part of the entire area distributed in various regions, in varying proportion, so that the mountainous area is equal to about 56 per cent of northern Italy; and 67 per cent of central Italy; 60 per cent of the islands of the kingdom. The moun¬ tainous area is even greater in those portions of the Italian regions outside the kingdom.

The Plains. — The great northern plain is formed by the level portion of the river basin of the Po in Venetia, Lombardy and Romagna. In middle Italy the larger plains extend along the Tyrrhenian coast in varying width between the Magra and Terracina, and flank the middle and lower banks

of the Tiber, the Arno and the Ombrone. In the south these plains are in the classic Campania felice, on the sides of the Garigliano and Volturno, and toward the Adri¬ atic form the tableland of Apulia. In the islands the largest plain is that of Campidano in Sardinia.

These plains are formed chiefly by alluvial deposits caused by the agency of atmospheric forces and by erosion of the base and flanks of the surrounding mountains and distributed by currents of water in areas which primarily, at least in certain localities, were seas. We find this in the greatest proportion in the valleys of the Po and Venetia, which geologists assure us were in former days a portion of the present Gulf of Venice, which extended like a deep in¬ dentation as far as Piedmont.

Mountains. — The mountains of Continental and Peninsular Italy are divided into two sys¬ tems : that of the Apennines and that of the

Alps. The island mountains arc considered, particularly by geologists, as continuations, to a greater or less extent, of the mainland chains. The system of the Apennines belongs entirely to Italy. This is not the case with the Alps, which extend for the most part into other countries, as France, Switzerland, Austria and Hungary. They form, as has been said, the land boundaries of Italy, not in the sense that Italy terminates at their southern base, al¬ though we consider as geographically Italian — as previously mentioned — all the Alpine re¬ gions whose streams empty into the river Po and into the Venetian rivers.

To this belong partly or entirely many of the great Alpine colossi (from 11,000, or a little more, to 15,781 feet) such as Mount Viso in the Cotian Alps, the Gran Paradiso, in the Gra- tian Alps, Mont Blanc and Monte Rosa, in the Pennine Alps, or Valletian Alps, the Adula (Rheinwaldhorn) , in the Lepontine Alps, the Bernina, the Orteles, the Adamello, the Wild- spitze in the Rhetian Alps, the Vedretta Mar- molata in the Dolomitic, or Cadorine Alps, and many others. And the most important thing to observe is, that in this part of Italy there arise from the great plains of the Po and Venetia numerous valleys, many of which are situated in an almost normal direction to the geograph¬ ical axis of the whole system, and pursue a rel¬ atively short course from the Italian lowlands to the heart of the whole mountain region, reaching almost to those long longitudinal, or oblique valleys of the Upper Rhone, the Upper Rhine, the Inn, the Drave, etc., which are characteristic 9f the non-Italian Alpine water¬ sheds, and which lead to the flourishing Euro¬ pean countries situated on the slopes of the whole mountain system.

Through this singular conformation, the passes, the cols, the saddles, which are found along this boundary were necessarily destined to become the

doors of communication between the inhabitants of either water-shed, with the double difference — serious on account of its advan¬ tages, as on account of its perils — that, in the first place, in the north one can reach these passageways by long valleys of easy ascent whilst to the south one has to climb a more precipitous ascent. As T. Fischer says, these gateways are adapted rather to enter Italy than to leave it ; and again, these passes radiate and diverge in three directions from Italy as a cen¬ tre — to the west, north and east — toward the three principal centres of European population, and these three nations all have on the side of the Mediterranean only one neighbor, whilst Italy, on the north, has to deal with three.

The Apennines— As for the Apennines, they form geographically, and not geologically, the continuation of the Maritime Alps along the Gulf of Genoa, enclosing on the south Continental Italy. They then turn their axis in an oblique direction from northwest to south¬ east, traversing the whole of Peninsular Italy. They form a great curve with the concave por¬ tion toward the Tyrrhenian Sea, and in cen¬ tral Italy they extend their principal masses rather toward the Adriatic, approaching then the Tyrrhenian Sea in southern Italy, i.e., the Campania, the Basilicata and Calabria. Geog¬ raphers now make the dividing point between the Alps and the Apennines the Col di Cadi- bona, or Altar Pass in the west-northwest of

Savona. The Apennines form neither a single nor a continuous chain; but from the principal branch they separate into several spurs and ramifications, or the main chain spreads out in clusters or groups of mountains with terraces, and noted tablelands, such as those of Aquila, Rieti and Perugia, or divide into a number of chains more or less parallel to each other. Geologists do not attribute to the proper Apen¬ nines many of the mountains in the western part of the peninsula — which includes a great part of Tuscany, of Latium, of the Campania and some portions of Calabria — the mountains and tablelands of Apulia, the volcanoes and part of the Peloritani, in Sicily, all those of Sardinia, of Corsica, of the Tuscan Archipelago and many others. The groups and chains, denied by geologists to the Apennines, are as¬ signed by them to other formations, belonging to an earlier geological period, which makes the geography of Italy assume a very different aspect.

Certainly the geological variations found in the study of these lands have great value, not alone in the line of science, but also in regard to the present orographic surfaces, to their per¬ manency and to their mineral

and vegetable products, with all the consequences that ensue in the various regions owing to the habitation of man. Geography shows us primarily that the mountains of the peninsula, as compared with the Alps, are not of any great extent or elevation, none ol them attaining a height of 9,750 feet — except Mount 2Etna, which is out of the peninsula and is a volcano ; and that the greater number of them are scarcely 6,500 feet high. The highest peaks are found in the most mountainous part, within the limits of 'Abruzzo, which contains the greatest mountain masses of the Apennines and the highest tablelands in the peninsula. In this region is Mount Vettore (8,043 feet) in the Sibilline Mountains between Nera (Tiber) and Tronto; the Peak of Sevo (8,050 feet) to the right of the source of the Tronto; Terminillo to the right of Upper Velino (Nera Tiber) ; the Gran Sasso d'ltalia (The Great Rock of Italy) to the right of Upper Vomano, with many points higher than 6,500 feet, and Monte Corno (9,493 feet), which is the highest peak in the peninsula. Majella has also similar altitudes, among which the highest is Monte Amaro (9,084 feet) to the left of the source of Aventino (Sangro) ; then Mount Velino, Sirente, Mount Petroso, Mount Meta, Viglio, and about 10 others. There are few considerable altitudes in the rest of the penin¬ sula, one or two in the southwest of the Basili¬ cata, none in the islands except Mtna, and a few summits in Corsica, among which the high¬ est is Monte Cinto (8,807 feet).

Compared with other and less mountainous countries useful minerals are relatively scarce in Italy. A young country, from a geological point of view, it does not possess in its Apen¬ nines such mineral products as are furnished by more ancient formations and which are an element of power to other European nations. Iron ore is mined specially in the not extensive island of Elba ; other metals, but not in large quantities, are found in Sardinia, and in the Alps of Lombardy and Venetia. Fossil coal of the best quality is found nowhere; on the other hand, much sulphur is found, especially in Sicily. Statuary marble is found in Tuscany,

in the Apuan Alps and always in places where the mountains are not of the formation assigned by geologists to the Apennines. But the fact remains that the mineral products do not con¬ stitute a factor in the wealth of Italy.

If we finally consider the Apennines in their general external aspects, the observing traveler who has crossed the Alps will find that the mountains of the peninsula differ from them not alone in height, but also in other special characteristics. There is wanting in the Apen¬ nines, in almost all their extent, the fearful and wild grandeur of much Alpine scenery; there are wanting the glaciers and the perpetual snow; there is wanting the Alpine vegetation, so rich in varied tints and extending in some parts to the most unusual altitude. The Apen¬ nines, on the contrary, are less ponderous, less dentated, less varied, less severe and precipitous, the valleys less

narrow and hemmed in, but also with scantier and less varied vegetation, and with many barren tracts, showing the bare sides of rock.

But as a compensation there are numerous large and pleasant valleys in almost every di¬ rection, where the regular sections of land, with a variety of cultivation, with verdant hills and mounts covered with villages, with a sky that is almost always bright, make a pleasing contrast to the barrenness of the distant moun¬ tains.

Rivers. — The outline and character of the Italian mountains is pretty clearly found in the physical hydrography, in the climate, in vegeta¬ tion and, finally, in the great lines of Italian history.

Beginning with the waters we find in the north, as well as the largest plain, the largest river of Italy, the Po, which crosses the entire valley in its greatest extent from west to east, and which, in proportion to the modesty of its length (only 260.9 miles in a straight line), may be considered to have the greatest volume of water of any river in the world. The hydro-graphic basin of the Po and its tributaries is relatively of great extent ; for to every kilo¬ meter of its course there are more than 104 kilometers of tributary area.

The amount of water that the Po carries to the sea (greater in the seasons of the heavy rains and the melting of the snows) is always quite large, for the reason that when the con¬ tribution of the Alpine tributaries, the Adda, Ticinus, etc., is less abundant, i.e., in winter, that of the Apennine tributaries, the Panaro, Taro, etc., is more so. The volume of water is greater in October and May, and it often does great damage to the surrounding regions. How¬ ever, notwithstanding all this abundance of water, the Po, as a medium of navigation, does not present the facilities that might be expected, for it wTorks potently and unceasinglv to change not only its banks, but also the position and ex¬ tent of its many sand and mud banks; and its various outlets into the sea are neither ample, nor deep, nor permanent. Its waters carry and deposit around and about its mouth in the Adri¬ atic great quantities of mud, which gradually form an extension of its mouths into a belt of land estimated to increase about 244 feet a year. These deposits would be larger still, if the waters contributed by its most important Alpine affluents, the Adda, Ticinus, Oglio and Mincio, were not purged of all detritus, which,

they get rid of in crossing the Lombard lakes.

Among the Alpine rivers which flow into the Adriatic must be mentioned the Adige, which, as compared with the Po, is inferior in the length of its course by only about a third, but is also four-fifths smaller in the amplitude of its hydrographic basin and still less in its vol¬ ume of water.

In the peninsular portion and in the islands of Italy, the not extensive area and the special distribution of the mountains do not permit the formation of large rivers ; those on the Adriatic coast, of the peninsula, where are found the principal groups of the Apennines, are the small¬ est. Here, on account of their short and pre¬ cipitous course, the rivers are more like tor¬ rents, except the Reno, which traverses the Romagna plain for a long stretch, and some that rise behind the crest of the coast chain in its ponds and recesses, as the Sangro, the Pescara, etc. In the Ionian Sea also similar causes, and, in addition the prolonged drought in summer, withdraw every value also from the larger rivers, such as the Busento, the Bradano, etc. But to the west of the Adriatic chain of the Apennines there is more diversity and less uni¬ formity in their knots and sinuosities, for being more numerous they can form valleys in direc¬ tions more or less oblique to the coast line, uniting longitudinal tracts of valley to trans¬ verse tracts, and hence they can develop larger rivers with more extensive basins, as the Tiber, the Arno, the Volturno, the Liri-Garigliano, etc.

The Tiber, the river of universal historic fame, is the largest river of peninsular Italy. Its length is almost equal to that of the Adige, but its hydrographic basin is more than one- fourth larger. Its sources (Monte Fumajolo) are about 149 miles distant from those of its most southern affluents, the Aniene and the Teverone (Monte Viglo) in a direct line from north, northwest to south, southeast. It re¬ ceives the waters of almost the entire Tyrrhenian water-shed from the greater Apen- nine groups. For that reason, especially from autumn to spring, it is liable to frequent floods, according as the downfall of rain and the melting of the snows occur in one or other or all parts of its vast basin. The country, and chiefly the city of Rome, suffered greatly from these floods until the recent works of systemization in the city, which formerly experienced every year, and even several times a year, the invasion of the river which over¬ flowed the lower wards to a depth of 10 or 12 feet. The Tiber also continues by means of de¬ posits to extend its estuary. From the time of Christ up to our day it has added a stretch of beach more than two and one-half miles wide.

The Arno, the Tuscan river, so celebrated in the history of civilization and so dear to vo¬ taries of the arts, has a course only three-fifths as long as that of the Tiber, and hardly half the extent of its basin. Its principal valleys may be distinguished by natural diversities very marked in four regions, i.e., in the Casentina, or Casentine Val d'Arno, wider and less impetu¬ ous up to its junction with the Tuscan Chiana; the Upper Val

d'Arno, shut in between the oppo¬ site chains of the Pratomagno and the Chianti; and the lower Val d'Arno, from its confluence with the Sieve until it reaches the sea, the most flourishing portion of Tuscany. But even in vol. 15 — 28

this last region it recalls the type of torrent, as much by the coarse deposits from the bed of the river as by the tremendous force and agita¬ tion of its waters. At Florence it may rise from a minimum flow of three cubic metres to a max¬ imum flow of 1,000 cubic metres, and in excep¬ tional cases to 2,000 cubic metres of water a sec- rn r at Piston the level plain, it may fall from 2,000 cubic metres at flood to a low level of 15 cubic metres a second. Its flood tides are most often in December, and in the preced¬ ing and subsequent months. Its lowest tide is in summer. The matter deposited at its mouth from the time of the Romans up to the present day forms a stretch of beach more than five miles wide.

Lakes. — Among the Italian lakes worthy of special mention are . the beautiful Lombardy lakes, Lago di Gardi, or Benaco, 140 square miles in extent ; Lago Maggiore, or Verbano ; Lago .di Como, or Latrio ; Lago di Lugano, or Geresio, d Iseo, or Sebino, di Varese, etc., which are long valleys enclosed between spurs of the Alps, shut in and protected toward the north by the. mountain, more open toward the south, and. girdled, by abandoned moraine hills, by ancient glaciers, with less imposing scenery, in general, than that of the Alpine lakes of Switzerland, but yet more pleasant on account of the smiling southern landscape and vegeta¬ tion; great basins of deposits, where the abun¬ dant waters of the rivers are purified before irrigating the luxuriant Lombard countrv. In other parts of Italy are scattered smaller'lakes, historically famous, as the Trasimeno or Lake of Perugia, the Lago di Bolsena, the Sabatino or Bracciano Lake, of Vico, of Albano, of Nemi, not far from Rome, situated in the craters of spent volcanoes; and many coast lagoons, such as the Venetian lagoon, the ample Val di Comacchio, situated north of Ravenna, the lakes of Lesina, of Salpi to the north and south of the spurs of Gargano, and several others.

Climate.— There is a great diversity of cli¬ matic conditions in the different regions of Italy, caused not alone by the difference in lati¬ tude, but also the multiplicity of the ramifica¬ tions of its principal mountain systems.

Italy is very long from north to south com¬ pared with other countries. The German Em¬ pire, for instance, covers less than 8° of lati¬ tude; the kingdom of Italy, which is a little over half as large as Germany, covers more than 10°. Hence it follows that in the most northerly regions the sun does not set in certain places in summer until, almost one and one-half hours later and in winter, almost one and one-half hours earlier than in

more southerly points. At the same time, however, the angle of inci¬ dence of the sun's rays on the horizontal plane in various places becomes greater at all places in the south and attains to 10° more than in the north ; and. it exercises therefore a much stronger calorific influence. Therefore the longer continuance, of heat of the long summer day in the north is made up for in the south by the greater intensity of the sun's rays and the continued clearness of the sky, and the difference in the summer temperature between the north and the south of Italy would tend to diminish, while in winter the greater length of the day as well as the greater intensity of the

sun's rays combined produce a condition advan¬ tageous to the southern portion, and the cli¬ matic differences in winter between the two por¬ tions of the country also caused by the sun in diverse latitudes will be more marked.

But to increase this meteorological diversity there enters the special oro-hydrographic con¬ figuration of the country. The sea which sur¬ rounds Italy, and which, except in the northern portion, is distant a maximum of almost 62 miles from any inland point, tends to lessen these extreme differences, but in very diverse ways according to the direction of the prevail¬ ing winds, and the mountain ranges.

Thus the great northern plain enclosed on three sides by mountains, as if it were a great amphitheatre, sloping down and open toward the little Mar di Venezia, does not profit as much by the tampering action of the sea as the rest of that portion, whilst it is exposed almost without protection to the atmospheric influences from the interior of the eastern European continent ; its climate becomes neces¬ sarily <(Continental,® i.e., extreme, with intense cold in winter, and great heat in summer, no more than one might expect from its greater distance from the equator. In fact, the tem¬ perature in Palermo in midsummer is 23°.9 centigrade; in Naples 23°.2; at Venice 23°. 1 ; at Milan 23°; whereas in winter it is 11°.2 at Palermo; 8°.8 at Naples; 3°. 7 at Venice; and 2° .2 at Milan. To this must be added the other great climatological factor of rainfall. The magnificent bulwark of the Alps which encircles Italy to the north acts as a powerful condenser of the moisture of the atmosphere, carried by the prevailing winds from the Tyrrhenian Sea, whence the enormous down¬ fall of rain and snow which the year round feeds the numerous affluents on the left bank of the Po, and the rivers flowing into the Gulf of Venice. The amount of rain reaches in northern Lago Maggiore (Cannobio) yearly 1,332 millimeters, and this is higher on the Carnic Alps (yearly 2,248 millimeters), where the currents of

moisture from the Mediter¬ ranean spend themselves, either surmounting the minor obstacle of the depression in the Ligurian Apennines, or avoiding this obstacle traveling by way of the long channel of the Adriatic. In Peninsular Italy, on the contrary, the special distribution of the Apennines and of the prevailing aerial currents produces a diversity of favorable conditions in the various regions. The Apennines and the other moun¬ tains sloping toward the Tyrrhenian Sea are more frequently exposed to warm and damp currents deviating more or less from south¬ west direction, while on the Adriatic slope there is in winter exactly the opposite, and in sum¬ mer a great variation of currents. Hence, in

all the country situated on the Tyrrhenian Sea from the Ligurian Riviera to the Gulf of Salerno there is a more copious rainfall. The regions at the base of the northern slope, on the contrary, have a smaller annual rainfall. Still smaller is the rainfall around the Plain of Foggia and near the Gulf of Tarentum, and in almost all the islands.

To the vegetation, however, is no less im¬ portant than the annual amount of rain, the manner in which it is distributed in the differ¬ ent seasons. In the southern portion there are

two months during the warm season in which there falls not a drop of rain. In the north rains are frequent even in summer, often in the form of noon-day thunder showers, which arc destructive to the ripening fruit in the fields. (Summer average of rainfall: Palermo, 28 mm.; Naples, 55 mm.; Venice, 198 mm.; Milan, 236 mm. Winter average: Palermo, 292 mm.; Naples, 281 mm.; Venice, 123 mm.; Milan, 193 mm.).

From all this we may conclude that it is not very exact to speak of ((the climate of Italy,® when there are so many different cli¬ mates, according to the topography of the vari¬ ous regions.

Local conditions serve again to modify these distinctions, and are determined more espe¬ cially by the formation, altitude and position of the mountains and valleys with regard to the prevailing direction of the aerial currents.

But all these variations do not modify the influence of latitude to such an extent as to prevent Italy, especially on the Tyrrhenian and in the central and southern latitudes, from being noted, in comparison with Europe, for an extraordinary mild climate, rendered still more agreeable by a larger number of cloudless days, and often made delightful by an enchanting splendor of the sky.

Animal and Plant Life. — In consequence of these conditions it is enough

to refer to the characteristics of the Italian vegetation. The Italian flora is considered by botanists to be ex¬ ceedingly varied, owing to the temperate cli¬ mate, as well as to the variety of climates which are suitable to a greater number of botanical species. In addition to this, for a long period, man has voluntarily, and involun¬ tarily, been increasing the species. Together with plants belonging to cold regions, there flourish in certain places plants belonging to warm countries. To mention only the best-known species, in the south there are orange groves, hedges of agave and spunzie, and cot¬ ton, sugar-cane and date palms ripen there; but many of these and other more or less tropical plants may be found also in places on all the Tyrrhenian slope as far as the north, where they even brighten the Ligurian landscape. Similarly, there grow quite extensively in Italy, especially near the sea, evergreen trees and shrubs, which give a characteristic appearance to the winter landscape. But most important of all is the olive, which grows all over central and southern Italy as high up as 1,600 or 1,900 feet above sea-level, and in the islands as high up as 2,600 feet. The olive does not grow in the Venetian and Po plains, on account of the severity of the winters, but it may be found in places protected from the north wind and weather, as on the sunny slopes of the Lombardy and Venetian foothills of the Alps, and of the volcanic Colli Euganci. And to¬ gether with the olive may be found other southern vegetation. In the plain of the Po the summer climate makes remunerative the cul¬ tivation of not only vines and other fruit-bear¬ ing shrubs, and exotic plants, but also the cul¬ tivation of rice. In the whole of Italy, there¬ fore, in the plains and on the less precipitous slopes are cultivated the different cereals, in¬ cluding maize in some regions, for instance, Abruzzo, and in some spots 2,600 feet above

sea-level. And while, in Continental Italy, the yig.orous winters suspend vegetation, in South Italy the groves of lemons and oranges and the pastures remain green, and many trees and shrubs are covered with leaves and flowers.

As for the animal kingdom, there are no species that have characteristics worthy of mention in these brief geographical outlines. Many centuries of history and the great num¬ ber of inhabitants have reduced to a minimum the species of animals that are not useful to man. Agriculture is carried on in favorable legions; grazing in summer on the mountains, and in winter on the marine plains. Fishing is carried on extensively on the sea coasts, and cattle, swine, sheep, horses, silk-worms are

1 r – t 111 more or jess abundance. Many species ot fish are found in the Tyrrhenian Sea; among them are sardines and tunny-fish. There is also an

industry in coral. The distribution of these various industries depends, of course, on the oro-hyd.rographic conditions.

Population. — The Italians form one peo¬ ple, and with very few exceptions speak one national language. But they present an extraor¬ dinary number of variations in character and physical type, as well as in dialect, which is a natural consequence of the varied regional and chmatic conditions of the country, and of the many thousand years of historical changes, in¬ vasions, conquests, intermingling and separa¬ tion and the various phases of civilization, out of which Italy of the present day has evolved. Before the Middle Ages, ancient history gives a record of the inhabitants of Italy as Iberi, Si- cani, Siculi, Liguri, Veneti, Iapigi, Etruschi and the great family of the Italian people prop¬ erly so-called: Umbri, Sabelli, Latini, Volsci, Oschi, and in the north the Galli, besides the Greek and Phoenician colonies of the south. Modern glottology finds traces of all these stocks in the division and differences of the present Italian dialects. Then came invasions and immigrations, small and large, of Germans, Arabs, Slavs, Spaniards, etc., at the beginning of the Middle Ages, and during the subsequent centuries; and as a last relic of these, there are found at the present day, within the kingdom, some isolated patches in the Alps, and in the Venetian foothills of the Alps, and in the high valleys of the Sesia and the Toce; Franco- provengals in the Piedmontese Alps; Slavs in the Julian Alps; Greeks, Albanians, Slavs and others in southern Italy and the islands. But taken altogether these colonies do not amount to-day to more than about 200,000 souls. Then again, this number is gradually decreasing with the multiplication of modern means of com¬ munication and with the increasing association between different districts. Further, the so- called ((Compartimenti territorialˆ (Piedmont, Liguria, Tuscany, Latium, etc.), which are more or less directly referable to transmitted histor¬ ical divisions, have their raison d'etre in a double order of facts, that is to say, in a com¬ bination marked with diversities inherent to the country, and in a condition of oro-hydro- graphic segregation more or less complete. Considered in their chief lines, it can be shown that they represent almost all not conventional divisions, but ((geographical provinces. ® And we must here seek one of the most cogent rea¬ sons for this political division, on account of which Italy fought for so many centuries.

When once the military and political valor of the. ancient Romans united Italy it was one of their chief and most laborious and wisest tasks to prevent the segregation of the various races by their network of celebrated roads. And even yet, new Italy in its formation into a single state feels the imperious need of uniting and bringing into closer contact the various

*prov¬ inces ot the kingdom by means of rapid com¬ munication by roads and railroads, and by the expenditure of a relatively large sum of money to t° *way with the natural inland barriers of the Apennines, by making roads across them at fully la points, with 15 different railroads, making furrows here and there through all the mountain system for long distances, also along its whole length, and enclosing the country as with a network of protection, with an 'im¬ mense. circle of steel rails.. Thus whilst the climatic and other geographical diversities re¬ main unchanged, and give variety and a valuable stimulus to the various industries of Italy, mod¬ ern civilization improves on nature by modify¬ ing the danger arising from segregation due to the natural formation of the geographical provinces, by promoting and cementing national unity.*

In 1915 the population was 36,120,118 to which should be added the population of the redeemed territory — 1,408,296, making the total

37,528,414.

Bibliography. — For a more profound study of the physical geography of Italy we recom¬ mend among others the following works : Mari- nelli, G., (The Earth) ; a popular treatise on universal geography (Milan). The fourth volume is entirely dedicated to Italy, part I pp. 1-509, particularly to the physical geog¬ raphy. Fischer, T.,

1 vol., with map and illustrations). Both these works refer to others containing re¬ searches on special subjects.

Giuseppe dalla Vedova, Professor of Geography in the Royal Univer¬ sity of Rome; Academician of the ((Lincei ? member of other scientific societies, etc.

2. ITALIAN ARCHAEOLOGY. Italian archaeology, from the remotest periods of human existence down to the Roman Age, pre¬ sents a series of successive phases enclosed by a vast horizon. The archaeological material, which is uniform or nearly so during the Stone Age, at the close of the latter, and at the begin¬ ning of the Metal Age, appears distinctly di¬ vided into regional groups. The people who produced it remaining in their own localities expressed their tendencies under varying influ¬ ences and in different ways, as influenced by their local environment without, however, los¬ ing the fundamental racial characteristics which testify to their common origin. During the fol¬ lowing age of metal these differences increase as waves pile up and mix with waves. To the

difference in implements is added the divergence of funeral rites. In northern and middle Italy, cremation and the placing of the remains in a

mortuary vase take the place of sepulchre; in other regions cremation appears at isolated points, while in others it is absent; all this indicating not only intensified commercial cur¬ rents, but also that there was a real movement

of population. Caution is necessary in attribut¬ ing differences of archaeological material and of rites to immigrations of new people; these phenomena do not always coincide, sometimes they conflict with the spread of race and lan¬ guage. If for a given epoch we should color a map, using four different colors to show the districts in which are found similar material, analogous funeral rites, one race and one lan¬ guage, the four colors would not exactly cover one another. Nevertheless, if there were immi¬ grations into Italy they occurred chiefly in the age of metal and the culmination of the move¬ ment was toward the end of the Bronze Age and at the beginning of the Iron Age. Two facts unite with the data supplied by implements and rites to prove that there was, in upper and middle Italy, an infiltration of peoples from the central regions of Europe : First, the presence in these parts of Italy of a different anthropo¬ logical type with a rather large and round head, whereas in lower Italy the old Mediterranean type of the oblong, finely modeled cranium has remained almost unaltered. Second, the ad¬ vance and then the predominance of the Aryan language, whereas the ancient Mediterranean race which occupied Italy and its islands at the end of the Stone Age had a non-Aryan lan¬ guage.

From the beginning of the Iron Age the dif¬ ferences between the different regions of Italy remain practically stationary as far as the an¬ cient indigenous civilizations are concerned ; but they soon became intensified and simplified by two conquests or civilization movements which divided Italy between them. These two move¬ ments came from the eastern basin of the Medi¬ terranean. From the insular and peninsular countries which afterward constituted classic Greece, there came into southern Italy and into Sicily small successive waves of peoples, at first not yet Aryanized as to language and per¬ haps driven out from their old habitations by new invasions (in these people we can recognize the Pelasgians of tradition) ; then, peoples who corresponded more and more to the conception which we have of the classic Greek (a Medi¬ terranean stock, Aryanized in language). The pre-Hellenic, proto-Hellenic and Hellenic peo¬ ples colonized chiefly the coast and some stretches of contiguous territory. A parallel movement was the establishment of Phoenician settlements, which were, however (except in a part of Sicily), covered up by the Grecian colonization, and are not of great importance as regards the Italian

Peninsula. The Phoe¬ nicians contented themselves with trading with the latter.

The other immigration, which divided Italy with the Greeks, was that of the Etruscans — a people of Mediterranean stock and of non- Aryan language. They came across the sea from Asia Minor and, finding the coasts of southern Italy occupied as far as Cumae, they crossed the Tiber and occupied the country to which they gave their name. From there, cross¬ ing the Apennines, they conquered the AEmilian plain as far as the Adriatic. Their influence branched out also into upper Italy, became ex¬ tended to Latini and over Rome, to the citizens of which the Etruscans were masters in the liberal arts and in religion, even giving them a king. Finally even the most southern Greek coastal colonies felt their influence which as¬

serted itself in the Campania of the interior by its systematizing work of changing old indig¬ enous dwelling-places into regular cities with religious and military organizations, which rose to great importance and to vigorous life (Capua, Nola, Pompeii).

The intensification of the pre-Hellenic and Hellenic commercial currents into real coloniza¬ tion movements took place on the old foundation of the same very ancient Mediterranean stock. The newcomers were not far from their mother country in which the sons of their own progeni¬ tors continued to live and with which they liked to connect themselves, giving to thgir new home the name of Larger Greece M eyakv, E Xkaq. Essen¬ tially traders and navigators, the Greeks did not give much care to the organization of territory. All these circumstances were ex¬ tremely unfavorable to the establishment by them of an Italian nationality, hence the indig¬ enous population of the south and of Sicily in part underwent a rather superficial assimilation which fell at the first blow and in part relapsed into barbarism.

Very different were the conditions in middle Italy when the Etruscans reached it. Before they, in their turn, conquered it the region inhabited by the old Mediterranean stock had already been conquered by the Umbri, who had an Aryan language and European civilization; and the prehistoric Umbria, which was consid¬ erably larger than the region which has pre¬ served the name, the'n underwent a sort of inediaevalism, of transformation and of revival. For their part the Etruscans did not have a home country near at hand w7here their brothers continued to live and with which they could keep up an intercourse. Their motherland was far distant and the connecting links were broken so completely that even to-day it is not possible, except very generally, to identify their original home. For that very reason the Etruscans were much better prepared than the Greeks to re¬ gard Italy as their real home and to co-operate in developing

a national spirit. But we should also mention the characteristics they show in the monuments which have come down to us. Profoundly religious, connoisseurs of art and excellent technicians, although not gifted with the sublime aesthetic sense toward which Greek art was tending, caring less for nav¬ igation and commerce than for organization of territory, the Etruscans got along better with the simple and rough Umbrians and conferred on them the dignity of a superior civilization, beginning with a true architecture, as shown in houses and tombs and the organization of a city and public and military works, up to a religion pregnant with doctrinal and cosmo¬ logical content. One fact which had a great influence in this connection was that the Etrus¬ cans, unique perhaps among the Mediterranean stocks in this respect, had preserved primitive

and homely customs ; they honored the hearth and gloried in the maternal name, mentioning it in epigraphs, whereas the Greeks had inherited from the ˆMvceneans® the separation of the two sexes and the very inferior position of women. By this conjunction of favorable circumstances notwithstanding the different language, the Etruscans very soon forgot, or made others for¬ get, that they were strangers ; they amalgamated the indigenous dements and assisted in creating that Italic civilization with its sentiment of na-

tionality, in opposition to the Greek; a sentiment which still existed among the Roman conserva¬ tives at the end of the republic who regarded anything with a flavor of Greek as foreign and reprehensible. Without the Etruscans there would probably not have been a superior Italic civilization opposed to the Greek; there would have been only the contrast between a rudimen¬ tary and semi-barbaric civilization with one more advanced.

The Gallic dominion in the Cisalpine Gaul bounded the Etruscan power on the north and still further circumscribed it by descending into the Cispadana Gaul. There was without doubt a momentary return to a simpler and more primi¬ tive civilization in upper Italy, but it is not at all true that the Gauls did not manufacture their own pottery, metals and other implements; their civilization has merely been less studied because it was ruder; but in certain points its centres of production can be established.

But the Roman eagles were drawing near to the boundaries of Italy; they closed the vista opened up by Italian archaeological material by restoring to uniformity the civilization of the peninsula and its products. Rome, the inheritor of the Etrusco-Italic national spirit, founded its power not so much

on commerce and navigation as on the organization of terri¬ tory, on the development of terrestrial com¬ munication, of public works and power and of military and political ordinances. Under the powerful hand of the ruler the old population became uniform in civilization and language. The old name of Italy, born in the extreme south of the peninsula, set up for a moment as the standard of the national spirit in rebellion against the leading city, is taken up by Rome, is carried as far as the Alps and remains through the centuries as the symbol of national unity.

In the following outline, necessarily con¬ densed, an attempt will be made to give a more detailed idea of Italian archaeology in the present stage of the study.

I. Stone Age. A. Archceolithic. — Besides the localities mentioned in an article by Mor- tille (Revue mens, de l'ecole d'anthrop. de Paris, 1891) on the diffusion in Italy of axe heads of the type of Chelles, it appears that these objects have been found in other places also. Still more recently they have been seen on the island of Capri (Bull, di paletn., ib. 1906), where, as in the black earth (Terra nera) of Venosa, they are found with bones of animals of an extinct species and precede the great con¬ flagrations caused by the volcanoes of the re¬ gion. On the spread of the so-called Monster and Campigny types (see Colini, ib., p. 203 et seq.) these stone implements had a large dif¬ fusion in Italy.

It is now certain that in the Quaternian Age dead bodies were placed in the caves of the Balzi Rossi (which although situated in Italy belong to the French sphere of influence), with rites which were still in use among the neolithites of western Liguria. (Consult Issel, in Bull, di paletnol. ib., 1906, p. 102).

B. Neolithic Period. — This age is character¬ ized by stones which are polished and bored (hammers, axe-heads, studied principally by Colini) or finely retouched. Polished Italian axes are not usually of silican material, but the most ancient are of green rocks, later of vari¬

ous rocks. Green rock was for a time held to be exotic and a proof of the immigration of the neolithic people, but local strata of it are be¬ ginning to be found and in any case such proofs of immigration do not hold good, be¬ cause it is much more easy for the object itself to have traveled from tribe to tribe as among modern savages. Besides, this epoch has a beautiful and solid pottery made by hand and burned over an open flame as continued to be the case during the prehistoric age down to the introduction of the pottery oven and of the wheel which came with the Hellenic and Etruscan influence. But the neolithic Italian pottery is not only more beautiful and more solid in form, it is also more rich in ornamen¬ tation, which

phenomenon is found also out¬ side of Italy. A class of this pottery, indubi¬ tably neolithic, although the descendants of its authors afterward possessed bronze, is better represented in southern Italy, especially in the grotto of Pertosa, near Salerno. The neolithic period of Sicily, on the other hand, admirably represented by the deposit at Stentinello near Syracuse, is connected in form and ornamen¬ tation rather with occidental development and with the pottery of the dolmens, as Pigorini has already shown in connection with the famous bell cup of Villafrati. Megalithic mon¬ uments are especially known in southern Italy and in the Italian islands.

The Italian neolithites lived in four ways : In grottoes; in fragile huts, the traces of which have been lost; in semi-subterranean huts (in which the part beneath the earth is found filled with human deposits, the so-called ((hut re- mains®), and on pile structures. The argu¬ ments formerly advanced for distinguishing different peoples by the varying style of their dwelling-places no longer hold good, in view of the facts; at times, however, a difference of age may be so distinguished. The dead were buried in caverns or in open ditches, mostly in a doubled-up position, sometimes on a bed of ochre from which the bones became colored, and which led to the belief in the practise of scarifying ; this is no longer admitted to-day.

II. Metal Age. C. TEneolithic. — The pop¬ ulation which qccupied Italy and the islands during the Neolithic Age still remained when it began to possess and to cast objects of copper and then of bronze, or rather of an imperfect alloy as are the oldest ones. The rites and cus¬ toms remained in substance the same, only be¬ coming more developed. This has been amply demonstrated in the profoundly scholarly mon¬ ograph of Colini, (I1 Sepolcreto di Remedello e il periodo eneolitico in Italia. } It is note¬ worthy that in that epoch there were already sporadic cases of cremation, which shows how even primitive indigenous customs evolve and change without the intervention of new people. The singular position assumed by Sicily in this epoch is also worthy of note, with its typical small funeral grottoes cut in the rock and its bichromic pottery painted with linear orna¬ ments of savage taste.

D. Age of Bronze. — For this epoch also we have a scholarly monograph by Colini in Vol. V of the (Atti del Congresso Storico di Roma) (1904, p. 3, et seq., reprinted with figures in the Bull, di paletn. ib. 1903 et seq.). With full understanding of his subject the learned author shows that all the regions of the Italian Penin-

sula and the islands had their age of bronze with tools and with the evolution of a charac¬ teristic civilization, but which varied in differ¬ ent regions according to the different ethnical constitution of the inhabitants. In Sicily, as is shown by the splendid research work carried on and accurately described by Orsi, there is no doubt that the age of bronze was evolved without any intrusion of new ethnic elements, but by the superposition of related elements (Siculi), passing through the straits of Mes¬ sina, upon the most ancient islanders of the same Mediterranean stock (Sicani), and it would have come about independently even without their aid. The Siculan age of bronze is particularly characterized by the multitude of funereal cells out of which lateral niches frequently open, by the introduction of certain architectonic principles, by weapons, instru¬ ments and ornaments of bronze of a charac¬ teristic style and by new commercial influ¬ ences substituting ˆMycenean® products for the pre-Mycenean which already appeared in the eneolithic period. Together with the facts of simple evolution, which would always have come about, there is a revolutionary one, that is, the sudden abandonment without decadence or decline of the singular bichromic eneolithic pottery and the brusque introduction of an achromic smooth pottery of an angular mould (imitation of metal), which almost instantly supplants the other. This fact, inexplicable by the simple theory of evolution, should be placed in connection with the historically certain event of the arrival of the Siculi in the island.

This opinion which the writer advanced (comp. ˆ'Anthropologies 1897, p. 129 et seq.); and has held for some years, is in its turn con¬ firmed by two facts : In southern Italy the archaeological stratum with the characteristic bichromic pottery of the Sicilian eneolithic period is lacking; also the neolithic pottery with decorations, of the type of Butmir and of Knossos evolves in the Metal Age into an achromic pottery of angular mould. The char¬ acteristics of this pottery are the high, broad handles with an opening. They are lacking in the Siculan eneolithic period, but are found in the Siculan age of bronze; and what is more important, in types which represent a typologi¬ cal or chronological continuation of those of the peninsula and which belong to a more recent strata also as regards certain chronology and represent a stylization and geometrization, an exaggeration or an atrophization of the pure cave forms which persist in southern Italy.

In this lower part of the peninsula, to judge from the studies of those who, like Orsi, know its material and that of the large neighboring island from personal observation, there can be no doubt that the ethnic basis is identical with that of Sicily and that dwellings, graves and implements are to be attributed to the same very old Siculan people who had occupied the peninsula from time immemorial. In southern Italy, therefore, the connection with Sicily in civilization shows the influence of propinquity and not only the commercial one. The dwell¬ ings of Taranto, held to be

analogous to the so-called terremare of AEmilia, in reality are not that, but are a Siculan village with houses or huts held up by piles planted in the ground, also surrounded in part by a stone wall continuation.

The neolithic period lasted tens of thou¬ sands of years; the tombs recently discovered belong to a very ancient age and show primi¬ tive types. The dwellings, on the contrary, begin (as at Pertosa) in the recent neolithic period contemporary with those of Knossos and of Butmir and end with the Mycenean period. The types of the vases of the dwell¬ ings of Taranto cannot be derived, from those of the terremare , because they are older, as Brizio rightly observed.

Ascending the peninsula, there is found in middle Italy, especially in Latium and in Rome itself, at least from the end of the Bronze Age, as it were the meeting of two currents; on the one hand the partial persistence of the rite of sepulture and of similar types of implements, which are considerably more numerous than is generally believed; on the other the superposi¬ tion of cremation and of certain new types or varieties.

In upper Italy, in which AEmilia may be in¬ cluded, we find cremation predominating. The theory according to which this rite was brought by a special invasion of pile dwellers of the age of bronze is founded on an observation, on a hypothetical explanation of the same and on a second hypothesis. The observation re¬ gards the difference between the material of the Eastern or Venetian dwellers and that of the Westerners; the hypothetical explanation is that this difference was caused by the coming of a new people ; the second hypothesis is that this new people began rapidly to descend the peninsula, preserving their customary living on pile structures, even on terra firma, far from the lakes and becoming builders of the mound dwellings (terremare) of AEmilia. This theory has been opposed by Brizio in his (Epoca pre- istorica) and practically the distinction between the Western and Eastern pile dwellings was asserted without sufficient reason.

E. Age of Iron. — In Sicily the character of the preceding age remains with a few modifica¬ tions, with the decadence of indigenous indus¬ tries and with the increase of commercial in¬ fluences in which the proto-Greek element takes the place of the Mycenean. The same thingˆ takes place in southern Italy of which the Campania has been studied in the last years more than other regions. Here, in two points, there have come to light new centres of pre¬ historic inhabitants who saw the dawn of Greek history and colonization and also in their funeral rites as in their local industries, restricted chiefly to pottery, reveal the persist¬ ence of relations with the prehistoric caves and with Sicily. The cemeteries of the valley of the Sarno are sufficiently enlightening in this respect, but much more important are

the graves and the pre-Hellenic dwellings of Cumse, which show us the origin of the Greek western colonies in a way very different from the conventional one, that of literary tradition and of pure history.

The rare and problematical traces of the Villanovian (Umbrian) civilization can point only to commerce. In middle Italy, especially in Latium, the traces of two ethnic elements still continue to be distinguishable, but in the end become confused with Etruscan influences and with those of Greek and Phoenician traders and the whole is under way to that happy fusion which gave us Rome. ˆEmilia and pre-

Etruscan Tuscany constituted the real sphere of Umbrian influence, whose largest centre was Bologna. For the classification of the Umbrian tombs of Bologna, for the traces of dwellings and for the celebrated deposit of S. Francesco, consult, in addition to the works of Brizio, the w?rk of Montelius, entitled (La civilization primitive en Italie. > An important centre of antiquity with close affinities to that of Bologna is at Este.

The general type of all these tombs is an excavation (Pozzo) at the bottom of which are collected the ashes covered by a cinerary urn (cistola), protected still further by an en¬ closure of stone slabs, or by a wall of small stones which cover the excavation, in which is also the funeral outlay. Altogether this civ¬ ilization differs and diverges widely from that of the south and of the islands; it is less Mediterranean and more European.

F. The Pelasgians. — There is no doubt that before the colonization movement of the classic Greeks, of Aryan language, there came, espe¬ cially into the Italian Peninsula, small waves of Oriental non-Aryan peoples ; one of the last was that of the Messapi, who according to Herodotus come from Crete and who have left us documents in an incomprehensible language isolated from the other Italian dialects and standing alone except for reminiscences of style, partly Mycenean, which they preserve in their implements. The last, strongest and most surely Pelasgian was that of the Etruscans. The question as to whether the wall girdles, otherwise called Cyclopean, should be referred to the Pelasgians and as to what materials and people correspond with them, has not yet been answered. The excavations of Norba, which were loudly heralded as a discomfiture of the Pelasgophiles and which concluded by attrib¬ uting the walls to the Romans, have in reality decided nothing. More conclusive were the excavations carried out by the writer in Atena Lucana, not so much

because they succeeded in obtaining very positive results, as because through them it was shown that the Romans could not have constructed the walls. The material found there of the historic age goes back at least to the 7th or 6th century before the vulgar era and the prehistoric age is also represented; but the implements collected were few, poor and left many gaps.

III. Elistoric Age. G. The Etruscans. — Etruscan archaeology deserves a separate article, but it is fairly well known through manuals of history, art and civilization. Here we will only mention that the theory of their descent from the Alps and of their ethnic unity with the so-called Italicans, is no more admitted; now the derivation of the Etruscans from Asia is recognized, together with the non-Aryan character of their language. Brizio has. the merit of having proved this, but the credit of having reopened the question and co-ordinated it with more recent research is due to Modestov. A great progress in Etruscan studies is repre¬ sented by the Museo topografico dell' -Etruria founded at Florence by Milani and described by him in a special illustrated publication which has the same title as the institute. Milani has published a remarkable collection of the prin¬ cipal monuments in the archaeological museum in Florence with good plates, with an attempt at a religious explanation. To the most ancient

Umbrian pozzo tombs with the rite of inciner¬ ation are added the- rich chamber tombs, with the rite of sepulture, with characteristic archi¬ tecture, art and a directly imported industry, which the Etruscans developed in their new home, whereas the indigenous population progressed in its turn, but gradually fell under the influence of its rulers. A too violent reac¬ tion against the ingenuous exaggeration of the old archaeologists, who too easily attributed everything to the Etruscans, fell into the oppo¬ site extreme of despoiling them of almost everything to attribute it to the Ionian Greeks. But now there is a tendency to return to the old standpoint; the important studies of Karo (in (Studi e MaterialP) return to the Etruscans the glory of the fine filigree and lace goldsmith work; we may also mention the studies of the writer on the origin of the Italic house whose first real architecture (which derives nothing from the hut of the age of iron, as Nissen be¬ lieved,) it owes to the Etruscans.

The existence of Etruscans in the Campania was, a few years ago, denied by some archaeolo¬ gists, but the question was reopened by the writer, who attributed to them the production of the black ware (bucchcro) which is peculiar to the interior of Campania in all the southern regions and is met only in Etruria; there was also found in old Capua an Etruscan inscription on terra-cotta and lastly in Pompeii an old column of Etruscan art, preceding the oldest houses of the city, which are of a non-Grecian character, and calcareous stone, and whose construction as well as the

regular map of Pompeii are also attributed to Etruscan art.

H. The Greeks. — The Hellenic colonies of Sicily and Italy also deserve a special article, but they also are well known and are discussed in all manuals of ancient history, of art and of Greek civilization. The oldest colony appears to be Cumse, which furnishes a geometric pot¬ tery more archaic than that of Sicily and in the foundation of which city the part taken by .TEolian Kyme is confirmed.

The Greeks, as has been seen, occupied a place already inhabited by an indigenous popu¬ lation, as was also the practise of the Etrus¬ cans, and they organized it into the form of a city. Cumae has furnished precious archaeolog¬ ical material, which is now mostly collected in the National Museum at Naples and which is still largely unpublished.

For the Greek colonies of Sicily we have exhaustive works, due in large part to the activity of Orsi. After the volume of Cavallari and Holm on Syracuse, our knowledge of the necropoli of that city and of their material has been greatly augmented by the numerous researches of which Orsi has given an account in (Notizie degli ScaviP On Megara Hyblsea we have a very good and complete study by Cavallari and Orsi and others by Orsi about Kamarina (in (Monum. dei LinceP)- But the other Sicilian colonies have been little studied; likewise the Italiote colonies, except now Ta¬ ranto, which also was neglected for a long time. Among the most important monuments left by the Greeks of Italy and Sicily are without doubt the temples. Peculiar to southern Italy is the abundant production of decorated pot¬ tery, born under the Greek influence, but de¬ veloped in large part in Italic cities or accord¬ ing to local spirit. Consult the writer's mono-

graph on (Ccramica antica nell' Italia meridi- onale/ of which Mr. 'Walters has given a good summary in his (History of Ancient

Pottery.)

I. The Gauls. — The Gauls have been met with by the students of the Transpadana, of Venice, and of VEmilia and Picenum. But their implements, of which there are scanty re¬ mains, are not at all beautiful and are very little studied. We will mention only the works of Bianchetti on the sepultures of Ornavasso, of Castelfranco and of Brizio on various necropoli of Lombardy and of the provinces of Bologna and Ancona.

J. The Romans. — In unifying Italy, the Romans unified also its civilization

and its products. The great artistic character of the monuments in which the Romans developed the national elements, inherited from the Etrus¬ cans, also taking up Greek elements, passed beyond the confines of Italy. These arts are above all architecture, historic and monographic sculpture, mural and decorative painting (into which was transferred much of Greek and Hellenistic art), and mosaics, of a more spe¬ cifically Alexandrine derivation, but to which, nevertheless, Roman artificers knew how to give an individual development and character. In their archaeological material we can distin- tinguish diversity of province and of fabric, but no longer different civilization and peoples.

A large part of our knowledge of the inti¬ mate life of the best Roman period is derived from Pompeii (q.v.), which, buried by an erup¬ tion of Vesuvius in 79 a.d., has preserved better than any other source the little implements of daily use, the circumstances surrounding their use and their application. A special article would be necessary to treat of Pompeii, but the place is so well known that a mere mention will be sufficient in this summary. A special importance attaches also to the topography and history of the city which was the great crucible in which were fused and from which were dif¬ fused all the elements which constituted Roman civilization. The most important of the finds recently made in the Forum are the pre- Romulean necropolis and the now celebrated stele with the inscription in which, after much hesitation and contradiction, a lex regia is now generally recognized.

K. The archaeology of Sardinia deserves a separate treatment on account of its special character.

Traces of the Palaeolithic Age have not yet been discovered in Sardinia. The neolithic period is connected with the civilization of the western basin of the Mediterranean, hence with the Sicilian and with that of the Italian Penin¬ sula ; likewise the eneolithic period to which must be attributed the domus de janas analo¬ gous to the oven grottoes of Sicily. An exca¬ vation recently completed by Taramelli at Anghclu Ruju, near Alghero (consult Notizic degli Scavi, 1904), not only shows us much better than before that period of prehistoric Sardinian archaeology, but proves to us that the Sardinian eneolithic period is superior to the Sicilian, as regards its greater antiquity, the more notable progress and richness of its local industries, and its development of funeral ar¬ chitecture. It proves besides that the beautiful pottery of chalcolithic Sardinia is very closely connected with that of the megalithic monu¬

ments of France and Spain, without having any relationship to that of Sicily, which with its singular and wild ornamentation in two colors always remains more isolated and stands out as a distinct ethical individuality,

taking the word in its historical rather than anthro¬ pological sense, because the race is the same. At the end of this epoch begins the civilization of the wall period (niiraghes) and of the <(tombs of the giants, M so typical of Sardinia and lasting without doubt many centuries, to come to a close at the time of the most ancient Phoenician colonization of the island. The more recent researches confirmed the opinion that the numerous and imposing Sardinian walls (niiraghes) , which are not tombs, are for¬ tified houses, often erected to guard passages which of themselves would attest to a period of greatness and power.

The discovery at Haghia Triada in Crete of large bronze tablets like those found some time ago in Sardinia at Serra Ilixi (comp. Bull, di paletn. 1904), gives occasion to mention the good services of the Italian mission in Crete to which are due noteworthy discoveries and full illustrations of them.

A worthy but hasty synopsis is the work of Pinza, (M9numenti primitivi della Sardegna/ the conclusions of which should be corrected in the light of more recent discoveries.

But Sardinian archaeology does not assume an individual aspect merely during the prehis¬ toric age; it stands apart from that of Italy, even in the most ancient phases of the histor¬ ical period. The superior and more advanced civilization of the Orient, the literary culture, are not represented either by the Etruscans or the Greeks, but by the Phoenicians ; who did not put foot on the Italian Peninsula and man¬ aged to maintain themselves in opposition to the Greeks in a part of Sicily, although they certainly did not represent the preponderating element. The study of Sardinian Phoenician antiquity was neglected for a long time. In the year that the writer directed the excavations, he carried on researches on the site of the city of Nora, completing the data gathered by others, and gave the results of his studies in a mono¬ graph published in Volume XIV of the

Giovanni Patroni,

Professor of Archceology in the Royal Uni¬ versity of Pavia.

3. PIISTORY OF THE MIDDLE AGES IN ITALY. In the Middle Ages Italy took the first rank in the history of civilization. The differences that arose under the Roman rule between the Greek Orient and the Latin Oc¬ cident continued in the new historical period and included also the religious beliefs termi¬ nating in schism.

During the greater part of the Middle Ages, Italy was the centre of political life of the Western Empires, and in the 14th and 15th cen¬ turies became

the centre of culture.

ITALY

The Church of Saint Mark, Venice

ITALY

1 The Appian Way, Rome

2 The Forum, Rome

ITALY

\ The Loggia, Florence

2 Hall of Saturn, Pitti Palace, Florence

ITALY

l The Piazzetta, Venice

2 The Rialto, Venice

ITALY — HISTORY OF THE MIDDLE AGES IN ITALY (3)

441

The Middle Ages are generally supposed to begin with the year 476, because from this time till the reign of Charlemagne no Western prince held the imperial power. Nevertheless, during these three centuries the empire did not remain in the West. It was a unique institution even when, under Diocletian and his successors, it was represented by several associated princes. After 476 it was again represented in the Occi¬ dent as a sovereign power by the resident prince at Constantinople, the legitimate heir of Romu¬ lus Augustulus, this unity manifesting itself above all in the uniformity of the laws and of the consulships, with their similar official desig¬ nations of the year, as long as it lasted.

Odoacer assumed the title of king out of re¬ gard for the barbarian army of Italy, but ruled only as an imperial functionary. His residence was at Ravenna, where he maintained the Ro¬ man form of administration with its complex organization, and its rigorous separation of the military from the civil functions. He ceded Provence to the Visigoths, conquered Dalmatia and Sicily, granted a third of the landed prop¬ erty of the Italians to the barbarian soldiery, where they took possession and settled, and thus through the application of the principles of hospitality there arose among

those people the institution of private landed property.

Odoacer's reign was a short one. Zenone sent him against the Ostrogoths under Theo- doric, who desired fresh conquests. Theodoric acted as an imperial functionary. He substi¬ tuted his own rule for that of Odoacer, resided at Ravenna, ceded to his soldiers the third of the Italian lands wherever the army was sta¬ tioned. Thus continued the imperial sovereignty in ideal and judicial order; for the consulate continued, and as long as the Ostrogoth kings were in power, they published edicts and not laws, and an edict came within the limits of a magistrate's power, but they in reality ruled as independent sovereigns.

Theodoric endeavored to amalgamate the Goths and the Romans. He maintained, with slight alterations, the tributary and administra¬ tive system of the last years of the empire, and in compiling the edicts, obligatory on both peoples, he established a common and general legislation. But this policy failed, especially by reason of the diverse religions of the two na¬ tions. His failure to accomplish these ends in¬ spired him to violence against the Romans. He was more fortunate in his external policy, for he restrained the power of Clodovicus, recon¬ quered Provence, and maintained a moral hegemony over some of the Germanic king¬ doms.

He was succeeded by Atalaric under the re¬ gency of his mother, Amalasunta, who desired to govern in accord with the emperor; but, when Atalaric died, the National party, opposed to the Romans, forced her to associate with her cousin, Theodatus, who had her assassinated, thus giving to Justinian an occasion to inter¬ fere in the affairs of Italy, and Belisarius, hav¬ ing conquered the Vandals, was commanded by the emperor to march against Theodatus, thus beginning a war that lasted 20 years, during which the kings Vitiges, Totila and Teia, and the Byzantine generals, Belisarius and Narses, were conspicuous by their valor. . At length Italy passed under the direct jurisdiction of Justinian, who rehabilitated it by Pragmatic

sanction. Provence was reconquered by the Franks.

The Greek domination in the whole penin¬ sula lasted but a short time. In 568, or there¬ about, the Lombards invaded Italy, followed by adventurers of various races, and they continued to extend their dominion, but could not con¬ quer the whole peninsula. Italy lost its political unity and the Roman division of it into prov¬ inces. A Lombard kingdom was formed. Italy in part was divided into Duchies, of which later on Pavia was the capital and its cities, the residences of dukes and gastaldii, became the centres of the new administrative divisions. Italy continued to be in part a

Byzantine prov¬ ince, governed by an exarch in Ravenna, and formed of scattered regions, almost all on the coast, which slowly reorganized as military circuits.

Meanwhile Gregory the Great gave to the Roman Church the priority over all the other churches of the Occident, and she thus rose in reality to be a universal institution. Gregory II defied the decree of Leo the Isaurian against the worship of images, and although the dis¬ sension did not go beyond the limits of a re¬ ligious controversy and the popes remained loyal to the emperor, as they preferred his rule to that of the Lombards, the papacy became con¬ scious of its power and under Zachary inter¬ meddled in the nomination of the kings, conse¬ crating the substitution of the dynasty of Pepin le Bref for that of the Merovingians.

The Lombard kings of most importance were Alboin, Autari, Agilulf, and then through the means of Theodolind began the conversion of the nation to Catholicism ; — Rotari, who pub¬ lished the Edict, a territorial law binding for both conqueror and conquered; Liutprand, Rachi, Astolfus, Desiderius. The latter two strove bitterly with the popes; Astolfus oc¬ cupied the Exarchate and threatened Rome. Stephen appealed to Pepin who confiscated Astolfus' conquests and gave them to the Church. In this way the Pope arrogated to him¬ self the domination in Rome, in the Exarchate and in Pentapolis, in the name of the jurisdic¬ tion of Saint Peter. Desiderius quarreled with Adrian I who appealed to Charlemagne. The latter conquered the Lombard kingdom except Beneventum, and renewed Pepin's donation to the Chprch. The Lombard kingdom, however, maintained its individuality, its union with the kingdom of the Franks being only personal and dynastic.

Charlemagne waged many campaigns in Italy; and little by little he substituted Frank¬ ish counts and marquises for the Lombard dukes, giving them authority to preside at the tribunals and in the administration, and to pro¬ claim a conscription in time of war. He obliged the dukes of Beneventum to recognize his sov¬ ereignty, and in the year 799 obtained from Pope Leo III the imperial crown, this dignity having lapsed in the Orient at the death of Con¬ stantine VI, and the Pope was only too anxious to assure to himself the protection of the ruler of what was now nearly the whole . Occident. Thus the Catholic world had two universal in¬ stitutions : one the papacy; the other, the new empire, consecrated by the Pope.

Under Charlemagne's weak successors the Carlovingian monarchy became divided into sev¬ eral kingdoms which were frequently at war be-

tween themselves. Charles the Fat reunited them, but in 887 he was deposed. The mon¬ archy was then divided into five states, one of which was the feudal kingdom of Italy. With the weakening of the sovereign authority the local governments instituted by Charlemagne were transformed into hereditary principalities. Thus arose the feudal aristocracy, the chief cause of the weakness of these monarchies. The feudal kingdom of Italy was continually dis¬ turbed by this proud and rebellious nobility, until through the instrumentality of Otto I, in 952, it became a fief of the Geman crown. Dur¬ ing this time the imperial throne was often vacant.

Meanwhile the duchy of Beneventum had been divided into the Lombard states of Ben¬ eventum, Salerno and Capua. The Greeks, through the machinations of the Arabs, lost Sicily, but reconquered a great part of Apulia ; Naples, Gaeta and Amalfi had become autono¬ mous duchies under the suzerainty of Byzan¬ tium. Rome was in a state of anarchy through local factions. Lacking imperial aid the papacy lost political authority. The islands of Venice became autonomous states under the suzerainty of Byzantium. Toward the end of the 7th century they formed a duchy which at the begin¬ ning of the 9th century had its capital at Rialto, an island that thus imposed its pre-eminence on the rest, and later took the name of Venice.

Otto I in the year 961 assumed the govern¬ ment of the Italian kingdom, and in 962 re¬ ceived the imperial crown at Rome. The Pope had need of protection against the adverse fac¬ tion and the king rose to the highest political supremacy. The coronation with the iron crown — a custom introduced by Berengarius I — and the coronation as emperor became from thence¬ forth essential, .consequent and complementary to the title of king of Germany; but the title to universal political supremacy came to the em¬ peror through the Pontifical consecration, and this stirred up bitter strife in subsequent times.

The policy of the House of Saxony (Otto I, II and III, and Henry II) toward Italy was determined by three aims : to weaken the power of the feudal laity by placing it in opposition with the feudal ecclesiasticism ; to establish the sovereignty over Rome by making the pontiff a vassal; to conquer southern Italy. With the first was associated the granting of the rights of supremacy and administration to certain b'shops; hence the temporal jurisdiction over (.'ties and its consequent restriction of the power of the count, which power was thus restricted to the. county or state, and sometimes this epis¬ copal jurisdiction extended to the whole county, and thus its limits coincided with those of the spiritual jurisdiction. As for

Rome, its au¬ thority was uncertain, as it varied according to the power of the emperor; and in southern Italy the expeditions sent thither had been un¬ successful. The succession of Henry II in Italy was contested vainly by Arduin, "assisted by the feudal secular party.

The House of Franconia succeeded the House of Saxony, in the person of four princes Conrad II, Henry III, IV, V. Conrad II placed the minor feudal secular party in opposi¬ tion to the feudal ecclesiastical party, granting to the former the right of heredity and the in¬ alienability of tenure, by this means strength¬ ening the middle ranks and decreasing the power

of the great feudal ecclesiastical and secular par¬ ties. During the minority of Henry IV (through the efforts of Hildebrand) the Church began its emancipation from subjugation to the empire, and rendered itself independent of the imperial power and of the civil factions, by en¬ trusting the election of the Pope to the College of Cardinals.

When Hildebrand became Pope, Gregory VII instituted a political theocracy and formu¬ lated the principle that the Pontificate held supremacy over the empire, and consequently over all Catholic powers, spiritual and tem¬ poral ; and as Henry IV pursued the traditional policy of the emperors, which was in direct contradiction to that of the Pope, there arose between the two institutions the most char¬ acteristic contest of the Middle Ages. Then it took form in the question of ecclesiastical in¬ vestiture, for the Pope would not grant to the secular princes this concession. This contest lasted during the reigns of Henry IV and Henry V, and came to an end at the Concordat of Worms, which did not determine the chief question — which of the two powers was su¬ preme — but only the accessory question of in¬ vestiture, establishing exclusive right of the Pope to spiritual investiture, and that of the king to temporal investiture.

These dissensions were advantageous to the Lombard cities. Owing to the comfortable, peaceful life they enjoyed because of the recon¬ struction of the walls, and the somewhat mild rule of the episcopal government, their popula¬ tion increased in the 10th and 11th centuries, and the middle ranks, whose party had been strengthened by Conrad II, formed new social classes, which resumed the profession of arms. During the contest for the rights of investiture the urban aristocracy, alone, or combined with the wealthier portion of the bourgeoisie, ac¬ quired the political rights of the local authori¬ ties. Thus arose a new civic order, the Com¬ monalty, who attained the position of consuls and the consilia. But all this was done without the sanction of the sovereign, and therefore was not as yet a legitimate institution.

Meanwhile, in southern Italy, in the 11th century, arose the Norman

principalities of Drengot and Altavilla. These, under Robert Guiscard and Roger, took Apulia and Calabria from Byzantium, Sicily from the Arabs, sub¬ jected Salerno and Benevento, and in order to legitimize their conquests received investiture from the Church. Roger II completed the con¬ quests by the subjugation of all the other states of southern Italy and of Abruzzi, and obliged the popes to recognize his royal title.

With the fall of the House of Franconia there arose in Germany a dynastic contest be¬ tween the Guelfs (House of Bavaria) and the Ghibellines (House of Suabia) for the succes¬ sion to the throne. Lothair of Saxony succeeded Henry V, then came Conrad of Franconia, then Frederick Barbarossa. These wished to recover their rights. as kings of Italy and as emperors; whence their contest with the Commonalty of upper Italy who formed, in defense of their autonomous authority, the first Lombard League, and with Pope Alexander III — for at that time, two popes having been elected by two parties, in the College of Cardinals, King Frederick thought he had the right to suppress the schism and thus he reopened the question of

supremacy between Pope and emperor. He made peace with the Pope at Venice in 1177, but even then, the only question settled was that of the legitimacy of Alexander. He came to an agreement with the Lombard League at Constance in 1183, and in this way the emperor recognized the autonomous authority of the Commonalty with the reservation to the sov¬ ereign of the right of investiture of consuls and the right of appellate jurisdiction. The Altavilla family being extinct, Henry, son of Barbarossa, obtained the throne of Sicily by law of descent; at the death of his father suc¬ ceeded h'm, but died in 1197, leaving a son four years old, the future Frederick II.

In 1198 Innocent III rose to the papacy and resumed the policy of Gregory VII, marking the apogee of theocracy. The Guelfs and Ghibellines fought for the succession in Ger¬ many; the former being victorious under Otto IV, assisted by the Pope. But the usual dis¬ sensions arose between Otto and Innocent, the Pope placing the king of Sicily, Frederick, in opposition to the emperor. Frederick was vic¬ torious and obtained the imperial crown from Honorius III.

The Commonalty, meanwhile, had become almost the chief political party in upper and central Italy; the counts of Savoy, the mar¬ quises of Lunigiana and Montferrat and some other princes being the few that

remained of the feudal party. The rights reserved to the sovereign by the Treaty of Constance were al¬ ready denied ; the Commonalty had become an independent republic. It extended its territory to the smaller neighboring communes — which it treated as subjects — to the rural communes and to the feudal proprietors of the country, obliging them to reside temporarily in the city.

Then there arose in the Commonalty new factions with the ancient name of Guelfs and Ghibellines, but impelled by local interest. The conquered feudality and the increasing power of the lower orders took part in these discords, but neither side, gained a definite victory. The economic condition being thus imperilled by the instability . of the government and continual wars, the idea was formed of substituting for the ctpnsuls a governor, potestas , of the order of cavaliers, chosen from other cities and foreign to the local factions. This was accomplished by degrees. At first by an unusual method — sus¬ pension of the consulate; then, in the first 10 years of the 3d century, by stable and regular method.

*The new provision proved inefficacious, be¬ cause the new authorities lacked the material strength necessary to overcome the factions. Thus sometimes a governor was drawn into their discords; anj the people formed in several cities a commune, of their own, with a captain of the people at its head. Under similar con¬ ditions, a party requires unity of action and one ruler. There was at the head of this one a leader, of an illustrious house, who sometimes deserted his own class to defend that of the people. Thus, ihe factions became identified with their head, and the dissensions between the tw*o parties became dissensions between rival houses. When the head of the triumphant fac¬ tion,* who. might also be the mayor himself or the captain of the people, held an unlimited tenure of the urban authority, there should be a new government — the signoria, who represented*

a necessary consequence of the new political and social conditions of the Commune. They do not represent a special official but the sum of the political power of the government. The first signoria arose in the latter half of the 3d century, in the form of a provisional dictator¬ ship bound to the interests of the faction ; later on, they became more stable, for the people had lost the consciousness of their rights, and, by the introduction of a mercenary soldiery, the Preface of arms; and also owing to the fact that the signoria promoted the interests of their own people.

Frederick II ruled according to Barbarossa's methods and consequently the dissensions with the papacy and the Communes led to the for¬ mation of a

second Lombard League. The war was ended in 1250 through the death of the em¬ peror, and without any treaty. The Italian cities maintained their independence. The im¬ perial power remained vacant until 1312, in which year it was resumed by Henry VII, but it had become a mere shadow of its former su¬ premacy, an honorary position conferred on the king of Germany after his coronation at Rome. The papacy took from the last Suabian princes (Conrad and Manfred) the kingdom of Sicily in order to bestow it on Charles of Anjou, who was not successful in his contest with the em¬ pire; thus even the excellent mind of Boniface VIII had not the power to re-establish the theocracy, now quite incompatible with the in¬ tellectual and moral development of the laity. By degrees in the political order the papacy was transformed into an elective principality, re¬ stricted to one portion of Italy.

After this period the history of mediaeval Italy became the history of its particular states and should be studied separately in separate ar¬ ticles. Here the history is only treated of as a whole.

The popes, not feeling secure in Rome, moved the Holy See to Avignon. On the re¬ establishment of the pontifical authority by Al'bornoz into the Ecclesiastical State, they re¬ turned, but the Western schisms weakened their authority. At length they took direct and real possession of the Roman Commune — which be¬ came an administrative entity — and exercised an uncertain sovereignty in 'the other portion of the Pontifical states.

The kingdom of Sicily, their fief, by the war of the Sicilian Vespers was divided into two kingdoms : Sicily under the kings of Aragon and Naples under the rule of the line of An¬ jou; then under the Durazzo ; and lastly, under Alfonso of Aragon, who left Sardinia, Sicily and Aragon to his. brother John; Naples to his natural son Ferdinand. Genoa, mistress of Corsica, destroyed the naval power of Pisa, and for its own commerical interests waged a bitter war. against Venice; after this being weakened by internal discords, she passed under the pro¬ tectorate of Milan, or of France. Florence con¬ quered Arezzo, Pistoia and Pisa. In 1400 the Medici., without any title, or external mark of authority, became the arbiters of the Commune. In Tuscany the signorie insinuated themselves like a sporadic growth; and the. Commune con¬ tinued as before in Florence, Siena and Lucca. Venice, mistress of the Adriatic through the domination of Istria and Dalmatia, extended her dominion into the Orient by the Fourth Crusade, and in the Occident her conquests in-

eluded all Venetia and part of Lombardy. In upper Italy the "higher

signoria® placed the "minor signori a» under subjection. The princely family of Visconti arose in Milan and conquered almost all Lombardy, and for a time other regions, and in 1395 obtained the title of dukes. When the Visconti family was extinct, Milan was ruled by the Ambrosian Republic ; then she again became a dukedom under the Sforzas. The House of Savoy extended its dominion in Italy as far as the Sesia, and under Amadeus VIII, in 1416, rose to the ducal dig¬ nity. All these states, although prosperous in respect to political economy and culture, were weak on account of military and institutional drawbacks which finally led to their decadence in modern times.

Bibliography.— Troya, Carlo, (2 vols., Leipzig 1847) ; Ficker, Julius, (Forschungen Zur Reichs-und Recht- geschichte Italiens> (4 vols., Innsbruck 1868- 74); Lavisse, Ernest and Rambaud, Alfred, (Histoire generale du IV siecle a nos Jorus) (Vols. I, II, III, Paris 1893-94) ; Hartmann, L. M., (Geschichte Italiens in Mittelalter) (Leipzig 1897-1915), and (Le Rovine del Mon- do Antico; traduzione di G. Lazzalto con ag- giunte e correzioni dell' autore) (Rome 1904) ; Villari, Pasquale, 'Mediaeval Italy from Charle¬ magne to Henry VIP ; trans. by C. Hulton (London 1910) ; Hodgkin, Thomas, Htaly and Her Invaders (Oxford 1885-99).*

Giovanni Monticolo,

Professor of Modern History, Royal University of Rome.

4. THE RENAISSANCE IN ITALY (14TH TO 16TH CENTURIES). Histori¬ cal Introduction. — Chronologically considered Italian history from 1300 to 1599 may be divided into the Age of the Despots, the Age of Inva¬ sions and the Spanish-Austrian Ascendency, and the beginning of the 14th century witnessed the bitter struggle between Guelfic democracy and faithfulness to the Pope arrayed against Ghibelline aristocracv and loyalty to the em¬ peror. Every Italian city, every hamlet, felt the strife. Every city was divided against itself and there could be no tranquillity until one- half of the citizens had driven the other half into exile, while from these battlements floated the banners of the partisans of the empire and from those the banners of the partisans of the Church. Soon the captains on each side, men of noble families experienced in war, took the lead in the struggle and finally became masters of the cities. The Estensi made themselves lords of Ferrara, the Torriani masters of Milan, the Della Scala dynasty arose in Verona and the Malatestas at Rimini. In Tuscany the strongly entrenched Guelf party long held the nobles in check, and for a time the Communes remained free from hereditary masters. But wherever they obtained a foothold these tyrants annihilated both parties for the sake of peace and their own advantage. The tyrant won fa¬ vor by leveling down the classes

and favoring the multitude. Italians tiring of the fury of these civil wars gradually settled down and turned to home comforts, arts and literature,

content to pay foreign mercenaries and adven¬ turers to do their fighting for them. These mercenary troops hired out to the highest bidder and sometimes fought alternately against and in defense of the same city. After 1350 these foreign mercenary soldiers were supplanted by the Italian mercenary, and Alberico da Bar- biano, a nobleman of Romagna, formed the first exclusively Italian company. Henceforth Italian battles were fought by Italian paid troops under Italian generals (Condottieri). But these soldiers were not patriotic; they sold their swords for money and fought for the highest bidder. Naturally they were not anx¬ ious to die or even to kill in a cause in which they had no interest, and battles became almost bloodless and diplomacy and skill were the requisites of victory rather than courage. In¬ trigue and treachery were rife and military vigor ceased to exist in Italy.

Between 1305 and 1447 five great powers were established in the Peninsula: The papacy, the republics of Venice and Florence, the duchy of Milan and the kingdom of Naples. In southern Italy, Joan, the childless wife of four husbands, . succeeded her grandfather in the kingdom in 1343 and was murdered in 1382 by Charles of Durazzo — who reigned five years. He was followed by his son Ladislaus in 1387 and_ by his daughter Joan II in 1414, and in 1435 Alfonso (called the Magnanimous) com¬ bined for the first time since 1282 the crowns of Sicily and Naples. The 23 years of Alfonso's reign were the most splendid in South Italian history. 1 he greatness of the Visconti family, dukes of Milan, dates from John, archbishop and lord of Milan, who died in 1354, and after a succession of incompetent and soon assassi¬ nated aspirants for the throne in 1378 Gian Galeazzo, his son, became duke and the most powerful and richest of the Italian despots. He pushed his dominion to the verge of Venice, subjugated Lombardy and attacked Tuscany] when suddenly he was cut short by the plague in 1402.

. After the expulsion of the Duke of Athens in 1343 and the great plague of 1348 the com¬ mon people of Florence rose against the mer¬ chant princes, and the necessities of war and of state soon placed Florence in the power of an oligarchy, headed by the great Albizzi family; Pisa was enslaved and Florence gained access to the sea. But the Medici gradually gathered strength and in 1433 came to open strife with the Albizzi and finally won.

When the popes settled in Avignon they lost their position as Italian rulers, but when Greg¬ ory XI returned to Rome and when Urban VI, elected 1378, put an end to the exile, the popes again became Italian sovereigns.

Martin V. (1417-31) and Eugenius IV U.431-47) resided principally in Florence, but Nicholas V before his death in 1455 had firmly established the papaev in its temporal power

Through the Middle Ages it had been the policy of Venice to refrain from conquest on the Italian mainland, and the first important entrance of Venice into Italian affairs was when in 1336 the republics of Florence and Venice formed an alliance against Mastino della Scala; and from 1352 to 1381 Venice and Genoa con¬ tested the . supremacy of the Mediterranean, when Venice finally, though after many re¬ verses, was victorious. In 1406 Venice added

ITALY

Cathedral of Pisa and the Leaning Tower

■ ‘ •

Verona, Vicenza and Padua to her posses¬ sions, and during the long Dogeship of Fran¬ cesco Foscari (1423-57) attained the height of her prosperity.

The year 1492, when Lorenzo Medici died, opened for Italy the age of invasions. Soon Spanish, German and French armies hastened to occupy her territory. Each petty Italian potentate strove for his own private advan¬ tage and there was no united resistance to the invaders. Though Rome and Florence rejoiced, the election of Leo X as Pope in 1513 brought no repose to Italy, and in 1527 occurred the famous sack of Rome by German and Spanish soldiers. But there was a great emperor, Charles V, and he in 1529 entered Italy and received the imperial crown in Bologna and achieved the conquest of the entire peninsula, and from 1530 to 1796 Italy ceased to have a history of her own. — Ed.

The Italian Renaissance.

To the most genial of the great events re¬ corded by history since the age of Augustus was given the expressive name of Renaissance. Born of a profound intellectual movement, which aroused throughout almost all Europe a love for and research into classical antiquity, the Renaissance rendered human thought active and paved the way for modern civilization and culture. Except in the Middle Ages the study of the Classics had never been less intel¬ lectually understood than at the beginning of this period. Religion, art and literature were all in a state of transition. Gradually

Europe shook off the night of the Dark Ages and re¬ belled against their gloom. It was a beneficent movement, though sometimes in drinking deep draughts from these cups of classic learning, of pleasure and of freedom from superstition and ignorance, these drinkers became inebriated with the -strong wine. The long duration of this transition constituted the Age of Renais¬ sance, the 14th, 15th and 16th centuries — an age which, according to the common accepta¬ tion, was no longer mediaeval, and not yet mod¬ ern. It had its own peculiar characteristics, resembling in some respects the later Alexan¬ drine Era; and in others, the splendid Age of Pericles ; and it was distinguished bv a mar¬ velous activity in the world of letters and art, and in the development of universal genius and of heroic women, or viragines, as they were called.

Famous names are exceptionally numerous, and the importance of each increases the diffi¬ culty of making a choice and causes confusion in summing up results.

Add to this the pre-eminently individualistic character of the Renaissance, due to its origin; the intricacies of greater and lesser warlike undertakings, tumults of the people, the bloody greed of the princely families, papal strife, re¬ ligious discords and contests, and one may form some idea of the obstacles overcome.

The causes which impelled these seekers to look to the past for the motives and the means of progress were many and diverse. The defects of actual civilization were apparent and the natural evolution of ideas revealed to human reason a new point of view from which to contemplate the varied phenomena of the visible and of the invisible world. As the 13th century drew near, the imminence of

antiquity made itself more constantly felt. This revival was marked by the unveiling of the human form, Niccolo Pisano, in a very decided manner through sculpture; the author whoever he may be, of the (Carmina Burana) ; Cerminate, Albertino, Uzzato and other literary contemporaries of Alighieri (1263-1321) car¬ ried forward the movement; as did also the masters who inspired Dante and Petrarch. A debt is also due to the rhetoricians and scien¬ tists of Byzantium and to the Hellenists of Sicily and Calabria, whence came Bernard Barlaam who prompted Petrarch and Boccaccio to undertake the study of Greek.

We now come to Dante. The political and religious ideals of Dante Alighieri are almost ˆidentical with those of Petrarch. The art which the most celebrated poet displayed ((Purgatorio XIP) belongs to another age, and possibly he got his inspiration from the columns of Rome and the sarcophagi of Pisa and Florence. No one observed and felt nature more

than he did, and what he said about it came with the meaning of oracular thought ; he loved fame, sought solitude, individualized himself ; a virtue and attributes, these, which, combined, distin¬ guished the man of the Renaissance from the man of the Middle Ages. Besides Beatrice, Alighieri had as a guide Virgil, and, occasion¬ ally, Statius; Guido Cavalacanti was his friend whose doubts or convictions he shared in the nights when, wandering through the dense for¬ ests, he had not yet left the course from which none ever came out alive. Separated from the pleasing and cold severity of the schools, Dante belonged to the Renaissance. But with him it has not the graceful coloring, almost like the breath of dawn, which already began to tinge all literature — the culture of the human race. This was made evident for the first time in the life and in the works of Petrarch, the father of Humanism, who sang the praises of Laura. Since Petrarch made his appearance, or, to fix the date more definitely, from his sojourn in Rome in the year 1337 until the time of Queen Elizabeth (1558-1603), Humanism and Renais¬ sance have been more or less synonymous. Some of those who followed the movement were realists ; but while the philologist has blazed the path by which we penetrate into the treas¬ ure-house of antiquity, and become acquainted with its principal actors and rulers, he is a Humanist per se.

The intellectual culture of the newly awakened civilization began after Petrarch had abandoned his scholastic methods of rea¬ soning and the Dantesque scourge made use of ridicule to undo scholastics, astrologers, physi¬ cians and other charlatans, and placed the ignored Plato above the dominant Aristotle. And it did not stop here; Florence, Arezzo, Bologna, Ferrara, Venice, became also the seats of the Renaissance. At Naples, the king of preachers, converted by Petrarch ; in Milan, the Archbishop Giovanni Visconti, his host ; in Piacenza, Mantua, Padua, Verona, the da Cor¬ reggio, the Gonzaga, the Da Carrara, the Della Scala, friends of Petrarch; in Avignon, popes not indifferent to the new philosophv, his gener¬ ous admirers, formed the first nucleus of that company of Maecenates of the Renaissance, numerous even in the 14th century, innumer¬ able in the succeeding century.

Already the movement was becoming ever

more intensified; little by little the faint voice of the Classics was made more audible, and the ruins uttered their words, and the treasures were brought forth from the cloisters and churches. At the end almost of the 1st century of Humanism (about 1414), those persons who were only moderately cultured were already animated by the spirit of the new age,

and classical culture had become an indispensable requisite to all who loved civilized society.

In the middle of the 14th century all minds were so well disposed that the design of Cola di Rienzi, so nobly conceived, see'med feasible. In Italy, Humanism had from the beginning patriotic characteristics. It is worthy of note that precisely in the 14th century there arose in Sicily a Latin faction in opposition to q foreign faction — the Catalana ; Alberigo da Barbiano with an Italian character in a com¬ pany of adventurers till then foreigners. The whole of Italy, either by money or by peaceful and unopposed usurpation, acquired political in¬ dependence. Humanism, meanwhile, invaded the pontifical domain ; first in Avignon, with the friends of Petrarch — Zanobi da Strada and Francesco Bruni; thence (when the schism was almost at an end), in Rome, where it soon mastered the papal secretary. In Florence and Bologna, with the Visconti and the Estensi, and all through the too numerous states of the Peninsula, convents, bishoprics and universi¬ ties with more or less caution opened their gates to Humanism. At the time of the Coun¬ cil of Constance (1414-18) the Renaissance re¬ ceived another impulse from the many and happy discoveries of Poggio, and subsequently from those of other unwearying searches of the Codices. They filled up deplorable gaps and improved our knowledge of classical civiliza¬ tion. The Humanists of the recent school diffused the knowledge of Greek civilization from the rostrum, searched for, guarded and preserved Greek Codici ; excavations and travel enriched with inscriptions and the results of precious labor the museums which were then being established. Ciriaco Anconitano and Aurispa da Noto made themselves famous; the former by his collection of inscriptions, and the latter by his ferreting out of manuscripts; while Flavio Biondo, of Forli, with Poggio, the Florentine, restored archaeology. Then for the second time the favor of princes and re¬ publics, of universities, cardinals, magnates was sought in order to obtain the rarest antiquities, the best manuscripts.

In 1447 Humanism issued triumphant, amid universal plaudits and rejoicing, in the very chair of Saint Peter (Tommaso Parentucelli, Nicholas V). In 1458, the poet, whom an em¬ peror had crowned with laurel, assumed the name of Pius II (Enea Silvio Piccolomini) . In the 15th century it had, besides the popes', the splendid protection of Alfonso the Mag¬ nanimous, of the Estensi, the Sforzas, the Mala- testas, the Gonzagas and the Montefeltros ; but at the head of them all stood Cosimo de' Medici, and Lorenzo de' Medici the Magnificent, who were the most sincere lovers of Humanism.*

At the very time when the students of moral science approached the thought of the classics, the artists demanded of antiquitv the secret by which they might produce artificially the fascination which the beautv of

nature exercises over the human mind. Although their attempts

were not always successful they arrived at the first transformation of mediaeval art, which is distinguished by the glorious names of Dona¬ tello, Mantegna, Leon Battista Alberti. All the artistic manifestations of human sentiment be¬ came modified, from the greatest to the least. There is the Humanistic literature and the liter¬ ature of the Renaissance. At this time, Human¬ ism had reached its apex. Humanism brought discord into the camp of the Latinists. All minds were partisans of Plato or Aristotle. At Padua, Averroism began to revive. The Middle Ages also seemed about to revive. The orators became rhetoricians; writers sometimes became awkward imitators ; canvases and walls became peopled with fauns; and the philosophers in reviving the forms of ceremonies no longer understood made themselves an object of ridi¬ cule to the Humanists themselves. The reaction came, and even before Savonarola planned his Catholic reform other men in the Church had set out to fight the spirit of the Renaissance, which now entrenched on the very foundations of the religion of which they were the ministers. At the same time sincere Humanists reacted not so much against the Boccaccio sincerity as against the obscurity which never was, and never can be, the aim of any true art.

The need was felt of new fields outside of the trodden paths. The broad philosophy of the Florentine Academy in reconciling classi¬ cism and Christianity was one of the most characteristic examples of this moral necessity. Other philologists began to explore the Semitic literature; they studied Hebrew and Arabic. Contemporaneously, the Italian language, at once the child and the means of civilization, be¬ came reinvigorated, and resumed the position that the ages had awarded it. Finally, Pico della Mirandola formulated the new Norm (program) affirming the rights of science, and the necessity of learning to know man in all the manifestations of his thought — the thought of the schools, which Humanism had overthrown. On this point the action of the revival was logical and complete ; eclectic mod¬ ern thought was born ; a new era commenced. We are witnessing the discovery of a new world.

Undoubtedly classical thought injured the religious fabric of Christianity in the minds of cultured people; but the new thought did not renounce the virtue of Christian morality. It is strange that, the fact has not been taken into account that in Italy the only persons who were interested in Grace and Justification were those very Humanists of the 16th century, and the legitimate descendants of the Humanists of the 15th century. And in the very centres of the first period of Humanism those philologists who apparently enjoyed gossip and pleasure were troubled by the same doubts as ourselves, which like great breakers dash here and there, from pole to pole. The two or three Obedi¬ ences; the deposition, the arrest and the

con¬ demnation of a fugitive Pope; the long con¬ test between the Council and the Pope, while they attacked the ecclesiastical question and forced the potentates of the Catholic world to a line of defense, placed the thinkers of the day in the identical conditions in which modern thinkers are placed by victorious science. That is why the Humanists faced the same questions which to-day preoccupv mankind. In their writings breathes the modern thought, and the

Renaissance has for half a century attracted the special attention of students who, when they have collected all that has been published regarding that period, will have a rich and precious library.

The action of Humanism was beneficial in other ways. Many ills for Which it is held re¬ sponsible were the effect of very remote causes ; and the Renaissance, in which Humanism played so large a part, is one of the glorious victories of civilization. To the lasting con¬ quests that the present age owes to the age of the Renaissance must be added another, which is that science at that period entered the path which has led it to the wonderful discoveries of our times. The study of anatomy first obtained a secure footing in the school of Bologna. In Florence, Toscanelli paved the way for the triumph of Christopher Columbus in the very year in which the Portuguese discovered the African coast. Navigation became a science, opened the unexplored ocean, and Europe be¬ came the watch-tower of the civilization of the world. Meanwhile, independently of Human¬ ism, but always in this 15th century of its activity, printing began to diffuse knowledge and to become the most efficacious means of promoting the brotherhood of humanity! See Renaissance.

Bibliography. — Consult in English, Burck- hardt, Jakob, (The Civilization of the Renais¬ sance in Italy J (trans. by S. G. C. Middlemore London 1914) ; Cambridge Modern History) (Vol. I, (

Pio Carlo Falletti,

Professor of Modern History, Royal University

of Bologna.

5. ITALIAN MODERN HISTORY (1492-1815). Foreign Intervention (1492- 1530).— The great Italian historian, Francesco Guicciardini (1483-1540), begins the history of his time by declaring that Italy was never so prosperous as toward 1492. Certainly the eco¬ nomic and

intellectual condition of the Italian people was then far superior to that of the rest of Europe; but they became weak from lack of unity. Whilst France and Spain organized powerful kingdoms, Italy remained divided into a number of states, none of which was strong enough to unite to itself the scattered portions of the peninsula, though each was sufficiently strong to hinder another from carrying out the great work of unification. Italian policy at that time consisted in a continued series of combinations to maintain a kind of equilibrium, always difficult and unstable, between the five large states of the peninsula, Milan, Venetia, Florence, Rome and Naples.

The lord of Florence, <(Lorenzo the Mag¬ nificent,® specially distinguished himself among his contemporaries by the great tact with which he prevented the breaking out of discords among various Italian princes ; but he died in 1492 and at his death the political equilibrium was suddenly disturbed.

The first dissensions arose between the court of Milan and that of Naples. Then the young king of France, Charles VIII, who as heir of the House of Anjou — the eternal rival of the House of Aragon in Naples — had a right to the Neapolitan crown, descended on Italy to

conquer it (1494). He crossed the peninsula without meeting any opposition, except at Flor¬ ence, where Pier Capponi with his energetic words of defiance induced the French king to modify his demands. The Aragonese in Naples did not know how to organize a serious re¬ sistance; and on 22 Feb. 1495, Charles VIII, without opposition, made his solemn entry into Naples. The extraordinary ease with which he accomplished this conquest alarmed the Italian princes. The Duke of Milan, Ludovico Sforza, called the Moor, who had invited Charles VIII to this undertaking, now began to organize a league against the French, which was joined by the republic of Venice; by Pope Alexander VI (Borgia) ; by the king of Spain, Ferdinand II, lord of Sicily and Sardinia ; and by the Emperor Maximilian. Thus for the ancient Italian equilibrium they began to substitute the idea of European equilibrium. At Fornovo on the Taro, on 6 July 1495, a furious battle was fought which cost the French army many lives, and the allies boasted a victory. Charles VIII, however, succeeded in escaping and returning to France. But the few troops left by him in Naples were speedily driven out, and the Ara¬ gonese dynasty was once again established on the throne.

Whilst Charles VIII was marching into Italy, the rule of the Medici had been over¬ thrown in Florence, and that city reorganized its old republican form of government. A Do¬ minican friar, Girolamo Savonarola (q.v.), of Ferrara, at that time exercised a great influence over the people of

Florence. But he aroused terrible enmity when in his holy enthusiasm he inveighed against the scandals that the court of Rome, represented at that time by the Borgias, furnished the world.

The Pope excommunicated him, and the discords in Florence furnished him a pretext for getting rid of the friar. On 23 May 1498, on the Piazza della Signoria, in Florence, Gi¬ rolamo Savonarola and two of his devoted fol¬ lowers were hanged, and their bodies burned.

A new expedition to Italy was meanwhile preparing in France. The new king, Louis XII, being descended from Valentina Visconti, claimed his right to the dukedom of Milan, and to make his conquest more sure he entered into an alliance with the Venetians, promising them a portion of his territory. Ludovico Sforza, the Moor, betrayed by his Swiss mercenaries, was made prisoner at Nevara, 10 April 1500, and taken to a castle in France where he remained until his death.

Once master of Milan, Louis XII consid¬ ered the conquest of Naples, and to ensure suc¬ cess he made pact with Ferdinand, king of Spain, that they should together attack Naples, and divide the territory between them. The conquest was easy (1501) ; but in the division of land there arose disputes between the victorious monarchs. During the war which followed, there occurred the celebrated tourna¬ ment combat between 13 Italians and 13 French¬ men, in which the palm of valor was awarded to the Italians. The war terminated in a sud¬ den rout of the French on the banks of the Garigliano, 28 Dec. 1503. The Spaniards re¬ mained masters of all of Napoletano.

Whilst the two principal regions of Italy, Lombardy and Napoletano, thus passed under foreign domination, in central Italy the family

of the Borgias attempted to establish a court and sovereignty.

One of the sons of the Pope, Caesar Borgia, called Duke Valentino, of the dukedom of Valentinois, which was ceded to him by the king of France, undertook to overthrow the ruling families in the cities of Romagna and the Marches. By most cruel and dishonorable methods he captured lmola, Forli, Cesena, Pesaro, Rimini and Faenza. As his captains had rebelled he pretended to accept their claims, but when he had them in his power condemned all to die. But on 18 Aug. 1503, after a few days' illness, Pope Alexander VI died. The Duke Valentino then became ill. This deter¬ mined the dissolution of his state. Many of the subjected cities recalled their former rulers; others were occupied by Venetians. The new Pope, Julius II, obliged him to restore to the Church the few remaining fortresses. Caesar

Borgia left Rome, and died a few years later while fighting with Spain.

Pope Julius II initiated a very warlike pol¬ icy. In order to retake from the Venetians the lands in Romagna which they were occupying, he formed a powerful league, which was called the League of Cambrai, from the French city, where it was signed. In this participated the Pope, the kings of France and Spain and the emperor of Germany. They all united against Venice. Thus, the old republic of S. Marco, which just at this time was beginning to find a formidable rival in its commerce with the Orient in the Portuguese, the discoverers of the new maritime route to the Indies, saw itself menaced also on the mainland by the principal powers of Europe.

In the spring of 1509, the French, after con¬ quering the Venetians at Agnadello, captured Bergamo, Brescia and Peschiera. The pon¬ tifical troops seized the territory of Romagna. The Spaniards took from Venice the ports of Apulia, and the Emperor Maximilian, descend¬ ing the Alps, advanced to Padua; but his re¬ peated assaults on the city were valiantly repulsed, and he was finally obliged to return to Germany. But the salvation of Venice was due to the ability of its diplomats rather than to the arms of its generals. The former de¬ tached the Pope from his alliance with the League which he had organized. Julius II, interested in preventing the extension of the French power in Italy, made peace with Venice (1510) and invited Alfonso of Este, Lord of Ferrara, to follow his example; and because he would not obey he invaded his territory. But the French hastened to aid the Duke of Ferrara, and then the Pope, carried away by the idea of succeeding in freeing Italy from for¬ eigners, organized against France a league with Venice and Spain, an alliance which was called the ((Holy League,® and was inaugurated with the battle cry of, <(Away with the barbarians.®

At first victory smiled on the French and their young and valiant general, Gaston de Foix. But after the battle of Ravenna, which was won by the French, and in which Gaston de Foix was killed (1512), the allies regained the advantage and were then joined by the emperor, who had been the ally of the French. In a few months the "League® succeeded in driving almost all the French from Italy.

The allies met in council at Mantua and assigned the dukedom of Milan to Maximilian

Sforza, son of Ludovico, the Moor, and sent an army to restore in Florence the rule of the Medici, in order to punish the republican gov¬ ernment of Florence for having shown itself favorable to the French. .

The most prominent member of the Medici family at that time was

Cardinal Giovanni, who on the death of Julius II (1513) became Pope and assumed the name of Leo X. According to the traditions of his family, he protected men of letters and artists, so that this period of marvel¬ ous development of Italian genius is called after him.

Meanwhile wars continued. The French could not reconcile themselves to the loss of Milan; but the attempt of Louis XII to re¬ conquer it proved disastrous. His successor, Francis I, on the contrary, at the battle of Marignano (13-14 Sept. 1515) succeeded in cap¬ turing it.

He desired to make France the first Euro¬ pean power ; but the young Charles V, who was descended from Ferdinand, king of Spain, be¬ came a formidable rival. The army of Charles regained Milan from the French and placed in power Francesco II, Sforza, last son of Ludo¬ vico the Moor (1521). The French vainly at¬ tempted to reconquer Lombardy. In the battle of Pavia (24 Feb. 1525) Francis I was taken prisoner. In order to regain his liberty he agreed to hard conditions of peace, but hardly had he touched French soil when he broke faith and entered into an alliance with Venice, Florence and with the new Pope, Clement VII, who also belonged to the House of Medici. During the war which ensued, 12,000 Germans, followers of the doctrine of Luther, descended on Italy, captured and pillaged Rome (1527). On hearing the news Florence overthrew the rule of the Medici and proclaimed anew the republic. Finally, the tide of war turned in favor of the emperor, more especially after the great Genoese admiral, Andrea Doria, went over into his service. The Pope and Francis I made terms with him ; and then the other allied forces had to submit to the conditions imposed by the victors. Charles V went to Bologna, where he was solemnly crowned emperor, 24 Feb. 1530. In the diplomatic congress called together, it was determined to allow Fran¬ cesco II, Sforza, to retain the duchy of Milan on condition that at his death it should pass into possession of Spain. Florence was to re¬ instate the Medici, as Charles V had promised the Pope. Already, at the end of the autumn of 1529 a Spanish army had come to lay siege to Florence, which, however, showed itself pre¬ pared to defend its liberty to the last. All the citizens, without regard to age, flew to battle on its walls. But this heroic resistance was in vain, owing to the treachery of Malatesta Baglioni, to whom Florence had entrusted the command of her troops. The decisive battle of Gavinana, near Pistoia, was fought 3 Aug. 1530, at which time was slain the Florentine, Francesco Ferrucci. A few days later, Florence surrendered to the imperial army, who ceded the rule to the Medici family.

Spanish Predominance (1530-1700). — In the midst of the wars which during the first 30 years of the 16th century convulsed Italy and ruined it economically, its political conditions also greatly changed. Of the five leading states, the Napoletano (Naples) had become a

vice-royalty of Spain; Lombardy was occupied by the military forces of Charles V, the other two states — Rome and Florence — had lost almost all their political importance and were obliged to bow to the Spanish rule; and Venice, although proudly maintaining her independence, was no longer in a position to hold her own against the great powers of Europe.

France made another attempt to oppose the predominant power of Charles V in Europe and renewed the war on several occasions. Piedmont was the chief sufferer. The Duke of Savoy, Charles III, who had desired to remain neutral, ended by losing almost all his territory. Fortunately his son Emanuele Filiberto, who had entered the service of Spain, gained (10 Aug. 1557) the great victory of Saint Quentin, in Flanders, and decided at the conclusion of the war to revisit his own state. Peace was concluded in 1559 at Cateau Cambresis. By the terms of this peace France was to restore almost all the territory occupied by her during the wrar, and thus the long rivalry between the two powers was definitely settled in favor of Spain.

The Spanish domination soon enervated the minds and corrupted the customs of the people; and they became an enfeebled race, weak, enervated, without enthusiasm and without ideals ; and to make it worse, religious intoler¬ ance prevailed, which induced the Italians to mask their incredulity by hypocrisy.

The richest and most fertile provinces, Milan, Naples, Sicily and Sardinia, were sub¬ ject to Spain and the rest of the peninsula felt the reflex action of this subjection. Thus, the popes were on friendly terms with the Span¬ iards, because the latter had supported their ecclesiastical policy, and this friendship was soon changed into servility. The Medici were favorably disposed toward Spain in order that they might be let alone ; the republic of Genoa from the time of Andrea Doria was an ally, or rather a servant of Spain; and the dukedoms of Ferrara, Mantua and Parma were too weak to venture on an independent policy. Italy was indeed a Spanish province.

Two of the Italian states alone maintained their dignity and independence : the duchy of Savoy and the republic of Venice; and in these two regions were comprised all that was best in Italian life of the period.

Emanuele Filiberto was the second founder of the House of Savoy. With his sword he re¬ gained the inheritance of his family, and then devoted his attention to performing the duty of a restorer and legislator to his people. His son and successor, Charles Emanuele I (1580-1614), ambitious, bold,

restless, endeavored by a con¬ tinual series of wars to aggrandize his states. Through an agreement with France he obtained the marquisate of Saluzzo, ceding in exchange la Bressa and other territory on the Rhone. It was an advantageous exchange for him, for in this way the French were totally excluded from Italy. He then sought an alliance with France in order to wrest Lombardy from the domina¬ tion of Spain, but the unexpected death of Henry IV prevented the execution of this great design. Spain demanded that he should dis¬ arm ; but instead of obeying, he invited the Italian states, and particularly Venice, to com¬ bine against Spain in a war of independence. However, none' of them accepted his invitation;

but, unaided for many years he bore the assaults of the Spanish arms, showing that, in the midst of the military decadence and the political enervation of the various states of the peninsula, there was one who knew how to maintain the dignity of the Italian name!

His last war was for the succession to the duchies of Mantua and Monferrato, in which Spain also took part, as did the emperor and France. The whole upper Italy was traversed and devastated by various foreign armies, who also spread the plague. These were the sorrow¬ ful years described by Alessandro Manzoni in his historical romance, (I Promessi SposiP The war still continued when Carlo Emanuele died.

Vittorio Amedeo, his son and successor, signed a peace by which he obtained the greater part of Monferrato, but ceded Pineolo to France, which thus once again got a foothold in Italy. The Prime Minister of France, Car¬ dinal Richelieu, succeeded anew in forming a league against Spain, which was joined by the dukes of Savoy, Mantua and Parma. The war had scarcely begun when Vittorio Amedeo died (1637). His widow, Maria Christina, called Madame Royale, assumed the regency in the name of her son ; but her cousins, Cardinal Maurizio and Prince Tommaso, wished to be associated with her in the government, and to this end they sought the aid of Spain. The Duchess, in her turn, had recourse to France, and thus Piedmont was once more traversed and devastated by Spanish and French soldiery. At length the princes of Savoy perceived that foreign powers were taking advantage of their dissensions for their own profit, and thought it best to come to an agreement among themselves.

In the second half of the 16th century Ven¬ ice was apparently at the zenith of her power and prosperity, and her great painters, Titian, Tintoretto, Paolo Veronese, etc., by their chef- d'cruvres proclaimed her triumph to the world. In reality, however, she was depending on the wealth

gathered in the past. Her power was already seriously threatened. In 1570 the Turks attacked Cyprus, and notwithstanding the long and glorious resistance of the Venetian troops, they succeeded in taking possession of the whole island. The Christian League, formed at that time through the zeal of Pope Pius V, armed a great fleet which gained the memorable victory of Lepanto over the Turks in 1571 ; but the results were meagre on account of the jeal¬ ousy between the allied powers.

The republic, while professing zeal in re¬ ligious matters, had always upheld the rights of the state in opposition to those of the Church. On that account it waged a lively dis¬ pute with Pope Paul V, who, annoyed at seeing his demands disregarded, excommunicated the republic (1606). Venice commanded the priests to continue the exercise of their worship under penalty of being banished from the territory, and almost all obeyed. Finally, through the in¬ terposition of the king of France, the Pope and the republic came to an agreement. . •

From now on, Venice became even less in¬ terested in Italian affairs, and in the Orient she sought only to defend against the Turks her farthest possessions. After a long war Candia passed under the dominion of the Turks. In 1684 Venice again took arms against the Turks, having as allies the emperor and the king of Poland. Her great general, Francesco Morosini,

conquered at that time the Peloponnesus, but on his death (1694) the era of the great Doges of Venice came to an end. Twenty years later the Peloponnesus again came under the power of the Turks.

Spanish domination in Italy lasted until the first years of the 18th century, and left sad traces behind it. No government ever took less care of its subjects than the Spanish govern¬ ment, which looked upon Italian provinces as lands that they might despoil, but not govern. The taxes became daily more intolerable, and the income which the government received from them was not disbursed for the advantage of those who paid them, but went to enrich the viceroys sent to Italy, to maintain the pomp of the court of Spain, and the enormous expenses of the wars which this power had to. carry on in many parts of the world. There were fre¬ quent insurrections, notably that of Naples (1647) which is associated with the name of a young fisherman, Masaniello ; but the govern¬ ment always succeeded in suppressing them by temporary concessions which did not alter the true condition of affairs.

Contested Predominance Between France and Austria (1700-1789). — The death of the king of Spain, Charles II (1700), and the war of the succession precipitated a long war be¬ tween the French dynasty of the Bourbons and the German House of Hapsburg, supported by England and Holland. The Imperialists sought to retain possession of the territory which Spain had in Italy; hence, the war was carried on largely in the Italian peninsula. The Duke of Savoy, Victor Amadeus II, was at first sup¬ ported by the Bourbons, but when they under¬ stood their own interests better they went oyer to the Imperial army. Then Piedmont was in¬ vaded and traversed in every direction by the French, who ended by laying siege to Turin (1706). Among the many glorious episodes during its defense is that relating to a private of the Miners, Pietro Micca, who at the sacri¬ fice of his life saved the citadel from a noctur¬ nal surprise assault. On 7 Sept. 1706, Duke Victor Amadeus II joined his troops to those under the command of Prince Eugene, and gained a great victory under the walls of Turin, in consequence of which the French were obliged to vacate Piedmont and the rest of Italy. By the Peace of Utrecht Sicily was given to Victor Amadeus II, who assumed the title of king. Sardinia, Naples and Lombardy were yielded to Austria. But a few years later the Italian Cardinal Giulio Alberoni, who had become Prime Minister to the king of Spain, attempted to regain possession of Sardinia and Sicily; but being threatened by the prin¬ cipal powers of Europe, the king of Spain retired his fleet and discharged his minister. Austria profited by this opportunity by compel¬ ling Victor Amadeus II to exchange Sicily for Sardinia (1720). Austria, however, did not .long retain Sicily and Naples; for one of the sons of the king of Spain, Charles of Bourbon, taking advantage of the War of Succession in Poland which upset all Europe, seized these territories and founded the Bourbon Neapolitan dynasty (1734). To make up for this loss the Emperor Charles VI received the duchy of Parma and Piacenza, in which the Farnesi dynasty was extinct; and on the extinction of the House of Medici (1737) he assigned the

grand duchy of Tuscany to brancis of Lor¬ raine, husband of his daughter Maria Teresa.

The death of the emperor, Charles VI, (1740) gave rise to a fresh war of succession, which lasted eight years, and covered with blood many regions of Europe. In Italy the French and Spaniards attempted to wrest from Austria both Milan and the Duchy of Parma and Piacenza; but the Empress Maria Teresa was aided by the king of Sardinia, Carlo Eman- uele III. Maria Teresa then sought to recon¬ quer Naples, but the army she sent out was de¬ feated at Velletri (1744). Meanwhile the French and Spanish fought, in alliance with the republic of Genoa, renewing their attacks in Lombardy; but after a few successes they were repulsed. Also the Austrians advancing as far as Genoa placed heavy tribute and humiliations on the

people, but the inhabitants of Genoa rose up and repulsed them (1746).

The following year the French and Spanish attempted to cross into Piedmont by way of the Colie dell'Assietta, but were routed. The only important change that took place in Italy in consequence of this war was the assigning of the duchy of Parma and Piacenza to Don Philip of Bourbon, son of the king of Spain.

After the Treaty of Aquisgrana, which sig¬ nalized the end of this war, Italv enjoyed a long period of peace (from 174&-92), which the various states of the peninsula devoted to their internal development. A current of new thought had overrun the whole of Europe through the writings of French authors; and these had given rise everywhere to a sort of tendency toward reform, animated bv a prin¬ ciple of toleration in matters of religion and by the idea of the need of a great social re¬ generation to ensure a greater degree of jus¬ tice among men. The governments ended by accepting these and sought to put them in prac¬ tise, the more willingly because the abolition of the privileges enjoyed by the nobles and the clergy represented an advantage for the sovereigns and also pleased the people, who were thus freed from a thousand annoyances, burdens and vexations.

In Naples, Charles of Bourbon (1734-59) acquired a good character for his civil and ec¬ clesiastical reforms. In the other branch of the Bourbons, at Parma, Duke Philip (1748-65), who introduced great reforms, was succeeded by his son Ferdinando, who abolished even those already established.

In Lombardy, on the other hand, under Maria Teresa (1740-80) was inaugurated a period of material and intellectual regenera¬ tion ; and Joseph II. who succeeded her in the government, prosecuted reforms' with even greater energy than his mother. Thus also in Tuscany, where Francis of Lorraine (1738- 65) was succeeded by Peter Leopold (1765- 90), who may justly be considered the greatest of the reform princes of Italy.

French Preponderance (1789-1815). — The breaking out of the French Revolution pro¬ duced a two-fold effect on Italy. Her rulers, in terror, halted their reforms, whilst the peo¬ ple, excited by the news from Paris, began to desire a change in the order of things with more eagerness than ever. Hence arose dis¬ cords which daily became more aggravated, when arrests and torture were resorted to in order to suppress the revolutionary spirit.

Piedmont, together with Austria, opened the war against France in the summer of 1792, and the French were victorious, and in the same year, 1792, took Savoy -and Nice. In 1796 the young general, Napoleon Bonaparte, separated the Austrian army from that of Piedmont; obliged King Victor Amadeus III to make peace ; then penetrated into Lombardy in pur¬ suit of the Austrians, and by a series of bril¬ liant victories secured possession of it. These events awoke Italy from her torpor, and en¬ couraged the secret aspirations of the people. Reggio and Modena rose in insurrection against the Duke, and uniting themselves to Bologna and Ferrara, which had been wrested by the French from the rule of the Pope, they organ¬ ized a republic, called Cispadana, which adopted the Italian tri-colored flag, with the white and red of the French flag but with green substi¬ tuted for blue.

Bonaparte also invaded the Pontifical States, obliging the Pope to subscribe to burdensome conditions of peace; then he pursued the Aus¬ trian army across the Alps as far as Leoben, at which place Austria decided to conclude pre¬ liminaries of peace (April 1797). Just at this time, in Verona, the populace and the peasantry rose in arms against the French and butchered them. This insurrection was quickly wiped out in blood, but General Bonaparte made use of it as a good pretext for an attack on the aristocratic republic of Venice, and by threaten¬ ing war, he compelled it to transform itself into a democratic government. In Genoa also, by Bonaparte's orders, the ancient form of govern¬ ment was abolished and the Ligurian League restored in imitation of the French govern¬ ment. Lombardy, which had been retaken from Austria, was made part of the Republica Cispadana and they became one republic, called the Cisalpine Republic.

In October 1797 peace was agreed on with Austria at Campoformio, in Friuli. By the terms of peace Austria was to renounce pos¬ session of Lombardy, but received instead the territory of the republic of Venice, which from this time ceased to exist. The cession of Venice to Austria gave the lie to the fine promises of liberty and independence that had been made by the French invaders, which was probably the reason for the harassing attacks and the plundering expeditions that occurred in the Cisalpine and Ligurian republics, which were now considered almost as vassals, which fact caused great dissatisfaction among the Italian populace. However, the two years (1796-97) showed a great awakening in the life of the peninsula.

In 1798 the French, on the pretext that the house of the French Ambassador had been vio¬ lated, took possession of Rome, declared the government to have fallen into decadence and established a repu'blic. Then, as the king of Naples had dared to declare war on them, they entered

Naples and proclaimed a republic there, which they called Parthenopea, from the ancient name of the city. On hearing the news that Austria, in alliance with Russia and Eng¬ land, meditated a fresh descent into Italy, the French took possession also of Piedmont and Tuscany.

But the Austro-Russian army entered Italy in the spring of 1799, and repeatedlv defeated the French, so that the latter were forced to

retreat into Lrguria. Naturally the republican governments, which had been established by them, not having sufficient standing in the coun¬ try, were overthrown, and many of the citizens who had compromised themselves by the favor with which they accepted the new ideas were obliged to emigrate. The republicans of Naples capitulated on the promise of amnesty; but King Ferdinand and Queen Maria Carolina violating their promises took fierce vengeance on the heads of the republican government. Among them were Dr. Domenico Cirillo, Judge Mario Pagano, Francesco Conforti, Ad¬ miral Francesco Caracciolo, etc.

Napoleon Bonaparte assumed the rule in France, with title of First Consul. He in¬ tended to reconquer Italy, where the French now possessed only Genoa, and even here they found themselves besieged. Massena, com¬ mander of the French army, shut up in Genoa, held out heroically until 4 June 1800. In the meantime Napoleon at the head of another army entering 'Italy by way of the Saint Bernard threatened the Austrians from the rear and forced them to retreat toward Lom¬ bardy. At Marengo, near Alexandria, on 14 June 1800, a great and decisive battle was fought. The Austrians were forced to abandon all their conquests and again confirm the Treaty of Campoformio. Napoleon re-es¬ tablished the Cisalpine and Ligurian republics, and annexed Piedmont to France. The Neapolitan and Austrian troops evacuated Rome, which was presented to the new Pope Pius VII. Shortly after this Parma and Pia¬ cenza were ceded to France, and the Bourbons, who owned that duchy, were given Tuscany, which was made into the kingdom of Etruria.

At the close of 1801 Napoleon convoked a meeting at Lyons of 452 leading men of the Cisalpine Repu'blic for the purpose of forming the new constitution, which was to be similar to that which then obtained in France. The re¬ public was to be called Italian, and Napoleon Bonaparte was elected President. He nomi¬ nated Francesco Melzi as Vice-President. From this tirqe the evils consequent on the military occupation of the preceding years began to diminish and this republic was able to enjoy true prosperity. The name of Italian Republic was pleasing to the people, and as the President was at a distance their independence seemed all the greater. Melzi knew how to attract general sympathy and governed wisely. But when Napoleon became emperor of the French he changed the republic of

Italy into the king¬ dom of Italy, and was crowned at Milan 26 May 1805. He named as vice-regent Eugene Beauharnais, a youth of good and gentle dis¬ position, who endeavored to show his gratitude toward the emperor by a blind obedience. As a result of the war of 1805, Austria had to re¬ nounce Venice, which became part of the king¬ dom of Italy, to the great joy of the Italian people, who flattered themselves that this was the first step toward the unification of the en¬ tire peninsula. Instead of that, Napoleon drove the Bourbons out of Naples, and made of it a separate kingdom, placing his brother Joseph Bonaparte on the throne. Then, as he had al¬ ready annexed Liguria to the French crown, he also annexed Tuscany and Latiiim, leaving to the kingdom of Italy only the Marches. With

this invasion ceased the temporal power of the popes (1809).

Thus the whole Italian peninsula was de¬ pendent directly or indirectly on Napoleon. The House of Savoy retained only the island of Sardinia; and the Bourbons of Naples Sicily. Napoleon, who moved the kings about as though they were chessmen, in 1808 raised his brother Joseph to the throne of Spain, and sent to Naples in his stead his cousin, Joachim Murat.

A great change had taken place, materially, intellectually and socially, in the Napoleonic dominions. New roads were opened, large canals dug, splendid monuments erected, agri¬ culture encouraged, industry and commerce favored, letters and the fine arts promoted. But his despotic will alienated Napoleon's sub¬ jects, especially when they remembered that having attained such great power, nothing could hinder his ambitious aims, and that to satisfy his own vanity he was always ready to sacrifice the lives of his soldiers. Hence, when his hour of disaster came he found little support in Italy.

In the autumn of 1813 Austria advanced threateningly on the kingdom of Italy. The viceroy, Eugene Bcauharnais, attempted to de¬ fend it, but in vain, particularly as the king of Naples, Joachim Murat, in order to retain his own throne, had entered into secret negotia¬ tions with Austria, and had also led an army toward upper Italy. The Austrians had already occupied a great portion of the kingdom when the news arrived in Italy that Napoleon had been forced to abdicate. Then arose an in¬ surrection in Milan against the French govern¬ ment. Count Prina, Minister of Finance, was massacred by the mob (April 1814). In conse¬ quence of these outrages, the viceroy, Eugene Beauharnais, left the kingdom. Milan was

oc¬ cupied by the Austrian troops.

*Almost all the former governments were re¬ stored. The Pope, Pius VII, re-entered Rome, Duke Ferdinand III took back Tuscany. The duchies of Parma and Modena were re-estab¬ lished. Victor Emanuele I of Savoy re-entered Turin. **

Joachim Murat alone retained the kingdom of Naples; but he soon had reason to doubt that Austria would keep the promise she had made him. He, therefore, became reconciled to Napoleon, who was then in the island of Elba, and when he left it to set out on the marvelous 100 days, Murat took up arms against Austria, inviting Italy to assist in a war of independence. He was defeated, and obliged to renounce the throne (20 May 1815). From Corsica, whither he had fled, he tried to reconquer Naples, but was made prisoner at Pizzo in Calabria, and shot (13 Oct. 1815).*

Bibliography. — Consult Ranke, L. von, ˆammtliche Werke> (Leipzig 1874) ; Lavisse et Rambaud, (Histoire generale) (Vol. IV et seq., Paris 1894-97) ; Villari, P., (Life and Times of Savonarola> (trans., London 1909); Symonds, J. A., (Catholic Reaction) (New York 1887) ; Orsi, Pietro, (Modern Italy) (trans., New York 1900) ; Cambridge Modern History > (Cambridge 1903-07).

Pietro Orsi,

Professor of Modern History, Royal Lyceum

of Venice.

6. ITALIAN HISTORY FROM 1815 TO 1907. Before the French Revolution, the territory which now forms the kingdom of Italy was inhabited by. about 17,000,000 people, and was composed of nine principal states : The kingdom of Sardinia with Piedmont and Savoy; the republic of Genoa; the duchy of Parma and of Piacenza; the duchy of Modena; the republic of Venetia; the republic of Lucca; the grand duchy of Tuscany; the Pon¬ tifical States; the kingdom of Naples with Sicily; and besides two regions belonging to foreign powers, i.e., Corsica to France, and Lombardy and Mantua ‘ to Austria. In these countries, the political, social, economic, judi¬ cial, financial and intellectual conditions were deplorable; the power of the sovereign was absolute ; the population was divided into classes, some of which possessed remarkable and varying privileges ; industry, commerce and agriculture were neglected, with consequent poverty of the laboring classes; justice was meted out unfairly to all, barbarously con¬ ducted and with no proportion between the crime and its

punishment ; the public finances were in a ruinous state ; education was very limited and difficult to acquire. Into this Italy, so complex and unprogressive, came the French Revolution (1789-1814) with the arms of the republic and of the emperor ; destroyed the existing states and set up and supported the Glorious Principles of 1789. After undergoing various transformations, Peninsular Italy (Sicily belonged to the Bourbons of Naples, Sardinia to the House of Savoy and Corsica to France) was thus partitioned by Napoleon I: one part was united to the French Empire (Piedmont, Liguria, Parma and Piacenza, Tus¬ cany, Umbria, Lazio) ; a second part formed the kingdom of Italy, which was destined to become independent under its own king, with the capital at Milan (composed of Lombardy, the province of Venetia, Modena, the province of Rome and the Marches) ; a third part, with the title of the kingdom of Naples, was held successively by two French kings, Giuseppe Bonaparte and Gioacchino (Joachim) Murat, with a certain independence. In these coun¬ tries, through the initiation of foreign folk, but with the co-operation of many Italians also, arose a period of economic activity; streets were opened; institutions were founded for the progress of science and the diffusion of knowledge ; the government and administration of affairs became vastly superior to what had preceded; and the equality of all before the law was established. The moral, civil and eco¬ nomic progress throughout the entire penin¬ sula was very evident and very considerable; but the people ended in becoming very discon¬ tented because of the incessant levies, which robbed the country of the flower of its youth, following the military enterprises of Napoleon, and also because of the enormous taxes which the emperor imposed upon every one accord¬ ing to his own despotic will. When the Napo¬ leonic dynasty fell, the United Powers, which had overthrown it, in order to wipe out every trace of the revolution in Italy, wished to re¬ establish the states exactly as they were before the coming of the French (except the repub¬ lics, which were not reconstituted), and they recalled the former sovereigns, and the entire

country was placed under the rule, direct or indirect, of Austria.

The Treaties of Paris and the Congress of Vienna (1814-1815) finally reorganized Italy in the following manner : there were seven prin¬ cipal states, nominally independent, and two regions governed by foreign rule. The inde¬ pendent states were: (1) The kingdom of Sardinia, to which the House of Savoy re¬ turned, which had at its head Victor Emanuel I, and to which was also given the territory of the former republic of Genoa; (2) the duchy of Parma and of Piacenza, given to Marie Louise of Austria, the wife

of Napoleon I; (3) the duchy of Modena, to the Archduke Fran¬ cis IV of Austria; (4) the grand duchy of Tuscany, to Ferdinand III of Austria; (5) the duchy of Lucca, to Maria Louisa of Bour¬ bon ; (6) The Pontifical State, to which Pins VII returned, freed from prison; (7) the kingdom of the two Sicilies, i.e., Naples and Sicily, to which Ferdinand IV (now become I) of Bourbon returned. The regions subject to foreign powers were : Corsica, which remained French, and the kingdom of Lombardy-Vene- tia, which passed to the House of Austria. The latter, therefore, possessed incontestible power in all Italy, since in addition to the direct au¬ thority over the kingdom of Lombardy-Vene- tia, it had its own princes in power over Tus¬ cany, Parma, Modena and exercised a sort of guardianship over the other states. Austria, the centre of reaction in Europe, represented in Italy the Holy Alliance, which had the plan to re-esiablish the divine right of monarchies and to hold the people quiet and submissive, and to carry out this plan the sovereigns belonging to the Alliance were obliged to help each other whenever called upon.

The returning princes were well received, because the allied powers had fraudulently promised that they would not forget the aspira¬ tions of the nation, and because the people hoped that, not only would the excellent insti¬ tutions founded by France be preserved but also that there would be an end to the waste of money and of blood which characterized the last years of the oppressive Napoleonic regime. The princes, on the contrary, enraged against everything that reminded them of the usurpers, gave themselves up to destroying all that the revolution had created. They banished or hu¬ miliated every one who had received offices from France; abolished all liberty of thought, of the press, of speech ; re-established the ancient laws which provided for privileged classes ; denied civil rights to Hebrews and to Protestants ; gave excessive power to the clergy, and restored to courts of justice the savage methods which barbarity had formerly fur¬ nished. Education became possible to only the few. In this mad reaction the Piedmont and Napoleonic government distinguished itself especially. The King Victor Emanuel I of Sar¬ dinia said that he considered that he had slept all the years of his exile and that he desired that his subjects should do so hereafter; there¬ fore, he endeavored to establish the state in every place exactly as it had been before the revolution. Discontent soon manifested itself everywhere. The people, finding themselves in an unjust and unbearable situation, commenced a Titanic struggle by means of secret societies, of conspiracies, of revolutions, even of open

war, which lasted from 1815 until 1870, and finally made Italy one, free and independent; after which the new state was able to develop its own powers, in such a way as to attain in a very short time that grade of prosperity and success in which it finds itself to-day.

The years from 1815 to 1907 are those of the Italian Resurrection, which should be divided into a Political Resurrection (1815-70) and an Economic Resurrection (1870-1907), and embraces five periods : (I) Conspiracies and in¬ surrections promoted by the Carbonari (1815— 31) ; (II) Conspiracies and insurrections promoted by ((Young Italy® (1831-46) ; (III) Action by the political neoguelfic school (1846- 49) ; (IV) Work under the direction of the House of Savoy and the foundation of Italian Unification (1849-70) ; (V) Development and progress of free Italy (1870-1907).

Period I. — Conspiracies and Insurrec¬ tions Promoted by the Carbonari (1815-31). — The general . discontent, the necessity of a radical change in public affairs, and the impos¬ sibility of displaying their own aspirations in the full light of day, compelled the Italians to form secret societies by means of which they hoped to attain their prohibited ends. In this first period the Carboneria was the principal one, an emanation from the Mazzoneria, whose symbols and language it had preserved; it arose in Naples during the reign of Murat, and was propagated after the return of the Bourbons for the organization of the oppressed against their oppressors, and hence spread throughout all Italy between 1815 and 1820. It enrolled among its members especially persons of the middle class, professional men, employees, the military and also some nobles. The sections called themselves Vendite. The society gradu¬ ally disbanded and the subdivisions assumed contrasting and fantastic names : Society of the Filadelfi, of the Adelfi, of the Maestri Perfetti (perfect masters), of the Spilla Nera (black pin), of the Federazione (confederation), etc. The program common to all was : independence of all foreigners, a form of liberal government and the confederation of all Italian states, which did not exclude the fact that some of the Ven- dite changed this general program, in so far that instead of the Confederated Italy they wished one Italy under the republican form of government, not the monarchial. The reaction¬ ary government, which feared the Carboneria, gave countenance to some societies formed wirh the opposite designs, the more important among which were the Calderari and the Sanfedisti. The history of Italy from 1815 to 1831 is con¬ tained in the history of the Carboneria.

The first revolutionary movement broke out in 1817 in Macerata, in the Marches, where the Carbonari were numerous, and was at once re¬ pressed by the Papal government. In 1819 the Austrian police discovered a Carboneria con¬ spiracy in Polesine in Rovigo, arrested many persons implicated, who were found guilty and put into prison, together with Pellico, who wrote the book called (Le Mie PrigionP (((My Pris¬ ons®). In 1820, after II Conciliatore, organ of the liberal patriotic party, had been suppressed, the discovery of other conspiracies led to the ar¬ rest in Milan of Pietro Maroncelli and of Silvio Pellico, followed by the arrest of Federico

Confalonieri, head of the conspiracy, of Giorgio Pallavicino, of Gaetano Castiglia and a hun-

dred others, who, found guilty during the years 1821-24, went to populate the dreadful Austrian prisons.

In Naples, the Carboneria conspirators were very numerous, especially in the army, and it was precisely the arnry which initiated the Rev¬ olution of. 1820-21. On 2 July 1820 their spirits roused by the triumph of liberty in Spain, two officers and 130 soldiers started from Nola toward Avellino to the cry of <(Liberty and a Constitution® ; then uniting themselves with two insurgent regiments under Guglielmo Pepe, whom they proclaimed their general, they all wrent to Naples, where the king, taken by sur¬ prise and also under compulsion of the citizens, promised a constitution, to which he swore fealty (13 July), invoking the lightnings of the Almighty upon his head if ever he violated it. In Palermo also the people rose, but in Sicily the movement took the form of a Separatist Movement, so that the constitutional govern¬ ment at Naples was obliged to send two gen¬ erals to overcome the insurgents and preserve the union of the two parts of the kingdom. Meanwhile the king, breaking faith, invoked the aid of the sovereigns of the Holy Alliance, who invited him to Lubiana, where in January 1821 they held a congress. The king had promised to defend before the allied sovereigns the con¬ stitution to which he had pledged himself ; but instead, the powers decided to intervene in the affairs of the Neapolitans by force of arms in order to re-establish the absolute monarchy. An Austrian army, commanded by General Fri- mont, invaded the kingdom, conquered the con¬ stitutionalists led by Gen. G. Pepe, at Antro- doco, entered Naples 23 March 1821, and then occupied Sicily. The constitution was abol¬ ished ; those who had headed the movement were cast into prison, some were sentenced to death and many were exiled.

In Piedmont, where the Carboneria was more commonly known as the Federazione (the Confederation), the Revolution of 1821 had two objects; to obtain a constitutional government ˆnd to drive the Austrians from the peninsula, in order to form with the House of Savoy a kingdom of all northern Italy. The promoters of this were chiefly officers of the army be¬ longing to the principal aristocratic families, and they believed that the young Prince and heir-presumptive to the throne, Carlo Alberto of Savoy-Carignano, was also of their party, since in private conversations with his friends he made no attempt to conceal his ardent love for the independence of his country and his de¬ sire to do something for her. The insurrection

burst forth when it became known that an Aus¬ trian army had arrived at Naples to quell this revolution, and they believed that they could attack it from the rear with the help of the Lombardy-Yenetians, who were to rise at the call of the Piedmontese. On 10 March 1821 a regiment in Alessandria rose, and formed there a provisional government, and during the days following other garrisons arrived in that city; some soldiers, at the gate of Turin, shout¬ ing for the constitution, raised the tri-colored banner; and the king, Victor Emanuel I, who felt that he could not change the order of events and did not wish to use violence against his subjects, abdicated in favor of his brother, Carlo Felice, naming as regent during the latter's ab¬ sence the Prince of Carignano, who, in obedi¬

ence to the demands of the people, conceded the Spanish constitution. But the king, Carlo Felice, in Modena, annulled this concession, or¬ dered Carlo Alberto to withdraw into Tuscany, assembled that part of the army which had re¬ mained faithful and called for help from Aus¬ tria. The soldiers in favor of the constitution were beaten (8 April) near Novara; the heads of the movement — the most famous of whom was Santorre of Samtarosa — in order to es¬ cape the gallows, were obliged to exile them¬ selves in Spain, Portugal, Greece, France or England.

These attempts at gaining liberty were fol¬ lowed by 10 years of frightful reaction, in Piedmont as well as at Naples and everywhere in Italy. Austria more than ever was master of all ; nevertheless, the Carbonari, beaten but not destroyed, continued to work in secret.

When in 1830 upon the accession of Louis Philippe to the throne of France, it seemed that the liberal aspirations of Europe had found strong and secure foundations, the patriots of central Italy hoped to be able to form a king¬ dom with a constitutional government, consist¬ ing of Lombardy, Modena, Parma and Ferrara; a kingdom which they would give to Francesco IV, Duke of Modena, who had much ambition and great wealth, and who they knew had an understanding with the Carbonari and was a friend of one of their most highly esteemed chiefs, Ciro Menotti. It is said that at the last moment the Duke was seized with fear of being discovered and severely punished by Austria, and, therefore, abandoned the conspiracy. Men¬ otti, in consequence of this, wished to antici¬ pate the revolution ; but on the night appointed for the rising (3ˆ4- Feb. 1831) the Duke, with 800 soldiers, surrounded his house and took him, with many others, prisoners ; and when he knew that the revolution was so widespread throughout the state, he repaired to Mantova, taking with him Menotti, to be under the pro¬ tection of the Austrian cannon. This revolu¬ tion extended to the Pontifical State, where Bologna (5 February) and later other cities rose in rebellion ; the temporal power of the Pope was declared abolished, and they founded, together with Romagna and the Marches, a*

free state which they called the United Provinces. From Parma also the Duchess Maria Louisa was obliged to flee and take refuge in Piacenza. The Austrians, called upon for help, intervened, overcame the Italians and again established in every place the preceding government. The Duke of Modena was savage in his revenge; shortly after his return Ciro Menotti and others were hanged on the gallows. The foreign powers in a Memorandum publicly invited Pope Gregory XVI to give to 'his state a more pa¬ cific administration; but the Pope, instead of ameliorating public administration of public affairs, gave himself up to a violent reaction, so that in 1832 the revolution again broke out. The Austrians returned, and the French occu¬ pied Ancona in order not to leave Italy in the power of Germans alone, and neither of them took their departure until 1838.

All these movements of the Carbonari, therefore, failed, because they were successive, not contemporaneous ; because they were not sufficiently prepared and not wisely guided ; be¬ cause, being the work of the minority, they were not participated in by the people ; and

finally, because their plans were to establish a kingdom, not a nation.

Period II. — Conspiracies and Insurrec¬ tions Promoted by «Young Italy (1831-46).*

The impossibility of obtaining independence and freedom for Italy by means of the Car- boneria was impressed upon the people chiefly by Giuseppe Mazzini (1805-72) of Genoa, who had been a member of this society and in 1830 by a piece of ordinary treachery had been cast into prison. While incarcerated in the fortress of Savona, he conceived the idea of forming a new association, which should be national and not sectional, and which, while pre¬ paring in secret for a revolution, should openly propagate its principles by means of the press. Released from prison, he was obliged to go into exile, and in Marseilles he became con¬ vinced that it was useless to expect any gener¬ ous initiative on the part of any sovereign; he therefore (from among the many Italian refugees of the Revolution of 1820-21 and that of 1831) founded in 1831 (

(1807-82).

Young Italy remained stunned by these severe blows for some years, but after a decade had passed she again became active. In 1843 at Savigno and in other places in Romagna, several revolutions against the pontifical gov¬ ernment took place, but the insurgents were beaten, and many of

them were imprisoned or condemned to death. A band of Calabrian patriots marched toward Cosenza (15 March 1844) and entered the place carrying the tri¬

colored banner and shouting < (long life to lib¬ erty and down with despotism, but being at¬ tacked vigorously by the Bourbon militia, they were quickly dispersed. Information of this somewhat insignificant movement reached two courageous youths, brothers Atilo and Emilio Bandiera, of Venice, who, being of the same political faith as Mazzini, had abandoned the service of the Austrian marines (in which they were officers and their father an admiral) and had fled to Corfu, there to wait for the moment to strike a blow for liberty and their country. Having collected other exiles, among them Nicola Ricciotti, they set out for Calabria, where they believed that the insurrection was being carried on, and disembarked at Cotrone, not expected, not knowing to whom or where they should turn, but convinced that if the under¬ taking should end with the sacrifice of them¬ selves, then such sacrifice would help the cause of Italy. Received in an unfriendly manner by the people — perhaps victims of treachery — they were attacked by the police and a battalion of the Bourbon military; some were taken prisoners, some were wounded and some were killed. A court-martial condemned to death the survivors, who were shot near Cosenza, only a very few being allowed to go free. In 1845 the agitation by Mazzini induced the Romagnoli to make another attempt ; Rimini rose and a provisional government was installed; but the liberal troops were put to flight by the Papal soldiers, and the rebels fled, reappearing in Tuscany.*

These and other attempts all met with fail¬ ure, because the people who should have made them succeed were not as yet sufficiently edu¬ cated up to the national idea, and because the number of insurrectionists did not suffice for the extremely difficult task of redeeming and uniting Italy.

Period III. — Action of the Neoguelf Po¬ litical School (1846-49). — In 1843 Vincenzo Gioberti, an exile for 10 years in Brussels, pub¬ lished there a book entitled (Upon the Moral and Civic Pre-eminence of the Italians,) in which, with much eloquence, he developed the following conceptions : That Italy could rise again without recourse to insurrections ; that this resurrection could come to pass, uniting the entire peninsula, by means of a confedera¬ tion of her princes; that to establish this Italian unity two provinces especially should be ac¬ tive — Rome, which should give the Pope as head of the confederation, and Piedmont, which should give its military force; that the princes should and would make wise and pacific re¬ forms ; and that Italy, thus leagued together, guided by a liberal Pope, would then rise to exercise that universal influence in action and in thought to which she was destined by her very nature. This book was rapidly dissemi¬ nated throughout the peninsula and gave a great impetus

to thought. In 1844 Cesar Balbo, in a work called (Upon the Hopes of Italy,) argued that the confederation would be possible only after the Austrians had been driven out from Italy; he advised, moreover, above all that the young men should be instructed in arms for a national war. In 1845 Massimo d'Azeglio wrote (Upon the Latest Developments in Ro¬ man Affairs, in which he demonstrated that conspiracy, sedition, partial insurrections, could not but be injurious to the establishment of lib¬ erty; that they should, on the contrary, first*

give proof of their civic courage by demanding openly from the government liberal reforms and institutions; and then of their military cour¬ age by conquest — when the occasion should arise — of their independence from foreign in¬ vaders. Following the publication of these books came many others, which argued the necessity of abandoning revolutionary move¬ ments, the advantage of looking frankly to the princes themselves for the reform of public or¬ dinances and the possibility of making liberty and religion go peacefully side by side. Thus they went on, forming a new political school, which was called "neoguelfa,® and of which Gioberti was the inspiration and the leader. The Neoguelfi, then, differed from the disciples of Mazzini in their aim and in their methods. In their aim, because deeming it impossible to take Rome from the Pope on account of the op¬ position which it would raise among Catholics throughout all Europe, they wished to substi¬ tute for the united republic desired by Mazzini a confederation of princes presided over by the Pope ; and they differed in their means because in place of popular and partial revolutions they wished to substitute pacific propaganda in order to obtain liberal reforms from the sov¬ ereigns, and preparation for national war in order to acquire independence.

This program seemed to be realized at once, for on 15 June 1846, Cardinal Giovanni Mastai- Ferretti was elected Pope with the name of Pius IX; he was noted for his liberal senti¬ ments, and his first act, most unusual, was a general amnesty to political offenders who filled the prisons of the Pontifical State, which am¬ nesty awakened enthusiastic joy, not alone in Rome but throughout all Italy. In 1847 other reforms followed, such as the concession of moderate liberty to the press, which allowed the foundation of various newspapers ; the in¬ stitution of a committee of state, composed of the laity, and a council of ministers; and the organization of the civil guards. The populace not only applauded but was really delirious with joy and demanded that the sovereigns should do as much as the Pope. And in this way they influenced the Grand Duke of

Tus¬ cany, Leopold II, and the king of Sardinia, Carlo Alberto. The latter dismissed his reac¬ tionary minister, Solaro of Margarita, and in October and November 1847 he granted a mod¬ erate liberty to the press, improved the judiciary ordinances, conceded to the citizens the election of municipal councillors. Public enthusiasm was extraordinary and the names of Pius IX and of Carlo Alberto were lauded to the skies. The movement extended throughout the penin¬ sula and spread through all classes of the popu¬ lation, because the initiative came from the head of the Church and because literature had taken upon herself a civic duty and disseminated widely sentiments of liberty and independence. Every mode of literary expression became an instrument for patriotic propaganda. The ro¬ mances of Guerrazzi and of d'Azeglio, the trag¬ edies of Manzoni and of Niccolini, the poetry of Leopardi, of Berchet, of Rossetti, of Giusti and of hundreds of others recalled to Italians in words of fire their former greatness and glory and incited them to rise from the pitiful condi¬ tions into which they had fallen. Literature, painting and music had civic and national in¬ tentions,

The tiny spark which started the great con¬ flagration was lighted in Sicily. The natives of Palermo rose in arms 12 Jan. 1848, and their example was promptly followed by the entire island; and as soon as they also rose in Naples, the king, Ferdinand II, who had not imitated Pius IX and other princes in regard to re¬ forms, was seized with great fear and did more than any of them, for he gave them directly a representative constitution. The excitement throughout the entire peninsula became enor¬ mous at this piece of news, and the sovereigns were forced to concede also everything which the most reactionary of the princes had ever refused. Carlo Alberto on 8 February prom¬ ised and on 4 March published the (Statute, } which, preserved by him and his successors, is still the foundation of all law in the kingdom of Italy. Yielding to the persistent demands of the citizens, Leopold II and Pius IX also pro¬ mulgated a constitutional statute. Having be¬ come free henceforth as far as the princes were concerned, the people could now think of secur¬ ing freedom from foreign oppression, and a favorable occasion was not long in presenting itself.

When the news that on 24 February the Parisians had overturned the throne of Louis Philippe, arrived at Vienna, it incited an insur¬ rection ; the news that this insurrection at Vienna had caused the fall of Minister Metter- nich induced Venice first of all to rise against the Austrians, drive them out and proclaim a republic; then Milan in a heroic struggle of five days (18-23 March) succeeded in forcing the hated oppressors out of the city. Carlo Alberto thereupon on 23 March declared war against Austria and took the field to give in¬ dependence to -Italy. The Pope, the king of Naples and the Grand Duke of Tuscany were constrained by the demands of the people to take part in the expedition and sent soldiers into the Valley

of the Po. But the Pope, in a proclamation on 29 April — probably because he feared a schism in Germany — declared that he could not participate in a war against the Aus¬ trians because they were Christians ; and the king of Naples, declaring that he had not set forth on this road to liberty of his own free will, came into conflict with Parliament, dis¬ missed it, smothered in blood the agitations in the principal cities and recalled to the kingdom the troops which had been started for the war. Carlo Alberto, who had ar¬ rived at Mincio, found himself consequently quite alone and deserted, but nevertheless he conquered the Austrians at Goito (30 May), but was in turn beaten in several encounters ; he was forced to a retreat, which was rendered more disastrous by other defeats, and which terminated in the Armistice of Salasco (10 Au¬ gust), by the terms of which Lombardy and Venice, which had given themselves to the king, were left in the hands of the triumphant enemy. Venice, however, declared herself a re¬ public under the Presidency of Daniele Manin, and thought of defending herself alone. The Pope, terrified by the rage of the Democratic party and by the assassination of the president of the Council of Ministers — Pellegrino Rossi • — fled on 24 November to Gaeta near the king of Naples. In Piedmont, the radical party wished a renewal of the war, although the country was quite unprepared; and the king did commence

a alva,n' ***n a very few days all was over. At Novara (23 March 1849) the Sardinian army was completely defeated by the Austrians, and OJ*** *"'i, same evening, Carlo Alberto, convinced that the conquerors would make better condi¬ tions with another sovereign, abdicated in favor ot his eldest son (who became King Victor Emanuel II), and retired in exile to Oporto in Portugal, where he died 28 July in the same year.*

Two glorious conflicts ended this first un- loititiatc war for Italian independence.

The Pope having fled to Gaeta and being invited in vain to return, a constitutional as- sembiy (9 Feb. 1849) abolished by proclamation the temporal power of the popes and set up the Roman Republic. Pius IX called for armed intervention from the Catholic nations to re¬ cover his temporal domain, and Naples, Spain, Austna and France took arms. Rome prepared to defend herself and Italians from all over the peninsula flocked to her standards. General Giuseppe Garibaldi, although he was not com¬ mander-in-chief of the military forces of the republic, played a splendid part. A triumvirate composed of Giuseppe Mazzini, Aurelio Saffi and Carlo Armellini, with unlimited power provided for the public necessities. The

*Aus- tria*Js occupied Bologna and took possession of Ancona; the Neapolitans were compelled to halt at Velletri by Garibaldi; the Spaniards, disembarking from their ships, covered them¬ selves with ridicule. The French, landing at Civitavecchia under the command of Oudinot, were driven from Rome 30 April. And when they turned against Gianicola (Janiculum) the defenders in numerous attacks from the 3d to the 30th of June gave extraordinary proofs of valor and sacrificed many noble lives. But the enemy nevertheless constantly approached nearer the city and bombarded it. The French finished by entering Rome, while the constitutional assembly in the Campidoglio ordered the army to ((cease a defence which had become impossible and to remain at its postA The triumvirate was dissolved, and Garibaldi with some of the best of his men left the city 2 July and, pursued by France and Austria, commenced that famous retreat in which he aimed to go to the help of Venice, still in a state of siege, and during which he lost his heroic consort, Anita.*

Venice, turned republic, had decided to re¬ sist at all cost the Austrians who were besieg¬ ing her; and splendidly did she keep her word. Surrounded by a circle of iron which each day grew closer, bombarded day and night, tortured by hunger and cholera, after a defense which was an honor not only to the city herself but to all Italy, she was obliged to capitulate on 24 August, and her most strenuous champions went into exile.

Thus, after the attempts of the Carbonari and those of Young Italy, the efforts of the Neoguelfi also failed. Put to the test of deeds, their program had proved itself impractical, al¬ though they had proved that it was useless to hope for anything from the liberality of princes irremediably retrogressive; that it was disas¬ trous to start the campaign with unprepared popular forces against a strong enemy hardened to war; that it was unwise to commence the struggle for independence without first spread¬ ing and disseminating throughout the entire

country the sentiment of duty toward one's country.. At all events the errors as much as the heroism of 1848-49 would serve as education to all Italians in the near future.

Period IV. — Direct Action by the House of Savoy and Formation of United Italy (1849— 70).— Austrian dominion over Lombardy and V enetia having been established by force of arms, Marshal Radetzky desired to render impossible any fresh attempts at independence, and spread everywhere fear and terror with his savage military action ; and to this end he constantly caused the arrest, condemnation and punishment of citizens guilty of having taken part in the deeds of 1848-49, of having in their possession arms or patriotic publications or of havmg uttered generous

sentiments concerning Italy. The result of this violent oppression was a new conspiracy, promoted by Mazzini, now an exile in London; this conspiracy had its centre in Mantova and was to prepare for a popular insurrection in Lombardy- Venetia in order to drive out the intruder and to estab¬ lish the republic. At its head was the priest Enrico Tazzoli. Some traces of the plot hav- ing been discovered by the police, many per- sons were arrested whose names appeared on the lists .of the conspirators ; the prisoners were treated in the most infamous manner by the State Tribunal; and on 7 Dec. 1852, Tazzoli and four other patriots were hanged. Mazzini made speedy answer to this severity, inciting on 6 Feb. 1853 an insurrection in Milan, which was the cause of fresh condemnations and fresh punishments. The consequence was that the proceedings of Mantova were repeated, and ended with a decree that sent to the gal¬ lows other patriots. Austria, seeing that she would never succeed by violent measures in ruling the spirit of Lombardy-Venetia, tried to draw her to herself by more gentle measures; so. the Archduke Maximilian was entrusted with the government of the Italian provinces But it was now too late. On 15 Jan. 1857, upon the same day that the emperor with his wife entered Milan, the Milanese displayed their feelings toward him by dedicating to the Sar¬ dinian army a monument commemorating the first war of Italian independence, which was placed in the Piazza Costello in Turin.

Reaction raged also in other Italian states, especially in the kingdom of the two Sicilies, where the government of Ferdinand II was, be¬ cause of its odious character, called by Glad¬ stone a ((denial of GodJ All those who had taken part in the movement of 1848-49 were frightfully persecuted at Naples and in Sicily.*

Thus, between 1849 and 1859 there raged throughout the peninsula the most unjust reac¬ tion ; but during this decade arose also a pro¬ gram for national redemption dictated in the hope of actual attainment, and there was one region in which the banner of liberty already waved and where that program was already approaching realization.

This new political policy, as well as that which had sought realization in 1848-49, was headed by Gioberti, who published a book about it in Paris in 1851 with the title (Upon the Civic Rehabilitation of Italy.) In this work Gioberti, having learned by experience, had destroyed that part of his preceding program which had proved impractical, and had adopted that part of the program of Mazzini which was

practical, and presented the new political plat¬ form as the special task to be accomplished by the House of Savoy, which alone had demon¬ strated itself as capable and worthy of per¬ forming it; no more any Primate, no_ more papal supremacy, no more a confederation of princes, but the supremacy of Piedmont, the state to belong to the laity, the abolition of the temporal power of the Pope, unification with Rome as the capital. Such was the program by means of which they accomplished the Italian Revolution from 1859 to 1870 and from which emerged the new free state.

Victor Emanuel II (1820-78), king of Sardinia, who succeeded his father after the unfortunate day at Novara, had pledged him¬ self to the statute with a faith which he al¬ ways kept and which won for him the title (Re Galantuomo) (((The Honest King®) ; and he dedicated his life to the triumph of liberty and to Italian independence. Reigning thus, with the help of his ministers at the head of whom were Massimo d'Azeglio and that great statesman Camillo Cavour (1810-61), he laid in Piedmont the foundations of a government absolutely liberal, national and progressive. They offered a generous hospitality to emigrants from all the other Italian states where reac¬ tion raged; since all were equal before the law, they abolished the Ecclesiastical Forum; they put through administrative, financial and economic reforms ; they stimulated agricultural and industrial production and extended com¬ merce ; they reorganized and improved the army because it was obliged to sustain future trials. The king and the Piedmontese govern¬ ment exerted themselves for the representation of the entire Italian nation; when the war against Russia broke out in the East, the king of Sardinia allied himself with France and England, and the Italian army acquired much glory in the Crimea (1855), thus giving an opportunity and justification to Cavour to speak with authority in the name of Italy in the Congress of Paris with which this war closed. In order to prepare the way for harmony among all the Italians in the coming rehabilita¬ tion, the ((National Society® . was founded in Turin in 1857, and Cavour, since the campaign of 1848-49 had demonstrated that Italy could not act by herself, succeeded in establishing harmonious relations with the Emperor Napoleon III, obtaining from him a promise of help in driving the Austrians out of the peninsula. Victor Emanuel II, in opening a new session of the Subalpine Parliament (10 Jan. 1859), declared that he ((was not insensible to the cries of sufferings® which were directed toward him from every part of Italy; and a few days afterward a treaty of alliance be¬ tween France and Piedmont was arranged, which formed a fitting conclusion to a glorious decade and which was to give independence to Italy.

Napoleon III, descending into Piedmont with 110,000 Frenchmen, promised to make Italy free from the Alps to the Adriatic. The Austrians, having crossed the Ticino on 29 April, hoped to be able to defeat the

Piedmontese before the arrival of their allies and to occupy Turin, but it was not possible. The French and Sardinians together were victorious at Montebello, Palestro and Magenta; and after that, the conquered enemy having withdrawn

toward Mincio, Victor Emanuel II and Na¬ poleon III entered Milan triumphantly on 8 June. These happy events caused the central Italian states to rise against their respective sovereigns — first Tuscany, then. Parma and Piacenza, while Modena and Reggio, and finally Ferrara and Romagna, offered allegiance to the king of Sardinia and accepted commissioners appointed by him. In the meanwhile the war continued, and at Solferino and at San Mar¬ tino (24 June) the allies were victorious in great battles; but the Emperor Napoleon III unexpectedly called a halt in the redemption of his promise, and on 11 July, for reasons not yet well understood, he concluded the armis¬ tice of Villafranca with the enemy, which armistice Victor Emanuel was regretfully forced to accept. By the terms of this armistice, followed in November by the Pact of Zurich, Lombardy was ceded to France, to be trans¬ ferred to Victor Emanuel, and in central Italy those princes were to return who had been driven out, since the populace demanded their return. But this they no longer desired; therefore, hardly had the royal commissioners departed, when the people elected provisional governments which at once set to work to thwart any attempts at return on the part of the abdicated sovereigns. Napoleon was at last convinced that it was not possible to detach from Piedmont those regions which so ear¬ nestly wished to be united with her; but he wished a recompense, which was the cession of Savoy and of Nice (24 March 1860) , granted in the treaty of alliance in exchange for the freedom of Lombardy-Venetia. Henceforth the kingdom of Sardinia included Piedmont, Lombardy, Parma and Piacenza, Modena, Fer¬ rara, Romagna, Tuscany, Liguria and the island from which it takes its name; and this was the beginning of the present kingdom of Italy.

In the kingdom of the two Sicilies Fer¬ dinand II was succeeded by Francesco II, a son worthy of his father. In the beginning of April 1860 a conspiracy gave rise to • a small rebellion in Palermo, followed by other insur¬ rections in various parts of the island. The time seemed opportune to Garibaldi to attempt the liberation of Sicily and of Naples. On 5 May 1,000 enthusiastic volunteers set out from the Rock of Quarto near Genoa, under his com¬ mand and with the good will of the govern¬ ment and the king of Piedmont ; they landed at Marsala, where Garibaldi assumed dictator¬ ship in the name of Victor Emanuel II, king of Italy, conquered the Bourbons at Culatafini, entered Palermo after a brief struggle, and, his numbers constantly increasing, gained a decisive victory at Milazzo ; and in a little more than a month the entire island was free. Hence¬ forth, some small risings discovered here and there opened up the way for him ; he

landed in Calabria, and almost without a blow, was welcomed as a liberator everywhere. He ad¬ vanced toward Naples, into which city, pre¬ ceding his men, he entered almost alone on 7 September, the day after King Francesco II had fled to the fortress at Gaeta. At this point an event occurred which has been called the masterpiece of Cavour. The governments of Europe were much disturbed by the triumphs of the popular hero Garibaldi, which rendered the Italian Revolution so terrible. Cavour

thought that if the secular monarchy of Savoy, which up to this time had only assisted this ex¬ pedition of Garibaldi's, should boldly assume the direction of it, it would not only add to its prestige in Italy, but would furnish the Euro¬ pean powers vvith such guarantees of order as to render their intervention unnecessary. He decided, therefore, to come to the ai-d of Garibaldi. Having first traversed and captured irom the Pope the Marches and Umbria in the victory of Castelfidario (18 September), the Piedmontese army entered Naples, where Gari¬ baldi and his followers had won the battle of Volturno but had not been able to capture the fortresses which still resisted them. Victor Emanuel II and Garibaldi entered together into Naples. A plebiscite of Neapolitans and of Sicilians declared the desire of these regions to be united with the others, as they had been in the former state of Savoy; and Garibaldi, after he had presented the result of this vote to the conquered king, withdrew into his island of Caprera, carrying with him as the rich booty of conquest a sack of straw. In February 1861, the first Parliament of all the regions of Italy was assembled in Turin; on 17 March that law, which declared the kingdom of Italy constitu¬ tional was ratified, and on 27 March Rome, still in the possession of the Pope, was boldly proclaimed the capital of the new state.

When Cavour died (6 June 1861), only two provinces were lacking to make Italian unity complete — Venice and Rome — and all were agreed that these should be joined to the mother country. But since the government, following in the footsteps of the great minister, wished to proceed with caution, especially as regarded the question of Rome, in order not to draw down upon the head of the young king the resentment of Catholic Europe, many Italians under the inspiration and guidance of Mazzini and of Garibaldi, formed a so-called party of action, which wished to proceed more rapidly and without so much consideration for foreign susceptibilities. Attempts were made by Garibaldi to settle the two questions by force of arms. In 1862. the government was obliged to interfere, first, to stop the general at Sarnico, near Bergamo, since with his volun¬ teers he wished to invade those provinces still held by Austria, and then to stop him

at Aspro- monte in Calabria, where he was advancing to take Rome from the Pope and then intending to free Venice. The final arrangements of the convention of September 1864 between France and Italy were much discussed; by its terms France was obligated to remove from Rome the garrison which had remained there since 1849, and Italy agreed not to attack nor to allow others to attack the Papal State, and also declared her willingness to move the capital of the kingdom from Turin to Florence. This change was made in 1865. . In the meantime the liberation of Venetia was approaching, to accomplish which, Italy arranged an alliance with the kingdom of Prussia, which at this time appeared to be unfriendly toward Aus¬ tria, her antagonist in Germany. In 1866 the two allies attacked their enemy at the same time, with the intention of entering Vienna to dictate there the terms of peace. But while the Prussians in Bohemia were victorious, the Italians, through mistakes of their leaders, met with two reverses, at Custoza on the land, and

at Lissa by sea. So that they were obliged to consent to receive Venetia from Austria on the most humiliating terms and to leave Trentino, Trieste and Istria still in her power.

The liberation of Venice intensified the need and the desire to redeem Rome, also, and Gari¬ baldi and his party of action set to work in the autumn of 1867. Bands of volunteers pene¬ trated the Pontifical State (narrowed down to Lazio by the deeds of 1859-60), and while an insurrection was being arranged in Rome it¬ self, . they occupied Monterotondo. The insur¬ rection failed; but notwithstanding a handful of 70 brave fellows, led by the Giovanni brothers and Enrico Cairoli, approached the city as near as the Villa Glori, where they were overcome by the Pontifical tr®ops and killed or captured; and the French having landed at Civitavecchia, because they insisted on the observation of the convention of Sep¬ tember which had been broken bv this unlucky invasion, Garibaldi betook himself to the moun¬ tains of Tivoli in order to prolong resistance; but having arrived at the basin of Mentana, he was here attacked and defeated (3 November) by the Papal troops and the French. This glorious defeat of the Italians had innumer¬ able consequences, since the entire nation felt that it could not any longer endure that a foreign decree could withhold from them their rightful capital. They prepared, therefore, with zeal for the supreme moment, which was not slow in presenting itself. When the Ecumenical Council of the Vatican in 1870 had proclaimed the dogma of the infallibility of the Pope, and the Franco-Prussian War had caused the downfall of Napoleon III, the Italian gov¬ ernment held itself freed of the obligations which it had assumed personally with the em¬ peror through the convention of September, and it decided to act. First it attempted to in¬ duce Pius IX to open the gates of Rome in a friendly way; upon receiving a refusal of this request, it was decided to use

force. An army commanded by Gen. Raffaele Cadorna (20 Sept. 1870), made a breach in the wall near Porta Pia, entered the city and was warmly welcomed by the population. The Pope made protest and declared himself a prisoner of the Italian Revolution ; but on 2 October, a plebis¬ cite of Romans consecrated the union of Rome with Italy. The Parliament in Florence in 1871 passed a law guaranteeing the papal secu¬ rity, and thereupon the capital was transferred into the free city without any opposition on the part of the Catholic powers, and Victor Emanuel II could declare (

Period V. — Development and Progress of Free Italy (1870-1907).— The various members of the country being brought together in one body, the Political Resurrection was nec¬ essarily followed as a natural consequence by

an economic, intellectual and social Resurrec¬ tion. All power after 1870 remained in the hands of that party which had had Cavour as master, and which had had the wisdom to guide Italy to unification. But this party, because of its oligarchial tendencies, lost its majority in Parliament and in the country, and political power passed in 1876 into the hands of the progressive party, which kept it for several years and did many good things, such as the ex¬ tension of electoral rights and the abolition of the most distasteful taxes. Then the Right and Left became mixed and confused and there were no longer distinct parties with different programs. In 1862 occurred the death of Maz- zini, who had been the first to preach to the nation its duty to unite; in 1878 Victor Eman¬ uel II died in Rome, the man who had realized that which Mazzini had thought, and whose sepulchre is the Pantheon. During the reign of Humbert I (1878-1900) the liberal institu¬ tions continued to develop with order and iegu- larity, and socialism, which vyas spreading throughout the country and sent its representa¬ tives to the Chamber of Deputies, was spurred to reform. Its representatives were instrumen¬ tal in passing laws to improve the administra¬ tive, judicial and financial regulations; they pro¬ vided for public hygiene; they protected the rights and the interests of the laboring classes, establishing obligatory insurance against acci¬ dents to the operatives, and limiting the hours of labor for women and children, founding a pension bureau for artisans, etc. Two very important events took place during the. reign of Humbert I: the stipulations of the Triple A.1U- ance and the acquisition of colonies in Africa.

Pius IX and his successor, Leo XIII, did not give up the pretense of still

possessing tem¬ poral power and threw obstacles of every kind in the way of the reign of the so-called usurp¬ ers. In France the republic was not yet upon a firm foundation and might at any time fall into the hands of the clericals, who were in favor of pontifical vindication. To this should be added the occupation of Tunis, made pro¬ visionally by France in 1881, which awakened great wrath south of the Alps. Italy believed herself in danger; and at the same time Aus¬ tria threatened her from the other side, because she was irritated by the agitations of the Italian party, called the Redemptionists, who desired the speedy liberation of Trentino, Trieste and Istria ; they felt the need of relying upon Germany, which was already united with Austria; and thus in 1882 arose the Triple Alliance (see under Italy — History from 1907 to 1919). Later, her wrath being appeased, Italy again approached France, and her consequent agree¬ ments with this power and with England safe¬ guarded her interests in the Mediterranean.

Her colonial possessions in Africa com¬ menced with the acquisition of Assab in 1882, then with the occupation of Massaua. in 1885. Wishing to occupy the high plateaus in Ethio¬ pia, the Italians came into conflict with Emperor John of Abyssinia; but he, after a victory at Dogali in 1887, was forced to withdraw. Some years afterward, Italy wished to exercise a sort of protectorate over the new Emperor Mcnelik, because of her occupation of some territory; he refused and war again broke out and this, after some honorable defeats for the Italians,

ended with the disastrous conflicts of Adua and of Abba Garima (1 March 1906). Thus the dream of a vast African Empire vanished, and Italy was obliged to content herself witn a more restricted territory, called Colonia Eritrea, which is being peacefully developed with hopes of a prosperous future. Besides this colony, there have been acquired upon the shores of eastern Africa the colonies of So¬ malia (Somaliland) and Benadir, and upon the northern (Mediterranean) coast territories ac¬ quired as a result of the war with Turkey. (See under Italy — History from 1907 to

1919).

The reign of Humbert I had a tragic ending. In consequence of a serious disagreement be¬ tween the ministry of Gen. Luigi Pelloux, which wished to restrict certain liberties, and the more advanced party of the Chamber, which defended them, a conflict which became most acute and which at length reached obstructionist tactics and produced great resentment, an Ital¬ ian anarchist left the United States, in order to revenge upon the king the retrogressive at¬ tempts of the Minister, and killed Humbert I at Monza 29 July 1900, awakening horror against the murderer and sympathy for the victim throughout the entire world. His young son, Victor Emanuel III, ascended the throne; he had been educated with the greatest care in re¬

gard to his exalted position, and he has proved that he respects liberty and is worthy of the esteem and affection of the Italians.

This nation, which has already given two civilizations to the world, when her redemption from foreign oppression and her own unifica¬ tion commenced, could already in certain as¬ pects stand upon equal footing with the most progressive of the civilized nations, but in others she was inferior to all. In fact, even in those centuries of slavery Italy was always the coun¬ try of science, literature and art; but in those same centuries her economic conditions were deplorable. Liberty not only made it possible for her to preserve those requisites which she already possessed, but also put her in a position to acquire those which she lacked. In science, the national genius which had produced Leon¬ ardo da Vinci, Galileo Galilei, Allesandro Volta, and many other distinguished persons, continued to manifest itself ; to mention only the principal names, there were the astronomers Angelo Secchi (1818-78) and Giovanni Schiapparelli (1835-1910); the great psychologist, . Cesare Lombroso (1836-1909), founder of criminal an¬ thropology ; the physiologist, Angelo Mosso (1846-1910), and the electricians Galileo Fer- rario (1847-97), who discovered the rotary magnetic field, and Guglielmo Marconi (1875

-), who gave us wireless telegraphy; the

philologist Graziadio Ascoli (1829-1907), the chemist, Stanislav Cannizzaro (1826-1910), the mathematicians Eugenio Beltrami (1835-1900), Luigi Cremona (1830-1903) and Giuseppe

Veronese (1854 –). In letters, the country

of Dante, of Petrarch, of Boccaccio, of Machia- velli, of Ariosto, of Tasso, after having seen her redemption assisted by the works of so many famous authors, whom we have already mentioned, having become free could, already boast of writers like Giosue Carducci (1836- 1907), Edmondo de Amicis (1846-1908) and Gabrielle d'Annunzio (1862 –). In the fine

arts, of which Italy had produced for many centuries so many masterpieces, it was difficult to keep herself on the heights to which she had formerly risen and to which so many other countries had arrived. Especially in archi¬ tecture are there many examples worth men¬ tioning, as regards originality, grandeur and purity of style, for instance, — the Gallery Vic¬ tor Emanuel in Milan by Giuseppe Mangoni (1827-87); the National Museum of Italian Renaissance in Turin, called Mole

Antonelliana from its author, Alexander Antonelli (1808- 88) ; the monument to Victor Emanuel in Rome by Giuseppe Sacconi (1854-1905). In paint¬ ing, we may mention, as among the most illus¬ trious, Domenico Morelli (1826-1901), Giacomo Favretto (1849-97), and Giovanni Segantini (1858—1900) . In sculpture those worthy of mention are Giovanni Dupre (1817-82), Vin¬ cenzo Vela (1822-91), and Giulio Monteverde

(1837 –). In music, after Rossini, Bellini

and Donizzeti, who attained their greatness dur¬ ing the period of struggle for Resurrection, Giuseppe Verdi (1813-1901) continued his ad¬ mirable productions, and Pietro Mascagni

(1863 –) commenced to make himself heard

of, as well as Ruggero Leoncavallo (1853 –),

Giacomo Puccini (1858), and Umberto Gior¬ dano (1870 –).

More difficult than the preservation of Italy's former importance in the scientific, literary and artistic world was the beginning of economic importance. The energy which liberty devel¬ oped in the inhabitants, especially in the north¬ ern parts, and the provisions of the state ren¬ dered possible many great public works, des¬ tined for the progress of agriculture, of indus¬ tries and of commerce ; for example, the re¬ demption of marshy lands in Ferrara and near Rome ; the colossal aqueduct of the Puglie ; the tunnels of Cenisio, Saint Gottard and the Sim¬ plon, which it is intended to follow by those of Spluga and Montebianco (Mont Blanc) ; the construction of railroads, which on 30 April 1915 extended a distance of 11,337 miles; the regu¬ lation of the harbors, among which Genoa bids fair to become the foremost on the Mediter¬ ranean. Industries which had never existed be¬ fore now appear and prosper from day to day; in some lines, for instance in weaving cotton cloth and silk fabrics, in the construction of automobiles, Italy does a large export business. The Alps which surround the peninsula, and the Apennines which traverse it, furnish in their streams cheap and abundant electric power ; which will constantly lessen the amount now paid for the importation of coal. The country does not yet produce all the wheat which it needs, but agriculture is constantly progressing. The population has increased not¬ ably, and 4,000,000 Italians work in foreign coun¬ tries, from whence they contribute their savings to add to the national wealth. If all the regions of the kingdom, in industries, in commerce, in agriculture, in the diffusion of popular educa¬ tion, should arrive at that degree of efficiency to which the northern provinces and a part of central Italy have

risen in less than half a cen¬ tury, Italy would in these aspects also stand on an equality with any of the most progressive nations. What she has been able to accomplish in spite of the enormous difficulties created by her peculiar conditions, was well seen in the

International Exposition held in Milan in 1906 to celebrate the opening of the Simplon tunnel.

Bibliography. — Consult Bianchi, N., (Storia della diplomazia europea in Italia (Turin 1865-72) ; Tivaroni, Carlo, (Storia del Risor- girnento italiano> (Turin 1888-97) ; Orsi, Pietro, (L'Italia moderna) (Milan 1910) ; Cesa- resco, E., liberation of Italy > (London 1895) ; Thayer, W. R., (Dawn of Italian Independ¬ enceˆ (Boston 1893) ; Trevelyan, G. M., Gari¬ baldi and the Making of Italy) (New York 1911) ; King, Bolton, (History of Italian Unity> (London 1899) ; Thayer, W. R., (Life and Times of Cavour) (Boston 1911) ; Orsi, Pietro, (Cavour and the Making of Modern Italy) (New York 1914) ; Crispi, Francesco, (Mem- oirsy (trans.r London 1912-14) ; King, B., and Okey, T., (Italy To-day) (London 1913).*

Beniamino Manzone,

Director of the Historical Review of Italian Risorgimento.

7. HISTORY FROM 1907 TO 1919.

Four years of industrial expansion followed; and it is quite proper to say, with more empha¬ sis than in the foregoing study, that in Rome and in Turin at the celebration in 1911 of the 50th anniversary of the foundation of the king¬ dom of Italy and the proclamation of Rome as its capital, we saw what Italy had been <(able to accomplish in spite of the enormous diffi¬ culties created by her peculiar conditions.® From the Tiber to the boundaries with France and Switzerland the peninsula was comfort¬ ably crowded with visitors from all parts of the world who came to see novel products of the 20th century as well as treasured products of all the 19 or more preceding centuries. It was in the same year that Italy undertook the annexation of Tripoli, sending her ultimatum to Turkey on 27 September. The Italo-Turkish War continued until 18 Oct. 1912, when by the Treaty of Ouchy, the sovereignty of Italy in Tripoli was practically established, and Italy, for her part, promised restoration of the 2Egean Islands to Turkey and payment of a part of the Ottoman foreign debt which was guaranteed by Tripoli and Cyrenaica revenues. On 5 Dec. 1912 the Triple Alliance was renewed and extended until 8 July 1920; this, however, was an arrangement far from satisfactory to patriotic Italians enlisted in the popular ((Italia irredenta® movement (irredenta, unredeemed, lacking liberty). It has been well said that the avowed object of that movement was

because no troops were necessary to protect the Italian frontier.® The attitude just re¬ ferred to underwent a change during the year 1915; popular sentiment in Italy inclined more and more strongly in favor of the cause repre¬ sented particularly by England and France — powers that had especially through restraints imposed upon Moslem elements in Egypt, Tunis, etc., given proofs of friendship for Italy in 1911-12; and on 3 May 1915, after adherence through a generation to the Triple Alliance, Italy renounced her treaty, so far as it con¬ trolled her relations with Austria-Hungary. The statement of Green Book, number 76, is that ((Italy, confident in her good right, affirms and proclaims that from this moment, 3 May, she resumes her entire freedom of action and declares her treaty of alliance with Austria- Hungary to be void and henceforth of no effect.® On 23 May, Italy declared that she considered herself in a state of war with Austria-Hungary from 24 May because that former ally obstructed the long-sought op¬ portunity of realizing her geographical aspira¬ tions. The subsequent Italian campaign was marked by the absence of great or striking events, simply because the strength of the Austrian military positions along or near the international boundaries (strictly artificial and political, rather than geographical or ethno¬ graphic) ((made Italy's task one of tremendous difficulties.®

On 13 and 14 Jan. 1915 there were severe earthquakes in the Avezzano region and central Italy generally; 16 towns were com¬ pletely destroyed, with the loss of 30,000 lives and of property valued at $60,000,000. On 7 Nov. 1915 the Italian steamship Ancona, when one day out on the voyage from Messina to New York with more than 400 passengers and a crew of about 170, was attacked by a sub¬ marine flying the Austro-Hungarian flag; and, according to the American note of 6 December, <(By gunfire and foundering of the vessel a large number of persons lost their lives or were seriously injured, among whom are citizens of the United States.® An influence too powerful within the country's limits to be overlooked in this sketch was that of the Socialists who in 1915 had 79 deputies and over 1,160,000 votes. The Socialist party openly opposed the war. On 9 March 1916 General Piacentini was ap¬ pointed commander of Italian troops in Al¬ bania ; General Cadorna was commander-in¬ chief on all fronts. On 21 March 1916 the government announced to the Chamber its firm adherence to the London convention. On 8 June 1916 the Imperial Appeal Court at Leipzig, in a dispute over contract, handed down a verdict declaring that war existed between Italy and Germany, actually though not

for¬ mally. On 28 Sept. 1916 the German Imperial Chancellor, Dr. Von Bethmann-Hollweg, as¬ serted in the course of a speech in the Reich¬ stag that the Entente powers made uninterrupted efforts to cause Italy to declare war; that for more than a year the Italian government re¬ sisted, but finally measures employed by Eng¬ land were so strong that Italy had to yield ; that the decision was brought about by British coercion ; although Italian hopes in regard to the Balkans also exercised influence. In point of fact, England had secured, and fairly earned,

Italy's gratitude, respect and confidence. At first successful in the campaign against her ancient enemy Austria, near the close o f 1917, the Austro-German army attacking in force, in¬ flicted a disastrous defeat on the Italian army under General Cadorna, until checked at the Piave River. This defeat resulted in a severe arraignment of the Boselli ministry which led to its downfall 25 Oct. 1917 and a new ministry under Signor Orlando succeeded on 31 Oct. During 1918 under General Diaz, the Italian army began its victorious onslaught on the Austro-German forces driving them back and finally capturing Trent, Trest and Udine, the chief Austrian base in Italy. A total of 300,- 000 prisoners and 5,000 guns were captured and the Austrians asked for and accepted armistice terms 4 Nov. 1918. See Italy and the War; War, European.

Bibliography. — Annunzio, G. d', (Per la Piu Grande Italia) (Milan 1915) ; Bainville, J., (La guerre et l'ltalie > (Paris 1916) ; Castellini, G., Trento e Trieste; 1' Irredentismo,5 etc. (Milan 1915) ; Destree, J., (En Italie avant la guerre,5 preface de Maurice Maeterlinck (Brus¬ sels 1915) ; Eddleston, R. H., Utalian Neu- trality) (Cambridge 1915) ; Errera, C., HI con¬ fine fra Italia e Austria> (Milan 1915) ; Fer- rero, G., (La Guerra Europea) (Milan 1915) ; Guard, W. J., (The Spirit of Italy5 (New York 1916) ; Hutton, E., (Naples and Southern Italy5 (London 1915) ; Piccoli, R., (Italy and the War5 (London 1915) ; Reggio, I., (Storia della Grande Guerra d'ltalia5 (Milan 1915) ; Saint-Cyr, C. de, (Pourquoi 1' Italie est Notre Alliee5 (Paris 1915) ; Young. G. F., (East and West,5 etc. (4 vols., Vols. I and II, London 1916) ; Zimmern, H., Utalian Leaders of To¬ day5 (London 1915) ; Jamison, E. M.,' and ethers, Utaly5 (New York 1918).

8. POLITICAL ADMINISTRATION. General Characteristics.— In order to under¬ stand the political character of the administra¬ tion in the kingdom of Italy, we must take into consideration certain essential elements of her Constitution, determined by her political history and by the manner of the formation of the Italian kingdom. The reaction against the secular division of Italy into a number of more or less insignificant states, none of them strong and all more or less at enmity with each other, determined the formation of a government that should not only be rigorously unified, but ab¬ solutely concentrated. There should be not only one source of

sovereign power, but also the greatest possible concentration of power in the central authority. Thus the original type of Italian administration was molded to a perfect similarity to that of France before Napoleon. Meanwhile, the broadly liberal spirit in which the Italian Constitution was applied and interpreted, and the domination of demo¬ cratic influences, rapidly led to a full and ab¬ solute adoption of the parliamentary system, by which the Cabinet is responsible in Parlia¬ ment for the acts of the Crown, and the Parliament exercises a direct and constant in¬ fluence on the proceedings of the public ad¬ ministration, either in virtue of the ever-widen¬ ing and increasing scope of its legislative functions, of the annual acceptance of the bud¬ get, or of what, strictly speaking, may be

called the inspectorial function (interrogazione , inter pellanza ed inchiesta) and the power of censuring the Cabinet and instigating dismissal from office.

In a unified and concentrated government, which is at the same time a parliamentary government, and as such subject to the rule of the majority or of parties, the influence of politics with all its menaces and all its perils on public administration, seemed almost in¬ evitable. The Italian government is certainly not free from this accusation. But the gravity of these dangers was fully foreseen, and deter¬ mined a reform government with the view of avoiding or diminishing them. Corresponding to this was an ulterior phase of administrative development in the Italian government which, in the field of science, encountered the influence of the German theories on the jurisdiction of government and on the judicial auto-limita¬ tion of the powers of the state as a guarantee not aione of political, but also of the civil, rights of the individual. Thus, while according to the statute the right of appointing or re¬ moving officials belongs to the head of the exec¬ utive, successive rulings gradually limited this power so as to make it little more than a formality and subordinate it to a multiplicity of limitations and privileges; thus the discre¬ tional powers of the public administration were regulated and disciplined with great strictness; thus a series of very severe inspections in ad¬ ministrative laws, judicial ordinances and par¬ liamentary ordinances. Perhaps, taken alto¬ gether, the government of Italy has to fear the dangers of weakness rather than those of violence and absolutism. The truth is that Italy has had too brief an education in the hard school of freedom; she is still passing through periods of transition, and has not yet conquered all the phases in the perfect forma¬ tion of an administrative organization.

Direct Administration of the Government. — The outward and formal affirmation of the unity of the administration is in the head of the kingdom. According to Art. 5 of the Stat¬ utes of the Kingdom, (

With the parliamentary form, however, of the Italian government all these prerogatives of the king are always exercised subject to the responsibility of the Ministry, either col¬ lectively (the Cabinet), or individually accord¬ ing to the nature of the act.

The responsible representatives of the gov¬ ernment are therefore the Ministries; and in Italy they have a double function : constitu¬ tional on the one hand, in which they assume the responsibility of the acts of the Crown before the Parliament; administrative on the other hand when they take the active direction of an important branch of public administration. There are 11 branches of the Ministry in the Italian government: (1) The Ministry of the Interior, which is really the political ministry par excellence (on it are dependent the depart¬

ments of police and of public sanitation, the local government offices, the communal administra¬ tions, the prisons, etc.) ; (2) the Ministry of Foreign Affairs; (3) the Ministry of War; (4) the Ministry of the Navy; (5) the Ministry of Public Finance; (6) the Ministry of the Exchequer (which administers the wealth of the kingdom and represents the financial econ¬ omy of the government) ; (7) the Ministry of Justice and Religion (which is supreme in all jurisdictionary and ecclesiastical matters). Then come the departments of social administration ; (8) the Ministry of Agriculture, Industry and Commerce; (9) the Ministry of Public Works (which comprises also transportation and rail¬ roads) ; (10) the Ministry of Public Instruction; (11) the Ministry of Postal Communication and Telegraphs. The supreme organ in the councils of the. government, intended to give advice to the Ministers, without, however, limiting their freedom or responsibility, is the Council of State, besides the special supreme councils which are instituted in the various Ministries for the discussion of special matters.

The direct administration of the govern¬ ment emanating from the ministerial centre — is felt throughout the whole territory of the kingdom by means of a network of local gov¬ ernment officials, co-ordinate and subordinate. Every special administration has, naturally, its special territorial organs; but even in this dif¬ fusion of the administrative action it has been the object to maintain a sort of sub-central unity, by the institution of a suitable official who should represent all the powers of the government within a certain extent of terri¬ tory. This office is filled by a prefect, within a circumscribed area known as a province; the kingdom is divided into 69 prefectures. The prefect, according to Art. 3 of the

Communal Law, represents the executive power in the whole province, provides for the execution of the laws, supervises the conduct of all the pub¬ lic government offices, superintends the safety of the public, has the power to make use of the police force, and to call out the soldiery. Thus, all the provincial government officials find their unit of co-ordination in the prefect, who upholds and confirms their subordination to the managing official of the Ministry. The judicial representation of the central adminis¬ tration is also assured in even the smallest section of territory, for in every commune the mayor (besides being the head of the com¬ munal administration, as we have said, is also empowered to represent the government, espe¬ cially in whatever regards public safety, the police department and local sanitation.

The Administrative Departments and Public Offices. — The unification of the Italian administration is specially shown in the bureau¬ cratic and departmental organization. All the offices of the government are united by a chain of obedience which mounts gradually from the lowest to the highest, from the local to the central government, up to the supreme head of the administration, i.e., the king. The admin¬ istration, except in certain very unusual cases, is bureaucratic, i.e., consists in paid individual responsibility of public functionaries who are at the same time professional employees. In Italy there is no general law on the judicial status of employees. There are, however, sev-

eral special laws and a lengthy and complex series of special regulations, forming, as one may say, a species of common law regarding public employment. The appointment of public employees is generally through competitive ex¬ amination, and in this way the various grades do not depend on the arbitrary whim of their superiors. The exceptions to. this rule are in the case only of certain official positions that are pre-eminently political, and especially that of prefect.

Local Administration. — The antecedent

history of the Italian government gave rise from the first to a spirit of mistrust of the local autonomies, ill concealed by purely exter¬ nal and formal recognition of an auto-admin¬ istration to a great extent democratic. This led to the breaking down of all connection with those great natural divisions of territory which in Italy were formed by regions many of which had a real and true geographical auton¬ omy (such as the large islands of Sicily and Sardinia), and others a parallel in antecedent

■*history in the usages, customs, dialect (as in the ancient kingdom of Naples, in Tuscany, Pied¬ mont, etc.). The whole territory of the king¬ dom was instead divided symmetrically into communes which were given a uniform gov¬ ernment, without any judicial recognition of the difference between large cities and small com¬ munes, between industrial and rural centres, etc. An aggregation of communes constituted a province (which is at the same time the cir¬ cumscribed section under the local authority of the prefecture, as has been previously men¬ tioned). There are 69 provinces, and the aver¬ age population of each of these amounts to about 500,000 inhabitants, but in actual fact the number and density is variable. Only occasion¬ ally the province is identical with the region (for example, Umbria and Basilicata) ; in gen¬ eral, every region comprises several provinces (Sicily, seven; Sardinia, two; Tuscany, eight; Piedmont, four, etc.).*

Thus the communes which the provinces may juridically retain as self-governing bodies are territorial corporations of which the gov¬ ernment makes use as organs of its administra¬ tion ; while, at the same time, they represent and take charge of the collective interests of the corporation itself. It follows that these corporations, as far as their activity in the field of public administration is concerned, have never any original rights of their own, but act in virtue of a delegated legislative authority, and use the powers transmitted to them by the government.

The legal limit of their autonomy is found in the normal functions of vigilance and con¬ trol which the government (through the in¬ strumentality of the prefectures and the Min¬ istry of the Interior) exercises over the local bodies, reserving to itself the right of annulling in these communities such enactments as might prove contrary to the laws and outside the limits of their right (competenza) . By certain enactments (but not as a law), the govern¬ ment exercises a real guardianship over the communal administrations, looking into their very actions with the consideration of . their expediency and utility. The organ of this guardianship is a college of seven members, partly honorary, partly official functionaries,

called the Giunta Provinciale Amministrativa (Provincial Administrative Assembly).

The communes and the provinces, according to a general law, do not exercise any of the activities of political, organizations, but only the economic and social institutions, particularly transportation, public instruction, hygiene and local police, and the assistance of the poor. Some of these services are made obligatory on them by law; others may or may not be in¬ stituted at discretion. An insuperable obstacle to this theoretical

liberty is doubtless, however, the lack of financial means. The local Italian administrations have no true and individual financial autonomy: the principal income. from taxes is the exclusive appurtenance of the gov¬ ernment, which leaves to the communes only a quota of the amount within certain limits. A law of 1903 permits the communes to assume the direct management of commercial or indus¬ trial enterprises that have a bearing on public interests and constitute to a certain extent natural monopolies (aqueducts, public and pri¬ vate lighting, tramways, telephones, mills and furnaces, public baths, etc.).

As regards the constitution of the com¬ munal representative bodies, the Italian law is sufficiently comprehensive and democratic. In all communes there is a deliberative body which sets forth the will of the community in matters of serious importance, and the com¬ munal council (in the provinces, the provincial council) .composed of a number of citizens (from 80 to 15, according to the population of the commune) nominated by the popular vote of the majority. All citizens are entitled to vote if they pay into the commune any kind of legal tax, provided they know how to read and write, and those who, having their domicile in the ‘ commune, shall be absolved from the obligation of elementary instruction. As a rule no direct interference by the assembly or by popular vote was permitted in the manage¬ ment of communal affairs; but, lately, the law on the municipalization of the public utilities insisted that the deliberations of the communal council which resolved to assume the service should be put to the vote of the electors of the communes (referendum).

The mayor is the head of the communal government and the organ of its active ad¬ ministration. He has, at the same time, as above mentioned, the dignity of a functionary of the central government. In spite of this complex position, his appointment is entrusted to the communal council, who elect him from among their number. The governor has the power to recall him from office as he has also the prerogative of selecting the communal council and of placing the administration of affairs in the hands of a commission in extraor¬ dinary until the next election and for a period not exceeding six months. The mayor is as¬ sisted in the exercise of his official functions by a body (giunta) of lawyers (assessors) elected also by the communal council. The pro¬ vincial council elects a provincial deputation which, with its president, is the organ of the active administration of the province itself.

Jurisdictionary Inspection. — Besides the parliamentary jurisdiction over the entire ad¬ ministration of the kingdom of which mention was made (notablv the practical drawing up of the obligatory balancing of expenses and the

sum allowed by the government, which is con¬ trolled by the Corte dei Conti), Italian public law has ordained a series of mutual inspec¬ tions (controlli contenziosi) , which are yet strictly jurisdictional.

The law of 1865 gives to the ordinary tri¬ bunals the power to reinstate in his rights the citizen who has been wronged by an act of the public administration, abolishing the ancient government courts of controlli conten¬ ziosi, which formerly existed, modeled on those of France. This full judicial power is, how¬ ever, subordinated to two conditions : that a true and inherent subjective right of the citi¬ zen should have been infringed; that the sen¬ tence should be limited to the recognition of the wrong suffered in the specific case, without the ability to revoke in itself the administrative act. Thus much in regard to the theory of the distinction between powders, which, although it has been discussed and is capable of discus¬ sion in the abstract, remains one of the positive accepted unwritten laws of the Italian Consti¬ tution. To offset the lack of protection of the legal sphere of individual interests caused by these limitations, a law of 1888 established a high tribunal of administrative justice (creat¬ ing a special section of the government coun¬ cil) which, with all the forms and guarantees of legal procedure in contradictorio, adjudicates on the objective legality of the acts and pro¬ visions of the administration, it being sufficient that the citizen should prove that not neces¬ sarily a law but a legal privilege has been im¬ paired by this act. The council of the govern¬ ment in the seal of administrative justice has the privilege of annulling the impugned ad¬ ministrative decree. For the settlement of dis¬ putes that may arise between the government authority and the judicial authority, the supreme tribunal is the highest court in the kingdom — the Court of Cassation in Rome.

Bibliography. — Consult Lowell, A. L., (The Governments of France, Italy and Ger¬ many > (Cambridge, Mass., 1914) ; also Orlando, V. E., ˆrimo trattato com'pleto di diritto amministrativo italiano) (Milan 1900-12) ; Dodd, W. F., (Modern Constitutions) (Vol. II,

1909).

Victor Emanuele Orlando,

Minister of Justice of the Kingdom; Professor

of Common Law, Royal University of Rome.

9. THE CROWN AND PARLIAMENT.

The nature of the relations between the ruler or head of the state and the Parliament is the best guide in determining the character of a representative government. These relations are harmonious in the constitutional systems of Prussia and of the German Empire; inhar¬ monious in the republics; distinctive in Eng¬ land, Belgium and Italy.

The note of discord is formed by the Cabi¬ net, when that Cabinet represents the inter¬ mediary between the ruler, or head, and the Parliament. From the historical point of view representative governments which have been formed through royal concessions recognize in their statutes the predominating influence of the sovereign, who is the centre of gravity of the state; and although these Parliaments have distinct power they yet consider him the head who inspires them and ordains their powers and the limitations of those powers. But this

can only be a transitory state of affairs. Liberties, though they have the appearance of concessions, are no longer revocable; the suf- Irage is being gradually extended and the in¬ fluence of the popular assembly on the action of the government is ever on the increase. There may be a more or less prolonged period of re¬ sistance on the part of the Crown, but parlia¬ mentary government, expressing the will of the people, will finally triumph over the constitu¬ tional form.

The Crown.

This brief general statement will aid us in understanding the origin, the historical and con¬ stitutional value of the Crown, in its relation to the character and to the proceedings of the Parliament in Italy. We can then, in bolder lines, portray a double period which cor¬ responds to the gradual development of our political organization. This political organiza¬ tion in its dynastic concessions resembles a charter; as regards its title, its form, it is a statute, as regards the spirit that prompts it, the manner in which it has evolved, it is a true constitution on a parliamentary basis. In its outward and superficial appearance it differs little from other statutes in which, as in Prus¬ sia, the ruler of the state is the head of the executive.

In Italy the statute has not the restrictive authority that it had in France in 1814, in Prus¬ sia in 1850, in Austria in 1867, all of which rep¬ resented royal concessions; and yet it still sug¬ gests the old absolutism in many particulars. To the Italian statute, as regards jurisdiction, the same standard cannot be applied that politi¬ cal science suggests in the examination of other constitutions. A scientific analysis will show that a statute conceded by royal initiative must have a special character. The king

thought that by creating the organization neces¬ sary for political government he would restrict his own power; but he really in this way or¬ dained that such matters as referred to the exercise of power or freedom should be regu¬ lated by law.

This complication of regulations, restrictions of written (codified) principles forms a series of limitations that the head of the state has placed on his own actions, and which is anal¬ ogous to the restrictions which the executive lays down by decree and ordinance. Without this we could not explain the provisions which do not come under the ordinary classification of the three forms of government. We shall merely cite the various forms of the Jus Imperii which daily become more comprehen¬ sive, and avoid the civic as they do the legal authority. These provisions, which assumed the form of royal decrees, represented the ex¬ ercise of the highest sovereignty, and had some analogy with the orders of the Privy-Council in England ; but on the other hand they must not be confounded with the royal enactments, such as those permitted by the charter of 1814 in France, which cost Charles X his throne and overthrew the Polignac Ministry, or with that which authorized the decree of May 1882 in Prussia.

It would be natural in Italy to expect a similarly enlarged sphere of royal authority which would appear to detract from the reality of parliamentary government. And in the pre-

liminary period of our constitutional history we have not a few instances of such a condition of affairs. But through the natural evolution of parliamentary government the rights immedi¬ ately belonging to the Crown were preserved, and all the rest were included in the responsi¬ bilities of a ministry directly responsible to a House of Deputies elected by the people.

The manner of procedure in the law of necessity, which comes up in extreme cases before any government, whether monarchist or republican, has not been clearly defined. The proclamation of a state of siege depends, in substance as well as form, on a royal decree which, although countersigned by all the mem¬ bers of the Cabinet, does not guarantee it from possible abuses. While preserving to the exec¬ utive the right of action by means of decrees, the limits of such a law of necessity should be fixed by means of laws such as they have in France and Germany; or better still, by the English method, which requires the interven¬ tion of Parliament.

The Italian statutes contain various disposi¬ tions in regard to the

prerogative of the Crown, namely, the mass of guarantees ordained to maintain the prestige of the Crown and its pre¬ eminence over a representative government, such as : the hereditary character of the Crown according to the Salic law (art. 2) ; the in¬ violability of the person of the king (art. 4) ; fixing his majority at 18 years of age (art. 11) ; the allowance to the members of the royal household; the regency, etc.

The royal income, the successive increments to which accruing from the annexation of the various Italian states to the old kingdom of Piedmont, in regard to which there were about seven laws on the civil list, from 16 March 1850 to 31 May 1877, besides the last one de¬ creed by King Humbert, corresponds almost to the permanent government expenses in Eng¬ land, and is free from parliamentary control. Its administration is autonomous and precludes all interference by either chamber.

The Minister of the Royal Household, ac¬ cording to the decree of 14 Nov. 1901, is nom¬ inated by the suggestion of the Council of Ministers, but has no responsibility towards the Parliament. The prerogatives constitute the traditional element, wkose precedents extend far back in the limited monarchy, as in the absolute. But there is another element — im¬ personal and non-statutory, but with a political significance and history connected with the state and with modern society. This is the most difficult matter the Crown has to contend with because it is relative to its raison d'etre with regard to the democracy.

The Crown in Italy resumes all the chief characteristics of the parliamentary monarchy. Hence, in spite of diversities of origin, of cus¬ toms and traditions, it resembles by analogy those of England and Belgium. A more pro¬ found observation of the acts and functions of the king has established the fact that a parlia¬ mentary monarchy will find its raison d'etre in an elective principle, although the form be hereditary. History gives instances of this. The transition from the constitutional to the parliamentary form was determined in England in 1688 by solemn Act of Parliament which de¬ posed James II and put in his place William of Orange.

In Belgium the new monarchy arose by elec¬ tive act of Parliament, after separation from France and the proclamation of a constitution in 1831.

In France the Crown underwent a profound transformation which distinguished the declara¬ tion of 1814 from that of 1830, when the Parlia¬ ment proclaimed Louis Philippe king of the French. The same character was seen in the dynasty of the Second Empire: Louis Napoleon was elected emperor in 1852 and called a pleb¬ iscite in 1869.

The Crown in Italy has a special hereditary character through its historical traditions, but in virtue of the annexations and of the pleb¬ iscites has been invested with an elective char¬ acter, which is reflected in its actions ; whence the constant and effectual support which it has given to the democratic evolution of the Italian Constitution. Within the limits of the Consti¬ tution the king, free from all restrictions, has the right to ameliorate the various organiza¬ tions of the state. This is shown by the foreign policy; the authority to form alliances, to enter into agreements with foreign nations, to form a government, to renew the Parliament, to con¬ voke the assembly.

These eminent prerogatives are distinct from the functions that the king exercises with the co-operation of the other functionaries of the government, which may be called co-operative functions :

(1) Co-operation with the legislative power in regard to 'the royal decree for the presenta¬ tion of all the laws projected by the ministry, and to the sanction of those laws; for once they are voted on by the Chamber and the Senate, they become law. In theory the king's veto is absolute, but its peremptory character does not hinder the passage of a law, in fact this right has never been exercised. The method of veto granted to the President of the United States answers the purpose better, and has a beneficial influence in allowing time for the amendment of many important laws. It would be advis¬ able to introduce it in Italy where the lack of a mixed commission prevents any means of ad¬ justing the want of unanimity in the two chambers, and thus leads to an acquiescence which is harmful to the efficiency of the laws.

(2) Co-operation with the executive power in the nomination to all the offices of state, which presupposes always a preference desig¬ nated by the government, which is responsible for its nominee. This series of mutual relations does not include (at least in form) the initia¬ tive of the king even in making those nomina¬ tions which seem to pertain exclusively to his prerogative, for instance, the nomination of senators. This, properly speaking, is his spe¬ cial right, in regard to the members of the gov¬ ernment, and has also to be subscribed by re¬ sponsible ministers.

(3) Co-operation with the judiciary in what¬ ever else belongs to the power of nomination ; the power of pardon and of amnesty.

The distinctive feature in a parliamentary monarchy was constituted in Italy by the Cabi¬ net, the choice of whose members depends on the free will of the king. According to the letter of the statute this privilege is absolute (art. 67) ; but in practice it has been modified to suit the conditions of Parliament and the

country, in accordance with the best traditions of England and Belgium.

In the preliminary period, from 1848-60, the king had a greater power of initiative. His prerogatives savored of the original character of the statute which was a concession by the Crown ; and the exercise of those prerogatives was a complete success, especially in the choice of the Prime Minister, Count Camillo Benso di Cavour, whose direction of Italian politics and their functions, seconded by King Victor Eman¬ uel II, led to the independence and unity of Italy. With the new kingdom, the national rep¬ resentation became of more value, the selection of the Cabinet was made the choice of a ma¬ jority, and depended on the political votes of the Chamber of Deputies. This proper method has been followed until the present time by the king, who thus maintains himself superior to all parties, and can adapt himself to the exi¬ gencies of public opinion.

In the exercise of the right of choosing the members of the government is also compre¬ hended the power to refuse any such nominees if the Crown thinks that the legal majority in Parliament does not correspond to the royal majority throughout the country. Thus it hap¬ pened that in 1864, after the sad cases in Turin which provoked a violent repression on the part of Minister Minghetti, subsequent to the con¬ vention of September, at which the capital was transferred from Turin to Florence, the king demanded the dismissal of the Cabinet, although it had a majority in the Parliament.

In several cases the Crown has not been willing to accept the retirements caused by hos¬ tile votes in the Chamber of Deputies, but it is a right which must be exercised with discre¬ tion, and it is always connected with the power of appeal to the country.

Collecting together the various solutions of the crisis during a period of 58 years it will be found that the Crown exercised greater free¬ dom in the choice of ministers under Charles Albert and Victor Emmanuel II; that in many instances it used the power of discretion under King Humbert, and that it conforms strictly to the designation of a parliamentary monarchy under the present government.

The Parliament.

Although the Parliament with its two Cham¬ bers in its construction resembles that of France in 1830, it is different from the latter in its evolution of more liberal customs.

The Chamber of Deputies, composed of 508 members, begun on a restricted electoral basis, acquired a democratic character after the reform of 1882, which established a limited member¬ ship, with the requisite of elementary education. This reform still has an influence on the for¬ mation of the parties. From the first these took the name of Right and Left; the former, the party of order, had the predominance until 1876, and endeavored to bring about national unity and to establish financial equilibrium, and to proclaim the secular attitude toward the papacy ; the latter, as the party of action, en¬ deavored above all to promote the more demo¬ cratic tendencies and to improve the economic condition of the country. But these two par¬ ties subsequently became subdivided into groups which made the formation of a Cabinet of har¬

monious members very difficult, particularly when, in latter times, a strong group of social¬ ists entered the Cabinet, in 1900.

The Upper Chamber, although founded on a basis of life tenure, consists largely of high officials. It has always maintained a liberal at¬ titude ; and even if it has sometimes opposed administrative reforms it has never attacked more important political reforms. This con¬ nection between the two branches of the Parlia¬ ment has helped to modify many provisions of the Senate. In 1916 there were 416 members of the Upper Chamber, including the six who were also members of the royal family.

The Senate, compared with the other Cham¬ ber, has more restricted attributes in regard to finance, although in practice it has several times exercised the power of amendment. It retains special judicial functions as ancient traditional survival of preceding statutes. It may in fact constitute itself a high court of justice for the consideration of cases of ministers accused by the other Chamber, and also for cases of polit¬ ical crime and where its own members are ac¬ cused (Statute, art. 36). It may accept in the first case the special judicial function (which is paralleled in the American Senate in regard to impeachment of the President, but it cannot be justified in the other two cases, which savor of privilege). With this exception the two branches of Parliament have identical rights in the exercise of the legal function ; in the simul¬ taneity of convocation, and in the closing of their _ sessions, which depends on the will of the king.

But there is a notable difference as regards the very existence of these two branches of Par¬ liament which is shown in the nomination of senators and the dissolution of the Chamber.

The Italian Statute (art. 33) in the organiza¬ tion of the Upper Chamber requires as mem¬ bers those holding the most important positions in the public service and in social life. This characteristic feature gives to life

membership a different stamp from that of the French Char¬ ter of 1830, from that of Prussia, in 1859, and from every other monarchical charter.

The 21 categories, in fact, constitute a true representation, with a species of gradual select¬ ive choice, because grades in membership are presupposed. The standard of nomination adopted by the Crown has followed the demo¬ cratic evolution of modern society, admitting as members of the Upper Chamber even those who give expression to advanced views. On the other hand, the Senate has understood its posi¬ tion toward the extension of the suffrage through the composition of the Upper Cham¬ ber. With remarkable instances of initiative it has more than once even attempted to reform its own organization, introducing the elective element as a primordial basis.

This shows how the Senate has understood the spirit of the times. It has, besides, on many occasions, stretched the exercise of its power of approval to the point of disapproving the nomination of certain senators, according to a standard which seemed exaggerated to some minds. With the organic decree of 14 Nov. 1901, the minister declared explicitly his right to propose the nominees for senator; but if he thus fulfils his ministerial responsibility, it does not lessen the supreme authority of the Senate,

exercised by virtue of a constitutional function, and which contains an exclusive right to decide in regard to the merits of its members (Statute, art. 60).

Not less to be considered is the royal pre¬ rogative in regard to the choice of the Chamber of Deputies. On its right exercise depends largely wise development, or disorder in public affairs. The Statute places no limitations on him except in the request that Parliament be reconvoked within four months.

No statutory limitation exists to this high prerogative which, except in Norway, holds in all constitutional monarchies ; and among the republics is recognized only in France, tem¬ pered by the previous assent of the Senate.

In the lack of regulations the experience and the wise judgment of the sovereign contributed largely in Italy to the right use of the Statute. There are certain special conditions that prac¬ tice has shown may determine the necessity and the occasion for a selection :

1. When there is continued dissension in re¬ gard to high matters of state ; as occurred on the occasion of the treaty between Piedmont and Austria with the celebrated Edict of Monca- lieri, in 1849.

2. When a serious conflict takes place be¬ tween the two branches of Parliament, and the king has not been able, or has not thought of settling it by renewing the Upper Chamber, aug¬ menting the number of senators to assure a government majority. This is what King Hum¬ bert did in 1880, calling the assembly to decide on the flour tax, which the Chamber wished to abolish, and the Senate intended to retain

(1880).

3. When the Chamber and the government had not fixed standards of general political rights it became necessary to take a popular vote to avoid more serious disturbance (1904).

4. When the new Cabinet had not obtained explicit approval, or results did not clearly show a majority of votes, on account of many absent votes (1892).

5. When through internal disturbances, not¬ withstanding the established majority, parlia¬ mentary business was impeded, as in 1900, when obstructionists paralyzed the work of the as¬ sembly.

6. When some grave event occurs which modifies the territory of the country, as in the occupation of Venice and Rome, which gave rise to an election in the Chamber on 13 Feb. 1867, and on 2 Nov. 1870.

7. When a new electoral law is voted. In this way the Chamber was elected in 1882 after the reforms. But it was not thought necessary to re-elect it in 1891, after the law which sub¬ stituted viva voce nominations for nominations by ballot.

From this short exposition it is seen how in Italy the Crown, while preserving its high dynastic prerogatives, has from the beginning followed such a liberal policy as to render mon¬ archy compatible with a wise democracy. The co-operation in the national reorganization, the common struggle for independence and unity, and the plebiscites have consolidated this union between the Crown and the Parliament.

The statute and political science may define the outlines, indicate the forms, but the rest must be governed by good customs which are the true guarantee of free institutions. Italy

can boast of a parliamentary monarchy which will bear comparison with the correct tradi¬ tions of England.

On its side the Parliament, following the trend of the times, has, without shocks or ex¬ cesses, adapted its constitution to modern needs.

Thus, with harmony established between the powers of the government, and political forms adjusted, Italy may proceed serenely on the path of social reform.

Consult Crosa, Emilio, (La competenza regia nel diritto italiano) (Milan 1916).

Giorgio Arcoleo,

Professor in Ordinary of Constitutional Law , of Comparative Public Law, Royal University of Naples; Grand Official of the Italian Crown; ex-Deputy in Parliament for Six Legislatures ; Senator of the Kingdom.

10. COMMUNAL AND PROVINCIAL ADMINISTRATION. Local Government.

— The local government in Italy is adminis¬ tered partly by bureaucratic functionaries ap¬ pointed by the central government and partly by independent civic corporations under the administration of officials elected by the people. Many of the public services have in various portions of the kingdom special adminis¬ trative officials. Thus, justice, the army and the navy, the administration of the mercan¬ tile marine (heads of departments and mari¬ time regions, and commanders of the ports) ; the Ministry of Industry and Agriculture (in¬ spectors of industry, of mines and forests) ; postal communication, telegraphs and tele¬ phones (departmental and local administra¬ tion) ; higher and secondary instruction (uni¬ versities, schools) ; finance (sub-treasurers). The greater number of the local services that are under government control are administered by prefects and sub-prefects. There is a pre¬ fect, a political and administrative magistrate appointed and. paid by the government in every province. This magistrate is assisted in the administration of the various services by other functionaries and by various colleagues.

Above all he is assisted by counsellors of the prefecture, who individually adm'nister some of the various branches of the service, such as the superintendence of the communes, the chari¬ table foundations, the public works, principally on the rivers (when there are not special com¬ panies for the purpose, called partnerships), and on the government roads, the prisons, etc. The counsellors of the prefecture, three in num¬ ber, constitute a council (the Council of the Prefecture), which gives advice to the Prefect on affairs of importance and audits the accounts of the communes. In the superintendence of the communes and the provinces, the Prefect is assisted by the provincial administrative ˆGiunta," a body presided over by the Prefect, consisting of two counsellors of the prefecture (besides a supplementary), and four other members (two supplementary) elected by

the provincial council. The provincial ˆGiunta® is empowered to approve the most important acts of the communes and of the provinces. Five members of the "Giunta® constitute a tribunal for the consideration of various ad¬ ministrative questions with appeal to Division IV and V of the Council-of-State. There is a Provincial Benevolent Committee to super-

intend the charitable foundations. In the de- paitment of elementary and secondary instruc¬ tion, the Prefect is assisted by a superintendent of instruction and a school provincial council. Public hygiene is under the superintendence of a provisional physician and veterinary, and a provincial sanitary council. In forestry there is a provincial council of forestry.

The police department is also under the direction of the Prefect; it has many repre¬ sentatives throughout the province according to the needs, police commissioners, sub-commis¬ sioners, delegates and the regular police.

There is a Sub-Prefect, a functionary paid and appointed by the government, in every region or district. The regions and districts number 284. The Sub-Prefect has the same duties as the Prefect, especially as regards the police.

The Mayor of each commune acts as a gov¬ ernment official in matters of general concern ; he is dependent in this capacity on the Prefect and Ministry. In the small communes in the same way the Mayor is head of the police.

The communes and provinces are independ¬ ent public organizations under the administra¬ tion of elected officials.

On 1 Jan. 1920 there were 8,3-16 communes. Some of these are large cities ; others, little rural communes. All are civic corporations, organized uniformly according to the general law (Provincial and Communal Law of 4 May 1898, with various subsequent amendments). Latterly there has been manifested a tendency to establish special regulations, financial rules, according to the various character and needs of the communes (Laws for the Southern prov¬ inces and the Islands, 1 July 1906). The affairs of every commune are administered by a Com¬ munal Council, a ((Giunta,)) and a Mayor. The counsellors are elected by the electors of the commune. There are four general requisites in order to be entitled to vote: Italian citizen¬ ship ; and age qualification of 21 years ; capacity to read and write; and that the citizen be of the male sex. The earlier restrictions were re¬ moved by the electoral law of 30 June 1912. The election of members

of the Communal Coun¬ cil takes place every two years, when a third of the counsellors are elected. The election is on a single ticket which is voted on throughout the commune. The representations of the minority is assured by the fact that each elector is prohibited from inscribing on the ticket more than four-fifths of the names of the candidates for election. The vote is a secret one. All the electors are eligible for the position of Com¬ munal Counsellor except in some cases of in¬ compatibility. The Communal Council meets twice a year in ordinary session ; and in ex¬ traordinary session whenever it is necessary to do so. The power of deliberating on the inter¬ ests of the commune belongs exclusively to the Communal Council. It decides on the regulation of local police, of hygiene, building permits, de¬ termines within the limits of the law the com¬ munal taxes, goes over the expense bills, ap¬ proves the annual budget, nominates and licenses employees, and administers the wealth of the commune. The communal ˆGiunta® is composed of a number of members, varying from 10 to 2 (besides two to four supplementaries) according to the population of the commune. The mem¬

bers of the ˆGiunta® are elected by the Council, and chosen from among the Counsellors. They are all elected anew every four years. The ˆGiunta-0 prepares the matters of deliberation for the Council and itself deliberates on matters of secondary importance. It may, in case of urgency, deliberate on matters belonging to the Council ; but these deliberations must be sub¬ mitted to the Council for ratification at its first meeting. The Mayor may be recalled by the Council, suspended from office by the Prefect removed by royal decree. The Mayor pre¬ sides over and convokes the ˆGiunta® and the Council, and carries their deliberations into execution, makes stipulations for contracts, represents the commune in law, supervises the communal force of employees. In case of urgency, he may issue regulations in regard to public safety in matters of hygiene or building permits, which can be put into force at once.

In every commune there must be at least one paid administrative official, the secretary of the commune, dhe action of the communal authorities is submitted to the control of the government authorities. All the deliberations of the Communal Council and "Giunta® are submitted to the Prefect or Sub-Prefect. The Prefect may annul them if they are contrary to the laws. The more important deliberations, such as regulations, deliberations in regard to taxes, mortgages, contracts binding the com¬ mune for over five years, the acquisition of real estate, and, in many cases the budget, etc., must be approved by the administrative provincial (< GiuntaC which has the power to approve and make them legal. 'Some other special matters concerning education and public health must be approved by the Provincial School Council, or the Council on Sanitation. If the communal authorities neglect to take action, or to make provision for obligatory services, the

Provincial <(Giunta® (and in some cases the Prefect) may take action in the matter. In grave matters

*Pllˆc OI*der, or in serious disturbances in the administration, the Communal Council may be dissolved by the Central Government. The communal affairs in that case are administered by a commissioner extraordinary appointed by the government. He cannot remain in office longer than six months. At the end of this time a new council is elected. The communal serv¬ ices are obligatory, or optional. They are obligatory when they are established by the law ; the rest are optional. The communes in which the taxes on land and buildings exceed the legal rate, of which we shall speak later, can¬ not have optional services. The principal obliga¬ tory services are as follows : The most impor¬ tant is elementary education ; every commune must have at least one elementary school with one teacher, and it is bound to have schools and teachers in greater number in proportion to the population, so that all may receive education (Law of 13 Nov. 1859; 15 July 1877; 21 Oct. 1903; 8 July 1904). (See Italy — Schools and Universities). Another important service is that of public health. Every commune must have a physician and a midwife paid by it for the gratuitous care of the poor. It must, if possible, pay another physician appointed by the government (or sanitary inspector) to supervise hygienic conditions. A commune may be obliged to employ a veterinary surgeon.*

Every commune must be furnished with drink¬ ing water, and have a cemetery (Law of 22 Dec. 1888; 26 June 1902; 25 Feb. 1904).

The service of local police comprises light¬ ing, prevention of fires, superintendence of street traffic, etc. The service of roads and highways includes the communal streets, their construction and maintenance. The service of beneficence comprises, in the communes, the ob¬ ligation to bear the expense of the sick poor taken to the hospitals ; to aid, with the prov¬ inces, in the expense of caring for foundlings ; and with other societies in providing for those who are unable to work. Besides this, the hos¬ pitals and other charitable foundations take a share in public beneficence (Law of 17 July 1890; 30 June 1889). The communes must also provide for the needs of private individuals by the municipal services, such as the manufac¬ ture of gas, of electricity, the distribution of drinking water to the houses, tramways, etc. The municipal plants of these industries must be approved by referendum (Law of 29 March

1903).

The revenues of the communes come in great part from the rents of real estate, from capital and industry. The rest is obtained from taxes. The principal are the following:

On funded property (land and buildings) the several communes may lay a tax as high as 50 per cent of that owing to the state (Gov¬ ernment tax). In exceptional instances this limit may be surpassed. There is the indirect tax on consumption (excise tax) ; on food¬ stuffs (except bread and flour) ; and other articles of necessity and luxury (Law of 15 April 1897; 14 July 1898 ; 23 Jan. 1902). An income tax may be established on the revenue of each family, which is slightly progressive. The personal revenues which are partially liable to this tax are assessed only in the way of two other taxes — on professional income and on cattle. There are a few other local taxes of minor importance. The communes have the selection between these taxes, but they must observe a certain order and a certain proportion between them ; they cannot impose any other taxes. The communes may unite associations to deal with their expenses and to provide for some branches of the services (schools, streets, physicians, industrial plants, etc.).

Every province has a provincial council, a provincial deputation and a president of the same. The provincial council is composed of a number of members varying from 60 to 20, according to the population. The counsellors are elected by the voters of the province. The voters of the separate communes are the electors of the province. All these voters who have their domicile in the province, or pay their taxes here, are eligible as provincial coun¬ sellors. The election is by separate colleges or districts. Each college nominates from one to five counsellors, according to population.

The provincial deputation consists of a num¬ ber of members — from 10 to 6, according to the population of the province. These are elected by the council, are chosen from among the counsellors, and hold office four years. The deputation is charged with the preparatory work, the same as the communal <(Giunta.® The president of the deputation is elected by the

council from among the counsellors. The provincial council may also be dissolved by the government in certain emergencies ; the provincial affairs are then administered for not more than six months by a commissioner ex¬ traordinary.

The principal obligatory services which be¬ long to the provinces are the roads and other important public works throughout the prov¬ ince; the expenses of beneficence in the main¬ tenance of lunatics and the erection of lunatic asylums (Law of 14 Feb. 1904) ; the contrib¬ uting toward the

expenses of the care of found¬ lings ; certain services and expenses connected with Sanitation (Law of 22 Dec. 1888; 21 July 1902). The province also provides for other services connected with secondary education and agriculture. Consult Nolla, P. D., (L'am- ministrazione dei communi delle provincie> (Verona 1891).

Federico Cammeo,

Professor of Jurisprudence, Royal University of Padua.

11. DEPARTMENT OF JUSTICE.

Justice, in civil and penal matters, is admin¬ istered in Italy by justices of peace, county judges {prcetors) , tribunals, appellate courts, assizes and the supreme courts.

Special laws regulate the jurisdiction of mili¬ tary and naval crimes. A college of officials of the public ministry is established at every tri¬ bunal and every court. Before the county judges (prcetors) the functions of the public ministry are administered by vice-praetors and minor officials, or by ordinary citizens who are occasionally appointed by special delegation.

To each of the above-mentioned tribunals there may be supplied additional magistrates and auditors. The number of magistrates and judges of the different categories, and the boundaries of the territory wherein they exer¬ cise jurisdiction, is fixed by law, and cannot be changed by executive power. This principle is important in relation to the fundamental con¬ stitution of the kingdom, that every man must be tried in the district where he is a resident.

The magistrates (except the judges of the peace) are all nominated by the king, at the proposal of the Minister of Justice, from among those who have the requirements prescribed by law. No one can become a magistrate who has not served his novitiate as an ˆauditor,® except the advocates and the solicitors, who may be received after a certain number of years of professional practice in the magis¬ tracy, or as judges or as officials of the public ministry.

Auditors are admitted after oral or written examination, provided they have been admitted to the bar. After 18 months' practise they may pass by examination to the rank of additional judges. This is the source of supply from which future county judges (prcetors) or judges are selected. Every other profession or office is forbidden to the magistrate, except that of county or common counsel and of deputy in Parliament, but with some restrictions concern¬ ing the place of the election and the number of judges who may be deputies. There is a strong expression of public opinion which

seeks to make this office incompatible with every other. The trials are public unless the judge

considers that tor moral reasons a case should he tried behind closed doors.

Justices of Peace. — In every community there is a justice of the peace, nominated by the first, president of the court of appeals of ,.s .ˆstrict, who must be selected from a list of eligibles submitted to him by the municipal authorities. This list is formed each year. The justice of the peace has two functions; one that of mediator and peacemaker in contro¬ versies of every kind. He is obliged (if re¬ quested by one of the quarreling parties) to attempt to bring matters to an agreement by summoning the other party, who, however, is not obliged to appear. Further, he has the function of judge in cases not concerning prop¬ erty rights, as real estate, not exceeding 100 francs in value, and in cases concerning evic¬ tions from the houses or farms, not exceeding 300 francs rental (about $60).

All suits of not more than $10 value are settled by the justice of the peace and can¬ not be appealed. The competency of the jus¬ tice of the peace is regulated in this manner by the new laws of 16 June 1892, No. 261; 28 July 1895, No. 455, and 24 Dec. 1896. No. 547, because the code of the civil law effective on 1 Jan. 1866 (at the time of the legislative and administrative unification of the new kingdom of Italy after the wars of 1859 and 1860), circumscribed the competency to $6. The en¬ largement of power did not have good results, so there is possible a return to the former re¬ striction that the justice of the peace may be peacemaker for all kinds of controversies but can only act as judge in cases of small money value.

County Judges. — In every district there is a county judge (preetor) to whom, according to the pressure and importance of his work, can be assigned one or more assistants, selected from recent graduates of a law school or from the assistant judges. The assistant judge can be nominated county judge after two years' practise as assistant. The county judges pass sentence, in civil and commercial matters, in lawsuits of a greater value than those over which the justice of the peace presides, but which may not exceed $300, except suits of honorary civil or political rights wherein the state is interested. Further, they pass sentence in lawsuits of any value concerning personal possession.

In penal matters the county judge may pass sentence upon all crimes not libellous ; for these the sentence cannot exceed three months of prison, one year of exile, or $200 fine.

Lawsuits of executive proceedings are also tried before the county judge, provided they concern household goods. Further, the county judge may preside over family councils and decide questions of guardianship for children and feeble-minded people. It is not necessary that the defense before the county judge should be conducted by an advocate or solicitor, but, in civil or commercial cases, it is sufficient to have a citizen who is considered capable on the authority of the judge.

Tribunals. — The members of the judicial authority, named tribunal, are called judges and county judges (preetors), and assistant judges can be nominated judges after several years of service. In each district there is a tribunal. The tribunal comprises, in civil and penal cases,

ihree members, and in the largest towns, where the number of trials is .great, it is divided into sections. The chief of the tribunal is called president. In the first instance the tribunals try all cases, civil, commercial and criminal, ex¬ ceeding the competency of the county judge. This limit has already been indicated. They also try heavier criminal and libel cases. The tribunes appeal cases sentenced by the county judge in the first instance as well as civil, commercial and penal matters.

In civil cases tried before tribunals each suitor is obliged, to have the assistance of a solicitor. Even if the plaintiff and defendant wish to appear and represent their causes per¬ sonally they are always assisted by a solicitor who, can interfere if, according to the presi¬ dent's opinion, the quarrelling parties are either too inexperienced or too angry to continue.

In criminal cases the accused must be de¬ fended by a lawyer. At every tribunal there must be an attorney of the people, who is called solicitor for the king. In criminal cases this public minister represents human society which punishes the crime, and if he thinks the sus¬ pected man is guilty, he makes the accusation and requests from the judge his condemnation. If, on the contrary, he believes in the innocence of the accused or has knowledge of some ex¬ tenuating circumstances he can demand of the public ministry his release. The presidents of tribunals and the prosecutors for the king are magistrates of equal degree.

Appellate Courts. — Every appellate court consists of at least two sections, one for the penal cases, and one for civil cases. Where, on account of a larger population, the number of cases is greater, there are more sections. The members of the appellate court are called counsellors and are of the same rank as the president of the tribunal. At the head of each of the sections composing the court, there is a president. The latter is equal in rank to the counsellors of the court of cassation, while the first president of the appellate court is a de¬ gree higher than the counsellor of the court of

cassation. Before the appellate court are brought, on appeal, all penal and civil cases judged by the tribunals in the first instance. In civil cases the court comprises five mem¬ bers ; in penal cases, four members. Every appellate court has an ˆoffice® of the public ministry represented by a general solicitor of the king and by one or more substitutes, ac¬ cording to necessity. Matters of ordinary juris¬ diction can be appealed before the appellate court, and here is heard, also, the opinion of the public minister, and it is decided upon by the members in council.

Assizes. — These courts are exclusively for penal cases, and are distinguished from all others because there are co-operating judges, called ((jurors,® who are selected by lot from a list of citizens, which is revised every year. For each session 30 jurors are selected, from these are chosen 14 for each case. Out of these 14, 12 are acting jurors and two surrogate jurors, in case one of the acting jurors should be absent during the trial.

There are one or more courts of assizes for every appellate court .district. They sit gen¬ erally twice every year, in spring and in autumn. But, if necessary, there are extra sessions. The court of assizes is presided over by a magis-

trate who is counsellor of the appellate court or president of the tribunal. The court of assizes is competent to judge all political crimes and all of the other more serious crimes which receive the penalty of more than 10 years in the penitentiary. The jurors pronounce the sentences based upon the facts which constitute the accusation, without manifesting reasons, but merely by a yes or no given after a secret

consultation. The jurors being 12 in number, the majority decides, but in cases of equal votes, the verdict which is favorable to the accused is the one taken.

After the verdict of the jurors, if affirmative, the court may be of the opinion that the facts do not constitute a crime, according to the code. This almost never occurs. Ordinarily when the verdict is affirmative (that is, with at least seven votes) the court pronounces and determines the penalty. Against a sentence of the court of assizes no appeal is possible, only a recourse to the court of cassation for viola¬ tion of the law.

Supreme Court — Court of Cassation. —

There are five courts of cassation in Italy. This multiplicity is in

contradiction to the func¬ tion of magistracy of pure justice which char¬ acterizes one court of cassation. But Italy, formed so recently by the uniting of several states, was unable to eliminate completely from every state all their central organs. She was obliged to leave the courts of cassation, as well as several other things, at Turin, at Florence, Naples and Palermo, and was obliged to form a court of cassation at Rome when this became the capital of Italy. However, though there are apparently five courts of cassation, in substance there is only one, divided, however, into sec¬ tions which instead of being all united at the capital, are distributed among several cities of the kingdom. The penal jurisdiction has been completely barred at all the other courts and entirely concentrated at Rome. To the Roman court has been exclusively consigned all cases concerning taxes and ecclesiastical matters. The court of cassation in handling civil mat¬ ters is composed of seven members. It ex¬ amines the sentences from which an appeal has been taken, and if no error of justice appears the appeal is rejected and the case finished. But if some error of justice (in form or substance) appears, the sentence is annulled and, without judgment, is dismissed to another magistrate. This last magistrate is free to judge according to his personal opinion, but his sentence is also subject to an appeal to the court of cassation in many cases. The court of cassation in Rome is also invested with the power of regulating questions of jurisdiction between the administrative authorities. There¬ fore when a sentence of appeal is denounced on account of having been unjustly judged on the question of competency there is no other recourse than to the court of cassation in Rome. Thus the court of cassation in Rome has the function of a Supreme Court, and as the king¬ dom of Italy is governed by the parliamentary system and there is no plurality of states, there can be no question as to whether a law is or is not constitutional (as. happens in the United States and in the confederation of Switzer¬ land) ; the law being an emanation of the power of the throne which judicial authority can never

dispute but must always respect. Judgment on the constitution can only be passed in Italy on the decrees and acts of the government as an executive power, inasmuch as we may decide whether the law of the state has been broken, because the executive power can exercise free action over the facts which are not regulated by law. But in cases of facts which do some under the law, the executive power has to conform to them. However, the decision, pro¬ vided the act of the executive power be con¬ stitutional, belongs entirely to the judicial au¬ thorities.

Military Justice. — For crimes committed by soldiers and officers of the army there are military courts which judge without possibility of appeal, but from whose decision recourse can be made to the supreme tribunal of war and navy which functions in the same way as the penal court of cassation. Analagously, there are maritime tribunals for sailors and officers

of marines, with recourse to a similar supreme court.

Jurisdiction of the Court of Accounts. —

The Court of Accounts is instituted to examine and decide all controversies which concern the accountings of the administration of the state, of the provinces and communities ; and further has to decide in all controversies regarding the pensions of employees of the state.

Jurisdiction of the Council of the State. — The council of the state is a consulting cor¬ poration divided into three sections for the various matters which must be interpellated, and passes its opinion on the affairs of the nation ; further, there has been added a fourth section which is charged with the jurisdiction of all affairs in which a private person or a corpora¬ tion claims to have had his interests interfered with by an unjust administrative act of some local or central authority. The recourse to the fourth section is made in the same way as the recourse to the court of cassation, and a dis¬ cussion between the lawyers of both parties is public.

Other Special Jurisdictions. — In every

province there is an administrative corporation, to which recourse can be had in certain cate¬ gories of affairs, and the decisions of which can be denounced for violation of administrative law by the fourth section of the council of state. There are special commissions for the imposts as well as for the custom houses. The power of these commissions is merely to decide the valuation of the imposts and the duties which must be paid. In the case of a question of a violation of the law through an attempt to collect customs dues unjustly, the power belongs to the judiciary authorities.

Bibliography. — Consult Orlando, V. E., (Primo brattato di diritto amministrativo ital- iano) (Milan 1900-12) ; Romano, Santi, (Prin- cipii di diritto amministrato italiano) (Milan

1906).

Ettore Sacchi,

Member of Parliament ; formerly Minister of Justice of the Kingdom; author of works on functions and limitations of Tribunals and Courts of Appeal.

12. THE PAPACY AND THE GOV¬ ERNMENT. Italy has been called upon to solve the gravest and most important problem that has agitated modern Europe — that of the

abolition of the temporal power of the Pope. W e cannot here dwell on the history of the rise of this power. Its raison d'etre at the present day, from the ecclesiastical point of view, is that, with the Catholic Church organized into a monarchy, with the Pope as sovereign, in Rome, the Catholic world, he would have sought to secure the independence of the Great European States, and would have acted as pacificator and umpire in settlement of their differences. Those states on their part recognizing the value of the influence of the papacy for their own pur¬ poses, would consequently take care that this great power should not fall into bondage to any one of them, but should remain independent and autonomous.

Hence it followed that the popes sought to form a temporal power of their own, in which they should rank as independent sovereigns, and since they were unable to form one strong and powerful state, they sought to keep Italy divided up into several petty states, thus pre¬ venting the formation of one preponderating power in the peninsula. For this reason every attempt toward the unification of Italy, or toward bringing it under one dominating power has always been opposed by the papacy.

Europe also opposed the unification of Italy for different reasons; but the desire to protect the temporal power of the Pope by preventing the unification of Italy was also a factor in European politics.

After the overthrow of the French domina¬ tion in the 19th century, the Italian national sentiment gradually developed, and as the desire for the independence of Italy grew, the prob¬ lem of the temporal power of the papacy was made a matter of serious consideration by the writers and political men of the day. But if in order to establish this federal idea and realize this beautiful ideal of Italian unity, she should despoil the Pope of his temporal power, Italy felt that she would incur the ill-feeling of Europe. Hence, unification seemed impossible. Hence, the neo-Guelphism of V. Gioberti, who originated the idea of making the Pope the head, the President, of the Italian federation. But during the revolution of 1848-49, when the idea of the independence of the Piedmontese monarchy originated, it seemed necessary for the unification of Italy to abolish the temporal power of the Pope.

After the revolution of 1859 Gioberti's idea as proclaimed in his great work, (I1 Rinnova- mentoP that Rome should be the capital of Italy, and that there should be a reform in Catholicism through which it would no longer be necessary that the Pope should hold tem¬ poral power, seemed

fulfilled in Italia Unita; and Cavour, the great statesman, proclaimed in the first Italian Parliament, held in Turin, that Rome was henceforth the capital, and declared that in Rome, Italy should proclaim the liberty of the Church, that is to say, granting to the Pope, by mutual agreement, independence in the exercise of his spiritual sovereignty over the Catholic world, and liberty to regulate the af¬ fairs of the Italian church, thus abolishing the existing concordats and laws which were in force in several of the Italian states, after the manner of the other Catholic European states.

When Cavour died, the Roman law courts objected to all agreements entered into by Ca¬

vour, and the Catholic world endeavored to prevent Italy from taking possession of Rome; and as the pontifical states in 1860 were no longer able to govern themselves, the French occupation, begun in 1849, was continued, al¬ though the Emperor Napoleon III in 1864 pledged himself to withdraw the French troops; but he did not do so until 1866, only to send them back again in 1867, when Garibaldi at¬ tempted to take forcible possession of Rome. Italian statesmen in the years 1861 to 1870 endeavored to persuade Europe that should Italy take possession of Rome she would give ample guarantees of independence to the Pope and liberty to the Church, and thus they pre¬ pared the way for an occupation to be under¬ taken as soon as a favorable opportunity pre¬ sented itself. And this occurred in 1870, when France, engaged in a war with Germany, was obliged to withdraw her troops, and soon, in addition to her other disasters, came the fall of Napoleon, who had formed with Italy the agreement of 1864.

On the 20th of September Italy took posses¬ sion of Rome and declared herself absolute temporal ruler, with the acquiescence, more or less cordial, of all the European governments. The latter, confiding in the promises of the Italian government, no longer interested them¬ selves in the question of temporal power and the ((Roman Question,® that is, the attitude of the Pope and of Italy in regard to the pos¬ session of Rome, was considered a purely Ital¬ ian question, in which it was not permitted to foreigners to meddle. The Law of Guaranty was passed by Parliament 19 May 1870, assur¬ ing independence to the Pope and liberty to the Church. At the time this law was criticized bitterly, even by those who, afterward becoming ministers, scrupulously observed it themselves, and made others observe it; for they were con¬ vinced that through this law Italy would suc¬ ceed in making the abolition of the Pope's temporal power an accepted fact.

The law has two clauses : the first, concern¬ ing the prerogative of the Pontiff and of the Holy See. The person of the Pope is declared sacred and inviolable; all public and personal attacks on his reason, evil speaking and

other offences directed against him to be punished as though they were directed against the king. But as this special protection guaranteed to the Pontiff did not diminish or prevent the lib¬ erty of conscience and of the press, it was ex¬ plicitly stated that the discussion of religious matters was freely permitted. By this arrange¬ ment the law recognized in the Pope a sort of spiritual sovereignty, independent of the tem¬ poral power — with which he was invested pri¬ marily — and also gave back to him sovereign honors and recognized his precedence, as is done by other Catholic sovereigns.

Once his sovereignty was recognized, the Pope could maintain a guard of honor, divided into classes, Swiss, Palatine and Noble, none of whom, however, have any recognized mili¬ tary rank in the national government; in fact the men who compose them, even though Italian citizens, are not subject to military duty as are ordinary troops. The number of these guards was not determined; the law reading (

to public order. The spiritual sovereignty of the Pope gave him the liberty to perform all the acts of his spiritual ministry, communicating freely with the Catholic world, planning as he saw fit the administrative policy of the Holy See, which was again called (

The papal post-office correspondence is trans¬ ported in a closed bag to the postal officials placed on the frontier, and papal mail matter is remitted by the Italian officials gratuitously. The same rule is observed for telegrams; the papal wire is connected with the rest of the state, and the papal telegrams are in the same category as the telegrams of the Italian gov¬ ernment and are transmitted gratuitously as if the postal or telegraphic correspondence were addressed to the king.

It is a secular custom that the institutions for ecclesiastical instruction and education in which the Holy See has the greatest number of dignitaries and functionaries, should be situa¬ ted in Rome, and its six adjoining bishoprics, which are immediately subordinate to the Pope as Bishop of Rome. Now, because in this the Pope is entirely free, these institutions are withdrawn from all interference from the school authorities of the state, for the Pope can nom¬ inate whom he will to the higher ecclesiastical positions, and the bishops can do the same for the smaller ones, without the authority of the government, giving the exequatur to the orders in the first instance, and the placet in the second, for the enjoyment of the beneficies annexed to these positions as well as for others in the kingdom.

With the purpose of removing any pretext for outside interference, and moved by the ne¬ cessity of providing for the economic exigencies of the Holy See, the law has ordained a species of civil list for the Pope of 3,225,000 lire (about $645,000) a year, entered in the great volume of Public Debt as a perpetual and inalienable pay¬ ment free from every kind of tax. The sum was fixed according to the balance of the Ro¬ man States of 1848, the only one published. This fund must be used for the support of the Pope, for the various functions of the (

demanded payment of this money, but the agree¬ ment to pay on the part of the Italian govern¬ ment has never been withdrawn, hence the total credit remains intact, though every five years the interest is outlawed, according to Italian state custom.

The apostolic palaces (Vatican and Lateran) the Villa of Castel Gandolfo and their depend¬ encies according to Italian public law should have been declared part of the government do¬ main ; instead of that, this declaration, on ac¬ count of political exigencies, was omitted, and by Art. 5 of the law the enjoyment of them was given to the Holy See in perpetuity, but at the same time the archaeological collections and the libraries adjoining are declared inalienable, which means that the Pope and the Holy See have no proprietary rights to them (as the clerics pretend) which would comprise the right to alienate, by sale, exchange or donation.

The Pope has besides, as an adjunct to his sovereignty, the right to an active and passive embassy, that is, the Italian government recog¬ nizes in all his functions the Ambassador of the Holy See (just as the King of Italy recognizes any other ambassador), and similar privileges throughout the kingdom.

As the papacy is an elective monarchy, and during an interregnum the sovereign power is vested in the College of Cardinals, which elects the Pope in conclave, the Italian government is obliged to protect the conclave from all mo¬ lestation and is hindered from placing any ob¬ stacle to the personal liberty of the cardinals. Hence the ecumenical councils throughout his¬ tory are regarded as sovereign assemblies of the Church and receive the same consideration as do their individual members. But now, since the proclamation of the dogma of infallibility, it is very difficult for them to continue as coun¬ cils, as the Pope may ex cathedra define and proclaim the religious truths obligatory upon the faithful (dogma).

Such is the law which, since 1871, has gov¬ erned the relations between the Pope and the government. It was never fully accepted in the Holy See, but nevertheless the latter enjoys all the privileges of a practical nature, which the government always observed and caused to be ob¬ served. Undoubtedly there never before was a time when the spiritual sovereignty of the Pope could be declared as openly as at present, as was proved by the two conclaves held since 1870. In spite of all this, and with all the con¬ ditions essential to this freedom, and the en¬ joyment of the privileges and protection of the law, the papacy has never recognized the state regime of affairs established in Rome in 1870. When the Pope and the king came to an ex¬ plicit understanding it was natural to believe, in the Catholic world, that either the Pope would subordinate his spiritual acts to the in¬ terests and political advantage of Italy, or that the Italian government would subordinate its policy to the exigencies of the Pope and the Church. Official animosity, by reason of the Law of Guaranty, enabled the Pope to enjoy that independence which, for centuries, could not be maintained unless by retaining the tem¬ poral power; moreover it permits the Italian government to maintain, in fact as well as in theory, a perfectly independent position in re¬ gard to a power as morally great as the papacy.

475

ITALY — POLITICAL PARTIES (13)

Thus, the official enmity serves both parties : it suits both that the Pope should consider the government as a usurper.

This official enmity was associated with a personal enmity, which has

never prevented se¬ cret agreements with the papal authorities re¬ sponsible for the safety of the Vatican and the Pope, and the political authority of the king¬ dom, during the pontificate of Pius IX, and at longer intervals during that of Leo XIII, who sought to isolate Italy politically, and thus to weaken, if not destroy the monarchical insti¬ tution; under Pius X this enmity was only of¬ ficial. That Pope was never a cardinal of the Curia, but during the time he was priest, pas¬ tor and bishop he had always held a simple cure of souls, at a distance from Rome, and he saw in his youth foreigners ruling over his na¬ tive country (Venice), and he exulted when he saw the Italian tricolor flag substituted for the yellow and black standard. As a patriarch of Venice he frequently had dealings with the sov¬ ereigns of Italy (for Venice was acquired through an international treaty and legiti¬ mately conquered by the House of Savoy) and he assisted in putting a stop to the socialist prop¬ aganda, which at the same time attacked mo¬ narchal institutions and religion, and he opposed it at Venice, inducing the faithful in the Church to vote in accord with the liberal monarchists. When he became Pope he could not forswear his former attitude; hence, while abstaining from every action which gave assent or ap¬ proval to the established conditions of 20 Sept. 1870, when the king's soldiers entered Rome, he did not continue the unyielding anti-Italian policy of Leo XIII and evidences were soon perceived of this new line of conduct of the Holy See. Pius X was a religious Pope, and as religion and the Church were not being per¬ secuted, he permitted frequent infractions of the law non expedit ; that is to say: the formal prohibition of Catholics from taking part in political elections, which was promulgated by Pius IX and confirmed by Leo XIII. But just because he would not recognize Rome, even tacitly, as the capital of the kingdom, he al¬ ways opposed the formation of any Catholic party in Parliament. The Catholics should vote for a monarchical candidate in preference to a Republican or a Socialist. Catholics loyal to the Holy See may enter Parliament and swear fealty to the king and the constitution, but none has the right to call himself a representa¬ tive of the ideas and principles approved by the Pope. And this was stipulated, because other¬ wise it would appear as if the Pope acknowl¬ edged the right to the possession of Rome, and the electors and parliamentary deputies faith¬ ful to the Pope, and the interpreters of his views, would be unable to deny the funda¬ mental principle of this acknowledgment, namely, the unity of Italy with Rome as its capital. Plence it is not possible in Italy to form a party similar to the Catholic Centre in the German Reichstag.

Thus it happens that now between the Pope and the king, that is, the Italian government, there is an official enmity, a lack of friendly feeling of agreement, and there exists only a practical modus vivendi, founded on the Law of Guaranty which obviates all cause of con¬ troversy.

And this is the condition of affairs which

best suits both parties : the Pope, because the prosecution of open hostilities would not be agreeable to the sentiment of the great major¬ ity of the clergy and of militant Catholics; whilst the open recognition of Rome as the capital would clash with prejudices not yet re¬ moved and would diminish the reputation of the independence of the Holy See in the Cath¬ olic world. It suits the king's government be¬ cause it removes the necessity of regarding the Pope, his faithful clergy, and the more zealous of the flock, as enemies, and allows him to en¬ joy the indirect aid of the first and the direct assistance of the others in combating the sub¬ versive parties without assuming any obliga¬ tion to make legislative concessions which might change the secular character of the Ital¬ ian government, and also without incurring any kind of responsibility toward foreign govern¬ ments through the international poliev of the Holy See.

But the necessary condition for the consoli¬ dation of this state of things is the mainte¬ nance of the ((Law of Guaranty.® By this means the Holy See and the Church will avoid in Rome serious trouble and Italy will not see the birth of civil dissensions which would be a men¬ ace to her prosperity. Everyone in Italy is agreed on this point, and no statesman, no mat¬ ter how anti-clerical, would think of changing it. Although it does not form a part of the na¬ tional constitution, it is . nevertheless looked upon as a law of constitutional importance, and as such cannot be changed without radically changing the order of fundamentally Italian in¬ stitutions. It has not, in truth, the character and importance of an international law, i.e., a law which implies a strict contract with other governments, but for all that the Italians are convinced that it cannot be disregarded with¬ out, interfering with the position that Italy oc¬ cupies in the international society and produc¬ ing a serious and perhaps ruinous change in her position in the political world.*

Therefore everyone in Italy is agreed on the maintenance of this law, although they recog¬ nize its defects. This is a compromise truly worthy of the character and political traditions of the Italians. And hence, this law expresses the nature, the character of the people, which is averse to exaggeration and to all kinds of ex¬ cess ; it agrees with its tendency to compromise and to surmount difficulties by strategy rather than force. Besides all this it is a historical necessity which Italy could not disregard after having abolished the temporal power of the Pope. Not in vain were Niccolo Machiavelli and Francesco Guicciardini, those founders of the art and science of diplomacy, born in Italy.

Consult Quinet, Edgar, (La question ro- maine devant l'histoire) (Paris 1868).

Domenico Zanichelli,

Professor of Constitutional Law, Royal Uni¬ versity of Pisa, Honorary Professor of the University of Siena.

13. POLITICAL PARTIES. In order to understand the origin of the political parties which asserted themselves in the first Italian Parliament we must remember that the unity of Italy was obtained by the combined forces of the constitutional monarchy of Savoy, which governed the ancient kingdom of Sardinia, and the ancient revolutionary Republican party which from 1832 had had as it master and in-

spircr Mazzini, and as a leader, during the events of 1859-60, Garibaldi.

In 1861, the Kingdom of Italy being estab¬ lished but not fully organized, the Right, which was more numerous and was composed of all those who, having followed the impulse given by Count Cavour, admitted unconditionally the monarchical constitutional form of government, because they saw that monarchy was indispen¬ sable not only to complete it, but also in order to the continuance of the unity of Italy. On the contrary the old Mazzini conspirators and the most active and enthusiastic followers of Gari¬ baldi sat generally on the Left.

But very shortly a large fraction of these, accepting the formula of Crispi which affirmed at that time that a monarchy would, unite Italy and a republic would disintegrate it, gave in their allegiance more or less conditionally to the monarchy, and constituted the Constitutional Left, which thus little by little became distinct from the Extreme Left, to which belonged all those who remained more firmly attached to the traditions and to the doctrines of Repub¬ licanism.

Until 1870 the question which chiefly divided the Constitutional Left from the Right was that relating to the method to be followed in com¬ pleting the unity of Italy. The members of the Left, in accordance with their principles, had the greatest confidence in conspiracy and popular movements, while those of the Right, who had always been lovers of law and order, or had connected themselves entirely with those principles, placed their confidence above all in the action of government, of diplomacy, and of the regular army. But the difference in the platform of the two parties was not so great as that of their origin and political education which caused them each to remain well disci¬ plined and compact, so that the Right always remained in favor of the government, and the Left always opposed to it. Both one

and the other, however, had a pronounced anti-clerical tendency; for at that time the temporal power of the popes was an obstacle in the way of the per¬ fecting of Italian unity, and the Pope had pro¬ hibited all those in whom the religious senti¬ ment predominated over patriotic feelings from having a seat in the Chamber of Deputies and participating in political elections.

The unity of Italy being an accomplished fact with the taking of Rome in 1870, the ranks of the Left were gradually increased by all the malcontents that the new regime had created because of the superfluous concentration of bureaucracy, and on account of the heavy bur¬ den of taxation; so that in 1876 they were able to obtain a majority in the Chamber of Depu¬ ties and get control of the government. But the superfluous outside elements which had crept into the party ; the inherent lack of disci¬ pline of the ancient revolutionary elements which yet lingered in their composition ; and, above all, the lack of a definite program, which, after 1860, should distinguish the Left from the Right, caused disorganization and disorder to enter the ranks of both the old parties. In con¬ sequence of this Depretis, who, with a few in¬ terruptions, was Prime Minister from 1876 to 1887, governed with the support of a majority composed of elements of the Left and of the Right. A small group of (

groups of the Constitutional Left who adhered to the other parliamentary leaders, among whom was Crispi ; and, lastly, the Extreme Left, at that time very numerous and very te¬ naciously attached to the revolutionary and Mazzini traditions. The situation was not nota¬ bly modified when, in 1887, Crispi came into power; nor under the successive ministries pre¬ sided over by Rudini, Giolitti, Zanardelli and other parliamentary leaders. From that day to this, the only new events of importance which occurred in the composition of the representa¬ tive parties in the Italian Chamber of Deputies, were the disappearance of the little group of Hntransigeants® of the Right wing on the one hand, and the entrance and establishment of the Socialist party, and of another of more re¬ cent date, composed of a small number of dep¬ uties, calling itself the Catholic or Clerical party.

It has already been mentioned that, until the end of the pontificate of Leo XIII the Clericals, as those are called in Italy in whom the reli¬ gious sentiment prevails, and who obey the in¬ junctions of the ecclesiastical authority, took no part in the political elections. But now the con¬ stitutional candidates are frequently supported by Clericals in opposition to the Socialist can¬ didates, and sometimes even to the Republicans. It, therefore, not infrequently happens that when two candidates are in the field — one constitutional and the other clerical — they vote for whichever candidate shows himself best disposed and less hostile toward the inter¬ ests of the Church. In five or six districts the success of those candidates

was assured who openly declared themselves the defenders of those interests. Although united in this one platform they yet act independently and all vote as they please on all questions that do not pertain to principles of religion, and hence do not form the nucleus of a true political party.

At present more than four-fifths of the Ital¬ ian deputies (about 420), openly adhere to the present monarchical institution under the House of Savoy. They are divided into the Right, the Constitutional Centre and the Constitutional Left; but these names have at the present time a signification which is largely topographical, i.e., having a relation to the position that each deputy occupies in the Chamber, or, at most, they serve to distinguish the adherents of the different parliamentary leaders. Thus, the fol¬ lowers of Rudini prefer to remain on the Right, those of Sonnino are all found in the Centre, while on the Left are seated the most faithful constituents of Giolitti and all of those who were previously attached to the fortunes of Zanardelli.

With many exceptions, in the Constitutional Left may be found the greatest sympathy for a popular program, and above ail, among the deputies who are the Extreme Left. There un¬ doubtedly belong to the Constitutional Left many deputies who have positive anti-clerical sympathies, and many others who show no marked political preference and are always ready to vote in favor of any government.

The deputies of the Extreme Left, who num¬ ber about 90 and are subdivided into Radicals, Republicans and Socialists, have more pro¬ nounced political sympathies. The first group (Radicals) is the most numerous; the second (Republicans) the smallest. Nevertheless,

am˚ng the Rachca]S are some old Republicans, \no with the lapse of time have come to admit that even a constitutional government may be¬ come a legitimate government, that temporarily, at least, it may be of benefit to the country, the more stalwart Republicans, on the other hand, remain strictly faithful to the old plat- form of Mazzini, but with some of them this fidelity is rather the result of attachment to their own political past than of a lasting convic- tion and choice. The Socialists, finally, are sub¬ divided into reformers and revolutionaries; but these two factions are determined rather by personal rivalry between the leaders of the party than by substantial differences in their platform. Although both adhere to the hu¬ manist doctrine, for the time being they con¬ fine themselves to supporting laws and provi¬ sions that favor governmental or municipal ownership of

public institutions, and strengthen the hand of the labor unions.

The parliamentary system in Italy being as it is, the Ministry should naturally control the majority of the Chamber. This majority is or¬ dinarily composed of deputies from the Right, the Constitutional Centre and the Constitu¬ tional Left, with this distinction — that some¬ times the one wing predominates, sometimes the other. It is not infrequent that the Radi¬ cals, and even the Republicans and the Social¬ ists, vote for a time for a certain Minister on the promise of a certain law or provision in which they are interested. There is always, however, in the Chamber, a more or less numer¬ ous party of the ˆopposition formed by two groups of constitutional deputies whose leaders do not form a part of the Ministry, and these are joined by some independent deputies and those who, for personal reasons, are dissatisfied with the government. In the long run the opposition can also always count on the support of the Extreme Left, or at least of the greater portion of it.

This almost anarchical condition of Italian political parties may well astonish those who are accustomed to the more severe discipline of parties in the United States of America, in Eng¬ land, and even in Belgium. But we must take into consideration that in Italy political parties exist rather in the Chamber of Deputies than in the whole country. In fact, outside of the Chamber, only the Socialists and the Clericals have trply organized parties. The truth is that the great majority of Italian candidates count primarily on personal friendship, loyalty and in¬ fluence for their success rather than on the sup¬ port of a political party; and although there are a certain number of persons, particularly in large cities, who vote according to their politi¬ cal convictions, there are more who cast their vote purely and simply for the man they know and respect, or from whom they hope to gain some advantage.

The consequence of this is that one finds some districts in which there are no Republican electors, electing a Republican deputy, and a district, which yesterday elected a man of the Right Wing, the next day — without any change having taken place in the political opinions of the electors — electing a man of the Left Wing, and even a Radical. Primarily, therefore, in the majority of cases it is the deputy who gives the political trend to the district, not the dis¬ trict that influences the deputy. The deputies,

therefore, entering the Chamber not through the means of a party, but almost free from all Party obligations, usually place themselves at the disposal of the parliamentary leader who inspires them with the most confidence, or the gi eatest sympathy. And if the new deputy should hold himself aloof and independent he seldom does it from noble and worthy motives, but more frequently in order to be better able to give his vote to

the whole Ministry in ex¬ change for some local advantage for his own district, or for some personal gain for himself or his friends who have been most active in the elections.

Consult Lowell, A. L., (The Governments or Prance, Italy, and Germany) (Cambridge, Mass. 1914) ; Colajanni, N., (I partiti politici in Italia > (Rome 1912).

Gaetano MosCa,

Lrofessor of Constitutional Law, Royal Uni¬ versity of Turin.

14. ITALIAN SOCIALISM. It has often been remarked that Italy during the 19th cen¬ tury, and especially during the period immedi¬ ately preceding the establishment of United Italy, contributed very little to the universal progress of science, letters and arts. The in¬ tellectual activity of the nation was engrossed in the long struggle for national independence. It was the overwhelming absorption in this same conflict which so long retarded the prog¬ ress of Socialism in Italy. Sixty years ago Italy had produced no Marx, no Engel, no Las- salle, no De Poepe, no Fourrier, no Owen, no Henry George.

After the accomplishment of Italian inde¬ pendence and union Milan became one of the great commercial cities and Genoa one of the most flourishing seaports in Europe; then the nation witnessed the first efforts of Italian workmen and peasants to secure something more than the expulsion of the oppressive for¬ eigner from her soil, and the unification of their country. In other countries the Internationale exhausted its power in the contentions between Bakounine and Marx, le petit Thiers crushed the Paris Commune before the Italian working classes began their struggle against capitalism. Of ˆsocialism — so called — Italians had pre¬ viously heard only the denunciations and theis- tic sermons of Giuseppe Mazzini, which, how¬ ever humanitarian, are religious and individual¬ istic and not socialistic.*

Moreover the Italian fight for freedom re¬ tarded the growth of Italian Socialism in a way which has passed almost unobserved and which in the absence of documentary proof is vigor¬ ously denied by Italian Conservatives. It is, however, true that the enthusiasm which prompted Italians to conspiracy and rebellion and high martial valor on fields of battle, to se¬ cure the liberty and unity of their country, was not inspired solely by patriotism. Many Ital¬ ians anticipated that with union and independ¬ ence certain great and radical reforms would be obtained. For some of these warriors the patriotic strife implied socialistic ideals; it cer¬ tainly admitted of a socialistic mirage. Evi¬ dence of this is to be found in

many popular sayings and songs current during the early half of the century, and in expressions scattered through many printed and written documents.

From the very beginning the National party

was divided into a right and a left faction. The satirical Tuscan poet and patriot, Giuseppe Giusti, in his letters often qualifies as commun¬ ists, or adepts in communism, several of the men who afterward fought for Italy. The epi¬ thet becomes significant in view of the terror which Giusti and every other loyal Conserva- ture felt when he detected even a taint of un¬ conscious socialism in this pre-eminently patri¬ otic struggle.

Again ! After Giuseppe Garibaldi had glor¬ iously guided his army of a thousand heroes in the conquest of Sicily, and it was necessary for him to assume the statesman's part and, as Dit- tatore of Sicily, to establish a new and ade¬ quate government in the conquered land ; by the advice of Francesco Crispi and his other coun¬ cilors of experience and wisdom, Garibaldi, in an almost forgotten proclamation, offered to let the islanders divide among themselves the state domain, thus clearly indicating how largely these patriots were imbued with the ideals of socialism. As long as this patriotic enthusiasm continued, there remained a vague hope that economic reform would grow out of political re¬ form. Hence the political revolution checked socialism ; both by engrossing intellectual forces that might otherwise have prepared public opin¬ ion for socialistic ideas, and by promising to achieve that economic redemption of the work¬ ing classes, which in other countries socialism promised to accomplish.

But the echo of the last battle for liberty had scarce died away when many Italians real¬ ized that so far as the economic redemption, of the lower classes was concerned, the Italian revolution was eloquently described in Dante's line,

"Lunga promessa coll' attender corto."

(An abundant promise and a meagre fulfilment.)

Some of the very men who with lofty patriot¬ ism had fought for the political freedom of Italy, were among the first who perceived that these expectations had not been realized. They were men trained to plan and successfully ex¬ ecute a political revolution, and believed that the same violent means would be equally suc¬ cessful in the field of social

revolution. They believed that an emulator of Garibaldi, strong of will and of dauntless courage, could stand on the field of economic conflict, as he had stood on the martial field, and with equal facil¬ ity achieve not less wonderful victories. Such men were prepared to listen to Bakounine's propaganda of violence, but they were not ripe for a socialism which taught respect for exist¬ ing laws.

Everything pointed the same way. The prevalent sympathy was for France. Victor Emanuele wished Italy to join in the war against Prussia. Garibaldi and his volunteers were fighting in the ranks of the French armies, public opinion followed, fascinated, the tragedy of the Paris Commune. Moreover the taxes and customs duties, often on articles of neces¬ sity, pressed heavily, and a wind of rebellion blew from all quarters, against these imposts, against the men who devised them, and against the institutions for whose benefit they were levied. Poverty in the country districts was great. Italian government bonds were 40 per cent below par, the rate of exchange was 15 per cent against Italy, trade was depressed and in¬

dustry arrested. Unpopular taxes are a strong inciter to rebellion, and the recent examples of successful revolt suggested a means of speedy and practical relief for the impoverished na-

tl01In the year 1872 Rome was released from the temporal power of the Church ; that same year saw the completion of the patriotic era and the birth of avowed socialism. The inter¬ nationalist doctrine, as then professed by the Internationale, spread over all the land. In Bologna, in March 1872, and in Rimini in August of the same year, were held the first meetings of the Italian sections of the Inter¬ nationale. The second of these meetings pro¬ posed the international socialist congress that was held at Saint Imier in Switzerland, 15 Sept. 1872. At this same congress the deputies of five national federations — followers of Ba- kounine— repudiated the autoritario movement begun by Marx, which was the actual origin of Italian socialism.

This Internationalist movement — or militant socialism — though begun so late in Italy, spread rapidly. It soon numbered more than 50 federated sections, and possessed more than 20 periodicals. Soon there were Internationalist uprisings. The year 18/3 was one of great suffering both in the farming communities and in the cities; and in the first months of 18/4 strikes and tumults- arose in nine cities. In the single month of July there were commotions m 16 different places in Central Italy. In August there was a widespread Internationalist move¬ ment in Romagna, and it also lasted long. in Tuscany, and in Puglia there were uprisings in¬ stigated by the notorious Enrico Malatesta.

A pitiless struggle now began between the Italian police and the Internationalists. Indeed the police organization was the only real op¬ ponent, since juries were always willing to acquit. Yet, so powerful is the Italian police system — it was even more powerful then — that the new-born party endured terrible or¬ deals. Meetings were dispersed, associations forbidden, newspapers suppressed, the liberty of some individuals abridged, forbidding them to go to certain places or to meet certain persons or to be found out of doors after a certain hour. Ammonizione and domicilio coatio were very real political weapons 30 years ago. But public and private meetings were held, circulars and periodicals secretly printed, and the proletarian movement was not entirely suppressed until after the final insurrectionary rising at Bene- vento in South Italy marked the death of Inter¬ nationalism.

Lacking all intellectual preparation, the prod¬ uct of temporary economic conditions, the dream of disordered imaginations, unable, to perceive the true ideals and purposes of Italian socialism, and unable to devise . a practical way of obtaining them, these anarchists and pseudo¬ anarchist strivings failed. Yet in the same sense as the pathological temperament of an epileptic is in harmony with his convulsions, so were these convulsive movements of the Inter¬ nationale in harmony with actual conditions of Italy at that time. Indeed they were the only movements that could be in accordance with those unhealthy conditions.

In Lombardy the different ethnical charac¬ ter of the people and a better education sug-

ges eel that the amelioration of social conditions could best be obtained through lawful political agitation ; hence it presented collectivism, and not communism as its goal. These two char- actenstic features of what has been called the Milanese dogma, gave it the name of legali- tano or autoritorio. The leaders of this move¬ ment were Enrico Bignami and Osvaldo Lnocchi-V lanni, who wrote in the periodical La t'lebe, first published in Lodi and afterward in Milan Except in Lombardy, Italy did not sup¬ port this movement for legalized socialism. Its methods were too modern, too scientific, too conservative, to appeal to a people ignorant, exasperated and with little political experience. Better rebellion and anarchy than the slow political and social preparations counseled by the law-abiding collectivists of the Milanese group.

After the failure of the Internationalist out¬ breaks, disputes arose between them and the Legahtarians and many of the working classes abandoned Internationalism. The capitalistic party waged war indiscriminately against

Mi¬ lanese Legahtarians and Internationalists. The leaders of these opposing extremes of social¬ ism involved in one common persecution and exile, soon realized that although divided on matters of minor importance, they could agree on many fundamentals, and that their only chance of success was in a union against the common enemy: capitalism and reaction.

One of the first results of this reconciliation was the adherence to socialism of the former leader of Italian Internationalism, Andrea Costa, who, on leaving prison thus addressed his friends: <(Hitherto we Internationalists have been self-centered, engrossed by the logic of ideas and by the preparation of revolutionary plans, which we deemed immediately realizable and we have neglected the study of the eco¬ nomic and moral conditions of the people and their immediate and bitterly felt wants. We have accordingly disregarded many of the ac¬ tivities of life, we have not sufficiently mingled with the masses and when, with generous im¬ pulse, we have attempted to raise the banner of revolution we have been misunderstood and de¬ serted. . . . Internationalism has been here¬ tofore the representative principle of a tempo¬ rary historic moment in the life of our people, it cannot stand for the whole of this life. We do not mean to discard the name ˆInternational,® but we want it to become something more than a scarecrow, we want it to embrace all the socialist parties found in other countries .®

These authoritative words were the epilogue of the dead Internationalist socialism and the prologue of the new socialism ; and the year 1882 marks the dividing line between the old and the new. Now for the first time did the Italian working classes clearly perceive their objective and the means by which it could be achieved. This passing of Internationalism and the birth of the new Italian Socialism was neither accidental nor was it due to the propa¬ ganda of certain enlightened leaders. Rather was it the result of a betterment in political and economic conditions. The petty and antagonis¬ tic states, duchies and kingdoms subject to the influence pi foreign powers, had become Italy, free and independent. During the 10 years suc¬ ceeding 1871 the products of Italian mines, many principal industries (as silk and cotton)

nearly or quite doubled in the value of their output. And this progress, with some excep¬ tions, has continued. The political change and industrial progress as surely provided the en¬ vironment and opportunities for the new social¬ ism as the former political unrest and economic depression created Internationalism.

From the wreck of Internationalism arose two parties. One had its chief strength in luscany and Romagna, under the leadership of Andrea Costa,

who sought to persuade the people that the time for conspiracies was past and that they should claim their rights through legal agitations. The other, in central and southern Italy where industry was languish¬ es* rid agricultural laborers desperately poor, found support from a people who maintained their reputation for impulsiveness, and the senti¬ ment of rebellion which they had inherited from Internationalism. In northern Italy where there was industrial activity and comparative agricul- J.PIiosPe^y> ike stern Marxist socialism also divided into two distinct movements — the rigidly political party of the intellectual social¬ ists, and the so-called ((workingmen's partv,® which was socialistic in intention, but which in practice adopted co-operative methods.

These four different manners of interpret¬ ing the socialist doctrine differed rather in the practical methods they advocated than on mat¬ ters of fundamental importance. But all four being newly adopted were passionately sustained by their neophyte following. Then also all over Italy socialism aroused the opposition of those Democrats and Republicans that belonged to the great middle class; and as in some places socialists opposed and in other places made al¬ liances with these parties, a new cause of dis¬ sension arose. It is hardly possible to find a clew out of this tangled maze. History here turns gossip. It is incoherent and — petty. Of these four divisions the most insignificant was that which nearest resembled the defunct In¬ ternationalism. The party of legalitarian social¬ ism as taught by Andrea Costa, which was somewhat imbued with Internationalism, was more important. It was the Labor party (partito operario) which originated in the co¬ operative group, and the strictly Marxist party which at first comprised only a few intellectual men, . both parties originating in Milan, that combined to produce the present Socialist party. The Labor party was formed by actual working men — Lazzari, Croce, Sacco and others. Fierce struggles were waged and the first victories won, struggles and victories sometimes against those Republicans and Democrats who sought to compel the Labor party to accept their leadership and. protection.

In the beginning the Milan Socialists ac¬ cepted the leadership of the Laborites, and candidates of both parties were found on the same electoral tickets. But at the Congress of Mantau, 1885 — the date which records the most prosperous moment for the Labor party — it was resolved that they would thenceforth make no alliance with the Socialist or any other political party. Yet in fact at the next political meeting in Milan such agreements were made. At this time men like Felippo Turati, the Ital¬ ian Juares; Camillo Prampolini, the apostle of Reggio Emilia, Agnini and Berenini, joined the Socialist party, .and directed it toward a purely Marxist conception. A few electoral victories

confirmed the wisdom of this program and as the Labor party lost influence many of its best members passed into the Socialist party, which now sought to unite all interests in one com¬ pact organization.

In the next Congress held in Milan in 1891 the anarchists and the Mazzinians were routed by the Marxist socialists, who immediately be¬ gan to receive large accessions from all over Italy, and the election of 1892 added to the socialist victories. Encouraged also by the co¬ lossal growth of socialism in Germany the prop¬ agandists labored unweariedly, and harmony and strength came to the party; and in the memorable Congress in Genoa in 1892, after repelling all alliances with anarchists and co¬ operatives, the Socialists proclaimed the con¬ stitution of the Socialist Italian Labor party — a party which, though officially dating from 5 Aug. 1892, did not in fact originate in the blending of the Milanese Labor party — an en¬ lightened trade unionism — with the socialist movement in Milan, led by Turati, Gnocchi, Viani, Prampolini and others, and in central Italy led by Andrea Costa.

It is important to remember that in 1892 capitalism offered no organized opposition to socialism, although socialistic doctrines had been preached all over Italy for 20 years. A weak bourgeoisie and a strong proletariat, ardent in its new faith, were the best guaran¬ tees for the success of socialism. For two years this state of affairs continued, and Italy wit¬ nessed the novel spectacle of a vast, political association held together by discipline, free from the bonds of secrecy or conspiracy. Out of the ranks of the bourgeoisie came many brave men who raised the banner of revolt against existing conditions. Cesare Lombroso, the great pathologist, Enrico Ferri, the eloquent orator and famous jurisconsult of the new pos¬ itivist school of criminology, joined the social¬ ists. They were followed by philosophers, poets, scientists and economists, in large num¬ bers.

The Congress held at Reggffi Emilia m 1893 was an apotheosis of the socialism that had vindicated the rights of the agricultural classes of North Italy, but — it was also the last action of the Socialist party which was not opposed by the bourgeoisie. Before the end of this year there were famine riots in Sicily, echoed also in Continental Italy. They were the inevitable consequences of the hunger of the people and the oppressive taxes. But the rioters were led by Socialists, and often socialist cries were used, hence repression took the form of war on socialism; the Statuto (Constitution) was violated and administrative deportations insti¬ tuted and freely applied to political agitators, liberty of the press was abolished, and by means of seizure of documents and lists of members and imprisonments, the party was for the time suppressed. But because this extreme violence

was instigated by the unpopular bour¬ geoisie and carried out by a ministry already discredited by the bank scandals, the Socialist party was not vitally injured. In January 1895, at a secret congress held in Parma, the party altered its constitution and assumed the name ˆItalian Socialist Party, » and .in the ensuing general election polled 80,000 votes, secured ad¬ ditional parliamentary seats and compelled the

passing of amnesty laws which brought security and tranquillity. At the next congress, held in Florence, the headquarters were transferred from Milan to Rome, the seat of government and the place most suitable for political propa¬ ganda, and it was also decided to publish a daily paper, L'Avanti, which could carry on the propaganda in a field not reached by the 40 or 50 existing weekly Socialist papers. In the gen¬ eral election of 1897 the Socialist vote increased to 130,000. In the congress of this year held at Bologna the intransigeant policy was defi¬ nitely rejected and it was agreed . to . make alliances with other democratic parties in op¬ position to the common enemy — the Conserva¬ tives. The party seemed on the highroad to prosperity. . '

Never has the desire either for personal, civil or religious liberty sufficed to rouse Ital¬ ians to rebellion. Liberty has either come peacefully or else as the result of conflicts for other ideals, such as the conflict for Italian unity and independence of foreign control. Public opinion naturally favors liberty — it is there and it is convenient. But because of a racial scepticism and excess of philosophic resignation, when this liberty is lost the sacri¬ fice is endured. Italians are easilv aroused, they no less easily forget, or desire to be left in repose. Hence the socialistic party, which in public meetings lifted its voice in strident propaganda and noisy warfare, was a disturber of the peace, a mischief-maker to the bour¬ geoisie, who welcomed an opportunity to de¬ stroy it. This opportunity came in 1898. For several months previously the Socialists had been speaking against the customs duty on for¬ eign wheat and flour, which enabled the incom¬ petent farmers of south and central Italy to pay starvation wages to the oppressed peasants, but which intolerably raised the cost of bread to the poorly paid industrial workers in the cities. This 'price of bread was still further increased in 1898 by the previous year's scanty harvest. Street tumults ensued which might have been avoided by the temporary reduction of the duty on foreign wheat. Martial law was almost everywhere proclaimed, and penal servitude was the frequent sentence pronounced by military judges. Members of Parliament and journalists were condemned to prison and exile, archives of Socialist associations were destroyed and the funds of co-operative socie¬ ties seized. The blow to socialism seemed mortal.

The government soon realized that this se¬ verity was not approved by public opinion and martial law was revoked; administrative de¬ portation

for political offenses ceased and am¬ nesty was granted. But though the govern¬ ment, repenting its leniency, asked from Parlia¬ ment laws restricting the right of association and liberty of the press, the Socialist leaders on leaving prison and returning from exile re¬ newed their agitation and inaugurated the first obstructive tactics ever attempted in an Italian Parliament, compelling a dissolution. This parliamentary revolution marks a historic event.

In the general election of 1900 the Minis¬ terial candidates received only 611,425 votes. Of the different opposition parties, the Mon¬ archists received 303,891, Radicals 110,208, Re¬ publicans 119,645 and Socialists 251,841 votes.

The Socialist vote had doubled in less than three years and the Socialist members of Par¬ liament had increased to 30. As soon as Parlia¬ ment met the Conservative Ministry fell and was succeeded by the Zanardelli-Giolitti coali¬ tion cabinet under which the Socialist party had such triumph, such influence and such dis¬ sension 1 ogether with the Republicans and ■Radicals they formed the Estrema Sinistra whose support was indispensable to the Minis¬ try- But though when in the minority these components of the Estrema Sinistra showed ability and power in harassing the government ; when, as a part of the majority supporting the new Ministry they attempted to pass from de- structive criticism to constructive legislation they showed pitiful inaptitude and quickly de¬ veloped dissensions. Thus- originated that crisis under which the Socialist party is still laboring.

ihe intense individualism and impatience of restiamt inherent in the Italian nature must ahvays be reckoned with in Italian political parties No sooner is an Italian Cabinet iormed, no sooner does an Italian political party become powerful, than distrust and jealousy enter in, and the process of disintegration be- ?nni' though the strike in the mine districts in iyui was largely successful and greatly in- ˆreaj w5§>es and though the railway employees in 1902, by threatening strike, obtained their demands, and though every dictate of prudence suggested that the Socialist party should unite m support of the Zanardelli-Giollitti Cabinet, they quarreled among themselves. Enrico Ferri be- came the leader of the Socialist malcontents, ihe dissenting faction refused financial sup¬ port to the Socialist newspaper Avanti because it supported the Ministry, and the director of that paper, Leonida Bissolati, resigned. Enrico Fern immediately took his place. This divi¬ sion within the party was really a personal rivalry between leaders.*

The moderate Social- 1 sts were defeated in the Bologna Congress of 1904. In vain did they point out that the bourgeoisie had recovered from panic and could now fight their battles without government sup¬ port. In vain did the moderates urge that the party rest content with a program of gradual reform. But the revolutionaries would have none of this. Bloody conflicts with the police broke out in South Italy followed by a general strike all over the country, which soon degen¬ erated into deplorable excesses. As a conse¬ quence, at the next general election the Social¬ ists lost several parliamentary seats, and in the strike of railway employees in 1905, promoted by the revolutionary group, the strikers were entirely defeated.

In consequence of the agitation resulting in this defeat of the railway strikers, the more belligerent faction of the Socialist party adopted the latest conception of French socialism as presented by Sorel, known as ˆSyndicalism.® Such conception implies that subordinating the purely political agitation, the proletarian move¬ ment should become a vast association exclu¬ sively confined to workingmen and rejecting assistance from <(the classes.® Syndicalism ex¬ pects the working class to oppose actively both capitalism and all government favorable to cap¬ italism. This sentiment of Syndicalism became stronger because it was a protest within the tigainst the alliance of Enrico Ferri, and the Fernsts with the Sonnino Ministry which vol. 15 — 31

rose and fell in March and April 1906. The situation became intolerable and a National So¬ cialist Congress was called in September 1906 to discuss the situation. In this congress it was discovered that the Reformists and the new section of socialism, calling itself <(Integralists,® were equally averse to the revolutionary policy of the trade unionism advocated by the Syn- (hcalists. . The newspaper published in Rome by the Syndicalists (L'Azione) violently attacked the party organ (L' Avanti), while the Integral- lsts and Reformists in combination defeated the Syndicalist policy of trade-unionism. The flourishing condition of Italian industry and commerce undoubtedly hindered (before the pai ticipation of Italy in the European War) the spread of socialism and soothed the asperity between capital and labor.

-ˆtit this very amelioration of the condition ot the Italian working classes tends to enlarge the range of their necessities and accustoms them to a higher standard of living. This re¬ sults in the institution of co-operative associa¬ tions and leagues for mutual assistance. The Italian proletariat will never consent to a re¬ turn to former conditions of privation, but will insist on still greater material comfort and less labor and a larger share in the nation's wealth, the struggle to secure these things will prob¬ ably be led by the Socialist party, and in the coming conflict the opposing capitalism and conservatism will probably continue to be less compactly

organized and less capable of strenu¬ ous resistance than in England and Germany. See Italy — History from 1907 to 1919 for socialist opposition to war in years 1916-17, etc.

The Socialist party faced a severe crisis in ULZ. In that year the official party organiza- tmn opposed the war with Tripoli, but Bissolati and Podrecca, the editor of L'Asino, with two other representatives, openly favored the gov¬ ernmental policy. In consequence they were expelled from the party by its congress. In this crisis 16 deputies out of 38 joined the Re¬ el rmist party, which has since gained consider¬ ably in membership and parliamentary influence though it has not grown nearly as fast as the Socialist party.

, r . lc « mlbt jjchlj puncu ZAAAUUU

votes for its candidates, and elected 21 repre¬ sentatives. _ At the same election the Socialist party received 960,000 votes, and elected 59 representatives In 1913 this party had a mem¬ bership of 37,000. Of course the struggle be¬ tween the trade unionists and the Syndicalists in the labor movement had a great influence upon the Socialist party.

Since the first day of the World War the Socialist party has been practically unanimous in opposing participation in the war. As far as the war is concerned the industrial move¬ ment is in full accord with the political move- ment. The industrial movement is divided into two distinct groups. The one is the so-called Reformist group; the other, the Syndicalist or¬ ganizations. Each of these groups possesses its own central organization. The Confeder- azione Generale del Lavoro is the older fed¬ eration. It indorses the war-position of the Socialist party, while the Unione Syndicate con¬ demns all political action and sees in the general strike the chief weapon of the working-class. This organization is patterned after the French General Confederation of Labor.

In May 1916, in the Ministerial reorganiza¬ tion, the Reformist party succeeded in placing Bissolati and three other members in the Cabi¬ net, where they were the most ardent support¬ ers of Italian intervention.

The Socialist party has representation in nearly every municipal government. . In 1917 about 800 towns and cities had Socialist ad¬ ministrations. According to the reports of party officials in 1917, the membership had risen to 64,000 in good standing, besides at least 25,000 former members at the front, who also are regarded as members in good

standing. The strength of the Socialist party is at present by far greater than that of any single capitalist party. Ed.

Joseph Spencer Kennard,

Author of (Italian Romance Writers 2 etc.

15. THE ITALIAN ARMY. The Ital¬ ian army follows the political movement of the nation. As the various regions of Italy were united in a short space of time to Piedmont, so all the military forces of the other states of the Peninsula united themselves with the military legions of that little kingdom.

It was necessary, however, to combine in one organization all the various little armies with their diverse systems and laws, and we have an instance of this in the action of the illustrious General Fanti who adapted the system devised for French troops to the needs of Italy.

The basis of Fanti's system was compulsory military service, by which all citizens between 20 and"39 years of age were compelled to serve in the army — in the line for the first few years and later on in the militia.

Another characteristic of this regulation was that each regiment should be drafted not from one special region, but from various parts of Italy. In this manner the provinces of the kingdom would not feel that they were being matched one against the other, and the pro¬ vincial spirit would make way for a greater national spirit.

Fanti's system remained in force for many years, but it is now deemed advisable that each regiment should recruit its forces from the cit¬ izens who reside in the neighborhood of the army at the commencement of hostilities. The examples of the War of 1870 indicated the need of important changes in the military systems, and General Ricotti provided for these by modelling the army, as much as possible, on the Prussian system, reorganizing special de¬ partments of the army, requiring greater educa¬ tion in the officers, and facilitating mobilization and creating the bold Alpine regiments which are stationed on confines of the kingdom to defend its borders.

Subsequently, through the efforts of Gen¬ erals Mezzacapo, Bavel, Marselli, Milon, Co- senz, and above all, General Luigi Pelloux, the government saw that imitating foreign military systems would not suffice for the defense of a nation, but that every nation should have some military characteristics peculiar to itself. Hence arose the present military organization of Italy, by which the principal strength of the army is in the infantry, to which are subsidiary a great number of cannon and a well

disciplined cav¬ alry. An extensive reorganization of the Italian army was undertaken early in the 20th century.

At that time only seven Alpine regiments were stationed in the Alpine valleys, two regi¬ ments of grenadiers stationed in Rome, 94 regiments of infantry of the line scattered throughout the kingdom. There were 12 regi¬ ments of sharpshooters, a special infantry with purely Italian characteristics; their record is world-wide; in them live the traditions of the Crimean War, and it is to the credit of General Lamarmora that he gave to Italy such a noble contingent. And as for its sturdy soldiers, speeding like arrows, their plumes flying in the wind, they pass in review before the people, who feel that their hearts beat in union with

their strong defenders.

All the regiments of the line have, either at headquarters or as near as possible to where they are stationed, a base of supplies. Each regiment has 12 companies, with three bat¬ talions of four companies each.

The artillery, before the European War, was composed of 24 regiments, part of them in the fortresses. There was a regiment of mounted artillery and one of light artillery, beside the five that furnished shoemakers, miners, ma¬ chinists and bridge builders, the engineer corps, supplies, officers and soldiers for the telegraph and telephone service, for the setting free of carrier pigeons, for the management of bal¬ loons and for every special mechanical and chemical need required by a well-organized army. The regiments of cavalry have each special and distinctive stripes, the headgear (Colbacco) special to the light cavalry, the helmet for the lancers.

The instruction of the cavalry is with a view of making it an active factor in an unex¬ pected attack or in routing the enemy already scattered by the fire of the soldiery, and to detach the reconnoitering service to the van of the army.

The problem of horse supply for the cavalry is a difficult one for Italy, hence she is obliged to limit the number of her cavalry. The cavalry officers pre excellent horsemen. At the head of small bands of soldiers, they traverse the most rugged portions of the country, climbing its mountains and dismounting promptly ready to attack in places which seemed inaccessible.

It is owing especially to Inspector General Majnoni (who was Minister of War during the administration of the Honorable Sidney Sonino), that such a practical direction was given to the instruction of the Italian cavalry. All the professions are represented by the army; thus they have physicians,

veterinarians, commissaries, accountants, all vested with a certain military rank of varying degrees.

The legions of Royal Carabinieri are an important factor in the strength of the army. These, beside being the most perfect body of police known to Europe, rendered eminent service in the national defense and took an honorable part in all the wars of Italian inde¬ pendence.

Every army corps consists of two divisions of infantry, and has besides a proportionate number of cavalry, artillery and engineers, a commissariat department, a department of health, hygiene, munitions, etc.

These divisions consists of two brigades of infantry, provided with the departments that are strictly necessary for the troops. There are also some independent divisions of cavalry.

ITALY — THE NAVAL MARINE (16)

483

Each infantry brigade is commanded by a ments~genera an<ˆ 1S comPosed of two regi-

In time of peace the work of the levy, or annual conscription, is entrusted partly to the civil authorities (mayors and prefects), partly to military districts.

dhe military district is, in fact, the bond ot umon between the people and the armv. It holds the register of all enlisted men and soldiers on unlimited furlough. It notifies tnem by police proclamation of the call to arms subjects them to medical examination and dis- tn xvfS tˆiem in various corps.

I he annual contingent of recruits amounts (m time of peace) to about 500,000, from which must be deducted those that are disabled by physical ailments, by various objections and

*inn mo y ve*0Sns' and this leaves only about 100,000 enlisted men a year. The enforced*

military service, the time during which a citizen, in time ot peace, must serve in the army, varies trom a minimum of 10 to a maximum of 34 months, and taking into account the loss by sickness or other causes, we see that the aver¬ age strength of the Italian army in time of peace is 215,000 men.

• ˆ cause for exemption from military serv-

ice, other than a specific malady or reason for unfitness specified by the law, is the fact of a man being an only son, of having had brothers who have borne arms, of being the support of his own family or of his nearest relatives. Thus it is seen that the flower of the nation is called to defend the country, for such defense requires in the ranks a number of men of robust con¬ stitution and good morals.

There were authoritative estimates to the effect that, should war occur, the regular army could place more than half a million men in the field, in addition to 200,000 militia (milizia mobile), while the Territorial Militia and the Communal Militia defended certain portions of territory and maintained public order. With a view of making Italy a military nation and diminishing the burdens of the army, the Tiro a segno Nazionaie was instituted, so that young men could practice sharpshooting (firing at a mark), and other important warlike exercises.

. . The government contributed $120,000 to initiate this patriotic institution, which was so warmly advocated by Garibaldi, and which is destined to develop greatly in the future. As it is evident that every war in Italy will be carried on most bitterly in the northern regions the chains of the Alps, Ligurian, Apennines', and the Riviera of Genoa and Venetia were covered with fortifications, which have been extended from year to year.

The rifles of the infantry (1890-91 model), are of small calibre, with long, rapid discharge, and are one of the best weapons known. There are in use steel cannon of 75 millimeters cal¬ ibre; these cannon, which can be dismounted, are considered the best in the world, even su¬ perior to those in use in France. Generally speaking all the munitions of war are con¬ structed in the arsenals, laboratories and foun¬ dries of the state with military organization.

The officers are trained in appropriate mili¬ tary schools — the infantry and cavalry in that of Modena, the artillery and the engineers in the Military Academy of Turin, and in order to enter these instiutions one must pass a

special examination and have obtained a high school (Lyceum) certificate.

ihe complementary officers, i.e., those young men who serve only in time of war in subaltern capacities, are taken from the one-year volun¬ teers, or those recruits who belong to the pro¬ fessional class; and being devoted to serious studies are permitted to serve 12 months only, in time of peace.

The cavalry, before taking service in a regi¬ ment, are obliged to take up a special course in the Pinerolo School; the artillery and engineers £!Jst

,pU5S£e their studies in ‘ the Technical School at Turin. There is, besides, at Parma, a school vyhere the infantry officers perfect themselves in the study of their profession

As it was extremely difficult to diffuse mili¬ tary instruction in the art of command, there was established in Turin the “School of War» which has a large attendance, as its students have special advantages for the pursuit of an army career, and many even aspire to a posi¬ tion in the Etat-Major.

The Talian army before the events of 1911- 12 and 1914-18 had not tried its strength in a great European war, for in 1866 it had only initiated its present organization, in 1870 only a small poition of it undertook the occupation of Rome, and in the colonial campaigns its strength was not proved as a whole, but it was represented by a small portion of the army hastily mobilized.

But if on these particular occasions it had no way ot putting all its machinery to the test that did not prevent the special attribute of its officers — bravery — and the excellence of its soldiery from being recognized. In the unfortunate battle of Adua a few thousand soldiers knew how to resist an innumerable horde of Sciyans and Abyssinians, and the acts of valor they performed excited the admiration °f Lurope, and the death of so many heroes, a loselli, a Galliano, an Arimondi and a Da- hormida, gave Italy the right to raise her head proudly on the field of defeat.

i iT,hf Pe°Ple are Pr°ud of their army, for they behold it ever ready to march into danger, ever ready to come to their assistance; in the’ cholera year in Naples; in the serious inunda¬ tions of the Veneto; in the earthquake of Liguria and Calabria ; in the disaster of the volcanic eruptions, always and ever the Italian soldiery fraternized with the people and en¬ deavored to the best of its ability to aid them in their, misfortunes, thus demonstrating that not alone in war may an army filled with noble sentiments be of benefit to its country.

Immediately after the war with Turkey the active army’s strength was 306,300 men (peace establishment). The war in Kurope, 1914—18, tested the flexibility of its organization,’ and the extraordinary result was that in three years, increasing tenfold, it became formidable even in the modern sense; for in 1916 the war effective of the Italian army was more than

3,150,000.

[Gen.] Fortunato Marazzi, Member of Parliament, Formerly Secretary of State for War.

16. THE NAVAL MARINE. The con¬ firmation of the Italian unity as an

accom¬ plished fact is coincident with the feverish anx¬ iety that manifested itself in all the European countries in the great transformation that

occurred in the marine service through the change from sailing vessels to steamships. At that time there was going on in Italy a com¬ plete reconstruction and reorganization, not only of the material, but also in the personnel — especially of the officers.

Officials.— In 1859-60 there existed in Italy only the Sardinian and Neapolitan marine, for the other states of Italy had no marine. The great diversity in the general management of these two navies, the difference in ability and culture in the upper officers — who were con¬ spicuously superior in the Sardinian navy — caused a decided lack of that harmony which is one of the essential factors in union. It was deemed necessary to combine the two naval schools of Genoa and Naples; and Leghorn was selected, in a region that might be called neutral, as the site of the new Naval Academy. The high¬ est results were obtained in every respect in this institute, for thanks to a critical and careful selection of students, it produces to-day officers who will bear comparison with those of any navy in the world.

Equipment. — Until a few years ago Italy possessed a flourishing merchant marine of sailing vessels, from which were taken a num¬ ber of the best officers for the naval service. The excellent seamanship of the Ligurian sailors was so well known that they were sought by foreign navies. But after the change from sail to steam, and the consequent diminution of sailing vessels, the large number of sailors on all the Italian coasts, and especially on that of Liguria, gradually diminished.

The great dockyards for construction, steel works and industrial establishments of all kinds arose in the course of a few years, as if by enchantment, on the two sea coasts of Genoa, and they have caused a fruitful and vigorous awakening of the energies and eco¬ nomic resources of the country. But they have absorbed for the most part the better elements, which, according to ancient tradition, were due to the marine life.

At the present day, the supply of seamen is not equal to the demand, and the state supplies the deficiency by voluntary enlistment and levy. The personnel thus enlisted consists mainly of the special branches of the service

and partic¬ ularly gunners and torpedo men. _

The Italian sailors are not given by nature or custom to the indulgence in wine and liquors, and they have the well-deserved reputation of being well disciplined, sturdy and of being able to endure an exceptional amount of fatigue. The descendants of the old Greeks, who colon¬ ized the coasts of Calabria and of Sicily, are to-day the best element in the manning of the Italian navy.

The inhabitants of the coast of Calabria and Sicily have been fishermen from their in¬ fancy. Accustomed to all kinds of fatigue and to every sort of weather, sober as anchorites, they pass their lives with an oar in their hands, thus tempering the muscles of their arms and chest, as the steel is tempered in the fire. And it is this valuable element which accounts for the brilliant victories constantly gained by the Italian seamen in the international regattas over a long course, as in the regatta at Shanghai in 1905 between a vessel of the Italian navy, Mar¬ co Polo, and one of the strongest vessels of the American navy.

Unfortunately, owing to the demands on the naval exchequer, the pay of the men is wretch¬ edly small, and for that reason very few re¬ main in the service after their obligatory term expires. This is a very serious inconvenience, especially where gunners and torpedo personnel are concerned, for they require a long and ex¬ pensive course of instruction. Consequently, recent years have seen the beginning of a move¬ ment to improve the condition of subordinate officers and the specialized personnel, to induce them to continue in the service. Special at¬ tention has been given to the instruction and

selection of gunners. # ‘

Armament. — At the time of making the change from sailing vessels to steamships, the industrial production of Italy was so limited that she was obliged to have recourse to foreign industry, and to France in particular, both for the building of ships and for the manufacture of armor. But a few years of active work were sufficient for the shipwrights to transform themselves into the best kind of iron workers and the government arsenals obviated the need of recourse to foreign manufacture, and they were able to build and equip through their own efforts the present day armored men-of:war. Flourishing private dockyards were established to compete with the government manufacture and Italy has been able to sell to foreign coun¬ tries a considerable number of armored vessels, and to take orders for others.

Steel Works. — Government production is for obvious reasons more costly

than private production, and in order to expedite Italian emancipation from foreign industries, also in armored vessels, the Italian government made provisions favoring the establishment and de¬ velopment of the large steel plant in Terni, which attained such a condition of efficiency as to produce on a large scale the highest grade of armor. Unfortunately, this private concern sought to raise its prices to the highest mark. This determined the government to give its orders for armorplate to foreign shipbuilders, and to establish government steel works to check private avarice.

Present Conditions of the Italian Navy.

— About 35 years ago the Italian navy held the third rank as a naval power among the principal nations of the world, but heavy finan¬ cial responsibilities had diminished the ex¬ chequer considerably just at a time when the other continental nations were awakening to the necessity of increasing their maritime power and directing all their efforts to the develop¬ ment of the navy. And thus it happened that in the course of a few years the Italian navy retrograded to the seventh rank. But the mar¬ velous progress in industrial commercial ac¬ tivity gave hope that before long there would be an improvement in this respect and before the European War she had risen to sixth place, superseding Austria-Hungary.

The period of economy in the War Depart¬ ment added to a policy of retrenchment on the part of the government have not failed to bear fruit, for the national budget shows a period of increased prosperity and the naval estimates for the fiscal year ending 30 June 1916 were, in amount, $54,481,415. It is true nevertheless that with this annual expenditure Italy might hope for a greater condition of efficiency in the navy than exists at present ; but the dis-

proportion which exists in Italy between ex¬ penditure and naval force and from which Austria and other states do not suffer is partly owing to the enormous number of government arsenals existing in Italy, the products of which are very costly, and which for territorial rea¬ sons it has been impossible hitherto to close.

The Italian navy in 1916 consisted of the following vessels (completed at the end of that year or at an earlier period) : six dreadnoughts, seven predreadnpughts, eight armored cruisers, 16 protected cruisers, 10 torpedo gunboats, etc., 48 destroyers, 71 torpedo boats and 19 sub¬ marines. Rest

assured, Italy will not spare attention and sacrifices in order to attain a naval efficiency, which shall be equal to the exigencies and the just political and commer¬ cial aspirations of the nation.

Consult Tamaro, A., (L'Adriatico — golfo d' Italia) (Milan 1915).

[Count] Candiani, Admiral of the Royal Italian Navy.

17. RELIGION IN ITALY. To repre¬ sent the present state and condition of religious life in Italy is a difficult matter on account of historical and ethnological considerations, and those who have tried to explain this religious life have given expression to the most varied and opposite opinions on the subject. There are some who say that in Italy there is not now and never has been a true religious spirit, but on the contrary a constant and universal indifference; that the official religion and the rites of the Roman Catholic Church are nothing but a travesty of pagan ceremonies ; that every¬ thing in worship is external and superficial and is a reflection of the sentiment of classic art, and of the political traditions of the Latin races. They say that the Church is a Christian embodiment of the Roman Empire, and of that instinct of government and of domination which Virgil immortalized in a memorable verse.

On the other hand, some maintain that there has always been a current of mystical inspira¬ tion through the ages of Italian history, to¬ gether with the official religion; that evolution¬ ary Catholicism has in Italy as large a follow¬ ing as elsewhere. This is evidenced by the in¬ terest aroused by the condemnation of Loisy, Bonomelli and Fogazzaro ; and that Christian Democracy, notwithstanding its recent condem¬ nation by the Pope, still retains the same vitality as was shown during the pontificate of Leo XIII.

The famous formula of Cavour seems to necessitate the absolute divorce of Church and State; and the indifference of the State to all that concerns the religious conscience of the Italian people is undoubted.

In France the rupture of the concordat and the subsequent anti-religious proceedings of the government threatened to lead to an open con¬ flict between the Church, jealous of her pre¬ rogative, and a government which was not only secular but even hostile to religion. In Italy, on the other hand, the secular sentiment of the government is indifference to all that concerns religion. Religious neutrality has been con¬ verted into religious annihilation.

This attitude of careless indifference induces political weakness, and is the cause of serious difficulties for the government, as well as for the Italian people.

The problem of divorce is one of many questions in regard to which the instability of our ecclesiastical polity is a source of danger to the country. There are also serious difficul¬ ties in Italy's international relations, especially with the heads of Catholic governments. Not¬ withstanding the Law of Guaranty the rela¬ tions between Church and State still remain indefinite on many points. The responsibility of the ecclesiastical authorities for the care and protection of the works of art which every¬ where adorn the churches has never been de¬ fined by law ; religious instruction is imparted in the schools in some communities, while in others it is excluded. This confusion will re¬ sult in obliging the State to take charge of the primary schools, owing to the fact that the government never took a firm stand on this problem.

The danger to public morals and to the family life of the citizens is still greater, on account of the uncertain relationship between civil and ecclesiastical marriages; and although there was ,a discussion in the Senate a few years ago about the draft of a law advocating the precedence of civil marriages, matters re¬ mained as they were before, the Senate relying on the old maxim, ((Let sleeping dogs lie.® But in this case there can be no rest. As the clergy frequently perform the religious ceremony of marriage when there are previous obligations and liaisons, cases of civil concubi¬ nage are frequent, and there is no way of pre¬ venting eventual desertion. This deplorable state of affairs, equally lamented by both parties, can only be remedied by conquering the hostility to civil marriage; an unjustifiable hos¬ tility because in its religious aspect the sacra¬ ment with its solemn character would give the final sanction to a contract founded chiefly on personal interest.

For the Italians who have the artistic in¬ stinct and a taste for external display, cere¬ monials are living and substantial things, and not mere superficialities, as the Catholic Church knows well.

The difficulties created by this state of af¬ fairs is also felt by the Church itself. The Italian government has never shown by its ac¬ tions that it understands the benefit that modern Italy would derive from having the support of the inferior clergy, particularly the clergy of the rural parishes.

Against the inflexible hostility of the higher ranks of the priesthood the government would have found a powerful ally among the inferior clergy for the reason that they are closer to the people and could attract them to their side in a thousand ways, thus resolving in a simple and practical manner the problem of elementary instruction — at least in the rural districts. The country parish priests and the curates in small cities are in a painful position as regards the civil authority, and more than one (

As the separation of the two authorities may explain, if it does not justify the indifference of the Italian government to all questions pertain¬ ing to religious and ecclesiastical polity, so the heated political discord after the occupation of Rome, confounding politics with a question of faith, gave a seeming excuse to the irreligion

of many political men, and under the guise of a kind of patriotism condoned their frequent attacks on the interests of the Church, and at the same time constrained the great majority of Catholics, even to this day, to refrain from par¬ ticipation in political life, thus robbing parlia¬ mentary life of that rich interchange of ideas which would doubtless have restored its pres¬ tige which had sunk so low in the estimation of the public.

There was in truth a party widely diffused throughout Italy who sought to adjust the pain¬ ful breach; and at one time- — in 1887 — it ap¬ peared as if a reconciliation would take place through the action of a number of persons whose representative was Father Tosti, and who believed it possible to be good citizens as well as good Catholics, to love and serve their country and yet to be devoted to the Church. But although there was no doubt of the advan¬ tages that the Italian government would derive from the new order of things, especially as civil liberty and the unity of Italy had always been an intangible possession, it was just as manifest that the Vatican could never officially withdraw its solemn and repeated declarations. Never¬ theless experience has shown that a modus vi- vendi is not only possible, but that a silent re¬ nunciation has already taken place. It was so manifest that the fall of the temporal power had no evil effect on the spiritual power of the Church ; and the impossibility of a restitutio in integrum was so evident that the younger and more cultured clergy felt that there was a re¬ nunciation, and an implied understanding. The fact that the younger Catholic party, in accord with the encyclical of Leo XIII Rerum No- varum , had entered into economic and social action as the Christian-Democratic party , sig¬ nifies that a larger field was open to their activity, and that the policy of revenge was abandoned.

It is true that Pius X hastened to restrain the impetuosity and curb the ardor of the young Christian Democracy; but while not revoking the il non expedit he himself agreed that the Italian Catholics should take part, wherever it seemed advisable to the local ecclesiastical authorities, in all political elections, and should sit in the Parliament at Rome. This attitude was a tacit recognition of Rome as the capital.

Thus it is that to-day the political question cannot excuse indifference on the part of sin¬ cere Italian patriots to the Church and to re¬ ligion,, as it could 36 years ago when the Roman question arose, and continued and violent pro¬ tests were heard from the Vatican. With the deprivation of its temporal power, the pontifi¬ cate, even in the eyes of Protestants and Free¬ thinkers, has gained in spiritual authority and acquired a certain dignity. For that reason to¬ day the conditions are more propitious for a religious revival than 10 years ago. The <(Bank Scandals,® the corruption in some branches of Italian public life, and occasional acts of violence, induced a feeling in the minds of many that Italy needed, if not religion, at least a moral regeneration. Many public men of the new generation believe that it is not incompatible with their patriotism to give a religious education to their sons, and feel that the worship of patriotism and of liberty alone cannot satisfy all the needs of the soul and of modern life.

Thus there originated a moral urtion, which was initiated in Rome in 1894 by a group of chosen men as a result of the lectures of Paul Dejardins and in imitation of the Societies of Ethical Culture started in America, Germany and other countries by Adler, and which are still active. Notwithstanding their noble ef¬ forts, the work of this Italian society was not a success, and the journal L'Ora presente (((The Present Hour®), which was the organ of this praiseworthy society, although well conceived and edited in a liberal and enlightened spirit, did not succeed in revivifying and renewing the public spirit of the country, and was short¬ lived.

On the other hand, every attempt to recon¬ cile the Catholic Church to the modern move¬ ment of ideas seemed to be futile. As regards its relations with international culture, whether in the line of thought, or of social life, it has that tendency to fortify itself behind the rigid inflexibility of dogma of authority and disci¬ pline at the least breadth of modern thought, more especially in the land where it has its historical seat and centre of power.

The Roman Catholic Church for long cen¬ turies marched with the times, and it had that marvelous power of adaptation which enabled it to survive the wreck of many empires, to hold its own amid varying events, and to issue victorious from the treachery of foes within and the persecution of enemies without its fold. In its apparent immobility, it progressed in doctrine and in action. The nil immutetur in ecclesia was rather, a rule of internal discipline than a precept of its active life.

It welcomed the culture of ancient Roman and the political traditions of the empire. With that good sense that characterizes the Latin race and which was its strength, the Catholic Church knew how to gain advantage from the uprising of the orders of mendicant friars in the 13th century. It made the

teachings of Aristotle the foundation of her philosophy, and in the humanitarian period welcomed Plato¬ nism. Under the name of culture it knew how to make use of the classical Renaissance through the fine arts, raising them to that magnificence exemplified in the Vatican chamber, and in the Sistine Chapel. This regeneration culminated in the Council of Trent.

It seemed as though its power of adaptation and assimilation had been exhausted in that effort and the secular evolutionary tradition lost. The Church from this time smothered every live movement of free' thought, although consenting to the work of literary and historical learning and — where they did not touch on dogma — the physical sciences. She would not affiliate with the three great movements of the 19th century — that of Italian national liberty, the socialistic movement and the modern scien¬ tific movement. After the vain hopes of 1848, the Church contrasted the Unification with the Freedom of Italy, and if Leo XIII in his en¬ cyclical Rerum Novarum appeared to arouse the Church to new social action, his succeeding en¬ cyclicals, and those of Pius X, discouraged the Christian Democracy, thus extinguishing all so¬ cialistic vitality in the younger clergy and the Catholic laity. It was the same with the sci¬ ences.

It was certainly a great benefit to the stu¬ dents of history when Leo XIII opened the

archives of the Vatican, and the Italian clergy have taken a notable place in the work of the scientific laboratories. But as the Holy See and the doctrine of papal infallibility closed the door on all independence of thought, it was natural that philosophy should also be officially proscribed by the Church, and thus by the act of Leo XIII the scholastic became the only true and sane philosopher. We hope that it will not be the same with biblical criticism, and that the commission selected by Leo XIII (in many respects liberal-minded men) will not risk the suppression of enlightened biblical study, of which the younger Vatican clergy have given praiseworthy examples.

However, the news that they found a dog¬ matic confirmation of the Mosaic o.rigin of the Pentateuch made one fear that even in this respect the Roman Catholic Church desires to close every channel to modern criticism, as was done in the condemnation of Loisy, in the re¬ traction imposed on Monsignor Hulst and other liheral, energetic Catholics. Just so in the re¬ cent condemnation of Bonomelli, of Fogazzaro, and his novel (The Saint, > and of Christian Democracy it is seen that the restrictive and

irreconcilable attitude still obtains in the bosom of Roman Catholicism toward every movement for freedom of thought.

Notwithstanding all these signs of rigid ad¬ herence to the central traditions of the Catho¬ lic Church, there is a noteworthy revival of religious life if not in the Church, at least all around it, in Italy. For this reason what Har- nack wrote some years ago is not exactly true to-day — that Italians were two extreme poles, Papistry and Atheism. He did not know that there would be many Italians who would con¬ sent that Italy should to-day be at the head of the movement of religious reform in the Catho¬ lic Church, as Harrier Reid affirmed in review¬ ing Fogazzaro's ideal works (Monthly Review, September 1906). It is not a question, if it ever was, in Italy, of a vague and unorganized aspiration. This is something more, and if the Will to Believe is not quite religious, it is never¬ theless, as Nietzsche declares, not a negation; and there are not wanting among us signs of the need of a renewal of faith, or at least of a greater regard for religious matters.

Little or nothing can be hoped for from the government in this respect, as long as the po¬ litical relations between it and the Church con¬ tinue to be strained, and as long as the tradi¬ tional policy lasts of abstention from all that concerns religion. The state could never be fa¬ vorable to religious instruction in the schools by the clergy, who might educate subjects as rebels, or traitors. On the other hand, the general lack of theological culture among a cultured laity, especially after the abolition of the theological faculty in the university, may lead to a consid¬ eration of a serious and effectual form of in¬ struction. The bourgeoisie , of which the gov¬ ernment is only a reflection, is saturated with Jacobinism; and Italian liberalism is not only legitimately anti-clerical, but also anti-religious. The government, liberal and non-religious as it is, and should be, has never appeared to be aware of the social and political value of the religious life among the people that it governs, and of the great truth taught by history — that religion is the strength and the beginning of all national life.

In addition to all this we must remember that what was called the Popular Party in Italy, and more especially the Radicals and the So¬ cialists, were at least the indirect supporters of each ministry, which, without them, could not have long remained in power, and that they brought into Italian public life the most deter¬ mined opposition not alone to the Church, but also to all religious matters ; and their words were assiduously propagated among the people as the words that would free them from that re¬ ligion which they looked upon as the traditional stronghold of authority and of the ruling classes. We notice, besides, that in science — – official science, so to speak — in Italy, positivist theories and tendencies still generally prevail, whilst in more cultivated countries they have lost ground, as might be seen

at the Congress of Free Thought held in Rome three years ago.

There is not much to be hoped for from the action of other religious bodies in Italy. In spite of the multiplication of evangelical cen¬ tres and literature, especially the Waldensian, they remain only isolated instances, and the entrance of Protestanism into Italy meets with the same opposition to-day it encountered in the time of Luther. The nature of the Italian race which demands in addition to the religious sentiment the satisfaction of its vivid imagina¬ tion and of the classic sense of beauty and of ceremonial form, is foreign to the inner spiritual individuality of the religious life peculiar to northern races ; it loves the association and social union of souls united in a common wor¬ ship and solemn and magnificent rites.

Nevertheless, whoever should deny that there is a breath of religious life in modern Italy would be greatly mistaken. The discussions raised by Fogazzaro's book, especially since his condemnation by the Church, were not owing to the literary value of the work, which is but slight, nor to his acknowledgment that ihe had not the courage to retract, but to the idea for¬ mulated in the book of a reform of the Church. It is true that the promulgation of these ideas are limited to a group of cultured persons, and it is not to be expected that a successful move for religious regeneration can extend to the people from that source. Then again, the sympathy for ˆFrancescanism,® whence arose the society of Saint Francis d'Assisi, founded by Sabatier, is more historical, erudite and ar¬ tistic than religious. The true religious move¬ ments always originate in the minds of the common people.

We must distinguish between the operative masses of the cities, agitated by the irreligious propaganda of socialism, and the rural popula¬ tion among whom the religious spirit is a living reality. In the southern part of the peninsula and in Sicily, particularly in the rural districts, religious belief often becomes dense superstition. An idolatry of saints and images, a belief in signs, omens and fetichism, rules the life of the people, sometimes accompanied by vicious cus¬ toms and personal violence. Centuries of pov¬ erty, illiteracy and oppression account for this in part ; but the Oriental character of these mixed races chiefly accounts for the frank sensualism, vivid imagination, intense emotionalism, im- pulsivity, semi-pagan worship of beauty and gorgeous ceremonial, and blind belief in Fate, which characterize their religion. Increasing education and better economic conditions will

gradually alter all this; and even now those who look beneath the surface will discover much ignorance and simple virtue sustained and com¬ forted by faith, by acts of abnegation and by admirable self-sacrifice. These are, of course, less en evidence than the more numerous social crimes and acts of violence ; but they are there, as a source of inspiration and a guiding influ¬ ence. In truth, this popular religious influence, especially enduring in the rural districts, is like a groundwork formed by the old current mys¬ ticisms which, in times past, created in Italy an original form of sentiment and of religious consciousness.

Italy gave to Christianity, Saint Benedict, and Saint James of Fiori, Francis of Assisi, and Catherine of Siena, Savonarola and Saint Ber¬ nardino, Philip Neri and Carlo Borromeo. And from religion was drawn the inspiration that prompted the works of those (

And one cannot better estimate the truly Italian character of this form of Christianity than by comparing the character of Saint Fran¬ cesco with that of Saint Domenico, Catherine of Siena or Ignatius Loyola.

It is noteworthy that in the saints, who were purely Italian, mystical virtue and religious inspiration were always combined with remark¬ able power of action in social matters. For that reason they were able to work in accord with the Church, which was able.and knew how to make use of their influence in moments of grave peril. The Roman pontificate by its won¬ derful faculty of adapting itself to the moral, social, artistic character of the Latin races, and more particularly the Italian people, was truly for long centuries an Italian institution. But those who to-day claim that among the peoples of mediaeval Europe the Italians were those whom Christianity found and left the most pagan of all, speak truly of the past, but at pres¬ ent and possibly in the future an international industrialism is preparing for a great modifica¬ tion of the historical heredity of the race. They are equally extreme in asserting that the papacy will always be a dictator to the consciences, as it certainly has been in the past ; a necessity in governing a people in whom the religious senti¬ ment was never associated with a deep knowl¬ edge and liberty of inspiration and of investiga¬ tion which gives such a diversified character to the Christianity of the northern races. It is well to remember that the papacy had in history a national and official character, and the Italian people, by a species of historical instinct, felt that the Latin and national spirit and traditions were really represented, not by the empire, but by the Church, and it was therefore by nature Guelph, and anti-imperial, that is anti-Germanic.

For this reason and under the new conditions it can no longer respond to the exigencies and requests of a people who have the deepest inner religion. I do not think it prudent to affirm, as others have done, that <(nothing

living or new,

can ever again arise through the spontaneity of the popular faith,® or that the Catholic Church is absolutely incapable of reviving in itself the religious spirit. Indifference characterizes the bourgeoisie who are not the truly representative Italian masses, who may yet prepare some sur¬ prises and an unexpected outbreak of faith in¬ spired by that need of religion that Mazzini, himself one of the most deeply religious spirits of our age, called <(the universal breath of hu¬ manity.® Should a man of the ideal greatness of a Francesco d'Assisi, or of a Savonarola, rise up not in the name of a dogma, but in virtue of active love and social charity toward his fel¬ low-creatures and speak words of freedom, the Italian mind might yet follow new phases of Christian idealism and civil greatness which would be incompatible with modern liberty.

The Italian Catholic is not lacking in reli¬ gious idealitv and spiritual potentiality. It is good to recall the romantic and spiritual Cathol¬ icism of Manzoni, Pellico, Rosmini, if only to convince ourselves that the Italian genius and the Christian spirit may unite to form a kind of intellectual greatness, and that the Christian conscience — in its Catholic ideal — may well be compatible with a certain spiritual liberty. It is doubtless true that among the Italian Catholics the performance of external acts such as are required by the Church too often goes hand in hand with intellectual incredulity or indifference, and sometimes as in the case of the rough, illit¬ erate peasants, especially in the south, also with crime. The type of Ser Ciappelletto is ever alive and real ; and of this union of outward religious observance with immorality of life, the history of the Renaissance gives us enough examples without quoting others.

There is no doubt that the profound senti¬ ment of individual responsibility and of sin pre¬ sented to the conscience by continual introspec¬ tion makes it less possible for those nations who have embraced Protestantism to understand this compromise with immorality. But we must bear in mind that that very imaginative faculty that prevails in the Italian mind may aid in keeping alive the sentiment of the divine, and in discovering it in every natural object (you re¬ call the Canticle of the Sun by Saint Francis) ; and that in a Catholic family of good life, the purity of religious and Christian sentiment is not inferior to that in a religious evangelical family, notwithstanding that the latter is pro¬ vided with more religious instruction. If in one there is more spiritual life, in the other there is a sense of authority and of discipline, and a co¬ efficient of moral greatness. However, if one considers the conflict between Church and State in France, that kind of <(Serrata® to which the French clergy lend themselves in obedience to the command of Rome, it shows a noble example of discipline and solidarity.

A phenomenon worthy of attention and a possible index of an internal Catholic regenera¬ tion in Italy is the importance that the laity are gaining in the life of the Church, as was pointed out to Germany in a notable book by Professor Ehrard. The Catholic activity of the last few years is owing greatly to this fact, and even to¬ day, although disapproved by the Pope, the <(Lega Democratica Nazionale® is declared pub¬ licly to be independent of the Church party, and thus assumes liberty of action in its economic and social program. The motive of all this

certainly was not a religious one, but it doubt¬ less will exercise a salutary reaction on the re¬ ligious life. Ihus the laity may be the means by which the Church may unite with modern culture. By its means the central authority of the Church may contribute indirectly to re¬ awaken the religious sentiment in Italy, as she is still in principle, if not in fact, the greatest spiritual power in the world. And in this the personal character and initiative of the Pontiff play an important part. . Now while Leo XIII was a diplomatic Pope and a politician, Pius X was an essentially religious Pope. His main ob¬ ject was to strengthen the internal discipline of the Church, or instaurare omnia in Christo, as he expressed himself. Meanwhile the history of the Church teaches us that popes of that temperament make many difficulties for the Church, for they look neither to the right nor the left but follow out their own idea. Leo XIII, a more liberal and more subtle spirit, who under¬ stood how to unite the Church with the states of Europe by lenti giri e con maestri passi, to quote Ariosto, would probably have succeeded in avoiding the Church's conflict with France. But from the simple and direct mind an im¬ pulse may be communicated to the religious conscience of Italy.

The condemnation of democratic Christianity although perhaps dangerous to Catholic inter¬ ests and to the social organization of the Ital¬ ian Catholic party is induced by fear that the younger Italian Catholic element in its social and political action may lose sight of the true religious scope of the Church.

We cannot eliminate religion from our life. And as the State cannot but acknowledge the great power of social and political action, it be¬ longs to the Church to contribute to the renewal of spiritual vitality, instead of yielding to worldly and political aims as she formerly did. The Catholic Church could also purify and simplify the ritual, bringing the liturgy closer to the intelligence of the people by the use of the vulgar tongue, limiting and rendering more intelligent the worship of saints, elevating Church music (as

did Pius X by restoring the Gregorian music), and instructing the clergy iri the culture of the arts. In this way the clergy and then the people would restore to the sacred images the dignity of religious art, in the place of all the paltry and unattractive ornaments that now disfigure them. External nature may lend its aid to the religious sentiment in a people born to art and beauty; and the crosses raised on the summits of the Alps and Apennines may prove to be symbols of this regenerated religious spirit.

But above all things the popular reading of the Bible and instruction in the New Testament should be diffused in order to destroy that in¬ difference which is the greatest enemy of re¬ ligion in Italy; and the people should be made to feel that the mediation of the priest cannot suffice for the needs of the soul, even of a Cath¬ olic ; and religious truth should be. presented in a manner to display more vividly than is now done the incompatibility of immoral life with a Christian conscience, and the inefficacy of re¬ ligious rites alone to reform a sinful life.

But it happens also that the Christian Church, and more particularly the Roman Catholic Church, recognizes two fundamental necessities of the modern spirit; one that re¬

*gards the system of faith, and the other that refers more especially to the Church organiza¬ tion as a social institution, which alone can bring it in touch with the life and culture of our day. 1 he doctrine of the immobility of dogma, not alone in substance, but also in formula, and still more the papal infallibility, preclude all possible doctrinal development in religion. *Now religious knowledge, like every other form of knowledge, should be open and capable of perfection in interpreting doctrines of faith; and the same concept of revelation for whoso¬ ever looks upon history as a divine education of humanity does not exclude, but rather im¬ plies, a gradual progress. Whatever lives must develop and perfect itself ; immutability means death ; and if the doctrinal system of the Church is a living organism it must also submit to the general law of evolution. And this is necessary for the social equilibrium. Religion is the cus¬ todian of tradition and is tenacious of what Schiller, in Wallenstein, calls ((the eternal yes¬ terday®; while science and history woo the fu¬ ture of humanity. But as both powers are necessary to the economy of life, so science on the one hand profits by the continuity of the work which unites the present and the future with the past. On the other hand religion must seek in the past the germ of the future, and the strength of regeneration.*

The Church must also learn that religious life should reflect in itself spiritual liberty, the essential form and condition of modern social life in all its manifestations. If it be true that where the spirit is, there is liberty, it is none the less true that where liberty exists there lives also the spirit. The

institutional and con¬ fessional character of religion is what chiefly repels modern thought. In Italian society in which the individual is no longer a member of an organization or institution, but acts freely with the consciousness of his rights, no religion is possible but one that is founded on intellec¬ tual liberty and individual initiative. The So¬ cialists also recognize religion as a personal and private matter, and that is certainly what it should be, a personal and intangible right. Again, if religion as a universal fact would have the value of a social function and for that reason be always represented by an in¬ stitution, the secret of its strength and the pivot on which it must turn in the future must ever be liberty of individual conscience. It is only by reconciling the cure of souls and the inherent spiritual need of the Italian race with the profound and necessary ex¬ actions of modern civilization, that the Ro¬ man Catholic Church can exercise a beneficial social power according to the forms permitted by civil liberty and by the progress of human culture.

Alessandro Chiappelli, Professor of Philosophy, Royal University of

Naples ; Commendatore della Corona d'ltalia;

Author of cThe Philosophy of Religion, } etc.

18. EDUCATION IN ITALY. In the

movement of modern culture, Italy has for many centuries maintained characteristics pe¬ culiar to herself. She forecasts and prophesies, but her work is restricted to the few and has not the power of assimilation to the masses; it is a nursery of budding genius, which brings forth few flowers or fruit in its garden. It is in Italy that new thought expands; that the

world of intellect is quickened. But this new thought which she has always produced she has never enjoyed. Humanism and the Renais¬ sance began at a distance from Italy with the reformation of the practical energies of life; in Italy, literary culture, the Belles Lettres, were the possession of the few. The philo¬ sophic trend of thought introduced by the Renaissance put an end in Italy to mediaeval mysticism, discovered new relations between nature and society, affirmed with Bruno the Infinity of Nature (LJinfinita natura), and with Campanella II senso come sapere. But else¬ where Spinoza, Schilling and Hegel explained the philosophy of immanence; and elsewhere Cartesio, Locke and Kant propounded the new theory of subjectivity. In Italy, Galileo intro¬ duced the new experimental philosophy; but it was elsewhere, with Bacon, that it became a system of*

logic and was generally diffused. It was in Italy, some years later, that Vico dis¬ covered many of the fundamental laws which govern society, but it was elsewhere that Vico's ideas were developed to their fullest extent. For many centuries the whole history of Italian culture is the history of initiative genius, but it is also the history of prodigious energies that were made of practical value elsewhere, and that exercised little or no influence in Italy.

What causes progress, what transforms and regenerates the education of a people comes from above, from its ideals; from its con¬ science, from its intellect and its culture; from the permeating of its social life and its activi¬ ties with the modern ideas.

But all this could not come to pass in Italy. Here, even as regards education, we have ideas and movements for regeneration without the power to carry them out and make them gen¬ eral. Italy heralded the better part of Human¬ ism, through Vittorino da Feltre; but the scholasticism inaugurated by him was of little benefit to the majority, and, besides, it was nar¬ rowed and spoiled by the meaningless verbal¬ ism of the Jesuits and the other monastic orders.

With the improved political conditions in Italy in the 18th century, and the new aspira¬ tions in regard to civil life, the educative idea gained bolder recognition among Italian men of letters and philosophers, particularly Genovesi and Filangieri; just as the effect of the French Revolution was felt at a distance, there were also signs in Italy of some new idea.

As Italy now found herself face to face with new educational needs, it was necessary that she should have the revolution of 1860, the true national rebirth.

The political revolution of 1860 required a great popular educational reform, in order to make the life of the new nation and the new government orderly, strong and secure. And such a reform was all the more urgently needed inasmuch as all knew that the revolution, which gave Italy its independence and made it a united kingdom, was the work of a cultured few; the effort and the aspiration of the best part of the bourgeoisie , who knew how to har¬ monize their ideas with those of the people.

The revolution of 1860 thus affected philo¬ sophic thought, the arts, literature ; but it did not affect the conscience of the common people. Nevertheless, the revolution represented one of

the greatest crises of history, inasmuch as it was to give new scope to the moral conscious¬ ness of Italy, and of the world, since it was not possible

to overturn the papacy and reconstruct the nation as a unity without touching the deep¬ est life of the Italian consciousness, There was, and is still going on, a moral conflict : the laic government, destined to develop on liberal lines, still finds itself in Italy in the midst of an ignorant and superstitious population. The formula of Cavour ((A free Church in a free State, w requires the education of the people on lines of moral, civil and political liberty in order to have concrete value or historical efficacy. There still exists a political conflict in the mind of the nation. For while the new state called the people to public life, they had been for centuries degraded and neglected, and were unprepared by special education to value either civil or political liberty. And this is the true reason for the apathy, the conflicts, the confusion and the anomalies of modern Italian life ; and this is the true cause of the lack of good administration in Italian parliamentary life. How is it possible that political convic¬ tions should be formed ; that there should be an interest in public affairs; purity and integrity in the exercise of electoral privileges, in a country where education is lacking in regard to the institutions by which that country is governed?*

There is also a serious economic conflict in the life of the nation. Italy is fertile; she abounds in natural wealth, and has, moreover, an abundance of the best kind of wealth : soundness of moral fibre and genius. But this does not suffice. For it is not possible, amid the economic competition of the civilized world, that an uncultivated, uneducated people should produce as much as those nations that are cul¬ tured and educated; or that their products should bear comparison with those of their competitors.

We do not wish it to be understood that Italy of to-day has done nothing for the edu¬ cation of the masses. She has done something, but ought to do a great deal more. It is true that Italy had to face an enormous task, com¬ plex and arduous. She had to found the nation and reconstruct every part of her administra¬ tion. She had to give an impulse to the puny economic life of the country. She had to sup¬ ply all the urgent needs of defense. She had to modernize an entire people ; to reorganize the culture of the higher and middle grade in¬ stitutes, and with all this to reconstruct the scholastic and educational life of the masses, without any precedents in liberal thought, or educational institutions. Thus the task of the United Kingdom was more and more arduous, and necessarily so on account of the prepon¬ derance in every society of the material over the moral life; on account of the traditional custom that the ruling classes should first pro¬ vide for their own welfare, instead of providing for the culture of the masses. For these and other reasons, the reform in the education of the masses could not be radical, complete, effective; and therefore it could not have the impetus, the coherence that it has elsewhere.

But if Italy has not done all that she should do, the example of other

nations who have al¬ ready achieved will incite the nation to do

better. But satisfactory progress is impossible unless the government take charge of the com¬ mon school education, instead of leaving it to communal and local authorities.

In the last statistics, out of every 100 re¬ cruits an average of 40 were found to be illiterate. Nevertheless there is progress and even to-day there is a rich field of primary moral instruction in the various regions. In the social order the importance acquired by higher culture and common school necessitates a better education of infants and younger chil¬ dren. . The deep moral crises which perturb the conscience of the masses make an early culti¬ vation of the heart indispensable; and demo¬ cratic life renders necessary the provision at an early age of an education of equality and of reciprocal respect. But these elementary institutions are not in proportion to the social needs.

And progress has also been made in the education of the people for professions. There is a form of professional instruction which makes part of popular education, for without it popular culture would not be effective, such as the learned professions, the arts or the trades necessary to all. Modern Italy in this respect has a legacy of institutions. There are indus¬ trial schools, art and trade schools, schools of applied art for industry and industrial design, professional and commercial schools for women, schools for viticulture and field courses in agri¬ culture. But although there is progress even here, these schools are not adequate to the needs of the people. The alumni of these schools number only about 60,000.

When we think of the great popular educa¬ tional revolution, which required the political revolution of 1860, we must acknowledge that what has already been done is insufficient for the needs of the masses. Italy as regards pop¬ ular pedagogy is a nation without harmony and equilibrium between its political institutions, its obligations and the education of the masses. The agitation by the best element in the king¬ dom and by the Democratic party in Parlia¬ ment shows that the nation feels the needs of a more intense and more comprehensive popular culture.

The progress of modern Italy in the so- called ˆmiddle schools® and in the universities and in the higher colleges has been very marked. After the beneficent law of Gianturco in the normal schools, these seminaries of the nation have acquired a great importance, both on ac¬ count of the culture

which they impart and also on account of the attention given to the preparation of future teachers. The lyceums and the technical institutes continue to improve their teaching force; the universities also grow from year to year in the number of students and improve in scholarship and science.

And here we must turn our attention to pedagogics.

Italian thought, philosophical, sociological and pedagogical, in the second half of the 18th century, owing to the political effects of the revolution, approximated more and more to the French thought. At the dawn of the cen¬ tury Realism (Sensismo) prevailed with Bo- relli, Soave, Gioia ; and even our pedagogical learning under Cuoco, Deffico, Capecelatro and others felt the influence of French thought.

As the century advanced new life came into

the thought and a new turn was given to peda¬ gogy, and, as in Germany, France and England, so in Italy we find pedagogics and philosophy allied.

It was Pasquale Galluppi who showed Europe that there existed in Italy a new move¬ ment in philosophic thought; but it was the Romagnosi,. the Rosmini and the Gioberti who made it evident to Italians through their re¬ searches in philosophy and pedagogy.

Romagnosi (1761-1835) represents the great¬ est and most extensive results in civic phi¬ losophy and civic education. In his work (DeH' indole e dei fattori dell' Incivilimento) he gives a sociologic significance to education, consider¬ ing it as one of the prime factors of civilization.

Romagnosi founded his pedagogical doc¬ trines on social psychology, and not on the individual psychology and all the minute and subjected analyses of the philosophers of his day.. According to Romagnosi the mind while yet in its individual formation passes through three, distinct phases: that of sensation, of imagination and of reason. Romagnosi saw all the importance of spontaneity in the scholar, but he also knew when the mind should be per¬ mitted to function unaided and when it should be directed by human art. He desired that edu¬ cational culture should unfold from the exterior domain of sensation to the inner man ; he con¬ sidered literary and scientific culture necessary in the scholastic field and thought that the state should take care of the education of the people. Romagnosi wrote argumentative treatises on education and was also interested in special pedagogic-scholastic questions. Cat- ta.nes followed in his footsteps, as did Ferrari, Giuseppe Sacchi and the famous, writers of Crepuscolo, who from 1849 to 1859 recon¬ structed the consciousness of Lombardy. Ro¬

magnosi represents the laic professor of the universities in the Italian cities in the first half of the 19th century.

Even Antonio Rosmini Serbati, 1797 to 1855, did not dissever philosophy from pedagogical thought, but his mind had other motives, other scopes, other directions. (I1 Nuovo saggio sull' origine dele idee) (1835) lays the foundation of his whole system of philosophy, a system which he developed more fully in successive works, in which there are frequently considera¬ tions relating to education or dissertations bear¬ ing directly on the subject. While Rosmini inculcated an idealistic philosophy, which should be modern, catholic and patriotic, he represented the Neo-Guelphian idea, — the idea which was to reorganize Italy with the papacy. He left incompleted his work on higher peda¬ gogy, (Del. principio. supremo della MetodicaP

Rosmini had an interpreter of his ideas in pedagogics, in Giambattista Antonio Rayneri.

The philosophy of Vincenzo Gioberti, 1801 to 1852, is this same idealistic philosophy — a catholic philosophy which seeks to regenerate Catholicism. . (I1 Primato morale e politico degli ItalianP (1843) and (I1 Gesuita Moderno) (1845) may be considered as veritable trea¬ tises on national pedagogy. But Gioberti in the course of politics and pedagogics, after the misfortunes of the war of 1848-49, recon¬ structed his political convictions and in (Rin- novamento civile d'Italia) (1851) he prophesied a new Italy and the end of Guelphism. He had an interpreter of many of his doctrines pertain-

ing to scholastics in Vito Fornari. Meanwhile, it is remarkable that Gioberti and Rosmini, two philosophers who wished to found a Catholic philosophy, were both opposed and condemned by the Church. They both combated Pan¬ theism and both were considered pantheistic by the Church. The Church condemned the patriot¬ ism of both. Among the great and liberal army of thinkers, of heroes and of martyrs of La Giovane Italia , Mazzini was a genius and a hero. He was not a philosopher in the sense of belonging to a school, or of being limited to a school of philosophy. He was the most exalted soul, mind and conscience, and most laborious patriot of Italy. Are not philosophy and pedagogy included in these words of his ? <(Witbout national education there exists morally no nation. The national conscience cannot be awakened except by its aid. Without national education, common to all citizens, the equality of civic duties and rights is an empty formula. The consciousness of duties ; the possibility of rights of

citizenship are left to chance or to the arbitrary choice of whoever may select the educator.®

La Giovane Italia educated the nation more than all the treatises on pedagogy of the day; more than all the professors. It co-operated in Italy's political reorganization more than all the Neo-Guelphian initiatives.

Italy had, nevertheless, treatises on peda¬ gogy in the years preceding the national recon¬ struction and these were written in order to hasten and prepare the way for this reconstruc¬ tion.

Niccolo Tommaseo, a man of liberal, uni¬ versal mind, in his work (Dell' Educazione; osservazioni, saggi pratici, published for the first time in 1826, had a wide conception of pedagogy. Tommaseo saw in education the root of all good. He felt the importance of the new methods and of schools for the masses.*

Among the treatises on general pedagogy, we may consider the (Pensieri sulla educa¬ zione, } by G. Capponi (1792-1875), published for the first time in 1845. In this treatise, small in bulk but full of ideas, Capponi considered under a new aspect the pedagogical reform, in¬ itiated by Rousseau's (Emile, > and determined what there was of truth and value in it. Cap¬ poni combated educational superficialism, and pointed out the multiplicity of causes that might make the work of education effective.

Raffaele Larrtbruschini had a veritable wor¬ ship for education, which he, like Capponi and Tommaseo, combined with a great love for Italy. His work as a pedagogist and educator was important, not alone in Tuscan}', but in other parts of Italy. His (Trattato dell' edu- cazione) was published in 1850, together with his complete works, subsequent to the recon¬ struction of Italy.

Other treatises on pedagogy were published by Vitale Rossi di Spello (1782-1851) in his (Manuale di scuola preparatory ; by Luigi Alessandro Parravicini (1800-80) . in his (Manuale di pedagogy ; by Domenico Berti (1820-97) in his book (Del metodo applicato all' insegnamento elementare, published in 1849. But the most systematic and best ar¬ ranged work on pedagogy is that of Giambat¬ tista Antonio Rayneri, (Primi principi di metodica,) published in 1850, Rayneri (1810—*

67) was one of those who took the most prominent position in the diffusion of peda¬ gogical culture among teachers, and it was not long before his books became almost a gospel for teachers.

Those who compared foreign treatises on pedagogy with our own found that our peda¬ gogical culture was too local and not suffi¬ ciently

universal ; that Italy needed a psycho¬ logical revival so as to be able to place the science of education on a broader foundation ; that there was a predominance of theological- metaphysical ideas ; that the lack of the spirit of political liberty restricted to a great extent the action of social ideas of any kind, and even of the pedagogical idea ; that the lack of scho¬ lastic life made pedagogy almost entirely for¬ malistic.

And in that first half of the 19th century, with its new pedagogical ideas, and its new scholastic movement, we must note the literary revival in the schools through the works, of Giannetto ; of Luigi Alessandro Parravicini ; the many books of Cesare Canu, by Antonio of the (Letture per fanciullP by Lambruschini ; of the (Letture graduate by Thouar; and of Fontana and by Vincenzo Troya. In all these new books for school reading there breathed a popular spirit, and it made one feel the need of harmonizing the school with the actual life of the people, and of adapting the life and teaching of the school to the life and thought of the masses.*

The Institutions of Ferrante Aporti (1792- 1857) brought into brotherhood men of va¬ rious beliefs, and were also patriotic institu¬ tions. If these institutions were not new they at least derived benefit from the new Italian sentiment ; and the asylums were co-operative in the nation's reconstruction, and made it evident to the masses that Italy would arise with new and higher ideals.

Pedagogical literature was also represented by women in Italy at this period by Caterina Franceschi Ferrucci (1803-67), whose chief work was entitled (L'educazione morale della donna italiana. Her work was highly 'praised, as it deserved to be. Giulia Molino-Colombini (1812-79) also wrote on pedagogy, and her work is entitled, (Sulla educazione della donna. **

But after 1860, when the greater part of Italy became unified, there arose a new life, the life of the nation; and with the new life of the nation, a new philosophy, a new peda¬ gogy.

The philosophy which before the revolution had been mainly Neo-Guelphian, now became wider in its scope, more Hegelian through the work of Ansoni.o Franchi Giuseppi; more posi¬ tive in the writings of Andrea Angivari. The older schools continued, it is true, on the same lines, but the new life in the thought of the day made itself felt by emphasizing the need of for¬ saking old traditions and placing the higher Italian intelligence on a par with the rest of the world; the need of making philosophy a free interpretation of the mind ; the need of making the reconstruction of Italian specula¬ tive thought correspond to the reconstruction of the. whole Italian life. Whilst before the revolution, . philosophy and pedagogy were strongly tinctured with Church doctrines, though perhaps ignorantly, there now

philosophy independent of all religious beliefs, a philosophy which sought nothing but the truth and the interests of humanity.

But even after the revolution pedagogical teaching allied itself closely to philosophical doctrines. Fusco, Siciliani, Angiulli, Latino, Gahelli and V eniali were very prominent in the pedagogy of the day. Eduardo Fusco (1824- 72), professor of anthropology and pedagogy in the University of Naples, in his lectures, edited by his wife after his death, gives evi¬ dence of a high and varied degree of culture, and profoundly liberal sentiments. He had a profound belief in education for refashioning Italian life and consciousness. Pietro Siciliani (1835-85) combined more broadly than Fusco philosophic speculation with pedagogics. He sought in philosophy a certain middle way, which should merge into an eclecticism influ¬ enced by the positivist traditions of Galileo and Vico. He became, in fact, after his manner a solitary positivist. He wrote a great many works on philosophy. His pedagogical works were the (Storia critica delle teorie pedagog- iche in relazione colle scienze socialP ; (La Sci- enza nell' educazione secondo i principi della sociologia modernaP His writings on peda¬ gogy had a great influence on teachers.

Andrea Angiulli (1837-90) was constantly occupied with the thought of a regeneration of philosophy and pedagogy. Three of his works are (La filosofia alia ricerca positiva* ; (La pedagogia, lo Stato e la famiglia) ; (La filosofia e la scuolaP These works are an honor to Italy. In no country has there been a higher conception of pedagogy than that of Angiulli. He was a great student of scientific philosophy and maintained his independence of thought in opposition to the greatest thinkers of the age. To all that he wrote, Angiulli gave the imprint of his personality and even the things said by others acquired a new value when spoken by him.

Emanuele Latino (1845-90) wrote (U lavoro manuale e il problema educativo) ; (Della peda¬ gogia nelle sue armonie ed antinomieP etc. Latino had not the philosophic and universal mind of Siciliani and Angiulli. He dealt with the most prominent questions of pedagogy, but he treated them from a critical scientific stand¬ point.

Aristida Gabelli (1830-91) was the author of (L'uomo e le scienze moralP ; (I1 metodo di insegnamento) ; (L'Istruzione della donna in Italia J ; (Pensieri) ; (L'Istruzione in Italia) ; HI mio e il tuo) ; (La nuova scuola di

diritto pen- ale in Italia> ; (Gli scetticiP Gabelli had a great insight in regard to schools and promoted the regeneration of their methods. His work, HI metodo di insegnamentoP had a great share in the regeneration of the Italian schools. Whilst among the teachers of the period pre¬ ceding 1860 the Pestalozzian reform reached in through the interpretation of Girard, with Ga¬ belli the system of Pestalozzi entered the schools stripped of all unimportant elements, and in its living and vigorous substance.

The teachers of this system, the schools and the scope of pedagogics were very effectively influenced by Francesco Veniali. The ques¬ tions in regard to the importance of the com¬ mon school, and the social standing of the teachers in new Italy was considered by him. By him, also, the new didactic method was dis¬

cussed in a practical manner ; and he was the first to lay bare the defects in the existing school administration, which left the common schools to the commune, upholding, according to Italian tradition, the direct action of the government. Francesco Veniali had the affec¬ tion and esteem of all the educators of his day. It was he who placed the various sys¬ tems on a practical basis ; it was he who pro¬ moted the improvement in normal schools and who contributed very largely to the higher cul¬ ture of teachers.

Italy boasts to-day living pedagogists of great ability who honor her. We may cite Allievo, Cololla, Credaro, Fornelli and Sergi.

Saverio de Domintcis,

Professor of Pedagogy, Royal University of Pavia; Author of Works on Teaching in Schools and Universities.

19. ITALIAN SCHOOLS AND UNI¬ VERSITIES. Public instruction in the king¬ dom of Italy is essentially of three grades: (1) Primary and popular; (2) intermediate and sec¬ ondary; (3) high school grade.

1. Primary and Popular Instruction. — Primary instruction is given, in general, in the elementary schools, and the course, under the care of men and women teachers under the direct superintendence of school inspectors and directors of instruction, lasts five, or even six, years, under government control which deter¬ mines the syllabus, the examinations and every other modus operandi. The elementary schools are supported by the communes.

Compulsory elementary instruction, pre¬ scribed by the law of 15 July 1877, No. 3961, for all those who were not under private in¬ struction, was through a later law extended to the 12th year of age ; this is restricted to the primary elementary course (the first three years) in those communes

where the compul¬ sory higher elementary course is lacking, and in other communes is extended to all the compul¬ sory classes of the high schools that may exist there.

The subsidiary branches of the elementary schools are : the Patronali ; the Educatori and the Recreatori, the kindergartens, and the pro¬ fessional schools, all of which are very little under legislative control or regulation. The government, for the most part, does little but exercise the right of supervision of institutions founded by local enterprise, or by the bequests of private citizens. The kindergartens, for in¬ stance, have for the most part been established by public or private beneficence ; hence, as works of charity they are dependent, to a certain ex¬ tent, on the Ministry of the Interior. These kindergartens number more than 2,000 public institutions, with 140,000 boys and 132,000 girls; and more than 1,300 private institutions with 42,000 boys and 43,000 girls.

A new institution of a free popular school lately established in Italy through private in¬ itiative is the People's LTniversity, the scope of which is to diffuse scientific, literary and artistic culture among the people. The new people's universities date from 1900. That of Turin, which may be called the original one, gave the keynote to what was to be the Italian type of the institution, having as its scope: (1) To popularize the most reliable conclusions of sci¬ ence, making them accessible to those who had

not received a special scholastic training; (2) to impart in a simple and lucid manner instruc¬ tion in the literature and history of the arts, with a view of accustoming the students to the conception of the noblest ideals of life. Rome and Bologna took up this movement almost con¬ temporaneously. There are in upper Italy about four of these institutions in Piedmont and Liguria, seven in Lombardy, five in Venetia, eight in Emilia, one in Rome, one in Naples, three in the rest of southern Italy, three in Sic¬ ily;. and many others are being established in various parts of Italy. They are also to be found beyond its confines.

2. Intermediate or Second-grade Instruc¬ tion. — Intermediate or second-grade instruction is of three kinds: Classical; technical; normal, or pedagogical.

Classical instruction is carried on for five years in the gymnasium, and for three years in the lyceum and comprises the following sub¬ jects: In the gymnasium, Italian, Latin, Greek, French, history and geography,

descriptive ge¬ ography, mathematics, natural history, gymnas¬ tics ; in the lyceum, Italian, Latin, Greek, his¬ tory and historical geography, philosophy, mathematics, natural history, physics and chem¬ istry, gymnastics.

Technical instruction is imparted: (a) In the technical schools; (b) in the technical in¬ stitutes; (c) in the nautical institutes.

(a) The technical schools aim .to give tech¬ nical instruction of the highest grade ; that is, to complete and extend the knowledge acquired in the elementary schools in such a manner that the students may succeed either in con¬ ducting a business or in minor administrative offices, and may be enabled to pass the exami¬ nation for admission to the first class of the Technical Institute. The years of study are three and cover 10 branches of study: Italian language, French language, Italian history, ge¬ ography, instruction on the duties and rights of citizens, elementary mathematics, instruc¬ tion in the natural sciences, accounting, design¬ ing, caligraphy. Training is added in gymnas¬ tics.

(b) The technical institutes have as their scope to impart technical instruction of the second grade, that is, to furnish the instruc¬ tion necessary to prepare the student for higher studies, to qualify him for certain professions and for positions in the government, in in¬ dustry, commerce and agriculture. The course of study is, therefore, divided into several sec¬ tions : a physico-mathematical course ; survey¬ ing; a commercial and bookkeeping course; a course in agriculture ; an industrial course. Each of these is adapted to some special end, and for that reason differs from the rest in the character of the instructions imparted. The course of study in each branch lasts four years.

(c) The nautical institutes have as their object to give intermediate technical instruction to those who intend to dedicate their lives to navigation and maritime arts and industry. The nautical institutes include three branches : one for captains ; another, machinists ; and another for shipbuilding. Each branch comprises two courses : one of two years for sea-captains on larger coasting- vessels ; one for machinists and for naval construction of the second grade ; another of three years for deep-sea captains,

for high grade machinists and for naval con¬ struction of the highest grade. A preparatory course of two years, to which the elementary school certificate gives admission, precedes each of these courses.

Normal, or pedagogic instruction is im¬ parted in the normal boys' schools, and in the normal and complementary girls' schools. Of the former, 29 are

under government control ; of the latter, 78 are government schools. The normal boys' and girls' schools are of two grades, elementary and high school. In the lower grade the studies are with a view to obtaining the certificate of teacher of the first three elementary classes; in the higher grade the studies are carried on with a view to obtain¬ ing a certificate as teacher of all of the five or six classes, and in the female department also a certificate as teacher or directress of a kindergarten. The course lasts three years for each grade. The complementary school course is also three years for each grade.

Other institutions of minor importance under government control are (a) the Convitti Nazionali, the aim of which is to give to young boys a moral, intellectual and physical education to make them worthy citizens. There are 43 such schools for boys, with over 4,000 boarders; (b) female institutes or female asy¬ lums. These may be divided into three cate¬ gories: (1) Shelters to provide temporary as¬ sistance for poor children, orphans, deserted children, etc. ; (2) institutions for young girls of refined and wealthy families; (3) misti (mixed schools) which partake to a certain ex¬ tent of the nature of both.

3. Higher Instruction. — Universities. Higher instruction is imparted in the universi¬ ties properly so-called, and in other special in¬ stitutes resembling the universities in the char¬ acter of their instruction. The Italian univer¬ ity consists fundamentally of the faculty. The faculty comprises four chairs: Juris¬ prudence; medicine and surgery; science — physics, mathematics and natural sciences ; literature and philosophy. Certain schools may form an integral part of the university, or be annexed to it, as the following: Applied engi¬ neering; agriculture; pharmacy; veterinary medicine; obstetrics. See Statistical Sum¬ mary.

The scholastic year begins in the universi¬ ties on 16 October and ends on 31 July. Each university publishes an (Annual, > in which, in addition to the list of names of professors and students, statistics, calendar and hours of study, there are printed the inaugural discourse of the academic year, and a catalogue of the works published during the year by the pro¬ fessors and assistant professors.

The government of the university with its varying duties, always under the supervision of the Minister of the Interior, is in the hands of the following authorities: (1) The rector; (2) the academic- council ; (3) the presidents of faculties and directors of schools; (4) the council of the faculty; (5) the general assem¬ bly of the professors.

There are three distinct classes of instruc¬ tors : (1) Official instructors (in ordinary and extraordinary); (2) teachers in charge; (3) unattached, or

private teachers.

In conformity with the law of 12 June 1904,

No. 253, the appointment of professors in ordi- nary and extraordinary is, with two unim- portant exceptions, by competitive examination.

. The appointment of those professors who give instruction in certain higher branches is only for one scholastic year, but may be re¬ newed.

The official teachers (in ordinary or extraor¬ dinary) may hold private or outside classes; also the associate doctors and those who have qualified as unattached teachers.

The official instructional courses are pub¬ lic, except the practical exercises and the ex¬ perimental demonstrations which the teachers may limit to those who are enrolled in their courses.

A distinction is made between students and those wfio attend the lectures (uditori). The students, at the close of their studies, have the privilege of obtaining the academic degrees, conferred by the faculty or school to which they belong; the studies pursued by the uditori, on the other hand, are of no value in obtaining an academic degree. In order to matriculate, students must have obtained the diploma of graduation granted by a lyceum, or some other equally valuable certificate according to the gen¬ eral regulations, or the special regulations of the faculty or school, concerning admission to the various courses of study. Under specific conditions laid down by Art. 12 of the General Regulations, both foreigners and Italians may matriculate, or continue their studies in the Italian universities, even though not natives or sons of Italian citizens, having or having had their usual domicile in foreign countries.

In the various faculties, or schools, there are held special examinations and examinations for certificates, for bachelor's degrees, and for diplomas according to the special regulations. The special examinations and the examinations for certificates are held in two sessions ; the first begins on 16 June; the second on 16 Octo¬ ber. The examinations for the degree of bachelor and for diplomas are held during the scholastic year at certain times appointed by the Council of the Faculty. All the examina¬ tions are public.

Every scholastic year a competition is opened between the young bachelors

of the various universities and the institutes for higher in¬ struction dependent on the Ministry of Public Instruction for a sum of money (scholarship) intended to place them in a pdsition to perfect themselves in their studies at a national or foreign university, or to undertake a course of travel for the sake of study.

The entire course in the faculty of medicine and surgery is completed in six years, whereas the complete course of study lasts only four years in the faculties of jurisprudence, of phys¬ ical sciences and of philosophy and literature.

Schools of Teachers. — To the faculties of philosophy and belles-lettres, physical science, and of mathematical and natural science are annexed schools of teachers, whose object is to perfect the alumni in the art of teaching philosophic, literary and scientific discipline in the lyceums, in the gymnasiums, in the technical and normal schools and in the technical insti¬ tutes. These are presided over by a director nominated by the Ministry for three years. The lectures they hold are private. The school of teachers annexed to the faculty of philosophy

and belles-lettres includes four departments, and requires a two-year attendance of each stu¬ dent who is enrolled in it.

Royal Normal High School of Pisa. — The Royal High School of Pisa deserves particular mention whether it be on account of its special discipline, or on account of its importance. ((Its object is to prepare and equip for the position professor or teacher of intermediate schools. " It was established in Pisa by the Grand Duke, 28 Nov. 1846; or, to speak more coirectly, re-established. For already at the end of 1813, by a Napoleonic decree (29 Janu¬ ary) there was established in this city an ancillary of that Normal School of Paris which was rebuilt by the same Napoleonic govern¬ ment in 1808 on the site of the ancient French Normal . School, founded in 1795 under the supervision of the Convention. The govern¬ ment of the school is entrusted to a council of managers presided over by the rector of the University of Pisa. The director of the school is chosen by the Minister of Instruction from among the professors in ordinary of the faculty of philosophy and belles-lettres and from that of mathematics, physics and natural science of the same university.

Schools of Pedagogics. By a royal decree of 1 Feb. 1906, there was established near the Royal University of the Kingdom (in the faculty of belles-lettres and philosophy) a course of higher studies (in proficiency) for the licentiates (graduates) of the normal schools with the view of preparing them for the position of school inspector and school prin¬ cipal. The course covers two years, but may be completed in one year by anyone who, in

addition to the requirements of the enrolment has also obtained a bachelor's degree or a diploma in Italian literature, history, peda¬ gogics, conferred by the royal higher female institutes in Rome and Florence.

University Institutes.— There may be named in this category: (a) The Royal Insti¬ tute in Florence for higher practical study and proficiency. This comprises three departments: (1) Philosophy and philology; (2) medicine and surgery; (3) physical and natural science, and two schools, a school of pharmacy and a school of obstetrics. The administrative gov¬ ernment of the institute is entrusted to a coun¬ cil of managers consisting of five members, two of whom represent the municipality of Florence and three the royal government; and the de¬ partment of instruction to an academic council composed of five members — the president of the council of managers, the presidents of the three departments, and the director of the school of pharmacy.

(b) The Royal Scientific-Literary Academy

of Milan: This has a university faculty of

philosophy and literature. By a royal de¬ cree of 18 Aug. 1880, there was added to the school of teachers annexed to this academy a department for qualifying students to teach modern languages and literature in the inter¬ mediate schools of the kingdom, to which are also admitted students who are not enrolled in the branches of philosophy and literature.

(c) The Royal Higher Institute of Tech- nologv of Milan. The obligations and govern¬ ment of this institute, maintained by the state with the aid of the province and commune of Milan, are determined by the royal decrees of

13 Nov. 1862, 5 March 1863, 3 Sept. 1865, 5 Nov. 1875, 24 Jan. 1897. The institute com¬ prises eight departments. The course in the preparatory school covers two years ; that in the special schools, three years, and that in the normal department, four years.

(d) The Royal Polytechnic High School of Naples. This school was established by royal decree of 30 July 1863, which at the same time abolished the pre-existing school of hydraulic and field engineering. It comprises courses in civil engineering, mechanical engineering and architecture; and in addition a special course in electro-technics, ani a course in hygiene as ap¬ plied to engineering. Each course covers three

years.

(e) The royal schools of applied engi¬ neering (not dependent on their respective uni¬ versities) of Bologna, Rome and Turin.

(f) The Royal Naval High School of Genoa (hitherto dependent on the Ministry of Marine).

(g) The royal schools of veterinary medi¬ cine of Milan, of Naples and of Turin.

Institutes and Special Schools. — (a) The royal higher institutes for female instructors in Florence and Rome. These were founded by the law of 25 June 1882, and their object is to provide for and to augment the literary and scientific culture of women, on the one hand, and on the other, to qualify them as teachers and instructors of special branches in the female normal schools, in schools of the highest grade, and in all the other intermediate girls' schools throughout the kingdom. The course covers four years.

(b) The university schools annexed to the lyceum gymnasiums of Aquila, Bari and Catanzaro.

(c) The Royal Institute of Social Science <(Cesare Alfieri® in Florence with the annexed provincial school for notaries. The course covers three years.

(d) The royal schools of theoretical and practical obstetrics of Milan, Novara, Venice and Vercelli.

(e) The Royal Oriental Institute of Naples. Here they have courses in Hindoostani, Arabic, Amaric, Turkish, Modern Greek, Albanian, Chinese, Japanese ; in the geography, religion, legislation of Oriental nations, and their com¬ mercial relations with Italy; and comple¬ mentary instruction in English and Russian.

(f) The Business University Luigi Bocconi of Milan. This was founded at the pious sug¬ gestion of the Milanese merchant, Ferdinand Bocconi, the elder, in honor of the memory of his son, Luigi, who lost his life in the disastrous battle of Adua.

(g) The institutes of fine arts (maintained by the government) at Bologna, Carrara, Flor¬ ence, Lucca, Massa, Milan, Modena, Naples, Palermo, Parma, Rome, Turin and Venice; and those not supported by the government, at Bergamo, Ferrara, Genoa, Novara, Pavia, Perugia, Piacenza, Pietrosanta, Ravenna, Tiena, Urbino, Vercelli and Verona.

(h) The musical institutes and conserva¬ tories, under government control, of Florence, Milan, Naples, Palermo and Parma; and those not supported by the government, of Bologna, Pesaro, Rome, Turin and Venice.

(i) There are some higher institutes de¬

pendent on the Ministry of Agriculture, Indus¬ try and Commerce, such as : (1) the three com¬ mercial high schools of Bari, Genoa and Venice; (2) the two high schools of agricul¬ ture of Milan and Portici ; (3) the higher Ag¬ rarian experimental institute of Perugia; (4) the institute of forestry of Vallombrosa.

Military Institutes. — Those dependent on the Ministry of War are (1) the War School of Turin; (2) the Military Academy of Turin; (3) the School of Artillery and Applied En¬ gineering of Turin; (4) the Military School of Modena; (5) the School of Applied Mili¬ tary Hygiene of Florence; (6) the Military Col¬ leges of Naples and Rome; (7) the Central School of Infantry in Parma; (8) the Cavalry School of Pinerole; (9) the Central School of Artillery on the Poligono del Nettuno near Rome; (10) the Military School of Instruction in the Use of Arms, in Rome. Those depend¬ ent on the Ministry of Marine are: (1) the Naval Academy of Leghorn; (2) the School for Apprentice-machinists in Venice.

Statistical Summary. — The (Report of the Commissioner of Education, Department of the Interior, Bureau of Education) (Washington 1915, pp. 711-717) includes the following sta¬ tistics of education in Italy: The number of pupils in infant schools in 1907-08 was 343,563 and 34,900 in orphan asylums ; in elementary public schools 3,002,168 and elementary private schools 148,081 ; in evening and holiday schools (new style) 182,373 enrolled and 127,948 in constant attendance. In 1911-12 the number of pupils (including auditors) attending normal schools was 20,961 (boys 3,727 and girls 17,234) ; in complementary (girl's) schools, 24,254; in <(gimnasi,® 48,406; in licei, 15,867; in technical schools, 94,031; in technical institutes, 22,181; in nautical institutes, 1,730. In 1912-13 the number of students in special and practical schools of agriculture was 1,716; in mining schools, 59; in industrial schools, 50,550; in in¬ stitutes of fine arts, 4,362; in institutes of music, 5,569. The universities and university schools annexed to royal licei were given as 24 in number, with 23,376 students ; the university institutes, schools _ of higher education for women, and special higher institutes, 28 in number, had 7,251 students. Military schools (12) had 3,630 students or cadets; the four naval schools, as a total, 586. Organized efforts were made in 1915 to attract <(more foreign students® to Italian universities or other institutions of the higher learning. Other items in the education report, 1915 (above cited), of special interest to American readers, are the

following: ((Moving pictures are now coming to be used in Italy for educational pur¬ poses. A moving-picture establishment (for such uses) was opened last November in Rome in the

Vittorio Puntoni,

Rector of the Royal University of Bologna,

20. THE EDUCATION AND SOCIAL STATUS OF WOMEN IN ITALY. One

of the most remarkable features of progress in Italy is the advance made in the education of women since 1880. In former centuries there were highly cultivated women, some dis¬ tinguished as writers or artists, especially as musicians and actresses, but in modern times until 1860 the great majority of Italian women seemed condemned to ignorance, especially in the southern provinces. Women were not even taught to read and write ; married or single, they were expected to take a subordinate posi¬ tion in their own families and in society. The ancient Roman law was observed, which made the man the absolute master of the household, the pater-familias, whom even adult children obeyed as their supreme head. To-day educa¬ tion is compulsory and elementary education is given free to all children of all classes and of both sexes ; the expenses are borne by the local authorities, assisted by the national gov¬ ernment, which exercises a general supervision over elementary culture. Elementary educa¬ tion is also imparted in private schools, au¬ thorized by the government, and these are under the direction of lay or clerical teachers duly qualified.

Educational institutions for women are di¬ vided into colleges and day schools ; some of these are supported by the communes, some by the government. Girls can pass from ele¬ mentary to normal schools, these being usually the highest grade passed by women. This en¬ ables them, like men, to obtain positions as teachers in elementary schools. Women, how¬ ever, have an advantage over men, as after their normal degree, they may enter for four years' higher training in the Institutes of Su¬ perior Studies, where in addition to advanced literature, they are trained in several branches of science and in foreign languages, French be¬ ing compulsory and a part of the program, and either German or English, according to choice. The degree taken in these Superior Institutes enables the young women to teach in the normal and technical schools. Educa¬ tion may be either technical and commercial or classical. Women are admitted to all edu¬ cational institutes and can follow the same courses of study as men ; they may take a university degree, and may profess and prac¬ tice medicine, chemistry, arts and philosophy, but a legal career is not yet open to women, even when duly qualified. In the early eighties of the last centurv. the first student in law, Lydia Poet, obtained her degree, but was

for¬ bidden to make use of it. The Tribunals, which are a part of the Government Department of Justice, objected to women-pleaders ; hence legal training is of use only in a lawyer's office, not in courts of justice. Later a woman- lawyer, Teresa Labriola, obtained permission to lecture in the University of Rome, where an¬ other learned and brilliant woman, Maria Mon- tessori, M.D. (q.v.), had a chair of anthropol¬ ogy (1900-07). In the University of Naples, Professor Ogliarolo was helped in his work and teaching of chemistry by his wife.

Technical, commercial and professional schools prepare girls either for teaching in such departments or for becoming bookkeepers, cashiers, dressmakers, laceworkers. etc. It was at last recognized that woman should un-

dertake her share of work and contribute to the support of herself and her family. In Italy the woman question is much nearer so¬ lution on the economic than on the moral side; it is not usual to prepare for a profession a girl, who has or will have private means suffi¬ cient to relieve her from the necessity for work; hence woman's education is not the same for all classes of society. Young girls of aristocracy of birth or wealth leave the con¬ vents or colleges where they have been edu¬ cated with a fair equipment of general informa¬ tion; many of them acquire an equivalent edu¬ cation at home by private tuition; but such an education being uncontrolled by any sort of examination, and conferring no degree, does not enable its recipients to follow any career, should she some day need to work.

The Institutes of Fine Arts have also been thrown open to women since 1890 and many girls take their degree as teachers of drawing; a few become painters or sculptors; many more work in the field of decorative art. The in¬ dustrial arts have made much progress of late in Italy; there are _ three excellent Industrial Museums, the one in Naples being renowned for its important production of delft-ware. But where women excel to-day in such industries is lacework. It was around 1886 that a Venetian Countess, Adriana Zon Marcello, a lady of honor to. Queen Margherita, conceived the idea of reviving the lost art of lacenaking, for which Italy had once been so famous. En¬ couraged by the Queen, the work was revived, at first in Venice, and so much interested the Italian ladies of the upper classes that the pro¬ duction of all kinds of hand-made laces and embroideries has been established in different provinces, reviving in each the special char¬ acteristic designs. A few years since the ladies conducting the work established an incorpo¬ rated Association of Italian Feminine Industries, having its headquarters in Rome. The work exhibited is of

exquisite character. Literature and journalism offer a large field of labor to women, but these professions are scantily re¬ munerated in Italy.

No one who has not lived in Italy during recent' years can realize the wonderful advance made in every department of woman's life. Women's associations have been started, wo¬ men's papers circulate, women work in new fields of labor, they are fully recognized as able to take care of themselves and their industrial co-operation during the Great War 1914-18, is regraded as having greatly advanced the solu¬ tion of their economic position. This advance, fostered by uplifting influences, is notable in Rome where it seemed well-nigh impossible that modern ideas could ever take root.

When Lady Aberdeen was president of the International Council of Women in 1898, she asked Mrs. Sanford, who was then coming from Canada to Italy, to invite Italian women to the great International Congress which was to be held in London in 1899. Mrs. Julia Ward Howe, who was then in Rome, greatly helped Mrs. Sanford in her mission. A meeting was held in Rome in 1898 and the Italian ladies present were deeply touched by the interest in Italy evinced by American women. They promised to draw up a program that (adapted to the circumstances, habits and needs of their country) should make it possible to do some-

thing practical towards starting a National Council of Women in Italy. It was decided to federate in one large association the principal co-operative societies of woman's activity; and the aims of the General Federation of Woman's Work were defined as follows To create a current of mutual understanding and kind feel¬ ing amongst women interested in this or other good works ; to make widely known the various existing enterprises of women ; to bring about, by the force and influence of the union of wo¬ men's associations, the most desirable reforms.

Since the congress in London, the first pro¬ gram has been greatly enlarged, but it con¬ tained the central idea, around which the dele¬ gates of different associations grouped them¬ selves. Countess Lavinia Taverna, a lady of honor of H. M. Queen Margherita, was unanimously named president and received the valuable help of Miss Dora Melegari, who was the first general secretary of the federation; one of the strongest of modern writers and a woman of very superior character.

When 60 different organizations, created and supported by women, had

joined the Roman Federation, it was decided to begin with them a National Council of Women. Three years after the first Federation of Woman's Work was organized there were 60 different institu¬ tions, whilst in the same number of years American women organized only 11.

Italian women carry their aspirations fur¬ ther than philanthropic schemes; they aim at a social activity in the fullest meaning of the word, but avoid every sort of political action. They study the condition of woman, comparing it with her condition in other countries, tak¬ ing into account the rare virtues of Italian women, virtues that often, by the force of cir¬ cumstances, reveal themselves in silent self- sacrifice more than in positive and efficient action. They acknowledge that woman in Italy has in all social spheres much to learn economically, morally, intellectually. The Italian woman is only now beginning to recog¬ nize and develop her moral sense and her social personality, and every effort is made to further this aim. By lectures, many of which treat of the different aspects of the woman question, — her culture, her social, judicial and even political rights, — through books, papers, reviews (such as Vita Femminile, started in Rome in 1907), Italian women are led to recog¬ nize that a high standard of social duties is necessary.

The majority of women do not believe that their active co-operation can be of any use in politics and are not desirous of the right to vote, for they know well how efficacious their indirect action can be, through their influence over the men of their own family and their friends. The influence of woman in the family is so strong in Italy, that the women question in Italy is of the utmost importance and has to be solved in a manner essentially different from that of other countries. The Italian woman understands that she cannot and must not remain inactive in the fervor of the moral resurrection of her country, and if at times she seems inert and uninterested, it is because she works in silence, without pomp or parade.

It may be safely asserted that the educated Italian woman is inferior to none. She differs only in temperament and its manifestations in

daily life. Averse to participation in public affairs, she is yet an important factor in them owing to her personal influence, and there is no doubt that woman in Ital^ is becoming an important social power. Freed from many prej¬ udices and misconceptions which have kept her far from the vital interests of the nation, she is advancing in the full promise of a brilliant future.

Countess Fanny Zampini Salazer, Professor of English in the Royal Institute of Higher Learning for Women in Rome.

21. ITALIAN LANGUAGE. I. The Lit¬ erary Language. — The Italian literary lan¬ guage has for a foundation the Florentine dia¬ lect, with which, more than with any other, it has in common not alone phonetics and mor¬ phology, but also syntax and vocabulary. In regard to its phonetics, which in this matter is of the greatest importance, it will be enough to say that Siena, which has had a certain desire to dispute the first place with Florence, has, as characteristics of its dialect, the examples, — conseglio, gionto, cavallaria, etc., which resem¬ ble the other Italian dialects and remove it from the Florentine (and literary) types: — consiglio, giunto, cavalier ia.

It was proper (because of Dante, and also of Boccaccio and of Petrarch) that the Floren¬ tine dialect should become the language of Italy; and of these three great names, Petrarch deserves a place quite by himself, because the language of his ˆanzoniere1 PBook of SongsD is generally much less idiomatic, and hence more largely Italian.*

The literary tongue of Italy is founded, then, . upon that Florentine dialect, a trifle archaic, of the 14th century, and has changed but little, partly from the respect for tradition, but more because the Florentine himself has not changed. The language of Dante is, with¬ out any serious differences, the language of to¬ day: there is no such thing as old-fashioned Italian and modern Italian.

Italian literature was the last to emerge among all the great Romance literatures, and its cradle was not in Tuscany. The cause for this tardiness can be found in part in the greater attachment which the Italians had for Latin. But probably certain negative condi¬ tions had more importance, namely, that in Italy there had not survived political and social conditions necessary for the development of the poetry of the laymen, or popular epic po¬ etry. At all events, the language of the first school of poetry, of the time of Frederick II, which contains the southern elements and also to a certain extent the language of the later schools, of Arezzo and Bologna, left also evi¬ dent traces in the language of the Florentine school of the dolce stil nnovo (soft new style), which quickly seized the sceptre of poetry, and these traces, although they are hardly discern¬ ible, have never entirely disappeared from our own poetic tongue.

The first document in that dialect, which from about 1290 down predominated in Italian arts, appeared in 1211, and naturally is not at all a literary document, being fragments of a Book of Florentine Bankers." But after Dante, the Florentine had no serious adversaries. The linguistic unification proceeded slowly at first, so that Ariosto, not only after Boccaccio and Petrarch, but also after Poliziano and Pulci, by

following in the steps of Boiardo, was able to write (Orlando Furioso) in a hybrid tongue, which, though seeking to be purely Italian, yet preserved phonetically and morphologically a great many Emilian elements.

However, now arrived the time when it ac¬ quired its rich vocabulary, its clarity, and so to speak, its theory, and when the language of the people (as used by Dante, by* Boccaccio and by Petrarch) should become the new lan¬ guage of Italy, capable and worthy of a gram¬ matical system as regular and as rigid as Latin. These three great Tuscan poets are Italian classics and are accessible to all Italians. And a kind of grammar of the popular tongue, founded upon their example, is the (Prose) by Bembo in 1525. Ariosto, following the move¬ ment, changed the (Orlando } written in the dialect of Emilia in the editions of 1516 and 1521, into the (Orlando) of 1532, which was written in the Tuscan dialect and above all tried to be grammatically correct. The period of hybridism was finished, although some traces of it, not only morphologically, but also phonet¬ ically (fame glia, gionto per giunto, etc.), are continually found in writers who were not Florentines, and above all not Tuscans, during the whole of the 16th and also the 1 7th centuries.

It was then a question of vocabulary and particularly of style, and has so continued until our time. In discussing the name to be given to the language, whether Florentine, Tuscan or Italian, etc., the earliest 16th century writers naturally did not distinguish in a particularly clear manner between phonetic hybridism and the rest ; neither the Senesi, who, against the exclusiveness of the Florentines, defended the customs of the whole of Tuscany and especially of Siena (and this continued rather late, even to the time of Girolamo Gigli, a writer of the 17th or the 18th century), nor Giorgio Trissino of Vicenza who desired to do his share in every¬ thing Italian. In the beginning of the 19th cen¬ tury, as a reaction against the ultra simple and colorless language of the 18th century, there arose a most strict school of the purest 14th century — a revival, which, although it was con¬ tested by Monti and by others in the name of a greater breadth and modernity in the choice of models, yet, having some merit, it helped to strengthen the weak and artificial academic quality of Italian prose.

Alessandro Manzoni, in his (Promessi Sposi,* first issued in 1827, succeeded partially in re¬ storing the model set by Ariosto ; but so much the more for Manzoni was it a question not of phonetics but of style, and of vocabulary so far as it is necessarily connected with style. In place of a language which had become too lit¬ erary, he wished to substitute a

language which, like the French, should be fresh, natural, pre¬ cise. Thus he became the most enthusiastic and convincing, and altogether the most logical and coherent of the advocates of living usage and consequently of Florentine speech. He thought that all the Italians, in order to possess a lan¬ guage not only alive and copious but free to all and by all equally understood, no matter how delicate or slight the meaning, and in all its more specialized usage — just as the French have done — should follow the usage of culti¬ vated persons of Florence. Thus there came, before all, a renewal of the , vocabulary ; but following on this were added naturally some

phonetic modifications, such as the substitution of o, which to-day the Tuscans pronounce, for uo, an archaic survival from the literary lan¬ guage. From this resulted (due to the work of the followers of Manzoni) a frenzy, so to speak, of Florentinism. But of all the noise made about it, there remains to-day only an echo in some recent books. Without any doubt, through his work and his example, even more than by his theories, Manzoni has assisted tremendously in reviving and infusing with new blood the ancient tongue, or — to speak more accurately — the ancient academic Italian prose ; although it may be that their traditions have not entirely disappeared, and that the vocabulary of the members of the Florentine Academy of Letters (the Crusca) is too loyal to these tradi¬ tions. And no one can doubt for a moment that he who wishes to speak or write well should pass a longer or shorter period at Flor¬ ence or at least in Tuscany, because the lan¬ guage used in Italian conversation, being mea¬ gre or inexact in almost all the provinces, it happens frequently that even cultured people lack the habit of thinking with energetic spon¬ taneity in Italian, whatever may be the subject of their thought. On the contrary, it is well understood to-day that a language is not reno¬ vated by those mnemonic exercises which were so dear to the followers of Manzoni, but only by copying and following beautiful and power¬ ful examples. An entire nation, which lives in the present, can never entirely forget its past; and the unification of the language cannot be brought about by artificial means but only by the progressive and ever ascending blending of Italian spirit and Italian culture.

From the standpoint of philology, Italian is one of the Romance languages, which are a continuation of the Latin, of which they are, so to speak, the present phases ; and, for certain qualities, for example, the loss of the final s, it could unite itself with the Rumano-Dalmatic dialects (or the Roman language of Dalmatia that has almost entirely disappeared), forming an Eastern group to oppose the Western group, composed of Ladin, French and Spanish.

Literary Italian, which belongs to central Italy, is one of the Romance

tongues which has preserved more abundantly and with fewer alterations the traits of the Latin as regards phonetics and the dictionary. One or another of the sister languages may have some partial advantage over this one; for example, the tongue of Sardinia, opposed not only to Italian but to all the dialects derived from the Roman, has preserved in its Tonic vowels a phase of Latin vocalism more archaic, we might say the phase of the time of the republic, as opposed to that of the empire; and the preservation of the final a, which set to the French and to the Provencal the fashion of preserving more at length the traces of the Latin declension. But this and other similar observations cannot change appreciably the result of judgment as a whole; it must be remembered that Italian has preserved faithfully almost all the internal consonants, so that it can present an almost unchanged series such as amate, amatis, mutare, credo, vidi, fedele, ripa, nipote, amico, and (as opposed for instance to segare), legare. For the rest, the dropping of the final s, which un¬ doubtedly once had a place in Latin vulgate, is not of special importance except as a part

of a general phenomenon, i.e., the loss of all the final consonants; and this phenomenon, combined with the preservation of all the final vowels (to say nothing of the weak vowels in the middle of a word), has given to the Italian language its new and special character.

As to the dictionary, the Italian certainly comprises a goodly number of German deriva¬ tives, but incomparably less than the French, and furthermore, has no other ancient or for¬ eign roots, in the way that Arabic, is found in Spanish.

Among the pre-eminent qualities of Italian must be put that inner power of preservation which we have already mentioned. Whatever may be the cause — and only in certain parts can it be attributed to the power of literary tradition, that is to say, because its greatest masterpiece, the (Divine Comedy, was written originally in that tongue, and afterward the*

Italian is the literary language of the entire kingdom of Italy (with some restrictions among the Valdesi and the French-Provengal of Val d' Aosta), and also of some Italian subjects in Austria, some in Switzerland and some in Malta. Corsica alone prefers French for its literary productions.

The Dialects. — Italy is, in regard to its language, one of the countries most compact and homogeneous. According to the last cen¬ sus (10 June 1911), the resident population numbered 35,845,048, of whom only about

83,300 were of French origin; 9,600 of Teutonic origin; 81,000 of Albanian; 29,000 of Greek; 11,700 of Catalanian origin, and 42,200 Slavs.

Not all the heterogeneous population of the kingdom of Italy can be considered as "colo¬ nies® or as "islands.® The following may be considered as "colonies® linguistically: (a) Germans of Veneto, of Tyrol origin (in the 13th century there was an emigration), who reformed themselves into the Thirteen Com¬ munes of Verona (reduced, it seems, now to two) and to the Seven Communes of Vicenza (now five at the most) and of Piedmont, around Monte Rosa and at the Simplon (12th and 13th centuries) ; (b) the Albanians, who form the most important group of foreign lan¬ guages, not Romance, in Sicily, in Calabria, in the southern provinces upon the Adriatic (from about half of the 15th century excepted) ; the last colony was Badessa in Abruzzo Tera- mano (1744) ; the Slavs in Molise; (d) the Greeks, from Ontrano (9th and 10th cen¬ turies) ; and reduced to very few in Bova in Calabria (11th century). In Corsica, at Car- gese, 650 Greeks settled in 1675.

Roman Colonies: The Catalanians of- Al- ghero, of Barcelona origin (1353ˆ72) ; the few Franco-Provengals or Faeto and Celle (of the time of Charles of Anjou) near Foggia (see following text for the Provencals of Guardia Piemontese in Calabria, for the Lombards in Sicily, etc.) ; and finally about 3,000 Rumanians in eastern Istria, now strongly Slavic in its language.

But to pass over the Semitics in Malta, we cannot call colonies the Provencals and Franco-Provencals of the Alps, who keep up

the idioms of the other slope. The boundary between the Ligurian and the Provencals is to be found at the Roja: Mentone and around there is more Provencal than Ligurian. They may become Provencals — or they may con¬ tinue many of the Provencal expressions, mix¬ ing with them Piedmontese and local words — the dialects under the Maritime Alps and the Cozie, down to the Monviso — to the right of which are the Valli Valdesi (Pral, etc.), with a dialect allied to that of Delfinato more to the east, — and also more south toward the upper course of the Clusone and to the sources of the Dora Riparia. A colony of Valdesi (about

I, 400), is Guardia Piemontese in the province of Cosenza.

From the district so influenced by the Pro¬ vencal, we pass by some intermediate grades, to that which is plainly Franco-Provencal, above all in the valleys of the southern Stura of Oreo (Val Soana), of the Dora Baltea (Val d'Aosta). 'In the Val d'Aosta the Franco- Provencal has its stronghold,

so that the lan¬ guage of culture is French. Then follows the Valsesia, plainlv Piedmontese of Piedmontese- Lombardian, which forms a sort of dividing wedge between them and the successive Alpine districts of various linguistic types. It is the Ladin dialect which is found in these parts; the Ladin dialect exists in the mountain regions more or less from Mount Rosa and farther. From these Lombardy valleys and especially from the more western, from Toce and from Maggia, alike, come the so-called Lombards of Sicily, of Sanfratello, etc. (11th to 13th cen¬ turies.)

The Ladini of the southern slope of the Alps are to-day reduced to very few in number (40,000 Grigioni), losing touch with the Ladini of Italy. To these belong entirely the small central zone, or Tridentine-Bellunese and that which is incomparably the most considerable, the eastern, that is, the Friuli. In official docu¬ ments the Ladini are considered to be among those who "speak Italian.® Here, in fact, there is no sign of that literary language which the Ladini of Switzerland have; and on the other part nearly half a million Friulani (with about

II, 000 in the central zone), form in the southern part of the Alps a strong, flourish¬ ing linguistic union, opposed to the few Gri¬ gioni, that one could well consider the Ladin an Italian language. At a time not so far distant there was a Friulano dialect as well as a Trieste dialect and a Muggian, now Veneto; at Trieste they still spoke Ladino in the first half of the 19th century; and at Muggia also in the second half.

We now come to the dialects which are usually regarded as Italian.

Dante, in his division of Italian dialects ((De Vulgari Eloquential I, x), which is per¬ haps the first attempt at any classification of dialects, divides them according to the two slopes of the Apennines, the Tyrrhenian and the Adriatic and counts them off into 14 prin¬ cipal types, seven for each slope. It was with¬ out doubt a happv thought, and almost every¬ where throughout southern Italy the division of Dante's is similar to our own. We will commence with a general division into four groups ; northerp, central, southern and Sicilian, and finally, by itself, Sardinia.

501

ITALY — ITALIAN LANGUAGE (21)

A. Northern Italy. — 1. The group so-called Gallo-Italiano, that is, (a) Ligurian, (b) Pied¬ montese, (c) Lombard, (d) Emilian (includ¬ ing the Romagnolo dialect). The most "Gallic® is naturally the Piedmont; the nearest to the Tuscan is the Ligurian, but Liguria, Piedmont and Lombardy form the territory of the ii and the 6 continuing the French type. Emilia in

turn is the true home of the e for the Latin or Tuscan a. This peculiarity appears until we reach the Metaurus River, and pass into Tus¬ cany, into the Aretino dialect. Let us not for¬ get the Genoese colony of Carloforte in Sar¬ dinia, and those Emilian colonies in Lucchese, of Gombitelli and Sillano.

2. Eastern Dialects : (a) Istriano, little

better preserved at Rovigno and Dignano. It is a very characteristic dialect, with features which recall the Veglioto or Dalmatian dialect, and the dialects of the southern shore of the Adriatic. (b) Veneto, or better Venetian. And among all the dialects, none that arose has had more conspicuous fortune, following upon the arms and the commerce of the great republic; here certainly its progress followed its family resemblance with the Tuscan, for the most part original but to a certain extent borrowed. To say nothing of its fortunes in the Levant, we must make mention that it con¬ quered territory everywhere, in all the cities of the country that surrounded Venice, in Friulano and Istriano. In Venetian, which in its oldest documents shows a trace of Ladino, neither u nor 6 ever appears ; nevertheless there is a strong tendency to drop out the weak vowels ; they have the diphthongs ie, no, etc. Very char¬ acteristic of this dialect is the aversion to double consonants, that is to say that there, as in Rumanian, vowel quantities remain un¬ changed when double consonants become simple.

B. Central Italy. — 1. Tuscan, with the dia¬ lects of Florence and those to the west, Pisa, Lucca and Pistoia; a little aside the southern Senese and then Aretino, of which we have spoken. The western dialects have, for ex¬ ample, ginnto, like the Florentine, but especially at Pisa and Lucca is the use of ˆ for z very noticeable, and at Lucca r for rr, which recalls the Ligurian dialect, etc. For the rest, the cities are all strongly under the influence of Florence. The quite prevalent opinion that at Siena they speak an Italian better than that of Florence, comes perhaps from an arbitrary in¬ terpretation of the old saying, already common in the 17th century. "Tuscan tongue in a Sienese mouth.® The characteristics of the Florentine and Tuscan language of to-day which most strike one accustomed to the Italian of the other provinces are perhaps the substitution of the simple o for the diphthong no, as bono for bnono ; the aspiration of the guttural c between two vowels, balio, for baco, la hasa; and, we may add, also the pronunciation of the palatal c between two vowels, fece. la cena, which differs from the explosive c following a consonant, as calce, etc. But if the Tuscans themselves freely recognize the aspiration of the guttural c, as pertaining to a dialect, they will with difficulty arrive at a recognition of the same thing in the fricative c, and it displeases them that the latter substitute the explosive c. We must also mention the synectic doubling, as a

ccasa, a rRoma.

2. Umbrian, Marchigiano, Sabino, Aquilano,

Roman. This is a group somewhat roughly formed. Dante distinguished, besides the Tus¬ can, the dialects of Ducato, namely, the Spo- letano, and those of Rome on the right slope; Marca Arconitana (between Calabria on the south and the Romagnolo toward the north). Especially, the Romagnolo (as they appro¬ priately term the Tuscan-Umbro) descends much further down the southern marches, and though it loses its more pronounced characteris¬ tics, like the e for a, it joins with the latest off¬ shoots at the Esino, at Jesi (amigo, pagado) and also at Ancona (poga, poca, fighi; soneto, sonetto, etc.) Perhaps the Spoletano appeared to Dante characteristically for its final u, which is usual from the Umbria of the southeast to the edges of Tirreno, and also belongs to Sabino and Aquilano, but not to the western zone of Orvieto, Viterbo, Rome, Velktri. Cer¬ tain southern characteristics, such as in nn for nd, mm for nv, mb, etc., may be said to be com¬ mon to all of central Italy, except Tuscany.

3. Corsican. If it were not for its geo¬ graphical position, it would be better to place it in this group between 1 and 2, but it has also very close relations with the Ligurian dialect, and naturally as we go further south it comes closer to the Sardinian tongues.

C. Southern Continental Italy. — Tyrrhenian Group, or Neapolitan, which extends to the other slope with Molise. The final vowel de¬ termines the accented vowel, but this final vowel which at one time had to be u or o, i and e, is now restricted uniformly to an e, which we will call short or vanishing: ome from onto, man, uomene from uomeni; parente, plural p orient e ; porte from porto, I carry, but puorte for ports ; negra but mgre, black and black, sposa but spuse, bridegroom and bride¬ grooms. We pass over the fact that it has besides nn from nd, etc., and also nd from nt, mb, ng from mp, nc, but everyone knows never¬ theless the characteristic types chiane and sciure for the Italian piano, fiore, which con¬ tinue in Sicilian, chianu, sciuri (also in Genoa, cian, sciu) ; and finally that splendid example of synectic phonetics Jnu vvase un bacio (a kiss), or a bbascio, etc.

2. Adriatic Groups. — Types of the Abruzzi, which comprehend the Capitanata. The foun¬ dation is the Neapolitan type, but th examples of the modification of the vowels are more than ever varied and complicated, and the accented vowels disguise themselves and become diph¬ thongs in the most singular manner. Here, as in Sicily, the accenting of the sentence plays an important part, so that the tonic vowel is treated as being weak, if the accent of the en¬ tire phrase is not placed upon it.

D. Sicily, with which we will unite Cala¬ bria : some of their peculiar traits extend to Terra d'Otranto. The consonants are often treated as in Neapolitan, but nevertheless dis¬ play their own peculiarities. But the Sicilian type has its own peculiar forms for the vowels especially; for instance, in place of the closed e or closed o of the Italian and the Romance tongues it employs an i or a u; pilu, pelo, suli, sole. As for the diphthongs ie, no, they depend rather upon the accent of the sentence rather than that of the individual words. (See C, 2).

E. Sardinia. — The language of Sardinia can be considered as a type by itself, at least as much as the Ladino. Here Dante expressed

the truth very delightfully: "(Sardi) qui non Latini (— Italiani) sunt, sed Latinis adsociandi videntur.® ((

The dialects, which we have fully listed, are all, except the Tuscan, sufficiently alive and im¬ portant from the standpoint of culture, because in Italy even well-educated people usually speak the general dialect with their companions; but not particularly the local dialect, because each of the many small states into which the Penin¬ sula was divided for so many centuries, or at least each of the principal states, developed to a certain extent a language particularly for con¬ versation, which is at the bottom the dialect of the capital city; thus the cultured Piedmontese usually speak the language of Turin, the in¬ habitants of Veneto, Venetian dialect, etc. And many of these dialects have had a rich poetical literature; although the writers in these dia¬ lects were almost always conscious of having produced works purely local in character, and considered their own writings, in opposition to those in the literary tongue, almost as a jest, so that generally they wrote only in a facetious tone. None the less it should be advisable for us to make some distinctions; for instance, the

Venetian, which was also the official language of the republic, was certainly in the mind of Carlo Goldoni something more important than a simple local dialect, since in this he wrote some of his best comedies ; Sardinia and Sicily also show special conditions. On the other hand, the tone and playful intention take away nothing from the artistic seriousness of a true poet; and Carlo Porta of Milan and the Roman Gioacchino Belli were certainly poets of the first rank, marvelously representing, with cunning satire, the life of their time in Milan and in Rome. To-day the flowery dialect continues ; but the Venetian theatre has an importance more than local, and to-day is supported, both on account of the excellence

of the dialect itself, easily intelligible to all, and because, of the happy continuation of Goldoni's comedies, not to speak of the splendid acting. Little is heard of the Piedmontese theatre, which en¬ joyed much favor at the time of the formation of the kingdom — and the theatres of Milan little depend upon Milanese actors. The Nea¬ politan dialect is carried throughout Italy by the charm of its melodies and its voluptuous but sad little songs, but Roman poetry has acquired great popularity everywhere, and this is partly due to the ease of the dialect of to-day, and partly to the Roman poets, especially Belli, but above all to that great and noble artist, as rich in epic and lyrical powers as in popular and pleasing comedy — Cesare Pascarella.

E. G. Parodi,

Professor of the Comparative History of the Classics and Neo-Latin Languages, Royal In¬ stitute of the Higher Studies, Florence.

22. ITALIAN LITERATURE. This ar¬ ticle deals with (1) The beginnings of Italian Literature; (2) The age of Dante, Petrarch and Boccaccio; (3) The Renaissance and Hu¬ manism; (4) Classicism and Decadence; (5) Arcadia and Rinnovamento ; (6) Contemporary period, the Terza Italia.

First Period — From the "Origins® to the 14th Century.

Italian literature was late in its beginning, although manners were more refined and the intellectual level higher in the Italian courts and Comuni than in the feudal castles of France of the same period. And the League of the Northern Cities against Barbarossa's invasion, the Vespri Siciliani, the organization of Comuni, the struggle against the encroachments of the Roman Church, the commercial activity of Italian seaports, the establishment of tri¬ bunals of justice and city councils, all testify to a comparative maturity of the national spirit. In France (La Chanson de Roland) was familiar to the Norman invaders of England in 1060; while the first original piece of Italian poetry, (I1 Contrasto di Ciulo d'Alcamo, is approx¬ imately dated 1231.*

This late development of Italian literature is chiefly due to the persistence of Roman civil¬ ization and the general use of Latin as the written language. For in spite of the many in¬ vasions of the Peninsula, the Italian stock is not a recent blend. It is the permanent Roman nationality, and the permanent Roman character. That the tradition of intellectual culture was never interrupted is evidenced by the number of Latin writings even in the darkest periods

of the Dark Ages, showing that the Peninsula has never been without some intellectual light. The empire and the Church, those two supreme powers of the Middle Ages, encouraged respect % f˚r the Latin by using it as the official lan¬ guage, and thus contributed to the contempt in which was held the spoken language, — Volgare. Even after the noble compositions in Italian, of Trecento (14th century), both Dante and Pe¬ trarch used Latin in their scholarly writings. 1 his Middle Age Latin literature and the grad¬ ual change from Latino Rustico to Volgare Rustico are considered in the article on the Italian Language. Though the Volgare was the latest of the Neolatin idioms and was every¬ where used, even by the learned in familiar conversation, it was not until 1231 in the Con- trasto that it found its way into literature. Yet so rapidly was it perfected by Dante, Petrarch and Boccaccio that in Dante's

The feudal ideal of chivalry, imported from France and Germany and unsympathetic to Italian tradition, also retarded the development of a national literature. The trouveres of langue d'oel and the troubadours of langue ,d'oc poured across the Alps and were welcomed by princes and common people. Everywhere these invaders scattered the ideas of their country, and the ideals of their legends. So numerous, noisy and popular were they that the city of Bologna in 1288 passed a law forbidding quod Cant ores francigenarum from dwelling near the town-hall and disturbing the council. Imita¬ tors of the Frence gate science flourished every¬ where, as Albertino Malaspina, Rambertino Buvalelli and the Mantuan Sordello whom Dante mentions. After the bloody croisade des Albigeois many troubadours sought the protec¬ tion of the Emperor Frederick II of Sicily. Many other intellectual forces sought the sup¬ port of that enlightened prince who welcomed Gli uomini che avevan bontade, giocolieri, sona- tori, e trovatori. On account of the learning and culture that came pouring in from all parts of Italy, the volgare used at the court of Fred¬ erick was more refined than that used in Naples or in the northern part of Italy, and more free from Latin than the Florentine dialect. And. here in Sicily arose' the first school of Italian poetry.

There was little originality and less genuine sentiment in these first productions of thar school variously named Provengal, Sicilian or Aulico-cortigiana. It was an imitation in both matter and form from the French model. The sonnet alone where two strambotti are joined is original ; otherwise the forms are the ballade, the pastourelle and the sirvente of the trouba¬ dours. Probably anterior to these is the much discussed Ciulo d'Alcamo, or Cielo del Canto, with its charming dialogue between an eager lover and a reluctant but finally yielding sweet¬ heart. The first entreating lines Rosa fresca aulentissima C'appari in ver restate are better

remembered than the realistic and more sincere conclusion. The name Scuola Siciliana survived the quickly vanished magnificence of the court that fostered it. The Tuscans who had lived in Frederick's court, or corresponded in Ten- zoni, were known as ˆSicilians.® Folcacchiero dei Folcacchieri in Siena and Monte Andrea

are remembered as ˆSicilians® of the second pe¬ riod. To Guido Guinicelli (1240 — ?) Dante al¬ lows the merit of opening a new field of poetry and of giving in the celebrated canzone Al cor gentil ripara sempre amove a new ideal after¬ ward called II dolce stil nuovo. Guinicelli, vyhorn Dante calls Padre mio e dei miei mig- liori, went from Bologna to Florence, and in¬ spired poets who introduced the spiritelli (im¬ personations of love), in which there is some psychological analysis and much mannerism. The Canzone (Donna mi prega of Cavalcante (1260 — ?) is the most perfect of these. It is a complete scholastic treatise on love's psychology.*

The asseveration that the Italian mind is never deeply religious is disproved by the mystic religious poetry which blossomed during the Middle Ages. It was almost localized in Um¬ bria and was chiefly inspired by that gentle apostle of poverty and love, Saint Francis of AsSisi, and his followers. Like manna to the hungry were the verses of the Cantico del Sole, and many a humble soul was inspired to imitate the Laudi of which every religious brotherhood had its own sacred stock. Jacopo Benedetti, known as Jacopone da Todi, is the best known of these religious poets. His (Laudi) which he called sacra pazzia (holy madness) consist of endless .exclamations and repetitions of tender worship of the Madonna and supplica¬ tions that God should severely punish his sins.

The prose works of this period were mostly written in Latin or French and do not form a part of ˆItalian® literature.

Il Trecento, 14th Century.

If the 12th century was the early spring¬ time of Italian literature, a time of seed-sowing and germination; followed in the 13th century by the first fruits of the harvest; then the 14th century may be considered the glorious summer of fruition. Before the opening of Trecento the foreign forms and ideas had been assimi¬ lated, transformed by Italian genius. Epic and lyric poetry, romantic and historic prose, were now Italian in character. Guido Guinicelli and Guido Cavalcanti had initiated the Dolce stil nuovo; Guittone d'Arezzo had written the first pure and stately Italian prose. And now began the century made glorious by Dante, Petrarch and Boccaccio.

Dante.

The facts of Dante's life belong to history, but the vicissitudes of his love, the evolution of his soul, stand within the compass of litera¬ ture, they explain and reveal his immortal work. He was nine years old when first he met Bea¬ trice, a child of eight; nine years later he again met her in the street, and was favored with her gentle saluto. In that instant love mastered his soul, Beatrice was the only object of his thought. The death of Beatrice did not break the charm, though for a moment Dante was attracted by a gentle dame who with him be¬ wailed his great loss; but soon he returned to his worship of Beatrice's memory. (La Vita Nuova) records the incidents and emotions of his love for Beatrice. Through these sonnets and canzoni, linked together by prose comment, runs a vein of tender melancholy, a spirit of transcendentalism. The canzone Donne che avete intelletto d'amore is in the Dolce stil nuovo introduced by Guido Guinicelli,' with a metaphysical deification of feminine beauty as an emanation of Divine Love as a means of salvation. The sonnets and (Tanto gentile) are gems of lyric poetry, and the vision Donna Pietosa is of classic simplicity. After telling of his grief at the death of Beatrice, he describes his vision of her soul rising to the glory of Paradise amidst a choir of cherubims singing praises. In Dante's (Canzoniere) are other beautiful lyrics, some with the same inspiration as in (Vita Nuova) and others, known as Rime petrose, composed in a different spirit; per¬ haps inspired by a woman named Pietra.

La Divina Com media.

Though doubtless his other writings suffice to place Dante among those illustrious Italians whose composition will always be read, it is be¬ cause of (The Divine Comedy) that Dante ranks as the chief glory of his nation, crowned with the same immortality as belong to Shakespeare and Homer.

(La Divina Commedia> was called ((Com- media® by Dante, ((Divina® being added imme¬ diately after his death by his admirers, and since universally accepted.

Poets, painters and preachers before Dante had attempted uncouth description of the three realms of Punishment, Expiation and Reward. Orcagna's frescoes in the Campo Santo of Pisa are a familiar illustration. From these Dante appropriated freely; his rich imagination and stern logic transforming all into a complex yet balanced harmony. The structure of the poem is simple and symmetrical in its ensemble, but

elaborate in its detail. The Inferno is a huge inverted cone, opening directly under Jerusalem, its outside edged by Anti-Inferno, which in its turn is circumscribed by the river Acheron. The interior of this cone is divided into con¬ centric rings (cerchi). In the upper, which is also the outer circle, the punishment is least, and increases in severity as in each successive descending concentric circle the sins to be pun¬ ished increase in turpitude. The bottom of this cone is formed by the funnel in which Lucifer became wedged half way, hurled down head foremost from the Empireo. His beastly triple head is in Inferno, while his legs form the cen¬ tral point of the opposite mount of Purgatorio.

Opposite to Inferno, in exact but inverted symmetry, rises the mount of Purgatorio, di¬ vided into a sequence of terraces corresponding to the cerchi (circles) of Inferno. Each terrace contains a certain category of sinners, the low¬ est being the worst. As Inferno had an Anti- Inferno and a final city of Dite, so Purgatorio is preceded by Anti-Purgatorio, surrounded by the Eden or Terrestrial Paradise encircled by the rivers of Lethe and Eunoe that wash away every recollection of sin. Paradiso is also im¬ agined on the plan of concentric circles, in ac¬ cord with the Ptolemaic system. Only in these spheres of splendor the Blessed are not con¬ strained to any fixed place, but soar freely from one circle to the other, and they all have their appointed seats in the mystic Rose, whose centre is God Himself.

The symmetrical harmony of the (Divine Comedy) extends to every detail. Nine circles in Hell and Anti-Inferno, nine terraces in Pur¬ gatory and Anti-Purgatory and nine spheres in Heaven and the Empireo. The two outer circles of Hell form the city of Dite, the last two of Purgatory the Terrestrial Paradise, and the last two spheres of Heaven the mystic Rose. The 33 cantos are divided into three parts, the repetition and multiplication of these leading up to nine, the perfect number com¬ posed of the Trinity multiplied by itself. Each of the three parts ends with the word stelle. The material unity of this hugely imagined construction is shown in the line which, straight from the centre of the mystic Rose (centre of Paradise), forms the axis of Mount Purgatory, passes through Lucifer's body and reaches Jerusalem. This symbolic line, reaching from God Himself, through the realms of glory, ex¬ piation and punishment, to Jerusalem, uniting the Church triumphant with the Church mili¬ tant typifies Redemption. Lucifer, in falling from Heaven has formed the hollow of Hell, and the opposite mount of Purgatory was formed by the horror which made the very earth recoil at his passage. Salvation for a sinful world staring from the Cross of Calvary at Jerusalem, conquers Hell and by the purifi¬ cations of Purgatory reopens Heaven, the dwelling-place of God, to redeemed mankind. This unity of conception is continued in the three allegorical significations of the Corn- media, the personal, moral and political. Con¬

sidered as personal to the poet, Dante's journey begins on Easter Day 1300, the Year of the Jubilee, and lasts seven days. Dante, then in middle life, finds himself in a forest in sight of a hill, sun-illumined at the top, his path op¬ posed by three beasts — his sins ; — he is res¬ cued by Virgil, who by Beatrice's command

shows him the realms of punishment and ex¬ piation. In the oolitical allegory Virgil, typify¬ ing the Power of the Empire, leads mankind through the realms of punishment and expia¬ tion up to the Terrestrial Paradise from whence Beatrice, signifying religion, conducts him through Heaven. In the moral allegory Virgil is human reason, Beatrice is Faith and all the Scholastic controversy is developed by Saints Thomas, Dominique and Peter. In Inferno the ghosts or shades endure pain in the flesh, hope¬ lessly conscious that pardon is past praying for. In Purgatorio the expiating soul is comforted with the certainty of ultimate pardon and with bright visions of happiness. In Heaven the souls are no more shades but lights. It is an ocean as full of brightness as Hell was black.

Of the myriad beings who people these three realms of hell, purgatory and heaven, Dante's supreme creation is Lucifer. Indeed, this per¬ sonification of Evil is the supreme intellectual conception of the Fallen God of all literature and of all time. Dante in some measure at- tained, to and completed what PEschylus essayed. Dante's Lucifer is as repulsive as Milton's Satan is fascinating. All glory is alien to him; all things of sin are a part of and have their source in him. He is all-evil, Evil, and en¬ during, the author of all the sin mankind en¬ dures, the loathsomeness of his person, the vileness of his acts, the futility of the motion of his vast bat-like wings, the worst of the hugeness and horror are indescribable. (

There are many other stupendous descrip¬ tions in the Commedia, powerful apostrophes, withering invectives ; the haughty words of Farinata degli Uberti, rising from his tomb; the piteous stories of Francesca da Rimini, and of Pia dei Tolomei ; the description of the ser¬ pents growing into men, then burning down to ashes and forever repeating this atrocious tor¬ ment; the appalling picture of the forest of withering branches weeping their intolerable misery in drops of blood. Shakespeare has more chords to his lyre, and Homer often rises to supreme heights, but with Shake¬ speare and Homer will ever be associated in an immortal triumvirate the name of Dante. He remains the chief glory of Italian litera¬ ture, and a world poet of the highest rank. Cino da Pistoia, after Dante, the most deli¬ cate of poets of the stil nuovo, has left many sonnets, ballads and canzoni, in

which he sang his love for fair Selvaggia. His passionate verses alternate moods of joy and grief, and show some psychologic observations. Cecco Angiolieri writes with humor, despair and gaiety. There is also ample and interesting material in the prose writing of the time. The (Fioretti di San Francesco, } a compilation of legends and sayings about Saint Francis of Assisi or attributed to him, are exquisitely sim¬ ple and of deep piety. Dino Compagni's

(ronica, and the Cronaca of the three Villanis describes the world in which Dante lived.

Francesco Petrarch, 1304-74.

If Dante was the last splendid representa¬ tive of the Middle Ages, Petrarch was the ris¬ ing sun of the Renaissance. The first sang the mystic contemplation of other-world ideals, the second initiated the study and observation of the human heart and of terrestrial beauty, and was a prey to that contrast of moods which make him the first victim of pessimism in lit¬ erature. Petrarch's love for Laura, his habits of elegance, his affection for rare manuscripts and classic authors, his craving for perfection of literary form, jarred cruelly with the reli¬ gious sentiment which became supreme in his later years. In Petrarch's poetry there is a cry of human suffering, a sincerity of expression which separates it from any previous composi¬ tion. (I1 Canzoniere) is a searching analysis of a single sensation, the psychology of a single soul. When Laura dies, Petrarch's grief is a brooding melancholy, less ascetic and more ten¬ der than the devotion professed by other poets of the stil nuovo. There are many chords in Petrarch's lyre, and Laura's praise is sung in many moods.

H Trionfi, > an allegorical poem mostly in terza rima, narrating the triumph of Love, Death and Fame, is a continuation of the Canzoniere. Petrarch is the poet of love, but he is also the first Italian poet who has in¬ tensely felt and sung of patriotism. He dreams of an Italy direct heiress of the Roman Re¬ public of Scipio, powerful in the liberty of Communes ; yet he perceives that a national monarchy is the best available form. In Petrarch's writings there is an exaggerated at¬ tention to form, though it never quite becomes mannerism as it does with his imitators.

Giovanni Boccaccio, 1313-75.

Boccaccio was a scholar possessed with the imagination of a poet, a ready wit and the charming manner which secured for him, the bastard son of a merchant, the welcome of princes and the love of a princess. His com¬ prehensive soul and rich nature epitomize his age and country. ITe is delighted with the dis¬ covery of an ancient manuscript, first realizes the

greatness of Dante's poem and spreads the knowledge broadcast; yet though abounding in literary work and scholarly study he finds time for business and also for public affairs. (I1 FilocoloP

The

tility of invention or of adaptation, the abundance of familiar detail cave us unsur¬ passed pictures of Neapolitan and Florentine life of the time. Knights and princes, artists and poets, gentlewomen and merry wives, friends, friars, hostel-keepers, shrewd mer¬ chants and lusty clerks, all move and speak in the gay medley of real life. The attacks on the clergy were warranted by their immorality, and Boccaccio's obscenity completes his picture. He borrows from all sources, chiefly from French fabliaux , with the one purpose of correctly rep¬ resenting the real world around him : its in¬ terests, its virtues, its vices. He is a pagan, as are the shrewd, prosperous Florentine pagans about him, those whom Carducci calls il popolo grasso, enjoying life and indifferent to any future finality. His only reverence is for Art, which he worships so ardently as to have given to his own work a correctness which ranks him as one of the intellectual triumvirate that molded the Italian language, and even the very spirit of the nation.

In perfect contrast with the irreligious and artistic world of Boccaccio and his imitator Franco Sacchetti and their disciples, loomed a great ascetic spirit, an inspired apostle, who subdued the fiercest and humbled the proudest, by declaring the simple message of Jesus Christ; an illiterate woman of humble birth, Santa Caterina da Siena. Unquestioned faith in her¬ self and her holy mission gave authority to her word, eloquence to her epistles and reminis¬ cences, most uncommon among Italian writers of that or any other period. It is another miracle of the power of Faith.

Il Quattrocento — 15th Century. The Re¬ naissance.

If the quattrocento (15th century) seems to have produced little that is memorable in Italian literature, the barrenness is only seeming.- It was a seed-germinating century, wedged in between the glorious 14th and the brilliant 16th century. A century of progress in classical studies, a period notable in the evolution of the national conscience. Petrarch and Boccaccio only a little forestalled their countrymen, and "Humanismˆ soon spread over all Italy.

Whether the word ˆhumanism® be given its Latin signification of

gentleness, courtliness; or is understood as emphasizing the human rather than the religious ideal it equally accorded with the Italian 15th century spirit — a spirit of rebellion against the papal and imperial in¬ fluences which dominated the Middle Ages. Italians have always claimed to be the inherit¬ ors of the Roman world, and to have uninter¬ ruptedly continued the classic tradition, and the

claim was certainly justified at this time, when Latin civism was asserted in the free Comuni, when emphasis was given to the Latin language, and when under the patronage of Cosimo de Medici, in the Accademia Platonica, meeting in the villa belonging to Marsilio Fieino, learned scholars and philosophers, in purely pagan spirit, disputed respecting Plato's and Aristotle's dogmas. Some timid priests, it is true, opposed this humanism, which, with its pagan myths, philosophic inquiry and sensuous beauty threat¬ ened the Church's supremacy. But soon schol¬ arly and epicurean prelates and popes (Niccolo V and Pio II) were themselves seduced by

humanism, and turned the current of reviv¬ ing philosophy and letters to the adornment of the Church, if not to the increase of her faith.

These literati were obsessed with admiration for letters and ancient manuscripts and espe¬ cially for elegance of Latin style. Yet they were more than mere pedants. Working away from the individualistic ideal of the trecento, they broadened the range of studies, in the universal Latin language which they called Lingua Nostra, opened a large field of investigation to the hu¬ man intellect, now released from the limitations of scholasticism, helped the progress of human¬ ity and taught princes and potentates to pay homage to learning. The second half of this century was marked by the fall of Constanti¬ nople, which left Italy the sole surviving warden of classical tradition and its princely courts the only asylum for fleeing scholars and philoso¬ phers. The invention of printing spread learn¬ ing and literature among large numbers. The splendor of newly established courts, each eager to make the people forget their former liberty; in Rome the returning popes, in Naples the House of Aragon, in Ferrara the Este, in Flor¬ ence the Medici and others only less bright because of their lesser importance, all exerting their influence for the glory of letters.

Neapolitan literary life was in the beginning aristocratic, Latin and scholastic ; a concourse of rhetors, grammarians and linguists, of whom Gioviano Pontano (1426-1503) and Ja¬ copo Sannazzaro (1457-1530) are types. Pon- tano's hexametric ˆridanusC and hendecasyl- labic (Seu BaiaeP imitate Ovid and Catullus, and sing of lustful love. Sannazzaro's (Arca- dia> presents with more refinement scenes of pastoral life, pictures of innocent gaiety and simple stories of love veiled in melancholy. Florence was not more world-famous for her commerce than for her glorious

triumvirate of trecentist poets, and for possessing the liter¬ ary language. In the Florentine crucible classic and Christian ideals were fused, and from her alembic issued the most perfect ex¬ amples of humanistic literature. Lorenzo de' Medici correctly represents these Florentines over whom he ruled. His admiration for every form of beauty, every phase of human thought; his preference for classic forms, his predilec¬ tion for pompous and bright pageantry, even the drinking songs (/ Beoni), which he com¬ posed in the solemn, almost religious metre of terza rima, are typical. Because he so com¬ pletely impersonated Florence, Lorenzo de' Medici loved Angelo Poliziano (1454—94) and Luigi Pulci (1432-84). Poliziano, beginning with Virgil, rifled his gems from all poetic caskets; yet with such gift of assimilation that his Stanze are more than mere stolen mosaics. Pulci's

But this chivalry of the North, which in the two preceding centuries had so poorly flourished in the soil of Roman civism, in the 1 5th century degenerated into the vulgar po¬ etry of wandering cantastorie ; catering for the amusement of unheroic popolani in the piazzas; and of sudi farragoes of heroic episodes and pseudo-history as (I Reali di Francia, which*

even in this 20th century is still read in many rustic Italian households. Sceptic scholars like Pulci used these popular errant knights, giants and enchanters as a convenient frame¬ work for their own image weaving. Count Mat- teo Boiardo (1434-94), of aristocratic Ferrara, treats his chivalrous heroes with respect. He adorns his stories with classical embellishments, and prefers the gentle knights of the Round Table to the stern warriors of the Chansons de qeste , as is indicated by the very title (Orlando InnamoratoP

There could be no lyric poetry in this age which ignored the charm of intimate self- communion and was content with the popular cansonetta and ris petto, or with metrical imi¬ tations of Petrarch. The religious drama (in a century in which the solitary voice of Savon¬ arola cried in the desert) became an anachron¬ ism. Soldiers with muskets stalked through the scenes of the Sacred Passion and angels lisped the prologue. Even the popular (Santa Uliva) is without literary value. Discarded by scholars, used only for familiar epistle or merry novelle , Italian prose only reaches terseness in the instructive writings of artists like Leon Battista Alberti (1407-72) or Leonardo da Vinci (1452-1519), careless of literary form; and in a few such passionate orators as Savon¬ arola and San Bernardino da Siena whose elo¬ quence is inspired by the intensity of their convictions.

Il Cinquecento. — 16th Century. — Classicism.

The trecento which witnessed the disinte¬ gration of feudalism and the partial destruction of ecclesiastical domination — those two foes of Italian Nationalism — produced Italy's chief lit¬ erary glory, Dante's (Divine Comedy. J The quattrocento replaced the mystic Christian Idealism of the Middle Ages with purely pa¬ gan ideals of human happiness and beauty. It established Italian as the literary language in place of the discredited Latin, witnessed a lit¬ erary assimilation of classic ideals with modern observation, saw an unparalleled development of the artistic sense, a refinement of manners and a fastidious taste which penetrated every part of the Peninsula. The Cinquecento wit¬ nessed the decline of Italian Nationalism. A French army invaded Italy (1494), Rome was sacked (1527), Florence fell (1530) and Charles V was crowned in Bologna (1530) by Clement VII ; strange contrast with so splendid an era in Italian Arts and Letters ! Political dis¬ integration coincided with the integration of the national language, and the spread of na¬ tional literature. This age of foreign and civil wars, of broken confederacies, of traitorous leagues, is the age of the establishment of new aesthetic ideals and forms of composition, and of that sense of finality which indicated the maturity of Classicism. Erudition, disciplined by antiquity, curbed extravagant attempts to create new literary forms. The Cinquecento had all the perfection and all the limitations of undiscussed classicism and aristocratic culture. Popular elements of inspiration in stories of chivalry, sacred dramatic representations, and popular forms of composition, like the ottava, the cansonetta, the comedy, were assimilated by courtly men of letters and the common peo¬ ple retreated from important participation in literary productions.

Machiavelli, Ariosto, Arentino, Cellini, Tasso, represent this 16th century.

Niccolo Machiavelli (1469-1527) is the prod¬ uct of this age. He impersonates that funda¬ mental element of the Italian character — the spirit of ancient Rome. His admiration is for strength and its result — ■ success. The greatest sin is weakness and failure. The weakling, pos¬ sessing velleity without power to compel ac¬ complishment, is despicable. Careless of reli¬ gious dogma, indifferent to moral teaching, the end always justified the means. The welfare of the state is the suprema lex : under his intent observation personages become meaning¬ less appearances, events become important, and beyond the passing phenomena he perceives the everlasting law.

The Florence of the Medici shared Machia- velli's unprejudiced views and even his ap¬ parent contradictions. He planned the institu¬ tion of a republic in his

If Machiavelli typifies the intellectual Ro¬ man element of the Italian race, Ariosto, Machiavelli's contemporary, represents those foreign elements, mediaeval and poetical, which are also a part of the Italian mind. Though he, too, is familiar with classicism and Latinity, they are acquired qualities. It is the legends of chivalry, the chansons de geste and epic poems, which fire his imagination ; and he expresses his poetry in the popular rhyme of the ottava. Ariosto's poetry is bright, spontaneous, spark¬ ling. L' art pour V art was the ideal of this diligent toiler, who without passion, faith, pa¬ triotism or religion, yet labors unweariedly to produce artistic beauty. The world he repre¬ sents, the society that first inspires and then admires his work, equals him in indifference to moral and religious ideals. The (Orlando Furioso^ Ariosto's masterpiece, is an accurate resume of Renaissance sentiment. The para¬ dise of pastoral simplicity which he describes is opposed to the court slavery under which he is restless. In Italy, chivalry was not a tan¬ gible reality but a traditional fiction, a fabric of the imagination to inspire popular minstrelsy and courtly poets, and held together by the gossamer links of a code of gallantry. Chiv¬ alry, like Cinquecento mythology and religion, could no longer inspire heroic deeds or write

epic poetry. Raphael with equal earnestness painted a Madonna or a Galatea, and Titian a Venus or his sweetheart; so Ariosto utilized tradition, legend, imagination in his poem; eager for beauty, and indifferent to the moral content.

Orlando Furioso) opens with the Saracens in France; they have defeated Charlemagne and are besieging Paris. The episode of this war ending in the victory of the Christian emperor, and the flight of Agramonte and his death in combat with Orlando, is the plot which binds together the many stories and endless episodes. The story of Prince Ruggiero the Saracen, and his marriage, after conversion, to Bradamante, the Christian heroine, is a glorification of the House of Este, which was the issue of this marriage. The episode of the fair and frigid Angelica rescued from the sea monster is very popular. Crowds of personages swarm in this poem, so full of imagination and actu¬ ality. Some of Ariosto's heroines are verit¬ able amazons testifying to their love by feats of warlike valor, and contrasting with other heroines, full of sweetly touching timid¬ ity. Ariosto's style and versification are fault¬ less. To have written with such perfect ca¬ dence and just management of measure, it is said he must have thought in ottave.

No history of Cinquecento literature should omit the shadow typified by

Pietro Aretino (1492-1556), the cynic pamphleteer, whose im¬ pudence in selling his defamatory verse, or his silence, is equalled by the immorality of the popes and princes who bought and flattered him. Machiavelli the philosopher has an ideal of virtue ; Ariosto the poet has an ennobling vision of beauty; even time-serving Guicciar¬ dini lives an unblemished life and believes that virtue is a good policy; but defamatory Aretino, son of a courtesan, bullies and blackmails ; like a ravenous wolf he seizes his prey with violence and impudence. He wears his pen like a dag¬ ger, ostentatiously ; he wields it like a coward. He surpasses the villain in the villainy of his libels, and is chief among braggarts. Yet, if we are content to take his viewpoint, his picture of his times and contemporaries is true. In this consists its value in a history of Italian litera¬ ture.

Lyrics, Tragedy, Comedy, Impromptu, Farce.

This Cinquecento , so intellectual and learned, gay and witty, betrays its emptiness in a flood of insipid lyrics, produced in imitation of Pe¬ trarch and Sannazzaro. Brightest exception is Michelangelo, who whether voicing his wrath at political corruptions or singing his passion¬ ate friendship for the widow, Princess Vittoria Colonna, has always strength and nobility of utterance. That same Vittoria Colonna herself wrote praiseworthy sonnets, full of feeling. Tragedy went limping in a moral atmosphere that neither inspired nor could appreciate tragic feeling. The (Panfila) of Pistoia is a clumsy adaptation of Seneca and is typical Giraldi s (1504-73)

There arrives in the development of every race as well as of every individual, a certain period characterized bv great curiosity to be¬

hold itself as in a mirror; an inordinate desire for self-knowledge. The Cinquecento led the Italian people up to that stage of self-conscious¬ ness, hence the popularity of comedy, a form of composition that vividly pictures society and presents its manners and spirit in the idio¬ matic language of familiar conversation. Lewd¬ ness characterizes all these plays, because cyn¬ ical and unconcealed debauch was characteristic of the age. In the palaces of princes, in the halls of academies, in the Parlatorio of every worldly convent, the occasional stage was pre¬ pared; and famous artists assisted in the crea¬ tion of gorgeous scenes and costumes ; while the common people delighted in the popular dia¬ logues (gliommeri) of the Jugglers. Out of this varied material finally evolved two sorts of composition, each having its own audience.ˆ If the dulled palate of the intellectual blase in princely halls preferred the idyls of the Pas¬ toral drama, the larger audiences of the com¬ mon people delighted in the rude wit and im¬ promptu dialogues of the ‘ Commedia a Sog- getto,} spoken in the local dialect. Satire is also a mirror in which the complacent society of Cinquecento delighted to observe its own reflection. Francesco Berni

(1497-1535) held up just the reflection to please his contempo¬ raries. The correctness of his style, the elegance of his verse, made the dainty frame. Berni wrote for the enlightened bourgeoisie of whom he was a part, in that style known from him as Bernesco, a parody of Petrarchism, a mixture of classicism, mannerism and realism; appar¬ ently rude, really fine art. In his Capitoli tercets he laughs at the rudeness or obscenity he records and without bitterness satirizes the immorality of all churchmen, from Pope Clem¬ ent to the poor parish priest, the comfortless hospitality of whose parish house is wittily described in ˆracastoroP

The prose writings of Cinquecento may be briefly summarized in the unassuming com¬ position of story tellers, biographers and essay¬ ists. Giorgio Vasari's (1511—74) (Lives of Painters) is a storehouse of information from which even modern critics are obliged to bor¬ row. Benvenuta Cellini (1500-71) in his

pompous, courtly and refined, in his 200 stories reproduces in another series of pictures the customs and life of his times.

The second half of the 16th century wit¬ nessed a great change in this bright Italian world. The long gathering darkness settled in the double pall of Spanish servitude and Catholic obscurantism. The Italian intelligence has always been either Roman Catholic or ra¬ tionalist. Some, like Machiavelli, have con¬ sidered religion as a question politic or artistic, neither to be discussed nor denied; others, like Savonarola, have demanded a reform of clergy, but not of dogma. But while other countries were shaken by religious storms and persecutions, in Italy there was no strife and consequently no victory. The heavy hand of the victorious papal power was accepted in¬ differently. The Council of Trent (1545-63) enforced discipline, which was resumed in the axiom Si non caste tamen caute and encour¬ aged hypocrisy. The institution of the "Index® comforted timid souls, scandalized by the cur¬ rent freedom of thought and license of expres¬ sion. The Cardinals in Council could neither create a religious spirit in Italy nor seriously reform the clergy; but they did try and par¬ tially succeeded in creating the appearance of this double reform. In the country where Savonarola had been an anachronism, and where Socinius found neither disciples nor op¬ ponents, there could be no real revival of faith; but society asserted the appearance of decency; and literature, assuming the forms of religion, without altering the paganism of its informing spirit, declined into the vacuity and affectation, hyprocrisy, pedantisrn and mannerism, which culminated in secentismo.

Yet two genuine poets and one immortal masterpiece brighten the gloom of the closing Cinquecento. Guarini's (Pastor Fido) and lasso's mark the momentous parting between classical Cinquecento and rococo Sei¬ cento, and they gleam with the beauties of both. This is a new and delicate art. Sensualism is veiled in sweet melancholy, a melancholy as in¬ definite as it is alluring; (a modern expression) and delicacy of images.

There have been privileged poets whose souls have vibrated in unison with an environ¬ ment which they have identified and represented in the serenity of mutual comprehension.

- *There are others, the martyr poets, who have been doomed to live in times and places in bitter contradiction with their own nature: of these the most unhappy is Torquato Tasso. Both the exterior and the spiritual conditions of his life were intolerably miserable. As a man — whether as courtier or as lover; as a spiritual being — both as Christian and as poet, there was eternal warfare between his character, his circumstances and his environment. There was ample cause for his insanity and for his subse¬ quent pitiful death. Tasso's heart full of ten¬ derness and sentiment craved love in the love¬ less circle of court life; Tasso's soul craved the comfort of Faith and of a spiritual religion; and the C hurch gave him sophism and formal¬ ism. He was a feather, beaten and tossed upon a stormy sea. When at last after pitiful mis¬ fortune, imprudence and illness, he was visited by a gleam of glory, cheered by a ray of hope, then he died; he died, and the bells of the cap¬*

ital pealed for his incpronation ; the laurel crowning of the author of (Gerusalemme Lib- erataP

Tasso's great poem glorifies the second Cru¬ sade, the battles between the Christian army under Godfrey of Bouillon and the Infidel un¬ der Aladin. The love of Tancredi for Erminia, of Olindo for Sofronia, the enchantments of Armida s garden; how eagerly have they been lead, how freely imitated! The weakness and yet the charm of ' Gerusalemme) is that this poem, having the heroic or epic form, is lyric and sentimental in inspiration. Modernity characterizes Tasso's poem ; a sympathizing in¬ trospection. It thrills in the immortal smile of Armida's eyes, it is beautifully analyzed in that scene of beauty, the death "of Clorinda. (Gerusalemme) was the last glory of Cinque¬ cento before the gloom of Seicento.

Il Seicento. — 17th Century. — Decadence.

In his (Promessi Sposi) Manzoni has vividly portrayed that wretched contrast in Italian 17th century life between the actual poverty and

weakness, and the inflated magnificence and insincerity which in art produced barroc- chism and in literature produced marinism. What the over-ornamented statues of Bernini, or the fagade of San Mose in Venice are in sculpture, the poetry of Marino is in poetry: productions vacuous in conception, lavish in embellishment. But life is more than poetry and the plastic arts, and these do not com¬ pletely represent the evolution of the Italian people. Though the Seicento is the most barren in the history of Italian literature, it is also the century of such solitary souls as Giordano Bruno, Tommaso Campanella and Galileo Galilei and Paolo Sarpi ; a period of travail from which was born the modern spirit and the beginnings of a new era in Science and Letters and experimental philosophy; the more beautifully bright when contrasted with the surrounding meanness and spiritual poverty.

Secentism in Italy, euphuism in England, le style precieux in France, gongorism in Spain are all equivalent phenomena. The mannerism of this period can be traced back even to Pe¬ trarch, and is seen in Tasso, but it only became overwhelming under the double pall of Spanish and papal oppression that now weighed upon Italy. It was not the special fault of any indi¬ vidual poet or prose writer, though some were greater sinners than others ; it was the char¬ acteristic of the century, this moral inertness, this soul vacuity, this pretension, this imbecility, virtuosity and affectation of glitter that was not gold, nor even pure brass. Love, that informing spirit of all lyric poetry, which had been alle¬ gorical and mystic in the Middle Ages, aesthetic and sensual in the Renaissance, now became a mere rhetorical artifice, a leit motif for infinite melodious and fantastic variations and multitudinous images, and minced and prated in sensual trifles. In the pages of the crowds of epic poetasters striving for immortal¬ ity along the path of Tasso and Ariosto, the word "heroism® echoed as sounding brass and tinkling cymbals. The more religion, morality and patriotism — those great lights of inspira¬ tion — grew dim in the souls of men the more did the marshlight of imitation elaborate with emptiness the pages of these versifiers.

Yet never had the forms of composition been more elaborate and finished ; all the spoils of the past, all the treasures of classicism and Renaissance, were at the command of these witty, refined, but sceptic, wearied and unspir¬ itual poets incapable of either Pagan or Chris¬ tian ideals. Giambattista Marini (1569-1625) is the epitome of Secentism. What Bernini is to Michelangelo, Marini is to Tasso and Petrarch. The same fatuity which multiplies the flowing draperies around the sculptured figures

of the one fills the poems of the other with strained images, extravagantly expressed. Marini, with his ample imagination, familiarity with classic models, facile devices of lewdness, grossness of detail, excessive ornamentation, extravagant metaphors, remains a curious document of the degree of aberration into which a civilized so¬ ciety can fall at some turning point in its evo¬ lution, when the intellectual lights of the past have grown dim and the beacon fires of, the new age are not yet perceived. T oute societe a la poesie qu'elle merit e and Marini's

Alessandro Tassoni was a man discontented with his own lot and who perceived the empti¬ ness of the world about him. Witty, pungent, impudent ; his invectives, libels and satires struck everything he disliked, especially the Spanish oppressors of Italy and the sometimes subservient Savoian princes. His (La Secchia Rapitaˆ was the sort of ridicule which could prove effective, but his critical essays

Francesco Bracciolini's (Scherno degli DeP is a parody of mythological legends, and Lo¬ renzo Lippi's

On 5 Oct. 1690, in San Pietro a Montorio was held the first meeting of the Accademia della Arcadia. The patron saints were Theoc¬ ritus, Virgil and Sannazzaro, the protecting deity Gesii Bambino (the Child Jesus) as a symbol of purity; the emblems were a rustic zampogna wreathed with laurel, the constitu¬ tion a mixture of archaism and affectation, the aim a return to Arcadian simplicity, the means an artificial refinement of both manners and language. (Arcadia) has had many literary sins laid to its charge, and justly; nothing could be worse than its axiom that nobility of literary composition was to be obtained through imitation; but the follies, puerilities, affecta¬ tions and dilettantism of Arcadia was a symp¬ tom rather than the cause of the current literary corruption. Giambattista Zappi, Eus- tachio Manfredi and Paolo Rolli are among the less forgotten poets of (Arcadia) and Carlo Innocenzo Frugoni (1692-1768) the last and most extravagant.

Seicento produced no Italian tragedy wor¬ thy of consideration, though the attempts were numberless; usually imitations from the Span¬ ish drama, or founded on some episode of the Gerusalemme or the Orlando. Giambattista Andreini's (Adamo) provided some scenes for Milton's (Paradise Lost.) So, too, the literary comedy chiefly consisted of imitation or trans¬ lation of Plautus and Terence. Popular com¬ edy (the Commedia dell' Arte) extended its success even to the court of France, though of the Arlecchino , Truffaldina, Brighella and the extravagant enthusiasm for the charming Isa¬ bella and Colombina, there has nothing come down to us but scenario, the plot stripped of the witty impromptu and brilliant dialogue. Initiated by Poliziano's (Orfeo,' Italian opera was gradually taking form. In 1600

Rinuccini s (Euridice) set to the music of Peri was received with favor, and was succeeded by Chiabrera s (Rapimento di Cefalo) with Monteverdi s music.

Justice to this much despised 17th century demands that credit be given to the vigorous writing of the martyr philosopher, Giordano Bruno. A spirit preoccupied by such lofty thoughts could only be eloquent and forceful. The candle he lighted at the stake has con¬ tinued through the centuries to illumine the lamps of the heirs to his ideals. Tommaso Cam- panella, another victim of religious obscuran¬ tism, paid with 26 years of prison and seven applications of torture for his faith in man's perfectibility through science and the help of wise government, as set forth in his Utopian dream, (La Citta del Sole) ; Galileo Galilei (1564-1642), whose wonderful discoveries and miserable fate are familiar, in his famous dia¬ logues) is a master of prose composition. Fra Paolo Sarpi (1552-1623), the champion of Ven¬ ice and antagonist of papal supremacy, in his 'History of the Council of Trent) presents a remarkable example of well-balanced historical information in pure and noble language.

Il Settecento — 18th Century.

Arcadia — Rinnovamento.

Mannerism, affectation and pretension char¬ acterized 17th century Italian literature; the emptiness of the early years of the following century was not less depressing. The Academy of Arcadia loudly proclaimed a return to pas¬ toral simplicity, a reform of manners and literary- taste, and a refinement of language. Gesn Bambino was the patron, and the Pandean pipe the emblem of the puerile association. Among the few silly sheep who have escaped oblivion are Vincenzo Gravina, Paolo Rolli and Carlo Frugoni. There were, however, a few prose writers worthy to be precursors of the Rinnova¬ mento. Ludovico Muratori (1672-1750), in (Annali d' Italia,) recalls his degenerate country¬ men to patriotic ideals, Girolamo Tiraboschi wrote the first complete manual of Italian liter¬ ature, and the philosopher Giambattista Vico (1668-1744), seems to have had prescience of much that has lately been proved by experi¬ mental science.

After the Peace of Aix-la-Chapelle (1748), and the return of the Italian princes to their thrones, ensued an era of social reform and in¬ tellectual activity. The influence of French philosophers, especially the scepticism and

lumanitarianism of the Encyclopedic, spread rapid- 111 Milan, in the hospitable Casa Verri, a group of young and eager intellectuals in-

lnAJU/l/e(ˆ a periodical which from

1/64-66 exercised real literary influence, and Lesaie Beccaria wrote his great treatise on Crime and Punishmentˆ— Dei Delitti e delle rene. Galiani, Algarotti, Baretti and Gozzi \eie worthy critics; on the subject of ((purism® literary controversy was vehement. The con¬ servative Accademia della Crusca opposed the admission of neologisms and foreign words to the language, and proscribed popular phrases ; vyhile the revolutionary Caffe insisted upon en¬ riching the classical idiom by free foreign bor¬ rowings. Melchiorre Cesarotti (1730-1808), in lus ˆSaggio sulla Filosofia delle Lingue) dictated the theory of this rebellion against linguistic tradition.

Metastasio, Goldoni, Parini, Alfieri, are the great writers of the Italian settecento. Pietro Trapassi, known under the hellenized name of Aletastasio (1698-1782), was a facile versifier, and understood the human heart. His tragedies are still admired, and his mannerisms and stage arrangements so universally copied that, with slight alteration of names and appearances, his heroes and heroines still strut the stages of Europe. Carlo Goldoni (1707-95), in his 250 plays accomplished for comedy what Metastasio did for melodrama. His faithful presentations of life are seasoned with smiling humor and in¬ dulgence and make no attempt at philosophic generalization, pathos or passion, while he rep¬ resents 'his corrupt age with a delicacy that is not hypocrisy. He preserves the familiar figures of Arlecchino, Brighella, Colornbina and the other maschere, but gives them new character¬ istics, and observing the classic unities his plays move rapidly, with few episodes or secondary characters. Le Carufe ciozote , Pantalon de' Bisognosi and Tita Nane treat every rank of life with equal indulgence, and their serenity, gaiety and winged epigrams still amuse Italian audiences. In the second half of the 18th century the poet Giuseppe Parini (1729-99), preached the new gospel of humanity. In Parini's chief poem, (I1 GiornoP he satirizes the empty life of a fashionable dandv, whose morning occupation is the toilet; the second part, including the Giovin Signore's attendance on his fashionable mistress ((La pudica d' altrui sposa a te caraf enlarges the scene.

Alfieri (1749-1803) and the Tragedy. — When Alfieri read (Plutarch's Lives, } and contrasted that early heroism with the pusillanimity of his own Italy, he shed bitter tears; and resolved to rouse his countrymen to a love of liberty and hatred of tyrants. He chose the theatre platform in order to reach the largest audience. Discarding all secondary personages, all epi¬ sodical ornament, he surpasses his model, Corneille, in the simplicity of his composition; the dialogue is abrupt, long speeches being re¬ served for declamation against tyrants and grandiloquent expressions of patriotism. Alfieri's tragedies all consist of contrasts between heroes and tyrants, as

Don Carlos against Philip, David against Saul. This eloquent appeal came at the crucial moment, the closing years of the 18th century; it sounded as a resurrection trumpet to the Italian nation, and the dead became alive. Alfieri's writings possess literary qualities, but

they 'are chiefly important for their patriotic purpose and political effect.

Ottocento — 19th Century.

Classic — Romantic — Modern.

The revival of Italian letters was closely associated with those political events of the 19th century which changed a mere expression geographique into a great and independent nation. Never in the world's history has the reciprocal influence of literature and political events been greater than during the Italian Kisorgxmento. This literature was both child and parent of the Italian cry for freedom, both Product and inspiration of the national revolt; the three periods of national evolution corre¬ spond with three phases of literary development. A first period of Classicism® answered to the Napoleonic shadows of glory and dreams of universal empire (1800-20) ; following close on the disappointment ot the Congress of Vienna and the restoration of the Austrian princes to their Italian thrones, the aroused spirit of re¬ bellion assumed the literary form of "romanti¬ cism® (1820-59). When the union of Italy was accomplished and reality failed to fulfil the promises of phantasy, came a third period, one of disillusion and depression, of which the lit¬ erary expression was "realism® ; followed finally by the Terza Italia in which republicans and neoguelphs became reconciled to the mon¬ archy, and literature found its present natural and national channel. Classic with Carducci, aesthetic with D'Annunzio, religiously mystic with Fogazzaro ; with as many divergent tend¬ encies as there are masterful writers to indi¬ cate new ideals, Italian literature has become an Art, worthy of the present, promising for the future.

Vincenzo Monti (1754— 1828) represents the conflicting tendencies of the first period. (La BassvillianaB written in 1793, echoes the gen¬ eral reprobation of republican violence; (Ritorno d'Astrea welcomes even an inglorious peace after the horror of war, Monti gathered honey and perfume from every flower; Shake¬ speare, Alfieri and the Greeks, suggest the heroic note in his tragedies (Aristodemo) and (Caio Graeco } ; his (Bardo della Selva Nera) is imitated from Gray's But Monti's assimilation and sensibility save his imitations from servility.*

Foscolo, Niccolini, Manzoni sang the name of Italy. Their alarum rang out in the silence of a nation's night, they appealed to abstract ideals and

aroused some emotion, but Ugo Foscolo's novel (Ultime Lettere di Jacopo Ortis) awakened the nation. Foscolo's nature was of pure Greek classicism, yet when in this novel he attempted to imitate Goethe's

language ; while in the opposing review // Conciliatore, Pellico, Romagnosi, Melchirrone Gioia and other liberal writers strove to rouse their countrymen to a knowledge of foreign thought and' literature. Their battlecry was ˆromanticism,® because romanticism meant re¬ bellion against every literary, religious or polit¬ ical yoke, and opposition to classicism and everything else favored by the Austrian op¬ pressor.

In the midst of this turmoil loomed Giacomo Leopardi (1798-1837). With craving for beauty, love and glory, with seething men¬ tality, soaring imagination ; this solitary soul, without faith or the consolations of religion, beats and breaks his wings on the iron bars of his spiritual prison-house. One by one all ideals, all aspirations drop from him ; virtue, love, patriotism crumble ; a poet's heart is des¬ olate, empty, despairing; each new pang, each bitter disillusion evokes a poem. (Le Ricor- danze) is the mournful story of love unattain¬ able,*

Alessandro Manzoni (1785-1873) wrote two tragedies, (Carmagnola> and ˆdelchi, ad¬ mired for their resounding verse; and his (Inni SacrP are true hymns of Christian faith; but Manzoni's fame is founded on his novel (I Promessi Sposi* ((The Betrothed*), which is the only great novel of the Italian romantic school. (I Promessi SposP is a faithful mir¬ ror of the moment, though modern Italians dislike to admit that the passive endurance of oppression there described truly represents the national spirit of that period. It is a simple story of love, with homely figures and char¬ acteristic types, round which is constructed a large and life-like historic picture. Once every novelist was a Manzonian. Grossi accepted the master's guidance, D'Azeglio his advice. Romagnosi, the deepest sociologist of < his time, and Rosmini, the opponent of Jesuitism, and many poets, novelists and philosophers formed the Milanese literary group of which Manzoni was the centre.*

Manzoni and Ippolito Nievo will always be contrasted, as will (I Promissi Sposi, and (Le Confession! d'un Ottuagenario* ((The Memoirs of a Man of Eighty*). These novels are the beginning and end of the romantic period. Manzoni lived to see his romance an abounding success, Nievo died before his was published. The very name Ippolito Nievo is an evocation*

of the romantic, rebellious, heroic Italy of which he writes. Like a hero of some legend, Nievo uttered a cry, wielded a sword, loved and was loved, and then in words vibrating with passion, pathos and sincerity he created a marvelous picture of his period, a wonderful presentation of the double evolution of him¬ self and of his Italy. Nievo's life, his novel, his country, each explains the other.

The romantic tragedy was attempted by Giovan Battista Niccolini. His Wrnaldo da Brescia) is an epic of symbols ringing with war trumpets, rather than a play. Italy is here represented by Arnaldo, the papal power by Pope Adrian, and imperial tyranny by Federigo III. Patriotism also inspires the poetry of Berchet, Giusti, Carlo Porta and Poerio Gioacchino Belli (1791-1863) is a master of humorous and patriotic poetry; his sonnets sound the inextinguishable laughter of the Roman people; the tavern and street corner, the priest and Pope, the mendicant and parasite all pass by, as he unrolls his panorama; it is Life,— Roman life. The poetry of Giovanni Prati . and Aleardo Aleardi fanned a flickering flame into the dying embers of romanticism, Giacomo Zanella was applauded for his short poem (Sopra una conchiglia fossile; but soon these pale stars were extinguished by the ris¬ ing sun of Carducci's classic splendor; and romanticism fled from Italian literature when Nationalism, the patriotic purpose which in¬ spired it, was attained. Though true as repre¬ senting a psychic moment, ˆromanticism® was false as a representation of Italian tempera¬ ment.*

Third Period. — After the occupation of Rome as the capital of Italy (1870) — fulfil¬ ment of hope long deferred, — Italians faced many discouraging political, social and financial problems incident to the amalgamation of many petty states into one united kingdom. Litera¬ ture reflected this moment of peculiar per¬ plexity. In Giosue Carducci Terza Italia found its voice ; his soul was the soul of the people, his genius the genius of his race ; the classicism, earnestness, patriotism of his poetry, are those of the complete and complex Italiano ; (Juve¬ nilia) is purely classic, (Levia Gravia is not free from foreign reminiscence, in (Decennalia) and (Giambi ed Epodi) are the impulses of Juvenal, the grandiloquence of Hugo; (Rime Nuove) is the greatest poetry of modern Italy, and is composed in every variety of metre ; (Odi Barbare,* so-called on account of their pseudo-classic metre, are classic reconstruc¬ tions; (£a ira* is an approach to a modern epic. Always Carducci adores Italy; his landscape, his characters, are purely Italian. What beauty in Maria Bionda whose smile is like the sun¬ beam of April novo on fields pied with flowers! How far from "Arcadian® mannerism and frisky lambs, is the life of the Maremma (Idillio Maremmano) plentiful in primaeval plowing, with young men lustful and brave, vaulting on wild horses !*

While poetry flamed, prose literature plodded. Paolo Ferrari and Achille Torelli wrote popular plays and Giuseppe Giacosa held the boards for 30 years. His plays (La Partita a scacchi and (I1 Conte Rosso) pleased Italian audiences and Tome le foglie) and (I1 Piu Forte) display feeling, and oerception of the*

Italian problem of a sceptic nation with an ancient civilization and an outworn faith, fac¬ ing modern civilization. Pasquale Villari's au¬ thoritative histories, (La Storia di Girolamo Savonarola e dei suoi tempi, > (Niccolo Michiavellip and (I primi due secoli della Storia di Firenze, > are not less known through English translation than in Italian ; they are a part of the best Italian literature of the cen¬ tury.

The Novel. — The last Manzonians and some close imitators of the French were issuing a few scarcely read novels when the dispute about "realism® aroused attention and stimu¬ lated writers. Zola's claim of having lighted a new lamp was not questioned; yet Italian literature in every age has shown a direct ob¬ servation of life. What more realistic than some passages in Dante, Boccaccio and Ariosto ? Except for the first few imitations from the French, Italian realism, — or "naturalism,® as they call it, developed in a purely Italian man¬ ner. Individualism is the keynote of the Italian character, and is reflected in that mirror of so¬ ciety, fiction. Love, to the Italian, is the effect of physical sensation, though this often after¬ ward develops into a sentiment. In Rovetta's novel (Mater Dolorosa, > Lalla loves her hus¬ band, yet accepts a lover; Serao's Ballerina is the slave of desire for a man who has never mentioned love to her; Neera's maidens are all swayed by physical sensation ; Fogazzaro's (Daniele Cortis) is almost the only successful Italian novel in which love is conquered by duty.

Giovanni Verga and Luigi Capuana were the first champions of the realistic Italian novel. Verga's representations of simple semi-civilized Sicily are truly Italian. De Roberto, a follower of Verga, has traced an historic picture of Sicilian life. Matilde Serao, after attempting the sentimental novel and the Zolian methods of observation, has successfully blended these two fictional elements in {Suor Giovanna della Croce. > Enrico Butti has given remarkable studies of the modern conscience. Antonio Fogazzaro's novels are an honor to Italy, they unite realistic observation and spiritual insight. Gerolamo Rovetta faithfully represents a so¬ ciety lacking in noble ideals ; his characters are as often sordid as wicked. Salvatore Farina is optimistic, Grazia Deledda feelingly describes her own Sardinia, and De Amicis presents familiar scenes of soldier life and street-car episodes.

In the beginning of the 20th century Gabriele D'Annunzio occupies the first position among Italian writers. He is the most widely read and the most imitated, and he has made incursions into almost every form of literary composition. In his lyric poetry bright images and harmonious rhythm partly conceal the cold¬ ness ; adopting Greek elements in his tragedies, a vague theory of heredity replaces classic fatality, and the undaunted will is substituted for heroic virtue. But D'Annunzio the com¬ plex, refined, egoist and sceptic, cannot grasp the grandiose simplicity of antiquity, — the transcendental self-abnegation which is the finality of tragic art. The pathos of Mila di Codrio, the sentiment of Francesca, even the devotion of Maria Vesta are tainted with artifi¬ ciality.

The immorality and cruel individualism of vol. 15 — 33

D'Annunzio are less repugnant when read in his novels than when spoken in his plays.

Satisfactory criticism by the Anglo-Saxon of Italian literature is difficult, the viewpoints, both moral and aesthetic, being so different. In the Italian psychology there is much latent paganism. This is evidenced in the persistence of classicism in literature; it accounts for the popularity of D'Annunzio. In Italv it is often asserted that the national literary development tends toward a return to Cinquecento ideals, the ideal of the artist careful only for the pre¬ cepts of his own art. But since no nation does ever return to a previous state, and since those predominant factors of modern literature, the novel and the drama, must inevitably reflect the nation's life and be occupied with the themes which appeal to the national conscience, Italian literature will doubtless give increas¬ ing attention to social and economic conditions and the relations of the individual to society. Writers on these subjects will seek for a philosophy of life and emphasize rather the emotion of ideas san the emotion of sentiment. For others, like Fogazzaro, the soul of man will be the arena of supreme strife, and the law of the soul, the relentless despotism of conscience, the subject of supreme interest; while still others, of the D'Annunzio school, will insist on the "humanist® ideal of "Art for Art's sake,® and find in Joy, Art and Beauty, the "fullness of life,® and the subjects for litera¬ ture.

Bibliography. — In General: Garnett's (Ital¬ ian LitP (1895) ; Kennard's Utalian Romance Writers 1906. In Italian — Tiraboschi, G., (Storia della lett. itaP (1805-13) ; DeSanctis, F., (Storia della lett. ital. (1870) ; (Storia let- teraria d'ltalia, scritta da una societa di pro- fessori* (Milan 1897-1913).*

For a study of Dante, there are numerous translations of Dante. Symonds' (Introduc¬ tion to Dante (1890); Dean Church, (Dante* (1878);*

Kennard's (The Fallen God) (1901); Scartazzini, Companion to Dante) (trans. 1895). In Italian — Ferrazzi, G. J., (Manuale dantesco (1871-77) ; Biagi, G. and Passerini, G. L., (Codice diplomatico dantesco* (1895-1903) ; Scartazzini's (Enciclopedia dantesca) (Milan 1896-1905), is of great value. Consult also*

Toynbee, Paget, (Dante Dictionary (Oxford 1914) ; Grandgent, C. H., (Dante> (New York 1916) ; Moore, Edward, (Studies in Dante) (4th series, Oxford 1896-1917).*

For the Renaissance — Symonds, T. A., (The Renaissance in Italy) (Vols. 4-5, London 1898); Gaspary, A., 'Storia d. lett. ital. } (Vol. II, trans. from the German 1900) ; Villari, P., (N. Machiavelli e i suoi tempi) (Milan 1895— 97), translated into English.

For 16th Century Ital. Lit. — Agresti, A., (Studi sulla commedia ital. del. sec. XVI> (1871); Flamini, F., (I1 Cinquecento) (Mihn 1902).

For 17th Cent. Ital. Lit. — Venturi, G. A., in (Giorn, stor. (XI, p. 432 et seq.) ; Alber- tozzi, A., (Romanzieri e romanzi.* For 18th Cent. Ital. Lit. — Lombardi, A., (Storia de lett. ital. nel sec. XVIIP ; Zanella, G., ˆ I costumi del sec. XVIII e la poesia del Parini.* For 19th Cent. Ital. Lit. — Croce. B., (La lett. della nuova Italia) (Bari 1914) ; Sanctis, Fr. de, (La lett. ital. nel secolo XIX* (Naples 1902) ; Croce, B., (La critica letteraria) (Rome 1897) ; Flamini, A., (La litt, ital. de 1868-98) (French).*

Joseph Spencer Kennard, Lecturer at The Sorbonne, Paris, Author of

ˆRomanzi e Romanzieri Italiani , cLa Femme*

dans le Roman Italiend (The Fallen Godd

etc.

23. ART IN ANCIENT ITALY. Italy's

geographical situation extending from north to south and reaching far into the Mediterranean Sea nearly midway between its eastern and western extremities, open on all sides to the migrations of peoples and the activities of com¬ merce, has from the earliest times subjected her to the influence of the civilizations of the vari¬ ous (

There was no true art in the Paleolithic Age, although some primitive Italian manufactures reveal a certain aesthetic sentiment for form and considerable skill in the making. Liguria, the Valley of the Vibrata and the island of Capri, are the chief Italian districts where are found relics of human industry of the Paleolithic Age, but these scanty remains do not permit of the minute classification which is possible for the same periods in France.

The Neolithic period was more productive. Its remains are similar almost everywhere in Italy and in its objective manifestations it does not differ from the character which this period of civilization presents in the rest of Europe. In architecture we have not immense megalithic constructions as in England and France; per¬ haps because the civilization of the Neolithic Age was not prevalent in Italy at the time in which these megalithic constructions were in vogue. Notwithstanding this, there are dolmens in the province of Otranto ; the caves of Liguria are full of neolithic remains ; and the islands preserved for a long period the remains of the population and the civilization of the Neolithic period, and especially of the latter phases of that civilization what is called cupro- or aeneolithic.

Throughout Italy may be found weapons of elegant form both in stone and in copper. Ceramics attained to artistic forms more than any other manufacture, as in the bell-shaped cups and bowls decorated with ornaments crudely cut with a knife, or stamped with wormlike designs, and then filled with a color¬ ing matter; the decorative element is always geometrical. The most beautiful works in neolithic ceramics are found among the insular populations, the Sicilians and the Sardinians, who had for a longer time tried to develop their civilization. Even their architecture made noteworthy advances in this period, perhaps through the influence of the Orient. We do not know if the dwellings of the living had already assumed artistic forms, although the ceilings of the dwellings in the neolithic and aeneolithic ages indicate great progress in roof construction ; they were circular or oval and partly sunk and covered with a kind of cupola. The artificial crematory vaults of Sicily are complicated systems of tombs, which may be compared with the Oriental tlioloi; the nuraghi, the domns de gianas, etc., of Sardinia; similar to the megalithic constructions of the Balearic Isles, or of Malta, and of Pantelleria, are an ulterior and characteristic development of the monuments of neolithic civilization ; there is an Oriental suggestion in the cupolas, the rare spiral decorations, and in some exceptional in¬ stances of fortified walls, or of encorbellement.

In Sicily (probably owing to ZEgeo-Oriental influences), the development of a ceramic art is to be noted which in the subsequent period sub¬ stituted painting in place of incised decoration, with the richness of polychrome ornaments.

In regard to architecture, the new people of roving habits, accustomed to living in marshy plains or on the lakes, brought with them a knowledge of building which was better adapted for buildings of wood than of stone. The palisades and the <(ter remare® of Lombardy, which are but the continuation of these, are constructed on strict principles of exactitude, defense and permanence, which we find later in the Etruscan cities (for instance Marzabotto), or in the entrenched Roman camps. Indeed, it is even a matter of doubt with some whether the architectural portions of the terremare should be attributed to these primitive people at all, and not rather to the subsequent Roman buildings. The fact is that the rude manner of life and the low development of the arts do not well accord with such a perfect system of land surveying. The ceramics of these people are of course an imperfect paste, of a dark color, for the most part not well molded, scantily decorated, generally with protuberances or applied ornaments, more rarely with en¬ graven or stamped designs.

The bronzes, on the other hand, show more advanced artistic forms; daggers, lances, arrows and personal ornaments in molten bronze, among which at length appears the fibula, or brooch, while there may still be found orna¬ ments of bone, ivory, amber and other natural substances (shells, teeth), or artificial sub¬ stances, imported glass compositions, etc.

Whilst in the 2Egean Archipelago and in Greece the civilization called Mycenean flour¬ ished, in the third and second thousand years

before Christ, there was in the Mediterranean basin a continual coming and going and min¬ gling of people in active commercee. During this period must have been formed the prin¬ cipal nuclei of Italian populations that figured in the dawn of history. A great part of northern and central Italy was occupied by the Umbri ; the central east and the south by Osco-Sabine populations ; in Liguria, in the islands and the extreme southern portion there survived prim¬ itive stocks such as the Liguri, the Siculi, early Sicilians and the Sardinian and the Messapii. In the upper eastern corner the Illyrian migra¬ tions continued which gave rise to the civiliza¬ tion of the Veneti; then in the central part, on the Mediterranean or Tyrrhenian side, there arose the splendid power of the Etruscans ; while, later, there descended from the Alps the Celts, and Greek colonies invaded the South.

Each of these peoples for a time held a certain supremacy over considerable territory and represented a certain phase of Italian art and civilization. The most splendid and most characteristic phase of the Iron. Age in upper Italy

is that found in the Felsinean (or Bolog¬ nese) territory corresponding to that on the other side of the Alps called Halstatt civilization.

The incinerating tombs in the last period are ornamented with stelai, or narrow slender slabs of sculptured stone above the surface of the ground. The metallic ornaments and bronze weapons are partly of molten work, some filed, some in relief and some carved and engraved.

The ornamental designs are evidently in¬ spired by the geometric forms of contempo¬ raneous Hellenic civilization. With the prog¬ ress of Mycenean decoration we have the gyrate, the wolf's tooth and the double spiral.

The broadsword belts of laminated bronze are beautiful ; the swords with hilt in form of antennae ; 'the poniards, etc.

Almost contemporaneous was the civiliza¬ tion of Venetia. The shapes of the vases are various; their characteristic decorations are first the bright stripes of red and black, then the impressions, then the incrustations of metal bosses. Great is the variety and richness of the pendants, tassels and amulets : sometimes fantastic animals double-bodied, in evident geo¬ metric style. Later appear the laced garments, and the famous situlce, finely worked in relief in long circles representing living scenes, festi¬ vals, hunting parties or simply animals running, as on the Corinthian vases.

In central and southern Italy. (

In the south of Italy, before the Greek colo¬ nizations, there was an extended Italian civili¬ zation ; but it fused with Sicilian elements which always predominate. In the extreme eastern limb, the Sallentine peninsula, we find among the Messapii survivals of a local civilization which developed under the Mycenean influence.

Characteristic, for instance, is the ceramic art which lasted until a late epoch with forms of a conca, or water vessel, of trozzelle, and with vivacious bright-colored painting, of which the elements are partly geometric, partly floral forms. It was at exactly this period that in Sicilian ceramics polychrome art found its widest and most varied application.

Another element of Italian art which started in the south and extended to central Italy is the civil and military architecture. In Lucania we find more rustic, and perhaps more ancient, instances of these constructions called Cyclo¬ pean or Pelasgic, which are found in a more perfect or earlier phase in central Italy. Here are also found walls of support for terraces, such as the Cretan, streets, sustained on sloping sides, bridges, hierons, altars, or central tem¬ ples, etc.

Exhaustive researches are still necessary to settle finally the disputes as to the antiquity and origin of these constructions. There are three hypotheses : either they derive their origin from the megalithic constructions of the Neo¬ lithic Age, or are an importation of the zEgeo- Mycenean architecture, or are an imitation of the Hellenic fortifications of later times.

Central Italy was soon made to feel the in¬ fluence of a remarkable people who, inhabiting a beautiful country, were endowed to an un¬ usual degree with a love of life and the artistic spirit.

The Etruscans present a problem in the history of ancient Italy which the unwearying efforts of learned men of two centuries and vast and profound excavations have not yet been able to solve. Apparently the better theory, however, considers the Etruscans a peo¬ ple differing from the other Italian races, as immigrants perhaps from Asia Minor. All students agree that the ancient inhabitants of Tuscany developed on Italian soil a peculiar form of civilization in which art had a great field of expansion and which exercised a power¬ ful influence on the neighboring or subject peoples. At the end of the 10th century b.c., or before that, we find in Etruria new forms in architecture and in the industries, which are the most ancient arts.

Civil and military architecture in Etruria was displayed in the fortified cities, where they had not the structure and the archaic forms of the so-called Pelasgic cities, although the same roof construction prevailed. The most ancient instances are those of Rusellse, Cosa and Fi- esole; at Populonia we find the intermediate phase and at Volterra and Cortona the more progressive form.

*In architecture, and especially in sepulchral architecture, *there are remarkable survivals of Mycenean types. The decorations of the gate of Felsina with two heraldic animals facing each other has a parallel in the Gate of Lions at Mycene, and true and regular tholoi, or circular buildings, such as the sepulchral cham¬ bers of the Tumulus of Petriera near Vetulonia, and the tomb of Cuma, recall as do some others the barbican vaults in the celebrated treasuries of Mycene. Still more characteristic bee-hive forms are seen in the ancient Tullianum at Rome and ogival sections of the fountain at Tusculum, which recall the Mycenean roof structure. Later on, as in Greece, the sepul¬ chral vault was more commonly in rectangular*

form with sloping roofs, copied from the houses, of which wre have effigies

on several urns and sarcophagi.

One of the merits of Etruscan architecture is, that it developed curved lines in roofs, fol¬ lowing a principle of Oriental architecture, that is to say, the invention of the arch and the dome formed by wedge-shaped pieces of the building material converging toward a common centre.

The most ancient examples, however, do not appear to go farther back than the 6th or 7th century b.c., as for instance the so-called tomb of Pythagoras, near Cortona.

On these principles the Etruscans were able to build roads, bridges, subterranean tunnels for drainage or aqueducts, and to build gates in their cities of enormous size, as, for instance, that of Volterra or the later one of Perugia.

As regards the edifices, we must suppose that the early wooden structures continued until considerably later times and we see imita¬ tions of them also in stone, as in the section of a tomb of Corneto. Through maritime com¬ merce with the Orient and Greece, the Etruscan architecture developed on Greco-Ionic models, of which the Tuscan style affords an example.

Recent discoveries prove that even in more modern buildings the foundations were con¬ structed after the Mycenean pattern. The ex¬ cavations at Marzabotto show the plant of the Etruscan cities. The city faces east and west ; its two principal streets, the Kardo and Decu- manus, formed a cross; in the centre of the cross is the Templum, and the four principal gates are at the extremities of these two cross streets. The Etruscan temple was rectangular upon a high base, sometimes a simple cell with pronaos or portico in front of the cella, but more often with three alcoves for the three idols, Jove, Juno and Minerva.

The form of the Italic and Etruscan dwell¬ ing differs from the Greek dwelling, is Oriental in its origin, and was brought into Italy by the Etruscans. This is the origin of the Roman donms, though so modified that the primitive form is almost unrecognizable.

In Etruria, plaster was used chiefly for the ornamentation of edifices, especially of temples, in which terra-cotta ornamental designs in dif¬ ferent colors were applied. But whether owing to the lack of a material suitable for sculpture, such as marble, whether through the practice gained in this decorative sculpture, coroplastic made great progress in Italy, as we see in the written traditions which celebrate, for instance, Damophilos and Gorgasos, the decorators of the temple of Ceres, and in the museums where

it figures as the principal art of the Etruscans. Remarkable examples of the archaic period are the sarcophagi in the Louvre, the British Mu¬ seum, and the Museum of the Villa Giulia in Rome, and the Ionic decoration discovered in recent times on the face of the temples of Luni, of Falerii and of Arcevia.

Modelling gave the Etruscans special oppor¬ tunity to practise the art of portraiture. Natu¬ ralism, sometimes carried to caricature, may be seen on some of the most ancient, on the cineraria busts, called canopi, such as those of Chiusi. The Tyrrhenian sculptors knew how to trace accurately physiognomical traits ; they were the true creators of the art of drawing from nature, which we find later in Roman art,

and renewed again in the Renaissance in the works of Donatello, in Etruscan ground. The Ins imaginum in the noble families encouraged this characteristic side of Italian art, but the true incentive was in the peculiar disposition of the Etruscan stock.

Next to coroplastic, but more rare, is the sculpture in soft stone, clay, rotten stone, nen- fro and peperino; which acquired a more dig¬ nified aspect by means of plaster and colors. In time these materials were also substituted for wood in the construction of more important buildings.

Painting was also extensively used by the Etruscans. The immoderate luxury of their life and the special care devoted to the dwell¬ ings of the dead caused them to place their tablets inside the tombs, concealed from public sight. From this it is argued that painting was also frequently used to decorate public and pri¬ vate buildings, of which no remains have been preserved.

The most ancient examples of mural paint¬ ing are found in the tombs of Veii, depicting animals of Oriental form, and in the slabs of Caere in the Louvre, with scenes relating to the religious ceremonials of the dead.

The richest and most varied sepulchral paintings of the beginning of the 6th century are found to-day in the necropolis of Corneto (Tarquinia), and at Orvieto (Volsinii), and Cervetri (Caere). The favorite subjects are those which, while representing material joys of life, as well as the basest and most cruel, seek to enliven the Elysium of the dead, per¬ haps with scenes of funeral ceremonials or his¬ torical events or the terrible scenes of Inferno, peopled with demons, evident prototypes of the Tuscan religious paintings of the Middle Ages. These paintings reveal the influence of Greek art, especially of Ionic art; the imported vessels (cups, bowls, etc.) served as an inspiration to the local artists, but the sentiment expressed in the subjects, full of mystery and ferocity, and the heavy and vulgar style of the

faces are sufficient to reveal the different character of the Etruscans.

The Etrusci tried also to imitate the beau¬ tiful ceramics which were brought from the best Greek manufactories; but it is hard to say how far they succeeded. They rather be¬ came specialists in the manufacture of the buc – chero, a dark pottery for funeral uses. Cer¬ tain copies of metal house utensils derived from the Italic clay paste, but perfected on Greco-Oriental models, soon became an Etruscan specialty, and in later times acquired the deli¬ cacy and lightness which is lacking in the more ancient type.

They were recognized as masters in the fusion of metal, even by the ancient Greeks. They executed a great number of works of industrial art, rising even to great sculptures, as in the Capitoline Wolf at Rome, the Arrin-gatore of Florence and other statues and statu¬ ettes scattered about in the different museums.

They were unsurpassed artists in the work¬ ing of gold. It seems as though they had in¬ herited from all the ancient people their special arts: from the ˆEgeans, filigree work and granulated work and glyptics ; from the Egyp¬ tians and the Phoenicians, enameling and glass compositions (pastes) ; from the Syrians and

other Asiatics, molding and carving; from the Ionians, the ornamental designing of fantastic flora and fauna, already reduced to decorative use; from widely separated sources the arts of blending different woods, of soldering metals and of wood carving.

From the most remote times we find in the Etruscan tombs ornaments of Oriental charac¬ ter, finely worked in gold, electron, silver, etc., mostly fibulas, belt clasps, necklaces, etc., as at Vetulonia, Caere, Praeneste, Cuma, about which there has been much discussion ; some archaeologists maintaining that they are of Greco-Ionian or Phoenician manufacture; others, that they are of local art. This last opinion seems now to be the most trustworthy. Later we find, especially in southern Etruria, chests decorated with the finest engraving, an art which became localized through the Latini of Praeneste, a technical art which was greatly employed in the manufacture of mirrors and which succeeded in imitating the celebrated Phoenician drinking cups.

In all the industrial arts the Etruscans ex¬ celled. The few remains we have of carved ivory show a perfect knowledge of intaglio. They were less happy

in the manufacture of money, which they learned probably from the Greek colonies of southern Italy.

Altogether, the Etruscans were a people eminently gifted with the artistic sense; they had the merit, through their conquests, by which they dominated a great part of Italy; or through their commerce, of diffusing also this branch of their civilization, the further histori¬ cal civilization of Italy, upon which was laid the foundation of the Roman power that con¬ quered the world.

The Etruscans had as competitors for the domination of Southern Italy, the Greeks, and as rivals in commerce the Phoenicians, espe¬ cially those of Carthage. But these had no standing in other countries but a commercial one; their influence was not that of colonizers. A people that is essentially practical, and with precise ideals, can never have a true and individual art of its own. Hence the Phoeni¬ cian influence in art in Italy, is quite incon¬ siderable, in spite of some of its special mani¬ festations in the colonies of Sardinia (as in Nora), and of Sicily (for instance, Eryx, with its walls). Besides this, the Italian spirit and the Etruscan were profoundly diverse, and agree only in anti-semitism.

The Greeks, on the other hand, who colo¬ nized Sicily and the extreme lower part of Italy in the 8th century, and who also had perhaps a commercial influence, if they were not true colonists in the. earlier times, entered as the principal factors into the classical civi¬ lization of Italy, investing the Etrusco-Italian civilization with elegance and refinement of form, without changing the substance.

We must remember that in one period of Greek history, Magna Grecia found itself in a more • flourishing condition than continental Greece, and that artists found in the west a better field for the exercise of their art than in their own country. The principal Greek colonies in Italy were of Doric or partly Doric origin ; hence Peloponnesian art was readily diffused in Italy. The Doric temples of Se- geste, of Selinunte and of Posidonia, of the 6th century, recall those of Olympia and Eginn.

Sicilian sculpture is similar to the works of Olympia; is seen also perhaps in the less archaic metopes of Selinunte, resembling the works of Kritios, and the acroterii (Ionian) of Locri.

The numismatic art of the Syracusans was unexcelled, and their coins stamped with the signature of Euainetos are the most beautiful specimens ever executed, even when compared with those made in Greece itself.

Tarentum was not only the commercial but the artistic centre. There are

said to have ex¬ isted manufactories for bronze molding, for gold work and for ceramics, the products of which are found all over Italy. One of the most singular manifestations of Greek art on Italian soil is ceramics. This 'western ceramic art differed from that of Greece, as well in a freer, clearer design, in a greater richness of coloring and greater size, suitable to a bar¬ barous style. The subjects, even the mytho¬ logical ones, deal chiefly with funeral ceremo¬ nies, for which they were exclusively destined.

Meanwhile the power of Rome increased, and its dominion extended, and in it was grad¬ ually concentrated all the Italian spirit, laying the foundation of its various elements. Rome, originating in small Italian beginnings, had soon received with Etruscan domination the spark of civilization and prepared itself now to absorb Hellenism. The outcome of this was the classic western civilization, the civilization of Rome.

Early art in Rome was essentially Etrus¬ can. That is shown by historical tradition and by the earliest, most archaic, monuments. Let us take, for instance, the tomb of Romulus in the Roman forum, the temple of Jupiter Capi- tolinus, etc. The mural paintings of the Esqui- lines preserve the Etruscan character, although of more recent date (2d century). They belong to the historical class, and in this class, to be exact, we must place the works recorded by tradition, naming as artists Fabius ((the Painter,® Pacuvius, M. Plautius, Lycon, etc.

The monuments of the period of the re¬ public partake of this Etruscan character with Greek habiliments ; such are the constructions in clay, whether they are fortified walls, in isodoma work, where the vertical joints of one course of stone are immediately over the centre of the blocks in the course below (Rome, Ardea, Tusculum, Satricum, etc.), or whether they are the most archaic temples of peperino ornamented with polychrome stucco work (temple of Victory on the Palatine Hill). The very city of Pompeii, the best preserved of Latin times, has a foundation of Etruscan char¬ acteristics, later Hellenized.

In architecture the Romans made great use of curves and of arches, which they learned to construct from the Etruscans, and they em¬ ployed these forms in the most ingenious ways such as in the long line of aqueducts, the bold bridges, the triumphal arches, the super-impos¬ ing of several tiers of arcades, in which people pretend to trace the Hellenic influence, even to the cupolas, among which the vault of the Pantheon, reconstructed by Hadrian, is con¬ spicuous for its amplitude and solidity.

Toward the end of the republic and at the beginning of the empire, there were introduced into Roman architecture, together with diverse materials, different artistic forms.

Bricks of solid clay, well shaped and of regu-

lar form, small dice of tufa, or simple chips and splinters of Hint pebbles, were collected into a solid mortar with chalk and pozzolana (a fer¬ ruginous stone from the volcanoes of Latium or Campania). The solidity of this material allowed of new constructions, especially the crossed arches and ample arcades. As regards architectural ornamentation, the Romans, be¬ sides the Tuscan, and the three Greek styles (with preference for the Corinthian), made use of a new style of architecture, the Composite, which was the outcome of the blending of the Ionic with the Corinthian.

In plastic art, the Romans soon became the servants of. the Greeks, whose admirable works obscured the rude local sculpture. Only in portraits did the former maintain, until the time of the decadence, the value of nature. Sculpture at the time of Augustus tried to imi¬ tate the best models of Attic art; the most per¬ fect of the monuments built in the Golden Age of Rome was the Ara Pacis, the culminating symbol of Roman civilization. And into his¬ torical reliefs, inspired, it may be, by Hellenic models, they knew how to put fresh life, as is shown in the reliefs on the triumphal arches of Claudius, Titus, Trajan and Marcus Aurelius and in the admirable sculptured recital of the Dacian wars, which surround the column of Trajan like a scitala, copied afterward in the column of Marcus Aurelius. The Roman con¬ suls, in their war boot}'-, and the pro-consuls and the administrators of the provinces, enriched the country with true works of original art, de¬ spoiling Greece and the Orient. What they could not steal was copied and the copies were made with the fidelity of perfected mechanical methods. The passion for collecting art works prevailed among private persons, and Greek artists came to Italy to establish their studios, attracted by this mania of the rich Romans.

The artists of the family of Polykles were called by Metellus ; Apollodorus, Apollonius, Glycon, Cleomenes, Antiochus are names of artists that may be read on famous statues in the Italian museums, such as the Torso of Belvedere, the Farnese Hercules. Avianus Evander was a celebrated sculptor in the service of Antonius, etc.

Pasiteles was the founder of a school which flourished in the latter days of the Roman republic and the first of the empire; a school without originality, and which, following the archaistic fashion of the times, copied and adapted earlier models and composed untruth¬ ful work. Among the products of this school are the <(Orestes and Electra® of Menclaus, in the

Ludovisi Gallery, the (

Nero, Hadrian, Marcus Aurelius, Heliogaba- lus, Alexander Severus, were true and real artists ; Hadrian left us a work of architecture, the temple of Venus in Rome, while the Greek, Apollodorus, architect and sculptor, created the admirable works which commemorate the glories of Trajan.

To the architects and sculptors of Imperial Rome, the decoration of the rich tombs, which extended for many miles beyond the gates of the city, was a fruitful field. All the most varied forms of mausoleums found a place there, from the modest sepulchral to the altar-

tomb, and from the sarcophagus to the colossal tumulus richly ornamented, as for example the archaic tomb near Albano, still of Etruscan type, and the sepulchre of Csecilia Metella on the Appian Way, of the latter days of the republic.

The Italian form of the tumulus, erected on a circular base, still prevailed; but the treat¬ ment was Hellenized. The Imperial tombs of Augustus and Hadrian still preserve that form as a foundation, while in the architectural adornment they are inspired by Hellenic monu¬ ments, such as the mausoleum of Arsinoe in Samothrace. But there are not lacking im¬ ported, or purely Hellenic forms; shafts, cediculce, little temples, or perhaps exotics like the Egyptian pyramid of Caius Cestius, or the turreted tombs with steps, as if several buld- ings were placed one on the other ; as, for in¬ stance, that of the Julians at S. Remy and that of the Secundini at Treves.

Roman painting of the more prosperous times remains only on mural decorations, and it is easy to form an idea of what the easel paintings and those in the technical art of encaustic were like. If one may be permitted to form a conception by the reproductions of paintings large and small in fresco on the walls, by portraits like the mummies of Faijum, and if the <(Muse of Cortona® were not a mere Renaissance imitation, it is certain that Roman art was not less advanced than Hellenic art. But it was just this resemblance to Hellenic art which deprived the Roman paintings of originality, unless it be that the works of a na¬ tional art parallel with that of historic sculp¬ ture have been lost.

Decorative painting may be studied in the few examples that have survived in Rome (the house of Livia, the auditorium of Maecenas, the thermae of Titus), and in the much-visited examples in the houses of Pompeii, but they are provincial art. Similarly with painting, mosaic and stucco decoration developed (as in the so- called Farnesina house, the tombs of the Latin Way, etc.). Besides this, the artists of the Renaissance preserved sketches and designs of mural paintings, since destroyed, and it was from this art

that the school of Raphael drew inspiration in its <(grottesche ,®

It has been possible to reconstruct the historical development of this Roman art. The works of the firs.t period resembled marble de¬ signs ; the second period developed an architec¬ tural style with effects of perspective; the third, a richer style with portraits interspersed; the fourth was ornamental and overladen with fantastic architecture, with scenes painted ac¬ cording to nature, alternating with copies of the most celebrated antique painting, sometimes most archaic. The prototypes of this pictorial decoration of the Hellenic epoch exist, or may be sought, in the islands of the Aegean Sea, in Asia Minor and Alexandria.

Mosaic and the opus sectile, or colored mar¬ ble inlaid work, were also of Oriental origin. In the most ancient mosaics with large tiles or stones and few colors, the motives are simple; divided into mythological figures, animals and fishes. Then there were represented, in a greater variety of colors, fishes and other ani¬ mals, little tables covered with the remains of the meal, until with a more refined technique

(opus vermiculatum) they made regular and true pictures, hunting scenes, as in the great mosaics of Praenestev and gladiatorial scenes, as in the mosaics of the Thermae of Caracalla, and contests in the arena, etc., and even such elaborate pictures as the battle of the Issus, found in the house of the Satyr (Faun) at Pompeii, and now in the Naples Museum.

In industrial arts the Romans, especially in the provinces, obtained fresh results. In the history of Italian ceramics, the production of types derived from the Greek ceased with the Calenian manufactories, and in Etruria arose the manufacture of vases and the plastic orna¬ mental work of Orvieto, then the delicate cups of Arretium, made of the finest clay, sometimes silvered and gilt, in the work of the Alexan¬ drian toreutic. The names of these manufac¬ turers are known : The celebrated Canuleius, Gabinius and Attilius and Popilius Attius, and it is supposed that these vessels were not imi¬ tated directly from the gold and silver vases, but from cups in relief of Megara. The glass industry, which throve principally in Cisalpine Gaul, blown and colored, or turned on a wheel in the style of glyptics as in the murrince cups, and the vasa diatreta, or even in the style of cameos, little by little supplanted terra-cotta for table use. Also the vessels made of precious metal kept alive the traditions of Alexandrian art, and we have an example of it in the rich silver furniture of Boscoreale.

In glyptics, the Romans continued the tra¬ ditions of Greece and especially the Hellenistic traditions in the great historical cameos. In the art of working in gold they remained in¬ ferior to the Etruscans, although they sur¬ passed them in artistic designs inspired by the Greek models.

What the art of the cabinet maker was able to produce in Roman times is found in the scarce specimens of furniture, inlaid with ebony and ivory, and encrusted with metal and precious stones, engraved or in relief. It is worth while here to recall the beds (in the Palazzo dei Conservatori at Rome, in the museum at Naples, and in the Kircherian Museum), the litters (in the palace of the Con¬ servatori), the tensa Capitolina, and the ivory beds of Ancona.

The weapons of war also present rich deco¬ rations, especially those for parade, the Impe¬ rial arms (the sword of Tiberius), or the glad¬ iatorial weapons (Naples).

The limits of this article do not permit con¬ sideration of the arts of calligraphy and min¬ iature, so richly developed in the Middle Ages, as seen in the beautiful codices of Virgil in the Vatican, and of Terence, and the Iliad of Milan; the classic age did not lack the taste for art in books, which is shown in the beautiful shape of their characters, as well as in the scenes which illustrate their books. To the Romans belong, above all the classical nations, the merit of giving an artistic shape to the letters of the alphabet.

But the very power of Rome which extended itself over a great portion of the known world was the cause of her decadence. Whilst the new classical civilization diffused itself bene¬ ficially in barbarous countries and art in these places assumed a provincial character, Rome absorbed fresh ethnical elements, and with these the germs of artistic decadence,

The mania for obtaining grandeur through hugeness, richness through a plethora of orna¬ mentation, was the cause of this decay. The baroque style was the sign of a similar artistic decline in more modern times.

In the public edifices there was already to be noticed this exaggeration : If, for instance, one stood before the forum of Caesar, and the forum of Augustus which surrounds the beau¬ tiful temple of Mars Ultor and the forum of Vespasian and the so-called forum of Nerva, in which is seen the most refined minuteness of ornamentation, proper in the second style of the 1st century, and then before the immense forum of Trajan, an admirable group of edifices, worthy centre of a capital of about a million inhabitants, one would see already in the Golden Age the tendency to excessive immensity. And it As still more instructive to compare the Thermae o f

Agrippa and of Titus, elegant and moderate in size, with the enormous construc¬ tionsˆ of Caracalla and Diocletian, where the amplitude of the arches becomes gigantic, and the incrustations of colored marble give the whole an Oriental polychrome character.

The Orient, that land of the origins of civ¬ ilization, has disburdened many times on the young West the ardor, the softness, the ex¬ uberance of its thousand years of civilization.

Plastic decorative art had a similar course. Compare reliefs on the arches of Titus and Trajan, which latter with its three arches shows an amplification of the pure Roman arch of the Golden Age, with the superimposed lifeless figures on the arch of Septimius. The monotony of the motives is reflected in the particulars ; for instance, in the parallelism of the folds. Only in portraits was the characteristic style kept alive.

And when Constantine, improving on the various elements of the better times, of Do- mitian and Trajan, gave orders to compose a monument of this order, the few reliefs that were added were, like the ivories of the Diptycha, like the Christian sarcophagi, the Omega of classic art and the Alpha of mediae¬ val art in Italy.

There, is little to say about the minor arts in Italy in the centuries of decadence. Deco¬ rative painting was to a great extent supplanted by mosaic, the opus sectile, by tapestry and textiles. Gold work began to take on barbaric forms which came from the peoples of the North; the fibulas with rays are an instance. Glass work, the flourishing art which also came from the barbarians, continued to produce many tinted and artistic vessels, and glassware, encrusted with gold in engraved designs, and the enamel in colors which was introduced into mosaics, became the fashion.

In Roman art during the decadence there were in embryo all the forms of mediaeval art, and in treating of this, we must consider the Roman monuments of the 4th century. Who¬ ever, therefore, studies classic art may be said to have exhausted his list in the artistic ex¬ amples of the 3d century.

Bibliography. — Fowler, Harold North, (A History of Sculpture) (chapters (Etruscan Sculpture5 and (Roman Sculpture, 5 New York 1916) ; Martha, Jules, (L'Art fitrusque5 (Paris 1889) ; Mau, A., (Pompcii, Its Life and Arts, trans. by F. W. Kelsey (New York 1900). Also the first volume of Venturi's great work*

(Storia dell' Arte Italiana) (Vol. I, Milan

1901).

Lucio Mariani,

Professor of Archceology, Royal University of Pisa.

24. HISTORICAL SYNOPSIS OF ITALIAN ART. From the time of Constan¬ tine to that of Justinian the Latin nations have garnered the inheritance of former ages and transmitted it to the modern world. Beneath many a layer of Hellenic art in Imperial Rome may be found meagre, crude and simple efforts which, on the decline of Roman splendor, fairly represented the artistic potentiality of the Latin race. By constant remolding these became the consecrated forms of Pisano and Giotto, just as on the decadence of Roman culture the noble and dignified language of Cicero and Tacitus was forgotten in the vulgar expressions of a common speech which by slow transformation became the language of Dante. So this art of rustics and peasants, obeying no classical -rules, was nevertheless influenced and enriched by all the prevailing Graeco-Roman forms whose types were in evidence everywhere ; in the workshops of stone-cutters in Rome and in the provinces, even as far as the southern boundaries of the Roman and Phoenician colonies in northern Africa. The conservative spirit of the people of the Middle Ages clung to this nucleus of art; for it was a precious legacy from Rome to the young and almost savage West. Simple and modest productions of Christian art also con¬ tributed to this legacy. In the Catacombs were depicted humble memories of splendid secular life as well as tender renditions of Bible stories or of scenes suggested by the imagina¬ tion of the early Christians.

Both Eastern and Western Christians had, in common, artistic traditions when representing Biblical themes. Some of these symbolical types, and the very lines of their composition, were used to and through the Middle Ages. Many artistic types of this period are lacking in imagination, borrowing nothing from the antique ; yet despite time's additions and modi¬ fications, despite the restraints imposed on them, they are clearly early Christian types.

Again, there are Etruscan elements that enter into the arts, just as the Romance lan¬ guages possess groups of words derived from old Italian dialects. These indigenous artistic elements can be traced through centuries ; for they were not annihilated by meeting even a triumphant rival nor by any Occidental immi¬ grant. A study of the relations of Etruscan to Roman art reveals a series of important facts as we trace in them the vestiges of Etruscan civilization, reminding us of the de¬ tritus of mountains which

goes to form the fertile soil of the valleys.

From Byzantium — which was in close con¬ tact with the immortal art of ancient Greece — and from Syria, Asia Minor and Egypt there came westward, but chiefly into Italy, many new, rich and splendidly vital forms that were handed down from generation to generation, like songs and legends.

German elements produced no important de¬ viations. The Roman tongues became richer in warlike words ; but barbarians, like the Lom¬ bards, who had no individual architecture, could not make any contributions to art. When

Roman art lost its majestic dignity, barbarians came to dress it with many-colored vestments resplendent with rubies, and other precious stones, brilliant clasps and necklaces of glass and amber set in gold. The arrival of the Lombards in Italy marked the period of _ ex¬ treme decadence; now began the use of animal forms in decoration, hitherto peculiar to Ger¬ many, distinctly mediaeval in character with pro¬ cessions of gryphons, dolphins, serpents, lions, leopards and centaurs. The pictorial treatment of everything was rigid and formal ; human beings, wild beasts and plants were equally un¬ recognizable.

From the 7th to the 11th century Italian art slowly elaborated the traditions of decadent times, repeating uncertainly and often childishly hereditary forms. There was no revival dur¬ ing the Lombard rule. Before the revolt of the Iconoclasts, Italian art had reached the ex¬ treme limits of decay; and at this period By¬ zantine art could not have found a refuge in Italy. Feeble, persecuted and condemned by those who should have supported it, the art of Byzantium lacked energy to impress itself any¬ where. The zeal of the Iconoclasts helped, nevertheless, to advance art ; for some ancient types became steadily more and more obscure, mysterious and detached from everyday life. Naturalistic decorations supplanted sacred rep¬ resentations; and multitudinous animal forms, even pictures of hunting and fishing, were re¬ tained by mediaeval artists.

Coincident with the political re-establish¬ ment of the Western Empire, Carlpvingian art endeavored to reconstitute fragments of classic days. Through Cassiodorus' influence ancient manuscripts were transcribed in the monasteries. There was, also, a revival of architecture; and the Italian, Teodulfo, built the basilica of Germigny-des-Pres. Lombardy, being influenced greatly by the Carlovingians, built churches and illuminated manuscripts. The golden altar of Saint Ambrosius, in Milan, the gift of Arch¬ bishop Angilberto II, was the work of Vuol- vinio. Completed in 835 a.d., — in the Carlovin- gian era, — it is the chef-d'oeuvre of Italian gold-

work.

In various parts of Italy there were, at this time, artistic revivals ; but before Italian art assumed its own peculiar form it was to be influenced by the art of Byzantium that flour¬ ished during the 11th century, whose beauty was similar to that of ancient Greece. After the 11th century art sought to adapt itself to out- of-doors, air and light. New expressions ap¬ peared and in the 12th century romantic art was flourishing. Towers now rose like lances from plains teeming with life; castles were built and cities were encompassed by walls and fortifications. And amidst all these rose the cathedral. Rude at first were these expressions of life's activities; but work refined them, and for their erection stones were chiseled and caverns cleft in the mountains of Luni, Verona, Lombardy and Istria. Few were the produc¬ tions that exemplified the value of ancient art, except in Etruria, where various Artinians seemed to have descended from above at Ris- toro d'Arezzo : — Wiligelmo and Nicola deco¬ rated the cathedrals of Emilia, borrowing ideas and methods from sarcophagi and classic mar¬ bles. Nicola established a lasting style upon

the Italo-Greek vases of Apulia, and Syracuse took the columns of the Athenian temples as models for her Christian edifices.

In the soul of Romanesque art ancient art survives; there remain in it traces of triumphal arches, thermae, theatres, forums, reflections of provincial rustic Roman forms, the legionaries, the sarcophagi of the Roman decadence (Bassi tempi) and primitive Christians; but the aspect of the fine arts changes and varies, owing to the tendency of the indigenous Latin elements to resolve themselves into national forms, just as the langue d'oc and langue d'oil are different from the language del bel paese dove il si suona. From the ancient stem of Roman art new sprouts appeared wherever the standards of the Roman legions had once passed. Of the edi¬ fices erected in the Romanesque period few remnants exist. The houses were usually of wood, thatched with matting and straw. Not until the 12th century were laws enacted for roof-construction, in order to prevent fires. In the 13th century palaces were built in the shadow of the towers : — palaces of Reason, palaces of the Podesta and of the Capitano. We still find in Mantua, Cremona, Piacenza, Milan, Como, Bergamo, Brescia, Padua, Vicenza and Monza some of these so-called Palaces-of- the-People, or of the Commune, of the Public, of Reason, of the Consuls, of the Prsetorium or of the Broletto. The timidity and the fe¬ rocity of mediaeval man are shown in the jux¬ taposition of humble homes nestling under the

grim towers of these palaces, as if for protec¬ tion and preparedness against attack. In the 12th century when civil discords were raging, the cities of Lombardy so bristled with these towers that <(Pavia, the towered® became espe¬ cially famous. The very high tower erected at Bologna in the beginning of the 12th century by Gherardo Asinelli and that erected about the same time in the vicinity, near the house of Garizendi, are both famous. Meanwhile, upon the summits of the Apennine hills many cas¬ tles arose ; and chronicles tell of continual in¬ cendiary fires and destructive assaults there¬ upon. The towers of the gates and fortifica¬ tions were crowned with battlements in which were loopholes, the gates themselves being for¬ tified barbicans. The 13th century added draw¬ bridges. From tower to tower men fought as from grappling warships; the vanquished one was razed to the ground. There was a marked advance in the development of Romanesque architecture in Piedmont and Montferrato dur¬ ing the 11th and 12th centuries. Here, as in Liguria, French forms were introduced. The oldest example of the new style in Lombardy is the church of Saint Ambrosius, dating from the beginning of the 12th century. Then in Pavia arose San Michele, a stimulus for the revival of architecture ; and in Modena the cathedral, whose architect was Lanfranco. Subsequently arose the cathedrals of Cremona, Piacenza, Ferrara and Verona; the abbeys of Nonantola, San Benedetto di Polirone and San Zeno di Verona. Several of these structures ultimately lost their primitive form ; but traces of their ancient common origin were not lacking.

Venetian architecture of the 11th century was the full and vivid flower of the powerful republic which, in close contact with the art

of the Byzantine Empire, fashioned itself on the Oriental without, however, rejecting many forms of the Roman decadence existing in Rayenna and Istria. It also embraced the new arrivals from Lombardy by way of Verona. The basilica of San Marco, rebuilt in the sec¬ ond half of the 11th century, demonstrates in the highest degree the importance of Byzan¬ tine art to Venice. Romanesque architecture developed early in Tuscany. Pisa, a flourishing republic in 1063, constructed her own cathedral as Venice had done and about the same time that San Marco was built. In 1013 Lorenzo began the noble basilica on the hill of San Miniato and also his baptistry: HI bel San Giovanni ,® he reconstructed the ancient cathe¬ dral, or church, of the abbey of Fiesole and erected the ancient parish church of Saint An¬ drew in Empoli. There were not many exam¬ ples of Romanesque architecture in Latium. In Umbrian architecture Romanesque charac¬ teristics predominate, as they did in and about Rome. The most complete 11th century Ro¬ manesque structure in the Marches is S. Maria de Portonovo ; but the most splendid is the cathedral of S. Ciriaco at Ancona, restored in the 13th century. In Apulia the earliest archi¬ tectural efforts were made by the Benedictines. In Campania, and notably in

Caserba Ventria, we find Arabic and Norman forms united as in Sicilian churches and parts of Apulian cathe¬ drals. The crown of Norman-Sicilian art is the cathedral of Monreale.

Romanesque sculpture developed in north¬ ern Italy in the cathedrals of Emilia under Wiligelmo and Nicolao; and Benedetto Ante- lami attained considerable eminence as did also the sculptors of Verona and Venice, who re¬ stored the early Christian types. In Tuscany its development was retarded and in Latium (Lazio) it became decorative under the guid¬ ance of its sculptors and of the Cosmati, who supplied ecclesiastical embellishments. In the time of Frederic II it flourished in Campania, Apulia and Sicily. During this monarch's reign the Gothic style prevailed in Apulia, the Basili¬ cata and Abruzzi ; and in the 12th century it became incorporated into the life, traditions and landscape of all Italy. The influence of the Gothic style was disseminated in Italy and Sicily through the instrumentality of the Cister¬ cians. Its starting points were S. Maria d'Arbona and Fossanova. From out the Sta¬ dium Artium of monasteries came artificers, who everywhere introduced the Gothic. Cister¬ cian enthusiasm spread to other orders ; and their themes and elements endured until schools and masters of a new art blended them, where¬ upon they became extinct. The Gothic was thus expanded and consolidated until square and plummet passed from the monks' hands into the laymen's.

In the 13th century (Dugento) pictorial art was still in its infancy. Human sentiments could scarcely be recognized as overcoming the rigidity of the material used to depict them ; yet common objects became motives, supplant¬ ing church symbols : the sweet, everyday events of life instead of formal representations of abstractions; and the flower of youth was sub¬ stituted for Romanesque asceticism. _ Love of nature was manifest from the beginning of the 13th century in Saint Francis of Assisi's ((Can-

tide of the Sun® and this love became more and more potent. JBut in the new art one looked in vain for the cell of reeds of Saint Francis, the poverty that was his bride and the corner-stone, reality. The monk of Assisi talked of love, and art responded in her own fashion by erecting over the remains of the saint the most beautiful house of prayer in the world. II Beato (Fra Angelico), Margari- tone and Ginuta attempted to portray it; but art was not yet competent to describe its pro¬ portions ; it had no words or phrases to express them. From Bertinghieri to Orlandi, from Ginuta to Rainerio d'Ugolino, from Margari- tone to Guido da Siena there is a slow pro¬ gression of low forms. In vain does modern criticism seek to exalt Guido da

Siena and make him the representative of the Renaissance by boasting of his pictorial palimpsest in the public palace of Siena. In the 13th century Roma docet! Torriti created more splendid mosaics ; Pietro Cavallini created with his mo¬ saics and frescoes a new art with an old Roman soul ; Filippo Rusuti introduced contemporary costumes into the mosaics of Santa Maria Mag- giore ; Giovanni di Cosma, in his sculptures and enamels, makes the latter brilliant with cosmatic forms and uses roped or twisted columns in the fagade of an edifice. The Cosmati in the 13th century in Rome was a family of workers in mosaic and tempera. Among these masters we find Cimabue, whose name was Gio¬ vanni di Pepe, who is usually regarded as the founder, the father, of Italian painting. In Assisi, in the calvary of the greater basilica he created the <(Drama of Golgotha.® At the close of the heroic period, wherein Cimabue, Pietro Cavallini and Toriti were the great trio, mod¬ ern art began with Giotto, pupil of Cimabue, and influenced by N. Pisano the sculptor whose style was, later, frequently imitated. Giotto is the first free painter of truth, of life. In the basilica of Assisi he rejuvenated everything, giving free play to his emotional nature, taking advantage of fleeting impulses of sentiment, determining the characters of men and of things. He continued his work of restoration at Rome, Florence and Padua; again at Assisi; at Naples and again at Florence and at Milan, crowning the efforts of the past and becoming the forerunner of those of the future. His genius dominated the 14th century {Trecento) . A whole constellation of artists revolved in his luminous orbit. Giottism is the name of the Florentine style pervading the works of Giotto, Gaddi, Orcagna, Fra Angelico and Gozzoli. It was killed by Masaccio. Throwing aside the royal mantles — Byzantine accoutrements — Giotto draped his figures in the humble garb of the people. He hearkened to the voices of souls, to the whisper of sentiment, to the cry of human passions. Giotto, like Dante, por¬ trayed with rapid strokes living emotions ; now representing Magdalen regenerated by grace, now the blessed Francis who loved the sun, the plants, all his fellow-creatures, — painting the rock on which he rested, the dawn which chased away the darkness and the birds who flew about him who would not injure them. In the church of Arena at Padua, Giotto depicted the Life of Mary ((

her atrocious sufferings to her everlasting joys. In Santa Croce at Florence he depicted John the Baptist, who trembled not before the tyrant and died praying. Saint John the Evangelist, who rose to a contemplation of the mysteries of the hereafter, was another inspiration to his brush, and in the palace of the Capitano at Florence, Giotto painted God sitting in judg¬ ment on the Florentines, both lowly and great, surrounded by a chorus of citizens, among whom is Dante the painter-poet, who gave form to human knowledge.

Venetian and Florentine art met in Florence, penetrated into Umbria, Assisi

and at last into the Marches. At Siena, the city of the Virgin, painting flourished without the dramatic impulse of Giotto, without his human simplicity. Duccio di Boninsegna, who borrowed forms from the Florentine Cimabue, adapted them to the elegance of the Byzantine School, made them splendid with imperial richness and molded them in rigid ecclesiasticism. Simone Martini, generally called Memmi, a follower of Duccio, a friend of Petrarch and painter of Laura, supplemented what was lacking in Ve¬ netian art. Gradually his coloring became warmer and his gold changed to crimson. At Assisi, he worked with his brother Donato; at Avignon he appropriated the colors of the most beautiful gems and founded a school which hastened the advance of painting in France. At Siena, Lippo Memmi, his cousin, produced beautiful works and also at San Gimignano, Orvieto and Pisa. Venetian miniature painters reproduced them in hymnals (books of chorals) and liturgical books; and at Avignon another imitated him in illustrating the parchments of San Giorgio, founded by Cardinal Jacopo Stefaneschi.

While Siena practised the artistocratic forms of Duccio and Simone Martini in contrast with the popular style of Giotto, the brothers Loren- zetti of Venice modified art at their expense. In the. courthouse of Siena, a monument of civil wisdom, decorated in conformity with the doctrines of Aristotle, and at Arezzo, Assisi, Florence and Massa Marittima, the Lorenzetti displayed their art: Ambrosio Lorenzetti. in Tuscan garb, painting the beautiful; and im¬ petuous Pietro, sometimes called Pietro Laurati the rough, savage and dramatic. This blending of the style of Duccio and of Simone Martini with others foreign to Siena, appropriated and assimilated by the Lorenzetti, continues until the beginning of the 15th century in innumer¬ able pictures by the constellation of Venetian artists. The diffusion of the Venetian style was in all directions : it conquered Pisa ; Barnabo da Modena accepted it; Allegretto Ruzi and Fran- cescuccio Ghissi retain traces of it; Andrea of Florence was influenced by it; and Lorenzo Monaco learned much from it.

Giottism held its ground in Florence during the 14th century; but the traditions of Giotto perished with Agnolo Gaddi, whose work was rigid and expressionless. Spinello Arentino awoke from the somnolent Florentine art of the second half of the 14th century and was the forerunner of a style seeking new 'deals, and freshened by study of the antique combmed with that of nature. In this same period Gio¬ vanni di Milano was painting for the city on the Arno's banks, Avanso and Altichiero were

accurate and excellent historical painters ; in some of their pictures, nobles and their fami¬ lies are portrayed being led to the throne of God by their patron saints. With these two men and Antonio Veneziano, or Antonio da Venezia, whose genius is revealed in the Pisan Campo Santo, and Tommaso da Modena, who painted the story of Saint Ursula at Treviso, came the bright springtide of art in northern Italy at the close of the 14th century. Cennino Cennini, author of the oldest Italian treatise on painting, painted about the time of Aretino.

The popular motif impressed on pictorial art by Giotto was similar to that impressed on sculpture by Niccolo d' Apulia (called Nicola Pisano). This style appeared first in Tuscany, at Lucca, in the carving of one of the side doors of S. Martino. Here Niccolo showed that he had seized with great ingenuity the power which is inherent in antique art as well as the fullness and robustness of sincere naturalism. In Pisa he decorated the exterior of the Baptistry. He placed at the junction of the first row of arches and at their crowns (keystones) heads and busts, a restoration of the human motif that comes from genius and forces one to say that modern art spoke, at its very inception, the last word. When, with the aid of his followers, he had completed his great task and was prepared to carve the pulpit of the Baptistry at Pisa, he was accorded the citizenship of Pisa, and was nominated a citi¬ zen in its Hall of Fame. From the pulpit of Pisa (1260) to that of Siena (1266-68) Nic- colo's style spread rapidly. That displayed at Pisa is grander, more monumental; at Siena, more Christian, more dramatic. Under the im¬ pulse of his genius .the monument grew with great unity, though the individuality of the workers was evident, especially of Giovanni Pisano and of Arnolfo. From Siena, Niccolo d'Apulia went to Pisa, thence in 1273 to Pis- toia, and in 1274 to Perugia to work on the fountain of the Piazza Maggiore, brought to completion by Giovanno Pisano, his son. In 1278 died this great sculptor, whose genius was the link between ancient and modern art. He educated Pisa, and Pisa taught Italy. Italy was conquered by the chisel-strokes of the school of Niccolo d'Apulia. Giovanni Pisano, who made his statues eloquent of passion, spread his paternal art throughout Tuscany, Umbria and Ventia; Arnolfo, his comrade, invested his marbles with ancient beauty, and at Rome tri¬ umphantly transformed the art of the Cosmati ; Andrea Pisano cast in bronze the door of the Baptistry at Florence through which modern art passes victorious; in Naples, Tino da Camaino founded a school which, until the Quattrocento, repeated the artistic dictum of the Pisan school ; Giovanni di Baldunio da Pisa brought models to the masters of Campione and Como in his arch of Sant' Eustorzio at Milan. Toward the close of the 14th century the Venetians elaborated new forms in sculp¬ ture, as they had already done in the realm of painting. Farobello and Pier Paolo dalli Mesegne are, among others, specially note¬ worthy. Mesegne worked with

his brother Jacobello. And thus Venetian sculpture found a place in all Italy, from Bologna, where it held the field, to Milan, where the florid Gothic dominated the last of its great structures, the

basilica of Saint Petronio and the Milan Cathedral.

The Quattrocento gave utterance to national ideals, without losing fidelity to nature, inten¬ sity, passion or soul. It did not sacrifice itself for the sake of effect ; it spoke without rhe¬ torical declamation. From forms still crude, from realistic harshness, sprang the most beautiful flowers of sentiment. The True was worshipped with childlike admiration and ten¬ derness. Romanesque art was trampled upon by the Gothic, but not destroyed. Amplified, it came back midst the Gothic resplendently : — it insinuated itself among spires and pin¬ nacles, paused in its experiments, expanded the proportions of structures, rounded off the sharp corners, squared contours and flattened summits. Thus it regained its position and prominence. 4 he antique forms were recast and blossomed again among the Christian. Not forgetful of the .glories and motives of its ancient life, Italian art recalled classic statues; again the nude saw the light of day, even at church portals; for the beauty of the nude figure no longer seemed demoniac, but a gift of God. Art, in its new youthfulness was the forerunner of humanism, of a restored civilization.

Architecture in the Quattrocento received its first impulses from Filippi Brunelleschi, a friend of Toscanelli and Donatello, whose chief cre¬ ation is the cupola of Santa Maria del Fiore. Among his followers, Michelozzo and Giuliano de Mariano are the most distinguished. Leon Battista Alberti, more Roman in his architec¬ ture, designed the temple dedicated to the god¬ dess Isotta by Sigismondo Pandolfo Malatesta at Rimini. Bernardo Rosellius built for Pius II at Piacenza, the Piccolomini Palace, the Com¬ mune Palace, the cathedral, the campanile — a whole city, in fact, of rare elegance.

With Florentine grace and witching deli¬ cacy Luciano di Lamana designed the Palace of Pesaro, the newer portion of the Palace of Urbino, and that of Gubbio for the lords of Montefeltro. Benedetto of Milan built the model of the Florentine city palaces, and that of Strozzi in Florence. Bramante d'Urbino, first in Milan and then in Rome, put the crown of glory on the architecture of the 15th cen¬ tury. Bramante was also a fine painter.

Painting in the 15th century appeared in as many guises in Italian cities as the colors of their flags. The walls of noblemen's palaces were adorned with frescoes and the churches were splendidly decorated. Every public fes¬ tival was a festival of art. If the mysteries, if the comedies of Plautus and Terence were presented; if the crowd proffered homage to their lords, if the princesses were going to church in their bridal carriages, art improvised scenery, arches and triumphal cars. These car¬ ried the maidens to their wedding; and art decorated the nuptial chests (cassoni), painted in those days with pictures from the Boccaccian fable of Griselda, or the triumphs of Petrarch. The anchor, with the Madonna seated holding the Holy Child in Her arms, the illuminated Book of Prayers and the Gentilezze of gold¬ smiths, were other favorite subjects for cassoni decoration. Art in the beautiful Quattrocento breathed in all things; in the Majolica vases, in the embroidered robes, whether velvet or

brocade, on the leather cover of the merchant's ledger, quite as much as on the binding of devotional books. From his beautifully orna¬ mented cradle until he slept under the arches between the chapels, escorted by virtues and liberal arts, man was guided by art. She was in the very air, in the Quattrocento, and per¬ meated social life. It seemed as if on old Olympus the gods must needs clothe them¬ selves in the dress of the Quattrocento and that heroes of antiquity came to life to enlist as soldiers of the

republics and the Italian Signoria.

It seemed as if the biblical characters re¬ vived to take their place among the officials and mayors of the corporations ; it seemed as though God and the Saints descended from the clouds to take human form. Every figure, sacred or profane, allegorical or historical, found, in the society of the artist, his garment, his background. They were no longer conven¬ tional forms ; but imaginary or historical scenes were represented with such simplicity as to make it appear that one had seen them with one's own eyes in the public square, or along the streets of one's city, on the verandas 01 under the wooden roofs of one's own house. To Masolino da Panicale and to Masaccio be¬ long the honor of bringing new ideals to Quattrocento art; of starting the school that culminated in Raphael and the founding of Modern Art. They determined how to place their figures in the landscape; in what planes to put them; and knew and applied the laws of perspective. The human form has its bones covered with muscles and skin and it can live and move in a real world ; — it has an indi¬ viduality. The work of Gentile da Fabriano looked backward; it was still Gothic. Michel¬ angelo said he had a hand as gentile (delicate) as his name. Pisanello painted birds and ani¬ mals and studied their habits, movements and instincts. The influence of these two last- named masters extended to Venice, Lombardy, Emilia, Tuscany, Umbria, the Marches, Rome and Naples. Meanwhile Piero della Francesca was exerting a great influence on art. He taught perspective at Urbino, Senigallia, Rimini, Bologna, Ferrara and Padua and like a comet left behind him a trail of light. Paeioli said of this stern painter that he was ((monarca a suoi di® (monarch of his day). He brought the art of perspective to the same height it reached with da Vinci; his figures stand clearly and luminously in the atmosphere ; his shadows are delicate and transparent and the flesh tints are like faint roses or the tender coloration of spring flowers. He used landscape back¬ grounds, experimented in painting in oiL and knew aerial perspective.

While this Tuscan grace was permeating Italy, Fra Giovanni da Fiesole, better known as Fra Angelico, or il Beato, the blessed, was painting diaphanous saints and angels : vera- mente di Paradiso. His art was a sweet psal¬ mody. The ladder seen by Jacob in his dream, upon which fair angels ascended to Heaven, was seen anew by Giovanni, whom posterity calls the Blessed. He composed sacred scenes with great ingenuity and with a childlike sim¬ plicity. His Madonnas are clothed in Gothic tunics; their eyes look out beneath faintly penciled brows; their form is the lithe, slender body of immaturity. Fra Angelico prayed be¬ fore beginning a picture and wept when he

painted the Crucifixion. His devils are mild, — never devilish.

Benozzo Gozzoli and Fra Lippo Lippi painted more substantially and developed further the forms of il Beato ; but they lacked his ingenuousness. The former was the naif and smiling story-telling artist of the Renais¬ sance; the latter a vigorous, rugged painter, not wholly of the cloister.

Andrea del Castagno and Paolo Uccello, stronger than Gozzoli and Lippi, were not so mystic or contemolative. Andrea had brutal vigor and Uccello tried the nude and was the first to paint battle scenes and to study perspec¬ tive. Persellino, the youthful and gentle, sought for corporeal beauty, and his pictures are full of lively grace. Castagna, Uccello and the perspective laws of della Francesca in¬ spired Baldovinetti, the two Pollajuoli and Andrea del Verrocchio, whose delineations of the human form were robust, correct and of almost a plastic quality. Baldovinetti gained fame from his mastery of minute details. Pietro and Antonio Pollajuolo were the first to reject tempera in favor of oils: they were goldsmiths, niello workers, engravers, perhaps etchers ; and they were the first to dissect the human body for art's sake. Verrocchio, a great sculptor, was the first Florentine to un¬ derstand landscape. His Colleone statue in Venice <(stands for the most magnificent equestrian statue of all times.®

Sandro Botticelli painted for the secular world; he was original, nervous and vehement. Myths and fables were his themes oftener than Bible stories. « A face long, narrow and with full, steadily gazing eyes, has become the ((Botticelli face®; and with the Pre-Raphaelites of England it was revived, especially by the brush of Dante Gabriel Rossetti. In Botticelli the art of Florence became a canticle of spring, redolent of jessamine and roses. Two of his followers, Filippino Lippi and Ghirlandajo, closed the era of <(Quattrocento Florentine painting.® The former had amazing facility, invention, grace and clarity; the latter loved to paint musical instruments as accessories in many of his pictures, and was a great master in mosaic.

Lucca Signorelli, the Cortonese, was strong, quick and resolute ; his pictures are warm, ruddy, sunburnt. He was always a moun¬ taineer, but beneath his rough exterior was a glowing soul. His nudes seem to be hewn with an axe ; but the results are robust, healthy bodies. He has been called the ((Dante of painting® ; but he is par excellence the painter of the nude.

The Tuscan school of the Quattrocento had as the crowning glory of its sincere efforts, of its indefatigable research, the work of the giant Michelangelo, and of Leonardo the prophet of modern times. Michelangelo re¬ mained a sculptor in his painting; his prophets, his sibyls, have the imperial cast of the Moses who is about to arise and terrify with his thundrous tones. He disdained the grace which other painters of the Quattrocento cher¬ ished ; the latter had been prodigal of flowers and smiles when portraying sacred figures ; he infused a sculptural,

monumental grandeur into them. They had refined and prettified everything, whilst he enlarged everything and raised it to sublime proportions. His athletes

wrestled under the vigor of his gaze, or reposed solemnly in their corners. The physiognomical traits of his figures disappear, to give place to the lineaments of the imagination; we can¬ not see into the foundation of the works of Michelangelo, for the man himself, alone, fills the entire space and breaks down the ob¬ stacles and the limitations from within; life dwells in him and bursts forth from him.

Leonardo da Vinci, inspired by his vision of things, impelled always by an irresistible de¬ sire to do something new, restless because of the> sense of perfection, which ever wider horizons had hitherto denied to his attainment, left uncompleted the greater part of his work because he found matter inadequate to depict the soul of things. Sublime in every stroke and in every word, Leonardo, even in his own day, appeared a prodigy. He held the eye of the painters of Lombardy, who revolved about him as satellites about a central sun. The pure ideals and idealism that came from past ages and the accumulated energy of genera¬ tions, all found expression in this marvelous man, who defies study and analysis. He painted two of the world's masterpieces, (Mona Lisa> and (The Last Supper ; and was sculp¬ tor, engineer, architect, scientist, scholar, musi¬ cian and poet. He invented the wheelbarrow and a machine that almost flew, and was the most versatile and fastidious man of the Renaissance. Elsewhere in Italy were men of genius who had new ideals and loved nature. The day came when monographic progress was rapid and when idealism was elevated and puri¬ fied by time.*

In the Marches and Umbria, painting in the Quattrocento chose sacred and allegorical subjects and treated them as though invaded bv the spirit of the people who went through life with a scourge. This degenerated into a forced naturalism and a vulgar conventionalism. Niccolo Alunno, often known as N. da Foligno, appeared sometimes to be a shouting savage, who depicted sorrowful, wrathful, disconsolate figures. Carlo Crivelli, a Venetian, came also to the Marches and gained force in expression, along with exaggeration and grotesqueness. Crivelli looked at the world with the eyes of a magpie, for he liked dazzling colors, gor¬ geousness and splendor. He embossed gold ornaments on his pictures and precious stones were sometimes embedded in the crowns.. Suave Tuscan art, fragrant with spring flowers, breathed upon this region; and the influence of P. della Francesca,

Fra Angelico, Gozzoli and Verrocchio was made manifest, and to a lesser degree that of Perugino, Pinturicchio and F. di Lorenzo.

Perugino invests his figures with a rare grace, although they all bear the imprint of the same model, the same sentiment of devo¬ tion, humilitv and abstraction ; his saints gradually became rosy and ethereal while his other personages are transformed into a monotonous, melancholy and mellifluous type. From the works of Perugino in particular was molded the crowning genius of the ideals of the art of Umbria and the Marches : Raffaello d'Urbino — Raphael. Pinturicchio, frequently the companion of Perugino, was intoxicated with color. Fiorenzo di Lorenzo is vivacious, imaginative and a sure draughtsman. His landscape backgrounds are exquisite. Raphael

exhibited his tendencies in his earliest produc¬ tions. His Florentine figures were incompar¬ ably sweet and delicately reposeful. In later work in Florence he drew inspiration from that ancient art which had dominated the banks of the Arno, as well as from modern sources. When he painted in Rome, this great assimi- lator and eclectic gave us models of consum¬ mate art. Raphael, who at first, like Perugino, delighted to depict the sweetness of the devout Umbrian maidens, passed to the noble ele¬ gance of the Florentines. In Rome he became a child of the South and idealized the vigor of the peasant women of the Roman Campagna, their figures of ample proportions, their skin bronzed by the sun; and of children with large eager eyes and black hair. The last of his pictures was the Transfiguration; his pupils placed the picture at the foot of his bed when he closed his eyes forever, the gentii'issimo Raffaello d'Urbino.

*The Emilian region gave tardy signs of a revival in painting. From the school of Squarcione in Padua, seeds were sown in Emilia. Cosme Tura of Ferrara appeared in the second half of the Quattrocento and became the head of a school. He was like a gold¬ smith, who with hammer-blows wrought figures in sheets of metal and illumined them as from an inner flame. At this time flourished Francesco del Cossa, painting rugged saints, with enamel-like coloring. Ercole de Roberto, Lorenzo Costa and Ercole Grandi were dis¬ ciples of these two masters. Returning from Ferrara to Bologna, several of the Ferrarese masters, — Galasso, Francesco del Cossa, Ercole de Roberto, Lorenzo Costa, — held the field in painting.. A comrade of Costa was Francesco Raibolini, called II Francia, a painter whose well ordered intelligence and simple and pious mind, imparted to his pictures a sense of scrupulous conscientiousness. One of his con¬ temporaries was Francesco Bianchi Ferrari, of Modena, who made accuracy of execution well-nigh a religion. He was Correggio's master and was known as Frare, or ((the Frarre.***

Correggio was the acme of Emilian art. Except for his first figures, which partook of Bianchi's spirituality and solidity, Correggio held his own as a colorist and appeared to derive his tints from rubies, sapphires, topazes and amethysts, from the .pigment of roses, the brightest colors of the rainbow, and was the first to paint diaphanous shadows. Correggio was the painter of light. With his colors har¬ monized like the tones of the lyre, he diffused happiness and joy in the hearts of those about him. In a blending of lights and shadows ap¬ peared his

put strong enthusiasm and phosphorescent bril¬ liancy into his fantastic forms, Correggio en¬ veloped his in the most voluptuous twilight. He cast treasures on the earth, this pittor delle grazie! He was a master of foreshortening and of chiaro'scuro, and with da Vinci the first to paint the smile of woman. His name was Antonio Allegri.

In Venice, painting, which in the 14th cen- turv had not developed as much as in other Italian cities, was given a living impulse in the 15th century by Gentile da Fabriano, Pisanello and still more by that master Squarcione, who was the founder of the greatest school of Lombardy. As on the head of Brunetto Latini there fell some leaves from the laurels of Dante, thus glory came from Squarcione on the head of his adopted son, Andrea Mantegna. The school of Squarcione became widely known. From Negraponte, an island in the ˆEgean, from Dalmatia, Parenzo in Istria, from the Venetian Lake, from the capital of the Estensi and from learned Bologna artists flocked to this school. Above all others, like a giant, rose Mantegna. Mantua was the principal scene of his fame. He had in his soul and in his art the sentiment of Roman grandeur, ex¬ pressed in its highest form in the (Triumph of Caesar, > now at Hampton Court. The classic was his master; and triumphal arches, ancient ruins formed the scenes in which were dis¬ played Christian ceremonies. The sculpturesque figures of Mantegna lacked the atmosphere with which they were surrounded by Giovanni, son of Jacopo Bellini, who with his brother, called Gentile, headed the Venetian school. Giambellino Giovanni, or John Bellini, departed but slightly in his early work from Paduan or Mantegnesque forms. But, little by little, all that he touched took the color of gems ; his shadows became transparent ; his clouds floated luminously through the air and visible harmony permeated all his idyllic compositions. The knowledge and science of Mantegna be¬ came poetry in John Bellini. His sublime Madonnas rose to reign over the earth, with beautiful silver-white drapery about their heads, with opalescent flesh tints, with the sweetest expression, seated on thrones of marble be¬ neath canopies made of golden mosaic.

When Antonello da Messina came to Venice with the ˆsecret® of the Flemish painters, the van Eycks, — the new oil medium, — Bellini ceased to paint in tempera and became a pioneer in the new method. ((He was not an artist, but a veritable school of art® has been said of him. A host of artists around John Bellini became intoxi¬ cated with color: Antonello da Messina and Carpaccio, Cima da Conegliano and Boccacciero, Bartolomeo Montagna and Morescalco, Lorenzo Lotto and Giorgione. Antonello da Messina probably went to Ghent and brought to Venice the new oil, or perfected drying medium. Car¬ paccio is a profound, yet amusing teller of stories in color. Cima's landscape and archi¬ tectural backgrounds are better than his figures. Montagna painted in a low key ; his figures are very dignified and his landscape backgrounds are poetical. Morescalco resembled Montagna. Lotto often imitated Giorgione and Titian and his compositions are at times affected and ex¬ aggerated. At the period of the Bellini colors in painting rivaled those of stained glass win¬ dows from Murano, or rich fabrics from the

Orient — color fairly sang ! Giorgione placed the crown of the Quattrocento art on Venice, but, snatched from life when only 33 years old (he was born in 1477), his task was completed by Titian. Giorgione was like a splendid knight in shimmering armor, conquering the realm of beauty, only to die in the very flower of his life. The versatility of this artist's genius was manifested in the realm of color, in the sweet womanhood of the Wirgin, with long oval face and thoughtful eyes veiled in shadow ; in (Venus) of the ivory skin, who, in draperies of silvery white and red yields to slumber, while the light gleams on her beautiful limbs and the green earth smiles beneath a lightly clouded sky. In every picture he shows the same love of nature in her varied moods, a most delicate selection of all the minutiae, the same noble style, the same luxuriant forms ; a desire for light, air, nudity, beauty. The genius and knowledge of Giorgione resembled those of Titian, although very many modern authorities consider Titian never to have equaled Giorgione in any respect. When doubt exists concerning the attribution of a masterpiece ascribed to either, it is not accorded to Giorgione if it fall slightly below supreme excellence. The two were students together. Titian bathed his canvases in sunlight, made the blood seem to course through the veins of his figures and, with vivid colors, reproduced living flesh tints. The doges, the Emperor Charles V, Philip II, the Medici, the Gonzago, the Estensi, the Far- nesi and Aretino sat to him for their portraits, in which they are immortalized. Titian's daugh¬ ter, Lavinia, superlatively beautiful, still bears witness to the love and pride of her father. When he died, the voice of joy was silenced, the splendor of the Venetian Republic was dimmed. With this cessation of the festal chorus of the last representative of the art of painting transmitted by Giorgione to Titian, Tintoretto appeared, heavy in coloring*

and in thought. He seems to have painted at fever heat, and done in a single day, his chef d' oeuvre, the (Miracle of San Marco, > so strong, full and resolute is his brush. It is as though a flame had darted from the sky and enveloped the earth ; the flesh of his figures is golden, the very marble is gold-illumined; under his hand autumnal foliage takes on crimson tints ; his colors are of flame and his painting is flam¬ boyant as the setting summer sun.

Italian sculpture and painting advanced along similar lines. In the Quattrocento there were pioneers who rose spontaneously to the summit of the ideal and they attained the highest emi¬ nence. Sculpture did not progress, as some have affirmed, outside the sepulchre of classic antiquity, made up of patched counterfeit copies of the antique, New apostles of art, Tuscan sculptors, traversed Italy and conquered it with their chisels. Now splendid monuments and equestrian statues were erected on public squares. Now triumphal arches were built and the churches were transformed into temples of beauty. Florence, the new Athens, as with a winnowing-fan swept wealth and civilization toward her sister cities. The trecento had brought forth great periods of learning, of high¬ est mechanical arts, the seven liberal arts, the seven planets, the seven sacraments, etc. ; but the Quattrocento bore the palm in industrial progress. Zampo della Quercia even sculp-

tured the virtues around the Gaia Fountain at biena as noble matrons, proud of their moral beauty. Learning left its traces on the Quattro¬ cento; but the artists in representing this or that sky seemed to have lost their memory; they made and unmade freely, weaving on a warp that was no longer classic, consigning to oblivion Marciano Cappella and Pendenzio, Cicero and Boetius, Saint Augustine and Saint Thomas of Aquinas. The representations of Old Testa¬ ment scenes, after Ghiberti had depicted them on the doors of the Baptistry at Florence and after Jacopo della Anuncia's work in the S. Petronio at Bologna, no longer bore the same relation to the antique. It was found in paint- lnff> — not so much in sculpture, — that in the desire for monuments much had to be omitted because of unsuitability. This tendency may also be noted in the themes taken from the New Testament, limited to the scenes from the Passion of our Lord. Donatello was the great¬ est among the masters who represented the tragedy of the God-Man. There never was a more violent outburst of passion in art, never a more forcibly shown distinction between the antique and the modern, and never the antithe¬ sis between classic serenity and Christian agita¬ tion. The concentration of the sculpture of the

Quattrocento, shown in some of the most sig¬ nificant scenes in the life of Christ, demon¬ strates that sculpture lent itself to dramatic rather than to historic scenes and preferably to the culmination of the lore which had come down from classical days. Thus in motifs from the lives and legends of the saints, the sculptor synthesized and summed up the chief essentials ; he suggested the scope of unex¬ pressed actions, allowing one to guess at their fulfilment and to prefigure the original form. From the beginning, Donatello's chisel affirmed these artistic aims exemplified plastically in (Saint John the Evangelist and the*

could personify the national tendency to place art in unison with the great memorials of an¬ tiquity, to make it prominent, or to detach it, as in the foundations of the Thermae, the forums and the Roman circuses.

It was natural that on Italian soil there should be a tendency toward a living type, and that art should obey certain laws which rule during certain periods, progressively advancing, augmenting, increasing in size and continually amplifying its chosen forms. But all through the 15th century sculpture was not permeated with classicism as literature was ; it was ani¬ mated thereby when in accord with its character,

it sought the antique by degrees as it came from the purest sources and beheld a vision of an¬ cient civilization that daily became clearer. Its acme of development was at the close of the Cinque cento when it acquired the grandeur of sculptured forms, the complex ingenuity of composition, the restless expression of emotion and began to look at examples of plastic art that had ripened elsewhere, inspired by another civilization. Before this, however, the assimila¬ tion of the antique was gradual and naturalistic art in the Quattrocento was the highway leading to the invasion of classicism.

Italian sculpture was inspired by the antique so that it possessed artistic liberty and a love for the nude. But modern art, ere it modeled the nude and gave free scope, perfected the head and gave the bust a place of honor. Not alone were the features represented, not alone the physiognomical traits, but the individual character, truth to life. Michelangelo omitted even the physiognomy in order to represent the thought. The bust was the portrait of a personality, but it did not fulfill the human de¬ sire to leave a remembrance or to have enduring fame. Monumental art in the Quattrocento found its loftiest expression in the equestrian statues of Ferrara, Padua and Venice; an art that made triumphal arches of the gateways of palaces and castles, that made holy places of mausoleums and mortuary chapels ; an art that peopled altars with statues. Mistress of her tools, Italian sculpture of the Quattrocento an¬ swered to the multifarious needs of the people and diffused itself throughout all the courts, in castles of France, in Flemish guilds, in palace of the sultans and in the royal

residence of the king of Hungary.

At the beginning of the Quattrocento, Nic- colo Lamberti di Arezzo rivaled, with his metal mouldings on the door of the Mandorla of Santa Maria del Fiore, the ancient vases of Aretino; Lorenzo Ghiberti applied the laws of painting and perspective to the door of the Baptistry and transformed low reliefs into pictures full of life. Meanwhile Lucca della Robbia, who had not the high imagination of Ghiberti nor the epic grandeur of Donatello, nevertheless placed amid vases of lilies, Mary, the fairest lily of earth ; and with this sweet image he brought joy into Tuscan life during the Quattrocento. Della Robbia worked in bronze and marble, but is best known as the founder of glazed terra cotta sculpture, made for, and chiefly found in, Florence. His son and grandsons continued his work; but before the close of the 16th century the art was in complete decay. But above all Tuscan masters of this century towers Donatello, who trans¬ lated man, the whole of man into marble, bronze and plaster; whether he placed the valorous knight Saint George (patron of the Corporation of Cuirasses) in a niche of San Michele, or erected rugged and wrathful prophets in the cathedral ; whether he sculptured a dissolute dance of youths or gave the (supposed) bust of Niccola da Uzzano the character of a trib¬ une. For a brief time classicism conquered him after his second trip to Rome; but life once more broke in upon the sacred history of Padua, in the harrassing drama of the Cruci¬ fixion and in the parchments of San Lorenzo of Florence.

Verocchio (((the true eye®) is the name by

which Donatello's follower Andrea di Cione is known. He gave an immortality to Bar¬ tolommeo Colleoni that this great captain s own exploits did not gain for him, even though he was without reproach and threw his gauntlet to the foe under fire and catapult.

Among the other pupils of Donatello is Agostino di Duccio, who, like a neo-Attic sculptor, draped his figures in clouds of tissue and cloth, with garlands, spirals and curves. At the same period lived Desiderio da Settig-nano, who gave his marble a soft vagueness, which seemed to be attained with a feather and not with a chisel. He had great dignity, refine¬ ment and elegance. Mino, his disciple, gave everything a facile, light character as though executed in wax or paste, and was, as Vasari said, more versed in the graces than in the fundamental canons of art. Very prolific and with a peculiar and interesting mannerism, Ber¬ nardo and Antonio Rosellino and

Benedetto da Mariano (da Maiano or Majano), whose works exhibited the effect of study of perspective on sculptors and sculpture, were other pupils of the master. In marked contrast with these is Antonio Pollajuolo, who loved the strength shown in the muscles of the athlete. Their realism is seen in an unfeeling spirit of analysis, in the want of repose shown by the form of the larger extremities, in their knotty fingers and steely tendons. There was striving for effect, indicative of the beginning of a decline in art. When Florence was laying the founda¬ tion of modern sculpture, Jacopo della Quercia at Siena, following Donatello's style rather closely, represented the return of art to the forms of its Etruscan ancestors. His art was free from all grossness; he died expecting his soul to be transformed into that of Michel¬ angelo by an artistic metempsychosis.

A Hercules was lurking in all the marbles Michelangelo chiseled. He slumbered in the white blocks from the quarries of Luni and, awaking, cast far from him like flakes of snow the chips that covered his powerful muscles. And behold ! Moses arose with a look of sub¬ lime wrath and passion, on whose lips were forming words of malediction. Again behold ! the slaves of the Museum of the Louvre, who shudder on awaking and who uphold this old world on their mighty arms. Lorenzo di Medici, the pensive, is another sombre creation of the master, — the Hercules, for once, omitted in favor of princely grace, beneath whose head pauses the shadow of death's wing ; and the "Nigh? (In Notte) who sleeps on the sepulchre of the Middle Ages, shunning the light. Michel¬ angelo is steeped in sadness; over his spirit are cast the shadows of human sorrow. In the midst of their glory his heroes hear the wailing of humanity. He is lifted, however, above the things of earth and touches the heavenly; he exalts his divine sentiment and meets the mys¬ teries of existence ; be builds his art on human tragedy and attains the sorrow of the universe. Michelangelo is the huge limit of modern art, as the marble mountain which he himself carved was transformed into a giant whose crest scales the clouds, shedding waves of light o'er the Tyrrhenian Sea. Michelangelo was this giant on the summit of Italian art ! The other re¬ gions of Italy had not the sculptural genius which combines in itself the multiple forces of production. At Venice the Tuscan masters had

given an impulse to the formation of the new school. Sculpture in Lombardy in the Quattro¬ cento is typified in the statues that adorn the cathedral of Milan. It is recognized with less uncertainty in the second half of that century in the works left in the Carthusian Monastery of Pavia by the brothers Mantegazza and by Amadeo and his followers. The Mantegazzi were noted for their drapery resembling wet paper _«the cartaceous manner? The chef d' oeuvre of the art of sculpture in Lombardy in the 15th century,— the work probably of one of the masters who decorated in terra cotta the cloisters of the Carthusian Monastery,— is the

< Dance of the Angels } in the vaulted ceiling of the cupola of the Portinari Chapel in Sant Eustorzio at Milan. Agostino Busti, called «// Barnbaia ? was an exponent of all the char¬ acteristics of the Lombardy school of sculpture in the 15th century, showing himself, however insatiable in the adornment of his statues and in the decoration of his monuments. From northern Italy the art of sculpture was intro¬ duced into Sicily by Pietro di Bondate, Fran¬ cesco Laurana, and above all, by Domenico Gazini, the master of a school that filled Sicily with statues until well on in the Cinque cento. Antonello Gazini, architect and sculptor, was extraordinarily industrious and productive, ever displaying the native grace and restraint of the Quattrocento. Mantua in the Quattrocento gloried in Sperandio ; Modena in Guido Maz- zoni ; Bologna showed signs of vitality after there came within her walls the brothers Dalle Masezze, Jacopo della Quercia, Niccolo dall Area di Bari, called oftener Niccolo dell' Area, 1414 —94. Sperandio, Andrea da Fiesole and Francesco di Simone da Fiesole, whereupon painting began and attempted to represent the noble figures of Francia.

At the commencement of the Cinquecento, differences in art in the various regions of Italy disappeared. Masters who reflected social life adhered to the costumes of their contempora¬ ries, and displayed the most minute attention to detail and truthfulness in individual portrai¬ ture, were superseded by those who represented traditional costumes, general academic forms and typical truth to type. Spontaneous art was forsaken by the artists enamored of Raphael's lyrical mannerisms and also by men who found inspiration in the epic grandeur of Michelan¬ gelo's decoration in the Sistine Chapel, that most consummate evidence of Quattrocento art. A great national artistic unity began to take definite form, due mainly to the predomi¬ nance of classical antiquity in the new art. The pagan world which art revived represented submission, oppression and inaugurated the Decadence; the word " rinascita }) "Renaissanceˆ uttered by Vasari [that writer on art and artists from whom so many borrow L.H.] believed he saw the salvation of the art in the Cinquecento in imitating classic, antiquity, expresses for us the arrest of Italian artistic vitality. When this vitality began to wane, art had become a servile imitator and sacrificed itself on the altar of classicism. The geniuses (the last sons of the Quattrocento) having disappeared and formula was substituted for sincerity. Raphael seemed everywhere triumphant, imitated by a host of artists ; but his sweetness was not to be found in the frescoes of those who copied him. It seemed as though Michelangelo was to

dominate the world; but the statues made by his nimble, acrobatic imitators lacked the strong breathing-power of his athletes and the terrible grandeur and solemnity of his imagination, ihus art, towards the middle of the 16th cen¬ tury, appeared to be almost completely devoid of inspiration. Imposing masses were used to produce astounding effects ; feeling the chill of immense spaces, they attempted restlessly to enliven them /with strong chiaro'scuro effects and forthwith began to twist, contort and tor¬ ture all forms. They invoked grace and made a grimace; they sought to clothe themselves in great magnificence, but succumbed under its weight ; they endeavored to imitate the antique and produced only a parody thereof. They were co conventional that truth was effaced and imagination played no part. This art, which no longer followed nature, was bowed beneath pon¬ derous reminiscences, like a wrinkled old bom¬ bastic glutton.

The neo-classicists of the Cinquecento, the Peruzzi, Antonio da Sangallo the younger, San- nicheli, Jacopo Sansoverino, Jacopo Tatti, better known, from his master, as Jacopo Sansavino, built edifices of antique solemnity. The old formulas of the ancient orders of architecture were not, as yet, rigidly observed, and archi¬ tecture had still its appropriate colors. The Veronese, Palladio, alone constituted a sort of Roman authority ; called, as he is <(the founder of modern architecture" his was but a masterly revival of ancient styles.

The Seicento (17th century), as if in reac¬ tion against the cold art of the mannerists of the end of the preceding century, chose strong contrasts of light and shade, delirious and dizzy forms. On account of this bewildering art appealing, as it did, to effect, to this magnifying of things, to this superabundance of material, ancient art, the flower of civilization, was cast aside. Even sculpture, under the followers of Michel Angelo in the Cinquecento seemed to be going into decay. Emilia, however, had still the terra cotta frescoes of Antonio Begarelli; Venice was adorned with the works of Jacopo Tatti (II Sansovino) and with the busts of Alessandro Vittoria, who rendered in plaster and marble portraits of Venetian noblemen, rivalling the pictures of Titian and Tintoretto. Painting in the Cinquecento, after the decline of the great generation that issued from its threshold, daily became weaker. Florence, after Fra Bartolommeo who was the first, it is believed, to use the lay-figure, and Andrea del Sarto, called ((Andrea the errorless," so fault¬ less, then, seemed his work, triumphed no longer; Siena, after having enjoyed fresh glory from Sodoma and from its Peruzzi, became insignificant; Parma lost its elegance after the death of Francesco Ferrara; and Mazzola better known as Parmigiano, the two Dossi being artis¬ tically exhausted, the city's quondam splendor became but a memory. When the followers of Leonardo disappeared and when Solario, Luini and Gaudenzio Ferrari died, Milan closed its school of painting. Venice, which like other Italian cities, had been tardy in art

develop¬ ment, advanced the more rapidly in her trium¬ phal career. The contemporaries of Titian, among them Palma Vecchio and Sebastiano del Piombo, Lorenzo Lotto and Bordenone, con¬ tinued the great Venetian traditions, while Boni¬ facio, Paris Bordone, Moretto da Brescia, vol. 15 — 34

Paolo Veronese, Gian Battista Moroni, da Bas- sano transmitted them to all the Cinquecento through their followers.

At the close of the Cinquecento when Flor¬ ence had exhausted her strength and Venice no longer showed her brilliant, glorious, Oriental coloration, Bologna and Naples, which had until then been inferior in artistic development began to dominate, one with the ((eclectic school" of the Carracci, the other with the naturalistic and forceful school of Michelangelo da Caravaggio.

The man who appeared to personify in him¬ self all the art of the Seicento, the most ver¬ satile that Rome had seen since Michel Angelo, was Lorenzo Bernini. In architecture he re¬ tained the monumental feeling; he glorified Michel Angelo unconditionally as an architect and despised Borromini, who, he said, instead of being inspired by the human form, estab¬ lished rules based on illusions. He considered round forms, or those described within a circle, as the most perfect and particularly admired contrast, observing that things do not appear as they really are, but that their appearance is due to their surroundings. Bernini looked at architecture as an art allied to sculpture ; and in architecture, as in sculpture, he saw with cor¬ rect eyes. Bernini was the architect who founded modern Rome.

Bernini brought pictorial knowledge to his sculpture, and his chisel passed over drapery, flesh and hair, ever changing facial delineation, ever varying the tonal effect, but never satisfy¬ ing his inner vision. Sometimes he broke, and in rage, the sketches of his figures; sometimes in lighter mood he spun hair so soft it waved in the wind. The polishing of the marble would make his figures flabby and pendulous ; the draperies swelled like willows in a storm, lash¬ ing the figures and strangling them. Bernini seems like an architect who strives to cor¬ rect nature, which is too weak and contemptible for him who desires to make it gigantic in order that it may impose, subjugate and blast. Ber¬ nini has been called the Rubens of the chisel. He is also said to examplify the Jesuit style — the (< Baroque " — and to have pandered to the poor taste of his day for favor and fortune, while he was the arbiter in all art matters in Rome.

The plan of the Carracci was to return to the antique, but they only gathered the remin¬ iscences of a by-gone great art, to reunite them in eclectic formulae, instead of producing a new, harmonious, potent style.

The trium¬ virate, Annibale, Ludovico and Agostino Car¬ racci, created an Academy of Design, the first type of all academies of fine arts. Endowed by nature more highly than the others Annibale left in the Farnese Gallery in Rome the most splendid example of decorative art of the 17th century. In the princely palaces of Italy, in the vast churches of the Jesuits entered the art of the Carracci to exalt God and man in a lan¬ guage full of eloquence, amid the odor of in¬ cense, gaudy gold objects and a throng that was moved by the surrounding baroque statues. The efforts of the Carracci to impart dignity and vigor to the ancient tree of Italian art were not in vain ; for the school produced Guido Reni, who painted Christ with the crown of thorns, his eyes languishing in pain and sorrow, as though his spirit were striving to return to the light. Albani, painter of cupids, gallant

swains, frail nymphs, coquettish graces; Do- menichino, a Quattrocentisto astray in the Scicento, timid among his bold contemporaries, conscientious among so many that were careless and slovenly ; Guercino, who wrapped his com¬ positions in gloom, enlivening them here and there with rays of light; and Lanfranco, who placed colossi on arches and cupolas, were also products of the Carracci school.

In Naples were other eclectics of greater technical force who painted under Caravaggio and Ribera, the former the <(King of the Dark- lings, the latter a Spaniard, known in Italy as Spagnoletto. Here, too, was the prince of modern landscape Italian painters, Salvator Rosa. In Genoa the eclectics were Bernardo Strozzi, a disciple of Caravaggio; and Benedetto Castiglione, a student of Van Dyck, the great Fleming. This master influenced also a Sicilian painter, Pietro Novelli, called II Monrealese. Tuscany had her eclectics, the more famous among them being the <(sweet Carlo,® Carlo Dolce and the antiquated Pietro Berretini da Cortona, the last-named a decorator who was vulgar, incorrect and mannered and whose work hastened art's decay.

When, at the dawn of the 18th century art began to degenerate, it became gayer, assumed smaller and more cheerful proportions, became sinuous as ivy, twined itself like ivy, moved like a snail, became sketchy, issued in spurts, poured itself forth in sentimental cascades of Arcadia. Human figures lost their bones and were re¬ leased from the prison of enormous mantles of marble amid rocks and clouds, with hair streaming in the wind, their arms in awkward and convulsed gesticulation. Then it was that classical antiquity beckoned anew, a siren lur¬ ing the modern artist. Pope Benedetto XIV from his throne outlawed the crusade for clas¬ sicism ; and

Winckelman suddenly sounded a call to arms around the Greco-Roman simulacri. The antique entered brusquely into the midst of the crowd of cicisbei, and advanced with a frown and looking grave, severe and dominat¬ ing amid the uproar of knaves. It was proper then that art, lacking high ideals, should turn to social life, renewing affectations, but also collecting a treasure of observation and of truth in the hands of Leone Ghezzi, of the Longhi and others. Erudition, philosophy and science entered to arrest art in its search for reality, and Winckelman, with his idealistic enthusiasm for antique beauty, united all in admiration of that civilization which in Pompeii and Hercu¬ laneum arises like a phoenix from its ashes. An exponent of classic art and the founder of scientific archaeology, Winckelman was a great German art critic living in Rome.

Decorative painting in the Settecento (18th century) had displayed its splendors in Venice through the brushes of Gian Battista Tiepolo, Piazzetta and Sebastian Ricci ; but in that cen¬ tury there was, in general, a division in artistic work; some were landscape painters, among whom Zuccarelli, a Venetian is admired; others were painters of ruins and architectural com¬ positions, the best of these being Giovanni Paolo Pannini; and still others painted flowers and fruit, and street scenes. Of these last An¬ tonio Canale called Canaletto. Bernardo Bel- loto and Francesco Guardi were unsurpassed. Ippolito Caffi, killed in the Battle of Lissa, 1866, was probably the last follower of Canaletto.

In 18th century sculpture, Canova was rep¬ resentative of his school, even in its varying tendencies. A terra-cotta relief in the seminary in Venice, shows this master's youthful fond¬ ness for the baroque. Subsequently his style was expressed in an assimilation of the antique. He persuaded himself that it was necessary to look at nature ((with the eyes of antiquity.® But the blending of the antique with the new art was, until the end of the Settecento (18th cen¬ tury) the dream of artists and scholars. To depict faces in whose profiles the forehead and nose were a continuous straight line; the forehead brevis of Marziale or tennis of Arazio ; the forehead of the same length as the nose and equal in length to the rest of the face from the nose to the end of the chin ; to arrange the hair in a curve so as to make the face oval, to mark the fine eyebrows, to round the chin gracefully; — all this was to construct the human body on an algebraic formula. Hence appeared expres¬ sionless faces, oval in shape, with soft effem¬ inate cheeks, the surface of the face rounded and smooth, with curls on the forehead and carefully twisted tresses. These heads did not breathe, but grew artificially in a hothouse, without the warmth of imagination, without the rose of life. Classic art was a fossil tree that can no longer delight men with its shade. Canova hoped that he might cause the trunk of this tree to send forth sprouts and burst into green foliage again ; and full of impulse for classic beauty, he began one of the many return

movements towards the antique which so often started in Italy, at every advance of civilization, all of which have been fruitless. From time to time the tide of Italy's seas ebbs and flows to antique shores, where there are no longer sirens, tritons or nereids.

In vain do we attempt to construct new tri¬ umphal arches, basilicas and theatres on the Roman model ; the opulence and Roman sense of empire are lacking. The various parts of the edifice may have corresponding proportions, measurements marked by square and compass according to the antique ; but the whole result is mechanical, material, pallid, cold. All the ornamentation is volute as with the Roman ; but it has no color and falls into identical stero- typed forms.

The decorative painting of the Appiani at¬ tempted to recall to life the grotesque figures of the Roman thermae and of the houses of Pom¬ peii ; but they were meaningless in their con¬ ventional elegance. All this art passed like a comet which obstructs the light of the sun only to leave long trails in the wretched art produc¬ tions of the 19th century.

The Ottocento (19th century) was the cen¬ tury of archaeology. The art of the past was persistently recalled ; but neither the Cincinnati nor the Coriolani created by the art of the king¬ dom of Italy; neither the lords and ladies under the dazzling Roman sky nor the saints of the Pre-Raphaelites with heads in a frame of gold fastened to their dress can express the new life. At times art idolized classic beauty, and again contorted itself in the neo-Gothic spears; now it had mystic fervor; now it became concu¬ piscent; sometimes it turned towards the grace¬ ful Quattrocento, sometimes toward the solemn Cinquecento, or the ponderous Seicento or the unrestrained Settecento. Thus the art of the past century is without unity, its aims are unde-

fined and its only progress is technical. It would seize upon the past as a plank of safety or it would take refuge in the kingdom of dreams and sail without a compass. But hav¬ ing achieved technical progress and being per¬ suaded that counterfeits of the antique are valueless, having abandoned academic ecclesi- asticism and feeling the need of adaptation to the sentiment of the common people, Italian art is preparing to speak the final word.

Bibliography — Consult Valeri, F. M., (La Corte di Ludovico il Moro) (Vol. I, Milan, 1913; Vol. II, 1915); Venturi, A., (Storia dell' Arte Italiana> (Vol. I, Milan 1901 to Vol. VII, Part IV, Milan 1915) ; Ricci, C., (Art in North¬ ern Italy (New York 1911); Layard, A. H., (The Italian Schools*

of Painting (2 vols., Lon¬ don 1902) ; Marquand and Frothingham, his¬ tory of Sculpture* (New York 1907) ; Muther, R., (History of Modern Painting* (4 vols., New York 1907) ; Meier-Graefe, J., (Modern Art* (2 vols., New York 1908) ; Villari, L., (Gio- vanni Segantini* (London 1901) ; Perkins, C. C., (Tuscan Sculptors* (2 vols., London 1864) ; and (Italian Sculptors* (2 vols., London 1864) ; Champlin and Perkins, Encyclopedia of Paint¬ ers and Paintings* ; Kuhn, (Rome, Ancient and Modern* (New York 1914) ; Crowe and Caval- caselle, (History of Painting in Northern Italy.*

Adolf Venturi,

Professor of the History of Art, Royal Univer¬ sity of Rome, Revised by Professor Leigh

Hunt.

25. ITALIAN ART IN THE 19TH AND 20TH CENTURIES. Whenever sculp¬ ture and architecture did not progress hand in hand with tempera and oil painting in this birthplace of art, Italy, it will nearly always be observed that either sculpture or architec¬ ture was the first to arrive at the acme of de¬ velopment, while the sister art of painting lagged behind.

In the early part of the 19th century there was much activity among Italian sculptors, but this revival, if it may be so called, gave no indication that Michelangelo, Donatello or Verrocchio were to have successors or rivals. Indeed, during the last hundred years the rise and growth of sculpture bear the same relation¬ ship to High Renaissance productions as 19th century paintings do to the canvases and panels of the Cinquecenti.

*Modern Italian sculpture may be said to be¬ gin with Antonio Canova (1757-1822), who in his day was the acknowledged European master of the chisel, a position he kept unchallenged for 40 years, although this (Csoft Bernini,** as he has been called, usually failed when he at¬ tacked large and virile subjects.*

Pietro Tenerani (1798-1869) followed Canova's style, but was much influenced by and shared commissions with Thorwaldsen, the Dane. This indefatigable and clever sculptor often worked the night through, chisel in hand. Tenerani grew rich, honors came to him from royalties and he was made director-general of all museums and galleries in Rome. In 1876 at an exhibition of his works the astonishing num¬ ber of 450 were shown.

When Romanticism followed as a matter of course the period dominated by Canova's marbles, more variety was seen in the choice of subjects: Stefano Ricci is noted for his monu¬ ments ; Lorenzo Bartolini, although somewhat

of a revolutionary, for his classical tendencies; and Luigi Pampaloni for his delightful rendi¬ tions of children. Pampaloni is also repre¬ sented in the cathedral of Florence by two majestic figures.

*Pio Fedi, goldsmith and engraver too, is celebrated for his statue of Pisano in the Uffizzi ; but the work by which he is best known is the ((Rape of Polyxena,** replicas of which were desired by art patrons for presenta¬ tion to the public park in New York and in Boston, but Fedi refused to duplicate his work. Not all of these men were at all times Roman¬ tic, for naturalism and realism were insinuat¬ ing themselves into Italian chisels as well as into the- brushes of painters in Italy and, for that matter, in France, England and America.*

*Giovanni Dupre was more original than his contemporaries. A devout Catholic, his sub¬ jects are chiefly religious; nevertheless, his masterpiece is the Cavour monument in Turin. Vincenzo Vela rose from a quarry-boy to be a distinguished artist; he was dramatic and forceful and is best known by his East Days of Napoleon,** purchased by Napoleon III for the French people and a fine replica of which is now in our own Corcoran Gallery.*

E. Ximenes was technically excellent, and the Lombard — Odoardo Tabacchi was not only an eminent teacher but the sculptor of many statues for the Milan Cathedral.

*Baron Charles Marochetti, whose parents were French and whose capo d'opera is the equestrian statue of Emmanuel Philibert, in Cagliari, the capital city of Sardinia, is repre¬ sented by many and noble works in France, England and Scotland, besides the monuments in his adopted country, Italy. On the Arc de Triomphe de l'Etoile in Paris is his splendid relief ((The Battle of Jemmappes.**

*Scipione Cassano and Giuseppe Grandi are both excellent technicians; the former best known for his lifelike figure of Pietro Micca, the latter for his monument of ((The Five Days** and a beautiful statue of Baccaria.*

*Medardo. Rosso, ((the Mefisto of Italian sculpture,** is Rodinesque, but has more dis¬ tinction than the great Frenchman and has thrown away all the conventions of sculpture that have descended from Grecian times. Velasquez's pictures seem to have impressed upon him a dignified gravity, but some of his recent work has been so extremely lacking in detail that its significance is far from the com¬ prehension of the ordinary lawman who loves art and even of those who devote themselves to its study.*

The scholarly and authoritative article on Italian Art by Professor Venturi brings vividly before us the splendid array of masters from

Vinci, Titian, del Sarto, Moroni, — to name only these, — it is to but follow the Diisseldorf School, the Munich School, the story-telling schools and the chic Parisian <(gems,® wherein grisette and soubrette attract by their <(pretti- ness,®

The mystic English brotherhood, heralded by Ruskin, went to the Italians before the days of Raphael for a sincere basis for their art. Our modern Italians took no part in any such movement, unless the adoption of some of the non-vascular style of the Nazarenes can be stretched into the statement that they followed the Pre-Raphaelites. There is a strange similarity in the kind of painting and in the choice of subject that stamp the beginning and rise of the American School of painting and that of the Italians who (in Italy) devoted them¬ selves to painting within the past century, due, no doubt, to both groups drinking from the same (Germanic) fountain, — the academic. Within the last two decades all has changed; sculpture and painting show the influence of the great motifs animating the Barbizon men, and also that of Rodin, Manet, Whistler and the Luminists.

Centuries ago there was a renaissance in Italy. There are now signs of another, at least in the art of painting, for Italy has been called the (

There was Carnevali, the eccentric, known as Piccio; the two Induni, Domenico excelling in genre, and Girolamo in military subjects; and Cremona, who was perhaps more technical than the Romanticists.

The turbulent Morelli (1826-1901) had a life resembling that of Salvator Rosa. He may be said to have founded the Neapolitan School of brilliant, dazzling, Fortuny-like color. Morelli may have been swayed by the pale school of the Nazarenes, but his pupil, P. Michetti and the younger Italian element were under the influence of Mariano Fortuny, a Spaniard painting brilliantly in the French manner in Rome, whose pictures were ((fetes of the sun.® Among this last-named group is the joyous Favretto, who has been likened to Guardi. His paintings are full of life, animation, splendor and truth. His colors are more tonal than the Spaniard's and his art more robust. His bril¬ liant career was ended before the age of forty.

A. and T. Conti and F. Vinea worked in the meticulous way of Meissonier, painting furniture, costumes, tapestries and the like with astonishing facility, and little else.

Scaramuzzo, illustrator of Dante, who also painted portraits and historical scenes ; and Luigi Serra, a close observer of nature, must be named among

the dextrous draughtsmen in the Italy of to-day.

One of the first men to break away from Romanticism was the erratic and poetic Fontanesi, who seems to have felt the solemn¬ ity of Barbizon.

Boldini, too, came under the thrall of Parisian, Manet-like fondness for flat color.

The figures in his portraits are attenuated al¬ most too much for the effect of the distinction he seeks; and yet one is reminded of Velasquez, from the predominance of lustreless black that were monotonous save for an occasional spot of rose or red, as in his portrait of Whistler.

Professor Simonetti, a pupil of Fortuny, and G. de Nittis, a pupil of Genome, produced chiefly genre subjects.

<(Giovanni Segantini,® says Muther, (

And finally, now that the 20th century art movement is well started, now that art is less national and more cosmopolitan, it is gratify¬ ing to see the young painters in Italy produc¬ ing canvases that are neither reminiscent nor mannered, but work that goes to prove Whistler's dictum : <(There is but one Art.®

Francesco Sartorelli loves boats and shores as the Hollanders do, and the cluttered water¬ ways, tows, festoons of masts and shipping at rest for the night. All these he paints simply and largely.

Pietro Fragiacomo gives vaguelv-massed im¬ pressions of Venice's lagoons and gondolas moored in groups at twilight. His treatment is broad, suggestive and poetical.

A strong and Barbizon-like landscape mas¬ ter is G. M. Zanetti, who has a favorite ((plac- ing® of a sturdy, noble tree in the centre of his pictures, dividing the distant light and dramatic¬ ally silhouetting his central blacks.

A. Milesi is one of modem Italy's many figure painters. He differs from the horde in depicting the prolific peasant-mother mid sim¬ ple but never sordid surroundings and all with¬ out (< Mignardisement ® or sentimentality. He is with and of his people, as is the Frenchman, Jean Frangois Millet.

Beppi Ciardi paints fine cattle in broad meadows and like Troyon, uses the horizontal, undulating line to make the land recede. He is a student of aerial perspective. Guglielmo Ciardi paints moving skies, the broad sea and reaches of land far into it. Less impressive than the others, there is a

straightforwardness in his style that recalls John Constable.

E. Tito arranges his spots, lines and masses so as to beautifully ((pattern® his picture. Drawing is less to him than the balance of color and the <(arrangement® of his motifs.

L. Bazzaro has all the feeling for canals and bridges of a modern Fleming; indeed, some of his Venetian scenes might well be in Bruges or Amsterdam.

G. Carozzi is like the gentle Daubigny in his treatment of quiet streams and river banks at close of day; and the versatile F. Cascano is. as much at home near the flat dunes by a still sea as on a glacier or in Milan's myster¬ iously dark cathedral.

The painters, E. Borsa, G. Belloni, A. Patti

and Emma Ciardi show, as the other 20th cen¬ tury artists do, the extinction of national schools and the struggle for idealistic and healthy Impressionism. Their tendencies are not social, ethical or classical, but poetical and, fortunately, popular.

Leigh Hunt,

Professor of Art in the College of the City of New York.

26. THE NATURAL AND PHYSICAL SCIENCES IN ITALY. Old and young at the same time, Italy combines with the tradi¬ tions of a glorious past in the field of science and the arts, the untrammelled energy of an overflowing vitality in modern times. She boasts among her sons the genial Leonardo da Vinci (q.v.), eminent as an artist and philoso¬ pher, an engineer and a naturalist ; and the im¬ mortal Galileo (q.v.), an apostle of truth and human progress. And if the former, prophetic and solitary on his intellectual heights, did not exercise a great influence on the development of science, it was the latter, on the other hand, from whom were derived those sciences which on account of their methods are called exact sciences, and who had followers at once in the Academy of Cimento which took as its motto the celebrated (

At the close of the 18th century and at the dawn of the 19th century in Italy we see Gal- vani, who in 1791 published his celebrated work, (De Viribus Electricitatis in Motu MuscularP ; and Volta, who interpreted the experiments of Galvani with a greater intelligence and gave rise to a new

branch of physics, the applica¬ tion of which has contributed very largely, next to the application of steam, to the transforma¬ tion of our civilization.

Contemporary with the two above mentioned was Spallanzani, who disclosed the secret of fecundation.

The works of the poet and naturalist, G. B. Brocchi, on the other hand, belong entirely to the 19th century. He shows us the geologi¬ cal structure of the Apennines, and in his works on paleontology unfolds ideas which to a certain extent anticipate the theories of Dar¬ win. To the same period belong the researches of Count Amedeo Avogadro, who was the first to insist on the distinction between atoms and molecules, and who discovered the law that bears his name ; also the ingenious experiments of Melloni, who, through the discovery that heat rays had the essential characteristics of light rays, made an important contribution to the theory of the unity of physical forces, which had also a valiant defender in Father Secchi. We must also mention Dal Negro, who in 1830 built the first electric motor. Toward the mid¬ dle of the century, Corti published his (Re- cherches sur l'organe d'ouie des mammiferesC in which he reveals the mechanism of the audi¬ tory organs, discovering the one that bears his name; Fusinieri, a thinker who has not been ap¬ preciated at his full value, put forth ideas that were strangely similar to the most modern theories on the constitution of matter; and Ascanio Sobrero, in 1847, made a preparation of

nitro-glycerine, which only 15 years later was made an industrial manufacture by Alfred Nobel.

At the present day the scientific institutes and laboratories of the great universities, and even of not a few of the middle-class and smaller colleges, constitute so many centres of research, which, aside from their value to the professors of the special branches of science, furnish their assistants and collaborators and others (out¬ side students), also the younger graduates of the universities, with their first equipment in the field of scientific research. The government observatory of the Collegio Romano (the old Jesuit college) at Rome; the observatory of the College of the Vatican; those of the Col¬ legio di Brera at Milan, of Arcetri near Flor¬ ence, of Genoa, Turin, Padua, Naples, Palermo and Catania, all of which, however, are not equipped with modern instruments, and others of minor importance, are zealously and earn¬ estly devoted to the study of astronomv and celestial phenomena, as well as to meteorology and physical geography. In connection with these last two studies there are numerous allied institutes of which we will first mention the. Central Bureau of Meteorology and Geo-dy¬ namics, which was established by Pietro Tav- chini and was under his direction for many years, and is now under the direction of L. Palazzo. This bureau, besides making daily weather forecasts by aid of the regular

ob¬ servations of a vast chain of meteorological stations, gives incentive and impetus to allied scientific research. There are, besides the ob¬ servatory of the Collegio Romano, which is connected with the above-mentioned Bureau of Meteorology, the observatories of Rocca di Papa and of Vesuvius, established specially for the study of seismic and volcanic phe¬ nomena, the observatories of Mount Cimone (7,020 feet above sea-level), of Mount Etna (9,587 feet) and of Mount Rosa (14,820 feet). By means of its meteorological bureau Italy has been able to join the international organiza¬ tion for the concerted universal study of seismic convulsions, and on the other hand the organi¬ zation participates with the Italian Aeronautic Society and the military Aeronautic corps in international aeronautic ascensions, from which meteorology derives the greatest benefit. There are similar institutes for botanical instruction and study, the first of which was founded in Italy in 1545.

Finally we will mention an institute which, thanks to the noble initiative and generosity of a stranger, arose on Italian soil, and is des¬ tined to pass entirely into the possession of Italy. We allude to the Zoological Institute at Naples, which was founded in 1870 by a German, Anton Dohrn, for the study of marine fauna and has become a model for similar institutes which have since been es¬ tablished at other seacoast towns. It is now being enlarged by the addition of another laboratory for the study of the physiology of marine animals.

In addition to the attention paid to scientific research in the universities and other institutes above mentioned, the scientific life of modern Italy displays itself in the academies, which ac¬ cording to their statutes should gather in themselves whatever there may be of note in

the intellectual ranks of the country, or of any of its provinces, and in the special asso¬ ciations which, in turn, seek for affiliation and exchange of ideas between students in the same branch of science. We shall name among the academies, some of which have already been in existence for a long time and are rich in glorious traditions and illustrious names, the Accademia dei Lincei in Rome, the Istituto Lombardo di Scienze e Lettere in Milan, the Instituto Vento di Scienze, Lettere e Arti in Venice, the Academies of Turin, Naples and Bologna. Among the scientific associa¬ tions we may mention Societa Italiana di Scienze Naturali, the Societa Geologica Italiana, the Societa di Fisica, the Societa Seismica, the Societa degli Spettroscopisti, the Unione Zoologica, the Societa per l'Entomologia, la Malacologia, etc. In addition to the transac¬ tions, memoirs and reports

published by these academies and associations, scientific informa¬ tion is placed at our disposal by the publica¬ tion of numerous technical journals, among which we may mention the Annali di Matema- tica, pnra ed applicata, the Gazetta Chimica, the Archivio Zoologico, the Nuovo Giornale ' Botanico, the Annali dell' Ufficio Centrale di Meteorologia e Geodinarnica, the Rivista Itali¬ ana di Paleontologia.

Passing now from institutions to men, from the work to the authors, and beginning according to ancient custom with astronomy, Italy of our own day gives us men who have acquired a merited celebrity even be¬ yond the confines of their country and outside the circle of their co-laborers in the same path of science. Temple, a native of Germany, who from 1875 until his death in 1889, was the director of the observatory of Arcetri near Florence, was a keen observer and an unweary¬ ing discoverer of comets and of smaller planets. Father Secchi (1818-78), who gained a world-wide reputation for the astro¬ nomical observatory of the Collegio Romano, of which he was the director, devoted himself to the systematic study of the spectra of the fixed stars, of which he made the first rational classification, based on the characteris¬ tics of their light rays. To Schiaparelli (b. 1835), the genial astronomer of the observatory of Brera, we owe the discovery of the relations between falling stars and comets, a long series of exact studies relating to the planet Mars, of which he designed the first chart subsequent to the observations made by him during the planetary opposition of 1877-78, and finally, the establishment of the fact that Mer¬ cury and Venus in a manner analogous to what we know in regard to the moon, com¬ plete their revolution around the sun in the same time that it takes each of them to per¬ form a complete revolution on its own axis. Tacchini (1838-1905), an unwearying organizer, took the initiative, or gave the impulse, in the establishing of scientific and astronomical so¬ cieties. In his own personal studies solar physics predominated. He devoted himself to observing the most important solar eclipses of the year 1870 and later, and discovered the white protuberances in addition to the red pro¬ tuberances. In the same branch of science we have an accurate and efficient investigator in Ricco (b. 1844), who devoted his attention to

terrestrial physics, and especially to the study of Mount Etna, in which field he was pre¬ ceded by the two Gemmolaro and by Silvcstri, and earned the name of biographer of the great Sicilian volcano.

The activity of Vesuvius, on the other hand, was observed and made the subject of study for many years by Palmieri (1807-96). He was also one of the first to apply exact methods to the investigation of the phenomena of at¬ mospheric electricity. And as this brings us into the domain of meteorology, we must men¬ tion Father Denza (1834-94), an earnest worker and investigator, who made noteworthy improvement in the

perfecting of meteorological instruments, and caused the establishment of regular observations in many mountain stations.

It is scarcely to be wondered at that in a country so frequently devastated by earth¬ quakes as Italy, seismology should have found many earnest and efficient students. Among those who deserve first mention is De Rossi (1834-98), although the tendency of his (Meteo¬ rologia Endogena; to establish a connection be¬ tween atmospheric and seismic phenomena cannot be said to be in conformity with the objective investigation of the facts. In the mod¬ ern study of seismology, which pays minute attention to even the slightest movement of the earth's surface, the works and instruments of Agamennone, of Cancani and of Vicentini are of great value.

From volcanoes and seismology it is but a step to geology and paleontology, the funda¬ mental principles of which were conceived, or at least instantly accepted, in Italy, where Leonardo da Vinci saw in some fossil the traces of animals and plants of former ages; where Brocchi, who may be called the father of mod¬ ern geology, recognized the formation of the Apennines; and where Capellini (b. 1833) as early as 1861 developed his course of lectures on the basis of the Darwinian theory. Pilla (1805-43) deserves mention as the precursor of many others in modern ideas ; Meneghini (1811-89) on account of his studies in Italian geology; Stoppani (1824-91), the geologist of Northern Italy, who in his book (I1 bel paese) showed himself a master in the art of popularizing science; A. and E. Gismondi, as at the head of the Piedmontese school; Cana- vari for his (Palaeontographica ItalicaP In mineralogy we have Sansoni (1853-95), the author of classical works on the crystalline forms of calcite; Bombicci (1833-1903); cele¬ brated outside the domain of his special science as the inventor and streuous upholder of the discharge of cannon as a preventive of hail; Viola, crystallographer ; and Artini, geologist.

Turning now to the exact sciences, in mathe¬ matics we find Betti, who taught mathematical physics at Pisa; Brioschi (1824-97), who ex¬ celled in all branches of his science, and par¬ ticularly in the theory of equations and de¬ terminants; Beltrami (1835-1900), who was remarkable for the clearness and elegance of his deductions; and Cremona (1830-1903), whose works in graphic statics and in projective geom¬ etry won him great fame. These were the masters of a host of students who to-day teach and advance their science throughout all Italy. In the present generation we have Dini, who teaches higher analysis; Bianchi, author of

(Lezioni di. geometria differenziale ; D'Ovidio and Veronese, geometricians; Volterra, subtle mathematical physicist ; Enriquez, a mathema¬ tician and philosopher.*

In the domain of physics, the seed sown by the undying work of Volta was destined to bring forth fruit primarily in other lands, where Ohm discovered the law of the electric current, Ampere the electro-magnetism, and where Faraday explained induction and the laws of electrolysis. Nevertheless, in every age Italy has given precious contribution to physics. We need only mention Nobili, who constructed the first sensitive galvanometer, of which Melloni made use in his celebrated experiments on radi¬ ant heat; Dal Negro, inventor of the first electric motor; Mossotti (1791-1863), whose ideas on molecular force contained the germs of certain theories that were developed later by Faraday and Clausius; Matteucci (1811- 68), who conducted many researches on mag¬ netism and on the phenomena of magnetism and induction. Felici (1819-1902), was a pupil of Mateucci, and his researches in electro-magnetic induction, which are admirable for their ele¬ gance and simplicity, furnished him with the subject-matter for a theory of induction which is a classic.

In modern times we name Blaserna, who established the first modern institute of physics in Italy; also Roiti, to whom we owe one of the first exact experiments determining the unity of electrical resistance ; Pacinotti, who as a young man invented an apparatus that later, under the name of Gramme's Ring, became the characteristic part of dynamo-electric machines and of electric motors with continuous current; Battelli, unwearied investigator and unexcelled instructor. Foremost of all is Righi, a profound experimenter, who, in a series of prolonged researches into the electric discharges in gas, made many observations which anticipated the later discoveries of other investigators, and which have acquired added importance in the light of modern theories. By his studies on the subject of electric waves Righi completed the analogy already made evident by the clas¬ sical experiments of Hertz, between these waves and the motion of light, and at the same time inspired the first experiments of Guglielmo Mar¬ coni. Marconi himself, to whose acute per¬ ception we owe wireless telegraphy, must be mentioned in this review; for his work, as well in its beginning as in the later phases of its de¬ velopment, constitutes a splendid application of scientific principles and discoveries, and is a shining proof of the practical value that may be obtained from even the most abstract researches. We must not omit from the list of physicists of the present day, Galileo Ferraris (1847-97), al¬ though he was snatched from his scientific labors 20 years ago ; for his work, through which orig¬ inated the discovery of the rotary magnetic field, which has found extensive application in electric motors, is stamped with the imprint of modern ideas.

Chemistry, the sister science of physics, often finds herself face to face with problems which by their nature are related to both these sciences, or which necessitate the use of methods of study belonging to the domain of physics. Hence, there arose an intermediate branch of science, physical chemistry, in the beginning of

which Italy also participated when Avogadro formulated his celebrated law which correlates the volume of different gases with the num¬ ber of the molecules they contain. Canniz¬ zaro, the Nestor of Italian chemistry of the present day, insisted on the exact distinction between atoms and molecules, which was due likewise to Avogadro. In order to determine the molecular weight of composite substances, Cannizzaro made use for the first time of the density of their vapors. The recent prog¬ ress in physical chemistry, which was inaugu¬ rated some decades ago by the study of dilute solutions, and by the application of the princi¬ ples of thermo-dynamics in the investigation of certain problems in chemistry, was greatly aided by the contributions of Italy in the labors of Paterno and his pupils, and of the schools of Ciamician and Nasini. Cannizzaro's re¬ searches on the subject of alcohols are also notable. The labors in organic chemistry of Ciamician, excellent as a teacher, are also cele¬ brated, as well as his studies, carried on in association with Silber, on certain chemical actions of light. Nasini is another brilliant teacher, who has recently made a study of the gases and radio-active emanations of the thermal springs and baths of Italy. Finally, in the domains where chemistry is auxiliary to other sciences we must mention Selmi, who dis¬ covered the ptomaines, and Guareschi, who contributed greatly to legal chemistry.

Among modern zoologists Italy can boast of Grassi, who discovered the secret of the prop¬ agation and metamorphosis of the eel, and by means of his celebrated researches, carried on in association with Bignami and Bastianelli, es¬ tablished beyond a doubt the fact that mos¬ quitoes, and especially the Anopheles claviger, or large mosquito, are the agents in the dif¬ fusion of the parasite of malaria. These re¬ searches opened a way by means of which unsuccessful attempts have been made to fight malaria infection (and other diseases that are transmitted in like manner), whether by tak¬ ing timely precautions against the sting of these insects, or by extirpating the insects themselves by drying up the marshes in which their larvae abound. Another eminent zoologist, Emery, author of an able manual of his science, has also acquired deserved fame through his mono¬ graph on the Fierasfer, and he is equally well known for his exact and diligent studies in the ant world.

In botany, Italy has given us Malpighi (1628— 94), who was the first to discover the mech¬ anism of nutrition in plants, and the relative function of foliage. In modern times we have Delpino (1833-1905), an eminently

scientific mind and the inaugurator of vegetable biology, which from 1867 he has dissociated from physi¬ ology. It is he who by systematic research established the functions of animals, and of the atmospheric factors in the biology of flow¬ ers, and who classified plants with exactness, according to the manner of their fecundation. In the past and in the present generation we may mention Parlatore and Carnel, horticul¬ turists; Saccardo, the mycologist, to whom we owe the (Sylloge fungorum omnium) ; and Pirotta, author of a vegetable physiology.

This cursory review of the condition of the sciences in Italy does not pretend to be ex-

haustive. In the midst of the activities and feverish life of a great nation it is difficult enough, if not impossible, to distinguish all the ideas that contain in themselves the germ of future progress, and the calm and impartial ob¬ server would find himself at a disadvantage if he should try to classify all intellects and weigh all merits. Instead of being a finished picture which is placed before the reader, this is only a rough sketch — a sketch, however, which while not defining particulars, should give a lively and clear impression of the es¬ sential characteristics of the object represented. And, thus, this sketch is intended to indicate whatever there is of enduring excellence or is characteristic in the scientific life of modern Italy.

B. Dessau,

Professor of Physics in the University of Peru¬ gia.

27. ITALIAN MUSIC. The death of Giuseppe Verdi undoubtedly marks the ebbing out of the most typical and most glorious epoch in the history of Italian music. From this point of view the date of 27 Jan. 1901, is full of historical importance. With it ends definitely the heroic age of Italian national music, of that art which, particularly in the works of G. Rossini, V. Bellini, G. Donizetti and of G. Verdi, irradiated the world. At the death of Verdi all understood that the legend¬ ary age of Italian opera had come to a close forever, and that now it would behoove us to deal in realities. To the heroes, succeeded mere mortals ; to the rule of genius, that of technique. What we lost in sublimity, we at¬ tempted to gain in profundity; compensation was sought for lack of clearness in the design, by brilliancy of coloring; for the loss of melodious verse, by the intensity of psychologi¬ cal meaning; and local color took the place of passional intensity.

Yet this new art preserved intact some precious characteristics of the Italian

race, this art which, while struggling nobly in the midst of surroundings that became each day more refractory and utilitarian, still succeeded in making its influence felt at home and abroad, leaving always a genial impression, and Italian national pride has no reason to be ashamed of it. It is, in fact, an indication of our constant progress in musical culture, which to-day shows a tendency to reorganize itself on broad and healthy lines.

We shall now see how the way was pre¬ pared for the actual musical movement, how and when it was outlined, assuming definite characteristics, and what were its successive vicissitudes up to the present time.

Giuseppe Verdi as long as he lived was at the head of Italian musical evolution. Alfredo Catalani, Amilcare Ponchielli and Arrigo Boito were old and authoritative pioneers.

Arrigo Boito, with the aristocratic and com¬ plex temperament of a poet and a musician, writing for Ponchielli the 'libretto of ˆioconda, and for Verdi the two splendid libretti*

union of classicism and modernity, 'Mefis- tofeleP together with the last chef -d' -oeuvres of Verdi had truly a great awakening power.

With his vocal scores, Ponchielli, especially in his (GiocondaP divested of obsolete conven¬ tionalism and animated by frank human pas¬ sion, prepared the way for modern realistic melodrama ; while Catalani, of the delicately elegiac inspiration, with the Lorey and the Wally, devoted himself by preference to Wag¬ nerian ideals. There are not wanting, then, notable composers. However, the inventive faculty of Italian musicians which appeared for so long to have slept soundly did not awaken until 15 years later in (Cavalleria RusticanaP by Mascagni, whose marvellous success was the commencement of a new school, and a new dawn. In the fever of novelty and modernity at any cost, this music gave evidence of the haste with which it had been created, as though it would recover the time that had been lost. With some exceptions it almost always showed the spasmodic effort to attain half results, rather than the serene joy of one who has achieved the fullness of completion. However, many of those works exercised at the time a fascination and continue to do so. Bearing the imprint of a broad modernity they have a happy relation to the indistinct needs of our souls ; and if, in their bearing on art and ar¬ tists, they represent only a halfway house on the wearisome road, to the public they may well mean the revival of opera. Such was certainly (Cavalleria RusticanaP in spite of some inequality of style in this melodic flow so limpid and spontaneous, that characterizes it from beginning to end, but especially in the freedom of movement and the freshness of im¬ pressions

which were to make of these short scenes of Sicilian life the basis of the new musical trend.

After the triumph of (Cavalleria Rusticana> nothing but realistic melodrama had any success in Italy. The madness of Carmen and the plunging of the dagger of Don Jose evolved on aesthetic canons of the power¬ ful and elegant art of Georges Bizet, had al¬ ready prepared a propitious soil. The love song of Turiddu and the slash of the knife of Compare Alfio did the rest. And here we have the realistic opera with Southern setting in¬ vading Italian ground, and the gentlemen with cape and sword retiring in good order before the heroes of (Mala Vita, of M. Giordano, be¬ fore the oyster venders of A. Santa Lucia of Maestro Lasca, before the Camorrists of A basso portOj Maestro Spinelli.*

Meanwhile Maestro Leoncavallo, following implicitly the word realism, gained a wide and well deserved reputation with his (PagliacciP while Maestro Cilea with TArlesiana, and Gaetano Luporino with (Dispetti Amorosi* and the (Collana di Pasqua) were well received, as they also followed the prevailing artistic ten¬ dency. It was not thus with Giacomo Puccini, who was already known before Mascagni by his (Le Villi ˆ and his ˆdgar* of romantic fan¬ ciful type. Following these with (ManonP with the exceedingly popular (La Boheme* (his mas¬ ter-piece), with the tragic (Tosca* and the exotic*

fragrance that betrays its far away romantic origin.

We must not suppose, however, that all the younger maestri followed exactly in the steps °r Mascagnb Puccini and Leoncavallo. Each of them studied to invent something new, but in his own manner and according to his own ideas. Thus Alberto Franchetti, in his Asraelp showed himself from the first to be a romanticist of the romanticists, enamored of Wagner and of the German school to which he belonged by virtue of the exact and profound study he had carried on in Germany.

But others, and not a few, may be added to those already mentioned, and they must be noticed here to complete the character of this first period, full of activity and illusions. Among the works that deserve special men¬ tion are (Hero and Leander,> by Luigi Manci- nelli; Lorenzo, by Mascheroni; by Floridia ; by Maestro Conti; (Festa a Marina,* by Coronaro ; (Celeste,* (Gringoire* and (Cortigiana,* by Scontrino and many others upon which the attention of the public has been centred, but only in fleeting fashion.*

Considered as a whole, this first period of the modern movement in music had, therefore, a prevailing characteristic of realism, as is shown in the selection of subjects, and in the form of the libretto. All of which does not prevent this predominant school with the Bizetian (Bizet) characteristics from being met in the field by an almost contemporaneous school with Wagnerian oroclivities, represented by Franchetti, Conti, Mancinelli and a few others. It was natural that the two schools should mutually exercise an influence on each other, and thus it happened that with reciprocal advantage the external differences in subject- matter and form finally disappeared and we come to a second period which represents the fusion of the two schools. A new program seems to have been substituted for the ultra- realistic and ultra-romantic order which had served their time, and the new program had a higher conception of dramatic environment and of a technique on a broader basis. The first honors in the bringing about of this evolution belong again to Mascagni, Puccini and Fran¬ chetti. Already in (L'Amico Fritz) and even more in (Ratcliff 5 — a profound artistic con¬ ception — Mascagni knew how to inspire crude realism with a breath of sublime poetry. And if Rantzau, Silvano and Zanetto had caused a halt in his upward career, (Iris) came just in time to reawaken the former confidence of the public. The dramatic action of (Iris) is a curious and strange blending of the real and the fantastic; but Mascagni's inspiration gave

it new treasures of harmony and orchestration, which made this opera the worthy rival of ' Cavalleria Rusticana. Puccini met with sim¬ ilar favor in his ˆosca,* with its gloomy and violent coloring, but strongly passionate style. Franchetti, after creating in (Asrael* and (Cristoforo Colombo * splendid, fantastic and historical pictures, attempted with a happy touch to portray modern epic sentiment in (Germania. * Leoncavallo, after making in his 'Medici* an incursion into the field of the great historical drama, and then coming back to realism in his (La Boheme,* gave us in (Zaza* the modern passional opera on intimate social lines. Meanwhile in (Chenier* and*

Taken altogether, the productions of this period are found to be better constructed and more balanced than those of the preceding period. The almost excessive seeking for di¬ rect scenic effect, which was the evident out¬ come of the choice of highly sensational sub¬ jects was now largely replaced by a greater nobility in style. However, we are not con¬ sidering a sporadic condition of our lyric drama, but actual characteristics common to all composers and which became more markedly evident in the third and more recent period of our operatic activity.

The success of Cordara's lyric mystery, (La tentazione di Gesu, composed upon Arturo Graf's dramatic poem, was a significant sign of the new*

aspirations.

Another worthy musician, Giacomo Orefice, already known by his (Gladiatore) and his (Cecilia, > acquired a deserved fame by his (Chopin, in which, with the able help of the poet Angiolo Orvieto, he cleverly portrayed the life and music of the great Polish musician in a lyrical drama; and this fame was increased by his (Moses,* with its mystically grand, elo¬ quent phraseology and its exalted style. The present output is full of the high conceptions and an effort to develop a more marked national character. This character of nationality is a question of life or death. On it depends whether Italian opera shall be able to reaffirm its traditional pre-eminence in the face of the tremendous competition of the schools of other countries.*

Besides opera, which in music is our most typical form and the most complete of our musical activity, there are also other kinds of music in which the Italians have taken honors. Among these is the oratorio.

This form of art. which is, as it were, an imaginary bridge connecting sacred and secular music, is of purely Italian origin. But while it developed most markedly outside of Italy under Bach and Handel, it became popular in Italy towards the end of the 1 7th century, in a long period of decadence which lasted to our day. To the Abbe Perosi belongs the honor of recalling this noble order of music to new life. The oratorios of Perosi are in fact a happy grafting of dramatic sentiment and im¬ proved modern technique on the ancient and glorious stock of Palestinian traditions. They awaken in the popular mind a deep echo which

appeared to be dying out, and their great suc¬ cess inaugurates a true and important evolu¬ tion in oratorio construction, which had wor¬ thy exponents in Maestro Tebaldini, Padre Ambrogio and Maestro Sonzongo. Oratorio had also a conscientious historian in the young and learned Abbe Pasquetti, author, of a book on (Musical Oratorio) in Italy.

As of oratorio, so also of real and regular sacred music there is much to say. In publish¬ ing his famous Motu proprio sulla musica sacra, Piux X laid down minute rules not only for the execution, but also the composition of church music, which he desired to bring back to its ancient purity. Among the most severely censured writers of sacred music are Bossi, Gallignani, Tebaldini, Terrabugio and others.

It is unpleasant for an Italian to , have to acknowledge that Italian

symphonists receive little encouragement. Italy certainly has not the glorious symphonic traditions of which Germany can boast. Nevertheless she has ac¬ quired some fame, through Bolzoni, Celega, Scontrino in his (Sinfonia Marinaresca,} and above all through Giovanni Sgambati and Giuseppe Martucci, the late director of the National Conservatory of Naples, in his highly valued symphonies in <(D):> and in major.

Also in instrumental chamber music, Sgam¬ bati and Martucci have made themselves con¬ spicuous. In this field Italian production is unable to compete with foreigners. However, artistic qualities may be found in the works of Bossi, Buonamici, Adolfo Crescentini, Fru- gatta, Del Valle, Faini, Enrico Oswald and in three interesting quartettes by A. Scontrini. Among the most recent works those of Zanella, Tarenghi and Brogi deserve praise.

Vocal chamber music has not with us taken on the classical character possessed by the lieder (songs) of Schumann and Schubert in Germany ; it deals exclusively with ballads and the ballads of Tosti, Rotoli, Denza, M. Costa and E. De Leva are universally known.

The great popularity of Italian singers in other countries obviates the need of mentioning names. There is almost alwavs a wealth of .good voices in Italy and there will never be a dearth of those who understand the delicate mechanism of the Italian Bel Canto.

The schools of stringed instruments of Milan, Turin, Rome, Naples, Pesaro and Parma enjoy a merited renown, and in general, the musical conservatories of these cities grad¬ uate a large number of the finest instrumental¬ ists. But Italian musical instruction is not up to modern standards. And a proof of this is the fact that almost all our best concertists (orchestra players) have studied, or perfected themselves in Belgium or Germany. Besides her orchestra players and her singers Italy boasts of a great number of orchestra leaders of renown, such as Mancinelli, Martucci and Toscanini and the Maestri Mugnone, Usiglio, Ferraris and many others.

Then in the field of musical literature there are talented writers, such as Nappi, Depanis, Franchi-Vernecq, Pozza, Checchi and Monaldi.

In spite of its partial disorganization and consequent scattering of energy, Italian musical art has proved its inexhaustible vitality and its admirable faculty of adapting itself to the new age. But the instruction now given in con¬ servatories should be made more practical and

more modern; care and intelligence should be given to the reorganization of Italian musical life, which from the theatre to the concert hall is in a

condition of uncertainty and continual crises; and above all, Italian musicians must endeavor to imprint on all their musical pro¬ ductions a more vigorous and more sincere Italian character.

Carlo Cordara,

Musical Critic of Marzocco , author of (La Tentazione di Gesind etc.

28. ECONOMIC CONDITIONS IN ITALY. The fundamental traits of the mod¬ ern economic conditions are similar in the prin¬ cipal countries of Europe and America. Wher¬ ever the returns from property are distinct from the returns from labor, wherever simple accu¬ mulation is the source of industrial remuner¬ ation ; the more numerous class of laborers and persons in the employ of others are recom¬ pensed with wages, for the most part not com¬ mensurate with the productivity of the enter¬ prise. In recent times wages have shown a tendency to rise to a greater or lesser degree above the amount required for bare physical subsistence ; and the conditions of workmen have improved also in function of the growth and vigor of their unions and organized in¬ sistence on more liberal compensation.

But if the general laws of distribution are uniform, the actual distribution varies in differ¬ ent countries; because of the diversity in the primary economic conditions of the various classes; by reason of the number and relative importance of the fractional parts into which the proprietary class is divided; because of the degree of density of the population and other causes; all of which exercise a greater or lesser degree of influence on the entire social system. Hence, the economics of each nation have their special peculiarities resulting from their specific conditions. In considering these conditions as they exist in Italy, we must remember that as an organized political unit Italy has had less than half a century of existence, whilst as re¬ gards the degree of cultivation of the land and country, she is economically ancient. But not until political unity had been obtained was there any considerable development of capital and an increase of industries in the various parts of Italy. The constitution of the new kingdom therefore marks an essential moment in Italian economic history. The accomplish¬ ment of political unity which is the brilliant triumph of the past generation has also given a special direction to public finances, which ought to be subordinated to the particular needs of the new collective organization, and in har¬ mony rather with the principle of productive taxation than with that of rates chosen in proportion to the individual revenues and wealth. In addition to this the new state assumed the debts and the deficit of the ex-states, which transmitted to her an onerous burden, about $450,000,000 of public debt, besides $20,000,000 of deficit. The excess of expenditure was aug¬ mented by the expenses of war and of civil renovation; the

consolidated debt continued to increase largely and the taxes by degrees made greater and more absolute demands on the wealth of the taxpayers. A persistent fight was instituted against the deficit which, from $140,000,000 in 1866, decreased to less than

$30,000,000, and except for a rise in 1870 began sensibly to decline, and in 1875 became trans¬ formed into surplus. Trusting too much to the natural increment of revenue and the per- mament efficacy of transitory expedients, the government agreed to a disproportionate amount of expenditure, and thus, after 10 years, a troublesome period occurred similar to the first, and in order to steer through this the government was obliged to practise the great¬ est economy, to increase the rate of many taxes, to introduce fresh taxes, to prohibit in the future recourse to the consolidated debt.

This severe political action not only tended to re-establish the equilibrium of the budget, and to the making of advantageous and continuous surplus after 1896-97, but served to give a stability to the Italian budget that richer na¬ tions may envy. In 1902-03 the budget showed a realized surplus of $19,800,000 ; .in 1904—05, of above $9,400,000, although an extraordinary but productive expenditure had to be met with the ordinary income. The prices of Italian public stocks in the last mentioned years were maintained above par, so that on 29 June 1906 the government could put into force the law whereby the 5 per cent gross and 4 per cent net obligations for an entire sum of more than $1,600,000,000 of capital were converted into obligations bearing only 3.75 per cent interest and automatically transformable after 15 years into 3.50 per cent, thereby causing a saving to the government of many millions in interest charges. Banking conditions also improved notably, doubtless because in conformity with the provisions of the law of 1894, the reserve funds increased, whilst the industrial and com¬ mercial expansion produced a greater demand for bills of credit.

These facts are quite remarkable, but one must not infer merely from the financial pros¬ perity of the government and the sound state of the banking circulation that the condition of national economics is absolutely vigorous. Taxation in Italy is very heavy; its total per¬ haps equals one-fifth of the annual production, and although the system of public revenue is complete in the sense that it reaches all the direct and indirect sources of individual eco¬ nomics, it is defective as regards elasticity, co¬ ordination and is too burdensome upon the most necessary articles of consumption. While the

land and house taxes have the character of a real tax, that on the income (ricchezza mobile) is personal, and many relate to profits, interest, honorariums, stipends, salaries ; but the fact that this has the character of a partial tax hardly serves as an offset to the severity of the first two taxes. Permanent incomes are taxed at a higher rate than temporary or un¬ certain incomes ; the exemptions are few and the minimum of exemption is low. Another $40,000,000 is obtained from a class of imposts called taxes on business, but the general opinion at present is that they should be reformed as to their acceptation, as annoyances are caused by their collection. Modern progress was only evidenced in 1902 in the taxes on succession, and this is the laudable initiative to a better distribution of the taxation. But it is to be de¬ plored that the food and home of the working¬ man should be so heavily burdened with im¬ posts. A diminution of the rate of taxation

would probably lead to a rapid increase of fiscal revenue, through the expansion of consumption, as occurred recently after the reduction of the duty on Brazilian coffee. But although it would be a benefit to finance and economics, it is not given any consideration on account of commercial policy. The duty on grain is 7.50 the quintal, and if it yields the state a variable, though always a considerable revenue, it places on the taxpayers the heavy burden of about $40,000,000. Added to this pernicious distri¬ bution of wealth, owing to the duty, there has been no advance in the cultivation of cereals, and now the average yield of 10 or 11 hecto¬ liters per acre is still small. In this connection it is proper to take into account the number of the agricultural population, which, considering the inhabitants employed in other occupations, amounts to 40 per cent of the whole, while 19 per cent are employed in manufacturing indus¬ tries, and 4J4 per cent in commerce.

Although the agricultural protectionism was counterbalanced by the industrial protectionism which developed after 1887 and was followed by a period of depression, there may be seen a noteworthy progress in the principal lines of production. The value of fuel for industrial use has increased, the power of steam engines and other motors, among which hydraulic and electric motors take the lead, increases in pro¬ portion to the increasing requirements of labor. The production of silk has grown remarkably, especially in the last 10 years, so has the cotton crop, especially the inferior grades; great per¬ fection has been attained in the tanning of leather ; and there has been a great increase in the chemical industries.

The bulk of international commerce which, in the two years of 1890 and 1891, was repre¬ sented by an average value of $420,000,000 a year, increased in the two years 1904-05 to an average of $729,800,000 a year.

A small portion of this increase may be attributed to variations in price, and since then we cannot say that there has been any diminution in internal commerce. The indications are sig¬ nificant, and besides agree with so many others that we may draw conclusions, for example, as to the increase in railroads, postal business, telegraphs, deposits in banks and savings banks, etc. But it is certain that the bulk of Italian foreign commerce is small compared with the foreign commerce of England, France or Ger¬ many.

An industrial increase may be noticed; but the greater part of these factories are of small production. The average number of employees or operatives in each factory rose to 25 in 1876 and 38 in 1903, allowing naturally for differ¬ ences in the different branches according to the relative technical requirements.

There are few large fortunes in Italy. Nitti made a calculation that there are from 1,500 to 1,600 millionaires; while in Germany there are about 11,000; in France, 15,000; and more than 30,000 in England. Every year minor inheritances of about $400 compose more than three-fourths of the total number; and those not exceeding $10,000, 98 per cent. The general wealth of $10,800,000,000 in 1885-90 rose to $13,000,000,000 in 1902-03.

In regard to the conditions of the laboring classes, the Bureau of Statistics has shown that

in 1871 the wage per hour on an average might be estimated at 0.171 lire and in 1903 at 0.265 (respectively about 3ˆ5 cents and 5 Ys cents). Taking into account the price of grain it would have taken a laborer 183 hours of toil during the first period to enable him to buy a quintal of grain ; and during the second period, only 91 hours. According to the researches of Sig¬ nori Geisser e Magrini, the average increase in actual wages in the usual industries was from 86 per cent in 1862, to 192 in 1903, an increase, therefore, of 123 per cent. The variations, however, are many; and if we maintain that to¬ day the expert operative commands wages as high as $1.40 to $1.60 a day, the conditions of the inferior workmen is a sad one, especially those that are not organized and who belong to domestic service. According to a census of workmen taken by the Umanitaria at Milan, out of more than 122,397 persons who on 1 July 1903, complained of their wages, 62,201 or 71.45 per cent of the operatives received a wage of 20 to 60 cents a day, and out of these

41,389 operatives, equal to 91.31 per cent less than 20 to 30 cents. In agricultural labor the wages were ascertained in 1901 ; the average wages, except for temporary increases, are even less than in the industries mentioned, and are re¬ duced whenever there is a lack of work, which so often happens in Italy particularly with agricultural labor.

The increasing emigration (in its whole being of 143,946 or 394 per 100,000 inhabitants, during the year 1916), which comprises for the most part agricultural laborers, must not be looked upon as an indication of absolute poverty, but is rather a symptom of the differ¬ ence between Italian and foreign wages. It has to a certain extent aided in eliminating the enormous excess of births over deaths, and has promoted savings which go to augment the na¬ tional capitalization, as the remittances to Italy of the emigrants to United States figured at $22,632,989.98 in 1916, can proportionally show. It has also helped to establish certain forms of agricultural contracts, but it certainly has de¬ prived Italian industry of valuable energy and changed the special demographic constitution of some of the southern countries.

The social legislation makes provision al¬ most exclusively for disabled workmen (pen¬ sions for the old and infirm; and for extraor¬ dinary emergencies, obligatory insurance against the accidents incident to labor), and by apposite Law of 4 April 1912, a National Institution of Insurances was created with contracts amount¬ ing already in December, 1916, to $231,120,000. More extensive provisions have been made to prevent the employment of young children and to shorten the hours of labor. A course of in¬ structive studies was instituted by the Labor Bureau (1904) and there began to be a more rigorous application of the protective laws, which is always more readily brought about 'by the solid organization of the labor federations. If strikes are still of frequent occurrence, there are not lacking instances of a peaceful settle¬ ment of the disputes between employers and em¬ ployees and the arrangement of mutual con¬ tracts.

Independent woman labor is a new economic factor to which the European War gave promi¬ nence, so that it will survive in Italy's economic

conditions. The secular tradition of the woman being supported in her life by the man, has now completely disappeared, together with any mate¬ rial depreciation of female labor through an antiquated moral prejudice.

It is certain that the progress in industrial civilization and the production of wealth is greater in Northern Italy than in the central and southern provinces, which is probably owing to intellectual and moral causes. There is less illiteracy in the northern provinces than in the general average of the kingdom or in the south¬ ern provinces. While in the province of Turin 89

per cent of the population above six years of age knows how to read, in the province of Cosenza — which represents the highest degree of illiteracy — only 30.4 per cent can read (see Italy — Schools and Universities). And as to the criminality, in Sicily and Sardinia the crime of homicide attains its highest figure, more than double that of the rest of the king¬ dom, and is very frequent in Campania and Calabria; while in Lombardy and Venetia it is at about the same rate as in the most progres¬ sive countries of Europe. A decisive decrease has been shown between the years 1909-13 by figures at 2.4 per 100,000 in Venetia, 2.3 in Lom¬ bardy, 3.1 in Emilia, 14.5 in Sardinia and 23.2 in Sicily, the proportion of this decrease being more sensible in the southern provinces.

From the fragmentary notes here given, it may be seen that in Italy, wealth and capital, although small compared with that of the more important countries of Europe and America, have greatly developed ; that industry has made remarkable progress, more in some regions than in others. Also the wages of the laboring classes, while inferior to those of workmen in other countries, have nevertheless almost doubled in 30 years, although this amelioration does not extend to all branches of the working class. Social legislation is always incomplete, but even here there is more than a beginning of building up and more effectual application of the law.

Bibliography. — (Annuario statistico ital- iano,J 2d series, Vol. VI, 1916, Central Bu¬ reau of Statistics , Roma 1918) ; Bollettino sani- tario, monthly publication (Home Depart¬ ment, National Health Bureau) ; (Statistica delle cause di morte, Annual of the Central Bureau of statistics; (Relazione e bilan- cio industriale dell'Azienda del chinino di Stato) ; (Statistica giudiziaria civile e commer- ciale,* Annual of the Department of Justice; (Statistica giudiziaria penale) (id.) ; (Statistica della criminalita. Notizie complementarD (id.) ; (Consimento della popolazione del Regno d'ltalia al 10 febbraio 191 V (Central Bureau of Statistics and Labor) ; (Bollettino dell'emigra- zione,* monthly publication (Foreign Depart¬ ment; Emigration Commissariat); (Bollettino di notizie sul credito e la previdenza) (General Directions for the use of co-operative and of private insurance associations) ; monthly pub¬ lication (industry, Commerce and Labor De¬ partment) ; (Le societa di mutuo soccorso in Italia al 31 dicembre 1904) (id.). See also bib¬ liography on Agriculture, etc.*

Augusto Graziani,

Professor of Political Economy, Royal Univer¬ sity of Naples; Honorary Professor , Univer¬ sity of Siena,

ITALY — AGRICULTURE IN ITALY (29)

29. AGRICULTURE IN ITALY. Italy,

by reason of its geographical situation, although in the Temperate Zone, gives us a synthesis of the vegetation of Europe. Next to Switzerland it is the most mountainous country in Europe. Two-thirds of its surface are cov¬ ered by the mountain chain of the Alps and by the Apennines, and about one-fifth must be classed as wholly unproductive of vegetation, from natural causes. The remaining portion is only partially cultivated, and is only fairly pro¬ ductive in certain portions.

Italy contains the great plain of the basin of the Po (Italy — Physical Geography), and the smaller plains which extend along the Med¬ iterranean, in the Pisan, Grossetan, Roman and Campanian territory; along the Adriatic in the tableland of Apulia; and also along the Cala¬ brian, Sicilian and Sardinian sea coast, where they are smaller.

Climatology. — Sicily and lower Italy, as regards the rainfall, have an absolutely littoral climate, with a minimum of rain in summer, and a maximum in winter. The valley of the Po, on the contrary, has an inland climate with two maximums of rain, in spring and in au¬ tumn, and two minimums, in summer and in winter. Central Italy has an uncertain climate, but resembles more that of the sea coast, with a maximum of rain in November and a mini¬ mum in July. On the Mediterranean slopes the rainfall is much greater than on the Adriatic side. Hailstorms are most frequent in the Al¬ pine zone, extending to the foot of the Rhetian Alps, the Carinthian and the Julian Alps; and in a Tyrrhenian belt extending from the Arno to Calabria; and less frequent in a Paduan belt beginning at the Maritime Alps, the Cotian, Graie and Pennine Alps, and extending to the east as far as the mouths of the Po; and in an Adriatic belt which extends from the Marches to the Salentine peninsula and to Sicily.

Agricultural Regions.— The agricultural regions of Italy may be divided into five: (1) The acid fruit region; (2) the olive region; (3) the vine-growing region; (4) the chestnut region; (5) the forest region, which it is hard to define exactly.

Agriculture presents itself under the most different aspects, as it partakes of the character of northern as well as southern cultivation. Rye, buckwheat, potatoes, chestnuts, are prin¬ cipally cultivated in the Alps, in the Apennines and their spurs. In the rolling country and in the central belt, wheat, maize, grapevines, le¬ guminous seed-plants, hemp and flax are grown. In the plains and in the hilly regions of the most southerly portions olives, almonds and acid fruits thrive, and at one time, in the ex¬ treme

edge of the peninsula and in Sicily, cot¬ ton was a favorite crop.

*Principal Crops. — According to statements published in 1916 there were 51,309,310 acres under crops; 11,272,339 acres afforested; <(waste land** constituting 7.4 per cent of the whole; tilled land 45.4 per cent; pasture 25.6 per cent; and vineyards and orchards 4.9 per cent. The principal crops in 1915 were wheat, barley, oats, rye, maize, rice, beans, potatoes, sugar beet-root, grapes and olives. A careful analysis of reports of the Superintendent of Agriculture and others which refer to the years 1892-1909 shows beyond question substantial progress in Italian agricul¬ ture which is especially noticeable in the last*

10 years, and this progress was much more marked in northern Italy (particularly in Venetia and Emilia) ; it was less noticeable in central Italy ; there was little or no improve¬ ment in southern Italy and the islands. Large areas of forest lands have been replanted by, or with the assistance of, the government in the last 50 years, and the forest produce amounts in value to $35,800,000 annually.

Breeding of Domestic Animals. — Cattle exceed probably 5,000,000 head, and they con¬ tinue to increase, especially in upper and middle Italy. Of the Italian breeds the most general is that with the gray saddle which occupies the centre and south of the peninsula. Then come the great – Piedmont breed and the red saddle cattle of Emilia.

The islands also have their special breeds. The Sicilian cattle with red saddle are a mo- dicana' breed. The other breeds are either mixed or are propagated nuances from the Alpine stock of Savoy, of Switzerland, or Aus¬ tria and these inhabit the spurs of the Alps in the Po valleys and also the plain. Whilst the cattle raisers of the Lombardy plain make a considerable profit in return for the care given to their milch cattle, those of Romagna devote themselves to producing a breed that can be used for labor and for beef. The Alpine moun¬ taineer seeks to put his mountain slopes to a good use by grazing cattle, and the Sicilian cat¬ tle raiser experiments with forage plants suit¬ able to the hot and dry climate of the island.

The improvement in breed may be explained by better judgment in the selection of breeding animals, by the more rational manner of feed¬ ing and by the importation of high-bred for¬ eign stock, among which the brown saddle Swiss cattle from Canton Schwyz, and those with the spotted saddle from Simmenthal pre¬ dominate.

The exportation of cattle forms a consider¬ able item in commerce. Switzerland, in 1903, imported over 30,000 head. But the increase in production provides also for the growing de¬ mand for home consumption.

Cheese and Butter. — The manufacture of cheese is of growing importance. In 1890, 57,000 cwt. of cheese was exported; in 1905, 171,000 cwt. Of butter in 1895, 44,000 cwt. was ex¬ ported, and in 1905 more than 60,000 cwt. The Swiss cheese, Emmenthal brand, which are im¬ ported in large quantities from Switzerland, are now manufactured largely in Italy, as a result of the study of Professor Moreschi and are of the finest quality, and have become an export.

In Latium and Sardinia cheese made of goat's milk is an important product.

Breeds of Horses. — There are numerous varieties of breeds which, while not losing en¬ tirely the characteristic of the stock from which they are derived — and Italy is famous for its horses — have acquired new characteristics from their environment. In upper Italy the horses are bred indoors; in Tuscany, in the south, and the islands they breed in the open. The num¬ ber of horses must be over 741,739 head, ac¬ cording to the enumeration made by the War Department.

Sheep. — Italy, like all the European states sees a gradual decrease in its flocks of sheep, owing to the extension and amplification of agriculture. A few years ago it was estimated that Italy produced about 12,000,000 kilo-

grammes of wool (worth $4,200,000), with fewer than 7,000,000 sheep.

The breeds of sheep deserving mention are: the Bergamasca, or giant sheep; the Vissana, which inhabit Latium, the Marches and Abruzzi ; the Gentile di Puglia ; and lastly, the Merinos, and the fat-tailed sheep, or (

The flocks of central and southern Italy summer in the Apennines, and pass the winter in the plains of the Maremma, of Latium, of Apulia, of Salernitano, and along the banks of the Ionian Sea. Better results in production and a heavier weight of wool have been ob¬ tained by breeding with the Merinos of the Rambouillet stock. The export of sheep reaches about 400,000, of which almost all go to Switz¬ erland.

Swine. — There has been a great increase in swine, which are made more productive by mating with the Yorkshire boar. In the south, and particularly in the Campania, the prize breed of Casertana is predominant. In the cen¬ tral and northern provinces the swine of Celtic type, with long snout, convex spine, with long legs, adapted to wandering across the meadows, are to be found. It may be affirmed that there are at least

2,000,000 swine. The raising of pigs is now a flourishing industry and produces an important commercial export. In 1905, 95,000 head were exported directly to Switzer¬ land and Austria-Hungary.

Poultry Breeding is in a primitive state. There are a few successful raisers, but most in¬ dustrial attempts at poultry breeding have failed. The valuable breeds of poultry are those of the Valley of the Arno, of the Polverara, of Padua, of Martinaf ranca ; but it may be said that every province has some that are valuable.

In 1905 about 93,000 cwt. of poultry were ex¬ ported; of eggs there were exported in the same year over 331,000 cwt. worth about $13,-

000,000.

Pigeons. — Large pigeons for food are pro¬ duced in considerable numbers, especially in the provinces of Emilia.

Exportation of Agricultural Products. —

Taken altogether the difference is very small between the total value of the agrarian prod¬ ucts imported and of those exported. (See be¬ low: Italy — International Commerce).

The principal agrarian products exported are: Unhusked rice and raw rice, prepared rice, chestnuts, potatoes, vegetables, greens and French tomatoes, dried vegetables, oranges, lemons, limes, fresh grapes, fresh fruits (dates included), almonds, nuts, hazel-nuts, dried figs, raw hemp, sumac, different kinds of wine in casks, every kind of wine in bottles, tartar or dregs of wine, purified olive oil, preserved vege¬ tables, fruits and greens, preserved tomatoes, essences of orange, neroli, bergamot and lemon, essence of new-mown hay. Cattle, pigs, fresh meat, salt and cured meat, poultry (live and dead), hens' eggs, butter (fresh and salt), cheese.

Irrigation and Improvements. — Whilst in northern Italy irrigation has from ancient times been carried on, in the other portions it is more recent, and not so complete, in others again it is entirely lacking, owing not alone to nat¬

ural obstacles such as the rugged topographical aspect of the region, and the perennial drought, but also to the persistence of obsolete methods of cultivation. In fact, whilst the valley of the Po is extensively irrigated, and the valley of the Serchio to a great extent, the valleys of the Arno and the Tiber remain neglected. Similarly, whilst the beautiful plain of Sulmona takes advantage of the waters of the tributaries of the Pescara, lower valleys of this and the adjacent littoral regions are parched in summer.

The area of land under irrigation in the kingdom, including vegetable gardens and orchards, is estimated at two-thirds of the total area of lands that may be irrigated with eco¬ nomic advantage.

Indications of Agricultural Progress. —

Some of the important indications of the pro¬ gressive movement in Italian agriculture are the importation of fertilizers; the increasing use of chemical fertilizers, particularly in north¬ ern and central Italy, and the importation of agricultural machines and implements. The en¬ tire imports of fertilizing material which in 1901 amounted to 2,848,646 cwt. (1,421,090 cwt. of mineral phosphates, fertilizers ; Thomas Gil¬ christ, 254,760 cwt.), at a cost of $4,712,563, rose in 1905 to 4,435,197 cwt. (2,401,440 mineral phos¬ phates; Gilchrist fertilizer, 674,590 cwt.), at a cost of $6,504,770. The use of phosphates as land fertilizer increased from 3,000,000 cwt. in 1900 to 5,000,000 cwt. in 1905.

Agricultural Associations. — The work of agricultural associations, the combined acquisi¬ tion of agricultural materials, has aided largely in introducing and spreading the employment of chemical fertilizers and agricultural ma¬ chinery.

The Italian Federation of Agricultural Asso¬ ciations, founded in 1892, consisted in 1900 of 229 agricultural associations and the consign¬ ation of goods imported amounted to $721,359. In 1905 the federated associations numbered 468 and the value of the imports had risen to

$1,877,837.

Not all the agricultural associations are members of the federation ; many are branches affiliated with the agrarian associations and committees. The 'Committee of Purchase for the Agricultural Association of Friuli (Udine) gives the following figures : In 1905, nitrate of soda distributed 4,000 cwt. ; in 1906, 7,800 cwt. ; in 1907, 15,000 cwt. In 1905 they distributed 150,000 cwt. of phosphates; in 1906, 200,000; in 1907, 350,000 cwt. .

The <(Federazione Italiana dei Consorzi AgrariU gave to its associates during the year 1905 agrarian machines for an amount as high as $452,000.

Agrarian Insurance Associations have

grown and done well in Italy with the purpose of compensating agricultural classes for acci¬ dental damages to crops or cattle. Twenty such associations operating especially against dam¬ ages by hailstones were reported in 1916 as having reimbursed damages for an amount of

$5,199,749.

Agricultural Classes: Economical Reports and Hygienic Conditions. — According to the census of 10 Feb. 1901, the agricultural popu¬ lation was numbered 16,836,551 ; of whom those above 15 years of age, namely, the adult people

employed in rural works, were divided as follows :

Farmers who cultivate their own lands . 2,305,795

Metayers (partners) . 1,731,546

tenants — farmers and lease holders . 659,489

stewards and rural agents . 28,881

Countrymen, ploughmen, etc., at regular work..' 828ˆ34

Kural laborers, at no regular work . 2,423,336

Herdsmen and shepherds, etc . 172,382

Cardeners and cultivators of acid fruits . 77,599

iotal . 8,227,462

A total 413,509 higher than in the year 1881. The persons employed in agriculture between the ages of 9 and 15 years of age comprised 9,611,003 individuals.

The number of males employed in agricul¬ ture (6,411,001) is double that of females (3,- 200,002). To every 100 males employed in agri¬ culture there are, in Piedmont, 77 women; in Liguria, 65 ; in the Marches and Abruzzi, 64; 56 in Venetia; 53 in Lombardy; 52 in the ex¬ duchies of Emilia, and only 5 in Sardinia ; 13 in Sicily, and 31 in Apulia.

The highest percentage of male agricultur¬ ists who worked their own land or that of their family was in Piedmont, Liguria and Abruzzi; the lowest was in Romagna, Calabria, Sicily and Tuscany: Tenant farms are found in nota¬ ble numbers only in Latium, Apulia and Cam¬ pania. Farms abound more particularly in Venetia, Campania, Basilicata and in the Emil- ian ex-duchies. They are rarer in Umbria, La¬ tium, the Marches, Tuscany,

Sardinia, Ro¬ magna and Sicily. Farming on shares is cus¬ tomary in the Marches, in Tuscany, Umbria and Romagna, and rare in Apulia, Basilicata, Pied¬ mont and Sardinia. The countrymen paid for regular work are found especially in Lombardy, Basilicata, in the ex-duchies of Emilia and in Sicily; those paid by the day, in Apulia, Sicily, Calabria, Sardinia and Latium.

As regards agricultural contracts, as Jacini observed, the Italian nation has shown great dis¬ cernment. One can see clearly that the char¬ acter of the existing contracts to-day was owing, not to chance, but to local conditions. Every form of contract would be more or less successful, according to the character of the contracting parties, and as they corresponded or not to the physical and economic conditions of the particular locality.

Hygienic Conditions — Malaria. — By rea¬ son of its conditions of soil and climate, Italy, of all countries in Europe, offers the largest field for malarial disease. Levy estimated, many years ago, the number of victims of malaria at 60,000; but since 1881 Sormani shows these figures to be exaggerated. From the Statistics on Causes of Mortality it is seen that during the period of 1887-1902 there was a maximum of 21,033 cases in 1887 and a minimum of 9,910 in 1902. The work of improvement, the preventive and curative means employed to combat the malady have contributed to lessen the rate and the intensity of the disease. The miasmatic belts were, in 1906, 3,349, distributed over the territory of 2,654 communes, of which 938 are considered totally malarial. The only piovinces free from malaria are Ancona, Arezzo, Cuneo, Florence, Piacenza, Genoa, Lucca, Macerata, Parma, Pesaro, Urbino and Porto Maurizio. Malaria has been fought by the government through a series of laws, the principal one be¬ ing the distribution of quinine by the govern¬ ment. In 1905-06 the government sold 18,712

kilogrammes of quinine; the mortality was

7,838.

Pellagra. — • It has now been ascertained that pellagra is caused by a toxic poison induced by the eating of maize, and there is no pellagra where, maize is not used for food. From the investigation instituted by the government in 1899 into the nature of the disease it was found that there are 40 provinces (all in upper and middle Italy) more or less severely afflicted by this, endemic disease. Abruzzi, Molise, Cam¬ pania, the Apulias, Bisilicata, the Calabrias, Sicily and Sardinia may be considered entirely free from the disease. The census of 1881 showed that in a population of 6,386,504 persons (which did not include all the provinces afflicted with this malady) the number of those suffer¬ ing from pellagra

was 104,067; while the census of 1899, made by the Interprovincial Pellagralogical Committee of Udine, gave 72,603 among a population of 7,033,440 inhabitants. In the 15 years from 1890-1904 the annual average rate of mortality from pellagra reached 3,767. By the middle of the 15 years, 1900-94, it was

2,846.

Civic Customs. — In Italy, besides the col¬ lective property ownership, which varies in origin and form, there exist private landed property and communal landed property over which the community has the rights of forestry, grazing and agriculture, etc.

Collective Property is an institution here and there in all districts, and is especially common and of great extent in the ex-pontifical states and in Emilia, where it had an approximate value of $4,800,000 in 1905, and was held, al¬ together, by 60,000 families (about 280,000 in¬ dividuals) united in associations as communes.

The government domain of the southern provinces and Sicily is also for public use, a survival of the laws of the feudal system, which represent another typical form of collective ownership, the legal authority over which is vested in the commune, whilst the profits de¬ rived from it belong to the citizens. These domains, however, have been in part taken pos¬ session of by private individuals or by religious bodies who hold them as their patrimony. Closely related judicially to the institution of government domain is that of the beni ex- ademprivili of Sardinia.

The Tratturi are grassy roads which extend from the mountains of Abruzzi across the slope of the sub-Apennines to the tableland of Apulia, as if the mountain pastures should extend to the Tavoliere, to the Murge, to the Salentine peninsula. These grazing lands will always ex¬ ist, and will preserve their character as public property, and hence unrestricted, inalienable, always renewable. Without them the migra¬ tions of the flocks and herds would not be possible, as the summer pastures are hundreds of kilometres distant from the winter pastures. The tratturi, tratturelli and bracci are 83 in number, of varying area, the four largest of which have a total length of nearly 2,000 miles.

The number of head of cattle in the 10 provinces gathered together in these networks or roads (Aquila, Chieti, Teramo, Benevento, Cam- pobasso, Avellino, Potenza, Bari, Lecce and Foggia) amount to about 2,720,000, of which 1,120,000 are nomadic grazers and 1,600,000 are stationary. Five hundred and twenty-eight thousand head of sheep and 30,000 cattle and

horses still make use of the tratturi of the government domain, to travel to the plain of Apulia, and the other 321,000 head of sheep migrate to the Roman territory.

Mortgages. — Until a few years ago it was claimed that the interest-bearing mortgages that burdened the Italian landed property exceeded $1,800,000,000. Instead of that, according to the results of the first investigation — made by the general administration of demesnes — on 31 Dec. 1903, the entire capital burdened by mort¬ gages amounted to $608,480,558, the number of titles to 829,259 with an average value of $733. Of the 829,259 mortgages, 407,997 were on land alone; 184,232 were on manufactories, and 241,030 on lands and factories.

The 65 per cent of mortgages among private individuals did not exceed a rate of 5 per cent interest ; 31 per cent of the same at 8 per cent rate of interest. Four per cent of the mort¬ gages at 8 per cent interest were principally in the following provinces : Abruzzi and Molise, 20.5 per cent ; Campania, 9 per cent ; Apulia, 14.2 per cent; Basilicata, 15.2 per cent; Cal¬ abria, 15.9 per cent; Sicily, 8.5 per cent, and Sardinia, 9.6 per cent.

Bibliography. — Catasto agrario del Regno d' Italia, current publication (General Direction of Agriculture) ; Notizie periodiche di statistica agraria (Agrarian Statistics Bureau) ; (Rivista del servizio minerario,* annual of the Agricul¬ tural Department (Royal Bureau of Mines) ; Censimento generate del bestiame 10 marzo 1908 (Departments of Agriculture, Industry and Commerce) ; (Superficie territoriale e superficie agraria e forestable dei Comuinidel Regno d'ltalia al 10 gennaio 1913 } (Agrarian Statistics Bureau). Concerning silk consult (Notizie statistiche sul raccolto bozzoli d'ltalia nel 1916) (Milan 1917).

[Hon.] Paolo Casciani, Member of Parliament ; Commendatore della Corona d'ltalia; Professor of Agronomy , Royal University of Rome.

30. ITALIAN INTERNATIONAL COM¬ MERCE. As the present kingdom of Italy was only established in September 1870, we cannot go back further than 1871 in considering the progress of the Italian commercial move¬ ment. We shall therefore begin to consider the foreign commerce of Italy from 1871.

The import trade of Italy greatly exceeds her export trade, which fact depends on two principal causes : on the manner in which the customs officials appraise the merchandise ; and on the fact that the enormous rush

of foreign visitors to the country brings in a great quan¬ tity of money, which, makes possible an in¬ fringement of the fundamental principle of an exchange of products.

In the 35 years, lasting from 1871 to 1901, the excess of imports was not uniform, and these great fluctuations depended on general causes.

From the year 1896 to 1900 there was a period of increase of imports, which was still more marked in 1900 and 1901, when the rate of increase was maintained at 320,000,000 of lire, a little less than $64,000,000. But the en¬ tire commercial movement represents an in¬ crease from 2,900,000,000 lire ($580,000,000) to 3,745,000,000 lire ($749,000,000). The char¬ acteristic, therefore, of . the present commerce

of Italy, as shown by the customs house statis¬ tics, is a constant excess of imports.

Finally, there is the period of rapid rise which lasted for eight years, and which, accom¬ panied by so many other indications of the growing commercial activity of the country, gave an assurance that this sign of prosperity was founded on a solid basis. Here are the relative figures, given in millions: (1898) 1,413;

(1905) 2,078.

The periods of greater exportation are as diverse as the causes that determine them. There was a long time — 17 years — from 1871 to 1887, during which the fluctuation was barely perceptible; Italian export trade remained steady at the million mark, very gradually di¬ minishing during the three years 1881-83, when there was a fall in exports.

In 1888 the new general tariffs and the new treaties of commerce, but above all the applica¬ tion of the tariff of reprisal between Italy and France brought about a period of unusual de¬ pression, which lasted 10 years before the ex¬ port trade resumed its previous figures. But dating from 1898, there began a period of pros¬ perity which is noteworthy and gives the highest figures in all the 35 years. '

The division of Italian commerce into the four great groups into which we usually divide the various products, denotes the nature of her commerce. In 1905 the variations between im¬ ports and exports gave the following figures in millions of lire :

Imports.

Exports.

Diff.

First class raw material. . .

822

252

570

Partly finished material . . .

428

618

190

Manufactured articles. . . .

473

417

46

Foodstuffs .

363

418

46

It was 10 years ago that we found a re¬ markable increase in the exports of the first class, agricultural products; but the foodstuffs increased in importation as well as in exporta¬ tion ; so that on the whole they exceeded the trade in manufactured articles. Notwithstand¬ ing the fact that the imports of grain rose from $22,000,000 to $41,000,000, the group of foodstuffs shows an increase of $9,000,000, hence a growth of $22,600,000 of exports, as against a growth of $13,600,000 in the im¬ port trade of the same group. Briefly, an exhaustive study and analysis of statistics shows that in the course of 10 years the imports increased 1.36 per cent in proportion to the whole in first-class merchandise, and the ex¬ ports have decreased at a greater rate — that is 2.46 per cent ; that the merchandise of the second group was imported in an increase of 2.32 per cent of the whole, and the exports in¬ creased even more, that is, 4.62 per

cent ; that manufactured articles were exported in an in¬ creasing ratio of 3.83 per cent above 1896, and hardly reached 1.22 per cent in imports; that the trade in foodstuffs showed a decrease of 4.08 per cent from that of 1896, and finally de¬ creased 5.99 per cent. Taking altogether the improvement in trade in the groups we find that while there is an absolute growth in the trade in foodstuffs, there is a noteworthy de¬ crease in the trade of other groups. And we make the further observation that statistics of the Italian Department of Commerce show : (1) An increasing development of national in¬ dustries, which demands an increasing quantity

of articles of the first class, and will enlarge the sphere of the export trade; (2) a greater degree of prosperity of the country which in¬ creases the demand for home consumption of manufactured articles and foodstuffs; (3) a transformation of the agricultural industry, which is losing ground in some of its exports and gaining ground in others. We also observe that commercial exchange with other countries is greatly facilitated at the present day; that the principle that ftProducts can be exchanged for products® is less applicable in the transac¬ tions between one government and other sepa¬ rate governments ; and that we can see more readily than ever before that there is a note¬ worthy equilibrium of commercial exchange be¬ tween one country and another. But as the commercial treaties, in modifying the ultra- protectional character of the general tariffs, aim at improving those commercial relations, which tend to equalize the value of the imports and the exports between every country, it is interesting to note this side of international commerce. In the case of those countries with which the Italian import or export is to the value of $2,000,000 or more, there is evidence of a fair equilibrium ; a few are excepted, which will be specially mentioned. Great Britain, in 1904, exported an excess of $35,000,- 000 to Italy, but if we consider that $28,600,000 represents the hard coal which she sold to Italy, the difference is reduced to $6,400,000, a comparatively small figure. Russia exports to Italy $29,000,000 more than she imports from that country, and this is accounted for by the $27,000,000 worth of grain which she sold to Italy. The British possessions in Asia ex¬ port an excess of $17,800,000 to Italy, $12,000,- 000 of which represents raw cotton in bulk, which Italy imports from India. The $14,200,- 000 of excess of importation from China com¬ prises $13,000,000 of raw silk in bulk. The ex¬ cess of $7,600,000 in imports from the United States is owing to raw cotton, of which Italy imports $29,200,000 worth.

The principal exports of Italy are to Swit¬ zerland, which buys from her over $32,000,000 worth of raw silk in bulk, and to European Turkey and Egypt where the excess of her ex¬ ports is owing to cotton and silk textiles, which Italy sells to those countries. In conclusion the excess of exports from Italy to the Argentine Republic is owing to wine, olive oil, and cotton textiles, which she sells to that state.

We shall now consider the effect of the at¬ tempt that Italy is making to find fresh markets for her products. We have already seen that she has increased her exports to Egypt and Ar¬ gentina to the amount of from $2,800,000 to $9,200,000 in the former, and from $11,400,000 to $25,800,000 in the latter instance, and we ob¬ serve the export movement toward Belgium, European Turkey, Sweden, Norway, Greece and Malta.

This brief summary of the foreign com¬ merce of Italy will now be completed by a few figures relating to the trade in precious metals. Although we know that the proposed customs duties are more unsettled than ever and that they do not represent commercial value or ex¬ change we simply give the figures relating to the imports and exports of raw gold, gold and silver coin, in 10 years, 1896-1905. The vol. is — 35

table will show that Italy is slowly gaining in wealth :

Imports Exports (Millions of lire)

1896 . 10.2 19.0

1897 . 8.6 23.6

1898 . 3.4 19.8

1899 . 5.5 15.9

1900 . 7.2 16.5

1901 . 11.7 16.3

1902 . 34.7 9.9

1903 . 156.7 6.7

1904 . 44.5 9.7

1905 . 169.5 8.2

1916 . 8,390. 3,088.

In 1915 the United States imported from Italy goods valued at $54,973,726, while Italy imported from the United States goods valued at $184,819,683, or between two and three times as much as in any one of the three years immediately preceding.

Bibliography. — (Movimento commercial del Reguo d'ltalia. Annual publication by the Finance Department (Bureau of General Cus¬ toms Duties) ; Statistica del commercio speciale d'importazione ed esportazione (monthly pub¬ lication by the same department) ; Stringher, B., (Su la bilancia dei pagamenti fra ITtalia e restero,) in Atti della Commissione Reale Per lo studio delle statistiche del commercio con I'estero.*

Arturo Jehan de Johannis, Director of the Royal Institute of Social Science , Cesare Alfieri J Florence.

31. ITALIAN FINANCE, The public debt of Italy, its origin and development, reflects the difficulties Italy experienced in becoming a great nation. The new nation took upon itself the obligations of the various territories out of which it grew and respected all the engagements made by them.

When Italy was united in one great nation and when the province of Venice and the province of Rome were united to the Italian nation, the interest charges on the public debts of the ex-states were formed as follows (bonds bearing 5 per cent, 4 and 3 per cent interest) :

CONSOLIDATED – 5 PER CENT INTEREST (IN LIRE)*

Sardinian States . 57,937, 695 . 05

Lombardian . 7,351,387.81

Venetian . 7,370,551.00

Modenian . 780,508.99

Parma . 610,453.95

Bologna . 121,500.00

Consolidated Pontificial States . 1 , 323 , 725 . 75

Redeemable . 1,982,153.18

Tuscan . 1,657,054.00

Neapolitan . 25,648,375.00

Sicilian . 6 , 800 , 000 00

Amounting to . Ill . 583 , 407 . 73

- *Note. — An Italian " lira " is equal to nearly 20 cents. Capital amount equal to . 2,231,668,154.60*

CONSOLIDATED — 4 PER CENT INTEREST

Sardinian States . 1,739,280.00

Lombardy . 179,797.72

Venice . 41, 909 . 00

Naples . 355,257.50

2,316,244.22

CONSOLIDATED — 3 PER CENT

Sardinian States

Tuscany .

Modena .

4,159,280.00 4,208,730 00 14,025.43

Equal to capital value of . 276,607,169. 19

Therefore the inherited public debts amounted nearly to the sum of 2,516,000,000

/

lire ($503,200,000 approximately), there re¬ mained only the obligations at 5 per cent and 3 per cent.

At this time the public debt of Italy was divided into three groups : Public Debts — ad¬ ministered by the general direction of public debts; Public Debts — administered by the gen¬ eral direction of foreign countries ; and the dif¬ ferent passivites. The essential part of these passivites is formed by those which are admin¬ istered by the Director of Public Debt. When the Organic Law of 1861, No. 94, was passed, it was aimed to give a solid form to the public debt; and accordingly the public administrators ordered and formed the Big Book, in which they could inscribe the parts written in an authentic form and the guarantees and privi¬ leges of the law. A new series of public laws was formed, in order to recognize sufficiently the debts of the different states, by which the main portion of those debts were recognized. Italian obligations were inscribed in the Big Book.

In enrolling the formation of Italian public obligations we find that the forms of public duties handled by the general administration are classified in the three following categories : (1) Consolidated obligations; (2) obligations entered separately in the Big Book; (3) obli¬ gations not entered in the Big Book, or special bookkeeping accounts.

The perpetual debt especially found its origin in the debts of the former state of Modena to private persons, and from the in¬ come promised for the support of the Vatican. These passivites bear 5 and 3 per cent interest. The redeemable debts were caused by obliga¬ tions of railroads assumed by the states of Tuscany and Parma and by obligations estab¬ lished by the Italian state to supply the expense of special railroads in Piedmont. Some parts of the redeemable obligations have been greatly reduced. The following amounts represent the duties entered separately in the Big Book:

PERPETUAL OBLIGATIONS

For support of the Pope . 3,225, 000 . 00

Obligations and other expenses of Modena 15 , 384 . 20

Total . 3,240,384.20

REDEEMABLE OBLIGATIONS

Obligations on railroads of Tuscany and

Parma . 2,048,663.14

Catholic loans for the ex-states of the Pope. 1,578, 450 . 00

Obligations 5 per cent of the ecclesiastical

rules . 2,929,950.00

Obligations 5 and 3 per cent for some

special railway lines in Piedmont . 3,847,316.00

Total . 10,404,379.14

According to the above figures we have a total sum of 13,644,763.34 lire of interest de¬ rived from bonds, and bonds redeemable sepa¬ rately inscribed.

Duties not named and not inscribed sepa¬ rately handled by the general direction of the public debts, are more interesting.

Their origin was found in the laws for re¬ deeming the precedent debts, or from the <(law of new rules, relating to various works, gen¬ erally for economical purposes, i.e., develop¬ ment of means of communication, for hygienic purposes or for the coast defenses or public utilities of the big cities. These are divided into the five following classes :

1. Obligations to redeem the railroad lines and canals, already built. Similar obligations,

3 and 5 per cent, for the Society of Roman Lines. (Lines of Livorno, Luca, Pistoia, Cen¬ tral Tuscany, Apiano, Grosseto and Rome) and those for redeeming the Cavour Canal.

2. Obligations regarding the new building of specified lines.

3. Obligations for completing the principal lines, and for supplying the

capital necessary to increase the patrimonial property (for in¬ creasing the stations, etc.). Similar obligations of 3 per cent of the societies for renting the Mediterranean, Adriatic and Sicula lines.

4. Obligations to protect Rome from the waters of the River Tiber, and for parts of waterworks systems in Rome and Naples.

5. Various outlays, not immediately profit¬ able.

The complete interest of the state on above obligations was on 30 June 1906, 48,372,648.60 lire on a capital of 1,416,575,607.20 ($283,315,121 approximately).

Of equal importance with the Italian Public Debt are the railroad obligations which are directly contracted by the state, or guaranteed by the state, to provide for the construction and for repairs or to complete the railroads.

A railroad debt (or bond) to the amount of 1,468,814,140.00 lire (about $293,762,828) was authorized for that purpose, but the capital actually realized was less than that amount.

These shares were issued at the following terms : 500 lire and 250 lire, redeemable in 50, 60 and 90 years. The first attempt at redemp¬ tion was made in 1891 by the Minister of the Treasury, Louis Luzzatti, who instituted serious economies ; especially by suspending the emis¬ sion of bonds for construction of railways.

During 1894 and 1895 another and more effi¬ cient impulsion to this economy was created by the Minister of the Treasury, Sidney Sonnino, forming two new types of consolidated 4.50 and

4 per cent net.

The various attempts at a reduction of the Italian national indebtedness and particularly of the high interest charges on the same culmi¬ nated in the successful conversion studied and prepared by Louis Luzzatti while Minister of the Treasury in the cabinet of Sonnino, and presented 29 June 1906 by Minister of the Treasury, A. Majorana of the Giolitti cabinet.

The conversion was in reference to the con¬ solidated 5 per cent gross, and to the consoli¬ dated 4 per cent net. The first, of 30 June 1906, amounted to a capital of 7,903,545,040, and the other, to the sum of 196,889,800. Both capitals amounted to 8,100,434,800.

By the said law of 29 June 1906 (No. 262, the Ministry of the Treasury

was authorized to abolish the 5 per cent gross, and the 4 per cent net, offering to the holders thereof 100 lire or the payment of the entire certificate at a loss of two lire, on 1 Jan. 1907, and the ex¬ change of the old bonds of 5 per cent gross and 4 per cent net, for a new emission of securities with interest at the annual rate of 3.75 per cent payable semi-annually, to be ex¬ empt from any present or future tax from 1 July 1907 to 1 July 1912, and to pay 3.50 per cent per year, with the same exemption, from 1 July 1912.

The result was a complete success. The

payments on exchange amounted only to the sum of 4,689,700. Of this amount 3,027,800 was on the exterior, and 1,661,900 on the interior, for the capital to be converted only on the ratio of 0.056 per cent. As for the total cost of the refunding operation, including general charges, commissions, and all other expenses, it totaled only 9,637,153.62 lire, which was less than 12 centimes for every 100 lire of nominal capital to be refunded, and was only 0.8772 per cent of the amount placed at the command of the two syndicates for the purpose of meeting every possible contingency. On the other hand the profit for the national finances, because of the reduction of the interest, was very con¬ siderable. In fact from 1 July 1907 until 1 July 1912 there was a saving of 20,254,017 lire each year. From 1 July 1912 until the year 1920 a double saving will be obtained, and in the 13 years taken together the total saving to the treasurv in interest charges will exceed 400,000,000 lire (nearly $80,000,000).

The public expenditures are naturally largely influenced by the receipts from taxes. These are chiefly the tax on real estate, on buildings and on rents. There is also a considerable tax on the transfer of real estate, and a tax on commerce, as well as on insurance and other commercial transactions.

Besides the contributions direct and indirect on business, real estate, rents, etc., there are the various well-known forms of taxes, i.e., the taxes of succession, taxes of registration, taxes on loans, custom house receipts, profits on sale of salt, profits of the tobacco and lottery mo¬ nopolies, etc.

In accordance with this, the national receipts of the year 1905-06 were 1,945,955,181.73 lire and the expenses were 1,860,514,249.31 ; the dif¬ ference between the two entries showing a sur¬ plus of 85,440,932.42. The budget for 1915—16 showed revenue 3,007,027,827 lire ($601,405,565

approximately) and expenditure 2,960,545,029 lire ($592,109,005 approximately).

There has been an actual surplus in recent years, a solid evidence of the prosperous con¬ ditions of the Italian finances.

Popular Discount Banks. — A study of the Italian system of banking is of importance for the reason that its financial methods enable the institutions to employ an uncommonly large portion, or proportion of the capital in order to assist commercial operations. But otherwise and in general, the Italian system of banking has no marked difference from the various sys¬ tems of the European continent, especially from the French and Spanish standpoint. Let us compare it to a pyramid. The popular banks are at its base, and various institutions of less import; the societies of credit are higher, terminating with the Bank of Italy, superior to all, aided by two institutions : the Bank of Naples and the Bank of Sicily. The Societies of Stockholders maintain the popular banks, and have only a limited responsibility. Their system is one of co-operation, loaning money to members only and sharing profits among themselves.

In 1902 there were 163 banks with a capital of 255,000,000 lire.

The emission institutions, the Bank of Italy, Bank of Naples, and Bank of Sicily, the first of which is a society with a capital of

240,000,000 lire, form the main body of this system of banking; their notes in circulation being supported by or based upon the guar¬ anty of the circulation by a metallic reserve, as provided by law. The maximum and normal limit of the circulation of the above institutions is fixed at 1,010,000,000 lire — of these 732,000,- 000 at the Bank of Italy, 226,000,000 at the Bank of Naples, 51,700,000 at the Bank of Sicily ; the reserve being 4 per cent of the note circulation.

The emissionary institutions are subject to supervision of the government, which proceeds by ordinary and extraordinary inspections. The director of the Bank of Italy is confirmed in his charge by the government. Those of the Banks of Naples and Sicily are directly appointed by him.

To complete this brief account we may state that the circulation of bank notes payable to bearer was, in 1905, for the Bank of Italy, 929,990,560,416 lire; Bank of Naples, 29,824,- 979,722 lire; for the Bank of Sicily, 67,480,71 1.11. The metallic reserve was, on 31 Dec. 1905, for the three institutes, 1,076,418,372 lire in gold; 805,877,224 in silver; 108,208,903 on foreign se¬ curity and 133,241,062 on Italian securities.

In 1916 the total debt of Italy was given as $2,610,000,000, but this certainly does not in¬ clude large items added in 1915-16. And the total money circulation of the state and banks in 1916 was $1,265,926,694, an average of $34.64 per inhabitant.

Bibliography. — (Relazione della Direzione generale del Tesoro, Annual of the Treasury Department ; Bollettino della Direzione generale per la vigilanza sugli Istitute di emissione, sui servizi del Tesoro e sulle spere di risanamento della citta d Napoli, monthly publication (id.) ; Gazetta ufficial del Regno d'ltalia; Bollettino di notizie sul credito e sulla previdenza, monthly publication (Department of Industry, Commerce and Labor) ; (Elenco degli Instituti di credito legalmente costituiti esistenti nel Regno al 30 giugno 19167 (id-) ; (Rendiconto generale consumtivo dell (Amministrazione dello StatoP In two parts. Congressional acts; (Relazione generale sulla amministrazione delle Finanze,* Annual of the Finance Depart¬ ment; (Sulle condizioni della marina mercantile italiana,* Annual of the Marine Department, (General Direction of mercantile marine). Consult also other annual and monthly publi¬ cations by the same department on salt, tobacco and lottery revenues.*

[Hon.]Giulio Alessio,

Member of Parliament ; Formerly Secretary of State for the Treasury ; Professor of Finance, Royal University of Padua.

32. ITALIAN EMIGRATION. The re¬ markable development of Italian emigration gives an altogether general interest to this sketch. Even outside of Italy there is an ample statistical bibliography in regard to Italian emi¬ gration, but the most valuable works are those of Senator Luigi Bodio, who for many years was Director-General of the government statis¬ tics, and there are also very interesting articles concerning emigration published in the Bulletin de ITnstitut international de Statistique, of which institute Professor Bodio was general secretary from its inception (1885) to 1906.

Worthy of record are, among others, the works of Nitti, Villari, Bosco, Tammeo, Adolfo Rossi, and in general the Bollettino della Emigrazione, published by the Commissioner of Emigration in the Ministry of Foreign Affairs.

Italy in the 19th century had a remarkably large emigration only after it became an in¬ dependent kingdom. She had, it is true, the political exodus of 1815, 1821 and 1831 ; but those people did not leave any traces

worthy of mention, except that among a great number of emigrants who were recruited to fight for the liberation of Italy there were scientists and geniuses of the highest rank who exalted the Italian name and made it honored in foreign lands.

Emigration in the Years 1901-05.

YEARS

For Trans¬ oceanic coun¬ tries

For Europe and Mediterranean States

Total

1901 .

279,674

253,571

533,245

1902 .

204,654

246,855

531,509

1903 .

282,435

225,541

507,976

1904 .

252,366

218,825

471,191

1905 .

447,083

279,248

726,331

Altogether in the 30 years from 1876-1905, of which we have the figures given by official statistics, 8,029,353 persons emigrated ; and of that number more than 4,000,000 went to trans¬ oceanic countries within 30 years. And these figures may be taken to be lower than the fact, owing to the inevitable inaccuracies in statistical investigations. If the calculation had been made regarding permanent emigration and temporary emigration, the latter would have shown figures somewhat larger than those given by the emi¬ gration to Europe and the Mediterranean states ; and, on the other hand, somewhat smaller for permanent emigration than those given for trans-oceanic emigration. In the five years, 1901-05, the emigration, taken altogether, exceeded that of all other periods, even the 10- year periods, of the 30 years ; and the figures for trans-oceanic countries are almost double those of the preceding five years, 1896-1900.

A cursory glance given to the distribution of emigrants from the various regions of Italy shows us that temporary emigration is greatest in those northern regions of Italy nearest the confines of the country; and hence emigration in those parts holds the same place that migra¬ tion from one portion of the country to another held in the other regions. The permanent emi¬ gration, on the other hand, prevails in the south of Italy, and especially in Abruzzi, Basili¬ cata and Calabria, which are, economically con¬ sidered, the least progressive regions. In Li¬ guria, which has had an industrial revival within the last few years, the emigration is very small.

Among the regions which show a great in¬ crease in emigration are : the Marches, which, in 1905, out of a population of 100,000, had 1,934 trans-oceanic emigrants; Calabria, which had 4,335 emigrants; Latium, 1,020; Abruzzi, 3,526 ; Sicily, 2,640, etc.

And taking the individual provinces in the various regions we find that in 1905 the trans¬ oceanic emigration was greater in the provinces of Caserta, Palermo, Cosenza, Catanzaro, Mes¬

sina, Reggio-Calabria, Avellino, Salerno, Chieti and Potenza.

As for the emigration to Europe and the Mediterranean countries, Venetia takes the lead of all other regions with 2,965 out of each 100,000 inhabitants; Emilia follows with 1,140; Piedmont with 1,105; Umbria with 1,073; Lom¬ bardy with 1,030; the Marches with 988; and Tuscany with 800 emigrants. The smallest quota was given by Calabria, with 108

emigrants. The emigration for Europe and the Medi¬ terranean countries (an especially temporary emigration) takes place more particularly from the northern and central provinces, as already said.

Male emigrants predominate and the adults are in excess of the children. These two char¬ acteristics are common to the emigrants from other countries. In the first three years, 1903-05, 83 out of 100 emigrants were males and 17 per cent women ; and of the total number of emi¬ grants about 11 per cent were not above 15 years old. The great predominance of males has noteworthy demographic consequences, both in the country from which they emigrate and in the country whither they are bound.

Italian Emigration to the United States, etc. — The emigration to the United States in 1905 was nearly one-half (43.62 per cent) of the entire number of emigrants. The number of emigrants for the United States increased gradually in the 30 years 1876-1905. In 1881 we find it at 11,842; 10 years later it had quadrupled (47,952 in 1890, 44,359 in 1891), falling to little more than 30,000 in 1894. But it soon increased again, and in a few years was over 100,000, and with a jump in 1901 to 1902 it rose from 121,139 to 193,772; the following year it increased again to 197,855. It was 168,789 in 1904, and almost doubled in 1905, with 316,797 emigrants. Statistics of emigration to the United States from Italy in the fiscal year ended 30 June 1915 show that only 57,217 Italians came as immigrants to the United States during that period.

But what strikes one particularly is the scanty emigration to Eritrea and other Italian possessions and protectorates in Africa, even to Tripoli; although to ensure a better future for Italian colonial politics it would be truly neces¬ sary and desirable that swarms of laborers should emigrate to those regions.

It is difficult to determine precisely the num¬ ber of Italian emigrants who return to their own country, because many return by land, i.e., by rail, and one can get no reliable figures in regard to them ; and the others who return by sea do not include all those who return home from trans-oceanic countries; a certain number of these disembark in foreign ports and continue their journey by rail. Out of 100 emi¬ grants, from 36 to 40 were considered, in the last four years, as emigrants for an indefinite period and were therefore stricken off the regis¬ ter of the population, it being understood that they had transferred their habitual domicile to a foreign country. The great increase in emi¬ gration, whether to trans-oceanic countries, or to Europe and the Mediterranean Basin, gives rise to the necessity for investigation as to what may be the causes of this tremendous emi¬ gratory movement.

There are conditions which doubtless favor

or stimulate emigration. Thus, the near neigh¬ borhood of the boundaries of a country render it easy to leave the country, even on foot, and to betake oneself to some other state to seek for work. Even the mountainous character of various regions induces migrations in the in¬ terior of the country, from hill to plain, and in great part to the emigration to foreign countries of mountaineers who are more dis¬ posed to move about than citizens of the plains; and often they are even compelled to leave their mountain homes in the winter season in order to make a living.

But an accurate investigation into the causes should distinguish between the physical, demo- graphical, economic, psychological, historical, administrative and tributary causes. It is im¬ possible, here, to undertake such an investiga¬ tion. Suffice it to note that malaria is a phys¬ ical cause that cannot be overlooked, that the density of the population is in some cases a coefficient of some importance, together with the high birth rate and hence the increase in the number of inhabitants, owing to the excess of births over deaths. Nevertheless Calabria has a very large emigration although she has not only a low density of population (91 in¬ habitants to the square kilometer), but has also a low birth rate and excess of births over deaths. Liguria with a high density (204 inhabitants to the square kilometer) has a comparatively small emigration, 720 per 100,000 inhabitants, of whom 560 go to trans-oceanic countries and 160 to European and Mediterranean states. We may certainly say that, not infrequently, where the population is least dense, the emigration is even greater; for the same causes that deter¬ mine the low density — as, for instance, a lack of the means of subsistence — promote also emigration.

The demographic factors, taken by them¬ selves, cannot be held responsible for the con¬ stant increase of emigration, as there are re¬ gions with a high birth rate, and a large excess of births over deaths, and yet with a small emigration. It is the economic conditions which give a determining power to the demographical factors, and for this reason we may say that emigration in Italy is the consequence of a superabundance of population only in the sense that they have not yet found that perfection in the conditions of existence and of labor that suffices ro keep them all in their own country, especially when compared with the conditions that they find in other lands.

Although Sardinia has one of the poorest regions, she has nevertheless a

small emigra¬ tion (341 in 100,000 inhabitants in 1905; while the average for the kingdom is 2,161). This must be attributed to the low density of popu¬ lation (33 to the square kilometer) and to the conditions peculiar to the island, which are not yet influenced by the social life of Italy, and to the fact that its inhabitants are passion¬ ately attached to their native soil.

In the southern provinces both poverty and the unprogressive character of agriculture, the low wages, the oppressive fiscal taxes and the antiquated and almost feudal characteristics of the relations between the proprietor of the soil and the laborer, which are specially noticeable in agricultural contracts, are the causes that help to promote emigration.

To these causes must be added those of the

intellectual condition, in this sense, that wherever there is the greatest amount of illiteracy, as in the southern provinces, there may be found also the greatest amount of ignorance and belief in those who cry up the far superior conditions of labor and wages in trans-oceanic and European countries.

Having thus examined the principal causes which help to determine emigration, we have still to note the consequences which follow from them. And it is easy to understand that the increase in population, in consequence of the tide of emigration, must have a limit. In some regions one can notice either a decrease in the whole population, or a partial decrease, i.e., in a greater or lesser number of communes. The Basilicata, for instance, between 1881 and 1901 (the last two censuses) has diminished; and similarly also several districts of Calabria (Rossano, Castrovillari) ; of Sicily (Corleone, Termini) ; of Venetia (Rovigo, Massa Superi- ore) ; of Piedmo.nt (Salluzzo, Cuneo, Pinerolo, Aosta). But it is particularly the composition of the population that shows the effect of the enormous emigration. Thus, by the predomi¬ nance of males who emigrate over females, the numerical equilibrium of the two sexes is changed, sp that women predominate over men in the regions from which there is the largest emigration. In southern Italy, according to Professor Bosco ((L'emigrazione del Mezzo- giorno) in the Giornale degli Economisti di Roma, April 1906, p. 328) there are communi¬ ties where the greater part of the population consists of women, children and old people, out of all proportion to the normal distribution of sex and age. And another sign that the emigra¬ tion in abnormal numbers of the strongest mem¬ bers is beginning to have an effect on the physi¬ cal constitution of the population is given in the remarkable number of conscripts who are refused on account of sickness, or physical irm perfections, in several portions of southern Italy.

In regard to the economic consequences, it is certain that owing to emigration Italian labor has been better paid, that it has resulted in higher wages for those who emigrated ; and the proof is in the savings sent back to the mother country in considerable sums, which, altogether, are calculated at over $40,000,000 a year. A considerable portion of these savings is employed to support the family at home; an¬ other portion is used to defray the debts in¬ curred by the emigrant before leaving, or on the occasion of his departure; a third portion sometimes assists parents or friends to emigrate, and hence serves as a stimulus to emigration ; finally, one portion of the savings is invested in house or land, or in some form of economic activity. We must not forget that emigration in reducing the supply of labor has tended to raise wages and that it has procured in other countries a numerous ˆclientele® for Italian pro¬ ducers and has procured for the mercantile ma¬ rine, through its transportation of emigrants, a source of wealth which would be still greater if in this trans-oceanic movement the foreign flag was not superior in prestige to the Italian.

But as there are advantages, so there are also disadvantages arising from emigration, and among these may be mentioned, not alone the lack of labor and the consequent neglect of land cultivation (and this may be partly remedied by migrations to the country itself I, not alone the

withdrawal of much of the young-, active, and therefore productive, element ; not alone the breaking up of families, from many of which the head is absent; but also the habit of indul¬ gence in alcoholics, particularly among the re¬ turned emigrants. And sometimes there has also been noticed a physical degeneration among individuals: the diseases arising from bad economic conditions, it is true, have decreased ; but those caused by vice in all its forms have increased. (Consult Pasquale Villari, (L'emi-grazione italiana e le sue consequenze) ; in the Nnova Antologia. Rome 1 Jan. 1907). Delin¬ quency has decreased in some forms, but has increased in other special forms, so that we may say that emigration, rather than diminish¬ ing crime, has changed the form of the delin¬ quency.

The Italian government is beginning to oc¬ cupy itself with the control of emigration ac¬ cording to the law of 1888, which we owe to Francesco Crispi, and which was intended to prevent the frauds and abuses of emigration agencies. It was more of a primitive character than anything else and it was soon found that the intervention of the government could not be restricted to these terms, but that it must exercise an efficient control, both in the country and during the voyage, and when possible in

the countries whither the emigrants were bound and where they landed. Through the special efforts of the Honorable Luzzatti Pantano and Visconti Venosta, Minister of Foreign Affairs, the Parliament sanctioned a new law 31 Jan. 1901, by which the phenomenon of emigration is truly controlled by an administrative organ¬ ization and with provisions which will, if amended, give better and more complete re¬ sults.

This law in its essential provisions has ref¬ erence to trans-oceanic emigration only, and although Art. 29 points out that the legislature has been forced to recognize the need of protecting the other emigrants from any pos¬ sible deplorable occurrence, to their injury, it is nevertheless certain that the emigrants to the countries of Europe and the Mediterranean have not had the legal and social guardianship they had expected. In order to study the prob¬ lems in relation to these matters two congresses have already been held; one at Udine in 1903, and one at Milan, January 1907.

Many and serious were the problems that previously confronted Italy in the first years of the present century, in regard to the phe¬ nomenon of emigration. All her material, moral and political life was at stake; and no doubt all the conditions of Italian life must im¬ prove before emigration may be restored to proportions that are not abnormal ; different from those that it has assumed in the last five years of the 30 which we considered with the aid of official statistics. It may be done, on the one hand, by not permitting the country in certain regions, especially in the south, to be depopulated of its laborers ; and on the other, it may be arranged that emigration shall acquire all those qualities which serve to pro¬ cure for it economic power in foreign lands, a moral authority and a just appreciation of the benefits that it confers on the countries of its destination. It is interesting to notice that in 1914 emigrants from Italy to the United States numbered 167,451 ; and in the same year 157,000

Italians returned from the United States to their native land. During the first year of the great war in Europe — the year ending in the summer of 1915 — the number of Italians reaching the United States as immigrants was, as mentioned above (Italian Emigration to the United States, etc.) only about one-third as great as in the previous year, or one-fifth of the number in a record year.

Riccardo dalla Volta,

Professor of Political Economy and Finance,

Royal Institute of Social Science, Cesare Al-

fieri, Florence ; Honorary Professor, Univer¬ sity of Padua; Author of Works on Eco¬ nomics.

33. ITALY, DIPLOMATIC RELATIONS OF THE UNITED STATES WITH.

Aside from the fantastic mission of Ralph Izzard of Tuscany during the American Rev¬ olution, the first diplomatic relations with any of the Italian nations which now form a part of unified Italy were the result of the dam¬ age to commerce of the United States from the privateers who infested the Mediterranean from 1809 to 1812 while Prince Murat was king of the two Sicilies. William Pinckney, who, in April 1816, was sent to the two Sicilies as minister plenipotentiary to obtain indemnity for losses sustained by American citizens by the seizure and confiscation of their property by the Neapolitan government, failed in his mission and was recalled. The claims long continued to be the subject of correspondence. In 1832, however, a treaty, secured by John Nelson charge d'affairs provided for the payment of over 2,000,000 ducats (about $800,000) which was distributed by a commission. Similar claims were later made against the Kingdom of Naples and were collected in a similar manner. Relations were continued through the American charge d'affairs at Naples until the close of 1860, and a Neapolitan charge d'affaires at Washington from 1846 to the close of 1861. New treaties were negotiated in 1845, 1854 and 1855. Relations with Sardinia began with a treaty concerning general trade and admission of tobacco negotiated in 1838 by a special American agent. The United States continued relations through a charge at Sardinia from 1840 to 1850 and a Sardinian charge at Wash¬ ington from 1839 to the assumption by Victor Emmanuel II of the title of King of Italy in 1861 when the Sardinian charge became the first minister of Italy to the United States. Diplomatic relations with the states of the Church were opened in 1848 and conducted through an American charge at Rome until May 1861 and through a minister resident from August 1861 to 1867 when the exercise of diplo¬ matic functions was suspended and the Amer¬ ican legation near the Pope was discontinued.

The United States sympathized with the Italian struggle for liberty and welcomed the new kingdom into the family of nations. Diplo¬ matic relations with the consolidated kingdom, which inherited treaty obligations from the con¬ trolling or constituent states, were begun by the appointment of George P. Marsh as envoy ex¬ traordinary .and minister plenipotentiary in March 1861.

Italy showed her friendship to the American Union during the Civil War. In 1864, she conceded a naval depot to the United States on certain conditions.

To meet new questions, treaties relating to consuls and extradition were negotiated in 1868 and a treaty of commerce and navigation in 1871. These were supplemented by later treaties.

In the struggle between the civil authority and the Pope, the United States refused to be involved and held no official intercourse with the Pope after the abolition of his civil power. In 1885 the Italian government objected to the appointment of A. M. Keiley of Virginia as American minister to Italy on the ground that his remarks at Richmond in 1871 in protest against the dethronement of the Pope as a civil sovereign rendered him persona non grata. In 1875, in response to an invitation of the United States government to European powers to join in a concerted mediation in the Spanish- Cuban War, Italy acted without result.

Italian immigration into Argentina between 1860 and 1880 laid a substantial basis for in¬ fluence which attracted the attention of the United States. Italian immigration to the United States, insignificant before 1870, but gradually increasing thereafter and rising rapidly in 1889 after the crisis in South Amer¬ ica, raised several questions affecting both do¬ mestic policy and Americo-Italian relations — including problems relating to expatriation and naturalization, new immigrant laws (to prevent the migration of criminals and paupers), the padroni system and the protection of Italian emigrants against it, and the consular inspection of emigrants at Naples.

In 1891, in connection with the Mafia inci¬ dent which suddenly disturbed friendly rela¬ tions and opened grave international compli¬ cations, Italy raised an important question concerning the relations of the United States as a national unit with other nations in the enforcement of its treaty obligations. Several Italian members of the Mafia, or Mafiosi (an oath bound secret society indigenous to Sicily), arrested and placed on trial in New Orleans for the murder (in October 1890) of Mayor Hennessey who had been investigating the operations of the society, were lynched in March 1891, by a mob which, having become impatient with the inefficiency of the ordinary methods of administering justice in the crime- infested city, forcibly entered the jail and took the law into their own hands. The Italian gov¬ ernment promptly sent a protest to Secretary Blaine, who expressed regret and urged Gov¬ ernor Nicholls of Louisiana to bring the guilty to justice. The Italian premier, probably in¬ fluenced to aggressiveness by an approaching meeting of the Parliament, demanded summary punishment and indemnity. In vain did Blaine try to extricate the American government

from an awkward situation by an explanation that under the American dual form of government the institution of judicial proceedings in the case belonged entirely to Louisiana, and by a rather humiliating statement that the United States had observed treaty obligation by ex¬ tending to Italian citizens the same protection that it could extend to American citizens in New Orleans. His reply was regarded as an equivocation. Without waiting for the further failure of judicial proceedings in Louisiana, the Italian minister, Baron Fava, withdrew from Washington, and for a time diplomatic relations were practically suspended.

The incident, and the admission that the

'Federal government was without means of de¬ fending foreigners against popular violence placed America in a deplorable light before the world. The American government, after an examination of all the facts, decided that, since Congress had not made offenses against the treaty rights of domiciled foreigners cognizable in the Federal courts, it would be proper in the consideration of international questions growing out of such incidents to regard the State officers charged with police and judicial power in such cases, as Federal agents for whose acts in such cases the Federal govern¬ ment is answerable — as ((it would be answer- able if the United States had used its constitu¬ tional right to define and punish crimes against treaty rights.® In 1892, the voluntary American offer of indemnity for the families of the Italian subjects who had been lynched, and the payment of over $24,000 from the diplo¬ matic fund for this purpose, resulted in an acceptance of the reparation by Italy, the return of Baron Fava and the renewal of friendly relations which have since continued — al¬ though occasionally somewhat affected by such incidents as the closing of the Italian immigra¬ tion bureau at Ellis Island in 1898 and 1899, and reflections of the American Industrial Commission upon the integrity of Italian officials. Unfortunately lynching cases similar to the New Orleans case of 1891 arose in Colorado in 1894 and in Louisiana in 1896. In each case the United States paid an indemnity.

In 1899, Italy adhered to the American open door policy in China. Three years later, she acted with Germany and Great Britain in be¬ ginning a blockade of Venezuelan ports, but soon withdrew. In the recent Italian conflict with Turkey in Tripoli, the United States had only a remote and detached interest. In the World War, relations increased in cordiality through common interests in apprehending the aggressive and offensive Central Powers which disturbed the peace from selfish motives.

Recent friendly relations have been accom¬ panied by the negotiation of several treaties. Under the provision of the Dingley tariff act, a new commercial treaty was negotiated in 1900. A supplementary commercial

agreement was made in 1909. The principle of arbitration em¬ bodied in the treaty negotiated by Secretary Root in 1908 was later extended by a new treaty negotiated by Secretary Bryan in 1914 (proclaimed in 1915) providing for investiga¬ tion before declaration of hostilities. A treaty of commerce and navigation, amendatory of Article III of the treaty of 1871, and providing for right of action by aliens in cases of injury or death caused by negligence or fault, was signed and ratified at Washington in February 1913. A treaty providing for reciprocal mili¬ tary service for citizens of the two countries was ratified in the latter part of 1918.

Bibliography. — Curtis, W. E., (United States and Foreign Powers1 (1892) ; Dewey, D. R., (National Problems* (1907) ; Moore, J. B., (Digest of International Law) (1906) ; The Nineteenth Century, Vol. XXIX, 701 (1891) ; General Index to Diplomatic Corre¬ spondence and Foreign Relations, 1861-99 (Washington 1902).*

James M. Callahan,

Professor of History and Political Science, West Virginia University.

*34. ITALY AND THE WORLD WAR.**

A general outline is given under Triple Alliance (q.v.) of the situation of Italy as a partner of Germany and Austria-Hungary from 1882 until the outbreak of the European War in 1914. The circumstances which brought Italy into that alliance are better known than those which led her to denounce the agreement and range herself on the side of the Allies as against her former partners. Since the declaration of Victor Emmanuel as kine of Italy on 17 March 1861 and the annexation of Rome in 1870, Italy had become a nation and a great power. But she was the youngest of the ((Great Powers® and also the smallest in population and wealth. Her position was not an easy one ; she had her own ambitions for influence and empire in the Mediterranean — the traditional home of Italian expansion — and harbored pious aspirations to the heritage of Venice. But she was not quite strong enough to stand alone, and it seemed that she might always be condemned to con¬ stant waiting on the aid of other nations. The new alliance for the moment satisfied her, but it gradually changed its character, for Crispi and Bismarck brought it about that Italy was becoming not an ally but a satellite of Ger¬ many; and when Germany herself came for¬ ward as a rival for power in the Mediterranean and the East, she (Italy) began to see that the alliance compromised the very liberty

of movement which she had hoped to attain. Though Crispi was not responsible for the alli¬ ance, which was formed five years before his first premiership, he was its constant defender and regarded it throughout as the corner stone of his foreign policy. The main object of the Triple Alliance, as frequently proclaimed to the world from Berlin, was to keep the peace of Europe by opposing an insuperable barrier against the designs of France on the West and of Russia on the East, to the latter of which both Bismarck and Vienna were even then quite alive. But both Berlin and Vienna had other objects in inducing Italy to join them. Bismarck was anxious at all costs to prevent an alliance between Italy and France, and Austria had her own private reasons, which she expressed from time to time in an unmistakable way. The chief of these was to stop the Ir¬ redentist agitation in Italy; for men like Kal- noky were well aware of its seriousness and naturally maintained that a claim for the re¬ turn of Trent and Trieste to Italy, if suc¬ cessful, would be the prelude to similar claims on the part of Austria's Slavonic provinces, which would mean the break-up of the Austrian Empire. Crispi strenuously repressed this agita¬ tion at home, with a view to maintaining a good understanding with Austria, which he regarded as essential to Italy's more immediate interests in the Mediterranean, at that time seriously threatened, by France. Other matters might wait; Italy would get her own in time if things went well. He believed in patience and pru¬ dence. ((The virtue of prudence led us to Rome,® he said in one of his great speeches in 1889, and at the same time gave it clearly to be understood what he expected . and hoped would be Italy's ultimate reward for a prudent policy: ((The peace of Europe is based upon treaties. We, like honest men, will respect these treaties, and, should any seek to violate them, we shall know how to do our duty.®

The speaker then quoted Marco Minghetti, a former brilliant member of the Assembly, <(as regards the question of nationality, it is neces¬ sary to choose the most favorable opportunity, but that, should war result in alterations to the map of Europe, Italy would have little to fear, for while we have nothing to yield, we might have much to gain and receive.® What Italy hoped to <(gain and receive® was The re¬ gion known to every Italian as (

In 1881 France proclaimed a regency over Tunis, an act deliberately suggested by Bis¬ marck for the purpose of sowing discord be¬ tween France and Italy. The latter had con¬ siderable interests in Tunisia, which she had regarded as likely one day to be, with Tripoli, her share of the North African coast; alarmed at the occupation of the harbor of Bizerta by a great European power, Italy looked about for allies whose interests were opposed to those of France, and the Triple Alliance re¬ sulted, exactly as Bismarck desired. Italy had no objection to Germany, for Prussia had helped her in 1866 and Bismarck had nodded encouragement in 1870.

Austria, on the other hand, was the hereditary jailer of thousands of ˆunredeemed® Italians, and the arch-enemy of the Italian race. However, Italy had to be either the ally or enemy of Austria, hence an alliance would be a protection both against France and Austria herself. As between Italy and Austria, the alliance was an unnatural arrangement, a marriage of convenience which left the Italians cold and inspired only the editorials in the official press. Hatred of Austria is a feeling deeply embedded in the bosoms of Italians, even of those Italians born in provinces which have never known the Austrian yoke. This hatred dates back to the end of 1746, when an Austrian army merci¬ lessly sacked Genoa and was only driven out by the citizens after a five days' bloody battle. By the Treaty of Vienna in 1815 Italy was dis¬ membered and repartitioned: Austria received the state of Lombardo-Veneto, including all of the territory between the Po, Ticino, and the Adriatic; the ancient republic of Ragusa, the valleys of Val Tellina, of Chiavenna and Bormio. The Austrian Ferdinand III of Lor¬ raine was reinstated grand-duke of Tuscany; the archduke Francis II, cousin of the Austrian emperor, received the duchy of Modena and Reggio; Napoleon's second wife was presented with the duchies of Parma, Piacenza and Guastalla ; Southern Italy, the kingdom of the Two Sicilies, was handed to a Bourbon prince and the duchy of Lucca to a Bourbon princess, etc. Revolutions against Austrian domination broke out in the kingdom of the Two Sicilies in 1820, and for the next 50 years an almost unin¬ terrupted struggle was maintained by the Italians, suppressed with unspeakable atrocities by the Austrian soldiery (see Italy). In the minds of Italians the name of Austria is in¬ separably linked with the martyrdom of count¬ less patriots and heroes, butchered women and children, the horrors of Brescia and the dun¬ geons of the Spielberg.

From 1815 to 1848 all Austria's maritime provinces retained their Italian character. Even the Imperial navy was predominantly Italian, being in fact known as the Imperial Royal Veneta Marina. After 1848 it was re-

organized on German lines. Even after the fust revolutionary war the northeastern littoral ot the Adriatic remained prevalently Italian, and Italian was the official language at Trieste as at Venice, at Cattaro as at Milan. The Slav population was primitive and ignorant; their only traces of culture were due to Italian influences. With the war of 1859 Austria lost Lombardy and, although after the creation of the Italian kingdom in 1861 she lost all author¬ ity over the western shore of the Adriatic south of the Po and ceased to be the only naval power in that sea, Austria still predominated.

*In 1866 Italy missed a priceless opportunity of completing her unity and, incidentally, of settling the vexed Adriatic question once for all in her own favor. But her generals failed to follow up their initial successes; Custozza, which could have been a decisive victory, be¬ came a partial defeat, and the incompetence of Admiral Persano brought about the naval disaster at Lissa, although the Italians had all the elements of success. After the Prussian victory of Sadowa, Venice was surrendered to Italy and after the fall of Napoleon III the Papal States were incorporated in the Italian kingdom. But the heartily reciprocated hatred of Austria survived in Italy. History, as taught in Italian schools, fostered undying hatred of the Tedeschi (Germans**) , as the Austrians are popularly called; old men trans¬ mitted to their families the legacy of rancor born of bitter memories against the former oppressors of Lombardy and Venetia; and the Irredentists strove to keep the question of Trent and Trieste steadily before their com¬ patriots. Nevertheless, for a whole generation the Triple Alliance held together like a self-denying ordinance between three mortal enemies who have decided to grip each other as tightly as they can, lest if any one of them be given elbow-room he should fly at the others' throats. The personal regard for Germany existing at one time on the Italian side developed into coolness on the growth of German (into the peninsula. German capi¬ tal financed banks with Italian names ; German commercial travelers commanding the Italian language flooded the country; German-owned hotels received streams of German tourists; whole sections of the Italian map became Ger¬ man and Austrian colonies, while German pro¬ fessors flooded Italian seats of learning and spread the doctrines of German Kultur. Mean¬ while, German diplomacy and France's colonial expansion in northern Africa aroused Italian sentiment against France with the result that from 1888 commercial relations between France and Italy were interrupted for 11 years. Even the fall of Crispi in 1896 brought no improvement in the strained relations. With the advent to Rome in 1898 of a brilliant French Ambassador, M. Barrere, the political horizon began to clear. In 1899 commercial relations were renewed and in 1904, much to the disgust of Germany and Austria, President Loubet visited Rome, where he was enthusiasti¬ cally received. Regardless of the Alliance, Austrian officialdom specially exerted itself to irritate and oppress the Gmredeemedˆ Italians under the Dual Monarchy. It had suited Bis¬ marck to foster Italian jealousy of French and British sea power and, notwithstanding Italy's insistent request, he refused to extend the*

Alliance to the Mediterranean, a fatal error of which Germany was to reap the consequences later. In joining her two partners Italy had assumed merely continental responsibilities : there was nothing in the Alliance that offered her any guarantee as to the inviolability of her coast line, which could only be threatened by France or England — or both. Italy began by arranging a complementary Mediterranean agreement with France. When England and b ranee concluded the Entente Cordiale in 1904, the Mediterranean clauses of their arrange¬ ment were integrally bound up with the Anglo- Italian and Franco-Italian understandings with regard to the same waters. The annexation of Bosnia-Herzegovina in 1908 by Austria still further widened the breach between Vienna and Rome. In 1909 the late Tsar and the king of Italy met at Racconigi accompanied by their ministers and laid the foundations of a friendly understanding based upon their common hostil¬ ity to the realization of German and Austro-Hungarian interests in the Balkans. A direct consequence of this step was the Balkan League's attack on Turkey in 1912. Italy had shaken off her leading strings and ceased to be the Cinderella of the Triple Alliance; those

strings were snapped when Italy made war on Turkey in 1911 and seized Tripoli. During the Tripolitan War the Austrian newspapers loaded Italy with abuse and Vienna placed every obstacle in her path, forbidding her to attack the Dardanelles, Preveza, San Giovanni di Medua, Salonica and Kavalla, and to seize the then Turkish islands of Chios and Mytelene. Thus the Italian and the Balkan League vic¬ tories over the Turk caused deep disappoint¬ ment to both Germany and Austria. Germany had undoubtedly reaped the least benefit from the Alliance during the 10 years preceding the European War. The Kaiser had done his best to keep his two partners together and in the position of subordinates, but both had kicked over the traces — Aehrenthal in 1908 and Giolitti in 1911. Irredentist sentiment in Italy grew stronger and threatened to burst into flames. To prevent an immediate rupture between her two allies Germany urged the in¬ stant renewal of the Alliance long before the fixed date on any possible terms whatever. German inspired newspapers hinted in 1912 that Italy would act wisely in confiding the direction of her Mediterranean interests to the Triple Alliance, advice which Italy naturally ignored; it was too late.. In the hands of the late Marquis di San Giuliano the foreign policy of Italy was played to the advantage of Austria. Despite the warnings of non-official Italians and British friends of Italy the Marquis op¬ posed Serbian aspirations to an Adriatic port and supported Austria in setting up a fictitious Albanian kingdom. By her course of action, Italy antagonized all the Balkan allies including Greece and upheld the interests of Austria. Already in 1913 Austria had sounded Italy with a proposed attack on Serbia, which plan was instantly rejected; the assassination of the archduke and his wife in the following year gave Austria her opportunity. This time Italy was not consulted. It did not leak out till 14 months later that the German Ambassa¬ dor in Constantinople had informed his Italian colleague there on 15 July 1914 (eight days before the presentation of the Austrian ultima-

turn at Belgrade) that the Austrian note would be so worded as to render war inevitable. For some unexplained reason the Italian Am¬ bassador (Signor Garroni) kept this piece of information for a year before communicating it to his government.

Whether with or without the connivance of Germany, Austria meant to make war on Ser¬ bia. Italy proclaimed with no uncertain voice that this was an act of aggression and that the purely defensive stipulations of her alliance re¬ lieved her of any obligation to stand on the side of Austria. That Italy should not enter as an ally of the Central powers into a war as

to the origin of which she was not con¬ sulted, and in which the successes of her allies would have been fatal to her own ambi¬ tion, was obvious. She stood aloof, mistress of her own actions; and then came the great temptation — the offer to Italy of the Trentino by Austria as a gift in return for neutrality. But the Italian people saw that to accept the gift would be to mortgage the whole future of Italy; to Austria it would have been blackmail extorted in the hour of danger; to Germany, who could lose nothing by the transaction, it would have been a gift thrown to a poor relation. But there were other elements at work besides the considerations of mere mate¬ rial interests. Italy stood divided between three opinions : there were those who favored the Triple Alliance and believed in a German victory; there were the ˆneutralists® ; and the Irredentists, who demanded war against Aus¬ tria. The entry of Great Britain gave the Triplicists pause; there was the British navy and a great, exposed Italian coast-line ; neu¬ trality presented a different but equally un¬ pleasant problem : a German victory would make Italy a German satellite for all time, while on the other hand an Allied victory, with Italy indifferently standing aside, would only leave her out in the cold if ever (

1914; in opposition stood Signor Giolitti, four times Premier and the most powerful political influence in Italy. He desired certain gains for his country, but preferred bargaining to war and urged acceptance of the Austrian offers. The majority in the Italian Par¬ liament was neutralist; the aristocracy largely pro-German. It was among the masses of the people, however, that different counsels pre¬ vailed. So early as 26 July 1914 M. Barrere wired to his government, (

The full records of the early diplomatic negotiations between Austria and Italy have not been made public. The Austrian (Red Book) and the Italian (Green Book) published, for the first time, the text of articles III, IV and VII of the Triple Alliance, hitherto kept secret. Though containing an invaluable reve¬ lation of long standing friction between the two states, the books cover only one month of diplomatic history, from 25 July to 25 Aug. 1914. From an official statement issued in Washington by the Italian Ambassador on 25 May 1915, we learn that early in July 1914 the Italian government, ((preoccupied by the pre¬ vailing feeling in Vienna, caused to be laid before the Austro-Hungarian government a number of suggestions advising moderation, and warning it of the impending danger of a European outbreak. The course adopted by Austria-Hungary against Serbia constituted, moreover, a direct encroachment upon the gen¬ eral interests of Italy, both political and eco¬ nomical, in the Balkan Peninsula. Austria-Hungary could not for a moment imagine that Italy could remain indifferent while Serbian independence was being trodden upon. . . . Therefore when Austria-Hungary [after re¬ peated warnings from Italy] ignored the usual practices and menaced Serbia by sending her an

ultimatum without in any way notifying the Italian government of what she proposed to do . . . she not only severed her alliance with Italy but committed an act inimical to Italy's interests.® The statement declares that <(Con- versations were initiated immediately after July 23 [the date of the Austrian ultimatum to Serbia] for the purpose of giving a new lease of life to the treaty which Italy alleged had been violated and thereby annulled by the act of Austria-Hungary. This object could be attained only by the conclusion of new agree¬ ments. The conversations were renewed, with additional propositions as the basis, in Decem¬ ber 1914.® The final correspondence published in the (Red Boo-k) leaves the impression of an approaching agreement between San Giuliano and Count Berchtold. On 16 October 1914 San

Giuliano died and was succeeded in the Foreign Office by Baron Sonnino. A long and intri¬ cate diplomatic duel now began between Italy and Austria, Germany intervening. Early in December 1914 Baron Sonnino took his stand upon the terms of the Triple Alliance, espe¬ cially Article VII, according to which Italy and Austria-Hungary were pledged to "give reciprocally all information calculated to en¬ lighten each other concerning their own inten¬ tions and those of other powers,® and that if either of the two parties <(should be ˆobliged to change the status quo ® in the Balkans or of the Ottoman coasts and islands in the Adriatic or the 2Egean seas, such change ((would only take place after previous arrangement between the two powers, which would have to be based upon the principle of a reciprocal compensation for all territorial or other advantages that either of them might acquire® as a result of such change. By this clause Austria was bound not to occupy any Balkan territory without a pre¬ vious agreement with Italy nor without ade¬ quately compensating her. Austria having in¬ vaded Serbia and thereby disturbed the whole political gravity of the Balkans, compensation was due to Italy. In reply to Count Berchtold's contention that Italy could have no grievance, because the Austrian occupation of Serbia was only "momentary,® Baron Sonnino reminded him that in April 1912 Austria had protested against the Italian bombardment of the Dardanelles and had prohibited even the use of searchlights against the Turkish coast, on the ground that such acts were an infringement of Article VII. Furthermore, Austria had also threatened that ((if the Italian government desired to regain its liberty of action the Austro-Hungarian gov¬ ernment would do the same.® At this point the diplomatic honors lay with Baron Sonnino, who maintained that Italy was entitled to apply the same regulations to Austria at war as that country had applied to Italy when at war. On 20 Dec. 1914 Count Berchtold accepted the

principle of Baron Sonnino's stipulations. Prince Bulow, former German Chancellor, was sent to Rome to keep Italy neutral by vicarious offers at the expense of Austria. The Austrian diplomats were playing for time, but Baron Sonnino pinned them down to the question, "What compensation are you prepared to offer for a breach of the Triple Alliance, which you are compelled to admit?® The appointment of Baron Burian (q.v.) as Austro-Hungarian Foreign Minister in place of Count Berchtold introduced a counteracting factor. Baron Burian was willing to offer compensations from other people's territory and suggested that Italy should look for her compensation after the war in Albania. The suggestion was rejected by Italy. Germany pressed Austria to surrender the Trentino and Prince Billow urged Italy not tp demand Trieste. Italy was meanwhile put¬ ting her army on a war basis and laying up mili¬ tary stores. Rome became the centre of politi¬ cal gravity for all the principal belligerents, out¬ bidding each other for the support of Italy. On 12 Feb. 1915 Baron Sonnino withdrew his original proposals for the cession to Italy of at least the unredeemed territories of the Trentino and the port of Trieste, and addressed a warning to Austria that any new military action undertaken in the Balkans against either Serbia or Montenegro, without previous agree¬

ment with Italy, would be considered an in¬ fringement of Article VII of the Alliance and would lead to grave consequences. The result of this step was to secure a temporary immunity from attack for Serbia at a time when there were credible rumors of a fresh invasion with German assistance. Negotiations began afresh in March 1915 with an offer by Baron Burian, now converted, by German pressure, to the principle that compensation must be made from Austrian territory. Baron Sonnino insisted on immediate negotiations without German inter¬ vention. Burian's offer of "territories in South Tyrol, including the city of Trent,® coupled with suggestions for a counter-payment by Italy, was rejected as too vague and meagre. On 20 March Prince Billow informed Baron Sonnino that Germany would guarantee the exe¬ cution of any agreement arrived at between Vienna and Rome. As Italy had insisted that the transference of any territories agreed upon must be made at once, the German offer of guarantees touched the heart of the contro¬ versy and led Baron Sonnino to ask what use the guarantee would be in case the Central Powers were defeated. On 8 April the Italian demands were definitely formulated, demanding the cession of the Trentino with the setting up of the boundaries fixed for the kingdom of Italy in 1811, and a new eastern frontier, to include Gradisca and Gorizia; the formation of Trieste and its neighborhood into an autono¬ mous state completely independent of Austria; the cession of the Curzolari Islands off the coast of Dalmatia; the immediate evacuation by Austria-Hungary of Trieste; the recognition of Italian sovereignty over Vallona and dis¬ trict, and the renunciation by

Austria-Hungary of any claims in Albania. In return for these concessions, Italy would pay 200,000,000 lire ($40,000,000) as indemnification for loss of gov¬ ernment property, would pledge herself to maintain neutrality throughout the war toward both Austria and Germany, and would re¬ nounce, for the duration of the war, any further claim under Article VII of the Triple Alliance. These proposals were declined by Vienna on 16 April 1915.

During the progress of these complicated negotiations the statesmen and diplomats of the Allied powers had not been idle in courting Italy. Of all the then neutral powers the action of Italy was most vital to the struggle, for she occupied a strategic position on the flank of both combatants. Her intervention on behalf of Germany and Austria would menace the French right-wing; and if she joined the Allies she would menace the Austrian left, while her fleet would establish a crushing superiority against Austria in the Mediterranean. From the Italian point of view, the decision was necessarily dictated by the interests of Italy, and those interests were becoming clearly de¬ fined. When the war broke out Italy's inter¬ ests were, on the whole, opposed to those of Germany and Austria; her relations with France and Great Britain were cordial and the sympathies of her people lay overwhelmingly with the Entente Allies. As already pointed out, uncompromising neutrality might leave Italy, at the end of the war, whichever side gained the victory, as the friend of neither the conquerors nor the vanquished, and with the realization of her national ambitions indefinitely

postponed. It was not improbable that the pre¬ dominant factor which guided the final decision of Italy was the question of whether she would be able to hold such territories (if ceded by Austria) in the event of a German victory. Perhaps the terms laid down were so framed as to invite rejection, following a precedent set by Austria in the Serbian ultimatum. Ten days after their rejection by Baron Burian a secret agreement was concluded in London on 26 April 1915 between Italy, France, Great Britain and Russia. The terms of that treaty were first published to the world on 28 Nov. 1917 in Petrograd, by order of Leon Trotzky, the Bolshevist Foreign Minister of Russia. (See London, Treaty of, 1915). On 3 May 1915 Baron Sonnino sent to Vienna a formal de¬ nunciation of the Italo-Austrian Alliance. Pub¬ lic opinion in Italy had meanwhile become loudly clamorous for intervention. The fate of Belgium and Serbia had created a deep im¬ pression and the news of the sinking of the Lusitania raised popular feeling to fever-point. Gabriele D'Annunzio (q.v.) and the grandsons of Garibaldi

appealed to vast, enthusiastic audi¬ ences. The Central Powers made one more attempt to save the situation. Baron Burian hastily offered further concessions as the basis for a new treaty. A political crisis then broke out. The neutralist ex-premier, Giolitti, who had fled from Rome a few months before, now reappeared. His followers agitated for accept¬ ance of the Austro-German terms. It seemed possible that he might return to power with an anti-war policy. Signor Salandra's resignation on 13 May, a week before the meeting of Par¬ liament, suddenly brought matters to a crisis and revealed the temper of the country. On the 16th it was announced amid great popular rejoicing, that the king had refused to accept the resignation of Salandra. Giolitti left Rome without facing Parliament and on the 20th the government secured overwhelming majorities in both chambers giving it extraordinary powers in the event of war. The fiery eloquence of D'Annunzio, coupled with his virile utterances in the popular press supplied the last spark for the fast impending conflagration. He gave voice to the indignant revolt against im¬ potence and dependence when he exclaimed: ((We will no longer be a museum of antiq¬ uities, a kind of hostelry, a pleasure-resort under a sky painted over with Prussian blue for the benefit of international honeymooners!® The Italian people called for war, not so much against the traditional foe of Italy as against the power which threatened the civilization of the world. On 22 May a general mobilization was ordered and on the 23d Italy entered the war by a formal declaration of hostilities against Austria. Baron Sonnino's skilful diplomacy had put Italy technically in the right; she went to war on grounds fully justified by the public sentiment of Europe. So far from <(coming in on the winning side,® Italy joined the Allies at a moment when their prospects looked black. Mackensen's phalanx was driving the Russians in Galicia and the British had suffered severely at Ypres. The first Dardanelles campaign had failed. In the spirit of Garibaldi and his Thousand, Italy entered upon her latest war of liberation with a popular enthusiasm which had very little care for material rewards.

Bibliography. — (American Year Book 1915 5 (p. 95 et seq.) ; (La Politica Estera Italiana, 1875-19165 (Bitonto 1916) ; Anonymous, (L'Adriatico) (Milan 1914) ; Bainville, J., (La guerre et l'l talie > (Paris 1916) ; Billot, A. (former French Ambassador to Italy), (La France et l'ltalie: Histoire des annees troublees 1881— 1899> (Paris 1905) ; Carnovale, L., (Why Italy Entered the Great War; Perche l'ltalia e entrata nella grande guerra) (English and Italian; Chicago 1917); Cassi, G., (I1 Mare Adriatico :• sue funzioni attraverse i tempi5 (Milan 1915) ; Chlumecky, L. yon, (Oester- reich-Ungarn und Italien) (Leipzig and Vienna 1907) ; Current History (Vol. Ill, pp. 490-497, New York 1915) ; (Diplomatische Akten- stiicke Betreffend die Ereignisse am Balkan ■ — 13 Aug. 1912 bis 6 Nov. 19135 (Vienna 1914) ; (Diplomatische Aktenstucke

Betreffend die Beziehungen Oesterreich-Ungarns zu Italien in der Zeit von 20 Juli 1914 bis 23 Mai 1915 5 (Vienna 1915) ; (Documenti diplomatici pre- sentati al Parlamento Italiano dal Ministro degli Affari Esteri, Sonnino } (Italian <(Green Book,® Rome 1915) ; Cocks, F. Seymour, (The Secret Treaties and Understandings) (London 1918) ; Coolidge, A. C., (Origins of the Triple Alliance) (New York 1917) ; Dudan, A., (La Monarchia degli Absburghi5 (Rome 1914) ; Fullerton, W. M., (Problems of Power5 (Lon¬ don 1914) ; Gayda, V., (L'Italia d'oltre confine5 (Turin 1914) ; Hall, (Modern Europe, 1815- 1915 5 (New York 1917) ; Holt, L. H., and Chil¬ ton, A. W., (The History of Europe from 1862 to 19145 (New York 1918) ; (Italy and the Adriatic5 (Quarterly Review, October 1915) ; Miller, W., (The Foreign Policy of Italy5 (ib. April 1917) ; Parker, Sir G., (The World in the Crucible5 (New York 1915) ; Ponsonby, Arthur,

Editorial Staff of The Americana.

ITALY, Free Church in, or the Evan¬ gelical Italian Church, a reformed religious sect founded by Alessandro Gavazzi in 1870 (see Gavazzi, Alessandro). In 1874 a confession of faith was formulated, an ecclesiastical con¬ stitution framed under a General Assembly and the title of <(Free Church in Italy® assumed. The confession is practically that of the Protes¬ tant churches, and the constitution is based on the government by elders, like that of the Pres¬ byterians, though the several congregations are practically uncentralized, as with the Independ¬ ents. In 1891, bv royal decree, the title ((Chiesca Evangelica Italiana® was given to this bodv. Elementary and Sunday schools are maintained. The schools of the church in Florence are par¬ tially supported by the state, and a gift bought and presented bv British friends is the old

church of San Jacopio in Florence. According to recent statistics the General Assembly legis¬ lates for 40 congregations represented in 10 dis¬ tricts embracing over 2,000 communicants.

ITASCA LAKE, farthest source of the Mississippi, in northern Minnesota. It is lo¬ cated about 47° 13′ 10″ N. and 95° 12′ W. at an altitude of 1,457 feet above sea-level. It was first definitely proved to be the source of the Mississippi by H. R. Schoolcraft (q.v.) in 1832 as a result of a journey of exploration under¬ taken under the auspices of the United States government. At the same time it received its name by a fanciful

combination of the two Latin words ver-itas-ca-put. Claims have been made at times, especially by W. Glazier, that another lake beyond Itasca Lake, known as Elk or Glazier Lake, is the ultimate source of the Mississippi. These have not been substan¬ tiated, however, and Itasca Lake is still con¬ sidered officially the source of the father of rivers. The ground has a substratum of sand and gravel, mingled with large boulders ; the surface is spongy and swampy. This basin has been made a national park of about seven by five miles, containing 19,701.69 acres (30.78 square miles). In the centre, fed by sources so permanent and with a flood plain so small that it has actually risen in dry seasons (though it receded some feet during the 19th century), lies Itasca, a giant among the small ponds around it, but having an area of only 1,130 acres, or 1H square miles. It is composed of a centre running east and west about a mile, whence ex¬ tend south an east and a west arm about 1ˆ2 miles long each, and another northward about a mile, the width varying from one-sixth to three-fourths of a mile. It has a shore line of 23,000 yards (over 13 miles). Depth, 4 to 50 and 60 feet; average, 20 to 35. The Mississippi flows from its north arm ; a strong brook called by Nicollet the <(Infant Mississippi55 flows into the west arm. The basin of Itasca Lake has been made into a state park. (See Mississippi River). Consult Brower, J. V., (Itasca State Park) (Saint Paul 1904) ; Brower, J. V., (The Mississippi River and its Source 5 (in Minnesota Historical Soci¬ ety Collections, Vol. VII, Saint Paul 1894) ; Baker, J. H., (The Sources of the Mississippi 5 (in ibid., Vol. VI, p. 1, Saint Paul 1894) ; Baker, L. H., (Origin of the Name of Itasca Lake5 (in Magazine of Western History, Vol. IV, p. 336, Cleveland 1886) ; Chambers, J., (The Mississippi River5 (New York 1910) ; Clarke, H., (The Source of the Mississippi5 (New York 1886) ; Glazier, W., Town the Great River5 (Philadelphia 1888); id., (Headwaters of the Mississippi5 (Chicago 1897) ; School¬ craft, H. R., (Narrative of an Expedition through the Upper Mississippi to Itasca Lake, etc.5 (New York 1834) ; id., (Summary Narra¬ tive of an Exploratory Expedition to the Sources of the Mississippi River in 1820, etc.5 f Philadelphia 1855) ; < Winch ell, N. H„ (The Source of the Mississippi5 (in Minnesota His¬ torical Society Collections, Vol. VIII, p. 226, Saint Paul 1898).

ITATA CASE, 1891, the cause of differ ences between Chile and the United States, resulting from the coup d'etat of Balmaceda (q.v.) and the revolt of the constitutional party in Chile. The latter through an agent had*

bought a quantity of arms and ammunition in New York, which were shipped to San Fran¬ cisco and then sent by a schooner to the south¬ ern coast, where it was met by the insurgent's vessel, the Itata, and the cargo transferred. The vessel had a few soldiers and a little artil¬ lery on board. The attorney-general issued a writ of detention on the ground that she was violating the United States neutrality laws ; the Itata, however, escaped, the

United States cruiser Charleston was sent in pursuit, over¬ hauled and captured her, and placed her on trial before the United States district court at San Diego. The courts discharged her as not hav¬ ing been guilty of such violation. Consult God- kin, E. L., (Itata Case5 (in Nation, Vol. LII, p. 416, New York 1891) ; United States, Presi¬ dent, Benjamin Harrison, (Message of the President Respecting the Relations with Chile5 (Washington 1892).

ITCH, a contagious disease of the skin (scabies) due to its invasion by the itch-mite (Sarcoptes scabiei), now rather rare in civiliza¬ tion. Even the adult mite is so small as to be barely visible, the female being about one six¬ teenth of an inch long and not quite as wide, while the male is still smaller. It has eight legs, two on each side of the head, to which suckers are attached, and four behind. (See Itch Mite). The female burrows into the skin and deposits her eggs, about 50 in number, and dies after a period of six weeks. After the eggs hatch out, the young make their way to the surface, and the impregnated females again bur¬ row into the skin, so keeping up the process. The most frequent sites selected by the bugs for their burrows are the web between the fingers, the front of the wrists, the umbilicus, the geni¬ tals in men, and the under side of the breasts in women. The first sign of the disease is itching, which forces the patient to scratch, particularly at. night, as the warmth of the bed increases the itch. The skin soon becomes in¬ flamed from scratching, and the discomfort is increased. Close examination may show the tiny burrow like a reddened pin-scratch about half an inch long. Many remedies are used with success but sulphur in the form of an ointment is the most common. As the bugs cannot be killed while still in the skin, a good plan is to take a hot bath with brisk rubbing, apply the ointment night and morning for three days, continuing to wear the same clothing and sleep in the same bed-clothes ; at the end of that time another bath is to be taken, all cloth¬ ing and bed-clothes changed, and another series of rubbings started. This must be continued as long as fresh burrows are found.

*ITCH MITE (Acarus scabiei or Sarcoptes scabiei), a minute icarus, supposed by some naturalists to be referred to by Aristotle in his (Historia Animalium.5 From the 12th century onward the connection of the mite and the itch was recognized but from 1800 to 1834 grave doubts were expressed. In that year, Renucci, a Corsican student, demonstrated the presence of the mite and investigation has since thrown much light on its structure and habits. The female is longer than the male, being visible to the naked eye, about one-fifth of an inch in length. In order to penetrate the horny layer of the epidermis, the mite assumes a nearly p~**- pendicular position ; and to avoid as much*

trouble as possible, it usually selects such spots as give least resistance, such as the space be¬ tween the fingers, the inside of the wrist, etc. Once fairly buried, it does not again come out, but burrows, and forms tortuous galleries within the skin. These galleries resemble the mark which is formed when a pen is drawn lightly over the skin without causing a scratch. In young children, and in persons with a deli¬ cate skin, they appear of grayish white color; while in persons with a coarse, dirty skin they are blackish. At certain intervals the galleries are pierced by small openings, for the admis¬ sion of air. It is through these openings, which sometimes appear like very minute black dots, that the young escape. The vesicles character¬ istic of the itch disease are attributed to a poison ejected by the mite. There are fewer males than females. (See Itch). Consult Os¬ born, < Insects Affecting Domestic Animals > (Washington 1896) and Raillet, (Zoologie medi- cale) (Paris 1895).

ITHACA, N. Y., city and county-seat of Tompkins County, on Cayuga Lake (42 miles long), and on the Lackawanna, Lehigh Valley and Central New York Southern railroads. It derives water power from several streams and has manufactories of autophones, silent roller chains, flour, advertising signs, cement, furni¬ ture, calendar clocks, firearms, salt, salt bags, well-drilling machinery and tools, furniture, paper,, cigars, carriages, boats, iron castings, traction engines, portable houses, incubators, brick, heel plates, rowing shells, aeroplanes, shirts, moving picture films, etc. The city is best known as the seat of Cornell University (q.v.) and the New York State Colleges of Agriculture and Veterinary Surgery (com¬ bined annual registration over 7,000), and the Cascadilla Preparatory School; and also as a popular summer resort. There are two na¬ tional banks, one trust company and two sav¬ ings banks (bank resources, $10,000,000), trolley connection with East Ithaca, large farming trade with Tompkins, Tioga, Cortland and Sen¬ eca counties ; and an assessed property valua¬ tion exceeding $8,000,000. Excellent State highways radiate in all directions. In the immediate vicinity are numerous gorges and waterfalls, the most noted of the falls being Triphammer, Ithaca, Enfield, Taughannock and Buttermilk. The Taughannock is 215 feet in height and is the highest waterfall east of the Rocky Mountains. There is here the Cornell Free Library containing 21,000 volumes, the Ithaca Conservatory of Music and Renwick Park. Under the charter of 1888, the govern¬ ment is vested in a mayor and city council elected every two years. An active Board of Commerce extends co-operation to manufac¬ turing concerns and the rural community. Ithaca was first settled in 1787 and was called at different periods, Sodom,® ((The Flats » and (until 1806, when Simeon Dewitt gave it the name it bears. It was incorporated as a village in 1821. Pop. (1920) 17,004.

ITHACA, the modern ITHAKI, one of the Ionian Islands, and the smallest except Paro, 17 miles northwest of the mainland of Greece and two miles north of Cephalonia. The surface is mountainous, but there are many pleasant valleys. The area is about 40 square miles. It was celebrated among the

ancients as the principality and home of Ulysses. Vathi is the capital. Pop. 12,000.

ITHAKI. See Ithaca.

ITINERANCY, a passing from place to place; in ecclesiastical usage, the Methodist system of limited pastorates instituted by Wes¬ ley. In the American Methodist Episcopal Church, North, no time limit has been placed on pastorates since 1900, although the bishop ap¬ points preachers from year to year. See Methodist Churches of the World.

ITINERARY, or ITINERARIUM, the

schedule of a route or table of the stages be¬ tween two places of importance with the dis¬ tances from one to another. Much of our knowledge of ancient geography is due to the intineraries issued by ancient peoples. Of these the best known are Htineraria AntoninP and Htinerarium HierosolymitanumP The former contains the Htinerarium Provinciarum) and the Htinerarium marinumP Various editions have been published, the best is perhaps that edited by (D'Urban Recueil des itineraires anciens) (Paris 1845).

ITIUS PORTUS, the port on the French coast, nearly opposite Dover, from which Caesar sailed on his. second expedition to Britain in 54 b.c. Its position has been a matter of much controversy; the majority of geographers, how¬ ever, identify it with Wissant, a village near Boulogne.

ITO, Hirobumi, Prince, Japanese states¬ man: b. Choshu, 2 Sept. 1840; d. 26 Oct. 1909. His father was a samurai retainer of the daimio of Choshu, with whom the youth became a trusted agent in his opposition to the Shogunate. While at Yedo in the interests of his chief, Ito became acquainted with western methods of warfare, consequent on the visit of Commodore Perry in 1854, and determining to study these in their native countries, with four comrades, including Inouye, left Japan secretly, and even¬ tually arived in London. Diplomatic compli¬ cations arising, owing to his daimio ignoring the right conferred by the Shogun on European powers to navigate the Inland Sea. Ito has¬ tened home before two years had elapsed, but was unsuccessful in his efforts to persuade the daimio of Choshu from opposing the European fleets assembled at Shimonoseki. The

daimio defeated, Japan awakened to the power of the West, and Ito became the impelling factor in its reorganization on models more in accord with the leading powers of the world. He took an active part in the overthrow of the Shogu¬ nate and the restoration of the Imperial power in the person of the Kotei or Mikado; in 1868 was appointed governor of Hiogo, and in 1869 vice-minister of finance. He then became prominent as an advocate of uniform coinage. In this connection he visited the United States and after studying the financial system of that country returned to Japan with the recommen¬ dation that the decimal system of money be adopted, which was done, and a mint estab¬ lished at Osaka. In 1872—73 he made a tour of the world, as a member of Iwakura's embassy, for the purpose of revising or modifying the treaties ther. in force. In 1872 he became min¬ ister of public works and established a college of engineering and secured the building of the railway from Yokohama to Tokio. In 1876 he

MARQUIS HIROBUMI ITO

.

(1

■

‘

‘ ‘,

.

.

again visited Europe to study the constitutions of the various countries for the purpose of re¬ modelling that of Japan. On his return he in¬ augurated a radical plan for changing social customs. Having become minister-president of state he started these reforms in the government offices, eliminating men of the old schools and substituting men of modern training and thought. He also reconstructed the laws and codes according to the ideas of western coun¬ tries and carried out many reforms in economy. In 1882, the emperor, desirous of adopting the constitutional form of government, commis¬ sioned Ito to proceed to Europe and America in order to investigate the governmental sys¬ tems of the two continents.

While in Europe he attended the coronation ceremony of Tsar Alexander III, as a representative of Japan, and returning in the following year, he began the work of drafting the constitution of the Empire. One year later Ito was appointed minister of the imperial household and created count. In 1885 he was dispatched to China and concluded the Tientsin Treaty with the late Li Hung- Chang ; 'became prime minister in the same year, but in 1888, when the privy council was created, resigned the premiership and was made presi- dent of the council. The constitution, the re¬ sult of his exhaustive investigation, was pro¬ claimed on 11 Feb. 1889, and when the imperial diet was first convened, Count Ito was ap¬ pointed president of the house of peers. Dur¬ ing his second premiership war broke out with China, and it was he who negotiated peace and concluded the Shimonoseki Treaty. -In recog¬ nition of his services during this war Count Ito was created Marquis in 1896. In the same year he resigned the premiership only to form his third cabinet in 1898. Soon afterwards, how¬ ever, at his own request the emperor relieved him from office, and he recommended to the sovereign the leaders of the two political par¬ ties then becoming prominent in the political life of the country. His advice was acted upon and these leaders formed a party cabinet, but soon quarreled, and the first party cabinet in the history of Japan ended in failure. Ito then organized a political party, the Constitutional¬ ists, but this action evoked strong opposition from the conservative element. When he formed his fourth cabinet in 1900, Marquis Ito met with firm opposition from the house of peers the members of which were mostly con¬ servative in view. His premiership was short¬ lived; he resigned in June 1901 and in order to improve his health visited Europe and America. He received the degree of LL.D. from Yale University and in England was created grand commander of the most Honorable Order of the Bath. Subsequently he severed connection with the party of his own creation and was ap¬ pointed president of the Privy Council. He failed to reach an understanding with Russia and at once opened negotiations which resulted in the Anglo-Japanese alliance of 1902. Dur¬ ing the war with Russia, Marquis Ito, as one of the ((Elder Statesmen® was the most trusted counsellor of the emperor. After the conclu¬ sion of peace which he did much to bring about, he was twice dispatched to Korea, these visits resulting in the Japan-Korea Treaty, declaring the Japanese protectorate over the peninsula. The marquis was ultimately appointed Resident- General of Korea, which high office he contin¬*

ued to hold until his assassination by a Korean at Harbin. The marquis was raised to the rank of prince in 1907. (See Japan; Korea). Consult Fitzgerald, W. G., (Some Japanese Statesmen of To-day) (in Putnam's Magazine, Vol. Ill, New York 1908) ; Foster, J. W., (Marquis Ito, the Japanese Statesman) (in International Quarterly, Vol. IX, New York 1904)

; Ladd, G. T., (In Korea with Marquis Ito) (ib. 1908) ; and Nakamura, K., (Prince Ito, the Man and Statesman) (ib. 1910) ; Grif¬ fis, W. E., (The Statesmanship of Ito) (in North American Review, Vol. CXCI, New York 1910) ; Johnston, J. T. M., (Hirobumi Ito — Japan > (in AVorld Patriots, > ib. 1917) ; Pal¬ mer, F., (Marquis Ito, the Great Man of Japan> (in Scribner's Magazine, Vol. XXX, p. 613, New York 1901).

ITRI, Italy, town of the province of Ca- serta, 90 miles southeast of Rome. It contains many ancient remains including an old tower supposed to be the tomb of Cicero, who was assassinated near Itri. The old castle and many of the houses were erected from stone taken from the Via Appia. Consult Baedeker South¬ ern Italy and Sicily) (Leipzig 1912). Pop.

6,100.

ITURBIDE, e-toor-be'da, Agustin de,

emperor of Mexico : b. Valladolid de Michoacan (now Morelia), Mexico, 27 Sept. 1783; d. Pa¬ dilla, State of Tamaulipas, 19 July 1824. In 1810 he was lieutenant in the provincial regi¬ ment of his native city, but on the breaking out of the troubles in Mexico joined the royalist party, and in this cause displayed such valor and ability that in 1816 he rose to the command of what was called the northern army, which occu¬ pied the provinces of Guanapuato and Valladolid. In 1820 the imprudent acts of the Spanish cortes produced so much exasperation among the clergy and the partisans of absolutism in Mex¬ ico, that these persons united to effect the in¬ dependence of their country, selecting Itunbide as their agent, and appointing him commander of the army in the south. He quickly bore down all opposition, and became so popular that he was proclaimed Emperor of Mexico, in May 1822, under the name of Agustin I. The Congress declared the throne hereditary in his family, and voted him a yearly allowance of $1,500,000. His troubled reign during which he showed great arrogance, disregard of all constitutional restraints, and cruelty towards his opponents came to an end in less than a year, by his abdication in March 1823. Con¬ gress granted him on his abdication a yearly pension of $25,000 on condition of his leaving the country, making sufficient provision for his family in case of his death. He resided in Leghorn for about a year, when he was induced to make an attempt to recover his lost crown. He first went to London where he published his famous Statement (transl. into English in 1824) and sailed for Mexico 11 May 1824. He landed with but a single attendant at Soto la Marina on 14 July 1824, but immediately was arrested and five days later was shot by order of the state of Tamaulipas without even being given a chance to appeal to Congress. His re¬ mains were, in 1838, brought to Mexico City and repose in its cathedral. . At the. same time he was officially invested with the title <(Liber- ator.® His

family settled in Georgetown

and later in Philadelphia, where his widow died in comparative poverty in 1861. Several of his sons subsequently held positions under the Mexican government, the eldest, Prince Angel, dying in the City of Mexico in 1872, the youngest, Prince Agustin, dying in Paris in 1873. Prince Angel's son, Agustin, b. 1864, was adopted by the Emperor Maximilian (q.v.) as his heir, Maximilian himself being childless. The collapse of the second empire, however, destroyed his chances of a throne. (See Mexico). Consult Beneski, C. de, (A Narrative of the Last Moments of the Life of Don A. de Iturbide) (New York 1825) ; Bigelow, J., (The Heir-Pre¬ sumptive to the Imperial Crown of Mexico) (in Harper's Monthly Magazine, Vol. LXVI, p. 735, New York 1883) ; Bulnes, F., (La Guerra de Independencia, Hidalgo-Itunbide) (Mexico 1910) ; Bustamante, C. M., (Historia del Em- perador Agustin de Iturbide) (Mexico 1846) ; Iturbide, A. de, (Agustin de Iturbide) (in American Catholic Historical Society of Phila¬ delphia, Records, Vols. XXVI-XXVII, Phila¬ delphia 1915-16); Navarro y Rodrigo, C. ; Agustin de Iturbide, etc.5 (Mexico 1906).

ITUREA, It' u-re-a, Palestine, the historical name of the district now called Jedur, between Mount Hermon and the Ledja mountains of Bashan, to the northeast of the Sea of Galilee. The Itureans were semi-nomadic Arabs, sup¬ posed to have been descendants of Jetur, a son of Ishmael, who had migrated northwards from Medina. In the 2d century b.c. they were sub¬ jugated by Judas Aristobulus ((the friend of the Greeks® and king of Judea who added their land to his kingdom and compelled them to accept Judaism. In 20 b.c. the district came under the rule of Herod (a grandson of Herod the Great), and at his death 4 b.c., fell to his son Philip, who is mentioned by Luke iii, 1, as tetrarch of the Iturean and Trachonitic region. In 44 a.d. the district became part of the Ro¬ man province of Syria, and many of the inhab¬ itants became soldiers in the Roman legions. They were celebrated as archers, brave and fearless, often mentioned on 1st and 2d cen¬ tury inscriptions. Marc Antony is accused of attempting to intimidate the Roman senate with his Iturean guards by Cicero in his c Philippics. >

ITZA, a Mayan people of northern Guate¬ mala. They came thither from Yucatan in the 15th century after the fall of the Maya Empire and settled on the shores of Lake Pefren. Cortes saw them in 1525 but the Spaniards

did not subdue them until Ursua took and pillaged their city in 1697. The records of this people date 'back to the 5th century and references to them are frequent in all Maya chronicles. Many of their records were destroyed by the Span¬ iards at the time of the conquest.

ITZCOATL, first Aztec emperor: His reign began in 1427. He formed a confederacy with the rulers of Acolhua and Tlatelulca against Maxtla of Tepanec, whom they captured after a short campaign and sacrificed to their gods. Itzcoatl instituted many reforms and greatly improved the state of his realm. He died about 1440. Consult Bancroft, H. H., ˆNative Races5 (Vol. V, San Francisco 1882).

ITZEHOE, town of Schleswig-Holstein, on the Stor, 30 miles northwest of . Hamburg. Its industrial establishments comprise cement

factories, carpet mills, soap works, chemical works, foundries, cigar factories, sugar mills, ship yards, etc. It carries on a considerable trade in cattle, grain, lumber and wine. It con¬ tains an ancient church and Rathaus. It grew around a castle erected here in 809 and is con¬ sequently the oldest town in Holstein. It re¬ received municipal rights in 1238. Pop. 16,500.

IUKA, I-u'ka, Miss., a village on the Mem¬ phis and Charleston railroad, in the northern part of the State, about 115 miles east of Mem¬ phis, was the scene of a severe engagement dur¬ ing the Civil War. Early in September, 1862, it was occupied by a small Union regiment as an outpost. On the morning of 13 September Gen. Sterling Price, moving north from Tupelo with a force of 14,000 men, to prevent Grant from sending reinforcements to General Buell in Kentucky, drove the Union regiment from the village and occupied it, and on the 19th was about moving to Rienzi on the Mobile and Ohio Railroad to form a junction with Earl Van Dorn's army preparatory to an attack upon Corinth. General Grant had been closely watching the movements of Price and Van Dorn, and when he heard that Price had occu¬ pied Iuka he determined to attack and cut him off before he could effect a junction with Van Dorn. General Rosecrans, who was near Corinth with 9,000 men, was ordered to move south to Rienzi and Jacinto, then eastward, and, marching on the roads from Jacinto and Ful¬ ton, to attack Iuka from the south. General Ord, with 6,000 men, was to move along the Memphis and Charleston Railroad to Burns¬ ville, thence by roads north of the railroad, and to attack on the north and west of Iuka. Grant accompanied Ord, who reached Burnsville on the 18th, and encamped within six miles of Iuka, which he proposed to attack early in the morning; but Grant, hearing that Rosecrans had been delayed in his movements and would not probably be up in time to attack next day, in¬ structed Ord not to move to the attack until the sound of

Rosecrans' guns was heard south of Iuka. Rosecrans, with the two divisions of Hamilton and Stanley, moved from Jacinto at 5 o'clock in the morning of the 19th and, after a march of 18 miles, at 4 p.m. his advance divi¬ sion (Hamilton's), about two miles south of Iuka, encountered Little's division of Price's command, Maury's division remaining in the north of Iuka, to confront Ord. Little, who was killed early in the engagement, had about 4,000 men, with which he attacked Hamilton vigorously before the latter could complete his lines. After a very severe fight, Hamilton was driven back some 600 yards, abandoning nine guns ; but, receiving three regiments of Stan¬ ley's division as a reinforcement, he rallied and regained part of his lost ground, when darkness ended the fighting. General Prince reports : <(The fight began, and was waged with a severity I have never seen surpassed.® Price prepared to renew the battle in the morning; but, convinced by his subordinates of the critical position he was in with Rosecrans in his front and Ord in rear, retreated southward by the Fulton road, which Rosecrans had failed to close as was in¬ tended. Ord did not hear the sounds of battle on the 19th, but, advancing on the morning of the 20th, found that Price had escaped. Price retreated southward and reached Baldwyn 23

September. Rosecrans and Ord returned to Corinth. Rosecrans reported a loss of 141 killed, 613 wounded, and 36 missing. Price re¬ ported a loss of 86 killed and 408 wounded ; Union estimates placing it much higher. There were also a number of other engagements and skirmishes near Iuka a various periods of the war, notably on 22-23 May, 13, 16, 20, 27 Sept. 1862; 7, 14 July 1863; 9 Jan., 17, 18 Feb. 1865. Consult Grant, U. S., (Personal Memoirs) (2 vols., New York 1895) ; Greene, F. V., (The Mississippi > (New York 1882) ; Johnson, R. U., and C. C. Buel, ed., (Battles and Leaders of the Civil War) (4 vols., New York 1888) ; Maury, D. W., (Battle of Iuka) (in Southern Magazine , Vol. II, p. 598, Baltimore 1872) ; Neil, H. M., (A Battery at Close Quarters5 (Co¬ lumbus 1909) ; United States, Conduct of War, Committee on, (Report of Investigation upon the Military Campaigns of Major Gen. W. S. Rosecrans) (Washington 1865) ; United States, War Department, (The War of the Rebellion, Official Records5 (Ser. I, Vol. XVII, part 1; Atlas, Washinton 1886-95).

E. A. Carman.

IVAN, 'e-van', the name of several rulers distinguished in Russian history. Ivan I, Kalita (Money-Bag), d. 1341. He was prince of Vlad¬ imir, Nishni Novgorod and Moscow, and later became Grand Duke of Moscow and

extended his dominions with the assistance of the Tar¬ tars. His younger son, Ivan II (b. 1326; d. 1359) became Grand Duke in 1353. Ivan III (b. 1440; d. 1505) succeeded his father Basil as Grand Duke of Muscovy in 1462. He was one of the most astute of the early rulers of Russia, extended the rule of Muscovy over the repub¬ lic of Novgorod and all its possessions includ¬ ing all of northern Russia (1478), over many of the other small principalities surrounding Muscovy, and over part of Lithuania (1503). In 1480 Ivan refused to pay the annual tribute to the Tartar Khan, which action, in spite of two attempts on the part of the latter to main¬ tain his sovereignty by force of arms, resulted in the liberation of Muscovy from the Tartar yoke. As a result of Ivan's second marriage to a daughter of Thomas Palaeologus, brother of the last Byzantine emperor, autocratic forms of government and court ceremonies gradually de¬ veloped at Moscow. Ivan did much to intro¬ duce western civilization into his domains and was also responsible for the compilation of the first Russian law code. Ivan IV, <(The Terri¬ ble® : b. 25 Aug. 1530; d. 17 March 1584. He was the grandson of Ivan III and succeeded his father, Basil III, in- 1533. In 1544 he ended the regency and assumed the government him¬ self. On 16 January 1547 he was crowned as the first Tsar of Russia. He conquered Kazan in 1552 and Astrakhan in 1554. His efforts to acquire additional territory in Livonia and Es- thonia, though carried on with large forces from 1560-82 almost without intermission, failed as a result of the stout resistance of Poland and Seveden. It was during his reign that the con¬ quest of Siberia was started (1581). Ivan IV was a peculiar mixture of political sagacity, admiration of western civilization and eastern barbarity. He was an indefatigable worker, comparatively well educated, but possessed such a strong strain of cruelty and immorality that it amounted at times almost to madness. Amongst vol. 15 — 36

his many barbarous deeds was the almost com¬ plete destruction of Novgorod and the slaughter of thousands of its inhabitants as punishment for an unproven attempt at revolution (1570). Another deed of similar nature was the killing of his son Ivan by a blow, given in a moment of uncontrollable fury, in spite of the fact that he was deeply attached to this son (1580). Twice during his rule (1565 and 1580) he pub¬ licly expressed a desire to abdicate, but was persuaded to continue on the throne. The next Russian Tsar, bearing the name Ivan, was Ivan V (b. 27 Aug. 1666; d. 29 Jan. 1696). He was a half-brother of Peter I, with whom he shared the throne for some time, but .being weak, both physically and mentally, he took no active part in the government of Russia. One of his five daughters, Anne, later ascended the throne as empress. Her great-nephew, the son of grand- duchess Anne and Duke Anton Ulrich of Brunswick-Bevern, became Ivan VI (b. 24 Aug. 1740; d. 5 Dec. 1764). His great-aunt appointed him her successor and upon her death, 17 Octo¬ ber

1740, he was proclaimed tsar under the re¬ gency of Ernest Johann Biren, Duke of Cour- land. The latter was overthrown by the young tsar's mother who assumed the regency in No¬ vember 1740. In December 1741 Elizabeth be¬ came empress as a result of a coup d'etat and the young tsar was sent to prison, first at Riga and Dvinsk, then at Kholmogory, and at last in the fortress of Schlusselburg. There he was murdered by some officers in whose charge he was put to forestall an attempt to liberate him, after having been kept in solitary confinement for more than 20 years. (See Russia). Consult Bain, R. N., (The First Romanovs) (London 1905) ; id., (Slavonic Europe; A Political His¬ tory of Poland and Russia from 1447 to 1796) (Cambridge Historical Series, No. 5, Cam¬ bridge 1908) ; id., (Russia under Anne and Elizabeth (in Cambridge Modern History,5 Vol. VI, p. 301, Cambridge 1909) ; Bury, J. B., (Russia, 1462-1682 5 (in (Cambridge Modern History,5 Vol. V, p. 477, Cambridge 1909) ; Farrer, J. A., (Ivan IV5 (in Gentleman's Maga¬ zine, N. S. Vol. XLI, p. 168, London 1888) ; Green, R., (Ivan the Terrible5 (in ibid., N. S. Vol. LII, p. 569, London 1894) ; Hotzsch, O., (Catharine ID (in Cambridge Modern His¬ tory, } Vol. VI, p. 657, Cambridge 1909). Man- villon, E. de, (Histoire de la Vie d'lwan VD (Paris 1766) ; Pember, A., (Ivan the Terrible) (London 1895) ; Pierling, P., (Rome et Mos- cou, 1547— 79) (Paris 1883); id,. (Le Saint- Siege, la Pologne, et Moscou, 1582— 87) (Paris 1885) ; id., (La Russie et l'Orient, etc.5 (Paris 1891) ; id., (La Russie et le Saint-Siege5 (3 vols., Paris 1896-1901) ; Ramband, A. N., (His- toire de la Russie5 (Paris 1878; translated into English by L. B. Lang, 2 vols., London 1879) ; Rappaport, A. S., (Mad Majesties, etc.5 (Lon¬ don 1910) ; Schiemann, T., (Russland, Polen, und Livland bis ins 17 Jahrhundert5 (2 vols., Berlin 1886) ; Strahl, P., und E. Hermann, (Geschichte des Russischen Staates5 (4 vols., Hamburg 1839-53) ; Waliszewski, K., (Ivan le Terrible5 (Paris 1904; translated into English by M. Loyd, Philadelphia 1904).

There is also an extensive literature in Rus¬ sian, practically none of which has been trans¬ lated into any western language. An exhaus¬ tive bibliography of it and of Russian and for-

eign documents referring to the times of the six Ivans will be found in Cambridge Modern History (Vols. V and VI, Cambridge 1909), mentioned above.*

IVANGOROD, Poland, a town and fort¬ ress on the Vistula at its confluence with the Wieprez, 60 miles southeast of Warsaw, prov¬ ince of Sedcle. This fortress marked the fur¬ thest point of the invasion of the

Austro-Ger- man forces on the eastern front in the great struggle of 1914-18. Pop. 5,500.

IVAN HOE, i'van'ho. (Ivanhoe, written by Sir Walter Scott and published anonymously in 1820, is a story of love and adventure in the days of chivalry. Following his usual practice in the historical novels of interweaving a ficti¬ tious romance with actual events, and coloring the whole with the manners of the time, Scott has in*

The period which Scott has chosen is the late 12th century, when the two elements of English society have not united in a common national life. The Saxons, dispossessed of their old inheritance but still constituting the sturdy body of the English people, are set against the Norman conquerors, brilliant feudal lords, endowed with all the knightly graces but haughty and tyrannical Of each of the two con¬ trasting groups Scott has given a memorable picture. The scene changes from the patriar¬ chal home of Cedric the Saxon, with its rough hospitality and home-spun comforts, in which master and serf live on terms of kindly famili¬ arity, to the Norman castle, with its courtly life of hall and 'bower and the dark mysteries of its gloomy dungeons, then again to the leafy for¬ est, where Robin Hood and his merry men lead the lawless but honorable life of the greenwood. The chief historical event involved in the story is the return of the heroic Richard I to Eng¬ land. By seizing the throne from his unpop¬ ular brother John, Richard restores justice to the realm and wins the loyalty even of his Saxon subjects.

The fiction of which Ivanhoe is the hero is less interesting than the historical setting and atmosphere which envelope it. The Knight, Ivanhoe, son of Cedric, has been disinherited by his father because of his love for the noble Saxon heiress Rowena, whom Cedric hopes to marry to Athelstane, a descendant of Edward the Confessor, thereby uniting the Saxon fac¬ tions and restoring the ancient monarchy. At the opening of the story Ivanhoe has returned to England from Palestine, where he has won the favor of Richard, disguised as a palmer. Furnished with a suit of armor by the much persecuted Jew, Isaac of York, he appears at the tournament at Ashby, where, after being wounded and forced to reveal himself, he is crowned victor by Rowena. On their return from the tournament the whole party of Cedric

is captured and imprisoned in the castle of Tor- quilstone by a band of Norman nobles led by De Bracy, who attempts to force Rowena to marry him by threatening the life of Ivanhoe. At the same time the Templar, Brian de Bois Guilbert, seizes Rebecca, daughter of Isaac, and tries in vain to make her his mistress. Meanwhile the castle is attacked by Robin Hood, who, under the name of Locksley, has won the prize for archery at the

tournament. Rebecca, who loves Ivanhoe and is nursing him to health by her oriental arts, describes to him from a window the progress of the siege. At length the castle is set on fire by Ulrica, a half crazed Saxon hag, seeking vengeance on the Normans. The Templar flees with Rebecca to the Preceptory of Templestowe. The Jewess is there condemned to death for sorcery and De Bois Guilbert is commanded to appear in the lists against her. He offers to save her if she will accept him, but she refuses and is about to be burned at the stake when suddenly Ivan¬ hoe, still weak from his wounds, appears dra¬ matically as her champion. De Guilbert falls dead at the first encounter and Rebecca is re¬ leased. Meanwhile John has received word that Richard is in England. The king had in fact been present at the tournament and per¬ formed remarkable deeds of valor disguised as The Black Sluggard. Barely escaping by the intervention of the outlaws from a plot of John's to assassinate him, he now reveals him¬ self, resumes his authority, and punishes the traitorous adherents of Prince John. Cedric, whose hope of restoring the Saxon dynasty has fallen with the return of the popular Richard at last consents to the marriage of Ivanhoe and Rowena.

The story is rich in incident and full of stir¬ ring adventure. If the hero and the heroine are somewhat insipid, the other figures, whom Scott sees chiefly in their historical and typical as¬ pects, are vividly portrayed and thoroughly interesting.

Consult Hutton, R. H., (Sir Walter Scott ((English Men of Letters Series>) ; Lockhart's (Life of Scott> ; Young, C. A., (The Waverley Novels) ; Essay by Bagehot, W., (Literary Studies1* (Vol. II) ; Stevenson, R. L., <(A Gos¬ sip on Romance® (in (Memories and Por¬ traits*). For complete bibliography consult (Cambridge History of English Literature) (Vol. II). James H. Hanford,*

Associate Professor of English, University of North Carolina.

IVEAGH, Edward Cecil Guiness, Baron,

Irish philanthropist: b. 10 Nov. 1847. He is a son of Sir B. L. Guinness (q.v.). In 1891 he became Baron Iveagh. He gave $1,250,000 for the purpose of erecting sanitary dwellings for working people at a low rent. Of this sum $1,000,000 was to be given to London, and the remainder to Dublin. < The income obtained on the capital is to be employed in the same fashion.

IVERACH, James, Scottish theologian : b.

Caithness, 1839. He received bis education at the University of Edinburgh and at New Col¬ lege. In 1869 he was ordained minister of the United Free

Church and from 1874 to 1887 held a pastorate at Ferry Hill, Aberdeen. From 1887 to 1907 he held the chair of apologetics at the Free Church College of Aberdeen ; becom-

ing professor of New Testament language and literature in the latter year at the same institu¬ tion, of which he also served as rector from 1905. His publications include (Evolution and Christianity > (1884) : 'Life and Times of Saint PauP (1890); 'The; Truth of Christianity) (1895); 'Theism in the Light of Present Science and Philosophy > (1899) ; 'Descartes, Spinoza, and the New Philosophy (1907) and numerous papers in the Spectator.*

IVES, ivz, Frederic Eugene, American in¬ ventor: b. Litchfield, Conn., 17 Feb. 1856. He received a public school education ; was director of the photographic laboratory at Cornell Uni¬ versity in 1874—78, and lectured with distinction before scientific societies in this country and in England. Among his inventions are the pro¬ cess of half-tone photo-engraving (1878) ; the three-color printing process in the typographic press, and also the parallax stereogram. His honor awards include the inscribed gold testimonial of the International Photo-En¬ gravers' Association (1911); the Cresson gold medal of the Franklin Institute, Philadelphia; special gold medal of the Photographic Society of Philadelphia; the Progress medal of the Royal Photographic Society of London and the Science medal, for work in color photography; the Scott legacy medal of the Franklin Insti¬ tute for the parallax stereogram; the Rumford medal of the Academy of Arts and Sciences for inventions in color photography and photo¬ engraving, besides 14 other medals from scien¬ tific societies for various inventions and dis¬ coveries. His published 'Isochromatic Photo¬ graphy with ChlorophylP (1886); (A New Principle in Heliochromy) (1889), etc.

IVES, Levi Silliman, American clergyman : b. Meriden, Conn., 16 Sept. 1797; d. New York, 13 Oct. 1867. He served a year in the army in the war of 1812-15, was educated at Lowville Academy, entered Hamilton College 'to prepare for the ministry of the Presbyterian church in 1816, withdrew on account of feeble health, joined the Protestant Episcopal Church in 1819, was ordained priest in 1823, and elected bishop of North Carolina in 1831. In 1848-49 he ex¬ hibited such strong sympathy with the Tractar- ian movement in England, that he was brought into antagonism with the majority in his diocese. Bishop Ives was arrainged for his views before the convention of the Episcopal church. His explanation were accepted for a time, but in 1852 he visited Rome and made his

*submission to Pius IX. Thus at the age of 58 he sought admission as a layman into the Catholic Church "with no prospect before him, but simply peace of conscience and the salva¬ tion of his soul.® His wife also was converted to the old faith. After his return to New York he became professor in Saint John's College, Fordham, and lecturer in the convents of the Sacred Heart and the Sisters of Charity. He was one of the founders and first president of the Catholic Protectory for Destitute Children. He published a catechism for the slaves in North Carolina; (Manual of Devotion * ; (Humility a Ministerial Qualification > (1840) ; 'Sermons on the Obedience of Faith* (1849); 'Trials of a Mind in its Progress to Catholo- cism) (1853) ; 'Letter to his Old Friends* (1853). Consult Shea, J. G., (The Catholic*

Church in the United States) (New York

1856).

IVIMEY, I-vI'me, Joseph, English Baptist clergyman and historian: b. 22 May 1773, at Ringwood, near Southampton ; d. London, 8 Feb. 1834. For a time he followed in his father's footsteps and was a tailor. He be¬ came a Baptist minister in 1794. For 29 years he was pastor of the Baptist church in Eagle street, Holborn, London He was a leader in the anti-slavery and missionary movements. His principal works include (The Life of Tohn Bunyan (1809), which was the chief author¬ ity for many years: (History of the English Baptists* . (4 vols., 1811—23); (The Life, Times and Opinions of John Milton> (1833). Consult Prichard, George, 'Memoir of the Life and Writings of Joseph Ivimey> (London 1835).*

IVIZA, an island of the Balearic group (q.v.).

IVORIES. On account of the fineness of its grain, warm tone, the polish it easily ac¬ quires, its adaptability to carving, and its in¬ corruptibility, ivory has been a favored medium for plastic art work from the very earliest times. In ancient Egyptian and Assyrian re¬ liefs we see representations of conquered Ethiopians bringing elephant tusks as tribute. In Egypt and Mesopotamia have been found ivory carvings of idols and utensils. But the oldest, graphic work on ivory extant is pre¬ historic and derived from the "cave-dwellers® when elephants inhabited Europe. Such pieces have been discovered in caves in the Dordogne (France), others in Switzerland. In¬ cised on these pieces of tusk are outlines of reindeer, mammoths, etc. In the Grotte du Pape (France) was found the carved torso of a woman ; and so on. In the museums at Lon¬ don, Paris, Cairo, etc., are goodly collections of ivory work done in the early Dynasties of the Egyptians. Two specimens in the Louvre are supposed to be a pair of clappers or castanets; one has rudely incised outlines of figures; the other has a head carved in relief and

its extremity is carved in the shape of a beautifully formed hand. The British Museum has two daggers ornamented and inlaid with ivory dating back to the Pharaoh of the Exodus ; in the Louvre are a small vase, spoons, toilet boxes, etc. Next in date are pieces from Assyria, of which 50 remarkable pieces of ivory from Nineveh fere in the British Museum; they were taken from the ruins of the Palace of Nimrod and have evi¬ dently suffered badly from fire. In the col¬ lection are fragments of winged1 sphinxes, plaques from a throne or couch, probably; a lion's head, portions of bulls' bodies, human heads, hands, legs, etc. Other museums have daggers, sword handles., sceptres, musical in¬ struments etc. The ancient Greeks used ivory on their large statues putting gold on the marble form for clothing and ivory for the flesh parts — they called the work "chryselephantine® ; nothing is extant but the records. The Roman consular diptychs are the earliest refined ivory carving existing, with few exceptions. Prob¬ ably of the 3d century a.d. is the beautiful statuette of Penthea in Cluny Museum; it is 15 inches high. The ancient head of a woman in the Vienna Museum is uf fine workmanship, nearly half natural size. Found in Etruscan

tombs (Chiusi and Calvi) are a few ivory examples dating, probably, back to the 4th century b.c., such as a Gorgon head with eyes of gold inlaid, horses' heads, lions, parts of mirrors and caskets, a large bust of a woman, all in the style of Greek art. And the Greeks used ivory, for Homer, in his Odyssey, speaks of the artisan Icmalios, goldsmith of Ithaca, making a chair of ivory and silver on which Penelope sat. Solomon's throne appears - to have been of ivory. The Roman curulean chairs were frequently of ivory. Most noted of the early Roman carved ivories are the "diptychs" or writing tablets; they consisted of two tablets folding over one another and fastened together loosely on one side. Their carved external sides give a representation of .a consul, scenes of public games, fights, etc., the inner side being plain and covered with wax on which to write notes with the style ; they measured about 12 inches by 5 or 6, and were strong and thick. The most important, perhaps, of the early diptychs extant is that in the Liverpool Mayer Museum ; its lower bas-re¬ lief depicts men fighting stags in the arena, above are three persons in a gallery. It has been attributed to the 3d century. Another early diptych (the other may not have been consular) extant is that dedicated to Marcus Aurelius Romulus. Csesar (308 a.d.), in the British Museum; it represents a funeral pro¬ cession and above is the apotheosis of the con¬ sul driven in a four-horse chariot to Heaven. Altogether about 50 diptychs dedicated to con¬ suls are extant. Some are to the following: Consul Rufus Probianus (322 a.d.),

typically seated with scribes attendant; Amicius Probus (406) ; Flavius Felix (428 a.d.) ; respectively in Berlin, Aosta and Paris. Of the consul Areo- bindus (506) no less than eight diptychs are extant. A number of existing diptychs were carved for private individuals, and these are often superior, as works of art, to those carved for consular adulation. Three lovely early diptych specimens are known as the Bellerophon, Aesculapius and Hygyeia, and the Bacchantes, in the museum at Kensington and that of Liver¬ pool. They are of beautiful workmanship, and belong to those usually designated as "classical diptychs." An ivory curule chair and ivory sceptre were frequently given by the Roman Senate to tributary sovereigns.

Early Christian and Byzantine Ivories.— The first ivory carvings of the Christians were, of course, "transitional," showing many of the former pagan features as well as copying the style, as they are contemporaneous till we come to the developed Byzantine style. Early Christian diptychs gave the names of those baptized, some gave the names of bishops and benefactors, martyrs, saints, others recorded the names of the dead. Several cylindrical pyxes (caskets), made from a section of ele¬ phant tusk, exist that are beautifully carved; one in the Berlin Museum has reliefs of the Saviour enthroned, Saint Peter and Saint Paul on curule chairs, other apostles standing around, etc. . Four small ivory plaques of great interest are in the British Museum and contain carv¬ ings that depict events in the history of Christ (Crucifixion, etc.) ; they date somewhere be¬ tween the 5th and 8th century. The leaf from the diptych of Rambona in the Vatican is a 9th century production and shows a bust of the

Saviour, with hand in act of benediction, an allegorical sun and moon holds a torch each, and, strangely, below is a wolf suckling two children with the inscription "Romulus and Remus nourished by a wolf," in Latin. These plaques are frequently used as book-covers (a 9th century example is in the Bodleian Library, Oxford; a 14th century one in th,e British Museum is perhaps the most beautiful). The "Nativity" was one of the favorite subjects with ivory carvers ; one, a plaque of Rhenish exe¬ cution, in the Cologne Museum dates from the 11th century. Of Byzantine ivories there are few after the 10th century, then come several of Russian origin. We cannot fail to note that the religious stiffness and conventionalism of Byzantine works, are little present in the ivory reliefs; there is a freedom of action and resem¬ blance to nature quite remarkable and different from art expressed in other mediums. In the British Museum is, perhaps, the most noted of these carvings; it represents an archangel hold¬ ing an orb ini one hand and a long rod in the other. This is one of the largest known (16ˆ inches by 5 x/2) and dates about the 4th century; it doubtless is part of a writing tablet, as the Greek inscription reads "Accept this gift, and having learned the cause," proving that another plaque is missing, which contained the rest of the. sentence. The noted Brescia casket in the

Quiriniana Library, Brescia, is a 5th or 6th cen¬ tury work; it has an overelaborated top and sides, but in classic style. Busts range round the upper part, two scenes of Jonah and the whale, the Saviour, Magdalen, Good Shepherd and sheep, story of Susannah, all in be¬ wildering closeness. The Episcopal chair of Maximianus (546) at Ravenna from As¬ syrian workers, apparently) is of ivory with beautifully carved panels. A superb archangel . Saint Michael in the British Museum is attributed to Antioch artists. In Byzantine style is the Carlovingian 9th century ivory bookcover in the Victoria and Albert Museum (London). The centre panel displays a Virgin and Child and a figure on each side, architectural columns are the frame, beautiful figures of angels float on the top panel. The Vatican owns a bookcover very similar but claimed as three centuries earlier. The 11th century Byzantine triptych in the Paris Cabinet de Medailles is claimed to be the most beautiful specimen of extant Byzantine art. The central division has a Crucifixion with the Virgin Mary and Saint John on either side, all of the characteristic "elongated" anatomy and straight close folds of drapery; Constantine and Empress Helen are in diminutive size below. The statuettes in the Byzantine shrine from the Soltikoff collection are some of walrus tusk and some of elephantine ivory. The Russian Church would be expected to furnish numerous specimens of Byzantine ivory carving; it affords however, only a few heads of pastoral staffs, plaques and other liturgical accessories. A 16th century panagia (a flat locket-shaped receptacle to hold the consecrated bread) of ivory in the Vatican has 10 scenes from the New Testament carved in the minutest form with great skill and producing facial expressions clearly. These surround a larger central circle containing three angels sitting at meat with Abraham. Two thrones in the Kremlin at Moscow are of ivory. One, attributed to Constantinople (1472), is the

Ivan III throne; its plaques were added and dated 16th to 17th century. The other prob¬ ably comes from Persia and is covered with ornaments of gold and gem stones. Plaques of ivory of Hindu workmanship are on front and sides, picturing an elephant hunt amongst open interlaced work. Saint Peter's ivory chair is in the Basilica (Rome). It is a massive square structure, the low back supporting a triangular pediment. Square ivory plaques covering the surface depict the labors of Hercules and six constellations.

Ecclesiastical Diptychs. — It is to the cus¬ tom, which dates back to very early times of the Church, of using ivory plaques (both <(con- sular® and ˆclassical") for liturgical decoration that so many have survived; later,

when no longer used, fortunately, these works of art were carefully preserved in the treasuries of the churches. But diptychs have palimpsests just as do manuscripts (see Manuscripts) and sepulchral brasses (see Brasses). In these cer¬ tain parts of a carved diptych that are not de¬ sired are planed down and other work substi¬ tuted. An example in the Victoria and Albert Museum, London, has all its original reliefs erased but traces remain of a consul's figure; a figure of the Saviour in 13th century Russo-Byzantine is carved on the back. Another such in the Liverpool Museum has the original sub¬ stituted by an inscription to Bishop Baldricus (10th century). The cathedral at Monza has two leaves of another.

Gothic Ivories. — In the 13th, 14th and 15th

centuries we come across Gothic architectural effects in the carving. For liturgical purposes we meet with ivory in diptychs, triptychs, re¬ tables or altar-pieces, pastoral staffs or croziers, shrines, statuettes, caskets, bookcovers, liturgi¬ cal combs, portable altars, holy-water buckets (situlce), flabelli (fans), rosary beads, etc.. The quality of the workmanship varies considerably, the French being best. In France, the Revolu¬ tion destroyed most pieces; in England, the Reformation. Noted extant pieces of this period are the cylindrical pyx in Saint Gereon treasury, Cologne; a 13th century casket, in the museum at Kensington, of wood overlaid with ivory plaques painted and gilt, showing Saint Felix enthroned, etc.; two fine caskets (in the latter museum), one with the figures of Christ, Saint Peter and Saint Paul in richly carved canopies (ˆtabernacles®) of Gothic architecture. There are also polyptyches (with more than three leaves) which often form a recess in which is a statuette or group ; these are termed ((shrines.® Germany and Italy did splendid work in such pieces. Nothing of great art value in diptychs or shrines later than the 14th century has come down to us. Charming statu- 'ettes exist of the Gothic period as found in the museums of Paris and London. The Virgin and Child is a favored subject for ivory statu¬ ettes, the Virgin is frequently standing and has a tendency to lean over above, utilizing to the full the curve in the tusk; some are seated. Some of these are colored, even gilded. The ((Vierge de Bourbon® (Louvre) is very noted, it is a <(Vierge ouvrante,® a style in which the figure can be opened in the centre producing two doors and disclosing groups carved in the interior. The Saint George and dragon group was another favorite with ivory carvers; this is usually thus divided : there is a hillock with

castles above, lower we find the kneeling prin¬ cess praying for delivery and at base Saint George is slaying the dragon, all in full relief. The Wallace Museum, London, has one of these of the 15th century, the Salting Collection had a smaller one. The Coronation of the Virgin (Louvre) from the Soltikoff Collection is very noted, the Christ figure is said to be a

portrait of Philip III, and the Virgin a likeness of Mary, daughter of Henry III. A number of ((Deposition from the Cross® groups in ivory are in existence, in Byzantine and Western style, in panels as well as diptychs, triptychs and cas¬ kets.

Secular Art in Ivory. — Caskets for secular

use from the 13th century with carved panels and borders exist; they are frequently carved with classic subjects, as the stories of Europa, Orpheus, Pegasus, with figures of centaurs and other monsters. Noted secular caskets are in the Brussels Museum, British Museum (the (

Noted Ivory Sculptors. — Frangois Girar- don (17th century) is supposed to have cre¬ ated the famous crucifix in the archiepiscopal palace at Troyes; a replica or the original is in Sens Cathedral. Joseph Villerme (a. 1720) of Saint Claude carved crucifixes exclusively and his work is extant in a number of churches in France. Other noted crucifixes are: one in Calvet Museum, Avignon, by J. B. Guillermin; high altar at the Sorbonne, Paris, by F. Anguier ; in Saint Germain-des-Pres Hospital, Paris, by Simon Jaillot. Famous German crucifix carv¬ ers were: Andreas Feistenberger (created beau¬ tiful crucifix of the archbishop of Tours) ; his work is supposed to be the greatly admired crucifix in the Benedictine abbey church at Downside, near Bath (19 inches high) ; another was Georg Petel (example -in Imperial Vienna Museum) ; Melchior Barthel (in Florence Mu¬ seum) ; Balthasar Permoser (Brunswick Mu¬ seum) ; Bernhard Bendel (Frankenkirche, Munich). The <(Flagellation® scene was a chosen subject for ivory carvers.

Post-Renaissance Ivories. — In the 17th century we get the strong Italian influence bear¬ ing on all Christian art, the religious intensity in art is now displaced by appeal to the eye more than the mind. The nude enters largely into the treatment of figure work. But the art

of ivory carving enters its decline to become decadent by the 18th century (rococo and baro¬ que). In the 17th century we have a series of antique subjects, gods and goddesses, baccha¬ nals, satyrs, mostly of inferior talent but fre¬ quently of fine execution and some pieces of re¬ markable art value and originality. Examples are plentiful, for they had a popular demand. And ivory found its uses not only in statuettes and groups but for furniture decoration and inlays, for tankards and ewers, for busts, por¬ trait medallions, caskets, chessmen and draughts¬ men, handles for arms,

turnery, etc. The wealthy German princes encouraged the art, some even took ivory artists into their court retinue. Of such were Augustus the Pious, Elector of Saxony, founder of the Dresden ((Green Vaults®; Maximilian, Elector of Ba¬ varia; the princely family of Fuggers; Ferdi¬ nand of Bavaria; Elector Georg Wilhelm of Brandenburg. Augsburg, Munich, Nuremberg became centres for ivory work, also Geislingen, Ulm, Stuttgart and Gmiind. France had as centres Dieppe, Saint Claude, Rouen. A few works worth citing are: the allegorical group of Christoph Maucher (Vienna) showing princes in wigs alongside holy persons, cherubs, scrolls, garlands, angels blowing trumpets ; the Louis XIII sceptre (Londesbo rough Collection), an elegantly formed hand; a German 16th cen¬ tury dagger; a Nuremberg cup held up by a mermaid, some horns. In the museums of Nuremberg, Cassel, Gotha, Brunswick, Carls- ruhe, Vienna, are good collections, also in Dresden, Berlin and Munich are fine pieces. Of Flemish work we have 16th century pieces of Frangois Duquesnoy (called II Fiamingo), six are in the Museum at Kensington, his favorite subject was youthful satyrs and naked children playing; his Diana and her nymphs bathing is very beautiful. Lucas Fayd'herbe, another Fleming, is supposed to have executed the pip¬ ing Pan group in the Madrid Prado Museum, but his best work is in tankards and standing cups with satyr processions and dances in the museum at Kensington and other museums. Gerhard van Opstal (d. 1698), also Flemish, worked in Paris ; his bacchanal figures, amorini and Venuses, etc., are full of charm. Other clever, and noted carvers are Frangois van Bossuit (Dutch), and the Germans, Christoph Angermair (with his wonderful cabinets, called Kunstschrdnke) , Georg Petel, Leonhard Kern, Bernhard Strauss, Balthasar Permoser, Ignaz Elhafen, etc. Lathe or turned work in ivory shows considerable skill in technique in this period; noted workers were: the Zick family, Lorenz' and his sons, Martin Teuber, Fil. Sen- ger, etc. Their extant examples show tours- de-force aided by rose-engine lathes, ellipse chucks, and other mechanical means. With the Spanish, ivory has not been a favorite medium for art work. The Moors, however, with the conquest brought the technique, as we see in openwork boxes, in which Oriental or Moham¬ medan treatment is evident, as well as the Cufic inscriptions.

Oriental Ivories — India, as the home of the elephant, was naturally fond of using ivory in decoration. As with all other civilized na¬ tions, India's arts are bound up with her creed; as the Christian carvers depicted Bible scenes, so the Indians found motifs in Buddhas, Krish-

nas, Vishnus, Ramas and other monster gods and goddesses of Hindu mythology. On ac¬ count of their monotonous frequency and ab¬ solute similarity of expression, Indian art does not appeal to all western minds as does their own much variegated, historical field of pic¬ torial work. Again, in its purely ornamental work its repeat treatment tends to soon pall on the

untrained western eye. The barbaric profusion of detail covering the entire surface, also, is against Occidental tenets. And, perhaps above all, the ivory medium does not afford the tonic effect produced by the polychromes seen and enjoyed in the Indian textiles, enamels, lacquers, etc., in their gorgeous splendor. The Indian Museum at Kensington affords examples covering the entire field of Hindu art in ivory and other mediums. Reliefs show lions and ele¬ phants surrounded and enmeshed with scroll foliage done in intricate, minute open-work. Benares, Bombay, Delhi, Travancore, etc., are centres for the finer work. Persia appears to have done very little in ivory carving worth notice ; her sword handles show, invariably, careful work, almost always in walrus tusk, however. Arab usage of ivory or bone is largely one of inlays, and the Saracenic type of geometrical motifs is displayed on door- panels and furniture to good effect. In com¬ bination with ebony and other dark woods very clever effects are seen in arabesque interlacing lines. Coptic screens, the pulpit (nimbar), etc., at Kensington afford us beautiful examples of this work in perfection, the former having carved relief panels of ivory.

China and Japan.— Practically all the carved ivory emanating from China consists of ob¬ jects prepared specially for the Western markets. Her native <(puzzle® balls, which are so carved that a series of different size balls, one within the other, and made of a single piece of ivory (seamless), are familiar objects and proof of skill and patience. Models of ships {sampans), dwellings, gardens, seen in mu¬ seums, are of delicate minute construction. China's Buddhist gods, of course, appear in ivory. While the work of the Celestials in ivory is cold and appeals little to the west¬ erner, Japanese ivories keenly interest us. In her netsukes we find a fund of pictorial art, diminutive nature in every detail, idealistic and grotesque, all in perfection though of micro¬ scopic proportion. These intricate pictures in relief in buttons are the surprise and admira¬ tion of all art students, and their scope in depiction and classification take pages to de¬ scribe. The Japanese inros (medicine or candy boxes) with their tiny drawers, so full of artistry in decoration, displayed in the museums with the netsukes (to which they belong) ab . ways attract admiring attention. Japanese figurines and groups (okimono) , their shrines, screens, sword-scabbards, etc., all show the perfection born only with the enthusiasm of an artist, and the names of these clever carvers have survived in honor in their land.

Recent ˆA7oˆk. — The uses of ivory in strictly modern days have been chiefly confined to brush-backs, billiard balls, paper cutters, etc., but good art work still is done in Europe in this, medium in such , centres as Dieppe and Paris. And, in the quiet of the studio a num¬ ber of artists of this and last century have

done fine art work in ivory, some allied to the gold and silversmiths. Moreau-Vauthier trained a number of pupils in this art ; the shops of Froment-Murice and Falize (Paris) have created talented ivory work. Among artists of genius in this line figure such names as Soitoux, Belleteste, Meugniot, Pradier, Descrieux, Baron Triqueti (high-altar at the Invalides), Rosset, all in France. In Italy, Constantin Meunier, Giuseppe Bonzanigo (1740-1820) trained pupils. Simart's design for the reproduction of the Minerva of the ancient Greek sculptor Phidias was carried out (reduced) in chrys-elephantine work (gold and ivory) by Froment-Meurice for the 1857 Paris Exposition. Other ivory sculptors of note are the Belgians, Julien Dil-lens, Charles van der Stappen, Phillippe Wolfers, Charles Samuel, Alphonse van Beurden (worked in England), etc. Aside from special¬ ists many leading artists have chosen ivory as a medium for an individual work.

Bibliography. — Cust, A., (The Ivory Workers of the Middle Ages) (London 1906) ; Dalton, O. M., (Byzantine Art and Archaeology) (Oxford 1911) ; id., (Catalogue of the Ivory Carvings of the Christian Era in the British MuseunU (London 1909) ; Didron, A. N., Unconographie chretienne) (Paris 1843) ; Kunz, G. F., (Ivory and the Elephant* (Garden City, N. Y., 1916) ; Labarte, J., (Histoire des arts industries (Paris 1864) ; Linas, C. de, Uvoires et emaux) (Bruges 1886) ; Masked, A., (Ivories> (London 1905) ; Maze-Sancier. (Le livre des collectionneurs) (Paris 1885) ; Mo- linier, E., (Catalogue des ivoires) (Louvre) (Paris 1895-96) ; Montfaucon, B., de, (L'An- tiquite explique et presente en figures * (Paris 1722) ; Scherer, C., (Studien zur Elfenbein- plastik seit der Renaissance) (Leipzig 1903) ; Stuhlfaut, G., (Die christliche Elfenbein- plastik) (Freiburg im Breisgau 1896).

Clement W. Coumbe, Technical Art Expert.

IVORY, Sir James, Scotch mathematician: b. Dundee, 1765 ; d. 21 Sept. 1842. He was edu¬ cated at the University of Saint Andrews. For many years he superintended a flax-spinning factory, and in 1804 was appointed professor of mathematics in the Royal Military College at Marlow. He was a self-taught mathematician, and spent much of his time in retirement, study¬ ing the writings of the most learned continental mathematicians, and adding to their value by original contributions. His most celebrated paper on the attraction of ellipsoids was pub¬ lished in 1809. Besides this paper he contrib¬ uted many others on the subject of the attrac¬ tion of spheroids and the theory of the figure of the earth. One of the last subjects which occu¬ pied his attention was the possible equilibrium of a spheroid with three unequal axes, which Jacobi had discovered. Next to the theory of attractions, that of atmospheric refraction, most seriously engaged his

attention, its great im¬ portance in astronomy and the curious mathe¬ matical difficulties which it presents, rendering it of great interest to analysts. In 1819 he was pensioned and retired, and knighthood was con¬ ferred upon him in 1831.

IVORY, properly the substance of which the tusks of the elephant consist, though the similar substance constituting the tusks of the hippopotamus and the horn of the narwhal is

also so called. There is also a wholly different substance known as vegetable ivory (q.v.). Ivory is prized for its beautiful color, the fine¬ ness of its grain and the high polish it is capable of receiving. That of the African ele¬ phant is most esteemed by the manufacturer for its density and whiteness. It is used as a mate¬ rial for knife-handles, pianoforte keys, combs, the (backs of brushes, billiard balls, chess-men, carved figures and ornamental articles of vari¬ ous kinds. Thin plates of ivory are used as panels for miniature paintings, and etchings are sometimes executed on such plates. The ivory of the hippopotamus is preferred by the dentist. The shavings and sawdust of ivory, by burning in a crucible, are converted into a black powder, from which is prepared a pig¬ ment known as ivory black. Ivory may be stained or dyed. The use of ivory was well known in very early ages. The ancients were acquainted with the art of sculpturing in ivory, of dyeing and inlaying it, and they often em¬ ployed it in statuary. Some of the most famous Grecian statues were chryselephantine, that is, were overlaid with plates of gold and ivory in conjunction. To provide the world's supply of ivory it is estimated that 9,000 to 12,000 ele¬ phants are killed annually. The medium weight of a tusk' is about 60 pounds, but some are found weighing as much as 170 pounds. See Ivories.

IVORY, Vegetable. See Vegetable Ivory.

IVORY-BILL, the great black-and-white, scarlet-crested woodpecker (Campephilas prin¬ cipalis), formerly numerous and greatly ad¬ mired throughout the southern States, but now surviving only in a few of the most secluded cypress swamps of the Gulf coast. Its exter¬ mination was begun by the Indians, who valued highly its splendid head-feathers as an orna¬ ment for warriors ; and completed by sports¬ men and plume-hunters. The books of Wilson, Audubon and early writers on American ani¬ mals give many interesting facts as to its habits.

IVORY CARVING. See Ivories.

IVORY COAST, The, West Africa, a colony comprised in French West Africa. It lies between Liberia and the British Gold Coast Colony, and, including the kingdom of Kong, extends inland to the military territories of

the French Sudan. The French obtained and as¬ serted rights on the coast about 1843, but did not actively occupy the territory till 1883. Its area is about 130,000 square miles, with a pop¬ ulation (1904) of 1,530,754, including 1,163 Europeans. Bingerville is the seat of the lieu¬ tenant-governor. There are a number of official schools and some Catholic private schools. The most populous centres are Grand Bassam, As- sinie, Grand Lahou, Sassandra, Tabou, all on the coast; and in the interior, Abigean, Aboisso, Tiassali and Korbogo. Bananas, plantains, pineapples and other fruits are cultivated ; cocoa- nuts and rubber are collected and European coffee is grown with success. Mahogany forests are worked and gold is found. Mahogany, palm kernels and palm oil are the principal ex¬ ports. In 1913 the value of the mahogany ex¬ ported was $940,222, in 1915 it had declined to $306,846. Lack of shipping facilities, owing to the European War, was the cause of the shrink-

age. In 1912 there were 1,900 miles of tele¬ graph and 420 miles of telephone lines. Tele¬ phonic communication exists between Bassam and Bingerville and other places. The budget of the colony for 1916 amounted to $1,299,663. Consult Villanour, R.. and Richard L., (Notre colonie de la Cote d'Ivoire) (Paris 1901) ; Mounier, M., (La France noire) (ib. 1894).

IVORY PALM, a South American palm- tree yielding corozo-nuts, — large white seeds called ((vegetable ivory® (q.v.).

IVREA, e-vra'a, Italy, city of the province of Turin, Piedmont, 38 miles by rail north of Turin. It has an interesting 10th century cathe¬ dral, and on the hill dominating the town is the 14th century Castello dello Quattro Torri, now used as a prison. A strategical position of im¬ portance on the Dora Baltea where it emerges from the mountains, Ivrea from the earliest times has been prominent in Italian history. It was the headquarters of Napoleon's greatest activity in the Italian campaign of 1800. Pop. 6,100; of commune 11,700.

IVY, a popular name for various climbing, creeping and drooping herbs and shrubs, the most widely known of which are the following: Common or English ivy (Hedera helix) is a tall climbing evergreen shrub of the family Araliacece, widely planted in Europe (where, as in northern Africa and eastern Asia, it is native), and in the warmer parts of the United States, its ornamental, abundant foliage being highly valued for covering walls, rocks and trellises. Its small and inconspicuous greenish, perfect flowers appear late in the autumn and the small black fruits (three to five seeded berries)

ripen the succeeding year. The fruits which are devoured by birds, are bitter and pungent and were formerly in medicinal repute. The gummy juice obtained from the stem, as also the fruit, contains the bitter principle hederin and the hederic acid characteristic of the plant. It has been used in making varnish. Contrary to popular opinion, ivy is not parasitic upon such trees as support it. It merely clings to them by its numerous hold-fast roots pro¬ duced along the entire length of its stems. Such trees as it injures are killed by constric¬ tion. The other popular notion that it makes the walls and houses upon which it climbs damp and unhealthy is also erroneous; in reality it dries them, the roots abstracting such water as reaches the wall through the dense foliage; yet exceptional cases of damage occur. It has numerous horticultural varieties which differ mainly in the form, color and markings of the leaves. These succeed best in rather moist, rich soils and shady positions and are not usually found to be hardy much farther north than New York unless well protected from the winter sun, as upon the north side of buildings, etc. As a cool greenhouse and a house plant it is very popular. Ivy leaves and ivy berries were formerly administered for various me¬ dicinal purposes, but they have been long out of use. The leaf and habit of the common ivy are so characteristic that reference is often made to them in the specific names of other plants, ˆivy-leaved® being common as a desig¬ nation. The plant .takes a prominent place in mythology and folk-lore.

Japanese or Boston ivy (Parthenocissus tricuspidata) and its near relative Virginia

creeper (P . quinquefolia) of the family Vita – cece, are probably the next best known species to which this name is applied. The former is the more graceful, and is gradually gaining in general favor over the latter, which demands more attention to keep it looking presentable. Both climb by means of tendrils, but the Boston ivy clings better to walls. It has three-lobed leaves; its rival, a compound leaf of five-leaf¬ lets. Both have brilliant autumnal colors in the north, where the Virginia creeper is the more hardy.

Among the herbaceous ivies Kenilworth ivy (Linaria cymbalaria), German ivy (Senecio mikanoides) , and ground ivy (Glechoma keder- acea) are best known in America. They are all popular greenhouse plants and are frequently planted in hanging-baskets because of their graceful habits. Poison-ivy or poison-oak is a climbing sumach whose leaflets somewhat resemble those of Virginia creeper, but are in threes instead of fives. See Poison-Ivy.

IVY OWL. See Owl.

IVY POISONING, a skin disease or dermatitis characterized by erythema, wheals, papules, vesicles, pustules, bullae, or a combina-. tion of two or more of them, with an addition of crusting and excoriations. It is caused by Rhus toxicodendron (poison ivy), a climbing plant and a small tree or shrub (poison oak) are the most common causes in the eastern part of the United States, and also in the West. In the Middle States the poison sumach seems to be the more commonly poisonous one Rhus venenata (poison dogwood, sumach elder). The nettle commonly seen in the woods and unkept meadows, the primrose (Primula ob- conica), the oleander (Nerium oleander), the rue (Ruta), the smartweed (Polygonum punc- tatum) are the most common ones known, but there are many others.

The inflammatory reaction produced by Rhus toxicodendron (poison ivy) is quite typical and so commonly seen in the springtime and sum¬ mer that even the ordinary person may make an accurate diagnosis. The disease starts upon the exposed parts primarily. The hands and wrists or forearms are the first members at¬ tacked usually, then follow the face, the geni¬ talia, and anal regions; barefooted children are great sufferers also. It is said that toxico- dendric acid, a volatile substance, is the cause, although it has not been specifically proved. Many persons who have had at one time or another severe attacks, have found that in passing through the woods, or anywhere in the proximity of the plant, they may have a recurrence of the attack, even though the plant is not touched. As the years pass and there has been no contact made with the ivy, this peculiar susceptibility to the air-laden poison becomes almost nil. There is a belief that after one attack of some severity there is a recurrence at the same time the following year, regardless of any proximity to plants. Prob¬ ably these are really cases of vesicular eczema. There is a serious tendency in some instances of ivy poisoning to a persistency toward a chronic condition, which, according to our present knowledge of eczema, may be classed as such.

Persons prone to attacks of eczema are very susceptible to the poison. There are in-

dividuals, too, who from childhood have never been subject to plant poisoning, but with change of climate or methods of living, suddenly are rendered susceptible. Then there are those who seem to preserve an immuity to poisonous plants, handling them with perfect impunity.

lhe poison ivy is a shrub which usually climbs by means of rootlets over rocks, walls, and trees, sometimes low and erect. Leaves are divided into

three somewhat four-sided pointed leaflets. This much dreaded plant is often confused with the beautiful Virginia creeper; the two can be distinguished by the three-divided leaves of the ivy and the usually five-divided leaves of the creeper. It is sup¬ posed that the ivy is especially harmful in the night or when the sun is not shining directly upon the plant. A more or less mild attack may be ushered in by a burning or itching of the skin. Within a few hours up to 24 or 48, an erythema may appear, followed by swelling, with vesicles, or the vesicles may arise, with little areola. The vesicles may be few in number, or clustered in great multitudes on the affected parts. At first they may be tense, but often rapidly become flaccid, rup¬ turing easily. The yellowish serum in the vesicles doubtless carries the poison, as it seems to inoculate nearby previously unaffected areas, spreading the disease. The lesions often de¬ velop in streaks or stellate patches slightly raised, surmounted by vesicles. The parts may swell to enormous proportions. The face be¬ comes quite distorted, the eyelids suffer, and conjunctivitis is not uncommon. The suffering from the itching and burning is intolerable. The dermatitis usually progresses to a certain point before regression takes place. Some abortive cases clear up rapidly. After the vesicles rupture and dry the erythema and swelling slowly disappear. The disease may last but a few days or remain from several weeks to several months. Its common dura¬ tion is from 10 days to three weeks. It often leaves in its wake a mass of freckles or pig¬ mentation such as often follows a sunburn.

In treatment the large vesicles should be evacuated, the secretion being prevented from reaching unaffected parts. Compresses of boric acid or phenol lotions may be used, or a solu¬ tion of thiosulphite of soda. Lotions with powder suspensions are comforting. Hot com¬ presses of salt and baking soda solution are helpful. A standard lotion is a compound resorcin, one containing boric acid and resorcin, a a 3 i;ˆpulv. zinci oxidi, 3 i. ; aq. calcis q.s. ad 3 viii. In mild cases healing may be ob¬ tained by a simple astringent ointment such as angmentum zinci oxidi, but ointments as a rule are not so pleasant as lotions.

IWAKURA, e-wa'koo-ra, Tomomi, Jap¬ anese reformer and statesman : b. Kioto, about 1825 ; d. Tokio, 20 July 1883. He was of illustrious ancestry, one of the Kuge or court nobility, chamberlain of the imperial household, and at first in favor of the expulsion of for¬ eigners. He never saw a foreigner until he was 43 years old. Becoming a Progressive, he was banished into exile and shaved his head, but his real aim was to restore the lustre of the imperial throne by the overthrow of the Yedo Shogunate. Entering into communication with the leaders of the confederation of southern

daimios, he became the link between court nobility and the progressive

samurai or gentry, and took a prominent part in the Restoration of 1868. He was one of the first to send his three sons to be educated under Verbeck and to America. He received high office and salary, and in 1870, as envoy of the mikado to the recalcitrant Satsuma leaders, led in the move¬ ment to abolish feudalism, and was prominent in securing the formation of a new national army. As Minister of Foreign Affairs and Junior Premier, he was visited by his sovereign. Lie went to Europe and America as head of the great embassy of 1872. Upon his return he opposed strongly and with success war against Korea He was a great admirer of political institutions in the United States and left a powerful impress on the nation and the sover¬ eign, from whom he received the highest honors. He escaped numerous attempts to assassinate him, notably that carried out by nine assassins in 1873. Of his children, a son, Prince Iwa- kura Tomosada, of the House of Peers, be¬ came an important functionary at the Court of the Emperor, and the other, a (laughter, became the head of the Red Cross work in Japan. See Japan.

ixion, iks-i; on, in Greek mythology, king of the Lapithae in Thessaly, son of Phlegyas. He married Dia, daughter of Deioneus. He murdered his father-in-law, and as punishment, became insane until Zeus cured him and per¬ mitted him to reside in Olympus. Lie be¬ came enamored of Hera, and attempted to seduce her. Zeus made a cloud in the shape of Hera, and carried it to the place where Ixion had appointed to meet her. Ixion was caught in the snare, and from his embrace with the cloud were born the Centaurs (q.v.). Zeus banished him from heaven j struck him with his thunder, and ordered him tied to a winged or fiery wheel which was to revolve eternally, according to some in the air, and to others in the underworld.

IXTLILXOCHITL, Fernando de Alba,

Mexican historian: b. Texcoco, 1570; d. there, 1649. He was descended, through his mother, from the ancient kings of Texcoco, and on the death of his eldest brother in 1602 he was declared by royal decree heir to the titles and possessions of his family. The property, how¬ ever, does not appear to have been large, as he complained in 1608 of the deplorable state of misery to which the posterity of the kings of Texcoco were reduced. At this time he was employed as interpreter by the viceroy, which appointment he owed to his learning and skill in explaining the hieroglyphic pictures of the ancient Mexicans. He had also a profound knowledge of the traditions of his ancestors which were preserved in the national songs, and was intimate with several old Indians famous for their knowledge of Mexican history. He turned his own labors and those of his friends to account in composing works on the history of his country. They remained un¬ known until their importance was revealed by Clavigero, and afterward by Humboldt. The

former says they were written in Spanish by command of the viceroy, and were deposited in the library of the Jesuits in Mexico. There were copies also in other libraries. The history was divided into 13 books or relations, many

Ot which Were repetitions of the former rela¬ tions, and covered the period from the most aticient titties to the destruction of the Mexican Empire; The 13th book was printed under the title) (Horribles crueldades de los conquista- dores de Mexico y de los Indios, que los ayud- aron en subyugar aquel imperio a la corona de Espana) (Mexico 1829; French translation by H. Ternaux-Compans, Paris 1838). After¬ ward Ternaux-Compans, having obtained a complete copy of the whole 13 books from Madrid, translated them into French under the title. (Histoire des Chichimecas et des anciens rois de Tezcoco) (2 vols., Paris 1840). An edition by Alfredo Chavero was published at the expense of the Mexican government (2 vols.j Mexico, 1891-92). The (Antiquities of Mexico, by Viscount Kingsborough (9 vols., London 1840) contains the Spanish text of the (Historia) and the (Relaciones> of Ixtlilxochitl.*

IYAR, the eighth month of the Jewish civil year, and the second month of the sacred year, corresponding, at the earliest, with April; but it may be as late as June; it has always only 29 days. Consult Burnaby, S. B., (Elements of the Jewish Calendar)

IYEYA.SU, Tokugawa, Japanese general and statesman: b. Okasaki, Mikawa, 1542; d. 1616. He served as a soldier under Nobunaga and Hideyoshi, and gradually rose to distinction. Obtaining land in Mikawa and the neighboring province of Suruga, he built the strong castle of Shidzuoka, a town still intimately associated with his family and dynasty. When Hideyoshi died in 1598, Iyeyasu promised to look after the interests of his son, Hideyori, a boy of six. But the child, as the son of an upstart, could not keep together the large following to which his father's abilities alone had given cohesion. Hidenolu, nephew of Nobunaga, a professed adherent of Christianity, represented a third party. The great battle of Sekigahara, fought near Lake Biwa, 15 Oct. 1600, finally decided matters and made Iyeyasu master of Japan. He had been establishing himself at Yedo, which he now made the centre of his rule. From this city he pacified Japan, adopt¬ ing in his foreign relations that isolating policy which made it a hermit country for the next two and a half centuries. He founded the magnificent dynasty of the Tokugawas, which ruled Japan vigorously until 1868, always, how¬ ever, acknowledging fealty to the ancient im¬ perial

house at Kioto. In 1616 Iyeyasu died, having given "peace® to his country. He was buried at Nikko, one of the noblest mausoleums in the world; and was deified under the post¬ humous title of Gongen-Sama. An interesting historical document bearing the title testi¬ mony or (Legacy of Iyeyasu* was written by him. The usual name by which it is referred to is (Hyakkajo,* or Hundred Articles. Con¬ sult Griffis, W. E., the Mikado's Empire.**

IZABAL, Guatemala, capital of the depart¬ ment of the same name, situated on the Golfo Dulce, or Lake Izabal. The Rio Dulce connects it with the Caribbean Sea, but is navigable to Izabal for small craft only. Izabal has a large export trade in ebony, rosewood, coffee, cacao, sarsaparilla, etc., through Livingston, a port on the Caribbean, at the embouchure of the Dulce. Pop. 4,000.

IZARD, George, American general : b. Richmond, Surrey, England, 21 Oct. 1776; d. Little Rock, Ark., 25 Jan. 1828. He was a son of Ralph Izard (q.v.). He was graduated from the College of Pennsylvania in 1792, and after a tour in Europe, and study in private military schools in England, Germany and France, he was appointed in 1794 a lieutenant in the regi¬ ment of artillerists and engineers in the United States army. He did not return to the United States until 1797, then held various commands, but resigned in 1803. Upon the breaking out of the War of 1812 with Great Britain he served as colonel of the 2d artillery, and was succes¬ sively promoted to be brigadier general in 1813 and major-general in 1814. At one period of the war he held chief command of the north¬ west frontier. In defense of his actions in this commend, attacked by anonymously published pamphlets, he published (Official Correspondence with the Department of War Relative to the Military Operations of the American Army under the Command of Major General Izard on the Northern Frontier of the United States, 1814 — 15 } (Philadelphia 1816). In 1825 he be¬ came governor of Arkansas Territory, in which office he died. Consult Manigault, G. E., the Military Career of General George Izard (in Magazine of American History, Vol. XIX, p. 462, New York 1888).*

IZARD, Ralph, American statesman : b. near Charleston, S. C., 1742; d. South Bay, near Charleston, 30 May 1804. He was educated at Christ's College, Cambridge, England, and, in¬ heriting an ample fortune, established himself in 1771 with his family in London, whence the troubled condition of American politics induced him in 1774 to retire to the Continent where he traveled extensively. He subsequently endeav¬ ored to impress upon the British ministry the ill-advised nature of the course they were pur¬ suing, but without effect. Although appointed in 1776 by the Continental Congress, United States Commissioner at the court of the grand duke of Tuscany, he continued to reside in Paris and played a prominent

part in the differ¬ ences existing between the American commis¬ sioners in France. In 1780 he returned to the United States, and found occasion to serve the country in various ways, having been instru¬ mental in procuring the appointment of Gen¬ eral Greene to the command of the southern army, and having once pledged his whole estate as security for funds needed in the purchase of ships of war in Europe. In 1782 he entered the Continental Congress, of which he remained a member until the peace ; and upon the adop¬ tion of the Federal constitution he was elected a United States Senator from Soifth Carolina, serving until 1795. As a legislator he was able! but not particularly eloquent and in the Senate possessed the confidence of all parties. The (Correspondence of Ralph - Izard from 1774 to 1804, with a Short Memoir, > was published by his daughter (New York 1844). He also wrote f An Account of a Journey to Niagara, Montreal and Quebec in 1765 > (New York 1846). Con¬ sult Manigault, G. E., (Ralph Izard, the South Carolina Statesman) (in Magazine of American History, Vol. XXIII, p. 60, New York 1890).

IZARD, the chamois (q.v.) ; so called in

the Pyrenees,

J

JTHE tenth letter of the English alphabet, was unknown to the ancient Latins and Greeks as an alphabetic character and representative of a vocal sound.

Till the 16th century the Latin and other alphabets of western Europe had only the let¬ ter i to represent both the vowel sound i and the consonant sound now represented by j : at least in fonts of type of that century, and till the end of that century or later, the character i served to represent both the vowel and the consonant, though a distinction was made be¬ tween them in manuscripts of the previous cen¬ tury by continuing the stroke of the i a little below the line when it stood for the consonant. This letter j from the first represented in Eng¬ lish the sound of dzh, in French that of zh ; in German and other languages its value is that of the consonant y ; for example, Julius, pronounced yulius, jacio, pronounced yacio.

For speakers of the modern European lan¬ guages the j in Latin has usually the same value as in their native tongues. But though for Spaniards j in Latin is equal to y, in their own speech / is a strong guttural aspirate that might be represented in English by kh. The sound of j in English is always represented in Italian by g, invariably followed by e or i; the French and English journal is in Italian giornale, the Latin judex. English judge is in Italian giiidice.

The sound of dzh is represented in English not only by its proper letter j, but also by g and by dg : jest, gem, edge. In the word "hallelujah® the j retains its early consonantal value of i or y.

JABALPUR, India, chief town of the dis¬ trict and division of the same name, in the central provinces, 1,458 feet above sea-level, 165 miles northeast of Nagpur. It is in a rocky basin, the gorges about which have been con¬ verted into artificial lakes of great beauty. It is a modern, growing city, and a station on the railway between Bombay and Allahabad. It has law, engineering and industrial schools and manufactories of carpets, cottons, statuary, brass, wire screens, etc. Pop. 100,650.

JABBOK, yab'bok, a river east of the river Jordan. After running 18 miles south, it runs nearly due west and empties into the Jordan River midway between the Sea of Gal¬ ilee and the Dead Sea. It was a boundary line between the ancient kingdoms of the Amorites and the land of Bashan. It

was also a boundary between the Jewish tribe of Reuben and the half tribe of Manasseh. In the time of Origen, he says it was known as the Jambice. The night struggle of Jacob with his visitor occur¬ red on the south bank of the river. From the bluish color of the water, it is now called Wady Zerka.

JABESH-GILEAD, the chief city of the land of Gilead lying within the limits of the half-tribe of Manasseh. There are ruins in the. Wady Yabis which may be those of the ancient city. The place is mentioned several times in the Old Testament. It was captured and destroyed by the Israelites and 400 of its virgins taken as wives by the Benjamites. Later the city was attacked by Nahash, leader of the Amorites. The city appealed to Saul, king of Israel for succor, he came to their rescue and routed the Amorites. They never forgot this service and after the fatal battle of Mount Gil- boa the citizens of Jabesh-Gilead recovered the bodies of Saul and his sons and gave them burial with honors. David commended the men of Jabesh-Gilead. Later the bones of Saul and his sons were buried in the territory of Ben¬ jamin.

JABIRU, jab'i-roo, a large species of stork (Mycteria americana) , somewhat resem¬ bling the adjutant, found nearly throughout South America and northward into Mexico and Texas. It is about five feet high, with stilt-like legs, and massive, slightly upeurved beak; the plumage is white and the naked head and neck black. In habits it resembles the other storks (q.v.). Several related Oriental species have received the same name.

JABORANDI, a Brazilian shrub (Pilo¬ carpus pennatij olius) of the order Rutacece, which yields a volatile oil from which is de¬ rived a principle (pilocarpin) in the form of an amorphous white powder having properties similar to atropine. It is the basis of the drug jaborandi, which is diaphoretic and sialagogic in its effects. Other ˆjaborandis® are obtained from species of Serronia, Aubletia and Piper.

JACAMARS, a group of small, gaudy, South American birds of the family Galbulidae, and related to the puff-birds and woodpeckers. Their plumage is highly colored, reds and bronzy greens and blues predominating. They live mostly along the outskirts of forests, and feed upon large insects caught in flight. White eggs are laid in holes in earthen banks ; and a whistling song is given during the breeding season.

JAQANAS, zha-sa'na or ja-ka'na, a group of birds (Parridce) related to the rails, and re¬ markable for the extraordinary length of the toes, which are further extended, especially the hallux, by long, slender claws. There are foui genera and about a dozen species, most of which inhabit the Old World — Africa, India, and Australia. The genus Parra is American, and one Mexican species (Parra spinosa) en¬ ters Texas. The beak is plover-like and the bend of the wing bears a stout and acute

horny spur; the plumage is of a rich purplish brown with the wings green and black. The great spread of the toes enable these birds to walk with ease on the floating leaves of water- lilies and similar plants, otherwise their habits are much like those of rails (q.v.).

JACARANDA, a genus of tropical Ameri¬ can trees of the Bignonia (q.v.) family. One (B . brasiliana) yields the wood called jacaranda wood, or blue ebony, which is very hard and capable of receiving a fine polish. The name is carelessly applied to several other South American woods used in cabinet-work.

JACARE, zha-ka-ra' or jak'a-re, a South American name for an alligator of the genus Caiman , of which the large black species (C. niger) reaches a length of 20 feet and is called on the upper Amazon jacare-nassu, while the jacare-tinga (C . trigonatus) is only six feet long, and has a slender muzzle and black- banded tail. See Cayman.

JACCOUD, zhaa'koo', Frangois Sigismond,

French physician: b. Geneva, 20 Nov. 1830; d. 27 April 1913. He was educated in Geneva and Paris ; became professor of pathology at Paris in 1877, and professor of clinical medicine there in 1883. In 1877 he was elected member of the Academy of Medicine. He wrote num¬ erous works, the most important of which are (De l'organisation des facultes de medicine en Allemagne) (1864); (Legons de clinique medi- cale) (1867-88) ; (Traite de pathologie interne } (7th ed., 1883) ; (Du froid comme cause de pneumonie) (1887). He was editor of Nou¬ veau dictionnaire de medicine et de chirurgie)

(1864-86).

JACK, a pike; in the United States, the common eastern pickerel (q.v.) is most usually meant. The wall-eyed pike (q.v.) is called <(j ack salmon" in some parts of the West. Sev¬ eral marine fishes are known as jack fish, am¬ ber jacks, etc., especially among the lively sea- bass, groupers, amber-fish and the like. The term, as in other cases, implies a quality in the animal exciting friendly interest and admiration.

JACK, an apparatus for raising heavy bodies and for moving machinery. The moving parts consist sometimes of a simple screw moving within a nut

fixed in the shell of the instru¬ ment, and turned by a long handle or a sys¬ tem of gearing; sometimes of a hydraulic press of compact form, small size and high power; and occasionally of combinations of levers and gearing. The first of these forms of the tool is variously called a jack-screw, or screw-jack; the second is usually termed an hydraulic jack; the last a geared jack. The screw-jack is most commonly used for moder¬ ate weights, as a few hundred pounds, or per¬ haps a ton; the others are used up to 10 or 20 tons, or even more, but finally merge into the hydraulic press, as they lose portability, which is an essential characteristic of the jack. The machine is always compact, as light as is consistent with proper strength and safety in operation, simple in design, and of the best material and workmanship, to insure the de¬ sired combination of strength and lightness. Its exterior is commonly a plain cylinder, mounted upon a properly formed foot and having concentric with it another cylinder, mov¬ ing snugly within or outside it. The introduc¬

tion of the automobile has made everybody familiar with a compact type of gear-jack for raising the body when adjusting or fitting tires, etc.

JACK, JACA, or JACK-TREE (native

name Jaca), a tree (Artocarpus integrifolia), related to the bread-fruit (q.v.), a native of the East Indian archipelago and southeastern Asia, often planted for ornament and for its fruit which grows to a larger size than the bread¬ fruit of the Southern Pacific islands. Speci¬ mens often weigh more than 30 pounds, and contain from 200 to 300 seeds, each of them four times as large as an almond. The seeds or nuts are eaten after being roasted or boiled, and the sweet fleshy pulp of the fruit is also eaten by coolies and natives but is less palata'ble than bread fruit. When the tree is young the fruit grows from the twigs; in middle age it grows from the trunk; and when the tree gets old, from the roots. It forms a great part of the food of the natives in some portions of India, Ceylon, etc. The yellowish timber is used for almost any purpose, being strong and ornamental. It yields a yellow dye. To succeed in growing the tree, hot moist atmos¬ phere, ample water but perfect drainage are essential.

JACK AND THE BEANSTALK, an

English nursery tale relating to the heroism of a boy. Its analogue occurs in many national folk-lore legends. It is supposed to represent in a figure the restoration to the earth of those fertilizing and elemental activities, which are necessary to human life. The harp is the wind, which drives the ships and turns the mills to grind the wheat. The bags of treasure are the rain-drops that scatter wealth and plenty. The red hen is the sun that brings life to birth by its fostering heat.

JACK THE GIANT KILLER, the hero

of an English nursery story, which reflects triumph of skill over strength and bulk such as makes the point of the story in David arid Goliath, Ulysses and Polyphemus, etc. The English form is based upon the legend that Saint Michael's Mount, in Cornwall, was once the fortress or castle of a giant, who was dis¬ lodged by the valor of an English knight. In adapting the story so as to claim the sympa¬ thies of children the knight is made to take the shape of a child.

JACK HORNER, the first words of an old nursery rhyme. The rhyme is said to be based on a historic fact. Horner was the messenger whom the abbot of Glastonbury sent to Henry \ III with the deeds of certain manors in¬ volved in the dissolution of monasteries. Horner obsequiously handed the parcel to the royal spoliator, but first of all managed to ab¬ stract the deeds of the manor of Wells, a "plum® indeed, and the abbot was afterward punished on the charge that he had withheld them.

JACK AND JILL, the first words of an old nursery rhyme, of considerable folk-lore interest. Jill is a corruption of the French Julienne, once common in England under the form Gillian. It also appears in the legend of Saint Kilia.n, where Geilana vindictively causes the good, bishop's death. This incident of Jack and Jill is probably based on one of the moon

JACKALS

1 Common Jackal

2 Side-striped Jackal

myths of Scandinavia. The Norse peasant sees in the spots on the moon the two children rescued by the moon from their father, who had forced them to draw water all the day.

JACK-IN-THE-PULPIT, or INDIAN TURNIP, a perennial herb (Ariseema triphyl- lutn) of the arum family (see Araccce), so called from its spadix, which is upright, with the spathe surrounding and arching over it, suggesting a preacher in an old-fashioned pulpit with a sounding-board. It is common in the United States, east of the great plains, in damp, shady woods and is easily grown in moist garden soil. The spathe falls away in early summer. By late summer the berries which form a dense ovoid head become a brilliant, waxy scarlet. Its acrid tuber or corm is valued for its

medicinal properties.

JACK-SNIPE, a gunner's term for a shore- bird, also called grass or meadow snipe, which is in reality a sandpiper, named in books the pectoral sandpiper (Tringa maculata) . The per¬ version of names is due to its somewhat game¬ like habits of lying to a dog and flushing cor¬ rectly from the grass, like a true snipe which render it an attractive object of pursuit; beside which, in the fall it becomes very fat, and it is then excellent eating. Unlike most sandpipers, it does not flock, at least to any extent, being oftenest found scattered singly or in pairs. In the United States it is chiefly, if not wholly, a bird of passage, breeding in Canada and winter¬ ing in the tropics. It is nine inches long, clay- colored, striped with blackish above ; breast ashy and sharply streaked; belly white. Con¬ sult authorities mentioned under shore-birds.

The English ˆjack-snipe® is a true snipe (Gallinago gallinula) of very small size, and therefore also known as ˆhalf-snipe.®

*JACKAL, a small active wild dog or wolf of the warmer regions of the Old World, found in southeast Europe, Africa, Syria and southern Asia. The common jackal averages about 2 or 2*4 feet in length and about 14 inches in height, with a bushy tail about 8 inches long. The eyes are small and the pupil is round. The general color of the body is a dirty yellow or brown, lighter on the throat and belly. Jackals inhabit holes and burrows whence they come forth in the evening to hunt in packs. Their cry consists of a series of pro¬ longed howls, followed by shorter yelps, much like that of the American coyote. The jackal subsists largely upon carrion, often that left after the repast of the fiercer and larger car¬ nivora; but it also kills prey for itself, a pack hunting down antelopes, deer or other animals, besides getting much small fare, as mice, lizards, insects and the like. They also eat certain kinds of vegetable food, and sometimes they do con¬ siderable damage to sugar and other plantations. The jackal is susceptible of being tamed, but its odor makes it by no means a desirable domestic animal. It is believed to be exceedingly cun¬ ning, and in many Eastern tales, especially among the people of India, plays exactly the same part as the fox does in those of Europe. It is probable that jackals have contributed frequently to the commingled stock represented in our domestic dogs, some of which betray very jackal-like points. They inter-breed with domestic races.*

The common jackal (Canis aureus) is the

most widely distributed species ; but another species, found mostly in eastern southern Africa, is the blackbacked jackal (C. meso- melas). This latter form has the back and end of the tail black, the other parts mostly red or yellowish-red. A third species of jackal found in South Africa is the

canduc (C. adustus), marked by a light stripe on the sides. Consult Mivart, cDogs, Jackals, Wolves and Foxes) (London 1890).

JACKASS KINGFISHER, or LAUGH¬ ING JACKASS, the name of a large inland kingfisher (Dacelogigas) of Australia, given by the colonists in allusion to its loud, hoarse cry. It is about 17 inches long, brown in gen¬ eral color, does not frequent water or catch fish, but lives on insects, small reptiles, etc., and lays its eggs in a hole in a tree.

JACKDAW, a small, black European crow (Co rims monedula) , with black legs and feet and grayish neck. They inhabit towers, spires and like elevated situations, and even in towns and populous cities are present and breed freely. The nests and eggs are like those of other crows (q.v.) which they resemble in general habits. Jackdaws are easily tamed, learn to pronounce many human words, and are most amusing pets, but are mischievous and thieving, like magpies.

JACKRABBIT. See Hares.

JACKS, Lawrence Pearsall, English edu¬ cator and editor: b. Nottingham 1860. He was educated at University School, Nottingham, University of London, Manchester College, Ox¬ ford, Gottingen University and Harvard Uni¬ versity. He entered the ministry as assistant to Stopford A. Brooke in Bedford chapel, Lon¬ don. Later he held parishes in Liverpool and Birmingham. Since 1903 he has been professor of philosophy in Manchester College, Oxford, and dean of the college and warden of resi¬ dence. He has been editor of the Hibbert Journal ever since it was founded in 1902. He is the author of (Mad Shepherds and other Human Studies) (1910) ; (Alchemy of

Thought (1911); (Among the Idol-Makers> (1912); (All Men are Ghosts* (1913); (From the Human End: A Collection of Essays) (1916) ; Philosophers in Trouble; a volume of stories) (1916) ; (Life and Letters of Stopford Brooke) (his father-in-law, 2 vols., 1917) ;*

(Country Air (1917).*

JACKSON, Abraham Valentine Williams,

American Indo-Iranian scholar: b. New York, 9 Feb. 1862. Graduated from Columbia in 1883, he was Fellow in letters there (1883-86), instructor in Anglo-Saxon and the Iranian lan¬ guages (1887-90), and, after study at Halle (1887-89), adjunct professor of English lan¬ guage and literature (1891-95). In 1895 he was appointed professor of Indo-Iranian languages and public lecturer at Columbia. By way of recognition of the instruction given by him in their ancient books, the Parsees made to

the Columbia library the gift of an important manu¬ script collection of Zoroastrian works. He ap¬ peared also as a public lecturer, became one of the directors of the American Oriental Society, and in addition to numerous contributions to the Journal of that society and other learned periodicals, wrote (A Hymn of Zoroaster, Yasna XXXP (1888); (An Avestan Gram-

mar> (1892); 'An Avestan Reader> (1893); (Zoroaster, the Prophet of Ancient Iran (1899). He traveled for research in India in 1901 and 1911, receiving special attention from the Parsis community in India; and also trav¬ eled in Persia and central Asia in 1903, 1907 and 1910. He wrote (Persia, Past and Pres¬ ent (1906) ; (From Constantinople to the Home of Omar Khayyam > (1911), and with A. Yohannan the 'Descriptive Catalogue of the Persian MSS. in the Metropolitan Museum of Art) (1913). He edited the 'Columbia Uni¬ versity Indo-Iranian Series) (5 vols., 1902), and 'A History of India) (9 vols., 1906-15).*

JACKSON, Andrew, seventh President of the United States: b. in the Waxhaw settle¬ ment near the border line between North and South Carolina, 15 March 1767; d. at his home "The Hermitage, » near Nashville, Tenn., 8 June 1845. It is a matter of dispute to which of these States the honor of his birth belongs, but the evidence is in favor of South Carolina. Andrew Jackson, his father, emigrated from Carnckfergus, County Antrim, in the north of Ireland, in 1765, and died a few days before the birth of his famous son. The early environ¬ ment of. the future President was extremely unpropitious. He lived in a rough frontier re¬ gion, with little opportunity for education or other form of culture. In fact, Jackson re-

CuiVe(ˆ vei7 kittle "schooling,® and was never able to write correct English. Little is known of his early life beyond the fact that he was a headstrong, pugnacious boy. During the Revolutionary War the Waxhaw district was invaded by the British who took Jackson pris- then a boy of 13, illtreated him and car¬ ried him to Camden for imprisonment. His two brothers lost their lives in the war and his mother died as a result of hardships incurred on a journey to Charleston to help care for prisoners there. These early incidents account for. his antipathy toward England, and doubt¬ less stimulated him at the battle of New Orleans, where he evened up old scores.

At the age of 17 he entered a law office at Salisbury, N. C. Traditions exist

of what would now be considered a wild life, and it is likely that they are true, for frontier societies, such as he lived in, took delight in gambling, horse¬ racing, cock fighting, dueling and similar pas- – times. Jackson was admitted to the bar in November 1787. In the spring of 1788 he started for Tennessee, and in the fall estab¬ lished himself at Nashville as a practising lawyer. In 1789 he was given the solicitorship with a salary of 40 pounds, for a Superior Court district comprising three counties in Tennessee.. The region where Jackson was to take up his duties as public prosecutor was wi]der than the Waxhaw Settlement. It was a real frontier filled with persons who were individualists, who believed in the personality of law, and who were unwilling to submit to any form of restraint. Here was the home of quarrels and feuds, a harvest for the young lawyer, but he must needs be a brave man, better versed in human nature than in precise knowledge of the law, to succeed in such an environment. Jackson had exactly these char¬ acteristics, with others, which made him the ideal man for such a position. Himself a prod¬ uct of the frontier, and chafing under the re¬

straint of law, yet he instinctively was some¬ what of a despot, a master of men, and quite as determined to make others obey the law, as he himself was often determined to break it. Jackson's main business from 1789 was to in¬ troduce law and order into a community that did not care for it. He found plenty to do, and it is on record that in the April term, 1790, out of 192 cases on the docket of the County Court at Nashville, Jackson was employed as counsel in 42 of them; in the year 1794, out of 397 cases he acted as counsel in 228. Besides devoting his energies to putting down lawless¬ ness among the whites, he found time to look after the Indians, who committed numerous murders in the district in this period. He thus acquired a taste for Indian fighting, which greatly influenced his subsequent career.

He married a Rachael Robards in Natchez, Miss., in the summer of 1791, believing that the legislature of Virginia had granted her husband a divorce, instead of, as was the case, a mere permission to bring suit for divorce.' The suit was not brought until 1793 and the divorce was granted, because technically Ro¬ bards' wife was unlawfully living with Jackson as his wife. Jackson immediately procured another license and had another ceremony per¬ formed in 1794. There is no good evidence that Jackson's wife wras unfaithful, or that Jackson was not acting in good faith and in the honest belief that a divorce had been granted. Nevertheless, as a lawyer, he should have known that the Virginia legislature did not grant divorces at this time, but only gave permission for a suit to be brought in the proper court. The incident was used merci¬ lessly by the partisan press in the campaign of 1828, but it is evident that those who knew Jackson believed in his honesty.

Jackson was a member of the convention which drafted the first constitution of Ten¬ nessee, and in 1796 was chosen representative

Vir£01lgress from State. The next summer, 1797, he was chosen senator to fill a vacancy,' but resigned in 1798 to become a judge of the Supreme Court of Tennessee, a position which he held, until 1804. While in Congress he did not distinguish himself particularly, but showed even so early his opposition to the United States Bank and to federalist doctrines. Little is known of his work as a judge of the Supreme Court, since few decisions were recorded, and not one of them was Jackson's. It is generally agreed that his knowledge of the law was extremely meagre and that he decided cases on the principles of common sense, modified, how¬ ever, by his own personal feelings and 'preju¬ dices.

From 1804 to 1811 he was engaged as a planter, trader and merchant. He ran a general country store in partnership with others. As a trader he was successful, but as a retail mer¬ chant he was nearly a failure, and was glad to sell, out at almost a total loss. This was the period of one of his famous duels, that with Charles Dickinson, and of numerous quarrels. Though without previous military experience to SP.E . °f> he was elected major-general of militia for the western district of Tennessee m 1802. When war was declared against Eng- ocma 111 Jackson offered his services with

2,W(J volunteers, and in the autumn was ordered

to proceed to New Orleans. In March 1813 he was at Natchez, Miss., when orders came from the Secretary of War to dismiss his troops. He refused and marched them back home 500 miles on his own responsibility and partly at his own expense, though later he was reimbursed by the government. In the fall of 1813 and spring of 1814 he was engaged in an expedition against the Creek Indians, who had massacred the garrison and refugees at Fort Mims, Ala., 30 Aug. 1813. He finally over¬ whelmed them at Tohopeka or Horseshoe Bend, Ala., 27 March 1814. This Indian war was outside the Federal operations and was carried on by the States of Tennessee, Georgia, Louisi¬ ana and Mississippi, but it had an important bearing on the whole campaign. For with the destruction of the Indian

power in this region there could be a concentration of military power at any point where it was needed in the South¬ west, and this really made possible the victory at New Orleans.

On 31 May 1814, Jackson was appointed major-general in the Regular Army and given command of the Department of the South. His headquarters were established at Mobile, then in dispute between Spain and the United States. On 6 November, without waiting for orders from Washington, he attacked the English, who had occupied Pensacola, apparently without ob¬ jections from Spain, and drove them out of Florida. This left him free for the defense of New Orleans, where he arrived 2 Dec. 1814. He declared martial law, impressed soldiers and sailors, and inspired his army of about 6,000 men with his own courage and deter¬ mination to resist attack at any cost. The Eng¬ lish had about 12,000 veteran troops under General Pakenham. In the main attack 8 Jan. 1915, he defeated the British, who lost over 2,000 in killed, wounded and captured, while Jackson lost the astonishingly small number of only seven killed and six wounded. This vic¬ tory, won when there was great discouragement over the progress of the war, made him a national military hero, and paved the way for his political career. Although the battle oc¬ curred after peace had been concluded, this did not affect Jackson's popularity. He became especially popular in the West, for this section felt that he had ended for all time the danger of the control of the Mississippi Valley by a foreign power.

Florida next demanded Jackson's attention. There was great disorder in this Spanish terri¬ tory because the coasts were a haunt for pri¬ vateers and filibusters. It was believed that the Indians got aid and encouragement from the Spanish and that British agents were stirring them up to wage a frontier war on the United States. Massacres of whites occurred and Spain took no vigorous measures to preserve order. In December 1817 Jackson was ordered to the Florida frontier to prepare for a possible invasion of the territory. Without waiting for direct orders, but understanding from the letter of a friend in Congress that President Monroe had approved his plan for the conquest of Florida, Jackson, who had raised troops in Ten¬ nessee and neighboring States, advanced ihrough Georgia. He captured Saint Marks, Florida, in March 1818, and within three months had overthrown the Seminole Indians, arrested

two British subjects, Arbuthnot and Ambrister, had them tried by court martial for inciting the Indians to war and for spying, and, on insufficient evidence, had them executed. This raised delicate diplomatic questions and led to a proposal by Calhoun, then Secretary of War, that Jackson should be censured for his con¬ duct. When Jackson found this out, during his first term as President, he vowed vengeance on Calhoun, and this incident was one of the causes of the break between the two men and the ousting of

Calhoun's friends from the Cab¬ inet.

After the acquisition of Florida by purchase in 1819, Jackson was appointed its territorial governor (1821). According to the testimony of Parton, his biographer, he governed badly and his conduct while governor was (

The election of 1828 was a great victory for Jackson, as he received 178 electoral votes to 83 for Adams. The result was a great surprise to many, especially to the conservative North Atlantic States. While many voted for Jackson for personal reasons, because he was a military hero or because of a belief that he was un¬ justly deprived of the presidency in 1824-25, and others as a protest against alleged mis- government by Adams, or personal antagonism to him, yet the real causes of Jackson's extraor¬ dinary success lie deeper. His election was the result of a protest against what many con¬ sidered too much centralization of power in the national government, and a tendency to interpret the Constitution too broadly. This was shown in decisions of the Supreme Court in several well-known and important cases, as well as in acts of Congress providing for in¬ ternal improvements at national expense, char¬ tering the Second United States Bank, uphold¬ ing the principle of a high protective tariff and refusing to distribute the public lands in a manner satisfactory to the West. These meas¬ ures were looked upon as on the whole favor¬ ing the interests and power of the manufactur¬ ing, commercial and financial classes of the Northeast rather than the great agricultural classes of the South and West who composed

the mass of the people. This combination of the South and West to gain their special in¬ terests, a low tariff for the South and cheap lands for the West, was the greatest force in the election of Jackson.

The election also turned on the question of what type of man should administer the govern¬ ment and make the laws. The Federalist, Jeffersonian-Republican and National-Republi¬ can parties had never represented the great mass of the people, and this largely because of the belief that the government should be run by carefully selected educated leaders. Jackson represented the great new West and its democ¬ racy. The notion, ((He is one of us® appealed very strongly to common men, and the election of Jackson was the answer to the ques¬ tion whether a class could be safely entrusted with the power to act wisely for the whole people. Jackson's real views on some of the important public questions were

unknown, such as his attitude on the tariff, internal improve¬ ments, public lands and National vs. State rights. On the other hand, he was known to favor slavery, the removal of the Indians from lands coveted by the white man, the interests of the common people, and hence to be op¬ posed to all forms of special privilege, monop¬ olies and the centring of power in the hands of a favored class. It was thought probable also that he would favor a lower tariff and laws pleasing to the West on the question of the distribution of the public lands, since he was a western man. It was known also that Jackson was a master of men, almost despotic by nature, in spite of his humble origin and his interest in the common man ; that his military career had taught him the necessity of obedi¬ ence to law, at least by those subject to his orders, , and that he was not likely to allow his authority to be questioned as President, or in the enforcement of the law as he understood it.

These views, help to explain the principal events and policies of Jackson's two administra¬ tions. His democracy, expressed by a phrase, (

judicial departments. Jackson greatly enlarged the importance and influence of the President in his contests with Congress and the Supreme Court.

His war on the United States Bank to pre¬ vent its securing a second charter was due pri¬ marily to his distrust of anything savoring of monopoly or special privilege. He gave notice in his first annual message of his doubts about the Bank, and vetoed the bill introduced by Clay for a new charter on 10 July 1832. This be¬ came the principal issue in the election of 1832 between Jackson and his opponent Clay. With his re-election by a large majority he was con¬ vinced that he had received a mandate from the people approving his attitude towards the Bank. In his second annual message he ques¬ tioned its solvency, without warrant, and then made plans to destroy it. He ordered two suc¬ cessive Secretaries of the Treasury to remove the government deposits, and after both refused, appointed a third, Roger B. Taney, who, in September 1833, ordered government money to be deposited in sundry State banks, "pet banks,® after 1 Oct. 1833. As money was withdrawn from the United States Bank to pay govern¬ ment expenses, its resources decreased. Jack- son's avowed purpose was to prevent the Bank from buying up members of Congress in order to secure another charter. There followed the resolution of the Senate 28 March 1834, origi¬ nally introduced bv Clay, to censure Jackson on the ground that he had usurped powers not con¬ ferred upon him by the Constitution. Later, in 1837, Jackson had the satisfaction of having this resolution expunged from the records. Growing out of the activity of the State banks in making loans of public funds, and through the issuing of large quantities of paper money by other State banks, with little or no

specie as a reserve, there arose a fever of speculation, especially in western lands which were paid for in paper money. Jackson called in a part of the government funds and issued his famous specie circular 11 July 1836, to the effect that only gold and silver would be received in pay¬ ment for public lands. These incidents contrib¬ uted largely to the panic of 1837.

Jackson reversed the policy of Adams in up¬ holding the right of the Indians of Georgia to own lands, as guaranteed by treaties with the United States. He upheld Georgia in its refusal to obey decrees of the Supreme Court, and him¬ self refused to execute them. He withdrew Federal troops from the Cherokee country, and allowed the State to assume jurisdiction over the Indian lands. This attitude was due partly to his hatred of the Indians, partly to the fact that he did not look upon the attitude of Georgia as one of defiance to the National government, but considered her as acting wholly within her rights. This was not understood thoroughly at the time, and misled the leaders of nullifica¬ tion in South Carolina, who supposed that Jack- son had conclusively proved himself to be a states' rights man, and could be depended on to support their theories.

The first hint of trouble with Jackson in the nullification controversy came at a dinner in honor to Jefferson held at Washington 13 April 1830. Jackson proposed a toast in reply to •several in favor of nullification, "Our Federal Union: it must be preserved,® in contrast with one proposed by Calhoun, in effect, "Liberty

dearer than Union.® The question arose be¬ cause of the opposition of South Carolina to the high tariff of 1828, ((the tariff of 'abominations.® This was believed to De unconstitutional and peculiarly unjust to the South. A convention held 19 Nov. 1832, declared the tariffs of 1828 and 1832 null and void in South Carolina, to go into effect 1 Feb. 1833, and threatened seces¬ sion if the federal government attempted to collect duties. Jackson ordered General Scott to Charleston, and sent two war vessels to the same port. He instructed the collector of the port to collect duties by force. He issued a proclamation 10 December telling the people of South Carolina that disunion by force was armed treason, and said, ((I consider the power to annul a law. of the United States, assumed by one State, incompatible with the existence of the Union, contradicted expressly by the letter of the Constitution, unauthorized by its spirit, inconsistent with every principle on which it was founded, and destructive of the great object for which it was formed.® This made Jackson almost as popular a civil as a military hero. The controversy ended in Jackson's favor, as the ordinance

was never enforced, though the tariff was reduced by the Act of

1833.

Jackson's constitutional views as illus¬ trated by his attitude on the Bank, Indian and nullification questions, are difficult to compre¬ hend unless one thoroughly understands his view' of the final source of authority in our governmental system, and the agency for exe¬ cuting it. According to Jackson, final power was the will of the people. A popular mandate was superior to acts of Congress or even to a decision of the Supreme Court. The President was the interpreter of just what the will of the people was, and must execute it independently of and without interference from Congress or the Supreme Court. The chief results of Jack- son's two administrations were a reduction of the tariff, the preservation of national authority as against the states, a check on tendencies to¬ ward monopoly and privilege, the enhancing of the power of the executive, the introduction of the spoils system, the destruction of the United States Bank, encouragement of speculation and inflation, and the extension of a vicious bank¬ ing system.

Jackson's character and policies affected peo¬ ple differently and opinions vary even to this day. His nature vas so positive that his traits stand out boldly, whether good or bad. His was an untrained mind, but one of great natural power, and he would have made his mark in any society or environment. Lacking the discipline which comes from close association with trained minds and from study, he was incapable of weighing evidence and deciding questions on the basis of the facts. Rather he formed his opinions and made his decisions intuitively, or in accordance with his feelings. He made fewer mistakes than many men highly trained, be¬ cause of his honesty of purpose, and his deter¬ mination to carry out a policy once he had made up his mind. His ideas were original and grew out of his experience. They were seldom directly borrowed from other men, either the dead or the living. He was a tynical son of the unadulterated frontier, and truly repre¬ sented the mass mind of the frontier, and that meant at this period the greater portion of the vol. is — 37

American people. His most striking traits were those of the frontier — provincialism, self-con¬ fidence, energy, persistency, belligerency, insub¬ ordination, individualism, honesty, simplicity, ignorance of books, loyalty to friends, and ha¬ tred of enemies. He was the idol of the mass of the people — of the common man. To the more cultured portions of American society he was an uncouth, illiterate backwoodsman. Though Harvard University conferred on him the degree of doctor of laws, the comment of John Ouincy Adams doubtless represented the attitude of many of the educated class towards Jackson. Adams said, "As myself an affection¬ ate

child of our Alma Mater, I would not be present to witness her disgrace in conferring her highest literary honors upon a barbarian who could not write a sentence of grammar and hardly could spell his own name.® The lan¬ guage is exaggerated, but the spirit of the re¬ mark was the sentiment of many, who could not divorce from, their minds the notion that gov¬ ernment must be administered only by trained, educated men.

Bibliography. — The latest and best biog¬ raphy of Jackson is that by John Spencer Bas¬ sett (2 vols., Garden City, New York 1911). The best single volume is that by William G. Sumner, (Boston 1882). Of the earlier biog¬ raphies that by James Parton is still useful (3 vols., New York 1861). Other biographies are by W. G. Brown (Boston 1900) ; John H. Eaton (Philadelphia 1817) ; Amos Kendall (New York 1843). For important phases of Jackson's career as President consult Catterall, R. C. H., (The Second Bank of the United States) (Chicago 1903) ; Boucher, Chauncey Samuel, (The Nullification Controversy in South Carolina (Chicago 1916). For extended bibliographies on all phases of Jackson's life, consult Edward Channing, Albert Bushnell Hart and Frederick Jackson Turner, 'Guide to the Study and Reading of American History) (pp. 412-420, Boston 1912).*

Marcus W. Jernegan,

Associate Professor of History, University of Chicago.

JACKSON, Benjamin Daydon, English botanist : b. London. 3 April 1846. He was edu¬ cated in private schools, was secretary of the Linnean Society from 1880 to 1902, since when he has acted as general secretary. In 1900-01 he was secretary to the departmental committee of the Treasury on botanical work. His nub- lications are 'Life of John Gerard) (1877); 'Life of Dr. William Turner) (1878); 'Guide to the Literature of Botany> (1881) ; 'Vege¬ table Technology) (1882) ; 'Pryor's Flora of LIerts) (1887) ; 'Index Kewensis (engaged nearly 14 years on its preparation, 1893-95) ; 'Supplement to Index Kewensis,* with Th. Durand (1901-06) ; 'Glossary of Botanic Terms* (1900; 3d ed., 1916) ; 'Life of George BenthanP (1906) ; editor of 'New Genera and Species of Cyperaceae,* by late C. B. Clarke (1908) ; 'Darwiniana) (1910) ; 'Index to the Linnean Herbarium* (1912) ; 'Catalogue of Linnean Specimens of Zoology* (1913), and many shorter articles, chiefly on botany, botanic history and bibliography.*

JACKSON, Charles, American jurist: b. Newburyport, Mass., 1775; d. 1855. In 1793 he was graduated at Harvard ; entered on the

study of law in the office of Chief Justice Par¬ sons. In 1796 he began the practice of his pro¬ fession in his native Newburyport, remaining there for seven years, when he removed to Boston. In the latter city he became a partner of Judge Hubbard, and the firm was soon the most prosperous in Massachusetts. From 1813 to 1824 Mr. Jackson was justice of the Supreme Court of Massachusetts; served as delegate to the State Constitutional Convention of 1820, and in 1833 was appointed member of the com¬ mission charged with the revision of the State laws. Justice Jackson is the author of the im¬ portant work, (Treatise on the Pleadings and Practice in Real Actions) (1828).

JACKSON, Charles Loring, American chemist: b. Boston, Mass., 4 April 1847. He was graduated at Harvard in 1867, and subse¬ quently studied at Heidelberg and Berlin. In 1868 he was appointed assistant in chemistry at Harvard, becoming full professor in 1881. He discovered a new method for the prepara¬ tion of borneol from camphor in 1883-84. He retired in 1911. He published (Lecture Notes in Chemistry) (1878) and numerous papers on organic chemistry in Proceedings of the Amer¬ ican Academy) and in the American Journal of Science.

JACKSON, Charles Thomas, American scientist: b. Plymouth, Mass., 21 June 1805; d. Somerville, Mass., 28 Aug. 1880. He was grad¬ uated at Harvard Medical College in 1829. He assisted in a geological and mineralogical sur¬ vey of Nova Scotia, publishing his results in (Memoirs of the American Academy of Arts and Science.) He went to Europe in 1829, spending his time in Germany, Italy and Paris. On his return he began practising at Boston, but abandoned this for the study of the sciences. In 1836 he became State Geologist of Maine, and later held the same post in Rhode Island 1839 and in New Hampshire 1840. He claimed to have been the first to indicate, in 1832, the ap¬ plicability of electricity to telegraphic use, and also claimed, in 1842, to have been the discov¬ erer of the anaesthetic effects of the inhalation of ether. In 1844 he conducted extensive re¬ search in the south shore lands of Lake Super¬ ior, and from 1847-49 was United States sur¬ veyor of mineral lands in Michigan. He re¬ ceived the Montyon prize of 2,500 francs from the French Academy of Sciences in 1852. He published a (Manual of Etherization, with a History of its Discovery) (1861), and several (Reports.)

JACKSON, Sir Cyril, English sociologist: b. about 1859. He was educated at New Col¬ lege, Oxford; studied for the bar and in 1891 was chosen member of the London School Board. Subsequently he migrated to Australia where he served as inspector general of schools in West Australia from 1903 to 1906. In 1910 he returned to London as acting agent-general

for West Australia and – in 1913 was elected alderman of the London County Council, of which he was chairman in 1915. Many of his official reports, are monographs on child labor and the condition of the unemployed and prob¬ lems incident thereto. ITe has also published (Unemployment and Trade Unions) (1910). and (Outlines of Education in England) (1914) • (The Religious Question in Public Education. In 1915 he was chairman of the advisory com¬*

mittee on national register and in the following year was vice-chairman on war pensions, etc., statutory committee. He was knighted in 1917.

JACKSON, Dugald Caleb, American elec¬ trical engineer: b. Kennett Square, Pa., 13 Feb. 1865. In 1885 he was graduated at the Penn¬ sylvania State College, and took a post-gradu¬ ate course in electrical engineering at Cornell in 1885-87. For the next two years he was vice-president and engineer of the Western Engineering Company at Lincoln, Neb. Subse¬ quently he was assistant chief engineer of the Sprague Electric Railway and Motor Comnany and chief engineer of the central district of the Edison General Electric Company. He is now consulting engineer and member of the firm of D. C, and W. B. Jackson. From 1891 to 1907 he also served as professor of electrical engi¬ neering at the University of Wisconsin and since 1907 has been in charge of the department of electrical engineering at the Massachusetts Institute of Technology. He has published (A Textbook on Electricity and Magnetism and the Construction of Dynamos) (1893); Elec¬ tricity and Magnetism (1895); (Alternating Currents and Alternating Current Machinery) (1896; new ed. 1913); (An Elementary Book on Electricity and Magnetism and their Appli¬ cations) (1902) and many papers on profes¬ sional topics.

JACIISON, Edward Payson, American author; b. Erzerum, Turkey, 15 March 1840; d. 1905.. He was educated at Amherst College ; served in the Union army during the Civil War as private of the 45th and lieutenant of the 5th Massachusetts ; was principal and superin¬ tendent of various educational institutions, and in 1877 was appointed master in the Boston Latin School. His works include (Mathemati¬ cal Geography) (1873); (A Demigod) (1886), a story published anonymously, and at first at¬ tributed to various well-known authors; (The Earth in Space) (1889); and (Character'Build- ing) (1892), to which was awarded a prize of $1,000, offered by the American Secular Union, jointly with N. P. Gilman's

JACKSON, Frederick George, English

QjEtlc explorer : b. Alcester, Warwickshire, 1860. He was educated at Denstone College and the University of Edinburgh, made jour¬ neys across the Australian deserts and the Great Tundra of Siberia, in 1894—97 was

leader of the Jackson-Harmsworth expedition to Franz Josef Land, and during the second Boer \ ar was in command of a company of mounted infantry. During his stay. in Franz Josef Land he mapped the region, which he proved to be a collection of islands, and made valuable mag¬ netic and meteorological observations. He was awarded the gold medal of the Paris Geo¬ graphical Society in 1899, and wrote (The Great. Frozen Land} (1895); 'A Thousand Days in the Arctic) (1899).

JACKSON, Gabrielle Emilie (Snow),

American writer for young people: b. New York, 13 Oct. 1861. Among her many publica¬ tions are (Denise and Ned Toodles) (1897) •

Perkins ' (1900) ; (Laddie and Lassie> (1900) ; (Caps and Capers) (1901) ; (Three Graces' (1903); (Three Graces at College' (1904); (Mother and Daughter' (1904); (Little Miss Cricket Series' (1905) ; 'Wee Winkles and W ideawake' series (1906) ; 'Ned Toodles the Second' (1906) ; 'A Blue Grass Beauty' (1907); (Joy of Piney Hill' (1907); 'Sun¬ light and Shadow' (1907) ; 'The Dawn of Womanhood' (1907) ; 'Three Little Women' series (1908) ; 'A Maid of Middies' Haven' (1909) ; 'Captain Polly of Annapolis' series (1910-11) ; 'Peggy Stewart' series (1911-12) ; 'Peterkin' (1914) ; 'Silverheels' (1916).

JACKSON, George, English and Canadian clergyman and educator: b. 15 Oct. 1864. Edu¬ cated at Collegiate School, Grimsby, Wesleyan Methodist College, Richmond and London Uni¬ versity. In 1880 he entered the Wesleyan Meth¬ odist ministry and was in charge of the Clithe- roe circuit. Superintendent of the Wesleyan Methodist Mission, Edinburgh, 1889-1906; pas¬ tor of Sherbourne Street Methodist Church, Toronto, 1906-09; professor of the English Bible, Victoria College, Toronto University, 1909-13 ; since 1913, professor of Pastoral The¬ ology and Church Organization, Didsbury Col¬ lege, Manchester, England. He is the author of 'First Things First' (1894); 'The Table Talk of Jesus' (18%) ; 'Judgment, Human and Divine' (1897); 'The Ten Commandments' (1898) ; 'A Young Man's Bookshelf' (1898) ; 'A Young Man's Religion' (1900) ; 'Memo¬ randa Paulina' (1901) ; 'The Old Methodism and the New' (1903) ; 'The Teaching of Jesus' (1903) ; 'The Fact of Conversion' (1908) ; 'Studies in the Old Testament' (1909) ; 'The Preacher and the Modern Mind' (Fernley Lec¬ ture, 1912); 'In a Preacher's Study' (1914); 'Leaves of Healing' (1916).

JACKSON, George Anson, American Con¬ gregational clergyman: b. North Adams, Mass., 17 March 1846. He was graduated from Yale in 1868, from the Andover Theological Semi¬ nary in 1871. was ordained to the Congregational ministry, and in 1872-97 held pastorates suc¬ cessively at Leavenworth, Kan., Southbridge, Mass., and Swampscott, Mass. In 1897 he be¬ came librarian of the General Theological Li¬ brary of Boston. He wrote 'The Apostolic Fathers' (1879) ; 'Fathers of the Third Cen¬ tury' (1881); 'Post-Nicene Greek Fathers' (1883) ; 'Post-Nicene Latin Fathers' (1883) ; 'The Son of a Prophet' (1894), a historical novel.

JACKSON, George Thomas, American dermatologist: b. New York, 19 Dec. 1852; d. 3 Jan. 1916. He received his education at the College of the City of New York and at the universities of Berlin, Vienna and Strassburg. In 1878 he was graduated in medicine at Co¬ lumbia University and for the next six years was engaged in general practice. He finally gave special attention to dermatology, in which he lectured at the New York Woman's Medical College from 1890 to 1899, and also at the Uni¬ versity of Vermont and at Columbia. His pub¬ lished works are 'Diseases of the Hair and Scalp' (1887, 1893); 'The Ready Reference Handbook of Diseases of the Skin' (1893; 7th ed., 1914) ; 'Treatise on the Diseases of the Hair,' with C. W. McMurtry (1912).

JACKSON, Helen Maria Fiske Hunt,

"H. H.," American novelist and poet : b. Am¬ herst, Mass., 18 Oct. 1831 ; d. San Francisco, 12 Aug. 1885. At 21 she married Capt. Edward Hunt (d. 1863) of the United States army, and began the wandering existence of an army of¬ ficer's wife. From 1867 to her death, 16 years later, her pen hardly rested. She wrote verses, sketches of travel, essays, children's stories, novels and tracts for the time, generally over the pen-name "H. H." Her life in the West after her marriage to W. S. Jackson, a banker of Colorado Springs, revealed to her the wrongs of the Indian, which she set herself at once to redress. Newspaper letters, appeals to govern¬ ment officialism, and finally her 'Century of Dishonor' (1881), a sharp arraignment of the nation for perfidy and cruelty toward its help¬ less wards, were her service to this cause. Her most popular story, 'Ramona,' (1884), a ro¬ mance whose protagonists are of Indian blood, was also an appeal for 'justice. This book, however, rose far above its polemic intention ; the beauty of its descriptions, its dramatic movement, its admirable characterization, and its imaginative insight entitling it to high rank. Two novels in the 'No Name Series' — 'Mercy Philbrick's Choice' (1876) and 'Hetty's Strange History' (1877) — show the qualities that in¬ fuse her prose : color, brilliancy of touch, grace of form, certainty of intuition and occa¬ sional admirable humor. She had not the gift of construction and lacked the power of self-criticism ; so that she is singularly uneven. It is no doubt chiefly her poems

which have gained for 'CH. H." a place in literature. They reveal genuine lyrical power, although at times marred by defective technique. Among books of hers not already named are 'Bits of Travel' (1873) ; 'Glimpses of Three Coasts'; 'Sonnets and Lyrics' (1886). To her have often been attributed the noted 'Saxe Holm' stories. Con¬ sult Higginson, T. W., 'Contemporaries' (Bos¬ ton 1900). See Ramona.

JACKSON, Henry Rootes, American dip¬ lomat and soldier: b. Athens, Ga., 24 June 1820; d. Savannah, Ga., 23 May 1898. He was grad¬ uated at Yale in 1839, admitted to the bar in Georgia and for several years was district at¬ torney. He served in the Mexican War, be¬ came judge of the Superior Court, and in 1853 went to Vienna as charge d'affaires, and the following year was made Minister resident there resigning in 1858. Before the outbreak of the Civil War he seceded from the Charles¬ ton Convention and, when his State seceded, commanded the State troops. He eventually resigned and joined the Confederate forces. Near the close of the war he was made a brigadier-general in Hood's army and was cap¬ tured with his whole command at Nashville after the battle of Franklin. In 1885 he was appointed United States Minister to Mexico, but resigned in the following year, because of a disagreement with government authorities over the ruling in the case of the American schooner Rebecca, which had been seized by the Mexi¬ cans on the charge of smuggling. He was the author of 'Tallulah, and Other Poems' (1850).

JACKSON, Howell Edmunds, American jurist: b. Paris, Tenn., 8 April 1832; d. West Meade, Tenn., 8 Aug. 1895. He was graduated from the University of Virginia in 1854, from

the law deoartment of Cumberland University in 1856, began practice in Jackson and later in Memphis, and upon the organization of the Con¬ federate government became receiver for prop¬ erty in West Tennessee confiscated to the pur¬ poses of the Confederacy. Subsequent to the war he became a member of the Court of Ref¬ erees of Tennessee, a tribunal which acted as a provisional Supreme Court in the hearing of cases that had arisen during the war period. Elected to the State legislature in 1880, he took his seat in the United States Senate in 1881, afterward left the Senate to become United States Circuit Court judge for the West Ten¬ nessee district, and in 1893 was appointed an associate justice- in the United States Supreme Court.

JACKSON, James, American soldier and statesman : b. Moreton

Hampstead, Devonshire, England, 21 Sept. 1757 ; d. Washington, D. C., 19 March 1806. He emigrated to America with his father in 1772 and studied law in Savan¬ nah. In March 1776 he aided in repelling a British attack upon that town, was appointed member of the first constitutional convention of Georgia in 1777 and subsequently was appointed brigade major of the Georgia militia. In 1781 he aided in the capture of the fort at Augusta, and was left in command of the place and upon the evacuation of Savannah by the British in 1782 was appointed by General Wayne to re¬ ceive the keys of the town. In 1789 he was chosen a representative in Congress, and from 1792 to 1795 was a member of the United States Senate. He had the principal share in the framing of the Georgia constitution of 1798 and upon its adoption was elected governor of the State and held that office until his re-election in 1801 to the United States Senate. He was a Jeffersonian in his political views.

JACKSON, James, American physician, brother of Charles Jackson (q.v.) : b. Newbury- port, Mass., 3 Oct. 1777; d. 1867. He was grad¬ uated at Harvard College in 1796; studied med¬ icine in London and on his return to Boston in 1800 commenced practice there, devoting him¬ self entirely to medical practice, to the exclu¬ sion of surgery and other branches. In 1803 he became a member of the Massachusetts Medical Society, of which he later became president. In 1810, with Dr. John C. Warren, he brought before the community a proposition for estab¬ lishing a hospital in the city of Boston. The first result of this was the organization of the asylum for the insane at Somerville, then in¬ cluded in Charlestown, and afterward of the Massachusetts General Hospital in Boston. Dr. Jackson was the first physician, and Dr. War¬ ren the first surgeon to this institution. In 1810 he was chosen professor of clinical medi¬ cine in Harvard, and in 1812 professor of the¬ ory and practice, becoming professor emeritus in 1835. His principal publications were (On the Brunonian System y (1809) ; (Remarks on the Medical Effects of Dentition) ; (Letters to a Young Physician > (1855). Of the last work several editions were printed. Consult Put¬ nam, (Memoir of Dr. James Jackson) (Boston

1905).

JACKSON, John Adams, American sculp¬ tor: b. Bath, Me., 5 Nov. 1825; d. Pracchia, Tus¬ cany, 30 Aug. 1879. He was apprenticed to a machinist in Boston, where he gave evidence of

talent by modeling a bust of Thomas Buchanan Read. He studied linear and geometrical drawing in Boston, gave much time to crayon portraits and then went to Paris, where he stud¬ ied under Suisse. In 1858 he went to New York and remained there until 1860, when he returned to Florence, which was afterward his home. His portrait busts include those of Dan¬ iel

Webster (1851), Adelaide Phillips (1853) and Wendell Phillips (1854). His ideal produc¬ tions are noted for their anatomical accuracy and graceful treatment. These include (Eve and the Dead AbeP (1862) ; (Autumn, ; (Cupid Stringing his Bow) ; (Titania and Nick Bot- tom) ; (The Culprit Fay ; (Dawn) ; (1873); (Hylas) (1875) and (I1 Pastorello.* He designed a statue of Dr. Elisha K. Kane, the Arctic ex¬ plorer, in 1860; a group for the southern gate¬ house of the reservoir in Central Park, N. Y. (1867) and the soldiers' monument at Lynn, Mass. (1874).*

JACKSON, Mercy Bisbee, American physi¬ cian : b. Hardwick, Mass., 17 Sept. 1802; d. Bos¬ ton, 13 Dec. 1877. She was graduated at the New England Female Medical College in 1860, having previously practised medicine in Ply¬ mouth, Mass., for 20 years and in Boston for 15 years. She was the first woman that was admitted to the American Institute of Homoe¬ opathy in Philadelphia, in June 1871, became a member of the Massachusetts Homoeopathic Society and of the Boston Homoeopathic Soci¬ ety in 1873, and in that year was made pro¬ fessor of diseases of children in the Boston University School of Medicine, which office she held until her death. She was twice married, her first husband being the Rev. John Bisbee, and her second, Capt. Daniel Jackson, of Ply¬ mouth. She was an active worker for the cause of temperance and woman suffrage, ad¬ dressed large audiences and contributed fre¬ quently to the Woman's Journal, published in Boston.

JACKSON, Patrick Tracy, American mer¬ chant brother of Charles Jackson (q.v.) : b. Newburyport, Mass., 14 Aug. 1780; d. Beverly, Mass., 12 Sept. 1847. At the age of 15 he was apprenticed to a merchant of Newburyport and subsequently established himself in Bos¬ ton in the India trade, in which he acquired a handsome fortune. In 1812, at the invita¬ tion of his brother-in-law, Francis C. Lowell, who had recently examined the process of the cotton manufacture in England, he engaged in a project to introduce the power loom, then newly invented, and the mode of constructing which was kept secret, into the United States. After repeated failures they succeeded in 1812 in producing a model from which a machine was subsequently constructed by Paul Moody. In 1813 they built their first mill at Waltham, near Boston, the first in the world that combined all the operations for converting the raw cot¬ ton into finished cloth. In 1821 Jackson made large purchases of land on the Merrimack River near the Pawtucket canal, on which a number of mills were constructed by the Merrimack Manufacturing Company, a corporation organ¬ ized under his auspices. This settlement formed the germ of the present city of Lowell. He procured in 1830 a charter for a railroad be-

tween Lowell and Boston and directed its con¬ struction until completion.

JACKSON, Samuel Macauley, American church historian: b. New York, 19 June 1851; d. Washington, Conn., 2 Aug. 1912. He was graduated from the College of the City of New York in 1870, from the Union Theological Seminary in 1873, and after further study at Leipzig (1873-76), held the pastorate of the Presbyterian Church at Norwood, N. J., in 1876— 80. From 1895-1912 he was professor of church history in New York University, and was chosen secretary of the church history section of the American Historical Association. He was as¬ sistant editor of Schaff's (Bible Dictionary) in 1878-80, associate and managing editor of the Encyclopaedia of Religious Knowledge> in 1880-84, and edited (A Concise Dictionary of Religious Knowledge5 (1891). He also pre¬ pared the first important bibliography of for¬ eign missions (1891), wrote Euldreich Zwingli5 (1901), the first original English biography of its subject, later enlarged and published as (The Latin Works and the Correspondence of Huldreich Zwingli, together with Selections of his German works5 in English translation

(1912).

JACKSON, Sheldon, American educator: b. Minaville, N. Y., 18 May 1834; d. 1909. He was graduated at Union College in 1855, at Princeton Theological Seminary in 1858; was- ordained to the ministry of the Presbyterian Church in the latter year; and was missionary to western Wisconsin and southern Minnesota in 1859-69. In 1869-82 he was superintendent of Presbyterian missions in western Iowa, Neb¬ raska, the Rocky Mountain territories, Wyo¬ ming, Colorado, New Mexico, Arizona, Utah, and Montana, and from 1877 in Alaska. In 1885 he became United States general agent of education in Alaska, and in 1887 organized the Alaskan society of natural history and ethnology at Sitka. He aided in founding a missionary college in Utah in 1896, was moderator of the Presbyterian General Assembly in 1897, and wrote 'Alaska and Missions on the North Pacific Coast) (1880) ; Education in Alaska5 (1881); annual reports on Education in Alaska5 from 1886; and annual reports on the (Introduction of Domestic Reindeer into Alaska5 (1891-1901). Consult Stewart, R. L., (Sheldon Jackson5 (New York 1908).

JACKSON, Stonewall. See Jackson, Thomas Jonathan.

JACKSON, Thomas, English Wesleyan clergyman, educator and editor : b. Sancton, Yorkshire, 12 Dec. 1783; d. Shepherd's Bush, London, 10 March 1873. He was largely a self-made man. He was editor of The Wes¬ leyan

Methodist Magazine and also of The Youths' Instructor and Guardian, 1824—42; professor of divinity in the Richmond Theo¬ logical College, 1842-El. He edited a new edi¬ tion of (John Wesley's Christian Library5 (30 vols.). He also edited 'The Works of John Wesley5 (14 vols., 1829-31); (A Library of Christian Biography5 (12 vols., 1837-40) ; 'The Lives of the Early Methodist Preachers5 (3 vols., 1837-38; 3d ed., 6 vols., 1865-66); (An¬ thony Farindon's Sermons5 (4 vols., 1849) ; 'The Journal of the Rev. Charles Wesley5 (2 vols., 1849). He was the author of many volumes and pamphlets. The most important

are 'The Life of John Goodwin5 (1822); 'Memoirs of the Life and Writings of Rev. Richard Watson5 (1834) ; (The Centenary of Wesleyan Methodism5 (1839); 'The Life of Rev. Charles Wesley5 (2 vols., 1841); (The Life of Rev. Robert Newton5 (1855) ; 'The Institutions of Christianity5 (1858) ; (The Apos¬ tolic Churches in the Holv Land5 (1886) ; (Rec¬ ollections of My Own Life and Times5 (ed. by B. Frankland, 1873). Consult also Dunn, Samuel, ' Recollections of Thomas Jackson and His Acts5 (1873). His large library is now the property of Garrett Biblical Institute, Evans¬ ton Ill.

JACKSON, Sir Thomas Graham, English architect: b. Hampstead, 21 Dec. 1835. He was educated at Oxford University and became a pupil of Sir George Gilbert Scott (q.v.) (1858-61), making a specialty of the Gothic style. He has designed most of the new schol¬ astic buildings in Oxford, Cambridge, Eton, Westminster School, Rugby, Harrow, etc., and has restored Great Malvern Priory, Bath Abbey and Winchester Cathedral, besides building many new Gothic churches. He has written (Modern Gothic Architecture5 (1873) ; (Wad- ham College, Oxford; its History and Build¬ ings5 (1893) ; (The Church of Saint Mary the Virgin, Oxford: Reasons in Architecture5 (1906); (Byzantine and Romanesque Architec¬ ture5 (1913); (Gothic Architecture in France, England and Italy5 (1915) ; (A Holiday in Umbria5 (1917). He was created a baronet in

1913.

JACKSON, Thomas Jonathan, commonly called ((Stonewall Jackson,55 American general: b. Clarksburg, Harrison County, W. Va., 21 Jan. 1824; d. near Chancellorsville, Va., 10 May 1863. Lieutenant-General Thomas Jonathan Jackson was one of the most unique, romantic characters of the War between the States, and crowded into the two years in which he served brilliant achievements which won him wider fame than any other soldier on either side. Descended from Scotch-Irish stock and inherit¬ ing many of the qualities of his ancestry, he was left a penniless orphan when three years old, and soon showed (*

diately reported for duty in Mexico, and serv¬ ing in the artillery won distinction on every field, always seeking the post of danger, being made first lieutenant at the siege of Vera Cruz, brevetted captain at Contreras and Churbusco, and major at Chapultepec, rising to this rank in seven months, and being promoted more rapidly than any other officer of his grade in the Mexi¬ can War. He was frequently and honorably mentioned in the official reports, and John B. Magruder, his immediate superior, wrote of him: <(If devotion, industry, talent and gallan¬ try are the highest qualities of a soldier, then he is entitled to the distinction which their possession confers.®

On the recommendation of his old comrade, D. H. Hill, whose brother-in-law he afterward became, Jackson was elected, in 1851, professor of natural science and instructor of military tactics in the Virginia Military Institute, Lex¬ ington, Va., being elected over McClellan, Reno, Rosecrans and G. W. Smith, whose names were submitted by the faculty at West Point. He made little reputation as a professor, and the cadets were always playing pranks upon him, and laughing at his eccentricities. From his habit of instructing his own servants in Scrip¬ ture lessons every Sunday afternoon grew his famous negro Sunday school to which he de¬ voted so much time and thought to which he contributed so liberally of his moderate means, — sending his pastor checks for it in the midst of his most active campaigns, — and which made such an impress upon the negroes and gave Jackson so warm a place in their affections that the first contribution to his monument was made in 1887 by the negro Baptist Church of Lexing¬ ton. Jackson was a Union man, opposed to se¬ cession as a remedy for Southern wrongs, though thoroughly believing in the abstract right of a State to secede, and greatly deprecated the war which he predicted would follow; but when the news reached the quiet little town of Lex¬ ington that Mr. Lincoln had called for 75,000 troops to coerce sovereign States, and that the Union Convention of Virginia had passed an ordinance of secession, Jackson said in a speech before a public meeting: ((I have longed to pre¬ serve the Union and would have been willing to sacrifice much to that end. But now that the North has chosen to inaugurate war against us, I am in favor of meeting her by drawing the sword and throwing away the scabbard.® Gov¬ ernor Letcher, his old neighbor and friend, who had a high estimate of his abilities, commis¬ sioned him colonel in the Virginia forces; but his brilliant record in Mexico had been for¬ gotten— he was only thought of as the quiet, eccentric professor, and when his name was presented to the Virginia convention, a promi¬ nent member arose and asked : <(Who is this Major Jackson, anyway?® and it required all the

eloquence of the Rockbridge delegates to secure his confirmation.

Marching the corps of cadets to Richmond where he remained for a brief season assisting in organizing and drilling the raw recruits in the ((Camp of Instruction,® he was ordered to Harper's Ferry on 3 May, where he bent his energies toward reducing the high-spirited rab¬ ble who had rushed to the front at the first sound of the bugle to the respectable Army of the Shenandoah, which he turned over to the

command of General J. E. Johnston 23 Mav. Placed in command of the Virginia brigade which afterward became so famous, he met the advance of General Patterson at Falling Waters on 2 July, gave them a decided check, and cap¬ tured a number of prisoners. Soon after he re¬ ceived his commission as brigadier-general in the following characteristic letter from General Lee :

Richmond, 3rd July, 1861,

My Dear General: — I have the pleasure of sending you a commission of brigadier-general in the Provisional Army; and to feel you merit it. May your advancement increase your usefulness to the State.

Very truly,

R. E. Lee.

But it was in the battle of first Manassas (Bull Run) that Jackson won his new name and fame, and the ringing words of the gallant Bee: <(There stands Jackson like a stone wall,® changed the name of <(Thomas Jonathan® into the immortal ((Stonewall® Jackson. He was wounded in the hand but refused to leave the field, and while the surgeons were dressing his wounds President Davis rode on the field, and Jackson, pushing aside the surgeons, tossed his cadet cap in the air and exclaimed : ((Hurrah for the President. Give me ten thousand men and I will be in Washington to-night!® In September he was made major-general, and was sent on 4 October to command the <(Valley District® and enter in the early part of 1862 on that famous "Valley Campaign,® which is now studied in military academies in Europe as illustrative of able strategy, rapid movements, and heroic fighting. In March he fell back before Banks' army of 35,000 men, and Banks reported him ((in full retreat from the valley® and started a column to cross the mountains and attack Johnston in flank as he was falling back from Manassas, when Jackson suddenly turned, marched 18 miles in the morning, and with 2,700 men fought at Kernstown, near Winchester, 8,000 of the enemy, and though sustaining the only defeat that ever befell him he accomplished his purpose in recalling

the column which was moving on Johnston's flank, quietly moved up the valley and took a strong position in Swift Run Gap from which he could easily defend himself or strike the enemy if he attempted to move on Staunton. Ewell's divi¬ sionˆ coming to take his place, he left this grim soldier, to watch Banks, and moved so secretly that neither friend nor foe had divined his plans until he thrilled the Confederacy and sent terror to the North by the following laconic and char¬ acteristic dispatch :

Valley District, May 9th, 1862.

Gen. S. Cooper: — God blessed our arms with victory at McDowell yesterday.

T. J. Jackson, Major-General.

He had defeated the advance of Fremont under Milroy and driven it back in great con¬ fusion. Then followed in rapid succession the uniting of Ewell's division with his at Luray, the driving in of Banks' flank at Front Royal' the cutting of his retreating column at Middle- town, and on 25 May the rout of Banks' army from the heights of Winchester, and driving him pellmell across the Potomac. He was about to cross the Potomac into Maryland in pursuit of Banks when he learned that Fremont from the west, and Shields, the head of McDowell's column, from the east, were marching to form

a junction in his rear at Strasburg. He at once put his army in motion and by forced marches (one of his brigades marched 52 miles in one day) he reached the point of danger in time to hold Fremont in check with one hand and Shields with the other until his whole army, prisoners and immense wagon trains loaded with captured stores passed on in safety. He then moved leisurely up the valley, burning the bridges over the Shenandoah to prevent a junc¬ ture between Fremont and Shields — his

rear being protected by that chivalrous knight and brave soldier, Gen. Turner Ashby, who filled the valley with the fame of his brilliant achieve¬ ments, and whose fall in a severe fight near Harrisonburg on 6 June was sadly lamented as a great calamity to the Confederate cause. On 7 June, at Cross Keys, Ewell badly defeated Fremont, and on 8 June, at Port Republic, on the opposite side of the river, Jackson routed Shields, and the armies sent to "crush® him were soon rapidly retreating down the valley, while "Stonewall® — that name will cling to him, but "Thunderbolt,® "Tornado,® or "Hur¬ ricane,® would be more expressive of his char¬ acter, — remained master of the situation. This campaign may be thus summarized : In 32 days Jackson and his "foot cavalry® had marched nearly 400 miles, skirmishing almost daily, fought five battles, defeated three armies, two of which were completely routed, captured 20 pieces of artillery, 4,000 prisoners, and immense quantities of stores of all kinds, and had done all this with a loss of fewer than 1,000 men killed, wounded and missing, and with a force of only 15,000 men, while there were at least 60,000 men opposed to him. He had spread consternation throughout the North and had neutralized McDowell's 40,000 men at Freder¬ icksburg, who were about to march to the aid of McClellan in investing Richmond. Jackson now rested for a brief season, was reinforced from Lee's army, made the impression on the enemy that he would advance down the valley again, and managed matters so secretly that Banks at Strasburg was busily engaged in forti¬ fying against an expected attack from him at the very time he was thundering on McClellan's flank at Richmond over 200 miles away. The part he bore in the Seven Days around Rich¬ mond, the second Manassas campaign, and the Maryland campaign was so conspicuous and so important that it would be, indeed, to write the history of the army to give it in detail. His skill and daring in the Seven Days battle, his defeat of Pope's advance under Banks at Cedar Run, his flank march to Pope's rear, and the pertinacity with which he held him at bay along the Warrenton road until Lee could come up with Longstreet and drive him into the fortifi¬ cations around Washington, his capture of Harper's Ferry with 11,000 prisoners, 13,000 stand of small arms, 73 pieces of artillery, and large quantities of provisions and stores of every description, and his conduct on the field of Sharpsburg, all added greatly to the fame of Stonewall Jackson and his grand old corps of "Foot Cavalry.® It was the privilege of the writer of this sketch to have been under Jack- son during the whole of his brilliant career, and it may not be amiss to describe him as he appeared at the head of Ins victorious legions; about 37 years old, six feet tall, medium build,

gray-blue eyes, light brown hair, set jaw and wide nostrils. He wore a plain gray uniform which soon became faded and soiled, cavalry boots and an old gray cadet cap with its rim tilting on his nose. He rode a raw-boned

sorrel horse which the men said "could not run except toward the enemy,® but whenever he appeared among the troops they would begin to give the Confederate yell, and he would take off his cap, put spurs to "Little Sorrel® and gallop away from them as rapidly as possible. On 10 Oct. 1862 he was made, lieutenant-general, and his corps made to consist of his old division, under W. B. Taliaferro, Early's division, A. P. Hill's division, and D. H. Hill's division, Colonel Brown's regiment of artillery, and numerous light batteries. At Fredericksburg, 13 Dec. 1862, he held the extreme right of Lee's army, and defeated with great slaughter Franklin's attack upon him. The following winter and spring Jackson spent in improving the organiza¬ tion, discipline and efficiency of his corps, and as, in his judgment, a most important means of accomplishing this, he labored to have chaplains in every regiment and missionaries to visit the army, and did everything in his power to pro¬ mote the religious welfare of his soldiers. It was largely through his influence that a chap¬ lains' association was formed, and he had regu¬ lar prayer-meetings at his headquarters during the weeks and preaching on Sundays. But the end hastened on, General Hooker threw Sedg¬ wick across the river below Fredericksburg the latter days of April 1863, crossed the bulk of his army above and strongly fortified his lines at Chancellorsville in the confident hope that Lee would either retreat on Richmond, or attack him in his strong position, where a crushing defeat would await him. But instead of doing either of these things Lee left Early to watch Sedgwick, moved up to Hooker's front, and sent Jackson with 22,000 men to make a march to Hooker's flank and rear. This was brilliantly executed and Jackson routed that flank of Hooker's army, and was proceeding to cut him off from his line of retreat and take a position where Hooker would have been compelled to attack him, when in returning from one of those bold reconnoissances which he so frequently made, his party was mistaken for the enemy and fired on by his own men and he was very severely, wounded. His left arm was ampu¬ tated, his other wounds dressed, and he was doing well and gave every promise of recovery, when pneumonia, brought on by exposure be¬ fore the battle, set in and he died at a quarter past three p.m., Sunday, 10 May 1863.

The great soldier had fought his last battle, won his last victory, and gone to wear his glit¬ tering "crown of reioicing.® He was buried as he had requested in "Lexington in the valley of Virginia.® A beautiful bronze statue marks his grave; on the hill at the Virginia Military Insti¬ tute, has been reared the stately "Jackson Me¬ morial Hall,® and in the capitol square of his native State stands the noble bronze statue, the gift of English admirers. Lee spoke his fittest eulogy when he wrote him after hearing that he was wounded: "Could I have dictated events I should have chosen for the good of the country to have been disabled in your stead.® Consult

Cooke, J. E., (Stonewall Jackson: A Military Biography (New York 1876) ;*

Jackson, M. A. M., (Memoirs) (Louisville 1895) ; Henderson, (Stonewall Jackson and the Civil War) (2 vols., New York 1902).

J. Wm, Jones.

JACKSON, Mich., city and county-seat of Jackson County; situated on both banks of the Grand River ; 37 miles south of Lansing, 74 miles west of Detroit, 209 miles east of Chicago, 71 miles northwest of Toledo, 100 miles north of Fort Wayne, and on the main line of the Michigan Central Railroad. It is the termini of the Grand Rapids Division, Sagi¬ naw Division, and Air Line Division of the Michigan Central; of the Toledo Division, and the Fort Wayne Division of the New York Central Railroad; of the Cincinnati Northern, a part of the Big Four system; of the Michi¬ gan Air Line, a branch of the Grand Trunk Railroad. It is connected with Detroit, also, by an electric road known as the Detroit United Railway, and is connected with Battle Creek, Kalamazoo, Grand Rapids, Lansing, Owosso and Saint Johns by an electric system known as the Michigan Railway Company, the main offices of which are in Jackson. Jackson is situated in a rich, agricultural region and carries on an extensive trade in fruits, grains and vegetables. Among its chief manufactures are. sewer pipe, automobiles, automobile acces¬ sories, oil stoves, corsets and underwear, waists and skirts, engines and motors, locomotives, wire fence, agricultural implements, oils and greases, chemicals and medicines and foundry products. Among the important industries are iron and steel, cigar making, Portland cement and mining. All the above employ about 14,000 hands, with a yearly output of more than $100,- 000,000. Coal and clay, the latter useful for pottery, are found nearby. There are five banks with a combined capital and surplus of $1,768,000, with total resources of $15,888,252; bank clearings for 1918 $53,568,324.53. There are six building and loan associations having combined assets of $5,576,538.21. Jackson is the home of the first association in Michigan. There are 34 church 'edifices of the vari¬ ous denominations. The school system is exceptionally fine, there being one city high school, two city intermediate high schools, 18 city grade schools, two parochial high schools and three parochial grade schools. There are two music conservatories and two business col¬ leges. Among the prominent buildings are Carnegie library, the United States Government building, Elks temple, Masonic temple, City Club and the Arbeiter Verein Club buildings. The city also has a hospital

and two sanitariums and there are located here also Mercy 'hospital, Young Men's and Young Women's Christian Association and the Odd Fellows State Home. There are two daily newspapers, one a morning paper and the other an evening paper with an aggregate circulation of 30,000. There are also three weeklies. In 1914 the city adopted the commission form of government and is operated, under the city manager plan. The city is lighted by gas and electric light and owns and operates its water¬ works. The first permanent settlement was made by Horace Blackman in 1829 and was first called Tacksonburg in 1830. In the same year a post office was established and named Tackson- apolis. In 1831 the township of Jacksonburg

was formed and remained such until 1838 when the name was changed to Jackson. When the Michigan Central Railroad was constructed through the southern part of the State in 1841 Jackson, grew rapidly, became a village in 1843, and an incorporated city in 1857. The inhabit¬ ants are mainly native born, though about one- third are of foreign descent, Irish, German, Polish and Italian predominating. Pop. (1920)

48,374.

JACKSON. Miss., capital of the State, county-seat of Hinds County; on the Pearl River and on the Yazoo and Mississippi Valley, the Illinois Central and the Alabama and Vicks¬ burg and other railroads.; about 40 miles east of Vicksburg, on the Mississippi. The first per¬ manent settlement was made in 1828 or 1829, and it was incorporated in 1840. In 1863 it was occupied for some time by Union forces under General Grant, and the ruins of the forti¬ fications erected at the siege are still in exist¬ ence. The city was nearly destroyed in 1864, by General Sherman. Jackson is situated in an agricultural region in which a large amount of cotton is raised. It is the commercial centre for a large section. The good railroad facilities and the advantage of traffic on the Pearl River are stimulating the increase of marketable agricul¬ tural and manufactured products. The chief industrial establishments are cottonseed-oil mills, fertilizer factories, sash, door and blind factories, foundries, brick-yards, a cotton-com¬ press, a plow and harrow factory, a broom fac¬ tory, lumber factory and cooper shops. Some of the principal public buildings are the State capitol, State charitable institutions for the blind, insane, deaf and dumb, the State library, Carnegie library and the James observatory. Among the private educational institutions of learning are the Millsaps College, founded in 1892 under the auspices of the Methodist Epis¬ copal Church; and the Bellhaven College for young ladies. The old capitol, the Confeder¬ ate monuments, and a statue of Jefferson Davis are also of interest. In 1913 the commission form of government was adopted. The water¬ works are the property of the municipality. Pop. (1920) 22,817.

JACKSON, Ohio, city, county-seat of Jack- son County; on Salt Creek, and on branches of the Baltimore and Ohio Southwestern, the Hock¬ ing Valley railroads, and on main line Detroit, Toledo and Ironton Railway, about 100 miles east of Cincinnati and 70 miles southeast of Columbia. Jackson is located in the vicinity of the early routes of travel from the Ohio River to the interior of what is now the State of Ohio, and on to the Great Lakes. The first permanent settlement was made in 1795, but it was not incorporated until 1847, several years after the limits of Ohio were decided. It is situated in a coal and iron mining section, but there is a large amount of good farming land in the vicinity. The chief industrial establishments of the city are found¬ ries, machine-shops, furnaces, woolen-mills, a tannery, and lumber yards. The coal and iron

vicinity contributes largely to the industrial wealth of the city. Pop. 5,842.

JACKSON, Tenn., city and county-seat of Madison Countv. situated about 80 miles north¬ east of Memnhis, on the South Fork of the Forked Deer River, and on the Illinois Central,

JACKSON, BATTLE OF

JACKSON, SIEGE OF

Mobile and Ohio and Nashville, Chicago and Saint Louis and Birmingham and Northwestern railroads. It is the trade centre of a large and fruitful agricultural region, is an important cotton market, and has manufactures of engines and boilers, cotton goods, lumber, machinery, flour, cottonseed-oil, furniture, trunks, spokes and skewers, plows, carriages, bricks and other products. Here are located the Union Univer¬ sity, the Memphis Conference Female Institute and Lane University. Jackson has a fine park, Carnegie library and modern municipal im¬ provements, the waterworks and electric-light system being owned by the city. It has five banks with a combined capital of $528,150. The government is by commission, composed of three commissioners. Jackson was first settled in 1818. Jackson is in the centre of a net work of 210 miles of graded and graveled roads of Madison county. During the Civil War. Jackson was at times the headquarters of General Grant. It was captured by Union troops 7 June 1862. On 19 Dec. 1862, General Forrest sent detachments of cavalry to destroy the railroad to the north and south, and with 400 men advanced on Jackson and had a run¬ ning fight with two regiments of Union infan¬ try and detachments of cavalry under Colonel Engelmann of the 43d Illinois, who disputed Forrest's advance until the fortifications of the town were reached, when Forrest withdrew and moved on Humboldt and

Trenton. On 13 July 1863, a Confederate cavalry force held the town and guarded a large number of conscripts. Col. Edward Hatch with 1,160 men of the 3d Michigan, 2d Iowa, 1st West Tennessee and 9th Illinois cavalry regiments attacked the Con¬ federates and drove them from the town, re¬ leasing about 450 conscripts, and capturing 250 horses and nearly 400 stand of small arms. Hatch's loss was very slight. The Confederates had 38 killed and about 150 wounded. Consult (Official Records> (Vol. XXIII). Pop 18,860.

JACKSON (Miss.), Battle of. After the battle of Raymond (q.v.), 12 May 1863, General Grant, having provided for the safety of his rear and left from the direction of Vicksburg, turned McPherson's and Sherman's corps and part of McClernand's on Jackson, 12 miles northeast of Raymond, to capture the place without delay. On the 13th McPherson moved from Raymond to Clinton, and then turned east on Jackson. Sherman moved through Ray¬ mond to Mississippi Springs on the 13th, and that night arranged with McPherson that both columns should arrive at Jackson about the same hour next day. McClernand closed up to Raymond and sent one division to Clinton to support McPherson. Gen. J. E. Johnston had arrived at Jackson on the evening of the 13th and, hearing next morning of the Union ap¬ proach on the Raymond and Clinton roads, ordered Gregg's brigade to take position on the first-named road, and Walker's brigade on the latter, with instructions to each to delay the Union advance as long as possible, to give time for the removal of public property from the city. The combined strength of Gregg and Walker was about 6,000 men. About 9 a.m. of the 14th McPherson's advance on the Clinton road came upon Walker's pickets and drove them back upon the main body, posted in works on the crest of a semi-circular ridge 2x/2 miles

west of Jackson, the front covered by a marshy creek lined with dense willows, and artillery commanding the bridge over the creek. At the end of nearly two hours Crocker's division of three brigades was deployed in line, with one brigade of Logan's in reserve. At 11 a.m. the skirmishers advanced to the creek and were checked, upon which the entire division went forward, drove in Walker's skirmishers, and advanced over the open ground beyond the creek, meeting a stout resistance ; but Walker's men soon retreated, abandoning seven guns. They were pushed more than a mile by Crocker; but his men fell into some disorder, and were finally brought to a stand by artillery posted in an inner line of works close to the town. While Crocker was reforming, Walker made his es¬ cape to the Canton road. Crocker's loss was 265 killed and wounded. On the Raymond road Sherman encountered Gregg and, by a flank movement, compelled him to abandon his entire line and ten guns, with the loss of nearly 200 prisoners and 81 in killed and wounded. Sherman's loss was 32. Johnston retreated northward on the Canton road. Mc¬ Pherson and Sherman entered

Jackson be¬ tween 3 and 4 p.m.; Sherman was left in the city to destroy the railroads, bridges, factories, arsenals and everything valuable. On the morn¬ ing of 15th Grant turned the rest of his army west, defeated Pemberton at the battle of Champion's Hill (q.v.) on the 16th, drove him across the Big Black on the 17th, and began the siege of Vicksburg. The Union loss at Jackson was 42 killed and 251 wounded. The Confederates make their loss less than 400, but Sherman estimated it at 845 killed, wounded and missing. Consult (War of Rebellion — Official Records> (Vol. XXIV, Washington 1889-1901); Johnston, J. E., (Narrative of Military Operations (New York 1877) ; Sher¬ man, 'Memoirs* (Vol. I, New York 1875) ; The Century Company's < Battles and Leaders of the Civil War> (Vol. Ill, New York 1887—*

88).

JACKSON, Siege of. The battle of Jack- son (q.v.), 14 May 1863, was followed by the movement of General Johnston northwest, with Gregg's and Walker's brigades, to form a junc¬ tion with Pemberton, who had been directed to join him; but early on the 19th he received word from Pemberton that he had decided to hold Vicksburg instead, upon which Johnston marched his troops to Canton. He was rein¬ forced, and 29 Tune he marched west to operate in the rear of Grant, who was besieging Vicks¬ burg. He was about to move on the morning of 5 July to the south of the Vicksburg and Jackson Railroad, when he heard that Vicks¬ burg had fallen, whereupon he fell back to Jackson and occupied a line of works covering the town, with both flanks on Pearl River. General Sherman had been held in readiness to move back and drive the Confederates from the State, and. when Vicksburg fell he moved promptly with his own corps and those of Gen¬ eral Ord and Parke, crossed the Big Black at three different points, and by 11 Tuly was close up to Johnston's works and shelling the city with nearly 100 guns. Ord's 13th corps was on the right, the 15th corps in the centre, and Parke's 9th corps on the left. On the 12th the fire of the artillery was increased, reaching

every part of the town, and Lauman's division of Ord's corps, moving in dense woods, came too close to the Confederate works, was struck in flank and driven back in disorder, losing over 500 men killed, wounded and captured, to¬ gether with the colors of three regiments. The siege was prosecuted night and day, and on the morning of the 17th Jackson was found evacu¬ ated, Johnston having retreated on the road to Brandon, and thence to Morton, where he ar¬ rived on the 20th. Steele's division pursued

Johnston as far as Brandon, 14 miles from Jackson; Sherman remained five days at Jack- son, destroying much property of every descrip¬ tion, and then returned to Vicksburg. The Union loss at Jackson, 11-16 July, was 129 killed, 762 wounded and 231 missing or cap¬ tured. The Confederate loss, 5-25 July, was 71 killed, 504 wounded and 764 captured or missing. Consult (Official Records) (Vol. XXIV, Washington 1889-1901) ; Johnston, J. E., (Narrative of Military Operations (New York 1877) ; Grant, (Memoirs) (Vol. I, New York 1885-86) ; Sherman, (Memoirs) (Vol. I, New York 1875) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. Ill, New York 1887-88).*

JACKSONVILLE, Fla., chief city of the State, and seat of Duval County in the north¬ eastern corner, on the west bank of the Saint John's, 24 miles from the ocean by water, 14 direct. It is an important trading port and one of the chief southern railroad centres, five great lines converging there, three of them trunk lines ; the Southern Seaboard Air Line, Atlantic Coast Line, Georgia Southern and Florida, Florida East Coast and Jacksonville and South¬ western. It is 138 miles south of Savannah, 212 north of Tampa and 165 east of Tallahassee, and about 1,000 from New York, with train service of 25 to 28 hours. It is also connected with all the Atlantic coast cities by the Clyde, Merchants and Miners and Miami Steamship lines, and with the picturesque Saint John's and its tributaries by six daily and tri-weekly lines of steamers, over 3,300 vessels enter and clear the port annually. The fascinating rivers, lakes, everglades, etc., of Florida, the best hunting and fishing grounds east of the Mississippi, with Jacksonville's mild and healthful winter and even summer climate, make it one of the leading tourists' resorts in the country, some 80,000 to 100,000 stopping annually at its numerous large and well-equipped hotels.

Jacksonville's position makes it the business key and metropolis of the peninsula, the great shipping point of Florida's exports and the dis¬ tributing point for its purchases. Of the former the chief are lumber, shingles and ties, mainly yellow pine from the great Florida forests; next come naval stores — for which it is the largest market in the world — turpentine, rosin and oil; phosphate and cotton have also increased and a heavy element is the shipping of fruit — oranges, pineapples and a great diversity of tropic fruits, (for which see Florida) — and garden vegetables to the North. The total for¬ eign exports in a recent year were valued at $1,371,300; the imports at $1,527,475. In a sub¬ urb of the city is the largest ostrich farm in the United States, and the only one east of California, whose products form part of the shipments; these also include great quantities of phosphates and fertilizers and kaolin. As

a jobbing centre for interior trade it has the immense advantage of having practically no competitor in the State, and is rapidly becoming one of the

foremost in the South; there arc numerous large wholesale grocery houses and the annual volume of wholesale business done in the city of Jacksonville under normal con¬ ditions is as follows : Groceries, hay and feed, $23,000,000; dry goods and notions, $1,750,000; boots and shoes, $500,000; machinery and mill supplies, $1,750,000; hardware, $600,000; paints and oils, $250,000; fertilizer, $8,000,000; drugs, $1,250,000; miscellaneous, $10,750,000; total, $47,850,000. This business implies large banking facilities; and there are now four national and six State banks in the city, besides a savings bank with over $3,241,000 of capital, $2,578,610 undivided profits and $22,883,223 deposits.

Jacksonville has large and diversified manu¬ facturing interests, having some 200 plants en¬ gaged in various lines of manufacture. Its chief specialty is lumber and timber products, which amounts to about one-fourth of the entire output of $6,500,000; there are 10 large saw and planing mills. Of the other industries the most considerable was the manufacture of ice. There were also three large shipbuilding plants, building both steel and wooden ships, foundry and other iron products, steam engi¬ neering works, brick and tile, paving and roof¬ ing materials, wooden ship and boat building, carriages, saddlery, mattresses, and palmetto fibre products, pulp, patent medicines, confec¬ tionery, cigars and other articles.

As a port it had long been hampered by shoals in the river and the bar outside the Saint John's.. The river is a magnificent estuary, a mile wide for many miles up, and with a chan¬ nel deep enough for the largest ocean vessels ; but it was not until 1896, by combined govern¬ ment and local efforts, that a channel 19 feet deep was obtained from Jacksonville to the ocean, admitting vessels of 3,800 tons. The na¬ tional government in 1901 appropriated $1,300,- 000 to deepen it to 24 feet all the wav, with a permanent system of jetties and dredging. It has over seven miles of water front. The Na¬ tional River and Harbor Act of 1906 made further appropriations of $409,750 for the work and in 1907 set aside $100,000 for maintenance. By 1910 a 24-foot channel, now deepened to 30 feet was completed and from vessels of 637 tons in 1870 to vessels of 2,027 tons in 1907, vessels of 5,000 tons were entering the port in 1914. It has the largest dry dock facilities in the entire southeast, and ships are brought a long distance for repairs and other work. Five of the largest oil companies in the world make this one of the principal points of import for crude and refined petroleum and its by-products. The increase of oil-burning ships is bringing many of them to Jacksonville for their fuel supply, all of which adds much to the import¬ ance of the port. The freedom of the city from storms, it never having had in its history a storm serious enough to injure shipping, makes it particularly attractive as this is an advantage that many

of the southern ports can¬ not boast. The city 7.6 square miles in area, is handsomely laid out, and its business section is almost entirely new, having been practically ob¬ literated by a fire on 3 May 1901, which de¬ stroyed 148 blocks, covering 455 acres, and in¬ cluding 2,361 buildings, a property loss of over

- – ,

.

m

‘ ‘«gj)say yg||*

« whi

*® SS5 * W S**

JACKSONVILLE, FLORIDA

*•**

JACKSONVILLE — JACMEL

587

$15,000,000. With astonishing energy new buildings were erected, and greatly improved ones. Among the finest buildings are the Union station, United States post-office and custom¬ house, Masonic temple, Saint Lukes Hospital, National Bank of Jacksonville (which were spared by the fire). Among the public build¬ ings since erected are the Windsor Hotel, Semi¬ nole, Elks, Women’s and Wheelmen’s club¬ houses, Mercantile Exchange Bank, Board of Trade and Duval High School. A $50,000 Car¬ negie free library was erected. The religious denominations built a number of fine churches. Notable among them are the Congregational, Baptist, Christian, McTieire Memorial (M. E. South), Snyder Memorial (M. E.), Presby¬ terian, Saint John’s Episcopal, Church of Good Shepherd, Episcopal and three fine churches for colored folk. There are five parks of 57 acres in all, ˆHemming® having a Confederate monu¬ ment ; and 14 miles of shell streets and drives, besides a general macadamizing of paving with vitrified brick. The ocean beaches 18 to 20 miles off, are among the finest on the Atlantic Coast. The sanitation of the city is perfect. After the yellow fever epidemic of 1888 it in¬ stalled a fine thorough system of sewerage, drained and filled in the swampy tracts around, and replaced the water supply with one almost chemically pure, drawn from artesian wells 500 to 1,000 feet deep. Its death rate has sunk to 10 in 1,000, one of the lowest in the

country. There are 20 miles of trolley tracks, and the city owns electric light works and waterworks ; both light and water are extremely cheap. The finances of the city are in the best condition. It has never defaulted its bonds, which are for the waterworks and electric plant, amounting to nearly $1,500,000 10 years ago, and now re¬ duced. There is no floating debt. Assessed valuation 1914 was $59,274,580; tax 16 mills on the dollar, or 11 mills if beyond the hydrants. Jacksonville was settled in 1816 by Lewis Z. Hogans, whence Hogan's Creek, dividing the city, is named. In 1822 it was laid out and named after Andrew Jackson, the first territo¬ rial governor of Florida. It was incorporated in 1833. The Seminole War prevented its de¬ velopment, but it revived in 1842 and has grown steadily since. Its population in 1850 was 1,045; in 1870, 6,912; 1890, 17,201; 1900, 28,429, of whom 16,271 or 57 per cent were colored: 1910, 57,699; 1920, according to the United States census, 91,558.

George E. Leonard,

Executive Secretary and Treasurer Jacksonville Chamber of Commerce.

JACKSONVILLE, Ill., city and county- seat of Morgan County ; situated on the Mau- vaisterre Creek, a branch of the Illinois River, about 34 miles southwest of Springfield, State Capitol, and 88 miles north of Saint Louis, Mis¬ souri ; on the Wabash, Chicago and Alton, Bur¬ lington and a branch of the Chicago, Peoria and Saint Louis railroads. Jacksonville was laid out as early as 1825, about seven years after the admission of the State of Illinois into the union, established as a town in 1840, incorpo¬ rated as a city in 1867. It was made the county-seat of Morgan County in 1825. The origin of the name of the city is somewhat un¬ certain, but the most probable tradition seems to indicate that it was named in honor of

Andrew Jackson, who was a prominent presi¬ dential candidate, at the time the town was founded. Jacksonville is noted for its institu¬ tions of learning, its wide, prettily elm-shaded streets, and its handsome residences. It is the seat of Illinois College, the oldest college in the State, founded through the efforts of local residents and a band of students from Yale College. Originally non-sectarion, the college has recently become Presbyterian, has absorbed the Jacksonville Female Aoademv and become affiliated with the University of Illinois. The Illinois Woman's College was established in 1847, under the auspices of the Methodist Episcopal Church and it is one of the largest woman's college in the West. The Illinois Woman's Academy and the College of Music are affiliated with the Illinois Woman's Col¬ lege. Among other institutions are the Jack¬ sonville Business College, the home school of the chain of Brown's Business Colleges; Routt College, the largest free tuition Catholic college in the West; the State School for the Blind; the State School for the Deaf and Dumb; the

State Central Hospital for the Insane; Our Saviour's Hospital in charge of the sisters of Holy Cross; the Passavant Memorial Hospital; a Carnegie free public library; the Conserva¬ tory of Music and Whipple Academy, a prepara¬ tory school. The last two are connected with Illinois College. The city hall, the county court¬ house, the high school, the David Prince School and the Ayers National Bank are the most prominent public buildings. Besides these there are numerous church edifices, the most attractive of which are the Grace Methodist Episcopal ; the Christian and the Westminster Presbyterian. The most important industrial establishments of the city are woolen mills, J. Capps and Sons, established in 1839 (the largest concern in the United States manufacturing high grade men's clothing from the raw wool) ; the Illinois Steel Bridge Works; the Jacksonville Railway and Light Company (McKinley System) and the car shops of the Chicago, Peoria and Saint Louis Railroad. Other manufactures include cigars, meat and creamer}- products, machine- shop products, bricks, candy, novelty fixtures for department stores, paper and flour. The city has been under the commission form of government since 1911; it was one of the first cities to adopt this form of government. Jacksonville owns and operates its electric-light plant and waterworks, and maintains about 250 acres of beautiful parks and playgrounds. Pop.

(1920) 15,713.

H. Jay Rodgers,

Secretary Jacksonville Chamber of Commerce.

JACKSONVILLE, Tex., town in Cherokee County, on the International and Great North¬ ern, the Texas and New Orleans, and the Saint Louis Southwestern railroads, 120 miles southeast of Dallas. It contains Methodist and Baptist colleges and has a large trade in agri¬ cultural produce and fruit. Its industrial es¬ tablishments are limited to saw mills, oil works, planing mills and basket and crate works. The town owns its water-supply system. Pop. 3,723.

JACMEL, or JACQUEMEL, Haiti, sea¬ port on the south coast of the republic, on Jacmel Bay, 30 mijes southwest of Port-au- Prince. The town is poorly built with narrow ill-paved streets. Harbor accommodations are

primitive and ocean-going vessels are unloaded and loaded by means of lighters. There is regular steamer communication with American and English ports. A consular agent of the United States is located at Jacmel.

Pop. (com¬ mune) 35,000 to 45,000.

JACOB, from Hebrew word Ya-aqob, lit¬ erally ((to seize the heel,® or "supplant,® also called Israel, third patriarch and son of Isaac and Rebekah. The story of his life as told in Genesis, has many dramatic incidents. The struggle before birth between the two brothers, their antagonism due to the episode of the birthright and later to the subterfuge whereby Jacob secured his father's blessing, Esau's deadly hatred, the wanderer's dream and Jacob's fleeing to safety, his. marriage with Laban's daughters, how his quiet life was dis¬ turbed and again he became a pilgrim ; the vision of the wrestling angel, his reconciliation with Esau and subsequent arrival at Hebran, where his parents lived, with his twelve sons, fathers of the ten tribes of Israel, all these events can be read and read again without los¬ ing their interest. The resemblances through¬ out the careers of the patriarchs — brotherly strife, parental overfondness and the rest, only emphasize the human quality of the narrative.

After ten years, as the closing chapters of Genesis inform the reader, Jacob's favorite son, Joseph, became leading actor in the drama. In their anger at his airs of superiority, his brothers sell him to a band of Ismaelites, telling Jacob that a wild beast had devoured him. Later, as Canaan was visited by a severe famine, the sons were sent to Egypt to buy corn, Ben¬ jamin being retained at home, but Jacob was obliged to let him go with the rest, as Joseph had refused otherwise to release Simeon held as hostage. How Jacob heard on the second return of his sons from Egypt that Joseph was ruler, how he set out to meet him, with a retinue of 66 persons, 11 sons and their children, and how Joseph met him at Goshen, to be re¬ ceived later by Pharoah and assigned a residence "in the best part of the land, in the land of Rameses,® complete a thrilling narrative. At that time, Jacob was 130 years of age. His death was the next great episode, but before his passing he made Joseph swear not to bury him in Egypt, but in the family sepulchre in Canaan. Then adopting Joseph's two sons, he blessed all his sons in solemn assembly, giving Joseph's younger son precedence over the elder and assigning to Joseph a portion more than his brothers. He was 147 at his death, his body being embalmed in Egyptian fashion. It was accompanied back to Canaan by an immense retinue including all the servants of Pharoah and all the elders of Egypt and was laid at rest in the cave of Machpelah at Hebron.

The story of Jacob, as can be said of the other patriarchs, h been attacked as unhis- torical, a charge easily made, if not substan¬ tiated. It is, however, a source-book of evi¬ dence on marriage customs, pastoral occupation, belief and traditions of the people, which must have had a basis of fact Jo be related with such naturalness and simplicity. The olden rabbis in their popular expositions of the Bible or

of Scripture. Much that seems obscure and of doubtful worth in the text receives fresh meaning. Take the story of the birthright, for example. Esau was fresh from the slaying of Nimrod and two of his companions, when he sold the birthright. In desiring it, Jacob wished chiefly its spiritual prerogatives. It is another opinion that Jacob wanted the birthright, be¬ cause the first born was forerunner of the priest who offered the family sacrifices and he felt that Esau was not fit to bring offerings to God. How the Midrash enlarges upon Scripture is illustrated by the statement that Jacob gave three injunctions to his sons before his death. They should not worship idols, nor blaspheme the name of God, nor permit a pagan to touch his corpse. On each side of his coffin, three of his sons were to be stationed, just as the tribes were later gathered in the wilderness. Joseph's order to have Jacob's bodv embalmed was not regarded with favor, it seemed to indi¬ cate a limitation of divine power. For rabbini¬ cal legends in general, bearing on the Biblical characters, the reader will find Dr. Louis Ginz- berg's (The Legends of the Jews) (Phila. 1913), the latest and fullest authority.

Abram S. Isaacs.

JACOB BEN-CHAYYIM BEN-ISAAC IBN-ADONIA, Jewish author: b. Tunis about 1470; d. Venice about the middle of the 16th century. Soon after the year 1500 the Jews of Tunis were severely persecuted. He fled to Italy'- and lived in Rome, Florence and Venice. At Venice he found employment as proof¬ reader on the Bamberg edition of the Rabbinic Bible which was prepared under the direction of Felix Pratensis. The second edition (4 vols., Venice 1524-25) was prepared by Jacob ben- Chayyim. It is noted for the amount of erudi¬ tion displayed, especially in connection with the Masorah. It contains the text, with the Masorah, the Targums, the Commentaries of many Jewish scholars including his own.

JACOB TOME INSTITUTE, an insti¬ tution of secondary education located at Port Deposit, Md. It was founded 1894 by Jacob Tome. When Mr. Tome's gift was made, only five other citizens of the United States — Stephen Girard, Anthony J. Drexel, Johns Hopkins, Charles Pratt and John D. Rockefel¬ ler — .had made greater gifts to educational in¬ stitutions. The endowment and other property of the school are estimated at more than $3,- 000,000. The Jacob Tome Institute was incor¬ porated in 1889. The boarding school for boys, founded in 1900, is located on the hills over¬ looking the historic Susquehanna River. The grounds^ of the institute include about 160 acres. The principal buildings are Memorial Hall, erected in memory of the founder, two dormi¬ tories, gymnasium, the Inn, power plant and infirmary. _ The school consists of six classes, each requiring one year. The studies of the last three years are arranged in five groups which prepare students for college, technical schools, or for active

business life. The insti¬ tute confers no degrees, although a certain amount of collegiate work can be and is done in the regular courses. Students must he not less than 10 years of age in order to gain admission. Special scholarships are offered to boys from Maryland. There is also a kindergarten, junior school and senior school for girls.

JACOBEAN ARCHITECTURE. See

Architecture — Renaissance Period.

JACOBI, ja-ko'bi, Abraham, American physician: b. Hartum, Westphalia, 6 May 1830; d. Lake George, N. Y., 10 July 1919. He studied at Greifswald, Gottingen and Bonn, and graduated M.D. at Bonn University in 1851. Those were years of revolutionary ferment in Germany and Jacobi, becoming identified with the movement, was imprisoned for <(high treason® at Berlin and Cologne (1851-53). In 1853 he settled in practice in New York, where his abilities soon brought him into notice. He was appointed professor of diseases of children at the New York Medical College (1860-65) and held a similar chair in the medical department of the University oi the City of New York (1865-70). Some years later he became professor of the diseases of children at the College of Physicians and Surgeons. He held many important ap¬ pointments, and was president of the New York State Medical Society (1882) ; of the New York Academy of Medicine (1885-89) ; in 1896 was president of the Association of American Physicians and in 1912 president of the Ameri¬ can Medical Association. In 1900 his 70th birthday was made the occasion of a public demonstration in his honor. Among his works are (Dentition and its Derangements) (1862) ; (Infant Hygiene (1873) ; (Diphtheria) (1880) ; (Therapeutics of Infancy and Childhood* (1895) ; (Aufsatze, Vortrage, und Reden) (1893) ; (Collectanea Jacobi* (8 vols., 1909).*

JACOBI, Friedrich Heinrich, German phi¬ losopher: b. Dfisseldorf, 25 Jan. 1743; d. Munich, 10 March 1819. He was educated at the University of Geneva, and in 1764 entered upon a commercial career in his native town; after a few years he retired from business, and in 1770 became a member of the councils for the duchies of Juliers and Berg. From his university days he was actively interested in literature and philosophy, and with Wieland started a journal in which some of his own writings were first published. In 1779 he went to Munich for a short time; and in 1793 left Dusseldorf and settled in Holstein. In 1804 he was called to Munich as a member of the Acad¬ emy of Sciences then newly established; from 1807 Jo 1812 he was

president of the academy; and in 1812 retired to prepare a collected edi¬ tion of his works, which, however, was not finished before his death. His writings include two philosophical romances, c Allwills Brief- Sammlung* (1774) and

(David Hume fiber den Glauben oder Idealismus and Realismus> (1785) ; (Von den Gottlichen Dingen* (1811). In these treatises he defines his theory that man's thought — or reason — is by its nature partial and limited, and can only connect facts, not explain their existence; and that the higher truths must be understood through another different faculty which he calls ■'faith® or ˆbelief® (((Glaube®) ; he does not, therefore, seek to establish a systematic philoso¬ phy. His theories involved him in considerable controversy, especially with the adherents of the critical philosophy. His collected works were published at Leipzig (6 vols., 1812-24). Consult Deycke,

zu seinen Zeitgenossen) (Frankfort 1848) ; Wilde, (F. H. Jacobi: A Study of the Origin of German Realism > (New York 1894) ; Craw¬ ford, (Philosophy of F. H. Jacobi* (ib. 1905) ; and Isenberg, (Der Einfluss der Philosophie Charles Bonnets auf F. H. Jacobi* (Tfibingen

1906).

JACOBI, Herman Georg Jakob, German

Sanskrit scholar: b. Cologne, 11 Feb. 1850. He was educated at Cologne Gymnasium, and later took up a course of studies in Sanskrit and allied languages at the universities of Bonn and Berlin. After spending a year (1872-73) in the India office in London on the old Sanskrit manuscripts, he went to India, making a tour of Rajputana. In 1875 he became a docent in Sanskrit at Bonn; from 1876-85 was professor extraordinarius of Sanskrit and Comnarative Philology at Minister, Westphalia; in 1885 was made professor ordinarius of Sanskrit at Kiel; and in 1889 was appointed professor of Sanskrit at Bonn. He made a special study of Tainism and Prakrit grammar, writing exhaustively on those subjects as well as on the Sanskrit poetical languages. Among the most important of his works are (The Indian Antiquary* and the (Epigraphia Indica,* published in 1892, in which he gives two sets of tables showing the Hindu dates in inscriptions, a work of much value. His other works include (De Astrologiae Indicse, Hora appellatae originibus) (1872) ; (The Kal- pasutra of Bhadrabahu* (1879); (The Ayaramgo Sutta of the Cvetambra Jains* (1882) ; (Gaina Sutras ˆ (1884) ; (Ausgewahlte Erzahlungen in Maharashtri. Zur Einffihrung in das Studium des Prahrit* (1886) ; (The Porisishtaparvan by Hemachandra> (1891); Sthaviravali Charita) (1891) ; (1893) ; (Kompositum und Nebensatz, Studien fiber die indogermanische Sprachentwicklung> (1897)

; (Bhasa's Svapnavasavadatta) (1913), etc.

JACOBI, Karl Gustav Jakob, German mathematician: b. Potsdam, 10 Dec. 1804; d. Berlin, 18 Feb. 1851. He obtained his education at the University of Berlin, where he studied especially mathematics and philosophy, later in 1824 becoming a privat-docent there. In 1825 he became assistant professor of mathematics at Konigsberg and in 1827 was appointed pro¬ fessor. He was appointed a member of the Prussian Academy of Sciences in 1836 and from 1842 till his death in 1851 lectured at the Uni¬ versity of Berlin. His most important wrork was on the theory of elliptic functions, but he also made some valuable contributions to the theory of numbers and determinants. Only a small portion of his writings and lectures were pub¬ lished during his lifetime and the greater part of these were published in the Crelles Journal. Among these are (Fundamenta Nova Theoriae Functionum Ellipticarum) (1829) ; (Canon Arithmeticus) (1839) ; (De Formatione et Pro- prietatibus Determinantium (1841) ; (Mathe- matische Werke> (1846-71). A complete edi¬ tion of his works, (Gesammelte Werke,* was published in seven volumes by the Berlin Acad¬ emy of Sciences (1881-91). His (Vorlesungen fiber Dynamik* did not appear till 1866, long after his death, and later in 1895, his essay, (Uber die vierfach periodischen Functionen*

Zweier Variabeln, was published in Latin. Consult Konigsberger, Carl Gustav Jacob Ja¬ cobˆ (Leipzig 1904).*

JACOBI, Mary Putnam, American physi¬ cian : b. London, England, 31 Aug. 1842 ; d. New York City, 10 June 1906. She was grad¬ uated from the New York College of Pharmacy in 1862, from the Woman's Medical College of Philadelphia in 1864 and from the Ecole de Medecine of Paris in 1871. She then entered practice in New York, in 1881 was anoointed clinical professor of the diseases of children in the New York Post-Graduate Medical School, where she lectured for three years. In 1874 she established an association for the promotion of the medical education of women, and became its president. In 1873 she was married to Abra¬ ham Jacobi (q.v.). She became a member of the American Medical Association, and pub¬ lished several works, including (1879); (Cold Pack and Anaemia (1880); (The Prophy¬ laxis of Insanity* (1881) ; (Common Sense Ap¬ plied to Woman's Suffrage) (1894).*

JACOBINS, jak'6-binz, the most famous of the clubs of the first French Revolution. When the States-General assembled at Versailles in 1789 it

was formed and called the Club Breton. On the removal of the court and national assem¬ bly to Paris it acquired importance and rapidly increased. It adopted the name of Societe des Amis de la Constitution, but as it met in a hall of the former Jacobin (Dominican) convent in Paris it was called the Jacobin Club. After the fall of the monarchy, in September 1792, it called itself Societe des Jacobins, Amis de la liberte et de l'egalite. It gradually became the controlling power of the Revolution (see French Revolution) and spread its influence over France, 1,200 branch societies being established before 1791, and obeying orders from the headquarters in Paris. Originally it was not particularly radical, either in its mem¬ bership or in its political views. The former consisted chiefly of professional men of liberal ideas, some few liberal aristocrats like Louis Philippe, due de Chartres, the due d'Aiguillon, the prince de Broglie, the vicomte de Noailles, etc. Its large mass was made up of the bour¬ geois. Amongst its best known members were Mirabeau, Robespierre, David, Barnave, Pere Gerard, Abbe Gregoire, the two Lamells, etc. In the provinces the membership was much more democratic. Gradually its political tendencies became more and more radical and its more moderate members either resigned or were expelled, in many instances to form new political clubs, such as the Club of 1789, the Feuillants, etc. In the beginning the sessions of the Ja¬ cobins were secret, but in October 1791 they were thrown open to the public. For a while the Jacobins ruled supreme, and the Convention itself was but their tool. Robespierre (q.v.) was their most influential member; they ruled through him during the Reign of Terror, and were overthrown after his downfall in 1794. In that year the Convention forbade the affilia¬ tion of societies; the Jacobin Club was sus¬ pended and its hall was closed. Two or three attempts were made later, especially in the prov¬ inces, to revive the club, but they had only

passing success. The term Jacobin is now often used to designate anyone holding extreme revo¬ lutionary views in politics. Numberless pam¬ phlets were then published in regard to the Jacobins, the most noted being (La Jacobinade, (Le secret des Jacobins> and (Les crimes des Jacobins. > There is a very extensive literature on the Jacobins. Its proceedings were published as (Journal des Amis de la Constitution* (4 vols., Paris 1793-95). The most authoritative work on the Jacobins is Aulard, F. A., (La Societe des Jacobins1* (6 vols., Paris 1889-97), containing a very full bibliography. Consult Barrnel, A. de, 'Memoirs, Illustrating the His¬ tory of Jacobinism* (4 vols., Hartford 1799) ; Dufay, P., 'Les Societe Populaires et l'Armee, 1791-94* (Paris 1913) ; Farmer, J. E., (Essays on French History* (New York 1897) ; Fri¬ bourg, A., 'Le Club des Jacobins en 1790* (in devolution Frangaise,* Vol. LVIII, p. 507, Paris 1910) ; Gros, J., 'Le Comite de Salut Pub¬ lic* (Paris 1893) ; Kuhlmann, C., (On the Con¬ flict of Parties in the Jacobine Club* (in Uni¬ versity of Nebraska*

Studies, Vol. V, No. 3, p. 229, Lincoln 1905) ; id., 'The Relation of the Jacobines to the Army, the National Guard, and Lafayette (ib. Vol. VI, No. 2, p. 153, Lincoln 1906) ; Mallet, G., 'La Politique Financiere des Jacobins * (Paris 1913) ; Mortimer-Ternaux, M., 'Histoire de la Terreur d'apres des Documents Authentiques et Inedits* (8 vols., Paris 1862- 81) ; Playfair, W., 'The History of Jacobinism, etc.* (2 vols., Philadelphia 1796) ; Schmidt, A., 'Tableaux de la Revolution Frangaise, etc.* (3 vols., Leipzig 1867-69) ; Taine, H. A., 'The Jacobine Conquest* (in 'The French Revolu¬ tion,* translated by J. Durand, New York 1881) ; Wallon, H.. (Histoire du Tribunal Revolu- tionair de Paris* (5 vols., Paris 1880) ; Zink- eisen, J. W., 'Der Takobinerklub* (2 vols., Ber¬ lin 1852-53).*

*JACOBITE CHRISTIANS, a subdivision of the sect of the Monophysites (q.v.) compris¬ ing those who dwelt in Syria, Mesopotamia and Babylonia, organized by a certain Jacobus Bara- daeus, in the reign of Justinian, somewhat later than the middle of the 6th century. Jacobus had been a monk whose poverty-stricken asceti¬ cism gained for him the title of Jacobus Bara- daeus (Ragged James). He had been appointed bishop of Edessa in 541, and from that year to 578 he traveled round gathering the members of his heretical sect, until they formed a com¬ pactly ordered body which has survived to the present time. They now number about 80,000 and are governed by a Patriarch of "Antioch and all the East.** Under him is the Maphrian, seven metropolitans and three bishops. There are many monks, from whose number the bish¬ ops are chosen. Consult Adeney, W. F., 'The Greek and Eastern Churches* (New York 1908) ; Assemani, bibliotheca Orientalis* (Vol. II, Rome 1719) ; Bliss, F. J., (The Religions of Modern Syria and Palestine* (New York 1912); Duval, R., (La Literature Syriaque* (Paris 1899) ; Kleyri, M., (Jacobus Baradeus* (Leyden 1882) ; Kruger, G., 'Monophysitsche Streitig- keiten* (Jena 1884) ; Silbernagel, N., 'Ver- fassung der Kirchen des Orients* (Landshut 1865) ; Wright, G., (Historv of Syriac Litera¬ ture* (London 1894).*

JACOBITES, a party in Great Britain (so styled from Lat. Jacobus, James), who after

the revolution in 1688 continued to be the adherents of the dethroned King James II, his descendants and, after the death of the last male representative (Cardinal York) in 1807 of the descendants of Charles I. Its members were chiefly, though not exclusively, Roman Catholics, its strongholds were Northumber¬ land, North Wales and the Scottish Highlands. In Ireland they were soon put down by con¬ quest. In England

the revolution was accom¬ plished with the apparent consent of all parties ; but in a year or two the Jacobite party gained considerable influence and continued to disturb the government of William throughout his reign. After the accession of Anne and the death of James their efforts slackened for a time ; but toward the close of her reign they revived. Bolingbroke and Oxford, with others of the Tory ministers of Anne, were in treaty with the son of James II, and either really or pretendedly negotiated for a restoration. On the arrival of George I in 1715 a rebellion broke out in Scotland, supported by a more insignifi¬ cant rising in the north of England. The failure of both these movements dampened the enthusi¬ asm of the English Jacobites, but in Scotland the party maintained its influence until the unsuc¬ cessful rebellion of 1745 put an end to its polit¬ ical importance, though some ultra-Jacobites did not think themselves justified in transferring their allegiance to the house of Brunswick till the death of Cardinal York in 1807. Even after that date sentimental Jacobitism had a certain amount of hold on a small group of people. It found expression in the formation of Jacobite societies, such as the ((Cycle of the White Rose® in Wales, "John Shaw's Club® in Manchester and the "Order of the White Rose® with branches in England and the United States, the legitimist Jacobite League of Great Britain and Ireland,® the ((Thames Valley Legitimist Club,® etc. Members of these associations con¬ sider the present British dynasty as usurpers and claim that the rightful occupants of the British throne is Marie Therese of Modena, now wife of Louis III, ex-king of Bavaria, great-great-great-great-great-granddaughter of Henrietta of Orleans, daughter of Charles I. Henrietta married Philip I, Duke of Orleans. Her daughter, Anne Marie (b. 1669; d. 1728), was joined in marriage to Victor Amadeus II, Duke of Savoy and later king of Sardinia. Of this union was born the future King Charles Emmanuel III, whose son was known as Victor Amadeus III. The latter's son, Victor Em¬ manuel I, left no sons, but his eldest daughter, Marie Beatrice became the wife of Francis IV, Duke of Modena. Their son, Ferdinand (d. 1849), left one daughter, Marie Therese (b. 1849). The latter married Louis III of Bavaria, and in the eyes of the legitimists, she is the rightful sovereign of Great Britain. The hopes and wishes of the Scottish Jacobites found ex¬ pression in many beautiful songs, which form an interesting feature of the national literature. These may be found in the following collections: Grosart, A. B., ed., (English Jacobite Ballads (Manchester 1877) ; Hogg, J., ed., 'The Jacobite Relics of Scotland) (Paisley 1874) ; Mackey, C., ed., (Jacobite Songs and Ballads, etcP (London 1861) ; Macquoid, G. S., ed., 'Jacobite Songs and Ballads> (London 1887). Many incidents in the history of the Jacobite party form the back¬ ground of historical novels. The most impor¬*

tant of these are Scott, Sir Walter, 'Waverley (1814); id., 'The Black*

Dwarf> (1816); id., 'Rob Roy (1817) ; Stevenson, R. L., (David Balfour) (2 vols., 1886-92) ; id., (The Master of Ballantrae) (1889) ; Thackeray, W. M., (The History of Henry Esmond* (1852). An ex¬ haustive list of the fictional treatment of Jacob¬ itism will be found in Baker, A. E., (A Guide to Historical Fiction* (London 1914). There is a vast literature on the subject which includes the large numbers of histories of famous Scottish families. Of other works on the sub¬ ject consult Aflardyce, J., ed., historical Papers Relating to the Jacobite Period, 1690-1750* (Aberdeen 1895-96) ; Beamont, W., (Jacobite Trials at Manchester in 1694) (in Chetham Society, Vol. XXVIII, Manchester 1854) ; Blaikie, W. B., 'An Itinerary of Prince Charles Edward Stuart* (Edinburgh 1897) ; id., 'Origins of the '45, etc.* (Edinburgh 1916) ; Carmichael, A., (Some Unrecorded Incidents of the Jacobite Risings> (in Celtic Review, Vol. VI, pp. 278, 334, Edinburgh 1910) ; Forbes, J. M., (Jacobite Gleanings* (Edinburgh 1903) ; Francillon, R. E., Underground Jacobitism* (in Monthly Review, London 1905) ; Gilbert, J. T., ed., 'Jacobite Nar¬ rative of the War in Ireland, 1688-91* (Dublin 1892) ; Grew, E. S. and M. S., (The English Court in Exile* (London 1911) ; Hadden, J. C. 'Prince Charles Edward* (London 1913) ; Hale, E., 'James Francis Stuart, the Old Chevalier) (London 1907) ; Head, F. W., 'The Fallen Stuarts* (Cambridge 1901) ; Jesse, J. H., (Memoirs of the Pretenders and their Adher- ents) (2 vols., London 1845) ; Klose, C. L., 'Memoir of Prince Charles Stuart, etc.* (2 vols., London 1845) ; Lang, A., ' Pickle the Spy, or the Incognito of Prince Charles> (London 1897) ; Mahon, Lord, 'The Forty-Five* (Lon¬ don 1852) ; Murdoch, W. G. B., (The Spirit of Jacobite Loyalty* (Edinburgh 1907) ; Power, W., 'Prince Charlie) (London 1912) ; Ray, J., (A Compleat History of the Rebellion) (York 1749) ; Rose, D. M., ed., 'Prince Charlie's Friends, or Jacobite Indictments) (Aberdeen 1896) ; Ruvigny, Marquis de, 'The Jacobite Peerage, etcP (Edinburgh 1904) ; Terry, C. S., 'The Rising of 1745 > (London 1900) ; id., ed., 'The Chevalier de Saint George and the Jacobite Movements in his Favour, 1 701— 20> (London 1915) ; Thomson, Mrs., 'Memoirs of the Jacob¬ ites of 1715 and 1745 J (3 vols., London 1845-46) ; Thomson, J. P., 'The Jacobite Rebellions 1689— 1746) (London 1914); Tulloch, A. B., 'The Forty-Five* (Inverness 1896) ; Vaughan, H. M., 'The Last of the Royal Stuarts) (Lon¬ don 1906) ; White, S. D., 'Revival of Jacob¬ itism* (in Westminster Review, Vol. CXLVI, p. 417, London 1896).*

JACOBS, Henry Eyster, American Lutheran clergyman and theologian : b. Gettys¬ burg, Pa. 10 Nov. 1844. He was graduated from Pennsylvania College (Gettysburg) in 1862, from the Lutheran Theological Seminary at Gettysburg in 1865, was professor of Latin and history in Pennsylvania College in 1870-80, of ancient languages in 1880-81 and of Greek in*

1881-83. In 1883 he became professor of systematic theology in the Lutheran Theolog¬ ical Seminary and in 1894 dean, and in 1910 chairman of the faculty of that institution. He was president of the Board of Foreign Missions of the General Council of the Lutheran

Church (1901-07); president of the American Society of Church History' (1910-11) ; and presi¬ dent of the Pennsylvania German Society (1911-12). Besides writing several Bible commentaries, contributing to encyclopaedias, translating and writing various German theological works, his publications include (The Lutheran Movement in England' (1891) ; a (History of the Lutheran Church in America) (1893); 'Elements of Re¬ ligion J (1894) ; a (Lif e of Martin Luther' (1898) ; 'The German Emigration to America 1709-40) (1899) ; (Summary of the Christian Faith> (1906).

JACOBS, Joseph, Anglo-American author and journalist: b. Sydney, New South Wales, 29 Aug. 1854; d. 30 Jan. 1916. He was grad¬ uated from Saint John's College, Cambridge, traveled in Spain in 1888 and in the United States in 1896, was at various times editor of 'Folk Lore,' the (Literary Year-Book ' and the ' Jewish Year-Book, ' was elected president of the Jewish Historical Society and became literary editor of the 'Jewish Encyclopaedia) in New York in 1906. His publications include, besides translations and editions of English classics, (Celtic Fairy Tales) (1891) ; 'Indian Fairy Tales' (1892) ; 'The Jews of Angevin England' (1893) ; 'Studies in Biblical Archae- ology> (1894); 'Literary Studies' (1895); and 'Jewish Ideals) (1896).

JACOBS, Michael, American Lutheran clergyman: b. near Waynesboro, Franklin County, Pa., 1808; d. 1871. He was graduated, in 1828, at Jefferson College, Canonsburg, and in the following year was appointed instructor at the Gettysburg Gymnasium. After 1832 he served as professor there and retired in 1865. In 1832 he entered the Lutheran ministry. He was a very versatile man; invented a method of preserving fruit and was a meteorologist of note. He published 'The Rebel Invasion of Maryland and Pennsylvania' (1863).

JACOBS, William Wymark, English novel¬ ist: b. London, 8 Sept. 1863. He was educated privately and at the age of 20 entered the civil service, Savings Bank Department, where he remained until 1899. His works deal

mostly with the lives and passion of those who toil on the sea, they include (Many Cargoes' (1896) ; (The Skipper's Wooing' (1897) ; (Sea Urchins' (1898) ; (A Master of Craft' (1900) ; 'Light Freights' (1901); (At Sunwich Port' (1902); (The Lady of the Barge' (1902) ; 'Odd Craft' (1903); 'Dialstone Lane' (1904); (Captains All' (1905); (Short Cruises' (1907); 'Salt- haven' (1908) ; 'Sailors' Knots' (1909) ; 'Ship's Company' (1911); 'Night Watches' (1914); 'The Castaways' (1916); (joint-au¬ thor) 'Beauty and the Barge,' a play in three acts, produced in New York (1913).

JACOB'S CAVERN, a remarkable natural cavern near Pineville, McDonald County, Mo.

It was discovered by E. H. Jacobs, and was named in his honor. The opening to the cav¬ ern is about 68 feet long and 45 feet deep. The height of the cavern varies from four feet to eight and one-half feet. The rock formation is stratified and is of limestone of the Subcarbon- iferous era. The floor is covered with a deep crust of ashes, in which were found flint knives, bone awls, hammer stones, human skeletons, and animal bones. Many of these relics are now in

the Museum of Phillips Academy, Andover, Mass. Consult Gould, C. N. (in Science , 31 July 1903) and Peabody (in American Anthro¬ pologist, Sept. 1903).

JACOB'S WELL is situated near the an¬ cient Sychar or Samaria, about two miles from the modern Nablus. It is not mentioned in the Old Testament, but is mentioned in the Gospel of John (iv, 6). The traditions of Moslems, J.ews and Christians identify it with Bir Yakub or Jacob's Well. Here it was that Jesus had his remarkable conversation with the woman of Samaria. It is about seven feet six inches in diameter with a narrow mouth. Its depth has been variously estimated. Arculfus (a.d. 67(3) estimated it at 240 feet. Major Anderson meas¬ ured it in 1866 and found it to be 75 feet. It is now the property of the Greek Church of Nablus and a hut has been built over the well and the surroundings improved. It is the site of several churches. The Crusaders built a church there which was destroyed soon after

1187.

JACOBSEN, Johan Adrian, Norwegian

ethnologist and explorer: b. Riso, 1853. For seven years after 1867 he was member of a whaling crew on the Spitzbergen and Murman coasts. He traveled along the west coast of South America in 1876-77 and subsequently visited the Arctic regions, bringing back hundreds of

ethnographical specimens. In 1881 he was engaged by the Berlin Museum fur Volkerkunde to gather ethnographical and other specimens on the west coast of North America, also Korea, Japan, Siberia, the South Sea Islands, etc. He spent seven years in this work, collecting in all over 18,000 specimens. Subsequently he made collections in Germany and Norway. At the Columbian Exposition of 1893 he exhibited a marvelous ethnographical collection from 25 non-European peoples. These formed the nu¬ cleus around which has grown the Field Colum¬ bian Museum of Chicago. He has published 'Reise an der nordwestkiiste Amerikas' (1884) • 'Eventyrlige farter' (1894); 'Reise in der in- selwelt des Banda-Meeres' (1896).

JACOBUS, Melancthon Williams, Amer¬ ican Presbyterian clergyman and educator: b. Allegheny, Pa., 15 Dec. 1855. He was gradu¬ ated from Princeton, 1877 ; from Princeton Theological Seminary, 1881, and after study¬ ing at Gottingen and Berlin (1881-84), was pastor of the Presbyterian Church at Oxford, Pa., in 1884-91. In 1891 he became professor of New Testament exegesis and criticism in the Hartford (Conn.) Theological Seminary. He re¬ ceived the degree of D.D. from Lafayette Col¬ lege (1892) and from Yale University (1910). Besides editorial work on numerous theological standard texts, his Stone lectures at the Prince¬ ton Theological Seminary (1897-98) appeared as 'A Problem in New Testament Criticism'

(1900).

JACOBUS BARADiEUS. See Jacobites.

JACOBY, Harold, American astronomer: b. New York, 4 March 1865. On his graduation from Columbia University in 1885, he applied himself to astronomical research, and was ap¬ pointed assistant astronomer United States eclipse expedition to West Africa (1889-90). He became professor of astronomy at Colum¬ bia in 1894 and an active member of the lead-

ing astronomical and scientific societies at home and abroad. His writings include numerous technical monographs in astronomical photog¬ raphy, stellar parallax and star clusters which have been published by French, English and Russian societies, frequent contributions to the periodical press on popular astronomy, and standard textbooks Practical Talks by an As¬ tronomer (1891); (Astronomy, a popular

handbook (1913) ; Navigation (1917).*

JACOPONE DA TODI, Italian monk and poet: b. Todi, Umbria, about 1230; d. 1306. He took up the profession of the law and became a successful practitioner. His wife died in 1268 and immediately afterward he abandoned his profession, gave his property to the poor, and took up a life of penance, attacking from time to time the licentiousness of the age. In 1278 he became a lay brother of the Order of Saint Francis. He was one of the opponents of Boni¬ face VIII, and when taken captive at Palestine in 1298, was thrown into prison, where he re¬ mained until the death of Boniface in 1303. Jacopone wrote several hymns, including the immortal (Stabat Mater Dolorosa. Consult Bruguali (Fra Jacopone da Todi* (Assisi 1907) ; Macdonnell, (Sons of Francis* (Lon¬ don 1902) ; Sorio, (Poesie scelte di Fra Jaco¬ pone da Todi* (Verona 1859).*

JACOTOT, Jean Joseph, zhon zho-zef zha-ko-to, French educator: b. Dijon, 4 March 1770; d. Paris, 30 July 1840. He studied at the University of Dijon, became professor of Latin, then studied law and during the revolution was successively soldier, secretary to the minister of war, and deputy-director of the Polytechnic School, where he was also professor of mathe¬ matics. He was elected to the chamber of dep¬ uties in 1815, but was forced, after the second restoration, to leave France. He went to Brus¬ sels, in 1818 was appointed lecturer on the French language in the University of Louvain, and in 1827 director of the Military Normal School. He returned to France after the revo¬ lution of 1830. The fundamental principle upon which his system of education rests is that every person is able to educate himself, provided he is once started in the right way. Knowledge should first be acquired through instinctive ex¬ perience, or by the memory. For example, in imparting a knowledge of a language. Jacotot began by making the pupil commit to memory a single passage; he then encouraged him to study for himself, first the separate words, then the letters, then the grammar, and lastly the full meaning and import. His steps were learn, re¬ peat, reflect and verify. He expounded his views in (Enseignement Universel (Louvain and Dijon 1822) which has been translated into various other languages. It consists of five parts: (Langue Maternelle* ; (Langue Etran- gere* ; (Messigue, Dessin et Peinture* ; (Droit et Philosophic* ; (Mathematiques.* Consult Cornelius, B., (An Account of M. Jacotot's Method of Universal Instruction* (London 1830) ; Guillard, A., (Biographie de J. Jacotot* (Paris 1860) ; Kenaston, G. F., (Educational Doctrines of J. J. Jacotot* (in Education, Vol. II, pp. 446, 564, Boston 1882) ; Payne, J., lec¬ tures on the History of Education* (London 1892) ; Quick. R. H., (Essavs on Educational Reformers* (New York 1907) ; Seltzsam, C., (Beitrage zur Wiirdigung der Jacototischen vol. 15 — 38*

Methode (Breslau 1848) ; Wurm, C. F., Ham¬ ilton und Jacotot* (Hamburg 1831).*

JACQUARD, Joseph Marie, zho-zef ma-re zha-kar, French inventor: b. Lyons, 7 July 1752; d. Oullins, near Lyons, 7 Aug. 1834. His parents were silk weavers, and he learned the same trade. After a long period of hardship, during which he shared in some of the cam¬ paigns of the Revolution, he made his name famous by the invention of his new loom, which was publicly exhibited at Paris in 1801 and pat¬ ented 23 December of the same year. During the final work on his loom he enjoyed the sup¬ port of Napoleon who had become interested in his inventive genius. He endeavored to intro¬ duce it into general use in Lyons, but was mobbed, and all but lost his life while his loom was ordered to be burned. Ultimately, how¬ ever, his invention gained extensive use, he was granted a small pension by the French govern¬ ment, and was able to spend the latter part of his life in comfortable independence. In 1819 he was made a chevalier of the Legion of Honor. The subsequent prosperity of Lyons is largely attributable to his invention, and a more enlightened generation erected a statue to him in 1840 on the very spot where his loom was publicly destroyed. (See Loom). Consult Bell, T. F., (Jacquard Weaving and Designing (London 1895) ; Donat, F., (Technologie der Jacquard-Weberei* (Vienna 1902) ; Du Saus- sois, A., (Galerie des Hommes Utiles* (Paris 1875) ; Grandsard, A., (Jacquard, sa Vie, etc.* (Paris 1869) ; Humphries, S., (Oriental Car¬ pets, etc.* (London 1910) ; Kohl, F., (Geschichte der Jacquard Machine* (Berlin 1872) ; Lamar¬ tine, A. de, (Memoirs of Celebrated Charac¬ ters* (Vol. II, New York 1854) ; id., (Jacquard- Gutenberg* (Paris 1864) ; Posselt, E. A., (The Jacquard Machine Analized and Explained* (Philadelphia 1893).*

JACQUARD MACHINE. See Damask.

JACQUE, Charles Emile, French painter: b. Paris, 1813; d. 1894. He gave his attention to wood-engraving and about 1846 turned his attention to genre painting. He excelled in de¬ picting rural and family life, domestic animals, flocks and herds, etc. There remain from his hand a great number of vignettes engraved on wood and copper. Among his best-known can¬ vasses are (Basse-cour ; (La sortie du trou- peau* ; (Un Interieur* ; Houlailler* (1861) ; (Un clos a Barbizon* (1863) ; (Grand troupeau au paturage* ; (L'Abreuvoir* ; (Le clair de lune* (1888). He was awarded a gold medal at the exposition of 1889. He was the last survivor of the great Barbizon school. He published (Le poulailler, monographic des poules in¬ digenes et exotiques* (1869).*

JACQUEMART, Jules Ferdinand, French etcher: b. Paris, 1837; d. Nice, 1880. He studied painting and more particularly etching and ex¬ hibited for the first time at the Salon of 1861. Besides the remarkable series representing the works of Rembrandt, Franz Hals, Meissonier, etc., he also illustrated his father's (Histoire de la porcelaine and (Histoire de la*

ceramique ; also Barbet de Jouy's (Gemmes et joyaux de la couronne,* and several portraits. At the ex¬ position of 1878 he received the Grand Medaille for etch'ng. He also executed over 100 water- colors, three of which are in the Metropolitan Museum, New York.*

JACQUERIE, zhak-e-re', the name given to the rising of the French peasantry in the 14th century after the battle of Poitiers. They com¬ mitted great devastations and outrages — burn¬ ing castles, murdering men and violating women — particularly in the northeast of France. They were at length quelled by the Captal de Buch and Gaston Phebus, count of Foix, who slaughtered 7,000 of them near Meaux. The term Jacquerie is derived from Jacques Bonhomme, a familiar epithet for a peasant. Consult Luce, (Histoire de la .Jacquerie (Paris 1895).*

JACTITATION. (1) An action to enjoin a false statement by the respondent that he or she is married to the petitioner. (2) An untrue statement which injures another. In both senses, the offense is punishable in English law by the high court of justice and by the ec¬ clesiastical courts. In sense 1, it is often called ˆjactitation of marriage.® (3) In Louisiana, an action for damages for slander of title brought by one in possession.

JADE, ya'de, or JAHDE, a bay of the North Sea on the coast of Oldenburg. It is about 70 square miles in extent and is very shallow. It was formed mostly by storm-floods from the 13th to the 16th century. The inlet is about l/2 miles wide and admits the largest vessels. On the west side of the inlet is the naval base of Wilhelmshaven.*

JADE, a remarkably tough, compact, orna¬ mental stone, of green to white color and vitreous lustre, used by the prehistoric peoples of Switzerland, Mexico, Alaska and other coun¬ tries for axes, utensils and carvings. It is still highly prized in the East, especially in China and New Zealand. Jade is a general term in¬ cluding two distinct minerals, jadeite and the more common nephrite. Jadeite belongs to the pyroxene group and chemically is a soda-spodu- mene, easily fusible (at 2.5) and having a spe¬ cific gravity of 3.3 to 3.35. Nephrite is a va¬ riety of amphibole identical with tremolite when of white color, or with actinolite when green, fusing much less easily (at 4) and with specific gravity of 2.95 to 3.0. Much information as to jade and implements made from it may be found in the publications of the Smithsonian Institution, especially a paper by S. Blondel,

JADLOWKER, Herman, Russian tenor : b. R ga, 1879. His father destined him for a commercial career but in order to avoid it the youth fled to Vienna in 1894. Here he studied under Gansbacher and in 1899 made his

debut in Kreutzer's

JADWIN, Edgar, American military engi¬ neer: b. Honesdale, Pa., 7 Aug. 1865. He studied at Lafayette College, was graduated from West Point in 1890, was an assistant in government engineering in 1890-91 and again from 1893, in the Spanish-American War was successively

major and lieutenant-colonel of the 3d United States Volunteer Engineers, and for a time commanded a battalion of this regiment in the sanitation of Matanzas, Cuba. Promoted cap¬ tain in the corps of engineers, U. S. A (1900), he was appointed (1902) to direct all Pacific Coast fortification and river and harbor work south of San Francisco. From 1907-11 he was engaged on the Panama Canal, becoming lieu¬ tenant-colonel in 1913.

JAEGER, ya'ger See Gull; Skua.

JAEGERS, Albert, American sculptor : b. Elberfeld, Germany, 28 March 1868. He was educated in the public schools of Germany and the United States and in art was self-taught. Since 1890 he has been professionally engaged as sculptor. He executed statuary for the Buf¬ falo and Saint Louis exposition; for the fine arts building, Saint Louis; the new custom¬ house, New York; also private monuments, busts and tablets in marble and bronze. He was commissioned by the United States government to erect the Baron von Steuben Statue for Washington; of which a replica was ordered and presented by Congress to William II, then Emperor of Germany, from whom Jaegers received a decoration. The sculptor's most re¬ cent commission was the execution of the Ger¬ mantown monument. He is a member of the National Sculpture Society and of the National Institute of Arts and Letters.

JAEL, the wife of Heber the Kenite of Ancient Israel. The kings of Canaan under the leadership of Sisera oppressed Israel. Deborah and Barak were then judges. They rallied their hosts to throw off the oppressive yoke. The Canaanites were defeated in a pitched battle <(in Toanach by the waters of Megiddo.® Sisera escaped and in his flight asked hospitality from Jael. She gave him food and drink. Then she took a nail and a. workman's hammer and after piercing his head through the temples, cut it off. Deborah in her song celebrating the victory commends

Jael as ((blessed above women.®

•

JAEN, Spain, capital of the province of the same name, on the slopes of the Jabalcuz Moun¬ tains, 40 miles southeast of Cordoba, on the Linares-Puente Genii Railway. The streets are narrow and irregular and it is

surrounded by ancient Moorish fortifications all crowned by a Moorish citadel. It contains several fine old churches, and several palaces, art galleries and a library. Leather, soap, alcohol and linen are manufactured. Poo. 26,890.

JAEN, Spain, a province in the southern part of the kingdom, bounded on the north by Cindad Real, east by Albacete, south and south¬ east by Granada, and west by Cordoba. Its sur¬ face is broken by the ranges of the Sierra Morena, the Sierra de Segura and the Sierra Cazoola. It is watered by the Guadilquivir and its affluents the Guadalimar, the Guadianamen and the Jaen. Copper, lead, iron, zinc and salt are found in considerable quantities. Lead is mined to the extent of 85,000 tons annually, much of the ore containing silver. The moun¬ tain regions are barren but the Guadalquivir valley is very fertile and produces cereals and olives. . Jaen was a Moorish kingdom for a short time after the Moorish conquest, but the

kingdom was ended by Ferdinand III in 1246 after which it remained part of Castile. Pop.

526,710.

JAFFA, jaf'fa or yaf'fa (ancient Joppa; Ar. Yafa; Heb. Yapho, beauty), an ancient city in the western part of Palestine on the Mediter¬ ranean Sea, about 35 miles from Terusalem. Jaffa is an old Phoenician town mentioned in several places in the Bible. It was the port of entry for Jerusalem and for several of the interior cities of Palestine. Here the cedars from Lebanon were landed and then carried overland for the building of the Temple in Jerusalem. The house where Simon the tanner lived, and where Saint Peter lodged, is still pointed out. In 1187 it was taken by Saladin, in 1191 by Richard I. In 1799 it was captured by Napoleon, who here put to death 1,200 Turk¬ ish prisoners. The narrow entrance to the harbor is extremely dangerous. The city is built on a high rocky coast, and presents to¬ day the same irregular arrangement of streets, and unattractive looking houses that it may have had hundreds of years ago. The remains of Roman fortifications and dwellings are in the vicinity. The old road to Jerusalem is ex¬ tremely interesting; but a railroad, built in 1892, connects the city with Jerusalem. The chief exports are oranges (said to be the finest in the world), other fruits, soap, sesame, wine, oil, raw silk and nuts. The chief imports are sugar rice, lumber, cotton goods, petroleum, tobacco and silk goods. The city contains sev¬ eral mosques, a Franciscan monastery and a

mission school. Some attempts have been made to establish colonies of Jews on land near Jaffa. Pop. about 45,000, which includes colonies of some 15,000 Jews cultivating an area of some 120,000 acres. They are mostly Russian Jews, some maintained by various Zionist societies, and others by the Jewish Colonization Associa¬ tion (founded by Baron E. de Rothschild). The colony maintains Hebrew schools, agricul¬ tural schools and experiment stations. There are also four German agricultural colonies in the Jaffa region. In the European War the British took Jaffa on 18 Nov. 1917. See War, European — T urkish Campaign.

JAFFNA, Ceylon, town at the north end of the island. It contains an old Dutch church and an ancient Portuguese fort. It has a large important export trade ; the imports are cotton, rice, sugar, petroleum, tobacco and lumber, the exports fruits, wine, oils, sesame and soap, oranges, etc. It is the seat of a government agent and district judge. In 204 b.c. it was taken by the Tamils whose rajahs held it till 1617, when they were ousted by the Portuguese. The latter were displaced by the Dutch in 1658. Pop. 45,000, mo:tly Mohammedans together with 8,000 Jews.

JAGANNATH, or JUGGERNAUT (San¬ skrit, Jcigannatha, lord of the world, one of the names of Vishnu), called by the natives Puri, a town and celebrated temple of Hindustan, in the presidency of Bengal, province of Orissa, on the Bay of Bengal, 48 miles south of Kat- tack. The town derives all its importance from the temple. This, the most celebrated shrine in Hindustan, was completed in the 12th cen¬ tury, at an enormous expense. The worship of Jagannath, the God of the people, aims at a catholicity with every form of Indian devotion

and at the incorporation therein of every Indian conception of God. The main street of the city, at the extremity of which the temple stands, consists entirely of religious structures built of stone. The gardens here produce the finest fruits in the province. The temple stands near the shore, in a waste, sandy tract, and appears like a shapeless mass of stone. The idol is a carved block of wood, with a hideous face, painted black, and a distended blood-red mouth, and is magnificently dressed. On festival days the throne of the image is placed on a high tower moving on wheels. Long ropes are at¬ tached to the tower, by which the people draw it along. The belief that devotees used to cast themselves headlong in front of this car to be crushed to death probably grew out of the accidental fatalities sometimes occurring. Every year pilgrims flock in crowds to the temple.

JAGELLONS. See Poland, History.

JAGERNDORF, Silesia, frontier town on the Oppa, 15 miles northwest of Troppau. It contains a castle of the Liechtenstein family, a church and

technical schools. It carries on an active trade and has manufactures of cloth, woolens, linen and machinery. The town suf- f erred severely during the Thirty Years War and more than once witnessed conflicts between Prussia and Austria. Pop. 16,680, mostly Germans.

JAGERSFONTEIN (ya'gerz-fon-tln) EX¬ CELSIOR, The, a name given the largest known diamond; found in the mine of the Jagersfontein . Company, . Orange Free State, South Africa, in 1893; weight, 971 carats; color, blue white.

JAGGERY, a coarse brown sugar made in the East Indies by the evaporation of the juice of several species of palms, chemically the same as cane-sugar. The sap which yields jaggery becomes by fermentation palm-wine, and from it arrack (q.v.) is distilled. Jaggery is con¬ sumed at home little or none of it entering

commerce. See Palm.

•

JAGIC, ya'gich, Vatroslav, Slavic philolo¬ gist: b. Warasdin, 1838. He received his edu¬ cation at the University of Vienna; taught for some time at Agram and in 1870 was appointed professor of comparative philology at Odessa. Four years later he became professor of Slavic philology at Berlin and in 1875 founded there the Archiv fur Slavische Philologie. He re¬ moved to Saint Petersburg in 1880, succeeding Sresnevski at the university there and in 1886 to Vienna as professor of Slavonic philology. He retired in 1908. He is a member of the Ser¬ bian and Cracow academies and of the Acad¬ emy of Saint Petersburg. He published a very great number of works on the history, language and literature of the Slavs and. edited the (Slavic Philological Encyclopedia) (Saint Petersburg 1909 et seq.).

JAGOW, Gottlieb von, German Secretary of State for Foreign Affairs: b. 26 June 1863. Educated at the University of Bonn, he entered the diplomatic service in 1895. He first made his mark as private secretary to Prince Billow, former Imperial Chancellor. He became Min¬ ister to Rome in 1907 and Ambassador in 1908. During the Turco-Italian war he conducted important negotiations with the Italian govern-

ment and, it is said, prevented a war between Austria and Italy at the time. He was recalled to Berlin and appointed foreign secretary on the death of Kiderlen-Waechter (q.v.) in 1913. A quiet, retiring and scholarly man, he

was one of the worst speakers in the Reichstag. Both the former American and British ambassadors to Germany expressed their appreciation of his unfailing courtesy. According to Mr. Gerard ((My Four Years in Germany) von Jagow was forced out of office in November 1916 by an agitation against him on account of his lack of force in defending government policy in the Reichstag. On 4 Aug. 1914 the British Ambas¬ sador in Berlin was informed by von Jagow that Germany could not respect the neutrality of Belgium, which led to the entrance of Great Britain into the war on the same day. During his first year as American Ambassador in Ber¬ lin, Mr. Gerard endeavored to persuade the German authorities to conclude a ((Bryan Peace Treaty® with the United States, to which von Jagow replied that, if Germany did so, he feared she would be ˆimmediately asked to sign similar treaties with England, France and Russia.®*

JAGUAR, jag'u-ar or jag' war, a great American spotted cat (Felis onca), once numer¬ ous as far north and east as Arkansas, but since the early part of the 19th century rare even in Mexico. It resembles the leopard, but is more robust (exceeding the cougar in weight), has a rounder head, relatively shorter legs and a shorter, thicker tail. The tawny yellow hide is spotted with black, the spots larger than those of the leopard, and inclined to form broken rings with a spot in the centre. Jaguars abound in the tropical forests, especially along the great rivers, where they find most prey. They sub¬ sist largely on capybaras, agoutis, etc., but fre¬ quently pounce upon deer when they come down to drink. They seem to be more arboreal than most large cats, and a favorite method of ob¬ taining their food is to lie along a tree-limb in some favorable spot and leap down upon the victim. But jaguars also abound in the treeless morasses of the Gran Chaco, and even on the dry uplands of Paraguay and Argentina, where their food and habits are entirely different from those that dwell in the forests. In view of the great extent of country and variety of circum¬ stances in which this animal lives, formal statements as to its habits are rarely more than locally true; and much error and superstition encumbers popular accounts. In general the jaguar has the manners and disposition of other great cats, changing with environment, season and circumstances. It submits grudgingly to captivity, and gives the same reluctant submis¬ sion to the training of the circus as is exhibited by other great cats. In some regions it is greatly feared by the people, while in other places it is regarded as little to be feared. Its greatest peculiarity, perhaps, is the tendency to terrific roars and cries, more loud and continu¬ ous than those of cougars or leopards. Consult the works of South American travelers and nat¬ uralists, especially Humboldt, Azara and Wal- terton. Their accounts are well summarized by Porter in (7th ed., London 1895) ; Hudson, W. H., (The Naturalist in La Plata (4th ed.,*

*ib. 1903) ; Wallace, A. R., (Travels on the Ama¬ zon * (ih. 1889).*

JAGUARONDI, jag-wa-ron'di, or YA- GUARONDI, a slender, long-tailed, unspotted, blackish-gray wildcat (Felis jaguarondi) of tropical America. It is not common, and is little known. It measures about 30 inches from snout to tail, and the tail is 25 inches long; and the sides of its nose are curiously pinched in.

JAHDE. See Jade.

JAHN, Friedrich Ludwig, German patriot: b. Lanz, 11 Aug. 1778; d. Freyburg, 15 Oct. 1852. He was educated at Halle, Gottingen and Greifswald, paying special attention to theology and philology. He served for a time in the Prussian army and in 1809 removed to Berlin, where he became a teacher. To restore the morale of his young countrymen, then at its lowest ebb after the Napoleonic conquest, he hit upon the idea of practising gymnastics. The result was the first Turnplatz , opened in 1811, and which was soon attended by 1,000 of the youth of. the German capital. Branches were soon formed in other cities, but the reactionary policy of the rulers in that day soon put an end to the movement, it being feared that it had a political or revolutionary significanci Jahn was arrested in 1819 and the Turnplclz sup¬ pressed. He was liberated in 1825, 1 ut was never after fully free and his remaining years were spent in comparative obscurity. The Turnvereine of present-day Germany is mod¬ eled closely on the designs of Jahn. Iri 1859 a monument was erected to his memory at Freyburg.

JAHN, Otto, German philologist: b. Kiel, 16 June 1813; d. Gottingen, 9 Sept. 1869. He was educated at Kiel, Leipzig and Berlin and subsequently traveled for three years in France and Italy. In 1839 he was appointed privat- docent at Kiel, and in 1842 removed to Griefs- wald as professor extraordinary of archaeology and philology, becoming ordinary professor in 1845. He was called to Leipzig in 1847 to the chair of archaeology btit four years latei he was deprived of his chair for having participated in the revolutionary movement of 1848-49. In 1855 he was called to the chair of the science of antiquity and to the directorship of the aca¬ demical art museum of Bonn. He was called to succeed Gerhard at Berlin, but died before his installation there. His services to classical philology were immense as also in the field of classical archaeology. His principal works are (Palamides (1836) ; (Telephos and Troilos* (1841); (Die Gemalde des Polygnot> (1841); (Pentheus und die Manaden* (1841) ; (Paris und Oinone) (1844) ; (Die hellenische Kunst) (1846); (Peitho, die Gottin der Uberredung* (1847) ; (Ueber einige Darstellungen des Paris- Urteils* (1849) ; (Die Ficoronische Cista) (1852) ; (Pausaniae descriptio arcis Athenarum* (3d ed., 1901) ; (Darstellungen griechischer Dichter auf*

Vasenbildern (1861). His critical editions of the classics include Juvenal, Persius and Sulpicia) (3d ed., 1893) ;*

(Gesammelte Aufsatze iüber Musik> (1866); (Biographische Aufsatze (1866); (Griechische Bilderchroniken* (1871). Consult biography by his nephew A. Michaelis (in (Allgemeine deutsche Biographies Vol. XIII, Leipzig 1881) and Sandys (History of Classical Scholarship* (Cambridge 1908).*

JAI-ALAI. See Pelota.

JAINISM, jin'iz'm, is one of the many re¬ ligions of India, followed by only about one million people, mostly in the northwest region. It closely resembles Buddhism, being a reaction contemporary with it in the 6th century b.c., from the precedent Brahmanism. These revolts arose from several causes: (1) the Kshatriya (warrior-caste) sought release from the reli¬ gious domination of the Brahman (priest- caste) ; (2) Kshatriya philosophy rejected the Vedic deities; (3) the doctrine of non-injury. This last item gave to Jainism its outstanding trait. Softened by a tropical climate, human¬ ized by a settled life in place of the old nomadic one, and driven by economy to abandon animal food, Indians had become increasingly reluctant to kill animals, except that the Brahmans natu¬ rally still demanded them for sacrifice. This practice was condemned by the Jains, who then proceeded with that extravagance characteristic of every Indian activity to spare all animal life whatsoever, even when noxious. To that end, the Jaina monk is equipped with a broom to sweep insects from his path, and a veil to sift them from his mouth, besides the inevitable almsbowl. Nor may he kill or disturb insects feeding upon his body. Moreover, Jains sup¬ port beast-hospitals in many cities of western India, where old or lame buffaloes, cows, goats, sheep, fowl, and hordes of vermin are housed and fed.

• Jainism was founded in the 6th century b.c., by Nataputta, entitled by his followers Maha- vira (Great Hero) and Jina (Conqueror). The son of a chieftain, he led a worldly life until at 30, upon the death of his beloved parents, he was so agitated by the seriousness of life that he left his wife and relatives and wan¬ dered naked as a homeless ascetic. For 12 years he practiced the severest austerities with deep meditation, and was never moved to anger, though beaten by sinful men. Thus did he be¬ come the*

Jina (Conqueror) and Kevalin (Per¬ fect Sage).

The Jaina monk attains deliverance for his spirit from the bonds of flesh by following the triratna (three jewels) : knowledge, faith and virtue.

This knowledge teaches that the world con¬ sists of eternal spirits and eternal atoms, with¬ out any supreme being. Eight re-births, after becoming a Jaina monk will secure the. spirit's release from matter; not for absorption into the absolute — as Brahmanism taught — nor for annihilation in Nirvana — as Buddhism taught — hut for something beyond human speculation; so that the Jaina was termed <(the may-be phil¬ osopher.^ Such agnosticism has never flour¬ ished among the credulous, imaginative Indians, who, moreover, lack the mental discipline af¬ forded by science. The second jewel is faith which reposes in the word of their master, Mahavira, and the declarations of their scrip¬ tures, the Agamas. Virtue, the third jewel, consists of the five-fold conduct that results

from such knowledge and such faith, namely: (1) to kill nothing whatever; (2) no to lie; (3) not to steal; (4) to abstain from sexual pleasures; (5) to renounce all the attachments of the senses. ((What is discontent and what is pleasure? One should live subject to neither. Giving up all gaiety, circumspect, restrained, one should lead a religious life. Man ! Thou art thine own friend; why lookest thou for a friend beyond thyself ?**

Seven sects are classed as Svetambara (white-attire) in contrast with the Digambara (sky-attire) who migrated to the South where a more equable climate allowed them to make compulsory that nakedness which had been only recommended in the earlier texts. These may be the gymnosophists mentioned by Greek his¬ torians, but nowadays they merely doff their upper garments during meals. There are other Indian ascetics, however, who still discard clothing, and are generally countenanced.

This monk-regimen was much tempered for the Jains laity, who in fact, were mostly pros¬ perous tradespeople, farming being prohibited by the non-injury doctrine. But, furthermore, this extension of Jainism to include laity intro¬ duced two important changes in the religion. First, to meet the religious needs of common folk, a worship of the founder, Jina, was insti¬ tuted with temples, idols, festivals, and offer¬ ings of flowers and incense. Second, the monks were compelled to abandon their homeless wan¬ derings, in order to care for the souls of their resident laity. This in turn, led to the erection of temples, the most costly and delicately beau¬ tiful in all India, as at Mount Abu, and the erection of cloisters where the leisured monks produced a varied literature. Thus does Nature, though expelled with a pitchfork, re¬ turn in the end. Unlike Buddhists, the Jains maintain

caste, some of them being even Brahmans.

*Bibliography.— Jacobi, H., ((Jaina Sutras** in Vols. 22 and 45 of (Sacred Books of the East,* gives translation of various scriptures, and an excellent introduction. (The Religions of India) by E. W._ Hopkins, contains a section on Jainism and a bibliography of the numerous articles in various journals.*

Edmund Buckley.

JAIPUR, or JEYPORE, India, city and native state of the Rajputana agency. The state has an area of 15,579 square miles ; its centre is a sandy plain and to the east are ranges of hills. Irrigation systems are being constructed to relieve the water scarcity. Cattle are raised as also corn, wheat, barley, cotton, tobacco and sugar. Manufactures in¬ clude cottons, statuary, pottery, brass and lacquer work. Copper, cobalt and marble are mined. The state was founded in 1128. Pop. 2,636,647. The city is 150 miles west of Agra, is fortified and is built mostly of pink stucco. It has wide, regular streets, and is the only city of India laid out in rectangular blocks. It contains the palace of the Maharaga, several colleges and an observatory. It was founded by Gai Singh II in 1728. The city has a large trade. Pop. 137,000.

JAIR. the name of several men mentioned in the Old Testament. The most important of that name judged Israel 22 years. He is said to have had 30 sons who rode on 30 ass colts.

Considerable discussion has arisen among com¬ mentators because of the attempt made to dis¬ tinguish the Jair mentioned in the Hexateuch from the Jair of the book of Judges.

JAIRUS, the name of a certain ruler of a synagogue whose home was not far from Capernaum. He had a daughter 12 years old who became critically ill, lying at the point of death. He sought Jesus in order that he might exercise his healing power. Jesus at once ac¬ companied the anxious father. Before the home was reached, a, messenger met them an¬ nouncing the child's death. When they arrived at the home, Jesus said <(She is not dead but sleepeth.® The professional mourners were sent from the room after ridiculing the statement. The parents and three disciples were detained. He then went to the bed, took the child by the hand and pronounced two Aramaic words ((Talitha Cumi® or "daughter arise,® and "she arose and walked.®

JAJCE, yal'tze, Bosnia, an historic town 62 miles by rail southeast of Sarajevo, occupy¬ ing a hill overlooking the picturesque Pliva River where it falls 100 feet into the Vrbas River. A series of small lakes and cascades along the course of the Pliva through miniature gorges and tree-clad mountains, with the main fall at Jajce, are utilized for industrial pur¬ poses without detracting from the natural scenic beauties of the neighborhood. <(The Lake Fort® or Turkish Djol Hissar at Jezero, lies five miles west of Jajce. A 14th century fortress crowns Jajce hill. The 15th century church of Saint Luke with its fine Italian cam¬ panile is said to cover the traditional grave of the evangelist. In the church are preserved and exhibited the casket and skeleton of the last king of independent Bosnia, Stefan Toma- sevic, who was flayed alive by the Turks and beheaded in Kraljeva Polje, the <(King's Field® just outside the walls. During the Moslem in¬ vasion of Europe in the 15th century, the dis¬ tricts of Jajce and Srebrenica, organized as the banate or Kingdom of Bosnia, and garrisoned by Hungarians, fiercely opposed the Turks as the outpost of Christendom. Bajazet II and his forces suffered a severe defeat from John Corvinus at Jajce in 1500, and resisted all at¬ tacks until the Hungarian power was over¬ thrown at Mohacs in 1526. Two years later, after being besieged by the enemy during 65 years, Jajce surrendered and its fall consum¬ mated the Turkish conquest. Pop. 5,000.

JAKUTSK, a territory and town of Siberia, more frequently written Yakutsk (q.v.).

JALAL-ED-DIN MOHAMMED. See

Akbar.

JALAL-UD-DIN RUMI, Persian philoso¬ pher : b. Balkh, Khorasan, 1207 ; d. 1273. His father was a scholar and carefully educated the son, who also was educated at Aleppo and Damascus. In 1231 he was made director of a college at Konieh in Asia Minor. He gradually developed into a mvstic. He founded an order of dervishes in 1247 for whom he wrote a col¬ lection of rules entitled ˆathnawiP The (Diwan) is a lyrical collection of great poetic merit. This philosopher was the first to teach the transmigration doctrine. Consult Browne, (Literary History of Persia) (New York 1906), and Davis,

JALANDHAR, or JULLUNDER, British India, a division of the Punjab, which includes Kangra, Hoshiarpur, Jalandhar, Ludhiana and Firozpur. The area of the division is 19,394 square miles, with a population of 3,967,724. The capital is Jalandhar, situated 260 miles northwest of Delhi. It has flouring mills, iron and brass foundries, and silk mills, also public gardens and a military cantonment. Pop. 69,300

JALAP (so called from Jalapa, or Xalapa, Mex., whence it is imported), the tuberous roots of several plants of the family Convol- vulaccce, that of Ipomcea purga being the most important. This is a twining herbaceous plant with cordate leaves and deep pink flowers, growing naturally on the eastern declivities of the Mexican Andes, at from 5,000 to 8,000 feet. The jalap of commerce consists of irregular ovoid dark-brown roots, varying from the size of an egg to that of a hazel-nut.

JALAPA, ha-la'pa, or XALAPA, Mexico, on the Interoceanic Railway, capital of the State of Vera Cruz. Spelled Jalapa by the public generally, but Xalapa (meaning <(five hills®) always in official documents of the city itself and of the state of Vera Cruz. Elevation 4,689 feet above the sea. One of the oldest and most picturesque cities in the Republic. Distant from the city of Mexico by the Inter¬ oceanic Railway 350 miles, and from the city of Vera Cruz, 81 miles. Long before the com¬ ing of the Spaniards the town was a place of considerable importance, having been founded by the native Indians. It became a city in 1830, and the seat of the Bishopric of Vera Cruz in 1864. That it possesses very agreeable climatic qualities may be inferred from the fact that its average temperature the year round is 66° in the shade. There are several plazas, cotton mills, cigar manufactories and tanneries, a chocolate factory, a soda water factory and numerous small shops. The educational insti¬ tutions are: Normal school, with a valuable chemical laboratory, physical and natural his¬ tory collection, library, gymnasium and a corps of 20 professors and teachers, a female college, a school of -fine arts, a preparatory college and primary schools. A few miles distant are the beautiful falls of Xico, which furnish the power for the city's electric lighting. There is the usual complement of churches ;

but the old con¬ vent of San Francisco, which dates back to 1555 and is now the Cathedral, is particularly interesting. Pop. about 25,000.

JALISCO , ha-les'ko, Mexico, a state bounded on the west by the Pacific Ocean, and on the north, east and south by the territory of Tepic and states of Durango, Zacatecas, Aquascali- entes, San Luis Potosi, Guanajuato, Queretaro, Michoacan and Colima. The Sierra Madre range in the eastern portion of the state in¬ cludes the active volcano Colima, the extinct Nevado _ and other high mountains. The largest river is the Santiago or Lerma. Chapala is not only the largest lake of Jalisco, but also of Mexico. The capital is Guadalajara (q.v.). Agricultural and manufacturing industries con¬ tribute to the state's wealth, supplementing in this respect the products of its mines. Area 31,846 square miles; population 1,220,160.

JAMAICA, from "Haymaca,® a native In¬ dian word signifying "island of fountains® or

JAJCE AND ITS WATERFALLS

■

■

'

.

more literally ((well watered® the largest of the British West Indian Islands. It occupies the central position in the Antillean region, being nearly equidistant from Florida and the northern point of South America; from the mouths of the Orinoco and Galveston; from the head of the Gulf of Honduras, on the west, and Saint Thomas, on the east. Its greatest length i s _ 1 44 miles; greatest breadth, 49 miles; area, 4,450 square miles. The eastern part of the island has, as its most commanding: feature, the Blue Mountain range (highest peak 7,360 feet). The centre and west, an elevated plateau of later geologic formation, show the characteristic Antillean limestone and, more perfectly here than elsewhere in the West Indies, the extraordinary results of exposure of that soluble material to the tropical rainfall. This upland plain, by the action of the elements, has been carved into hills, basins, called "cock¬ pits,® 500 feet or more in depth, and much larger and deeper valleys, in which the planta¬ tions are

situated, and from which the numer¬ ous streams often find their way to the sea by underground passages. One of these depres- sions_, the Clarendon Valley (drained through a canon), is 25 miles wide and 50 miles long; another, Saint-Thomas-in-the-Vale, is circular in form, with a diameter of aDout 10 miles. Throughout the western half of the island such valleys occur, some with, others without, ap¬ parent drainage outlets. Coastal plains are most extensive, on the south side, where the largest, the plain of Liguanea, has an area of 200 square miles. There are no navigable rivers, but a great number of small streams, pools and thermal springs. In the limestone region there are many caverns, interesting on account of their size, beauty, relics of the old Indian population. The mean temperature at the coast is very little more than 78° F. ; that of the larger part of the habitable regions (1,000 to 3,000 feet above sea-level) is about 73° F. ; and at the altitude of 5,500 feet it is 60° F. On the plateau the annual variation is scarcely 9° ; for example, at Saint Elizabeth the maximum is 75° F. and the minimum 67° F. The average rainfall is 66 inches, the extremes being 100 inches on the high mountains and 44 inches at Kingston. The death rate is 20.9 in 1,000; but this favorable showing, as com¬ pared with the other islands of the Antilles, is due much less to natural advantages than to the strict enforcement of local sanitary and quaran¬ tine regulations. The population in 1916 was 904,681. The census of 1911 gave as the num¬ ber of whites, 15,605; colored, 163,201; black, 630,181; East Indian, 17,380; Chinese, 2,111; not stated 2,905. The birth rate is little less than twice the death rate. The Jamaica negroes are fairly good laborers when well fed; the menial work of the island is performed by them, and they are regarded as cheerful, hon¬ est and respectful servants. They have no share whatever in the government.

Jamaica has no distinctively native mammals. There are many species of lizards, including the large iguana, a few harmless snakes and the slightly poisonous centipede and scorpion. In the lowlands mosquitoes, ants, sand-flies, but¬ terflies, fireflies and beetles, parrots, pigeons, water-fowls and 20 different kinds of song¬ birds are common. Edible marine fish are seldom caught near the island, but the streams

contain a few fresh-water species. The flora is distinguished from that of the other Antillean regions by the total absence of the royal palm, and by the abundance of pimentos, or allspice- trees, which are rarely found elsewhere. Com¬ mon trees are the ceiba, mango, wild orange, cocoa-palm, plantain, fustic, logwood and cedar. Begonias, orchids, ferns and grasses abound, except on the southern coast, which has a flora of the arid type, including the cactus, thorny acacias, and similar plants.

Agriculture and Transportation. — There were 1,012,128 acres under cultivation in 1916— 17. Of this total 68,332 acres are devoted to

pimento (allspice), but chiefly as a by-product on lands, also used for stock-raising. Since the abolition of slavery the production of sugar has fallen off very greatly. In 1805 Jamaica exported 151,000 hogsheads of sugar, and 5,- 000,000 gallons of rum; in 1897 the cultivation of sugar-cane constituted only 19 per cent of the whole agricultural industry; in 1914-15 only 31,727 acres were under this crop. Other products have gradually taken its place. Since the great frosts in Florida (1895-96) the ex¬ portation of oranges from Jamaica has been carried on profitably; since 1886 tobacco has been grown and cigars for exportation made on a large scale. Coffee from the Blue Mountain estates is of fine quality. The cultivation of cacao has increased in recent years ; ginger grows most readily in the rich soils on the mountain; and among the other exports may be mentioned lime-juice, tamarinds, nutmegs, a number . of dyewoods and cabinet-woods. Special instruction in agriculture is given at the schools, and agricultural and horticultural interests are encouraged by the government and active private associations. The banana crop is increasing in importance, the average annual output reaching nearly 14,000,000 bunches, valued at about $5,800,000. The annual output of dyewoods is valued approximately at $440,- 000. The land is divided into small holdings, those of five acres and less numbering over 60,600 out of a total of 80,000 holdings. East Indian immigration was resumed in 1891, and since then large estates have been increasing in number. The soil is very fertile, being com¬ posed largely of sedimentary deposits from the white and red limestone formations which over- lie the granite that forms the principal structure of the island. Agriculture is the chief indus¬ try, and nearly all others are dependent thereon.

*The United States has the most important trade relations with Jamaica, furnishing a large part of the staple food supplies, and affording the best market for the island's fruit and sugar. Thus, in 1914—15, the total exports were valued at $14,522,665, the United States taking $8,847,310 in value; the United Kingdom $2,749,015, etc. Imports from the United States were valued at $6,105,755, and from the United Kingdom at $4,931,090. The total foreign business of the island in 1916-17 was $28,824,- 000, of which $15,084,000 came from imports and $13,740,000 from exports. There are 197ˆ4 miles of railway, 1,135 *4 of telegraph, including railway telegraph lines; 865ˆ4 of telephone lines; 18ˆ4 miles of electric and 8*4 of steam tramways. The system of public highways, ex¬ tending into all parts of the island, is admirable; the roads are thoroughly well built and graded, have substantial bridges, and are kept in, good*

repair. The total tonnage of shipping, entered and cleared, in 1914—15 was 4,306,848, of which 2,240,429 were British. During the European war the British shipping with Jamaica fell off very greatly.

Government and Education.— The execu¬ tive authority is vested in a governor, appointed by the king. He is assisted by a Privy Council and a Legislative Council (the governor, 5 ex-officio, 10 nominated and 14 elected mem¬ bers). For the administration of local affairs there are boards elected in each parish. Admit¬ tance to the lower grades of the civil service is gained through competitive examinations. The government medical service has in charge 18 public hospitals. The police -system includes more than 100 stations in different parts of the island; a force of more than 1,500 men (769 dis¬ trict constables) ; several prisons, reformatories and industrial schools. There is a local artillery militia and rifle corps besides the garrison of regular troops. Fortifications and batteries are at Port Royal, Rocky Point, Salt Pond's Hill, Rock Fort, Fort Augusta, Fort Clarence and Apostles' Battery. The. judicial department in¬ cludes a high court of justice (nine members), circuit courts and a magistrate in each parish. Public revenue and expenditure in 1914-15, the last normal year during the European War, were $4,900,850 for the former, $5,274,845 for the latter; and the public debt was $3,854,305. Public elementary schools in 1916 numbered 696; average attendance, 65,302. There are four government training colleges for teachers ; several endowed secondary, industrial and high schools ; a public lyceum and museum, with a valuable library, etc. Local examinations are held on the island by the University of Cam¬ bridge. In 1870 the Church of England was disestablished and disendowed on the island.

*The Cayman, Turks and Caicos Islands, and the Morant and Pedro Cays are attached to Ta- maica for administrative purposes. Of these, the first group lies in the Caribbean Sea, 180 miles northwest of Jamaica, and comprises Grand Cayman, 17 miles long, 4 to 7 broad; Little Cayman, 9 miles long and about 1 mile broad; and Cayman Brae, 10 miles long and 1*4 miles broad. The government is admin'stered by. a commissioner and magistrates are ap¬ pointed by the governor of Jamaica. The popu¬ lation of the Cayman Islands is about 5,930. The second group, Turks and Caicos Islands, situated nearly 500 miles northeast of Jamaica, geographically belongs to the Bahamas ; but the governor of Jamaica exercises a supervising power over the local authorities (a commis¬ sioner and legislative board of 5 members). Area, 165*4 square miles; population, 5,615; capital, Grand Turk; products, salt, sponges, pink pearl, etc. The Morant Cavs and Pedro Cays are situated, respectively, about 33 miles southeast and about 45 miles southwest of Jamaica.*

Kingston, the capital had in 1917 59,288 in¬ habitants, a good water-

supply and system of sewerage, well-lighted streets, large shops and a street railway. The town is, however, unat¬ tractive. Residences of the officials and wealthy merchants are built in the suburbs. Public institutions are the museum, library, co¬ lonial offices, schools, churches, almshouse, peni¬ tentiary, asylum and Victoria market. Four

miles away is the important naval station of Port Royal, headquarters for the British West India naval forces, and a strongly-fortified place. Spanish Town, population 7,119, at one time the capital, is situated 15 miles west of Kingston. Port Antonio, on the northeast side of the island; Montego Bay, population 6,616; Savanna-la-Mar, Falmouth, Lucea, Saint Ann's Bay, Buff Bay, Port Morant, Black River, etc., are distributed among the three counties of Surrey, Middlesex and Cornwall.

History. — Jamaica was discovered by Co¬ lumbus 3 May 1494; and he named it Saint Iago ; but this designation was only used by the Spaniards ; and was soon abandoned even by them in favor of the native name. As a Span¬ ish colony (1509-1655) Jamaica was backward and of little consequence. The total popula¬ tion in the year last mentioned, when an Eng¬ lish fleet sent out by Cromwell captured it, was only 3,000. One-half of that number took ref¬ uge in Cuba. Until the restoration of the Eng¬ lish kings Jamaica was under military jurisdic¬ tion; but it was given a civil government under an executive council in 1661. Nine years later England obtained a clear title to Jamaica by the Treaty of Madrid. The settlers who arrived subsequently were peasants from Scotland, Ire¬ land and England, English subjects from the other West Indian islands and Jewish traders from Minorca. Negroes were brought from Africa in great numbers; the old town of Port Royal being chosen as a convenient point from which to reship slaves to the other islands and the mainland. That town, once a place of great wealth and importance, was rui-ned by re¬ peated calamities. «On 7 June 1692 happened that earthquake which swallowed up a great part of Port Royal,® says Edwards, who ex¬ plains that the town ((was chiefly built on a bank of sand, adhering to a rock in the sea, and a very slight concussion, aided by the weight of the buildings, would probably have accom¬ plished its destruction.® Hurricanes in 1712 and 1722, and a conflagration 13 July 1815, com¬ pleted the work of obliteration. During the 18th century the island suffered from many slave insurrections and uprisings on the part of the "maroons,® descendants of Spanish African slaves inhabiting the mountainous districts and inaccessible places. Toward the close of the 18th century the island was occupied by large plantations and was exceedingly productive. Before that time 610.000 slaves had been landed at Port Royal. The freeing of the negroes resulted in the abandonment of the island by many landlords. In August 1903 a hurricane inflicted great injury at several points in Ja¬ maica and on the Cayman Islands. On 14 Jan. 1907 Jamaica was visited by a disastrous earth¬

quake which (((in ten seconds,® Treves says) almost entirely destroyed Kingston.

Bibliography.— Aspinall, A. E., (London 1912) ; Cundall, F., (Historic Tamai- ca (London 1915) ; Gardner, W. J., 'A His¬ tory of Jamaica> (London 1909) ; 'Handbook of Jamaica) (1918) ; Henderson, J., 'Tamaica, Painted by A. S. Forrest, Described by T Hen¬ derson) (London 1906) ; Hill, R. T., 'Cuba and Porto Rico With the Other Islands of the West Indies (New York 1898) ; New York Public*

Library, (List of Works Relating to the West Indies (New York 1912) ; Phillips, U. B., (A Jamaica Slave Plantation (New York 1914, repr. Amer. Historical Rev., Vol. XIX, No. 3) ; Treves, F., (The Cradle of the Deep* (London*

1908).

Marrion Wilcox.

JAMAICA, N. Y., a part of the borough of Queens in the city of New York, since 1 Jan. 1898; an important junction on the Long Island Railroad. Prior to its incorporation in Greater New York, Jamaica was the county-seat of Queens County, on Long Island. The town was settled as early as 1656. Several houses built before the Revolutionary War are in a good state of preservation. In the vicinity market gardening is carried on extensively. One of the New York State normal schools is situated in Jamaica.

JAMAICA BAY, New York, an inlet of the Atlantic Ocean which indents the southeast shore of Long Island. It is nearly circular in shape ; the Rockaway Beach extends across the side toward the ocean and makes of the bay a land-locked body of water. A number of islands are in the middle and at the entrance. The whole of the bay, except an inlet, Head Bay on the east shore, is within the limits of New York city; Coney Island is near the entrance to the bay.

JAMBLICHUS, another spelling of Iam-

blichus (q.v.).

JAMES, Saint, called the "Greater,® the son of Zebedee. He was called to. be an apos¬ tle, together with his brother Saint John, as they were mending

their nets with their father, who was a fisherman. They then followed Christ, were witnesses with Saint Peter of the transfiguration, and accompanied our Lord in the garden of Gethsemane. In the lists of the apostles given in the synoptic Gospels and in the Acts the names of Peter, Andrew, James and John stand first; and it is plain that these four were at the head of the 12 throughout. After the ascension Saint James persevered in prayer with the other apostles and the women and the Lord's brethren. Nothing further is certainly known of him till the passover of 44, when, being in Jerusalem, the Jews stirred up Herod Agrippa I against him, who put him to a cruel death. Thus Saint James was the first of the apostles who suffered martyrdom. There is a legend that he went to Spain, and that his bones lent miraculous aid to the Spaniards against the Saracens.

JAMES, Saint, called the "Less,® an apostle, the brother or cousin of Jesus. He is called in Scripture the "Just,® and is probably the apostle described in Matt, x, 3, and elsewhere as the son of Alpheus. He was the head of the church in Jerusalem when the Scribes and Pharisees threw him down from the gable of the temple, and a fuller dashed out his brains with a club, about the year 62. This is the account of his death given by Hegesippus, a Christian of Jew¬ ish origin, who lived in the middle of the 2d century, and it differs somewhat from the narra¬ tive of Josephus. Some critics maintain that James, the son of Alpheus, was one person, and Tames, the brother of Jesus, another. Whether Tames was the author of the eoistle which bears his name is considered doubtful.

JAMES I, king of England, and VI of Scotland, the only child of Mary, Queen of Scots, by her cousin Henry Stuart, Lord Darn- ley : b. Edinburgh Castle, 19 June 1566; d. palace of Theobalds, Hertfordshire, 27 March 1625. In 1567 he was solemnly crowned at Stirling, and from that time all public acts ran in his name. His childhood was passed during civil wars, under the regencies of Murray, Mar and Mor¬ ton, during which time he resided in Stirling Castle under the tuition of the celebrated Buchanan. From the first he seems to have imbibed those exalted notions of the royal au¬ thority and divine right which proved so inju¬ rious to his posterity. But James soon found it advisable to ally himself with Queen Eliza¬ beth and to accept a pension from her. When, however, it became apparent that the life of his mother was in danger from the sentence of an English judicature, James sent representatives to England to intercede with Elizabeth ; but his whole procedure in the matter shows a singular callousness. As a matter of form he ordered the clergy to pray for his mother, but when the news of Mary's execution arrived James was not much moved, though he at¬ tempted to make a show of indignation by con¬ demning one of the commissioners to death, a sentence which, however, he commuted to ban¬ ishment. On 23 Nov. 1589 James married Anne, daughter of Frederick II, king of Den¬ mark. On his return home,

after passing the winter in festivities at Copenhagen, he was in some danger from the unruliness of the nobles; and for several succeeding years of his reign the history of Scotland displays much turbu¬ lence and party contest, but the supremacy of the Crown was finally vindicated. In 1603 James succeeded to the crown of England, on the death of Elizabeth, and proceeded amidst the acclamations of his new subjects to Lon¬ don. One of his first acts was to bestow a profusion of honors and titles on the inhabit¬ ants of both countries. At a conference held at Hampton Court between the divines of the Established Church and the Puritans, James exhibited the ill-will he bore to popular schemes of church government. The meeting of Parlia¬ ment also enabled him to assert those princi¬ ples of absolute power in the Crown which he could never practically maintain, but the theo¬ retical claim of which provided the increasing spirit of freedom in the House of Commons with constant matter of alarm and contention. Although James had behaved with great lenity to the Catholics in Scotland, those in England were so disappointed in their expectations of favor that the famous gunpowder plot was con¬ certed in 1605, the object of which was to blow up the king and Parliament. (See Gunpowder Plot, The). In 1612 he lost his eldest son Henry, a prince of great promise, then 19; and in the following year the eventful marriage of his daughter Elizabeth with the Elector Palatine took place. No circumstance in the reign of James was more unpopular than his treatment of the celebrated Sir Walter Raleigh (q.v.). James had set his heart on marrying his son Charles to a Spanish princess, but the nego¬ tiations failed through the overbearing temper of Buckingham, the royal favorite, who quar¬ reled with the grandees of the Spanish court. The close of the life of James was marked by

violent contests with his Parliament. He was also much disquieted 'by the misfortune of his son-in-law, the Elector Palatine, who, having been induced to accept the crown of Bohemia, and to head the Protestant interest in Germany, was stripped of all his dominions by the em¬ peror. Urged by national feelings for the Protestant cause, he was at length (10 March 1624) induced to declare war against Spain and the emperor; and troops were sent to Holland to act in conjunction with Prince Maurice. James was not destitute of abilities nor of good intentions, but the former were not those of a ruler, and he was neither beloved at home nor esteemed abroad. He received dur¬ ing his lifetime a great deal of adulation on the score of his literary abilities, and to him the authorized version of the Bible (1611) is inscribed. He was aptly described by Sully as ftthe wisest fool in Christendom.ˆ Consult Aikin, (Memoirs of the Court of King James the First) (1822) ; Burton, (History of Scot- land} (1873) ; Macaulay, history

of England (1858) ; Gardiner, S. R., (History of England> from the Accession of James I to the Spanish Marriage1* (1863-69) ; id., (The First Two Stuarts* (1876) ; Henderson, T. F., < James I and VP (1904) ; and (Cambridge Modern His¬ tory* (Vol. Ill, 1910).*

JAMES II, king of England, second son of Charles I and of Henrietta of France: b. London, 15 Oct. 1633; d. Saint Germain, France, 16 Sept. 1701. He was at once declared Duke of York, though only formally raised to that dignity in 1643. At the Restoration in 1660 he took the command of the fleet as lord high- admiral, and was also made warden of the Cinque Ports. He had previously married Anne, daughter of Chancellor Hyde, after¬ ward Lord Clarendon (q.v.). In March 1671 the Duchess of York died. Before her death she declared herself a convert to the Roman Catholic faith, which had been secretly that of the duke for many years, and was now openly avowed by him. This declaration laid the foundation of the opposition which finally drove him from the throne. A test act being soon after passed, to prevent Roman Catholics from holding public employments, the duke was obliged to resign his command. On 21 Nov. 1671 he married Mary Beatrice of Este, daughter of the Duke of Modena, and in 1677 his eldest daughter, Mary, was united to Wil¬ liam, Prince of Orange.

On the death of Charles II, 6 Feb. 1685, the duke succeeded, tinder the title of James II, and from the time of his ascending the throne seems to have acted with a steady determination to render himself absolute and to restore the Roman Catholic religion. At variance with his Parliament, he. was under the necessity of ac¬ cepting a pension from Louis XIV. He sent an agent to Rome to pave the way for a solemn readmission of England into the bosom of that Church, conduct which encouraged the rebellion of the Duke of Monmouth (1685). The un¬ relenting temper of James was again exhibited in the executions on this account. The legal proceedings under Jeffreys were brutal in the extreme; and no fewer than 320 persons were hanged on the western circuit alone, which attained an unenviable notoriety as the Bloody Assize. The New Netherlands (which in¬

cluded the city of New York) had been granted to him by Charles II, and his subserviency to the French King was seen in the Treaty of Neutrality agreed on in 1686 governing the re¬ lations of their American colonies. James gradually proceeded to a direct attack on the Established Church by the formation of an ecclesiastical commission, which cited before it all clergymen who had done anything to dis¬ please the court. Apparently to conciliate the Puritans, a declaration of indulgence in matters of religion was ordered to be read by the clergy in all the churches of the kingdom, but its real object, however, was to favor tfie Roman Catholic element. Seven bishops met and drew up a loyal and humble petition against this

ordinance, and for this act they were sent to the Tower, on a charge of seditious libel. On 29 June 1688, not many days after the birth of his son, the Old Pretender, they were ac¬ quitted amid the most enthusiastic rejoicings of the populace. The innovations, in regard both to the religion and government, gradually united opposing interests, and a large body of nobility and gentry concurred in an application to the Prince of Orange, signed by seven of the most prominent and influential political leaders, to occupy the throne. James, who was long kept in ignorance of these transactions, when informed of them by his minister at The Hague, was struck with terror equal to his former infatuation, and immediately repealing all his obnoxious acts, practised every method to gain popularity. All confidence was, how¬ ever, destroyed between the king and the peo¬ ple. William arrived with his fleet in Torbay 5 Nov. 1688, and landed his forces, amounting to 14,000 men. Several men of rank went over to William, and the royal army began to desert by entire regiments. Incapable of any vigor¬ ous resolution, and finding his overtures of accommodation disregarded, James resolved to quit the country. He repaired to Saint Ger¬ main, where he was received with great kind¬ ness and hospitality by Louis XIV. In the meantime the throne of Great Britain was de¬ clared abdicated, and was occupied, with the national and parliamentary consent, by his eldest daughter, Mary, and her husband, Wil¬ liam, conjointly; Anne, who had equally with her sister been educated a strict Protestant, being declared next in succession, to the ex¬ clusion of her infant brother, known in his¬ tory as the Pretender, who had been born on 10 June of that year. Assisted by Louis XIV, James was enabled, in March 1689, to make an attempt for the recover} of Ireland. The re¬ sult of the battle of the Boyne, fought 1 July 1690, compelled him to return to France. All succeeding projects for his restoration proved equally abortive. Before his death he under¬ went a spiritual transformation, and died in the odor of sanctity. Consult Acton, ˆLectures on Modern Historv) (1906); Burnet, 'History of the Reign of King James the Second ; Cavelli, Les dermers Stuarts a Saint Germain-en- Laye> (1871) ; Fea, 'James II and his Wives* 0908) • Klopp, Der Fall des Hauses Stuart* (18/5-88), and Cambridge Modern History) (Vol. IV. 1911). *

JAMES I, king of Scotland, of the house of Stuart: b. Dunfermline, 1394: d. Perth 21 Feb. 1437. He was the son of Robert III In

1406, while on his way to France, he was taken by the English and carried to the Tower of London. For the next 18 years he remained a prisoner in England, being confined during part of his captivity in Nottingham Castle, Evesham, and Windsor Castle, where he wrote the (King's QuhaiU and other poems. Robert III died very shortly after learning of his son's captiv¬

ity, and James was proclaimed king; but during the remainder of the reign of Henry IV and the whole of that of Henry V, he was de¬ tained in England, with a view to prevent the alliance of Scotland with France. In 1424, under the regency of the Duke of Bedford, he was restored to his kingdom, at which time he was in his 30th year. Previous to his de¬ parture he married Jane or Joanna Beaufort, daughter of the Earl of Somerset, a lady of the blood royal of England, who is the fair dame alluded to in his poem (The King's QuhairP On his return to Scotland he re¬ stored Scotland to some degree of order, but so severe was his treatment of his turbulent nobles that he was at last murdered by their emissaries at Perth in the 13th year of his reign. His works, edited by Skeat, were published by the Scottish Text Society (1884).

JAMES II, king of Scotland, son of James I : b. 16 Oct. 1430 ; d. Roxburgh, Scotland, 3 Aug. 1460. During the minority his kingdom was distracted by struggles for power between his tutors Livingston and Crichton and the great house of Douglas. In 1449 he assumed the government and married Mary of Guelder- land. He had latterly allied himself with the Douglases, but being deprived of all real power, he resolved to free himself from their yoke. This he did in 1452 by inducing the Earl of Douglas to come to Stirling Castle, where he stabbed him with his own hand. He then quelled a powerful insurrection headed by the next earl, whose lands were confiscated. In 1460 he infringed a truce with Henry VI of England by besieging the castle of Roxburgh, and was killed by the bursting of a cannon in the 29th year of his age.

JAMES III, king of Scotland, son of James II: b. 10 July 1451; d. 11 June 1488. He was crowned at Kelso on his father's death, but in 1465 came under the influence of Bishop Ken¬ nedy and the Boyd family, one of the latter espousing the king's sister in 1467. James mar¬ ried Margaret of Denmark in 1469, and dis¬ missed the Boyds from favor only to advance other favorites. Prominent among these was Cochrane, through whom one brother of James was obliged to flee the kingdom, and another was put to death. The nobles seized Cochrane and five others and hanged them. Subsequently a plot was formed to dethrone the king, and though many peers remained loyal to him the royal army was defeated at Sauchieburn near Stirling. James escaped from the field, but was murdered during his flight.

JAMES IV, king of Scotland: b. 17 March 1473; d. Flodden. 9 Sept. 1513. He was the son of James III. He commanded the nobles who vanquished and killed his father at Sauchie¬ burn, and was crowned at Scone in June 1488. He married Margaret, the daughter of Henry VII of England, but taking umbrage at the hostile attitude of his brother-in-law, Henry VIII, allied himself with France. He was

defeated and slain at the battle of Flodden (q.v.) during an invasion of England.

JAMES V, king of Scotland, son of James IV: b. Linlithgow, Scotland, 10 April 1512; d. Falkland Palace, 14 Dec. 1542. He came to the throne under the regency of his mother in 1513 and assumed the reins of government in 1528. He married Madeleine of France in 1537, and on her death married the daughter of the Duke of Guise, Mary of Lorraine, in 1538. He ruled with much vigor and decision, and on account of his mingling freely with his people was called ((the king of the commons.® Becom¬ ing entangled in war with England in 1542, he was defeated at the battle of Solway Moss and died a month later. He was succeeded by his daughter, Mary, Queen of Scots, who was but seven days old at his death.

JAMES (James Francis Edward Stuart), Prince of Wales, styled James III by the Jacobites and the Old Pretender by the Han¬ overian party, and son of James II, king of England. See Stuart, James Francis Ed¬ ward.

JAMES, Bushrod Washington, American oculist : b. Philadelphia, 25 Aug. 1836 ; d. 1903. Graduated from the Homoeopathic Medical Col¬ lege of Pennsylvania in 1857, he became well known as a practitioner; he was elected presi¬ dent of the Pennsylvania Homoeopathic Medical Society in 1873, of the American Institute of Homoeopathy in 1883, and in 1896 was vice- president of the Homoeopathic Medical Con¬ gress held at London, England. His publica¬ tions include (American Climates and Resorts* (1889), a manual of climatology (1889) ,

JAMES, Daniel Willis, American mer¬ chant and philanthropist : b. Liverpool, England, 1832; d. 1907. He came to America in early life and engaged in commercial life with the firm of Phelps, Dodge & Co., of New York. He amassed a huge fortune which he distrib¬ uted to a great number of public institutions and seats of learning. Among the institutions which benefited from his philanthropy were Union Theological Seminary, $1,000,000; Am¬ herst and Oberlin colleges, Columbia Univer¬ sity, Cathedral of Saint John, New York, and the Hartford Theological Seminary. Under the terms of his will $100,000 was left to each of the following: Columbia, Yale, Union Theo¬ logical Seminary, Cooper Union, Amherst Col¬ lege, American Board for Foreign Missions, Children's Aid Society, Cathedral of Saint John, New York, Presbyterian Hospital, New York. To Madison, N. J., he gave a library, assembly hall and public park.

JAMES, Edmund Janes, American edu¬ cator and author: b. Jacksonville, Ill., 21 May 1855. He was educated at Illinois State Nor¬ mal School, at

Northwestern and Harvard uni¬ versities. and received the degrees of A.M., Ph.D., University of Halle. 1877 ; and of LL.D., Cornell College,' Iowa, 1902; Weslevan, 1903; Queen's College, 1903; Harvard, 1909; Michi¬ gan, 1914, and Northwestern 1914. After scholastic positions at Evanston^ and Normal, at the universities of Pennsylvania and of Chi¬ cago, instructing in political and social science.

he was president of Northwestern University 1902-04, and since 1 Sept. 1904 president of the University of Illinois. He is a member of numerous learned societies, the author of a great number of miscellaneous articles in scien¬ tific journals and of the following works: delation of the Modern Municipality to the Gas Supply' (1886); 'The Legal Tender De¬ cisions' (1887) ; 'The Canal and the Railway) (1890) ; 'Federal Constitution of Germany' (1890) ; 'Federal Constitution of Switzerland (1890) ; 'Education of Business Men in Europe' (1899) ; 'Charters of City of Chicago) (1900) ; (Growth of Great Cities in Area and Population' (1900) ; Government of a Typical German City — Halle) (1900); (The Land Grant Act of 1862' (1910); 'A National Eco¬ nomic Program' (1916); (A Naval Program'

(1916).

JAMES, Florence, "Florence Warden,® English novelist: b. Hanworth, Middlesex, 16 May 1857. She taught as a governess, 1875-80, and was on the stage, 1880-85. Her novels, many of which are strongly sensational in char¬ acter, have 'been very popular in this country as well as in England. They are published under the pseudonym of <(Florence Warden,® and among them are (At the World's Mercy) ; 'The House on the Marsh, ' which established her reputation; (A Prince of Darkness > ; 'Those Westerton Girls) ; (A Passage through Bohemia) ; 'The Inn by the Shore) ; (Mad Sir Geoffrey1 ; (The Man with the Amber Eyes,' etc.*

JAMES, George Payne Rainsford, Eng¬ lish novelist and historian : b. London, 9 Aug. 1799; d. Venice, 9 June 1860. As a young man he traveled widely on the Continent. He began his writing under the influence of Scott's novels, and wrote in all over 100 novels ; he was also known as the author of popular historical books, and in 1839 was appointed historiographer royal, in this capacity writing (History of the United States Boundary Question'. and 'The Corn Laws.' In 1850 he was British consul in Mas¬ sachusetts, two years later was transferred to Norfolk, Va., and in 1856 became consul gen¬ eral at Venice. His novels include

Gypsy } (1835); 'Attila' (1837) ;

JAMES, George Wharton, American ex¬ plorer, ethnologist, lecturer and author: b. Gainsborough, Lincolnshire, England, 27 Sept. 1858. He spent many years in making geolog¬ ical and other researches in California and else¬ where in the southwestern United States, is a member of various learned societies in this country and England; was associate editor The Craftsman , 1904—05 ; editor Out-West, 1912-14, and lecturer at the Panama-Pacific and Panama-Cafifornia exnositions, 1915-16. He published 'The Lick Observatory) (1888) ; 'Na¬ ture Sermons' ; 'Picturesque Southern Cali¬

fornia' ; 'Missions and Mission Indians of California' ; 'From Alpine Snow to Semi- Tropical- Sea' ; 'In and Around the Grand Canyon' (1900); 'Indian Basketry' (1900); 'The Indians of the Painted Desert Region' (1903); 'How to Make Indian and other Baskets' (1903); 'Travelers' Handbook to Southern Californa' ; 'In and Out of the Old Missions of California' (1905) ; "The Story of Scraggles' ; 'The Wonders of the Colorado Desert' (1906); 'What the White Race May Learn from the Indian'; 'Through Ramona's Country' (1907) ; 'The Grand Canyon of Arizona' (1909) ; 'The Hero of California' (1910); 'Indian Blankets and their Makers'; 'California, Romantic and Beautiful' (1914); 'The Lake of the Sky, Lake Tahoe'; 'Our American Wonderlands' (1915) ; 'Living the Radiant Life' ; 'Quit Your Worrying' ; 'Ari¬ zona, the Wonderland'; 'Reclaiming the Arid West' (1916) ; 'Exposition Memories' (1917) ; 'House Blessing and Guest Book' (1918).

JAMES, Henry, American Swedenborgian theologian: b. Albany, N. Y., 3 June 1811; d. Cambridge, Mass., 18 Dec. 1882. He was edu¬ cated at Union College and Princeton Theolog¬ ical Seminary, traveled abroad and became a Sandemanian and later a Swedenborgian. He subsequently lived in New York, Newport, R. I., and lastly at Cambridge. Among the most noted of his works on morals and religion are 'What is the State?' (1845); 'Moralism and Christianity' (1852); 'Lectures and Miscel¬ lanies'll^); 'The Nature of Evil' (1855); 'Christianity the Logic of Creation' (1857); 'Substance and Shadow' (1863); 'The Secret of Swedenborg' (1869) His (Literary Re¬ mains,' edited by William James, appeared in 1885. He was the father of William and Henry James (qq.v.).

JAMES, Henry, American novelist and es¬ sayist: b. New York, 15 April 1843; d. London 28 Feb. 1916. He was the son of a clergyman, Henry James (q.v.), who gained fame as a writer on philosophico-theological subjects, first from the Sandemanian and afterward from the Swedenborgian standpoint. The novelist, known until his father's death as Henry James! Junior, was educated under his father's guid¬ ance in New*

York, Geneva, Paris and Boulogne. He lived in Europe with his parents during the. years 1855-59, and after his return to the United States studied in the Harvard Law School in 1862. He began his literary career about 1865 as a contributor to American maga¬ zines, and soon afterward published 'The Story of a Year, a tale of the American Civil War.' In 1869 he took up his residence in Europe, and resided chiefly in England and Italy. In 1915, the year before his death, he became a natural¬ ized British subject and on 2 Jan. 1916 was decorated by King George V with the Order of Merit. 'Roderick Hudson' (1875) was his first long novel. His subsequent novels include .'Watch and Ward' (1878), originally published in 1871, in the Atlantic Monthly, 'The American' (1877), by some regarded as his best; 'Daisy Mdler' (1878); 'The Europeans: a Sketch' (1878); 'Confidence' (1880); 'Washington Square' (1880) ; 'A Bundle of Letters' 0880); 'Diary of a Man of Fifty' (1880) .; 'The Portrait of a Lady' (1881) ; 'The Bostonians' (1886) ; 'Princess Casamassima'

JAMES

005

(1886) ; cThe Tragic Muse) (1892) ; (The Other House1 (1896) ; 'The Spoils of Poynton1 (1897); 'What Maisie Knew) (1897); 'The Awkward Age1 (1899); (The Sacred Fount1 (1901) ; (The Wings of a Dove1 (1902) ; 'The Better Sort1 (1903). He has also written a great many short stories, among which are (A Passionate Pilgrim, and other Tales1 (1875); (Pension Beaurepas1 (1878); 'An In¬ ternational Episode1 (1879) ; 'The Madonna of the Future, and Other Tales1 (1879) ; 'The Siege of London1 (1883) ; (The Point of View1 (1883); 'Tales of Three Cities1 (1884); 'The Author of Beltraffio, and other Stories1 (1885) ; 'Stories Revived1 (1885) ; 'The Aspern Papers, and other Stories1 (1888) ; 'The Reverberator1 (1888); (A London Life, and other Stories1 (1889) ; (The Lesson of the Master, and other Stories1 (1892) ; 'The Real Thing, and other Tales1 (1893); (Picture and Text1 (1893); 'The Private Life1 (1893), a collection of stories; 'The Album1 (1894) ; 'The Reprobate1 (1894); 'Tenants1 (1894); 'Disengaged1 (1894) ; 'Terminations, and other Stories1 (1896); 'In a Cage1 (1898); 'The Two Magics1 (1898), consisting of two stories; 'The Soft Side1 (1900), a seres of stories; 'Ques¬ tion of our Speech; The Lesson of Balzac1 (1905); 'American Scene1 (1906); 'Italian Hours1 (1909); 'Julia Bride1 (1909); 'Finer Grain1 (1910) ; 'The Outcry1 (1911) ; 'Small Boys and Others (1913). In very many of his stories he describes the life of Americans in Europe, and they depend for much of their interest upon the contrasts between American and European character and institutions. Though a very prolific writer, he was never careless, his style being always felicitous, while in respect to the substance of his work he ranked as the subtlest of American novelists. A

dramatic version of 'The American1 was produced in London in 1891, but neither it nor his subsequent play 'Guy Domville1 (1895) was successful. He turned his intimate knowledge of modern French literature to good account in his volume of essays entitled 'French Poets and Novelists1 (1878). Other works of a similar kind are 'Transatlantic Sketches1 (1875) ; 'Portraits of Places1 (1884) ; 'A Little Tour in France1 (1884; new ed., 1900) ; 'Par¬ tial Portraits1 (1888); 'Essays in London and Elsewhere1 (1893). He also contributed the volume on 'Hawthorne1 (1879) in the 'Eng¬ lish Men of Letters1 series, and in 1903 pub¬ lished 'William Wetmore Story and his Friends,1 a notable biography. A revised definitive edition was issued of his 'Novels and Tales1 (24 vols., 1909). See Ambassadors, The; Daisy Miller.

JAMES, James Alton, American educator : b. Hazel Green, Wis., 17 Sept. 1864. He is a graduate of the State Normal School, Platte- ville, Wis., and the University of Wisconsin 1888, receiving his Ph.D. from Johns Hopkins University in 1893. He was superintendent of schools in Darlington, Wis., 1888-90; professor of history in Cornell College, Iowa, 1893-97. Since 1897 he has occupied the chair of his¬ tory in Northwestern University as head of the department, and is also the chairman of the graduate student work of the university. He is a member of several educational and his¬ torical societies. He is the author of (with

Allen Hart Stanford) 'Government in State and Nation1 (1901); 'Our Government1 (1903); 'American History1 (1909); 'Read¬ ings in American History1 (1914). He is the editor ot the 'History of Contemporary Civil¬ ization1 by Charles Seignobos (1909), and the George Rogers Clark Papers for the Illinois State Historical Society Papers (1912).

JAMES, Jesse W., American outlaw : b. Clay County, Mo., 1847 ; shot to death, Saint Joseph, Mo., 3 April 1882. During the Civil War the family, sympathizing with the cause of the South, suffered greatly at the hands of their neighbors who favored the Union side. Jesse became a member of the guerilla band led by Quantrell and soon established a reputa¬ tion for courage and daring second to none. At the end of the war he surrendered and re¬ turned to his home. In the following year, however, enemies of his family managed to have him declared an outlaw, and thereafter for 16 years he was hunted throughout the land, a price upon his head. His name became a household word throughout America during this long struggle with the authorities. Many romantic adventures and not a few crimes were ascribed to him. He was invariably successful in the exploits he undertook to replenish his stores, of ammunition or food, usually effected by train or bank robberies. A reward of $10,000 for his capture dead or alive was offered by the Governor of Missouri, and James was be¬ trayed by the

Ford brothers, members of his own gang. Charles and Robert Ford surren¬ dered themselves after shooting James, received the reward, and, strange to relate, were placed on trial and sentenced to death for murder. They were pardoned by the governor. Later in the same year another member of James' band, his. brother Frank, surrendered, was in jail awaiting trial for over a year and finally released. He subsequently occupied a farm in the vicinity of Excelsior Springs, Mo., where he died, 18 Feb. 1915. It has been asserted that Jesse James desired to surrender if he could be given a fair trial. Jesse was far from the criminal desperado many have represented him to be. He was chivalrous to women, and during the long years of his struggle with the law committed no crime with the primary in¬ tention of taking human life, but was solely actuated by the motive of maintaining his • status as a free man. Consult James, Jesse, Jr., 'Jesse James, My Father1 (Independence, Mo..

1899).

JAMES, John Angell, English Congrega¬ tional clergyman : b. Blandford, Dorsetshire, 6 June 1785; d. Birmingham, 1 Oct. 1859. He was educated at the denominational college at Gosport. He entered the ministry when 17 years old and before he was 20 was settled as pastor of the Carr's Lane Parish, Birmingham, where he served until his death. He was one of the most noted preachers of his time. He was the author of 'The Anxious Inquirer1 (1849, many other eds.) ; 'Christian Charity Ex¬ plained1 (6th ed., 1850) ; 'Christian Father's Present1 (13th ed., 1841) ; 'Christian Fellow¬ ship1 (11th ed., 1855) ; 'Christian Professor Addressed1 (5th ed., 1852) ; 'Christian Prog¬ ress1 (1853) ; 'Church in Earnest1 (4th ed., 1851); 'Course of Faith1 (1852); 'Earnest Ministry, the Want of the Times1 (6th ed.,

1855); (Elizabeth Bates (18-15); (Family*

Monitor (9th ed., 1848) ; (Female Piety* (4th ed., 1855) ; (Sunday School Teachers' Guide) (17th ed., 1845), and many other minor works. His works were collected and published in 17 vols. (1860-64). The last volume contains his autobiography. Consult also Dale, R. W.,*

JAMES, Louis, American actor: b. Tre- mont, Ill., 3 Oct. 1842; d. 1910. His first ap¬ pearance on the stage was at Louisville, Ky., in 1864. From 1865 to 1870 he was a member of the company organized by Mrs. John Drew, and from 1871 to 1875 was a member of the famous company of

Augustin Daly, New York. After 1875 he appeared with Lawrence Barrett and Joseph Jefferson. From 1892 to 1895 he starred in a series of classical revivals. His most suc¬ cessful Shakespearean roles were Autolycus, Nick Bottom and Cardinal Wolsey. Consult Clapp and Edgett, (Players of the Present (New York 1900).*

JAMES, Ollie M., American legislator: b. Crittenden County, Ky., 27 July 1871; d. 28 Aug.. 1918. He received an academic education and in 1887 was appointed page of the Kentucky legislature. He made his law studies under his father and in 1891 was admitted to the Ken¬ tucky bar. In the contest for the governorship of Kentucky Mr. James was one of the attor¬ neys for the late Governor Goebel. In 1896 he was a delegate to the Democratic National Con¬ vention ; was delegate-at-large in 1904 and in 1908. In the convention of 1908 he seconded the nomination of William J. Bryan for the Presidency. He was chairman of the Ken¬ tucky State Democratic Convention of 1900 and from 1903 to 1913 was a member of Congress from the First Kentucky District On 10 Jan. 1912 he was elected United States Senator for the term 1913—19. In 1912 he was chairman of the Democratic National Convention, which nominated Woodrow Wilson for the Presi¬ dency.

JAMES, Thomas Lemuel, American banker and Postmaster-General of the United States: b. Utica, N. Y., 29 March 1831 ; d. New York, 11 Sept. 1916. He early learned the printer's business and bought out a weekly Whig paper, the Madison County Journal, at Ham¬ ilton; and in 1856 changed its name to the Democrat-Republican, which was for 10 years the most powerful Republican organ in Madi¬ son County. He was collector of canal tolls at Hamilton 1854-73; was appointed inspector of customs in New York 1861; weigher in 1864; and in 1870 was promoted to be deputy collector in charge of the bonded warehouse, which de¬ partment he immediately proceeded to arrange according to a new system. In 1873 President Grant appointed him postmaster of New York, and he was reappointed by President Hayes in 1877. He filled this office with signal success and originated improvements in the delivery system, involving the whole postal methods of the United States. President Garfield in 1881 gave him the portfolio of Postmaster-General, and his chief important service was his initia¬ tion of inquiries which led to the investigation of the Star Route frauds, the saving of over $2,000,000 a year to the department, and a rec¬ ommendation for a reduction of letter postage from three cents to two cents which was soon

adopted. He received the degree of A.M. from Hamilton College in 1863 and that of LL.D. from Madison University 1883, Saint John's College 1884 and Saint Francis Xavier's Col¬ lege 1886. From 1882 he was president of the new Lincoln National Bank of New York city, which

brought him into intimate relations with some of the most powerful financiers of the metropolis and the nation. In 1895 he was elected mayor of Tenafly, N. J.

*JAMES, Thomas Potts, American botan¬ ist : b. Radnor, Pa., 1803 ; d. 1882. He acquired an interest in a wholesale drug firm in Phila¬ delphia, in which city he lived nearly all his life. Removing to Cambridge, Mass., in 1867, he be¬ gan extensive researches in botany. Many of his papers appeared in Proceedings of the Philadelphia Academy of Natural Sciences * and in Proceedings of the American Academy of Arts and Sciences.* He wrote the article KMusci** in King's (Exploration of the 40th Parallel * and collaborated with Lesquereux in (Manual of American Mosses) (1884).*

JAMES, William, English naval historian : d. London, 28 May 1827. The date of his birth is unknown. In 1801-13 he practised as a proc¬ tor in the Jamaica Admiralty Court. He was interned in the United States when war broke out with Britain in 1812, but he effected his es¬ cape and reached Halifax. In the Naval Chronicle he published a number of articles which he signed ((Boxer.)) In 1816 appeared his (Inquiry into the Merits of the Principal Naval Actions between Great Britain and the United States, which in the following year ap¬ peared in an enlarged edition. This work was very partisan, James being violently anti-Amer¬ ican. Cooper wrote a refutation in 1839, but erred on the other side. Roosevelt's (Naval War of 1812 J (1882) was the first fair pres¬ entation of the subject. James' fame rests, however, on his great (Naval History of Great Britain,* begun in 1819, which appeared in five volumes (1822-24) and reprinted (6 vols., 1826). Editions appeared in 1837 and in 1886, and an epitome by R. O'Beirne appeared in 1888. In 1895 an (Index* was issued by the Naval Records Society.*

JAMES, William, American psychologist and philosopher: b. New York, 11 Jan. 1842; d. Chocorua, N. H., 26 Aug. 1910. He was the son of Henry James, theologian, and brother of Henry James, novelist. He was educated in New York and abroad, studied in 1861-63 at the Lawrence Scientific School of Harvard Uni¬ versity, accompanied the Thayer expedition to Brazil in 1864—65, was graduated from the Har¬ vard Medical School in 1870, in 1872 was ap¬ pointed instructor in anatomy and physiology at the school, and in 1876 assistant professor of physiology. In 1885 he was appointed assistant professor of philosophy in the university, in 1889 professor of psychology, and subsequently professor of philosophy. He was Gifford lec¬ turer on natural religion in the University of Edinburgh (1899-1901); Lowell Institute lec¬ turer (1906) ; and Hibbert lecturer on the mod¬ ern status of philosophy at Manchester Col¬ lege, Oxford (1909). His best-known work was done in the domain of analytical

psychol¬ ogy in which he won European recognition. His works are marked by a most readable style and skilful exposition of different topics, no-*

tably <(radical empiricism® and "pragmatism.® He was a founder of the American Society for Psychological Research in 1884, and published Principles of Psychology) (1890) ; and Psy¬ chology, Briefer Course5 (1892), both popular textbooks; (The Will to Believe> (1897); (Human Immortality) (1898) ; (Talks to Teach¬ ers on Psychology) (1899); (The Varieties of Religious Experience) (1902) ; PragmatisnP (1907) ; (A Pluralistic Universe) (1909) ; (The Meaning of Truth 5 (1909) ; < Memories and Studies5 (1911) ; Pome Problems of Philos¬ ophy5 (1911); (Essays in Radical Empiri¬ cism5 (1912). Consult (Essays Philosophical and Psychological in Honor of William James, by his Colleagues at Columbia University5 (London 1908) ; Flournoy, Th., (The Philoso¬ phy of William James5 (New York 1917) ; Knox, H. V., Philosophy of William James5 (London 1914) ; Royce, J., (William James, and Other Essays on the Philosophy of Life5 (New York 1911).

JAMES, Epistle of, one of the seven New Testament epistles called "Catholic55 or "Gen¬ eral,55 because addressed, unlike Paul's writings, to no specific group or individual, but "to the twelve tribes of the Dispersion,55 the latter term being given no such local limitation as is at¬ tached to it in 1 Peter i, 1. Though lacking the customary thanksgiving, prayer and concluding salutations or benediction, the conventional epistolary tokens appear in the introductory sig¬ nature, address and formula of greeting, fol¬ lowed by some 60 hortatory imperatives. The readers addressed as "the twelve tribes,® like those who in 1 Peter i, 1, and Gal. vi, 16, are styled "the elect® and "the Israel of God,® are Christian believers. (Compare Gal. iii, 29; Phil- iii, 3). The writer has added to his name "James® no further clue to his identity, such as Paul and Peter's designation of themselves as "apostles,® or the words "the brother of James,® attached to the name of Jude (ver. 1). The assumption that the author was "James, the Lord's brother® (Gal. i, 19; ii, 9, 12) has made from the time of Origen (a.d. 230) an inevitable and fascinating appeal to the imagination. The adamantine obstacle, however, to the theory of a pre-Pauline date and authorship lies in the drastic polemic of ii, 14-26 against such an an- tinomian abuse of his distinctive doctrine of saving faith as he foreshadowed and repro¬ bated in Phil, iii, 18 f. A Hebrew Christian, familiar with Old Testament characters, the Septuagint version and the Wisdom books, he shows no trace of the mvsticism of Paul and

John, making no single allusion to Christ's in¬ carnation, death, resurrection, or to forgiveness in His name. Twice only does he mention Jesus' name (i, 1; ii, 1), though no whit behind Paul in reproducing the ethical lucidity and rigor of his divine Master. His literary form is that of the Greek diatribe, the traditional style of the street-preacher of philosophic morals, shaped to arrest and hold the attention of pass¬ ers-by (Acts xvii, 17 f). It is "wisdom crying aloud in the street® (Prov. i, 20) with bold challenges, pointed questions, imaginary inter¬ ruptions from objectors, striking metaphors, co¬ gent similes and abrupt transitions and repeti¬ tion of topics. His method is not the syste¬ matic development of argument, but that of antiphonal contrast, as found in the Proverbs

and the Sermon on the Mount. Thus the dou¬ ble meaning of the Greek word rcetpao/iog sug¬ gests in i, 2-11 the mutual aspects of prayerful fortitude in. trials from without, and in i, 12-18 the tragic issues of temptation from within. Similarly the ethics of word and deed are treated in recurrent refrains. Tongue religion and heart religion are contrasted in i, 19-26; reckless and conceited censoriousness with the spirit of peace-making, in iii, 1-18; the thought¬ less boasting of future plans with trust in Providence, in iv, 13-17 ; and the Oriental habit of profane swearing with simplicity of utter¬ ance in v, 12. So in i, 27— ii, 26 the caricature of a dead faith that courts the rich and feeds the poor with pious platitudes is opposed to a living faith of deeds; and in v, 1-6 and iv, 1-12 the spirit of worldly greed and pride is set over against a humble walk with God. In v, 7-11, 13-20, as before in i, 5, prayer for patience and mutual confession and intercession are com¬ mended.

Though authorship and date must remain uncertain, as in the case of Job and Hebrews, yet none the less aptly do the words of the Pastoral Epistle apply to this Scripture as "profitable for teaching, for reproof, for cor¬ rection, for instruction which is in righteous¬ ness.® (2 Tim. iii, 16).

Bibliography. — Discussion of authorship, date, style, vocabulary may be found in New Testament Introductions: T. Zahn (Eng. trans., 1909); J. Moffatt (1911); B. Weiss (1897); H. J. Holtzmann (1892) ; A. Juelicher (1904) ; A. S. Peake (1910) ; and detailed exegesis in commentaries: J. B. Mayor (3d ed., 1910) ; W. Beyschlag's Meyer (3d ed., 1897) ; H. von Soden in Holtzmann's (Hand-Commentar5 (3d ed., 1899) ; Oesterley in Expositor's Greek Tes¬ tament (1910) ; E. H. Plumptre in (Cambridge Bible5 (1884); F. J. A. Horj (1909); R. J. Knowling in (Westminster New Testament5 (1904) ; J. H. Ropes (1916).

Marcus D. Buell,

Professor of New Testament Greek and Exe¬ gesis, Boston University

School of Theology.

JAMES BAY, Canada, an inlet of Hudson Bay, in the southern part, named in honor of Capt. Thomas James, an English navigator, who explored this body of water in 1631-33. The bay is about 320 miles long and from 140 to 160 miles wide. It contains a number of islands, the largest, Agomska, being about 70 miles in length. Several large rivers flow into James Bay; the Albany, Moose, Noddawai and East Main are the largest: Moose Factory, at the mouth of Moose River, on the southern shore, is the most important Canadian trading station, next to York Factory, of the Hudson's Bay Company.

JAMES OF COMPOSTELLA. See Com-

postella, Order of Saint James of; and James, Saint, the, "Greater.®

JAMES ISLAND, S. C., an island in Charleston Harbor, famous for its. sea island cotton. It is separated from the city of Charleston by the Ashley River and the South Channel of the harbor, here a little over a mile wide. On the northeast coast of the island is Fort Johnson and nearby a quarantine station. Just northeast of the island is Fort Sumter (q.v.). The battle of Secessionville, fought on

16 June 1862, and several other engagements of the Civil War, took place on this island. Pop.

3,147.

JAMES MILLIKEN UNIVERSITY,

Ill., an organization which includes three institu¬ tions of learning: the Lincoln College, located at Lincoln, Ill. ; the Industrial School and the Decatur College, at Decatur, Ill. The synods of the Cumberland Presbyterian Church of Iowa, Indiana and Illino's, founded in 1865 the Lincoln College, comprising schools of art, music and elocution, a classic college and a preparatory department, at times a commercial school. The Decatur College and Industrial School are endowed institutions- opened in 1903. In 1900-01 a fund for a university was pro¬ vided by gifts from James Milliken, an appro¬ priation from the Cumberland Presbvterian synods of Iowa, Illinois and Indiana, and dona¬ tions from the citizens of Decatur. The three schools mentioned were united in the James Milliken University, but each one retains to a certain degree its own independence.

Lincoln College has a faculty of 18 and an annual aver¬ age attendance of nearly 300 students. The Decatur institutions have a faculty of 58 and an annual average attendance of over 1,100 stu¬ dents.

JAMES RIVER, a stream which, rising in Wells County, in North Dakota, flows south into South Dakota, and in a southerly direction across the State into the Missouri River. It is about 450 miles long. On or near the James River are Aberdeen, Huron, Mitchell and Yankton near the mouth, in South Dakota; and Jamestown in North Dakota.

JAMES RIVER, the largest river in Vir¬ ginia, rises in the western part of the State, in the Alleghany Mountains, the head-waters being the Jackson and Cowpasture rivers which unite at Iron Gate in Virginia. The James flows southeast to Buchanan, in Botetourt County, then northeast to Balcony Falls, where it breaks through the Blue Ridge Mountains, again south¬ east to Lynchburg, then northeast to Scottsville, from which point the general course is south¬ east to the Chesapeake Bay. Its length is about 450 miles. At the Rocketts, just below Rich¬ mond, where the river becomes a tidal stream, is the head of navigation for steamboats of 130 tons, about 150 miles from the mouth. Ocean steamers come up the river as far as City Point, at the mouth of the Appomattox River. From City Point to the mouth, 66 miles, the stream is really a broad, deep estuary with Hampton Roads (q.v.) at its entrance to the Chesapeake. The falls in the river at Richmond, about 100 feet in six miles, furnish a large amount of water power. From Richmond to Buchanan, a distance of nearly 200 miles, the Kanawha Canal follows the course of the river and utilizes extensive reaches of slack water navigation. The chief tributaries of the James are the Chickahominy (q.v.) from the north, and the Appomattox from the south. The broad body of water at the entrance into Chesapeake was early explored by European navigators, and Jamestown (q.v.)" the first permanent English settlement, was located on this river.

JAMESON, ja'me-son, Anna Brownell Murphy, English author and art critic: b. Dub¬ lin, 17 May 1794; d. Ealing, Middlesex, Eng¬

land, 17 March 1860. In 1827 she was married to Robert Jameson, afterward speaker of the house of assembly of Upper Canada, and At¬ torney-General, but the union proved unhappy. She made her first appearance as an authoress by the publication of the (Diary of an En-nuyee5 (1826), which was very favorably re¬ ceived. Her (Loves of the Poets5 appeared (1829), and was succeeded by (Memoirs of Fe¬ male Sovereigns5 (1831) and Characteristics of Shakespeare's Women 5 (1832). In 1836

Mrs. Jameson visited her husband in Canada and published (Winter

Studies and Summer Rambles in Canada5 (1838). Later works of hers include Companion to the Private Gal¬ leries of Art in London5 (1842) ; (Memoirs of the Early Italian Painters5 (1845) ; (Memoirs and Essays on Art, Literature, and Social Mor¬ als5 (lo46) ; (Sacred and Legendary Art5

(1848) ; (Legends of the Monastic Orders5 (1850) ; (Legends of the Madonna5 (1852). In these the author has given admirable exposi¬ tions of the works of the old masters and the religious bearings of mediaeval art. Few writers have done so much to refine the public taste and diffuse sound canons of art criticism. Consult Macpherson, (Memoirs of the Life of Anna Jameson5 (1878).

JAMESON, John Franklin, American his¬ torical writer: b. Boston, 19 Sept. 1859. He was graduated from Amherst College in 1879 and was professor of history at Brown University 1888-1901. He has been managing editor of the American Historical Review from 1895 and the head of the department of history at the University of Chicago from 1901. He has pub¬ lished (History of Historical Writing in Amer¬ ica5 (1891) ; ˆDictionary of United States His¬ tory5 (1894; republished as the encyclopedic Dictionary of American History,5 3 vols., 1904).

JAMESON, Sir Leander Starr, South

African statesman: b. Edinburgh, Scotland, 9 Feb. 1853; d. London, 26 Nov. 1917. He studied medicine, took his degree, and was gaining a reputation as a skilful young surgeon when he went to South Africa in 1878, where he made the acquaintance of Cecil Rhodes in Kimberley. In 1889, while Rhodes was forming the Char¬ tered Company, he sent Jameson as envoy to negotiate with the Matabele chief Lobengula. Jameson's tact and medical skill overcame the dusky potentate's objections to the Rhodes ex¬ pedition, which set out in 1890. In 1891 Jameson was appointed administrator of Rhodesia, acting as commander, judge and prime minister. In the Matabele rising of 1893 he accompanied a column to Bulawayo, where he remained after the flight of Lobengula to establish another British administration. The creation of Rhodesia caused great resentment in the Transvaal Republic, as it limited Boer expansion to the north. The struggle between President Kruger (q.v.) and the Uitlanders striving for government reform led to tlie be¬ lief that a rising among the latter was im¬ minent. In December 1895 Jameson, at the head of a small force of Chartered Company's police and volunteers, stood waiting on the Bechuana- land border for the signal. On account of dis¬ agreement, however, the revolt in Johannes¬ burg was postponed, and Jameson, with or without the orders of Rhodes, forced the hands of the conspirators by invading the Transvaal

with 500 men and three field guns on 28 Dec. 1895. On 2 Jan. 1896 they were surrounded by the Boers near Dornkop, where they were com¬ pelled to surrender. The British government repudiated Jameson's action and entirely dis¬ owned him. He was brought back to Eng¬ land, tried and sentenced to a term of im¬ prisonment. He was released after four months on account of sickness. The ill-starred raid produced untold trouble in South Africa, whither Jameson returned to the assistance of Rhodes. The latter died before the close of the South African War (q.v.), and Jameson was elected to his seat in the Cape house of assembly. He had a burdensome ((past® to live down, but by 1904 he became the recognized leader of the Progressive party. In that year he became Prime Minister of Cape Colony, holding that office till 1908. His administra¬ tion was marked by economy, internal reforms and a sincere desire to reconcile the conflicting elements of Boer and Briton. Rhodes' great dream of union in South Africa was un¬ swervingly pursued by Jameson, and it was in a large measure due to his efforts that that ideal was realized in 1909. The policy which he stamped upon the Unionist party at the Bloem¬ fontein conference in 1910 has been maintained to the present day. From 1908 to 1912 he sat in the Opposition ; in the latter year illness compelled him to resign and return to England. In 1913 he was elected chairman of the Char¬ tered Company in London. As chairman of the Central Prisoners of War Committee dur¬ ing the European War he performed valuable service to the government. In many British eyes ((Doctor Jim® was regarded as a hero; what he tried to do with 500 men it took the government 2,500,000 men and a three years' war to accomplish. See Jameson Raid; Rhodes, C. ; Rhodesia ; South Africa ; South African War.

JAMESON, Robert, Scottish naturalist: b. Leith, 11 July 1774; d. 28 April 1854. In 1800 he went to Freyberg, Saxony, to study natural history under Werner, and in 1804 was elected to the professorship of natural history in the University of Edinburgh. In 1809 he published (Elements of Geognosy, 5 in which he gave a comprehensive exposition of the Nep¬ tunian theory as modified by Werner. In 1819, with Sir David Brewster, he founded the Philosophical Journal of Edinburgh, of which he became editor. He also founded, in 1826, the New Philosophical Journal. Others of his principal works are (System of Mineralogy 5 (1804) ; (Mineralogical Description of the County of Dumbarton5 (1805) ; (Manual of Minerals and Mountain Rocks5 (1821) ; Ele¬ ments of Mineralogy5 (1837). He was a fel¬ low of almost all the learned societies of Europe.

JAMESON RAID. See Jameson, Lean-

der Starr.

JAMESONITE, a sulphide of lead and antimony, Ph2Sb2Sr>. Known as feather ore and a minor source of lead in various mines in Arizona, California, Nevada, South Dakota and Utah.

JAMESTOWN, British naval coaling sta¬ tion, seaport and town, on the island of Saint Helena, in the south Atlantic. It contains an vol. 15 — 39

observatory. Nearby is shown the tomb of Napoleon Bonaparte, whose body was trans¬ ported thence to Paris in 1845. Pop. 1,439.

JAMESTOWN, N. D., city, county-seat of Stutsman County, on the James River, and on the main line and a branch of the Northern Pacific Railroad, about 80 miles west of Fargo on the Red River of the North, and 100 miles east of Bismark on the Missouri River. It is situated in an agricultural region, noted for its extensive wheat fields and large stock farms. Some of the industrial establishments are flour¬ mills, grain elevators, stock-yards, wholesale groceries, lumber, brick yards and municipal waterworks. It is the trade centre for a large extent of country, and the small towns off the railroad procure their local supplies of manu¬ factures and groceries from Jamestown. Among prominent public buildings are the Ro¬ man Catholic cathedral, a fine courthouse, pub¬ lic library, State hospital for the insane, hos¬ pital, Saint John's Academy and the Presby¬ terian College. Pop. (1920) 6,627.

JAMESTOWN, N. Y., city in Chautauqua County, on the Chadakoin River, which is the outlet of Chautauqua Lake upon the southern end of which Jamestown is lo¬ cated; on the main line of the Erie Railroad and connected with the main lines of the New York Central and Nickle Plate railroads by two modern electric traction lines, the James¬ town, Westfield and Northwestern and the Chautauqua Traction Company, the one skirting the east side of Chautauqua Lake and the other the west side; 70 miles by rail southwest of Buffalo; Jamestown and Warren Electric con¬ nects with Pennsylvania at Warren, Pa.; lake steamers make regular trips connecting with all towns on Chautauqua Lake. The first perma¬ nent settlement was made in 1810 by settlers in search of agricultural lands. The location, so near the outlet of the lake and in the midst of a fertile agricultural region, attracted settlers, and in 1815 the town was planned; incorpo¬ rated as a village in 1827. Jamestown is the principal furniture centre of the East, has large manufactories of metal furniture, metal doors and interior trim ; has several large worsted, cotton, yarn and towel mills ; manufactures photographic papers, automobile axles and radiators, wood carvings,

washing machines, veneer and panels, voting machines, pianos, pav¬ ing brick, tools, window screens, mirrors, bee¬ hives, etc. The James Prendergast Free Li¬ brary cost $125,000 and contains 25,000 volumes and a number of very fine paintings. The high school and 12 branch schools furnish oppor¬ tunity for an excellent education. The prox¬ imity of the famous Chautauqua Institution brings to the vicinity annually many of the great authorities of the world in science, art, letters, government, music, etc. The municipal officers of Jamestown are a mayor, who holds office two years, a city council, a clerk, over¬ seer of the poor, sealers of weights and meas¬ ures, market-master, constables,, assessors, jus¬ tices of the peace and police justice, all of whom are elected by the people. Other subordinate officials are appointed by the mayor subject to the approval of the council. Jamestown was the home of Reuben E. Fenton (q.v.). There are about 10,000 Swedes now living in James-

town. Those who were born in Sweden still use their native language in their homes, but all are naturalized American citizens. The Norden Club is one of the finest Swedish clubs in the country and has a number of very fine examples of Swedish art in paintings and sculpture. Pop. (1920) 38,917.

JAMESTOWN, Va., in James City County, the first permanent English settlement in the New World, and capital of Virginia 1607-98, on what was a peninsula of the James River some 32 miles from its mouth, nearly opposite the present Williamsburg, with a neck over¬ flowed at high tide, and since then washed away, leaving the place an island; the front also has been eaten away by the river, so that the site of the original huts is submerged. It was ill chosen and malarious, and the place never prospered; but no towns did in early Virginia. It was founded 13 May 1607 by the company of Gosnold, Wingfield, John Smith, etc., with Captain Newport; and was first a triangular wooden blockhouse called Fort James, after the king, around which some huts sprang up. These were entirely destroyed by fire in 1608, but soon rebuilt. In 1609 there were 50 or 60 wooden houses of one and two stories, with a chapel and a storehouse, sur¬ rounded by a log palisade 15 feet high and with a fort at the neck. During the Starving Time of 1609-10 it was nearly depopulated, and on 7 June 1610 the remnant deserted it and started for England; but meeting Lord Delaware with provision ships at the mouth of the river, all turned back and reoccupied it. Delaware found the chapel ((ruined and unfrequented.55 In 1616 John Rolfe says there were 50 inhabitants. By 1619 a church of hewn timber 50 by 20 had been built; in July 1619 the first legislative

assembly in America was held there. A timely warning enabled its inhabitants to escape the great Indian massacre of 1622, and it was a place of refuge for those outside it. The first brick edifice in Jamestown was erected in 1640; a brick church some time after; between 1676 and 1684 was built the brick church whose ivy-mantled tower still stands, and which is incorrectly supposed by many tourists to be the one in which Rolfe married Pocahontas. About the same time a more ambitious fort was begun, with a maga¬ zine still traceable; but so injudiciously located for guarding the river-channel that it was above instead of below the place to be defended. Jamestown has little history separate from the colony thence till Bacon's Rebellion (q.v.) ; as Berkeley's capital, it was burnt to the ground by Bacon, that it might no longer <(harbor the rogues.® Again rebuilt, in the last decade of the century it was once more destroyed by fire, and never rose from its ashes. It had long been dwindling, and removal of the capital had been mooted, and in 1698 Williamsburg was made the capital. Till very recent years the ruins of Jamestown were left to sink gradu¬ ally into the encroaching river; but some years ago the Association for the Preservation of Virginia Antiquities bought it, and with the help of the national government have built a sea-wall and saved the relics from further de¬ struction. Besides the church tower a few tombstones and remains of two or three houses still exist. Consult Tyler, (Cradle of the Re¬ public } (1900).

JAMESTOWN TERCENTENNIAL EX¬ POSITION, a commemoration of the 300th anniversary of the settlement of Jamestown, held at Hampton Roads, Va., 26 April-30 Nov. 1907. The grounds on the south shore of the Roads covered 350 acres. There were eight principal buildings in Georgian style erected around Raleigh court. Lesser buildings housed the exhibits of the several States and foreign countries. In all there were about 2,500 ex¬ hibits grouped into historic arts, education, social economy, machinery and transportation, manufactures and liberal arts, agriculture, forestry, food products, fish and game, metal¬ lurgy and mining. Total admissions aggregated 2,800,000, of which only 1,500,000 were paid. Financially the affair was a fiasco, as the final accounting showed a deficit of $2,655,000. Con¬ sult (Final Report of the Jamestown Ter-Cen- tennial Commission (Washington 1909) and (Official Blue Book of the Jamestown Ter-Cen- tennial Exposition, a.d. 1907> (Norfolk 1909).

JAMESTOWN WEED. See Datura.

JAMI, Nur-Ed-Din 'Abd-ur-Rahman Ibn Ahmad, Persian poet and mystic : b. Jam, Khor- asan, 1414; d. Herat, 9 Nov. 1492. He received an excellent education as is evident from his polished style. He was the last great classic poet of Persia and was deeply versed in Sufic philosophy. In three

JAMIESON, John, Scottish lexicographer : b. Glasgow, 3 March 1759; d. Edinburgh, 12 July 1838. He was educated at the University of Glasgow and also studied for a short time in Edinburgh. In 1789. he was licensed to preach and became pastor of an Anti-burgher congre¬ gation at Farfar; in 1797 he accepted a call to the Nicholson Street Anti-burgher church of Edinburgh. Jamieson's reputation as a man of letters rests on his (Etymological Dictionary of the Scottish Language) (1808-09; supplement 1825). It is a work of great industry and con¬ siderable value as a collection of Scottish words, phrases, customs, etc. ; but as first pub¬ lished had little critical or philological merit, according to the present standard. The philo¬ logical department was greatly strengthened in the edition by Donaldson and Longmuir (1879— 87). Jamieson also published (Ancient Culdees of Iona5 (181J) ; Hermes Scythicus, or the Radical Affinities of the Greek and Latin Lan¬ guages to the Gothic5 (1814) ; (An Historical Account of the Royal Palaces of Scotland.5

JAMITZER, or JAMNITZER, Wenzel,

German goldsmith: b. Vienna, 1508; d. 1585. Early in life he went with his family to Nurem- burg and in 1534 was admitted to the guild of master craftsman. Subsequently he was ap¬ pointed goldsmith to the court, serving succes¬ sively Emperor Charles V, Ferdinand I, Maxi-

milian 11 and Rudolph II. Many fine specimens of his handiwork are extant, including a jewel box in the collection of the Dresden palace, a gilt silver table piece in the Rothschild collec¬ tion, Paris, statuettes in the Treasury at Vienna, a jewel box in the Munich Treasury and a cup belonging to the deposed emperor, Wilhelm II of Germany.

JAMMU, India, capital of the state of the same name in Kashmir, northern India, on the river Tavi. The town and palace are on the right bank of the stream, while on a height on the opposite bank is a great fort overlooking the town. There are extensive ruins which attest the former splendor of the city. It contains the palace of the Maharaja, a hospital, college and many temples. Coal mines are operated in the vicinity and the city is now reached by a rail¬ way. It has a modern water-supply system. Pop. 31,700.

JAN MAYEN, yan mi'en, an island in the Arctic Ocean, about 250 miles northeast of Ice¬ land; area, about 160 square miles. It is vol¬ canic, with an irregular surface, mountainous near the extinct volcano, Beerenburg, about 6,500 feet in height. One of the active volca¬ noes is about 1,500 feet high. There are some large glaciers on the island, one near Beeren¬ burg. The island was named after Jan Mayen, a Dutch navigator, who

discovered the land in 1611. Later it was ascertained that Henry Hud¬ son visited the island in 1607. Vessels from Norway and Scotland occasionally visit the island. In 1882-83 scientists from Austria lived on the island for some months, engaged chiefly in making meteorological observations.

JANAUSCHEK, ya'now-shek, Fanny

(Franziska Magdalena Romance), American actress: b. Prague, Bohemia, 20 July 1830; d. Amityville, L. I., 28 Nov. 1904. She first went upon the stage in Cologne, playing in that city and also in Frankfort, 1848-60, and subse¬ quently played in Dresden and the principal cities of Germany. In 1852 she was married to Capt. Frederick Pillot, of the German navy. She made her first tour in America, 1867-69, playing in the German language and securing most favorable notice. Returning to Germany she studied English, and in 1873 made her sec¬ ond visit to the United States, when she played in English the most exacting Shakespearean roles. She was also very successful in such roles as Meg Merrilies, Mary, Queen of Scots, and in double roles, as in (Bleak House) and other plays. She retired from the stage in 1898.

JANE, Fred T., English naval author: b. 6 Aug. 1870 ; d. 8 March 1916. He was educated at Exeter School, invented the naval war game, was naval correspondent of the Engineer, the Scientific American and the Daily Chronicle, and has written (The Lordship, the Passen, and We1 (1897); (The Port Guard Ship5 (1899);

(All the World's Fighting Ships5 (naval an¬ nual) ; (The Torpedo in Peace and War5 (1898) ; (The Jane Naval War Game5 (1898) ; (The Imperial Russian Navy5 (1900) ; (Ever Mohun5 (1901); (Hints on Playing the Jane Naval War Game5 (1902) ;

011

(1907);

JANE EYRE, ar. For its day (Jane Eyre,5 published in 1847, was a most unconventional novel. It came in the wake of multitudes of sentimental novels in which the heroines were perfect and lifeless beings, and the heroes were all handsome and correct in their conduct. Against this unreality, (Jane Eyre was a pro¬ test, highly emotional, not to say hysterical. The author, Charlotte Bronte, the daughter of a Yorkshire clergyman, had grown up amid the hard surroundings of a bleak parish on the moors, and of boarding schools where the chil¬ dren were ill treated and ill fed. At the age of 30 she decided to put her own rebellious spirit into a novel, which should also follow in some degree the details of her own life. In¬ stead of*

being rich and beautiful, Jane Eyre is a poor and obscure girl, very small and plain in stature, with pale cheeks and green eyes. But she has a keen intelligence, and is thoroughly honest, outspoken and brave. In this heroine of a new type, Charlotte Bronte sought to de¬ pict a young woman who should be true to her opinions, true to herself, under all circumstan¬ ces, whatever might be the consequences to her¬ self or to others. Likewise the hero, Edward Rochester, was of a kind new to fiction. He was unshapely, his features were large and dis¬ torted and he had had an unsavory past. Nevertheless Jane Eyre fell in love with him, to the consternation of readers. There had never been in fiction any proposal of marriage like Rochester's, nor any acceptance like Jane Eyre's, on that moonlit night which ended in thunder and lightning and a deluge of rain.

Though the novelty of (Jane Eyre5 has par¬ tially worn away, it still remains a most inter¬ esting story. It was admired by Thackeray, to whom the second edition was dedicated ; and Trollope praised its just balance between the ordinary incidents of real life and extraordi¬ nary occurrences such as an interrupted mar¬ riage, strange premonitions, dreams and a spec¬ tre. JJane Eyre5 was a sincere book written by the sincerest of women.

Wilbur L. Cross.

JANES, Edmund Storer, American Meth¬ odist Episcopal bishop: b. Sheffierd, Berkshire County, Mass., 27 April 1807; d. New York, IS Sept. 1876. In 1830 he entered the Methodist ministry in the Philadelphia conference, in 1835 became financial agent for Dickinson College, in 1840-44 was financial secretary of the American Bible Society, and in 1844 was elected bishop. In connection with his episcopal duties he trav¬ eled widely in the United States and abroad, and subsequent to the Civil War aided in the reorganization of his Church. He had some reputation as a preacher. Consult Ridgway, H. B., (The Life of Edmund S. Janes5 (New York 1882).

JANESVILLE, Wis., city and county-seat of Rock County, on the Rock River and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroads, about 91 miles northwest of Chicago and 71 miles southwest of Milwaukee. The first permanent settlement as a village was in 1837, and it was chartered in 1853. Janesville is located in an agricultural region, noted for the amount and

quality of tobacco raised. The chief manufac¬ tures are agricultural implements, foundry products, wagons and carriages, furniture, cot¬ ton and woolen goods, flour, fountain pens, porch shades, hammocks, beet sugar, wire fenc¬ ing, nails, cigars, cigar boxes, cigar box labels and fireless cookers. It has large lumber and brick yards and many large tobacco storage houses. There are two national and two State banks. Its principal trade is in its own manu¬ factured goods, farm and dairy products. Some of its principal buildings are the State School for the Blind, the Saint Joseph's Con¬ vent, the Y. M. C. A. buildings, two hospitals, the churches, high school, public library, court¬ house, city hall, government building and audi¬ torium. Its attractive retail stores draw a great deal of trade from all points in southern Wisconsin. The city owns its own waterworks and has the commission form of government. The mayor and two councilmen are elected for six-year terms. The mayor appoints subject to confirmation by the councilmen the city attor¬ ney, city clerk, treasurer, sealer of weights and measures and assessor, also the board of edu¬ cation and directors of the Public Library and fire and police commissioners. The members of the fire and police departments are selected from the eligible civil service list. The city has always had a slow but steady growth and a gradual expansion in industrial and commercial lines. Pop. (1920) 18,293.

JANET, zha-na', Paul, French philosopher: b. Paris, 30 April 1823 ; d. 4 Oct. 1899. He was professor of moral philosophy in the college at Bourges 1845-48, and in the University of Strassburg 1848-57 ; was professor of logic in the Lycee Louis-le-Grand at Paris 1857-64; and from 1867-97 was professor of the history of philosophy at the Sorbonne. In 1864 he was elected a member of the Academy of Moral Sciences ; in 1877 was made an officer of the Legion of Honor. His chief works are (La famille : Legons de philosophic morale1 (1855), awarded a Sorbonne prize; (Histoire de la philosophic morale et politiques dans l'antiquite et dans le temps modernes) (2 vols., 1858), also crowned by the Academy; (Le philosophic du bonheur1 (1862, 1873) ; (Etudes sur la dia- lectique dans Platon et HegeP (1860); (Le materialisme contemporain en Allemagne1 (1864) ; (Histoire de la science politique) (1871); (Problemes du XIXe siecle1 (1872);

(Philosophic de la Revolution frangaise1 (1875); (Les causes finales1 (1877) ; 'Saint- Simon et la Saint-Simonisme) (1878) ; 'Les philosophic frangaise contemporaine) (1879); (Les maitres de la pensee moderne1 (1883) ; (Les origines du socialisme contemporain1 (1883) ; 'Victor Cousin et son oeuvre1 (1885) ; 'La philosophic de Lamennais) (1890); 'Fene- lon) (1892) ; 'Principes de metaphysique et de psychology (1896) ; and translated Spinoza's 'God, Man and Happiness, 1 and Leibnitz's 'New Essays on Human Understanding.1

JANET, Pierre, French psychologist: b. Paris, 30 May 1859. He is professor of psychology in the College of France, director of the psychological laboratories at Salpetriere and specialist on nervous and mental diseases. He has been professor of philosophy at the Lycees of Chateauroux and Havre (1881-89) ; Rollin College and the Lycees Louis-le-Grand

and Condorcct (1889-98); Sorbonne (1898— 1902), and the College of France (1897-1902;. Since this latter date he has been professor of psychology in the College of France. He has published (Etudes sur Malebranche1 (1886) ; v Bacon et les alchimistes1 (1887) ; 'L'Automatisme psychologique1 (1889) ; 'L'Etat mental des hysteriques1 (1893) ; 'Nervoses et idees fixes1 (1898) ; 'Les Obsessions et la psychas- tenie1 (1903) ; The Major Symptoms of Hysteria1 (lectures delivered at Harvard Uni¬ versity in 1907).

JANEWAY, Edward Gamaliel, American

physician: b. near New Brunswick/iN. T., 1841; d. 1911. In 1860 he was graduated at Rutgers College and four years later from the New York College of Physicians and Surgeons. During the Civil War he served as acting medical cadet at the Newark Army Hospital. From 1864 to 1866 he was a member of the staff of Bellevue Hospital and subsequently engaged in private practice. In 1872 he was instructor in anatomy at New York University and from 1873 to 1876 taught materia medica and therapeutics in the Bellevue Hospital Medical College. In 1876-81 he was professor of pathological anatomy, from 1881 to 1884 asso¬ ciate professor of the principles and practice of medicine, and in 1884-91 professor at the latter institution. In 1897 he became professor of clinical medicine at University and Bellevue Hospital Medical College. In the following year he was appointed dean, serving in this capacity until 1905. In the same year he was appointed, professor of medicine. He was visit¬ ing and consulting physician to several hospitals of New York city; was president of the Ameri¬ can Academy of Medicine, and of the Associa¬ tion of American Physicians. For six years, beginning in 1875 he held the public office of commissioner of health.

JANICULUM, or MOUNT JANICU-

LU.S, a hill on the west bank of the Tiber, op¬ posite old Rome. It rises to a height of 300 feet above the sea and affords a fine view of the city. It was also known as Mons Aureus (Montario) and during the reign of Augustus was included in the city limits, becoming the 14th ward as Regio Transtiberina (Trastavere). The Sublicion Bridge first connected it with Rome ; the Himilius Pons was added in 181 b.c. and Pons Valentinianus in

366 a.d. Con¬ sult Baedeker, ‘Central Italy and Rome1 (15th Eng. ed., Leipzig 1909) and Platner, Topog¬ raphy of Ancient Rome1 (New York 1912).

JANIN, Jules Gabriel, French critic: b.

Saint Etienne, department of the Loire, 16 Feb. 1804; d. Paris, 20 June 1874. He was educated at Saint Etienne and at the College Louis-le-Grand; studied law and became a private tutor in the Latin quarter of Paris; and then turned’ to literature, becoming editor, novelist, journal¬ ist and critic. He soon became a contributor to several papers, notably the Liberal opposition paper Le Figaro, and the government paper Quotidienne, and in 1836 became connected as dramatic critic with the Journal des Debats, in the columns of which he wrote for nearly 40 years. He possessed a wonderful piquancy of style and an airy grace of sentiment and wit, which made him a delightful retailer of small talk, but as a critic, however, he was utterly in¬ consistent through lack of any general prin-

ciples of judgment, and said the first thing that entered his mind, though fortunately his lack of judgment was linked with amiability. He was an indefatigable worker and was in con¬ stant demand by the publishers of Paris to re¬ view books, write prefaces, and do other literary work. Of his published works, one or two of which are remarkable both in substance and style, the following are noteworthy: (L’ane Mort et la Femme Guillotinee) (1829), which went through several editions; (Histoire de la litterature dramatique en France) (6 vols.,

1858), a selection of his weekly feuilletons, altered and remodeled so as to present a sketch of the history of the French stage and dramatic artists during nearly a quarter of a century; (Rachel et la tragedies a biographical and critical work upon that great tragic artist, with photographic illustrations (1859), and a translation of (Horace} into French (6th ed., 1885). His (CEuvres de Jules JaniiP (12 vols., 1875-78), and (Correspondence) (1877) ap¬

peared after his death. He became a member of the French Academy in 1870.

JANINA, or YANINA, Greece, town near the frontier of Albania, on the Lake of Janina, 40 miles inland from the shore opposite Corfu, in the northwestern part of the kingdom. It contains churches, mosques, synagogues, a library, hospital and gymnasium. It contains many ruins and

buildings which attest its former splendor. Goldsmithing is carried on as also is the manufacture of silk goods, leather and colored linens. The town belonged to the Eastern or Byzantine Empire in the 9th century. The Normans destroyed it twice in the 11th and 12th centuries and in 1430 it became a pos¬ session of Turkey. Under Turkish rule it be¬ came the capital of the vilayet of Janina. The Greeks besieged the place in 1913 and took it on 6 March. Under the terms of the treaties of London and Bucharest Janina became part of the kingdom of Greece. Pop. 16,804.

JANIS, Elsie (Elsie Janis Bierbower), American actress : b. Columbus, Ohio, 16 March 1890. She was educated by private governess and teachers ; made her first appearance on the stage as Cain in (The Charity BalP (1896). In 1898-1903 she played in vaudeville ; starred in (The Belle of New York) in 1904; later ap¬ peared in (The Fortune Teller) and (The DuchessP She starred in (The Vanderbilt Cup) in 1905-07 ; and later under the manage¬ ment of Charles B. Dillingham in (The Hoy¬ den,) (The Fair Co-ed) (1908-09) and (Slim Princess) (1910-11). In 1911 she appeared in her own play (A Star for a Night and in 1913 in (The Lady of the Slipper.) She appeared in London in 1914 in (The Passing Show.**

JANITSCHEK, ya'ne-chek, Hubert, Aus¬ trian historical art writer: b. Troppau, Silesia, 30 Oct. 1846; d. Leipzig, 21 June 1893. He was educated at the university at Gratz 1868-73, from the latter year until 1877 pursued the study of art history in Italy, from 1877-79 was custodian of the Austrian Museum of Art and Industry in Vienna, and was subsequently pro¬ fessor in the universities of Prague (1879), Strassburg (1881) and Leipzig (1891). He was the author of the following biographies in Dohme's (Kunst und Kunstler — Andrea del Sarto, Bellini, Paolo Veronese, Tintoretto, etc.; and also wrote (Die Gesellschaft der Renais¬*

sance in Italien und die Kunst (1879) ; (Zwei Studien zu Geschichte der karolingischen Malerei* (1885) ; (Geschichte der deutschen MalereP (in Grote's (Geschichte der deutschen Kunst,) (Berlin 1890); (Dantes Kunstlehre und Giottos Kunst) (Leipzig 1892), etc. His wife, Marie (b. Vienna, 23 July 1859) became known as a poet and novelist, her principal works be¬ ing (Legenden und Geschichten) (1885) ; (Im Kampf um die Zukunft,) an epic poem (1887) ; (Gesammelte Gedichte) (2 vols., 1892) ; (Aus Alten Zeiten) (1900) ; the novels (Aus der Schmeide des Lebens) (1890) ; (Lichthungrige Leute} (1891); (Atlas* (1893); (Gott hat es gewollt* (1895); (Frauenkraft) (1900); bar¬ ter Sieg) (1901), etc.*

JANIUAY, ha-ne-wi, Philippines, a pueblo of the province of Iloilo, Panay, situated 18 miles northwest of the town of Iloilo, near the Jalaur River. It lies in a hilly country and petroleum has been reported in the vicinity. Pop. 28,700.

JANIZARIES, j an'i-za-riz (Turkish, jeni- tcheri, new soldiers), an infantry force of Tur¬ key, first organized by the Sultan Orkhan about 1330, and in 1362 increased to about 10,000 by Amurath I, who gave them considerable im¬ portance by bestowing on them special privi¬ leges. The janizaries thus became a class of warriors so deeply imbued with the military spirit that they proved in many instances a means of salvation to the empire. It was their boast that they had never fled in battle, and they were the nerve and sinew of the Ottoman army. The regular troops of janizaries at one time numbered 60,000 or more, but they were afterward reduced to 25,000. They were kept in barracks in Constantinople and a few other cities. The irregular troops amounted to 300,000 or 400,000, and were scattered among all the cities of the empire, in time of peace performing police duties. The janizaries who constituted the sul¬ tan's bodyguard became in time so dangerous and their insurrections so frequent that several unsuccessful attempts were made to reform or disband them. In 1826 they rebelled on account of a proposal to form a new militia, when the sultan, Mahmoud II, having displayed the flag of the Prophet, and being supported by their commander-in-chief, defeated the rebels and burned their barracks, and many of them perished in the flames. A royal proclamation abolished the corps. As many as 15.000 were executed, and fully 20,000 were banished.

JANK, Angelo, German artist : b. Munich, 1868. He was educated at the Munich Academy under Hocker and Lofftz and in 1907 he was appointed to a chair there. He excels in the execution of hunting scenes. In 1909 his (The Hunt) and (The Horsewoman) were exhibited at the Metropolitan Museum, New York. In addition to these he has executed (Mailed De¬ fense,) owned by the king of Italy; (The Hurdle Race,) in the Elberfeld Museum; statue of the Duke of Saxe-Coburg-Gotha ; (Princess and Swineherd,) in Munich. The German gov¬ ernment commissioned Jank to execute an his¬ torical series in the Reichstag. He is well known also for his colored lithographs.

JANKO, yon'ko, Paul von, Hungarian pianist and inventor: b. Totis, Hungary, 1856. He made his musical studies at the Conservatory

of Vienna and at Berlin tinder Ehrlich. His hands being very small, his execution on the piano was hampered through not being able to reach an octave. To obviate this difficulty he invented (1882) the keyboard known

by his name. He made several tours in 1886-90 to demonstrate its practicability, introducing it first in London and later in New York. He removed to Constantinople in 1892. The key¬ board has six rows of keys placed fanwise in a semi-circle, with three keys to each note, one below the other, and is sometimes called the chromatic keyboard. It is claimed that finger¬ ing is much easier and simpler by this method, which despite its undoubted merit has not taken popular hold. The keyboard can be attached to any pianoforte, grand, upright or square.

JANNARIS, Anthony, Greek educator: b. Laklcoi, a village in Kydonia, southwest of Canea, island of Crete, 25 Aug. 1852; d. at sea, 26 April 1909. He was educated at Canea, Athens and Marburg; was Foreign Secretary to the Cretan government 1882-84; headmaster of the public gymnasium there 1883—85 ; head clerk to the British consulate in Crete 1884-88; and lecturer on Greek literature at Athens Uni¬ versity in 1889. He took a prominent part in the Cretan insurrection of 1889-90, and was proscribed by the sultan ; and subsequently went to England, where for six years he studied in the British Museum investigating the history of the Greek language. Upon his return to Crete he was elected a member of the Assembly, and during the troubles of 1897 acted as correspond¬ ent for the Times. From 1896 to 1904 he was lecturer on post-classical and modern Greek at Saint Andrews University and was afterward Inspector-General of Education in Crete. He was a prolific writer on Greek grammar and philology.

JANNES AND JAMBRES. When Moses wrought his wondrous magic before Pharaoh he was opposed by two Egyptian magicians — Jannes and Jambres. They were so much im¬ pressed that they became proselytes and accom¬ panied the Children of Israel on their march to the promised land. According to the Talmud, the golden calf was made by Aaron at their instigation. They are mentioned in several apocryphal writings and in 2 Tim. iii, 8. Pliny and Apuleius mention Moses and Jannes as the names of ancient magicians. Eusebius quotes Numenius, a Greek philosopher of the 2d cen¬ tury, as representing Jannes and Jambres as Egyptians.

JANNET, Claudio, French economist: b. Paris, 22 March 1844; d. there, 21 Nov. 1894. He was educated as an advocate and became professor of political economy at the Catholic University of Paris. His work was largely in¬ fluenced by P. G. F. LePlay (1802-82). Author of (Etude sur la Voconia) (1867) ; (De l'Etat present et de l'avenir des associations co¬ operatives > (1867) ; (L'internationale et la ques¬ tion sociale) (1871) ; (Les resultats du partage force des successions en Provence) (1871); (Les Etats-Unis contemporains> (1875; 4th ed., 1888) ; (Les societes secretes1 (1876) ; (Le credit populaire et les banques en Italie 5 (1885) ; (Le Socialisme d'Etat et la reforme sociale) (1889) ; (Le capital, la*

speculation et la finance au XIXe siecle) (1892) ; (Les ouvriers des doux mondes) (1893), etc.

JANOW, ja'nov, Matthias von, theologian and reformer, considered the Wiclif of the Bo¬ hemian Church : date of birth unknown, though he was probably born in Prague; d. there, 30 Nov. 1394. Very little concerning his early life is known, except that he was descended from a noble Bohemian family, studied theology at the University of Prague and later spent about six years at the University of Paris. He then went to Rome, in 1381 was appointed canon of the cathedral of Saint Vitus in Prague and confessor to Charles II, and continued in that office until his death. He had no oratorical ability, but through his writings exercised a remarkable influence on the religious thought of his time. His writings were collected in a work entitled (De Regulse Veteris et Novi TestamentP (1392). In this book he denounced the corrup¬ tion and evil that existed in the Church, alleged gross misconduct of bishops and priests and urged that all human additions to Christianity, both doctrinal and ceremonial, be eliminated, and that the Church return to its original be¬ liefs and doctrines. The Pope declared these writings heretical, and 16 years after his death they were publicly burned with those of Wiclif. Consult Lutzow, (Life of John Hus> (New York 1909).

JANS, Anneke, an'na-ke yans (or An- netje), Dutch colonist in America: d. Albany, N. Y., 1663. She came from Holland to New Netherland in 1630 with Roeloff Jansen, her husband, who secured in 1636 a grant of a tract of land containing 62 acres and reaching from the Hudson to the present Broadway and from a point near Desbrosses street to Warren street. In 1654, Anneke, upon the death of her second husband, Evarardus Bogardus (q.v.), obtained in her name a patent-right to the tract. In 1671 the land was sold by the heirs to the English Governor Lovelace. Three of the heirs, how¬ ever, did not sign the document. Subsequently the property was confiscated by the English government and deeded to Trinity Church cor¬ poration (1705). From 1749 the possession of the property has been the subject of numerous suits by the heirs, based chiefly on the omitted signatures, and all decided for the defendants.

*JANS, Jansen Enikel, or Enenkel, Aus¬ trian historian and poet : 13th century. He is notable as the author of (Weltchronik, * a nar¬ rative of little historical worth but valuable from a literary standpoint. It was edited by Strauch in cMonumenta Germanise Historica)*

(Vol. II, Part I, 1891). He also wrote a 'Furstenbuchp which deals with the Austrian dukes Leopold VII and Frederick the Quarrel¬ some, and while historically inaccurate is note¬ worthy because of the personal anecdotes it contains. It was edited by Rauch in ˆcrip- tores Rerum AustriacarumP (Vol.

I, 1790).

JANSEN, yan'sen, or jan'sen, Cornelius, Dutch theologian: b. near Leerdam, Holland, 28 Oct. 1585; d. Ypres, Belgium, 6 May 1638. From his 17th year he applied himself to the study of theology and first came into notice while professor of theology at Louvain (1630), as a teacher of the most rigid Augustinianism, especially in connection with the doctrine of free will and divine mercy. This brought him Ttjp conflict with the Jesuits. He was appointed (1636) bishop of Ypres, where he completed

his famous work, on which he had labored for 22 years, under the title Augustinus, seu Doc- trina Sti. Augustini de humanae naturae sani¬ tate, aegritudine, medicinal In this he de¬ clared philosophy, especially that of the Aris¬ totelians, to be the source of Pelagian error, and in accordance with rigid Augustinianism, maintained the utter corruption of human na¬ ture and the extinction of free will, together with predestination. The school of thought he thus founded is now known as Jansenism (q.v.).

JANSEN, Olaus, Swedish naturalist : b. Christianstadt, 1714; d. Copenhagen, Denmark, 1778. He was educated in Germany; was a pro¬ fessor in the University of Tubingen for sev¬ eral years; was then appointed to a professor¬ ship in the University of Copenhagen, of which he was rector in 1761 ; and was elected a mem¬ ber of the Academy of Sciences in 1762. In 1764 he was sent by the Danish government to study the natural resources of the South Ameri¬ can countries, but during his travels he reached as far north as Central America, Louisiana and Florida. In 1772 he visited Boston. His chief publications are (Den Geist in den Natur- videnskaben og naturens almindelige laere) (1773) ; (Neue Reisen durch Brazilien und Peru (1775) ; (Neue Reisen durch Louisiana und Neuva Espana* (1776) ; Anmarkningar till Historia Naturalis och climatet i Nye Eng¬ land och Nye Spanien) (1778), etc.*

JANSENISM, strictly speaking, denotes both a theological system in the matter of grace and free will, and the Christian sect that has arisen from that system. In a loose sense, Jan¬ senism is the rigid, straightlaced severity of the Jansenists in the application of the principles of morality, — especially in the almost imprac¬ ticable dispositions they required for Holy Communion. This article confines itself to the strict sense of the word Jansenism; and pre¬ sents a brief survey of the origin and evolution of both the doctrine and the sect.

I. Origin of Jansenism. — Imbued with the principles of Baius, — Michel de Bay, former professor of scripture at the University of Louvain, — Cornelius Jansenius, bishop of Ypres, wrote his (Augustinus to set forth what he deemed to be the teaching of Saint Augustine in the matter of grace and free will. After his death the work was published, a.d. 1640, under the auspices of the University of Louvain. It was prohibited by the papal internuncio, con¬ demned by a decree and by briefs of Pope Urban VIII, denounced and vigorously attacked by the Jesuits; and yet gained rapid vogue. The following year, 1641, a second edition was published at Paris with the approbation of the Sorbonne. A papal commission was then ap¬ pointed to examine the VIII in the bull (in eminenti,* because of its defense of the condemned propositions of Baius.*

The complete title of this epoch-making folio is Augustinus, seu doctrina Sancti Augustini de humanae naturae sanitate, aegritudine, medi- cina, adversus Pelagianos et Massilienses, tribus tomis comprehensa. The first part expounds Pclagianism in such wise as to identify there¬ with the teaching of the Jesuits on grace. The second part treats of Saint Augustine's three states of human nature : the state of innocence before the fall of Adam, that of corruption*

after the fall, and the hypothetical state of human nature that is neither elevated by grace nor degraded by sin. Herein the teaching of Baius is closely followed. The third part is on grace and predestination.

To make the condemnation of the Augus- tinus) more specific, a new papal commission (1651) selected therefrom five propositions, which are here subjoined and referred to their respective parts in the volume :

1°. Some of God's precepts are impossible to the just, even though they desire and try to observe such, with the strength that they at present have; nor have they the grace by which such precepts might be possible. (Pt. Ill, Bk. ii, Ch. 13).

2°. In the state of fallen nature, one never resists in¬ terior grace. (Pt. Ill, Bk. ii, Ch. 24).

3°. For merit or blame, in the state of fallen nature, freedom from all internal determining force (libertas a neces¬ sitate) is not necessary; but freedom from all external de¬ termining force (libertas a coactione) is enough. (Pt. Ill, Bk. vi, Ch. 38).

4°. The Semi-Pelagians admitted the necessity of an interior grace, that should precede each act, — even the beginning of the act of faith; and they weie heretics in that they taught this grace to be such as man's will might

resist or obey. (Pt. I, Bk. viii, Ch. 6).

5°. It is Semi-Pelagian to say that Christ died or shed his blood for all men without exception. (Pt. Ill, Bk. iii, Ch. 21).

These propositions were condemned as heret¬ ical, by Innocent X, in the Constitution (Cum occasione) (1653) ; by Alexander VII, in the Constitution Ad sanctam B. Petri Sedem, (1656), and in the Constitution JRegiminis Apostolici* (1664) ; by Clement XI, in the Con¬ stitution (Vineam Domini* (1705).*

II. The Question of Right. — Before the condemnation by Innocent X, the Jansenists ad¬ mitted that the five mooted propositions were representative of the theological system of Jan¬ senius. Fundamental to this system is the Baian theory of a never rejected grace (gratia vic- trix). Without this great grace, man by the necessity of fallen nature yields to desire (vo – luptas) ; against this grace, man is not free Jo follow desire. The elect are predestined to vic¬ torious grace and to glory, and that previous to God's foreknowledge of their future merit; only the elect does God sincerely will to save, for them alone did Christ pray and give up his life. The reprobate are absolutely predestined to be deprived of this never failing grace, and that previous to God's foreknowledge of their future blame; and so God does not sincerely will to save the reprobate, nor did Christ die for them. That the condemned propositions of the Au- gustinus> were a nucleus of this theory of mor¬ ally necessitating grace, and of morally neces¬ sitated will, was at first admitted by the Jan¬ senists. Their defense was that the five propo¬ sitions correctly set forth Saint Augustine's doc¬ trine on nature and grace ; and that they had not been rightly condemned.

III. The Question of Fact. — Once the con¬ demnation of Innocent X was published, the Jansenists shifted ground; and undertook their famous evasion by the question of fact. They rejected the five propositions as rightly con¬ demned; but clung to the Augustinus. They denied the fact that the propositions were con¬ tained in the (Augustinus * in the meaningthat had been censured as heretical ; and insisted that the infallibility of the Church had nothing to do with such facts as the meaning intended by Jansenius and set forth in the Augustinus.1* Antoine Arnauld was the mightiest champion of*

this evasion between 1653 and 1655. The bish¬ ops met in Paris, 28 March 1654, and declared that the Pope had condemned the meaning in¬

tended by Jansenius; their declaration was ap¬ proved by Innocent X the following September. The Sorbonne respectfully submitted in 1656. It was then that Pascal stepped into the arena. His (Lettres Provinciates,5 23 Jan. 1656 to 24 March 1657, poked fun at the Sorbonne for discussing the statements of Arnauld, reveled in raillery about the condemnation and sparkled with witty banter of the Jesuits and their casu¬ istry. . Indeed, most of the VII, 1656, who decided the fact of the heresy of the Augustinus.5

Still the Jansenists went on without submis¬ sion, either in a negative attitude of ((respectful silence® or in such positive opposition to the papal decrees as was evidenced by Quesnel in deflexions Morales. 5 That book reproduced the theory of Jansenius on grace and free will, and was approved by de Noailles, bishop of Chalons, later cardinal and archbishop of Paris. A new papal condemnation was needed. It came in the bull Wnigenitus,5 1713, whereby Clement XI condemned 101 propositions of deflexions Morales.5 Jansenism now reached its strongest and stormiest epoch. The universities of Paris, Rheims and Nantes rejected the bull. Four bishops appealed Jo a future general council against the (Unigenitus,5 1717. They were joined by other bishops and many priests. Car¬ dinal de Noailles appealed <(from the Pope ill informed to the Pope better informed.® Clement XI, by the bull dastoralis officii,5 1718, excom¬ municated the recalcitrants. The Jansenists and recalcitrants, including Cardinal de Noailles, appealed from the bull dastoralis officii5 to a general council. For a while the Church in France was rent with the schism. On the side of the Jansenists were a cardinal, 18 bish¬ ops and about 3,000 priests; on the side of the Pope were four cardinals, at least an hundred bishops, and more than an hundred thousand clerics. The schism lasted some 10 years. De Noailles submitted in 1728, and Jan¬ senism gradually died out in France. Not so in the Netherlands. Here the vicars apostolic, who governed the small body of Catholics, were tainted with the ideas of the

Bibliography.— Rapin, (Histoire du Jan- seni$me) (1861). ; Dumas, H., (Histoire de&cinq

propositions de Jansenius5 (1699) ; Maynard, (Les Provinciales et leur refutation (1851); Lafitau, (Histoire de la Constitution Unigeni- tus) (1737); Le Roy, (La France et Rome de 1700 a 1715 } (1892) ; Saint Dechamps, (De hae- resi janseniana ab Apostolica Sede merito pro- scripta) (1654).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College.

JANSON, zhan-son, Kristofer Nagel, Nor¬ wegian novelist and educator : b. Bergen, 5 May 1841. He was educated for the ministry at the University of Christiana, later interested him¬ self in the movement for popular education and established a (

(Norske Dikt,5 poetry (1867); (1867), a drama portraying the fate of the last Roman Catholic bishop of Iceland; (Marit Skj,olte> (1868) ; 1872) ; (Torgrim5 (1872) ; son) (1872); (Fraa Dansketidi5 ((From the Times of Danish Rule,5 1875) ; (Den Bergtekne5 ((The Spell-Bound Fiddler, 5 1876); Wore

Bedsteforaeldre5 ((Our Grandparents5) ;

JANSON, Paul, Belgian advocate and poli¬ tician : -b. Herstal, 11 April 1840. He became well known for his speeches on social reform, was elected to Parliament in 1877 and in 1878 became a member of the Liberal Cabinet. His activities in behalf of universal suffrage caused a split in the Liberal party and in 1884 Janson lost his seat in Parliament. The party was re¬ united and Janson returned to Parliament in 1889. He revived the question of universal suffrage and secured its adoption 18 April 1893, but lost his seat in the following year. He was re-elected in 1900, became an active worker for equal suffrage and was prominent in the parlia¬ mentary discussion of the Kongo investigations in 1906. He was appointed State Minister in

1 9 12.

JANSSEN, Cornelius (also JANSEN or JOHNSON), English portrait painter: b. Lon¬ don, 1593; d. 1664. After earnest effort for many years he was rewarded in 1618 by being made the fashionable painter at the court. He maintained his pre-eminence until Van Dvck came to England. Janssen went to Holland during the troubled years of the wars between Charles I and the Parliament. His work is of a refined order, finished with infinite care and all portray his powers as colorist. His scheme of. throwing features, into high relief by provid-

ing a dark background has never been excelled. His best portraits are those of Charles I, the Duke of Buckingham, John Milton as a boy, and (The Magistrates.5 Janssen is represented in many private collections and also in the col¬ lections of Rotterdam, Lille, Dresden and Brunswick.

JANSSEN, yan'sen, Johannes, German Roman Catholic historian: b.

Xanten, Rhenish Prussia, 10 April 1829; d. Frankfort-on-the Main, 24 Dec. 1891. He was educated at the uni¬ versities of Louvain, Bonn (1851-53) and Ber¬ lin, was professor of history in the Gymnasium at Frankfort-on-the-Mainin 1854, became a priest in 1860 and domestic prelate to the Pope in 1880. He is chiefly known by a work in six volumes, published in 1876, and which subsequently went through 14 editions, entitled (Geschichte des deutschen Volkes seit dem Ausgang des Mittel- alters) ('History of the German People from the Close of the Middle Ages to the Beginning of the Thirty Years' War 1618)) . This work at¬ tained instant and great popularity among the German people, yet though its learning and thoroughness were not questioned, it was severely attacked by Baumgarten, Ebrard, Schweizer and others as being partial and un¬ fair. A French translation of the first two vol¬ umes was published in Paris in 1887-88. Jans¬ sen's other works include (Wibald von Stahlo und Corven) (1854); (Frankreichs Rhein- geliiste und deutschfeindliche Politik in friihern Jahrhunderten) (2d ed., 1883) ; (Schiller als His- toriker) (2d ed., 1879) ; (Zur Genesis der ersten Teilung Polens5 (1865) ; (Gustav Adolph in Deutschland) (1865) ; 'Frankfurts Reichskorre- spondenz von 1376—1519> (1875; 4th ed., 1889) ; 'Friedrich Leopold, Graf zu Stolberg) (2d ed., 1882) ; (An meine Kritiker) (1882) ; 'Ein zweites Wort an meine Kritiker) (1883), etc.

JANSSEN, Peter, German painter: b. Diis- seldorf, 12 Dec. 1844; d. Berlin, 19 Fe'b. 1908. His father was J. Theodor J. Janssen, a noted engraver, and from him he obtained his early education; in his 16th year he entered the Acad¬ emy at Diisseldorf and became a pupil of Ben- demanns and Sohn. In 1877 he was appointed a professor in the Diisseldorf Academy, in 1895 its director, and in 1885 was elected a member of the Berlin Academy. In 1868 he painted his first great work, (The Denial of Peter, 5 in the Academy at Philadelphia. In the same year he obtained first prize in a contest for decorating the walls of the Rathaussaal in Krefeld and completed this work in 1873. In the summer of 1872 he completed the colossal wall painting in the Bremen Exchange, (The Colonization of the Baltic Coast.5 In 1874 he decorated the walls of one of the rooms of the National Gallery in Berlin in wax colors, the painting taken from 12 subjects being entitled 'The Myth of Prome¬ theus. 5 During 1880-82 he decorated the walls of the town hall at Erfurt with six large and three small paintings in wax colors entitled (Momentous Episodes in the History of Er¬ furt. > These are noted for their brilliant color scheme and dramatic development. Other paint¬ ings by him are 'The Infancy of Bacchus5 (1883), exhibited at the International Exhibi¬ tion in Munich;

(The Battle at FelVbellin5 (1884) ; Mature,5 (Beauty,) 'Human Life5 and Hmagination5 in the Aula of the Academy at Diisseldorf.

JANSSEN, Pierre Jules Cesar, French

astronomer: b. Paris, 22 Feb. 1824; d. Meudon, 23 Dec. 1907. He was graduated in 1852 as li¬ centiate in the mathematical sciences, and in 1860 as doctor of physical sciences, his graduat¬ ing thesis, 'L'absorption de la chaleur rayon- nante obscure dans les milieux de l'ceil,5 creat¬ ing widespread discussion. In 1853 he became temporary professor in the Lycee Charlemagne, and from 1865 to 1871 was professor of general physics in the Special School of Architecture. In 1857 he went to Peru to fix the location of the magnetic equator; from 1861 to 1864 was in Italy observing the solar spectrum; and from the latter year until 1867 was in the Azores with Saint Claire Deville. In 1867 he went to Trani and in 1868 to Guntoor, India, to observe the total, eclipse of the sun, making special spectro¬ scopic observations on the protuberances. In 1870 he escaped in a balloon from Paris, then in a state of siege, in order that he might wit¬ ness the Algerian obscuration ; in 1874 watched the transit of Venus in Japan; in 1875 went as astronomer . with the English expedition to Siam ; and in the latter year was appointed di¬ rector of the astrophysical observatory at Meu¬ don, near Paris. In 1883 he was in the Caro¬ line Islands. In 1891 he began his ascensions of Mont Blanc, and in 1892-93 founded an ob¬ servatory there.

JANSSENS VAN NUYSSEN, zhan'san, Abraham, Flemish painter: b. Antwerp, 1575; d. there,. 1632. In early youth he showed remark¬ able aptitude for painting, and when 18 years of age became the pupil of Jan Snellinck. In 1601 he. was admitted as a master into the guild of Saint Luke of which he was dean 1606-07; he then visited Italy. As a colorist he ranks next to Rubens among the Flemish painters of the 17th century; in correctness of drawing he ex¬ celled him, in treatment of the nude and in bold composition he equaled him, but in general freedom of disposition and touch and in faculty of color he fell far short. The most important of his paintings, which include biblical, alle¬ gorical and mythological subjects, are (Madonna with Saints5 and (Entombment,5 in the Car¬ melite church at Antwerp; (Ecce Homo5 and (Descent from the Cross,5 in the cathedral of Saint Bavon at Ghent; 'The Resurrection of Lazarus,5 in the Elector Palatine's Gallery;

(Madonna, 5 (Adoration of the Magi5 and

'Scaldis,5 in the Antwerp Museum; 'Venus and Adonis5 and (Day and Night,5 in the Vienna Museum ; (01d Age Resting on Faith and Hope,5 in the Brussels Museum; 'Meleager and Atalanta5 and

JANUARIUS, jan-u-a'ri-us, Saint: b. Na¬ ples, or Benevento, Italy, 21 April 272; d. Poz- zuoli, Italy,. 19 Sept. 305. He became bishop of

Benevento in 303 and at the time of the persecu¬ tion of the Christians by Diocletian was be¬ headed. He is the patron saint of Naples. His body lies in the crypt of the cathedral at Naples; and two phials of his blood which a pious matron caught, according to tradition, at his execution, are preserved in a chapel in the south aisle. It is asserted that the blood lique-

fies on being brought near the head of the saint. A trial is made on three festivals of each year, the chief of which is the anniversary of the martyrdom, and also when public danger or calamity exists or is impending. It is believed that the patron saint is particularly propitious if the blood moves briskly in the phials and appears of a clear red, while the opposite is regarded as presaging some ill to the country.

JANUARY, the first month of the year, was by the Romans held sacred to Janus, from whom the name was derived. The Roman year originally began with March and consisted of only 10 months. Numa is said to have added January and February to the calendar; but al¬ though the Romans as early as 251 b.c. accepted January as the first month of the year, the nations of Europe did not universally adopt it as such till the 18th century. Wulfmonath was the Anglo-Saxon name for the first month. The 25th of March was the beginning of the ancient Jewish year, and that day, instead of 1 January, long held a legal position in Chris¬ tian countries as the opening of the new year.

JANUS, ja' nus, an ancient Latin divinity, after whom the first month of the year was named. He was sometimes represented as a porter or keeper with a sceptre in the right hand and a key in the left, seated on a glittering throne ; but was most commonly represented on the Roman as of the early coinage as having one head with two bearded faces, one looking forward and the other backward, and this latter image was set up under the arch in the Forum. Janus was called Mather,® his name was first invoked at the beginning of all solemn sacrifices and he was worshipped as the god of gods, the sovereign disposer of wrar and peace and the dispenser of the fortunes of mankind. By some he was regarded as the god of light and heaven — the sun-god, the supreme janitor in heaven and on earth, identical with Jupiter (q.v.) — who opened the gates of heaven to let out the day and closed them again upon the return of evening. Others held that all doors (jauna) and all passages (janus) were under his care. The commencement of both the year, month and day were regarded as sacred to Janus. The temple of Janus, standing on the north side of the Forum near the curia, was in reality only two parallel arches facing east and west,

con¬ nected by side walls and furnished with gates. According to an ordinance of Numa Pompilius these gates were to be opened at the beginning of every war and remain open until peace was established in every country subject to Rome, but during the long space of 700 years the gates were closed only three times. Consult Fowler, (The Roman Festivals) (1899) ; Toutain, (Etudes de Mythologie) (1909).

JANVIER, jan'vi-a, Catharine Ann, Amer¬ ican painter and author: b. Philadelphia, Pa. She is the widow of T. A. Janvier (q.v.), whom she married 26 Sept. 1878. Her paintings include (Geoffrey Rudel and the Countess of TripolP ; (The Princess Badroulbadour ; (The Guitar Player 5 ; (Daniel at Prayer* ; (The Vio¬ linist, J etc. She has written (Keramics for Students) (1880) ; (London News* (1904) ; and has translated (from the Provencal of Felix Gras) (The Reds of the Midi* (1896) ; (The Terror* (1898) ; and (The White Terror**

(1900).

*JANVIER, Margaret Thomson, American author, sister of T. A. Janvier: b. New Orleans 1844; d. February 1913. Under the pen-name ˆMargaret Vandegrjft** she wrote many juvenile stories and verses, including (Under the Dog- Star* (1881); (Clover Beach* ; (Little Helpers* ; (The Absent-Minded Fairy, and Other Verses* (1883) ; (The Dead Doll, and Other Verses* (1888); (The Queen's Body-Guard*; (Doris and Theodora* ; (Rose Raymond's Wards* ; (Ways and Means* ; (Holidays at Home* ; (Little Bell, and Other Stories* ; (Umbrellas to Mend,* etc.*

JANVIER, Thomas Allibone. American author: b. Philadelphia, Pa., 16 July 1849; d. 18 June 1913. He received a common school education; was an editorial writer for the Philadelphia Press, Bulletin and Times in 1870-81 ; married and passed some time in Colorado, New Mexico and Mexico; lived in New York during most of the period 1884-94, and then made his residence in France and Eng¬ land. Among his works are (Color Studies (1885) ; (The Mexican Guide* (1887) ; (The Aztec Treasure House* (1890) ; (Stories of Old New Spain* (1891) ; (The Uncle of an Angel and Other Stories* (1891) ; cAn Embassy to Provence* (1893), the chronicle of a Euro¬ pean journey; (In Old New York* (1894), popular historical sketches; (In the Sargasso Sea* (1898) ; (The Passing of Thomas, and Other Stories* (1900); (In Great Waters* (1901) ; (The Christmas Kalends of Provence* (1902); (The Dutch Founding of New York* (1903) ; (Legends of the City of Mex¬ ico* (1910) ; (From the South of France* (1912) ; (At the Casa Napoleon,* with (Memoir* by Hitchcock, R. (1914).*

JAOK, a large sculpin, Myoxocephalus jaok, of the Bering Sea, used locally

*as a food fish. It is from 12 to 18 inches long, olive grayish above and white below, common in shallow waters along the Bering Sea coasts and into the Arctic. <(Jaok** is the Kamchatka name for the fish. The ((cottus jaok** of the Kamchatkas in these waters is also used as a food fish, and is known by various names, the Koriahs calling it (*

JAORA, India, a native state in the Malwa agency, Central India, comprising two separate tracts lying between Neemuch and Ratlam. The total area, which includes also the dependencies of Piplanda and Pant Piplanda, is 568 square miles. The head of the state is styled nawab, is of Afghan descent and of Mohammedan faith. In 1818 the native state was guaranteed its independence by the British under the Treaty of Mandsaur. The region is fertile and pro¬ duces cotton, Indian corn, opium and several kinds of millet. The Malwa opium of com¬ merce is largely produced in Jaora. The annual revenue is about $285,000, of which about $45,000 is paid as tribute. Pop. 84,200.

JAORA, India, towrn and capital of the native state of the same name, situated on the Rajputana-Malwa Railway, about 20 miles north of Ratlam. The town is regularly laid out and has several substantial buildings of modern con¬ struction. There are also a dispensary and a high school. The Zenana dispensary dates from the jubilee year of 1897. Pop. 23,850.

619

JAPAN — TOPOGRAPHY OF JAPAN (1)

JAPAN (corruption of Marco Polo's Zipangu , native name Dai Nippon, or Dai Nihon [from dai, great; ni, sun; lion, root or rising], Land of the Rising Sun), island-empire lying off the northeast coast of Asia, long re¬ markable for the proud isolating policy of its rulers, and now claiming special consideration on account both of its recent renewed relations with the civilized world and of the wonderful changes that during the past 50 years have been in progress in the country. The following series deals with the real spirit of the past history of Japan and with the present condition of that empire under the following heads :

1. Topography of Japan.

2. Ethnology.

3. The Development and

Constitution of Society in Japan.

4. Mental Characteristics of

the Japanese.

5. History of the Empire to

1889.

6. History of Japan, 1889-

1919.

7. The Japanese Constitu¬

tion.

8. Foreign Relations.

9. The Samurai.

10. Education in Japan.

11. The Religions of Japan.

12. Japanese Language.

13. Japanese Literature.

14. History of Japanese Fine

Art.

15. Japanese Architecture.

16. Finance and Coinage Sys¬

tem of Japan.

17. Banking System of

Japan.

18. Agriculture in Japan.

19. The Japanese Army.

20. The Navy.

21. Russo-Japanese War.

22. Diplomatic Relations

with the United States.

23. Japan in the World War.

24. Railways and Highways.

1. TOPOGRAPHY OF JAPAN. Along

the Pacific coast of the Asiatic continent lies the archipelago of Japan, stretching from the southwest to the northeast. It consists of three large arcs, with their convex side turned toward the ocean. The principal arc, which is situated in the middle, consists of four large islands, namely, the main island of Hokkaido (called Yezo by Europeans), Honshu (often erroneously called Nippon), Shikoku and Kyushu. At both ends of the principal arc begin the other two arcs, Chishima (Kurile) and Ryukyu (Luchu), which are long series of small islands. Be¬ sides all these, two large islands have been recently added to this country, Taiwan (For¬ mosa) in 1895 and the southern half of Kara- futo (Sakhalin) in 1905. On the whole, the archipelago of Japan consists of six larger islands with the addition of many hundreds of smaller islands. The whole chain meridionally measures 29 degrees of latitude, extending be¬ tween Vele Rete Rocks (21° 45′ N.) and Alaid Island in the Kurile Group (50° 58′ N.), while it longitudinally covers a comparatively narrow zone between Kwasho in the Hoko Group (119° 20′ E.) and Shimushu Island in the Chishima Group (156° 32′ E.). The area of the principal islands forming these arcs are as follows :

Area (with annexed small isles),

sq. m.

Honshu . 86,524

Shikoku . 7,011

Kyushu . 15,543

Sado . 334

Oki . 130

Awaji . 218

Iki . 51

Tsushima . 266

Ogasawara-jima . 27

Ryukyu . 932

Taiwan Group

Taiwan (Formosa) . 13,419

Hoko-to (Pescadores) . 49

Hokkaido

Main island or Hokushu (Yezo) . 30,058

Chishima (Kurile) . 6,137

Karafuto (Sakhalin) (estimated) . 12,634

Total (without Karafuto). 160,699

Total (with Karafuto) . 173,333

By the addition of Korea (q.v.) the area of the empire was increased 32 per cent, with a grand total of 260,738 square miles.

Partially enclosed by the principal central arc lies the Sea of Japan. This mediterranean sea is a deep depression, whose maximum depth is near the northeast coast of the Korean Peninsula. The northern end of this sea is connected by the narrow passage of Mamiya Strait or the Gulf of Tartary, with the Sea of Okhotsk, a fairly deep depression partially enclosed by the Chishima arc. Passing through Tsushima Strait, another outlet of the Sea of Japan, we come to the China Sea, which is merely shallow water on a great continental shelf, along the edge of which runs the Ryukyu arc. The warm Japan Current or Kuroshiwo washes the southwestern coast of the archipelago, while the cold Chishima Current flows along the northeastern coast. Tsushima Current, a branch of the former, enters the Sea of Japan and affords moisture and warmth to the northwestern coast of Honshu. Liman Current, one of two smaller cold currents along Karafuto, flows southwest near the coast of the Asiatic continent.

Generally speaking, the archipelago is very mountainous and its topographic features are highly complicated. The crustal movements of the earth have generated large mountain sys¬ tems, which are again separated into several ranges. Some of these ranges are nearly 10,000 feet in height and exhibit landscapes of Alpine character. Moreover, owing to these

terrestrial disturbances, we find many volcanic chains, which are arranged mostly along but sometimes across the principal trend of the archipelago. Many of the lofty peaks in this country are the magnificent cones of volcanic origin. Plains could not develop to any great extent in such a land. They are found occasionally along sea- coasts as well as along the banks of large rivers. Comparatively well-developed plains are found in delta districts, which are generally fertile and densely populated. Also in mountain districts we meet some basins, sometimes with lakes nestling in their centres. Rivers in Japan are naturally short and are mostly torrents, thus giving everywhere scenic beauty as well as water power for industrial purposes. The stony deltas of these torrents are frequently formed at the base of mountains on the coast. The coastal line is generally well developed, more so along the Pacific coast than along the coast of the Sea of Japan. Every island is indented with innumerable bays and inlets, surrounded by rocky bluffs and sandy beaches. Thousands of isles and rocks are scattered near the coast, especially in the famous Seto-uchi or Inland Sea, which stretches between the three large islands, Honshu, Shikoku and Kyushu and is connected by very narrow straits with the Pacific Ocean and the Sea of Japan. The high¬ est development of a coastal line may be seen along the shore of Kyushu, which measures 5.0 miles in area to every mile of coast line, while Honshu measures 4.6, Shikoku 3.8, Ho¬ kushu 2.3, and the lowest, Taiwan, 1.8. The topography of each principal island in detail follows.

Honshu. — The fundamental form of Hon¬ shu, the main island, is outlined bv two great mountain systems, which are called the northern and the southern arc. The two systems meet in

the central part of the island forming a syn- taxis or ˆSchaarung® where lies the great volcanic chain of Fuji. The northern arc, which is often called the Sakhalin system, is quite a large system and consists of several parallel ranges whose northern extension passes through Hokushu, the main island of Hokkaido, to Karafuto (Sakhalin). These ranges run nearly north and south but their southern por¬ tion gradually tends to the southwest. In the northern half of Honshu or northern Japan there are three ranges, separated from each other very distinctly by depressions of low plains. The central range begins on the shore of the Gulf of Mutsu. It runs south, forming the backbone of northern Japan as well as the watershed between the Pacific Ocean and the Sea of Japan. Geologically the range shows the later formations of the Tertiary Period, accompanying a few exposures of Archaean and Palaeozoic formation. Moreover, this range is a series of

volcanic cones, forming the Nasu volcanic chain. Some of the cones exceed 7,000 feet in altitude. At the northern extremity of the Nasu volcanic chain stands Osore-yama (2,572 feet) on the north coast of the Gulf of Mutsu. The chain runs south through such volcanoes as Yatsukoda-san (5,153 feet), Ganju-san (6,790 feet), a gigan¬ tic volcanic cone of North Japan, Koma-ga- take (3,834 feet), Sukawa-dake (5,435 feet), Zao-san (6,442 feet), Adataro-san (4,658 feet), Adzuma-yama (6,294 feet), Bandai-san (6,442 feet), Nasu-san (6,271 feet), and turns, to the southwest and then west through Takahara- yama (5,881 feet), Nantai-zan (8,144 feet), the principal peak of the Nikko Group, Hiuchi- dake (7,813 feet), Akanagi-yama (7,511 feet), Nikko Shirane (7,504 feet), Akagi-san (6,209 feet), Haruna-san (4,779 feet) and Asama- yama (8,134 feet). Some of these are still active. The great eruption of Asama-yama in 1783 and the explosion of Bandai-san in 1888 were most remarkable.

The second range, which runs parallel to the central range and along the coast of the Sea of Japan, is of similar geological forma¬ tion to the first. These ranges are separated from each other by a series of low lands such as the valleys of the sister rivers Omono and Mogami, the basins of Yonezawa, Aidzu and Inawashiro, etc. The range is divided into two parts by the gorge of Mogami. The north¬ ern half, which is composed mostly of hills or low tablelands, is generally comprised under the name of Dewa-hill. The southern half is very mountainous and is called the Echigo Mountain Range. Asahi-dake (7,032 feet) and . Iide-san (6,232 feet) are the prominent peaks of the granite mass in this range. The south¬ ern prolongation of the range stretches between the Aidzu basin and Echigo plain and termi¬ nates in Mikuni Range.

A volcanic chain runs parallel to this west¬ ern range. Commencing at Iwaki-san (5,209 feet), it passes through Moriyoshi-yama (4,769 feet), Cholcai-zan (6,964 feet) and Gassan (5,944 feet). Chokai is well known because of its gigantic proportions and therefore this chain takes the name of this volcano. The coastal line of the Sea of Japan is mostly flat and unbroken. Its monotony is disturbed only by the volcanic peninsula of Oga, which en¬ closes the shallow waters of the lagoon Hachi-

ro-gata. The plain of Echigo on the same coast is one of the largest plains in the country

The third range running along the Pacific Coast east of the central range differs from the other two in several respects. It consists of such older geologic formations as Archaean, Palaeozoic and Mesozoic, associated with vari¬ ous kinds of old eruptive rocks. Topographi¬ cally it forms no continuous chain as does the central range, and it is divided into the two spindle-shaped mountain groups, Kitakami and Abukuma. The Kitakami

group on the north is sharply separated from the central range by the tectonic valleys of Mabechi and Kita¬ kami. Its external features show no regularity as a mountain system, which can be observed merely in its inner stratified structure. The network of numerous valleys extending in various directions, which have resulted from erosion, divide the district into an irregular group of mountains and hills. Hayachine, the highest peak, measures about 6,560 feet. The coast of this region is not so smooth and flat as . the coast of the Sea of Japan, but it is in many places very deeply indented with numerous small inlets of the "Rias® type, such as Miyako, Kamaishi, Onagawa, etc., afford¬ ing vessels protected anchorages. Near Oshika Peninsula on the south, separated from the mainland by a narrow passage of water, is the granitic island of Kinkazan, whose lofty peak is the sailor's landmark. Waveworn Matsu¬ shima, a group of a hundred small islands in the Bay of Sendai to the west of Oskika Penin¬ sula, is noted for its beautiful scenery.

Another mountainous region, lying between the Pacific Ocean and the tectonic valley of Abukuma, is commonly called the Abukuma Plateau. This is a broad mountain mass, and consists of an extensive area of gneiss and crystalline schists with a narrow zone of coal¬ bearing strata of Tertiary formation along the coast. The abrasion was much greater here than in the Kitakami Mountainland. The An¬ cient mountain system with its Comdex strata is now reduced to an undulating plateau, whose greatest elevation scarcely exceeds 3,300 feet. The southern extension of this plateau forms the small ranges of Yamizo and Naka, which gradually sink into the plain of Kwanto. At the extremity of the latter stands an isolated mountain called Tsukuba-san (2,850 feet); on one of its summits the well-known meteorologi¬ cal observatory was established some years ago by H. I. H. Prince Yamashina. Another extension of the northern arc toward the south¬ west forms the mountain blocks or "Scholle® of Ashio and Kwanto or Chichibu, which form the north and northwest boundaries of Kwanto-plain. The Kwanto group is a square mass of the older geological formations. On the west it terminates abruptly in the tectonic valley of Chikuma-gawa and in the basin of Kofu, and on the east in the plain of Kwanto. Some celebrated mountains of this group are Buko-zan (4,297 feet), Kobushi-dake (8,062 feet), and Kimpu-zan (8,367 feet). The great volcanic district of Kenashi and Iwasuge with the extinct volcanoes of the same names lies between the Kwanto group on the south and the Mikuni group on the east. The volcanic chain also stretches to the south until it joins the Nasu volcanic chain at Asama-yama.

i' At-""

*.W«l**

.fuss r*-e

YEZOjind’

CHISHIMA

(KCIULi: IS.) Scale.

RUSSIAN)

K/.sk’A‘1” V

v

/pst‘olk

. $ ^ •/sU5’101’

SAKHALIN)

KW.H1S0E«»«»!’-o /^lijuno-ur*

Vakuno-sH»^^Y__ ■ hebITT^ Tri »«*>“’ 1

•.Kot*>)k,‘k l’

■TIOKOL^V . I //, klKWOAl.//-

Blagovyeshchens]

ku£”1*°*X

ikotas I.’ ‘-£?

gjU^KUFAS

EMPIRE

195 Statute Miles to one inch.

karafwto ˆ

Khabarovsl

Ha/ b|n

‘anrfka

AJtUSASH!

‘iukeshi

*)l»SU*0*

Ketoi !>,

Otaruˆ

O’SHIMA

ˆ/ˆVladlvo »tok VeUrthe C reat Gvlf

Hakodal

SEA OF

ˆ 1 Iq/ rw

Shimusib

5ˆ Okinoerabv ˆ IhiyaI.I

lZKNA I.’*

t 1veI.._L/ Akumi l..

Ton a 1.

‘Aomori

MakanruhJui

Rebunsiri

C. Nobul/Oi

Vousan for ^fJeDaah ,

ch'osen/—^*

jorioka

Sendai

I'Xonokl^o

A T "V ^

KUME l.Q Kerama

*c. OkabetsU^*

.TOKYO

;V Shibetor<

^ o Bettob^V-^ ,vP f urubetsiy5^j

^Knemoi ■ / vj C. Ricord

N iUJNASHIRI I.

;ohama 35't^26:

Nagoya.

b Kyoto p'saka; Ishtma

" ritual

^oiote • 'i^akjd

■Esashi

/'"rebels,

Jornamab

_Rururnoi)i)^f

MashikfcJ

Pinnacle Is.

SHlKbkU

Kilunj

Tamauji

*Taihokru**

*‘S,l.*ngl,a;i*

Santiau Pt.

Eh abu 1.

KYUSHU

Shinchiki

Tarawa I.

V \ I Shikotai I.ˆr*

7 F 7 n 1 X

I’p-C // VorHauianalca*

*/ Arv-£v*kkeshl’*

ANEGA-SH1

“Yonakchi I. Ibiomote I.

IsiUUAKl

8utstttsu.

“arauta-efj

Setanaijw

aSssˆ:

hS

ukuyam}.

fu ˆKarcnko

KamitebumaT

• TokuhoI.

AIWAN

•kinawa

!y (FOUMjOSA)

lORRlSpN

ft/

• -

< Daitojy

afg#

/I ids air

V, U*k>.JS*

oˆC. tsai Horoizumi jOina

TAIAVAN

(Formosa/

AND

RYUKYU ISLANDS

Scale.

Mreano I

OUTLINE MAP

OF

JAPAN

Scale.

C. Yerimo

*, ISUieAKI I •*iomqte 1^*

laSS,“08/*

Pinan

‘”’•ouina

-SJSjOiifa

iinchi

raHura

(L-alA-O’ I

. 0A“moriB|

Botel-tobaoo I

0 100 goo 300 400 500

570 Statute Miles to one inch.

iflachinohe

173 Statute Miles to one inch.

‘Qarampi 122 <

*/WC Oki *J*

J^oro /. r0a° . cv ^ ‘

‘■mt

VR/n#

r-Y’((Hu r^aoetsu’ J\ ^“ikov.

UGHTOjV strait

“”“”“fraiv

°‘nhka

yihllki * “‘fa*an-a \9“-^la,Da r

c-

4 ‘ < *4 y

Hokat»

.. Kaebash;/ ‘

^C^b‘

1% hub

■4y»

r^iiTFM

Li£j,«l2U

JjhAino H.

Maisaki^^auy 4”‘”- Y^

t- “■1-oUOAf/

JAPAN

MAIN ISLANDS

Statute Miles, 71 = 1 Inch.

Kilometres, 113

V . ‘ B

YainogaVa ■

Capitals of Countries @ Capitals of Ken ® Raod McNally’s New 11 x 14 Map of Japan. Copyright by Rand McNally & Co,

Longitude East from Greenwich,

.

‘

C5

■»

•

I

‘

JAPAN — TOPOGRAPHY OF JAPAN (1)

321

Kusatsu-Shirane (7,498 feet) and Adzumaya- san (7,731 feet) are well known in this chain.

The plain of Kwanto, the largest in the country, stretches between the Kwanto group and the Pacific Ocean. On the south it ex¬ tends as far as the two hilly peninsulas, Boso (Awa-Kadzusa) and Miura, which enclose the Bay of Tokio, an outshoot of the Pacific. The plain is gently undulating, partly of Tertiary formation, but mostly covered by later de¬ posits. # It is drained by many streams, of which Tone is most noted. Lakes and lagoons are numerous, and Kasumi-ga-ura near the mouth of the Tone is the second greatest lake of Japan. The plain is well cultivated and thickly populated. There are over 40 cities and towns with populations of over 10,000. Tokio, the capital of Japan, with its population of over 2,030,000, is situated on the mouth of the Sumida River, which flows into the Bay of Tokio. At a distance of only 19 miles from the capital is Yokohama, the greatest seaport in the country, and a little south is Yokosuka, One of Japan’s naval ports. Many towns in the northern part of the plain are noted for their flourishing silk industry.

In the central part of Honshu, where the two great mountain systems meet, lies a zone of great tectonic depression, which is repre¬ sented by the valley of Chikuma-gawa on the east, and those of Fuji-kawa and Kamanashi-gawa and the lowlands of Matsumoto-daira on the west. Along this zone runs the volcanic chain of Fuji and many cones stand as the boundary posts separating the two topographi¬ cal districts, Northern and Southern Japan. The chain originates in the far south in the Markinna Group in the Pacific Ocean ; and running north through the Volcano Group (Iwo-jima) and Shichito Group, it reaches the peninsula of Idzu on the south coast of Honshu. Several eruptions on these volcanic islands and of the submarine volcanoes have been recorded in recent years. Noteworthy among these is Oshima or Vries Island, which is now ac¬ tive. The Idzu Peninsula with Amagi-san (4,546 feet) is linked with Honshu by the Hakone, which is well

known for its large and beautiful atrio-lake. As'hi-no-ko, as well as many hot springs. Next to Hakone and over Ashitaka stands the prominent cone of Mount Fuji, whose snowclad peak reaches the height of 12,392 feet. The chain tends toward northwest and north and passing through Kaya-ga-take (4,067 feet), Yatsu-ga-take (9,637 feet), Tateshina-yama (8,298 feet), it termi¬ nates at the Myoko Group (Myoko-zan, 8,049 feet) on the coast of the Sea of Japan.

The southern arc of Honshu was first de¬ scribed as a part of the Sinian System by Pampelly and then as a part of the Kuenlun System by Loczy, both considering it as a single system and an extension of Nan-ling or of Peling (Tsin-ling) on the Asiatic continent respectively. But Baron von Richthofen in a recent opinion says that it consists of two dif¬ ferent mountain systems, which unite in south¬ ern Japan; one chain on ihe coast of the Sea of Japan, which he names Chugoku Mountain being probably an extension of the Kuenlun System or Tsin-ling, while the other, which runs along the Pacific Coast and is called the Kuma-kii Range, belongs to the mountain sys¬ tem of southern China or Nanling. Without

going into further discussions of these tectonic problems, we will turn our attention to the general topography of southern Japan.

Between the tectonic valleys of Fuji-kawa and Tenryu-gawa lies the Akaishi Mountain, which from its outline is often called Akaishi Sphenoid. It is composed of several ranges of various geological formations. The highest peak of the Akaishi proper reaches the alti¬ tude of 10,145 feet, while the culminating peak of the whole group with a height of 10,332 feet is in the Shiramine Range, which runs parallel to the Akaishi proper on the eastern side of the Oigawa Valley. The northern ex¬ tension of the Shiramine joins a granitic mass with the precipitous peaks of Koma-ga-take (9,843 feet) and Ho-o-zan (9,551 feet). The southern extension of the Akaishi Range forms the mountain districts of Totomi and Mikawa, and disappears in the Akumi Peninsula.

Nearly parallel to the Akaishi Mountain, and between the two great valleys of Tenryu and Kiso, extends the Kiso Range with another Koma-ga-take (9,446 feet). This range joins the mountainlands of Mikawa in the south. The spurs of these mountains form a terraced coastal plain which is mostly grass-plain or Mdara,® such as Takashi-ga-hara, Mikata-ga- hara, etc. The lowlands at their base are well cultivated and contain many towns and villages, through which runs the trunk line of the Tokio-Kobe Railway. Many large rivers such as the Fuji, the Abe, the Oi and the Tenryu flow toward the south, cutting deep valleys in the Akaishi Mountain and its spurs, and forming stony deltas on this coastal plain. On the plain is Lake Hamana, which is now connected with the sea by a narrow outlet.

Coming back to the great tectonic valley of Fuji-Kamanashi, we find the small basin of Suwa with the lake of the same name. It lies 2,600 feet above sea-level and is the source of the Tenryu. Further to the north, separated from this basin by the small ridge of Shiojiri- toge, stretches the valley of Matsumoto-daira with an average height of 1,500 feet. Rising precipitously from this level the lofty Hida Range forms the western boundary of the valley. This range extends south to the right side of the great Kiso Valley, and the north end of it terminates abruptly in the precipitous cliff of Oyashirazu on the Sea of Japan. This is the highest mountain range in the empire with many peaks of 10,000 feet in altitude, and hence it is often called the ((Japanese Alps.® There is no glacier in this range at present, but the striated surface of the rocks of Shirouma-ga-take, one of the prominent peaks, indicates the former existence of one. Like the Akaishi Range, it consists of older geological formations and various eruptive rocks. Among several peaks Yari-ga-take (10,142 feet) or the (

closely parallel to the western side of the northern Hida Range and separated from it by the great gorge of Kurobe-kawa.

The western flank of the whole Hida Range is not so steep as the eastern, bat slopes to the mountainland of Hida, sometimes called the Hida Plateau. This comprises a wide tract of the most mountainous district in Japan, which spreads over the province of Hida and a part of Mino and Etchu. In its centre there is the small basin or "Becken® of Takayama. To the north of this mountainland lies the fertile plain of Toyama, along the coast of the deep Toyama Bay, an arm of the Sea of Japan. Jindzu-gawa and Imidzu-gawa drain this mountainland and then flow through the plain. The western border is a high ridge, upon which stands the volcano Haku san (8,659 feet). The range slopes gradually through a hilly region to a narrow belt of the coastal plain along the Sea of Japan. The province of Noto is a large peninsula on this coast, with Nanao, an excellent harbor. The coastal plain is thickly populated and there are such cities as Kanazawa, the seat of an old ˆDaimyo,® and as Fukui, famous for its silk manufacture.

On the south of the Hida Mountainland stretches the low lands of Mino and Owari. It is a part of the great depression, whose southern half is now occupied by the Ise-no- umi, an arm of the Pacific. The Mino-Owari plain is drained by the three rivers, Kiso-gawa, Nagara-kawa and Ibi-kawa. It is extremely fertile and produces rice of an excellent quality. Nagoya is a flourishing commercial and in¬ dustrial city and also an important railway

junction in this plain. This plain is bounded on the west by the range of Ibuki, Yoro and Suzuka. On the further west, there is a series of such depressions separated from each other by north and south <(Horst)) ranges, which finally come to the great depression of the Inland Sea or Setouchi.

Next to the Mino-Owari plain and between the ˆHorst® Yoro and Hiei-Kasagi, there lies the depression of the province of Omi, the greatest part of which is occupied by Lake Biwa, the most picturesque and largest fresh¬ water lake in Japan. The waters of the Sea of Japan cut deep into the land, forming Tsuruga Bay, and there is only a narrow tract of land between this bay and Lake Biwa. Iga is a small basin to the south of the former. On the southwest of Omi Basin there are the basins of Yamashiro and Yamato. There was, however, originally a single depression between Hiei-Kasagi (Hira-san 4,044 feet, Hieizan, 2,700 feet), and Kongo (4,057 feet) mountains which was afterward divided into the two basins bv the undulating hills of in¬ significant height between them. These basins have played an important role in the history of Japan. The basin of Yamato was the seat of the capital of the Nara dynasty, 1,000 vears ago, and there still remain many buildings, especially ancient Buddhist temples. In the centre of the basin of Yamashiro is situated the city of Kioto, which was the capital of Japan for a thousand years until Tokio was made the new metropolis in 1868. The city which is often called the <(Paris of Tapan,® is well known for its scenic beauties and its many old magnificent palaces and temples, and it is also noted for its artistic and industrial

wares, especially various kinds of silk, em¬ broideries, porcelains and cloisonne ware.

*On the other side of Kongo-horst lies the * plain of Settsu, which sinks into Osaka Bay on the west. The Yodo River drains Lake Biwa, and passing through both the plains of Yama¬ shiro and Settsu, it discharges into Osaka Bay Lying at its mouth, Osaka was for centuries a commercial centre of Japan and at present it is a flourishing industrial city. It is the second largest city of Japan with its popula¬ tion of over 1,380,000. Kobe has an excellent harbor on the shore of the bay and is the largest importing port, especially cotton, in the empire.*

On the south of this framework of Horsts and depressions lies the large peninsula of Kii. It is bounded by the Idzumi Range, whose highest point is Katsuragi-san (2,814 feet). Ki-no-kawa flows in the valley at the southern foot of this range. The peninsula is very mountainous. Especially on the eastern side of Kumano-gawa, a deep transversal valley, the range attains a considerable height in many peaks of the Omine Group (culminating point is 6,153 feet) and Odaiga-hara-san (5,527 feet). These mountains are

nothing but an extension of the noted Akaishi Range. The range dips down into the Sea of Ise at the peninsula of Akumi ; but, reappearing in Shima Peninsula on the opposite coast of the sea, it extends westward with an increasing magni¬ tude and height. Several geological forma¬ tions from an old crystalline schist to the Ter¬ tiary are exposed in the successive zones from north to south. The continuity of this system may well be traced in the island of Shikoku through Kii Strait.

On the other hand, the palaeozoic mountain- lands of Tamba lie north of the Yamashiro and Settsu basins. They occupy an extensive area of older formation, like the Hida Plateau, but not so high and inaccessible. On the north of these mountainlands is the wide Bav of Wakasa, its coast indented with many small inlets. On this bay are Maidzura, a naval port, and also Amano-hashidate, noted for its beautiful scenery.

The western part of Honshu forms the large peninsula of Chugoku. It is almost en¬ tirely mountainous with a few plains along the coast and rivers. The mountains, however, scarcely exceed 4,000 feet in height, with the few exceptions of some volcanoes, which form a volcanic chain through the northern half of this district. Dai-sen (6,157 feet), Sambe- yama (4,025 feet) and Aono-yama are the most celebrated volcanoes. The earlier geological formation of Chugoku is greatly disturbed by the eruption of granite and other igneous rocks, which are now widely exposed throughout this district. Rivers are generally short, and there are only a few noteworthy ones such as Go- no-kawa running into the Sea of Japan, Higashi-no-Okawa, Nishi-no-Okawa, Kawabe- Kawa and Ota-gawa flowing into the Inland Sea of Setouchi. The coastal lines on both sides of this district show great contrasts. Along the Sea of Japan the coast is very poor with bays and islands. There is one independent range, the Shinji, forming a peninsula of Shi- mane, which is separated from the main land by the Lagoon Naka-no-umi, Lake Shinji and the low plain of Kidzuki. The south coast of

Chugoku is quite different. It faces Setouchi on the Inland Sea. This peculiar sea is a zone of depression having Chugoku on one side and Shikoku and Kyushu on the other. It is divided into several (

The coastal line of Chugoku is highly de¬ veloped on the shore of Setouchi. Numerous inlets cut into the land, and there are many good harbors and anchorages. Among them the Bay of Hiroshima is one of the best, with the city of the same name on its shore, and Ujina, its harbor, which was the

headquarters of transport ships in the recent wars. Not far from Ujina, and on the coast of an arm of Aki-nada, is the naval port of Kure with its large docks and arsenal. Itsuku-shima or Miyajima, situated in Hiroshima Bay, is noted for its beautiful scenery.

Shikoku. — As a whole this great island is a single mountain group of southern Japan. It is separated from Chugoku by the Inland Sea, while a great depression forms the large Bay of Tosa on the south, bounded by the two promontories, Muroto and Sada (Ashizuri), pro¬ jecting southward into the Pacific. Kii Strait on the east and Bungo Channel on the west, cut off Shikoku from Kii Peninsula and Kyushu Island. There is a great similarity between the mountain formations of Shikoku and the others. Shikoku Range, which extends east and west through the island, is a continuation of the mountains in Kii Peninsula and Kyushu Islands. The greater part of the island is very mountainous, and there are several lofty peaks, such as Tsurugi-san (7,354 feet) and Ishidzuchi-san (6,878 feet). The northern part of Shikoku, from which the two great penin¬ sulas of Takanawa and Sanuki project into the Inland Sea, is very similar in its geological and topographical features to the Chugoku and Setouchi islands. The peninsula of Sanuki is nothing but a recently elevated tract of the same sea. Many isolated granite mountains and hills, like islands, stand on the low plain. Among many rivers, Yoshino-gawa is most noted. In its upper course it flows eastward, forming a valley in the Shikoku Range, then cutting through the range it forms the famous gorge of Oboke and Koboke and turns again eastward parallel to the range, flowing through a wide plain until it empties into Kii Channel. Other noted mountain rivers are Shimanto- gawa; Niyodo-gawa and Monobe-kawa, which flow into the Bay of Tosa. A peculiar develop¬ ment of the coastal line on the western side of the island shows man}7 elongated peninsulas and promontories, such as Sada-no-misaki. Awa- no-naruto, situated, in. the narrow strait between Shikoku and) Awaji is very remarkable on ac¬ count of its terrible whirlpools, which are caused by tidal currents.

Kyushu. — This is the third largest island in

Japan with its topographical and geological features very complicated in many respects. The coastal line, especially in its northern part, is more highly developed than any in the country. The Kyushu Range, which is a con¬ tinuation of the Shikoku Range, passes obliquely through the southern half of the island. It culminates on the boundary between the two provinces of Higo and Hiuga with sev¬ eral high peaks, such as Ichibusa-yama (5,970 feet), Ishido-yama (5,724 feet) and Mikuni- yama (5,396 feet). Hitoyoshi-basin is an en¬ closed basin in this range. The well-known river of Kuma-gawa flows from Ichibusa-yama, and passing through that basin cuts this range again forming a picturesque gorge through which it flows

into the Sea of Yatsushiro. Further south, there stretch the two great peninsulas of Satsuma and Osumi, forming the shores of the beautiful Bay of Kagoshima. The geological formation of 'these peninsulas is mostly mesozoic combined with the other de¬ posits by Kyushu Range; but its surface is covered to a great extent by ejecta of volcanoes, there having been several violent eruptions in recent ages. Kirishima-yama is situated be¬ tween Satsuma and Osumi, and is one of the most celebrated active volcanoes in Japan. Karakuni-dake (5,661 feet) and Takachiho-no- min? (5,064 feet) are magnificent cones in the Kirishima Group. The volcanic chain of Kirishima commences in this group, and runs south through. Sakura-jima, the volcanic island (3,749 feet) in the Bc,y of Kagoshima, well known for its terrible eruption of 1914, and Kaimon-dake (3,041 feet), a perfect cone at the extremity of Satsuma Peninsula. The further extension of this chain passes through the volcanic islands of Kawabe Shichito (Seven Islands of Kawabe), some of which are active at present.

In the northern, part of Kyushu on the other hand, there, lies the so-called Tsukushi Mountain, which is a mountain group of vari¬ ous geologic formations, ancient and recent, as well as of plutonic and volcanic rocks. There is no regularity in. the mountain formation and the whole region is divided into many moun¬ tains and hilly tracts, the heights rarely ex¬ ceeding 3,300 feet, except in the case of some volcanic cones. An extreme development of the coastal line forms the peninsulas of Sonoki and. Shimabara, which are connected with the main body by the narrow isthmus of Isahaya. Omura Bay and Ariake Bay are separated by these peninsulas from the sea. There are many excellent harbors on this coast. Nagasaki, a beautiful inlet of <(Rias® type, was first opened for Chinese and Dutch merchants, and centuries ago it was known as the only port for foreign trade. Now it has a large dockyard and is a commercial centre of southern Japan. Sasebo is a good naval port. Many good anchorages are also found on the northern coast. Fukuoka, with Hakata harbor in its neighborhood, is one of the most flourishing cities of Kyushu, situated on the beautiful Bay of Hakata. Moji, situated in the extreme north of Kyushu and along the Strait of Shimonoseki, has had a rapid development during the past few years, as an export harbor for coal, wThich is abundantly produced in the Tertiary hills of the Tsukushi Range in the provinces of Chikuzen and Buzen. Wakamatsu, southwest of Moji, is also a coal

harbor, and near this town are the Imperial Iron Works of Yawata.

Between Tsukushi Range and Kyushu Range there lies a great volcanic

mass, whose ejecta cover an extensive area in the central part of Kyushu. Aso-san in this group is a remarkable active volcano. The diameter of its outermost craterwall is 17.5 miles by 12.5 miles; perhaps it is one of the greatest in the world. Surrounded by this wall is a large crater plain and in its centre stand five volcanic cones, among which Taka-dake is the highest (5,543 feet). To the northeast of the Aso proper stretches the Aso volcanic chain. In this chain there are the volcanic groups of Kuju-san (6,100 feet) next to that of Aso, Yubu-dake (5,517 feet), and Tsurumi-dake (4,890 feet) near the shore of Beppu Bay, and the circular peninsula of Kunisaki with the volcano Futago (2,430 feet). The further extension of the chain may be traced to some small islands in the Inland Sea. Another continuation of this chain in the opposite direction is indicated by Ki'bo-zan (2,326 feet) in Kumamoto Plain and Unzen-ga-take (4,871 feet), on Shimabara Peninsula. To the north of the latter there is another volcano Tara-dake (1,226 feet).

A comparatively wide plain extends along the shore of Ariake Bay. It is divided into two parts by the hilly region of Miike. The northern plain is drained by Chikugo-gawa, the largest river of Kyushu, and is thickly populated. Higo Plain on the south has in its centre the city of Kumamoto. This plain is ex¬ tremely fertile and produces rice of the best quality. There are many islands near Kyushu. On the west there are the twin islands of Ama- kusa, Koshiki and Goto Group, while on the north Iki and Tsushima form the stepping stones between Japan and Korea.

Ryukyu. — All the islands stretching between Kyushu and Taiwan (Formosa) are comprised under the name of Ryukyu Group. But politi¬ cally the northern group of these islands be¬ longs to Kyushu. These islands are nothing but the peaks of a submerged mountain ridge along the edge of the continental shelf. Geo¬ logically the arc of Ryukyu is divided into three zones. The islands in the central zone are mostly of older geologic formations, while those in the outer zone are of the later Tertiary period. The inner zone is of the volcanic origin, and is the continuation of the Kirishi- ma volcanic chain of Kyushu. Okinawa-jima, the largest island, is situated in the centre of this group. Most of the islands are hilly, with the exception of Yaku-shima with a granite mountain Yaku-dake (6,183 feet).

Taiwan (Formosa).. — This spindle-shaped island is at the southern extremity of the Em¬ pire and lies next to the province of Fokien of southern China from which it is separated by the Taiwan Channel. The slight develop¬ ment of the coastal line characterizes this island, there being no large indentations. Ke- lung, the gate to this island on its northern end, is but a small ˆRias,® harbor. The backbone of Taiwan begins with a precipitous cliff on the northern coast, and stretches W. S. W. for some distance, then turns to S. S. W. at Setsu- san (Mount Sylvia, 12,641 feet).

From this lofty peak the range runs along the length of the island, until it terminates at Garampi or the South Cape. It culminates at Niitaka-

yama or Mount Morrison (14,268 feet), the highest mountain of Japan. This range con¬ sists of Palaeozoic and Archaean formations and slopes abruptly on its eastern side. Sharply separated from this range by a tectonic valley, another small range (the Taito), stretches north and south along the eastern coast. Parallel to the west side of the central range lie spurs of a later geological formation with a lower altitude. Along its foot extends a strip of the coastal plain, where the soil is remarkably fertile, and sugarcane and rice are cultivated. A characteristic feature of this plain is the excellent development of the deltas of many rivers, which, leaving the mountain region, suddenly discharge their water and silts into the plain. Taihoku, the metropolis of the island, is situated in a small basin at the northern end, through which the Tamsui River flows, having Tamsui harbor at its mouth. The hilly tract around this basin is well known for its tea plantations. On the north of the same basin stands the volcanic group of Taiton- zan (2,145 feet).

Hoko-to, or Pascadore Islands, are a group of small islands in Taiwan Channel. They are of basalt, with an insignificant altitude above the sea. The main island of Hoko-to has Mako, an excellent shelter harbor.

Hokkaido. — Hokusu, the main island of Hokkaido, or Yezo, as it is called 'by Europeans, is the second great island of Japan. It is rhom¬ bic in its general outline with the coast mostly level and low, and with a peninsula of fish-tail shape on the southwest. The continuation of the volcanic chains in northern Honshu ex¬ tends into this peninsular part. The large bay of Uchiura, or the Volcano Bay, commands an excellent view of various volcanoes on its coast. On the south of the bay is Koma-ga-take, to the southeast of which stands the active volcano of Esan. There are many volcanoes, especially in the region to the north of the bay. Makkari- nupuri or Shiribeshi-yama (6,873 feet), which is situated at the centre of that volcanic region, is noted for its perfect cone. Other volcanoes are Usu. Tarumaye, etc.

The backbone of the main part of Hokushu consists of older rocks and passes through the island in a S. S. E. — N. N. W. direction from Cape Erimo to Cape Soya. The southern half of this range is called Hidaka Mountain, the Yubari Range running parallel to it along its western side. At the centre of this backbone stand many peaks, most of which are of vol¬ canic origin. Among these prominent peaks, Nutapkaushibe (7,691 feet), Oputateshike (6,- 494 feet), and Tokachi-dake (5,943 feet) are well-known volcanoes, and Ishikari-dake (6,- 675 feet) consisting of older eruptive rocks, is also noted for its high altitude. The Chishi- ma volcanic

chain runs east, from Nutap¬ kaushibe, including several volcanic cones, such as Meakan (5,304 feet), Oakan (4,950 feet), Atosa-nupuri, and Raushi-yama (5,160 feet).

Seaward from these elevations stretches a gently undulating hilly region through which many large rivers flow, such as Ishikari-gawa, Teshio-gawa, Tokachi-gawa, etc. Fertile plains are found along these rivers. The largest plain in the- island is that of Ishikari, which separates the main body of the island from its peninsular part and penetrates further north-

JAPAN

Fujiyama, from Tokaido Road

JAPAN

1 Government Offices, Fuku

2 Modern Bridge and Entrance to the Imperial Palace, Tokio

.

JAPAN

1 Bronze statue of Goddess of Mercy, recently erected by rich merchant of Osaka 2 One of the Daimios of Chosen in civil dress

JAPAN

1 and 2 Modern Japanese Sculpture in Choshi

3 The Kwannon Fountain, Birth of the River, Osaka

ward into the mountain district along the river Ishikari. Kamikawa is a basin at the upper course of that river. Sapporo, the political centre of this island, is situated in the plain of Ishikari, and Otaru, its flourishing harbor, lies at a short distance from it.

Chishima or Kuriles. — This group of islands stretches from the Bay of Nemuro to the southern extremity of Kamchatka Penin¬ sula, describing a large arc forming the eastern boundary of the Sea of Okhotsk. These islands are entirely of volcanic origin, accompanying Tertiary strata in some islands. The three great islands, Kunashiri, Etorofu and Uruppu, lie to

the northeast of the main island of Hok¬ kaido in the order named. These islands have been explored 'but little and are very sparsely populated.

Karafuto (Sakhalin). — The island of Kara-

futo stretches from east to west with the meri¬ dian of 142° 30′ E. as its axis. This island is now politically divided into two parts by the parallel of 50° N., Japan possessing its southern half. There are two peninsulas at the southern end of Japanese Karafuto which form the coast of Aniwa Bay. Kushunkotan (Korsakof), the political centre of the island, is a harbor situated at the northern end of this bay. Another large bay, which is called Terpenia Bay, lies on the eastern coast. The principal mountain chain, the Sakhalin Range, commences at Cape Notoro at the southern extremity of the island, form¬ ing a continuation of the backbone of Hokkaido, from which Karafuto is separated by the nar¬ row channel of Soya. This range is of the later geological periods, like to the northern Hokkaido, and generally it consists of gently undulating hills. There are neither precipitous mountains nor abruptly elevated lofty peaks. The highest mountain, Spamberg, does not ex¬ ceed 3,300 feet in height. Susuya and Tako rivers flow in opposite directions along the eastern foot of the range, forming a valley which extends north and south. On the other side of this valley the Susuya Range stretches along the eastern peninsula. There older geo¬ logical formations are exposed, which may be the continuation of the same strata in Hidaka Range of Hokkaido. Along Susuya River there is an alluvial plain where Vladimirovka, the principal town, is situated. In the middle part of the island a similar topography is found. A large river valley formed by the Poronai and the Tym separates the Tiora Mountain Range on the east from the Sakhalin Range. Poronai River rises in the Russian territory, and flows across the boundary line. There is a plain along the most of its course until it flows into Terpenia Bay. Some tundra or barren lands are found on its upper course.

Climate. — As the archipelago of Japan ex¬ tends over 29 degrees of latitude, different parts of the country have different climates, though there prevails an oceanic climate in general. In Taiwan and Ryukyu tropical and subtropical vegetations flourish, while in Karafuto and Chishima severe Arctic cold is experienced.ˆ The mean annual temperature is 75.7° F. (24.3° C.) in Koshun, a town in the southern extremity of Taiwan, and is over 68° F. (20° C.) in all islands of Ryukyu Group. In the greater part of Kyushu and Shikoku the mean temperature is 59° F. (15° C.). The Setouchi coast of Chu-

goku is warmer than the coast of the Sea of Japan in the same peninsula.

In the mountain- lands of central Honshu, as well as in the prov¬ inces of northern Honshu, the temperature be¬ comes gradually lower and averages 50° F. (10° C.), while a milder climate is always experi¬ enced on the Pacific coast. In Tokio, it is 56.8° F. (13.8° C.) and in Yokohama 57.6° F. (14.2° C.). In Hokkaido the climate is gener¬ ally cold. In most towns, except those in the southern peninsula, the annual temperature ranges between 39° F. (4° C.) and 44° F. (7° C.). Karafuto and Chishima are of course still colder. Mean annual temperature of Shisuka in Karafuto is 30.4° F. (— 0.9° C.). August is the hottest month in most of the country, with the exception of Taiwan and southern Ryukyu, where the mean temperature in the month of July reaches over 80° F. (27° C.). February is the coldest month in Taiwan, Ryukyu and some parts of southern Japan, as well as on the coast of the Sea of Japan, while in other parts January is generally colder. The mean maximum temperature exceeds 86° F. (30° C.) in most of Japan, and the minimum reaches 22° below zero F. (— 30° C.) in Asahi- gawa and Obihiro in Hokkaido, 40° below zero F. (— 40° C.) in Ochiai in Karafuto).

Having the Asiatic continent on one side and the Pacific Ocean on the other, the most of the archipelago is included in the monsoon region. In winter, when the continent is ex¬ tremely cold and the highest atmospheric pres¬ sure is attained, severe northwest and north winds prevail throughout the country. In sum¬ mer, however, when the continent is heated and there is a low atmospheric pressure, warm and wet winds blow from the S. and S. W., that is, from the Pacific Ocean. Naturally there are several kinds of local winds, due to the complicated configuration of the land. Violent hurricanes or so-called typhoons (Taifoons), which occur mostly during the last of the sum¬ mer and in the first of the autumn, cause terri¬ ble damage, especially to rice crops. They arise generally in the neighboring sea of Taiwan, and passing over Ryukyu and Kyushu, strike the Sea of Japan. Sometimes they pass fur¬ ther to the east through central Honshu. Typhoons from another source are said to come from the southern sea and suddenly strike the Pacific coast of central Japan.

The rainfall is of course abundant in the islands of Japan. The southern islands experi¬ ence an extraordinarily great amount of rain. At Kelung in Taiwan, the annual precipita¬ tion is 130.6 inches, and in Oshima of Ryukyu Group 129.5 inches, while in Hachijo Island 153.5 inches. As a high mountain range runs along the axis of the main islands, a greater rainfall is caused on the coast of the Pacific Ocean during the summer than in the winter, while in the regions along the Sea of Japan the reverse is true. In these regions, except Hokkaido and northern Honshu, the rainfall exceeds 78 inches annually. In Tokio it is 59.0 inches. The least rainfall occurs in Hokkaido and Karafuto, though there it is not less than 27 inches, and in most of the island it amounts to 40 inches or over. In the

beginning of the sum¬ mer, when the summer monsoon com¬ mences, the southern and central regions of

J apan are generally cloudy and have many rainy days, though the whole amount of the precipita¬ tion is not exceedingly great. Heavy rains fall, oftener in storms, at the end of the summer in the same districts, and they cause inundations of many rivers, inflicting great damage on rice- fields and hindering communication in several directions.

It is an astonishing fact that an enormous amount of snow falls on the northern coast of central Japan. Prevailing cold winds from the northwest bring the moisture of the Sea of Japan, especially that of the Tsushima cur¬ rent, a branch of the warm Kuroshiwo or Japan current, and deposit it in the form of snow on the barrier of the high mountain range. It is difficult to believe that the depth of snow on the plains is at least three feet and ia the mountain districts is sometimes more than 10 feet during the winter season. This is a real fact, however; whole towns and villages are often nearly buried under the snow, wmch is cleared away only with great difficulty.

Mineral Wealth. — The chief mineral prod¬ ucts of Japan are coal, copper, gold, silver, iron, antimony, petroleum and sulphur. Among these minerals, coal stands as the most valua- ble product. Over 20,000,000 tons of coal are annually produced, one-fifth of which is ex¬ ported. The richest coal-fields are located in the northern mountains of Kyushu and in the Yubari Range of Hokkaido. Coal occurs also on the Pacific coast of Abukuma Plateau of Plonshu. Most of the Japanese coalmeasures belong to the Tertiary formation. Copper plays the most important role among metal produc¬ tions, and Japan ranks as one of the chief sources of copper in the world. The annual average of its export is estimated to be over 76,000,000 pounds, or two-thirds of the total production. The celebrated copper mines are Kosaka, Ashio and Hitachi in the northern Honshu and Besshi in the island of Shikoku. Precious metals, however, are not quite so abundant. Gold occurs both in veins and in alluvial deposits. It is produced mostly in the province of Satsuma in Kyushu and in north¬ ern Taiwan. The gold mines of the island of Sado in the Sea of Japan have been known for centuries. Silver is obtained in several locali¬ ties, but the principal mines are Kosaka and Hitachi in northern Honshu. A mine of anti¬ mony at Ichinokawa on the northern coast of Shikoku is well known for its mineralogical im¬ portance on account of its magnificent crystals of antimony glance. The celebrated iron mine of Kamaishi is on the Pacific

coast of Kitakami mountainland in northern Honshu. Iron is not produced in sufficient quantities to supply do¬ mestic demand. Much ironware is imported from Europe as well as iron ore from China and Korea. The production of petroleum is annually increasing. In 1914 about 94,320,000 gallons of crude oil were obtained. Oil fields stretch along the coast of the Sea of Japan mostly in the Tertiary hills. The most pro¬ ductive wells are found in the province of Echigo. Sulphur is produced in several vol¬ canoes. The quantity of precious stones found in Japan is insignificant. The only ornamental stones are quartz and agate. Topaz occurs in some places. Among building stones granite is most popular. It is quarried abundantly in

southern Honshu. Its Japanese name <(Mikage- ishi® was derived from the name of a quarry near Kobe on the coast of Osaka Bay. Ande¬ site and tuff are other important building ma¬ terials. Good porcelain-clay is obtained in several places throughout the country.

Flora and Fauna — It is true, to a certain extent, that Japan is poor in land flora and fauna, as it consists of groups of islands sepa¬ rated from the continent. The empire, how¬ ever, extends, from the tropical nearly to the frigid zone, and approaches the continent so closely at several points, that the species of the Asiatic continent are apt to be introduced very easily into the nearest islands. Consequent¬ ly, the islands are comparatively rich in num¬ ber of species, which closely resemble those of the continent.

Flora. — The whole island of Taiwan is practically tropical in nature, with luxuriant vegetation, as the name ˆFormosa® implies. Of the plants growing on the plains, the betel- nut palm (Areca catechu), the banyans (Ficus retusa and F. wightiana), the Pandanus (P. odoratissima), the bamboo, and the tree-fern (Cyathea spinulosa) are the principal ones. The most important of the cultivated plants are rice, sugarcane, the tea plant, the sweet potato and the ananus. The camphor tree (Cinnamomum camphora), the king of the Formosan forest, grows in woods on some¬ what elevated ground, attaining 10 feet in di¬ ameter and 130-160 feet in height.

Kyushu, Shikoku, and a quarter of Honshu, south of the parallel 35° N., present some semi- tropical features, with several species of the oaks (Quercus glauca, Q. myrsinaefolia, etc.) and the pines (Pinus Thunbergii and P. densi- flora). The stately growth of the woods of P. Thumbergii on the sand dunes gives magnifi¬ cent scenery everywhere along the shores of this region. The tea plant and the wax tree (Rhus saccedanea) are extensively cultivated.

In that part of Honshu which is north of the parallel 35° N., there are found the forest trees of the temperate zones. The beech (Fagus sylvatica),

(hinoki (Chamaecyparis obutosa), <(sawara» (Ch. pisifera), the arbor vitje (Thujopsis dolabrata), «sugi» (Cryptomeria japomca), and the fir-tree (Abies firma). The mulberry tree and the lacquer tree (Rhus verni- cifera) are planted abundantly. Here is found also the Ginkgo tree, a primitive conifer, in¬ digenous to Japan, Korea and China.

These three central islands with their semi- tropical and temperate characteristics are the most thickly populated and most thoroughly cultivated of the whole country; so the plains and valleys are mostly covered with fields of rice and barley.

Hokkaido and Karafuto may be grouped together as belonging to the subarctic zone. In this zone, the air (Abies sachalinensis) , the spruce (Picea ajanensis), and the larch (Larix leptolepis), are the chief trees in the forests The birches (Betula), the alders (Alnus), and the poplars (Poplus) are found with these in some places. Thus, the general features are very much like those of Siberia or the north¬ ern part of North America.

In Taiwan and the central Honshu, where great elevations occur, vertical zones of flora may be traced, which very nearly coincide with the horizontal zones just mentioned, although the same species are not always represented in the proper zones.

It may be assumed that the coasts of the Sea of Japan are generally poor in the marine flora, while the coasts of the Pacific are rich in the number of species as well as of indi¬ viduals. On the southern Pacific side, where Kuroshiwo or the Japanese current passes close to the shore, many species of the red algae, Sargassum and Ecklonia adorn the submarine rocks and cliffs ; while on the northern Pacific coast, which the cold currents wash, Laminaria and Alaria grow abundantly. Alaria fistulosa nearly 300 feet in length is not rare.

Fauna. — The land animals of Taiwan are also semi-tropical. Among the mammals, the pangolin (Manis dalmani), with its relatives in India and Africa, is well known; the black bear (Ursus formosanus), the wild boar (Sus tai- vanis), and the deer (Cervus Swinhonii) belong to species different from those of the central Japan. Out of about 200 species of birds known in this island, four-fifths are similar to those of India and China, while one-half are similar to those of Japan proper. The most useful domestic animal is the bison (Bos chin- ensis), which is used for plowing and also sup¬ plies meat, hides and horns to the natives. Swine are bred everywhere in the

islands as also in China.

Kyushu, Shikoku and Honshu may be grouped in one faunal zone; for there is scarcely any marked line to divide them into two zones, as in the case of plants. Most of the important groups or families of animals of the temperate continent are likely to be found in this region. Among the mammals,, the hares (Lepus brachy urus and L. variabilis), the wild boar (Sus leucomystax), the deer (Cervus sika), the fox (Canis japonica), ((tanuki55 (C. procyonoides), the otter (Lutra vulgaris), <(itachi5> (Putorius itatsi), and the bear (Ursus japonicus) are the principal ones. Of the birds, wild ducks (Anas), the pheasant (Phasianus versicolor), and the snipes (Scolopax) attract sportsmen. The bush warbler (Cettia cantans), and the white eye (Zosterops japonica) are common caged birds. The long-tailed fowl of the prov¬ ince of Tosa in Shikoku deserves notice. The most remarkable facts concerning the fauna of Japan are that the monkey (Inuus specio- sus) lives far north at Aomori (41° N.), and the giant salamander (Megalobatrachus maxi- mus) survives in the mountain streams of the western Honshu. It is also an interesting fact that the wild cat and the Chinese ring-necked pheasant (Phasianus torquatus) are found in the island of Tsushima, which is considered to be a stepping stone between the continent and central Japan in the migration of animals. Of domestic animals, horses and cattle are most common. The small silkworm (Bombyx mori) is most important economically.

The fauna of the islands north of the Tsu- garu Strait is of a different character, as is also the flora. The black fox (Canis alpinus), the sea otter (Enhydra lutris), the marten (Mustela brachyura), the brown bear (Ursus arctos), and the leopard seal (Phoca fcetida) are common in this zone. The fur seal (Cal-

lorhinus ursinus), which migrates in winter to the sea off Choshi or the Tsushima Strait, breeds in summer on the rocky shores of the Chishima (Kuriles) and the Robben Island off Cape Patience in Karafuto. The gray-headed green woodpecker (Gecinus canus), the great black woodpecker (Picus martius), Blackis- ton's eagle owl (Bubo blackistonii), and the hazel grouse (Tetrao bonasia) are also peculiar species. . The Tsugaru Strait, though only 10 miles vvide, most clearly divides the islands of Japan into two zones. This fact was first an¬ nounced by Blackiston of Hakodate, in whose honor the boundary is called ((Blackiston's line.55

In high mountains such as are found in Taiwan and central Honshu, alpine species are often observed. The most remarkable of these are the common ptarmigan (Tetrao mutus), and Japanese alpine accentor (Accentor alpi¬ nus. erythropygius).

The fishes in the seas of Taiwan are very similar to those in the seas of the Malay Archi¬ pelago, India and eastern Africa. ((Sabahi55 (Chanos chanos) are bred in large num¬ bers in ponds on the west coast of the island. In the seas around the three central islands, there are many peculiar species, although some resemble those of the Chinese and Indian seas. Bonito (Thynnus pelamys), Tunny (Thynnus thynnus), the Spanish mackerel (Scomber colias), the snapper (Pagrus major), the sar¬ dine (Clupea melanostica), and the anchovy (Engraulis japonicus) are economically most important. The seas of Hokkaido and Kara¬ futo, and a greater part of the Sea of Japan contain fishes of a subarctic nature; and the species found there are often similar to those of North America and occasionally to those of northern Europe. The herring (Clupea pal- lasii), the cod (Gadus brandtii), and the dog salmon (Onchorhychus keta) are economically most important. <(Ayu55 (Plecoglossus altivelis) and ((Shirauwo55 (Salanx) are fishes character¬ istic of Japan and Korea. The viviparous surf-fishes (Ditrema) and <(Chika55 (Hypome- sus) are confined to Japan and North America. ((Rabuka55 (Chlamydoselachus anguineus) often caught (off the Tokio Bay, being a primitive shark, is famous throughout the whole world. The culture of the pearl oyster (Avicula mar- tensii),. and the artificial method of depositing pearls in the shells which is practised at Shima on the coast of the Sea of Ise, are worthy of notice.

Bibliography. — Topographical and Descrip¬ tive: (A Sketch of the Geograph}'- of the Em¬ pire of Japan> (in (Chinese and Japanese Re¬ pository, > Vol. Ill, London 1865) ; (Ni-hon chi shi nyaku,5 a short sketch of the geography of Japan, published by the Department of Educa¬ tion (Tokio 1874) ; Browne, (Japan, the Place and the People) (Boston 1904) ; Chamberlain and Mason, (Handbook for Travellers in Japan5 (London 1903) ; Clement, (Handbook of Mod¬ ern Japan5 (Chicago 1903') ; Guerville, (Au Japon5 (Paris 1904) ; Griffis, (The Mikado's Empire5 (rev. ed., New York 1906) ; Geerts, A. J. C., (Les produits de la Nature japonaise et chinoise5 (Yokohama 1878) ; Kotora Jimbo, (Notes on the Minerals of Japan5 (in Journal of the College of Science of the Imperial Uni¬ versity of Japan, Vol. VII, Tokio 1899) ; Mac- Cauley, (The Japanese Landscape5 (in Trans-

actions of Asiatic Society of Japan, Vol. XXIII, Yokohama 1895) ; Metchnikoff, L., (L'empire japonais) (Geneva 1881) ; Rein, J. J., (Japan nach Reisen und Studien, etc.) (Leipzig 1881— 86; Eng. trans., London 1889) ; Scherer, (Japan To-day) (Philadelphia 1904) ; Satow, E., (The

Geography of Japan 5 (in Transactions of Asi¬ atic Society of Japan, Yokohama 1874) ; Mel- choir de Vogue, (L'empire soleil levant5 (in Soc. nof ande de geog., Paris 1902) ; (Reports5 of the Imperial Geological Survey of Japan; Transactions of the Seismological Society of Japan.

Flora and Fauna: Adams, (Travels of a Naturalist in Japan5 (London 1870) ; Blaki- ston and Pryer, (Catalogue of the Birds of Japan5 (in Transactions of the Asiatic Society of Japan, 1880) ; Conder, (Landscape Garden¬ ing in Japan5 (London 1894), and (Floral Art of Japan5 (London 1900) ; Franchet and Sava- tier, (Enumeratio plantarum in Japania sponte- crescentium5 (2 vols., Paris 1875-79) ; Piggott, (The Garden of Japan5 (London 1892) ; Sar¬ gent, C. S., (Notes on the Forest Flora of Japan5 (Boston 1894) ; Seebohm, (Birds of the Japanese Empire5 (London 1890) ; Temminck and Schlegel, (Fauna Japonica5 ; Wallace, (Island Life.5

Naomasa Yamasaki,

Professor of Geography in the Imperial Univer¬ sity , Tokio.

2. ETHNOLOGY. The limit of a nation

and that of a race do not necessarily coincide. While a nation may consist of two or more racial elements, one and the same division of a race may be found in different countries. We see both cases exemplified in the people of Japan. Extending from the Kurile islands and the southern half of Saghalien in the north to Formosa in the south, the empire naturally con¬ tains several racial elements. Though some of them are peculiar to the land, others are the small branches spreading from the main stems of peoples which are to be found in other coun¬ tries.

Besides these existing populations we must count among the inhabitants of Japan the pre¬ historic people, who have left innumerable stone-age objects throughout the greater part of the country. Thus from ethnological points of view, Japan is remarkable for containing peoples of exceedingly different character in a comparatively limited area. We will now describe the constituent people under respective headings.

Prehistoric Stone-Age People. — Stone im¬ plements and potteries found in the northern portions of the Kurile islands and those found in Formosa were evidently made by the fore¬ fathers of the present inhabitants of those places. Relics of different types and of differ¬ ent kinds have been discovered from several stone-age sites widelv distributed in the lands lying between Loo-Choo and the southern por¬ tions of the Kurile islands and Saghalien. As these relics form a group by themselves, and as no connecting

links exist between them and those found in the two extreme places above mentioned, we are led to the conclusion that there must have been a stone-age neople differ¬ ing both from the aborigines of Formosa and from the Kurile Ainu.

From shell mounds — the refuse heaps left

by the stone-age people — human bones are sometimes found often broken and scattered, like the bones of wild animals, showing that cannibalism was practised by the people. As it is very difficult to obtain entire skeletons, special burial places being almost unknown, the knowledge of the osteological character of the people is very limited. The only conclusion which can be drawn from such insufficient materials is that the forms of these bones do not agree with those of the Ainu or the Japan¬ ese, who are the successors, so to speak, of the stone-age people in Yezo and the main islands of Japan respectively.

In general the relics found in the northern districts are comparatively new, showing the latest movement of the stone-age people to have been from the south to the north, that is toward Yezo. Among the Ainu living in the island just named, there are traditions that those who made stone implements and potteries ware entirely different from the Ainu them¬ selves or from the Japanese, and that this pre- Ainu race migrated northward as the Ainu in¬ creased in number. The Ainu gave several names to the race, Koropokguru being one. Supposing the traditions to be correct, the foot¬ prints of the stone-age people must be sought for in Saghalien and the regions situated on the north and the northeast of the northern part of the Kurile islands. According to the Saghalien Ainu, the stone-age people called themselves Tonchi, and lived there about eight generations back. So far as known., the Chukchi, the Aleuts and the Eskimo are those who seem to have had close connections with the stone-age people. Among the three mentioned, the Eskimo are most intimately related to the latter, at least in manners, customs and handiwork. This con¬ clusion is obtained from the minute investiga¬ tions concerning the stone-age sites and relics.

Present Inhabitants. — In Saghalien there are the Giliaks, the Orokkos and the Ainu. In the Kurile islands and Yezo, the Ainu with some local peculiarities are found. The Bonin islands are inhabited by the naturalized Euro¬ peans. The aboriginal tribes and the Chinese immigrants in Formosa are now Japanese sub¬ jects. Having these peoples in the northern and the southern parts of the empire, the Japanese proper occupy the chief central is¬ lands, and thence spread in both directions. The natives of Loo-Choo have no distinctive ethnological peculiarities, and are to be con¬ sidered as forming a branch of the Japanese. The Giliaks and the Orokkos are found not only in Japanese, but also in Russian territory, and both of them belong

*to the Tungus, who are chiefly distributed in the northern part of Asia. The aborigines of Formosa are Malayans, the inhabitants of the Philippine * Islands showing a strong resemblance to them. Geo¬ graphically considered, the large and small islands of Japan form a kind of stepping stone extending from the north to the south. Just as we now find the Tungus and the Malayan at the two ends, so in remote times the chief central islands of Japan might have been in¬ habited by the northern and the southern races. Moreover, some people might have come from the continent by way of the peninsula of Korea. According to traditions and records, we are led to believe that such was actually the case.*

The average height of Japanese men is

about five feet three inches. Cephalic index, 80; hair, straight and black; iris, dark brown; complexion, very light brown, often white in better classes ; face, some narrow, some broad ; beard, some full, some small.

Among the Japanese proper, there are some who have the Korean physiogonomy, while others show the Malay traits. Some are so hairy that it is difficult to distinguish them from the Ainu. The Japanese language is closely related to the Korean. In Japanese manners and customs some likeness to those of Korea and Malay are found.

It is quite probable that the Ainu, Malay and continental elements are the chief, though not necessarily the only, constituents of the Japanese. See Mental Characteristics of the Japanese; The Development and Consti¬ tution of Society in Japan.

Bibliography. — Dooman, (The Origin of the Japanese Race) (in Transactions of the Asiatic Society of Japan, Vol. XXV, Yokohama 1897) ; Oshima Tane Hito, (Essai d'ethnographie jap- onaise) (in Revue frangaise du Japon, Vol. I, Tokio 1892) ; Griffis, (The Japanese Nation in Evolution : Steps in the Progress of a Great People) (New York 1907) ; Puini, (Le origini del popolo e della civilta Giapponese) (Turin 1905) ; Batchelor, (The Ainu of Japaffi (Lon¬ don 1892), and (The Ainu and their Folklore (1901) ; Landor, A. H. S., (Alone With the Hairy Ainu* (London 1893) ; Bickmore, (The Ainos or Hairy Men of Yesso, Saghalien and the Kurile Islands) (1868).*

Shogoro Tsuboi,

Professor of Ethnology in the Imperial Uni¬ versity, Tokio.

3. THE DEVELOPMENT AND CON¬ STITUTION OF SOCIETY IN

JAPAN.

Except England, there is perhaps no other coun¬ try so aristocratic as Japan. From the begin¬ ning of its history, there have always been some aristocrats in the land. In the first period after the era of Jimmu Tenno, we find distinction of noble and ignoble classes among the people. Those who had clan names and belonged to some clan were noble, and those who had no clan name and belonged to no clan were ig¬ noble. Before the Reform of Taikwa period a.d. 645-46, societv was entirely constituted on clanship and family associations.

Among the nobles, two clans, respectively called Omi and Muraji, stood in the highest rank. Omi was a clan name, mostly conferred on the branches of the imperial line since Jimmu, and Muraji on the clans descended from the branches of the ancestors of Jimmu. Oomi and Omuraji were the names given Jo the respective chiefs of these noble clans, who were the prime ministers of the emperor or Mikado (Tenno in Japanized Chinese language). Below these clans there were others which per¬ formed certain hereditary functions for the emperor. They were called collectively Tomo-no-miyatsuko. Some performed. religious func- 'tion, some military, some judiciary and others weaving, sewing, cooking, forestry, fishery, etc. In fact for every social function a clanship was constituted. They all had their own chiefs. Be¬ sides these there were also hereditary clans who had the power of the local administration in the country. They were called Kuni-no-Mffiatsuko and Agatanushi. At first the local

tribal chiefs, who were subjugated by Jimmu and became loyal to him, were appointed to these local functions, and later the sons of the emperors were also appointed.

The foreign immigrants who were natural¬ ized and distinguished in learning and art were also given a clan name, and left some hereditary function to their descendants.

The smaller family associations were also to be distinguished within these clanships. They had their particular names and organizations and headships. The family names were derived sometimes from their occupation, sometimes from the name of the localities where they dwelt and sometimes from the name of their ancestors. Besides the members proper there were clients or servants who had no clan name and so were servile to the noble class. They were perhaps the aboriginal tribes who inhabited the country before the coming of the superior race, to whom they became serfs and domestic servants.

The early society of Japan was constituted in this way, and it may be

called clannish feudalism. For the clan and family chiefs owned the land and governed the people di¬ rectly. The Mikado had complete power only in his private domains and in those belonging to his family. He had his jurisdiction only in those cases relating to sacrilege, treason and the controversies between several clans and families. In such cases the ordeal of hot water was administered as in mediaeval Europe. Otherwise the clan, and family chiefs had com¬ plete power of life and death over the mem¬ bers 'belonging to their clans and associations. Hence the clans and families appropriated the land and the people, and had monopoly of offices and hereditary occupations in their re¬ spective groups. And by their aggrandisements and encroachments the feuds among them be¬ came in time interminable. So came the Re¬ form of Taikwa era, a.d. 645-46.

This reform was the first attempt to put an end to clannish feudalism and to introduce the form of centralized government. In many respects it resembled the Restoration of 1868, only it was based partly on the ideas and insti¬ tutions introduced from China. By this reform the land and the people were made immediate subjects of the emperor and the state. Before this time they were subject in the first place to their clan and family chiefs, without whose mediation the emperor and the state could do nothing. The reform put an end to the hered¬ ity of public functions in certain clans and families. The clan and family organizations were left as before, but the political offices were opened to all without reference to clan or family. The clannish ownership of land was abolished. To indemnify the owners the whoie or a part of the taxes paid by a certain num¬ ber of households was given them. Every male and female above six years old was to be provided with a certain proportion of land. A boy was to receive two tan (4.90 acres) and a girl two-thirds of what a boy received. Not even the servile class was excluded. Those who belonged to the government and were public servants received the same proportion of land as the noble class. But those who were private servants received a third. For this purpose a census was to be taken every sixth year. More-

over, the association of five households living in a neighborhood was organized and put under a headman. A household in those days con¬ sisted of several families and several genera¬ tions, as 'brothers, uncles and their children lived together with their clients and servants. A household in some cases consisted of more than 100 persons. Women were allowed to be¬ come the head of a household. But the dis¬ tinction between the noble and servile classes was left untouched, although the social inter¬ mingling of the two classes was unavoidable. Some poor noblemen sold their clan

names and became servile, while natural children were constantly born to the two classes. So it was ordered by the Reform Act that among the noble class the children should be¬ long to the father and among the servile class they should belong to the mother, while natural children of the two should belong to the servile class.

Thus the land and the people were national¬ ized. The reform, however, was not com¬ plete until the laws of the Emperor Mommu were promulgated, a.d. 702. These laws were called Taiho-ryo. By the Reform of Taikwa all people, except military functionaries, were prohibited from bearing swords. Even the royal members and state ministers were not exempted from this rule. By Taiho-ryo the principle of universal military service was in¬ troduced, by which every third male was to serve as a soldier. The term of the soldiers in the capital was one year, and that of those in the sea borders three years.

But the above reform and regulations based on it came at a time to be impracticable. For it was the entire reorganization of the central and local administration, as well as of the mode of land-ownership, which the state tried to in- troduce, while it left the clan and family asso¬ ciations in society as heretofore. The heredity of public functions in certain clans and families was abolished, but the same persons were em¬ ployed as before in the central and local ad¬ ministration under different names and qualifi¬ cations. The state was too weak to enforce the intended, reforms, while the clanship and family associations were too deeply rooted to be overcome. In time the Fujiwara family or clan descended from Kamatari, who with the Crown Prince Naka-no-oye (afterward the Em¬ peror Tenchi) carried through the reform of Taikwa, got the complete po'wer of govern¬ ment and official functions into their" hands. As the salaries of officials in those days, paid by the gifts of cloth and certain amounts of taxes from the land and the people, were not sufficient for ambitious and avaricious men, they appropriated the waste lands, and by culti¬ vation. turned them into fertile fields. Thus the private ownership of land and private juris¬ diction rearose, and increased more and more. Within these private lands called Shoyen, the central and. local governments had no power of administration and the personal and household taxes were free, while the taxes on land were very light.. So the increase of these lands subtracted in fact so much from the power of the emperor and the state that the court tried to put an end to this private system of owner¬ ship and jurisdiction. But being unable to pro¬ hibit it, the court finally succumbed to it; that

is, the court sanctioned it, and had its own private domain and jurisdiction.

As the central government was too feeble, and the system of universal military service and drill was not carried out, there arose a powerful class

*of men in the country who were at first the administrators of Shoyen or the court nobles' private lands, ruled the peasants below them, and sent soldiers to the capital as guards and police. They were the middle class and backbone of society throughout the whole country. They were afterward called Bushi or Samurai. (See article — The Samurai). In the meantime the old clanship and family asso¬ ciations were entirely confused, but the new clanship and associations arose in their place. Such was the Fujiwara Clan, and after it came Tachibana, Taira and Minamoto clans in suc¬ cession. They were the nobles of the capital, branched out from the imperial family, whose descendants and relations were ramified throughout the country. As the government was too weak to protect the life and property of the people, the noble clans attached to them¬ selves the people, and especially the fighting men became their retainers. In the capital (Kioto) the Fujiwara Clan held the perfect control of government for several centuries. But they were mostly civilians and had need of generals who could fight. Now the two clans of Taira and Minamoto, which title was be¬ stowed by the emperor, respectively descended from the younger sons of the Emperors Kwammu (a.d. 782-806) and Seiwa (a.d. 859- 77), became very powerful as military leaders. They were not able to compete with the Fuji¬ wara Clan in civil administration and at the court, and so they Served as generals and as local governors, where there was much disturb¬ ance. . They grew up to be two great rival clans in the capital and throughout the country. The fighting men, or Bushi, became their re¬ tainers. Thus the new feudalism, based on land and local associations and attached to the military clans of Taira or Minamoto, was gradually formed in spite of the prohibitions and remonstrances from the central govern¬ ment. Finally the emperor, the Fujiwara Clan and their several families were powerless against the two military clans, who had suc¬ cessively . fought with each other for the su¬ premacy in the capital and in the country. The Minamoto Clan vanquished the Taira Clan under the leadership of the two brothers, Yori- tomo and Yoshitsune. Yoritomo (a.d.' 1186- 1200) was the founder of military government and organizer of territorial feudalism, which continued down to the Restoration of 1868. Yoritomo was the first Shogun (general in chief), in the special sense of that term. He established military court called Bakufu at Kamakura, which , was the second capital and the centre of military government for 146 years (a.d. 1186-1332). Yoritomo, by the sanc¬ tion of the emperor, established the military chiefs in every province side by side with the * civil governors appointed by the court. Thus peace and order were preserved, after civil wars had distracted the whole country. The code of honor and allegiance to some military chiefs besides the emperor, now called Bushido arose in this period. The virtues' of courage! loyalty, magnanimity, simplicity and frugality*

were inculcated by Yoritomo and his contempo¬ raries. From this period also those who had large private estates and many retainers were called Daimyo (greater barons), and those who had smaller estates Shomyo (lesser barons).

After the Ashikaga family, a scion of the Minamoto Clan, succeeded in the military gov¬ ernment of the country, a.d. 1336, and estab¬ lished Bakufu at Kioto, the dual system of local administration was done away, and only the military governors appointed by the Shoguns were left in the provinces. The office of these local governors became hereditary functions, the ownership of land and political jurisdiction were now identified, and thus the feudal system was made complete. The local chiefs who were the administrators of nobles' lands in the previous era became independent local magnates. At first the retainers of military chiefs tilled the soil in the time of peace, and were soldiers only in the time of war. But during the Ashi¬ kaga period (a.d. 1338-1573) wars were so con¬ stant and general that fighting was the only occupation of the retainers. Thus the military class and the industrial class became entirely distinct, although there was of course constant recruiting from, and mixing with, each other.

Under Tokugawa Iyeyasu, also a scion of the Minamoto Clan and the victor of the famous battle of Sekigahara (a.d. 1600), the most per¬ fect form of feudalism was established and con¬ tinued down to the present era. Bakufu was established at Yedo, now Tokio, which very soon became the largest city in Japan. During this Tokugawa period, the emperor was power¬ less, more so than during the Kamakura and Ashikaga periods, but was none the less held divine as before. Iyeyasu and his descendants were able to hold the whole country in peace, almost without intermission during the two cen¬ turies and a half. The function of the Shogun was hereditary, but it needed the imperial in¬ vestiture every time. The whole country was distributed to the military chiefs or nobles, most of whom arose during the civil wars at the end of the Ashikaga dynasty. These terri¬ torial nobles had complete power of govern¬ ment within their provinces, and no appeal to the central government was allowed against their decisions in civil and criminal cases. But they were responsible to Bakufu for misgov- ernment. Their succession and marriage re¬ quired the sanction of Yedo government. So long as they governed their provinces well they were allowed to hold their fiefs and to transmit them to their descendants. Bakufu only regu¬ lated the military, monetary and postal and foreign affairs.

During the Kamakura and Ashikaga periods one knight and several foot soldiers were per¬ haps furnished from every unit of feudal tenure. In the latter period the land tax was paid in money in some localities, but

Hideyoshi enforced the ancient custom of payment in rice, which was followed by Iyeyasu and continued till 1873. According to the regulation of the Kwanyei period (1624-43), the Tokugawa gov¬ ernment demanded from all land producing 1,000 koku of rice (a koku is equal to 4.9629 bushels), 23 soldiers, 2 spears, 1 bow, 1 musket; from all land producing 10,000 koku of rice, 235 foot soldiers, 10 knights, 10 bows, 20 muskets, 30 spears; from all land producing

100,000 koku of rice, 2,055 foot soldiers, 170 knights, 60 bows, 350 muskets, 150 spears, and so on in the same proportion. During the Genroku period (1688-1703), it is said that the whole country, with the exception of the island Tsushima, produced 25,786,895 koku of rice. Now the Tokugawa government owned, as its immediate feudal tenure, the land which pro¬ duced 8,000,000 koku of rice. It was more than one-third of the produce of the whole country. The greatest territorial noble had only 1,000,000 koku of rice for his income. So the Yedo gov¬ ernment, under the Shoguns and their immedi¬ ate soldiers, was the most powerful feudatory in the country, and by the aid of the other branches of the Tokugawa family and former retainers now settled as territorial nobles in various provinces, was able to keep the most insubordinate feudal nobles in peace. The terri¬ torial nobles who had the income of 10,000 koku of rice and upward were entitled to be called Daimyo. These Daimyo or territorial nobles were obliged to leave as hostages their wives and children at Yedo. They had to attend the court at Yedo every year at first and later every other year. They had to aid Bakufu in cases of great occasions and expensive public works and had of course to furnish contingents when the general or special levy was ordered. Military levy was also made on the military class who had the income of less than 10,000 koku of rice.

The land of Daimyos who had no sons to succeed them was escheated at first, but later the Daimyos were allowed to name their suc¬ cessors. The military class, including the Daimyos and their retainers, all came under the jurisdiction of Bakufu. Bushi or Samurai were nearly all of them retainers of some Daimyos. They were obliged to bear two swords, one long and one short. They all had family names besides their personal names. They were carefully educated in the art of fighting, and also in the Chinese classics. They were thus taught Bushido and Confucian ethics. They were the fighting class, but from them all the civil officers were supplied. They were free from taxation, and were exempted from criminal law. The code of honor was their supreme law. In case they committed great wrong, they were permitted to punish themselves by means of Harakiri, or honorable suicide. But if they committed heinous crimes unworthy of Samurai, they were first deprived of their Samurai rank or gentility, and then they were punished as any other criminal belonging to Heimin class (common people).

Besides these retainers there were free Sa¬ murai who had no lord to serve. They were called Ronin (floating men). They were orig¬ inally retainers of some Daimyos, but they lost or for some reason left their lord, and so be¬ came lordless Samurai. They were permitted to have family names and bear two swords like all the rest of the military class. They were very independent and a source of great trouble to the government. But the principle of Bushido was sometimes best exemplified by these men, as is well known by the story of the 47 Ronins. ,

The physicians, priests and scholars did not belong to any feudal classification. They did not belong to Samurai. So they were legally

Heimin (common people), but they were not so treated. They were honored and respected. The physicians and scholars were entitled to have family names and bear swords (physi¬ cians only one). They at first shaved their heads just as the Buddhist priests do even now. This was for the reason that during the Ashi- kaga period the civil wars were so general and learning declined so much that the priests alone were the learned class as in the dark ages of mediaeval Europe. During the regency of Sho¬ gun Tsunayoshi, a.d. 1681-1709, scholars ceased to shave their heads, but the physicians com¬ monly did shave their heads till the present era.

The Buddhist priests were the great instru¬ ment in the spiritual and material civilization of Japan. As militarism prevailed in the coun¬ try, they alone had the key of knowledge and education. Some of them were teachers and counsellors to the emperors, shoguns and local magnates. They were universally recognized as such by the common people. During the Tokugawa period the special class of scholars arose, and the government undertook the educa¬ tion of the military class. But the education of the common people was left still to priests and private persons. Hence all private schools devoted to the education of the common people were called Terakoya or church-schools. To send children to the church meant to send them to school. As scholars arose the privilege of educating the children was not monopolized by the priests as in the previous periods, but their influence was enhanced in another direction. Since Christianity, that is (Roman Catholicism), was entirely prohibited (a.d. 1636), every

Japanese was obliged to belong to some Bud¬ dhistic church. Thus the priests had the power of census in their hands. All births, deaths and marriages were registered by the priests, and their certificates were necessary. Every Buddhist church had its constituents among the people, who supported the priests and the tem¬ ples belonging to them. The priestly functions were open to all classes, if they wished to enter them. In the age

of militarism and hereditary nobility, priesthoods alone were free to all. Those, therefore, who were tired of worldly ambition, fond of learning and were offended at the feudal caste-system, entered the priest¬ hood.

The art of healing was highly respected in Japan, and physicians were employed as court doctors both in the central and local govern¬ ments. In fact it was the art of healing which saved Japan from Oriental stagnation and de¬ cay. It was in the year 1771 a.d. that a few able physicians in Yedo began the study of the Dutch language and medicine, which finally opened the eyes of the intellectual class to Western science and civilization. ftBe a prime minister or become a physician, for they are both -benevolent arts,® was a common saying in China, and it continues to be so in Japan until this day, though the maxim itself was forgotten long ago in China.

Heimin or the common people consisted of two classes. Those who lived in villages were called .Hiyakusho. They were peasants. Those who lived in the towns were. called Chonin. They were merchants, traders and artisans. They were not allowed to have family names or bear swords, Merchants and traders had

their shop-name, and used it before their per¬ sonal names. Otherwise they named their par¬ ticular trade. So did also peasants. They called themselves Hiyakusho so and so. But by ex¬ ceptional merit they were sometimes entitled to have family names and bear swords, which was considered a great honor. At first the Heimin were allowed to bear swords, but as it proved dangerous long swords were pro¬ hibited to them, a.d. 1644, and finally all swords were prohibited, a.d. 1668.

The town people, or Chonin, were put under the jurisdiction of a machi-bugyo or governor, but they were largely left to their own self- government. The Elders, called Machi-Toshi- yori, were selected and appointed from them (there were three in Yedo). Below them there were Nanushi, or headmen, for one or more streets (268 in Yedo). Under these there were Jinushi or land-proprietors, and Yanushi or house-owners, who performed various import¬ ant functions for their wards. There were also Goningumi (five-men-association), consist¬ ing of five neighboring households organized for mutual help.

It was the same with regard to the adminis¬ tration of the villages. In each village there was a headman called sometimes Nanushi, but usually Shoya. He was elected by the peasants themselves from one of the most honorable families among them. His term of office was sometimes for life and sometimes for a number of years. There were also the Goningumi and its headman; deputies of peasants who partici¬ pated in the administration of the villages, and sometimes there were Ojoya or great headmen who were

superintendents over the headmen or shoyas of several villages, sometimes 10, 20 or more villages.

Below the Heimin class there were outcasts and beggars, respectively called Yeta and Hinin. The Yeta class were butchers, and they were specially despised, as Buddhism taught men not to kill animals. These people were allowed to live only in certain districts and quarters, and there were some villages called Yeta-mura, where the Yeta class only dwelt.

In Yedo these classes were put under the jurisdiction of special men, selected from their number, to govern them. In case a Heimin became a beggar, he could retrieve his position by industry. But if he married a beggar woman and begot children, he could return to his former class, but she and her children could not rise with him into the Heimin class.

Three years after the Restoration (1871), all classes were allowed to intermarry with each other. And in the same year the names Yeta and Hinin were abolished, and the outcasts and beggars were also incorporated within the Heimin or common people.

A kind of slavery existed from a very early period. That is, poor people sold themselves to the rich and noble. During the Kamakura period there came to be a special sort of trades¬ men called Hito-akibito, engaged in buying and selling, servants. The government prohibited this kind of trade, but could not stop it. In the Ashikaga period they kidnapped young boys and girls and sold them. This continued down to the Tokugawa period, when it was made a capital offense. The government at one time even tried to limit the term of engagements of

the servants to 10 years. In fact, in 1872 long engagements were prohibited as slavish, and restricted to one year.

The morality of sexes has always been the weakest part of Oriental ethics in general. It was so in Japan. Divorce was easy, and con¬ cubines and mistresses were permitted to the noble and the wealthy. But in spite of all irregularities and licentious practices in fact, monogamy has always been a legal marriage. That is, bigamy or polygamy in a literal sense was not recognized by the law. Only one woman was a man's proper wife. So there has been only one queen, properly so called. That was a rule, though there were some exceptions in some corrupt periods of Japanese history. In primitive Japan a marriage was allowed be¬ tween brothers and sisters of different mothers. It was a universal custom that a woman should not go over 'to her husband's house after her marriage. She remained at her own

home, which the husband frequented as a visitor. On the marriage day, a bridegroom \%ent to the bride's house, where there was a feast prepared. Even to this day, in the marriage ceremony a nuptial cup is first given to the bride, and after she drinks it is given to the bridegroom. It means that she is the host and the bridegroom is the guest. It continued to be a custom for a long period of time, that the wife should remain at her parental home for several months or even several years after her marriage before she was taken over to her husband's house.

After the Kamakura period it came to be a custom that the wife should be taken to her husband's home immediately after the day of marriage, which took place at her house. Later, the bride was taken to the bridegroom's home from the first, and the marriage ceremony itself was performed at his house. However, even during the Tokugawa period and in fact till to-day, a woman always keeps her own family name, which is used as her honorary title and shows her good breeding.

During the Kamakura period a wife was able to have her dowry as her own property, which was not allowed to be mixed up with that of her husband. Even when her husband's property was confiscated her property was not touched, except in case of heinous crimes such as treason, murder and robbery. If she was divorced and a child was born after her di¬ vorce, a boy went to the father and a daughter to the mother, hut until 10 years old the boy was allowed to remain with his mother. It was the original custom in Japan that property should be divided among all children and even to the relatives. It was so in the Kamakura period. In case the owner did not execute his will before his death, the government did it according to its discretion. If there was no child or relative left to succeed to his prop¬ erty, it was given over to the temples and the churches.

During the same period land was sold freely, but the military class was prohibited to sell the beneficiary land given by the government as a reward. Later even hereditary land was not allowed to be sold to the lower class. During the Ashikaga period, primogeniture in the male line became more and more the rule for the succession of estates. And it was made the strict law during the Tokugawa dynasty. Di¬

vision of estates was not permitted, and the eldest son inherited the whole property of his father, while it was made his obligation to support all his brothers and sisters. As the younger sons could not inherit any property from their father, they had to be adopted by a childless Samurai before they were permitted to . marry, and unless they were very distin¬ guished in talent and ability they were not allowed to start a new family.

The Tokugawa government prohibited a peasant to change his occupation

and to be¬ come a tradesman. He was not permitted to sell his soil and divide it among his children in case it was not more than one cho (2.45 acres) in extent. In fact, all sale of land for perpetuity was not allowed except in the cities of Yedo, Kioto and Osaka. Even its trans¬ ference was restricted by law, in order to pre¬ vent the accumulation of estates in the hands of a few large proprietors. Throughout the whole history of Japan the legal principle re¬ lating to land was that the proprietary right be¬ longed only to the state. In the year of the Restoration, 1868, the land belonging to the villages was turned over to the peasants, and the sale of land for perpetuity was legally al¬ lowed in 1872.

From very early times there was a ceremony called Gembuku, observed when children grew up to be mature. It was so called because the dress of an adult was to be worn from that time. It was called Ui kamuri (new cap), be¬ cause a man's cap was given for the first time. The age was not fixed by law, but usually at 15 or 16. In the case of emperors and rulers, the ceremony was performed even in childhood. It was performed sometimes at night and some¬ times in day time, and it was considered a matter of great importance, especially by the military class. A master was needed for its performance. He was either a chief-man of the clan or family, or the suzerain to whom he owed his allegiance. He was called Eboshi oya or sponsor (Kamuri is a general term for cap, and Eboshi is a special term for a kind of cap formerly worn by the Japanese nobles). During the Tokugawa dynasty, a cap was omitted except in the case of court and terri¬ torial nobles. The retainers only changed the manner of hair dressing at this ceremony. Now this custom is obsolete.

Society in Japan, as it has historically de¬ veloped and as it now stands, is legally dis¬ tinguished into four classes: (1) Kwozoku or the Imperial family; (2) Kwazoku or the No¬ bility; (3) Shizoku or the old Samurai or Bushi ; (4) Heimin or the Common People.

1. Kwozoku. — The imperial family in Japan is the oldest existing royal family in the world. The mikado or emperor is the earliest institution, and stands at the basis of all other institutions in the country. The pres¬ ent emperor is the 123d of the imperial line. No king or emperor or president has such unanimous reverence and love of his subjects. The people are very proud of the fact that the reigning imperial family has descended from time immemorial in an unbroken line of suc¬ cession to the present. Indeed, the imperial family is now the emblem and embodiment of national immortality. It signifies the fact that Japan has never been conquered by the out-

side nations. It means that the imperial house and the people are one and inseparable elements of the state. It signifies also that in spite of great social and political revolutions which the people have undergone in the past there is something steady and consistent in the national character. Since the 8th century a.d. the im¬ perial family has reigned but has not gov¬ erned. The noble a families one after another took possession of the governmental power. Still they all governed in the name of the em¬ peror, or some member of the imperial family. Throughout the whole history of Japan the emperor has been the fountain of honor and the bestower of the official degree of rank and title on all functionaries, including the Shoguns and the Daimyos. Before the present consti¬ tution was promulgated (1889), the female suc¬ cession to the throne was constitutional, and Japan has had six empresses among the sov¬ ereigns of the past. Hereafter the throne shall be succeeded to only by male descendants in the male line.

2. Kwazoku.-— This is the title of the no¬ bility in Japan, legally adopted in 1869 when the old appellations of court and territorial nobles were abolished. However, the existing orders of nobility were created only in 1884, and the nobles were classified into five orders of princes, marquises, counts, viscounts and barons. Among them are three classes distin¬ guished.ˆ First comes the old court nobility called Kuge. They are the oldest families of all the nobles, some of them being more than 1,000 years in existence. Before the Restora¬ tion they were all very poor and abject in con¬ dition. On account of the feudal system which prevailed they had no work but to attend the emperor and discuss the matter of bestowing honorary degrees of rank and title. Next come the old Daimyos or territorial nobles, who were the former local hereditary rulers. Some fam¬ ilies among them are seven or eight hundred years, and some about 300 years old. They voluntarily gave up their lands and people to the emperor in 1869, when they were made the local governors instead of Daimyos. But the system of local autonomy was entirely abolished in 1871, when they were forever re¬ moved from their provinces and removed to Tokio. Last but not least are the new nobles created since 1884. Prominent among them are the statesmen and generals who broke up the Shogunate and the feudal system, estab¬ lished Parliament and the constitutional gov¬ ernment and brought to the successful issue the wars with China and Russia.

3. Shizoku. — This is the title legalized also in 1869, to be applied to the retainers of the Daimyos. At first the lowest class of retainers were called Sotsu, but this distinction was abolished in 1872. They had been a privileged class, with hereditary pensions. The leaders among them were the chief movers in the abolition of the Shogunate and the Restoration of the emperor to power. With the downfall of feudalism and the decree of universal mili¬ tary service issued in 1873, they lost their hereditary

military function, and in the same year another decree was promulgated announc¬ ing that the government was ready to commute the pensions of the Shizoku at the rate of six years' purchase for hereditary pensions and

four years' for life pensions — one-half of the commutations to be paid in cash and one-half in bonds bearing interest at the rate of 8 per cent. Many of them voluntarily gave up their pensions for this meagre commutation, deter¬ mined to earn their living hereafter by indus¬ try and trade. But there were also many who could not adapt themselves to this new con¬ dition, and so they were for some years the constant source of local disturbances and in¬ surrections against the new government. But the vast majority of them entered the civil and military service in the new government, and also engaged in the work of education. The universal military service and universal com¬ mon education, based on the western system, led by these men as captains and teachers, was wonderfully successful, as is shown by recent results.

4. Heimin. — To this class belong mostly the common people engaged in trades and com¬ merce, field tillage and all kinds of manual labor. The distinctions between the Shizoku and the Heimin are only nominal and fast dis¬ appearing, for many of the former Samurai are now engaged in tilling the soil and in every kind of industry and trade, while those be¬ longing to the former Hiyakusho and Chonin are legally equal to Shizoku in all respects. Universal military service and universal educa¬ tion are making them all equal or nearly equal in spirit and character. The Heimin fought as common soldiers against the Samurai class when they rose against the new government ; they finally put down the Satsuma Rebellion in 1876, and in the wars with China and Russia, their courage, valor and devotion were sig¬ nally displayed.

Even before the Restoration, the Heimin class had imbibed the chivalric elements of the military class in their theatres and Yose (houses where public entertainments were given), and now that education is made universal and the constitution has secured to them equal rights and privileges, it is no wonder that they are fast rising into power.

According . to recent statistics, the popula¬ tion was divided among the various classes as follows: Imperial family, 69; Kwazoku, 5,937 ; Shizoku, 2,3 10,269; Heimin, 51,045,983. The rate of increase among Kwazoku is 10.47 per thousand; among Shizoku, 8.26; and among Heimin, 15.54. The nobility was strengthened by the creation of new members. The Shizoku, notwithstanding their disorganization and pov¬ erty, were able to increase greatly in population, and their assimilation with the common class has been the most powerful means in raising the spirit and character of the whole nation.

Though the division into noble and servile classes has always existed in Japan, it was not a caste system in fact. Though a legal mar¬ riage between them did not take place as a rule, concubinage constantly infused democratic blood into the families of the higher class. When a wife was childless the sons of concu¬ bines became heirs, and as the noble women were not so fertile as women of the lower class, the blood of aristocracy in Japan has become very democratic notwithstanding high pedigrees and pretensions. Moreover, as local and gen¬ eral wars were so frequent until the beginning of the 17th century, the ruined aristocratic fam-

llies and their retainers were constantly forced into the lower class, so that there was a perpet¬ ual influx of aristocratic blood into the veins of the common people. This explains why, under certain circumstances, the Japanese aris¬ tocrats are very progressive and even demo¬ cratic, and why the common people themselves are so aristocratic and love aristocracy as the natural form of social institutions.

Two things distinguish society in Japan from that of Europe and America. In the first place, family, and not the individual, is still the living social unit. Ancestor worship is still a living religion in every family. The free¬ dom of faith is recognized by the Constitution and there is no particular ecclesiastical organ¬ ization sanctioned and favored by the state. So the people are Buddhists, Shintoists, Confu- cianists and Christians, according to their in¬ dividual tastes. But it may be said that an¬ cestor worship is still common to all classes. In each family there is a legally recognized head, who has the reins of domestic govern¬ ment. Moreover, a council held by relatives is authorized and recognized by the law. The continuity of the family name and its succes¬ sion is regarded as so important, that the adop¬ tion of sons and daughters is still practised by those who have no children.

In the second place, the state is all in all in Japan. The idea of the state is exactly that of the ancient Greeks and Romans. The state is a whole and the individual a part. The state has existed so long and developed so strong that no one thinks of rights not be¬ stowed and recognized bv the state. In Europe the Church existed before the state, and the strong and mighty influence it has still is known to all. In Japan there is no conflict between the state and the church. The state existed be¬ fore the introduction of Confucianism, Bud¬ dhism and Christianity, so that there has never been and can never be any religious association claiming rights above the state, as in mediaeval Europe. So the state and the church are com¬ pletely

separate. The state holds in its hand the entire control of education, marriage and the civil status of every individual. Japan is wholly free from religious embarrassments in these respects.. After half a century of great political and social transformations, all classes are in unison and equally progressive and conserva¬ tive. There are some radicalists in politics and thought, but no anarchist. There are many conservatives, but no reactionary. The organ¬ izations and strikes of laborers have already begun, together with the introduction of the modern factory system and its defects. But the Socialists as a party have as yet no exist¬ ence in Japan. Herein lies the strength and weakness of Japanese society. Though strong and united as no other nation is, individually and socially speaking, Japan is still a youth and mediocre.

Kazutami Ukita,

Professor of History and Sociology, Waseda University, Tokio.

4. MENTAL CHARACTERISTICS OF THE JAPANESE. There are few subjects where anything approaching scientific exactness is more difficult, or even impossible, than those which fall under the general title of (

the basis for a trustworthy conclusion are ex¬ ceedingly abstruse and complex ; they are in¬ deed of such a character as to require for their detection and appreciation a trained and ex¬ perienced observer. But supposing the facts to be. admitted, there are then no well-established principles under the guidance of which the facts may receive a satisfactory theoretical treatment. For there is no universal agreement as to the existence of definite race temperaments; while, with those observers who accept the theory of specific mental characteristics for different tribes and nations, the practical application of their theory to particular cases is not accus¬ tomed to produce very notable results. Never¬ theless, we are believers in the existence and predominating influence of temperament con¬ sidered as manifesting itself in large collections of individuals who share the same admixture of blood, through long periods of time.

In applying this belief to any particular peo¬ ple, however, one or two important considera¬ tions can never be safely lost out of mind. The first and most important of these is the spiritual unity of all the different races in one human race. This fact of an essential spiritual unity, as enunciated and illustrated by anthropologists like Waitz and others, may be accepted as a fundamental factor in the solution of all the psychological problems belonging to this class. As far back as we can go in history, and as far afield from the centres of race-culture to the extreme borders of barbarism and savagism, human nature appears to be essentially the same. Even that mythical being called "primitive man is not exempt from this conclusion.*

And so long as we remain upon sound empirical grounds it must be admitted that a far wider gap exists between the lowest of the human species and the highest of the lower animals, than between the lowest and the highest of the genus homo, or the highest of this genus and its own most suc¬ cessful efforts to picture the nature of the an¬ gelic and the divine. In every large collection of individuals, moreover, while a certain aver¬ age quality may be detected as belonging to the great majority, many important differences must be observed. Thus all the different tem¬ peraments appear, in a more or less distinctly marked form, even among those peoples which are as a whole most definitely characterized by a so-called race temperament. And, finally, as the physical and social environment of any peo¬ ple, however exclusively its temperamental mix¬ ture may have remained, undergoes either slow or more rapid but important changes, the men¬ tal characteristics of the race seem to become altered or obscured.

In attempting, then, to describe the mental characteristics of the Japanese it is assumed that they are in all essential respects like our¬ selves — whether by "ourselves be meant Amer¬ icans, English, German, French, or, as well, the more important races of both the Near and the Far East. This consideration, however, serves rather to emphasize the further truth that a cer¬ tain characteristic mixture of mental and moral qualities may be observed, which is quite worthy to be called the Japanese temperament.* Here human nature has attained a highly specialized type. In a word, there is probably no other one of the foremost and equally populous nations of the world whose mental characteristics, as de-*

veloped on a basis of race temperament, are more strongly marked. And the reasons for this are not difficult to discover.

So far as the obscure problem of the race origins of the Japanese can be solved by mod¬ ern ethnographic authority, the most probable conclusion may be stated in the following way. The modern Japanese race originated as a mix¬ ture of Tartar or Mongolian (in the larger and somewhat looser, but not altogether inappro¬ priate use of the latter term) and Malay immi¬ grants with the Ainus and traces of other indig¬ enous elements. It is a not improbable con¬ jecture that the varied and conflicting character of the elements which thus became combined accounts for some of the more puzzling fea¬ tures of that national temperament which has resulted from this mixture of races. Interest¬ ing differences characterize the Mongolian and Malay peoples; and both of these differ in im¬ portant ways from what we know of the Ainus and other less-known tribes indigenous to Ja¬

pan. As supremely important molding influ¬ ences to determine the mental characteristics of the Japanese of to-day, three historical facts de¬ mand our attention. However different, or even conflicting, the original elements may have been, they were welded into a common typical form by a long period of comparative isolation and exclusion of other admixture with foreign ele¬ ments. through generations, and even through centuries (for the educational and artistic in¬ fluences from China and Korea did not modify the result in an important way, so far as this temperament was concerned), the process of specializing by combining and recombining the same elements went on without interruption from outside sources.

The second historical fact is recent. After centuries of physical and social isolation, such as is favorable to the production of a specific type, there has followed a half-century of rapid changes due to altered relations toward foreign influences. These recent changes have, how¬ ever, as yet resulted in very little admixture of foreign blood. They have, therefore, produced no essential alteration in the temperament or the hereditary mental characteristics of the Japanese as a people. But they have, of course, produced important alterations in the physical and social manifestations of these characteris¬ tics. On the one hand, they have had the ef¬ fect to confuse, for the time being, the minds, the morals, the ancestral ideas and customs of the people ; and to make upon the superficial observer a variety of bewildering and contra¬ dictory impressions. On the other hand, this period of rapid change is defining, deepening and developing the Japanese temperament, and of course, also, the essential mental and moral characteristics which rest upon it as on their base.

The third important historical fact is the development of the feudal system. This re¬ sulted in making the economic and social condi¬ tion of Japan down to its modern era much more like that of mediaeval Europe than of China. Indeed, we are almost justified in de¬ nying that Japan has ever been an Oriental na¬ tion in the fullest meaning of the words.

When we come to inquire, therefore, as to what term shall be employed to designate the temperament of the Japanese, the answer may

be given with a rather unusual degree of con¬ fidence. For the ethnographic conditions and the historical influences have combined to give the nation a distinct quality. This tempera¬ ment is predominatingly sentimental, although with considerable infusion of the choleric. The sentimental temperament is characterized by great sensitiveness to all kinds of impressions, especially those of a sensuous and sesthetical or¬ der; by varied, strong and oftentimes sudden and even conflicting and tumultuous reactions ; by an eager but somewhat naive intellectual curiosity and a versatile gift of adaptability; by a lively, picturesque and concrete, but

usually not profound or scientifically controlled imagi¬ nation ; by warm, responsive, but rather un¬ stable emotions ; by a splendid power to attain, under trying emergencies, the heights of .moral and religious devotion and achievement, and yet a tendency to carry to extremes certain particulars and thus to miss somewhat of the controlling principle of an ethical harmony; and by a disposition to deal with moral and religious truths as though they are matters worthy of only a passing curiosity rather than concerned with the profounder insights and most important activities of human life.

If now we adopt this description as in the main characterizing the racial temperament of the Japanese people at large, we must at once remind ourselves of certain important mod¬ ifying considerations. As among every gifted and highly developed people, so in Japan, there are many examples of other temperaments or temperamental mixtures. And indeed, no so-called ((race temperament® can remain pure. That intense and persistent energy, combined with intellectual sagacity and the power to or¬ ganize and to achieve practical results by fol¬ lowing up one's purposes with a consistent and unswerving determination, which is character¬ istic of the choleric temperament, has been well marked in the case of many of the great men of Japan. When instructed and disciplined, as it was under the old regime among the Samurai, it produced many splendid examples of a note¬ worthy and admirable but one-sided chivalry. It produced a system of nicely adjusted cus¬ toms and manners, where appropriateness and a subtly adapted symbolism ruled over the con¬ duct of classes and gave an air of good breed¬ ing to all. And nowhere else, in the world's history, have there been more notable examples of supreme, self-sacrificing devotion to persons and to a chosen cause.

On the other hand, it must be admitted that a certain instability, or lack of steadiness, often amounting to fickleness, and a tendency to re¬ verse movement, to change opinions, parties and sides, even to entertain contradictory plans and purposes, characterize the sentimental tempera¬ ment. In this way must we account for the ex¬ tremely puzzling nature, to the man of a dif¬ ferent race temperament and of Occidental cul¬ ture, of many of the mental characteristics and of much of the conduct of the Japanese people as a whole. It is peculiarly difficult to know the Japanese at all thoroughly, and to maintain to¬ ward them an attitude of indifference.

With regard to the fundamental appetites and passions of human nature, no well-defined difference appears between the Japanese and the inhabitants of the different highly civilized parts

of Europe and America. Centuries of an almost complete disuse of animal food, combined with the climatic influences of those regions of Japan that are the most populous, may have had some important effect in bringing about an absence of the manifestation of physical vigor and of that energetic and direct way of going about the business in hand which characterizes the Anglo-Saxon and Teutonic races. The philoso¬ phy of life which was introduced by Buddhism, and which has, together with Confucian ethics, influenced the upper classes and filtered down through the lower orders of the people, has also been of great importance. In such matters, in Japan, as everywhere else, economic consider¬ ations are also very powerful. Whatever the causes may have been, the Japanese have never been, and are not now, so much given to glut¬ tony and to intemperance as the people of nothern Europe.

In the past, and even down to the present time, the sexual relations of the Japanese have been characterized by a certain greater degree of looseness and lack of moral and social re¬ straint than has been the case among the peo¬ ple of Europe and of North America. This has not been due, however, to any excess of sexual appetite or to deficiency in moral feeling or lack of a moral code. It has chiefly been due to the social constitution of the people, and to the fact that the prevailing ethical and religious opinions and principals did not emphasize the sexual re¬ lation as being, primarily considered, a matter of ethical concernment. We have, therefore, on the one hand a certain naive openness of speech and of conduct in these matters, such as as¬ tonishes and shocks the reader of the Kojiki and of much of the older and more modern litera¬ ture, as well as the observer of customs which have prevailed well down into the modern era. Such are phallic worship in religion, concubi¬ nage, licensed prostitution, promiscuous bathing and free exposure of the person, as well as a relatively low estimate put upon the value of sexual purity as a personal virtue, when con¬ sidered apart from the sentiment of loyalty. On the other hand, there is in Japan a relative absence of the more coarse and brutal forms of sensuality; and on the part of woman a tradi¬ tional willingness for self-sacrifice which it is difficult even to explain, and much less to jus¬ tify, to the Occidental mind, but which frequent¬ ly springs from the very noblest sentiments of devotion and loyalty. The changes for the bet¬ ter, both in opinion and in practice, which are taking place in the country, make it perfectly clear that inferiority, whether from the point of view of intellect or morality, cannot be charged against the Japanese in this regard. It is also worthy of mention that the more serious moral and religious didactic literature of the Japan¬ ese, as represented in. dramatic form by the "No,® is almost absolutely free from any im¬ pure suggestions.*

As to the other emotions and sentiments, the life of feeling among the Japanese corresponds in general to the type already described. Anger,

jealousy, envy, grief, sympathy and the domestic and friendly emotions are quick to kindle, and tend to run to excess or to change to their op¬ posites when they have either become them¬ selves exhausted or have seized upon any ob¬ served or imagined reason for change. But the

artistic feeling which produces a fine sense of propriety and a regard for personal dignity, re¬ inforced by that carefully defined and legally guarded system of rules of behavior (especially under the Tokugawa dynasty), to which refer¬ ence has already been made, serve to' modify and repress the manifestation of these feelings. Even smiles and laughter come often to be the mask of grief and sadness rather than the ex¬ pression of happiness and rejoicing. Hate and love, jealousy and sympathy, strong dislike and strong liking, hide behind an unmoved or cour¬ teous demeanor and finally break forth to the surprise of the foreigner who is self-deceived, rather than deliberately deceived by others, through a lack either of insight or of sympathy. Thus the subtle, complicated and indirect, rather than the open, simple and frank character of the mental life becomes still, further empha¬ sized in the conduct of the Japanese. Here again, however, under the prevailing sense of honor and the ruling principle of loyalty, as the one belongs both to the temperament and to the historical development of the people, and as the other is the gift of the Confucian ethics em¬ phasized and deepened by the same historical development, the very highest examples of a knightly and trustworthy manhood have been commendably frequent in Japan.

More particular examination of the intel¬ lectual traits of the Japanese calls for something like the following analysis. These traits are such, however, as on the whole go with, or rather are an integral part of the sentimental temperament in its higher and finer forms of culture. And, first, we may note an exceedingly vivid, enterprising, and, so to say, hopeful in¬ tellectual interest and a widely varied intellec¬ tual curiosity. The average Japanese has an inquiring mind. This often manifests itself as a naive and almost childish desire to know how natural objects are constituted and how manu¬ factured articles are made. It is back of the quiet, open-eyed wonder with which the children stare at the manners and dress of the foreigner (marked by an almost complete absence of any tendency to rudeness or violence) ; and it shows itself in that semi-religious feeling of mystery with which the displays of freakishness, as well as of power, by nature are regarded. What has been called the "hopeful® character of this varied intellectual interest leads to the reacly confidence that whatever anyone else has made may as well, or even better, be made by the Japanese; and it is perhaps also influential in producing the so frequent conviction that even the fundamental mysteries of existence and of human life are not beyond the possibility of a new and much improved solution by some ad¬ venturesome young Japanese philosopher who may add the training of modern science to his own extraordinary native ability.

This native curiosity is undoubtedly produc¬ tive of an unusual versatility

of intellectual op¬ erations and achievements. The Japanese mind is decidedly gifted in adapting itself to changed conditions and adapting means to ends. This is the truth which underlies the charge so often made in recent times that the Japanese are "merely imitative® and not "original® or inde¬ pendently inventive. It is scarcely necessary to remark in this connection that the claim to be original, in any very strict meaning of that word,

cannot be fairly made by any individual or any nation. And, on the other hand, no people have produced a type of race-culture more strongly marked by distinct characteristics, or signalized by individual members of stronger character, than have the Japanese. It is the versatility and adaptability of the intellect of the race, rather than the merely imitative quality of their achievement, which is noteworthy. The notion, therefore, that Japan owes its recent remark¬ ably rapid progress entirely to its opportunity to borrow what other people had worked out for themselves in an original way, is quite in¬ defensible in the face of historic truth. The whole history of Japan has been marked es¬ sentially by the same characteristics. Through all this history, foreign languages and litera¬ tures, manufactures and arts, arms and ships and modes of warfare, have been adopted, adapted and improved upon to meet the peculiar requirements and necessities of the national de¬ velopment.

These qualities of intellect result in rather unusual gifts of making a "synthetic seizure," or picturesque mental presentation of the con¬ crete object, or of some form of statement in which the general principle is embodied or ap¬ plied. Such is apt to be the character of the work done by the form of imagination that suits best the other characteristics of the senti¬ mental temperament. The Japanese language has remained, almost down to the present time, in the synthetic stage. It has an enormous va¬ riety of verbs and verbal expressions for the various modifications of activity such as are expressed in English by the words, "to put," (

It cannot be denied that the excellencies of the intellectual activities which characterize the Japanese have their correlated deficiencies. And these deficiencies are, in the main, just those which customarily belong to the sentimental temperament. Patient, prolonged and carefully guarded observation of fact, with the judgment held in suspense until it can be tested by a sufficient accumulation of cases or by the well- known methods pf scientific induction based upon experiment, is neither natural nor easy for this temperament. Truths are discovered or

proved, not so much by any strict adherence to logical processes as by a

kind of mental seizure which depends upon the working of a lively and picturesque imagination suggesting to the curi¬ ous intellect an answer to its problem. It still remains doubtful, then, whether the higher forms of mathematics, logic, physics, chemistry and even the psychological sciences will receive an accession to their accumulated store of clear¬ ly ascertained and defensible principles, corre¬ sponding to the amount expended upon educa¬ tion by the New Japan. Still, inasmuch as in¬ tellectual curiosity and lively imagination count for much even in these sciences, the laudable ambition and exceptional talents of a few may in time make up for the deficiencies of the many in this regard.

The development of philosophy in Japan is characterized by the same temperamental fea¬ tures. It has hitherto taken two principal di¬ rections and has been either practical — a phi¬ losophy of conduct — or speculative as a semi¬ religious and intuitively mystical theory of re¬ ality and of human life. The practical philoso¬ phy of Japan has derived its inspiration and its form of development chiefly fromjihe Confu- cian ethics ; it has therefore been the guide of notable statesmen and warriors, the doctrine of great teachers (who in Japan as everywhere else in the world, have been the chief influences for molding the national life and national des¬ tiny), and the inspirer of the spirit of Bushido of the Samurai class, who have been the strength alike of the Old and of the New Japan. The speculative form of philosophy has derived its sources principally from Buddhism. But nowhere else has the stimulus of the Buddhistic view of the world and of human life produced such a variety of more or less harmonious, but also, in their details, conspicuously or subtly conflicting speculations, as among the Japanese. In general these speculations, which are essen¬ tially considered different varieties of one kind of philosophy, follow the Indian type. They are poetical, mystical, intuitive, symbolic and generally vague and inconclusive. They do not, however, anywhere attain the symmetry or pro¬ portions of the best examples of the speculative thinking of India. A philosophy that aims to base itself frankly and intelligently upon the particular sciences, and to attain a systematic and scientific whole by the use of logical meth¬ ods, is neither easy nor congenial for the senti¬ mental temperament. But the Oriental type of philosophy, as modified by the mental character¬ istics of the Japanese, has its own place and value in the development of human reflective thinking.

The race-temperament and mental character¬ istics of the Japanese have shown themselves most conspicuously, and even resplendently, in two ways : the chivalry, of war and the exqui¬ site sympathy, taste and skill of art. Brave, proud-spirited, governed by sentiments attached to the forms of action becoming to the class, or rank, and appropriate for personal relations, rather than by considerations of either a utili¬ tarianˆ or strictly

ethical character — such has been, in general, the character of the Japanese in war. . Even through that unhappy period, dur¬ ing which the feudal lords and military chief¬ tains. were occupied with the attempt to ex¬ terminate each other, the same character was

maintained essentially unchanged. To act as in honor bound,)} whether under the principle ol noblesse oblige, or under the sense of obliga¬ tion to render unquestioning service to one's superior, has been the rule of the true-spirited Japanese. And no Christian knighthood in mediaeval Europe produced higher examples of devotion to honor and to duty — however mis¬ taken the particular form which this devotion may have taken — than have characterized the entire history of Japan. Indeed, the way in which the spirit of chivalry descended upon all the orders of the people in their conduct of their War with Russia is one of the marvels of human history.

The artistic temperament of the Japanese, under stimulation and guidance from teachers and examples from China and Korea, and from their own physical environment, has responded with a form of art which, in many of its char¬ acteristic features, is unique. The paintings, sculpture and literature which were the more direct product of the philosophical and religious conceptions of Buddhism (especially for a thou¬ sand years from the 7th century onward) closely resembles, in many of their principal features, the art of mediaeval Christian Europe. But it is in their representation of natural objects, or their decorative art when natural objects or sug¬ gestions from nature are employed, that the artistic imagination and achievement of the Japanese is most distinctive and most admirable. Here we find a quickness and delicacy of per¬ ception, a tenderness and depth of sympathy, a wealth of suggestiveness which knows how to address the appreciative soul without details that obscure and confuse, such as have been nowhere else developed to the same degree. These qualities of Japanese art are the direct result of the race-temperament and mental char¬ acteristics of the people, as they have already been described. These aptitudes have not only produced celebrated artists and schools of art, but have also — which is a more difficult and distinctive thing — developed a people pene¬ trated throughout with the appreciation and love of the beautiful, whether as produced by natural forces or by human skill. Emperors, shoguns, warriors and abbots and monks write poetry; contests of skill in poetical composition become interesting and exciting court func¬ tions ; the ceremonials connected with the view¬ ing of the cherry-blossoms or the chrysanthe¬ mums, or with the

making of tea, are diligently cultivated by the nobility and by the leaders of the nation. On the other hand, peasants, fisher¬ men and coolies look in an admiring and wor¬ shipful way upon what of nature's life-work seems to other peoples trivial and uninteresting; they, too, collect and cherish pretty stones, shells, etc., treat with personal affection flowers, grasses and shrubs, and take a sentimental pleasure in moon-viewing, in listening to the chirping of the cicada or the kirigirisu, and in the beauties of the temple grove or its treasures of brasses, carvings and kakemonos. A branch just thrown across a misty sky, a bird just alighted upon a lotus-stem and opening its throat for song, a fish swimming against the current, as well as a tiger lapping water from a stream, or engaged in a life-and-death struggle with another tiger, the head of Fuji reflected in Lake Hakone — such are the themes which, with infinite variation in details, inspire both

the pictorial and the poetical art of the Japanese. And if the critic is inclined to bring against such work the charge of those weaknesses which are undoubtedly characteristic of the aesthetical products and conceptions of the sentimental temperament, he may be reminded that the strength also of this kind of art consists in just t"15 its tender and sympathetic appreciation, and suggestive reproduction, of what a coarser taste regards as trivial or indifferent. That the Japanese are capable of historical painting in a spirited and large style, their past endeavors would seem to make clear. And when their pictorial and poetical compositions come again under the inspiring influence of philosophy and religion, there is good reason to hope that their artistic efforts of the similar motif and charac¬ ter will greatly excel those to which Buddhism gave birth. See History of Japanese Fine Art.

In estimating the moral characteristics of the Japanese it is absolutely essential to determine what we mean by morality. In the compre¬ hensive but strictly appropriate meaning of the word, all races have essentially the same moral character. That is to say, they all have pre¬ ferred forms of conduct, make value-judgments of the ethical type, are stirred and guided by feelings of obligation, approbation and dis¬ approbation, merit and demerit, in view of dif¬ ferent kinds of conduct ; and they all hold them¬ selves and others responsible under some theory of a voluntary self-control. As to what particu¬ lar forms of conduct are preferred, and have attached to them the appropriate feelings, and as to what in action is deemed morally right or morally wrong, although there is really a much more fundamental agreement than is ordinarily supposed, there exists, of course, a great variety both of opinions and of practice.

With this general truth assumed, we may safely declare that the Japanese are as truly moral as any other race of civilized human beings. But the particular form which the moral code and the practice approved by the

public conscience have taken has been chiefly shaped by the Confucian ethics, with modifica¬ tions from the Buddhist religion. As has al¬ ready been explained, the central principle of this ethics is loyalty — shown, according to the prevalent circumstances and relations, to the emperor as the civil, military and religious head of the nation, or to the liege-lord or mili¬ tary chieftain, to the parent, to the clan, to the sworn ally or friend. This principle of loyalty is oftentimes so overpowering in its influence as to obscure the other obligations of a symmet¬ rical moral law, and even to produce startling and almost grotesque effects. For example, while it developed a carefully regulated code of suicide and blood-revenge, it also fostered the unreasonable and insane feeling of obligation to commit hari-kari for the vindication of one's own honor, or murder in the execution of ven¬ geance upon others. But when inspired by a worthy cause and guided by a due amount of practical wisdom, it has, as has already been said, been productive of a most admirable type and of many splendid examples of a noble devotion to moral ideals. The less obtrusive, but from the Christian point of view no less important, virtues of pity, kindliness, humility and resignation owe their existence and their cultivation, here as everywhere, largely to the influences of religion.

In connection with this explanation of the Japanese type of morals, another consideration is not without importance. This kind of moral¬ ity is personal, rather than theoretical or legal, in the more restricted meaning of the latter term. But it is also, of course, an affair of custom; hence the right and wrong of conduct is determined, not so much by the application of abstract principles, or of a so-called moral law, with its unconditional imperative and its uni¬ versal claims, as by resort to the appeal to what is proper under different personal relations. In the virtues of gratitude and personal devotion the Japanese are not excelled, and probably are not equaled, by any other people.

The relative absence of an established code of business morality, and the low condition of business morals, among the Japanese, is fre¬ quently remarked; and the fact cannot be de¬ nied. It does not, however, show any funda¬ mental deficiency in the moral consciousness of the people, or even any relative inferiority in the average grade of the public morality in general. The deficiency is to be explained as growing out of historical conditions. For in the first place, in the Old Japan men of honor did not engage in business ; they did not even in general regard the getting and expenditure of money as a matter that came immediately into touch with their right to consider themselves men of honor. There were, indeed, some

honorable men in trade ; but the honorable class did not, and could not, engage in trade. Besides, the considera¬ tions which influenced all classes in their finan¬ cial transactions with each other were of the same personal sort, to which reference has frequently been made. Not the keeping of one's word or contract, as such ; not the being fair, honest and truthful with all as a matter of either principle or policy; but the being loyal to the person to whom your loyalty was pledged — 'this consideration overcame and often ex¬ tinguished all other considerations. _ At the present time, a great crowd of untrained and uninformed multitudes, from the lower and the lowest classes, without experience or estab¬ lished moral principles and reputation, have rushed into all the various branches of labor, trade, manufacturing and other forms of busi¬ ness. If, however, as seems probable, and even fairly certain, the instruction of the government schools, and the experience of life, are per¬ mitted to mold and to guide the inherited tem¬ perament and prevalent mental and moral char¬ acteristics of the people, the Japanese will suc¬ ceed in attaining the front rank of honor in the pursuits of peace, as they have certainly already attained that rank in the science and art of war.

As regards their religious nature and devel¬ opment the Japanese do not differ essentially from other peoples of the same grade of race- culture; while their more or less important characteristics of religious belief, sentiment and practice correspond well to the national type of character. Religious superstitions of all the various kinds have flourished among the ignorant, here as elsewhere ; although those of the more dark and cruel kind, such as char¬ acterized the Aztecs and much of northern Europe, and are to-day prevalent in Africa and some of the South Sea Islands, do not appear ever to have taken a similar hold upon the Japanese. The physical horrors of the popular

Buddhistic heifl have been relatively impotent in Japan, either as inspiration or as restraint. Myth-making and miracle-mongering, such as result from the application of a lively imagina¬ tion to religious and semi-religious conceptions, are nowhere more abundant. Invisible, divine spirits of all sorts, both good and evil (but chiefly kindly), dwell near to man and are ever ready to enter into personal relations with him. The religion of nature-worship in all its mani¬ fold forms and manifestations is inseparably connected with the aesthetical sympathy and artistic appreciation of natural objects and phe¬ nomena. While ancestor-worship and hero- worship both spring from and contribute to those sentiments of loyalty and devotion which are the spiritual impulse and moral principle of what has been noblest in the past life of the nation.

When religious belief develops into a mono¬ theistic faith, the conception of God is apt to be clouded by an imperfect apprehension of the nature of

Personality and an inadequate esti¬ mate of personal values. Thus a tendency to a mystical and vague, rather than a logical or scientific pantheism, controls the thinking and shapes the conclusions of the philosophy of religion, or theology, among the Japanese; and agnosticism or atheism in religion is rather the result of indifference, or of intellectual weariness, or of the affectation of independent and modern views, than of scientific deductions or systematic reflection. When, however, the Being of the World is clearly apprehended as the Ideal of perfect Ethical Spirit, and man's relations to this Being are • regarded as best symbolized under such terms, of a personal sig¬ nificance and value, as Lord, Father and Re¬ deemer, the characteristic temperament of this race quite naturally and spontaneously, as it were, produces examples of religious devotion, self-sacrifice and heroism, which have rarely been equaled, and have never been excelled, in the religious history of the race.

The question arises, whether these so-called racial characteristics of the Japanese are not rapidly changing under the greatly changed con¬ ditions of the modern life — whether, indeed, they have not already changed essentially, and are destined to still greater changes in the future. How, then, can they properly be re¬ garded as racial at all ? Modern science, mod¬ ern business, enlarged ambitions and opportuni¬ ties for foreign intercourse, but especially what we may call the democratizing *of the people (a process going on over all the world), are undoubtedly working marvelous alterations in the mind and conduct of the nation at large. We believe, however, as yet that these altera¬ tions are not inconsistent with the appraisal of the racial characteristics, in respect of their elements both of strength and of weakness, as it has already been somewhat minutely made. It is a notable source of our confidence in the future development of Japan that, under enor¬ mous difficulties in the past, and frequent ap¬ parent crises in its more recent period, the Japanese government and people have shown themselves equal to trying emergencies.*

George Trumbull Ladd,

Late Emeritus Professor of Metaphysics and Moral Philosophy , Yale University ; Lecturer on Education in the universities of Japan.

JAPAN — HISTORY OF THE EMPIRE TO 1889 (5)

641

5 HISTORY OF THE EMPIRE TO 1889. Introduction. — The Japanese Empire has been ruled for above 25 centuries (2,567 years) under one unbroken line of sovereigns since the Emperor Jimmu, whose 123d descend¬ ant is the present emperor. The people may be justly proud of

their long history, the pages of which have never been polluted by any for¬ eign conquest, and of that matchless continu¬ ity of their illustrious rulers, whom they never tired of revering and loving, even while polit¬ ical supremacy was in subjects' hands. Per¬ haps we may seek the main source of the harmonious unison of ruler and subject in that patriarchal administration adopted by Japanese from the earliest age; and besides, the singu¬ larly harmonious temperament of the people and the isolated position of their islands in the sea seem to have contributed much toward forming a solid nationality.

Reliable calendars first came into use in Japan early in the_ middle part of the 7th cen¬ tury of the Christian era, so that the genuine¬ ness of dates given by ancient chroniclers to events lying still earlier must be considered doubtful. Modern specialists affect to find a prolongation of 500 to 600 years in that part of Japanese history, and that the Christian era is one century later than the Japanese.

The period prior to the Emperor Jimmu is called ((Kamiyo)) ((

The historic period may be divided into three great periods: (1) The Age of Imperial Administration; (2) the Age of Military Dicta¬ torship; (3) the Restoration and Constitutional Imperial Administration; and these further sec¬ tioned into minor series.

The Age of Imperial Administration.

1. The First Emperor Jimmu and the De¬ velopment of the Empire. — The Emperor Jimmu, the first emperor, valiant and wise, left with his forces the old palace of Hyuga, in the southern part of Kyushu and settled in Yamato, the central part of Japan. There subduing the aborigines called <(Cave-Dwellers® and some nobles who had migrated there from Takama- ga-Hara in a still earlier period, he was crowned as emperor, and ordained the duties of his sub¬ jects of merit and those nobles who became submissive to him, including military affairs, rites, local administration, etc.

Such a distribution of duties was extended even to subaltern subjects, and as the original holder of an office bequeathed it to his son, who again passed it to his son in succession, names of professions in the course of time came to denote families themselves. These families possessed retainers and land property, and titles <(Kabane® as Omi, Muraji, etc., varying accord-

ing to the family dignity, were conferred by the emperor upon their headmen. Otomo-no- O-muraji Mononobe-O-muraji, Nakatomi- no-O-muraji, Soga-no-O-omi, etc., were the most influential of these titled

families. If the need arose these families were to take arms for the emperor — the very centre round which they were firmly united.

In the reign of the Emperor Sujin (the 10th) four generals were sent in four directions to extend the imperial authority. A system of taxation was fixed for the first time, industry encouraged and communication facilitated. Thus under the emperor the country made con¬ spicuous progress.

Two rebellious tribes, however, arose in the west and the north, the former with the name of (

The Empress Jingo, the wife of the 14th emperor, attempted an expedition to Korea, her¬ self leading the forces, and succeeding in mak¬ ing nearly the whole of Korea dependent on Japanese authority.

The conquest of Korea had an important significance, not only because of the tribute she annually brought, but because of the liberal in¬ troduction of Indian and Chinese civilization, for at that time Korea was far ahead of Japan in culture. A number of Chinese and Koreans were naturalized in Japan and various new arts were cultivated by them. In ancient Japan the gentlefolk were divided into three classes: (1) Those descended from sovereigns; (2) those descended from deities of the prehistoric age; and (3) those descended from naturalized for¬ eigners, as above mentioned.

In the reign of the 29th emperor, Kimmei, in 552 a.d., the Korean envoy introduced images of Buddha and copies of the Sutras and strongly commended the virtues of Bud¬ dhism. Mononobe and Soga, two influential families who held great political antipathy to¬ ward each other, were widely separated in their opinions concerning the new religion, the former against it and the latter for it. Buddhism, however, having found an able advocate in the renowned Prince Shotoku, the Soga family at last overcame the anti-Buddhist party.

The Prince Shotoku, being charged with the regency of the 33d empress, Suiko, executed reforms in various departments. He laid down, for the first time, a constitution containing the essentials of politics and ethics; introduced the use of the calendar; dedicated to Buddha a number of magnificent temples, and in 607 a.d. the first authorized ambassador was sent to China with an aim of promoting international intercourse. The arts of architecture, sculpture and painting made marked progress with the steadily growing popularity of the new creed, which necessarily led to the construction of many places of worship.

Thus the introduction of Chinese learning and Buddhism was the most significant epoch- making phenomenon in the whole range of

Japanese history, and Buddhism left lasting traces in the national customs, disposition, and even in the politics of the nation. The reign of the 35th empress, Kogyoku, the loyal Naka- tomi-no-Kamatari assisted Prince Naka-no-Oye and succeeded in checking and destroying the arbitrary exercise of power by the Soga family.

2. The Era of the Taikwa Reformation. — On the fall of the Soga family, the 36th em¬ peror, Kotoku, came to the throne, and with the help of the heir apparent, Naka-no-Oye, and acting on the advice of Kamatari and others, inaugurated, in 645 a.d., the famous re¬ forms known in history as the Taikwa Reforma¬ tion, after the name of the era which was settled upon for the first time.

In that reformation, in order to remove the wide interval between the rich and the poor, all lands and people in the possession of private individuals were confiscated by the state and distributed among the people with certain con¬ ditions. The Prince Naka-no-Oye reigned as the Emperor Tenchi, and established, based on the Chinese models, the various laws of punish¬ ment, administrative organization, education, conscription, taxation and other civil codes. Afterward, in 702 a.d., these laws, which go by the name of Taihoryo, were supplemented and revised and were transmitted to posterity for a long period. The emperor subdued the tribes of Yezo and Shukushin (in Manchuria), so that the imperial authority was made known even in the modern Hokwaido. Korea, how¬ ever, which had been the source of many troubles, was abandoned in this reign.

3. The Nara Epoch. — We now enter into what is known as the «Nara Epoch,® celebrated for its politics, Buddhism and arts.

W hile the 43d empress, Gemmyo, reigned, the seat of the imperial government, subject till then to frequent removals, was laid at Nara in Tamato (710 a.d.), and the palaces, and city and government buildings were planned to meet that international intercourse which was grad¬ ually growing close between Japan and China, the pristine simplicity being found unsuited to the capital.

One of the most noteworthy events in this epoch is the upheaval of the Fujiwara family, descendants of Nakatomi-no-Kamatari, an emi¬ nent leader in the Taikwa Reformation. Fubito, his son, also achieved deeds of merit; and Fubito's daughter was the first instance of a subject being raised to imperial consort. Ex¬ cept a short interruption caused by internal

quarrels, the Fujiwara family increased more and more in its authority, until the zenith was reached in the period called the <(Heian-cho Epoch.® In that period the subjugation and cultivation of the Yezo district and the en¬ couragement of agriculture were noteworthy.

In accordance with the provisions of the Taihoryo, a university was established in the capital as well as local schools throughout the provinces, with the aim of training government officials — the subjects chiefly taught being law, history, mathematics and the Chinese philoso¬ phy. Hence in that epoch scholars versed in those lines of learning were very numerous, and it was then that those historical and geo¬ graphical accounts of the Kojiki, Nihon Shoki and Fudoki were comniled. Many students pro¬ ceeded to China to finish their education, and

some, such as Abeno-Nakamaro, obtained high position in China. Men and women of that epoch wrote good Japanese poetry, which is preserved in the collection named Mannyoshu. In that age the Japanese syllabaries, Kata-kana and Hira-kana, were invented to be substituted for the inconvenient Chinese ideographs.

Among the events of the epoch none is more noteworthy than the wide spread of Buddhism. This result may be attributed to the fact that it found many fervent devotees in the imperial family. The Emperor Shomu built provincial temples (Kokubun-ji) for nuns and priests and endowed them with liberal donations. He more¬ over had a huge image of Buddha constructed, and put it in a large temple, Todaiji, at Nara, perhaps the largest wooden edifice the world has ever known. Record says that the Emperor Shomu adopted the tonsure and took a Buddist appellation. The Empress Komyo, his consort, was also zealously devoted to Buddhism and founded a charity-hospital for medical treat¬ ment, and measures were taken also for rescu¬ ing foundlings. Among many priests of high reputation, Gyogibosatsu is recognized as the most eminent. He and other high priests who successively rose to fame were not satisfied with the mere preaching of doctrines, but showed great activity in building bridges and roads and teaching the people to be industrious. There were, of course, priests who abused their religious authority — the destroyer of one of whom was the still celebrated loyal Wake-no- Kiyomaro. Carpenters, from the practice ac¬ quired in building temples, learned how to con¬ struct large edifices, and the workmanship of the temple idols is wonderful and never fails to dazzle those who visit Todai-ji, Yakushi-ji and other old temples at Nara. Painting and weaving also made tremendous progress, and the storehouse called Shoso-in, formerly form¬ ing part of the Todai-ji and now in the im¬ perial possession, witnesses how far the civil¬ ization in that epoch advanced. It contains things used by the Emperor Shomu, among which are several articles illustrating the inter¬ mingling of the

culture of India, western Asia and even Europe through the Chinese, and con¬ tains the census register, the Book of Taxes, etc., as old as 702 a.d. The wooden copies of Sutras, contained in many thousand small pagodas, sculptured 'by order of the Emperor Shomu, are perhaps the oldest extant samples of wooden printing. While the capital attained a high level in this epoch, it is undeniable that the rest of the country was still in a state of com¬ parative ignorance.

A Heian-cho Epoch. — In the reign of the 50th emperor, Kwammu, the capital was trans¬ ferred to Heian-kyo, 794 a.d., perhaps for ad¬ ministrative purposes. It was the modern Kioto, which is, however, only half the size of the original. There more than 70 emperors reigned for above 1,070 years, until the great Meiji Restoration. The 'interval which sepa¬ rates 794 a.d. and the year of the establishment of the Kamakura Shogunate, is known in his¬ tory as ((Heian-cho-Epoch.» Another salient event in this reign was the complete subiugation of insurgents in the eastern Yezo districts by sending there Saka-no-uye-no-Tamuramaro.

Several reigns from Kwammu to the Em¬ peror Ninmyo, his grandson, comprise the most

prosperous part of the epoch. Learning made a marked advance, and the Emperor Saga is said to have been unique in his penmanship. Besides, many private schools were started by the court nobles.

Buddhism found two more able champions in Saicho (Dengyo Daishi) and Kukai (Kobo Daishi), the former of whom founded Yenry- aku-ji on Mount Hiei, and the latter Kongobu- ji on Mount Koya. They are said to have taught the identity of the deities of Shintoism, the native religion, with those of Buddhism, which subsequently won the strong devotion of the people of all classes. Buddhism accordingly became the predominating factor in settling all matters relating to political, military and social occurrences. But Shinto shrines, such as Ise or Kamo, always held the people's hearts even in this ascendant age of Buddhism.

5. The Zenith of the Fujiwara Family. — The Fujiwara family which sustained a loss of prestige for a time again rose to an eminence when Fuyutsugu was appointed to a vital posi¬ tion called Kurodo-no-Kami. His daughter was elevated to be an imperial consort, and bore a son, who came to the throne as the 55th em¬ peror, Montoku. With Yoshifusa, son of Fuyutsugu, the Fujiwara family increased its power, for he was the first

subject appointed Chief Minister of State, for which office till then none but imperial princes had been deemed available. Moreover, he was charged with regency over the 56th emperor, Seiwa, his grandson, who was only nine years old when enthroned. Mototsune, his son, was appointed ˆKwanbaku,® and after a time the custom of appointing the ex-regent to that position of im¬ portance became fixed. It seemed indeed as though all the highest offices of state had be¬ come the exclusive monopoly of this family.

The Emperor Uda, being of a sagacious turn of mind, contrived to put a check on the arbi¬ trary power exercised Aby the Fujiwara family by ‘bestowing an eminent position on Sugawara- no-Michizane. Michizane’s banishment, how¬ ever, was soon accomplished by Tokihira, a minister of the Fujiwara, and his colleagues in 901 a.d. Thus the invulnerability of this family was once more demonstrated.

Although the next emperor, Daigo, was cele¬ brated for his illustrious virtues, and scholars and artists like Ki-no-Tsurayuki, Ki-no-Haseo, Miyoshi Kiyoyuki, Kose-no-Kanaoka, etc., were fostered under that reign, under an appearance of tranquillity and grandeur there lurked ele¬ ments of effeminacy and corruption. The laws of Taihoryo were gradually being relaxed, and the arbitrary power of the Fujiwara family be¬ came uncontrollable.

*While enjoying such an arbitrary exercise of power, the Fujiwara family was naturally sub¬ ject to internal disturbances arising from the selfish ambitions among them. Every prominent member of the family sought to increase his own authority by becoming closely related to the imperial family. At last, Michinaga (about 1,000 a.d.) became supreme and represented in himself the zenith of that splendid family. His three daughters became the consorts of three successive emperors and he was grandfather of three emperors. A writer depicted the events of these times in a work to which he gave the title (The Annals of Grandeur.**

This epoch was distinguished by great gaiety and splendor. Nobles lived in spacious and grand houses, dressed lavishly and spent most of their time in reunions of poetry and music and dilettanteish observation of nature. Jap¬ anese poetry, however, made a marked advance. Ki-no-Tsurayuki, by order of Emperor Daigo, compiled the ˆKokinshuJ a collection of the best poetry, and this was followed by 20 similar collections. Another noteworthy fact is that national literature began to develop perceptible activity, while the Chinese literature lost much of its sway, owing to the custom of sending ambassadors to China being abandoned. Thus Chinese poetry was supplanted by national verses; and romance, sketches, etc., were writ¬ ten in the national syllabary. Tosa-Nikki, Genji-Monogatari, Makura-no-Soshi*

were the productions of most renown, and many lady courtiers in the reign of the Emperor Ichijo, and at the time when Michinaga was in power, occupied positions of literary pre-eminence. In short, while the period of the imitation of Chinese culture was passing, the national litera¬ ture was steadily growing.

While the nobility in the metropolis were devoting themselves almost entirely to pleasure¬ seeking, administration in the country districts was. entrusted to unprincipled officials. It was an important feature of the Taikwa reforms that all the land in the country became state property, and at the same time was allotted to individuals under certain conditions, which, however, in the course of time, fell into neglect. The rich acquired large tracts: to nobles and temples land property was granted, and, more¬ over, uncultivated lands were suffered to re¬ main in the possession of individuals to get them cultivated. Cunning people evaded the public duties by nominally transferring their lands to nobles and temples, while they them¬ selves acted as stewards. Thus the land of private possession having greatly increased, not only the power of local authority, but also the revenue of the government gradually dimin¬ ished, and became one of the chief causes of the decline of Imperial administration.

On the other hand the rise of the military clans is a most noteworthy event in this epoch. During the reigns of the Emperors Kwammu and Saga the plan was introduced, mainly from the financial point of view, of reducing some of the. Imperial princes to the rank of subjects and giving them family names. Taira (Heishi) and Minamoto (Genji) were the most important instances. Some of these reduced princes ac¬ quired large influence in the districts admin¬ istered by them, and each trained a large bodv of retainers in the arts of war, availing himself of the inefficiency of the conscript laws of the Taihoryo. Such was the origin of the military clans.

In 939 a.d., a man of the Taira clan, by name Masakado, in the eastern provinces, and Fujiwara-no-Sumitomo of the Fujiwara clan, in the western, rebelled against the Imperial au¬ thority, but were immed'.ately defeated. These revolts afforded important occasions for clan as¬ cendency. In 1031 a.d., Yorinobu, a grandson of Tsunemoto, who defeated Sumitomo, achieved success in the Revolt of Tadatsune of the Taira clan, and the two. insurrections were quelled respectively by Yoriyoshi, the son, and Yoshiiye,

the grandson Previously, in 1019 a.d., Takaiye of Fujiwara frustrated the invasion of Kyushu by plundering tribes of Toi of Manchuria. His

descendants secured a military stronghold in Kyushu. Thus, while the Fujiwara family was rapt in dreams of grandeur, the reins of power came into the hands of the military classes, composed of the clans Minatomo, Taira, and a branch of Fujiwara.

6. The Age of the ex-Emperors. — The

unbridled omnipotency of the Fujiwara family began to wane in the reign of the 71st em¬ peror, Gosanjo, who was sagacious and austere and had no lineal relations with the Fujiwara family. His elaborate scheme of reforms, how¬ ever, was not realized because of his untimely death. The Emperor Shirakawa, also a man of resolution, interfered with state affairs even after his abdication of the throne in 1086, which was the earliest precedent of that peculiar sort of government called Insei (Ex-Emperor's Ad¬ ministration).

Luxury in dress, magnificence of dwellings and fanatic devotion to Buddhism were the chief features of this epoch. Large temples in the vicinity of Kioto, such as Yenryaku-ji, Onjo-ji, Kofuku-ji, etc., possessed rich properties, and each maintained thousands of sacerdotal sol¬ diers, who if dissatisfied with any measures of the government, armed with bow and arrow, would make descent on Kioto in great force to obtain their will. Accordingly, it was always to military men in the provinces that both the emperor and the Fujiwara family resorted when feuds broke out or the Buddhist soldiers acted lawlessly, and thus the elevation of mili¬ tary men to positions of power was most natural.

The struggle for political pre-eminence by the Fujiwara family and the long years of moral corruption of the Heian-cho epoch resulted in a disturbance in 1156 ad. In that year the 76th emperor, Konoye, died, and the ex-Emperor Sutoku, seconded by Fujiwara-no-Yorinaga, Minamoto-no-Tameyoshi and others, tried to ascend the throne once more; whereas the Regent Tadamichi, brother of Yorinaga, not being on good terms with his brother, with the help of Kiyomori of the Taira clan, and Yosh- itomo, son of Tameyoshi, crowned Goshirakawa emperor. Thus a bloody war called ((Hogen Disturbance® ensued, which ended in the rout of the ex-emperor. In this way the military classes forced their wav into the administrative authority of the state. Three years after the Hogen Disturbance, an insurrection arose, known in history as the ((Heiji Disturbance,® in which the power of the Minamoto clan was almost completely broken by the loss of Yoshi- torno, its leader, and the Taira clan speedily attained ascendency. The period (1166-85) is called the Taira Age. Kiyomori, by virtue of his success in the two disturbances, was ap¬ pointed Chief Minister of the State, and all his kinsmen and followers were given prominent positions, and the reign of the Fujiwara family was practically '

over.

Arbitrary power, and especially the arrogant attitude of Kiyomori toward the ex-Emperor Goshirakawa, greatly incensed his opponents, and Minamoto-no-Yoritomo, a son of Yoshi- tomo, and Yoshinaka, his cousin, raised a force of troops in compliance with the mandate of the Prince Mochihito, a son of the ex-emperor,

and after several battles drove out the Taira party from Kioto. In the tragic sea-battle at Dan-no-ura (1185 a.d.) the Taira clan was completely crushed by the forces of Yoshitsune, Y'oritomo's younger brother.

The Age of Military Dictatorship.

1. The Kamakura Epoch. — After a deci¬ sive battle at Dan-no-ura, Yoritomo was created Grand General of Expedition (Seii-Taishogun) , founded the Shogun's government at Kamakura, and the Age of Military Dictatorship of about 700 years begins. Under a pretext of arresting fugitives of the Taira clan, or stray followers of Yoshitsune — his able brother with whom he was on bad terms — and of preventing disturbance in the future, Yoritomo had his relatives and partisans appointed as High Constables in each province and as superintendents of both public land and of nobles' estates, and applied a certain system of taxation on all land property (1185 a.d.) . Thus Yoritomo, acting on the sagacious advice of Oye-no-Hiromoto, a man of great statesmanship, succeeded in becoming the mas¬ ter of the state administration, and while the power of the former provincial governors ap¬ pointed by the Imperial court and the headmen of nobles' estates gradually lost their authority, these newly appointed military officials steadily grew into what were called ((Daimyos,® or feu¬ dal lords.

Profiting by the unfortunate precedents of the Fujiwara and Taira families, the mode of life laid down by Yoritomo was simple and frugal. Bravery, honor and loyalty were pro¬ claimed the highest virtues, and if one were found guilty of any serious fault he must atone by suicide. Thus at this period the rules of the Japanese chivalry were clearly prescribed, though the spirit was not new. This soldierly spirit prevailed in literature and amusements, and this warlike age also witnessed the rise of the Zen sect of Buddhism.

The line of Yoritomo came to an end in the third Shogun, and after that the govern¬ ment fell into the hands of the Hojo family to which the Yoritomo's consort belonged, although the nominal Shogun was brought from Kioto.

In 1221 a.d. the Emperor Gotoba attempted the destruction of the Hojo family, which at¬ tempt, however, utterly failed, and the property of those who espoused the Imperial cause was confiscated and divided among the Hojo's fol¬ lowers. Some of the Hojo's family were sta¬ tioned in Kioto to restore order, and to act as overseers, and, by the judicious and generous administration of such excellent statesmen as Yasutoki and Tokiyori, that family enjoyed the widest popularity. Yasutoki left a knightly code of 51 articles, which was respected as the basis of laws throughout the military dictator¬ ship up to the Meiji Restoraticn.

In the reign of the 90th emperor, Kame- vama, when Tokimune, the son of Tokiyori, held regency in Kamakura, Kublai Khan, the Mongolian conqueror, sent envoys to Japan seeking her submission, but his proposals were rejected. In 1-281 a.d., the Chinese and the Mon¬ golian forces, above 130,000, together with the Koreans, made an invasion into Kyushu, and were defeated. The period of war and anxiety extended over 30 years, but perseverance and final success made manifest the national spirit of Japan.

Troubles about the succession of emperors served as an excellent occasion for the Hojo family to obtain paramount power. The 96th emperor, Godaigo, a daring and wise monarch, lamenting the decay of the Imperial authority, realizing the imbecility of Hojo Takatoki, and relying on the never failing loyalty of Kusunoki Masashige, Nitta Yjshisada and others, at last , succeeded in the restoration of administrative authority to the Imperial House (1333 a.d.).

2. Revival of the Imperial Power in the Kemmu Era. The Northern and Southern Courts. — Ashikaga Takauji, a member of the Minamoto clan, and a man of distinction in the late war, knowing the dissatisfaction of the military classes in the partial distribution of re¬ wards, and the court nobles' prejudice against men of arms, saw an opportunity to raise an independent army. Addressing himself to the newly created Emperor Komyo, of the line of the Emperor Gofukakusa, he began a revolt against the Emperor Godaigo, and forced him to seek refuge in the Yoshino-Yama, the cele¬ brated place of cherry-blossoms in the province of Yamato. For a period of 57 years, dating ■from 1336 a.d., two lines of emperors reigned simultaneouslv, one in Kioto and the other in Yoshino, and this is therefore termed the age of Northern and Southern Courts. On the death of Kusunoki and Nitta, able defenders of the South, the Ashikaga family rose into su¬ preme power. In 1392 a.d., the two Imperial houses were reconciled and

united.

3. The Muromachi (Ashikaga) Epoch. — As the Ashikaga family placed the site of their Shogunal government in Kioto at Muromachi, that period is known as the Muromachi Age. The 3d Shogun, Yoshimitsu asserted his author¬ ity by destroying such powerful generals as Ouchi Yoshihiro and Yamana Ujikiyo, who had become insolent by reason of their rich estates. He was also notorious for his love of arbitrary rule and luxury, well exemplified in his sump¬ tuous villa, Kinkaku-ji, at Kioto.

When Takauji laid his seat in Kioto, he at the same time sent his second son, Motouji, the uncle of Yoshimitsu, to Kamakura to be gov¬ ernor there; but his descendants growing in power became ambitious, and were finally over¬ thrown. With the fall of the governor at Kamakura, the whole of the Kwanto district was thrown into disturbance.

In the time of Yoshimasa, the 8th Shogun of _ the Ashikaga line, the disastrous war of Onin broke out (1467 a.d.), occasioned by a succession of troubles in the family of the Sho¬ gun and his followers. Hosokawa Katsumoto led one party, and Yamana Sozen the other, and Kioto was the field of battle for 11 years and was miserably reduced to a state of desola¬ tion and ruin. Palaces and temples were burned to the ground with irreparable loss of treasures and documents.

After the war, territorial nobles returned to their castles and would not listen to the central government. This age of constant contest, ex¬ tending from the end of the 1 5th century to that of the 16th, is denominated the "Period of Military Emergency.® Hojo Soun was the most typical hero who attained a position of eminence by the sheer force of sword. In the mean¬ while, Uyesugi in Echigo, Takeda in Kai, Ima- gawa in Suruga, Otomo and Shimazu in Kyu¬ shu, Mori in Chugoku, were exercising their

respective dictatorships at their own sweet will, until the country was once more united under Oda Nobunaga and Toyotomi Hideyoshi.

During a century of continuous military dis¬ turbances, literature and the arts made notable progress, for learning was conscientiously culti¬ vated by priests of the Zen sect and poetry still continued to be the favorite pastime of court nobles and even of soldiers. In this age, the (

While the peaceful intercourse between Ja¬ pan and China was maintained by the Shogunate the people of the littoral districts of Kyushu, Chugoku and Shikoku, after the repulse of the Mongolian invasion, made frequent raids into China and Korea, which reached a climax in the age of the Military Emergency. In China the name of "Wako® ("Japanese raid®)

was given to these pirates and they were greatly dreaded. For the introduction of the gun by the Portu¬ guese in 1543 a.d., the propagation of Chris¬ tianity by Xavier, etc., the dispatch of ambas¬ sadors to the Roman Pope by various mag¬ nates of Kyushu. See Foreign Relations.

4. Oda and Toyotomi Period. — Tn this state of the local autonomy, Oda Nobunaga greatly distinguished himself and was charged by _ the 106th emperor, Ogimachi, with the pacification of the city of Kioto. As the guardian of the Shogun Yoshiaki, he entered Kioto, where he repaired the Imperial Palace, restored the poor nobles and established order. In 1573 a.d. the Ashikaga Shogunate terminated with the expulsion of Yoshiaki by Nobunaga. He subjugated the Takeda clan of the province of Kai, and was about to start on a campaign against the Mori clan of Chugoku, when he was suddenly attacked and killed by a vassal (1582 A.D.) .

Upon Nobunaga's death, Toyotomi Hide¬ yoshi, his tried vassal, afterward Taiko, per¬ haps one of the most renowned participators in Japanese history, took his place. He subdued all the important territorial nobles in nine years and the restoration of domestic tranquillity was at last established (1590 a.d.). When the Em¬ peror Goyozei paid a visit to his newly con¬ structed mansion in Kioto, Hideyoshi settled the Civil List, allotted land property to court nobles, and exacted from all generals an oath that they should reverence the sovereign, and they should not show any disobedience to the "Kwanbaku,® which position he held.

Availing himself of the valiant spirit of those times, Hideyoshi in 1592 made an expedition into "Ming,® via Korea, seemingly to be avenged of the Mongolian invasion in the Kamakura

Period. The royal palace of Korea was taken by Japanese forces, and a large body of Chinese reinforcement put to rout. Although the Chi¬ nese suggestion of reconciliation was accepted by Hideyoshi, the fraud practised by Chinese envoys put him in such a rage that large forces were immediately mustered for the second in¬ vasion, which was frustrated by the death of Hideyoshi (1598 a.d.).

Being fully aware of the smouldering senti¬ ments of hostility, Hideyoshi, just before his death, entrusted the administration of the state to the hands of Tokugawa Iyeyasu of Yedo (the present Tokio), who was illustrious for his rank and renown. After the death of Hideyoshi, however, the generals — such as Ishida Mitsu- nari, Mori, Uyesugi and others — who had served

under him, took up arms against Iyeyasu in the cause of Hideyoshi's son, Hideyori. The Tokugawa forces were led by Iyeyasu, assisted by Asano, Kuroda, Kato and others. The op¬ posing armies met on the Sekigahara Plain in Mino, and the Ishida party was utterly defeated, so that the administrative power came wholly into Tokugawa's hands (1600 a.d.).

5. Yedo (or Tokugawa) Epoch. — Three years later Tokugawa Iyeyasu was appointed Seii-Taishogun, and founded a Shogunal gov¬ ernment in Yedo, which naturally increased in size and grandeur. His administrative suprem¬ acy over feudal lords was secured by being generous as well as authoritative. The succes¬ sor of Hideyoshi, ruling in Osaka, hoped to be restored to the position his father had occupied, and there flocked to his standard many thou¬ sands of <(Ronins® (unenrolled samurai), but the result was an utter failure. Thus the illus¬ trious house of Toyotomi having been de¬ stroyed, the country entered upon a long era of peace.

The measures contained in Iyeyasu's laws for territorial government were of the most prudent nature. To avoid the excessive auton¬ omy of territorial nobles, every feudal lord was required to live every alternate year in Yedo; the construction of castles was placed under strict limitations and by means of a careful territorial distribution, nobles were prevented from forming allies. He knew how to give allegiance to the Imperial family, without sur¬ rendering any actual authority. The encourage¬ ment of learning and refined manners resulted in obliterating the cruel and rude customs of the people.

Believing it for Japan's commercial advan¬ tage that friendly intercourse should exist with Korea, peaceful relations were resumed, and it became a custom to have an embassy of con¬ gratulation sent from Korea on the occasion of the succession of a new Shogun. Under Iyemitsu, the 3d Shogun, a man of extraordi¬ nary ability, the organization of the Shogunal government was perfected, while the supremacy of the Shogun was conspicuously enhanced. At this time the government rigorously perse¬ cuted the Jesuits and their followers as danger¬ ous to the welfare of the country, and Christian converts fled to Shimabara, where their head¬ quarters was at last subdued, in 1638 a.d. It is believed that some of those defeated at Sekiga¬ hara sided with the Christians to be revenged on the Tokugawa. Fearing the spread of Chris¬ tianity, strict laws were enacted for the prohibi¬

tion of foreign communication, and no foreign vessels were permitted to enter except those of Korea, China and Holland.

About two centuries and a half, from 1615 a.d., the year of the fab of Toyotomi, down to the Meiji Restoration, was a period of tranquil¬ lity,

broken once by the Christian insurrection, and in it culture made wonderful progress, and the war spirit perceptibly diminished. During the celebrated era of Genroku (1680-1709 a.d.) when the 5th Shogun, Tsunayoshi, ruled, the highest seat of education was established by the Shogun's order, and the grandson of the cele¬ brated scholar Hayashi Doshun appointed its president. This encouragement of education was imitated by the feudal nobles, who also established schools in their respective provinces, and vied with each other in getting men of learning. The most distinguished of these sa¬ vants were Ogiu Sorai, Ito Jinsai and Arai Hakuseki. In that period the <(No® dance. <(Joruri® music and the dramatic play enjoyed wide popularity, and costumes and furnitures were of the most luxurious nature. It was at this time that the famous vendetta of the 47 Ronins took place (1702 a.d.).

The empire being thus busily absorbed in the cultivation of learning and arts, the administra¬ tion of the Shogunate was characterized by in¬ action, and the military equipment began to be neglected. The 8th Shogun, Yoshimune (1716— 45 a.d.), on assuming administrative control, set himself to reorganize the government by introducing the Kyoho reforms. He retrieved the poverty of the whole country by the en¬ forcement of frugality and economy, and fos¬ tered the popular taste for martial exercise. He collected also a volume of laws, called ((Hyak- ka-jo,® commended the Dutch learning intro¬ duced by Aoki Konyo, and encouraged industry. On the death of the Shogun Yoshimune, the political adjustment relaxed. Matsudaira Sad- anobu then became the chief minister and set himself to enforce the Kwansei era reforms. Then succeeded the exceptionally prosperous eras of Bunka and Bunsei (1804-29 a.d.) during which many evil practices crept in, but a great reform took place under Midzuno Tadakuni, in the era of Tempo (1841 a.d.).

In 1853 a.d., Commodore Perry came to Japan with his fleet. Several years before this arrival, both Russia and England had sought permission of the government to carry on trade, but without avail. As the result of various en¬ croachments of the Russians, and the disorderly conduct of Englishmen at Nagasaki, careful measures were taken for littoral defense, and the government ordered that any foreign ship approaching the coast should be fired on. Among the Japanese, however, many who had acquired the Dutch learning spoke against such a violent policy.

On the other hand, the cry of <(Loyalty to the Throne® became more and more fervent, for the people had learned how the military families of successive generations asserted their own authority at the expense of that of the Imperial House. The history of the past was widely studied in such a painstaking work as (Dainihonshi) (History of Japan) compiled by Mitsukuni of Mito and his retainers. The stud¬ ies of national literature,

pioneered by a learned group of men, headed by Kamo-no-

Mabtichi, Moto-ori Norinaga, etc., naturally stirred up still more the people's love for the emperor.

The Shogun's government, though tradition¬ ally accustomed to the arbitrary exercise of power, was now perplexed, both by the Im¬ perial court and the popular cry, and the neces¬ sity of coming to some terms with America and other foreign powers was felt. Moreover, the Shogunate was disturbed by an internal trouble about the succession. At this crisis, the cour¬ ageous I'i Naosuke (Kamon-no-kami) was ap¬ pointed Tairo (Prime Minister), and in 1858 a.d. a temporary ytreaty was signed with five countries — America, England, France, Russia and Holland, and the succession problem was also settled.

The blame for having taken the audacious step of concluding a treaty without the Imperial sanction was thrown upon Ii, who, however, re¬ solved to settle the disturbance by dismissing, sending into exile or to death all opponents of his policy. Amidst such a hue and cry, Ii was attacked and. killed by the Mito Ronins, and the authority .of 'the Shogunate rapidly diminished. The Mori clan of Choshu united with the Shim azu clan of Satsuma with the common view of destroying the Shogunate government. Finding himself confronted by such difficulties, Yosh- inobu, the 15th and the last Shogun of the Tokugawa, acting on the advice of Yamanouchi of Tosa, resigned the office of Shogun, and re¬ stored the administrative power to the Imperial Court in October 1867 a.d. Thus the Toku¬ gawa Shogunate ended with a brilliant history of 265 years, and the Age of the Military Dic¬ tatorship for 682 years came to an end.

Restoration and Constitutional Imperial Administration.

Subsequent to the restoration of the admin¬ istrative authority and the overthrow of the Tokugawa Shogunate, the Shogun's household troops and some of the territorial nobles, owing to their dissatisfaction with the attitude of the Choshu and Satsuma clans, attempted revolts, all of which, however, were defeated.

In the first year of the Meiji era, that is the year next to the Restoration, the Em¬ peror Mutsuhito (q.v.) issued a declaration de¬ fining the basal essentials of his administration, as for instance, that the management of the state should conform to the public opinion ; that rulers and subjects should be united for the development of the nation; that the knowl¬ edge of the

world should be sought in order to make firmer the empire's foundation. In the 2d of the Meiji, the capital was transferred from Kioto to Tokio.

Even after the Restoration, the unification of the national administration was found im¬ possible, for the land and the people were still in the possession of feudal lords. The four powerful clans of Satsuma, Hizen, Tosa and Choshu, therefore, addressed to the sovereign a letter declaring their desire to restore their land and retainers to the emperor, and all other nobles followed the same course. Then the ftHan® (fiefs) numbering above 300, were re¬ placed by (

Among various minor reforms, the distinc¬ tions of Kuge (court nobles), Daimyo (feudal nobles), Shi-No-Ko-Sho (samurai, peasant, artisan and merchant) were abolished, and the people were divided into the three ranks of Kwa-zoku, Shi-zoku and Heimin. The cue and swords of men were discarded, and the lunar calendar was replaced by the solar. A new law of conscription was issued declaring every man to be a soldier, and many codes of laws were enacted.

The emperor also encouraged education bv giving special attention to it, and the Imperial Rescript' was announced to settle the funda¬ mental basis of education. At present, there are numerous educational establishments, includ¬ ing universities, colleges, middle and common schools, etc. Railways, post, telegraph and mail steamers were provided for facilitating com¬ munication. Though some conservatives were opposed to the introduction of Occidentalism, foreign civilization advanced with irresistible speed and energy, which advance, however, was happily modified by a strong national sentiment.

In 1875 a senate was organized for legisla¬ tive purposes, and the assembling of local governors prepared the way for representative government. In 1889 the Constitution was pro¬ mulgated amidst universal congratulation, and in the following year the first session of the Imperial Diet took place. Thus the constitu¬ tional imperial government of the nation was firmly established.

Sanji Mikami,

Professor of History in the Imperial University , Tokio.

6. HISTORY OF JAPAN, 1889-1919. The

political evolution of Japan from the restoration of the Mikado to supreme power, in 1868, pro¬ ceeded from the imperial oath given to form a representative national assembly, to limit pre¬ rogative and to decide all matters of national interest in accordance with public opinion. Twenty-one

years elapsed before this promise was fulfilled. Meanwhile, preparatory construc¬ tive measures through local administration, look¬ ing to constitutional government were carried out by the men in power ; while the discussion of principles by pen and voice went steadily on among the rival parties. Roughly speaking, these were founded by Masanawo Nakamura, and Yukichi Fukuzawa, on idealistic and ma¬ terialistic theories respectively, in the 60's. Later Iwakura and Ito (q.v.) representing Prussian, and Okuno and Itagaki the British theories respectively, as to the responsibility of the ministers to the sovereign or to the Diet, incarnated the prevailing opinions. On account of the severe criticism of the men in power, through the new force of journalism, and the inevitable first results of free education, the arbitrary ((Peace Preservation Act® of 1887 was enforced, which virtually banished all hostile critics from Tokio and imprisoned those who refused to obey. Yet on the gathering of the first Diet in 1890 most of these men, thus roughly handled, held seats. At once began a most vigorous opposition, with the determina¬ tion to control the budget, to widen the fran¬ chise and to secure party government. A sur¬ vey of 40 years past shows that in the actions and reactions of political parties, although feudalism in form was past, its spirit remained. Whatever the ((name or form or ritual word,®

the passionate instincts of clanship, rather than insight into, or devotion to, fundamental prin¬ ciples governed the formation of parties and held men together in a common purpose. In 1870, when feudalism was abolished, there were about 480,000 Samurai (q.v.) or trained intel¬ lectual men in the empire. Popular education soon increased this host, also bringing in a new generation reared in modern ideas. Ito, (

*woman to whom fresh opportunities are open. The new civil code, passed by the Diet in 1896 (in English 1897), left the way open for reform and the terrific economic pressure because of the industrial revolution, completely altering the structure of the family, has left society in a state of flux. All this has unquestionably pre¬ pared the way for ˆdemocracy® — but of what type? Imperial, proletariat, or intelligent and educated — one that shall bind the nation pre- servatively closer to its noblest ideals and save the honor and prestige of the imnerial house — the type of Russia or of England? The struggle of parties is now on between the radical Im¬ perialists and those who would look to the English-speaking nations for inspiration, if not for models. A remarka*ble book by Yukio Ozaki, ex-mayor of Tokio, which appeared in 1918, entitled*

have frankly confessed disappointment at the results of their two great wars and concerning the new territory gained or old claims con¬ firmed. The comparatively small emigration from the ancient bounds of the three great islands, Hondo, Shikoku, Kiushiu, already con¬ taining over 50,000,000 souls, into the thinly populated, hut climatically different, Formosa, Yezo and Saghalien has been very far from meeting expectations. Nor are there yet any startling signs of either Korea or Manchuria being flooded with subjects of the Mikado. After two wars, ostensibly in her 'behalf, and many costly attempts to reform the peninsular kingdom, which, as Ito said, Hacked nearly all the features of a modern state,® Japan changed her protectorate to annexation, and, under its ancient name of Chosen, Korea (q.v.) was made a province of the Japanese Empire. While Japan's system of colonization has worked ma¬ terial wonders in Korea and Formosa, the nearness of the Philippines, as revealing the startling difference in Japanese and American ideals and methods, must work for good. At least the optimist hopes and thinks so, while the Japanese government expects to find in the peninsula room enough for all subjects of the Mikado living within the bounds of Morning Calm. We have preferred in this article, fol¬ lowing Professor Mikami's clear and able sur¬ vey, so rich in description of events, as a loyal native sees them, to present within the limits of a brief sketch the philosophy of the facts, rather than marshal an array of dates. Out¬ standing in the chronology of the past four decades was the decease on 30 July 1912 of the great Emperor Mutsuhito (q.v.), who, from 1868, led his people, magnanimouslv and with unselfish wisdom, through a reign unquestion¬ ably excelling all other in brilliancy, and with few peers as to length of time. Unfortunately, we think, the ancient august and unique title ((Mikado® has been relegated to poetry. The term ((Emperor® — now made to suffer in repute, because of the downfall of autocracy in a world-wide war — has come into general use. Of Yoshihito, third son of Mutsuhito and now executive head of the empire, the promise al¬ ready given of one likely to fulfil the hopes of the nation by following in his father's footsteps has been thus far fulfilled. Japan sends her ablest sons to attend the Peace Conference in Paris to settle the results of the Great War and in reasonable hope of a bright future faces the coming third decade of the 20th century.

William Elliot Griffis.

7. THE JAPANESE CONSTITUTION.

Among the jurists of Europe and America, it had heretofore been

considered that constitu¬ tional government is only compatible with the social and political status of the Western na¬ tions, and furthermore that Oriental nations could never adopt this form of government, because they have no common ground upon which constitutional government could be planted; therefore when, in the year 1881, the Emperor of Japan announced, by the Imperial Edict, that constitutional government should be established at the end of 10 years, the peoples of Europe and America thought that he had adopted a mistaken policy.

But the year 1890 came, and the first Parlia¬ ment was convened in accordance with the

Constitution which was promulgated the year before, and has continued ever since. Thus constitutional government in Japan, in spite of many boisterous meetings and much sensational discussions, which are by no means uncommon in Europe and America, must be considered a success.

In order to explain why Japan, one of the Oriental nations, has succeeded in adopting the system of constitutional government, it is neces¬ sary to review some of the important facts connected with constitutional movements in Japan during the last 40 years.

On his ascension to the throne after the Imperial Restoration in 1868, His Imperial Maj¬ esty proclaimed the five articles of the imperial oath, one of which marked out distinctly the future course of His Imperial Government, in the following words: ((We shall henceforth

seek knowledge and wisdom in an outside world and establish the National Assembly where the important affairs of State shall be decided by public opinion.®

This is the fundamental principle of Japa¬ nese national policy, by which all the subsequent changes and reorganization, both political and social, were carried out and consummated. In 1875, the judiciary system was organized by establishing the Court of Cassation, to main¬ tain the unity for the execution of the law, although there were already the District Court, the Provincial Court and the Court of Appeals, but there was no Supreme Court where all the judicial matters in the empire could be decided and unified. In the same year the Sen¬ ate was established by the Imperial Decree, which clearly stated that in future all import¬ ant legislative bills be brought by the Cabinet and discussed before the Senate. The changes placed the Japanese government on the same organization as Europe and America — under the three branches of the Executive, Legisla¬ tive and Judicial. This might be called the first step in the central government to pave the way for constitutionalism in the future.

Now, let us turn to the reorganization of provincial affairs. In 1879, the law was passed in the Senate establishing a Provincial Assem¬ bly in all the provinces of the empire. To this Assembly all the taxpayers send their rep¬ resentatives by election, and the governors of the provinces bring the annual estimates, which are discussed and voted upon by its members. Here we find again a system of self-government in local affairs, like that in Europe and America.

As soon as the people acquired the right to discuss and vote upon the provincial ex¬ penditures, they naturally desired to have the Parliament opened, where they might discuss and vote upon the national expenditures, in the same way as in the Provincial Assembly. This was urgently demanded by the political lead¬ ers outside of the government, as the only means to interest the people in the welfare of the country, and they still further insisted that this was the principle of the imperial oath of 1868. The public speeches and newspaper dis¬ cussions on the question intensified the demands of the people, which had grown so strong as to compel the government to adopt a policy to open the Parliament much sooner than had been intended, and the famous Imperial Proc¬ lamation of 1881 was issued, by which the em¬ peror declared a first Parliament to be opened

in 1890. Thereupon the emperor appointed Marquis Ito to go abroad on a mission to study the constitutions of Europe and entrusted him with the important work of drawing up the draft of a constitution. In 1884, after four years of close investigation of the European constitutions, he returned to Japan, and soon the committee was appointed to prepare the draft under the guidance of Marquis Ito. This committee consisted of the late Viscount Inouye, Marquis Ito and the present writer.

During the five years from 1884 and 1885, Marquis Ito had personally directed the work of the committee and drawn up the draft, which was submitted to the emperor for his approval. In the spring of 1888 the Emperor organized the Privy Council, and opened the meetings to deliberate upon the draft of the Constitution. The first meeting was held in May, and con¬ tinued until January 1889, and was presided over by His Imperial Majesty in person, who attended every session of the council. After a close deliberation of nine months, the Con¬ stitution was promulgated by the Emperor in person 11 Feb. 1889, with solemn and gorgeous ceremony, in the throne room of the Imperial Palace, attended by the imperial families, min¬ isters of state, privy councillors, foreign dip¬ lomatic corps, all high officials, and governors and representatives of

provinces, and its proc¬ lamation was followed by national rejoicings and festivities.

Thus the movement for constitutional gov¬ ernment in Japan began at first with the im¬ perial oath of 1868, and was continued in re¬ modelling a political mechanism for a long duration of 23 years, and finally completed by separating the government into the three branches of Executive, Legislative and Judi¬ ciary, which are acknowledged principles of constitutional government in Europe and America.

But there is an important difference between the constitution of the Western nations and that of Japan. The constitutions of England and the continent of Europe are really the out¬ come of a popular uprising against the tyranny of rulers; in other words, constitutional gov¬ ernment was demanded and established as the natural right of the people. Consequently even the constitutions of monarchial Europe were drawn up in such a way as to put the greatest stress and importance upon the popular right, and at the same time the power of the sov¬ ereign was curtailed as much as possible. The constitutional history of Europe and America is a protest against the encroachment of the sovereign upon popular rights; but the Japan¬ ese Constitution emanated from the emperor — fountain of power — and not from the popular right, as clearly stated in the imperial oath. Before the people ever dreamed of a popular right or a Parliament, the emperor had al¬ ready marked out the policy of constitutional government in future, because his ardent de¬ sire was to elevate his country so as to enable it to take rank among the civilized nations of the West; and this is not only his wish, but is in strict accordance with a national policy be¬ queathed by his imperial ancestors.

Following this national policy, the Consti¬ tution was drawn up with strict adherence to, and in preservation of, the traditional history of Japan and the fundamental principle of the

imperial government for 2,500 years. However, the form of the Japanese Constitution is prac¬ tically the same as those of Europe and Amer¬ ica ; but with this difference, that the texts of the Japanese Constitution contain only the fundamental principle of state; that is to say, the prerogative of emperor, rights and du¬ ties of people, powers of Parliament, powers and duties of ministers of state and privy councillors, and judiciary and finance. All these are embodied only in the 76 articles of the Constitution.

Here we naturally meet a question — how can the national affairs be administered under only 76 articles? When, however, we examine the Japanese Constitution minutely, we find that it was drawn up so as to separate as many articles as relate to <(Rules and Proceedings of

Parliament,® <(The Laws of the Election of Members of Parliament,® and ((The National Budget,® and these are embodied in the sup¬ plementary laws of the Constitution, and en¬ acted at the same time. Why was such a sepa¬ ration necessary? Because when a first Parlia¬ ment is opened, the government as well as the members, in discussing national affairs, might find it necessary to make some changes in the articles therein. If such a change affect the text in the Constitution, it might afford a good opportunity for some unscrupulous politician to try to change the fundamental principle, and even if he failed in his attempt, it could cer¬ tainly lessen the weight of the Constitution, but if these articles are separated from the consti¬ tutional text, then they can be easily changed and amended so as to meet any need.

This is particularly so in regard to ((The Laws of the Election of Members to the Parlia¬ ment,® because the qualifications of members and many details connected with the election must be modified from time to time so as to meet the future requirements of the progress of people and the change of national conditions ; as was done in 1900 when the law was modified to meet the requirements in regard to the quali¬ fications of electors and candidates.

The Japanese Constitution is divided into seven chapters, comprehending 76 articles:

Chapter I relates to the Emperor; Chapter

to the Rights and Duties of the Subjects; Chapter III to the Imperial Parliament; Chap¬ ter IV to the Minister of State and Privy Coun¬ cil ; Chapter V to the Judicature; Chapter VI to the Finances; Chapter VII to the Supple¬ mentary Rules.

Chapter I relates to the imperial sovereignty. The present emperor of Japan is the direct descendant of the first Emperor Gimmu, who, after having conquered all the tribes, became the sole ruler of the nation in the year 660 b c During a period of more than 25 centuries, one unbroken line of emperors has succeeded to the imperial power, a unique exception in the his¬ tory of monarchies. This fact was strongly emphasized in Article I by stating that <(the Em¬ pire of Japan shall be reigned over and governed by a line of emperors unbroken for ages eter¬ nal.®

Under this chapter the royal prerogatives ai e summarized as concisely as possible in a few articles, yet conceding all the ancient rights and powers of the emperor which had been so long in the hands of the Japanese sovereign. In regard to the royal prerogative, European

countries have enumerated in their constitutions all the rights and powers of the sovereign so fully that they have greatly handicapped the royal will; but the emperor of Japan, so long as he does not interfere with the Constitution, can exercise his ancient right to the full. Ac¬ cording to the Constitution, the three powers of state, . the Legislative, Executive and Judi¬ cial, are invested in the person of the emperor, who is the life and centre of the whole political mechanism. Japan, by the method she pursues in connection with her sovereign, gets rid of the idea once prevalent in the 18th century, that legislative, executive and judicial powers should be independent of one another.

Chapter II deals with the rights and duties of the Japanese subjects in conformity with European system. When feudalism held sway in Japan, the people were divided into four dis¬ tinct classes : the military, the farming, the arti¬ san and the merchant. Civil and political rights were enjoyed only by the military, but at the imperial restoration, in 1868, class distinction in politics was abolished; and by the new Consti¬ tution civil preference has likewise been put aside. Each Japanese subject, therefore, in his political and civil rights, is now on an equal footing with his neighbor. Moreover, he has acquired the freedom of speech and writing to¬ gether with that of publication, and the privi¬ lege of holding and attending public meetings and forming associations; liberty to choose a place of residence ; and, finally, he is granted the freedom of religious belief and worship. Nor can a Japanese be arrested, detained, tried or punished except according to law ; nor can a dwelling be entered or searched without a mag¬ istrate's warrant. The right of property and the privacy of correspondence are considered inviolable except by a provision of law. Each subject has an equal eligibility for civil or mili¬ tary appointments, and for any other public office; and no preference is given to family or order. The right of petition, which in an early period of their constitutionalism was so much sought after by the Anglo-Saxons, and won at last after fierce opposition, was granted to Jap¬ anese subjects as a free gift of the emperor.

In Chapter III the organization of Parlia¬ ment is divided into, first, the House of Peers, and, second, the House of Representatives. The organization of the two Houses is not men¬ tioned in the Constitution, but is leit to ordi¬ nary laws, in order to meet the requirements of time, and to be modified accordingly. Qualifi¬ cation and the electorate, too, must vary with social and political progress ; but the Constitu¬ tion itself cannot be changed like ordinary laws.

The parliamentary organization greatly re¬ sembles that of England, but its power is more limited. If we compare the Japanese Parlia¬ ment with that of England and with the Con¬ gress of the United States, we see a greater resemblance to the American- Congress than to the English Parliament; for the latter has al¬ most the sole right of sovereignty and can well- nigh act as it pleases, and even change the Con¬ stitution itself; while the former must obey the provisions of the Constitution, and can do nothing outside of the power already sanctioned thereby. There is, however, a striking differ¬ ence between the. Japanese and the American constitutions, for in the United States the Con¬ stitution proceeds from the people; in Japan

from the emperor. Therefore the Japanese Parliament may be styled a non-sovereign, leg- istro-financial assembly, for it is convened by the emperor to deliberate upon questions of law and the national budget. If we compare the constitutions of three countries, namely, England, the United States and Japan, we have a marked dissimilarity : in England the sov¬ ereign power rests with Parliament; in the United States with the people; and in Japan with the emperor. Here we have an excellent specimen of three constitutional forms of gov¬ ernment. The first we may call a constitu¬ tional parliamentary government, the second a constitutional democracy and the third a con¬ stitutional monarchy.

The Japanese Parliament has many powers, which are enumerated in the Constitution, but if we take the more important ones, they are four in number. The first is to deliberate~upon and discuss points of law brought either by the government or by its own members; the second, to examine and vote upon the national budget; the third, to receive petitions from the people, and to question the government upon any matter relating thereto; and the fourth, to present an address to the emperor upon grave questions of national affairs, or to report to him upon the condition of ministerial confi¬ dence.

Chapter IV relates to t-he ministers of state and privy councillors. There is, possibly, no question of constitutional law further from so¬ lution than that dealing with the responsibility of ministers — and to what extent their respon¬ sibility reaches, and to whom the ministers are really responsible.

In almost every country governed by a con¬ stitution it is acknowledged by custom or usage that the ministers are responsible to the Parlia¬ ment for the management of national affairs, and by this means the Parliament has already gained the whole power of sovereignty, or is endeavoring to gain it at -the expense of minis¬ terial stability.

From this article we infer that the Japanese ministers are responsible only to the emperor — not to the Parliament — for the management of national

affairs ; and ministerial responsibility arises simply from the advice they have given to their sovereign as councillors. But when we examine their position- toward the Parliament from a practical point of view, we find the ministers with a twofold responsibility, — one, direct, to the emperor, and the other, indirect, to the Parliament. Notwithstanding the fact that the ministers of state are appointed by the sovereign personally, and their official posi¬ tion is entirely dependent upon the royal pleas¬ ure, Parliament, by means of an address to the emperor, controls the conduct of ministers in regard to national policies. This indirect re¬ sponsibility comes from the position of the ministers toward the Parliament in relation to questions of law and the national budget.

The Privy Council is the supreme delibera¬ tive body attached to the sovereign, whom it advises whenever it is consulted upon important questions of national policy. Its function is, first, to decide disputes arising from the inter¬ pretation of the Constitution, or the quasi¬ constitutional laws, such as the Law of the Houses, the Election Law, the Law of Finance, and the like, or disputes in regard to the budget

or other financial measures; and, second, to deliberate upon amendments to the Constitu¬ tion, or amendments to the quasi-constitutional laws. Thus the Constitution creates the two media in the system of government through which the national affairs are managed: the one, the ministers of state, who guide the na¬ tional policy and transact all the administrations of government ; and the other, the Privy Coun¬ cil, which advises the sovereign whenever he consults with that body.

We now come to Chapter V. According to the system which prevailed in Japan during the time of feudalism, the Department of Justice was under the control of the state, and judges were dependent upon the Minister of Justice. But as the influence of the military class under the feudal system increased, all the political powers passed into their hands, and consequently judi¬ cial power was under the guidance of the chief of police, and so continued till the time of the imperial restoration in 1868. Immediately after, however, the judicial authority was centred in the emperor. Thus the Japanese fully recog¬ nized the legal maxim that the sovereign is the fountain of justice, and that all judgments should be pronounced in his name; and this recognition is clearly stated in Article 57 of the Constitution, which says that ((the judica¬ ture shall be exercised by the courts of law, according to law in the name of the Emperor.®

The judicial organization of Japan is much the same as that of the Western nations, for the court is divided into the following classes, namely: first, the District Court; second, the Provincial Court; third, th'e Court of Appeals; and fourth, the Court of Cassation. The judges are appointed by the emperor ; but he can select only those who possess the proper qualifica¬ tions according to the provisions- of law. In order that a trial may be conducted with justice and impartiality, the judges are appointed for life, independent of dismissal either by the em¬ peror or by the Parliament, and they can 'be dis¬ charged from their office only bv a sentence passed by the criminal court, or upon the dis¬ ciplinary trial, whose rules and proceedings are to be decided by law.

Chapter VI deals with finance. The Con¬ stitution attaches great importance to financial affairs, for it has made many improvements on European systems which have been the result of the keen observation of the most practical financiers. For instance, the national budget is first presented to the House of Representatives in a form similar to that of most constitutional countries in Europe; but the House of Peers has the same right to examine it and vote upon it as the Lower House ; and by these means, while giving the Upper House more power than a mere adoption or rejection of the budget in banc, it restricts the absolute power qf the House of Representatives over the annual bud¬ get. In this respect, the Japanese Constitution more resembles that of the United States than that of Great Britain. A careful investigation of the English parliamentary control over the national budget has shown that there was a time when that Constitution allowed the same right to the House of Lords as to the House of Commons ; but in the course of years the latter gradually gained a full sway over the question of national finance. Yet since the peers pay as

heavy taxes to the treasury as the commons, they should not be deprived of the right to vote on this question. This is one of those anomalies of the English Constitution which can be ex¬ plained only by its peculiar history and tradi¬ tion. Therefore it is unnecessary to follow the example of Great Britain in a new country like Japan, as she has her peculiar history and a different condition of national finance.

Another instance of divergence is that of the expenditure, which, according to the Con¬ stitution, is divided into two classes, the im¬ movable and the movable. In regard to the immovable, Article 67 states that <(those already fixed expenditures, based by the Constitution upon the powers appertaining to the emperor, and such expenditures as may have arisen by the effect of law, or that appertain to the legal obligations of the government, shall be neither rejected or reduced by the Imperial Parlia¬ ment without the concurrence of the govern¬ ment.® Under this head are included the civil list, ordinary expenses required by the organi¬ zation of

different branches of the administra¬ tion, and by that of the army and navy, the salaries of all civil and military officers, and outlays that may be required in consequence of treaties concluded with foreign nations ; the expense of the House of Parliament, annual and other miscellaneous allowances to the members, government pensions and annuities, the interest on the national debt, redemption of the same, and other outlays of a like nature. These expenditures are fixed by the Constitu- ■ tion, which, being the highest and the funda¬ mental law of the country, cannot be changed by any process of ordinary legislation. Thus all those expenditures which are necessary for the existence and continuance of the national government are secure from reduction or rejec¬ tion by either House. This provision may be compared with those regulations relating to the English Consolidated Fund; and a similar pro¬ tective clause has recently been made in several German states, namely, Brunswick, Oldenberg, Hanover and Saxe-Meiningen.

The movable expenditures, consisting of all those items exclusive of the immovable ex¬ penditures which are either casual or temporary in their nature, -are annually brought before the Parliament for discussion and approval.

Our last chapter is devoted to the supple¬ mentary rules, and has special reference to the amendment of the Constitution, which can be made only by the emperor.

By the adoption of the constitutional gov¬ ernment, Japan has shown to the whole world that she is following in the steps of the civil¬ ized nations, and the record of the last 18 years of her Parliament has shown to Europe and America that Japan has mastered the most intricate mechanism of constitutional govern¬ ment. And again by adopting the constitutional government, Japan not only entered into the family of civilized nations, but has shown to the world that the constitutional government is not monopolized by the Caucasian race. More¬ over, Japan by her earnest study of 19th cen¬ tury science, by her keen appreciation of the fruit of civilization, and bv her strong percep¬ tion of national responsibility has entered into the arena of constitutional government and mastered thoroughly the same principle ac-

JAPAN — FOREIGN RELATIONS (8)

knowledged in the civilized nations of Europe and America.

Viscount Kentaro Kaneko, Privy Councillor, Tokio.

_ 8. FOREIGN RELATIONS. The first

foreign relations of Japan were, as might be expected from the geographical position of the islands, with the peninsula of Korea. The dividing strait with the islands of Iki and Tsu¬ shima situated, like stepping stones, at conven¬ ient distances, cannot have been very difficult to cross even in primitive boats. We accord¬ ingly notice that there existed from the earliest times close relations between these two coun¬ tries, and in the beginning of the Christian era Japan was exercising a sort of protection over the kingdom of Nimana. The kings of Silla, on the other hand, had so much influence over the tribes in the south of Japan as to instigate them to revolt against the central government. Continuous troubles caused by 'them induced the Empress Jingo to set out on an expedition to Korea. This invasion, however, was so unex¬ pected that when the Japanese army landed on the coast of Silla, 200 a.d., the king asked for peace without offering the least resistance. The kings of Kulei and Paikchyoi soon followed his example, and the three kingdoms of Korea be¬ came vassal states of Japan. They promised to pay annual tributes and the Japanese resident at Nimana was entrusted with their super¬ vision. They, however, very often failed to keep their promise, and had to be as often chastised. They, moreover, waged frequent wars against one another, and Japan had always to interfere i'n the interest of the weaker state. Many residents, too, taking advantage of the great distance from home, attempted to make themselves independent, and armies had to be sent to punish them. Thus the dominion over Korea was the cause of endless trouble to Japan.

In 562 Silla conquered Nimana and did away with the Japanese government which had existed there for about five centuries. Silla grew further in power, and allying herself with the new risen Tang rulers of China conquered Paikchyoi in 662, and Kulei in 668. Japan's attempt to check the progress of the allies was of no avail and her influence in the peninsula came to an end.

The intercourse with Korea, however, was not wholly stopped. Silla sent embassies, al¬ though with frequent interruptions and often in hostile attitude, and when the new kingdom of Pohai arose in the 8th century, her embassies came very often, so that 'there used to be inter¬ preters for their language in Echizen, and those for that of Silla in Tsushima. When in the 10th century Silla was overthrown and the later kingdom of Kulei arose, the official rela¬ tions with Japan were stopped, but commerce went on as before.

The intercourse with Korea was highly bene¬ ficial to Japan. Korean weavers, embroiderers, potters, blacksmiths, shipwrights and other arti¬ sans were encouraged to establish their indus¬ tries in Japan. Physicians, astronomers and painters vvere also invited. The study of Chinese literature was introduced by two Korean scholars, Achiki and Wani, in the latter part

of the 3d century and thus the way was opened for the adoption of Chinese characters. In 552 the king of Paikchyoi presented to the

emperor of Japan an image of Buddha and a a copy of the sutras. Notwithstanding the strong opposition on the part of many influ¬ ential adherents of the national worship, Bud¬ dhism gained ground steadily. In the train of the new religion came priests, temple architects, sculptors, painters, musicians, etc. These, to¬ gether with Korean emigrants, who settled in large numbers in different parts of Japan, helped to give a great impulse to the progress of arts and industries.

The Japanese seem to have come into con¬ tact with the Chinese for the first time in Korea, where numbers took refuge from the terrors of constant wars in their own country. Later on, some of these, like the Hadas and the Ayas, settled with all their families in Japan.

In those times merchants from different parts of Japan were accustomed to go to China via Korea. In the beginning of the 4th century the court sent an envoy to Wu with the object of engaging weavers. Afterward embassies were sent from time to time during the rule of the Sui and the Tang dynasties, the first em¬ bassy to the court of Sui leaving Japan in 606. These embassies were accompanied by a large number of priests and students. These latter came back after a stay of some years full of new ideas. They helped to reorganize the gov¬ ernment and make new laws and introduced improvements in social organizations. They gave a new stimulus to the study of the Chinese classics and thus prepared the way for the growth of the national literature. Two forms of syllabics — kala-kana and hira-kana — were both their inventions. They brought back with them such useful plants as tea, cotton and the orange, and also helped to bring about the progress of arts and industries. In short, they played a very important part in introducing the Chinese civilization.

These embassies had to be stopped at the end of the 9th century, when the power of the Tang emperors became very weak and China was plunged in a frightful state of wars. They were not renewed when the Sui dynasty began to reign, but Japanese priests still continued to visit China, and commerce was even more active than before. The Japanese authorities encouraged the coming of Chinese vessels by opening new ports in the interior, and confer¬ ring special honors upon Chinese merchants.

When the Mongol-Tartars overthrew the Sung emperors-, and the new dynasty of Yuen began to reign, the _ great emperor, Kublai Khan, conceived the idea of annexing Japan, and sent in 1268 an envoy demanding immedi¬ ate submission. This and other embassies were sent back without any reply. The Khan, en¬ raged at this slight, sent a fleet of

450 vessels against the island empire. In 1274 the fleet proceeded to the western coast of Kyushu, after ravaging the islands of Tsushima and Iki. The Japanese army made a stout defense and kept the enemy.from landing for more than a month, when a violent storm destroyed many of the invading vessels and the remnant sailed away secretly by night. This disaster only helped to enrage the Khan still more, and when his envoys were put to death in 1279 by the order of Hojo-Tokimune, he fitted out a large fleet of 4.000 vessels with 100,000 soldiers and 10,000 Korean contingents. All this time Japan was

not idle. The western coast of Kiushu was strongly fortified, and soldiers flocked there from all parts of Japan to defend their country. The immense fleet came in 1281, and began to attack the forts at once. The Japanese suf¬ fered very much from the enemy's guns, but they were able to prevent the landing of the enemy for more than two months. The num¬ ber, however, might have finally told, when for the second time the elements came to Japan's help. On the 16th of August, 1281, a typhoon attacked the coast and shattered the whole fleet of the Mongols ; a few thousand sur¬ vivors took refuge on the small island of Taka- shima, but were either killed or taken prisoners. It is said that out of the whole army only three were able to escape alive. Such was the end of the grand fleet of the mighty Khan. Japan might well ibe proud of her stout resistance, and rejoice over her miraculous deliverance.

After this defeat Yuen emperors relin¬ quished forever the conquest of Japan and even became friendly. Commercial relations were re-established and in the middle of the 14th century we find semi-official Japanese vessels going annually to China — the so-called Tenryuji vessels, the proceeds of whose commerce were to be used for the benefit of the temple.

At the end of the 14th century, Choo-Yuen- Chang, the founder of the Ming dynasty, after expelling the Mongol invaders, sent an em¬ bassy to demand that Japan acknowledge China's sovereignty, but the Japanese govern¬ ment angrily refused to do so. The Chinese emperor, however, thought better of it, and made it a policy of his house never to attempt the conquest of the islands. In the 15th century the Ashikaga shoguns sent frequent embassies to the court of the Ming sovereigns, and com¬ merce was very flourishing. Hakata, Hyogo and Sakai were the chief ports of foreign trade. The most important articles of import were textile fabrics, dye-stuffs and drugs. Cop¬ per coins were brought in large quantities, as Japan did not yet coin her own money.

During the troublesome times which fol¬ lowed the decline of the power of the Yuen dynasty many lost their livings in China and turned pirates. Many Japanese adventurers joined the bands of pirates and plundered the coast towns of China. Their junks were known as ˆBahan® vessels and were held in fear all along the coast. The government was incapable of suppressing them. To exercise closer super¬ vision over the pirates, the Ming government sent passports to be given by the Japanese gov¬ ernment to merchants going to China. Japan's relations with China continued in this state till the time of Hideyoshi.

At the end of the 16th century Hideyoshi, having brought into subjection all the princes of Japan, and put an end to internal disturb¬ ances, conceived the idea of conquering foreign countries. This was a skilful stroke of policy on his part as the newly subjugated princes would forget their own dissatisfaction in the glory of the nation. From his unprecedented successes he also seems to have come to believe in his mission of grand conquests. In 1590 he sent an envoy to Korea to demand her to recognize Japan's suzerainty and also to tell China to do the same. As Korea refused to do either he made immediate preparations

to invade the peninsula. In April 1592 a lanu force of 130,000 soldiers and a fleet manned with 9,000 sailors left from Kyushu. The army landed at Fusan, and was everywhere victori¬ ous. The capital was taken, the king fled and two young princes of the royal blood were taken prisoners. Two Chinese armies sent in succor were defeated one after another. These signal defeats induced -China to sue for peace. After some negotiations seven articles of peace were agreed upon, and a truce was con¬ cluded, the greater part of the Japanese army withdrawing from Korea. In these articles Hideyoshi demanded among other things the cession of one-half of Korea, and as pledges for peace in future, the marriage of a Chinese princess with a Japanese prince of the imperial blood, as also the giving in hostage of the Korean Prince Royal. The Chinese em¬ peror did not ratify these terms, but thought Hideyoshi could be appeased by making him king of Japan. When in 1596 an envoy came to Japan with the imperial patent to that effect, and its purport was made known to Hideyoshi, the latter became so enraged as to throw the document on the ground and summarily dismiss the envoy. Renewal of the war was at once declared and in February of the following year the Japanese forces again left for Korea. The second campaign was not very successful at the outset. The Japanese suffered great losses from the combined Chinese and Korean armies. When they began to gain advantages and assert their superiority over the enemy the death of Hideyoshi (13 Sept. 1598) led to the recall of the army.

Iyeyasu, who was intent on promoting the material prosperity of Japan, wished to culti¬ vate friendly relations with China and Korea, and tried to

remove the feeling of enmity by restoring the captives of war. In 1606 Korea sent an embassy and renewed her commerce with Tsushima, but China repulsed the ad¬ vances of Iyeyasu, and forbade her subjects to trade with Japan. Notwithstanding this, all through the Tokugawa period Chinese mer¬ chants came in large numbers to the port of Nagasaki.

Japan was brought to the notice of Eu¬ ropeans for the first time by Marco Polo. His description of Zipangu, immensely rich in gold, made a deep impression on the minds of Eu¬ ropeans, and it is a well-known fact that Colum¬ bus had the discovery of the island in view when he set out on his westward voyage. It was, however, in 1542 that the Europeans first reached Japan. In that year three Portuguese adventurers, Antonio da Mota, Francisco Zeimoto and Antonio Pexoto by name, met a violent storm on their way from Siam to Ningpo, and after drifting for some days on the broad sea arrived at the islands in the south of Japan. According to a trustworthy Japan¬ ese accountf the first arrival of Europeans was*

- *Antonio Galvao, 'Tratado dos descobrimentos antigos e modemos,' etc. Lisbon, 1563.*

t An essay on the introduction of fire-arms by Nampo a learned priest of Kagoshima, who flourished at the be¬ ginning of the 16th century. Femao Mendez Pinto's claim to the discovery of Japan has misled many writers. A manuscript history of the ' Church of Japan, up to 1634, compiled by Tesuit Fathers residing in Japan at the time! now in the Ajuda Library at Lisbon, refute Pinto's claim, and describes the book as written more for amusing one than for telling the truth."

^ | anegashima off the coast of Satsuma in I040. but the wbig ship with a crew of more than one hundred men of strange forms and unintelligible language" seems to have been other than the junk of the three adventurers.

I his ship seems to have come after the dis¬ covery was made known by the adventurers. The Portuguese commerce once opened grew in importance very rapidly. Already in 1546, we find no less than three Portuguese vessels trading in the ports of Satsuma at the same time.

The Jesuit missionaries helped to bring about further growth of commerce. In 1547 a certain \ajiro of Kagoshima, who having committed a homicide took refuge in a temple and became a bonze, was taken to Malacca in a Portuguese vessel. There he met Francis Xavier, who was one of the first mem¬ bers of the new order of Jesuits, founded in 1540, and had been*

engaged since 1542 in the conversion of the East. Following Xavier's ad¬ vice, Yajiro went to Goa and entered the Jesuit College of Saint Paul, March 1548. He was baptized a short time afterward, and was henceforth known as Paul of the Holy Faith. In 1549 Xavier left India taking with him Paul and his two servants, and two Jesuits — Father Cosmo de Torres and Brother Juan Fernandez, — and arrived at Kagoshima on the 15th of August of the same year. After preaching about a year in Satsuma, Xavier was obliged to leave on account of the violent opposition of the Buddhist priests. He went to Hirado — Firando, as the Europeans used to call it — and thence to Yamaguchi. Xavier also visited Mikado, the capital, but, finding it in a state of great confusion consequent to the wars, he gave up the idea of preaching there and returned to Yamaguchi. In November 1551 he left for India from the port of Hiji in Bungo. His stay in Japan was a little over two years and he made only about 700 converts, but he con¬ ceived such a good opinion of the convertibility of the people, that he wrote to Rome strongly recommending the sending of more members of the order. In order to facilitate the voyage, he proposed that the viceroy of India or some rich merchants should be induced to send regularly trading vessels laden with pepper and European goods, which would sell very profitably. He urged that they must catch ((every one by his own bait." Xavier's suggestions were acted upon. Beginning with three in 1552, Jesuit mission¬ aries were sent from time to time, and encour¬ agement of the Japanese trade resulted in its rapid growth.

The Portuguese vessels first visited the ports of Satsuma and Bungo. Xavier induced these vessels to come to Hirado when he was ordered to leave Satsuma, and so long as Christianity was favored the port remained a flourishing centre of foreign trade. As, how¬ ever, the Prince of Hirado acceded to the de¬ mand of the Buddhist priests and became un¬ friendly to the missionaries, the Portuguese captains began to visit other ports after 1562. In 1570 they entered the port of Nagasaki for the first time, and as the 'harbor was very con¬

- *The history of the Church of Japan points out that the name Angero, which appears in most European books, is a corrupted form of Yajiro, who as a bonze adopted the name of Ansei.*

*venient and the Prince friendly to the Chris¬ tians it was made the port for Portuguese com¬ merce. A few years later the Prince of Omura presented Nagasaki to the Church. The Jesuits made it the headquarters of their mission, and many churches and convents were built. The Portuguese settled there i*n large numbers, and JˆPanese merchants flocked from all parts of the country. Nagasaki, which was a small fish¬ ing village, soon became a very flourishing com¬ mercial town. After the conquest of Kyushu, Hideyoshi confiscated the territory and ap¬ pointed a Bugyo to*

look after the government of this important town. At that time there were 23 sTeeˆ-s and the hills had to be cut and the sea filled up, to make room for enlarging the city.

In 1557 the Portuguese were allowed by the Chinese authorities to establish a commercial settlement in Macao. The Portuguese trade with Japan was carried on from that port and the ships, leaving it in the end of June or early in July, reached Nagasaki usually in about 20 days. In leaving Japan they had to sail by the north¬ east monsoon, which continued to blow from October to March, so that although these ships used to sail in October, they had to stay in port for two or three months. This was the busiest season there. The chief articles of import were raw silk, cotton goods, silk and woolen stuffs from Europe, India and China, leather and glass wares of Europe, and spices of the Southern Islands. In return, the Portuguese merchants carried gold, silver and iron, rice, flour, ham and duied fish ; lacquer wares, screens and arms were also exported. The trade was very lucrative and Macao owed its prosperity almost entirely to Japanese commerce.

In the meantime, missionaries were making steady progress. Many princes of Kyushu em¬ braced Christianity and under the patronage of Nobunaga, Christianity got strong foothold in central Japan. In 1582 the Christian Princes of Bungo, Arima and Omura at the suggestion of Father Valignani sent an embassy to Spain and Rome. Before this the Prince of Bungo sent an envoy to the viceroy of India in the vessel by which Xavier returned to Goa, and after¬ ward courtesies were exchanged between them The Prince of Hirado also entered into com¬ munication with the Viceroy. But this was the first embassy to Europe. The embassy con¬ sisted of two young men of about 16 years of age, relatives of the Princes, and two Samurais, a little older, with some Japanese and foreign Jesuits. They left Nagasaki in February 1582, and stopping on the way at Macao and Goa, ar¬ rived at Lisbon in August 1584. Thence the embassy went to Madrid and were received in audience by Philip II November 1584. They then crossed the Mediterranean from Alicante to Leghorn and went to Rome via Pisa and Flor¬ ence. On 23 March 1585, they made a public entry into the city and were received in a pub¬ lic consistory by Gregory XIII. The Pope died shortly after, so that the embassy had to wait for the dispatches till Sixtus V was elected Pope. They left Rome in the beginning of June, and after visiting Bologna, Ferrara, Venice, Mantova, Milan and Genoa, where they were very cordially received by the princes and the doges, crossed the sea to Barcelona and thence went through Spain and Portugal to Lis-

*bon. They set sail from the latter port in April 1586, and arrived at Nagasaki in July 1590.**

In Europe the embassy was a great success ; the work of the Jesuits in Japan was highly appreciated and among other things they got the exclusive right of evangelizing the country. But on arriving in Japan they were greatly dis¬ appointed. The Prince of Bungo was already dead, and his successor was neither so powerful nor so zealous for the interest of Christianity. The Prince of Omura was also dead. Father Valignani, who accompanied the embassy from Goa as the viceroy's ambassador, was granted an audience by Hideyoshi, but with the express condition that there would be no. talk on re¬ ligion and in his answer to the viceroy Hide¬ yoshi stated his reasons for expelling the Jesuits and prohibiting Christianity. The edict, how¬ ever, was not strictly enforced. In 1592 there were altogether 125 Jesuits — 40 fathers and 85 brothers — and 166 native catechists in 20 houses and residences, one college and one seminary. The number of • the Christians steadily increased by the combined efforts of these workers.

By this time there were many missionaries well versed in the Japanese language. Many of these devoted themselves to the translation of religious works. As Valignani brought a quantity of European type with him many of these, like (Doutrina Crista (Amakusa 1592), (Contemptus Mundi* (Amakusa 1596), etc., were printed in Romanized Japanese. They also printed*

In the 16th century the Philippine Islands were frequented by Japanese pirates, of whom mention has already been made. In 1574, only four years after Legaspi took possession of the city, a Japanese corsair attacked Manila at the head of 600 men and was about to take it, when relief arrived and obliged him to re¬ tire. Being re-enforced by the pirate Limahon, to whose famous band he belonged, the corsair returned to the attack some days later, but was again repulsed, and finally left the islands. In 1581 another band of Japanese pirates was driven out of Cagayan after a bloody fight with the Spaniards. But it was in 1584 that we first find mention of the coming of the Spaniards to Japan. In August of that year a ship from Manila bound for Macao entered the port of Hirado by the captain's almost in¬ credible ignorance of the seas. The Prince of Hirado seized the opportunity to send a letter to the governor, asking him to send a ship with missionaries every year. The vessel left for Macao in October, and the desire of the Prince was also made known to the Spanish government, but we hear no more of the affair. In the spring of 1592, Hideyoshi sent an envoy

- *Many documents relating to this embassy, among which are some*

letters of the ambassadors in Japanese, are still extant in the Vatican archives, and the State archives of Rome, Florence, Venice, Mantova, Modena, Milan and Genoa. The more interesting of these have been published: Berchet, G. 'Le antiche ambasciate Giapponesi in Italia,' (Venice 1877), and Boncompagni Ludovisi, 'Le prime due ambasciate dei Giapponesi a Roma' (Rome 1904).

to the governor of the Philippine Islands de¬ manding of him that he recognize the. sov¬ ereignty of Japan, and threatening him with an invasion in case he hesitated to do so at once. The embassy with Harada-Magosichiro at its head arrived at Manila 29 May. Magosichiro was well known in the city which he had previ¬ ously visited as a merchant. At that time the number of the Spanish soldiers in Manila was small and wholly inadequate to defend the place. As it was rumored that the warlike preparations for the invasion of Korea then in progress in Japan were really intended for the islands, the Philippine government thought it better to dis¬ simulate and gain time. Pretending that the low birth of the envoy made the embassy sus¬ picious, and that they could not understand the letter as there was no one to interpret it, the governor, Gomez Perez das Marinas, sent Fray Juan Cobos with a letter and some presents to Hideyoshi. At the same time he wrote, urgent letters to Mexico and Spain informing the king and the viceroy of the situation, and ask¬ ing for an immediate re-enforcement. Father Cobos arrived in safety at Nagasaki, and saw Hideyoshi at his headquarters at Nagoya in the province of Hizen. He left with a letter of Hideyoshi confirming the first, but his ship was wrecked off Formosa, and only the ship of the second Japanese envoy, Harada-Kiyemon, reached Manila in the end of May 1593. Mak¬ ing the loss of Hideyoshi's letter another pre¬ text the governor sent a second embassy. Fray Pedro Baptista saw Hideyoshi at Nagoya and sent his answer to Manila by one of his suite, he himself remaining as hostage with other Franciscans of the embassy. A council of chief officials at Manila which met on re¬ ceiving this letter, 24 April 1594, was of the opinion that a downright refusal to submit would only serve to irritate Hide¬ yoshi and precipitate his invasion, and decided to send a letter expressing their willingness to continue friendly relations with Japan and promising to answer more particularly on re¬ ceiving instructions from Madrid. By this time Hideyoshi must have become aware of the du¬ plicity of the Philippine government, but he was then so deeply engaged in the Korean war that the idea of invading the islands, if he ever really entertained it, had to be given up for the moment. In 1596 a richly laden Spanish galleon called San Felipe encountered a violent storm on her way from Cavite to Acapulco and took refuge in a port of Tosa. Hideyoshi declared the ship forfeited with all its goods. It is said that the captain, wishing to impress the Japanese with the greatness of Spain, pointed out on a map of the world all*

the Spanish possessions, and when asked how all those territories were obtained, explained that it was by sending missionaries first, and then soldiers to co-operate with the converts in subduing them. This alarmed the authorities, confirming them in the suspicions they already entertained. Hideyoshi immediatelv ordered Father Baptista with five Franciscans and 20 Japanese Christians to be put to death on the charge of having preached Christianity con-

- *A Spanish translation of the letter still preserved in the Archivo de Indias, at Seville, proves that this was a mere pretext. The translation, probably made by some Chinese, almost exactly corresponds with a Japanese draft in existence. Many other documents relating to this affair are preserved in the same archives.*

trary to his edict. The new governor, Don Francisco Tello, demanded restitution of the forfeited goods and satisfaction for the execu¬ tion of the ambassador and his suite 1597. Hideyoshi answered by simply stating that a ship wrecked on the Japanese coast belonged by right to him, and that the priests were exe¬ cuted because they disregarded the laws of the country and were laying plans to get possession of Japan. Don Francisco did not make any further protest. The commerce with Japan to which the Spanish settlement owed its supply of provisions, iron, nails and other material for shipbuilding, was so important that the Philip¬ pine government was ready to overlook any slight rather than lose it.

When Iyeyasu succeeded to the government he adopted an entirely different attitude to¬ ward the islands, as he did toward Korea. He asked a Franciscan father in Japan to com¬ municate to the governor his desire to maintain friendly relations with the islands. In 1602 he sent an envoy to Manila and the governor, Don Pedro de Acuna, cordially responded. In com¬ pliance with the request of Iyeyasu he sent to the port of Uraga, a small vessel, which failed to reach that port, but a few years later Spanish ships began to call at Uraga regularly. Iyeyasu also wished to establish commercial relations with Mexico. He repeatedly asked the governor to make his desire known to the viceroy. When in 1609 the galleon San Francisco was wrecked on the coast of Kazusa and Don Rodrigo de Vivero, ex-governor of the Philippine Islands, who was one of the passengers, visited Iyeyasu, he mentioned his desire, Don Rodrigo, seeing an opportunity for the Christianization of the land and the expulsion of the Dutch who had established a factory at Hirado, promised to use his influence to bring about the desired rela¬ tions and consented to make the

voyage to Mexico in a Japanese ship. The ship registered 120 tons, and had been built some years before by William Adams, an English pilot who had been in Japan since 1600. Fray Alonzo Munoz, a Franciscan father, left in the same vessel with the letters of Iyeyasu to the king of Spain and his minister, the Duke of Lerma. The San Buenaventura set sail from Uraga in August 1610, and reached Matanchel in October. This was the first Japanese ship to cross the Pacific Ocean.

In April 1600, a Dutch ship caller the Liefde arrived at Bungo. It was one of the five ships that left Texel, June 1598, with the intention of reaching the Molucca Islands by way of the Strait of Magellan. The crew, of whom only 18 survived, remained in Japan. In 1605 the captain, Tacob Quackrnack, sailed from Hirado in a junk of the Prince with a letter of Iyeyasu and a passport for the Dutch vessels that would come to Japan. In 1608 the directors of the Dutch East India Company, hearing that a truce for 12 years, was about to be concluded between Holland and Spain on the basis of maintaining the status quo, sent a dispatch boat to the commander of the fleet in the East instructing him to make treaties with as many native princes of the East as possible, and especially with Japan. Admiral Verhoeven accordingly ordered two ships, the Roo'de Leeuw met Pijlen and the Griff oen, to Japan. They arrived at Hirado, 2 July 1609, established a factory there and left 3 October, with a letter to the Stadtholder and some passports from vou 15 — 42

Iyeyasu. After the arrival of the Liefde the Portuguese and the Spaniards tried every .means to induce the government to send the Dutch out of Japan, but Iyeyasu in pursuance of his policy of encouraging foreign commerce, stead¬ ily refused to take such a step.

When Don Rodrigo arrived at Mexico an expedition was about to leave for the discovery of the Isles of Gold and Silver, which were said to be situated near Japan. It wras decided that Sebastian Vizcaino should go first to Japan and thank the government for the courtesies shown to Don Rodrigo and thence set out on the voyage of discovery. Vizcaino left Aca¬ pulco, 22 March 1611, taking with him the Japanese merchants who accompanied Don Rodrigo, and arrived at Uraga, 10 June 1611. He was received by the Shogun and Iyeyasu with great ceremony. With permission of the government he sounded the eastern coast of Japan and then set out from Uraga, 16 Sept. 1612, on the voyage of discovery. After sailing about for many days in the hopeless search for the Gold and Silver Isles the ship suffered so much from the storms that Vizcaino was obliged to enter Uraga again, 7 November. This time he encountered a reception quite dif¬ ferent from the first. The enemies of the Spaniards insinuated that the soundings of the coast were made with a view to the coming in¬ vasion and Vizcaino's silence about the Isles of Gold and Silver was also commented

upon, as a treacherous act. These added to the dislike the authorities had entertained of the overbear¬ ing attitude of Vizcaino. Vizcaino was baffled in all his attempts to get a vessel to take him back to Mexico. He was obliged to accept the proposal of Date-Masamune, a powerful prince in the north of Japan, to take passage in his ship. The ship was to carry an embassy of Masamune to the king of Spain and the Pope, with the object of asking them to send Fran¬ ciscans to teach Christianity in his dominion, for whose voyage Masamune offered to send ships to Mexico every year. The moving spirit of the embassy was Fray Luis Sotelo, who wished to open a field of action for his order. With the same object he had promoted the em¬ bassy of 1610, but there was no news of Father Munoz. He grew impatient and determined to go himself. He was aware of the desire of Masamune to open commerce with Mexico. He saw his opportunity in the embarrassment of Vizcaino, and persuaded Masamune to send Vizcaino and his crew to Mexico in his ship. He himself undertook to go with Hasekura- Rokuemon, a retainer of Masamune, to make a commercial treaty with the court of Spain. The ship set sail from the port of Tsukinoura, 28 Oct. 1613, and arrived at Acapulco, 25 Jan. 1614. Thence the embassy proceeded to Mexico and embarking from Vera Cruz, 10 June, en¬ tered the port of San Lucar on the 5th of October. They were magnificently entertained in Seville, where they took a letter of Masa¬ mune with his presents. The embassy pro-*

- *The letters of Masamune to the city of Seville and the Pope are still kept in the municipal archives of Seville and the Vatican Library respectively. Correspondences, resolu¬ tions, reports and other documents relating to the embassy are abundantly preserved in the municipal archives of Seville and the Archivo de Indias. Documents from the Vatican and the state archives of Venice and Genoa have been published in the words of Berchet and Boncompagni- Ludovisi already referred to. These documents, together with all other materials concerning the embassy are given in the "Dai Nippon Shiryo," Part XII, Vol. XII.*

ceeded to Madrid, and had an audience of the king, 30 Jan. 1615. Taking passage from Barce¬ lona in a ship bound for Genoa the embassy arrived at Rome, 25 Oct. 1615. Pope Paul V, who was impatiently waiting for the arrival of this second embassy from Japan, received them with great honors. He recommended the king of Spain to accede to the desire of Masamune and nominated Sotelo bishop of the north¬ eastern part of Japan. Hasekura was made a noble, and the Samurais of his suite citizens

of Rome. The embassy left Rome, 7 Jan. 1616, visited the Grand Duke of Tuscany on their wray, and retraced their steps from Genoa to Seville. Considering the religious zeal of the king of Spain, this embassy was expected to accomplish its object easily, but it was doomed to share the same fate as that of Father Munoz. Munoz arrived at Madrid at the end of 1611, but his mission proved a failure. Fray Diego de Santa Catalina was sent after long de¬ lay as envoy and taking passage from Acapulco in the ship of Masamune, arrived at Uraga, August 1615, but as the letter of Phillip III said nothing about the commerce, the govern¬ ment refused to accept the presents, and dis¬ missed Fray Diego in disgrace. In default of any other vessel Fray Diego made another voyage in Masamune's ship, contrary to the orders of the viceroy, and arrived in Mexico, March 1617. The failure of Munoz's embassy was mainly due to the strong opposition on the part of the merchants of Manila, who de¬ sired to monopolize the Japanese trade. In the case of Masamune's embassy, another fac¬ tor entered. The Jesuits, fearing that its suc¬ cess would secure to the Franciscans the same advantages that the embassy of 1585 brought to themselves, used their powerful influence to bring about its failure. The persecution of 1614 was made use of to discredit the embassy. Neither the recommendations of the Pope and the municipality of Seville nor the utmost efforts on the part of the embassy wTere of any avail. The embassy had to leave for Mexico in 1617 without having accomplished its mis¬ sion. In the spring of 1618, they embarked at Acapulco in the ship that had been waiting for them since the previous year and sailed for the Philippine Islands. Hasekura returned to Japan in 1620. Sotelo, who was placed under strict vigilance by the authorities, finally suc¬ ceeded. in evading it and embarked for Japan, 1622. He was easily recognized, thrown into prison and put to death, August 1624.

The attempts to establish a regular trade with Mexico ended in failure. But all this time the foreign commerce of Japan kept steadily growing. In 1612 two Dutch ships arrived at Hirado. These were the first ships sent from Amsterdam after receiving the news of the es¬ tablishment of a factory in Japan. The Dutch commerce was now regularly established.

In 1613 another competitor entered the field. The East India Company of London, which had long cherished the idea of trading with Japan, at last sent, in April 1611, Capt. John Saris with the express object of establishing a factory in Japan. Captain Saris arrived at Hiado, 11 June 1613, on board the Clove. Wil¬ liam Adams, whose presence in Japan was known in England, was sent for, and with his help ample privileges were obtained, and a fac¬ tory was established at Hirado.

After the death of Iyeyasu, 1 June 1616, the Shogun adopted a new policy toward the foreigners. He began with ordering the Dutch and the English to

recall their agents at Osaka and Yedo, and to limit their trade to Hirado and Nagasaki. He adopted more severe meas¬ ures toward Christianity, and seeing that the missionaries continued to come from the Philip¬ pine Islands against his repeated orders, he pro¬ hibited the visits of Spanish vessels in 1624. An embassy, which came from Manila in 1623, for promoting friendly relations, was sent back in that year with orders to come no more.

The English and the Dutch, confined to the small market of Hirado, began a sharp compe¬ tition between themselves, and even went so far as to fight with each other in the street. The English suffered very much from this competition, and felt themselves greatly re¬ lieved when a treaty of defense was made be¬ tween the two nations, June 1619. A part of the fleet of defense was stationed at Hirado and used to go out against Spanish ships and Chinese vessels trading with Manila, on pirati¬ cal expeditions. This was the busiest time for the English factory- (July 1620-August 1622). Very soon after the fleet was disbanded, the factory was dissolved as unprofitable, and the staff left for Batavia, 24 Dec. 1623. The re¬ joicing of the Dutch at this event did not last long.

In 1624 the Dutch founded a commercial settlement in Formosa with the consent of China. There they found many Japanese al¬ ready trading with the Chinese. Formosa, then known as Takasago, seems to have been a favor¬ ite rendezvous of Japanese pirate vessels, and since the time of Hideyoshi several attempts had been made to subjugate the island. Such being the case the Japanese vessels that entered the port refused to pay the customs duties levied by the Dutch. Hamada-Yahyoe, captain of a junk, was especially offended at the treat¬ ment he received and took to Japan 16 natives of Sinkan as ambassadors sent to offer the sov¬ ereignty of the island'to the Shogun, 1627. The Shogun received them at the court, and sent them back with presents. Some days before Hamada left Formosa, Pieter Nuyts, governor of Formosa, went to Japan to notify the gov¬ ernment of the occupation of Formosa and to negotiate for the prohibition of Japanese junks going to Formosa. But he was not even re¬ ceived by the Shogun, and returned to Formosa greatly offended. When Hamada arrived there with two junks in April 1628, the governor threw the natives of Sinkan into prison and con¬ fiscated the Shogun's presents. He then took on shore all the arms in the junks and tried to keep the junks till he had consulted the chief factor of Hirado on the steps to be taken. Hamada called on the governor with some com¬ panions and taking him unaware made him prisoner. The Dutch came to the rescue in large numbers but could do nothing lest Nuyts should be killed. After some negotiations Nuyts was released in exchange for five hostages, among whom was his young son. Restitution was made for the damages suffered by the Japanese, and the junks were allowed to leave in company with a Dutch ship which

carried five Japanese hostages, to be exchanged with the Dutch at Nagasaki. On their arrival the gov¬ ernment threw the Dutch hostages and the more

important members of the crew of the Dutch ship into prison, sequestrated the ships at Hirado and put strict watch on the Dutch factory.

*Greatly alarmed at this news the governor- general recalled Pieter Nuyts to Batavia and sent an envoy to Japan to explain the Formosa affair, 1629. But the Japanese government re¬ mained inexorable and insisted on the surrender of the fort Zeelandia in Formosa. The gover- ner-general decided to make Nuyts *the scape¬ goat. When he arrived in 1632 and was deliv¬ ered to the government, other prisoners were released, the Dutch trade was restored and the claim to Formosa was given up. Nuyts himself was released in 1636.*

After strict measures had been adopted to stop the entrance of missionaries, Japanese priests educated abroad were sent. The gov¬ ernment now resorted to a strict supervision upon Japanese junks engaged in foreign trade and the Japanese coming back from abroad, 1633. Finding this still inadequate the govern¬ ment forbade all Japanese junks to go abroad under severe penalty, 1636. This put an end to an active trade with Tonkin, Cochinchina, Cambodia, Siam and most important ˆplaces of the Malay Peninsula, which had continued to grow since the time of Hideyoshi and with whose sovereigns the Tokugawa government used to carry on correspondence. In many of these places there were considerable Japanese settlements; the Japanese soldiers of fortune sometimes played very important roles, like Yamada-Nizayemon in Siam.*

The Portuguese merchants were shut up in an artificial island, Desima, in the harbor of Nagasaki, 1635, and all the descendants of the Europeans in Nagasaki and Hirado were sent away. In December 1637 the peasants of Arima, who had been long groaning under heavy taxes, rose against their oppressors. The Christians of Amakusa joined them. After some delay the government forces arrived. The Christians defended themselves very bravely in the castle of Hara, some 45,000, women and children in¬ clusive, against 120,000 trained soldiers. The siege lasted for more than three months, but the castle was finally taken by a general assault, 12 April 1638, and most of the besieged were put to death.

This revolt made the government even more suspicious of the Christians,

and suspecting that the Portuguese were at the back of the rebels decided to put an end to the Portuguese com¬ merce, which although broken in 1610, when the Prince of Arima attacked the Madre dc Dios in the harbor of Nagasaki as the captain had refused to appear before the authorities and answer the charge of having murdered some Japanese who visited Macao in 1608 in a junk belonging to the Prince, and the ship was acci¬ dentally burned and all the crew perished, was restored in 1611 by Dom Nuno Sotomaior who came as ambassador of the viceroy. Two ves¬ sels which arrived in 1639 were sent back with orders never to return under penalty of death, and when in 1640 an embassy came from Macao, the ambassadors with all their suites excepting 13, mostly blacks, were executed and the ship sunk.

In 1647 an attempt at the renewal of the trade was made by Dom Gonqalo Siqueira de

Souza, who came to Nagasaki as Ambassador from Portugal to announce its independence from Spain and the accession of John IV to the throne, but it proved a failure. Another attempt was made in 1685, when a junk with 12 Japanese was wrecked off Macao, but the cap¬ tain of the vessel that took them to Nagasaki was sent back with strict injunctions to return no more.

The relations with Portugal, however, lasted so long that they have left many indelible traces. In the Japanese language there are numerous words of Portuguese origin, some of which are so perfectly naturalized that their foreign origin does not strike one at once. Such are: boro (bolo, cake), kompeito (confeitos, comfits), pan (pao, bread), hiryuzu (filhos, omelette), koppu (copo, glass), botan (botao, button), batteira (bateira, boat), rasha (raxa, cloth), jiban (gibao, undershirt), birodo (veludo, velvet), kappa (capa, cloak), zambo or zabon. (zamboa, pompoleon), marmero (mar-melo, quince), etc.

When the Portuguese ships were sent away in 1639, the Dutch thought that they had now got the monopoly of the trade, and it was made an occasion of a fete at Batavia. But they were very soon undeceived. In November 1640 they were ordered to demolish the new stone warehouse at Hirado, and the next year they were removed to Nagasaki. They were closely confined in the small island of Desima which they were seldom allowed to leave. There they were allowed to carry on commerce on a limited scale under strict supervision of the authorities. All these measures were taken to prevent the entrance of Christian mission¬ aries. Every conceivable device that might be resorted to by them was carefully provided against. The government succeeded so well that after the execution of some missionaries who came in 1643, only one more attempt is re¬ corded. In 1708 a Jesuit

father, Giovanni Bat¬ tista Sidoti, landed at an island near Satsuma, but was discovered and sent to Nagasaki and thence to Yedo, where he died in prison 1715.

The policy of seclusion was carried out. Be¬ sides the Dutch only the Chinese and Koreans were allowed to trade with Japan, and em¬ bassies were sent from Korea on occasions of the Shoguns' assuming the government.

During the centuries that followed, the only notices Europe had of Japan were through the Dutch. Engelbert Kaempfer (1690-92), Charles Peter Thurberg (1775-76), and Philipp Franz von Siebold (1823-30), all physicians to the factory of Nagasaki, contributed above all others to the knowledge of Japan in Europe. The works of Isaac Titsingh, J. F. van Over-meer Fisscher and G. F. Meijlan, who were members of the factory, gave further informa¬ tion about Japan.

Whatever Japan received of the material civilization of Europe was through the Dutch. Especially after the Shogun Yoshimune (1716— 45) did away with the proscription of Euro¬ pean books, so far as they had nothing to do with Christianity, the study of Dutch books be¬ came very popular. Many scientific books were translated from the Dutch, and great progress was made in mathematics, astronomy, medicine, natural sciences and military arts. The official visits paid from time to time by the directors

of the Dutch factory, usually accompanied by physicians, were opportunities eagerly seized by the savants of Yedo to learn more about Europe and her science. The Dutch scholars came to be leaders in thought and many of them played a very important part in bringing about the new era.

At the end of the 18th century this state of quiet seclusion in Japan was disturbed. The English, who were baffled in their attempt to renew the trade in- 1673, when they sent the ship Return from Formosa, repeatedly visited the Japanese seas after 1791. In 1813 and again in 1814 vessels sent from Batavia by Lieutenant- Governor Raffles tried to get the factory at Nagasaki into English hands, but were thwarted by Director Hendrik Doeff. Before this, the Russians, who had been gradually proceeding southwards from Kamchatka since the begin¬ ning of the 18th century, made several attempts to open intercourse with Japan. In 1792 Lieu¬ tenant Laxman came to Matrsumaye with some Japanese who were

wrecked in the Okhotsk Sea and was directed to Nagasaki for negotiations. In 1804 Count Resanoff accordingly came to Nagasaki, but his mission was a failure. In Oc¬ tober 1813 Captain Rikord was sent back from Hakodate with Golownin who had been con¬ fined in Yeso, since July 1811, with a notice that Japan- desired no commerce. In 1837 the Mor¬ rison, fitted out by an American firm at Macao to return some shipwrecked Japanese, visited the bays of Yedo and Kagoshima, but was driven off. In 1848 Commodore Biddle, who commanded the American fleet in the China Sea, came to the Bay of Yedo with two war¬ ships to ascertain if the Japanese ports would be opened and was sent back with a negative answer. An embassy, which King William III of Holland sent in 1844 with the express object of persuading Japan to open her ports to Euro¬ pean nations, equally failed. When, however, Commodore Perry entered Uraga with a fleet of four ships, 8 July 1853, and delivered' a letter of President Fillmore, asking <(friendship, com¬ merce, a supply of coal and provisions and pro¬ tection for the shipwrecked people,® and re¬ turned for an answer early the next year a treaty was concluded and signed at Kanagawa, 31 March 1854. Japan consented to open the ports of Shimoda and Hakodate to the Ameri¬ can trade.*

In 1858 a new treaty was made with the United States, substituting the port of Yoko¬ hama for Shimoda, and promising to open Nagasaki, Kobe and Niigata or another port on the western coast of Japan. On the basis of these treaties, Japan concluded treaties with Great Britain, Russia, the Netherlands and France (1854-58) and at somewhat later dates with other Powers of Europe.

The opening of the country after so many centuries of isolation could not be effected with¬ out opposition. The Shogun's government was severely criticized for having taken such a weighty step without having first asked the sanction of the emperor. Ii Kamon-no-Kami, Prince of Hikone, was assassinated as being chiefly responsible for the conclusion of the treaties, 24 March 1860. The emperor repeat¬ edly ordered the Shogun to take vigorous measures for the expulsion of foreigners. The Shogun's government tried to explain this state

of affairs to the Powers and requested them to withdraw, but the Powers would not consent to do so. Hostile acts of the Prince of Nagato toward foreign vessels passing the Strait of Simonoseki, and frequent outrages committed by Samurais against European residents caused great trouble to the government. These and other troubles induced the Shogun to resign and restore the power to the emperor 9 Nov. 1867. The government of the emperor now took a measure adapted to the need of the times and ratified the treaties, and the emperor received foreign representatives in audience, March 1867. The expulsion of foreigners was, indeed, a cry raised for

gathering those who were against the Shogun's regime.

Having once given up her policy of seclu¬ sion, Japan exerted herself to the utmost to enter into closer relations with foreign coun¬ tries. When in 1899 the vexatious problem of revision of treaties was finally solved after so many abortive attempts since 1871, the whole country was thrown open to foreigners and all the restrictions hitherto imposed on them were removed. After her co-operation with the Western Powers during the Boxer trouble in China (1900) Japan was fully admitted to the comity of civilized nations.

In recent times Japan was more than once brought to the verge of war with China : in 1874 when a Japanese army was sent to For¬ mosa to punish some aboriginal tribes in the south for having repeatedly murdered the Jap¬ anese subjects .wrecked on their shore, and in 1879 when China objected to Japan's making the .Ryukyu Islands an integral part of the empire by converting them into the prefecture of Okinawa. But the rupture came when China refused to acknowledge the independence of Korea. The war opened with tfie naval en¬ counter off the coast of Yashan, 25 July 1894, and ended in a complete defeat of China. A treaty of peace, was signed at Simonoseki, 17 April 1895. China acknowledged the independ¬ ence of Korea, ceded the Liaotung Peninsula, Formosa and the Pescadores to Japan, and promised to pay a war indemnity.*

. The interference of the three Powers — Rus¬ sia, Germany and France — which obliged Japan to give up the possession of the Liaotung Penin¬ sula, was very much resented by the nation. The exchange of Saghalien for the Kurile Islands in 1875 was always regarded as an act of injustice on the part of Russia. Russia's advance in Manchuria and her growing influ¬ ence in Korea alarmed Japan, and war finally broke out, 8 Feb. 1904. After a succession of brilliant victories, both by land and sea, for Japan, peace was made bv the Treaty of Ports¬ mouth (q.v.), 5 Sept. 1905. That part of Sag¬ halien, south of the 50th parallel of North latitude, was ceded to Japan. Russia promised to withdraw from Manchuria and acknowledged Japan's . special interest in Korea. The new convention between Japan and Korea, 17 Nov. 1905, established Japan's position.

N. Murakami,

Commissioner of Historical Compilation, Im¬ perial University, Tokio.

9. THE SAMURAI. Definition and Ety¬ mology.— Samurai, now domiciled in the dic¬ tionaries of European languages, is a strictly

Japanese term, being derived from a verb — samurau, to attend, to wait upon, to serve. Samurai, therefore, meant originally a person who attended upon another — naturally upon his superior. But the use of the term was con¬ fined to honorable and personal service, and as in the course of time, under the regime of feudalism, class distinctions and different grades of honor were instituted and certain kinds of service, notably the military, became more ex¬ clusive, the term samurai was applied only to those belonging to the military class of the feudal clans. In a wide sense it included the whole of the military nobility, the warrior class ; though in a more usual and restricted sense, it meant the inferior nobility exclusive of the daimyo, much like the English knights bachelors, whom Blackstone defines as ((the most ancient though the lowest order of .knight¬ hood.®

The idea of what the samurai was can, per¬ haps, be better conveyed by comparing him with his compeer in Europe than by a mere etymological explanation. Almost every nation has had at one time or another — especially under the regime of feudalism, but even prior to it — something like the usage of knighting, whether it was done by means of a formal rite or not. Caesar speaks of the institution of soldurii in Aquitaine; Tacitus mentions that of comitati among German tribes ; the Romans had equites aurati; mediaeval Germany had Ritter- schaft; France her chevaliers; in fact con¬ tinental Europe boasted of the existence of Milites medii. It can scarcely escape the most cursory glance that several of these terms bear an etymological relation to the horse, obviously because the knights served on horseback, whereas the common soldiers marched on foot. It is interesting to note, however, that the English word knight has no reference to a horse — its original meaning being the Saxon cniht, signifying pner, servus or attendant, this possessing a significance strangely parallel with samurai. Samurai is, or was, explained as being strictly of Japanese origin; but as is- the case with every word in the Japanese vocabu¬ lary, there is either its equivalent in pure Chinese or a sinified expression for it. In fact, both in literature and formal speech, it was considered more dignified to adopt the sinico form; so that the term Shi (the nearest Chinese equivalent for gentry), or Bushi (fight¬ ing nobility), or Buke (warrior family) came to be used almost as commonly as the pure Japanese original. In contrast to the sinico Bushi may be mentioned its archaic equivalent in purest Japanese. The word mono-nofu or mono-nobe, literally <(article bearer,® i.e., the wearer of arms — more especially the sword, which was the distinguishing article worn by the order. Some derive it from a word mean¬ ing thing-doer, one who acts or does anything, the most important thing of course being fight¬ ing. Still another archaic term is masu-rao, — strong man, and though this was used in con¬ trast to weak woman, and therefore meant simply masculine personality, it was often ap¬ plied in the sense of

samurai. Both masu-rao and mono-nofu are now used almost only in prosody.

History. — As has already been hinted at, the germ of the institution of a separate class comprising the fighting force can be found in

the term samurai. But it took centuries of gradual development for it to assume a narrow, exclusive meaning. Formerly there was no separate class of warriors. Whoever was pos¬ sessed of two brawny arms and two stalwart legs joined an army in times of need, and whoever added to strong limbs the possession of a powerful will and stout heart became a leader. Even after the leadership, gained by personal superiority, became hereditary, the fighting force was not separated from the mass of the population.

The constant warfare of the Middle Ages necessitated division of labor — consequently of social classes, and by the end of the 8th century we notice that the samurai formed a pretty clearly defined order.

About the 9th and 10th centuries the gov¬ ernors of the provinces were not only ap¬ pointed from Kioto, where was the seat of government, but were usually dispatched from among the court nobility, much like the pre¬ fects of the Roman Empire. They served a number of years in the country, feeling like exiles, always yearning to go back to the court and the capital. While such feeling was gen¬ eral there was little danger of local life becom¬ ing strong or turbulent, but as the population grew throughout the empire, and villages de¬ veloped into towns, the service of a prefect changed to one less onerous and fatiguing. The more ambitious shared with Caesar the senti¬ ment that they would rather be first in a mountain village than second in Rome. Such men would willingly stay in their provinces, where they would surround themselves at least with a body-guard and perhaps with an army, particularly if they had danger to fear from any source. They took pains to have ready a certain number of trained fighters for emer¬ gency. Governors who by these and other means gained influence and power in their localities were soon rooted in them, so that when their term of office expired thev either begged for postponement or flatly refused to be moved. Oftener still did it happen that the offspring of the prefects were left behind in the provinces and these were naturally treated with deference by the people. As they and their relatives increased in number, thev came to form a class between the high nobility and the rest of the population. They were naturally possessed of landed estates ; for in spite of the fact that private ownership of land was forbidden by law, as there was little control exercised by the court, the local magnates actually owned large tracts of land in their own names. It was the owners of large manors (shoyen) who were called ((great names® (daimyo), and these

surrounded themselves with armed protectors, to whom the ancient title of mono-nofu , or samurai, was applied. This was a quite common origin of hereditary governorshin, which later developed into feudal relations. It is not to be inferred that this was the chief cause of feudal institutions. The growth of feudalism was so gradual that no definite dates can be assigned to each step of its progress ; but in the 12th century, when Yoritomo inaugurated the regime of feudalism, the samurai order was in full swing of de¬ velopment and continued to flourish during succeeding centuries, until it was abolished in

1871.

JAPAN — THE SAMURAI (9)

We must bear in mind in following the history of the samurai that they never formed a close corporation. The class was kept up by heredity, but was never wholly exclusive. It was recruited from among the peasants, or even from the much despised merchants, pro¬ vided the candidates proved themselves effi¬ cient in any branch of military art. It was also possible for the samurai to adopt promising boys from other classes than their own. While the order could thus be replenished from out¬ side, such of its members as proved unworthy of its privileges could be excluded, — as for instance, by being deprived of their rights of samurai by their lords (daimyo) or by having their lands expropriated. This would leave them without the means to maintain their live¬ lihood, not to speak of their pretensions. Even at present the samurai are recognized under the appellation of shizoku (shi- class) ; but this is only a name, implying neither rights nor duties. In 1871, when they were mediatized, many of them surrendered even their title. Their revenues, which had been given them in so many bushels of rice a year, were commuted into interest-bearing bonds and their peculiar privileges were taken away, to make place for the general conscription whereby the whole nation was, so to say, raised to the rank of the samurai, as far as the right of fighting for the country was concerned. Still the order contained about 400,000 families, or 2,000,000 souls, and in every way formed a formidable power in the empire. Primarily a fighting order, the samurai were political rulers in times of peace. In the four-fold classification of the people, they were at the head, — the rest being the tillers of the soil, the artisans and lastly the merchants.

As an army they comprised the bravest and cheapest defense of the nation; as an economic factor they were the most important land owners ; and considered merely as consumers they created the chief demand for the finer products of manufacture and art; as an intel¬ lectual power they were

scholars in every field of knowledge, whereas the priests, if deeper in their studies, confined themselves to Buddhistic lore; as a moral potency they set the standard for the entire nation, and it is in this last aspect that we shall treat the samurai in this article. The moral teachings of the samurai are contained in an unwritten code of ethics, which, for want of a better name, may be called Bushido.

Bushido — Literally «the way of the war¬ rior,)} — means the principles which should guide the samurai in his dealings with himself and with the rest of the world. It means the noblesse oblige of the fighting order, the Pre¬ cepts of Knighthood. It may be roughly rendered as the moral notions of Japanese chivalry. Very often the term is employed in a broad sense when it includes more than moral precepts, bringing within its compass the technical arts which a samurai was expected to master. Of course these arts were mainly of a martial character, e.g., fencing, jiu jitsu, horsemanship, the use of the spear and of the bow and arrow — later of the gun. As improved methods of warfare were introduced, the tech¬ nical part of Bushido training lost its import¬ ance, except as an efficient mode of physical exercise; but its ethical part is still a spring at*

which the Japanese people drink and refresh their moral existence.

Before proceeding with a resume of its pre¬ cepts, it may be well to dwell more fully upon the fact that Bushido is not a written code of morals. It possesses neither a Bible nor a Koran, and though the writings of Confucius and Mencius furnish it with no mean ethical principles, Bushido is neither Confucianism nor Mencianism. There is no systematic treatise on the principles or precepts of Bushido, and if now and ihen an attempt was made at one, it failed of general acceptance. Like a Volks- lied or proverb, it is the product of many minds that put a word there or changed it here, and which the mass of its followers sanctioned as true to their experience; or— to take a more dignified example, its growth was like that of the Brijtish Constitution, unformulated and un¬ written, but not the less with mighty power to accuse cr excuse man's action. It consists largely of the modus operandi of right conduct and soul discipline. The last expression — soul discipline — is used advisedly, as I hesitate to use freely a more exalted term — spiritual culture. If asked to enumerate the articles of faith and of the ethical doctrines of Christians, one might answer by presenting a copy of the Bible or perhaps the Nicaean creed or a treatise on theology ; but if asked to tabulate the duties of an English gentleman, one would feel the inadequacy of any systematic treatise. The letters of Chesterfield cover but a small frac¬ tion of a gentleman's duties, and Froissart's Chronicles and the Waverley novels do not form a system. This is exactly the case with Bushido. Japanese literature is not altogether wanting in attempts at a more or less orderly presentation of the samurai's duties and privi¬ leges;

but none rose to the rank of a classic and none was adopted as a standard. The samurai belonged to different dans, being re¬ tainers of different lords. Though the daimyo were usually in hostile relations one to another, and though their retainers necessarily shared in these relations, still there was the conscious¬ ness of a common bond, the sense of identity of interests among them. They knew their vocation and interests, as distinct from those of other classes of the community, were the same regarding themselves, irrespective of the differences of the clans in which they served. Bushi wa aimi tagai (((the samurai are the same one with another®). Being so closely allied in their calling and interests, it was only natural that they should come to adopt — even without mutual consultation or joint session — the same rules of conduct, primarily, as I imagine, in their public quasi inter-state, or literally inter-clan relations, and later in their private conduct.

It is almost axiomatic that the ethical ob¬ ligations of any social, exclusive class show wider divergencies than the laws of morality which unite man to the world in general ; in other words, a class such as the samurai has a very high conception of some responsibilities and yet it may tolerate the most lax ideas in others. It cannot be denied, as Crozier says in his Civilization and Progress, that (*

strength and weakness of any class morality lie just here, and this is true of Bushido. In its eagerness to foster the masculine vir¬ tues, it neglected the proper education of the gentle sex ; in its one-sided appreciation of military valor it discarded industrial worth ; in its exaltation of samurai prerogative it set at naught the commonest rights of the plebeian order. But it is not the shortcomings of Bu¬ shido which have impressed the nation, but its practical precepts. What is deficient and defective in this moral regime can be remedied and supplied by the growth of democracy, which is irresistible, whereas the qualities it has impressed upon the nation are such as cannot easily be promoted by democratic insti¬ tutions. To give a few of the more prominent moral sentiments particularly cherished by Bushido, we wall briefly describe its sense of honor.

In Japan it is more usual to employ the word renchi-shin (literally, the sense of shame) as equivalent to the sense of honor, which characterizes every repertoire of knightly vir¬ tues. The worst thing which could be affirmed of a samurai was that he knew not shame. The two conceptions of honor and shame are so intimately allied that they not only seem inseparable but the reverse and obverse of the same thing. Honor sounds

like an accretion gained over and above one's ordinary lot, and shame savors of something of which one is deprived. Shame is a painful sensation which accompanies the knowledge of guilt. It is what Kant would call the natural and immedi¬ ate punishment for one's own conscious com¬ mission of sin or omission of duty. It is the self-knowledge of disturbed moral equipoise, and the more perfect the balance the more sensitive is it to the slightest disorder. Shame is the most delicate index of moral health, and the bushi was required to distinguish what constitutes shame and to avoid it. Like the English word shame, haji means first of all a painful sensation excited by a consciousness of guilt or impropriety, in which case it was a , spiritual experience of an individual, irre¬ spective of his relation to others; but it also means, secondarily, reproach or contempt in¬ curred from outside.

It may be asked by what standard was the guilt or innocence of a deed, involving honor or shame, to be decided. A deed or thought that in the least clouded the lustre of the im¬ maculate mirror of the mind was forthwith deemed shame. This simple faith in human nature was accepted as an axiomatic truth, no attempt being made to demonstrate it philosophically or theologically. Shame, there¬ fore, was not explained ; it was to be felt and avoided. As to honor, — the opposite of shame, — it was identified with a good name, and hence with reputation and fame. The error into which young samurai fell so easily and so naturally was to confound these and to en¬ deavor to acquire name — rather fame — by means of any sort. Hence emulation and rivalry sometimes went beyond the limits of common-sense and wisdom. Another danger to which samurai youths were exposed was a false sense of shame — malus pudor. Misfortunes which could be rationally explained, or in Western lands would be termed ((acts of Providence,® were often construed as deeds for which the in¬

dividuals concerned held themselves responsible, and so many a useful life found a self-sought end. We are disposed to think that the em¬ phasis placed on conscience as the criterion for honor or shame, for virtue or vice, for good or evil — sharing as it does the practical doc¬ trines of Socrates and the mystic tenets of Jacob Boehme and George Fox — was on the whole a healthy and beautiful teaching to fol¬ low, being based on the very root of moral consciousness.

The exaltation of benevolence was a logi¬ cal outcome of a practical accompaniment of a sense of shame. Malice would be fatal to the highest instinct of honor, benevolence alone being consistent with it. By benevolence it meant love commingled with pity and mercy, which one feels toward one's inferiors. It was par excellence a virtue of princes. They represented divine powers, ruling over their subjects with authority derived from heaven. This theocratic idea explains the comparative beneficence of

the feudal regime. Paternal government was also based on the assumption that the ruler mediates between heaven and man, and thought weakness of the system is apparent, it must be borne in mind that ab¬ solutism and feudalism were largely built on moral principles. Benevolence, however, was not altogether to be confined to the rulers. Every samurai was to be mindful of it in his transactions with his inferiors, with the weak¬ er sex and with weaker men — with defeated enemies. It was considered disgraceful in samurai to take advantage of the weakness of others. Strategy and ruse de guerre were of course entirely justified in warfare; but even then some warriors went so far as to give ample opportunities to their enemies for due preparation. In private life, too, benevolence and the gentle virtues — magnanimity, forgive¬ ness, mercy and pity — were ever extolled as befitting the noble occupation of the samurai. "Superior men hate sins but not the sinner,® said Confucius. It may not be amiss to ob¬ serve here that the religious instinct of Japan, as expressed in Shintoism, never invented a hell, though it looked for a spacious firmament as an abiding place for the souls of the dead. In fact it has rarely spoken of sin except as defilement or contamination.

As benevolence is a virtue which the supe¬ rior observes toward his inferiors, it is largely that of a ruler to his subjects. As to the subjects themselves, — the samurai proper, — Bushido laid particular stress on what may be called the reverential virtues : namely, those which men should observe in their dealings with people above them, such as loyalty to¬ ward their lord and master, filialty to their parents, and, in the case of the woman, obedi¬ ence to her husband.

Of loyalty it has been said that it is the most deeply implanted virtue of the Japanese race. To be faithful in serving the master was equivalent to loving the country with which he is identified. Patriotism and loy¬ alty therefore are hardly separable in Japanese ethics. In the feudal period, loyalty meant faithful service to a daimyo, who in his turn owed allegiance to the emperor. Percival Lowell has charged the Japanese with imper¬ sonality. In one sense he is right; in another he is quite astray. In no other code does per-

sonality preponderate as in Bushido. One may say that an anthropomorphic element dominates the precepts of Bushido. The samurai were men of action, speculation being either an in¬ tellectual pastime or a method of mental dis¬ cipline, and they were interested in concrete things. They cared little for abstract princi¬ ples which regulate the relations

between lord and retainer; their concern was to serve their daimyo with all their soul and body. And yet it must be noted that in personally serving his master (a man in flesh and blood) the samurai was not required to be a slave, pander¬ ing to every freak or fancy of a despot. If he thought his lord wrong, faithful service de¬ manded that he should lead him into the right path. An unscrupulous flatterer who made it his trade to satisfy the self-will of his ruler gained no place < (i' the story.® If all his ad¬ monitions and requests availed nothing he resorted to the last appeal of disembowelment.

Allied to loyalty was the virtue of filialty so often dwelt upon in the precepts of knight¬ hood. Under the feudal regime, each samurai had to furnish a certain number of armed men according to the amount of revenue granted him by the daimyo. As each holder of a benefice, that is to say, each head of a family, was held responsible for military service, the family and not the individual was the social and political unit. Added to this fact was another, namely, the custom of ancestor wor¬ ship. These two considerations made family relations compact and rendered the chief of the family an important moral and social factor. If the Arab practice of polygamy is kept up not solely by amorous sentiment but from an economic motive, neither was the feudal in¬ tegrity of a family maintained wholly by moral regard. Whatever may be the sociological as¬ pect of filialty, upon it and loyaltv is founded the entire fabric of Japanese morals. This ex¬ plains the important role the father plays in the economic or a feudal society. Moreover, the conservative ethics imported from China, hal¬ lowed the traditional ancestor worship of the race and it is clear without further explanation what filial piety must mean in the moral system of Japanese feudalism. Few motives of action are stronger in the Japanese mind than the glorification of his family.

*In comparison with the father, the mother was not counted a social or political unit, and this fact helped to enhance her value within the family. It is only reasonable to expect woman's share to be small in a militant so¬ ciety, such as feudalism produces. At the same time, when a father's service is largely concerned in the welfare of his lord and of the community, the government of the house¬ hold and the education of the children are naturally left to the mother. This has been distinctly true among the samurai. The as¬ sistance rendered by woman to the general wel¬ fare, and more particularly to her husband, was called naijo — the inner help — the service hid¬ den from unconcerned eyes. It was a work directly known and appreciated only by the members of the family and chiefly repaid by the sons in their filial love and pious remembrance. Hence, though little note was taken of woman's position in public, within the familv it was not much inferior to that of the pater faniilias. Woman's influence in Bushido was largely ex^*

ercised through her position as mother. The education of the samurai was in its earliest stages naturally left to her. And here it is important to note that, while among the daimyo concubinage was usual and the chil¬ dren, legitimate or illegitimate, were frequently reared by nurses, the samurai could ill afford to keep mistresses and the bringing up of their children was considered the proper work of the mothers. This explains the general superiority, both physically and intellectually, of the samurai over the daimyo.

A point of great moment in the education of the samurai youth wa$ the inculcation of courage, bravery and fortitude. The arts of war and the technique of warfare were of much less importance than the mental and moral apti¬ tude of the fighters. When two combatants confronted each other on the field, the ques¬ tion was not which party should win, but who would prove himself the braver — even though defeated. Children were therefore taught to admire daring deeds and deeds of endurance. In the pedagogics of Bushido, children were often subjected to severe tasks, in order to inure them to hardships. The pangs of cold, of hunger, of fear or dread, were almost sys¬ tematically imposed upon them. They dared not shirk sorrow or pain. How could they when honor might at any time require them to commit seppuku, — disembowelment?

In Japanese anatomy, the hara, which is the comprehensive region between the breast and pelvis — including the stomach, gall-bladder, spleen, liver and intestines, was believed to be the seat of the soul. This view was shared by the Greeks who used the terms thumos and phren for the same part of the body, and also by the Hebrews, who looked upon the bowels as the seat of passion and compassion. We know that there are important ganglia in the abdomen and how susceptible they are to any emotion. The custom of splitting the ab¬ domen, though it may at first seem ridiculous, came from the idea that if one's spirit re¬ sides there, one can show by disemboweling himself his innermost thoughts and the motives which actuated him. Seppuku was thus thought the most honorable mode of ending one's life and was therefore confined to the samurai class. It is a great mistake to look upon it merely as a process of committing suicide. It was sometimes imposed as a legal punishment in which case there was no actual cutting of the abdomen, but decapitation by a kaishaku, who was often the friend of the condemned. Disgrace of the father, that is of the family, name, is of all things the hardest for a samurai to endure.

The training of a samurai was no light work. Indeed his whole career was far from being smooth and easy. Constant vigilance was the price of his status. If fighting had been his only vocation, we might have had a quarrelsome, bloodthirsty animal, and such a type was not wholly wanting, though it was despised as that of a "boarˆsumurai. When it existed it was

chiefly found among the young, and it was exactly this rude type with its haughty, swaggering, manners, which at¬ tracted the notice of foreigners. But this low type was far from the ideal of Bushido. In¬ tellectual culture combined with a strong will, refinement of manners that would not sink

*into effeminate mannerism or obsequious con- x ventionality, superiority in the two accomplish¬ ments of war and peace, of military and liter¬ ary arts. (Bun-bu Ryo-do), was the goal aimed at. In speaking of the ideals of Bushido one cannot help calling to mind the guardians of Plato. It is not by accident or jest that Mr. Wells has chosen the name O'f samurai for an ideal social class in his (Modern Utopia.**

Striving after an ideal, imperfect as it may have been, the life of a conscientious samurai was a strenuous one, and so in popular liter¬ ature his lot was often bewailed; for, like all wholesome moral systems, Bushido taught more of duties than of rights. The samurai had few rights above the commonalty, and what rights they enjoyed did not amount to any sub¬ stantial benefit. If he had a desire for wealth, a merchant's lot could better secure this. If his inclination were for mere pleasures, he might well envy a tradesman. If his taste lay in literary ease, religious retirement would as¬ sure him that. Luxuries he had to forego and even his pleasures were regulated. In spite of some degree of laxity which public sen¬ timent tolerated, the strict regime allotted him only a certain kind of dance, of music and of pastime. The two swords which it was the privilege of the samurai to carry served more as a reminder of the dignity and responsibility of his calling than of its privileges.

Bibliography.— Mitford, Tales of Old Japan ; Norman, (The Fighting Man of Ja- pan) ; Knapp, (Feudal and Modern Japan* ; Maclay, (Mito Yashiki* ; Nitobe, (Bushido, the Soul of Japan*; Nitobe, (Bushido, the Moral Ideas of the Japanese) in Alfred Stead's (Ja- pan by the Japanese* ; Alfred Stead's (Great Japan* (Chs. II, III, IV, VII); Greey, The Loyal Ronins) ; Griffis, 'Honda, the SamuraP ; Dickens, (The Loyal League* ; Okakura, 'The Spirit of Japan. **

Inazo Nitobe,

Director of the First Higher School, Tokio.

10. EDUCATION IN JAPAN. Introduc¬ tion. — In 27 0 a.d. the king of Korea sent his ambassador to the Imperial Court of Japan. This led to the adoption of the Chinese learn¬ ing, which, for more than 1,000 years, was

the most important factor in the Japanese educa¬ tional system. From time to time Japan sent special missions and students to China for study, while many Chinese and Koreans went to Japan and were naturalized.

With the advent of Chinese learning Con¬ fucianism soon became the foundation of Japan's moral and literary education. About this time Buddhism also entered the country. It found devout adherents at the court, and priests went in large numbers to China to study Buddhism and its literature. Out of the joint influence of these two, her social refinement was attained. Early In 701 a.d. we find an educational system laid out in the Taiho Stat¬ ute. A state university was founded in the capital, Kioto, and provincial schools were es¬ tablished in the provinces, while powerful fami¬ lies in the provinces founded private schools to educate their own children and those of their relatives and retainers. It was maintained that the basis of all good actions lies in filial piety, and copies of 'Kokyo,* or the Treatise on*

- *Name of the era.*

*Piety, * were distributed throughout the empire and every home had a copy. Thus moral edu¬ cation was encouraged. At this epoch literature also flourished among the women of high class. But the pen was soon obliged to give way to the sword. The powerful families in the prov¬ inces waged war upon each other, while at the court people passed most of their time in com¬ posing effeminate poems, and seldom cared to enter deeply into the study of literature. On the other hand, the military class had no spare time to devote to learning, and literature be¬ came the sole monopoly of the priests. They taught their neighbors' children in the an¬ nexes to the temples, hence came the word Terakoya,** or children's house of the temple, which institution survived even until the estab¬ lishment of the modern elementary schools.*

*In 1603 a.d. Tokugawa Iyeyasu founded the Bakufu or Shogunate in Yedo. When peace was restored, he encouraged arts and learning. In 1691 a.d. Tsunayoshi, the fifth Shogun, founded a college which was the origin of the "Shoheiko,** the highest seat of Chinese learn¬ ing in Yedo. Distinguished scholars came out of this school and literature again prospered. Feudal lords in the provinces, following the ex¬ ample of their feudal chief in Yedo, also set up schools for the sons of their retainers. These may be called the public schools of the time. There were also many private schools estab¬ lished by scholars on their own account, who taught young men Chinese classics. These schools, it must be remembered, chiefly taught the doctrines of Confucius and Mencius, to¬ gether with literature and history. The com¬ mon people need not be profoundly taught ; they should he made chiefly to rely upon the rulers,** was the educational policy of the*

*government. But after the Middle Ages, the Terakoya pros¬ pered and was free to all. During the regime of Tokugawa, peace continued for more than 250 years, which led to the rapid development of belles-lettres. The pure Japanese literature, rivaling the Chinese classics, began to gain much attention, and it soon made wonderful progress and attained a height heretofore un¬ known. The intercourse with foreign countries became more frequent under the early Toku- gawas and by the study of the Dutch language the enlightenment of the West was introduced into the country. Many people studied medi¬ cine, physics, chemistry, etc., together with the foreign military science. Later, the Bakufu itself established in Yedo an institution called the ((Bansho-torishirabe-sho,** the Place for In¬ vestigating Foreign Books, and also a medical school called the "Igakusho,** i.e., the Place for Medical Study, which gave a great impetus to the study of Dutch. Toward the close of the Tokugawa regime, some began to study English and French books also, while others went abroad for study by the order of the govern¬ ment and in unauthorized cases ran away from the country for the same purpose. In short, learning which had declined during the Middle Ages again prospered during the Tokugawas, and besides the prosecution of the Chinese liter¬ ature and philosophy, there arose gradually a new field of the Western science, producing many distinguished scholars even among the common people.*

In 1867 a.d. the Shogunate came to an end,

which led to the restoration of the imperial power. All institutions, and especially the sys¬ tem of education, were radically reformed. In 1872, the ˆGakusei,® i.e., the Educational Code, was promulgated. The basis of the new system was laid. The empire was henceforth to be divided into eight university districts, each one of which was divided into 32 middle school dis¬ tricts, while each middle school district was again subdivided into 210 elementary school dis¬ tricts ; and the schools of the corresponding grade in each district were to be established. But it was found that this system could not be well carried out in its entirety, and many revisions of the ordinances relating to universities, nor¬ mal schools, middle schools, elementary schools, etc., had to be decreed, but no fundamental changes have taken place since that time. In 1890, the ordinance for the elementary schools was revised and a system of compulsory educa¬ tion was adopted. When local conditions de¬ mand it, the school year may begin on the 1st of September and end on the 31st of August. On 30 Oct. 1890, the Imperial Rescript with re¬ gard to education was proclaimed and the moral basis of Japanese national education was defi¬ nitely settled. The English

version of the Re¬ script reads as follows :

Know Ye, Our Subjects:

Our Imperial Ancestors have founded Our Empire on a basis broad and everlasting and have deeply and firmly implanted virtue; Our subjects ever united in loyalty and filial piety have from generation to generation illustrated the beauty thereof. This is the glory of the fundamental character of Our Empire, and herein also lies the source of Our education. Ye, Our subjects, be filial to your parents, affectionate to your brothers and sisters; as husbands and wives be harmonious, as friends true; bear yourselves in modesty and moderation; extend your benevolence to all; pursue learning and cultivate arts, and thereby develop intellectual faculties and perfect moral powers; furthermore advance public good and promote common interests; always respect the constitution and observe the laws; should emer¬ gency arise, offer yourselves courageously to the State; and thus guard and maintain the prosperity of Our Imperial Throne coeval with heaven and earth. The way here set forth is indeed the teaching bequeathed by Our Imperial Ancestors, to be observed alike by Their Descendants and all subjects, infallible for all ages and true in all places. It is Our wish to lay it to heart in all reverence, in common with you, Our subjects, that We may all thus attain to the same virtue.

The 30th day of the 10th month of the 23d year of Meiji.

(Imperial Sign Manual. Imperial Seal.)

This Rescript is the foundation of the moral education of the Japanese people. After the

new educational system <(Gakusei>) was estab¬ lished and its details proclaimed, many foreign scholars were employed and a great number of students were sent abroad to study. Japan now naturally entered a transition period which blindly welcomed new ideas and as blindly dis¬ pensed with old ones. Some radical followers of the new learning espoused the American util¬ itarianism which they half understood, while others loudly advocated the French idea of lib¬ erty. Then came the German system of philos¬ ophy and methods of education. To oppose these tendencies there arose the <(Kokusui hoson shugi,® i.e., the principle of preserving the coun¬ try's traditions. In the midst of darkness and confusion which these conflicting elements occa¬ sioned and enhanced, appeared the above Re¬ script, which set at rest much of public anxiety and enlightened the educational world.

One great advantage of Japanese education is its complete separation from

religion. Any conflict on this subject is unknown. In 1899, the Minister of Education issued an instruction to the effect that all government and public schools as well as those schools the curricula of which are fixed by ordinances, should teach no religion whatever in the school hours or even outside of them. This instruction made the separation be¬ tween education and religion complete.

Ever since the restoration, the whole nation has striven to. advance education, in spite of incessant political troubles, civil and foreign wars. The improvement not only in the equip¬ ment of schools, but also in the personnel of the teaching staff., is continually being made the object of special attention by the Department of Education. The table which follows shows the gradual increase of pupils and students in dif¬ ferent scholastic institutions.

If classified according to the nature of in¬ struction given, Japanese education may be di¬ vided into three distinct parts, viz., general, special and technical. But in the wide sense of the term, special education includes technical education, and so the latter comes under the control of the Bureau of Special Education. If classified according to the grade, it comprises the three degrees of elementary, secondary and higher education. General education consists in teaching of such subjects as are essential to the people as a whole. It is given in schools be-

KINDS OF SCHOOLS

Elementary schools .

Blind and dumb schools .

Normal schools .

Higher normal schools .

Higher normal schools for women .

Special institutes for the training of

teachers .

Middle schools .

High schools for girls .

Higher schools .

Imperial universities .

Special schools .

Special technical schools .

Technical schools of secondary and

primary grades .

Technical continuation schools. . .

Institutes for the training of technical

school teachers .

Sericultural institutes .

Miscellaneous schools .

1915

1914

1913

1912

1911

1907

7 , 263 , 733

7,095,755

7,037,430

7,023,661

6,861,718

5,514,735

2,848

2,789

2,669

2,571

2,238

1 ,536

27,739

27,928

27,653

27,076

25,391

18,928

1,088

1,077

1,091

1,070

1,093

938

693

689

659

590

506

357

186

166

122

55

52

91

136,778

131,946

128,973

125,304

122,345

108,531

90 , 009

83,287

75,128

64 , 809

56,239

35,876

6,215

6,359

6,537

6,665

6,341

4,534

9,611

9,572

8,946

7,438

7,239

6 397

30,422

30,109

27,048

27,468

26,244

25 575

7 , 505

7,098

6,896

6.983

6,694

/ 48.422

\ 38,975

} 80,922

74,869

70.085

64,739

• 222,953

446,844

384,983

346,767

302,341

262,978

185

173

170

156

177

137

338

166,244

154,428

148,761

142,868

145,123

142,695

8,275,497

8,017,619

7,893,719

7,809,140

7,589,117

6,083,281

Total

667

JAPAN — EDUCATION IN JAPAN (10)

longing to the elementary and secondary grade,

„ such as the elementary schools, other schools of a similar grade, kindergartens, normal schools, middle schools, high schools for girls, other schools of a similar grade as the two preceding, higher normal schools, etc. Special education consists in the teaching of the ad¬ vanced sciences and arts and constitutes mostly the domain of higher education, including the universities. Technical education consists in the teaching of all those sciences and arts nec¬ essary for preparing the pupils in trades, agri¬ culture and industries. The technical schools, which belong to the elementary grade are the supplementary technical, the apprentices', agri¬ cultural and commercial schools of the lower grade. Those which belong to the secondary grade are agricultural, commercial and indus¬ trial schools of the middle classes, while higher industrial, higher agricultural or higher com¬ mercial schools come under the head of higher education.

Educational Administration. — The highest central authority which directs the affairs re¬ lating to education is the Imperial Department of Education. Since 1871 it has its seat in Tokio and constitutes one of the nine depart¬ ments of the Imperial Japanese government. The Minister has entire control of all educa¬ tional matters of the empire, except those placed under other departments on account of special reasons. For instance, the Peers' School is under the control of the Imperial Household Department; Military and Naval schools under the Departments of Army and Navy; schools for Mercantile Marine, for Post and Telegraph are under the management of the Minister of Communications ; while all schools in Formosa are controlled by its governor-general under the orders of the Minister of Interior. The Minister issues the departmental ordinances, in¬ structions, etc., in exercising his administrative powers.

As the assistant officials of the Minister there are a vice-minister, two parliamentary secreta¬ ries, three heads of bureaus, councillors, a pri¬ vate secretary, secretaries, inspectors, an officer of school hygiene, a superintendent officer of schoolbooks, examiners and compilers of school¬ books, architects, clerks, etc. The three bureaus are styled respectively the General, the Special and the Religious. The secretariat of the Min¬ ister is divided into five sections, viz., those of private secretary, drafting, accountant, school books and charts, and architecture, and each section has a director. The vice-minister assists the Minister in managing the affairs of the de¬ partment and has the immediate superintend¬ ence of the works of the different bureaus. Each head of the bureau takes the charge of his own bureau and is responsible for its affairs. The Bureau of Special Education takes charge of the affairs relating to higher education; the Imperial universities, high schools, special schools, the Imperial Academy, etc., coming under its control. The Bureau of General Edu¬ cation takes

charge of the affairs relating to general education ; normal schools, middle schools, high schools for girls, elementary schools, kindergartens, schools for blind and dumb, educational associations, libraries, muse¬ ums. It also takes charge of the affairs relating to school hygiene and investigates for the improvement of the Japanese language. The

Bureau of Religions which formerly be¬ longed to the Department of Home Affairs was removed to that of Education in 1913. It supervises the ecclesiastical affairs of the country. But it must not be sup¬ posed that by this combination religion forms any part of school education, as these two are kept entirely independent of each other. The Bureau of Special Education also takes charge of the affairs relating to technical education; industrial schools, agricultural schools, commer¬ cial schools, apprentices' schools, supplementary technical schools, etc., being under its cogni¬ zance. For the purpose of inspection seven reg¬ ular inspectors act for the Minister. Their duties consist in inspecting the state of educa¬ tion throughout the country, but while they are in Tokio they also serve in the different bureaus and assist in managing their affairs. They in¬ spect the condition of educational administra¬ tion and the state of school education, hygiene and finance, etc., giving such advice and instruc¬ tion as may be necessary. During their tour they submit to the consideration of the Minister any question calling for speedy action, and when they return at once report to the Minister orally, and within a month send in a written memorandum. Besides these permanent inspec¬ tors there are professors in higher and other schools, etc., who are provisionally charged with additional and special duties of inspector¬ ship on particular subjects.

The education investigation committee is under the control of the Minister of Education and was first appointed in 1913. Its duty is to investigate important matters relating to educa¬ tion, to express an opinion upon questions sub¬ mitted to. it by the Minister, as well as to pre¬ sent to him its own opinion upon various mat¬ ters. The committee is composed of represen¬ tatives not only of educational authority, but also of all circles outside, of them, and conse¬ quently it is many-sided in its nature. Under the superintendence of the Minister there are also several standing commissions for special matters. For instance, the Commission for Ex¬ amining the Qualification of Teachers has the charge of testing and examining the candidates who wish to become teachers of normal, middle or high schools, etc. The schoolbooks and charts, investigation committee is under the su¬ pervision of the Minister of Education and compiles, examines and discusses the school¬ books and charts on morals, history and the Jap¬ anese language, used in the elementary schools. It also' examines matters relating to other schools, books and charts, if they are sub¬ mitted to it by the Minister. The Board of Seismology investigates and experiments to find the best suitable construction for guarding against the

effects of earthquakes, and pursues scientific investigations for pre¬ dicting earthquakes. The Board of Geodesy manages affairs connected with the Inter¬ national Geodetic Society and investigates various subjects bearing on geodesy. The Spe¬ cial Observatory for the Measurement of Lati¬ tudes is occupied with affairs connected with the measurement of the variation of latitudes in accordance with the contract entered into be¬ tween the government and the International Geodetic Society. The Commission for the Compilation of Catalogues of Scientific Litera¬ ture conducts the affairs connected with the

International Committee organized for the same purpose. The Commission for the Examina¬ tion of Medical Practitioners takes upon itself the work of periodical examination of physi¬ cians. A similar commission exists for the examination of pharmaceutists. The aim of the Imperial Academy is to promote the ad¬ vancement of the sciences and arts and gives assistance in propagating the salutary influence of education in general. It has 60 members, chosen from among the most distinguished men of learning; foreigners who have rendered special service to science and art are made hon¬ orary members. There are also a Board for Editing and Collecting Materials of the Restora¬ tion (of Meiji), and an Institute for the In¬ vestigation of Contagious Diseases. Besides these the minister has the control over the Im¬ perial Library and the Central Meteorological Observatory.

The principal local instrument of education is the governor. The whole empire with the exception of Chosen (Korea), Taiwan (For¬ mosa) and Karafuto (South Saghalien), is di¬ vided into one Do, three Fu and 43 Ken, each of which has a local governor. Each governor takes charge of administration of his locality. All Do, Fus and Kens are local administrative districts and are at the same time self-govern¬ ing corporations. Each governor has inspectors under him who attend to school matters under his jurisdiction and is mainly responsible for the expedition of educational affairs. Fu and Ken are divided into Gun, and each Gun has its chief official called Guncho, who is in turn assisted by an inspector on matters re¬ lating to schools. Cities, towns and villages are also self-governing corporations, and have a mayor or a headman. The mayor or headman manages the educational affairs relating to cities, towns and villages, respectively. It is designed that a school committee should exist in every Fu, Ken and Gun, as well as in every city, town and village, but at present they exist only in cities, towns and villages. The local governors specially appoint school physicians for every public school, but at present

those schools established by villages, as well as those of poorer districts with a population of less than 5,000, may be exempted.

Primary Education.

Elementary Schools. — The government be¬ gan to take serious notice of national educa¬ tion after the Imperial Restoration (1868). Previous to that people who wished their chil¬ dren taught sent them to Terakoya,® where they obtained the rudiments of knowledge, as already mentioned. In 1872 the "Gakusei, or the Ordinance for Educational System, was issued, and elementary schools were established, part of the expense being borne by the state. In 1879 this ordinance was replaced by another called the Kyoikurei,® or the Ordinance of Education, which was again revised in the fol¬ lowing year, and also again in 1884. The Kyoikurei was followed in 1886 by the <(Sho- gakkorei, or the Ordinance relating to Elemen¬ tary Schools. Thus the basis of the present educational system was gradually laid. In 1890 further revisions were introduced, and in 1900 the present system was adopted, which was also partly revised in 1903, 1907, 1911 and 1913.

The aim of the elementary schools is to teach the foundation principles of moral and popular education, giving such knowledge as is essential for life, care being also taken to develop the physique of the children. Religious teaching having no place in the Japanese system, the foundation of the general education consists of the moral, the intellectual and the physical train¬ ing. There are no preparatory schools in addi¬ tion to the middle schools as in some countries. Hence everybody, rich or poor, high or low, must first enter the elementary school. Thus •the Japanese elementary schools give, in the strictest sense of the term, the national educa¬ tion. The only exception to the rule is found in the Peers' School where the boys of the high classes are taken.

Elementary schools are divided into two kinds, viz., the ordinary and the higher. The former has a course which extends over six years, while in the latter the course varies from two or three. The period of our compulsory education, which used to be four years, was in¬ creased to six in 1907, and since then the re¬ sult has been quite satisfactory. In the higher elementary schools a more advanced grade, or in other words continuation of the ordinary elementary school course is given. A consider¬ able portion of the elementary schools have both of these grades. All elementary schools may have a supplementary course. The course must not run for more than two years, and the subjects, and the season of the year in which they may be taught, are determined according to the requirements of the locality. Unlike the system of some German states, these courses are not yet compulsory Cities, towns and vil¬ lages must all establish their own ordinary ele¬ mentary schools. But if a self-governing cor¬ poration is too

poor or there exists some special reasons against establishing its own school, the education of its children may be entrusted to other corporations, or it may have a school in common with some others. Higher elementary schools not being compulsory are generally established by self-governing corporations on the approval of their local governors. Private persons can also establish elementary schools on the same condition. The school age of a child begins on the next day after reaching his sixth year and ends on the day when he com¬ pletes his 14th year, the whole term covering a period of eight years. His schooling should commence at the beginning of the first school year that comes within the period of his school age, and should end at the conclusion of his ordinary elementary school course. During this period, his guardian is responsible for his at¬ tendance at school. If they wish to have the children taught at home or in private schools they, must first apply for permission to the au¬ thorities. In no case, except the absolute pov¬ erty of the guardian or the idiocy, deformity or illness of the children, may they be excused from these responsibilities. Children still in the age of compulsory education may not be em¬ ployed to the neglect of their education. Ac¬ cording to the latest statistics 98 per cent of boys and 97 per cent of girls of school age are studying in schools. Formerly the custom was not general among the common classes to educate girls, but guardians have seen now the need of educating the girls as well as the boys.

N Provi

Higher Education.

High Schools. — Higher education is given in the universities and special schools. There are also a number of schools called higher schools or Koto Gakko. They are not in them¬ selves complete institutions of higher education, but simply teach preparatory courses for the universities. In some respects they may cor¬ respond to the colleges in America. In Europe and America those who complete their second¬ ary education can at once enter universities, as well as higher technical schools. But in Japan, the high schools which prepare the pupils for the universities intervene between the universities and the middle schools. Each high school is divided into three departments. The first de¬ partment teaches preparatory course for those who enter the colleges of law, and literature; the second department for those who wish to study the course of pharmacy, or enter the colleges of engineering, of science and agricul¬ ture, while the third department prepares those desirous of entering the college of medicine. In these schools, special attention is paid to the teaching of foreign languages and more

hours are allotted to them than to other subjects. But the three years of high school education does, much good in the way of building up the boys' physique and character, as well as in giving a more advanced knowledge of foreign languages. The languages taught are either English, German or French. During the time they are in school pupils are exempt from mili¬ tary service, and graduates have the privilege of joining the army as one-year volunteers. They also receive favorable treatment at the state examinations for middle school teachers.

Imperial Universities.

Although universities, broadly speaking, are not new institutions in Japan, yet the Imperial universities as they exist at present owe their ongm to the Bansho-Torishirabe-Dokoro of the Bakufu, instituted toward the end of the iokugawa period. After the Restoration the institution was re-established by the govern¬ ment under the name of the Kaiseijo, or the Flace of Enlightenment. The Tokio Medical School, which afterward formed the Seiyo- Igakujo of the Bakufu, together with the insti- tiition above cited, formed the nucleus of the /okio University, which came into existence in 1877 and comprised the faculties of law science literature and medicine. In 1885 the school of law, which hitherto had been carried on b}r the Department of Justice to meet its own require¬ ment, was also incorporated into the faculty of law. In the same year the College of Engi¬ neering, similarly under the control of the Department of Public Works, was also taken over by the Department of Education, as the former was abolished. In 1886 the ordinance relating to the Imperial University was issued, and the former Tokio University and the Col¬ lege of Engineering carried on their work under the new name of the Imperial University. In 1890 the Tokio School of Agriculture and Forestry, which had been under the auspices of the Department of Agriculture and Com¬ merce, was transformed into a college of agri¬ culture and added to the Imperial University of Tokio. Thus the Imperial University of Tokio now includes the six faculties, viz., those of law, medicine, engineering, literature, sci¬ ence and agriculture. In 1897 another univer¬ sity was created in Kioto, and is now complete with five faculties of law, medicine, science engineering and literature. Unlike the univer¬ sities of the West they have no theological department. The Japanese government in the budget of 1907 authorized the creation of two new independent universities, one in the north and one in the south of Japan. In 1907 the Tohoku (east-northern) Imperial University was established in Sendai and the Sapporo Agricultural School being transformed into the faculty of agriculture was attached to it. Now it includes two faculties: those of science (at Sendai) and agriculture (at Sapporo). Besides, two departments of medicine and engineering, which are the reorganization of the old Sendai Special School of Medicine and the old Sendai Higher Technical School, are attached to it. The Kyushu Imperial

University was estab¬ lished in Fukuoka in 1910, and it includes two faculties of medicine and engineering. The ordinance relating to Imperial universities re¬ gards them as institutions established for the purpose of instruction in the sciences and arts indispensable to the state, and of conducting independent research iiDthe various branches of learning. The president of the university presides over the whole institution. The head of each faculty takes charge of the affairs relating to his college. The university council is formed from the heads of faculties and one professor out of each faculty. The president calls its meetings at any time and acts as the chairman. The council discusses matters con¬ cerning the course of study, establishment of chairs, and the internal regulations of all the

faculties, conferring of degrees, and also other matters submitted to them either by the Minis¬ ter or the president. It can also lay its views to the Minister of Education, regarding matters of higher education. Sometimes the title of an honorary professor is bestowed by command of the Emperor or by the proposal of the Minister of Education, upon those who have rendered meritorious service to the university or have made some achievements in science deserving of special honor. In every faculty there is an Assembly of Professors consisting of all professors (assistant professors being exclu¬ sive) of the faculty. It discusses the curricu¬ lum, examinations, conferring of degrees and other subjects submitted to them either by the Minister or by the president. The business officials of the university are the secretary, the superintendent of the students, clerks, etc. The faculty courses of the two universities are as follows :

The Faculty of Law: In Tokio the four courses are law, politics, political economy and commerce. Kioto has two courses of law, and politics and economy.

The Faculty of Medicine: In Tokio the courses are medicine and pharmacy. Kioto has no course of pharmacy.

The Faculty of Engineering: In Tokio the courses are (1) civil engineering, (2) mechan¬ ical engineering, (3) naval architecture, (4) technology of arms, (5) electric engineering, (6) architecture, (7) applied chemistry, (8) technology of explosives, (9) mining, (10) metallurgy. In Kioto the courses are (1) civil engineering, (2) mechanical engineering, (3) electrical engineering, (4) mining and metal¬ lurgy, (5) chemical technology.

The Faculty of Science: In Tokio the courses are (1) mathematics, (2)

astronomy, (3) theoretical physics, (4) experimental phys¬ ics, (5) chemistry, (6) zoology, (7) botany, (8) geology, (9) mineralogy.

The Faculty of Literature: In Tokio the courses are (1) philosophy, (2) history, (3) literature. Kioto has also the same courses.

In the Faculty of Agriculture in the Tokio University the courses are (1) agriculture, (2) agricultural chemistry, (3) forestry, (4) veteri¬ nary science, (5) marine products.

The courses of study in the Tokio Imperial University are as follows :

The Faculty of Science : Mathematics, chemistry and geology.

The Faculty of Agriculture : Agriculture, agricultural chemistry, forestry and zootechny.

The courses of study in the Kyushu Imperial University are as follows :

The F'aculty of Medicine: Medicine.

The Faculty of Engineering: Civil engi¬ neering, mechanical engineering, electrical en¬ gineering, applied chemistry, mining metallurgy.

The time of study required in each faculty varies from three to four years. In matters of discipline much freedom is allowed to the stu¬ dents of the university, it being taken for granted that they have already the firm basis of moral culture. The results of investigations of the professors and students are published in the journals of the faculties. The equipment of the universities, although much remains yet to be done, compares favorably with similiar insti¬ tutions abroad. An astronomical observatory

is attached to the College of Science, and a spe¬ cial bureau for Compilation of Historical Mate¬ rials is attached to the College of Literature. There are also botanical gardens, marine labora¬ tories, hospitals, experimental farms, forestry stations, etc. The universities have contributed much toward the welfare of the nation.

Special Schools.

In 1903 the ordinance relating to the special schools was issued, and those schools which give instructions in some particular branch or branches of science and art, were all called special schools and come under this ordinance. The special schools established by the state are the five Special Schools of Medicine, the Tokio School of Foreign Languages, the Tokio Fine Arts School and the Tokio Academy of Music. The public corporations such

as Fu, Ken and city, or private individuals may found special schools. Persons who have completed the pre¬ scribed course of instruction in the middle schools or in the high school for girls, with course extending over four years or more, or who possess equal or higher attainments are qualified to enter. Special schools have a course extending over three years or more. Since the special schools give instruction of high grade to young men who have finished secondary edu¬ cation, the state gives the graduate special priv¬ ileges, as for instance, the graduates from the special school of medicine can practice without any examination and those who have passed through the special school of literature can at once obtain a license of a middle school teacher. Some of the special schools in Japan may be considered as corresponding to the university of lower type found in the United States and elsewhere ; they discharge the functions gener¬ ally belonging to the latter institutions.

Among the private special schools who may call themselves "Daiguku® (university), after permission is obtained from the Minister, the most prominent are the Keia-gijuku University, the Waseda University and the Doshisha Uni¬ versity. The first was established before the Restoration of Meiji, in the period of Keio by the late Yukichi Fukuzawa, one of the greatest men in Japan, the graduates numbering nearly 10,000. The second was founded by Count (now Marquis) Shigenobu Okuma, now Prime Minister, and his friends in 1882. The gradu¬ ates are more than 18,000, the third in Kioto was founded by the late Jo Nushima in 1875, and it is now as well known as the former two. Other private schools having the courses of study relating to law, politics and political econ¬ omy are the Meiji University, the Hosei Uni¬ versity, the Chuo University, the Nippon Uni¬ versity, the Senshu University, etc.

There are but a few special schools in which girls may be admitted. Among the gov¬ ernment schools, the Tokio Academy of Music and among the private schools the Women's College at Mejiro are the only places where women can attend.

Technical Education.

Confucianism taught a sublime doctrine which made the people esteem transcendent philosophy and little attention, if at all, was paid to what corresponds to modern utilitarian¬ ism. Besides, under the old regime it was con-

Side red that farming, trade and industiy needed nothing but experience and that business men would not gain much by study. But with the change of the times and the participation of ‘ apJ}j the co.mmerce and industry of the world, the establishment of technical education »ecame essential and the department began to encourage it by founding the system of supple¬ mentary technical schools, apprentices’ schools, by teaching subjects which have reference to industry in the elementary schools, and also by establishing other higher technical schools. In lb94, the Law of Granting State Aid to Tech¬ nical Schools was enacted, and 150,000 yen was annually paid out of the state treasury for this purpose. It was subsequently increased and now it amounts to 297,661 yen. Measures have been taken to train teachers for these schools. In 1899, the Ordinance for Technical Schools was issued. Its purport is to provide education essential for those who pursue agriculture, com- meice and industry. In all Fu, Ken. as well as m Hokkaido (all administrative districts) tech¬ nical schools may be established and the Min¬ ister of Education can order any of them to found a technical school or schools according as the condition of the locality requires them. Any Gun, city, town or village may also establish technical schools if the locality requires them, and if at the same time they do not impede the progress of elementary school education. A chamber of commerce or private individual may also found technical schools. A technical school whether public or whose equipment and course of instruction is considered by the Minister to be efficient is entitled to receive a subsidy out of the national treasury for the period of three years to the amount not exceeding the sum which the original founder appropriates toward its maintenance. This term of subsidy may be renewed.

Supplementary Technical Schools.— Ac¬ cording to the provisions of Supplementary Technical School Act of 1902, these schools provide such knowledge as is most useful for those who wish to engage in any branch of trades and industries, and at the same time gen¬ eral education is also continued to supplement what they already have learned previously. The entrance qualifications consist in having some rudiments of general education which are equal or above the ordinary elementary school stand¬ ard, and in being not younger than 12 years of age. The length of the courses is also fixed so as to suit the local convenience.

Apprentices’ Schools. — The apprentices’ schools admit pupils who are not younger than 12, and who also have general education equal¬ ing the ordinary elementary school standard. The course of study extends from six months to four years and a good deal of freedom is allowed in fixing the term and the school hours. The present regulation was issued in 1904.

Industrial Schools. — These schools are the principal organs of industrial education as fixed by the Provisions for Industrial Schools issued in 1899.

Children 14 or older who have re¬ ceived the two years' course of the higher ele¬ mentary schools, or upward, may be admitted. The course of study extends over three years and it may be lengthened by one year. Prepar¬ atory courses may also be added and boys of 12 years of age or upward who have passed the

sixth year of the ordinary elementary school are taken. Special courses are also organized for the benefit of pupils who cannot follow regular courses and who wish to learn special subjects.

Agricultural Schools. — The agricultural schools are established in accordance with the Provisions for Agricultural Schools issued in 1899. They are of two kinds, those of A and B grades. A grade schools admit only those who have passed a higher elementary school of two years course or who have equal or higher at¬ tainments. The courses of study run for three years and they may be lengthened by one year. In the B grade, boys of 12 years or older, and who have graduated from the ordinary elemen¬ tary schools or have similar or higher attain¬ ments, can apply for admittance. The course cf study extends over three years. In the for¬ mer grade school, preparatory courses may also be added. Special courses may be established in both.

Commercial Schools. — These schools are founded in accordance with the Provisions for Commercial Schools, issued in 1899. They are also of. two grades, commonly termed A and B, respectively. As to the rules of admittance, the length of courses, etc., these two kinds of com¬ mercial schools are exactly the same as those of the two corresponding grades of agricultural schools. The only difference consists in the length of the courses. In the commercial schools of A category, they may be continued for five years.

Nautical Schools — Schools of Marine Products, etc. — In 1899 the Ordinance for Nautical Schools was issued. They are of two kinds, and the regulations are about the same as the technical schools above explained. The higher navigation school is under the control of the Department of Communications. With re¬ gard to the schools of marine prpducts, the or¬ dinance relating to their establishment and working was issued in 1901. All these schools thus far enumerated belong to the grades of primary and secondary education, and other technical schools which are of a higher stand¬ ard are called Special Technical Schools and come under the Ordinance for the Special Schools, of which some explanation has al¬ ready been given. They are mostly government institutions. The High Industrial Schools which give a higher grade of industrial educa¬ tion are

found one each in Tokio, Kioto, Osaka, Nagoya, Kumamoto, Akita, Kiryu and Yo- nezawa. As regards high agricultural and for¬ estry schools, there is one each in Moricka and Kagoshima. . As regards higher sericultural schools, coming under the agricultural schools, there is one each in Tokio, Kioto and Uyeda. The schools in Tokio and Kioto are the reorganization of the sericultural institutes which had been transferred to the supervision of the Minister of Education from that of Ag¬ riculture and Commerce in 1913. Of the high commercial schools, there is one each in To¬ kio, Kobe, Nagasaki, Osaka, Yamaguchi and Otaru. Boys who have finished the middle schools or have similar qualifications can apply for admission. The applicants to these schools are so numerous that only one-third to one-tenth of the total number of applicants, the pro¬ portion varying with the different schools, can

be admitted. The government and private bene¬ factors are making common cause to establish more of these schools to meet this deficiency of accommodation.

Training of Teachers and the Licenses.

There are special organizations for training teachers of all kinds of schools. For the teach¬ ers of the. elementary schools there are both boys' and girls' normal schools, and similarly the teachers and professors of the normal schools, the middle schools and the high schools for girls, are prepared at the higher normal schools, of which two each of both sexes exist, i.e., in Tokio, Hiroshima and Nara. Besides these, there are special institutes for the training of teachers, which are attached to several govern¬ ment schools of high grade. To fill up the de¬ ficiency of the teachers of domestic science and sewing, a revision was introduced to the regu¬ lation for these institutes in 1912 and enabled the authorities of the institutes, if circumstances require, to entrust the instruction of a part of the pupils in the course of domestic science, to any public and private school having the Min¬ ister's permission regarding the test of teach¬ ers without examination. The schools where pupils are entrusted for instruction at present are the First High School for Girls of Kioto Prefecture, the private Tokio Sewing School for Girls, the private Girls' School of Indus¬ trial Arts, the private Wayo Sewing School for Girls. Persons who have not graduated from any of the above institutes, must pass examina¬ tion to obtain licenses. The government is de¬ voting much attention to providing capable teachers, but some non-qualified teachers are still being employed. After graduation, the pu¬ pils are required to serve for a certain period as

elementary school teachers in the locality in which they graduated. The periods are four years for male graduates from the first section, five years for graduates from the second sec¬ tion.

Normal Schools.

According to the ordinance relating to the normal schools issued in 1897, one or more nor¬ mal schools, where elementary school teachers are trained, must be established in the Hokkaido and in each Fu and Ken. The qualifications re¬ quired for admittance consist of a strong con¬ stitution, sound morals and exemplary charac¬ ter. The aim of the normal school education is not simply to give the pupils knowledge essen¬ tial for teachers, but also to build them up in a strong, virtuous, affectionate and dignified char¬ acter.

*The regular course in normal schools is di¬ vided into two sections : the first and the sec¬ ond, and the latter may be omitted, should local circumstances make this advisable. Besides the regular course, a preparatory course*and a train¬ ing course may be provided.*

The course of study in the first section ex¬ tends over four years, for both male and female pupils. In the second section the course for men lasts for one year only, while that for women extends over one or two years.

Candidates for the first section must be graduates of the preparatory course, graduates of higher elementary schools of three years' courses, or persons of not less than 15 years of

age, who have attainments equal or superior to those of graduates. Candidates for the second section, must be, in the case of male pupils, graduates of middle schools, or lads of not less than 17, who have attainments equal or superior to those of graduates. In the case of female pupils, if they wish to become candidates for admission to the course in the second section, which extends over 2 years, they must either be graduates of high schools for girls provided with four years' courses, or they must be per¬ sons not less than 16 years of age and possessed of attainments equal or superior to those of graduates. But if they wish to take the one year's course, they must either be graduates of a high school for girls with a five years' course, or be persons not less than 17 years of age, and possessed of attainments equal or superior to those, of graduates. But, for the time being, even in the case of providing a one year course, graduates from high schools for girls, which had only four years' courses, and persons aged 16, or above, who have similar attainments to those of graduates, were to be admitted.

The object of the preparatory course is to give those pupils who wish to enter the first section of the regular course, the necessary knowledge and training. The course of study lasts for one year. Applicants for admission must either be graduates of higher elementary schools having two years' courses, or be per¬ sons possessed of attainments equal or su¬ perior to those of graduates, and not less than 14 years of age.

The training course is of two kinds, viz., the training course for elementary school teach¬ ers, and the training course for kindergarten¬ ers. . The former is provided for the purpose of giving the necessary knowledge to those who have licenses as regular elementary school teachers.. Sometimes the training course may be provided for the purpose of training ordi¬ nary elementary school teachers and regular teachers of sewing. Candidates for admission to the training course for assistant teachers of ordinary elementary schools, whose course ex¬ tends over one year, must either be graduates of higher elementary schools with two years' courses, or be persons possessed of attainments equal or superior to those of graduates; while candidates for the courses for regular teachers in ordinary elementary schools, and for regular teachers of sewing which extend over two years for the. former, and over one year for the latter, must either have licenses as assistant teachers of ordinary elementary schools, or be possessed of attainments equal to those of assistant teachers. The course for kindergarteners fur¬ nishes knowledge and training necessary for those who wish to become kindergarteners, and for those who have the certificate of a kinder¬ gartener.

Preparatory courses, training courses for elementary school and kindergarten teach¬ ers may be opened. Boarding and the school expenses are defrayed by the localities, and the boys after graduation have the obligation to serve as teachers in elementary schools for seven years; during the half of this term they must work in the school which the governor des¬ ignates. For the girls, the time of service is shorter, being five years, during two of which they are under the same obligations as boys

in i expect of working in a particular school to which the authority appoints.

Higher Normal Schools.

, higher normal school is an institution

designed to train teachers for the normal schools and the middle schools,

including high schools tor girls. The regular courses of study in the higher normal schools consist of Japanese lan¬ guage and Chinese literature, of English, of geography and history, of mathematics, of phys¬ ics and chemistry, and of natural history courses. Besides the above courses preparatory and post-graduate courses may be established. I he courses run for one year in the preparatory, three years in the regular and from one to two years and a half in the post-graduate. In some particular cases, special courses may be pro¬ vided, to which elective pupils may be admitted. The special investigation course may also be provided. The applicants for admission for these schools must be graduates from the regu¬ lar courses of either a normal school or a mid¬ dle school. The governor of the locality rec¬ ommends several candidates and the director of the higher normal school chooses out of them. The graduates who receive the whole school ex¬ penses and board must serve for seven years, three years of which they must attend the schools to which the Minister of Education ap¬ points them ; those who receive part of their expenses, for five years, two of which are in the schools designated by the Minister; and those who have borne their own expenses, for three years.

Besides these there are temporary establish¬ ments for the training of teachers where such subjects as are specially needed in secondary schools are taught, for instance, English, Jap¬ anese languages, natural history, physics and chemistry, etc. These institutes are annexed for the sake of economy and convenience to the universities or other government schools. The graduates from the middle schools or from the high schools for girls of four years' term may be admitted. The courses of study generally run for two years. No tuition is charged and school expenses and board are sometimes al¬ lowed them. If they receive them for cer¬ tain length of time they have obligation to serve after graduation during a certain period.

Special institutes for the training of indus¬ trial, commercial and agricultural school teach¬ ers are also established. These institutions are attached to the College of Agriculture of the Imperial University of Tokio, the Tokio Higher Commercial School and the Tokio Higher Technical School. School expenses and board are allowed them. Besides these arrange¬ ments, aid is sometimes given to the students and pupils in the College of Agriculture or of other government schools on the condition that they serve after graduation in the technical schools.

The Licenses for Teachers.

All teachers who engage in elementary or secondary education require teachers' licenses. Those in the government schools need none. The general license for elementary school teachers, heretofore granted by the Minister of Education, was discontinued in 1913, and the general and prefectural

licenses being united, the one granted by local governors came to

hold good throughout the empire. The Min¬ ister of Education also issues general license for teachers of secondary schools. The gradu¬ ates of certain government schools are entitled to receive this license without any formality. A permanent board of examination is attached to the Department of Education, whose work is to examine, generally once a year, applicants desiring to become teachers in the secondary schools. The standard of this examination is being gradually raised in view of the increased supply of properly qualified teachers during the last few years. A complete system of pension lor all grades of teachers and professors has been established and has no doubt contributed largely toward making the teaching profession an honorable and a permanent one.

Nobuaki Maicino, Ex-Minister of Education, Tokio.

11. THE RELIGIONS OF JAPAN. Pre¬ liminary Remarks. — The religious history of Japan is characterized by incessant influxes of foreign religions. The minds of the people have not remained wholly passive towards these influences, but a free and spontaneous develop¬ ment of religious thought and sentiment was almost impossible. The interest of the history, therefore lies in the manifold aspects of the foreign influences, in their adaptations to the national genius and in the several amalgama¬ tions which have resulted from these interfer¬ ences.

In considering the entire history, five periods may be distinguished: (1) The prehistoric re¬ ligion . of the Japanese was an unorganized worship of spirits, both of nature and' of the dead. . It was, toward the dawn of history, developing a form of ancestor-worship, being closely connected with the clan system. (2) The introduction of Buddhism in the 6th cen¬ tury a.d. gave a new turn to the religious development. During the seven centuries fol¬ lowing, various forms and teachings of Bud¬ dhism which were prevalent in the Asiatic con¬ tinent were successively imported. But these importations prepared for more original ex¬ periences of the people. (3) The 13th century is marked by the appearance of new forms of Buddhism which were more or less distinctly Japanese. It was followed by 300 years of con¬ flict, both religious and political.' (4) The political peace and national unity which were restored at the beginning of the 17th century brought peace to religion. But the peace was kept by artificial means— by political oppression. This period, on the other hand, gave rise to Confucianism and the revival of the national Shinto religion, while Buddhism slumbered for a long time. (5) The revolution of 1868 shook off all the artificial restraints that had made for. peace. The religious sentiment is now growing, and is in a state of ferment, the new element of Christianity having been added and Buddhism reawakened.

Through all these vicissitudes, no Japanese religion ever organized a firm, exclusive na¬ tional church. Nevertheless, protection by and interferences on the part of the government and the ruling clans always affected the relative positions of the various religions. Every prom¬ inent religious body enjoyed, more or less, a kind of state patronage. Thus the ambition to secure the privilege of being sanctioned and

protected by the rulers was responsible for the chief effort of many a religious leader. But the toleration of various religions and the many attempts at compromise have been character¬ istic of the whole history.

I. Prehistoric Religion (before circa 550 a.d.) . — The prehistoric religion of the Japanese consisted in the worship of the kami, or spirits and deities. It is usually known by the name Shinto, or The Way of the Kami, but it was not an organized observance or teaching. Both the appellation and the attempts to systematize it are post-Buddhistic. The belief in these kami, whose respective functions and relations to one another were not quite definite, and the simple rituals intended to invoke or to propi¬ tiate them, made up the whole of the religion. Anything which seemed to the uncultured people unusual or mysterious wTas believed to possess a spirit, either benignant or malevolent, or both. Some of the kami were thought to be residing in heaven, and others sojourning among aerial phenomena, natural objects or living beings. Men are, or may become, kami by the manifestation of extraordinary powers.

Though there existed no definite theogony and no clear cosmology, a certain system of mythology may be traced. In the primeval chaos, we are told, some pairs of deities were generated spontaneously one after an¬ other. All these seem to have represented productive powers, and the first of them, the High-Producing •(Taka-mi-musubi) and the Divine-Producing (Kami-mi-musubi) , are in¬ voked constantly. The last of these pairs, the Male-Who-Invites (Izana-gi) and the Female- who-Invites (Izana-mi), generated the islands of the Japanese archipelago and the several ob¬ jects of nature, which are all called kami. But of the male alone were born the two most important deities. One is the Heaven-Shining Deity (Ama-ter-asn) , the goddess of light and culture, and the other the Swift-Impetuous (Snsa-no-wo) , the god of darkness and outrage. The heavenly kami clustered around the former and they drove the latter into exile. The mali¬ cious spirits, on the other hand, did not make up a unified force. The contrast of these two deities, as we might expect, did not develop into a dualism, as in the religion of the ancient Persians, with which Shinto has some resem¬

blances. On the contrary, a compromise was made of these two. They were considered to be the conjoint generators of the ruling family. This may be due to the introduction into the mythology of certain compromises between the divided clans.

Each tribe or clan had its own tutelary or ancestral deity, a hero, a personified quality of nature or a fetish. The special favor of the tutelary deity was expected by each clan, but that did not exclude the worship of other kami in case of need. The Heaven-Shining, the pro¬ genitrix of the ruling family, is accompanied often by her noumenon, the High-Producing Deity, who follows behind her. On the other hand, the Great-Land-Master and the Re¬ nowned Dwarf, the offsprings of the Impetuous, appear as formidable spirits and were wor¬ shipped without regard to clan distinctions. But the general tendency of the religion, near the dawn of history, was toward the supremacy of the Heaven-Shining Deity, built upon the

basis of an indiscriminate worship of various deities and spirits. The preponderance of the Heaven-Shining Deity and the growing power of the ruling family co-operated with each other.

Curiously enough, in spite of the belief in the spirits and in the ancestral deities, the ideas about the human soul and its future conditions were rather vague. There was a kind of Hades, the Land of Gloom (Y omotsn-kuni) , and also the Heavenly World. Not every one, however, was expected to go to either the one or the other after his death. The soul was believed to be composed of two parts, the one mild, refined and happy, and the other wild, raw and raging. The latter manifested itself separately from the person to whom it belonged, even to his own astonishment. Whether every deity or human being was believed to possess these two, or powerful persons only, is not clear.

The ritual of a religion like this was natur¬ ally quite simple. The deities were worshipped in their abodes, in simple buildings or as in¬ habiting natural objects. There were no images but only representations in mirrors, and in other objects. The offerings consisted of raw foods, drinks, cloth, etc. Prayers were recited or rituals performed before the sanctuaries. The Harvest and the Feast of the Purification, the latter of which was celebrated twice a year, were the greatest festivals. Spells and divina¬ tions were known but were not elaborate. The divine efficacies of the objects connected with the rituals were believed in and made use of mostly against evil spirits. Priestly families existed but the priestly practices were not limited to them.

II. The First Period of Buddhism in Japan

(circa 550-1200). — Constant communication with the continent brought various arts to the islands, one after another. The introduction of the Chinese writings gave the people some ac¬ quaintance with reading and writing, and pos¬ sibly the aspiration for a higher civilization, but scarcely any religious influence. In 538 (usually but erroneously ascribed to 552) Bud¬ dha's religion, represented by his image and some scriptures, was presented to the imperial court by King of Paikchoi (a state in Korea) as the sign of homage and friendship. The ex¬ istence of a kami called Buddha, who was said to be infinite in his power and wisdom and who was represented by a fine image, unknown be¬ fore, was an amazing revelation to the court people. Some of them, who had probably been worshipping the deity before, were in favor of receiving the presents, but many others, who adhered to the worship of the national kami, were against it. The conflict was involved with political and clan strifes. It lasted 50 years, during which time the new worship was sup¬ ported by the efforts of its missionaries, by works of art and also by some alleged miracles. The fall of the conservative party and the as¬ cending of Prince Shotoku, the Constantine of Japanese Buddhism, to the regency decided the final issue of the struggle. The Three Treas¬ ures (Buddha, his Law and his Church) were proclaimed as the ultimate foundation of the national faith. Temples and monasteries, side by side with asylums and hospitals, were built. Priests and artisans immigrated in throngs. The Prince himself gave lectures on the Bud¬ dhist scriptures. We owe the oldest Buddhist

writings to the Prince and the works of art to Buddhism under his reign.

. Buddhism brought new ideas, that of the spiritual communion with the Buddhist saints and of the birth in Buddha's Land. But the most influential factors of the Buddhist propa¬ ganda were the activities of artists and mission¬ aries. Through the channels of arts and indus¬ try they began to refine the sentiment of the people and to promote their welfare. At any rate, it was an overwhelming power, incompar¬ ably more powerful and appealing in every re¬ spect than the pristine faith. The civilization of Japan made a leap by embracing the Bud¬ dhist religion, but at the same time the spon¬ taneous development of Japan's own religion was arrested.

During the 200 years following this decisive step, the missionary zeal and the activities of Buddhist priests were indeed admirable. Their influence soon made itself felt in the provinces. Roads were built, rivers bridged, mountainous regions made passable. The influence of Bud¬ dhism progressed steadily. The greatest patron of the imported religion was

always the one w'ho occupied the Imperial throne. The idea was that the tranquillity of the country and the security of the throne depended upon the favor of Buddha and his celestial attendants. Thus temples built were dedicated to these super¬ natural guardians, and the manuscripts of the sacred texts were distributed in the provinces in order to secure the benefits of the celestial guardianship. But this was not a merely super¬ stitious idea. Constant distribution of medical materials and the sending of physicians accom¬ panied by preachers to the provinces must have been received by the people with great gratitude, both toward the religion and the government. We can imagine also how the provincial cathe¬ drals impressed the people's mind with the dig¬ nity of the Imperial court and of the Buddhist hierarchy.

The progress of Buddhism culminated in the foundation of a central cathedral near Nara, the capital. It was dedicated to Lochana, one of the spiritual bodies of Buddha, and on the occasion of the thanksgiving for the first dis¬ covery of a gold mine in Japan (749), the sovereign (Shomu) himself bowed before the gigantic statue of the Buddha, declaring him¬ self to be the Servant of the Three Jewels. The Empress was no less eager in showing her piety. Works of charity were instituted by her. Buddha, in the disguise of a sick man, is said to have been cured by her in one of her hos¬ pitals. These examples were imitated by nobles, and much wealth was lavished on the pious cause.

Even under this marvelous progress of Buddhist influence, the old faith in the kami kept its hold firmly on the people. The con¬ struction of the central cathedral was com¬ pleted primarily on account of the oracular sanction given by the Heaven-Shining Deity. The alleged sanction was based on a concil¬ iatory explanation that the Deity herself was a manifestation of Buddha. This compromise gave a stimulus significant for the further de¬ velopment of Buddhism, both to its gain and loss. The step became once for all a typical model of the further amalgamation of Buddha's religion with the old worship. The compromise was a natural outcome of the Buddhist propa¬

ganda which was largely carried on by the means of outward splendor and the idea of im¬ mediate helpfulness. Of course, these were aided by the teaching of Buddhist phdosophy and by moral disciplines, both of the monks and of the laymen. But this wisdom and morality, on the one side, and the ideal of salvation, on the other, were rather loosely connected. The rebirth in a heavenly world, rather than the ulti¬ mate enlightenment, and in addition, the worldly benefits which the religion afforded, were the chief attractions.

This circumstance furnished the reason for the religious arts of this period

— chiefly mural paintings and sculpture. The Buddhism adopted by the Japanese was, first of all, a religion referring constantly to beauty. The classical period of Japanese sculpture, which has never been excelled by the later ages, was the result. It is perhaps needless to state how Buddhism refined the aesthetic sentiment of the people by its arts, gave a stimulus to the building of more lasting abodes by its architecture, and made firmer the social organization by the help of its hierarchic institutions.

The removal of -the Imperial residence from Nara to Kioto in 794 marked a parallel change, not only of the chief seat of Buddhism but in its doctrine also. One monastery on a hill near the new. capital, known thence as Hiei, and a temple in the town were founded under Imperial patronage. The two most conspicuous personages in the history of Japanese.Buddhism, Saicho (whose posthumous name is Dengyo, 767-822) and Kukai (posthumous Kobo, 774- 835), were despatched to China in 804. This opened a new path for Buddhism, and they started a new departure. The religion of these two was characterized by its elaborate system of mysticism, most probably a form of Bud¬ dhism mixed with Hinduism and Persian Magism. . Here doctrine and ideal, philosophy and religion were more closely connected than in the Buddhism of the preceding period.

Dengyo's teaching was founded upon the Buddhadology of the Lotus of Truth the Tohan- nine Gospel of Buddhism, so to speak. In it the personal Buddha was revealed in his real, though quasi-historical, and spiritual aspects. The historical Buddha, the revealer of the Way to Truth, is at the same time the Truth itself. These two aspects of Buddha's personality, to¬ gether with his manifestations to believing spirits of all possible varieties, make up the Buddhist Trinity. All the practices of virtue, meditation, mysteries and the wisdom of philos¬ ophy are, with Dengyo, to be concentrated in the belief in the trinitarian Buddha. Though the mystic side was the chief source of the influence which Dengyo and his successors exercised upon the court, other sides of his religion were cultivated in his monastery on Mount Hiei. In this way the hill monastery became a centre of Buddhist religion and learn¬ ing and several branches of the later Buddhism flowed out of this fountain.

On the other side. Kobo's Buddhism loses sight of a personal Buddha in the mist of a mystic pantheism. It was a curious combina¬ tion of phantastic idealism and extreme ma¬ terialism. The mystic practices founded upon this doctrine became the chief attractions both to the court and the people. Kobo's ingenuity and zeal gradually overshadowed Dengyo's in-

fluence and many of the latter's followers found it more useful to emphasize the mystic side of their master's teaching. Thus the Japanese Buddhism of the four centuries from the ninth onward was chiefly a religion of mysteries.

During this period the growing centraliza¬ tion of the government and the splendor of the court life, on the one side, and the hierarchic system of the two centres of mystic Buddhism, on the other, helped one another in their growth. Buddhist ceremonies became the order of the day in the court. Sermons and sacra¬ ments in numerous temples were attended by throngs, both of the high and low in rank. Bishops and abbots became dignified nobles, exercising their influence upon affairs, political and military.

Still care must have been taken of the kami of old. The amalgamation of the kami-worship with Buddhism went on. While Dengyo's at¬ tempt on this line was not quite successful, Kobo's mystic pantheism was just fitted for embracing the old deities into the Buddhist pan¬ theonˆ The Ryobu, or syncretic, Shinto now came into vogue. Every Shinto sanctuary was attended by Buddhist priests and their rituals were a mixture. But as the Shinto belief was affected by Buddhism, so Buddhism was to a great degree influenced by the Shinto religion. We can speak of a systematized Shinto as ex¬ isting after this time, and the syncretism con¬ tinued till the Restoration of 186S.

The sway of the mystic Buddhism, how¬ ever, was not limited to the external aspects of religious exercises. In the midst of solemn ceremonies and the luxurious splendor of the court life, the evanescence of worldly things was felt and the aspiration for an eternal bliss become conspicuous. The people, who had long since ceased to be naive children of nature, were led to the conscious consideration of the problems of human life and to self-introspec¬ tion. Side by side with painting and sculpture, literature imbued with Buddhistic sentiment be¬ came a great influence. Romantic sentimental¬ ism, combined with an uneasy spirit, marks many romances of the latter part of the period. Thus a current of disquieted and aspiring emo¬ tion was flowing under the external brilliancies, both religious and social.

III. Religious Agitations (1200-1600).— The above-mentioned current finally manifested itself in a powerful way, when the Fujiwara clan, which furnished the sole directors of the flourishing court life and the ruling political forces, was overpowered by the military clans. Political and family strifes in the middle of the 12th century brought the weakness of the court to the light of day. To the place of the Fuji¬ wara nobles the military clan of Taira suc¬ ceeded. But this latter enjoyed only 30 years of luxurious life and was crushed by the Mina- moto clan (in 1185). Instead of the refine¬

ment and luxury of the preceding rulers the Minamoto rule was a stern militarism, and they ruled the whole country with their headquarters in an eastern province. This momentous change, though long since prepared for, impressed deeply the people in the capital and the western provinces. Cherry blossoms in full bloom were dispersed suddenly 'by a frosty storm. Not only the poets felt so, but all the neople saw the change actually take place before their eves.

It was not a mere political revolution. The

Buddhist hierarchy lost its power together with its political supporters. The people's longing for a simple and appealing faith was no longer satisfied by elaborate mystifications and gor¬ geous rituals. The result was the rise of pietism.

The germ of the pietist faith had been, for a hundred years, fostered in the monasteries belonging to Hiei. Faith in Amita the re¬ deemer in the Western Pure Land (Jodo, or Sukhawati) had its propagators in several writers, painters and itinerant preachers. The time was ripe for its rise ; sentiment and aspira¬ tion demanded it. Its coming into power was signalized by Honen (1133-1212), the promul¬ gator of the faith in the turn of the 12th and the 13th centuries. Honen opened the only- gate of salvation that all might enter by a sim¬ ple and devout faith in Amita's redeeming power. Amita's grace, into which we can be taken by invoking his name, was the gospel he brought forward to the salvation of him¬ self and all those who would follow his faith. Conversion in masses took place ; conversion of the nobles and courtiers amazed by the sud¬ den decline of the court splendor, of the mili¬ tary men disgusted with their barbarous pur¬ suits, of the common people long since dis¬ satisfied with the mere outward forms of reli¬ gion. His saintly personality with his simple gospel of salvation was indeed a revelation of the serene light issuing from the Western Land of Bliss.

Honen was succeeded bv many able disciples. One of them, Shinran (1173-1262), popularized the faith by still more appealing doctrines. He disregarded the signs of Amita's grace, the abundant repetitions of the Buddha's name ; he also abolished the prohibition of the marriage of priests: all in contrast to his master. Not "virtues® but "faith® was his sole watchword. This was quite a new phase in the history of Buddhism; Shinran's religion (now called the Shinshu, or True Doctrine) continues to this day to be the most influential in Japan.

The pietists were followed by a prophet I" the first half of the 13th century Kublai, the Mongol Emperor, subdued nearly the whole of the Asiatic continent, and his army and navy began to threaten the Island Empire.

Great were the fear and the commotion throughout the country. Nichiren (1222-1282), the prophet, took this opportunity to warn the nation that it would be vanquished by the invaders, unless conversion to the true faith should take place. His faith was the orthodox teaching of Buddha as taught in the Lotus of Truth and his tenet consisted in the adoration of the Truth by uttering the title of the Scripture, which he considered to embody the Trinity. With this cry of "Return to Buddha® and his prophetic utterance in the tone of a Jeremiah, he opposed every prevailing authority, both political and ecclesiastical. Insults followed bv trials and prosecutions, only helped to strengthen his en¬ thusiasm. At last, during his exile in a re¬ mote island, he attained the conviction that he was the Suffering Sage whom Buddha had des¬ tined for the propagation of the Law in the latter days of the world. After this, in a re¬ tirement of eight years, his thought was occu¬ pied with the spread of his Buddhism from Japan to the whole world. Though his dream of universal religious unity remained unreal-

lzed, his prophetic zeal and his patience in suf¬ fering were emulated by his disciples.

T o the awakening of faith in various ways another new feature was added by the intro¬ duction of Zen Buddhism. Eisai (1141-1215) and Dog.en (1200-1253) were its agents. They differed in the transmissions of the method and in the characteristics of its practice, the for¬ mer's being mystical and the latter's practical. But both taught a simple and direct method of emancipation from worldly troubles by prac¬ tising Zen (Dhyana) or meditation. The method is characterized by the absence of dog¬ mas and consists in simnly striving to realize one's own inner self. There the practitioners are taught to arrive at Buddha's wisdom which is coeval with reality. But reality does not exclude phenomenality. When once the inner¬ most self is realized, everything, though seem¬ ingly ephemeral and offensive, becomes resplen¬ dent with bright rays of eternal light. It was quite natural that this simple method converted many warriors. The Buddhism of temples and rituals wa's substituted by that of the fields and camps.

In the pietism of Honen, the revivalism of Nichiren and the intuitionalism of the Zen prac¬ tice, Japanese Buddhism attained its own stand¬ points. These new departures, which were con¬ comitant with the growth of national sentiment influenced the life of the nation in evˆry respect. Visions of the blissful superhuman existence, resulting from pious faith, or nature and land¬ scape in their appeal to serene meditation, be¬ came the theme

of paintings. Rhapsodists re¬ cited the rise and fall of the contending clans with many episodes in which figured the men and women who were saved from sorrow and agony by faith. Religious teachers wrote their epistles and hymns in simple yet powerfully appealing Jaoanese, in contrast to the dogmatic treatises of the preceding period, written in Chinese. Monasteries and mansions, hermit¬ ages and cottages came to have closer touch. Popular education instead of profound philos¬ ophizing; counsels and services relating to daily affairs instead of mysteries and rituals ; these were the instruments of the propaganda. Tea, fans, kakemono, caligraphic drawing, Japanese smile, the sternness of expression, everything now known as peculiarly Japanese is the prod¬ uct of these influences, directly or indirectly.

The firm and peaceful government under the military dictatorship which lasted over 100 years in the 13th century, was followed by political disintegration. The Age of Wars lasted from about 1330 to 1600. It was also the age of reli¬ gious conflict. The followers of Shinran in¬ creased rapidly throughout the country. They organized an almost extra-territorial church, with the abbot of Hongwanji (their central temple) as their head. The old centres of Bud¬ dhism on Hiei and other mountain temples were occupied by armed bonzes. The mission¬ ary zeal and fervent attitude of Nichiren's fol¬ lowers everywhere encountered bloody resist¬ ance. Religious bodies and orders became mili¬ tant and fought not only each other, but feudal lords also. In the midst of this confusion minor sects arose. Every nossible idea and practice found its promulgator and followers. It was the Zen monasteries that cared for the preservation of literature and the cultivation of useful arts during this time.

Some attempts were made at organizing the Shinto religion which had almost been absorbed into Buddhism. Chikafusa (died in 1354), the patriotic court noble, tried to combine Japanese mythology with Buddhist cosmology and in that way to explain and confirm the divinity of the sovereigns. He became, in this latter respect, a forerunner of the nationalistic Shintoists of the 19th century. A family of diviners, Urabe by name, and its chief repre¬ sentatives in the 16th century founded a school of Shinto, called the Unitarian Sect (Yui-itsu), in antithesis to the syncretic or double Shinto. But in reality it was a combination of Dengyo's Buddhism with several alien ingredients. In their writings, profound philosophical sayings are found side by side with curious explanations of mystic practices. Another branch of Shinto was. found in the 16th century, though its com¬ pletion dates from the next century. It is named the Geku-Shinto, having been organized by the priests of the temple Geku, a counter¬ part of the shrine dedicated to the Heaven- Shining Deity. The system was much imbued with Confucianistic elements, not in moral teachings but in cosmology and divination. All of these priests who formulated doctrines

were voluminous writers, but their influence was not great.

The agitation was increased by the unex¬ pected arrival of the Jesuit fathers in the middle of the 16th century and by their amazing success, which was partly due to the fire-arms which their countrymen imported. Some feudal lords got the new fighting instruments to¬ gether with. their new faith. They fought their neighbors with the help of the rifles ; temples and shrines were devastated. The rise of the Jesuit propaganda culminated in the establishment of a central cathedral in the capital (in 1568) under the patronage of Nobunaga, a feudal lord who then ruled in the capital. Nobunaga was a mortal foe of the Buddhist soldier bonzes and fought them incessantly. It was his re¬ ligious policy to welcome the new religion. The converts numbered at that time nearly 300,000, among whom there were not a few feudal lords. But the turn of their fate began with the death of their patron in 1582. His suc¬ cessors endeavored to expel the missionaries and the obstinate converts from the country. The last blood of the martyrs was shed in 1638, when the stronghold of the Christian in¬ surgents was crushed. Unexpected as was their arrival and amazing as was their success, the Jesuit fathers disappeared from the. country like a comet. Their name corrupted into Jap¬ anese (

The period which had a glorious start of religious awakening ended thus in a miserable absorption of religion into politics and battles. Nevertheless the beliefs sown in the heart of the nation still remain and may grow up again.

IV. Peace and Stagnation (1600-1868).— The complete extinction of Christianity was

synchronous with the firm establishment of the Tokugawa Shogunate. The new regime put an end to the age of warfares, both feudal and ecclesiastical. The policy of the new govern¬ ment in regard to religion was to keep, strictly, the status quo of the various branches of Bud¬ dhism and to guard against any rise of Chris¬ tianity by means of the religious census en¬ trusted to Buddhist priests. Each Buddhist body was allowed self - management but no change of area of jurisdiction was allowed. The state churches, so to speak, were richly patronized by the authorities. Stagnation began in ease.

Another remarkable feature of the state management was the establishment of an ortho¬ dox Confucianism as a system of moral in¬ struction apart from ecclesiastical institution. The orthodoxy was founded upon the

writings of Chu-hi, a Chinese philosopher of the 12th century. Obedience was the first and last of his teaching, and this was the best suited to the intention not only of the central govern¬ ment, but of the feudal states, all of them now eagerly seeking to keep peace and to establish order. The Samurai (comprising the warrior and ruling class) were trained in the orthodox moral teaching. The morality of faithfulness, stern justice and rigorous self-discipline com¬ bined with the code of honor, which had been fostered among the Samurai during the long Age of Wars. These made up the Bushido, the way of the Samurai. See The Samurai.

The establishment of the orthodox teaching had two kinds of consequences. One was the general indifference of the Samurai class to¬ ward religion, and a feeling of antipathy toward Buddhism. Though Confucianism was not destitute of cosmological and philosophical speculations, its centre of gravity fell on prac¬ tical morality. Self-discipline, domestic man¬ agement and state government were the cardinal interests of its teachings that were now adapted to the orthodox teaching current among the Samurai. A positivism and a Stoicism like this is necessarily an opponent of religious faith. Thus Confucianism, which had been trans¬ mitted chiefly by Buddhists, now became their opponent. Buddhism incurred an antagonism for the first time in the history of its exist¬ ence in Japan, from an orthodox Confucianist in the middle of the 17th century. His example was followed by nearly every Confucianist of subsequent years. This. anti-Buddhistic tend¬ ency among the Samurai class raised its voice most at the time of the Restoration and is felt even to-day.

The other consequence was neglect of the moral training of the common people and con¬ tempt for the merchant class. Not only was the moral code of the ruling class incapable of refining the people, but it was more conven¬ ient for the rulers to keep them as blindly obedient servants. Husbandry was regarded as the only source of wealth, but husbandmen were mere producers. Trade was thought a treacherous occupation and merchants were treated as base, contemptible people. It was quite natural, in this condition of society, that general education was left in the hands of poor schoolmasters who taught reading and counting only, or at the mercy of Buddhist priests, who became more and more corrupted in conditions

of ease and security. To meet the need there arose, in the middle of the 18th century, an ethical movement which was humanitarian in its spirit and popular in its practice. The move¬ ment is known as the Shin-gaku, or mental learning, which means the culture of the mind. The teachers of this popular education were men of admirable character, their teachings were quite broad and plain, and their lectures and writings were persuasive in tone, attractive and intelligible to all. The movement flour¬ ished, and continued to have great success up to . the end of the Shogunate regime,

when its quiet and meek character no longer fulfilled the need of the new reign.

Buddhism enjoyed, as the patronized re¬ ligion, a peaceful slumber during this period. But its activity never totally died out. It was during the peaceful times that most of its writings were printed, and that, a thing more important, the dogmatic system of each of its sections was .organized, so that in form it reached the utmost refinement. Strifes of orthodox, teachers of dogma with heretics were characteristic of Buddhism at this period. Ap¬ peals for decisions were often taken to the government and many tragi- comedies were played by the meddling of the officials with subtle dogmatic discussions. Curiously the Shinshu men, the followers of the pietist re¬ formers of the 13th century, were foremost in these struggles.

Among the Confucianists appeared many men of more or less original genius, more of them outside the orthodox circle than within. Their struggles with the orthodox teachers and also among themselves were so severe that the government at last found it necessary to pro¬ hibit the heretical branches. Still they made common cause with the orthodox men in their attitude against religion.

To these opponents of Buddhism was added a new factor, i.e., the revival of Shinto. The first section of the revivalists was composed of learned Confucianists and Samurai. Their creeds amounted to obedience to the heavenly reason and to its practice in loyalty and filial piety. Loyalty, not only to the feudal lords, but to the imperial throne, and filial piety, chiefly expressed in ancestor-worship, made them ad¬ vocates of the Shinto belief. Thus the ortho¬ dox Confucianism adopted by the Shogunare government became, one of the factors which threw down the existing regime and restored the imperial authority. The second section of the new Shintoists were Japanese philologists. Studies of the ancient mythological and his¬ torical writings, the. first impetus to which was given by a Buddhist monk, were now used for. the revival of the ancestral religion in its ancient and pure form, at least such as these philologists thought it had been. Indeed, their Shinto was free from Buddhistic and Confu- cianistic elements, but the most prominent of them, Hirata (died- 1843), was already in¬ fluenced by European learning. These men and their followers contributed to the restoration of. the imperial regime and influenced the re¬ ligious policy of the new era. But their re¬ ligious influence was not deep.

Another remarkable feature of the Shinto revival was the appearance of some theistic Shintoists during the last century of this period

They considered themselves Shintoists and they are called so. But in reality their beliefs were loosely connected with ancient traditions. They were men of original religious experiences, al¬ most visionaries. Kurozumi (died 1849), the most prominent among them, can be called a propounder of almost pure monotheism in a very simple and devout form.

V . The New Era, Progress and Problems (1868 —). — The new era opened with the res¬ toration of the imperial authority in 1868. Chauvinistic Shintoists and Confucian samurai, both prominent agents in the political trans- iormation, tried at once to establish a national religion. The National Cult Department stood at the head of the new government and every means was taken to exclude Buddhist influence. All the privileges granted to Buddhist priests and temples were abolished. Buddhist were driven out of the kami-temples that they were attending; images, decorations, scriptures etc., were taken out and burned. Even cremation which had been introduced by the Buddhists was prohibited. The purification of the na¬ tional religion was carried out, after 1,200 years of its mingling with Buddhism. The establishment of the Shinto faith as the state religion was fatal to Buddhism in its material aspect, but this loss was to be compensated by its spiritual reawakening. The zeal of th*e Buddhists, combined with the unstable social conditions after revolution, influenced the gov¬ ernment to the extent of instituting an Ecclesi¬ astical Board, under the supervision of which both Shintoists and Buddhists could preach the "patriotic and humanitarian principles" as the authoritative teaching of the state (1872). The two religions now stood on an equal footing. After three years the board was dissolved. Buddhist churches were allowed their respective independent management, . and Shintoists were ordered to organize their own bodies apart from the court ritual. The fervent Shinto revival subsided, after a few years' sway, and the freedom of belief was pronounced de facto.

The same year (1875) witnessed an event decisive for the progress of Christianity. This was the return of Neeshima from America and his founding the Doshisha Theological School. Prior to this, the prohibition of the Kirisitan Bateren had been withdrawn (in 1872). Young men converted to the Christian faith gathered themselves together in several towns, with a high aspiration. — to enlighten themselves and their countrymen. Firm in their belief, they had withstood the effects of the suspicion and hatred of their neighbors and the threatening of their Samurai fathers. Now these enthu¬ siasts found their leader in Neeshima. The opening of the campaign for the Gospel at the beginning of the new era was a bright one and its rapid progress uo to the end of the eighties vyas astounding. The amount of the educa¬ tional works produced by Christian mission schools during

these years can never be over¬ estimated. The moral ideas which Christianity has sown are now bearing frin't, especially in the matrimonial relations. S"de bv side with the Protestants, the works of the Roman Catho-hc and the Greek Orthodox missionaries pro¬ gressed steadily among the lower classes. The Christianization of the whole nation had once seemed not to he a mere drearn. But this was a surface current. A parallel current of

agnosticism and a hidden one of reaction once more manifested themselves.

The Samurais, who had once been against the opening of the country to the "foreign barbarians," ran to the other extremity after the Restoration. Everything European or American seemed to them to be the best. To¬ gether with railroads and telegraphs, Rousseau, Mill and Bentham were welcomed indiscrim¬ inately. The rapid progress of Christianity, especially Protestant, was partly assisted by the Europeanizing tendency of the time. But the nationalistic ideas never died out. When, to¬ ward the end of the eighties, problems of the treaty revision with foreign powers gave rise to anti-foreign feelings, reaction made itself felt in the religious sphere. Buddhists were foremost in the anti-Christian movements. All conservatives, many of whom were Shintoists or Conf ucianists, gathered under the banner of a "Buddhistic Patriotic Union" or of an "Association for the Establishment of the Na¬ tional Religion" — which they called "The Great Way uniting the Three Religions." They for¬ got their former antagonisms and joined hands, simply to oppose the foreign religion. They were also aided by young Buddhists who had studied Western philosophy and who fought Christianity with Draper, Renan, Spencer in their hands. Thus we see here a curious alli¬ ance of conservative reaction with agnosticism, the sciences and Indian philosophy. Indeed the Christianity which prevailed at that time de¬ served these attacks. By many of the converts it was accepted because it was the religion of the Westerners, who were inventors of the locomotive, or who spoke the "enlightened Eng¬ lish language."

The combined reaction was followed by more clearly nationalistic ideas. In 1890 an imperial rescript on the national code of moral¬ ity was issued. It was founded upon "the teach¬ ing of the Imperial Forefathers" and aimed at the unification of national morality. These features of the edict were made use of by some thinkers as the weapons to be used against Christianity and later against religious ~ faith in general. The war with China in 1894-95 gave a momentous impulse to the rise of the national consciousness and to the reawakening of the Samurai snirit. The educational circle that never allowed religious influence to come into it, and which was composed mostly of Sa¬ murai's sons, advanced from the attack on Chris¬ tianity and Buddhism to the attemnt to dictate to the

nation's conscience an authoritative prin¬ ciple. Shintoists now separated from Buddh¬ ism. Though the attempt to organize a propa¬ ganda of the nationalism failed, the ideas rep¬ resented the creed of the majority of the edu¬ cationists.

The religious problem of New Japan was now translated from the differences between the old and the new, or between Christ and Buddha, to the antithesis between religion and non¬ religion. Whether there is to be a religious faith or a mere moral teaching; this has been the point of the dispute since that time. Soon after the outbreak of the dispute a meeting of leading Buddhists, and Christians in friendly terms was held (in 1896). Some of the ad¬ dresses given at the meeting nronounced the hope that the followers of Buddha and of Christ might join hands against their common

foes, the advocates of irreligion. The meeting marked a turning point in the religious prob¬ lems and became the predecessor of the present Religious Union of Japan.

While a group of educationists was trying to invent a substitute for religion and religious leaders were looking for a new opening, the people were left to themselves. Most of the Buddhists sects were engaged in internal strug¬ gles. Buddhist teachers themselves were desti¬ tute of faith; neither their old traditions nor the newly allied philosophy was able to give them vitality. Some Shinto sects were founded or revived. Most of them had little to do with the nationalistic Shinto, but they represented various shadings of popular theistic religion. The most influential of them, the Tenri, or the Heavenly Reason, teaches that there is a sole Supreme Divinity and preaches absolute faith in Him. But these beliefs are mingled with superstitious practices and obscure cults. These dark sides became manifest when economic panics after the war were manifested by a general emotional depressioin. At the same time religious needs among the younger generation began to expess themselves in the two extremes, scepticism and sentimental pietism. There arose many unions of young Buddhists with various affiliations ranging from rationalism to revival¬ ism. Christian churches began anew to be thronged by young seekers after faith. The increased publication of religious essays and books of devotion, both Buddhist and Chris¬ tian; new editions of the writings of ancient Buddhist teachers ; the organization of religious and philosophical lectureships;' these signs showed an urgent demand for faith and truth. The seeking was naturally accompanied by un¬ easiness and disquietude of head and heart. The general dissatisfaction with the prevailing forms of religion and ethics

gave opportunities for the rise of several extreme propositions and theories. Tolstoi, Nietzsche, Leopardi were often referred to. These disharmonies marked the turning of the century and in the midst of the struggles and conflicting influences the war with Russia (1904-05) broke out.

The religious and moral struggles which seemed to have subsided during the war be¬ came again prominent soon after its close. Adoration of the way of the Samurai and plead¬ ing for the ancient patriarchal system, ancestor worship, etc., followed the celebrations of the victories. Militarism is getting more hold in education. Side by side with the advocates of these reactionary ideas there appeared some who alleged that they had seen in vision, God or Buddha, and some prophets who pretended to be revealers of new truths.

In the religious movement of contemnorary Japan three points are to be noticed: (1) The conservative reaction amounting to the advocacy of the national Shinto religion, in conjunction with the patriarchal system of the family; (2) the revolting spirit among the younger genera¬ tion, their radical individualism and spiritual disquietude; and (3) the problems concerning the relationship between Buddhism and Chris¬ tianity, including the question of adjustment of the. latter to the genius and the needs of the nation. . The .first of these stands in a close connection with the political reaction against the constitutional or democratic regime ; and the co-operation of the conservative politicians

and the educational authorities is endeavoring to dictate to the nation's conscience a moral code, which is national and secular and there¬ fore anti-religious in principle and applications. This has ever been a powerful factor in the religious and moral movement since the nineties of the last century, but its influence or coercion is now being sharpened in reaction against the rising radical tendency, combined with spiritual aspiration and uneasiness of the individual. The disquiet and yearning spirit of the individ¬ ual, especially among the rising generations, does not know wherein its course should con¬ sist, and consequently runs easily to an extreme of revolting spirit against anything traditional or authoritative. This critical situation is ag¬ gravated by the social unrest caused by the rise of industrialism, the consequent uneven dis¬ tribution of wealth, the pressure of the rapidly increasing population, and more especially by the bewildering conflicts of religious and ethical ideas.

ixub last aspect oi me present situation is chiefly a consequence of the deficient vitality °f Buddhism and of the retarded progress of Christian propaganda, in short of the weakness of religious influence at large. It is a question whether Buddhism could revive its edifying energy, but it is certain that the religious ques¬ tion of Japan cannot be solved without taking into

account the deep-seated heritage of Bud¬ dhist influence. On the other hand, Christian¬ ity is facing grave problems of how to adjust itself to the genius and needs of the Japanese, as well as of how to face the anti-Christian or non-religious ideas introduced from the West into Japan. The question of Buddhism versus Christianity is being shifted to that of religion versus non-religion, or in other words, of uni¬ versal ideal versus national ethics. A light may, however, be discerned in the cordial relation¬ ship and mutual understanding between some leaders of the two universal religions existing in Japan, and in their co-operative attitude toward various religious and moral problems of the day.

*Bibliography.— Anesaki, < Religious and Moral Development of the Japanese Religion> (Harvard University Press, 1918); Anesaki, (Nichiren, the Buddhist Prophet5 (1916) * Aston, Shinto, (Lon¬ don ; Cobbold, (Religions in Japan:*

Buddhism, Shintoism, Christianity5 (London 1894) ; Griffis, (The Religions of Tapan5 (New York 1895); Harada.

aLInterpretatlon> ˆNew York 1905) ; Knox

Masaharu Anesaki,

l tofessov of the Science of Reliqion, ImbeYicil U niversity, T okio.

\2 JAPANESE LANGUAGE, The. No

vital affinity with any other language has been demonstrated for the Japanese, though in its structure it may be grouped with the Uralo- Altaic tongues, in which are the Korean and Turkish. By the late Mr. Hirai much labor was spent in showing its close relation to the Aryan stock, while the apparent identity of many of its roots with those of the Hebrew was proved by the late David Thompson, one of the long line of American scholars who have

*furnished keys to the treasures, and bridges to the mastery, of the colloquial and written lan¬ guage; in the public spoken use of which, in Japan, Americans have notably excelled. Pre- \ious to contact with China, whence writing was borrowed, the old Japanese language, or dialect, * was as relatively free from Chinese elements as was the Anglo-Saxon pre¬ vious to contact with the Romans. The ancient i9or\t0 rˆuaˆs and the classic literature (ante 1200 a.d.) are expressed in this archaic tongue. The*

written language is much more closely allied to ancient models and idioms, differing from the modern colloquial fully as much as Latin does from Italian, while also the daily talk of the plain people is in notable contrast to that of the modern educated man. One finds also that the speech of the native women ap¬ proaches a standard of purity unknown among the men. From the 6th to the 19th century the Japanese borrowed wholesale from the Chinese, mostly in vocabulary, though even idioms and the structure of many sentences have thus been modified. In this way the vol¬ ume of the original language has more than doubled, the additions filling large dictionaries. Yet since 1860, through the coinage of new terms transferred from the Chinese and the combinations of ideographs made in Japan, the repertoire has been immensely enlarged. A Japanese of, say, 1850, could not make much of the book and newspaper language, or even the conversation of well-bred men of to-day. The classic style is much in vogue for books, correspondence, advertisements and legal docu¬ ments, though a mixture of both styles is pre¬ ferred. The softer speech of the female part of Japan has little to do with sex or cultivated charm, but is to be ascribed rather to the greater use of their mellifluous native tongue in its comparative purity and extreme richness of vowels and liquids. The men make a large use of Sinico-Japanese, or words derived from the Chinese, very much as we employ terms which, hy the thousands, are borrowed from the Latin or Greek. Yet no Chinese can un¬ derstand even the vocabulary of spoken Japa¬ nese, for the two systems of pronunciation are both old and of course modified by long use in an alien country. The first (Go) was im¬ ported from southern China a thousand years ago, when Nanking was the capital. The more modern (Kan-on) was brought from North China, when Peking was the chief city, mean¬ while suffering change in Japan; while also both systems were and are used. The differ¬ ences between Pennsylvania "Dutch and mod¬ ern German and "Mohawk* Dutch and the Holland tongue of to-day suggest parallels. The kana, or syllabary in use, can only par¬ tially express foreign sounds. Hence, for ex¬ ample, the rendering in the native newspapers of the candidates (there being no l in Japa¬ nese), Blaine and Cleveland (Buraine and Kure- burando), or of the English name, Longford, as Ronguwanudo. When the Japanese bor¬ rowed letters from the Chinese, who had no alphabet, they in time, and traditionally under Kobo Daishi (774-835 a.d.), invented a svlla- bary of kana, or side letters containing 47 char¬ acters. This, with diacritical marks, now in¬ cludes 73 signs, of which 68 are used and is written in two forms, the square (kata) and the round or curved (hira). Though always*

despised by the scholars, this writing is much used by the common people in the popular books and newspapers to give the sound of the less known Chinese characters, fresh coinages of pen and brain and foreign names and

places; much as vve, in our dictionaries, make visible and potentially audible the pronuncia¬ tion especially of uncommon, new or foreign words or names. The foreign student, there¬ fore, attacking Japanese for mastery must really learn three languages in one. If to this he would achieve power to write it fluently and exactly, he must learn a script that foils a Chinese and means the attainment of from two to six thousand signs expressed in the books and in four or five styles of script Nevertheless the task set Defore native children, who grow up in a home and social atmosphere created by centuries of Buddhism, Shinto and Confucianism, with an environment of native traditio.n, necessity' and custom, to which the adult foreigner is as a babe, has been greatly exaggerated by outsiders. So also has the impersonal and honorific elements, which are part of the common life of all, but which, when rendered with senseless literalism by an alien, are caricatures. Jo use the words "august, "honorable,* etc., in constant repetition, as for¬ eigners usually do in trying to reproduce Japa¬ nese honorific speech, comes as near to reality as does "pidgin English* or the "Yokohama dia¬ lect* to the correct standard of language as used by either a Japanese or an American gentleman. As an instrument of thought for use in the modern world, the language of Nippon has marked limitations and defects, but for daily use at home, easy conversation, ordinary human intercourse and in some notable lines of ex¬ pression that reflect nature's realitj'-, influencing the national history, tastes and temperament, it is unsurpassed. Prof. E. W. Clement, an American, long resident in Japan, gives his verdict thus: "The Japanese language is in¬ volved, complicated, impersonal, neutral, ob¬ scure, but also pretty, musical, logical and polite. Some Japanese argue stoutly for the superiority of their language in stating first the substantive of the main object or theme and the action concerning it afterward. For ex¬ ample, we say in English, "see the moon,* but in Japan, "the moon see.* The patriotic subject of the Mikado argues that the moon was first and man next, the visible object being prior to the act of seeing. So also one word for house is ya-ne, or roof-root. This is because, in Japanese house building, the very heavy roof is made first of all (to secure the structure against earthquake shock, which passes usually before the possibly destructive motion is com¬ municated to the structure, the top weight hold¬ ing the whole secure) and the rest of the edi¬ fice is made to fit the roof. So with hundreds of words, which hold and reproduce the race- memory and state the actual fact, which seem strange to us, but not to the natives. Funda¬ mental features of this agglutinative language are the unchangeabiHty of the root, the pre¬ cedence of the qualifying word before the thing qualified, the placing of the dependent or ex¬ planatory clauses before the main statement and of the object before the verb, with the predicate at the end of the sentence, and the general use of post positions instead of prepo¬ sitions. Inflections are few or at the vanish-*

ing point. The nouns have no gender, number, person and hardly any case, though the first foreign grammarians from southern Europe tried to learn and teach this language accord¬ ing to the framework of Latin accidence, be¬ cause there are particles that suggest case. The adjectives have no degrees of comparison and there are no true personal or possessive pro¬ nouns. So much for the negative side ! On the other hand, the abundance of honorifics which were developed in the feudal age of manifold gradations of society, serve admirably in lieu of pronouns. The natives experience little difficulty in addressing each other, or in dividing in their own minds between meum and tuum. One creditable feature is seen in the almost total absence of the verbal appa¬ ratus for cursing or swearing, the language also being very deficient in terms of abuse. Indeed, the spirit of the tongue of Japan has been described as <(in honor preferring one an¬ other.® Since also the introduction of Occi¬ dental ideas and the literary, social and polit¬ ical machinery of the West, with new molds of thought and channels of expression, Japa¬ nese speakers have developed a power of oratory and an adroitness in debate that has proved to be as vigorous and effective as that heard in other deliberative bodies. Many of the old words have been, as it were, born again, with a larger soul. The drama, the stage and the story teller's booth have for centuries been the home of good elocution, but the method of reading audibly in public among the Japanese differs notably from our idea and practice of rendering with expression and feeling, so as to make true interpretation of text or author. With little attention paid to closrng periods, or the beginning of sentences, and catching the breath in a curious way, there seems in this mannerism little feeling or attractiveness. The same irritating defect, as we deem it, smites with disgust the ears of the teacher of English, when his pupils <(read® our authors. The Japanese verb, as shown by the masterly analysis of Verbeck, has complications known, perhaps, in few other languages. It possesses a negative passive voice and also potential powers and significations which in our lan¬ guage are lacking, but which by an adroit speaker are very effective on the stage, pulpit or rostrum. Striking negative features are the absence of personification and the almost total disuse of metaphor and allegory. This makes the acquisition of Japanese the more difficult to a foreigner, and especially is this true in public discourse to one whose mother speech is so rich in figures, personification, metaphor and allegorical concept. One curious effect is the inability, in Japanese, to join a neuter noun to a transitive verb. No such terms as heat or cold, science or the emotions can be rendered in our way, such as< (

native language books closely resembling More's (Utopia, J Gulliver's

travels5 and Bunyan's (Pilgrim's Progress.) The pronunciation of Japanese is easy and there is little trouble from the dialects. The most notable of these are found in the Riu Kiu (Loo Choo) islands and in the northern provinces, where a hodgepodge, or patois, made up of words brought by im¬ migrants from all the lower provinces is in vogue. Archaic forms are much more numer¬ ous in the south and west, which are the older seats of civilization. In a word, in the new north or latest settled portion and in the south, the oldest part of the empire, there are the greater variations. The Ainu tongue, spoken by the aborigines, in Yezo or the Hokkaido, is Aryan. Japanese writing is in its beauty of form vastly superior to our script and callig¬ raphy is with this people one of the oldest of the fine arts and forms of culture. The use of the brush-pen, directed, not from the wrist but from the shoulder, has helped pow¬ erfully to educate a race of artists. Yet, strange to say, the sign manual, or signature, does not hold the same place in Japan as with us. Only a man's seal is accepted as legal. As compared with the inexhaustibility and po¬ tentiality of the written characters the Japa¬ nese is noted for its poverty of sounds. Its homophony — so many vocables having the same sound in the colloquial — is great ; but, while endless punning is possible, it is not wel¬ come in conversation in which elegant ex¬ pressions are rather sought for, the speaker's meaning being made plain by the context, peri¬ phrasis, or the use of many <(bundle words,® of which we in English have comparatively few, such as <(head® of cattle, <(flock® of birds, etc. Herein lies another reason why the written and the colloquial forms in both vocabulary and structure differ so markedly. In the written language, no fear of misunderstanding troubles a penman, for with a separate symbol for each word — the eye, being quicker in apprehension than the ear, he can, at will, use or create new expressions or compounds. Hence also the wonderful affluence of Western technical terms and conceptions now in use, which only slowly pass from book to tongue and from learned text to common speech. Few or no professors in the universities can, without the written symbol, make their lectures intelligible even to trained listeners, while discourse in the bald vernacular, to a general audience, on an erudite theme, is impossible. Clearness is purchased only by the combined use of voice and symbol, making appeal to both ear and eye. It is possi¬ ble for a Japanese, who can draw from the in¬ exhaustible treasure of the Chinese ideographs, to render all abstract words and technical terms and every shade of meaning represented in the columns of an American newspaper or learned periodical. These borrowings fill large dic¬ tionaries while Gubbins' work in three volumes shows in part the transfers and coinages since 1860. These new modern terms inserted by the alert Japanese, though once despised by the Chinese, are now liberally appropriated by them, for use in the 20th century China of newspaper days and are gladly made use of also in textbooks and for both timely and abstruse publications. For this reason

it is quite certain that, for a long time to come, in Chinese Asia, the ideographic will hold its own

and triumph over phonetic speech or writing. About 1885 a strong movement was launched in Tokio to supplant the native script, by Romanization. The Romaji Kai, or Roman Letter Society, spent much toil, time and money in pushing the hoped-for reformation; but the writer of this sketch, at that time, told the chief promoter, then young, that he would count many gray hairs in his head before this desirable object was even measurably achieved. To-day, all idea of supplanting the Chinese characters is abandoned. While the colloquial is involved and prolix, the ideographic writing cannot be surpassed for terseness. As 85 per cent of our knowledge comes to us through the eye, one can see how, relatively, the Occidental is relatively handicapped and the Oriental is equipped. Even among us, the arbitrary signs, $ c. m., £ s. d. and the numerals 12 3, the mathematical and astronomical signs, etc. — a universal system — hold their own because of brevity, time-saving and easy apprehension. American scholars have borne an honorable part in creating an apparatus for the study and translation of Japanese. The pioneer labors of Van Reed, Liggins, Brown, Verbeck, Imbrie were followed by the grammar and dictionaries of James Curtis Hepburn, M.D., of whose lexicographical labors — the last edition of this great dictionary being in 1903 — one Japanese said, ((all others are but a second edition of Hepburn,® while the complete version of the Bible into Japanese is acknowledged to be one of the most successful of modern achievements of this sort.

Consult Aston's Grammars of the (Spoken Language' (1881); of the (Written Language' (1904) ; Chamberlain, (The Japanese Lan¬ guage' (1887) ; Satow and Masakata, (English- Japanese Dictionary of the Spoken Language' (1879) ; Imbrie, (English-Japanese Etymology' (1889); Prentys and Sasamoto, Japanese for Daily Use' (1905) ; Brinkley's cJapanese-Eng- lish Dictionary' (1896) ; Shimada, Y., (Eng- lish-Japanese Dictionary' (1897), and the valu¬ able papers in the transactions of the Asiatic Society of Japan' (1872, 1919).

William Elliot Griffis,

Author of (Japan — In History, Folk-lore and Art ; (The Mikado-Institution and Person .'*

13. JAPANESE LITERATURE. Gen¬ eral History. — Although the

antiquity of Japan¬ ese civilization cannot be compared with that of China or Greece, it dates from a remote age. The history of Japanese literature extends over a period of 13 or 14 centuries, and it is there¬ fore possible to give here only a brief account of its progress.

The 7th and 8th centuries a.d., which em¬ brace the Nara period and some time preceding, may be called the Grecian age of Japan, for those who have studied the relics of sculpture, pictorial art, and the architecture of each pe¬ riod are impressed by the strong resemblance. In the sphere of letters, however, the remains are comparatively few. This can be explained as follows. Although Japanese civilization was of a high order in consequence of the in¬ fluences of Chinese civilization and of Buddhism acting upon a nation eager for advancement, no vernacular letters had as yet been invented, and therefore books were written in Chinese

or a very complicated method which made use of Chinese characters to represent the Japanese language. Hence the number of books written was comparatively small, and many of those which were written seem to have been alto¬ gether or partly lost. Of those still remaining we have the (Kojiki) and (Nihongi' in history and the

The 400 years beginning with the 9th cen¬ tury are generally called the Heian era, and in some respects this may be called the Roman period. . It was during this age that Japanese civilization, benefiting by the influences of the Nara period, made signal progress in every di¬ rection especially in literature. The intellectual activity of the period may be said to have di¬ vided itself into two currents : one for the study of Chinese letters and the other for the growth of the native literature. But the study of Chinese literature became so prevalent that men ambitious to distinguish themselves de¬ voted all their energy to it and the writing of Chinese essays and poems was common, espe¬ cially among the court nobles. At the same time the progress made by the native literature was highly commendable. It is significant, however, that the study of the native literature was pursued chiefly by females, and most of the standard works were the production of women. Though there were no native letters during the Nara period, toward its close we have the Kana, or Japanese phonetic alphabet. But it was not until the Heian era that the system of letters was definitely settled, thus making it possible for the first time to write books by phonetically transcribing the native language. The books written according to the new system during these four centuries were numerous, and what may be called the Japan¬ ese classics were mostly the production of this period.

The literature of the period may be roughly divided into three classes. The first and most numerous are the books known as Monogatari; the second kind are the diaries, and the last, but not the least important, the

miscellaneous works. Monogatari literally means a narrative, but some of this literature are pure works of fiction, and some, such as the Yeika Monoga¬ tari, are historical works, though written in a somewhat novel style. There are also several books which are called Monogatari, but more properly belong to the third class. Works of fiction occupy the greater part of the Mono¬ gatari class. Here again, many books written during this period have been lost altogether; some are remembered by name only and others remain in a mutilated and confused form. The principal of those st'll remaining is the (Take- tori Monogatari' (Bamboo Cutter) — a short novel, considered to be the most ancient of its k:nd. A divine ma'den is the centre character of the narrative, which tells of many incidents of courtship by several admirers, ending in the

*ascent of the maiden to heaven. Consult (Victor Dicken's English translation). Next comes (Ise Monogatari. * Although this book is called Monogatari its style belongs more to the third kind — miscellaneous. Its chief interest lies in the poems it contains, and therefore it cannot have so much charm for foreigners as for Japanese. After these two works come the ' Yamato Monogatari, > etc., containing such stories as of a Japanese student who, on his return from China, was shipwrecked and in the course of time reached Persia, where he learned the secret of flute playing from a di¬ vine personage, or as of a young lady who was badly treated by her stepmother. The stories are always concerned with love affairs. Of all the Monogatari, however, the most famous is the) Of later productions we may mention the (Sagoromo Monogatari,* (Hamamatsu Chi- unagon* and (Konjaku Monogatari.* One note¬ worthy feature is that Japanese works of fiction of this era far excelled in several respects those of China of the same epoch. Of the (Nikki*. (diary), may be mentioned besides the (Nikki* written by the author of the (Genji,* the (Tosa Nikki* and (Kagero Nikki, * which were written before the (Genji,* and the Hzumishikibu Nikki, > etc.*

For several hundred years following the 13th century literature in Japan showed a significant decline. This was due in the first place to the fact that the authority of the imperial court suffered a decline concurrent with the rise of militarism, accompanied periodically by civil wars. Intellectual studies were totally neglected among the common people and scholarship in a large measure became a monopoly of the monks. This decay, in the second place, is at¬ tributable to the fact that the pure native litera¬ ture which flourished in the Heian era disap¬ peared, and a new style of writing arose, — a mixture of the Chinese character and the Kana. While resulting

in no improvement in the sys¬ tem of writing this produced much confusion, and the mode of writing was thrown back al¬ most to its condition in the Nara era. But the number of literary works produced during this period was not small, and they may be said to possess a significant peculiarity of their own. Enlightenment during the Heian period was confined chiefly to the nobles in the capital (Kioto), but unfortunately it became debased into mere empty luxury, resulting in the cor¬

*ruption and effeminacy of manners and customs. As a result, the literature of the period lacked vigor and force. The chief endeavor of writers was for refinement and grace. They became weak and diffuse. Moreover, the writers of the period were mostly women, and even men generally imitated the female style. Since the 13th century, however, the chief literary productions, as the result of the prevalence of the military spirit, dealt with war-like themes, though they were mostly written by priests, and were commonly known as (Gunkimono) (War Narratives). They were written somewhat in the style of romance, and, therefore, from a strictly historical point of view, may be open to criticism ; but nevertheless they form interesting reading. Of such books we may cite the (Hogen Monogatari, * (Heike Monogatari* and (Genpei Seisuiki.* Such were the general conditions from the 13th century to the middle of the 14th, which embrace the Kamakura and Hojo periods, and in fact the same conditions continued down to the end of the 1 5th century, namely, the Ashikaga era. The famous (TaiheikP was an early production of this age. Mention should also be made of the (Jingo Shotoki,* which was a historical work of a serious nature, with critical observations, a rare production in Orien¬ tal history. Another well-known book is the (Tsuredzuregusa,* which was written in pure Japanese style after the one which appeared during the Heian period, being a collection of short sketches in much the same style as the (Makuranososhi * (Pillow Sketches). (For specimens consult Aston's Japanese Literature). In conciseness and pointedness of expression it excels the standard works of the latter period and is classed among Japanese classics. The*

The period which can be compared with that in modern Europe dates from the be¬ ginning of the Tokugawa era down to our own day, namely, the last tnree centuries. For nearly 300 years, i.e., since the establishment of the Tokugawa Shogunate in the beginning of the 17th century, Japan enjoyed practically con¬ tinuous peace, the country during this time be¬ ing almost entirely secluded from the outside world. In this period intellectual study made great strides under the encouragement and patronage of the Shogunate itself and the feudal lords. Owing to the rapid growth of the new cities of Yedo (Tokio) and Osaka, the centre of literary activity, hitherto concentrated in Kioto alone, was now divided between Yedo in the. east and Osaka and Kioto in the west. This literary activity

was divided into three great phases: first, the revival of Chinese study; second, research into Japanese classics; and, third, activity in the production of all descrip¬ tions of fiction and dramatic pieces. As for the revival of the study of Chinese, it not only surpassed that of the Nara and Heian eras, but in the subjects of philosophy, history, Chinese poems and essays, the work was even an object of admiration of the Chinese themselves. The study of Japanese classics resulted in a better knowledge of the ancient books of the Nara and Heian eras, as well as in a clearer concep¬ tion of the Shinto doctrines. In the sphere of Pure, literature, however, the revival failed to regain the standard represented by the fManyoshu of the Nara era and other classical works produced in the Heian era. Thus we*

can see that the revival of both the Chinese study and the research into classical works, al¬ though both greatly helped the advancement of general culture, were unable to produce any brilliant native literature, owing to the fact that the first was altogether foreign to the native tongue and the second mainly limited to research into the works of antiquity. It is in the third phase — the growth of fiction and drama — that we must seek the real merit of the native literature. In scholastic attainments, the writers belonging to this class were not equal to those belonging to the other classes, but their imaginative power and adaptability far excelled the others. While the full scope and variety of the literary productions of the period cannot be given here, it can be said that these works of fiction may be roughly divided into three classes, namely, heroic stories, such as those of Bakin; love stories, such as those of Tamenaga; and the humorous miscellaneous works of such writers as Ikku.

Since the introduction of modern European civilization Japanese literature has shown new vigor, and books of all kinds have been written and published in such an innumerable number as is unparalleled in any past period. The great drawback of the modern system of writing is that it differs from the spoken language. Be¬ sides, the use of pure, phonetic letters, without mixing the Chinese characters, has long fallen into decay. Many a writer is now engaged in endeavoring to identify the written and spoken language and devising all sorts of forms of composition. In other words Japanese litera¬ ture is still in a transitory stage, and there¬ fore there are no standard works to show as specimens of the new literature It may, how¬ ever, be said that many valuable works have already been written by representatives of the new generation, with great promise of further progress.

Japanese Poetry.

The oldest Japanese verses in existence are those contained in -the (Koj iki ‘ (vide Cham¬ berlain’s translation) and the During the Heian era the compo¬ sition of Chinese poems became much more prevalent and collections which were then made were numerous. The writers were generally men, but women were not wanting. From the Kamakura era down to the Aslffkaga era, Chi¬ nese poetry declined in the general decay of all literary pursuits but was not altogether lost. During the last three centuries, together with the general advancement of literary study, Chi¬

nese poetry has made such a striking develop¬ ment as to eclipse that of the Heian ‘era. As, however, the Chinese school of poetry is after all foreign to our real purpose, we must dis¬ pense with a detailed account of it here.

The oldest Japanese verses next to those

*me (Koj iki } and (Nihongi) are those of the (Manyoshu. * The greater part of these belong to the Nara era, namely, the 8th century, and a portion belongs to the latter part of the 7th century. The most celebrated poet of the penod was Hitomaru, who flourished toward the latter part of the 7th century, and the next in degree is Akahito. These two are considered by common consent as the greatest Japanese poets. Next to these we may mention the Okunq Yakamochi, and a woman, Odomo Iratsume. (For specimens consult translations by Chamberlain, Aston and Dick¬ ens). During the Heian era poetry flourished between the Chinese study on the one hand and the Japanese literary pursuits on the other. Ihere are seven or eight collections of poems made to the order of the successive emperors, headed by the famous work (Kokinshu,> besides many private collections. (For examples of some of those in the*

Among the most celebrated poets, men and women, of the Heian era, we may mention Narihira, Komachi (a woman), Sojo Henjo, Tsurayuki, Mitsune and Shunzei; and among those who flourished in the latter part of the period and the Kamakura era, namely, the latter half of the 12th century and the early part of the 13th century, the names of Teika, Karyu, Saigyo and Sanetomo (the third Shogun of Kamakura). From that time down to our own day poetical composition has been main¬ tained unbroken, so that it is impossible to give minute description of it. But from the fact that the presentation of poems to the em¬ peror and the holding of the so-called <(poetry- meeting,® forms one of the court ceremonies at New Year, it may be seen how deeply this poetic desire is connected with Japanese na¬ tional life. When we look over the whole history of Japanese poetry, its golden age must be assigned to the Manyoshu period. This contains all sorts of poetic work, from those by the emperors down to those by the common people of remote regions, those by the court nobles naturally being the chief. All these seem to show how highly the poetic

spirit de¬ veloped among the Japanese people at large. Besides, the (Manyoshu } contains the so-called <(long® poems as well as <(short,® but since the Heian era (

Beginning about 300 years ago, a new poetic style called the Haikai or Hokku was devel¬ oped. This form of verse is even shorter than the (

Following the Ashikaga era, that is, the 14th and 15th centuries, the so-called Renka ((

As to the form of Japanese poetry, there is no rhyme nor strict metrical cadency. About the only element in which poetry differs from prose is that in the former five or seven sylla¬ bles form one line — strictly speaking, a sen¬ tence, for it is not always written in the form of a separate line as in the Western poems. This peculiarity is entirely due to the nature of the language, for poetic euphony and sentiment can be acquired without the use of rhyme or metre. The common method of placing to¬ gether these five or seven syllable lines is to place each alternatively commencing with a five- syllable line. But it is not necessarily a fixed method because some of the long poems com¬ mence with seven. In some cases, especially in pooular songs, two or three lines of the same syllables are nlaced together. It differs accord¬ ing to the different periods and the nature of poems and there are lines wh'ch are either shorter than five syllables or longer than sˆven, intermingled with other lines for the sake of variety.

In Japanese composition even poems which are termed Hong® are not so lengthy as many Western poems. The ordinary short poems consist of only 31 syllables, 5, 7, 5, 7 and 7. and the Hokku of only 17 syllables, 5, 7 and 5. <(Japanese poetry is, in short, confined to lyrics, and what, for want of a better word, may be called epigrams.® This is what Mr. Aston says of Japanese poetry and it is not very far from the fact. Under the circumstances, Japanese poetry when translated into another language will invariably fail to convey any poetical thought to the European mir.d in general. How¬ ever, poetry of any tongue has its peculiar charming power to those who have grown up with the language — a power unknown to out¬ siders. This is most certainly the truth with regard to Japanese poetry. Let us give a few examples :

Tsuki ya aranu Haru ya mukashi no Haru naranu Wagami hitotsu wa Moto no mi nishite.

The plain literary translation of these lines would be :

Is there no moon?

Is the spring not the old spring?

My person alone remaining the original person?

This poem for Japanese possesses an inde¬ scribable charm, — food for sentiment and im¬ agination. The meaning is that while the moon and spring are the same, I alone am not the same old person — told with a pathos which strongly appeals to the Japanese mind not only by its literary meaning, but also by the mode of expression. The piece is the most celebrated work of Narihira, the first writer of the Heian era. Again:'

Furu ike ya Kawazu tobikomu Mizu no oto.

This is the best-known Hokku by Basho and is considered, to be a masterly example of his so-called legitimate style of Hokku. Its literary translation cannot be other than as Mr. Aston has it :*

An ancient pond!

With a sound from the water Of the frog as it plunges in.

What can a foreigner make out of it? Yet it strongly appeals to the sentiment and imagi¬ nation of the Japanese. It carries with it a philosophical idea which is comprehensible only to them. Another example:

Asagao ni Tsurube torarete Morai-mizu.

This poem is often quoted by many Western writers. Mr. Aston translates thus: <(Having had my well-bucket taken away by the con¬ volvuli, — giftwater!® What foreigner could find any poetical meaning in this without a lengthy explanation? Thus we can see that it is almost impossible to translate Japanese poems into any foreign language and convey their real sentiment and force of imagination.

H;thˆrto this short review has been chiefly confined to those poems wh:ch are chiefly de¬ signed for reading. There has. however, al¬ ways been another kind, though less imnortant in the strict literary sense, namely, verses used for singing or chanting. There are still extant

some scores of examples of this class of work rrom the Nara era and the early part of the Heian cia. Since those early days, however, this torm of poetry has undergone many changes and grown into many varieties. Gen¬ erally speaking, these productions are much

Y oky oku) and (Joruri > are nothing more than a modified form of poetry, but these are dra¬ matic pieces in a sense and we must defer our discussion on this class to the section of the drama.

The Drama.

Theatrical performances in Japan began to assume their present style about 300 years ago. But the origin of the drama is very remote. In the Nara era there were the so-called Ka- gura and Saibara — dances accompanied by singing and music performed chiefly in Shinto shrines. The difference between the two is slight, the Saibara having a more humorous tendency. Next arose the so-called Sarugaku and Dengaku, much in the same manner as the Kagura and Saibara. The difference between these two is also slight, with the exception that the Sarugaku is derived more from old dances, while the Dengaku has its origin in the pas¬ time of the peasants. Many of the poems used in these various performances still remain. In the Kamakura era the Heike Monogatari, which was written in a high poetic style, was adapted for chanting in accompaniment of the Biwa, a string instrument. In the same era the Denga¬ ku, probably influenced by the singing of the Heike Monogatari, underwent some alterations, and historical narratives having been intro¬ duced into the play, it began to assume the style of theatrical performances. This change was quickly followed by the Sarugaku. Hence arose the No of Dengaku and the No of Saru¬ gaku, the term No being taken to mean per¬ formance. The Dengaku, however, soon de¬ clined and the Sarugaku alone made continuous progress. In the Ashikaga era, it became the chief source of pleasure for the upper classes, being patronized by the Shogun himself. Then arose a class of professional actors, and the gentry themselves began to learn to sing and even to play and had no compunction in doing so in the presence of their friends. While the acting is called No, the words, the written nar¬ ratives which are to be sung, are called Yok- yoku. In the time when the Sarugaku became popular to the disadvantage of the Dengaku, the term No came generally to mean the No of Sarugaku.

The so-called Yokyoku has much merit as literature. There are nearly 300 specimens of these Yokyoku and nearly all of them are the production of the Ashikaga era. They are not so long as those of the Greek or Roman come¬ dies, but their construction has some similarity, for the words

uttered by the actors are not limited to dialogues but contain descriptive parts as well. Thus when an actor represent¬ ing a certain character appears on the stage, he generally announces who he is, why he has come there, where he is going to and such like. The method of playing has a certain similarity to the modern European opera, for the words uttered by the characters are sung and not spoken all through. The general features of the play show thar these works were greatly in¬ fluenced by Buddhism. This is due in the first VOL 15 — 44

place to the fact that the religion exercised much influence over the mind of the people

ai?e' an< in the second place to the fact that the playwrights were mostly priests. From the scholastic point of view, the sentences in these plays are not free from defects, but they are strong in the poetical element and some parts of these works cannot be too highly praised. The Yokyoku and No may be called the classical drama of Japan. They enjoy the favor of the upper classes even to this day in the same manner as . the opera flourishes in Europe side by side with the ordinary theatre.

After the No there is another class of per¬ formance called Kyogen, or short comedies. In ancient times the Dengaku and Sarugaku contained much of the comical element, but during the Ashikaga era, when the Yokyoku and No reached the height of prosperity and was at the same time greatly influenced by Buddhism, they became transformed into trag¬ edy, or at least became very serious in their nature. They lacked comic effects. The Kyo¬ gen arose to supply this want, and it became a general practice after a No performance for a Kyogen to follow, for the sake of change. No and Kyogen actors played on the same stage, but as a profession the Kyogen actors were and are considered to-day to be inferior. In the Kyogen, unlike the No, the words are spoken, though pronounced and uttered in the style of the Ashikaga era. As the chief object of the Kyogen is comedy, they have little of the poet¬ ical element. But as comedy they are excellent. The Yokyoku and Kyogen plays have always been printed, so that they may be read by the people who are not professional or amateur actors. There was still another kind of dance, or rather play, called the Kowaka, which pre¬ vailed side by side with the No. In this the words (text) were called Mainohon, many of which still remain. The Mainohon, like' the Yokyoku, exercised much influence on the de¬ velopment of the theatre of later days, but these texts are very similar to those of the Yokyoku, and therefore we may spare any detailed ac¬ count of them here.

The modern theatrical performance origi¬ nated toward the end of the Ashikaga era, and soon acquired the name of Kabuki. Since then the name

Kabuki has come to signify theatrical performance acted bv human actors in contrast to the Avatsuri Shibai, that is, the marionette theatre. The Kabuki is said to have originated in the dancing and singing per¬ formed among other shows on a rude stage at the river side of Shijo in Kioto by a woman named Kuni, a native of Izumo. Into this sing¬ ing and dancing, ideas of older performances, namely, the No or Kyogen, were introduced, and before long they assumed the style of the modern stage performance. On account of the origin of the Kabuki, the social position of this class has always been held in verv low esteem, by no means comparable with that of the No actors. Kabuki actors have been gener¬ ally known by the name of Kawaramono (Riverside people), but contrary to the No, which has made no change or improvement since the Ashikaga era, the Kabuki has under¬ gone many changes and improvements from time to time until it has attained its present prosperity.

As to the Kabuki performances, in the early

stage of development women were the chief actors, resulting in the term Onna Kabuki. But boys were also employed and a little later on, even grown-up men. A peculiarity in those days was that women played male characters and men the female. Women Kabuki became extremely popular. Many stages, rude as they were, were established everywhere, but the acting produced much evil effect on the morals of the people and it was finally forbidden by law. Next flourished for a time the so-called Wakashu (boy) Kabuki. This again produced social evil and was forbidden by law. Thence¬ forth the performers were mainly grown-up men, as we see them on the modern stage, who acted the female characters. As time went on, however, women performers came into ex¬ istence again, but they formed companies of their own sex only, and the male characters were played among themselves. The number of actresses is now very small comparatively.

In the early days of the Kabuki, the per¬ formances were short and simple, plays consist¬ ing of several acts having come into existence only by gradual development.

In the beginning there were no professional playwrights. Plays were chiefly written by actors or some one who took an interest in the matter, and further, plays were even devised bv the actors impromptu and not written at all. Later on the stage began to have professional playwrights attached to each theatre. Unlike the drama in Europe, these plays were never printed

for public circulation, but used only for acting at the time, and were often written more to suit the performers than for literary excellence. And again when an old play was acted it was often subjected to alteration for similar purposes ; in other words, the dramatic personae are often reduced or added to to suit the number or ability of the actors. And there¬ fore the texts of the Kabuki have not much literary merit. Though it may look somewhat strange, it is in the plays of the marionette theatres that we must seek the equivalent of the European drama. The marionette per¬ formance originated about the same time as the Kabuki. Previously, there had been a par¬ ticular kind of chanted narrative, the Joruri, which name is said to have come into use in a long chanting song consisting of 12 sec¬ tions, and telling of a love story between Yoshitsune and a maiden named Jorurihime. This was written by a lady and was entitled ˆoururihimeP Subsequently many works of a similar nature were written and the introduc¬ tion of the Samisen (a three-stringed musical instrument) gave much impulse to their de¬ velopment. To the chanting of these songs the marionette performances were added. Various styles of chanting were also gradually introduced. Toward the end of the 17th cen¬ tury there arose two great geniuses, Gidayu Takemoto and Monzaemon Chikamatsu. Take- moto had a great natural gift for chanting Joruri, and devised, a new style of chanting which became known as Gidayu. Chikamatsu was a playwright of the Kabuki. He hit upon the idea of writing Joruri texts based on the principle of the Kabuki plays. Gidayu Takemoto chanted them to the acting of the marionettes, for which the new theatre known by the name of Takemotoza was estab¬ lished in Osaka. There were then skilful

marionette players, and many mechanical im¬ provements were added to the marionettes themselves. By the combined efforts of these two authors and these skilful players the mari¬ onettes soon acquired a very wide popularity. The success of this theatre was followed by the establishment of the Toyotakeza, and many writers of great ability, rivals and followers, appeared in succession, such as Kaion Ki, Izumo Takeda, Ippo Nishizawa and Sosuke Namiki. Chikamatsu himself wrote nearly 100 pieces, and his rivals and followers wrote a large number. It is almost a matter of wonder that so many writers of ability made their ap¬ pearance one after another nearly at the same time. It is also a fact that nearly all the ablest writers were drawn to the side of the mari¬ onette theatre, leaving the Kabuki writers far in the background. This state of things now came to exercise great influence upon the Kabuki theatres, and perforce they soon began to adapt the marionette plays for their own stage. The text of the Gidayu is written in a manner somewhat similar to the ordinary works of fiction, containing much descriptive matter as well as dialogues. The point in which the Gidayu differs from the ordinary novels or romances lies in the fact that the general con¬ struction of the Gidayu is made to fit the stage and

*consequently a lengthy description or dialogue is avoided, the whole story being di¬ vided into a certain number of acts of nearly the same length. Besides, as the whole is to be chanted, the phrases are suitably written, for which purpose certain metrical devices are ap¬ plied. These plays are divided into two great classes; one, Jidaimono (historical) and the other, Sewamono (social). The chanting of the Gidayu text is also widely practised inde¬ pendently of marionette performances and is very popular among the people at large. From this fact these texts are printed *and widely circulated. Their great popularity encouraged writers to exert their utmost ability. Scru¬ pulous attention was paid to minor things. At the marionette performance the chanters sit in one corner of the stage while the marionettes are worked by the players in harmony with the chanting.*

Like the ordinary plays, action and dialogue in the Gidayu exaggerate, being too direct and strong. We must, however, make allowance for this from the very nature of the play, because, the marionettes are mere puppets and the realistic effect on. the stage must come from the chanting. If action and dialogue were as common as those of the ordinary actors they would be insufficient to produce the desired effect on the spectators. For specimens of the Gidayu text we may refer to the English trans¬ lation of the Chushingura UMagazine of Loyal Retainers®) and the Asagao-Nikki (((Morning Glory Diary®), both by Victor Dickens. We may also take notice of one other thing. In these plays the proverbial saying encouraging what is good and chastising what is bad is always aimed at, and they are not so full of love stories as Western plays. In them mere representation of realism is not the main ob¬ ject. The best plays were written in the 18th century during the Tokugawa era.

Although in all fields of literature much progress has been made since the Restoration of the Imperial authority 40 years ago, the

production during this time of the Gidayu may be said to be almost nil. On the other hand seye, Kabuki plays were written by eminent scholars and some of them are of much value, ˆamPˆe the Kasuganotsubone, written by Mr G. Fukuchi. Generally speaking, how- ever, playwriting is still in a transitory stage ˆn.,rlt cannot be said as yet to have made a brilliant addition to Japanese literature.

Bibliography. — The following are some of the principal Japanese books of

reference: Moritaro Hayashi, 'History of Japanese Litera¬ ture ; S. Fujioka, (Complete History of the National .Literature (of the Heian Era) ; Y. Haga, 'Ten Lectures on the National Litera- ture} ; K. Konakamura, 'Brief History of Sing¬ ing, Dancing and Music* ; Toshiro Ihara,*

Baron Kencho Suyematsu, Privy Councillor, Shiroyamacho, Shiba, Tokio.

14. HISTORY OF JAPANESE FINE ART. In giving an outline of the history of Japanese fine art it is to be noted first that there are two factors: one which has proceeded from the character and ability of the nation, and the other from the influence of foreign civilization. These two factors, harmoniously blended, have resulted in the distinguishing traits of Japanese art, and brought forth its peculiar charm, so that its characteristics can never be fully com¬ prehended .unless we keep these in mind.

The occurrences which took place before the Yamato race, the ancestors of the present Jap¬ anese, settled on this island in the Far East are concealed in obscurity, although according to the descriptions given in the record there is no question that a certain stage of civilization had already been reached at the beginning of the foundation of the country. Seen from the material point of view, the Japanese ancestors had emerged from trogrodyte habit and dwelt in thatched houses ; for dress they wore trousers and hat or crown; used strung jewels for ornament; and farming and sericulture were their occupation. They knew the art of making pottery and manufactured earthenwares, such as vases, shallow dishes, etc. Metallurgy was also known, for they made spears or hal¬ berts, swords, bells, mirrors, etc. From the spiritual point of view, they were early char¬ acterized by profound reverence for the deity, and the custom of regarding their ancestors with veneration prevailed among them. We learn that they expressed their passion in poetic compositions, and enjoyed dancing and singing accompanied with music. These and various other traditions help us to form an idea of the character and manners of the early Jap¬ anese. They respected superiors and elders, being united in clans and families ; and if order among themselves was rigorously maintained, there was a beautiful custom of gentle manner. Although they were distinguished by martial spirit, yet they were compassionate and never indulged in savage cruelties; cleanliness was universal ; unreasonable obstinacy was looked upon with aversion, and they were frank and sincere, brom their lively nature they took pleasure in singing and dancing. Although no particular dexterity in art was to be seen, we have sufficient evidence to show that there already appeared the bud of art. Such was the

state of the primitive Japanese tribes. And when we examine the power which contributed to the development of their character and habit, we find that the most potent influence was that of the physical features of the

country.

The island of Japan lies in the Pacific Ocean °n j- eas- the Asiatic continent, and ex¬ tending from north to south it includes many degrees of latitude. As one extremity touches the frigid zone and the other the torrid zone, the natural scenery continuously undergoes kaleidoscopic changes in the four seasons, hence there is no monotony of surroundings. In addition to. this, the cold and the warm ocean current rapidly flows around, and the trade and the seasonal winds blow over the land, thus regulating its climate or causing it to change. Above all, the two mountain systems of China and Karafuto (Saghalien) and their branches penetrating the length of the island, and their lofty ridges, covered with thick forest, are everywhere seen piled one upon another. The air, full of moisture that comes from the ocean, strikes these walls and turns to cloud, mist* rain or snow, thus constantly playing wonderful tricks of transforming nature, and the more lends enchantment to the view** of mountains and waters. There is a lavish variety of fauna and flora. Fine trees and rare grasses, some with lovely flowers and leaves, others producing delicious fruits and berries; birds and insects singing and chirping and displaying beautiful plumes — these entrance men's hearts and en¬ rich their imagination. That the Japanese race, being environed with such splendid natural views and influenced by them, and storing up the poetic as well as the artistic thought, should have produced many celebrated masterpieces of art is to be expected as a matter of course.*

\ et the land is bounded within narrow limits, with no huge mountains, no gigantic streams, no extensive plains and marshes ; the climate is not extremely intense; no animals of mon¬ strous forms with peculiarly deep hues or with ferocious and horrible natures are met with; and no plants and flowers of deep color or pungent smell are found; so that the influence which they exercise upon the inhabitants is not very sharp and acute in its character. As a consequence Japanese art is destitute of that profound and imposing trait which defies man's calculation, but consists in pieces of fine plans executed with dexterity and tinged with grace and refinement. Moreover, the mild tempera¬ ture, and the fertile soil that yields abundant products, have given the people means for easy subsistence without a violent struggle for life, — thus causing them to acquire a calm and gentle nature.

Besides, the country being isolated from the Asiatic mainland by sea, the nation has been free from foreign aggression and from the evil influences of the continent. Down to the last days of Tokugawa Shogunate she had little external trouble apart from the wars with Korea. and the invasion she suffered from the Mongols. Even on these occasions victory al¬ ways lay on her side, and consequently the people have been preserved from

prejudice and exclusivism — faults so apt to be found in na¬ tions that have frequently • experienced hard treatment from victorious invaders. The Jap¬ anese have ever shown hospitality to foreigners

and have assimilated and profited by foreign civilizations. Nor have the numerous civil wars left the people destitute of feeling or given them a cruel character. The land standing, so to speak, on a group of volcanoes, terrible devastations have often afflicted the nation ; yet it has not impaired their optimistic disposition, fostered by the rich bounties of Nature. They even take delight in viewing the strange and majestic forms of the volcanic rocks and use them as materials of poetry and painting.

In short, such noble traits as piety, benevo¬ lence, alertness, cheerfulness, artistic inclination, simplicity, purity, bravery, sobriety and straight¬ forwardness, may be found in abundance among this nation. Moreover, they are wonderfully clever in the use of their fingers, shown in a variety of artistic employments. They are not a people of profound speculation, but are highly gifted with intuitive insight and assimilative and ameliorative capacities. These national characteristics are manifest through the entire history of Japanese art and constitute its main features.

As has been stated, the Japanese love so¬ briety and simplicity and are by nature dis¬ inclined to ostentation. Hence their productions are marked by grace as well as skill. We can readily see that the young shoots of Japanese art sprang up in the earliest period of their national existence, though owing to the want of necessary encouragement their growth was not rapid.

The oldest forms of artistic design seem to have been ornaments used in decorating dress, weapons, tombs, coffins and articles employed in religious ceremonies. This . may be proved by various archaeological relics, discovered in many districts. They have, however, little artistic merit, and are only valuable as throwing some light upon ancient art — for showing us specimens of original and purely Japanese art.

From the very outset of authentic history the Japanese commenced intercourse with the Koreans, and the latter's civilization, primitive as it was, at once began to influence the former, but not so much as to accelerate the develop¬ ment of their art. The subjugation of Korea by the heroic Empress Jingo (201 a.d.) bound Korea to send annual tributes to Japan, and through this channel the art and industry of the continent flowed into the island empire. Later, in the reign of Ojin, Pep-che

(Kudara), one of the three Korean states, introduced to Japan the literature, of China. This event marks a great epoch in the history of Japanese civilization ; after that every institution was copied from China, artisans were invited, and during the reign of Yuryaku, In-sa-ra-a (In-shiraga), a painter of Pep-che, was employed. In the 13th year of the Emperor Kimmei (a.d. 552) the king of Pep-che presented a statue of Buddha, a copy of the sacred canon and several articles of ornament, such as banners and canopies. The statue had been made in China after the (

The civilization of the Asiatic continent has so strongly influenced Japanese art that, since its first introduction, its every wave and billow have left some trace on the art of Japan. Thus

the ancient art of China and Korea opened the way for the artistic progress of Suiko's reign, and the flowery times of the T'ang dynasty had their counterparts in the age of the Emperors Tenchi, Shomu and Kwammu. And if we take into consideration the fact that during the ((Six Dynasties,® and the dynasties of Sui and T'ang, China already had close intercourse with India, which, in its turn, was in contact with Greece and Rome, we may justly say that the early civilization of Japan was indirectly con¬ nected with those of Europe and India. Dur¬ ing the age of the Fujiwara's regency Japanese art began to assume a definite form and even developed certain distinct features, but subse¬ quently in the age of the Kamakura and Ashi-kaga Shoguns, Chinese influence (Sung and Yuan dynasties) became once more remarkable. However, it was not of long duration; for in the Toyotomi and Tokugawa regimes national art again took its own course, though we must not neglect the fresh effect produced on it by the new civilization of Ming and Ching dynasties.

Thus we see the great and constant influence of foreign civilizations on the artistic history of Japan, yet it would be a gross error to regard Japanese art as nothing but an imitation of the arts of India, China and Korea, and that without these prototypes Japanese art would never have existed or would never have emerged from its prehistoric stage. There would be nothing wrong in calling Japanese art a branch of Oriental art, but it has a nobler mission than being a mere branch — it aims at extracting, the essence of Oriental art and con¬ structing it on a purified and ennobled basis. Though it has been guided and encouraged by exotic arts, it has never been a blind follower: it has digested them and, at the same time, has well preserved its own individuality.

India, China and Korea have all failed to stem the tides of foreign aggression, their national existence has been destroyed or threatened, and their old civilizations have been wiped out. The result is that it is impossible to admire their ancient glory or to recover their old treasures among the

crumbling ruins. Japan, on the contrary, having remained im¬ mune from any of these disasters, her oldest productions are still extant, and even foreign objects of artistic and historic interest may be found within her boundaries. And since every step of the development of her art may be distinctly traced, its study will afford an insight into the artistic history of the foreign nations with whom she has been in contact. Indeed it is no exaggeration to say that the cream and essence of Oriental art has been preserved nowhere but in Japan, and by its people it will be worked to perfection.

Would it be possible to name the characteris¬ tics of Japanese art — the features underlying all its branches: painting, sculpture, architec¬ ture, industry, etc.? We may mention the fol¬ lowing three. The first is mildness and pure simplicity. Coloring is for the most part sober and plain, and very seldom gorgeous. Japanese art prefers moderation and genial ease to ex¬ cessive grandeur; sobriety and chastity to pro¬ fundity, intensity and vulgarity. Even such horror-inspiring subjects as the pictures of hell are not thrilling in effect. The statue of Buddha at Nara is grand, but it is only the

high-water mark of continental influence and does not represent the pure Japanese disposition.

The second characteristic of Japanese art is its exquisite lightness or delicacy. This is due to the joyful frame of the people's mind and to the wonderful dexterity of their hands. There is no artistic product but is marked by charm¬ ing workmanship.

The third feature is its idealism in repre¬ sentation. Japanese art is not realistic, it does not aim at photographic accuracy, but by the free and bold exercise of imagination it tries to abstract the essential aspect of objects and to give expression to the artist's sentiments by its portrayal. It is for this reason that form is comparatively little regarded, while idea is considered all important ; that it is weak in realistic delineation and strong in decorative design. These three points underlie all Japanese art and distinguish it from the art of other Oriental nations.

With regard to the division of the history of Japanese art the opinions of scholars vary a great deal, so much so that it is an utter im¬ possibility to settle the question definitely once for all, marking the beginning and the end of each period with absolute certainty and pre¬ cision. Yet, in following out its development, it will be both convenient, and in some

measure be justifiable, to divide the whole period into 12 portions, characterized by special features. It is to be remembered, however, that the treat¬ ment of the subject is necessarily short and summary owing to the limitations of space. And again, the title of each epoch is given for prac¬ tical convenience and is not always identical with its namesake in the classification of politi¬ cal history.

(1) The Age of the Empress Suiko (540-644 a.d.). (2) The Age of the Emperor Tenchi

(645-723 a.d.) . (3) The Age of the Emperor

Shomu (724-31 a.d.). (4) The Age of the

Emperor Kwammu (782-888 a.d.). (5) The

Age of the Fujiwara's regency (889-1086 a.d.). (6) The Age of the Ex-Emperors' regency (1087-1183 a.d.) . (7) The Age of the Kama¬

kura Shogunate (1186-1392 a.d.). (8) The Age of the Ashikaga Shogunate (1393-1573 a.d.). (9) The Age of the Toyotomi's Supremacy (1574—1614 a.d.) . (10) The First Age of the

Tokugawa Shogunate (1615-1744 a.d.). (11)

The Second Age of the Tokugawa Shogunate (1745-1867 a.d.) . (12) The Age of the Grand

National Metamorphosis (1868- a.d.).

First Period.

The Era of the Empress Suiko (540-644 A.D.), — The aesthetic sense inherent in the Jap¬ anese race long remained latent and undevel¬ oped. Not until the middle of the 6th century did the artistic endowment, or rather art-loving potentialities, of the people begin to reveal themselves in the land of the Rising Sim. The beginnings of the study of pictorial and glyptic art — the first page, as it were, of the history of Japanese art, must be dated from the time of the Emperor Kimmei when the civilization of the ftSix Dynasties® of China (265 to 617 a.d.) was introduced through Korea and with it Buddhist images and sacred books were brought over to the country. Later, in the reign of the Empress Suiko, the empress herself became a devout believer in Buddhism, Prince Shotoku being no less enthusiastic a votary. With the

object of propagating the religion through the land they invited famous

priests and Buddhist sculptors from Korea, and by their order many images were made and temples and pagodas built in large numbers. Thus, under the Im¬ perial patronage Buddhist art made rapid and signal progress.

In architecture the first work that calls for special notice was the construction of a monas¬ tery consisting of seven buildings (Shichido-garan), part of which grand work is still to be seen in the Kondo (Golden Hall) of the Monastery of Horyuji, Nara.

The native artist who crowned the first great progress of Japanese sculpture was Kuratsukuri-no Tori. One of his greatest works, the bronze statues of Sakyamuni and two attendant disciples (Shaka-Sanzon ; (Shimbi Tailkwan,> Vol. I; Vol. CLXIX) are still preserved in the Kondo of the Horyuji. The wooden image representing a goddess of mercy (Kwannon, i.e., Avalokites'vara ; consult (Shimbi Taikwan, Vol. X; ˆokkwaP Vol. CLXXIV ; (Shobi SiryoP Vol. IV, 4) in the Yumedono (((Dream hall®) of the same monas¬ tery, attributed to the chisel of Prince Shotoku, is of the same style of homeliness and sim¬ plicity. Pictorial art had not yet been fully developed. Many families of painters had sprung up, however, and were engaged in the work of decorating Buddhist images and shrines. The so-called <(mitsuda® picture (a picture painted with several pigments mixed with the juice of a plant called «mitsuda,® which grows in India and other tropical coun¬ tries) of the Tamamushi shrine in the Horyuji (consult (Shimbi Taikwan,* Vol. II; (Kokkwa,> Vol. CLXXXII) and reputed to be the oldest surviving, specimen, of the kind in the East, is fantastical in design, being a sort of pattern, and is, besides, plain in delineation and simple in coloring.*

Of applied art the most advanced were bronze casting, sculpture on metal and metal tempering; while textile fabric and embroidery had not attained a high degree of excellence; decorative arts, on the other hand, achieved a great development. In fine, the art of this period is traceable to the Buddhist art of India introduced through China and Korea ; and there is evidence that not a few of the works belong¬ ing to this era were produced by Chinese and Korean immigrants.

Second Period.

The Era of the Emperor Tenchi (645-723 A.D.). — During this period, busy intercourse having been established between Japan and China, the latter's civilization found its way direct into the former without passing through Korea as had hitherto been the case ; most of Japan's institutions, laws, literature and religion were accordingly remodeled on those of China ; and this, in no small degree, helped the de¬ velopment of various branches of art. Besides, as native artists had in the course of time

acquired great dexterity in their workmanship the works produced during this period are char¬ acterized by grandeur and magnificence, and are deeply instinct with a serene and noble spirit. The famous sculptors, Yamakuchi-no- atai Oguchi and Yakushi Tokuho, flourished in the reign of the Emperor Kotoku. One of his greatest works, the images of the Shitenno

(the guardian gods of the four regions; consult (Shimbi Taikwan, Vol. IV; Vol. Ill; (Kokkwa,> Vol. CX; (Shobi Siryo,* Vol. II, 6), a relic of the era of the Emperor Tenchi, and said to have been worshiped by Lady Tachibana, are distinguished by the fine workmanship of their halo and backscreen as well as by the gracefulness of their form and features, bearing testimony to the refinement and elaborateness attained by the fine arts of the epoch.*

During this era the style of the T'ang dynasty rapidly gained ground, and influenced things in general, and art objects in particular, with the result that great works stamped with solemnity and elegance were produced, the images of Sho-kwannon (Arya Avalokites'vara; consult (Shimbi Taikwan,> Vol. Ill; (Kokkwa, Vol. LV) in the <(Toindo® (East Hall) of the Yakushiji, and the <(Yakushi-sanzon® (Bheshaj- yaguru and two dependents; consult (Shimbi Taikwan,> Vol. V; Vols. XV and CLXXXIII) in the (*

Toward the end of this period the art of modeling in clay increased with rapid strides, having produced Keimonye and Keishukun, famous sculptors in this period. Among the specimens of pictorial art is the mural picture in the Kondo of the Horyuji, representing the ((Shibutsu-jodo® (the Paradises of Four Buddhas; consult (Shimbi Taikwan, Vols. II and XV; Vols. XXIV and CXCII; (Shobi SiryoP Vols. I and II) and famous for bearing resemblance to the old picture found in the temple of Ajanta Cave, in India. In its pattern is visible, in no small degree, a mixture of the Indian and the Greek style. Showing, as it docs, traces of great power of line, color and composition, the picture is, indeed, a rare treasure of Oriental art.*

Moreover, as the demand of the Imperial Court for furniture, ornamental dresses and decorative pictures increased, departments re¬ lating to various branches of art were insti¬ tuted with the object of encouraging the people to cultivate the fine as well as the useful arts.

Architecture made a great development and attained a high degree of refinement. Un¬ fortunately few, if any, examples of this art have been

preserved, the east Pagoda of the Yakushiji, in fact, being the sole existing speci¬ men of the work.

Third Period.

The Era of the Emperor Shomu (724-81 A.D.). — The civilization of the T'ang dynasty, introduced and copied in the preceding era, reached its highest point in this; the erection of Buddhist images and the construction of temples and pagodas were carried out exten¬ sively; and fine arts and various technical in¬ dustries made noticeable progress, furniture, utensils and even playthings being made as showy and gorgeous as possible. The most celebrated monument representative of this glorious and flourishing epoch is the bronze representing Vairochana Buddha in the Todaiji.

The statue is in a sitting posture and matchless for its colossal size, the height of the body being 53 feet 5 inches, the length of the face 15 feet, and all the other parts being pro¬ portionately gigantic. It is to be regretted, however, that having undergone several re¬ pairs in later ages, it has lost a great deal of its original form. The founder was Kunina- ka-no-muraji Kimimaro.

The art of making clay and dry-lacquered images made striking progress during this period and attained a high degree of elaborate¬ ness and refinement. Among the specimens of the former are the images of <(Shitenno® (Four guardian gods; consult (Shimbi TaikwanC Vol. I; ˆokkwaP Vols. XLII, CLXX and CLXXXIV ; Vol. Ill;

(KokkwaP Vol. XXVI) and the ((Taisha- kuten® (Indra; consult (Shimbi TaikwanP Vol. X; Vol. CCXXXI) in the Sangatsu-do of the Todaiji, and the (

The works of this period are signalized by a harmonious combination of reality and imagination and by the well-shaped forms of the bodies of the postures and of the foldings of the garments; while expression was by no means neglected.

Pictorial art. also made a remarkable ad¬ vancement in this era. The screen picture rep¬ resenting a beauty under a tree, in the posses¬ sion of the Shoso-in of the Todaiji (consult (Shimbi TaikwanP Vol. XV; CCXXVI) and the Kichijotennyo (Goddess of Fortune, Sri) of the Yakushiji (consult

As for the progress of applied art it was simply wonderful. In this connection special mentions must be made of the treasure-house belonging to the Shoso-in of the Todaiji. There are kept in this store nearly 3,000 articles, all being specimens of fine and ap¬ plied arts of this era; bronzes, textile fabrics, embroidery, sculptures, inlaid work of gold or silver, lacquer

works, glass, enamel ware, mother-of-pearl lacquer works, gold-dust-sprinkled lacquer work, paintings of <(mitsuda®

(a kind of oil pigment) and Koketsu (a kind of dyeing) being well represented here. It will be seen that during this period many branches of applied art attained the highest degree of elegance and refinement, while their decorative patterns and figures were freely drawn from Chinese or Indian stories and events.

The gong called <(Kwagenkei® with its

stand is to be counted among the masterpieces of this epoch by virtue both of its fine shape and its elegant casting. Consult (Shimbi Taik- wan,> Vol. V; Vol. XCVII.

Fourth Period.

The Era of the Emperor Kwammu (782- 888 A.D.). — Soon after the accession of the Emperor Kwammu to the throne the capital was removed to Yamashiro (now Kioto) ; the Im¬ perial palace built after the fashion of the T'ang dynasty; government was remodeled on Chinese plan, and various institutions reformed. Things took a new turn and the prosperity of the country greatly increased. What was more, this period produced such great priests as Saicho and Kukai. The former was the founder of the Tendai sect; the latter of the Shingon sect. They endeavored to spread the teachings of Buddha with great assiduity, en¬ lightened the people and helped them into great activity. Such being the case, the fine arts of this period were signalized with a lofty and majestic idea. Kukai, or Kobo-daishi as he was called, was an accomplished priest of profound learning, and produced not a few excellent works of painting and sculpture. Among the specimens of his work is the image rep¬ resenting the deity Fudo (Achara) in the Toji, Kioto (consult (Shimbi Taikwan, Vol. I). The picture representing the priest Gonso, in the Fumonin, Kovasan (consult (Shimbi Taikwan,* Vol. VI; (Kokkwa,* Vol. CCXXIX), and the portraits of Nagarjuna and Nagabodhi in the Toji, attributed to him, are executed in noble and refined taste, and marked with ele¬ gance and grandeur (consult (Shimbi Taik- wan,> Vol. XII; (Kokkwa,> Vol. CCXIV; (Shobi Siryo,* Vol. I, 3). Saicho (Dengyo- daishi) was also a very learned and highly ac¬ complished priest, credited with a great genius for painting and sculpture. The priest Enchin painted the Achara mostly; the Red Achara in the Myohoin, Koyasan, being his greatest work. (Consult (Shimbi TaikwTan,*

Vol. VIII; (Kokkwa, Vol. CCXXXII). Beside Buddhis¬ tic paintings, artists of the time began to take up human figures, landscape, birds and^ flowers for subjects of pictures. Kudara Kawanari was a great master of painting of this kind.*

Of the specimens of the sculpture of this epoch the image of the ((Noyrin Kwannon® in the Kwansinji, Kawachi (consult (Shobi Siryo, Vol. II, 3), that of Achaon in the Tachibana- dera, Yamato, that of Bodhisttoa Miroku in the Kwaizaudo, Todaji, and the statue of the priest Ryoben (consult (Shimbi Taikwan/ Vol. VI; (Kokkwa,* Vol. CLX ; (Shobi Siryo,* Vol. VIII, 1), are the finest relics we now have, being the most graceful and the least conven¬ tional, while delicately expressive and inspiring loftiness and grandeur. Besides these there are not a few masterpieces in this line.*

*Architecture made a great progress with the laying out of the new capital at Kioto, the Imperial palace and various offices built after the T'ang fashion being extremely fine and elegant. The construction of the Imperial palace was for the first time brought to per¬ fection, and what was called the <(Dai-dairi** (Court) style came into existence. The Tendai and the Shingon sects introduced a new feature into the construction of the temples, and the establishment of the incarnation theory (((Shin-*

*butsu-dotai-setsu,** i.e., theory that identifies Japanese gods with Buddhas) gave a certain Buddhist architectural style to the building of Shin-to shrines. The (*

Fifth Period.

The Era of the Fujiwara Regency (889- 1086 A.D.). — The epoch of the Fujiwara Re¬ gency was indeed a glorious period, stamped with great national development and prosperity: the nation at large flourished, and not a few customs and manners were formed and reached maturity. In the reign of the Emperor Uda the practice of dispatching envoys to China was discontinued, and in consequence the impetus from without ceased to come. The civilization which had found its way into Jaoan in the preceding age was fully assimilated in this, and Japan developed a new native style of her own. Moreover, the luxurious life led by the Fuji¬ wara family and the great prevalence of Bud¬ dhism at that time conspired to help the advances of both fine and industrial arts, cultivating such special qualities as beauty, elegance, severity and refinement. In the early part of this period flourished Kose-no Kanaoka, the greatest pic¬ torial artist the country had yet produced. He was famous for his pictures of Buddhist di¬ vinities, human figures, landscape, birds and flowers, all of which were said to be delicately fine and elaborate. Unfortunately, however, almost no specimens of his work have come down to the present age. But collating all the traditions

circulating about him we gather that he was a great master of painting animal life, being true to nature; he seems to have struck a new style of his own, apart from those of the T'ang fashion. His descendants succeeded him and founded the Kose school, Kimmochi and Hirotaka being among the most celebrated mem¬ bers of the line. The picture representing the Prince Shotoku and his two attendants, in the collection of the late Viscount Saisho (consult (Shimbi Taikwan, Vol. XVII), attributed to Kanaoka, is an excellent specimen indicative of the characteristic gracefulness and elegance be¬ longing to the early part of this period.*

The priest Eri and Asukabe Tsunenori are believed to have been great masters of painting of this epoch. The priest Eshin, one of the promoters of the <(Pure Land" doctrine, mostly painted pictures of Amitabha Buddha, welcoming the devotees who come to his Para¬ dise (Amida-raiko), his style being purely Japanese. The picture of Amitabha and the 25 Bodhisattvas, still preserved in Koyasan, is a great piece of work attributed to his brush. (Consult (Shimbi Taikwan, * Vol. IV; Uvok- kwa,> Vols. LXXXII and CCXXXII). Takuma Tamenari is celebrated for his pictures on the walls and on the panels of the doors of the Howodo, Uji. (Consult (Shimbi Taikwan,* Vol. IV; (Kokkwa,* Vol. Ill; (Shobi Siryo,* Vols. VII, 5, and III, 2). Takumino-kami Fujiwara Motomitsu, a great master of painting, is looked on as the founder of the Kasuga school. One*

♦"Pure Land" (Jodo) Sanskrit "Sukhavati," the Para¬ dise of the worshippers of Amitabha.

of the greatest in the early part of this period is the painting of ((Amida Sanzon Raigei,® still in the Hokkaji, Yamato (consult (Shimbi Taikwan,> Vol. VII; (Kokkwa,> Vol. CLXVII; (Shobi Siryo,> Vol. IV, 3) and the points of its nobleness and elegance are, indeed, the king of the religious painting in Japan. Sculp¬ ture came to develop a native style and greatly improved in due time, leaving at present the image of (Vol. II; (Kokkwa,> Vols. C'XXI and CLXXXIV ; (Shobi SiryoP Vol. Ill, 5), and that of ((Jizobosatsu® in the Shore- yin of the Horyuji, as the representatives in the early part of this period. This brand of art culminated in the work of the celebrated Jocho who introduced elegance, gracefulness and refinement in and improved the character¬ istic features of this period. The image of Amitabha in the Byodoin, Uji, Yamashiro (con¬ sult CLXXII ; (Shobi Siryo, Vol. IV, 5) is believed to have been a produc¬ tion of the later part of his life. His son Kakujo and pupil Chosei succeeded him, each founding an atelier for religious sculpture.*

Architecture also developed a new native style; temples were built in such a way as to present an elegant and graceful appearance on the outside, while the inside was superbly dec¬ orated with mother-of-pearl lacquer work and gold-lacquered work. Of the specimens of the architecture of this period the monastery Hos- shoji constructed by the order of Fujiwara Michinaga is the most magnificent and the finest, built on a grand scale. Howodo in Uji and the Konjikido (Golden Hall), in the Chusonji, Hiraizumi, Rikuchu province, both of which are still preserved, though built on a very small scale, yet reflect something of the general style of architecture prevalent in this era. The mansions of noblemen were built after what was termed the ((Shinden-tsukuri® (Sleep¬ ing-chamber-style), a grand and imposing style of architecture, and in the construction of the Imperial palace arose the «Satodairi» (Village- court), an informal and much simpler style than the "Dai-dairi® (Court). A native style began to stamp itself in dresses and furniture of all descriptions, affecting their shape and decoration not a little.

Lacquer works, textile fabrics and metal works abounded in elegance and tastefulness, and were free from conventionality, breathing loftiness; design became richer and more in¬ genious; workmanship and technique were car¬ ried to a high degree of elaboration and re¬ finement; and not a few specimens of the work stamped with these noble qualities have come down to the present age.

Sixth Period.

The Era of the Regency of Ex-Emperors (1087-1183 A.D.). — The customs and manners which had been formed and had reached ma¬ turity in the preceding era attained a still greater development in this. Things were, on one hand, getting effeminate and conventional ; while, on the other, reaction having already set in with the changes of the times, a lively and vigorous style began to assert itself. The power of the Fujiwara family had, indeed, been on the wane; but the Taira family, who had taken their place, having succeeded to their

luxury and extravagance as well as to the po¬ litical ascendancy, and having devoted their energies to the cultivation of belles-lettres, fine arts and technical industries did not show any sign of decline, and demand for arts-objects did not decrease in the least. In pictorial art Fujiwara Takayoshi originated a new stvle characterized by elegance and delicacy. "The Genji-Monogatari-Emaki is the existing speci¬ men of his work. (Consult (Shimbi TaikwanP Vol. I; Vols. XVII, XVIII, CLXXX and CLXXXII). He was followed by his son Takachika, and it was in the time of Tosa-no Gonnokami Tsunetaka that the school bore the family name Tosa. KakuyU or the (Vol. XIV; (Kokkwa > Vols. I, CLXXXII and CCV).*

Takanobu was a master of portrait painting. The foundation of the old Tosa school, representative of pure Japanese painting, is to be ascribed to these great artists.

. During this period the practice of loving pictures for their own sake obtained, and de¬ mand for beautiful pictures besides those painted for religious or decorative purposes grew larger and larger, pictorial scrolls were made much of. Taste for arts-objects was much cultivated among the upper classes, and there arose, in consequence, peculiar styles, such as the ((Tsukuri-ye® (((making-up pictures®) and the ((Ashide-ye® (pictures painted with Kana characters), while the game called «Ye- awˆw (picture-setting) was in great vogue.

The sacred book dedicated by the Taira family to the Itsukushima shrine bears witness to the artistic taste of those days, being ingen¬ ious in design and beautiful in decoration. (Con¬ sult (Shimbi Taikwan, Vol. VII; Vols. XV and CXIII). As for sculpture, though the descendants of Jocho kept up the traditional style of the famify, yet it became more elaborate and showv, losing much of the loftiness and grandeur as shown in the works of previous ages. Architecture and other branches of applied art grew more and more delicate, and came to lack in strength and vigor*

Seventh Period.

The Era of the Kamakura Shogunate (1186-1392 A.D.). — By the time Yoritomo originated the . Shogunate at Kamakura, the sPlnˆ of simplicity and strength, characteristic of the military class of the time, naturally also found its vent in the works of art ; their per¬ vading features are force and manliness. The Zen (Dhyana), i.e., ((meditation,» sect of Bud¬ dhism which was introduced into Japan in this period, along with the then established Nichiren sect, with their astute doctrine, were not with¬ out their influences on the artistic productions of the age. The carved figure, so full of ro-

Murslkf sliikibtu SCr°U reeresenti”S ˆ ™vet of Lady

business, by the Buddhistic sculptor Unkei and his son Tankei, are most representative of its spirit. Even a great advance in faithfulness to nature and skill of expression is noticed in their works, among which the statues of the two guardian kings (Niwo) at the gate of the tem¬ ple Todaiji, are looked upon as the now exist¬ ent chef-d’oeuvre. (Consult (Shimbi Taikwan, Vol. II; Vols. XI and XII).*

Among the followers of the Unkei school of sculptors Jokei and Koben are to be mentioned. Kwaikei, also known as Annami, adhered to the older style of sculpture, and carved many statues of Amitabha.

As for the pictorial art, the characteristically Japanese modes of design and execution made a further development and manifested a great amount of activity. The Tosa school could boast of such great names as Sumiyoshi-Keion, the author of the illustrated Scroll of the Heiji-Monogatari> (according to a certain tra¬ dition, this is attributed to Hamuro Tokinaga, but it is not credible; consult (Shimbi Taikwan, Vols. V and X; Vols. XVI, CXXXVI and CLXXXII) ; Nobuzane to whom the authorship of the illustrations in the (Kitano-Engi) (consult (Shimbi Taikwan,* Vol. IX; Vols. XXXVI and LXXXVI), and of the illustrated Scroll of the Eigwa-MonogatarP is attributed (consult (Shimbi Taikwan,} Vol. IV; ˆokkwa,5 Vols. XLIII and.XLVII) ; Yoshimitsu, the author of the illustrated Life of Honen-Shonin) (con¬ sult (Shimbi Taikwan,* Vol. VIII; (Kokkwa,) Vols. LVIII, CXLI, CLXXVII and CXCIV; (Shobi SiryoA Vol. II, 5) ; En-i, the author of the illustrated Life of Ippen-Shonin> (con¬ sult (Shimbi Taikwan,* Vols. II, XII; (Kokkwa,> Vols. LXXIII, CXLVIII and CCVI) ; Nagataka, the author of the (Sumi- yoshi-monogatarP (consult (Shimbi Taikwan,* Vol. VIII; (Kokkwa,> Vols. LIII and CCXL), and the illustrated Scroll of the Mongolian Invasion* (consult (Kokkwa,* Vol. IX), and Takashina Takakane, the author of the illus¬ trated Scroll of Kasuga-Gongen-Kenki) (miracles of the deity of Kasuga : consult (Shimbi Taikwan,* Vols. V and VIII; (Kokkwa, * Vols. XXXI, CXL, CLXIV and CCXLI).*

The Kose School continued to supply us chiefly pictures concerning Buddhism, Arihisa being the most famous of its supporters. Kore- hisa, although originally an artist belonging to this school, made a departure from it. The well-known illustrated Scroll of the Later Three-Year-Campaign is from his brush. Consult (Kokkwa,* Vols. XII and CCII.*

Shoga, a master belonging to the Takuma school, chiefly produced the Buddhistic pic¬ tures. Later on, Yeiga of the same school, made a study of the Chinese masters, such as Li Lung-Min of the Sung dynasty, and Wan-Hui of the Yuan dynasty. The picture of the Arahats (saints) was his favorite subject.

Near the close of the period now under consideration, a kind of ink-drawing introduced by the Zen (Dhyana) priests who had been to China under the Sung Sovereigns, came gradu¬ ally to find in Kawo, Mokuan, Myotaku and others its able propagators.

From the architectural point of view, we must observe that side by side with

a new style of building as shown in the Dhyana

*temples there arose in Kamakura a plain form of private dwelling, known as the ((Buke-tsu- kuri** (((Military style**).*

The troubled state of the times necessitated the manufacture of warlike implements, and great progress is noticed in the making of armors and swords. Lacquer work also made a considerable advance. And it is during the Kamakura period that Kato Shirozaemon originated the Seto pottery on his return from China where he went to learn the ceramic art.

Eighth Period.

The Era of the Ashikaga Shogunate (1393—1573 A.D.). — The period that followed the reunion of the Southern and the Northern branches of the Imperial line of descent was one of exorbitant luxury, in which the Sho¬ guns of the Ashikaga family were sybarites enough to live. The astounding indulgence which marked out Yoshimitsu and Yoshimasa from- among other extravagant Shoguns of the time did much to enhance the great develop¬ ments both in arts and industry.

It is, however, not to be forgotten that the austere simplicity and directness of the Dhyana doctrine also fostered a taste for serene beauty among the people and that the tea cere¬ monial was very much in vogue as a form of its expression in the daily life. Hence the studied avoidance of wild luxuriance in the works of art of the period. The pictorial art of the Ashikaga period was totally under the in¬ fluence of the Sung and Yuan masters. Priest Myn-Cho drew his Buddhas and Chinese sages, closely following the modes of delineating things as seen in the pictures of the Takuma school and those of the Sung and the Yuan dynasties. When the ink-drawing had begun to .make its way among Japanese artists, among its votaries were Priest Josetsa and his dis¬ ciple Shubun in the Oei period. These two gradually formed their own school by an eclectic of the Chinese masterpieces. Among their illustrious followers are Shinno, Jasoku, Sesshu, Sotan, Shingei, Shinso, Shokei and Masanobu.

Of all these well-known names that of Ses¬ shu is most conspicuous, his works giving tests to his exquisite way of brushing as well as his fullness of manly strength. Indeed, he may be said to be the greatest artist Japan had yet produced, his works being marked by great sublimity. Masanobu is the originator of the Kano school. His son Motonobu made a deep investigation of the Sung and the Yuan mas¬ ters, which he deepened by a study of the technics peculiar to the Tosa school. That is how he came to complete what his father had begun. Sesson was also one of the great artists in this period. The Tosa school had dwindled into common place during this period, and

Mitsunobu was the only artist of the line who breathed a new life through his assimila¬ tion of the Sung mode of delineation. Sculp¬ ture showed a sign of decay in this period. No great names honored once so flourishing a branch of art. Nobleness of features which characterized the Buddhistic images was not to be seen in the new productions, whose very fineness of outward form only suggest effemi¬ nacy and formality. It is to be speciallv men¬ tioned, however, that a new activity arose in the carving of the masks for the No-dancers —

a phenomenon that appeared as an outcome of the rise of the lyric drama.

In the fieM of architecture, the Dhyana style of Buddhistic edifices had reached its P^fection, and the so-called (

All forms of industry had made great progress through the increased demand and encouragement on the part of patrons. The making of armors and swords as well as the peaceful art of decoration was successfully car¬ ried on by their respective masters. Plain gold or silver lacquering too came to be prac¬ tised with wonderful skill and art. The great zeal with which the fashionable arts of the tea-drinking and the incense tournaments were pursued proved a most favorable stimulus for the production of the much-famed examples of the. ceramic art. Many exquisite works of this period came from the furnace of Shozui, who visited China to learn how to make the celadon porcelain from the Ming artists.

were employed in ornamenting buildings. The latter part of this age, however, brought forth the famous sculptor Hidari Jingoro. It mav be worth mentioning that remarkable skill was exhibited in the carving of No masks. As to manufacturing art, apart from the encourage¬ ment afforded- by the extravagance of the daimyos and the general prevalence of tea¬ making, the great influx of foreign articles through the merchants of China, the Malay Archipelago and Western countries stimulated the progress of all branches of Japanese art.

Ninth Period.

a T?\he J?ra °,f ,the T°y°tomi (1574-1614 A'U'T Llowar.d the close of the Ashikaga period the empire was thrown into a state of utter confusion, but when Oda Nobunaga gained the controlling power over Japan and was sub¬ sequently succeeded by the great Taiko Hide- yoshi, the dashing disposition and the extrava- taste of the people strongly tinged the different lines of art. But this Zeitgeist and its consequent effect on fashion was, in

some measure, counteracted by the prevalence of chanoyu (Ceremonious tea-making® —an art which, under the strenuous encouragement of Hideyoshi and the devoted enthusiasm of those who took interest in it, attained to a high de- gree of artistic excellence. It even affected the style of architecture and industry.

In this period the paintings of Kano Yeitoku ‘ were characterized by strong force and free use of his brush, and brilliancy of color. His works were immensely admired by the warrior class and used in decorating magnificent edi- fices. He had three disciples: Sanraku. Koyet-

SUc ˆud TjSia K°yetsu first modified the style of the old Tosa school and made a style of his own Furthermore he improved upon makive (gold and silver lacquer) by his noble and unique designs, and his representations of popu- lai scenes promoted the oncoming of the ukiyoye school. 5

m}U archltecture, Hideyoshi’s two castles, Momoyama and Juraku, were the most magni- hcent 1 he daimyos, too, took pride in the splendor of their castles. The construction of bhinto shrines also was gradually improved, un-

/k MVr was .cabed the yatsumune-dzukuri (buildings consisting of eight edifices, large and small) edifices was invented. It has been charged that the Buddhist temples of the bhm sect are wanting in solemnity, but in mag¬ nitude they are seldom equalled. In the con¬ struction of tea-rooms the greatest elegance of taste was displayed, and gardening, too, un¬ derwent a favorable change. In sculpture there were few great productions, except those that

Tenth Period.

The First Period of the Tokugawa Sho- ˆraˆe (1615—1744 A.D.). — With the firm es¬ tablishment of the Tokugawa’s supremacy, the literature and art of Japan took a long stride- and as the empire had enjoyed tranquillity f0£ many years people in general became effeminate and weak-spirited through excessive devotion to literary pursuits, while the plebeians raised the condition of their living owing to the growth of their wealth. The result was that the fashion and the taste of those days were to a great extent, modeled by the fancy of the lower but comparatively rich plebeians. Accordingly and .industry gradually departed from their old fashion of grandeur and magnificence, and assumed milder and plainer aspects

At the beginning of this period, however, t«efMaC.er°f the f.oregoing age was still per- Crˆ 6 T • r ev,en ln the vivid ukiyoye painting of Matabei and the superb style of Sotatsu’s decorative pictures there was a touch of vigor

and grandeur. But as the age gradually rip- ened and fancy deepened the so-called Ge'nroku fashion unfolded all its glory.

Among the . artists Tannyu held a verv prominent position-. He studied both Chinese and Japanese art and formed a novel style dis¬ tinguished for the broadness of subjects and plainness of treatment, while Naonobu, Yasu-flnd Tstlneriobu contributed to extending ini °fc school. Sansetsu, remain-

to?' lotcb.. faithfully preserved his ances- style ; Mitsuoki improved upon the old Tosa style by blending in it the brush of the*

vff^eSfnmacSter • ; J??ke\ and his son Gukei re¬ vived the Sumiyoshi school; Hanabusa Itcho

choosing his themes in the scenes of dailv life' wff£CLed h&ht and < farming pictures; Motonobu Pecubar ^auty and grace of treatment secured the foundation of the ukiyoye school Lnoshun, Kwaigetsudo, Masanobu and Kivo-

5XL fn rmed f /r?uP themselves, while Sukenobu worked independently. Korin the

great genius and unequalled decorative painter applied his art to lacquer work, while his younger brother Kenzan achieved the highest

wares ^ gracefu^ paintings on porcelain

. , In tbls a?e sculptors chiefly put their efforts into microscopic details; hence diminutive works of rare merit — such as Netsuke — were produced, but larger works like Buddhist stat¬ ues continued to decline. Of the sculptors who made .a specialty of carving Buddhist statues Tankai Risshi and Shimidzu Riukei alone were ce ebrated. Carving came to be widely used m the decoration of buildings, but the stvle grew too complex. y

u^j arJ;b^('ctllre. a new mode of construction called the <(gongen-tzukuri» found its rise.

JAPAN

1 Gateway to Shinto Temple, Kamakura 2 Bronze Buddhas and Pagoda at Asskusa, Tokio

JAPAN

1 Buddhist Temple, Asakusa, Tokio

2 Interior of the Chinese Buddhist Temple, Yokohama

Gate of the Golden Temple, Tokio

Hectagonal Temple, Kioto

‘ 3ˆ1 S !£0de uhad more tendency to monastery

; r-. 1 c ttian the Yatsumune-tzukuri, the former being an advance upon the latter. However though it surpassed the older chyles in sec¬ tional detail, it lost in general sublimity. The temples at Nikko and Uyeno best reflect the type ol that age. Side by side with the growth ot luxurious taste among the people and of scientific and technical progress, all other lines oi art and industry attained to hi her excel¬ lence.

Eleventh Period.

The Second Period of the Tokugawa Sho- gunate (1745-1867 A.D.).-When Iyeshige,

the Ninth Shogun of the Tokugawa House, en¬ tered upon his office, the general fancy in Yedo had tended toward greater pomp and vulgar splendor; but in Kioto quiet and chaste liter¬ ature and art rose into ascendency, and the two capitals presented a strange contrast. The Kano school, adhering to its old rules with overstrictness, was, as it were, fossilized, and produced no fresh masters; but ukiyoye gained greater popularity, and its masters, Shunsho, Harunobu, Utamaro, Toyokuni, Keisai and many others, competed with one another in painting bright and attractive pictures. Indeed the demand for their works was such that it called forth the invention of color-printing from woodblocks. Hokusai enlarged the range of painting, and covered with his skill all ob¬ jectsˆ of natural and social existence. Hiro¬ shige was renowned for his landscape painting, and the pictures he depicted for woodcut re¬ production had a peculiar charm. Shiba Kokan imitated European painting and also made some attempts at copper-plate pictures.

The influx of Ming and Ching institutions affected the Kioto artists. Ginankai, Chitaiga and Shabuson were renowned adherents of the Southern school, and it was by their stimula¬ tion that the celebrated Maruyama Okyo founded his realistic school, thus making quite a new

phase in the art of Japan. Goshun, originally a pupil of the Southern school, opened the Shijo school. Besides them, Shi- seki, Shoko, Jakuchu, Sosen, Ganku, Zaichu, Chikuden more or less copied the style of Ming and Ching painting. By and by the'ir art influ¬ enced the artists of eastern Japan as mav be observed in Buncho and Kwazan. Toward the end of the Shogunate, Totsugen and Ikkei and some others revived the old Tosa school, and from it Yosai's brush supervened. In industry, the simple articles fashioned after the taste of literary men came into popularity, whereupon many artisans took their models in Ming and Ching manufactures.

Twelfth Period.

The Age of the Grand National Meta- morphosis (1868-A.D.). — The advent of the Meiji Restoration completely destroyed the . feudal system and swept away the old atmos¬ phere. The country was thrown into the midst of the world's great tide, and the general com¬ motion arising therefrom was so violent that both arj and literature fell into a temporary lapse. Soon, however, as the Imperial rule manifested its beauty, they once more com¬ menced activity and progress, and are now ready to make a bold flight. It was only half a century ago that this old island empire had

the grand national metamorphosis. But in that short space of time the nation has digested every department of Western civilization with

SUC as to surprise the whole

world. Yet, whatever the material progress of Japan may have been, her art and literature are still in a state of transition, and it is impossible o foretell their future. We have no doubt however that the nation will blend all the best points of the East and the West with the sig- nal success which has marked its past efforts and bring out a new product of indescribable value, though we are aware the completion of such a task must necessarily require the labor ot many a long year.

The first artist to come into the new at- mosphere was Kano Hogai, and Hashimoto Uaho followed in his wake. The latter studied °u ™?.ters and developed a new style. From the ohijo school Kono Bairei and Kawabata Gyokusho rose, of whom the latter is trying to devise some novelties. Shibata Zeshin was an artist of rich originality, while Kishi Chi- kudos forte was painting from nature. Nogu- c . Yukoku and Taki Kwatei were eminent artists of Southern school; Takemura Koun and 1 akuchi Kyuichi are noted for their original style in wood-carving, and Ishikawa Komei for his ivory work. European painting and plaster casting have made some progress. The archi¬ tects have successfully introduced the European mode of house-

building with bricks and stone while they continue the proper Japanese style of building with wood.

Baron Ryuichi Kuki,

Triyy Councillor and Custodian of the Imperial Art Treasures.

15. JAPANESE ARCHITECTURE. The

architecture of Japan, like that of China from wffich it is derived by way of Korea, is wholly distinct from any of the styles of southern or western Asia. It was brought to Japan in the 6th century of our era by Korean Buddhists; there appears no trace of any precedent indige¬ nous style. As developed by Japan from this

imported type, it has persisted until the present time.

Characteristics.— Superficially, Japanese ar¬ chitecture appears to be a single style, on ac¬ count of certain characteristics which run through all the periods; on closer examination these periods are distinguishable by their de¬ tails and ornament, as well as by subtle dif¬ ferences > of taste. Like the Chi nese and Korean, it is an architecture of wood, employ¬ ing this material with such refinement and dignity as to exalt it to an artistic and monu¬ mental importance which it has nowhere else attained. While stone is used for terraces, stairways and embankment walls, and — singu¬ larly enough — for decorative lanterns as archi¬ tectural adjuncts, the entire structure of tem¬ ples, gates or torii, towers or pagodas, houses and palaces, is of wood. Even stucco appears only in rare instances. The most distinctive feature is the roof, gabled or hipped, having invariably a concave-curved' sweep, with very wide eaves upturned at the corners. The sup¬ porting structure consists of heavy posts, square or round, carrving equally heavy girders framed into them, which in turn carry an elaborate and complicated framework of brackets and ties. The principle o'f the truss supported at

the ends is not recognized ; that of the canti¬ lever appears in the bracketed construction, which rests directly on the main posts and girders. A central mast is an essential feature of every pagoda. Superposed stories are in retreating stages, each marked by a tiled roof forming wide-projecting eaves. All wooden members are mortised or halved into each other, without nails or pins. Sheet-metal collars of copper, silver or bronze often decorate the points of junction. The wood is highly finished and left

either of its natural color, or lac¬ quered in red, black or other colors, especially in temple interiors. All roofs are tiled with gray, dark green or red tiles. There is no wall-design, properly speaking: temple struc¬ tures are generally open; domestic buildings walled only with wooden panels and paper shutters, except in rare instances of palaces and castles which have plain plastered walls. The masonry of terrace walls is finely executed, but the principles of jointing employed in the West are not followed, and the masonry is, on the whole, the least successful part of the architecture, though never failing in the pic¬ turesque quality. In some of the Tokugawa castles, however, stones of huge size were em¬ ployed. . rivaling those of Baalbek in Syria.

Periods. — The Korean style, called Shichido Garan, lasted from 580 to nearly 800 a.d. ; it was at first purely Chinese in character, and has left in excellent preservation the beautiful pagoda and hondo (temple hall) at Horiuji (580 a.d.) , the Sanjuto at Hokiji (about 646), and monasteries, much rebuilt, at Horiuji, Nara and Osaka. The noble Yakushiji pagoda near Nara (680 a.d.) represents the Japanese modifi¬ cation of this style, which declined after 725, leaving, only a few small and simple temples (Todaiji, Shinyakushiji, etc.). This style is marked by the purity and refinement of its curves, the grace of its proportions and its internal simplicity.

The Helan period followed with the transfer of the capital to Kioto, in 782, by the Mikado Kwammi, and was marked by a new impulse from China direct, with a great increase in decorative splendor. Its one extant unmodified monument is the Ho-o-do at Uji, built as a villa but later converted into the <(Phcenix Hall® of the temple Byodo-in, remarkable for its beautiful lines and its internal splendor, especially for its coffered, carved, lacquered and inlaid ceiling. The Enriakuji on Mount Shiei and the Chion-in at Kioto have been largely rebuilt.

Ashikaga Period. — From the end of the 12th to. the end of the 14th century confusion reigned under the Fujiwara shoguns, who were succeeded by the greatly Ashikaga dynasty, and the. capital was transferred to Kamakura. Art revived under a second Chinese influence. The dominant style .was that of the Zen Buddhist temples and palaces. The temples were without pagodas, the hondo was square and lofty, ac¬ companied by a complex group of monastic dependencies ; the palaces were of singularly elegant design, if we may judge by two extant pavilions at Kioto — the celebrated Kinkakuji and Ginkakuji (15th centurv).

Tokugawa Period. — In 1603 the great Iye- yasu established the Tokugawa dynasty, with the capital at Yeddo (Tokio), and ushered in the policy of exclusion and isolation (1635-

1853), and of the military feudalism of the daimyos. The ancient Shinto religion was re¬ vived, and architecture took on a hitherto un¬ exampled splendor of decoration, exemplified by the gorgeous temples at Nikko, Suba or Shiba and Uyeno. The judgment of critics is divided as to the merits of the Tokugawa style ; the general verdict is that purity of line and refined simplicity of form were exchanged for complexity and magnificence of detail, but the beauty and impressiveness of the result are admitted by all.

The Japanese divide the Shinto temple archi¬ tecture into 10 sub-styles (Oyashiro, Otori, Sunnyoshi, Kibitsu, etc.) ; but only a Japanese expert can distinguish them. The great major¬ ity of extant temples are of this religion and period, and many of them extremely beauti¬ ful, as much by their surroundings, terraces, gardens, torii or gates and dependencies as by the lacquer, carving, metal adornments and brac¬ keting of their interiors. Many have pagodas like the Buddhist temples (e.g., at Nikko, built 1810—18) . The . Tokugawa palaces or castles (yashiki) are imposing compositions, despite the light construction of their central or resi¬ dence buildings in wood and plaster. The ter¬ races of massive masonry, the gateways, the concentric courts about the central dominant nagaiya, are well exemplified by the castles and palaces of Himeiji and Osaka, of Hikone and Kumamoto, and by the Nyo-rikyo and Katsura-rikyo at Kioto. The ordinary Japanese house is a charming but frail structure of frame, with rooms divided by fixed or sliding panels of wood and rice-paper. Each room is planned to fit a given number of mats of three by six feet, and the chief room has a recess or alcove for the daily display of a single kakemono, vase or other choice work of art, taken from the godun or fireproof storeroom. There is no distinction of type of rooms for special functions or uses. The present-day architecture of Japan is being unhappily in¬ fluenced by Western models, especially in com¬ mercial buildings.

Bibliography.— Conder, R. J., (New York 1905) ; Dresser, (Japan, its Archi¬ tecture, Art and Art Manufactures) (New York 1882) ; Gonse, L., (L'Art Japonais5 (Paris 1883) ; Morse, E. S., Japanese Homes and their Surroundings (Boston 1886). Consult also article (Japan> in Sturgis, R., dictionary of Architecture) (New York 1901), and Vols. II and III of (Official Guidebook published by the Imperial Railways of Japan (Tokio 1914).*

A. D. F. Hamlin,

Professor of the History of Architecture, Columbia University.

16. FINANCE AND COINAGE SYS¬ TEM IN JAPAN. Introduction. — After the Restoration, 1868-71, Japan passed through many sudden and sweeping changes in her po¬ litical and social affairs. Feudalism was abol¬

ished in favor of the centralization of govern¬ ment, to be succeeded by a representative form of government ; the nation was engaged in civil wars and also passed through two foreign wars. In financial matters, too, the changes that oc-

JAPAN — FINANCE AND COINAGE SYSTEM IN JAPAN (16)

' juried were both important and memorable. The adjustment of the land system and the reform of land taxation, the adjustment of hereditary salaries of Daimios (feudal lords) and Samurais by means of public loans, the uni¬ fication of ithe business of the state treasury, the reform of various taxes, the adjustment of paper currency and the adoption of the gold standard were among the most important of the changes. Of these this article will treat chiefly the adjustment of the paper currency, and the adoption of gold standard, as they were the most important and difficult tasks of all. The adoption of gold standard was one of the most important measures to bring this country into the international circle of common economics. A treatment of these two topics will take us over the general view of currency system in modern Japan.

How the Paper Money Came to be Issued.

— The coinage system in vogue at the time of the Restoration (1868) was based on the sys¬ tem that was first established in the 6th year of Keicho (1600 a.d.), and continued to pre¬ vail for upward of 260 years until the end of the Tokugawa regime. The Shogunate govern¬ ment, however, frequently resorted to recoinage in order to relieve its growing financial difficul¬ ties, invariably making the coins lighter in quan¬ tity and poorer in quality. Some of the Dai¬ mios, too, took the liberty of secretly coining money, while, with the permission of the gov¬ ernment, some of them also issued paper money. The consequence of all these irregularities was that the currency system of Japan at the end of the Shogunate government was in a most disorderly condition.

Soon after the Restoration, the Imperial government resolved to reorganize the existing system of coinage on a sound basis, and in 1871 set itself to the task of reminting all the old coins. A gold standard was adopted, making one yen gold the standard unit. It consisted, after the American system, of 90 per cent of pure gold, its weight being 25.72 grains. A one yen silver coin weighing 416 grains, 90 per cent of which were silver, was also issued to be ex¬ clusively used at the treaty ports. In this way, although a gold standard was adopted, yet as a matter of fact it could not be operated in a satisfactory manner, owing to the over-issue of paper money and other circumstances then pre¬ vailing. Besides, as Mexican silver dollars were generally used as the medium of exchange in the trade

of the Far East, it was found impos¬ sible to maintain the gold standard in Japan. Under the circumstances, in 1878 the govern¬ ment allowed the use of the one yen silver piece as legal tender throughout the country, the cir¬ culation of which had formerly been confined to the limits of the treaty ports. The result was that the monetary system of Japan became bimetallic, and after the adjustment of incon¬ vertible paper money it became a de facto silver standard.

Government Paper Money in the Early Years of Meiji. — In 1869 and the year follow¬ ing the government was financially in a very difficult position. . This was mainly due to the heavy expenses it had to meet in connection with the revolutionary wars, when there was scarcely any fixed source of revenue to rely upon. In order to relieve this financial distress, in

1868 the government issued paper money called Kinsatsu (literally, gold notes). Then again, when in 1871 feudalism was abolished, the gov¬ ernment had to take over all the paper money which had been issued by different Daimios. In order to adjust this class of paper money and owing to several other circumstances, the gov¬ ernment was obliged to issue further large amounts of paper money from time to time, until about the end of 1876 it totalled 93,000,000 yen.

The credit of these paper notes was at first exceedingly bad. In Tokio and Osaka, the price of the new paper money was at one time more than 60 per cent below the' specie, while in other localities it could not be circulated. This was mainly due to the fact that the various kinds of paper money issued by different Daimios had already much depreciated in value, there having been even cases where they were disowned by the governments which had issued them. Moreover, the new government was not as yet established on a firm footing, while the paper money was issued with neither the security for conversion nor within reasonable limit. It is not at all strange that the general public placed little confidence in the new paper currency.

In view of such a state of things, the gov¬ ernment endeavored to facilitate the circulation of the paper currency by every available means. Expostulations and threatenings were resorted to and then an order to pay taxes in the paper money was issued. It was even proclaimed that a person who would take premium in the ex¬ change of paper with specie should be fined or imprisoned. Despite all these measures, the government could not keep up the price of paper on par with specie. So in December 1868, the government was obliged to make public recog¬ nition of the difference in price of paper and specie. This, however, only had the effect of still lowering the price of paper, and the gov¬ ernment withdrew the measure in April of the following year. In May of the same year the government

shortened the period of circulation of the paper notes to five from the original 13 years, and pledged to regard them, if they re¬ mained in circulation after the expiration of that period, as government bonds bearing 6 per cent interest, besides announcing to the public the means of redemption and the amount of issue. These measures, however, were not satisfactorily carried out. But as the prestige of the new government gradually came to be fully established, the credit 0'f the paper money increased, and about 1872 the people even came to prefer it because of the convenience of hand- ling.. In fact its price became even higher than specie.

The Over-Issue of Paper Money Owing to the Rebellion of 1877. — Matters were progress¬ ing favorably, when in 1877 a rebellion broke out in the southwestern provinces of the empire. In order to defray the expenses of this civil war, the government was obliged to issue 27,000,000 yen of paper notes. Thus the amount of the paper money in circulation suddenly in¬ creased, until in January 1879 it reached the maximum amount of some 120,830.000 yen.

The Issue of Reserve Paper Money. — Al¬ though these paper notes were issued by the government with the intention of withdrawing

them after a fixed period, yet practically they became a sort of permanent debt; and besides them the government provided itself with re¬ serve paper notes, which were issued whenever it found itself in want of money, withdrawing them as soon as revenues were obtained. This extraordinary issue of reserve paper money gradually increased in amount, so that after 1878 the average yearly issue reached 20,000,000 yen.

The National Bank Notes. — Besides the kinds of inconvertible notes, mentioned above, there was another kind of inconverti¬ ble paper, namely, the national bank notes. When in 1872 the government pledged to redeem paper currency in five instead of 13 years as originally fixed, it adopted a scheme of establishing national banks with power to issue convertible notes, these notes to be issued on the strength of the govern¬ ment bonds deposited in the Treasury Depart¬ ment. With this object in view the National Bank Regulations, modeled largely after the system then in vogue in the United States, were proclaimed. According to these regulations, a national bank was to have a capital of at least 50,000 yen, and was first to bring to the gov¬ ernment paper money equal in amount to six- tenths of its capital, for which the government was to deliver in exchange the same amount of the Kinsatsu-Exchange bonds bearing 6 per cent interest, and

these the bank was again to take to the government to be deposited as security for the same amount of the convertible bank notes to be delivered; four-tenths of the capital was to be in specie and kept as reserve for the conversion of these notes. The govern¬ ment intended to retire all the government paper money hitherto issued in exchange for these notes, but unfortunately that intention could not be. carried out. For the specie was getting daily more scarce so that as soon as the con¬ vertible bank notes were issued, so much de¬ mand was made on the banks for exchange, that these notes never obtained any extensive circulation. Thus only four national banks were established, which issued some 2,000,000 yen of convertible notes between them. In 1876 the government issued some 174,000,000 yen of the Hereditary Pension bonds to take the place of the annual pensions of the Daimio and Samurai classes, hitherto paid in rice. The government intended that these bonds should be made the capital of national banks and that those banks should be authorized to issue notes. In this way, it was believed that the Samurai would obtain a means of livelihood, while the economic market would be supplied with the much needed capital in the form of bank notes. With these ends in view, in August 1876, the government made certain amendments in the National Bank Regulations, so. that it now became possible to establish a national bank with power to issue notes without specie reserve at all. To be par¬ ticular, the total , amount of notes which the national banks might issue was limited to 34,- 000,000 yen ; a bank might place as deposits in the government treasury any kind of govern¬ ment bonds bearing interest at 4 per cent and upward, to the amount equaling eight-tenths of its capital, in order to be able to issue bank notes equal to the amount of that deposit; at the same time the required conversion reserve for the notes issued was reduced to but two-

tenths of the capital, and moreover this might be in any kind of currency. Thus the national bank notes were changed from being convert¬ ible in specie, into being convertible in currency; and since the currency of the time was incon¬ vertible government paper money, these bank notes, too, became another kind of inconvertible paper money.

The establishment of national banks having thus become quite easy, many were soon estab¬ lished, and in April 1880 the notes issued by them reached the maximum amount of 34,420,- 000 yen.

In these ways, the amount of inconvertible paper money in circulation rose step by step, until it reached its highest point in January 1880, as may be seen from the figures given

below :

Yen

Government paper money . 113,831,709

Reserve paper money temporarily issued . 22,188,116

National bank notes . 34, 137,652

170,157,477

The Policy of the Government Toward Inconvertible Paper Money About 1879.—

One result of such over-issue of inconvertible paper money was the difference in price of sil¬ ver and paper, which began to manifest itself at the beginning of 1877. At the close of that year the ratio between silver and paper became as much or more than 1 yen and 21 sen of paper to 1 yen of silver. The general public began to pay attention to the disposal of the paper money. The government, too, recognized the necessity of taking measures to redeem the government bonds and paper money, and in August 1877 drew up a plan aimed at the redemption of the paper money within seven years, publishing it in July of the following year.

An opinion, however, prevailed both among the authorities and the general public that the differences in the value of paper and silver were due not to the depreciation of paper, but to the appreciation of silver, and the govern¬ ment made efforts to prevent the rise of the price of silver rather than to redeem the paper money. Thus, when in March 1879, the dif¬ ference between silver and paper became 1 yen and 26 sen of paper to 1 yen of silver, the gov¬ ernment induced the First, Second, Mitsui and Specie banks to sell out silver coin. The meas¬ ure was unsuccessful in so far as it temporarily checked the rise of the price of silver, but no sooner was the sale of silver coin suspended than the paper money further depreciated. As it. was, the government abandoned ithe meas¬ ure in September 1880.

The government also opened a place for transacting the exchange of Mexican dollars at Yokohama with the purpose of facilitating the sale and purchase of silver and of preventing thereby the rise of the price of silver. Further in February 1880, the government established the Yokohama Specie Bank, contributing one- third of its capital, with the object of inviting people to invest hoarded coins, so that these coins might be supplied to the financial market. The. Specie Bank was, moreover, to engage in foreign. exchange in order to facilitate monetary circulation between Japan and foreign countries.

All these measures, taken with the object of checking the rise of the price of

silver, having

failed, the government ultimately resolved to set itself to the task of redeeming paper money in carnest In September 1880, the government doubled the rate of tax on sake, so that the increased revenue to the amount of 5,000,000 yen a year might be set apart as a redemption fund. Again, the government extended the spheres of local taxation, correspondingly light¬ ening the burden of the central government, and at the same time the government expendi- •UrCn wf re much curtailed, the surplus obtained in all these ways being also added to the re¬ demption fund. Besides all these, the govern¬ ment decided gradually to transfer by sale to Pnyate hands the government factories, which had been established for the encouragement of industry ; stopped making loans to companies and individuals out of the reserve fund in the I reasury ; and every yen thus gained went to increase further the amount of the redemption fund.

\ et the depreciation of paper did not stop. In April 1881, 1 yen silver brought on an average 1 yen 80 sen of paper, this being the lowest point ever reached in the depreciation of paper money.

The Effects of the Over-Issue of Incon- veitible Paper Money on the Finance of Japan. — Before 1877, the over-issue of incon¬ vertible notes resulted only in the excess of im¬ ports over exports and the efflux of specie from the country, but after that year, as the amount of inconvertible notes issued suddenly increased, not only a great depreciation of paper and a faster and greater efflux of specie followed, but prices rose with abnormal rapidity. This was especially the case with the price of rice, which rose by 98 per cent in 1880 and 1881 compared with that in 1877. The rate of interest also rose by more than 4 per cent on an average in those days, it being possible to buy government bonds bearing 7 per cent interest at a price more than 30 yen lower than their face value. The bad effect of such a state of things was felt in various directions. The revenue of the govern¬ ment was practically reduced to one-half in value of what it had been, and the people who lived on fixed incomes suffered greatly owing to the sudden and considerable depreciation of their incomes. The rise of the price of rice swelled the incomes of farmers, who constituted a great majority of the inhabitants of the empire, with the result that they contracted habits of luxury. The imports exceeded the exports more and more and gold and silver left the country in ever-increasing quantity. As for the industrial and mercantile classes, they were simply bewildered at the sudden and frequent fluctuations of prices and instead of engaging in honest business, hoped and

struggled to reap profit by speculation. In fact the financial market of those days was. apparently in a very prosperous condition, but it was actually on the brink of ruin. This may be judged from the fact that whereas the export trade of the country increased 62 per cent in the five years between 1872 and 1876, it increased by only 28 per cent in the same length of time between 1877 and 1881.

The Adjustment of the Inconvertible Paper Currency.— In the autumn of 1881, a great split took place in the government, and as a result the present writer was transferred from the chair of the Minister of Home Affairs

to that of the Minister of Finance. It was just the time when the depreciation of the paper money reached its lowest point and both the government and people were in a most uneasy mood. It was found that the amount of the government paper and of the bank notes in circulation at that time stood as follows i

Government paper money .

Government paper money temporarily issued out of the Paper Money Reserve. .

Notes issued by National Banks _

Yen

105,905,211

14,500,000

34,398,030

Total

154,803,242

All these were inconvertible paper money. I he government decided that unless some drastic measures be taken to dispose of them the state finance would soon come to ruin. It became clear in the eyes of the financial author¬ ities that to accomplish the adjustment of the inconvertible paper money there was no other way than that side by side with the redemption of a portion of the paper money in circulation steps be taken to increase the specie reserve of the government preparatory to the resumption of specie payment. It was at first intended to adjust and redeem all the inconvertible notes issued by the government and national banks once for all, and establish a central bank having

Axr iSO'l Privˆe&e of issuing convertible notes, vv ith that intention, investigations were made into the actual financial condition of the govern¬ ment. It was found that 7,000,000 yen could be annually appropriated from the ordinary rev¬ enue of the government toward the redemption of paper money and that tnere was a reserve fund amounting to about 55,000,000 yen. Of this sum about 19,000,000 yen had been loaned out, so that the amount at hand was but 36,000,000 yen. . But as about 25,000,000 yen out of this bonds and 2,000,000 yen of bank shares and paper money, the amount of specie was no more than 8,000,000 yen. Further, even this amount existed in the account book' only, for out of this, 3,000,000 yen were loaned out to certain foreigners, so that the amount of specie actually available for conversion was only about 5,000,000 yen. Nevertheless it was firmly be¬ lieved that by utilizing the balance of revenue above referred to, and also by employing this specie reserve to advantage, the government should be able to carry out its scheme of re¬ deeming paper money in about five years.

In some quarters it was opined that it was unwise to accumulate and store specie, because specie would of itself naturally flow in if the paper money should be withdrawn and the currency decreased. Anticipating, however, the great difficulty that would attend the realization of the scheme of convertible notes, the govern¬ ment adhered to the policy of accumulating and storing as much specie as possible.

The task of doing this, however, was not an easy one. The amount of the specie that re¬ mained in the country on those days was ex¬ tremely small, while the yearly output of gold and silver mines in the country was less than 400,000 yen. Moreover, bound up by the treaty, the government could not revise tariff to its advantage. On the other hand in view of the financial condition of the time, the country would suffer great disadvantage if foreign loans were resorted to. Under these circumstances the government came to the conclusion that the

only way open was to try to bring in gold and silver from abroad by means of discount¬ ing foreign bills of exchange accompanied by securities, and accordingly this scheme was adopted though there was no little opposition within the government itself.

It indeed required a great determination on the part of the government to accomplish the adjustment of the paper currency; for it was apparent with the rise in the value of paper money the prices would fall, leading to the dis¬ appearance of the seeming prosperity of the country which then prevailed. Loud voices would naturally be raised against this policy from

all quarters. To make it sure that no opposition would ever stop the carrying out of the government's scheme, the emperor's special sanction for this scheme was obtained.

The Adjustment of the Reserve Paper Money. — The first task was the adjustment of the reserve paper money. As before stated, the reserve paper money was issued for tem¬ porarily meeting the deficit of revenue. It was thus not of a permanent nature, but all the same it had the evil result of increasing the amount of circulation of inconvertible notes.

In order to withdraw from circulation the amount thus utilized from the paper money re¬ serve, certain changes were made in the method of making receipts and disbursements of the public revenue, as well as in the method of disbursing the expenditures of the government departments, so that thenceforth these dis¬ bursements were all made at the exchequer, instead of having the amounts . of the esti¬ mated expenditures turned over in lump sums to the departmental authorities in the early part of the fiscal year, as had been done before. These changes were effectual in giving the Treasury available funds. Yet further steps were taken toward the increase of the govern¬ ment reserve by withdrawing the loans made out of the government reserve (in aid of industrial enterprises) and by selling the government bonds which were held by the Reserve Fund. The increased specie in the reserve obtained in this way was temporarily utilized as well as all the available funds in the Treasury for the withdrawal from circulation of the reserve paper money, the task being accomplished in January 1883. After this, whenever the govern¬ ment was temporarily in need of funds, they issued short-term public loans in the form of the Treasury bills. The Treasury Bills Regula¬ tions were issued in September 1884.

Economy in the State Expenditure and the Redemption of Paper Money. — The ad¬ justment of the troubles connected with the temporary issue from the Paper Money Reserve was comparatively easy. But with regard to the adjustment of the troubles which existed in connection with the paper currency proper, the task was very much greater.

As was stated above, in October 1881, when the writer was appointed Minister of Finance, it was found that about 7,000,000 yen could be appropriated annually out of the ordinary revenue for the redemption of paper money. In order that this surplus should not be spent for any other object, the government decided that the state expenditures should not be further increased for the three years after the year

1882.

During the period just mentioned, however,

the government had to defray considerable ex¬ traordinary expenditures owing to the outbreak of cholera throughout the country, the occur¬ rence of troubles with Korea and the consequent expansion of armament, and some other affairs. Besides, after 1882 on account of the general dullness of trade, the government revenue markedly decreased. For instance, in 1883 the revenue decreased by as much as 2,000,000 yen in sake tax alone. Thus having found it im¬ possible to carry out the prearranged plan, the government took measures to increase its revenue by means of new taxes. Thus in 1882 the government first levied stamp duties on patent medicines, and license tax on the brokers of the rice-exchange and the stock- exchange, and revised sake and tobacco taxes ; and in 1885 taxes on soy and confectionery were levied for the first time. Part of the surplus of the revenue which was secured through these means was devoted to the re¬ demption of the paper money, while the re¬ mainder was added to the reserve fund with the object of employing it for securing the im¬ portation of specie from abroad. The amount employed in these ways for the adjustment of the paper money during the five years from 1881 to 1885 was as follows :

Yen

The amount directly employed in the redemp¬

tion of the paper money . 13 , 640 , 000

The amount added to the reserve fund . 26 , 466 , 828

Total . 40,106,828

The direct redemption of the paper money with part of the surplus of the revenue was made only till 1883. It was abandoned after 1884, as the difference of paper and silver in price disappeared, and all the surplus of the revenue was added to the reserve fund.

The Discounting Operations of Foreign Bills of Exchange and the Accumulation of Reserve Specie. — The reserve fund so fre¬ quently referred to above originated in the government's learning, through the trying finan¬ cial experience of the first years following the Restoration, the importance of creating a fund during normal times, and also because there was the need of such a fund to enable the gov¬ ernment to resume specie payment. The fund was commenced and efforts were made to aug¬ ment it by investment. In 1878, 20,000,000 yen were set aside as the sinking fund, out of the reserve fund, with the purpose of investing the amount in government bonds in order to apply the interest accruing

therefrom to paying off the principal and interest of the public debt. In 1881 the total amount of the reserve fund possessed by the government was more than 55,000,000 yen, the reserve fund proper and the sinking fund being counted together. In Au¬ gust 1882, the government decided to purchase specie with the government bonds constituting the sinking fund, and since then the sinking fund existed in name only. As the amount of specie in the reserve fund which was possessed by the government in 1882 was onlv about 5,000,000 yen, the attempt was now made to increase it with the specie obtained by discount¬ ing foreign bills of exchange.

It was in 1880 that the government first engaged in transactions connected with foreign bills of exchange by establishing the Yokohoma Specie Bank and entrusting to it the sum of

3,000,000 yen in order that it might discount foreign bills of exchange on the security of exported goods, at the request of mercantile companies engaged in the direct export trade. The main object of thus engaging in discount¬ ing foreign bills of exchange was to encourage, on the one hand, the direct export trade, and on the other to secure specie — it being the object of the government to use the specie thus obtained in paying off its foreign expenses. In those early days, however, the business con¬ nected with the foreign bills of exchange being entirely new, and the whole thing being mis¬ managed, there arose various evils connected with it, so that the result was far from ac¬ complishing the object sought. The govern¬ ment thus not only failed to accomplish the absorption of specie, but had even to sustain losses, owing to the fact that the advances made often remained unpaid long after the expiration of the term of maturity. The causes of this failure on the part of the government, in its first experience connected with foreign bills of exchange, appear to have been: (1) The laxity in the inspection of goods before discounting the bills of exchange, so that goods of inferior quality were sent abroad which did not com¬ mand the expected price. (2) The business con¬ nected with the disposal of exported goods being mismanaged, led to uncertainties and irregularities in their sales, causing delay in the payment of bills. (3) Since the money ad¬ vanced in discounting the foreign bills of ex¬ change was in paper money, it was arranged that the collection of those bills abroad should also take place in terms of paper money; so that the price realized abroad on the goods exported was, in paying for these bills, con¬ verted into the terms of paper money according to the rate of exchange prevailing at the time. And this process took place at a time when the paper currency was rapidly depreciating. As a result, the export merchants became engrossed in the

subjects of fluctuations in the value of paper money — regarding their business as one of speculation rather than of sober, legitimate transaction, in the hope of realizing certain chance profits from the fluctuation of paper money.

Accordingly the system of discounting for¬ eign bills of exchange was revised so as to do away with the above-mentioned evils and the revised system was put into operation after March 1882. The following were the chief points of revision: (1) The Specie Bank to make a very strict examination of the goods on whose security the bills were discounted. (2) The Japanese consulate at the place whither the goods were sent to be entrusted with their supervision, so that they were not to be de¬ livered until after the payments were made for the bills of exchange. (3) The bills to be made payable in foreign currency at the rate pre¬ viously determined in accordance with the rate of foreign exchange ruling on the day of dis¬ counting them.

Since these revisions were introduced into the system of discounting foreign bills of ex¬ change export merchants gave up any idea of speculation and ceased to cause losses to the government. Further, in June 1884, the priv¬ ilege of having the bills discounted was ex¬ tended to foreigners also. The result was verv satisfactory, the amount of specie acquired in vol. 15 — 45

foreign countries having markedly increased after September of that year. The government was thus enabled to increase the specie reserve, which was no more than 8,000,000 yen in 1881, to more than 42,000,000 yen at the end of 1885.

Establishment of the Bank of Japan. — Simultaneously with commencing the accumu¬ lation of reserve specie, the government felt that in order to effect the adjustment of the paper money it would be necessary to establish a great Central Bank. As before said, the national banks in Japan were patterned after the American system. As a matter of fact there were in 1883 over 260 banks, with their branches throughout the country, which issued paper money to the amount of 34.000,000 yen. But the capital they had at their disposal was generally of small amount. Besides they were established in circumscribed localities, each one within a narrow circle of influence. For this reason the communication between different banks was exceedingly bad, so much so that should there be surplus capital in one bank and another bank be in dire need, yet the former could not help the latter. In order to remedy such a state of affairs, it was thought that there was no better way than establishing a great Central Bank, as in Western countries. It was believed that such a bank would do much to regulate the monetary circulation of the country, sim¬ plify the business of the Exchequer, smooth the transactions of foreign bills of exchange and

regulate the influx and efflux of specie and bullion. Besides, it was believed that to invest it with the sole privilege of issuing convertible notes was of utmost importance to the adjust¬ ment and unification of paper money.

After studying the systems regarding such central banks in vogue in different European countries, the government came to the con¬ clusion that the Belgic system would best serve as a model, and after its pattern a plan was drawn up for the establishment of a Central Bank, called the Bank of Japan, and the main features to be as follows: (1) That the Bank of Japan would be able to facilitate the circula¬ tion of currency throughout the country, as it would be in a position to look upon other banks somewhat as its branch offices and open cor¬ respondence with them. (2) That the Bank of Japan would be able to increase the strength of national banks as well as of trading or manu¬ facturing companies by means of rediscounting their bills. (3) That the Bank of Japan would be able to lower the current rate of interest, as it would chiefly engage in the business of dis¬ counting short-period bills and thereby would facilitate the circulation of capital. (4) That when the business organization of the Bank of Japan was Completed, it would be possible to simplify the business of the government by en¬ trusting to the bank a part of the business of the Finance Department, such as the receipt and disbursement of government money and the liquidation of the public debt. (5) That the Bank of Japan might be made an organ of im¬ porting and preserving specie by making dis¬ counting foreign bills of exchange one of its functions.

The Regulations concerning the Bank of Japan were promulgated in June 1882, and in October of the same year the bank was founded. The main points in these regulations were as follows : (1) The term of business of the bank

to be 30 years. (2) The capital to be 10,000,000 yen. (3) One-fifth part of the capital to be paid in before the bank opened business and the remainder payable in instalments as the bank might require according to its business needs.

(4) A limit to be placed on the kind of busi¬ ness the bank may engage in; the risky and dangerous kinds of business to be prohibited.

(5) The bank to be entrusted with the receipt and disbursement of government money, so far as it was convenient to the government. (6) While the issuing of convertible bank notes should be considered its rightful

privilege, that privilege to be withheld for some time to come. (7) The governor and vice-governor of the bank to be appointed by the government, the former to be of Chokunin rank and the latter of Sonin rank. , (8) The Minister of Finance to appoint comptrollers to act as his representa¬ tives. (9) The directors and auditors to be elected by the 13 bank's shareholders. (10) The bank to make the monthly report of its business conditions to the Minister of Finance. (11) The government to become the bank's shareholder to the amount of one-half the en¬ tire capital of the bank.

It goes without saying that such a central bank should possess the sole privilege of issuing convertible bank notes. But in those days Japan did not possess an adequate specie reserve and the difference of paper and silver in value was exceedingly great. For these reasons the gov¬ ernment withheld from the bank the privilege of issuing convertible notes for some time. In return, with the view of making the establish¬ ment of the bank easy, the government under¬ took to take one-half of the entire capital of the bank and also permitted the bank to give 2 per cent more dividends to private shareholders than the government received. In spite of such favorable conditions, the task of inducing the people to invest their money in the bank's shares was not an easy one.

Disposal of the National Banks. — Having

thus succeeded in gaining the first step in the direction of the adjustment of paper money — namely, the establishment of a central bank, the government now faced the task of dispos¬ ing of national bank notes.

Since the national banks had been chartered for 20 years, and that term had not expired, they could not be abolished at once. On the other hand, however, should they be left as they were and abolished at the expiration of the term there was a fear that not only these banks but the country would greatly suffer.

In view of these circumstances the plan adopted by the government was as follows : (1) After the expiration of the term of 20 years each national bank be permitted to continue business, if it so desired, as a private institu¬ tion. (2) Each bank to deposit with the Bank of Japan a reserve fund for the redemption of notes, money equal in amount to one-fourth the amount of notes issued by that bank and also make a deposit in the same way of a por¬ tion of its profit every half year, the amount to equal 2.5 per cent per annum of the amount of the notes issued by it. The Bank of Japan to buy government, bonds with that fund in order to spend the interest accruing therefrom for the redemption of notes. If after the ex¬ piration of the term of the bank, there yet re¬ main notes unredeemed, that fund be employed

for the redemption of such remaining portion of the notes. (3) The Bank of Japan to trans¬ act the business of redeeming national bank notes according to the above method and to ex¬ change national bank notes with currency any time the demand is made.

In May 1883, the National Bank Regulations were properly amended and the disposal of the national bank notes was immediately com¬ menced. As described, the accumulation of specie, was begun simultaneously with the re¬ demption of the government paper money and the. government set itself to the task of dis¬ posing of the national bank notes as soon as the establishment of a central bank was accom¬ plished. Thus the time for carrying out the conversion of paper money now approached.

The amount of the reserve specie at the end of 1885 was more than 42,000,000 yen. Of this amount more than 13,000,000 yen were in gold. When this amount was estimated at the current price of silver at that time, the total amount of the reserve specie increased from over 42,000,000 yen to 45,000,000 yen. In consequence, the per¬ centage of the reserve specie was in reality 59 to the amount of the government paper money in circulation, and 37.9 to the aggregate amount of the government paper money and bank notes.

A great difficulty was experienced in accumu¬ lating specie on account of the disadvantageous position in which the country found itself with regard to the treaty with foreign countries. By that treaty Japan was entirely circumscribed in the exercise of the power to revise its tariff system, being unable to impose any customs duty on imported foreign articles other than the 5 per cent, duty fixed in the treaty. If Japan had been at liberty to increase its customs duty, the gov¬ ernment might have increased its revenue and obtained a source of accumulating specie. Be¬ sides, it would have made the trade relation with foreign countries advantageous to Japan and given facilities for attracting specie from foreign countries. As, however, Japan was un¬ able to do all these things, a great difficulty was experienced in attracting specie from foreign countries, as in so doing Japan had only to rely upon the means of discounting foreign bills of exchange.

As the amount of paper money in circula¬ tion decreased and that of the reserve specie increased, the difference of paper and silver in price gradually became less, until at the end of 1885 it almost disappeared.

The gradual disappearance of the difference in price of paper money and silver brought about various effects upon the financial condi¬ tion of Japan. Prices gradually fell to their normal standard. The fall of price of rice was especially noticeable. In 1884 it fell to nearly one-half of what it

was in 1881. Interest also fell to its normal rate of about 10 per cent which ruled before the over-issue of incon¬ vertible notes, while government bonds were quoted at a price approximate to their face value. But closely following on the heels of these results there came a severe depression of trade and industry which culminated in 1883 and 1884. . The fall of the price of rice told most heavily upon farmers, who had contracted habits, of luxury during the years of its high quotation, for practically their incomes now fell off by nearly one-half, while their burden in the shape of land-tax was doubled. Eoud voices

v complaint against the government's financial policy resounded throughout the country, and the authorities had great difficulty in satisfying local officials, who sympathized with the farm¬ ers and came up to the metropolis one after another to lay their complaint before the Cen¬ tral government. Convinced that the redemp¬ tion of paper money was of utmost importance to the state finance, the government was deaf against all complaints and resolutely pursued its policy.

Facts Connected with the Conversion of Paper Money. — By 1884 it was satisfactory to find that the amount of paper money in circula¬ tion was much reduced, while the government's reserve fund in specie considerably increased. In view of these facts, the price of paper money gradually kept rising until if stood on a par with silver. Now came the opportunity to carry out the convertible note system, and the gov¬ ernment decided to permit the Bank of Japan to issue a certain amount of convertible bank notes as a sort of experiment, preparatory to the resumption of specie payments. The Con¬ vertible Bank Note Regulations were promul¬ gated in May 1884, and the Bank of Japan issued convertible notes for the first time in May of the following year, the amount reaching 3,000,000 yen at the end of that year.

Every preparation for the resumption of specie paying having been made, the govern¬ ment began in January 1888 to pay specie for the government paper money, entrusting the business with the Bank of Japan.

Although the government commenced specie payment for the government paper money, the people rarely made the demand to have the ex¬ change made. The reason was that the differ¬ ence between paper and silver in value had already disappeared, and people generally pre¬ ferred paper because of the convenience of handling.

As a result of the gradual redemption of both government paper money and National Bank notes, it was found on the last day of June 1888, that the

amount of the former had been reduced by more than 49,000,000 yen and that of the latter by 28,000,000 yen. The opportunity arrived to finally dispose of them all and place the currency system of the country on a sound basis. The government therefore decided to permit the Bank of Japan to issue convertible notes to the amount of 70,000,000 yen on the security of a conversion reserve, of which sum 21,000,000 yen was to be issued by the Bank at its own will, 22,000,000 yen was to be supplied to the government as a loan at interest of 2 per cent for redemption of the government paper money, and the remaining 27,000,000 yen was to be issued by the Bank after January 1889, grad¬ ually in proportion as the National Bank notes would be redeemed. In view of this plan, the Convertible Bank Notes Regulations were amended in August 1889. The government, however, did not find it necessary to make the above-mentioned loan.*

In March 1890, the government adopted a plan of setting apart as a redemption reserve the sum of 10,000,000 yen, out of the reserve fund, in order to accomplish the entire with¬ drawal of the government paper money. In May of the same year the legal amount of notes to be issued on the security of the Reserve by the Bank of Japan was enlarged to 85,000,000

yen, while at the same time it was provided that the Bank should loan the government 22,- 000,000 yen without interest. The Regulations were duly amended to suit these changes, and in July of the same year the government secured the above mentioned loan and added the amount to the Redemption Fund.

*In these ways, both the government paper money and the National Bank notes were finally all withdrawn and the unification of the paper currency, by means of the Bank of Japan con¬ vertible notes, was accomplished. The amount of the government paper money which was re¬ deemed from January 1886 to the end of March 1890 was more than 48,000,000 yen. Of this amount, 43,346,716 yen were exchanged with silver coins and 4,933,124 yen were redeemed by government bonds and other means **

The amount of the bank notes which were redeemed in the^ same period was more than 3,700,000 yen. The following table gives the particulars :

Amount redeemed by the Bank of Japan by Yen

means of the joint redemption method . 3,730,451

Withdrawn from circulation on account of fraudulent alterations or winding up of busi¬ ness . 33,561

Total . 3,764,012

These schemes of redemption were carried out without a hitch, and in 1898 the law was promulgated announcing that the government paper money should cease to circulate after the 31 Dec. 1899.

With regard to the redemption of the na¬ tional bank notes, it steadily progressed by means of the joint redemption method before mentioned, and in 1896 it was announced that they should also cease to circulate on 31 Dec.

1899.

To briefly sum up. In October 1881 there were in circulation more than 154,000,000 yen of inconvertible paper money. It was redeemed in the following ways: (1) The reserve paper money, 14,500,000 yen. This amount was entirely redeemed by the end of 1883 by means of the surplus funds obtained through effecting reform in the method of making receipts and disburse¬ ments of the public revenue and also by other means. (2) The government .paper money, 105,- 905,212 yen. Of this amount, 65,839,956 yen were redeemed by the end of March 1890, 13,640,000 yen by the surplus revenue, 43,346,716 yen with specie and 8,853,240 yen by government bonds and other means. The remaining amount of 40,065,256 yen was gradually redeemed with 10,000,000 yen, the balance of the Reserve Fund, and 22,000,000 yen- loaned from the Bank of Japan. The amount of 8,065,256 yen, which still remained unredeemed, was exchanged with silver coins of denominations below 50 sen out of the general revenue, as it consisted of paper money of smaller denominations. In these ways, the whole amount was adjusted within five years after 1899, at the end of which the circulation of the paper money ceased. (3) The national bank notes, 34,398,030 yen. Of this amount 3,764,013 yen were redeemed by the end of March 1890 by means of the joint redemption

- *Of more than 43,000,000 yen, which were exchanged with silver and coins, the amount exchanged by demands from private people and banks was only some 8,900,000 yen. The rest of the paper money exchanged was re¬ ceived and exchanged with silver coins either by the Bank of Japan or by the government.*

method and other means. The remaining amount of 32,634,017 yen was also redeemed by means of the joint redemption method within five years after 1899.

Thus all the inconvertible paper money in Japan was adjusted, and to-day only specie and the convertible notes issued by the Bank of Japan are in circulation.

The Effects of the Adjustment of Paper Money on the Finance of Japan. — As will be seen from the foregoing survey, prices fell to their normal standard and no fluctuations took place; the rate of interest became less than 10 per cent on an average after 1886; the govern¬ ment bonds were always quoted above their face-value; while the export trade of the coun¬ try steadily increased, so much so that compared with that of 1886, 1889 showed an increase of 63 per cent and compared with that of 1885 an increase of 88 per cent. As for the banking and different industries they also became very prosperous. See Banking System.

The amount of capital invested in banks and different industrial and commercial com¬ panies increased two and a half fold in five years. If banks are excluded, the increase was four fold. The businesses that made especially striding progress during this period were rail¬ roads and spinning mills. Other industries also showed a tendency of steady advance, and on the whole the business situation presented a very favorable prospect.

The adjustment or withdrawal of non-con¬ vertible paper money was accomplished in such circumstances. But whatever may be said nominally, the task was effected on the basis of silver conversion and the country, henceforth, became one of de facto silver standard.

The necessity had been foreseen of the country adopting sooner or later the gold standard system, in order that it might keep pace with the world's tendency and that it might enter the international circle of common economics. But the step could not be im¬ mediately taken at the time as silver was still the principal currency in the neighboring coun¬ tries, while bimetalism had not yet lost its in¬ fluence with not a few countries of Europe and America. Besides the adoption of the gold standard required a large gold reserve, which in the prevailing circumstances was dif¬ ficult to obtain. For this reason, the country was obliged temporarily to adopt in practice a silver standard thereby to accomplish the with¬ drawal of paper money by exchanging it for silver.

In looking back to the price of silver in modern times, it is seen that the ratio between gold and silver prior to 1873 was fairly stable at about 1 to. 15.5. From about 1871 the world's production of silver greatly increased, this being almost synchronous with the advent of the new German Empire. That country, in its endeavors to reform and unify its system of currency, saw the advisability of replacing silver with gold, and stopped its free coinage of silver by enacting a new currency law. In 1873 Germany finally

put the gold standard system in force and began to dispose of large quantities of silver. This gave rise to a powerful tendency for the depreciation of silver. In consequence, many countries of Europe and America, which had hitherto had in force a bimetallic standard, began to feel the

danger of being forced to a position of prac¬ tically using the silver standard system. A change of the currency system to a gold stand¬ ard then became infectious among these coun¬ tries, some of them adopting it immediately, others ceasing the free coining of silver, all running to the policy of absorbing gold to the rejection of silver. The pro-gold-anti-silver policy of these countries resulted naturally in more and more pushing down the price of sil¬ ver, so that in 1876 the ratio between gold and silver came to stand at 1 to 17.88, an average for that year. This aroused the countries pro¬ ducing or possessing large quantities of silver to an effort to uphold the price of that metal. In 1878 the United States enacted the Bland Law and tried to stem the downward tendency of silver by buying and coining it. The re¬ public went further in 1890 and replaced the Bland Law with the Sherman Law, which gave the government the power to buy up a larger quantity of silver. For a time this had the effect of slackening the fall of silver, even of recovering its price to some extent. But the great force of tide was not to be resisted by artificial means, and' in 1891 the ratio fell on an average to 1 to 20.9, which still further went down to 1 to 23.72 in 1893, with a threatening prospect that there would be no end to the de¬ preciation of silver. It had, then, become clear that there was no longer any hope for the future of silver and the countries which had been looking on began to act, some of them stopping the free coinage of silver, and others adopting gold standard. In 1893 the United States repealed the Sherman Law, and also British India, which had hitherto been a great silver using country stopped the free coinage of the metal, the latter going so far as to charge a duty of 5 per cent on its importation the fol¬ lowing year. Its downward career continuing, silver came to stand in 1894 on an average at the ratio of 32.56 against 1 of gold.

Not many years after the adjustment of paper money in this country, thus, the fall of silver became so marked that its currency sys¬ tem, which for the time had obtained a stability by the reform on silver basis, came to be seriously affected.. At that time two-thirds of the country's foreign trade were with the gold countries, and the ratio of exchange with them became so fluctuating that those engaged in the trade knew not how to conduct their business, while the persistent rise of prices of commodi¬ ties tended to engender a speculative spirit among the people. It became apparent that the maintenance of the silver standard system was not to the good of the country.

Such being^ the case, the then Minister of Finance, Mr. Kunitake Watanobe (since created viscount), recommended to the government the appointment of a commission composed of men experienced and learned in economic matters, to investigate and deliberate carefully on a policy that might be adopted as to the future of the country's currency system. As the result, an Imperial Ordinance was issued in October 1893, ^ appointing a Coinage Investigation Com¬ mission, which, after spending nearly three years on its work, submitted a report in July 1896. Of the commission of 15, eight were of opinion that there was a necessity of making changes in the coinage system, while the re¬ maining seven thought otherwise. Of the

„ majority, six were in favor of a gold standard, and two advocated a bimetallic system. Previ¬ ous to this, in March 1895 Matsukata had re¬ turned to the post of Minister of Finance. In the following month a peace treaty was con¬ cluded with China, and that country agreed to pay a war indemnity amounting to 200,000,000 taels. As already stated he had foreseen the necessity of the country adopting the gold standard system in order to keep pace with the world's tendency. But owing to the dif¬ ficulty of acquiring an adequate supply of gold for the purpose, Matsukata could not help hesitating forthwith to take up the reform. Now that, however, a large war indemnity was to come from China, the best opportunity was presenting itself for the execution of the re¬ form. In order to pay the indemnity, China could do so only by raising a loan in the European markets. In the peace treaty the indemnity was stated in the terms of Kuping tael. But since money was to come from the European mar¬ kets, it was plain that it would involve China in no small trouble to reduce it first into silver and then pay it to this country, while it would be very convenient to her if it could be so ar¬ ranged that she pay it in the currency she raised in London and other markets. Such an ar¬ rangement would be equally acceptable to this country, which might keep the money paid as a gold reserve for the purpose of adopting the gold standard system. The suggestion alonp- this line met with the approval of the Imperial government, which, thereupon, approached the Chinese government with the proposition indi¬ cated. China's answer being favorable, negotia¬ tions were concluded in the sense that the weight of one Kuping tael would be fixed at 575.82 grains of pure silver, and China would pay the entire amount of indemnity reduced into the terms of British currency at the ratio of 30.4429202662d. for one ounce of silver of the standard quality in London, being the aver¬ age of the prices for June, July and August of 1895. A protocol to this effect was ex¬ changed between the two countries on 6 Oct.

1895.

Subsequently the two governments agreed to compute in British money the amount to be paid by China as compensation for the retrocession of the Liaotung Peninsula, namely, 30,000,000 Kuping taels, as well as the indemnity for the expenses of occupying VVei-hai-wei, namely 500,000 Kuping taels yearly. Thus the amount due from China as indemnity and otherwise totaled £38,082,884 15s. 6ˆd., or 231,500,000 Ku¬ ping taels.

Matsukata resigned in August 1895, his views on the post-bellum financing failing to receive the approval of the government. But in September of the following year, he formed a new Cabinet by Imperial order, holding at the same time the post of Finance Minister. This gave him an opportunity, at once, to proceed with preliminaries for the adoption of gold standard. He submitted a draft of the Coinage Law with its subsidiary laws to the Cabinet Council on 25 Feb. 1897, and obtained its ap¬ proval. It was then that the late Emperor granted him the gracious words to the effect that opinions were divided as to the advisability of adopting a gold standard, but coming from Matsukata, it should be depended that his views were correct. He was profoundly impressed

with the honor done and vowed to himself at the time that, happen what may, he must bring the scheme to a success.

The bills for the Coinage Law and sub¬ sidiary laws, were introduced in the House of Representatives on 1 March 1897. The Coinage Law Bill was drafted on the basis of pure gold standard, laying it down that the weight of two fun (gram 0.75) of pure gold shall be the unit of the coinage and shall be called yen. As to the one-yen silver coin in circulation, it was proposed to withdraw it gradually by exchanging, according to the convenience of the government, and that a six months' notice would be given in the form of an Imperial Ordinance, in case its circulation was to be stopped, while it would remain convertible for five years from the day after the promulgation of such ordinance. The reason why the weight of unit yen was fixed at 2 fun of pure gold was because of the following circumstances. The silver yen in circulation contained 6 mom- me 4 fun and fractions of pure silver, and thus the new gold coin would bring the ratio of gold and silver to 1 to 32 and fractions, which was comparatively a near approach to the average ratio at London since January of that year, which was 1 to 32 (slightly less), and which would, therefore, facilitate the set¬ tlement of transactions in the transition from the silver to the gold standard system. Fur¬ ther the old gold yen would correspond exactly to two new gold yen. These were the points in favor of the proposal, in keeping the old and new coins in circulation. Nevertheless objec¬ tions raised to the Coinage Bill were not few. One of them was that the adoption of gold standard would

prove a check to the growing export trade of the country with gold countries, for the fall of silver proved an encouragement to trade, which it would be as long as silver remained the standard. Another was that, as all the Oriental countries were using silver, the adoption of gold standard would greatly inter¬ fere with this country's trade with them. The third was that the country would not be able to maintain a gold standard as it produced very little gold; the fourth that more than 100,000,- 000 yen of the country's silver yen had found its way abroad, and the national treasury would have to incur staggering losses, should it be sent back here for conversion on the further fall of silver. Nor did these ex¬ haust by any means the faults found with the proposed reform. But if the country was to achieve a healthy economic development, it was imperative that it push its way to join the inter¬ national circle of common economics. To do so the economic basis of the country must be put on a system of coinage in common use throughout the world. By the end of 1896 the country had already received something over £22,400,000 in part settlement of dues from China, and could not afford to let pass the ex¬ cellent opportunity to carry out the currency reform by the use of the money. It was no time to be overweighed by doubts. Fortunately the Diet shared the views of the government, and both the Representatives and Peers passed the coinage and other subsidiary bills with not a single amendment. The Imperial sanction was obtained on 29 March and the bills became laws to take effect from 1 October.

In putting the new Coinage Law into opera-

tion Matsukata took pains to think out plans to insure its success. They were: (1) To buy gold bullion with the proceeds of Chinese indemnity, to bring home to be struck into new gold coin ; and (2) to effect the exchange and withdrawal from circulation of one-yen silver and the one- yen silver certificates issued bv the Mint, with part of the new gold coin thus minted. As the result of careful investigations a fairly ac¬ curate estimate was obtained as to the amounts to be exchanged, namely, silver yen in circula¬ tion at home 39,320,000 yen, that to be sent back from abroad 10,000,000 ven. and silver bullion corresponding to the silver certificates of the Mint 30,000,000 yen, a total of 79,320,000 yen; (3) to dispose of one-yen silver retired from circulation and the redeemed silver bul¬ lion, partly by minting them into subsidiary coin, and partly by seling them aibroad, after dis¬ figuring it in the case of one-yen silver, so as to make it legally unfit for circulation at home ; (4) to make an increased issue of sub¬ sidiary silver coins. The gold piece which would correspond to one

yen, if coined, would be so tiny and light as to make it inconvenient for daily transactions. For this reason no pro¬ vision was made in the Coinage Law for the minting of one-yen gold piece. Yet in order to keep firm the foundations of the currency system, and to protect the masses from losses, the people must be supplied with hard money for purposes of small daily transactions. The one-yen convertible notes, then in circulation to the amount of over 60,000,000 yen were filling this need. It was proposed, therefore, to issue subsidiary coins of 50 sen and smaller denomi¬ nations to the amount of 40,000,000 yen to take the place of one-yen convertible notes, which were to be retired.

In pursuance of the plan summarized above, Matsukata set about carrying into effect of the gold standard system. Between January 1898 and November of the same year, he was out of office ; but the execution of the plans was continued during the interval. On his re¬ turn to office, again as the Minister of Finance, he finally carried them to completion.

In putting the Coinage Law into operation, the first step taken was to cause the Mint in¬ cessantly to strike off the new gold coin out of the gold bullion bought with part of pro¬ ceeds of the Chinese indemnity, which was brought home as rapidly as it was secured. The minting of the new coin was started in July 1897, when the bullion began to arrive, and by April 1898, 74,455,735 yen worth was turned out. Prepared with this new gold coin the ex¬ change of old silver yen was commenced on 1 Oct. 1897, the day on which the Coinage Law went into force.

Previous to this Matsukata had concluded that it was of advantage to the progress of the currency reform to stop the circulation of one-yen silver as early as possible. Con¬ sequently on 18 Sept. 1897, the Imperial sanc¬ tion was obtained for an Ordinance, which was forthwith proclaimed, limiting the period of its circulation to the first day of April 1898. Ac¬ cording to the new Coinage Law, a term of five years was allowed for the exchange of one-yen silver, after it ceased to circulate. What turned out was, however, that the work had progressed with unexpected rapidity, so much so that there was no need to let the five year

term run its course. In fact, there was not only no need of it, but some danger that, if the five year period was allowed to remain, counter¬ feit one-yen pieces might be imported from abroad. On account of this, toward the end of 1897 he submitted to the Cabinet a draft of law for shortening the period in question; but owing to the dissolution of the Imperial Diet, which then took place, the bill was never laid before the legislature. Marquis Inouye, who succeeded Matsukata in the office of the Minister of Finance, also saw the need of cut¬ ting short the five year period, and a bill of that import was introduced in June 1898, in the Diet, which was

then sitting in an extraor¬ dinary session, and was passed by the two Houses. The bill became law with the Imperial sanction and was promulgated on, the 10th of the same month, announcing that the exchange period shall close on 31 July 1898. Thus was finished the task of exchanging one-yen silver.

On looking back to the circumstances which attended the exchange operations, it must be noted, first of all, that there had been a total issue of 165,133,710 yen in one-year silver. Of this amount, a net total remaining abroad (or the residue obtained by deducting that which having once gone abroad found its way back into the country by 31 July 1898, the day on which expired the period allowed for the ex¬ change of one-yen silver) was 99,508,740 yen. Again, the sum of 11,028,633 yen was taken and disbursed abroad during the war with China, while that which remained unexchanged by 31 July 1898, out of the amount sent to Formosa after the island had become Japan's possession, was 5,732,027 yen. On the other hand the amount exchanged for gold coin, or retired on 'being received in payment of taxes and other dues between 1 Oct. 1897 and 31 July 1898 was 45,588,369 yen (including 10,846,- 465 yen that came back from abroad, and 34,- 741,904 yen in circulation at home). Besides this the amount recoined by the government was 460,904 yen. The total thus accounted for stood at 162,318,673 yen which as compared with the total sum which had been issued, showed a difference of 2,815,037 yen, — the amount which was not exchanged within the period set apart for exchange, and which was probably lost or destroyed at home or taken away by foreign travelers. The return of one- yen silver had been looked upon as the greatest difficulty in the way of putting the gold stand¬ ard system into execution, and the matter had received my most careful attention, which in¬ cluded receiving reports from Shanghai, Hong¬ kong and the strait settlements and other places, concerning its movements. It was discovered that in China a large quantity of it had been recast into the tael silver, while many others of it circulating there had been disfigured and had lost their qualifications as Japanese legal tender. It was ascertained further that it was also largely in circulation scattered in the strait settlements and the neighboring islands, under conditions which made its return home difficult. In the light of these facts, it was finally de¬ cided to put the estimate of the one-yen silver returning home for exchange at about 10,000,- 000 yen, as stated above. It was a piece of good fortune that the actual results of exchange proved the estimate fairly correct. The amount of silver certificates issued bv the Mint, which

s remained unredeemed, stood at 29,505,453 yen at the time when the new Coinage Law came into torce. 1 hese were also all exchanged. 1 Inis

the amount of one-yen silver that was ex¬ changed for gold coin, or withdrawn through being received in payment of taxes or other dues, between 1 Oct. 1897 and 31 July 1898 totaled 45,588,369 yen, and that exchanged for 90 Acrr bullion held against the silver certificates 29,505,4d3 yen as alreadv mentioned, making a grand total of 75,093,822 yen, coming quite close to the estimate. Although the period set down for the exchange of one-yen silver was shortened to ten months, as stated above, elab¬ orate care was taken in carrying out the opera¬ tion, which was conducted at the Central Gov¬ ernment Treasury, 447 local treasuries and sub¬ treasuries throughout the country, and the Bank of Japan's agent, the Yokohama Specie Bank and its branch at Kobe. Also one-yen silver was accepted in payment of taxes and other dues during the period. Every facility was thus extended for the purpose, and the exchange operation was completed with perfect smooth¬ ness, so that not a single case of omission was reported at its termination.

A sum of 27,567,012 yen out of 75,093,822 yen, which represented the total of one-yen sil¬ ver withdrawn and silver bullion released from the silver certificates, was turned over to the service of subsidiary silver coins to be minted m the 1897, 1898 and 1899 fiscal years, while 40,786,662 yen was disposed of at Shanghai and Hongkong, and the remaining 6,740,148 yen was transported to Formosa and Korea, to be there released for circulation. This part of the busi¬ ness was in this way completed in December 1898, or one year and three months after the coming into force of the new Coinage Law. The greatest care was exercised in this opera¬ tion of disposing of the retired silver coin and bullion, to carry it out as speedily as pos¬ sible at as high prices as obtainable. There was, at first, a fear that a loss of 10 per cent or more might be sustained owing to the fall of silver; but fortunately the actual shrinkage incurred was only seven per cent, while the operation, was finished in a little over one year. More satisfactory still, the price at which the sale was effected was somewhat higher than the average silver quotation in London at the time. The total charged to the National Treas¬ ury on account of the retiring of the silver currency was 5,553,312 yen, including 5,397,581 yen representing the shrinkage, and 155,731 yen the amount of. general expenditure for conduct¬ ing the operation. This disbursement was met with the profit of the Mint accruing from mak¬ ing the subsidiary coins which amounted to 5,651,961 yen, and which, therefore, yielded some surplus. So was completed the work of putting into execution the gold standard system.

Between 22 and 23 years have elapsed since the adoption of gold standard. Within that time the country came through great wars ex¬ tending over a year, but the foundation of its currency system has suffered in no way. In looking over the economic condition of the country during that span of time, it is seen that, nothing has happened to prove much against the

calculations made in anticipation. The . range of fluctuations in the prices of com¬ modities in general has become considerably narrower than formerlv, enabling merchants

and manufacturers to form their plans on a

.HJ and stable basis. The rate of exchange with the gold countries has been freed from violent fluctuations, so that the country's trade with them has been given opportunities to grow steadily, under very healthy conditions. The economic world of the country is now on a nsing career. It may be noted that what is gamed m transactions with the gold countries is liable to be lost in those with the silver countries. But this country's relations with the silver countries have never been so great as those with the gold countries. Besides the fluctuations of silver were not so great as be¬ fore the adoption of gold standard, and the re¬ sults, of trade with the silver countries show that it has not suffered seriously. On the con¬ trary it is . growing steadily. Especially worthy of notice is the fact that the adoption of gold standard has induced the people of the rich countries of Europe and America to invest in this country their money carrying a low interest, with a feeling of perfect security. That this circumstance has to no small extent been help¬ ful to the industrial development of this coun¬ try admits no manner of doubt. Furthermore it must not be forgotten that the fact of this being a gold country gave it great advantages when, at the time of the 1904-05 war, it raised large loans in the western markets.

Those who desire to have fuller particulars of the subjects treated in the present article, will find them in the (Report on the Adoption of Gold Standard in Japan, } published in 1899.

Count Masayoshi Matsukata.

17. BANKING SYSTEM OF JAPAN.

The progress of the banking system in Japan commenced at the enactment of the National Bank Regulations in 1872. The progress was rapid, and at present (1918), 46 years after the enactment, Japan possesses a complete system of ordinary and savings banks; special banks to minister to the development of foreign ex¬ change, agriculture, commerce and industry; clearing houses and the different associations, information bureaus, brokerage houses, trust companies, etc., to assist the work of the banks.

Even before the Restoration in 1868 there had been in Japan institutions conducting the works of banks. They received deposits, made loans, issued exchange and commercial bills, and conducting exchequer business for feudal lords and shoguns, thus promoting the eco¬ nomic progress of the country. After the Restoration, establishments called exchange companies were organized, at the instance of the government, at several commercial centres. They also, conducted a general banking busi¬ ness and issued gold and silver notes. The constitution of these establishments was, how¬ ever, not perfect enough to entitle them to the name of banks according to the modern under¬ standing. The banking corporation worthy of the name did not exist in Japan until the na¬ tional banks were established.

After the Restoration in 1868 the government sent a deputation to inspect the banking system of foreign countries for the purpose not only of promoting the financial and industrial prosperity of Japan, but of consolidating the government paper money, which had been issued to an enor¬ mous amount. As the result of this inspection tour the government promulgated, in November

1872, the National Bank Regulations, drawn up after the model of the American system. Ac¬ cording to the regulations the national banks had to pay six-tenths of their capital to the government in the government paper money; to receive in exchange the same amount of public loan bonds; to deposit the bonds with the government and get permission to issue the same amount of bank notes convertible to gold. The First and three other national banks were established in accordance with the regu¬ lations. At the time, however, the government had to issue inconvertible notes to meet na¬ tional expenditure, and the result was that there was a difference in value between paper and hard money. Bank notes issued by the banks were returned to the banks instantly, placing them in serious difficulties. About this time the government gave public loan bonds to the nobility and Samurai class to compensate for the loss 'of their income. In order to increase the utility of these bonds on the one hand and to relieve the banks of their difficulties on the other, the government encouraged the organiza¬ tion of new banks, and in 1876 made an amend¬ ment to the National Bank Regulations. Ac¬ cording to the new regulations the amount of notes to be issued by the banks was increased to eight-tenths of their capital. The banks had to deposit the same amount of public loan bonds with the government as security for their bank notes, which were made convertible

with coin. As the result of this amendment the bank notes heretofore convertible to gold became incon¬ vertible, and the banks were able to get more profits than before. This gave an impetus to the organization of banks, the number of which reached 153 at one time.

Moreover, the government issued a large amount of paper notes in order to meet the expenses relating to the Satsuma Rebellion of 1877, with the result that the amount of incon¬ vertible bank notes greatly increased and their value decreased as compared with hard money.

In order to improve the situation, the gov¬ ernment, after 1877, endeavored to discourage the organization of national banks and to de¬ crease the amount of notes. In 1880 it had the Yokohama Specie Bank established as an organ of foreign exchange and of promoting the im¬ portation of specie. In 1882 the Bank of Japan was established after the style of the Central Banks in European states. In the next year the National Bank Regulations were again amended, prohibiting the existence of national banks on the expiration of their respective terms of business. The privilege to issue notes was taken back from those banks and given to the Bank of Japan. By this amendment the principle of the unification of paper currency was established, and the national banks, hitherto exercising great influence in 'the money market, were, one by one, converted into private banks, and in 1899 the national banks had ceased to exist.

The progress of private banks was steady after the Restoration, and their number reached 954 in 1884. At the time, however, the national banks still exercised great power in the money market, and as there was little necessity for the central government to exercise strict super¬ vision over other banks, the latter were rele¬ gated to the control of local governments. Sub¬

sequently, the national banks were converted into private banks, due to the amendment of the National Bank Regulations, as already mentioned, and independent of this there was a tendency for the steady increase of the num¬ ber of private banks. To cope with the situ¬ ation the government, in 1890, promulgated the Banking Regulations and the Savings Bank Regulations. These laws were not put in force till 1893, to which date the operation of the Commericial Code was postponed.

These laws constituted almost a perfect sys¬ tem of legislation relating to banks, except with regard to the function of making loans of a long term for agriculture and industry. In order to make good this defect the government, in 1896, issue the Law of the Hypothec Bank of Japan and Law of the Agricultural and In¬ dustrial Banks. The former bank was then es¬ tablished in Tokio and the latter in Tokio and in each of the other

prefectures.

In 1895 Japan came into possession of For¬ mosa, and in order to improve the monetary conditions in that island the government, in 1897, promulgated the Law of the Bank of For¬ mosa. The bank was established in 1899 and conducted the issue of convertible notes and general banking business.

As there was no financial organ for the colonization of Hokkaido, the government en¬ acted in 1899 the Laws of the Colonial Bank of Hokkaido, and the bank was established in the following year.

Meanwhile the number of various industrial companies in Japan kept increasing, and the amount of shares and debenture issued by these companies reached huge figures. In spite of this fact, Japan had few banks which could make sufficient loans on these shares and de¬ bentures. This circumstance being considered detrimental to the progress of the nation's in¬ dustry, the government, in 1900, promulgated the Law of the Industrial Bank of Japan, and a bank on the basis of this law was established in 1902.

In view of the increasing number of Japan¬ ese banks carrying on their business in foreign countries, the government, in 1905, promulgated a law for the control of such banks, providing that imperial ordinances may be issued for the said control according to the conditions pre¬ vailing in the country where the banks are engaged in business. In the same year an im¬ perial ordinance was issued in relation to the Dai-ichi Ginko, Ltd., carrying on its business in Korea. By the ordinance the bank was au¬ thorized to issue bank notes in Korea. In 1909 the Bank of Korea (later renamed Bank of Chosen) was established and succeeded to the business of the Dai-ichi Ginko, Ltd., and be¬ came the central bank in Chosen.

The Yokohama Specie Bank obtained the right to issue bank notes in foreign countries in 1901, and has been exercising that right in China. In 1906 an imperial ordinance was issued to control the issue of business of the Yokohama Specie Bank.

Special Banks — 1. The Bank of Japan.— The Bank of Japan is the central bank of the empire, established in accordance with the Law of the Bank of Japan. At the end of 1915 it had a registered capital amounting to $30,000- 000, of which $18,750,000 had been paid up,

s and possessed reserves amounting to $15,112,500. Its business consists of discounting or pur¬ chasing public loan bonds and commercial bills,

purchase and sale of gold and silver bullion, making loans on security of gold or silver or of bonds guaranteed by the government, collec¬ tion of bills, receiving deposits for safety and making cash accounts for the state treasury.

The bank has the privilege to issue bank notes convertible to gold coins. In principle the bank has to keep the same amount of gold and silver as conversion fund. But at the same time it is allowed to substitute the specie re¬ serve with sound bonds to the extent of $60,- 000,000. In the event of the money market de¬ manding a large amount of currency, the bank, subject to permission by the government, may issue notes in excess over the legal limit. The excess issue must be, of course, backed by security reserves. In this case, a tax of not less than 5 per cent per annum is imposed on the amount issued over the legal limit. At the end of 1915 the amount of convertible notes issued stood at $215,069,005, of which the sum of $124,208,900 was backed by specie reserve.

The government exercises the most strict supervision over the bank, being represented by standing inspectors. The governor and vice- governor of the bank are appointed by the government, and the bank cannot change its regulations (company contract) and take im¬ portant measures without permission or sanc¬ tion of the Minister of Finance.

2. The Yokohama Specie Bank. — The Yokohama Specie Bank was established in ac¬ cordance with the Law of the Yokohama Specie Bank, and its principal object is to conduct foreign exchange business. At the end of 1915 it had a registered capital amounting to $24,000,000, of which $15,000,000 had been paid up, and reserves amounting to $10,675,086. It has branch offices not only in many places in Japan and Kwantung Province, Manchuria, but in London, Lyons, New York, San Francisco, Hawaii, Bombay, Calcutta, Hongkong and various points in China. The offices in Kwan¬ tung Province and China are allowed by the government to issue notes convertible to silver, against the reserves of the same amount. The kind of the reserves are ordered by the govern¬ ment. At present the bank is ordered to keep specie reserves against more than half of the issue amount, and security reserves for the remainder. # The government supervision over the bank is exercised by permanent inspectors, and the appointment of directors, elected at a general meeting of shareholders, is valid only after being sanctioned by the Minister of Fi¬ nance. On the whole, the bank is supervised by the government in the same manner as is the Bank of Japan.

3. The Hypothec Bank of Japan.— The ob¬ ject of this bank is to promote the improve¬ ment and progress of agriculture and industry, and it mostly makes loans on immovable prop¬ erty. At the end of 1915 it had a

registered capital of $20,000,000, fully paid up, and re¬ serves amounting to $2,769,200. In business it makes loans to be repaid in annual instalments covering not more than 50 years, usually on security of immovable property. It may also make fixed loans on immovable property for a term of not more than five years. Sucn loans, however, shall not exceed one-tenth of die total

amount of loans made for yearly instalments, lhe bank may also make loans without secu¬ rity to public or other sound corporations.

As a means to obtain funds the bank is al¬ lowed to issue debentures up to an amount 10 times as large as the sum of its fixed deposits and paid-up capital. As a means of advancing money to the Agricultural and Industrial banks, it may take up debentures issued by those banks, make loans on security of right of claim of those banks due to their loans and appoint those banks to be its agents and make loans on their standing as security. The government supervises this bank generally in the same manner as it supervises the Bank of Japan.

4. The Agricultural and Industrial Bank.— This bank has been established in each pre¬ fecture, in accordance with the Law of the Agricultural and Industrial Banks. It has the same object of business as the Hypothec Bank of Japan, only on a smaller scale. At the end of 1915 the number of the Agricultural and In¬ dustrial banks in Japan was 46, having a total registered capital of $25,360,000 ($22,547,500 paid up), and reserves amounting to $13,532,279. Its line of business is, on the whole, the same as that of the Hypothec Bank of Japan. But they are different in that the Agricultural and Industrial Bank is allowed to make loans re¬ payable in yearly instalments extending over only 30 years, and that the maximum of de¬ bentures to be issued is only five times its paid-up capital. The government supervision over the bank is similar to that over the Hy¬ pothec Bank, except that in this bank the ap¬ pointment of directors is solely entrusted to ‘ election by a general meeting of shareholders.

. 5. The Bank of Formosa. — This is a colo¬ nial bank especially organized for the exploita¬ tion of Formosa. At the end of 1915 it had a registered capital amounting to $4,000,000 ($6,- 250,000 paid up), and reserves amounting to $2,075,000. It engages in a general banking business and owns the privilege to issue bank notes convertible into gold coin. The issue is conducted in a manner generally similar to that of the Bank of Japan. The method and degree of the government supervision over this bank is on the whole similar to that over the Bank of Japan.

6. The Hokkaido Colonial Bank. — The ob¬ ject of this bank is to supply funds for the work of. colonization of Hokkaido. At the end of 1915 it had

a capital amounting to $2,500,000 fully paid up, and reserves amounting to $780,- 850. Its business consists essentially of making loans for long terms on security of immovable property. It is also allowed to make loans on security of local produce and of shares and de¬ bentures, discount bills, take up debentures of the companies whose object is to colonize the island, engage in exchange business and re¬ ceive deposits fixed or on current account. The bank may issue debentures to the extent of five times its paid-up capital. The government supervision is conducted in a similar manner to that over the Agricultural and Industrial banks.

7. The Industrial Bank of Japan. — This bank can be aptly called a bank of movable property. At the end of 1915 it had a regis¬ tered capital amounting to $8,750,000 ($8,500, 000 paid up),. and reserves amounting to $962,- 500. Its business consists in subscribing or taking up public and local loan bond and de-

bentures, making loans on security of these bonds or shares, or of corporations established in accordance with laws relating to mines, fac¬ tories and railways, in receiving deposits, safe¬ keeping and trust business relating to mort¬ gage debentures, etc. The bank can issue de¬ bentures aggregating not more than 10 times its paid-up capital. The method and extent of the government supervision over this bank are similar to that over the Hypothec Bank of Japan.

8. The Bank of Chosen. — This bank was established in 1909 and was first called the Bank of Korea, but renamed the Bank of Chosen in 1911, and has its head office in Keijo (Seoul). At the end of 1915 it had a registered capital amounting to $2,000,000 (fully paid up), and reserves amounting to $189,250. It engages in a general banking business and owns the privi¬ lege of issuing bank notes convertible into gold coin or the Bank of Japan convertible notes. The issue of the notes, backed by security re¬ serves, is limited to $15,000,000. According to requirements of the money market, the bank may, subject to permission by the governor- general of Chosen, issue notes in excess over this limit. At the end of 1915 the amount of convertible notes issued stood at $17,193,760. The bank has its branch offices in Tokio, Muk¬ den, Dairen, Cheng-chun, Ssu-ping-chieh, Kai-yuan, Harping and Ying-kou.

Ordinary Banks. — By ordinary banks is meant those banks which engage in a general banking business in accordance with the Bank¬ ing Regulation. Of all banks, these are under the most lenient supervision by

the government.

Those who desire to engage in ordinary banking business must obtain the sanction of the Minister of Finance. The amount of the capital of an ordinary bank was formerly with¬ out any limitation, but since 1901 all banks have been ordered to possess a capital amounting to $250,000 at least. The classification, number and amount of capital of ordinary banks existing in Japan at the end of 1915 were as follows:

Kinds of Banks Number Registered capital

Kabushiki Kaisha . 1,228 $242,259,205 00

Gomei Kaisha . 67 7,626,475 00

Goshi Kaisha. 99 5,752,717 50

Kabushiki Goshi Kaisha . 1 100,000 00

Individuals . 54 1, 895 ,760 00

Total . 1,449 $257,634,857 50

According to investigations made at the end of 1915, paid-up capital totalled $179,255,992 and reserves $63,849,702.50.

Sayings Banks. — The savings banks receive deposits at the rate of compound interest, and are subject to government supervision more strict than given to ordinary banks, in the fol¬ lowing points: (1) They must be organized as joint-stock companies, limited. (2) They must not amend their company contract with¬ out the sanction of the government. (3) Di¬ rectors must be under unlimited liabilities.

(4) They must reserve one-fourth of savings deposits in the shape of public loan bonds or other sound securities and deposit them with the government as security for depositors. At first there were restrictions with regard to the sort of investment to be made by the savings banks. But these restrictions were removed in 1895, and instead the four provisions above

enumerated were instituted. As a result of the measure the savings banks now invest their money in a similar way as ordinary banks. The number and amount of registered capital of savings banks at the end of 1915 were 657 and $96,662,175, •respectively. According to in¬ vestigation under the same date the paid-up capital aggregated $60,463,596 and the reserves

$11,216,104.

The government postal savings banks re¬ corded in April 1917 total deposits amounting to

$159,580,639.

Clearing-houses. — The clearing-house in Japan was first established in Osaka in 1879 after the model of similar institutions in Europe and America. Subsequently it was organized in Tokio and other places, there being at present 11 clearing houses in Japan. The one in Tokio has the following regulations, and those in other places have on the whole similar regula¬ tions : (1) Members are limited to those banks

which are members of the Tokio Bankers' As¬ sociation and which have current account con¬ nections with the Bank of Japan. (2) New membership shall be awarded with approval of more than three-fourths of the total number of members, to be decided by open ballot. (3) Members shall deposit security money with the house, and in the event of their failing to re¬ pay their debts in the clearance of bills, the account will be settled with the security money. In that case the defaulter loses his membership.

(4) Members may represent non-member banks in clearing bills, provided that a majority of the members approve of the representation.

(5) In the case of the above clause, the repre¬ senting bank shall demand a money security from the represented bank, and use that money for settling accounts in case the latter fails to repay debts due to clearing its bills. In that case the clearing house shall refuse to enter¬ tain the representation of that particular bank.

(6) In the event of the payer of bills cleared failing to pay, the name of that payer shall be made public. (7) The clearing-house accounts of members are settled by current account at the Bank of Japan. Number and value of bills cleared at different clearing houses in Japan in 1915 were as follows:

Number

Clearing Houses of bills Valuation

*Tokio . 4,657,708 *2,593,705,529 50*

Osaka . 3,314,561 1,699,438,390 00

Kioto . 780,259 154,461,509 00

Yokohama . 626,082 5^7,909,176 00

Kobe . 804,538 538,752,244 50

Nagoya . 470,273 143,105,156 50

Hiroshima . 89,457 15,940,694 50

Kan-Mon . 120,072 57,603,825 00

Kanazawa . 81,730 15,502,767 00

Hakodate . 134,231 25,564,300 50

˚taru . 112,654 30,476,500 50

Total . 11,191,565 $5,812,860,093 00

Baron Yoshiro Sakatani. 18. AGRICULTURE IN JAPAN. His¬ tory. — The ancestors of the modern Japanese seem not to have been eaters of meat and milk, and butter and cheese were unknown to them. These facts, together with the mountainous character of the country, fully justify the sup¬ position of the non-existence of any nomadic tribe. It is very probable that from the earliest time the Japanese understood how to till the soil, whose only crop, however, with the possi-

ble exception of hemp, was rice. European authors seem to think that the Japanese started agriculture after the Chinese pattern, but there is reason to believe that the cultivation of rice was introduced from India. Rice in those days was probably sown in marshy places, year after >ear in succession, without fallowing and with¬ out manure. But it was soon found that marshes were not sufficient. As the agricul- tural lands gradually extended, the first great effort of the government to foster agriculture axm? ln maˆin.g arrangements for irrigation. W hen we consider that low tracts of land only were devoted to rice culture, where rain water and irrigation were productive of large quan¬ tities of rich soil, we can understand why suc¬ cessive crops of rice have not exhausted the soil s fertility. Moreover, as nitrification does not occur in wet soils, nitrogenous compounds were little wasted.

Breaking up land for rice was much en¬ couraged, which led to the proprietorship of land at a very early period. But lack of knowl¬ edge and capital only permitted the irrigation of low tracts of land, and the resources of paddy fields were soon exhausted. Then it became necessary to till the dry fields and the cultiva¬ tion of barley was gradually introduced, but we cannot say the exact date. Indian millets, soybean and other crops were

also introduced and their cultivation encouraged. Indeed we find in very early literature the name of gokoku (the five grains), which signified rice, barley, soybean, awa and hiye, the latter two bemg kinds of Indian millets, or some¬ times rice, barley, awa, soybean and adzuki (Phaseolus radiatus).

It is very probable that silkworm raising began at a much earlier date than is generally believed, but the silk industry was not greatly encouraged until after the eggs of Chinese silk¬ worms were introduced in 195 a.d. Thereafter silkworm raising continued to occupy an im¬ portant place in farming, until it fell into de¬ cline on account of the civil wars, its revival taking place only after the mikado was restored to power in 1871.

Whether or not any live stock, such as cattle and horses, existed in the remotest antiquity is much disputed, but if so they were certainly not much used. At first even cattle were useJ solely as beasts of burden, for which purpose, on account of the mountainous character of the country, and the narrow and rugged roads, they were better suited than horses. They were often slaughtered, not for meat, but for their hide. The use of milk as food was unknown. It was in the reign of Kotoku (645—654) when the use of milk as medicine was introduced, but such use was discouraged by Buddhism. Horses came into use very early for the saddle and as beasts of burden ; indeed the north¬ eastern provinces were celebrated for their horse breeding.

The use of live stock as meat came gradually into use and even swine were raised to some extent. But after Buddhism came into power the government prohibited the slaughtering of live stock, so the raising of swine was stopped entirely. Cattle were then used solely as beasts of burden and for cultivation, for which pur¬ pose small farmers often preferred them to horses, especially in mountainous districts.

It is evident, therefore, that Japanese agri¬

culture must have been the tilling husbandry from the very beginning and remains so to the present day, except in mountainous districts where large tracts of natural pasture are found, on which cattle and horse-breeding is conducted by farmers. The Japanese greatly esteemed agriculture and believed in the Chinese saying, translated into Japanese, < (No wa Kuni rio moto,» which means “agriculture is the founda¬ tion of the country, and every sagacious em¬ peror and his advisers encouraged the improve¬ ment of agriculture, mainly after the Chinese pattern. But before the establishment of feudalism, When the nobles became very power¬ ful, its encouragement was largely neglected and the land gradually fell into the possession of a few, and heavy rent was levied by landlords. From that

time also, on account of the dis¬ turbance of internal peace, farmers suffered and agriculture greatly declined. Notwithstanding these discouragements various circumstances helped the farmers to improve their agriculture, and new crops and improved implements were gradually introduced, and in some districts agriculture made noteworthy progress. But universal progress began only after the restora¬ tion of peace by Taiko Hideyoshi. During the eras Keicho and Genna (1596-1623) many im¬ portant crops were introduced, among which may be mentioned cotton (whidh indeed had been introduced once before), tobacco, potatoes, sweet potatoes, sugar cane, etc. Under the long peaceful Shogunate of Tokugawa, agriculture nourished and made great progress. As the country became closed to foreign intercourse, the people were more and more dependent upon agriculture to supply their needs, and Toku¬ gawa Shogun and many feudal lords greatly encouraged it on their estates, though there were other lords who cared very little for their people, and there, under heavy tax, agriculture could not make much progress. Thus even at present great differences can be seen in the state of agriculture in various localities. After the restoration to power of the mikado, and the beginning of the Meiji era, there was rapid and great progress, which will be treated under another heading.

Area of the Land under Cultivation and Crops Cultivated. — Though agriculture is con¬ ducted very intensively, and especially in the warmer part of the country, terracing is em¬ ployed on an extended scale on account of the predominant mountainous character of the country and on account of the method of farm¬ ing which is based principally on rice cultiva¬ tion. Mixed farming is almost entirely un¬ known except in the mountainous districts, and the percentage of the land under cultivation is therefore very small. Indeed with the excep¬ tion of Hokkaido, which may be regarded as a colony, and where a large extent of land is not yet broken, and Formosa and Chosen, which were recently annexed, little more than 17 per cent may be taken as a fair estimate of the cultivated land. If we compare this percentage with 43 per cent for Belgium, 59 per cent for France, 49 per cent for Germany, or even 17 per cent for Switzerland, it will be seen how low is the percentage in Japan.*

The following figures, according to recent

- *Professor Rein in his work on 'Industrial Japan' much underrates the extent of terracing; he appears not to have seen it in Shikoku, Chiugoku, etc.*

statistics, will show how much agricultural land is under cultivation (excepting Hokkaido, For¬ mosa and Chosen): Percentage of

Cho whole area*

Land under crops . 5,205,163.4 17.0

Forests . 13,903,801.7 59.5

Haraf and grass land . 1,950,582.0 1.5

- *Cho = 10 tan = 2.5 acres.*

t Grass land for forage and for manure is but very little used.

The land under cultivation is divided into <(ta® (paddy fields) and <(hata® (dry-land fields), the former amounting to 2,857,509.1 cho and the latter to 2,347,554.3 cho. Paddy fields are almost entirely devoted to rice. But rice is not the only crop which is cutivated in ta, for the climate in the larger part of the country is such that two crops a year can be obtained if the soil is sufficiently drained ; indeed the recent government report shows that the area of ta under two crops is about 40 per cent. So- called ˆaftercrops® of rice consist now-a-days mainly of barleys, rape cultivation which for¬ merly was extensively practised being now much decreased; and Gengeso or Rengeso (Astragalus siricus) cultivation, used as green manure, came gradually into use.

Dry-land fields are more variously culti¬ vated. Their principal use is of course for the cultivation of food crops such as wheat, barley, upland rice, Indian corn, soybean, adzuki, Indian millets, buckwheat, sweet pota¬ toes, potatoes, taro, radish (which is very dif¬ ferent from the occidental radish, being much larger and longer), etc. Barley is mainly di¬ vided into two varieties, naked and with husk, the former being suited especially for warmer districts and that with husk for colder parts, but as naked barley is easier to handle, its culti¬ vation seems to increase more and more, sup¬ planting common barley. Common barley is much used as food for live stock and for other purposes, but its principal use is for human food; naked barley, on the other hand, being almost exclusively used for human food.

Industrial crops are cultivated with few ex¬ ceptions, such as i (Juncus effusus) and Schichito i (Cyperus tegetiformis) in dry-land fields. Sugar-cane, cotton (which decreased from 55,541 cho in 1895 to 2,402.2 cho in 1914 on account of the amount of cotton imported), tea plant, ai (Polvgonum tinctorium), hemp, tobacco, paper mulberry, rape, sesarnun, wax- tree, ginseng, lacquer tree, peppermint are the principal industrial crops. _ The area of crops under cultivation and their productiveness in

1914, according to the government statistics (1916), are as follows:

Cho

Koku

Pice .

_ 3,033,369

57,006,541

Barley .

595 , 865

**10,253,615*

Wheat .

_ 510,036

**5,349,513*

Naked barley .

705,928

**8,178,314*

Foxtail millet .

168.428

1,747,296

Barnvard millet .

58,850

959,037

Proso millet .

36,351

461,333

Small red bean (Adzuki) .

130,003

912,636

Buckwheat .

_ 161,558

1,368,919

Rape seed .

124,118

883,116

Kwan

Potato .

83,818

234,502,689

Sweet potato .

305,014

981,108,069

Seed cotton .

_ 2,402

794,711

Hemo .

11,017

2,525,184

Leaf indigo .

4,513

2,180,365

Sugar cane .

22,601

266,954,504

Tea .

30,108

54,182,669

Tobacco leaf .

- *In the year 1915.*

36,182

15,265,725

One of the most important crops, mulberry, was estimated in 1915 at 371,298 cho, and the number of lacquer trees at 918,092.

On dry-land fields, two crops may generally be taken and even three crops a year are not exceptional, especially in the warmer provinces. It may be remarked that most cereals can be, and indeed are, generally cultivated year after year in succession without fallowing, not only on paddy fields, but also on dry-land fields. In¬ deed rotation of crops is not much practised unless it is absolutely necessary with certain crops which will not bear cultivation succes¬ sively. At present the area of fruit trees is fast increasing, among which may be 'mentioned mikan or Japanese oranges, pears, peaches, Kaki (Diosporya Kaki) apples, grapes, etc. Apples were introduced in the beginning of the Meiji era, and they are extensively cultivated, especially in the northeastern provinces and Hokkaido. Vegetables and flowers are much cultivated especially in the vicinity of towns and cities, but not within enclosure as in Europe, market gardens being all in open fields and not to be distinguished from common farms. There are special gardens, commonly within . enclosures, where specialists called Wuyekiya (tree growers) raise ornamental trees and shrubs, flowers, special dwarf trees in pots, etc. These gardeners are distinguished from agriculturists.

Agricultural Implements — Under so small and so intensive a farming it is no wonder that the implements used are so simple and so rude. The plow

(Karasuki) (

Instead of the harrow, farmers use <(magu- wa,® which is a kind of rake. Except the plow, ((maguwa® and the carts sometimes used, there are almost no agricultural implements used with the horse.

A hand implement for digging, used exten¬ sively, is ((Kuwa,® which is often erroneously translated hoe, but which may be properly named a broad-shared mattock. Kuwa is the simplest and most serviceable of all implements. With it the farmer can dig, break clods, pul¬ verize the soil, even press the surface, make high ridges and small and shallow furrows for sowing in rows, cultivate between the rows, dig holes, etc. . One of its kind named <(Bitschu- kuwa® has its share divided into three or four teeth and is used to dig paddy fields when wet. Spades are used in some of the districts.

An implement especially constructed to culti¬ vate between the rows of rice is named <(Gan- zume,® and has long curved teeth and a short handle. Nowadays a hand implement named

717

JAPAN — AGRICULTURE IN JAPAN (18)

‘ uchi-kuruma,)> which may be defined as a kind of roller with teeth around, came much in use as it works much quicker than weeding with hands as was usual. Harvesting is done entirely with a sickle (Kama). Cereals are threshed generally with a comb-like implement, (something like a flax rippler) Hnekogi® or

mugikogih Grains are chaffed with a speci¬ ally constructed mill (momisuriusu).

Principal Manures. — From remote ages Japanese farmers have understood how to pre¬ serve the soil from exhaustion by using manure. The manure par excellence was and is human excrement. The water closet is generally pro¬ vided commonly with two earthen jars, one to receive the excrement and another to receive the urine. Farmers reserve these two excreta, mixing both in a large earthen jar or tub, lightly roofing over to exclude rainwater and sun¬ shine. After they have rotted and the urea is changed into ammonia, they are diluted with a large quantity of water and are spread upon the soil, or applied in various ways even di¬ rectly to crops growing between the rows. They are often mixed in making compost.

Green manures are largely used, the most common form being grass cut from natural meadows called “magusaba,” or from under¬ grass in forests.

°Genge> > and soybean are often sown in paddy fields and plowed in as green manure.

Compost manure also plays a great role. It is of many kinds, the principal of which is made of farmyard manure, often with a large quantity of grass used as litter. Compost is also made of earth mixed with dead leave from for¬ ests. In districts where farming is intensively conducted, compost is carefully made in a small hut especially constructed for the purpose.

Rape cake is extensively used and was for¬ merly the only manure to be bought. It has now much decreased, but its place is more than replaced by soybean cake imported from China. Fish manures are extensively used, the princi¬ pal of which is herring cake, dried sardine and sardine cake.

Rice cleanings are used as manure as well as for food for livestock. Wood and straw ashes are extensively used, formerly being the only potash manure. Lime is much used, es¬ pecially in paddy fields in the warmer half of the country.

Recently great changes have been, and are now being experienced in the manurial world, so to say. Artificial manures are now extensively used, and many factories have been established to manufacture them, phosphatic minerals being imported from America and various islands. Three factories for lime-nitrogen are also es¬ tablished. Superphosphate alone, or with am¬ monia and potash salts, is sold under the name of artificial manure, complete manure, etc. Farmers in various provinces plan to use ammonia sulphate as manure.

Livestock. — Cattle and horses are as yet not so numerous as in occidental countries, and meat, milk, butter and cheese are not so ex¬ tensively used. Milch cows are little kept by common farmers, but by special dairymen, who usually buy all food for these cows. Japanese cows have very poor milking quality, so that these dairymen depend entirely upon occidental breeds, such as Holstein, Ayrshire, Jersey, Swiss Brown, etc., or their crosses. Japanese breeds

aie very small but very good as working ani¬ mals and farmers generally use cows instead of oxe9; Their meat has a most excellent flavor.

More horses than cattle are used in agricul¬ ture, buMhey are small in size and of primitive

im!i ˆ be number of cattle and horses in 1914, according to the statistics of 1916, was as follows: Cattle, 1,387,233; horses, 1 ,579,454. I he government is giving the greatest atten¬ tion, however, to the improvement of the live¬ stock. Livestock other than cattle and horses are exceedingly

small in number. Sheep were introduced less than 40 years ago but without much success, the result showing that, not¬ withstanding the humidity of the climate, they can be raised only with difficulty. The raising of pigs is being much encouraged, and the in¬ dustry is increasing rapidly. In 1914 statistics give numbers as follows : Sheep, 2,77 1 ; goats 95,323; pigs, 332,456.

Fowls are extensively kept by small farmers. Many varieties were introduced at various times during the Tokugawa shogunate but little care was given to breeding, and they all seem to have greatly degenerated. Great attention, however, is now being paid to breeding and many new varieties are introduced, and although quite a large number is kept, something like 1,000,000 yen of fowl eggs is imported every year from China. Duck-raising is not given much attention. Bees are kept in a few dis¬ tricts. to some extent, but the art of keeping bees is yet in a very backward condition.

One of the most important industries of Japan is the silk industry, sericulture being ex¬ tensively conducted by small farmers, whohave plenty of labor well suited to it. Silk-worms are mainly divided into two kinds, common silk¬ worms . and wild silkworms, the former of which is raised within the house and is the principal one. The eggs, or graines, are raised exclusively by specialists, the art being a very difficult one. The egg-raisers have generally a very large house specially constructed and well fitted for sericulture. Farmers, on the other hand, generally use one or more rooms of their houses which they can spare during the season. Farmers often raise silkworms two or three times a year, and plant mulberrv trees in plantations, around the fields, on road sides or near their dwellings.

General Features of Japanese Agriculture. — Japan with her oceanic climate, being lo¬ cated within the boundary of the monsoon, is well suited to rice cultivation, especially in the warmer portion. In the colder section, though rice is also the principal crop, its cultivation ex¬ tending up to 43° 30′ N. lat., it is rather a risky crop owing to the shortness of summer — heat often being insufficient for its good maturing. The wheat and barley crops are also exceed¬ ingly risky, for during harvest time, which may be anywhere between the end of May and the beginning of July, the season is liable to be very wet.

. Soils vary greatly, often changing within a mile. One kind of soil which deserves special notice contains a large percentage of volcanic ash, very light, with high water capacity and great absorptive power, and occurs to a large extent in Kuwanto and Kiushiu. As a rule, soils are not very rich and need to be carefully cultivated and well manured.

With such climate and soils, combined with

the mountainous character of the country, farm¬ ing on a large scale cannot be profitable, which accounts for the small farms, the holdings on an average not being more than one cho, or 2.5 acres. Farms of more than five cho are rather rare exceptions.

Though there are many landlords in Japan, the land is much more equally distributed than in some parts of Europe. Nevertheless farm¬ ers cultivating small holdings are not all peas¬ ant proprietors, tenancy being by no means rare, which may be seen from the following table :

Ta Hata

Farming on own land. ... 49.04 per cent 60.09 per cent

Tenancy . 50.96 per cent 39.91 percent

These small farmers have to pay a heavy tax on each acre of land, central and local, and for tenants the rent is exceedingly high. The rent varies of course according to circumstances, but generally speaking it is equal to about one- half to two-thirds of the produce in the case of paddy fields, aftercrops being excluded. The rent is generally paid in kind, rice in the case of paddy fields ; soybean, barley, or sometimes money, in the case of dry-land fields. Metay¬ age is very rare, and the tenancy is such that the rent is fixed according to custom, its value changing only very gradually. Owing to vari¬ ous historical causes and also to the fact that paddy fields, if not well drained, are unsuitable for the erection of buildings, the houses, which often serve both as dwellings and farm build¬ ings, or which are in close connection with the latter, are grouped together into villages or built along the roadside. There are almost no enclosed farms with buildings in the centre, and it is very difficult to make students in Japan understand the meaning of farm in the Occi¬ dental sense of the word. Paddy and dry-land fields are divided into small parcels, side by side, having no fences, the paddy fields being separated by small ridges designed to hold the water of irrigation on the surface. Each par¬ cel has its owner, but the fields being scattered involves a great drawback to the economy of labor.

These small farmers, often with less than one cho of land, frequently cultivate only one crop of rice, which is sown in seedbeds at the end cf April or at the beginning of May and planted mainly in the month of June. The har¬ vest time is from September till November. Where two crops are

obtained, the field is cul¬ tivated soon after the harvest, and harvest time comes just before rice planting. The farmer's working days are therefore very unequally dis¬ tributed. Where they have to cultivate dry¬ land fields their labor is more equally distrib¬ uted, but then the acreage they have to manage is often so small that the work on the farm is not enough for the full employment of their labor, and their income is naturally often not enough to live upon. So the farmers are obliged to resort to various industries other than farming. Formerly the farmers had to spin and weave their own clothes, but now that this is being done by factories, they have to seek other industries, such as sericulture, silk reeling, tea culture, mat making, sugar manu¬ facture, starch manufacture, weaving rice- straw mats, making strawplait from barley, weaving cotton and silk goods as commercial

articles, making baskets from bamboo stem and making wood-shaving plait, etc. Keeping fowls and swine must be enumerated among these by¬ industries of Japanese farmers; also forest cul¬ ture to obtain material to make charcoal, wooden articles, fishery and fishing, etc.

Small farmers sell their labor to large farm¬ ers or to factories, if any such exists in the neighborhood, or seek employment elsewhere. These small farmers, little less than 70 per cent of whom cultivate below one cho, with plenty of labor, most naturally farm their land in the most intensive manner possible, thoroughly cul¬ tivating, weeding, manuring, which may fairly be designated as gardening. Indeed in rice cul¬ ture farmers spend some 20 to 25 days' labor or more per tan, which is equal to 80 or 100 days' labor per acre. For other cereals some 15 days must be allowed per tan. It would seem that the product should be very large. But the statistics show but an ordinary average. For example, rice gives, on an average, about 1.7 koku of husked grain per tan, which is equal to about 34 bushels per acre ; barley little less than 1.6 koku or 32 bushels per acre; wheat some 1 koku or 20 bushels per acre, which certainly are not good crops. The figures quoted above may be too low ; on the other hand, even very poor soils are sometimes cultivated by indus¬ trious farmers, year after year, successively without fallowing, as already shown. The cli¬ mate also is not suited to barley and wheat. These facts must lower the average. So that if we take a medium crop at two to three koku per tan for rice (40 to 60 bushels per acre), or even four koku or more per tan (90 bushels per acre), in very good soil, and two to three koku per tan for barley, we are probably more nearly right as regards the product of intensive farming.

Notwithstanding such intensive farming, land population's too dense, and small farmers can hardly subsist, especially those who hire the land under the burden of heavy rent, and those who live in the colder districts. Immigration, inland and abroad, and employment elsewhere are depended

on to obviate the bad conditions, but improvement in agriculture and more ex¬ tended employment in by-industries are abso¬ lutely necessary to these farmers.

Recent Progress of Agriculture. — With the downfall of the Shogunate and the opening of the country to foreign intercourse, great changes, began to take place everywhere, both in political and in economical spheres. Under the influence of foreign trade and industrial development at home, the farmers lost some by-industries, such as spinning and weaving and some of their crops declined, as cotton, rape, ai, hemp, etc., but in many branches there has been great development and progress, as in sericulture and the tea industry, as the govern¬ ment statistics show.

The silk industry was formerly restricted to a few localities, but the export of raw silk has become so extensive that there is now almost no locality without some production of cocoons. So. also with the tea industry, though much re- ‘ stricted. Tea was formerly produced in vari¬ ous localities, but had very small market. When, however, it found a foreign market its increase was very rapid.; while the silk indus¬ try seems to have no limit for its expansion.

‘ Ihc ˆ0ˆ0w.ing figures will show the progress in tnese two important industries:

Years	*1900-1904. . .*	*1905-1909. .*	*1910-1914.*
Cocoons, koku (average per year)*	*2,648,413*	*3,262,212*	*4,318,469*
Tea, kwan (average per year)*	*7,033,598*	*7,325,315*	

8,691,093

lbs.(SrUr~5 bUSh‘ (dry)’ 48 galS- (liquidB kwan = 8.3*

The production of rice has undoubtedly in¬ creased very greatly, but the statistics show comparatively very small increase in the acre¬ age of rice culture.

Years

1900-1904. 1905-1909. .

1910-1914 _ ’

Acreage Husked rice

(average per year) (average per year) Cho Koku

2,853,573 44,643,328

2,909,379 47,579,722

2,997,715 51,166,025

But when we remember that some 20 years ago 2.5 koku per tan was considered a tolerably good harvest, in the same districts less than three koku is not considered a good crop at present, and the harvest of more than four koku per tan is not rare. And it is not improbable that during recent 10 years it has increased, as some experts are inclined to think, some 50 per cent, which is much larger than is shown by the above statistics. Such a great progress is not to be wondered at when we consider that in recent years many new varieties have been introduced, and the quantity of manure used has been exceedingly large, the demand for which could not be satisfied without importing large quantities from abroad each year, amount¬ ing to more than some 36,000,000 yen.

Efforts have successfully been made to intro¬ duce many good breeds of livestock from Eu¬ rope and America. Great improvement is no¬ ticed in the breeds of fowls, good breeds being largely introduced from abroad.

Farmers are becoming aware of the value and usefulness of science, and under the guid¬ ance of experts, directly or indirectly, they are making a gradual but constant improvement, which must of course result in increased pro¬ duction. Governments, central and local, are making constant effort to introduce improve¬ ments in agriculture and assist the farmer.

Agricultural education is encouraged. Agri¬ cultural instructions are given

in the higher primary schools of villages and there are more than 7,000 continuation schools for agriculture, after the methods of the Fortbildings-schule of Germany. Agricultural schools are divided into two classes, higher and lower, almost every prefecture having one or more of the former, and various counties having the latter; special schools, especially for sericulture, horticulture and veterinary, not being wanting. There are at present three higher agricultural schools, two government establishments and one private school in Tokio established by the Agricultural Society. of Japan. There are at present two university colleges, one in Tokio and another in Sapporo Each has a subsidiary course similar in grade to the higher agricultural schools. Ag¬ ricultural courses are given in the common and higher normal schools. Local agricultural schools receive aid from the national funds. Agricultural courses of a few weeks are being

given in various places of every prefecture. Lectures for farmers are well attended and show excellent results.

*There are now three higher sericultural ?c*lc*°ls established by the government; in Tokio, in Wuyeda in Nagauo prefecture, and in Kioto, in the two former of which instruction in silk leeling is also given. There are also many local institutes intended to give sericultural instruc¬ tion. Agricultural experiment stations are many. _ One central station with its branch sta¬ tions is established by government ; also one sericultural experiment station with five branches: (1) Agriculture proper; (2) agri¬ cultural chemistry; (3) agronomy; (4) vege¬ table pathology ; (5) entomology. Almost every prefecture has an agricultural or sericultural experiment station ; aid being given from the national fund ; many countries and villages have trial fields; also private institutes are not wanting.*

Agricultural societies are divided into village societies, county societies and prefecture socie¬ ties, there being one in every prefecture, in every county, in nearly all villages, according to the law relating to agricultural societies, and aid is given from the national fund and often from local governments, counties and villages, and we have now a central, the Imperial Soci¬ ety^ There are also many general and special societies aside from those established according to the law relating to agricultural associations.

Prefectures and counties, and even villages, often employ agricultural, dendrological, seri-‘ cultural and other experts to give free lectures and suggestions to farmers, and the central and local governments often hold industrial and ag¬ ricultural exhibitions.

The government is now making a great ef- fore to promote co-operative societies, includ¬ ing credit societies. These societies are all ex¬ ceedingly

important for the small farmers of Japan and they now number more than 11,500. Besides the law passed in 1900 relating to indus¬ trial societies, there exists a law relating to as¬ sociations for important products, a law relat¬ ing to livestock associations and a law relating to tea industry associations, all of which seek to promote these respective industries on the basis of co-operative principles. Great efforts are also being made to promote sericulture by giving special instruction, and a law has been passed to prevent silkworm diseases by securing to the farmer good and sound eggs.

Among the means to promote the improve¬ ment of livestock, large pasture has been es¬ tablished in the Imperial domains where good breeds of horses and cattle are raised. The government has also established a zoo technical experiment station with its three branch sta¬ tions, three stud farms and 15 stallion depots. Laws have been passed as follows : For the in¬ spection of stallions (1897) ; for the preven¬ tion of animal plagues (1896) ; and for the pre¬ vention of bovine tuberculosis (1901).

Preventive and destructive means against in¬ jurious insects are under the guidance of ex¬ perts and are gradually coming into use among farmers. A law designed to enforce, when nec¬ essary, the means for prevention was passed in

1896.

To prevent fraud in artificial manures, a law was passed providing for the supervision of all

commercial fertilizers and each prefecture has a chemical laboratory to analyze the manure whenever requested. Besides credit-societies to provide small capital, the government has es¬ tablished the Industrial Bank of Japan, which is a central and special credit fonder and local agricultural and industrial banks of similar na¬ ture. These banks lend capital for agricultural and other industries principally on mortgage, allowing a low interest on a long term.

Land improvements are now going on very rapidly with the aid of the national and local funds, especially to promote drainage and irri¬ gation in paddy fields and to overcome the small size and irregular form of the land par¬ cels, which has been a great drawback in tilling operations. To this end the law relating to adjustment of farm lands was promulgated in 1899, which has now in addition the aim to pro¬ mote the clearing of land and

drying of water to get more arable field. Finally it may be stated that many agricultural products are feel¬ ing the pressure from without, on account of the keen competition, which may result in re¬ duced prices. Some think that sooner or later Japanese agriculture will be conducted on a large scale, but those who know the climate and the contour of the country do not believe that Japanese farming could be organized on the Occidental large farming system.

Tokiyoshi Yokoi,

Professor of Agriculture in the Imperial Uni¬ versity, Tokio.

19. THE JAPANESE ARMY. In 1868, the first year of Meiji, the Imperial Japanese Government was formed under the Emperor Meiji. It had seven departments, one of which was that of the navy and army. While the name of the department has been changed several times, naval and military officers have always formed one branch of the administra¬ tion. In the year 1868, this department of the navy and army had come into the possession of the bureaus of the navy, army, construction, warships, ordnance, horse administration, mili¬ tary school and military administration. Next year it had the addition of the bureaus of ac¬ count and courts-martial.

In 1871 military stations were established in Tokio, Tohoku, Osaka and Chinzei. At the same time took place the organization of the general staff bureau, naval school, shipbuilding office and other naval offices.

In 1872 the War Office was separated from the Navy Department and made an independent department. Two years later the number of military stations was increased from four to six and established at Tokio, Sendai, Nagoya, Osaka, Hiroshima and Kumamoto. At the time, however, the General Staff still formed a bu¬ reau of the War Office.

In 1875 military arsenals were established in Tokio and Osaka. In 1876 the Artillery Council was organized. In 1878 the General Staff Office was separated from the War Office, there being added the hydrographic and kin¬ dred offices, compilation, translation and sur¬ vey, together with a library. Two years after¬ ward a telegraph section was added to the General Staff Office.

In 1881 gendarmerie headquarters were es¬ tablished in Tokio. In the following year a military staff college was established under the

direction of the General Staff Office. In 1883 an Engineering Council was organized.

In January 1882, an Imperial rescript was given by His Majesty to his army and navy as their mottoes : Concerning Loyalty, Courtesy, Bravery, Faith, and Thrift.

Meanwhile, the Department of Military Training being established, the affairs on train¬ ing has gone under the Inspector-General of Military Training; the military administration, under the War Minister ; and all the rest, un¬ der the Chief of General Staff.

In 1886 a thorough reorganization of the War Office took place. It now consisted of the Minister's secretariates and bureaus of general affairs, cavalry, artillery, engineering account and medical affairs. Toward the end of that year a special fortification department was or¬ ganized.

In 1888 the military stations were converted into Division Headquarters. At this time, the War Office established the woolen factory now existing at Senju. In 1890 the Imperial Body¬ guard Headquarters were organized.

During 1895 there existed, as an outcome of the Chino-Japanese War, a special quarantine department. In June, offices having charge of the construction of telegraphs and lighthouses in Formosa were established and a military of¬ fice was organized under the direction of the governor-general of Formosa.

In 1896 the number of army divisions in Japan was increased from 6 to 12, and Totoku- fu (offices of General Superintendence) were created for the eastern, central and western sections of Japan.

In 1898 the Gensui-fu (Council of Field- marshals and Fleet Admirals) and the Head¬ quarters of Military Education were organized.

The War Office was reorganized in 1900, with new bureaus, viz., those of general affairs, per¬ sonnel, military affairs, supply and justice. The Military Supply Depot was established in 1902.

In 1903 the Artillery and Engineering Coun¬ cils were abolished. Branches of the Supply Depot were established at Ujina and Osaka. On 28 December of that year the Regulations of the Imperial Military Headquarters in Time of War and of the Military Council were amended.

On 13 Jan. 1904, the Totoku-fu were abol¬ ished. On 21 February, shortly after the out¬ break of the war (1904), a bureau of informa¬ tion relating to prisoners of war was established in Tokio. On 24 April the Tokio Garrison Headquarters were newly organized. On 23 June, a special military quarantine office was established in Tokio, and quarantine stations were opened in Ni-no-shima and Dairi in No¬ vember.

In 1905 a special military Central Exchequer was organized. Shortly after the opening of the war depots for the Russian prisoners of war were established at Matsuyama, Himeji, Fu- kuchiyama, Shizuoka, Hamadera, Navashino and other places, the total number of such de¬ pots being 29. A military quarantine station was newly established at Wada Point, Kobe, in September. •

On 31 July 1906 the Regulations of the Mili¬ tary Department of the Government-General of Kwantung and of the Headquarters of the Mili¬ tary Forces in Korea were enacted. On 6 August the Regulations of the Homes for

JAPAN

Osaka Castle

JAPAN

VIEWS OF THE NATIONAL EXPOSITION OF

1 The Midway, looking toward the Art Gallery

INDUSTRY, OSAKA

2 The Art Gallery

‘ Crippled Soldiers were enacted. For the time being the home is established in Tokio.

In 1907 and 1916 twro divisions wrere in¬ creased, the whole number of divisions at pres¬ ent being 21.

In 1907 there were added two brigades of cavalry, one brigade of field artillery, three battalions of mountain artillery and one brigade of communication corps.

Thenceforward, communication brigade be¬ ing expanded, now it consists of one railway regiment, one battalion of aviation, and wireless corps; they are respectively stationed at Na- kano, Chiba and Tokorozawa.

. In 1909 a temporary office for the investiga¬ tion of aviation was established.

a11 conseclueric the reorganization of 1910, the War Office consists now of Secre¬ tariate and six bureaus : Military Affairs, Per¬ sonnel, Ordnance, Medical, Intendance and Justice.

The number of officers (active service) in 1915 wras as following:

General .

Gendarme. . . .

Infantry .

Cavalry .

Artillery .

Sappers .

Commissariats Comptrollers . .

Surgeons .

Veterinarians. . Band corps . . .

157

236

7,244

682

1,995

693

486

1,035

1,243

270

5

Military Supply System — Clothing.—

Offices for supplying clothing for the army are controlled by the clothing and provisions section in the Comptroller's Bureau of the War Office. There is also the clothing depot, being a central executive organ. Cloth is manufactured at the Senju woolen factory, belonging to the army. The War Office gives clothing materials and money every year to the army, offices and schools, and causes them to regulate the supply among themselves. With the material and money, clothes are made for non-commissioned officers, soldiers and students.

Provisions and Fodder.ˆ The clothing and provisions section of the Comptroller's Bureau of the War Office controls affairs relating to the supply of provisions and fodder to the army. There exists also the provisions and fodder de¬ pot as a central executive organ. Provisions and fodder required by the army are procured by the Division Comptrollers' departments, and those for other official establishments and schools by their respective directors. Military bodies are given fixed amounts of provisions and fodder and of money, as also are schools with dormitories, and are allowed to manage their own supply business. The food is supplied after cooking by the military bodies and schools. The supply of fodder is managed in a similar way.

Factories — Military Arsenal. — The mili¬ tary arsenal engages in the manufacture and repair of arms required by the army and ammu¬ nition required by the navy. It is governed by the military inspector of arms.

There areˆ military arsenals in Tokio and Osaka. The Tokio arsenal manufactures rifles, cartridges and gun-equipment, and governs gun¬ powder manufactories at Meguro, Itabashi, Iwahana and Atsuda, all near to Tokio. The

Osaka arsenal makes guns, gun-carriages, shot and accessories, and governs the Ujina gun¬ powder manufactory and the Moji manufactory Branches of the arsenals, when deemed necessary, are established at the places where the branch arms depots exist. The Ar- tillery and Engineering School belongs to the iokio Military Arsenal.

Senju Woolen Factory. — This factory manufactures cloth required by the army and is governed by the Minister of War. 'it is managed as a special account.

Clothing Depot. — This depot procures cloth mainly from the Senju woolen factory and makes it into military clothes. The depot also procures sundry goods and cloth from the public and supplies the army.

Provisions and Fodder Depot.— This depot conducts the business relating to provisions and fodder to be used in time of war. The exami¬ nation of such provisions and fodder is con¬ ducted here.

Horse Administration. — The history of the supply of horses to the Japanese army can be divided into three periods. In the first period (1868-72) grown horses were acquired from the public and supplied to the army; in the second period (1873-80) growrn horses were purchased from the public and supplied to the army after they had been trained ; and in the third period (1881 to the present) young horses have been procured and supplied as military horses after being reared as such. The army has a military horse supply department, under the direction of the Minister of War. This department engages in the purchase, training, supply and investigation of supply resources of military horses. The department has a head office at Tokio and nine branch offices in horse counties. The purchase of horses is conducted by purchase officers who are dispatched from Tokio ˆ to Hokkaido, Akita, Aomori, Iwatc, Miyagi, Fukushima, Tochigi, Kagoshima and other prefectures every year, in the spring and autumn. In order to maintain these horses, all branch offices of the Horse Supply Department have their own pastures, to the extent of about 143,000 acres.

Supply of Personnel — Officers. — In the

early stage of the army, as organized after the Restoration of the Imperial Regime, military officers were appointed from among the officers in the military forces of different clans and from among the people in general. The method of obtaining military officers underwent many changes before the present system was organ¬ ized. At present officers of infantry, cavalry, artillery, sappers and commissariat troops are selected from among, the following classes after the necessary education with the colors and at the Military College: (1) Graduates from the Central Military Preparatory School.

(2) Graduates from a Middle School or from a school of an equal, or higher grade, who have passed an examination for the service.

(3) One-year volunteers bearing testimonial of the commander of their corps and who have passed an examination for the service. (4) Non¬ commissioned officers of all arms in active serv¬ ice, who are of good behavior and recommend- able character, who bear testimonials of the commander of their corps, and who have passed an examination for the service. (Graduates

from the Central Military Preparatory School are those who have received three years' edu¬ cation at a local military preparatory school and one year and nine months' education at the Central Military Preparatory School. Students of the local military preparatory schools are selected from among boys of 13 to 15 years of age who aspire to be military officers).

Gendarme (officer) are filled up from among offices of other branches of service.

Officers of the Military Comptrollers' De¬ partment are obtained from the following classes, after the necessary education with an infantry corps and at the Military Comptrollers' School: (1) Graduates from a middle school, or from a school of an equal or higher grade, who have passed an examination for the serv¬ ice. (2) One-year volunteers who bear testi¬ monials of the commander of their corps and who have passed an examination for the serv¬ ice. (3) Non-commissioned officers in the comptrollers' department in active service, who are of good behavior and recommendable char¬ acter, who bear testimonials of the commander of their corps and who have passed an exami¬ nation for the service.

Officers in the hygienic department are ob¬ tained from the following classes, after the necessary training -\yith an infantry corps and at a military hospital: (1) Graduates from the Medical College of the Imperial universi¬ ties, from the special medical schools or from the prefectural medical schools with the recog¬ nition of the Minister of Education as of an equal or higher grade than middle school, who have applied for the military7 service and who have been educated at those schools at the re¬ quest of the army. (2) Graduates from the above schools, or those who have acquired equal qualifications at foreign schools, who ap¬ ply for service. (3) Those one-year volun¬ teers who bear a license as medical practitioners or pharmaceutists and who apply for service.

Officers of the veterinary department are ob¬ tained from among the following classes, after the necessary education with a mounted corps :

(1) Graduates from the veterinary departments of the College of Agriculture of the Imperial University or of the Government Special In¬ dustrial School (Jitsugyo Semmon Gakko), who have applied for service and were educated at those schools at the request of the army.

(2) Graduates from the above schools, or those who have obtained equal qualifications at a foreign school, who apply for service. (3) One-year volunteers who possess the license of veterinary surgeon, and who apply for

service.

Officers of military bands are promoted from among those who have served in the military bands for three years or more and whose merits are recognized.

Non-commissioned Officers. — In the early

stage of the modern Japanese army, non-com¬ missioned officers were recruited in the same manner as officers. Under the present system non-commissioned officers of gendarmerie are recruited as follows: (1) First-class privates of gendarmerie in active service who have been in the gendarmerie service for more than two years and whose behavior is good and character recommendable. (2) Non-commissioned officers of infantry, cavalry, artillery, sappers and com¬ missariat troops (excepting various artisan

corps), who have been in active service for jnore than six years after joining the colors, who are of good behavior and of recommend¬ able character; who have applied for admission into the gendarmerie department, and have passed the necessary examination and who still have a margin of age for active service to the extent of more than one year. (3) Gendarm¬ erie corporals or sergeants in reserve, who are of good behavior and recommendable character ,ana who apply for active service within one year after the expiration of their term for active service. (4) Reserve corporal or sergeant of infantry, cavalry, artillery, sappers or com¬ missariat troops who have been in active serv¬ ice for more than six years, who are of good behavior and recommendable character, and ;who, applying for the position of non-commis¬ sioned officer of gendarmerie, have passed an examination for the service.

, Reserves of non-commissioned officers of infantry, cavalry, artillery, sappers and commis¬ sariat troops are as follows: (1) Soldiers of all arms in active service who apply for re¬ newed service as non-commissioned officers, and those troops in the Tsushima Garrison who ap¬ ply for permission to be with the colors until their term for active service expires and who are fit for such service. (2) Reserve first-class privates who while with the colors have dis¬ charged the duties of corporal and who apply for the position of non-commissioned officer within one year after the expiration of their term for active service. (3) Reserve first-class privates, who possess a certificate showing capa¬ bility to discharge the duties of a non-commis¬ sioned officer and who ‘apply for such position in less than one year after the expiration of term for active service. (4) Reserve sergeants or corporals who apply for active service in less than one year after the expiration of their term for active service.

Artificers (N. C. O.) are obtained from among those persons who are not in the re¬ serve of the navy or army or first year pri¬ vates of all arms, who have passed an exam¬ ination for the service and gone through the jiecessary education at the artillery and engi¬ neering school.

Non-commissioned officers of horseshoe- makers are drafted from horseshoe-makers in the second or third years of active service in cavalry, artillery or commissariat troops, who apply for renewed service and who are fit. They are then given nine months' education at the veterinary school, in order to become chief horseshoe-makers.

Non-commissioned officers in the hygienic department are obtained from the following groups of men: (1) Ambulance hands or sol¬ diers of any arm in active service, who apply for renewed service as non-commissioned offi¬ cers in the hygienic department, or men in the Tsushima garrison who desire to remain with the colors until the expiration of their term of active service, and who are fit for the position of non-commissioned officers. (2) Ambulance men in reserve, who while in active service have been chief nurses, and who apply for the posi¬ tion of non-commissioned officers in active service in less than one year after the expira¬ tion of their term of active service. (3) Am¬ bulance men in reserve who possess a certificate

qualifying them for the position of non-com¬ missioned officers and who apply for active service within one year after the expiration of then term for active service. (4) Second and third class chief nurses in reserve who apply to enter active service within one year after the expiration of their term for active service.

Non-commissioned officers in the comp¬ troller's department are taken from the follow¬ ing: (1) Non-commissioned officers attached to corps of all arms who apply to be such officers m the comptroller's department, and first-class privates who have been in active service for two years or more after joining the colors and who have applied for renewed service as non¬ commissioned officers in the comptrollers' de¬ partment and obtained the necessary knowledge for such position. (2) Reserve first-class pri¬ vates of all arms, who while in the active service have acted as accountants, and who apply for the position of non-commissioned officer in active service within one year after the expiration of their term of active service. (3) Reserve non-commissioned officers or first- class privates of all arms who possess a certifi¬ cate showing their fitness to be non-commis¬ sioned officers in the comptrollers' department, and who apply for such position in

active serv¬ ice within one year after the expiration of their term for active service. (4) Second or third- class accountants in reserve, who apply to enter active service within one year after the expira¬ tion of their term of active service.

Non-commissioned officers in military bands are drafted from bandsmen who have been in active service for more than two years and who are. sufficiently accomplished to be non¬ commissioned officers.

Privates.— In the early period of the Meiji era soldiers were recruited from all clans according to the amount of revenue of their lord. In 1873 the Conscription Law was pro¬ mulgated, and all men in the country were en¬ tered in the army list on their reaching the age of 20. This laid the foundation of the present Japanese army. The law was amended several times, but its spirit remained the same. The present system provides: (1) All Japanese male subjects between 17 and 40 years of age are responsible for military service. (2) The army is classified into regulars, second-reserves, recruits and national army. (3) The regular service is divided into active and first reserve services. The active service is for three years beginning with the 20th year of age. The first reserve service is for four years and four months, for those who have finished the active service. (4) The. second reserve service is for 10 years, and enlists those who have finished the regular service. (5) Recruit service is for 12 years and four months and enlists a required number of the surplus men over the required number of regulars each year. (6) The na¬ tional army service is divided into first and second national army services. The first na¬ tional army includes the second reserves and trained recruits who have, finished their term of service. The second national army is consti¬ tuted by those who are enlisted in either of the above services.

.Men are drafted independent of the Con¬ scription Law as follows: (1) First-class pri¬ vates of gendarmerie are obtained from among soldiers of other branches of the army by their

application. (2) Bandsmen are obtained from graduates from the Military Bandsmen's School.

Military Education. — Military education in Japan is given in the following schools: (1) Military Staff College; three years' course, ad¬ mits about 60 students a year. (2) Military College of Artillery and Engineering; three years course, admits 120 students a year. (3) Military College ; 18 months' course, admits 450 -a year. This is a cadets' school. (4) Military Toyama School; soldiers are taught tactics, shooting, fencing and gymnastics in a two to seven months' course; number of students varies from year to year. (5) Central Military Preparatory School ; two years'

course, admits 300 students a year. (6) Local Military Preparatory Schools; exist in Sendai, Nagoya, Osaka, Hiroshima and Kumamoto; three years' course, admits. 50 students a year. (7) Military Cavalry Practice School; 11 months' course to be given to cavalrymen; number of students varies. (8) Military Field Artillery Practice School ; two and three months' course, number of students varies. -(9) Military Siege Artil¬ lery Practice School; course two months to one year. (10) Telegraph Educational Bat¬ talion; courses, one year and 18 months. (11) Military Comptrollers' School ; accountant cadets and accountant officers are taught here ; the course for the former is one year nine months, and that for the latter one year. (12) Military Surgeons' School; course for officers covers four months at the most and that for cadets one year. (13) Military Veterinary School; course three to nine months. (14) Military Artillery and Engineering School ; trains non-commissioned officers; courses, one and two years. (15) Infantry Practice School; teaches infantry tactics for, mainly, infantry officers. . The admission number of students and course in above mentioned schools would be varied from time to time.

Court-Martial. — In 1871, when the military stations were established and regular troops enlisted for the first time in Japan, a naval and military criminal code was enacted. In the following year the War Office was established and a military law court came into existence. The present military penal code was promul¬ gated in 1883 and amended in 1888.

In the Japanese military law court or court- martial the provisions not only of the military penal code, but of the ordinary criminal law and other penal regulations are applied.

There exists two sorts of courts-martial ; one is the Higher Court-martial and the other is the Division Court-martial, the latter exist¬ ing in each division. The Higher Court-martial exists in Tokio and delivers judgment in offenses committed by generals, and conducts the re-examination of cases examined by the Division Court-martial. Trial by courts-martial is not open to the public. Neither debate nor prosecution is allowed. Counsel and appeal are prohibited.

Military justice is conducted by procurators, secretaries and judges, and presided over by the Minister of War in the case of the Higher Court-martial, and by the commander of divi¬ sion in . the case . of Division Court-martial. Secretaries are civil officials and execute duties resembling those of preliminary judge in the ordinary law courts. Judgment is given by five judges, all of whom are military officers. Sec-

retaries may participate in trial but have no voice in making decision. Procurators are also outside the court-martial, strictly speaking. Judgment becomes valid by sanction by the commander of division or of the emperor, ac¬ cording to the official status of the offender.

Besides those above mentioned, courts- martial are established in Formosa and in field armies and forts in time of war. They are similarly constituted on the whole as the Divi¬ sion Court-martial. With the progress of the military organization and general litigation sys¬ tem in Japan, the courts-martial will be gradu¬ ally improved.

Military Prisons. — The organization of military prisons was enacted in 1876 for the first time. It was amended several times, the latest amendment taking place in 1894. Military prisons exist in those places where exists a court-martial, and are governed by the officers who preside over the court-martial. The staff of a military prison consists of a director, clerks, chief jailor and jailors. In military prisons are imprisoned small offenders who are in active service or military officials still re¬ taining their official positions, and defendants in criminal cases. The prison building is di¬ vided into three sections, rooms for defendants, cells for convicts and detention houses. The military prison is so conducted as to execute penalties in a most appropriate way against military offenders, that is, with a view to the maintenance of the military spirit and discipline.

Sanitation. — In 1868, the first year of Meiji, a naval and military department was estab¬ lished in the imperial government, and in Octo¬ ber, the same year, a soldiers' provisionary hospital was founded in Tokio. This forms the beginning of the hospital system of the Japanese army. In February 1870 another military hos¬ pital was established in Osaka. At the time military surgeons were engaged in the treatment of patients as well as in teaching subordinate physicians. These hospitals gave medicine not only to soldiers, but to the general public. In 1871 a Bureau of Naval and Military Surgeons was organized in the War Office, and was ordered to control all affairs relating to med¬ icine for the army in the whole empire. At the same time regulations relating to the organ¬ ization of military hospitals were published. The bureau of surgeons, above mentioned, was placed under the direction of a surgeon of the rank of major-general. In those days surgeons were appointed by periodical examination from among ordinary physicians.

In 1872 military hospitals were established at each military station. The organization of the hygienic administration in the army under¬ went various modifications afterward. The present regulations of military

hospitals were promulgated in February 1898.

According to the present system, military hospitals exist at all places where is stationed a military garrison. These hospitals not only give medical treatment to soldiers, but engage in storing and supplying medicines and medical in¬ struments and in teaching non-commissioned officers and men of the hygienic department. According to their size and importance, the hospitals are divided into five classes. These hospitals are so constructed as to be able to take in as patients about 3.5 per cent of the total

troops stationed at the place where the hospital exists.

The personnel of the hospital includes a di¬ rector, surgeons, pharmaceutists, accountants, chief nurse, and nurses. The director of a mili¬ tary hospital is appointed from among surgeons of the rank of captain to colonel, inclusive. He is controlled by the chief surgeon of the divi: sion to which he belongs in the execution of his medical duties.

Veterinary Department. — At the beginning of the modern Japanese Army, veterinary af¬ fairs were conducted by the Bureau of Sur¬ geons, and a regulation for providing cavalry, artillery, and other corps requiring horses, with veterinaries, was enacted. At the time veteri- naries were draftetd from the general public. In 1873, an independent department of veterina¬ ries was established, and the rank of veterinary officers fixed. In the following year, non-com¬ missioned officers and men of the veterinary department were appointed. At first these non¬ commissioned officers and men were taken from graduates from the military veterinary school. But subsequently this school was ordered to de¬ vote itself to the supply of officers, and men or lower ranks were taken from among conscripts. At present this school gives training to horse- shoe-makers. The course in the school for offi¬ cers is about five months, that for non-commis¬ sioned officers three months, and that for candi¬ dates for non-commissioned officers nine months.

Lt.-General K. Oshima, Minister of War in the Terauchi Cabinet.

20. THE NAVY. Naval affairs had been fairly well developed in Japan until the isola¬ tion policy of the Tokugawa Shogunate in 1635 prohibted the building of ocean-going vessels under pain of capital punishment.

A few ancient naval undertakings which are noteworthy in Japanese history are: The ex¬ pedition of the Empress Jingo to Sankan (ancient Korea) in 200 a.d. ; the fighting in the Inland Sea of Japan between the clans Gen and Hei in 1186; the Chinese attempt to invade Japan and the arrival of Kublai's armada on the coast of Kiushu and the annihilation of it in 1280; the encounters between the Japanese and Korean fleets on the

southern coast ˆof Korea on the occasion of Taiko's (Hideyoshi's) invasion of that peninsula in 1592-98. In the beginning of the 17th century the predatory visit of Japanese pirate junks to the coast of South China is notable and it was about that time also that Japanese junks sailed, for commercial purpose, to China, the Philippines, Java, Siam and India. The ocean-going vessels of Japan at that period numbered over 200.

It. may perhaps be worth while to recall how warships of Western style were introduced into Japan.

In 1838 the Mito clan, obtaining some necessary information from a Dutchman (the Dutch were the only foreign traders who were allowed to come to Nagasaki until after the commercial treaty was made with the United States of America), built the first ship on a foreign model ever constructed in Japan. Al¬ though this ship was completed and named Hitachi-maru it was never allowed to be used.

After the visit of American men-of-war in 1853, the Tokugawa Shogunate permitted the

building oi large ships, and at the same time oidered from Holland, through their trading agents, one steam corvette, one sailing corvette, \ ith auxiliary steamers of different sizes ; but these vessels did not arrive in Japan, owing to the trouble existing in Europe at that time.

In 1854 a two-masted ship, the H ovco-maru (length 130 feet, beam 30 feet) was built at L raga, on an English model; and at about the same time two more were built, one at Yedo (lokio), the other at Satsuma, both of which were planned on European models.

At the time of the Crimean War a Russian sloop was wrecked on the coast of Japan, and permission was given that Japanese workmen might he employed in repairing the vessel ; this gave an opportunity to obtain some practical working knowledge of Western naval architec¬ ture.

In 1855 His Majesty the King of Holland presented a steam corvette to the Tokugawa Shogun, which was named the Kanko-kan. At this time the Japanese ensign Himomaru (the sun or a red ball in a white ground) was in¬ troduced, and has been used as the national flag ever since.

Subsequently the naval school was estab¬ lished at Nagasaki by the Tokugawa Shogun- ate, and instruction in naval matters was given there by

Dutch naval officers. The students for admission to this school were appointed by the Shogunate, and also selected by the different clans. Another naval school was organized at Yedo with Kanko-maru as a training ship, and employed both Dutch and English officers as instructors. Some new ships were built at Nagasaki, and two ships were bought abroad, one of which named the Kanrin-maru after¬ ward (1860) made a cruise to San Francisco manned by Japanese officers and crew under Captain Katsu (late Count Katsu).

In 1857 Her Majesty Queen Victoria pre¬ sented a steam yacht to the Tokugawa Shogun, and it was named the Hanrio-kan.

In this way the navy of the Tokugawa Sho¬ gunate was slowly gathered together and organ¬ ized, and in 1867 nine men-of-war and 36 auxil¬ iary vessels were on the list (besides the ships belonging to the different clans).

Then came the War of Restoration (1867), and most of the ships of the Tokugawa Sho¬ gunate, except the iron-clad Kotetsu (old stonewall Jackson), led by Admiral Yeno- moto (the rebel chief), fled to Yezo Island (Hokkaido) and fought a battle at Hakodate which resulted in the total destruction of the rebel fleet, which, however, had lost some of their best ships before the battle.

After the War of Restoration the clans in possession of the warships presented them to His Majesty's government, and the Imperial Navy was formed and organized in 1867-70. The ships in 1872 were 20 in number, the ag¬ gregate tonnage being 12,390 tons.

i he Imperial Navy had experienced a few engagements before the war with China in 1894-1895, such as the Formosan Expedition of 1874; the bombardment and capture of Yeisojo in Korea by H. I. M. S. Unyo in 1875; the Satsuma Rebellion in 1877.

At the time of the war between Japan and China in 1894, the Japanese naval force con¬ sisted of one small iron-clad of 3,777 tons dis¬ placement ; three coast-defense cruisers (Itsu-

*kushima class) of 4,278 tons; one second class cruiser (Yoshino) of 4,216 tons; four pro¬ tected cruisers of between 2,230 and 3,700 tons ; 11 corvette and gunboats of between 1,000 and 2,000 tons ; and 25 torpedo boats. The aggre¬ gate tonnage of the above was 59,006 tons**

The most noted engagements of the China- Japan War were : The opening engagement off Asan, Korea; the battle of the Yalu; the tor¬ pedo-boat attack at W ei-hai-wei ; the occupa¬ tion of the Pescadores, Takao and

Ampin.

After the China-Japan War the Japanese navy commenced the building of battleships and cruisers under the new scheme to increase its strength, and at the outbreak of the war between Japan and Russia in 1904, the Japanese force consisted of six battleships of 13,000- 15,000 tons; eight armored cruisers of 7,700- 10,000 tons ; 14 protected cruisers of 3,000-4,800 tons; 10 coast-defense ships of 7,000 tons and under; 19 gunboats, etc., of 2,000 tons and under ; 19 torpedo-boat destroyers and 87 tor¬ pedo boats. The aggregate tonnage of the above was about 270,000 tons.

At the end of the Russo-Japan War, the loss sustained by Japan was as follows: two battleships ; two protected cruisers; two coast- defense ships; four gun vessels, etc.; two tor¬ pedo-boat detroyers; and nine torpedo boats. The captured Russian men-of-war, etc., augmented the Japanese navy as follows: six battleships of 9,600-13,500 tons; one armored cruiser of 7,700 tons; two protected cruisers of 6,600 tons; two coast-defense ships of 4 900 tons; two torpedo gunboats of 400 tons; and three torpedo-boat destroyers.

The Naval Administration. — At first, after the Restoration, the Imperial Army and Navy were controlled by one department ; but in 1872, in the process of organization, they were made separate and independent departments of the government.

The management and control of the Imperial Navy is carried out under the direction of the Minister of Marine, who is appointed from the flag officers. Being a member of the Cabinet, he is directly responsible to the emperor for all actions of the Ministry of Marine. He acts in naval matters concerning, the movement of ships, schemes of mobilization, national defense and naval intelligence, in consultation with the chief of the Naval General Staff.

The Naval General Staff Department is inde¬ pendent of the Ministry of Marine, its chief being under the direct control of H. I. M. the emperor.

There are seven bureaus in the Ministry of Marine: Military Affairs, Personnel, Material, Steam-Engineering, Medical, General Account Provision and Clothing, and Justice.

There are also four departments under com¬ mand of the Minister of Marine: The Depart¬ ment of Technics, the Department of Naval Education, the Department of Works and Buildings and the Department of Hydror- raphy.

Naval Stations and Dockyards. — The

coast of the empire is divided into five naval

**The Chinese naval force at the same period was 81 ships, 77,389 tons, and 25 torpedo boats, 1,042 tons; but at the conclusion of the war most of the Chinese men-of-war and torpedo boats were either destroyed or surrendered and only the Nanyang and Kanton fleets, insignificant in power, were saved,*

districts, and the headquarters of each is placed at the chief naval port of that district called Chinjufu (naval station). Headquarters of the first naval district is at Yokosuka, the second at Kure, the third at Sasebo, the fourth at Maizuru and the fifth at Chinkai (the fifth naval district is controlled by the Sasebo-Chin- fufu for the time being). There are also four Yokobu (secondary naval station) ; Bako (Pes¬ cadores Islands), Ryojun (Port Arthur), Chin¬ kai (Korea) and Ominato (Awomori Bay).

Each Chinjufu is commanded by an admiral, who is commander-in-chief, and the following official functions are under his control : The personal staff, consisting of the chief of staff, adjutants, aide-de-camp, inspector of signal stations, recruiting officers, etc. ; the arsenal (dockyards, ordnance and torpedo factory and depot, general supply stores) ; the accountant department (including works and buildings, provision and clothing stores), the hospital; the naval barrack; the torpedo division; the steam reserve; port office; court-martial.

The secondary naval stations are organized on a smaller scale and have the means of small repairs for torpedo crafts, etc.

The arsenals and their present capacity is as follows: Kure — able to build armored and unarmored ships, engines and guns of any size; to furnish armor plates, torpedoes and ammu¬ nition. Yokosuka — able to build armored and unarmored ships and engines of any size ; and make all kinds of repairs to ships and arma¬ ments. Sasebo and Maizuru — able to build ships of moderate size and make all kinds of repairs to ships and armaments. Tokio — the manufacture of small stores for ordnance and torpedoes, and some special articles. fThe arsenal at Tokio does not belong to any naval station).

Personnel. — For the fiscal year ending April 1917 the number of officers and men voted for the Imperial navy was as follows: Officers, 4,773; warrant officers, 1,574; petty officers and men. 65,047. Number of officers on the retired list is 1,192; number of petty officers and men in

reserve, 26,882 ; number of naval reserve (men trained in merchant service and passed as midshipmen and petty officers) is 2,426.

The officers of the Imperial navy are divided into two classes, the executive and non-execu¬ tive officers. The executive naval officers are admirals, captains, commanders, lieutenant- commanders, lieutenants, sub-lieutenants, mid¬ shipmen, naval cadets, gunners and boatswains. The non-executive naval officers are engineer officers (engineer-admiral, engineer-captain, engineer-commander, etc.) ; medical officers; paymasters; naval constructors; ordnance engi¬ neers ; hydrographical engineers ; carpenters ; bandmasters and warranted writers.

Executive Officers. — In the Imperial Jap¬ anese navy the naval cadets are appointed by competitive examination, which is open to the sons of all Japanese subjects. The entrance ex¬ amination is held, at present, in 13 of the prin¬ cipal towns of the country, under the super¬ vision of the superintendent of the Naval Col¬ lege. The number of cadetships available for the year having been previously gazetted by the Minister of Marine, applications are made to the superintendent of the Naval College through the local authorities within the specified limit of time. A candidate must not be under 16 or

over 20 years of age. A candidate is examined in the following subjects: Japanese composi¬ tion, mathematics, English, Chinese, geogra¬ phy, history, physics, chemistry and drawing; also, if the candidate desires, in French, German or Russian. Successful candidates become naval cadets and join the Naval College at Yetajima, on the Inland Sea near the Kure naval station. The traveling money to the college is paid, and at the college evervthing is provided by the government.

The cadets remain in the Naval College three years, and are instructed in seamanship, navigation, higher mathematics, English, phy¬ sics, chemistry, gunnery and torpedoes, steam engineering, etc.

After having passed the final examination successfully they are appointed to the sea-going training-ships as midshipmen. At the end of eight months' cruising the midshipmen are ex¬ amined in what they have learned on board, and then transferred to different ships in com¬ mission and after four months' practical service, if favorably reported by the captain of each ship, will be commissioned as sub-lieutenant.

Promotion of naval officers is entirely by selection, and the list of candidates deserving that honor is decided upon by the board of ad¬ mirals, which meets once a year. This board is composed of eight or nine members, but when sitting to decide the list of promotions, all the

commanders-in-chief of naval stations and the squadrons, with the senior officers of the different branches, such as engineers and medi¬ cal corps, etc., are summoned, and the Minister of Marine takes the chair. Officers of the fol¬ lowing rank who have been on duty for the specified number of years are eligible for nom¬ ination : Sub-lieutenants, one year; lieutenants, junior grade, two years; lieutenants, five years; lieutenant-commanders, two years ; commanders, two years ; captains, two years ; rear-admirals, three years.

Naval officers are placed on the retired list on account of age. The age-limit of the dif¬ ferent ranks is as follows: Admirals at the age of 65 ; surgeons, paymasters and constructors with the rank of vice-admiral, at the age of 62; vice-admirals and engineer-vice-admirals at the age of 60; surgeons, paymasters, and con¬ structors with the rank of rear-admiral at the age of 58; rear admirals and engineer-rear- admirals at the age of 56; surgeons pay¬ masters and constructors with the rank of cap¬ tain at the age of 54; captains, engineer-cap¬ tains and hydrographical engineers with the rank of captain at the age of 52; surgeons, pay¬ masters, constructors with the rank of comman¬ der and chief warrant officers at the age of 50; commanders, engineer-commanders, hydro- graphical engineers of the same rank, and war¬ rant officers at the age of 48; surgeons, pay¬ masters and constructors with the rank of lieu¬ tenant-commander at the age of 47 ; lieutenant- commanders, engineer-lieutenant-commanders and hydrographical engineers of the same rank at the age of 45 ; surgeons, paymasters and con¬ structors with the rank of lieutenant at the age of 44; lieutenants, engineer-lieutenants and hydrographical engineers of the same rank at the age of 43; surgeons, paymasters and con¬ structors with the rank of lieutenant (junior grade) at the age of 40; lieutenants (junior grade). sub-lieutenants, engineer-lieutenants

(junior grade), engineer-sub-lieutenants and hydrographical engineers of the same rank at die age ot 38, all officers are placed on non¬ service pension list five years after being placed on the retired list.

Engineering Officers. — The appointment ot engineer students is effected in the same manner as the appointment of naval cadets. The students joining the Naval College of Engineer¬ ing remain three years, going through a course ot advanced mathematics, physics, chemistry, theory of the steam engine, etc. They also re¬ ceive practical training in the engineering work¬ shops of the Yokosuka dockyard, receiving in¬ struction in iron shipbuilding, the working of marine engines and boilers, the practical use of

the various instruments used in the engine- room, as well as in the construction and work- ing of electric light, torpedo and gun machinery. The students successfully passing the final examination- are appointed to the sea¬ going training ship as engineer-midshipmen, and they get commission as engineer-sub-lieu- tenants in the same way as midshipmen, gain¬ ing succeeding steps of promotion, as in the case of executive officers.

Medical Officers.— Candidates for the med¬ ical branch of the navy are reauired to pass a medical examination before being allowed to go up for the competitive examinations. The lat¬ ter include medicine, surgery, science and modern languages. Successful candidates be¬ come probationary assistant surgeons of the navy, and have to join the Navy Medical Col¬ lege for instruction. They remain there not less than one year, and if they pass the ex¬ amination at the college successfully, are ap¬ pointed to the hospitals of the different naval stations. After a certain period of time, if recommended, they are commissioned as assist¬ ant surgeons ; succeeding steps of promotion are by selection. The successive grades of rank are assistant-surgeon, surgeon, staff and fleet surgeon, surgeon-inspector and surgeon-general. Surgeons and assistant surgeons are also ap¬ pointed from among the graduates of the Im¬ perial universities and medical colleges respec¬ tively.*

Paymasters. — Paymasters are brought up in the paymaster school, the students being selected in a similar manner as the engineer students and after three years' education at the school they become probationary assistant pay¬ masters, and after one year practical training are commissioned as assistant paymasters, gain¬ ing succeeding steps of promotion by selection. Ranking is as follows : Assistant paymasters, paymasters, chief, staff and fleet paymasters, paymaster-inspectors and paymaster-general. The paymasters and assistant paymasters are also appointed from among the graduates of the universities and commercial colleges re¬ spectively, when vacancy occurs.

Naval Constructors. — Every year a cer¬ tain number of the naval architecture students from the Imperial University can make appli¬ cation to become students of the navy. The expenses of the successful candidates are paid by the navy, and on being graduated they are appointed assistant naval constructors. Pro¬ motions to naval constructor, chief inspector and inspector-general of naval construction are gained by selection.

Ordnance Engineers. — Ordnance engineers are appointed in the same manner as naval Constructors. Naval officers and engineers can also enter this branch by special appointment if desired.

Hydrographical Engineers.— Students in this branch are taught in the hydrographical office the theory and practice of surveys, etc., and, passing a successful examination, are ap¬ pointed assistants. Assistants can acquire rank as high as that of captain. As this branch of the service can be performed by naval officers, the continuance of this department is doubtful.

Warrant Officers. — The executive warrant officers are gunners and boatswains, gunners and torpedo-gunners having to have their quali¬ fication of gunnery or torpedo instructions be¬ fore promotion. The non-executive branches holding relative ranks are engine-room artifi¬ cers, bandmasters, carpenters, writers and nurses. They are all selected from the petty officers of their respective bodies, having served at least two years at sea. A warrant officer of more than ordinary ability can, after six years of service, be promoted to be chief warrant officer which ranks with sub-lieutenant, and chief warrant officers of long and meritorious service receive the rank of lieutenant when placed on the reserve list.

Petty Officers and Men. — The petty offi¬ cers ana the men of the navy are divided in the same method as the warrant officers. Petty officers, with the exception of the writers, are all appointed from the men. There are three ranks in every branch — viz.: The chief or first, sec¬ ond and third class petty officers. The men are enlisted in two classes, the volunteers and the conscripts ; the first serve for eight years, the second for four. Both classes are allowed to renew their enlistment for terms of three years until the petty officers reach the age of 45, and the men that of 40 years of age. Men appointed to be petty officers must serve six years from the day of appointment. The age of enlistment for volunteers is as follows : Seamen and stokers, 17 to 21 years; carpenters' crew, nurses, blacksmiths, etc., 17 to 26 years; bandsmen 16 to 19 years. The age of conscripts must be over

20.

Examinations for the promotion of petty officers and men are held twice every year, and they are eligible for the examination if they have served at sea as follows: Petty officers — First class or chief petty officers, one and a half years as second class petty officers; second class, one year as third class petty officers; third class, one year as leading seamen. Men — Petty officers, leading seamen or first class men, able seamen or second class men, and ordinary or third class men, are examined in April and October. Boys are examined in May and No¬ vember. Boys are trained for four months in the naval barracks at each naval station, and then sent to the sea-going training-ships for two months at least before being distributed among the ships of the squadron, etc. From among able seamen and upwards to first class petty officers inclusive, a certain number of men are selected and examined to become sea¬ men gunners and torpedo men, and

the success¬ ful candidates are trained respectively at the gunnery and torpedo-training stations at Yokosuka.

There are three different courses of instruc-

tion for seamen gunners, torpedo men, torpedo instructors, etc.: (1) A course for seamen gunners; (2) a course for gunnery instructors; (3) recapitulatory, or short course. Stokers, carpenters' crews and blacksmiths are given the same instruction as seamen, and are trained in the artificers' training station according to their standing as seamen. Further details of the in¬ struction of other branches of petty officers and men are unnecessary, it being similar in prin¬ ciple to that given for the seamen class.

The Naval Academy. — Advanced instruc¬ tion for naval officers and engineers is given at the Naval Academy situated at Tokio. It is conducted by a rear-admiral superintendent and several instructors and officers of different ranks, as well as by a staff of professors. The courses of instruction for officer students are divided as follows: (1) Officers' long course, two years; (2) officers' short course, one year; (3) optional course, one year (nearly) ; (4) engineer's long course, two years; (5) engi¬ neers' short course, one year.

Officer students are nominated by the com¬ mander-in-chief of naval stations and squad¬ rons, and by officers having similar authority, according to a notice given once a year by the Minister of Marine. A candidate for a long course must have had experience of sea duty for three years, be in good health, possess good judgment and a fair knowledge of his profes¬ sion, and have a good record. Officer students for the optional course are not nominated, but make application, stating the subjects to be studied, and permission is granted them by the Minister of Marine if he sees no objection. Officer students of this class include captains, commanders, and lieutenants.

The principal subjects taught at the academy for officers are: (1) Strategy; (2) naval tac¬ tics; (3) military tactics; (4) history of war; (5) ordnance and machinery, including gun¬ nery, torpedoes, naval architecture, steam en¬ gines, hydraulic and electric machinery; (6) navigation, meteorology, coast survey, etc.; (7) fortification; (8) land survey; (9) navy and military administration; (10) international law.

Preparatory subjects are advanced mathe¬ matics, dynamics, physics,

applied dynamics.

Optional subjects are criminal law of the navy, modern languages, photography.

The subjects for engineer officers are, first part: (1) Steam engines; (2) practical engi¬ neering; (3) designing of engines and ma¬ chinery; (4) naval architecture; (5) construc¬ tion of ordnance.

Second part. (1) Theory of steam engi¬ neering; (2) kinematics of machinery; (3) strength of material; (4) resistance and pro¬ pulsion; (5) hydrodynamics and hydraulic ma¬ chinery; (6) electricity and electric machinery and apparatus.

Preparatory subjects are mathematics, dy¬ namics, physics, chemistry, metallurgy.

Optional subjects are criminal law of the navy, modern languages, photography.

Officers choosing the optional course may select any of the subjects enumerated above, but the selection thereof must be made at the (time of application.

Naval Expenditure. — The expenditure for

the Imperial navy is divided into two classes : ˆOrdinary expenditure, and extraordinary ex¬

penditure. The ordinary expenditure is for the maintenance of the navy, and the extraordinary expenditure for construction and new estab¬ lishments.

The following figures will give some idea of the increase in expenditures of the Imperial navy since 1870, compared with the tonnage of the ships :

FISCAL YEAR

Expenditures

Tonnage

Ordinary,

yen

Extraordinary,

yen

1870 .

886,856

\

13 767

1880 .

2,817,912

291,890

25,727

1890 .

5,412,491

4,089,201

61,763

1900 .

19,484,952

24,494,374

255,497

1901 .

21,063,345

15,262,843

258,077

1902 .

21,530,237

14,587,619

263,077

1903 .

8,132,720

12,480,498

298,222

1904 .

12,332,139

11,079,801

280,524

1905 .

28,914,073

11,693, 495

367,894

1906 .

33.414,695

49,067,524

426,234

1907 .

31,292,235

40,979,383

513,351

1908 .

34,347,699

37,230,748

505,109

1909 .

35,143,415

35,902,959

505 , 206

1910 .

38,359,312

45,481,219

524,273

1911 .

40,208,251

60,255,366

536,054

1912 .

41,533,600

53,951,538

585,574

1913 .

38,885,701

57,559,890

631,346

1914 .

30,398,898

52,861,106

654,346

1915 .

38,998,117

45,396,342

690,302

1916 .

*46,496,165

*55,747,761

. .

- Estimates.

The special naval expenditures of Japan- China War and Russo-Japan War were as fol¬ lows: Japan-China War (1894-95), 35,955.137 yen; Russo-Japan War (1904-05), 239,578,251 yen.

Besides the ordinary and extraordinary ex¬ penditure, the navy has special funds amount¬ ing to 3,000,000 yen for ship-building and ord¬ nance construction materials, which are divided among the dock-yards and arsenals as the mate¬ rial funds.

Baron M. Saito,

Admiral, Imperial Japanese Navyr

21. RUSSO-JAPANESE WAR. Causes of the War. — The Russo-Japanese War was caused by the conflict of interests between the two nations owing to the pursuance by Russia of a policy of expansion in the Far East.

Commencing the colonization of Siberia from the latter part of the 16th century, Russia stead¬ ily advanced toward the East, until after about a century she succeeded in the subjugation of nearly the. whole of that vast region. She then advanced into Manchuria, with the result that China objected to her action and the Nertchinsk Treaty, by which the boundary line between the two countries was fixed, was concluded on 27 Aug.. 1689. By virtue of this treaty, Russia had to withdraw from the Amur region, which she had occupied, and was checked from seeking an outlet on the Pacific coast for about a cen¬ tury and a half. This did not mean, however, that Russia abandoned her Eastern policy, and with the

appointment of Muravieff to the gov¬ ernorship of eastern Siberia in 1847, she began to move toward the southeast, and by way of the Amur at last reached the Sea of Okotsk. On 16 May 1854, she concluded the Treaty of Aigun with China, by which she annexed the district to the north of the Amur. Two years after, when China was invaded by the allied

Jtn3

■ vi 2 CcV*

*3r

RELIEF MAP OF THE FIELD OF RUSSO-JAPANESE WAR

From a Map Prepared by the Intelligence Bureau of the War Department of Japan

. .

troops of Great Britain and France, General Ignatieff, the then Russian Ambassador at Pe¬ king, took the opportunity to win the good will of the Chinese government by intervening be¬ tween China and her enemies. In return for this service, the Treaty of Peking was signed on 2 Nov. 1860, by which Russia took posses¬ sion of the district east of the Usuri, and thus for the first time in her history expanded her dominion to the coast washed by the Sea of Japan. She now founded the city of Vladivos- tock, which she made the basis for carrying out her long-cherished Far Eastern policy.

But as the long distance between Saint Petersburg and Vladivostock proved impeditive in many ways to the successful realization of her scheme, Russia determined to connect the two cities by rail. Thus the construction of the Siberian Railway was commenced in May 1891 and finished about 10 years later. Russia now found herself in possession of a powerful in¬ strument in realizing her policy, but she was not satisfied, for being ice-bound in winter Vladivostock was not suited to her commercial and strategical purposes. Russia, therefore, wished to get an ice-free port somewhere in the south and waited for an opportunity to at¬ tain that object.

In 1894 the Japan-China War broke out and in the following year, by the Treaty of Shimo- noseki, China agreed to cede to Japan the Liao¬ tung Peninsula. Seeing in this a great obstacle to the pursuance of her policy,

Russia, backed by Germany and France, coerced Japan to re¬ turn the Liaotung Peninsula to its original owner, which act of Russia was viewed by the Japanese people with anything but gratitude.

In 1896 Russia signed a secret treaty, the celebrated Cassini Treaty, with China, by which she obtained the privilege of constructing rail¬ ways in Manchuria. She founded the Eastern Chinese Railway Company, and immediately set herself to the work of building railways in that region. In December 1897, she took an¬ other decided step forward. She occupied Port Arthur and Talien, the very places from which she had ousted Japan, obtained the formal lease of the two ports from China on 27 March of the following year, and immediately began to equip them with armaments.

In 1900 the Boxer rising took place in China, which was quelled by the allied troops of the Western Powers and Japan. Russia, which had now completed her two lines of rail¬ way in Manchuria, seized the opportunity to send out a large force to that region on the pretext of guarding the railway, and after the Boxer disturbances were over refused to with¬ draw her troops. Thus she not only continued the practical occupation of Manchuria, but, gradually increasing pressure on Korea by en¬ croaching on the Yalu as well as by diplomacy in Seoul, menaced most seriously the indepen¬ dence of that kingdom. As a matter of fact, Russia's ambition on Korea was not a new thing. After the conclusion of the Japan-China War, M. Waeber, the then Russian Minister at Seoul, left nothing undone to extend Russia's influence in the Korean court by utilizing the anti-Japanese faction. Subsequently, M. Speyer, who succeeded M. Waeber as the representative of Russia in Korea, attempted to get practical control over the financial and military power

of that country. This attempt, however, was frustrated owing to a strong protest made by Japan and Great Britain. During the years following the Japan-China War, no less than three agreements had been arrived at between Russia and Japan, and at last it looked as if Russia was going to slacken her pace. As soon, however, as her plans were matured in Man¬ churia, her activities again began to show themselves in Korea, in many cases completely ignoring the agreements above referred to.

The attitude of the Japanese government toward this state of affairs is best expressed by the following quotations from Baron Komura's dispatch to the late Japanese Minister in Saint Petersburg. He says: (

The Japanese government, however, was eager for peace and made overtures to the Russian government in July 1903 to come to a friendly agreement concerning the settlement of the Manchurian and Korean problems. Having obtained the consent of the Russian govern¬ ment, a

memorandum was drafted which would form the basis of agreement.

The main points in the memorandum were (1) that Russia and Japan should both respect the independence and territorial integrity of China and Korea and maintain the principle of equal opportunity toward all nations; (2) that the two nations should reciprocally recognize Japan's preponderating interests in Korea and Russia's special interests in railway enterprises in Manchuria, and that each had right to take such measures as was necessary for the protection of their respective interests; (3) that each nation was free to send troops to protect the interests mentioned above; (4) that Russia should recognize the exclusive right of Japan to advise and assist Korea in the interest of civil and military reform. Against this memo¬ randum Russia sent on 3 October a counter proposal demanding that Japan recognize Man¬ churia to be outside her sphere of> interest and forego her exclusive right to assist Korea in making military reform, and that Japan and Russia should mutually engage not to use Korea for strategical purposes, as well as to consider that part of Korea lying to the north of the 39th parallel as a neutral zone.

Besides, Russia quietly suppressed in this counter note the important clause providing for equal opportunity for the commerce and indus-

try of all nations. On the receipt of this counter note the Japanese government, after several conferences with Baron Rosen, the then Russian Minister in Tokio, proposed a fresh memorandum containing the ˆirreducible mini¬ mum, }) which was accordingly communicated to the Russian government on the last day of October. In this new memorandum Japan made several important concessions: (1) Japan would engage not to undertake on the coast of Korea any military works capable of menacing the freedom of navigation in the Korean Straits ;

(2) she would agree to the proposal of Russia to create a neutral zone, but that said zone to be created at the Korean-Manchurian fron¬ tier and to extend 50 kilometers on each side ;

(3) that Russia and Japan should mutually de¬ clare that Korea was beyond the sphere of the ˆspecial® interest of Russia and Manchuria of Japan.

To this note Russia replied only on 11 De¬ cember. In this new counter note Russia was entirely silent on the subject of Manchuria, and regarding Korea repeated the restrictions pro¬ posed in September, including the

restriction of Japan's giving advice and assistance on mili¬ tary matters. On 21 December Japan made her last attempt to come to terms with Russia, and M. Kurino, the then Japanese Minister to Saint Petersburg, was instructed to present a note vcrbale to the Russian Foreign Minister. In this note verbale the Russian government was requested to reconsider her contention that Japan had no right to have a voice in the affairs of Manchuria and that Japanese assistance to Korea be limited to civil affairs only; besides Japan finally requested Russia to give up the idea of creating a neutral zone out of the Korean territory north of the 39th parallel. To this Russia gave reply which reached Tokio on 6 Jan. 1904, again insisting that Japan should recognize Manchuria as beyond her sphere of influence; that Japan should agree to the Russian proposal of creating a neutral zone in North Korea; that Japan should be accorded full right to the privileges according to the existing treaties, but no right to estab¬ lish settlements ; and no mention was made of China's territorial integrity in Manchuria.

Against this the Japanese government made another proposal on 13 January making fur¬ ther concessions, such as giving up the claim to special interest in Manchuria, provided Rus¬ sia agreed to grant full privilege for the enjoy¬ ment of treaty rights acquired from the Chi¬ nese government besides giving up her claim to special interests in Korea. But to this last proposal Russia kept postponing reply, while reports of Russian military preparation on the Yalu side of Manchuria kept coming.

On 1 February the governor of Vladivostock warned the Japanese commercial agent there to prepare for withdrawing his compatriots. Under these circumstances it seemed doubtful to Japan whether the Russian government was really sincere and wished an amicable agree¬ ment. The Japanese government felt that it had made all possible concessions in the interest of peace, and on 5 Feb. 1904 sent a note inform¬ ing the Russian government of the severance of friendly relations between the two countries. On 10 February Minister Kurino withdrew from Saint Petersburg, while Baron Rosen, the then

Russian Minister at Tokio, left the Japanese capital on the following day.

Opening of Hostilities. — No sooner was Russia informed of the severance of friendly relations than Japan prepared for hostilities. In order to assume the offensive attitude, it was necessary for Japan to hold the command of the sea. With that object in view, the naval authorities organized a combined fleet consist¬ ing of four divisions.

Vice-Admiral Togo, who shortly before had been appointed commander-in-chief of the com¬ bined squadrons, left Sasebo on board his flag¬ ship Mikasa on 6 February with the entire fleet. Russia's Pacific squadron

consisted at that time of 57 vessels, whose aggregate tonnage was about 190,000 tons, while Japan possessed 76 warships with an aggregate tonnage of about 270,000. The main strength of the Russian fleet was then concentrated at Port Arthur, only two vessels being stationed at Chemulpho and three others at Vladivostock. The main strength of the Japanese fleet went to attack the enemy's squadron at Port Arthur. It was found that most of the Russian war¬ ships were at anchor on roadstead outside the harbor of Port Arthur. During the night of 8 February, 18 Japanese destroyers ap¬ proached those warships and by torpedoing greatly damaged the Retvizan and two other vessels. On the following day the fleet again opened fire on the Russian ships, and after an indecisive engagement, withdrew to its base in the Korean Sea. Previous to this, the Fourth Division of the fleet, commanded by Rear- Admiral Uryu, went to Chemulpho and by sum¬ moning out the Russian gunboat Coreets and the cruiser Varyeg engaged them in battle in the neighborhood of the island of Phalmi on the 9th and greatly damaged them. After 35 minutes' action the Russian ships were com¬ pelled to return to Chemulpho, where shortly after the two ships blew up.

By these two naval actions Japan secured the supremacy of the sea, so that henceforth her troops could be sent free of danger to any place in Korea and Manchuria. On the 10th the war was formally declared by the emperors of both powers and on the 12th Japan estab¬ lished military and naval headquarters in the Imperial Palace at Tokio.

Operations of the Manchurian Armies. — Under the escort of a squadron commanded by Rear-Admiral Uryu, the advance-guards of the Japanese army, which consisted of four bat¬ talions, landed at Chemulpho on 8 February, and passing through Seoul rapidly advanced north¬ ward and occupied Phyng-yang, which is a town of the greatest strategical importance be¬ tween Seoul and Wiju, a town on the left bank of the Yalu. By that time some Russian troops had been advancing southward and made their appearance on 28 February at a point about five miles north of Tsi-sing-wan, one of the gates of Phyng-yang. A skirmish with the Japanese outposts took place, in which the Russians were repulsed. This was the first land engagement of the war. The Japanese troops, now greatly augmented by contingents which constantly ar¬ rived, marched northward, and having occupied Wiju on 3 April concentrated on the left bank of the Yalu. These constituted the First Army, being made up of three divisions, with General

Kuroki as the commander-in-chief. The Rus¬ sians, who had occupied the right bank of the over, concentrated their main strength at Kiu- tencheng and tried to prevent the Japanese from ciossing the river. In face of

incessant and heavy tmng oi the enemy, however, the troops suc¬ ceeded m constructing a bridge across the river and by means of this bridge carried out the general attack of the enemy's position at Kiu- liencheng on 1 May. Severe fighting, lasting 101 more than two hours, took place, resulting in the complete victory of the attackers. The Russians, who were greatly outnumbered, fled, noti\ pursued by the Japanese, who captured tH eng- lnvan-cheng on 6 May and continued to advance in the direction of Liaoyang. Hsihoyen, to the east of Liaoyang, was the key to the deteiise of that city. The Russians had sta¬ tioned three brigades there and defended the place with the greatest tenacity. But Japanese troops belonging to the Twelfth Division made a most fierce attack and compelled the Russians to evacuate the place on 18 July. Thus by the beginning of August the Japanese were already menacing Liaoyang. Previous to this, the In¬ dependent Tenth Division, commanded by Lieu¬ tenant-General Kawamura, which had the mis¬ sion of connecting different armies assigned to it, landed at Takushan on 19 May, and co¬ operating with a detachment of the First Army occupied Sinyen on 8 June. By this time the organization of the Fourth Army was com¬ pleted, with General Nozu as commander. It landed at Nauchienao and joined the Tenth Di¬ vision at Sinyen. The combined army now advanced by way of Fenshuiling, and after oc¬ cupying Tohmucheng, turned northward and pressed on toward Liaoyang.

The Second Army, led by General Oku, landed in Liaotung Peninsula at Yentaao on d May, being charged with the task of bringing pressure on the rear of Port Arthur. About the middle of the peninsula there is a narrow isthmus, on which a high hill called Nan-Shan stands, and at its foot is a town called Kin- chow. It is a place of the greatest strategical importance, constituting the first barrier to Port Arthur. General Stoessel, commander of the Port Arthur garrison, resolved to retain it at all cost, so that he might respond to the advance of the relief army from the north on the one hand and defend Talien on the other. For several weeks past he had spared no pains to fortify the hill by digging trenches, mount¬ ing heavy cannon, laying subterranean mines and wire entanglements and adopting every other method of defense known to military sci¬ ence. Against this strongly defended hill Gen¬ eral Oku hurled three divisions on 26 May, and with the co-operation of three Japanese war¬ ships, which fired on the enemy from the sea, succeeded in dislodging the Russians from their position after a fierce battle. In this way Port Arthur was completely isolated. The Russians in the direction of Liaoyang thought to recover the hill in order to restore communi¬ cation between the south and north. With that object in view they concentrated their strength to the norlh of Wafangtien. The Tap- anese turned to the north to meet them and 1 ought a battle at Tehlitz on 16 June, inflicting a crushing defeat on the enemy. The Japanese then

pressed on Kaiping and after three days'

fighting occupied the town on 9 July. Subse¬ quently they marched farther north and by taking possession of Haicheng and Niuchwang on 3 August menaced Liaoyang.

Thus, the First, Second and Fourth Japanese armies won victory after victory, and now marched on Liaoyang from three sides; while tne 1 hird Army under General Nogi took the place of the Second Army in pressing the siege of Port Arthur.

The Siege of Port Arthur.— Soon after Russia leased Port Arthur from China she commenced to convert it into one of the strong¬ est fortresses in the world. She built there many forts and mounted on them guns of vari¬ ous calibres, quick-firing guns, machine guns and heavy cannon. Between each fort, trenches or tunnels were built for communication, and in front of the forts covered trenches, wire en¬ tanglements, subterranean mines, abatises and other means of defense were prepared. In fact Port Arthur was armed to the teeth with every description of the latest and most powerful of weapons and defended by every means which human ingenuity could devise, while a great army and a powerful fleet, commanded by Gen¬ eral Stoessel and Admiral Stark, respectively, were awaiting the attack of the Japanese. There is little wonder that in the course of the Russo- Japanese War the Japanese found Port Arthur the hardest nut they had to crack.

Beginning with the attack made on 8 Feb¬ ruary, the Japanese fleet repeatedly essaved its strength against Port Arthur. On 13 February, in face of a great snowstorm, it attempted a torpedo attack, but without much avail. It then attempted to block the entrance to the harbor by sinking steamers there, ffhe first attempt was made on 24 February, when four steamers were sunk at the entrance. Later three more similar attempts were made, in which the Japanese were partly successful. One remarkable fact in connection with those daring blocking at¬ tempts was that officers and men vied with each other to take part in the task, which meant almost certain death. As a matter of fact, more than 2,000 officers and men volunteered to serve in the third attempt. On 13 April, several Rus¬ sian warships suddenly' emerged out of the har¬ bor and appeared to be attempting to escape but being met by the Japanese fleet with heavy firing steamed back to the harbor.

It was at this time that the Russian flag¬ ship Petropavlovsk , striking one of the mechan¬ ical mines which had been laid by the Japanese the previous night, exploded and sank. Vice- Admiral Makaroff, who had succeeded Admiral Stark as commander-in-chief of the Russian fleet some time before, was on board the Petropavlovsk, and was drowned with more

than 600 of her officers and crew. The Japan¬ ese, however, were not free of similar disasters. On 12 May the dispatch-boat Miyako struck a Russian mine and sank while engaged in clear¬ ing the Talien harbor of mines. Three days after, the cruiser Yoshino sank off Port Arthur in consequence of a collision during a thick fog with the cruiser Kasuga. On the same day the battleships Hatsuse and Yashima, two of the most powerful ships of the Japanese navy, were destroyed, having struck the enemy's "mines; and to add to these misfortunes, the gunboat Oshima and the destroyer Akatsuki were also

lost. In spite of these repeated disasters the Japanese commanders continued to harass the enemy with greater vigor than before. On 26 May, when the town of Kinchow was taken, thus isolating Port Arthur, Vice-Admiral Togo declared blockade over the coast of Liaotung between Pitszwo and Pulantien, and while keep¬ ing up a vigilant watch over those vessels which attempted to smuggle provisions and ammuni¬ tion to Port Arthur, greatly assisted the land force in harassing the enemy. On 10 August the whole of the enemy's fleet attempted to escape from Port Arthur. The Japanese fleet met them about 30 miles off Port Arthur and in a fierce battle which ensued inflicted heavy damage. For instance, the Russian flagship Cesarevitch was greatly injured and Rear- Admiral Vithoft was killed. Other Russian ships also sustained severe damage and steamed back to the harbor of Port Arthur, except four which made good their escape to Kjaochow and elsewhere. After this great naval engage¬ ment the Russian fleet lay concealed in the harbor and never again attempted to escape.

On 6 June, General Nogi landed at Liao¬ tung Peninsula at the head of the Third Army, and starting from Kinchow, which had been occupied by the Second Army, advanced south¬ ward, pressing the rear of Port Arthur by the beginning of August. The Russian garrison in that fortress was now apparently doomed. On 16 August a parlementaire was sent by the Japanese army to the commander of the fortress communicating to him the Imperial wishes with regard to the disposal of non-combatants and also counseling his surrender. On the fol¬ lowing day the enemy replied to the communi¬ cation, refusing either to deliver the non-com¬ batants or to surrender. So the Japanese army opened a general attack on the fortress on the 19th. A bloody fight followed, which lasted till the 23d. The Russians held their positions with great tenacitv and courage, and the Japan¬ ese were only able to capture the East and West forts of Panlungshan at great cost. The attack on the North Fort of Tungkeikwanshan proved most costly,

the losses sustained by the Japanese being extraordinarily heavy. Under these circumstances the Japanese concluded that Port Arthur could not be taken by storm and resolved to carry on a long siege.

Japanese Naval Operations in the Direc¬ tion of Vladivostock and Saghalien. — At the beginning of the war, the Russians had three warships at Vladivostock and were ready to meet the Japanese on the sea by the co-operation of the Vladivostock squadron and the Port Arthur squadron. On 6 March Vice-Admiral Kamimura, commander of the Second Squadron, led seven warships to a bombardment of Vladi¬ vostock. The enemy's ships, however, did not venture out and give battle. On 25 April they unsuspectedly made their appearance off Gen- san, Korea, and attacked and sank the Kinshu- maru, a Japanese transport. On 15 June they again sank another transport, the Hidachi-maru, and on 30 June some of their torpedo boats raided Gensan. Despite these frequent appear¬ ances, they successfully eluded the Japanese warships, until on 14 August they were caught by the Kamimura squadron off Ulsan, Korea, while they were steaming southward. In the engagement which followed, the Rurik ,

one of the Russian cruisers, was sunk and two others were heavily damaged. The Vladivostock squadron then became entirely inactive.

The Russian cruiser Novik, which had escaped to Kiaochow from Port Arthur after the naval engagement on 10 August, was re¬ quested by the German authorities there to leave the port. In consequence she left Kiao¬ chow and for some time her whereabouts was unknown. It was later found that she was pro¬ ceeding toward Vladivostock by a roundabout way on the Pacific. The Japanese cruisers Tsushima and Cliitose at once gave chase and, overtaking her at Korsakoff, in Saghalien, com¬ pletely disabled her.

The Battles of Liaoyang and of the Shaho. — The first goal of Japan's Manchurian armies was Liaoyang. As the different armies approached it there arose the necessity of estab¬ lishing headquarters, which should control and direct their movements. Thus, on 24 June, the headquarters of the Manchurian armies were created with Marshal Oyama as the head and General Kodama as chief of the staff. They left Tokio for the front on 6 July. In the meantime, General Kuropatkin, commander-in- chief of the Russian armies in Manchuria, had his headquarters between Liaoyang and Muk¬ den, and was trying to check the advance of the Japanese armies. At the beginning of August, Japan's First Army was at Yushu- lingtsz and Yangtzling, the Second at Haicheng and the Fourth at Tohmucheng. Marshal Oyama made the First Army the left wing, the Fourth Army the centre and the Second Army the right wing, and ordered a general advance on Liaoyang, so that by about 23 or 24 August the Japanese armies found

themselves in the vicinity of Liaoyang. Confronting them the enemy had Lieutenant-General Stackelberg with three army corps opposed to the Second and Fourth Japanese armies, Lieutenant-General Ivanoff with two army corps opposed to the First Army, and General Kuropatkin with all the reserve forces stationed outside Liaoyang, besides providing a flying column to meet a flanking attack. On 25 August the Japanese right wing opened fire on the Russians, and steadily defeating them pushed forward until on 1 and 2 September it occupied positions be¬ hind Liaoyang. In the meantime the Japanese Central Army and left wing also operated against the enemy. They dislodged him from his positions at Anshantien and Sheushampao one after another, and hotly pursuing pressed on Liaoyang. It was originally the plan of the Russians to rendezvous their retreating troops at Liaoyang, but due to the hot pursuit of the Japanese armies much confusion occurred among the Russians, and a great army, prob¬ ably 250,000 strong, fled northward. Bv 4 Sep¬ tember the Japanese armies completed the occu¬ pation of Liaoyang. The Japanese armies in this fight probably numbering 200,000. In this engagement the Japanese casualties were roughly estimated at 18,000 and those of Rus¬ sia at more than 25,000.

The news of the Russian defeat at Liao¬ yang caused consternation at Saint Petersburg, and at a conference held before the throne loud were the voices condemning General Kuropatkin. The result was that General Grip-enberg, who had always been on bad terms with

Kuropatkin, was appointed commander of the Second Russian Army. Moreover, Kuropatkin was constantly urged to go to the relief of Port Arthur. In these circumstances Kuropatkin decided to take the offensive with the view of wiping out the disgrace he had sustained at Liaoyang. He led a great army southward and the battle of the Shaho ensued.

On that occasion the Russians marched against the Japanese positions by three different roads. On 9 October General Stackelberg, at the head of two army corps, attacked the Jap¬ anese right wring. This was the beginning of the great battle which continued to be fiercely fought in all directions until the 15th, there being some minor engagements till the 17th. Everywhere the Japanese were victorious and the Russians fell back in the direction of Muk¬ den by taking three roads to the east of the railway.

After the battle of the Shaho the Japanese Manchurian armies remained inactive for some time, taking no step other than checking the advance of the enemy in the direction of the Shaho. Their intention was to wait for the

fall of Port Arthur and join General Nogi's army to themselves, so that they might advance north¬ ward en masse and inflict a crushing defeat on the enemy.

The Fall of Port Arthur. — Since the first general attack made on 19 August the invest¬ ing army of Port Arthur made altogether four general attacks on the fortress before 26 No¬ vember. But every time the Russians offered a stubborn resistance, causing great losses to the Japanese. There is a hill known as the 203-metre hill at the northwestern extremity of the line of fortifications behind Port Arthur. It is the highest hill at the back of the fortress and from its summit the whole view of the harbor and town can be obtained. For this reason the hill is the key to the fate of the fortress. On the occasion of the second general attack the First Division attacked it with all its might for four consecutive days and nights, but failed to take possession of it after having lost heavily in its fighting strength. From 27 November the investing army again made an¬ other attempt to capture it, concentrating all the fires of its artillery and hurling column after column against it. A most fierce and bloody hand-to-hand fighting resulted, and at last dur¬ ing the night of the 30th a detachment of Jap¬ anese succeeded in carrying the hill. On the following day, however, the Russians returned to a counter-attack in great force and innumer¬ able were the casualties on both sides. So heavy indeed were the losses that the sides of the hill were literally covered with the killed and wounded, and in order to recover them the parlementaires from the opposing forces met and arranged for a partial armistice.

After the killed and wounded were removed fighting was resumed with redoubled fury. It was only on 5 December that the Japanese suc¬ ceeded in repulsing all the counter-attacks of the Russians and completing the occupation of the 203-metre hill.

When the 203-metre hill fell into the hands of the Japanese the fate of Port Arthur was practically sealed. Establishing a watchtower and mounting heavy cannon on its summit, the Japanese army bombarded the enemy's warships

in the harbor day after day which, without hav¬ ing any shelter to protect them, were easily hit and sunk one after another. The Sevastopol and some other vessels, which had escaped be¬ yond the range of cannon, were attacked with torpedoes and completely . disabled, and by 11 December the Russian Pacific squadron was annihilated. Then the Tungk ikwanshan Fort was taken by the Japanese on the 16th, the Frhlungshan Fort on the 28th and the Sung- shushan Fort on the 31st.

By this time the Russian garrison found itself in the last extremity of

distress. Its store • u°°d and ammunition was almost exhausted, it had no place to take in the wounded and sick, and its combatants were nearly worn out, due to unceasing fighting, with scarcely enough strength left to take up arms. In these cir¬ cumstances General Stoessel saw no other way but to surrender. On 1 Jan. 1905, he sent a parlementaire to the Japanese army in order to negotiate terms £>f surrender. General Nogi, commander of the investing army, accepted the request and commissioned Major-General Ijichi, chief of his staff, to meet and discuss the terms of surrender with the Russian commis¬ sioner on the following day at Sinshiying. At this meeting the terms of surrender were agreed upon and signed by both commissioners. After all the fortifications and other military equip¬ ments had been duly delivered by the Russians into the hands of the Japanese, on 5 January General Stoessel came out of the fortress and met General Nogi. Previous to this, the em¬ peror of Japan, on hearing of the capitulation of the Port Arthur garrison, magnanimously desired that, in appreciation of General Stoes- sel's arduous services for the sake of his country, he should be accorded all the honors of war. In consequence, General Stoessel and 536 officers were allowed to wear arms and return to Russia under obligation not to take part again in the present war. General Vock and a number of officers, however, refused to be re¬ leased on parole, and were consequently sent to Japan as prisoners of war. Altogether 40,243 officers and rank and file were made prisoners of war.

Thus Port Arthur fell, and in consequence the blockade over the coast of Liaotung by the Japanese navy was discontinued and a Naval Admiralty was established at Port Arthur with Vice-Admiral Shibayama as commander, and on 15 January General Nogi made the formal entry into the fortress.

The Battles of Heikautai and of Mukden. — The Russian defeat at Liaoyang and the fall of Port Arthur made a great impression on European Russia. Russia, which had enjoyed the fame of being a great military power, must inflict at least one defeat on the Japanese in order to save her face. It was at this time that General Kuropatkin saw that the strength of the right wing of the Japanese Manchurian armies, which were stationed in the direction of Heikautai, was comparatively weak. Here was a chance to score a victory. So General Kuropatkin ordered General Gripenberg to cross the Hunho and commence forward opera¬ tions against the right wing on 23 Jan. 1905. Lieutenant-General Tachimi, who was com¬ manding the Japanese troops at Heikautai, con¬ fronted him and the battle was opened on the

26th. It was fought for three consecutive days and nights, and yet the fortune of war remained undecided. On the 29th all the Japanese regi¬ ments, determining either to drive off the Rus¬ sians once for all or be annihilated in the attempt, made a most fierce attack, and despite great losses caused by machine-guns pushed forward and on the following morning at last succeeded in compelling the enemy to retreat.

After the defeat at Liaoyang the Russians had been gradually concentrating their strength at Mukden, where they assidously prepared defense-works and attempted to check the ad¬ vance of the Japanese toward the north. In the meantime the Japanese army was also greatly augmented, due to the joining of the Third Army after the capitulation of Port Arthur and that of the Yalu Army under the command of General Kawamura. Marshal Oyama now saw the opportune moment had arrived to take Mukden and ordered a general advance on the enemy's lines centring on Mukden. His gen¬ eral plan was: the central, left and right armies were to essay a frontal attack on the enemy by disposing themselves between Penh- siku in the east and the left bank of the Hunho in the west ; the Third Army was to be in the left of the left wing and the Yalu Army in the right of the right wing, so that the one might be between the right bank of the Hunho and its left bank and strike at Mukden from the northwestern direction by taking a round¬ about way, while the other might work in con¬ junction with the right wing from the direction of Hsingshing, attack the enemy in the direc¬ tion of Hsingshing and capture at one blow both Mukden and Fushun. This plan was faith¬ fully and excellently carried out. The mem¬ orable battle was opened 19 February. The ex¬ treme right wing of the Japanese armies pushed northward after occupying Chinghocheng, pressed on the left bank of the Hunho and, occupying the entire neighborhood of Fushun by 10 March, drove off the enemy in that region northward. The Russian casualties in this direction were not less than 20,000, while those of the Japanese were only some 3,800. As for the extreme left wing, it commenced operations on 27 February, and advancing from the west toward the northwest emerged in the rear of the enemy, and while the Japanese central, left and right armies were still confronting the Russians along the Shaho, was menacing Muk¬ den itself with the railway line between it and the city. These prompt actions of the Japanese two extreme wings greatly contributed to vic¬ tory, for the Russians, already hard pressed in front, were thrown into utter confusion, find¬ ing themselves attacked from the rear. By 11 March the Russians in the direction of the Shaho retreated to the right bank of the Hunho in disorder, and either by being hotly pursued or being surrounded, lost heavily. So great was the Russians' defeat indeed that in the direction of the Shaho their casualties were over 90,000. On the 15th Marshal Oyama made the formal entry into Mukden, and the office of the Tartar- General of the city was made

the seat of his headquarters. The battle of Mukden was prob¬ ably one of the greatest battles since history began, its battle line having extended to more than 125 miles, while the armies confronting

each other numbered probably 450,000 on the Russian side and 350,000 on the Japanese side. After that battle the Japanese armies continued the pursuit of the retiring Russians, and Tieh- ling, Kaiyuan, Changtu and other places fell into their hands one after another.

The Battle of the Japan Sea. — When Port Arthur was completely isolated, Russia organ¬ ized a second Pacific squadron with the purpose of relieving it. Led by Vice-Admiral Rojest- vensky, it left Libau for the Far East on 16 Oct. 1904. The squadron was divided into two divisions, one of which voyaged round Africa, while the other passed through the Suez Canal. They joined again at Madagascar on the day on which Port Arthur capitulated. In April 1905 it stopped at different ports in French Annam, one after another, and on 5 May was joined by a third Pacific squadron commanded by Rear-Admiral Nebogatoff. As Port Arthur had already fallen, the Russian fleet steamed northward with the purpose of entering Vladi- vostock. Admiral Togo, commander-in-chief of the Japanese fleet, anticipated that the enemy's fleet would attempt the passage of the Straits of Tsushima, and calmly waited for its coming, having concentrated all his naval strength at the base of operations. At 5 a.m. on 27 May he received a wireless telegram saying that the enemy's fleet was sighted. He at once issued orders to different detachments of warships to sally forth and meet the enemy according to a prearranged plan. At 2 p.m. on the same day the opposing fleets confronted each other to the north of Okinoshima Island. Admiral Togo hoisted on the masthead of his flagship, Mikasa, a signal saying : «The fate of the Empire depends on the issue of this battle. All are expected to do their best? At 2.08 p.m. the enemy opened fire, but the Japanese fleet refrained from responding until the range be¬ came less than 6,000 metres. Then it opened fire. It was both fierce and effective, and in a short time, beginning with the Oslabya, which led the enemy's fleet, and the flagship, Kniaz Suvaroff, most of the Russian warships were either sunk or disabled, and when darkness- set in the Japanese destroyers and torpedo- boats made daring attacks on the still remaining vessels of the enemy. On the following day the Japanese fleet succeeded in intercepting five Russian vessels, which were trying to escape northward. Rear-Admiral Nebogatoff, who commanded this detachment of the Russian fleet, saw the utter futility of resistance and sur¬ rendered. As for Vice-Admiral Rojestvensky, he was found on board a captured destroyer in a seriously wounded condition and made a prisoner of war. Of the 38 vessels which had attempted the passage of the Straits of Tsu¬ shima 20 were sunk and five were captured by the Japanese, and only four cruisers and a few destroyers and transports made good their es¬ cape. Thus it is no exaggeration to say that the Second and

Third Russian Pacific squadrons were practically annihilated. In contrast to this overwhelming loss sustained by Russia the Japanese losses consisted of only three torpedo- boats.

Thus Russia lost on land Liaoyang, Port Arthur and Mukden, while on sea the First, Second and Third Pacific squadrons. The issue of the war was now clearly decided.

JAPAN

First Landing of Americans in Japan, July 14, 1853

SCENE ON THE BAY OF YEDDO, JULY 11, 1853 Lieutenant Bent in the " Mississippi's " Cutter Passing Through a Fleet of Japanese Boats

i

JAPAN

JAPAN

American Sailors in the Temple Grounds, Simoda, July 8, 1854

JAPAN

1 ftroup of Figures at the Annual Celebration of the Worship of the Dead

2 Altar at the Ceremonial of the Worship of the Dead

JAPAN — DIPLOMATIC RELATIONS WITH UNITED STATES (22) 735

The North Korean Army. — For some time after the outbreak of the war Japan stationed only small garrisons at different places in Ko¬ rea, blit in view of frequent raids made by the Russians into the northern province of Ham- gyong, headquarters of the Japanese troops in the peninsula were established at Seoul in the summer of 1905, with Lieutenant-General Miyo- shi as commander-in-chief. The North Korean Army thus organized for the first time occupied the important town of Kyong-syong on 20 June and steadily advancing northward cleared the Pu-ryong and Pu-peuk districts of the enemy by 24 July, and occupying Ivyong-heung, a town on the frontier of much strategical importance, was in a position to menace Vladivostock.

The Subjugation of Saghalien. — Not long after the battle of the Japan Sea a Saghalien expeditionary army was organized with military and naval contingents under the command of Lieutenant-General Haraguchi. On 4 July 1905 a squadron commanded by Vice-Admiral Ka- taoka left Otaru escorting a number of trans¬ ports with troops on board. On 8 July the

Japanese occupied Korsakoff without difficulty and advancing further north occupied Alex- androvski on the 24th, and on the 30th Lieu¬ tenant-General Haraguchi proclaimed military administration over the whole island. On the same da}r the Russian military governor of the island asked for an armistice, and on the fol¬ lowing day the Japanese and Russian commis¬ sioners met to discuss the terms of surrender. The Russians agreed to Japan's terms, and 3,270 officers and men surrendered. In this way Saghalien was subjugated in three weeks.

Since the outbreak of the war Japan had won every battle on land and sea. Especially the great victories of the battles of Mukden and of the Japan Sea placed her in a most favorable condition as to the ultimate issue of the war. It was at this time that President Roosevelt of the United States urged the two combatants to lay down their arms. After duly considering different aspects of the situation, the Japanese government concluded that it was wise to listen to the friendly advice of President Roosevelt. On 3 July 1905 Baron Jutaro Komura, Min¬ ister for Foreign Affairs, and Mr. Kogoro Takahira, Japanese Minister at Washington, were appointed plenipotentiaries for negotiating the terms of peace with Russian plenipoten¬ tiaries (M. Witte and Baron Rosen). The peace conferences, held at Portsmouth, U. S. A., in the latter part of August, arrived at a satisfac¬ tory conclusion and the treaty was signed by the plenipotentiaries of both parties on 5 Sep¬ tember. See Portsmouth, Treaty of.

Tokiwo Yokoi.

22. DIPLOMATIC RELATIONS WITH THE UNITED STATES.— Since the close of the 19th century, Japan, which was intro¬ duced to intercourse with the world by the tact¬ ful American expedition of 1853-54, and with which the United States has had recently more points of contact than with any other power except Great Britain, has occupied second place in American diplomatic relations. The earlier importance of friendly relations with Japan, which was first visited by an American vessel (the Elisa of New York) at the port of Nagasaki in 1797 and again in 1803 in unsuc¬ cessful attempts to open trade, was greatly in¬

creased by the American discovery of valuable whale fisheries near the Kurile Islands, fol¬ lowed by the imprisonment of ship-wrecked American seamen on the Japanese coasts from which foreigners were excluded by a hermit policy. The importance of closer relations was especially emphasized more strongly by the negotiation of a treaty with China in 1844 and the acquisition of California in 1848, resulting in plans (by 1851) for a trans-Pacific line of steamers. The earliest plans to open trade by an expedition under government auspices, first proposed by Captain Porter in 1815, were never executed. In 1832 President Jackson, recog¬ nizing the need of ports

in the Far East, sent Edmund Roberts as a confidential agent to several countries of that region, including Japan, with instructions to negotiate treaties to secure the safety of seamen and commerce, but Roberts did not proceed beyond Cochin China. Later hopes of an opportunity to find a way for the beginning of friendly relations were disappointed by the failure of friendly private attempts to return some shipwrecked Japanese in 1837, and again in 1845, and by the later unsuccessful efforts at peaceful negotia¬ tions to open trade relations through Commo¬ dore Biddle of the American Navy Department . in 1846.

In the growing trade with China after 1844, the superiority attained by American ˆclipper® ships by 1845, the development of American in¬ terests on the Pacific Coast after 1848, and the increasing importance of accessible harbors for supplies and refuge for American trading and whaling vessels, the American govern¬ ment found new subjects for diplomatic efforts in the Pacific and good reasons for urging the opening of intercourse with Japan. Its purpose after 1848 to guard more vigilantly American interest in the Pacific was indicated by negotia¬ tion of the first treaty with Hawaii in 1849 and also a treaty with the Sultan of Bruni in Borneo in 1850; and its determination incidently to resist more strenuously the Japanese policy of strict Oriental isolation and exclusiveness which provoked American enterprise (else¬ where so successful in mastering opposition) was illustrated in 1849 by the peremptory de¬ mand of Commander Glynn for the immediate release of 16 American prisoners — a demand to which the Japanese officials acceded after failure to evade it by successive strategic manoeuvres, first by threats of offensive opera¬ tions, then by haughty indifference and finally by evasive diplomacy. In 1851, the American government, influenced by Glynn's enthusiastic suggestions and proposals for conversion of the Japanese policy, decided upon another friendly appeal for access and supplies for trading ves¬ sels, through instructions to Commodore Aulick whose powers were transferred (in November 1852) to Commodore M. C. Perry.

Without use of force, but by exhibition of American power through ships and inventions, Perry in March 1854 negotiated the first treaty of Japan with a western power — a treaty which, regarded as a marked American success, pro¬ vided for peace, amity, trade and supplies at the ports of Shimoda and Hakodate, protection to shipwrecked sailors and ships in distress, consular residence at Shimoda, and most- favored-nation treatment. From the expedi¬ tion and the treatv Japan dates its new birth —

a fact recently recognized by the erection of c monument to Perry in 1901.

For over half a century, with only a brief exception, relations continued mutually friendly.

Townsend Harris, who was commissioned consul general in September 1855 and established his residence on the Bay of Yedo at Shimoda which had been opened to American commerce by Perry's treaty, soon found that the opening to foreigners, accepted as inevitable by the government, was resisted by the people who were unwilling to receive the ((western barbar-iansT In the disorder which resulted in the period of readjustment, while other nations held the weak and tottering Japanese government to the strictest accountability, he refused to sanction harsh and oppressive measures. But, though interested in Japanese welfare and op¬ posed to taking any unfair advantage of Japanese ignorance of international relations, he firmly and skillfully ripped open the laminated deception of the Japanese diploma¬ tists and succeeded in obtaining all the conces¬ sions which became the basis of new treaties negotiated at Yedo in the American spirit of justice and tolerance — treaties which secured commercial rights and laid the foundations of diplomatic intercourse. By a treaty negotiated 17 June 1857 he secured rights of permanent . residence at the two open ports, the. opening of an additional port at Nagasake, residence of a vice-consul at Hakodate, and extraterritoriality. On 29 July 1858, having secured right of audi¬ ence, he negotiated the third important Ameri¬ can treaty providing for mutual diplomatic representation at the national capitals, three new ports, extension of the jurisdiction of consular courts, full religious freedom and privileges to Americans, and regulation of cus¬ toms (subject to revision after five years if desired by Japan). Ratifications were ex¬ changed at Washington with appropriate cere¬ monies in 1860 by a special Japanese embassy which aroused public interest. In recognition of his services, in January 1859 Mr. Harris was commissioned minister resident, a position which he held until April 1862.

The American policy of separate action and respect for Japanese sovereignty — a policy consistently maintained except in emergencies created for a brief period by Japanese foreign agitation and internal disorders — increased Japanese confidence and facilitated diplomatic relations.

Unfortunately Japan, under the influences of the misfortunes which had overwhelmed China, and against the prudent policy counselled by the American representative, sought to tem¬ porize in the face of apprehended dangers, but gradually yielded to foreign demands. Thus it was forced to grant extraterritoriality, under which foreign consuls set up miniature courts involving the unfortunate natives in technical violations of their edicts,. and to submit to foreign demands for tariff concessions, for various exemptions (from land taxes, tonnage and lighthouse dues, and bridge

tolls) and for monopoly of coastwise trade. Tfie tariff con¬ cessions later involved the country in financial distress, resulting from the burden of taxes on agricultural interests which produced detesta¬ tion for the government and disdain for foreigners.

Even while Harris was serving as American

minister conservative opposition to the treaty concessions produced an anti-foreign agitation, incidentally resulting in the assassination of Harris' secretary, the burning of the American legation and the compulsory withdrawal of American representatives from Yedo.

After 1863, as a result of the necessity of chastening the reactionary feudatory Japanese prince of Choshiu who in defiance of the Ty¬ coon had closed the Shimonoseki straits, the American government adopted a new rule of practice in regard to international relations. Harris' successor, R. H. Pruyn, in concert with representatives of other governments de¬ manded the observance of treaties and in Janu¬ ary 1864 negotiated a treaty reducing duties. In his period as minister, occurred the revolt against the Shogun, who represented the legal government. It culminated in the attempt by the rebellious daimio of Nogato to close the straits of Shimonoseki, an act which resulted in an expedition of allied fleets in which vessels of the United States, participated. Following the action of the reactionary lord of Choshiu in firing on American and other foreign ships in Shimonoseki Strait, the United States govern¬ ment acted in connection with governments of other powers (Great Britain, France and the Netherlands) in bombarding Shimonoseki forts and in exacting indemnity (1864), in securing at Osaka (in November 1865) the Imperial section to the existing treaties, and in nego¬ tiating a concerted international treaty (of June 1866) securing more liberal trade privi¬ leges and a regulation limiting duties at 5 per cent during the pleasure of the treaty powers but providing for revision within a specified time by concert of the powers — a regulation which proved burdensome to Japan. Religious tˆeJ"ation largely secured through the firmness of the American minister Van Valkenburg and his successors between 1868 and 1874 was later sanctioned by the Constitution of 1889.

Following the revolution which resulted in the establishment of the emperor's government at Tokio, Japan made unsuccessful efforts to negotiate for a reconsideration and revision of burdensome treaty relations with a view to securing autonomy, to take effect after 1872. rhese efforts were made, first through the foreign ministers at Tokio, and later (1871-72) through a Japanese embassy of five eminent men which was sent to visit foreign capitals but found no hope of concessions except at \ ashington. Then, encouraged especially by the friendly liberal spirit of the

United States, the awakened nation began the task of reaching a high national standard which would be recog¬ nized by the treaty powers. The first step was taken by increasing the number of young Japanese students sent abroad for education, and by increasing travel abroad by Japanese of maturity to observe the ways of the western world. The progressive results appeared in the establishment of a system of diplomatic re¬ ceptions at Tokio in 1872, the adoption of the Gregorian calendar in 1872, the creation of provincial assemblies in 1875, followed in rapid succession by codes of laws, compulsory uni¬ versal education, a constitution, and a national parliament.

Meantime several incidents indicated the growth of mutual confidence and friendship between the United States and Japan. In

. . :

COMMODORE PERRY MEETING THE IMPERIAL COMMISSIONERS OF JAPAN, JUNE 8, 1854

.

.

undertaking the annexation of the Lu Chu Islands in 1872, Japan recognized the Perry Treaty with the islands which had been pro¬ claimed by the American government in 1855. An interesting question of jurisdiction over the Bonin Islands on which Americans had estab¬ lished a small colony in 1832, and over part of which Commodore Perry had established a claim by occupation in the name of the United States in 1853, was satisfactorily settled in 1873 by the decision of the American govern¬ ment (Secretary Fish) not to support a claim which had no sanction of the American con¬ gress. In the postal convention of 1873, the United States again manifested confidence, and recognized Japan's ability and right, by sur¬ rendering to the Japanese government the control of its mail system. In 1883 the Ameri¬ can government gave another evidence of good will and sense of justice in the courteous re¬ turn to Japan of the American portion of the Shimonoseki indemnity of 1863, whose remis¬ sion had been sought by Japan in 1874, and at least two-thirds of which was popularly re¬ garded as shameless extortion. It also gave another evidence of fairness by an apology for the action of Commander Selfridge who vio¬ lated the sovereignty of Japan by firing at a target on Japanese shores.

With each new progressive step the Japanese government increasingly felt

the irk¬ someness of the disabilities imposed by treaties which could be terminated only by concerted consent of all the treaty powers. The question of the revision and reformation of her treaties with foreign powers overshadowed all others.

The American government, which, although it had recognized the earlier need of unity of policy by the treaty powers, had never fully approved the continuation of the treaty provi¬ sions for extraterritoriality and tariff restric¬ tions, sympathized with the long continued efforts for treaty revisions so much desired by Japan to remove a badge of inferiority which earlier necessary treaty arrangements had im¬ posed and was the first foreign power to favor revision. In 1875 it adopted an independent course by negotiating a treaty conceding cus¬ toms autonomy and the right to regulate the coasting trade, but not operative until Japan could induce other treaty powers to negotiate similar treaties. Following this treaty the Jap¬ anese in 1879 demonstrated their high regard for America by the friendly welcome and re¬ ception by government and people to ex-President Grant, who visited Japan in that year and was entertained in regal state at one of the Emperor's private palaces at Tokio.

Efforts, failing to obtain concessions from the other powers, unsuccessfully renewed in 1882, began to make some progress in a joint diplomatic conference at Tokio in 1886-87, but not enough to satisfy Japan. Meantime, begin¬ ning in 1879, the United States faithfully obeyed Japan's quarantine regulations which were ignored by other powers. In 1880, it negotiated a convention for reimbursing shipwreck ex¬ penses and in 1886, following a voluntary act of international comity by the Japanese govern¬ ment in the arrest and surrender of an Amer¬ ican criminal who had sought asylum in Japan, it negotiated with Japan an extradition treaty which gave support to Japan's efforts toward judicial autonomy and complete sovereignty.

Finally through the amazing results of a war, which arose in 1894 against China con¬ cerning the control of Korea, Japan won the recognition of her rights as a world power — promptly accorded in a treaty with Great Brit¬ ain • — which, then diplomatically isolated from the other European powers, promptly sought an alliance to protect interests of the Far East from possible result of an alliance of Russia, Germany and France. Following the comple¬ tion of the British treaty, the United States in 1894 quickly ratified and proclaimed a treaty, ef¬ fective in 1899, setting an example for the prompt action of the other powers and result¬ ing in a general agreement, effective in 1899, terminating extraterritoriality and providing for realization of complete tariff autonomy by 1911, thus

recognizing Japan as a peer among the great powers — the final step of a series in which the United States had always taken the initiative.

The recognition of the accomplished modern¬ ity of Japan was followed by new diplomatic evidence of friendliness, and by an increase of pleasant social relations resulting from increase of travel and trade, and marred only occasion¬ ally by discord or dissatisfaction. In 1897, at the invitation of the American government, Japan and Russia agreed to send delegates to meet those of the United States at an interna¬ tional conference with a view to the protection of the fur seals of the North Pacific which, under existing regulations, were threatened with extinction. The conference drafted and signed a treaty which was made operative con¬ ditional upon adhesion of Great Britain. The regulation of the industry was finally made ef¬ fective by the negotiation of a treaty of 1911 to which Great Britain was also a party. In 1898, when the United States annexed Hawaii to which there had recently been an influx of sur¬ plus Japanese population, the Japanese govern¬ ment, apprehensive that the act would disturb the balance of power in the Pacific, and might jeopardize the rights of Japanese citizens resid¬ ing in Hawaii, expressed its disappointment in a surprising formal protest which, however, was soon withdrawn. It made no protest against the American annexation of the Philippines, and it supported the American principle of the (

the period of hostilities between Japan and Russia, Secretary Taft and party, briefly stop¬ ping in Japan received an extraordinary ovation. America, although it could have interfered under treaty provision to maintain the independ¬ ence of Korea, ignored the private appeals of the Korean emperor, and placed no obstacle to Japan's domination there. In 1906 both coun¬ tries raised their legation to embassies. In 1908 by an exchange of notes they committed themselves to a policy of existing status quo in the Pacific and China and to the principle of equal opportunity of communication and indus¬ try in China.

In the period from 1897 to 1908, treaties were negotiated providing for extension of ex¬ tradition (1906), for protection of patents (1897), and copyrights (1905 and 1908), and for arbitration of legal and treaty differences (1908, renewed in 1913).

Meantime, however, the character of rela¬ tions was radically changed by events of the decade before 1908. After 1906, friction and strained relations were threatened by two groups of questions: (1) those relating to

Japa¬ nese emigration to America, and anti-Japanese agitation or legislation on the Pacific coast; and (2) those relating to American-Japanese riv¬ alry in Asia and the Pacific (including the coasts of Latin America). An anti-Japanese movement in California, originating in eco¬ nomic and social differences and becoming more pronoumced by the rapid increase of Japanese immigration after 1906, culminated in a violent agitation (in 1906-07) for exclusion of Japa¬ nese laborers under a regulating clause of the treaty of 1894, and placed the Washington gov¬ ernment in a very uncomfortable situation. A crisis was averted (in 1907-08) through ex¬ change of notes resulting in an agreement for restricting through the Japanese passport sys¬ tem the emigration of Japanese to the United States.

Closely related to this agitation, and even a more dangerous element in threatening a diplo¬ matic crisis was the ordinance of the San Fran¬ cisco Board of Education, issued in the autumn of 1906, requiring segregation of Japanese, Chi¬ nese and Korean children in an Oriental school. This measure was later essentially modified through the influence of President Roosevelt who disapproved it and co-operated with the Japanese government in reducing the agitation by the friendly informal understanding of 1907-08 under which Japan undertook, by refus¬ ing passports, to restrict emigration of laborers to the United States — thus meeting the Califor¬ nia demand and at the same time saving Japa¬ nese pride.

In 1907 the President under authority of the Immigration Act of that year, excluded from continental territory of the United States, per¬ sons having passports for American insular possession, for the canal zone, or for other countries. In a new treaty of 1911, supple¬ menting that of 1894 and omitting the clause in regard to the regulation of immigration of la¬ borers, Japan agreed to maintain the limitation of emigration of laborers as exercised in the preceding three years.

Relations were again strained in 1913 by proposed legislation in California for prevent¬ ing certain classes of aliens from holding lands

in the State. Tihe legislation as passed was materially modified by permitting agricultural leases — following a conference of the Governor with Secretary Bryan who was sent to Cali¬ fornia by President Wilson to present views on the international question involved and the Washington government maintained that as modified, although it reflected local economic competition, it preserved all rights under the treaty of 1911; but it was still regarded by Japan as an act involving unjust racial discrimi¬ nation.

Perhaps the crux of the Japanese question in the United States is naturalization — to prevent discrimination. The question of the position of Japanese already lawfully residing in the United States — an issue distinct from immi¬ gration — has proved most perplexing. Al¬ though, under treaties they have had the rights of citizens of the most favored nation, they have been ineligible to citizenship and, beyond rights protected by treaty, have been at the mercy of unfriendly legislatures restricting their privi¬ leges. With a view to settlement of the ques¬ tion, in December 1906, President Roosevelt recommended to Congress the enactment of a law specifically providing for naturalization of resident Japanese who might desire American citizenship; but the time was inauspicious for consideration of the question. Rightly or wrongly, Japan thinks that inasmuch as she has shown herself conciliatory and accommo¬ dating in the matter of immigration, <(it should be the duty of the authorities and leaders at Washington to make honest efforts to extend citizenship to the Japanese now here and thus shield them from the whimsical legislation of the various States® which if not curbed may eventually produce a most critical situation.

The character of relations has also been changed by the development of many new points of contact since 1898, and especially since 1905. Relations were especially affected by the completion of the Isthmian Canal which placed the United States nearer than Japan to the western coasts of Mexico and South America, and closer to Japanese doctrine in regard to the control of Asia. The overflow of surplus land¬ less Japanese population, which after 1905 found an outlet in Korea, has started a migratory movement across the Pacific to undeveloped Latin America — especially to Mexico, also to Peru and Chile, and even to Brazil — which will doubtless increase greatly in volume, and may in time provoke agitation and alarm among the native populations, and possibly result in condi¬ tions inducing the Japanese government to threaten the use of force to protect its subjects, and thus compel the Latin American govern¬ ments to appeal to the United States for protec¬ tion under the Monroe doctrine. In 1912, ap¬ prehension of Japanese plans to purchase Mag¬ dalina Bay on Mexican territory of Lower Cali¬ fornia for a harbor and a Japanese colony caused the proposal of a new corollary of the Monroe doctrine known as the Lodge resolu¬ tion, which passed the Senate by a vote of 51 to 4 but was not accepted by President Taft.

Restriction on Japanese emigration to the western coast of the Pacific will impel them toward the islands and coasts of the Far East. Their desire for islands was indicated by their recent demand (in November 1918) for reten-

tion of the Caroline, Ladrone and Marshall groups, in which they supplanted Germany at the opening of the recent World War. Toward Hawaii, in which there is a large Japanese pop¬ ulation, Japanese jingoes, disappointed by the American annexation of 1898, still entertain ambitions not reconcilable with American in¬ terests — although there is no evidence that their irrepressible chauvinism is shared by re¬ sponsible statesmen at Tokio. Toward the nearer but tropical, thickly settled Philippines, in which there is no large Japanese population, but a discordant population possibly of distant kin, Japanese imperialists and ardent expansion¬ ists after the close of tihe Russo-Japanese war turned their awakened thought in favor of trop¬ ical colonies, and perhaps they may be the ad¬ vance guard of future Japanese policy on a question possibly not yet completely settled in American policy. Probably Japan does not at present covet the Philippines, but wants there only economic privileges such as she has en¬ joyed equally with all nations.

Toward China, concerning which before 1905 there was complete harmony of American- Japanese interests and policy, Japanese policy since 1905 (has changed, in accord with a claim of "natural liberators and protectors of China from servitude to Europeans,® and as a result of increasing American-Japanese commercial competition in the Pacific and Far East. After the close of the war against Russia, fought single-handed, and professedly in support of an open door policy, Japan, confronted by a re¬ sumption of the Russia policy of encroachment on China, fearing the failure of any further contest to secure more decisive results, and especially apprehensive of German designs, sur¬ prised the United States and the world by nego¬ tiating a friendly agreement of alliance with Russia in 1916 as a means of security in the development of Japanese enterprise in Man¬ churia. By this significant convention each party agreed not to "become a party to any arrange¬ ment or political combination® directed against the other, and to "act in concert on the meas¬ ures to be taken® in case of menace to the terri¬ torial rights or special interests of either in the Far East.

Japanese statesmen claim that the ((guiding factor® of the foreign policy of Japan — a coun¬ try over crowded and endowed with scant re¬ sources — is the ((instinct of self-preservation,® directed against menaces both from within and from without, and primarily expressed in plans for the solution of the Chinese question ("the molding of Asia's destiny®) but also in plans for conversion into a great commercial nation.

In the recent controversies between Japan and China, the United States did not become directly involved. Following the Japanese de¬ mands on China,

which were granted in large part by the China-Japanese treaty of 25 May 1915, t'he American government announced that it could not agree to any action which might impair American-Chinese treaty obligations, or the open door, or Chinese integrity. In 1917 it reached an agreement with Japan on questions relating to Japanese policy in China. Late in August 1917 a special Japanese mission armed with full power, headed by Viscount Kikujire Ishii arrived at San Francisco en route to Washington to secure better understanding

between the two countries, and to silence mischievous reports By an agreement of 2 November between Secretary Lansing and Viscount Ishii, the United States government, consistent with the principle of the Monroe doctrine, recognized that Japan by territorial propinquity had special interests in China, and obtained from Japan a recognition of the prin¬ ciple of the open door and a denial of any pur¬ pose to infringe in any way on the independ¬ ence or territorial integrity of China. Although the recognition of special Japanese interests conceded no right or authority over the destinies of the Chinese peoples and was joined with the guarantee of China's independence and integrity, and although the pact was justified by China's feeble condition as a sovereign state, the Chi¬ nese government made a formal protest stating that it <(will not allow itself to be bound by any agreement entered into by other nations® in which it had no part. The Chinese were too much engrossed in civil strife to see that the American recognition of Japanese special inter¬ ests was really a recognition of an Asiatic Monroe doctrine — an American recognition of a real Japanese analogue to the Monroe doc¬ trine.

Bibliography — Callahan, J. M., (American Relations in the Pacific and the Far East) (1901) ; Coolidge, A. C., (The United States as a World PoweU (new ed., New York 1917) ; Curtis, W. E., (The United States and Foreign Powers) (1892) ; (Foreign Relations of the United States) (1861 —) ; Foster, J. W., Amer¬ ican Diplomacy in the Orient } (1903) ; John¬ son, W. F., American Foreign Relations (1916) ; Kawakami, K. K., American-Japanese Relations* (1912) ; Kawakami, K. K., (Japan in World Politics* (1917) ; Malloy, W. M., (Treaties, Conventions . . . between the*

United States and other Powers) (1910) ; Mil- lis, H. A., (The Japanese Problem in the United States (1915) ; Moore, J. B., (Digest of Inter¬ national Law) (1906) ; Nitobe, Inazo, (Inter- course between the United States and Japan)*

(1891).

James M. Callahan,

Professor of History and Political Science, West Virginia University.

23. JAPAN IN THE WORLD WAR.

When in 1859 Japan emerged from her long iso¬ lation into international interests and affairs and became a trading nation, she made it her policy to keep open the paths of communication with Europe. It was with this idea that, immediately after the war in 1905, she sought peace and co¬ operation with Russia. One visible demonstra¬ tion of this desire is seen in the erection, by the two nations, of a handsome memorial at Port Arthur, in honor of the victims of the siege, both Muscovite and Japanese. Further¬ more, several treaties, amounting almost to an alliance, offensive and defensive, were made be¬ tween 1905 and 1914. Envoys of either country, visiting the capital of the other, were received with marked demonstrations of joy. Strenuous efforts were made in Japan to bend all energies to developing the resources of the empire, dur¬ ing the era of peace which was now expected to endure for a generation, at least. The invasion, in 1907, of Shantung province and the erection of a German colony and naval station with for¬ tress, garrison and railway penetration into the

interior of China, on which $100,000,000 have been spent, seemed to menace these plans. Yet few suspected at that time that this occupation would so soon breed complications. Like a sudden growl of thunder, while the sky was blue, portending a storm, came the news, in July 1914, of impending hostilities in Europe. As soon as war was declared by Germany against Great Britain, the ambassadors of the Entente Allied belligerents, then in Tokio, met to confer concerning the part, and the sphere, of Japan's operations in the war. In compliance with the terms of Article II of the Anglo-Japa- nese Alliance renewed in July 1911, Japan was ready. By exchange of notes between Tokio and London, it was agreed that Japan should take charge of naval matters in the eastern seas and make conquest of the German colonies in the Far East and the Pacific Ocean — the ques¬ tion of ultimate possession being left to the con¬ gress of nations after the war. According to Article XIII of the Constitution of 1889, ((the emperor declares war, makes peace and con¬ cludes treaties,® on 23 August Japan declared war against Germany. It was not expected that she would send an army to Europe, but she must eliminate Germany from eastern Asia and the Pacific islands. Virtually the whole guard¬ ianship of the area east of the Atlantic Ocean was put under her care, so that every available vessel owned by the Entente Allies, armed or unarmed, might be released for activities in western waters. The Red Cross Society of Japan acted with

promptness, and dispatched three relief corps of trained men and women, with remedies and surgical equipment ; the staff for England being 20, for France, 29, and for Russia, 13, these numbers being increased later.

The outbreak of the European War, in which Japan and Russia were now Allies, was the signal for intense activities, carried on night and day, in the arsenals and factories of Osaka and other cities. Artillery and munitions, espe¬ cially shrapnel shells, over a million rifles, boots, shoes, clothing and most of the requisites of an army in the field were made during the war and dispatched, by way of Vladivostok, to the front. It was these supplies that enabled the Russians to win signal advantages over the Ger¬ mans, just when the Allies were hard pressed at Verdun and along the western front.

The detailed program of co-operation be¬ tween Japan and the Entente Allies looked to the reduction of the strong German fortress at Tsingtau in China, the possession and occupa¬ tion of all German colonies in the Pacific, the clearing of the seas of German commerce-raid¬ ers, the convoying of French transports from China (with laborers) and Annam (with sol¬ diers), and the British and colonial ships, with troops from Australia, New Zealand and South Africa, and the sending of a fleet of destroyers to the Mediterranean. The successful execution of this plan resulted in the uninterrupted dis¬ patch of reinforcements to the western front, the freedom of commerce, assistance in putting down a mutiny at Singapore, and the release of nearly the whole of the Siberian army to aid the Russians in Europe on the western front. The disnatch of three divisions, with the block¬ ading fleet (20,000 men with 162 guns) under General Kamio, to Tsingtau, compelled the sur¬ render of that fortress on 7 Nov. 1914, and the

occupation of the German area in China, with a garrisoning force, was made under General Otani. One by one the German colonies in the Pacific were taken over by Japan and the seas cleared of raiders. The torpedoing of a Japa¬ nese destroyer in the Mediterranean and the landing of 80 corpses at Yokosha, for crema¬ tion, brought home the realities of war on the waters. The casualties suffered by the Japa¬ nese, down to 1 September 1915 totaled 3,000. One effect of the war, following rapidly, was the creation of a vast system of shipbuilding, which brought so great and sudden influx of wealth to Japan as to disturb seriously the social equilibrium and raise up a class of millionaires, who seemed to have the worst traits of the vul¬ gar new rich. With the distribution of this world's goods so uneven and the pernicious activities of speculators in food continuing, in spite of government's warning and a large im¬ portation of foreign rice, nation-wide food riots occurred in August 1918, on the very eve of the departure of the army of intervention. The upset of old

conditions in Russia, first by the revolution and then by the Bolsheviki, caused the accumulation at Vladivostok, over acres of area, of stores imported from Japan which it would require months to remove. To protect these stores from loot and deterioration the Japanese government ordered a small guard of marines to be landed. When, amid the turbu¬ lence in Siberia, several Japanese lost their lives the popular wrath at home flamed out. Hitherto it was the government rather than the people of Japan that was actively interested in the <(white man's war.® It was difficult for the average Japanese to see why the nations that had per¬ sistently refused admission of his countrymen to either their home lands or their colonies, should ask help from Japan. Why must Japa¬ nese make sacrifices to support a war in remote regions when taxes were already so onerous and the standard of life was kept low by mili¬ tary and naval burdens just when new wants were felt and fresh ambitions were awakening? With less than a score of submarines, very few aeroplanes and much of her armament made obsolete by the new applications of science, Japan could not, even if finances permitted and she was especially invited, send a large force to the western or other fronts, and Russia never called for aid in war. When, however, under the Bolsheviki regime, virtual anarchy in Si¬ beria and the release of 300,000 German prison¬ ers presented a menace that was nigh at hand, as well as of world import, both people and government in Japan were one in zealous read¬ iness for co-operation and intervention by the Allies in Siberia. After assurances given that Japan sought no territorial advantage, desired to keep friendship with the Russian people, and would abide by the ultimate decision of the Allies, three divisions were at once dispatched by way of Vladivostok, Korea and Manchuria under General K. Otani. Junction was promptly made with the Czecko-Slovaks, the Americans and other allied contingents. The United States Ambassador, Roland S. Morris, followed and held conferences with the heads of the pro¬ visional governments arrayed against the Bol¬ sheviki. The new cabinet in Tokio, under Kei Hara; premier, laying stress on friendship with Russia, disclaimed any idea of intervening in

*the domestic situation. Otani landed 19 August, *°ught a battle on 24 August, and by 5 Sept. 1918 had moved his army 420 miles and cap¬ tured Khabaravosk. By 12 September the allied forces entered Blagiovestchensk, capital of the Amur province. Chief of Staff Uyehara of Tokio, having telegraphed thanks and compli¬ ments to the American Colonel Morrow, the latter praised General Otani, declaring that ((the union of the Japanese and American armies will still more closely unite the friendly nations.® By 22 September the Japanese cavalry, having*

overcome the enemies' resistance, took pos¬ session of Rufulor and other points 300 miles farther. Consult Jones, (The Fall of Tsing- tau} (1915) ; Coleman, (Japan or Germany > (1918) ; Ozak; (The Voice of Japanese Democ- racy) (1918).

William Elliot Griffis, Author of (The Mikado's Empire?

24. RAILWAYS AND HIGHWAYS.— Railways. — Before Nationalization. — In De¬ cember 1867 the Tokugawa Government planned a scheme for the introduction of a railway sys¬ tem in Japan. But, unfortunately, the Restora¬ tion War broke out soon afterward and re¬ tarded every step of civilization. Shortly after the Restoration, the new government again took up the matter. At this time, however, it was very difficult to raise the necessary capital for any new enterprise, because both the govern¬ ment and the people were then very poor owing to the war. It was, therefore, after encounter¬ ing a hard struggle that the government suc¬ ceeded in creating the first railway bureau, on 19 March 1870, afterward making the decision to construct a line between Tokio and Kobe (now the Tokaido Railway line). Meantime, a number of English engineers arrived, and they laid out the work. On 7 May 1872, the first train ran through from Tokio to Yokohama, and two years later there was a line open for traffic in the West from Kobe to Osaka, a dis¬ tance of 20 miles. In 1877 the western line was extended as far as Kioto, and a few years after¬ ward Otsu Section was also opened to traffic ; so that at the end of 1880 there were some 58 miles of railway in operation in this district. The excavation work of the Yanagese Tunnel, 4,185 feet in length, located between Nagahama and Tsuruga, and one of the longest tunnels in Japan was completed in November 1883, nearly three and a half years having been spent in its construction.

In the same year, the Nippon Railway Com¬ pany, the pioneer private railway company in Japan, opened its first section from Tokio to Kumagae, a distance of 30 miles. The com¬ pany, incorporated with a capital of 20,000,000 yen, which has since been increased to 66,000,000 yen, obtained in 1881 a charter for laying a line between Tokio and Aomori, a distance of 445 miles. It was a rather bold undertaking at that time, for not only did the people lack experience in the work, but no data to form any reliable estimate on profit and loss could be procured. In view of these circumstances, the government agreed to guarantee a profit within a certain limit, and gave every possible convenience tend¬ ing to further the work, and at the middle of 1884 the company had a total mileage of 63 miles from Tokio to Takasaki. At this time, the gov¬ ernment was also busily engaged in extending

the Tokaido Line to Ogaki, which was opened in April of the same year.

In December 1887, the third section of the Nippon Railway Company was completed as far as Sendai, which is situated about 220 miles north from Tokio. In 1888 the Sanyo Rail¬ way Company was organized with a capital of 13,000,000 yen, which was later increased to 36,000,000 yen. This company's route, running from Kobe to Shimonoseki, a distance of 329 miles, enjoys the distinction of being the most picturesque in Japan. In November of the same year, the first section of the route, from Kobe to Himeji, was opened. In the following year, the Kyushu Railway Company, the pioneer on the island of Kyushu, opened its first section from Hakata to Kurume, a distance of 22 miles. This company was incorporated with a capital of 16,500,000 yen, but, as the result of the ab¬ sorption of several companies, it has since in¬ creased its funds to 62,000,000 yen. The com¬ pany was originally authorized to construct a line from Moji to Yatsushiro, a distance of 143 miles, and soon afterward it was chartered to extend its line to Nagasaki with several branches. In the meantime, the government, recognizing the importance of a more complete system of railways, undertook to build the Northern Line. Its route begins at Takasaki and passing through the Usui mountain reaches Naoyetsu, 117 miles. This section was not opened till 1 April 1893, owing to the numerous engineering difficulties. The nature of the work on this route will be realized when it is stated that no fewer than 26 tunnels had to be excavated; a ratio of one to each four miles. This was, in¬ deed, the first rack railway constructed in Japan, worked by the Abt system. On the other hand, the government continued to extend its line by the Tokaido way, and in 1887, the eastward line, from Ogaki to Hamamatsu, and the westward line, from Yokohama to Kodzu, were opened. The through connection between Yokohama and Kobe, a distance of 358 miles, was satisfactorily effected, 16 April 1889.

During 1890, various sections of private rail¬ ways were completed, and the Hokkaido gov¬ ernment Railway extending from Temiya to Horonai, 62 miles in length, was transferred to the Hokkaido Colliery Railway Company, a private enterprise. A few years later the trunk line of the company was extended to Port Muroran with two branches, a total dis¬ tance of 60 miles ; while the government built some 160 miles in other divisions. At this time, the Kanson Railway, now the Hokkaido Rail¬ way, was organized with a capital of 6,000,000 yen, for the purpose of building a line of 158 miles between Hakodate and Otaru, and the line was completed in October 1904. During the three years from 1886 to 1888, railway under¬ takings were remarkably active, and many small companies were incorporated, but in the year 1889 the failure of the harvest caused a great business depression, and all new projects were suspended. But at the close of 1891, the Kyushu Railway was opened as far as Saga, and the Sanyo Railway to Onomichi, while the Nippon

Railway finished its through communication from Tokio to Aomori.

In June 1892, the Law of Railway Construc¬ tion was promulgated, prescribing the route along which government railways were to be

built, and those lines that required more rapid construction were set apart to be developed under the First Period Construction Pro¬ gram. These lines extended altogether over 1,900 miles approximately, and their construc¬ tion work had to be completed in 12 years from commencement. Under the Second Period Con¬ struction Program the lines omitted from the First Period Construction Program were to be completed, extending some 2,525 miles. Toward the end of 1894, the northern section of the gov¬ ernment Ou Railway Line was finished as far as Hirosaki, while the southern section was com¬ pleted as far as Shinjo. The work on the Cen¬ tral line also made steady progress, the section from Nagoya to Nakatsu on the western side, and that from Hachioji to Kofu on the eastern side being completed. All these sections were included in the First Period Construction Pro¬ gram, and now the government had a total mileage of some 570 miles. Shortly after the China-Japan War, the business boom brought out a large number of railway schemes, no less than 42 companies being formed simultaneously in the western part of the empire.

At the close 1898) Japan possessed 3,420′ miles of railways, of which 768 miles were un¬ der government control and the rest worked by private companies, numbering 42 in all. At this time the government was busily engaged in building the San-in and Kagoshima lines, both prescribed in the First Period Construction Program, and the private companies were ac¬ tive. So that in the year 1906, 34 years after the opening of the Tokio-Yokohama Line, the government was in possession of some 1,500 miles of railway, while the private companies extended their lines up to 3,270 miles. On 20 May 1906, a grand banquet was held at Nagoya, for the celebration of the completion of 5,000 miles of railway in Japan.

The question of the most suitable gauge for Japanese, railways has been a matter of much public discussion, but the standard gauge now generally used is 3 feet 6 inches., while for light railway, extensively developed in recent years, 2 feet 6 inches gauge is used.

State Acquisition of Private Railways. — The first railway regulations were published in Feb¬ ruary 1872, and they were amended in the fol¬ lowing May with the general rules relating to the working of railways. Since then

they have been followed by many minor regulations until 1887, when the regulation of private railways was promulgated. Five years later the Law of Railway Construction was enacted. In March 1900, two important railway legislative meas¬ ures were published: the Private Railway Law and the Law Relating to the Working of Rail¬ ways, which were put in force on 1 October of that year, abrogating all the regulations prior to the enactments. But the railway legislations of far greater importance were the promulgations in March 1906, of the Railway Nationalization Law and the Law for Purchasing the Seoul- Fusan Railway, in Korea. It will be remem¬ bered that the first bill for railway national¬ ization was introduced in the Diet in 1891, but it failed to get the majority. Early in 1899, the bill again appeared, and it again failed. In the following year a modified bill for the purchase of private railways was introduced in the Diet, but it was annihilated by opposition.

In the meanwhile, the Japan-Russia War broke out and all new government schemes, except those directly connected with the war, had to be suspended. Soon after the war the govern¬ ment took up the matter again, and on March 1906 a bill for the state purchase of railways was introduced in the Diet. Tragic contentions were brought up against the bill, but it finally passed in a modified shape. The following 10 extracts will be read with interest :

1. Railways to be purchased. — All railways constructed for the purpose of general trans¬ portation, except those built for communication in limited localities; the following being the names of those to be purchased : Hokkaido Colliery Railway, Hokkaido Railway, Nippon Railway, Ganyetsu Railway, Hokuyetsu Rail¬ way, Kobu Railway, Sobu Railway, Boso Rail¬ way, Nanao Railway, Kansai Railway, Sangu Railway, Kioto Railway, Nishinari Railway, Hankaku Railway, Sanyo Railway, Tokushima Railway, Kyushu Railway.

2. Time of acquisition. — From time to time during the period between 1906 and 1915.

3. Prices to be paid. — These shall be cal¬ culated on the basis of : (a) a figure represent¬ ing the average rate of profit as against the amount of money disbursed in construction ac¬ count during six semi-annual business terms, commencing the second half of 1902 and ending the first half of 1905, is to be first of all ob¬ tained by actual calculation. This figure is multiplied by the amount of construction dis¬ bursement up to the date of purchase. Twenty times the product so obtained is to form the purchase price; (b) an amount of Government Railway Loan Bonds of such face value as to cover the market value of the goods in stock, excepting the goods purchased and not yet paid for. (((Profit)) mentioned above

designates the surplus of the gross earnings over the business expenditures, bonus to staff, and interest on the accounts other than the profit account. The ˆaverage ratio of profit® is obtained by doub¬ ling the total profits during the six terms men¬ tioned above, and dividing by the total cost of construction during the same periods.)

4. Terms of Purchase. — The price of the railway shall be paid by the government within five years after the date of purchase with 5 per cent loan bonds, at face value. And', in ad¬ dition, 5 per cent, interest on the price of rail¬ ways shall be paid from the date of -purchase pending the delivery of Joan bonds.

5. 'Companies' loans. — All loans spent for construction account to be excluded from the purchase price and to be replaced with the loan bonds valued according to the market price.

6. Companies' _ rights and obligations.— All rights and obligations, standing at the date of purchase, to be taken over by the government, except those of additional business. The rights and obligations between the companies and stockholders, the balance of the capital stock, and also the rights and obligations belonging to the income account, reserves, and the miscel¬ laneous account, to be excluded.

7. Companies' additional business.— If the railway company operates any additional busi¬ ness, the government may purchase the prop¬ erty belonging to that business with the rail¬ ways.

8. Capital expenditures. — All expenditures for the capital account, except that incurred by the loans, shall be considered as the expenditures tor the construction account and good in stock account, and the outlay of loans must always come after the capital expenditures.

9. The companies not having three years business terms or any dividend. — The terms of purchase of railways of such railway companies shall be decided by mutual agreement be¬ tween the government and the companies.

10. The appraisers' decision. — Companies are allowed to appeal against the decision of the government with regard to the price and the rights and obligations of the railways, and in the event of the appraisers' decision being un¬ acceptable, to appeal to the Minister concerned.

Three months after the promulgation of the law a commission, styled the Temporary Bureau for the Preparation of Railway Nationalization, was created under the superintendence of the Vice-Minister of Communications. At the sug¬ gestion of the Commission the time of trans¬ fer was changed to one year. The original idea of the government in spreading the term over nine years was to preclude any possibility of economical disturbances attending the issue of loan bonds to an enormous amount within a short space of time, but subsequent inquiry con¬ vinced the government that such' disturbances were not likely to occur, but that any delay in the acquisition would prove prejudicial to the interests of the state. The provisions of the law gave some of the companies concerned an incentive to start various works on the lines allotted for purchase, for, according to the law, any sum invested in this way would be more than compensated for. Such outlays amounted, in less than a month after the promulgation of the law, to 12.1 million yen which, upon the computation by the method prescribed in the law, would mean an indemnity of 23.5 millions from the treasury. On the other hand, the new companies, of which the purchase price was to be decided upon by mutual arrangements, were naturally disinclined to spend money upon the maintenance of way, for any such expenditure would mean a loss to the companies to the amount of the difference between the face-value and the current price of the loan bonds at the time of transfer. It was further apprehended that the companies might lose the spirit of com¬ petition for increased business, and might, at the _ same time, even at the expense of the efficiency of railway service, resort to practices calculated to bring them immediate gain. Lastly,

the impending purchase would naturally leave the employees of the companies in suspense as to their status after the state acquisition, and this would have an undesirable effect upon the service.

I hese considerations induced the govern¬ ment to hasten the period of acquisition, and the purchase of the 17 companies was accom¬ plished between October 1906 and October 1907. At the same time the subsidiary busi¬ ness was also taken over. As to the officials and employees of the purchased railways, they were all given the option of remaining in the service. As might be expected, various claims were advanced by the companies in settling the purchase price, but fortunately they were all settled by amicable arrangements, and not one case was referred to the

arbitration committee provided for in the law. The price of pur¬ chase was determined upon the basis of profit for the nine companies, while for the remain¬ ing eight railways the price was determined by mutual arrangements between the contracting parties.

Result of Nationalization. — The advent of the nationalized system and the removal of various drawbacks incidental to diverse manage¬ ment and different method of working marked a new epoch in the history of Japanese railway business.

The management took up the question of revising passenger and goods tariffs that had been on diverse systems peculiar to each com¬ pany. . The passenger tariff was thoroughly re¬ vised in November 1907, adopting the tapering system on all the lines, though considerations relating to local conditions and competition pre¬ vented the fundamental unification of the goods tariff. At last in October 1912 the goods tariff was placed on the equal basis on all the govern¬ ment lines except the Sanyo line. The repeated revisions have not only simplified transactions, but also proved beneficial to all travelers and shippers.

In the financial arrangement of the state, the _ government railways are set apart as special account, and all disbursements for con¬ struction, working, improvement, etc., are to be met by the receipts and profits accruing from railway traffic. Total mileage of government lines open to traffic at the end of March 1920 reached 6,207.8 miles. The following figures will indicate the remarkable increase of traffic that favored the state railways after the national¬ ization.

Year Ending March 31

Passenger traffic

Goods traffic

Total earnings including sundry receipts (1000 yen)

Working expenses (1000 yen)

Working

ratio

(1 000 yen)

Profit (1000 yen)

Mileage

(1000)

Earnings (1000 yen)

Ton-mileage

(1000)

Earnings (1000 yen)

1910 .

2,812,329

42 , 408

1,911,197

37,055

80,665

40,824

50.6

39,840

1911 .

3,038,736

45 , 206

2,126,834

40,881

87,432

41,868

47.9

45 , 564

1912 .

3,382,586

50,985

2,347,871

45,584

98,080

44.251

45.1

53,828

1913 .

3,626,316

54,390

2,691,464

49,378

105,884

48,395

45.7

57,489

1914 .

3,690,964

55,930

3,053,852

52,862

111,236

52,172

46.9

59,064

1915 .

3,623, 743

55 044

2 982 798

52 451

109,925

55 , 360

50 4

54 564

1916 .

3,856,536

57! 162

3! 309! 518

57! 985

117,794

53 . 802

45.7

63! 992

1917 .

4,255,374

64,838

4,179,134

69,970

138,027

58 , 446

42.3

79,580

744

JAPAN — RAILWAYS AND HIGHWAYS (24)

Colonial Railways. — The Formosa Railway, which was ceded to Japan in 1895 by the Chinese Government, is now 260 miles in length, extending from Kelung in the north to Takau in the south and thus, through connection of the two important seaports of the island is satisfactorily effected. By the end of 1913 the Ako line was completed and the fertile plain of Ako was made easily accessible. Total mileage open to traffic at the end of March 1919 reached 354 miles including branch lines. Besides the government railways, there are 286 miles of private lines laid by the sugar companies. The railways in Korea were completed from Fusan as far as the Yalu River, with a total mileage of 609 miles while in Manchuria there are also 486 miles of railway under Japanese influence, running from Port Arthur to the city of Kwangchengtsz, which promises a great exten-

to encourage the speedy development of rail¬ way network in the country, embracing trunk lines, light railways and tramways — the three kinds of railways which were to be made inter¬ dependent upon one another in order to effect the improvement of communication facilities as a whole. To invite the co-operation of private enterprise the law removed, or otherwise re¬ laxed, the rigorous restraints formerly placed upon the grant of charters, construction, opera¬ tion, etc. As a further inducement for encourag¬ ing light railway projects the Subsidy to Light Railway Law was put into force in 1912. The enforcement of the two laws, coupled with the application to the light railways of the Railwa}' Mortgage Law, mutatis mutandis, gave an im¬ petus to the rise of light railway projects from year to year, as may be seen in the following table : —

Statement Showing Light Railway Projects, Etc.

Number of Railways

Mileage

Capital

Year Ending March 31

Open

Projected but not yet opened

Open

Under

construction or sanctioned

Open

railways

Railways not yet opened

1911 .

15

36

M. Ch.

233.09

M. Ch.

639.07

Yen

10,321,000

Yen

30,690,000

1912 .

23

121

311.05

1,826.62

14,828,820

75,128,850

1913 .

34

174

- *542.10*

2,637.54

27,887,572

117,780,680

1914 .

53

207

778.61

3,108.25

43,937,404

122,940,340

1915 .

83

186

1,138.44

2,648.61

57,030,287

102,633,462

1916 .

110

139

1,442.72

1,801.08

69,413,779

67 , 503 , 000

1917 .

120

112

1,547.61

1,565.76

73,771,878

62 , 641 , 500

N. B. — Including "private" railways (operated under the Private Railway Law) and tramways which have been con¬ verted into light railways.

sion in the future. In 1905 southern Saghalien was ceded to Japan as the result of the Ports¬ mouth treaty, and at the end of March 1919 there were 66.3 miles in this new dominion.

Privately-worked Railways after Nationalisa¬ tion. — The state acquisition of the 17 leading companies' lines in 1906 and 1907 left in private hands an insignificant mileage of less than 450 miles which were all short, local lines. The new state policy, indeed, brought private enterprise to a standstill, and there was no appreciable new construction for a few years after the nationalization. This state of affairs was, however, soon changed, and the private building was revived, mainly under the stimulus of the new Light Railway Law issued in 1910. The measure was intended by the

government

The Private and the Light Railway Laws were replaced by the Local Railway Law enacted in April 1919, and all the ˆprivate® and light railways came to be controlled by this new law under the designation of (

*Tramways — * The Japanese tramways date back from 1880, when an application was ten¬ dered for the construction of the Tokio Horse Tram Company's line which was completed and opened for traffic in 1883. By Imperial Ordi¬ nance No. 266, issued in October 1908, the con¬ struction of tramways came under control of the Minister of Communications, and subse¬ quently, by Imperial Ordinance No. 307, the jurisdiction passed to the Imperial Government Railways.*

The following are the results of working during the nine years to 31 March 1917 : —

Statement Showing Results of Working of the Tramways

Year Ending March 31

No. of tram¬ ways

Mileage

Capital

Cost of construction

No. of passengers carried

Weight of goods hauled

Revenue

Working

expenses

- – - –

Profit

1909 .

1910 .

1911 .

1912 .

1913 .

1914 .

1915 .

1916 .

1917 .

74

86

99

108

121

126

129

136

139

M. Ch.

605.73 685.68 838.64 933.01 1,072.24 1,138.39 1,195.50 1,255.05 1,277.23

Yen

97,163,595

108,629,768

142,945,111

180,902,644

241,344,327

258,231,940

281,745,441

274,511,854

307,868,304

Yen

5,811,681 72,337,722 101,591,169 150,429,037 192,284,381 208 , 242 , 459 223,066,154 228,421,408 231,116,126

242,243,064

289,937,399

367,504,173

479,265,363

506,568,091

576,229,774

702,130,499

638,483,167

695,462,383

Ton

953,122 778,909 848,379 1,001,952 1,614,048 1,188,269 1,365, 486 1,311,534 1,756,723

Yen

10,587.641

12,389,131

15,721,637

20,961,655

22,867,453

25,634,451

26,646,180

27,826,977

31,999,346

Yen

5,930,269

6,834,909

8,501,326

12,058,591

12,569,245

14,002,489

13,149,868

13,427,649

15,333,462

Yen

4,657,372 5,554,222 7,220,311 8,903,064 10,298,208 11,631 ,962 13,496,312 14,399,328 16,665,884

Highways and Bridges. — In ancient times the roads in Japan seem to have been in com¬ paratively good condition. With the introduc¬ tion of the feudal system in the Middle Ages, however, each feudal lord began to lose interest in the efficient upkeep of highways within his domain, which -might facilitate the invasion of his aggressive neighbors, and all improvement in this direction was purposely neglected.

Since the abolition of feudalism in 1868, every encouragement has been given to plans looking to the reconstruction of roads. To meet the growing requirements caused by the develop¬ ment of heavy vehicles with high

speed, a law was enacted in 1919 entitled (

The Minister of the Interior is charged with the general supervision over the administration of roads in Japan which are divided into five classes according to the authorities by which they are directly managed and controlled, viz. : national, prefectural, county, city and village roads.

The national and prefectural roads are under the direct management of the governors of pre¬ fectures; while the county, city and village roads are managed respectively by the county head¬ men, the mayors and the village headmen.

Expenditures for the roads are borne by the respective organizations of self-government, assisted in the case of the national and pre¬ fectural roads by a subsidy from the national treasury; and in the case, of the other roads, by subsidy from organizations of directly superior authority.

The mileage of roads in Japan in 1920 is as follows : —

National roads . 5 , 000 miles, about

Prefectural roads . 35 , 000 miles, about

County roads)

City roads | . 300 , 000 miles, about

Village roads J •

Bridges are regarded as forming part of the roads. According to the plans outlined by the Department of the Interior, all bridges lying on the national roads are to be structures of steel or cf other material of permanent durability.

The number of bridges in Japan in 1916 was as follows : —

Steel and iron bridges . 518

Stone bridges . 71 , 268

Wooden bridges . 136,860

Others . 127,498

Minister oj Communications, Tokio.

JAPANESE CERAMICS. The ancient Kameoka ware of Japan Brinkley

considers as pottery of the aborigines who were displaced by the early invaders who conquered and set¬ tled in Japan. The ware is too crude to de¬ scribe; the same may be said of ware (found in graves) made by the early Mongol invaders. Gyogi-yaki (yaki is the Japanese equivalent to our word ware) pieces are found in Japanese temples and are highly reverenced as the pro¬

duction in the 8th century of potters working under the tuition of the Korean Buddhist priest Gyogi ; they are glazeless pieces in dark clay lacking any art merit. Kato Shirozaemon, called generally Toshiro made dainty little tea jars of fine close paste and lustrous glaze, the body being purple, light red, dark red, gray, etc. The Japanese prize these pieces above every" thing, preserving them in costly lacquer boxes, etc., and term them Ko-Seto (old Seto). Pot¬ tery production was continued by four genera¬ tions descendant from Toshiro, their wares be¬ ing respectively known as Ki-Seto-yaki, Chu- Kobutsu or Kinka-zan and Hafu-gama. These pieces (many extant) are all tea-ceremony (Cha-no-yu) articles. Gorodayu Goshonzui, set¬ tled in Hizen (probably Arita) where he made porcelain wares after Chinese models, and in Chinese clay imported by him. The work stopped when the supply ran out; he used the famous ˆMohammedan® blue (see Chinese Ceramics) on tea jars, water vessels, censers, cups (for the matcha ceremony) in ((hawthorn® and other floral decoration, also ˆconventional children® in arabesques. Soshiro, at Fu-shimi, made rich white or buff-colored in¬ cense burners and tea jars late in the 16th cen¬ tury. They are of polished biscuit (unglazed) with designs in red, gold or black lacquers. Korean potters settled in the port of Karatsu (or Negoya) on the Hizen coast in the 11th – century, but the Oku-gorai pieces though crude, are later Karatsu-yaki, or perhaps Korean. They are of coarsely crackled patchy brown body, Korean style stone-ware (E-Gorai) was made here in the 12th century in gray or brown ware. The 12th century Karatsu rice measuring bowls (Yoni-hakari) still exist. Flambe (mottled) glazes appear middle of the 17th century. In the 18th century a special ware for the Shogun's court, termed Kanjo-garatsu, was made. It con¬ sisted of cups, tea jars, etc., with simple incised decoration filled in with white clay and having a darkish green glaze. But another ware under this name is stone-ware with white or gray glaze. In 1525 the Korean potter Ameya came to Kioto ; he called his archaic ware So-kei- yaki. His widow's ware (Ama yaki) was an improvement, but his son, Chojiro, became famous through his tea-ceremony pieces. The Teiko (ruler) presented him with a seal having the ideograph Raku on it, and the ware became the greatly prized Raku-yaki of the tea-cere¬ monies. His descendants run kilns to this day. The term raku has ever since stood to represent a thick ware of coarse clay and thick lustrous glaze such as those of Tatsumon, Tokio, Banko, Bizen, Kioto, Shigaraki, Osaka, Ohi, etc.

Satsuma-Yaki is a faience of several varie¬ ties and localities as well as periods ; the ((Go- honde® Yoshiro-stamped product alone is of eight styles (according to color and appear¬ ance of glaze), and the Kumagawa finely crackled brown paste, buff-glazed ware is an¬ other held in great esteem by Japanese con¬ noisseurs ; it originated the ware that later be¬ came world famous. The Hibiki-de (white crackled) faience was first made (1650) at Tatsumon ji, and the Japanese treasure pieces in Tangen's (court painter) decoration. Some old crackle Satsuma faience is in apple-green or yellow monochrome. Old Satsuma aimed at producing a surface exactly like ivory, and sue-

ceeded ; 18th century enamel-decorated pieces have very hard, close-grained paste and lustrous glaze. Enamel colors were rich and mellow, very pure and brilliant : green, Prussian blue, red, purple, black, yellow and gold. We are told by experts that few Western collections contain representative pieces of this greatly prized variety ; instead, they are the later ware of ((crude, chalky pate® and glaze ((fissured® not finely crackled, pigments less brilliant, and the motifs of saints, Bodhisatvas, Arhats, human figures, etc., though executed very skilfully, produced for export and not purchased by Jap¬ anese connoisseurs. The highly valued early ware motifs were diapers, landscapes, flowers, phoenix, lion, dragon, kirin. Such pieces rarely reached higher than seven inches and consisted of censers (koro), cups, slender-necked wine- bottles (saki-dokuri) , incense boxes (kogo)} ewers (suiteki) , vases (shoku-sh'ta) , etc. Large pieces in Western collections are said to be modern. Most specimens sold as Satsuma are modern and were made at Ota and Awata.

Banko-Yaki, at first was an unglazed raku ware made, end of the 18th century, by a wealthy amateur, Gozaemon. Patronized by the Shogun, he imitated contemporary Chien-lung (see Chinese Ceramics), also Delft faience (see Delft Faience), besides some original effects in brilliantly glazed floral decoration. His mark was Banko (enduring). This is Ko-Banko-Yaki, distinguishing it from the later imitations by Yusetsu marked with the same stamp.

Kioto-Yaki first came to favorable notice in the 1 7th century and were more or less crude pieces in red unglazed pottery ; a coarse raku- yaki in white, black and yellow glazes ; faience in fine pate ˆ and yellowish brown glaze ; un¬ glazed fine pate buff pottery with black decora¬ tion and gold lacquer; faience with crackle glaze and blue or brown underglaze decoration ; the last a. highly refined artistic ware. Ninsei and his followers

made remarkable pieces for the court.

Awata-Yaki. — Japan's great ceramic expert patron, Ninsei, made the wares of this place famous. The representative ware is a brownish hard, close faience of grayish, semi-transparent glaze, profuse enamel decoration in bright green and opaque blue, chiefly, with gold and silver enrichments. Red, purple and yellow are found. Clever designs (detached subjects such as sparrows on bamboo, a plum branch, etc.) were done by Kinzan (Sansei) who died 1743, and was succeeded by a son and grandson. Kinko- zan introduced a conventional decorative style, instead of the former naturalistic. Dohachie started a kiln here middle of the 18th century, and his artist, Shofutei Kuchu, acquired fame, as well as his son. Hozan did clever land¬ scapes and floral scrolls in underglaze blue on faience; his grandson's (Bunzo) imitation Delft flourished with his white floral decoration on rich blue background, and his Warabi-de (fern scroll) style. Taizan Yohei established a raku kiln in 1711, and his ninth successive generation is now making wares here. Awata pieces are often sold as Satsuma, though much less dense of body than the latter.

Bizen-Yciki kilns existed from late 14th cen¬ tury, making coarse red stoneware. Paste im¬ proved end of 16th century, and then the ware

(ritual pottery) became known as Ko-Bizen or Imbe-yaki. It had accidental patches of glaze, later full glaze. In 17th century appeared bluish-brown faience (Ao-Bizen) in figures, mythological beings, birds, fishes, etc. In the 18th century came a red body; Hi-dasuki Bizen (16th to 19th centuries) shows the mark of the rope of straw left on the clay. Shira-Bizen is of grayish white paste and is called also Kan- koku from the location where made.

Of the many other old kilns held in high esteem by the Japanese we will mention only the following: Akahadi-yaki, dating far back, had little of merit till Nomura Ninsei started improvements here, as in other places. In 1761 its faience was of (

Japanese Porcelains. — In discussing Jap¬ anese porcelain it is necessary to remember that the Japanese, unlike the Westerners, admire and even venerate their old (Ko) earthenware, however crude if ancient, and prefer a less pretentious appearance in their ceramic criterion than is. displayed by the bright white sheen of porcelain.. Therefore the very great industrial progress in porcelain manufacture made by the natives of Nipon was produced under the stimulus of a European demand; the style of decoration, though the motifs and methods of treatment are great in the merit of artistic cre¬ ative talent, leans largely toward the desire to please and satisfy Occidental desires. Japanese clays, apparently, forbid the one-

process firing of the Chinese kilns: they first bake to a <(biscuit® state. (See Ceramics). Colors re¬ quiring the grand feu (intense) heat, also the glaze, are next subjected to the high tempera¬ ture kiln. Lastly, the enamel-color and gold decollation are baked in the muffle oven. The provinces which produce porcelain are Hizen, Kaga, Kioto and Owari, and the ware often receives its name from the province.

Conflicting claims as to the discovery of porcelain clay in Japan give to Kanagai Risam- pei (about 1605) or to Takahira Goroschichi (1625) the credit. The latter is said to have found porcelain stone at the hill Izuma-yama (Hizen province), but as a recent opening of the grave of the former disclosed blue under¬ glaze true porcelain made from Izuma-yama clay, it would appear 1605 was the date of the discovery. And now was made the ((01d Japan® ware prized of Western collectors. It was made at Arita, Hizen province, and sent to the port of Imari, whence the European traders exported it to Europe. Hence we find the anomalous fact that one and the same ware is known to the Western World as Arita, Hizen and Imari ware.

Arita Ware. — Sakaida Kakiemon was Arita's chief potter in early days, and learned the process of making red and green enamels. By

JAPANESE CERAMICS

1 Bowls and Oil Bottle. Karatou, Banko and Seto Ware. (Late 18th Century)

2 Japanese Naheshima Polychrome Plate (about 1780). In Metropolitan Museum of Art, New York.

N

x 16-16 he started making a ware that became world renowned. With a blue underglaze of fine quality and lustreless red, green and blue enamels (overglaze) and gold, and, by creating a new style of decoration, on fine paste and milk-white glaze, the product was superb. Avoiding the Chinese system of filling in the spaces with accessories, Kakiemon satisfied him¬ self with carefully painted medallions, a piece of bamboo, or plum or pine, a phoenix, or flut¬ tering birds, leaving the large remaining space as untouched ground color. By 1660 the style was in its perfection; and his descendants continued the now famous Kakiemon style. Early underglaze blue decoration was perfect, but in the later output it has a tendency to ((run® when subjected to the second firing, mak¬ ing specimens with

unblurred blue in the deco¬ ration quite rare. On account of its diaper,

Porcelain Plate. Arita Ware (Hizen Province); i8th Cen¬ tury. (Metropolitan Museum of Art, New York).

scroll and floral subjects the early Arita pieces were termed Nishiki-de ("brocade pattern®). In the 17th century already European made- to-order tendencies appear in both shapes and decorations, and lilac blue, russet-brown, purple black and lemon-yellow were added to the enamel palette. Arita "egg-shell® was not made probably till the latter part of the 18th cen¬ tury, and the (

dishes, cups, sake bottles, censers, incense boxes (kogo) are scarce and prized, but by 1750 only common wares were being made. In 1809 the factory was moved to Yamashiro-mura and Ko- Kutani style revived till 1865 in stoneware body with lustrous glaze colors (green, purple, blue, yellow). Kutani red decoration pieces are known now as Kaga. A Satsuma porcelain kiln was started in 1661, but ran only two years; in 1779 Arita style porcelain was made here of some merit in its paste, softer and whiter than Imari, its enamel decoration gave place, in 1868, to blue and white. Hirado-yaki — Brinkley says this is ((perhaps the finest porcelain manufac¬ tured in Japan.® Made at Mikawachi-yama. Originally made heavy reddish stoneware, but fine porcelain stone, discovered at Fukae (1712), mixed with local material produced a body of "exceptional fineness and purity.® Matsura, the Hirado chief, subsidized the factory forbidding sales and only court and presentation ware was produced — termed Kenjo-mono. It has a velvet-like, lustrous surface, without the ((01d Japan® granulation. Decoration is mostly blue of exquisitely soft and clear tone in details of wonderfully clear details. Pieces are of all forms, even human figures, children, Bodhi- satvas, etc. Few of the finest pieces are marked. Japanese porcelain varieties and kilns are in¬ numerable.

The subject of Japanese ceramics would be very imperfectly told without special mention of their great genius, Hozan, second only to Ninsei. He was 11th descendant of a ceramic family, noted for their fire-boxes (furo). Early in the 19th century he studied at Awata and soon became famous for his celadons, blue- and-white porcelain, faience, especially imita¬ tions of Cochin China faience. The chief of Kishu (1827) invited him to start a kiln in his castle park, where he made the celebrated Oniwa-yaki (honorable park ware)r or Kaira- ku-en ware. His aubergine porcelains, com¬ binations of turquoise blue, purple and yellow faience glazes were far superior to later ones. His famous "Kinrande® (scarlet-and-gold brocade) style, or "Akaji-kinga® (gold designs on red ground), bear the ((Eiraku® stamp. This red was lustrous yet exquisitely soft. In 1840 he opened a kiln in Narikata-machi (in Kioto), where he made faience in Ninsei style. His

pieces from this kiln are called <(Omuro-yaki.® Later he made blue-under-glaze on Lake Biwa shore, in Akaji-kinga style under the name Butsuya, and died about 1855. Marks: Some are impressed with a seal, some scratched, some painted. They are frequently the names of places where made, as Asahi, Minato, etc., but the potter's name is the most frequent.

Bibliography. — Audsley, G. A., and Bowes, J. L., (Keramic Art in Japan (London 1881) ; Atkinson, R. W., (Note on the Porcelain Indus¬ try in Japan) (in Asiatic Society of Japan, Yokohama 1880) ; Blacker, T. F., (Chats on Oriental China) (New York 1908) ; Bowes, J. L., (JaPanese Pottery) (Liverpool 1890) ; Brinkley, Capt. F., Japan: Its History, Arts and Literature* (Boston and Tokio 1901-02) ; Burty, P., Japanese Pottery* (in Artistic Japan, London 1889) ; Franks, Sir A. W., Jap¬ anese Pottery* (South Kensington Museum Handbook, London 1880) ; Gasnault, P., (La Ceramique de l'extreme Orient) (in (L'Art*

Auden, Paris 1879) ; Holme, C., (The Cha-no- yu Pottery of Japan* (in International Studio, London 1909) ; Gonse. L., (L'Art ceramique du Japon) (in (Katalog der orientalisch keramis- chen Ausstellung,* Vienna 1884) ; Julien, S. A., (Memoire sur la Porcelain du Japon* (supple¬ ment to (Histoire et Fabrication de la Pcrce- laine chinoise,* Paris 1856) ; Mew, E., Jap¬ anese Porcelain> (London 1909) ; Oueda To- kounosouke, (La Ceramique japonnaise) (Paris 1895).*

Clement W. Coumbe.

JAPANESE LACQUERWORK. See

Lacquers and Lacquerwork.

JAPANESE AND ORIENTAL ARMS AND ARMOR. Nippon's upper classes have, from the very distant past, shown a depth of study and reverence for the fashioning of arms and armor, including a complex etiquette, that amounts to a military cult. Their Samurai were fighting nobles devoted to military achievement as a career. Their warriors (bushi) lived in religious devotion to their martial ethics — termed bushido. Mr. Bashford of the Metro¬ politan Museum of Arts, New York, writes: Japan is hardly second to Europe in furnishing artistic examples of arms and armor.8

Armor (Yoroi).— The earliest armor was of sheepskin or oxhide, then (before the 7th century) it was of leather. By the 7th century iron armor was in use; this was a corselet of iron plates rivetted together, a flaring skirt of metal, leather guards for shoulders and the upper arm and a conical

helmet. By the 16th century guns were introduced, but the ethics of warriors upheld the use of their revered long¬ bow and arrows (so inseparable was the bow and arrow in their ideals that yumi-ya is synonym of both), and their religiously rever¬ enced sword (katana). And the light and loose-hanging armor continued in constant use, conservatively retaining the same parts though subject to changes in fashion. The headpiece (kabuto) consists of three parts: the liachi or skull, the shikoro or articulated neck protector, and the maye-zashi or peak. At the sides are curved wing-pieces (fuki-gay eshi) , sometimes part of the shikoro. Varieties of the ha chi are: dzu nari and saku nari (shaped like the crown of the head), mono nari (peach shaped), to- kamuri (form of the kamuri ceremonial hat), kimen (demon's head), shii nari (nut shaped), toppai (tall conical form flattened at sides). The bowl (liachi) is of iron or hard-lacquered leather in a single piece or of rivetted strips. The tatarni kabuto (folding helmet) is con¬ structed of loosely joined articulate circlets capable of closing up more or less flat. The ordinary hachis outer surface is composed of numerous elongated triangular ribs running from the lower rim to the socket surrounding the opening in the apex. The outer rim of this socket is termed hachiman-za, and is sacred to the god of war and used for occult decoration, often an embossed or engraved conventional chrysanthemum (kikumon) , when it is called kiku-za. A silk cloth sometimes closed this opening against the weather and was fastened by strings to^ four metal knobs called shi-ten- biyo (four Deva knobs). For higher ranks are added quarterings in gold and silver in bands extending from the hachimanza to the back and

front, sometimes also to the sides, thus dividing the helmet ornamentally into two, four or eight parts (termed respectively kata-jiro, shiho-jiro, Iiappo-jiro) . Small holes on four sides allow thin leather strips to connect with the inside cap. The shikoro (neck defense) consists of either three, five, six or seven laminated metal plates or stiff leather of a curved form fastened together with silk cords. In some examples the laminations consist of small metal scales (kozane), 100 to 136 in a row. The inner side of the shikoro is usually coated with bright red lacquer (said to reflect fierce color on the war¬ rior's face). The before-mentioned fuki-gaye- shi (curved wing pieces) at the sides are gen¬ erally fastened to the edge of the shakoro plates and curl round projecting at the sides. They are generally covered 'with ornamented leather and a decorated border, the centre hav¬ ing the metal crest of the wearer. The right side piece is sometimes hinged to be movable when the bow is in action. The peaks or front- lets (maye-hashi) are inside of gilt, red lacquer, or lined with red leather, usually with a metal border. Each has a three-branched metal socket (harai-date) ; in the centre is a dragon or crest form (mayedate) , and cm either side are placed curved horn-like metal branches (tsunamot o) , broad and thin with

foliated ends. Behind the liachi is a decorated brass ring from which to hang a thick tasselled silk cord (kasa- jirushi no kuwan) hanging in bow form behind, used sometimes for attaching the kasajirushi, a white cloth badge worn as distinguish¬ ing mark in battle. In some helmets is another similar ring above this one for attach¬ ing the horo, a large bag, filled with cotton or stretched on wicker-work frame, hung at the back for the protection of cavalry from arrow- shots. Besides crests (mayedate) other badges (wakidate and usliiro-date) are sometimes worn on the sides or back. The face is protected by a visor (menko or saku-bo) separate from the helmet and attached by strings ; it is a metal mask covering the whole features (then termed mempo) with eye and nostril perforations, or only covering the cheeks and portion below the nose (then termed ho-ate). The masks are named according to the character of the fea¬ tures, as: tsubame-bo (swallow-face), suru-bo (monkey-face), okina-men (old-man's face), shiwadzura (wrinkled face), waradzura (young boy's face), etc. The menko is generally made of one piece, except the nose and upper lip covering which is generally detachable for eat¬ ing and drinking. Two small holes with metal tubes near the bottom of the mask give egress for perspiration. Hair of the wild boar, horse or deer are furnished for the upper lip, chin and cheeks, usually, but they are sometimes painted. Deep wrinkles appear, sometimes, on the cheeks to prevent a weapon slipping over the smooth surface into the eyehole. Knobs afford hold for the fastening cords. A kind of gorgette (yodare-gane or yodare-kake or yen-u) hangs from the bottom of the menko made of either laminated plates, leather, or chain mail and widening gradually toward the bottom. The Japanese had a half-helmet (lian buri) or skull cap of leather or metal worn instead of the kabuto, some reaching to the temples, some only covering the crown. The former consisted of several hinged plates, and had ear-holes and

ti

JAPANESE ARMS. AND ARMOR

Japanese Seventeenth Century Corselet Japanese Seventeenth Century Corselet. Prawn Back

OLD JAPANESE ARMOR

1 Helmet and Mask (hooJci) ; Seventeenth century 3 Helmet (hachi), Corselet and Taces; Fourteenth

or Sixteenth Century

2 Arm Defences of a Daimyo; Eighteenth Century

4 A Sixteenth Century Kabuto

5 Skull-piece (hachi) of Japanese Helmet; about

1850. (In Metropolitan Museum of Art, New York)

JAPANESE AND ORIENTAL ARMS AND ARMOR

*, a hole on top for the tuft of hair, and was covered with leather, the ends being used for tying beneath the chin. The Japanese term do takes in trunk armor and leg as well as poste¬ rior protective parts. The do-niarn was a cor¬ selet opening at the side, the hotoke-do was of a single piece of metal wrought into the form of a naked torso. Such pieces are usually black, some covered with shark-skin are termed same-tsudzumi ; when covered with tortoise¬ shell, velvet, silk, etc., they are called, respec¬ tively, bekko-tsudzumi, birodo-tsudzumi, moji- tsudzumi, etc., while those covered with leather (kawa-tsudzuma) were given also names ac¬ cording to the styles of leather used such as, gilt, blue, lacquered, diapered, etc. Polished brass, iron inlaid with colored or precious metals, were the material of some do-maru. holding corselets (tatami-do) had two or four plates . (shinai-kane-no do and nimai-kane-no do) hinged at the sides and fastening with clasps and strings. The hato-mune do ("pigeon- breasted®) corresponded to the bulging (peas- cod® European cuirass. The oke-gawa do was a do-maru composed of metal or hard leather scales overlapping. The skirt-pieces (kusad – zuri) depending from the corselet, taking the place of European "taces® (see Plate Armor), in old armor were each in a continuous piece lengthening toward the bottom considerably, the lower part having a central slit to facilitate the movement of the legs. In later armor the kusadzuri consisted of a number of taces hang¬ ing quite loosely and overlapping; the front portion was divided into three, the back three or four, and one piece at each side. They were laminated plates or scales hung by a row of silk cords. Pieces corresponding to the European (<1 palettes® (see Plate Armor) w*ere the sendan- no-ita, for the right side and the hato-wo-no- ita, for the left side, protecting the front of the armpits. They are only on old and perfect specimens. Right and left had different shapes, hence different names. The former was a nar¬ row board (3 inch x 9 inch) composed of three plates or rows of scales connected by cords and lined with leather; the hato-no-wo-ita, smaller than the other, is an oblong piece of metal or thick lacquered leather having a kind of dove¬ tailed projection above. Both are suspended from the watagami (shoulder braces). The sode (epaulie re in European armor) protected the shoidder and upper arm, it consisted of a broad, slightly convex, piece made of laminated steel plates or imbricated scales and lined with leather, and was suspended from the wata-gami by cords of leather. There were several vari¬ eties of sode such as the kawara-sode, namban- sode, maru-sode, ha-*

sode, hiyotan-sode, ki-no- ha-sode, named according to their make up and shape. The kote, in some respects, answers to the European avant-bras and brassart (see Plate Armor), being a tight defensive sleeve protecting the entire arm. It was of padded cloth, leather or silk, widening at the mouth, where it fits the shoulder, and was tied by strings round the chest. The kote is covered in part by mail with additional metal plates and terminates in a metal hand-guard or semi¬ gauntlet called tetsu-gai. They only cover the front of the arm and are laced behind. The top plate (kamuri-ita) covers the shoulder, below is a large metal plate (gaku-no-ita) or

scales connected by mail to protect the muscles of the upper arm. A circular plate (hiji-gane) protects the elbow point. The lower part of the fore arm has long parallel splint-like strips of metal connected by chain mail (the ikada) or a single piece of pierced and embossed metal. Attached to this, at bottom, is usually a second plate (tetsugai) rounded to fit the shape of the back of the hand above the knuckles. Gloves als9 were worn. Kote varieties: tsutsti-gote mail covered and reinforced with plates ; tsugi-gote shaped more like the sode , but smaller. Protecting the thighs, as do European i(cuis- sards, ® was the liai-date hanging loose like a double apron, which was made in different style-, known as ita-hai-date, odoshi-hai-date, etc. The Japanese defenses for the lower part of the legs (called sune-ate) are mostly curved plates formed to the calf and fastened by clasps or strings, like the Greek and Roman greaves. Varieties are bis ham on- sune-ate made of three continuous metal plates reaching above the knee; shimotate-sune-ate made of plates and strips of chain mail alternating; tsutsu-sune-ate, nivo-sune-ate, kiyahan-sune- ate, etc. The feet were clad with shoes (kutsu) having pointed curved toes for riding or cere¬ monies, but straw sandals were preferred for marching and fighting. Soles were of stiff leather, uppers of bear's skin. The jim-bauri was a kind of tabard or surcoat worn over the armor for display.

Arms. — The sword was the Samurai's most valued possession; he called it his "soul.® But the longbow and the arrow were always a chief weapon. The long sword (katana) was pre¬ served with religious care wrapped in the finest silks and enclosed, often, in the costliest of lacquered and inlaid caskets. Allowing a view of its sheath and blade (Japanese blades are of great perfection and superior to the Western) to a foreigner is a mark of intimate friendship. The short sword (wakizashi) and the katana were so closely associated as to be considered a "pair® and termed daisho, and both had simi¬ lar mountings and were stuck in the same sheath. A dagger-sword (tanto) was also car¬ ried. Great artistic talent was expended on the Japanese warrior's sword "furniture®: sword- guards (tsuba), ferrule-like pommels (kashiri), ring-bands (fuchi), decorative peg-heads (

menuki), to attach blade to the grip. So lovely is the workmanship of the tsuba, depict¬ ing life and scenery in marvelous metallic deli¬ cacy, that these miniatures in metal (the wealthy carried actual "stocks® for frequent changes of display) are greatly prized by museums and Western connoisseurs, who have numerous large collections. A peculiar instrument was the small knife (kozuka) with its flat orna¬ mented handle; it was used with remarkable precision for throwing. Skewers (kogai) were in the same sheath with the kozuka, used for hairpins, also to "tag® the dead victim with the victor's identity. Pole arms — The spear was a favorite weapon with the Japanese, who were very skilful in its use, the higher classes having many racks full. One old form was the hoko, a guard's spear with six-foot pole and eight- inch blade either leaf-shape or waved (like the Malay kris) ; a sickle-shaped horn projected on one or both sides at the joint of blade. A lance (yari) was used by the 14th century with "hog-

backed" blade five inches long. The nagi-nata had a three-foot long scimiter blade fixed on a slightly longer haft. It was a weapon favored by female warriors. They had halberds (see Pole Arms) also. Spear heads were of beau¬ tiful construction. While the Japanese in their feudal warfare did not make much use of fire¬ arms they had guns, pistols and cannon, mostly imported by 16th century Portuguese traders. Little development occurred in these arms, and from 1853, when Commodore Perry opened up their ports, they copied European types (re¬ volvers, etc.).

East Indian.

Armor. — Helmet, top. Gorget or neck¬ piece, kant'hah sobha. Cuirass, char'aina (((four mirrors®), Peti. Coat with gorget attached, bhanju. Coat of mail, zirih or zirah. Coat of mail having head and body in single piece, g'hug'hwah. Coat worn over the armor (sur- coat), angirk'hah. Armguard, dastana. Horse armor. Quaslipah, horse's headpiece.

Arms. — Shields : Ordinary shield, dhal, maru; shield made of cane, udanal. Spears, pointed at both ends, tschehontah; sangu , bhala. Bomarangs, katariya. Battleaxes, tarangaleh (common axe), tabar-zaghnol (pointed, crow¬ bill), tabar-zaghnol (double-axe), shushpar (globular head), buckle. Swords. Scimeter, baneh, bhelhetah, ayda-katti, khanda, pattisa, pata (gauntlet sword), dha (short sword), abb asi, gupti (swordstick — concealed). Sabres: Talwar,' teg ha. Daggers: Katar (short dag¬ ger), jamdhar (ordinary dagger), jamdhar doulicaneh (dagger ending in two points), jamdhar sehlicaneh (ending in three points), jambiyah,

bank, pichangatti, gupti kard (long dagger). Bows: Maktah (simple bow), raman (composite bow), tarkash, gulel (pellet bow). Arrows: Tir (iron-tipped), bit la (hardwood- tipped). Maces. Gargaz or garz. ((Tiger- claw® knuckles, bag'hnak. Guns. Toradar (matchlocks).

Siamese.

Arms. — Single-bow, kasun. Cross-bow, thami. Spear, hak (plain spear), hak sat (seven feet long, thrown by the foot). Lance or javelin, khoum (seven feet long). Swords. Dass (long curved sword), ngao (curved knife or sword 18 inches long with 6 foot pole). Shields. Oblong, dang; round, lo.

Malays use a kris (undulating dagger or sword) and straight sword.

Persia, Kashmir, Afghanistan, etc. Sabre, samsher. Sword, salawar yataghan. Battle- axe, tabar. Daggers, cuirass same as India.

Chinese.— Armor and arms of the Chinese are of little interest. They have had no mili¬ tary caste for many centuries and the little in¬ consequential armor found is of a <(parade® or <(costume" form, consisting chiefly of rich vest¬ ments with some splints or other reinforcements beneath of little practical defensive value. They used bows and arrows, swords, daggers, maces, trident spears, etc.

Arab Arms. — The jambiya was the charac¬ teristic dagger. The sword was termed khan- jar; shields were circular and oblong, of hip¬ popotamus hide. Maces were of ebony. Guns and pistols are generally decorated (some very beautifully) with arabesque ornament.

Bibliography.— Church, A. H., (The Fur¬ niture of the Sword) (in Burlington Fine Arts

Club Catalogue, London 1894) ; Conder, J., cThe History of Japanese Armor' (in Asiatic Soc. of Japan Trans. Yokohama 1881) ; Dean, B., (Handbook of Arms and Armor; European and Oriental' (in Metropolitan Museum of Art Collection, New York 1915) ; Dean, B., Cata¬ logue of Loan Collection of Japanese Armor in Metropolitan Museum of Art' (New York 1903) ; Egerton, W., (A Description of Indian and Oriental Armour' (London 1896) ; Gar butt, M., (Japanese Armour from the Inside) (in Japan Soc. of London Trans., London 1912-13) ; Gilbertson, E., (The Decoration of Swords and Sword Furniture' (in Japan Soc. of London Trans., London 1896) ; Hawkshaw, J. C., Japanese Sword-mounts) (London 1910) ; Jacoby, G., (Die Waffen in Alt-Japan' (in Zeitschrift fiir historische Waffenkunde Leipzig 1907) ; Hara Shinkichi, (Die Meister der Japanischen Schwertzierathen' (Hamburg 1902) ; Laking, Sir G. F., Catalogue Wallace Collection of Oriental Arms and Armour' (London

1914) ; MacClatchie, T. R. H., Che Sword of Japan; its History and Traditions' (in Asiatic Soc. of Japan Trans., Yokohama 1873) ; Mosle, A. G., (Japanische Kunstwerke' (Vol. II, Berlin 1909) ; Miiller-Beeck, G., (Die wichtigsten Trutzwaffen Alt- Japans' (in Deutsche Gesellschaft fiir Natiir und Volker- kunde Ostasiens, Yokohama 1814) ; Ogawa, K.,

(Military Costume in Old Japan' (Tokio 1893) ; Trau, F., (JaPanische Rustunge'n, Waf¬ fen, etc.' (in Heraldisch-genealogischer Verein Jahrbuch, Vienna 1881).

Clement W. Coumbe.

JAPANESE STUDENTS IN AMER¬ ICA. In the latter days of her hermitage, un¬ der the laws of exclusion and inclusion, for¬ mulated by Iyeyasu (q.v.), far-sighted Japan¬ ese urged the importation of foreign experts and the sending of young men to study abroad. In 1861, six were dispatched to Holland to mas¬ ter modern naval science. They returned to Japan in 1866 in a warship built at Amsterdam. Of these,. Akamatsu and Enomoto rose to be admirals in the. Japanese navy. Yokoi Heishiro sent to America his two nephews Ise and Numagawa in 1866, and a youth from Fu- kui, named Kusakabe. Another party of nearly a dozen lads from Satsuma had got away se¬ cretly and some of these were for a time with Thomas Lake Harris, in his settlement on Lake Erie; but all went sooner or later to New Brunswick, N. J., and into the grammar school or Rutger's College. Immediately on the forma¬ tion of. the new Imperial Government in 1868, Dr. Guido F. Verbeck, an American missionary at Nagasaki, who for eight years had urged the matter, went to Kioto and interested high officers in the enterprise, and scores of prom¬ ising young Japanese were sent abroad. Re¬ porting first to Rev. John Mason Ferris in New York, their adviser, they scattered into other institutions,, in order to learn English more rap¬ idly. Within a decade, they were found in al¬ most all the Northern States. Since 1866 the stream of these passionate pilgrims has been continuous, and with the war in Europe the ac¬ tual and relative number in the United States after 1914 became larger than ever. Of these students, the majority now come at their own expense, or are sent by relatives, yet the Im¬ perial Department of Education selects and

sends regularly special students, most of whom now being previously either professors or gradu¬ ates of the higher schools in Japan. From very incomplete but suggestive records since 1866, it seems that the overwhelming majority of these seekers after knowledge subsequent to their

re¬ turn home turn out well. Fully one-half fulfil careers above the average of the stay-at-homes. Probably 90 per cent of those coming pursue studies in the physical sciences and useful arts; others in law, history, ethics or political theory ; a still smaller but influential minority take courses in the language and literature or at¬ tend the theological seminaries. Over 30 are known as professors, instructors or trained as¬ sistants in American colleges or in bureaus of research. In the earlier years of this movement not a few inquirers went back more in love with Oriental civilization than before. Many fell victims to climate, overstudy or lack of harmony with their new environment. Soon, however, that elastic power of adaptation, which is part of the national genius, asserted itself. In both physical and mental health and in ac¬ ceptance of Occidental ideas, these students now .go back to hasten that union and recon¬ ciliation between the Orient and Occident that must make for the mutually advantageous bene¬ fit of the whole world and race. It is probably a moderate estimate that places the number of the Japanese students in America since 1866, who sought the higher institutions in prepara¬ tion for professional leadership at home, at not less than 20,000. Nor is this interest in educa¬ tion confined to the male sex. In 1872 six girls were sent to America, two graduating at Vas-sar and one at Bryn Mawr, who were later very influential in Japan; one being the Marchioness Oyama (q.v.), another the Baroness Uryu and a third, Miss Ume Tsuda, who has made a remarkable record as educator of women. She has been the soul of the move¬ ment which resulted in the opening of the Woman's Christian University in Tokio, 25 March 1918. Of the first school for girls, under government auspices, in Tokio, 1872, Miss Mar¬ garet C. Griffiths was the principal. After its evolution into the Tokio Female Normal School and the Peeress's School, several score Japan¬ ese girls have studied or graduated from Amer¬ ican women's colleges. The Japanese Student, a periodical which covers the interests of this class, is published in Chicago.

Bibliography. — Lanman, (The Japanese Students in America) (1872) ; Lewis, (The Ed¬ ucational Conquest of the Far East) (1903); Burton, (The Education of Women in the Far East) (1914) ; Griffis, (Verbeck of Japan (1900) ; Brown, S. R., (A Maker of the New Orient* (1902), (The Rutgers Graduates in Japan* (1916) ; and Blakeslee, (Japan and Jap¬ anese American Relations) (1912).*

William Elliot Griffis.

JAPANESE WAIFS IN AMERICA. The

question of the aboriginal peopling of the American continent, presumably from Asia, re¬ ceives light from the historic record of ships with men and women, mostly fishermen and boat people blown out to sea and into the

Kuro Shiwo (q.v.), whence they would drift or be carried to the shores of the Aleutian Islands, the coast of British America and the United States and thence to Hawaii. From time un¬

recorded, there has existed a current in which boats would be borne northward and eastward and yet for the most part be in sight of head¬ lands by day and be lighted at night by vol¬ canoes, in a part of the Pacific Ocean and in comparatively shallow water, wherein it was not impossible to obtain food. The marine myths of the Polynesians, Filipinos, Formosans and Japanese are reinforced by the numerous traditions of fishermen, sailors and passengers that went out but never returned. So long as the Pacific Ocean was unvexed by the keels of European or other large ships, there could be no record, but as soon as these appeared, which was after the edict of Iyeyasu (q.v.) in 1624, which forbade the building of sea-going vessels and commanded the destruction of those already built, leaving only junks and smacks, the record of waifs picked up at sea begins. From 1782 to 1876 there were collected, by C. W. Brooks of San Francisco, certified instances with dates of 49 Japanese junks wrecked, met or seen on American and Hawaiian shores. Of these, 19 stranded or their crews landed on the Aleutian Islands, 10 in Alaska or British America, 3 on the coast of the United States and 2 on Ha¬ waiian shores. All the others were picked up in the currents which flow from Japan and via Alaska to. California and bend to Hawaii. Some of these junks were black with age, full of live fish, water-logged or out over 18 months. An average crew of a junk is 10 men, not counting passengers. Of the number of live human be¬ ings noted, the average was 14, of those found dead 7 ; or, when not definitely stated, many, several, or a number. Reports of other instances of men landing from foundered junks are numerous, but without exact data. For several years after 1876 the writer cut out the references in newspapers to other waifs found, and instances still occur yearly; but probably not so often as in the era of non-ocean-going ships. Only a few instances of females found on board were noted, though Japanese women often live upon and go out on fishing boats with their husbands or kinsfolk. Arguments from language, physiognomy, customs, super¬ stitions, implements, flora, fauna, games and coins found are not wanting. Unaltered Japan¬ ese words are found in the Indian vocabularies of the Pacific Coast, and the entire field awaits a competent tiller. Of the waifs rescued, mostly by American captains, some returning to Japan became famous, such as Nakahama Manjiro and Heco (q.v.), who wrote books; Sam Patch, Dan Ketch, Kinzo and others, who acted as interpreters. Consult Griffis, Appen¬ dix to the first edition of (The Mikado's Em¬ pire (1876) ; Nitobe, (The Relations Between the United States and Japan* (1890).*

William Elliot Griffis.

*JAPANNING, the art of giving a brilliant finish to a surface by applying several coats of varnish, dried and hardened so as to be fixed. The article to be japanned is first brushed over with two or three coats of priming. It is then covered with varnish, previously mixed with a pigment of the tint desired. This is called the ground color; and if the subject is to ex¬ hibit a design, the. objects are painted upon it in colors mixed with varnish, and used in the same manner as for oil-painting. The whole is then covered with additional coats*of transparent*

varnish, dried or baked on and polished. The process is subject to considerable variation, being a combination of painting and partial enameling. See Lacquering; Varnish.

JAPHETH, a son of Noah and progenitor of the branch of the human race called Japhetic, born when- his father had attained his 500th year (Gen. v, 32). For his act of filial respect to his father (Gen. ix, 23-27) he received the latter's blessing and promise of future enlarge¬ ment, when his descendants would extend over the world, with Canaan his as well as Shem's servant. Married before the Flood, he and his wife were saved in the Ark. The birth of his seven sons occurred after the Deluge (x, 1). The name has been variously explained. Ac¬ cording to Gen. ix, 27, it is derived from an Aramaic root, signifying ((to exoand,® in allusion to the wide expansion of Japheth's descendants in the west of Europe and north of Asia, including Armenians, Medes, Greeks, Thracians, etc. Others trace it to the root "fair,® in reference to the light complexions of his posterity. The former derivation has most in its favor. Arab legend invests Japheth with wondrous powers (Weil, (Bibl. LegP viii, 46) and mentions 11 of his sons as founders of as many Asiatic nations. But the gift of imagination was not given to rabbinical and Mohammedan writers alone. Some more modern authors seek to identify Japheth with the Iapetos of Greek fable (Margoliouth in Hasting's (Dict. Bible), whose wife, Asia, bore Prometheus, civilization's founder. The word, too, has been loosely employed by some philologists in the term Japhetic or Indo- European languages, in contradistinction to Semitic and Hamitic. The homiletical tenden¬ cies of the rabbis are exemplified in the Midrashic comment on Gen. ix, 1, when God blessed Noah and his sons. In blessing Japheth He. promised that all of his sons should be white and gave as their portion deserts and fields. (Pirke R. El. xxiv).*

JAPIKS, ja'piks, Gijsbert, Frisian poet; b. Bolsward, 1603; d. 1666. He was carefully educated and became a schoolmaster at Bols¬ ward. He

made translations from French verse and also wrote a number of versions of the Psalms. His original verse was exception¬ ally _ meritorious and did much to restore the Frisian dialect to its place in literature. His (Friesche Rymlerge) (1668), was edited by Epkema (Leeuwarden 1821 ; with vocabulary and grammar,. 1825). Consult Halbertsma, (Hulde aan Gijsbert Japiks (Bolsward 1824; Leeuwarden 1827).*

JARARACA, zha'ra-ra'ka, a venomous South American serpent of the crotaloid family, classified as Lachesis jararaca, Bothrops jararaca , and also as Trimeresurus jararaca, a closely allied species being the labaria, Trimeresurus atrox, from which it is almost in¬ distinguishable. The jararaca ranges from the Amazon regions southward to Sao Paola and westward to Peru and Ecuador. The color is grayish brown, splotched with darker brown above and gray beneath with longitudinal rows of whitish or yellowish spots. The bite is gen¬ erally fatal.

JARDIN D'ACCLIMATATION, zhar'-

dan da'kle'ma'ta'syon', Paris, a plot of 50 acres

in the northwest angle of the Bois de Boulogne devoted to the acclimatization of foreign plants and animals. It was founded in 1854, and con¬ tains more animals, except beasts of prey, than the Jardin des Plantes. It has also a permanent exhibition of the processes and equipment of a dairy, aviary, greenhouses, poultry and carrier pigeon raising and gardening, and there is a winter garden and an aquarium. It forms a popular resort for pleasure and information.

JARDIN MABILLE, zhar'dan ma'bel', Paris, a popular resort of the demimonde founded 'by a dancer, Mabille, in 1840 and con¬ tinuing one of the showplaces of the city until its close in 1875. It was celebrated for its beautiful fittings and for its originations in dancing.

JARDIN DES PLANTES, zhar'dan da plant, Paris, a plot of 74 acres originally known as the Jardin du Roi, founded by Guy de La Brosse, physician to Louis XIII in 1635 as a garden for medicinal herbs. After the appoint¬ ment of the Comte de Buffon as director, in 1739, the menagerie, galleries of collections, libraries, laboratories and lecture-rooms were es¬ tablished there and since 1794 it has been known as the Museum d'Histoire Naturelle.

JARDINE, William M., American agrono¬ mist; b. Oneida County, Idaho, 16 Jan. 1879. In 1904 he was graduated at the Agricultural Col¬ lege of Utah and subseauently studied at the Graduate School of the University of Illinois. Until his 20th year he lived and worked on ranches in Idaho and

Montana ; in 1904 was made assistant in the department of agronomy, instructor in 1905, and professor in 1906 at the Agricultural College of Utah. From 1907 to 1910 he was engaged as assistant United States cerealist in charge of dry land grain investiga¬ tions. In 1910 he was appointed agronomist of the Kansas State Agricultural College and Ex¬ periment Station. For the first quarter of 1913 he was acting director of the Experiment Sta¬ tion and dean of agriculture and since April 1913 has served as director of the Kansas Ex¬ periment Station. Mr. Jardine is the author of numerous papers, and bulletins on dry farming and crop production. In 1915—16 he was presi¬ dent of the International Dry-Farming Con¬ gress and Soil Products Exposition. He is a member of the American Society of Agronomy, of which he was president in 1916—17, and Fel¬ low of the American Association for the Ad¬ vancement of Science. Mr. Jardine is one of a group, including Willet M. Hays, Niels E. Hansen and others, who have wrought effec¬ tively in the uplift of agriculture in recent years.

JARNAC, zhar'nak, France, town in the department of Charente, on the river Charente, 23 miles west of Angouleme. It has a large trade in brandy and wine and manufactures wine casks. It was the scene, 13 March 1569, of the defeat of the Huguenot forces under Conde and Coligny by the Catholics under the Duke of Anjou. Pop. 4,894.

JARNEFELT, yer'ne-felt, Armas, Finnish

composer; b. Wiborg, 14 Aug. 1869. He studied under Wegehus and Busoni at the Conservatory at Helsingfors, under Massenet at Paris and Becker at Berlin. He became conductor of the theatre at Magdeburg in 1897, at Dusseldorf

in 1898, and principal conductor of the Royal Opera at Stockholm in 1907. He succeeded Wegelius as director of the Helsingfors Con¬ servatory in 1906. Among Finnish composers of the present day he ranks next to Sibelius. Author of a number of overtures, suites for °t,CˆeSˆra' ˆoral work with orchestra, male choruses, piano compositions, serenades, fan¬ tasies and the symphonic poem 'KorsholmP

JARO, ha ro, Philippine Islands, name of two towns: (1) In the northern pa of Leyte Island, 15 miles southwest of Tacloban, in a mountainous district. Pop. about 12,475. (2)*

In the province of Iloilo, Panay, on the Jaro River, two miles northwest of

the capital city, Iloilo. It was founded by the Spanish in 1584, and in 1903-08 it was a part of the municipality of Iloilo, but resumed its separate identity. It is situated in a rich agricultural district producing sugar, and manufactures silk, cotton and pina tissues. Pop. 10,681.

JAROSITE. A mineral consisting of a hydrous potassium ferric sulphate, K20 3Fe20s 4S03.6H20. It is common in many mines of Ltah but of no economic value.

JAROSLAU, ya'ro-slou', Poland, town in Galicia, 17 miles northwest of Przemysl, on the river San, and on the railroad between Lemberg and Cracow. It is a garrison town, has manu¬ factures of textiles, pottery and brandy, and is an active trading centre. In the European War the town was twice taken by the Russians in the operations around Przemysl. Pop. 24,974.

JARRATT, Devereux, American colonial clergyman: b. New Kent County, Va., 6 Jan. (O.S.) 1732-33; d. Bath, Va., 29 Jan. 1801. He was largely a self-educated man. In 1762 he went to England in order to enter the minis¬ try of the Established Church and receive orders. On his return he began his long serv¬ ice of nearly 30 years at Bath, Va. In the be¬ ginning of the Methodist movement in America he was very friendly with the leaders, especially Bishop Asbury, who makes frequent mention of him in his 'Journalˆ He published 'Ser¬ mons on various and important subjects in practical Divinity > (3 vols., 1795). His 'Auto- biography) appeared in 1806.

JARRIC, zhar'rek, Louis Etienne, Chev¬ alier de, West Indian revolutionist : b. Aux Cayes, Haiti, 1757; d. there, 21 Feb. 1791. He was a mulatto, the natural son of a wealthy creole nobleman and had no claim to the title he assumed, but was well educated and pos¬ sessed of means. He served as a captain in the French Revolution and was member of the Assembly in 1789. He organized a society "Amis des Noirs® (Friends of the Blacks) with the purpose of securing equal recognition with the whites. Failing to gain his purpose he engaged with Oge in an armed revolution in San Domingo in October 1790, their forces were defeated and Jarric was captured and put to death by torture.

JARROW-ON-TYNE, England, municipal borough in Durham, on the estuary of the Tyne, about six miles east of Newcastle, and on a branch of the Northeastern Railway. The parish church of Saint Paul was built in 685 and still shows much pre-Norman work, al¬ though the tower is Norman. The Benedictine monasterv was founded in 681 and was the abode

of the Venerable Bede. The town was of little commercial importance until the establishment there of large shipbuilding yards and marine- engine works. There are also iron foundries, gun factories, chemical works and paper mills, and there are large exports of coal. The town was incorporated in 1875. Pop. 33,726.

JARVES, jar'ves, James Jackson, Ameri¬ can art writer : b. Boston, Mass., 20 Aug. 1818; d. Tarasp, Switzerland, 28 June 1888. In 1838, he sailed for the Sandwich Islands and resided for several years in Honolulu where he pub¬ lished the first newspaper ever printed there, the Polynesian. Before returning to the United States he traveled in California, Mexico and Central America, and subsequently published a 'History of the Hawaiian or Sandwich Islands) (1843) ; 'Scenes and Scenery of the Sandwich Islands* (1844), and 'Scenes and Scenery in California* (1844). He afterward resided in Europe, was United States vice-consul at Flor¬ ence 1879-82, and engaged in making a collec¬ tion of old masters the largest part of which, consisting of early Italian masters, eventually became the property of Yale University. Another collection, of Venetian glass, is now at the Metropolitan Museum, New York. For his services to Italian art he was made a chevalier of the Crown of Italy. His later works include 'Parisian Sights and French Principles) (1855- 56); 'Art Hints) (1855); Italian Sights and Papal Principles* (1856) ; 'Kiana, a Tradition of Hawaii* (1857); 'Confessions of an Inquired (1857) ; 'The Art Idea) (1864) ; 'Art Studies: The Old Masters of Italy) (1861) ; 'Glimpses at the Art of Japan> (1876) ; 'Italian Rambles) (1884). Consult Bunner, A. C, 'The Jarves Collection of Italian Pictures in the Galleries of the Yale Art School* (in Scribner's Maga¬ zine, Vol. LII, p. 253, New York 1912) ; Siren, O., 'A Descriptive Catalogue of the Pictures in the Jarves Collection belonging to Yale Uni- versity) (New Haven 1916).

JARVIS, Edward, American physician : b. Concord, Mass., 9 Jan. 1803; d. Dorchester, Mass., 31 Oct. 1884. He was graduated at Harvard in 1826 and at the Harvard Medical School in 1830. He engaged in practice at Northfield and Concord, Mass., Louisville, Ky., and after 1842 at Dorchester, Mass. He made a sanitary survey of Massachusetts under orders of the government in 1855, and in 1860 was appointed by the Secretary of the Interior to tabulate the mortality statistics of the United States census of that year. He was president of the American Statistical Association from 1852 until his death. Author of numerous medical reports and 'Practical Physiology* (1848) ; 'Primary Physiology for the Schools)

(1849).

JARVIS, John Wesley, American portrait painter: b. South Shields, England, 1780; d. New York, 1834. He was a nephew of the great John Wesley and was sent to Philadelphia at the age of five. He was principally self-taught, and settled in New York where his portrait work early gained recognition. He studied anatomy and phrenology in their relation to art, and he was especially successful in secur¬ ing a characteristic likeness. His sitters in¬ cluded Gen. Andrew Jackson, Gov. De¬ witt Clinton, Fitz-Greene Halleck, Bishop Benjamin Moore, John Randolph and many

other prominent persons. He was a man of erratic temperament and convivial habits and his mode of life eventually injured his work. His wit and eccentricities were famous and his popularity enabled him to live extravagantly for a time, but he eventually died in poverty. Two of his portraits are in the Metropolitan Museum, New York, and others are in the city hall and in the collection of the New York Historical So¬ ciety. Both Sully and Inman studied under him.

JARVIS, Samuel Farmer, American Prot¬ estant Episcopal clergyman : b. Middletown, Conn., 20 Jan. 1786; d. there, 26 March 1851. He was graduated at Yale in 1805, ordained in 1811, and was appointed rector of Saint Michael's Church, Bloomingdale, N. Y. In 1813 he became rector of Saint James' Church, New York and retained both charges until 1819 when he became professor of biblical learning at the General Theological Seminary. In 1820-26 he was rector of Saint Paul's, Boston, and after¬ ward spent nine years in Europe in the study of church history. He was professor of Oriental literature at Washington (now Trinity) College, in 1835-37, and in 1837-42 he was rector of Christ Church, Middletown, Conn. He was appointed historiographer of the Epis¬ copal Church of America in 1838, and after 1842 devoted himself to literature. He was one of the editors of the Gospel Advocate in 1821— 26. Author of (A Discourse on the Religion of the Indian Tribes of North America) (1820) ; (A Chronological Introduction to the History of the Church) (1844) ; (The Church of the Redeemed (Vol. I, 1850), etc.

JASHER, ja'sher, Book of, a lost book of the Hebrew Scriptures, twice mentioned in the Bible (Josh, x, 13, and 2 Sam. i, 18), and about which various conjectures have been made. It was most probably a national song book of post-Solomonic age whose concerts were partly secular, partly religious. From the mention of the book in Joshua and 2 Samuel it has been inferred that the book of Jasher could not have been written before the time of David's lamentation. But this assumes that the book of Jasher

was all written at once, an assumption which in our ignorance regarding it we are not at liberty to make; for the book of Jasher may have been written at different times. The the¬ ory of Dr. Donaldson as to its scope and con¬ tents, in conformity with which he proceeded to reconstruct it from the fragments which he thought he could trace throughout the several books of the Old Testament, has met with lit¬ tle favor either from English or Continental scholars. Consult Donaldson, (Fragmenta Archetypa Carminum Hebraicorum in Masore- thico Veteris Testamenti Textu passim tessel- lataP

JASMIN, zhas'man', Jacques Boe, Pro¬ vencal poet: 'b. 6 March 1798; d. 4 Oct. 1864. Of humble parentage, he became a wig-maker ; but devoted all his leisure to reading and study. From his father he inherited a talent for the composition of poems and songs in the Pro¬ vencal tongue. His local poems, especially those composed for the carnival and the country fairs, became quite popular. In 1825 he pub¬ lished (Lou ChalibaryP a mock-heroic poem which found readers throughout the langue d'oc country. (Lou Tres de May (1830), an*

ode of great power and beauty, made him famous throughout France and Provencal Spain. Then followed poems relating to the humble life from which he had sprung and filled with remembrances of the joys and sorrows of his childhood days, and like the minstrels of olden time he went about from village and town to village and town reciting his poems. (Las Papillotos (1835) contained the best of his poems up to that date. Other collections fol¬ lowed in l842, 1851 and 1863. He was hailed by the Paris critics as a great poet. Of his longer poems, the best known, most popular and of greatest merit is (Frangounetto) (1842), a dramatic and touching story of thwarted love, in which village superstitions and prejudices are painted in a most vivid and realistic manner. Literary honors were showered upon him not only in the Provencal country but throughout France. Among those who publicly recog¬ nized his genius were Louis-Philippe and the Duchesse d'Orleans. His poetical recitations brought out more people than the theatres and he was in demand everywhere for the inaugu¬ ration of societies, the consecration of churches and similar functions ; and always the funds taken in at these functions were devoted to charitable purposes.*

JASMINE, or JESSAMINE, a genus (Jasminum) of beautiful plants of the olive family, including many cultivated species and varieties. Most of these are shrubs with long slender branches bearing usually compound leaves and panicles of fragrant white or yellow flowers. They are natives principally of the East Indies. The common jasmine (/. offici¬ nale) has become naturalized in the south of Europe, where it grows 8 or 10 feet tall, and is practically an evergreen. The oil of jasmine is obtained from J. officinale

and J. grandi- florum, but it is usually imitated or adulterated. J. sambac also furnishes an oil in the East. A very common greenhouse species is /. humile.

Several shrubs are called jasmines which are not closely related to the true jasmine. Thus the red jasmine of the West Indies (Plumeria rubra), the source of the perfume frangipanni, is of the oleander family; the Chile jasmine (Mandevillea suavolens) , is an¬ other fragrant species of the same family, widely cultivated, and others might be mentioned. Two of these outside ˆjasmines® are familiar in the United States, one of which is a native. The Cape jasmine (Gardenia florida) is a Chinese shrub of the madder family, which found its way to England and America about the middle of the 18th century ; a double- flowered variety is sometimes grown in green¬ houses and it grows out of doors along the southern seaboard, it being the special pride of Charleston, S. C., after one of whose citizens the genus Gardenia was named by Linnaeus.

The native species is the Carolina or yellow jasmine (Gclsemium sempervirens) , an exceed¬ ingly odorous climbing plant of the family Loganiacece , common throughout the South At¬ lantic States. It is a vine, whose blossoms grow in axillary racemes of from one to six vivid yellow tubular flowers ; and "evening trumpet-flower® is a common name. "Early laden, indeed, is the warm air of spring with its delicious perfume. . . . Through woods and thickets it wends its way vigorously and gleams

- as 1),iˆtly as does later the Cherokee rose. It is one of the joys of the season. ® The roots are regarded by the country people as possessed of medical virtues.

JASON, a Jewish high priest in 174-71 b.c He was the second son of Simon II and a brother of Onias III, whom he succeeded in the nigh pnesthood. He is stated by Josephus (Ant. xn, 5, 1) to have changed his name to Jason Irom Jesus, and he is said to have paid ˆ°r aPP°intment as high priest. Vvhilc.Omas was answering the charges of the Hellenists, Jason is supposed to have joined forces with them. He secured permission to bund at Jerusalem a gymnasium and an ephe- bum, and by payment of a further sum gained for the people of Jerusalem the title and privi¬ leges ot citizens of Antioch. He furthered by all means in his power the spread of Hellenism and sent competitors, and a large sum of money for a sacrifice to Hercules, to the Olympian games at Tyre. He was succeeded by Mene- inus in 171 b.c., but in the absence of Antiochus Epiphanes in a campaign against

Egypt in 170 b.c., he rallied the people to his aid and forced Men elans to take refuge in a fortress. His seizure of power was soon followed by the re¬ turn of Antiochus who took the city, and Tason m his turn was expelled. He took refuge with the Ammonites and finally with the Lacedae¬ monians, among whom he died. Consult 2 Mac¬ cabees iv, 7-26; Josephus, < Antioch > (xii, 5); Stanley, (Lectures on the History of the Jewish Church (iii, 324) ; (Wellhausen, Hsraelitische und Judische Geschichte* (2d ed., p. 235, Berlin*

1 895) .

JASON, in Greek legend, the son of 2Eson, king of Iolcos in Thessaly, a hero of ancient Greece, celebrated for his share in the Argo- nautic expedition, before which he had distin¬ guished himself in the Calydonian hunt. He belonged to the family of the ./Eolidae at Iolcos, and his instructor was the centaur Chiron, who educated most of the heroes of that time. (For his adventures in the Argonautic expedition see Argonauts). On his return to Iolcos with Medea as his wife he avenged the murder of his parents and his brother by putting Pelias to death. But he was unable to retain possession of the throne, and was obliged to resign it to Acastus, son of Pelias, and flee with his wife to Corinth. Here they passed 10 years, till Tason, wearied of Medea, fell in love with Glauce (Creusa, according to some accounts), daugh¬ ter of Creon, king of Corinth, married her and put away Medea and her children. Medea, hav¬ ing revenged herself on her hated rival, fled from the wrath of Jason in her car drawn by winged dragons, the gift of Helios, to zEgeus, king of Athens, after she had put to death Mer- merus and Pheres, her sons by Jason. Accord¬ ing to some Jason killed himself from grief; but others relate that, after passing a miserable wandering life, he came to his death by acci¬ dent. Others say that he was reconciled to Medea and returned with her to Colchis, where he ruled many years.

JASON OF CYRENE, a Hellenistic Jew whose history of the times of the Maccabees, written originally in five books now lost, is embodied in 2 Maccabees, reference to the origi¬ nal historian being made in 2 Maccabees ii,

19 32. Nothing is known of Jason except the references to him in 2 Maccabees.

JASONVILLE, Ind., village of Greene

County, 25 miles southeast of Terre Haute, on the Chicago, Terre Haute and Southeastern

P ˆas r*ch deposits of coal. Pop.

(1920) 4,461.

JASPER, William, American soldier: b. South Carolina, about 1750; d. Savannah, Ga., ‘ 17/9. At the commencement of the Revo¬

lutionary War he enlisted in the 2d South Caro¬ lina regiment, in which he became a sergeant. Subsequently, in the attack upon Fort Moultrie by a British fleet, he distinguished himself by leaping through an embrasure to the ground, under a shower of cannon balls, and recovering the flag of South Carolina, which had been shot off. Governor Rutledge presented him with his own sword .and offered him a lieutenant’s com¬ mission; this, however, Jasper declined, saying: ‘T am not fit to keep officers’ company; I am but. a sergeant.** His commander gave him a roving commission to scour the country with a few men and surprise and capture the’ enemy’s outposts. His achievements in this capacity seem to belong to romance rather than history and in boldness equal any recorded in the Revo¬ lutionary annals of the Southern States. Promi¬ nent among them was the rescue by himself and a single comrade of some American captives from a party of British soldiers, whom he over¬ powered and made prisoners. At the assault upon Savannah he received his death wound while fastening to the parapet the standard which had been presented to his regiment. His hold, however, never relaxed, and be bore the colors to a place of safety before he died. A county of Georgia and a square in Savannah have been named after him. Consult McGrady,

‘ South Carolina in the Revolution (1901).

JASPER, Ala., village and county-seat of Walker County, 35 miles northwest of Birming¬ ham, on the Alabama Central, the Saint Louis and San Francisco, the Illinois Central and Northern Alabama railroads. It is situated in

2 509mportant coal and cotton district- Pop-

jasper, Ind., town, county-seat of Dubois County, on the Patoka River, and on a branch of the Louisville, Evansville and Saint Louis Railroad, about 47 miles northeast of Evans¬ ville. Jasper is situated in an agricultural re¬ gion. The chief manufacturing establishments are saw-mills, lumbering and planing-mills, flour-mills, a furniture factory and a brickyard. Pop. (1920) 2,539.

JASPER, an ‘impure quartz, less hard than flint or even than common quartz, but which gives .fire with steel. It is entirely opaque, or sometimes feebly translucent at the edges, and presents almost every variety of color.

It is found in metamorphic rocks and often occurs in very large masses. It admits of an elegant polish and is used for vases, seals, snuff-boxes, etc. There are several varieties, as red, brown, blackish, bluish, Egyptian. Ribbon or agate jasper is jasper in layers.

JASPER WARE, a white terra cotta or porcelain bisque invented by Josiah Wedgwood and used for the delicate reliefs in his cameo ware. It is also used for jewelry settings and statuettes. See Wedgwood Ware.

JASPILITE, a compact siliceous rock sim¬ ilar to jasper in appearance. Its occurrence in the Lake Superior region is of economic im¬ portance as it appears invariably above the ore- bearing formation.

JASSY, yas'se, Rumania, the former capi¬ tal of Moldavia, on the Bahluiu River. There is a university with 900 students ; the industrial enterprises are few; but the commerce is ex¬ tensive and important. The chief exports are petroleum, grain, meat and salt; the chief im¬ ports are coal and clothing. A treaty between Russia and Turkey was concluded here in 1792. It was in Jassy, in 1821, that Alexander Ypsi- lanti really began the work for Greek independ¬ ence. About one-half the population are Jews. Pop. 75,882, about 33 per cent being Jews.

JASTROW, yas'tro, Ignaz, German econo¬ mist and historian: b. Nakel, 13 Sept. 1856. He was educated at Breslau, Berlin and Got¬ tingen, and in 1885 was appointed privat-docent of social economy at the University of Berlin. He visited the United States in 1904 and since 1905 has been professor of administrative sci¬ ence at Berlin. He edited the Jahresberichte der Geschichtswissenschaft in 1888-91 ; the So- ciale Praxis in 1895-97 ; since 1896 he has edited Das Gewerbegericht, and since 1897 Der Ar- beitsmarkt. Author of 'Geschichte des deutschen Einheitstraumes und seiner Erfiillung) (1884; 4th ed., 1891) ; (Die Volkszahl Deutscher Stadte am Ende des Mittelalters und zu Beginn der Neuzeit' (1886) ; 'Das interesse des Kauf- mannsstandes am Biirgerlichen Gesetzbuch) (1890); 'Biirgertum und Staatsverwaltung' (1907) ; 'Cedachtnisrede auf Dunker) (1911) ;

(Arbeiterschutz> (1912) ; (Geld und Kredit' (1914), etc.

JASTROW, jas'tro, Joseph, American psy¬ chologist : b. Warsaw, Poland, 30 Jan. 1863. He is a son of Rabbi Jastrow (q.v.) and came to America in childhood. He was graduated from the University of Pennsylvania in 1882

and has been since 1888 professor of psychology at the University of Wisconsin. He became president of the American Psychological Association in 1900. In 1893 he was head of the psychological section at the World's Columbian Exposition. He contributed to the Psychological Review, of which he was associate editor and to other scien¬ tific and popular magazines. He is editor of (The Conduct of Mind Series) and has pub¬ lished (Time-Relations of Mental Phenomena) (1890) ; (Epitomes of Three Sciences) (1890) ; 'Fact and Fable in Psychology) (1900); 'The Subconscious) (1906) ; 'The Qualities of Men) (1910) ; 'Character and TemperamenG (1915).

JASTROW, Marcus M., American rabbi and lexicographer: b. Rogasen, Posen, 1829; d. Germantown, Pa., 13 Oct. 1903. . After the usual rabbinic and academic studies he was graduated from the University of Halle in 1854, became a barber in Berlin and then rabbi at Warsaw. After five years he was obliged to leave by reason of his political opinions, after being subjected to arrest. He was rabbi in Baden 1859-63, at Worms 1863-66, whence he was called to the Congregation Rodef Sholen, Philadelphia, with which he was connected until his death, within recent years (1892-1903) as rabbi emeritus. Besides some monographs and contributions to the press, he is best known for his 'Dictionary of the Targumim, the Talmud

Babli and Yerushalmi, and the Midrashic Liter¬ ature > (16 narts, 1904), a monument of untiring erudition and broad scholarship. He edited the Talmudic department of the 'Jewish Encyclo¬ paedia.'

JASTROW, Morris, Jr., American Orien¬ talist: b. Warsaw, Poland, 13 Aug. 1861; d. Tenkintown, Pa., 22 June 1921. Coming to Philadelphia with his parents in early child¬ hood (1866), he was trained in the schools of that city, was graduated from the University of Pennsylvania in 1881, and from the Univer¬ sity of Leipzig 1884, receiving the degree of Ph.D., after which he spent another year in the study of Semitic languages at the Sorbonne, the College de France and the Ecole des Langues Orientales Levant Vivantes. He had intended to devote himself to the Jewish ministry, carry¬ ing on for this purpose theological studies at the Jewish Seminary of Breslau (Germany) while pursuing the . study of Semitic languages at German universities. On his return to the United States in 1885 he was appointed assist¬ ant to his father in Philadelphia, which position he voluntarily resigned after one year,, in order to devote himself entirely to linguistic and archaeological studies. He gradually extended his field to include the history of religions. He v/as connected with the University of Pennsyl¬ vania after 1885, first as instructor in Semitic languages and afterward, in 1891,. appointed to the chair of Semitic languages which position he held till his death. In 1888 he was made assistant librarian of the university, and in 1898 librarian-in-chief. His published works are

‘Religion of the Assyrians and Babylonians’ (1898) ; ‘Two Grammatical Treatises of Abu Zakariyya Hayyug’ (1897); ‘A Fragment of the Babylonian Dibbarra Epic’ (1891) ; ‘The Study of Religion) (1901) ; ‘Aspects of Reli¬ gious Practice and Belief among the Babylo¬ nians and Assyrians) (1911) ; ‘Die Religion Babyloniens und Assyriens) (3 vols., 1905— 12), an enlarged and entirely rewritten Ger¬ man edition of the English work above, to¬ gether with a separate volume of illustrations bearing on the religion of the Babylonians and Assyrians; ‘Bildermappe zur Religion Babylo¬ niens und Assyriens> (1912) ; ‘Hebrew and Babylonian Traditions’ (1914) ; ‘Babylonian- Assyrian Birth Omens and Their Cultural Sig- nificance) (1914) ; and ‘The Civilization of Babylonia and Assyria’ (1915). In collabora¬ tion with his wife (Helen Bachman Jastrow) he edited an English translation of ‘Selected Essays of James Darmesteter’ (1895), the translation from the French being made by Mrs. Jastrow, and he adding a memoir of Darmes¬ teter. In addition to the above he published a large number of papers on Assyriological, Biblical and Hebrew topics, as well as arti¬ cles dealing with the history of religions and with archaeological problems in ‘the periodicals of learned societies of America and Europe and in technical periodicals of various parts of the world. He. was also a contributor to vari¬ ous Bible dictionaries, to the ‘Jewish Encyclo¬ pedia,’ ‘Encyclopedia Britannica,’ ‘Interna¬ tional Encyclopedia,’ to ‘Webster’s Dictionary,’ etc. A bibliography of his books, monographs and papers, covering the years 1885-1916, was compiled and published (for private circulation) by Profs. A. T. Clay and J. A. Montgomery.

JASZBERENY, yas-be-ran-y, Hungary, town of the District of jasz-Nagykun Szolnok, on the Zagyva, 40 miles east of Budapest. It is situated in an agricultural district and has a trade in grain and livestock. There is an agri¬ cultural school, a museum and an interesting Franciscan cloister. Pop. 29,675.

JATAKA, ja’ta-ka, a collection of 547 stories of the different births of Buddha, known to have been in existence as early as 380 b.c. The book is written in the Pali language and forms a part of the Buddhist sacred canon. It is evi¬ dent that the identification of Buddha with the heroes of the fables and stories current in India began soon after his death. The leading character in each fable was made a Bodhisatta, one who is destined through rebirths to be¬ come a Buddha, and the stories deal with the wten perfections, w generosity, goodness, renun¬ ciation, wisdom, energy, patience, truthfulness, resolution, kindness and equanimity. The ex¬ istence of the Jataka stories in the original Pali text forms a valuable contribution to the knowledge of folklore, as its antiquity insures its freedom from Western influences or color¬ ing. On the other hand, various versions

found their way through Sanskrit and Old Persian into European literature and form the basis of many Western fairy tales and fables, among them those of ZEsop. Bas-reliefs illustrating the Jatakas were in existence as early as the middle of the 3d century b.c. The Jataka was trans¬ lated into English under the direction of E. B. Cowell assisted by Chalmers, Rouse, Francis and Neil (7 vols., Cambridge 1895-1913). An earlier edition of the Jataka in the Pali text was edited by Fausboll (7 vols., London 1879- 97). The introduction to the old Jataka book in the original Pali gives a life of Buddha which was translated into English by T. W. Rhys Davids (London 1880). Consult Kern, H., ataka-mala Sanskrit text (Cambridge, Mass., 1891 ; Eng. trans., Speyer, J. S., Oxford, 1895) ; (Buddhist India) (chap. XI, London 1903) ; Kuhn, E., (Barlaam und Joasaph) (Munich 1893) ; Cunningham, A., (The Stipa of BarhuD ('London 1879).

JATROPHA, jat'ro-fa, a genus of euphor- biaceous plants of the tribe Crotonece, tropical and chiefly American. They are of interest principally for their medicinal properties, which reside mostly in the seeds. These, in the case of Jatropha curcas, are called Barbados or physic nuts, — the last in allusion to their pur¬ gative power. The so-called jathropha-oil is extracted from the seeds of the coral-plant (/. multi fid a) and of the East Indian /. glauca, and is used externally as a stimulant. A com¬ mon species in the southern United States is the spurge-nettle or tread-softly (/. stimulosa) . See Manihot.

JATS, jats, the most numerous of the agri¬ cultural population of the Punjab, India, num¬ bering about four and a half millions. They are by many identified with the Getce; and some of the best authorities accept the theory that they are descended from Scythian invaders of India in prehistoric times. Some scholars be¬ lieve them cognate with the Gvpsies (q.v.). Their religion is Mohammedan. Thev are tall, light brown in coloring, with long faces, high forehead and clean-cut features. Consult Ris- ley, H., (The People of India (Calcutta 1908).*

JAUNDICE, jan'- or jan'dis, a morbid con¬ dition arising from the circulation of bile in the blood, with consequent staining of the tissues and a peculiar train of symptoms resulting from the poisoning. The tint of the skin and certain mucous membranes varies from a light yellow to a brownish or saffron hue. Staining of the conjunctiva is first observed, and is most in¬ tense. Jaundice, with reference to its origin, may be either obstructive or toxic. The term obstructive means causing a hindrance to the outflow of the bile from the gall-ducts into the intestine, with its consequent absorption into the hepatic vein and general circulation. Not only is the skin stained, but all the secretions as well, the urine becoming dark brown. As no bile is thrown into the intestine, the stools become clay- colored and usually hard. There is frequently distressing cutaneous itching, and other

skin- maladies are not uncommon. The blood par¬ tially loses its power of coagulation, and the vessels are apt to allow the escape of blood into the tissues, giving rise to purpuric spots. The pulse is usually slow, and the patient somewhat melancholic. In bad cases death may follow a period of convulsions, delirium or coma. The cause of this obstruction may be anything oc¬ cluding the lumen of the ducts from within as catarrh of the membrane of the intestine, where the bile-ducts open, or catarrh anywhere along the course of the ducts; stones or thickened bile may block up some part of the tubes, or they may be occluded from pressure on the outside by tumors, constricting bands or shrinking of the liver-substance. (See Liver, Diseases of the). The toxic form of jaundice is due to the circulation of poisons in the blood which break down the red cells or, more rarely, destroy the liver cells. The jaundice in this form is not so intense, and the other symptoms caused by the poison are of more importance. Many of the infectious diseases, such as influenza, typhoid fever, yellow fever, pneumonia, pyaemia and acute atrophy of the liver, cause this form. Mineral poisons, particularly phosphorus, act in the same way. Jaundice in the new-born is so common as to be considered a natural condition, and usually lasts but a few days. It is evident from the many conditions that may give rise to jaundice that it must be considered as a symp¬ tom, and treatment should be directed to aiding the bodily functions until the exact cause can be determined.

JAUNPUR, j own-poor, British India, city in the district of the same name in the Benares division, on the river Gumti, 34 miles by rail northwest of Benares. It is a city of great antiquity and was formerly the capital of a Mohammedan kingdom extending from Budaun and Etawah to Behar. It has many fine archi¬ tectural monuments, among them a gateway of the 16th century, a mosque dating from 1376, the baths of Ibrahim Shah, the bridge over the Gumti, built in 1569-73, and other splendid re¬ mains. The city was a centre of revolt during the Indian mutiny in 1857. While it is famous for its perfumes it is no longer commercially important. Pop. 30,473.

JAUREQUI AGUILAR, hou'ra-ge e a'ge-lar, Juan Martinez de, Spanish poet : bap¬ tized Seville, 24 Nov. 1583; d. Madrid, 11 Tan. 1641. He studied at Rome and in 1610. is known to have been in Spain with a reputation

as both painter and poet. He is supposed to have painted the portrait of Cervantes men¬ tioned in the prologue to (novelas exemplares^ which is

believed to be the one now in the pos¬ session of the Real Academia Espanola ; and his translation of Tasso's (Aminto) (Rome 1607) is praised in the second volume of (Don Quixote. > His (Rimas> (1618) comprised a collection of charming lyrics, and in its preface the poet severely scored the affectations of the school of Gongora. He was appointed groom of the chamber to Philip IV through the influ¬ ence of Olivares, and afterward won the Order of Calatrava through his spirited presentment of his views of the art of poetry in (Discurso poetico contra el hablar culto y oscuro) (1624). Later, however, Jaurequi fell under the influ¬ ences he had so strenuously combated, his XLII, Madrid 1857) . His translation of the (Aminto) was edited by Lopez de Sedano in (Parnaso espanoP (Vol II Madrid 1768-78).

JAURES, Jean Leon, zhoii la-on zho-ra, French Socialist: b. Castres, 3 Sept. 1859; d. Paris, 31 July 1914. He taught in Albi and Toulouse, and in 1885 entered politics and was elected to the Chamber of Deputies from Tarn ; at this time he was a moderate Republican. In 1889 he failed of re-election, and returned to Toulouse, where he was. active in the establish-ing.of a college of medicine. Becoming a So¬ cialist, he defended the strikers at Carmaux, and in 1893 was again elected to the Chamber' where he became one of the leaders of the So¬ cialists. . He failed of re-election in 1898, but was again elected in 1902. When the Socialist Millerand accepted a position in the Cabinet, Jaures defended his action, thus opposing Guesde and the Parti Ouvrier, but sought at the same time to reconcile the factions. He also took an important part in obtaining a revision of the Dreyfus case. He stood out as a cham¬ pion of the workmen in the great strike of 1910. At a Socialist conference in Brussels in the. summer of 1914 he made a strong attack on militarism, and declared himself in favor of an international strike for the prevention of war — an attitude which subjected him to severe criti¬ cism, and was directly the cause of his assassi¬ nation by shooting at the hands of a half-de¬ mented man outside a cafe in Paris. He was one of the greatest leaders of French Socialism, and probably the greatest orator in the Cham¬ ber of Deputies. He founded L'Humanite in 1904, and contributed six of the 12 volumes of the cHistoire Socialiste) (1904-08).

JAVA, ja'va (native, Siti-Java or Yava, land of millet), an island of Dutch East India; situated between lat. 5° 52′ (Saint Nicholas Point), and 8° 50′ (South Cape) S. ; and long. 105 13′ and 114° 39′ E. The island is bounded on the north by the Java Sea, on the east by Bali Strait, which separates Tava from Bali Island, on the south by the Indian Ocean and on the west by Sunda Strait which separates the island from Sumatra. It extends east and west, declining 15° toward the south. It is about 660

miles long, from 40 to 125 miles wide, and the area is about 48,686

square miles. The Indian Ocean, which beats with great force along the south coast, has prevented the formation, on that side, of such alluvial plains as extend along the north coast. From the same cause the south coast is generally unsafe for shipping, while the north affords excellent anchorage at almost all times and places. The south presents a continuous front of crags and rocks, forming the outer edge of an extremely mountainous country; the north is flat and low, and covered in many places with mangrove swamps. The chief harbors on the north are those of Sura¬ baya and Batavia ; on the south that of Chilat- jap, formed by the small island Kambangan.

Topography and Hydrography. — The whole configuration of the island has been trans¬ formed by volcanic action. There are at least 45 volcanoes in Java, of which half are active. In the western end of the island they are grouped in a mass and attain a height of 10,000 feet, but in the eastern portion, though more scattered, they are generally higher, one, Semeru, 12,044 feet, being the highest in the island. Among the chief are Salak (7,266), near Batavia, now extinct; Gede (9,720) ; Tjirmaj (10,075); Marbabu (10,670); Rauu (10,820); Slamar (11,250). Papandayang, in the southwest, destroyed about 3,000 persons in 1772. In 1822 great damage was done 'by the eruption of Galungung, one of the volcanoes in the western part of the island. In 1686, about 10,000 lives were lost by the eruption of Ring ghit, once over 12,000 feet high, but now a low mountain. The eruption of Kloet (q.v.), in 1901, was most disastrous. The eruption of Krakatoa (q.v.) in 1883, was one of the horrors of modern times.

The island is subject to earthquakes, usu¬ ally not severe. Three earthquakes are known to have preceded and 19 accompanied volcanic eruptions. In 1867 occurred a most destructive earthquake. A low range of non-volcanic hills, about 3,000 feet high, extends along the south coast. The crater of an extinct volcano called Guwa Upas, or the Vale of Poison, about one- half mile round, is held in horror by the natives. It is said that every living creature that enters it drops dead, and the soil is covered with the carcasses of deer, birds, and even the bones of men, killed by the carbonic acid gas which lies in the bottom of the valley; but its terrors have been much exaggerated. «In another crater in this land of wonders,® says Sir Charles Lyell, ((the sulphurous exhalations have killed tigers, birds and innumerable insects; and the soft parts of these animals, such as the fibres, mus¬ cles, hair, etc., are very well preserved, while the bones are corroded or entirely destroyed.® Numerous rivers flow from the north and south sides of the mountains, carrying fertility with them, and affording supplies to innumer¬ able artificial water-courses used in irrigation. These streams are. generally rapid, shallow and so encumbered with sandbanks as not to be navigable ; so that only two rivers, the Solo and the river of Surabaya, are navigable for large boats; the others are only suitable for proas or

canoes of the lightest draught, or for floating down timber from the mountains. The Tji Tafun and the Tji Manuk are navigable a part of the year.

JAVA

759

Climate. — Java is considered fairly healthy, but proper care must be taken to avoid the ex¬ cessive heat of midday and the night air from the marshes. The temperature of the plains and- valleys is during the day from 85° to 94° F., and during the night from 73° to 80°. The mean temperature at Batavia is 78.69° F. At an elevation of 6,000 feet the thermometer de¬ scends to 60°, while the tops of the highest peaks are often covered with ice but no snow falls. The breezes from the water modify the temperature. There are two seasons ; the dry from April to October, and the rainy season from October to April. During the rainy sea¬ son there is an almost continuous rainfall except for a short time in the morning. The annual rainfall is about 80 inches. The island is not subject to storms which injure life or property, but near the high mountains there are fre¬ quent thunder storms.

Geology. — Java is formed mainly of ter¬ tiary, though partly of post-tertiary strata; but by volcanic action the arrangement has been much disturbed. Rocks containing fossil in¬ vertebrates are common, but the fossils of ver¬ tebrates have not been discovered. There are no metallic veins of sufficient length or depth to be profitable for mining ; the Bantam coal¬ mines, in the northwestern part of the island, yield only lignite ; sulphur, naphtha and asphalt are found in several places, and small quanti¬ ties of salt, saltpeter and magnese. Limestone and marble are in the southern part. Its min¬ erals, with the exception of .tin, are not consid¬ ered of sufficient value to be classed among its natural wealth-producing resources.

*Vegetation. — With a temperature ranging from 94° to the freezing-point, a volcanic soil plenteously watered naturally and artificially, it is not surprising that Java should be of aston- nishing fertility; the range of its vegetation naturally follows that of its temperature, from the palms of the tropics to the mosses of the temperate zone. The coast is fringed with coconu*t trees ; behind them the ground rises gently to the foot of the mountain chain, and is completely cultivated. Vast fields of rice, arti¬ ficially watered, distributed amphitheatrewise on the flanks of the hills, yield often three harvests annually. In the same altitude are found the cotton plant, the mangoes, sugar-cane, indigo, palm-trees and other tropical vegetation. Higher up than the rice-fields the bases of the mountains are*

covered with vast forests of the fig-tree tribe of different species, remarkable for their great height and vigorous growth. Tea, coffee, fruits, cinchona, sandalwood, ma¬ hogany, camphor, bamboo, rattan and many other forms of vegetation are found in this altitude of from 2,000 to 4,000 feet. These are followed still higher up by the plane-like liquid- ambars, with their erect stems covered with parasites, also rattans and Rubiacea ?, the latter of numerous species, some of them exhaling a very foetid odor. Along the upper limits of the liquidambers, about 4,000 feet above the sea, lofty trees are still plentiful ; here may be seen Podocarpus cupressus, with its lofty straight stem, a tree allied to the yew, and furnishing the best timber in Java; the Dammar pine, rho¬ dodendrons, laurels of numerous species, chest¬ nuts, oaks and several others, magnolias, myr¬ tles, tobacco, maize, potatoes and other vegeta¬

tion common to the temperate zones. About 7,000 feet high the vegetation changes its as¬ pect, and mosses appear, which, with heaths, are the principal plants found on the loftier ele¬ vations. Before leaving the natural vegetation the famed poison-tree, the chettik or upas ,(An- tiaris toxicaria), may be named as a noted Japanese plant. The vast forests likewise claim notice ; they are 791 in number, and cover a very extensive surface in 13 of the provinces, and consist mainly of teak. To prevent the waste which was going on, the government has placed them under superintendence, and draws from them a large amount of revenue.

Animals. — Including domestic and marine animals 100 kinds of mammalia inhabit Java. In the west part the one-horned rhinoceros is not uncommon ; and in the higher districts the royal tiger, panther and tiger-cat keep the in¬ habitantsˆ in constant alarm by their depreda¬ tions. The babiroussa and two kinds of wild hog form the large game of the island. There are only two species of the ape kind, but they people the forests in countless numbers. Two kinds of lemurs inspire the inhabitants with superstitious fear by their mysterious noc¬ turnal habits ; and this island may be esteemed the native seat of the largest bats, some of which measure five feet across the wings. They may be seen suspended from the branches in hundreds during the day, and at night they devastate the orchards and gardens. Two civets are common and supply a perfume of which the Javanese are passionately fond; the wild ox abounds in the woods ; and the buffalo is the only animal used in agricultural labor. The horses are small, but vigorous, and, as in India, are not used for agricultural purposes. Two species of wild dogs and six species of deer are found here. Among the domestic animals are the buffalo, ox, horse, goat and sheep. The ornithology of Java is rich and varied, both in genera and in species. About 300 species of land birds have been found on the island, among them the peacock, partridge, quail, 10 different species of pigeon, 11 species of heron, two of cuckoo, the woodpeckers, the black and crimson oriole, the

hornbill, eagle, owl, the brilliant look¬ ing and appropriately named minaret flycatcher, the ((swift}) (q.v.), and the minor bird so apt in learning to mimic human speech is common. Almost all the known generic groups of rapa¬ cious birds are found here in great numbers, and gallinaceous fowls are plentiful. A variety of reptiles are found on the island, among them the python. Insects cover the grounds and plants in countless numbers ; but few are dis¬ tinguished for brilliancy or variety of color, or are remarkable in form. Fish are plentiful in the rivers and along the coast ; but those of the rivers are of inferior quality for food. Ex¬ cellent oysters are abundant on the north coast, and prawns, from which a condiment called trasi is prepared, are considered delicious by the natives. Crocodiles from 20 to 30 feet in length inhabit the watercourses.

Occupations and Productions. — The Ja¬ vanese are almost entirely occupied in agricul¬ ture. There is a small class of fishermen on the north coast and a few artisans in the towns, but the great bulk of the people live directly or in¬ directly by the cultivation of the land, in which they have made greater progress than any other

Asiatic nation except the Chinese and Japanese. The chief crop is rice, of which with the aid of irrigation, industriously and almost universally applied, two crops are raised in a year. Lands that cannot be irrigated are used for growing pulses, oil-giving plants, cotton, sugar-cane and tobacco ; and on the mountain slopes, at an ele¬ vation of 2.000 or 3,000 feet, coffee is cultivated. ((In the most fertile parts of Java^ says Craw- furd, <(and these from the neighborhood of the high mountains are usually also the most pic¬ turesque, the scenery is at once agreeable and magnificent, and certainly for grandeur and beauty excels all that I have seen even in Italy, that country which in summer bears the nearest resemblance to Java. In such situations we have mountains 10,000 feet high, cultivated to half their height, the valleys below having all the. appearance of a well-watered garden, in which the fruit trees are so abundant as to con¬ ceal the closely packed villages. w The mechanic arts among the Javanese are not so far advanced as their agriculture. About 30 crafts are prac¬ tised among them, of which the principal are those of the blacksmith or cutler, the carpenter, the sheath maker, the coppersmith, the gold¬ smith and the potter. Bricks and tiles are largely made. The carpenters are skilful in house and boat-building. They make vessels of all sizes from 50 tons down to fishing canoes, and under European superintendence build large ships. The ordinary dwellings of the people are built of a rough frame of timber, thatched with grass or palm leaves and with walls and partitions of split

bamboo. The Javanese excel all other nations of the Malay Archipelago in the working of metals. They are especially skil¬ ful in the manufacture of the national weapon, the kris or dagger, which is worn by every man and boy above 14 years as part of his ordinary costume, and by many ladies of high rank. They make also excellent gongs of brass, and these with other musical instruments of the same metal have long been exported to the neighbor¬ ing countries. The only native textile material woven by the Javanese is cotton, of which they make only a stout durable calico, and this is purely a domestic manufacture, carried on ex¬ clusively by the .women. From raw silk im¬ ported from China, the silkworm not being reared in Java, a coarse cloth is woven by the women. Paper of the nature of the ancient papyrus is a manufacture peculiar to the Javanese.

The greater part of the agricultural lands of Java is claimed by the government of the Netherlands and the private estates are prin¬ cipally in the residencies in the western part of the island. The government or the private landowners can enforce one day's gratuitous work out of seven, and in some cases more, from all the laborers on their estates. In 1882 the greater part of the enforced gratuitous labor for the government was abolished in re¬ turn for the payment of one guilder (40 cents) per head yearly. In 1914 the natives in Java and Madura had under cultivation 9,607,000 acres. Prior to 1891 the government raised sugar; but since 1891 the sugar is all raised on private properties and on lands hired by the natives, or on lands held on emphyteutic tenure from the government. In 1914 the number of sugar factories was 191 and the yield of sugar was 1,363,380 tons. The yield of coffee in Java

for 1914 was 8,696 tons ; of tea, 29,893,603 kilo¬ grams; and of cacoa, 1,186,282 kilos.

Trade and Commerce. — The trade of Java is now large, and what was once a burdensome colony has become one of the principal sources of wealth to Holland. The great bulk of the foreign trade is carried on through the ports of Batavia, Samarang and Surabaya. The prin¬ cipal exports are sugar, coffee, cinchona, indigo, nutmegs, mace, cloves, cinnamon, pepper, tea, rice, copra, cacoa, tapioca, cochineal, cubebs, ar¬ rack, tobacco, hides, india rubber and tin. With the exception of rice, about one-half of which goes to Borneo and China, nearly four-fifths of the exports go to the Netherlands. The principal imports are cotton yarns and cloth, machinery, iron, coal and woolen goods.

Education. — The Europeans and the na¬ tives have separate schools with a slight differ¬ ence in their methods of government. Ample provisions are made by the government for the education of the natives. In 1914 there were 834 government schools, with 175,666 enrol¬ ments, and 494

private schools, with 50,301 pu¬ pils. There is an agricultural college, a mu¬ seum and a fine botanical garden at Buitenzorg and a gymnasium at Batavia. In science the people have made little progress, possessing only a rude notion of astronomy and a slight knowledge of arithmetic. Their architecture at present day hardly deserves the name, though the country abounds with remarkable remains of temples built many centuries ago by the an¬ cestors of the present inhabitants. " Of the other fine arts, music is the one in which they have made the greatest progress. They are passion¬ ately fond of it and have generally good taste. Their melodies are wild, plaintive and interest¬ ing and more pleasing to the European ear than any other Asiatic music. They have wind and string instruments, but their best and most com¬ mon instruments are drums and gongs.

Religion. — All religious denominations are allowed perfect freedom in Java. The Javanese are Mohammedans, which faith was established by Arab conquerors in the 15th century and has almost displaced Brahminism and Buddhism, the ancient religions of the country. In 1914,' in Java and Madura, there were 30,000 native Christians.

Ethnology. — The native population of Java comprises two distinct nations, the Sundese and the Javanese. The Sundese occupy the western end of the island and are greatly inferior in number , to the Javanese and less advanced in civilization. They speak a distinct language. Both nations are of the Malayan race. They are generally about two inches shorter than the men of the Mongolian and Caucasian races, with round faces, wide mouths, high cheek bones short and small noses and small, black, deep-seated eyes. The complexion is brown with a shade of yellow, and is never black. The hair of the head is thick, black, lank and harsh, and is either scanty or altogether wanting on other parts of the body. A few short, straggling hairs compose the beard. The people are not active and make but poor runners or wrestlers. They are described as a peaceable, docile, sober, sim¬ ple and industrious people. Mr. Crawfurd, au- 1f?or of A Descriptive Dictionary of the In¬ dian Islands,) who lived several years in Java, says: < (From my own experience of them, I have no difficulty in pronouncing them the most

' straightforward and truthful Asiatic people that I have met.. The practice of running amuck, so frequent with the other cultivated nations of the archipelago, is of very rare occurrence with

i They are Patient» enduring and easily

led when convinced that the orders given are not contrary to the ancient laws and customs of the country, which are held in religious reverence. They are very susceptible of affronts, which they are not slow to avenge with the kris, which is invariably worn, and they are frequently like¬ wise armed with the sabre or pike. The mass of the Javanese take only one wife, but people of quality and wealth take advantage of the lati¬ tude allowed by the Koran and practise polyg¬ amy All, without distinction, are passionately fond of gaming, more especially of cock-fight- mg.

Population. — Java is one of the most densely peopled countries of the world. The population m 1905 was 28,604,719. The population of the principal towns in Java, January 1905, was:

Other

Eiaro- Orien-

peans Natives Chinese Arabs tals Total

Batavia . 8,777 99,320 28,150 2,058 246 138,551

Surabaya… 8,063 124,473 14,843 2,482 237 150,198

Surakarta… 1,572 109,524 6,532 337 413118,378

The whole population of Java is legally di¬ vided into Europeans and races assimilated with them, and natives and races assimilated with them. The Europeans and those assim¬ ilated with them are generally living under the laws which prevail in Netherlands, while the natives and those assimilated with them observe the customs and laws of India. The division of the population into the two classes mentioned is in accordance with the code which specifies the limits and conditions for legislation in Dutch East India. The governor-general, together with the council, has power to make individual exceptions to the general rule.

Government and Revenue.— The most im¬ portant feature of Javanese society is the vil¬ lage, which forms a complete body politic, with considerable powers of self-government. Its officers are elected by the people, and are charged with the collection of the taxes and the maintenance of public order. The general government of the island is entrusted to a gov¬ ernor-general, appointed by the king of Holland. He is commander-in-chief of the army and navy and possesses nearly absolute power. Jus¬ tice is administered to the European inhabitants by a Supreme Court at Batavia, and by three provincial courts at Batavia, Samarang and Surabaya. There are besides these other courts for the Asiatic population. In 1832 Gen. Jo¬ hannes Graaf Van den Bosch introduced into Java a

system of government known as the ˆculture system.)} In principal, it was based upon the officially superintended labor of the natives, directed so as to produce not only a sufficiency of food for themselves, but a large revenue for the Netherlands. This obligatory labor was applied to the culture of coffee, sugar, indigo, pepper, tea, tobacco and some other products ; but at present the labor of the natives is required only for the culture of coffee which is marketed by the government. By the terms of a bill which passed the legislature of the Netherlands in 1870, the obligatory cultivation of the sugar-cane is now totally abolished.

Java, including the island of Madura, com¬ prises 17 residencies, each governed by a resi- ass'isted by assistant residents and other officials. Before receiving government appoint¬ ments, these officials must first have had exam¬ inations. . The resident and his assistants, to¬ gether with a number of native officials, exer¬ cise almost absolute control over the province in charge. The native officials are remunerated for their services by salaries or by a percentage on the amount of taxes collected. No law can be enacted or enforced by any governor-general which will conflict with the ˆRegulations for the Government of Netherlands India, » laws passed m 1854 by the king and States-General of the Netherlands.

*The revenues are derived from the govern¬ ment monopolies of railroads, salt, opium and from the sale of government products obtained under the ˆculture system.** Other revenues are obtained from taxes on houses and estates, sale of government lands, custom duties, licenses, personal tax and from a number of in¬ direct taxes. The greatest expenditures are for the general administration, about one-third, and for the army and navy another third.*

Defense. — The army and navy of java form a part of the defense of the whole Netherlands India. The army is colonial and the regular army of the Netherlands is not allowed on duty in any part of Dutch East India. The com¬ missioned officers are Europeans, except a few prominent natives to whom honorary offices have been given. One-half the non-commis¬ sioned officers must also be Europeans. There is a school attached to every battalion, and a military academy on the island of Java, at Meester Cornelis, a place near Batavia.

History.— Ancient Javanese history is writ¬ ten in the still existing magnificent remains of temples and other public buildings, which are plentifully scattered over the island. Near Solo are the ruins of the temple at Brambanum, which are supposed to date from the 9th century and are eloquent of the magnificence of the Hindu period in Java. At Boro Buddor there is probably the largest Buddhist temple in the world, perched on the summit of a hill, above which it towers to a height of 120 feet, adorned

with 998 bas-reliefs illustrating the life of Buddha, while 441 images of Buddha are still in existence. These and similar remains attest that the worship, of Brahma and Buddha once prevailed in the island under the Hindu empire of Modjopahit, the dismemberment of which was consummated by the Arabs 1478 a.d., by the destruction of a vast capital of that name. Islamism had previously supplanted the rival faiths . and had driven their last adherents into the neighboring island of Bali. The island then fell under the dominion of numerous petty chiefs, and was found in that state by the Portuguese, the first European settlers on the island, who arrived in 1511. They were fol¬ lowed in 1595 by the Dutch, who soon eclipsed them. Though their views were at first directed wholly to commerce, the Dutch merchants, like the British East India Company, soon found it necessary to assume the position of a governing power, and treated accordingly with the native princes, with whom they were frequently at war. In 1811 Java was taken from the Dutch by the British, who, however, restored it after the Peace of 1816, since which time it has

remained in their hands. Up till 1825 various portions of the island were still under native princes, who paid tribute to Holland; but in that year a revolt took place, which resulted in the whole island falling under the Dutch sway; although two provinces have been left, but only nominally, under the government of Javanese princes — Surakarta and Jokjokarta. Both princes have a court, nobles, ministers, etc., but are the mere instruments of the Dutch govern¬ ment, by whom they are allowed handsome pen¬ sions. Since the close of this war the island has been rapidly increasing in population and prosperity. On 20 Sept. 1859 the Dutch legis¬ lature totally abolished slavery in Java. The natives never had slaves and there never were but a few thousand on the island.

Language and Literature. — It is not certain whether the name of Java be connected with the Sanskrit Javana and Yavana, both of which, besides being related to Tama as names of Greece, also signify (especially the latter) Bac- tria, Arabia and other foreign countries, and, moreover, swift, horse, etc. ; or whether its etymon be of a different origin. As regards the affinities of the Javanese language, Roorda con¬ siders it as a branch of the Malay. Crawfurd derives it from the vernacular of the aborigines, to whom he attributes the primitive culture of the Malayan Islands. Domeny de Rienzi sup¬ poses it to have arisen from the language of the Bugis of Celebes, by an admixture of Malay and Sanskrit. Humboldt connects it, both as to words and grammar, with the Tagala, the most developed Malayan tongue of the Philippine Islands, as well as with other Malay

idioms and with Sanskrit. Others see in it a type of the unmixed tribes of Oceania. It cer¬ tainly shows all these affinities and contains also some Arabic elements. The Javanese is the most cultivated of all Polynesian languages, owing to the very early intercourse of the island with the continent of India, whose Arvan as well as Dravidan influence is attested by the presence of Malabaric words along with those from the Sanskrit, not only in Javanese, but also in the idioms of Sumatra, Madagascar, etc. Both religious and political revolutions have served to modify the condition of the languages. There are four dialects, according to Raffles, on the. three islands which form the linguistic group in question, namely: (1) The tongue of the mountaineers of Sunda, in the western part of Java, east of Tagal, probably vernacular through this whole region before the introduc¬ tion of Mohammedanism, now spoken by about one-tenth of the population of the island; it contains many Malay and some Sanskrit words, stands in the same relation to the principal lan¬ guage as the Welsh does to the English and is best spoken at Bantam, sluggishly at Bogor and Chianjore and verging to the Javanese at Cher- ibon. (2) The Javanese proper, east of the last-named city, extending through the rest of the island, especially along its north shore ; its words are long at Tagal, shorter at Samarang, full, short and strong at the courts of Sura¬ karta in the centre and Jokjokarta in the south; it approaches the Madurese at Surabaya and the Balian at Banyu-Vangi. (3) The dialect of Madura and Sumanap, which has many Sunda words, with more of Malay, and with peculiar endings. (4) That of Bal'i, little dif¬ ferent from the general Javanese This island

preserves the ancient letters as well as Brah- minism, both expelled from Java in the 15th century. A sort of jargon, analogous to the lingua franca, is spoken at Batavia, being a medley of Dutch, Portuguese, Javanese and Malay. Along with the preceding there are also peculiar styles or idioms of speech, varying in accordance with social position and age, as the mad h jo (intermediate), between equals; the basa or bohoso-ngoko (language popular), to inferiors; the bdsa-kramo (language superior), urbane, court idiom, about three-fourths of it Sanskrit, used by poets as the speech of gods, heroes and ghosts. As to locality, there are also two vernacular idioms, namely, the basa- dalam of the interior and the bdsa-luar, spoken along the shores. The Kavi (learned, wise, poet) is the ancient sacred language of Java and consists of about six parts of Sanskrit, less altered than in the Pali, to four of Javano- Malay. It owes its origin to Brahminic immi¬ gration, about the beginning of our era. It is to the Javanese what Sanskrit is to the Hindo- stanee, and Pali to the Indo-Chinese languages. Declining in the 14th century, it took refuge in Bali and was imperfectly known by the Pa- nambahan at Sumanap at the time when Raf¬ fles was in Java. Passages in the Kavi are sometimes quoted on peculiar occasions, as for instance in fables and dramas; the term itself is employed as a title

of works, etc., such as Sekar-kavi, flowers of poetry, whence Sekarini, a Kavi metre; Rama-kavi, the Javanese Rama- yana ; Kavindhra, principal singer or poet (named ma-kathd, narrator, in Tagala). A few specimens of words may show the relation of the Javanese to the common Malay, where the difference, if not specially noted, is sometimes more in the accent than otherwise : langit, heaven; tanah, earth (Mai. also benua, region) ; ayer (Jav. also banyu), water; laut (Jav. la- hut), sea; dhina (Mai. hari), day; bengi (Mai. malam) , night; vulan (Mai. biilan), moon; terang (Mai. trang), light; mati, to die; lulat (Mai. kasih), to love; dara, virgin; dheva (Mai. tuhan), god, lord; mangan (Mai. makan, santap), to eat; bdpa, pak (Mai. pa, politely ayah), father; ma, bok (Mai. ma, ama, politely ibu, bonda), mother, etc. Compounds and de¬ rivatives abound, but the latter are more fre¬ quently formed by suffixes than by prefixes, in which the Tagala is very rich. There are many contractions into tr, ngl, ngr, with the dropping of short vowels, together with the alteration of the initial sound (similarly to the Celtic), and other variations which obscure the etymic ori¬ gin, thus : Sans, ndtha, master, lord, becomes tata, order, to reign; Jav. neda, to eat, feda, food; nulls, to write, tulis, scripture; nitik, to prove, titik, proof. The prefix n denotes verbs, t substantives ; other changes are : nyatur, to tell, chatur, tale; nyerrat, to write, serrat, writ¬ ing, etc. The doubling of the first syllable makes verbs, as tutulung, to help, from tulung, aid; gagriya, to dwell, from griya, house. The insertion, of in is the sign of the passive voice. Substantives are also made by prefixing pent (pen, pe), denoting an agent; thus: pem-pekto, carrier, from pekto, to carry; pen-dahar, eater, etc. ; by prefixing ka, a sign of the past parti¬ ciple; ka-bekto, Lat. allatum; by suffixing n (en, an) : bakt-en, the carrying, dahar-an, Lat. cibus ; and by both prefix and suffix: ka-da- har-cm, an eatable. Articles, gender and the

. ˆual number are wanting. In the plural, cases < re denoted by particles, and also by reduplica¬ tion as in the Japanese. The genitive relation is shown by the precedence of the noun or by inserting ing. The other relations of case are indicated by means of verbs. The adjective is unchanged after the substantive. Pronominal orms are fewer than in Malay : kita , we in Ma-

ˆ Javanese. The numerals are: (1) sidsln, (2) loro, (3) telu, (4) papat, (5) hmo (6) nem, (7) pitu, (8) volu, (9) songngo, (10) sepulah, (11) savelas, (12) volas, etc. Ordinals are formed by prefixing ping or ka- figures of numbers are modified letters. I he person, number, tense, mood and voice of verbs are indicated by certain particles. Many verbs and nouns are

expressed by the same word, others are distinguished as stated above. Ihe suffixes of the imperative are o, ono, en, enno. The following are examples of a verb in various forms : ningngalli, to see ; passive, d hi pun, tingngalli, katingallan, etc.' kula tingngalli, I have seen ; bade kula ting¬ ngalli, I shall see; tinningngallam, to see one another , sampeyan tingngalli, see ; kula ting- ngallana that I may see, etc. The construction is as follows:

gama kahula kang vonten ing surga, vasta andika dadi ehipienno W° &rt* ***n ˆeaver*** *name thy be hallowed.*

As regards the shape and employment of letters, the graphic system is derived from the Devana- gan, but not as regards their order, which is as follows: /ha, na, tcha, ra, ka, da, ta, sa, va, la, d.a' dJa> ya> nya> ma, ga, ba, ta, ng'a. These ZOAkshara (letters) are consonants with an adherent a in the general language, or o at the courts of princes, which, when not suppressed, gives to the syllabarium the epithet of lagana. As many P dsciTigciu (consonants) are vowelless, three of them are annexed, the others subscribed to other letters. This peculiar succession of letters must have originated prior to that of the organic scheme of the Devanagari, and it is explained by its signifying: <(There were two messengers, disputing, equally courageous, till both died.® The Akshara-Buddha, being an¬ cient, differ in form from the later Akshara- gede. Some Kavi letters are almost like those of the Sanskrit, while the more recent resemble the square Pali. The vowels are called San- dang'an (connection), namely, a, i, u, e, e (al¬ most French muet), o, either used as initials or (except a) attached to the consonants instead of the inherent a. The diacritic signs are analo¬ gous to those of the Devanagari. There are also characters for the quasi-vowels le and re. The writing runs from left to right, each letter being connected with the others in words, and these following one another without any space left between them. Tradition assigns the in¬ troduction of writing as well as of Brahminism and political institutions to Aji Sava Baya. Pal¬ eography finds a rich harvest in Java, .its sub¬ jects being distributed in four classes: (1) inscriptions in ancient Devanagari near the ruins of Brambanan and Sinagasari ; (2) those in square Kavi letters, from which the cursive are derived, mostly on stone and metal ; (3) those in a dialect resembling the language of Sunda; (4) the Chandra-Sangkala (light of loyal times or dates), which consist in selecting

such words, symbolic of numbers, as may also express a fact that is to be recorded. Thus, for instance, the date of the destruction of .Majapa- mt, a fact most important in Javanese history, is thus inscribed (1400, reading from right to

Sima (o) ilang (o) kertdning (4) bumi (1).

Lost and gone (is) (the) work, (pride of the) earth (land).

The date of certain long graves at Gresik, near the tomb of the princess of Chermai (1313), is thus written:

Kaya ■ (3) yulan (1) putri (3) iku (1).

Like (to the) moon princess (that) was.

The literature, which is in Kavi, dates from about the commencement of our era, and is rich, especially in legends concerning cosmog- °.nV The subjects of the works are mostly either of a mythical or ethical character. Promi¬ nent among the former are the Kanda (Sans Khandata, fragment, section) Pepakem (book), or Sejarah (history) ; Manek-Maya, a mythical genesis, in which Buddhism predominates ; Vi vaha-Kavi (matrimonial poem), about a' Ra¬ sa ksa (evil spirit) who courts a Vidaduri (nymph) ; Rama- Kavi , the Javanese Ramayana : Rankes pit, <(Arjunas Grandson;® Mintaraga, a poem on Arjuna in the Indra mountain. This kmd of composition comes down to the time of Aji Saya Baya. Of the ethical order are the Niti Sastra Kavi, in the purest style, of about the 13th century; and Sruti, which al¬ ready alludes to Islam. But the Brata Yudha ("Holy War®) is an epos mostly on the deeds of Arjuna; being an episode of the Mahab- harata, in 712 stanzas, with varying rhymes. The Sastra Menava is a Javanese imitation of the ordinances of the Indian Menu. Indeed, most of the Kavi works are such imitations] Whether mere versions of Sanskrit works have been made or still exist is not precisely known ; but there are many Javanese versions from the Kavi. Javanese literature abounds in romantic compositions, mostly of elegiac form. Among these, the adventures of the popular hero Pandji are most prominent. Dramas, and especially puppet shows, called vayang (shadows), and with figures of either leather or wood personat¬ ing heroes, are popular.

Bibliography.— Bastian, dndonesien>; Blume, (Florse JavaP ; Breitenstein, (Java) ; Cabaton, (Java and Sumatra) ; Chailley-Bert, (Java et ses habitants5 (Paris 1900) ; Craw- furd, (Asiatic Research5; Dulaurie, (Memoirs relatifs au cours des langues Malaie et Java¬ nese) ; Day, (Policy and Administration of the Dutch in Java) (with a bibliography) ; De Wit, (Facts and Fancies about Java5; Giesehagen, (Aus Java und Sumatra5 ; Gronemann, (In den Kedaton te Jogjakarter5 ; Higginson, (Java, the Pearl of the East5 ; Horsfield, (Zoological Re¬ search in Java and the Neighboring Islands5; Junghuhu, (Java) ; Kohlbrugge, (L'Anthropho- logines des Tenggerois5 ; Meyer, (Die Kalangs auf Java5; Muller, (Beschreibung der Insel Java5 (trans.) ; Raffles,

(Java, the Garden of the East5 ; Van Nooten,

(Fleurs, fruits, et feuillages de File de Java5 ; Verbeek and Fennema, (Description geologique de Java et Madoura5 ; Walcott, 'Java and Her Neighbours5 ; Wallace, (The Malay Archi¬ pelago.5 . See Dutch East Indies.

JAVA, The. See Constitution, The. JAVA FOWLS. See Poultry.

JAVA SEA, a body of water with Borneo on the north, Celebes on the east, the island of Java on the south and Sumatra on the west. It borders on a number of other islands, all small. The direct route from Singapore to Australia is through Java Sea; and it is crossed by two approved routes to China, one by Pitt's Passage and the other through the Straits of Macassar.

JAVA SPARROW, a species of Oriental weaver-bird (Munia oryzivora) , called rice-bird or paddy-bird by the British in India and China, where it has become naturalized from its orig¬ inal home in Java. It has a poor song but is kept in cages for its beauty and liveliness, and is sold by bird-dealers all over the world. Its colors are slate-blue and black, with conspicu¬ ous white cheeks and a swollen rosy bill. It is about seven inches from beak to tip of tail. The female is lighter in color. Fanciers have produced a pure white cage variety.

JAVARY, zha-va-re', a river which has its rise on the Peru-Brazilian border, opposite Aguas Termales, Peru, in about lat. 6° S., flows northwest, then north and northeast into the Amazon River. The greater part of its course of 350 miles it forms the boundary line between Brazil and Peru. It is navigable from the mouth to the Anahuacas Mountains.

JAVELIN, a short and light spear thrown from the hand and in ancient warfare used by both horse and foot soldiers. The pilum of the Romans was a weapon of this description and was used either to throw or to thrust with. The shaft was four and one-half feet long and the barbed iron head was of equal length, but as it extended half way up the shaft, the whole length of the weapon .was nearly seven feet. The small spears of many savage tribes have been known by this name. The throwing of javelins was one of the contests in the Olympic games (q.v.).

JAVELINE, the local name in the Rio Grande region of the small northern peccary (q.v.).

JAVELLE (zha-vel) WATER, a solution containing potassium hypochlorite, obtained by mixing potassium carbonate, bleaching-powder and water. The

liquid is employed as a dis¬ infectant, as a bleaching agent and in photog¬ raphy. See Bleaching; Eau de Javelle, under Eau; and Hypochlorous Acid.

JAWS, Anatomy of the. The upper jaw is formed by the union of the two superior max¬ illae; these bones each form part of the cheek, the outer wall of the nasal cavity, the hard palate and the lower part of the eye-socket. The lower jaw is formed of one bone, the in¬ ferior maxilla, which presents a horseshoe¬ shaped body, and vertical plates of bone ascend¬ ing from the body posteriorly. The top of these vertical plates is widened into a knob-like end for articulation with the skull.

Dislocation of the jaw may take place during excessive laughter or yawning. The articular knob slips forward and the jaw is held open. Reposition is accomplished by placing the thumbs on the back teeth and making forcible down¬

ward and slightly backward pressure until the bone is felt to snap into place.

Fracture of the upper jaw is uncommon ex¬ cept when the face is crushed in. Usually in fracture it is the body of the lower jaw near the front that is broken. Besides the usual signs of fracture (q.v.) the attitude may be character¬ istic; the patient is unable to shut the jaw; and the difference in the line of the teeth may show clearly. Repair of the fracture is facilitated by fastening the upper jaw with a sling-bandage carried around the head and keeping it so fastened until union is established. During this time the patient is forced to eat liquid foods almost entirely.

JAXARTES, jak-sar'tez. See Syr Darya.

JAY, Sir James, American physician, brother of John Jay (q.v.),: b. New York, 27 Oct. 1732; d. Springfield, N. J., 20 Oct. 1815. He studied medicine and established himself as a physician. He was associated with Rev. Dr. William Smith in 1755 in securing an endowment for the pres¬ ent University of Pennsylvania; and in 1762, while on a visit to England, he represented to George III the need for higher education in the colonies, and was successful in securing funds for the endowment of King's College, now Columbia University. He was knighted in 1763. He was prominent in the passage of the New York act of attainder, and was imprisoned dur¬ ing the British occupation of New York, but was released in 1782 upon the arrival of Sir Guy Carleton. Author of two pamphlets con¬ cerning the collections of funds for colleges (1771, 1774) ; and Reflections and Observations on the Gout) (London 1772).

JAY, John, American statesman and jurist: b. New York, 12 Dec. 1745; d.

Bedford, West¬ chester County, N. Y., 17 May 1829. His father was a wealthy merchant of Huguenot stock, and his mother a daughter of Jacobus Van Cortlandt. His father, — early discovering, to use his own words, that Jay was of (

Bound by no ancestral ties to England, and having married in 1774 a daughter of the famous Whig and Revolutionary governor of New Jersey, William Livingston, many would suppose that in the conflict impending between the colonies and mother country, Jay's voice,

Copyright by C. E. Anderson, Sec'y, 190J

JOHN JAY

Chief Justice of the United States Supreme Court, 1789-1795

-

■

-

. ■

x hke those of James Otis and Samuel Adams, would have been from the first ((still for war.® But he was constitutionally so calm and con¬ servative that he was unwilling to be too pre¬ cipitate in determining upon a change in the mode of government. When, however, the colonists decided that their only safety lay in separation, Jay was found to be as staunch and aggressive a patriot as any, and represented the citizens of New York on the committee to settle the question arising out of the Boston Port Bill. Jay drafted the suggestion of that com¬ mittee that ((a Congress of Deputies from the Colonies in general® be convoked — in fact, the convocation of the Continental Congress. He was a member of that Congress, and met with it in Philadelphia on 5 Sept. 1774. Congress at once appointed a committee to ((state the rights of the colonies in general,® of which Jay was made a member. This committee desig¬ nated him to draft an address to the people of Great Britain, which was so satisfactory that it was at once reported to Congress, and adopted by it. Jefferson, without knowing who was the author, pronounced it <(a production cer¬ tainly of the finest pen in America.®

Jay was also sent. to the 2d Continental Con¬ gress, but in the interim devoted himself to shaping the public mind in the direction of obedience to Congress and in hostility to en¬ forcement of Parliamentary taxation. When the 2d Congress convened, the signal shot — "heard round the world® — had been fired at Lexington, and Congress, realizing that a condi¬ tion of war existed, deputed Jay to draft an address to the people of Canada, which was prepared and adopted, and circulated in that country. . He also wrote an address to the peo¬ ple of Jamaica and Ireland by request of Con¬ gress, but the second petition to the king that he prevailed upon Congress to make was written by Dickinson. Other important and effective work by him in that general direction might be cited, but I shall be content with the assertion I deem supported by the facts, that as a creator and molder of public opinion at that particular juncture Jay stands unrivaled; and all this was in the main accomplished through the wise use of his pen, the efficacy of which was strongly presented by John Adams when he wrote re¬ garding it to Jefferson, "I never bestowed much attention to any of those addresses, which were all but repetitions of the same things ; the same facts and arguments ; dress and ornaments rather than body, soul or substance. I was in great error, no doubt, and am ashamed to con¬ fess it, for these things were necessary to give popularity to the cause, both at home and abroad.® Jay's contribution to the debates in Congress, like all his public work, showed that he followed in all things and upon all questions the path illuminated by the light of his well-balanced judgment, and his conscience, thinking not of personal popularity, but simply of the right. He served actively upon the committee that carried on negotiations with foreign powers friendly to America and inimical to England. Indeed, during the year 1775 he was a member of so many committees, each having different and important objects, that it is diffi¬ cult to understand how he was able to accom¬ plish so much important and laborious work.

If it be asked why so good a patriot as Jay was not a signer of the Declaration of Inde¬

pendence, the answer is, that in 1776, while a member of the Continental Congress, Jay was also elected to the New York Provincial Con¬ gress, and the Continental Congress having di¬ rected the colonies to each adopt a government, Jay, on the call of his colony, proceeded to New York to take part in the formation of the local government, where he was forced to re¬ main while the Declaration of Independence was being signed. During 1777, and while the war was going on in the vicinity of New York, the Provincial Congress, then styled the Con¬ vention of the Representatives of the State of New York, was laboring with exceeding diffi¬ culty, the members, as is recorded, performing ((all the various and arduous duties of legislators, soldiers, negotiators, committees of safety and ways and means,

judges, juries, fathers and guardians of their own families, flying before the enemy, and then protectors of a beloved commonwealth.® Yet amid all this turmoil and unrest a constitution was drafted by Jay which was, in the main, adopted as drafted, and was published upon 22 April 1777, by being read in front of the courthouse in Kingston. A committee was at once appointed, Jay being a member, to organize a new government ; and a council of safety was created to act until the legislature should meet. Robert R. Livingston was appointed chancellor and Jay chief justice, and the judicial department of government was temporarily organized.

Jay was urged to be a candidate for gover¬ nor at the first election under the constitution, but declined. General Clinton was elected over his opponent, General Schuyler, and took the oath of office, it is said, while <(clothed in the uniform of the service, standing on the top of a barrel in front of the Court-House in Kings¬ ton.® On 9 September following, Chief Justice Jay delivered an address to the grand jury at Kingston, which is to be found in the first volume of his correspondence and public papers. The address is a much prized document of Revolutionary times, and was, undoubtedly, in¬ tended to reach and affect a much larger con¬ stituency than the grand jury to whom it was delivered. Of course, in those unsettled days, with the struggle between the old and the new countries raging, but little litigation of im¬ portance came before the Supreme Court, so that during Jay's chief justiceship the work of the court was mainly confined to criminal trials, and the court never sat in banc. During 1778 he was active in the Council of Revision, of which he was a member ex-officio. The legis¬ lature in 1779 appointed Jay to Congress with¬ out requiring him to vacate the office of chief justice, it being resolved that owing to serious questions between certain States ((a special case® obtained under the constitution. Shortly afterward Congress elected him its president. Later in the year, however, he resigned the office of chief justice, designing, he said, to recoup his failing fortunes. But his desires in that direction were not to be gratified. More than 20 years elapsed before the public he had served so well would submit to be deprived of his services.

In October, 1779, Jay resigned the presidency of Congress to accept the office of Minister to Spain. His instructions in part were to secure if possible a commercial treaty with Spain simi¬ lar to that existing with France, to acquire a

port in Spanish dominion on the Mississippi, and to negotiate a loan of $5,000,000. • That his mission was not entirely successful, and was

personally disagreeable, was due to the fact that Spain disliked the new nation because it occupied lands formerly held by Spain, and it was apprehended that with increasing strength it might reach out and take more — fears that we know now were not groundless. While Minister to Spain, Jay was appointed, with Franklin, Jefferson, Adams and Laurens, com¬ missioner for a general peace. Their instruc¬ tions rested on the mistaken theory that France would aid in procuring for us the 'best possible terms. In June 1782, Jay joined Franklin, then Minister to France, in Paris, and promptly but cautiously entered upon an investigation which disclosed that France had other interests to serve than those of the United States. Pos¬ sessed of the situation, he boldly entered upon negotiations with England's representative without even consulting his only colleague in Paris, whom he regarded as necessarily embar¬ rassed by his position as Minister to France, and his instructions. With firmness, and yet with great tact, he conducted the negotiations alone until joined by Adams, who enthusiastically approved of his action, and so advised Mr. Franklin, who, after consultation, agreed that the negotiations should be concluded without consulting the French court. The result of these most interesting negotiations with Eng¬ land was a treaty by which the United States gained more than Congress had ever ventured to propose. And Jay's part in this great triumph of diplomacy is well summed up in a letter writ¬ ten by his fellow commissioner John Adams to Jonathan Jackson, <(a man and his office were never better united than Mr. Jay and the com¬ mission for peace. Had he been detained at Madrid, as I was in Holland, and all left to Franklin, as was wished, all would have been lost.® He was appointed by Congress Secretary of Foreign Affairs. This office he filled with his usual ability, settling international questions, and advocating the building of a navy, and the organization of a Federal government under a constitution. His papers in the Federalist evidence both his activity and forcefulness in this direction; and his influence contributed in no small degree in bringing New York to the support of the Federal Constitution.

It is said that after the first election of Washington to the presidency he offered Jay the choice of any office in the government, and that he chose that of chief justice of the Supreme Court of the United States, which he justly regarded as the most exalted position next to the presidency; but be that as it may, Washing¬ ton appointed him to that position, and in his letter to Jay, advising him of the nomination, said, ((I not only acted in conformity with my best judgment, but I trust I did a grateful thing to the good citizens of these United States.® His term of office was effective in shaping the foreign policy of the United States as well as in establishing the dignity and independence of the Federal judiciary. He resigned in 1795; but in the meantime and in 1792 the Federalists supported him unsuccessfully against Governor Clinton for the governorship of New York.

In 1794 President Washington urged him to go to Great Britain as special envoy to settle differ¬ ences growing out of the failure of that country

to keep the obligations of the Treaty of 1784, — differences which had aroused a strong war spirit all over the land. It was easy for Jay to foresee that the outcome of the situation would in all probability be unpopular with the people, but he did not hesitate to meet the responsibility that Washington believed he could meet better than any other man, nartly because of the reputation he had established in England while negotiating the Treaty of Peace of 1784. A treaty resulted, known on this side of the ocean as (< Jay's Treaty,® which settled the eastern boundary of Maine; recovered for illegal cap¬ tures by British cruisers $10,000,000; secured the surrender of the Western forts still gar¬ risoned by the British, and came to a point of agreement about the West India trade. With the exception of the latter article the treaty was approved by the President and ratified by the Senate. But many were not satisfied, and they denounced him with tongue and pen, and even burned him in effigy in Boston, Philadelphia and at his own home, New York.

He found on his return that he had been elected governor of New York — before the public had knowledge of the terms of the treaty, of course. Before the close of that term, and in April 1799 he was re-elected by a majority so large as to constitute a personal triumph. During this term the statute was passed providing for the gradual emancipation of slaves within the State, then numbering about 22,000. The six years of his incumbency of the office of governor were crowded with interesting legislative and executive events in which he performed his part with that staunch devotion to the public interests which ever characterized his efforts throughout his career as a servant of the public, as is well illustrated by his refusal to be a party to the scheme of certain leaders of the Federalists to secure the electoral vote of New York for the ensuing election. The unexpected result of the spring elections of 1800 assured the Republicans of a substantial working majority on joint ballot, and hence of the Presidential electors under the law as it then stood. It was generally con¬ ceded that New York would determine the Choice of the next President. Although the Federalists had, in March prior to the elections, defeated the attempt of the Republicans to re¬ district the State, and had insisted that it was necessary that the State should act as a unit in the choice of Presidential electors, the leaders changed their position after the election had gone against them and insisted that the electors should be chosen by districts. Alexander Hamilton wrote Governor Jay on 7 May advis¬ ing that he call an extra session of the legis¬ lature to enact such a statute before July first, the end of the legislative year. Philip Schuy¬ ler also wrote a letter strongly urging that such a course furnished the only' means of saving the ((nation from more disasters.® But Jay, al¬ though a staunch Federalist, who had received the

votes of New Jersey and Delaware, five votes from Connecticut and one from Rhode Island for the Presidency in the preceding electoral college, refused to take such action, and endorsed on Hamilton's letter these words:

((Proposing a measure for party purposes which I think it would not become me to adopt.® He refused a renomination for the office of governor on the ground that he now

intended to retire from public life, and his pur¬ pose was unshaken by President Adams an¬ nouncing to him his nomination and confirma¬ tion a second time as chief justice of the United States. This office he held until 1801 when he retired from public life.

Consult Correspondence and Public Papers of John Jay> edited by H. C. Johnston (1890- 93) ; Jay, William, (Life of John Jay> (1833) ; Whitelocke, (Life and Times of John Jay (1887) ; Pellew, (John Jay* (1890).*

; Alton B. Parker,

Late Chief Judge of the Court of Appeals of

the State of New York.

JAY, John, American diplomatist: b. New York, 23 June 1817 ; d. there, 5 May 1894. He was the son of William Jay (q.v.). He was graduated from Columbia in 1836, studied law in New York, was admitted to the bar in 1839, became a prominent opponent of slavery, was secretary of the Irish relief committee in 1847 and was counsel for several fugitive slaves. He organized the meetings at the Broadway Taber¬ nacle, New York, in 1854, and took a leading part in the organization of the Republican party at Syracuse, 27 Sept. 1855. From 1869 until his resignation in 1875 he was United States Minister to Austria, in 1877 was ap¬ pointed chairman of the so-called Jay commis¬ sion for the investigation of the New York customs-house administration, and in 1883 was appointed the Republican member of the New York State Civil Service Commission. He was long corresponding secretary of the New York Historical Society. In 1889 he became presi¬ dent of the American Historical Association, and published several pamphlets, among them (The Dignity of the Abolition Cause (1839), and (The American Church and the American Slave-trade) (1860).*

JAY, William, English Congregational clergyman and writer: b. Tisbury, Wiltshire, 8 May 1769; d. Bath, 27 Dec. 1853. After study¬ ing for the

Congregational ministry, he offi¬ ciated at Hope Chapel, near Bristol, and became pastor in 1789 of Argyle Chapel, Bath, where he remained till 1853. As a preacher he not only enjoyed a high celebrity in his own denomina¬ tion, but won the applause of fastidious critics like John Foster, Sheridan and Beckford. His sermons are esteemed as well for their catholic spirit as their practical earnestness and simplic¬ ity of style, and have passed through many editions. His collected works were published in 12 volumes between 1842-48, and his auto¬ biography in 1854.

JAY, William, American jurist: b. New York, 16 June 1789; d. Bedford, N. Y„ 14 Oct. 1858. He was the son of John Jay, statesman and jurist (q.v.). Graduated from Yale in 1808, he studied law with J. _ B. Henry at Albany, was obliged by defective eyesight to withdraw from the profession, and became in¬ terested in various philanthropic movements, in¬ cluding the anti-slavery cause. He was a founder of the American Bible Society (1816), which he greatly promoted and long defended against High Church attacks led by Bishop Hobart. In 1818-21 he was judge of common pleas in New York, and in 1835-37 correspond¬ ing foreign secretary of the American Anti- Slavery Society, in the drafting of whose con¬ stitution he had assisted. He wrote much on

anti-slavery, and was recognized as a leader of the more conservative of the Abolitionists. Among his publications were (The Life and Writings of John Jay (1833) ; (An Inquiry into the Character and Tendency of the Ameri¬ can Colonization and American Anti-Slavery Societies* (1834); (A View of the Action of the Federal Government in Behalf of Slavery) (1837) ; (War and Peace) (1848.)*

Jay, Me., town in Franklin County, about 30 miles northwest of Augusta, on the Androscoggin River and on the Maine Central Railroad. There are granite quarries in the vicinity and the town possesses a large electric power plant Pop. 2,987.

JAYADEVA, or DJAYADEVA, Hindu

poet and dramatist : lived in 1200 or 1300 a.d. The time and details of his life are unknown, but his (Gitagovinda, the (Song of Krishna,* is the only known example of the religious drama in Sanskrit. The drama is a lyric poem, and is usually given a mystical interpretation. It delineates^ the love of Krishna, as a cowherd, for Radha, the milkmaid, his faithlessness and subsequent return to her, and is taken as sym¬ bolical of the human soul's straying from its true allegiance but returning at length to the God which created it. The work is of great poetic beauty and is remarkable for its*

melodious and truthful mirroring of passionate emotions. Native editions are those of Vidyasagara (Calcutta 1882) ; and Telang and Pansikar (Bombay 1899). (Gitagovinda) was edited with a Latin translation by C. Lassen (Bonn 1836). English translations are those of Sir William Jones (London 1799; new ed., Calcutta 1894) ; and Sir Edwin Arnold, (The Indian Song of Songs) (London 1875).

JAYHAWKER, a name originating in Kansas during the slavery and anti-slavery war¬ fare; applied to a few Free State men who organized a system of retaliation against pro¬ slavery outrages. Governor Lane of Kansas, in 1861, declared that ((the people of Kansas were neither thieves, plunderers, nor jay- liawkersA

JAYNE, Horace, American scientist : b. Philadelphia, 5 March 1859; d. 9 July 1913. He was graduated at the University of Penn¬ sylvania in 1879, received his M.D. there in 1882, and later studied at the University of Leipzig and under Haeckel at Jena. He be¬ came professor of biology at the University of Pennsylvania in 1884, and in 1894-1905 he was professor of zoology and director of the Wistar Institute of Anatomy there. He was secretary of the biological faculty at the University of Pennsylvania in 1884-89, and dean of the col¬ legiate faculty in 1889-94, when he resigned to accept an appointment as one of the trustees at Drexel Institute. Author of many scientific pa¬ pers and Abnormalities Observed in t-he North American Coleoptera) (1880); (Mammalian Anatomy) (1898) ; etc.

JAYS, a group of birds forming with the magpies a sub-family (Garrulince) of the Cor- videe, or crow family. They are readily dis¬ tinguished from the true crows (Corvince) by their relatively short wings, long conspicuous tails, and usually showy plumage, in which blue colors are prominent. They are generally smaller than the crows, have weaker bills, and

feet better adapted to the more completely ar¬ boreal life which they lead. Jays are found throughout the greater part of the world, but Amciica leads in number and variety of species North America has four genera and 10 species with many additional local varieties. A famil¬ ial representative is the bluejay (Cyanocitta cnstata) which is numerous throughout the eastern half of the United States and Canada, it is about one foot long, of which the tail is nearly half; the head conspicuously crested; purplish-blue above with a slight tinge of the same color on the generally gray underparts- the wings and tail are a nearly saturated blue ln,the males,

duller in the females, cross-barred with black and with white markings especially conspicuous on the end of the tail ; a rich black collar encircles the neck. The bluejay eats all kinds of nuts, fruits, large insects, and at times the eggs and young of other birds; it seldom leaves the trees in search of food, and when on the ground hops instead of walking like the crow. Except in Canada it is resident, and it breeds throughout its entire range. The nest a large structure of twigs, grass, leaves, etc., is built in trees, bushes or old buildings. Five is the usual number of eggs. Like the magpie this jay is known to collect and hoard various glittering or brightly colored objects, but is chiefly noteworthy on account of the variety and quality of its notes which range from the harshest cries to full flute-like tones. On the Eacmc Coast this species is replaced by the darker and duller Steller's jay (C. stelleri). ihe Canada jay, or whisky jack (Perisoreus canadensis) is, as its name indicates, a northern bird, found within the United States only along t e northern border, and occasionally breeding in northern Maine. This is a dull-colored gray)ird, without a crest, and with soft, lax plum¬ age. It is well known to hunters and lumber¬ men whose camps it haunts with great boldness- and in manners and voice resembles the bluejay It nests very early in the spring. Related sPecl^,s. ar9 Oregon jay (P. obscurus) and the Siberian jay (P . infanstus) of boreal Eurasia. Several species of crestless deep-blue Florida jays (Aphelocoma) inhabit Florida and the West, and the .Southwest. The brilliant green jay (Xanthura luxuriosa) is an example of the gorgeous tropical jays which just enter t c v/r!^ed in Texas. Consult the works'*

ot Wilson, Aubudon, Nuttall and American ornithologists generally; for western species in particular, Coues, Elliott, (Birds of the North¬ west (Washington 1874), 'Birds of the Colo¬ rado Valley* (1878) ; Dresser, < Birds of Europe^ (London 1879) ; Dawson and Bowles,*

~ ^ TREATY, 1794. The Articles of

Confederation provided that the States might nullify at will any provisions of whatever com¬ mercial treaty Congress might negotiate; of course therefore no nation with much commerce to be disturbed by our competition would make such treaties with us. Our chief commerce was with Great Britain ; and that country would make no commercial treaty whatever with us even for years after the Constitution had given Congress power to enforce its treaties There

were two main reasons for this: first, that Great Britain had valuable commercial monopolies (especially in the West Indies) for which she thought we could return no equivalent; second, she was angry over the sequelce of the Peace of 1783. She had agreed to surrender the border forts on the Great Lakes, the Saint Lawrence and Lake Champlain, and carry off

*no negroes, on condition that Congress "recommend** to the States to restore confiscated Tory property, and agree to confiscate no more. Congress did so twice emphatically, but the States paid no at¬ tention to it; the British government, though it knew very well how much the recommendation meant, made this an excuse to retain the forts and refuse payment for 3,000 negroes carried off; this in turn hardened the States to refuse compliance with the treaty, and the forts being made a basis for Indian outrages winked at by the British commandants enraged the country still more. The Republicans, who sympathized with the new French Republic and hated Great Britain .held the House; the Federalists, whose sympathies were exactly opposite, the Senate by a small majority. On 16 Dec. 1793, Jefferson made a famous report on a House resolution, recommending retaliatory duties ; and after an acrid debate the Republicans pushed through a non intercourse resolution, only defeated even in the Senate by Vice-President Adams' casting \ ote. But Washington threw his weight into the scale of peace, and nominated Chief Justice John Jay as envoy extraordinary to negotiate a commercial treaty. With Lord Granville he*

lrCWuUp ori ˆ Nov. 1794, which removed tne chief American grievance by surrendering tne torts, but refused compensation for the negroes and referred all other claims to com¬ missioners; and as to commerce, allowed direct but not coasting trade between the United States and the British East and West Indies (the latter

*t1? vesfe~ n˚it ovU 70 tons), but denied the United States the right to export sugar, mo¬ lasses, coffee, cocoa or cotton to Europe — in other words, to become an intermediary for the British colonies to evade the British commer¬ cial monopoly; and limited even this provision to two years after peace with the powers then at war with Great Britain. There were also clauses which impliedly recognized British right ot search and impressment, and power to make anything contraband. The treaty was ratified py the Senate. in secret session (8 June 1795) but when published excited an uproar of public indignation; Jay was burned in effigy, and even Washington vilified incredibly. The Virginia legislature and the Federal House practically passed votes of censure; but the people gradu- afly came to recognize that it was the best thing to be had, hard as were the terms; the commer¬ cial bodies in the States openly commended it; Hamilton wrote his "Camillus** letters in its favor;. and after a bitter struggle for manv weeks in the House to refuse compliance with the Senate action, the treaty won by 51 to 48.*

JEAFFRESON, John Cordy, English an thor : b. Framlingham, Suffolk, 14 Jan.R1831 • d. London, 2 Feb. 1901. He was educated at Ox-

doneH ".1 WP C?"ed 1° t!? e bar in 1859′ but aban- doned the legal profession for literature His

;s r Crew.e Rise (1854) was followed v a lengthy series in the three-volume type then popular, among them 'Live it Down**

THE JAY FAMILY

mem

j2mM

. I M.

£

Mb

ˆ mm

bl j r

CeIUpW

1 European Jay (Garrulus glandarius)

2 Mexican Long-crested Jay (Cyanocitta

diademata)

3 Canada Jay (Perisoreus canadensis)

4 Blue-capped Jay (Cyanocorax chrysops)

5 American Bluejay (Cyanocitta cristata)

6 Spanish Jay (Cyanopica cooki)

7 Red-billed Jay (Cissa erythrorhyncha)

,(1863) and (Not Dead YeD (1864), which were moderately successful. He was appointed in¬ spector of documents for the Historical Manu- script Commission in 1874, and from 1858 until his death he was a contributor to the Athenaeum. He wrote five popular works of two volumes each, of

anecdotal social history

r,°oC«xrs>,.(1^):

, S » (A Book about

the Table (1874). His duties as inspector of documents gave him access to manuscript collec- tions which resulted in his publication of (The Rea Lord Byron > (2 vols., 1883) ; (The Real Shelley (2 vols 1885) ;

*N/PionAnd kord< Nelson> (2 vols., 1889; new e.d * [?97)* He described himself as a «realis- tic» biographer hut was severely criticized for*

Cu-nSOr^OUS m4nner handling his material and his lack of historical training, although the volumes gave much new and valuable informa¬ tion.

JEAN CHRISTOPHE, zhaii krls'tof, by Komain Rolland. One of the most noteworthy novels to appear in France, from the death of Zola to the opening of the World W^ar, was the (Jean Christophe> of Romain Rolland. Its im¬ portance lies partly in the novelty of its infor¬ mal manner and partly in the range and import-

t?Cn °j i!tS t^leme- With regard to manner, Rolland has put away rhetoric and eloquence, chmax:, dramatic effect and all the traditional methods of the novelist, to tell his story in the simple language of conversation and to follow in his meandering and now and then clogged and almost tedious narrative, the slow-moving processes of life. With regard to his theme, he had set himself the task of studying the un¬ folding of a musical genius, tracing him from infancy through childhood and adolescence in Germany, to full maturity in Paris, at a time of unsettled, shifting and conflicting ideals. This gradual unfolding of the temperament of Jean Christophe provides the principle of unity which links the 10 small volumes of the French edi¬ tion. But the analysis of Jean Christophe's psychology is but one element of interest; for the larger aspects of the theme imposed them¬ selves upon the author as he proceeded and as he brings his hero into contact with the ruling classes in Germany, with new-found French friends and with the world of music and letters. His minute study of a single great man thus widens, until it becomes a dispassionate yet keen survey of the national ideals of leading European peoples in the som'bre twilight that marked, the closing of the 19th century. Teacher and critic rather than great creative artist, Rolland had been moved to write the history of the inner life of the generation that came to maturity before the Great War and to present its account to posterity.

The task was a large one and the results were uneven. The earlier volumes, especially the first, dealing with the childhood of Jean Christophe in the

old-fashioned south German town, have the clearness, quaintness and charm of old engravings and are artistically the most perfect. As he proceeds and his subject broadens, the author loses himself in disquisi¬ tions on art and politics, but especially on music, which even when correct in substance are out

of focus. The later volumes therefore give an impression of diffuseness and lack of artistic mastery and are marked by the touch of resent ¬ ment of one who had struggled long and bitterly j.01 reco&niti°n. No author of the time, however, had shown greater penetration, and the con- trast between Teuton and Latin character and civilizations was clearly and truthfully drawn. Rolland knew the hidden springs from which France grew her strength and was conscious of the coming <(revival® of the spirit of France. He foresaw also the rapidly approaching era of force and war, and his later volumes read like a prophecy of the coming cataclysm which he deplored. This is a testimony to the truth of his diagnosis. When, however, after the outbreak of the war he pleaded in Above the Conflict, as he had done in his novel, for mutual understanding, he was disowned by the genera¬ tion which had earlier acclaimed him as its spokesman.*

When all lis sand, in spite of the touches of sourness, of inconsistencies, tiresome disquisi¬ tions and occasionally grotesque psychology, Rolland' s scope and range, his earnestness, sin¬ cerity. and vision mark his work as one of the truly important achievements in French prose fiction of the last 25 years.

Christian Gauss.

JEAN PAUL. See Richter, Jean Paul Friedrich.

JEANES, jenz, Anna T., American Quaker philanthropist: b. Philadelphia, 1822; d. there, 25 Sept. 1907. She was deeply interested in charitable and educational institutions and gave freely to their support, as well as to projects for the elevation of the negro race in the United States. She gave $200,000 to the tech¬ nical school known as Spring Garden Institute; $100,000 to the Hicksite Friends; $200,000 to the Quaker schools of Philadelphia, and $200,- 000 to the Home for Aged Friends, to which she retired in her last years. She also gave $1,000,000 as a (

JEANES (Anna T.) FOUNDATION, a

fund of $1,000,000 placed under the trusteeship of Booker T. Washington and Hollis B. Fris- sell, April 1907, by Miss Anna T. Jeanes (q.v.), for. the purpose of ˆassisting in the southern United States community, country and

rural schools for the great class of negroes to whom the small, rural and community schools are alone available.® The work of the foundation is closely allied with that of the General Educa¬ tion Board. It concerns itself chiefly with in¬ dustrial education, extension work and the ap¬ pointment of. county agents with the general purpose of improving both educational and home, conditions and securing public co-opera¬ tion in the work. The fund is employed in stimulating effort rather than in actual pay¬ ment of the cost of such extensions.

JEANNE D'ARC, zhan dark. See Joan of Arc.

JEANNETTE, Pa., borough in Westmore¬ land County, on the Pennsylvania Railroad, about 25 miles southeast of Pittsburgh. The natural gas which supplies the borough has contributed somewhat to its development. It is situated in a fertile agricultural region, which is also a coal mining section. It manufactures window glass, flint glass, tableware, lamps and shades, mine fans, rubber goods, bottles, etc. Jeannette was settled in 1888 and incorporated the following year. The government is vested in a burgess and a council. Pop. (1920) 10,627.

JEANNETTEˆ EXPEDITION, an enter¬ prise, projected 1879 by James Gordon Bennett of the New York Herald, who sent out an Arctic expedition from San Francisco in the. steamer Jeannette, under command of Lieuten¬ ant De Long, U. S. N. The Jeannette was early caught in the icepack, drifted for nearly two years and never escaped from its grip. After the wreck of the Jeannette the crew embarked in two cutters and a whaleboat. Lieutenant Danenhower and a portion of the Jeannette's crew reached New York in May 1882. The bodies of De Long and his men were finally discovered in the snow, with evidences that all had perished from cold and hunger. See Polar Research.

JEANRON, zhan'ron, Philippe Auguste,

French painter: b. Boulogne-sur-Mer, 10 May 1810; d. Paris, 10 April 1877. He studied under Sigalon and Souchon and engaged in genre and historical painting. During the Revolution of 1848 he was appointed to the charge of the Louvre and director-general of the national mu¬ seums by Ledru Rollin. He opened new gal¬ leries and reclassified the pictures at the Louvre, and. reorganized the collections of many pro¬ vincial museums. In 1863 he was appointed di¬ rector of the museum at Marseilles. He was elected to the Legion of Honor in 1855 and be¬ came corresponding

member of the Institute in 1863. Among his works are (Lille Museum) ; (Camp at EquihenP (Chartres Museum); (View of 'Cape Grisnez) (Boulogne Museum); (View of Cape Grisnez; Evening) (Aix Museum). Author of (Histoire de recole franqaise) (1852); (De l'art de la peinture) (1865).

JEBB, John, Irish clergyman of the Church of England: b. Drogheda, Ireland, 27 Sept. 1775; d. East Hill, Surrey, 9 Dec. 1833. He was educated at the Londonderry Grammar School and graduated from Trinity College, Dublin. In 1799 he was ordained. After serv¬ ing as curate and examining chaplain for Arch¬ bishop Broderick he became, in 1820, arch¬ deacon of Emly. In 1822 he was made bishop of Limerick. Five years later he was stricken with paralysis, and being unable to participate in active work he removed to England and en¬ gaged in literary work. The last year of his life he spent in arranging and superintending the. rebinding of many books in his library, which numbered over 9,000 volumes. He edited several volumes, and was the author of Ser¬ mons on Subjects Chiefly Practical) (1815 and several later editions) ; (Practical Theology) (1830; 2d ed., 2 vols., 1837) ; (Pastoral Instruc¬ tions on the Character and Principles of the

Church of England) (1831; new ed., 1844); c Sacred Literature) (new ed., 1831) ; (Thirty Years Correspondence with Alexander Knox, EsqP (edited by R. W. Charles Forster, 1833; who also wrote (The Life of John Jebb with Selections from his Letters; 2 vols., 1836).

JEBB, Sir Richard Claverhouse, English

Greek scholar : b. Dundee, Scotland, 27 Aug. 1841 ; d. 9 Dec. 1905. He was educated at the Charterhouse, London, and Cambridge Univer¬ sity, and in 1869 became public orator there. From 1875-89 he was professor of Greek in Glasgow University, and in 1889 was appointed to the same chair at Cambridge. In 1874 mar¬ ried the widow of a general in the United States army, and he paid several visits to the United States. His best-known works are (The Attic Orators) (1876) ; (Modern Greece)

(1880) ; a (Life of Richard Bentley) (1882) ; Corner: an Introduction to the Iliad and Odyssey) (1886) ; (Lectures on Greek Poetry) (1893) ; (Humanism in Education) (1899), and an edition of Sophocles, with notes and trans¬ lation, which is his greatest work and has been described as the (

JECKER, zhe'kar, Jean Baptiste, Swiss banker: b. Porrentruy, Bern, 1810; d. Paris, 26 May 1871. He entered the banking house of Hottinguer in 1836, and afterward settled in Mexico where he founded a bank and

amassed a great fortune. In 1859 Jecker's bank under¬ took the conversion of the Mexican domestic debt, charging an extortionate commission which was sanctioned by President Miramon. Upon the election of President Juarez the agree¬ ment was repudiated, together with the with¬ drawal of permission to explore Sonora and Lower California. The French intervention in Mexico having been decided upon Jecker trans¬ ferred his rights as an explorer in Sonora to that government for 10,000,000 francs, and in 1861 he settled his claim against the Mexican government for the. sum of 22, 660,000 francs, to be paid in three instalments. Two of these were paid, but Maximilian refused to pay the third because of the embarrassment it caused the treasury, although the later testimony of Marshal Bazaine showed the agreement to have been made by Maximilian's cabinet and the French mission, supported by the French lega¬ tion. Jecker returned to France, was arrested by the orders of the Commune 10 May 1871 and shot 26 May.

JEDBURGH, jed'bur-o, Scotland, royal and police borough and county-town of Rox¬ burghshire, 56 miles southeast of Edinburgh, on Jed Water, a tributary of the Teviot, and on the North British Railway. It is the seat of the stately ruined abbey founded as a priorv for the Augustinian monks in 1118 or 1138 and erected into an abbey by David I in 1147. The castle, erected by. David in 1174 and occupied by William the Lion and other Scottish kings, was leveled by the townspeople in 1409. The site was occupied by a prison in 1823, but the building fell into disuse and is now known as

the castle. There are standing houses in which Alary Queen of Scots lived in 1566, and where Prince Charles Edward resided in 1745. The town was sacked and burned many times during the Border strife. The modern town has an excellent grammar school, fine county buildings, library, public hall and two public parks. In¬ dustries include the manufacture of woolen blankets and hosiery, breweries, tanneries, iron foundries, and the town is noted for its pears and garden produce. Pop. police borough

JEDDAH, Arabia, (Arabic, Juddah), the chief trading port on the Red Sea, 60 miles west of Mecca, in the new kingdom of Hedjaz. It is a walled city containing many fine build¬ ings and wide streets. The custom house and the mosques are the chief structures. The city is very prosperous but is handicapped by a bad water supply and an exceedingly sultry climate, the

latter very trying to Europeans. In early times Jeddah was about the only point of com¬ mercial contact between Asia and Africa, and its commerce frequently reached the great sum of $4,500,000 annually. In late years this com¬ merce has declined to about $1,000,000. The city is the centre of the trade in pearls, mother- of-pearl, coral, balsam, coffee, aromatic herbs, horses, Oriental rugs and carpets, etc. Thou¬ sands of pilgrims to Mecca pass through the city annually, and catering to their needs is an important source of income to the inhabitants. There are two lines of steamers to Suez and other lines touch here. The tomb of Eve, one of the holy places of Islam, is just without the city. Jeddah was long in the hands of the Egyptians; fell to Turkey in 1840 and in 1858 was the scene of the murder of Christian missionaries. In the July following an English war vessel besieged the city for three days. During the Great War on the formation of the new king¬ dom of Hedjaz, the city of Jeddah was in¬ cluded within that realm. Pop. about 30,000.

JEDIDAH, wife of Amon, king of Judah, the daughter of Adaiah of Bozkath, and mother of Josiah, one of the most enlightened of the kings of Judah.

JEFFERIES, Richard, English author and

naturalist: b. near Swindon, 6 Nov. 1848; d. Goring, 14 Aug. 1887. He was practically self- educated, but inherited from his father, a small farmer, a love for the beauties of the country and strongly developed powers of observation.

His early literary efforts, including the writing and publishing of several novels, bore seamy fruits, and his first literary production of im- portance was (The Wiltshire Labourer,' pub¬ lished in the Times in 1872. In 1873 he began writing for Frasers Magazine on 'Farms and Farming, ' and in 1877 he achieved a consider¬ able success by his publication in the Pall Mall Gazette of his series 'The Gamekeeper at Home/ His work combined beauty of ex¬ pression amounting at times to prose poetry, with the acute observation of a naturalist, and his succeeding productions found an appreciative circle of admirers. His health began to break in 1881, and for the last two years of his life his work was dictated to his wife. He wrote ■! The. Gamekeeper at Home> (1878); (Wild Life in a Southern County) (1879) : (Bevis) (1882); 'The Story of My Heart' (1883);

Life of the Fields,' containing the remarkable paper, 'The Pageant of Summer' (1884) •

/i"oo7I\^0n^0n) (1^85) ; (Amaryllis at the Fair' (1887), etc. Too proud to make known the straightened circumstances occasioned by his many

illnesses, Jefferies died harassed by pov¬ erty, but the sympathy aroused at his death caused the grant of a pension to his wife. Con¬ sult Besant, Sir W, 'Eulogy of Richard Jef¬ feries' (1888) ; Salt, H. S., (Richard Jefferies, a Study' (1894); Thomas, E., 'Richard Jef¬ feries, His Life and Work' (1909).

JEFFERS, Wellington, Canadian clergy- man: b. Cork, Ireland, 1814; d. 1896. While Wellington was still a youth he removed with his parents to Kingston, Ontario. After mak¬ ing his preparatory theological studies and the regular theological course he was ordained in 1841 to the ministry of the Wesleyan Methodist Church. From 1841 to 1884 he held several im¬ portant pastorates within the boundaries of On¬ tario. He served also as district chairman for several years, was secretary of the conference in 1853, was appointed codelegate in 1866 and in 1879 was president of the conference. He retired from active duty in 1884. From 1860 to 1869 Mr. Jeffers was editor of the official organ of his church — the Christian Guardian As a pulpit orator he had few peers in Canada and was famous as an extempore speaker. In theological matters Jeffers belonged to the con¬ servative, traditional group of his church among the members of which he wielded a pow¬ erful influence. Victoria LTniversity gave him the honorary degree of D.D. in 1863.

*■,**

L i /

4- 4 .

II I ».

.% V

^JUTOST: — 1 .'Cl'

.

« > t

5 i

.

■ .J'l

. U.M il ci L. ■:$ ' Un[2rtt – z-.rnu •>!■ ;

1 : vj) ' I i

ir ?:)HV ■ CO mi ‘J’llion-u; v-)it

:: : > . , : . 0 fro a nOi. ‘j t • . ■ ’f

r ; f • 1 < .1 j 1 10 1 b •/; J • I ri

.

- V I •; n* i tl

. >ubotrf n >,f >;./ forc*

(t’.jit

‘

.

■ ; ‘ •

. (I »i 4* 6 !

■

vjj

: ;

\m * , i . r ; – • • • k

.(-‘.H) < '! >‘ ‘ / ’ . i *‘h . t.

‘

.! > ’ : :■ ;

‘• ■; m u •;*, • ‘ ri ub •; : rro ; r u •?

,

i .

>r!) ‘i ’.v ■■ ’ •• >■!

i *j i >\

-

■

■■•••. ~ • : rt A

. : {. rnJfijK ri .f • <.!••

.

YH' i/tflf ' Lilt

'

. Hfti gJi/ M viufcnjO

r

jbj! or • l i i

.

■

I p

■

t

. ..

.

'

1

Vol. 16, JEFFERSON TO LATIN

Americana

>

I

.

.

• ‘

i

1

<

1

I

1

i

1

i

i

1

I

I

i

1

i

I

cL

THE

ENCYCLOPEDIA

li

AMERICANA

JT

l&gs?

Unnee§al

MoWLEDGE/

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK CHICAGO

a\^

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, EINDING

BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN I 8 1922

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XVI N

ALDEN, RAYMOND M., Ph.D., Litt.D.

Professor of English, Stanford University LADY OF THE LAKE, THE

ASHER, JOSEPH MAYOR, M.A.

Late Professor of Homilectics, Jewish Theological Seminary of America

JEWS AND JUDAISM — FOOD AND

HEALTH LAWS

BAILEY, WILLIAM L., M.A.

Associate Professor of Political Science, Grinnell College

JOURNALISM, AGRICULTURAL

BENNETT, CHARLES E., Litt.D.*

Late Professor of Latin, Cornell University JUVENAL'S SATIRES

BERRY, GEORGE RICKER, Ph.D., D.D.

Professor of Old Testament Interpretation and Semitic Languages, Colgate University

JOEL, BOOK OF

JONAH, BOOK OF

JOSHUA, BOOK OF

BLAKER, ERNEST, Ph.D.

Assistant Professor of Physics, Cornell University LABORATORY

BOGART, ERNEST LUDLOW, Ph.D.

Professor of Economics, University of Illinois LABOR

BOTHNE, GISLE C., A.B.

Professor of Scandinavian Languages and Literature, University of Minnesota

KING RENE'S DAUGHTER

BRADY, CYRUS TOWNSEND, LL.D.*

Author of “ Life of Paul Jones,” etc.

JONES, JOHN PAUL

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University JOHN INGLESANT

LAMB, CHARLES

LANDOR, WALTER SAVAGE

BROOKE, TUCKER, M.A., Litt.B.

Professor of English, Yale University

KING HENRY THE FIFTH

KING HENRY THE SIXTH

KING HENRY THE EIGHTH

KING JOHN

KING RICHARD THE SECOND

KING RICHARD THE THIRD

BUELL, MARCUS D., S.T.B., D.D.

Professor of New Testament Greek and Exegesis, Boston University School of Theology

JUDE, EPISTLE OF

CAIRNS, WILLIAM B., Ph.D.

Associate Professor of American Literature, Univer-

, sity of Wisconsin

JOHN WOOLMAN’S JOURNAL

’ / ■*. i (’ • I . 0

CANFIELD, ARTHUR G., Ph.D.

Professor of Romance Languages, University of Michigan

LA CONFESSION D'UN ENFANT DU

SIECLE

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

LANTERN SLIDES

LATEX

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of Cincinnati

LABYRINTH, THE

L'AIGLON

CHANDLER, J. A. C., Ph.D., LL.D.

Superintendent of Schools, Richmond, Va.

JEFFERSON, THOMAS

tt

COCHRANE, CHARLES H.

Formerly of the Editorial Staff of " Newspaperdom "

JOURNALISM, CLASS PUBLICATIONS

COHEN, SOLOMON SOLIS, A.M., M.D.

Author, editor and writer on Zionism, Philadelphia, Pa.

JEWS AND JUDAISM — ZIONISM

COUMBE, CLEMENT W.

Technical Art Expert

LACQUERS AND LACQUERWORK,

JAPANESE

LAMB IN ART

LAPIDARY WORK

CREIGHTON, JAMES E., Ph.D. LL.D.

Professor of Logic and Metaphysics, Cornell UflK

versity

KANT, IMMANUEL

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

KIPLING, RUDYARD

LAST DAYS OF POMPEII, THE

DEIMEL, RICHARD F., B.S., M.A.

Assistant Professor of Mechanics, Stevens Institute of Technology

KINEMATICS OF MACHINERY

DEMBITZ, LEWIS N.

Author of “ Jewish Services in Synagogue and Home ”

JEWS AND TUDAISM — THE SPIRIT

OF RABBINIC LEGISLATION

- Deceased

Contributors to Volume XVI — Continued DEUTSCH, GOTTHARD, Ph.D.*

Late Professor of History, and Dean of Hebrew Union College, Cincinnati, Ohio

JEWS AND JUDAISM — JEWISH LIT¬

ERATURE

DICKINSON, THOMAS H., Ph.D.

Associate Professor of English, University of Wis¬

consin

GEHRING, ALBERT, A.M.

Author of “ The Basis of Musical Pleasure,” etc.

KEYBOARD

GOTTHEIL, RICHARD, Ph.D.

Professor of Semitic Languages, Columbia University JEWS AND JUDAISM — THE KARA¬

ITES

LADY WINDERMERE’S FAN

JEW OF MALTA, THE

JUSTICE

DOLE, NATHAN HASKELL, A.B.

Translator of the works of Tolstoi, etc.

KOROLENKO, VLADIMIR GALAK-

TIONOVITCH

LA VITA NUOVA

DRACHMAN, BERNARD, Ph.D.

Professor Rabbinical College of America JEWS AND JUDAISM — HEBREW

LANGUAGE, THE

DUNN, WALDO H., M.A., Litt.D.

Professor of English Language and Literature, Col¬

lege of Wooster, Wooster, Ohio

JOHNSON, BOSWELL'S LIFE OF

EISERHARDT, EWALD, Ph.D.

Professor of German, University of Rochester JOURNALISTS, THE

ESTES, DAVID FOSTER, D.D.

Professor of New Testament Interpretation, Hamil¬

ton Theological Seminary, Colgate University JESUS CHRIST

JOHN THE BAPTIST

FINEGAN, THOMAS E., M.A., LL.D.

State Superintendent of Public Instruction for Pennsylvania. Formerly Deputy Commissioner of Education, State of New York

LAN CASTERI AN SCHOOLS

FORD, JEREMIAH D. M., Ph.D. *

Smith Professor French and Spanish Languages, Harvard University

JOSE

LA BARRACA

LA VICTORIA DE JUNIN

GRIFFIS, WILLIAM ELLIOT, L.H.D.

Author of " Corea, the Hermit Nation," etc.

KOREA

LAFAYETTE AT BARRON HILL

GUITERMAN, ARTHUR, B.A.

Author and Critic

JUNGLE BOOKS, THE

KIDNAPPED

KIM

HALE, EDWARD E., Ph.D.

Professor of English Literature, Union College L'ALLEGRO

HALLER, WILLIAM, Ph.D.

Instructor in English, Columbia University LALLA ROOKH

HALPIN, PATRICK A., Ph.D.

Late Professor of Ethics, New Rochelle College JUSTIFICATION

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

KENILWORTH

KUBLA KHAN

LAMIA

LAODAMIA

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor Department of Language and Literature, College of the City of New York JUNG-DEUTSCHLAND

KELLER, GOTTFRIED

KNOOP, GERHARD JULIUS

KONRAD VON WURZBURG

KUMMER, FRIEDRICH

OUCKAMA

FOWLER, HENRY THATCHER, Ph.D.

Professor of Biblical Literature and History, Brown University

JOB, BOOK OF

JUDGES, BOOKS OF

KINGS, BOOKS OF

HERRICK, MYRON T., LL.D.

United States Ambassador to France

INGALLS, RALPH

LAND CREDIT AND LAND CREDIT

INSTITUTIONS

GAUSS, CHRISTIAN, Litt.D.

Professor of Modern Languages, Princeton Univer¬

sity

LA MARE AU DIABLE

LA NOUVELLE HELOISE

HILL, PATTY SMITH

Associate Professor in Education, and Director of Lower Primary Education, Teachers' College, Columbia University, New York City

KINDERGARTEN

GEDDES, JAMES, Jr., Ph.D.

Professor of Romance Languages, Boston University LA CITTA MORTA

LA GIOCONDA

HIRSCH, EMIL G., A.B., A.M.

Professor of Rabbinical Literature and Philosophy, The University of Chicago

JEWS AND JUDAISM — THE CABALA

- Deceased

Contributors to Volume XVI — Continued

HODGE, FREDERICK W.

Smithsonian Institution, Washington, D. C.

KERESAN

HOWARD, WILLIAM G., A.M.

Assistant Professor of German, Harvard University LAOKOON

HUBBARD, HENRY V., A.M., S.B.

Assistant Professor of Landscape Architecture, Harvard University

LANDSCAPE ARCHITECTURE

INGERSOLL, ERNEST

Zoologist and author

LAKE DWELLINGS

LAND-BRIDGES ACROSS THE OCEANS

ISAACS, ABRAM S., Ph.D.

Professor of Semitic Languages, New York Uni¬

versity

JEWISH NATIONAL ORGAN I Z AT LONS

IN THE UNITED STATES

JEWS AND JUDAISM — THE TALMUD

JEWS AND JUDAISM — ANTI-SEMI¬

TISM

JEWS AND JUDAISM — SYNAGOGUE

JEWS AND JUDAISM — THE PRESENT

STATUS OF THE JEWS

JASTROW, MORRIS, JR., Ph.D.

Professor of Semitic Languages and Librarian, University of Pennsylvania

JEWS AND JUDAISM — JEWISH PHIL¬

OSOPHICAL WRITERS

KARPELES, GUSTAV, Ph.D.

Author of “ Jewish Literature and Other Essays.”

JEWS AND JUDAISM — THE JEW IN

ART, SCIENCE AND LITERATURE

KING, JAMES L.

Kansas State Librarian

KANSAS, STATE OF

KOHLER, KAUFMANN, Ph.D.

President of Hebrew Union College, Cincinnati, Ohio

JEWS AND JUDAISM — COMMERCE

AND THE JEWS •

KOHLER, MAX J., A.M., LL.B.

Formerly Corresponding Secretary American Jewish Historical Society

JEWS AND JUDAISM — JEWS IN

AMERICA

KUNZ, GEORGE F., Ph.D., Sc.D.

Gem expert. Tiffany & Co., New York City JEWELRY

JEWELRY TRADE, THE

LANDSBERG, MAX, Ph.D.

Rabbi, Temple Berith Kodesh, Rochester, N. Y.

JEWS AND JUDAISM — EDUCATION

AND THE JEWS

LEVIAS, C., M.A.

Formerly Professor of Hebrew, Union College JEWS AND JUDAISM — MASORAH

LEVY, J. LEONARD, D.D.

Late Rabbi Cong. Rodeph Shalom, Pittsburgh, Pa.

JEWS AND JUDAISM — ALLIANCE

ISRAELITE UNIVERSELLE

LIVINGSTON, ARTHUR

Professor of Italian, Western University, London, Ontario, Canada

JERUSALEM DELIVERED

LOISEAUX, LOUIS A., B.S.

Associate Professor of Romance Languages and Literatures, Columbia University

L'ABBE CONSTANTIN

LOW, A. P.

Of the Geological Survey of Canada

LABRADOR

McCREA, NELSON G., Ph.D.

Professor of Latin Language and Literature, Columbia University

JUVENAL

McGRANE, R. C., Ph.D.

Assistant Professor of History, University of Cin¬

cinnati

JOHNSON, ANDREW

McVEA, EMILIE W., Litt.D.

President of Sweet Briar College, Sweet Briar, Va.

LANIER, SIDNEY

MEADER, CLARENCE L., A.B.

Professor of Latin, Sanskrit and General Linguistics, University of Michigan

LANGUAGE, SCIENCE OF

MEADER, JOHN R.

Labor and Service Department, Brighton Mills, Passaic, N. J.

LABOR TURNOVER

MENDES, FREDERICK DE SOLA, Ph.D.

Rabbi and Author, West End Synagogue, New York City

JEWS AND JUDAISM — THE HISTORY

AND PRINCIPLES OF JUDAISM

MENTEL, E. W.

Industrial Commissioner

KANSAS CITY

MIMS, EDWIN, Ph.D.

Professor of English, Vanderbilt University JULIUS CAESAR

KING HENRY THE FOURTH

KING LEAR

Contributors to Volume XVI — Concluded NOURSE, EDWARD E., D.D.

Professor of Biblical Theology, Hartford Theological Seminary

JOHN, EPISTLES OF

JOHN, GOSPEL OF

OGDEN, CHARLES J., Ph.D.

New York City

LAMAISM

PERLMAN, SELIG, Ph.D.

Department of Political Economy, The University of Wisconsin

LABOR DEPARTMENTS, FOREIGN

LABOR LEGISLATION, FOREIGN

LABOR ORGANIZATIONS, FOREIGN

PFEIL, STEPHEN*

Formerly Editor of the Philadelphia “ Press.”

JURISDICTION

JURISPRUDENCE

LAISSEZ – FAIRE

PHILIPSON, DAVID, A.B.

Professor of Homiletics, Hebrew Union College, Cincinnati, Ohio

JEWS AND JUDAISM — A CENTURY

OF EMANCIPATION

ROSENAU, WILLIAM, Ph.D.

Associate in Post Biblical Hebrew, John Hopkins University; and Rabbi of Congregation Cheb Shalom, Baltimore, Md.

JEWS AND JUDAISM — JEWISH HIS¬

TORY

SCHMIDT, NATHANIEL, A.M.

Professor of Semitic Languages and Literatures Cornell University

JEREMIAH

JEREMIAH, BOOK OF

JEREMIAH, LAMENTATIONS OF

SILVERMAN, JOSEPH, A.B., D.D.

Rabbi, Temple Emanu-El, New York City

JUDAISM, REFORM

SINGLETON, ESTHER

Author of “The Art of the Belgian Galleries;”

French and English Furniture,” etc.

LACE

STANOYEVICH, MILIVOY S., M.A.

Slavonic Department, University of California JUGOSLAVIA

THOMAS, DAVID Y., Ph.D.

Professor of History and Political Science, University of Arkansas

LABOR LEGISLATION, AMERICAN

LABOR MOVEMENT IN AMERICA

LABOR UNIONS

THORNDIKE, ASHLEY H., Ph.D., L.H.D.

Professor of English, Columbia University JONSON, BEN

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of Literature, Columbia University JOHN GILPIN

JOHNSON, SAMUEL

KEATS, JOHN

TUTHILL, EDWARD, Ph.D.

Professor of History and Political Science, University of Kentucky

KENTUCKY, STATE OF

VAN DOREN, CARL, Ph.D.

Associate in English, Columbia University KNICKERBOCKER HISTORY OF NEW

YORK

LAST OF THE MOHICANS

WALDMANN, MORRIS D.

Executive Director, United Hebrew Charities, New York City

JEWISH CHARITIES

WALSH, JAMES J., M.D., Ph.D., LL.D.

New York City

JOURNEY AROUND MY ROOM

WAXMAN, SAMUEL M.

College of Liberal Arts, Boston University LA FAMILIA DE ALVAREDA

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern French Literature ”

L’AMI FRITZ

LA CHARTREUSE DE PARME

LA DAME AUX CAMELIAS

LA FONTAINE FABLES

LAMARTINE, ALPHONSE MARIE

LOUIS DE PRAT DE

WIENER, LEO

Professor of Slavic Languages and Literatures Harvard University

KALEVALA

KORDYAN

LANGUAGE MAP OF EUROPE

WRIGHT, HERBERT F., Ph.D.

Sometime of the Department of Latin, The Catholic University of America

JESU DULCIS MEMORIA

LATIN LANGUAGE

YOUNG, STARK, B.A., M.A.

Professor of English, Amherst College

JOLLY BEGGARS, THE

- Deceased

KEY TO PRONUNCIATION.

a

a

far, father

fate, hate

n

Span, u, as in canon (can’yon),

pin on (pen’yon)

a or a

at, fat

ng

mingle, singing

i

a

air, care

nk

bank, ink

a

ado, sofa

6

no, open

A

a

all, fall

o or o

not, on

ch

choose, church

A

0

corn, nor

e

eel, we

6

atom, symbol

e or c

bed, end

o

book, look

e

her, over : also Fr. e, as in de;

eu, as in nenf ; and oeu , as in

boeuf, coeur; Ger. d (or oe),

as in okonomie.

oi

o or oo

oil, soil ; also Ger. eu, as in beutel fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or h

Ger. ch, as in nicht, wacht

u or u

but, us

h\v

what

u

pull, put

r

i or 1

file, ice

him, it

ii

between u and e, as in Fr. sur,

Ger. Muller

A

1

between e and i, mostly in

Oriental final syllables, as,

Ferid-ud-din

V

y

of, very

(consonantal) yes, young

j

gem, genius

z

p’.easant, rose

kw

quaint, quite

zh

azure, pleasure

ri

Fr. nasal in or n, as in embon¬

point , Jean, temps

‘(prime),

” (secondary) accents, to indicate

syllabic stress

.

t

.

‘ yjss*: ‘ , •

,

..

-•/•i ; • • ■ : .i •

■■

■

•

.

! ” . ; 1 ■ •

v, A

JEFFERSON, Charles Edward, Ameri¬

can Congregational clergyman : b. Cam¬

bridge, Ohio, 29 Aug. 1860. He was

graduated from Ohio Wesleyan Uni¬

versity (Delaware, Ohio) in 1882, from the School of Theology of Boston University in 1887, was ordained to the Congrega¬

tional ministry in 1887. He was pastor of th6

Central Congregational Church at Chelsea, Mass., until 1898, when he became pastor of the Broadway Tabernacle, New York. In 1914 he became chairman of the executive committee of the Church of Peace Union, endowed by Andrew . Carnegie. Among his writings are (Quiet Talks with Earnest People in My Study ‘ ; and (The Broadway Tabernacle of the Past and Future) (1901) ; (Doctrine and Deed) (1902); (Things Fundamental’ (1903); (The Minister as Prophet’ (1905) ; (Faith and Life’

(1905) ; (The New Crusade) (1907) ; (The Character of Jesus) (1908) ; (My Father’s Busi-

ness) (1909) ; (The Christmas Builders’

(1909) ; (The Building of the Church' (1910, 1913) ; (Why We May Believe in Life after Death' (1911) ; (The Minister as Shepherd'

(1912); (The Cause of > the War' (1914); Christianity and International Peace' (1915) ; (The Land of Enough' (1917).

JEFFERSON, Joseph, American actor: b.

Philadelphia, 20 Feb. 1829; d. Palm Beach, Fla., 23 April 1905. He was privately'educated and from infancy was upon the stage, appearing as Cora's child in (Pizarro' when three years old, and among his first public appearances being that as a miniature of T. D. Rice in one of the latter's <(Jim Crow" entertainments at Wash¬

ington, D. C. In 1843 he became a member of a band of strolling players that gave primitive entertainments through Mississippi and Texas, and followed the United States army into Mex¬

ico. On his return to the United States he appeared at the Arch . Street Theatre, Philadel¬

phia, directed the performances at Peale's Mu¬

seum in that city, became known as an excel¬

lent stock actor, and in 1851 played Marroll in

His prominence began with his creation of Asa Trenchard in Cur American Cousin,' which eliminated from the stage the -traditional carica¬

ture of Yankee character. He visited Europe in 1856 and soon after his return joined Laura Keene's Company. He then appeared in the parts he afterward made famous: Newman Noggs in (Nicholas Nickleby' ; Caleb Plummer in (The Cricket on the Hearth' ; Dr. Pangloss in (The Heir at Law' ; Dr. Ollapod in (The Poor Gentleman' ; Mr. Golightly in (Lend Me Five Shillings' ; Salem Scudder in (The Octoroon' ; Bob Acres in (The Rivals' ; and, above all, Rip Van Winkle in the play of that name. Dis¬

satisfied with his own dramatization of Irving'; sketch, in which he had appeared at Washington in 1860, Jefferson had the play rewritten by Dion Boucicault, and in Boucicault's version, with slight changes, afterward acted. The drama ran for 170 nights at the Adelphi, Lon¬

don, in 1865, and in the United States was so successful that for years Jefferson appeared there in nothing else. Jefferson's Rip estab¬

lished itself as one of the classic creations of the stage, and outside of Shakespeare probably no character ever attained so wide and per¬

manent a recognition with the American pub¬

lic. In the later years of his life he played but a few weeks annually in a repertoire of favorite parts. He also made a considerable reputation as an artist by his impressionist landscapes in oils. His acting method was distinguished by ease, verisimilitude and perfection of > finish.

In the plays used by him he, for artistic pur¬

poses, introduced several admirable changes and additions. He was a member of the American Academy of Arts and Letters. He published an interesting (Autobiography' (New York 1890), and a (Reply to Ignatius Donnelly on the Shakespeare-Bacon Argument.' Consult the (Autobiography' and Carroll, /Twelve Ameri¬

cans' (New York 1883) ; Dole, N. H., (Joseph Jefferson at Home' (Boston 1898); Jefferson, E. P., Untimate Recollections of Joseph Jef¬

ferson' (New York 1909) ; Matthews and Hut¬

ton, (Actors and Actresses of Great Britain and the United States' (ib. 1886) ; Moses, M. J., (Famous Actor-Families in America'

(ib. 1906) ; Wilson, Francis, (Joseph Jefferson'

(ib. 1906) ; id., (Reminiscences of a Fellow Player' (ib. 1906) ; Winter, William,

fersons' (Boston 1881); id., (Other Days'

(New York 1908).

JEFFERSON, Thomas, American states¬

man, third President of the United States; b.

Shadwell, Albemarle County, Va., 13 April 1743; d. Monticello, Albemarle County, Va., 4 July 1826; student at William and Mary Col¬

lege, Williamsburg. Va., 1760-62; student of law 1762-67; member of

house of burgesses 1769-74; member of Virginia Conventions 1774

and 1775; of the Continental Congress 1775-76; of Virginia legislature 1776-79; governor of 2

JEFFERSON

Virginia 1779-81 ; member of Congress 1783— 84 ; Minister to France 1784-89; Secretary of State 1790-93; Vice-President 1797-1801) ; President 1801-09; in retirement at Monticello 1809-26.

Thomas Jefferson was the son of Peter Jef¬

ferson, a planter of Albemarle County, Va.

His mother w.as Jane Randolph, daughter of Isham Randolph, who was a descendant of William Randolph of Turkey Island, the pro¬

genitor of that family so well known in Vir¬

ginia history. Jefferson's birthplace was Shad-

well, about four miles from the city of Char¬

lottesville. At this homestead he resided until it was destroyed by fire in 1770; thereupon Jefferson selected a low mountain about two miles from Charlottesville, where he built that now famous mansion, ˆMonticello.® Albemarle County, Va., has the proud distinction of being the section in which Jefferson was born, reared, lived, died and lies buried. Jefferson's early education, as was usually the case with Vir¬

ginia planters, was entrusted first to a private tutor, from whom he learned Latin, Greek, French and mathematics. At 14 his father died, and after two years in a school conducted by the Rev. James Maury, he entered in 1760

William and Mary College, at that time the best institution of learning in America. The student Jefferson is described as tall and raw-

boned, with reddish hair and grayish hazel eyes.

He was not then regarded as handsome, though in after years he was considered as probably the most attractive in appearance of the great Virginia statesmen. As a youth he was noted for his intelligence, and while at college he was in constant associatiomwith such men of culture as George Wythe (q.v.), the eminent lawyer; Prof. William

Small, the profound scholar, and Gov. Francis Fauquier (q.v.), the gay and accomplished gentleman. With these gentle¬

men, many years his senior, he was accustomed to discuss the deepest questions of philosophy and government. In Williamsburg, Jefferson was one of the leaders in all social functions, and always attended the balls given in the Apollo Room of the Raleigh Tavern. Probably his first year at college was spent among too many festivities, but during his second year he is said to have been a most diligent student, often devoting 15 hours a day to his books.

After two years of college work he commenced the study of law under George Wythe, but did not apply for admission to practice before the General Court of Virginia till 1767. Jefferson was now 24 years of age ; he had a large farm of 1,900 acres (soon increased to 5,000 acres) to which he gave his personal supervision.

Though he devoted much time to this farm, he succeeded so well as a lawyer that his profession soon paid him $3,000 annually.

In 1769 he was returned by Albemarle

County a member of the House of Burgesses, an honor which his father had had before him.

This was Jefferson's beginning as a statesman.

He had stood in 1765 in the hallway of the Flouse of Burgesses when Patrick Henry (q.v.) offered his famous resolution against the Stamp Act, > and from Patrick Henry he imbibed the spirit of revolution. Just as soon as he became a member of the Burgesses, he joined the party of resistance to England. He was by nature a bold and fearless thinker, and when a mere boy he had had engraved on a seal as his motto, <(Resistance to tyrants is obedience to God,® a principle to which he held through¬

out his long and eventful life. Jefferson was present when the House of Burgesses passed the resolutions of 1769. He was one of those who signed the agreement not to import goods from England. He was also a member of the House of Burgesses when, in 1 773, it estab¬

lished a Committee of Correspondence between Virginia and the other colonies. Some think that the resolutions for such a committee were drawn by Jefferson, though they were offered in the house by his kinsman, Dabney Carr (q.v.). Of this committee Jefferson was a member. He served again in the House of Burgesses in 1774, and was

one of those who voted for the resolution appointing a day of fasting and prayer because of the oppressive measures which England had passed against the city of Boston. When the governor dissolved the assembly, Jefferson met with those discon¬

tented members who called for a general con¬

gress of the colonies and asked the freeholders of Virginia for a convention to consider the state of the colony. To this convention Jeffer¬

son was returned by the people of Albemarle.

The convention of 1774 was the first extra-

legal assembly to meet in Virginia. Jefferson was unable to be present, having been taken ill on his way to Williamsburg. However, his in¬

fluence was felt through a document called <(The Summary View of the Rights of British America,® which was intended to be a series of instructions to the Virginia delegates to the First Continental Congress. The instrument marked him as a revolutionist, and as an ad¬

vocate of independence from England, for In it he distinctly claimed that the colonies had a right to govern themselves without interference from the English Parliament. His views were too radical for the Virginia convention to give them its official stamp.

Jefferson was also elected a membe. .he convention of 1775, which met at Saint John's Church, Richmond, and when Patrick Henry by his eloquence carried the colony Into open re¬

bellion against the mother country, Jefferson was appointed a member of the committee to devise a plan for organizing the militia of the colony. Shortly after this he became a member of the Second Continental Congress. When he entered that body he was 32 years of age, being one of the youngest three members. Here he was placed on such important committees as those which drafted a paper to explain the re¬

bellious attitude of Massachusetts at Lexington and Concord, and to reply to Lord North's ˆConciliatory Policy.® On each committee he showed such a strong republican tendency that his suggestions were not accepted. The mem¬

bers of the Continental Congress of 1775 were not far-sighted enough

to see that independence was the only course. Finally, in the spring of 1776, there came to the Virginia members of Congress instructions from the Virginia con¬

vention of 1776 that the united colonies should be declared free and independent States ;> and accordingly Richard Henry Lee, called the American Cicero, moved that a Declaration of Independence should be adopted. In accord¬

ance with the motion, a committee was ap¬

pointed and the members were elected by ballot. Jefferson s facility for writing was so THOMAS JEFFERSON

Third President of the United States

JEFFERSON

3

well known to the Congress that he received the highest number of votes and was named as chairman of the committee over such men as John Adams, Benjamin Franklin, Roger Sher¬

man and Robert R. Livingston. To him as chairman fell the task of drafting that immortal document which stands in the history of the world as the most revolutionary political paper ever written. On 4 July 1776, the instrument, practically as offered by Jefferson, was unani¬

mously adopted and to it were placed the sig¬

natures of all the members of Congress then present, except one. The principles set forth in that document mean a government by and for the people, and show that Jefferson was far ahead of his day; for it is only at the dawn of the 20th century that we are beginning to com¬

prehend the great and universal truths that Jef¬

ferson made known to the world. (See Decla¬

ration of Independence). Jefferson retired from Congress in 1776, and, on returning to his native State, entered the Virginia legisla¬

ture with the hope of revising and modifying her laws so that they might accord with re¬

publican government. For three years he served in the House of Delegates. During this time he succeeded in breaking down the laws of primogeniture and entail, in practically disestab¬

lishing the English Church and in passing one of the best laws that the world has ever seen for public education providing an ideal system from the primary school to the university.

Through his influence the legislature appointed a committee to revise thoroughly the laws of Virginia. The committee was composed of Ed¬

mund Pendleton, George Wythe and Jefferson.

After two years the revision, chiefly done by Jefferson, was submitted to the General Assem¬

bly, but was not adopted in toto. Finally, how¬

ever, in 1785, while Jefferson was in France, his faithful friend and political follower, James Madison, secured the passage of nearly all of Jefferson's work. It was at this time that the legislature approved the famous Statute for Re¬

ligious Freedom, by which the complete sepa¬

ration of Church and State was accomplished, except the taking away of the glebe lands, a thing which was done in 1802. Jefferson wished even more radical changes in Virginia, such as the equalizing of representation on population instead of having two representatives from each county. He also desired that the suffrage should not be restricted to landowners, but that it should be extended to all men who might be subject to military duty. He likewise advocated more local self-government in the counties and towns of the State. He even went so far as to advocate the emancipation and the deportation of the slaves from Virginia. These measures were too radical for the Virginia Assembly, and were rejected. It is interesting to note, however, that all of them have since been ac¬

complished save the deportation of the negroes.

Jefferson was governor of Virginia from June 1779 to June 1781. These were trying times; Virginia was invaded by British troops under Cornwallis, and Jefferson lacked money and resources with which to defend properly the State. His administration has often been criticized, some claiming that he was a mere doctrinaire and not a practical man ; but close scrutiny shows that he did all that then lay in his power.

In 1783 Jefferson entered the Congress of the United States. To this body he proposed in 1784 a plan for the government of the North¬

west Territory which Virginia so generously gave to the Union. One clause of this plan provided for the prohibition of slavery in that territory after 1800, and for this reason the plan was not adopted. In 1787, however, Con¬

gress enacted a bill for the government of the Northwest much like the original draft of Jefferson. From him Congress had the plan of our present decimal monetary system. In 1784 Jefferson was sent to France to join Ben¬

jamin Franklin and John Adams in negotiating commercial matters with foreign countries, and in 1785 he succeeded Franklin as our Minister Plenipotentiary to the French court. Through his efforts many unjust impositions on Ameri¬

can commerce were removed by the French government.

In October 1789 he returned to America and the following year became Secretary of State in Washingtonis Cabinet, in which position he opposed Hamilton (q.v.), who favored the ex¬

ercise of extensive powers by Congress. Jef¬

ferson believed in a real federal relation be¬

tween the States, and in a restricting of the congressional powers to purely constitutional authorizations. The final line of cleavage came when Congress passed a bill to establish a na¬

tional bank. Hamilton submitted to Washing¬

ton a paper asserting that such a step was legal, while Jefferson made a vigorous written pro¬

test showing that the ‘bill was unconstitutional.

Washingtop approved the measure, thus accept¬

ing Hamilton’s views as correct. The Bank Bill, along with similar congressional acts, caused the establishment of two distinct parties — the Federalist or Loose Construction party, headed by Hamilton, and the Anti-Federalist or Strict Construction party, with Jefferson as its leader. Jefferson’s followers were usually called the Democratic-

Republicans.

In December 1793 Jefferson resigned from the cabinet and returned to Monticello, where he remained for four years, studying farming.

His estate at this time contained 10,647 acres of land, worked by 154 slaves, and stocked with 34 horses, 5 mules and 249 cattle. Among the negroes he had a sort of industrial (manual¬

training) school, and taught them to be cabinet¬

makers, bricklayers, masons and smiths.

From his retirement at Monticello, Jefferson was called to become Vice-P resident in 1797, a position wThich he held till 1801. During these four years he bitterly opposed the so-called monarchical tendencies of the Federal party as seen in the Alien and Sedition Acts (q.v.), and he boldly asserted the compact theory of State sovereignty in the Kentucky resolutions of 1799.

The Kentucky resolutions and Virginia reso¬

lutions of 1798-99 (the latter framed by Mad¬

ison after a copy of the Kentucky resolutions sent him by Jefferson), made the platform, so to speak, of the Democratic-Republican party which elected Jefferson as President in 1801.

From 4 March 1801 to 4 March 1809 Jeffer¬

son was President. He was the first President to be inaugurated in Washington City. He be¬

lieved in rotation in office, and in pursuance of this idea removed a number of Federalists from their positions. His great act, however, was the purchase of the Louisiana Territory from France for the sum of $15,000,000. This vast territory was acquired for two reasons : 4

(1) In order that the United States might have control of the Mississippi River and the port of New Orleans; and (2) that the United States might not be hampered by European countries in the development of a republican form of government. As Secretary of State in Washington's Cabinet, Jefferson had prac¬

tically asserted what was afterward known as the Monroe Doctrine,

when he claimed that the United States should see that no European countries, other than those already holding possessions, secure a foothold in America. In 1801 Jefferson viewed with alarm the transfer of the Louisiana Territory from Spain to France,ˆ for he feared that, with France added to Spain, . England and Russia, in control of colonies in America, republican government would have a hard struggle. Jefferson was accused of inconsistency for having sanctioned the Louisliana Purchase (q.v.)', for if he had ap¬

plied the strict construction principle of the Constitution here as in such acts of Congress as the establishment of the national bank, this territory could not have been purchased, there being no provision in the Constitution allowing territorial expansion. But Jefferson's political sagacity kept him from refusing this great op¬

portunity, and his wish of expansion caused him to advocate earnestly the purchase of Florida from Spain. It was 13 years later be¬

fore his desire was accomplished. The second administration of Jefferson was not so success¬

ful^ the first. It opened with a war against the Tripolitan pirates who were plundering Ameri¬

can commerce. The outcome of this war was to increase our influence among the nations of the world. The last years of the second term were marked with difficult complications arising out of the Napoleonic wars. Napoleon tried to prevent the United States from trading with England, and England retaliated by attempting to cut off all commercial relations between the United States and France. Many American vessels were seized by both England and France.

Adding to this indignity, England claimed the right to search American vessels for English seamen, and an English war vessel actually fired on an American man-of-war, killing three of the crew and wounding 18. Jefferson tried to meet the restrictions on American commerce by the Non-Importation Bill and the Embargo Act. To enforce the measures all of the New England ships would have been shut up in American harbors. The New England mer¬

chants preferred to run the risk of losing their ships to keeping them without traffic ; therefore they began to abuse the President and his pol¬

icy. The result was that Congress felt forced to repeal the Embargo Act. Jefferson always claimed that had the embargo been enforced the

United States would have gained its rights without the second war with England in 1812.

See Embargo in the United States.

On 4 March 1809, Jefferson retired from the White House, and spent the remaining 17

years of his life at Monticello. In these latter days he was known as the <(Sage of Monticello,55

and to his home came people of prominence from all parts of the world to consult with him on great questions of politics and economics.

Often his housekeeper had to provide beds for 50 guests. The demands which were made on his hospitality were so great that he died a bankrupt. During this period of his life he did all that he could to encourage better methods in agriculture, to reform the government of Virginia and to develop in it a better system of education. The crowning event of his life was the establishment of the University of Virginia (q.v.) in 1819. He died on 4 July 1826, just 50 years from the day that has made him famous in all history, and by a singular coincidence his old rival and political antago¬

nist, John- Adams, passed away on the same day.

Jefferson asked that three things be inscribed on his tomb ; <(Author of the Declaration of Independence ; of the Statute for Religious Liberty in Virginia, and Founder of the Uni¬

versity -of Virginia,® — three acts which have made him famous.

Jefferson stands in history for (1) Repub¬

lican government and the sovereignty of the people; (2) Opposition to privileged orders of nobility and the entail system; (3) Universal education and local circulating libraries ; (4) Separation of Church and State; (5) Freedom of thought and speech; (6) Local self-govern¬

ment; (7) Economy in government and small public debt; (8) A -policy of peace; (9) Polit¬

ical equality and universal suffrage: (10) Strict construction of the Constitution and the sov¬

ereignty of the States; (11) Well-trained militia and small standing army; (12) Metallic money, either gold or silver, as a standard, and no paper legal tender; (13) Opposition to bounties and monopolies; (14) Emancipation and de¬

portation of slaves; (15) Expansion of the United States to include Louisiana, Florida, Cuba and Canada; (16) Maintenance of Indian reservations; (17) Judiciary beyond the control of the legislative or executive branches of gov¬

ernment; (18) Small navy; (19) Opposition to nepotism; (20) Rotation in office; (21) Opposi¬

tion to all secession movements, North or South.

This review will show that Jefferson probably gave to the world more broad principles of government than any other man. Whenever republican forms of government exist there the name of Jefferson will always be uttered with reverence and respect. Important monu¬

ments to Jefferson are as follows: by David d'Angers in the Capitol, Washington, a copy in the New York city-hall, and one at Angers, France; by Galt, at the University of Virginia; by Ezekiel, in Louisville, Ky. ; by Hiram Powers, in Hall of Representatives, Washing¬

ton; by Partridge, at Columbia University; and by Valentine, in Richmond, Va.

Bibliography.— Adams, H. B.,

ferson and the University of Virginia) (Wash¬

ington 1888) ; Bryce, James, University and Historical Addresses) (New York 1913) ; Chan-

ning,. cThe Jeffersonian System5 (ib. 1906) ; Curtis, W. E., (True Thomas Jefferson5 (Phila¬

delphia 1901) ; Dodd, W. E., Statesmen of the Old South5 (ib. 1911) ; Dunlap, J. R., Jeffer¬

sonian Democracy5 (ib. 1903) ; Foley, Jefferson Cyclopedia5 (ib. 1900) ; Ford, P. L., (Writings of Thomas Jefferson5 (10 vols., ib., 1892-99) ; Forman, Wife and Writings of Thomas Jeffer¬

son5 (Indianapolis 1900) ; Littleton, Martin W., ˆMonticello5 (New

York 1912) ; id., (One Wish : An Appeal for the Purchase by the United States of the Home of Thomas Jeffer¬

son at Monticello5 (ib. 1912) : Morse, T. J., ˆThomas Jefferson5 (Boston 1898) ; Patton.

JEFFERSON — JEFFERSON-BURR IMBROGLIO

Jefferson, Cabell, and the University of Vir-

gl.n1ˆ* (New York 1906) ; Parton, James, ‘Life of Ihomas Jefferson) (Boston 1874); Randall, n! u Thomas. Jefferson> (ib- 1858) ; Ran¬

dolph, T J., (editor), ‘Memoir, Correspond¬

ence and Miscellanies from the Papers of ioon1yias Jefferson> (4 vols., Charlottesville, Va., 18w9) ; Schouler, James, (Thomas Jefferson) (New York 1897); Trent, W. P., ‘Southern Statesmen of the Old Regime) (ib. 1897) •

Tucker, G., ‘Life of Thomas Jefferson, Third President of the United States) (2 vols, Phila¬

delphia 1837) ; Watson, T. E., ‘Life and Times of Thomas Jefferson> (New York 1903) *

Williams, J. S., ‘Thomas Jefferson: His Per¬

manent Influence on American Institutions }

(ib. 1913). For bibliographies of Jefferson, consult Tompkins, H. B., ‘Biblioteca Jefferson-

iana} (New York 1887) and Johnston, R. H., ‘Contribution to a Bibliography,) in Thomas Jefferson’s ‘Writings) (Monticello ed., Vol.

XX, Washington 1905). Consult also Lambeth and Manning, ‘Thomas Jefferson as an Archi¬

tect and Designer of Landscapes) (Boston 1913) and Kimball, S. F., ‘Thomas fefferson as Architect,) in Architectural Quarterly (Vol.

II, Cambridge, Mass., 1914) ; Muzzy, D. S ‘

‘Thomas Jefferson) (1918).

J. A. C. Chandler,

Superintendent of Schools, Richmond, Va.

JEFFERSON, Tex., city, county-seat of

Marion County, on the Cypress Bayou, and on the Missouri, Kansas and Texas, and the Texas and Pacific, and the Jefferson and Northwestern railroads, about 20 miles from the eastern boundary of the State and 142 miles east of Dallas. It was settled in 1850 and incorporated in 1866. It is situated in an agricultural and stock-raising region with rich iron ore deposits in the vicinity. Some of the principal indus¬

trial establishments are furnaces, machine-shops, foundries, sawmills, cottonseed-oil mills and large storage houses. The shipments are chiefly articles manufactured in the city, vegetables, grain, cotton, livestock and fruit. The prin¬

cipal buildings are a government building, the city and county buildings. An iron bridge across the Bayou and good roads assist in mak¬

ing Jefferson the trade centre for a large part of Marion and Cass counties. The government is vested in a mayor and council. The water¬

works are the property of the municipality.

Pop. 2,549.

JEFFERSON, Wis., city and county-seat of Jefferson County, at the junction of the Rock and Crawfish rivers, 50 miles west of Milwau¬

kee and on the Chicago and Northwestern Railroad. It was settled in 1837 and is governed by a mayor and a council elected every two years under a charter of 1893. It has pork¬

packing plants, flour-mills, tanneries, brick and tile works, carriage and wagon factories and other industries. The city owns and operates the waterworks and the electric-lighting plant.

Pop. 2,582.

JEFFERSON, State of, the name proposed for what is now the State of Colorado. In 1859

delegates met in an endeavor to establish a pro¬

visional government. A constitution was adopted for the “State of Jefferson® with an area somewhat larger than that of Colorado, extending from 37° to 43° north latitude and from 102° to 110° west longitude. The opposi¬

tion to a State led to a second convention which, under the fiction of erecting a territory, established a new state and called it the “Terri¬

tory of Jefferson.® The constitution adopted by the first convention was ratified but never went into effect. The constitution adopted by the second convention was almost unanimously rati¬

fied 24 Oct. 1859, on which day a full comple¬

ment of State officers was elected. The new territory was constantly embroiled with its neighbor territories, and when it was recognized by,ˆongress *n 1ˆ61. it was given the name of Colorado.

JEFFERSON BARRACKS, Mo., United

States military post and reservation, 10 miles below Saint Louis on the Mississippi River.

The site was chosen by Generals Gaines and At¬

kinson in 1826 and the camp was formally designated “Jefferson Barracks® 23 October of that year. A “School for the Instruction of Infantry® was established there under the guid¬

ance of the commander, Col. Henry Leaven¬

worth, but was in existence only a short time.

The reservation comprises 1,261 acres and in¬

cludes a national cemetery. It has a post-office, telegraph and railroad stations and houses the Saint Louis powder depot. It has latterly been known as the Jefferson Barracks Recruit Depot, one of five stations for the initial reception of recruits prior to their assignment to various regiments. The post became a brigadier-gen¬

eral’s command in 1898.

JEFFERSON-BURR IMBROGLIO, im-

bro’lyo, a disputed Presidential election which resulted from a defective clause in the Con¬

stitution and caused its amendment in 1800.

By its original provisions, the person who re¬

ceived the highest number of electoral votes should be President, the next highest Vice-

President. Each set of electors had informally agreed that to save the pride of the leading candidates (Jefferson and Burr, Adams and Pinckney) each pair should have equal votes, and with one exception never reflected that this meant a tie; one Rhode Island Federalist elec¬

tor cast his second vote, for John Jay instead of Pinckney, and there is an unproven charge that Burr intrigued for an extra vote over Jef¬

ferson. They, however, received 73 each, and Federalist House had to choose between the two Democratic candidates. Rules were adopted for the balloting, among the chief being that the Senate should be admitted, that the balloting should be in secret session and that the House should not adjourn till a choice was made. The Federalists in caucus decided to vote for Burr; perhaps partly to spite the Democrats — Jefferson being their great na¬

tional leader and the great Federalist terror, and the man the Democrats had intended to vote for as President — and partly because Burr as a New York man would consult North¬

ern commercial interests, which the Virginian Jefferson might antagonize. They were right in this ; Burr would not have laid the Em¬

bargo. Their solid vote would have elected Burr by one (nine out of 16 States) ; but they could not hold their members, three of whom bolted and voted for Jefferson to satisfy public feeling in their districts. Thus Jefferson had eight States, Burr six. and Vermont and Mary¬

land were divided. But the Burr electors in the last two secretly agreed with Bayard of 6

JEFFERSON CITY

JEFFERSONVILLE

Delaware, who had also voted for Burr, that if there were likely to be bad blood and danger from prolonged balloting, they would stop it by voting for Jefferson. The casting vote thus lay with Bayard, who justly

commanded con¬

fidence; but as the agreement was not known the situation seemed much more perilous than it was. The balloting lasted a- week without change. Some of the Federalists plotted to have it last till John Adams' term* expired, and then let the others fight it out, or leave it by special act to Chief Justice John Marshall (Federalist), as a sort of regent trustee. The Democrats countered by resolving either to have Jefferson and Burr jointly (one of them cer¬

tainly being President) call a special session, or to seize the capital by a militia force, call a convention, and revise the Constitution.

Finally, after 34 ballots, the confederate electors decided that if Jefferson would give a guarantee for the civil service, he should have the elec¬

tion after one more ballot; he gave the guar¬

antee, and was elected on the 36th ballot by 10 to 6 (States). Burr became Vice-President; that the attempt to put him at the head was mainly due to real fear for commerce is made probable by the fact that every New England State except the one (Vermont) which had no commerce voted for him to the last. This af¬

fair resulted in the passage of the Twelfth Amendment (see Constitution of the United States), which obliged the electors to specify their choice for the offices on distinct ballots, and enlarge the range of choice to three can¬

didates in case of tie.

JEFF, EPSON CITY, Mo., city, capital of the State, and county-seat of Cole County, on the Missouri River, and the Chicago and Alton, and the Missouri Pacific railroads, 125 miles west of Saint Louis. It is the farming and manu¬

facturing trade centre for Cole and adjacent counties ; has manufactories of flour, shoes, clothing, beer, brooms, bricks, farming imple¬

ments, carriages and wagons, and iron found¬

ries. It is the seat of Lincoln Institute, State Capitol building, State penitentiary, State arm¬

ory, governor's mansion, Supreme Court build¬

ing, United States courthouse and the Carnegie Public Library. It has gas and electric light plants, street car system, one national bank, four State banks and a trust company, daily, weekly and monthly periodicals, and an assessed prop¬

erty valuation exceeding $2,500,000. Jefferson City was settled in 1826 and was first incorpo¬

rated in 1839. A mayor and council elected every two years administer the affairs of the city. Pop. 15,000.

JEFFERSON RIVER, Montana, a stream

about 200 miles long, formed by the union of the Beaver Head and Wisdom (or Big Hole) rivers in Madison County. It unites with the Madison and Gallatin to form the Missouri.

JEFFERSONTON, Engagement at. Early

in October 1863 the Army of the Potomac, under command of General Meade, lay around Culpeper Court House, with the advance of two corps on the Rapidan. General Lee, who was south of the Rapidan, determined to flank Meade's position, seized the Orange and Alex¬

andria Railroad north of the Rappahannock, and intercept his retreat upon Washington.

Informed of the movement, Meade withdrew his army to the north side of the Rappahan¬

nock, 11 October, his rear-guard of cavalry having a sharp engagement with the Confeder¬

ate cavalry at Brandy Station. Believing that the Confederate army was moving upon Cul¬

peper, Meade turned about and on the 12th threw three infantry corps and a cavalry divi¬

sion south of the Rappahannock, with instruc¬

tions to push forward and find and strike Lee, if at Culpeper. When they reached Brandy Station the Confederate army was nowhere in that neighborhood. At this time General Gregg's division of Union cavalry was guarding the upper fords of the Rappahannock and Hazel

rivers; on the morning of the 12th Colonel Gregg's brigade crossed the Rappahannock near Sulphur Springs; his pickets at Jeffersonton being driven in, he marched for that place, found it in possession of the enemy, drove them from the town and occupied it. That morning Fitzhugh Lee's cavalry division, leading the Confederate advance from near Madison Court House, crossed Hazel River at Stark's Ford and pressed on toward the Rappahannock.

The 11th Virginia Cavalry drove Gregg's skir¬

mishers into Jeffersonton and attacked the two regiments in the town, but was driven out after losing several men. The 7th and 12th Virginia were now sent to the left and right, encircling the town, a combined attack was made, and Gregg was utterly routed and driven across the Rappahannock, with a loss of about 400 men, most of them captured. The Confederate loss was about 40 killed and wounded. When Meade heard of the engagement, and that Lee was crossing the Rappahannock at Warrenton

Springs, he hastily recrossed the river, with¬

drew to Auburn and Catlett's Station and, on the 14th, to Centreville, Lee following closely and attacking his rear at Auburn and Bristoe Station during the day. Consult (War of Re¬

bellion-Official Records* (Vol. XXIX, Wash¬

ington 1889-1901) ; Walker, F. A., (Historv of the Second Army Corps* (New York 1886).

JEFFERSONVILLE, Ind., city and county-

seat, of Clark County, on the Ohio River, the Baltimore and Ohio Southwestern, the Pitts¬

burgh. Cincinnati, Chicago and Saint Louis, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, 125 miles southwest of Cincin¬

nati, 50 miles northeast of Evansville and 108

miles south of Indianapolis. It is opposite Louisville, Ky., with which it is connected by bridges, ferry and electric street car 'service, the interurban lines also connecting with Charlestown, New Albany and Indianapolis.

It has the deepest harbor between Pittsburgh and Cairo, is ˆIndiana's Gateway City** and is never affected by any flood rise of the Ohio River. At the head of the Ohio Falls an ex¬

cellent water supply and superior water power are available. The city has in all 22 industries, 100 retail stores and 100 in trades, professions and miscellaneous callings. It contains United States post-office building, the Indiana State Reformatory, new high school building, Masonic Orphans' Home, Carnegie library, United States quartermaster's supply depot, American Car & Foundry Company's immense works, the Howard Ship Yards Company's plant, and sev¬

eral other large manufacturing plants. It has electric lights, two banks (one national) and daily and weekly papers: 13 churches of various denominations ; thoroughly equipped public 7

school system; paid fire department; paid police force; local company Indiana National Guards; two troops of Boy Scouts, and a Chamber of Commerce, in a flourishing condition. Numer¬

ous orders and societies are represented and the population is almost entirely native-born. The total assessed valuation for taxation in 1915

was $4,197,095. It has an area of 81.68 acres; £U9 miles of streets; 14 miles of sidewalks, the ma>or and council is elected every four years. Police commissioners are appointed by the mayor. Pop. (1920) 10,098.

Edward Turner, American

railroad president: b. Liverpool, England 6

ˆqPco 18f3'- He came t0 the United States' in i.,. ,and m 18a 6 entered the employ of the Illinois Central Railroad Company, of which he became general superintendent in 1877-85 and general manager in 1885-'89, when he resigned.

He visited the Paris Exposition in 1889 as the representative of the executive committee of the citizens of Chicago, and was chairman of the grounds and buildings committee of the Columbian Exposition at Chicago until 1891

He was president of the Denver and Rio Grande Railroad Company fin 1891-1912, its general manager m 1891-1900 and since 1912 has

acted as chairman of its board of directors. He was receiver for the Rio Grande Southern Railroad Company in 1893-95, and has since been its president. He is also president of the New Orleans and Northwestern Railroad, and is con¬

nected as director, chairman or vice-president with various other railroads and trust com¬

panies.

JEFFERY, Walter J., Australian journal¬

ist and author : b. Portsmouth, England, 20

Aug. 1861. After having been a sailor for 10

years he settled in Sydney in 1886, where he entered newspaper work and became eventually, successively, sub-manager of the Evening News, Town and Country Journal and Woman's Bud¬

get, and editor of the Evening News. Among his published works are (A ˆ Century of Our Sea Story) (London 1900) ; (The King's Yard5 ; (History of Australia5 ; and (English Naval History.5 He collaborated with George Lewis Beck in (A First Fleet Family5 ;

neers of Australia5; (The Mutineers5; Ad¬

miral Phillip5 ; (The Tapu of Bunderah5 ; and (The Mystery of Laughlin Isles.5 He has writ¬

ten much on naval history of which he is an acknowledged expert; and he has contributed extensively to magazines.

JEFFERYS, Charles William, Canadian

artist : b. Rochester, England, 1869. He came to Canada in early life, received his art educa¬

tion in Toronto and New York, and engaged in black and white illustration in the latter city for some years. His pictures of pioneer life are very effective.

JEFFREY, Edward Charles, American

botanist : b. Saint Catharines, Ontario, Canada, 21 May 1866. He was graduated at the Uni¬

versity of Toronto in 1888 and took his Pih.D.

at Harvard in 1898. He was Fellow in biology at the University of Toronto in 1889-92, and lecturer in that subject in 1892-1902. He was appointed assistant professor in vegetable his¬

tology at Harvard in 1902, and is now professor of botany there.

JEFFREY, Francis, Lord, Scottish judge

and critic: b. Edinburgh. 23 Oct. 1773; d. Craig-

brook Castle, near Edinburgh, 26 Jan. 1850. He was educated at the University of Glasgow and Queen's College, Oxford, and was admitted to the Scottish bar in 1794. He assisted in estab¬

lishing the Edinburgh Review in 1802 with Sydney Smith, Lord Brougham and others, and alter two numbers had been issued became its editor, a position which he held till July 1829.

He showed great talents as an editor, and, al¬

though many of his literary judgments have been reversed by posterity, was accounted the greatest critic of his time. In 1831 he was made lord-advocate, and sat for several years as mem¬

ber of Parliament for Edinburgh. He was made a lord of session in 1834, and continued during a period of 16 years to be one of the ablest and most popular judges of the Supreme Court in Scotland. Consult Cockburn (The Life of Lord Jeffrey5 (1852); Gates,

JEFFREYS, George, 1st Baron Jeffreys,

English judge: b. Acton, near Wrexham, Wales, 1648; d. London, 18 April 1689. He was called to the bar an 1668, and soon after was chosen recorder of London. He was appointed chief justice of Chester, created a baronet in 1680

and became chief justice of King's Bench in 1682. He was one of the advisers and pro¬

moters of the arbitrary measures of James II; and for his sanguinary and inhuman proceed-

mgs against the adherents of Monmouth on the famous ˆBloody Assize,55 was rewarded with the post of lord high chancellor (1685). After the abdication of King James, the chancellor, who had disguised

himself as a seaman, was de¬

tected by a mob and carried before the lord mayor, who sent him to the lords in council, bv whom he was committed to the Tower, where he died. Consult Woolrych, (Memoirs of the Life of Judge Jeffreys5 (1827) ; Campbell, (Lives of the Lord Chancellors5 (Vol. IV, 1849-57) ; Macaujay, (History of England5 (Vols. I and II, 1856); Irving,

(1898). y

JEFFRIES, John, American physician; b.

Boston, Mass., 5 Feb. 1744; d. there, 16 Sept.

1819. He was graduated at Harvard in 1763, studied medicine at London and Aberdeen, and returning to Boston in 1769 he entered upon a lucrative practice, which continued until the evacuation of the town ‘by the British troops, whom he accompanied to Halifax. After serv¬

ing as surgeon-general of the troops in Halifax, he was appointed in 1779 surgeon-major of the forces in America. In the succeeding year he established himself in London in the practice of his profession, but also occupied himself much with scientific studies, and in the prosecu¬

tion of his experiments in atmospheric tempera¬

ture undertook, 7 Jan. 1785, a remarkable voy¬

age in a balloon from Dover cliffs across the British Channel, landing in the forest of Guiennes in France. This was the first success¬

ful attempt at aerostation on an extended scale, and Jeffries in consequence received many at¬

tentions from the learned societies of IParis.

In 1789 he returned to Boston, where he prac¬

tised his profession until the close of his life.

He announced a course of lectures on anatomy in Boston in 1789, but so great was the preju¬

dice against the practice of dissecting that on 8

the evening of the second lecture a mob broke into his anatomical room. The course thus in¬

terrupted was never resumed, and the single lecture delivered by Jeffries is said to have been the first public one on anatomy given in New England.

JEHOASH, pseudonym of Solomon Bloom-

garden, Yiddish poet: b. Verzhbolovo, govern¬

ment of Suwalki, Russian Poland, April 1870.

He came to the United States in 1890, and in 1900 he became a regular contributor to Die'

Zukunft. He had written verse from an early age and created a favorable impression with his first volume, published in America in 1907.

Other volumes followed, and prior to his visit to Palestine in 1914 a collected edition of his works, including a volume of fables, was brought out in seven volumes. He edited with C. D. Spivak

ments in Yiddish) (1911) ; and besides the works already mentioned is author of (From New York to Rehoboth and Back* (3 vols., 1917-18). In 1918 he was engaged upon a translation of the Bible into Yiddish.

JEHOIAKIM, the 18th king of Judah,

was the second son of Josiah. His name was originally Eliakim. His later name was given him by the Egyptians who placed him on the throne, after deposing his brother Jehoahaz.

He encouraged all the abominations and strange worship abolished by his father. He was a man of blood and oppression and reigned 11 years.

The country was invaded from Babylon and Jehoiakim taken to Babylon in fetters, but was soon after reinstated on his throne. The prophet Daniel was taken to Babylon at the same time. Later Jehoiakim against the advice of the prophet Jeremiah threw off the yoke of Babylon. The closing years of his reign were full of misery. The land at the instance of the Babylonians was overrun by

neighboring peo¬

ples. The death of Jehoiakim is veiled in ob¬

scurity. At any rate he died during the siege of Jerusalem before Nebuchadnezzar had ar¬

rived to conduct the campaign. His body was thrown before the walls and left there.

JEHOL, zha'hol, (Hot Stream) or

CHENG-TE-FU, China, city in the province Chi-li, 140 miles by road northeast of Peking, on the Luan-ho. It is the site of the imperial palace Pi-shu-shan-chuang, <(mountain lodge for avoid¬

ing heat,® built in 1703, in the style of Yuen-

ming-yuen, the imperial palace near Peking.

The palace formed a refuge for the imperial court during the occupation of Peking by the allied armies of England and France in 1860, and again in 1912 upon the abdication of the Manchu emperor. The inhabitants of the town are prosperous and there are fine shops, a con¬

siderable trade and notable productions, i-n in¬

laid wares. The surrounding district is well wooded, and there are many Lama monasteries and temples, among them the famous Teshi-

lumbo, and the Potalasu, which was modeled upon the style of the palace of the Grand Lama of Tibet at Potala. Poo. variously estimated at 10,000 to 25,000.

JEHORAM, or JORAM, the name of five

Bible characters. Only two are of special im¬

portance. Jehoram, king of Israel, was the second son of Ahab and Jezebel and succeeded his brother Ahaziah, becoming the 10th king after the division of the kingdom. He reign* 4

12 years. Three wars occurred in his reign Moab revolted. Jehoram with the aid of Jehoshaphat, king of Judah, and the king of Edom, defeated Mesa, the king of Moab, over¬

run the land and destroyed its cities. Later followed' two wars with Syria. In the first the Syrian armies were led by Ben Hadad, and in the second by Hazael, newly anointed king by Elisha. Jehoram lost his throne and his life in the revolt of Jehu. Jehu himself shot the fatal arrow, and Jehoram fell on the very piece of ground which Ahab seized from Naboth, the Jezreelite, and thus fulfilled minutely the prophecy of Elisha. Jehoram was also the name of the 5th king of Judah, who succeeded his father Jehoshaphat on the throne and reigned eight years. He married the daughter of Ahab . and Jezebel, the noted Athalia'h. He put his six brothers to death and become an idolater. The Edomites re¬

volted from him and became independent. His kingdom was repeatedly invaded by the Philis¬

tines on the west and by the Arabians and Cushites on the east. His last days were filled with suffering as he was subject to a form of malignant dysentery in a most severe type. Be¬

cause of his wickedness he was refused a place of burial among the kings. Elijah had admon¬

ished him from time to time without avail.

JEHOSHAPHAT, 4th king of Judah

after the revolt of the 10 tribes. He was char¬

acterized as a good king. He brought about co-operative relations with the kingdom of Israel. The marriage of his son Jehoram to Athaliah was intended to cement amicable re¬

lations with the other kingdom, but final re¬

sults were disastrous for the royal line. The king tried to restore the maritime commerce of King Solomon, but his fleet was wrecked on its first voyage. His alliance with Ahab was not a great success and only brought him into difficulty. His campaign, when joining with Jehoram of Israel and the king of Edom his vassal against Moab, was very successful. He received tribute from the Philistines and Arabians. His internal management of the kingdom was admirable. At one time he sent forth a commission to teach <(The book of the law of the Lord® in the cities of Judah. He established local judges in every fenced city and a double court of appeals, ecclesiastical and civil, at Jerusalem. His reign was the most prosperous reign enjoyed by the kingdom of Judah. After reigning 25 years he died at the age of 60, and was

succeeded by his son Jehoram (q.v.).

JEHOVAH, an erroneous pronunciation of

the name of the God of Israel in the Bible, due to pronouncing the vowels of the term (

which was not altered to avoid the profanation of the divine name for magical or other blasphe¬

mous purposes. Hence it is pronounced

((Adonay® the <(Lord® or <(Adonay Elohim,®

((Lord God.® The oldest Greek versions use the term <(Kurios® <(Lord,® the exact translation of the current Jewish substitute for the orig¬

inal Tetragrammation Yahweh. The reading <(Jdhovah® Can be traced to the early Middle Ages and until lately was said to be invented JEHOVIST — JEHU

by Peter Gallatin (1518), confessor of Pope Leo X. Recent writers, however, trace it to an earlier date, being found in Raymond Martin's (Pugeo FideP (1270). It was doubtless due to the fact that Christian Hebraists regarded it as a superstition to substitute any word for the divine name, or, as Professor Moore suggests, they may have been ignorant of the rule that although the consonants of the word to be sub¬

stituted are ordinarily written in the margin, yet as "Adonay® was regularly read for the in¬

effable name, it was deemed unnecessary to note the fact at every occurrence. Of the various Yahwah, the commonly accepted spelling for names of God that appear in the Old Testament, Jehovah, occurs the most frequently. There are some divergencies in regard to its use by the Biblical writers which have given rise to the terms Eldhist and Jehovist documentary sources.

For example, it was made known to Moses in a vision at Horeb (Ex. iii). In Ex. vi 2, 3, it is said the name was not known to the patriarchs. It is not employed in Ecclesiastes and in Daniel is found only in Ch. ix. In many of the Psalms, Elohim occurs much more frequently than

Yahweh. To avoid repetition of this name, when the name Adonay precedes, Yahweh is written by the Masorites with the vowels of Elohim and is read Elohim instead of Yahweh. Throughout the New Testament it is rendered like the Septuagint “Lord.® It was pronounced by the priests only in the temple service ; it was mentioned 10 times on the day of Atonement. Josephus (Antiq. ii, 12) de¬

clares that religion forbids him to make known its pronunciation. Philo in more than one passage calls it ineffable, to be uttered only by those whose ears and tongues are purified by wisdom to hear and utter it in a holy place and the penalty of death is to be expected by those who utter it unseasonably. ((De Vita Moses).

After the temple services had ceased, rabbinical tradition kept up reverence for the name whose misuse evoked the words of the Mishua (Sanh. x, 1), “He who pronounces the name with its own letters has no share in the future world.® It was utilized in those early centuries by healers and magicians — magic papyri pre¬

serve it in many places. Attempts at pronuncia¬

tion were made by some of the Christian Fathers, but without any uniformity. It was not long before the exact pronunciation was wholly lost. There has been much speculation as to the origin and meaning of the term. At¬

tempts to connect it with any Indo-European deity or to trace it to Egypt or China need not be considered seriously or efforts to identify it with other Semitic divinities. Exact scholar¬

ship is wanting and sources are very meagre.

Even Friedrich Delitzsch was not successful in his labors to read it in Babylonian tablets of its first dynasty, before 2000 b.c. It is no less dif¬

ficult to interpret its meaning. Oriental lan¬

guages have a mysticism of their own and pre¬

sent peculiar problems to cooler and less unim¬

aginative Western minds. Merely to give cur¬

rent explanation of the meaning of the word, some derive it from a

Hebrew root “to fall® sig¬

nifying originally some sacred object believed to have fallen from heaven; others from a root “to blow,® a name for the God of the storm, and still others, with more probability, see in it the causative form of the word “to be®

— he who causes to be, that is the Creator. The passage in Ex. iii, 14, where in answer to the question “What is His name?® the reply is given “I am that I am® emphasizes the idea of God as a living, active being, who was, is and ever will be, as many Jewish commentators interpret the cited phrase, “Ehyeh-asher-ehyeh.® Compared with the lifeless gods of the heathen, He is the ever existing source of creation, illustrated by many passages in Holy Writ. In rabbinical tra¬

dition it has been the subject of much discus¬

sion; but it was reserved for the Cabalist in direct contradiction to the spirit of restraint and reverence that forbade the mention of the divine name to make it and its synonyms an essential part of their cosmology, giving it the power to perform miracles and create life. It was awe at the sacred name not any superstitutious fear that dictated the general Jewish reticence as to its expression by voice or pen, for in letter¬

writing it is not written out in full, but repre¬

sented by the letter “he® or a “dalet® with an accent. Nothing could be in more marked con¬

trast to such reticence than the glibness and fre¬

quency with which the term is used by the mod¬

ern world whether as an oath or exclamation.

Consult Blau, (Das altjud. zauberweseiP

(1898) ; Driver, (Present Theories on the Ori¬

gin and Nature of the Tetrag.> (in (Studia Biblica,* 1885).

JEHOVIST, je-ho’vist, sometimes called

Jahwist, a hypothetic author of the Pentateuch, who used the word Jehovah, or Jahweh, as the name of God instead of Elohim, which term denotes the Supreme Being in other passages of the sacred

canon. To the writer who employs the latter designation is applied the term Elo¬

hist. According to the theories of many modern Biblical critics the present Pentateuch is a com¬

pilation from two original records, one made by an Elohist, the other by a Jehovist. The Je-

hovist history is supposed to be the older of the two (by some critics it is dated 950 b.c.), and to have consisted of an account of Jehovists, dealings with the chosen people up to the con¬

quest of Palestine west of the Jordan. It is a religious history of the attainment of the Prom¬

ised Land. In this history was emphasized the supremacy of Jehovah as the one God, creator of the world, and the national God and Father of the chosen people, in whose affairs He interposes as He appeared to their early forefathers in the shape of a man or an angel.

In the Elohist record, which is supposed to cover the same period and to have been written 700 b.c., there is a more modern interpretation of history attempted. The anthropomorphic sug¬

gestions of deity are softened, Elohim inter¬

poses merely by a voice, speaking to his people in words of encouragement or rebuke. Through the narrative of the hypothetical Elohist there runs also a tone of sadness, there are anticipa¬

tions of coming disaster and disappointment.

The Jehovistic or Jahwistic editor who com¬

bined these two histories is supposed to have lived in the 7th century b.c., while in the 4th century b.c. a third post-exilic writer added to these combined elements the legal codes which swelled the Pentateuch into the Hexateuch.

JEHU, general of the army of Joram, king of Israel. The prophet Elisha sent one of the school of the prophets to anoint him king over 10

Israel, and in a sudden revolution Joram was slain and Jehu reigned in his stead. He was the first of a new, the 5th dynasty, and reigned

843-815 b.c. On his accession he massacred all the family of Ahab, including his wretched wife, Jezebel, and put the priests of Baal to the sword. In order to obtain possession of the kingdom of Judah he slew Ahaziah the king, and 42 of his family. But his reign was not a prosperous or successful one, and by an inva¬

sion of the Assyrians he lost all the territory east of the Jordan. His name has been found on the black obelisk discovered by Layard at Nineveh, and now in the British Museum. This obelisk was set up by Shalmaneser II, and the inscription refers to the tribute paid ‘by Jehu to the Assyrian monarch.

JEHU, colloquial name for a coachman, or for one addicted to immoderation in driving.

Its origin is from 2 Kings ix, 20, <(the driving is like the driving of Jehu the son of Nimshi; for he driveth furiously.®

JEJEEBHOY, Sir Jamsetjee, Parsee mer¬

chant and philanthropist: b. Bombay, 15 July 1783; d. there, 15 April 1859. By his energy and business talents he succeeded in achieving for himself the position of the first native mer¬

chant in India, and realizing a fortune of nearly a million sterling. The munificence displayed by him toward all benevolent and public objects, without regard to class or creed, was of the most princely kind, his donations from first to last being estimated at about $1,500,000. Among benevolent, institutions founded by him are the great hospital at Bombay which bears his name, the establishment in the same city for the edu¬

cation of poor Parsee children, and the dhurum-

sallas, or places of refuge for travelers in vari¬

ous parts of the country. He also constructed the causeway uniting the islands of Bombay and Salsette, the waterworks at Poonah, the bridges at Earla, Parta and Bartha, and other public works. He was knighted in 1842, and in 1857

made a baronet. A statue was subsequently erected in honor of him in the town-hall of Bombay.

JEJUNUM, je -joo'num (Latin, jejunus ,

empty), the second portion of the small intes¬

tine, succeeding the duodenum, and so named from its generally being found empty after death. The duodenum extends to about 12

inches in length, and the jejunum forms two-

fifths of the remaining portion of the small in¬

testine. See Intestine.

JELLICOE, John Rushworth (Viscount

Jellicoe of Scapa), British admiral: b. 5 Dec.

1859. His father, Capt. J. H. Jellicoe, was for¬

merly commodore of the Royal Mail Steam Packet Company, and his great-grandfather, Adm. Philip Patton, was second sea lord at the time of Trafalgar. Jellicoe entered the navy in 1872 and served as a lieutenant during the Egyp¬

tian War, 1882. About that time he began to concentrate his attention on naval gunnery and came under the influence cff Lord Fisher (q.v.), the captain of the gunnery school. In 1888

Fisher, as director of naval ordnance, made Jellicoe his assistant at the Admiralty. Pro¬

moted commander in 1891, he was appointed to the training ship Victoria and was on that ves¬

sel when she was rammed and sunk by the Camperdoii'n in the Mediterranean in 1893. As a captain he was chief of staff to Admiral Sey¬

mour in China in 1900 and was severely wound¬

ed. After a period as naval assistant to the Controller of the Navy, he commanded the cruiser Drake and in 1905 became director of naval ordnance. For about 15 years he had served in high commands afloat and alternately in administrative posts ashore. He was rear-

admiral of the Atlantic fleet in 1907-08; third sea lord in 1908-10; vice-admiral commanding the Second Division of the Home Fleets, 1910—12; and second sea lord in 1912-14. Early in July 1914 it was announced that he had been selected commander-in-chief of the home fleets, his appointment to take effect at the end of the year on the retirement of Admiral Cal¬

laghan. On the outbreak of the European War, however, he was immediately placed in com¬

mand and hoisted his flag on the Iron Duke on 4 Aug. 1914, the day Great Britain entered the war. He retained that high command for two years and four months, during which time he commanded the grand fleet in the important bat¬

tle of Jutland. In December 1916 Jellicoe was succeeded by Admiral

Beatty (q.v.) and ap¬

pointed first sea lord in place of Admiral Sir Henry Jackson. A year later, in December 1917, Vice-Admiral Sir Rosslyn Wemyss be¬

came first sea lord and Jellicoe was raised to the peerage <(in recognition of his very distin¬

guished services.® See War, European —Naval Operations.

JELLIFFE, jel'if, Smith Ely, American

physician : b. Brooklyn, N. Y., 27 Oct. 1866. He was graduated from the Brooklyn Polytechnic Institute in 1886 and in 1889 the degree of M.D.

was conferred upon him at Columbia University.

In 1900 he received the degree of Ph.D. from the same university. He was instructor in materia medica in Columbia University and professor of pharmacognosy in the same uni¬

versity. Later professor of psychiatry in Ford-

ham University, New York, and later adjunct professor of diseases of the mind and nervous system in. the Post Graduate Hospital and Med¬

ical School, New York. In his earlier academic work he was active in botany, chemistry, phar¬

macognosy and materia medica. Of later years he has specialized more particularly in diseases of the nervous system. Some of his earlier published works included a (Flora) of Long Island, his Ph.D. thesis; (A text book on bot¬

any^ another on medical chemistry, another on pharmacognosy and a revision of Butler's Ma¬

teria Medica) ; a number of translations from French, German and Italian on paranoia; the Wasserman Reaction in Psychiatry, Psychic Treatment of Nervous Diseases; the Semi-

Insane, Psychoneuroses and their Treatment; Vagotonia; Dream Problem; the Myth of the Birth of the Hero and numerous minor papers.

From 1900-05 he was editor of the Medical News , 1 905—07,

associate editor of the New York Medical Journal. In 1913 with D. W. A.

White he published a (Modern Treatment of Nervous and Mental Disease, } in 1915 with the same author a (Textbook on Diseases of the Nervous System. } In 1907 these two authors founded the (Nervous and Mental Disease Mon¬

ograph Series, > of which 22 volumes have ap¬

peared, and in 1913 they also founded a new journal, the Psychoanalytic Review, a journal devoted to an understanding of human conduct.'

JELLYFISHES

FORMS OF DISCOMEDUSjE

1 Pilema giltschii (I natural size) 4 Rhopilema frida ($ natural size) 2 View of the same from above (the organs seen through 5 Brachiolophus collaris (£ natural size) the transparent convex disk or " umbrella ") ► 6 Cannorrhiza connexa 3 View of the same from beneath 7 The same from beneath Q natural size) MEDUSA LIKE ANIMALS

Since 1900 he has been the managing editor of the Journal of Nervous and Mental Disease. In 1915 he edited 'Appleton's Medical Dictionary,*

was a contributor to the (Standard Dictionary* ; to Osier's ' Modern Medicine) ; Forscheimer's 'Modern Therapeutics,* and has contributed largely to the 'Encyclopedia Americana. > Dr.

Jelliffe is active in practice, limiting his medi¬

cal work to diseases of the nervous sys¬

tem, to which he has contributed a large num¬

ber of smaller and larger studies, the larger of which are here briefly mentioned.

JELLY includes every translucent juice so far thickened as to coagulate

when cold into a trembling mass; as the juices of acid or muci¬

laginous fruits, currants, etc., which, by the addition of one part of sugar to two parts of juice, and, by boiling, have obtained a proper consistence.

1. Animal Jelly. — The soft parts, such as the muscles, skin, cartilage or integuments of animals, when boiled in water, yield a solution which on cooling solidifies to a tremulous jelly.

Seventy pounds of bones, when treated with one pound of water in the form of steam, at a pres¬

sure of four pounds to the square inch and sim¬

ultaneously digested in five gallons of water, will yield about 20 gallons of a strong jelly.

Animal jelly seems to be nearly identical in composition with the tissues which yield it, so that we are unable to trace any chemical change, except, perhaps, the assimilation of water dur¬

ing the process of its manufacture. The fol¬

lowing anafysis shows the average percentage of carbon, hydrogen and nitrogen in animal jelly:

Carbon Hydrogen Nitrogen

(1) 49.0 7.0 19.4

(2) 50.0 6.5 17.5

2. Vegetable Jelly. — When the juice of fruits is heated with sugar, the liquid forms a stiff jelly on cooling. It appears from the re¬

searches of Fremy and others that unripe fruits contain a compound of carbon, hydrogen and oxygen called pectose; as the fruit ripens, this substance is transformed into pectin, the change being brought about chiefly by the influence of a peculiar ferment called pectase, which is con¬

tained in the fruits. As pectin is soluble in water, the expressed juice of ripe fruits con¬

tains a large quantity of this substance, which on heating to a temperature of about 105° F. is converted into one or more substances

which have not as yet been completely studied, but which have the property of gelatinizing on cool¬

ing. The principal of these substances are pec-

tosic and metapectic acids. This latter acid, when boiled along with another strong acid, whether mineral or organic, is decomposed, one of the products being pectin sugar, a substance which is closely allied to glucose, so that in all probability there is produced in the very proc¬

ess of manufacturing jellies more or less of this sugar, which certainly is not cane-sugar, and which might, therefore, be by some re¬

garded as an adulteration. The processes which, in the living plant, result in the trans¬

formation of pectose into pectin may be imi¬

tated on a small scale by heating the juice of unripe fruit with the pulp, which contains the ferment pectase, or with a dilute acid which induces the same change as this substance. Al¬

kalis also produce a similar effect.

JELLYFISH, the medusa-stage of Hydro-

zoa (q.v.), but more especially the common name of Scyphozoa (formerly Discomedusa) , the second class of the phylum Ccelenterata (q.v.). A familiar example is the common large jellyfish of the coast of New England, Aurelia flavidula. It sometimes reaches the diameter of 10 inches ; its umbrella-shaped body is convex and smooth above, and from the under sides hang down four thick oral lobes which unite to form a square mouth-opening also giving off four tentacles. The margin of the umbrella or disc is fringed and bears eight eyes which are covered by a lobe. Just under the surface are seen the water-vascular canals, branching out from four primary canals radiating from the stomach. When in motion, the disc contracts and expands rhythmically, on the average from 12 to 15 times a minute.

The Aurelia spawns late in the summer, the females having yellowish ovaries, while the sperm glands of the males are roseate in hue.

The eggs are fertilized in the sea and the cili¬

ated pear-shaped larva by October sinks to the bottom, attaching itself

to rocks or shells, finally assuming a hydra-like shape, with often as many as 24 long slender tentacles. This is the Scyphistoma stage in which it remains about 18

months. From this it passes into the Strobila stage in which the body divides into a series of cup-shaped discs, each of which is scalloped on the upturned edge. These discs separate one after the other in March and swim away as miniature jellyfishes called Ephyrce. The Ephyra is at first about a fifth of an inch in di¬

ameter, and becomes a fully formed Aurelia in April, reaching maturity in August. Another but less common jellyfish on the coast of New England and in the north Atlantic is the great Cyanea arctica, or “blue jelly,® which is nearly two feet in diameter, sometimes from three to five, and with very long string-like tentacles, sometimes extending from 20 to 100 feet, which are filled with stinging or lasso-cells (tricho-

cysts), so that the animal is poisonous to fisher¬

men and bathers. While these forms undergo a metamorphosis, in fact, an alternation of gen¬

eration, other kinds, as Pelagia , etc., are known to develop directly from the egg, and even the aurelia under exceptional circumstances does not pass through the scyphistoma stage. The jellyfishes are divided into a number of groups.

They are most numerous in the tropical seas, comprising forms of great beauty. Consult Agassiz and Mayer, ‘Acalephs from the Fiji Islands) (in Bulletin of the Museum of Com¬

parative Zoology, Vol. XXXII, Cambridge 1899) ; Romanes, C. J., ‘Jellyfish, Starfish and Sea Urchins* (New York 1885) ; Packard, ‘Zoology* (1897) ; Arnold, ‘The Sea Beach at Ebb-tide) (1902) ; Mayer, A. G., ‘The Medusae of the World* (Washington 1911).

JELUTONG (Malay), an inferior kind of

rubber prepared from a large variety of rubber trees that grow wild in the swamps of Borneo.

JEMAPPES, zhe-map’, Belgium, city in

the province of Hainault, five miles southwest of Mons, on the river Haine. It was here that the French under Dumouriez won a de¬

cisive victory over the Austrians under the Duke of Saxe-Teschen, 6 Nov. 1792. It was the first victory won by the French Republic and was followed by the occupation of Belgium.

In the European War it was one of the towns occupied by the German invasion in 1914 and one of the last towns to be reoccupied by the Allied forces before the signing of the armistice 11 Nov. 1918. There are iron mines in the vicinity and the town has manufactories of glass and porcelain. Pop., commune, 14,270.

. JEMEZ, Ha'mas, N. M., pueblo village 45

miles west of Santa Fe, on the Jemez River, an affluent of the Rio Grande. The inhabitants are of Tanoan stock, law-abiding and prosperous and owners of productive farms. Pop. about 500.

JENA, ya'na, Germany, town, 12 miles east of Weimar, on the left bank of the Saale. It consists of the town proper and of four suburbs.

It contains a famous university which was opened in 1558 and attained its highest pros¬

perity toward the end of the 18th century, when it numbered Schiller, Humboldt, Fichte, Schelling and Griesbach among its teachers and was attended by above 1,000 students; Arndt and Hegel later were professors here. In 1844

the number of students had dwindled to 411, but now averages about 800. It has 98 pro¬

fessors and instructors, who teach the different branches of law, medicine, philosophy and theol¬

ogy; and possesses an anatomical theatre, botan¬

ical garden, observatory, good physical and chemical cabinets and a library of 270,000

volumes. Jena lenses and optical manufactures are famous. Pop. 38,500.

JENA GLASS. Jena is one of the chief centres o f the glass industry of the world and it is particularly noted for its manufactures of glass

adapted to various optical and chemical uses. This industry was initiated by Abbe and Schott under grants from the Prussian govern¬

ment. With a view to improving the quality of the glass, an almost exhaustive study has been made of the properties of various possible mixtures of silicates, borates and phosphates.

The Jena optical glasses have indices of refrac¬

tion between 1.5100 and 1.9626 for the 1) line, mean dispersions for C-F between 0.00737 and 0.04882, and specific gravities between 2.46 and 6.33. Jena resistance tubing for chemical and thermometer use is a sodium-magnesium-

aluminum-zinc borosilicate glass. (See Glass).

Consult Hoverstadt, (Jena Glass and its Sci¬

entific Industrial Appliances) (New York 1902).

JENATSCH, ya'natch, Georg, or Jurg,

Swiss political leader and soldier: b. Samaden, 1596; d. Coire, 24 Jan. 1639. He was educated at Zurich and Basel and became pastor of the Protestant church at Scharaus, near Tunis, in 1617. He entered politics, espousing the cause of the Venetian and Protestant Salis family against that of the Spanish and Romanist family of Planta. He was the leader of the body which in 1618 put to death by torture the arch-priest, Rusca of Sondrio, and outlawed the Plantas.

In 1621 he was one of the murderers of Pompey Planta, head of the opposition, and was forced thereafter to flee the country, abandoning his pastorate and becoming a soldier in the service of the French. . The peace of 1626 between France and Spain. left the Romanists in control and destroyed Jenatsch's hope of return to power. After killing his colonel in a duel he again fled from his native land, and joining thq forces of the French he ably supported the Duke de Rohan in expelling the Spaniards from the Valtellina in 1635. Upon the failure of the French to restore the Protestant Grisons ascend¬

ency he turned Romanist and joined the Span¬

iards in the plot which led to the downfall of Rohan's power. Again failing to secure ascend¬

ency for the Grisons in the Valtellina he ap¬

proached the French for support, but was as¬

sassinated by one of Planta's supporters. Later in the year the Spaniards restored the Val¬

tellina to the Grisons, in whose possession it remained until 1797. His career is important because of its close connection with the long struggle of France and Spain for the Valtellina, one of the most sanguinary phases of the Thirty Years' War.

JENCKES, or JENKS, Joseph, American

inventor, grandfather of Joseph Jenckes, gov¬

ernor of Rhode Island (q.v.) : b. Colbrooke, England, 1602 ; d. Lynn, Mass., 16 March 1683.

He came to America about 1645 and settled at Lynn, where he established the first iron and brass foundry on the Western continent, and manufactured the first domestic utensils, ma¬

chinery and tools produced here. He was granted a patent <(for the making of engines of mills go by water® by the legislature 6 May 1646, and also received patents for a sawmill.

He executed the dies for the Massachusetts coinage of 1652, including the famous (

scythe which was vastly superior to any scythe then made and which has been adopted prac¬

tically throughout the world without material change.

JENCKES, jenks, or JENKS, Joseph, colo¬

nial governor of Rhode Island : b. Pawtucket, 1656; d. 15 June 1740. He was a land-surveyor and was commissioner of the Rhode Island colony in settling boundary disputes with Mas¬

sachusetts and Connecticut, and was afterward employed by Massachusetts in similar troubles with New Hampshire and Maine. He served in various official capacities in the colony, was member of assembly in 1700-08 and deputy governor in 1715-27. He went to England in 1721 to lay the boundary disputes before the king; and in 1727-32 he was governor of the colony, refusing re-election.

JENCKES, Thomas Allen, American legis¬

lator, (

Cumberland, R. I., 2 Nov. 1818; d. there, 4 Nov.

1875. He was graduated at Brown University in 1838, was admitted to the bar of Rhode Island in 1840, and engaged in practice in Provi¬

dence. He was retained by the United States government in its suits against the Credit Mo-

bilier. He was secretary of the landholders'

convention in 1841, of .the State Constitutional Convention in 1842, and of the governor's council upon its establishment. He was elected to the State legislature in 1845 and gained a notable triumph in his carrying against deter¬

mined opposition his point that the legislature might order a new trial. He was appointed one of the commissioners to revise the laws of the State in 1855, and in 1862 he was elected to Congress, where he served until 1871. He was chairman of the committee on patents, intro-

duced and succeeded in carrying the Bankrupt Law of 1867, and gained the revision of the patent and copyright laws. He was especially prominent in the introduction of measures cal¬

culated to reform the civil service on a basis of competition and probation, and after the termination of his service in Congress still worked earnestly for it until its passage in 1883.

He also obtained the passage of the bill making admission to West Point dependent upon com¬

petitive examination. He engaged in the prac¬

tice of law in New York after his retirement from Congress.

JENKIN, Henry Charles Fleming, Eng¬

lish engineer: b. near Dungeness, Kent, 25

March 1833 ; d. Edinburgh, 12 June 1885. He took his MW at the

University of Genoa in 1850 and in 1851 began his career as an engi¬

neer at Manchester. He afterward was with the submarine cable-works at Birkenhead. In 1859 he became associated with Sir William Thomson, afterward Lord Kelvin, in experi¬

ments on the resistance and insulation of elec¬

tric cables, and his researches on the resistance of gutta-percha were recognized as of great importance. In partnership with Thomson he worked out many problems in connection with submarine telegraphy, and was connected with the laying of many cables. His services as a consulting telegraph engineer were in large de-

mandand his inventions, upon which he took out 35 patents, brought him large financial re¬

turns. He was elected a Fellow of the Royal Society in 1865 and in that year was appointed professor of engineering at University College, London. From 1868 until his death he was professor of engineering at Edinburgh Univer¬

sity. He was exceptionally sound as a practical engineer and his determinative work in elec¬

tricity was invaluable. He took up the work of sanitation with the vigorous thoroughness that characterized all his efforts, promoted the found¬

ing of a sanitary association in Edinburgh and materially aided the work with practical articles on the subject. At the time of his premature death he was engaged in completing an automa¬

tic electric system for the transportation of merchandise, known as ˆtelpherage®. Many of his scientific papers appeared in the Transac¬

tions of the Royal Society of London and the Proceedings of the Royal Society of Edin¬

burgh. He was also author of (Magnetism and Electricity* (1873) ; (Healthy Houses* (1878).

His collected writings, with an appreciative

JENKINS, Charles Jones, American jurist and statesman : b. Beaufort County, S. C, 6

Jan. 1805; d. Summerville, Ga., 14 June 1883.

He was graduated from Union College, Sche¬

nectady, N. Y., in 1824, and after the study of law began practice in Augusta, Ga. He was a member of the Georgia legislature in 1830

and after a short service as attorney-general of the State was a member of the legislature 1836-50, and a leader of his party there. He was State senator 1856-60, and was a judge of the Georgia Supreme Court 1860-65. He became provisional governor of his State in 1865, hold¬

ing office till 1868, and presided over the Con¬

stitutional Convention of 1877. Consult Jones, C. C., (Life of C. J. Jenkins) (Atlanta, Ga., 1884).

JENKINS, Edward Hopkins, American

agricultural chemist: b. Falmouth, Mass., 31

May 1850. _ He was graduated at Yale in 1872, specialized in chemistry there in 1872-75, studied at the University of Leipzig in 1875-76, and took his Ph.D. at Yale in 1879. In 1877-1900

he was chemist of the Connecticut Agricultural Experiment Station, was its vice-director in 1882-1900 and since 1900 has been its director.

He was chairman of the State Sewage Commis¬

sion in 1897-1903. Author of

ports published under the auspices of the State.

JENKINS, John Edward, English political ?oEoS0, wnter: b. Bangalore, India, 28 July 1838; d. London, 4 June 1910. He was edu¬

cated at McGill University, Canada, and the University of. Pennsylvania, was agent-general for Canada in London, 1874— 76, and sat in Parliament for Dundee, 1874-80. He became famous by the publication of his (Ginx's Baby, his Birth . and other Misfortunes > (1870), a clever satire aimed at the struggles of rival secretariat to secure control of the religious education of a derelict child.

„ JENKINS, Thornton Alexander, Amer¬

ican naval commander: b. Orange County, Va., 11 .Dec. 1811; d. 9 Aug. 1893. Entering the United States navy as a midshipman in 1828, he served therein during the war with Mexico.

Appointed to investigate European lighthouse systems he framed the law passed in 1852 under which the existing lighthouse board is managed.

He saw active service during the Civil War and was chief of the Bureau of Navigation 1865-69.

From 1869 to 1871 he was naval secretary of the lighthouse board and commanded the East India squadron 1871— 73. In 1870 he was ap¬

pointed rear-admiral and retired from active service in 1873.

JENKINS, Ky., town in Letcher County,

129 miles from Ashland on the Sandy Valley and Elkhorn Railroad. It was founded in 1911

by the Consolidation Coal Company and de¬

veloped into a model town for the operatives in the rich coal mines of the district. It has a Y. M. C. A. and is planned to give ideal hous¬

ing and social conditions. Pop. (1920) 4,707.

JENKINS' EAR, War of, popular name

for the war between England and Spain in 1739. Robert Jenkins, an English master mariner, was on a return voyage from the West Indies in 1731 when his brig, the Rebecca, was boarded by a Spanish guardacosta, whose com¬

mander cut off one of his ears and committed other outrages. The story at first attracked little attention, but repeated by Jenkins before the House of Commons in 1738 it became a contributing cause to the outbreak of war the following year.

JENKINS FERRY, Battle of. During the

winter of 1863-64 the Union forces of Generals Steele and Blunt held the line of the Arkansas River, with headquarters at Little Rock; the Confederates, under Gen. Sterling Price, held that of the Washita, with headquarters at Cam¬

den, which was strongly fortified. On 23

March 1864 Steele started from Little Rock southward with .about 8,000 men to co-operate with General Banks' expedition up Red River, the objective point of both being Shreveport, 14

La. General Thayer, with 5,000 men, left Fort Smith on the 21st to join Steele at Arkadelphia, and Col. Powell Clayton, with a small cavalry force, marched from Pine Bluff in the direction of Camden, which was Steele's first objective. Steele reached Arkadelphia on the 28th, was joined near Elkins' Ferry, on the Little Missouri, by Thayer, and, after several severe skirmishes, in which the Confederates were defeated, flanked Price out of Camden, 15 April, and occupied it. Here he was fully informed that Banks had been defeated on Red River and was retreating and his own position became very precarious. Gen. E.

Kirby Smith, who had been opposing Banks, marched rapidly with three divisions of in¬

fantry — 8,000 men and 14 guns — to join Price and crush Steele. Steele was too strongly en¬

trenched at Camden to be attacked, but he was greatly harassed and nearly surrounded by the gathering Confederates, his forage-trains, with their guard, were cut off and captured, and, the loss of a large supply-train at Marks' Mills, 25 April, with nearly an entire brigade and a battery, determined him to fall back to the Arkansas River. He left Camden on the night of the 26th, crossed the Washita, and had hardly begun his movement northward when Smith and Price pressed him vigorously and kept up a running fight, which was particularly sharp on the 29th, when Steele reached Jenkins'

Ferry, on the Saline River. The river was swollen, and Steele had crossed only part of his army when his rear brigade, commanded by Gen. S. A. Rice, was fiercely attacked by Price, and yielded some ground. But the bri¬

gade rallied, and, supported by a part of Engel-

mann's that had not yet crossed the river, en¬

gaged in a sanguinary fight lasting the greater part of the day. Three times the Confederates charged and were repulsed, and the Union line advancing, the Confederates fell back and did not renew the fight.

Steele now crossed the river without further molestation, and moved leisurely to Little Rock, which was reached 2

May, and Thayer's division was sent back to Fort Smith. Price was so badly defeated that he made no effort to follow Steele north of Saline River. The Union loss at Jenkins Ferry was 63 killed, 413 wounded and 45 missing.

The Confederates report a loss of 86 killed, 356

wounded and one missing. The Union loss dur¬

ing the entire campaign (23 March-2 May) was 102 killed, 601 wounded and 1,072 missing, a total of 1,775. Consult (War of Rebellion —Official Records) (Vol. XXXIV, Washington 1889-1901) ; The Century Company's (Battles and Leaders of the Civil War5 (Vol. IV, New York 1887-88).

JENKINTOWN, Pa., borough in Mont¬

gomery County, 10 miles north of Philadelphia, on the Philadelphia and Reading Railroad. It is situated in a well-to-do farming district and has railway supply works. Pop. 3,366.

JENKS, Arthur Whipple, American Prot¬

estant Episcopal clergyman and educator : b.

Concord, N. H., 9 Aug. 1863. He was. gradu¬

ated at Dartmouth College in 1884, received his M.A. there in 1887, and his B.D. from the General Theological in 1896. He was ordained in 1893, and was rector of Saint Luke's, Woods-

ville, N. H., until 1895 when he became pro¬

fessor of ecclesiastical history at Nashotah House, Wisconsin. He was appointed profes¬

sor of that subject at Trinity College, Toronto, Canada, in 1901 and since 1910 has occupied that chair at the General Theological Seminary.

Author of (Beatitudes of the Psalter5 (1914) ; (Use and Abuse of Church History5 (1915).

JENKS, Edward, English publicist : b. Clap-

ham, Surrey, 20 Feb. 1861. He was educated at Dulwich College and Cambridge University; was dean of the faculty of law in the Univer¬

sity of Melbourne, 1889-92, and Queen Victoria professor of law in University College, Liver¬

pool, 1892-96. He was reader in English law at Oxford, 1896-1903 ; and is now principal and director of studies of the Law Society. He is widely known as a writer on English law, his works comprising Constitutional Experiments of the Commonwealth) (1891) ; (The Doctrine of Consideration in English Law) (1893) ; (Outline of English Local Government5 (1895); Caw and Politics in Middle Ages) (1897) ; (A Short History of Politics) (2d ed., 1900) ; Parliamentary England, 1660-1832) (1903); (Digest of English Civil Law5 (1907-14); (Husband and Wife in the Law5 (1909) ; (The State and the Nation) (1919).

JENKS, Jeremiah Whipple, American po¬

litical economist: b. Saint Clair, Mich., 2 Sept.

1856. He was graduated from the University of Michigan in 1878, and subsequently studied in Germany, at the University of Halle. He then studied law and was admitted to the Michigan bar. In 1879-83 he was professor of Greek, Latin and German in Mount Morris Col¬

lege, Illinois ; in 1886-89 was professor of politi¬

cal science and English literature at Knox Col¬

lege, Galesburg, Ill. ; in 1889-91 professor of political economy and social science at Indiana University; and 1891-1912 professor of political economy and politics at Cornell University, Ithaca, N. Y. ; in 1912 he became professor of government and director of the division of public affairs at New York University. In 1899-1901 he was expert agent for the United States Industrial Commission on investigation of trusts and industrial combinations in United States and Europe, and consulting expert for the Department of Labor on the same subject.

In 1902 he was special commissioner of the United States War Department to investigate questions of currency, labor, internal taxation and police in the Orient. In 1903 he went to Mexico to consult with the Minister of Finance in regard to a change of the financial system.

In 1903-04 he was a member of the United States Commission on

International Exchange in special charge of reform of the currency in China. In 1907—10 he was a member of the United States Immigration Commission, and in 1906-07 was president of the American Economic Association. He is chairman of the board of directors of the Alexander Hamilton Institute. He has written (Henry C. Carey als Natfonalokonom5 (Jena 1885) ; (The Trust Problem5 (1900; 6th ed., 1912) ; (Report Indus¬

trial Commission Industrial Combinations in Europe5 (Vol. XVIII, 1901) ; (Report on Cer¬

tain Economic Questions in the English and Dutch Colonies in the Orient5 (1902). He is editor and part author of (Reports of the United States Industrial Commission on Trusts and Industrial Combination5 (Vol. I, 1900; Vol.

XIII, 1901). He compiled (Statutes and Di-

gested Decisions of Federal, State and Terri¬

torial Law Relating to Trusts and Industrial Combinations' (2 vols., 1900), and is part author and compiler of (Reports of Commis¬

sion on International Exchange' (1904, 1905); (Citizenship and the Schools' (1906); (Great Fortunes, the Winning, the Using' (1906); (The Political and Social Significance of the Life and Teachings of Jesus' (1906); (Life Questions of High School Boys' (1908) ; Principles of Politics' (1909); Governmental Action for Social Welfare' (1910); (The Im¬

migration Problem,' with W. Jett Lauck (1913; 4th ed. 1917) ; (The Making of a Nation' ; (The Testing of a Nation's Ideals,' with Prof.

Charles F. Kent (1915) ; Personal Problems of Boys Who Work' (1913) ; Pusiness and the Government' (1917). He is a frequent con¬

tributor to periodical literature on economic and political questions. He is recognized as one of the foremost authorities on the trust question, and his writings are marked by scholarly and accurate investigation, combined with unusual simplicity and clearness of

statement.

JENKS, Tudor, American editor and au¬

thor : b. Brooklyn, N. Y., 7 May 1857. He was graduated from Yale in 1878, from the Colum¬

bia Law School in 1880, studied art in Paris in 1880-81, practised law in New York in 1881-87, and in 1887 became a member of the staff of the Saint Nicholas Magazine until 1902. His writings include many magazine contributions in prose and verse, and a number of books for young readers. In 1912 he resumed law-

practice.

JENKS, William, American Congregational

clergyman: b. Newton, Mass., 25 Nov. 1778; d.

Boston, 13 Nov. 1866. He was graduated at Harvard in 1797 and was ordained in 1805, serv¬

ing as pastor at Bath, Me., in 1805-17. In the meantime he was a chaplain in the War of 1812 and was for three years professor of Ori¬

ental and English literature at Bowdoin Col¬

lege. He settled in Boston in 1818, engaging in special work among the seamen, and founding a free chapel for them which grew into the Mariner's Church and Sailors' Home, and was the foundation of the City Missionary Society.

He was pastor of the church in Greene street in 1826-45. He was a founder of the American Oriental Society, and was for many years cor¬

responding secretary and senior vice-president of the American Antiquarian Society of Worcester, Mass. Author of (A Commentary on the Bible,' 120,000 copies sold (5 vols., 1834; 6 vols., 1851) ; Explanatory Bible Atlas and Scripture Gazeteer' (1849).

JENNER, jen'er, Edward, English physi¬

cian, discoverer of vaccination as a preventive of the smallpox: b. Berkeley, Gloucestershire, 17 May 1749; d. there, 26 Jan. 1823. Having adopted the medical profession, he visited Lon¬

don to attend the lectures of the celebrated anatomist, John Hunter, in whose family he re¬

sided for two years. Returning to the country, he settled at Berkeley to practise his profession.

His investigations concerning the cowpox were commenced about 1776, when his attention was excited by the circumstance of finding that some individuals to whom he attempted to com¬

municate the smallpox by inoculation were not susceptible to the disease ; and on inquiry he found that all such patients, though they had never had the smallpox, had undergone the casual cowpox, a disease common among the farmers and dairy-servants in Gloucestershire, who had some idea of its preventive effect. Other medi¬

cal men were aware of the prevalence of this opinion but treated it as a popular prejudice; and Jenner seems to have been the first who ascertained its correctness, and endeavored to derive from it some practical advantage. He discovered that the variolce vaccince, or cowpox, as the complaint has been since termed, could be propagated from one human subject to an¬

other by inoculation, rendering all who passed through it secure from the smallpox. In 1798

he published a short treatise — (An Inquiry into the Cause and Effects of the Variolse Vaccineae'

— and in July 1798, Cline, surgeon to Saint Thomas' Hospital, introduced vaccination into that institution. The practice was adopted in the army and navy and in the country gener¬

ally, and soon spread to other countries, and honors and rewards were conferred on the au¬

thor of the discovery. In 1802 a parliamentary grant was made to him of the sum of £10,000, and five years later a second grant of £20,000.

Besides the treatise already mentioned, and 'Further Observations on the Variola Vaccine or Cow-Pox' (1799) Jenner also published vari¬

ous letters and papers on the same subject, as well as on others. A famous paper of his on the cuckoo appeared in the (Philosophical Transactions' in 1788. Consult Baron, (Life of Jenner' ; Creighton, (

Jenner and Vaccination'

(1889) ; Crookshanks (History and Pathology of Vaccination' (1890). The last-named work contains reprints of the 'Inquiry,' the (Further Observations,' and other papers by Jenner. See Vaccination.

JENNER, Sir William, English physician : b. Chatham, 1815; d. London, 11 Dec. 1898. He was educated at University College, London, became in .1849 professor of pathological anat-

omy, and in 1860 of clinical medicine in that institution, and in 1861 physician to the queen.

From 1863-72 he was appointed professor of the principles and practice of medicine in Univer¬

sity College and in 1868 was created a baronet.

He wrote various papers on specific diseases, and was the earliest to establish the difference in kind between typhus and typhoid fevers.

JENNET, a small Spanish horse with a

strain of Arabian blood, of high reputation for its beauty of form and its speed. The name is of English and. French usage and was per¬

verted from its original meaning, designating a horseman of a Barbary tribe noted for its splendid cavalry.

JENNINGS, Herbert Spencer, American

zoologist: b. Tonica, Ill., 8 April 1868. He was graduated at the University of Michigan in 1893 and studied afterward at Harvard and at Jena. He received an honorary LL.D. from Clark University in 1909. He engaged in teaching botany and zoology, was assistant pro¬

fessor of zoology at the University of Michi¬

gan in 1900-03 and at the University of Penn¬

sylvania in 1903-05. He was appointed pro¬

fessor of experimental zoology at Johns Hop¬

kins University in 1906 and since 1910 he has been Henry Waters professor of zoology and director of the laboratory there. He was di¬

rector of the United States Fish Commission's Biological Survey of the Great Lakes in 16

JENNINGS

JEPHTHAH

1901, and in research work has specialized on the physiology of micro-organisms and animal behavior. He is associate editor of the Journal of Experimental Zoology , of Genetics and of the Journal of Animal Behavior. Author, with Jacob Reighard, of (The Anatomy of the Cat >

(1901); (Behavior of Lower Orgamsms)

(1906).

JENNINGS, Louis John, Anglo-American

journalist, author and politician : b. London, 1836 ; d. there, 9 Feb. 1893. He was on the staff of the London Times in London, India and New York from 1860 until 1867, when he be¬

came editor of the New York Times. He at¬

tacked the Tweed Ring in the columns of the Times and was largely instrumental in bringing its activities to an end. In 1876 he resumed his residence in England, where he became reader for the publishing house of Murray and acted as representative of the New York Herald. He represented Stockport in Parliament in 1885-86.

Author of (Eighty Years of Republican Govern¬

ment in the United States* (1868) ; (Field Paths and Green Lanes) (1877) ; (The Millionaire: A NoveP (3 vols., 1883); (Mr. Gladstone: A Study-* (1887), etc. He edited Lord Randolph Churchill's Speeches with Notes and Introduc¬

tion } (1889).

JENNINGS, Samuel, American colonial

Quaker preacher: d. 1708. In 1680 he came from Buckinghamshire, England, to Burlington, N. J., and was governor of West Jersey in 1683.

Becoming entangled in religious controversy he opposed the Quaker

schismatic, George Keith, and in London in 1694 supported the action of the American Friends in regard to Keith.

On returning to America he often made preach¬

ing tours through the various colonies, and after the recall of the English governor, Lord Cornbury, aided in restoring public order in the affairs of West Jersey.

JENNINGS, Sarah, Duchess of Marl¬

borough. See Marlborough, Duke of.

JENNINGS, La., town and parish-seat in Jefferson Davis Parish, 40 miles west of La¬

fayette, on the Mermenteau River and on_ the Southern Pacific Railroad. It is situated in a productive fruit, rice and lumber district, has rice- and saw-mills, and manufactures oil-well supplies. It adopted the commission form of government in 1913. Pop. 4,000.

JENSEN, Wilhelm, German author: b.

Heiligenhafen, Holstein, 15 Feb. 1837 ; d. Mu¬

nich, 24 Nov. 1911. He received his classical education at Kiel and Lubeck and studied medi¬

cine at Kiel, Wiirsburg and Breslau, but aban¬

doned the profession of medicine for literature.

He engaged in further private study, and for a time lived in Munich where he was in touch with the leading men of letters. He lived in Stuttgart in 1865-69, editing the S chwahische Volks-Zeitung, and at Flensburg he edited the Norddeutsche Zeitung in 1869—72. He. was a resident of Kiel in 1872-76, of Freiburg in 1876-

88 and from 1888′ lived in Munich. Ete was the author of more than 100 works, including fiction, narratives and tragedies. Among them are the novels (Die Braune Erica) (1868) ; (Barthenia) (1877) ; (Karin von Schweden* (1878) ; (Gotz und Gisela) (1886); (1894); (Luv und Lee) (1897) ; the narratives (Aus den Tagen der Hansa* (1885); (1901); the tragedies

JEOPARDY, a law term covering the peril to a defendant involved in the course of a trial for a criminal offense; generally used in con¬

nection with the United States constitutional provision that no person shall twice be put in jeopardy for the same offense. Jeopardy in the legal sense is usually construed to begin tor the defendant when a trial jury is impaneled and sworn to try the case and give a verdict. There are, however, some cases in which it has been held that jeopardy does not attach until after a verdict has been reached.

JEPHSON, jef'son, Robert, British poet

and dramatist: b. Ireland, 1736; d. Blackrock, near Dublin, 31 May 1803. He served in the British army, attained the rank of captain of infantry and retired on half pay about 1763.

For the succeeding four years he was the guest of William Gerard Hamilton and was highly popular in a circle of friends which included Garrick, Goldsmith, Reynolds, Johnson, Burke, Burney and Charles Townshend. He was ap¬

pointed master of the horse to the lord-lieuten¬

ant of Ireland in 1767, thereupon removing to Dublin, where he held this position under 12

viceroys. From 1778 he held a seat in the Irish Parliament. As master of the horse he was granted a permanent pension of £300 which was afterward doubled. Most notable among his tragedies are (Braganza) (Drury Lane 1775), which was highly praised by Walpole, and the (Count of Norbonne* (Covent Garden 1781), in which Kemble later made a great suc¬

cess. Among his other tragedies are (The Law of Lombardy* (1779) ; (The Conspiracy*

(1796). A series of articles published in the Mercury, defending with much wit and vivacity the administration of Lord Townshend as vice¬

roy, was later published in book form, (The Bachelor, or Speculations of Jeoffry Wagstaffe.*

He wrote several farces, comedies and a musical comedy; the heroic poem Toman Portraits) (1794); and a satire on the excesses of the French Revolution,

JEPHTHAH, jef'tha, in Jewish history one of the judges of Israel (Judges xi, xii). He was a son of Gilead, and was driven from home by his brothers, but when the Ammonites made war against Israel was

summoned to defend his countrymen. Jephthah after trying conciliatory measures without success, put himself at the head of the Israelites, and defeated the enemy.

He had made a vow that if he was victorious he would sacrifice to God as a burnt-offering whatever should first come to meet him from his house. He was met by his daughter, his only child, whom he accordingly sacrificed to the Lord (Judges xi, 29, 40). The way in which the vow was kept has given rise to much con¬

troversy, some authors maintaining that Jeph¬

thah put his daughter to death ;. others that he devoted her to perpetual virginity; others that he actually sacrificed her as a burnt-offering, and that, though prohibited by law of Moses, these human sacrifices occasionally took place.

He was judge for six years and was buried in Gilead. The best commentaries on Judges are by Moore and Budde.

JEPSON — JERDAN

It

JEPSON, Edgar, English novelist : b. Lon¬

don, 28 Nov. 1864. He was educated at Oxford and has published (Sibyl Falcon) (1895); (The Passion for Romance) (1896) ; (The Keepers of the People) (1898) ;

umphs of Tinker) (1905) ; ‘Tangled Wedlock >

(1906); (Arsene Lupin’ (1908); (The- Girl’s Head) (1910); ‘The Gillingham Rubies’ (1915); (The Man Who Came Back) (1915) ; ‘The Night Hawk > (1916); ‘Esther Lawes’ (1916).

JEQUITINHONHA, zha’ke-te-nvo’nya,

or RIO GRANDE DO BELMONTE, Brazil,

river in the eastern coast country. It rises in the Serra do Espinhaco in the state of Minas Geraes, and flows in a northeasterly direction through the state of Bahia, emptying into the Atlantic near Belmonte, 200 miles below Bahia.

The river is about 400 miles long and in the upper three-quarters of its course the current is swift. At Salto Grande, about 100 miles from the

coast, is a cataract which is considered one of the grandest in South America. The river is navigable for about 60 miles from the coast.

JERABEK, yer'zha-bek, Frantisek, Bo¬

hemian dramatist: b. Sobotka, 25 Jan. 1836; d. Prague, March 1893. He was educated at Leitmeritz and at Prague, and afterward en¬

gaged in teaching, journalism and the writing of plays. He edited Pokrok and was at different times a member of the Bohemian Diet and the Austrian Reichsrat. He was author of a history of the beginnings of romantic poetry, 'Stara doba romantickeho busnictvi' (1884). His dramas deal with social problems and include several based upon histQrical facts. Among them are 'Hana' (1858); 'Faithful Servant of His Master' (1870; Ger. trans., 1872) ; 'Syn cloveka,> 'The Son of Man' (1878); 'Zavist'

(1885), etc.

JERAHMEEL, je-ra-me-el, the name of a

tribe friendly with David when he was in exile in Ziklag. Their founder is supposed to have been the brother of Caleb, the intimate of Joshua. The tribe is supposed to have pene¬

trated Israel quite thoroughly and it is T. K.

Cheyne's theory that many corruptions of the Old Testament text came from them. Some other Old Testament scholars have felt that Dr. Cheyne carried his theory to an extreme and saw Jerahmeelites in every Hebrew bush and root. Consult his article in the Encyclo¬

paedia Biblica,) and his various books on the Psalms.

JERBA, or GERBI, Africa, island in the Gulf of Cabes, off the east coast of Tunis, occu¬

pied by the French since 1881. Its greatest length is 20 miles and its area is 425 square miles. The land is level and the soil fertile but without either springs or rivers, the water sup¬

ply depending upon wells and cisterns. The chief town, which forms the capital, market-

town and seaport, is Haumt-et-suk, situated on the north side of the market. There is a fort built by the Spaniards in 1824 and a modern

French fort with a French garrison. At El Kantara are extensive ruins believed to be those of the ancient Roman seaport Meninx. The island is the Lotophagitis, or Lotus-eaters'

Island of the Greeks and Romans. The popu-

vot, 16 — 2

lation consists in the main of Berbers. Indus¬

tries include the raising and export of dates, olives and other fruits, the manufacture of silk-

and-wool materials and a fine white pottery, and there is a sponge market open from November till March. Pop. about 45,000.

JERBOAS, jer-bo'az or jer'bo-az, small

rodents of the family Dipodidae , found in the sandy plains of Africa, Russia and southern Asia, and represented by a few species in North America. Their most prominent peculiarity is the great length of the hind legs, especially in the metatarsal portion, so that they look Jike miniature kangaroos. They walk ordinarily on their two hind feet, but when alarmed escape danger by long leaps. They are fawn-colored, as a rule, with long, slender tails, large ears, big eyes and nocturnal habits. They dwell in underground burrows and tunnels, many of which, more or less connected, are likely to be found together. Their food is mainly vegetable, but they also eat insects, eggs, etc. ; they hiber¬

nate in cold climates, do not store food and are the prey of foxes, jackals, wildcats, serpents and Arab children. The most familiar species of jerboa is the Egyptian form (Dipus cegypticus) , found in North Africa in arid places. The jumping-hare of South Africa (Pedetes capen-

sis), and its ally, the jumping-mouse of North America (Zapus hudsonius), are also well-

known examples of the family. The latter is a reddish "mouse,® white underneath, which abounds all over the temperate parts of the country, and is easily recognized by its bounding gait. It is one of the longest and soundest of winter sleepers, preparing for its dormancy a warm ball-like nest of grass lodged in a bush or among strong weeds. Gerbils (q.v.) of Africa and India are often confused with jer¬

boas, but are a group of true mice. Consult Blanford, W. T., ‘Fauna of British India: Mammalia) (London 1888-90) ; Lyon, M. W., Comparison of the Osteology of the Jerboas and Jumping Mjce) (Washington 1901) ; Lydek-

ker, (Royal NaturalHistory’ (Vol. Ill, 1895).

JERDAN, William, Scottish journalist: b.

Kelso, Roxburgshire, 16 April 1782; d. Bushey Heath, . Hertfordshire, 11 July 1869. He en¬

gaged in journalism in London in 1806, was present in the lobby of the House of Commons when Spencer Perceval was shot, 11 May 1812, and was the first to seize the assassin. .He be¬

came editor of the High-Tory organ, the Sun, in 1813, and was complimented in high quarters for the freshness of his foreign news. He in¬

troduced, too, the then uncommon feature of almost daily literary articles in his columns.

In 1817 he became connected with the Literary Gazette as editor and part owner, acquiring sole ownership in 1842, and until 1850 he edited and directed the periodical with exceptional ability.

He was closely associated with many prominent writers of his time. His personal fortunes were impaired through the Whitehead Bank failure of 1808 and the panic of 1826, and the dishonesty of a friend to whom he had en¬

trusted investments finally ruined him financially.

His friends subscribed a testimonial of more than £900 and in 1853 he was granted a pen¬

sion of £100 from the civil list. Among his writings the most valuable are ‘ Autobiography ‘

(4 vols., 1852-53), and (Men I Have Known’

(1866).

JEREMIAH. A great Judaean prophet. He

seems to have been born at Anathoth, the mod¬

ern Anat, three miles north of Jerusalem, c.

650 b.c., and belonged to a priestly family re-

siding there. His father Hilkiah has been identified with the discoverer of the law (2

Kings xxii, 28) by Clement of Alexandria, Pseudo-Jerome (c. 800), Joseph Kimchi, Paul of Burgos, Abarbanel and a number of other interpreters ; and V. Bohlen supposed that father and son collaborated in the production of the code promulgated in 620 b.c. This iden¬

tification was rejected by Lyranus, Calvin, Junius, Piscator and others, because he is not described as the high-priest ; Castro, Sanctius, Ghisler, Sebastian Schmidt, Carpzov, Calmet, Venema, Blayney and most recent exegetes have assumed that he was a descendant of Abiathar, the priest deposed by Solomon and relegated to Anathoth (1 Kings ii, 26), and Ryssel thinks the opposition of Jeremiah Jo the priesthood in Jerusalem was a continuation of the rivalry between the sons of Eli and the Zadokites. It is possible, however, that in the course of four centuries members of other priestly families had moved into the town so conveniently near the capital. Jeremiah had an uncle by the name of Shallum, and a cousin named Hanamel. From Jer.. xvi, 1 it may be inferred that he never married. He probably began his prophetic ministry in 625 b.c. When he heard the divine voice calling him to be a prophet to his people, he was first reluctant because of his youth, but was reassured by a vision of an almond tree the name of which suggested that Yahwe would watch over his oracles to bring them to. early fulfilment, and forced to speak by a vision of a seething cal¬

dron whose smoke was blown from the north, indicating the direction whence the evil would break forth. Until recent times it was gener¬

ally supposed that the enemy whose advance into Judah Teremiah expected was the Chal-

dsean. Allusions to the Scythian invasion de¬

scribed by Herodotus (i, 105) by his contem¬

porary Zephaniah were suspected by Pezron UEssai sur les

prophetes,> 1693), Hermann v.

der Hardt ((In Iobum,5 1728) and F. C.

Cramer ((Scythische Denkmaler in PalastinaP

1777). Volney ((Recherches nouvellesB

1814) and Eichhorn (1819) identified Jere¬

miah's northern enemy with the Scythians, and this opinion has been adopted by the majority of critics and historians. But the older view has been maintained, not only by Ivueper, Hav-

ernick, Neumann, Tholuck, Nagel sbach, Keil, Vigouroux, Trochon, Schneedorfer, ICnaben-

bauer and Mvrberg, but also by Graf, Reuss, 1814) and E'ichhorn (1819) identified Jere¬

miah himself and many of his hearers looked upon Yahwe's oracles of doom as conditional, so that if the conduct of the people warranted it, he would repent him of the evil he had spoken (xxvi, 17—19). With their ignorance of the secret treaties in the chancelleries of the allied nations, their narrow escape from the Scythians who naturally spared Assyrian terri¬

tory must have seemed to them more

marvelous than it does to us. . An in¬

creased fear of Yahwe and gratitude to¬

ward him, in conseciuence of his deliverance, may have prepared the way for the reform of 620. Some scholars have supposed that Jere¬

miah went about preaching in the interest or the centralization of the cult in Jerusalem, and was persecuted by his townsmen because of his advocacy of the Deuteronomic Code.. His atti¬

tude toward the temple, the 'sacrificial system, and the written law renders this improbable.

It is significant that the prophetess Huldah, and not Jeremiah, was consulted after the discovery of the law-book. If his declaration that the false pen of the scribes has wrought falsely®

(viii, 8) referred to some other code then be¬

ing prepared in priestly circles, he would have laid himself open to serious misapprehension, since those who said (

nomic Code that had been discovered and officially adopted (2 Kings xxii, 8; xxiii, 3).

To the covenant of Yahwe, involving obedi¬

ence to his commandments when he led his people out of Egypt, he sincerely answered Amen (xi, 5) ; but he was convinced that on that' day Yahwe had not spoken concerning burnt-offerings and sacrifices (vii, 22). If the people of Anathoth conspired to put him to death (xi, 19), it was because he had rebuked them for worshiping other divinities, among them probably the goddess Anath. He may at this time have removed to Jerusalem. Practi¬

cally nothing is known of his life during the next fifteen years. It is strange that the battle of Megiddo and its tragic outcome have left no echo in his extant prophecies. Like. Isaiah, he was strongly op'posed to any alliance with Egypt; but neither does he seem to have fav¬

ored a pro-Assyrian policy (ii, 18). His silence may indicate disapproval of Josiah's course, whether it was dictated, by loyalty as a vassal or ambition for additional territory as a reward for service. The Chronicler charges Josiah with having disregarded the warning of a pagan oracle, not to interfere in a quarrel that was not his (2 Chron. xxxv, 21 ff) ; and even if the story was invented to account for the fate of a good king, it never¬

theless reflects a position that may well have been Jeremiah's. He ascribes to the prophet an elegy (vs. 26) which is lost and can scarcely be thought to be genuine. The Assyrian em¬

pire fell in 606, and the eyes of Jeremiah turned once more to the north to discover what Yahwe's purpose was. It was probably his unshaken faith in the oracles Yahwe had given him to utter that made it certain to his mind that the real evil would not come from the south (Egypt), but from the north.

Nebuchadnezzar's march through Mesopo¬

tamia, his victory over Necho at Carchemish in 605, and his descent to the border of Egypt revealed to Jeremiah that it was not Media, into whose power Assyria proper had fallen, but Chaldaea, that was to be

the scourge . in Yahwe's hand to bring his people to a genuine reformation or to utter ruin. The moral con¬

dition of Judah and the character of Jehoiakim rendered the need of such a visitation obvious.

It may have been when the defeat of Necho s arms had driven the people with renewed zeal to the Yahwe-cult in the temple that Jeremiah appeared with an oracle predicting the destruc¬

tion of the great sanctuary in whose inviolabil¬

ity they believed (vii, Iff).

In 605 Baruch is said to have written in a roll from the mouth of Jeremiah all the words JEREMIAH

that Yahwe had spoken to him. The reason for this procedure was probably not that Jeremiah was unacquainted with the art of writing, as Buttenwieser thinks, or as a man of letters found it convenient to dictate to his private secretary from a note-book kept by him for many years, as is generally supposed, but rather, as Stade has pointed out, that he was an inspired oracle-giver whose utterances in a state of ecstacy might be written down by another. The new word of Yahwe contained, no doubt, the substance of many an oracle in the past, but the burden of its message was that the enemy from the north, long ago an¬

nounced by Yahwe, now distinctly named as the king of Babylon, would come and destroy the land and its inhabitants (xxxvi, 29). When the roll was the following year cut up and burned by Jehoiakim, Jeremiah hid himself, but continued to denounce the king, e.g., for his failure to pay his workmen, and to predict for him an evil death. Nor did he think that Yahwe would help Jehoiachin, who was act¬

ually deported in 597. In the time of Zede-

kiah (597-586), he strenuously opposed the Egyptian party which advocated independence, and finally persuaded the king -to open rebel¬

lion against Nebuchadnezzar. Another prophet, Hananiah, announced in the name of Yahwe that Jehoiachin and the exiles would return in two years; Jeremiah declared that the exile would last 70 years, and is

said to have threat¬

ened Hananiah with death within a year. In 587. when Nebuchadnezzar temporarily raised the siege of Jerusalem, Zedekiah requested the prophet to consult Yahwe, and received the advice to surrender. At this time his indigna¬

tion was aroused by the reduction to slavery again of freedmen emancipated at the approach of the Chaldaeans. As he counseled desertion to the enemy, and by his speeches <(weakened the hands of the men of war,® he was im¬

prisoned, and an attempt was apparently made to put him to death. When the city was cap¬

tured he was allowed to remain in Palestine with his people. How long he survived the fall of Jerusalem is not known. After the murder of Gedaliah he is said to have been forced to accompany a number of fugitives into Egypt, and to have predicted at Daphnae the conquest of Egypt by Nebuchadnezzar, the massacre or deportation of its people, the burn¬

ing of its temples and the destruction of all the Jews in Migdol, Daphnae, Memphis and Upper Egypt. The Elephantine papyri, discov¬

ered in 1904, have revealed the fact that there was a Jewish military colony on the island opposite Syene, having a temple of its own in 526 and continuing its existence throughout the 5th century. It probably was brought into the country by Psammetichus I. This colony was certainly not destroyed by Nebuchadnezzar.

We possess no evidence of a conquest of Egypt by this king. The account of Nesu Hor, gov¬

ernor of Syene, was once supposed to allude to it, but it is now generally recognized that it refers to a rebellion of Libyan, Greek and Syrian garrisons in the cataract district. A badly mutilated cuneiform inscription from the 37th year of Nebuchadnezzar mentions a con¬

flict with a king of Egypt of whose name only the syllable su is legible. Wiedemann and others thought that the original text must have told of a raid into Egypt. But Maspero, (His-

toire ancienne) (1899) and Breasted, (History of Egypt ˆ (1905) seem to be right in maintain¬

ing that no inference can be drawn except the dispatch by Amasis of naval and land forces to meet the Chaldaeans and a probable loss of Syrian territory. We now know that the colony at Elephantine was not annihilated or carried away by Nebuchadnezzar, and that it confirmed to worship other gods besides Yahwe in a temple which was not destroyed even by Cam-

byses, but ruined by the priests of Chnub from Syene in 411. It may have been broken up when Egypt recovered its independence in 404; and it is not improbable that a later Palestinian writer, knowing that there had been exiles in various, parts of Egypt in the time of Jeremiah, but as ignorant in regard to the history of the Jews of Elephantine as the modern world was until 1904, supposed that the earlier colonies had been destroyed by Nebuchadnezzar, and put upon the lips of the prophet oracles an¬

nouncing -their doom. Some interpreters who, like Duhm, are strongly convinced that as a whole, these oracles cannot have come from Jeremiah, nevertheless assume a small genuine nucleus. _ If they are right, Jeremiah's latest prognostications were no more destined to a literal fulfilment than some of the earlier ones.

Most students recognize to-day that his great¬

ness as a prophet does not depend uoon the accuracy with which he was able to foretell future events. History does not record when, where and in what manner he died. According to a legend preserved by Tertullian, Jerome, Epiphanius and Isidore of Pelusium, he was stoned to death by his people in Daphnae, while others relate that he was brought from Egypt to Babylon by Nebuchadnezzar or returned with Baruch to Palestine. In 2 Macc. ii, 4ff, he is said to have hidden the tabernacle, the ark and the altar of incense in Mount Nebo, and in 2 Macc. xv, 12ff he appears to Judas Maccabaeus, presenting him with a sword.

Numerous other stories have been collected by Neumann ((Jeremias von Anathoth^ 1856)

and Ginzburg ((Jewish Encyclopaedia,* 1904).

The estimate of Jeremiah is necessarily affected by the evidential value assigned to the various parts of the book that bears his name.

Renan considered him as a fanatic filled with hatred of the human race; but this judgment was based upon oracles against foreign nations which probably are not his. The opinion of Maurice Vernes that a

prophet who -gave his people the counsel to surrender is a historically impossible character arises from a failure to recognize the highest type ot patriotism, and the tendency of religious genius to subordinate all considerations of state to the demands of the. divinity. Certain charges of cowardice, disingenuoivsness, partisanship and personal animosity are in a large measure based on stories which are perhaps too unquestioningly accepted as in every detail accurate. His phys¬

ical courage may not have been always equal to his spiritual boldness; he may not have been altogether free from vindictiveness, and Ben¬

nett wisely warns against picturing Hananiah and the Egyptian party as absolutely black, Jeremiah and the Chaldaean party as absolutely white. His strong sense of being in the right made him firm as a wall when the occasion de-

manded it, and also made the patriotic ardor of his opponents seem like treason against Yahwe. The popular conception of him as the “weeping prophet® is largely derived from Lamentations. There is no mistaking, how¬

ever, his prevailing sadness and his tenderness of heart. The idea that he foretold a new cov¬

enant, the restoration of the monarchy, and a boundless material prosperity is based on oracles that probably were not uttered by him.

It was given to this prophet to see more clearly than his predecessors how independent real re¬

ligion and true morality are of the ceremonies of a temple cult, the external authority of a written law, and the shifting fortunes of polit¬

ical society, ‘to enter fresh fields of spiritual experience and to open new paths of personal piety.

Bibliography. — Eichhorn, J. G., (Diehebrai-

schen Propheten) (1819) ; Knobel, A., (Der Prophetismus der Hebraer) (1837) ; Ewald, H., (Die Propheten des alten Bundes) (1841: 1868) ; Tholuck, F. A. G., (Die Propheten und ihre WeissagungeiP (1860) ; Matthes, J. C., (De pseudopronhetismo Hebraeo-unP (1859) ; Kuenen,

A., (De profeten en de profetie onder IsraeP (1875) ; Pierson, A., ‘Israels profeten) (1877) ; Smith, W. Robertson, ‘The Prophets of IsraeP (1882; 1895); Cheyne, T. K., Jere¬

miah, hi-s Life and Times1* (1883) ; Marti, K., ‘Der Prophet Jeremia von AnatoP (1889) ; Vernes, M., ‘Du pretendu polytheisme des He-

breux) (1891) ; Schmidt, N., Jeremiah* (in (Encyclopaedia Biblical 1901) ; id., ‘Scythians*

,(ib. 1903) ; Erbt, W., Jeremia und seine Zeit>

(1902) ; Kieser, D., (in Theologische Studien und Kritiken, 1905) ; Bruston, E.’, ‘Le prophete Jeremie et son temps) (1906) ; Gillies, J. R., Jeremiah, the Man and his Message-* (1907) ; Koberle, J., (Der Prophet Jeremia) (1908) ; Bennett, W. H. (in Review of Theology and Philosophy, 1911) ; Causse, A., (Les prophetes d’Israel* (1913); Wilke, F. (in Alttestament-

liche Studien Kittel dargebracht, 1913) ; Puukko, F., ib. ; Buttenwieser, M., ‘The Prophets of IsraeP (1914) ; Holscher, G., (Die Propheten1* (1914).

Nathaniel Schmidt,

Professor of Semitic Languages and Litera¬

tures, Cornell University.

JEREMIAH, Book of. One of the canon¬

ical books of the Old Testament. In the He¬

brew Bible it once occupied the first position among the later prophets. A tradition pre¬

served in (Baba bathra,* 14b, 15a, gives the fol¬

lowing order of these prophets: Jeremiah, Eze¬

kiel, Isaiah and The Twelve. Vitringa sug¬

gested that Jeremiah was made to follow the books of Kings, because these were also ascribed to the prophet. Some modern scholars have thought that Isaiah was put in the third place because it contains many late additions; but these were not recognized as such, and the whole book was clearly assigned to the age of Hezekiah. The

Babylonian Talmud explains the order by declaring that “the book of Kings ends in desolation, Jeremiah is all desolation, Ezekiel begins with desolation and ends with consolation, and Isaiah is all consolation.®

(‘Baba bathra,* 14b). A manner of reasoning that would thus account for an existing order is not unlikely to have influenced the original arrangement, since the principle of- placing words of comfort after words of reproof is characteristic of editorial activity not only in the larger volumes but also in the smaller col¬

lections that were gathered together to form them. But as late as the 1st century a.d. each book seems to have been written on a separate roll (Luke iv, 17), and in enumerating, them the order apparently varied, as is seen in the Greek Bible and its daughter-versions where Isaiah precedes Jeremiah and Ezekiel and even Daniel is still counted among the prophets.

The Hebrew text found in our extant manu¬

scripts presents substantially, so far as the con¬

sonants are concerned, the book as it was offi¬

cially recognized in the Palestinian synagogues in the 2d centurv a.d., while the vocalization exhibits the tradition prevalent in the 7th. The translations into Syriac, into Greek by Aquila, Symmachus and Theodotion, and into Latin by Jerome, as well as the Aramaic Targum, testify in the main to this type. On the other hand, the earliest Greek translation, from which the Old Latin, Coptic, Ethiopic, Armenian, Geor¬

gian, Slavonic and Syro-Hexaplaric versions were made, seems to bear witness to a Hebrew text considerably shorter and in part differently arranged. Passages of some length, such as xvii, 1-4, xxvii, 19-22, xxix, 16-20, xxxiii, 14-26, xxxix, 4-13 and Hi, 28-30, and others are not represented in it, and numerous duplicated utterances, single verses and words are lack¬

ing. It has been estimated that the Greek ver¬

sion is about one-eighth shorter than the He¬

brew text. The prophecies against foreign nations, xlvi-li, are placed in the middle of the volume between xxv, 13 and xxv, 15, and the order of the nations is different. These facts have been explained in various

ways. The substantial accuracy of the masoretic text has been defended and the translator himself or later copyists charged with wilful alterations, omissions and blunders by Jerome, Grabe, Spohn, Kueper, Havernick, Wichelhaus, Na-

gels'bach, Graf, Keil, Frankl, Vatke, Reuss, Orelli, Payne Smith, Kiihl, Strack, Kaulen, Trochon, Schneedorfer and Comely. That the Greek version actually represents a briefer and more original Hebrew text has been the opin¬

ion of J. D. Michaelis, Eichhorn, Dahler, Movers, De Wette, Hitzig, Bleek, Neteler, Scholz, Workman, Streane, Stade. Schwally, Caste, Cheyne, Giesebrecht, Schmidt, Duhm, Baudissin, Erbt, Thackeray, Gautier, Gigot, Cornill, Peake, Sellin and Moore. Some Cath¬

olic scholars have not improperly compared the additional material in the Hebrew text with the additions to Daniel and Esther in the Greek text. In both instances we have prob¬

ably to deal with interpolations and expansions already extant in the language of the original, preserved in one case by the Hebrew and the later versions, in the other by early as well as late Greek translations, but not in the Hebrew or Aramaic. The question has been raised whether there was only one Greek version of Jeremiah before the days of Aquila, Symma¬

chus and Theodotion. Not only Justin but also Josephus and some of the New Testament writers seem to have used a translation more in accord with the masoretic text than that presented by the great uncials. It is almost certain that the author of Rev. xviii, 20, knew and imitated Jer. i, 48, and that Matt, xxvii, 32, JEREMIAH

21

betrays an acquaintance with Jer. x, 7, 10.

Probably Theodotion made his translation on the basis of a version already extant in the 1st century a.d. The theory of an Egyptian and a Palestinian recension, advocated by Mich-

aelis, Eichhorn, Movers and others, has now been generally abandoned, and recent critics simply assume that we possess in the Old Greek and the Hebrew two phases, both of them relatively late, of the development of the same text

These conclusions have naturally strength¬

ened the suspicion of other additions to the orig¬

inal made before the first translation appeared.

David Kimchi, Abrabanel, Luther, Calvin, Grotius and Huet considered the statement ((Thus far are the words of Jeremiah® in li, 64, as showing that no part of lii was written by the prophet, and Richard Simon inferred that Jeremiah was not the only author of the book.

It is generally held to-day that this chapter was either copied from 2 Kings xxv or from a source also used by the author of this work.

The prophecy against Babylon, 1— li, has been regarded as coming from a later hand by Eich¬

horn, v. Coelln, Gramberg, Maurer, Knobel, Ewald, S. Davidson, Rowland Williams, Kue-

nen, Herzfeld, Budde, Cheyne, Reuss, Konig, Driver. Kautzsch, S track, Vatke, Wildeboer, A. B. Davidson, Schmidt, Duhm, Erbt, Baudis-

sin, Bruston, Cornill, Bennett, Gigot, Findley, Peake, Moore, Fowler, Sellin and Creelman.

Its genuineness has been defended by Kueper, Umbreit, Havernick, Bleek, Riehm, Nagels-

bach, Keil, Graf, Trochon, Kaulen, Knaben-

bauer, Comely, Myrberg and Orelli. Movers, De Wette, Hitzig, Scholz and others have as¬

sumed a small Jeremianic nucleus, but the evi¬

dence seems to be strongly against this assump¬

tion. Eichhorn also expressed grave doubts as to the prophecies against foreign nations in xlvi-xlix, and they have been assigned to a later period by Vatke, Stade, Schwally, Well-

hausen, Smend, Budde, Schmidt, Duhm and Marti. Many scholars, like Hupfeld, Kuenen, Rowland Williams, Cheyne, Giesebrecht,

Bleecker, A. B. Davidson, Cornill, Driver and Peake, have attempted to vindicate for Jere¬

miah some part, greater or smaller, in the com¬

position of these chapters, while others have sought to maintain that they are altogether his.

but there is a growing impression of an irrecon¬

cilable conflict between the spirit animating them and the tone and tenor of the universally recognized utterances of Jeremiah. A sense of this contrast seems to have been felt in early times when the promises of restoration were added, xlvi, 26, xlviii, 47, xlix, 6, and xlix 39 which were still absent (probably also in xlix, 39) in the copy the first translator used.

Movers, De Wette and Hitzig noticed in xxx-xxxi a strong affinity to Isaiah xl-lxvi, and suggested that the author of the latter had edited and interpolated the former. Hupfeld ((Einleitung in das Alte Testament, > 1859; MS. in the writer's possession) suspected the two chapters of being altogether spurious <(be-

cause of their close kinship to Pseudo-Isaiah®; Vatke, Stade, Smend, Schmidt and Holscher reached the same conclusion, partly for other reasons, and Duhm and Cheyne rejected most of this work, including xxxi, 31-34, which is looked upon by many others as the Jeremianic kernel. The Aramaic verse, x, 11. was sup¬

posed by Houbigant and Venema to have been added by a later hand; the secondary char¬

acter of the whole -section, x, 1-16, has since then been recognized by many; and the same applies to iii, 16-18, xii, 14-17, xvii, 19-27, and other passages. A number of minor poems, psalm-fragments and elegies were marked by Stade ((Geschichte Israels. } 1889) as interpo¬

lations. Some of them have been claimed for Jeremiah by Duhm on metrical grounds. See¬

ing that these Confessions® have been widely used in the characterization of Jeremiah's inner life, a more searching examination of them is greatly needed. As to the historic parts, Hup¬

feld considered xl, 2-xlii, 6, as a later in¬

sertion, and A. B. Davidson declared xlii, 7-

22, (free construction from the hand of the historian.® This sketch has been much admired for its life-likeness, and in its original form

may have revealed more of the narrator's art, though this is not considered by all critics as in itself vouching for its accuracy. Pierson pointed out many apparent inconsistencies and improbabilities in the various narratives." Several interpreters have suggested that the account of the prophet's journeys to the Euphrates (xiii) is an allegory or dramatization of an oracle. Schmidt (1900) looked upon xxxv as having a similar origin, its purpose being to explain the elevation of some Rechabites into a position in the lower clerus, and questioned the age and strictly his¬

torical character of some' of the other stories.

In many instances Duhm (1901) independently reached similar conclusions, and they were in the main approved by Kieser. The effect of the discovery of the Elephantine papyri on this line of investigation has been discussed in the preceding article.

Already Origen and Jerome observed the lack of orderly arrangement in the book. The absence of any chronological or logical se¬

quence seems to preclude the idea of a single author or an intelligent and painstaking editor.

The superscriptions assign xxi to the reign of Zedekiah, xxv to that of Jehoiakim, xxxii and xxxiv to that of Zedekiah, xxxv and xxxvi to that of Jehoiakim, xxxvii-xxxix to that of Zedekiah, and xlv to that of Jehoiakim. Even the shorter text contains numerous duplicates.

From i, 3 Grotius inferred that xl— li once formed a separate book. Spinoza assumed that the prophecies are scraps collected without ar¬

rangement from different historians, and pointed /to a problem in the relations of xxi and xxxviii that has not yet been satisfactorily solved. Eichhorn (1777) supposed that as late as in the time of Josephus (Antiquities,* x, 79) there were two distinct books of Jeremiah, viz., (1) i-xxiv and xlvi-li and (2) xxvi-xlv.

The passage in Josephus is obscure, and an¬

other in Sifre debe Rah seems to refer to the book of Jeremiah and Lamentations. Thomas Paine ((The Age of Reason, > 1798) added to Spinoza's difficulties and concluded that the book is <(a medley of detached and unauthen¬

ticated anecdotes.® Bertholdt (1816) assumed that there were three collections, viz., (1) i-

xxiv, (2) xxv, xlvi-li and (3) xxvi-xlv. De Wette and others called attention to the uncer¬

tain and sometimes even un-Hebraic character 22

of the many subheadings. Aside from the prophecies against foreign nations, Ewaid counted 23 such headings and regarded them as marking divisions of the book. Schmidt (1900) considered them, like the titles in Isaiah and the Psalms, as clues to the smaller collections, often indicated also by additions at the end.

Thackeray (1903) reached the conclusion that i-xxiv and the prophecies against Elam, Egypt and Babylon once formed a book that was first translated into Greek, the prophecies against the lesser nations and the rest of the volume forming another which was subsequently ren¬

dered into Greek by the same hand that trans¬

lated the first part of Baruch. In the light of these investigations the larger collections from which the book was formed appear to have been (1) i-xx; (2) xxi-xxiv; (3) xxv, 1-13, xlvi-li, xxv, 15-38; (4) xxvi-xxix; (5) xxx-

xxxiii ; (6) xxxiv-xxxix; (7) xl-xlv, and the appendix lii. Of these (1) was no doubt the earliest, itself composed of several smaller col¬

lections, but united into a book of which i, If. was the superscription, ascribing it to the 13th year of Josiah. When (2) was added the title was probably supplemented with i, 3. There were apparently two collections of oracles against foreign nations, viz., (1) xlix, 34-39, xlvi, 1— li, with its prologue, xxv, 1-13, and (2) xlvii, xlix, 1-33, xlviii, with its epilogue xxv, 15-38, of which the former was attached to the book first translated, while the latter, once circulat¬

ing separately, was made the beginning of an¬

other large volume. In (4) xxvii-xxix by peculiarities of .spelling that cannot have been arbitrarily limited by the copyist of the whole book to this section shows a separate origin; in (5) xxx-xxxi is referred to as a book; and in (7) xlv is clearly an appendix. Before the end of the 2d century b.c. the entire work, in¬

cluding lii, was available in Greek, while prob¬

ably in the next century all the oracles against foreign nations were placed in some standard codex toward the close and in a somewhat dif¬

ferent order between xlv and lii, and many more words were added in various parts. Even if this conception of the growth of the book, in some respects analogous to that now gen¬

erally held in regard to the book of Isaiah, is accepted, the problem remains how genuine Jeremianic oracles and trustworthy accounts of the prophet's life found their way into these collections. It is supposed by many scholars that Baruch's roll (xxxvi, 1 ff.) can be recon¬

structed by selecting those passages in the present book that may be considered as earlier than the 4th year of Jehoiakim, removing from them later accretions, and arranging them in a probable chronological order. But that roll, read three times in a day. cannot have been very extensive, and obviously had a special purpose. The only words that we know to. have been in it (xxxvi, 29), and to which Jehoiakim strenuously objected, are not found anywhere in the sections that can be considered. Dahler and Herbst, therefore, maintained that it is in vain to look in the earlier chapters for the particular message of Baruch's roll. Gratz and Cheyne thought of xxv as containing its sub¬

stance, a chapter now regarded by many, as secondary; and Schmidt also considered it im¬

possible to discover its precise contents. But as on this occasion the inspired utterance was taken down by Baruch, it is reasonable to sup¬

pose that on other occasions this friend or other disciples committed to writing oracles that fell from the prophet's lips. The exist ence of such reports, afterward expanded by many words like unto them, Avould account for the lack of any chronological or topical ar¬

rangement. It has been thought that a sketch of the prophet's official career was written by Baruch. The manner in which he is mentioned in xxxvi, xliii and xlv and his reputed author¬

ship of other books have made this conjecture appear quite natural. It is altogether likely that Baruch wrote down some words of the prophet even after 605-604, and not impossible that some communications coming from him formed the 'nucleus of the historical sketch that existed in later times and was used by the com¬

pilers. But there is no claim or suggestion of either in the book itself.

Some scholars have found a hint of it in xlv, the scribe adding to his work a rebuke and a promise that no one but himself could have known. Cornill has ingeniously suggested that the great thing he sought for himself was the deliverance of Judah from the doom announced in the roll.

From Jeremiah's standpoint that was not pos¬

sible except through the conversion of Jehoia¬

kim and his people to the policy of non-

resistance and subjection to the Chaldseans.

But why should he not seek this, what other purpose can Jeremiah have had in sending him with the roll, and how could this be described as a selfish design? Giesebrecht, Duhm and Erbt reject the date given and place the inci¬

dent after the destruction of Jerusalem, with¬

out making it more intelligible. Reuss ques¬

tioned it, and Schwally regarded it as spurious.

It is natural that a private oracle, designed to account for Baruch's escape, should have been placed at the end of the 7th collection, just as a similar oracle (xxix, 15-18) was placed at the end of the 6th. While it is, therefore, impossible to affirm dogmatically, what is at best only a theory, that certain parts of the present book have been copied from Baruch's roll and others taken from a biography written by him, it is wholly probable that we owe to him and such as he the preservation of some of the oracles uttered by Jeremiah, in 625 when the Scythian came down from the north and later in the reign of Josiah, as well as in the days of Jehoiakim, Jehoiachin and Zedekiah, and also of some facts in regard to his career, sufficient to give us a relatively clear idea of this prophet's message and character.

Jerome described the style of Jeremiah as rustic and inferior to Isaiah's. Lowth observed in some parts of the book the parallelism char¬

acteristic, as he saw, of Hebrew poetry. Blay-

ney printed the text so as to bring out this feature, and it has been accepted by most mod¬

ern interpreters. Thus a line was drawn be¬

tween the parts written in an easily flowing prose and those having a poetic form. More recently it has been seen that a certain regular recurrence of stressed syllables, consequently a metre, also characterizes, not only such books as Job, Proverbs and Psalms and the poems interspersed in the historic records, but also the oracles of the prophets given in an exalted style. This has been applied to Jeremiah by Muller and Sievers, and more in detail by JEREMIAH

Duhm, Cornill and Giesebrecht. A metre that without a question was used predominantly by Jeremiah has been regarded by Duhm as a cri¬

terion of genuineness. To some extent this is no doubt legitimate. But when it is considered how readily such a poetic form lends itself to imitation and how easily later scribes may have .concealed it by innocent changes and additions, this test must be handled with great delicacy.

The temptation to conjectural emendation on purely metrical grounds is strong, but the an¬

cient witnesses to the text always have a first claim to consideration. Yet even this recent study of the prophet as a poet has tended to bring out more fully the force and beauty as well as the grandeur and significance of his oracles. Like the book of Isaiah that of Jere¬

miah is to modern scholarship a thesaurus of things old and new. Here, also, the great prophet who has given his name to the volume stands out pre-eminent, unrivaled in spiritual insight and power by those whose voices have become blended with his. Just as the seer who was called to meet the needs of his time by speaking comfortably to the heart of Zion, though the influence of his ideas has been very great, by no means has outstripped in power the mighty son of Amoz, so Jeremiah, as we are beginning to ‘see him, is more truly a prophet to the nations than any seer pouring out his cup of fury on the pagan peoples or prognosticating for Judah a new regime of ma¬

terial prosperity, inspiring loyalty to king and law-book. It is doubtful whether without Jere¬

miah’s teaching the idea of a new covenant could have been suggested, which showed its tendency when the Zadokite covenanters emi¬

grated to Damascus, and its real strength when early Christianity went forth to establish a different type of religious communion. But the man himself who strove to free religion from the fetters of ceremonialism and the bondage to nationalism and put it on a foundation that .could not be shaken by the fall of temples and .of thrones, is likely to be remembered with honor when the pomp of empire and the sav¬

agery of war and the middle walls of national partition shall have passed away and given place to the nobler life of man's maturity.

Bibliography. — Commentaries by Origen,

Ephraem, Theodoret, Jerome (only i-xxxii), Rhabanus Maurus, Thomas Wallensis, Nicolaus Lyranus, Joseph ben Simeon Kara, Ibn Ezra, Rashi, David Kimchi, Abrabanel, Solomon ben Melek, Zwingli, Oecolampadius, Bugenhagen, Calvin, Strigel, Vatablus, Capella, Sa, Figueiro, Broughton, Polanus, Piscator, Castro, Sanctius, Maldonat, Ghisler, Cornelius a Lapide, Grotius, Malvenda, Hiilsemann, Sebastian Schmidt, Alt-

ing, Lowth, Calmet, Clericus, Venema, Blay-

ney, Dathe, Rosenmfiller, Dahler, Maurer, Hitzig, Ewald, Henderson, Umbreit, Graf, Neumann, Nagelsbach, Le Hir, R. Williams, Payne Smith, Keil, Scholz, Trochon, Plumptre, Cheyne, Schneedorfer, Giesebrecht, Ball and Bennett, Myrberg, Knabenbauer, Duhm, Cor¬

nill, Driver, Orelli, Peake. Introductions by Sixtus Senensis, Richard Simon, Carpzov, Eich-

horn, Jahn, Augusti, Bertholdt, Horne, De Wette, Havernick, Herbst-Welte, Glaire, Keil, Davidson, Hupfeld, Bleek, Ffirst, Kuenen, Kaulen, Strack Cornill, Driven, Wildeboer, Baudissin, Mann, Bennett-Adeney, Budde,

Gautier, Gigot, Gray, McFadyen, Flower, Moore, Creelman. Spinoza, B., (Tractatus theologico-politicus) (1670); Calmet, A, dis¬

sertation 'sur' les Rechabites) (1720); Lowth, R., de sacra poesi Hebraeorum' (1753) ; Houbigant, F., cBiblia hebraica) (1753) ; Eich-

horn, J. G., in Repertorium fur biblische und mor genldndische Literatur (1777); Michaelia J. D., (Anmerkungen fur Ungelehrte) (1790); Nagelsbach, C. W. E., der Prophet Jeremias und Babylon) (1850) ; Neteler, B., (Gliederung des Buches Jeremia) (1870); Gratz, H., in Monatsschrift des Judenthums (1874) ; Pierson A., Hsraels

Profeten> (1877) ; Budde, K„ in Jahrbiicher fur deutsche Theologie (1878); Stade, B., in Zeitschrift filr alttestamentliche Wisse'nschaft (1884, 1885, 1892, 1903, 1906); Schwally, F., ib. (1888); Bleecker, L. H. K., (Jeremias profetieen tegen de volkeren>

(1894); Bulmerincq, A. V., das Zukunftsbild des Propheten Jeremia* (1894); Davidson, A. B., in (A Dictionary of the Bible* (1899) ; Schmidt, N., in The New World (1900) ; id., in ˆEncyclopaedia Biblica) (1901); id., in (The New International Encyclopaedia* (1914); Erbt, W., (Jeremia und -seine Zeit* (1902); Kieser, O., in Theologische – Studien und Krit-

iken (1905); Jacoby, G., ib. (1906); Bruston, E., deprophete Jeremie* (1906) ; Gillies, T. R., (Jeremiah : the Man and his Message* (1907) ; Findlay, G. G., in dictionary of .the Bible) (1909) ; Haller, Max, in die Religion in Ge-

schichte und Gegenwart* (1912) ; Cheyne, T. K, in (Encyclopaedia Britannic#* (1911) ; Holscher, G., die Propheten Israels* (1914); Grabe, J. E., de vitiis LXX interpretum* (1707); Spohn, G. L., (Jeremias vates e versione Judaeorum Alexandrinorum* (1794, 1824);

Moyers, F. C., de utriusque recensionis vaticiniorum Jeremiae indole et origine) (1837) ; Wichelhaus, J., de Jeremiae versione Alexandrina* (1847); Frankl, P. F., (Studien fiber die LXX und Peschite zu Jeremias (1873) ; Scholz, A., der massoretisohe Text und die LXX-Uebersetzung des Buches Jeremias>

(1875) ; Kfihl, E., das Verhaltniss der Massora zur LXX im Jeremia* (1875) ; Workman, G. C., (The Text of Jeremiah) (1889) ; Coste, E., die Weissagungen des Jeremia wider die fremden Volker) (1895) ; Streane, A. W.,

John, in Journal of Theological Studies (1903) ; Mfiller, D. H., die Propheten in ihrer ursprfinglichen Form* (1896); Sievers, A., (Studien zur hebraischen Metrik* (1901) ; Cornill, C. H., die metrischen Stficke des Buches Jeremia reconstruiert* (1901) ; Giese¬

brecht, F., (Jeremias Metrik) (1905) ; Gray, B., dorms of Hebrew Poetry) (1915); Newman, L. I., and Popper, W., (Studies in Biblical Parallelism* (1918).

Nathaniel Schmidt,

Professor of Semitic Languages and Litera¬

tures, Cornell University.

JEREMIAH, Lamentations of. A canon¬

ical book of the Old Testament. In the Greek Bible and its daughter versions, as well as in the Syriac and the Latin Vulgate, it is desig¬

nated as the damentations of Jeremiah,) and it is also described in the Babylonian Talmud as

JEREMIAH

Hebrew Bible. In the versions it follows the book of Jeremiah, while the tradition preserved in (Baba bathra) 14b assigned it a position among the miscellaneous writings, or hagio-

grapha, between Canticles and Daniel ; when the group of five rolls was formed, it was gen¬

erally placed between Ruth and Ecclesiastes.

Since it was originally anonymous, as it has continued to be in the Hebrew, and the prac¬

tice grew up of reading it on the 9th of Ab, the anniversary of the capture of Jerusalem by Nebuchadnezzar, it was kept separate in the Palestinian synagogue and not connected with the book of Jeremiah, and consequently could in course of time be united with other rolls also more or less regularly read in public on certain fast and feast days. There is no very marked difference between the masoretic text and the ancient versions, though these are often of considerable value in establishing the orig¬

inal. Only the late Aramaic Targum shows a strong tendency to expansion, not always in good taste. Origen apparently did not have before him the translations of Aquila and Theodotion, though there can be no doubt that this book was also rendered by them, and some readings of Aquila have indeed been recorded in manuscripts (cp. Field, (Ongenis Hexapla,*

1875).

That these lamentations are written in a poetic form is too obvious not to have been observed at ail times ; but the precise char¬

acter of this form has only gradually been dis¬

cerned. The fact that four of the five, chap¬

ters employ the device of an acrostic invited comparison with the alphabetic psalms, and the peculiar circumstance that ii, iii and iv ex¬

hibit in one respect a different order of the letters, Pe preceding Ayin (P before O), was as puzzling to Jerome and Lyranus as to us.

It can scarcely be due to a scribal error, as it is thrice repeated, or to forgetfulness on the part of the poet, as he set out deliberately, to follow the alphabet, or to an esoteric motive so carefully hidden as to be of no didactic value, or to a different order in Babylonian Aramaic preferred by the Chaldean govern¬

ment, as Grotius thought. At a time when the letters had not yet been used for numerical purposes, a transposition of the two letters may have been in vogue in certain circles, since it seems to be found also in Ps. ix-x, and pos¬

sibly in Ps. xxxiv. In i and ii each verse con¬

sists of three members, and the verses begin severally with the successive letters of. the alphabet; in iii the verses, consist of single members, and three verses in succession begin with the same letter, the chapter having thus 66 verses; in iv each verse has two members only, and v is not alphabetical, but has 22

verses. Maldonat (1611) found a prevalence of 12 syllables to the stichos, .but also verses of 16 and 14. Lowth recognized an unusual poetic structure and supposed the verse to be dodecasyllabic; and more recently Bickell has also spoken of the dodecasyllabic metre. De Wette observed that each member of the verse has a caesura corresponding both with the accent and with the sense; Keil noticed that this caesura divides the verse into two unequal parts; Ley discerned that the second is shorter than the first, and designated this . form as elegiac pentameter; Gietmann called it endeca-

syllabic verse, with the arsis after the third syllable. Budde described most clearly the peculiar Qinoth metre: the verse may consist of one or more members, but each is divided by a caesura into two unequal parts, the second being shorter than the first. There is no doubt that this ((limping metre8 was frequently used in funeral dirges sung by .“cunning women8 at the wake of the dead, but it is not employed in David’s elegy, and does not seem to have been reserved originally for elegiac poetry. It is the death-wail of Jerusalem, represented as a widowed and disgraced princess, that is heard in i, ii and iv ; iii

appears to be a poetic mono¬

logue of Israel, represented as a man, rather than an elegy, and v is not so much an elegy as a prayer, and is not in the elegiac metre, but has a peculiar assonance or rhyme, the same vowel or syllable being repeated.

In the Hebrew Bible neither title nor text contains any claim or direct indication of au¬

thorship. But the Greek version begins “after Israel was taken captive and Jerusalem laid waste, Jeremiah sat down and wept, and sang this elegy over Jerusalem.8 This was some¬

what expanded in the Latin Vulgate; and the superscription in the Targum runs, “Jeremiah the prophet and chief priest said thus.8 The Babylonian Talmud also declares that Jeremiah wrote lamentationsˆ It is interesting to ob¬

serve that Bonaventura, Lyranus, Sanchez, Castro, Bellarmin, Lucas and Cornelius a Lapide attributed no canonical value to the introductions in the Greek and Latin texts.

In 2 Chronicles xxxv, 25 Jeremiah is said to have sung an elegy oyer Josiah, according to custom chanted by singing men and women, and preserved in written form among the lamen¬

tationsˆ It is by no means certain that the author referred to our present collection ; nor would an interpretation of the extant threnodies as a funeral dirge over Josiah command much weight either by virtue of age, being centuries later than the .prophet’s time, or intrinsic proba¬

bility. The decision rests wholly upon internal evidence. It was very natural to think of Jere¬

miah, the prophet who foretold and witnessed the destruction of temple, capital and state, as lamenting the fall of Zion ; there was an un¬

mistakable similarity to his style in some pas¬

sages ; he was a man of poetic temperament, and the peculiar metre had occasionally been employed by other prophets. Those who as¬

sumed that Jeremiah was the author assigned as the date of

composition either 608, imme¬

diately after the death of Josiah, or 605, when Baruch's roll was written, or 586, in the months between the capture and destruction of Jeru¬

salem, or the time between 586 and 570. The first view was maintained by Josephus, Jerome, Rhabanus Maurus, Bonaventura, Vatablus,

Junius, Maldonat, Figueiro, Tarnovius, Calo-

vius, Michaelis and Dathe; the second was suggested by Rashi, but rejected by Ibn Ezra; the third or fourth has been adopted by Theo-

doret, Procopius, Olympiodorus, Ghisler, Cal-

met, Blayney, Henderson, De Wette, Gerlach, Orelli, Keil, Bleek, Kaulen, Knabenbauer, Kay.

Hermann von der Hardt in 1712 declared that he could not believe that Jeremiah, with his experience, had written a lamentation so diffuse and composed in such a literary fashion, but on account of the differences of style thought of Daniel, his three companions and Jehoi-

achin as the authors. The theory of a Jere-

mianic authorship was also abandoned by August1 (1806), an anonymous writer in Lubmgtsche Quartalschrift (1819), Kalkar, Bunsen, who thought of Baruch as author, Lwald, Noldeke, Kuenen, Schrader, Nagelsbach, Vatke, Wellhausen, Cornill, Lohr, Budde, Cheyne, Driver, Strack, Selbie, Baudissin, Gigot, Gautier, Sellin, Moore, Beer, Gunkel, Creel-

man, Peake. They have urged important di¬

vergencies from the peculiarities of Jeremiah in language, style and thought, and especially in the attitude toward the monarchy, the Egyptian alliance, the priesthood and the tem¬

ple cult. Thackeray called attention to the fact that Lamentations was not translated into Greek by either of the two men to whom we owe the version of the Prophecies. Thenius regarded ii and iv as coming

from the prophet's pen, the remaining chapters as later; Fries thought that i-iii were Jeremianic, iv-v Mac-

cabsean. There is a tendency at present to¬

ward ascribing ii and iv to the same author and to the latter part of the Persian period, i and v to different authors at the end of this period and iii to a poet living in -the 3d cen¬

tury. Reuss justly observed that the profound impression these lamentations make on the reader is due to the nature of the subject rather than to any literary qualities shown in its treatment. The interest that always attaches itself to misfortune excites our sympathy in the highest degree, and we can but admire the touching personification of. Jersualem as a widow seated by the wayside, reminding of the Capta Judea figured as a woman in mourn¬

ing on the Titus arch, or of the people as a man of sorrows, recalling the suffering servant of Yahwe in the anonymous additions to Isaiah.

This impression is somewhat weakened by the numerous repetitions, the monotonous length, the lack of logical development and the re¬

straints imposed by a mechanical form. It is probable that the elegies were produced for liturgical, purposes in connection with the com¬

memoration of the great calamity.

Bibliography.— Commentaries by Ephrem,

Theodoret, Olympiodorus, Rhabanus, Lyranus, Bonaventura,. Hugo of Saint Victor, Rashi. Ibn Ezra, Kimchi, Tanchum ben Joseph, Menahem ben Sh.elbo, Tobia ben Eliezer, Calvin, Oeco-

lampadius, Bugenhagen, Petrus Martyr, Sanc-

tius, Maldonat, . Ghisler, Tarnovius, Grotius, Calovius, Cornelius a Lapide, Calmet, Blayney, Herder, Rosenmuller, Maurer, Dathe, Ewald, Henderson, Kalkar, Thenius, Keil, Nagelsbach, Gerlach, Payne Smith, Streane, Plumptre, Cheyne, Oettli, Lohr, Budde, Minocchi, Peake; the introductions enumerated at the end of the preceding article; Lowth, R., (De sacra poesi HebraeorurrP (1753) ; Lessing, J. T., (Obser-

vationes in tristia Jeremiae) (1770) ; Pareau, J. H., (Threni Jeremiae philologice et critice illustrate (1790) ; Meier, E., (Geschichte der poetischen Nationalliteratur der HebraeD

(1856) ; Noldeke, Th., (Alttestamentliche Liter-

atur) (1868) ; Rohde, E. H., (Num Jeremias threnos scripseriD (1871) ; Montet, F., (f£tude sur le livre des Lamentations> (1875) ; Merkel, H., (Ueber das Alter des Buches der Klage-

lieder) (1881) ; Fries, S. A., in Zeitschrift fur alttestamentliche Wissenschaft (1893) ; Lohr, M., (ib. 1894) : Budde, K., in The New World, 1893; Selbie, J. A., in (A Dictionary of the Bible) (1900) ; Cheyne, T. K., in ˆEncyclo¬

paedia Biblica) (1902); Beer, G., in (Kurzes Bibelw6rterbuch> (1903); Kay, D. M., in (Dictionary of the Bible> (1909); Ball, J. C, in * Encyclopaedia Britannica) (1911); Gunkel, Hermann, in (Die Religion in Geschichte und GegenwarD (1912) ; Fowler, H. T., (A History of the Literature of Ancient Israel > (1912).

Nathaniel Schmidt,

Professor of Semitic Languages and Litera¬

tures, Cornell University.

JEREZ DELOS CABALLEROS, ha'rath

da Ids ka-ba-lya'ros (Jerez of the Knights), Spain, tovvn in the province of Badajoz, situated on the hills overlooking _ the river Ardila, a tributary of the Guadiana, 12 miles east of the"

Portuguese fronthr, and 39 miles south of the city of Badajoz. The older part of the town has a Moorish wall with six gates, and there is a fortress with three imposing towers. The situation is picturesque and the newer sections are well built. The town has no railway con¬

nection and its trade is chiefly in the products of the rich farming and fruit district surround¬

ing it, the district being especially noted for hams and bacon. The town is thought to have been founded by the Phoenicians, and was taken from the Moors by Alfonso IX, of Leon, in 1229. It was enlarged by his son, Saint Ferdinand, in 1232, and given to the Knights Templar, whence its name. Pop. 10,271.

JEREZ DE LA FRONTERA, ha'rath da

la fron-ta'ra, or XEREZ, or XERES, Spain, city in the province of Cadiz,

about seven miles from the Atlantic Coast and 33 miles by rail from Cadiz, near the river Gaudalete and on the Seville-Cadiz Railroad. It is famous for its vast vineyards and the manufacture of sherry wine, which takes its name from the town. The surrounding district comprises a fertile plain of wide extent, and besides the vineyards there is a large production of grain, fruit and livestock. There is a 15th century church of San Miguel, a 16th century town-

hall, which, however, is officially superseded by a modern building, a bull-ring, academies of law, medicine and commerce, and modern hos¬

pitals and charitable institutions. The great bodegas, or wine cellars for the manufacture and storage of wine, are among the chief ob¬

jects of interest in the town. Jerez was at one time a Roman colony but fell into the hands of the Moors, from whom it was captured by Ferdinand III of Castile, but the Moors twice recovered it before it came permanently into Spanish possession upon its capture by Alfonso X in 1264. In 711 it was the scene of the vic¬

tory of the Saracens under Tarik over the West Goths under Roderick. In earlier times the town suffered heavily from yellow fever but purification of the water supply in 1869

practically eliminated the trouble. Pop. 10,940.

JERFALCON, jer'fa"kn, or GYRFAL-

CON, a large, and bold falcon of the Scandi¬

navian mountains (Falco gyrfalcoˆ . represented by closely allied species or varieties- in Iceland, Greenland and the Hudson Bay rep-
ion, whose plumage is prevailingly white, with more or less blackish markings, especially about the face.

It is one of the largest, strongest and most im¬

petuous of its race; and has always been highly prized by falconers, among whom, by ancient laws, its use was restricted to men of ducal and 26

princely rank. The bird is a rare winter wanderer to the United States from Arctic Canada, where it breeds, and survives the win¬

ter mainly by killing ptarmigan.

JERICHAU, ja’re-kow, Jens Adolf, Dan¬

ish sculptor: ‘b. Assens, Funen, 17 April 1816; d. Copenhagen, 25 July 1883. He studied at Copenhagen and under Thorvaldsen at Rome.

His first notable production was a frieze in the Royal Palace at Christiansborg, its subject be¬

ing the marriage of Alexander the Great and Roxana; and in 1846 he produced the heroic group (Hercules and Hebe.5 He was appointed professor at the Academy of Copenhagen in ‘1849. He was married to Elizabeth Baumann, a genre painter of distinction: b. Warsaw, 21

Nov. 1819; d. Copenhagen, 11 July 1881. Their son, Harald, became a landscape painter: b.

Copenhagen, 17 Aug. 1852; d. Rome, 6 March 1878. Jerichau’s further works include monu¬

ments to Oersted and Anderson at Copenhagen ; (Penelope5 ; (Adam and Eve after the FalP ;

JERICHO, jer’i-ko, a once important city of ancient Palestine, near the foot of the moun¬

tains, on the west side of the Jordan plain, northeast of Jerusalem. Its name means ((city of palms.® The site is marked by mounds of sun-dried bricks, and called Tel es-Sultan; gardens and a fine spring are found there. The palms and balsams for which Jericho was formerly famed have disappeared. < At the con¬

quest of Palestine by Joshua, Jericho was the key to the country and was miraculously cap¬

tured, destroyed by fire and its rebuilding for¬

bidden-under a curse. Excavations carried on by Sellin and Watzinger have revealed inter¬

esting caves and ruins. It is now a poor vil¬

lage, much visited by tourists. It has two hotels, a Russian monastery

and church. Dur¬

ing the European War Jericho was captured by British troops under General Allenby on_ 21

Feb. 1918. Under its modern name of Eriha, the village that now stands on the site of ancient Jericho consists of some 300 wretched hovels and huts. Pop. about 300.

JERKED BEEF, beef cut into strips of

about an inch thick, , and dried in the sun. This method of preserving meat has been largely adopted in South America and Australia. Cut from the animals when in good condition, these strips of flesh dry in the sun before decomposi¬

tion commences, and will keep for any length of time. In the United States, jerked beef is com¬

mon in the Southwest.

JERMYN, jer'min, Pa., borough in Lacka¬

wanna County, 12 miles northeast of Scranton, on the Lackawanna River, and on the Delaware and Hudson, and the New York, Ontario and Western railroads. It is located in a rich coal mining region, has powder mills and other man¬

ufacturing interests. Poo. 3,326.

JEROBOAM I, the first king of Israel, the northern kingdom. Having conspired against Solomon, he was obliged to escape to Egypt, where he remained until the monarch's death.

He then returned to lead an insurrection against Rehoboam, which ended in the formation of Ihe kingdom of Israel, composed of the 10

revolted tribes. These tribes worshipped at Bethel and Dan, instead of going to Jerusalem.

Jeroboam reigned from about 937 b.c. to 915 b.c.

JEROBOAM II, king of Israel. He was

the son of Joash. He reigned from about 782

b.c. to 741 b.c. His reign was evidently an active one. He was a skilful

warrior, and re¬

gained territory which had been captured by the king of Aram in previous reigns. It was dur¬

ing Jeroboam's time that Hosea and Amos an¬

nounced their prophecies.

JEROME, je-rom' or jer'om, .Saint (Euse¬

bius Hieronymus Sophronius), a father of the Latin Church : b. Stridon, between Styria and Hungary, about 331 ; d. Bethlehem 420. His parents educated him with care in literary studies and he read the Greek and Roman classics at Rome under the famous gram¬

marian Donatus. He did not escape uncon¬

taminated by the licentiousness of the capital ; but soon became inclined to the Christian faith.

The catacombs and tombs of the martyrs first excited his devotion. His travels on the Rhine and in Gaul made him acquainted with several Christian preachers, and he was eventually baptized. After a long residence at Aquileia he went in 373 to Antioch in Syria, where he passed through a spiritual crisis and renounced pagan learning, and in 374 retired to the deserts of Chalcis. There he spent four years as a hermit in the severest mortifications and labori¬

ous studies. Fie left his solitude again to be ordained priest at Antioch, but soon after went to Constantinople to enjoy the instruction of Gregory Nazianzus. In Rome, where he be¬

came literary secretary to Pope Damasus, he made his appearance as a teacher. His exposi¬

tions of the Holy Scriptures found favor with the Roman ladies, and many placed themselves under his spiritual direction. Marcella and Paula, rich patricians, are celebrated for the learned and ingenious theological epistles he wrote them, and for their rare monastic piety.

Paula accompanied him to Palestine in 386, where he founded a convent at Bethlehem ; here he remained till his death. His writings show his active participation in the controversies of his day, and his letters give a very vivid idea of the condition of society at Rome. They are full of satiric strictures on the corrupt clergy, and are often as

biting as Juvenal or Martial.

Many of them are profoundly touching and full of fervent piety; others are lampoons traversed with vehement invective with the spirit of Plautinian ribaldry. His Biblical labors are highly valuable ; his Latin version of the Old Testament from the original language is a marvelous achievement, and it may be said that ecclesiastical Latin, originated with Jerome's Vulgate. His principal claim to the gratitude of the Church is that he was the founder of Latin monasticism. Consult Farrar, (Lives of the Fathers5 (1889); Largent, (Saint Jerome5; Sanders, (Etudes sur Saint Jerome5 (1903), and the English translation of the works in the (Library of the Nicene and Post-Nicene Fathers5 (1892).

JEROME, Jerome Klapka, English hu¬

morist: b. Walsall, 2 May 1859. He was at first a clerk in a railway office, afterward actor, school-master and journalist by turns. After many discouragements he succeeded in making a popular hit with his book, (On the Stage —and Off5 (1888), largely autobiographical. His JEROME

JERROLD

27

(Idle Thoughts of an Idle Fellow* (1889) and . Lhree Men in a Boat) (1889) made him famous irJ: America as well as at home. He edited the Hdler> with Robert Barr (q.v.) (1892-97) ;

Day) (1892-97) ; and has published several suc¬

cessful comedies: (Sunset) (1888); (New Lamps for 01d> (1890) ; Miss Hobbs> (1900), etc. He is also author of (John Ingerfield) (1894); (Sketches in Lavender) (1897V Ob¬

servations of Henry) (1901);

(1907), the stage adaptation of which was most successfully produced by Sir Johnston Forbes-Robertson; (They and I> (1909) ; (The Master of Mrs. Chilvers) (1911) ; (1913);

H>oor Little Thing) (1914) ;

(1917) ;/Cook> (1917), etc. He gave a series of readings in the United States in 1914.

JEROME, Thomas Spencer, American

classical scholar: b. United States, about 1863; d. Capri, Italy, 1914. He was the son of David Howell Jerome, 18th governor of Michigan, and was graduated at the University of Michi¬

gan in 1884, later studying law at Harvard.

He engaged in the practice of law in Detroit; but, possessed of abundant means, he went to live at Capri, where he devoted himself to the critical study of Roman history and acted as consular agent. His premature death prevented'

the completion of his work, of which the only published effort is Toman Memories in the Landscape Seen from Canri) (1914), which was published posthumously but was finished at the time of his death and is considered of excep¬

tional value.

JEROME, William Travers, American

lawyer and politician: b. New York, 18 April 1859. He entered Amherst College, but indif¬

ferent health compelled him to leave. He graduated from the Columbia Law School in 1884. In 1888 he was appointed assistant dis¬

trict attorney, in which position he saw much of the political corruption prevailing in the city.

In 1890 he was active in the Municipal League, which opposed Tammany; in 1893 was assistant counsel of the Lexow Committee, in 1894 a member of the committee of 70 and manager of the campaign which resulted in the election of Mayor Strong. In the same year the mayor ap¬

pointed him judge of the Court of Special Ses¬

sions. In 1901 he was active in the Fusion campaign against Tammany; and in 1902 was elected district attorney of New York County; immediately after his election he established headquarters in the East Side of New York, in order to be within easy reach of the people who most needed his assistance; in this official position he has done very effective work in the breaking down of the system of

protection of vice and maladministration of justice. In 1905

he was again elected district attorney on an independent ticket by 16,255 plurality.' In this capacity he conducted the prosecutions of Harry K. Thaw for the murder of Stanford White; and he was retained as counsel for the State of New York in the subsequent legal pro¬

ceedings.

JEROME, Ariz., town in Yavapai County, 28 miles northeast of. Prescott, and on the United Verde and Pacific railroads. There are extensive mining interests, including copper and gold; and the town has cooper smelters and kindred industries. Pop. (1920) 4,030.

JEROME OF PRAGUE, Bohemian re¬

ligious reformer: b. Prague, about 1370; d.

there, 30 May 1416. He was educated at the universities of Prague, Paris, Oxford, Cologne and Heidelberg ; and was in faith and suffer¬

ings the companion of the famous John Huss, whom he excelled in learning and eloquence, and to whom he was inferior only in modera¬

tion and prudence. His reputation for learning was so great that he was employed by Ladislaus II of Poland to organize the University of Cracow ; and Sigismund of Hungary caused Jerome to preach .before him in Buda. ' He took a zealous part at Prague in the contest of his friend Huss against the authorities, and not un-

frequently proceeded to violence, causing the monks who opposed him to be arrested, and even had one thrown into the Moldau. He publicly burned in 1411 the bull of the crusade against Ladislaus of Naples and the papal in¬

dulgences. When Huss was imprisoned in Constance he. could not remain inactive, and hastened to his defense. But attempting to re¬

turn to Prague the Duke of Siilzbach caused him to be arrested in Hirschau and carried in chains to Constance. After an imprisonment of half a year he consented on 11 Sept. 1415 to recant the heresies with which he and Huss vvere charged. But this recantation did not de¬

liver him, and after languishing a year, he solemnly retracted his recantation. On 30 May he was burned at the command of the council and his ashes thrown into the Rhine.

JERRARD, jer'ard, George Birch, British mathematician : b. about 1803 ; d. Long Stratton, Norfolk, 23 Nov. 1863. He was graduated at Trinity College, Dublin, in 1827 and became known for his work in connection with the theory of equations, especially his contributions toward the . solution of the general quintic equation, which was afterward developed along the lines followed by Jerrard, Arthur Cayley and Sir James Cockle. Author of Mathemati¬

cal Researches) (1832-35) } (An Essay on the Resolution of Equations) (1859).

JERROLD, jer'old, Douglas William, Eng¬

lish dramatist and humorist: b. London, 3 Jan.

1803; d. Ivilburn Priory, near London, 8 June 1857. He was a midshipman in the navy 1813-

15, and then quitting the service, was bound ap¬

prentice to a printer in London. By hard study he made himself master of Latin and Italian, besides acquiring an extensive knowledge of general, literature, and at first attempted dramatic criticism. The bent of his genius, however, lay mainly in the direction of dramatic writing. Numberless pieces were produced by him before he was 20, but the first which won decided popularity was (Black-eyed Susan,) presented for 3(X) successive nights at the Surrey Theatre in 1829. Fortunes were made out of the play; but the author only got $300

for it Among Terrold's subsequent dramas were the ˆRent-dav' ; (Nell Gwvnne* ; (The Housekeeper) ; 'Prisoner of War) ; 'Bubbles of a Day) and 'Time Works Winders,) the last named one of the most successful comedies on the English stage. He founded and con¬

ducted successively the Illuminated Magazine and Douglas J err old's Shilling Magazine was 28

a member of the literary staff of Punch, and in 1852 became editor of Lloyd's Weekly News¬

paper. To this he contributed (Mrs. Caudle's Curtain Lectures) ; (Punch's Letters to his Son* ; the (Story of a Feather.* He wrote several novels, among which are (The Mad Mode of Money*, and ˆChronicles of Clover-

nook) (1846). A selection of his essays, edited by his grandson, Walter Jerrold, appeared in 1903. Though a powerful master of satire, he never allowed his wit, whether as an author or in private life, to be tinged with malevolence.

Consult Jerrold, W. B., (Life and Remains of Douglas Terrold) (1859) ; Jerrold, W. C., (Douglas Jerrold and Punch.*

JERROLD, William Blanchard, English

journalist and miscellaneous writer, eldest son of Douglas Jerrold (q.v.) : b. London, 23 Dec.

1826; d. there, 10 March 1884. He succeeded his father in 1857 as editor of Lloyd's News¬

paper , and as such strongly espoused the cause of the North in the American Civil War. Some of his leading articles on this subject were, by instruction of the American authorities, placarded and displayed in New York. He was the author of a very successful farce, (Cool as a Cucumber* (1851), and other plays. He also wrote (Swedish Sketches1* (1852) ; (Life of Douglas Jerrold) (1858), and (Life of Naooleon IIP, his greatest work, which was completed in 4 vols. between 1874 and 1882.

JERSEY, Island of, the largest, most im¬

portant and most southerly of -the Channel Islands, lying in the English Channel, and be¬

longing to Great Britain. It is 12 miles long and from four to seven miles wide, and has an area of 45 square miles. The distance to the coast of France is about 15 miles. Rugged and precipitous in the north, the interior is mostly table-land and is well-wooded. The principal town is Saint Helier. Pop. 28,000. The island is famous for a breed of cattle. Fruit and potatoes are largely grown, and are exported in enormous quantities. The island was part of the old Norman provinces brought with the Conquest to the Crown of England. The speech of the farming population is a patois Norman French, but English is spoken every¬

where, while the use of modern French and English is a bi-lingual feature of the courts and states governing body. Pop. 52,000.

JERSEY CATTLE. See Cattle.

JERSEY (jer'z!) CITY, N. J., the most important suburb of New York since the an¬

nexation of Brooklyn, the second largest city in New Jersey, and seat of Hudson County. It occupies about five miles of the Hudson River frontage opposite lower New York: Paulus Hook, its starting point, is exactly opposite the Battery. It lies on a peninsula between the Hudson and New York Bay on one side, and the Hackensack and Newark Bay on the other; and is limited on the south by Bayonne, which takes up the lower end of the peninsula, and on the north by Hoboken. It has several ferry lines and tunnels to different portions of New York, operated by the great railroads which have their terminals here — all the roads from the south and west: the Pennsylvania, Erie, Balti¬

more and Ohio, Lehigh Valley, Delaware, Lacka¬

wanna and Western, New York, Susquehanna and Western, Central of New Jersey, and the West Shore line of the New York Central.

The Morris Canal ends here. Jersey City is also the terminal of several of the most important steamship lines between New York and Europe.

Its area is 12,228 acres, or 19.1 square miles.

The city lies on a flat meadow about a mile wide from the river back to a sharp bluff; the business section occupies the former, the resi¬

dence district the latter, with some very hand¬

some streets of costly dwellings. The munic¬

ipal improvements are of a high and thorough grade: paving (nearly all the streets are paved, largely with granite and asphalt), sewerage, water supply, etc. The trolley service extends to all the neighboring section of New Jersey.

The parks are few and very small, less than in almost any other large American city ; but along the ridge in the western part extends the magnificent Hudson County boulevard, 19 miles long (the entire length of that county from Bayonne up, and five miles of Bergen County), 100 feet wide, and with a noble view of the river and upper New York, as well as the country west. The city hall with the soldiers'

monument, the public library, the courthouse, the Dickinson high school and the Fourth Regi¬

ment armory, are among the conspicuous build¬

ings. The intellectual facilities of the city are good, aside from its proximity to New York.

It has 37 public schools, besides 16 Roman Catholic parochial schools, and for higher edu¬

cation two public high schools, Hasbrouck In¬

stitute (1856), Saint Peter's (Roman Catholic) College (1878), Saint Aloysius Academy.

There is a public library with over 100,000 vol¬

umes. The hospitals are the City, Saint Francis, German and Christ; there are several homes and asylums, and some convents.

The immense commercial and shipping inter¬

ests of the city, though second only to those of New York, have no separate statistics, the cus¬

toms report being included in that of the latter city. Its position on the great river, with Newark Bay in the rear and the entrance of Kill van Kull on the south, give it a most favor¬

able commercial position, which has been im¬

proved by properly equipped wharves. There is a steady and concerted movement to increase still further these port facilities by co-ordina¬

tion of railroads, piers and terminal yards and buildings, with a belt line railroad. The Penn¬

sylvania and Erie roads have large gram ele¬

vators here. Among the leading industries are those of slaughtering and meat-packing: Jer¬

sey City is the meat depot of New York, and has several huge abattoirs on the river front on the Hackensack meadows Jn the northwest.

Its slaughter-house products in 1910 amounted to $22,314,000. Its other manufactures are enormous, the total amounting to $128,775,000

in 1910. They are exceedingly varied, no one having a great predominance except slaughter¬

ing and meat packing and tobacco manufacture with over $11,065,000 a year; other important branches are iron and steel goods, locomotives, boilers and heating apparatus ; bridges, ships and windmills; planing-mill products, cars, car¬

riages, boxes and cooperage ; brass, copper and zinc goods, electrical and scientific apparatus; pottery and glass; lead-pencils and famous crucibles used in all chemical laboratories and smelting works; watches, jewelry and musical instruments; sugar and confectionery; mineral waters and patent medicines ; soap and candles (a natural annex to the abattoirs), and per-

1 urnes; compressed gas; chemicals, paints and looting materials; paper and window-shades; lubber goods; silk thread and goods; oakum; fireworks ; printing and writing inks and var¬

nish ; and hundreds of others. There are three national banks, and 10 State and private banks, with loan and trust companies. The city has an active and progressive Chamber of Com¬

merce of the modern type.

Since June 1913 the city has had a com¬

mission form of government with five com¬

missioners; most of the other officials are ap¬

pointed by the commission except the school board which is appointed by the mayor. The assessed valuation in 1915 was $292,796,827 ; PUˆ*C debt, excluding the water debt,

30 Nov. 1915 was $10,350,625; the sinking fund JJ. oSaI ’°00’000- The exPenditures are about f?’ S L? rar- iThf largest single item is 8 l,oU9, 402.65 for schools.

ˆ The population in 1850 was 6,856; 1860, ?nbi26T1870’ 82’546; 1880, 120,722; 1890, 163,003; 1900, 206,433; 1910, 267,779; 1920, 297,864. Of these about 60,000 are foreign-born, mostly Irish and

German.

• c*ty was used °nly as farm¬

ing land till into the 19th century despite its remarkable position. In 1802 the entire popu¬

lation was 13 in one house with outbuildings; this was on Paulus Hook, the point opposite the Battery, named after the Dutchman Michael Pauw, who formerly owned it. Here in the Revolution the American fortifications had been taken by the British, and retaken and destroyed in a most brilliant action by <(Light Horse Harry» Lee. In 1804 the "Associates of the Jersey Company8 -bought the land, and laid it out in streets, incorporating it as a vil¬

lage with a board of selectmen. In 1820 it was incorporated as the «Citv of Jersey,8 still with a board of selectmen; in 1838 it was reincor¬

porated as Jersey City, with a mayor and aider-

men. Repeated annexations have brought it to its present territory: Van Vorst in 1851, Hud¬

son City and Bergen in 1869, Greenville in 1873. It obtained a new charter in 1889. Con¬

sult McLean, 'History of Jersey City) (1895) ; Eaton, 'Jersey City and its Historic Sites*

(1899).

JERSEY SHORE, Pa., 'borough in Ly¬

coming County, on the Susquehanna River, 15

miles southwest of Williamsport, on the Penn¬

sylvania and the New York Central and Hud¬

son River railroads. It is situated in a fertile agricultural district and has machine shops, foundries, electric works, a silk mill and other industries. Pop. (1920) 6,103.

JERSEYVILLE, Ill., city and county-seat of Jersey County, on the Chicago and Alton and the Chicago, Peoria and Saint Louis rail¬

roads, 66 miles southwest of Springfield. It was settled in 1839, incorporated in 1867, and adopted a new city charter in 1897. It has a public library and courthouse, and being the centre of a rich agricultural district, has an established trade in produce, fruit, grain and live-stock and has manufactories of shoes. The waterworks are owned by the city. The gov¬

ernment is vested in a mayor and council.

Pop. 4,113.

JERUSALEM, Wilhelm, Austrian psychol¬

ogist and educator: b. Drenic, Bohemia, 11 Oct.

1854. He was educated at Prague, engaged in teaching, and in 1907 became lecturer in philos¬

ophy and pedagogy at the University of Vienna.

His works offer many valuable contributions to the study of philosophy. Author of (Zur Re¬

form der philosophischen Propadeutik) (1885) ; (Lehrbuch der empirischen Pyschologie) (1888; 5th ed., 1912); (Die Urteilsfunktion} (1895); (Emleitung in die Philosophic (1899; 6th ed., 1913; eng. trans., 1910; trans, into Russian, Polish and Japanese) ; (Gedanken und DenkeU

(1905; trans. of William James' 'Pragmat-

ism}) ; 'Die Soziologie des Erkennens in der ZukunfD (1909).

JERUSALEM (Greek Hierousalem ; Old

Hebrew pronunciation, Yurushalem. Tel-el-

Amarna tablets, Uru-sa-lim ((city of peace8; As¬

syrian monuments, Ur-sa-li-im-mn. The Greek and Latin Hierosolyma is a corruption, from the erroneous supposition that the first syllable is Greek hieros, sacred. Hadrian renamed it /Elia- Capitolina, and its official name was long YElia, even Arabicized into Iliya; the Greeks called it Kapitolias. Arabic name, Beit el-

Makdis, or simply el-Mukaddas, modern ver¬

nacular el-Kuds, <(the sanctuary,8 or el-Kuds esh-sherif) .

The “Holy City8 is 33 miles from ‘its ptrrt of Jaffa on the Mediterranean, 15 from the Dead Sea, 18 from the Jordan, 19 from David’s first capital, Hebron, and 34 ‘or 35 from the old kingdom of Samaria : the pregnant Hebrew his¬

tory was transacted in the space of a county. It is 126 miles from Damascus. The position of the dome of the Church of the Holy Sepulchre is lat. 31° 46′ 45″ N., long. 35° 13′ 25″ E.’ The city lies in the midst of an infertile, ill-watered district, once (under good government) made prosperous by irrigation, later blighted by Turk¬

ish possession. The rainfall is about 23 inches.

The climate is hot and irregular — rising to 112°

and not sinking below 25°, with an annual mean of 62° — but not malarious; the city is insani¬

tary and plague-stricken, but from dirt, lack of sewerage, bad water, and the unhygienic habits of the people. The only natural water-supply (the drainage sinking in the soft limestone) is from the Virgin’s Spring (Gihon), an inter¬

mittent natural siphon on a dolomite floor, in a rocky cave 12 feet deep in the face of the eastern ridge; this was carried by a rock and masonry conduit to the rock and masonry Pool of Siloam, 52 x 18, and thence to another, the Old Pool; a shaft within the walls led down to a rock channel communicating with the spring.

At present the water-supply is from rain-tanks or “pools,8 in and out of the walls. The re¬

maining one of three old aqueducts, which carries water when in repair, was built by Pilate. There is little trade except that of local shops for supplying tourists; and the manufac¬

ture is chiefly of souvenirs, as olive-wood and mother-of-pearl articles. Indeed, as a commer¬

cial location it never possessed any merits, and its greatness was due to original reli¬

gious and political status. It is connected with Jaffa (west), Bethlehem and Hebron (south), and Jericho (north) by carriage-roads; and in

1892 a narrow-gauge railroad to Jaffa, with a circuitous course of 54 miles, was opened by a French company.

Jerusalem was built on several hills. <(This group of hills, now represented by a nearly level plateau, as the inner valleys have been filled up 30

with the accumulations of ages, forms an outly¬

ing spur of the mountains of Judea, and has a general direction of north and south. On the north side the ground is comparatively level; two valleys, on the west, south and east, en¬

circle the site, and gradually getting deeper, unite near the Pool of Siloam, forming one valley which runs down to the Dead Sea.®

The modern city, much less extensive than the old in its best estate, is a rough quad¬

rangle surrounded by a very irregular wall, built in the 16th century by Solyman I, on the lines of the Crusaders' fortifications. It has nomi¬

nally eight gates, two on each side; the Jaffa and A'bd-ul-Hamid on the west (the latter very recent), the Zion and Dung on the south, the Golden (closed up) and Saint Stephen's on the east, and the Damascus and Herod's on the north. The city is unevenly divided, by the main street running from the Damascus gate south to near the Zion gate, and that running east from the Jaffa gate to the Haram-esh-

sherif, into four "quarters® in which the great religious divisions are segregated : the Moham¬

medan, much the largest, on the northeast, ad¬

joining the original holy places; the Christian next, on the northwest, where is the Church of the Holy Sepulchre ; the Armenian on the southwest; the Jewish on the southeast. The streets are crooked, narrow, ill-made, and dirty, and the city has few except historical attrac¬

tions ; the stream of tourists, however, has de¬

veloped civilized conveniences such as hotels, banks, mercantile establishments, etc. Several Jewish colonies have been settled in the

envi¬

rons ; and since 1858 a quarter has grown up outside the walls on the northwest, approached by the Jaffa Gate, and containing consulates, Christian churches, schools, charitable institu¬

tions, etc., but not more sanitary than the old.

The city prior to British occupation in 1917

was the capital of an independent sanjak, subject to the government at Constantinople.

It has an executive and a town council with representation of the great religious divisions.

It is the seat of Roman Catholic, Greek Catho¬

lic and Armenian patriarchs ; the smaller east¬

ern churches have resident bishops; and till 1887

a joint Protestant bishopric was supported by England and Prussia, with alternate bishops, but on the death of ithe then incumbent Prussia withdrew from the arrangement, and England continued it alone. Pop. in 1911 about 68,000, made up of 8,000 Mohammedans, 10,000 Chris¬

tians and 50,000 Jews. In addition, there is a floating population of pilgrims to the sacred sites.

The intense historical interest is centred on memorials of the time or localities of David and Solomon, and of the life and death of Christ. Of the former, the supreme interest is in the Haram-esh-Sherif, the site of the temple, and palace of Solomon and of the later temples.

It is a walled area about 527 × 330 yards, with an elevated platform in the centre reached by steps ; in the centre is the beautiful Kubbet es-Sakhra, or Dome of the Rock — a wooden octagon with sides of 66 feet 7 inches, decorated on the out¬

side with marble and porcelain tiles, each of the four sides which face the cardinal points hav¬

ing a square gate surmounted by a vaulted arch.

Just east of this is the Chain Dome, or David’s Place of Judgment.

Other domes of interest are near; but the next most notable structure in the Haram is the mosque El Aksa, at the south end. Within it are also a beautiful 15th cen¬

tury fountain, a pulpit of the same date, a mod¬

ern mosque called the Throne of Solomon, and the fortress of Antonia. Of the Christian monuments, the most noteworthy is the Church of the Holy Sepulchre, in the Christian quar¬

ter, originally built by Constantine the. Great over the traditional site of the Crucifixion.

(See Hoi.y Sepulchre). There is a rotunda, with a dome 65 feet in diameter, above a small Chapel of the Sepulchre; a number of church buildings, said to include the site of Golgotha or Calvary; and 22 chapels. The Via Dolo¬

rosa, along which Jesus is said to have carried the cross to Calvary, follows the present street Tarik Bab Sitti Maryam from Saint Stephen's Gate. Several modern churches and other in¬

stitutions are also worth visiting; but the thronging Scriptural associations • — besides those mentioned above, the Mount of Olives, the Pool of Bethesda, the Vale of Hinnom, etc. —overshadow all else.

Topography and History. — About a mile north of Jerusalem, the main north and south watershed ridge of Palestine turns to the west; while a spur called Olivet, having three pin¬

nacles, runs first southeast one and one-half miles, and then south one and one-fourth miles.

The space between the two is occupied by a plateau sloping southeastward, and separated on each side from the bounding ridges by a ravine 300 to 400 feet deep, with steep and often precipitous sides. The eastern ravine, separating it from Olivet, is the "brook® Kedron or Kidron (Cedron), which was always a dry bed; the western is the Wady el-Rababi (prob¬

ably the vale of Hinnom), which after skirting it omthe west, turns east along the southern scarp of the plateau and joins the Kedron. Through this plateau from north to south runs a broader and much less deep and precipitous valley, the Tyropceon* ("cheese-makers' place®) 100 to 150

feet deep, thus dividing it into two uneven sec¬

tions : the east ridge is continuous, and its northern part was the first occupied ; the west¬

ern part, the “new city,® is divided by a lateral branch of the Tyropceon into two summits, a north and a south, connected by a narrow saddle separating also Tyropceon from el-Rababi. The general height may be stated as about 2,500 feet; the eastern ridge is 2,440 feet at the north, and descends southward ; the western north summit is 2,490 feet, south summit 2,520. The accumu¬

lation of the rubbish of 3,000 years, however, has greatly modified the contours of the hills and ravines, obliterating some minor ones alto¬

gether. The average depth over the rock levels is 30 to 40 feet, and in the valleys 70, in one case reaching 120.

This plateau, surrounded on three sides by steeply scarped bluffs and crested with hills, was a natural fortress; but it had two defects — it commanded nothing in particular, and its water-

supply (one spring intermitting for hours or even a day or two, and that at the foot of a bluff) was very scanty. Probably at the first, as many times since, army after army marched around it, and left it untouched as of too little military significance. We first hear of it on the Tel el-Amarna tablets (about 1400 b.c.) when it is seemingly a little hill fort with a small gar-

JERUSALEM

Site of Solomon’s Temple, from the Northwest The Mosque of Omar

JERUSALEM

JERUSALEM

Copyright Underwood & Underwood, N. Y

1 Herod’s Temple

2 Solomon’s Temple

The famous Scheck Models

. .

•

%

a*

rison, possibly with a village also, and the capi¬

tal ol the ((land of Jerusalem,® apparently a sAn;a > ‘ territory along the watershed. The king, A j “Khiba, is a vassal of the king of Egypt, and begging assistance against the Khabiri (He¬

brews?). Later it is a minor ((Jebusite® cita¬

del: Hebron, Bethlehem, Bethel, Gibeah, Jeri¬

cho, are all more important. But when David undertook to form a consolidated Hebrew king¬

dom, Jerusalem had the transcendent merit that it lay on the border between Judah and the northern tribes, not historically identified with either; it was also fairly on the central line of communication, and convenient for action against the Philistines and the desert tribes at once. He made terms with the Jebusites and occupied the hill-fort of Zion on Ophel, near the only available water-supply. Possibly a vil¬

lage grew up on the eastern slope of the hill ; but it was small, for the whole levy of Palestine was but 30,000 men (2 Sam. vi, 1), and other places held the trade. Solomon greatly in¬

creased the size of the town, and built a stone temple for Yahweh and a great palace. Under Rehoboam the place was captured by Shishak of Egypt; under Amaziah by Jehoash, and its walls partly leveled. During the palmy times of the northern kingdom it was held of small ac¬

count except by the Judahites: it was only one of many places of pilgrimage down to Heze-

kiah’s time, and the northern prophets ignore it and speak of Bethel, Gilgal and Beersheba.

With the fall of its northern neighbor, for the moment its importance and wealth increased; it became the one shrine which had never been defiled with the rites of the native religions, the centre of Jewish religious life, the one place where sacrifice might be offered In the later days of the monarchy the town spread beyond the east ridge into the Tyropceon ; a second town and a trading quarter grew up. For a long time after its destruction by Nebuchadnezzar in 586 the history is scant and dubious. It suf¬

fered heavily under the Persian Empire; under Artaxerxes Ochus the temple may have been destroyed. Alexander's sacrificing in the tem¬

ple is mythical; and in 320, Appian says, Ptol¬

emy Soter destroyed the city. Then there was a time of peace and prosperity, culminating in the high-priesthood of Simon II (219-199 B.c.) ; after a series of struggles between the Ptole¬

mies and the Seleucids, in which the former took and garrisoned the place and the Jews helped drive out the garrison, the Seleucids obtained Palestine by treaty in 197. When Antiochus Epiphanes undertook to Hellenize Palestine in 169, he took the city, destroyed the walls, plun¬

dered the temple, and erected an altar to Zeus in place of that to Yahweh. Judas Macabaeus rebuilt the temple and the walls ; again razed by the Greeks, they were again rebuilt by Jona¬

than. Under the Hasmonaean dynasty it ex¬

tended to the western ridge; there was a new palace and royal quarter of great splendor; the city became the metropolis of the Jewish world, and the one great pilgrim shrine. Then it became tributary to Rome, but at least still a kingdom governed by its own sovereigns ; such it was when Jesus was born ; but it shortly after became a province governed by a Roman procurator. The Roman system of repression and Jewish national feeling were brought sharply into conflict, aside from any actual mis-

government; and a grand national revolt took place, which in 66 a.d. gained possession of Jeru¬

salem. V espasian was appointed to repress it ; and in 70 a.d, his son Titus, after one of the most frightful sieges in history, with unimagi¬

nable horrors, took it, burned the temple, and leveled the city to the

ground. Josephus says the city's population was 1,000,000, and Tacitus (probably from Josephus) 600,000. Both are absurd, those of Josephus are Oriental in their nf>Aera^0nL FrPm 30,000 to a maximum

45,000 may be estimated. It remained a ruin for many years. In 131 Hadrian visited the site and ordered the rebuilding of the city, appre¬

hending a restoration of pagan worship, the Jews broke out in rebellion under Bar-Cochba ; and Hadrian, not caring to set up a new centre of Jewish propaganda, made it a Roman colony called 2Elia Capitolina, and forbade Jews to enter it on pain of death. Thence till the time of Constantine nothing is known of it ; except as a Jewish shrine it was nothing. When the empire became Christian, Constantine's mother, Helena, induced him to cherish the seat of Christ's ministry and death; and he built the Church of the Holy Sepulchre. Pilgrims flocked to Jerusalem from all parts, and it be¬

came the shrine of Christendom. Captured by Khosru of Persia in 614, it was retaken by Heraclius in 628 ; but in 637 was taken by the Moslems under the caliph Omar. The line of Arabian caliphs of different dynasties was suc¬

ceeded by the Seljuk Turks. The Christians were oppressed, the sacred places defiled; to crown all, the overland caravan trade was cut off. Religious feeling and mercantile interest together roused Europe to the crusades, and Jerusalem was taken by Godfrey of Bouillon in 1099, becoming the capital of a Christian mon¬

archy. This maintained a precarious existence till 1187, when Saladin recaptured the city and it remained in Mohammedan possession again for 730 years, up to Dec. 1917 when in the Pal¬

estinian campaign of the World War it sur¬

rendered after a short siege to British troops under General Sir E. H. Allenby.

Bibliography.— Among the many excellent works on the subject, consult, for topography and ancient history, the article Jerusalem in the ((Encyclopasdia Biblica,® by W. R. and G. A.

Smith and Colonel Conder; also for topography, Colonel Conder in Hastings' dictionary of the Bible. } Consult also Warren and Conder's

(4th ed., 1899) ; Atkins, G. G., Jerusalem : Past and Present (1918) ;

G. A. Smith's (Jerusalem from the Earliest Times to a.d. 70> (2 vols., 1908) ; also his historical Geography1* of Pal¬

estine; Watson, (JerusaletrP in the Mediaeval Towns Series; the Quarterly Statements) of the Palestine Exploration Fund and the pro¬

ceeding of the German Palestinian Society.

JERUSALEM, Councils or Synods of, a

number of councils held at Jerusalem after the meeting of the Apostles (Acts xv), of which 32

six are of prime importance. (1) The first ecclesiastical council, believed to have been held about 47 and mentioned in Acts xv, discussed the extent to which Judaic law should be fol¬

lowed in the Christian Church. The council gave three decisions: (a) abstention from meats which had been offered to idols; (b) from blood and strangled things; (c) from fornica¬

tion. (2) In 335 an attempt was made to heal the differences in the church at the time of the meeting of the bishops to consecrate the church of the Holy Sepulchre, and Arius was restored to fellowship and permitted to return to Alex¬

andria. (3) In 349 Maximus, bishop of Jerusalem, and 60 other bishops met upon the return of Athanasius to Alexandria, rescinded the decree published against him and dispatched a synodal letter to the church in Alexandria.

(4) In 399, held in response to an appeal from Theophilus of Alexandria to sustain the decree against the Origenists ; the decree was confirmed and the resolution to hold no communion with those who denied the equality of the Father and the Son was passed. (5) In 553 the acts of the fifth Ecumenical Council of Constanti¬

nople were received by all the bishops of Pales¬

tine except Alexander of Abilene, who, being absent, was deposed. (6) In 1672 the most not¬

able, council was held, convened by Dositheus, patriarch of Jerusalem, with the object of eradicating Calvinism. It was attended by 53

prelates, six metropolitans and other officers and members of the church. It rejected uncon¬

ditional predestination and justification by faith alone, and advocated the Roman Catholic doc¬

trines of transubstantiation and of purgatory.

Its decisions were the cause of considerable trouble in the Eastern church, charges of lean¬

ings toward Romanism being made, although the council had specifically pronounced against the Roman Catholic affirmation that the Holy Ghost proceeds from both Father and Son.

The pronouncements of this council are re¬

garded on the whole as one of the most import¬

ant expressions of f ith of the Eastern church.

JERUSALEM CHAMBER, a large hall in

the deanery of Westminster, noted for its his¬

torical associations. It was built for Abbot Littlington, 1376-86. Henry IV died in it, 20

March 1413. It was the meeting place of the Westminster Assembly in 1643, also of the com¬

pany of revisers of the New Testament of 1881. The Old Testament Company also met there part of the time. Before they were buried in Westminster Abbey, Addison (1719) and Congreve (1728) lay in state in the hall.

The name of the hall was probably given be¬

cause of the tapestries on the walls depicting scenes from Jerusalem.

JERUSALEM CHERRY, an ornamental

house plant of the nightshade family, solarium capsicastrum and solarium pseudo-capsicum, of which the latter species is a native of Madeira.

The plant attains a height of from one to three feet with oblanceolate

leaves borne on short stems and ‘small white flowers followed by bright red or yellow berries the size and ap¬

pearance of cherries. It is readily propagated by either seed or cuttings. It is sometimes called ((winter cherry,® and its fruit is inedible.

JERUSALEM CREED, the confession of

faith generally believed to have been taught by Saint Cyril of Jerusalem in his catechetical lec¬

tures about 347 a.d., based upon the Nicene creed of 325 a.d. and amplified by Cyril upon his return from exile in 362 a.d. It reads: ((I believe in one God, the Father Almighty, maker of heaven and earth, and of all things visible and invisible; and in one Lord Jesus Christ, the only begotten Son of God, begotten by the Father before all worlds, very God, by whom all things were made, who was incarnate and made man, crucified and buried, and the third day ascended into the heavens, and sat down at the right hand of the Father; and is com¬

ing to judge quick and dead. And in the Holy Ghost, the paraclete, who spake by the prophets ; and in one baptism for the remission of sins; and in one holy catholic church ; and resurrec¬

tion of the flesh; and in life everlasting.® It forms the basis of the creed adopted by the council of Constantinople, 381 a.d. Consult Schaff, Dr. P., (The Creeds of Christendom*

(3 vols., 1877) ; (The Library of the Fathers) (Vol. II, Oxford translation, 1832) ; Riddle, (Christian Antiquities*; Curtis, (Creeds and Confessions) (1911).

JERUSALEM DELIVERED. In dealing

with the Jerusalem Delivered) (1581), critics have the advantage of knowing from Tasso’s dialogues and from his later version of the poem ((Jerusalem Regained, * 1593), the con¬

siderations which determined for the author its content and its form. In his critical theory <(plot® and <(ornament® are basic and distinct categories; while prominent before his mind were the successful examples of Ariosto, Boiardo and Pulci. These chivalric romances were loose agglomerations of episodes related but tenuously to a central theme. Tasso consciously strove to build a poem of the

same kind that would conform however, as regards the cate¬

gory of plot, to the canons of Aristotle's (Poetics* as modified by himself. It would have a unified theme to constitute a major in¬

terest. To this the episodic would be subject in the category of ornament. As an Italian of his time, Tasso conceived of religion, rather than patriotism as the subject of most lasting interest (the traditional motive of the ancient epic). . But the imaginative tale, whether patriotic or religious, must, to convey its mes¬

sage to the reader, carry the conviction of his¬

torical narrative (doctrine of verisimilitude).

Actual history does not leave room for the dis¬

tinctive act of the poet: invention. He must select accordingly a subject which, recognized as history, will be but so vaguely known in detail that the fictitious will be accepted as true.

The Turkish menace was the terror of Tasso's time ; and one of the poetic commonplaces was to incite Christian Europe to a new Crusade.

The subject of the holy wars thus imposed itself upon him for reasons of piety, present interest, and theoretical suitabilitv. He chose the conquest of Jerusalem by Geoffrey of Bouillon (First Crusade, a.d. 1096-99) ; its epic motive was to be the triumph of the just man through God over the wiles of sin and the obstacles set by evil fortune.

The operation of Tasso's pious purpose and of his critical theory can be traced through the Jerusalem Delivered> in the parts that are worthless. . The theme that gives his much sought logical unity is mechanical and unimagi¬

native. His just man, Geoffrey, is a lifeless 33

abstraction, his Divinity a dull magician work¬

ing in roundabout ways to produce miracles not worth the trouble. The preoccupation of the moral purpose contributes some allegory that is shallow if geometrically logical. The episodes gain nothing from their dependence on the plot; while the theory of ornament as applied to style carries metaphor-making to extremes that have

interest only historically as setting a fashion henceforth current in the most decadent period of Italian letters. So far as the Jerusalem Delivered* is a regular epic, it is dead. It lives only as a fantastic romance that gave free play to Tasso's supreme genius in the moods associated with the elegy and the idyll.

As the religious spirit overrides Tasso's biography so it overrides the strong passions of his soul. He felt intensely the beauty of life; he was deeply attached to the exterior world; he knew the inspirations of love, the allurements of sensuous pleasure. He never surmounted entirely the thought of death; rather he knows to the full what delusion means, the anguish of separation from loved objects and people, solitude, helplessness, despair. So he knows also the value of the Christian promise; and paying submissive tribute to the anthropomorphic aspects of dogma, he rises through faith to a vivid realiza¬

tion of true Christian experience. These are the elements of the lyric exaltation that has made some of his episodes immortal. In Sophronia he incarnates a mood of religious rapture indifferent to death and to worldly love, so completely does the martyr feel herself safe with God; whereas her lover, Olindo, snatches at the last consolations of life, rebelling in despair at the thought of what death makes forever impossible. Death and love are once more set in contrast in the death and conversion of Clorinda. Here is a violent sob of fare¬

well accentuated by the bitterness of avoidable error — the great motive that romanticism has always played on to rouse extreme effects of pathos. But love struggles over the grave to console with the softening and sweetening hope in the Resurrection. Clorinda's mute benedic¬

tion on Tancred is one of the most moving touches in all poetry. Erminia's flight to the Christian camp over a moonlit solitude is a complex experience of humility, surrender, de¬

votion, expressing in words filled with beautiful Vergilian echoes, a suffocated lament for un¬

realizable yearnings. In the story of (Armida) the idyllic sweetness, the sensuous suppres¬

sions of the

Tasso's orthodoxy in religion and in critical theory, his development of ingenuity in metaphor, his impeccable Petrarchism, his urbane

preciosity, his skill in classic allusion, his elegant fancy, conquered the aristocratic circles of the next two centuries in Europe, when everyone ranked him as superior to Petrarch and Dante — this, in spite of a fatuous pedantic quarrel over the theory of the epic which embittered the poet's later years and lasted for several decades after his death. The Romantic movement of the 19th century, re¬

jecting most of the critical tradition from which Tasso drew, justly relegated him to a more modest position in the literary hierarchy of

Italy. In virtue of his story-telling gift, the common people of all regions of that country have accorded to the Jerusalem Delivered) a popularity, as a code-book of rustic chivalry, second only to the legends of Roland and Charlemagne still so current in the South.

The poem endures in literature as the best ex¬

pression of the ideals and mental traits of the Italian Counter-Reform and as the greatest product of the preceptual aesthetics of the Renaissance. Tasso's only equals among

Italians in religious literature are Dante and Fogazzaro.

Arthur Livingston.

JERUSALEM OAK. See Goosefoot.

JERUSALEM PLANK ROAD, Engage¬

ment near. After the battle of Cold Harbor (q.v.), 1-3 June 1864, General Grant crossed to the south of James River, made unsuccessful assaults upon the Petersburg intrenchments, 15-

18 June, and then determined to invest the city partially by a line of works toward the South Side Railroad, and by the evening of the 21st the Fifth corps rested its left on the Jerusalem Plank Road. The Second corps, followed by the Sixth, was moved across the road with the intention of seizing the Weldon Railroad at a point near Globe Tavern next day, and with the expectation of seizing also the South Side Rail¬

road, and cutting Lee's communication with Lynchburg. At night the Sixth corps was in rear of the left of the Second. The orders for the 22d were that the Fifth corps should hold fast its position in front of the Confederate in¬

trenchments, while the Second and Sixth swung to the right, and forward on its left, each division intrenching as it came into line.

In the movement the corps commanders at first were directed to keep up connection, then they were ordered to move without regard to each other, each taking care of his own flanks.

The Second and Sixth corps moved chiefly through densely wooded thickets; the Second on the right and near the Confederate works ; the Sixth at right angles to the Second toward the Weldon Railroad. Gibbon's division of the Second corps had swung in on the left of the Fifth and intrenched, Mott's division was in¬

trenching, and Barlow's division, on the left, was not yet in position, when the last named was attacked. Gen. A. P. Hill had been sent down the Weldon Railroad to oppose Meade's attempt upon it. He had the three divisions of Wilcox, Mahone and Bushrod Johnson. Leav¬

ing Wilcox to oppose the Sixth corps, which had not come up on the left of the Second, Hill, about 3 p.m., passed Mahone and Johnson through the opening between the two corps and struck Barlow in flank and rear, driving him back in confusion to the position from which he had advanced in the morning, and taking many prisoners. Mott's division, on Barlow's right, fell back precipitately, and then Hill struck Gibbon's left brigade in front, flank and rear, causing it to give way and abandon a bat¬

tery of. four guns. So sudden and unexpected was this attack upon Gibbon that the greater part of several regiments were captured with their colors. Gibbon made an unsuccessful effort to recover the lost portion of his line.

Hill returned to his intrenchments, leaving some force on the railroad, and toward evening the Second corps was thrown forward; but it was

not until next morning that it occupied the ground from which it had been driven, the Sixth corps, forming on its left, thrown back facing the Weldon Railroad, and about a mile tiom it. The Union loss on the 22d, confined almost entirely to the Second corps, was nearly 2,000, of whom about 1,700 were prisoners. The Confederate loss is unknown. Consult (Vol. XL

Washington 1889-1901) ; Humphreys, A. A., (The Virginia Campa gn

of 1864-65> (New York 1883) ; Walker, F. A., (History of the Second Army Corns > (New York 1886).

JERVIS, jer'vis or jar'vis, John, Earl of St. Vincent, British admiral: b. Meadford Staffordshire, 9 Jan. 1735; d. 14 March 1823. He entered the navy 4 Tan. 1749, was promoted lieutenant 19 Feb; 1755, took part in the capture of Quebec, and in 1759 was appointed to the command of the sloop Scorpion. He became post-captain in 1760, and in 1769-72 he com¬

manded the A' arm, stationed in Med'terranean waters. He was then put on half-pay and traveled extensively in Europe and European waters, making many valuable notes on naval affairs. During the American Revolution he commanded the 80-gun F oudroyant, participated in the battle of Ushant on 27 July 1778, in the relief of Gibraltar, and on 19 April 1782 he captured the French man-of-war Pegase, for which achievement he was made K.B. He was sent to Parliament for Launceston in 1783 and for Yarmouth in 1784. He became vice-admiral in 1793 and until 1795 commanded the naval operations against the French in the West In¬

dies. He was appointed to the command of the Mediterranean fleet in 1795, receiving rank as admiral, and successfully maintained the blockade of Toulon. Upon the alliance of Spam and France and the occupation of Italy by the French he was obliged to withdraw his fleet to the Atlantic, and on 14 Feb. 1797 he engaged the Spanish fleet off Saint Vincent at heavy odds and completely routed it. For this victory he was granted his earldom and a pen¬

sion of £3,000. In 1797, during the general mutinies at Spithead and Nore, his prompt measures and the high state of discipline in which he maintained his command were suc¬

cessful in keeping his ships free from the trouble. He was often bitterly criticized as a disciplinarian, his firmness extending to his of¬

ficers' conduct as well as that of the sailors-

mit Lord Nelson, whose methods were wholly different, acknowledged the efficiency of Lord St. Vincent's . measures and the necessity for them at the time. Nelson's victory at the bat¬

tle of the Nile was largely due to the high discipline which St. Vincent had inaugurated.

He resigned his command because of ill health in 1/99 and upon

return to duty in 1800 he took command of the Channel fleet, where he instituted his usual disciplinary methods to the great indignation of his officers and crews, but with salutary results so far as the efficiency of the fleet was concerned, as he was able to maintain the blockade of Brest for 121 days.

He was First Lord of the Admiralty in 1801-03

and was fearlessly dictatorial in the institution of reforms at the dockyards, but was opposed by Pitt on the grounds that he failed to see the necessity of preparing the fleet for war He refused the command of the Channel fleet under Pitt's ministry in 1803, assumed it after Pitt's death in 1806, but asked to be relieved in 1807. The rank of adtniral of the fleet was conferred upon him by George IV at the time of his coronation. Lord St. Vincent ranks high among the commanders of his time, through whom the supremacy of British naval power was established. The biographies by Tucker (2 vols., 1844) and Brenton (1838) are not considered authoritative in the best sense.

Consult Laughton, (From Howard to Nelson) (1899) ; Mahan, A. T., (Types of Naval Heroes) (1901) ; Anson, (Life of John Jervis, Admiral Lord St. Vincent* (1913).

JERVOIS, jer'vis, Sir William Francis

Drummond, British general and engineer: b.

Cowes, Isle of Wight, 10 Sept. 1821 ; d. Bitterne, Hampshire, 16 Aug. 1897. He was educated at the Royal Military Academy at Woolwich and was commissioned second lieutenant in the Royal Engineers 19 March 1839. He was or¬

dered to the Cape of Good Hope in 1841, where he remained on engineering duty and in active serviceagainst the Boers and Kaffirs until 1848.

Returning to England he continued in the en¬

gineering service. He was appointed assistant inspector-general of fortifications at the War Office 7 April 1856, and in 1857 became in addition secretary to the defense committee.

He prepared the plans for the defense of Lon¬

don in case of invasion during the period when war with France was

threatened in 1857, and in 1859 drafted a report and recommenda¬

tions for defenses calling for an appronriation of £7,000,000, which was granted by Parliament.

He was appointed director of works for fortifi¬

cations in 1862, and in 1863 made an official tour of inspection of the fortifications of Canada ana Bermuda, also visiting th~se of eastern United States. He afterward inspected the progress of. fortifications in all parts of the British Empire, and upon the completion of the work in 1874 it was found that he had carried out the plans submitted to Parliament and kept within the £7,460,000 appropriation by a margin of £40,000. He was governor of the Straits Settlements in 1875-77, of South Australia in 1877-82, retiring from military service with the rank of lieutenant-general 7 April 1882

He served as governor of New Zealand in 1882-

89, t when he returned to England with an enviable record for both ability and popularity.

He served on the consultative committee on coast defense duties under Edward Stanhope in 1890. He was a member of the Royal Society a knight commander of the Orders of Saint George and Saint Michael, and author of nu¬

merous valuable reports on problems of defense.

JESHURUN is a tender and affectionate

poetical term applied to the oeople of Israel occurring four times in the Old Testament It is variously interpreted. Kimchi says “Israel is so called as being just among the nations.®

Gesemus translates it as “a righteous little people.®

. JESI, ya’ze, or IESI (anc. 2Esis), Italy, city and episcopal see of the Marches in the province of Ancona, on the River Esino, 17

miles by rail southwest of Ancona. Its walls date from mediaeval times and are well-pre-

.served. The cathedral of Saint Sentimius was built in 308, and the Palazzo del Commune in 1487-1503. There- is a library containing paint¬

Baccio Pontelli in 1488. The town takes its name from the river, which from 250 b.c. to about 82 b.c. formed the boundary of Italy.

The ancient town 2Esis was a colony used by the Romans as a recruiting ground. It was the birthplace of Emperor Frederick II, as well as of the composer Giovanni Battista Pergolesi.

Pop. commune, 24,777.

JESPERSEN, yes'per-sen, Jens Otto

Harry, Danish philologist: b. Randers, 1860.

He was educated at the University of Copen¬

hagen where he became professor of English in 1893. He was associate editor of Dania in 1890-1903, and in 1906 he received the Volney prize of the French Institute. He lectured at Saint Louis in 1904 and at Columbia University and the University of California in 1909-10.

His literary works deal chiefly with phonetics.

Author of 'The Articulation of Speech Sounds>

(1889) ; (Chausers Liv og Digtning> (1893); 'Fonetik Lseren om Sproglyd) (1897-99) ; (Sprogundervisning) (1901; Eng. trans., 1904); 'Growth and Structure of the English Lan-

guage) (1905) ; (Modern English Grammar'

(1909); 'Lehrbuch der Phonetik' (1913); (Storre engelsk grammatik pa historisk grund-

lag (1909-14) ; 'Engelske Laessestykker>

(1914), etc.

JESSAMY BRIDE, The, name given in

compliment by Goldsmith to Mary Horneck, a relative of Reynolds and a member of a family with whom the author was on terms of intimacy.

Miss Horneck was thought to be the object of affection on the part of Goldsmith. She became Mrs. Gwynn and afterward gave to Prior her recollections of the author. “Jessamy® is a poetic name for jasmine.

JESSE, jes’se, in the Bible stands at the head of the house of David, who was his son.

While Saul was persecuting David he took refuge in the land of the Moabites, where Ruth the Moabitess, his grandmother, had lived. In the genealogy of Jesus Christ as given in the Gospels of Matthew and Luke he is mentioned as one of the ancestors, as Christ in the New Testament is hailed “Son of David.® This fact has suggested some of the most interesting crea¬

tions of mediaeval art, and what is called a “Jesse window® is a stained glass church win¬

dow in which Jesse is depicted as the root of a tree which bears as its fruit David and other heroes and saints of the Old Testament, with the infant Jesus in the arms of his mother on the highest branch.

JESSE, Edward, English author and nat¬

uralist: b. Hutton Cranswick, Yorkshire, 14

Jan. 1780; d. Brighton, 28 March 1868. He was secretary to Lord Dartmouth and was ap¬

pointed successively to a clerkship in the woods and forestry office and deputy surveyor of the royal parks and palaces. His love for natural history was fostered by his residence in Rich¬

mond Park, and later in Bushey Park, and at Hampton, where he was connected with the restoration of the Hampton Court Palace.

While not possessed of scientific training Jesse’s powers of observation and facility in expressing himself gave a considerable popularity to his writings. Author of ‘Gleanings in Natural History) (1832-35) ; ‘An Angler’s Rambles) (1836) ; (Anecdotes of Dogs) (1846) ; lec¬

tures on Natural History) (1863). He edited Izaak Walton’s ‘Compleat Angler) ; Gilbert White’s ‘Selborne’ ; and L. Ritchie’s ‘Windsor Castle.’ He also wrote handbooks to Windsor, Hampton Court and other places of note.

JESSE, John Henaage, English historian, son of Edward Jesse (q.v.) :

b. 1815; d. London, 7 July 1874. He was educated at Eton and afterward became a clerk in the admiralty, where he served for many years. He early de¬

veloped a taste for literature and while his initial attempts at verse and drama were of lit¬

tle moment his later work possesses consider¬

able value as presenting the times of which he wrote from the social and anecdotal side of history. Author of 'Memoirs of the Court of England During the Reign of the Stuarts'

(J840) ; 'George Selwyn and His Contempora¬

ries' (1843; new ed., 1882); 'Memoirs of the Pretenders and their Adherents' (1845) ; 'Lit¬

erary and Historical Memoirs of London'

(1847) ; 'London and Its Celebrities' (1850); 'Memoirs of the Life and Reign of King George the Third' (1867) ; 'Memoirs of Celebrated Etonians' (1875), etc. A collected edition of his works was published (30 vols., London 1901).

JESSE, Richard Henry, American edu¬

cator: b. Epping Forest, Lancaster County, Va., 1 March 1853. He was graduated from the Uni¬

versity of Virginia in 1875. He studied at Leip¬

zig in 1885. Inspected German schools in 1890.

Studied at Munich, spring and summer semes¬

ter, 1905 ; at Berlin, fall and winter semester, 1905-06 ; was dean of the academic department of the University of Louisiana from 1878 till its union with Tulane University in 1884, in which institution he was professor of Latin till 1891. From July 1891 to July 1908 he was president of the University of Missouri. From ill-health he resigned as university president and entered by invitation upon The Carnegie Foundation. He has served as president of the Missouri State Teachers' Association, the Southern Association of Colleges and Secondary Schools, the National Association of State Uni¬

versities and the Baptist Congress. In 1904 he was awarded a

commemorative diploma and medal at the Saint Louis Exposition for his services to education. He is author of 'Mis¬

souri Literature' (1901), with E. A. Allen, and of papers in the transactions of various socie¬

ties.

JESSEL, jes'el, Sir George, English judge: b. London, 13 Feb. 1824; d. there, 21 March 1883. He was of Jewish parentage and was educated at University College, London, where he became a fellow in 1846. He was called to the bar at Lincoln's Inn in 1847, was called within the bar and became a bencher in 1865, and in 1868 he was elected to Parliament for Dover. He attracted Gladstone's favorable no¬

tice in 1869 by two sound speeches on the Bank¬

ruptcy Bill, and in 1871 he was appointed Solici¬

tor-General. He succeeded Lord Romilly as Master of the Rolls in 1873, was sworn a privy councillor and resigned his seat in Parliament.

The Judicature Act of 1881 made him presi¬

dent of the First Court of Appeal where he served the remainder of his life. He was nota¬

ble as a judge for his wide learning, his quick, accurate judgments and the rapidity and thor¬

oughness with which he cleared his calendar.

He was the first Jew to take a share in the 30

executive government of England, to become a regular member of the Privy Council and to take a seat on the judicial bench of Great Brit¬

ain. He was vice-chancellor of the University of London from 1880, a trustee of the British Museum and a fellow of the Royal Society.

JESSOPP, Augustus, Anglican clergyman

and author: b. 20 Dec. 1824; d. 12 Feb. 1914.

He was educated at Cambridge and after taking orders in the Anglican Church was curate of Papworth Saint Agnes, Cambridgeshire, 1848-

54; head master of Helston Grammar School, Cornwall, 1854-59; was headmaster of King Edwardˆ VPs School, Norwich, 1859-79 and from 1879 rector of Seaming, Norfolk. He was an authority on archaelogical subjects, wrote largely on past and present village life in Eng¬

land; and contributed many articles to the dic¬

tionary of National Biography.) His works in¬

clude (Arcady for Better for Worse) (1881), studies of agricultural life in Norfolk; (Studies by a Recluse5 ; (Trials of a Country Parson > ; (The Coming of the Friars,5 etc.

JESSUP, Henry Harris, American Presby¬

terian missionary and author : b. Montrose, Pa., 19 April 1832; d. 28 April 1910. He was grad¬

uated at Yale in 1851, at the Union Theological Seminary in 1855, and was ordained in that year.

He served as a missionary in Tripoli and Syria in 1856-60, and from 1860 until his death was at Beirut. He was missionary editor of the Arabic journal El-N eshrah, and was professor of theology and homilitics in the Syrian theo¬

logical Seminary at Beirut. He was moderator of the General Assembly at Saratoga in 1879.

Author of (The Women of the Arabs 5 (1874) ; (Mohammedan Missionary Problem 5 (1879) ; (The Greek Church and Protestant Missions) (1885); (Autobiography and History of the Syria Mission5 (1909) ; (Fifty-three Years in Syria5 (1910) ; etc.

JESTER, a professional (

by European monarchs and wealthy nobles.

Originally the jester was a court minstrel whose duty it was to tell and sing of gestes, heroic deeds (Lat. gesta), but with the decline of min¬

strelsy the word gestc changed in meaning and the gestour developed

into a domestic buffoon (Fr. bouffon), a retailer of witty stories. They usually wore a motley dress and a cap sur¬

mounted with bells and asses' ears or a cock's comb, hence the modern word ((coxcomb,55 a showy fool or vain pretentious person. The emblem of the jester was the fool's bauble or marotte. Consult Chambers. E. K., (The Me¬

diaeval Stage5 (London 1903) ; Doran. J..

tory of Court Fools5 (London 1858) ; Douce, F.. (Clowns and Fools in Shakespeare.5 in Illustrations of Shakespeare (London 1839).

JESU DULCIS MEMORIA (

very thought of thee5), the first line of a poem dating from the 12th century. In the earliest manuscript it consists of 42 stanzas of four lines each with a single rhythmic scheme for each stanza. Twelve stanzas of this poem have been taken to form three hymns of the Office of the Holy Name in the Roman Breviary, namely, 'Jesu dulcis memoria5 (Vespers), (Jesu rex admirabilis5 (Matins) and

icum5 (Lauds). The dictionary of Hymn-

ology* (1892) states that (

rectly) ascribed to Saint Bernard and there are many parallels to it in his prose works, espe¬

cially that on the Canticles. It has been vari¬

ously dated 1130, 1140 or 1153, but as positive proof is lacking that it is unquestionably the work of Saint Bernard, it is manifestly im¬

possible to fix a date for its composition.55 Al¬

though Dom Gueranger contends that there are ˆincontestable manuscripts55 to prove that the three hymns of the Holy Name were written by a Benedictine abbess of the 14th century, he does not give the date and location of these manuscripts, and the existence of the 12th cen¬

tury manuscript seems to preclude that possi¬

bility. Hymnologists of the present day, in¬

cluding Schaff, Trench, March and Duffield, seem to be unanimous in

following the tradition of Saint Bernard's authorship. Mearns in the second edition of the dictionary of Hym-

nology5 (London 1907) retains this opinion as correct. The (Jesu dulcis memoria5 has been translated into English many times, notably by Bagshawe, by Donahoe and by Caswall, the latter's being perhaps the best known of the English translations. A fine translation, pre¬

serving the metre and rhymic scheme of the original, was published by Hugh T. Henry in the American Ecclesiastical Review (January 1900).

Herbert F. Wright.

JESUIT ESTATES ACT. See Canada —

Jesuit Estates Act.

JESUIT RELATIONS AND ALLIED

DOCUMENTS, The, a series of 72 volumes on the travels and explorations of the Jesuit missionaries in New France (1610-1791). The original French, Latin and Italian texts, with English translations and notes ; illustrated by portraits, maps and facsimiles, have been edited by Reuben Gold Thwaites. The very great value of the work is that of original materials of the most interesting character for the history of North America from 1611, the date of the first landing of Jesuit missionaries on the shores of Nova Scotia. The reproduction of docu¬

ments takes them in chronological order. The execution of the work by translators, editors and printers (at Cleveland, Ohio) is in every way admirable; and its completion makes a monumental addition to American historical libraries.

JESUITS, a religious order of the Catholic Church whose members, like those of similar societies, solemnly bind themselves to aspire to perfection by leading a life of chastity, by re¬

nouncing the possession of all personal prop¬

erty, and by obedience to lawful superiors in all that does not contravene the law of God.

A certain number of them add a special vow of obedience to the Pope. They are called the Society or Company of Jesus, the latter desig¬

nation expressing more correctly the military idea of the founder, which was to establish, as it were, a new battalion in the spiritual army of the Catholic Church. There are no female Jesuits, nor are there crypto or secret Jesuits.

Romances are mostly responsible for such myths. Nor does the society form, as is some¬

times fancied, a sort of sect within the Church.

R. W. Thompson, ex-Secretarv of the United States navy, in his (Footprints of the Jesuits,5

asserts that they are such, and independent of the Pope, and in one instance he accuses them of being idolaters. As a matter of fact the Society of Jesus has always inculcated ardent devotion to the Pope, the most uncompromising orthodoxy and an intense Catholic spirit. The descriptions of Jesuits as crafty, unscrupulous men constantly engaged in dark plots against all who stand in their way, are inventions of their enemies and have no foundation in fact.

Finally they are not monks, as they are some¬

times described. Technically they are classed among churchmen as clerics, living according to a rule and are properly regular clerics.

The special object of the society beside the personal sanctification of its members is to propagate the Christian faith chiefly by teaching and preaching. Their teaching is restricted mainly to the higher studies, and includes litera¬

ture, mathematics, science, philosophy, theology and the cognate branches. Their preaching ad¬

dresses itself to all classes, but, by predilection, and at stated periods in a Jesuit's life, by ex¬

press injunction, it concerns itself with cate¬

chizing the ignorant and instructing the inmates of hospitals and penal institutions, while it ad¬

dresses itself also to more cultured and spiritual audiences. One

special and characteristic feature of its ministry is known as the "Spirit-

ual Exercises® or "Retreats® which it may be regarded as having introduced, or revived in the modern church, and are now a universal ascetic practice with the clergy and religious communities as well as with a considerable number of the laity. A "Retreat® is a with¬

drawal from worldly occupations for a more or less protracted period in order to scrutinize the state of the soul and to take means to amend one's life, or to strive for higher Christian per¬

fection. The method of these "Exercises® is laid down in a small manual written by the founder of the society. The book itself, which is at first sight fragmentary, and only sugges¬

tive in its character, is not easily understood or explained except by those who are trained to interpret it.

The society was founded by Ignatius Loyola, a Spanish nobleman, who after being disabled in fighting for his country, betook himself to the solitude of a cave near the little town of Manresa, Spain, where he passed some months in prayer and severe bodily austerities. Later, desirous of working more effectively for the salvation of his fellow men, he determined to become a priest, and for that purpose studied in the universities of Alcala and Salamanca, and finally in- Paris, where he gathered about him six companions, among whom were Francis Xavier, the future Apostle of Japan, Peter Faber, whom, with Ignatius and Xavier, the Church was to honor subsequently as a saint, and also Salmeron and Laynez, who were con¬

spicuous luminaries at the Council of Trent which' was then about to be convened against the doctrines of Luther, Calvin and others who had just then arisen.

On 15 Aug. 1534 these seven men organized themselves into a society and pronounced their vows in the crypt of a little chapel in what is now Rue Antoinette, a short distance below the crest of the hill of Montmartre in Paris. It was only six years afterward that Pope Paul III gave them and the others who had joined them meantime his solemn approval.

The peculiarities of their organization were the occasion of much antagonism at the very outset on the part of some of the most eminent men of the Catholic Church. The Inquisition strongly suspected its purposes and doctrines.

The name of the “Society of Jesus® was objec¬

tionable to Pope Sixtus V. Unlike other orders they were to be dispensed from reciting the divine office in common, and were to wear no distinctive habit. The length of probation and the general structure of the society were un¬

usual. The members were first the professed who were relatively few. In them the govern¬

ing power resided, and they were distinguished by a special vow of obedience to the Pope.

Then came the spiritual coadjutors, or priests, who did not take the special vow of obedience to the Pope. Preparing for either category were the students or scholastics, and lastly there were lay brothers who were to devote themselves to domestic duties. Those who ap¬

plied for admission were to pass two years of noviceship, and not one as in other religious orders, and were then admitted to what are called simple vows which could be easily dis¬

pensed with by proper authority if the subject were subsequently found unfit. Following the noviceship, two years were given to a review of the classical studies ; then came three years of philosophy, mathematics and the physical sciences; five years of college teaching and four years of theology, to end only with another year of seclusion and prayer, after which the can¬

didate was permitted to take the solemn vows which bound him irrevocably to the order as a spiritual coadjutor or professed. The proba¬

tion of the lay brothers was protracted to 10

years. The Jesuit renounces by vow all ecclesi¬

astical dignities, and accepts them only in un¬

usual circumstances and by express command of the Pope, under pain of sin in case of re¬

fusal. As the establishment of the Society of Jesus coincided with the Protestant Reforma¬

tion the efforts of the first Jesuits were nat¬

urally directed to combat that movement.

Under the guidance of Canisius so much suc¬

cess attended their work in Germany and other northern nations, that, according to Macaulay, Protestantism was effectually checked. In Eng¬

land where Elizabeth had inaugurated a move¬

ment against her Catholic subjects, and previous to that under Henry VIII the Jesuits stopped at no danger to . go to the rescue of their brethren in the faith; and what they did there was repeated in other parts of the world. “In spite of oceans and deserts, of hunger and pestilence, of spies and penal laws, of dungeons and racks, of gibbets and quartering blocks, the Jesuits were to be found under every dis¬

guise, in every, country; scholars, physicians, merchants, servingmen, in the hostile court of Sweden, in the old manor houses of Cheshire, among the hovels of Connaught arguing, in¬

structing, consoling, animating the courage of the timid, holding up the crucifix before the eyes of the dying.®

Such is the testimony of Macaulay, a Prot¬

estant historian. Though many died as martyrs on the scaffolds and in the prisons of England and elsewhere, yet their skill in evading detec¬

tion as well as their courage in living in the midst of their enemies and their great suc¬

cess in winning converts well explain the hatred with which they were regarded in Protestant 36

countries from the beginning, while it gives us the historical origin of the tradition of cunning and deceit which has always been associated with the name of Jesuit.

Under James I they were accused of com¬

plicity in an alleged attempt to blow up both houses of Parliament, and though clearly proven to be innocent of the charge, Father Garnet, who was said to have been cognizant of the plot, was executed, and the accusation is still believed. Guy Fawkes’ Day commemorates the

event and perpetuates the calumny. It is probably in connection with this occurrence that the supposed Jesuit doctrine of ((the end justifying the means® was first accredited to them and the accusation made that ((it was their office,® as Macaulay assures his readers, ((to plot against the thrones and lives of apostate kings, to spread evil rumors, to raise tumults, to inflame civil wars and to arm the hands of the assassin.® The first one who is accused of formulating the doctrine of the end justifying the means is Father Wagemann of Innsbruck 1762. Even the murders of Henry III and Henry IV of France were ascribed to them, and under Charles II of England six Jesuits were accused by Titus Oates of conspiracy and put to death. These and other charges have been repeatedly disproved, yet writers of ro¬

mance, and even writers of history, never fail to find readers credulous enough to accept them as true.

While the Jesuits were propagating the faith in Europe they were sending missionaries to every part of the world to preach the Gospel to heathen nations. Greatest of all these apostles was Saint Francis Xavier whom all Protestant writers unite in glorifying and whom the pagans almost worshipped as a deity. His name is still mentioned with enthusiasm among the pagans in Japan and the Occident. The conversions which he effected and the miracles he wrought almost defy belief. It is a testi¬

mony to the solidity of his teaching that al¬

though Catholicity was apparently obliterated in Japan by a series of bloody persecutions, the French missionaries who entered the country in 1860 found 30,000 Japanese Christians there.

In spite of the absence, of priests, the doctrines and practices received from Francis Xavier which meant death to profess openly had been handed down from father to son for a period of nearly 300 years. One blot on the reputation of the society in this field was the shameful apostasy of one of their superiors; but he atoned for his sin by a subsequent martyrdom.

In America the French Jesuits undertook the task of evangelizing the Indians, and at one time had 3,000 civilized and christianized Hurons under their control. In what is now New York, Father Jogues was cruelly tortured and slain on the banks of the Mohawk in 1646.

In 1649 Gamier, Daniel and others were shot to death; and at the same time De Brebeuf and Lallemant were burned at the stake while

their flesh was slashed with knives and their hearts cut out and eaten by the Indians of Lake Su¬

perior. Others died from want and exposure.

It was Jogues who discovered Lake George to which he gave the name of Lac du Saint Sacre-

ment. Later on Le Moyne came upon the salt springs near Syracuse. Marquette discovered the Mississippi which he named the River of the Immaculate Conception. He explored it as far as the mouth of the Arkansas, and return¬

ing home was the first white man with his companions to travel over the territory of what is now the city of Chicago. Wisconsin has erected a statute to his honor. Other Jesuits reached the Pacific coast and established the missions of California which they handed over to the famous Franciscan Junipero Serra when the society was suppressed. English Jesuits had come over with Lord Baltimore; and before that five Spanish members of the order had been slain by the Indians on the banks of the Rappa¬

hannock. The (

sions have been recently published by an Amer¬

ican publishing house and form 72 volumes of missionary and scientific information which the Atlantic Monthly considers the most precious material that could be desired for the history of this country. Similar records have been kept by the Jesuits of other nationalities. Mar¬

quette's diary and maps of the discovery of the Mississippi decided _ the controversy between France and England about the possession of the western territory.

The missions of South America conducted by the Spanish and Portuguese Jesuits were re¬

markable in their character and extent. Father Anchieta, a native of Brazil, was particularly distinguished for his missionary success as well as his gift of miraculous powers. Peter Claver devoted himself to the thousands of negro slaves who were brought to the port of Carta¬

gena. Other Jesuits traveled through Chile and Peru. Seventy of them on their way thither vvere said to be killed by Calvinists who inter¬

cepted them at sea. But their most famous work was what are known as the < Reductions >

or Christian Commonwealths of Paraguay. The description of these missions forms one of the most, brilliant chapters of Chateaubriand's (Genie du Christianisme* ; but a recent work entitled (A Vanished Arcadia* by Cunningham-

Graham gives a more reliable and scholarly ac¬

count of what was accomplished there. Vol¬

taire says: <(When in 1768 the missions of Paraguay left the hands of the Jesuits, they had arrived at perhaps, the highest degree of civilization to which it is possible to conduct a young people.®

. «For nearly 200 years they controlled a dis-

tuct as large as France,® writes Cunningham-

Graham, «where they had established 32 towns in which there were 160,000 Indians whom they had converted and civilized, teaching them agri¬

culture, the mechanical arts, commerce and even forming among them a small army of defense.

The annual income of the country was about 1,000,000 reales. The missionaries were finally expelled by Charles III, and the country fell back into its primitive condition of a tangled wilderness.®

The reasons of their expulsions were first iˆi jealousy of the Spaniards at being ex¬

cluded from the territory, secondly the anger of the colonists at being prevented from en¬

slaving the Indians, and thirdly the ungrounded suspicion that, there were gold mines in the missions.. An impression in the royal mind that the Jesuits had reflected on the circumstances of his birth made him an easy instrument in the hands of the enemies of the society Curious as it may appear,® writes Cunningham-

Graham, ((the bitterest opponents of the Jesuits were Catholics, and Protestants have often been their apologists. Buifon, Raynal and Mon¬

tesquieu with V oltaire, Robertson and Southey have written favorably of the internal govern¬

ment of the mission and the effect it produced.

When the Spanish general was sent to dis¬

possess them, he set about it with more prepara¬

tion than Cortes or Pizarro made for the con¬

quest of Mexico or Peru. But there was no resistance, and all the wealth the fathers had was the poor clothes on their backs.® The destruction of these missions was probably a part of the prearranged plan for the annihila¬

tion of the whole society.

The missions of Japan which Francis Xavier had inaugurated continued after his death in spite of the fierce persecutions in which many Jesuits perished. He had been unable to reach China and died on a lonely island off the coast.

Ricci, Verbiest, Schall and others carried out his project and became the advisers of the emperor as well as his astronomers, mathe¬

maticians and mechanicians. The great bronze astronomical instruments carried off by Ger¬

many on the occasion of the invasion of that country by the allied powers of Europe were the work of the Jesuits of the 17th cen¬

tury. As soon as the mission was started, great numbers of Jesuits came from Europe, half of them generally dying on the passage. In 1661

they possessed 151 churches and 38 residences there, and had written as many as 131 works on religion, 103 on mathematics and 55 on physical and moral sciences.

Numberless other missions were established elsewhere; de Nobili for instance lived like a Brahman in India to reach that particular caste, and was almost suspected of apostasy for doing so. He is said to have made 100,000 converts.

Jesuits overran the whole Indian peninsula and crossed the Himalayas into Tibet. Africa had long before been penetrated, and one of the first members of the society was Patriarch of Ethi¬

opia. The present explorers of the Dark Con¬

tinent find remnants of former missions far in the interior. They had gone from Mexico to the Philippines in the earliest days ; they had entered Tartary and Lebanon, and when their own efforts were thwarted they induced others to take their places. Thus De Rhodes, a Jesuit expelled from Japan, founded the Society des Missions Etrangeres, a body of secular priests who have given a great number of saints and martyrs to the Catholic Church.

While the Jesuits were engaged in mission¬

ary work among the uncivilized peoples of the world they erected splendid churches all over Europe, and furnished such orators to the pul¬

pit as Bourdaloue in France, Vieyra in Portu¬

gal and Segneri in Italy. The (Book of Spirit¬

ual Exercises, > according to Saint Francis de Sales, ((has converted as many souls as it has letters.® But their apostolic work was not re¬

stricted to preaching, and we hear of a single French Jesuit who during his 40 years of min¬

istry had established as many as 146 hospitals for the poor. They founded orphan and Mag¬

dalen asylums. They were the confessors of kings and princes and delegates of the Holy See, but they extricated themselves from these honorable charges as soon as it was possible to do so. At the time of the suppression they controlled and directed the majority of the ecclesiastical seminaries of Europe.

The success of the society in the work of education forms a great chapter in its history.

Their method is found in what is known as the (Ratio StudiorunP or Plan of Studies. It is a complete system of pedagogy and covers the whole field from the lowest class of grammar up to philosophy and theology. The plan was first conceived by Ignatius himself, and subse¬

quently elaborated by one of his successors, Claudius Aquaviva. Compayre, one of the chief pedagogists of the present time, denounces it as a mere system of memorizing. Bacon says of it: ((Never has anything more perfect been invented.® Their colleges at one time covered all Europe, and in the single school of Louis le Grand they had as many as 3,000 students.

Kings assisted at its public academic exercises.

Among their scholars they can claim some of the greatest men of modern times, as for in¬

stance Popes Gregory XIII, Benedict XIV, Pius VII, Saint Francis de Sales, Bossuet, Fleury, Flechier, Montesquieu, Malesherbes, Tasso, Galileo, Corneille, Descartes, Moliere, Mezzofanti, Muratori, Buffon, Cresset, Canova, Tilly, Wallenstein, Conde, the Emperors Maxi¬

milian, Ferdinand and others. Even Voltaire was one of their pupils. The disturbed condi¬

tions of modern times prevent a similar brilliant showing, but many of the most distinguished Catholic churchmen of to-day have studied in their schools, and notably Leo XIII who was trained by them from his college classes to the end of his theological course.

Within their own ranks they have furnished great scholars in all branches of philosophy, theology, history, philology, literature and science. It is sufficient to name such men as Suarez, De Lugo, Bellarmine, Toletus, Lessius, a Lapide, and to note that the treatises of Jesuit writers form the textbooks in all the theological seminaries of the Catholic Church to-day. They have written in almost every lan¬

guage and on every conceivable subject, and the mere catalogue of their writers, though not yet complete, already fills more than seven large quarto volumes. Their missionary enter¬

prises were never disjoined from scientific in¬

vestigation.

Their history is marked by ceaseless activity in launching new schemes for the spread of the Catholic faith, and by absolute fearlessness in opposing error regardless of any consequences to themselves. These two characteristics may explain why even by some Catholics they are regarded as a disturbing element in the Church.

One of their most noted disputes with church¬

men was with the Dominicans on grace, during which the Jesuit doctrine of grace was formu¬

lated. The contest lasted for nine years, and although great theological learning was adduced on both sides a truce was imposed by the Pope without any decision being arrived at. Of far greater consequence was their war with the Jansenists. It was chiefly on this occasion that the society was accused of laxity in their moral code and that their great antagonist Pascal won fame by his (Lettres Provinciales > which like the famous (Monita Secreta) of former times purported to be the private instruction of supe¬

riors to members of the order. After this con¬

test their expulsion from France was an easy 40

task, as the Jansenists wielded great political influence and were backed by the irreligious element which was growing rapidly there.

They have been expelled over and over again from almost every Catholic country in Europe, always, however, coming back again to renew their work when the storm had subsided; and this fact has been adduced as a proof that there is something iniquitous in the very nature of the organization. Worse still in 1773 the entire order was suppressed by a brief of Pope Clement XIV and all their goods confiscated They then numbered 24,000 members and had establishments in all parts of the world and flourishing missions, all of which were immedi¬

ately destroyed, but not one Jesuit uttered a word of complaint or protest. What is remark¬

able is that while Catholic Popes expelled them they were protected by the schismatic Catherine of Russia, and the Protestant Frederick of Prussia, the friend of Voltaire. This very pro¬

tection was urged as a reproach against them and as a proof of their guilt.

With the exception of the disastrous finan¬

cial speculation of Lavalette, which was the sin of an individual and

not imputable to the entire society, as commercial transactions were abso¬

lutely prohibited by the statutes, the society is proved to be guiltless both in its partial sup¬

pressions and in its total abolition. This is clear from the very brief of Clement XIV

which dealt the blow. In that document all the charges are enumerated, but not one is pro¬

nounced to be true. The society was suppressed as a political necessity and for nothing else.

The encyclopaedists of France regarded it as their most redoubtable opponent and had vowed its destruction. “Destroy the Jesuits,® said Vol-

taire, (ˆand we shall make an end of the beastry Church. In this work the Bourbon kings had to be enlisted. Madame de Pompadour, the king’s mistress, whom the Jesuits had refused to absolve, influenced Louis XV ; the Spanish and Portuguese ministers wrought on the fears of their sovereigns by forged documents con¬

taining threats and plans of assassination, and when all was ready the monarchs gave the Pope a choice of suppression of the society or schism The Pope yielded, and is said by Pius VI and Pius VII to have lost his mind in consequence.

I he vindication of the society came immedi¬

ately. The very Pope who suppressed them approved of their corporate existence in Russia Pius VI who succeeded him in the following year readmitted them into Italy, and Pius VII on the fall of Napoleon re-established the so¬

ciety in all its integrity on 7 Aug. 1814..

. Since its rehabilitation the society has con¬

tinued to increase in spite of constantly in¬

creasing difficulties. In the beginning of 1916

it counted 17,008 members, of whom 8,448 were priests, and 4,413 scholastics in preparation for the priesthood. The general of the

society is Uledimir Ledochowski, who was elected' 11

Frebim?15u In the United States the beginning of m7 there were 2,626 Jesuits, with colleges and churches in the principal cities and with flourishing missions among the Indians of the Rocky Mountains and Alaska. In Cuba and the Philippines their schools have achieved remark¬

able success, and the great meteorological observ¬

atories of Havana and Manila were established and are at present controlled by them. The chief houses for studies for the American mem¬

bers of the order are at Woodstock, Md., Saint Louis, Mo., and Montreal, P. Q.

In some countries of Europe the same hos¬

tility still pursues them. In the revolutions of 1830 and 1848 their houses were closed and the members driven out of the country. In the Kulturkampf inaugurated by Bismarck they were the first victims, and all the efforts of the Centre party have hitherto failed to secure their re-entrance into Germany. Similarly they were the first to be struck in the present religious persecution in France. On the other hand they have been the recipients of countless marks of esteem and affection on the part of Leo XIII, and he placed the stamp of his approval on the society by adding many new names to its already long list of canonized saints and martyrs.

Bibliography.— De Ravignan, (De l'Exist-

ence et de 1 Institut des Jesuites> (1844) ; Foley, Records of the English Province of the So¬

ciety of Jesus> (5 vols., 1875); Huber, (Der Jesuten Orden) (1873) ; Genelli, (Life of Saint Ignatius V Maynard, (Jesuits, their Studies and Teachings) _ (i855) ; Michelet, 'The Jesuits'

/ioc4\ Nicolini, (History of the Tesuits) YArPrlandlm' Historia Societatis Jesu

040-1625'; Parkman, 'Jesuits fn North Amer-

ica (1868); Suarez, 'De Religione Societatis JesiP (1634); Thompson, 'Footprints of the Jesuits); Thwaites, 'Jesuit Relations> (73

vols.) ; Weld, ‘Suppression of the Society of Jesus > (1877). J

T. J. Campbell, S.J.

JESUP Morris Ketchum, American

banker, b. Westport, Conn., 21 June 1830; d.

New York city, 22 Jan. 1908. He was engaged in banking in New York 1852-84, but retired ±rom business in the latter year. In 1881 he became president of the New York City Mis¬

sion and Tract Society, for which he subse¬

quently erecte.d the DeWitt Memorial Church in Kmngton Street, in memory of Rev T De-

Witt, his father-in-law. He was made presi-

fo7o °f the Plve ,Points House of Industry in 1872; was a founder of the Young Men’s Chris-

1077 Association, which he was president in 18/2. He was also president of the Metro¬

politan Museum of Natural History in 1881

?sodo °ion7he York Chamber of Commerce 1899-1907. To the Metropolitan Museum of rt he &4ye a collection of native woods valued at $100,000; to the Woman’s Hospital in New York city, $100,000; and to Yale Uni¬

versity and Williams College, also large sums.

He endowed the Jesup North Pacific Expedi¬

tion (q.v.), and gave liberal sums as well as much time and thought to the establishment of schools for the colored population of the South In 190s he received the order of knighthood from the Czar of Russia for his philanthropic work Consult Brown, W. A., ‘Morris Ketchum Jesup) (New York 1910).

TTr»xiSUmu NORTH PACIFIC EXPEDI-

11 I he, an American organization for archaeological research, supported by Morris K.

Jesup (q.v.), and conducted under the aus-

PcCe\T *nd .direction of the American Museum . tV at*l1ira!- History. The work began in 1897

in British Columbia. > In that year Prof. Harlan 1. Smith began to dig in the Thompson River district. In successive years he worked a little

farther east, and also around Puget Sound, and down the west coast of Washington. Re¬

sults of these explorations have been compared and conclusions drawn as to the class of people who inhabited these regions in prehistoric times.

Very interesting differences were found among them. Some were more highly developed than others. In particular, one small section east of the city of Vancouver was found to reveal traces of a people much more highlv developed than any others of the section, and interesting in many ways to the archaeologist. Some of the regions explored revealed the remains of coast tribes; others of interior tribes. At some P°i-1irS tˆiese characteristics merged, producing a different type. New discoveries of one season explained things not understood in previous ex-

plorations. So to gather up missing links and further elucidate the whole region, especially that interesting little neople near Vancouver, it was necessary to take up some new territory and thoroughly explore it. Professor Smith therefore, went into the Yakima Valley in northern Washington in 1903. On the map this section does not look far from the Thompson River district in British Columbia. And when one reflects how very similar are the white people now inhabiting the two sections and how near the two districts are, it is interesting to hnd that the prehistoric peoples inhabiting them differed at least as much as the Spanish and the Germans, according to Professor Smith's conclusions. Not only their culture, but their skulls were different, as shown by the skeletons brought back by the expedition. These ancient tribes seemed to have lived, each in its little nook of coast or river valley, for unnumbered ages, never going to see what was on the other side of the mountain; developing each its own little morsel of civilization in its own little way, its life and culture and development modified by the little corner of the earth's surface in which it sat down, seemingly to stay forever Sometimes shell heaps are found miles in length, and with tree stumps six feet in dia¬

meter . standing on nine feet of these layers, of which each is only an inch or two in thick¬

ness. It took a good many generations of In¬

dians to pile up those successive layers with the shells from their shell-fish dinners. A stump of Douglas fir, oyer six feet in diameter, stood on a shell heap eight feet below the sur¬

face which contained human remains. The tree indicated an age for the top layers of more than 500 years. The material brought back in¬

cluded carved and sculptured pipes, stone mor¬

tars, pestles, and sinkers, bone implements used on spears, deer antlers used as handles, stone adzes differing from those found anywhere else, bone needles, shed ornaments, and the like!

The expedition also found many paintings and sculptures on rock walls, which were photo¬

graphed.

JESUS, SON pF SIRACH, mentioned in

the book of Ecclesiasticus (1, 7) as the author of that book. In the Septuagint Ecclesiasticus is called the “Wisdom of Jesus, Son of Sirach,®

or the “Wisdom of Sirach.® He was a native of Jerusalem, the son of Eleazer, and the book reveals its Palestinian origin. He was a scribe and G. Margoliouth argues (from li, 23) that he was “in the latter part of his life the head, and probably founder and sole teacher of an academy for the moral instruction of youth at Jerusalem.®

JESUS CHRIST, the founder of the Chris¬

tian religion. Four documents dating from the second half of the 1st century, the “Gospels,®

give some account of the life of Jesus, chiefly confined to his brief public work and death.

Beyond what they give little is known as to his history. Some of the most important facts are referred to in other writings of the New testament, especially in the letters of Paul; secular history contains mere references to him ; a number of later writings, the so-called

Apocryphal Gospels,® purport to give additional information, but they are fictitious and worth¬

less; and beyond a very few sayings which were probably rightly attributed to Jesus, called Agrapha,® tradition has preserved nothing of value which was not embodied in the Gospels.

These narratives vary, but are rarely inconsist¬

ent : usually they may best be regarded as com¬

plementary, and the picture of the life and work of Jesus which may be drawn from them has been accepted as trustworthy throughout Chris¬

tendom in all centuries, and while on many points confirmation from other sources cannot expected, the investigations of impartial scholars have rather confirmed its accuracy than invalidated it.

Birth and Parentage. — According to the Gospels, Jesus was born in the family of a car¬

penter, named Joseph, living in Nazareth (q.v.), a small town in southern Galilee. Descent from the line of kings of Judah which began with David is positively claimed for Joseph, and, as some understand the genealogical tables, for Mary, his wife, as well, but during the centuries of national disaster the descendants of David seem to have sunk into poverty and inconspicu¬

ousness. While Nazareth was the family home, the birthplace of Jesus was Bethlehem (q.v.), the village of Judea in which David himself was born, a fact which is explained by mention of a census said to have been made under Ro¬

man authority while Quirinius was Roman rep-

resentative in Judea, and to have required that all citizens should be enrolled at the original home of the family. Though no other record of this enrollment has yet been discovered, late discoveries make the fact seem more plausible was formerly regarded by some scholars.

Jhe Gospels represent Jesus as born of a virgin, conception having been due to special divine power. The date of his birth cannot be given with certainty as to day, month or even year. Since it must have somewhat pre¬

ceded the death of Herod (April 4 b.c.), it probably occurred sometime in the year 5 b.c.

(possibly 6). It is reported that Mary, in a village strange to her, and at the time over¬

crowded with visitors, could find no place to lay her new born babe but in a manger. But at the presentation in the Temple for the offer¬

ing of the sacrifices which Jewish ritual pre¬

scribed after child-birth, the infant was joy¬

ously hailed by Simeon and Anna, aged saints profoundly possessed by the common Messianic expectation of the nation at that time, and, as shepherds from not far away had come in the night of his birth in obedience to a vision of angels, so, later, the Magi (q.v.) from afar guided by a star sought the child to offer him obeisance and rich gifts. This visit of the 42

Magi, however, made Herod aware of the birth of a child who might grow up to be a dan¬

gerous rival of the dynasty which he hoped to found, and it is handed down to us that unable to trace it he ordered the slaughter of all the infants of the village up to the age of two years. But his parents, divinely, warned, had taken the child to a safe refuge in Egypt, where they remained till the death of Herod, presumably only a short time. If they returned in the expectation of bringing him up in the ancient home of his line, they were deterred by fear of Archelaus who had succeeded his father as ruler in Judea, and consequently they turned aside to Nazareth where they were secure under the milder rule of Antipas.

Early Manhood — Of the life of Jesus up to manhood nothing is known, except the mere mention of his visit to Jerusalem when 12 years old. It can be supposed only that He was sub¬

jected to the natural influences of a religious Jewish family of the time, of synagogue and of school, of a village at once quiet and yet close to the thronging traffic on one of the great thoroughfares of that age, and finally of the work of a carpenter, for such he is said to have been, till 30 years of age. It was about this time, possibly in the year 26 (or 27) that John the Baptist (q.v.) began his public career, and at

once aroused great religious and patriotic fervor in the nation.

The careers of neither John nor Jesus are intelligible without an understanding of the ex¬

pectant attitude of the Jewish people in the first century. The ancient prophets of the nation had centuries earlier foretold a renaissance of the Hebrew kingdom under a descendant of David, through the generations this hope smoul¬

dered in the hearts of the people, only fanned to a brighter flame by blasts of persecution and national disaster, and the whole influence of the sect of the Pharisees (q.v.), popular and powerful out of proportion to their numbers, increased its intensity under Herod and his suc¬

cessors. The people were ready to be fired by the proclamation so strikingly made by the gaunt desert-dweller that the fulfilment of the national hopes and dreams was near: ((The kingdom of heaven is at hand.® The preaching of John was, however, no less moral and reli¬

gious than patriotic. His message was (

pent® ; let the nation prepare by penitence to meet the king coming in his kingdom. This prophetic voice set the country in a blaze.

Throngs gathered to listen to the new preaching and by a striking symbol, a plunge in the rush¬

ing Jordan, to pledge themselves to the new movement. After a time Jesus joined the crowds which attended the ministry of John.

It is impossible to say what connection may have existed between John and Jesus. Not only were their families related, but there may have been constant intimacy. John, however, based his later testimony as to Jesus, not at all on his own knowledge of him, but entirely on the divine revelation which was his commission.

Jesus offered himself for baptism, insisting that the reluctant preacher should perform the rite, and thus pledged himself to the Coming King¬

dom. While it is not claimed that the wonders which attended the baptism were known to others than John and Jesus himself, the story of the Gospels is that a heavenly voice asserted the Messiahship of Jesus, and that with the appearance of a dove the Divine Spirit came

to him. The conviction of his mission to his na¬

tion and the world was no new thought to the carpenter of Nazareth, and it was with this thought in mind that he recognized the signifi¬

cance of the Baptist's public appearance, joined his auditors, and submitted to the ordinance which he administered. Yet it is not surprising, on the other hand, that he felt constrained, when his own conviction was confirmed, to seek the desert of Judea that alone he might adjust himself to the new responsibilities and burdens of the mission which he must undertake. Amid the solitude of the barren rocks and gloomy caves of that desolate region he meditated and struggled. Of this period we know only the striking story, necessarily autobiographic in origin, in which he depicts the struggles which he underwent as due to Satan's influence.

Temptations thus forced in upon him to selfish use of his power, to sensational fanaticism and to compromise with evil in order to advance his ends, were successively resisted, and at the end of 40 days he came forth the victor in all these spiritual conflicts, ready to enter actively on his ministry.

The Ministry. — Jesus returned to the Jor¬

dan where John was still at work, and aided by his testimony, associated with himself a little group who instinctively recognized in him a future leader of the nation. He went from there first to his home district, where he and his companions were guests at a wedding at Cana, a little town which has been hallowed in all the Christian centuries by John's report of the changing of the water into the wine needed for the entertainment of the company in the prolonged merrymaking incident to such an occasion. Then, as it was near the Pass-

over time, Jesus, accompanied by his mother and brothers as well as his few followers, after staying a short time at Capernaum, went on to Jerusalem. How long he remained in or near the capital city must continue a matter of inference from a few doubtful phrases, but it seems most probable that he remained in Judea for some months, perhaps from April to December. The chief events ascribed to this period are the first cleansing of the Temple and the night interview with the influential rabbi, Nicodemus, and while the effect on city or nation was not great, it was presumably at this time that Jesus formed the strong friend¬

ships in Judea, to which incidental reference is often made afterward. The closing of this portion of his ministry seems to have been due on the one side to the hostile jealousy of the dominant Pharisees which would hinder success in Judea, and, on- the other, to the im¬

prisonment of John the Baptist which made it possible for Jesus to work in Galilee without what might have seemed competition, and, in¬

deed, made it advisable for him to take up the work which John had been obliged to drop.

On his return to Galilee Jesus soon recalled his disciples, who, if they had accompanied him throughout his work in Judea, had scattered for a time to their homes, and associated him¬

self with them in a companionship which was thereafter unbroken till his death. He made Capernaum the central point of his ministry, returning thither from each of his repeated tours throughout the many scores of cities and villages which then existed in Galilee, Wher-

ever he went the keynote of his preaching was the same as John's had been, (} ; but as time passed his instructions, exhortations and warn¬

ings swept throughout the whole scale of human experience and touched every note of religious nrui moral truth. The keynote of his teaching about God was his love, infinite, untiring, eter¬

nal. On the ground of this love he proclaimed pardon to every penitent, even though a harlot or an outlaw. But this certainty and freeness of forgiveness was not allowed to diminish the loftiness and imperativeness of the standard of duty which he held up. Indeed, the high moral tone of his teaching, accompanied as it was by a constant and insistent demand for absolute sincerity, and his disregard for all mere forms, without the spirit in particular, his teachings and practice in reference to fast¬

ing, ceremonial purifications and Sabbath keep¬

ing, combined to set against him the Pharisees and through their influence the leaders and of¬

ficials of the nation.

Popularity.— For a long time his popularity was great and throngs gathered to see and hear him, attracted in part by the reports of his miracles. Far and wide the stories were told that diseases yielded to his command, that the fevered, the palsied, the blind', the deaf and dumb, the lepers, the demonized, were restored to soundness, and, later that on repeated occa¬

sions he brought the dead to life. But these great works were distinctly secondary. He was first and foremost the Prophet of Nazareth, the Preacher. As such he spoke with peculiar attractiveness and power. His style was simple and direct, and his discourse was frequently adorned with unequaled parables, illustrations drawn from nature or common life, which, though sometimes, veiling the truth from the thoughtless, sometimes added immensely to its clearness and effectiveness. His activity as a preacher at first won him steadily increasing popularity among the people at large, until, about two years after his work began, 5,000

men, whose hunger had been satisfied by his power on the lakeside, determined to make him king. But in this purpose they lacked all real sympathy with the character and aims which Jesus exemplified. The kingdom winch cen¬

turies before the prophets of the nation had foretold was a kingdom to be sure, but a king¬

dom which should be based on a right rela¬

tion of its subjects to God and existing only to serve the divine ends. The Jews as they read these prophecies had seen in them, only something political, worldly and selfish. Now when Jesus in fulfilment of prophecy had come to offer himself to the nation as its promised king, he would be king only as his kingdom might be the expression and instrument of a religious people, deeply, purely, unselfishly reli¬

gious. So. at the very climax of popular favor his clear vision instantly recognized how widely their ideals and purposes differed from his.

The Twelve Apostles. — For some time this condition of affairs had been anticipated, and Jesus had laid his plans and shaped his work accordingly. Since the Jewish people would have no such kingdom as he was about to establish, he had several months previously or¬

ganized under the name of apostles a group of 12 of his disciples, to

whom he would impart himself, and on whom he would so far as pos¬

sible stamp himself, that they in turn might repeat his activity in their relations to others.

Although he retained the name kingdom, what he looked forward to establishing was not a political but a spiritual community or body.

After the choice of the apostles the dis¬

courses of Jesus had been largely shaped for their special benefit; after his rejection of the offer, of kingship from the unappreciative multitude, who in turn instantly deserted him when they saw that he would refuse to gratify then* selfish hopes, his work was mainly for the benefit of the twelve, although he neglected no opportunity which came within his reach of trying to touch the soul of the nation or of individuals. Much of the last year of his life Jesus spent in seclusion. He made a journey, doubtless traveling in leisurely fashion, north¬

west from Capernaum to Sidon, returning as it appears by a roundabout route through the Decapolis, and . another journey northeast to Caesarea Philippi; some time was spent in Perea to the east of the Jordan; and though he seems more than, once to have shown himself con¬

spicuously in Jerusalem or its immediate neigh¬

borhood, yet during most of the time which he spent in Judea he secluded himself in an ob¬

scure village named Ephriam.

So far as the work of Jesus was concerned, the most significant event of the last year, if not of all the. three, years of his ministry, was the conversation with the apostles near Caesarea Philippi as to the opinion of him which gener¬

ally prevailed and as to their own convictions.

While Jesus is reported at least once to have claimed to be the expected Messiah, and while this claim, was necessarily implied in much that he had said of himself, and while some of the twelve had very early expressed the opinion that they had found the one of whom Moses and the prophets had spoken, yet this view had never found expression as their matured conviction. Such expression Jesus at last sought. His first question was as to the com¬

mon sentiment concerning him, and the frank answer was that while he was generally recog¬

nized as one far beyond the ordinary, he was not at all recognized as the Promised One.

In face of this answer Jesus pressed the further question, <(What am I to you?):> and the answer of Peter, one speaking for all, was that he was the Christ. This answer assured the ultimate success of his mission, for these followers would win more. But he could not fail at the same time to foresee the irrepressible conflict between himself and the leaders of the nation, and. so, relying on their faith in him as the Christ, he immediately began to familiarize them with the fact of his death, though this only confused and offended them, and at the same time to add promises of resurrection which they do not seem to have grasped at all.

The apparent failure of the. mission of Jesus which he. thus foretold, culminating as it did in his rejection and1 death, was due alike to what he was, what he taught and what he demanded. He himself was devoted with ab¬

solute singlemindedness to his wont. sincere, unselfish, loving, beneficient, and pure with such perfect and manifest purity that only a few voices of detraction have ever been out of har¬

mony with the almost unanimous recognition and assertion of the sinlessness of his whole life.

His teaching, while not in all respects original 44

in matter or form, was in spirit and effective¬

ness such an advance on the Old Testament which he confirmed or the rabbis with whom he largely agreed that it seemed (

ing.® He demanded of others the same per¬

fection of sincerity, altruistic self-forgetfulness and supreme devotion to the will of God which he himself practised, and he as sternly de¬

nounced hypocrites as he tenderly welcomed penitents. All his teaching came with a unique tone of authority and this was made

more significant by the claims which he advanced for himself. He occasionally asserted and con¬

stantly implied that he was a special messen¬

ger from God and unique representative of Him, and from time to time he distinctly claimed divine attributes and powers. Thus he spoke ; to confirm this he pointed to his miracles; as such he held himself up as the proper object of supreme and absolutely limitless devotion ; the recognition of this supremacy he demanded of all and gladly accepted from his disciples, a self-assertion which in view of his sincerity and simplicity of soul is as significant as in view of his transparent honesty coupled with unsurpassed sensitiveness to evils is the absence of ever confessing a fault. Between such a one with such a message and such demands and the rulers of the nation at the time there was necessarily an irreconcilable antagonism which could end in no way but in his death.

The Messiah. — In the spring of the year 29 (possibly 30), after Jesus had been before the public for three years, the task of implant¬

ing the spiritual kingdom in the hearts of the select 12 was so far completed that it would be permanent, and at the same time the conflict with the authorities could not wisely be longer postponed. Accordingly Jesus went up to Jeru¬

salem to the Passove’r with the throngs which assembled at that time from every part of the country. While he gave repeated proofs that in spirit he was walking in the shadow of the cross which he foresaw at the end) of the road, yet this journey, unlike those which had pre¬

ceded it, was intentionally made, by the send¬

ing of 70 messengers before him to proclaim his coming, a significant progress through the country. Reaching the neighborhood of Jeru¬

salem, he stopped for the Sabbath at the neigh¬

boring village of Bethany, to which he returned each night till the end, and then on the fol¬

lowing day he made a somewhat formal entry into the capital city. It needed only that he should mount a riding ass that those who ac¬

companied him should be reminded of an an¬

cient prophecy, and they, with another throng which came out from Jerusalem to meet him, acclaimed him as the promised and coming king, carpeting the road before him with green branches from the trees at the roadside and with their own clothes thrown before him in the zeal of their loyalty. Thus they led him to the Temple, where the procession dispersed.

While informal and at first thought only a failure in its lack of definite result, this <(tri-

umphal entry® had deep significance as a public claim to his right to rule the nation as God's appointed representative, and he stopped short of assuming this office only because he desired and demanded first the acceptance of him by the nation. . During the days that followed he repeated this claim in various ways ; again he drove out of the Temple the huckstering crowds so out of harmony with its proper use, and in prolonged controversy with the representatives of all the parties of the time he bore himself as their Master and proved himself such. All this goaded his enemies at last to action, and through the treachery of Judas Iscariot, one of the inner circle of 12 disciples, almost at once an unlooked-for opportunity presented itself to them.

The Last Supper. — On Thursday evening of Passover week, after special precautions to keep secret the place of their assembling, Jesus sat down at a last supper with his apostles to what he knew would be his last interview with them before his death. While the traitor has gone out to secure his arrest, he pours out his soul to the others in words too tender and profound for their comprehension; he warns them that they will speedily desert him to go alone to his fate; he tells them something of the unique significance of his death in language which contains in germ the later doctrines of the Church, on this point ; presenting them bread and wine, he instituted the second of the two rites of the universal church and finally commends them and all future believers in him to God in a prayer of incomparable elevation and pathos. He then went out to a resort familiar to him and his friends, an olive grove named Gethsemane in a valley close to the walls of the city. There the horror of the coming hours, not craven fear of death, but distress at the very thought of the tremendous experi¬

ence which he must undergo in soul, drew from him a thrice repeated prayer of such intensity that the very blood was forced through the pores of the skin, but on the prayer fol¬

lowed serenity of resignation and purpose which continued unruffled to the end. Then he awak¬

ened his disciples who to his disappointment had repeatedly been overcome by- sleep and so had left him to his spiritual distress without even the sympathy of his friends, and went to meet the force of Roman soldiers and Temple guards which in needless precaution the officials guided by the traitor brought to seize him. He quietly submitted to arrest, and his followers struck but a single blow in his defense and then scattered in the darkness, two of them, however, John and Peter, followed at a distance, the latter only to deny later afl discipleship and even acquaintance.

Trial for Blasphemy.— While some details of the four accounts of the trials of Jesus are obscure, if not inconsistent, yet their general course may easily be made out. At the house of the high priest Caiaphas, or of the still more influential Annas, his father-in-law, and an ex-

high priest, there was before daylight an infor¬

mal session of all the Sanhedrin who could be gathered. . Unable to find even perjured testi¬

mony which was sufficiently consistent to war¬

rant his condemnation, the high priest as presi¬

dent of the great court of the nation put Jesus under oath and asked him if he claimed to be the Christ. Firmly and positively Jesus an¬

swered that he was, whereupon his enemies without even pretense of investigation declared this claim to be blasphemy for which according to Jewish law he must die. But this verdict would be legal only if rendered in the daytime, and so, having been left during the interval to be the object of mockery by the guards, as soon as the day broke, he was formally arraigned and JESUS CHRIST

condemned. As, however, the right to inflict the death penalty had been reserved to himself by the Roman procurator, -in order to accom¬

plish their purpose they must secure his con¬

demnation of Jesus in addition to their own, and accordingly the Sanhedrin conduct him to Pi¬

late and demand his execution. But Pilate re¬

fused to order his execution without investiga¬

tion, and when they charged him with instigat¬

ing sedition against the Roman government, the judge instantly recognized their malicious in¬

sincerity and the innocence of the prisoner. In his consequent desire to release him Pilate in turn pronounced him innocent ; sent him to Antipas, who only made sport of him and re¬

turned him ; vainly tried to stir up the populace to demand his release according to the custom that a prisoner should be released at Passover time ; ordered him scourged in hope that that cruelty would satisfy his enemies ; displayed him bloody from the torturing lash and crowned by the soldiers with thorns in cruel jest, fancy¬

ing that this sight would surely evoke pity; but finally, terrified at the mutterings of the crowd and fearing lest should he persevere charges might be made to the emperor against himself, Pilate ordered the crucifixion of Jesus.

The Crucifixion. — The execution took place at once, scarcely later than the middle of the forenoon. Although so far weakened by the sufferings of the night and morning that the sufferer fainted under the cross which, as was customary, was laid on him to bear to the place of execution, he bore himself throughout with majestic patience and dignity. Under the jeers of his triumphant enemies, in sight of his mother and friends, in the unexplained and portentious darkness which beginning at noon lasted for hours, amid the indescribable physical tortures of the cross, he spoke but to pray forgivingly for those who were the agents of his suffering, and to commend his mother to John, her nephew and his most intimate and beloved disciple. At mid-afternoon he uttered a cry to God, ((Why hast thou forsaken me?9 which can be under¬

stood only as expressive of intensest soul agony.

As if this agony culminated and ended with the cry, he then spoke calmly of his thirst and took the drink which a sympathetic bystander pressed to his lips, then commended his spirit to God, and with a loud shout expired, it would seem with a literally broken or ruptured heart. Al¬

though death seldom came so soon to the cruci¬

fied, yet the fact is undeniable in the case of Jesus, for when somewhat later the criminals who had been crucified with him received a blow intended to hasten their death, the soldiers rec¬

ognized that he was already dead, and yet one of them thrust a spear deep into his side, appar¬

ently touching the heart, and on Pilate's inquiry the officer in charge certified to his death. By leave of the governor two members of the San¬

hedrin, who were secretly disciples, took down the body and hurriedly but reverently buried it at the close of day not far from Calvary, where he had been crucified, in a rockhewn tomb, which later was officially sealed.

Of the facts relating to Jesus during the next few weeks, no less than five (if the last verses of Mark are by another hand, then six) separate accounts are preserved, no two pre¬

cisely agreeing, but, on the other hand no two being mutually contradictory, and one of these accounts, that of Paul, was written within 25

years of the events narrated. It is told that first women going at the dawn of Sunday en¬

tered the open tomb but found not the body of Jesus; that later Peter and John also found it empty; that Peter, then 10 of the apostles to¬

gether, and also two other men miles from Jerusalem, as well as Mary Magdalene, saw Jesus that same day in recognizable human form and talked with him ; that these appearances and conversations were repeated at different places and in varying circumstances for about six weeks ; that on one occasion he was seen by as many as jOO at the same time, some of whom were at first doubtful as to the facts; and that then these manifestations entirely ceased, except for the experience of Paul. It is certain that the disciples in these few weeks had come to be convinced that Jesus had actually been with them and that consequently they passed out of a state of gloom and despair into joyous and unflinching boldness; that the belief in the physical resurrection of Jesus was an essential part of the creed and preaching of the primitive Church ; and that the first day of the week be¬

came the Christian day of worship. No plausi¬

ble explanation of these facts, of the empty tomb ; of the reports and convictions of the disciples; who claimed to have seen and talked with Jesus in human form, especially of the case of Paul; of the revulsion of feeling on their part ; of the consequent foundation of the Christian Church and of the consecration of the first day of the week, has ever been given ex¬

cept that after his death Jesus, in this as in so much else unlike all other men, entered by res¬

urrection and later ascension upon a new course of life and a new course of activity. Without the resurrection as well as the life and death of Jesus historical Christianity could never have come into existence ; by it he became the founder of the Church and the dominating per¬

sonality of the ages.

Bibliography.— Andrews,

dent's Life of Christ5 ; Holtzmann, (Life of Jesus5 ; Keim, (History of Jesus of Nazara5 ; Pick, (The Extra-Canonical Life of Christ5 ; Renan, (Life of Jesus5 ; Rhees, (Life of Jesus of Nazareth5 ; Seeley, (Ecce Homo5 ; Smith, (The Founder of Christendom5 ; Stalker, (Life of Jesus Christ5 ; Strauss, Wife of Jesus Christ Critically Examined5 ; Weiss, Wife of Christ.5

Consult also later works by Hall, G. S., (Jesus: The Christ in the Light of Psychology5 (1916) ; Hurlbut, J. L., (Story of Jesus for Young and Old5 (1916) ; Husband, R. W., Wrosecution of Jesus: Its Date, History and Legality5 (1916) ; Rauscherbusch, W., (The Social Principles of Jesus5 (1916).

David Foster Estes,

Professor of New Testament Interpretation, Hamilton Theological Seminary, Colgate Uni¬

versity.

JESUS CHRIST, Logia of, the sayings of Christ, a title given to certain 1st century papyri, discovered in the course of excavations at Oxyrrhynchus carried on under the direction of Professors Grenfell and Hunt. The name 46

(Agrapha} is generally applied to these sayings.

See Agrapha.

JESUS COLLEGE, Cambridge, England,

founded by Alcock, bishop of Ely, in 1496. It has 16 foundation fellowships, open without re¬

striction to all the king's subjects. Five were of the original foundation and the others have been added by subsequent benefactors. Six of the fellows are required to be in orders. The mastership and one fellowship are in the abso¬

lute appointment of the bishop of Ely. To the other fellowships on a vacancy the master and fellows nominate two candidates, one of whom is elected by the bishop. There are numerous scholarships. The college in 1913-14 — the last date for which statistics are of any value —consisted of a master, 10 fellows, 34 scholars and 186 undergraduates. It was founded on the site of the Benedictine nunnery of Saint Radi-

gund, and its buildings, some of them dating from the 12th century, are of great interest.

JESUS COLLEGE, Oxford, England,

founded by Queen Elizabeth in 1571 on the pe¬

tition of Dr. Hugh Price, treasurer of Saint David's, Wales, who left lands for the main¬

tenance of a principal, eight fellows and eight scholars. It was intended to be the Welsh col¬

lege and a number'of the scholarships are (un¬

less in default of suitable candidates) re¬

stricted to natives of the orincipality. A fel¬

lowship founded by Charles I for natives of Guernsey and Jersey has been converted into two scholarships for natives of these islands or persons educated at Elizabeth College, Guernsey, or Victoria College, Jersey. This was the first college founded under the Protestant regime.

The college faculty now comprises a master, 12

fellows, 30 scholars and an average attendance of over 200 undergraduates.

JESUS ISLAND, Canada, an island in the Saint John River, not far from where it joins the Saint Lawrence River; area, about 1,200

square miles.

JET, a mineral, which is found in compact masses so hard and solid as to be susceptible of being turned on a lathe and manufactured into ornamental articles. It has been worked for centuries in Whitby, England. It is found in thin laminations, which subsequently thicken out to two or three inches in the upper lias strata in that neighborhood; a lower bed, from which the best quality is obtained, has a thick¬

ness of 20 feet and is known as jet rock. Jet is supposed to have been worked in England as far back as the time of the Romans. Jet rosa¬

ries and crosses were common in the Abbey of Whitb}" when it was a resort of pilgrims. The jet manufactures of Whitby fell away about the time of Queen Elizabeth and were revived in 1800. It is also manufactured at Scarborough, England.

JETSAM, jet'sam, merchandise lost at sea either through being thrown overboard in the act of ˆjettison® (q.v.), or through the sinking of the ship. The term differs from ˆflotsam,®

goods which float after being thrown overboard; and from ˆlignan,® when they are sunk but se¬

cured to a cork or buoy to permit future recov¬

ery. Goods lost in this way come under the law of ˆaverage® (q.v.) and their value may be recovered by the owner.

JETTJE, zh€'ta', Sir Louis Amable, Cana¬

dian editor, jurist and statesman: b. L'As-

somption, Province of Quebec, 15 Tan. 1836. He was educated at L'Assomption College and was called to the bar in 1857. He engaged in the practice of law at Montreal and also in journal¬

ism, becoming editor of L'Ordre, at Montreal.

He was elected to the House of Commons for Montreal (East) in

1872-78. He became pro¬

fessor of civil law in Laval University in 1878

and in that year was appointed judge of the Superior Court of Montreal. In 1898-1908 he was lieutenant-governor of Quebec, and in 1901

he was knighted. He was a member of the Alaskan Boundary Commission in 1903 and since 1909 he has been Chief Justice of the Court of King's Bench, Montreal. He served on the commission for the revision of the Civil Code of Quebec, and is a commander of the Legion of Honor of France. Author of Ob¬

servations relatives au code de procedure civil >

(1888).

JETTIES are dikes at the mouth of a river or across a harbor bar to increase the riverine or tidal current by narrowing the channel and thus scour out a deeper bed, to accommodate navigation. Single jetties are solely at the mouths of rivers with strong currents, to de¬

flect these to one side of its natural channel, but in most rivers and in all harbors they are dou¬

ble, forming an entire artificial channel. Briefly, the physical principles are: The power of water to transport solid matter varies as the square of its velocity, so that increasing the strength of current two-fifths will about dou¬

ble its sand-carrying capacity; the velocity in¬

creases with increase of slope and decrease of friction ; the slope is increased by narrowing the channel, since it forces flood waters inside or outside to rise higher at the entrance, and the friction decreases as the width of the channel; and lastly, if a channel of a given depth and width passes a given quantity of water, then a narrower channel involves either a permanently greater height of water if the bed were rigid, or the scouring of the bed to a depth which, multiplied by the new width, will produce an equal cross-section with the old. The increased slope and the correspondent velocity vanish as the water cuts a deeper basin ; but the velocity due to lessened friction does not, nor do the deepened channel, the greater discharge through it and the greater tidal fluctuation due to the larger basin. The channel is scoured along until the deepening sea establishes an equilibrium of

action.

The system is not new. A number of im¬

portant European rivers were jettied even be¬

fore the middle of the last century, and others not much later. The Danube at Stilina had been deepened to 21 feet, from 8 feet before; and in 1874 Eads found seven German rivers, includ¬

ing the Oder and Vistula, improved so that with initial channels of 4 to 7 feet, they then had 13

to 23.5. Several of these are still deeper now, the result increasing somewhat for many years under the same conditions. The Neva in Rus¬

sia has also such works ; as also the harbors of Calais and Dunkirk in France. In the United States a very great number have been con¬

structed, both for rivers and harbors ; the great¬

est of all are the jetties at the mouth of the JETTISON

s Mississippi, and as the general principles are alike in all, these may be briefly described.

The Mississippi discharges its waters to the gulf not by one channel, but in the main by three, running through “passes® 12 to 17 miles long trom the delta land to the sea and widely divergent. The largest is the Southwest Pass; next the easternmost, Pass a l’Outre, with two branches. In the middle is the smallest, South Pass, 600 to 800 feet wide, and taking not over a 10th the total discharge, with a shoal at its head only 15 feet deep, and a bar at its mouth only 8 feet; so that, with 30 feet of water through the delta, it was unserviceable for deep¬

water navigation. Capt. James B. Eads offered to build jetties to deepen the bar at Southwest Pass from its then 13 to 28 feet; but Congress preferred South Pass as cheaper and simpler, needing work only at the head and foot. Work was begun in June 1875 and within nine months the water was 13 feet on the bar; by 1879 it was 29 feet ; it is now over 30.

The west side of the pass had silted up into land 4,000 feet farther out

than the east, so that the west side of the two parallel dikes built out to 30 feet depth in the Gulf was about 7,800 feet, while the east was 11,800. First piles were driven in two rows 1,000 feet apart (the piles 12 feet apart) to mark the lines of the projected jetty-walls. Then mattresses were built, of wil¬

low branches, or young willows 15 feet long, cut with the leaves on, laid in four courses, each crosswise to the next and fastened together at top and bottom by pine planking 2ˆ4 inches thick, doweled with hickory pins ; this com¬

pressed the willows to a thickness of about 2

feet and their brush-ends projected 3 or 4 feet.

These mattresses were 100 feet long; for the bottom course they were made 50 feet wide, but steadily narrowed for each of the four courses at first needed to bring them to the surface of the water, the top one being 20 feet wide.

Wider ones were used in deep water. These were built on shore, on ways as for launching boats ; towed by tugs to the places indicated by the line of piles and sunk by loading one or two tons of stone on top. Once down, they speedily filled with sediment and became solid.

At the sea end foundations of mattresses 200 to 300 feet broad were laid. For two or three years these stone-laden mattresses gradually sunk in the soft bottom and new ones were added at the top to bring the surface even. The willows not imbedded in sediment were riveted with stone. Where exposed to storms, they were considerably sloped and more thoroughly riveted. The sea ends were afterward capped with concrete blocks. The jetties have under¬

gone considerable repairs since then, but have essentially done their work of making the river navigable for large vessels.

One of the difficulties was this : If obstacles were placed in the way of a free flow of water, the river would by so much at least desert this pass and run through the others ; so that their heads had to be closed up to a sufficient extent to prevent this. Plans for improving the South¬

west Pass in like manner were submitted by United States army engineers. Construction was begun toward the end of 1903 and com¬

pleted five years later at a cost of about $2,625,-

000. The east jetty was extended for 3.000

feet and the west for 3,750 feet in 1909-12. The final depth gained is 35 feet.

At the mouth of the Brazos, west of Gal¬

veston, Tex., an ingenious plan was adopted for avoiding interference in the work by flood-

tides : A long trestle was built out to deep water above high tide, the mattresses hung un¬

der it by ropes and the stone dropped on them from above to sink them. Instead of being launched from shore and towed, they were car¬

ried on a portable railway running on top of the trestle and let down.

The Columbia River jetty is the most con¬

spicuous example of the single instead of the double dike. It is 42ˆ4 miles in length, the long¬

est in the world. The bar at the mouth of the river, ever shifting and sometimes not over 12

feet deep, had half spoiled this superb river for navigation, and was greatly dreaded. But the river has a mean high-water discharge of 60,000

cubic feet per second, a mean tidal ebb of 1,000,000, with tides of 6.2 feet; and in 1884 a single curved line of brush mattresses with rub¬

ble-stone copings was begun, completed in 1894, to turn the current away from spreading itself on both sides and scour out the channel on one.

This was finished in 1894 with a channel 30 feet deep and made the river a highway of the heaviest ocean commerce, with lines to all Pacific lands. The improvement was not permanent and in 1902 the channel was only 21

feet in depth. In 1903 a north jetty 2l/2 miles long was projected, together with a iy2 mile addition to the south jetty. These additions were completed in 1913.

Others are too numerous for more than brief mention. At Yaquima Bay, Ore., 115 miles south of the Columbia — an estuary 20 miles long discharging into the sea through a narrow, tortuous, shifting channel, and over a sand-bar with 7 feet of water — parallel jetties about half a mile long, one of rubble-stone on a rock bed, one of brush and stone on a sand bed, have doubled the depth of water and made the chan¬

nel calculable. At Galveston, the single jetty was a relative failure, it needing a double one to converge the tides; and in 1896 the govern¬

ment completed it, with sides of 35,000 and 25,000 feet, costing over $8,000,000, and furnish¬

ing 27 feet of water between the island and the mainland. Other notable ones are at the mouth of Saint John's River, Florida, beginning at the sides of the river-mouth and converging to 1,000 feet apart at the crest of the bar. Charles¬

ton's double one has sides of 15,000 feet each.

Consult Corthell, E. H., (The Mississippi Jetties* (New York 1881) ; Haupt, L. M., ˆlet-

ties for Improving Estuaries) in Journal of Franklin Institute (Philadelphia 1888) ; Perilli, "Jetties of Armored Concrete,® in (Report of International Congress on Navigation (Brus¬

sels. 1905), and transactions of the American Society of Civil Engineers) (Vol. LIV, Part A; New York 1905). Consult also Engineering News (New York 1874 et seq),. especially nos.

of 23 Aug. and 4 Oct. 1900, and Reports1* of Chief of Engineers, United States Army (Wash¬

ington, D. C.).

JETTISON, the throwing overboard of

goods constituting a ship's cargo in order to lighten the load of a ship in distress, to save her from foundering, float her when stranded, or permit her to escape from an enemy. In such cases the loss to the individual owner is compensated by a general contribution levied 48

upon the owner of the remaining cargo, freight and ship, for whose benefit the merchandise was sacrificed. If, instead of ‘being thrown over¬

board, goods are placed in small boats, or light¬

ers, in order to ease the ship, and are subse¬

quently lost, it still constitutes jettison. In case of insured goods the company with whom the jettisoned goods are insured is entitled to rec¬

ompense through the law of average.

ˆ JEUNESSE DOREE, La., la zhe’nes do’ra (Fr., ((Gilded \outh®), sobriquet given to a band of counter-revolutionists against the Ja¬

cobins formed after the fall of Robespierre. Its members were youthful scions of aristocratic families and their warfare against the tem¬

porarily scattered Jacobins constituted rough physical handling wherever they were met. The term _ was originated by Frangois Xavier Pagees in (Histoire secrete de la revolution frangaiseP The name and its English transla¬

tion, “gilded youth,® has come to be a common designation for wealthy young idlers.

JEVONS, Frank Byron, English educator

and religious writer: b. 9 Sept. 1858. He was graduated at Wadham College, Oxford. He was connected with the staff of Durham Uni¬

versity in various capacities from 1882, was vice-

chancellor there in 1910-11, since when he has been pro-vice-chancellor, and from 1910 he has been professor of philosophy. Author of (The Development of the Athenian Democracy) ; ‘The Prehistoric Antiquities of the Aryan Peo-

ples) (1890) ; (An Introduction to the History of Religion } (6th ed., 1896) ; < Study of Corn-

parative Religion } (1908); ‘ Personality) (1913); ‘Philosophy : What is It?) (1914).

JEVONS, William Stanley, English logi¬

cian and economist: b. Liverpool, 1 Sept. 1835; d. Bexhill, near Hastings, 13 Aug. 1882. He was graduated from University College, Lon¬

don. Having obtained an appointment in the Royal Mint, he went to New South Wales in 1854, but afterward returned to England, and in 1866 became professor of logic, philosophy and political economy in Owens College, Man¬

chester, and this post he held until his resigna¬

tion in 1876 in order to accept the chair of po¬

litical economy in London University. He re¬

tired from this position in 1880 for the purpose of devoting his whole time to literary pursuits.

He was drowned while bathing at Bexhill, Sus¬

sex. His writings include (Pure Logic) (1864) and 'The Substitution of Similars)' (1869), in which he sought to popularize symbolic logic through a modification of Boole's mathematical methods; (Elementary Lessons in Logic) (1870) ; (Theory of Political Economy > (1871) ; 'The Principles of Science) (1874); 'Money and the Mechanism of Exchange) (1875) ; (Primer of Logic) (1876) ; 'Primer of Political Economy) (1878); (Studies in Deductive

Logic J (1880); and 'The State in Relation to Labour) (1882)'. Among works published post¬

humously are (Methods of Social Reform >

(1883); (Investigations in Currency and Fi¬

nance) (1884); and 'Pure Logic) (1890); 'Principles of Economics) (1905), parts of an unfinished treatise on economics with a number of essays contributed to periodicals. In a pamphlet on the 'Coal Question) (1865) he presented a mass of evidence to show that Eng¬

land's progress would be checked by want of coal ; in his work in political economy he at¬

tempted to put the chief definitions in the form of. mathematical quantitative formulae, and in this way did important work in revealing the nature and relations of economic facts; he also

deyeloped the theory of marginal utility. His ‘Life and Letters) edited by his wife were pub¬

lished in 1886.

JEW, The Wandering, a poetical person¬

age of popular traditions, who owes his exist¬

ence to a story connected with the well-known scene in the history of Christ’s passion. As Jesus was on the way to the place of execution, overcome with the weight of the cross, he wished to rest on a stone before the house of a Jew, whom the story calls Ahasuerus, who drove him away with curses. Jesus calmly re¬

plied, “Thou shalt wander on the earth till I re¬

turn.)) The astonished Jew did not come to himself till the crowd had passed and the streets were empty. Driven by fear and remorse, he has since wandered, according to the command of the Lord, from place to place, and has never yet been able to find a grave. Shelley. Lewis, Croly and Mrs. Norton in England, Schubart and Schlegel in Germany, and Sue in France, have turned this legend to account. Goethe has sketched Ahasuerus with great spirit and humor as a philosophic cobbler at Jerusalem who op¬

poses Christ with a cold worldly logic which will not look above the things of earth. See Wandering Jew, The.

OF MALTA, The. Marlowe’s ‘Jew

of Malta) is memorable for at least three rea-

sons. . It was the most popular play of its pe¬

riod, if not the most popular English play up to that time. So far as is known, the plot was en¬

tirely original. Its chief character Barabas is the English prototype of a series of popular English characters, of which Shylock. Volpone and Sir Giles Overreach are noteworthy.

As Marlowe proceeded in the handling of plot he laid aside that “alchemy of eloquence®

upon which he had depended. The main situa¬

tion of. ‘The Jew of Malta) arises still from a vaunting spirit. Barabas in his opening solilo¬

quy shows “infinite riches in a little room® to be his ambition. But the ambition is so crowded in the action that it is difficult to dis¬

tinguish it from the blood lust so popular in the plays of the day.

The play was probably produced about 158ˆ

at the Court and the Cock-Pit, the part of the Jew being taken by Edward Alleyn. It is first mentioned in Henslowe’s diary in’ 1592, and was not printed until. 1633, when it was given to the world in an edition by Thomas Heywood. As the play comes down to us it reveals very hur¬

ried composition. The first two acts are as precise as is the following play ‘Edward IIP

Thereafter the action becomes confused and crowded. Action follows action with little re¬

gard for motive and sequence. Barabas out¬

lives a dozen deaths. More strangely still this portion lacks the magic of Marlowe’s line And yet there is no doubt that this second portion gave the play its popularity. Two characters stand out to appear again in the plays of later \ nters, Barabas, villain beyond nature, and Abagail, his daughter, who by her virtues shames the house that reared her. Editions i A. (1850, 1858) ; Cunningham, Lt.-Col. F.

(1870-71) ; Bullen, A. H. (1885) ; Mermaid Series, ed., Havelock Ellis (1887, 1903) ; Every-

man’s Library, ed., Edward Thomas (1909).

Consult Symonds, J. A., (Shakespeare’s Pre¬

decessors in the English Drama > (1881) ; Ward, A. W., (A History of English Dramatic Litera¬

ture* (3 vols., 1899) ; Ingram, J. _ H., (Christopher Marlowe and His Associates) (1904).

Thomas H. Dickinson.

JEWEL, John, English bishop : b. Bude, Devonshire, 24 May 1522; d. Moncton Farleigh, near Laycock, Wiltshire, 23 Sept. 1571. He was educated at Merton and Corpus Christi Col¬

leges, Oxford, and was elected a fellow of Cor¬

pus Christi in 1542. He was greatly influenced by the teachings of John Parkhurst, later bishop of Norwich, and he was a follower of Peter Martyr. He is known to have been a licensed preacher in 1551 and he had made a consider¬

able reputation as a teacher. Upon the acces¬

sion of Mary in 1553 all those suspected of Protestant leanings were weeded out of Ox¬

ford and Jewel was deprived of his fellowship.

He made his way to the Continent, reaching Frankfort in 1555. He was associated with Coxe in his controversy with Knox, and later joined Peter Martyr of Strassburg, with him visiting Zurich and Padua. He returned to England on the accession of Elizabeth and was one of the Protestant clergymen selected as a disputant at the Westminster conference with the Romanists in 1559. He was consecrated bishop of Salisbury 21 Jan. 1560, and became recognized as the literary apologist of the Elizabethan settlement. He engaged in a con¬

troversy concerning the case of the Church of England as against that of Rome, first with Cole and later with the more formidable Harding.

His (Apologia ecclesiae Anglicanae) (1562) was stated by Bishop Creighton to be the <(first methodical statement on the subject® and to ((form the groundwork of all subsequent con¬

troversy.® Harding published a bitter (Answer) (1564), and Jewel followed with a

croft. His collected works were published un¬

der the direction of Archbishop Bancroft (1609) ; Cambridge (4 vols., 1845-50) ; Oxford (8 vols., 1848). Consult Le Bas, (Life of Bishop JeweP (London 1835).

JEWEL-WEED, TOUCH-ME-NOT, or

SNAP-WEED, popular names for two plants, Impatiens pallida and I. biflora, of the family Impaiientacece, well known in damp shady places throughout the cooler parts of North America, where they form dense masses. They are characterized by sac-like, pendulous, yellow or orange, more or less spotted flowers, and by their sensitive seed pods' which when mature burst with the slightest touch and throw the seeds to a considerable distance. Hence the second and third names above. The first name is probably a survival of their use as antidotes for so-called Rhus poisoning.

JEWELL, Theodore Frelinghuysen,

American naval officer: b. Georgetown, D. C., 5 Aug. 1844. He was graduated at the United VOL. J6 — 4

Slates Naval Academy in 1864. He was ap¬

pointed acting midshipman 28 Nov. 1861, and in June and July 1863 he commanded a naval bat¬

tery of field howitzers in defense of Washing¬

ton. He was commissioned ensign in 1866, served at various foreign stations, was com¬

mander of the Naval Torpedo Station in 1890-

93, and of the naval gun factory in 1893-96.

He was in command of the United States pro¬

tected cruiser Minneapolis in the Spanish War and later commanded the armored cruiser Brooklyn in the Philippines. He served as a member of the Naval Examining Board and in 1904 was commander-in-chief of the European squadron. He was retired 22 Nov. 1904. Author of various articles on naval matters, particularly torpedoes and ordnance.

JEWELRY, ornaments for personal adorn¬

ment, usually made of gems and precious metals. At some remote period primitive man gradually migrated northward from the tropical belt in which the species probably first came into existence, and as he felt the colder tem¬

perature severe and trying, especially at night, he was induced to

invent some sort of covering or clothing, by means of which he could secure warmth. What the first clothing was, it is of course impossible to determine, but it may be conjectured to have consisted of belts of grass or leaves, knotted together either by their own stacks, or by accessory vegetable fibres. When men became hunters, which they did not do until they had progressed far enough to have invented offensive weapons, they no doubt soon used dried skins for clothing. A rough tan¬

ning of such skins could have been managed by rubbing them with fat. Then came the difficulty of fastening them. Some savage tribes still wear cloaks which have only a hole cut for the head to go through, and this is likely to be a primitive type ; then, also, they might have been tied up with strips of sinew, but at an early stage they were pinned together with a bone or large thorn. Here is the germ of the brooch.

Numbers of such pins have been found in all places where the remains of primitive man ex¬

ist, and they range from the simplest forms to quite ornamental ones. The heads of the carved specimens show a certain amount of progression, and are often decorated with en¬

graved lines, dots and circles. Ivory, wood and bone are all commonly used, and in time, as metal working became known, these early pins are imitated in bronze and gold. From the Stone Age, through the Bronze Age, up to the Iron Age, in which we are still considered to be, pins and their derivatives, brooches and buckles, have been universally used, and it is an interesting study to endeavor to trace their utilitarian development, as well as that of their artistic and technical beauties. Starting with the earliest metal pins, it soon appears that the head, or thickened end, is treated ornamentally, hammered flat, and pierced. Through the pierced hole in the top of the pin are often found wire rings coiled several times, or single rings, as in a number of specimens from Ireland. In the case of Roman jewels found in Britain, there are chains of which a few links only are left, and in one instance at least a pin, the head of which was threaded with a chain of several links, was taken from among the debris of one of the Swiss lake-dwellings. The modern safety-pin is quite the same in all essential re-

spects as one which was found by Dr. Schlie-

mann at Mycenae, and the same form, with the arch more or less specialized in design, has been very largely used north and south, east and west. The Greeks made the arch short, and enlarged and ornamented the nose or hol¬

low for the pin to rest in ; the Romans made the arch big. set it. with beads of amber and bronze, and fretted it out in innumerable ways, with curves, spirals and all sorts of twists and turns which the fancy of the artist could de¬

vise* Roman fibulce are more usually

made of bronze or silver, but the Greek are largely of gold, and of exquisite workmanship.

Of the principal tools that have been and are still used in the production of jewelry, the hammer in some form, at first of flint or some other hard stone, and later of metal, was prob¬

ably the earliest employed, then we have the chisel and later the pointed graver, for en¬

graving a design, and the drill for perforation, either the simple pointed drill, or else the bow-

drill that has been used from the North Pole to the South Pole, by Hindus and Chinese, by civilized and semi-civilized peoples. Another essential article is a small crucible of clav, or even hardened sand, in which the metals to be used for soldering can be melted. It is im¬

portant that only easily fusible metals be em¬

ployed for this purpose, as those less easily fusible would be liable to make an imperfect joining and would probably break down.

Setting precious stones in points, or galleries as they are called, initiated about a century ago, has led to machine stamping, the galleries be¬

ing cut off, the settings stamped out and the stones fitted to the points which are then bent over. The free use of machine work has done much to lessen the artistic beauty of jewels.

On the other hand we have to recognize that the employment of

platinum settings, which has been general since. 1900, has marked a notable advance. Large pieces of platinum, carefully drilled, with the metal filed away in the clear spaces between the platinum and the stone, make the latter stand out for itself, while in the gold settings formerly used the yellow metal was apt to obtrude itself too much. Sometimes precious stones are set in platinum worked into a weblike texture.

The first prehistoric necklaces were those made of the pierced teeth of animals. In a burial, situated at La Barma Grande, near Mentone, France, there was found in 1884, on a male skeleton, a necklace of 14 stags' teeth, pierced and strung, accompanied by pierced vertebrae of a fish, and having little ornamental pendants of carved bone; animals' claws were also pierced and strung in a like manner to form necklaces. But out of such small begin¬

nings have developed the wonderfully-wrought necklaces of Egyptian and Greek art, and the splendidly designed works of the Renaissance and modern jewelers, as well as the marvelous variety of those produced in the Far East.

The evolution of ring forms covers as wide a range chronologically and geographically as does that of any of the types of jewelry. The origin of the ring has sometimes been ascribed to the knot, in connection with the supposed magic or binding virtues of a piece of string or wire twisted around the finger. Here as in some other cases, however, the comparative facility with which an ornamental effect could be attained was probably the main, if not the exclusive, cause for the wearing of rings.

Hence we meet in the course of ages with an almost infinite variety of forms and materials, from a plain round hoop, to an elaborately chased metal ring, or one set with one or more precious stones.

The brooch in its manifold forms was a favorite ornamental object from an early period down to the 17th century, and even later. In mediaeval times, the Irish and Anglo-Saxon brooches were made with an unhinged pin, which, after having traversed the material to be attached, was turned about until it could be passed through an opening formed on one side of the ring. Later, about the 11th century, the ring was . flattened, the opening closed, the pin reduced in length so as to accord with the ring's diameter, and attached to the ring by a hinge. In this style the pin was held down on the ring by the pressure of the article of clothing it had passed through. The import¬

ance of the plaid among the Highlands of Scotland, as a badge of clannish devotion, served to retain the brooch longer in favor in the Highlands than elsewhere, since it both attached the prized garment and adorned it.

A famous jewel of this kind is the Loch Buy Brooch. This is set with a Cabochon-cut rock crystal; along the ring are 10 projecting turrets, at the apex of each of which is a pearl.

Originally in the possession of the Macleans of Loch Buy, this brooch was eventuallv acquired by a private collector, and was purchased by the British Museum at the disposal of his collection.

. The earliest dated of the great jewel finds in Egypt were those discovered by Flinders Petue in 1901 at Abydos in the royal tombs there. Among them the bracelets of the queen ® ˆ Zer, a sovereign who reigned toward the beginning of the 1st dynasty, about 5400 b.c., give eloquent testimony of the skill of the Egyptian goldsmiths at this remote period. In one of these bracelets are a series of golden hawks surmounting alternate blocks of gold and turquoise; in another are groups of three dark beads of lapis lazuli, on either side of which a i e triple gold balls, beaten hollow and soldered together so cleverly that neither ex¬

cess nor difference of color can be perceived.

What is pronounced to be the richest of all Egyptian royal tombs is that found at Dahshur in the southern part of the great necropolis of Memphis, wherein had been scpultured several princesses of the family of Amenemhat II of *”.e 12th dynasty (2716-2684 b.c.). The mummy of Princess Knoumit was adorned with a ser¬

pent necklace, composed of beads of gold, silver, carnelian, lapis-lazuli and emerald, as well as hieroglyphic signs wrought in gold and inlaid with gems. She had anklets, bracelets and armlets of gold with precious stone settings.

To a later period, but still to one sufficiently 1 emote, belong the jewels of Aah-hotep, queen of Sekenenra III (1610-1597 b.c.), of the 17th dynasty. This queen lived to be almost if not quite a centenarian, and in her tomb was dis¬

covered a wealth of jewels, a richly adorned diadem and a pectoral, splendid chains, neck¬

laces, bracelets, armbands, etc., and also her gold signet ring. This

discovery was made by Mariette in 1859, in the northernmost part of the Theban necropolis.

JEWELRY

51

Although much valuable jewelry must have been produced in Babylonia and Assyria, the fact that the ancient peoples of these regions did not pay the same devout reverence to the remains of the dead as was done in Egypt, and the differences in architectural construction as well as in climate between Egypt and Meso¬

potamia, have combined to prevent the preserva¬

tion of any considerable part of the jewels.

The earliest works of the kind appear to have been executed of copper, and molds for casting metals seem to have been made in a very re¬

mote age. At a later time, the discovery of making bronze by alloying copper with tin rendered another metal available, and in the Assyrian period ornaments of this material to a great degree take the place of copper ones.

Some of these bronze ornaments that have been preserved are highly decorated ; one of them, a plaque which was evidently used to exorcise the demons of disease, bears, in an upper row, nine symbols of the gods ; beneath them appear figures representing the seven evil spirits caus¬

ing diseases, and below this is shown the patient stretched out on a couch, the god of the waters Ea, who is said to have instructed mankind in the arts, being figured in the act of pronouncing the magic formula destined to banish the dis¬

ease. Underneath this again is depicted the fearful demon Labartu, who is being driven away by another demon, in obedience to the mighty words spoken by Ea. For earrings and necklaces gold and silver were much in use, some finely wrought gold necklaces from early Babylonian times being in existence.*

As to Hebrew jewelry before the time of the Kings, our very slight information is derived from the account of the offerings made by the children of Israel in the Wilderness for the decoration of the

Tabernacle and for the form¬

ing of the Golden Calf. In the former case we are told (Exod. xxxv, 22) <(the men and women brought bracelets and earrings and rings and tablets, all jewels of gold,® and for the Golden Calf mention is made of gifts of earrings by men and women. The famous (

der) given by Judah to Tamar (Gen. xxxvii, 12-26). Of course, Joseph's ring, a gift of Pharaoh, would have been a piece of Egyptian jewelry; indeed, in all probability this was the case also with the jewels contributed by the Hebrews in the Wilderness. At the battle of Gilboa, where King Saul met his death, he is said to have worn his royal crown, which was brought to David by the Amalakite who slew Saul (2 Sam. i, 10). In about 1030 b.c., David carried off from the statue of the Ammonite god Milcom a crown weighing, with its pre¬

cious stones, a talent of gold, worth about $33,325 ; as David placed this crown on his head, he bore rather a heavy burden, ' for such an amount of gold would weigh some 110J4

pounds avoirdupois. In the reign of Solomon, when the temple was to be built, the ((Wise * Morris Jastrow, * The Civilization of Babylonia and Assyria * (Philadelphia, 1915, pp. 410-415).

t G. F. Kunz, ' The Curious Lore of Precious Stones,'

(Philadelphia 1913, chap, viii, pp. 275-306).

King® called in the aid of Phoenician crafts¬

men for its adornment, and probably the He¬

brew jewels of this and a later time were made by Phoenicians, or by those who had received instruction from them. In Isaiah's age we learn from this prophet (iii, 16-26) that the ˆdaughters of Zion® wore metal anklets, mak¬

ing <(a tinkling about their feet,® also circlets (tires) like the moon, as well as chains and bracelets, ornaments for the legs, headbands, tablets, earrings, rings and nose jewels. Un¬

doubtedly in the case of the wealthy, these adornments were all made of gold.

In the development of the jewelers' art, Phoenicia played a similar part to Etruria, in¬

deed the latter country was in many instances directly dependent upon the former. Little originality is to be noted in Phoenician work, but the. Phoenicians, as the great trading-folk of the time between 1000 or 1200 b.c., and about 500 b.c., or earlier, when the Greeks first challenged their supremacy and then supplanted them, had been active carriers of foreign jewelry from land to land, besides producing a considerable quantity of their own workmanship based on foreign models. This was of course supplemented by the inland trade between the Greek colonies of Asia Minor and the Asiatic and Egyptian sources to the southward and eastward.

Etruscan jewelry was mainly of eclectic types combining, or copying, models of Egyp¬

tian or Assyrian origin, transmitted in a modi¬

fied form by the Phoenicians and by the early Greeks. It was evidently through the Etruscans that the art was brought to the Romans. How¬

ever, in spite of the fact that the Etruscans were essentially copyists, they evolved many beautiful decorative designs and so successfully developed their originals as to produce a clearly marked national jewelry.

Probably the earliest Greek jewels of elabo¬

rate workmanship are those unearthed by Schliemann at ‘Mycenae in 1876-88, and those brought to light by him a few years earlier in the Troad. Whatever we may think of his attribution of many of them to Homeric per¬

sonages, there can be no doubt that they belong to the peoples and the localities celebrated in the Iliad and the Odyssey, and represent at its best the Greek art in jewelry of from 1600

to 1400 b.c., and a few centuries later. The so-called Minoan gems, specifically those of Crete, and by extension those of other 2Egean islands (hence sometimes called <(Island gems®), are less impressive, though they are of slightly earlier date, as are also those from Ilysus on the island of Rhodes. The latter jewels, now in the British Museum, comprise necklaces of irregularly-cut beads of amber, amethyst, agate or rock crystals, very rarely polished, and of polished carnelian beads. There are also many small bead-pendants of porcelain, some of them glazed.

The finest jewel found by Dr. Schliemann at Mycenae is a gold brooch,

having an elaborate centre boss of gold and silver plates worked into the form of a full-blown flower. Here were also unearthed several small earrings set with amethyst, as well as objects having inlays and beads of glass, amethyst or carnelian. In¬

taglio gems with gold settings were also found.

Besides some curious earrings the Troad fur¬

nished plaques made of gold wire fashioned 52

into a kind of basket-work, and provided with a hook for attachment to the lobe of the ear; from the plaque depended little golden chains, on which in many cases small gold leaves were soldered as ornaments.

The best Greek jewelry dates from the 5th century before Christ, when Greek art of all kinds stood at the very highest point, and this branch of art continued to flourish among the Greeks for many centuries. The goldsmiths used their precious metals in a manner showing their appreciation of the fact that any material, however precious, was subordinate in the art¬

ist's mind to the design and workmanship that gave it life and grace. . Of all forms of orna¬

mentation, delicate filigree work was most highly favored, and for color, which was spar¬

ingly employed, reliance was rather placed upon enameling than upon precious stones. The designs were preferably of fruit or flower themes, or else of the more graceful of the animal forms. Virtually all the beau¬

tiful types of jewelry that had so far been evolved in the world known to them were laid under contribution by the Greek jewelers, and elaborated by them. But although splendid crowns, diadems, necklaces, bracelets, armlets, funeral wreaths, pins and rings were made, the greatest variety of design is perhaps ex¬

hibited in the wealth of earrings that still exist, although so many must have been de¬

stroyed or lost. So potent was the tendency to create beautiful forms and to enrich the decoration, that the size of the earrings was

progressively increased, so that some of them greatly exceed the normal dimensions of this jewel, and must have been worn suspended from a bandeau, or some such support, bound on the head, as they are much too heavy to be sustained by the ear.

A most extraordinary assemblage of jewels belonging to the Persian period of the latter part of the 4th century b.c., was uncovered by M. Henry de Morgan near Susa, on 10 Feb.

1901, when he brought to light from six meters below the surface a bronze sarcophagus con¬

taining the skeleton of a woman. Heaped upon the breast of the skeleton, and strewn about the head and neck, was a mass of finely-wrought and artistic jewels, comprising: a gold torque weighing nearly a pound troy, decorated with lion's heads, the gold inlaid with turquoise and lapis-lazuli; bracelets of like design; several long and valuable stone-set necklaces, and a three-row pearl necklace, originallv consisting of from 400 to 500 pearls, of which 238 were still in a fair state of preservation after a lapse of more than 22 centuries. The stones in the other necklaces comprised turquoise, lapis-lazuli, emerald, agate, various jaspers, red and blond carnelian, feldspar, jade (?), hyaline and milky quartz, amethyst of a pale violet hue, hematite, several marbles and breccia.*

The Scytho-Greek art of which so many examples have been found in the tumuli of the Crimea, more especially in those about Kertch, the ancient Panticapaeum, settled by Greeks from Miletus in the 6th century b.c., represents in many of its specimens a Proto-

Russian art. Others again are purely Greek and the rest are either the work of Greek * Consult G. F. Kunz, * The Magic of Jewels and Charms'

(Philadelphia 1915, pp. 323-325: pi. opp. p. 334).

artists or were executed by those whom they had instructed. The finest specimens were gathered together in the Kertch Museum at the Hermitage in Petrograd. The largest and rich¬

est of these tumuli is that known as Koul-Oba (Tartar for "ash-heap®), situated about four miles west_ of Kertch, and which when first excavated in 1831 had escaped the plundering to which so many other of the grave-mounds had been subjected. A great variety of jewels was found in this tomb, which must have been that of one of the richest kings of the region, and it has been approximately dated at about 300

b.c. , at which time there flourished a Bos-

porian king named Pairisades. Within the tomb were found the moldering remains of a king, his queen, his servants and his horses, and upon the royal person, as well as around it, were the royal treasures. On the king's neck was a massive gold torque, the ends terminating in figures of Scythians on horseback, partly in green and blue enamel. Encircling his wrists and arms were penannular bracelets and arm-

lets, wrought most beautifully of a massive cable of gold, the ends figuring sphinxes.

Adorning the head of a woman, evidently be¬

longing to the royal house, and who had been sepultured near-by, was a mitre-shaped diadem similar to that worn by the king; a gold torque with lion-forms at its ends was around her neck, and also a magnificent necklace in filigree work with medaillions in repousse, and bearing many exquisitely delicate chainlets, on which hung as pendants a number of vase-shaped ornaments and others in granulated work re¬

sembling those met with in some of the finest Etruscan necklaces. Unfortunately, although this splendid sepulture had remained undis¬

turbed for more than 20 centuries, it was care¬

lessly guarded after it was opened, and golden ornaments to the weight of 120 pounds were stolen by the neighboring peasants, only about 15 pounds' weight of them being eventually recovered by the authorities.

Before the Cnristian era the Roman world was indebted to Greece and Etruria for all but the plainest jewelry forms, and in the palmy days of Imperial Rome, the expert jewelers were either Greeks themselves or had learned the art under Greek influence. The specifically Koman work was more massive, seeming to lay as great stress upon the intrinsic value of the precious metal used for a jewel, as upon its artistic character. At the same time the tendency to produce a striking effect was dis¬

played in the free use of the more brilliantly-

colored stones. Reds, yellows and blues were favored, and the contrast is emphasized by the addition of pearls, which enjoyed immense favor

ˆmPeriai Rome, when the pearl-fisheries of the East were laid under contribution to satis¬

fy the luxurious tastes of the wealthy Romans.

Drawing to herself as she did the finest fruits of the world's culture in every direction, Rome offered a rich variety of all known forms and designs of jewelry, this wonderful variety of borrowed or adapted types hiding her lack of originality. As the power and wealth of the state declined there was a progressive decline in the artistic merit of the ornamental objects produced, until toward the end the quality and value of the materials used for the jewels much sin passed the skill displayed in their work¬

manship and decoration.

The most remarkable examples of the Visi-

gothic art of Spain that have been preserved for us are the gold crowns and coronets found in 1858 at the Fuente de Guarrazar, near Tol¬

edo, and now preserved at the Musee Cluny at Paris. Of these the one bearing the name of the Spanish-Gothic king Reccesvinthus (649-

672) is the finest. It consists of a broad, mas¬

sive gold band, about four inches high, the diameter being about eight inches; along the upper and lower edges runs a bordering of cloisonne incrusted with almandine garnets, and on the band are set in relief 30 Oriental sapphires of great beauty and of large size; alternating with the sapphires are 30 large pearls. _ From the band hang 24 golden chains, supporting as many letters in gold cloisonne, reading Reccesvinthus rex offeret. Each of these letters terminates with a gold pendant from which hangs a pearl and a pear-shaped sapphire. The crown is suspended by a quad¬

ruple chain of fine workmanship, which at¬

taches it to a double fleuron of massive gold, enriched with 12 pendent sapphires. The cross which occupies the centre of the crown, and is attached to the fleuron by a long golden chain, is remarkable

both for the richness of its mate¬

rial and the elegance of its form. It is of massive gold and is decorated with six beautiful sapphires and eight large pearls. The letters depending from the crown proclaim it to have been a votive offering, and the church to which it and the other crowns were dedicated was that of Sancta Maria in Sorbaceis, near Toledo.*

The two most striking types of jewelry characteristic of Celtic art are the crescent¬

shaped head ornaments and the massive gold torques. The former are made of thin plates of gold, usually with a simple decoration of parallel lines ; they were probably attached near the ears by extensions on either side, so that the moon-shaped ornament could project up¬

ward above the head ; but some of them may have been adapted to be worn suspended from the neck. An exceptionally rich example in the Dublin Museum has a weight of 16 ounces, giving a metal value of $330, as the gold is probably nearly if not quite pure. The gold torques are twisted lengths of the metal, turned to a circular form, so as to be worn around the neck; but many of the metal torques were worn passing over the shoulder and across the breast. Splendid gold fibulce, or clasps, from prehistoric times, have also been found in Ireland; some of those of penannular form, with cup-shaped terminations, are very large and heavy, one in the Dublin Museum weighing as much as 33 ounces, the intrinsic value being $680. Armlets of gold were also made, as were plates of gold for adorning garments.

Anglo-Saxon jewelry was essentially of the same type as the Merovingian. The Anglo-

Saxon jewelers possessed a strong individuality, so that the personal note is very pronounced in their work. The execution was artistic and the jeweler's sense of color in the choice of stone adornments was highly developed. As it was the custom to bury many ornaments with the dead, the sepultures, especially those of Kent, have afforded a bountiful harvest of fine * Consult ' The Book of the Pearl ' by George Frederick TCunz and Charles Hugh Stevenson (New York 1908, pp.

415, 416, pi. opp. p. 416).

jewels. Examples of almost all types have been unearthed. Bead necklaces are present in great variety, the materials ranging from glass

up to amber and amethyst, while for the wealthy there were gold necklaces with more precious settings. Hairpins, with fantastic, bird or animal forms, or with garnets, were much in favor. The well-known jewel of Alfred the Great, now in the Ashmolean Museum at Ox¬

ford, was found at Newton Park, three miles from Athelney, county of Somerset, where Alfred sought refuge during the Danish in¬

vasion in 878. It measures two inches in length, one and onenfifth inches in width and half an inch in thickness, and is considered to repre¬

sent Anglo-Saxon jewelry at its very best. In shape it is oval, the front and the back being flat. On the obverse, beneath a plate of rock crystal, two-fifths of an inch thick, there is a plaque of semi-transparent cloisonne enamel, blue, white, green and brown, figuring a man's form. At the smaller end of the oval a pro¬

longation is shaped like a boar's head. An Anglo-Saxon inscription in gold letters, along the edge of the jewel, reads: Aelfred mec heht gewyrcan (Alfred ordered me to be wrought).

The gold is delicately fashioned in filigree and granular work; the enamel figure has been variously considered to represent Christ, Saint Neot, Saint Cuthbert, or Alfred himself. Of Anglo-Saxon gold rings, the most noteworthy are three, bearing respectively the names of Ahlstan, bishop of Sherbourne (824-67) ; of Ethelwulf, king of Wessex (836-58), the father of Alfred the Great, and of Ethelswith, queen of Murcia, Alfred's sister. Ethelswith's ring was tied to a dog's collar by the farmer who found it, and served this ignoble use for six months, until to his surprise and joy the man learned that it was of gold.

For the jewelry of the early Middle Ages we have to depend largely upon the treatise by the monk Theophilus (or Rugerus) called (Sched-

ula Diversarum ArtiumB written about 1000

a.d., in which are quite fully described the technical processes of the goldsmiths and jewel¬

ers of the time. It evidently records the prac¬

tices of Byzantine workers. Of Merovingian ornaments one of the most valuable finds was that made accidently at Tournai in 1653, when the regalia of Chilperic I (d. 481), the founder of the Merovingian dynasty, were brought to light. These included a bracelet, clasps,

buckles and the royal signet, of gold, engraved with the bust of the king; there were also some 300

golden bees, which had served for the adorn¬

ment of a mantle. Each piece of the treasure is inlaid with thin slices of garnet, or red glass, held between gold partitions. From the succeeding Carolingian period fewer examples of jewelry have been preserved, because Charle¬

magne (742-814) discouraged the practice of burying jewels with the bodies of their late owners, lest by this means too great a quantity of the precious metals should be withdrawn from use. Nevertheless, many of Charlemagne's own treasures were placed with his body in his tomb at Aix-la-Chapelle. His pendent, gold reliquary, set with a large cabochon- cut sap¬

phire in front, and a square-cut sapphire at the back, between which was inserted a small cross made from wood of the True Cross sent him by Haroun al-Raschid, was found when 54

his tomb was opened in 1169. In 1804 Napoleon directed the custodians of the treasure in the cathedral at Aix-la-Chapelle to present this reliquary to Josephine on the occasion of a visit she made to Charlemagne's tomb. It passed into the hands of Hortense, Josephine's daughter, who gave it to her son, Napoleon III.

What has become of it since his downfall and death is rather doubtful, but it is said to be in a private French collection.

With the Renaissance begins the revival of the jeweler's art in sympathy with that of all the other fine arts, and, as in most of these, it was Italy that moved in the vanguard, the Italian goldsmiths and jewelers leading the way here also. While the larger part of the early works has disappeared in the course of cen¬

turies, we are fortunate in having many exact representations of them in contemporary por¬

traits, which are often very trustworthy wit¬

nesses, since a number of the 15th century painters began their careers as goldsmiths and jewelers, as, for example, Tommaso de Fimi-

guerra, Antonio Pollaiuolo, Botticelli, Domenico Guirlandajo and Francia. To these must be added, as great jewelers of the 15th and 16th centuries, Ambrogio Foppa (Caradosso) and Michelangelo di Viviano, the former of whom worked in Milan and Naples, and the latter in Florence, patronized by Lorenzo and Giuliano dei Medici. All these workers were, however, surpassed by the great master of the craft!

Benvenuto Cellini (1500-71).

Among the innovations introduced in Euro¬

pean jewelry by the Renaissance artists was a pendent jewel worn on the forehead, which may remind us of the favorite Hindu custom of wearing such an ornament, although this latter is often a jeweled disc, suspended from the large veil worn over the head and shoulders.

The Renaissance ornament was known in

France as the ferroniere, from the famous Louvre portrait presumably by Leonardo da Vinci and formerly reputed to be that of one of the latest flames of Frangois I, the beautiful wife of an ironmonger. The face depicted is, however, in all probability that of Lucrezia Crivelli, a mistress of Ludovico Sforza, ®I1 Moro,® Duke of Milan.

As might be inferred from a contemplation of the paintings of the period, the jewelers in¬

dulged in a rich use of color, both in precious stones and in enameling, and these colors were so artistically blended and so wonderfully com¬

bined with the most delicately beautiful gold-

work that the result was an object in which the value of the materials was exceeded by the art exercised in its production. It is note¬

worthy that the diamond, so greatly favored in later times, was at this period less prized than the emerald and the ruby. This appears in the scale of values for the four precious stones given by Cellini in 1568, although he places the sapphire far down the scale. On faultless, one-

carat stones he sets these prices : ruby, 800 gold crowns; emerald, 400; diamond, 100, and sap¬

phire but 10 crowns. The stones were usually table-cut, and in many cases the elaborate enameling of the jewel almost hid the gold substratum, except where it was left free to figure some details of the decoration.

French jewelry of the 16th century is illus¬

trated by a large number of designs of the highest artistic merit. Among the foremost of those designers whose ideas are skilfully worked out, either by themselves or by highly-

trained goldsmiths, may be mentioned Jacques Androuet Ducereau (c. 1510— c. 1585), Etienne Delaune (1518-95) and Pierre Woeriot of Lor¬

raine (1532-aft. 1589). Of course their art owed much to the stimulus given by Cellini's activity in France under Frangois I, and the fondness for jewels increased greatly under the last Valois kings, the contemporary chroniclers giving graphic descriptions of many costly ones possessing extraordinary beauty. In Spain great favor was bestowed upon elaborate reliquaries, and a characteristically Spanish decoration of these was with painted glass, termed in French of a later time verve eglomise , perhaps after a certain clever 18th century jeweler named Glomy. In this process the underside of a plate of glass, or of rock crystal, was covered with gold leaf; on this was traced the design, so that the part of the gold leaf to be left untouched was defined.

W here it was removed, pigments were applied to bring out the design, and the proper degree of light and shade was attained by the applica¬

tion of varnishes of various thicknesses.

Pendants were favorite ornaments in Spain, as were also bow-shaped jewels for breast orna¬

ments. For the settings emeralds were very often used, a great variety of these stones, of various degrees of excellence, having been brought to Spain from Peru after the Spanish Conquest. The mines whence they came have not been traced, and they were perhaps already exhausted when the Spaniards invaded the land.

In Germany, great centres of the goldsmiths'

art in the 16th century were Augsburg, Munich and Nuremberg. The Fuggers, the great bank-

ers of .Augsburg, did much to encourage the production of fine jewelry, indeed they com¬

bined dealing with precious stones and splendid jewels in a remarkably clever way with their banking business. Naturally the Italian in¬

fluence was potent in these German cities, al¬

though the striking and original work of such masters as Albrecht Diirer and Hans Holbein, the former the son of a goldsmith, occupies a very high place in the history of jewelry. Hol¬

bein s numerous designs, made in England preserve for us a record of his excellence in the art.

To the 17th century belongs the reign of the aigrette, consisting of clusters of precious stones set in enameled gold and mounted on movable stalks; another favorite jewel of this century was the bow or rosette to be worn on the breast, named a sevigne, after the world-

famous letter writer, the Marquise de Sevigne.

A splendid English jewel of the early part of this century is that known as the (cLyte Jewel,®

in the British Museum. It was a gift of J^mes I to a Mr. Thomas Lyte, as a reward for the latter's zeal in drawing up a pedigree of the sovereign. An openwork cover has dia¬

monds on the outside and brilliant enamel on the reverse, while on the back of the jewel is a white enameled plate on which is a design done in alternate lines of gold and of ruby enamel; the enamel bordering is of ruby-red and sap¬

phire blue.

Toward the end of the 17th century, pen¬

dants are found made of gold only, and some JEWELRY

specimens of Portuguese work are remarkable for delicacy of execution ; these are sometimes set with very small diamonds. Sprays of leaves and flowers and knots of ribbon are made in metal during the 17th century, and are thickly set with crystals — paste or real precious stones — particularly by Venetian, French and Portuguese, followed at a safe dis¬

tance by English workmen. The best of these are by Giles Legare, and in the 18th century by his follower, Pierre Bourdon.

The search for new styles of ornamentation led at the end of the 17th century to the de¬

velopment of the variety of decoration and de¬

sign to which the name ˆrococo® has been given, and this became gradually the dominant tend¬

ency in the first half of the 18th century.

Among the masters of this style in France may be noted Jean Bourget and Pierre Bourdon, and in Italy Gian Battista Grondoni and Carlo Ciampali. More potent, however, was the ac¬

tivity of Melchior Dinglinger who, after work¬

ing for a time at Augsburg, came to Dresden in 1702 at the invitation of Augustus II, sur-

named ((The Strong,® Elector of Saxony, and king of Poland as Augustus I, at whose court he was employed for 30 years as court jeweler, together with his brother, and with his son, Johann Melchior Dinglinger. The elector availed himself of their services in planning and enriching the famous Green Vaults in Dresden, wherein is assembled a most remark¬

able collection of the ornamental objects pro¬

duced in this period. The discovery of the remains of Pompeii in 1755 gave a new direc¬

tion to taste, and signaled the downfall of rococo and a revival of classic models. How¬

ever, although much of the jewelry wrought by the goldsmiths of the first half of the 18th cen¬

tury is too extravagant and eccentric in style to please a truly refined artistic appreciation,'

many single objects testify to the skill and technical ability of those who produced them.

In France, during the Directory, the aim of the ladies of fashion was to resemble as much as possible the statues of the Greek goddesses, and this led to a rejection of elaborate jewel¬

ing. Indeed, many women discarded jewels almost entirely, and even the frail ladies popu¬

larly called merveilleuses, who wore too many, wished them to be of very simple design, so that they might not detract from the effect pro¬

duced by perfection of physical form. In 1800, when the Egyptian campaign was in everyone's mind, the dandies regarded it as the height of good taste to wear turbans a la Mameluck, adorned with scarabs, sphinxes and obelisks.

At this time and through the First Empire pub¬

lic taste was dominated in the matter of per¬

sonal adornment by the painter David, and un¬

fortunately his ideas in this respect were not on a level with his general artistic ability, for he was tyrannized over by the influence of classic tradition. The Restoration marked a decided reaction against the tendency to severity and rigidity generally characterizing the early part of the century as to jewelry. In sympa¬

thy with the later rise and triumph of Roman¬

ticism in literature and painting, jewelers sought to create works of art at once striking and graceful. The reaction against exclusively classic models brought about a revival of Gothic forms, which gained popular favor to a high degree. Still this was only an artificiality of another type, and it was reserved for the latter half of the 19th century to seek for in¬

spiration directly in the realm of nature.

The jewelry of modern times has developed along the lines of eclecticism, the general trend being toward gracefulness and delicacy.

In Italy the Castellanis in the first half of the 19th century renewed the use of the granulated gold ornamentation of the finest Etruscan jewelry, and somewhat later Lucien Falize, who flour¬

ished during the Second Empire in France, con¬

tributed much to the success of the modern movement. Whatever may be the inevitable errors resulting from the striving after novel effects, . the tendency has been, on the whole, to maintain all that is best in the examples of classic as well as of Renaissance art, while welcoming such original forms as recommend themselves because of their tastefulness and beauty. Probably no single name has been so freely mentioned in connection with modern French jewelry as that of Rene Lalique, and the ((Art Nouveau® style, despite some vagaries, has found favor both in Europe and America.

Indeed, it may truly be said that the jeweler's art was never more international than it is to-day, and in no age has there been a greater variety of objects produced, or a higher average standard _ of excellence attained than at the present time.

For Chinese jewelry filigree work is highly favored, and the native jeweler is exceedingly expert and artistic in this branch of his art.

Enameling is also greatly fancied in dark blues and pale blues. When precious stones are set they are usually cut rounded, en cabo-

chon, not in facets, but in many cases imitation stones are used, prepared to the hue required by the enamel setting. Pearls are much in re¬

quest, and they, as well as the stones that are employed, are drilled and attached by fine wire to the setting. Delicately wrought hairpins and earrings are greatly in vogue among Chi¬

nese ladies.

India has produced an immense variety of jewels of all kinds. Indeed the forms are so many and so beautiful, the designs produced so attractive, and the love of personal decoration so widespread among the peoples of India, that a great many inferior metals and imitation precious stones are used by the jewelers, al¬

though of course the jewels of the noble and wealthy are of gold and silver, adorned with costly genuine gems. Naturally, as India might be called the home of the pearl, this gem of the sea constitutes one of the

most prized deco¬

rations of the richest jewels. Among the more specifically Flindu forms of personal adorn¬

ment must be noted the ever-present bangle-

bracelet, untold thousands of which have been produced. Glass and lac bangles are made in all parts of India, the choicest at Benares, Lucknow, Delhi and other towns of Upper In¬

dia. Bracelets of dyed circles of shell are also in favor, and occasionally ivory bracelets are manufactured. Chains, armlets, crosses, etc., are part of the characteristic Indian jewelry and more especially national and attractive are the forehead ornaments, of painted glass for the poorer and of gold with a pendent gem for the richer.

In many Oriental countries there has been hut little change in form or variety of work¬

manship for more than two millenniums. A close similarity of design may be remarked in the decoration of the Hindu work of to-day and in that of the Egyptians and Phoenicians many hundred years before the Christian era.

The bracelets, earrings, rings, etc., are still fre¬

quently ornamented with little gold beads, with filigree work or with delicate chainwork. It has indeed been conjectured that India was really the source of these designs In view of the active commercial intercourse with West¬

ern lands dating from the campaigns of Alex¬

ander the Great.

The Aztecs of Mexico and the aboriginal peoples ruled over by the Incas in Peru” had developed a considerable and complex civiliza¬

tion at the time of the Spanish Conquest in the early part of the 16th century, and their love of luxury and adornment, as well as the skill of their craftsmen, must have resulted in the production of many jewels.

However, the reports of the Spanish chroniclers as to these objects are in many cases far from trustwor¬

thy, as for instance those concerning the “emerald® ornaments which had belonged to Montezuma, and were given by Cortes to his bride on his return to Spain in 1529. Accord¬

ing to Gomara’s recital, one of these had been carved by a Mexican lapidary into the form of a rose, another was shaped like a horn, a third had been fashioned as a fish with golden eyes, still another had been formed as a bell having for the tongue a pearl, while the fifth was cut into a small cup, with foot of gold and having attached four little golden chains, each supporting a splendid pearl. These ornaments or jewels cannot have been of emerald, as this stone does not occur in Mexico, but were prob¬

ably either of jade, or else of greenish tor-

quoise, or some other of the green or greenish stones known to the ancient Mexicans, rather indiscriminately, as chalchiliuitl. The five ob¬

jects brought by Cortes are said to have been lost at sea in 1541, during the disastrous Span¬

ish expedition against Algiers, in which he took part. As the richest of the Peruvian jewels were of gold, with or without precious stone settings, the avidity of the Spaniards for the precious metal caused them to melt down the ornaments without regard for their value as objects of art, or of historic interest. In mod¬

ern times the graves of Peru have yielded some examples testifying to the skill of the early Peruvian goldsmiths, but undoubtedly the chief treasures of the Incas are irrecoverably lost.

Summarized briefly: (1) Savage tribes

have used for their ornaments natural objects easily worked. (2) The cultured nations of antiquity have generally made their finest pieces of personal ornament of gold. (3) Dur¬

ing the period of the Renaissance gold and sil¬

ver, colored precious stones and vitreous enam-

els were very largely used. (4) During the 19th century the. diamond

particularly claimed the attention of jewelers, and the 20th century has been marked by a strong preference for platinum in settings, especially for diamonds.

See Diamond; Gems, Engraving of- Pearl-

Precious Stones, etc.

BibHography.— TheophiJus (or RUgerus),

‘Schedula Diversarum ArtiunP (Eng. tran. by R. Hendrie, London 1847) ; Cellini, Benvenuto, (lYattato dell’ Oreficeria) (Florence 1568) ; Gorlaeus, (De Annulis) (Leyden 1601); Pouget, ‘Traite des pierres precieuses) (Paris 1762) ; Rambusson, J., (Les pierres precieuses et les principaux ornements> (ib. 1870) ; King, C. W., (Antique. Gems and Rings* (London 1872) ; Castellani, A., (Dell’ Oreficeria Italiana) (Rome 1872) ; Schliemann, H., ‘Mycenae* (London 1875) ; ‘Tiryns* (ib. 1886) ; Linas, C. de, (Les origines de l’orfevrerie Cloisonnee* (3 vols., Paris 1877-87) ; Bapst, Germain, (Histoire des joyaux de la couronne de France* (ib. 1889) ; Earle, J., XIX

Siecle> (3 vols., Paris 1906-08); Smith, H.

Clifford, ‘Jewellery* (London 1908) ; Kunz, G. F., (Curious Lore of Precious Stones*

(Philadelphia 1913), id., (Magic of Jewels and Charms * (ib. 1915) ; Kunz, G. F. and Stevenson, C. H., (lhe Book of the PearP (New York 1908).

George F. Kunz.

JEWELRY TRADE, The. The making

of jewelry is one of the oldest trades of which the American historian can find record, for while a the manufacture of such articles of adornment occupied a position of little com¬

mercial importance until several years after the settlement of this country by the colonists, the fact remains that jewelry was made by the na¬

tive Indians many years before the first Euro¬

peans, set foot upon American soil.

Prim and precise as the Puritans are sup¬

posed to have been, it is a mistake to imagine that they were too primitive in their opinions to appreciate the advantages of a little jewelry in the adornment of their persons. Both the Dutch and the English brought such ornaments with them to the new world, and one's personal attire was considered incomplete without the buckles, brooches and rings which were in vogue at that time. As the natural result gold and silver smithing was one of the first indus¬

tries to be established in the colonies, and every large town had its smiths who produced the most popular articles of jewelry, as well as cer¬

tain kinds of trinkets for the Indians, medals, snuff-boxes, etc.

One of the most important products of the early silversmith's art was the making of elabo¬

rate boxes from rare woods, or, sometimes, shell inlaid with gold or silver. Snuff-boxes were manufactured in this way, while other boxes were made to contain the parchments which conferred the freedom of the city upon distin¬

guished guests. Sometimes these boxes were made entirely of silver and were lined with gold. Occasionally the metal was gold, studded with, precious stones. It was such a box as this in which the people of New York presented the "freedom® to Alexander Hamilton, after his elaborate defense of the liberties of the press in New York, in 1784; while similar boxes were later conferred upon Lafayette, Washing¬

ton and General Scott. The making of such boxes and other ornamental insignia conferred upon distinguished men represents but one of the branches of the art of the smith, for there were, so many demands made upon the craft that its ranks were constantly extending. In JEWELRY TRADE

1788, when the adoption of the Federal Consti-

' tution was celebrated in Philadelphia, there were no less than 35 goldsmiths and jewelers in the procession, while, more than 20 years before, it had been the profuse display of jew¬

elry, silverware, etc., in the homes of the promi¬

nent New Yorkers that had incited Townshend to introduce the

historic bill known as the aStamp Act,® which was undoubtedly the enter¬

ing wedge in the struggle which finally sepa¬

rated the colonists and the Crown. At this period in the history of the nation the colonies that could boast of the richest inhabitants, and which could, therefore, afford to spend the greatest amount of money for jewelry and other articles of personal adornment, were South Carolina, Virginia, Maryland, New York, Penn¬

sylvania and Massachusetts.

When compared to the facilities afforded to jewelers at the present day the tools of the old-

time silversmiths were crude enough. The only noticeable difference between them and those used by workers in other metals was in their size, a factor which fitted them for finer work.

The extreme tenuity and the lack of brittleness of gold and silver gave room for the exhibition of great ingenuity on the part of the artist who aspired to forget the ordinary patterns in the creation of more fanciful designs, while the at¬

tainment of the polished, or burnished, surface made a more tender treatment imperative. In the beginning of the century the art of frost¬

ing gold, like that of satin-finishing silver, was unknown. Gold and silver both came from the workshop with a glittering surface, and such ornamental and decorative work as may then have been attempted was either crude enamel¬

ing, applied work or engraving. Later, of course, came all the new processes by means of which the precious metals have been used con¬

jointly with other metals, or wiith wood, mother-

of-pearl, glass, porcelain, pearls and gems. .

In those days everybody who engaged in the industry of jewelry-making learned his trade so thoroughly and in such an old-fashioned man¬

ner that it was impossible to draw the close distinctions between the several different but associated occupations that are so clearly drawn

to-day. At that time, to say that a man was a ((jeweler® indicated that he was a goldsmith and silversmith, a watchmaker and clockmaker and a maker of fine mechanical instruments, for each of these branches involved a knowl¬

edge of the others. At the same time the trade was thoroughly a mechanical one, and any at¬

tempt to realize a higher ideal in the making of jewelry and other ornaments was most unusual.

Instead of <(wasting his time® over such inven¬

tions the artisan devoted all the hours of labor to such work as might be assigned to him, even dividing his time and skill between his own and kindred trades. To a similar degree the seller of such goods was more frequently a workman than a dealer. While a merchant in the strict sense of the word, he was usually a person who could take his place at the bench if necessity required, and who owed his success as a salesman to his knowledge of the various kinds of metal and fancy work for the adorn¬

ment of the person. Gradually, as the demand for such goods increased, the more progressive of these merchants began to manufacture the simple articles which they sold, although it was some time before this branch of the industry had extended beyond the making of spoons, forks, rings and similar small pieces.

The first American manufactory of jewels is said to have been that established in Newark, N. J., in 1790, by Mr. E. Hinsdale, who died 20 years later, and was succeeded by his partner Mr. Taylor. The New York of 1820 could boast of but two manufacturing jewelers, Mr.

G. F. Downing and a Frenchman by the name of La Guerre. The revolutionary hero, Paul Revere (1735-1818) was originally trained as a goldsmith and silversmith, and he practised his art in Boston before the Revolution. The Knoxville Gazette of 20 Oct. 1792 contains the advertisement of a local goldsmith and jeweler, who declares that he also makes rifles in the neatest and most approved fashion.

From the earliest days in the history of the jewelry trade, Providence, R. I., has been one of the great centres of this industry. It was shortly after the close of the Revolutionary War that Messrs. Sanders and Pitman and Cyril Dodge began to make silverware in that oity. As early as 1805 there were no less than four establishments located there. They were operated by Nehemiah Dodge, John C. Jenckes,

Ezekiel Burr, and Pitman and Dorrance, and their product, to make which they employed about 30 men, included silver spoons, gold beads and the simplest designs in finger rings. A few years later some of these manufacturers began to turn their attention to cheap jewelry in which silver and other alloys were used with a small fraction of gold. These included many small articles like breast-pins, ear-rings, key¬

rings, sleeve-buttons, etc., as well as some large articles which were plated by the hammering process. The first jewelry establishment at At¬

tleboro, Mass., a town which has continued to hold a prominent place in the trade, was opened about 1805, while the establishment of the busi¬

ness in Newark, N. J., by the firm of Hinsdale and Taylor dates from about the same time.

Philadelphia also became identified with the early jewelry interests. The firm of Bailey and Company, a house which is still conducting business, although under another name, was one of the first manufacturers in that city, and its trade with the West and South soon became so extensive that the concern became known as one of the most prosperous in the business.

Maiden Lane, New York, did not become the centre of the American jewelry trade until about 1830. The demand for jewelry inspired new ideas in manufacture, and, as much of the desire for novelties originated in New York, that city naturally became the market for the introduction of such products. In the New York Mercantile Register for 1848-

49, one may find the advertisements of the following houses, which were then prominent manufacturers of jewelry, watches and silver¬

ware: Ball, Tompkins and Black (late Mar-

quand and Company), 247 Broadway; Allcock and Allen, 341 Broadway; Gale and Hayden, 116 Fulton street; Tiffany, Young and Ellis, founded in 1837, Charles L. Tiffany, founder, the forerunner of Tiffany & Co., 271 Broad¬

way; Wood and Hughes, 142 Fulton street; Samuel W. Benedict, 5 Wall street ; George C.

Allen, 51 Wall street ; Squire and Brother, 92

Fulton street and 182 Bowery. Some of these 58

houses have since gone out of existence; only one now retains its original name, but three are still conducted under firm names which retain some portion of the early title.

Although great advances have been made in every branch of American art there is no par¬

ticular in which it is more pronounced than in the metal work which is so conspicuous a part of the art of the gold and silver smiths, and the fact that the American product is now re¬

garded as superior to that of any other coun¬

try of the world is not only due to our knowl¬

edge of the art in itself, but is largely the re¬

sult of our wider knowledge of the articles into whose manufacture good taste enters. To-day the designers employed by the great gold and silver smiths of America are not only men of refinement and liberal education, but they are so truly artists, in the best sense of the word, that they could, if required, draw or model from life, or paint in oils or water-

colors. It is largely due to the efforts of such men that so much advance has been made in the making of ornamental gold and silver ware during the past half century, a progress which is indicated by our exhibitions of such articles as loving-cups, vases and presentation pieces, among which one may mention the gold medals valued at $1,000 and $500, which were pre¬

sented by the State of New York to Dr. E. K.

Kane and Commander H. S. Hartstein, the Arctic explorers, in 1858; the silver vase made in honor of William Cullen Bryant, now a part of the exhibit at the Metropolitan Museum of Art, and the several testimonials presented to Cyrus Field, upon the completion of the trans¬

atlantic cable, in 1866. Among the other con¬

spicuous specimens of this art are the silver service which was presented to the arbitrators of the. Alabama Claims, in 1873, the silver centrepiece duplicating the statue, “Liberty En¬

lightening the World, }) which was presented to August Bartholdi, in 1886; the elaborate testi-

?r,0™al Presented to William Ewart Gladstone, in 18/7 ; the Edwin Booth loving-cup, and the many yachting trophies that have been manu¬

factured on the occasion of (international and other important regattas.

The discovery of gold in California, in 1848, naturally gave a great impetus to the manufac¬

turing jewelry industry, for it gave assurance of an ample supply of metal needed for all purposes without the cost of importation, and if, at that time, we were lacking, in knowledge as to the various forms in which the art of the smiths had been developed, it needed but such expositions as those at London and Paris to perfect our education in that respect. With such secrets revealed to us, however, it took but a comparatively short time for us to ac¬

quire the inventions in machinery and tools necessary to the reduction of the cost of pro¬

duction and it is largely due to our success along these lines that we have been able to lead the nations of the world in this branch of the fine arts.

The process of electro-metallurgy was intro¬

duced about 1860, and since that time all kinds of goods in which plating has been employed have been made by this method, the centres of production being located chiefly throughout Connecticut, although there are other large plants, at Newark, N. J., and Providence, R. I.

Speaking from a strictly commercial point of view it is almost impossible to overestimate the value of this process, for it has brought within the reach of people of limited means an attrac¬

tive line of tableware and other articles of utility that are now deemed indispensable in every household. If not as artistic and as highly

finished as solid silverware they are ex¬

tremely serviceable and there can be no ques¬

tion but that the better grades of such goods possess considerable artistic merit. In fact, for a time at least, the silver-plated ware en¬

croached upon the province of solid silver, but during more recent years the low valuation of silver bullion, and the mechanical inventions which have further reduced the cost of produc¬

tion, have tended to reverse the tables.

The production of watches is so closely re¬

lated to the jewelry trade that some reference must be made to it in any review of that in¬

dustry. It was but a comparatively short time ago that all watches were imported, whereas to-day we have progressed so far it is only some very small watches for ladies' use and some particularly complicated chronographs that are now obtained in Europe. AJ1 others are made in this country, the industry being largely cen¬

tred in New Jersey, Massachusetts and Illinois.

In its consumption of diamonds and other precious stones America will also compare favorably with other nations, New York being the largest, market for such gems in the world.

Although it was but a few years ago that the art of diamond cutting and polishing was estab¬

lished in the United States, our wise tariff regulations have given such an impetus to this branch of the trade that some of the most ex¬

pert cutters from Holland have now located in this country.

So far as statistics go we have but little ma¬

terial concerning the early history of the jew¬

elry industry. We know that, in 1812, the value of the Providence product was but $100,000, and that, as late as 1860, the returns from all parts of the country were small as compared to those of the present day. In that year, for example, the jewelers and watch¬

makers of Philadelphia produced but $691,430

worth; the silverware manufacturers, $516,000

worth, and the makers of watch-cases and chains, $1,714,800. The production of gold chains and jewelry at New York was $2,497,761 ; of gold watch-cases, $337,690, and of silverware'

$1,250,695. In Newark, the total product was $1,341,000, while Providence produced $2,251,-

382 in jewelry and $490,000 in silverware. The following census statistics, covering the years from 1880 to. 1905, indicate the great advances which have since been made in the trade : 1880

Establishments . 739

Capital . $11,431,164

Employees . 12,697

Wages . $6,441,688

Value of product $22,201,621

1890

783

$22,246,508

13,880

$8,038,327

$34,761,458

1905

Establishments . 1 , 023

Capital . $39,678,956

Employees . 22,080

Wages . $12,593,000

V alue of product $53,225, 000

1910

1,537

$63,811,000

30,347

$18,358,000

$80,350,000

1900

851

$27,872,000

20,468

$10,644,000

$46,129,000

1915

1 , 914

$72,404,000

28,289

$18,302,000

$81 , 006,000

Unfortunately, however, such statistics can¬

not indicate what great things have been ac¬

complished from an artistic standpoint, for the time has now come when the American jeweler JEWETT — JEWISH CALENDAR

59

instead of going to Europe for his ideas and models, leads the best European producers in both correctness and originality of designs and workmanship.

The following figures are given by the cen¬

sus bureau as to the value of the jewelry prod¬

uct in the four cities producing the largest quantity :

Percentage of

total in the

Total value of product United States

‘ – * – — . – * – V

1909 1914 1909 1914

Providence, R. I. $20,166,003 $20,933,990 25.1 25.8

New York, N. Y. 19,236,368 20,467,868 23.9 25.3

Newark, N. J – 13,152,340 11,215,214 16.4 13.8

Attleboro, Mass. 7,396,558 8.353,935 9.2 10.3

The four leading States show the following figures of product :

1909 1914 1909 1914

New York . $20,362,620 $21,810,245 25.3 26.9

Rhode Island – 20,685,100 21,522,251 25.7 26.6

Massachusetts… 15,210,738 14,175,857 18.9 17.5

New Jersey . 13,272,004 11,347.455 16.5 14.0

In 1914, Chicago produced jewelry to the value of $3,135,945, being 3.84 per cent of the total product in the United States. The entire State of Illinois produced $3,264,465 worth of jewelry.

The reports regarding two of the leading centres of jewelry production, Attleboro and North Attleboro, Mass., for 1913 and 1917, show the slightly unfavorable effect of war condi¬

tions upon this industry:

Attleboro North Attleboro

1913 1917 1913 1917

Establishments 81 64 37 34

Capital . $8,581,425 $8,553,611 $4,235,937 $3,993,372

Employees – 3,931 2,871 1,875 1,516

Wages . $2,536,658 $2,166,661 $1,249,397 $1,161,109

Value of prod¬

uct . $9,364,159 $11,308,913 $3,968,810 $4,259,834

The increase in value of product was prob¬

ably due to the higher prices realized.

George F. Kunz.

JEWETT, Charles Coffin, American li¬

brarian : b. Lebanon, Me., 12 Aug. 1816; d.

Braintree, Mass., 9 Jan. 1868. He was grad¬

uated at Brown University in 1835 and from the Andover Theological Seminary in 1840. He was librarian at Andover while studying there and prepared a catalogue of the library. He was appointed librarian at Brown University in 1841 and professor of modern languages there in 1843. He was librarian of the Smith¬

sonian Institute at Washington in 1848-58, and thereafter until his death was superintendent of the Boston Library. His work in rearrang¬

ing and cataloguing the library at Brown Uni¬

versity attracted wide attention, the merits of his system being recognized in Europe as well as in the United States ; and he established in the new library at Boston one of the first library card catalogues. His work was largely pioneer in modern library method and his system has served as a model in both United States and Canada. His writings on the subject of library economy are of importance. Author of (Facts and Considerations Relative to Duties on Books >

(1846); (On the Construction of Catalogues of Libraries and their

Publication by Means of Separate Stereotyped Titles, with Rules and Examples) (1852) ; (Notices of Public Libraries of the United States) (1854).

JEWETT, Sarah Orne, American novelist

and writer of short stories : b. South Berwick, Me., 3 Sept. 1849; d. 1909. She was educated at Berwick Academy and became a contributor to the Atlantic Monthly in 1869, in which period¬

ical the larger part of her work appeared. Her usual theme was the New England character seen from its most attractive side, its gentler aspects given greater prominence and its harsher ones not unduly emphasized. Her works in¬

clude (Deephaven> (1877); < Play Days > (1878); <01d Friends and New-* (1879) ; ˆCountry By-

Ways } (1881) ; (The Mate of the Daylight, and Friends Ashore* (1883) ; (A Country Doctor, *

a novel (1884); (A Marsh Island, > a novel (1885) ; (A White Heron and Other Stories*

(1886) ; (The Story of the Normans,* an his¬

torical work (1887);

(1890); (Tales of New England) (1890); (A Native of Winby, and Other Tales) (1893) ; (The Life of Nancy* (1895); (The Country of the Pointed Firs) (1896) ; (The Queen's Twin and Other Stories) (1899) ; (Betty Leicester's Christmas) (1899) ; (The Tory Lover) (1901). Consult her

lantic Monthly, Vol. XCIV, Boston 1904).

JEWFISH, a huge Californian game-fish

(Stereolepis gigas) of the sea-bass family (S erranidce) . It has a single dorsal fin, the soft part of which is shorter than the spinous portion, and is brown with black blotches and becomes much darker with age. Among the dense growth of kelp in moderately deep water along the coast of southern California the jew-

fish finds a congenial home. Belonging to a family of game-fishes and reaching a weight of 300 to 500 pounds, it has long been a favorite

object of sport for ambitious anglers.

Two other fishes of the same family but more closely related to the groupers are known as the Florida or black jewfish (Garrupa, nig-

rita) and the spotted jewfish (Promicro ps gut-

tains'). The former ranges from Florida to Brazil, and the latter widely through the warm parts of both Atlantic and Pacific oceans. The black jewfish is quite common about the coral reefs, in the caverns of which it lurks. Al¬

though not especially gamy, its enormous size and weight, sometimes reaching even 1,000

pounds, have induced a few anglers to essay its capture with rod and reel. It is easily distin¬

guished from the Californian jewfish by its greater robustness, strong canine teeth and rounded caudal fin. Consult Jordan and Ever-

mann, (American Food and Game Fishes)

(1903) ; Holder, (Big Game Fishes of the United States 5 (New York 1903).

JEWISH CALENDAR. The Jews date

their era from the Creation, which according to their tradition was 3760-61 years before the Christian era. The Jewish year is a lunar year and consists of 12 months with an additional one for leap year. The months have alternately 29

and 30 days, the 1st and 30th days being called New-moon. Each cycle of 19 years has 7 leap years, the 3d, 6th, 8th, 11th, 14th, 17th and 19th.

The spring months are called Nisan (in which the Passover is celebrated). Iyar, Sivan ; sum¬

mer includes Tammuz, Ab, Elul; autumn, Tishri, 60

Heshvan, Kislev ; and winter Tebeth, Shebat, Adar, with 2d Adar for leap year. The civil year began with the month of Nisan; the re¬

ligious with Tishri. Rules for the computation of the calendar were issued, after various meth¬

ods had been employed in earlier centuries, by Hillel II (330-365). The date usually assigned by Jewish writers to the year when Hillel fixed the calendar is 670 of the Seleucidan era, or 4119 a.m., or 359 of the Christian era. Consult (Jewish Encyclopedia) (Vol. Ill, New York 1912).

JEWISH CHARITIES. See Jews and

Judaism.

JEWISH CHAUTAUQUA. See Chau¬

tauqua, Jewish.

JEWISH EXCHEQUER, a special di¬

vision of the Court of Exchequer of England (1200-90) which dealt with lawsuits between Jew and Christian, chiefly in reference to debts due the former, and recorded the taxes im¬

posed on the Jews. The fact that it was found necessary to have a centre for Jewish business indicates the prominence in trade and finance of the Jews in England from the reign of Henry II to the period of their expulsion (1290).

The court did not long survive their denarture.

Many important data from its records have been jointly published by the Selden Society and the Jewish Historical Society of England.

JEWISH FRATERNITIES. While so¬

cieties for mutual benefit exist in large numbers among the Jews in every land, in the United States the fraternities or orders have acquired special popularity, and promote not alone Jew¬

ish solidarity but aid in maintaining many chari¬

table institutions. These organizations as a class give pecuniary benefits in case of illness, and death-endowments, which latter insurance fea¬

ture is now being made optional. The oldest and most influential is the Order of Benai Berith (<(Sons of the Covenant®), formed 60 years

ago, and having a membership of 35,000. Its 330 lodges extend over the entire country, and it has 13 lodges in Algeria, Bulgaria, Egypt, Tur¬

key and Palestine, 42 in Germany, 16 in Ru¬

mania and 10 in Austria. It supports orphan asylums in Cleveland, Ohio, Atlanta, Ga., San Francisco, Cal., a home for the aged at Yonkers, N. Y., a free library in New York, while it co¬

operates with an orphan home in New Orleans, a technical school in Philadelphia and a hos¬

pital for consumptives in Denver, Colo. The next leading order is the Free Sons of Israel, founded in 1849, with 97 lodges and 9,810 mem¬

bers. The Free Sons of Benjamin (1879) has 192 lodges, 14,088 male and 1,361 female mem¬

bers. The Berith Abraham (1859) has 365

lodges and 70,000 members. The I. O. Berith Abraham, with 302 lodges and 56,949 members, was founded in 1887. The Ahavas Israel Order (1890) counts 124 lodges. In addition there are seven other fraternities which have been recently started. The Order of Kesher Shel Barzel, founded a home for the aged at Cleve¬

land. Special efforts are now being made by the Benai Berith to institute lodges among the Russian and Rumanian immigrants.

JEWISH NATIONAL ORGANIZA¬

TIONS IN THE UNITED STATES. With

the rapid increase in recent decades of the Jewish population, due chiefly to enforced emi¬

gration from parts of Europe where anti-

Jewish legislation and unfavorable economic conditions have long prevailed, Jewish com¬

munities have markedly developed in numbers and influence with the general growth of Amer¬

ican cities, large and small. Hence the more urgent need of religious, educational and social organizations to cement more firmly scattered

elements and create greater attachment to their traditions. Such societies, too, ensure efficiency in the education of the young, in the relief of the poor; and in any co-operation with similar foreign organizations in times of danger and distress. Their activity is not exceptional, but is no less true practically of all religious or racial elements. To mention concisely the char¬

acter and work of the most important Jewish national organizations, the various fraternities are powerful factors in Jewish solidarity. The oldest and most influential, the I. O. B. B., had its 10th quinquennial convention in 1915, writh 40,083 members, 442 lodges (in North America, Europe, Asia and Africa), 11 districts, and three hospitals in Denver, New Orleans and Hot Springs, Ark. ; orphans' homes in New Or¬

leans, Cleveland, Los Angeles, Erie, Pa. ; Home for Aged in Yonkers, N. Y. ; six Sabbath and immigrant schools, a club at San Francisco, and employment bureaus at Chicago and Pittsburgh, with other agencies. The I. O. Brith Abraham had its 32d annual convention in 1918; it has over 200,000 members and 760 lodges. The order Berith Abraham, founded in 1859, has 58,000 members and 365 lodges. The I. O. Berith Sholom had its 14th annual convention in 1918; it has 54,000 members and 371 lodges. Other orders are the Free Sons of Israel, 8,000 mem¬

bers, Free Sons of Judah, 25,000 members. In¬

dependent Western Star Order, 22,000 members, the I. O. of True Sisters, in its 68th year, about 6,000 members. The Jewish Chautauqua was formed in 1893, has 5,000 members, with correspondence school faculty and about 60

circles of students. Of imposing numbers are various labor organizations, all founded within recent years and extending over the entire country. The Jewish Socialist Federation has over 5,000 members — its purpose is ((socialist and political agitation and organization of the Jewish working class,® with about 90 branches.

The Poale Zion Socialist Labor Partv is 12

years old, has 3,800 members and 77 branches.

The Socialist Territorialist Labor Party is 12

years old, has 3,200 members and 45 branches.

In the field of religion is the Union of Ameri¬

can Hebrew Congregation, organized 1893, com¬

posed in 1918 of over 200 congregations, the largest and most prominent in the country, with four departments, executive and financial, board of governors of the Hebrew Union College, board of delegates on civil rights, board “of managers of synagogue and school extension.

The Hebrew Union College has about 150 grad¬

uates in office, with a full staff of professors and a large body of students. In the same field of religion are the Union of Orthodox Jewish Congregation, founded in 1898, of lim¬

ited numbers, the United Orthodox Rabbis, or¬

ganized in 1907, 120 members, and the United Synagogue of America, founded in 1913, with a small but growing constituencv. Zionistic in character are the Order Sons of Zion (1908), 4,000 members and 87 camps ; the Socialist 61

Young Poale Zion (1915), 800 members and 19

‘ branches; Young Judaea (1908), nearly 350

circles, to popularize Jewish education and spread Zionism among Jewish youth; the Miz¬

rahi of America (1912), 4 bureaus, 100 organ¬

izations and 10,000 members, whose aim is (

can Zionism. Hadassah is the women’s Zionist society, founded 1912, nearly 30 chapters, affili¬

ated with American Federation of Zionists. Its purpose in America is to foster Jewish ideals and make Zionist propaganda; in Palestine, to establish a system of district visiting nursing.

The Federation of American Zionists, organized 1897, has 50,000 shekel payers and 156 societies, issues a magazine, leaflets, etc. The various Zionist Societies were merged in 1918 into one organization and a Jewish Congress was called in December to uphold Jewish

rights abroad.

In the special line of aiding the immigrant the leading society, Hebrew Sheltering and Im¬

migrant Aid, had its 29th annual convention in 1918. Its membership is over 76,000, and its purpose is to facilitate the lawful entry of Jewish immigrants, to provide temporary help, to discourage their settling in cities and en¬

courage agricultural pursuits, to foster Ameri¬

can ideals It has many affiliated societies, East and West. Theˆ Federation of Jewish Farmers (1909) has about 1,200 members and 45 so¬

cieties, and promotes admirably the interests of its adherents. Effective societies to encourage agriculture are the Jewish Agricultural and In¬

dustrial Aid Society (1900), which maintains a bureau of information and farm labor office, helps Jewish farmers by counsel and loans, publishes the Jewish Farmer, supports itinerant agricultural lectures, grants free scholarships at agricultural colleges and it was the first to organize agricultural credit banks in America.

The Council of Jewish Women (1893), has developed to over 90 sections in nearly all the States, and many junior auxiliaries. Its work is conducted under committees of religion, religious schools, philanthropy, reciprocity, peace and arbitration, education and immigrant aid, the latter a national feature, while the sec¬

tions engage in religious, benevolent and edu¬

cational work. The National Federation of Temple Sisterhoods (1913) co-operates with the Union of American Hebrew Congregations, has over 180 constituent societies and aids in the synagogue's social and educational activities.

The Council of Y. M. H. A. and similar socie¬

ties (1913) promotes the education, religious and otherwise, of its 372 component parts and acts as organizer and adviser. The National Conference of Jewish Charities (1899) has a membership of nearly 200 societies from all sections, with regular conventions and other helpful features. The 11th annual session of Jewish Social workers at

Pittsburgh in June 1917 had 300 delegates from every large city in the United States. It was there stated that the sum of $10,000,000 is spent yearly on Jewish organized charitable work. Among the sub¬

jects discussed were the needs of federation, social problems, child caring, art in settlements, mental hygiene, wife desertion and child aban¬

donment. The National Farm School (1896), with over 230 graduates and 2,500 members, conducts an agricultural school and farms, at Doylestown, Bucks County, Pa., to promote scientific farming and a taste for agriculture among young people, particularly recent immi¬

grants. The American Jewish Publication So¬

ciety (1888), 15,000 members, distributes 50,000

volumes yearly, issuing works in Jewish his¬

tory and literature for its readers, old and young. In 1917 it published a new translation of the Old Testament, and has planned a num¬

ber of scholarly works, original and translated, in various departments. It is aided appreciably by a number of important endowments. The Intercollegiate Menorah Association (1913) has branches in various colleges, publishes a maga¬

zine, and aims to study and advance Jewish culture and ideals among college men and women. The American Jewish Historical So¬

ciety (1892), 400 members, has issued 26

volumes. It maintains a collection of books, manuscripts and historical objects, and pub¬

lishes volumes of Jewish historical interest from year to year. The American Jewish Committee (1906) with a comparatively small membership, but fairly representative of Ameri¬

can Jewry, aims to prevent the infringement of Jewish civil and religious rights and to alleviate the consequences of persecution. Its func¬

tions are executive as well as advisory. It main¬

tains a bureau of statistics, co-operates with other organizations at home and abroad in Jewish interests, takes a leading part in secur¬

ing relief funds in emergencies, and issues pub¬

lications from time to time bearing on its activi¬

ties and related subjects. Consult the Year Books of the American Jewish Publication So¬

ciety (Philadelphia 1900-18).

Abram S. Isaacs.

JEWISH SECTS. See Samaritans; Phari¬

sees ; Sadducees; Essenes; Karaites (Jews and Judaism) ; Sabbatians.

JEWISH WAR, The (7 repi tov lovdaitiov nolefiov), a work of Flavius Josephus (b. c. 37; d. c. 96 a.d.) and the earliest of his writings which have been preserved. Its composition has been fixed in the latter years of the reign of Vespasian (69-79 a.d.). The Aramaic original has disappeared but the Greek version prepared by the author and some Greek scholars has survived. The author was a friend of the Romans in his later years and the object of (The Jewish WaD appears to have been an attempt to convince the Babylonian Jews of the invincibility of Roman arms and so deter them from revolt.

JEWISH WOMEN'S COUNCIL. Founded

September 1893, this organization has been of marked value in awakening the interest of American Jewesses in the history and literature of their creed as well as in developing among them modern methods in educational and charitable work. Affiliating with the National Council of Women it has arrayed on a common platform its representatives. The Council has a large increasing membership. Besides study¬

ing Jewish history and literature, it carries on activities in philanthropy, with settlements, sew¬

ing and industrial schools, kindergartens, man¬

ual training school, gymnasiums, free baths, day nurseries, personal service groups, kitchen gardens, and other forms of useful activity, often open to all creeds. Co-operation is en¬

couraged with the various other Jewish socie¬

ties.

(1) JEWS AND JUDAISM. Jews (from

Heb. Yehudi, man of Judah; Greek, ’ lovfialoi ; Latin, Judaei) is the general name for the Semitic people which dwelt in Palestine from the earliest times. At first the name was con¬

fined to the members of the tribe of Judah, but was later extended to include all subjects of the kingdom of Judah, and, after the Baby¬

lonian captivity, to all who professed the Jewish religion, whether dwelling in Palestine or else¬

where throughout the world, provided they traced their origin to the tribes of Israel or were converts to the Jewish faith. In modern times the words Jew, Hebrew and Israelite are used indiscriminately of the same people. In succeeding pages the ethnology, history, lan¬

guage, literature, religious life, racial character¬

istics, etc., of this ancient people are treated under the following headings :

1. History and Principles of

Judaism.

2. Jewish History.

3. The Hebrew Language.

4. Jewish Literature.

5. Jewish Philosophical

Writers.

6. The Jew in Art, Science

and Literature.

7. The Talmud.

8. The Masorah.

9. The Cabala.

10. The Karaites.

11. Anti-Semitism.

12. Zionism.

13. The Spirit of Rabbinic

Legislation.

14. A Century of Emancipa¬

tion.

15. The Synagogue.

16. Reform Judaism.

-17. Education and the Jews.

18. Commerce and the Jews.

19. Food and Health Laws.

20. Jewish Charities.

21. Jews in America.

22. Present Status of the

Jews throughout the

World.

23. Alliance Israelite Uni-

verselle.

1. THE HISTORY AND PRINCIPLES

OF JUDAISM. Judaism is the religion of the Hebrew people and of that portion of the same to-day known as Jews.* A religion which has been active in the world for so many cen¬

turies has naturally undergone modification as to details from age to age, both by growth from within and by adoption from without; but in essentials, Judaism has been character¬

istically staunch to its principles from its earliest days. The objects of this article is to outline, historically and concisely, the essentials, and briefly to mention the successive secondary points of accretion and modification. There are five ages of development to be distinguished.

I. The Patriarchal Age. — Judaism's funda¬

mental conception is its earliest : the spiritual nature of the Deity and His consequent eleva¬

tion above all human forms, methods and attributes. Though not clearly expressed in Genesis, this seems to be at bottom the lesson taught by the first Hebrew, Abraham, who, in the land of Canaan whither the divine call had summoned him from his home in Mesopotamia, built altars to the Living God and ((called upon His name.® These altars, built without images, taught the first principle of the spirituality of God, not to be represented by stock or stone.

What Genesis omits, Jewish legend as recorded in Talmud and Midrash abundantly supplies, in the shape of tradition — no doubt with suffi¬

cient substratum of truth — as to who Abraham *The Jews known to civilization to-day are the. descend¬

ants of only the smaller kingdom of Judah, which con¬

sisted of the two tribes of Judah and Benjamin (with a sprinkling of priests and Levites of the tribe of Levi) and which, in the year 586 B. C. E. was transported to Babylon by Nebuchadnezzar and allowed to return to Palestine by Cyrus, king of Persia in 536. The members of the larger kingdom of Israel — the Ten Tribes — were deported in the year 720 by Salmanassar, king of Assyria, to unknown re¬

gions in the interior of Asia, and have since disappeared from history.

came to the conception of an invisible spiritual God, and how he preached his first convictions of the new truth by vigorous assault upon the idols of his father, an image-carver, and his neighbors. Most scholars see in the abortive <(sacrifice of Isaac® (Gen. xxii) also an object-

lesson of protest against the prevalent Canaan-

itish practice of human sacrifices, and espe¬

cially of sacrifices of children. For the rest, we have, beyond the institution of Circum¬

cision (Gen. xvii, 9) as protest, and possibly as physical aid against the current temptations to the immoralities which formed essential features of Canaanite idolatry, no trace of any code of observance connected with this early form of Judaism; no regulations as to cere¬

monies or food-laws (compare Gen. xviii, 8, in contradiction to Ex. xxiii, 19), unless indeed the Noachide prohibition of blood (Gen. ix, 4) is to be understood as current among this branch of Noah's descendants.

II. The Formative National Age. — With the advent of Moses and the contact with a much more highly developed religious culture, that of the Egyptians, a more elaborate Juda¬

ism came into being. A definite central shrine as a visible mark of God's presence among men (Ex. xxv, 8), but still without any central image or idol ; and above all, the direct and formal acceptance by the Hebrews of a mission of enlightenment to the nations on behalf of ((the Holy God,® i.e., the Pure (Ex. xix, 5, 6), prepared the way for the adoption of a some¬

what complex religious ritual — cast in the uni¬

versally prevailing form of animal sacrifices and burnt offerings — together with a system of fasts, feasts and holy days, food-laws and health-

laws, regulations political and agricultural, the whole forming a body of legislation, set down in the later books of the Pentateuch, admirably suited both to Israel's formative desert-sojourn and to the promised period of reoccupancy of the land of Canaan, the old home of the patri¬

archs. Of fundamental principles we note in Moses' age, the Eternity of God (Ehyeh asher Ehyeh <(I shall be what I am,® Ex. iii, 14) ; the Unity of God, in contraversion of the multi¬

tudinous, circumscribed and mutually antago¬

nistic gods of Canaan and Egypt- the duty of uprooting the foul idolators and idolatries of the land of Canaan (Ex. xxiii, 24, 33; Deut.

vii, 1, 6) ; the fact of the divine revelation of religious and ethical

fundamentals (Deut. v, 22) ; the duty of serving God by acts of love and obedience to His revealed will (Deut. x, 12) and of training children in this practice (Deut. xi, 19); love of the neighbor — the <(Golden Ethic® — (Lev. xix, 18) ; love of the foreigner, <(for strangers were ye in the land of Egypt® (Ex. xxii, 21; Lev. xix, 34; Deut. x, 19), etc.

III. The Age of National Independence. —In spite of the loving warnings and wise safe¬

guards of the Mosaic legislation, the Hebrews when restored to the occupancy of Canaan did not remain faithful to their local mission, but, to a greater or less degree, fraternized with heathen nations to the extent of adopting their idolatrous ways and principles. The prophets urged to higher conceptions, but not always successfully: a superficial ceremonialism seems to have been the highest point attained by the yet uncultured people. ((To obey is better than sacrifice, and to harken than the fat of rams!®

(1 Sam. xv, 22) was Samuel's reproof to Saul.

It was not until David ascended the throne and brought to the national ceremonialism the ele¬

ment of reverential, spiritual elevation that Judaism at all approached the higher plane to which Moses inspired it. An elaborate central worship was planned and prepared for by David, with accessories of music and psalmody, and found its grand culmination in the stately temple of Solomon (b.c.e. 1018). But although the lofty religious spirit of David and the other psalmists found expression in this elaborate public ritual and exerted due influence over the popular mind, it needed all the energy and de¬

votion of the prophets during the reigns of Solomon's successors in the twin-kingdoms into which the Hebrews then divided, to maintain these lofty ideals. . The golden age of a spirit¬

ually exalted Judaism was surely reached when its preachers held up as the religion's highest teachings God's desire that men should be just and merciful, upright and generous, in prefer¬

ence to being ceremonially observant and ostentatiously pious (Isa. i, 12-17; Hos. v, 14, 15, 24; Micah vi, 6-9); God's willingness to extend

forgiveness to repentant sinners (Isa.

lv, 7; Jer. iii, 22, iv, 1, 2; Ezek. xviii, 21-32; Hos. xiv, 2) ; God's exalted spiritual nature, above all picture or comparison (Isa. xl, 18-

25) ; the ineffable superiority of His thoughts and His ways to men's thoughts and ways (Isa.

lv, 8, 9) ; and His intimate, interested knowl¬

edge and supervision of men's deeds (Ps. xciv, 7-11; Jer. xx, 12, xxiii, 24).

Political independence of other nations, however, might have had the evil result of sug¬

gesting that Israel's religion was the exclusive prerogative of. Israel's people. Against this narrow conception, too, the prophets contended, with their teachings of the Fatherhood of God unto all men (Isa. xlv, 22-24; Jer. x, 6. 7; Zech. xiv, 9, 16; Mai. ii, 10) and with the de¬

scription of a glorious epoch to come when ((many nations should go up to the mountain of the Lord, to the house of the God of Jacob, to learn of His ways and to walk in His paths®

(Micah iv, 1, 2). The strongest opposition to the growth and maintenance of all such ideals centred in the political ambitions of the people, and their frequent approximations — for polit¬

ical reasons fundamentally — to the paganism of one or other of their powerful neighbor-

states; so that the history of the Hebrews under their own kings is a record of continual re¬

lapses into idolatry and heathen immorality, together with revulsions, now and again, back to purer Judaism. The most enduring and prominent contribution to Judaism traceable to this age of religious storm-and-stress is the be¬

lief in the coming of a Messiah (((anointed one, king®), who was to be a descendant of the royal house of David, and, as earthly monarch over a reunited Israel, would restore the pure worship of the spiritual One God of their fathers (Isa. xi, 1-10).

IV. The Age of Exile and Oppression. —When the above-mentioned

political ambitions of the sister-kingdoms culminated in the de¬

struction of both (Israel in 720 and Judah in 586), the population of the smaller one, Judah, deported to the plains of Babylon, found there leisure and inclination for a closer and more devoted attention to their religion, which re¬

sulted in the growth of a minute formalism of observance and petty precept, substantiated and elaborated upon the foundation of the Mosaic law. Its multitudinous details are collected in the Talmud (see article The Talmud in this section), and for many generations after the Jews' return. to Palestine (536), the rabbis and sages of this epoch, both in Palestine and among those remaining in Babylonia, impressed their extremist piety upon the people ; not al¬

together, however, without protest. Not that the lofty ideals of the prophets were ignored; to the contrary, they were treasured and still further developed in many a noble dictum and many a shining example. But the popular senti¬

ment threw itself by preference into the re¬

ligion of ceremonial and observance, and when, after a brief oeriod of independence under the Asmoneans, the Jews succumbed to the military might of Rome in 70 c.e., this ceremonial bent proved the chief source of spiritualizing strength to teachers and people alike in the en¬

suing centuries of exile and oppression. A most elaborate accumulation of ritual observ¬

ance grew up in their new homes, in North Africa, Spain, France, Germany and Poland, codified from time to time by such Talmudical experts as Isaac of Fez, usually called (

(died, at Lucena 1103) ; Moses Maimonides, lived in Spain and Egypt, 1135-1204; Jacob ben Asher, died in Spain, before 1340, author of the (Arba TurinP ((Four Rows>); Joseph Karo, lived in Spain and Turkey (1488-1575), author of the (Shulchan AruclP ((Arranged Table >) . Obedience to these voluminous codes of ceremonial law constitutes to-day the chief difference between Jews of the <(Orthodox® and ((Re form® wings of modern Judaism, the former accepting, the latter rejecting, their binding force.

But while ceremonial formalism absorbed the religious thought and activities of the masses of the people in all their foreign homes, the

growing culture of the ages appealed forci¬

bly to the superior intellects of the Jews, espe¬

cially in such countries as Spain (both Moor¬

ish and Christian), southern France, Italy, etc., and deep philosophical expositions became numerous (see article Jewish Philosophical Writers). Their chief aim was still to maintain and fortify the doctrines of that spiritual sole God whom Abraham and Moses taught, not so much now in contravention of heathenism as in protest against the doctrines of the Christian Church. Perhaps as complete a presentation as is possible of Judaic tenets in this age may be found in the

wise including the Yigdal in its ritual (con¬

sult Union Prayerbook, compiled by the Cen¬

tral Conference of American Rabbis, Cincinnati 1894, Vol. I, pp. 162-163; Vol. II, pp. 120-121).

They include the unity, omniscience and incor¬

poreality of God, the truth of the prophecy of Moses and the prophets, future reward and punishment, the coming of Messiah, immortal¬

ity of the soul.

V. The Modern Age. — The divergences be¬

tween the two wings of modern Judaism, the 64

“Orthodox® and the “Reform,® rarely trench upon fundamental principles, but are mainly concerned with the observance or non-observ¬

ance of precepts and practices that have added themselves in the course of time and in various countries of sojourn, to the ritual features of the religion. The only serious approach to a fundamental difference is concerned rather with the political side of the religion, namely, the belief in a personal Messiah to come, a factor originating, as shown above, in the age when impending loss of national independence and the stress of national politics stirred the hope in superior minds for restoration of a Davidic kingship, with God’s law of mercy and justice, coupled with complete reverence, more potently in

sway than ever before. Reform Judaism deems that restored Jewish nationality in Palestine is by no means an essential feature of the Messianic age of universal . peace and righteousness, and therefore looks coldly to-day upon such nationalistic endeavors as Zionism (see article Zionism in this section). It does not seem attracted even to the Jewish Terri¬

torial Organization (familiarly called the Ito, from its initials), originating in 1905, having for its object the establishment of a Jewish state outside of Palestine. It agrees with Orthodoxy in refusing to make propaganda for the dissemination of Jewish principles other than by the passive policy of example and their inherent truth. In religious practice it rejects the minutiae of ceremonial observance, house¬

hold and synagogal. Reform Judaism is repre¬

sented to-day in the matter of seminary-instruc¬

tion in America, by the Hebrew Union College at Cincinnati; in Germany by the Jewish The¬

ological Seminary at Breslau, by the Hoch-

schule (now Lehranstalt) fur die Wissenschaft des Judenthums, at Berlin, and in Austria-Hun¬

gary by the Landes-Rabbiner Schule at Buda¬

pest. Orthodox Judaism counts, among others, the following seminaries : The Paris Seminaire Israelite de France, the London Jews' College, the Berlin Rabbinical Seminary, the New York Jewish Theological Seminary, and the Rabbin¬

ical College of America.

Bibliography.— Abbott, Hsrael in Eurone) (London 1905) ; Abraham, I., 'Jewish Life in the Middle Ages) (London 1896) ; Aguilar, Grace, (The Jewish Faith) (Philadelphia 1873) ; id., (The Spirit of Judaism* (ib. 1873) ; Bedar-

ride, (Les Juifs en France, en Italie et en Espagne* (3d ed., Paris 1867) ; Benisch, A., 'Judaism Surveyed) (London 1874) ; Cornill, C. H., 'The Prophets of IsraeP (9th ed., trans.

by Corkran, Chicago 1910) ; Drumont, 'La France juive* (Paris 1886);

Ewald, Heinrich, (Gesohichte des Volkes IsraeP (7 vols., 3d ed., Gottingen 1864-78; English trans., 5 vols., Lon¬

don 1869-74) ; Friedlander, M., ‘The Jewish Religion > (London 1891) ; Graetz, ‘Geschichte der Juden von den iiltesten Zeiten bis auf die Gegenwart* (11 vols., Berlin 1854-75; abgd.

English ed., 5 vols., Philadelphia 1873) ; ‘Juda-

ism) (in (The Jewish Encyclopedia, > Vol. VII, New York 1904) ; Joseph, M., ‘Judaism as Creed and Life® (London 1903) ; Jost, ‘Ge-

schiohte der Israeliten seit der Zeit der Makka-

baer bis auf unsere Zeit) (10 vols., Berlin 1820-

47) ; Kohler, K., (Manuel of Judaism* (New York 1898) ; Lazarus, M., ‘The Ethics of Juda-

’snP (trans. by H. Szold, Philadelphia 1900) ; Magnus (Lady), (OutIines of Jewish History*

(ib. 1890) ; Meyer, Ed., ‘Entstehung des Juden-

tums) (Halle 1896) ; Milman, H. H., (History of the Jews) (rev. ed., 2 vols., New York 1909) ; Montefiore, ‘Lectures on the Origin and Growth of Religion as Illustrated by the Re¬

ligion of the Ancient Hebrews) (London 1893) ; Renan, E., (Le judaisme comme race et comme religion) (Paris 1883) ; Reinach, J., (Histoire des Israelites* (2d ed., Paris 1902) ; Schechter, (Studies in JudaisrrP (Philadelphia 1896) ; Stanley, A. P., ‘Lectures on the His¬

tory of the Jewish Church * (3 vols., London 1864—76 ; 3 vols., New York 1901-02) ; Taylor, C., (Sayings of the Jewish Fathers) (2d ed., Cambridge 1897).

Frederick de Sola Mendes,

Rabbi and Author , West End Synagogue, New York City.

2. JEWISH HISTORY. I Pre-Exilic

Times. — Although the title “Jew® is not known until Israel’s return from the Exile, 536 b.c.

(Ezr. iv, 12), Jewish history precedes the Exile by 2,000 years. The

progenitor was Abraham, who, hailing from Ur of the Chaldees, is known, not as a “Jew,® but as a “Hebrew®

(Gen. xiv, 13). As patriarch of his tribe, he was succeeded by his son Isaac; Isaac, in turn, by Jacob, surnamed “Israel,® and Israel by his 12 sons, who, after the slavery of their de¬

scendants in Egypt, became the heads of 12

tribes, known collectively as “Israel® or “the Children of Israel® (Ex. i, 1). Among the 12

tribes, neither Levi, who was destined for the service of God, nor Joseph, who was supplanted by his two sons, Ephraim and Me-

nasseh, is represented. With the conclusion of Egyptian servitude, the Children of Israel were formed into a nation by Moses, their liberator.

Moses led Israel, by a circuitous route, through the desert, toward Canaan. Forty years were consumed in making that journey, during which time Israel’s appointment as “a kingdom of priests and a holy nation® with the establish¬

ment of a theocracy as highest aim was made known; religious tenets, ethical precepts, hygienic laws and social principles were pro¬

mulgated ; a tabernacle, with an elaborate sacri¬

ficial cult, was established; countless hardships were endured; frequent rebellions were insti¬

tuted and numerous battles were fought.

Upon his death, Moses was succeeded by Joshua, a warrior chieftain, who, crossing the river Jordan, and vanquishing many of the native tribes, divided Canaan, by lot, among the tribes, and set up the tabernacle at Shiloh.

The natives who were not vanquished proved sources of annoyance to the invading Israelites, and often made certain portions of Israel trib¬

utary to them. This condition called for the “Judges® .who, b” means of battle, succeeded in regaining for the Israelites their independ¬

ence. Of these there are 15 most celebrated, among whom are Deborah, Gideon, Samson and Samuel, also the. first of the prophets, a class of men whose principal aim was to keep Israel free from the

contaminating heathen influences of the natives, and loyal to the higher worship of the one God. It was in Samuel's days, about the middle of the 11th century b.c., that democratic Israel became a monarchy. Saul was made king. His throne did not pass over to his son, but to David, who had proved victor in many battles against the harassing JEWS AND JUDAISM –

Philistines. Upon the close of David's life, re¬

plete with warfare, his son, Solomon, who be¬

came the architect of a powerful kingdom, suc¬

ceeded him. He beautified Jerusalem, the capi¬

tal, built the first temple, constructed palaces, extended commerce and made many alliances with foreign nations. Although his was a golden age, it was in his time that idolatry was introduced into Israel. Upon his death (977

b.c.) a revolt broke out. Solomon had taxed the people heavily, to further his many expen¬

sive ventures. The people wanted the taxes de¬

creased. Rehaboam, his son and successor, re¬

fused to listen to the clamors of the people.

Ten tribes seceded and formed an independent kingdom, called the (

ing to Rehaboam only Judah and Benjamin, termed the ((Kingdom of Judah.® Israel had 19

and Judah 20 kings. Jeraboam, the first king of Israel, desirous of weaning the tribes of their attachment to Jerusalem, the common sanctuary, introduced the calf worship in Dan and Bethel. Israel, through the example of its kings, went from bad to worse, until, in 719 b.c., Samaria, Israel's capital, was destroyed, and the people constituting the 10 tribes were deported to Assyria by Shalmanezer IV, to become lost forever. Judah, too, entered upon the down¬

ward path. With the exception of occasional and temporary reforms under Asa (954), Heze-

kiah (720) and Josiah (627), Judbh was idol¬

atrous, always reflecting the fetichism of sur¬

rounding nations. The exhortations of such prophets as Elijah, Elisha, Jonah, Amos, Joel, Hosea, Zechariah, Micah, Isaiah, • Zephaniah, Jeremiah and others, were of no more avail with Judah than with Israel, so that in 586

b.c., Jerusalem was razed to the ground, the temple destroyed and the people taken captives to Babylonia by Nebucl adnezzar.

II. From Exile to Dispersion. — The cap¬

tivity lasted 70 years. Many of the Judeans hoped for a return to their land and for a res¬

urrected commonwealth. They met with en¬

couragement at the hands of the prophets Eze¬

kiel, the Babylonian Isaiah, and Haggai. In 538

b.c., Cyrus, king of Persia, taking Babylonia, permitted the Jews to return to Jerusalem, in order to rebuild it and erect a temple. Only a part took advantage of the privilege to join the first pilgrims, under Zerubabel. The building of the temple was interrupted, as a result of the charges brought against the Jews by the Sa¬

maritans, Assyrian settlers of Samaria. How¬

ever, in 516 b.c., the Temple was comoleted. In 459, Ezra, a scribe well versed in the law, who was, in course of time, followed by Nehemiah, came to Jerusalem. Nehemiah regenerated Judah physically, and Ezra culturally. Ezra was responsible for the formation of the Great Assembly, the study of the law, the rejuvenation of the literary genius, and the beginnings of the synagogal service. With the invasion of Alex¬

ander the Great into Asia (332 b.c.), Jews came into contact with Greek thought, which did not leave them altogether unaffected. Judah had become tributary to Egypt, whither the Greek civilization was transplanted, and two parties, Hellenists and Hassidim arose: the Hellenists admitting philosophy as man's guide, and the Hassidim recognizing only the law of Moses (Torah).

While these two parties' were in dispute,

Syria gained control of Palestine, and, in course of time, aimed at the destruction of Israel, the confiscation of the Temple and the destruction of Israel's faith, under Antiochus Epiphanes (168 b.c.) . Thus came into existence the Mac¬

cabees. They took up arms against Syria, re¬

gained the Temple and eventually won for the Jews national independence, so that when Judah allied itself with Rome (140 b.c.), it once more had a king in John Hyrcan (135 b.c.). It was at this time that Biblical literature, which had begun to thrive with the return of the Exile from Babylonia, flowered most luxuriantly. However, Jewish independence was not to endure very long. The Jews were divided by parties, such as the Pharisees, Sadducees and Essenes (qq.v.). The Idumseans were converted to Judaism. One of their number, Herod I, ob¬

tained control of the Jewish state and was pro¬

claimed king by the Roman Senate (37 b.c.).

In their political and religious hostilities, Rome was called in to act as arbiter and assumed the dictatorship. Rome, the friend, soon turned enemy. It tried to get possession of Jerusalem and succeeded in its undertaking under Titus (70 a.d.) . After a long siege, the city was burned, the Temple destroyed and thousands of Jews were carried away captives to Rome.

III. From Exile to Close of Oriental

Schools. — Many foresaw the doom of the Holy City. The law of Israel had grown to be more than the Bible, and Israel's life was no longer thought to be dependent upon the possession of Palestine. An attempt was therefore made to save the law and life. Rabbi Johanan ben Sac-

cai requested of Rome — and the request was granted — to be allowed to remove from Jeru¬

salem to Jabneh, in order to establish there a school, whose purpose would be to keep intact the teachings which had grown up in the earlier schools of Palestine. Thousands of pupils fol¬

lowed the teacher and soon the Sanhedrin, the religious court of the Jews, was transplanted thither. Although Rome permitted Johanan to

found a school in Jabneh, Rome did not look with favor on Israel's new lease on life. It interdicted the study of the law, the secret of Jewish preservation and seconded its interdic¬

tions by persecutions and massacres, among which the death of the 10 martyrs, participants in the Bar-Cochba revolution, during the reign of the Emperor Hadrian, was undoubtedly one of the most bloody (135 a.d.). Unable to en¬

joy the rest and peace on Palestinean soil, the Jews soon found their way to ever friendly Babylonia, where many of their brethren so¬

journed. The Rabbis, who had been forbidden to erect schools in the Holy Land, established them in Babylonia. It was in the very midst of the constantly shifting centre of Jewish gravity and the uninterrupted stream of perse¬

cution, that Rabbi Jehudah, a Palestinean rabbi (190), deemed it necessary to collect, in perma¬

nent, systematic form, all the civil, criminal, re¬

ligious and ethical principles which the new surroundings had brought into existence, calling the name of this collection (

ally produced, the Palestinean Talmud (375) and the Babylonian Talmud (550) ; the two Talmuds containing the discussions of the schools on the teachings of the Mishnah. (See 66

article Talmud in this section). Residence in Palestine was made more and more impossible for Jews. In Palestine, beginning with the Council of Nice (325), Jews were exposed eventually to the hostilities of the Church, as well as to those of imperial Rome ; whereas on the other hand, they were granted fair treat¬

ment in Neo-Persian Babylonia. In Babylonia they had a political head in the "Exilarch®, and religious authorities in the "Gaons® of the academies. It was in these schools that the Bible was given its present canonical form, that the vocalization of the Hebrew text of the scriptures was fixed, that the many Midrashim were created, that additions were made to the prayer-book, and that numerous ceremonies were established.

That the positions of honor held out to the Jews of Babylonia filled the more prominent among them with ambition goes without saying.

Anan ben David (761) expected to be pro¬

moted to the Exilarchate, but was disappointed.

Incensed by his disappointment, and later im¬

prisoned for having himself proclaimed anti-

Exilarch, he, as soon as released, assumed the aggressive toward the prevailing Jewish thought current of Babylonia, instituting a movement called “Karaism.® (See article The Karaites in this section). In justice it must be confessed that the movement was beneficial as well as detrimental to the Jews of those times, for it helped to check their imagination which had often run riot in their understanding of scrip¬

tures. Rabbinism was recast, and in its recast form found an ardent champion in Saadia ben Joseph (892-942) who, though a native of Fayum in upper Egypt, attained to the Gaonate of Sora, because of his Biblical, Talmudical, and grammatical knowledge and his religio-

philosophical genuis. As long as his school of Sora had at its head a man like Saadia, the wrangles between the Jewish scholars of Baby¬

lonia and the growing Mohammedan antago¬

nism to Jews and Judiaism, both disintegrating influences of the Babylonian academic life, did not make themselves markedly felt; but when once Saadia was no more, the decline of the schools of the East was inevitable. To prevent the closing of the schools, four scholars (948), Shemarya ben Elchanon, Chushiel, Nathan ben Isaac Cohen and Moses ben Chanoch, were de¬

spatched to scattered Jewry, to collect funds for the maintenance of Sora. They embarked on the same vessel, which was captured by a Spanish-Arabic admiral, and thus became sep¬

arated forever; Shemarya going to Alexandria, Chushiel to Cyrene, Nathan to Narbonne and Moses to Cordova. Thus was the last hope of Babylonian Jewry defeated and the Jews began to make history in European countries.

IV. From Close of Oriental Schools to Close of 16th Century.—

Although Jewish his¬

tory now takes us into European countries, Jews lived in Europe long before the middle of the 10th century. Already in the earliest cen¬

turies of the Common Era, Jews, who soon grew into fair-sized communities, contributing to the prosperity of the various governments, were found in all countries, in consequence of the. Jewish dispersion. Welcomed upon their arrival wheresoever they settled, they did not anywhere continue to live long in the enjov-

ment of peace. Europe made suffering the badge of all their race. They were misunder¬

stood and misrepresented ; they were regarded unbelievers and infidels. Not only during the Crusades did they suffer, as for instance in Rouen, Treves, Speyer,. Worms, Cologne, Ratis-

bon, Prague (1096), in South Germany and h ranee (1147), in Toledo (1212), in'Anjou and Poiton (1236), but also in times and amid con¬

ditions which held out peace to others. Time and time again edicts restricting them were unjustly promulgated, as, for example, by Pope Gregor}ˆ VII (1078), by the government of France (1198), by the Council of Avignon (1209), by Pope Innocent III, instituting the "Jew Badge® (1215), by the Council of Za¬

mora (1313), by Juan II (1412), by the Council of Basle (1434), by Eugenius IV (1442), by Paul IV (1555), and in Russia in 1881 and still later. Time and again they were crowded into Ghettos, as for example in Rome, Prague, Frankfort and the Russian Pale. Time and again their literature, especially the Talmud, because not understood, was either unjustly burned, asˆfor instance in Paris (1242), in Cre¬

mona (1559), or publicly attacked, as by the Dominicans (1507), or forbidden to be studied, as by Pope Benedict XIII (1415). Time and again the Jews were unjustly accused of the use of Christian blood for ritualistic purposes, as in Blois (1171), all over Germany (1283), in South Germany (1431), in the case of Simon of Trent (1475), which brought a Jewish persecution in its train in Ratisbon, in Damascus (1840) and in Tiszla Eszla, Hungary (1882). Time and again they * were unjustly imprisoned, as in England by King John (1210), and again in 1278. Time and time again they were unjustly banished from their homes, as from Granada (1066), from France (1254), from England (1290 X a second time from France (1306) and a third time (1394), from Cologne (1426), from Spain (1492), from Portugal

(1497), from Prague (1561), from the Papal States (1569), from Italian principalities (1597) and from Worms (1615). Time and again they were unjustly persecuted and massacred by the thou¬

sands, as in London (1189), in Germany all the way from the Rhine to Vienna (1190) and again in Germany in 1298 and frequently thereafter in France (1321), all over Europe on account of the “Black Death® (1348), in Spain (from 1391

to 149ˆ), in Silesia, and Poland (1453), in Por-

tugal (lo30), again in Poland (1648), and in Germany, Austria and Russia as late as our times, on account of anti-Semitic agitations.

That all of this suffering stunted the Jews physically is self-evident, and that it, to a cer-

tain extent, prevented the broadest spiritual un¬

folding, in accordance with the brighter light of their religious genius, is therefore not surpris¬

es- The spintual offspring of persecution was that mysticism known as the Cabala (see article The Cabala in this section), and the belief in such pseudo-Messiahs as Serene (720) David Alroy (1160), Abraham Abulafia (1279)’ Asher Lemmlein (1502), David Reubeni and Solo¬

mon Molko (1558), Isaac Luria (1569), Sab-

ns, tcii Zevi (166d) and others. However bar-

ring these vagaries, the Jews developed a phe¬

nomenal intellectual activitv, not merelv along religious, but along all lines of thought.’

With the arrival of Moses ben Chanoch in Cordova (945) the Jews took an active part in 67

the development of far-famed Andalusia.

Apart from the celebrated Spanish seats of learning they helped to create, they also culti¬

vated a many-sided specific Jewish literature.

Versed as the Spanish Jews became in Arabic lore, and acquainted as they were with the work done by the Moors in Arabic philology, they soon began to apply the science of philology to Hebrew grammar and lexicography. Biblical criticism found in them champions. Philosophy and poetry were cultivated among them by fa¬

mous men. Simultaneous with the Jews in Spain, those of France also were intellectually active. The Jews of Italy, too, were bound to grow likewise. In Germany and Poland, the specific literature produced by the Jews cov¬

ered, for the most part, the ritual, Biblical in¬

terpretation and legal codes.

V. From Settlement of Jews in Holland Until the Present Time. — Although the flower¬

ing of Spanish-Jewish life, which came to an end in the reign of Ferdinand and Isabella of Spain, through the intrigues of their chief in¬

quisitor, Torquemada, in 1492, was noticeable in Italy and Turkey in consequence of the wel¬

come these countries extended to the hapless fugitives, that flowering was most apparent in Holland. Holland had become the most ardent champion of the broadest liberty, from the time that it threw off the yoke of Philip II of Spain.

Thither, therefore, countless Jews, more par¬

ticularly the. Marranos, who were obliged to profess Christianity outwardly and practice Judaism only secretly, found their way, and soon made of Amsterdam a second Cordova.

Being unchecked and unhampered by restrictions of any kind, it was only natural that the Jews of Holland became, in due course of time, ex¬

ponents of a comparative rationalism in re¬

ligion, to the extremes of which as preached by Benedict Spinoza, the Amsterdam Rabbinate, Saul Levi Morteira and Isaac Aboab, objected.

The Jews of Holland, never very numerous, contributed no little in

defining the trend of Jewish history; and yet, however otherwise valuable their contribution to the happier and higher life of the Jews may have been, one event, for the occurrence of which Menasseh ben Israel is responsible, stands out in bold re¬

lief. That event is the readmission of Jews into England under Cromwell (1655), they hav¬

ing been forbidden to dwell there for several centuries. The rationalism of Holland Jewry may not have influenced Jewry immediately all over Europe, but it worked with telling sub¬

tlety and effected sure results the moment the Jews began to be treated with more justice than they had been previously accorded. Now a pseudo-Messiah like Berachyah may have de¬

luded the people ; now an enemy like Eisen-

menger (1700) may have misrepresented them; and ‘now Chassidism (an unnatural piety) may have claimed to be the ideal conduct for the Jew, as was the case at the time of Israel Baal-

shem (1750), the founder of the movement; still, it was a question of only a short time, how soon the bars hemming the Jews in from with¬

out and the bolts hemming them in from within would be broken.

The year 1729 witnessed the birth of Moses Mendelssohn (q.v.) in Dessau, Germany. Hav¬

ing gone from his native town to cultured Ber¬

lin, having learned the sciences, philosophy and JEWISH HISTORY (2)

ethics and having become acquainted with Les¬

sing (q.v.), whose ((Nathan the Wise® he be¬

came, he attempted to explain the Jew and his faith to the Jew himself and to the world, so as to prove the Jew’s right to the privileges of citi¬

zenship. The first attempt he made in this di¬

rection was to translate the Pentateuch (1778) and other Biblical books into German for the Jews, in order to wean them of the jargon, which translation was soon followed by his (Jerusa¬

lem y and (Morgenstunden.) He was called upon to answer not only attacks made upon his people by non-Jews, but also those made upon him by his own people, to whom the jargon had become a sacred tongue and the narrow Ghetto life the natural Jewish life. Unwelcome as his good offices were in many quarters, they soon began to tell without and within Jewry, in France, Batavia, Westphalia, Hamburg and Mecklenburg. In the meantime, Jews were permitted to enter German gymnasia and uni¬

versities. Leopold Zunz and Isaac Markus Jost availed themselves of the opportunity, with others, built on the foundation laid by Men¬

delssohn,, and hence are the fathers of the move¬

ment which is known as the (

ism,® and has made itself felt all over the world, more especially Europe and America.

Although these men and their followers worked unceasingly to place the Jew, his faith and ideals before the world in their true light, prejudice and persecution against the Jews still continued to live. The year 1819 witnessed persecutions whose tocsin was the shout C(LIep-Hep® (Hie-

rosolyma est perdita, i.e., ˆJerusalem is de¬

stroyed®). The Jew's rights had to.be won by incessant fighting. The emancipation of the Jews of German states, won in 1848, required the constant defense of a Gabriel Riesser, Ferdi¬

nand Lasalle, Eduard Lasker and Karl Marx in Germany, of an Isaac Adolphe Cremieux in France, of a Moses Montefiore in England, of an Alliance Israelite Universelle in the Orient and of a Union of American Hebrew Congre¬

gations, with Isaac M. Wise as creator, in the United States. To-day the Jews live in almost all parts of the world. They number about 11,000,000, the greater part being in Russia, and 3,000,000 in the United States. Wheresoever sufficiently numerous, they worship in large and stately synagogues. Their mode of worship varies in degree of ceremonialism, ritualism and the language of prayer, though the Hebrew is heard in all synagogues. In every country they have one or more theological seminaries, the first of the modern type having been founded at Breslau in 1854. A movement which has, in recent years, become prominent on ac¬

count of Russian persecutions, but has been variously interpreted by its several factions, is ((Zionism,® which primarily aimed to estab¬

lish, for persecuted Jews, a legally assured home in Palestine. As a humanitarian move¬

ment, if feasible, it appeals to all Jews. As a national movement it has opponents as em¬

phatic in their opposition, as are its champions emphatic in their propaganda. Though the Jew is justly called the ((Wandering Jew,® he is not any the less justly termed, because of his life, despite persecutions and massacre, the ((Eternal Jew.®

Bibliography.— /. Pre-Exilic Times— Bible; Kuenen, A., ‘Religion of Israel;* Renan, E.t JEWS AND JUDAISM — THE HEBREW LANGUAGE (3) (Histoire du Peuple Israel ;> Wise,

tory of the Israelitish Nation from Abraham to the Present Time) ; Stanley, A. P., (History of the Jewish Church.)

D. From Exile to Dispersion. — Cheyne, (Jewish Religious Life after the Exile) ; Jas-

trow, M., (Vier Jahrhunderte aus der Ge-

schichte der Juden, etc.); Meyer, E.,

hung des Judenthums) ; Schuerer, (Jewish Peo¬

ple in the Time of Christ) ; Wise, (History of the Hebrews’ Second Commonwealth. >

III. From Exile to Close of Oriental Schools.

— Geiger, ; Neu-

bauer, ‘Geschichte des Karaeerthums) ; Rose-

nau, ‘Some Ancient Oriental Academies.) IV. From Close of Oriental Schools to Close of the 16th Century. — Blunt, (History of the Jews in England) ; Kayserling, (Geschichte der Juden in Portugal } ; Lea, (History of the In¬

quisition and the Middle Ages) ; Ranke, his¬

tory of the Popes> ; Krauskopf, (Jews and Moors in Spain.)

V. From Settlement of Jews in Holland until the Present. — Karpeles, (Jews and Juda¬

ism in the 19th Century) ; Philipson, D., <01d European Jewries); Ritter, (Geschichte der Juedischen Reformation.)

F/. General References. — Abrahams, Jew¬

ish Literature); Dubnow, (Jewish History;) Deutsch, (Philosophy of Jewish History) ; Geiger, (Judaism and Its History) ; Graetz, (History of the Jews); Hosmer,

. William Rosenau,

Associate in Post Biblical Hebrew, Johns Hop¬

kins University; and Rabbi of Congregation Cheb Shalom, Baltimore, Md.

3. THE HEBREW LANGUAGE. Origin

and Name. — Hebrew is the language of the ancient Hebrew nation. It is a Semitic lan¬

guage, that is to say, one of the great group of languages spoken in antiquity and to a great ex¬

tent in modern times also, in southwestern Asia and contiguous regions by the nations de¬

scended, according to the account given in Gen.

x, 21—31, from Shem, the son of Noah* The Semitic tongues are divided into four great divisions or branches, the South Semitic or Arabic, the. Middle Semitic or Canaanitic, the North Semitic or Aramaic and the East Sem¬

itic or Assyrio-Babylonian. The Hebrew be¬

longs to the second or Canaanitic branch and has, as its sister dialects, the Canaanitic tongues, the Phoenician of the coast cities and the Punic of Carthage and its colonies. The name He¬

brew language does not appear to have been its original designation. In Isaiah xix, 18, it is called “the language of Canaan” and in 2 Kings

xvm, 28 Isaiah xxxvi, 11, 13, Neh. xiii, 24, it is called “Judean” or “Jewish.” f In the Tal-

I!” caˆed athe language of the sanctuary”

(Sanh. 21 b. et-alia). By modern writers it is called ((the language of Eber” or “Hebrew.” $

The Canaamtes and Phoenicians are stated in this chapter to have descended from Ham. Their language however, undoubtedly belongs to the stock now designated t ˆi?hlS Tay, siSnify either the speech of the tribe of called °r °* the whole natlon which afterward was thus t The term EfipaiOTi Hebrew

Testament to designate the Aramaic

rather than the true Hebrew.

is used in the New

vernacular of Palestine

Old Testament Hebrew. — With the excep¬

tion of parts of Daniel, Ezra and one verse in Jeremiah, Chap, x, vii, the entire Old Testament is written in Hebrew. Considering the long pe¬

riod of time over which the composition of the Biblical books extends one would naturally ex¬

pect great variations in their linguistic and grammatical forms. As a matter of fact there is a most surprising uniformity and homogene¬

ity. The Hebrew of the earliest is practically identical with that of the latest books. The probable reason of this, is that in the Biblical writings ,we have the literary idiom, which is fixed, as distinguished from the spoken lan¬

guage, which undoubtedly varied greatly in dif¬

ferent times and regions. The fact that the Biblical books were revered as sacred also un¬

doubtedly contributed to this uniformity of dic¬

tion. However, a progressive variation, due to historic influences, is

clearly discernible also in the Biblical Hebrew. The language tends con¬

stantly to become Aramaized. The earlier writ¬

ings. are purest in their language, the later waitings contain man}'-Aramaic nouns, verbs and. terms of expression. Such books as Ec¬

clesiastes and the Song of Songs are closely approximate in their language to the Mish¬

it1 Hebrew. Job shows a strong Ara-bic influence.

Other Sources of Hebrew. — Outside of

the Bible the ancient Hebrew is only preserved in some few inscriptions. These are chiefly the iooAˆrate<ˆ Mesa stone, an inscription found in 1880 near the Pool of Siloam at Jerusalem and the coins of the Maccabean princes and of the revolts against Vespasian and Hadrian.

Grammatical Structure.— The Hebrew in

its grammatical structure, exhibits in general the characteristics of the Semitic family of lan¬

guages, which differs greatly from the Indo-

Germanic, its most prominent neighbor. Its most striking characteristic is its root-system.

All the parts of speech are derived from roots or word-stems which are almost invariably tri-

literal. Modifications, such as conjugation in verbs and declension in nouns, are indicated generally by internal or vowel changes. The verb has but two tenses, the uses of which vary in accordance with peculiar rules. The noun has only two genders, masculine and feminine and no direct, method of indicating case rela¬

tions for which purpose pronominal prefixes are usually employed. Possessive pronouns and pronominal objects of the verbs are indi¬

cated bv suffixes. Compound nouns are almost unknown, except in proper nouns. The syntax is extremely simple and direct co-ordination of clauses without periodic construction, is the rule. These facts would seem to indicate pov¬

erty and lack of development in Hebraic ex¬

pression. . But it rather indicates directness of grasp of ideas which are presented with the pic¬

turesque clearness of word-photography, rather than in the. vagueness of involved relationships.

I his. is strikingly exemplified by the Vav con-

versive or consecutive, as it is termed by mod-

ern grammarians. This peculiar usage of the conjunction, unknown in the other Semitic tongues, enables the Hebrew to picture the se¬

quence of events, past or future, with a clear¬

ness and directness of connection impossible in other languages. Another example of the real¬

istic directness of Hebrew speech is the fact that in it the so-called ratio obliqua or indirect

discourse is unknown. All quotations are made in the very words of the speaker.

Relation to Indo-European. — The Hebrew grammar shows, as has been stated, no evidence of relation to the Indo-European tongues.*

Lexicographically there is much more agree¬

ment. A great number of Hebrew word-stems agree in sound with Indo-European terms of the same sense. But these are largely confined to onomatapoetic words or to such whose simi¬

larity may be explained as merely fortuitous.

They do not establish any historical or generic relation which is inconceivable without agree¬

ment in grammatical structure.

Loan-Words.— The Hebrew, even in its

purest state, contains numerous loan-words, de¬

rived from the languages of the peoples with whom the Hebrews came into contact. Exam¬

ples of such are: from the Egyptian, Yeor, ((the Nile” ; from the Persian, Pardes, (

In the later stages of the language these for¬

eign terms increase greatly in number. The Mishnah Hebrew, for instance, contains several hundred terms derived from the Greek and Latin. Conversely, Hebrew loan-words are found in Greek and Latin, notably the former, as for example xpvaog, gold, Heb. **nn Hams.

Many of these terms occur in early Greek writ¬

ings, thus showing contact of the two peoples at a much earlier date than it is known historic¬

ally to have occurred. These Semitic terms in the classic tongues may, however, have been in¬

troduced by the Phoenicians in their commer¬

cial expeditions and not be due to direct contact with the Hebrews.

Mishnah Hebrew. — It is a somewhat gen¬

eral, but erroneous, supposition that during the Babylonian exile the Jews entirely unlearned the colloquial use of the Hebrew, and that the Hebrew of the Mishnah is an artificial tongue, the product of the schools. As a matter of fact the Hebrew continued to be a living language throughout the period of the second temple, though limited to narrowing circles of the peo¬

ple. Because of its being chiefly represented in the Mishnah and other Halachic works, the language of the second Jewish commonwealth is known as Mishnah or Mishnaic Hebrew. It differs greatly from the Biblical Hebrew ; but these differences are only sufficient to stamp it as a different dialect, not a different tongue.

The main differences are as follows : the Mish¬

naic Hebrew contains a much greater number of foreign terms than the Bible language, its syntax is considerably modified by Aramaic in¬

fluence, the feminine future or imperfect plural forms and the Vav

conversive have disappeared, the plural ending D? = im has become \ = in, the suffix dt = am is changed to]T = an, the participles are more extensively used, the par¬

ticle shel^^St? frequently preceded by the pos¬

sessive suffix is often employed as a substitute for the construct state, prepositions and con¬

junctions are more numerous and are used differently than in the Biblical Hebrew and many new terms have been coined from exist¬

- An exception must be made in the case of the German causative verbs, produced by modification of the original vowel of the verb, e.g., schwimmen, to float, schwemmen, to cause to float, sinken, to sink, senken to cause to sink.

This is exactly in the manner of the Semitic tongues and is a peculiar phenomenon.

ing Hebrew roots. In all this the influence of the schools was no doubt very potent. In the liturgy the language used is much closer to the Biblical model.

The Neo-Hebraic. — With the destruction of the second temple and the scattering of the Jews throughout the world influences disruptive of the Hebrew increased greatly in intensity.

As a medium of spoken intercourse it almost ceased to exist, but as a literary medium it has been cultivated and used continuously up to the present day. This later form of the language is known as Neo-Hebraic or New Hebrew. It is not a uniform language but differs greatly ac¬

cording to the capacity of the writer and the nature of the subject treated, in some composi¬

tions being almost classic in beauty and correct¬

ness, while in others it degenerates into a mixed and corrupt jargon. At present the Hebrew is experiencing considerable of a Renaissance, principally in Russia and Palestine. Works on all possible subjects are written in it and a sys¬

tematic effort is made to qualify it for all the purposes of a modern tongue by the introduction of new terms, coined mainly from the old

Hebrew roots, for all modern concepts. Efforts are also made to rehabilitate it as a medium of spoken intercourse by the formation of societies whose members are pledged to speak only Hebrew with each other. In Palestine, where not only historic sentiment but the existence of diverse Jewish elements side by side have made the revival of the Hebrew not only desirable but necessary, these efforts have been most suc¬

cessful and the Hebrew has become again to a great extent the spoken language of the Hebrew people.

Bibliography. — For Biblical Hebrew in

general consult Gesenius, (Geschichte der He-

braischen Sprache und Schrift5 ; Noldeke's ar¬

ticle, (Sprache, hebraische5 (in (Schenkel's Bibel-Lexicon,5 Vol. V) ; Cowley, A. E., He¬

brew Language and Literature5 (Encyclopedia Britannica,5 11th ed., Vol. XIII). For the relation of Hebrew to the other Semitic tongues consult Renan, (Histoire generale et systeme compare des langues semitiques5 (5th ed., Paris 1878) ; Hommel, (Die Semitischen Volker und Sprachen5 ; Brockelmann, (Grundriss der ver-

gleichenden Grammatik5 (Berlin 1907); Wright, W., Eectures on the Comparative Grammar of the Semitic Languages5 (Cambridge 1890). For Aramaisms consult Kautzsch, (Die Aramaismen im Alten Testament.5 For the relation between Hebrew and Indo-European tongues consult Abel, Einleitung in ein agyptisch-semitisch indo-europaisches Wurzelworterbuch,5 and

Lewy, H., Eie semitischen Fremdworter im Griechischen5 ; also Muss-Arnolt, (Semitic Words in Greek and Latin5 (in transactions5

of the American Philological Association, XXIII). Of introductory grammars the best are Davidson, Untroductory Hebrew Grammar5

(9th ed., Edinburgh 1888) ; id., (Hebrew Syn¬

tax5 (ib. 1894) ; Gesenius, (Hebraische Gram-

matik5 (ed. Kautzsch, 28th ed., Leipzig 1909; English trans., Oxford 1910). Standard lexi¬

cons are the following: Brown, Briggs and Driver, Eebrew-English Lexicon5 (Oxford

1892-1906), and Gesenius, thesaurus philologi-

cus5 (Leipzig 1829-58) ; id., (Hebraisches Handworterbuch5 (1 5th ed., by Zimmern and Buhl, Leipzig 1910). For later Hebrew consult TO

JEWS AND JUDAISM — JEWISH LITERATURE (4) Levy, 'Neuhebraisches Worterbuch' (Leipzig 1876-89), and Jastrcnv, dictionary of the Tar-

gumi, etc.' (New York 1886). For Mishnah Hebrew consult Siegfried and Strack,

buch der Neu-hebraischen Sprache und Litera¬

ture Bernard Drachman,

Rabbi Congregation Zichron Ephraim, New York.

4. JEWISH LITERATURE. I. The He¬

brew National Literature to 70 A.D.— The former belief that in patriarchal times Israel could have had no literature is now. disproved.

The code of Hammurabi has established the fact that already in the age of Abraham the art of writing was known, and records of events kept. Still, the oldest remains of He¬

brew literature are only found in fragments of ancient songs and in parables, such as the war-

song of Lemeh (Gen. iv, 23-24), and the Song of the Well (Numbers xxi, 17-20). Col¬

lections of such songs existed, and are alluded to under the title of (Book of the Wars of the Lord' (Numbers xxi, 14), and (Book of the Righteous' (Joshua x, 13; 2 Sam. i, 18). At a later period codifications of laws were begun, and still later, recollections of the historv of the past, naturally overgrown with legends, were written down. It is impossible to give their date or that of the compilation in which they have been brought down to us. The nature of such investigations will always lead only to negative results with some degree of certainty. As

to the positive inferences, drawn from these results, differences are bound to ex¬

ist, especially as religious prejudice enters largely into this controversy.

It may be laid down as a generally accepted opinion, that the entire Pentateuch, as we have it, cannot have been written by Moses, and that the oldest part is. the so-called book of the covenant (Ex. xxi-xxiv). Then follows the Jehovistic code, named so, because in it the name of God is given as Jehovah (or rather Jahveh). Then followed the Elohistic code, named from the employment of the word Elohim, for God. After that came the compila¬

tion of Deuteronomy, and finally the priestly code, chiefly found in Leviticus. This arrange¬

ment does not exclude the fact that some older passages are found in the younger codes, and that some of the older codes contain additions from the hands of the last compiler, who, nat¬

urally, lived after the priestly code had been written. The date of these books is always hypothetical. Still, it may be considered as the prevalent opinion, that the Jehovistic code comes from the 9th century, because it con¬

tains references to the sacred places of Bethel, which presupposes an author who lived in the kingdom of Israel. The Elohistic code may be dated from the 8th century. In the period, characterized by the revival of religious senti¬

ment under King Josiah the book of Deuteron¬

omy was discovered, according to the testimony of the Bible. It is, therefore, to be dated from about 600. The ideals evolved during the exile, when the past of Israel was gilded with reminis¬

cences and the ideals of a strictly uniform ritual and an organized hierarchy were formed, were laid down in the priestly code during the 6th century, but the final adoption of the Pen¬

tateuch, with its attempts to fill some lacunae and to harmonize some discrepancies, did not take place until about 400.

Prophetic literature began with Hosea and Isaiah during the 8th century. Micah, Nahum, Zephaniah and Jeremiah followed during the

succeeding century. Again here, the dating is difficult. One of the clearest facts is -a refer¬

ence to King Cyrus of Persia (Isaiah xlv, 1), which indicates, beyond a doubt, that the prophet who wrote the passage was a contem¬

porary with this Persian king, and, therefore, lived nearly two centuries after Isaiah, who lived at the time of Ahaz. Chapter 66, which denounces the rebuilding of the Temple as something heathenish, is of still later origin.

The Babylonian exile naturally stimulated literature in various ways, and still more so, the return of the exiles, to whom Cyrus gave permission to settle again in the land of their fathers (538). Of this time we possess the prophesies of Haggai and Malachi, and the beautiful idyl of Ruth, with its clearly indicated polemic against Ezra's prohibition of intermar¬

riage with the heathen. The book of Jonah, although, as the language would seem to indi¬

cate, of very late origin, clearly presents a uni-

versalistic tendency which is the opposite of the strongly nationalistic ideas expressed by Ezra and Nehemiah. From the same period we must date a large number of the Psalms which form the hymnbook of the congregation of Israel. Here again the dating is exceedingly difficult, as a great many of the Psalms have no clear historical references. Others, such as Psalm 51, show that they have been interpolated by later hands, as the whole Psalm denounces sacrificial worship, while the last twro verses pray for the restoration of the sacrifices. Some again, as Psalm 74, speaking of the destruction of the synagogues, clearlv point to the time of Antiochus Epiphanes (175). Quite a number ot the Biblical books cannot be dated at all, ex¬

cept in so far as the linguistic reasons will give a vague indication of their origin. Such is the case with Canticles, Ecclesiastes and Job, m reference to which various scholars differ widely, and only agree that Canticles and Eccle¬

siastics cannot have been written by Solomon and that Job, which the Talmud places in the days of Moses, is of much later origin.

A clear indication of the origin, even to the month, is given in the book of Daniel. Here m apocalyptic form, the world's history, as far as it affected the Jews, is reviewed, from the days of Alexander the Great

to the death of Antiochus Epiphanes (164). It is evident that the author wrote under the impression produced by this important event, which he expected would inaugurate the kingdom of heaven Less certain, although very likely, is the as¬

sumption that the book of Esther was written at the same period, because its author starts from the same point of view, presenting Israel s deliverance from a cruel persecution, although his idea is just the opposite of that of his supposed contemporary. Daniel pleads for a religious solidification, and the author of Esther for an amalgamation with the non-

Jewish world. It is very difficult to say when the Bible, as such, was formed into a" canon.

It is probable that this never took place, but that the various books and fragments of such were collected as a library of ancient Hebrew literature, and only later on considered as JEWS AND JUDAISM—JEWISH LITERATURE (4) 71

divinely inspired. The collection may have taken place in the 1st century b.c., and the be¬

lief that these books were written under special divine guidance was more and more crystallized a century later.

The conquest of the Orient by Alexander the Great had a far-reaching influence on the spiritual life of the Jews. Through the medium of Greek, which now was generally adopted in the Orient, the Jews became acquainted with an entirely different realm of thought. This widened their horizon and stimulated their pride, because, while the Greeks looked down upon them as barbarians, they were zealous to show that whatever was good in Greek thought was borrowed from the Jews. They conceived for the first time an idea of secular literature.

There is only one book in the Hebrew Bible which could be definitely classed as secular, and this is the book of Canticles, almost certainly modeled after the Idyls of the Greek Theoc¬

ritus.

The influence of Greek thought on the Jews is manifested in the so-called Septuagint (q.v.), a translation of the Bible, which, according to the legend, was undertaken by 72 Jewish scholars, designated by the High Priest, upon ■the request of the Egyptian king, Ptolemy III

(283-8/). This translation became very popu¬

lar among the Jews outside of Palestine, and in some instances superseded the Greek original, as was also the case with the book of Sirach, written in Hebrew about 180 and translated 50

years later by the author's grandson into Greek.

The Hebrew text was entirely lost until 1896, when remnants were discovered in the garret of an old synagogue. The book of Sirach is an imitation of the Biblical book of Proverbs.

So is the Wisdom of Solomon, and a great many authors tried their hands at writing books after Biblical patterns, and at interpolating the existing Hebrew books of the Bible. These books form the collection of Apocrypha, which means hidden books or books excluded from the canon of holy writ. Some were devoted to contemporary history, as is the case with the first and second books of the Maccabees, writ¬

ten most probably in the 1st century b.c. Others were amplifications of existing Biblical books, as is the case with the fourth book of Ezra, or the book of Jubilees and the book of Enoch.

Finally, a great number were apologetic, prompted by a desire to show to the Greek¬

speaking world the superiority of Jewish thought and life. To this class belong the third and fourth books of the Maccabees ; the latter the work of the historian Josephus.

The .desire to prove that Judaism was the only true philosophy and tended to elevate man to the highest attainable level prompted the writing of quite a number of Jewish books.

The most prominent authors of this type are Philo of Alexandria and his younger contem¬

porary, Flavius Josephus of Palestine. Both wrote historical and philosophical works.

Josephus is known to us as a classic historian and is especially valuable for the history of his own time and the century preceding his days, for which he is the only complete source extant.

In his book against Apion he defends Judaism against charges preferred by a Greek author.

Similar is the work of Philo, the most classic representative of the Jewish Alexandrian school, on whose work Christian ideas are, to some extent, based. Besides theological writers, we find among the Jews a number of authors who, prompted by the Greek classics, tried to present Jewish ideas in the poetical form, bor¬

rowed from the Greeks. The most prominent are Ezekiel, who wrote a dream based on the Exodus, and another Philo, who wrote an epic on Jerusalem. Another peculiar feature of this welding of the Jewish and Greek spirits is presented in the Sibylline oracles. Here Jew¬

ish authors adopted the mythical idea of a Sibyl, who in remotest antiquity had predicted events of later times by putting into the mouth of the Sibyl the glorification of Israel and the pre¬

diction of its final triumph. Christian authors have partly interpolated some of these Jewish works and partly imitated them, making the Sibyl predict the coming of Christianity as the final solution of the world's problems.

II. Talmudic Period. — The Maccabean re¬

volt (165 b.c.) was undertaken by a small band of people determined to die rather than give up their ancestral religion. When the victory was obtained their utmost care was devoted to the preservation (and the development of the visible symbol of their religion, the Law of God.

Thus the Scribes, who are traced back to Ezra, became the undisputed spiritual leaders of Israel. It was one of their number who com¬

posed the 119th Psalm, arranged so that eight acrostics are devoted to every one of the 22

letters of the Hebrew alphabet, praising in 176

verses the one all-important topic of the devo¬

tion to God's statutes, commandments, laws, ordinances and testimonies. This devotion to the law became still stronger after the destruc¬

tion of the Temple of Jerusalem (70 a.d.). The law now was the one bond which united the scattered people of Israel. The study of the law was undertaken first with a practical end in view. It was the endeavor of the Scribes to clarify all possible details, and to answer all the

questions which emergency might bring before the observant Jew. This habit of going into the minutiae of the law, whose infiniteness was a matter in whic'h the pious scholars prided themselves, led to the habit of developing the law, for the law's sake. The most unlikely, and even impossible, consequences were dis¬

cussed in the schools, because it was meritorous to devote one's life to the expounding: of God's will, laid down in his Thorah. Over these hair¬

splitting decisions the rabbis did not forget the spiritualizing ideas which were the real object of their Alexandrian coreligionists.

There were two principal methods of study¬

ing the word of God. The first, looking upon the law and its practice, is called Halachah, literally, the Walk, meaning the practice. The second method is called Hagadah, preaching, and is devoted to the finding of edifying thoughts in the Bible. For a long time these studies were confined to the schoolroom, the teacher expounding the law to his pupils as he had learned it from his teachers, or as he saw fit to present it. The mass of these laws grew.

Originally, some made brief notes of their les¬

sons, called Meggillath Setarim, <(secret scroll, w or named after the teacher in whose school the notes were taken, as Mishnah of Rabbi Akiba, of Rabbi Meir, of Rabbi Nathan. The name Mishnah became then the technical term for a collection of rabbinical laws. The word means the Second Law, or, more properly, although JEWS AND JUDAISM — JEWISH LITERATURE (4) not literally, a compendium of the law. Ac-

cording to reliable tradition the first one to compile these scattered laws 4ntO' one code and to arrange them according to the -subject matter was Judah Hanasi, head of the school of Tiberias, 200. His compendium of what may be called partly rabbinical law and partly Mosaic law, in rabbinical conception, was called Mishnah, and forms the textbook of the Jewish law, comprising the ritual as well as the civil laws and the penal code. The Dogma is almost entirely missing.

Judah Hanasi's first effort stimulated others into imitation. Other codes were compiled, either following the example of the Mishnah, and arranging the text according to subject matter, or taking the Pentateuch as text, and commenting upon its laws, showing the rabbin¬

ical interpretation. A work belonging to the first class is the Tosefta (literally, addition), and to the latter class belongs the Mekilta (literally, methods, namely of scriptural inter-

pretation), a rabbinical commentary on Exodus, oiira. (I he Book), a rabbinical commentary on Leviticus, Sifre (The Books), a commentary on Numbers and Deuteronomy. Legal discussions continued even after the Mishnah had been recognized as the authorized code of laws, the disciples and successors of Judah Hanasi continued to discuss the text of the Mishnah in the same way in which the text of the Bible had been treated by their predecessors. These glosses soon greatly exceeded the text in vol¬

ume and they were called Gemara (comple¬

tion). Together with the Mishnah, the Gemara formed one book, called the Talmud. (See article Talmud in this section). With the growing influence of Christianity, the condi¬

tion of the Jews in Palestine became more and more unfavorable, and a great many emigrated to the more congenial Parthian kingdom in Mesopotamia, which, from the time of the Exile had had Jewish settlements and so two schools were formed, one being in Palestine, notably in Tiberias, and the other in southern Mesopotamia. Both schools used the same .11 5*1? aSi a textbook, but the glosses natu-

i ally differed, although there was a considerable interchange of ideas owing to the fact that some noted Palestine scholar would settle in Babylonia, or some promising Babylonian student went to Palestine to continue his studies, ihus two Gemaras were compiled one containing the glosses of the Palestinian rabbis called- the Talmud of Jerusalem, and the other containing the glosses of the Baby¬

lonian rabbis, called the Talmud of Babylon.

u °ˆGr ˆ,aS cloˆed abollt 350> and the latter about 500. These dates, however, are not ac¬

curate, just as the tradition that Judah Hanasi compiled the Mishnah is not accurate when taken literally. All of these codes have been handled freely, and some of them have been interpolated by authors as late as the 8th cen¬

tury.

The fundamental conception of the Jewish student was that

everything worth knowing was contained in the Bible, and notably in the Pentateuch, and so they looked to the Bible and especially to the Pentateuch, for a con¬

firmation of their conceptions. The contro-

versms with Christianity, which especially affected the Jews in Palestine, produced quite a literature of homiletical explanations of the Bible. This is called the Midrash (literally, investigation). While the Midrash originally applies to both Halachah and Hagadah, it is more specifically understood with regard to the latter. The expositions of the Scripture de¬

livered by various prominent teachers were col¬

lected, and so a vast number of Midrashim were compiled, the oldest of which is the Genesis Rabba, about 600. This literature was still more subject to arbitrary interpolations and additions, because the subject always dis¬

appeared behind the object, which was to teach the fear of the Lord. Who had first made a certain statement, and in what form he had made it, was from this point of view of no consequence.

-mv. rtuu uic ucginmng oi the /th

century were sad times for the Jews, both of Palestine and of Babylonia. Their coreligion¬

ists, living outside of these two countries, scat¬

tered all over the northern coast of Africa, over Italy, France and Spain, and perhaps, already ˚uer Germany, were numerically so insignificant that their spiritual life left no traces behind I he conquest of the Orient by the Moham¬

medans brought new impulses to the Jews.

First of all the schools of Babylon were re¬

vived, and devoted themselves to talmudical literature, to the composition of a liturgy, and by and by, also, to a more systematic study of theology, resulting in works on Biblical exegesis, on Hebrew grammar, on philosophy, ayd',bna y » on theosophy. The spiritual leaders of this age were the men who presided over t j schools of Babylon, and were called Gaon, andintjler?fore11tblSi Period»

extending from 630

t0 I?40.’ 1S caIled the period of the Geonim.

, i ‘ eir m(Jst important object was to codify the law, and to make their decisions in indi¬

vidual cases as accessible as possible. So a number of codes were composed, either ar-

ranged according to subject matter, like the Halachoth Gedoloth of Simeon Kahira (700) or arranged according to the lessons from the Pentateuch, like the Sheeltot of Ahai. Further-

more the authority of the famous scholars of Babylon was appealed to in difficult cases that came up for decision, in doctrinal questions, or very often for the interpretation of important talmudic passages. A copy of the replies was preserved, and as years passed by compilations of these replies were made, and served, as in our day the decisions of the Supreme Courts these decisions were written partly in the Jewish-Aramaic. dialect of those days and partly in Arabic, which, since the rise of Islam, had superseded the former dialect spoken by the Jews. Another literary activity was that which was devoted to liturgical needs The synagogue was strictly congregational, but the desl!T for unity on the one hand, and the im¬

possibility of having property qualified con¬

gregational leaders in every small congregation on the other, created a need for a uniform liturgy Amram (800), the Gaon of Sura, was appealed to and compiled such an order of services. This official liturgy, however, was soon supplemented by what might be called hymns and is technically called by a word taken from the Greek «Piyut.» The authors of such Piyuts are called <(payetanim.» They amplified the service by dwelling on certain favorite themes, such as the sacrifice of Isaac or by a poetical paraphrase of the official liturgy!

 (4) Their activity lasted from 800 to 1200, although occasional attempts at this kind of poetry ex¬

tend down to our times. Their most prominent representative is Eleazar Hakalir. They em¬

ployed both rhyme and acrostic, but owing to tar-fetched allusions their style is obscure and the poetical value of their productions meagre.

In 760 a serious schism took place. Politi¬

cal conditions, combined with sectional strife and the growing propensity for the hair-split¬

ting methods of rabbinical legislation, created a sect which rejected every authority but the Bible. The leader of this movement was Anan ben David, and his followers called them¬

selves Bene Mikra (((Sons of the Scripture®), or Karaites. (See article The Karaites in this section). This movement produced quite an extensive polemical literature, and led to a deepening of exegetical studies as also to various attempts at presenting the theological conceptions of Judaism in a clear and concise form, while the doctrinal part of theology had formerly been altogether neglected out of preference for the law. The most important defender of the Karaitic doctrine is Salmon ben Jeroham, and on- the side of the Rabbanites, as they were then' called, Saadia, the Gaon of Sura (892-942). The latter translated the Bible into Arabic, wrote Arabic commentaries on Biblical books, and besides his activity in other directions, is noteworthy as a pioneer in what is called the Philosophy of Religion, but ought more properly to be termed apologetics.

He wrote a book in Arabic on Judaism, (Dogma and Philosophy. } From this time on, a decline in the spiritual life of the Babylonian Jews is noticeable. At the end of the 10th, and in the beginning of the 11th century, only the names of Sherira, and his son, Haii, are prominent as rabbinical authors. Both occupied the position of Gaon of Pumbeditha, in Babylonia. The former, especially, is noteworthy for his com¬

pilation of the history of rabbinical law, which was undertaken for apologetic purposes, in order to prove that the rabbinical law had come down in uninterrupted tradition from the days of Moses. With this decline in Babylonia, new centres of spiritual life appeared in other countries. In Morocco, Isaac Israeli (850-950) appears, whose medical treatises, written in Arabic, are considered important contributions to the medical literature of his day. He also wrote Biblical commentaries, and he was the first to present the idea that some of the pas¬

sages of the Pentateuch were written after Moses' time. In the 10th century, we meet the first Jewish author known by name in Europe.

He is Sabattai Donolo, who wrote on astronomy and on Cabala. Cabala, literally tradition, is the Jewish theosophy, which, while obscure in its origin, seems to go back to Neo-Platonic philosophy, and received its first systematic presentation in the Sefer Yezirah ('Book of Creationˆ, written most likely about 850. (See article The Cabala in this section). Before Donolo, however, there were some Jewish authors in Italy, whom we do not know by name. One of them wrote the Josippon, a Hebrew abstract of the works of Josephus.

Another wrote a homiletical compilation, called the Chapters of Rabbi Eliezer, and ascribed to Eliezer ben Hyrkanos, who flourished about 100 in Palestine, but really written by a Roman Jew, about 840.

The classic period of Jewish literature in mediaeval times began in the 10th century in Spain. There, under the favorable condition produced by Arabic dominion, some Jews be-

came powerful factors at the courts of the Caliphs, and, like their Arabic countrymen, em¬

ployed their wealth and their influence for the patronage of literature. Such Maecenases were Hasdai ibn Shaprut (950), and Samuel Hanagid (1050). Under their influence, a systematic study of Hebrew grammar began The names of the most important authors on this subject are Dunash ibn Labrat, Menahem ben Saruk (10th century) ; who were succeeded by Ibn Ganah and Judah Hajug. Ibn Ganah wrote the first Hebrew dictionary. With such attempts, naturally, exegesis went hand in hand, and penetration into the laws of the language de¬

veloped a finer taste for Hebrew style, and a better conception of the art of poetry than that which the former Payetanim possessed. Of the numerous exegetes of this period, Abraham ibn Esra (1092-1167) deserves to be mentioned. He not only employed his knowledge of grammar and the principle that the Bible must be ex¬

plained from the point of view of the context, but he also claimed that the rabbinical interpre¬

tation of scripture was not infallible, and, finally, he pointed out a number of passages in the Pentateuch which could not have been written by Moses. So he became the father of Biblical criticism. Of the Hebrew poets of this age, two deserve very prominent mention, Solomon ibn Gabirol (1022-70) and Judah Halevi (1 080—1141).

Both handled the Hebrew language not merely for the purposes of religious poetry, but for secular poetry, as well, and with a mastery which makes them classics, not merely of Jew¬

ish, but of the world's literature. Judah Hal¬

evi's (Ode on Zion) has been translated into various modern languages. During this period, the Philosophy of Religion, if we may employ this traditional term, developed to its highest perfection. (See article Jewish Philosophical Writers in this section). The first to write on this topic in Spain was Bahya ibn Pakuda (11th century), whose work, (Duties of the Heart1 emphasizes the necessity of an inner religion, as contrasted with the idea of strict ritual observance. A very popular work is the (Kusari > of Judah Halevi. The most import¬

ant development of this class of literature is the 'Guide for the Perplexed,1 by Moses ben Maimon (1135-1204), written like the above-

mentioned works in Arabic. Like them, it was translated into Hebrew, in the course of the 12th century. While this literary activity show!; a somewhat secular tendency, also evident in works on astronomy, medicine, science, etc., talmudic studies were not neglected. Maimon-

ides wrote a code of the Jewish law, including even the sacrificial cult, and the constitutional law for Israel's kingdom, dogma and ethics, under the title, (Mishneh Torah. > He had been preceded by Isaac Alfasi (1013-1103), a native of Fez, who lived during the latter part of his life in Spain. Alfasi made an abstract of the Talmud, in order to facilitate legal decisions, and this work became a very popular code of Jewish law and was often commented upon.

Jewish literature developed in France, some¬

what later than in Spain. There were chiefly two centres, one in the south, the Provence, and one in the east, the Champagne. The oldest

 (4) name of anv prominence is that of Gershom, surnamed, <(The Light of the Diaspora. w He wrote talmudic commentaries, and a number of decisions and hymns. In the latter part of his life he moved to Mayence, where he estab¬

lished a new centre of Jewish spiritual activity.

He died in 1028. To the school founded by him belongs the most popular of all mediaeval authors, Solomon ben Isaac of Troyes, called <

pretations of the law and the best rabbinical homilies is the most popular work of mediaeval Jewish literature, being used to-day in numer¬

ous schools and study circles. His disciples, among whom members of his own family, es¬

pecially his two grandsons, Samuel and Jacob ben Meir, were most prominent, continued his work in commenting on the Talmud, and laid down their work in glosses, called Tosafot (ad¬

ditions). In Germany, where studies began with the 11th century, attention was almost ex¬

clusively given to the Talmud, besides which only religious poetry was cultivated; lacking, however, the true inspiration of the Spanish school.

With the death of Maimonides a marked de¬

cline occurred. With a few exceptions, exegesis degenerates into blind adherence to rabbinical authorities, philosophy becomes more and more fanciful homiletics, or gives way to theosophy, and poetry becomes punning on Biblical and tal¬

mudic phrases. Exceptions are found in the cases of Joseph Kimhi, and his two sons, Moses and David (1150-1230), and Moses ben Nahman (1200-70) whose commentary on the Penta¬

teuch, though as a rule very sound, shows very often leanings toward fanciful mysticism.

Notable, in this period, is the work of the family of Ibn Tibbon, four generations of which were engaged in the translation of Arabic works into Hebrew, and so, along with others, among whom may be mentioned Jacob Anatoli of the 13th century, helped to preserve the treasures of Greek literature, which they trans¬

lated from Arabic into Latin. Among those who worked along the lines of Saadia for the harmonization of religion and science, mention must be made of Hasdai Crescas, author of 'The Light of the Lord,* Levi ben Gershom, author of (The Wars of the Lord* (14th cen¬

tury), and, finally, Joseph Albo (1400-40), whose work UkkarinP ((The Fundaments of Faith*), is altogether dependent on Maimonides.

While this decline is noticeable in the best parts of Jewish literature, there is, on the other hand, a great activity in mystic literature. The most important work of this kind is the (Zohar >

(ˆBrightness*). It is a theosophical explana¬

tion of the Pentateuch, which gives itself as the work of Simeon ben Johai, a rabbi of the 2d century, but is now generally believed to have been written by a Spanish author, Moses de Leon, about 1280. The fabrications of works of this kind, attributed to the authorities of the Talmud, and even to patriarchs, became as frequent in these days as it had been in the first Christian century, when the book of Enoch, and the Sibylline oracles were composed. The German Jews of those days confined their activ¬

ity exclusively to Talmudic literature, and even in this line were frequently devoting them¬

selves to the minutest details of ritual practice.

A very prominent author of this day, and the founder of an important school, wras Meir of Rothenburg, who is otherwise well known in Jewish history as a martyr, who spent seven years in prison, because he refused to allow his congregation to pay the ransom, for the ex¬

action of which King Rudolf had imprisoned him (1286). Exceptions are found in Italy, where most noteworthy are the poets, Kalony-

mos ben Kalonymos and Immanuel of Rome, the latter a friend and contemporary of Dante.

Another exception are some polemical works against Christianity, among which mention may be made of the Nizahon, by Lipman of Muehlhausen (14th century).

III. From the Reformation to Moses Men¬

delssohn. — The expulsion of the Jews from Spain (1492) had an unfavorable influence on Jewish literature. The Jew, driven to the Orient and to Poland, and even expelled from all centres of culture in western Europe, be¬

came more and more spiritually isolated. On the other hand, however, rabbinical literature was more widely studied, owing to the assist¬

ance of the printing press. Talmudic studies flourished largely in the Orient and in Poland.

The most important production of this time is the popular code of the law, the (Schulhan Aruk, } by Joseph Caro (1488—1575), written in Safed, and edited with annotations by Moses Isserles (1520-72), of Cracow. Annotations to the code of the law formed the most popular literary occupation for the rabbis of the 17th and 18th centuries. While the belief in the ralbbinical authority became more and more al¬

most absolute, indications of a development in the opposite direction began to appear. Elijah Levita (1469—1549), a German who lived in Italy, and devoted his activity to grammar, made an important step in critical archaeology by his discovery that the vowel points were not invented before the 7th century. He was fol¬

lowed by Azariah dei Rossi (1511—78), who, in his work (Meor Enayim* proved that the authoiity of the Talmud could not be main¬

tained in questions of history and astronomy His work brought forth a number of apologies of rabbinical literature, notably, the by Solomon ibn Verga, by Gedaliah ibn Yahia, and the (Valley of Weeping,* by Joseph Hakohen, all of the 16th century.”’ The influence of this development is offset by the growth, of Cabalistic literature, which pene¬

trates into every branch of religious practice, and degenerates into the compilation of sense-

 less phrases. The comparatively soundest representative of this class is Isaiah Horwitz (1550-1630), whose book (The Two Tablets of the Covenant, J intended to give a system of Cabala, became very popular. The type of utter degeneracy is represented by Hayim Vital, whose exposition of the doctrine of the trans¬

migration of the soul, and of similar Cabalistic doctrines, is partly childish, and partly unin¬

telligible. At the same time, however, Cabala was attacked severely by Leon Modena, of Venice (1571-1648), who also wrote a defense of rabbinical Judaism, against the attacks of freethinkers, of whom Uriel Acosta is the most prominent type. Apologetic works were further written by the Amsterdam rabbi, Menasseh ben Israel (1600-55), who is famous in history owing to his audience with Oliver Cromwell, which resulted in the readmission of the Jews to England, after nearly 400 years of exile.

Still, the most untiring activity of the Jews was devoted to dialectical explanations of the Tal¬

mud, and to the exposition of the ritual law.

A great exception is the case of Moses Hayim Luzzatto (1707ˆ4-7) of Padua, whose allegori¬

cal dramas, written in Hebrew, and patterned after Italian masters, rank with the best Hebrew poetry of mediaeval times. Another exceptional position may be claimed for Jacob Emden (1696-1776) who, while a strict believer in rab¬

binical authority, wrote a work, proving that the (Zohar,> as we possess it, was the work of a Spanish Jew.

IV. From Moses Mendelssohn to the

Present Day. — Religious toleration, partly the result of actual conditions as they developed after the Thirty Years' War, and partly the re¬

sult of the philosophical teachings of Locke, and his disciples, the English Deists, and the French encyclopedists, influenced the condition of the Jews very favorably. Admitted to higher occupations,

and to the universities, the number of those who devoted themselves to secular learning began to increase consider¬

ably in the 18th century. This movement to rescue the Jews from their mental isolation received its strongest impetus from Moses Mendelssohn (1729-86), whose translation of the Pentateuch into pure literary German changed the hitherto one-sided education of the Jewish youth. His example was followed by a number of his friends, who, like him, trans¬

lated the Biblical books and the prayerbooks into pure literary German, and wrote Biblical commentaries, which, by their clear Hebrew, and by their embodiment of modern methods and ideas, broadened the intellectual horizon of the Jewish student. Together with this movement there was a revival of Hebrew poetry, notably due to Hartwig Wessely (1725-

1805), which helped to develop a literary art, almost forgotten since the beginning of the 16th century. A prominent factor was Ha-

meossef (1783-1810), a Hebrew periodical, edited by friends of Mendelssohn. Through the medium of these works, the Jews became acquainted with secular literature, and very soon a generation arose that received a secular education equal to that of their Christian neighbors, which could not but influence the de¬

velopment of Jewish literature. This branch, is inaptly called, <(The Science of Judaism.®

It is a systematic presentation of Jewish litera¬

ture and history. The founder was Leopold Zunz (1794—1886), whose (Gottesdienstliche Vortraege* was the first, and is still unsurpassed in its scientific presentation of homiletical liter¬

ature. Of his numerous other works, special mention must be made of his (Synagogale Poe-

sieP another pioneer work, presenting a history of liturgical literature and especially of liturgi¬

cal poetry. His work was taken up by some Polish scholars, who, possessing a vast ac¬

quaintance with Jewish literature, lacked sys¬

tematic training, and living in a land where secular studies were considered heresy, had re¬

ceived the first ray of light from some men who had come, under Mendelssohn's influence, to Berlin. The leaders were Nahman Krochmal (1785-1840), and Solomon Loeb Rapoport

(1790-1867). The latter presented for the first time biographies of mediaeval Jewish authors in scientific form. The attack on this movement by fanatics prompted some fine satirical works in Hebrew, notably, (The Re-

vealer of Secrets, > by Joseph Perl (1773-1838), patterned after the (Epistolae obscurorumP and a travesty on the Jewish mystics; also (The Observer,) by Isaac Erter (1792-1851).

These two currents of literature, namely, the investigation of the history and literature of the Jews on the one hand, and the poetical representation of modern ideas in good Hebrew, on the other, characterize the literary activity of the Jews in the 19th century. The work of Zunz was continued by various au¬

thors, notably Zechariah Frankel (1801—75) , who was head of the Breslau Seminary, and stimulated many authors into similar activity.

Abraham Geiger (1808-74), the leader of the liberal movement in religious matters, has also contributed to the elucidation of Jewish his¬

tory An attempt to nresent history in a more popular form was first made by Isaac Marcus Jost (1793-1860). The most popular work of this kind was written by Heinrich Graetz (1817-91), whose work has gone through several editions, and been translated into vari¬

ous languages. More strictly scientific is the work of Moritz Steinschneider, born 1816. Of the numerous scholars who worked on indi¬

vidual topics of Jewish history and literature, mention may be made of Isaac H. Weiss (181 5—1905), Meyer Kayserling (1829-1905), David Kaufmann (1852-99). Jewish poetry and

fiction were chiefly cultivated in Russia, where, through the efforts of Isaac Baer Lewinsohn (1789-1860), modern ideas were cultivated. A marvelous art in the use of Biblical Hebrew for novels was exhibited by Abraham Mapu (1808-67), who first attempted to write novels

from Biblical times, and later on used the Biblical language with unprecedented skill in writing a novel from the life of the Russian Jews of his day. Poetry, especially of the satirical sort, is best represented by Leon Gor¬

don (1831-92), while in novels from contem¬

porary Jewish life Perez Smolensky (1842-84) ranks foremost.

Some words must be said about the devel¬

opment of literature in Yiddish, which is a German, freely mixed with Hebrew, and in eastern Europe also with Slavic. Originally devoted merely to practical religious purposes, such as translation of prayerbooks for the edification and religious instruction of women, in the latter half of the 19th century it began to be used for higher literary purposes, in 76

poems, novels and dramas. As a poet, Simeon Frug niay be considered as the foremost repre¬

sentative; among the novelists, S. J. Abramo-

witz, Solomon Rabbinowitz and J. S. Peretz, some of whose works may justly claim a place in the world's literature. Among the drama¬

tists, Jacob Gordin is noteworthy for his bold treatment of sociological and economical ques¬

tions, although the plots of his plays are mostly adaptations from the classics of other lan¬

guages.

In this connection a new branch of litera¬

ture has to be mentioned, which, akin to the idyl, is peculiarly Jewish. It is the so-called Ghetto novel, cultivated first in the Ger¬

man language by Aaron Bernstein (1812—84), in his two novels, (Voegele der Magi d, >

and (Mendi Gibbor,* presenting life in a pro¬

visional town of Eastern Germany in the period of transition from Ghetto to modern culture.

Leopold Kompert (1822-86), wrote stories from Bohemian Ghettos which are masterpieces of their kind. Life in the overcrowded Ghetto districts of eastern Galicia, with its squalor and superstition on the one hand, and its ardent desire for knowledge and its beautiful family life on the other, were masterfully presented by Leopold von Sacher-Masoch (1835-95), and Karl Emil Franzos (1848-1904). Israel Zang-

will, born 1864, presented the life of the Russian Jews in London. Sketches from Jewish life in Moravia were written by Martha Wolfenstein (1871-1906), in her (Idyls of the GassP

A development of the 19th century is Jewish periodical literature, although its beginnings reach back to 1674, when a periodical in Judeo-

Spanish was first published in Amsterdam.

These periodicals are mostly weekly, when devoted to religious interests. The oldest of them is the Allgemeine Zeitung des Juden-

thums, now of Berlin, founded in 1837 at Leip¬

zig. It was followed bv the Archives Israelites of Paris, in 1840, the Jewish Chronicle of Lon¬

don, jn J841, the American Israelite of Cin¬

cinnati, in 1854 and the Jewish Messenger of New York in 1856. Such papers appear in at least 15 languages. Dailies in Hebrew and Yiddish are devoted to general news, but give particular attention to Jewish affairs. They ap¬

pear in Warsaw, Wilna, Saint Petersburg and New York. The oldest is Hazefirah, founded in 1862 as a weekly, edited as a daily since 1886 and suspended by order of the govern¬

ment in 1905. Some monthlies and quarterlies are devoted to scientific and literary purposes ; the most prominent are Monatsschrlft fuer Ge-

schiclite nnd Wissenschaft des Judenthums (1851), Revue des Etudes J uves (1880), and the Jewish Quarterly Review (1880). To this class belong numerous yearbooks, published in various languages, and appearing more or less regularly.

In spite of these modern tendencies, which occupied the attention of

Jewish authors dur¬

ing the 19th century, talmudic studies of the old type were not entirely neglected. They are, however, mostly confined to the east of Europe, and the Orient. The most prominent rabbinical author in the beginning of the 19th century was Moses Schreiber (Sofer), rabbi of Presburg (1762-1839). In the Orient, the most prolific authors of rabbinical works of the 19th century are Havim David Hazan (1790-1876), rabbi of Jerusalem, Hayim Palagi, rabbi of Smyrna (1782-1868), and finally, Hayim Hezekiah Medini, of Hebron (1832-

1904). Of the Jews of Europe, the most prom¬

inent rank amongst the talmudic authors in the latter part of the 19th century, was held by Isaac Elhanan Spektor (1810-96), rabbi of Kovno.

Bibliography. — Abraham's (Short History of Jewish Literature) (London 1906) ; Dar-

mesteter, Arsene, (Philadelphia 1897) ; Steinschneider, (Juedische LiteratuO

(m.Ersch und Gruber's (Allgemeine Encyklo-

padie der Wissenschaften und Kiinste,* Section ii, Vol. 27, Leipzig 1850) ; Karpeles, (Ge-

schichte der judischen LiteratuO (Berlin 1886); id., (Jewish Literature and Other Essays*

(Philadelphia 1895) ; Winter und Wiinsche, ■Die Judische Literatur seit Abschluss des Ivanons) (Berlin 1897); and

Gotthard Deutsch,

Late Professor of History and Dean of Hebrew Union College, Cincinnati, Ohio.

5. JEWISH PHILOSOPHICAL WRIT¬

ERS. The philosophic spirit in its proper sense appeared among the Jews at the time of their contact with Greek culture, which began with the conquest of the Semitic Orient by Alexander the Great. Its first definite traces are to be discerned in the skepticism which pervades Job and Ecclesiastes, books which in their present form

belong, therefore, to a period subsequent to the last quarter of the 4th cen¬

tury b.c. In the former work, the skepticism is more or less veiled and proceeds no further than to express a doubt as to the wise workings of Providence.. In the latter composition, the skep¬

tical spirit is more pronounced and amounts to a practical denial of divine justice. Results of a more positive character, however, appear in the system of Philo Judaeus (b. in Alexandria about r B'P-' , ' ˆter 40 a.d.). In his many works, ot which the chief are in the form of com¬

mentaries to the Pentateuch, he strives to i econcile the traditional tenets of Judaism with the eclectic school of Greek philosophy. While recognizing the Old Testament as divine and authoritative, he makes full use of allegory, to adapt Jewish conceptions to current Greek wis¬

dom-. The cornerstone of his system is formed by his doctrine of the Logos or ((Word** as the active agency associated with God in his crea¬

tive powers. He identifies the Logos with the . divine wisdom, » so strongly personified, notably in the book of Proverbs, as to become not merely an attribute, but an element of the divine Philo is influenced throughout by Plato's doc¬

trine of ideas, and while leaving little permanent impress on Jewish, he profoundly influenced «WriSt,11an- theology. The conception of the Word" in the Gospel of John is the most striking trace of the Philonic doctrine, and so enthusiastic were the early Christians over r'P s touchings that some of them saw in him a Christian. Philo's philosophy plays also a prominent part in the writings of the Church bathers, and it is chiefly due to them that his works were preserved.

. ˆ W One of the earliest and most dis¬

tinguished Jewish philosophers dates from the 9th century when the intellectual centre was still in the East, although there were already indications of its transfer to northern Africa JEWS AND JUDAISM — JEWISH PHILOSOPHICAL WRITERS (5) a,l< n Spain. The rise of Islam, followed by conflicts among its adherents as to the inter¬

pretation of the Koran, had given a fresh stimulus to philosophic thought which had its influence likewise upon the Jews. The rise of the Karaite sect (see article The Karaites in this section) at the end of the 8th century is to be directly ascribed to this influence. For a time

it seemed as though the disintegration of Rabbinical Judaism was at hand when the tide was stemmed by a profound thinker and prolific writer — Saadia ben Joseph, (born in Dilaz in upper Egypt in 892 and who died at Sura 942.

Equally versed in the Talmudic and Islamic theology, Saadia attempted to reconcile the teachings of Jewish orthodoxy with the current philosophy as developed chiefly by the Islamic rationalists known. as the Motazilites (or Sepa¬

ratists). His main work, written in Arabic.

Book of Faith and Doctrines,-' was completed in 933 and may be said to mark the first system¬

atic compend of Jewish philosophy. Differing from Philo in making Biblical doctrines his starting-point, his entire efforts were devoted to demonstrating that where the current philosophv or rationalism was in contradiction to the Old Testament, the philosophy must be wrong and the Old Testament right. The aim of the book is clearly set forth in the intro¬

duction as intended to put an end to the pre¬

vailing confusion, and to rescue those immersed in the sea of doubt and error. Recognizing as sources of knowledge the testimony of the senses, reason and logic, he declares that a fourth source — revelation, as comprised in the Old Testament, is superior to them all, because through revealed knowledge the means is found to control the correctness of the teachings deduced from the other sources. In his chief philosophic work Saadia includes discussions of the creation of the world, of the attributes of the Creator, the theory of revelation, the be¬

liefs based upon divine justice, the doctrine of the soul, the resurrection of the dead and of the Messianic belief, concluding with a sum¬

mary of ethical precepts.

Beginning in each main subdivision with the teachings of the law and the prophets on the subject, he contrasts these teachings with the speculations of the philosophers and shows wherein the errors of the latter consist. He betrays Aristotelian influences and at times, especially in his discussion of the problems of creation, follows very closely the model of the more rationalistic Islamic theologians.

Accept¬

ing the philosophic doctrine of a creatio ex nihilo, he proves its . correctness from the use of the word <(bara® in Gen. i, 1, which he de¬

clares means creating something out of nothing.

The doctrine of a creator as set* forth through revelation in the Old Testament is confirmed by reason which declares that creation implies a creator. Passing on to the more precise de¬

termination of the attributes of the Creator, he polemicizes against the dualistic tenets of Zo¬

roastrianism, and against the trinitarian doctrine of Christianity in his endeavor to justify the conception of God as a unit. The divine laws as laid down in the Pentateuch, supplemented by oral tradition, are, according to Saadia, given in order to enable men to attain to the highest degree of blessedness ; and while recognizing in the divine laws given to Israel two classes, 77

(a) those suggested by reason and (b) those due to revelation, he shows by examples how the latter may likewise be explained by pure reason.

Perhaps the most original feature in Saadia's philosophy is the manner in which he endeavors to reconcile the doctrine of the freedom of the human will with the belief in the omniscience and omnipotence of God. He solves the problem by declaring that God could control the human will, but deliberately gave men freedom, so that he might bear the responsibility for his acts.

Suffering and trials are sent by God to man in order to bring him by spiritual discipline nearer to perfection. He criticizes the various theories proposed by philosophers and others as to the nature of the soul and declares it to be a fine substance created by God, and placed in the human body during its stay on earth. After its life on earth another existence is in store for the soul, but only after the number of the souls to be created has reached an end, when all souls are again united to their bodies. In this combination of the doctrine of immortality with the resurrection of the body, Saadia be¬

trays the influence of Islamic theologians who postulated this doctrine on the basis of the pictures of Paradise drawn in the Koran.

Saadia s Messianic beliefs accord with those in¬

dicated in the Talmud, pointing to the appear¬

ance of the Messiah as a preliminary to the resurrection of the dead. In the world to come the good and pious will receive their recompense for their acts and sufferings in this world. The influence of Saadia on his age was profound.

Through his philosophy in conjunction with his polemical writings against the Karaites, the new sect received a blow from which it never recovered. Jewish orthodoxy once more won the day, and it was not until the days of Mai-

monides that the soundness of Saadia's system was questioned.

Ibn Gabirol. — Passing by some minor writ¬

ers like Bachya ben Joseph ibn Pakuda who flourished at Saragossa in the first half of the 11th century and who largely on the basis of Saadia's religious philosophy developed a system of Jewish ethics in a work known as

sents a combination of Jewish doctrines with certain phases of Islamic mysticism, we reach in Solomon Ibn Gabirol (b. in Malaga about 1021; d. in Valencia about 1058) a thinker of the first magnitude, whose chief work written in Arabic is (The Fountain of Life.' Though its aim is to reconcile the monotheistic doctrines of Judaism with the philosophy of Neo-Plato¬

nism which Gabirol espoused in opposition to the prevailing Aristotelianism, its basis is essen¬

tially philosophical rather than theological. Nor does the author lay any special stress upon his Jewish beliefs, as a consequence of which the influence that he exerted upon the scholasticism of mediaeval Christianity was far greater than upon Jewish theology. The work consists of five treatises dealing respectively (1) with mat¬

ter and form, (2) the substance underlying the corporeality of the world, (3) proofs of the existence of intermediaries between God and the physical world, (4) proofs that these inter¬

mediaries known as ˆsimple® or ˆintelligible®

substances are composed of matter and form, and (5) a treatise on

universal matter and uni¬

versal form. According to Gabirol's system, 78

everything that exists is embraced under these three categories: (1) God, which is the first substance, (2) the world, which is matter and form, and (3) will as intermediary between the two. Whether Gabirol connected with God divine attributes apart from an existence pure and simple is a question in regard to which opinions differ. The best authorities, however, incline to the view that Gabirol was an opponent of ascribing attributes to God as in¬

gredient parts of his Being. Gabirol's chief model among the Greek Neo-Platonists is Plo¬

tinus, though he knew this author through secondary sources only. In an ethical treatise entitled (The Improvement of the Moral Quali¬

ties, } composed in 1045, he is even bolder than in his philosophic work, inasmuch as he at¬

tempts to formulate principles of ethics without reference to religious belief or doctrines. A comparison between Philo and Gabirol naturally suggests itself. Both revert to Plato as the natural source of their inspiration Philo adapted Judaism to the Platonic doctrines whereas Gabirol a thousand years later revised Neo-Platonism and adapted Judaism, so far as it. entered into his thoughts, to this system.

Like Philo, Gabirol's influence was profound on Christian theology and under the Europeanized form of his name, Avicebron, his writings translated into Latin helped to mold the thought of such philosophers as Albertus Mag¬

nus, Thomas Aquinas, Duns Scotus and Gior¬

dano Bruno. Ibn Gabirol was also a poet of the first rank, whose liturgical compositions in Hebrew give evidence that his philosophy, though so apparently independent of Jewish doctrines, had not weaned him from Jewish orthodoxy. In this combination of poet and philosopher, he suggests comparison with Judah (or Jehudah) Halevi — the next important writer to engage, our attention.

Judah Halevi was born in Toledo toward the end of the 11th century, dying some time after 1140 during a journey to the Orient. He is more famous for his exquisite Hebrew poems — both lyric and religious —

than for his philos¬

ophy. The tone, form and imagination of the poet color his views of life far more so than in the case of Ibn Gabirol. Hence, in his philosophic treatise, written in Arabic, but gen¬

erally known by the title of the Hebrew trans¬

lation as (The Book of CuzarP — he takes his stand upon revealed religion, which to him is superior and more trustworthy than any human speculation. He does not even attempt, like Saadia, to reconcile religion with philosophy, but devotes himself mainly to showing the superior¬

ity of Judaism among the religions claiming to be revealed. The discussion of the tenets of Judaism and the proof for their truth is given in the form of a dialogue between a Jew and the pagan king of Chazars — hence its title —who after discussing religion with a philosopher, a Christian and a Mohammedan, turns to the Jew for a statement of his beliefs. Naturally Judah Halevi cannot escape dealing with the current philosophical doctrines, and while claim¬

ing to draw his views exclusively from the teachings of the Old Testament, introduces dis¬

tinctively Aristotelian notions, as well as cer¬

tain views held by Islamic theologians. God is for him the first cause who creates the world out of “nothing.® He divides the attributes of God, without any distinction between essential and non-essential, into three classes — active, relative and negative. While not regarding God as a corporeal Being he is not prepared to reject all the anthropomorphisms in the Old Testa¬

ment as purely symbolical. According to him, the immortality of the soul, the resurrection of the dead and the doctrine of rewards and punishment are all taught in the Old Testament and constitute essential features in Judaism.

An entire division of the book is devoted to a refutation of the Karaites, an exposition of the basis and development of oral tradition as ex¬

emplified in the Talmud, while the fifth and last division is taken up with polemics against the current systems, including the Aristotelian cos¬

mology and the Epicurean doctrine of Fatalism which was also accepted by the orthodox Islamic theologians. His attempt to reconcile the free¬

dom of the human will with the omniscience of God follows largely on the lines laid down by Saadia.

Maimonides. — The greatest of all Jewish philosophers in whom their philosophical ac¬

tivity reached its zenith was Moses ben Maimon, generally known as Maimonides (b. in Cordova, 30 March 1135; d. at Cairo, 13 Dec. 1204).

His two main works are (1) the codification of the talmudic regulations systematically ar¬

ranged into 14 groups. This elaborate treatise, to which he gave the title (Mishneh Torah } or (The Second Law) and which was written in Hebrew, is a profound monument to the au¬

thor's learning, ingenuity and skill. It marked an epoch not only in talmudic studies, but in the history of Judaism, and although intended to uphold and strengthen the authority of the Tal¬

mud, in reality led in the course of time to an anti-talmudic movement, which after many vicissitudes contributed to the decline of Rab¬

binical authority in Judaism and eventually to its overthrow in all of western Europe and in America. The orthodoxy displayed by Maimon¬

ides in his code is in striking contrast to the freedom and boldness of his philosophical and theological views in his great philosophical work, completed in 1187, written in Arabic and known as the < Guide of the Perplexed. 5 Upon this work his claim to immortal fame rests.

Its principal aim may be summed up as an at¬

tempt to bring about the reconciliation between the prevailing modification of the Aristotelian philosophy and Judaism. Maimonides purposed to do for Judaism what Alfarabi, Avicenna (or Ibn Sina) did for Islam — to adapt it to the teachings of Aristotle, as these teachings were understood and interpreted in his days. Start¬

ing from the thesis that there can be no con¬

tradiction between truths revealed by God and truths discerned by the human mind, which is a power derived from God, Maimonides ex¬

plains the apparent conflict between science and religion as due to a misunderstanding of the anthropomorphisms in the Old Testament.

Holding more strictly than any of his prede¬

cessors to the doctrine of the incorporeality of God, and going to the length of declaring every one who denied this dogma to be an idolater, he is obliged to fall back in accounting for anthropomorphic descriptions of God in the Bible on the old Philonic principle of the two¬

fold meaning — an external or superficial one and an internal or allegorical one. By the same JEWS AND JUDAISM — JEWISH PHILOSOPHICAL WRITERS (5) method he disposes, of the attempt to predicate positive attributes into five classes, (1) those t lat include all the essential properties of an object, (2) those that include only a part of the essential properties, (3) those indicating a quality, (4) those indicating the relation of one object to another, (5) those referring to the actions of an object. He rejects all but the last either because they rest upon the erroneous as¬

sumption that God can be defined or because they contradict the fundamental view of the absoluteness of God. Attributes referring to God's actions may be admitted because they do not assume the coexistence with him of any¬

thing else. Maimonides, accordingly, interprets the names given to God in the Old Testament as indicative of His activity. While accepting the principle of creatio ex uihilo, because it can be supported by better arguments than the doctrine of the eternity of matter, he admits that no positive proof can be given for the former and criticizes sharply the seven argu¬

ments. in support of the doctrine given by the Islamic theologians. In a series of 26 proposi¬

tions he establishes the doctrines of the exist¬

ence, unity and incorporeality of God as the primal cause. He accepts the Aristotelian view of a number of heavenly spheres, each endowed with an intellect and possessing a soul, but instead of regarding these

spheres and intel¬

ligences . as coexisting with the primal cause, Maimonides maintains that they were created by the will of God. With the help of his allegorical method of interpreting Biblical pas¬

sages, he proceeds to show that the account of creation in the book of Genesis is in accord with the views, of Aristotle. He takes the first word of Genesis as the term for ˆIntelligences,®

which, constitutes the first work of God, as proclaiming the creatio ex nihilo. Adam's sin and even the three sons of Adam are accorded a purely allegorical interpretation, so that in this vyay everything falls into line with the Aristotelian system. When he comes to prophecy, which in accord with the philosophers he regards as a natural quality that may be granted to any man whose physical, mental and moral qualities are in perfect condition, he extends the allegorical method to the inter¬

pretation of the prophetic visions, notably those of Ezekiel. Evil, according to Maimonides, has no positive existence, and consistently all such evils as are in the Old Testament ascribed to God as the direct cause are interpreted al¬

legorically. His solution of the apparent con¬

tradiction between God's omniscience and the freedom of the human will possesses at least one original feature in the emphasis that he lays upon God's knowledge as essentially one of possibilities, and that the knowledge of the realization of one of several possibilities does not affect the nature of the ((possible.® This being admitted, man has a free choice among several possibilities. The last part of the (Guide) is devoted to an exposition of Mai¬

monides' system of ethics which is based upon the Pentateuchal laws. These laws bear either directly'- or indirectly upon morality as the means to attain the highest happiness which in the case of men as superior to the animal world and as the end and purpose of creation must consist in a moral and intellectual perfection.

In accordance with this basic principle he pro¬

ceeds to the interpretation of the Pentateuchal precepts and from them deduces precepts for the regulation of man's life. His philosophy though intended as a justification of Judaism was not so regarded by those whose philosoph¬

ical interests were subsidiary to their religious zeal. There was much in the (Guide) that ap¬

peared rationalistic to more simple-minded be¬

lievers— more particularly his views of prophecy and miracles, both of which he accounted for as due to perfectly natural processes. His lack of positiveness with regard to the doctrine of the o eatio ex nihilo also aroused offense, and it was not long before a controversy arose that grew in bitterness between the adherents and. opponents of Maimonides in France and Spain, and which threatened at one time to create a break in Jewry. The influence of Maimonides (Guide) extended, however, far beyond the limits of Judaism. Through a Latin translation it made . its way to Christian scholas¬

tics and it was instrumental, like Gabirol's (Fountain, J in shaping the thoughts of men like Albertus Magnus, Duns Scotus and numerous others, while within the pale of Judaism its traces may be discerned in Spinoza's system and down to the 18th century in men like Moses Mendelssohn and Solomon Maimon.

Gersonides. — Half a century after Mai-

moindes we encounter in Levi ben Gerson known as Gersonides (b. 1288; d. 1344), and in Latin as Leo Hebrseus, a philosopher who struck out into new paths, diverging somewhat from those of Maimonides.. He was remarkable for the wide scope of his attainments, embracing logic, metaphysics, mathematics and medicine.

As a philosopher his fame rests upon his work (The Wars of God,} which is devoted chiefly to a discussion of those questions which Maimoni¬

des. left in a vague state or in which he opposed Aristotelian principles. Gersonides clings more closely to Aristotle than any other Jewish philosopher, and thus represents the climax of Aristotelian influence in Jewish theology. If Maimonides is dependent upon Ibn Sina's in¬

terpretation of Aristotle, Gersonides may be said to represent the adaptation of Ibn Roshd's (or Averroes') exposition of the Aristotelian system to Judaism and which involved a more radical departure from orthodoxy. In a conflict between reason and religion, he does not hesitate to give the preference to reason. He ranges himself on the side of the scholastic realists and follows the arguments of the latter in

maintaining that the intellect inasmuch as it consists of conceived ideas having a real ex¬

istence may survive after the body decays. In opposition to Maimonides, he claims that certain attributes, such as knowledge, can be predicated of God but that divine knowledge is not to be placed on a par with human knowledge in any such particular. Through the wide divergence between the two, he opens the way for the maintenance of the doctrine of the freedom of the human will in the face of God's omniscience.

Perhaps the most original part of his philosophy is his view of creation, assuming as he does that from eternity there existed inert and un¬

determined matter, devoid of form, to which God at the proper time bestowed form, life and motion. He thus occupies a middle position between those who accepted the eternitv of matter and those who admitted the creatio ex nihilo.

Crescas. — The revolt against Aristotelian-

ism came in the following century, the chief rep¬

resentatives of the movement being Chasdai ben Abraham (or ben Jehuda) Crescas (1340—1410) and his pupil Joseph Albo (1380-1435).

In his work, (The Light of God,* Crescas boldly makes front against the subjection of Jewish theology to the tenets of the Aristotelians, whether of the Avicenna-Maimonides or of the Averroes-Gersonides type. He criticizes the 26

Aristotelian propositions adopted by Maimon-

ides as the basis of his doctrine of the First Cause, and endeavors to show that through revelation alone can the belief in the unity of God be established. Against Maimonides he assumes that attributes can be assigned to God without involving oneself in contradictions. As the six fundamental doctrines of Judaism he sets up the omniscience, omnipotence and prov¬

idence of God, prophecy, freedom of the will and recognition of a

purpose in creation. As the purpose of God's creation of the world he assumes the happiness of man's soul, though admitting that this happiness is not fully realized until after death when the soul enters into higher realms of existence. The soul is in¬

dependent of knowledge and man's highest per¬

fection is reached not through knowledge but through love of God's law, and obedience to it.

Joseph Albo. — Crescas' pupil Joseph Albo develops the themes of his master still further.

In his (Principles) he plants himself even more securely on the basis of revelation, main¬

taining that the Mosaic law as the outcome of revelation establishes the claim of Judaism for all times as the only true religion. Instead of six, he sets up three principles as fundamental to this true religion, (1) the existence of God, (2) revelation and (3) rewards for the observ¬

ance of God's laws and punishment for dis¬

obedience. Albo may be called the philosopher of Jewish orthodoxy par excellence, and the only feature of this orthodoxy that is perhaps not accentuated with its full force is the Mes¬

sianic doctrine which is obscured by that of divine retribution. Such was the popularity of Albo's work that it eclipsed the glory of Maimonides. The philosophical movement

among the Jews thus issues, as among the Mo¬

hammedans, in the triumph of orthodoxy. With the breaking of the bond between the prevailing Aristotelian systems and Judaism, a distinctive religious philosophy among the Jews, for the time being at least, comes to an end. Instead, we have, as the next step in the realm of spec¬

ulation, the tendency toward mysticism, which became more marked as the ages passed on, until in the 16th century it successfully stifled all efforts at independent speculation. The dark period of persecution which the Jews en¬

countered, leading in Spain to their expulsion at the end of the 15th century, and to their more or less complete isolation from the life

around them by the establishment of ghettos, either voluntary or enforced, in Italy, France, Germany, Poland, Russia and even Holland, was also a factor in bringing the philosophical movement among them to a temporary close.

Thus thrown upon their own resources, the study and interpretation of the Talmud, with¬

out reference to extraneous currents of thought, furnished by the side of absorption in cabalistic lore the outlet for intellectual ener¬

gies. See article The Cabala in this section.

Spinoza. — In a measure Baruch Spinoza (1632-77) is to be regarded as a representative of Jewish philosophy because of the influence exerted upon him in his youthful training by Maimonides, Gersonides and Crescas, but his thought turning into the new direction given to philosophical speculation by the movement that dates from Descartes he developed a sys¬

tem in which Judaism as a revealed religion had no part. The breaking away from scholasti¬

cism opened up new aspects, and Spinoza takes his place in the general history of philosophy rather than in the religious philosophy of Juda¬

ism, and this despite the fact that there are features in his system which can be directly traced to some of the Jewish philosophers of the Middle Ages. Thus it is generally agreed that Spinoza's attitude toward the problem of determinism was derived from Crescas, as like¬

wise the emphasis he lays upon the love of God, rather than knowledge as the highest human quality. From Maimonides he appears to ob¬

tain the view that Time arose in Creation and not the reverse. His attitude toward the ques¬

tion of divine attributes also points to the in¬

fluence of Jewish philosophers. His break, however, with the prevailing form of Judaism was so complete, as illustrated not merely by his excommunication but by his departure from the accepted doctrine of the Pentateuchal Laws as a special dispensation for the Jews derived directly from the divine source through Moses, as to

place him outside of the rank of Jewish philosophers. His system, however, furnishes a link between Jewish theology and the currents of the later philosophical systems like those of Leibnitz and Wolff (built up largely under the influence of Spinoza, though with an endeavor to escape from his conclusions), so that when toward the end of the 18th century the Jews once more began to take their place within the world's activities, the influence of Spinoza on specifically Jewish thought also began to make itself felt. Moses Mendelssohn, the mediator between Judaism and the external world, though a follower of Wolff's system, yet derives some of his views from Spinoza, and Solomon Mai-

mon, one of the ablest of the early exponents of the Kantian philosophy, passed through a period of domination of Spinozastic philosophy.

Indeed from a certain point of view, Spinoza's pantheism may be regarded as the last word of Jewish religious philosophy, though it involves the discarding of the specific doctrine of the divine authority of the Old Testament. In a certain sense, Spinoza is the last Jewish philos¬

opher. See Spinoza.

The attitude of Mendelssohn and Maimon toward the systems prevailing in their days is typical of modern Judaism, the exponents of which are swayed, as are the exponents of Christianity, by the currents of thought arising on the basis of scientific investigations outside of the domain of religious belief — either ac¬

cepting the. modern attitude toward the prob¬

lems of existence, or endeavoring to confront it. Whether conditions will ever arise that will again lead to a distinctively Jewish philosophy is more than doubtful. The present tendency throughout the more intelligent religious world to seek the essence of religion in the heart and soul of man and to lay the main emphasis of the religious life upon conduct rather than upon speculation is unfavorable to the creation

of such conditions, either in Judaism or in Christianity.

Bibliography. — General : Moritz Eisler, (\ 'orlesungen uber die Jiidischen Philosophen des Mittelalters) (Vienna 1876) ; J. S. Spieg-

ler, (Geschichte der Philosophic des Juden-

thums) (Berlin 1900) ; Salomon Munk, (Me-

langes de Philosophic Arabe et Juive) (Paris 1859) ; David Kaufmann, (Geschichte der At-

tributenlehre in der Jiidischen Religionsphil-

osophie des Mittelalters von Saadia bis Mai-

munP (Gotha 1877) ; Manuel Joel, (Beitrage zur Geschichte der Philosophic1* (2 vols., Bres¬

lau 1876—84) ; B. Beer, (Philosophie und Philosophische Schriftsteller der Juden) (Leip¬

zig 1852) ; Schmiedel, (Judische 'Religionsphil¬

osophie1* (Vienna 1869).

Special: (a) Old Testament: Moritz

Friedlander, (Grieschische Philosophic im Al-

ten Testament'* (Berlin 1904); (b) Philo: James Drummond, (Philo Judaeus, or the Jewish Alexandrian Philosophy in its Development and Completion (London 1888); (c) Saadia: J.

Guttmann, (Religionsphilosophie des Saadia*

(Gottingen 1882) ; Wilhelm Engelmann, (Die Religionsphilosophie Saadia Gaons) (Munster 1903); (d) Bachya: J. H. Hertz, (Bachja, the Jewish Thomas a Kempis* (New York 1898) ; Isaac Husik, (A History of Mediaeval Jewish Philosophy) (Philadelphia 1916) ; (e) Ibn Ga-

birol : H. Adler, (Ibn Gabirol and his Influence upon Scholastic Philosophy) (London 1865) ; J.

Guttmann, (Die Philosophic des Salomon Ibn Gabirol } (Gottingen 1889); (f) Judah Halevi; Hartwig Hirschfeld, (Judah Halevi's Kitab al-

Khazari translated from the Arabic1* (London 1905); (g) Maimonides : S. Munk, (Le Guide des Egares* (3 vols., Paris 1858-66) ; Michael Friedlander, (Guide of the Perplexed1* (Lon¬

don, 3 vols., 1881-85) ; Israel Abrahams, (Mai¬

monides1* (Philadelphia 1903) ; (h) Gersonides : A. Weil, (La Philosophic Religueuse de Levi ben Gerson1* (Paris 1868) ; (i) Crescas: Philipp Bloch, (Die Willensfreiheit von Chasdai Kres-

kas1* (Munich 1879); (j) Albo : Tanzer,

burg 1896).

Morris Jastrow, Jr.,

Professor of Semitic Languages, and Libra¬

rian, University of Pennsylvania.

6. THE JEW IN ART, SCIENCE AND

LITERATURE. It is a task of much diffi¬

culty to describe the influence which the Jews in all ages have exercised on art, science and literature; for a period of more than 3,000

years will have to be considered, while the Jews have not only shared all the great devel¬

opments of humanity's intellectual life, but have blended therewith the views which are at the basis of their own individuality. The culture of the Jews is bound up with that of antiquity, with Christianity's origin and development, all important movements of the Middle Ages, all grades of development and tendencies of the modern era. While it takes part in the intel¬

lectual life of the past and present, whose struggles and sorrows it shares, it becomes a complement of universal culture, but with an organism which aids in its turn the recognition of the universal.

Art. — It is conceivable how a people of such positive monotheistic belief should have only slightly cultivated art. Such cultivation be-

longed rather to a race which had received the surname of Japhet, or beauty, in the genealogical record of Noah, thus symbolizing its mission.

It was, however, the mission of the Hebrews to know God and spread this knowledge throughout the world. The older Talmudists assigned

to Hellas the cultivation of beauty, to Judaea that of religious truth. In fact certain lines of art were condemned by the Hebrews, because they led to idolatry, to imitating and deifying nature, which in the Jewish religion was secondary to God, as the world's creator.

Poetry, however, chiefly the lyric, and music were zealously cultivated — in these fields they equalled the most important achievements of other races in antiquity or surpassed them in many respects. Unquestionably the Jew's capacity for music is an old inheritance of his race. Architecture, too, with its side-lines, was familiar to the Hebrews, judging from their temples, gardens, pleasure grounds. The plas¬

tic arts and painting were not cultivated from religious motives, not from any want of taste or capacity. The mimic art, for a similar rea¬

son, was adopted at a late period, but with great success. The dance had been early de¬

veloped into an art, and with musical accom¬

paniment. Upon the whole, however, the nur¬

ture and development of art was neither the task nor the strength of old Israel, which lacked all the conditions to its growth. The period of national prosperity under Solomon and his suc¬

cessors, the most favorable time for such ar¬

tistic- achievements, occurred at too early a stage in the intellectual development of the race, and when this gradually reached its ma¬

turity art found little sunshine.

In the Middle Ages. — A similar condition occurred in the Middle Ages, but to a greater degree. Persecution, leading to incessant wan¬

dering from city to city, and land to land, pre¬

vented any growth of art, even in countries where the Jews enjoyed comparative rest for some centuries. In Spain, of all lands, where they dwelt in free competition with the Arabs, shared joyously the pleasures of life, hard¬

ened themselves in knightly exercises, sang and danced, spoke the vernacular like a mother tongue, and participated in intellectual

progress, the religious prohibition against idolatry was carried out by the rabbis to the extremest limit. Islam, with its fanatic hostility to plas¬

tic art, was a worthy model ; not only the rep¬

resentations of the Deity, but that of living beings, man and animal, was not allowed. Yet we hear in Spain of a famous Jewish portrait painter, whose name is unknown ; and in Ti¬

tian's days, on the border lines of the 15th and 16th centuries, we learn of an Italian portrait painter and illustrator, Mose dal Castellazzo, who attained high fame in art-loving Venice and then elsewhere in Italy.

Art in the Synagogue — One form of art was cultivated by the Jews in the Middle Ages — the ecclesiastical. If the synagogue interior was usually free from any decoration, there were exceptions, when this was permitted, if rabbinical authorities assented. One of the most eminent sages in the 1 5th century allowed painting of forms of animals and plants in the synagogue on the ground that there was no likelihood of the Jew becoming an idolator.

Hence we find in the synagogue windows painted glass and on the walls birds and plants.

In some MSS. of prayerbooks and ritual works the illustration is a real adornment — an art that attained great development in the later Middle Ages. The goldsmith's art and silver embroidery employed in the decoration of the scrolls of the law, the curtains, coverings, little bells, goblets, lamps and other objects used in the synagogue, reached high perfection in the ghetto.

In the Modern Era. — As the Jews, first in Germany, in the second half of the 18th cen¬

tury, again participated in the nation's intellec¬

tual activity, they devoted their attention to every branch of art Hardly half a century after their emancipation, they number in Ger¬

many prominent painters who rank among the ablest in their profession, like Eduard Bende-

mann, one of the leaders in the older historical school; Philipp Veit,

one of the most brilliant representatives of ecclesiastical art ; Eduard Magnus, Julius Muhr, Moritz Oppenheim,

whose (Pictures from the Old Jewish Family Life) have acquired fame; Solomon Hart, the first Jewish Academician in England. In our day Jewish painters are prominent in every land. To mention the most eminent, let us re¬

call the Hollander Josef Israels, the English Academician S. J. Solomon, the Austrian por¬

trait painter Leopold Horowitz, the French his¬

torical painter Eugene Vichel, the genre artist Friedrich Friedlander, the Belgian painter Carl Jacoby, with names like Herman Junker, Max Kahn, Louis Neustatter, Felix Possart, Toby Rosenthal, — one of the few American genre painters with a reputation in Europe — the great Swedish painter Geskel Salomon, Na¬

thaniel Sichel, Isidor Kaufmann, Philipp Aarons, Henry Baron, M. Verner, David Bles — the dozen of Dutch painters — Karl Heinrich Bloch, Felix Borchardt, Lajos Brack, Friedrich Kraus, the Polish historical painter Alexander Lesser, the French idyl painter Emile Levy, Leopold Pollack, Felix Heinrich and Karl Schlesinger, Gustav Wertheimer, Jules Worms, F. Hirszenberg, Philipp Laszlo, Samuel Hirsch-

felder, Herman Struck, Isaac Snowman, the American Henry Mosler, Geo. D. M. Peixotto, Ernest Peixotto, M. A. Woolf. In the modern movement, , Max Liebermann, Lesser LIry and Louis Corinth are among the leaders. Strange to say, Russia has expelled the most painters.

In copper and steel engraving, as in etching, the Jews furnish three of the first masters of this art — Friedrich Frankel, Louis Jacoby and Henryk Redlich. In America Louis ‘ Loeb, Henry Wolf and Jacques Reich have acquired high rank. In sculpture one can mention as pre-eminent the Russian Marcus Antokolski, then the American M. J. Ezekiel and Ephraim Keyser, the French Antoni Adam Solomon, E.

Soldi, Em. Hanneaux, L. Astruc ; the Hungarian Max Klein, the Belgian Charles Samuel, the German Louis Sussman Hellborn, the Russian Leopold Bernstamm, Henrik Glycenstein,

Charles Giinzburg. In architecture may be mentioned, in Europe, Max Fleischer, Georg J.

Hitzig, W. . Stiassny, Richard Wolffenstein, Ludwig Levi, Frederick Marcks, Adolf Wolff,'

Siegmund Taussig; the American Dankmar

Adler, Arnold W. Brunner, Henry Fernbach, Fdgar M. Lazarus, S. B. Eisendrath. As med¬

alists and engravers few names surpass in ex¬

cellence A. Abrahamson, Salomon Bucher, Jacques Karl and Leopold Wiener.

Music — Through all the stages of his his¬

tory, music was always close to the Jew. In antiquity it accompanied the Temple service, in the Middle Ages it comforted the home and in the modern era it was to reach high develop¬

ment. The long list of composers, musical artists and directors is opened by the English¬

man, John Barnett, and there follow Sir Julius Benedict, Meyerbeer, Felix Mendelssohn-Bar-

tholdy, J. F. Halevy, George Bizet, Anton Ru-

benstein, Jacques Offenbach, Ignatz Brail, Karl Goldmark, Frederic Cowen, Ferd. David, Fried¬

rich Gernsheim, Ferd. Hiller, Eduard Lassen, Ignatz Moscheles, Moritz Moszkowski, Sieg¬

fried Ochs, Julius Schulhoff, Jules Cohen, Josef Dessauer, Baron A. Franchetti, Ferd. Gumbert, Adalbert von Goldschmidt, Leopold Auer, H.

W. Ernst, J. Joachim, E. Remenyi, H. Wieni-

awski, H. and A. Grunfeld, David Popper, H

Herz, M. Rosenthal, Karl Taussig, Karl Hey-

mann, M. J. Gusikow, L. Damrosch, S. Sulzer, Herman Levi, Gustav Mahler, Julius Stern, L.

Lewandowski, and the artistes Clotilde Klee-

berg, Sophie Jaffe, Ilona Eibenschutz, Berthe Marx, Fannie Bloomfield-Zeisler, the American pianist.

The Stage. — In dramatic art the achieve¬

ments of the Jew have been conspicuous. Among actors, ‘singers, theatrical directors, managers, m every civilized land, there is a lengthy list of Jewish names. To mention the most prominent, as operatic and concert singers, there are Leo¬

pold Demuth, Georg Henschel, Paul Kalisch, Leopold Landau, Nikolaus Rothmiihl, Julius Lieban, Heinrich Sontheim, John Braham, Jose Lederer, Pauline Lucca, the sisters Grisi, Lola Beeth, Juditha Pasta, Caroline Gompertz, Rosa Olitzka. Among famous actors and actresses are Rachel Felix and Sarah Bernhardt, Adolf von Sonnenthal, E. Worms, S. Berr, L. Barnay Anton Ascher, Bogumil Dawison, Ludwig

Dessoir, Siegwart Friedmann, Alfred Hertz, Maximilian Ludwig, Gustav Kadelburg, Ernest von Possart, Emrich Robert, Moritz Rott, Emil Thomas. In America, the names of Aaron J

Jonas B. and Moses f. Phillips, Mordecai Noah Emanuel and S. B. H. Judah occur in the early history of the American stage as playwrights and actors, and in more recent days the Wal-

lacks, Madeline Henriques, both of’ Jewish ori¬

gin, David Warfield, H. Conried, Jacob Adler.

Science. ((Knowledge and understanding®

were ever regarded in Israel as the highest palladium from the earliest ages of its national history to the present day. The priest was the community’s teacher and physician as well. In later times, when the different sciences were separated from each other more and more, the rabbis of the Talmudic era not only recom¬

mended such avocations to the faithful, but zealously devoted themselves to such pursuits.

Many Talmudic teachers were physicians, astronomers, mathematicians, jurists. In the Talmud principles of geometry are stated, which agree with the modern rules. Its computation of the calendar rested upon the finest astron¬

omical observation. The number of bones in the human body is given

exactly as in modern anatomy. In the Middle Ages the Encyclopedia of the Sciences included chiefly three disciplines astronomy, which was connected with mathe-

matics and geometry, medicine and philosophy.

In all these fields the Jews have accomplished much, in some degree they have been pioneers, particularly in Spain and North Africa, where they could develop unchecked. The foundation of mediaeval mathematics — the (Almagestˆ of Ptolemy, and of mediaeval botany — the (Plant Lore) of Dioscorides, Jews brought to Europe.

It was Abraham (b. Chija) who wrote the first textbook of geometry that Europe could boast of; it was a Jew who brought to Europe the Arabic-Indian numbers; a Jew whose observations on the inclination of the earth's axis cleared the way for the immortal astronomer who, as he arranged his system of the world, had to have translated into Latin the Arabic writings of that Jew, Jacob ibn Machir.

A French Jew furnished an approximation for incommensurable numbers; a Spanish Jew was the first to apply decimal fractions in the ex¬

traction of the square root. As Jewish astron¬

omers, among the Arabs, are mentioned Mas-

challah, Sahl el Taberi, Sind ben Ali, Ibn Sima-

weih, etc., through whom the Arabs already in the 8th century became acquainted with Indian medicine and astronomy, before the Greek sci¬

ences had been introduced. Natural philosophy and medicine, mathematics and astronomy, formed often the transition from the halakha to the hagada, and knowledge of these sciences could not therefore have been unknown to the teachers of the law.

Medicine. — Jews have performed the most important service in the department of medi¬

cine. Masergeweih (683) translated from the Syrian into Arabic the (Pandects) of the Pres¬

byter Aaron, a valuable medical work of antiq¬

uity. Nearly all the works of the Greeks and Arabs, the Syrians and Indians, the Nestorians and Christians, were brought to Europe by Jews and thus rescued from oblivion. These very writings were then, mostly by Jews, again translated into Arabic. More than 200 such translations have been restored by modern bibliography out of the dust of libraries. Their activity was precious for the history of the sciences in the Middle Ages. Entire families like the Tibbon and the Kalonymos occupied themselves in such work. It is stated that Jews were the first teachers of medicine at the first European high schools of Salerno and Mont¬

pelier. Whether this is a fact or not it is. in every case proved, what the history of medicine illustrates, that the labors of the Tews in this field during the first half of the Middle Ages belong to the greatest achievements in that sci¬

ence, which without such activity could hardly be thought of as existing. In those days, too, Jews were body-physicians of popes and em¬

perors, of sultans and notabilities in many countries.

Present Day Medical Scientists. — To-day this tendency has been naturally strengthened, with the result that in all lands Jews are among the most eminent physicians and medical inves¬

tigators. We need mention only the names of Ludwig Traube, Herman Senator, August

Hirsch, Jacob Henle, Eduard Henoch, Albert Neisser, Robert Remak, Julius Pagel, . Karl Stork, Emil Zuckerhandl, Johann Schnitzler, Adolf Politzer, Paul Ehrlich, Julius Cohnheim, Wilhelm Ebstein, H. Zeissel, Jac. Fischel, August Wasserman, Ludwig Mauthner, Karl Weigert, Victor Birch-Hirschfeld, John Lebert, Heinrich Jacobson, Julius Wolf, Jacob Gottstein, in Ger¬

many; Germain See, Georges Hayman, Sieg-

mund Rosenstein and Jacob Stokvis, in Hol¬

land; Sir Felix Semon, in London; G. Valentin and Moritz Schiff, in Switzerland; Gottlieb Cluge, in Belgium; Max Mandelstamm, Josef Bertenson, in Russia ; Elias Cohen-Pasha, in Turkey. In the United States it would be no • exaggeration to say that 50 names and more

could be cited of Jewish physicians and medical experts who are leaders in their profession in every city and included in college faculties. It was Dr. Simon Flexner, who was chosen director of the Rockefeller Institute of Preven¬

tive Medicine. Of German physiologists we might mention among the authorities Julius Bernstein, Herman and Immanuel Munk,

Nathan Zuntz, Isidor Rosenthal.

Natural Sciences. — In the natural sciences, Jews number distinguished names in the varied lines of research. The most famous botanists are Ferdinand Cohn, N. Pringsheim, Julius Sachs. Among the eminent chemists are Victor Meyer, whose discoveries were remarkable, Adolf Pinner, Rafael Meldola, Karl Lieber-

mann, Oscar Liebreich, Georg Lunge, H. G.

Magnus. As geologists, mineralogists and pa-

laeologists one may include Emil Cohen, Angelo Heilprin. In physics a name of international prominence is Heinrich Hertz, famous for his discoveries in electricity and magnetism, with F. J. Pisko, P. T. Ries, who was the first Jew¬

ish Academician in Germany, and Arthur Schuster in England. As zoologists, we can refer to Mendelssohn's contemporary, M. E.

Bloch, to Emil Selenka, H. Gabriel, E. Laden-

burg, G. Lehfeld, Leo Graetz.

Mathematics. — For centuries Jews have

studied mathematics. Their sagacity, gift of combination, power of thought, have won signal success. The rabbis of the Talmud had mathe¬

matical ability. In the Middle Ages the science of mathematics was preparation for philosophy.

In this field Jews were intermediaries and trans¬

lators, as well as independent authors. They were employed in editing the Alfonsine Tables — the chief being Isaac Ibn Sid, with Judah b.

Salomo Cohen and Samuel Levi. One of the leading mediaeval Biblical

commentators, Abra¬

ham Ibn Ezra, was regarded by the Catholic Middle Ages as patron of mathematics. In later centuries Jews displayed similar interest in that science, and to-day they number leaders in the line. For instance, we may mention Leopold Kronecker, Felix Klein, Immanuel Fuchs, S. Spitzer, W. Konigsberger, Meyer Hirsch, Georg and Mortiz Cantor, Oscar Min¬

kowski, J. Rosanes, G. Schonfliess, S. Wein-

garten, Ch. Slonimski, Herman Schapiro, Maur¬

ice Levi, J. J. Sylvester. In astronomy can be included Wilhelm Beer, Wilhelm Goldschmidt, Adolf Hirsch, Robert Rubenson, E. Schwarzs-

child, Prof. Harold Jacoby, of Columbia Uni¬

versity.

Travel and Exploration. — To turn from traversing the skies with the telescope to traversing the earth in the interests of scien¬

tific research, we find a large number of Jewish travelers who have penetrated distant lands.

From the legendary Eldad-ha-Dani of the 9th century, Benjamin of Tudela, and Petachia of Regensburg down to the men who shared the sea-journeys of the Portuguese, the Spaniards and the Italians, and accompanied Columbus and Vasco de Gama, to our time, a lengthy list could be given. In recent times can be men¬

tioned J. J. Benjamin, Jacob Saphir, J. Halevy, while among explorers are Emin Pasha, Emil Bessel, Oscar Neumann, Eduard Glaser, Her¬

man Vambery, Edouard Foa, Adolph Strauss, W. G. Palgrave (of Jewish descent), and in America Angelo Heilprin and Franz Boas, who is associated with Arctic research. In this con¬

nection may be recalled the labors of Jews in engineering, science and invention, etc., with Jos. Hirsch, Maurice Levy, J. Bachman for France, E. Herman and G. Schlesinger for Germany, Mendes Cohen, Emil Berliner, Elias E. Ries, Albert Edward Woolf, E. Zalinski for the United States. Here, too, may be included prominent names in numismatics, statistics and economics. In the latter branch Profs. E. R.

A. Seligman and J. H. Hollander are author¬

ities in the United States; A. Raffalovicz in Russia; L. Luzzatti, Leone Wollenberg in Italy; as statisticians, Maurice Block is pre¬

eminent in France, Josef Korosi in Hungary, while Leone Levi did useful work in England.

Here belong the founders of modern Socialism — David Ricardo, Karl Marx, Ferdinand Las-

salle, E. Bernstein, with J. Jastrow, Max Hirsch, Edgar Loening, E. Warschauer, Ludwig Ham¬

burger. As numismatists we can refer to Julius briedlander, Wilhelm Lowy, A. Merzbacher, Leopold Hamburger, M. A. Levy.

Law. — Biblical and Talmudic legislation shows clearly that the Jews from olden days showed special inclination toward law and its interpretation. Coworkers in the compilation of . the Pandects, they furnish distinguished jurists, judges and lawyers. In France they can point to Adolphe Crem'ieux, August Bedar-

rides, A. Lyon-Caen ; in England to Sir Geqrge Jessel, Sir George Lewis, J. Waley, Earl Read¬

ing; in Holland to the Assers, Goudsmit, Gode-

froi; in Germany and Austro-Hungary, to Eduard Gans, Levin Goldschmidt, Paul Laband.

Karl Griinhut, Herman Staub, Heinrich Har-

burger, Heinrich Wiener, H. Friedeberg, H.

Makower, Eduard von Simson, Wolfgang Wes-

sely, David Rubi, Ferd. Frensdorf, Julius Unger, Max Neuda, H. Dernburg, J. Glaser; in America they include a number of State and city judges.

Philosophy. — Recent writers call the Jews <(the people of philosophy,® and in fact to re¬

flect on the highest questions of life has ever been their custom. Philosophy was regarded among them as one of the weightiest sciences —both during the Middle Ages and to-day. We have to thank

the Jews for the diffusion in Europe of Neo-Platonism, for being interme¬

diaries between the Arab and Christian philos¬

ophy, for the basis of Scholasticism, the popu¬

larizing of Greek philosophy in Europe, and the birth of a new conception of the universe.

In the construction of this new-world philos¬

ophy, above all else in spreading the systems of Kant, Hegel and Schopenhauer, Jews have taken a conspicuous part. . Among the Alexan¬

drian philosophers Philo is pre-eminent, Solo¬

mon Ibn Gabirol opened a new path for Plato¬

nism, and was Scholasticism's pioneer, Moses Maimonides raised Aristotelianism to specula¬

tive heights. (See article Jewish Philosophi¬

cal Writers in this section). Baruch Spinoza was influenced by. him and later investigators, who were more inclined to mysticism. Jews were associated with the achievements of the Renaissance and Humanism, because they were teachers of the leaders of those movements. It was Moses Mendelssohn who popularized

philosophy. Markus Herz and Salomon Mai-

mon, Lazarus Bendavid, were enthusiastic sup¬

porters of Kant, whose most important repre¬

sentative in the new philosophy is Prof. Her¬

mann Cohen of Marburg. The founders of the school of folk-psvchology, Moritz Lazarus and H. Steinthal, champion Herbart's philos¬

ophy. Hegel's best followers were Eduard Gans and Julius Braniss; Schopenhauer's most ardent disciples, Julius Frauenstadt, D. Asher, Moritz Venetianer. In addition belong to philos¬

ophy Ludwig Stein, H. Bergson, Adolph Las-

son, S. L. Steinheim, Adolphe Franck, S. Alex¬

ander.

Philology. — In the line of language, too, the Jews have labored with zeal. They count among the foremost workers in philology, as well as in literary history and bibliography. A brief summary of names will be sufficient proof — such as G. Ascoli, Jules Oppert, Jacdb Bernays, Theodor Gompertz, Michele Amari, Theodor Benfey, M. Breal, James and Arsene Darmesteter, Jos. and Hartwig Derenbourg, H.

Weil, W. Freund, Julius Fiirst, Lazarus Geiger, Theodor Goldstiicker, Ignatz Goldziher, J.

Halevy, Wilhelm Bacher, H. Hirschfeld, S.

Landauei", Gustav Weill, A. Harkavy, Salomon Munk, Adolf Mussafia, Daniel Sanders, S.

Benedetti, L. Kellner, I. Gollanz, and in the United States, Marcus Jastrow, Alexander Kohut, M. Bloomfield, and a number of younger scholars v. ho. have done much to arouse interest in Semitic studies at American universities.

History.— In the Middle Ages history was neglected — they had no time to write' their history, for before their old sufferings were narrated, new trials were to be endured. A few chronicles alone survive, with some Memor.

Books. From the historian Josephus, of the 1st century, to our time, Judaism has produced no eminent historian of the outside world.

With so much more zeal have Jews in more recent years devoted themselves to this depart¬

ment, men like Philipp Jaffe, Martin Philipp-

son, Max Biidinger, Harry Bresslau, Samuel Sugenheim, Alfred Stern, Adolf Beer, Ernst Bernheim, Jacob Caro, Heinrich Friedjung, Salomon and Theodor Reinach, Julius Schwarz Cesare d'Ancona, Alfred Przibram, E. Szanto.'

Samuel Romanelli is the historian of Venice, and Robert Davidson of Florence. Charles Gross, of Harvard, is an authority on early English

history, as is Felix Liebermann on English law.

In the history of the Jews in its varied depart¬

ments Jewish scholars have naturally displayed particular ability — one need only mention names like Graetz, Zunz, Jost, Steinschneider, Geiger, Kayserlmg, Giidemann, A. Berliner. In the closely-allied branch of archaeology, Charles Waldstein is a pre-eminent name, with B. Be-

rensoii in art criticism.

Literature. — In its earliest historical pe¬

riod Israel gave to humanity its best achieve¬

ment in literature— the Bible, which with proph¬

ets and psalmists, despite the latest discoveries and researches, remains without a peer in the entire stretch of the world's literature. Since the close of the Canon until to-day the Bible has furnished a wealth of inspiration to the JEWS AND JUDAISM— JEW IN ART, SCIENCE AND LITERATURE (6) 85

poets and writers of every race. The greatest poets in the world have been impelled by its words ; it has exerted a distinct influence on the literary genius of every European literature, and how much plastic art is its debtor is far 'from being appreciated.

In the Early and Middle Ages. — The first translation of a book into another language was the Greek translation of the Bible — the Sep-

tuagint. This leads us to the participation of Jews in Greek literature. Of Philo, who has already been mentioned, it was said in Alexan¬

dria that he wrote as fine Greek as the divine Plato. Then lived, too, the first Jewish drama¬

tist, Ezekiel ; then a long line of philosophers, poets, historians, the author of the Sibylline books, and many other writers in Greek. In the Middle Ages the Jews familiarized them¬

selves with Arabic literature, under whose in¬

fluence the new Hebrew poetry in Spain devel¬

oped. What Arab and Jew united in those cen¬

turies accomplished is not to be overlooked.

They rescued the treasures of classical antiquity from oblivion and preserved them for posterity; they enriched the arts and sciences and truly promoted the intellectual growth of humanity.

Jews appear, too, among the Arab poets, like Abraham Ibn Sahl, who is praised by them as one of the most graceful singers of love, Ibn el Mudawwer, Kasmune, etc. The Indian and Greek world of fable was communicated to Europe by Jews. During the entire Middle Ages, when the old literary treasures were practically lost, they preserved almost the only knowledge of those romances, stories and fables which were to enter modern literature by a roundabout way through Arabia and Spain from the world of the ancients and the pictured pomp of India. They took a prominent part in those stories from the Orient, which still serve as material for our narrative literature. Later, too, when the Mohammedans were driven from Spain, the Jews displayed a lively interest in the development of the Arabic literature and language. A Moorish Israelite, Ibn Alfange, wrote the first (Chronicle of the Cid} ; another the first Spanish romance ; a third — the bap¬

tized Petrus Alphonsus — the first story in Ori¬

ental manner, (Disciplina Clericalis) ; a fourth was the first Castilian troubadour, Santob de Carrion ; and a fifth, Rodrigo de Cota, is cred¬

ited with the authorship of the first Spanish drama ˆelestinaP In the Spanish song-

books of the 15th century can be found many poems of baptized Jews. At the same era Jews were familiar with French literature. From the glosses of Rashi, the famous Biblical commen¬

tator, the old French language has been partly reconstructed ; and Rashi's contemporaries, who through Nicolas of Lyra directly influenced Luther, already knew German and utilized that language. At the very period when the Jews in Germany were persecuted in the crudest fashion, there lived a Jewish minnesinger, Siiesskind von Trimberg; a Jew shared in the authorship of

orations of romantic legends aid to-day in inter¬

preting old German literature.

In Modern Times. — When through Lessing and Mendelssohn the Jews

in literature, at least, were emancipated, they devoted themselves to authorship with special zeal. Jewesses, like, Henriette Herz, Rachel Varnhagen von Ense, Dorothea Veit, founded the Berlin Salon and gave distinct impetus to Romanticism. Moses Mendelssohn was not only a philosopher, but one of the first authors in the era of rationalism.

Heine is unquestionably the greatest German lyric poet after Goethe, Ludwig Borne the first German critic after Lessing. Berthold Auer¬

bach founded the school of village tales; Fanny Lewald that of the woman's social romance.

Jews have taken marked interest in all later literary movements. One may mention in this field the German authors, Karl Beck, Michael Beer, Theodor Creizenach, L. A. Frankl, Leo¬

pold Kompert, Karl Emil Franzos, E. Kulke, Moritz Hartmann, L. Kalisch, S. Kapper, Hie¬

ronymus Lorm, S. H. Mosenthal, Max Ring, Ludwig Robert, J. Rodenberg, August Silber-

stein, M. G. Saphir, H. Stieglitz, Daniel Spitzer, J. V. Weilen, L. Wihl, O. L. B. Wolff, Wilhelm Wolfsohn; and of later writers Theodor Herzl, L. Hevesy, A. L'Arronge, F. Lubliner, Fritz Mauthner, Oscar Blumenthal, Max Bernstein, J. J. David, L. Fulda, Max Nordau, Georg Hirschfeld, Felix Hollander, L. Jacobowski, J. Lowenberg, A. Schnitzler, J. Wassermann, Ernst Rosmer, Henriette Ottenheimer, Lina Morgenstern, Betty Paoli, Jenny Hirsch. In the history of literature Ludwig Geiger, Richard M.

Meyer, Gustav and Otto Hirschfeld, Otto Pniower, Max Hermann, Eduard Engel, Max von Waldberg, E. Wolff can be mentioned.

In France Jews contribute to all branches of poetry — in dramatic composition may be in¬

cluded Catulle Mendes, Abraham Dreyfus, Er¬

nest Blum, Leon Halevy, A. d'Ennery, A. Vala-

bregue, and as lyric poet Leon Gozlan, Gustav Cahn, Eugene Manuel, Louis Ratisbonne. In England Sir Philip Magnus has written exten¬

sively on education, Joseph Jacobs is an au¬

thority on folklore, Sidney Lee is a leading Shakespeare scholar, Emanuel Deutsch was the first to tell the English world what the Talmud really was, B. L. Farjeon was a voluminous novelist, while I. Zangwill is prominent in vari¬

ous lines. In Italy one may point to Alessandro d' Ancona,ˆ David Levi, Tullo Masserani, Er-

minia Fua; in Denmark to Henrik Hertz, M.

Goldschmidt, Georg and Eduard Brandes, Silvia Benet ; in Sweden to O. Levertin and Sophie Elkan; in Holland to Isaac d' Acosta of the past and H. Heijermans of the present; in Russia to S. Frug, S. Nadson, N. Minsky; in Rumania to Ronetti Roman, the greatest poet of our day, and to H. Tiktin, the greatest philologist; in Hungary -to Ludwig Doczi, Josef Kiss, Adolph Agai, A. Nemeny, all writers of distinction. In the United States Isaac Harby, Mordecai M. Noah are names of the past; with Emma Lazarus admittedly the leading poet and essayist, and among present-day story-

writers I. K. Friedman, Ezra S. Brudno, Emma Wolf, Miriam Michaelson, Martha Wolfenstein, Mary Moss, Abraham Cahan, Montague Glass.

Prof. L. Wiener has written on the history of Yiddish literature, Oscar S. Straus on (The Origin of the Republican Form of Government,*

an'd (Roger Williams. * Professor Winkler has edited a number of German classics. In jour¬

nalism Jews have undoubtedly attained promi¬

nence, as names like L. Sonnemann, Dernberg and Bernstein in Germany, Brody in Hungary, Lawson and Lucien Wolf in England, Pulitzer, Ochs, Rosewater, De Young in America, amply prove.

We have given merely a survey, necessarily 86

incomplete, of Jewish activity in art, science and literature, in all ages and among all nations.

It has been shown, however, with sufficient clearness that they have always striven with ardent enthusiasm for ideal aims, and with marked energy, despite unfavorable conditions, have taken an active

interest in all the develop¬

ments of the world's intellectual life Bibliography. — Art.ˆ Kaufmann,

schichte der Kunst in Syn> (1897) ; Gudemann, Judenthum und die Bildenden Kiinste)

0890) ; A. Wolff, 'Jfidische Kiinstler> (1902); j- Solomon, (Art and Judaism) (in J. Q. R

XIII 533 ff.) ; D. H. Muller, 'Die Hagadah von Serajewo> (1898).

Science. — Steinschneider, (Die hebr. Uber-

setzungen des Mittelalters) ; Gudemann, (Gesch ?TrTCe Vir- Vnd de.s Erzieh> hei den Juden> ; M. J. Schleiden, 'Die Verdienste der Juden fiir die Erh, der Wiss. im Mittelalter) ; I. Abra¬

hams, 'Jewish Life in the Middle Ages) • A Kohut, 'Beriihmte Israel Manner und Frauen >

etc.

Literature. — Steinschneider, 'Jewish Litera-

ture) ; G. Karpeles, ' Jewish Literature and Other Essays > ; and his 'Allgem. Gesch. der LitteraturP

. . . . Gustav Karpeles,

Author of ' Jewish Literature and Other Es¬

says. '

t TALMUD, a code or digest of

Jewish laws and opinions. The Talmud is in ieality a combination of two entirely separate works the Mishna being the text and the Gemara its commentary. The name signifies ar*d has come to be applied to the

combined text and commentary, although it refers properly to the Gemara alone. There are two recensions of the Gemara, one called the Palestinian Talmud, originating in Pales-

tme, the other Babylonian, in Babylon. They differ both in language and contents. There are only slight variations in their respective Mishnas.

..-ˆhe Mishna. — The word Mishna has been differently interpreted, according to its etymol¬

ogy either as. “second® or as “doctrine,® oral teaching. It is a codification of the oral or unwritten law, based upon the written law of the lorah or Pentateuch, and was compiled during the era of the second Temple, and com¬

pleted at the end of the second Christian cen-

tury. As in course of time the oral law became unwieldy in bulk and hard to be remembered, 2?™? to its lack of order and arrangement, Hdlel who presided over the Sanhedrin in Herod s days, made the first attempt to svs-

tematize the immense mass of material by arranging it in six divisions, which were ac¬

cepted by later revisers. Rabbi Akiba, who par¬

ticipated in the Bar Cochba revolt, went a step further by employing a more correct method of division His disciple, Rabbi Meir, continued the work of revision, or, rather, collation, of o d-time usages and teachings. Toward the n ?frˆhˆ?d century, R. Judah, the Prince, called Rabbi,® a descendant of the wise Hillel strove to complete the work of his predecessors’

sifted anew the mass of traditional ordinances’

and became, by his intellectual vigor and free¬

dom. the r&l compiler of the Mishna. In his later years he subjected the work to further revision, although some additions after his death were made by others. Whether Rabbi wrote the Mishna or merely transmitted it orally to his disciples is not definitely known, and has long been a moot point among scholars, with the probability in favor of his having written the work.

Divisions of the Mishna.— The Mishna is divided into six chief sections, called Sedarim of ˆ/ders: (1) Zeraim, seeds or products of the held, containing the ritual laws respecting agriculture. (2) Moed, Festival, referring to laws of the Sabbath and festivals. (3) Nashim, Women, including rules about marriage and divorce. (4) Nezikin, Damages, a large sec¬

tion of the civil and criminal law. (5) Ko-

dashim, Sacred Things, discussing the laws of sacrifice and the Temple service. (6) Teharoth, t unhcation, treating of regulations as to things clean and unclean. Each Order is divided into .Maseeh to th, or treatises, which are 63 in all in the Mishna. Each treatise is subdivided into chaptei s, oi Perakim, and each chapter or perek into paragraphs, each of. which is called Mishna or halakhah, law principle. The arrangement of the Orders is fixed, although the sequence of tieatises, chapters and paragraphs is more open to question.

Contents of the Treatises of the Mishna.

— the best way to describe the subject matter of the Mishna is to give a list of the various reatises and their contents. These are as fol¬

lows, according to the six Orders: I (1) Berak-

- benedictions, treating of liturgical rules.

(-) 1 eah, corner, about the corners and glean¬

ings of the field. (3) Demai, uncertain, about corn bought from those suspected of not having given tithes. (4) Khilayim, mixtures, about the prohibited mixtures in plants, animals and garments. (5) Shebiith, the Sabbatic year.

T?rUmodl,' heave offerings for the priests.

(7) Maaseroth tithes to be given to the ˆevites. (8) Maaser Sherd, the second tithe according to Dent, xiv, 22-26. (9) Challa, the dough, to be given to the priests, as ordered in Xum. xv, 20—21 . (10) Orla, treating of the fruits of the tree during its first four years, as commanded in Lev. xix, 23-25. (11) Biccurim, A\ ficS uri,i S' .The contents of Order II: (l) babbath, giving an account of labors prohibited on that day. (2) Erubin, com¬

binations, continuing the subject of the pre-

bm/nf treat/ˆ cnd r1e.ferrinS ˆ the Sabbath boundary. (3) Pesachim, relating to the laws of Passover and the paschal lamb. (4) Sheka-

i1??' Jlie la™ of the half-shekel temple tax.

(b) Yoma, of the day of Atonement. (6) Suk-

kah, of the laws concerning the Feast of Taber-

nacles.. (7) Betsah, of the work permitted or prohifuted on the

festivals. (8) Rosh Hashonah, of the feast of the New Year. (9) Taanith, as to the public feasts. (10) Megilla, the scroll about the reading of the book of Esther on the feast of Punm (11) Moed Katan. minor feasts, referring to the intermediate days of the festivals of Passover and the Feast of Taber¬

nacles. (12) Chagiga, feast offerings, referring * iPnVˆte4 offTe”ngs on the three pilgrim shvals Order III: (1) Jebamoth, sisters-

m-law, about levirate marriage. (2) Khetuboth marriage contracts, of dower and marriage set¬

tlements. (3) Nedanm, as to vows and their annulment. (4) Nazir, of the laws concerning Nazante. (5) Sotah, about the woman 8Ufi-

pected of infidelity, according to Num. v, 12-31.

(6) Gittin, the laws of divorce. (7) Kid-

dushin, of betrothals. Order IV: (1) Baba Kama, of damages and injuries. (2) Baba Metsia, of laws concerning found property, buy¬

ing and selling, lending, hiring and renting.

(3) Baba Bathra, of real estate, trade and hereditary succession. (4) Sanhedrin, of courts, their procedure, and capital punishment. (5) Maccoth, stripes, referring chiefly to false wit¬

ness and its penalties. (6) Shebuoth, oaths, about the various kinds of oaths, private and public. (7) Eduyoth, testimonies, laws and decisions collected from the testimonies of famous teachers. (8) Abodah Sara, idolatry, of idols and their worshipers. (9) Aboth, a col¬

lection of ethical sentences from the fathers or Mishna teachers. (10) Horayoth, decisions, as to the effect of erroneous decision by a religious authority, according to Lev. iv, 5. Order V : (1) Sebachim, sacrifices, of animal sacrifices and the mode of offering. (2) Menachoth, meat-offerings, about meat and drink offerings.

(3) Chullin, of the methods of slaughtering ani¬

mals for food and of the dietary laws. (4) Bekhoroth, of the laws concerning the first-

born. (5) Arakhin, values, as to how things or persons dedicated by vow are legally appraised to be redeemed. (6) Temurah, exchange, of the laws about dedicated things which have been exchanged, according to Lev. xxvii, 10-27.

(7) Kherithoth, excisions, of the sins subject to the penalty of excision and their expiation.

(8) Meila, trespass, concerning the sins of pro¬

faning sacred things. (9) Tamid, the daily sacrifice, a description of the Temple service connected with the daily morning and evening sacrifice. (10) Middoth, measurements, giv¬

ing chiefly the measurements and description of the Temple courts, gates and halls. (11) Kin-

nim, birds' nests, an account of the sacrifices which consist of fowls, the offering of the poor.

Order VI: (1) Khelim, as to how domestic vessels become unclean ritually. (2) Ohaloth, tents, as to how tents and houses become ritually unclean. (3) Negaim, of laws as to leprosy of men, garments and houses. (4) Parah, the heifer, treats of the red heifer and its ashes as a purifying agent. (5) Teharoth, purifica¬

tion. (6) Mikvaoth, wells, how wells and reservoirs are fit to be used for ritual purifica¬

tion. The remaining six treatises concern various kinds of ritual uncleanness.

The Mishna Rabbis. — The men who are

mentioned as authorities in the Mishna are among the most notable names in Jewish history for about five and a half centuries from the era of the scribes to the death of Rabbi (210).

They include the scribes of Soferim, who suc¬

ceeded Ezra, and continued for about two cen¬

turies, the teachers who headed the Sanhedrin in pairs from the Maccabean struggle until the period of Hillel and Shamai, and finally the disciples of the two latter and their succes¬

sors. These were called Tanaim teachers, whose opinions extend over

fully two centuries, and whose disputations reveal marked intellectual keenness. Another class of rabbis received the name of Amoraim, speakers or expounders, whose labors were carried on in the schools, of Tiberias, Sepphoris and Caesarea in Palestine, and in Nahardea, Sura and Pumbaditha in Babylonia. Their province was to explain the terse Mishna phrases, examine into their sources, reconcile apparent contradictions and apply the traditional principles to new cases. The Pales¬

tinian Amoraim were titled rabbis, the Baby¬

lonian rab or mar. They date from the death of Judah the Prince to the end of the 5th cen¬

tury, which marks the compilation of the Baby¬

lonian Talmud. They number several hundreds, while their predecessors, the Tanaim, amounted to about 120. .

The Gemara. — The name Gemara, which

means completion or doctrine, which has come to be used interchangeably with Talmud, is practically a commentary on the Mishna, although some of its elements may be older. It embraces the discussions and interpretations of the Amoraim, but contains in addition a vast bulk of matter often unconnected with the Mishna text and touching upon law, history, ethics and homiletics. The Palestinian Talmud, the work of the schools and schoolmen of Pal¬

estine, was more distinctly national, being com¬

posed on Jewish soil, and was completed about 370, although a later date is claimed by some.

The Babylonian Talmud was finished about a century later. If rabbis like Jochanan, Rab and Samuel were pioneers in the work, others gave the finishing touches, men like Rabba (270-330), Abayi (280-338) and Rava (299-

352). while Ashi (352-427) and Rabina (d.

499) are associated with its actual compilation.

The Palestinian Gemara in its present form ex¬

tends only over 39 out of the 63 treaties of the Mishna, thus indicating

a probable loss of many treatises. The deficiency may partly be due to persecutions which abruptly closed the schools in Palestine, and partly to the fact that the Palestinian Gemara hardly received the favor and attention which commentators have given to the Babylonian. It is stated that Ashi de¬

voted 30 years to the task of compilation and then revised the entire work. His Gemara cov¬

ers only 37 of the treatises of the Mishna.

The Two Gemaras Compared. — The Ge-

maras differ in language, style and method. The Mjishna is in new Hebrew, which was developed during the era of the second Temple. While the popular language was Aramaic, the ancient Hebrew was retained for the liturgy and legal forms. Contemporary languages had their in¬

fluence on it, and the Aramaic, Greek and Latin were drawn upon and modified by the Hebrew idiom. In regard to the Palestinian Gemara, the language is the West Aramaic, which was current in Palestine in the age of the Amoraim.

The language of the Babylonian is a blend of Hebrew, East Aramaic and Persian, with other dialects whose decipherment is often attended with much difficulty. Of the main elements of the Gemara, the halakhah or abstract law ele¬

ment, and the hagadah or legend, the former is more fully represented in the Palestinian, while the latter is more at home in the Babylonian edi¬

tion. In size the Palestinian is about one-third of the Babylonian, and only in modern times has aroused the attention of Jewish scholars. The study of the Babylonian Talmud, however, flour¬

ished in North Africa and thence passed to Spain, France, Germany and Poland and was ever a subject of interest and devotion. It gave rise to a vast library of rabbinical literature.

Not the least curious incident connected with the spread of this study is that the four mes¬

sengers sent by the schools of Babylonia in their days of decline to collect funds from their 88

richer brethren in other lands were taken cap¬

tive by the Spanish pirates and sold in different slave-markets. All were redeemed by their co¬

religionists and they became the heads of the community at Cairo, Kairwan in Africa, Cor¬

dova and possibly in Narbonne. Among names eminent in the diffusion of Talmudic learning from the East to the West after the era of Shenra Gaon, his son Hai Gaon and Samuel bar Hophm, were Gershom ben Judah of Metz, [saac ot Troyes, Jacob ben Yakar of Worms JNathan ben Jechiel of Rome, Isaac ben Judah of Mavence and the famous Rashi, his sons-in-

law and disciples. After the expulsion of the Jews from England (1290) and France (1306), Roland became a favored home for them and a seat of Talmudic learning whose glory has not yet been extinguished, although in other lands such lore is less cultivated. Of recent years, however, a fresh impulse has been given to Talmudic studies both in Europe and the United States.

The Talmud in History. — The history of the Talmud is essentially a history of the reli¬

gious and intellectual development of the Jews, which has been elsewhere treated. A spiritual temple arose among the Israelites when the Temple at Jerusalem had been destroyed by the Romans. The Talmud's history, however, is an lmpoi tant theme, and a brief glance at the vary-

lng foi tunes of this volume will show the con¬

tinuous persecution which it has received, like the Jew himself. It was proscribed by 'state and church, mutilated by the official censor, con¬

demned by councils, burned by popes and kings.

Earlier centuries show a scattering fire of ful-

minations against it, from the era of Justinian, but the Middle Ages were persistent in such in¬

cidents of violence. In 1240 the Jews of France vvere compelled to

surrender their copies of the Talmud and the work was put on trial, the result of which was that it was ordered to be burned.

Twenty-four carloads of the Talmud and simi¬

lar writings were seized by Saint Louis and publicly burned in Paris in June 1242. The an¬

niversary was held as a fast and elegies were written on the event. Barcelona had a four days' trial of the Talmud on 20 July 1263. In 1264 Clement IX issued a bull of confiscation and subjected the Talmud to examination by the Franciscans and Dominicans, who expunged what they deemed abusive and blasphemous.

Tortosa, Aragon, witnessed a public trial of the Talmud, which lasted from February 1413 until 12 Nov. 1414 and had 68 sessions. Pope Bene¬

dict XIII presided, condemned the work to the flames and prohibited its further study. His bull of 11 clauses issued 11 May 1415 never came into effect, for he was deposed by the Council of Constance. The hue and cry against the Talmud in the beginning of the 16th century was to have a marked influence on the Reforma¬

tion and to pave the way for a Hebrew renais¬

sance. On 19 Aug. 1509 the Emperor Maximilian gave Pfefferkorn full power over the Talmud and similar works; but when he demanded their surrender the Jews of Frankfort appealed to the archbishop of Mayence, who temporarily checked the Dominicans. Reuchlin, the head of the Humanists, was asked to describe the char¬

acter of the Talmud and by him it was vindi¬

cated. Hutten and the author of (Epistolae Obscurorum Virorum,* lampooned Hoogstraten and the Dominicans. The Talmud gained new adherents, including Erasmus and Franz von Sickingen. The universities were appealed to for their opinion and the University of Paris condemned the Talmud. Finally the subject was brought before the Lateran Council and the Dominicans were compelled to pay the costs of their suit against Reuchlin, while Leo X per¬

mitted the Talmud to be printed by Daniel Bom-

berg at Venice. It was in the very year of the editio prince ps of the Talmud (1520) that Luther at Wittenberg burnt the Pope's bull.

On 12 Aug lp53 Pope Julius III signed the decree laid before him by the Inquisition-Gen¬

eral, condemning to confiscation and the flames throughout Italy all copies of the Talmud and Hebrew books Paul IV continued hostile, but Rius 1\ modified somewhat the harsh laws hll lˆediate predecessors. His bull (24

March 1564), in accordance with the decision oi the Council of Trent, allowed the Talmud to be. printed provided its name were omitted and it had been submitted before publica¬

tion to the censor. The mutilations of the Tal¬

mud in accordance with the whim of an igno¬

rant censor were often very curious; that the word heathen can refer to a non-Christian and that the Rome of the early rabbis was not the Rome of the papacy did not dawn upon the in¬

telligence of the learned inquisitors. A brighter day was now to follow, with the Hebrew renais-

sance. In Holland, England and Switzerland, almudic studies attracted a host of scholars and the Buxtorfs, L'Empereur, Sheringam, Sel-

den, burenhuys, were among those who strove to popularize rabbinical lore and who were to be succeeded by a host of learned men down to our own day translators and interpreters in ■vaiied fashion.. It is true, the Talmud was now and then subjected to condemnation; as re¬

cently as 1757, a large number of copies were burned in Poland by fanatics. Germany, too during the wave of anti-Semitism, revived old-

time accusations. But the Talmud has survived the storm and Christian scholars like Franz De-

litzsch, August Wiinsche, H. L. Strack and W.

u VOWe- e j?ln<:d with a host of Jewish scholais in its vindication and interpretation After all its vicissitudes, it seems to have found lest as a distinct addition to the world's cul

ffire. Pope Clement's proposal in 1307 to found i almudical chairs at the universities has been adopted to some extent in Europe and

America Talmud Manuscripts, Editions and Trans¬

lations.— It is not to be expected that many manuscripts of the Talmud have been preserved aˆer ds experiences during the Middle Ages.

Ihe bonfire at Cremona in 1559, in which 12,000

volumes of the Talmud were burned, was only one of such incidents. The only known complete manuscript of the Babylonian Talmud, 1369, is in the Royal Library of Munich. Codices of single portions are preserved in the Vatican Library and in the libraries at Oxford, Paris, Leyden and other cities of Europe. Columbia Univer¬

sity has secured frorn South Arabia a collection of manuscripts containing four treatises which date from 1548. The University Library of Cambridge, England, has a fragment of the lalmud Pesachim, from the 8th or 9th century, Sldlted 1879' with an autotype facsimile by W. H. Lowe. Manuscripts of the Mishna or portions of it are found in a few libraries JEWS AND JUDAISM — THE TALMUD (7)

abroad. The only manuscript of the Palestinian 1 alniud ot any importance is to be found in Leyden. As to printed editions of the Mishna, the first appeared (1492) in Naples and has since been followed by numerous others. In Venice (1520-23) appeared the first edition of the Babylonian Talmud by Daniel Bomberg in 12 folio volumes and it has been followed by many editions in Venice, Basel, Amsterdam, Berlin, Warsaw, Vienna, etc. Only four com¬

plete editions of the Palestinian have appeared, Bomberg' s Venice edition of 1523-24 being the first. Several parts, however, have been is¬

sued with commentaries. The Mishna has been translated into Latin and German and partially into English. Translations of single treatises of the Babylonian Talmud have appeared in Latin, German, French and English. At pres¬

ent complete translations of the work are being attempted in Berlin and New York. Special monographs have appeared on the medicine of the Talmud, its mathematics, its botany, zool¬

ogy* astronomy, civil and criminal law, its leg¬

ends, its archaeology, meteorology, coins and weights, chronology and calendar, its customs, ethics and psychology, its exegesis, geography

and history, linguistics, education, its supersti¬

tions and. philosophy, its poetry and proverbs —an extensive list that proves how comprehensive is the work and how many-sided the old-time sages who fought and wrought until the fabric was finished. Out of its mines the workmen are still bringing fresh gems to light and its deep lying strata furnish an inexhaustible field for research in almost every department of human knowledge.

The Talmud's Influence. — On the Jewish people the influence of the Talmud has been remarkable, not only by maintaining religious ideas among them, but by promoting their soli¬

darity. Its development illustrates the buoyancy of Judaism and the ease with which at a time of national overthrow and dispersion a funda¬

mental reform could be instituted. It was a darings design, when so much of the Mosaic law had lost its application, to infuse new life into the religious code and provide for continu¬

ous intellectual development. The soldiers who defended Jerusalem became scholars whose la¬

bors were to be more successful in the field of progress and thought. The Talmud, too, was a popular institution — it was no exclusive pos¬

session of the few. All could become sages if they had the brain and soul-power. In its dis¬

putations, a purer atmosphere was breathed that made the Dark Ages impossible — it was tonic and preservative as well. Hence Jews could be scientists, physicians, poets, philosophers in goodly number, because their intellects had been Talmud-fed and they had no craving for the riotousness and immorality that prevailed among their contemporaries. The rabbi, too, was no idJe ecclesiastic, but a resolute worker, now a saddler, now a weaver, now a carpenter, now a dyer, for the study of the law was held to be most meritorious when combined with some manual employment. Hence the helpful and ennobling domestic life, in ages when fam¬

ily vices, not virtues, were exemplified alike in court, palace and hovel. On the other hand, it must frankly be stated, that the exclusive study of the Talmud was often narrowing and re¬

pressive, with an unhappy influence on Jewish growth. It produced in

such instances an in¬

tellectual Ghetto, utterly foreign to the spirit of representative sages, dwarfing the Jewish soul and its ambitions. When scholars become scholiasts, and broad students fatuous school¬

men, like the mediaeval champions who argued as to how many angels could stand on the point u a nee<ˆe> mental decay is inevitable. Hence the study of the Talmud degenerated at times into useless dialectic, which met the severe re¬

buke of clear-thinking rabbis, but held sway over many minds and particularly in lands where the Jew knew no vernacular but a mon¬

grel jargon of his own, and had no rights or . privileges as a citizen, being merely a serf or underling, to be told to <(move on l® with every fresh outbreak of the mob — a veritable Ahasu-

erus of the popular imagination, ever wander¬

ing. No wonder that under such conditions he found solace in his Talmud and built his moun¬

tains of syllogism on very unsubstantial basis.

It was Moses Mendelssohn who broke away from the intellectual Ghetto of his coreligion¬

ists and paved the way for their emancipation from the exclusive Talmudic atmosphere. They were to be citizens of the world hereafter and civil and religious liberty became their posses¬

sion. The Talmud was to be cherished, but not made an idol of, to be venerated, but not wor¬

shiped. It was a work to be studied, but not regarded as an infallible authority. It was to be analyzed, dissected, subjected to criticism as the work of men. Bible, Mishna, Gemara, with ritual codes and commentaries, were but steps in the progressive development of Judaism whose sages are restricted to no age and clime, but are continuous as God's revelation. One can thus understand how the Talmud supplies ammunition to all schools in modern Jewry, whether right, left or centre; progressive or conservative ; advances of orthodoxy or reform.

Faults of the Talmud. — While claiming high rank for the Talmud

among the works that have influenced millions of people, it is not necessary to glorify it out of all proportion and assert its absolute perfection. There are faults in this encyclopedia, which records the opinions of a thousand disputants of different climes, conditions and eras, their after-dinner talk, as it were, and their more serious utterances.

These faults are given as four-fold by the Jew¬

ish historian Graetz (History, II, p. 633, Am.

ed.). The Talmud contains much that is im¬

material and frivolous, it reflects the supersti¬

tions and views of its Persian birthplace, with their magic, incantations, miraculous cures, de¬

moniacal medicine and mystic dreams — all op¬

posed to the spirit of Judaism. Then, too, it contains occasional instances of harsh judg¬

ments and decrees against other nations and re¬

ligions; and, finally, it seems to favor an in¬

correct exposition of Scripture, accepting, as it does, often tasteless interpretations. What Graetz asserts is not to be denied ; yet these defects are not organic. The Talmud is not one book but a collection of books ; is not by one author, but by a thousand authors ; is the work not of one age, but seven centuries. What wonder, then, that there are faults in such a composite creation, which Graetz compares to a literary Herculaneum and Pompeii, compris¬

ing the sublime and the common, the great and the small, the grave and the ridiculous, the altar and the ashes, things Jewish and heathenish side by side. The expressions of uncharitable-

ness, often nothing but the utterances of ill-

humor and righteous indignation of some sin¬

gle teacher, preserved by over-faithful pupils, are more than counterbalanced by the breadth and humanity that often illuminate the Talmud; and by its recognition of genuine religion as something higher than race or creed. One must also consider that the rabbis never enjoyed se¬

curity for any prolonged period. The Roman, the Greek, the Persian and the rest were ever “baiting® them, and persecutions were constant.

If their utterances were human and expressed their agony and passion in times of bitter dis¬

tress, the spirit of broad humanity was never wholly absent from their complaints. It was a sage of the Mishna who said: ((A heathen who occupies himself with the law of God stands in the same rank as the high priest.®

Commentaries on the Talmud.— The first

to write a commentary on the Mishna was Maimonides (12th century), originally in Ara¬

bic. Manuscripts of this work are in” the Bod¬

leian and have been translated into Hebrew by some scholars of the 13th century. R. Tanchum of Jerusalem followed Maimonides by writing a lexicon of the Mishna in Arabic. This has never been published, but manuscript copies ex¬

ist in the Bodleian. A large number of com¬

mentaries have appeared upon the Mishna in whole or in part, usually clear and simple in aim, concise and exact in expression. As com¬

mentator on almost the whole of the Talmud, Rashi of Troyes (1040-1105) is most eminent, and his very clear and systematic exposition ap¬

pears in every edition of the Babylonian Tal¬

mud. The supplements and additions to Rashi’s commentary were written by his relatives and pupils. A collection of notes and discussions called Tosafoth, additions, appears in all Tal¬

mud editions, whose authors called “Tosafists ,®

lived in France and Germany during the 12th and 13th centuries. Three of the more import¬

ant later commentators whose expositions are printed in many Talmud editions are Solomon Luria (16th century), Samuel Edels (d. 1631) and Meir Lublin (d. 1616).

Helps to Talmudic Study. — These consist –

of lexicons from the oldest, the Aruch of R.

Nathan ben Jechiel of Rome, of the 11th cen¬

tury, recently revised and enlarged by Kohut as the (Aruch CompletumP to Fischer's revised and enlarged edition of Buxtorf, Levy's dic¬

tionary of the Talmuds and Midrashim > (in German) and Jastrow's dictionary of the Tal¬

mudˆ etc. (London and New York, 1886-1903), an admirable and scholarly work. Then must be mentioned grammars, like Luzzatto's and Levias', which aid in the study of the idiom of the Babylonian Talmud, chrestomathies for be¬

ginners and more elaborate introductorv works and treatises from Samuel Hanagid's fragment (11th century) and Maimonides' introduction, translated into German by Pinner, to modern authors like Briill, Frankel and pre-eminently J. H. Weiss. There are other works of refer¬

ence, but the best help is the living teacher, who is obviously the most trustworthy pilot through the ((sea of the Talmud.®

Bibliography. — Mielziner, Hntroduction to the TalmucP ; Deutsch and Darmesteter,

says) (Jewish Publication Society of America) ; Schechter, 'Studies in TudaisnP ; Ginzberg's (Legends of the Jews) ; Isaac's, (Stories from the Rabbis > ; Graetz, distory, Vol. IP; De-

Sola and Raphall's (Eighteen Tractates from the Mishna. > An exhaustive bibliography in English, German and French is given in Miel-

ziner's work. The various volumes of the Jew¬

ish Encyclopedia > furnish ample material.

Abram S. Isaacs,

Professor of Semitic Languages, New York University.

8. THE MASORAH. Masorah or Masso-

rah is the name given to the body of critical notes on the external form of the Hebrew-

Aramaic text of the Old Testament. The name is taken from Ezek. xx, 37, and means orig¬

inally “fetter,® the fixation of the text having been correctly looked upon as a fetter on its exposition. In later times the word assumed the meaning of “tradition.® This body of notes represents the literary labors of a long line of scholars, very few of whom are known by name, who flourished during a period of about 17 centuries — from about 300 b.c. to the invention of printing. They were mostly cop}’-

ists or professional scribes or teachers of the Bible and their notes were the outcome of a close application to their professional work.

Object and Method.— The chief object of the masoretic notes was to serve as a guide to the copyists and enable them to produce a faultless Bible-text. They were written on the margins of private Bible-codices or between the lines and collected in a. body before or after such codices or finally compiled in special in¬

dependent works. In Bible-scrolls designed for public use at the synagogue no notes were per¬

mitted . in accordance with the injunction of Deut. iv, 2. The amount of masoretic notes differs greatly depending on the amount of space at the copyist’s disposal; on the size of the script used, the price of the writing mate¬

rial and of the scribe’s labor and on the fanci¬

ful shape he gave to his glosses, which were sometimes written so as to form ornamental decorations to the book.

The independent works are arranged topic¬

ally in numbered groups or rubrics; the inter¬

linear and marginal notes, however, follow the order of the text, forming a kind of running annotation. Presumably in the course of time a certain technique was worked out with re¬

gard to the distribution of masoretic material.

•Certain matter was designed preferably for the intercolumnal and outside perpendicular mar¬

gins other matter for the upper and lower margins, etc. The former is known as the Inner or Small Masorah, the latter as the Outer or Large Masorah ; the glosses surrounding the initial word of a book, usually written on a separate line, are called the Initial Masorah.

the term Large Masorah is also applied to the lexically arranged notes at the end of the printed Bible, usually called Masoretic Con¬

cordance or Final Masorah.

. The Small Masorah consists of brief notes with reference to marginal readings, to statis¬

tics, showing how many times a particular form occurs in Scripture, to full and defective spell¬

ing and to abnormally written letters. The Large Masorah is more copious in its notes The Final Masorah comprises all the longer rubrics for which space could not be found in the margin of the text.

The old Hebrew text was in all probability 91

JEWS AND JUDAISM — THE MASORAH (8)

written in continuous script, without any break, – and some of its words were abbreviated. The masorites divided the text into words, books, sections, paragraphs, verses and clauses (prob¬

ably in the chronological order here enumer¬

ated), the various divisions being indicated by spaces. They fixed the orthography, pronunci¬

ation and cantillation, and introduced the square . characters or modern Hebrew script.

To indicate various teachings, legal or popular, religious or mystical, they formed some letters in some words in an abnormal way; some are

larger, other smaller than the rest, -some have their strokes or bars curved, others have them drawn out in a scroll, still others have scroll¬

like and semi-circular attachments, or a broken stroke. Most of these graphic peculiarities are of a late date and their vogue was short-lived; the printed Alasorah either ignored them or did not know them, and some of the terms referring to such peculiarities were already mis¬

understood by specialists in the 14th century.

More of a purely caligraphical origin are the titles or apices on. certain letters of alphabet.

There are four words having one of their letters suspended above the line. One of them, the n in the name of Manasse (Judges' xviii,'

30), is due 'to a correction of the original Moses|

out of reverence for the latter. The origin of the other three (Ps. lxxx, 14; Job xxxviii, 13, 15) is doubtful. In the opinion of some they are mistakes for large letters; according to others they are later insertions of originally omitted weak consonants.

Nine passages in the Bible are preceded and followed by signs usually called ˆinverted Nuns,® because they look like the letter N in ■the Hebrew alphabet. These signs are probably of text-critical importance. Their real signifi¬

cance is. however, unknown.

In 15 passages some words are stigmatized as a sign of deletion. At a later period a mar¬

ginal reading takes the place of a stigma. The marginal readings are of a threefold character: (1) words to be read for those written in the text; (2) words to be read for those not writ¬

ten or omitted in the text; (3) words written, but not to be read. The origin of these vari¬

ants is manifold. Some represent various read¬

ings in ancient manuscripts; others arose from the necessity of replacing erroneous expressions by correct ones, difficult, irregular, provincial and archaic, by simpler, current and appropri¬

ate ; or cacophonous by euphonious expressions.

Some of them may have been designed to call attention to some mystic meaning or homiletical lesson supposed to be embodied in the text.

Finally, and this at a later date, they represent variant readings found in Talmudic literature.

In traditional literature the observation is found that in some passages the number of which varies in the different sources as 7, 11, 13, 15 or 18, the Bible contains expressions other than the context would lead one to ex¬

pect. To the question why this is so, the earliest. sources answer: ((the Bible uses euphemism.® The later sources, however, ex¬

plain this by the assertion that the men of the Great Synagogue, i.e., the scholars of pre-Mac-

cabean times, had made corrections in the text.

Modern investigators are inclined to attribute these peculiarities to the authors or redactors of . the Biblical books themselves, the latter shrinking from putting in writing a thought which some of the readers might expect them to express. The assertion about the corrections made by the scribes is probably due to the tradition which ascribes the redaction of sev-

eral books of Scripture to the Great Synagogue.

I extual Correction. — There are, however, phenomena in the Biblical text which lead one 1° ˆssume that at some time textual corrections , ˆ .ˆee,n made. These corrections may be classified under the following heads: (1) Re¬

moval of unseemly expressions used in refer¬

ence to God; e.g., the substitution of the verb /° bless® for ((to curse® in certain passages.

(2) Safeguarding of the Tetragrammaton ; e.g.

the substitution of Elohim for Yhwh in certain passages. Under this head some have counted such phenomena as the variants of the divine names in proper names, e.g., . Joahaz for Jehoahaz. (3) Removal of

application of the names of false gods to Yhwh ; e.g., the change of the name Ishbaal to Ishbosheth; or, accord¬

ing to another opinion, from Ishbosheth to Ishbaal. (4) Safeguarding the unity of divine*

worship at Jerusalum. Here belongs the change of the city of Righteousness® (Isaiah xix, 18) to that of ˆDestruction.®

A large portion of the Masorah is given to statistical data : how many letters, words, verses, sections and chapters there are in each book and in all of them together; which is the middle letter, word or verse in each book; how many words begin with a certain letter or combina¬

tion of letters; how many times a particular form of word occurs in the Bible, etc. This feature probably has its origin in the early copyists counting the letters of the text to have a basis, for calculating the charge to be made for their labor.

Beside the labors of fixing and guarding the purity of the text, the masorites put the world of scholars under the greatest obligation by in¬

venting and introducing in the 6th century sys¬

tems of vocalization and accentuation, embody¬

ing the pronunciation as handed down in the schools of their time, and their understanding of the textual connection. A great deal of our grammatical knowledge of the Hebrew lan¬

guage is based on their vocalization.

History and Development.— The history of the Masorah may be divided into three periods : (1) creative period, from its beginning to the introduction of vowel-signs; (2) reproductive period, from the introduction of vowel-signs to the printing of the Masorah in 1425; (3) crit¬

ical period, from 1425 to the present day. The cultivation of masoretic studies both took its rise and had its culmination in Palestine. Still, it had already in the 2d Christian century its workers in Babylonia. In the course of time differences of spelling and pronunciation devel¬

oped not only between the schools of Palestine and Babylonia, but in

the various seats of learn¬

ing in each country. In Babylonia the school of Sura differed from that of Nehardea; sim¬

ilar differences existed in the schools of Pales¬

tine, where the chief seat of learning in later times was Tiberias. These differences must have become accentuated with the introduction of graphic signs for pronunciation and cantilla¬

tion ; and every locality, following the tradition of its school, had a standard codex embodying its readings.. The Biblical text accepted by us, its vocalization and accentuation, the Alasorah in its contents and language, as well as the 92

regulations with reference to writing of Biblical books, all are of Palestinian origin. Frag¬

ments of text and Masorah originating in Babylonia have but recently been discovered.

In this period living tradition ceased, and the masorites in preparing their codices usually followed the one school or the other, exam¬

ining, however, standard codices of other schools and noting their differences. In the first half of the 10th century Aaron ben Moses Ben-Asher of Tiberias and Ben-Naphtali, heads of two rival masoretical schools, each wrote a standard copy of the Bible, embodying the traditions of their respective schools. Both of them were descendants of distinguished fam¬

ilies of masorites. Ben-Asher's codex became recognized as the standard text of the Bible.

Notwithstanding this, for reasons unknown, neither the printed text, nor any manuscript which has come down to us, is based entirely on Ben-Asher; they are all eclectic. The two rival authorities, Ben-Asher and Ben-Naphtali, practically brought the Masorah to a close.

Very few additions were made by the later masorites, styled in the 13th and 14th centuries Nakdanim, who revised the works of the copy¬

ists, added the vowels and accents, and fre¬

quently the Masorah. Considerable influence on the development and spread of Masoretic literature was exercised during the three first centuries of the second millennium by the Franco-German school of Tosaphists, or Tal¬

mudic annotators.

Jacob ben Hayyim ibn Adonijah, having col¬

lated a vast number of manuscripts, sys¬

tematized his material and arranged the Ma¬

sorah in the second Bomberg edition of the Bible (Venice 1424-25). Besides introducing the Masorah into the margin, he compiled at the close of his Bible a concordance of Ma¬

soretic glosses for which he could find no room in a marginal form, and added an elaborate introduction — the first treatise on the Masorah ever written. In spite of its numerous errors this excellent work has generally been acknowledged as the ((textus receptus* Next to Ibn Adoni¬

jah the critical study has been most advanced by Elijah Levita, who published his famous (Massoret ha-massoreL in 1538. The (Tiberias) of the elder Buxterf (1620) made Levita's re¬

searches accessible to Christian students.

Levita compiled likewise a vast masoretic con¬

cordance which still lies in the National Library of Paris unpublished. Other prominent work¬

ers in this field in the times of the Renaissance were Rabbi Meir ben Todros ha-Levi, Mena-

hem di Lonzano, and Jedidiah Solomon of Norzi. In modern times, to mention only the most prominent names, were W. Heidenheim, S. Pinsker, S. Frensdorff, S. Baer and C. D.

Ginsburg.

In imitation of the Masorah to the Hebrew text a similar work exists to the text of the Aramaic version, known as Targum Onkelos.

Its date is probably about 900.

Bibliography. — On the name : Bacher, W., Jewish Quarterly Review (III, 785) ; Levias, C., in (Hebrew Union College Annual } for 1904.

On the Masora : Ibn Adonijah, UntroductioiP

(ed. Ginsburg, London 1865) ; Levita, (Mas-

soret ha-massoreD (ed. Ginsburg, ib. 1867) ; Strack, H. L., Prolegomena Critica1* (Leip¬

zig 1873) ; Harris, I., Pise and Development of the Massorah) (Jewish Quarterly Review, I, 128 ff.) ; Gin-sburg, C. D., Untroduction to the Hebrew Bible> (London 1897) ; Bacher, W., (Die Masorah> (in Winter & Wuensche,

(Juedische Literature II, 121-132).

C. Levias,

Formerly Professor of Hebrew, Union College.

9. THE CABALA. Cabala designates the

mystic lore of the Jews and the practices based thereon.. The name is etymologically related to a Hebrew verb meaning to receive and which is technically used to denote the recep¬

tion and transmission of divine revelation. Its application to theosophic speculation and theurgic art indicates the belief that the doc¬

trines and practices comprising the Cabala were imparted through divine revelation, saints such as, among others, the Patriarchs being regarded as the chosen recipients of the divine unfolding.

The twofold character of the Cabala as speculative and experimental is expressed in the distinction of the one as Cabala Iynnit —reflective Cabala, and of the other as Cabala Maasit — active or theurgic Cabala. His¬

torically considered, the Cabala antedates by many .centuries the works devoted to the ex¬

position of its theories and the inculcation of its practices. Indications are plentiful in both the Apocrypha and the Pseudo-epigrapha, nota¬

bly in the Enoch books and the Testaments of various Biblical heroes, pointing to the ac¬

ceptance and currency of Cabalistic concepts at the time these extra-canonical books were composed. Babylonian mythological elements, as well as Zoroastrian theological conceits, were among _ the extraneous influences that gave fertile impulse to cabalistic speculation. Greek philosophy, especially as developed in the Stoic and Neo-Platonic systems of Alexandria, must also be credited with having stimulated its de-

velopmenu Jewish, of the late pre-Christian, and Christian Gnosticism of the early Christian centuries, may be looked upon as its prede¬

cessor. The absolutely transcendental char¬

acter of Jewish monotheism could not but lay near to reflective minds the fundamental prob¬

lems, basic to all Jewish mysticism, how the sublime extra and supra-mundane Deity could be 'the Creator of the existing world and could be regarded as being in contact with it as its ruler and guide, and more especially how man could rise into communion with God. The Biblical account of the Creation known as the Ma'aseh Bereshit (literally the work of the be¬

ginning) and the description of the divine chariot in the first chapter of Ezekiel termed the Ma'aseh Merkabah (literally the work of the chariot) were held in early Talmudic rec¬

ords to hide esoteric knowledge within the reach of the chosen few who of mature age and proper degree of wisdom might venture to unravel their occult suggestions. The allegor¬

ical method of interpreting scriptural contexts, in vogue among the preachers of Haggadists of the synagogue, stood the elect searchers for the contents of divine revelation transmitted in these two chapters in good stead. By amplify¬

ing it, they arrived at the deeper meaning of Genesis i and Ezekiel i, designated by them as die «secrets» and the C(hidden things* of the Torah or the Law. But care was had not to divulge publicly the truth thus found. It was zealously reserved exclusively for the «wise»

and ((worthy.® Concepts that recur as basic to later theosophic speculations are attributed to some of these Talmudic wise men; for instance, the view that fire, water and air existed before creation, these three producing light, darkness and wisdom respectively, the world being a combination of these six elements, or that crea¬

tion in reality is a process of condensation, God contracting Himself or His garments of light to make room for the world resulting from this operation. The Pantheistic designa¬

tion of the Godhead as the (

mudic schools, as is also the personification of God's ((Justice® and <(Mercy,® of frequent re¬

currence in Talmudical parlance. Another evi¬

dence to the same effect is the tendency char¬

acteristic of a number of Talmudical observa¬

tions to represent God's activity by 10 hypos¬

tases of Sephirot, viz., wisdom, insight, cogni¬

tion, power, strength, immutability, justice, righteousness, love and mercy. Sometimes, as in Philo, wisdom is named as the totality of these 10 potentialities. But most significant in this connection is the occurrence in Talmudic theology of Metatron, an angelic mediator be¬

tween the transcendental Deity and Creation.

He is the Demiurgos, the instrument through which the supra-mundane God acts. Again the soul is often described as pre-existent. The pious are credited with the power while living to ascend to God. During such ascension they learn the secrets of the Beyond. Furthermore the ((mystery of sex® and of ˆmarriage,® which is one of the main preoccupations of the later (literary) Cabala, as well as the doctrine of emanation, is met with in the Pseudo-epigrapha as in Talmudic passages.

Cabalistic speculation and practice presented in the Talmudic documents in detached glosses proceeded to become more systematic in what is known as the Geonic period (from about 500-900 or 1000

a.d). Jewish mysticism de¬

veloped a literature of its own which however has been preserved only in fragmentary form.

From what is known of the contents of this literature, it is certain that theosophy and cos¬

mogony were central in its speculative inter¬

ests, while theurgic practice, the art of produc¬

ing by mystic words and names certain effects, was another department of its preoccupation.

In theosophy, the nature and personality of Met-citron ; the dimensions of God, or those of this mediator, presented the principal theme for discussion. The work entitled (Shiur Komah,) the proportions of the (divine) stature, is devoted to the latter. Descriptions of the celestial halls or Hekalot and of the visits and experiences of saints and ascetics that made the <(ascension® furnish the matter of other treatises. To cosmogonic mysticism be¬

long works treating of the ((six days of Crea¬

tion,® the story of the conflict between God and Primal Water, or between the ((Masculine® and ((Feminine® Waters, descriptions of Paradise and the lower world. As for theurgic art, these fragmentary remnants of mystic litera¬

ture present expositions of the power vested in such as know the names of angels, or of the prophylactic virtue of the knowledge and the use of mystic names.

The most important work by far is the famous Sepher Yezirah, the book of the Crea¬

tion. Its date is in doubt. Certain it is that before the beginning of the second Christian millennium it had come to be regarded as one of the most important books calling for and receiving commentation at the hands of the mo§it learned. According to this book the fundamentals of all being are Sephirot or potentialities. These mediate between God and Creation. They comprehend first three emana¬

tions, one direct from God and the other mediate, viz.: (1) Spirit or air (Hebrew Ruach), from which came (2) water, which in turn was

condensed into (3) fire. To these are added six dimensions, three to the right and three to the left. The 10th element is the Spirit of God. All 10 are eternal, the first three being, however, pre-existent. They are the substance of all that is, the form being supplied by the 22 letters of the Hebrew alpha¬

bet. Between substance and form is a con¬

trast. Creation consists in resolving this con¬

trast. God is the solvent. Through Him as the solvent, existence, i.e., combination of form and substance, takes on reality.

The Neo-Platonic and Pythagorean char¬

acter of the books' theorizing is evident. To some sectaries the affirmations of the treatise seemed too strongly anthropomorphic. They therefore posited between God and universe a mediator, the ((Prince of the World,® to whom they imputed all acts of creation and to him they referred the corporeal descriptions of God found in the Bible.

Among the systems that to a certain degree were, impregnated with Cabalistic Pantheism, and in turn exercised a determining influence on the further evolution of Jewish mysticism, that of Ibn Gabirol holds a prominent place, as his philosophy seemed to confirm the theory of God's immanence, underlying the central theory of the Cabala, that of successive emana¬

tion.

Subsequently the Cabala differentiated into that of the German Jews, and that of the Jews of Spain and Provence. Among these Eleazar of Worms and Abraham Abulafia deserve men¬

tion as exponents of the doctrine. They held that God was too exalted to be cognized by human intellect. But between the Unknowable God and man searching for God was God's Kabod or Glory, created by God out of His own primal fire. This <(Glory® has shape and dimension. It is seated on a Throne in the east but screened by a curtain open alone in the west. To this Kabod the descriptive adjectives of the Bible refer. Four worlds are in exist¬

ence: (1) That of this (

alism and unstirred sobriety of the schools' dia¬

lects. Fasting, asceticism and meditation were resorted to to bring on the coveted ecstatic states, or recourse was had to the mystic names of angels and the deity.

The Cabala of the Provence traced its origin 94

to a revelation by the prophet Elijah to Jacob ha-Nazir, who in turn initiated Abraham, son of David of Posquieres, whose son (Isaac the blind) again transmitted the doctrines to his followers. This invoking of the prophet Elijah shows that the mystics of Spain and the Provence regarded their doctrines as of divine authority. That it had come to them from afar — from Babylon by way of Greece and Greek philosophy — is now the theory of the compe¬

tent scholars. The more important expositions are comprised in the following works: (1) (Masseket AziluD or treatise on emanation; (2) ˆahirp in which a new classification of the Sephirot is given and the doctrine of con¬

tinuous emanation is advanced; (3) Azriel's book, written ((to present Cabala to philosophers wkh a view of making it acceptable to them® ; (4) a number of pseudo-epigraphic books of the second half of the 13th century, based on the foregoing; (5) the one publication com¬

monly regarded as the Bible of the Cabala, the (Zohar) (Splendor, based on Dan. xii, 3), writ¬

ten in the form of a commentary on the Penta¬

teuch and introduced as R. Simon ben Yochai's production. Analysis demonstrates that the Zohar is ((an aggregate of heterogeneous parts.®

The compilation probably is not older than the beginning of the 14th century. It received its present form largely at the hands of Moses de Leon. Later Cabalists, either exponents or opponents of the Zohar, were Joseph ben Abraham, Ibn Wakar, Moses Botarel, Isaac Arama, Isaac Abravanel, Abraham Saba, Isaac Luria, Moses Zacuto and others. The Cabala found readiest acceptance among the Jews in Turkey and in Poland. The pseudo-messian-

ism of Shabbatai Zewi (1665) rested to a cer¬

tain extent on Cabalistic expectations, asceti¬

cisms, keeping vigils at frequent intervals, per¬

forming baptismal ablutions, doing penance, having marked the practices of the adherents of the later Cabalistic teachers, who regarded these acts as preparatory to leading pure lives and expressive of love for man, virtues that were hoped to usher in the coming of the promised Redeemer.

The Cabala of the Jews was not without influence on the thoughts of Christian scholars, among them Raymon Lulli (1225-1315), Pico di Mirandola (1463-94), Reuchlin, Heinrich, Cornelius Agrippa (1487-1535), Zorzi (1460-

1540) and others. It is not too much to say that Cabalistic speculation recurs in the the¬

ology of some of the noted precursors of the Reformation, and had a share in the develop¬

ment of the Evangelical Church's dogmatics.

In brief, the main contentions of the Cabala are these: (1) God is unknowable in His own essence. He is the En-sof, limitless, infinite.

He is the Hidden of All Hidden. He is the <(negative® as far as He is cognizable by man.

He is the first primal of all primals, the ulterior principle. Only as far as He has deigned to change His absoluteness into relativity, by per¬

mitting creation to take on existence, is He cognizable in measure as creation reveals Him.

Between Him and creation, through irradiation or condensation of His primal light, He placed a mediator, Metatron, or the Prince of the World, or the Merkaba or Chariot; to this, sometimes denoted as the first Sephirah, refer all anthropomorphisms of scriptural description of the Godhead. The Infinite has no attributes.

But the Mediator has. He is the (

ernor of the world. He is endowed with cor¬

poreality.

In God, will and thought and action are identical and synchronous • — instantaneous. In Him transition from resolution to execution

presupposes no change in essence. This divine will is the Razon Kadmon, the uncreated eter¬

nal will. It is the first principle or sephirah.

God, however, concentrates himself. This ((mystery of the divine concentration® (Sod Zimzum) results in rendering visible that part of himself which is the world. This act is similar to making a rent in a vessel, through which the contents are exposed to view.

Through God's self-concentration, however, room is made for the visible world. For it limited vacancy is produced in which the divine ray of light is implanted as the germ of pro¬

gressive creation. The Infinite has thus him¬

self willed His partial finiteness. The Cause of all Causes has produced the 10 Sephiroth.

He is the Crown, the Light that is Infinite.

In Him there is neither form nor substance.

But He made a little vessel, the letter Yod.

It is <(wisdom® ; then created He the sea, which is reason. This sea He divided into seven streams, for which He made seven ves¬

sels : (1) Greatness; (2) power; (3) beauty; (4) victory; (5) highness; (6) foundation; (7) Shekinah or government. Some of these Sephiroth are constructive, others — the first three — are elemental. Some mystics regard these 10 as identical — representing only various aspects of the Divine Infinite — but others hold them to be tools of the Creator, superior be¬

ings totally different from Him. In the Sephiroth two natures inhere: (1) That through which all change occurs, i.e., the ((vessel® ; (2) that which is unchangeable, i.e., the ((Light® or the Power.

(2) Man. Man is the highest creature. His body is built according to the mysteries of wisdom. But he is more than body. He is threefold, soul, — animal soul (Nephesh), moral soul (Ruach), intelligent soul (Neshamah).

This third soul emanates from ((Wisdom,® the second from <(Beauty,® the third from (

minion, or Kingdom.® The soul is pre-existent.

After dissolution of the temporary union of body and triune soul, the intelligent soul as¬

cends to God, the moral soul enters Eden, the animal abides peacefully on earth. This is the destiny of the righteous. If stained by sin, the soul has to undergo punitory trials. Hence the Cabala accepts the doctrine of -the transmigra¬

tion of the soul. Only those souls that have fully developed their power may return to God or enter Eden; others will have to serve their period of probation, sometimes two souls being ((inter-impregnated,® merged into one, so as to help each other in the performance of the al¬

lotted task.

Man should love and fear God. Love is the secret of unity with God. In the degree man loves God he rises to higher intimacy with God.

Life in the beyond is life which vouchsafes deeper contemplation of the divine reality. Evil is the contrary of the God-like, the ((left side.®

Evil is finite. Evil man mistakes semblance for 95

substance. He separates himself from God.

I he C abala to a certain extent teaches the sin¬

lessness of original man whose fall brought sin and evil into creation.

. Man, however, is not eternally lost. He may rise to the centre of divine light through peni¬

tence.

The Cabala has induced a more spiritual conception of religion and emphazised its ethical implications more strongly than legal ritualism could vitalize. On the other hand it encouraged the belief in magic, in demons and opened the door to many grotesque and even noxious superstitions. Its adepts came to put faith in signs and constellations, and other¬

wise naturalized in Judaism many conceits and customs. of non-

Jewish origin and significance.

Bibliography. — General readers may be re¬

ferred to Franck, A., (La Kabbale> (German translation by Jellinek) ; Ginsberg, ‘The Kab-

balah) ; Fliigel, ‘Philosophic Qabbala and Ve¬

danta? ; Myer, Isaac, ‘Qabbalah.* An exhaus¬

tive list of special works is given in ‘Jewish Encyclopedia) (III, 479).

Emil G. Hirsch,

Professor of Rabbinical Literature and Philos¬

ophy, University of Chicago.

10. THE KARAITES. A Jewish sect which took its rise in southern Mesopotamia in the second half of the 8th century and which has persisted to the present day. Several causes have contributed to its origin and continuance, some purely personal, others depending upon a difference of view in regard to some of the essential features of Rabbinical Judaism.

Origin. — The development of what is known as Rabbinical Judaism, which commenced after the destruction of the second Hebrew com¬

monwealth, has not been as one-sided as is popularly imagined. In addition to the written law, the basis of all religious and all civil de¬

velopment, an unwritten law had naturally grown up which by its interpretation of the written law fitted that law to the changing times and to different needs. In this manner a large mass of traditions interpreting and enlarging the law has come into being. This mass is known as the oral law, and it gradually acquired a sanction and a sanctity second only to that of the canon. This oral law was not necessarily rigid; for as long as the schools maintained their vigor a natural and healthy development took place. Custom, however, came to the aid of the oral law and in a natural process was itself then regarded as law. The development, however, was not homogeneous.

There were at all times within the Jewish polity freer spirits who rebelled against the trammels which a fixed interpretation of the Biblical laws naturally induced. They imagined that by basing

themselves wholly upon the word of Scripture they would free themselves, for¬

getting that they were running the risk of worshiping the letter instead of the spirit which manifested itself in the development of the oral law. From time to time sects arose, having as their principal object the negation of the official tradition. Of such a kind were the Samaritans, though their opposition to the Jews was more political than religious, and in a large measure the Sadducees. To such sects the Karaites belong; but they represent the only sect that has had a long and important — THE KARAITES (10)

existence and against which Rabbinical Judaism had continually to be on the alert.

Anan and the Early Karaites. — The sect vvas thus to a certain extent the outcome of the opposition to the official oral law. A per¬

sonal element entered into this opposition.

The founder of the sect was a certain Anan ben David, said by some to have been a de¬

scendant of Bostani, a celebrated head of the captivity. His followers and certain Moham¬

medan writers assert that he himself was an exilarch ; this is undoubtedly a falsehood. His uncle, however, did occupy that position; and when he died in 760 Anan had a certain right to expect the appointment. A younger brother, Josiah by name, was preferred. Whatever may have been the reason for this preferment, Anan resented it and out of pique had himself proclaimed exilarch in 767. This appeared to the Abbasid Caliph al-Mansur as treason, seeing that the regular exilarch had been confirmed by himself. Anan was imprisoned, and only released by heavy bribes given to the officials.

He then started, out to build up a following of his own. His immediate followers, who must be clearly distinguished from later Karaites, were called Ananites. This was no difficult matter at that period and in those regions.

The Mohammedan world itself was in a fer¬

ment, due largely to the pretensions raised by the various followers of Ali. Numerous Mo¬

hammedan sects raised their heads, and their example cannot have been lost upon the Jews living in their neighborhood. The influence of Mohammedan thought upon the Jews was great at all times; and it cannot be doubted that this influence was strongly exerted in the formation of Karaism. The central doctrine of Anan's philosophical or theological rebellion was his denial that the oral law was divine.

According to him all portions of the Bible are of equal value. One must delve deep into it in order to take out its secret and its hidden meaning. No fixed rules are to govern this study; each individual must find out for him¬

self what is the law. To a greater or less de¬

gree similar controversies were raging in the Mohammedan world. The Shiites in a measure denounced tradition (Sunnah) as much as Anan did ; and even among the orthodox the question as to the right of individual specula¬

tion occasioned bitter controversies. The founder of one of the four chief Mohammedan legal systems, Abu Hanifah, was the one who upheld this doctrine of the right of individual speculation ; and it cannot be merely a chance circumstance that he lived in the same place and at the same time, as did Anan. In fact it is said that he was imprisoned together with Anan. Undoubtedly the two systems have their basal thought in common.

Spurred on by the example in the Moham¬

medan world, the Karaites held that they were not a new sect, that they represented true Juda¬

ism, and that it is necessary to return to the purity in belief and practice of Moses and the Prophets, just as Mohammed insisted that he simply reintroduced the old religion of Abra¬

ham. The Rabbinites he held were following the secession introduced by Teroboam. The Sadducees had, it was further held, found out a part of the truth;, but Anan was the first to reveal it in its entirety. The connection with 96

the Sadducees seems undoubted, in spite of the fact that the later Karaites rejected the con¬

nection, because the Sadducees did not believe in the resurrection. This is seen in their adop¬

tion of certain Biblical interpretations which are only to be found among the Sadducees or in the early Halakah which was superseded by that which became canonical, e.g., the meaning of the expression ((on the morrow after the Sabbathˆ (Lev. xxii, 11), as the time for com¬

mencing to w;ave a sheaf of the first fruits ; the real meaning of the lex talionis (Deut. xix, 21) and the use of the flesh of an animal that was diseased before it was slaughtered. The older Halakah not only forbade one to kindle a light on the Sabbath day but even to allow it to burn — an interpretation followed by the Sadducees, the Samaritans and the Falashas.

The early Karaites seem even to have had Sadduceean writings in their possession which are now lost, the authenticity of which not even their great opponent Saadia contested. Anan was an eclectic, and evidently tried to gather into his fold all manner of doctrine that was in any way opposed to the Rabbinical interpre¬

tation. Thus he introduced the prohibition of eating meat or drinking wine during the exile of the Jews from the Holy Land; a theory up¬

held by two minor sects, the followers of Abu Isa of Ispahan (685 to 705), and of Yugdan, a pupil of Abu Isa. But despite his opposition to the Rabbinites, Anan followed their teach¬

ings in many things. He himself was a good Talmudist and he took over nearly all the rules of Biblical interpretation upon which the Tal¬

mudists based their system. He was by nature something of an ascetic, and consequently was apt to follow in all cases the more stringent rather than the more lenient view in questions of practice. In fact, he may be said to have developed a tradition and a Talmud of his own.

His immediate followers, who called them¬

selves ((Mourners for Zion,ˆ went to live in Jerusalem, where they gradually died out and were of very little influence upon the develop¬

ment even of their own sect.

Development. — -In the 10th and 11th cen¬

turies Karaism took on quite a large follow¬

ing. It spread notablv in Babylonia, Persia, Syria, Palestine and Egypt. It found a sec¬

ond home in Constantinople, and from here spread into Europe and certain parts of the Mediterranean littoral. We hear of Karaites m Salonica, and, what is of more importance, in Spain itself. One reason for this extension was undoubtedly the point d'appui that Karaism gave to all those who, for one reason or an¬

other, were dissatisfied with Rabbinism. A more important reason was the supineness of the Jewish authorities in Babylon who were the nominal or spiritual heads of all the Jewish communities, but who were fast losing the direction of their affairs and prominence in scholarship. In a most surprising manner these Babylonian authorities misjudged the possible effects of the new schism. Even though prose¬

lytes were made out of their own ranks, they must have persuaded themselves that the new movement could be killed by silence. The Gaon Natronai bar Hilai (ca. 857-867) is the first one to busy himself with the new doctrine.

In Spain it was otherwise. A Castilian Jew, Oid al-Taras, in 1054, journed to Jerusalem, where he became a convert to the new school.

He returned and commenced to spread Kara¬

ism among the Spanish Jews. There grew up communities in Carrion, Burgos, Toledo and Talavera, etc. The Rabbinites, however, were aroused, and even secured the aid of the secu¬

lar arm. Both the religious and the civil power weighed heavily upon the Karaites. At the end of the 11th century, then again under Alfonso VIII (1126-56), and a third time under Al¬

fonso IX (1158-1214), they suffered perse¬

cution and the schism was nipped in the bud.

But without making use of secular weapons, a young scholar in Fostat (Old Cairo), Egypt, set out in a scientific way to demolish the

foundations upon which Karaism was built up.

Had it not been for Saadia ben Joseph (892-

942), the heresy might have made great inroads into the Jewish body politic. Not only as a young man in Egypt, but later as Gaon at Sura, he devoted some of his best energies to refuting the works of Anan and to writing anti-Karaitic tracts. The refutation may be said to have been complete; for he set at rest any fear that the heresy might become dangerous to the real unity of Judaism.

The polemics of Saadia naturally called forth replies on the part of the Karaites and produced the flower of Karaite literature.

Karaite scholars were forced to defend their theological position, their peculiar interpreta¬

tion of the Bible, and their knowledge of the Hebrew language. The chief Karaite writers of this period were the polemicist and Bible commentator, Solomon ben Jeruham (940) ; David ben Abraham al Fazi (950), the author of a Hebrew dictionary; Tacob al-Kirkisani (938), author of a commentary on the Pen¬

tateuch; David ben Boaz (ca. 910), author of a commentary on the Pentateuch and a work on the principles of religion ; Japhet ben Ali (ca. 1000), their most prolific commentator, and Sahl ben Masliah (ca. 980), the author of a work on the Biblical laws.

Further History.— In the next period Con¬

stantinople becomes the centre. Its most im¬

portant Karaite scholar was undoubtedly Judah Hadassi (1149), the author of the (Eshkol ha-

Kofer^ an encyclopedic work in rhvmed prose, giving a whole system of Karaite theology and treating of the most varied subjects. After him lived Aaron ben Joseph, the elder (1300), a native of the Crimea, who is known not only as a distinguished Bible commentator, but as the compiler of the prayerbook still used by the Karaites, and to which he contributed some notable poems of his own. Aaron ben Elijah the younger (1300-69), wrote the most philo¬

sophic treatise (Gan Eden) of any Karaite, as well as a commentary on the Pentateuch which is still very much in honor among hrs fellow-

believers. He had studied thoroughly the writ¬

ings of Maimonides, and he did his best to raise up Karaism out of the morass into which it had fallen through the heavy onslaughts of Saadia. To these must be added Elijah ben Moses Bashyazi, the systematizer of Karaite canon law (1420-90), his brother-in-law, Caleb. Afendoipulo (end of the 1 5th century), liturgical poet and writer of homiletic and theological works, and Moses ben Elijah Bash¬

yazi (1544-72), a writer on theology. At the present day there are from 50 to 60 families in 97

Constantinople concentrated in the district Hass-

keui. Upon several occasions the Karaites procured Firmans from the Porte recogniz¬

ing themselves as a religious body apart from the other Jews and with their own chief rabbi.

In 1900 these Firmans were confirmed by an Irade.

The Karaites had come into Egypt not long after the foundation of their sect. That they had made considerable progress there is seen from the fact that Saadia commenced his po¬

lemical writings in Fostat before 928, and that he had a number of direct opponents in the city.

It was here, too, that lived the only important poet produced by the Karaites — Moses Dar'i who wrote in the style of the Judaeo- Arabian poets of Spain. In Cairo, the Karaites, as else¬

where, kept themselves apart from the rest of the Jews. They had their own organization, at the head of which was a Nagid, who, how¬

ever, was under the general jurisdiction of the Rabbinite Nagid. They had their own syna¬

gogues, first in Fostat and then in Cairo itself.

They acquired a considerable amount of wealth there, being largely engaged in the goldsmith trade, while a number occupied positions of eminence chiefly as physicians. In the year 1313, when Abraham Maimonides was chief of the Egyptian Jews, a number of Karaites

were converted to Rabbinism. At the present day about 400 families live in Cairo mostly in a separate street back of the old Jewish quarter.

In Russia. — Under the Tartar rulers of southern Russia Karaite Jews had emigrated during the 12th century into the Crimea and into Lithuania. From here they even pene¬

trated into Galicia, and a Karaite community exists to-day there in the city of Halitsch.

A portion of the city of Troki was given over to them; and here Isaac ben Abraham Troki composed, in 1593, his polemic, Hizzuk Emunah, directed against the Christian interpretation of Old Testament Messianic passages. It was especially in the Crimea that they flourished and evidenced some attempt at a revival of their literature; Simhah Isaac Lutski (1750) wrote a bibliography of Karaite writers, while Isaac ben Solomon, at the beginning of the 19th century, composed a work upon the doc¬

trines of his sect. Their chief settlements here were in Chufnt-Kale, Goslov (Eupatoria), Kaffa (Theodosia), Yenikele and Sulchat. In contradistinction to the other Jews in the Rus¬

sian Empire they have always been treated well by the government. In 1796 Catherine II re¬

lieved them of one-half of the poll tax, and from 1827 to 1874 they were entirely freed from service in the army. As late as 1905 the Kara¬

ites in Moscow were permitted to keep their synagogue open, a privilege not granted to other Jews. In the Russian Empire there were in 1914 43 Karaite communities, all under the leadership of an energetic Haham Pam-

puloff. They are, however, yearly decreasing in number; as they have until recently refused to intermarry with other Jews. The attempt was recently made to have the government grant complete civil rights to all Rabbinite Jews who married Karaite girls upon condition that they formally renounce the Talmud. It was in the Crimea also that a Karaite archaeologist, Abraham Firkovich, made his celebrated collec¬

tion of Karaite antiquities and manuscripts, af¬

ter having traveled over a great portion of

the Hither East for that especial purpose. Un¬

fortunately, despite the excellency of this col¬

lection which is now deposited in the Imperial Library at Saint Petersburg, he forged the dates on gravestones and upon manuscripts in order to prove the great antiquity of Karaite settlements in the Crimea and the disassocia-

tion of the ancestors of the present Karaites from the eyents that preceded the death of Jesus. At times, the Karaites in Russia have not scrupled at aiding the Russian government against the other Jews of the empire. Before the war of 1914 there were about 10,000 Kara¬

ites in Russia, about 2,000 in Cairo, 20 or 25 in Jerusalem, and another thousand scattered in various places.

Dogmas and Customs. — The religious dog¬

mas of later Karaism have been formulated by Judah Hadassi as follows: 1. Creatio ex nihil o ; 2. The existence of a Creator; 3. God is an absolute unity and incorporeal ; 4. Moses and the other prophets were sent by God; 5. God has given to us the Torah, which is true and complete in every respect and not wanting the addition of the oral law; 6. The Torah must be studied by every Jew in the original language; 7. The Holy Temple was a place erected by God for his manifestation; 8. Resurrection of the dead ; 9. Reward and punishment after death; 10. The coming of the Messiah, the Son of David. In other ob¬

servances the Karaites differ in several par¬

ticulars from the Rabbinites. Their syna¬

gogues are more thoroughly Oriental and have the appearance of Mohammedan mosques.

Their prayers are largely made up of selections from the Bible, and of hymns composed by Aaron ben. Elijah. Before entering the syna¬

gogue they remove their shoes. They do not wear phylacteries nor celebrate the festival of Hanukkah. They observe the Sabbath rest with great strictness; though in some places fire and light are now permitted on that day. Pentecost is celebrated on the day after the

Sabbath ; and the 10th of Ab is observed as the anni¬

versary of the destruction of the Temple. The prohibitive degrees of marriage have been greatly extended.

It should also be said that during its early development Karaism reacted favorably upon Jewish learning in the East. The Rabbinite Jews were forced to meet their opponents upon their own ground. Karaite exegesis led the Rabbinite Jews to a deeper study of the Bible and of the Hebrew language. The philosophic presentment of their theology necessitated an equally philosophic presentment on the part of the Rabbinites, and the rivalry they engendered was useful in turning the other Jews to a closer and more scientific examination of their own position.

Bibliography. — S. Pinsker, (Likkute Kad-

moniyyot, Zur Geschichte des Karaismus) (Vienna 1860) ; A. Harkavy, (Likkute Kad-

moniot iF (Saint Petersburg 1903) ; P. Frankl in Ersch and Gruber, (Allgemeine Encyclo-

pedie) (Sec. ii, p. 33) ; J. Fiirst, (Geschichte des Karaerthums' (Leipzig 1862-69) ; S. Poz-

nanski, (Anan et les Ecrits) (in (Revue des Etudes JuivesP Vol. XLIV, p. 161 et seq.) ; id., (Anti-Karaite Writings of Saadiah Gaon) (in Jewish Quarterly Review, Vol. X, p. 238) ; (The Karaite Literary Opponents of Saadiah Gaon) (ib., Vol. XVIII, p. 209). On the Kara-

kes inTChufut-Kaleh, consult ' Globus > (Vol.

LaaXIV, p. 7 et seq.) ; on the Karaites of Cairo, R. Gottheil in 'The Jewish Comment }

(Baltimore 1905). A bibliography of Karaite books is given bv E. N. Adler in Jewish Quar¬

terly Review, XII, p. 674), and G. Margoliouth has published (Ibn al-Hiti's Chronicle of Karaite Doctors > (ib., Vol. IX, p. 429).

D , , ˆ Richard Gottheil,

Professor of Semitic Languages , Columbia University.

11. ANTI-SEMITISM. A term which has

received a special signification of its own as the situation of the Jews in Germany, France, Russia and elsewhere, in recent decades, has become more or less acute, means opposition to the Jews and their religion for various rea¬

sons Such enmity, springing from many causes, has been a persistent factor in history from the eia of the Pharaohs. Its manifestations assume different forms according to local or national conditions — from the crassest prejudice due to ignorance to more intense odium due to envy and often arousing long-continued persecutions or popular outbreaks. While it is unjust to call every criticism of the Jews and Judaism anti-

oemitic radical and religious peculiarities af-

iord a fair field for the critic or investigator, v ho is not always to be termed an enemy because he discerns flaws or weaknesses —Anti-Semitism is wholly unfriendly, usually unjust, exaggerates minor defects into funda¬

mental vices, employs faulty generalizations, and is careless how it arouses to strife and bloodshed, so keen and ruthless is pursuit of its quarry. History and literature abound in antipathies to nation and sect, from which, in Europe, Roman Catholic and Protestant, Metho¬

dist and Quaker alike have suffered, and which have crystallized themselves in words like barbarian, and heathen, mummery and jesuitical.

Anti-Semitism, however, in its intense and most characteristic form, is more than an antipathy it is a relentless hunt to the death, which de-

nymg social and political equality to the Jew would brand him as outcast and alien, strip Judaism of every distinguishing excellence, re¬

vive for the Jew an exclusive Ghetto or banish him from civilized climes. And this is done in the name of society, religion and the state.

What strength there must be in Judaism to awaken such antagonism ! And how super-

hcial the culture that countenances such enmity !

Or.g.ii and History. — The word Anti-

bemitism owes its origin and present meaning to the ethnical differentiation of the Jews as Semites from the Aryan or Indo-European.

Ethnology is made to prove that the racial traits of the Jews as Semites render them in¬

ferior and that they are legitimate objects of aversion. The theory as well as the present unfriendly signification of the term are of re¬

cent date, appearing in Germany about 1880

when the movement against the Jew and Juda¬

ism began to gain headway and spread else¬

where, as the. era of persecution assumed a deadly phase in Russia. Decades earlier the word Semitism had been employed in a purely academic sense by philologists, but soon the theory of Semitic inferiority was to be as¬

serted first by Lassen (1800-76), who ascribed to the Semite rather unflattering traits, such as intellectual sharpness, exclusiveness and selfish¬

ness in marked contrast to “the harmony of psychical forces which distinguishes the Aryan.®

It was reserved for Ernest Renan (1823-92) to emphasize still more strongly Semitic inferior¬

ity : he went so far as to assert that “science and philosophy wrere foreign® to the Semites.

But if this opinion was not sufficient, he added in his (Studies of Religious History) various other generalizations — a line in which he was fluite proficient — to the effect that the Semites did not comprehend civilization in the modern sense ; they were intolerant as the logical result of being monotheists, bequeathing their bigotry to the Aryans, wrho wrerc naturally broader, while the Jews can attribute the hatred which has been extended to them for so many centu¬

ries to their glowing anticipation of future triumph. There can be little doubt that Renan’s views had marked influence upon the growth of a hostile anti-Semitic spirit, although he urged his readers to be careful

in their in¬

terpretation of his opinions. He stated ex¬

pressly that Jews to-day were not Semites but moderns and he denied in his ‘Judaism as Race and Religion > that there was such a thing as a Jewish race. The extensive literature of anti-Semitism shows throughout Renan’s un¬

conscious coloring. It was but a short path from him to von Helhvald, who called the Jew a cancer, to Goldwin Smith, who termed him a parasite,® and to Stewart Chamberlain.

Durmg the progress of the European War of 1914-18 some anti-Semitic feeling arose in Eng¬

land, chiefly in connection with army enlist¬

ments.

In Ancient Authors. — – The curious persist¬

ence of anti-Semitism in modern cultured writers and the. faulty generalizations which they do not hesitate to proclaim as scientific truth thus finds its parallel in many famous authors of antiquity. Thus Manetho, high priest, of the temple at Heliopolis and court historian under the early Ptolemies, consid¬

ered the Jews descendants of the Hyksos usurpers and attributed their expulsion from Egypt to sacrilege, and irreligion, stigmatizing them at the same time as afflicted with leprosy j t the story was repeated by Chaeremon and Lysimachus, to reappear in Schiller’s0 Mis¬

sion of Moses.) Diodorus Siculus asserts that the prevalence of a plague in Egypt led to the banishment of foreigners, most of whom en¬

tered “the country now called Judea®; at the same time he vindicates the character of Moses and the traditional religion. Apollonius Molo a Greek rhetorician who lived at Rome in Cicero s time, pronounces Moses “a conjuror and deceiver®; and his disciple, Cicero, went turther in his utterances to show his contempt, there are several passages in his ‘Pro Flacco) which display his animus against a people whose wealth and influence were beginning to bC .flarerd ,Th?ir barbarous superstitions must be fought,® he exclaims; they are a na-

tion addicted to “suspicion and slander®; they display contempt for the Roman power.®

lacitus, the model for historians, repeats the tables of Manetho as to the origin of the Jews and adds that their laws are “hostile to men and calculated to inspire the Jew with hatred and opposition to the rest of mankind®

— “the first instruction they receive is to de¬

spise the gods, to forswear their country, to 99

forpt father, mother, and children.® Horace ‘and Martial could jest at the Jew and his cere¬

monies, like a modern comic journalist, while Juvenal exercised his wit more than once in the same direction, and Seneca, with all of his philosophic insight, deplores that ((this abomi¬

nable nation® has spread its customs every¬

where and ((the conquered have given their laws to the conqueror.® Under such teachings from moralists and orators, what wonder that the spirit of persecution was roused in Rome, Antioch, Lybia and the Greek cities, with its accompanying bloodshed. In this era Chris¬

tian and Tew were brethren in suffering and de¬

spised alike for harboring a <(detestable super¬

stition® ; and many of the accusations which in after centuries the Church hurled against the Jew were now forged against the Chris¬

tian.

Apion and His Accusations. — It was Apion, an Egyptian teacher of rhetoric at Rome in the reign of Tiberius, who was probably the most violent anti-Semitic in his field of his or any day; for his statements as preserved by Josephus in the historian’s treatise (Against Apion,) are modern in their variety and bitter¬

ness, while they are as baseless, as Josephus suc¬

cinctly shows. Among his many charges, Apion claimed that the Jews derived the name Sab¬

bath from the circumstance that they were obliged to rest after journeying for six days because they were afflicted with a painful dis¬

ease which the Egyptians called Sabbatosis.

He asserts that they put up a head of an ass in the Holy of Holies, that they caught a Greek annually and fattened him for sacrifice. He accuses them of having produced <(no wonder¬

ful men, not any inventors of arts or any emi¬

nent for wisdom.® He states that <(they swear by God to bear no good will to any foreigner, especially to Egyptians, while they have no just laws of their own and do not worship God as they ought.® One of the replies made by Jo¬

sephus can be given here. If the Jews, said the historian, had set up the head of an ass, it would not have been more contemptible than some of the animals, such as the goat, which the Egyptians deify. But the statement, he continued, is an untruth, which Apion would not have told had he not the heart of an ass or the impudence of a dog.

In the Dispersion. — The spirit of antag¬

onism to the Jew which was displayed after the final destruction of Jerusalem and the gradual dispersion of the Jews, east and west, can hardly be called anti-Semitism, for it was really anti-Judaism and directed against the Jew and his religion. It was practically a re¬

ligious, not a social or political crusade, in di¬

rect contrast to the modern movement which ostensibly claims to be without any religious motive and to work purely for the welfare of society and the state. Under the Romans there was often some approach to a legal residence, but the attitude of the Church toward Jews and heretics was decisive. While here and there a kindly voice was heard and occasionally priest and prince championed them, the ages until the French Revolution were periods of enforced seclusion and repressive legislation. With the iron power of religion and the state checking them at every step, the Jews became a special class, awakening to new life and vigor for a few centuries under the Moslem, but liable at — ANTI-SEMITISM (11)

any moment to be at the mercy of the mob in Mohammedan Spain or Christian Europe. Be¬

ing thus the weaker class both in numbers and prestige, upon whom insult could be heaoed with impunity, the morale of the Jews was not to be improved by the policy which herded them in the Ghetto and restricted them from ordinary avocations. Most of the faults which their enemies discerned in them were acquired, not hereditary. The famous dramatist who to suit the London temper of his day consciously transposed the characters in the original story at the basis of (The Merchant of Venice) and branded the Jew as a Shylock for all time, il¬

lustrates the attitude of those centuries.

Springing from these conditions came the con¬

ception of a Jew as a kind of Barabbas, in Marlowe's play, who poisons wells, murders children, commits all kinds of wickedness in his hatred of the Christian. In the heated at¬

mosphere of the Dark and Middle Ages no ac¬

cusation was too vile to fasten on the Tew.

Hence their responsibility for the <(Black Death,® a plague which ravaged Europe be¬

tween 1348 and 1351. A myth arose, especially in Germany, that the disease sprang from the wells which the Jews had poisoned. Alleged confessions were sent from town to town and the maddened populace wreaked vengeance, for¬

getting that the Jews were suffering as much as their neighbors from the pestilence. In nearly every town in Germany, exclusive of Austria, about 350 in all, the Jewish communi¬

ties were attacked, only three large Jewish cen¬

tres by the end of the 15th century being left in that land. A further source of odium was the Jewish usurer. Owing to the canon law forbidding loans on money, the money trade of western Europe fell into the hands of the Jews in the early Middle Ages, who charged high interest, first because there was little if any competition, and secondly because of the insecure tenure of their property — emperors, prelates and powerful individuals could not be depended upon long to remain under a bur¬

den of debt to heretics. However, Christian evasions of the canon law

became frequent and Jews were soon despoiled of their capital; and as reputable trades, professions and agricul¬

ture were denied them, they were forced into humbler occupations, but the taint of the money-lender has clung to them even in later days when money-lending has become the vital international pursuit. Undoubtedly it was im¬

prudent for them to lend on interest, but they had no other resource and one can understand the sense of power it gave to a despoiled race, for which they had to pay dearly in exactions and expulsions from land to land until Eng¬

land was closed to them for centuries.

The Blood Accusation. — Among the many

popular accusations which have been fostered upon the Jew, none is more revolting than the charge of using Christian blood for ritual pur¬

poses, notably in connection with the Passover.

The origin of such a myth is still unknown, but the frequency of its occurrence the past seven centuries is not to be denied. When a decade ago Christian missionaries in China can be ac¬

cused by the populace of slaying Chinese chil¬

dren for Church purposes, one may faintly un¬

derstand how such accusations originate in ig¬

norance ami fanaticism in any age or clime.

But the slander seems doubly incredible when 100

one realizes that there is no Jewish ritual which prescribes the use of human blood. It is needless in this connection to trace the history of the blood-accusation which appears first to have been alleged against the Jews in 1144, in the case of Saint William of Norwich, although the first literary mention dates from the middle of the 13th century, in a work of Thomas Can-

timpre. The Norwich case was thus developed.

A convert! — and it must be confessed that converts were not averse to making mischief — said that the Jews annually sacrified a Chris¬

tian child at Passover, and when the boy was missing, the Jews were accused. It seems, however, that during an attack of catalepsy he had been buried alive by his relatives. No Jew was tried or punished in Norwich, but the rumor led to charges against the Jews in other English towns. A list of similar incidents from the 13th to the 16th centuries could be given. Chaucer has mentioned the story of Little Hugh of Lincoln — a lad of eight years, whose sudden disappearance was laid at the door of the Jews with tragic consequences.

Most remarkable, however, is the survival of such a myth in the 19th century, cases having occurred in 1882 (Hungary), 1891 (Corfu and Prussia), 1899-1900 (Bohemia and Prussia), and of course without a shadow of proof as to the alleged crime. It is of interest to note that in recent years August Rohling of Prague, who was most conspicuous in his efforts to prove the truth of the blood-accusation, was com¬

pletely refuted by a Christian theologian of distinction — Professor Strack in his scholarly book * Das Blut.} Christian divines have pro¬

tested against the charge, which has received the condemnation of many popes and the sanc¬

tion of none. Yet, such is the persistence of the anti-Semitic spirit, the accusation may re¬

appear at any time in eastern Europe. As late as the summer of 1916 the blood-accusation was seriously discussed in northern Ireland. Its latest appearance in Russia was the Beilis case near Kieff in 1914.

Recent Movements.— In long-continued at¬

tempts to prevent the complete emancipation of the Jews in Germany about the middle of the 19th century there was ample opportunity for anti-Semitism to show its hand. Prominent leaders in politics, literature and the Church alike advocated the denial to the Jews of civil and political rights so long as they remained Jews. The ideals of the French Revolution had been forgotten. When the unwholesome era of reaction had passed and liberalism be¬

came the nation's rallying cry, the Clerical party scenting danger to absolutism began anew a crusade against the Jews as the cause of every evil, the prominence of Jewish members of the Reichstag, like Ludwig Bamberger and Edward Lasker, arousing fresh hatred. Hence

arose anti-Semitism both in Germany and Aus¬

tria as a distinct political program. In 1878 a Christian Socialist party, under Court Chap¬

lain Adolf Stoecker, was formed, whose avowed purpose was anti-Jewish. ((The Jews are our misfortune," said Prof. Heinrich von Trcitschke (1834—96) in 1880 and for two dec¬

ades the anti-Jewish agitation continued, it be¬

ing made an issue in all elections and scattered riots took place, while books and pamphlets antagonistic to the Jews were published in the chief cities. It was even proposed to exclude — ANTI-SEMITISM (11)

Jews from public office, but that attempt was not successful. Bismarck acted as a check while m office and his influence led to Stoec-

ker's retirement as court chaplain, while pow¬

erless or unwilling to prevent the growth of anti-Semitism. Renewed agitation appeared when Bismarck ceased to hold office (20 March 1890), and Ahlwardt began his attacks on the Lowe firm with their ˆJudenflinten" which were. to be furnished the German army to en¬

sure its defeat by the French; but his animosity was without ultimate effect, and he passed into obscurity like so many of his class, Henrici, Forster, Stoecker and the rest. In 1891 the <(Verein zur Abwehr des Antisemitismus," a society to combat the attacks of the anti-Se¬

mites, was formed by prominent German au¬

thors and scientists, showing the growing sym¬

pathy of the better classes, and little by little the agitation appears to have lost much of its virus, with the disappearance, often through imprisonment for various crimes, of notorious leaders. In Austria George von Schonerer was the first to begin a distinct anti-Semitic movement (1882), whose adherents were

elected in steadily greater numbers to the Reichsrath and the provincial Diets. To Lue-

gar, mayor of Vienna, the party is indebted for its turbulent character, although of late years its excesses have been less marked. In France, Edouard Drumont's book, *La France Juive5 (1886) was the beginning

of an open anti-Semitic campaign which grew into the Dreyfus affair nine years later, as books and pamphlets were published, and Drumont's paper (La Libre Parole) became widely read. The story of Captain Dreyfus shows to what length the anti-Semites will go ; if Clericalism in¬

spired their efforts the present dissolution of religious, orders in France tells its own moral.

In Russia anti-Semitism has produced since 1881 a succession of disorders in many cities which culminated in the excesses of Kisheneff and elsewhere (1903) that have aroused the world to indignation. It remains to be seen if mediaeval restrictions, against the Jews will be abolished. In Rumania, despite the provision of the Berlin Congress (1878) guaranteeing civil and religious liberty to all citizens, the Jews continued to receive harsh treatment; became victims of popular outbreaks; were restricted in trade and profession and debarred from pub¬

lic schools. As the natural result of such treatment recent decades have witnessed an increasing emigration from Russia and Ru¬

mania to all portions of the globe, the great majority settling in the United States.

Future of Anti-Semitism.— In the diffusion of education and the gradual recognition of the truth that nations and creeds are partners in the great work of human betterment, one mav expect a general disappearance of antipathies and animosities as the borderland of the re¬

ligions is broadening and the era of co-opera¬

tion and confederation is less distant than at 'ppocfi in the world s history. This recon¬

ciliation is not to be hurried — one must be satisfied to think that the agreements among people, and creeds are more numerous than the diversities which drive them apart. And the Jew will do his share to promote good will among men, as his race and religion are uni¬

versalized and memories of persecution and prejudice no longer promote disharmony

or

exclusiveness. There will be no Jewish prob¬

lem when civil and religious liberty is every¬

where acknowledged and class privileges have ceased to exist in the growing consciousness of human brotherhood.

Bibliography. — In the extensive literature on the subject the best general works are Le Roy Beaulieu, (Israel chez les Nations> (Eng¬

lish translation by Mrs. Heilman) ; B. Lazare, (Contre l'Antisemitisme) (English translation.

New York 1903) ; Joseph Jacobs, (The Jewish Question) (London 1885). On the blood-

accusation, besides Strack's work, consult Chwolson, (Blutanklage) (Frankfort 1901) ; Franz Delitzsch, (Schuchmatt, den Blutliignern, Rohling and Justus > (Erlangen 1883) ; M. Joel, (Die Angriffe des Heidenthums an Juden und Christen in den Ersten Jahrhunderten

Romischen Csesaren) (Breslau 1879). A use¬

ful little work is John Gill, (Notices of the Jews and Their Country by the classic writers of antiquity* (2d ed., London 1872).

Abram S. Isaacs,

Professor of Semitic Languages, New York U niversity.

12. ZIONISM. Past and Present. — The

first Basel Congress (1897) declared that the movement it organized (

mingled, many currents. The first in point of time is the expectation founded on Biblical prophecy and its traditional interpretation, that God's purpose concerning His people can only be fulfilled by regathering the dispersed of Judah and Israel in the land of their fathers ; and that this will be brought about through a divinely-

commissioned prince of the House of David —hence an ((anointed one" (Messiah). This hope is expressed in many prayers of the established synagogue liturgy and even in the individual or collective

(

dered it faithful and patriotic service. In Germany the 19th century witnessed a confer¬

ence of rabbis (Frankfort 1845) who faith¬

fully represented a large body of ((Reform Jews" resolving to expunge from the prayer-

book (

ish State" ; while in the United States this ex¬

ample was not only followed by two rabbinical conferences (Philadelphia 1869, Pittsburgh 1885), but bettered by the declarations of preachers and orators that <(America was [their]

Palestine and Washington [their] Jerusalem."

In those countries wherein the Jews have been continuously oppressed, as Russia, Rumania, Galicia, Morocco, the <(dream" of. re-establish¬

ment in the Holy Land as a priestly nation, under the direct protection of Providence, has naturally been more prolonged and more in¬

tense; and a strong intelligent minority — not all of whom may be characterized as ((enthusi-

asts" — has nurtured the same hope, even in free countries. The belief that restoration was to be signalized, as of old, by some unmistak¬

able sign of miraculous intervention, necessarily tended to discourage human initiative. Hence the many attempts, fantastic, tragic or simply premature, of pretended Messiahs (e.g., Serene, 7 29; David Alroy, 1160; Sabbathai Zebi, 1648) ; of Jewish statesmen in the service of European states (e.g., Joseph Nasi, Duke of Naxos, Ven¬

ice, 1550, Constantinople, 1565) ; or of bene¬

volent Jews of local prominence (e.g., Mordecai M. Noah of New York, c. 1820) to establish self-governing Jewish communities in Palestine or elsewhere proved abortive or disastrous. A less ambitious and more frankly philanthropic movement has, however, in recent times, met with a somewhat greater measure of success.

In 1870 Charles Netter, acting for the ˆAlli¬

ance Israelite Universelle," established a farm-

school near Jaffe, on land presented by the Sultan (Mikveh Israel) and in 1878 under the influence of Laurence Oliphant, active work in planting Jewish agricultural colonies in Pales¬

tine began. Baron Edmond de Rothschild now became interested ana gave wise and practical aid. In 1882, and subsequently, many settle¬

ments arose. This was brought about largely through agitation in Germany and, especially, in Russia, by means of various societies which finally took the name of Ohovevei Zion ((

manian and Russian persecutions of 1880 and 1881, the movement continued to spread in these and other countries, including England, France and the United States ; and in 1884 a confer¬

ence was held in which more than 50 societies were represented. This phase of Zionism reached its height in 1890. In 1892-94, perhaps because the immigrants were so largely of Rus¬

sian nativity as to raise the question of a pos¬

sible complication with a persistent enemy, the Sultan's government restricted the entry of foreign Jews into Palestine, and the coloniza¬

tion movement received a temporary check, only recently removed. Meanwhile two other currents, always more or less active, began to flow strongly; one of them, turbulently. The latter third of the 19th century was marked in Europe by the recrudescence of separatist and nationalist sentiment. The French Revolution had made ˆuniversal brotherhood" a watchword, and this influence persisted until after the failure of the revolutions of 1848 in Germany.

The Franco-Prussian War (1870) and the Russo-Turkish War (1878) marked the return¬

ing intensification of racial and national hatreds.

To this a false philology and a falser anthropol¬

ogy brought its pseudo-scientific jargon of ((Aryan," ((Semite" and (

tism. George Eliot in (Daniel Deronda) (1876) described the first; the resurrection of obsolete oppressive laws and government-incited mas¬

sacres in Russia (1880 to 1906) typify the last.

(See article Anti-Semitism in this section).

In Germany, France and Austria Jews were not killed or subjected to legal disabilities, but they were harassed and restricted in social and pro-

fessional life until finally the high-water mark of this form of persecution was reached in the ((Dreyfus Affair® in France (1894-1906).

The Herzl Movement.— It may have been

his observation and experience while sojourn¬

ing in Paris in 1895 as correspondent of the Nene Freie Presse of Vienna, that led Dr.

Theodor Herzl (b. 1860; d. 1904), an Austrian playwright and feuilletonist not before identi¬

fied with Jewish life or affairs, to write his JudenstaaC ; an attempt to prove that the Jewish question® can only be solved by the establishment of a Jewish state. At first intended only for private circulation, this pamphlet was later published broadcast (1896) in German, English, French, Hebrew and Yid¬

dish. Assuming that anti-Semitism is uneradic-

able ; that whatever may be true as to individual Jews here and there, the Jews as a whole are welcomed into the social life around

them ; and that true assimilation is possible only by means of intermarriage — which means disappearance — Herzl . proposes an organized effort to obtain a territory wherein Jews may build up a state of their own. The underlying motive being political and economic, not re¬

ligious, one part of the globe will serve as well as another, and he at first suggested that Argen¬

tina might be available. Later, he was brought to realize the

sentimental importance of the Holy Land, and now for the first time his proposition becomes in truth Zionistic. In some of its details it was, indeed, anticipated by Benedetto Mussolino (1870), an Italian Chris¬

tian, who had vainly journeyed to London in the attempt to interest Lord Palmerston and Lord Rothschild in his project. In both plans lurkish suzerainty was to be acknowledged and the holy places of other faiths made extra-terri¬

torial For the accomplishment of its object the (Judenstaat> suggests first, a "Society of Jews® to do the preliminary scientific and politi¬

cal work (since measurably realized in the Zionist organization, especially its "Palestine Committee®) ; then a chartered "Jewish Com¬

pany® similar to the British East India or rcrwvv* nnˆrlcaij Company, with a capital of ±30,000,000 and with headquarters in London (partially realized in the "Jewish Colonial Trust). In July 1896, Herzl was induced to present his plan in person before representative London Jews. It was received with polite coldness or active hostility — in striking con¬

trast to the enthusiasm evoked from an assem-

bjage of poor Jews in the east end of that city, t he difference was typical and prophetic. In¬

difference or opposition was manifested by the vast majority of prosperous Jews, not only in England but also in western and central Europe, and virulently in America.

Spread of the Movement.— The

staat> nevertheless exerted an influence in the crystallization of opinion and action among Jews _ imbued with or susceptible to the na¬

tionalist sentiment. More important was the change gradually wrought in the attitude of Herzl himself, who, forced far beyond his primary intention of literary propaganda into the active role of leader and organizer of a re¬

awakened people, and brought into contact, as not before, with religious Jews of both orthodox and reform wings, began better to understand both his people and their destiny. His new thought sprang

into extemporaneous and epi¬

grammatic utterance when he declared at Basel that “the return to Judaism must precede the return to Zion.® For by this time much sup¬

port had come from among the “Chovevei Zion®

and kindred societies, and an alternative terri¬

tory to Palestine could not be considered. The Jewish bankers and rich Jews in general con¬

tinued to be either indifferent or antagonistic to Zionism. Certain orthodox rabbis opposed it as an endeavor to anticipate Providence ; reform rabbis denounced it as an attempt to reverse history. Many sincere thinkers, re¬

garding Anti-Semitism as a temporary aber¬

ration, regretted the movement as an apparent abandonment of the position won by Jews in countries where their only distinction from fel¬

low-citizens is in creed, not in nationality —a position to be stoutly contended for wherever it has not yet been attained.

Herzl was not, however, altogether without the help of Jews of learning and distinction, and among those who early declared in his favor were representatives of the strictest or¬

thodoxy, of the most extreme radicalism, and of the supremest indifferentism to all religion.

Sympathy also came from the Gentile world from men eminent in art, literature, statesman¬

ship and Christian theology. A call was issued for an international convention at Munich, but so great was the opposition of the most influen¬

tial rabbis and laymen among the Tews of Ger¬

many that Basel in Switzerland was chosen in¬

stead and there, on July 29, 30 and 31, 1897, the first Zionist Congress assembled. It was com¬

posed of 204 members, most of whom came as private individuals, though a number repre-

various organizations, especially the

Chovevei Zion® societies, which later became virtually merged into the Zionist body here constituted. This Congress issued the' docu-

ment known as the defining ˆ!onlst aim the words cited at the head of this article and proposing the following means ˆ°r attainment : (1) The promotion °f. the settlement of Jewish agriculturists, artisans and tradesmen in Palestine; (2) the federation of all Jews into local or general groups according to the laws of the various countries; (3) the strengthening of the Jewish feeling and consciousness ; (4) preparatory steps for the attainment of those government grants which are necessary to the achievement of the Zionist purpose. The scheme of repre¬

sentative organization was formulated, an executive body (Actions Comite) constituted and steps taken toward the establishment of a Jewish national fund® and the formation of a c?rP°ration which should be custodian

°, . ,e national fund and perform the functions which the had suggested for the «Jewish Company.® «The National fund,® now very considerable, is derived from the sale of stamps placed upon all official Zionist com¬

munications, and upon other correspondence bv ardent Zionists; from free-will offerings, and from payments made to inscribe persons and societies in # the "Golden Book.® It is to be used exclusively for the purchase of land in Palestine, and although originally intended not to be touched until it had reached $1,000,000

as recently been drawn upon for such pur-

5?sef* ?£<7-ˆ10n.'s1tTi)ank» known as

the Jewish Colonial Trust, Limited, of London was chartered under the laws of Great Britain!

(to.promote, develop, work, and carry on coloni¬

zation schemes in the East, by preference in Palestine and Syria, or in any other part of the world.® Its authorized capital stock is £2,000,000 in £1 shares, of which somewhat less than £325,000 has been paid in, chiefly by the joint efforts of the very poor and upon an in¬

stalment plan. Control is lodged in 100

((founders' shares,® which must be held by mem¬

bers of the ˆcouncil of administration,® who must in turn be chosen from the ((Grosses Ac¬

tions Comite® (Greater Executive Committee) of the Zionist organization. In 1902 a sub¬

sidiary corporation, ((The Anglo-Palestine Com¬

pany® was formed and a branch opened in Jaffe.

Quite recently branches have been opened in Jerusalem and in Beirut. Through the Colonial Trust the Zionist organization hopes to obtain concessions of territory, and to promote therein agriculture, industry and commerce. Mean¬

while it is the custodian and administrator of the Jewish National Fund and devotes its capi¬

tal to the encouragement and development of private enterprise on the part of the settlers in Palestine. In 1906 its statutes were so altered as to restrict its operations to Palestine and adjacent regions.

Work of the Congresses. — The second and third congresses were held at Basel in 1898

and 1899 respectively. Organization had now so far progressed that only delegates were per¬

mitted to vote. A proposition to acquire Cy¬

prus was rejected. With a view of making propaganda the fourth congress (1900) was held in London; the fifth returned to Basel and decided that subsequent assemblages should be biennial. Herzl necessarily became president of all congresses held during his life¬

time and chairman of the smaller executive committee which had its seat in Vienna. He practically gave up his life to the work, except in so

far as his refusal of salary made it neces¬

sary to continue his literary labors, for a live¬

lihood. He had interviews with ministers and crowned heads, including the Sultan and Kaiser Wilhelm II, from both of whom he received sympathetic expressions, but he was never able to report more than ((progress® to the congress.

Negotiations with representatives of the Egyp¬

tian and English governments for a concession of land at Al'Arish in the Sinaitic Peninsula (1898) failed because of the necessity for irri¬

gation, as diversion of any part of the Nile water could not be permitted. Herzl continued, however, to keep in touch with the British gov¬

ernment and at the Sixth Zionist Congress held in Basel, 23 to 28 Aug. 1903, was enabled to make oublic the willingness of Lord Lansdowne «t0 entertain favorably proposals® from the Jewish Colonial Trust, Limited, ((for the estab¬

lishment of a Jewish colony or settlement® in British East Africa; with the ((appointment of a Jewish official as the chief of the local ad¬

ministration, . . . and permission to . the colony to have a free hand in municipal legisla¬

tion . . . such local autonomy being condi¬

tioned upon the right of His \ Britannic]

Majesty's government to exercise general, con¬

trol.® The proposition to send a commission to examine the country offered and to report to a subsequent special session of the congress was bitterly opposed by the Russian delegates, who on its adoption withdrew, and only Herzl's personal pleading and the agreement that no funds of the Zionist organization should be expended by the Commission of Inquiry pre¬

vailed upon them to return to subsequent sit¬

tings. Much delav was experienced in form¬

ing and dispatching the Commission; oppo¬

sition becoming meanwhile more and more pro¬

nounced in Russia, spreading to Germany, England and America. Simultaneously with the sixth Basel Congress, the first Jewish Con¬

gress had met in Palestine in the colony Zikron Jacob, under the presidency of M. Us¬

sischkin of Ekaterinoslav, apparently never pro¬

ceeding further. Ussischkin, hovTever, organ¬

ized an aggressive movement within the Zionist organization to discredit and defeat the East African project. Others proceeded with greater considerateness but no less determination. A conference of Russian members of the ((Greater Actions Comite,® held at Kharkof in October 1903, demanded the abandonment of all schemes of ftTerritorialism® ; by which term the move¬

ment for Jewish state-building outside of Palestine now became known. Meanwhile the East African Commission had reported to the Actions Comite 16 May 1904. The report was not unanimous, but two of the three members agreed that the territory offered by the British government (the <(Ghas Ngishu Plateau®) was insufficient for a large number of Jewish set¬

tlers, and was fitted for grazing rather than agriculture. At the sixth congress, Herzl had exhibited signs of physical weakness. The worry consequent upon the dissensions that fol¬

lowed this congress completed what nine years of overwork and anxiety had begun, and on 3

July 1904 he died after a few days of acute illness. The seventh congress (Bas<4 1905), at¬

tended by more than 600 delegates, was con¬

trolled by the followers of Ussischkin. It voted overwhelmingly to <(reject either as an end or as a means colonizing activity outside Palestine and adjacent lands,® and that ((the Zionist or¬

ganization shall not engage itself further with the proposal of the British government.® As a result, the Territorialist delegates, under the leadership of Israel Zangwill (q.v.), met upon the adjournment of the congress and organized the “Jewish. Territorial Organization®

(Ito), which has since perfected an international or¬

ganization, aiming to obtain wherever feasible, “a publicly, legally assured place of settlement upon an autonomous basis® for those Jews who are persecuted in the countries wherein they now live. Within recent years, it has practically ceased activity.

Many anti-Zionists and non-Zionists have joined the Ito, and many who remain Zionists, particularly in America, have united likewise with the new organization. It has recently appointed a “Geographical Commission® em¬

bracing such men as Lord Rothschild and Hon.

Oscar S. Straus.

Present Status. — The number of Zionist societies throughout the world runs well into the thousands. They are comnos’d of mem¬

bers subscribing to the Basel program and pay¬

ing “one shekel® (25 cents) yearly into the general fund, with such local dues as may be exacted. For every 200 shekel-payers one delegate may be sent to the congress. The societies in various countries are aggregated more or less completely into federations. The president of the Jewish Colonial Trust and the head of the executive committee has been a JEWS AND JUDAISM — SPIRIT OF RABBINIC LEGISLATION (13) citizen of Cologne, to which city the head¬

quarters has been transferred. Here also is now published Die Welt, the Zionist or¬

gan founded by Herzl, and here will meet the <(yearly conferences® of the Larger Executive Committee, which will probably take the place of frequent congresses. One of the most promising features in recent reorganization is the “Palestine Committee,® headed by Prof.

Otto Warburg of Berlin, which systematically studies industrial and other conditions in Pal¬

estine. There are many parties in present-

day Zionism — some being religious, others non-religious or even irreligious, and having various economic aims, such as the “Po’ale Zion,® a frankly proletarian or even socialistic organization. The “Ziyone Zionists,® probably representing the old (

sist on diplomatic action, while the (

boring lands under the best attainable assur¬

ances. “Moral Zionism® pleads for a national spiritual, rather than a political, centre in Pales¬

tine. Doubtless in time the fusion of these varied elements will lead to useful results.

Meanwhile the Jewish population of Palestine is increasing with rapidly developing activities, agricultural, industrial, commercial, educational ; while Zionism has brought closer together the Jews of different lands; stimulated anew the study of Hebrew literature and Jewish history and led to a re-examination and increasingly better understanding of the fundamentals, ethnic, religious and economic, of Judaism.

A profound impetus was given to Zionism in the latter part of 1917 by Hon. A. J. Balfour’s statement that <(His Majesty’s government favor the establishment in Palestine of a national home land for the Jewish people, and will use their best endeavors to facilitate the achieve¬

ment of this object, it being clearly understood that nothing shall be done which may prejudice the civil and religious rights of existing non.-

Jewish communities in Palestine or the rights and political status enjoyed by Jews in any other country.® A preliminary fund of a mil¬

lion dollars — a hundred million to be raised later — was at once begun by Jews in America for the rehabilitation of Palestine.

Bibliography.— Theodor Herzl, ‘Die Juden-

staat) (Vienna 1896) ; ‘The Jewish State >

(London 1896, New York 1905) ; (Ukazatel Literatury o Sionizme5 (Saint Petersburg 1903) ; Sapir, (Der Zionsmus Bruner Judischer

*Verlag) (1903); ‘Die Welt> (Vienna) ; Schach-

tel, Register zu den Protokollen der Zion-

istemkongresse, i-vP (Berlin 1905) ; R. Got-

theil, ‘The Zionist Movement in North Amer¬

ican Review (1902) ; Max Nordau, in The In¬

ternational Quarterly (1902) No. 1; Theodor Herzl's (Zionistische Schriften,* ed. Leon Kell¬

ner (Berlin 1905) ; Max Jaffe, 'Die Nationale Widergeburt der JudeiP (Berlin 1897) ; Ben Eliezer, 'Die Judenfrage und der Socialer JudenstaaU (Bern 1898) ; Aron Sandler, 'An-

thropologie und Zionismus) (Brunn 1904) ; 'The Maccabean5 (Washington and New

York) ; Publications of the Federation of Amer¬

ican Zionists; R. Gottheil, in 'Jewish Encyclo¬

pedia, y article "Zionism® (New York 1906).

Solomon Solis Cohen, M.D.,

Author, editor and writer on Zionism, Phila¬

delphia, Pa.

13. THE SPIRIT OF RABBINIC LEG¬

ISLATION. In Deut. iv, 2, Israel was told: "Ye shall not add aught to the word that I command you, nor shall ye diminish aught therefrom.® In the course of time, however, many new laws unavoidably crept in, along with new outward conditions, habits of life, tastes and beliefs; aside from relapses towards the old Babylonian statutes, forming a kind of common law for all Semitic Asia.

The Law-making Power — For lack of an elective body wielding undisputed authority, with the early disuse of the sovereign assem¬

blies of all Israel known from the book of Judges, the law-making power rested only with the learned men, who were wont to interpret and apply the existing laws, that is, with the judges. These sat not only in civil and crim¬

inal cases but also passed on all questions of morals, ritual, and doctrine, for state and church were one. After the death of Herod, it seems, any man learned in the law began to be called "rabbi,® or "my master® ; but the rabbi's office and spirit fell to Ezra and his companions. The leading scribes from their time down to Simeon the Just were comprised under the vague name of the "Great Syna¬

gogue.® Of their names and activity hardly anything is known with certainty; but there were ascribed to them these maxims (Mishnah Aboth, i, 1) : “Be slow in judgment, raise up many disciples; make a fence around the law.®

The last maxim led to many additions to the divine commands ; for the rabbis narrowly con¬

strued the verse forbidding additions or dimi¬

nutions thus : whenever the law names so and so many things to be used for one purpose; for instance, four paragraphs in the phylactery (Ex. xiii, 9, 16; Deut. vi, 8; xiii, 18), you must not use one more nor one less than this num¬

ber. The grouping of the three maxims shows that the same men were judges, religious teach¬

ers and law-makers.

Making of New Laws. — New laws were

worked out mainly by a bold interpretation of the Torah (Pentateuch), which when accepted by the people became, part of the traditions or of the oral law. This was carried down the ages by word of mouth from teacher to pupil or in the remembrance of judicial decisions until toward the beginning of the 3d century it was .written down in the Mishnah, the com¬

mentaries on Exodus and Leviticus and in the Aramaic version (Targum) of Onkelos. The Mishnah in turn became the text of the later discussions of the Talmud (see article The Talmud in this section), and this whole mass, of religious and juridical lore proved the starting point for the rabbis of later ages.

Many of the new rules were avowed innova¬

tions, bearing the name of “Gezeroth® and of “Taqqanoth® (prohibitions and institutions).

Scope and Method.— The drift of rab¬

binical legislation ran always along four lines : the desire to set up a “fence® or outworks around the law ; to render it more humane, fitted for a higher culture; to create a more rational and spiritual worship of God than that JEWS AND JUDIASM — SPIRIT OF

of the sacrificial altar; in times much later than the Talmud to adapt the Jews to the demands of their non-Jewish neighbors. It is to be understood, however, that the Talmud itself lays the groundwork for such concessions.

The (

ing usury from fellow-Israelites ; but it was mainly directed to ritual observances, such as Sabbath rest and abstention from forbidden foods. The rabbis frankly declared that cer¬

tain acts, if done on the Sabbath, constitute (

scribed a course of salting and watering the flesh of mammals and fowl, although these had been bled to death in the act of slaughtering.

They feared that the taste of the inhering blood once acquired might tempt the people to eat also the flowing blood. In like manner, the prohibition of leavened food on the Passover was surrounded by many minute rules which, were avowedly not demanded by the true mean¬

ing of the text: for example, that against the use of <(Median strong drink,® that is a fer¬

mented infusion of barley.. On the strength of the command (Num. xxxi, 23) for cleansing the captured utensils of the Midianites the use of dishes which have been employed for for¬

bidden food, unless they have first been appro¬

priately cleansed, is prohibited. Earthenware thus defiled cannot be cleansed, but must not be used at all. Thus the dietary laws of the Jews address themselves as much to the kitchen utensils as to the stomach. The thrice written words: <(Thou shall not seethe the kid in his mother's milk® were construed «thou shalt not cook, eat or use flesh in milk.® While admit¬

ting that fowl's flesh is not within this wider scope of the prohibition, as its mother gives no milk, the rabbis nevertheless told the faith¬

ful that the flesh of fowl must also be kept out of touch with milk or cheese. The task to keep flesh and milk and the dishes for each apart is quite an obsession to observant Jewish housewives. The desire to bring humanity into the law and the ministrations of justice was

shown by construing (

ant must pay in money both for the loss of earning capacity and for the pain inflicted; while damages for the affront were deduced from Deut. xxv, 12, which hard-sounding verse was held to signify this and nothing more. The Mishnah may have been right in its construc¬

tion of ((eye for eye,® but to change the ampu¬

tation of a woman's hand into a rule that awards a solace in cash for the disgrace of a whipping is judicial legislation of the bold¬

est type; hut it was evidently borne out by ancient custom running back to the code of King Hammurabi. In the cause of mercy the rabbis taught that a man condemned to ston¬

ing should be thrown headforemost on a large stone ; one condemned to be burned should have hot lead poured into his throat at the moment of being strangled. The penalty of death or of 40 stripes (at least for ritual offenses) was to be adjudged only when the culprit had been previously warned of the *sinfulness of his act; and criminal proceedings were beset with such technicalities as to render conviction almost impossible. The position of women, both as wives and daughters, was much more favor¬

able, the power of the husband and father much more restricted, than if the text of the Pentateuch alone had been regarded. Thus at the age of 12 years and a half a girl was termed <(mature® and thenceforward freed from the father's control. The law for maintaining and endowing orphan daughters put them in a ma¬

jority of cases in a more favorable position than the sons and heirs.

Spiritual Growth. — The returned Babylon¬

ian exiles naturally craved a more spiritual mode of worship than that of bloody sacrifices.

In the land of their captivity .they had wor¬

shiped God without an altar. King Josiah's reform restricting all offerings to one chosen place had taken root. The farmers of Judea could bring or even see a sacrifice but rarely; they could fulfil Hosea's prediction: (

hanim® claiming descent from Aaron, alone qualified to minister and

partly supported by a tribute paid in kind (®Terumah®), which might be eaten only in (

cessors of the Great Synagogue, began building up the liturgy which in its outlines is used still by the Jews of our day. Its main elements are: the reading of the Shema (((Hear O Israel®), which is Deut. iv, 4-9, xi, 13-21, and the last five verses of Num. xv; the former two pas¬

sages inculcating belief in God's unity and in national reward and punishment, demand

<(thou shalt speak of them when thou liest down and when thou risest® ; the latter .to commem¬

orate briefly the liberation from Egypt. When ((thou liest down and risest® was interpreted to mean at even and morning tide, thus enabling many to join in worship. Among the benedic¬

tions drawn up to precede these readings one was written to combat three forms of false be¬

lief. It blesses the Lord Svho formeth light and createth darkness,® in protest against Per¬

sian dualism ; it asserts that He renews on each day the work of creation, in opposition to a godless philosophy; it names Him as the maker of sun, moon and stars to rebuke those who worshiped the luminaries as gods. The other chief element is the prayer proper, modified for Sabbath, festivals, new moons and fasts, spoken in standing posture .twice daily, morn¬

ing and afternoon; a third recital in 'the night service was made obligatory only by the ef¬

forts of the patriarch Gamaliel about 100 a.d.

A grace after meals was elaborated, based on the command in Deut. ix, 1 : ((thou shalt bless the Lord -thy God for the goodly land, etc.® ; and other home devotions for hallowing Sab¬

baths and festivals at the evening meal,, to denote the return of work time, special services for Pa-ssover night, and for many other do-

occasions, were prepared. To the duty of reciting the liturgy was added that of hear¬

ing at stated times — Sabbaths, festivals, Mon¬

days and Thursdays — the written Law read in public. Nehemiah's wooden turret (viii) is the pattern for the platform from which the scroll of the law is read to-day, as Ezra read it to men, women and children assembled around him. Later on lessons from the prophets were added; in the days of Jesus it had become customary to preach on a text from this lesson.

Thus while sacrifices went on in the temple, the synagogue (q.v.) was ready in and out¬

side of the holy land whenever the Israelites met, to satisfy their needs with common exer¬

cises — confession, praise, prayer, the study of God's law, comfort from the prophets, moni¬

tion to faith and good works. When the tem¬

ple fell, the synagogue had almost supplanted it by greater usefulness. The Pharisees, or "Haberim,® companions as they called them¬

selves, had already taught the people that learn¬

ing in the written law and in the traditions was weightier than .priestly descent; as the Mishnah blunty puts it : an adulterine bastard, if a dis¬

ciple of the sages, is of more importance than an unlearned high priest. The rabbis of the Mishnah and Talmud and all their successors in the rabbinical office have been either Phari¬

sees or the spiritual descendants of the Phari¬

saic party, which represented the main current of Jewish thought.

Influenced by Conditions.— The rules com¬

prised under the name of the "ban of Rabbenu Gershom® (Rabbi Gershom ben Judah, b. at Metz, 960; d. at Mayence, 1040), form the best illustration of a principle proclaimed by the rabbis and accepted by the Jewish people as a concession to the nations among whom they dwell. The date and place of the synod which issued this "ban® is

rather uncertain; the latest researches fix it at about the year 1000 and at Mayence. It was pronounced against Jews liv¬

ing in Christian countries, and accepted by those alone, who should be married to more than one wife at a time, or who should divorce a wife (except for notorious adultery) with¬

out her consent, or who should put obstacles in the way of one apostatizing under fear of death when he tried to return to the fold. But this decree of comparatively late date is only the outcome of the principle declared by Sam¬

uel at Nehardea (about 235 a.d.) : “The stat¬

ute of the kingdom is law® ; that is, when the law of a country does not demand from the Jew anything contrary to the law of God, he should obey the law of the country in which he lives.

Bibliography. — Kohut, ‘Geschichte der

Deutschen Juden) ; Dembitz, ‘Jewish Services in Synagogue and Home) ; Rabbinowicz, ‘Leg¬

islation Civile du Talmud,* ‘Legislation Crimi-

nelle du Talmud. *

Lewis N. Dembitz,

Author of ‘ Jewish Services in Synagogue and Home .*

14. A CENTURY OF EMANCIPA¬

TION. Up to the close of the 18th century the Jews had no political or civil rights anywhere.

The only serious attempt at remedying this state of affairs before that time was made in England in 1753, when Parliament passed the Jews’ Emancipation Bill, but so great was the outcry raised throughout the country that it was immediately repealed. In Germany a kind¬

lier spirit had arisen in the latter half of the 18th century, the era of enlightenment, notably through the influence of Moses Mendelssohn (q.v.). Lessing’s friendship had resulted in ‘Nathan the Wise,* and another friend of the “Jewish Socrates,® Christian Wilhelm von Dohm, made the first extended plea for the political emancipation of the Jews in his work ‘On the Civil Improvement of the Jews’

(1781). In 1782 the Emperor Joseph of Aus¬

tria issued the famous Toleration Edict; its object was not the political but rather the edu¬

cational emancipation of the Jews; schools were established in which other branches than the Hebrew, the only subject o'f instruction then offered to Jewish children, were taught.

After Mendelssohn's death the French orator and statesman Mirabeau (q.v.) published a book entitled 'Moses Mendelssohn and Political Reform) (London 1787), in which he urged the cause of the Jews.

France. — The country in which these seeds first bore fruit was France. A year before the French Revolution the Royal Society of Sci¬

ences and Arts of Metz offered a prize for the best essay on the subject "What are the best means to make the Jews happier and more use¬

ful in France?® Nine were offered in competi¬

tion for the prize which was awarded jointly to three contestants, one of whom was the Abbe Gregoire, to whose efforts as a member of the National Assembly the passing of the bill on 27

Sept. 1791, granting full rights of citizenship to the Jews of France, was largely due. Some time earlier (23 Jan. 1790) the assembly had voted rights of citizenship to the so-called Por¬

tuguese Jews. The status of the Jews also en¬

gaged the . attention of Napoleon I. In 1807 he convened in Paris an assembly of Jewish nota¬

bles from the various sections of France and Italy, known as the French Sanhedrin, to which he propounded a number of questions, the sixth of which was "Do the Jews who are natives of France, and are treated as French citizens by the law, look upon France as their fatherland?

Do they consider themselves in duty bound to defend it? Are they obliged to obey the laws and satisfy all the demands of the civil code? ®

These questions were answered with a decided affirmative; the emperor was assured that the Jews looked upon other Frenchman as

their brethren and upon France as their native coun¬

try. The final step which placed the Jews for once and all on terms of absolute equality with all citizens of other faiths was taken on 13 Nov.

1830, when the Minister of Education offered a bill providing for the payment of the salaries of the rabbis from the public treasury as was the case with Catholic priests and the Protestant clergy. This became a law 8 Feb. 1831. The last vestige of mediaeval discrimination against the Jews disappeared when the Supreme Court abolished the oath "More Judaico® in 1846.

Holland. — In the national convention of the Batavian Republic a bill was passed on 2

Sept. 1796, which declared that "No Jew shall be excluded from rights or advantages which are associated with citizenship in the Batavian Republic and which he may desire to enjoy.®

Since then the Jews of Holland have had all political rights; how absolutely their equal

standing with other citizens is assured appears from the adoption of a resolution by the legis¬

lature in 1845 giving the widows of rabbis the same pensions as the widows of the Protestant clergy.

Germany. — In none of the many German states was political emancipation definitely granted to the Jews before 1848. True, the Prussian edict of 11 March 1812, issued by Frederick William III at the instance of his liberal-minded Prime Minister, Hardenberg, did declare the Jews to be natives and granted them citizenship on the condition of their taking fam¬

ily names and using the German or any other living language in place of the German-Jewish jargon. They were given permission to settle anywhere and to acquire real estate; all special Jew taxes were abolished; in return they had to assume all the obligations of citizenship, nota¬

bly the payment of taxes and military service.

After the Congress of Vienna and the fall of Napoleon a spirit of reaction set in and this edict remained practically a dead letter. Not

till 1848 was definite political emancipation granted the Jews of Prussia. Paragraph 4 of the law of 5 Dec. 1848 declared that “All Prussians are equal before the law. Class privi¬

leges are not recognized. Public offices are open to all who are capable of filling them,® and paragraph 11 stated that ((The enjoyment of political rights is independent of religious con¬

fession and of membership in any religious as¬

sociation.® In that same year the delegates from the various German - states in Parliament assembled at Frankfort-on-the-Main formulated a statement of the fundamental rights of the German people. Paragraph 13 was to the effect that ((The enjoyment of civil and political rights is to be neither conditioned nor limited by re¬

ligious belief ; neither are political duties to be interfered with by it.® The chief champion of the cause of Jewish emancipation in Germany was Gabriel Riesser (1806-63). Notably dur¬

ing the fourth and fifth decades of the 19th century when this question was . prominently before the legislatures of the various German states was he active. In each one of these states the Jewish question had a varied course, but in time one after the other removed the civil disabilities of the Jews, Hanover and Nassau in 1848, Wurttemburg in 1861, Baden in 1862, Saxony in 1868, and Bavaria last of all in 1869.

England. — In England the final struggle for Jewish emancipation began in 1830 and continued till into the 20th century, when in 1903 the religious test at London University was abolished with the appointment of a Jew (Israel Gollancz) to a professorship. In 1829

the bill removing the civil disabilities of the Catholics had passed the Houses of Parlia¬

ment. The following year Robert Grant intro¬

duced a bill in the House of Commons granting the same boon to the Jews; this bill was passed in the Lower House in 1833 but was defeated in the House of Lords; the same fate met the bill in 1834; in fact the bill was passed 10 times in the House of Commons and rejected as often in the Upper House before a Jew was finally permitted to take his seat in the House of Commons in 1858. In 1835 a bill was passed called the Sheriffs’ Declaration Bill permitting Jews to hold the office of sheriff. In 1836

David Salomons was elected sheriff in London.

In 1845 a bill became law whereby Jews were permitted to hold municipal offices. The Reli¬

gious Opinions' Relief Bill passed in 1846 re¬

moved some minor disabilities from Jews and dissenters from the Established Church. The situation became particularly acute when Lionel de Rothschild was elected to Parliament in 1847 for the city of London. A bill was in¬

troduced in December of that year to permit him to take his seat. It took the course of its predecessors of like nature, passing the Com¬

mons, and being thrown out by the Lords. The year 1850 witnessed a similar experience. David Salomons who was elected a member for Greenwich in 1851 took the bull by the horns when he persisted in holding his seat although ordered to withdraw by the speaker; he aggra¬

vated the offense when he voted "no® on a motion for adjournment made after his re¬

fusal to withdraw. The Prime Minister now ordered that he leave the chamber. Salomons addressed the House and although the members sympathized with him they sustained the Prime Minister. The case was carried to the courts; the decision was against Salomons on the ground that he had no right to vote before tak¬

ing the oath prescribed for members of Par¬

liament. He was compelled to pay a fine of £500 for each time he had voted. Three times more, in 1853, 1856 and 1857, the Commons passed the bill, butt the Lords persisted in re¬

jecting it; finally in 1858 a bill passed both houses which declared the House of Commons competent on occasion to modify the form of oath by special resolution. Lionel de Roths¬

child by such special resolution of the House was now permitted to take his seat, omitting from the oath the words <(on the true faith of a Christian.® In 1860 this concession was made a standing rule and in 1866 the Parliamentary Oaths' Act was passed which omitted the ob¬

jectionable words altogether and thus removed the discrimination

which marked off the Jewish members. The University Test Act was abol¬

ished in 1870; in 1885 the first Jew (Baron Nathaniel de Rothschild) became a member of the House of Lords, and in 1890 all reli¬

gious tests for all offices excepting the king-

ship itself were removed and all offices were thrown open to all subjects of the realm with¬

out distinction of creed.

Austria. — The Toleration Edict of Joseph II was of no significance as far as the political emancipation of the Jews of that realm was concerned. There was no definite step toward removing civil or political disabilities until the year 1846 when the oath “More Judaico® was abolished; on 25 April 1848 the new Constitu¬

tion granting free exercise of religion and civil rights irrespective of religious creed was pro¬

mulgated; five Jewish deputies were elected to the first Parliament which convened after the new -Constitution went into force. On 28 Octo¬

ber of that same year the special Jewish taxes were abolished. As in a number of German states a period of reaction set in in Austria after the revolutionary fire of 1848 had spent itself, and the Jews suffered from this reactionary spirit; the rights granted them were revoked; •when ’the concordat was signed in 1855 whereby the reins of government fell altogether into the hands of the Clerical party, the anti- Jewish spirit was accentuated and some mediaeval de¬

crees touching the status of the Jews passed al 108

 this time. The reactionary regime was in power till July 1859 when the peace of Villa-

franca was signed. Soon thereafter, in February 1860, some new legislation in reference to the Jews was framed of a more liberal spirit. On 21 Dec. 1867 the new Constitution was issued, which established the political equality of all citizens of the empire regardless of religious faith.

Hungary.— In the other portion of the dual kingdom political emancipation was greatly agitated in the fifth decade of the 19th century.

As early however as 1790 the Jews of that land had laid before Leopold II a petition re¬

questing equality with other citizens ; the fol¬

lowing year the Diet passed legislation <(De Judaeis® affording the Jews protection. At the same time a promise was made that a commis¬

sion would be appointed to look into the situ¬

ation and to report measures for the better¬

ment of their condition. A half century passed before any real relief was afforded. The Diet of 1840 passed a law which allowed all Jews of good repute whether native or naturalized to reside anywhere except in mining towns ; this law also permitted them to study for the pro¬

fessions and engage in manufacture; however, their right to own real estate was restricted to the cities. In 1846 the toleration tax was abol¬

ished. Nowhere did the Jews take so promi¬

nent a part in the revolutionary struggle of 1848 as in Hungary. This was appreciated by the party of freedom and in the national as¬

sembly of the Hungarian Republic held at Sze-

gedin in 1849 a bill was introduced and passed on 28 July granting the Jews all rights of citi¬

zenship. This republic was of very short dura¬

tion. The Jews enjoyed their newly won rights just two weeks. The overthrow of the Hun¬

garian Republic was followed by the most strin¬

gent restrictive measures and the Jews were made to suffer severely for their sympathy with and participation in the revolutionary struggle ; a very heavy tax was imposed and every right that had been granted was revoked. The ques¬

tion of Jewish emancipation was not agitated again till 1861 but no remedial legislation was passed till 1867. In December of that year both houses of the Hungarian Parliament passed a bill granting political emancipation. Full emancipation was secured when on 11 May 1896

the Upper House after two previous rejec¬

tions concurred in the bill passed by the Lower House two years earlier recognizing the Jew¬

ish religion as one of the legally acknowledged faiths of the country.

Denmark. — When the deliberative assem¬

blies were established in the various provinces of Denmark by the laws of 28 May 1831 and 15 May 1834, the Jews were granted the right to vote but they were not permitted to. stand for election to Parliament; the Constitution adopted 5 June 1849 granted them full political rights and removed all restrictions.

Belgium. — The Jews were emancipated po¬

litically in 1815.

Italy. — When Italy passed into the domin¬

ion of Napoleon I the Jews of that country secured the advantages of the liberal French legislation. With the fall of Napoleon and the reinstatement of Pius VII, the Jews were deprived of the liberties they enjoyed under French rule and the old mediaeval legislation was re-enforced. This continued till 1848, the revolutionary year, when as everywhere else a brighter day dawned for the Jews of Italy; however, in the reaction which followed they were again forced into mediaeval conditions.

This continued till 1859 when with the achieve¬

ment of Italian unity the Jews received full political rights ; in Rome alone were those withheld but there, too, they were granted upon the downfall of the papacy as a temporal power (September 1870).

United States. — The first amendment to the Constitution announces unequivocally the sepa¬

ration of church and state; all men are equal before the law whatever

their religious creed ; however a number of the 13 original States which adopted State constitutions before the Constitution of the United States was framed demanded religious tests of a character to ex¬

clude all but believing Christians from holding office. The constitution of Delaware of 1776

had such a test which was abolished in the amended constitution of 1792. The constitu¬

tion of Massachusetts which had a similar pro¬

vision was not amended till 1822. According to a constitutional provision of New Jersey only Protestants could hold office; not till 1844

was this article amended; the article of the constitution of Pennsylvania which posted a belief in the Old and New Testaments as pre¬

requisite for office-holders was amended in 1790 to the effect that belief in God and the future state should be the condition; Vermont repealed the religious test of the constitution of 1777 in 1793; Rhode Island, Connecticut, Virginia and Georgia required no religious tests in their original constitutions. In Maryland a long struggle was necessary before the provi¬

sion of the constitution of 1778 requiring belief in the Christian religion as a condition for office-holders was abolished. The Jew bill in¬

troduced in the legislature in 1818, whose ob¬

ject was to remove the civil disability of the Jewish citizens of the State, was not passed till 1826. The new constitution adopted in 1851

still contained the original clause accompanied, however, by a special provision for the Jews; the constitution of 1867 definitely removed all religious tests excepting the belief in the ex¬

istence of God. The constitution of North Carolina of 1776 made a belief in the Protes¬

tant religion a condition for holding any office of trust or profit; in 1835 the words ((Christian religion® were substituted for (

ligion® ; this emancipated Catholics, but not Jews; not till 1868 was this remedied, when only such were declared as being disqualified for office who <(shall deny the existence of Almighty God.®

Rumania. — In 1878 the representatives of the powers of Europe assembled at the Con¬

gress of Berlin made the political and civil emancipation of the Jews one of the conditions of the independence of Rumania. These

rights have not been granted, and alone among European powers Rumania refuses to grant her Jewish citizens the rights of men. There have been reports now and then, however, since the Russian Revolution that Rumania will emancipate the Jews within her borders.

Russia. — Long after emancipation had come to the Jews of western Europe, repressive laws of the most extreme character continued in

force against them in the land which contained oyer half the Jews in the world. Protests by s leading statesmen and citizen's of all faiths in the free lands of Europe and America were of no avail. The United States had gone so far as to refuse to renew its commercial treaty with Russia because American Jews were not permitted to enter Russia though holding the American passport. Then burst upon a startled world the Russian revolution. March 15, 1917, became one of the epochal days in the world's history. The oppressed classes in Russia were freed. Among them the Jews. On 5 April the provisional government abolished all limitations on rights of Russian citizens and friendly aliens based on race and religion. On 20 April all words offensive to Judaism were stricken out of the official oath taken by Jews. Joy reigned in the Russian Jewries, in truth among Jews and all lovers of freedom throughout the world.

The Jews in the two chief cities of Russia de¬

cided to commemorate the emancipation of Russian Jewry in striking ways, the Jewish community in Petrograd by establishing a Temple of Equality in connection with an in¬

ternational institute for the study of national problems, and the Jewish community of Mos¬

cow by establishing a special fund. To be¬

come really effective as the law of the land the decrees issued by the various cabinets that have been in power since the revolution must be ratified by the Constituent Assembly. The Constituent Assembly whose duly elected dele¬

gates met on 18 Jan. 1918 and organized by elec-

ing a presiding officer unwelcome to the Bolshe-

viki and extreme social radicals is being blocked from further assembling by these extremists.

No one can tell what the future may bring forth. But for the present Russian Jewry is free !

Bibliography. — Graetz, (History of the Jews) (English translation, v. 429 ff., Philadel¬

phia 1895) ; Karpeles, (Jews and Judaism in the 19th Century) (Philadelphia 1905) ; Gabriel Riesser's (Gesammelte Schriften* (4 vols.

passim, Frankfort-on-the-Main, 1867-68) ; Jost, (Neuere Geschichte der Israeliten, 1815—1845 } (Berlin 1847) ; Scheidler, (Juden-Eman-

cipation) (in Ersch und Gruber's (Allgemeine Encyclopadie,* part XXVII, 253-315) ; Kahn, (Les Juifs a Paris) (64 ff., Paris 1889) ; Philip-

son, (Judaism and the Modern State* (in (The World's Parliament of Religions,* I, 360, Chi¬

cago 1893) ; Don Lenine, Isaac, (The Russian Revolution* (New York 1917) ; (The America-

Jewish Year Book 1917-18,* article <(Russia, The Revolution,** 306-309.

David Philipson,

Professor of Homiletics, Hebrew Union Col¬

lege, Cincinnati, Ohio.

15. THE SYNAGOGUE. The origin and

development of the synagogue, the story of its simple beginnings from the Babylonian captivity to its appearance in Palestine, to spread from land to land with the dispersion of the Jewish people; the gradual rise

of synagogue prayers and customs, which form so vital a factor in the survival of Judaism; — these are subjects which are full of interest, and not from the standpoint of archaeology alone. For the syna¬

gogue is a living organism — it means more than edifice or meeting-place for prayer. It spans the entire history of Israel and is coex-

tensive with the Jewish consciousness from the earliest dawn of an organized worship and discipline, rite and doctrine, law and custom.

The synagogue is thus school, assembly, home, law-court, as well as house of prayer; and some¬

times in an era of persecution it was a fortress also, wherein the Jew resisted the enemy and perished amid the flames of the sanctuary. The history of the synagogue is, then, primarily the history of the Jewish people and their religion, although in the present sketch the subject will be limited to the story of the synagogue in its current meaning.

Origin. — It was when the Jews went to Babylon under Nebuchadnezzar in the 6th cen¬

tury before the common era that the desire for public worship and instruction gave rise to the synagogue, contradistinguished from the Tem¬

ple with its forms and sacrifices. Tradition traces a synagogue to King Jehoiachin of Judah, who, borne captive to Babylonia with his people, founded such a place of assembly at Shafjatib, in the district of Nehardea. Whether the legend be historical or not, synagogues must have spread in the land of the captivity and been transplanted to Palentine on the return under Ezra. For the post-exilic Psalm lxxiv, 4-8 complains of the destruction of places of worship and Ezra (in Neh. viii) is represented as summoning the people to prayer and instruc¬

tion, he himself reading the law as he and the heads of the community stand upon a wooden platform in the centre of the worshippers. To this rude beginning can be traced the modern synagogue.

Name. — Synagogue is but one of many ap¬

pellations, and is merely the Greek translation of the Hebrew <(Beth ha Keneseth** ((

plied to all places of worship outside of the Temple which were so numerous throughout Palestine and the Eastern world. In the Apo¬

crypha references are made to a <(Proseuche**

(((house of prayer**) and the word is found in Josephus and Philo and in Juvenal, too, in an often cited passage, usually, however, with a more restricted meaning than synagogue. It is of interest to learn from the Talmudic tradition (Pesachim 88 a) that Abraham called his place of prayer a ((mount,** Isaac a ((field,** and Jacob a <(house.** The first Temple was called ((Beth El,** <(house of God** (1 Kings vii, 12). In later Biblical books the term ((Moed,** ((place of as¬

sembly,** is used (Lam. i, 4; Ps. lxxiv, 4, 8).

Growth. — The spread of the synagogue was rapid with the diffusion of the Jewish in the im¬

mediate centuries before and after the fall of Judaea. There are distinct references in the Talmud to the fact that in Jerusalem were 480

synagogues, so large was the host of foreign Jews who visited the Temple and necessitated the creation of many places of prayer. There were synagogues of the Alexandrians, Liber¬

tines, Cyrenians, Elymaeans and Asiatics. In the reign of Augustus Caesar, Rone had many synagogues, which attracted Roman visitors, leading to the conversion of men and women of eminence, and arousing respect for Jewish Sab¬

baths and festivals. A few centuries later when the Christians of Rome burned down a synagogue, and the usurper Maximus com¬

manded the Roman Senate to rebuild it at the expense of the state, he was called a Jew by 110

Ambrosius of Milan. In Egypt, with nearly a million of Jews, according to Philo, the famous synagogue at Alexandria was one of the wonders of its century. In the New Testa¬

ment many are the allusions to the synagogues of Damascus, Antioch, Athens, Corinth and elsewhere outside of Palestine and to Nazareth and Capernaum within its limits. To the Jew¬

ish colonies which went from Rome to the south of France and to Spain is due the syna¬

gogue's appearance in Europe. To the east and the west and the isles of the sea, the synagogue spread, and the spirit of persecution which aimed at its destruction only served to maintain and develop its strength. By the running stream or sea shore, so as to admit of ablutions, in those early days the house of prajˆer was erected, and if in the crowded city no private roof was to exceed it in height. And often be¬

yond the beaten track of travel, in the wilder¬

ness and deserted village, the little Jewish synagogue would be built, to become a refuge for the persecuted in after centuries. Several of the oldest existing synagogues in Europe, so runs the tradition, date back to such an origin.

Often, too, the synagogue was erected close to the tombs of famous rabbis — a custom com¬

mon in early times among Christian and Mo¬

hammedan. Visiting Europe and the East to¬

ward the end of the 12th century, Rabbi Petachia tells in his (Benisch's ed., London 1856) of seeing at Nisibis two syna¬

gogues built by Ezra the Scribe, at Bagdad three besides that which tradition refers to Daniel. In Babylon he found 30, all the wor¬

shipers being bare-footed. At Tiberias he vis¬

ited the synagogue ascribed to Joshua, at Da¬

mascus the one supposed to be erected by Elieser ben Asariah, who lived about the 1st Christian century. In Alexandria, Egypt, is the Elijah synagogue, so-called because legend claims that the prophet for some time dwelt on the spot, and into its neighboring small houses sick Jews and Mohammedans are taken, in the hope that Elijah will perform miracles in their behalf. Making every allowance for pious credulity, a reasonable antiquity for such syna¬

gogues must be admitted. The Karaite syna¬

gogue in Jerusalem dates from the 9th century.

The synagogue on Rabbi Simon ben Jochai's grave near Safet and Rabbi Meir's synagogue in Tiberias are of venerable age.

Famous Synagogues— The roll begins with the Basilica of Alexandria, destroyed when the Jewish community was swept away in a whirl¬

wind of persecution (about 116 of the common era). He who never beheld it, to paraphrase the description in the Talmud (Sukkah, 10 b), never saw the majesty of Israel. It rose like a basilica, colonnade within colonnade, filled at times with a throng of people twice as great as went out of Egypt with Moses. There, too, were golden chairs inlaid with precious stones corresponding in number with the 70 elders of the Sanhedrim, each of which seats cost 25,000,-

(XX) golden denarii. In the centre on an eleva¬

tion of wood stood the choir-leader. Each guild had its own place, so that a stranger might recognize his trade and join his coworkers. So large was the edifice that the responses of the congregation were directed by a flag signal.

Snain had numerous svnaeosrues of importance.

When Cordova fell in 1148 its magnificent synagogues were destroyed. In Toledo at its THE SYNAGOGUE (15)

height of prosperity, there were many splendid synagogues, two of nrincely magnificence, which still exist after varied transformations. The Samuel Abulafia synagogue (1357), El Transito, later transformed into a church, was built partly in the Gothic, partly in the Moorish style.

It consisted of several naves separated from each other by columns and arches ; the upper part of the walls was decorated with delicately cut arabesques, within which, in white char¬

acters on green ground, can still be read the 80th Psalm in Hebrew. On the north and south sides are inscriptions in bas-relief, recit¬

ing the merits of the founder and of Don Pedro of Castile. Once the treasurer and adviser of Don Pedro, Abulafia died under the torture, three years after his synagogue was completed (1360), happily unconscious that the edifice about a century and a half later, with the ex¬

pulsion of the Jews from Spain, was to be converted into a church, to

remain to our time an ornament to the old Castilian city. Such changes were common in the Middle Ages.

The first synagogue in the north of Europe was built in 1598 by the Portuguese Jews of Amsterdam — a historic community with its memories of Spinoza. When the Portuguese synagogue was originally erected in London in 1702, the Quaker architect who would receive no compensation except the actual cost (£2,750) of the building, incorporated in the roof a beam from a royal ship presented by Queen Anne.

Prague can point to a synagogue, around which fanciful legends cluster, which in parts dates back to the 12th century, and Worms, as fruitful in legend, can show a portion of its old syna¬

gogue which was not later than the year 1100.

Stately was the Venice synagogue, built in the 16th century, with a splendor of ornamentation that attests its wealth and taste.

Under the Ban. — If books have their fates, synagogues would also seem to have had their destinies, which were not always of the happiest kind. Their forcible conversion into churches was often a sign of the times. As earlv as the 5th century Theodosius II prohibited the Jews from building new synagogues. A century later Justinian I renewed that decree with increased severity. When the Jews of Genoa asked per¬

mission of Theodoric to put their synagogue into better repair he granted it grudgingly, but later showed his liberality in condemning the Roman commune to make compensation for the synagogue which a mob in that city had burned.

Pope Gregory I razed to the ground a syna¬

gogue Jn Sicily. Calinh Omar I was as intol¬

erant, including the church in his orders. Omar II (717-20) wrote to his governors : <(Do not pull down a church or a synagogue, but do not allow new ones to be built within your prov¬

inces.® At the Council of Oxford (1222) Stephen Langton forbade the Jews of England to build synagogues. Alfonso X of Castile (1252—84) may have called the reader of prayers in a Toledo synagogue, Don Zag, an eminent astronomer, J(his sage,® but his code of laws contains a prohibition against building new synagogues. Pope

Eugenius IV, in a letter to the bishops of Leon and Castile (1442), also decreed that Jews should build no more syna¬

gogues. As late as 1612 in Hamburg Jews were not allowed to have synagogues, but such re¬

strictions did not last long. They were per¬

mitted in a few years to meet for religious JEWS AND JUDAISM — THE SYNAGOGUE (15)

worship on their threat that otherwise they would leave Hamburg in a body, with their s capital and business connections. On the other hand, instances are not rare of kindlier con¬

sideration. Chrysostom may have fulminated against the synagogues of Antioch and called them infamous theatres and dens of robbers, but Theodosius the Great (379—95) ordered the bishop of Callinius in northern Mesopo¬

tamia, who had caused a synagogue to be burned down, to have it rebuilt at his own expense.

The Byzantine emperor, Arcadius (395-408), protected the synagogues when they were at¬

tacked by the clergy in Illyria. Cyril of Alex¬

andria, whose zeal led to Hypatia's death, aroused the mob to destroy His synagogue ; but Theodosius II compelled the clergy and mob of Antioch to restore the synagogues to their owners. In 1419 Pope Martin V issued a bull, in whose preamble it was expressly stated that Jews should not be molested in their synagogues and ((their laws, rights, and customs be not as¬

sailed® — and he was not the only Pope who pro¬

tested against bigotry. In the days of Innocent III a complaint was made at Sens that the synagogue was higher than the church, which offended the sensibilities of the churchmen. In the 14th century in Rome, church and synagogue were built in close proximity, without arousing the ire of the populace. Five centuries later in many cities in the United States, churches are invited to occupy synagogues at times of emergency, and Jewish and Christian ministers, with their

congregations, join in service on national holy days.

Synagogue Architecture. — There is no dis¬

tinct Jewish architecture — the synagogue's form has varied with its environment and the archi¬

tect's artistic genius. Jewish law, it is true, concerns itself with the height and the position of the edifice — it must be higher than private dwellings and must face the east ; otherwise there is no restriction. Hence there can be synagogues octagonal and quadrilateral al¬

though the cruciform arrangement would be hardly admissible. The readiness with which prevailing styles were adopted is proved by the remains of synagogues in Palestine, which Kitchener in the Quarterly Statement for July 1877 of the Palestine Exploration Fund reduces to 14, of which 11 are known and 3 doubtful. He finds that these ruins show similarity in plan and detail of ornamentation, with the same class of moldings, and pointing to same date of erection. He concludes that the Roman emperors Antonius Pius and Alex¬

ander Severus, who were great builders and restorers of temples in Syria, inspired and aided the erection of these synagogues, which were built by Roman labor. <(The dressing, size and nature of the masonry is certainly Roman.®

Kitchener gives as their date 150-300 of the common era. The Worms synagogue is Ro¬

manesque, the Old New. synagogue at Prague, Gothic. The Santa Maria la Blanca in Toledo, formerly a synagogue, but changed into a church in 1405, is built after most, approved Moonsh-

Spanish design. The plan is that of a basilica, the ground floor tiled, being an oblong square about 90 by 65 feet, divided into five naves or aisles, divided by four rows of octagon pillars, nine in each row. Horseshoe arches of peculiar Moorish pattern rise from these columns. Over the arches, whose spandrils are carved into elegant rose patterns, is placed a second arcade ornamented with pure Byzantine work, appear¬

ing like stonelace. A third series of stalactite archlets rests upon double pillarets, crowned by an elaborate frieze reaching to the roof, which though of wood has the durability of rock, and black with age, still shows traces of gold orna¬

mentation. In 1550 this building was used as a Magdalen asylum, and at the French invasion in 1792 was appropriated for military barracks.

In Trani, Sicily, is a Gothic Catholic church, which was originally a synagogue — in the early centuries the Jews of Sicily were numerous and prominent. In Poland and parts of Russia are wooden synagogues, whose flat roofs show in¬

dubitable signs that they could harbor cannon, when the Jews were forced to defend them¬

selves. The variety of synagogue architecture illustrated in the splendid new places of worship that now adorn the chief cities of Europe —such as Strassburg, Berlin, Paris, Vienna, Flor¬

ence, Turin, Munich, Warsaw, Cologne, Buda¬

pest, etc., — shows that the synagogue to-day is as adaptive as of old and runs the gamut of every style from the Classic to the Renais¬

sance. This freedom and eclecticism are seen at their best in the United States, where within the past few decades in particular a large num¬

ber of magnificent new synagogues have been erected — the reform congregation calling them preferably <(temples.® The oldest American synagogue is at Newport, R I. (1762), in the Colonial style of the period, built of brick, with a carved stone cornice and porch. With the increase in population and wealth, the syna¬

gogues have rapidly improved in size and beauty. The styles have been largely Moorish, as in Temple Emanu-El, New York, but the Byzantine, Romanesque, Renaissance and

Classic, with their various blendings, are also represented. The first regular synagogue in New York was erected in Mill street in 1729, a simple structure which was later taken down and more pretentiously rebuilt.

The Inner Synagogue. — The interior archi¬

tecture of the synagogue has been to a certain degree retained from the earliest times. The centre of the main floor is occupied by an ele¬

vated platform, on which stands the desk, from which the lessons from the Pentateuch and the Prophets, and in some communities the

regular prayers, are read. This platform is usually called Almemor, from the Arabic al-minbar, ((the chair,® or by its Talmudic name Bema, the Greek Bˆ/za, a speaker's platform. It re¬

calls Ezra's wooden pulpit, from which he ad¬

dressed the people (Neh. vii, 4). Directly facing the entrance from the vestibule which is usually at its western end is the Ark, termed Teba or (

pended. A perpetual light is hanging in front of the Ark, symbolic of immortality. In the new American synagogues reading desk and pul¬

pit are combined before the Ark. The olden tabernacle is thus powerfully suggested by the inner arrangement of the average modern syna¬

gogue with the curtain screening the Ark, like the curtain which concealed the Holy of Holies.

The main floor is reserved for men and boys, the gallery, or in smaller buildings, a side room is set aside for the women. The separation of

the sexes, however, has rapidly disappeared in American synagogues of the progressive school; and family pews have been introduced, while the men no longer pray with covered heads in Oriental fashion. The interior equipment of the synagogue is capable of splendid decoration.

The Ark is often elaborately ornamented, and while plastic art has received little if any en¬

couragement, carved wood or rich marbles are often employed and Mexican onyx, gold and mosaics used with fine effect. The Italian syna¬

gogues are remarkable for their costly em¬

broidered curtains and scroll coverings. Usu¬

ally the walls are plain, but at times are elab¬

orately decorated, according to the resources of the congregation, the windows being either severely simple or of richly stained glass. The tendency to-day among some of the wealthiest temples is to abandon almost wholly the tradi¬

tional features of the synagogue in the effort to secure the acoustics, comfort and ventilation of a perfect lecture-hall or auditorium, whatever becomes of the “devotional ensemble,® in which respect some churches are equally at fault.

Synagogue Administration. — The highest

functionary is the rabbi, which signifies “my teacher® ; originally in days of national auton¬

omy a judge and adviser in civil and criminal matters and religious questions, to-day his func¬

tion in the United States and in centres of Western civilization, as distinguished from the Orient and Eastern lands in general, is chiefly to preach. In countries where Jewish ecclesi¬

astical law is scrupulously followed and the traditions strictly observed, he decides on reli¬

gious and theological matters. The reader in the synagogue is called hazan, ((overseer,® from which comes the Christian episkopos, an official whose duty it was to ensure the correct read¬

ing of the service. He is termed also cantor and possesses high musical abilities. The sham-

mash is sexton or general servant of the con¬

gregation. The business head is called parnas, “provider,® or merely president in new-fash¬

ioned synagogues, who with the vice-president, and a number of trustees, manage the temporal interests. A useful functionary existed after the Babylonian Captivity, when the Hebrew was disappearing as the language of the people, called a methurgeman ((

preter,® who used to translate into the vernac¬

ular the lessons from the Hebrew Pentateuch.

The primitive synagogue had other officials, whose duties are now

relegated elsewhere. A helpful service was rendered by the 10 Bat-

lanini, or ((men of leisure,® whose presence was necessary as a legal quorum for worship.

These were either people of independent means or stipendiaries of the congregation. This quorum of 10 was called Minvan. To become a member of the synagogue, no formal sub¬

scription to a creed is exacted; the mere fact of being an Israelite is sufficient. Each syna¬

gogue is autonomous, although of recent dec¬

ades unions of congregations, under various names, have been established in England, Ger¬

many and the United States. Their functions, however, are largely educational, and they do not interfere with the independence of any con¬

stituent member. The synagogue is supported by seat or pew assessments and by voluntary offerings. There are never collections except for charitable or patriotic causes. Paid officials are elected by the trustees or members, for short or long terms, but sometimes for life.

Ritual and Customs. — To describe briefly the liturgy of the modern synagogue it is an evolution from the ritual of the primitive place of meeting, with its suggestions of the Temple service. It consists of portions from the Penta¬

teuch and the Psalms, with certain selections, called (

benedictions,® and additional passages of an¬

cient origin. With the centuries and enforced emigration from land to land, the simple ele¬

ments in the liturgy were developed and am¬

plified, additions were constantly made by poetasters and local rabbis, until with the ser¬

mon the length of the service was unduly pro¬

tracted and its solemnity disturbed. Hence of late decades

condensation and elimination have taken place, while music and the mixed choir have been introduced in more progressive syna¬

gogues of Europe and the United States. In these, too, the Hebrew has been curtailed and many portions of the service read in the ver¬

nacular, particularly the lessons from the Penta¬

teuch and Prophets, and the prayer for the government, whether it be kingdom, empire or republic. There is a deep vein of solemnity in the old-time liturgy, although its leit-motif is more national than individual. The atmos¬

phere, however, is far from narrow and God is usually described not as God of the Jew alone, hut of ((all flesh,® “all nations,® of humanity. At the same time the lesson is en¬

forced that men are brethren and religion is a daily exercise and not a weekly parade. As the liturgy was composed at times when the spirit of persecution was most rampant, its breadth and beauty are all the more notable.

It must not be imagined, however, that the synagogue was like a monastery, and its spirit ascetic and unduly rigid. It was the centre of communal activity, the meeting-place for all in¬

terested in benevolence, education and social welfare. Here came the bridegroom, the Sab¬

bath after his marriage. Here was brought the babe on its first outing. Here worshiped the young mother, when she recovered from illness. Here publicly prayed the orphan and the mourner when their dear ones were taken from them. Here, too, the sinner did penance * — was not Uriel Acosta flogged in the Amster¬

dam synagogue in 1633, although in ((a retired corner?® There are records extant of public announcements on Saturdays in the synagogues of the results of law suits and of properties in the market. Lost articles were openly cried, and a proclamation of stolen goods was insti¬

tuted. The moral law, both as regards commer¬

cial honesty and domestic virtues, was publicly enforced. “Be one of the first in synagogue,®

reads a quotation from a 14th century Jew in the Jewish Quarterly Review, III, p. 463, <(Do not speak during prayers, but repeat the re¬

sponses and after the service do acts of kind¬

ness. . . . Wash me clean, comb my hair as in my lifetime, in order that I may go clean to my eternal resting-place, just as I used to go every Sabbath evening to the Synagogue.® The sermon lost its hold during the Middle Ages.

The rabbi was more of a teacher than preacher, but Jewish pulpit eloquence revived with the century of emancipation and to-day the rabbi of the best type wields influence as preacher. The JEWS AMD JUDAISM— REFORM JUDAISM (16)

olden synagogue was the first “institutional church’* and it maintains its essential character.

Bibliography. — Dembitz’s (Jewish Services in Synagoeue and Home* ; Abraham’s (Jewish Life in the Middle Ages’ ; earlier volumes of Graetz’s (History of the Jews’ ; Rosenau’s (Jewish Ceremonial Institutions and Customs.’

For readers of German may be recommended Dr. Frauberger’s monographs on the art, archae¬

ology and architecture of the synagogue issued by the Frankfort (A. M.) Society for the Study of Jewish Monuments of Art.

Abram S. Isaacs,

Professor Semitic Languages, New York Uni¬

versity.

16. REFORM JUDAISM. Reform Ju¬

daism in America finds its roots in the begin¬

ning of the reform movement that took place in Germany in the first quarter of the 19th century. The cause of the religious advance of the Jew in Europe was the breaking up of the Ghetto in the latter half of the 18th century.

As long as the Jew was excluded from the world, its culture and its

opportunities, he found his greatest comfort in his Hebrew studies and in his religion. The latter de¬

veloped only along its own narrow lines and was protected from every admixture of for¬

eign elements. The Jew, as it were, built a “fence around the law.” When the bars of the Ghetto fell and the Jew was initiated into a new world of thought, language, literature and activity, he found the old religion incongruous with modern life and the rabbinical law too rigid for the new conditions. Reconciliation between the two was difficult. A bitter struggle ensued between the old religion and the new life. A compromise was the only solution.

Judaism was equal to the demand. Heart¬

burnings, personalities, domestic schism, often followed in the wake of innovations. The wheels of progress, however, could not be stayed.

Moses Mendelssohn translated parts of the Bible into German and thus opened up a new field of study for the Jew. This was_ followed by a translation of the prayerbook into Ger¬

man by David Friedlander. The Talmudic reg¬

ulations were either openly violated or inter¬

preted in a liberal spirit. Religious schools for instructing the younger generation in the prin¬

ciples and practices of Judaism as well as in the literature and history of Israel were insti¬

tuted and conducted according to modern peda¬

gogical methods. Religious services in many synagogues were modified, rituals were short¬

ened, objectionable features were omitted, and prayers, sermons and hymns in the vernacular were introduced. Israel Jacobson was the first who successfully established reformed religious schools and services in Germany and later built a Reform temple at Seesen, which was conse¬

crated 17 July 1810. This Reform movement soon spread to Berlin and Hamburg and before long it reached America and found expression here in 1824 in the city of Charleston in the organization of the

“Reform Society” of Israel¬

ites, which instituted divine services that con¬

sisted of a short ritual with sermons, etc.,, in English and the abolition of offerings during the divine service. A great ecclesiastical battle resulted and many questions of Reform were delayed for several years. An organ was pur-

chased and the system of family pews adopted in spite of much opposition. It may here be mentioned to the everlasting credit of Re¬

form Judaism, that it instituted family pews and gave to woman the right to worship in the same pew with her husband and sons. The practice of the orthodox wing, which still pre¬

vails in many congregations, of isolating women in a screened gallery, is both improper and without warrant in this age of enlightenment.

Reform differs further from Orthodoxy in the interpretations put upon the Scriptures and the Talmud and the authority with which they are severally credited. Orthodoxy gives to both Scripture and Talmud a binding authority over Jews without regard to circumstances of time and place. Reform seeks to set up a higher standard of authority than merely the literal texts and to find a way of reconciling ancient laws and traditions, if possible, with modern re¬

quirements. The usual custom of Reformers is to be reasonable and to discriminate between the essentials and the non-essentials of Judaism.

Reform Judaism has discarded belief in bod¬

ily resurrection, in the coming of a personal Messiah, in the national restoration of Pales¬

tine and the reinstitution of the ancient temple with its Levitical cults. Reform Tudaism is also manifested in a refusal to abide by the rigorous enforcement of the Mosaic and Rab¬

binical dietary laws and in certain changes in the ritual and religious observances. The Re¬

form instituted at Charleston soon spread to the North where in the city of New York the Temple Emanu-El was organized in 1845 under

the leadership of Rev. Dr. Leo Merzbacher who formed his own ritual for the congregation.

Temple Emanu-El has led the van of the Re¬

form Jewish congregations of America for over half a century and has given much im¬

petus to the progress of Israel. Under Dr, Samuel Adler and Dr. Gustav Gottheil this congregation made vast strides and is now the largest and wealthiest Jewish congregation of the world. Its place of worship is situated at the corner of Fifth avenue and 43d street, and its present rabbis are the Rev. Drs. Joseph Silverman and Hyman G. Enelow. Har Sinai congregation was soon organized in Baltimore under the banner of Reform and adopted the prayebbook of the Hamburg Temple. Some of its noted rabbis were Dr. David Einhorn, Dr.

Samuel Sale, Dr. D. Philipson and Dr. F. Shan-

farber. The present incumbent is Rabbi Charles Rubenstein. A stronger note than all these, however, was sounded in the early days of reform at Albany where Rev. Dr. I. M.

Wise officiated from 1846 to 1854. He had come from Germany, impregnated with the new spirit of progress, and at once, carried his cherished ideals into practice in this country.

He fought some of the early battles of Reform in America which went far beyond the expecta¬

tions or desires of the Reformers of Europe.

He contended for choir and organ and for a prayerbook in the vernacular and his Minhag America (the American ritual) was acceptable to most American Reform congregations for almost 50 years. It later became the basis of the Union Prayerbook now generally in use.

Wise was not alone in his strenuous battles for .

progress. Leo Merzbacher, Max Libienthal, Samuel Adler, David Einhorn and Samuel 114

JEWS AND JUDAISM— REFORM JUDAISM (16)

Hirsch ably entered the lists and contributed valuable aid to the new

movement. These men were later reinforced by such valiant Reform leaders as B. Felsenthal, J. K. Gutheim and Gustav Gottheil. Rev. Dr. Isaac M. Wise, rightly called the father of American Reform Judaism, gave to this movement a greater im¬

petus than it had ever received, when in 1873

he organized the Union of American Hebrew Congregations and under its auspices, in 1875, the Hebrew Union College, a theological sem¬

inary for the training of American rabbis. A great drawback to the progress of the reform element was the lack of leaders and rabbis with modern scholastic education who could enter into the spirit of American conditions and the needs of Israel in this country. In the last 35 years over 200 graduates of this col¬

lege have found pulpits in reform congrega¬

tions where, with their modern culture and the ability to appeal to the younger generation, they have had eminent success, and have given Reform (or Progressive Judaism, as it is sometimes called) a firm foothold on American soil. The Union of American Hebrew Congre¬

gations is now actively engaged in providing circuit preachers for small congregations and in organizing congregations and religious schools in communities where none exist. Another source of active strength to Reform Judaism has been the Central Conference of American Rabbis, which the late Rev. Dr. I. M. Wise called into existence in Detroit in July 1889.

This had been preceded by several Reform Rabbinical Conferences which from time to time discussed burning ecclesiastical and ritual questions. The most noted of the conferences was the Pittsburgh Conference held in Novem¬

ber 1885, at which the following platform of Reform Judaism was adopted and which in the main has been approved by nearly all Re¬

form rabbis and teachers and been generally accepted by the laity :

Act 1. — Judaism conveys the highest con¬

ception of God and of his relation to Man.

God is the Creator and Ruler of the world, Father and Educator of the human race.

Act 2. — The Holy Scriptures are the record of Divine Revelation and of the consecration of the Jewish people as the missionaries of the one God. In composition and literary arrange¬

ment the Scriptures are only the work of men with the unavoidable limitations of their age.

Act 3. — The results of natural science are the best helps to the understanding of the work¬

ing of Divine Love in the world, the Bible serv¬

ing as guides to illustrate the working of Divine Power within us.

Act 4. — The Mosaic laws are intended for the training of the Jews of Palestine in their former surroundings ; only the moral laws are divine ; all social, political and priestly statutes, inconsistent with our modern habits and views, are to be rejected.

Act 5. — The Mosaic-Rabbinical laws on diet, purity and dress fail to imbue modern Jews with the spirit of priestly holiness ; their ob¬

servance to-day would obstruct rather than en¬

hance moral and spiritual elevation.

Act 6. — Israel's Messianic hope relates to ' the establishment of the authority of peace, truth, justice and love among men. No return to Palestine is expected, nor the reinstitution there of a Jewish state, nor of a worship con¬

ducted by descendants of Aaron.

Act 7. — Jmdaism is an ever-growing, pro¬

gressive and rational religion of modern civil¬

ization and asserts the necessity of preserving identity with the great past of the Jewish nation.

Act 8. — Judaism hails the efforts made by various religious denominations toward remov¬

ing the barriers separating sect from sect.

Act 9. — It is the duty of Jews to spread the knowledge of their religious truths and mission amongst Jews and non-Jews.

Act 10. — The present agitated state of Juda¬

ism is a period of transition from a blind belief in authority and exclusion to a rational and humanitarian conception of religion; the masses, therefore, should be enlightened as to the history and mission of the Jewish people and their social and spiritual condition elevated through press, pulpit and school.

The Central Conference of American Rabbis has, under the regime of its founder and first president, Dr. I. M. Wise (1889-98), and its second president, Dr. Joseph Silverman (1899-

1903), formulated many decisions which have been put into practice b}ˆ the people at lar£e, the most important of which are the abrogation of circumcision for adult proselytes, permis¬

sion to the rabbis to officiate at cremations, the interdiction of rabbis from officiating at inter¬

marriages (between Jews and non-Jews), etc.

The most important work of the conference has been the publication of the Union Prayer Book and Union Hymnal, both of which have become very popular and have been the means of bringing unity into the religious services of more than 200 Reform congregations and abolishing the many different rituals which had been a source of confusion in modern Judaism.

Of late years some Reform congregations have been holding Sunday services in addition to the regular Sabbath services and many peo¬

ple have had grave fears lest this movement might lead to the substitution of Sunday for the Jewish Sabbath. The Central Conference of American Rabbis at its convention at De¬

troit July 1903 allayed those fears by adopting a resolution to the effect that this Conference favors adherence to the historical Sabbath as the fundamental, institution of Judaism, and that Sunday services, whenever held, must only be regarded as supplementary to the regular Sabbath services. The future of Reform Juda¬

ism in this country is pregnant with great possibilities. It is to be shaped, in the main, by the Union of American Hebrew Congrega¬

tions,. the Central Conference of American Rabbis and the Hebrew Union College (Cin¬

cinnati, Ohio) presided over by Dr. K. Kohler, the successor of Dr. I. M. Wise, and by the graduates of this college of whom the older and more prominent are H. Berkowitz, Jos, Krauskopf, Louis Grossman, R. Grossman, M.

Heller, David Philipson, Jos. Stolz, Jos. Silver-

man, Wm. Rosenau. Among other leading

Reform rabbis of America may be counted E. G. Hirsch, K. Kohler, S. Sale, Leon Harri¬

son, I. S. Moses, Abram Simon, S. Schulman, M. H. Harris, S. S. Wise and R. Grossman. It is hoped that the Jewish Theological Seminary of America (New York), will also add power and inflllience to progressive Judaism in JEWS AND JUDAISM— EDUCATION AND THE JEWS (17) 115

America, notwithstanding its present conserva¬

tive tendency. The main problem for the re¬

formers of the future will be how to promote assimilation with modern conditions without sacrificing the integrity of Judaism.

Bibliography. — (Reports of the Union of American Hebrew Congregations) ; (Reports of the Central Conference of American Rabbis) ; (Yearbooks of the American Jewish Historical Society) ; Philipson, (Reminiscences of I. M.

Wise) ; Grossman, (Life and Writings of I. M.

Wise) ; May, Max B., (Isaac Meyer Wise, Founder of American Judaism } (1916) ; Philip¬

son, (The Reform Movement in JudaisnP

(New York 1907) ; Kohler, Settlement of Jews in North America) ; and (The Jewish Encyclopedia?

Joseph Silverman,

Rabbi , Temple Emanu-El, New York City.

17. EDUCATION AND THE JEWS.

The rise of education among the Jews during the period before the

Babylonian exile is, like all the beginnings of national and intellectual life in antiquity, enveloped in obscurity. But enough can be learned from many casual allu¬

sions in Biblical literature to prove that even during that early era education had attained a high standard, and had become a solid founda¬

tion upon which generations could continue to build. So much is certain, that education began at a very tender age, from the moment when the intelligence of the child first awak¬

ened. Then the impressions had to begin to produce what was regarded the end and aim of all education, namely, to make a perfect man.

Among the Jews the virtuous man was one who realized his likeness to God in whose im¬

age he was created. This ideal was taught by the Hebrew prophets, and formed the basis of their education, which religion commanded should be given to all alike. _ Every duty to. the individual and the community was a religious duty; therefore there was a perfect union of religion and life, and education had as its end systematically to form and elevate humanity.

Of the highest truth and duties it was com¬

manded <(Thou shalt teach them unto thy chil¬

dren, and shalt talk of them when thou sittest in thy house, and when thou walkest by the way, and when thou best down, and when thou risest up? (Deut. vi, 7). ((This instruction educated the whole people to the consciousness, that conduct is the largest concern of life, so that righteousness became Irael's ideal.® (Mat¬

thew Arnold).

The survival of the Jews after the twice re¬

peated destruction of their national life, their salvation from disappearance under 18 cen¬

turies of systematic persecution and their con¬

stant high standard of intellectual and moral attainments is due to the

high value, they placed upon education and the manner in which it has been adapted by them to every age and time, so that no progress, caused by the ad¬

vance of science, found opposition among them for any length of time. Therefore a modern educator has said truly, ((If ever a people had demonstrated the value of education, it is the Jews.®

In Biblical Times. — During the earliest period the instruction was domestic — the home was the only school, the parents were the only teachers. (Deut. iv, 9; vi, 7; xi, 19). Cere¬

monies were introduced in the house for the purpose of impressing upon the plastic minds of the children .the glorious achievements of the fathers and government of the world by God. (Ex. xiii, 8). Abraham's merit was found in the assurance that he would give his children such training. (Gen. xviii, 19). There are many evidences that the arts of reading and writing became more and more widely diffused.

The well-educated child is the joy of his parents. (Prov. x, 1; xvii, 25). But religion and virtue remained the foundation of all edu¬

cation. ((The fear of the Lord is the beginning of wisdom.® (Prov. i, 7). The main object of the Sabbath assemblages was instruction ; everyone was made thoroughly acquainted with the national literature. (Deut. xxxi, 12-13).

So the Jews were trained to become <(the people of the book.®

In the Rabbinical Era. — During the period of the second temple systematic instruction and schooling were introduced. First the high school (Beth ha-Midrash) in connection with every synagogue (first mentioned Eccles. li, 23). The New Testament refers to these schools many times. Luke v, 17 speaks of teachers from every town in Galilee and Judea which proves how numerous they were. It seemed indeed so unthinkable that such schools had not existed from primaeval times, that the later Haggadah anticipates the Beth ha-Mid¬

rash for the time of Moses, Joshua and Sam¬

uel, that it reported Solomon built schoolhouses and Hezekiah supported them. Primary edu¬

cation was made compulsory by Simon ben Shetah about 75 b.c., and the High Priest Joshua ben Gamla, 63-65 a.d., enacted that teachers

be appointed in every province and town for children from the ages of six to seven years up. It was then that the elementary school (Beth ha-Sefer) was established, and together with the high school connected with every synagogue. (Talm. Babl. Ber. 17, a, Ta'anit 23, b, Kidd. 30, a, Yalkut Is. 257). At the time of Josephus the duty of universal edu¬

cation for every child was regarded as so im¬

portant that he says (Ap. I, 12) ((Moses com¬

manded us to instruct the children in the ele¬

ments of knowledge, reading, writing and the deeds of the forefathers.® He could state with pride (Ap. II, 25) ((Amongst us every child must learn to read.® In addition to reading, writing and the history of the past it was the duty of every father to have his son taught the art of swimming and to give him manual train¬

ing by letting him learn a trade.

•In the midst of the convulsions caused by the destruction of Jerusalem and the Temple R. Jochanan ben Saklcai obtained from Ves¬

pasian the permission to establish an academy at Jamnia which at once became the centre of Jewish learning, the mother of the succeeding high schools where the discussions were held whose records are preserved in the Talmud, (see Talmud) which is filled with evidences of wise pedagogic insight in t'he arrangement of schools and courses of studies _ and antici¬

pates many of the new movements in education which mark the present time. Especially is the high importance of the teacher and the re¬

spect due to him expressed in the most em¬

phatic manner. ((A President of the Academy,®

relates the Talmud, <(sent some scholars to ex-

 amine the schools and establish them where none existed. They came to a city and de¬

manded to see the keepers of the city. The magistrates and police officials were introduced to them. (These are not the city's keepers P

said the wise men, (Who then are?> asked the citizens. (The city's keepers are the teachers of the children, > was the reply.® <(A city with¬

out elementary schools deserves to be de¬

stroyed,® is another saying. Nothing was per¬

mitted to interfere with the school lessons, not even the rebuilding of the Temple. Rabbi Jehudah said ((The world is saved only by the breath of the school children.® The subjects of instruction were in the first place the re¬

ligious literature, the Bible and the Talmud.

But the studies were so arranged that by the nature of the talmudic discussions they em¬

braced all known sciences : natural history, anatomy, medicine, geometry, astronomy and foreign languages.

In Later Times. — The succeeding ages

were dominated by the wise rules laid down in the Talmud referring to discipline, qualifica¬

tions of the teachers, the respect due to the teachers, rules about limiting the size of the classes taught by one teacher and the atten¬

tion paid to the individuality of the pupils.

The great regard paid to the school by the Jews in the Middle Ages, when among Chris¬

tians education was limited to the small number of the favored classes, is apparent from a de¬

tailed scheme preserved from the 12th century for the course of instruction followed in the schools. The order of studies is carefully elaborated from the elementary schools for all children through the secondary schools up to the academies. In the 13th century the ((seven sciences® comprised the prescribed curriculum among the Jews as it did among the Christians. Especially in Italy systematic education received great care and encourage¬

ment at that time, and the same is true of Spain and Provence. Great rabbis stimulated interest in science outside of religious lore ; He¬

brew books of ethics of the period contain side by side with the moral teaching's of the rabbis maxims from Aristotle, Porphyry, Theophras¬

tus and others. The Jewish educational cur¬

riculum in Italy included the whole field of knowledge, theology, poetry, philosophy and natural science long before the Renaissance.

In Spain the ordinary course of Jewish study was Bible, Hebrew poetry, Talmud, the relation of philosophy and revelation, the logic of Aristotle, the elements of Euclid, arithmetic, the mathematical works of Nicomachus, Theo¬

dosius, Menelaus, Archimedes and others, op¬

tics, music, mechanics, medicine, natural science and metaphysics. So it happened that during the darkest mediaeval times Jews were con¬

spicuous as scholars, philosophers and physi¬

cians ; to them, in fact, is owing the scientific elaboration and advancement of medicine; they took the most active part in the progress of as¬

tronomy, founded the famous schools of Mont¬

pelier and Salerno and contributed essentially to the flourishing condition of Padua. With¬

out Jewish inventions neither Columbus nor Vasco de Gama could have made their daring sea voyages. Moritz Steinschneider in his great work (The Hebrew translations of the middle ages, and the Jews as interpreted has shown the inestimable services rendered by them in being the mediators of Greek and Mohamme¬

dan civilization for the nations of the Occi¬

dent. All of this high education and respect for scholarship was based upon the broad foundation of the elementary school which ex¬

isted in every and even the smallest Jewish con¬

gregation.

Child Training. — Although little attention was paid to the education of the girls, never¬

theless many of them became distinguished by scholarship, and all were imbued with the high¬

est appreciation of learning. The mothers took their little sons to school and both the mother and father participated in the important func¬

tion of introducing the boy to school for the first time. This was made a solemn religious ceremony, so arranged as to leave an indelible impression upon the tender mind of the child.

The initiation took place in the synagogue on the Feast of Pentecost,

the traditional anniver¬

sary of the revelation on Mount Sinai. Early in the morning the boy was dressed in new clothes and three cakes of fine flour and honey were baked for him by a young maiden. Three eggs were boiled and apples and other fruit were gathered in profusion. Then the child was taken in the arms of the rabbi or another learned friend first to the school and then to the synagogue or vice-versa. The child was placed on the reading dais before the scroll, from which the Ten Commandments were read as the lesson of the day. In the school he then received the first lesson in reading Hebrew. On a slate were traced in honey some of the letters of the alphabet, or simple texts, such as <(Moses commanded us a law, an inheritance for the congregation of Jacob® (Deut. xxxiii, 4) ; the first verse of Leviticus and ((Let instruction be my vocation.® The child was then handed over to the arms of his mother who had stood by during this delightful scene. (Abraham's Jew¬

ish Life in the Middle Ages,* p. 348, from Machzor Vitry, p. 628).

Rabbis as Educators. — The influence of Jewish education became very conspicuous when at the time of the Renaissance the revival of learning took place. Then the Jews were the only ones through whom the Hebrew Bible could be rediscovered for the Christian world.

As once Origen and Jerome, so now the reli¬

gious Reformers learned to read and interpret the Hebrew Scriptures from the Jews, and Luther in his commentaries is altogether de¬

pendent on Nicholas de Lyra, who in his turn had appropriated the commentary of Rashi (Rabbi Solomon ben Isaac of Troyes 1040-

1105), which was familiar to every Jewish child.

So the Italian Jews especially became the teach¬

ers of nearly all Hebraists among the Human¬

ists. Wherever the Jews found a refuge dur¬

ing the persecutions in Germany, and when ex¬

pelled from England and France, Spain, Por¬

tugal and Sicily, they carried their educational ideals with them and it

was their first concern to establish elementary schools and schools for higher education. Especially praised by con¬

temporaries on account of its excellent syste¬

matic arrangement was the school at Amster¬

dam, where Spinoza received his primary edu¬

cation.

In Modern Times.— Less systematic were

the educational establishments in Germany and Austria in consequence of the centuries of op¬

pression to which the Jews were subjected and

their total deprivation of all civil rights in those countries. But even there they did the best pos¬

sible under their arduous condition, and at no time were men distinguished by scholarship lacking among them. The system was finally improved in Germany by the influence of Moses Mendelssohn and his followers, and in Austria through the initiative of Hartwig Wessely who stirred up the Jews to improve their schools in accordance with the suggestions of the Em¬

peror Joseph II. So at the end of the 18th and the beginning of the 19th centuries a number of Jewish schools were founded on the old Jewish principles combined with the most modern pedagogic developments. The Jewish Free School was founded in Berlin in 1778, the Wil¬

helm School of Breslau in 1791, the Franz School of Dessau in 1799, the Jacobson School at Seesen in the Harz in 1801, the Philanthro-

pin at Frankfort-on-the-Main in 1804, the Sam¬

son School at Wolfenbiittel in 1807. At the latter school Leopold Zunz received his educa¬

tion and imbibed that love of learning which made him the founder of the scientific treat¬

ment of Jewish religion, literature and history.

These schools were so excellent that most of them were patronized by Christians also. They set an example for schools with similar ambi¬

tions in every Jewish congregation in western Europe. Immediately the necessity was felt for competent teachers at such schools and for rabbis systematically trained and endowed with general education. The first teachers' seminary was founded at Cassel in 1809. Others followed in rapid succession. For the education of rab¬

bis many institutions sprang up which have won deserved distinction in France, Germany, Italy, Austria, England and America.

The New Education. — Guided by the con¬

viction that education would be the best means of improving the wretched condition of the Jews in Rumania and Turkey, the Alliance Israelite Univerelle (see article Alliance Israelite Universelle) has opened in those countries many schools for the teaching of ele¬

mentary branches, languages and manual train¬

ing, their high standard being so well recog¬

nized that in Turkey they are largely patronized by Mohammedans and Christians also. Trade schools and schools for technical training have been founded by Jews. Those, established in America for the benefit of Jewish immigrants and their children, in New York city the Edu¬

cational Alliance by the Baron Hirsch Fund and in Chicago the Jewish Manual Training School deserve special mention on account of the magnificent work they are doing.

Bibliography. — Abrahams, (Jewish Life of the Middle Ages;' Berliner, A., (Aus dem Le-

ben der deutschen Juden im MittelalteL ; Guedeman, M., (Das juedische Unterrichtswe-

sen) ; Leipziger, H. M., (The Education of the Tews) ; Hamburger, (Vol. V, article «Education») .

Max Landsberg,

Rabbi, Temple Berlth Kodesh, Rochester, N. Y.

18. COMMERCE AND THE JEWS.

Commerce or the exchange of goods is and has at all times been one of the prime motors of civilization. In antiquity the Phoenicians were the great trading nation, and together with the various products they carried from one land to another they spread the elements of culture into remote parts of the earth. Thus they fur¬

nished the Greeks with the very elements out of which their industry, art and literature after¬

ward developed until they themselves became heirs to the Phoenician trade. Less known and recognized is the fact that during the early Middle Ages the Jews, owing to their disper¬

sion over the globe and their connection with one another, were the merchant people par ex¬

cellence, filling the position of the Canaanite of old as intermediaries of the world's trade.

Early Traders. — On the soil of Palestine the Hebrews were gradually transformed from a people of shepherds into farmers. Trading was greatly discouraged by legislation which prohibited loaning money on interest and the merchant's honesty was distrusted alike by prophet and by sage (Hosea xii, 7 ; Ecclesiasti-

cus xxvi, 29-xxvii, 2; Kiddushin iv, 14). The great caravan routes from Arabia and Egypt to Tyre and Damascus did not touch the high¬

lands of Judaea and Samaria; it was the Ca¬

naanite or Phoenician who ((walked around®

from town to town and from house to house with his merchandise (Isaiah xxiii, 8; Hosea xii, 8; Ezek. xvii, 4; Zech. xiv, 21; Prov. xxxi, 24). Once or twice the attempt was made to join the Phoenicians in maritime expeditions but without success (I Kings x, 15—22 ; xxii, 48). In the Babylonian exile the Jew imbibed an unquenchable love for the wide world; his eyes were opened to the facilities of com¬

merce as he watched the markets of Babylonia and of Tyre (Ezek. xxvii ; Genesis x; Tobit i, 13). Travel on land or on sea for the pur¬

suit of commerce became a matter of frequent occurrence also among Palestinian Jews under the Persian dominion (Prov. vii, 19y20; Ps.

cvii, 23; Tobit i, 13, 21; iii, 7; Jonah i, 3), al¬

though the markets of Jerusalem were chiefly occupied by Phoenician traders at the time of Ezra (Nehem. iii, 31; xiii, 16). Josephus also writes rather in a spirit of contempt for trade: «We neither inhabit a maritime country nor do we delight in commercial occupation, but take pains in cultivating the fertile land we inhabit.®

(Contra Apionem i, 12).

Hellenic Jews. — It was chiefly since the time of Alexander the Great and under the Ptolemies and Seleucides that the Jews settled in large numbers in the great centres of com¬

merce all along the Mediterranean and en¬

gaged in mercantile pursuits acquiring wealth and influence to such a degree as to rouse the jealousy of their Greek competitors. This was especially the case in Alexandria where they inhabited a large portion of land along the sea and became owners of ships and great merchant princes controlling the navigation of the Nile.

(Philo In Flaccum 8; III Maca. iii, 10; Jose¬

phus Contra Apionem ii, 5; Comp. Frankel Mo-

natschrift, 1874, p. 147, and Theodore Reincharl, ((Judaei® in (Dictionnaire des Antiquites Goth-

ques et RomainesO- There was scarcely a commercial town throughout the whole Roman Empire from Asia Minor to Spain in which they had not a colony of their own, enjoying the protection of the Roman rulers because of their success (Josephus, Ant. xiv, 7, 2-3; Jewish War ii, 16, 4). They were Jews in race and faith, but Hellenes in culture ; commerce broad-

 ened their views and rendered them cosmopoli¬

tan. Jewish merchants carried Jewish ideas wherever they went ; they paved the way for a world-conquering faith. They ploughed the soil for Saint Paul and Christianity to reap the great harvest.

Judaea also came under the influence of the commercial spirit of the Hellenic Jew. The large list of goods mentioned in the Mishnah gives evidence of the extensive international trade carried on by the Jews

which flooded the mother-country with merchandise imported from all parts of the globe and which enriched the Jewish vocabulary with a great variety of Greek terms (Herzfeld, (Handelsgeschichte der Juden des Alterthumsˆ 1879; Schuerer, ˆesch. d. juedischen Volkes) II3, 50-63). The ships sculptured upon the Maccabean mauso¬

leum point to the possession of a mercantile fleet by the Jews stationed at Joppa, the port at which Simon the Maccabean prince endeav¬

ored to develop the foreign trade (I Macc.

xiii, 29; xiv, 5), whereas King Herod desired to make Caesarea a more convenient harbor (Josephus, Ant. xv, 9, 6). As a typical man of wealth of this time a high priest by the name of Eleazar ben Harsom is mentioned in the Talmud who is said to have inherited from his father a thousand towns on land and a thou¬

sand ships on sea (Yoma 35b). But the best proof of the gradual transformation of the Jews from an agricultural to a commercial peo¬

ple at the time of Herod is given by the fact that Hillel, the great master of the rabbinical schools, felt induced to institute a legal mode of procedure in regard to loans of money which virtually did away with the Mosaic pro¬

hibition (Gittin v, 5). It shows that invest¬

ment of capital in commercial speculation had become a necessity with the people.

The Jews in the Dispersion. — The fall of Judaea in the year 70 and the final defeat at the Bar Kokba War in 135 changed the destiny of the Jews altogether, and they bent their efforts to a far larger extent than before upon mer¬

cantile pursuits. Scattered over the wide globe, they were enabled through extensive travel and good connections to establish flourishing trade everywhere. Especially in Babylonia under the dominion of the Parthians they amassed great fortunes by commerce, enjoying the favor of wise rulers. (Consult Herzfeld 1, c.

118-119; 336). Along the Phoenician sea-coast they became heirs to the Phoenician trade and industry to such an extent that far into the Middle Ages they are found to be the chief manfacturers of Tyrian glass and of purple, as shown by Benjamin of Tudela’s Travels. Ere

Christianity spread its arms westward, they marched as peddlers under the shadow of the Roman eagle up the Ebro as far as Toledo and Saragossa, up the Rhine as far as Cologne and along the Danube as far as the Black Sea, car¬

rying on an importing trade in spices and per¬

fumes, in pearls and jewels and in costly clothes of the East. Particularly was the silk-

trade greatly developed, if not altogether mon¬

opolized bv them, and this accounts for ancient Jewish settlements in China, the home of silk and for the protection accorded to Jewish silk manufacturers by rulers of Sicily, France and Spain. _ (Consult Heyd, (Gesch. des Levanthan-

dels^ i, 6-9, 12; 24; 26; Mommsen, (Roemische Gesch.,* v, 465-470; Herzfeld, 119; 308; Graetz, (Gesch. d. Juden, > v3, 55, 228, 329 and else¬

where). The same seems to have been the case with the trade in spices (Heyd, 1. c. 12, 141; Depping, (Die Juden in Mittelalter,* p. 132; Bedarride, (Les Juifs de France,) 46; 454). It is significant that the Jews were assessed to pay their taxes in the shape of pepper (Dep¬

ping, 1. c. 132). The existence of black Jews in Malabar indicates the establishment of Jewish colonies in India for commercial purposes.

Throughout the early Christian centuries Jews are mentioned as importing silk, spices and em¬

broidered goods from the East to the markets of Spain and France. The flourishing period of Jewish trade came when the victorious flag of Mohammed united the East and the West into one great empire offering new incentives to industry and commerce. Jews were employed by the Moslem rulers as commissaries of the army and as financiers. Jewish merchants, partly on their own ships, made regular trips from far off China, India and Egypt to Mar¬

seilles and Narbonne, bringing the produce of the East to the Western depots of commerce.

They carried the fur and amber of Russia, brought to the Crimea or to Bohemia the shawls and embroideries of Constantinople, the spices of India and drugs of Arabia to the mar¬

kets of Narbonne, Lyons, Cologne and May-

ence (Bedarride, 1. c. 57 and elsewhere). De¬

scriptions of the mercantile routes taken by such Jewish traders have been preserved by Arabic geographers, showing the important position taken by them as international mediators be¬

tween the Orient and the Occident. Jews were indeed in those centuries the merchants (mer-

catores or negotiatores) par excellence. This accounts for the fact that Jews were selected as ambassadors by German emperors like Charle¬

magne and Otto I and made secretaries of finance and prime ministers by the Moslem rulers. Conversant with the languages of many countries, they had the opportunity of con¬

trolling the market and accumulating great wealth as no other class of people (Sombart, W., (The Jews and Modern Capitalism, > Lon¬

don 1913; and collation of Jewish reviews in Am. Econ. Report for 1913 ; Heyd, 1. c. 138—142; 87; 194; 258; Jacob, (Handelsartikel der Araber,} 1891, p. 9; Stobbe, (Die Juden in Deutschland, > 6-7; 103; 199-200; 231; Kremer, (Die Kulturgeschichte des Orients, > I, 188; II, 176; Lee's (Spanish Inquisition* ; Kohler, K., (Die Weltgeschichtliche Bedeutung des jiidische Handels, > in (Jahrbuch fur jiidische Geschichte und Literatur, 1909, pp. 90-107).

As Addison says in the Spectator, they were so disseminated through all the trading parts of the world that they became the instrument through which the most distant nations con¬

versed with one another and by which mankind were knit together in a general correspon¬

dence.

The trade in slaves was almost exclusively in their hands a long time. (Consult Heyd and Stobbe 1. c.). Some they brought from Gaul, but to a larger extent they bought slaves from the Slavonic rulers (Benjamin of Tudela, p. lllb ; and Graetz, Gesch. V, 303). With the Chazar kings in the Crimea they also stood in close relationship, as is proved by the fact that the latter embraced the faith of the Tews

(Graetz, 1. c. 176 et seq. ; Beer, (Gesch. des WelthandelsP 198, 229-230). The entire trade . with the products of the Baltic provinces seems to have been in their hands since the time of the Roman Empire (Schuerer, 1. c., Ill, 18).

Besides woolen and silken goods, spices, tapestry, embroideries and furs, we find jewelry, gold and precious stones also monopolized by them. Nor was the commercial activity of the Jews merely confined to the exchange of goods. They reared those centres of commerce in western Europe which were afterward occupied by the rich burghers or merchant guilds who drove them out of their possessions in order to rid them¬

selves of their competitors or masters in the art of trading. The beginnings of the history of cities such as Narbonne and Lyons, Cologne and Mayence, Nuremberg, Regensburg, Ulm and Augsburg, London and York and dozens, if not hundreds of others, coincide as a rule with Jew¬

ish settlements in these places, one far-sighted Jew being the pioneer of commerce whose suc¬

cess attracted other Jewish traders, to render the market there a centre of commerce, until, finally, the growing wealth of the Jews rouses the jealousy of the Christian people and be¬

comes the cause of their oppression and ex¬

pulsion. As Sombart (supra), Kieselbach, (Der Gang des WelthandelsP and Roscher, (Die Juden im MittelalterP in his (Ansichten der Volkswirthschaftp II, have shown, the Jews opened new sources of wealth everywhere by creating the means and methods of communica¬

tion for the trade, for which neither the peasant or farmer nor the nobleman had the capability or the understanding. Only wise rulers, realizing the benefits conferred by the Jewish traders upon the country, encouraged these by special privileges to settle therein and develop its resources. This was done by Charlemagne and his successors in France and in Germany, by Alfred the Great and William the Conqueror and Cromwell in England, by King Roger of Sicily, Kasimir the Great in Poland and Sultan Bajazid in Turkey. Every¬

where the commercial genius of the Jewish people developed the prosperity of the cities.

(Consult also Lecky, ˆHistory of the Rise of the Spirit of Rationalism in Europe, > II, 272-

273). ((They were the teachers and tutors of the commercial activity of Europe, M says Roscher, 1. c., and no sooner did the cities feel that they could do without them than they dis¬

possessed them of all they had acquired, though half of the houses of Paris, London or Nurem¬

berg had been theirs, and either killed or ex¬

pelled them. But even when driven by a blood¬

thirsty mob or by hostile guilds and by state legislation out of his original domain, the world-

commerce, the Jew carried his small stock of merchandise into the villages to bring, as Kiesel¬

bach says, the elements of culture also into parts more remote from civilization, or he took up the despised work of the money lender, finally to rise to the influential position of banker and prince of finance. The whole system of modern exchange of money is, if not his invention, certainly to a large extent his work. To his financiering skill and inter-

national trade the banks of Amsterdam, . Ham¬

burg and finally of England owe their existence and their success.

Results of Their Activity.— What Jewish commerce achieved in all these lands became manifest in France after their expulsion in 1306, and in England after their expulsion in 1290, and still more so in Spain after 1492.

Jewish fugitives of Spain carried the trade into Turkey and Holland and into Italian cities like Leghorn and Ancona, just as Poland's commer¬

cial industry was entirely due to fugitive Jews of Germany. (Consult Sombart, supra; Graetz, (Gesch. d. Juden) index, and (Jewish Encyclo¬

pediaˆ s. v.). So did the New World profit by the persecutions of the Jew in the Old. Jewish Marranos built up the trade in tobacco, coffee

and sugar in South America, and with the help of the Jews of Amsterdam for some time brought the world's commerce into the hands of Holland until Cromwell succeeded in opening England for the Jews and thus paved the way for the British trade with the West Indies.

(Consult Beer, (Gesch. d. WelthandelsP II, 211, 366; Kohler, Max, Jewish Activity in American Colonial Commerce, } in Publications of the American Jewish Historical Society, > X, 47-63). The trade between America, Europe and the Levant was almost entirely in the hands of Spanish Jews or Marranos; families like the Gradis, Caceres, Mendez, Lopez and Henriques had their branches and their ships in almost every part of the world. (Consult Wolf, Lucien, (Menasseh ben IsraeP ; Gruenwald, (Portu-

giesengraeber auf deutscher ErdeA- Jews were instrumental in starting the East India Com¬

panies (Picciotto, (Sketches of Anglo- Jewish History, > 134). They were largely pioneers of commerce in North America. Jewish mer¬

chants (Marranos) enabled Columbus and other navigators to discover the new hemisphere and provided the new lands with grain, horses and other needs (Kayserling, (Christopher Colum-

bus) and the article The Jew in America in this section). They possessed large tobacco, sugar and coffee plantations in Cuba, . Brazil, Surinam, Curagoa, and kept up commercial con¬

nections through navigation, partly by means of their own ships, with North America, Amster¬

dam, Leghorn in Italy, and the Far East (Gru¬

enwald, 1. c.) and were extensively engaged in the West Indian trade, in trade with the Ameri¬

can Indians and in developing the country west of the Ohio.

When with the era of the Reformation the systematic oppression of the Jews somewhat re¬

laxed and they were again allowed to pursue more honorable and profitable occupations, _we find them for a century or two, up to the time of the better regulated traffic by steam rail¬

roads, the chief visitors of the annual or semi¬

annual fairs held at Leipzig, Frankfort on the Oder, Prague, Wilna, Novgorod and other great market places, whither they bring their clothes, silk and velvet, fur, leather and other goods, for sale. On these occasions Jewish merchants from the remote parts of the continent met, exchanging the products of the various lands and providing their specific districts with goods for home consumption. In some provinces of Europe, lews became the principal dealers in cattle and the chief attendants of the cattle markets; elsewhere, as in Russia, they deal chiefly in grain and lumber.

The new modes of industry finally trans¬

formed the former peddlers in old clothes and the like into manufacturers of woolen, silk and leather goods. The first silk and velvet fac¬

tories in Prussia and the woolen factories in 120

 Austria were introduced there by Jews. Hence¬

forth Jews monopolize this trade again in a large part of the world. Compare for the whole also the article “Commerce® in the Jewish Encyclopedia, } and article “Juifs® in (La Grande Encyclopaedic \

Owing to his constant expulsion from the land inhabited and cultivated by him, whether in Palestine or in Babylonia, in Africa or in southern Europe, the commercial instinct was developed in the Jew, thus making him excel his competitors. As a skilful and far-sighted merchant he not only acquired the wealth and power needed to maintain himself amidst the perils surrounding him wherever he was treated and regarded as an alien, but he proved the most valuable promoter of civilization in the lands in which he lived, the foremost liberalizing element in the shaping and broadening of human culture.

Kaufmann Kohler,

President of Hebrew Union College, Cincinnati, Ohio.

19. FOOD AND HEALTH LAWS.

Food Laws. — The food laws of the Jewish people form a very complex system, with numerous and diversified enactments. These re¬

fer to the. determination of the species of animals, birds, fish and insects that may be eaten; the method of slaughter; the inspection of the animal for disease and lesion; the pro¬

hibition of the blood, fat and certain parts of the animal; the treatment of meat prior to cooking; the prohibition of certain food mix¬

tures ; certain vegetable food laws, such as the prohibition of leaven during Passover, first fruit crops — Orlah, and the new corn — Hadas'h; and various anti-heathen food laws, affecting the use of wine, etc. It is certainly very suggestive of the importance of food legislation that the first direct command of God to Adam should be a food law (Gen. ii, 17), and that the punishment for its trangression should be the advent of death. The exposition of the dietary laws has given rise to a vast literature to which every century and almost every school of thought has made its contribu¬

tion, but the general result is chaos. This is due mainly to three causes: (1) The essentially monistic nature ot the Jewish thought has been quite overlooked. Conceptions that appear al¬

most antithetic for the modern mind were ap¬

prehended as an undifferentiated whole by the ancient Hebrew. His language had no word that would be equivalent to "nature® ; the physical and the psychical, the legal and the ethical, the spiritual and the vital, were all uni¬

fied manifestations of the Theocratic Will. So that when the Bible declares with all emphasis that the end of the law is "life® — "that ye shall live by them®— "your life and the prolongation of your days,® it is just as uncritical to exclude physical life from this end as it would be to exclude from it the life of the spirit and the life everlasting. (2) The second cause of the overwhelming confusion prevalent in this litera¬

ture is the unscientific exaltation of every ob¬

served effect of the laws into a motive for their promulgation and observance . (3) The avowedly different character of many of these laws in origin and purpose has been largely disregarded. The exposition of the dietary system would have been much simplified and in¬

numerable controversies avoided if it had been clearly understood that the statement of effects does not involve their predication as motives;

that motives apparently diverse could yet re¬

main unified and undifferentiated for the Jewish mind, and that there is no one explanation that will cover all the laws :

1. Clean and Unclean Species. — Among the quadrupeds only the ruminants -that are pro¬

vided with fully cloven hoofs are declared to be fit for food ; and of these only the kine, sheep and goats are fit for sacrifice (Lev. xi, Deut.

xiv). The rabbis refer to another distinguish¬

ing mark possessed by all clean animals, namely, the absence of incisors from the upper jaw (Talmud Bab., Hullin 59A). Among the fish, only those that have fins and scales are clean ; thus all the siluridae, eels and shell-fish are pro¬

hibited. As all that have scales have also fins, the presence of scales is the decisive mark (Talmud Bab., Niddah 51A). No marks are given in the Bible to determine the clean fowl, but a long list is recorded of species that are unclean. These are birds of prey, scavenger birds and marsh fowl. The bat is also included in the list. All the species not named are declared fit for food. The rabbis have formulated certain marks distinguishing the clean fowl — but finally only those birds that are traditionally known to be clean are permitted to be used for food (Talmud Bab., Hullin 63B). All insects are declared unclean, with exception of four species of locusts. All creeping things are unclean (Shulhan Aruch, Yore Deah §§ 79-85).

The earliest explanation of this distinction between clean and unclean is afforded in the allegorical interpretations of the Apocrypha (IV Maccab. 5, Letter of Aristeas, etc.), the works of Philo and the Fathers of the Church (Augustine, Irenaeus, ‘Cyril, Tertullian, Novatian “On the Jewish Meats®). The unclean animals are all regarded as typifying vices, — the hare libidinousness, the swine impurity, the fox craft, etc. The doyen hoof, the first sign of purity, typifies the distinction between good and evil ; the chewing of the cud symbolizes the constant repetition of the law. This method of inter¬

pretation, while certainly leading to curious results, has some justification in the Bible pres¬

entation of the Serpent as the agent of tempta¬

tion (Gen. iii, 1) and also in the figures em¬

ployed by Ezekiel (chap, xxiii, 20). Another explanation bases itself upon the natural and instinctive antipathy and loathing that destruc¬

tive and death-dealing animals arouse. It is only natural that beasts of prey, serpentine and snake-like fish, slimy crustaceans, birds of prey, marsh fowl and scavenger birds, insects feed¬

ing on corruption and ordure, should be held unclean and polluting by a people striving to keep itself pure and holy (Lev. xi, 43). The consequences of this striving after holiness affect the whole of Jewish thought and life, and are of primal importance for the comprehension of the dietary system (Schechter, Jewish Quart.

Rev. Vol. X, Art. “Holiness®). That death¬

dealing creatures were regarded as abhorrent and imperfect is proved definitely by the prophecy of Isaiah, who sees as one of the conditions of the Messianic period “that the wolf shall dwell with the lamb — and the lion shall eat straw like the ox — they shall not hurt or destroy in all my holy mountains,® etc.

(Is. xi, 6-9, lxv, 25). There must further be noted the special shrinking evidenced in many , ways from the hybrid and border species as de¬

partures from the true order of nature, which was that (

Others have seen in the distinction made between the clean and the unclean the means to separate Israel from the rest of the sur¬

rounding nations. (

rupt and degenerate Canaanites, and so th.e swine was pronounced impure.® (Ewald). The argument is entirely without warrant, as the kine, sheep and goats were all eaten by the neighboring nations, and yet are regarded as clean for Israel.

Many have striven to connect the food laws of Israel with those of Manu. It is true that the food laws of Manu, with regard to the clean and unclean, have a great many elements in common with the Jewish Code, but the dif¬

ferences are too great to permit of any direct connection. Both give expression to the natural repugnance for certain classes of animals, but the details do not agree. In Manu’s laws the hare, rhinoceros,

porcupine, hedgehog, are all permitted, but they are unclean in the Jewish Code. The prohibitions relating to the birds, too, are not the same. Manu prohibits birds dwelling in cities and those that strike with the beak. There are also differences with regard to the fish. Manu prohibits all but a few species, and declares the crocodile, turtle and tortoise clean, but these are unclean in the Jewish Code. The Jewish law stands even further removed from the Zend-Avesta, as it knows nothing of the dualism of the latter (Gen. i, 31; Is. xlv, 7; Ps. cxlviii, 10). The most recent interpretation is the one advanced by W. Robertson Smith and accepted by Stade and Cheyne. He regards the prohibitions as identical with the taboo that Totemism places upon the use for food of the sacred ancestral animals. But it is the essence of Totemism that while sacred animals are not to be eaten generally, they are to be eaten eucharistically, as a religious rite and further, these animals being regarded as ancestral, their names are reproduced in the names of tribes and indi¬

viduals. With regard to the first point, there is absolutely no proof that the unclean creatures were ever eaten eucharistically in Israel. The two verses usually cited (Is. lxv, 4 and lxvi, 17), which condemn the consumption of swine are 'altogether too doubtful in meaning and too decidedly the subject of dispute (Duhm, Marti) to be in any way important. Still less fortunate is the attempt to prove the existence of Totemism from the occurrence of such names as Achbor and Chesir ; for there is a larger number of clean animals whose names occur as names of individuals — Zimri (?) Hagab, Eglah, Epher, Rachel, Jonah, etc. (Jacobs, (Stud, in Bib. Arch.O- If any further proof were needed that the bestowal of names has no connection with Totemism and is the result of accident or the suggestion of environment, it would be afforded by the large number of plants, excluded from consideration of clean and unclean, that furnish the names of indi¬

viduals. Thus Susanna (Lily), Hadassah

(Myrtle), Tamar (Palm), Carmi (Vineyard), Elah (Terebinth), Elon (Oak), Keziah (Cas¬

sia), Zetham (Olive). Totemism, moreover, would utterly fail to account for the extensive¬

ness of the list of the unclean, and for the evi¬

dent principles of selection guiding the com¬

pilation of the list. But the presence of Totem¬

ism altogether, characteristic as it is of the lowest stages of savage life, would be a startling anachronism in the highly complex and ethical civilization of the Hebrews (Noldeke, (Zeitsch.

d. Deutsch. Morg. Gesell.p 1886) . The consider¬

ation of the dietary laws as hygienic enactments will come under the section in this article Health Laws.

Blood. — The prohibition of. blood is avow¬

edly different from the prohibition of the un¬

clean creatures. Blood was too precious to. be used by man. It was identified with the vital sentient principle. It was therefore to be con¬

secrated to God. It is declared to be the medium of atonement representing. the very life of the animal sacrificed (Lev. xvii, 11). The injunction concerning the blood is coeval with the verv permission to use flesh as food (Gen.

ix, 4). It is enunciated as a duty for all human¬

ity, and the stranger was bound to respect the prohibition equally with the Israelite.

In the case of non-sacrificial animals or birds, the blood had to be poured on the ground and covered with earth (Lev. xvii, 10-15). The prohibition only applied to blood of mammals and birds, not to the blood of fish or locusts.

It referred only to the free blood, in the blood¬

vessels, and not to that absorbed in the tissues.

The blood .prohibition was one of the chief factors for the law of Shehitah or ritual slaugh¬

ter. So great is the abhorrence of the Jews toward blood that bread is rendered, un¬

fit for use if in the process of eating it be¬

come tinged by a speck of blood from the teeth (T. B. Kethuboth 60A). The monstrous absurditv of the <(Blood Accusation® has been adequately treated by Strack ((Das Blut in GlaubenP etc., Munich 1900) and Chwolson GBlutanklageˆ 1901). Early Christianity ac¬

cepted the blood prohibition (Tertullian, Apo-

log.), and it remained in force for various Christian sects till comparatively recent times (Grotius on Acts xv, 20). For Moslems, the prohibition is still in force (Koran, Sura II, V, VI). For the hygienic consideration of the blood prohibition, see under section Health Laws in this article.

Fat. — The fat, like the blood, was reserved for the altar. Its prohibition was therefore limited to the fat of sacrificial animals — kine, sheep and goats — and did not refer to that of other clean animals or birds. It was further limited to the fat similar in character to. the intestinal fat, lying in layers separate from the flesh, and did not refer to that which was grown with the flesh (Lev. iii, 16, 17 ; Shul. Aruch, Yore Deiih § 64). The traditions of Karaitic Jews differ from those of Rab¬

binical Jews with regard to the extent of the fat prohibition (Adereth Eliahu, Chap. 19).

The curious suggestion of Michaelis that the prohibition was “due to the desire to further the 122

JEWS AND JUDAISM — FOOD AND HEALTH LAWS (19) oil culture of the country has no foundation.

For hygienic aspect, see section Health Laws.

aSinew which Shrank .” — <(Therefore shall the children of Israel not eat of the sinew which shrank which is upon the hollow of the thigh” (Gen. xxxii, 32; cf. Septuagint). The prohibition of the nervus ischiadicus (?) com¬

memorates the great triumph of Jacob, when, through his victory over the Angel of the night, he received the name Israel, and despite his own injury compelled ‘his conquered op¬

ponent to bless him. It is the special moment of great achievement to Jacob (Hosea xii, 4, 5) and of supreme destiny to his children (Gen.

xxxv, 10, 11). Owing to the disputed nature and locality of the prohibited sinew, the pro¬

hibition has been extended to both the nervi ischiadici, the adjacent veins, tubular sinews and fatty fibres. The removal of all these, however, demands a special knowledge and ex¬

pertness infrequent in many Jewish communi¬

ties ; so that the sirloin, etc., is not generally available for food except in the Orient and eastern Europe (S'hul. Aruch, Yore Deah §65).

Slaughtering. — All animals that die other¬

wise than by Shehitah, ritual slaughter, are termed Nebhelah (that which dieth by itself), and all that are torn by beasts or are afflicted by any fatal disease or lesion are called Trefah (the Torn). In both cases their use for food is prohibited. The ritual slaughter, Shehitah, is one of the most important functions in the Jew¬

ish ceremonial and is always in the hands of trained experts (Deut. xii, 21). The knife used is specially sharpened and repeatedly tested by experts to ensure a perfectly sharp and smooth edge. Its blade, being usually 14 inches in length and two inches in- width, is specially adapted for rapid manipulation. It must then be drawn with a steady stroke across the throat, severing the trachsea and esophagus and divid¬

ing the pneumogastric nerve controlling cardiac action, and the carotid artery and jugular vein.

Reserving hygienic considerations for (

ducted by Dr. Dembo in Saint Petersburg under the auspices of a scientific commission: (1) Comparative Painlessness of Death. — (a) The severing of the great blood-vessels, producing instantaneous anaemia of the brain, results in absolute unconsciousness — the gray matter of the brain ceasing its function at once and com¬

plete loss of consciousness following in three to five seconds, (b) The cut is exceedingly rapid, seldom consuming more than one second in time, as the knife is sharpened and smoothed with extraordinary precaution ; consequently the pain of death is minimized. (2) Economi¬

cal Considerations. — (a) Through the much earlier appearance of rigor mortis, the meat is sooner available for food, (b) Through the much later appearance of decomposition, the meat remains longer available even in summer (Shul. Aruch, Yore Deah §§ 1-27).

Inspection. — While the proper performance of Shehitah excludes the animal from the cate¬

gory of Nebhelah, it must be further examined to ascertain beyond all question that it is not Trefah (suffering from any mortal disease or lesion). This examination, Bedikah, is purely hygienic and is treated under section Health Laws. But just as the Shehitah (ritual slaugh¬

ter), with all its far-reaching ethical, economi¬

cal and hygienic consequences, originated in all probability with the necessities of the altar serv¬

ice — to pour out the blood for sacrifice — so the Bedikah (examination for disease) with all that it involves had its prototype in the temple service in the priestly examination of the sacrifice for disqualifying blemishes (Lev. xxii, 20-25; Malachi 1, 8).

Extraction of Blood-Vessels, etc. — The pro¬

hibition of the blood, the fat and the nervi ischiadichi necessitates the careful extraction (nikkur) of certain blood-vessels, mem¬

branes, fat layers and tissues, sinews and fat-

fibres from various parts of the body (Shul.

Aruch, Yore Deah § 65.) English-speaking Jews call this process of extraction (

a word derived from the Judseo-German <(por-

schen." The process is very elaborate ((Jewish Encyclopedia, > article Porging in the case of animals. It is, however, very simple in the case of fowl, where the prohibition neither of fat nor of the nervi ischiadichi obtains.

Salting, etc. — There still remains one further process Melihah (salting), before the meat is fit for food, and that is the soaking and salting thereof to remove the surface blood. Salt also came on the altar with sacrifices (Lev. ii, 13; Ezek. xliii, 24). The hygienic importance of Melihah is referred to under section Health Laws.

Products of the Prohibited. — Not only are the unclean and the diseased animals prohibited but all their products. Thus the milk and cheese of both unclean and diseased (Trefah) animals are prohibited. Milk and cheese should not therefore be purchased in the general market without superintendence. Human milk is prohibited for the adult and even for the child who has once been properly weaned. So

the eggs of unclean birds and all eggs on whose yolk a drop of blood is found are prohibited.

In like manner the roe of an unclean fish can¬

not be eaten. Honey, however, is permitted, as it is not regarded as a product of the bee, but simply as the nectar gathered by the insect (Shul. Aruch, Yore Deah § 81). In the case of any mixture of the forbidden and the per¬

mitted, — if the taste of the forbidden object be discernible, then all is forbidden. So cheese which has been curdled with a prohibited rennet is entirely prohibited, and some superin¬

tendence ought to -be exercised over the manu¬

facture of cheese.

Meat and Milk. — The threefold repetition of the command ((Thou shalt not seethe the young in its mother's milk" (Deut. xiv, 21) is traditionally interpreted as referring to the threefold prohibition of cooking meat and milk together, of eating this mixture or of deriving any benefit from it. The interpretations of the command have been many and varied, but two predominate, and have certain justification.

Philo construes it as an ethical law similar to (Deut. xxii, 6, and Lev. xxii, 28), denouncing cruelty to animals and intended for the moral discipline of the people. The milk that was set apart by nature for the nourishment of the young should not be used as the medium in which the young is seethed. Maimonides ex¬

plains the prohibition as directed against an old heathen custom or magical rite of propitiat-

ing the nature gods by sprinkling the fields with this meat and milk broth. This ex-

' planation of the prohibition has also been ad¬

vanced by Spencer and Cudworth and has re¬

ceived some support from modern authorities.

Meat and milk are never partaken of together at the same meal, sufficient interval being al¬

lowed, if the meat has been eaten first, for it to be digested before partaking of milk. The pro¬

hibition refers with equal force to any prepara¬

tions in which meat or milk enters (Shul.

Aruch, Yore Deah §§ 87-97).

Vegetable Dietary Laws. — Not all the food laws concern themselves with meat. There is the injunction concerning Orlah which forbids the use for food of the fruit of a tree in the first three years of its growth (Lev. xix, 23-

25). The yield of the fourth vear, or its money equivalent, was brought to Jerusalem and used for special rejoicing and feasting. The prohibition of the fruit crop of the first three years continues binding to the present day.

Another law of somewhat similar character is that of Hadash which prohibits the eating of the new corn until the time of the offering of the Omer (Lev. xxiii, 9-14). The sowing of mixed seeds in a vineyard is prohibited (Deut.

xxii, 9). Should, however, the prohibition be transgressed, then the produce cannot be used for food. But the most important vegetable dietary laws are those of Hametz and Matzah commemorating the Exodus from Egypt. Dur¬

ing the eight davs of the Passover festival no leaven (Hametz) can be eaten and none may be permitted to remain in the house (Ex. xiii, 7).

There is furthermore the positive law that un¬

leavened bread (Matzah) shall be eaten.

Heathen Food Lazos. — Another group of dietary laws are either prohibitive of the ob¬

jects of idolatrous worship or of intercourse between Jews and idol-worshipers. The most important of these refer to the use of. wine.

Wine that has been consecrated to an idol is absolutely prohibited. But even the ordinary wine of the heathen is prohibited, partly be¬

cause of the suspicion that he may have conse¬

crated it to his idol but also to create a social barrier that would make the possibility of inter¬

marriage more remote (Ab. Zarah 36B). Fur¬

thermore wine that has been touched by an idolator, though belonging to a Jew, will be under suspicion of having been idolatrously consecrated and its use prohibited. The gen¬

eral stringency of the regulations is, however, influenced by the specific conditions of social environment.

Health Laws. — There has been consider¬

able dispute as to the existence of a class of professional medical men distinct from the priestly class in Biblical times. The occurrence of the expression «thy healer" (Ex. xv, 26) has been advanced as an argument for the affirmative, but the whole verse may be inter¬

preted as referring to a union of the sacerdotal and the medical offices. Certainly the context in Ex. xxi, 18-20 seems to imply that the doctor was paid; and there is mentioned in Isaiah the Hobhesh or woundbinder. Asa, king of Judah, is reproached for having sought help from the physicians and not from God. The Prophets were frequently appealed to for aid in sickness and one interesting cure i? recorded as having been made by Isaiah.

King Hezekiah had fallen sick of a disease which Lauder Brunton identifies with the in¬

flammation of the tonsils. The prophet cures him with a plaster of figs, — a remedy not un¬

known to modern treatment. Later, we find physicians highly honored (Ecclesiasticus xxxviii, 1-8), and numerous evidences of con¬

siderable skill on their part. A long array of famous physicians is recorded in the Talmud and many difficult operations are credited to them (Kotelmann, Virchow's

84). A prolonged controversy has raged round the interpretation of a passage in the Talmud (T. B. Niddah 40A) which according, to one reading refers to the successful performance of <(Csesarian Section," Hysterotomy, mother and child both being saved. Of special importance is the physiology and pathology of the Talmud tractate Hullin. Certainly the health laws of the Bible give eloquent testimony

to the ad¬

vanced condition of social hygiene. Certain biotic advantages have been claimed for the Jew. Greater longevity, greater fecundity, greater exemption from tuberculosis and syph¬

ilis, special capacity for acclimatization, are among these. But the advantages do not ap¬

pear to be racial and seem to be entirely de¬

pendent upon the degree of the observance of the special laws, and to be forfeited with the non-observance of these (Adler, Nossig).

Work and Rest. — The first health laws are given in the Decalogue with the institution of the six days of labor and the seventh day of rest. The hygiene of labor is clearly recognized in Jewish law. Even the scholar is enjoined to acquire a handicraft (Pirke Aboth ii, 2). The necessity of physical training is insisted upon with emphasis, and it is accounted a paramount duty for the father to teach his child a craft and to train him to swim. Even the women of the wealthiest class are enjoined to work because of the destructive effect of idleness upon moral strength and mental sanity (T. B.

Kethuboth 59B ; cf. Proverbs xxxi), but over pressure has been guarded against by the com¬

plementary regulation of a full day. of periodical rest. Since the nature of the toxins produced by fatigue and the extremely gradual rate of their elimination from the system have been more clearly recognized the Sabbath rest, has become a scientifically demonstrable hygienic necessity, which no shortening of the day's labor can possibly supply.

Food. — Nearly all the food laws have their hygienic aspect. The prohibition of the carniv¬

ore with their exclusively nitrogenous diet;. of the swine with its tendency to trichinic in¬

fection, and the readiness of its meat,, as most freely productive of gelatine, to. provide a fa¬

vorable nidus for morbific bacilli (Dr. E. Bal¬

lard), has been welcomed as a health law of importance. Dr. Borell of Goppingen (Vir¬

chow's (ArchivP 65) describes the presence of worms similar to trichina in the blood of the raven, and Virchow adds, that this is a variety of Filaria similar to the Filaria sanguinis hominis which is known to be the cause of chyluria and chylous hematuria and supposed to 'be the cause of Elephantiasis. Similar dis¬

coveries have been made by Herbst in the blood of the crow, the daw, the hawk and thˆ jay.

The rejection of eels, mursena, oysters, mus¬

sels and crabs from the list of foods has been regarded as hygienic since these feed largely on 124

 sewage, and have been the causes of numerous epidemics, especially of typhoidal character.

The ordinary mussel, mythis edulis, has had its poison examined and analyzed by several spe¬

cialists (Virchow's

ated surface waters has also its hygienic aspect.

Recent investigation as to the propagation of disease through insects and animals, — malaria and yellow fever by the mosquito, typhoid by the fly, pneumonia by mice, hydatid cysts by the dog, etc., seems to afford continually grow¬

ing evidence to the hygienic value of the food-

laws and of the elaborate regulations concern¬

ing the defilement of person, clothes, food¬

stuffs and utensils by contact with the various species (Lev. xi, 32 et seq.).

The rejection of blood has also its hygienic effect. It is in the blood that toxins produced by disease germs and occasionally the germs themselves circulate, and this makes it a vehi¬

cle for communication of disease ; and further by its own rapid decomposition, it becomes also an original source of disease. The intestinal fat has also been considered by many hygienic-

ally objectionable, as (harboring parasites in the lymphatic ganglia (Ebstein). In the method of slaughter (Shehitah) a valuable group of health laws is encountered. (1) The two main characteristics of the Shehitah are the quick bleeding and the accompanying epilep-

toidal convulsions. These produce, after cer¬

tain chemical reactions, the -acid phosphate of potash, KH_2PO_4, which is antiputrefactive. It hinders the development of micro-organisms, delays the formation of the products of decom¬

position of ptomaines and toxins, and imparts an additional savor to the meat. (2) Through the epileptoidal convulsions the blood left in the meat is less alkaline and therefore less fa¬

vorable to the development of bacteria (Dembo). The Bedikah (Examination) is

avowedly a pure health law. Its function is to determine whether or not the animal was suffering from any fatal disease or lesion, as this would make it Trefah, <(Torn,® and unfit for food. For this purpose the chief organs have to be examined, especially the lungs. It must be clearly determined whether or not there are any adhesions either of one lobe of the lungs to the other, or the whole or part of the lungs to the diaphragm or chest wall. The lungs are tested for perforations by inflation during immersion in water. The surface of the lungs is examined for tubercules of any kind (Dr. Behrend in Nineteenth Century, 1889).

Inspection of other organs occurs only when symptoms are observed indicating the presence — or when there is general prevalence — of some affection. Nor are the lungs of a fowl examined unless there is special ground for suspicion. Koch (Inter. Med. Cong. 1890) has, however, shown that tuberculosis of fowl is a species distinct from human or bovine tubercu¬

losis and is innocuous to man.

Melihah, or <(salting the meat" prior to use, has for its purpose the removal of the stagnant, impure, diseased, germ-laden, surface blood.

When the conditions, under which meat has often to be kept before use. be remembered, the health value of the Melihah law will be clearly apparent (Hyamson, Jewish Quarterly Review, Vol. IX). The avoidance of the mixed meat and milk diet has also been hygienically com¬

mended. It is claimed that the simultaneous ingestion of soluble and fibrinous albumen is not well borne by the gastric apparatus (Aron-

stam). Of importance are the special laws aim¬

ing at the purity of water and milk. In coun¬

tries where poisonous reptiles abound, water and milk must not be left uncovered. Articles of food should not be kept in any unclean place, as under the bed, nor be served from any impure vessel. Timely and simple diet is recommended. There are 83 diseases that are prevented by an early breakfast of bread and salt and a pitcher of water. For health rea¬

sons, it was enjoined that meat and fish should not be eaten simultaneously.

Body. — In its insistence on the purity of the body Jewish law presents a unique phenomenon.

As Leroy Beaulieu declares, ((for 25 centuries the Jew has striven to be clean, and alone has observed the laws of moral and physical purity.®

Yet here as elsewhere there should be no con¬

fusion between effects and motives. Though the motives were to a considerable degree avowedly hygienic, yet predominantly they were religious. Ablutions were demanded from the Jew, for prayer could not be pronounced amid physical uncleanliness ; his body had to be scrupulously clean for the Phylacteries could not otherwise be worn. At the very moment of rising, ablution of the hands and face was enjoined — without this he could not offer his morning prayer (Psalm xxvi, 6). Before and after every meal the hands had to be washed and a special benediction for the injunction of cleanliness pronounced. After every unclean bodily function, after touching any unclean object, after visiting a cemetery, ablutions had to be performed. Although water is truly precious in the East, yet there never was stint of it for the purposes of cleanliness. Rabbi Akiba in prison preferred to leave his thirst unassuaged, and used his dole of water for ablutions. It was prohibited to live in a town that had not a bath, and the use of water was regarded as the infallible panacea. <(Better a little cold water in the morning and a warm hand and foot bath in the evening than all the salves in the world® (Shab. 109A) : ((Man endangers the eye, nose, mouth and ear if he touch them with unwashed hands.® The value of the warm baths of Emmaus near Tiberias, of Gadara in

Persea and Callirrhoe near the Dead Sea, was thoroughly appreciated. Nor were aesthetic considerations overlooked in the case of the body. Physical beauty was highly valued (T. B. Berachoth 20A). The long list of blemishes and disfigurements, over 150 in number, that were disqualifying for the priest¬

hood points to the existence of a high standard for physical conformation (Sifra, Emor III).

Clothes. — The view entertained as to the cleanliness of clothes is tersely stated in the apothegm, <(the -sage upon whose garments a grease spot is found is worthy of death.® The uncleanliness of his garment was an insult to the holy law whose dignity it was his duty to protect. Whenever the man has been in con¬

tact with any impurity, whether it be one of the leproidal diseases or the impurity of the corpse, or any sexual impurity, it is not only his body, but also his clothes that have to be

washed. It is perhaps unduly imaginative to see in the law which prohibits the wool being mixed ‘ with flax in the manufacture of garments, an anticipation of Jaeger (M. N. Adler). But Ebstein insists nevertheless that such a garment would be hygienically harmful as the wool would tend to warm and the cotton or flax to cool the body and there would be unequal pro¬

tection for the body surface (Deut. xxii, 11).

There is a reference in Leviticus to a peculiar species of reddish or greenish discolorations occurring in garments and destroying the ma¬

terial. It is termed leproid and may be some form of fungoid growth. Where garments are worn for long periods such growths may occur.

Directions are given for inspection and seclu¬

sion, lustration or destruction (Lev. xiii, 47).

Sanitary Arrangements. — The Bible already makes provision for the protection of the camp from the usual plagues of typhoid, diarrhoea and dysentery attendant on camp life. The consignment of all putrid matter to the earth — in a place without the camp — ensured disin¬

fection and the protection of the water and the air (Deut. xxiii, 9-14). These admirable hy¬

gienic provisions are the direct consequences of the Holiness motive with its psychophysical implications : <(that thy camp shall be holy.®

In the subsequent city life similar precautions were taken. It was prohibited to rear poultry or keep wild animals or permit dung-heaps to gather in Jerusalem (T. B. Baba Kama, 82B).

No tannery could be erected within 50 cubits of the city limits, and then only to the east of the city so that the prevalent west wind would carry away the effluvia. Kimhi maintains in his comment to Psalm xxvii, that a fire burned con-

tinualfy without the city for the destruction of all cadavers and offal and refuse. Many scholars, though not all, accept this statement.

Certain writers have referred to the extremely valuable sanitary results of the minutely scru¬

pulous removal of all leaven from the homes before the advent of Passover (M. N. Adler).

As this involves the thorough overhauling of the whole house from garret to cellar, the purification and cleansing of all utensils and kitchen accessories, and the destruction of the accumulation of scraps, etc.— the hygienic ef¬

fects, however undesigned, must be acknowl¬

edged (Ex. xii, 19; Deut. xvi, 4).

Temperance. — Both in food and drink tem¬

perance was enjoined. Gluttony and drunken¬

ness is the special crime of the rebellious son whose punishment is death. Wine was so important an article of food, that special influence was necessary to prevent its abuse.

The stories of Noah and Lot conveyed their own moral. The priests were held unfit for office if they indulged in strong drink. The order of the Nazarites, and the clan of the Rechabites, upheld an ideal of abstinence. But yet the value of wine as a medicine was recog¬

nized (Prov. xxxi, 6). Nor was the ascetic attitude entirely approved of. The Nazarite brought his sacrifice when the term of his vow was

over for having denied himself that which God permitted. (

Dwelling. — The Bible records the special protection to be afforded to the fiat roofs of the houses. They were to be surrounded by a battlement so there should be no blood upon them (Deut. xxii, 8). The height of the bat¬

tlement is fixed at a minimum of 3.06 feet. It must be strongly built and able to stand any ordinary strain. There are further injunctions prohibiting the presence of any open well or pit, or the presence of unsafe ladders about the house. There is a remarkable series of hygienic laws referring to a diseased condition of the house (Lev. xiv). The reference is probably to houses attacked by dry rot — merulius lacry-

mans, a fungoid growth inimical to the health of the inhabitants. There are clearly formu¬

lated in the regulations — (1) duty of dec¬

laration; (2) duty of examination and diag¬

nosis; (3) complete removal of the affected parts without the camp; (4) scraping of the in¬

terior of the house and removal of the dust and debris without the camp to the unclean place; (5) on return of the affection, the house is to be completely destroyed; (6) all the persons who have been in the house, eaten or slept therein, must be purified through the washing of clothes and person (Baginsky).

Disease. — Proceeding upon the principle that the whole law was given for life and not for death (Lev. xviii, 5, T. B. Ab. Zarah 27B), the interest of the patient is declared superior to any of the ordinary religious obligations; —even the sanctity of the Sabbath and the Day of Atonement giving way to the necessities of medical treatment. The duty of visiting the sick is a part of the great Imitatio Dei (T. B.

Sota 14A) and the neglect of this duty is de¬

clared by Rabbi Akiba to be a criminal indif¬

ference to human life (T. B. Nedarim 39B).

But the visiting must be helpful in act and rev¬

erent in spirit since the Divine Shechinah stands ever watching at the head of the bed of suffering. This visiting should, however, be entirely omitted if the nature of the disease or the attendant circumstances make it a source of embarrassment to the patient. In certain cases of disease or contact with disease meas¬

ures for purification and disinfection have been enacted. Wherever there has been con¬

tact with the dead, or pseudo-leprous symp¬

toms of disease, or sexual secretions and dis¬

charges — an elaborate process of washing and bathing for person and garments prevails.

Burial. — Interment must take place as speedily as possible (Deut. xxi, 22). It is the last and most unselfish act of kindness one can perform to one's fellow. God himself showed the example by burying Moses. All can claim interment, even the criminal executed on the gallows (Deut. xxi, 23). Cemeteries were ex¬

tramural and were prohibited within a circuit of 60 cubits from the city limits. The dead were placed in caves and vaults and were visited by their relatives for three days after, to avoid all possibility of their being buried alive. After some time the remains were then interred in the grave proper. The rapid de¬

composition of the body to its constituent ele¬

ments is regarded as desirable. While crema¬

tion is opposed to Jewish practice (Gen. iii, 10; Eccles. xii, 7), yet quicklime is frequently placed in the grave in some countries. The prevalent custom among observant Jews in 126

 eastern Europe and the Orient is to have the coffin of the simplest construction, — a few boards nailed together, — with the bottom per¬

forated, — so as to interpose no obstacle to rapid decomposition. The selection of the soil for cemetery purposes is of hygienic value. —as the ground must not be in contact with any water sources, and thus the danger of contami¬

nation of the water supply is minimized. An interesting account is

given in the Bible of the composition of the ((Water of Lustration® used for all who had been in contact with the dead.

Undoubtedly the ingredients possess high disin¬

fecting qualities. Into its composition entered cedar wood (coniferae), rich in phenol and cresol and cedrene camphor; hyssop with its camphoraceous oil of penetrating aroma and other oils, rich in oxygen ; the cremated carcase of the heifer, rich in potash and soda (Num.

xix) .

Sexual Relations. — There is a vast legisla¬

tion controlling all the circumstances of sexual relation. The penalty of death is imposed for all acts of sodomy or . unnatural intercourse, for connection within specially prohibited de¬

grees and for adultery with a married woman (Lev. xx, 10-16). Excision is the penalty imposed for all other illicit connections. Pros¬

titution is absolutely prohibited (Deut. xxiii, 18) and chastity is demanded from both sexes.

Two of the commandments of the Decalogue are devoted to the maintenance of the purity of married life (Ex. xx, 14, 17), and the elaborate table of prohibited degrees protects it hygienically (Lev. xviii, 7-18). Thus the marriage institution is enabled to perform its proper function, the fulfilment of the law : ((Be ye fruitful and multiply® (Gen. i, 28).

Anticonceptional acts invited the Divine doom (Gen. xxxviii, 9), and the duty of begetting children is declared the supreme privilege and blessing (Psalm cxxvii, 3-5; Psalm cxxviii, 3-4). In opposition to the powerful current of opinion, favoring childlessness, that found sup¬

port among Epicureans and Stoics in the inter¬

ests of greater independence and possibilities of self-indulgence or self-development, and in Essenaic and Christian monachism in the inter¬

ests of chastity and personal holiness, the rabbis compare a man voluntarily childless to a ((shedder of blood® and ((an opponent of God®

and adjudge him unworthy of life (T. B.

Yebamoth, 63B et seq.). Yet marriage is ac¬

knowledged to be also an end in itself (Gen. ii, 18), and an eloquent panegyric is pronounced over it. <(He who is without wife, dwells with¬

out joy; without blessing; without good; with¬

out religion ; without citadel ; without peace.

The wife is to be loved as one's self ; to be honored more than one's self® (T. B. Yeb., 62B). The age recommended for marrying is about 18 years for the male and extreme dis¬

parity of age is discountenanced. The influence of modesty in love is declared of paramount im¬

portance for the character of the children (T.

B. Nicldah, 71 A), and temperance is absolutely enforced by the rigid prohibition of sexual relations for a certain period succeeding the menses and parturition (Lev. xii, 2-5; xx, 18).

Behrend maintains that the enforced temperance ensures procreation at a specially favorable period. The fecundation that occurs after the lapse of seven days following the cessation of the menses is much less likely to result in abor¬

tions. Circumcision was regarded by Philo and Maimonides as assisting in the promotion of temperance by weakening the erotic element (cf. Bereshith Rabbah, § 80) while increasing functional power. Motherhood was honored even in animals (Lev. xxii, 28; Deut. xxii, 6).

The time preceding and following parturition is the occasion for the exercise of extreme care both dietetically and mentally (Jud. xiii, 7 ; T. B. Yoma, 8; T. B. Kethuboth, 60B). The nourishment of the child is the duty of the mother (1 Sam. i, 23), the mother's milk being regarded as the best food. With regard to sexual impurities the laws are very minute and detailed and refer to the impurity through coition, the menses, parturition, secretions and discharges of various kinds. Segregation, bath¬

ing and washing of the clothes, etc., are the means by which purity is

restored. The laws in Leviticus (chaps, xii-xv) are elaborated in the Shulhan Aruch, Yore Dealt, §§ 183-200. The fullest protection is given to woman and the utmost hygienic precautions are taken (Baginsky).

Leproid Impurity. — Much controversy pre¬

vails concerning the leproid affections referred to in Leviticus (chap, xiii et seq.). One group of interpreters identif}' the disease here referred to with true leprosy, Lepra Arabum or Elephan¬

tiasis Grce corum (Haser, Michaelis, Neumann, Fox). A second group regard the Zaraath of Leviticus as a generic term covering a large variety of skin diseases ranging from true leprosy to the comparatively mild psori¬

asis (Lepra Grcecorum) , scabies, eczema and possibly syphilitic affections. (Aug. Hirsch, Liveing, Munro). Others again find no con¬

nection at all with true leprosy (Hebra, Munch, Hillary, Finaly, S. R. Hirsch). Thus Munoh maintains that the Lepra Arabum was quite un¬

known to the early Hebrews. Finaly gives a peculiar and unwarranted connotation to the diseased ((skin of the flesh® (Lev. xiii, 2) and would confine the whole legislation to syphilitic affections. Hirsch, Hoffmann and other theo¬

logians regard the disease as a purely symbolical affection, similar possibly to the ((mark of Cain®

(Gen. iv, 15).

The following are the main negative con¬

siderations that influence those that deny all reference to true leprosy: (1) The absence of the characteristic symptoms of Lepra Arabum; ansesthesia, muscular atrophy and loss of ex¬

tremities, etc. (Cf. Sforno on Lev. xiii, 2).

(2) The extreme brevity of the interval of seven days, between the different inspections that determine the presence or absence of a serious affection, points away from leprosy which is characteristically slow in development.

(3) The excessively mild enforcement of the regulations in the later development of the law makes the identification of Zaraath with true

leprosy highly improbable (T. B. Moed Katan, 7B). (4) The Biblical Zaraath seems to be regarded as an hereditary and contagious dis¬

ease. Many authorities, however, consider true leprosy to be neither contagious nor hereditary.

(5) Certain anomalies in the regulations suggest a symbolic disease or infliction of stigmata ex¬

pressive of Divine displeasure rather than a true disease (T. B. Arachin, 16A; cf. Ex. iv, 6; Num. xii, 10). Thus when the white leprous

efflorescence covers the whole body the affection is pronounced clean and neither isolation nor ‘ further inspection follows. Yet this complete efflorescence is apparently a characteristic of the incurable Egyptian leprosy. (Deut. xviii, 35).

None of these considerations is, however, conclusive, and most probably Zaraath in the Bible is a generic term including many diverse skin diseases and among them true leprosy.

The characteristics of the advanced stages of Lepra Arabum do not seem to have been un¬

known (Num. xii, 10, 12; Deut. xxviii, 27, 35), and the reference to Egyptian leprosy seems to point to true leprosy, which was known in Egypt (Ebers). In Leviticus, however, the earliest symptoms alone are given to determine the presence of the disease. The laxity in the enforcement of the rules in later times may be explained by the gradual decrease of true lep¬

rosy among the Jews, and the consequent lim¬

itation of Zaraath legislation to the minor skin affections. The terrible diseases that decimated the army of Pompey were largely leproid in character (Pliny), and the immunity of the Jews to all these is affirmed by Tacitus. Sim¬

ilar testimony to the freedom of the Jews from leprosy is afforded by Plutarch (Sympos.) and Aelian ((De Natura animaP), who assert the consumption of swine to be the cause of lep¬

rosy and skin disease (cf. T. B. Kiddushin, 49B). The apparent anomalies are removed if Zaraath be regarded as a term covering many widely different skin affections. Modern science has discovered

the special leprosy fungus, Bacil¬

lus Leprce, and has, on the whole, vindicated the Bible view of leprosy as contagious. Its hered¬

itary character has been less clearly determined, but it is also less clearly implied in the Bible.

The main points of hygienic interest are those referred to in the affected house, — the insist¬

ence upon declaration of disease, diagnosis, isolation, lustration, etc.

Bibliography. — Adler, (Health Laws of

Bible) (Asiatic Quarterly Review, Vol. Ill, 1892) ; Aronstam, (Jewish Dietary Laws) (Medical Age, 1904) ; Baginsky, (Hyg. Grund-

ziige mos. Gesetzg.5 (1895); Bennett, (Diseases of the Bible) (1896) ; Bergel,

Talmudisten) (1885) : Dembo, (Jewish Method of Slaughter5 (1894) ; Ebstein, (Medezin in A. TP (Stuttgart 1901) and (Med. in N. T.

and Talmud5 (Stuttgart 1903) ; Finaly, (V. die wahre Bedeutung des Aussatzes in der BibeP

(Arch. f. Dermat. u. Syphilis, Vol. II, 1870); Frank, (System einer Vollstend Mediz. PolizeP

(I7g4_1800) ; Hebra, (Lehrb. d. Hautkr.5 (Vol.

II, Stuttgart 1860-76) ; Hirsch, (Handbuch d.

Histor. geograph. Pathologie) (1883) ; Munch.

cient Arabs5 (Journal of Philology 1880) ; Wiener, (Jud. Speisegesetze5 (Breslau 1895) ; Zapletal, (Totemismus u. d. Relig. Israels5

(Freiburg 1901).

Joseph Mayor Asher,

Late Professor of Homiletics, Jewish Theolog¬

ical Seminary of America.

20. JEWISH CHARITIES. On 26 April

1655, the board of directors of the Dutch West India Company wrote to Governor Stuyvesant as follows : ((After many consultations, we have decided and resolved upon a certain petition made by said Portuguese Jews, that they shall have permission to sell and to trade in New Netherland and to live and remain there, pro¬

vided the poor among them shall not become a burden to the company or to the community, but be supported by their own nation.55

The records of the department of charities of the city of New York show that on 6 July 1916, in a Jewish population approximating 1,250,000 in Greater New York, in the alms¬

house on Blackwell's Island there were 72

pauper Jews, of whom the majority were blind, idiotic or possessed of some peculiar defect which prevented admission to existing Jewish charitable institutions. These figures indicate how thoroughly the Jews of New York have assumed the responsibility imposed upon them over 250 years ago. The same is true of Jews throughout the United States. In our modern day, under more favorable conditions and auspices, the Jew has, to some extent, become non-sectarian in his philanthropies. Hospitals, as a rule, supported and endowed by Jews, throw open their doors to sufferers irrespective of creed, color or nationality. Other instances could be cited of charities, not medical, organ¬

ized along similar lines. The Jewish free em¬

ployment bureaus of New York make no dis¬

tinction with its applicants. The Educational Alliance and other Jewish social centres in the same city offer their clubs and classes to the Jew and Gentile alike. Jewish agencies, giving material relief, or to use a better term, those which care for the needy in their own homes, in the main confine their work to beneficiaries of their own faith, without, however, making any rigid distinction. On the other hand, the trend of Jewish charity has been in the direction of caring for the Jewish poor, solely through Jewish agencies, and without the intervention or co-operation of other sectarian or non-sectarian societies or institutions.

The problem of the Jewish charitable so¬

cieties of the United States to-day is the prob¬

lem of the care of the immigrant. As such, it passes beyond merely local lines. In some of its manifestations it is national in character and in a few it has an international significance.

The fact that the large bulk of the needv Jews in the United States reside in New York is accidental, and concerns the Jews of Denver and San Francisco equally with those of the Eastern seaboard cities. Insofar the problem is a national one. Moreover, to deal intelli¬

gently with the question requires a knowledge of the immigrant's antecedents, the impelling motive which brought him to the United States and an acquaintance with his previous environ¬

ment. And here the international phase of the question comes in. Roughly speaking, it may be said that there are no American-born Jewish poor. Of the 9,274 families who applied for assistance to the United Hebrew Charities of New York during the year ending 30 Sept.

1915, 2 per cent were born in the United States.

And of these the majority of heads of families were of the first generation. Jewish dependents who have an ancestry in the United States of more than two generations are practically un¬

known. It must not be concluded, however, that Jewish immigrants become dependent on their arrival. In 1915 only 13.59 per cent of applicants at the United Hebrew Charities of 128

 New York were in this country less than five years.

In the year 1881 began that great wave of emigration from eastern Europe, the end of which is not yet. Driven by a relentless perse¬

cution, which endangered not only their homes but frequently their lives, thousands of Jews were compelled to flee from their homes to seek new residence on these shores. The Russo-

Jewish committee which originally undertook the work of caring for these immigrants turned it over very shortly to the Hebrew Emigrant Aid Society, which came into existence in De¬

cember 1881. In one year this society spent $250,000, $50,000 less than had been spent by the United Hebrew Charities of New York in the seven years of its existence. In the first and only annual report of the Emigrant Aid Society its president outlined as tersely as pos¬

sible the efforts that had been made to provide homes and occupations for the thousands of fleeing exiles who reached these shores during the momentous summer of 1882. In the month of July the committee spent for board and lodging alone over $11,700.

With the gradual falling off in immigration, the Emigrant Aid Society went out of exist¬

ence, and the care of the needy immigrant who remained in New York and who became im¬

poverished after residence reverted to the United Hebrew Charities. In 1885 immigration again began to grow heavier and continued to grow in such numbers that in the following five years over 120,000 immigrants arrived at Castle Garden. In 1890 the immigration reached the figures of 32,321, the largest number ever recorded up to that time. With all that had been done, the real work of the charities was but to begin. In 1891 the religious persecution of the Russian Jews reached a climax. In the year ending 30 September, 62,574 immigrants arrived at New York, of whom nearly 40,000 ar¬

rived between June and September. The en¬

tire charitable effort of the New York Jewish community was for the time directed out of the ordinary channels and applied to this monu¬

mental question of caring for the arriving Rus¬

sian Jews. The Baron de Hirsch Fund, instead of utilizing its income for its educational work, appropriated over $67,000 to the United Hebrew Charities to assist in the work of the Immigra¬

tion Bureau. Over $175,000 was spent by the United Hebrew Charities during this year. In September of 1891, it became apparent that there would be no cessation to the immigration, and that much larger funds would be necessary to give anything like adequate assistance to the unfortunates who were arriving at the rate of 2,000 per week. The enthusiasm which was aroused at a banquet tendered to the late Jesse Seligman brought into existence the ((Russian Transportation Fund,® which added over $90,-

000 to the revenues of the United Hebrew Charities and which was given by the citizens of New York, irrespective of creed. Later in the year, a standing committee of the society, known as ((The Central Russian Refugees Com¬

mittee® was organized and was made up of representatives of the Baron de Hirsch Fund, the Russian Transportation Fund, the United Hebrew Charities and the American Committee for Ameliorating the Condition of the Russian Exiles. The last committee was organized to secure the co-operation of relief societies in other cities, in order that the various European societies who were assisting the persecuted Russians to emigrate should thoroughly

understand the attitude of the New York or¬

ganization. The year, October 1891 to Septem¬

ber 1892, will ever be a memorable one in the history of the Russian emigration and of Jew¬

ish philanthropy; 52,134 immigrants arrived at the Barge office in that time. The treasurer of the United Hebrew Charities paid out the enormous sum of $321,311.05, of which $145,200

was spent by the Russian Refugees Committee between February and September.

Since the year 1881, 1,981,563 Jewish immi¬

grants have arrived at the port of New York alone. Of these, the bulk comprise refugees from Russian and Rumanian persecution,

Austrians and Galicians. They came from countries in which many of them lived under conditions of appalling poverty. The records of the Immigration Bureau show that from the standpoint of material wealth, these immigrants are below the average of immigrants from other European countries. Due to their previ¬

ous condition, a goodly percentage is illiterate.

On the other hand, the number of skilled artisans and craftsmen is so large as to be dis¬

tinctly noticeable. In 1909, the work at Ellis Island was turned over to a newly-created so¬

ciety known as the Hebrew Sheltering and Immigrant Aid Society.

Many years ago it was realized that the in¬

creasing settlement of this population in the city must be discouraged as far as possible and two organizations, generously endowed with funds, the Jewish Agricultural and Industrial Aid Society, established in 1900, and the Indus¬

trial Removal Office, established in the same year, began a concerted movement to distribute as many of these immigrants as possible over the less thickly populated sections of the coun¬

try. The former encourages their settlement on farms ; the latter in the smaller industrial centres of the country. These attempts have met with great success, 85,000 Jewish souls hav¬

ing been satisfactorily removed to the interior and placed in positions where they have been self-supporting. But these numbers form only a small part of the influx of Jewish immigrants during this period.

In 1907, Mr. Jacob H. Schiff organized a movement which he alone has supported in this country, to divert Jewish immigrants from the Atlantic seaports to the Far West, through the port of Galveston, Tex., and through this movement has accomplished substantial results, about 9,000 immigrants being distributed in this way to the sparsely settled sections of the coun¬

try. While it has not stemmed the tide to any considerable degree, it has established, in those which it has settled, centres of attraction for thousands of others who would otherwise have come to the Atlantic seaports. This move¬

ment was abandoned just before the European War broke out in 1914.

The experience of these organizations have long pointed the way for governmental action.

Several years ago, a division was created in the Immigration Bureau of the Federal govern¬

ment, known as the Division of Information, whose purpose it has been to encourage the dis¬

tribution of immigrants throughout the coun¬

try so as to relieve congestion in the large sea¬

ports.

As stated before dependency among Jews in this city is largely the result of immigration.

‘ By that it was not meant that the newly-ar¬

rived required assistance, but that those in need of aid belonged nearly entirely to the class who were handicapped in their struggle for existence because they were strangers in a strange land.

But as the years pass, these people depend more and more upon themselves and resort to com¬

munity aid only in exceptional cases.

In spite of the large increase of population, there has been a constantly diminishing number of applications for relief at the United Hebrew Charities of New York and its co-operating societies. Many of the immigrants who came here 10 and 20 years ago are now very com¬

fortably situated, notwithstanding, if an in¬

vestigation were made of their history, many of them would be found recorded on the books of the United Hebrew Charities. Even with the great mass of Jews who settled here during the past generation and who are still in the wage earning classes, very few find it necessary to apply for relief when in temporary distress.

During the great cloakmakers’ strike in 1910

and the shirtwaist makers’ strike shortly after, involving approximately 100,000 workers, prac¬

tically none of these persons found it necessary to ask aid of the charities, in spite of the fact that they were out of employment for four months. The panic of November 1907 threw hundreds of thousands of persons out of em¬

ployment; nevertheless, a negligible number of persons applied for assistance and these did not come to the doors of the charities until June of the following year. The masses of the Jewish wage earners in

this city have estab¬

lished, and effectually organized for them¬

selves, their own mutual benefit societies to which they resort during emergencies of illness, accident, death and unemployment. There is hardly a Jewish workingman or storekeeper of the immigrant class wlm does not belong to a mutual benefit society. These people have demonstrated in a marvelous fashion that social insurance is better than charity.

Though the mutual benefit societies have been the most important factor in the reduc¬

tion of community dependency, there have been minor factors that must not be ignored. The Industrial Removal office and the Jewish Agri¬

cultural and Industrial Aid Society, above re¬

ferred to, have contributed their share to this happy situation. The Hebrew Free Loan As¬

sociation is another organization peculiarly Jewish, which is, to some degree, responsible.

This organization was established about 20

years ago and since that time has loaned sums ranging from $5 to $200 in 240,000 cases with¬

out investigation and without security, also without interest, but simply upon the guarantee of two responsible persons that the sums loaned would be returned. Only five-eighths of 1 per cent of the $7,000,000 thus loaned has not been repaid.

In spite of the growing independence of the great masses of the Jewish people in this city, the United Hebrew Charities finds it necessary to continue its activities and because the families who do require aid are, for a large part, in the position where continuous assist¬

ance and treatment must be afforded, increased funds are necessary both for relief and for administration. In 1903, the society disbursed

about $200,000, aiding during that year 7,900

families. In 1913, the society expended about $300,000, aiding 3,996 families. But this was not the only cause for this increase in dis¬

bursements. Two other causes have operated, — first, the cost of the necessities of life has substantially increased, and secondly, higher standards of relief have been adopted by the organization.

The United Hebrew Charities limits its activi¬

ties to what was the city of New York before the consolidation of the boroughs, that is, to Manhattan and the Bronx. It was established 45 years ago, as an off-shoot of the Hebrew Benevolent and Orphan Asylum Society, and was composed of the following organizations : Hebrew Benevolent and Orphan Asylum So¬

ciety, The Hebrew Benevolent Fuel Association, the Hebrew Relief Society of Congregation Shearith Israel, Ladies Benevolent Society, Congregation Gates of Prayer and the Hebrew Ladies Benevolent Society of Yorkville.

The general character of its relief work does not differ materially from that of the other large relief organizations, except in this respect, that for many years the United Hebrew Charities has maintained a large list of pen¬

sioners, so-called, that is, of the families who after a careful investigation are found to be in a position where regular and continuous relief is necessary. These families are visited from time to time, irregularly, to determine whether their conditions have changed, requiring a re¬

adjustment of the treatment, or at such times as the families themselves seek advice or ad¬

ditional aid.

As to the causes of distress among Jewish families, these do not differ except in one re¬

spect from the causes that operate among non-

Jewislh families. It can safely be said that much of the dependency prevailing here is due to circumstances over which they have little control. Sickness among Jewish cases is re¬

sponsible for 45 per cent of the applications; half of this is due to

tuberculosis; 30 per cent is due to widowhood. Among the other 25 per cent, employment plays its part} old age, physical and mental handicaps play their part, as well as family desertions. These causes cannot be pre¬

sented with scientific accuracy. An analysis of the causes of distress are highly intricate and complex, as Dr. Devine points out in his book (Causes of Misery. ˆ What part heredity plays in bringing these victims to the doors of the charities is difficult to determine, but unques¬

tionably it plays its important role, for if every Jewish widow, tuberculosis patient and chronic invalid were to apply to the organization for assistance, the numbers now coming would be multiplied several times. There is one cause which is absent among Jewish families, — the drink evil is practically unknown among Jews.

The United Hebrew Charities has consist¬

ently pursued the policy of attacking the causes of distress so far as it has been able. In most instances, the removal of the causes could not be brought about by the organization itself, be¬

cause they are governed by conditions beyond its control. There is one cause, however, which it has been able to attack in a substantial de¬

gree, and that is, family desertion. The im¬

pression may have been created because of its extraordinary activity in this direction, that this evil prevails to a larger extent among Jews

 than among other families, but this is not so.

The records of other organizations show that desertion is as large a contributing factor in dependency among other people. As a result of the work done by that organization, the National Conference of Jewish Charities estab¬

lished the National Desertion Bureau in 1910

to act as a clearing-house for desertion cases for all Jewish charities throughout the country.

Up to the present time about 10,000 such cases have been taken up

and in about 75 per cent the deserter has been located. In nearly all the instances they were reconciled with their families or an arrangement was made under which they resumed the support of the family, even though separated from them, and in a few cases where the deserter refused to resume his moral and legal obligations, the laws on the subject were invoked. The reports of that bureau are among the most interesting human documents ever published.

The cornerstone of Jewish charity is aid to <(self-help.® Maimonides, the great Jewish law codifier, enumerated eight different kinds of charity in the order of their merit. The first was aiding the poor to help themselves. This principle has always been the primary object of so-called ((case work,® with all of these organizations. Similar methods to accomplish these results are followed with variations by all the large relief organizations. In the case of the Jewish charities, the instruments employed are in some respects similar and in others dif¬

ferent. About $15,000 of its funds are yearly applied in the form of loans without security to enable persons to become self-supporting in small businesses. These means come largely from what is termed ((The Self-Support and Self-Help Fund.® A few years ago the or¬

ganization established a workroom for women on a modern business plan, where neckties and shirts, boys' wash suits are manufactured with electric power machines. To this workroom have been sent many women whose absence from the home caused no neglect to their chil¬

dren, nor worked unusual hardship to the women themselves.

It is only rarely that the able-bodied men apply to the organization. It is, therefore, not necessary under normal conditions to aid such people in securing work. There are always, however, a considerable number of handicapped persons applying to us who are able to engage in some vocation, but who because of their mis¬

fortune find it difficult to obtain employment.

For these there is conducted an employment bureau. Much difficulty is experienced in se¬

curing work for such people. All of the Jewish Employment agencies were coordinated into a Placement Clearing House whose office was in the Hebrew Charities Building. Because the Federal government has established employ¬

ment bureaus the work of these agencies is being rapidly turned over to the government bureaus.

In recent years, the spread of tuberculosis among Jews has merited the earnest attention of the society, and among its other activities the United Hebrew Charities has been a pio¬

neer in developing a systematic plan for caring for such tuberculous applicants in their own homes, for whom no provision could be made in existing sanatoria. The campaign thus begun has been not only a charitable but a social one.

Not only have these unfortunates been given food, nourishment and medical care to aid them toward recovery, but in addition thereto, in¬

struction has been given them in the rudiments of sanitation and in the prevention of infection.

It is significant that the work of the United Hebrew Charities in this field has been fol¬

lowed to some extent by the Committee on Tuberculosis of the Charity Organization So¬

ciety.

In 1910, realizing the inadequate sanatorium treatment and also the limitations under which the United Hebrew Charities labored in deal¬

ing with tuberculous families, it entered into an arrangement with the Free Synagogue to join in an experiment with a view to deter¬

mining what results could be accomplished with such families in their own homes, if adequate funds were afforded for their maintenance and for effective medical supervision and nurs¬

ing. The results of that experiment were so encouraging that in 1913 the co-operation of the Montefiore Home was enlisted in an en¬

larged experiment along the same lines, and this committee, known as the Jewish Committee on Tuberculosis, is now doing this intensive and rehabilitative work with the family of every Jewish patient admitted to local sanatoria and is spending $60,000 annually to carry on this work. A very interesting activity carried on by this committee is a model garment factory em¬

ploying upward of 150 former sufferers from tuberculosis, all of them receiving union wages.

Practically none of these persons have suffered relapses.

The name <(United Hebrew Charities® as ap¬

plied to the New York organization is some¬

what of a misnomer, since it does not include all the Jewish charitable agencies in the city of New York. It would be more proper to speak of it as the consolidation of all the purely relief societies which existed in New York prior to 1874. Aside from these, there are to¬

day hospitals, orphanages, technical schools for boys and girls, trade schools, day nurseries and kindergartens, guilds for crippled children burial societies, loan societies, societies for ma¬

ternity relief and a goodly number of smaller organizations which have been founded by the immigrants of the last 20 years. Among the most important large organizations and insti¬

tutions in New York may be mentioned: The Mount Sinai Hospital, Lebanon Hospital, Beth Israel Hospital, Montefiore Home, Hebrew Orphan Asylum, Hebrew Sheltering Guardian Society, Home for Hebrew Infants and He¬

brew Free Loan Association. It is estimated that there are over 300 Jewish organizations and societies in the city of New York to-day, whose activities to a greater or lesser degree are directed along philanthropic lines. Practically all of the larger organizations, such as the hos¬

pitals, etc., work in co-operation with the United Hebrew Charities. In some of the other cities in the United States, where the question of the care of the poor is not so complex as in New York, closer co-operation has gone by leaps and bounds. In cities like Philadelphia, Cin¬

cinnati, Cleveland, Chicago and others, the in¬

dividual societies have formed federations of charities, the purpose of the federation being to express the philanthropic impulse of the com¬

munity in terms of greatest economy, the smallest amount of friction and the highest

possible efficiency. In Philadelphia the federa¬

tion is the common treasury. It acts as the common collection agency of all moneys and distributes them pro rata among the various societies and institutions, whose autonomy is not impaired by this method. In other cities, this plan with some slight variations is in force.

In New York after sporadic attempts a federa¬

tion for the support of philanthropic societies was established in 1917 numbering 91 constitu¬

ent societies.

In addition to these local federations, the various societies throughout the United States have joined together to form a national, body known as the National Conference of Jewish Charities. At present it comprises the chari¬

table organizations of 85 cities. Annual con¬

ferences are held. The published reports of these meetings indicate conclusively the wis¬

dom and the necessity of founding such a national organization. The rules governing the transportation of dependents which have been in force in the National Conference of Jewish Charities since its inception were adopted, with alterations and additions, at a meeting of the National Conference of Chari¬

ties and Corrections at the meeting held in Atlanta in May 1903. The official organ of. the National Conference of Jewish Charities is a monthly publication, Jewish Charities.

Some idea of the extent to which the Jewish charities have been developed in the United States may be gathered from the following: In practically every city and town there are benev¬

olent societies which look after the interests of the poor in their midst. Jewish orphan asy¬

lums are established in the cities of Atlanta, Baltimore, Boston, Brooklyn, Chicago, Cincin¬

nati, Cleveland, Newark, New Orleans, New York, Philadelphia,

Pittsburgh, Rochester and San Francisco and Erie, Pa. In New York there are three institutions and in Philadelphia there are two. New York has a dozen Jewish hospitals and such cities as Philadelphia, Balti¬

more, Chicago, Cincinnati, Denver, New Or¬

leans and San Francisco, and even smaller cities, each have one or more. Homes for aged and infirm are found in most of the large cities.

Similarly, educational movements along philan¬

thropic lines are developing throughout the country. These include organizations such as the Hebrew Educational Society of Brooklyn, The Hebrew Education Society of Philadelphia, The Jewish Training School and Hebrew Insti¬

tute of Chicago, the Hebrew Free and Indus¬

trial School of Saint Louis, the Hebrew Indus¬

trial School of Boston, the Clara de Hirsch Home for Working Girls, the Hebrew Techni¬

cal School for Girls, the Hebrew Technical In¬

stitute and the Baron de Hirsch Trg.de School, the last four being situated in New York.

The Maxwell Street Settlement of Chicago and the Neighborhood House in Saint Paul are under Jewish auspices. Most of the large cities have Jewish settlements. In New York the Educational Alliance, the largest institution of its kind in the United States, has within the past few years developed a settlement with resi¬

dent workers. Along educational lines, the Jewish Chautauqua Society, a national organ¬

ization, has conducted a summer school m philanthropy in connection with its summer as¬

sembly held in Atlantic City, N. J. At these sessions, important communal problems of in¬

terest to Jewish workers in philanthropy have been considered.

Other national organizations of importance are the Jewish

Agriculturists' Aid Society, the Baron de Hirsch Fund and the Jewish Agricultural and Industrial Aid Society. The first named, with headquarters in Chicago, is engaged in placing farmers throughout the Northwest, particularly in Dakota. The work of this society, while not on an extended scale, has nevertheless given results and has demon¬

strated the fact that it is possible to take resi¬

dents of congested centres, remove them to country districts and make farmers of them.

The Baron de Hirsch Fund was established under a foundation of the late Baron de Hirsch, the deed of trust being incorporated in March 1890. Its activities at present are di¬

rected to the conduct of the Baron de Hirsch Trade School in New York city and the Agri¬

cultural Colony at Woodbine, N. J., where the Fund has an Agricultural and Industrial School. The Fund likewise gives moneys to co-operating societies in various cities for the purpose of granting tools and teaching trades to recently arrived immigrants. The Jewish Agricultural and Industrial Aid Society is an offshoot of the Baron de Hirsch Fund, receiv¬

ing money from the latter society and from the Jewish Colonization Association, which was created under a de Hirsch endowment. Its purpose is to find agricultural and industrial positions for Jewish immigrants. Under the care of this organization are the various colo¬

nies in South Jersey, aside from Woodbine, and the organization has made farm loans to farmers in various parts of the United States, particularly in Connecticut.

The number of philanthropic organizations has grown so large and their problems so com¬

plex that the National Conference of Jewish Charities has established a field bureau to study them and give advice to local committees. In New York a Bureau of Philanthropic Research has been created, under the auspices . of the Council of Jewish Communal Institutions, to study local philanthropic needs and resources.

These bureaus together with the Bureau of Statistics of the Jewish Committee have re¬

cently been amalgamated with headquarters in New York.

Morris D. Waldman,

Executive Director, United Hebrew Charities, New York City.

21. JEWS IN AMERICA. Although the

Jewish population of America has been greatly increased by immigration only since 1881, Jews have been closely identified with American his¬

tory for centuries.

Before taking up the history of the Jews in America, some statistics concerning the Amer-

ican-Jewish population at various periods will be in order, as tending to throw light on more isolated historical incidents relating, for the most part, to the experience of a small fraction only.

Statistics. — The latest and most authorita¬

tive statistics as to the present Jewish popula¬

tion of the United States are furnished by the (American Jewish Year Book) (1918), wherein it is computed that the total number of Jews in this country is 3,300,000, of whom about 1,500,000 reside in New York city; in Chi-

cago, 225,000; Philadelphia, 200,000; Cleveland, 100,000; Boston, 77,500; Saint Louis, 60,000; Baltimore, 60,000; Pittsburgh, 60,000; Newark, 55,000; Detroit, 50,000, and San Francisco 25,000; all the other States and Territories, in¬

cluding Hawaii, Porto Rico and the Philippine Islands, and also the District of Columbia, like¬

wise contain some Jewish residents. In mak¬

ing up this total, account is taken of the fact that about 2,001,000

Jewish immigrants arrived in the United States from 1881 to 1 July 1915.

New York city, which contains the largest Jewish community that has ever existed within the confines of a single municipality, has over 1,200 congregations, and 180 religious schools with 41,403 pupils, exclusive of about 14,000 who attend private schools. It has over 100 recrea¬

tional and cultural agencies, more than 1,000

mutual aid societies, 965 lodges, 193 economic agencies and 164 philanthropic and correctional agencies. Dr. Oppenheim gives a list of nine cities, exclusive of New York city, containing an aggregate of over 9,200,000 inhabitants, of which 900,000 are Jews. New York city is not percentage-wise the most Jewish city. Chelsea, Mass., has a general population of 46,000 and contains 13,000 Jews, or a Jewish population of 28 per cent. Rosenhayn, N. J., has a gen¬

eral population of 600, and contains 300 Jews, or a Jewish population of 50 per cent, while Carmel, N. J., has a general population of 750

and contains 450 Jews or a Jewish population of 60 per cent. Woodbine, N. J., is practically en¬

tirely Jewish in population. The same au¬

thority computes the Jewish population of America, exclusive of the United States, as follows: Canada, 75,681; British West Indies, approximately, 1,000; Argentina, 55,000; Brazil, 3,000; Cuba, 4,000; Mexico, 8,900; Curasao, 670; Surinam (Dutch Guiana), 933, and Vene¬

zuela, 411. These figures are mere estimates, than which nothing more accurate is at pres-

sent obtainable ; but they are no doubt approx¬

imately correct, being based upon partial actual counts; the United States census of 1910 re¬

turns oi persons giving Hebrew and Yiddish as their mother tongue ; the government immi¬

gration records, analyses of death rates and reports of competent judges in the various localities, . and having also been revised from

time to time in the light of criticism and new data.

The first systematic attempt to secure statis¬

tics of the Jewish population in the United States culminated in the publication of a re¬

port by the Union of American Hebrew Con¬

gregations in 1880, giving estimates for each State and city in the Union, and aggregating 230,257 persons. In connection with the na¬

tional census of 1890 statistical information was gathered regarding Jewish congregations in the United States, and the total number of Jewish communicants was estimated at 130,496, belonging to 533 church organizations. Of these, 316 organizations, having 122 church edifices, valued at $2,802,050, and 51,597 com¬

municants, are to be credited to Orthodox Judaism, . while Reform Judaism counted 217

organizations, having 179 church edifices, valued at $6,952,225, and 72,899 communicants. A very large majority of the Jewish immigrants ar¬

riving in the United States since 1890 belong to the orthodox wing, and even the figures of 1890 undoubtedly disregard numerous small, often unorganized, orthodox congregations, from whom it was relatively more difficult to secure reports. In 1818 the Jewish population of the United States was estimated at 3,000

only; in 1848, at 50,000. In South America there were several thousand Jews prior to 1650, the greater part of whom were in Brazil, as noted below; but hostile laws and the persecu¬

tions of the Inquisition, while driving some to the West Indies, and even as far north as New Netherlands, caused several thousands Jewish settlers in Spanish and Portuguese territories to totally give up their Jewish identity.

It might be said that there were successive tides of Jewish emigration to America from European countries, fairly well separated from each other in point of time. During the first 250 years after the discovery of America the settlers were mainly Jewish immigrants of Spanish-Portuguese stock, with a sprinkling of German, French, English and Polish Jews.

German Jewish emigration becomes consider¬

able only about the time of the American Revo¬

lution (though evidence is accumulating that it took upon itself larger dimensions and at an earlier period than is commonly believed) ; it was stimulated by the reactionary measures fol¬

lowing the Napoleonic wars and the Revolution of 1848, and began to include emigrants from the Austro-Hungarian Empire, and later on an increasing number of Poles. The Russian-

Jewish exodus, which began about 1881, was by far the heaviest of these various currents of emigration, and was itself succeeded or rather joined by a Rumanian- Jewish wave about 1900.

Jews in the Spanish and Portuguese Colo¬

nies. — Before the discovery Jews were ac¬

tively identified with the fate of America, as may be said without reference to the curious and once widely accepted theory that the American Indians are descendants of the lost Ten Tribes. Emilio Castelar, the late Spanish statesman and historian, referring to the co¬

incidence that the Jews were expelled from Spain in the year that Columbus started on his first voyage of discovery — a circumstance noted by Columbus himself in his journal, and repeatedly thereafter commented upon by Jew¬

ish historians — makes this observation : It chanced that one of the last vessels transporting into exile the Jews expelled from Spain by the religious intolerance of which the recently created and odious Tribunal of the Faith was the embodiment, passed by the little fleet bound in search of another world, whose creation should be new¬

born, a haven be afforded to the quickening principle of human liberty, and a temple reared to the God of enfranchised and redeemed consciences.

But Jewish aid to Columbus was not limited to Jews accompanying him on his first voyage (including Luis de Torres, a new convert to Christianity, who went as interpreter because of his knowledge of Arabic, and settled before 1500 in America), nor to the circumstance that Columbus carried with him, as aids on his voy¬

age, a sea-quadrant called “Jacob’s Staff, in¬

vented by a Spanish Jew, and astronomical tables and charts invented by another Jew. The more significant and important fact is that Jewish financiers at the Spanish court were his leading patrons, and advanced the money for his voyage, as evidenced by original account-

books still found in the Spanish archives ; so JEWS AND JUDAISM — JEWS IN AMERICA (21) 133

that it was a mere recognition of this circum¬

stance that induced him to address the first two letters (now justly famous, and the earliest ‘ copies of printed editions of which command thousands of dollars from book-fanciers) nar¬

rating his discovery to those two secret Jewish friends, Luis de Santangel, chancellor of Aragon, and Gabriel Sanchez, royal treasurer.

In the light of such facts the late Herbert B.

Adams wrote that ((not jewels, but Jews, were the real financial basis of the first expedition of Columbus.® The revenues needed to fit out the second expedition were secured from the proceeds of the property of which the ex¬

pelled Spanish Jews were despoiled by the In¬

quisition at the time of their expulsion from Spain.

In spite of prohibitions upon Jewish settle¬

ment in Spanish and Portuguese America, many Jews rapidly emigrated to the New World from among those exiled from Spain and Portugal; occasionally, in spite of the incon¬

sistency involved, in view of those prohibitions, Jews and Jewesses were forcibly transported to America by the state through the agency of the Inquisition. By 1548 Jews are referred to not merely as having settled in Brazil, but as introducing sugar-culture there, which they transplanted from Madeira. The smoking of tobacco had been introduced to Europeans even before 1500 by Luis de Torres, a companion of Columbus. Occasionally, enormous sums of money had to be raised and given to the Crown in order to effect suspension or revocations of prohibitions upon Jewish settlement in the Spanish and Portuguese colonies. But the In-

quisitioin and its terrors were introduced even into the New World; hence Jews found it ad¬

visable to try to conceal their faith under the cloak of Christianity; and it is principally in the records of the Inquisition that we find proofs of the Jewish practices of many of these settlers — called Marranos or secret Jews- —whose trials commonly resulted in imprison¬

ment, frequently in death at the stake, and were at all events followed by confiscation of their property.

In Brazil, Jewish settlers actively aided the Dutch in effecting their conquest of that coun¬

try, about 1620, after which the Jews en masse threw off their Christian disguise and publicly professed their own religion. The Dutch West India Company (q.v.), which obtained the pro¬

prietorship of Brazil, had many influential Jewish stockholders, and under their auspices large numbers of Jews from Portugal, Hol¬

land and Germany emigrated. Jewish resi¬

dents are referred to about 1640 as owning the principal sugar-plantations of Brazil, and as heavily interested in the diamond industry then developing there; and there is also evi¬

dence that a Jewish literature sprang up in Brazil at this time. Some idea of their num¬

bers may be gathered from the fact that at the time of the surrender of Recife (Pernam¬

buco) to the Portuguese, after its recapture from the Dutch, soon after the middle of the 17th century, that city alone contained about 5,000 Jews, even after many had departed from the city. In smaller numbers they were also established in other cities of Brazil, in Mexico, Peru, the West Indies and at other points.

The Dutch capitulation of Brazil in 1654 led to their flight in large numbers from that country, their migrations leading them north¬

ward, particularly to the West Indies, and one party of refugees even becoming the nucleus of a Jewish settlement at New Amsterdam (New York city) in 1654. Many, however, remained in the South American colonies, and their Jewish identity was gradually lost under the hostile

influences at work. The settlements under Dutch auspices at Surinam, Cayenne and Curasao are reserving of particular attention.

Of the professing Jewish inhabitants now to be found in these districts, enumerated in the statistics just considered, very few are de¬

scendants of the original Spanish settlers, the great bulk of them being comparatively recent arrivals from Germany, Russia and Rumania.

Through the munificence of Baron de Hirsch (q.v.) millions of dollars were employed about 1891 in the purchase of land and equipment for the use of agricultural colonies of Russian Jews established under his auspices in Argentina, where several thousand Jews settled, though they have met with only moderate success.

West Indies. — Reference has already been made to early settlements of Jews in Cuba and other West Indian islands. Their settlement in Jamaica was particularly important on account of their numbers and the once great commercial importance of the island. For the latter reason their residence in the Barbados, at Saint Eus-

tatius, Martinique and in the Danish West Indian colonies also led to important conse¬

quences. Reference will be made hereafter to this circumstance. Except in Cuba, the decline of the above-named places commercially has caused a decided diminution in the number of their Jewish inhabitants, and to-day the chief interest in the settlements is historical.

Early Settlements in the United States before the Revolution. — There are indications of some isolated and casual arrivals of indi¬

vidual Jews within the present limits of the United States prior to the arrival of the party from Brazil in colonial New York during the Dutch regime, in 1654; these were in Maryland, Virginia, New England and New York. These instances (other than those in the Dutch col¬

ony) are purely casual, however, and unimport¬

ant, because Jews were not allowed at this time to live as avowed Jews in any of the principal countries that then had colonies in America except Holland. Prohibitions against their settlement were in force (though occa¬

sionally ignored) in Spain, Portugal, England, and to some extent in

France. Holland alone at this time welcomed the Jewish refugee, to her great commercial advantage ; and this ((common harbor of all opinions and of all heresies® was, logically enough, destined to es¬

tablish a precedent for granting religious lib¬

erty also in the New World. It is true that in New Netherlands Gov. Peter Stuyvesant (q.v.) was decidedly hostile to the Jewish ar¬

rivals, as were also some of the early Dutch ecclesiastical authorities.; but thanks to the leveling and humanizing influence of commerce, and to Jewish holdings of stock in the Dutch West India Company, the directors of that company, 26 April 1655, instructed their gov¬

ernor that the Hews shall have permission to sail to and trade in New Netherlands, and to live and remain there, provided the poor among

them shall not become a burden to the com¬

pany, or to the community, but be supported by their own nation® ; and Stuyvesant was strongly reproved soon after for seeking to thwart these clearly expressed wishes of the company. This grant was commemorated in 1905 by a wide-

scaled celebration throughout the country of the «250th Anniversary of the Settlement of the Jews in the United States.? The emancipation of Jews was, however, only gradual; certain restrictions were continued through the whole colonial period, though they decreased from time to time, and in importance. Public wor¬

ship, as distinguished from private religious services, was forbidden them till near the close of the 17th century, as was also selling at retail, and certain political rights of citizenship were also denied; but these restrictions in the course of time were largely removed in prac¬

tice, so that the adoption of the first constitution of the State of New York, in the Revolutionary period, which established absolute religious lib¬

erty, conferred in effect few, if any, privileges on the Jewish residents of that State which they had not already virtually enjoyed. In the in¬

terior the number of Jewish residents had grown somewhat by emigration from Germany, Hungary, Poland and also from England, which, under Cromwell, readmitted the Jews soon after the time of their settlement in New Netherlands; but the increase in numbers through immigration was not great till after 1800, for there were few Jews in England, and still fewer who desired to emigrate from there, while emigration to New York and New Eng¬

land prior to the above date from any of the other designated countries was very small.

To Newport, R. I., Jews emigrated very soon after they first settled in New Amsterdam, and Roger Williams (q.v.) in terms included them in his program for establishing a colony where religious liberty would be accorded to all sects and creeds. In the course of time they erected a synagogue here also, as well as in New York, and established a community which con¬

tributed most materially to the commercial pros¬

perity of Newport, which city far outrivaled New York for some decades before the Revolu¬

tion, and until, during that struggle, its shipping interests received a blow from which they never wholly recovered. Here, also, there were some retrogressions during the colonial period from Roger Williams' enlightened declaration of principles; but on the whole, Jews were most prosperous . residents of Newport during the latter portion of the colonial period. Even though the colony never was numerous, it em¬

braced such merchant princes as Aaron Lopez and Jacob Rodrigues Rivera, and its fortunes were commemorated, after all the old-time resi¬

dents had departed, in Longfellow's famous lines on (T;he Jewish Cemetery at Newport.) Already in the colonial period Jewish settlers occasionally found their way into Connecticut, also to Boston, and even, it would seem, to Maine, but they were very few in number, and the present Jewish residents of New England date almost entirely from the period of German settlement after 1848, followed by a much more considerable Polish and Russian-Iewish settle¬

ment toward the end of the l'9th century.

About 1820 Maj. Mordecai M. Noah, at one time United States consul to Tunis, developed a fantastic plan for founding a Jewish state for the

oppressed Jews of other lands under his own ((judgeship,® near Niagara Falls, at a place he named <(Ararat, City of Refuge,® and attempted to tax all the Jews throughout the world for this purpose, but the scheme merely aroused amused attention. Other less am¬

bitious early colonization schemes also were formed.

Pennsylvania, under William Penn's gener¬

ous plan for founding a home for victims of persecution, attracted Jewish settlers, and in the early decades of the 18th century a little stream of immigration began which brought a number of German, English and Polish Jewish settlers to Philadelphia, whose numbers were increased, after the capture of New York by the British in 1776, by the arrival of Portuguese Jews from that city. The Jewish settlement in Lancaster, Pa., was made shortly before the American Revolution ; and there was a small Jewish immigration into Maryland and Vir¬

ginia, with communities in Schaefersville, Eas¬

ton, Baltimore and Richmond. Before the close of the Revolution a Portuguese synagogue had been erected in Philadelphia ; soon a Ger¬

man Jewish congregation was established there ; and about the same period one was erected in Richmond, Va. The laws of Mary¬

land prohibited Jewish settlement, and as early as 1658, Dr. Jacob Lumbrozo, ((the Jew physi¬

cian,® figured there as defendant in a blasphemy trial, which nearly cost him his life. Baltimore is of particular interest because it was the only city in the United States in which systematic and long-continued efforts were necessary, sub¬

sequent to the Revolution, in order to secure full civil and political rights for Jews as such; they acquired them finally in 1826. Georgia attracted Jews almost immediately after the founding of the colony, parties of both Ger¬

man and Portuguese Jewish settlers having ar¬

rived at Savannah in 1733. Some of these were indigent Jews, who were assisted to emigrate by coreligionists in England. Off-shoots from this colony migrated to South Carolina before the. first half of the 18th century and a congre¬

gation was formed in Charleston in 1750. By the time of the Revolution, and for some dec¬

ades thereafter, Charleston contained one of the most important and prosperous Jewish communities in the United States. In both of these colonies Jews seem to have figured as holders of responsible civil office before the close of the Revolutionary War.

The various places which contained Jewish communities prior to the Revolution have now been enumerated; the total Jewish population embraced in them and in other and more iso¬

lated settlements was, as seen, somewhat less than 3,000 in the year 1800.

Interior Settlements. — Space does not per¬

mit consideration of the various Jewish settle¬

ments and their date of establishment outside of the limits of the 13 colonies. The great ma¬

jority of Jewish residents of the United States still reside along the eastern coast-line. In time, the westward, movement carried Jewish settlers along with it, some into interior cities in the original 13 States, others farther west.

In fact during the second half of the 18th cen¬

tury, the Gratz, Franks, Simon and Henry fam¬

ilies, in conjunction with George Croghan and

others, did much to open up the territory west of the Mississippi. By 1800 there were several v Jewish residents at Pittsburgh. Judah Touro (q.v.), the well-known Jewish philanthropist, went to New Orleans about 1801, and Jews were destined, during the latter half of the 19th century, to achieve considerable political distinction there, though probably there were some Jewish settlers in the Louisiana Territory nearly a century earlier, who were persecuted by reason of the prohibitions in the French ((Code Noir® upon Jewish settlement. The first indisputable Jewish resident of Kentucky seems to have settled there about 1808. Ohio appears to have received its first Jewish residents about 1817-19 and after 1830 a considerable tide of German-Jewish immigration flowed to¬

ward Cincinnati. In Illinois, which has to-day a considerable number of Jewish inhabitants especially in and about Chicago, the first Jew¬

ish settler probably arrived about 1841 ; and after a couple of years, numbers of German Jews began to come. A little later this same tide reached Detroit, Mich. Texas, while still belonging to Mexico, had quite a contin¬

gent of Jewish settlers, who began to arrive about 1821. California attracted a considerable number of Jews at the time of the gold discov¬

ery in 1849, and in 1850 they had two congre¬

gations in San Francisco. It will be observed that the great majority of Jews in the United States are to be found in the large cities, due largely to prohibition abroad in Russia and Rumania on their owning land and living out¬

side of specified urban sections, which habits the immigrants carry with them to this coun¬

try.

The reactionary movement that followed the Napoleonic wars in Germany, early in the 19th century, and particularly the barbarous Jewish marriage laws of some of the German states (which, among numerous disabilities from which Jews suffered, were possibly the most objec¬

tionable, as they forbade more than a certain number of Jewish couples to live in any dis¬

trict), greatly stimulated German Jewish emi¬

gration to the United States from about 1815.

After the revolutions of 1848 the political and economic unrest in Germany and throughout Europe caused a particularly valuable and in¬

telligent class of Jewish immigrants to come to this country, including, in addition to Germans, also Hungarians, Pdes and Bohemians; while after 1881 the Russian- Jewish exodus assumed large dimensions, and the Rumanian-Jewish emigration began to be heavy about 1900. The volume of these tides can be gauged by com¬

paring the estimates of Jewish population at various periods, already quoted, with these va¬

rious dates. The forced emigration of recent years from Russia and Rumania has naturally had the effect of bringing to these shores per¬

sons less adequately equipped, and who had known fewer opportunities for development and self-improvement than the earlier immi¬

grants, generally speaking, had enjoyed, but their Americanization and progress here have been phenomenal.

The Jews in American Commerce, Indus¬

tries and the Professions. — Reference has al¬

ready been made to early Jewish activities in the field of commerce, exhibited in Brazil and the West Indies particularly. It is most im¬

portant here to note the consequences which followed the dispersion of the Jews throughout so many different lands and districts, resulting in their opening of international and intercolo¬

nial trade relations with each other long before those having no such ties of relationship or confidence, and no such common language or commercial abilities, were ready for any such mutual intercourse. The result was that in early colonial days Jews were pioneers and prime promotors of intercolonial and foreign commerce in America, which became not merely profitable, but actually indispensable, for the maintenance of the colonies. The most distant points thus became interlinked by means of their Jewish residents. Every industry and branch of trade engaged their attention. Among persons who were particularly prominent in these fields, besides Lopez, Rivera and Touro, already referred to, were Lewis Gomez and his sons, who were exporters of wheat on a very large scale in colonial New York, early in the 18th century; Hayman Levy, the fur dealer of New York, who had close relations with the Indians and was at one time the employer of the first John Jacob Astor; David Gradis of Bordeaux, who is described as having (

trolled the trade of France with the West Indies, in the 18th century, the Gratzes, etc.

Aaron Lopez of Newport had a fleet of over 30

vessels shortly before the Revolution, engaged in trade between Newport, the West Indies and Africa. Newport Jews also created the sper¬

maceti industry. Jews were among the found¬

ers of the New York Chamber of Commerce and one figures on its seal as a member of the committee receiving its charter from the colonial governor. They were also among the founders of the New York Stock Exchange, and ever since that time have been growing in import¬

ance in America as bankers, brokers, financiers and railroad magnates. They have been par¬

ticularly influential in certain lines of ‘trade, in¬

cluding the cotton, tobacco, sugar, coffee, jewelry, leather, hides, meat-packing and. cloth¬

ing industries and department-store activities..

The Jews of America have produced distin¬

guished inventors, lawyers, physicians, rabbis, journalists, scientists, artists, dramatists and professors, filling chairs at all the leading uni¬

versities, far in excess of the proportional num¬

ber of their race in the population of the coun¬

try. On the other hand, the large immigration of unskilled laborers into the United States has led to the employment of thousands of Jews here in every industrial pursuit, frequently at the start under unfavorable conditions.

Jews in the Army, Navy and Public Serv¬

ice Generally.— Prior to the American Revo¬

lution there were Jews serving in the militia and in the colonial wars. During the Revolu¬

tionary War, their numbers on the army rolls far exceeded their ratio to the total population and a number achieved distinction above the ranks. The New York Jewish congregation concluded, by a decisive majority vote, to dis¬

band, rather than to sacrifice patriotism on the altar of religion and many of its members fled to Philadelphia, just prior to the British occu¬

pancy of New York. In the South, a corps of volunteer infantry, known as. Captain Lushing-

ton's company, composed principally of Jews, was organized in Charleston in 1779, and fought in the patriot ranks. A number of Jews had figured as signers to the Non-Importation 136

JEWS AND JUDAISM— JEWS IN AMERICA (21) Agreement of 1765. Among those on the Revo¬

lutionary rolls who achieved military distinc¬

tion are Col. Solomon Bush ; Col. David S.

Franks, aide-de-camp to General Arnold be¬

fore the latter's treason, and who was the bearer of the signed definitive treaty of peace, sent abroad by Congress for delivery there; Isaac Franks, who became colonel of Pennsyl¬

vania's volunteers soon after the Revolution, after having served long during the war in the ranks; Capt. Jacob de la Motta ; Major Nones; Lieutenant Seixas ; and Deputy Commissary-

General of Issues Sheftall, of Georgia. During our War of 1812 and the Mexican War many Jews served in the ranks and occasionally as holders of important military positions ; while during the Civil War the number of Jewish soldiers in the field far exceeded their ratio to the whole population of the country, and they held military positions from brigadier-general down. Hon. Simon Wolf, in his work, (The American Jew as Patriot, Soldier and Citizen, }

has, by means of enormous labor and investi¬

gation, collected available names and records of Jewish soldiers in the Federal army and navy, in which he reports that during the Civil War no fewer than 7,884 Jews served, and even these numbers are necessarily incomplete. As the Jews were Union men in the North, so those living in the South generally espoused the cause of the Confederacy and Mr. Wolf's figures in¬

clude less than 2,000 Confederate Jewish sol¬

diers. The number included by him as serving in the Union and Confederate navies is rela¬

tively smaller. A similar list of Jews who served during the Spanish-American War has been compiled ((American Jewish Year Book >

1900-01, pp. 527-622), and includes thousands of names, again exceeding the relative ratio based on that of the total number of persons serving to the total population ; and President Roosevelt, years later, felt called upon to compliment them pub¬

licly upon their bravery, as indicated by in¬

stances of Jews who served under him and were commended for gallantry. Neither have Jews failed to enlist in our navy, for since the latter was instituted, a number of Jews have notably risen from the files to naval distinction, as witness the careers of Captain Etting, Maj.

David M. Cohen of the United States Marine Corps, Capt. Levi M. Harby, Capt. Jonas P.

Levy and ˆCommodore® Uriah P. Levy, who at the time of his death in 1862 was the rank¬

ing officer in the United States navy, Rear-

Admiral Marix and Captain Zalinski. Nor have Jews failed to render the government sig¬

nal services in private life. Haym Salomon, the associate of Robert Morris and Madison, was broker to the Office of Finance, and it was through his hands that the loans from France and Holland to the infant republic passed ; he made heavy advances to the gov¬

ernment, which at the time of his death was indebted to him in hundreds of thousands of dollars, which have never been repaid, in spite of repeated Congressional reports in favor of the claim. During the Revolutionary period, there were still others who aided the govern¬

ment's hazardous financial fortunes. Among the most distinguished Jewish patriots of the Revolution stands Francis Salvador, who was a member of the South Carolina Provincial Congress and of the General Assembly of that State. On the other hand there were, naturally enough, also a few Tories among the Jews, chief among whom were David Franks of Phil¬

adelphia, who had been British commissary-

general, during the French and Indian War, to¬

gether with his father, Jacob Franks. David Franks' daughter, Rebecca Franks, was one of the leading belles and wits of Philadelphia and New York during the Revolution. A number of Jews have served in Congress, both in the Senate and the House of Representatives, the most prominent among them having been Judah P. Benjamin (q.v.), who resigned his seat in the Senate to become Attorney-General, Secre¬

tary of War and then Secretary of State of the Confederate States and subsequently became leader of the English bar. Several Jews have been United States ministers to foreign coun¬

tries and consuls-general, one of the former, Oscar S. Straus, now being a member of the Permanent Court of Arbitration at The Hague, and having been Secretary of Commerce and Labor under President Roosevelt. Many have been judges in different States, and several have been attorneys-general of their States, and Louis D. Brandeis was appointed by President Wilson as justice of the United States Supreme Court.

Several have held the office of governor in American States, and a number have been mayors of leading cities, while many others have held local and State offices. Among those who. rendered our government most valuable services in trying financial times are J. & W.

Sehgman & Co. Several Jews, particularly Moritz Pinner, David Einhorn and M. Heilprin, were active workers for individual liberty in the anti-slavery movement.

Charities and Other Institutions.— The

Jewish charities of the United States are un¬

equaled in magnitude and efficiency, compared with the total Jewish population. Naturally enough, the enormous exodus of well-nigh in¬

digent Jews to these shores has greatly increased the burden falling on their more fortunate co¬

religionists. The amounts disbursed by the or¬

ganized Jewish charities in New York city alone exceeds $3,000,000 per annum and are of the most varied character. The pure milk de¬

pots opened by Nathan Straus, at a heavy cost, in New York — an example which has been followed in other cities — is one of the most effective forms of charitable endeavor and has saved thousands of infant lives. Various Jews of the United States have contributed hundreds of thousands of dollars at a time in individual instances to charitable purposes, best known among whom is Mr. Jacob H. Schiff, of New York, who is credited with observance of the old Jewish practice of giving a tithe of his income to charity. About $5,000,000

were raised by the Jews of the United States for the relief of their coreligionists in the war zone in 1914-18, besides large contributions to non-Jewish war relief funds. The arbitration movement for settling controversies between capital and labor, known as the Civic Federa¬

tion, has enlisted several Jews in its directorate.

The Jewish charities of the United States are being systematized and organized more and more from year to year; aid is being afforded by the annual national conferences of Tewish charities and the Industrial Removal Office has opened offices throughout the United States to

aid indigent immigrants after arrival, to seek locations for them in the interior of the coun¬

try and thus relieve the congestion of the large Eastern cities. Special efforts have also been made to promote agricultural pursuits among the Jews of the United States, and to encourage industrial activities among them. Of course all the local New York charities deal particularly with recent arrivals, but the Baron de Hirsch Fund, the Hebrew Sheltering and Immigrant Aid Society, the Council of Jewish Women, the Clara de Hirsch Home, the Hannah Laven-

burgh Home and the Educational Alliance es¬

pecially address their efforts toward them. In 1911 the United States abrogated her treaty with Russia, because Russia declined to treat American citizens of the Jewish faith, holding our passports, on a parity with citizens of other faiths, and refused to permit them to enter Rus¬

sia under the treaty concessions. In Secretary Hay's Rumanian note of 1902 and on other occasions, the United States sought to secure full

rights for persecuted Jews abroad. See article Jewish Charities in this section.

A number of very large mutual benefit and mutual development societies, taking the form of fraternities and Jewish lodges, exist within the United States and do much good, chief among them being the Independent Order B'nai B'rith, Independent Order Brith Abra¬

ham, the Independent Order Free Sons of Is¬

rael, the Arbeiter Ring and the Independent Order Sons of Benjamin. The recently organ¬

ized Zionist movement has appealed greatly to many thousands of Jews in America, par¬

ticularly to the more orthodox and they have organized numerous societies to aid in estab¬

lishing a Jewish state, in Palestine or else¬

where, for the benefit of the persecuted Jews of eastern Europe. Several Jewish theological seminaries are maintained in the United States, one in Cincinnati, by the reform wing, called the Hebrew Union College, sustained by the Union of American Hebrew Congregations, which was founded by Isaac M. Wise, and of which Dr. K. Kohler is president, and an or¬

thodox seminary in New York called the Jew¬

ish Theological Seminary, of which the late Dr. Solomon Schechter was president. Be¬

sides the Union of American Hebrew Congre¬

gations, there exists an (< American Jewish Com¬

mittee,® with branches in the various States, in which the orthodox Jews are more fully repre¬

sented; for a number of years Judge Mayer Sulzberger of Philadelphia was president and he was succeeded by Louis Marshall of New York city. A Rabbinical Conference called to¬

gether by Dr. K. Kohler in conjunction with Dr. I. M. Wise and Dr. S. Hirsch at Pitts¬

burgh in 1885, adopted a Declaration of Prin¬

ciples for the Reform wing in American Juda¬

ism. A ((Jewish Publication Society® was founded in 1888 and has issued many Jewish works, and the (Jewish Encyclopedia5 in 12

volumes was issued in America, with a new Jewish Bible translation as a close second, the most important Jewish work published in mod¬

ern times. Numerous Jewish newspapers are issued, including a number of dailies in Yiddish.

Bibliography. — Bernheimer, C. S., (The Russian Tew in the United States5 .(Philadel¬

phia 1905) ; Blum, I., (The Jews of Baltimore5

(Baltimore 1910) ; Cahan, A., (The Russian Jew in America) (Atlantic Monthly, July 1898) ; Daly, Ch. P., Settlement of the lews in North America) (edited by Max J. Kohler, New York 1893) ; Eliassof, H., (German Amer¬

ican Jews5 (in (Jahrbuch der Deutsch-Amer-

ikanischen Historischen Gesellschaft von Illi¬

nois, } Vol. XIV, Chicago 1915) ; Elzas, B. A., ‘Jews in South Carolina5 (Philadelphia 1905) ; Hapgood, H., (The Spirit of the Ghetto5 (New York 1902) ; Joseph, S., (Jewish Immigration to the United States5 (New York 1914) ; Ivay-

serling, M., (Christopher Columbus and the Participation of Jews in the Spanish and Por¬

tuguese Discoveries5 (New York 1894) ; Mar-

kens, I., (Hebrews in America5 (NTew York 1888; Morais, H. S., (The Jews of Philadel¬

phia5 (Philadelphia 1894) ; Straus, O. S., (Origin of Republican Form of Government in the United States5 (2d ed., New York 1901) ; Wheatley, R., (The Jews in New York5 (Cen¬

tury Magazine, Vol. XXI, pp. 323, 512) ; Wiernik, Peter, (History of the Jews in America5 (New York 1912) ; Wolf, S., (The American Jew as Patriot, Soldier and Citizen5

(Philadelphia 1895) ; Publications of the Jewish Historical Society (Vols. I-XXVI) ; (The Two hundred and fiftieth Anniversary of the Settlement of the Jews in the United States5

(New York 1905) ; (Jewish Encyclopedia5

(articles <(America,® ((United States,® (< Amer¬

ica, Judaism in®; also articles under the names of the various countries, States, cities, distin¬

guished individuals, organizations, . etc.) ; (American Jewish Year Book5 (annual issues) ; (Jewish Commund Register of New York City5

(1917-18).

Max J. Kohler,

Formerly Corresponding Secretary, American Jewish Historical Society.

22. PRESENT STATUS OF THE JEWS

THROUGHOUT THE WORLD. With the

voluntary and enforced emigration which marks the Jew in every age, and to which the past century was as little an exception as the present bids likely to prove, it is difficult to regard the status of the Jews as fixed for any length of time. The population is as shifting as condi¬

tions. Within the past three and a half decades there has been a Jewish migration of fully 2,500,000 from eastern Europe to western lands, and across the sea to North and South Amer¬

ica, Australia and South Africa. Even if the new environment be permanent adaptation takes- time, and one must be prepared for in¬

equalities in many ways. Yet it is possible to give an accurate and fairly comprehensive sketch of the present-day status of the Jews in every land.

Australia. — In the gradual settlement Jew¬

ish merchants and men of affairs took a prom¬

inent part, and as a result they have entered largely into colonial life,

and form an import¬

ant factor in its prosperity. Their population is about 20,000, with the greater number in New South Wales (7,000), Victoria (6,000), New Zealand (3,000), with communities in South and West Australia, Queensland and Tasmania. The discovery of gold in 1892 drew emigrants to West Australia, and a flourishing Jewish congregation exists' in Perth, although it is liable to decline, if the mines cease to at¬

tract, as happened in Coolgardie, where the synagogue built in 1896 was sold for a Masonic 138

 hall, owing to lessening numbers. Throughout Australia, in most of the capitals and many of the smaller towns, Jews have been mayors; the agent-generalship of New South Wales has been held by Sir Saul Samuel and Sir Julian Salomons. Many have sat in the various Par¬

liaments, and some have been colonial min¬

isters; for example, V. L. Solomon (1899), Premier of South Australia, and Sir John Vogel, long Premier of New Zealand. In Adelaide J. Lazar, J. M. Solomon and Lewis Cohen (1883-84) . have been mayors; M. Laza¬

rus has been president of its Chamber of Manu¬

factures. In Melbourne Edward Cohen was three times mayor, E. L. Zox being his suc¬

cessor in Parliament. I. A. Isaacs was attor¬

ney-general (1894-99), his brother J. I. was a member of Parliament (1894), other members being N. Steinfeld of Ballarat, Joseph Stein¬

berg of Bendigo, . F. J. Levien of Geelong, Theo. and B. J. Fink and D. B. Lazarus. In Sydney the name of J. G. Raphael is preserved in several of its streets; he with Charles Col¬

lins, L. W. Levy and J. J. Cohen occupied official positions; George J. Cohen, Richard Gotthelf and other Jews were presidents of the Chamber of Commerce; H. E. Cohen was one of the judges of the Supreme Court. In 1905 J. J. Cohen, Daniel Levi and A. E. Collins were members of the legislative assembly. It must be added that intermarriages have been very frequent in Australia, particularly in

Sydney. Exceedingly handsome synagogues

are in Sydney and Melbourne, and smaller ones elsewhere. The better class of Jews are well represented in professional and mercantile life.

In 1912 Arthur M. Myers was called to the New Zealand cabinet, and Hyman Herman ap¬

pointed government director of Geological Sur¬

vey of Victoria. In 1913 John Monash of Vic¬

toria made brigadier-general ; 1916, major-

general in the European War.

Africa. — It is not easy to give exact statis¬

tics as to. the Jews in Africa, but to follow the figures given by Isador Loeb, about 25 years ago their numbers were then 468,000 — the population of the different localities being Abyssinia, 200,000 (a palpable exaggeration) ; Algeria and Sahara, 43,500; Cape Colony, 1,500

(since then increased probably to 50,000) ; Egypt, 8,000; Morocco, 100,000; Tripoli, 60,000, and Tunis, 55,000. In Abyssinia exists a colony of Jews called Falashas, ˆemigrants,® who have other appellations in different parts of the country. Their origin is obscure, but they pre¬

serve Jewish, customs. Agriculture is their chief occupation. They are ignorant of He¬

brew, but preserve the Mosaic religion based upon the Ethiopic version of the Pentateuch.

They are found in various districts of Abys¬

sinia and have had an eventful history. In Algeria, the condition of the Jews was greatly improved by the French conquest, and their re¬

ligious status is on a par with the Jews of France. The consistory of Algiers has five congregations and 14 outlying communities ; Constantine's includes 21 communities and Oran 38. In 1891 Leroy-Beaulieu gave a total Jew¬

ish population of 47,564. Practically due to M. Drumont and the French Clericals anti-

Semitism raged in Algiers for some years, but has grown less violent. Of the Jews of Algiers a recent census showed a large proportion fol¬

lowed handicrafts. It has 19 synagogues, 13

being private. In South Africa the Jewish population may be stated to have reached nearly 50,000, including the Transvaal, 25,000; Cape Colony, 22,000; Natal, 2,000. Cape Town has four synagogues, and they are scattered in every district, the large influx of Russians be¬

ing noticeable. Kimberley's synagogue has a memorial tablet to Jewish officers and soldiers who fell in the Anglo-Boer War. Natal has two synagogues. Jonas Bergthal (1820-1901) was a member of the assembly, while in the 90's A. Fass and M. G. Levy held official positions; in the Orange Free State Isaac Bau¬

mann was twice mayor of Bloemfontein; M.

Leviseur and W. Ehrich have had civic honors.

In the Transvaal the Jews enjoy a large share of prosperity, and among the men of prom¬

inence can be mentioned Samuel Marks, the Barnatos, Neumann, Albu, Eckstein, Alfred Beit. In the Boer War about 2,800 Jews fought on the British side and many were in the Boer ranks. Jewish services are held in Rhodesia, where communities are growing' —Buluwayo has a synagogue, as well as in Bechuanaland and in Portuguese territory in Lourengo Marques. There are numerous Zion¬

ist societies, and the religious training of the young is steadily improving.

In Egypt, according to the census of 1907, –

the Jewish population numbers 38,635, of whom half are natives, half strangers. The condi¬

tion of the Jews has been greatly improved of late decades owing to the work of the Alliance Israelite Universelle (q.v.), which established many schools. Cairo has 10 synagogues in all, with 10,000 Jewish inhabitants. Morocco had in the 80's of the last century about 40,000 Jews, although widely varying estimates are given.

They are of two classes : the descendants of the early settlers, who are found mostly in the Atlas and hilly section ; and of those who sought shelter in Morocco from Spain and Portugal. The former, speaking the Berber, are antagonistic to modern ideas; the latter form, a progressive settlement, many speaking Spanish. In the ports they are fair linguists, are active in business, particularly in Mogador; and are employed by the foreign consulates.

With the exception of a few under foreign pro¬

tection all suffer from Moorish injustice, and are confined in the Mellah, or Ghetto, of each town. Such treatment has not been without its effect in making a spiritless people, who live in poverty, largely due to early child-

marriages, while superstitions abound. The Jews of Tripoli number about 20,000 and share the superstitions of their environment. They have 18 synagogues, small and large, and are engaged in commerce and trade. Nearly 5,000

live in neighboring towns. Tunis, a dependency of France since 1881, grants equal privileges to Mohammedans and Jews — the latter num¬

ber about 50,000 in the whole district — 30,000

of whom are in the city of Tunis. They are divided into two classes : the Tunsi, descendants of the .first settlers ; the Grana, descendants of the exiles from Spain and Portugal, and of Jews of Leghorn (Gorneyim). There are 27

synagogues, and while a few of the people are financiers and professional men, the great ma¬

jority are petty traders. The other 12 towns in the regency contain about 12,000 Jews. Dur-

ing the European War (1914-18) a Zion mule transport corps was formed at Alexandria com¬

posed entirely of Palestinian refugees.

Asia.— The Jewish population approximately is thus divided: Asiatic Turkey, 200,000; Asiatic Russia, 115,000; British possessions, 20,000; Persia, China, etc., 30,000; total, about 365,000.

They vary in their political status according, to the political complexion of the countries which hold sway — Turkey, Russia or Great Britain.

Their status has gradually improved — Turkey since 1876 has instituted a close approach to civil and religious freedom, and has frequently made Jews public officials. In Yemen, Kur¬

distan and Persia their condition continues less favorable. In Asia Minor, half of whose Jew¬

ish population reside in the vilayet of Smyrna, they are active petty traders and handicrafts¬

men; schools, including an agricultural one, and workshops, are making the outlook bright for the future. In Asiatic Russia, the Caucasus, some of the Jews (who numbered about 78,000

in 1918) have become Mohammedans and

Christians, and present strange types to the ethnologist. The Mountain and Georgian Jews present widely different traits. A curious sect are the Sabbatarians, who use Russian, not Hebrew, in their prayers, but conform to many Jewish customs. Siberia had 58,730

Jews, according to census of 1918. They have had to endure many exactions and their posi¬

tion is very anomalous ; yet they are welcomed because of their energetic business methods.

In Bokkara are about 5,000 Jews who wear a special badge and dwell in an enforced Ghetto.

The cotton trade is largely in the hands of the Jews. In the British possessions Aden has 2,500

Jews, who have almost monopolized the. trade in ostrich feathers. At least 25,000 reside in British India, the greatest number in Bombay, where the Sassoons have done so much to edu¬

cate and uplift the poor. In this city, too, can be found the Beni-Israel, a sect of black Jews, of whom about 5,000 live in Bombay and 2,000

elsewhere in the Bombay Presidency and about 2,500 in Calcutta. They speak the Mahrati and were originally oil men or oil pressers, as their native name implies. Many are educated men and have entered the professions. They have several synagogues, some very handsome. In Calcutta the Jews number many prominent men in trade. Although the vernacular of the rich Jews is Arabic, their habits and dress are European. Afghanistan has fully 40,000 Jews in the chief cities. They pay a war-tax, which exempts them from military service. They live in special quarters in the larger towns. Persia treats its Jews with continued exactions that have broken the spirit of the people, who en¬

gage perforce in the lowliest avocations.

Teheran has 5,500; Ispahan, where their con¬

dition is a little better, about 3,700. China has flourishing communities of foreign Jews at Shanghai and Hongkong, who deal largely in opium and cotton. A native body of Jews re¬

duced to 100 in number by the census of 1900

exists in Kai-Fung-Foo, in the province of Honan. Since 1870 their synagogue has been in ruins, and poverty has compelled them, to sell their possessions, sacred and otherwise.

Their origin is obscure.. They are probably from Persia and have interesting traditions.

In 1916 Palestine had probably 75,000 Jews, of whom 15,000 are in rural settlements, with Jerusalem, Hebron, Safed and Tiberias favored places of residence. The agricultural colonies show fair progress. Five hundred thousand boxes of oranges came from Jewish plantations at latest estimate. The wine trade is flourish¬

ing. The general credit and the schools, due much to the Hirsch

organization, are similar helpful agencies. There are in efficient work¬

ing order reforestration colonies, an industrial colony of Yemenites, an agricultural experi¬

ment station and a system of plant exchanges between Palestine and America. Despite an occasional locust plague and the disadvan¬

tageous results of the European War, the status of the Jews in Palestine is hopeful.

The successive appointments of Messrs. Mor-

ganthau and Elkus as ambassadors to Turkey have been a distinct benefit. Recent develop¬

ments are discussed under Palestine and Zionism.

Europe. — In Austria, with the dawn of free¬

dom in 1860, followed by the constitution of 1867, the status of the Jews began to improve, several were returned to Parliament and Baron Anselm de Rothschild was made a peer; in 1903 there were three Jewish members of the House of Lords, the brothers Gomperz and Baron von Oppenheimer, while many are uni¬

versity professors in various lines, with a full quota of journalists, musicians, dramatists, scientists, scholars. Vienna in 1900 had 146,926

Jews, with a large proportion of conversions to Christianity, 559 in 1900 and 617 in 1904, due doubtless to anti-Semitism in the capital.

They form one community, whose receipts in 1903 reached 2,243,449 kronen, expenses 2,147,-

506, and which is particularly rich in educa¬

tional and charitable institutions. Belgium has about 14,000, with larger communities at Brus¬

sels and Antwerp. In the latter city they num¬

ber about 9,000. One of their principal indus¬

tries is diamond cutting, which occupies about 750. Brussels has an important Jewish com¬

munity, with many charitable societies and rep¬

resentatives in the arts and learned professions.

Bohemia imposed some mediaeval exactions as late as 1849, and even in later years there have been occasional Czech outbreaks, but the gen¬

eral prosperity has been uninterrupted. Prague has the largest Jewish community (20,000), while in about 150 of the smaller towns are included 50,000. In Bosnia 4,000 out of the 7,500 Jews reside in Sarajevo, where many are lawyers, physicians and public officials. Bul¬

garia has 30,000, divided into 35 communities, the largest being Sofia, Rustchuk and Philip-

polis. Since the Alliance Israelite has opened its trade schools, trading has been supplemented by handicrafts. The general prosperity has been somewhat affected by popular hostility (see Judaism — Anti-Semitism) which pro¬

motes emigration to Turkey in Asia. Owing to their bravery in saving Sofia from destruction by the Turks in 1877, Prince Alexander decreed in 1879 that the fire brigade should be enrolled exclusively from Jewish citizens, with a place of honor at all processions. Denmark has 3,600

Jews, Copenhagen having the largest commu¬

nity (500), and include varieties of occupation from trade to agriculture ; in the latter calling are landed proprietors and peasants. There are many intermarriages with the non-Jewish popu¬

lation. It is only since 1849 that complete civil and religious liberty was proclaimed.

France, with its 150,000 Jews, of whom about 100,000 live in Paris, offers an example of practical assimilation, for despite the exist¬

ence of a certain social prejudice, many of them occupy prominent positions in every walk of life, in literature, art, science, law, the army, and in no other country do they include such an array of names

known beyond their own country. The patriotism and generosity of the wealthier representatives have done much to strengthen the Jewish status, which has gained morally by the Separation Law. While the Jews of France are conservative, a reform movement has just begun in Paris, whose sup¬

porters are sanguine of success. Paris has an extended number of Jewish institutions, re¬

ligious, benevolent and educational, with five large synagogues and many smaller ones. In 1912 M. G. Lippman was elected president of the French Academy, Ferdinand David Minis¬

ter of Commerce and M. G. L. Klotz reap¬

pointed Minister of Finance.

Great Britain. — The 175,000 Jews in Lon¬

don, forming the bulk of their number in the British Isles (estimated at 275,000), have at¬

tained the fullest civil and religious liberty, and their favorable condition has resulted in a fair, if not remarkable, display of talent in art, science, literature, the law and political life, while they have done more than their share in colonial expansion. They have held the office of mayor in a number of cities, including Lon¬

don, have entered Parliament where they be¬

long to different parties, such is their individ¬

uality. Their influence is such that again and again have imposing meetings been held by prominent Christian divines and leaders throughout England to protest against the spirit of persecution in Rumania, Russia and else¬

where. Within the past year or two the ques¬

tion of immigration has aroused much debate and ill-feeling, a new Alien bill was passed, whose real purpose was to check Jewish ar¬

rivals from Russia, not from any anti-Semit¬

ism, but a desire to prevent further overcrowd¬

ing in the east end of London. During the war in South Africa fully

1,000 Jewish soldiers par¬

ticipated. At present S. Alexander is professor of mental philosophy and E. Schuster of physics in the Victoria University, Sir Philip Magnus is one of the chief authorities in tech¬

nical education, Israel Abrahams is reader in rabbinics at Cambridge University, where lately C. Waldstein was Slade professor of fine arts.

Solomon Hart, S. J. Solomon and Simeon Solo¬

mon are prominent names in art, while S. L.

Lee, I. Gollancz, Claude Montefiore, Israel Zangwill are known in literature. The Jews of England have secured their present status largely because of the vigor with which they fought for their rights, and won public opinion in their favor, while their splendid record in philanthropy with names like the Rothschilds, the Goldsmiths, the Mocattas, the Montefiores, has done much to add to their fame. In com¬

merce and finance they number a large number of important firms in London, Manchester and Liverpool. The condition of the Russian ele¬

ment in the chief cities is more or less a prob¬

lem, whose solution requires patience and for¬

bearance. The younger element soon becomes English, but the older transplants to English soil the Ghetto atmosphere — a phenomenon which is seen all over the world. In 1902, according to official data, the sum of £111,639

was spent by London Jewish charities. Of the Russian and Polish Jews in London in 1901, amounting to 28,574 males, 24,863 females, it was found that 24,164 males and 5,358 females earn their own living in a great variety of trades. The Jewish population of Ireland in 1901 was given as 3,771, the bulk residing at Dublin, 2,200; Belfast, 450; Cork, 400. Rus¬

sian immigration is adding steadily to their numbers. Sir Otto Jaffe was lord mayor of Belfast (1899-1900), high sheriff a year later, and is now justice of the peace for that city, and counsel for Germany. Lewis Harris and his son, A. W., were aldermen of Dublin ; Trinity College, Dublin, has graduated many Jewish students. Scotland has almost its entire body of Jews in Glasgow and Edinburgh, about 9,000 in all ;

there are congregations in Dundee, Aberdeen and Greenock. Recent immigration has built up the Scotch communities. Glasgow has 7,000 Jews, with three congregations, with several benevolent and educational societies.

Two of their representatives are justices of the peace. Herbert Samuel was appointed Post¬

master-General of Great Britain, and Edwin Samuel Montagu member of the cabinet, in 1915; Sir Rufus Isaacs, Lord Chief Justice in 1913, made Lord Reading more recently.

In Germany's various sections before the war of 1914, the Jewish status was dis¬

tinctly favorable, after centuries of conflict which has not wholly died away. Baden in¬

cludes 27,000 Jews in 15 rabbinical districts, who enjoy equal rights with the other inhabit¬

ants. Bavaria numbers 55,000, with a long list of names who are adding to its strength in trade and industry and scholarship. Some are members of the Bavarian Diet, others are prom¬

inent in law and the learned professions.

Fuerth has a number of Jewish industrialists in mirrors, bronzes, toys and hardware, leaders in their line. In Nuremberg, Fuerth and Bam¬

berg they control the hop business ; the cattle trade is entirely in the hands of the country Jews. In the duchy of Brunswick about 2,200

reside. In Elsass-Lothringen, despite the emi¬

gration of many Jews after the annexation, about 37,000 reside in the province, chiefly in Strassburg, Muhlhausen and Colmar; they are largely manufacturers and merchants. Hesse-

Cassel has 18,500; Hesse-Darmstadt in its three districts about 26,000, with numerous educa¬

tional and charitable institutions, and with every calling open to them. Prussia in 1900

had a Jewish population of 392,332. Of its chief cities, Berlin has 19 synagogues and numerous educational and benevolent institu¬

tions, with a brilliant coterie of prominent names in all the arts and professions, trades and. industries, many being authorities in their callings, and prolific contributors to art, sci¬

ence and literature. There are fully 110,000

Jews. Breslau has about 25,000 and here, too, in the various professions, particularly med¬

icine and the natural sciences, they number very eminent names. They are in every trade and manufacture, and hold many chairs in the university. Hamburg has about 20,000. Within recent years it has had some prominent repre¬

sentatives in different fields — with many in¬

stitutions, such as schools, hospitals and syna-

gogues. Hanover has a prosperous community of about 5,000, who number leaders in com¬

merce and trade. Saxony, where the Jews were late in securing complete freedom, had in 1904, 12,196, 7,000 being in Leipzig and 3,059

in Dresden ; in both cities they are identified with the chief industries. In 1900 the Jews of Wurtemberg numbered 1*1,916. The criminal status of the whole population in that year was 0.089 per cent; of the Jews, 0.083. Many char¬

itable institutions abound, and ‘there are hand¬

some synagogues in the chief cities. In Stutt¬

gart in 1903 there were 3,015 Jews, who include manufacturers, lawyers and merchants of note, while they are members of the city Superior Court and of the faculty of its polytechnic and its conservatory of music. In 1912 Dr. Har-

burger of Munich University was made presi¬

dent of Senate of Supreme Court, Max Lieber-

mann Senator of the Academy, Judge Wolfs-

thal of Ratisbon, Attorney-General. Greece has 10,000, with about 4,000 in Janina and Prevesa in Epirus, including Corfu, 4,000; Larissa, 2,750; Athens, 400. In Athens the majority are of Levantine-Spanish descent, and are peddlers or artisans. In Corfu they are exporters and manufacturers. There are no restrictions on their progress in Greece under the present gov¬

ernment. Although it was not until 16 May 1896 when Hungary declared Judaism a ˆlegally recognized religion, the Jews have long at¬

tained prominence in varied lines of political, industrial, scientific and artistic development, and contributed a long list of notable names.

They have founded important institutions for religion, charity and education, their new syna¬

gogues are among the handsomest in the Old World, and in their chief communities, Buda¬

pest (166,198), Szegedin (5,863), Temesvar (5,916), Presburg (7,110), they are prominent in every calling. In 1913 Budapest had a Jew¬

ish burgomaster. In 1912 the government cre¬

ated two chairs for the Talmud at the Buda¬

pest University.

In Norway, where Jews have been allowed to live since 1851, their present number is hardly a thousand, who are engaged exclusively in industrial pursuits and are on- the whole prosperous. The majority reside in Christiania, with the rest in Trondhjem and Bergen. Ru¬

mania's treatment of the Jews, marked by con¬

stant exactions and 'neglect of the provisions of the Treaty of Berlin (1878), has not only reduced the Jewish population to less than 225,-

000, but made their condition pitiable in the extreme. Mediaeval conditions have led . to wholesale emigration — at least 80,000 having left between 1898 and 1905, chiefly to the United States; and unless exactions cease their num¬

bers are likely still further to decrease. Much poverty exists among the Jews, although there is a small wealthy class. From recent data as to

the Jews of Russia, it appears (1897) that they number 5,189,401 or 4.13 per cent, a figure which has been reduced by steady emigration from cities large and small to all parts of the world. In the Pale of Settlement reside 93.93

per cent of the Jewish population, or 11.46 of the total population. They are massed together most densely in northwest Russia and Poland, where they form 14 per cent of the entire popu¬

lation, figures which throw light on recent out¬

breaks. A number of agricultural colonies, 301

in number, including 10,721 families, with 68,-

959 population, who occupy 100,107 deciatines of land, exist in a number of governments, but these are necessarily limited. In 1898 the num¬

ber of artisans in the Pale and Poland reached 500,986, or 13.2 per cent of the total Jewish population. Technical training having been only recently introduced, old-time methods of learning prevail, save in some of the larger cities. Owing to keen competition the income of the Jewish artisans is insufficient to support their families, and extreme poverty with its at¬

tendant unsanitary surroundings prevail. In addition, in the Pale and Poland are 105,000

Jewish day laborers, about 2 per cent of the entire Jewish population. Without the Pale, in the interior of Russia (1893) were 1,948

Jewish workshops compared to 24,020 belonging to non- Jews, -being most numerous as tailors and metal-workers. Some idea of the great poverty in the Pale may be gathered from the number of loan associations, of homes of shelter for the transient poor, 226 in all, and similar institutions, of medical committees and hospitals, and of other charities for their bene¬

fit. From 1899-1918 the Jewish emigration to the United States, chiefly Russian, reached 1,548,594, due to political as well as eco¬

nomic conditions. It is not necessary to dwell upon existing legislation regarding the Pale, and until an enlightened government holds sway no permanent change for (he better is possible. Despite unfavorable circumstances, the scholarly abilities of large numbers of the Russian

Jews are evidenced by the Hebrew Renaissance among them, and the enthusiasm with which liberal studies are followed by thousands of young men and women. In liter¬

ature, journalism, archaeology, medical and natural science, jurisprudence, art, they show much activity. Old-time rabbinical education holds its own among the great majority of the people, while early marriages powerfully pro¬

mote poverty. In 1899 the percentage of- Jew¬

ish students to total number in the Russian universities was 10.9. According to the census of 1913, the Jews of all Russia number 6,946,090

souls, or 4.2 per cent of the entire population, and fully one-half of all the Jews in the world.

Yet they constitute 15.6 per cent of the resi¬

dents in urban centres. A striking illustration of Jewish concentration in towns is furnished by Berditscheff, where they number 41,617, or 78 per cent of the total population, or by War¬

saw, with 219,128, or 34.3 per cent. The birth rate of 1877 was 35.43 per 1,000, being less than other sections, except Protestants, 34.73.

The rate of illegitimacy in European Russia was small — 5.4 per 1,000 births; among the Catholics 36. In 1897 the Jewish death rate was 17.82 per 1,000 as against 34.28 for ortho¬

dox Christians, and 22.76 for Roman Catholics.

The predominant language among the Jews is Yiddish, 96.90 per cent of the entire population using that medium. For insanity the Jewish figure (9.84 per 1,000) is greater than that of the Poles and Russians (8.51 and 9.54), but much less than the Letts (13.75), and- the Ger¬

mans (15.04). The May laws of 1881, which restricted the free movement of the Jews out¬

side the Pale of Settlement (Russian Poland and 15 Russian provinces), set the stream of emigration into permanent motion toward all 142

 parts of the world. In one year alone (1904-

05), in consequence of the Russo-Japanese War and internal disorders, 92,388 Jews left the country. It is estimated ‘that in the past 20 years 1,123,000 have emigrated from Russia — more than o’ne-fifth of the whole of Russian Jewry.

(Consult Dr. Arthur Ruppin’s work issued by the German Bureau for Jewish Statistics.

Berlin: Jiidischer Verlag 1906). In regard to age distribution the Jews have a higher percen¬

tage of persons under 10 years of age, owing to lower infant mortality, but in consequence of this excess of children 100 Jews have de¬

pendent on them for support two more than the orthodox Christians, three more than Catholics and Mohammedans, and six more than Luther¬

ans. In Finland a movement took place in 1906

to give the Jews equality with the rest of the population. Bill granting full rights became a law 15 Feb. 1918. They are found at Helsing¬

fors and a few other places, and suffer from many political restrictions. Serbia, since 1889, has abolished all anti-Jewish laws, but the Jews take little part in public affairs until their equal¬

ity is more generally recognized by the people.

They number about 7,500, chiefly in Belgrade (4,500), including a few lawyers, physicians and engineers, with some state officials. Spain, whose early .settlement by the Jews is attested by a tombstone unearthed in Adra, with a Latin inscription, which dates back to the 3d century, has within recent decades opened her territory to the Jews, very few of whom have settled on its historic soil. In 1858, - under General Prim, the edict of expulsion was repealed, and in later years Senor Lapuya headed a movement to invite Russian emigrants to Spain, but with¬

out more than a limited response, although in time the settlers may be larger in number.

Madrid has about 25 families, who hold holi¬

day services — they came from Tunis, Moga-

dor, Lisbon, Alexandria, etc. In Toledo, where but a few reside, the government ordered the restoration of El Transito (see Synagogue), formerly a Jewish place of worship, but which had been converted into a church. Seville had (1905) 200 Jewish families, the majority poor, being emigrants from Tangier and elsewhere in Africa. In this connection the Jews of Portu¬

gal may be mentioned. Ln 1903 they numbered 500 persons, the majority being merchants and shipowners. According to the constitution of 1826 they are not allowed to hold service save in-places not bearing the signs of a public house of worship. Lisbon has 400 Jews, mostly natives of Gibraltar, Morocco or the Azores.

A number are prominent in science, letters and the arts. There is one communal synagogue (1902), situated in an enclosure, and without any outward sign. The cemetery dates back to 1801. Switzerland, where civil and religious liberty exists apart from a statute (1903) de¬

claring illegal slaughtering of animals accord¬

ing to the Jewish ritual law, has fully 20,000

Jews, with congregations in the larger towns, Zurich being the most important, with 5,500

Jewish population, as international in character as the city itself. In the Cantoral Council are two Jewish representatives and at the university polytechnic and gymnasiums are several Tew-

ish professors and privat-docents. The Tews are mostly merchants, excluding the Polish and Russian immigrants who begin as peddlers but soon enter other callings. The canton of Bern has about 2,500, with many Jews as uni¬

versity professors. Basel has about 340 fami¬

lies.

Sweden grants full civil and religious free¬

dom to the Jews, barring a few privileges which neither they nor any other non-Lutherans can obtain. There are synagogues in all of the larger cities, with a total Jewish population of fully 5,000. Turkey in Europe and Asia had (1914) 260,000, of whom the largest number are in Constantinople, Adrianople, Salonica. The condition of the young people has improved owing ito the spreading of schools,

technical, agricultural and religious, by the Alliance Israelite, with 6,651 children in European and 6,299 in Asiatic Turkey. The Jews speak usually a mixture of Spanish and Hebrew, often a Judaeo-German dialect, and rarely Turkish, although they are making strong effort to speak the latter more generally.

They enjoy the same privileges as all ˆrayahs/

non-Moslem subjects. According to the con¬

stitution of 1876 the equality of all Ottomans is proclaimed before the law and in the short¬

lived National Assembly of the following year several Jews were among the members. The Jewish administration, before the European.

War, ratified by the sultan in 1865, consisted of three councils, a national assembly of 80, a tem¬

poral council of 7 lay members and a spiritual council of 9 rabbis. Of the various Turkish communities, Salonioa is the largest and most picturesque. While the majority are poor and engaged in all kinds of handicrafts and petty trade, the city has, with the professions repre¬

sented, 37 synagogues, with numerous chari¬

table institutions. Constantinople contains among other callings, some wealthy wholesale merchants and bankers. The only glass works in Turkey is carried on by a Jewish manufac¬

turer. The schools of the Alliance Israelite teach many handicrafts, but their graduates become largely accountants in financial institu¬

tions. The civil list in the Ministry of Public Instruction and the consular offices includes a number of Jews, 20 of whom are physicians and druggists. The Jews of Russia, Poland, Galicia and Rumania suffered severely in the European War, both in numbers and otherwise.

North America.— With increasing Russian

emigration within recent years, Canada's Tew-

ish population must reach at least 75,000, with 25,000 in Montreal, 5,000 in Manitoba, 8,000 in Toronto and 10,000 in Quebec. There are several agricultural colonies in the North¬

west, due to the gifts of Baron de Hirsch (1892), in a section called Assiniboia at three settlements. Jews have sat in the Canadian Parliament, Mr. Nathan of British Columbia being the first to attain the honor. In 1845

there was only one synagogue in all Canada; now they exist in Toronto, Victoria, B. C., Hamilton, Winnipeg (2), Halifax, Saint John'

N. B., Ottawa, London, Quebec. It is of inter¬

est to note that Christian sympathizers in Mon¬

treal, headed by theˆ Anglican bishop, contrib¬

uted to the fund in aid of the Russian refugees.

In their occupations the Jews are indistinguish¬

able from other citizens. United States — The history and development of the American Jews have alreadv been described (see Tews in America) ; it only remains to gather a few JEWS AND JUDAISM — ALLIANCE ISRAELITE UNIVERSELLE (23) 143

additional facts and note further tendencies.

In the effort to promote education, uplift the ' destitute, and Americanize the incoming masses of emigrants, the lines of demarcation between reform and orthodoxy seem to be becoming fainter, and a spirit of conservatism, free from fanaticism of either extreme, appears to be growing. Greater interest is being shown in agricultural and technical education, which will help in turning thousands to the soil, but divert thousands of the young to the arts and handicrafts. More energy, too, is being displayed in distributing emigrants from the congested centres of New York and else¬

where, although with increasing immigration the results are comparatively slight. Recent ar¬

rivals are of a better class on the whole, and include many who have ample resources. In the larger cities, however, the general character of the Jews is being unconsciously changed, owing to the gradual elimination of the dis¬

tinctively American, English or Portuguese type, and the appearance in every line of the Russian, who competes keenly with the less numerous German. But this is only a reflex of American phenomena in

general, as the emi¬

grant outnumbers the native, or appears to do so by reason of his aggressiveness in securing a foothold. The skilled Jewish laborers in New York city number (1915) 350,000; the great ma¬

jority belong to the United Hebrew Trades; two-thirds are Russian, being found as well in the silk mills of New Jersey, the machine shops of Connecticut and jewelry factories of Rhode Island. In 1903 in the New York State prisons out of 9,820 prisoners 257 were Jews; in the city prisons (1904) out of 3,251, 479 were Jews; in the Blackwell's Island workhouse for year 1904 were 1,036 Jews out of 19,520

prisoners. More than 80 per cent of the stu¬

dents in the City College are Russo-Jewish emigrants or the children of Russian Jews.

The chief lines of commerce in which the Jews in New York are thus given, in the order of importance : Clothing manufactur¬

ers, jewelry, jobbers, wholesale butchers, liquor dealers, leaf tobacco jobbers, cigar manu¬

facturers, cloak manufacturers, chamois im¬

porters, leather and hides, manufacturers of overshirts, watch importers, artificial flowers and feathers, furs, undergarments, lace and em¬

broidery, white shirts, hats and caps. Immi¬

gration since 1904 has largely increased these figures. In 1911 Jews occupied 2.984 farms with 30,000 persons engaged in agriculture, and two large schools, at Woodbine, N. J., and at Doylestown, Pa. The land value of these farms according to data of 1912 reached $22,-

194,335, and equipment value of $4,166,329.

In 1905 the real property of synagogues and Jewish charitable institutions in New York city, exempted from taxation, was valued at $13,558,100. With the gradual settlement of the Far West they are found among the pioneers in Alaska and the far Western plains.. The Jew¬

ish population in the United States in 1918 was 3..390.572.

South and Central America — While Jews are to be found in all the more prosperous cities of the South American continent, their numbers are very small, except in Argen¬

tina, where agricultural colonies exist, swell¬

ing the Jewish population to 110,000. Brazil has 4,000, and there are about 8,000 scat¬

tered in the other states. A few are found in Panama, with an old cemetery ; there is a small community in the City of Mexico. The Dutch colonies have supplied most of the 300

Jews in Dutch Guiana and Venezuela. Jews of German descent are the leading jewelers at Lima and Santiago. The only synagogues (2) are in Buenos Aires ; in Argentina many of the Russian colonists have found their way to the chief cities. The imperial purchase of land for colonization by Baron de Hirsch in¬

cluded over 17,000,000 acres. Their present condition is fairly reassuring, but they require continual support and they cannot be regarded as entirely successful. Mo'iseville, the oldest of the colonies, in the Santa Fe province, is the next prosperous, with 1,200 settlers, and a good outlook for the future. Mauricio, in the prov¬

ince of Buenos Aires, is less favorably situated and has 1,100 colonists. Clara, in Entre Rios province, is the largest, with 5,000 souls, who dwell in 19 villages. The future success of these colonies will depend on the independent character of the colonists. The equipment is thorough and has cost millions. In Santiago, Chile, there are many Jewish merchants of prominence but no organized congregation.

West Indies. — Jewish activity in these islands was early displayed and is still con¬

tinued, although fluctuating from time to time, and declining sadly in some places. At Saint Thomas, once the seat of an important Jewish community, hardly 50 survive. Jamaica shows a similar decline, with its diminished commer¬

cial importance. Its former historic settlements at Spanish Town, which had two congregations 60 years ago, Montego Bay, Falmouth and La-

covia have passed away. Kingston has one fair-sized congregation since the merger of. the two existing in 1900. The Jews hold positions

of prominence in various lines but. lose many of their best material through emigration to England or the United States.. The hurricane of 1831 brought about a decline in the pros¬

perous Barados community whose numbers

have dwindled to hardly 20. Curagoa has an influential body numbering about 1,100 in two congregations, including lawyers, physicians, druggists, merchants, members of the executive and colonial councils, judges, bank presidents and officers in the militia. The Jews of Suri¬

nam number 1,500 and occupy a promi¬

nent position, being large property-owners.

Bibliography. — For the present status of the Jews, see Jewish Year-Books, issued annu¬

ally in London and Philadelphia,, as well as annual reports of Union of American Hebrew Congregations, Deutsche Gemeindebund,. Alli¬

ance Israelite, Anglo-Jewish Association, American Jewish Historical Society and similar societies. E. Adler's (Jews in Many Lands >

(Philadelphia 1905) throws light on the con¬

dition of the Jews in the East and in scattered communities.

Abram S. Isaacs,

Professor of Semitic Languages, New York University.

23. ALLIANCE ISRAELITE UNI¬

VERSELLE. An organization with head¬

quarters at Paris, France, having for its purpose the protection, improvement and edu¬

cation of the Jewish people. Its activities have been directed, in the main, toward safeguard-

 ing and educating Jews in eastern Europe, Asia Minor and North Africa. During the first half of the last century several attacks made on the Jews by fanatical mobs, owing chiefly to false charges of ritual

murder, evoked fervent ap¬

peals for organization, to which apparently lit¬

tle heed was at first paid. Public sentiment be¬

gan to crystallize after the Damascus blood ac¬

cusation in 1840. A temporary cessation of dif¬

ficulties produced indifference to the needs of organization when, on 23 June 1858, the world was startled by the announcement of the de¬

tails of the Mortara case. Edgar Mortara, aged six, a son of Jewish parents, was forcibly ab¬

ducted from his parents' home in Bologna by papal soldiers on the grounds that four years earlier, during a supposed spell of sickness, a servant, Anna Morisi, had secretly baptized the child.

Origin of the Alliance. — Public sentiment now became inflamed. The need of some cen¬

tral organization to watch over Jewish interests was keenly felt and the (< Alliance Israelite Uni-

verselle,® founded in 1860, was the result. Six Parisian Jews, at that time but little known, but whose names have since become almost house¬

hold words in Jewry, were chiefly instrumental in founding the society. They were Aristide Astruc, later chief rabbi of Belgium ; Isidor Cahen, editor of the (Archives Israelites-* ; Jules Carvallo, civil engineer; Narcisse Leven, law¬

yer; Prof. Eugene Manuel; Charles Netter, merchant.

Objects. — The object of the Society is: ((To defend the honor of the Jewish name whenever it is attacked; to encourage, by all the means at our disposal, manual labor and the pursuit of useful trades and professions ; to combat, whenever necessary, the ignorance and vice resulting from oppression; to contend, by the power of persuasion and moral influence, for the emancipation of our brethren who still suf¬

fer under the oppressive burden of exceptional legislation ; to advance and promote the com¬

plete enfranchisement of our brethren by in¬

tellectual and moral regeneration.® Article I of the Society's Statutes states its object: <((1) To toil everywhere for the emancipation and moral progress of the Jewish people; (2) To extend effective help to those who suffer persecution because they are Jews; (3) To en¬

courage all publications calculated to promote these ends.®

Management. — The Alliance is managed by a central committee of 62 persons, 23 of whom reside in France and 39 in other countries. Its headquarters are located at 35 Rue de Trevise, Paris. The central committee is elected for nine years, one-third of the members retiring at the end of three years, being, however, eligible for re-election.

Methods. — The modus operandi of the Al¬

liance is solely along lines of moral force. The results achieved have, therefore, been slow of growth. They are, however, permanent in char¬

acter and are beginning to bear fruit in the most unmistakable manner. The work has nat¬

urally divided itself into three branches, (1) political; (2) educational; (3) literary. Politi¬

cal activity has not been resorted to with a view of intermeddling in the affairs of the powers, but of appealing to political leaders to secure justice. The necessity for such work arises from the fact that the Jews are followers of a religion which has no government to support it.

Political Activities. — While the undertak¬

ings of the Alliance in this direction have not been uniformly successful, they have served to stir the world's sluggish moral sense and in many important respects to improve the politi¬

cal status of the Jews. Switzerland and Sweden first yielded to the appeals of the Alliance and after these initial successes, Russia and the Bal¬

kan provinces were the European countries in which the strongest efforts were made, because in these lands the Jews suffered most from all kinds of disabilities. At the time when this society was formed the lot of the Jews in the Balkan provinces was most unfortunate. At its

instance remedial legislation was promised and when Adolphe Cremieux went to Bucharest in 1866 and pleaded with the Rumanian authori¬

ties, it was believed that Jewish emancipation had been effected. But conditions went from bad to worse, until in 1878 the Berlin Treaty in Article 44 (inserted in the main through the in¬

fluence of the Alliance), demanded recognition of the political rights of Jews in the Balkan provinces. Serbia and Bulgaria have been faithful to the terms of the treaty, but to this day Rumania considers the Jews as aliens, al¬

though the government in 1917 promised re¬

forms. Rumania remains the scene of great activity on the part of the Alliance, large sub¬

ventions being annually granted for charitable and educational purposes. In spite of persist¬

ent representations to the Russian government little success has been achieved in Russia. The political status of the Jews is that of aliens.

Social, economic, civil and religious disabilities of every character menace the progress of about 6,000,000 Jewish souls. During the famine of 1869, when Poland and the west-Russian provinces suffered, the Alliance came to the res¬

cue of the unfortunate, provided funds for the purchase of food, helped many to emigrate to Occidental lands, took charge of several hun¬

dred orphans and founded trade-schools for Russo-Jewish children in western Europe.

When the persecutions of 1881-83 were inau¬

gurated, when the <(May Laws® were put into operation and the Pale was again made the compulsory residence of millions of unhappy Jews, the Alliance again became an angel of mercy for them. Kishineff, Odessa, Kieff are names which recall the barbaric massacres of many helpless Jews, and during 1905 the Alli¬

ance became the agent of the world's bene¬

ficence, distributing over 3,000,000 francs among the sufferers. The soldiers wounded during the Russo-Japanese War, widows and orphans de¬

prived of their natural protectors during the massacres, 8,000 workmen rendered penniless through riots and mob violence, emigrants who sought opportunity and liberty in foreign lands, have all been efficiently assisted by the minis¬

trations of this ((universal® agent. With the ex¬

pulsion of the Tsar in 1917, a happier outlook was predicted for justice for the Jews of Rus¬

sia. In Mohammedan countries Jewish disabili¬

ties are of a different character. Here the peo¬

ple suffer from poverty and lack of education, rather than from political inequality. Still, large sums of money have been spent by the Alliance in Morocco, Tunis, Egypt, Persia and Turkey to protect the Jews from the violence

of the mobs incidental to the misrule prevail¬

ing in most of these countries. Its representa¬

tions have been strengthened by the interven¬

tion and support of the British and French, and, in recent years, of the American, consuls, with gratifying results. In 1914 Spain gave grants to schools in Tetuan, Larache and Al¬

cazar in return for making Spanish the lan¬

guage of instruction.

Educational Work. — The most hopeful

work conducted is the educational activities de¬

signed for intellectual and moral improvement.

The bulk of the world's Jewish population in 1860 resided in unprogressive countries and the intellectual status of the majority was

neces¬

sarily low. In 1862 a school was founded in Tetuan (Morocco), in 1864 another was opened in Tangiers and in 1865 a third was started in Bagdad. In 1880 there were 34 schools ; in 1890, 54; in 1899, 94 — 58 of which were for boys and 36 for girls, having an attendance of 24,000 pupils. To-day the Alliance conducts 132

schools, with an enrolment of more than 40,000

pupils, in Bulgaria, Turkey in. Europe, Turkey in Asia, Egypt, Tripoli, Tunis, Algeria, Mo¬

rocco and Persia. Schools are . free to the poorest children who also receive, free of charge, and at the expense of the Alliance,, a mid-day meal each day and one or two suits of clothes each year. Whenever possible the scholar must pay a fee, which in the case of the most prosperous is as high as 20 francs a month. The schools are open to children of all denominations, and non-Jews as well as Jews are found among the pupils and in¬

structors. In some localities night-schools for adults are now being conducted. A Rabbinical seminary was founded in Constantinople in 1897. In order to provide instructors for the 132 schools conducted by the Alliance, a normal school was founded in Paris in 1867.

As far as possible the teachers are selected from the communities in which they are to teach in later years, and are sent to Paris for tuition.

The ((Ecole Normale Israelite® has a. magnifi¬

cent building in the French capital in which hundreds of male and female students have re¬

ceived an education to fit them for their pro¬

fession. Theory and practice go hand in hand under the system of the Alliance. Elementary school education is supplemented by manual and agricultural training. On 5 April 1870 the Mikveh Israel (Hope of Israel) Agricultural School was founded in Jaffa, upon a grant of land of about 600 acres sympathetically granted to the Alliance by an imperial firman of the Turkish government. Fortunately for the undertaking M. Charles Netter was ready to devote his energies to the development of the school, whose existence was due to his sug¬

gestion and whose success has been greatly due to his initiative and

capable administration. M.

Netter died in 1882. The Jaffa Agricultural School has over 220 pupils. Graduates of this school have become the instructors of the col¬

onists who have settled on the Baron Edmond de Rothschild colonies in Palestine and in the de Hirsch colonies in Argentina. Another agri¬

cultural school was founded in 1895, in Djedei, a few miles from Tunis. A tract, of land, of about 3,000 acres was purchased, suitable build¬

ings erected and in a few years there was an enrolment of over 210 pupils. The Alliance also provides means of earning a livelihood vol. 16 — 10

through training given in the trade-schools. In 35 different centres of the Near East ((appren-

tice-schools® are conducted in which children are taught remunerative trades. The trade-

school in Jerusalem, founded in 1882, has been particularly successful.

Further Activities. — Another branch of ed¬

ucational work undertaken is directed toward the formation of public opinion concerning the Jews. It has spread abroad a knowledge of Jews and Judaism by means of help given to Jewish scholars by subventions granted to assist them while writing and publishing their works.

It is said that no important work referring to Jews and Judaism has appeared during the past 35 years without some assistance, being granted by this Society. The Alliance library consists of nearly 25,000 volumes.

Bibliography. — The bulletins,* annual,

semi-annual and monthly, published usually in French and occasionally in English, German, Dutch, Italian, Judaeo-German and Hebrew; (Publication of the 25th Anniversary of the Foundation of the Alliance Israelite Univer-

selleP issued in 1885, and published in French, English, German and Judaeo-Spanish ; ˆPubli¬

cation, > issued in 1896, containing a review of work done from 1860-r96; French pamphlet by M. Nissim Behar, American Agent of the Alliance.

J. Leonard Levy, D.D.,

Late Rabbi Cong. Rodeph Shalom , Pittsburgh , Pa.

JEW'S HARP, a small musical instrument held between the lips, the sound coming from the vibrations of a tongue . of metal, bent at a right angle, which is set in motion by being twitched with the. fore-finger. The sound is increased in intensity by the breath, and altered in pitch by the shape of the cavity of the mouth, which acts as a reflector. The name some de¬

rive from jeu, play, from the. fact of. its being a toy; but more probably it is a derisive allu¬

sion to the harp of David.

JEW'S MALLOW, a pot-herb. See Cor-

CHORUS.

JEWSBURY, Geraldine Endsor, English

novelist: b. Measham, ' Derbyshire, 1812; d.

London, 23 Sept. 1880. She was brought up under the care of her brilliant elder sister, Maria Jane Jewsbury (q.v.), and is chiefly re¬

membered for her friendship with Thomas Carlyle and his wife, although her writings were popular in her lifetime. She possessed a wide circle of friends, among them W. E.

Forster, Huxley and Froude. She met the Carlyles in 1841 and the friendship then formed lasted through Mrs. Carlyle's and Miss Jews-

bury's lifetimes. Her account of Mrs. Carlyle's early life is printed in Carlyle's < Reminiscences. >

She wrote for Charles Dicken's Household Words at his solicitation, and also contributed to the Athenceum and to the Westminster Re¬

view Author of the novels (Zoe> (1845); (The Half Sisters > (1848) ; (Marian Withers) (1851); (Constance Herbert (1855); (The Sorrows of Gentility) (1856); (Right or Wrong) (1859).

JEWSBURY, Maria Jane (Mrs. William

K. 'Fletcher), English author, sister of the preceding: b. Measham, Derbyshire, 25 Oct.

1800; d. Poonah, India, 4 Oct. 1833. She lost her mother at the age of 18 and thereupon as-

sumed the care of her younger sister and three brothers. Her first published verse appeared when she was about 18 and she later adopted literature as a profession. She held the ad¬

miring friendship of Wordsworth, Miss Landon and other notables and her work was well-

received. She married a missionary in 1832

and died of cholera 14 months later. Author of (Phantasmagoria, or Sketches of Life and Character (2 vols., 1824) ; (Letters to the Young* (1828) ; (Lays of' Leisure Hours) (1829) ; (The Three Histories: The History of an Enthusiast, — the History of a Nonchalant, the History of a Realist* (1830; 3d ed., 1838).

JEX-BLAKE, Sophia, English physician :

b. Sussex, January 1840; d. Sussex, 7 Jan. 1912.

She was the daughter of a physician, studied medicine in Boston, Mass., 1866-68, and re¬

turning to England matriculated at the Univer¬

sity of Edinburgh. Here her action in attempt¬

ing to enter the medical profession aroused the greatest hostility; she was mobbed and eventu¬

ally excluded from the classes; legal proceed¬

ings taken, on her behalf proved unsuccessful on appeal ; and she subsequently graduated at the University of Berne. She was a pioneer in the higher education of women, and it was her sacrifices that opened the way for women students in medicine in British universities.

She founded the London School of Medicine for Women in 1874, the Edinburgh School of Medicine for Women in 1886; and practised in Edinburgh from 1878-99.

JEZEBEL, the Phoenician wife of Ahab,

king of Israel. She was the evil genius of her husband, favored the idolatrous worship of Baal in Palestine, and persecuted the prophets of Je¬

hovah. Her name left a dark stain upon the annals, of Israel and survived to the later dis¬

pensation where it occurs in the Book of Reve¬

lation (Rev. xi, 20) as a symbol of feminine depravity and impiejy. She outlived Ahab by 14 years (2 Kings ix, 30-37), and was finally murdered by Jehu, when he captured the throne of the northern kingdom (about 843 b.c.).

Consult Schmidt, N., (The Sins of JezebeP

(in Journal of Biblical Literature , Boston 1915).

JHELAM, je'lam, or JHELUM (ancient

Hydaspes), a river which has its rise in Kash¬

mir. An octagonal tank has been built in a garden at Vernag, and into this reservoir flow springs from the Western Himalayas, which form the head waters of the Jhelam. The river flows northwest to the Wulur Lake, about 10

miles from Srinagar; then southwest and north¬

west, forming a curve from Wulur Lake through Barambula Pass to Mazufurubad,

where it turns south, . and flows along the boundary between Punjab and Kashmir, a dis¬

tance of about 100 miles. Leaving the boundary line at Jhelam it flows southwest into the Chenab River. Its whole course is about 500 miles, nearly all of which is navigable. The first part of its course is through remarkable mountain scenery and the last through a rich agricultural region. It is the thoroughfare for a number of large cities, and small towns. This is the river upon the banks of which Alexander the Great built a war fleet in 326 b.c. and fought a battle with Porus.

JICARILLA, a tribe of North American

Indians of Athapascan stock, originally occupy¬

ing portions of Arizona and New Mexico but now settled on a reservation near Tierra Amarilla in northern New Mexico. The tribe at one time comprised two bands, the Llanero and the Ollero, ranging on different banks of the Rio Grande. The name <(Jicarilla** is sup¬

posed to be of Spanish origin, from ((jicara,**

a basket tray, the tribe being famed for its skill in basket weaving. At one time they were the terror of their district, but they now live quietly although they remain uncivilized. Their language is similar to that of the Apaches and they are believed to be an offshoot of that tribe although they maintained their independent ex¬

istence. The tribe is steadily decreasing, now numbering less than 700.

JIG, in music, a light, quick tune or air to be found in the sonatas of Corelli, Handel and other composers till toward the middle of the 18th century. The Irish jig, played to a dance also called a jig, is a lively tune of two or three sections written in 6-8 time. The jig is popular among many nations, is distinguished by vari¬

ous titles and has a certain amount of, differ¬

ence in the steps according to the habits and customs of the people by whom it is adopted.

With some it is a sober, steady country dance ; with others it is a wild, savage exercise, with¬

out point of meaning. With some it is made a means of displaying the agility of the lower limbs of a combined company of dancers ; with others it is a terpsichorean drama for two per¬

formers, in which all the emotions excited by love are represented by

gestures and cries.

In mechanics, a device for holding a casting, stamped work, etc., in position for machining, drilling, etc.

In ore-concentration, a box in which sized ore may be shaken.

JIGGER, the corrupt current form of

<(chigoe,** the South American name of a small arachnid, or red bug (Sarcopsylla penetrans), which abounds in tropical America, and is troublesome by working its way under the skin, especially of the feet, where, unless speedily removed, it produces eggs and forms a bad sore.

JIHAD, ji-had', JEHAD, or TIHAD

(Arab. ®zeal, endeavor®), the term applied to the religious war, as undertaken by Moham¬

medans against those who did not believe in the mission of the Prophet, for the purpose of pro¬

moting the spread of Islam. The Jihad was a religious duty, imposed upon the faithful both by the Koran and the concurrence of sacred tradition. Its purpose was ostensibly the Mo-

hammedanization of the unbelieving, and it was carried on in a systematic manner. The dis¬

position of the peoples conquered in the Jihad was prescribed by law. Captives and others who fell into the hands of the Mohammedan hosts had the choice of three things given them.

Either they were to deny their own faith and accept that of Islam, or to consent to pay a toll tax to their conquerors. If they refused both of these alternatives they were put to death by the sword. Consult Baillie, (Of Jihad in Mo¬

hammedan Law) (1871) ; Hughes, T. P., (Dic¬

tionary of Islam* (1886).

JIMENEZ DE RADA, Rodrigo, Spanish

archbishop and historian : b. probably Puente la Reina, Navarra, about 1170; d. 1247. He studied at Paris, entered the Franciscan Order and

1210. He was a dominant figure of his time, a learned writer, statesman, warrior and coun¬

sellor of kings. He was engaged at the battle of Las Navas de Tolosa, and commenced the building of the cathedral at Toledo, and founded the first general schools there. His work as a historian was of great importance and influence.

Author of (Historia GothicaJ better known as (Chronica Rerum Gestarum in Hispania,* which he translated into Castilian, (Historia de los Godos> (1241).

‘JIMMU TENNO («Son of Heaven®),

originally KAMU-YAMATO-IWARE-BIKO,

first ruler of Japan and legendary founder of the reigning line of mikados. He was supposed to be the great-grandson of the grandson of the sun-goddess Amaterasu and the first human ruler of Japan. The name wJimmu Tenno® is supposed to have been given him 14 centuries after his death. While Japanese annalists place his reign as beginning at 660 b.c., there is small ground for crediting Japanese chronology before the 5th century, as the (Records* of Ancient Matters) are without dates. However, 660 b.c. is generally accepted as the beginning of Jimmu Tenno’s rule, in which year he was supposed to have been crowned. He died at his palace of Kashiwa-bara in 585 b.c., his age being reckoned 127 by the (Chronicles of Japan-*

and 137 by the (Records of Ancient Matters.*

The theory generally accepted concerning the origin of Jimmu is that if he actually existed he was the leader of an invading band of Mon¬

golians from the Korean peninsula. The Jap¬

anese calendar dates from the supposed begin¬

ning of Jimmu’s reign, and his day is set as 11 February.

JIMSON-WEED. See Datura.

JINGAL, jm’gal, a large heavy musket used in eastern Asia, especially by the Chinese. It is fired on a rest, or swivel, from a wall, or the

bulwark of a boat or ship.

JINGO, a word first used as a political term in the Russo-Turkish War of 1877-78, and was applied to a class of British politicians who continually urged on Disraeli, then the Prime Minister, the necessity of taking sides with the Turks. The word was adopted from «McDer-

mott's War Song® — that is, the song sung in music halls by McDermott and very popular at the time. The chorus ran thus :

We don't want to fight, but, by Jingo! if we do, We've got the ships, we've got the men, we've got the money, too.

((Jingo® is used to denote any person in favor of aggressive military policy.

JINGO-KOGO, legendary empress of

Japan, wife of Chuai Tenno, 14th Mikado (191—200 a.d.). Upon the death of her husband she assumed control of the government, reigning until 270. Chuai Tenno died while , on ˆan ex¬

pedition to suppress an insurrection in Kiushiu, and his wife, concealing his death, left the campaign in the hands of a general while she proceeded with a great force to conquer Korea.

After her victorious return, her son, Ojen Tenno, 15th Mikado, was born and Jingo Kogo continued to reign as regent. The son was afterward canonized as Hachiman, god of war.

While there is little doubt that the invasion and conquest of Korea are largely mythical there are references in Chinese history, usually more accurate, which indicate the existence of this empress at the period credited by Japanese his¬

torians. There is further reference to her in the annals of Japan, when her step-brothers vainly endeavored to prevent her return to Yamato and to bar her son's succession. She is still worshiped in Japan.

JINN, DJINN, or GENII, a class of

spirits in Arabian folklore and mythology. They are lower than the angels and are made of fire, but are capable of appearing in both human and animal form; and if good are beautiful, while if bad they are hideous. They are sup¬

posed to exercise supernatural influence, which may be either goor or bad. While supernatural they are supposed to live, propagate their kind and die as humans do, except that the duration of their lives is greater. Their home is the mountain Kaf and their rulers are kings named Suleyman, or Solomon, one of whom is sup¬

posed with their aid to have built the Pyramids.

In current translations of the (Arabian Nights) they are called ((genii® ; but this, while generally passed, is not to be taken to mean that they are identical with the genii of Roman mythology.

JINRIKISHA, jm-rik'e-sha, man-power-

carriage, a light vehicle balanced on two wheels, with projecting shafts and cross bar, within which a man steps and pulls. The jin-riki-sha was given a name oy the Japanese, with one of those many hundreds of modern word-coinages with Chinese characters, created since contact with foreigners, and which the Chinese them¬

selves have accepted. The common native term in use is kuruma (wheel). Foreigners usually clip one word of the combination, making it ((rick-shaw,® while the. Japanese usually say jin-riki — both vulgarisms. This vehicle, which has gone round the world and is in es¬

pecial use where labor is cheap, was invented in 1871, at Yokohama, by the Rev. Jonathan Goble, who died in May 1898. He was an American Baptist missionary and formerly a marine in the United States navy, under Com¬

modore Perry. With meagre salary and hav¬

ing a sick wife, and desiring to give her gentle outdoor exercise, he showed to a Japanese carpenter a picture of a baby car¬

riage in Godey's Lady's Book, and suggested the plan and form. The Jin-riki-sha quickly displaced the kago and palanquin, and is now in turn being displaced in Japan by the electric trolley car. Whereas in 1908 there were 165,995

jin-riki-sha in use in Japan, the number in 1916-17 was but 112,687, while stage coaches and private horse carriages (ba-sha), auto¬

mobiles, tram and steam cars (joku-sha), had multiplied in an extraordinary ratio.

JIRASEK, Alois, Bohemian novelist and

dramatist: b. Hronov, 25 Aug. 1851. He was appointed instructor in a gymnasium at Prague in 1888, and has devoted himself to the por¬

trayal of Bohemian history through medium of historical fiction and drama. Author of the novels

The drama

JIU JITSU (written also ju-jutsu and jiu-

jitsu), the Japanese method of personal attack and self-defense, literally meaning the art of 148

making one's opponent use his strength to his own disadvantage. There are many methods, but only one is recognized as official, that de¬

vised by Prof. Jiguro Kano, principal of the High Normal School of Tokio, and is taught to every officer and enlisted man of the Japanese army, navy and police departments. Included in the 160 feats of the Kano system are the ((serious tricks,® by which death may be caused at the will of the adept, and the process of Kuatsu or revivi 'cation, by which the appar¬

ently lifeless victim is restored to the full use of his functional powers. Jiu jitsu is not a system of muscle building by physical training, but rather a means of offsetting the effective¬

ness of powerful muscles, by performing the most skilful yet simple manoeuvres. The United States government has recognized its import¬

ance as science by having it taught at West Point and Annapolis as a special training. It is a scientific application of the knowledge of the weaker spots in the human anatomy to offense and defense. Such spots as the <(funny bone® are utilized to down an adversary; fingers are bent backward; an opponent's on¬

ward rush is utilized to trip him; he is en¬

couraged to uncover an armpit; he is pressed in the gland below and back of the ear; in short every trick that would be accounted "foul® in wrestling and boxing is the height of excellence in jiu jitsu. The study

and prac¬

tice of this art has been recommended to slight men and to women as a protection in case of assault. In professional jiu jitsu bouts the con¬

testants avoid being injured by rapping the floor with hand or foot, and thus acknowledg¬

ing defeat when an adversary has one in a position where he could inflict serious hurt.

Consult Skinner, (Jiu Jitsu> (New York 1904).

JIVARO, JIBARO.S, GIVAROS, or

XIVAROS, South American Indian race living in Ecuador and northern Peru about the tribu¬

taries of the upper Amazon. They are di¬

vided into numerous small tribes with individ¬

ual names, are wholly savage and their lan¬

guage has never been classified. They live chiefly by hunting and warfare, their weapons being lances and bow guns with poisoned arrows.. They are head hunters, drying and preserving their enemies' heads and also those of their own chiefs. Spanish settlements were made in their territory in the 16th century and missionaries established themselves there, but all were driven out by an uprising against them in 1599. They live in wooden houses, constructed with considerable skill, raise corn, beans and bananas, and possess the art of weaving.

JOAB, jo 'ab, the son of King David's sister Zeruiah, and commander-in-chief of David's army. He is first mentioned as the leader of David's men in an expedition against Abner.

When Joab treacherously murdered Abner in revenge, for the death of Asahel, David dared not punish the deed, and thus showed the as¬

cendency which Joab had acquired over him.

After David had been established king in Jeru¬

salem, Joab conducted all his wars with uni¬

form success. He remained faithful to him during the rebellion of Absalom. When he had slain that ungrateful son, David made a weak attempt to supersede him in favor of Amasa, the general of Absalom. Joab slew Amasa and resumed his post, a proceeding in which the king tacitly acquiesced. He further supported David by assisting in the murder of Uriah the Hittite. Toward the close of David's reign he joined in the rebellion of Adonijah, for which Solomon, by the advice of David, put him to death (1 Kings ii, 28-34).

JOACHIM, yo'a-Him, Joseph, Hungarian

violinist: b. Kittsee, near Presburg, 28 June 1831; d. Berlin, 15 Aug. 1907. He was of Jew¬

ish parentage and studied under Szervaczinsky at Budapest, with Bohm at Vienna and Haupt¬

mann at the Vienna Conservatory, and after appearances in concert continued his studies at Leipzig. He played in England in 1844. In 1849 he became concert-meister of the Weimar grand-ducal orchestra, of which Liszt was then conductor, in 1854—66 was solo-violinist and con¬

ductor of concerts to the king of Hanover, and in 1868 became director of the Hochschule fiir ausiibende Tonkunst at Berlin. He be¬

came known, both as an interpreter of the best music and as an executant, as the greatest vio¬

linist of his time, and particularly as a quartette player gained an almost classic reputation. His compositions include the (Hungarian Concerto*

in D-minor for violin and orchestra, his most important works; ballads, trios, overtures, marches and works for violin and pianoforte.

He played also in the famous quartette which included De Ahna, second violin ; Hausmann, 'cello, and Wirth, viola. Consult Moser, A., (Joseph Joachim* (Berlin 1904) ; and Bickley, Nora, (Letters from and to Joseph Joachim*

(London 1914).

JOACHIM, jo'a-kim, Saint, Order of, an order of knighthood founded 20 June 1755, under the title ((Order of Jonathan for the pur¬

pose of defending the honor of Divine Provi¬

dence.® It consisted of 14 dukes, princes, counts and nobles, and its grand master was Prince Franz Christian of Saxe-Coburg. Its object was by the establishment of com-

manderies to stir up the rich to philanthropic work among the lower classes. This order was still in. existence in 1820, but it has since then been dissolved.

JOACHIM DE FLORIS, Italian mystic

theologian: b. Celico, near Cosenza, Calabria, about 1145; d. Monte Nero, 20 March 1202.

Of noble birth he was brought up at the court of . Duke Roger of Apulia and in his youth visited the holy places of the East. Soon after his return he resolved to alter his manner of life and entered the Cistercian order at Casa-

mari. In 1177 we find mention of him as abbot of the monastery of Corazzo. He visited Pope Lucius III at Veroli in 1183, and Urban III at Verona two years later. He soon became dis¬

satisfied with the lax discipline of the monastery and retired to the solitudes of Pietralata, where with some followers he founded the abbey of San Giovanni in Fiore, on Monte Nero. He was befriended by the Pope and emperor and branch houses were established. He is best known however as the author of prophetic and polemical works, although in the 13th and suc¬

ceeding centuries many such works were put out under his name. Only those enumerated in his will can be deemed absolutely authentic.

These are (Concordia Novi ac Veteris Testa¬

ment;* (first printed at Venice 1519) ; (Ex-

positio Apocalypsis* (Venice 1527) ; (Psalter-

ium decern Chordarum) (Venice 1527) and various ((libelli55 against the adversaries of the sChristian name and faith. He divides the his¬

tory of mankind into three periods, which in the

tions were made in his works. Some of the opinions attributed to him were condemned at the Lateran Council of 1215. In 1255 others similarly attributed to him were censured by Pope Alexander IV, but the orthodoxy of Joachim was affirmed. Consult (Acta Sanc¬

torum5 (Antwerp 1643-86) ; Roussetat, Xavier, (Etude d'histoire religeuse aux 12e et 13e siecles, Joachim de Flores, Jean de Parma et la doctrine de l'evangile eterneP (2d ed., Paris 1867) ; Fournier, P. E. L., (Etudes sur Joachim de Flore5 (ib. 1909).

JOACHIMITES, a Christian sect having

its origin in the teaching of Joachim, abbot of Floris in Calabria (1145-1202). He was a visionary reformer. He fiercely attacked the corruptions of the Church. His hope and teaching was that there was to come an <(Age of the Spirit55 in which the Holy Spirit was to have its sway over the secular, beginning with 1260. Some of his teaching was Montanistic.

In turn his doctrines were influential with the Franciscans who accepted the idea of the Age of the Spirit; and the Reformers who saw the vision of a better church and therefore of a better world. Joachim and his followers based their vision on a genuine religious experience.

JOACHIMSTHAL, Austria, city in Bo¬

hemia, 12 miles north of Karlsbad, at the foot of the Keilberg and at an elevation of 2,365

feet. It is a mining and manufacturing town and originally was celebrated for its silver mines. The silver pieces known as <(Joachims-

thaler,55 and later shortened to ((thaler,55 were first coined here in 1518 or 1519. The silver mines are no longer important, but there are other mines of bismuth, nickel and zinc blend.

Manufactures include gloves, dyes, tobacco, paper, lace and dolls. Pop. commune 7,550.

JOAN, Pope, mythical female Pope, sup¬

posed to have occupied the papal chair in the guise of a man as Pope John VIII, 855-58. As there was no interregnum between Pope Leo IV, 847-55 and Pope Benedict III, 855-58, the story is undoubtedly pure fable; and moreover no mention is made of the supposed popess until the middle of the 13th century, contem¬

porary history being entirely silent on the mat¬

ter. The legend runs that Joan was of English descent but born at Ingelheim or Mainz, and that she loved a Benedictine monk with whom she fled to Athens disguised as a man. She attained great learning and after the death of her lover went to Rome, still in male attire, rose to be cardinal and finally was elected Pope.

She died in childbirth during a papal proces¬

sion, one legend having it that in a vision she was given choice between temporal disgrace and eternal punishment. The story was widely current from the 13th to the 1 7 th centuries and was first definitely refuted by a French Calvin¬

ist, David Blondel, in (Eclaircissement deˆ la question si une femme a ete assise au siege papal de Rome5 (1647) and in (De Joanna Papissa5 (1657). These volumes were ably supplemented by Johann Dollinger, (Papstfabeln des Mittelalters5 (1863; Eng. trans., 1872).

JOAN (jo-an or jon) OF ARC (Jeanne

d'Arc), the Maid of Orleans, heroine of France: b. Domremy, Basse Lorraine, now department of the Vosges, 6 Jan. 1412; d. Rouen, 30 May 1431. While she was still a girl she began to be deeply affected by the woes of her country, much of which was conquered by the English and their Burgundian allies, leaving only a small portion to th'e French king, Charles VII.

From about 13 she declared she heard heavenly voices, which at last became very definite in their commands to go to the aid of Charles and liberate France. At first she was regarded as insane, but eventually she found her way to the king and his councillors, and having per¬

suaded them of her sincerity, received per¬

mission to hasten with Dunois to the deliverance of Orleans. In a male dress, fully armed, she bore the sword and the sacred- banner, as the signal of victory, at the head of the army. The first enterprise was successful. With 10,000 men she marched from Blois, and on 29 April

reached Orleans with supplies. By bold sallies, to which she animated the besieged, the English were forced from their in-trenchments, and Suf¬

folk abandoned the siege (8 May 1429). Other successes followed; Charles entered Rheims in triumph ; and at the anointing and coronation of the king, 17 July, Joan stood at his side. She then asked to be allowed to return home, but at the urgent request of King Charles, remained with the army. She was later less successful and failed to capture Paris. On 24 May 1430

she entered Compiegne, then besieged by the Burgundians, and on the same day, in a sally from the town, was taken prisoner Subse¬

quently she was delivered to the English, who, with the University of Paris and the bishop of Beauvais, demanded her execution as a sorce¬

ress. She was taken to Rouen, and after a long mock-trial, accompanied with many shame¬

ful circumstances, condemned to death. On submitting to the Church, however, and de¬

claring her revelations to be the work of Satan, her punishment was commuted to perpetual im¬

prisonment. But pretexts were soon found to treat her as a relapsed criminal, and as such she was burned at Rouen, and her ashes were thrown into the Seine. She died with un¬

daunted fortitude. Her recantation _ is now doubted by some historians. Voltaire, in a notorious burlesque, (La Pucelle,5 Southey, Schiller and others have made her the subject of their verse. Schiller's drama, (Die Jung¬

frau von Orleans,5 still remains the worthiest monument of her fame. A revision of the trial was later had at the instance of her family, and she was declared innocent (1456). From 1875 the question of her canonization was dis¬

cussed at Rome, in 1902 she was pronounced ((venerable55 ; in 1909 she was beatified, and in 1920 she was canonized by Benedict XV.

Bibliography. — Bangs, M. R., (Jeanne d'Arc5

(Boston 1910) ; Dunaud, (Teanne d'Arc5

(Paris 1906) ; Fabre, (Proces de rehabilitation de Jeanne d'Arc5 (2 vols., ib. 1913) ; Fawcett, M. G., (Five Famous French Women5 (New York 1905) ; France, Anatole, (Vie de Jeanne d'Arc5 (Eng. trans., 2 vols., London 1909) ; Lang, Andrew, (The Maid of France5 (ib.

1908) ; Lanery d'Arc, Pierre, (Le livre d'or de 150

Jeanne d'Arc: Bibliographic raisonnee et analy-

tique) (Paris 1894) ; Lowell, F. C., (Joan of Arc> (Boston 1896) ; Luce, (Jeanne d'Arc a Domremy> (Paris 1887) ; Marin, (Jeanne d'Arc, tacticien et strategiste) (4 vols., ib. 1891) ; Marty, (L'Histoire de Jeanne d'Arc d'Apres les documents originaux) (ib. 1897) ; Oliphant, c Jeanne d'Arc> (London 1896) : Quicherat, (Proces de Condamnation et rehabilitation de Jeanne d'Arc > (5 vols., Paris 1841-49).

JOAN OF ARC, Personal Recollections

of, a historical novel by «Mark Twain" (S. L.

Clemens), published in 1896. It professes to be a translation by Jean Frangois Alden from the ancient French of the original unpublished MS. in the national archives of France, written by the Sieur Louis de Conte, her page and secretary. The historical facts are closely fol¬

lowed.

JOANNESIA, a genus of plants of the

family Euphorbiacece. J. princeps, the single species, is an inhabitant of Brazil. The wood is spongy and light, the flower yellow and large, and the fruit a gray nut which encloses two kernels in a double rind. The fruit is strongly purgative and is used by Brazilians as a remedy in cases of indigestion, jaundice and other diseases. Oil is pressed from these kernels, with which the natives anoint their limbs. It is said to be a good drying oil and excellent for painting. The rinds of the fruits, thrown into ponds, destroy the fish.

JOASH (or JEHOASH, as it is some¬

times written), king of Judah, was the great grandson of Ahab and grandson of the wicked Athaliah who sought to put him out of the

way. He was also a direct descendant of David. He was hidden away in a lumber-

room of the palace by an aunt. When

he was seven years old he was placed on the throne by the priestly party under the leadership of Jehoiada. On the whole his reign was a good one. He repaired the Temple and had the people taught

from the rediscovered roll of the law. The blot on his reign was the murder of Zechariah, son of his benefactor, Jehoida. Hazuel, the Syrian, invaded his kingdom but was bought off with immense bribes, including the Temple treasures. He was the victim of a painful malady and because of his loathsome condition was finally assassinated by his own servants.

JOB, a legendary character of Hebrew

literature whose history is poetically treated in the book of Job. He is said to have been a sheik of the patriarchal age who lived near the Arabian desert on the eastern bound¬

ary of Palestine. After repeated disaster and ruin, suddenly stripped of his possession, be¬

reaved of his children, himself smitten with leprosy, and his wife advising him <(to curse God and die," he gives way to despair, his friends even giving him but critical, philosophi¬

cal advice. Finally, however, by force of char¬

acter he rises superior to circumstances, and re¬

gains health, wealth and honor. The traditions handed down, according to early custom, in oral form, were committed to MS. about the 5th century b.c. While they have their origin in historical tradition, the events describing the life of Job are not regarded as literal history.

Some authorities contend that the book is purely a literary invention, a rabbi as early as the lalmud (Baba Bathra) (xv, 1), writing l(Job was not, and was not created, but is an allegory." See Job, Book of.

JOB, Book of. The supreme masterpiece

of ancient Hebrew literature, is one of the small group of world poems

that live as univer¬

sal expressions of the human spirit. The book takes its name from its hero, who is pictured as an ancient sheik living to the eastward of Palestine, on the borders of the Arabian Desert.

Already in the time of Ezekiel (Ezek. xiv, 14, 20), the name was famous as that of a right¬

eous man. It was perhaps two and a half cen¬

turies later than Ezekiel's reference that the unnamed author of the book made the ancient, traditional figure the hero of his great poem.

The exact date of the author and his work is undetermined, but the relation of the poem to the general development of Jewish literature places it most naturally in the last century of Persian rule or even shortly after Alexander's conquest.

In orderly structure, Job resembles Greek and other Western literary works much more closely than do most examples of ancient Sem¬

itic literature. The poem is framed by a pro¬

logue and epilogue in prose. These, presum¬

ably, give the substance of the ancient tradi¬

tional story as it had come to the author. It may be that their present artistic form is due to his genius, but the explanation of Job's suf¬

ferings given in the prologue is so foreign to the body of the poem, and the restoration of double the material blessings, in the epilogue, is so far below and so inconsistent with the thought of the poem that it seems as though the tradition was already too firmly established for the author greatly to modify its substance.

The prose sections, when taken together, give a dramatic account of a series of misfortunes that fell on Job in order to prove to the Satan, <(the Adversary," that disinterested righteous¬

ness does exist in man. Having endured the test with complete devotion to God, Job was re¬

warded with material prosperity twice as great as he had before. The prologue closes with the visit of Job's three friends who come to comfort him, but sit by him in silence for seven days. The great poem,

inserted between the two parts of the prose narrative, itself falls into three main divisions: (1) the discourses of Job and his three friends (chaps, iii-xxxi), (2) the speeches of Elihu (chaps, xxxii-

xxxvii), (3) the words of Jehovah and Job (chaps, xxxvni-xlii, 6). The Elihu section is best regarded as a later addition, made by some one who felt that the author had failed to pre¬

sent the orthodox point of view maintained by the friends with enough strength. The original poem would then be made up of the two great divisions — the debate between Job and his friends and the interposition of Jehovah when the friends have been silenced. The poem is much more impressive in this briefer form.

The first section is subdivided into Job's curse and three cycles of debate. In each cycle the friends speak in turn, followed in every case by Job, except that in the third cycle the third friend, Zophar, does not appear. Some of the words ascribed to Job in this section probably belonged originally to Zophar (xxvii, 7-11, 13-

23) so that the three cycles were complete. The notable poem on the unsearchableness of wis-

dom, near the close of the third cycle (chap, xxviii), belongs to no one of the speakers in ' the original debate and was probably introduced by some later hand.

In sharpest contrast to the prologue, the poem begins with Job vehemently cursing the day of his birth and longing for death. The friends are greatly shocked at Job's words.

Eliphaz urges that confession of sin would be appropriate; Job is no doubt a great sinner for trouble does not come without a cause. He exhorts the sufferer to seek unto God, who will greatly bless if Job accepts correction and does not despise the chastening of the Almighty.

Job admits that his words have been rash under his great calamity and again longs for death.

He adds pertinently that when one is ready to faint and is forsaking the fear of the Almighty, kindness should be shown him from a friend;

but his friends have proved as deceitful as the mountain torrents of Palestine which vanish under the summer's heat. He describes the horror of the disease with which he has been smitten, which gives him no respite day or night and then turns to bitter words toward the watcher of men who has set him up as a mark.

Bildad now speaks, and more bluntly than Eli¬

phaz had done, even suggesting that Job's chil¬

dren may have met their sudden, tragic death because of their sin. At the close, he too holds out hope; but Job now sees his hopeless case with his friends. If it. is true, as they believe, that God gives prosperity to the righteous and sends suffering to the wicked, then he is proven guilty, yet his conscience acquits him. His own suffering has opened his eyes to the fact that the time-honored dogma of material re¬

wards and punishments is not true to the facts ; rather wickedness prospers and it must be God who is responsible. If it be not He, who then is it? Returning at length to his longing for final release, he pleads with God for a little mercy before he goes to the land of the shadow of death. Zophar, untouched by the pathos of Job's plea, charges that God is exacting less than Job's iniquity deserves. In this first cycle of the discussion, the point of view of the friends becomes clear. They have inherited the noble faith bequeathed by the prophets and are earnest defenders of God's justice and mercy.

The prophetic doctrine that sin brings suffering to the sinner may be supported with much evi¬

dence. Job has had a personal experience, however, which has made clear to him the fact that material benefits are not always, appor¬

tioned on the basis of merit. In closing this cycle of the debate, Job sarcastically scorns the friends' traditional wisdom with which he is as familiar as they. They draw their .wisdom from the ancients; he tells them. that wisdom is with God and power too; but Divine justice he cannot find in human affairs. From man he turns to God, longing to speak directly with Him; he will take his life in his hand and ap¬

pear before the Almighty. Then the strength of the sick man fails. God's hand is upon him so that he cannot argue his case. He prays that he may be hidden in the grave till the wrath is past and then may have a hearing.

Thus Job is brought to the question: If a man die, shall he live again?

If Job could believe in a life after death, he could wait, but he sees only oblivion and sinks back in despair.

Already before this first cycle ends, the interest of the sympathetic reader has insensi¬

bly passed from the argument of the debate to the unfolding of Job's inner life. In the fol¬

lowing cycles the accusations of the friends be¬

come more direct, but they are able to add little that is new in support of their contention that all suffering is sent for sin. In the second cycle it becomes clear that all Job really asks of his friends is sympathy while he pursues his lonely quest through the darkness. It is God, not the friends, with whom he is really concerned. Once and again he rises to the momentary faith that his case is clear in heaven and that he will ultimately see God and find vindication. Under all his doubts there is the conviction that God must be just as well as powerful. Job's real quest is for a satisfying view of God which the current theology could not afford him. The friends who represent this theology are silenced but not convinced. The debate closes with a long discourse of Job in which he tells how in his former honored con¬

dition he had been accustomed to give sympa¬

thy to the wretched and defends himself against the charges of sin. Then he realizes that his defense is hopeless ; God does not hear and he is speaking in ignorance of the charge against him.

Omitting the Elihu speeches as an intrusion on the original complete poem, Job's wish is suddenly granted. Jehovah speaks out of the whirlwind, telling of his wisdom and power in the creation and control of the mighty forces of nature. In this section many feel that an interpolator had added the semi-mythical be¬

hemoth and leviathan (xl, 15 — xli, 34). With¬

out these the section contains the wonders of both the inanimate and animal worlds. In the speeches of the Almighty no really new thought is added to the faith that the Hebrew prophets had attained before the book of Job was writ¬

ten; but a splendid, dramatic presentation of the Divine wisdom and power seen in nature humbles Job; he feels that he had heard of God by. the hearing of the ear but that he now sees Him. In this vision he

rests humbled and content, not even thinking of arguing his case as he had hoped to do.

Like every great work of literature, the book of Job is a transcript from life as it is.

It reveals the negative power and the limita¬

tions of the critical intellect, the positive power and outreach of vision and faith. The. classi¬

fication of the poem has been the. subject of much debate. That it is dramatic is obvious; it may even be presented with some effective power upon the modern stage; yet the theory that the poem is a genuine drama, designed for action, is now generally abandoned. It is rec¬

ognized, indeed, that the ancient Semites did not develop any true drama, so far as our knowledge of their life and literature extends.

The work has in recent years been styled an epic, <(the epic of the inner life,® telling the story of the perilous quest and brave deeds of a typical Jewish hero whose exploits were in the sphere of the spirit. In external form it resembles epic rather less than drama, yet the recognition of the fact that the search for God is the essence of the poem is vital to its right understanding. Exact classification, of ancient Semitic writings under our categories of Indo-

European literature is not possible. The divi¬

sions of epic and dramatic poetry were made 158

for the description of Greek not Hebrew poetry.

That has its own forms, usually less rigid than those of Western writings. As yet they have defied thoroughly satisfactory definition. Al¬

though Job is a supreme world poem revealing ((the essentials of life in its greatness,® true alike to the 4th century b.c. and the 20th century a.d., in external form it is Semitic poetry, not Occidental. This statement is just as true of its general structure as it is of its genuinely Hebrew rhythm and metre.

Bibliography. — Barton, G. A., (Job) (in ‘Bible for Home and School, > New York 1911) ; Cheyne, T. K., ‘Job and Solomon >

(New York 1887) ; Cornill, C. H., introduc¬

tion to the Canonical Books of the Old Testa¬

ment® (London 1909) ; Creelman, H., intro¬

duction to the Old Testament (New York 1917) ; Davidson, A. B., Cambridge 1887); Driver, S. R., ‘Book of JotP (Oxford 1906), and introduction to the Literature of the Old Testament (New York, revised ed., 1914) ; ‘Encyclopaedia Bib-

lica) (New York 1901) ; Fowler, H. T., ‘His¬

tory of the Literature of Ancient IsraeP (New York 1912) ; Genung, J. F., ‘The Epic of the Inner Life> (Boston 1891); Gibson, E. C. S., ‘Job) (in ‘Westminster Commentaries* Lon¬

don, revised ed., 1905) ; Hastings, J., ‘Diction¬

ary of the Bible * (New York 1900) ; ‘Jewish Encyclopaedia > (New York 1904) ; Strahan, J., ‘Book of Job) (Edinburgh 1913).

Henry Thatcher Fowler,

Professor of Biblical Literature and History, Brown University.

JOBERT DE LAMBALLE, zho’bar de

lan bal, Antoine Joseph, French surgeon: b.

Matignon, 17 Dec. 1799; d. Passy, 25 April 1867. In 1825 he was made assistant in anat¬

omy for the faculty of Paris, then doctor of medicine and supplementary professor at the Ecole de Medecine. next surgeon for the cen¬

tral bureau of hospitals. In 1830 he became surgeon at the Saint Louis Hospital, and in his later years he worked in the Hotel Dieu Hos¬

pital, and was made professor of the external clinic of the Paris faculty. In 1854 he was ap¬

pointed surgeon to the emperor and was made member of the

Academy of Sciences in 1856.

He did valuable service in uterine diseases and invented cystoplastie by use of healthy tissue in the cure of vesico-vaginal fistula. His best-

known works are ‘Traite des plaies d’armes a feu) (Paris 1833) ; ‘Recherches sur les ap-

pareils electriques des poissons > (ib. 1858) ; ‘Etudes sur le systeme nerveux) (ib. 1838) ; ‘Traite de chirurgie plastique* (ib. 1849); ‘De la Reunion en chirurgie) (1864).

JOB’S TEAR, a stout grass (Coix lachry-

majobi), allied to maize, and sometimes six or eight feet in height. It is a native of tropical Asia and Africa, is naturalized in Spain and in other countries, and is sometimes grown in hothouses. The hard, round, shining seed-

capsules, from whose fanciful resemblance to tears the plant derives its name, are used in making rosaries and ornamental articles, as medicine by the Chinese, and as a staple food among some of the hill-tribes of northern India.

See also Grasses in the United States.

JOBSON, Frederick James, English Wes¬

leyan clergyman: b. Northwich, Cheshire, 6 July 1812; d. London, 4 Jan. 1881. After serv¬

ing as apprentice to a Norwich architect he en¬

tered (1834) the Wesleyan ministry preaching at Patrington, Yorkshire (1834), and Manches¬

ter (1835-37), when he became assistant at City Road Chapel, London. He was a delegate (1856) of the British conference to the Meth¬

odist Episcopal Conference held at Indianap¬

olis, Ind., and to the Sydney, Australia (I860), conference.. He advanced the publishing busi¬

ness of his denomination as book steward (1864-79) and superintended the issue of the Methodist Magazine for 12 years. At the Wes¬

leyan Methodist Conference (1869) he was elected president. His best-known works are ‘Chapel and School Architecture) (London 1850) ; ‘America and American Methodism*

(1857); ‘Australia; with Notes by the way on Egypt, Ceylon, Bombay and the Holy Land*

(1862) ; ‘Perfect Love for Christian Believers) (1864) ; ‘Serious Truths for Consideration (1864). In B. Gregory’s ‘Life of F. J. Jobson) (London 1884) are a number of his sermons.

JOCELYN, Nathaniel, American portrait

painter: b. New Haven, Conn., 31 Jan. 1796; d. there, 13 Jan. 1881. At 18 he was appren¬

ticed to an engraver, but after three years his early love for painting asserted itself and he established himself as a portrait painter at New Haven in 1820. He was for some time resident in Savannah, where he painted many portraits, but returned to his native town where his work was very popular and where from 1825 to 1835

he painted the portraits of many notables, not a few of which are preserved in Alumni Hall at Yale. His fame extended beyond the limits of his State and he exhibited at the Academy of Design on several occasions. At the age of 80 he painted ‘Ocean Breezes,* a successful work of fancy, and his only one. His portraits have been greatly, prized by critics. Jocelyn was a staunch anti-slavery man, and his home in New Haven was long one of the stations on the underground railroad. He was for many years the senior partner of a bank-note engrav¬

ing company in New York which subsequently became the American Bank Note Company, resigning from the latter in 1867.

JODHPUR, India, capital city of the Raj¬

put state Marwar or Jodhpur, in lat. 26° 17′ N.

and long. 73° .4′ E. It was built by Rao Jodha 1459 a.d.. and is located on the Luni, constructed like an amphitheatre and surrounded by a strong wall. On a high rock is the fort which contains the palace of the maharajah. The sacred suburb Mahamandil lies somewhat apart and is also1 fortified and is ruled over by the high priest of the empire. To the north are the magnificent ruins. of .the. forsaken (1459) cap¬

ital Mandor. This city is the seat of govern¬

ment and the. buildings are of good architecture and substantial construction as the neighbor¬

hood has a large stone supply. Here are lo¬

cated a high school, college, two hospitals, etc.

It is an important commercial centre and has a wheat market and electric-lighting plant.

Among its manufactures are beans, ivory'

lacquer wares, vegetable dyes, etc. Pop. 59,262!

JODHPUR, or MARWAR, India, tribu¬

tary state of the British East Indian province Rajputana. It is bordered on the east by the Aravalli Mountains whose watershed feeds the JOE PYE WEED — JOFFRE

river Luni which flows through the entire state, ending in the Great Rann. To the west it is ˆbordered by the Indian Desert. The climate runs to great extremes, frost often appearing in the winter season. There are several salt lakes from which salt is extracted in commercial quantities. In the irrigated sections are grown wheat and cotton. The best camels of India are raised here besides fine cattle, horses and sheep. Its exports also include wool, iron and zinc. Sugar, rice and cotton goods are the chief imports. The railway from Sindh to Agra bisects the state from west to east. Its maharajah has great governing power and re¬

ceives a big income from taxation and sustains a considerable army. Pop. 2,057,553.

JOE PYE WEED. See Eupatorium.

JOEL, one of the minor Hebrew prophets who lived in the 5th centurv b.c., a predecessor by a few years of Amos and Hosea, whose writ¬

ings are very similar in character. Outside of his writings, nothing is known of the author.

His style is that of a clear, calm, logical mind free from the doubts and

struggles that dis¬

tract the minds of other Hebrew poets and prophets. Without the strain and abruptness that characterize the writings of Hosea and Jeremiah, his language is smooth and flowing, the imagery is gorgeous in its profusion, and metaphor and hyperbole have to be interpreted to discern fact amid the maze of imagination and fancy. See Joel, Book of.

JOEL, Book of. The book consists of

two parts, which differ materially from each other in thought. Chapters i and ii, 1-27, except for possible later additions, were written in the midst of a plague of locusts and drought, re¬

garded as a punishment upon Israel; while chapter ii, 28-32 and chapter iii (chapters iii and iv in the Hebrew), make no mention of these circumstances but are dealing with the coming day of Yahweh, the final judgment on the nations. Until recently the whole book, or the most of it, has been regarded as the work of a single author; but now some maintain that the second part, or the most of it, is not by the author of the first part. This is on grounds of thought and style, neither reason, however, giving a sufficient warrant for this conclusion.

The probable view is that the most of the book was by a single author, the two portions, how¬

ever, being written at different times. There are a few later additions. These in the first portion are i, 15; ii, lb, 2, 10-11, 20. All these were designed to connect the first part with the thought of the second, in each case they are inappropriate in the context and interrupt the thought. In the second part iii, 4-8 interrupts the connection, and is to be regarded as a later addition.

Concerning the prophet, nothing is known outside of the book. His name means: <(Yahweh is God.® In earlier times the date was often thought to be pre-exilic. It is now generally recognized, however, that it is post-exilic. This is evident from iii, 2, from which it appears that the people are scattered among the nations.

There is no mention of a king, which points to the same period. The emphasis on the import¬

ance of the Temple services also strongly sug¬

gests the post-exilic period. Chapter ii, 32 is a direct allusion to Obadiah xvii, which was written after the exile. The allusions to foreign nations make no mention of Assyria or Babylonia, one of which is mentioned in every pre-exilic prophet except Amos, and doubtless alluded to there. Further, there is no mention of the northern kingdom, Israel, which ex¬

cludes the pre-exilic period except the last part.

The Temple is standing, as appears from fre¬

quent references, such as i, 13, hence it is after 516 b.c. Probably ii, 9 indicates that the wall of Jerusalem has been built, thus indicating the time after Nehemiah. The date about 400 b.c.

seems, therefore, most probable.

The thought of the book is in accord with the general teaching of the prophets, although it makes no material advance upon the messages given earlier. The author prizes more highly than most of the prophets the external worship, yet this is regarded as an expression of the realities of the inner life, ii, 13. He connects sin and punishment, repentance and national prosperity. He looks forward to the coming day of Yahweh, a general judgment upon the nations for their sins. In this time the true Israel, the faithful who call upon Yahweh, will be delivered, ii, 32, iii, 16; and will receive abundant blessing, iii, 18—21 . The conception of God emphasizes his power and his justice.

Bibliography. — Bewer, J. A., (JoeP ((In-

ternational Critical Commentary,* New York 1911) ; Driver, S. R., (J°d and Amos* ^Cam¬

bridge Bible,* Cambridge 1897) ; Smith, G. A., (The Book of the Twelve Prophets) (Ex¬

positor's Bible, * Vol. II, New York 1898).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

JOFFRE, zho'fr', Joseph Jacques Cesaire, marshal of France : b. Rivesaltes, Pyrenees, 4

Jan. 1852. He was educated at the College of Perpignan and in 1868 was enrolled at the fLcole Polytechnique as a student of military engineering. He joined the French army as second lieutenant during the Franco-Prussian War of 1870-71, and was in command of a battery during the siege of Paris. He returned to the Polytechnique after the war, was made a lieutenant in 1872, helped in the defense of Pontarlier in 1874 and became captain in 1876.

He served in Tongking under Courbet in 1883-

84, and under Dodds in Dahomey 10 years later.

He took part in the occupation of Timbuctoo in 1894 and in the Madagascar campaign of 1897 ; was appointed on his return professor at the Higher War School and in 1901 was made brigadier-general of a division. He organized the defenses of Formosa and in 1911 while in command of the Second Army corps at Amiens was made commander of all the French forces.

The Three Years' Service Law for the French army is largely due to his efforts. He is a dis¬

tinguished mathematician. At the outbreak of the war in Europe in 1914 he was chief of the general staff. He was placed in supreme com¬

mand of all forces, both British and French, on the western front. History will in all proba¬

bility laud him as the hem of the Marne.

With Von Kluck battering his way to Paris, Joffre doggedly refused to give battle, announc¬

ing that at his own time and on his own ground, and not before, would he make his stand. But when, finally, he issued his memorable . orders on the eve of Lafayette's birthday, in that gloomy September of 1914, <(Troops unable to advance should die where thˆv stand rather

than give ground to the enemy,® not a soldier wavered. The German was thrown back on the Somme front, Paris was saved and Joffre ascended to the council of France's heroes.

Joffre yielded the command of the forces in the field to General Nivelle in 1917, and became adviser of the general staff at the war office.

In April 1917 ‘he was made a member of the French High Commission to confer with the government of the United States on the con¬

duct of the war. Everywhere in America he was hailed as (

mand for his many little deeds of kindness along the battle line and men in high places respect him because, shortly after he assumed supreme command, he cashiered several gen¬

erals for inefficiency, without regard to friend¬

ship or political influence. He has published (My March to TimbuctooP

JOGUES, zhog, Isaac, French missionary

among the North American Indians : b. Orleans, 10 Jan. 1607 ; d. Ossernenon, near the present Auriesville, Montgomery County, N. Y., 18 Oct.

1646. He became a Jesuit at Rouen in 1624, and, after some years passed in study and teach¬

ing, was ordained in 1636. At his own request he was immediately sent to the Huron mission in Canada. In 1639 he undertook a mission to the Tobacco Nation, in 1641 preached to the Algonquins at Sault Sainte Marie, not long after went to Three Rivers for supplies for the Huron Mission, and upon his return was cap¬

tured by the Mohawks and severely tortured.

He remained among the Indians as a slave, until the summer of 1643, when he made his escape to the Dutch settlement of Rensselaerswyck (Albany), and was conveyed thence to New Amsterdam. He finally reached France, where he was treated with great consideration, and invited to court. Returning to Canada, he traveled to the Mohawk country in May 1646, in the capacity of an ambassador to conclude a treaty between that people .and the French.

Ascending the Sorel, he passed through Lake Champlain and Lake George, which he named Lac Saint Sacrement. Having ratified the peace he returned to Quebec, and after a few days’ rest set out for the

Mohawks again, this time as the founder of the Mission of the Martyrs. He was soon tortured as a sorcerer, and finally killed. Consult Martin, trans. by Shea, (Father Isaac Jogues> (1896); Parkman, (The Jesuits in North America) (1898). See Jesuits.

JOHANNES SECUNDUS, Latin poet : b.

The Hague, 14 Nov. 1511; d. Doornyk, 24 Sept.

1536. His actual family name was Jan Nicolai Everaerts. He studied law at Bourges, then turned to art, traveling through Italy and Spain and becoming secretary of Cardinal Tavera, archbishop of Toledo. He became devoted to poetry and his work shows tenderness, and re¬

fined selection expressed in the classic lan¬

guage. Best known is his A complete collection of his poetic works is found in ˆpera poetica) edited by his brothers (Paris 1541; Leyden 1821).

JOHANNESBURG, yd-han'nes-boorg or

jd-han'nes-berg, South Africa, the most populous city and the commercial metropolis of South Africa, situated 5,735 feet above the sea, about 30 miles southwest of Pretoria, in the Transvaal, with which and with Delagoa Bay 364 miles, Durban 483 miles, East London 659

miles, Port Elizabeth 715 miles and Cape Town 957 miles, it is in railway communication. It is the recognized business centre of the rich gold fields of the Witwatersrand. In 1886 it was represented by a few shanties, but the discovery of gold and the development of gold mining has made it within a comparatively few years the most important city in South Africa.

Municipal government was conferred upon the city by the Transvaal authorities in 1896, when the population within a three-mile radius was 102,078, of whom 50,907 were whites, 67 per cent of these being of British origin, while the Boer citizens numbered 6,205. The great Uit-

lander agitation, which culminated in the Trans¬

vaal War (1899-1902), centred in Johannesburg, which was occupied by Lord Roberts in 1900.

Since the close of the war, important public im¬

provements have been carried through. These include many miles of well-paved streets, an elaborate electric car system, new waterworks and a sanitation system. Mementoes of the former Boer rule are an imposing but dis¬

mantled fortress which dominates the town, and the monument near Krugersdorp which com¬

memorates the declaration of Boer independ¬

ence in 1880. The town is lighted bv electricity.

The international peace exhibition of South Africa, held at Johannesburg in 1904-05, when the _ inhabitants numbered 158,580, fully re¬

habilitated commercial interests, and it was then predicted that within six years Johannesburg would have a population of 200,000. It has bettered that number. Pop. 237,104, of which 119,953 are Europeans, and 117,151 natives.

JOHANNINE EPISTLES. See John,

Epistles of.

JOHN, the name of 23 Popes, as follows: JOHN I, Saint: b. Tuscany; d. 526. He succeeded Hormisdas in 523, and was a friend of Boethius, who dedicated to him several of his works. Theodoric sent him to Constanti¬

nople to induce the Emperor Justin to adopt milder measures toward the Arians. Though received with uncommon pomp, his mission was fruitless, and on his return Theodoric threw him and his companions into prison, where he died. He is commemorated by the Roman Catholic Church 27 May.

JOHN II (Mercurius) : d. Rome, 27 May 535. He was a Roman and was surnamed Mer¬

curius by reason of his eloquence. He became Pope in 532. His letters are published in Migne, (Patrologia Latina) (Vol. LXVI).

JOHN III: d. Rome, 12 July 572. He was a Roman and became Pope in July 560. During his time the Lombards frequently ravaged Italy.

JOHN IV: b. Salona in Dalmatia ; d. Rome, 1 1 Oct. 642. He was elevated to the papal chair in December 640 and was noted for zeal and orthodoxy. He formally condemned the Mono-

thelitic statement of faith which Sergius had drawn up at the desire of the Emperor Herac-

lius.

JOHN V: b. Antioch, Syria; d. Rome,

2 Aug. 686. He was the earliest of several pontiffs of Oriental origin and had been sent to GENERAL JOSEPH JACQUES CESAIRE JOFFRE

Marshal de France

Commander-in-Chief of the French armies (1915 17) ;

the Sixth General Council by Pope Agatho as legate. He became Pope 24 July 685.

JOHN VI: he was a Greek by birth ; d.

Rome, 9 Jan. 705. He became Pope in 701, and when appealed to with reference to the long dispute between Saint Wilfred of York and the archiepiscopal see of Canterbury, decided in favor of the latter.

JOHN VII, a Greek: d. Rome, 17 Oct. 707.

He became Pope 1 March 705.

JOHN VIII, a Roman : d. Rome, 15 Dec.

882. He became Pope in 872. The Saracens during his pontificate pushed their ravages to the gates of Rome and he was compelled in 877

to pay them tribute. He crowned three em¬

perors, Charles the Bald, 875 ; Louis the Stam¬

merer, 878; and Charles the Fat, 881. He attempted, but unsuccessfully, to unite the Greek and Latin churches.

JOHN IX: b. Tibur; d. May 900. He be¬

longed to the Benedictine order and became Pope, as the choice of the Frankish party, in June 898.

JOHN X: b. Romagna; d. July 929. He

was a man of great ability and of virtuous char¬

acter notwithstanding the aspersions Liutprand casts upon him. He was archbishop of

Ravenna in 905 and became Pope in 914. He placed himself at the head of an army and drove the Saracens from Italy, but his deter¬

mination to rule independently of any faction aroused the anger of his opponents and he was imprisoned, and at length murdered, by Theodora's daughter, Marozia, whose ambitions he had thwarted.

JOHN XI: b. 906 ; d. 936. He was the son of Marozia (q.v.) and Guy, Duke of Spoleto.

He was elected Pope while under age in 931, and governed through the influence of his mother. His brother Alberic II revolted and imprisoned the Pope and his mother in the castle of San Angelo, where John died.

JOHN XII (Octavian) : d. Rome, 14 May 964. He was the son of Alberic and grandson of Marozia. He became Pope in 956, after the death of Agapetus II, though only 18, and was the first Pope who changed his name on acces¬

sion to the papal dignity. He applied to the Emperor Otho I for assistance against Beren-

garius II, crowned the emperor 962, and swore allegiance to him, but soon after revolted against Otho, who caused him to be deposed by a council, in 963, and Leo VIII to be elected.

On Otho's departure for Germany, John re¬

turned and excommunicated his rival.

JOHN XIII, a Roman : d. Rome., 6 Sept.

972. He was bishop of Narni, was made Pope in 965 by the influence of the Emperor Otho I and was expelled by the Roman nobles. Otho II

restored him to Rome and was crowned by him. The Poles and Hungarians were con¬

verted during his pontificate.

JOHN XIV (Peter) : b. Pavia; d. Rome, 20 Aug. 984. He was bishop of Pavia and had been chancellor to Otho II who made him Pope in November 983, in place of the anti-pope Boni¬

face VII. The latter had seized the papacy after the death of Otho I. Boniface now re¬

turned from Constantinople and imprisoned John in the castle of San Angelo, where he died soon after.

JOHN XV: d. Rome, April 996. He was

ihe choice of Crescentius and his party, under whose influence he remained throughout his reign (985-996).

JOHN XVI (Philagathus), a Greek of

Calabria: d. probably April 1013. He became Pope in 997. A native of Rossano, Calabria, he became a monk and from Otto II received the abbey of Nonantola. In 988 he was pro¬

moted to the see of Piacenza. Crescentius placed him on the papal throne in 997 which he occupied about a year before he was thrown into prison by Otto III, and subsequently re¬

moved to a monastery. His nose and ears were cut off and his eyes gouged out.

JOHN XVII (Sicco): b. Ripa Jani; d.

Rome, 6 Nov. 1003. An anti-pope intruded during the pontificate of Gregory V. He reigned only a few months, from 13 June 1003 to 6

November.

JOHN XVIII (Phasianus). He became

Pope on Christmas Day 1003, and in May 1009

resigned his office and entered a monastery.

His pontificate was marked by strict attention to ecclesiastical

administration.

JOHN XIX, a Roman: d. January 1033.

He succeeded his brother, Benedict VIII. He was disposed to concede the title Ecumenical to the patriarch of Constantinople, but this met with so much opposition from the Latin Church that he was obliged to withdraw the concession.

He crowned the Emperor Conrad II in the presence of Rudolph of Burgundy and King Canute of Denmark and England.

JOHN XX, frequently called JOHN XXI

(Pedro) : b. Lisbon, Portugal; d. Viterbo, Italy, 20 May 1277. He became in 1273 cardinal-

bishop of Frascati and Pope in September 1276.

He was learned in philosophy and medicine and wrote several treatises still of interest as show¬

ing the status of mediaeval medicine.

JOHN XXL See John XX.

JOHN XXII (Jacques D'Euse) : b. Cahors, about 1244; d. Avignon, 4 Dec. 1334. He was archbishop of Avignon, cardinal-bishop of Porto (1312) and was elected Pope at Lyons 1316, two years after the death of Clement V.

He resided at Avignon, but had many adherents in Italy. He is important in German history on account of the active part he took in the dis¬

putes of the Emperors Louis of Bavaria and Frederick of Austria. Louis intruded the anti¬

pope Nicholas V and declared John XXII de¬

posed. Several theological controversies filled his pontificate with ecclesiastical strife, the most'

notable being the question of absolute evangel¬

ical poverty raised by the Franciscans and that of hominalism led by William Occam (q.v.).

He published in 1317 the Constitutions of Clement V,-* a manual of canon law, since known by the title (Clementines) (q.v.). He was also the author of the decretals called (ExtravagantesP

JOHN XXIII (Baldassare Cossa) : b.

Naples; d. Florence, 22 Dec. 1419. He was elected Pope in 1410, by the Council of Pisa, after the death of Alexander V, on condition that, if Gregory XII and Benedict XIII would resign, he would also retire to end the schism.

He summoned the Council of Constance, de¬

manded by the Emperor Sigismund, in 1415, where he confirmed his resignation 2 March; but 20 March he fled secretly from Constance to Schaffhausen and revoked his resignation.

He was cited before the council, but not ap-

pearing, he was suspended and finally deposed.

He was imprisoned four years. Pope Martin V

subsequently pardoned him and made him car¬

dinal-bishop of Tuscoli and dean of the college of cardinals.

JOHN, king of England: b. Oxford, 24

Dec. 1166; d. Newark, Nottinghamshire, 19 Oct.

1216. He was the youngest son of Henry II, by Eleanor of Guienne. Being left without any particular provision he received the name of Sans Terre or Lackland; but his brother, Rich¬

ard I, on his accession conferred large pos¬

sessions on him. He obtained the crown on the death of Richard in 1199, although the French provinces of Anjou, Touraine and Maine declared for his nephew, Arthur of Brittany, who was lineally the rightful heir, then with the king of France. A war ensued, in which John recovered the revolted provinces and received homage from Arthur. In 1201

disturbances again broke out in France, and Arthur, who had joined the malcontents, was captured and confined in the castle of Rouen and never heard of more. John was universally suspected of his nephew's death, and in the war which followed he lost Normandy, Anjou, Maine and Touraine. In 1205 his quarrel with the Pope began regarding the election to the see of Canterbury, to which the Pope had nom¬

inated Stephen Langton. The result was that Innocent III laid the whole kingdom under an interdict, and 1211 issued a bull deposing John.

Thereupon John made abject submission to the Pope, even agreeing to hold his kingdom as a vassal of the Pope (1213). His arbitrary pro¬

ceedings led to a rising of his nobles, and he was compelled to sign the Magna Charta or Great Charter 15 June 1215. But he did not mean to keep the agreement, and obtaining a bull from the Pope annulling the charter, raised an army of mercenaries and commenced war.

The barons, in despair, offered the crown of England to the Dauphin Louis, who accordingly landed at Sandwich 30 May 1216, and was re¬

ceived as lawful sovereign. The issue was still doubtful when John died. Consult Stubbs, W., (Lectures on Early English History> (Vol. I, London 1906) ; Norgate, K., (England under the Angevin Kings* (1887) , and (John Lack-

land> (1902).

JOHN II, king of France, surnamed the <(Good® : b. about 1319; d. London, 8 April 1364.

He was the son of Philip VI of Valois and was a monarch distinguished alike for his incapacity and his misfortunes. In 1356 he was defeated and taken prisoner by the Black Prince at the battle of Poitiers, and detained at Bordeaux and at London till released at a heavy expense to his country by the Peace of Bretigny in 1360. On learning that his son, the Duke of Anjou, who had been left as a hostage in England, had effected his escape, he returned to London, where he died.

JOHN III (Sobieski), king of Poland: b.

Olesko, Galicia, 2 June 1624; d. 17 June 1696.

After receiving his education at home he trav¬

eled in France, England, Italy and Germany with his brother, returning in 1648 on his father's death. John Casimir appointed him standard-bearer to the Crown, and he distin¬

guished himself in the war against the Russians and Swedes, which terminated with the P"eace of Oliva in 1660. In 1669 Michael Koribut was chosen king on the resignation of John Casimir against a party who preferred Sobieski. On the death of Michael he was chosen king, 21

May 1674. A new war with the Turks was con¬

cluded after varying success by a peace, 27 Oct.

1676. The anarchy in which Poland was con¬

stantly kept by the turbulence of its aristocracy was aggravated during the reign of Sobieski by the intrigues of his wife, and his own talent for administration was not equal to his capacity as a general. Besides internal troubles, European politics at this time occupied the attention of Sobieski, whose alliance was solicited both by Lous XIV and the emperor. He at length con¬

cluded (31 March 1683) an alliance with the latter against the Turks, who had allied them¬

selves with the malcontents in Hungary and threatened a most formidable invasion of the empire. Uniting with the Austrian forces 9

September, at the head of a combined force of 83,000 men, he inflicted a decisive defeat on the Turks and compelled them to raise the siege of Vienna, 12 Sept. 1683. He terminated the campaign with the capture of Gran (27 Octo¬

ber), which had been in the possession of the Turks for nearly a century and a half. In 1686

he overran Moldavia and Wallachia, but failed to make a permanent conquest. Consult Tat-

ham, (John Sobieski* (Oxford 1881) ; Dupont, (Memoires pour servir a l'histoire de Sobieski*

(Warsaw 1885) ; and Rieder, (Johann III, Konig von Polen> (Vienna 1883).

JOHN, Claude Hermann Walter, English

clergyman, educator and assyriologist : b.

Banwell, Somersetshire, 4 Feb. 1857. He was educated at Queen's College, Cambridge Uni¬

versity. He was second master of Horton Col¬

lege, Tasmania, 1880-84; Paston Grammar School 1885-87 ; tutor at Saint Peter's College, Peterborough, 1887-92. After his ordination in 1887, he was curate of several parishes, and until 1901 assistant chaplain of his alma mater and rector of Saint Butolph's, Cambridge, 1892-

1909. He was Edwardes Fellow of Queen's College, 1903-09; lecturer on assyriology in the same institution, 1895-1909; also at King's Col¬

lege, London, 1904-10. Since 1909 he has been master of Saint Catharine's College, Cambridge.

He.has contributed largely to scientific journals and dictionaries dealing with subjects in as¬

syriology and biblical archaeology. His works include (The Oldest Code of Laws in the World, the Code of Hammurabi* (1903) ; (Babylonian and Assyrian Laws, Contracts and Letters* (1904) ; (Ur-Engur — a Bronze of the Fourth Millenium) (1908) ; (Ancient Assyria) (1912) ; (Ancient Babylonia) (1913) ; dela¬

tions between the Laws of the Babylonians and the Laws of the Hebrew Peoples, > (The Schweich Lectures for 1912-14). He also de¬

livered the Bohlen lectures on <(The Religious Significance of Semitic Proper Names.® He edited (The Old Testament in the Light of the Ancient East* by Alfred Jeremias (2 vols., 1911).

JOHN, yon, Eugenie («E. Marlitt®),

German novelist: b. Arnstadt, Thuringia, Ger¬

many, 5 Dec. 1825 ; d. there, 22 June 1887. She was the daughter of a portrait painter, and after pursuing the study of music at Vienna, lived at court for some years. She then re¬

turned to her native town and took up novel writing, using the pseudonym of ((E. Marlitt.®

Her works, which are very numerous, have JOHN — JOHN, GOSPEL OF

been translated into English by Mrs. A. L.

Wistar, and have been very popular in this country. Among them are (Gold Elsie ' (1868) ; (01d Mamselle's Secret' (1868) ; (Countess Gisela' (1870) ; (Princess of the Moor' (1872) ; (The Second Wife' ; (In the Counsellor's House.'

JOHN, Griffith, Welsh Congregational mis¬

sionary : b. Swansea, 14 Dec. 1831; d. 1912.

He studied at Brecon College (1850-54), then at the Missionary College, Bedford, England.

He was assigned to China (1855) by the Lon¬

don Missionary Society, residing, till 1861, at or near Shanghai, moving then to Hankow and becoming the first Protestant missionary in central China. He made numerous trips through the contiguous country, establishing a number of churches and mission stations. With the exception of two furloughs to Great Britain (1870-73 and 1881-82), visiting the United States during the latter, he continued his services in China till 1906, when his declining health forced his resigning from missionary work.

JOHN, Sir William Goscombe, Welsh

sculptor: b. Cardiff, 1860. He studied at the City of London School of Art, Kensington and the Royal Academy Schools, taking the Royal Academy gold medal and traveling studentship (1889), when he went to Paris to study (1890-

91), taking the gold medal at the Paris Salon (1901). A few of his principal works are statues of King Edward VII, at Cape Town ; Prince Christian Victor, at Windsor; 7th Duke of Devonshire, at Eastbourne; the historian W. E. H. Lecky, at Trinity College, Dublin; equestrian statue of the Earl of Minto, at Cal¬

cutta. Among his best-known memorials are the Marquis of Salisbury, at Westminster Ab¬

bey and in Hatfield Church ; Bishop Lewis and Dean Vaughan, in Llandaff Cathedral ; Sir Arthur Sullivan, in Saint Paul's Cathedral ; that dedicated to the Coldstream Guards and War Correspondents, in Saint Paul's Cathedral. His works in a lighter vein contain (A Boy at Play,'

in Tate Gallery; (The Elf,' in Cardiff Art Gal¬

lery; (Morpheus' and (Saint John the Baptist,'

in Liverpool Art Gallery. He was created a knight in 1911 and is a corresponding member of the Institute of France, and Royal Aca¬

demician since 1909.

JOHN, Epistles of. Three short epistles in the New Testament traditionally assigned to the Apostle John. The first and longest con¬

tains no definite indication as to its author or destination. It lacks the usual epistolary intro¬

duction and closing salutation. Nevertheless, it is a genuine letter and from one author, on his own sole responsibility, in spite of the occa¬

sional use of the first person plural (e.g., in chap. i). Though the author speaks with au¬

thority on matters of the Christian faith, it is the authority of fatherly affection, rather than of official position, that is felt and asserted.

The inference is that the author was an old man writing to a church or group of churches whose members looked to him for spiritual guidance and regarded him with deep affection.

The general purpose of the letter was to urge and lead those addressed to a fuller realization of their fellowship with God through His Son Jesus Christ, the Word of Life. He argues and pleads for the sinless life (confession of sin, trust in the Divine grace, positive ((walking in the light"), with special emphasis on love as absolutely essential. This can be realized only through a full acceptance of the great redemp¬

tive work of God in Christ and therefore a full confession of Jesus Christ, son of God, (

mian tendencies that were threatening to sub¬

vert the faith of those addressed. Linguisti¬

cally and doctrinally 1 John has so much in common with the Fourth Gospel that the pre¬

vailing opinion is that it was from the same hand and for the same circle of readers. Evi¬

dence of its use from Polycarp (c. 110 a.d.) down is abundant and trustworthy.

The second and third epistles are very short letters and belong together. 2 John, addressed to a church (called <(lady," Greek Kvpia)f is ■ a message of affectionate admonition, warning against erroneous teachers (<(anti-Christs").

3 John, to Gaius, a member of the church ad¬

dressed in 2 John, is of a more private and confidential character. Gaius is commended for his hospitality to itinerant missionaries. Dio-

trephes was probably the leading member of the church addressed in 2 John. The author, in both letters, calls himself <(the elder," but does not give his name. Stylistically and doctrinally the relation of 2 and 3 John to 1 John is close, and identity of authorship is the most probable view. For literature see article on John, Gospel of.

Edward E. Nourse.

JOHN, Gospel of. The fourth Gospel in the usual order of the New Testament writings.

According to tradition, this gospel was written by the beloved disciple, John, in his old age, at Ephesus in Asia, near the end of the 1st cen¬

tury (90-100 a.d.) . On this view, the gospel embodies the personal testimony of one of Jesus' most intimate disciples, and consequently is the most reliable and valuable of all the gospels.

To-day this traditional view is strenuously disputed. While the great spiritual value of the book is conceded, its apostolic authorship and independent or primary authority for the events of Jesus' ministry or for His teaching are denied. It is assigned to an unknown, though highly gifted, author, a Christian of Asia, who wrote in the early years of the 2d century, and was familiar with the earlier Christian literature (e.g., Paul's letters, and the Synoptics), but who felt that a new formu¬

lation of Christian truth was called for in view of the various doctrinal complications that threatened to undermine the faith of the Church. He therefore composed this ˆspirit¬

ual" gospel, in reality a profound doctrinal treatise rather than a gospel. The following discussion will attempt to set forth, as fully as space permits, the character of this gospel and the problem it presents for solution.

I. Contents. — Formally, at least, the plan of the gospel is simple. The purpose of the writer is plainly stated in xx, 30-31, and the book was planned to accomplish a result, namely, a faith in Jesus that issues in life.

The writer sought to show why and how it is that belief in Jesus gives life, and unbelief re¬

sults in death. The contents unfold simply and 158

JOHN, GOSPEL OF

naturally according to this ruling motive, as can be seen from the following brief outline: Introductory section (the Prologue). The fact and significance of the incarnation of the Word (i, 1-18).

I. The Beginnings of Faith. How Jesus won the first believers (i, 19- iv, 54).

1. The witness of John and the first fol¬

lowers from John's disciples (i, 19-

2. The first ((sign® at Cana (ii, 1-12).

3. Manifestation of His authority at

Jerusalem and Judea, resulting in

(imperfect) faith on the part of

many. The case of Nicodemus and

additional testimony of John (ii, 13-

iii, 36).

4. The faith of the woman of Samaria and of the Samaritans (iv, 1-42).

5. Return to Galilee. The second <(sign®

and its resultant faith (iv, 43-54).

II. The Manifestations of Unbelief, culminat¬

ing in the decision of the Jewish au¬

thorities to put Jesus to death

(v-xii).

1. Jesus in Jerusalem cures a cripple on the Sabbath, and arouses the

hostility of the Jews (v).

2. In Galilee, at a Passover season, 5,000

fed. The day following the Jews re¬

fuse to believe Jesus' claim to be the Bread of Life. Many desert Him,

but the Twelve remain faithful (vi).

3. Again in Jerusalem, at Feast of Taber¬

nacles, Jesus' claims rejected in ex¬

tended debate by the Jews who are

severely condemned for their un¬

belief (vii, 1— x, 21).

4. In Jerusalem, at a Feast of Dedica¬

tion, another instance of unbelief and hostility (x, 2 2-42).

5. The Raising of Lazarus. In itself

this was full proof of Jesus as <(the resurrection and the life,® but its

effect on the Jews was to decide

them to put Jesus to death (xi. 1-

57).

6. The final public presentation of Him¬

self at the last Passover season. In¬

cidents of belief and welcome. The

author's reflections on the great act

of unbelief, the rejection of Jesus

by the Jews (xii, 1-50).

III. Jesus' more complete and confidential reve¬

lation of Himself to His own (xiii-

xvii).

1. The footwashing at the Supper and

teaching based upon it (xiii, 1-20).

2. Disclosure of the impending betrayal and of his separation from them

(xiii. 21-38).

3. Fuller teaching concerning His de¬

parture and concerning Himself and

the Paraclete (xiv-xvi).

4. The great intercessory prayer (xvii).

IV. The Culmination of Unbelief, The Arrest, Trial, Condemnation, Crucifixion,

Death and Burial of Jesus (xviii-

xix).

V. The Victory — the raised and living Lord.

Various appearances of the risen

Jesus confirming the faith of the

Disciples (xx, 1-29).

Conclusion (xx, 30-31).

Appendix ■ — The reinstatement of Peter and Jesus' saying concerning the beloved dis¬

ciple (xxi).

The author states (xx, 30-31) that out of the many ((signs® which Jesus did he had selected certain as calculated to produce faith.

It is noteworthy that there are just seven such signs ((1) ii, 1-12; (2) iv, 43-54; (3) v, 1-10; (4) vi, 1-10; (5) vi, 16-21; (6) ix, 1-12; (7) xi,

1-44). That the author intended this number to be noticed and a symbolic significance to be attached to it is nowhere stated. If such a symbolic principle is assumed as intentional the book at once becomes full of subtle allusions, each alleged concrete fact being intended to suggest or teach some profound spiritual truth.

On this principle the entire outline of the gospel can be converted into a theological pro¬

gram, the key to which is furnished by the prologue. This principle is accepted by many critics and dominates most of the modern critical interpretations of the gospel.

II. Relation to the Synoptics. — The con¬

trast between the Fourth Gospel and the Syn¬

optics is striking. There is a marked difference not only in respect to the general plan, but as to the details of Jesus' ministry, the style of His discourses and the content of His teaching.

Instead of an account of Jesus' birth and childhood, as in Matthew and Luke, we find the profound statement of the incarnation of the Word as the introductory section. In the Synoptics we have a narrative of the work of John the Baptist, his popular preaching, his prediction of the coming One, his baptism of Jesus. In our gospel John's testimony is the all important thing, testimony given to the offi¬

cial representatives of the Jews or to his fol¬

lowers. There is no account of John's min¬

istry as such. Our gospel omits all reference to Jesus' temptation, but devotes considerable space to the way Jesus gained His first disci¬

ples and to a ministry in Jerusalem and Judea about which the Synoptics say nothing. The great popular ministry in Galilee to which the Synoptic account is chiefly devoted is all but omitted in our gospel. It is there as an indis¬

tinct background, while in bold relief we have the two visits to Jerusalem (ch. v and vii, 2-x, 21) of which the Synoptic account' says noth¬

ing. Only in the case of the feeding of the 5,000 do the two accounts meet on common ground and here the differences are as promi¬

nent as the resemblances. While the Fourth Gospel, like the Synoptics, thinks of a ministry in Perea (cf. x, 40) and also, like them, fol¬

lows this with an account of the events of Pas¬

sion Week and of the resurrection appearances, it relates an almost entirely different set of in¬

cidents, and in the few identical cases the ac¬

count itself is characteristically different.

The Synoptic account reflects the popular tradition, of a broad and general character, of Jesus' ministry. Our gospel covers only a few selected incidents and deals with these in a very intensive and personal way. The inci¬

dents are largely of a more private nature.

Note, for example, chs. xiii-xvii, devoted en¬

tirely to one evening's intimate fellowship of Jesus with His disciples.

It would seem that the author of our gos¬

pel used the Synoptic outline, assuming it to be JOHN, GOSPEL OF

well known, as a working basis, and tried to adjust his own very different account to this ' V1 s.u?h a way as to cause the reader, already familiar with the Synoptic account, no serious disturbance of mind. That he succeeded ad¬

mirably everyone must admit. On points of chronology he was particular. The indeter¬

minate length of the ministry in the Synoptic account is corrected by noting the feasts- —especially three Passovers- — which show that the ministry covered more than two years. The cleansing of the Temple is placed at the begin¬

ning instead of the end of the ministry. The opening of the ministry in Galilee did not follow immediately upon the recognition of Jesus by John (cf. i, 35ff., and iii, 24, with Mark i, 13, 14). The last supper was on the night before the Passover and Jesus was crucified on the feast-

day itself, not a day later, as in the Synoptics.

As to the style of Jesus' discourse there is a very remarkable difference between our gos¬

pel and the Synoptics. The parables are ab¬

sent, although Jesus speaks in figures. In the Synoptics Jesus usually talks in a popular, sim¬

ple, straightforward way and the common peo¬

ple hear Him gladly or with interest. In our gospel Jesus' speech is allusive, obscure, figura¬

tive, perpetually provoking question as to His meaning, even when speaking most confiden¬

tially to His disciples. The subjects of His discourse are not the same. In the Synoptics Jesus talks only rarely about Himself, mainly about conduct, morality, religion in the broad sense and the life it calls for. In our gospel His subject is mainly Himself: His signifi¬

cance, His relation to the Father, belief in Him, etc. In the Synoptics, His audience is usually the masses — the common people to whom He ministered as a physician to the sick with His <(good news® of the Kingdom. In our gospel His audience is usually either some isolated individual, or the (hostile) <(Jews,®

or His disciples.

Finally, our gospel differs from the Synop¬

tics in that it is very definitely a theological writing, which cannot be said of the other gospels. The gospel opens with a section that is doctrinal in the fullest sense, a section which no one but a profound theologian could have com¬

posed. And throughout the work, in apparently simple language, doctrines of highest, import¬

ance are set forth. Nothing like this is found in the Synoptics.

The facts mentioned thus far are patent to all.- No theory of the gospel's origin can be ac¬

cepted that fails to give a reasonable explana¬

tion of them.

III. Internal Evidence as to Authorship.

— Turning now to the question of authorship, we shall consider first the internal evidence.

That is, what evidence, explicit or unintentional, does the book furnish as to its author, or the time and place of its composition.

Explicit statements are few and not definite.

Such are i, 14f, ((we beheld his glory,® (

refer? Is there here a claim or assertion by the author that he was a personal disciple of Jesus? Such seems to be the view of xxi, 24, but this is in the appendix, the authorship and date of which is a problem bv itself. We also find hints concerning a disciple, indefinitely in¬

dicated as present (i. 35-42), at other times designated as the disciple ((whom Jesus loved®

(xiii, 23; xix, 26; xx, 2), or simply as ((the other disciple® (xviii, 15; xx, 4, 8). So far as our limited knowledge of the Apostolic Age permits a judgment, these allusions can refer to but one individual, the Apostle John, one of the three (

and | |.s ; . xiv, 32ff. and ||s)'. In the passages cited it is not expressly claimed that the un¬

named disciple was Tie author of the gospel or the. main source of its contents, but xix, 35, taken in connection with verses 25 and 26, im¬

plies this, and such is the view of ch. xxi (cf. v. 24).

It is entirely in harmony with such a claim that our gospel assumes an intimate acquaint¬

ance with the minute details of Jesus' ministry, — the very hour when events took place, how He sat Thus® on the well-curb, details of topog¬

raphy, etc., — and with the Judaism of the time When Jesus lived. It will probably be conceded by every impartial critic that no serious error has been proved against the gospel. The al¬

leged anachronism in the name Tea of Ti¬

berias® collapses in view of Josephus' similar, although not exactly identical, expression in his history of the Jewish War (iii, 3, 5; iv, 8, 2) written between 75 and 79 a.d. The alleged scientific objection to the ((blood and water®

(xix, 34) is shown to be baseless by Sir A. R.

Simpson, M.D., in (The Expositor, > 1911, Vol.

II, pp. 300 ff. Many apparent improbabilities, indeed, suggest themselves, but these are not proofs that the work does not rest upon the testimony of an apostle or eyewitness.

Such, in general, seems to be the claim or assumption of the book itself, and it has been commonly received for centuries as guaran¬

teeing apostolic authorship. But the book also gives other evidence regarding itself on which the chief stress is laid to-day by many critics and which, it is claimed, makes it impossible to hold to apostolic authorship, and neces¬

sitates a date not earlier than the first decade of the 2d century. Very briefly stated this evi¬

dence consists in the distinctly theological char¬

acter of the Fourth Gospel and especially in the mature and developed type of its theological conceptions. The use made explicitly in the prologue of the Logos-idea and implicitly (it is claimed) throughout the book, which ever has in mind the Logos-Christ ; the central signifi¬

cance assigned to the person of Christ, the (Logos) Son, the revealer of the Father and imparter of eternal life to those who come to know Him; the highly spiritualized eschatology in contrast to the realistic type of the Synop¬

tics ; and in general the indications that the author was familiar with and had assimilated the main Pauline doctrines, but had sought to modify or complete them in certain important respects, — such facts, it is claimed, point deci¬

sively to some one of the post-apostolic genera¬

tion as the author. It is also claimed, and not without reason, that the author had in mind certain Docetic and Gnostic errors which he

attempted to refute, errors that were particu¬

larly prevalent and dangerous in the first dec¬

ades of the 2d century. Admitting the correct¬

ness of these observations, the problem is, do they decisively prove that the gospel could not have been written by the Apostle John?

Arguments drawn from the structure of the book are of uncertain value. In both style and structure the gospel is unique and amenable to no rule. Certain sections, as chs. v and vi and chs. xv and xvi, appear to have been shifted from their original positions, but minute study reveals so many instances of abrupt transitions, of broken or interrupted narrative or discourse, and of unexplained situations that the simple hypo-thesis of misplaced sheets (of the original MS.) will not suffice. It is a case either of extensive editing by a later hand of a document originally shorter and more orderly than our present gospel, or of a work unique in char¬

acter and quite careless of ordinary rules of composition. If it is a case of editing, the task of ascertaining the scope and order of the orig¬

inal (apostolic?) material is a hopeless one.

One must admit, therefore, that the internal evidence, drawn from the book itself, is not clear, either as to its date or author. It seems to claim an eyewitness of Jesus' ministry, even a <(beloved disciple,® as its author. On the other hand, the quality of its theology and the stage of theological development and the char¬

acter of the theological controversies presup¬

posed in the book seem to indicate a date when authorship by an apostle becomes very question¬

able. Its other internal characteristics are not decisive.

IV. The External Evidence. — The testi¬

mony of early Christian writers after about 160 a.d. is practically unanimous as to the early date and Johannine authorship of the gospel.

Even the sole known exception, the small and obscure group in Asia Minor, later called the Alogi, with possibly the Roman presbyter Gaius, did not dispute the early date, though they asserted that the gnostic Cerinthus was its au¬

thor. Such writers as Theophilus of Antioch, Irenaeus of Lyons, Clement of Alexandria and Tertullian of Carthage assumed that the Johan¬

nine authorship was indisputable. They knew of no other tradition. But as our inquiry is pushed back toward the beginning of the 2d century traces of the use or knowledge of the gospel become increasingly uncertain. It must be remembered, however, that the same thing is measurably true of each one of the Synoptics, especially Mark, the oldest gospel of all. Justin Martyr (140-50 a.d.) almost certainly used our gospel as the work of the Apostle John. Igna¬

tius of Antioch (110-17 a.d.) was acquainted with its type of thought and may have read it.

Both Papias (c. 140 a.d.) and Polycarp (110-17

a.d.) made use of 1 John, which speaks for rather than against their knowledge of the gospel, but this is all that can be said with confidence. The evidence that Basilides, the Egyptian Gnostic (c. 130), used our gospel is strong, though not free from uncertainty. That I Clement, writ¬

ten in the West, at Rome, about 96 a.d. con¬

tains no allusion to this gospel is not surprising.

In case the gospel was written in Asia between 90 and 100 a.d. a reasonable time must be al¬

lowed for it to have, become generally circulated and known as familiarly as the older gospels were. When this is taken into consideration the evidence for the gospel compares very favor¬

ably with that in favor of Mark, for example.

The reliability of the tradition that the Apostle John lived <(to the times of Trajan®

(98-117), as it is expressed by Irenaeus, and that the later part of his life was spent in Asia (Ephesus) has been emphatically disputed by

many critics, especially since DeBoor proved from newly-discovered evidence that Papias probably said something about John being put to death by the Jews. But the exact wording of Papias' statement has not been recovered, nor the context to which it belonged. Until we have more than only a few fragments of Papias' work in our hands, we shall not be able to base any conclusions on what he may have said or meant. Irenaeus' testimony as to how he himself, in his youth, heard Polycarp of Asia speak of his intercourse with the Apostle John is positive and cannot easily be brushed aside. Then there is the obscure figure of an <(Elder® named John, spoken of by Pa¬

pias, who may have become confused, even as early as c. 140-50 a.d., with the Apostle John.

V. Conclusions. — The decision of the crit¬

ical question is, it is evident, beset by great difficulties. The external evidence, while on the whole favorable to Johannine authorship, is not strong enough to be considered decisive. The internal evidence is conflicting. It is both for and against the traditional view. Each of the opposing views can be supported with forcible arguments, and a decision will probably be found to rest mainly on one's personal equation.

No one knows (historically) when the Apos¬

tle John died, nor where or how he spent his last years. No one knows what were his mental and spiritual gifts. No one can say that he could or could not have written such a book as the Fourth Gospel. But these things are practically certain : the Fourth Gospel must have been composed after the Synoptic tradi¬

tion was generally accepted. It was composed by one who was richly endowed with spiritual insight, who had a profound Christian experi¬

ence, and who had thought deeply on some of the greatest problems of theology and was able to discuss or state them in marvelously simple and concise language. Can any one say positively that an aged apostle could not have planned deliberately a ˆspiritual® gospel in which the words and deeds of Jesus were to be treated symbolically rather than literally?

However the problem of authorship may

eventually be solved, the fact remains that in the Fourth Gospel the Christian Church pos¬

sesses a treasure of priceless worth. To the spiritually minded of all the Christian cen¬

turies this gospel has ministered more effec¬

tively, probably, than any other New Testa¬

ment Book. It has spoken untold comfort to the troubled and sorrowing. A mystic influ¬

ence emanates from it and under its spell God and eternal life become realities of experience.

Whoever wrote it had sounded the depths of the revelation of Christ. Through its influence the early Church was enabled to clarify and unify its faith, and realize the full significance of the gospel in an age when subtle specula¬

tions threatened to strangle its life and confuse its mind.

Bibliography. — The literature on the Fourth Gospel (including usually a consideration of the Epistle of John) is extraordinarily extensive and cannot be listed here. The most service¬

able recent list will be found in Moffat's in¬

troduction to the Literature of the New Testa¬

ment (New York 1915). Of special import¬

ance are the following: Zahn, introduction to the New Testament (Vol. Ill, Edinburgh JOHN, ORDER OF SAINT— JOHN THE BAPTIST

1909) ; Feine, Paul, (Theologie des neuen Testa¬

ments y (2 Aufl. Leipzig 1910, pp. 514-631) ; (En¬

cyclopaedia Biblica* (Vol. II, New York 1901, articles ˆGospels® and ((John, Apostle") ; Bacon, B. W., (The Fourth Gospel in Literature and Debate> (New York 1910) ; Stanton, V. H„

(The Gospels as Historical Documents) (Part I, Cambridge 1903) ; Sanday, W., lThe Crit¬

icism of the Fourth Gospel > (New York 1905) ; Drummond, J., (The

Character and Authorship of the Fourth Gospel > (London 1903) ; Scott, E. F., (The Fourth GospeP (Edinburgh 1906) ; (Cambridge Biblical Essays* (New York 1909, pp. 251-329) ; Findlay, G. G., fellowship in the Life Eternal* (on 1 John, London 1909) ; Lati¬

mer, Jackson, (The Problem of the Fourth Gospel* (Cambridge 1914).

Edward E. Nourse,

Professor of Biblical Theology, Hartford Theological Seminary.

JOHN, Order of Saint, a military religious order of mediaeval origin. The Knights Hos¬

pitallers of Saint John, subsequently known as Knights of Rhodes, and lastly as Knights of Malta, were once a great power in Christian Europe. The origin of the order is unknown, but most probably it was early in its history that a rich merchant of Amalfi built not far from the Holy Sepulchre at Jerusalem a cer¬

tain church known as Santa Maria della Latina, with a monastery for monks, under the rule of Saint Benedict, and a hospital for pilgrims.

The first patron of the order seems to have been Saint John the Compassionate, patriarch of Alexandria in the 7th century. Afterward Saint John the Baptist was chosen patron, and the Benedictine brethren assumed the title of Johannites, or Brothers Hospitallers of Saint John. Pope Paschalis II in 1113 gave them the privilege of electing their own rector.

Later, in addition to the vow of poverty, chas¬

tity and obedience they were pledged to make war upon the infidels, and assumed a black cloak with a white cross on the left side. The members were divided into three classes, knights of noble birth, the fighting class, priests bound to the service of the Church, and brethren of service who took care of the sick and acted as guides to the pilgrims. In 1291 the order was driven from Palestine by the conquests of the Saracens, and after holding Cyprus for a time they occupied Rhodes in 1309, from which they were ultimately driven by Sultan Soliman II in 1522. After that the knights retired to Candia and other places, but finally^ to Malta, which Charles V granted them in 1530. Here they continued to be a bulwark of western Europe against the Turkish ..navies till modern times. The chief of this order, which had great possessions in almost every part of Europe, was called (

The military duty of the knights consisted in taking the field at least three times against the Turks or the pirates of Barbary. In war they wore a red jacket or tabard, charged with a white cross. In 1798 Malta was unexpectedly attacked and taken by Bonaparte, and about the same time the extensive properties belong¬

ing to the order in various countries were con¬

fiscated. This may be considered the end of

the order as a vital institution, although shortly after the capture of Malta, Paul I, who had been chosen grand master, took the order under his protection, and it still exists nominally at least. After the death of Paul the nomination of the head of the order was vested in the Pope.

JOHN, Saint. See Saint John.

JOHN OF AUSTRIA, commonly called

DON JOHN OF AUSTRIA, Spanish gen¬

eral : b. Ratisbon, Bavaria, 24 Feb. 1547 ; d.

near Namur, Belgium, 1 Oct. 1578. He was an illegitimate son of the Emperor Charles V

by Barbara Blomberg. In 1550 he was sent to Spain where he was brought up under the care of Don Luis de Quijada at Villagarcia near Valladolid. The will of Charles V recog¬

nized him as his son and recommended him to Philip II, who created him a prince of the house of Austria. In 1568 he was placed in command of a squadron which fought the Bar¬

bary pirates, and in 1569 undertook the sup¬

pression of the Morisco rebellion in Andalusia, in which he was most successful. In 1570 he conducted a campaign against the Moors of Granada with great vigor and relentlessness, and in the following year commanded the al¬

lied fleet which won the great naval battle of Lepanto over the Turks (7 Oct. 1571). In 1576 he was appointed governor of the Nether¬

lands, and had won with the Prince of Parma the victory of Gemblours (1578) over William the Silent, when he died suddenly, not with¬

out suspicion of having been poisoned by his jealous half-brother, Philip II, but for this belief there is no evidence. Consult Motley,

(1883).

JOHN THE BAPTIST, the “forerun¬

ner** of Jesus the Christ. He was the son of Zacharias, a Jewish priest, whose wife, Eliza¬

beth, was also of a priestly family. The dates neither of his birth nor of his entrance on his public work can be fixed with unmistakable certainty. For his birth, dates varying from 8 to 4 b.c. have been proposed, and the be¬

ginning of his ministry must have been about 26 to 28 a.d. According to Luke he was born when his parents were extremely old, and the evangelist adds a story of great beauty about the vision of Zacharias while engaged in his priestly duties in the Temple, and the visit to Elizabeth of her relative Mary, the Virgin Mother of Jesus. Of the life of John before he steps out into public activities we know little. The home of his parents was in one of the hill towns of Judea, but. there is no good ground for naming any particular city, as has sometimes been done. From his birth he had been dedicated as a “Nazarite,** that is, he was under obligation to allow his hair and beard to grow untrimmed, to refrain from all .use of wine and other intoxicants, and especially to avoid every contact with a dead body. He seems while still young to have decided not to take the honored office of priest which would have been his by hereditary right and to have withdrawn to the desolate and lonely desert of Judea, which the presumably early death of his’ parents would leave him quite free to .do.

There he lived with the utmost simplicity, dressed in a robe of coarse camel’s hair cloth 162

and eating the locusts and wild honey which abounded in that wild region to the west of the Dead Sea. The notion that he was associated with the Essenes, ascetics dwelling in com¬

munities in the desert, though earlier held by some, has nothing in its favor and has now scarcely any advocates.

It is not surprising that when John sud¬

denly _ began to preach he aroused wide and deep interest amounting to general enthusiasm at first throughout Judea, and then elsewhere as he extended his ministry along the whole Jordan Valley. The very figure of the gaunt and meanly clad desert dweller must have been striking; his vehement warnings against sin and demands for thoroughgoing re¬

pentance were most impressive, and these were re-enforced by the assertion that the prophecies of the King and divine kingdom to come which had so long sustained the faith and rekindled the hopes of Israel were now near to fulfilment. Never had the summons to repentance been so vehement, and never had it been re-enforced with such a motive, ((The expected King will speedily set up his promised kingdom of righteousness : repent, therefore, that by righteousness the nation may become fit to receive its King.® Throngs of all classes of society flocked to listen to hear the trumpet message of the desert evangelist, and multi¬

tudes were plunged in baptism beneath the waters of the Jordan in token of their obedi¬

ence to his message, pledging themselves as penitents to the service of the ((One who was to Come.®

But the most significant point in the minis¬

try of John -was reached when Jesus came from Nazareth and in spite of protestations insisted on baptism at his hands. The details of the event are not fully recorded. The later statement of the Baptist that he had not known Jesus before his baptism may mean only that before that he had no grounds for definitely recognizing him as the Messiah whose coming he was foretelling, or it may mean that in spite of their possibly remote cousinship John and Jesus had had no previous personal ac¬

quaintance at all. The hesitation of John to baptize Jesus may have rested on earlier knowl¬

edge of his character, but it may also have developed at the first interview. It is fre¬

quently assumed that the heavenly sight and sound which we are told accompanied the bap¬

tism were shared by the crowds who are sup¬

posed to have been present, but this is nowhere asserted, nor indeed is it necessarily implied that any others than John and Jesus were present at the time. The Synoptic Gospels deal chiefly with the work of John up to the baptism of Jesus, while the Fourth Gospel gives his testimony to Jesus afterward, and so there is no such inconsistency between the reports as is sometimes said to exist. According to the Fourth Gospel, which purports to be by the Apostle John, possibly a relative of the Baptist and at any rate one of his followers, the impression made by the baptismal scene was such that he was convinced that the Messiah had now come, and while he did not modify his preaching, leaving it to Jesus to reveal himself in his own way, he privately pointed him out as «The Lamb of God who should bear away the sin of the world,® and some of his disciples consequently at once transferred their allegiance to Jesus.

That after this clear recognition John sent some of his disciples to seek from Jesus an ex¬

plicit assertion of his Messiahship has some¬

times been explained as due to a desire to ob¬

tain confirmation of the faith of these disciples, but the answer of Jesus makes it probable that it was due to some lack, at the time at least, of positive conviction in John's own mind, per¬

haps because the method of Jesus in presenting himself to the nation was not what John had expected, an uncertainty very probably inten¬

sified by the depression which his imprison¬

ment may be presumed to have caused or in¬

tensified. But in the discourse which followed Jesus took occasion to eulogize John as greater than any of the prophets, as the greatest man who had ever lived.

After his recognition of Jesus as the One for whom he was preparing the way, John con¬

tinued his work for a time, perhaps for some months, presumably with the feeling that the people still needed in mind and life the work which he had been doing. But his fidelity to his mission as a preacher of repentance and right living soon cost him his liberty and in the end his life. Herod Antipas, the ruler under Rome of Galilee and Perea, had taken to him¬

self the wife of his brother Philip. This dou¬

bly adulterous connection John denounced openly and apparently to Herod's own face, having perhaps been summoned by him to preach at court. This aroused such a fury of hate, especially in Herodias, the woman in the case, that John was imprisoned in the fortress of Machserus near the Dead Sea, in the ruins of which marks of fetters may still be traced on the walls of the dungeons. Finally after perhaps months of hesitation on the part of Herod, by the shameful artifice of allowing her daughter Salome actually to appear as a dan¬

cing girl before Herod and his guests at a feast, he was induced to swear that he would give the girl whatever she asked, and when she demanded in fulfilment of this rash promise (

Bibliography.— Blakiston, A.,

tist and his relation to Tesus* (1912) ; Feather J., (The Last of the Prophets* (1894)* Rey¬

nolds, H. R., (John the Baptist* (1874)- Rob¬

ertson A. T.,

ment J (1895).

David F. Estes,

Professor of ˆ New Testament Interpretation , Colgate University.

JOHN BROWN'S BODY, a famous

marching song of the Civil War, the origin of which has for years been in dispute. It has been generally credited to C. S. Hall of Charles¬

town, Mass. (1861). The words were applied JOHN BULL — JOHN THE FEARLESS

to an old tune common in England in the 18th century.

(<JOHN BULL," a popular nickname or

sobriquet applied to England or to its citizens.

In 1712 Dr. John Arbuthnot (q.v.) wrote a po¬

litical allegory entitled the (History of John Bullˆ It was designed to ridicule the Duke of Marlborough and to render the Continental War then raging unpopular. x\side from its immediate object, it is one of the best humor¬

ous compositions in the English language. Each of the European nations had a designation in the work; the French were <(Lewis Baboon,"

the Dutch, <(Nicholas Frog," etc. The sturdy English yeomen and the English public in gen¬

eral were amused with the apt cognomen in spite of the satire intended, and it was adopted by the people with such hearty good will that it has been popular ever since in all parts of England.

JOHN THE CONSTANT, Elector of

Saxony: b. 30 June 1468; d. Schweidnitz, 16

Aug. 1532. He was fourth son of Elector Ernst and lived during youth at the court of his great-uncle, Emperor Frederick III. He took part in the campaigns of 1494 and 1499

and succeeded his brother, Frederick the Wise (1525), as Elector, declaring himself emphati¬

cally in favor of the Reformation. In 1526 he joined the Torgau Union hindering the agita¬

tions of the followers of the old faith and plac¬

ing his coreligionists in the position to form a unanimous party at the Diet of Speyer. Using the power given him over Church matters he instituted (1527-29) visitations throughout his domain of the Evangelical State Church of Saxony. In 1530, at the Diet of Augsburg, he opposed the emperor fearlessly on the question of the confession. In 1531 he united the Prot¬

estants in their defense with the Schmalkaldic League.

JOHN CRERAR LIBRARY, The, a free

public library, established in Chicago, Ill., in 1894, in accordance with the provisions of the will of the late John Crerar. Mr. Crerar, a prominent merchant of the city, had no near relatives and left

$600,000 in personal bequests, nearly $1,000,000 to many of the charities of the city and the remainder of his estate, then valued at not quite $2,500,000, to the library. In 1917 the library had a total income of $235,000, of which $33,000 were spent for the increase of the library, $42,000 for rent, $83,000 for main¬

tenance and $41,000 set aside for a building fund. Land has been purchased at the north¬

west corner of North Michigan avenue and Randolph street, opposite the Chicago Public Library, and plans have been prepared for an 11-story building of Romanesque style. A por¬

tion of the site will be occupied as temporary quarters until circumstances permit building.

By agreement with the other public libraries of the city, the library limits its scope to the sciences and useful arts. The field is defined and the development attained is indicated by the following statement of the departments es¬

tablished and the number of bound volumes in each on 1 June 1918: Social sciences, 103,035; physical sciences, • 30,345 ; natural sciences, 37,-

079; medical sciences, 71,869; applied sciences, 77,795; general works, 53,233. Such a library of course attracts special classes of readers: of these, physicians are the most numerous, en¬

gineers second, chemists third and teachers fourth. The library is especially strong in sets of periodicals and society transactions and also contains special collections on aviation, crema¬

tion, eye and ear and medical history.

JOHN OF DAMASCUS, Saint; also

known as John Damascene and John Chry-

sorrhoas (<(gold-streaming" — eloquent), the last of the Greek fathers: b. Damascus toward the end of the 7th century; d. about 753. The son of a Syrian Christian bearing the Arabic name of Mansur, who held a government office in Damascus under the Saracen Caliph Abdul Malek, John received an excellent education in theology and philosophy from an Italian monk named Cosmas, a prisoner of war in Saracen hands. All that is known of the life of John is derived from a

scanty biography written in the 10th century by the patriarch John IV of Jerusalem, who culled his material from an earlier Arabic biography. The ((life”

is embroidered with some fabulous details, in¬

cluding the famous legend of his right hand being cut off by order of the Greek emperor, and afterward miraculously restored. About 730 a.d. John sold his property, gave the pro¬

ceeds to the poor and buried himself in the monastery of Mar Saba (Saint Sabas), be¬

tween Jerusalem and the Dead Sea. His great¬

est theological work is the (Fountain of Knowledge,* a systematical theology founded on Aristotelian metaphysics and the writings of Leontius of Byzantium. For a short time he officiated as priest in the church at Jerusalem, but returned to the monastery to devote him¬

self to writing. His zeal for image-worship brought him into conflict with the iconoclasts, against whom he indited three essays or dia¬

tribes, between 726 and 736. These excited much discussion and criticism. Included in his works is an essay in defense of image-worship, addressed <(to all Christians and to the Em¬

peror Constantine Caballinos and to all Here¬

tics,” which is not regarded as genuine. He died in the monastery and was buried there; the body is said to have been removed to Con¬

stantinople in the 14th century. The most au¬

thoritative theologian of the Eastern Church, he is honored as a saint in both the Greek and Latin churches. The biography referred to above was published in Rome 1553, and an edi¬

tion of his works — in Greek and Latin — by Father Lequin, appeared in Paris in 1712 and was reprinted in Verona in 1748. Consult Migne, (Patrologia Graeca* (Vols. XCIV-XCVI, Paris 1854-66) ; biographies by Langen (Gotha 1879) and Lupton (London 1882) ; Burkhard, K. I., (Johajjnes von Damaskus Ausziige aus Neme-

sius) (Vienna 1909) ; Harnack, Adolf, (History of Dogma > (Vols. III and IV, Boston 1 897 —99) ; Salmond, (Nicene and Post-Nicene

Fathers) ; Whyte, Alexander, ‘Father John of the Greek Church * (New York 1898) ; Allies, JOHN DORY. See Dory.

JOHN THE FEARLESS, or SANS

PEUR, Duke of Burgundy : b. 1371 ; d. 10

Sept. 1419. He was son of Philippe the Bold and joined King Sigismond of Hungary with the French army for the crusade against the Turks. He was taken prisoner (1396) at the battle of Nikopolis and was released on pay-

ment of a ransom of 200,000 ducats. He be¬

came Duke of Burgundy (1404) on his father’s death. He was adverse to the extravagant Duke of Orleans, and, greatly provoked by the latter, brought about his assassination (1407), thereby rising to leadership in the state and to the rearing of the Dauphin. This gave rise to civil strife on the part of the Orleans adherents, and the lawless actions of the pro-Burgundian Paris mob — the Cabochiens — led (1413) to John’s downfall. Henry V of England (1415) becoming his ally, he captured the capital (1418) with severe reprisals. Called by the Dauphin Charles for an interview he was mur¬

dered (1419) on the bridge crossing the Yonne near Monterean.

JOHN OF GAUNT, gant or gant, Duke

of Lancaster, English soldier : b. Ghent, Flanders (whence his name), 1340; d. London, 3 Feb. 1399. He was the fourth son of Edward III and his queen, Philippa of Hainaut. He was created Duke of Lancaster in 1362; served in the French wars, and became governor of Guienne. He assumed in right of his wife the title of king of Castile, invaded that kingdom to assert his claims, but relinquished them in favor of Prince Henry of Castile, his son-in-

law. He was a supporter of the reformer John Wiclif, and a patron of the poet Chaucer.

Shakespeare introduced him as a prominent figure in the play of

(Richard IIP His eldest son, Bolingbroke, became king of England as Henry IV. Consult Longman, (Life and Times of Edward IIP (1869); Trevelyan, G. M., (England in the Age of Wycliffe) (2d ed., 1899).

JOHN GILPIN, or in full «The Divert¬

ing History of John Gilpin showing how he went farther than he intended and

came safe home again,® is a famous hu¬

morous ballad by William Cowper, written about October 1782 and printed anonymously the next month in the Public Advertiser. The runaway adventure it describes is said to have happened to a certain John Beyer, linen draper, and the name John Gilpin is thought to have been taken from a tombstone in Saint Marga¬

ret's, Westminster. It is more certain that the story was told Cowper by his friend, Lady Aus¬

ten, in order that she might relieve him in one of his periods of gloom. He is said to have been so amused that he could not sleep until he had got out of bed and written down some of the stanzas as they had come to him. Then he polished and added, sending portions across the street for the approval of a jocular barber friend. When published, the poem made its way fairly well, but it broke away like Gilpin's horse and got its great start toward its un¬

bounded popularity through the recitations of it given in 1785 by the actor Henderson. The same year it was included in the same volume with (The Taskp and doubtless helped to make that a success. It has never since de¬

clined in popularity, and one fails to see how it ever can, so long as people display a propensity to laugh at the not clearly dangerous misad¬

ventures of others, and so long as a free nat¬

ural style and a genuine fund of humor varying from arch to almost rollicking are as rare as they seem to be among literary gifts.

William P. Trent.

JOHN HALIFAX, GENTLEMAN, a

novel by Dinah Maria Muloch Craik, in which the hero, John Halifax, one of ((nature's noble¬

men,® beginning life as a poor boy, works his way up to prosperity and happiness, by means of his high principles, undaunted courage and nobility of character. The heroine is Ursula March ; and the simple domestic story includes few minor characters. The interest lies in the development of character: and the author's as¬

sertion is that true nobility is of the soul and does not inhere in wealth, in learning or in posi¬

tion ; and that integrity and loftiness of purpose form the character of a true gentleman.

JOHN INGLESANT, by J. Henry Short-

house, a well-known novel first published in 1881 belongs to the type of fiction represented by Kingsley's (Hypatia) and Pater's (Marius the Epicurean.) The author called it a (

sophical romance,® designing it to be a means of presenting philosophy under the guise of fiction. The method is generally that of Reade's (The Cloister and the Hearth, } by which is un¬

rolled a panorama of the life of a period in various lands. (John InglesanD is, however, concerned far less with a brilliant picture of personalities and customs in many countries than with expositions of dominant religious and political ideas. The hero from whom the book takes its name is the descendant of a family es¬

tablished and enriched during the religious transformations of Henry VIII, but his own time is that of the Commonwealth. Educated under the influence of a Jesuit with a view to future services to the Roman Church, he be¬

comes an important member of King Charles's entourage and as such not only sheds his blood in the Royalist cause but meets representatives of nearly all the English factions and sects.

As a confidential emissary of the king, he barely escapes suffering his master's fate. On his release from two years' imprisonment he goes to France, where he mingles with the Royalist refugees and becomes acquainted with important types of French religious thought.

An important mission leads him to Italy, where he remains for several

years, influenced by and influencing, as well as merely observing, the intricate play of religious politics and faiths, of character and custom, until his final return to England. Throughout the chief end of the novel is to represent a cross-section in several countries of a dominant interest and to expand various views, to such a degree, indeed, that the personal characters are very much obscured and the people become rather types and mouth¬

pieces than individuals.

William T. Brewster.

JOHN OF LEYDEN, li'den. See Ana¬

baptists.

JOHN OF NEPOMUK, or POMUK,

patron saint of Bohemia: b. Nepomuk, about 1330; d. 20 March 1393. He is considered as the protector of those falsely accused and of those in danger of drowning. He is said to have been made master of arts at Prague after being consecrated to the priesthood. There is very much difference between the accounts that have come down to us concerning the life of this saint and but little reliable historical facts.

There are even claimed to be two personalities embodied in the legendary incidents at hand.

He was preacher in the Teynkirche at Prague, soon thereafter elevated to canon of Saint Veit's, then provost of All Saints'. Later he was appointed almoner of King Wenceslas IV

and father confessor of Queen Johanna. For refusing to divulge the queen's confessions in spite of the king's threats and after all tortures had failed to extract the secrets of the con¬

fessional, he was, on the eve of Ascension Day 1383, thrown into the river Moldau. History also tells of a John of Nepomuk drowned by Wenceslas from which the legend borrows some features. One fact is assured, that he was killed 20 March 1393 for differences of opinion in Church politics. The fact that Benedict XIII, in 1729, canonized a man whose exist¬

ence is not provable gave Schmude, in his (Geschichte des Lebens und der offentlichen Ver-

ehrung des ersten Martyrers des Beichtsiegels) (Innsbruck 1883), the idea that there were two Nepomuks. Abel attempts to make this saintly episode an allegory of the heretical Hus. The legend has given rise to the symbolic emblem of a padlock on the lips of a figure being used as representative of this saint in art. Consult Frind, (Der geschichtliche Johannes von Nepo-

muk) (2d ed., Prague 1871), and (Der heilige Johann von Nepomuk) (ib. 1879) ; Reimann, in Sybel's Historische Zeitschrift (Vol. XXVII).

JOHN NEPOMUK SALVATOR, Arch¬

duke of Austria and Prince of Tuscany: b.

Florence, 25 Nov. 1852; d. – 1891. He was the youngest son of Archduke Leopold II of Tuscany, became colonel (1876) with command of a regiment at Komorn, then (1878) com¬

mander of an infantry brigade at Vienna; then mayor-general, commanding a brigade in the army of occupation at Bosnia. In 1879 he was commander of a division, and was transferred to Lenz (1883-87), commanding the 3d di¬

vision, as a disciplinary measure for publish¬

ing his (Drill oder Erziehung) (Vienna 1883) criticizing the leaders of the army. He was suddenly deprived of his command in consequence of his arbitrary claim to the Bulgarian throne. In 1889 he resigned

every dignity and rank and took the name of Johann Orth, from the title of his castle near Gmunden. He then went abroad and, having passed his examinations as ship's captain, he purchased, equipped and manned a merchant¬

man, the Margerita, and sailed from Hamburg for South America. It is generally conceded that he suffered shipwreck on the coast of South America and lost his life, not a soul, however, surviving to corroborate the fact.

Legendary stories of his living with his brother Archduke Ludwig Salvator of Tuscany at Majorca and other fabrications have been denied by those best able to know. He also wrote (Betrachtungen fiber die Organisations der osterreichischen artillerie) (Vienna 1875) ;

Infanterieregiments Erzherzog Wilhelm Nr. 12>

(ib. 1877-80, 2 vols.). He wrote the text for the ballet and wrote ad¬

versely of spiritualism in (Einblicke in den Spiritismus> (Linz 1885, 5th ed.). Consult Heinrich, (Erzherzog Johann, mit Beitragen zur Geschichte der Begrfindung der Zweiten Dynastie Bulgariens) (Vienna 1901).

JOHN O'GROAT'S HOUSE. In the

reign of James IV of Scotland, about 1489, John of Groat, or Groot, from Holland, set¬

tled on some land on Duncan's Bay Head, the most northerly point in Great Britain and was followed by a number of brothers. This would appear to be historic fact as descendants of the Groats still live in these parts. The mythical part of the story has two versions. One of these states that there were seven brothers who came from Holland to join John and con¬

sequent disputes arose as to family precedence, which induced John to build a house of octa¬

gon shape having one room, eight windows and eight doors, and containing an octagonal table. This permitted each branch of the family to enter by its own particular door and sit at its own particular part of the table, and left no room for dispute as to precedence of entry or place at table. The other version de¬

clares the disputants were eight sons of John O'Groat and they caused him to invent this form of structure to dispel the trouble. The foundation stones and lines on a green hum¬

mock are all that remains of the building; a hotel, erected nearby, with an octagonal tower commemorates the name since 1876. Burns mentions (

The phrase <(from John O'Groat's to Land's End® is a term long in use expressive of the entire length, 994 miles, of Great Britain which is included in these two geographical extreme locations at the most northerly and the most southerly points.

JOHN THE PARRICIDE, known also as

JOHN OF SWABIA: b. 1290; d. about 1313.

He was son of Duke Rudolph II of Swabia, brother of the German Emperor Albert I and was reared in the Bohemian court. He de¬

manded, when he became of age, a share in the Hapsburg domain, and, upon refusal by his uncle, he took a vow, spurred on by the arch¬

bishop of Mainz, against the king's life.

While Albert was crossing the Reuss (1 May 1308) near Rheinfelden he, together with three knights, forced his way on to the vessel and, separating the king from his retinue killed him on the opposite bank of the river. He and his companions were outlawed and pursued vigor¬

ously till he took refuge in a monastery, becom¬

ing a monk. His end is unknown, but there is a story that he died, in monk's garb, repentant (1313) at the feet of Emperor Heinrich VII at Pisa. Schiller makes use of this character in (Wilhelm TellP Consult Mficke,

JOHN PAW, a large and beautiful grouper (Epinephelns Drummond-Hayi) , which is dark umber brown densely covered with small white pearly spots. It inhabits the Gulf of Mexico and is valued as a good fish in Florida. It is also known in the Bermudas, where it is called ((speckled hind.®

JOHN OF SALISBURY, English his¬

torian and prelate: b. Salisbury, about 1120; d. 25 Oct., probably 1180. He is mentioned jn documents often as Johannes Saresberiensis.

He studied at Paris and Chartres under Abe¬

lard and Gilbert and accompanied (1148) Pope Eugenius III to Italy, returning to England (1153 or 1154) to enter the service of the archbishop of Canterbury. After the fall of Archbishop Thomas a Becket, he fled with Henry II to France, returning (1170) with Becket and, after the latter's assassination, 166 JOHN B STETSON UNIVERSITY — JOHNS HOPKINS UNIVERSITY

wrote his biography. He was appointed (1174) thesaurus of the capital at Exeter and (1176) bishop of Chatres. He was a lovable, cultured prelate, learned and broad of view, a philos¬

opher, theologian, jurist and historian, honored by his contemporaries. His a clerico-political philoso¬

phy, show the classic culture of his mind. His letters are a valuable source for contempora¬

neous history. His works have been edited by Giles (Oxford 1847-48; 5 vols.). Consult Schaarschmidt, (Johannes SarseberiensisJ

(Leipzig 1862) ; Denimuia,

(Paris 1873).

JOHN B. STETSON UNIVERSITY, a

coeducational school founded in 1884 at De Land, Fla., under the auspices of the Baptist denomination. The institution was first called De Land University, but in honor of John Batterson Stetson (q.v.), who has given large gifts to the institution, nearly all of the build¬

ings and the campus, the name has been changed. The departments are a preparatory, schools of music, law, art and technology, a normal and practice school for teachers, a busi¬

ness college and a college of liberal arts. The courses lead to the degrees of bachelor of arts, laws and philosophy, and to degrees of bachelor of civil, electrical and mechanical engineering.

The school in 1898 made arrangements with the University of Chicago, whereby the gradu¬

ates of the college of liberal arts, who have a high standing in their studies, may receive cor¬

responding degrees from the Chicago institu¬

tion. In 1917 the number of students in at¬

tendance was 487, the number of professors and instructors 40. The endowment fund amounted to about $1,000,000 and the income to $40,000.

The library contains over 24,000 volumes.

The campus of 35 acres and the well-equipped modern buildings are valued at $300, 000.

JOHN STRANGE WINTER. See

Stannard, Henrietta.

JOHN WOOLMAN'S JOURNAL.

Charles Lamb's advice, ((Get the writings of John Woolman by heart,® is well known, and other sensitive and idealistic critics, English and American, have been equally enthusiastic over Woolman's chief work, his Journal; but among practical Americans of to-day it is to be feared that the book is oftener praised than read. It was begun when Woolman was 35

years old, and was continued until his death, in 1772, at the age of 52. Though it is called a journal, it goes back to recount the events of his whole life, particularly his spiritual experi¬

ences. It is notable that among the few Ameri¬

can classics that have come down from the 18th century are the autobiographies of two men who represent opposed tendencies in American thought — Franklin and Woolman. In contrast with Franklin's extreme practicality stands Woolman's disregard of wordly things, and his readiness to sacrifice property, convenience, and bodily comfort for the sake of principle, and even for reasons of conscience so slight as to seem almost whims. Thus, on his trip to Europe he endured all the hardships of the steerage for the reason, as he says, ((that on the outside of that part of the ship where the cabin was I observed sundry sorts of carved work and imagery ; that in the cabin I observed some superfluity of workmanship of several sorts,®

and he felt a scruple against paying a passage rate that was greater because of these worldly adornments. Woolman was, however, no

ordinary crank or eccentric reformer. The genuineness and sweetness of his character im¬

pel us to respect him when he goes to the greatest extremes in matters of conscience. He did not, like Franklin, pay deliberate attention to the mastery of style, but his singularly pure and limpid prose seems a natural expression of the man himself.

William B. Cairns

JOHNNY CRAPAUD, kra'po' (toad), a

popular nickname of the French nation, in a collective sense.

JOHNNY REB, a nickname given to the

Confederates -by the Federals during the Civil War, when they were usually termed ((rebels®

in the Northern States.

JOHNNY VERDE, or JUAN VERDE,

a fish belonging to the genus Paralabrax, con¬

fined to the coasts of tropical America. The species Paralabrax nebulifer, known locally as the johnny verde, frequents our Pacific coast from Monterey to Lower California, where it is an important food fish. It is usually found in shallow water, grows to 18 inches length, is of a greenish color with mottlings irregularly pale and dark. The spotted . cabrilla, Parala¬

brax maculatofasciatus, of this genus is found from San Pedro, Cal., to Mazatlan.

JOHN'S, Eve of Saint, the survival of a popular celebration of remote antiquity, held on 23 June, which in Christian times because the vigil or eve of the feast of the nativity of Saint John Baptist, 24 June (Midsummer Day).

On the eve of the feast it was the custom in former times to kindle fires called Saint John's fires. This was indeed a continuance of those Teutonic and Scandinavian pagan festivals, which at the winter solstice were observed with Yule-fires, and at the summer solstice with similar beacon-fires, originally intended to com¬

municate through the country the changes in the seasons announced by the priesthood, so as to direct the activities of agriculture and navi¬

gation. The burning of the Yule log at Christ¬

mas is a survival of these observances.

JOHNS HOPKINS UNIVERSITY, a

university at Baltimore, Md., founded by Johns Hopkins, who was born in Maryland and amassed a fortune in Baltimore. He died in 1873 and bequeathed $3,500,000 to found a uni¬

versity. Opened in 1876, it is now one of the-

foremost universities in the United States. In 1902 a large tract of land in the suburbs of the city, comprising 176 acres (56 of which have been deeded to the city for a public park), was presented by several friends as a future site for the university. This noteworthy gift was fol¬

lowed within a few months by a generous con¬

tribution from alumni and citizens of Baltimore of $1,000,000 toward the permanent endowment of the institution. In the summer of 1916 the equipment of the university, in all departments but medicine and chemistry, was removed to the new site. A commanding structure named Gil¬

man Hall (in honor of the first president of the university) houses the library and provides ANDREW JOHNSON

Seventeenth President of the United States JOHNSON

seminary and classrooms for the non-labora¬

tory subjects, besides offices of administration.

It also takes care temporarily of the depart¬

ments of zoology and botany. A separate building close by is equipped for plant physiol¬

ogy and botanical research work. There are two fine buildings for engineering, and the de¬

partments of physics, geology and undergraduate chemistry find temporary homes therein. The department of engineering was organized in 1912, funds for buildings and equipment hav¬

ing been appropriated by the State legislature.

A most important part of the university is the medical school — begun in 1893 — occupying several buildings in the immediate vicinity of the Johns Hopkins Hospital. The most recent addition to the medical work is the school of hygiene and public health established by the Rockefeller Foundation, to be opened in 1917.

Connected with the university is the Johns Hop¬

kins Press, from which issue the American Journal of Mathematics ; The American Jour¬

nal of Philology ; Memoirs from the Biological Laboratory ; Studies -in Historical and Political Science; Beitrdge zur Assyriologie ; Modern Language Notes; Hesperia; Johns Hopkins University Circular; Terrestrial Magnetism and Atmospheric Electricity, etc. The degrees of bachelor of arts, bachelor of science, bachelor of science in engineering, master of arts, mas¬

ter in engineering, doctor of philosophy and doctor of medicine are conferred. The uni¬

versity reported at the close of 1916 — profes¬

sors, instructors and lecturers, 274; students, 1,668; number of graduates, 3,300; volumes in the library, 197,000; productive funds, 86,000,-

000 ; grounds and buildings valued at $3,360,-

000; value of books and apparatus, $633,000; income, $565,000. The university offers a large number of fellowships and scholarships for the encouragement of promising or needy students.

Five endowed scholarships, three endowed fellowships, 10 university fellowship and 55

free tuition scholarships are open to college graduates. For undergraduates in arts and sciences there are 43 free tuition scholarships; for engineering students 129; for medical stu¬

dents seven. The universitv receives as students the following classes : College graduates, men or women, who may proceed to the higher de¬

grees, or may work for longer or shorter periods in the various seminaries or labora¬

tories without reference to a degree; under¬

graduate students looking forward to the de¬

gree of bachelor of arts, or of bachelor of science in engineering; candidates for the de¬

gree of doctor of medicine, for whom a four-

year course is provided, and who. may be either men or women; doctors of medicine desiring to pursue certain special courses ; students who have not taken a degree, and are not looking forward to a degree, but who desire to avail themselves for a brief period of the opportuni¬

ties here offered. College courses for teachers and others, at convenient hours in the afternoon and evening and on Saturday morning, have been provided for several years. In the autumn of 1916 the university inauguarated evening courses in business economics and in engineer¬

ing subjects. Summer courses have been con¬

ducted since 1911. Work in these three groups may be credited toward the degree of bachelor of science. It is difficult to overestimate the in¬

fluence of the Johns Hopkins University upon higher education in this country. . There is scarcely an American college faculty that has not been enriched by the presence of one or more of its graduates, bringing with them at least something of the spirit of the institution, and its respect for exact scholarship and regard for scientific truth.

JOHNSON, Alba Boardman, American

manufacturer: b. Pittsburgh, Pa., 8 Feb. 1858.

He was graduated ,at Central High School, Philadelphia, in 1876. In 1877 he entered as junior clerk at the Baldwin Locomotive Works, then owned by Burnham, Parry, Williams and Company, in 1878ˆ79 he was with the Edge Moor Iron Works of Wilmington, Del., and re¬

turned to the Baldwin Locomotive YVorks in the latter year. He was admitted to partnership in 1896 and in 1909 was made vice-president and treasurer and in 1911 president of the Baldwin works. He is a director of the Federal Reserve Bank, of the Standard Steel Works, of the New York Life Insurance Com¬

pany and many other corporations. He is president of the American Manufacturer's Ex¬

port Association and a member of the Ameri¬

can Master Mechanics' Association.

JOHNSON, Alvin Saunders, American

economist: b. near Homer, Neb., 18 Dec. 1874.

He studied at the University of Nebraska, took the -degree Ph.D. (1902) at Columbia, and was appointed (1901) reader in economics at Bryn Mawr College. He became instructor and adjunct-professor of economics (1902-06)* at Columbia, professor of economics, University of Nebraska (1906-08) and at the University of Texas (1908). He was acting associate professor at University of Chicago (1909) and associate professor (1910-11), professor of economics at Leland Stanford, Jr. University (1911-12), Cornell University (1912—16) , then professor of political science, Stanford Uni¬

versity (1916-18). From 1902-04 -he was editor of economics for New International Encyclo¬

pedia, and editor of political science for the American edition (Nelson's Encyclopedia.5

He wrote (Rent in Modern Economic Theory >

(1903) ; (Introduction to Economics5 (1909) ; (The Professor and the Petticoat5 (1914).

JOHNSON, Andrew, 17th President of

the United States : b. Raleigh, N. C., 29 Dec.

1808; d. Carter's Station, Tenn., 31 July 1875.

Johnson's father died when the boy was 5 years old, and at 10 he was apprenticed to a tailor in his native town. While at work, Johnson gained the first rudiments of an education from a gentlemen who often visited the tailor's shop and read aloud to the journeymen and the ap¬

prentices from a volume of speeches of eminent British orators. Johnson became interested and received the book as a gift from the owner and learned to read and spell at the same time. In 1824, having completed his apprenticeship, he left Raleigh and went to Laurens .Court House.

In 1826 he returned to Raleigh, but in Septem¬

ber of the same year he left with his mother, whom he always showed the greatest solicitude and respect, for Greenville, Tenn. The follow¬

ing year he married. Encouraged and aided by his wife he learned to write and figure. Be¬

coming interested in the problems of his fel¬

low-workers -he was elected alderman (1828), to which office he was twice re-elected. In 1830

tion for three terms. He was also chosen by the County Court as trustee of Rhea Academy, which he held until he entered the State legis¬

lature. In 1839 he took an active part in the adoption of a new State constitution which greatly enlarged the freedom of the masses and guaranteed freedom of speech and of the press.

The next year he was elected to the State legis¬

lature from the counties of Washington and Green where he was especially pronounced in his opposition to the wild schemes of internal improvements then In vogue. Defeated in 1837 for re-election, he was returned in 1839

when the State realized the justice of his posi¬

tion in view of the crisis of 1837. Johnson can¬

vassed eastern Tennessee for the Democratic candidate in 1840, and served as presidential elector-at-large. In the following year he en¬

tered the State senate, signalizing .his advent by the introduction of a judicious measure for internal improvements. In 1843 he was nomi¬

nated from the first district for Congress, and in December took his seat in the national House of Representatives, which he continued to hold for 10 years. While in the lower house he sup¬

ported a bill for refunding the fine imposed on General Jackson, the annexation of Texas, the war measures of Polk's administration, and a homestead measure, and opposed all schemes of internal improvement

when local in scope and the tariff of 1842. On 2 Aug. 1848, he •made a speech setting forth his ideas with re¬

gard to the President's veto power. (

rest or suspend for the time being unconstitu¬

tional, hasty and improvident legislation until the people, the sovereigns in this country, have time and opportunity to consider its propriety.®

This utterance was made the theme of an in¬

teresting article in the Democratic Review in its January issue. Returning to his own State he was chosen for governor in 1853. His inaugural excited much criticism for its ultra radical statements. Two years later he was elected to the United States Senate. As sena¬

tor he gained special distinction in advocat¬

ing a homestead measure, only to see his efforts thwarted by President Buchanan.

By this time the slavery problem was the real issue of the nation. Johnson, a Southern Democrat, himself the owner of slaves ((acquired by the toil of his hands,® mildly upheld slavery, but he did not believe in compromises nor in agitating the slavery controversy, deeming all such discussions as futile. For this reason he disbelieved in the right of petition but sup¬

ported the Compromise of 1850 because he thought each resolution embodied his views.

Nevertheless he did not sanction the Southern attitude of threatening the national government.

In the National Democratic Convention at Charleston in 1860, Johnson was a candidate, but in the election he supported the Brecken-

ridge ticket. When he saw the determination of the South to secede, he alone of the South¬

ern members refused <(to go with his State®

when it withdrew. In 1861 he returned to Tennessee and often at the

risk of his life worked in behalf of the Union. In 1862 he be¬

came military governor of that part of Tennes¬

see under the control of the Northern forces and began organizing a Union government.

Two years later Johnson was placed on the ticket with Lincoln in order to secure the votes of the border States and the Democrats.

At the sudden death of Lincoln, Johnson undertook the difficult problem of reconstruc¬

tion left unfinished by his predecessor. Per¬

haps no man in the Union was so unfitted for this task as the President. Egotistical, tactless, self-confident, fond of making extravagant speeches, radical by nature, and uneducated, Johnson was incapable of grasping the subject.

Where Lincoln by his skill could have molded opinion to his view, Johnson aroused a storm of opposition. Yet, to the radical Republicans, Johnson's succession to the mild Lincoln was received with acclaim, for the new incumbent had always displayed himself as a vigorous prosecutor of the recalcitrant Southerners.

But no sooner was Johnson in office than he began to change, probably due to Seward's in¬

fluence and the added responsibility of his new office. In so doing, Johnson soon found him¬

self in opposition to the legislative branch of the government.

Two possible agencies were available to handle the new situation. One, the executive branch, working on the theory that the Presi¬

dent as commander-in-chief of the army had the power to establish military rule and with¬

draw it; the other, the legislative body, on the assumption that restoration was a part of the lawmaking function. Lincoln, in dealing with the parts of Tennessee, Arkansas and Louisiana recovered from the Confederacy, had under¬

taken the task of reconstruction by issuing his Amnesty Proclamation (8 Dec. 1863), in which he had declared that when a number of

citizens of the State equal to one-tenth of the vote of that particular State in 1860 had taken the pre¬

scribed presidential oath, they might establish a civil government; but the President had defi¬

nitely stated that the admission of their senators and representatives to Congress would rest en¬

tirely with the legislative branch. Congress showed its opposition to this scheme by hastily passing the Wade-Davis Bill (2 July 1864).

Lincoln «pocket vetoed® the bill, but the signifi¬

cance of the struggle demonstrated the deter¬

mination of Congress to exert its full pre¬

rogatives.

Notwithstanding this warning from Con¬

gress, Johnson embarked on the same policy at his succession, and on 29 May 1865 issued a sim¬

ilar Amnesty Proclamation, excluding, however, more classes than Lincoln had done. Immedi¬

ately the work of creating provisional govern¬

ment in the seceded States began, and by Oc¬

tober six Southern States had carried out John¬

son's ideas by denying the right of secession and abolishing slavery. Three circumstances, however, contributed to destroy the efficacy of his plan; (1) the South adopted harsh «black codes® which, by prescribing severe restrictions covering apprenticeship, vagrancy and employ¬

ment of the freedmen, led the North to suspect the new establishments of good faith ; (2) the selection of old secession leaders as new rep¬

resentatives, Georgia even going so far as to choose Stephens, the ex-Vice-President of the Confederacy, as one of her United States sen¬

ators; (3) the determination of the radicals in Congress to exclude the

give the negro political rights, thereby assuring the supremacy of the Republican party. Accord-

N ingly, a bitter contest began between the Presi¬

dent and Congress, led by Stevens and Sumner, over the question of reconstruction. On 4 Dec.

1865 Stevens introduced a resolution creating a Reconstruction Committee composed of nine representatives and six senators. This started the conflict. Johnson replied by vetoing (19

Feb. 1866) the Freedmen's Bureau Bill intended to aid the negro ; and, three days later, he de¬

livered a public address to a serenading party in which he charged Stevens, Sumner and Wen¬

dell Phillips with trying to . destroy the principles of the government. From this time on the breach was irremediable and Congress passed over the President's veto the Civil Rights Bill, a new Freedmen's Bureau Bill, and submitted the 14th Amendment to the States. Both par¬

ties appealed to the people in the fall election for vindication, and, owing to Johnson's lack of tact and decorum in his (

ment of the ex-Confederates and the enfran¬

chisement of the negroes. Johnson, to his credit, carried out faithfully these laws, but the final test came with the removal of Stanton as Secretary of War in violation of the Tenure of Office Act, 2 March 1867. This act forbade the President dismissing any officer without the consent of the Senate. Counseled by his Attorney-General that the act was unconstitu¬

tional, Johnson dismissed Stanton, now in open accord with the radicals and for whose protec¬

tion the law had been enacted. In dismissing Stanton, Johnson broke with Grant over a question of veracity, and thereby gave Congress its opportunity. In February 1868 the House of Representatives voted to

impeach him. The main charges brought against the President were (1) his dismissal of Stanton; (2) his declarations that certain laws were unconstitu¬

tional ; (3) his speeches in the campaign of 1866 ; (4) his opposition to Congressional re¬

construction. The trial was poorly conducted ; the evidence showed much animus; and the fear that Wade, president of the Senate, would succeed, combined with the happy appointment of General Schofield as Secretary of War, turned the tide in favor of the President. Thus on the final vote he was acquitted (35-19), the requisite two-thirds for conviction not having been obtained. In 1868 Johnson was a candidate in the Democratic National Convention but failed to secure the nomination. He returned to Greenville, and after several unsuccessful attempts was elected senator in 1875. His tri¬

umph was short, for he died in July.

Bibliography.— DeWitt, D. M., (The Im¬

peachment and Trial of Andrew Johnson) (New York 1903) ; Chadsey, C. E., {The Strug¬

gle between President Johnson and Congress over Reconstruction (New York 1896) ;

Seward, F. W., (Andrew Johnson) (Philadel¬

phia 1890) ; Dunning, W. A., (Essays on the Civil War and Reconstruction (New York 1898) ; id., (More Light on Andrew Johnson'

(in American Historical Review, April 1906) ; Foster, L., (Life and Speeches of Andrew John¬

son' (New York 1866).

R. C. McGrane,

Assistant Professor of History, University of Cincinnati.

JOHNSON, Bradley Tyler, American

lawyer: b. Frederick, Md., 29 Sept. 1829; d. 5

Oct. 1903. He was graduated from Princeton in 1849, studied law at

Harvard in 1850-51, entered practice at Frederick in 1851, became in that year State's attorney for Frederick County, was a delegate to the National Demo¬

cratic Convention at Charleston and Baltimore in 1860, withdrew from the convention and sup¬

ported the Breckenridge and Lane ticket. At his own expense he organized a company for the Confederate service, in which he rose/to be brigadier-general of cavalry (1864). Subse¬

quent to the war he practised law at Richmond in 1865-79, at Baltimore in 1879-90 ; and was a member of the State senate of Virginia in 1875-90. His works include (Reports of Chase's Decisions' (1875) ; (Memoir of J. E. Johnston'

(1891); a (Life of General Washington'; (Maryland in Confederate Military History'

(Atlanta 1899).

JOHNSON, Burges, American publisher

and journalist: b. Rutland, Vt., 9 Nov. 1877.

He was graduated at Amherst (1899) and be¬

came reporter on the New York Commercial Advertiser and the Evening Post. He was lit¬

erary adviser for G. P. Putnam's Sons (1900-

02) and on the literary staff of Harper &

Brothers (1903-06), assistant editor on Every¬

body's Magazine (1906-07), editor of Outing (1907-08), becoming president of the Thomp¬

son, Brown Co., publishers (1908-13). He was appointed manager of the educational depart¬

ment of E. P. Dutton & Co. (1913) and assistant professor of English at Vassar College (1915).

He has written (Rhymes of Little Boys' (1905) ; (Pleasant Tragedies of Childhood' (1905); (Beastly Rhymes' (1906) ; (Rhymes of Home'

(1909) ; (Yearbook of Humor' (1910) ; bash¬

ful Ballads' (1911); (Rhymes of Little Folk'

(1915).

JOHNSON, Cave, American politician : b.

Robertson County, Tenn., 11 Jan. 1793; d.

Clarksville, Tenn., 23 Nov. 1866. Admitted to the bar, he practised at Clarksville, in 1820 be¬

came a judge of the State Circuit Court, and was a Democratic representative in Congress in 1829-37 and again in 1839-45. In 1845 he was appointed Postmaster-General, from which post he retired at the close of Polk's adminis¬

tration (1849). He was president of the Ten¬

nessee State Bank in 1850-59, and was elected to the State senate as a Unionist in 1863, al¬

though unable to serve because of ill-health.

He was against secession and used every en¬

deavor to keep Tennessee in the Union. He consistently supported Andrew Johnson and his policy of conciliation.

JOHNSON, Charles Fletcher, American

legislator: b. Winslow, Me., 14 Feb. 1859. He was graduated at Bowdoin College (1879), receiving LL.D. diploma (1911). He was appointed principal of the high school at Machias, Me. (1881-86), admitted to the bar (1886) and practising first at Waterville, where he was elected mavor. In 1892 and 1894 he was the Democratic candidate for governor of 170

Maine, and was a member of the House of Representatives in 1905 and 1907. He was United States senator from Maine from 191 1—17, and circuit judge, first circuit, from 1917.

JOHNSON, Clifton, American author and

illustrator: b. Hadley, Mass., 25 Jan. 1865. He obtained a secondary education, worked on a farm, was clerk in a bookshop and school teacher, studied in the New York art schools, published in 1892 (The New England Country,5

an illustrated study of farm folk, and later was much abroad obtaining notes and pictures for works on foreign life. More recently he has visited every nook and corner of the United States in gathering material for an (American Highways and Byways) series in seven volumes.

He has edited a considerable number of books for school use and illustrated a long list of others by famous authors. Among the volumes of which he is author and illustrator are (The Country School5 (1893) ; (The Farmer's Boy5

(1894) ; (What They Say in New England5

(1896); (Among English Hedgerows5 (1899); (Along French Byways5 (1900) ; (The Isle of the Shamrock5 (1901) ; (The Land of Heather5

(1903); (01d Time Schools5 (1904);

sissippi Valley, California, the Rocky Moun¬

tains, the Great Lakes, from the Saint Lawrence to Virginia, and New England, the first volume published in 1904, the last in 1915) ; and battle¬

ground Adventures in the Civil War5 (1915).

JOHNSON, Duncan Starr, American

botanist: b. Cromwell, Conn., 21 July 1867.

He took the degree B.S. (1892) at Wesleyan University and Ph.D. at Johns Hopkins (1897), then studied at Munich (1901). He was ap¬

pointed assistant in botany (1898), becoming associate (1899) and associate professor (1901), to become professor, in 1906 and director of the botanical garden from 1913. From 1896-

1900 he had charge of botany work and of cryptogamic botany from 1902-11 at Cold Spring Harbor, L. I. He worked on botanical ex¬

ploration and. investigation (1903, 1906 and 1910) at Jamaica, West Indies, and was special investigator at Carnegie Institution, Washing¬

ton (1912 and 1915). He has written (The Relation of Plants to Tide Levels5 (1915) in collaboration with H. H. York, and has been a regular contributor to the botanical journals.

JOHNSON, Eastman, American painter :

b. Lowell, Me., 29 July 1824; d. New York city, 5 April 1906. He began his art studies at the Royal Academy, Diisseldorf (1849-51), and de¬

veloped a distinct talent for genre. He after¬

ward traveled in France, Italy and Holland, and spent four years at The Hague. Among his pictures painted in Europe are the Savoy¬

ard5 and the (Card Players,5 in which he showed the influence of the Dutch school. He returned to the United States in 1856 and de¬

voted himself for some years to the study of rustic and negro life and he painted some of the most popular pictures ever produced by a native painter; manv of them have been engraved and chromolithographed. The best known are (01d Kentucky Home5 ; (Husking Bee5 ; and the boyhood of Abraham Lincoln.5 He also pro¬

duced excellent likenesses of Grover Cleveland, Benjamin Harrison, John D, Rockefeller, Wil¬

liam H. Vanderbilt, Cornelius Vanderbilt, Mrs.

August Belmont and Mrs. Alexander Hamilton.

JOHNSON, Edward, American colonial

historian : b. Herne Hill, Kent, England, about 1599; d. Woburn, Mass., 23 April 1672. He emigrated to America probably with Governor Winthrop in 1630. In 1632 he was engaged in trade at Merrimack, and was on the committee appointed to superintend the foundation of a new town and church at the place now called Woburn. In 1643 he was elected by the town of Woburn a member of the legislature of Mas¬

sachusetts, in which he continued to sit till 1671, with the exception of 1648. In 1655 he was chosen speaker of the house. He was recorder of Woburn from the time of its incorporation till his death. In 1665 he was one of the mem¬

bers deputed to hold conference with the com¬

missioners sent from England by Charles II.

He wrote a (History of New England from the English Planting in 1628 till 1652, or Wonder-

Working Providence of Zion's Saviour5 (1654).

It was reprinted in Massachusetts Historical Collection5 (2d series, Vols. I-V, VII-VIII).

There is also a facsimile edition with an intro¬

duction by W. F. Poole.

JOHNSON, Edward, American soldier: b.

Chesterfield County, Va., 16 April 1816; d.

Richmond, Va., 22 Feb. 1873. After being grad¬

uated from the United States Military Academy in 1838 he fought in the Florida wars, for his services in which he was brevetted captain, and subsequently in the Mexican War, being brevet¬

ted major for his conduct at Chapultepec. He received his captain's commission in 1851, but in 1861 resigned to enter the army of the Con¬

federate States as colonel of the 12th Georgia Volunteers. He was promoted brigadier-general in 1862 and major-general in 1863. At Gettys¬

burg he commanded a division. He was cap¬

tured with his entire force at Spottsylvania (12 May 1864) and retaken in the following December. Subsequent to the war he was a farmer in Chesterfield County, Va.

JOHNSON, Emily Pauline, Canadian

poetess : b. Chiefwood, Ontario, 1862 ; d. Van¬

couver, 7 March 1913; the daughter of George Johnson, head chief of the Mohawk Indians, and of his English wife. Her poems on Indian subjects are full of dramatic force and inten¬

sity. Her works are (The White Wampum5

(1894); (Canadian Born5 (1903); and (Flint and Feathers5 (1912).

JOHNSON, Emory Richard, American

economist: b. Waupun, Wis., 22 March 1864.

He studied at University of Wisconsin (1888) and University of Pennsylvania (1893), taking the degree of Sc.D. (1913). He was instructor of economics at Haverford College (1893-96), professor of transportation and commerce at University of Pennsylvania (1896). He served as expert on transportation (1899) on the United States Industrial Commission, and was a mem¬

ber on valuation of railway property for the United States Census Bureau (1904-05). and as expert on traffic on the National Waterways Commission (1909). In 1911 he furnished a report on Panama. Canal traffic, etc., for Presi¬

dent Taft, and arbitrated the dispute (1907) be¬

tween the Southern Pacific Company and the Order of Railroad Telegraphers. He is an ex¬

director of the Bureau of Municipal Research, Philadelphia, and director of the Philadelphia JOHNSON

171

Maritime Exchange. He has written (Inland Waterways; their Relation to Transportation (1893) ; ‘ American Railway Transportation (1903); ‘Elements of Transportation (1906); ‘Railroad Traffic and Rates) (1911); ‘Panama Canal Traffic and Tolls) (1912) ; ‘Measure-

ment of Vessels for the Panama CanaP

(1913); ‘The Panama Canal and Commerce) (1916) ; ‘Principles of Railroad Transporta¬

tion) (1916), and many papers on the econom¬

ics ot railroads, etc. He was editor of the Annals of the American Academy of Political and Social Science from 1901-14.

JOHNSON, Franklin, American Baptist

clergyman and educator; b. Frankfort, Ohio. 2

Nov. 1836; d. 7 Oct. 1916. He was graduated from Colgate Seminary in 1861 ; was ordained a Baptist minister in 1862, and was pastor at Bay City, Mich., 1861-63 ; Lambertville, N. J., 1864-

66; Passaic, N. J., 1866-72; Newark. N. J., 1872ˆ74; and Cambridge, Mass., 1874-88. He studied at German universities and traveled Europe, Egypt and Palestine in 1868-69. He was made D.D. by the University of Jena, Ger¬

many, in 1869, and LL.D. by the University of Ottawa, Kan., 1898. After his pastorate in Cambridge he traveled in Greece and spent the winter of 1888-89 in Athens. He was presi¬

dent of Ottawa University 1890-92. The re¬

mainder of his public life was in connec¬

tion with the University of Chicago, where he was assistant professor of church history and homiletics 1892-94; associate professor 1894-95; professor 1895-1908; and professor emeritus after 1908. Thus his public life was divided into two almost equal parts, the first in the pastorate and the second in univer¬

sity administration and teaching. While labor¬

ing as pastor at Cambridge he was also editor of The Watchman 1876-77. The following are his principal published writings: (The Gospel according to Matthew,) with notes (1873) ; (Moses and IsraeP (1874) ; ‘Heroes and Judges from the Lawgiver to the King) (1875) ; ‘True Womanhood; Hints on the Formation of Womanly Character) (1884) ; and ‘Romance in Song,) a translation of Heine’s ‘Lyrical Interlude) (1884) ; ‘The New Psychic Studies in their Relation to Christian Thought) (1886) ; ‘The Quotations of the New Testament from the Old considered in the Light of General Literature) (1896) ; ‘The Home Missionaries,) a poem (1899) : ‘Have we the Likeness of Christ?) (1902) ; ‘The Christian’s Relation to Evolution) (1904). In addition he made con¬

tributions to reviews and to encyclopedias, and published translations of Latin, and Anabaptist hymns in the current periodicals. He jour¬

neyed around the world in 1913—14. making studies of Christian missions and the conditions of Asiatic populations.

JOHNSON, Gisle Christian, Norwegian

Lutheran theologian : b. Fredrikshald, 10 Sept.

1822; d. Christiania, 17 July 1894. He was edu¬

cated at the Christianssand Cathedral School and University of Christiania, gaining a schol¬

arship which assisted him to study at Berlin, Leipzig, Erlangen, Heidelberg, Tubingen and Paris. He was appointed (1847) lecturer of theology at Christiania University and became professor in 1860. His lecture subjects were systematic theology, history of doctrine, the New Testament canon, but after 1877, church history. He was of the strict orthodox old Lu¬

theran faith. He wrote ‘Nogle Ord om Barne-

daaben) when the pietist Lammers (1857) left the Established Church to found a “free apos¬

tolic and Christian congregation.)) With Cas-

pari, he edited Tidskrift for den evangelisk lather ske Kirke i Norge, and founded (1863) the Luthersk Kirketidende, editing it till 1875.

His ‘Grundrids af den systematiske Theologie) appeared 1878-79, but his ‘Forelaesninger over den christelike Ethik’ and also his ‘Forelaes¬

ninger over Dogmehistorien) were not pub¬

lished till after his death, in 1896.

JOHNSON, Helen Kendrick. American

author: b. Hamilton, N. Y., 4 Jan. 1844; d. 3

Jan. 1917. She was the daughter of A. C. Ken¬

drick (q.v.) and was married to Rossiter John¬

son (q.v.) in 1869. Besides editing several com¬

pilations of verse she published ‘The Roddy Books,) popular juvenile tales (1874-76) ; ‘Our Familiar Songs) (1881) ; ‘Raleigh Westgate) (1889) ; ‘Woman and the Republic) (1897).

She was an active member of the Association Opposed to the Extension of Suffrage to Women and wrote much on the question of woman suf¬

frage. She founded the Meridian Club in 1886, and the Guidon Club in 1907.

JOHNSON, Herman Merrill, American

educator: b. Butternuts, N. Y., 15 Nov. 1815; d. Carlisle, Pa., 5 April 1868. He was gradu¬

ated (1839) at Wesleyan University, Connecti¬

cut, and appointed professor of ancient lan¬

guages at Saint Charles College, Missouri.

He accepted a similar position (1842) at Augusta College, Kentucky, which he left (1844) when called to the chair of ancient languages and literature at Ohio Wesleyan University. In 1850 he became professor of philosophy and English literature at Dickin¬

son College and was called to the chair of moral science in 1860, accepting in the same year the presidency, which he held till his death. Ohio Wesleyan University conferred on him (1852) the degree of D.D. He edited ‘Orientalia Antiquaria Herodoti,) published an edition of the ‘Clio) of Herodotus (1850) and was a regular contributor to the Methodist Quarterly Review and the religious periodicals.

JOHNSON, Herrick, American clergy¬

man and educator: b. Caughnewaga, N. Y., 22

Sept. 1832; d. 20 Nov. 1913. He was graduated (1857) at Hamilton College and (1860) Au¬

burn Theological Seminary, and became asso¬

ciate pastor (1860-62) at the First Presbyterian Church, Troy, N. Y., then pastor (1862-67) at the Third Presbyterian Church, Pittsburgh, Pa.

He was pastor (1868-73) of the First Presby¬

terian Church, Philadelphia, and was then made professor of

homiletics and pastoral theology at Auburn Theological Seminary (1874-80), becoming next pastor at the Fourth Presbyte¬

rian Church, Chicago, until 1883. From 1880-

1906 he was teaching at McCormick Theological Seminary, Chicago. He was president of the Presbyterian Board of Ministerial Education (1869-73) and of the Presbvterian Board of Aid (1883-1903), moderator of the Springfield, Ill., General Assembly (1882), etc. He wrote 'Christianity's Challenge) (Chicago 1880) ; 'Plain Talks about the Theatre) (1882) ; 'Re¬

vivals, their Place and Power) (1883) ; 'Pres¬

byterian Bulwarks) (New York 1887) ; 'Pres-

byterian Book of Forms> (Philadelphia 1889) ; (Ideal Ministry* (1908).

JOHNSON, Herschel Vespasian, Amer¬

ican jurist and politician: b. Burke County, Ga., 8 Sept. 1812; d. Jefferson County, Ga., 16 Aug. 1880. He was graduated from the University of Georgia in 1834, studied law, practised there, from 1844 at Milledgeville, and in 1848 was appointed to the Senate of the United States to fill the seat of W. T. Colquitt, resigned. A strong advocate of Clay's com¬

promise scheme, he identified himself with the Southern Unionists. In 1849-53 he was a judge of the Georgia Superior Court, in 1853-57 gov¬

ernor of the State. He was nominated by the Northern Democracy in 1860 as Vice-President on the presidential ticket with Douglas. Though opposed to secession, he followed his State, and in 1862 was elected to the Confederate Con¬

gress. Elected United States senator in 1866, he was refused his seat because of war disa¬

bilities. He was a judge of the Georgia Supe¬

rior Court from 1873 until his death.

JOHNSON, Hiram Warren, American

lawyer and senator : b. Sacramento, Cal., 2

Sept. 1866. He was educated at the University of California and was called to the California bar (1888), practising at Sacramento, but mov¬

ing (1902) to San Francisco. He made his reputation as one of the prosecuting attorneys in the boodling cases (1906-07) which involved the leading officials of the city and the utility corporations. When Francis J. Heney was shot in the court room during his prosecution of Abe Ruef for bribery, he took his place and convicted Ruef (1908). He was elected gover¬

nor of California (1911-15) and re-elected for the term 1915-19, but resigned 1917. He was a founder of the Progressive party (1912) and nominee for Vice-President on the Progressive ticket and was elected United States senator from California, for the term 1917-23. Dur¬

ing his administration as governor he contin¬

ued his attacks on the Southern Pacific Rail¬

road with the expressed determination that that corporation should loosen its political hold on the State, and he rid the government of numerous, inefficient office holders. He advo¬

cated initiative and referendum as an amend¬

ment to the constitution of his State to aid in putting political grafters out of office. The Webb Bill, forbidding the ownership of land by Asiatic aliens, was signed by him (1913) and brought on a heated and prolonged con¬

troversy between Washington and the Japanese government.

JTOHNSON, Sir John, American colonial

soldier: b. near Johnstown, N. Y., 5 Nov. 1742: d. Montreal, 4 Jan. 1830. He was the son of Sir William Johnson (q.v.), was knighted in 1765 and succeeded to his father's estates and baronetcy in the § Mohawk Valley in 1774.

When the Revolution came on he escaped to Canada in 1776 with 700 loyalists. FTe organ¬

ized the corps known as the Queen's Own Amer¬

ican Regiment, of which he was commissioned colonel. In July 1777, he took part in the siege of Fort Stanwix (q.v.). He defeated General Herkimer in the latter's brilliant attempt to cause the besiegers to abandon their operations; but was himself subsequently defeated. Dur¬

ing the next two years he continued active in northern and central New York, and the Indian massacres of Cherry Valley and Wyoming formed some of the most painful incidents of the war. He was, however, crushingly de¬

feated at Newton (now Elmira) 29 Aug. 1779, and retired to Montreal. His influence over the Indians had always been remarkable and the British government appointed him super¬

intendent-general of Indian affairs in British North America, besides making him extensive land grants, to replace the Mohawk family es¬

tates which had been confiscated. Consult Stone, (Life of Brant) (Albany 1865).

JOHNSON, John Albert, American pub¬

lic official : b. Saint Peter, Minn., 1861 ; d.

Rochester, Minn., 21 Sept. 1909. When John¬

son was only 13 years old, his father died in the county poorhouse of alcoholic dementia, and he was forced to leave school in order to support his mother. He was employed by vari¬

ous mercantile establishments and for a time was connected with a railroad construction gang. During all of this time, however, he continued to educate himself by private study.

His success in this respect was demonstrated in 1886 when he was made editor of the Saint Peter Herald. He was active in bringing about civic improvements, providing free public lec¬

tures and establishing playgrounds. His at¬

tractive personality and geniality made him ex¬

tremely popular. In 1894 he entered politics as Democratic candidate for the State senate; though then unsuccessful, in 1898 he was elected

and served in three successive legisla¬

tures. He became known for his independence of party partisanship when he opposed Gover¬

nor Lind on the question of withdrawing Min¬

nesota troops from the Philippines. Johnson was a bold advocate of tariff reform and econ¬

omy in the administration of the government.

In 1904 he was nominated and elected gover¬

nor. The campaign was extremely bitter, and personalities entered largely into the speeches.

The public issue concerned the merging of the Great Northern and Northern Pacific railroads, but Johnson was taunted with reference to his family. His popularity with the Scandinavian element, his public record and the assaults on his family turned public sentiment in his favor, and he was elected by a plurality of 6,000 at a time when Roosevelt carried the State for the Republican national ticket by 146,000. As governor, fie. achieved immense success, and through his influence legislation was enacted providing for employers' liability, the abolition of railroad passes, schools for delinquent girls, and a reformation of the civil service; he was also instrumental in effecting local and national reforms in insurance laws. He was re-elected governor in 1906 by a plurality of 76,000, and again in 1908 by 20,000, although Taft carried the State for the Republican national ticket by 85,000 votes. In the presidential campaign of 1908 Johnson was frequently mentioned for the Democratic nomination, and he received 46

votes in the Denver Convention. His prestige and success as governor were not diminished by the quiet, . though determined, method em¬

ployed by him in dealing with the miners'

strike of . 1908. He had long suffered from appendicitis, and in 1909 an operation was per¬

formed, but failed to save his life.

JOHNSON

JOHNSON, John Butler, American civil

engineer and educator: b. Marlboro, Ohio, 11

June 1850; d. Madison, Wis., 1902. He gradu¬

ated as a civil engineer (1878) at the University of Michigan and was appointed assistant engi¬

neer in the United States Lake and Mississippi River surveys. In 1883 he accepted the chair of civil engineering at Washington University, Saint Louis, Mo., in which vocation he became noted among educators. He was chosen dean of the College of Mechanics and Engineering (1898), at the University of Wisconsin, where he taught till his dearth. He wrote Theory and Practice of Surveying) (8th ed., 1904) ; (Materials of Construction (1st ed., 1897) ; Engineering Contracts and Specifications* (3d ed., 1904). In 1884 he directed the Index to Current Literature in the Journal of the Asso¬

ciation of Engineering Societies, and (1891).

the United States Agricultural Department placed him in charge of the extensive tests of American timbers.

JOHNSON, Joseph French, American

economist : b. Hardwick, Mass., 24 Aug. 1853.

He was graduated (1878) at Harvard, studied political economy and history for one year in Germany and became member of the staff of the Springfield Republican, then financial editor of the Chicago Tribune. He founded the Spokane, Wash., Tribune (1890), selling out in 1893 tO' become professor at Wharton School of Commerce, University of Pennsylvania (1893-1901). From 1899-1903 he was lecturer on finance at Columbia University and, 'from 1901, professor of political economy. From 1903 he was dean of the School of Commerce, Accounts and Finance at New York University.

Hobart College, Geneva, N. Y., conferred LL.D.

degree (1915). He was a member of the com¬

mission on New Sources of Revenue for New York city (1912) and of the commission to re¬

vise the banking laws of New York State (1913). He wrote (Money and Currency) (1905); (Syllabus of Money and Banking) (1899) ; (Report on the Canadian Banking Sys¬

tem for the National Monetary Commission (1910), besides numerous contributions to the technical periodicals on financial and economic problems.

JOHNSON, Manuel John, English as¬

tronomer : b. Macao, China, 23 May 1805 ; d. 28

Feb. 1859. He was educated at Addiscombe College, England, entered the artillery (1821) at Saint Helena, becoming aide-de-camp to General Walker, who aided him in founding an observatory on the island. By 1833 he had secured materials for (A catalogue of 606 prin¬

cipal Fixed Stars in the Southern Hemisphere) which was printed by his patrons, the East In¬

dia Company (1835), who had furnished his astronomical equipment. For this important catalogue he was awarded the Royal As¬

tronomical Society's Gold Medal. He was ap¬

pointed (1839) to take charge of the Radcliffe observatory when he worked indefatigably on the redetermination of Groombridge's circum¬

polar stars, his investigations appearing in 18

volumes of the Radcliffe Observations. With the aid of Sir Robert Peel an improved outfit of instruments was furnished (1843) including a Simms transit circle and a heliometer (1849) by Repsold of Hamburg with a seven and one-

half object glass, the largest then existing. With this new equipment he observed (1850) 26 im¬

portant double stars and (1852-53) measured the chief stars of the Pleiades and the annual parallaxes of 61 Cygni, continuing the work on Castor, Arcturius and Lyrae (1854-55). He was elected Fellow of the Royal Society (1856), and president of the Royal Astronomical So¬

ciety (1857-58). His catalogue of 6,317 cir¬

cumpolar stars was in the printer's hands when he died and was published in 1860. A prize for an essay on an astronomical or meteorological subject is offered at Oxford every four years, since 1862, instituted in his memory. Con¬

sult Foster's (Alumni Oxoniensis,* Monthly Notices Royal Astronomical Society (Vols.

XIX and XX).

JOHNSON, Owen, American author : b.

New York, 27 Aug. 1878. He is a son of Robert Underwood Johnson and was graduated at Yale in 1901. His story of school life (The Varmint* (1910), with its boyish high spirits, cleverness and wholesomeness, is perhaps his best work. (Stover at Yale) (1911), a college story, frank in its criticisms of certain phases of life at Yale, aroused a storm of controversy.

He has also written (Arrows of the Almighty*

(1901); (In the Name of Liberty) (1905); (Max Fargus) (1906) ; The Eternal Boy) (1909) ; The Humming Bird) (1910) ; Ten¬

nessee Shad* (1911); The Sixty-first Second*

(1912) ; The Salamander* (1914), later drama¬

tized; (Murder in Any Degree) (1914) ; tak¬

ing Money) (1914); The Woman Gives)

(1915). He also wrote the plays The Comet*

(1908) ; (Comedy for Wives) (1912), and an adaptation from the French, The Return from Jerusalem* (1912) ; (Virtuous Wives) (1918).

JOHNSON, Reverdy, American jurist: b.

Annapolis, Md., 21 May 1796; d. there, 10 Feb.

1876. He was educated at Saint John's College in that city, and at 17 began to study law. In 1815 he was admitted to the bar, in 1817 re¬

moved to Baltimore and subsequently devoted his time mainly to the arguing of cases before the United States Supreme Court. He reported

seven volumes of the decisions of the Mary¬

land Court of Appeals, known as (Harris' and Johnson's Reports,* (1820). In 1821 he was elected a State senator, and at the expiration of his term in 1825 was re-elected for a second term. In 1845 he was chosen a United States senator, resigning in 1849 on being appointed At¬

torney-General of the United States. On the succession of Mr. Fillmore, after the death of President Taylor, he resigned that office, and resumed in Baltimore the practice of the law.

In 1861 he was a member of the peace com¬

mission, was United States senator 1863-68, and succeeding Charles Francis Adams as Minister to England in 1868 negotiated the treaty for the adjustment of the Alabama claims, afterward rejected by the Senate. He was recalled in 1869. He prepared an argument in defense of Mrs. Surratt, accused of complicity in the as¬

sassination of Lincoln, but it was refused a hearing by the military court.

JOHNSON, Richard Mentor, American

statesman and soldier : b. Floyd's Station, near Louisville, Ky., 17 Oct. 1780; d. Frankfort, Ky., 19 Nov. 1850. He was educated at Transyl¬

vania University, and subsequently studied law and practised with success. He commenced his public career as a member of the Kentucky

legislature, to which he was elected at 23, and in 1807 was returned to Congress, and remained a member of the House until 1819. He was a firm supporter of the administration of Mad¬

ison, and upon the commencement of the War of 1812 raised a body of Kentucky mounted riflemen, whom he commanded, on the Cana¬

dian frontier. The decisive charge of his mounted volunteers mainly contributed to the brilliant victory gained over the British and Indians at the battle of the Thames, 5 Oct.

1813, and it was 'by his hand that the Indian leader Tecumseh is

commonly supposed to have fallen. In 1819 he was elected to fill a vacancy in the United States Senate, of which he continued a member until 1829, when he was again returned to the House of Representatives.

He remained a member until his election by the senate in March, 1837, as Vice-President of the United States. He discharged the duties of presiding officer of the Senate for four years, and in the Presidential election of 1840 was an unsuccessful candidate of the Democratic party for Vice-President. He thenceforth lived chiefly in retirement. He was, however, serv¬

ing a term in the State legislature at the time of his death. In Congress his chief efforts were against the discontinuance of the Sunday mails, and in behalf of soldiers of the Revolu¬

tion or of the War of 1812, who applied for pensions. He was the author of the law abol¬

ishing imprisonment for debt in Kentucky.

JOHNSON, Richard W., American mili¬

tary officer: b. near Smithland, Ky., 7 Feb. 1827; d. Saint Paul, Minn., 21 April 1897. He was graduated at West Point in 1849, was employed chiefly on frontier service until 1861, when he became colonel of the 3d Kentucky Cavalry, 11

October was appointed brigadier-general of volunteers, and later commanded a division at Murfreesboro, and with his division fought under Thomas at Chickamauga (19-21 Sept.

1863). He commanded the 12th division of the Army of the Cumberland in the invasion of Georgia and a division of cavalry at Nashville, was brevetted brigadier-general, United States army, for his services (13 March 1865), and, having been mustered out of the volunteer serv¬

ice, became provost-marshal of the military division of the Tennessee. In 1867 he resigned from the service with rank of major-general, changed by act of Congress (1875), to briga¬

dier. Among his writings were ‘Life of Gen.

G. H. Thomas5 (1881), and (A Soldier’s Reminiscences) (1886).

JOHNSON, Robert Underwood, Ameri¬

can editor and author: b. Washington, D. C., 12 Jan. 1853. He was educated at Earlham College, Indiana, and joined the staff of the Cen¬

tury Magazine in 1873, he was associate editor from 1881 to 1909, and in the latter year, on the death of Richard Watson Gilder, succeeded to the editorial chair, which he occupied until May 1913. He early became noted for his services in behalf of international copyright, as secretary of the American Copyright League doing much to secure the passage of the law of 1891, for which he was decorated by the French and Italian governments. With Clarence Clough Buel he had charge of editing the Cen¬

tury War Series, 5 afterward published as ‘Battles and Leaders of the Civil War5 (1887—88). He induced General Grant to write his (Memoirs, 5 and, with John Muir, set on foot the movement resulting in the creation of the Yosemite National Park. He was the originator of the Memorial to Keats and Shelley in Rome, and has been active in many national move¬

ments, notably the forest conservation move¬

ment. He became permanent secretary of the American Academy of Arts and Letters. In 1920 he was made Ambassador to Italy. His writings include ‘The Winter Hour and Other Poems5 (1891), and ‘Songs of Liberty and Other Poems5 (1897); T’oems5 (1902);

‘Poems,5 enlarged (1908); ‘Saint Gaudens : An Ode5 (1910-13); ‘Italian Rhapsody, etc.’ (1917).

JOHNSON, Rossiter, American author

and editor: b. Rochester, N. Y., 27 Jan. 1840.

He was graduated at the University of Rochester in 1863 and was associate editor of the Rochester Democrat 1864-68. From 1869

to 1872 he edited the Concord (N. H.) States¬

man; and in 1873-77 was associated with George Ripley and Charles A. Dana in editing the American Cyclopaedia, while in 1879-80 he aided Sydney Howard Gay in his ‘History of the United States.5 In 1883-1902 he was editor of the Annual Cyclopaedia, and in 1900-04

was editor of the ‘Universal Cyclopaedia.5

He edited the series of ‘Little Classics5 (18

vols., 1874-80); (Liber Scriptorum5 (1893), and was editor-in-chief of the (World’s Great Books) (50 vols., 1898—1901) ; (Great Events by Famous Historians5 (20 vols., 1904), and of (The Authors’ Digest5 (1909). In 1906, in col¬

laboration with Dora Knowlton Ranous, he edited ‘The Literature of Italy5 (16 vols., 1906). His original works include (Phaeton Rogers,5 a novel of boy life (1881); (A His¬

tory of the French War ending in the Con¬

quest of Canada5 (1882) ; (History of the War of 1 812 ˆ (1882) ; ‘Idler and Poet,5 verse (1883) ; ‘History of the War of Secession5

(1888) ; ‘The End of a Rainbow,5 a story (1892) ; ‘The Hero of Manila5 (1899) ; ‘Short History of the War with Spain5 (1899) •

‘Morning Lights and Evening Shadows,5

poems (1902); ‘The Alphabet of Rhetoric5

(1903) ; ‘The Clash of Nations5 (1914) ; ‘Cap¬

tain John Smith> (1915), and ‘Episodes’ of the Civil War> (1916); ‘Biography of Helen Kendricks Johnson5 (1917).

JOHNSON, Samuel, American college

president, first president of King’s College (now Columbia University) : b. Guilford, Conn., 14 Oct. 1696; d. Stratford, Conn., 6 June 1772

He was graduated at Yale College in 1714, and two years later appointed tutor there. In 1718

he resigned to receive ordination as a Congre¬

gational minister, and settled at West Haven He relinquished his charge in 1722 and. soon after sailed for England, where he received Episcopal ordination in 1723. Shortly after he returned to America, bearing a commission as missionary of the Society for the Propagation of the Gospel in Foreign Parts, and settled in Stratford, Conn., as rector of an Episcopal church there. In 1743 he received the degree of D-D. from the University of Oxford. In 1746

he published ‘A System of Morality,5 and in 1752 a compend of logic

and metaphysics, and another of ethics ; the two latter were printed in Philadelphia by Franklin as textbooks for the University of Pennsylvania. In 1755 he was offered the presidency of that university, but de-

dined it. In 1753 he was invited to accept the presidency of the newly founded King's College Jn New Y ork, in all the plans for which he had been consulted. He did so, but in 1763 resigned and returned to Stratford, where he resumed his parochial duties, revised his previous works and published an (English and a Hebrew Grammar* (1767). Johnson carried on long controversies upholding apostolic succession and divine sovereignty. Consult Beardsley, (Life of Samuel Johnson, D.DP (New York 1876), and Chandler, (Life of Samuel Johnson) (London 1824).

JOHNSON, Samuel, English man of let¬

ters: b. Lichfield, 18 Sept. (N. S.) 1709; d. Lon¬

don, 13 Dec. 1784. He was the son of Michael Johnson, a learned bookseller, and his wife, Sarah Ford. The father was a Jacobitical, High Church Tory, somewhat given to melancholy, and not methodical in habits. The son took after him in these particulars. Of the mother little is known. They had another son, Nathaniel, born in 1712, who died at 25. The elder Johnson was a man of some local import¬

ance, church warden, sheriff and bailiff, but before his death in 1731 his business had de¬

clined until he was nearly bankrupt.

Samuel is said to have been a very preco¬

cious child, but his mental forwardness could not ' compensate for his bodily defects. His face was deeply marked by scrofula and one eye was permanently injured, Queen Anne's touch profit¬

ing him nothing, but leaving in his loyal memory a vague picture of a <(lady in diamonds and a long black 'hood.® He was first taught by a dame, later at the Lichfield school. Being lazy and lumbering he early exerted his powers of command upon his fellows by making three of

his mates carry him to school. In 1726, he was sent to school at Stourbridge for a year.

Then he remained for two years at home, where he did little except to read widely among his father's books. His talents impressed a neigh¬

boring gentleman, who offered to send him to Oxford. Johnson entered Pembroke College as a commoner 31 Oct. 1728, remained in con¬

tinuous residence a little over a year, and re¬

turned for brief periods, until the autumn of 1731. He was wretchedly poor during his college residence, and he left without a degree because of his father's business troubles. The stories of his haranguing students in a tattered gown and flinging away in a passion a pair of shoes left at his door are well known. His un¬

usual learning seems to have impressed the col¬

lege authorities from the beginning, and his Latin translation of Pope's (Messiahˆ printed in 1731 in a ˆmiscellany,® pleased that famous poet. But Johnson was too indolent and hy-

pochrondriacal to profit greatly from the col¬

lege routine, and the cutting short of his aca¬

demic career is thus not specially to be re-

greted.

After his father's death he found himself obliged to earn his living by teaching school and acting as chaplain to a baronet, who did not treat him kindly. He soon gave up the place and removed to Birmingham, where he lived with an old schoolmate named Hector and be¬

came a bookseller's hack. The only fairly im¬

portant work of these years was his translation, through the French, of the Portuguese Lobo's (Voyage to Abyssinia, } which appeared in 1735.

Johnson is said to have walked to Oxford to get a copy of the French version, which has never yet found its way back to the shelves of the Pembroke College library.

In 1735 he made a marriage which, has af¬

forded posterity a great deal of amusement.

Among his acquaintances in Birmingham was a mercer named Henry Porter, who died in 1734, leaving a widow and three children. In a little less than a year Johnson married the widow, who was about 20 years his senior. John¬

son declared that it was a love match on both sides, and his own constancy to her throughout her life and his devotion to her memory prove that for himself at least he did not exaggerate.

Despite his uncouth appearance, his eccentrici¬

ties, his visionary and morbid qualities which made some people think him insane, the widow is said to have recognized that he was at bot¬

tom one of the most sensible of men. Accord¬

ing to Garrick he showed no sense of the beautiful in choosing a fat, painted and affected old woman. She showed no prudence in plac¬

ing her small fortune under the control of a poor young man with apparently slim prospects.

Yet as Johnson was nearsighted and could see but little of what shocked others in his wife —if indeed the report of Garrick was not pur¬

posely exaggerated — and as he undoubtedly made her a good husband, there seems to be little reason to waste sympathy on either party to the match.

After his marriage Johnson set up a board¬

ing school near Lichfield. His peculiarities nat¬

urally prevented him from succeeding. He’ may have had only three pupils ; but one of these, David Garrick, combines with the master him¬

self to make the short-lived school a very famous one. Early in 1737 the two set out to¬

gether to seek their fortunes in London, Mrs.

Johnson being left in Lichfield. They had little money, and Johnson's chief baggage seems to have consisted of part of his tragedy

The literary adventurer spent his first months in London seeking employment from the book¬

sellers. He lived prudently and seems to have been aided by Henry Hervey, a son of the Earl of Bristol. In the summer he returned to Lich¬

field and finished Hrene* ; in the autumn he re¬

moved permanently to London with his wife.

Macaulay in an excellent paragraph of his admirable essay on Johnson describes the des¬

perate state of authors at the time. In 1736 the day of the patron was drawing to a close, but, although Pope had succeeded in making the public his patron, it was too early for other men to hope to rival him. Writers who under Queen Anne might have received money and political positions were now rather happy when they were sure of their meals. Booksellers kept them under by <(sweat-shop® methods. Johnson took his place in the toiling ranks, but, because of his pride, suffered more than most of his brother hacks. His never polished manners deterio¬

rated in cellar restaurants ; he became a sloven in his dress and, as all the world knows, he never got over his acquired aversion to clean linen. Much of the brutality of manners for which he was afterward reproached is ac¬

counted for by the rough treatment to which he was subjected at this period of his career.

The details which Boswell was able to gather with regard to the early life of his hero are not very ample. After (Irene) was refused by a 176

manager, Johnson secured employment with Cave in 1738, revising for The Gentleman's Magazine the parliamentary debates, which could be published only as if they had occurred in the senate of Liliput. From July 1741 to March 1744 he wrote the debates, making use of notes taken by others. They were often re¬

garded as genuine, few readers knowing that the writer, to use his own words, had taken care that the Whig dogs should not have the best of it.

Meanwhile in 1738 Johnson had published through Dodsley his first important piece of work, the satire entitled (Londonˆ in which he imitated Juvenal's third satire as Boileau and Oldham had done before him. Being a strong, manly spirit and having his own sufferings and indignities to spur him on, he produced a poem which seemed so good to his contemporaries that the first edition was exhausted in a week.

Pope inquired who the author was and en¬

deavored to have him elected to the mastership of a school. The project failed and Johnson remained in London gathering the knowledge of writers and life that stood him in such good stead in his later criticism.

This knowledge was first displayed on a con¬

siderable scale in his life of Richard Savage (q.v.), which appeared in February 1744 John¬

son, who had been much thrown with Savage, took that curious personage far too seriously ; but his small biography is not only valuable as an excellent description of the literary Bohe-

mianism of the day, but is important as one of the first books of its kind to abandon a stiff and formal or a stately tone, and to present a life simply and vividly. When we praise Boswell as a biographer, we ought not to forget thait his great subject gave him instructions which the Scotchman bettered.

Little is heard of Johnson for the next two or three years, but his fame must have grown, for in 1747 he was employed by a sort of book¬

sellers' syndicate to prepare an English diction¬

ary, this project superseding that of an edition of Shakespeare, which he contemplated in 1745.

The dictionary was to be in two folio volumes for which he was to receive £1,575. The entire cost of preparing copy fell on him, however, hence the bargain was not a profitable one to the needy scholar except in so far as it enhanced his reputation. He issued a plan of his work dedicated to Lord Chesterfield ; did a large amount of reading to secure quotations ; em¬

ployed six amanuenses to copy such citations as he had marked ; supplied etymologies and defini¬

tions ; and finally on 15 April 1755 stood forth to the world as (

bered; but it should not be forgotten that John¬

son not only far surpassed his predecessors, but also laid the foundations on which subse¬

quent lexicographers have reared more impos¬

ing structures. The dictionary is also remem¬

bered as the occasion of Johnson's writing one of the most famous of all letters — that to Lord Chesterfield, who had neglected him for years but on the eve of the publication of the great work wrote flattering notices of it in the hope that it might be dedicated to him. John¬

son's letter of 7 Feb. 1755 is remarkable not merely for the dignity with which he refused to be encumbered with help after he had safely reached the shore unassisted, but also for the touching pathos with which he referred to his disillusionment and his loneliness. His <(Tetty,®

for whose sake he had labored so heroically, was not by his side to share his rewards. She had died in March 1752.

The completion of the (< Dictionary® in eight years would have been sufficient work and glory for a more than ordinary man of letters; but between 1747 and 1755 Johnson added greatly to his reputation in other ways. In January 1749

the second of his celebrated satires appeared, (The Vanity of Human Wishes, > based upon the tenth satire of Juvenal. It is better than the

tentious pieces of moralizing in verse to be found in English literature. It brought Johnson only 15 guineas. He received nearly £300 in benefits and copyright for his tragedy

Even Garrick's acting and Johnson's appear¬

ance in a box clad in a gold-laced hat and a gold-laced scarlet waistcoat could not save so undramatic a performance. It ran nine nights; the person who has read it nine times has prob¬

ably never existed. /

More important than his reappearance as a poet was his assumption of the role of periodi¬

cal essayist. His famous semi-weekly imitation of The Spectator, entitled The Rambler, which ran from 20 March 1750 to 14 March 1752, was not specially successful as a journal, but when the numbers were gathered into volumes, which Johnson most carefully revised, the work became very popular. That it was the equal of The Spectator, as the novelist Richardson, who wrote the only really popular number, and other contemporaries declared, nobody now believes. That it should have held its own against so formidable a rival, when so many other attempts had failed, is a clear proof that it had genuine merits. It certainly established Johnson's fame as a moralist, and, if we omit the papers in which he clumsily attempted to be entertaining as well as some of his speci¬

fically critical essays, we can still find in its pages more sound thought and feeling with re¬

gard to human life in its lights and shadows than can be discovered in the pages of most of the essayists we actually read. Johnson's con¬

temporaries were also greatly impressed by his elaborate, balanced, Latinistic prose style. The effects of this both upon the prose of his period and upon his own reputation were injurious.

Even to this day most people think of Dr. John-

son — he was not yet M.A., that degree coming to him from Oxford, partly in reward for The Rambler, in time to be printed on the title page of the Dictionary — as a pompous affected writer who never

used a short English word, if he could find a long Latin one to put in its place. The Rambler and other works pro¬

duced when he was about 40 give a basis of truth to this opinion; but we should remember that as he grew older and after he had had much practice as a racy talker, his style became simpler and stronger.

The last number of The Rambler was writ¬

ten when Mrs. Johnson was dying. He mourned her loss sincerely through 32 years of widower-

hood. He did not see her painted cheeks or hear her affected giggles ; he saw only an ideal being whose death left him desolate. No one can read the numerous references to her in his (Prayers and Meditations) (1785) without feel¬

ing a profound respect for the blinded man.

During the years between 1752 and 1759, that is between The Rambler and ‘Kasselas,*

Johnson not only published the Dictionary, wrote essays for his friend Dr. Hawkesworth’s (The Adventured (1753-54), and edited and contributed to the Literary Mazagine, or Uni¬

versal Review (1756-58), but also issued pro¬

posals for the edition of Shakespeare he had long contemplated (1756), and began a new series of essays, The Idler. He lazily put off the Shakespeare until a taunt by the satirist, Charles Churchill, in (The Ghost,* to the effect that he was cheating the subscribers who had paid in their money forced him to gO’ to work on the promised edition, which finally appeared in 1765. Naturally, it was not a monument of scholarship, but it contained some sound crit¬

icism, and its preface has long been regarded as one of the most sensible introductions to the reading of Shakespeare that we possess. The Idler ran in weekly numbers from 15 April 1758

to 5 April 1760 on Saturdays in Newberry’s (Universal Chronicle.* It was collected in two volumes in 1761 and in part deserved its title, for

it was distinctly less ponderous than The Rambler.

It is at this period that the Johnson who has impressed the world's imagination as a man begins clearly to emerge. He was still the old impecunious Johnson, for the year after the Dictionary appeared he was twice arrested for debt. But he was slowly improving his finances, and he was gathering around him friends who were better than riches. He had long delighted in tavern clubs where he met queer characters, such as the forger, Psalmanazer (q.v.). In 1749 he organized a club of his own at the King's Head, which included Bathurst, Hawkes-

worth, and his future biographer, Sir John Hawkins. Then he formed friendships — des¬

tined to become more famous because they figured so frequently in Boswell — with the ac¬

complished Grecian Bennet Langton, with the gay, fashionable Topham Beauclerk, with Sir Joshua Reynolds and Dr. Burney, and, a trifle later, with Goldsmith and Burke. An humbler circle of friends is still more picturesque — to wit, the unfortunates he received into his gloomy house after his wife died — blind Miss Anna Williams, good talker but peevish, Robert Levett, the self-educated physician of the poor, to whose memory Johnson consecrated one of the most pathetic of English elegies — and later, Mrs. Desmonlins and Miss Carmichael. These dependents, as was natural, quarreled among themselves and harassed their benefactor. An¬

other inmate of his house, of whom we fre¬

quently hear, was his 'black servant, Francis Barber. , . ,

In January 1759 Johnson s old mother died at Lichfield. The storv that he wrote (Rasselas, Prince of Abyssinia,* in a week, to pay her funeral expenses is, as is usual, not altogether accurate. It seems to have been begun before her death, mainly in order to defray the cost of a visit to her. When published, it became the most popular of his writings, and it still has readers and ranks as a classic, although a vol. 16 — 12 '

ponderous one. It has little narrative interest, lacks the atmosphere of the East, presents us with personages rather than with persons, and makes them talk in an impossibly magniloquent style ; yet, when all deductions are made, it re¬

mains not only a strong attack upon the fashion¬

able shallow optimism of the day which John¬

son detested, but also one of the most manly utterances on the evils of life and the courage needed to combat them that has ever been heard from an English moralist. In literary ability Johnson was inferior to Voltaire, whose witty (Candide,* by a curious coincidence, attacked the optimists almost contemporaneously with

Three years after (Rasselas* began its long life in numerous editions and translations, John¬

son's own life was almost entirely changed. In July 1762, despite his famous uncomplimentary definition of (

per annum. He was independent enough to be able to afford being slightly inconsistent, and he did not promise to support the Tory government in return for its favors. Pensioned or unpen¬

sioned he would have taken his reactionary position on American affairs, whether or not he would have written his unfortunate (Taxation no Tyranny* (1775), just as naturally as he took part in exposing the Cock Lane Ghost (1762).

His pension gave Johnson full opportunity to indulge his constitutional sluggishness. He could afford to write only now and then, to lie in bed till the afternoon, to> spend the evening at a tavern laying down the law to his hearers.

Thanks partly to his genius for conversation and friendship, partly to his rooted dislike of solitude, he grew to be more and more of a club-man, as the word was then understood, and it was in this capacity rather than as a produc¬

tive man of letters that he became the literary dictator of his time. As Macaulay remarks, between 1765 and 1775 Johnson published only what it would scarcely have taken him a week to write if he had been working at his old rate of speed. Instead of writing he talked, and wben he came forward again as an author, the vigorous English of his. conversation got the better of the stately Latin of his pen. About the beginning of 1764 he became the chief figure of the famous club which for nearly 20 years held weekly or fortnightly meetings at the Turk's Head, Soho. Besides Johnson, its chief members were Reynolds, Burke, Goldsmith, Gibbon, Garrick, Sir William Jones, and, last but not least, James Boswell, whom Johnson caused to be elected early in 1773. Langton, Beauclerc, Bishop Percy, Fox, and others nearly or quite as distinguished, were also members.

It is perhaps not so surprising that these men admitted Boswell at Johnson's solicitation as that Johnson should have tolerated the bibulous, gossiping little man, who hailed from a part of Great Britain for which the sturdy English moralist had always professed a great dislike.

The matter can no more be settled by explana¬

tion than Johnson's infatuation with Mrs. Por¬

ter. Boswell, with all his faults, must have been amusing, and his devotion to his master doubtless touched that essentially kind though rough personage. At any rate, posterity, .which owes so much to Boswell, has no occasion to criticize harshly either of the apparently ill-

assorted friends. It is better to remember that, although several other members of the club wrote books that have stood the wear and tear of time more successfully than most of John¬

son's writings have done — Burke, Goldsmith and Gibbon, for example, and Boswell himself the fact that Johnson dominated such men speaks volumes for his essential greatness as a man. Mere dictatorial rudeness and other qualities natural to an Ursa Major, as the poet Gray used to denominate him, are not sufficient to explain the phenomenon.

Boswell is not the only person who lives in literature because he was once associated with Johnson. Henry Thrale, the brewer, and his bright, gay wife are mainly remembered, .be¬

cause after 1764 Johnson passed much of his time at the brewery in Southwark and at their villa at Streatham, leaving his new house in Fleet street to be occupied in the main by the queer recipients of his bounty already men¬

tioned^ He now became somewhat more pol¬

ished in his manners and enjoyed the society of such interesting women as Fanny Burney (Mme. D'Arblay, q.v.), Hannah More (q.v.), Mrs. Montagu and Mrs. Carter. The literary lion in such company presents ia picture very different from that of the adventurer

wandering the streets with Savage. Boswell gives so many interesting pictures of the later Johnson that it is difficult to select the most striking. The interview with George III was a great event in the life of so loyal a subject It took place in February 1767. His softening down in the presence of that amusing radical, John Wilkes, showed him in a still happier light. His ex¬

cursions, whether with Boswell or the Thrales to the Hebrides (1773), to Wales (1774) and to France (1775) —to say nothing of visits to his< old friends at Oxford and elsewhere, had their share with time in mellowing his charac¬

ter and widening his outlook upon men and institutions. (A Journey to the Western Isles, >

the account he gave of. his visit to Scotland with Boswell, upon which the latter wrote a more sprightly book, would have given far more offense to the Scotch if it had been writ-

££etwi° decades earlier. It was published in 1775, the year Oxford, following Dublin by 10

years, made him a doctor, and is a dignified and worthy book; but it is probably chiefly re¬

membered because in it Johnson severely han¬

dled James Macpherson of Ossian fame, a fact which led to Macpherson's challenging him, and to Johnson's purchasing a stout stick, which he did not have occasion to use on his challenger.

. Two years later — Easter Eve 1777 — a com¬

mittee representing many of the best London booksellers called, upon Johnson to ask him to furnish introductions to a proposed series of the works of the English poets since the Res¬

toration. The project pleased him, he named a compensation far too low (200 guineas, subse¬

quently increased by £200 by the booksellers), shook off his lethargy and by 1781 had finished the most famous of his books, the (Lives of the English Poets, 5 which appeared (collected) in 10 small volumes (1779, 1781). This latest work was, in literary merit, by far his best. He was in sympathy with most of the poets he had to treat, he had amassed through reading and gos¬

sip much information about them, he had mel¬

lowed with age, the common sense and sound morality, which are the best features of his criticism, had full chance to display themselves, and his. style was no longer ponderous and un-

ldiomatic. The life of Milton was marred by prejudice, religious and political, as well as by lack of appreciation of such a poem as Wycidasff the life of Gray was unsympathetic and inade¬

quate ; but the chief lives, such as those of Cowley, Addison, Dryden, Swift, Pope and Savage, left little to be desired, and many of the minor sketches were intelligent, to the point, and, not infrequently, humorous in a somewhat grim fashion. In short, the book well deserves the place it has secured as an 18th century classic.

After its publication Johnson aged rapidly, and what with the loss of friends (like Thrale in 1781, and Levett in 1782), and with his dread of death and his increasing infirmities of gout and asthma, the last three years of his life were very painful. A break with Mrs. Thrale in consequence of her attachment to the Italian Piozzi, whom she married in 1784, led to his going back to his house in Fleet street, to re¬

criminations and bad temper trying both to him and to her, and finally to his last letter to her, which is pathetic in the extreme. In the sum¬

mer of 1783 he had a paralytic stroke; recover¬

ing, he tried, more or less in vain, to forget his miseries in his clubs, old and new. He visited Oxford with Boswell ; plans were formed to get him to Italy, but failed; and in November 1784 he entered upon his last illness. Physi¬

cians and friends served him with the utmost kindness, his fears of death subsided, and after bravely undergoing operations and giving many proofs of his unfeigned piety, he died peace¬

fully on 13 Dec. 1784. Seven days later he was buried in Westminster Abbey.

Johnsons massive figure and disfigured face, his swaying backward and forward, his mutter¬

ing prayers to himself, his touching all the posts he passed, his bad manners at table, his 25 and less cups of tea, his slovenliness, his near-

sight-

edness all his moral and physical peculiarities are known wherever Boswell is read. We do not so frequently recall his generosity in mak¬

ing advances after a quarrel, his love of chil¬

dren, his chivalry toward women, his loyalty •to his friends, his charity to the poor, his hatred of tyranny in every form. We remember his prejudices and superstitions without recalling the fact that he inherited them in large meas-

ure. By insisting upon his eccentricities we tend to overlook his splendid triumph over bod¬

ily infirmities and social drawbacks that would have quelled a less resolute spirit. Johnson at bottom was of heroic mold — courageous ten¬

der, . large-minded, sound-hearted. His pecul¬

iarities make him picturesque; study of his character and his career reveals him to have been truly great as a man. As a man of letters he is also great, through his influence upon the literature of his period, through his services to lexicography, through the solid intelligence aJld morality of his essays and ˆasselas,5

through the sanity of his best criticism, and through the vitality of his biographical sketches But as a writer of books that are judged solelv on their intrinsic merits of style and substance Johnson can scarcely be termed great. His complete works have been but rarely reprinted in the past 80 years and are little' read. As an essayist and letter-writer, and poet, he is not in the highest class; is found to JOHNSON

be heavy reading by most people; the (Lives of the Poets) are perused in their entirety by but few. Boswell does much more to pre¬

serve Johnson's fame than the great Doctor's own writings ; but the value of these is easily underestimated, and Boswell's biography would not have been such a great book if Johnson had not been such a great man. See Lives of the Poets; Rambler, The; Rasselas ; Vanity of Human Wishes.

Bibliography. — Good editions of Boswell's Fife of Samuel Johnson5

are by G. Birkbeck Hill (6 vols., Oxford 1887) and by Roger Ing-

pen (2 vols., New York 1909). Other editions of importance are those by Malone (6th edition of the work, 1811), Croker (11th edition, 1831; revised, 1835), Percy Fitzgerald (1874), Rev.

Alexander Napier (1884). Other sources of in¬

formation are the biography by Sir John Haw¬

kins (1787), Arthur Murphy's (Essay on the Life and Genius, etc.5 (1792), Mrs. Piozzi's Anecdotes5 (1786), and her (Autobiography >

(1861), the Diary of Mme. D'Arblay (1841, now edited anew by Austin Dobson), and, in general, books dealing with the chief men of the time, Goldsmith, Reynolds, Burke, etc. Consult also the short lives by Leslie Stephen O Eng¬

lish Men of Letters,5 London 1879), and Col.

F. Grant ((Great Writers,5 ib. 1887); Dennis, J., (Dr. Johnson5 (New York 1905) ; Raleigh, W. A., Samuel Johnson5 (Oxford 1907) ; id., (Six Essays on Johnson5 (ib. 1910) ; Shorter, C. K., Hmmortal Memories5 (New York 1907) ; Piozzi, H. L. T., (Dr. Johnson's Mrs. Thrale5

(ib. 1910) ; Broadley, A. M., (Dr. Johnson and Mrs. Thrale5 (ib. 1910) ; Burney, F.,

son and Fanny Burney5 (ib. 1911) ; Bailey, J. C., (Dr. Johnson and His Circle5 (ib. 1913).

The chief critical essays are by M. Arnold, Birrell, Carlyle, Macaulay and Leslie Stephen.

Consult also Birkbeck Hill's (Dr. Johnson and His Friends5 (1878), and (Johnsonian Miscel¬

lanies5 (1897), and Whitwell Elwin's Tome Eighteenth Century Men of Letters5 (1902).

Johnson's works were edited by Hawkins in 1787 in 11 volumes (to which two volumes edited by Stockdale were added later). Sev¬

eral editions by Arthur Murphy followed (1792, 1796, etc.)-, then two by Chalmers (1810, 1816), and finally in 1825 came the best, the Oxford edition in 11 volumes, edited by F. P. Walesby and containing

the Parliamentary Debates.

Johnson's (Letters,5 save those included in Bos¬

well's, were edited by Birkbeck Hill in 1892

(2 vols.). Reprints of separate works have been very numerous, of late chiefly for school use.

The best editions of (Rasselas 5 are those by Birkbeck Hill (1887), and O. F. Emerson (1895). The (Lives of the Poets5 were edited by Peter Cunningham in 1854, by Mrs. Napier in 1890 and by Arthur Waugh in 1896; but these have been superseded by the monumental edition of Birkbeck Hill (3 vols., 1905). Mat¬

thew Arnold edited six of the lives in 1878.

William P. Trent,

Professor of English Literature, Columbia Uni¬

versity.

JOHNSON, Samuel, American preacher

and author : b. Salem, Mass., 10 Oct. 1822 , d.

North Andover, 19 Feb. 1882. He was gradu¬

ated from Harvard in 1842, and from the Har¬

vard Divinity School in 1846. He joined no religious denomination, and save for one year with a Unitarian church in Dorchester was not settled as a minister until 1853, when he estab¬

lished in Lynn, Mass., an independent society, with which he remained till 1870, then with¬

drew to complete studies of many years, the re¬

sults of which appeared later in his publica¬

tions. With Samuel Longfellow (q.v.) he com¬

piled a (Book of Hymns5 (1846) and (Hymns of the Spirit5 . (1864). Some of his own in¬

spiring hymns in these books are now found in the collections of various denominations. His critical study (The Worship of Jesus5 (1868), written in accordance with his views of uni¬

versal religion, is described by O. B. Frothing-

ham as (

lifting essay on that subject in any language.55

He printed notable essays on religion, reform, etc., in The Radical and other periodicals. His great work (Oriental Religions,5 including Undia5 (1872), (China5 (1877) and (Persia5

(1885) — the last containing an introduction and a critical estimate of Johnson by O. B. Froth

ingham — represents what Johnson himself calls his ((purely humanistic point of view.55

His philosophy was highly transcendental ; but being versed in many languages, he was ac¬

quainted with all schools, and with the results of history, literature, science and criticism in every department. (Oriental Religions,5 in the task of writing which scholars have compared his competence, patience and thoroughness with the same qualities in Darwin, has taken its place among the most learned and liberal con¬

tributions to the study of comparative religion and civilization. Prof. E. J. Eitel, the German Orientalist, wrote of ˆJohnson's pre-eminent merit:? as the historian of universal religion,55

and F. Max Muller paid him tribute as the finder of <(a religion behind all religions.55 His (Theodore Parker5 (1890) is a profoundly spiritual interpretation of that preacher and reformer, whose work on the intellectual side was surpassed by Johnson's, while on the moral side, as in the anti-slavery conflict, they stood as equal comrades. A little volume of John¬

son's hymns, with other poems, was published in 1899. Consult Longfellow, (Lectures, Essays and Sermons by Samuel Johnson, with a Memoir5 (Boston 1883). This volume con¬

tains some of Johnson's best papers, including brilliant lectures on ˆSwitzerland5 and Flor¬

ence,5 the outgrowth of searching observations in Europe, (Equal Opportunity for Woman,5

(Labor Parties and Labor Reform,5 and an illuminative essay on transcendentalism. 5

JOHNSON, Samuel William, American

chemist: b. Kingsboro, N. Y., 3 July 1830; d.

1909. He studied at Yale Scientific School and the universities of Leipzig and Munich. In 1856 he became professor of analytical chem¬

istry in the Sheffield Scientific School of Yale, taught agricultural chemistry there 1857-75, and from 1875 to 1896 was professor of theoretical and agricultural chemistry, becoming in 1896

professor emeritus. He was director of the Connecticut Agricultural Experiment Station from 1877 to 1899. In 1858 he was -made chem¬

ist to the State Agricultural Society, in which capacity he issued an important seri&s of papers on commercial fertilizers and allied subjects.

He was elected to the National Academy of Sciences, and in 1878 was president of the American Chemical Society. He published 180

JOHNSON

(Essays on Peat Muck and Commercial

Manures' (1859); (How Crops Feed) (1870) ; (Peat and Its Uses) (1866); (How Crops Grow) (1868), and edited Fresenius' Quanti¬

tative Chemical Analysis' (1864, 1875, 1883).

JOHNSON, Thomas, American states¬

men: b. Saint Leonard's, Md., 1732; d. 1819.

He studied law at Annapolis, was elected to ■the. first Continental Congress (1774), was again sent to Congress in 1776, moved the ap¬

pointment .of Washington as commander-in-

chief, and in the same year became brigadier-

general of Maryland militia, going to Washing¬

ton's relief in the winter of that year. In 1777

he was chosen governor of Maryland, remaining in office until the close of 1779, and rendering important services to the Continental Congress and . its forces. In 1780 he entered the pro¬

vincial congress and the house of delegates, in 1781-87 was in the Continental Congress, where he supported the Constitution and was a mem¬

ber of the Maryland Convention which ratified that instrument in 1789. In 1791 became an associate justice of the United States Supreme Court, and later declined the office of chief justice. He was a member of the commission which laid out the city of Washington.

JOHNSON, Thomas Cary, American

theologian: b. Fishbok Hill, Va., 9 July 1859.

He was graduated at Hampden-Sidney College (1882) and took diplomas in Latin, Greek and mathematics (1883-84) at the University of Virginia, then graduating in theology (1887) at Union Theological Seminary, Virginia. He was appointed professor of Old and New Testa¬

ment exegesis at Austin (Tex.) Theological School (1889-90), and was ordained to the ministry in 1890, becoming pastor-elect of the Third Church, Louisville, Ky. (1890-01). He was made a member of the faculty of Union Theological Seminary, Richmond, Va.. filling chairs of English Bible and pastoral theology (1891-92), ecclesiastical history and polity (1892-13), systematic theology since 1913. He wrote (History of the Southern Presbyterian Church) (1894) ; (John Calvin and the Genevan Reformation' (1900) ; Wife and Letters of Robert Lewis Dabney' (1893) ; Wife and Let¬

ters of Benjamin Morgan Palmer) (1906) ; ˆVirginia Presbyterianism and Religious Lib¬

erty' (1907) ; Introduction to Christian Mis-

sions) (1909) ; (Baptism in the Apostolic Age'

(1912).

JOHNSON, Thomas Loftin, American

capitalist and municipal reformer: b. George¬

town, ICv., 18 July 1854; d. Cleveland, Ohio, 10

April 1911. He was clerk in a street railway office (1869-75), and invented several street rail¬

way devices, included the Johnson rail and a fare box; became owner of. a street railway in Indianapolis and later acquired large interests in Cleveland, Detroit and Brooklyn; he was also interested in iron manufacture in Cleve¬

land. He disposed of his railway properties and became prominent in politics as a member of the Democratic party, and known as an advocate of. the. single tax and public owner¬

ship of public utilities. His plans for municipal ownership attracted nation-wide attention.

Though opposed to the free coinage of silver he supported Bryan in 1896 and 1900, and the State convention which he controlled unani¬

mously endorsed the Kansas City platform.

He was a member of Congress, 1891-95. In 1901 he was elected mayor of Cleveland, and was re-elected 1903, 1905 and 1907. He trans¬

formed the city government by introducing sev¬

eral radical reforms. He was an advocate of three-cent street railway fares. In 1903 he was the Democratic candidate for governor of Ohio, but was defeated. He quitted public life in 1910. Consult his autobiography, (My Story/

edited by E. J. Hauser (New York 1911).

JOHNSON, Virginia Wales, American

novelist: b. Brooklyn, N. Y., 28 Dec. 1849; d. 16

Tan. 1916. After 1875 she lived in Florence, Italy.

Her publications, mainly for young folk, include (Kettle Club Series) (1870); (Travels of an American OwP (1870); (J0seph the Jew’

(1873);. JA Sack of Gold > (1874);

skill bairies' (1875) ; (The Calderwood Secret'

(1875); (A Foreign Marriage' (1880); (The Neptune Vase/ her finest work (1881);

(1886); (Miss Nancy's Pilgrimage' (1887); (The House of the Musician' (1887);

. JOHNSON, Sir William, British super¬

intendent-general of Indian affairs in North America : b. Smithtown, County Meath, Ireland 1715; d. near Johnstown, N. Y., 11 July 1774

His uncle, Sir Peter Warren, offered his nephew the management of his entire property in New York, if the latter would undertake its improvement and settlement. Johnson accepted the offer and in 1738 established himself upon a tract of .land on the south side of the Mohawk about 25 miles from Schenectady, which Sir Peter had called Warrensburgh. In addition to the settling and improving of the country, he embarked in trade with the Indians, whom lie always treated with perfect honesty and jus-

lice. . He became a master of their language speaking many of their dialects as perfectly as they did themselves and was thoroughly ac¬

quainted with their beliefs and customs. He was adopted by the Mohawks as one of their own tribe, chosen a sachem and named Wari-

aghej aghe, or. Warraghiaghy, ((he who has charge of affairs." In 1744 he was appointed colonel of the Six Nations, in 1746 commis-

f°1ler New York for Indian affairs. In 1/30 he became a member of the provincial council. In 1754 he attended as one of the delegates fiom New York the congress of Al-

bany and also the great council held with the Indians on that occasion, at which they strongly urged his reappointment as their super-

A* tˆie council of Alexandria, 14

April. 17.55, he was. sent for by Braddock and commissioned by him asole superintendent of t ie affairs of the Six LTnited Nations, their al-

hes and dependents." He was also, pursuant to the. determination of that council, created a major-general and commander-in-chief of the

provincial forces destined for the expedition against Crown Point. At the head of these forces, in September 1755, he defeated Baron Dieskau at Lake George. This victory saved the colony from the French and Johnson re¬

ceived the thanks of Parliament for his vie-

tory, was voted £5,000 and on 27 Nov. 1755, cre¬

ated a baronet of Great Britain. On his arrival at Lac Saint Sacrament a few days before this battle, he gave to it the name of Lake George, ((not only in honor of his majesty, but to assert his undoubted dominion here.ˆ In March 1756

he received from George II a commission as <(colonel, agent, and sole superintendent of the affairs of the Six Nations, and other northern Indians.** He held this office for the rest of his life. In 1758 was present with Abercrombie at Ticonderoga. General Prideaux led the ex¬

pedition against Fort Niagara in 1759. John¬

son was second in command and upon the death of Prideaux, before that fort, succeeded to the command in chief. With upward of 1,000 In¬

dian allies he continued the siege with great vigor and cut to pieces the French army. He led the same Indian allies the following year in the Canadian expedition of Amherst and was present at the capitulation of Montreal and the surrender of Canada to the British arms in 1760.

The war was now at an end and the king granted to Sir William for his services a tract of about 100,000 acres of land, north of the Mo¬

hawk. In 1764, the country being at peace and the Indians perfectly contented, Sir William erected Johnson Hall, a large wooden edifice still standing. The village of Johnstown, with stores, an inn, a courthouse and an Episcopal church was soon laid out. In 1772 it became the shire town of Tryon County. Johnson lived in the style of an old English baron of former days and exercised a liberal hospitality. In 1768 he concluded the Treaty of Fort Stanwix. He wrote (The

Language, Customs and Manners of the Six Nations,* published in Proceedings of the Philosophical Society of Philadelphia (1772) and his letters have great historical value. Consult (Calendar of the Sir William Johnson Manuscripts,* compiled by Day (Al¬

bany 1909) ; Buell, (Sir William Johnson) (New York 1903) ; Griffis, (Sir William Johnson and the Six Nations) (ib. 1891) ; Stone, (Life of Sir William Johnson) (2 vols., Albany 1865).

JOHNSON, William, American jurist: b.

Charleston, S. C., 27 Dec. 1771; d. Brooklyn, N. Y., 11 Aug. 1834. He was graduated (1790) at Princeton, then entered the law office of the celebrated Charles Cotesworth Pinckney and was admitted (1793) to the bar. He repre¬

sented Charleston at the State legislature till 1798, when he was appointed judge of the Court of Common Pleas. In 1804 Thomas Jef¬

ferson appointed him associate justice of the United States Supreme Court. He was an ad¬

herent to the Jefferson political principles but was firm in all matters respecting his reading of the law. This brought him into collision with the President in the celebrated ˆEmbargo® act, which he declared illegal and he belonged to the minority in the matter of the South Caro¬

lina nullification proceedings. He found op¬

position to him so strong that he had to leave the State for a time, going (1832) to western Pennsylvania, then to Brooklyn, N. Y., where he died. He wrote (The Life and Correspond¬

ence of Major-General Nathaniel Greene) (1822), and in 1826 he published a eulogy on Adams and Jefferson.

JOHNSON, William Samuel, American

jurist: b. Stratford, Conn., 7 Oct. 1727; d. there, 14 Nov. 1819. He was the son of the Rev.

Samuel Johnson (q.v.), first president of King's College (Columbia University), New York.

He was graduated from Yale in 1744, was ad¬

mitted to the bar, practised in the New York and Connecticut courts, in 1761 and 1765 rep¬

resented Stratford in the Connecticut general assembly, or lower house, and in the latter year was a Connecticut delegate to the Stamp-act congress at New York. In 1766 he became a member of the governor's council or upper house of the Connecticut legislature, in 1 766— 7 1

was in England as special agent for the colony in defense of its title to land obtained from the Mohegan Indians, in 1771 re-entered the coun¬

cil, and for a time in 1772 was a judge of the Superior Court of the colony. After Lexington, he was a member of a committee sent to Gen¬

eral Gage on the unsuccessful mission of in¬

quiring into possible means of peace. Opposed to the Revolution, he remained in private life during its progress, but in 1784-87 was a mem¬

ber of the Continental Congress, in 1787-89 sat in the Connecticut assembly, in 1787-1800 was president of Columbia College, and from 1789 to 1791, when he resigned, was the first United States senator from Connecticut. He resigned the college presidency in 1800 because of fail¬

ing health and retired to Stratford. Oxford conferred on him the degree of D.C.L. in 1766.

He made the acquaintance of Dr. Samuel John¬

son during his stay in London, and later cor¬

responded with him. His letters to the governors of Connecticut during his residence in Great Britain have been published in the (Collections) of the Massachusetts Historical Society, 5th series, Vol. IX (Boston 1885). Consult Beards-

lev, (Life of William Samuel Johnson1* (Bos¬

ton 1876).

JOHNSON, William Woolsey, American

mathematician: b. Owego, N. Y., 23 June 1841.

He was graduated (1862) at Yale University, receiving (1868) the degree A.M., and served on the staff of the United States Nautical Al¬

manac Office (1862-64), at Cambridge, Mass.

He was appointed assistant professor of mathe¬

matics at the United States Naval Academy, Newport, R. I., and at Annapolis (1864—70), and professor of mathematics at Kenyon Col¬

lege, Ohio (1870-72), and Saint John's College, Maryland (1872-81), returning to the United States Naval Academy in 1881. He was made also professor of mathematics in the navy from 1913. He has written (An Elementary Treatise on the Integral Calculus) (1881) ; (Curve Trac¬

ing in Cartesian Co-ordinates) (1884) ; (The Theory of Errors and Method of Least Squares1*

(1890); (Treatise on Differential Equations) (1889); (Theoretical Mechanics> (1901); trea¬

tise on Differential Calculus* (1904) ; dif¬

ferential Equations) (1906) ; monographs on mathematics; treatise on Integral Calculus) (1907) ; (An Elementary Treatise on the Dif¬

ferential Calculus1* (1908).

JOHNSON, Boswell's Life of. Boswell's

(Life of Johnson1* is one of the world's greatest biographies. Apart from, its intrinsic literary worth, it is of historical importance in that it marks a culminating point in the general de¬

velopment of biography. From the time of Plutarch, and before, writers had been striving to set forth and follow proper methods of life writing. Boswell summed up and exemplified all the precepts of past method and gave to the 182

JOHNSON

world a model of biography. It is not going too far to say that, since the publication of the (Life of Johnson in May 1791, all worth while biographies have followed, as far as possible, the general method

employed by Boswell ; that they have been, in short, mere variants of the (Johnson. , It may be seen, therefore, that Bos¬

well's work was both a culmination and an in¬

novation.

In addition to its importance as a landmark m the general history of biography, the 'Life of Johnson) is one of the few classic English lives. Many critics of high rank pronounce it the greatest in the language. Although it is undoubtedly true that the (Life ˆ has exerted a greater influence upon the course of English biography than has any other single work, it may yet be questioned whether, from every point of view, it may be classed as the greatest of such works in the language. There is no doubt that it is one of the four or five greatest ; that only such works as Lockhart's 'Life of Scott,5 Trevelyan's 'Life of Macaulay, 5

Froud.e's 'Life of Carlyle5 and Allen's 'Life'of Phillips Brooks5 may be put in the same class with it.

. The biography is affected by certain limita¬

tions under which Boswell worked. In the first place, he did not meet Johnson until 16 May 1763, when the sage was nearly 54 years old. In consequence, about one-fifth of the (Life5 is concerned with the 54 years; the re¬

mainder with the 21 years during which Bos¬

well knew Johnson. It was not the struggling and obscure, but the retired and famous John¬

son that Boswell knew and recorded. Croker calculated that Boswell met Johnson on 276

days, _ including the period of the tour to the Hebrides — a time sufficiently brief, indeed, to enable one to write one of the most intimate biographies in existence. Furthermore, Bos¬

well was a man of strong prejudices; he dis¬

liked to have Johnson show attention to others and could scarcely brook being outshone in any company. It is to his prejudices that we must lay the account for his attitude in the 'Life5

toward such people as Sir John Hawkins, Mrs.

Piozzi and Oliver Goldsmith.

The greatness of Boswell's work is the joint result of the subject, the biographer and the plan. Johnson was, perhaps, England's greatest literary dictator and possessed an individuality more interesting than anything he ever wrote.

In the sum of his qualities and characteristics, he was a type of the English race. Boswell had the qualities requisite to a faithful delinea¬

tion of such a subject. He combined strict re¬

gard for truth with intense devotion to his task, unsparing zeal in the face of stern rebuffs, will¬

ing sacrifice of his own dignity — whenever such seemed necessary, and a dramatic instinct keener almost than that possessed by any other biographer. The plan followed in the 'Life5

is autobiographical : as far as he was able, Bos¬

well allowed Johnson to reveal himself by means of conversation, letters and extracts from other written and printed documents. In addition, he included letters written to Johnson and the opinions of Johnson's contemporaries, with the result, to adapt the words of Carlyle, that he showed "what and how produced was Johnson's effect on society ; what and how produced was the effect of society on him.55 Boswell never made the mistake of lapsing into sheer adula¬

tion : . «I profess,55 he plainly asserted, ((to write, not his panegyric, which must be all praise, but his life; which, great and good as he was, must not be supposed to be entirely perfect.55 Bos¬

well says that he followed the plan adopted by the Rev. William Mason in the 'Life of Thomas Gray.5 One has but to read Mason's dull and colorless work to appreciate the triumph of Bos¬

well's genius; to learn, in fact, of how little comparative importance is mere plan apart from actual genius for writing biography. It is true that Boswell employed no methods that had not been used by biographers as far back as Plutarch; indeed, he refers to Plutarch as "the prince of ancient biographers,55 and any reader can determine for himself how much Boswell took to heart Plutarch's statement that it is not "always in the most distinguished achievements that men's

virtues or vices may be best discerned; but very often an action of small note, a short saying, or a jest, shall dis¬

tinguish a person's real character more than the greatest sieges or the most important bat¬

tles. 55 In the matter of recording conversation, and of representing events dramatically, Bos¬

well has had no superior among biographers.

The Wife' portrays Johnson from many an¬

gles and vindicates the proud assertion made by Boswell in a letter to William Temple: "I am absolutely certain that my mode of biog¬

raphy, which gives not only a history of John¬

son's visible progress through the world, and of his publications, but a view of his mind in his letters and conversations, is the most perfect that can be conceived, and will be more of a Life than any work that has yet appeared.55

"What we want in a biography,55 wrote Wil¬

liam Ewart Gladstone in his Quarterly Review article on Trevelyan's 'Life of~ Macaulay,5 "and what, despite the etymology of the title we very seldom find, is life. To fulfil its idea, it must have in it the essential quality of move¬

ment. . . . Neither love . . . nor for¬

getfulness of self will make a thoroughly good biography, without this subtle gift of imparting fife. By this it was that Boswell established himself as tne prince of all biographers.55

Gladstone has but voiced the general sentiment of a century and a quarter. What the biog-

rapher saw and. heard, and knew he recorded faithfully; Johnson fives and moves and speaks m our presence. Boswell was wise enough, however, to do more than merely record facts ; he interpreted, and his artistic interpretation of Johnson, while ever subject to the censure of being only "an aspect of the truth seen from one particular point of view, 55 has survived the dou¬

ble test of time and criticism, and has earned the palm which is

awarded only to true artistry.

One sure evidence of Boswell's skill in grada¬

tion and in creating the illusion that one has always known Johnson is the fact that few readers ever notice that almost the whole of the book deals, with the last 21 years of the sub-

ject's fife. Limitations the work may have; supplemented as it may be, however, by read¬

ings from Mrs. Piozzi's 'Anecdotes of Dr.

Johnson,5 Fanny Burney's 'Diary,5 the 'Life5

by Sir John Hawkins, or from any other of the numerous fives, sketches and critical articles that have accumulated during more than a cen¬

tury. Boswell's Johnson is the Johnson that JOHNSON CITY — JOHNSTON

the world knows, the only Johnson that the world is likely to know intimately as long as sthe English language endures and men main¬

tain an interest in the vigorous personalities of English literature. Those who would actually know Johnson and obtain ((a view of literature and literary men in Great Britain for near half a century during which he flourished,® must go directly to Boswell's great work. For it, there can be no substitute. For a discussion of the place of Boswell's work in the development of biography consult Dunn's (English Biography*

(ch. 5).

Waldo H. Dunn.

JOHNSON CITY, Tenn., city in Wash¬

ington County, on the Southern and other rail¬

roads, 106 miles north of Knoxville. Its ele¬

vated location and picturesque mountain scen¬

ery make it a favorite summer resort for Southern people. Here are located the moun¬

tain branch of the National Soldiers' Home and the East Tennessee State Normal School. The manufacturing interests include iron furnaces, rolling-mills, machine shops, tanneries and brickmaking plants, cigar, box, table and furni¬

ture factories, a tannery and several wood¬

working establishments. The city was settled in 1870 and is governed under a charter of 1897, by a mayor and council elected biennially. The city owns the waterworks. Pop. (1920) 12,442.

JOHNSON GRASS. See Grasses in the

United States.

JOHNSON'S ISLAND, Ohio, an island

located at the mouth of Sandusky Bay, over¬

looking Lake Erie, about a mile long and a mile and a half wide. The island was used during the Civil War as a prison for captured Con¬

federates. It was an ideal spot for a prison post. No prisoner was ever known to escape from it. The grounds were enclosed within a fence 12 feet high, with a platform top, upon which sentinels paced to and fro, day and night.

To the north Lake Erie stretches away for 50

miles ; on the east, separated by three miles of water, lies Sandusky, while west and south of the island are broad stretches of Sandusky Bay.

The island was used almost exclusively as a prison for officers, the total number confined there from first to last aggregating over 15,000.

The first prisoners were taken there in April 1862 and in September 1865 the last of them were sent to Fort Lafayette _ and Johnson's Island was abandoned as a prison post. The men confined on Johnson's Island represented the flower of the chivalry of the South. They were largely professional men and planters, among them being many who were prominent in science, literature and art.

JOHNSTON, Albert Sidney, American

general : b. Mason County, Ky., 3 Feb. 1803 ; d. Shiloh, Miss., 6 April 1862. General Johns¬

ton had but a brief career in the Confederate army and the first part of that career was one of great disaster and consequently of severe criticism; but he fell ((on the field of glory® at Shiloh, and not a few endorse the opinion of President Davis that he was the greatest gen¬

eral whom the war produced. Descended from a long line of illustrious ancestors, he obtained his literary education at Transylvania Univer¬

sity and was graduated at West Point 30 June 1826, being number eight in a brilliant class of which Jefferson Davis was a member. He was brevetted second lieutenant in the 2d Infan¬

tryˆ transferred to the 6th Infantry in 1827, was regimental adjutant from 1828 to 1832, aide to General Atkinson a year, and acting assistant adjutant-general to Illinois volunteers during the Black Hawk War — in all of which posi¬

tions he showed the qualities of an accom¬

plished soldier. He resigned his commission in the United States army 31 May 1834, having determined to settle in Texas and cast in his fortunes with the <(Lone Star® Republic.

The battle of San Jacinto was fought 21

April 1836, and soon after Johnston arrived in Texas and enlisted as a private soldier in the Texan army. His merit soon brought him promotion and he was made adjutant-general of the Army of Texas and not long after briga¬

dier-general and chief commander of the army in the place of Gen. Felix Houston. As a re¬

sult of jealousy growing out of this promo¬

tion there was an unfortunate duel between Houston and Johnston, in which the latter was wounded. He continued in command of the Texan army until 1838, when he was made Secretary of War of the Republic of Texas. In 1839 he led an expedition against the hostile Cherokee Indians and in a battle on the Neches defeated and routed them with great slaughter.

He used all of his abilities and wide influence in bringing about the

annexation of Texas to the United States, and promptly enlisted when the Mexican War broke out, being colonel of a regiment of Texas volunteers. He was dis¬

tinguished in various battles, especially at Mon¬

terey, where he had three horses shot from under him and was highly complimented by General Butler, on whose staff he was serving.

On 31 Oct. 1849 he was appointed by Presi¬

dent Taylor paymaster in the United States army, with the rank of major and when the 2d Cavalry regiment was formed he was appointed, 3 March 1855, its colonel on the recommenda¬

tion of his old classmate and lifelong friend, Jefferson Davis, who was at that time the able and efficient Secretary of War. In 1857 he was put in command of an expedition to Utah to force the Mormons to submit to the laws of the United States government and overcame great difficulties and showed such ability and tact in the delicate mission that he was made brevet brigadier-general. When the war be¬

tween the States broke out General Johnston was in command of the department of the Pa¬

cific. but he very promptly resigned his com¬

mission and with a small party made his way across the plains, passing through New Orleans and reached Richmond on 2 September, where he had a cordial reception and was made a full general . and assigned to the command of the department of Kentucky, whither he went at once, beginning the able and efficient discharge of his duties there.

It could not be published at the time that he had a force barely 20,000 to defend that long-

line against overwhelming numbers of the enemy, and he was severely criticised in the newspapers for not being more aggressive and when Forts Henry and Donelson fell and he was compelled to fall back and abandon to the enemy so large a section of Confederate ter¬

ritory that abuse and severest criticism were heaped upon him, he was denounced as incom-

petent and his removal from command was de¬

manded. President Davis calmly said: (

ment: <(lhe test of merit in my profession, with the people, is success. It is a hard rule, but / think it right. If I join this corps to the forces of General Beauregard (I confess a hazardous experiment), then those who are now exclaiming against me will be without an argu¬

ment." He alluded to his plan of uniting with Beauregard to strike . Grant before Buell and Mitchel could join him, and in pursuance of which plan he marched from Corinth, Miss., on 3 April, intending to attack Grant at Pittsburgh Landing, or Shiloh Church, 20 miles off on 4

April. There was delay on the part of some of the troops so that the. attack could not be made until the morning of the 6th, but with his 40,000 men Johnston attacked Grant's 50,000

with such impetuosity, skill and dash that the Federals were driven back at every point, were huddled together at Pittsburgh Landing and there seemed to be lacking at 2.30 p.m. only one more vigorous advance to annihilate Grant's army. But just at this moment the great com¬

mander who had just, remarked to one- of his staff: ((The victory is ours. We shall soon water our horses in the Tennessee River," was struck by a minie ball in his leg, and. bled to death in 15 minutes. In the confusion which followed, the advance was not made. Beaure¬

gard. (who had been ill in his ambulance all day and did. not appreciate the real situation) ordered the Confederate lines to fall back.

Buell and Mitchel came up that night with 55,000

fresh troops, and thus the fruits of Johnston's great victory were lost and the next day the Con¬

federates were compelled to fall back to Corinth.

No nobler eulogy could be pronounced on Albert Sidney Johnston than that of President Davis in a. special message to the Confederate Congress, in which he said: "Without doing injustice to the living, it

may safely be said that our loss is irreparable. Among the shining hosts of the great and good who now cluster around the banner of our country, there exists no purer spirit, no more heroic soul than that of the illustrious man whose death I join you in lamenting. In his death he has illustrated the character for which, through life, he was conspicuous — that of singleness of purpose and devotion to duty with his whole energies. Bent on obtaining the victory which he deemed es¬

sential to his country's cause, he rode on to the accomplishment of his object, forgetful of self, while his veiy life blood was fast ebbing away.

His last breath cheered his comrades on to vic¬

tory.. The last, sound he heard was their shout of victory. His last thought was his country, and long and deeply did his country mourn its loss."

It is scarcely extravagant to say that had Albert Sidney Johnston lived the victory at Shi¬

loh would have been complete, the whole char¬

acter of the campaign in the West would have been changed, and with Lee in Virginia and Johnston in the West, the result of the war might have been different. The monument to Albeit Sidney Johnston in New Orleans is one of the most beautiful in the country; he is buried in Austin, the capital of his adopted State. Consult the biography by his son, W. P.

Johnston, 'Life of Albert Sidnev Johnston5

(New York 1878).

J. Wm. Jones,

Author and Lecturer.

JOHNSTON, Alexander, American his¬

torian: b. Brooklyn, L. I., 29 April 1849; d.

Princeton, N. J., 21 July 1889. He was gradu¬

ated from Rutgers College, New Jersey, in 1870, studied law and was admitted to the bar in 1876. He did not practise, however, and was professor of jurisprudence and political econ¬

omy at Princeton University from 1883 till his death. He was the author of ‘History of American Politics 5 (1879); Connecticut: a Study of a Commonwealth-Democracy 5 (1887) ; ‘History of the United States for Schools) (1886); and ‘The United States: its History and Constitution, > reprinted from the Encyclo¬

paedia. Britannica) (1887).

JOHNSTON, Alexander Keith, Scottish

cartographer : b. Kirkhill, Edinburgh, Scotland, 28 Dec. 1804; d. 10 July 1871. His first import¬

ant work, the (National Atlas, > was published in .1843. At the suggestion of Humboldt, he visited Germany and gathered material for his ‘Physical Atlas of Natural Phenomena> (1848-

56), and his (Royal Atlas of Geography5 (1861) was one of the most beautiful and minutely ac¬

curate atlases ever published up to that time.

His son of the same name (b. 1844; d. 28 June 1879) continued his father’s enterprises ; ’ and died whilst leading an important exploring ex¬

pedition to the head of Lake Nyassa.

JOHNSTON, Annie Fellows, American

author: b. Evansville, Ind., 1863;. sister of Al¬

bion Fellows Bacon (q.v.). She is one of two noted sisters, daughters of Rev. Albion Fel¬

lows. She was educated at the State Univer¬

sity of Iowa and early went into literature and became known as a writer of stories for young people. Her husband, W. L. Johnston, dying in 1892, she was thrown upon the resources of her pen, and thereafter she produced in rapid succession juvenile stories that became very popular and are still extensively read. Among these stories are (Big Brother5 (1893);

(1897) ; ‘Songs Ysame5 (with her sister Albion Fellows Bacon, 1897) ;

tucky5 (1899);

(1901); (The Little Colonel's Hero5 (1902)-

'Cicely5 (1902); 'Asa Holmes5 (1902); < Is¬

lands of Providence5 (1903); (Little Colonel at Boarding School5 (1903); 'Little Colonel in Arizona5 (1904); 'The Quilt that Jack Built5

(1904) ; (Little Colonel's Christmas Vacation5

(1905); (In the Desert of Waiting5; cThree Weavers5; 'Mildred's Inheritance5; 'Maid of Honor5; 'The Little Colonel's Knight Comes Riding5 (1907); 'Mary Ware5 (1908); 'Legend Book5 (1910) ; 'Marv Ware in Texas5 (1910) *

(Travelers Five5 (1911); 'Promised Land5

(1912); (Miss Santa Claus of the Pullman) (1913) ; (Georgina of the Rainbows) (1916).

JOHNSTON, Charles Haven Ladd,

American author: b. Washington, 17 July 1877.

Educated at Harvard. Teacher of English at Harvard University 1901-02; instructor in Eng¬

lish and lecturer on military history at the Massachusetts Institute of Technology (190T-

05). Since then he has given most of his at¬

tention to literature. Among his published works are c Little Pilgrimages among the Women Who Have Written Famous Books)

(1901) ; 'Famous Cavalry Leaders) (1908) ; (Famous Indian Chiefs) (1909) ; 'Famous Scouts) (1910); (Famous Privateersmen)

(1911) ; (Famous Frontiersmen) (1913) ; 'Our Little Viking Cousin) (1916).

JOHNSTON, Christopher, American As-

syriologist : b. Baltimore, 2 Dec. 1856; d. 1914.

He studied (1872-79) at the University of Virginia, receiving the M.A. diploma, then at University of Maryland, where (1880) he re¬

ceived M.D. diploma. In 1888 he became special student of Assyriology at Johns Hop¬

kins, becoming Fellow in Semitics (1889-91) and Ph.D. (1894). From 1880-88 'he practised medicine, devoting much study to ancient and modern languages. He was. (1891-94) in¬

structor at Johns Hopkins, then (1894-99), associate in Semitics and associate professor Oriental history and archaeology from 1899-

1908. He wrote (Epistolary Literature of the Assyrians and Babylonians) (1896), and edited 'Ancient Empires of the East) (1906).

JOHNSTON, Frank, American lawyer:

b. Raymond, Miss., 31 Dec. 1843. He was edu¬

cated at Mississippi College, and at the Western Military Institute of Nashville, Tenn. He fought with the Confederate army in the Civil War and was wounded at the battle of Big Black. Since 1866 he has been a practising lawyer and in 1879 became a member of the Catholic church. From 1893 to 1895 he was at¬

torney-general of Mississippi and since 1912 has been first assistant attorney-general. He was a delegate from his State to the Democratic National Conventions of 1872 and 1876. In 1875 he brought about a conference which set¬

tled the Reconstruction difficulties in Mississippi.

In 1889 he successfully advocated a State con¬

stitutional convention to consider the question of suffrage. Thereafter his most conspicuous public services were in connection with the abolishment of the convict-leasing system, in both State and counties. He was special judge of the Mississippi Supreme Court in many im¬

portant cases. He is a member of the Missis¬

sippi Historical Society, in the publication of which he collaborated.

He contributed to (The Catholic Encyclopedia.)

JOHNSTON, Gabriel, American colonial

governor of North Carolina: b. Scotland, 1699; d. 1752. Very little is known of his personal history. He was educated at the University of Saint Andrew's, with a view to the medical profession, which he seems not to have prac¬

tised. He was for a while professor of Oriental languages at Saint Andrew's, and then removed to London, where he was engaged with Pulteney and Bolingbroke in writing for the Craftsman. By the influence of the Earl of Wilmington he was appointed governor of North Carolina, and took the oath of office at Brunswick, 2 Nov. 1734. He was the ablest and most successful of all the colonial gov¬

ernors, holding the reins of power up to the time of his death. Consult Ashe, (History of North Carolina) (Vol. I, Chap. 19, Greensboro, N. C., 1908).

JOHNSTON, George Ben, American sur¬

geon: b. Tazewell, Va., 25 July 1853; d. 20 Dec.

1916. He studied at the University of Virginia (1870-75) and took his degree (M.D.) at Uni¬

versity Medical College, New York University (1876). He became professor of surgery at the Medical College of Virginia, surgeon at the Memorial Hospital, Richmond, at Johnston-

Willis Sanatorium, and at Abingdon, Va., hos¬

pital. . He acted as president of the American Surgical Association (1904-05) and of the Medical Society of Virginia (1897), also of the Southern Surgical and Gynecological Associa¬

tion (1887) and is an ex-president of Rich¬

mond Academy of Medicine anid Surgery, etc.

He was a frequent contributor to. the surgical journals.

JOHNSTON, Sir Harry Hamilton, Eng¬

lish traveler: b. London, 12 June 1858. He was educated at King's College, London, and the Royal Academy of Arts, traveled in North

Africa, 1879-80, and Portuguese West Africa, and the Kongo region, 1882-83. He com¬

manded a scientific expedition to Mount Kili¬

manjaro in 1884 and has held various consular posts in Africa. He has published ‘Essays on the Tunisian Question) (1880-81) ; ‘The River Kongo) (1884) ; Kilimanjaro) (1885) ; ‘His-

tory of a Slave) (1889) ; (Life of Livingstone) (1891) ; ‘British Central Africa) (1897) ; ‘His-

tory of the Colonization of Africa by Alien Races) (1899) ; (The Uganda Protectorate) (1902); (The Nile Quest) (1903); ‘Liberia) (1906); ‘The British Empire in Africa) (1910); ‘Views and Reviews) (1912); ‘Com¬

mon Sense in Foreign Policy) (1913), etc.

JOHNSTON, Henry Phelps, American

historical writer: b. 1842. He was graduated at Yale in 1862. He is professor of history in the College of the City of New York. He is a member New York and Connecticut His¬

toric societies, American Antiquarian So¬

ciety and New York Sons of the Revolution.

He has published ‘The Battle of Harlem Heights) ; ‘Observations on Judge Jones) ; ‘Loyalist History of the Revolution) ; ‘The Yorktown Campaign) ; ‘Biography of Nathan Hale) (2 editions) ; ‘Campaign around New York and Brooklyn, 1776) ; ‘Storming of Stony Point, 1779} ; ‘Record of Connecticut Soldiers in the Revolution) ; ‘Correspondence and Pub¬

lic Papers of John Jay) (4 vols.) ; ‘Yale in the Revolution,) etc.

JOHNSTON, James Steptoe, American

Episcopal bishop: b. Church Hill, Miss., 9 June 1843. He was educated at the University of Virginia, served as 2d lieutenant in the Confed¬

erate cavalry during the Civil War, subsequently studied law and was admitted to the bar. After being admitted to the bar he took orders in the Episcopal Church in 1869 and after holding rec¬

torships at Port Gibson, Miss., six years ; Mount Sterling, Ky., four years; and Mobile, Ala., eight years became bishop of western Texas in January 1888. In May 1913 he retired from active service and turned over the administra¬

tion of the diocese to his coadjutor, and is now 186

serving a small church and two missions in the mountains of West Texas.

JOHNSTON, John Humphreys, Ameri¬

can artist: b. New York, 2 Nov. 1857. He studied art in New York as a pupil of La Farge, and in Paris under Lefebre and Doucet.

He was awarded (1896) the Temple gold medal by the Pennsylvania Academy of Fine

Arts and a silver medal at the Paris Exposi¬

tion (1900) as well as the silver medal at Buf¬

falo Exposition (1901); gold medal at Munich (1902) ; and silver medal at Saint Louis Ex¬

position (1904). His works are to be found in the galleries of the Musee de Luxembourg, Paris, the Wilstach Trust Collection, Philadel¬

phia, Carnegie Institute, Pittsburgh, etc. He is a Chevalier Legion d'Honneur (1901) and re¬

sides at Venice.

JOHNSTON, Joseph Eggleston, Amer¬

ican soldier: b. Cherry Grove, Va., 3 Feb. 1807; d. Washington, D. C., 21 March 1891. He was graduated at West Point in 1829; and served with distinction in the Black Hawk and Semi¬

nole wars. In the Mexican War he distin¬

guished himself also and was brevetted major and colonel United States army for bravery at Cerro Gordo. He was promoted quartermas¬

ter-general of the army with the rank of briga¬

dier-general in June 1860, but resigned his com¬

mission when Virginia seceded. He was then made major-general of Virginia volunteers and later full general in the Confederate service, taking an active part in the first battle of Bull Run, 21 July 1861, where he personally led a charge with the colors of the 4th Alabama regi¬

ment in his hands. At the battle of Fair Oaks, 31 May 1862, Johnston was severely wounded and was disabled for service for several months.

In November he again reported for duty and was assigned to the Military Department of Tennessee. In the operations of Grant before Vicksburg he did everything possible to pre¬

vent the shutting up of General Pemberton in Vicksburg, telegraphing him 2 May: «If Grant crosses, unite all your troops to beat him. Suc¬

cess will give back what was abandoned to win it.® Although similar orders were repeatedly sent to Pemberton, they were disregarded; Pemberton allowed himself to be shut up in Vicksburg and the siege and surrender on 4

July followed. In December of the same year he took command of Bragg's army at Dalton, Ga., and by the spring of. 1864 brought it to a state of efficiency which it had not previously had, though it contained only 45,000 men against Sherman's 98,797. The campaign from Dalton to Atlanta, a distance of 100 miles, was a series of severe engagements without a general battle, Johnston's friends claiming "the retreat had been the masterpiece of Johnston's life and one of the most skilful and successful that had ever been executed.® On 17 July 1864 Johnston was superseded in this command by General Hood.

In the early part of 1865 he was several times defeated by Sherman, to whom he surrendered at Durham Station, N. C., on 26 April, the terms of capitulation resembling those granted to Lee at Appomattox. After the war Johnston en¬

gaged in business, and was member of Congress 1876-78. He was a pallbearer at the funerals of Grant and Sherman. He was United States Commissioner of Railways 1885-89 and the au¬

thor of (A Narrative of Military Operations During the Late War*

(1874). Consult Hughes, (General Johnston) (New York 1893).

JOHNSTON, Mary, American novelist :

b. Buchanan, Botetourt County, Va., 21 Nov.

1870. In 1898 she became suddenly famous through her (Prisoners of Hope: a Tale of Colonial Virginia,* and her next book, (To Have and to Hold) (1900), was even more popular. She has since published 'Audrey*

(1902) ; (Sir Mortimer* (1904) ; 'The Goddess of Reason) (1907) ; (Louis Rand* (1908) ; 'The Long RolP (1911) ; (Cease Firing*

(1912); 'Hagar* (1913); (The Witch> (1914); 'The Fortunes of Garin) (1915) ; 'Foes*

(1918). 'Audrey* and 'Sir Mortimer* were dramatized.

JOHNSTON, Richard Malcolm, Ameri¬

can author: b. Powelton, Ga., 8 March 1822; d. Baltimore, Md., 23 Sept. 1898. He was grad¬

uated at Mercer University in 1841 ; was ad¬

mitted to the bar in 1843 ; and began practice in Sparta, Ga., the same year. He was pro¬

fessor of literature in the University of Georgia in 1857-61 and served as colonel in the Con¬

federate service during the- Civil War. At its close he established a boys' boarding school at Sparta, which he removed in 1867 to Baltimore and of which he was the head for many years.

His publications include historical Sketch of English Literature) ; 'Life of Alexander H.

Stephens) (1883) ; 'Dukesborough Tales*

(1883) ; (01d Mark Langston* ; 'Ogeechee Cross Firings* (1889) ; (Mr. Absalom Billingslea and Other Georgia Folk* (1887) ; 'Studies Literary and Social* (1891-92) ; (The Primes and Their Neighbors* ; (Mr. Billy Downs and His Likes.*

The usual theme of his longer as well as his shorter fictions is the life

of the middle class Georgian in the ante-bellum period.

JOHNSTON, Robert Matteson, Ameri¬

can historian: b. Paris, France, 11 April 1867; d. Cambridge, Mass., 28 Jan. 1920. He studied in France, England and Germany, graduating (M.A.) at Cambridge University (1889) and becoming barrister-at-law of the Inner Temple, London. He was lecturer on history at Harvard and Mount Holyoke colleges (1904) and pro¬

fessor of history at Harvard after 1908 and professor of history at Bryn Mawr College (1907-08). He wrote (The Roman- Theocracy and the Republic, 1846-49* (1901); 'Napoleon; a short biography* (1904); 'The Napoleonic Empire in Southern Italy and the Rise of the Secret Societies* (1904) ; 'Memoirs of Mala-

koff* (1907) ; (American Soldiers* (1907) ; Wrench Revolution* (1909) ; 'The Corsican*

(1910); 'The Holy Christian Church* (1912); 'Memoire de Marie Caroline, reine de Naples*

(1912); 'Bull Run* (1913); 'Arms and the Race* (1915).

JOHNSTON, Samuel, American lawyer

and statesman, nephew of Gabriel Johnston (q.v.) : b. Dundee, Scotland, 15 Dec. 1733; d. near Edenton, N. C., 18 Aug. 1816. His father, John, came to North Carolina in 1736, became surveyor-general and acquired large landed estates. The son chose the profession of the law, and was clerk of the Superior Court in Chowan County for five years from 1767, and served there also as naval officer under the Crown. Elected to the assembly in 1769 from the first he espoused the popular side, and in JOHNSTON

1773 the assembly placed him on its standing committee of inquiry and correspondence, the organ by which it sought to co-operate with the other provinces. This was the first decisive step toward revolution taken by the legislature of North Carolina. He was an active member of the first two provincial congresses in this province. The 3d and 4th met at his summons, and he presided over the deliberations of both.

In the 3d, August 1775, the political organiza¬

tion of the province was decided on and the supreme executive authority was entrusted to a provincial council, of wrhich he wras made the chairman, and so virtually the governor of the province. In September 1775 he was chosen treasurer for the northern district of North Carolina. In 1781-82 he was a member of the Continental Congress. In 1787 he was elected governor of the State, and in 1788 presided over the convention which rejected the Federal Constitution, which, however, he supported with all hisˆ influence. He was United States sen¬

ator 1789-93 and judge of the Superior Court 1800-03.

JOHNSTON, William Dawson, American

librarian: b. Essex Center, Vt., 11 June 1871.

He was graduated (1893) at Brown Univer¬

sity, studied (1893-94) at the University of Chi¬

cago and took the degree A.M. at Harvard (1897-98). He was instructor of history (1894—97) at the University of Michigan and (1899-1900) at Brown University. He was as¬

sistant (1900—07) at the Library of Congress, lecturer on bibliography (1905—07) at Simmons College. He served as librarian (1907-09) at the Bureau of Education, Washington, at Co¬

lumbia University (1909-14), Saint Paul Pub¬

lic Library, since 1914. He has written his¬

tory of the Library of Congress* (1904), and (Special Collections in Libraries in the United States* (1912), besides contributing numerous articles to the library journals.

JOHNSTON, William Preston, American

educator: b. Louisville, Ky., 5 Jan. 1831; d.

Lexington, Va., 16 July 1899. He was a son of A. S. Johnston (q.v.) and was graduated at Yale in 1852 and from the Louisville Law School in 1853. He served as colonel and aide-de-camp to Jefferson Davis in the Con¬

federate army during the Civil War, and soon after its close became professor of history and literature at the Washington and Lee Univer¬

sity, remaining there till 1877. In 1880 he be¬

came president of the Louisiana State Univer¬

sity, and after its union with Tulane University, New Orleans, in 1884, was president of that institution till his death. His publications in¬

clude fLife of General Albert Sidney Johnsto,n) (1877) ; (The Johnstons of Salisbury * and (The Prototype of Hamlet* (1890).

JOHNSTONE, Scotland, police burgh and

manufacturing town in Renfrewshire, on the Black Cart, three and one-half miles west by south of Paisley and 11 miles west of Glasgow by the Glasgow and Southern Railway. This busy . little city's chief industries are flax¬

spinning, thread manufacturing, paper-making, brass and iron founding. It has coal mines and works in the vicinity. Elderslie, said to be the birthplace of Sir William Wallace, is but one mile to the east. Pop. 12,000.

JOHNSTOWN, N. Y., city and county-

seat of Fulton County, on Cayadutta Creek, and on the honda, J. & G. Railroad, 44 miles northwest of Albany. In 1771, a few years after its settlement, it was named after its founder,. Sir W illiam Johnson, whose man¬

sion, built here 10 years earlier, still stands almost as it was left by him. In 1808 Johns¬

town was incorporated as a village, and in 1895

it received a city charter. The courthouse and jail, built by 'Sir William Johnson in 1772, oc¬

cupy with Johnson Hall an interesting place in local history. The city has a public library building which was the gift of Andrew Car¬

negie. The industries of Johnstown include a variety of important manufactures, chief among which are those of gloves and mittens, knit goods, of different kinds, leather, gelatin, lumber, grist-mill and machine-shop products, etc. The city has an active Chamber of Com¬

merce. The municipal government is well sup¬

ported^ by public spirit, and the city's affairs are efficiently managed. The people elect the water board and the school board, and the waterworks are owned and operated by the city. Pop. 10,875.

JOHNSTOWN, Pa., city, Cambria County,

on the Conemaugh River and on the Baltimore and Ohio and the Pennsylvania railroads, about 80 miles east of Pittsburgh. The Little Cone¬

maugh River and Stony Creek unite at Johns¬

town and form the Conemaugh River. The area of the city is about five square miles, and the valley in which it is located ranges from 1,148 feet to 1,600 feet above sea-level. Johns¬

town was settled in 1794, was incorporated as a borough in 1831 and as a city in 1889. Its situ¬

ation, in a coal and iron ore region, combined with its great water power, has made it an im¬

portant manufacturing centre. Fire-clay and limestone are also found in the vicinity. Some of its industrial establishments are the Cambria Steel Company works, where about 16,000 men are employed, the Lorain Steel Company, iron and steel works, iron-plate mills, street-car rail factory, silk mill, planing-mills, cement works, furniture factories, potteries, breweries, brick¬

yards, machine-shops, foundries, furnaces, wire works, leather and woolen goods. Some of the noted public buildings are the Cambria Free Library, a new $250,000 Y. M. C. A., the Cone¬

maugh Valley Memorial Hospital, 67 churches, the city hall and the high school. The number and arrangement of the parks add to the beauty of the place.

In Grand View Cemetery are the graves of 777 unidentified dead who perished in the <(Johnstown Floods This disastrous flood oc¬

curred on 31 May 1889, and was the result of the destruction of a dam across South Fork, a small branch of the Conemaugh River. Heavy rains had fallen and the mountain streams of the vicinity had become roaring torrents. The dam kept back the waters of Conemaugh Lake,

about two and one-half miles long, one and one-

half miles wide and averaging over 50 feet in depth ; in some places the water of the lake was 100 feet in depth. The direct distance from the city was about 12 miles, but along the river the distance was five or six miles longer. In a very short time after the dam had burst the valley was flooded and Johnstown and several small villages were under water. The loss of lives was 2,205 and the loss of property was estimated to be about $10,000,000. Aid for the sufferers came from all parts of the country 188

and the city was soon rebuilt and its industries re-established. Pop. 67.327.

JOIGNEAUX, zhwa-nyo, Pierre, French

agronomist and journalist: b. Ruffey-les-

Beaune, 23 Dec. 1815; d. Bois-Colombes, 25

Jan. 1892. He was educated at Lcole Centrale, Paris, but soon went into militant politics and was sentenced (1838) to four year's imprison¬

ment for participation in the secretly published L' Homme Libre paper. In 1848 he was elected by his department member of the Constituent Assembly, then to the Legislative Assembly.

He issued the Feuille du Village (1849-51), an organ of republican propaganda, which had great success. He was expelled in consequence of the coup d'etat, returning to France in 1859

by favor of the general amnesty, and devoted his time to the subject of agriculture. He failed of election for Cote-d'Or and La Sarthe (1869), but was sent (1871) to the National Assembly for Cote-d'Or, which constituency he served till the elections of 1889 when he re¬

fused the candidacy. Shortly afterward, at a by-election, he was made senator. During these sessions he sat on the benches of the Ex¬

treme Left and occupied himself chiefly on agri¬

cultural matters. He wrote numerous books and pamphlets to popularize the knowledge of agriculture. Among his works are

(Diction-

naire d'agriculture pratique) (Paris 1855), in collaboration with Dr. Moreau; (Le Livre de la Ferme) (ib. 1861-64), with several assistants.

Just previous to his death he published (Souve¬

nirs historiques) (ib. 1891). The Versailles School of Agriculture had a bust made in his memory.

JOINERY, the industry and art of joining wood, stone or metal work by sawing, planing, cross-cutting, etc., connecting by means of glue, framing, nails, cement or bolts, and fitting the construction for the internal and external fur¬

nishings of buildings, ships and for various ar¬

ticles of furniture, etc. In woodwork, grooving, tonguing, mitering, mortising, molding and bead¬

ing, wedge-cutting, boring, etc., are performed by means of a power-tool with different attach¬

ments called the joiner; the joiner's gauge is a scribing tool used to make a mark on a board parallel to its edge, while the facing and match¬

ing of boards is accomplished by means of a long bench plane called the joiner's plane. In carpentry and joinery, in architectural stone and structural steel work, the mold or the place where one piece of timber, stone or steel is connected with another is called the joint. See Building; Cabinetmaking; Carpentry; Bridge Construction; Steel Construction.

JOINT, in anatomy, an articulation or con¬

nection between bones. Many of the im¬

movable joints are so close in their union that the two bones practically become one, as in the dovetailed sutures of the skull. In the make-up of a movable joint there are the two bones, and covering the surface of each a layer of tissue of rubbery consistency called cartilage ; binding the bones together are firm inelastic bands of tissue called ligaments. Over the surface of the cartilage and the inner surfaces of the liga¬

ments there is a thin, smooth layer of tissue, the. synovial membrane, which is kept constantly moist with an oily fluid to prevent friction.

Joints are classified according to the variety of motions they allow: the freest is the ball and-

socket joint, as seen in the hip and shoulder.

Diseases of Joints. — Joint-diseases are dis¬

tinguished by names that indicate the principal structure involved and the causes of disease.

Where the cause is a specific disorder, as tuber¬

culosis, rheumatism, syphilis or gonorrhoea, the name of that particular malady is given to the inflammation. The only structure of a joint that is apt to be involved alone is the synovial mem¬

brane, and inflammation of this structure is called synovitis. Inflammation of all the joint-

structures is called arthritis, and where the bone is the primary seat of the trouble, or is prin¬

cipally involved, the name osteo-arthritis is used.

Synovitis. — This condition results from in¬

juries (sprains, bruises and wounds), from overuse, acting as an injury, and from poisons circulating in the blood. The joint is painful, moves with greater pain and may be red outside.

Blood-serum is poured out and the synovial sac is distended. (This condition constitutes (

solute rest of the joint and pressure by a snug bandage hasten recovery. When such injuries are repeated, or when the inflammation is slight but persistent, painting with iodine tincture may be of value. When the condition of inflamma¬

tion reaches the suppurative stage all the struc¬

tures of the joint are involved and the condition is considered under the term ˆarthritis.®

Arthritis (non-specific). — This is due to the extension of disease of

contiguous bone, or it may result from wounds or in the course of various diseases. The joint becomes swollen, red, very painful and the general symptoms are severe. When the poison is sufficiently virulent, suppurative arthritis results and the pus col¬

lects in the synovial sac. (See Inflammation).

In this. condition the joint becomes <(boggy,® and the poisoning of the entire system is so severe as to warrant the most radical measures for relief. Opening the joint and allowing the es¬

cape of the pus, with thorough cleansing, may be sufficient, or the limb may have to be sacri¬

ficed. See Arthritis ; Arthritis Deformans ; Gout; Rheumatism; Syphilis.

Knock-knee. — This is a deformity of the legs, consisting in the angular projection of the knee inward, and is sometimes called in-knee.

It arises in children learning to walk who are affected with rickets (q.v.). The deformity is due to the faulty growth of the bones which enter into the joint. In early life, correction of it may be secured by splints and braces ; but when the bones become less pliable, the femur, the tibia, or both, may have to be severed by chiseling and the bones held in the normal line by plaster casts until union has taken place.

Charcot's Disease.— The peculiar form of arthritis thus named occurs in the course of locomotor ataxia, the knee-joint usually being the one affected. The joint swells painlessly, the structures are worn away and the function of the joint is lost.

Sprains. — These are wrenches resulting in more or less stretching or laceration of liga¬

ments, hemorrhage in and around the joint and sometimes the displacement of tendons. The part usually swells at once and movement causes severe pain. This injury may closely re-

semble a joint-fracture. Absolute rest of the joint must be insisted upon, as synovitis may follow. Alternating hot and cold applications,

if started early, lessen the damage. The joint should then be snugly bandaged and kept so until swelling and tenderness disappear.

Wounds of Joints. — Injuries of this nature may cause damage directly to the structures or by infecting the joint and producing arthritis.

Penetration into the synovial sac is indicated by an escape of the viscid fluid.

Floating Cartilages. — These are rarely seen except in the knee-joint, where they are ordi¬

narily due to a small portion of cartilage being bitten off between the bones ; this piece then floats around in the synovial sac and causes trouble when the ‘ bones lock together on it.

When this occurs, the patient falls to the ground because of the severe pain. The synovial mem¬

brane is injured and is apt to be mildly in¬

flamed. These bodies may sometimes be felt through the skin and can be held, by holding the joint in the same position, until an opening is made; but ordinarily when the attacks become so frequent as to be unbearable the joint has to be opened and searched.

JOINT-SNAKE. See Glass-Snake.

JOINT STOCK BANKS. See Banks and

Banking — World’s Systems.

JOINT STOCK COMPANY, or ASSO¬

CIATION. The usual definition in law of this term is that a joint stock company is an association of individuals for the purposes of profit, possessing a common capital, being di¬

vided into shares, of which each member pos¬

sesses one or more, and which are transferable by the owner. It is distinguished from ordi¬

nary partnerships in that the death or with¬

drawal of an ordinary partner brings a dissolu¬

tion of the firm, whereas in the case of joint stock companies death or withdrawal of inter¬

est does not involve dissolution. The members of a joint stock company, contrary legislation absent, are liable for all debts of the associa¬

tion the same as partnership members, and a similarity exists respecting other essential features. The joint stock company is distin¬

guished from a corporation inasmuch as in the latter case its shareholders are liable for the debts of the company only to the extent of the share of the capital stock actually contributed by them, whereas members of a joint stock company are liable to contribute to the debts of the company. With these exceptions both forms of association are similar. Statutory enactments in England and the United States have been passed regulating their government.

In England the Companies Act of 1862 provides <(any seven or more persons associated for any lawful purpose may, by subscribing their names to a memorandum of association, and otherwise complying with 'the requisitions of the act in respect to registration, form an incorporated company, with or without limited liability.® In cases where the intention of the company is that its members shall be subject only to lim¬

ited liability the word ˆLimited® has to be stated in the company's title. Joint stock com¬

panies have been formed in large numbers un¬

der this law and have become one of the most important forms of commercial exploitation in England. In the United States statutes have been passed regulating the organization, gov¬

ernment and management of joint stock com¬

panies, fixing the minimum number of members, authorizing the companies to sue or be sued in their own name, providing for the methods of management and establishing the extent of the liability of the members. The usual require¬

ments mentioned in these statutes are that they record articles of association together with names of the members, amount of capital, name of company and character and location of the business. In general it may be asserted that at least one meeting of the members

each year is provided by law or the articles of the associa¬

tion, timely notice being given the members as to time and place of said annual meeting. At this annual meeting the stockholders elect their officers by vote. A statute securing to minority stockholders in corporations the power of elect¬

ing a representative in the board of directors does not apply to joint stock associations unless so incorporated in its articles. Contracts with joint stock associations can be made only with the officers or managers as stated in the asso¬

ciations' articles or as contained in the statute.

As a joint stock company has the character and power, substantially, of a corporation, it may be served with process in a foreign juris¬

diction. All the members, statutory regulation being absent, are parties to an action either by or against a joint stock association. While suit against members or officers individually is not valid, statutes generally provide that suits may be instituted in the name of a designated officer, as the president or treasurer of the company. But if judgment is properly rendered against a president as such, it does not bind his individual property. Dissolution is usually by consent of the members mutually, but the consent must be unanimous if the asso¬

ciation is formed for a special period. Joint stock companies have not gained such popu¬

larity here as in England, the laws of corpora¬

tions being less drastic in the United States than in England. Consult Birdseye, (New York Statutes,* article (

(New York 1901) ; Hurrell and Hyde, (Law of Joint Stock Companies) (London 1898) ; Bind¬

ley, (The Law of Companies) (ib. 1889) ; Scott, (The Constitution and Finance of Eng¬

lish, Scottish and Irish Joint Stock Companies to 1720, Vols. I-IIP (Cambridge 1910—12) ; Lomnitz, H., (Die Systematische Beurbeiting der Veroffentlichungen von aktiengessell-

schaften) (Leipzig 1908). See Corporations, History; Corporations, Legal.

JOINT TENANTS, persons who hold or

own lands jointly, by title created expressly by one and the same deed or will. It has been uni¬

formly held by the courts that a unity of pos¬

session derived by several and distinct con¬

veyances does not constitute a joint tenancy, but rather a tenancy in common. Joint tenants must have the same interest, derived from the same conveyance, commencing at one and the same time, and held by a united possession.

The duration of the estates must be alike in both, and also the interest. Should one hold under the conveyance for a term of years, and the other for life, the possession even for a term of years would not be a joint tenancy.

The estate must vest in each tenant at the same time. In the case of a will which gives one an 190

interest to commence at a day named and another an interest to commence a year later, no joint tenancy is created thereby. Should one receive an interest absolute and another an interest for life, the relation of joint tenants would not be created. The doctrine of sur¬

vivorship is the distinguishing incident of title by joint tenancy. In the event of the death of one of the joint tenants, the survivor is enti¬

tled to the whole property, and the full title im¬

mediately vests in him. This is not an incident of tenancy in common. Many of the States of the Union have abolished title by survivorship in joint tenancy by constitutional provisions or by express statute enactments. In other States acts have been passed abrogating the distinction between joint tenants and tenants in common; and inheritance by survivorship not being an incident of tenancy in common, such acts are construed by the courts as abolishing such in¬

heritance. Such acts do not apply to existing joint tenancies, but only to such as may be created after the enactment. Consult Kent, J., Commentary on American Law) (14th ed., 4

vols., Boston 1896) ; Blackstone, W.,

mentaries) (4th ed., 2 vols., Chicago 1899).

JOINT-WORM. See Chalcis; Wheat

Insect-pests.

JOINTS, breaks or fractures in the rocks of the earth's crust, dividing them into larger or smaller blocks. They differ from faults (q.v.) only in that the latter have undergone relative slipping of one wall past the other.

Joints may be produced either by tension or compression. Columnar jointing (q.v.) in basalts is a good illustration of the former.

The latter usually occurs in regions of folding.

Joints when very small and closely spaced produce fracture cleavage (q.v.) in rocks.

When a large number of joints are parallel they form a joint system. In sedimentary rocks two prominent systems often occur nearly at right angles to each other causing the rock to break in nearly rectangular blocks. When joints be¬

come filled with mineral matter they form veins (q.v.). Jointing aids in ground water circulation, particularly in non-porous rocks like granite. It is also an aid in quarrying, unless the joints are too closely spaced, in which case they destroy the value of the rock.

JOINTURE, join'tur, a settlement of lands and tenements made to a woman in considera¬

tion of marriage, as a substitute for dower.

Originally it was a joint estate limited to both husband and wife as a joint tenancy and sub¬

jected to survivorship. The wife takes noth¬

ing under the settlement until after the death of the husband, unless special provisions are in¬

corporated, which in reality modifies the effect of a regular jointure. In some settlements, de¬

nominated jointures, provisions are inserted to the effect that they are not to exclude enjoy¬

ment of dower; but such provisions are an in¬

novation upon the established province of join¬

tures. A good jointure must provide that it shall take effect, in possession and orofit, im¬

mediately after the death of the husband; that it shall be for the life of the wife herself, and cannot be left in trust for her use and benefit.

It should be provided that it is in settlement of all dower interest, in order to maintain its dis¬

tinctive features of jointure. The settlement must be executed before marriage, as marriage constitutes the entire consideration for the jointure. Such an instrument properly executed before marriage is binding on the wife and a complete bar to dower in any dowable lands owned or conveyed by the husband during the marital relations. Without the intervention and assistance of legislative action, no other form of agreement is effectual to bar dower.

It sometimes happens that the wife is deprived of her jointure by lawful acts to which she is not a party, as by the lands being taken for public purposes, or in some other manner equally legitimate. In such a case the settle¬

ment does not bar her claim against the hus¬

band's estate to the extent to which she is de¬

prived of her jointure.

JOINVILLE, zhwan'vel', Frangois Ferdi¬

nand Philippe Louis Marie d'Orleans, Prince de, third son of Louis Philippe: b. Neuilly, 14

Aug. 1818; d. Paris, 16 June 1900. He entered the naval school at Brest and was made lieu¬

tenant in 1836. He distinguished himself (1838) outside Vera Cruz when the war was de¬

clared against Mexico. In 1843 he married Princess Francesca of

Braganza, sister of Don Pedro II, and he was created vice-admiral in 1845, sitting meanwhile in the Chamber of Peers. The Revolution of 1848 forced his exile to England, leaving, in 1861, for the United States accompanied by his son, the Due de Penthievre, and his nephews, the Comte de Paris and the Due de Chartres. They entered the service under General McClellan. In 1870

he was again in France and, as Colonel Loth-

erod, was actively present in the 15th Corps before Orleans. He was arrested under instruc¬

tions of Gambetta and interned five days at the. prefecture of Mans and then returned to exile in England. At the 1871 elections he was chosen as representative of both La Manche and Haute-Marne and took the latter seat in the assembly. He retired from politics, but (1886) had to return to exile when the law again banished the royal families. Return¬

ing to France in 1895 he died there. He wrote numerous articles on history and the navy which appeared in the Revue de Deux Monde s signed as manager or director of that publica¬

tion ; they have since been published in col¬

lective form under the title (Essais sur la marine frangaise: L'escadre de la Mediterranee) (Paris 1853), and (£tudes sur la marine et recits de guerre. > His (La guerre d'Amerique, campagne du Potomac* had its second edition in 1872. In 1894 he published some of his inter¬

esting memories of the year 1848 in (Vieux souvenirs, 1818-1848. *

JOINVILLE, zhwan-vel, Jean, Sire de,

French historian: b. Champagne, 1224; d. 24

Dec. 1317. He early entered the service of Thibaut, king of Navarre, and in 1248 raised a troop of 9 knights and 700 armed soldiers, and accompanied Louis IX in his first crusade to the Holy Land. He rose high in favor with Louis, shared his captivity, returned with him to France in 1254 and spent much of his time at court. In 1283 he became governor of Cham¬

pagne during the minority of Jeanne de Navarre. In 1315 he volunteered to accom¬

pany Louis X in his expedition against Flanders.

His (Histoire de Saint Louis, > is one of the most valuable specimens of early French prose.

It consists of an elaboration of scattered notes JOKAI — JOLIET

taken during his military expeditions, combined with hearsay and tradition. It gives a lavish .account o! King Louis, relating his heroic deeds and his many meritorious qualities. His papers of chancellery are annotated with vari¬

ous remarks of historical interest. The 'His-

t(jlre • s „survived in three manuscripts, first edited in 1546. The best edition with a trans¬

it10?, mto later French is hy N. de Waillv in Societe de 1 histoire de France5 (4 vols., 1874).

In addition to this work, Joinville is also credited with a (Credo) first reproduced in facsimile in 'Melanges de la Societe des bibliophiles f rangais5 (1837). His chancellery reports are edited in 'Bibliotheque de l'Lcole des Chartes) (1867).

JOKAI, yo ka-i, Maurus, Hungarian novel-

\S/r ' b: Komorn. 19 Feb. 1825; d. Budapest, 5

May 1904. In 1846 he received his advocate's diploma, but never practised, and from a very early age devoted himself to literary work. In 1842 he produced a drama, (The Jew Boy,:* in 1846 his first novel, (Work-days, 5 was pub¬

lished, and in 1847 he issued a collection of stories entitled (Flowers of the Desert.5 He served the cause of Hungarian independence in the revolutionary movement of 1848, and after its failure was a political suspect and that dur¬

ing the period of his greatest literary produc¬

tivity. His 'Revolution and Battle Pictures5

appeared m 1849, and after that he devoted himself with extraordinary energy to journalis¬

tic and literary work, producing in all more than 300 volumes. He was a member of the Hungarian Parliament and the recognized leader of the Liberal opposition after the restoration of the constitution, and in 1897 was appointed a life member of the House of Magnates. He was a successful newspaper editor continuously from 1858 till his death, his last paper being the Nemzet (Nation). He is best known by his numerous romances and novels. Among the latter are (Transylvania's Golden Age) (1851) ; (The Man with Two Horns) (1852) ; 'The Turks in Hungary5

(1852) ; 'A Hungarian Nabob5 (1854) ; 'Karpathy Zoltan) (1855); (Political Fashions5

(1861) ; (The New Landlord5 (1862) ; 'The New Landlord5 (1865) ; (The Romance of the Next Century5 (1874); (Our Days5 (1881); 'The Man of Gold or A Modern Midas5

(1886); (There is no DeviP (1891); 'Dr.

Dumany's Wife5 (Eng. trans. 1891) ; (In Love With the Czarina5 (Eng. trans. 1894) ; 'The Nameless Castle5 (Eng. trans. 1891) ; 'The Green Book5 (Eng. trans. 1897) ; (The Lion of Janina) (Eng. trans. 1897) ; (The Poor Pluto¬

crats5 (Eng. trans. 1899) ; (Debts of Honor5

(Eng. trans. 1900) ; (The Baron's Son5 (Eng.

trans. 1900) ; 'The Day of Wrath5 (Eng. trans.

1900). His best plays are 'King Kolomon5

(1855); 'Manlius Sinister5 (1856); 'Georg Dozsa5 (1858) ; (The Martyrs of Szigetvar5

(1859), and (Milton5 (1878). His 'Political Poems5 appeared in 1880. Consult Nevai, 'M.

Jokai5 (1894), and Temperley, (Maurus Jokai and the Historical Novel,5 in the Contem¬

porary Review, > July 1904. See Man of Gold, A.

JOKJAKARTA, or D JOGJAKARTA,

Java, Dutch resident town, on the island near the south coast. -It is connected by railway with the harbor of Tlelatjap and with Batavia,

Surakarta and Samarang. It is the residence of a native prince as well as of the Dutch resi¬

dent and is quite powerfully garrisoned. There are great temple ruins in the vicinity. Pop.

about 80,000.

.JOLIET, Charles, French journalist: b.

Saint Hippolyte-sur-le-Doubs, Doubs, 1832; d.

1910. He received his education at the College of Chartres and the Versailles Lyceum. He secured a place in the civil service in 1854, mean¬

while writing occasionally for the newspapers.

He published ‘L’Esprit de Diderot5 in 1859.

After 1864 he devoted himself exclusively to journalistic and literary pursuits. His (Le roman de deux jeunes maries5 (1866) and ‘Made¬

moiselle Cherubin5 (1870) were very successful and he became well known during the Franco-

Prussian War of 1870, through his narration of incidents connected with the campaign. Other works are Wes romans patriotiques5 (1871) ; (Le train des maris5 (1872); (Trois uhlans5

(1872) ; ‘La foire aux chagrins5 (1873) ; ‘Carmagnol5 (1876); (La vipere5 (1880); (Le crime du pont de Chatou5 (1882) ; (Le medecin des dames5 (1885); Violette) (1890) ; ‘Nou-

veaux jeux d’esprit5 (1892).

JOLIET, Louis, American explorer: b.

Quebec, 21 Sept. 1645; d. Canada, May 1700.

He was educated at the Jesuit College of Que¬

bec, and subsequently engaged in the fur trade on the western frontier, thereby ‘becoming familiar with the missionaries and tribes. He was selected by the governor Frontenac to as¬

certain the direction and mouth of the Mississippi, a few of whose

affluents had al¬

ready been visited by missionaries and traders.

Starting with his companion, the illustrious Father Marquette (q.v.), and five other French¬

man, from Green Bay in June 1673, he as¬

cended the Fox River, and descended the Wis¬

consin to. its confluence with the Mississippi, down which they sailed as far as the country of the Chickasaws, below the entrance of the Arkansas. Having ascertained with tolerable accuracy the general course of the stream, they returned to Green Bay, by the way of Illinois River, Chicago and Lake Michigan, whence Joliet started alone for Quebec. The whole route traveled by them is estimated at 2,500

miles. He lost his journal and other papers in the rapids above Montreal, hut wrote out from recollection a few pages of manuscript, which agree with the narrative of Marquette. In the same manner he prepared a map of the region explored. The French government inade¬

quately rewarded him for his services with the Island of Anticosti at the mouth of the Saint Lawrence, where he ‘built a house and fort for his family, intending to embark in trade. He appears, however, to have been subsequently employed in the West. In 1691 his island was captured by a British fleet and his property destroyed. In 1697 the seignory of Joliet, Can¬

ada, was assigned to him. Joliet, the capital of Will County, Ill, is named after him. Con¬

sult Parkman, ‘La Salle or the Discovery of the Great West5 (1869); Winsor, ‘Narrative and Critical History of America5 (1884-87) ; Gagnon, ‘Louis Jolliet5 (Quebec 1902).

JOLIET, Ill., city, county-seat of Will County, on the DesPlaines River, and Lakes to Gulf Deep Waterway; also, on the Chicago, Rock Island and Pacific, the Michigan Central, 192

the Atchison, Topeka and Santa Fe, the Elgin, Joliet and Eastern, the Lake Shore and Elgin and the Chicago and Alton railroads, 40 miles

southwest of Chicago. The first permanent settlement was made in 1831 and the city was chartered in 1859. The place was named in honor of Louis Joliet, a French navigator and one of the. party who with Marquette visited this place in 1673. The city is situated in a rich agricultural region, and large limestone quarries are in the vicinity. Its chief manufac¬

turing establishments are the American Steel and Wire and the Illinois Steel Company Mills, Coal Products Company, chemicals, matches, art Calendars, cartons, oil and gaso¬

line tractors, automobiles and auto accessories, machine shops, agricultural implement works, foundry and furnace products and breweries.

Some of the public institutions are the State penitentiary, Silver Cross and Saint Joseph's hospitals, Saint Francis Academy and a public library which contains 45,000 volumes. The Illinois Steel Company Athenaeum, a club¬

house for workingmen, is a fine institution.

There is a fine Country Club and a flourishing Association of Commerce. The city has com¬

mission form of government and owns and operates the waterworks. The Chicago Sani¬

tary District Power Plant supplies Chicago with light and power. The power plant of the Pub¬

lic Service Company of Northern Illinois is located here. Pop. (1920) 38,406.

JOLIETTE, or INDUSTRY VILLAGE,

Canada, town and county-seat of Joliette County, Quebec, on the L'Assomption River, on the Canadian Pacific and Canadian Northern railways, 36 miles northeast of Montreal. It is an important market town, has fine water power and has a good trade in lumber and farm products. It has large foundries, saw, paper and grist mills, and manufactories of woolen goods, biscuit, agricultural implements, carriages and tobacco and cigars. Limestone for building is quarried in the vicinity. The municipality controls the waterworks and elec¬

tric light. Pop. 6,346.

JOLIN, Johan Kristofer, Swedish dram¬

atist: b. Stockholm, 1818; d. 1884. He was engaged as actor at the Stockholm Theatre in 1845-68 and for part of that time also' served as reader and director of the dramatic school.

He wrote a number of clever, witty plays, and some novels and sketches. His plays, are (Master Smith) (1847) ;

Petter) (1883). John's complete works have been issued (15 vols., 1872-88).

JOLINE, Adrian Hoffman, American law¬

yer: b. Ossining, N. Y., 30 June 1850; d. 15

Oct. 1912. In 1870 he was graduated at Prince¬

ton University and in 1872 was graduated in law at Columbia University and was admitted to the bar in the same year. At the time of his death he was senior member of the firm of Joline, Larkin and Rathbone. He acquired vast transportation interests ; was president of the Missouri, Kansas and Texas Railroad and also the Texas company of the same name from 1906 to 1909; was director of the Albany and Susquehanna Railroad Company, the American and Foreign Insurance Company, the National Surety Company, the United Traction and Electric Company and the Chatham and

Phoenix National Bank. After 1907 he acted as receiver of the Metropolitan Street Railway Company of New York. Mr. Joline was an expert on railroad legislation and corporation law in general. In 1912 he received a letter from Gov. Woodrow Wilson of New Jer¬

sey in which the latter expressed a desire for the elimination of Mr. W. J. Bryan from the political arena. The publication of the letter just previous to the presidential campaign caused a great stir among leaders of the Demo¬

cratic party and for a time a rupture seemed imminent. Mr. Joline was a great booklover and collector of rare works. He wrote Medi¬

tations of an Autograph Collector5 (1902) ; diversions of a Book Lover5 (1903) ; 'At the Library Table) (1910) ; 'Edgehill Essays5

(1911) ; (Rambles in Autograph Land5 (1913).

JOLLY, Julius, German philologist : b.

Heidelberg, 1849. He was educated at the uni¬

versities of Munich, Berlin and Leipzig. In 1872 he was appointed docent and in 1877 pro¬

fessor of Sanskrit and comparative philology at the University of Wurzburg. In 1882-83 he traveled in India. Professor Jolly is a rec¬

ognized authority on Hindu jurisprudence. His works include (Ein Kapital vergleichender Syntax5 (1872) ; 'Geschichte des Infinitivs im Indogermanischen5 (1873); (Naradiya Dhar-

masastra5 (1876) ; (The Institutes of Vishnu) (1880); (Tagore Law Lectures5 (1885); (A History of the Hindu Law of Partition, In¬

heritance and Adoption5 (1885) ; 'Manutikasan-

graha5 (1885-90) ; (Institutes of Naradasmriti5

(1885-86) ; (Manava Dharmasastra5 (1887) ; 'Minor Law Books5 (1889) ; (Recht und Sitte 5

(1896) andj 'Indische Medezin5 (1901) in (Grun-

driss der Indoarischen Philologie.5 He also wrote a life of Georg Biihler (1899).

JOLLY BALANCE, a spring balance de¬

vised by Prof. Philipp von Jolly, of the University of Munich, for determining the specific gravities of small objects. In its usual form it consists essentially of a long spiral spring of fine wire, to the lower end of which two pans are at¬

tached, one above the other. The lower pan is kept immersed in water, while the upper one remains in the air. The object whose specific gravity is to be determined is placed in the upper pan first, and the extension of the spring due to the weight of the object in the air is noted. The specimen is then transferred to the lower pan (where it will be under water), and the extension of the spring under these new conditions is also noted. The specific gravity of the specimen is then obtained by dividing the extension of the spring when the object is in the air by the difference between the two extensions as observed for air and water, re¬

spectively. The extension of the spring is ob¬

served by means of. a graduated scale engraved upon a mirror that is placed back of the spring, and parallel to it. In taking a reading, the eye is brought into such a position that the image of the pupil is seen in the mirror directly behind the image of the pointer at the lower end of the spring. In this way errors of paral¬

lax are avoided in the readings. The Jolly bal¬

ance is chiefly used for the rapid determina¬

tion of the specific gravities of minerals and JOLLY BEGGARS — JOMINI

1£K3

similar objects, where great precision is not essential.

JOLLY BEGGARS, The. (The Jolly

Beggars* is one of many instances of Burns'

range of gifts and interests. He had always had a taste, he says in a letter, for the com¬

pany of blackguards, though he had no ambition to become one. The poem is called a cantata; and is, indeed, an opera of beggary, with the scene laid in Poosie Nansie's hedge alehouse; and the characters, all noisy vagrants from roaming the world, rising one after another, with short introductions of them in recitativo, to sing of their braveries and loves, lusts, de¬

baucheries, of the highways, the hedges, of old days and soldier boys and youth. The whole piece is done in the manner of Jan Steen and Ostade among the painters ; and in literature of the folk ballads, of Swift, Rabelais, Fielding, Shakespeare's Falstaff.

The frequent tendencies in the last four decades, especially on the Continent, to some¬

thing of the broad realism of earlier periods, help clear the way for (The Jolly Beggars) of the apologetic types of criticism from which it has often suffered, and make possible a more honest and direct approach. The chief excel¬

lence of the work lies in its power of minstrelsy, which here takes the

direction of coarse, ca¬

rousing, bludgeoning humor, genuine balladry of the highway people : one of the best pieces in English of genre, kept perfectly to one key.

(The Jolly Beggars) was written in 1785, after a visit to an alehouse where a party of vagrants were carousing; but out of con¬

sideration for his public's sense of propriety, Burns excluded it from his published work. So that the poem was first printed, though only in part, in 1799, from a manuscript given to friends. In 1801 another manuscript was added to the first, making the poem complete as it now stands.

Stark Young.

JOLY, Henri, on're zho'le', French philoso¬

pher : b. Auxerre, 1839. He was educated at the Ecole Normale Superieure; became a teacher at Douai, where he remained until 1871, removing that year in a similar capacity to Dijon and being made dean in 1878. He was assistant at the Sorbonne in 1881-83 and spent one year at the College de France in 1886-87.

He was elected to the Academy of Moral and Political Sciences in 1903. He published Ele¬

ments de morale) (1880); (Psychologie com¬

pare : L'homme ct 1'animaP (1877; 5th ed., 1911) ; (Psychologie des grands hommes* (1883 ; 3d ed., 1912) ; (Le crime) (1888) ; (La France criminelle) (1889); (Cours de philosophic* (9th ed., 1891) ; (Socialisme chretien* (1892) ; (A travers l'Europe) (1898) ;

nelle* (1910) ; E'ltalie contemporainej (1911) ; E'EnfanU (1912) ; Eistoire de la civilization (1913).

JOLY, jo'le, John, Irish physicist: b. Holly¬

wood, King's County, Ireland, 1857. He re¬

ceived his education at Trinity College, Dublin; served there as demonstrator in civil engineer-

ing in 1882-91 ; and demonstrator in experi¬

mental physics in 1893. Since 1897 he has been professor of geology and mineralogy in the University of Dublin. He is scientific adviser to Dr. Steevens' Hospital, Dublin, and in 1911

was awarded the Boyle medal of the Royal Dublin Society. In 1918 Dr. Joly visited the United States as a member of the university commission to secure, a closer rapprochement between the institutions of higher education in England and the United States. He has pub¬

lished (Radioactivity and Geology * (1909) ; (The Birth-time of the World, etc.* (1915); (Synchronous Signalling in Navigation,) and contributions to the Royal Society, the Philo¬

sophical Magazine, etc.

JOLY DE LOTBINIERE, zho'le' de

ld'be'nyar, Sir Henri Gustave, Canadian states¬

man : b. France, 5 Dec. 1829; d. Quebec, 15

Nov. 1908. He was educated in Paris, called to the bar of Lower Canada in 1855 and was first returned to the legislature in 1861. After Confederation he led the opposition in the Que¬

bec legislature for some years, and was pro¬

vincial premier 1878-79). He was controller and later Minister of Inland Revenue in the Domin¬

ion Cabinet, 1896-1900; and was lieutenant-gov¬

ernor of British Columbia, 1900-06.

JOMARD, zho'mar, Edme Frangois,

French Egyptologist: b. Versailles, 1777 ; d. 1862.

He was educated at the Ecole Polytechnique ; went to Egypt with the French army in 1798

as member of the scientific commission. He became secretary of the latter in 1802. He edited Ea description de 1'EgypteP to which he made several contributions. He was one of the founders of the Geographical Society of Paris in 1821 and seven years later was made curator-director of the Royal Library. Acting on Jomard's advice, Mehemet Ali sent several Egyptian youths to be educated under him

in France, and in this way was started the Institut des Egyptiens. Jomard received the title of Bey from the Khedive. He published (Voyage a l'Oasis de Syouah) (1823) and (Remarques sur les rapports de l'Ethiopie et l'Egypte) (1822).

JOMINI, zho'me'ne', Antoine Henri,

Baron, general in the French and afterward in the Russian service, and writer on military tactics: b. Payerne, Vaud, Switzerland, 6 March 1779; d. Passy, 24 March 1869. He began his military career in a Swiss regiment in the French service, and chiefly through the friend¬

ship of Ney was raised to high military rank by Napoleon. In 1804 he began the publication of (Traite des grandes operations militaires.*

He distinguished himself in active service dur¬

ing the retreat from Russia, but offended at his treatment from Napoleon, really Berthier, the latter's chief of staff, he passed over to the allies after the armistice of Plaeswitz, and en¬

tered the service of Russia, in which he became lieutenant-general and aide-de-camp to the em¬

peror. He declined to take part in the invasion of France in 1814. In 1828 he was active in the military operations at Varna; and in 1856

returned to Paris. Besides the work already mentioned, his (Histoire critique et militaire des campagnes de la Revolution* (5 vols., Paris 1806) ; (Vie politique et militaire de Napoleon) (4 vols., Paris 1827) ; 'Tableau analytique des principales combinaisons de la guerre) (1830); 194

JOMMELLI — JONAH, BOOK OF

'Precis de l'art de la guerre) (1836) are still of interest and value. Consult Lecomte, (Le gen¬

eral JominP (3d ed., Lausanne 1888).

JOMMELLI, yo-merie, Nicolo, Italian com¬

poser, b. Naples, 11 Sept. 1714; d. 28 Aug.

1774. . He studied music with Muzillo, Prota, Mancini and Leonardo Leo; first composed can¬

tatas, then applied himself to dramatic music, produced his first opera, (Errore amoroso, > at Naples, in 1737, and his first serious opera, Odoardop in 1738, and the fame achieved by these works led to his being invited to Rome in 1740. There, under the patronage of Cardinal York, he composed two new operas, and in 1741

went to Bologna and composed (Ezio) and studied with Padre Martini. He then made a tour of the chief cities of Italy; produced (Didone) in Rome,

poser at Stuttgart till 1772, when he returned to Naples. His last, and 'believed by many his greatest, work, the (Miserere, > was composed after he had been paralyzed. His works com¬

prise 40 operas, 5 cantatas, 4 oratorios and 34

church compositions. Consult Albert, H.,

colo Jommelli als OpernkomponisC (Halle 1908).

JONAH, a Hebrew prophet: b. Gath-

hepher, Zebulon, c. 781 to 741 b.c. The son of Amittai, he lived in the early years of the reign of Jeroboam II, king of Israel, who acceded to the throne in 781 b.c. He foretold the victories of Jeroboam over the Syrians, as related in – Rings xiv, 25. The book of Jonah, written some three centuries later, describing his mis¬

sion to Nineveh to warn the inhabitants of the destruction of their city within 40 days tells all that is known of his subsequent life. See Jonah, Book of.

JONAH, Book of. The book of Jonah is written concerning a prophet, Jonah, the son of Amittai, doubtless to be identified with the prophet of that name whose prediction in the time of Jeroboam II is recorded in 2 Kings xiv, 25. The book was written much later than the lifetime of the prophet, however. The language of the book is particularly decisive, for Ar-

maisms and other late words afford clear evi¬

dence that it was written after the exile. The thought of the book makes it probable that it was intended as a protest against the narrow¬

ness of postexilic Judaism, which was most conspicuous after the time

of Ezra and Nehe-

miah. It is probable, therefore, that the book is not earlier than 400 b.c., and may be some¬

what later than that. The phrase ((the king of Nineveh.® iii, 6, is in accord with this dating, since it is one which would not have been used until some time after the end of the kingdom of Assyria, in 606. Concerning the personality of the author, or authors, nothing is known out¬

side of the book itself.

The nature of the book is much disputed. It has in the past often been considered to be historical, but various features of the book are against that, of which the swallowing of Jonah by the fish and his later deliverance unhurt, and the repentance of the whole. city of Nineveh at the call of an unknown foreign prophet are but more conspicuous features among many im¬

probabilities. It is a book of wonders, not of history. Some have given it an allegorical in¬

terpretation, Jonah representing the nation Israel and Babylon being the fish which swal¬

lowed the nation during the exile. But the details of the treatment do not yield themselves readily to an allegorical interpretation. It is to be regarded as a story designed to teach a lesson, a romance. The story as such is doubt¬

less the creation of the author. It may be based upon some current story or stories. Similar stories of the. swallowing of a man by a monster and later deliverance are common among many ancient peoples. The somewhat similar story of Perseus and Andromeda is located at Joppa, the port from which Jonah embarked.

There has been some question whether the book is all by one author. With the exception of a few words here and there, however, there seems no reason for question except in refer¬

ence to the psalm in ii, 2-9. That is undoubtedly not by the author of the remainder of the book.

First of all, it is inappropriate at this point, Jonah can hardly have been thought to utter this while within the whale, and in its nature it

is a thanksgiving for deliverance and not a prayer for such deliverance. It would be more appropriate if put after verse 10. But even then it would be in some measure inappropriate.

The psalm presupposes no such experience as Jonah s but only drowning. The drowning, in accordance with the usage of the psalms of 'the Old Testament, is more probably figurative, as a description of extreme trials, than literal. The psalm was doubtless composed independently and probably in use in some collection of psalms, it being similar to those in the Book of Psalms.'

Nothing definitely indicates whether the psalm was added by the author or by a later reader or editor. In any case it is more probable that it was originally designed to be after verse 10, but was accidentally transposed. If added later it was probably written on the margin, so that its ti ansposition would be easy. The psalm con¬

sists largely of reminiscences of other psalms and hence is probably postexilic.

In literary form the book excels ; as a ro¬

mance it is very artistically worked out.

There are two principal thoughts in the book.

Ihe first concerns the nature of the prophet's work, particularly in prediction. The purpose of the prophet is a practical one, to affect the fives of the hearers; not to present a program of the future, but so to present that future as to influence the lives of those addressed. This influence may so change their lives that the prediction of punishment will not be fulfilled.

The prediction is conditional, as had been stated by earlier prophets. The other thought, and the principal one, concerns the character of God and his plans for men. The thought of God is not limited to the nation Israel, but is concerned with mankind generally. Even the great op¬

pressor of Israel, Assyria, is the object of God's loving care; the people of that nation may find mercy from God if they repent. It is God's world-wide plans of mercy for men that are here presented, quite in the spirit of Deutero-

Isaiah. It is one of the most exalted messages in the Old Testament.

Bibliography. — Bewer, J. A., ‘Jonah’ (in¬

ternational Critical Commentary, ’ (New York 1912) ; Kennedy, J., (On the Book of Jonah) (London 1895) ; Perowne, T. T., (Books of Obadiah and Jonah) ((Cambridge Bible,’ Cam¬

bridge 1879) ; Smith, G. A., ‘The Book of the Twelve Prophets’ (Expositor’s Bible,’ Vol. II, New York 1898).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages , Colgate University.

JONAH CRAB, a crab of southern New

England (Cancer borealis) related to the com¬

mon edible species, but more robust and with a thicker, harder shell. It lives at low tide on exposed rocky shores and is sometimes found buried at 10 fathoms.

JONAS , Ho-nas, Alberto, Spanish pianist : b. Madrid, 1868. His musical studies were prosecuted at the Madrid Conservatory and at the Brussels Conservatory in 1886-90. He also studied under Rubinstein at Saint Petersburg and made a successful debut at Berlin in 1891.

He held the chair of music at the University of Michigan from 1894 to 1905; removed to Berlin in 1906, but he returned to New York in 1914

where he teaches music.

JONAS, yo’nas, Justus (originally Jobst Koch), German religious reformer: b. Nord-

hausen, Saxony, 5 June 1493; d. Eisfeldt, 9 Oct.

1555. He accompanied Luther to the Diet at Worms, assisted him in translating the Old Testament, took part in the Marburg Confer¬

ence, as well as in drawing up the so-called ar¬

ticles of Torgau and was present at the Diet of Augsburg. He did good service to the cause of the Reformation, not only by his preaching, but by his vigorous translations into German of the Latin works of Luther and Melanchthon. Con¬

sult Lindsay, (History of the Reformation in Germany) (New York 1906).

JONATHAN, son of Saul, king of Israel.

He carried on the war against the Philistines for some time with victorious success, but in the battle of Gilboa (1033 b.c.) was slain. His friendship for David is one of the most beauti¬

ful incidents in Old Testament history, and the elegy or dirge composed by David on his death — 'The Song of the Bow) — is in the highest strain of Hebrew poetry. Consult Schmidt, 'Messages of the Poets) (New York 1911).

JONATHAN BEN NUZZIEL, uz-zi-el, a

Hebrew scholar, who flourished about 30 b.c.

He was one of the first 30 disciples of Hillel, all of whom were credited with great learning and ability. He translated some of the Hebrew prophetical writings into the Aramaic lan¬

guage and wrote expositions of Haggai, Zechariah and Malachi.. Tradition has also credited him with (The Paraphrase on the Pen¬

tateuch, ' (The Paraphrase on the Prophets' and 'The Paraphrase on the Five Migilloth.' Later Jewish writers ascribed them to the joint work of several persons.

JONES, Alfred, American engraver: b.

Liverpool, England, 1819; d. New York, 28

April 1900. He came to the United States when young and received first prize at the National Academy of Design in New York, in 1839, for a drawing that he had made from Thorwald-

sen's 'Mercury.' He first came into public no¬

tice by his engravings of (The Proposal,' by Asher B. Durand, and (The Farmer's Nooning,'

after William S. Mount, and his work was in request for illustrated publications. He went to Europe in 1846 and after studying in life-

schools there, was elected a member of the Na¬

tional Academy, New York, in 1851. He is re¬

garded as one of the best engravers of his pe¬

riod in America. For many years he was con¬

nected with the American Banknote Company of New York, as an engraver. Among his steel plates are (The Image Breaker,' after Leutze; portraits of Adoniram Judson by Chester Hard¬

ing and William Cullen Bryant; (The Capture of Major Andre, ' after Durand; 'Sparking,'

by Edmonds; (The New Scholar'; 'Mexican News' ; 'Life's Happy Hour' after Lillie M.

Spencer; 'Poor Relations,' after J. H. Beard; 'Patrick Henry Delivering his Celebrated Speech.' Jones was run over by a cab in New York city and died of his injuries.

JONES, Amanda Theodosia, American

poet : b. East Bloomfield, Ontario County, N. Y., 19 Oct. 1835 ; d. Brooklyn, N. Y., 1 March 1914.

She was a contributor to many periodicals and was literary editor of the W estern Rural in 1869-70. She invented and patented several vacuum preserving processes for canning with¬

out cooking and the desiccation of fruits, etc., also a series of valves applicable to oil, air, vacuum, steam, gas, etc. Some of her war songs were very popular. She published 'Ulah and Other Poems' (1860) ; 'Atlantis and Other Poems' (1866) ; 'A Prairie Idyl, and Other Poems' (1882) ; 'Rubaiyat of Solomon and Other Poems' (1905) ; 'Collected Poems'

(1906); 'A Psychic Autobiography' (1910).

JONES, Anson, last president of the Re¬

public of Texas; b. Great Barrington, Mass., 20

Jan. 1798; d. Houston, Tex., 7 Jan. 1858. He commenced the study of medicine in Litchfield, Conn., in 1817, and in 1820 was licensed to practise. He established himself in 1833 in Bra¬

zoria, Tex., and upon the outbreak of the trou¬

bles between Texas and Mexico, became one of the earliest advocates of the severance of the two countries. In the succeeding war of inde¬

pendence he served as a private soldier and as surgeon in the Texan army. In 1837-38 he was a representative in the Texan Congress from Brazoria County; in 1838 was sent as Minister to Washington, where he endeavored, though unsuccessfully, to secure the annexation of Texas to the United States, and on his return to Texas took his seat in Congress as senator from Brazoria and in 1841 was appointed by President Houston his Secretary of State, which office he filled three years. In September 1844

he was elected President of Texas for three years from the ensuing December and held that office ■ until the annexation of Texas to the United States. He succeeded in maintaining a footing of equality in negotiations with Eng¬

land, France and the United States; and by the intervention of the two former powers the gov¬

ernment of Mexico was induced to acknowledge the independence of Texas. His journal and autobiography appeared in book form in 1858.

Jones County and Anson, its county-seat, were named after him.

JONES, Arthur Edward, Canadian clergy¬

man, educator and author : b. Brockville, On-

f

tario, 17 Nov. 1838. He was educated at Saint Mary's College, Montreal, and Jesuit scholasti-

cates at Amiens and Vais, France, Boston, Ford-

ham and Woodstock, United States. In 1857 he entered the Jesuit order; taught Latin at Saint Mary's College, Montreal, in 1861-62 and sub¬

sequently was professor of belles-lettres, rhet¬

oric and geometry at Saint John's College, Fordham, N. Y. He was ordained to the priest¬

hood in 1873 ; was professor of belles-lettres at Saint Francis Xavier College, New York, in 1874-75 and in the following year gave missions in New Brunswick. From 1876 to 1881 he taught English literature and geometry at Saint Mary's, Montreal, and from 1882 to 1900 he was assistant priest at the church of the Gesu, Mon¬

treal, at the same time serving as archivist of Saint Mary's College. He identified the scene of the martyrdom of Peres Brebeuf and Lalle-

mant and of Huron villages famous in

early Canadian annals. He collaborated with R. G. Thwaite in the latter's (Jesuit Relations and Allied Documents.* At the Saint Louis Exposition of 1904 his historical and archaeo¬

logical exhibit won the grand prize and he him¬

self was awarded a medal for his work as archivist. He invented a practical fire-escape for institutions and a perpetual calendar of movable feasts. In 1906, at Quebec, he lectured on Huron topography before the International •Congress of Americanists. Dr. Jones was archi¬

tect of several colleges of his order. He is a member of the Ontario Historical Society and other learned societies of Canada and the United States. He is the author of (Biens des Jesuites en Canada* (1888) ; (Sketch of Louis Andre, S.J.* (1889) ; (Answer to a Communica¬

tion in the Montreal Star and the Gazette and the Toronto Mail campaign against the

Jesuit Estates BilP (1889) ; (A Jesuit Father on the Act) (1889) ; 'Site of the Mascoutin Village* (1907); 'Hendake Ehen or Old Hu-

ronia* (1909-11). He discovered and edited, with biographical notes, Laure's (Relation of the Saguenay Mission* (1893) and is a con¬

tributor to the Recherches Historiques , 'The Catholic Encyclopedia, * etc.

JONES, Charles Colcock, Jr., American

author: b. Savannah, Ga., 28 Oct. 1831; d. 19

July 1893. He was graduated at Princeton (1852), at Llarvard Law School (1855) and was admitted to the bar in 1856. He served as colonel of artillery in the Confederate army during the war for the Union and on the re¬

turn of peace removed to New York, where he practised law. In 1877 he returned to Georgia and devoted his time to the study of the his¬

tory and archaeology of that State. He wrote (Historical Sketch of the Chatham Artillery during theˆConfederate Struggle for Independ¬

ence) (1867) ; (Reminiscences of the Last Days of Gen. Harry Lee) (1870) ; 'Antiquities of the Southern Indians) (1873) ; 'Life of Commodore Josiah Tatnall* (1878) ; (Negro Myths from the Georgia Coast, Told in the Vernacular) (1888) ; 'The History of Georgia) (2 vols., 1883) ; (English Colonization of Georgia*

(1887).

JONES, Edward (Bardy Brenin), Welsh

bard and writer on music: b. Llanderfel, Mer¬

ionethshire, 1752; d. London, 1 824. His whole life almost was spent in studying the harp and in promoting Welsh minstrelsy. He went to London in 1775 and a few years later was made official bard to the Prince of Wales. He pub¬

lished (Musical and Poetic Relics of the Welsh Bards* (1784; 1794); 'The Bardic Museum of Primitive British Literature* (1802); 'Lyric Airs, Consisting of Specimens of Melodies of Greek, Albanian, Wallachian, Turkish, Persian, Chinese and Moorish Melodies* (1804) ; (Cheshire Melodies) (1803) ; (The Musical Bou¬

quet-* (1799) ; (The Musical Miscellany) ; Terp¬

sichore's Banquet* ; The Minstrel's Serenade) ; 'Maltese Melodies) ;

The Musical Portfolio) ; ‘Musical Remains of Handel, Bach, Abel, etcP ; ‘Collection of Melodies for Beginners on the Harp. >

JONES, E(mily) E(lizabeth) Constance,

English educator : b. about 1857. She received her university education at Girton College, Cambridge, taking first in the moral science tripos in 1880. She was examiner in logic in the Cambridge Higher Local in 1902-04; also resident lecturer on moral sciences at Girton from 1884 to 1903 and mistress of Girton Col¬

lege from 1903 to 1916. She is external mem¬

ber of the board of philosophic studies of the University of London, governor of the Univer¬

sity College of Wales, and member of the council of the Cambridge Training College for Women. With Miss E. Hamilton she translated Lotze’s ‘Mikrokosmus,* and is the author of ‘Elements of Logic as a Science of Proposi¬

tions* ; ‘General Logic*; “Primer of Logic*

(2d ed., 1918) ; ‘Primer of Ethics* ; (A New Law of Thought and its Logical Bearings*

(1911) ; ‘Girton College* (1913) ; Three Great Questions* (1915) and of various articles and reviews. She was entrusted with carrying through the press the 6th and 7th editions of the late Professor Sidgwick’s ‘Methods of Ethics* (1901) and with editing his ‘Lectures on the Ethics of Green, Spencer, and Marti-

neau* (1902).

JONES, Francis Coates, American painter : b. Baltimore, Md., 25 July 1857. He studied at the Lcole des Beaux-Arts under Yvon, Leh¬

mann, Boulanger and Lefebvre. Since 1882 he has maintained a studio in New York; his specialty is figure painting. He was awarded medals at the Buffalo and Saint Louis exposi¬

tions and in 1894 was elected to the National Academy. He is a member of the National Institute of Arts and Letters and director of the American Federation of Arts. His paint¬

ings include ‘A Perplexing Move* (1909); ‘Cup of Tea* (1910) ;

‘Nymphs Bathing*

(1911); The Letter* (1911); The Sisters*

(1912); ‘A Wooded Hillside* (1912); The Trout Pool* (1913).

JONES, Frederick Scheetz, American edu¬

cator: b. Palmyra, Mo, 7 April 1862. In 1884

he was graduated at Yale University and studied subsequently at the University of Berlin and the Zurich Polytechnic. From 1889 to 1909 he was professor of physics; from 1902 to 1909

dean of the College of Engineering of the Uni¬

versity of Minnesota and since 1909 dean of Yale College.

JONES, George Heber, American mission¬

ary: b. Mohawk, N. Y., 14 Aug. 1867; d. Miami, Fla., 10 May 1919. He was educated in the public schools of Utica. In 1887 he was ap¬

pointed missionary to Korea by the Methodist JONES

Episcopal Church ; in educational work at Seoul from 1888 to 1891 ; principal Pai Chai English School at Seoul in 1892-93 ; presiding elder at Chemulpo 1893-1903; superintendent of the Ivorean Mission of the Methodist Episcopal Church in 1897-99. From 1903 to 1907 he was in the United States, serving as a secretary to the board of missions and as lecturer. He re¬

turned to Korea in 1907 ; was president of the Korean Biblical Institute and the Union Theo¬

logical School from 1907 to 1911. In 1915—18 he was special lecturer on missions at the Boston University School of Theology. From 1913 to 1919 he was editorial secretary to the board of foreign missions of the Methodist Episcopal Church. He published (Korea: Country and People5 (1907) ; (English-Korean Dictionary of Scientific and Technical Terms5 (1910).

JONES, Harry Clary, American chemist :

b. New London, Md., 11 Nov. 1865; d. 19 March 1916. In 1889 he

was graduated at Johns Hop¬

kins University, and studied subsequently at Leipzig, Amsterdam and Stockholm. After his return to the United States he became instructor in physics at Johns Hopkins, asso¬

ciate professor in 1900 and professor in 1904.

He edited the Zeitschrift fur physikalische Chemie and Journal de Chimie physique. In 1913 he was awarded the Langstreth medal of the Franklin Institute. He published ‘Freezing Point, Boiling Point, and Conductivity Methods5

(1897) ; ‘Theory of Electrolytic Dissociation5

(1900) ; (Elements of Physical Chemistry5

(1902; Russian 1911; Italian 1912); (Elements of Inorganic Chemistry5 (1903) ; (Electrical Nature of Matter and Radioactivity5 (1906) ; (Hydrates in Aqueous Solutions5 (1907) ; ‘The Absorption Spectra of Solutions5 (1909) ; (Introduction to Physical Chemistry5 (1910) ; ‘Electrical Conductivity of Salts and Organic Acids5 (1912) ; (New Era in Chemistry5 (1913) and many papers in professional journals.

JONES, Sir Henry, Welsh educator: b.

Llangernyw, North Wales, 1852. In 1879 he was graduated at the University of Glasgow.

He was professor of philosophy and political economy at the University College of North Wales and subsequently professor of logic and metaphysics at Saint Andrew’s. Since 1894 he has been professor of moral philosophy at the University of Glasgow. In 1912 he was knighted. His publications include (Browning as a Religious and Philosophical Teacher5

(1891; 6th ed.,» 1912); ‘The Philosophy of Lotze5 (1895) ; ‘Idealism as a Practical Creed5

(1909) ; ‘The Working Faith of the Social Re¬

former5 (1910) ; ‘Social Powers5 (1913).

JONES, Henry Arthur, English dramatist: b. Grandborough, Buckinghamshire, 28 Sept.

1851. After a secondary education, he took up writing as a means of livelihood, and in 1879

appeared as playwright with ‘A Clerical Error,5

performed by Wilson Barrett at the Court Theatre. He followed this by a series of com¬

edies of modern life, clever in dialogue and stagecraft, which have been very popular, par¬

ticularly with English audiences. They include ‘Silver King5 (1882) ; ‘Saints and Sinners5

(1884); ‘Middleman5 (1889); ‘Tudah) (1890); ‘The Dancing Girl5 (1891); ‘The Tempter5

(1893) ; The Masqueraders5 (1894) ; ‘Michael and His Lost Angel5 (1896) ; ‘The Rogue’s Comedy5 (1896); ‘The Liars5 (1897); ‘The Manoeuvres of Jane5 (1898); ‘Carnac Sahib5

(1899); ‘Mrs. Dane’s Defence5 (1900); ‘The Princess’s Nose5 (1902) ; ‘Josenh Entangled5

(1904) ; ‘The Hypocrites5 (1906) ; ‘The Evan¬

gelist5 (1907) ; ‘Dolly Reforming Herself5

(1908) ; ‘Mary Goes First5 (1913) ; ‘The Lie5

(1914). He is also author of a number of essays and lectures. He visited the United States in 1914. See Michael and His Lost Angel.

JONES, H(ugh) Bolton, American painter: b. Baltimore, Md., 20 Oct. 1848. He studied art in Baltimore and in France; made a specialty of landscapes. In 1889 he was awarded a third class medal at the Paris Ex¬

position and a medal at the Columbian Exposi¬

tion, Chicago, in 1893. He received a bronze medal at the Paris Exposition of 1900 and a gold medal at the Saint Louis Exposition of 1904. In 1883 he was elected to the National Academy. In the Metropolitan Museum, New York, are his ‘Autumn5 and ‘Spring.5 He is a member of the National Institute of Arts and Letters.

JONES, Inigo, English architect: b. Lon¬

don, 15 July 1573; d. there, 21 July 1652. He was the son of a clothworker and began life as a carpenter, but showing a taste for paint¬

ing, William, Earl of Pembroke, supplied him with the means of visiting Italy for the pur¬

pose of studying landscape painting. At Venice the works of Palladio inspired him with a taste for architecture. He was appointed first architect to Christian IV, king of Denmark, but in 1605 he returned to his native country.

After being employed for a time as a scenic and stage artist, he was appointed in 1610 sur¬

veyor of the works to Henry, Prince of Wales.

After the death of the prince he again visited Italy, and extended his knowledge and im¬

proved his taste from the examination of the models of ancient and modern art. The ban¬

queting house at Whitehall is a monument of his skill and science. At Winchester Cathedral he erected a screen in the style of classic antiquity. Like Wren he seems not to have duly appreciated the Pointed style of building.

He built the front of Wilton House, in Wilt¬

shire, for Philip, Earl of Pembroke, and was much employed by the court and by many of the nobility and gentry. He also designed the scenery and decorations for masques — a species of dramatic entertainment fashionable in the early part of the 1 7th century. In these pieces the dialogues and songs were composed by Ben Johnson, who quarreled with Jones and abused him in epigrams and satires. Being a Roman Catholic and a partisan of royalty, he suffered in the Civil War, and in 1646 was forced to pay a heavy fine as a malignant or cavalier. As an author he is known by a work on Stonehenge, composed by command of King James I, in which he undertook to prove that Stonehenge was erected by the Romans, and was a hypaethral temple dedicated to the god Ccelus.

He was the reviver of classical architecture in England, but he blended Gothic elements with the Italian style. Among his works besides those mentioned are the Greenwich Hospital, the old London Exchange and

the portico of Saint Paul's Church and Earl Pembroke's house. Consult the 'Life5 by Cunningham (1898) ; Loftie, 'Inigo Jones and Wren5

(1893), and the papers by Blomfield in the Portfolio for 1889.

JONES, Jacob, American naval officer : b.

near Smyrna, Del., March 1768; d. Philadel¬

phia, 3 Aug. 1850. He entered the United States navy in 1799 as a midshipman, and while serving in the war with Tripoli was captured in 1803 and held a prisoner for 18 months.

In 1812 he became commander of the Wasp and with her captured the English brig Frolic, 18 Oct. 1812, but on the following day en¬

countered the English war vessel Poictiers, 74

guns, by which both the Wasp and its prize were taken. He was released on parole at Bermuda and for his victory over the Frolic was voted a gold medal by Congress and $25,000

was granted to him and his crew in payment of the personal loss they had sustained. He subsequently commanded squadrons in the Mediterranean and the Pacific.

JONES, James Kimbrough, American poli¬

tician : b. Love, Marshall County, Miss., 29

Sept. 1839; d. 1 June 1908. His parents were residents of Tennessee, but in 1848 removed to a plantation in Dallas County, Ark. James served in the Confederate army during the Civil War, and then engaged in planting till 1873, when lie began to practise law in Dalton County, Ark. He was^ a member of the State senate in 1873-77 and its president in the last-

named year. In 1881-85 he was a member of Congress, having been elected as a Democrat, and in the latter year was elected to the United State Senate. He was re-elected in 1890 and 1897, and was chairman of the Democratic Na¬

tional Committee, conducting the Presidential campaigns of 1896 and

1900. Jones was an ardent tariff reformer. He retired from politics in 1903 and entered on the practice of law in Washington.

JONES, Jenkin Lloyd, American Unitarian clergyman: b. Llandyssil, Cardiganshire, Wales, 14 Nov. 1843 ; d. 12 Sept. 1918. He came to America with his parents while an infant, served in a Wisconsin regiment during the Civil War, and was graduated from the Meadville (Pa.) Theological Seminary in 1870. He was instrumental in organizing the Congress of Re¬

ligion Unity, the organ of the congress, was edited by him after 1879. In 1909 he was given the degree of LL.D. by the University of Wis¬

consin. He was pastor of All Souls Unitarian Church, Janesville, Wis., 1874—83; was secre¬

tary of the Western Unitarian Conference for nine years, and after 1883 was pastor of All Souls Church, Chicago (independent), and after 1905 head resident of the Abraham Lincoln Centre. He was, from its inception, identified with the Peace movement, and was noted as a lecturer throughout the United States. Among his published works are with W. C. Gannett (1886); Prac¬

tical Piety) (1890) ; Pits of Wayside GospeP

(1899) ; (Love and Loyalty) (1907) ; (On the Firing Line in the Battle for Sobriety) (1910), etc.

JONES, John, American surgeon: b. Ja¬

maicaˆ L. I., 1729; d. 1791. He studied med¬

icine . in Europe, and, returning to America, practised in New York, becoming professor of surgery in King's College, and, with Dr. Bard, founding the New York Hospital in 1771.

After the occupation of New York by the English forces in 1777 he removed to Philadel¬

phia, there being one of the physicians of the Pennsylvania Hospital, and in 1787 vice-presi¬

dent of the College of Physicians. He was the friend and physician of both Washington and Franklin, attending the latter in his last illness.

He published Plain Remarks upon Wounds and Fractures1* (1775).

JONES, John Paul, the first of the great American sea fighters, and not the least splen¬

did in the long line, was born John Paul —the name Jones being a subsequent assump¬

tion— on 6 July 1747 on the estate of Arbig-

land, in the parish of . Kirkbean, in the county of Kircudbright, Scotland; d. Paris, 18 July 1792. His family was obscure, his circum¬

stances narrow, his advantages meagre, his op¬

portunities limited. . At the age of 12 he be¬

came a sailor. Genius rose superior to adverse circumstances, however, and before he died he was one of the most accomplished officers who ever served the United States. The greatest men of America and France took pleasure in his society and were proud of his friendship.

He progressed rapidly in his chosen career.

At 19 he was chief mate of a slaver, a legiti¬

mate occupation in his day, but one that filled him with disgust. At 21 he was captain of a trader. In 1773 he came to America, forsook the sea and settled in Virginia on his brother's plantation, the latter having died childless in that year. It was at this time that he assumed the name Jones, by which he is so well known.

Heˆwas still poor and obscure when on 7

Dec. 1775 he was appointed a lieutenant in the new Continental navy, and was ordered to the Alfred, a small converted merchantman, Com¬

modore Hopkins' flagship, on which, in the latter part of December, he had the honor of hoisting with his own hands the first naval flag of an American squadron. This was the famous yellow silk banner with a rattlesnake, and perhaps a pine tree, emblazoned upon it, with the significant legend, (

Hopkins made an abortive expedition to New Providence, in which Jones had but one opportunity to distinguish himself. At the peril of his commission, when the regular pilots refused to do so, he volunteered to take the Alfred through a difficult and dangerous

chan¬

nel. Needless to say, he succeeded — he always succeeded!

His first independent command was the little brig-ship Providence, of 70 men and 12 4-pound guns. In the fall of 1775 he made a notable cruise in this vessel ; he skirmished with, and escaped from, by seamanship and daring, two heavy frigates, the Solebay and the Milford; m four months he captured 16 vessels, 8 of which were sent in as prizes, 5 burned, 3 re¬

turned to certain poor fishermen ; and he de¬

stroyed property aggregating $1,000,000.

Later, in command of the Alfred, with a short crew of 150 when he should have had 300, he made another brilliant cruise in which he burned several British transports, captured one storeship laden to the gunwales with price¬

less munitions of war and supplies, cut out three of the coal fleet from under the guns of the Flora frigate, and had another smart brush with the Milford.

He was commissioned captain in the navy on 10 Oct. 1776, and on 14 June 1777, in the ‘Same resolution that established the form of the American flag, he was ordered to the Ranger, a small ship-rigged corvette of 300 tons and 18 6-pounders. On her, at Portsmouth, N. H., on 4 July, he hoisted the first Stars and Stripes that ever flew from the peak of an American man-of-war. Sailing for European waters, he carried to France the official dispatches an¬

nouncing Burgoyne’s surrender, which brought about the Franco-American alliance.

In Quiberon Bay, late on the evening of 14

Feb. 1778, in the Ranger, he received the first formal recognition ever given by a foreign fleet to the United States in a salute to the American flag. As it was after sunset when the salutes were exchanged, in order that there should be no mistake about it, the next morn¬

ing, 15 February, Jones transferred his flag to the Independence, a small privateer, and de¬

liberately sailed through La Motte Piquet's fleet of battleships, saluting and receiving salutes again.

ˆ In April 1778, still on the Ranger, he left Brest on a cruise in British waters, which took him around Ireland. During this cruise he made daring but abortive attempts to burn the shipping at Whitehaven, and to capture the Earl of Selkirk at Saint Mary's Isle. On the evening of 24 April, off Carrickfergus, he fought the British sloop-of-war Drake, of equal force and larger crew, to a standstill in an hour and five minutes. When the Drake struck her flag, her rigging, sails and spars were cut to pieces. She had 42 killed and wounded- —more than one-fifth of her crew — and was completely helpless. The Ranger lost 2 killed and 6 wounded.

In 1779 Jones hoisted his flag on the Due de Duras, a condemned East Indiaman, which would have been broken up had he not turned her into a makeshift frigate by mounting 40

guns in her batteries — 14 12-pounders, 20

nines and 6 eighteens. This, in honor of Franklin, he renamed the Bon Homme Richard.

Accompanied by the fine little American-built frigate Alliance, 32, commanded by Pierre Landais, an incompetent and unbalanced French naval officer in the American service, the French corvette Pallas, 30, Captain de Cot-

tineau, with the brig Vengeance, 12, and the cutter Cerf, 16, Jones cruised around England and Scotland, taking many valuable prizes and striking terror all along the shore, in spite of constant mutiny and insubordination among the ships, officers and men of his heterogeneous squadron.

On the evening of 23 September, off Flam-

borough Head, he fell iq with the valuable Baltic convoy. He was accompanied at the time only by the Alliance and the Pallas. The Baltic convoy was protected by the Serapis and the Scarborough. The Serapis was a brand-

new double-banked frigate of 800 tons, carrying 20 18-pounders, 20 nines and 10 sixes. Inas¬

much as the 18-pounders on the Richard burst and were abandoned after the first fire, the Serapis could and did discharge nearly twice as many pounds' weight of broadsides as the Rich ard — say 300 pounds to 175. The Pallas grapnled with the Scarborough — a more equal match —and Jones attacked the Serapis, which was not unwilling — quite the contrary — for the fight.

Ihe battle was one of the most memorable and desperate ever fought upon the ocean. The Richard was riddled like a sieve. Her rotten sides were literally blown out to starboard and port by the heavy batteries of the Serapis.

Jones had several hundred English prisoners on board. The master-at-arms released them, but with great readiness and presence of mind Jones, who was brilliantly supported by Rich¬

ard Dale, his first lieutenant, sent them to the pumps while he continued to fight the English frigate, his own ship kept afloat by their efforts.

Captain Pearson of the Serapis was a brave man, but no match for the indomitable person¬

ality of the American commander. After sev¬

eral hours of such fighting as had scarcely been seen before on the narrow seas, he struck his flag. The Alliance, commanded by a jealous and _ incapable Frenchman, had contributed nothing to Jones' success. Indeed, she had twice deliberately poured her broadsides into the Richard in spite of frequent warning. The American vessel was so wrecked alow and aloft that she sank alongside, and Jones had to trans¬

fer the survivors of his crew to the English frigate. The aggregate of the two crews was nearly 700, of which about 350 were killed or wounded. The Scarborough was captured by the Pallas after a smart action.

Jones took his prizes into the Texel, when, after showing himself as vigorous and able in statecraft in maintaining American honor in diplomatic intrigues as he was at sea in battle, he was forced to turn over the Serapis and Scarborough to France.

The poverty of America did not permit Jones to get to sea in adequate ships thereafter, although he subsequently commanded succes¬

sively the Alliance and the Ariel, a small sloop-

of-war, in which he caused the British letter-

of-marque Triumph to strike her flag after a brief action, from which she escaped by a clever ruse, he performed no other conspicuous service.

After the Revolution he took service under Catherine of Russia, carefully reserving his American citizenship. In her service, in June and July 1788, he fought four brilliant actions in the Black Sea, in which he had to contend with the usual discouragement of indifferent personnel and wretched material, and in which he displayed all his old-time qualities, winning his usual successes, too.

Worn out in unrequited service, disgusted with Russian court intrigues of which he was the victim, resentful of the infamous Potem¬

kin's brutal attempts at coercion, he asked leave of absence from Catherine's service and went to Paris, where in the companionship of his friends and in the society of the beautiful Aimee de Telison, the one woman he loved, he lived two years, and died of dropsy on 18 July 1792, at the age of 45.

Besides the memory of his battles, Paul Jones left a collection of immortal sayings, which are the heritage of the American navy and the admiration of brave men the world over.

"I do not wish to have command of any ship that does not sail fast, for I intend to go in harm's way!"

"I have ever looked out for the honor of the American flag."

"I can never renounce the glorious title of a citizen of the United States."

Last, but not least, the curt phrase which comes ringing through the centuries like a trumpet call to battle ; the words with which he replied to the demand of the astonished Pear¬

son, who saw the enemy's ship beaten to a pulp, and wondered why he did not yield : "I have not yet begun to fight !"

Never in his long career did Jones have a decent ship or a respectable crew. His ma¬

terials were always of the very poorest. His officers, with the exception of Richard Dale, were but little to boast of. What he accom¬

plished he accomplished by the exercise of his own indomitable will, his serene courage, his matchless skill as a sailor and his devotion to the cause he had espoused. After his death, among his papers, the following little memo¬

randum of his services, written in his own hand, was found:

In 1775, J. Paul Jones armed and embarked in the first American ship of war. In the Revolution he had 23 battles a j solemn rencontres by sea; made 7 descents in Britain and her colonies; took of her navy two ships of equal, and two of superior force, many store-ships, and others; con¬

strained her to fortify her ports; suffer the Irish volunteers; desist from her cruel burnings in America, and exchange, as prisoners of war, the American citizens taken on the ocean, and cast into prisons of England, as “traitors, pirates, and felons! ’

Paul Jones was accused of being a pirate.

The charge was a long time dying, but it is to-day generally withdrawn. His status was clear and unequivocal. He was a regularly commissioned officer in the navy.

In person Jones was a small, slender, well-

made man, about five feet seven inches high.

His complexion was dark, his features were regular and his eyes black and brilliant. He had acquired a charming manner, especially with women, and not a little education and polish in his varied career. He wrote and spoke fluently, and, like Nelson, sometimes amused himself by making, indifferent verse. His chief fault was his vanity. In morals he was rather above the custom of the time and the society in which he mingled. He had one child by Aimee de Teli-

son, which died in infancy.

As a strategist, tactician and fighter he stands high among naval captains. Louis XVI conferred on him the Order of Military Merit and

presented him with a magnificent sword; the Empress Catherine appointed him a rear-

admiral and created him a knight of Sainte Anne and Congress formally thanked him and awarded him a gold medal for his services. He vyas accorded the honor of a public funeral by the French Assembly, and was buried in a Protestant cemetery at the corner of the Rue de la Grange aux Belles and the Rue des Ecluses Saint Martin, in Paris. In the spring of 1905, through the efforts of Gen. Horace Porter, American Ambassador to France, his remains were discovered and identified ' and brought to America in the armored cruiser Brooklyn, flagship of Rear-Adm. Charles D.

Sigsbee's accompanying squadron. They are in¬

terred at the United States Naval Academy at Annapolis, Md., awaiting the completion of a suitable resting place for them.

There is one mystery connected with Jones'

life which has never been cleared up. No one knows why John Paul assumed the name Jones.

There have been two attempts at explanation: one that he took it in testamentary succession to his brother, William Paul, who had taken the name Jones to inherit property from one William Jones, a Virginia planter. This is now disproved, and the prevailing theory is that the name was assumed by John Paul out of respect and affection for the Jones family of North Carolina, from whom he had received much kindness.

Bibliography.— Barnes, J. S., 'Logs of the Serapis, Alliance, Ariel, under the Command of John Paul Jones 1779-80) (New York 1911); Crawford, R. M., (The Sailor whom England Feared* (London 1913) ; Fanning, Nathaniel, 'Fanning's Narrative, the Memoirs of Nathan¬

iel Fanning of the American Navy 1778— 83) (ib. 1913) ; Tooker, L. F,, 'John Paul Jones) (New York 1916) ; Brady, C. T., (Commodore Paul Jones' (New York 1900) ; Buell, 'John Paul Jones, the Founder of the American Navy* ; Hapgood, 'Paul Tones' (Boston 1901); Laughton, J. K., 'Studies in Naval History'

(New York 1887) ; Taylor, Janette, 'Life and Battles of John Paul Jones' (Boston 1855).

Cyrus Townsend Brady.

JONES, John Percival, American politician: b. Herefordshire, England, 1830; d. 1912. His Parents brought him to the United States in 1831 and settled in northern Ohio. He was edu¬

cated in the schools of Cleveland and in the early days of California gold-mining he jour¬

neyed across the Rockies to that State, where he acquired several mining interests' and was successful as an operator. He was for a time sheriff of Tuolumne County and in 1863-67 was a member of the State senate. In the latter year he removed to Nevada, where he became a proprietor of the Crown Point silver mine, through which he realized a fortune. He be¬

came powerful in State politics through his in¬

fluence with the miners. He was elected to the United States Senate from Nevada in 1873, was re-elected as a Republican in 1879, 1885 and • ri ^ ^ Silverite in 1897. He was an influential member of the Senate committees on Post Roads and on Mines and Mining, in which field his experience was invaluable. After 1875

he stood forth as a champion of bimetallism and supported W. J. Bryan in 1896. He re¬

turned to the Republican fold in 1900, but still held to his free-silver coinage doctrine and re¬

tired in 1903.

JUNES, John William, American clergy-

man and author: b. Louisa, Va., 25 Sept. 1836; d. Columbus, Ga., 17 March 1909. He was graduated from the University of Virginia in 1859 and from the Southern Baptist Theological Seminary, and during the war served as private and then chaplain in the Confederate army.

He was paster of a Baptist church in Lexing-

ton Va. 1865-71, and chaplain of Washington College during Lee's presidency, and since the last-named date was successively agent of vari¬

es Southern institutions, chaplain of the University of Virginia and pastor of several churches. Besides editing 14 volumes of 'South¬

ern Historical Papers' he published 'Personal Reminiscences, Anecdotes and Letters of R E

Lee> (1874) 'Christ jn the Camp, or Religion m Lees Army'; 'Memorial Volume of Jeffer¬

son Davis'; 'History of the Unites States'

etc. '

JONES, Leonard Augustus, American

jurist: b. Templeton, Mass., 13 Jan. 1832; d.

1909. He was graduated from Harvard in 1855

and from Harvard Law School in 1858. He -was admitted to the Suffolk bar in 1858 and practised until 1874 when he became associate editor (1874-1904) and later editor (1904-07) of the American Law Review. Among his many legal works are (Law of Mortgages and Real Property5 (6th ed., 1904) ; (Law of Mort¬

gages of Personal Property) (5th ed., 1908) ; 'Law of Easements> (1898) ; (Index to Legal Periodical Literature> (2 vols., 1889) ; 'Legal Forms5 (6th ed., rev., 1909) ; 'Real Property) (2 vols., 1896) ; 'Collateral Securities and Pledges) (3d ed., 1912) ; 'Corporate Bonds and Mortgages5 (3d ed., 1907) ; 'Landlord and Ten¬

ant (1906). He was appointed judge of the Court of Land Registrations in 1898.

JONES, Lewis Ralph, American botanist : b. Brandon, Wis., 5 Dec. 1864. In 1883-86 he studied at Ripon College ; in 1889 at the Uni¬

versity of Michigan. From 1889 to 1910 he was professor of botany at the University of Ver¬

mont and botanist of the Vermont Experiment Station. Since 1 Feb. 1910 he has been pro¬

fessor of plant pathology at the University of Wisconsin. He carried out investigations in the laboratory of the Bureau of Plant Industry, Washington, in 1904, and is a collaborator of the Department of

Agriculture. He is a member of many botanical societies and is the author of botanical reports, bulletins, etc., in scientific magazines. He is editor of the American Jour¬

nal of Botany and of the bacteriological terms of Webster's 'New International Dictionary.5

JONES, Sir Lyman Melvin, Canadian capi¬

talist : b. York County, Ontario, 21 Sept. 1843; d. 15 April 1917. As a youth he entered the employment of A. Harris, Son & Co., agricul¬

tural implement makers, Brantford ; on the formation of the Massey-Harris Company, Toronto, in 1891, became manager of the con¬

solidated companies ; and in 1902 president and general manager. He took a considerable in¬

terest in public affairs, and while resident in Winnipeg was mayor of the city (1887-88) and treasurer in the Greenway provincial govern¬

ment 1888-89. He was a Liberal in politics and was called to the senate in 1901, but opposed his party during the reciprocity issue in 1911, and in that year he was knighted.

JONES, Owen, English architect: b. Lon¬

don, 15 Feb. 1809; d. there, 19 April 1874. In 1834 he traveled in Spain and studied the art monuments of Granada, after which he visited Egypt. On returning to England he published his great work on the Alhambra. In 1851 he undertook the decoration of the Crystal Palace at the first Universal Exhibition. He also fur¬

nished the various courts of different architec¬

ture, notably the "Alhambra Court.55 His re¬

searches and publications had a wonderful in¬

fluence on the decorative art of England, espe¬

cially his 'Grammar of Ornament, 5 in which he illustrated the decorative devices of all nations.

He published 'Plans, Elevations, Sections and Details of the Alhambra) (1845).

JONES, Peter, American Indian mission¬

ary: b. 1 Jan. 1802; d. 29 June 1856. His Indian name was Kahkewaquonaby ; his father was a white man of Welsh descent named Augustus Jones, who maintained the closest friendship with Brant during the latter's life. Peter's mother was Tuhbenahneeguay, daughter of a chief of the Missisauga on Credit River at the extreme western end of Lake Ontario. Peter remained with his tribe, following their cus¬

toms and accompanying them on their excur¬

sions, until his 16th year, when his father, who was then a government surveyor, had him bap¬

tized by an English Episcopal minister. Hav¬

ing professed religion at a camp-meeting held near Ancaster, Ontario, and taken an active part in the religious exercises of the Wesleyan Methodist Church, Peter was sent on a mission¬

ary tour, in 1827, to Lake Simcoe and other points in western Ontario, although not yet or¬

dained. He had by this time entered on his lit¬

erary work, as in this year was published a hymnbook translated by him into Chippewa.

He was constituted a Wesleyan Methodist min¬

ister at the Toronto Conference of 1833. The remainder of his life was devoted chiefly to mis¬

sionary work among the Missisauga and Chip¬

pewa, and to some extent among the Iroquois.

His position as a Christian pastor and ruling chief of his tribe gave him great influence, not only among his own people, but among all the Chippewa tribes. He visited England and New York and made repeated journeys in behalf of his people. It was largely through his efforts that the titles of the Credit Indians to their lands were perfected. A monument was erected to his memory, in 1887, at Brantford. In addi¬

tion to the above-mentioned volume of hymns, Jones was author of

‘An Ojibway Spelling Book) (1828) ; translation of part of the New Testament (1829) ; ‘The First Book of Moses) (1835). He also wrote ‘Life and Journals of Kah-ke-wa-quo-na-by (Rev. Peter Jones)5

(1860) ; and ‘History of the Ojibway Indians5

(1861). Consult Pilling, ‘Bibliography Algonq.

Lang. Bull. B.A.E.5 (1891).

JONES, Samuel Porter, commonly known

as Sam Jones, American Methodist revival preacher : b. Chambers County, Ala., 16 Oct.

1847; d. 15 Oct. 1906. He was admitted to the Georgia bar in 1869 and practised successfully for a time. His drinking habits put an end to his career as a lawyer. Becoming converted in 1872 he was admitted to the ministry of the Methodist Church South, and afterward de¬

voted himself to evangelistic work, his marked eccentricities of speech and manner probably contributing somewhat to his popularity. His works include ‘Famous Stories of Sam P.

Jones5 (1908) ; ‘Popular Lectures of Sam P.

Jones5 (1909) ; ‘Sam Jones’s Revival Sermons5

(1912) ; ‘Lightning Flashes and Thunderbolts5

(1912).

JONES, Thomas, American lawyer : b.

Fort Neck, Long Island, 30 April 1731 ; d. Hod-

desdon, England, 25 July 1792. In 1750 he was graduated at Yale and in 1755 was licensed to practise law. In 1757 he was appointed clerk of Queens County (N. Y.) courts and for many years was attorney for the governors of King’s College (now Columbia University). In 1769

he became recorder of New York city, retain¬

ing that office until 1773, when he was made judge of the Supreme Court in place of his father, serving until the close of the Revolu¬

tionary War, and held the last court under the Crown at White Plains

in April 1776. On 27

June 1776 he was arrested at the instance of the New York Provincial Congress for refusing to 202

obey the summons of the committee to show why he “should be considered a friend of the American cause.55 He was paroled but was re¬

arrested on 1 1 August, was detained a prisoner in Connecticut until December when he Wets paroled a second time. He was carried off a second time to Connecticut in 1779 and in April 1780 was exchanged for Gen. Gold S. Silliman.

He went to England in 1781. The negotiations for peace in 1782 prevented his return, as he was included in the New York act of attainder, by which his life was ipso facto forfeited and his estate confiscated. Jones was the author of History of New York during the Revolution¬

ary War5 (latest ed., 1879).

Thomas ap Catesby, American

naval officer: b. Virginia, 1787; d. 1858. Hav¬

ing entered the navy in 1805, he was employed in suppressing piracy, smuggling and the slave trade m the Gulf, saw service in the latter part of the War of 1812 when with a squadron of five gunboats he tried to bar the passage across Lake Borgne to Vice-Admiral Cochrane and his fleet. He inflicted great losses on the English, was himself seriously wounded before his ves¬

sels were captured. In 1826 he was sent to the Hawaiian Islands to settle the difficulties aris¬

ing through the efforts of a local party to make the islands a British dependency. Jones se¬

cured the payment of debts claimed by Amer¬

ican citizens and presided over a meeting of the factions and denied publicly the assertion of the British consul thst the islands were a, British dependency. While in command of the Pacific squadron in

1842 he heard that war had been declared between Mexico and the United States and fearing from the actions of the British man-of-war Dublin that that government in¬

tended the annexation of California, he landed cit Monterey and took possession in the name of the United States. Because of this impru¬

dence he was removed temporarily from his command.

JONES, Walter, American physiological

chemist: b. Baltimore, Md., 28 April 1865 He g;a£uated at Johns Hopkins in 1888. In 1891-92 he was professor of chemistry at Wit¬

tenberg College, Springfield, Ohio; in 1892-95

professor of analytical chemistry at Purdue University; in 1895-98 assistant in physiological chemistry at Johns Hopkins; associate profes¬

sor there in 1898-1908 and professor since 1908.

During the past 25 years he has given special attention to original investigations" in the field of physiological chemistry, the results of which have been published through contributions to American, German and English technical jour¬

nals. He has published (Nucleic Acids5 (1914).

JONES, Wesley Livsey, American legis¬

lator : b. near Bethany, Ill., 9 Oct. 1863. In 1886

he was graduated at the Southern Illinois Col¬

lege. In the same year he was admitted to the bar. _ He moved to the Territory of Washing-

!oonˆSt before its admission to Statehood, in 1889, and located at North Yakima, where he bved until 1917, when he removed to Seattle.

From 1899 to 1909 he was member of Congress-

at-large from Washington. In 1909 he was elected United States senator and was re¬

elected in 1914 and in 1920.

JONES, Sir William, English lawver and Oriental scholar: b. London, 28 Sept. 1746; d.

Calcutta, 27 April 1794. He was educated at Harrow and Oxford and early acquired a repu¬

tation as a linguist, Hebrew, Persian, Arabic, and even Chinese, besides German, Italian, French, Spanish and Portuguese being among his acquisitions. In 1770 his translation (in French) of the life of Nadir Shah from the Persian appeared; in 1771 his grammar of the Persian language; in 1774 his (Poeseos Asiaticse Commentariorum Libri Sex,5 and in 1783 his translation of the seven Arabic poems known as . e Moallakat. 5 He had been called to the bar ni 1774 and in 1783 was nominated judge in the Supreme Court of Judicature, Bengal, and knighted. Here he did much for the further¬

ance ol Oriental studies, being one of the first Europeans to study Sanskrit, founding the Royal Asiatic Society, in 1784 translating the Sakuntala, the Ordinances of Mffinu, besides tales, poems, extracts from the Vedas,' etc. He also undertook a digest of the Hindu' and Mo¬

hammedan laws, which he did not, however live to complete.

jv-/rMn,a, william, American anthropologist : b. Indian Territory, 1871 ; d. 1909. One of his great grandfathers was Wa-shi-ho-wa, a Fox chief. Jones was brought up by his grand¬

mother on the Fox and Sauk Reservation. He was educated at Hampton Institute, Phillips An¬

dover Academy and Harvard University, being graduated at the last-named institution in 1900

brom Columbia he obtained the degree of Ph.D.

He was employed by the American Museum of Natural History, New York, to collect ethnolo¬

gical specimens of the Sauk, Fox and Ojibwa tribes. He was a noted Indian linguist. He lost his life in the Philippines in an attack by the natives. He published (The Algonkin Man-

ltou5; (Kickapoo Texts5; (Fox Texts5; (Some /S?JleLof Algonquian Word-Formation5

°T>.’ ‘Mortuary Observances and the Adop¬

tion Rites of the Algonquin Foxes of Iowa.5

JONESBORO, jonz’bur-o, Ark., city,

county-seat of Craighead County, on the Saint Louis and San Francisco, the Saint Louis Southwestern and the Jonesboro, Lake City and Eastern railroads, about 120 miles northeast of Little Rock. It was first settled in 1870, al

t lough some settlements had been made earlier ?n Jn jhe vicinity. It was incorporated m 1882. It is situated in an agricultural and lumbering region and the railroad facilities make it the trade centre for quite an extent of country. The chief manufactures are flour lumber, cotton oil, machines, staves and head¬

ings, boxes and wagons. In addition to the manufactures there is considerable trade in grain, live-stock and some dairy products. The government is vested in a mayor and council elected every two years. The city owns the (1920) 9384ˆ and SCWerage systems- Pop.

JONESBORO, Ga., city, county-seat of

Clayton County, on the Central of Georgia Kailroad, about 16 miles south of Atlanta. It is situated in a fertile agricultural region, but Us nearness to Atlanta and lack of water power are hindrances to manufacturing. Its chief trade is in fertilizers, cotton and farm prod¬

ucts. At this point, August 1864, was fought a hotly-contested battle with General Howard of bnerman s army, m command of the Federal

troops, and General Hardee of Hood’s army, in command of the Confederates. Pop. 970. See Jonesboro, Battle of.

JONESBORO, Battle of and Fall of At¬

lanta. After the battle of Ezra Church (q.v.), 28 July 1864, General Sherman, unable fully to invest Atlanta, drew the Fourteenth corps and Schofield’s Army of the Ohio from the left and extended his lines on the right nearly to East Point, about six miles below Atlanta, the junc¬

tion of the two railroads leading from the south, upon which the city and Hood's army de¬

pended for supplies. Hood made a correspond¬

ing movement to cover the roads, meeting Sher¬

man's advance with strong, well-entrenched lines, and, 6 August, severely handling two of Schofield's brigades that had crossed Utoy Creek, killing and wounding over 300 men and taking two colors. To compel Sherman to re¬

linquish his movement and raise the siege of Atlanta, Hood, 10 August, sent Wheeler with about 5,000 cavalry to operate upon his line of communication with Nashville. Wheeler moved promptly, struck and destroyed the railroad near Marietta, Calhoun, Adairsville and Dalton, captured over 1,000 head of beef-cattle and other supplies, and, after demonstrating on Dalton and Resaca, was driven into East Tennessee. Sher¬

man had issued an order, 16 August, for a gen¬

eral movement on the 18th upon the West Point and Macon railroads, for the purpose of forcing Hood from Atlanta, but hearing of Wheeler's raid, he suspended the order and directed Gen¬

eral Kilpatrick, with 5,000 cavalry, to move on the night of the 18th against the West Point and Macon roads and destroy them completely.

Kilpatrick started from near Sandtown, crossed the West Point road at Fairburn and struck the Macon road a short distance north of Jonesboro, some 26 miles from Atlanta, where he encountered Ross' brigade of cavalry, which was driven through Jonesboro. But little of the railroad had been destroyed when Jackson's brigade of cavalry and an infantry brigade, coming up from the south, compelled Kilpatrick to retreat. Making a circuit, he again struck the railroad at Lovejoy's, about six miles south of Jonesboro, and encountered a Confederate force, through which he cut his way and reached Decatur, near Atlanta, on the 22d. As Sherman was satisfied that Kilpatrick had not greatly damaged the railroad, he renewed his order for the movement of the whole army. On the night of the 25th the siege of Atlanta was raised. The sick and wounded, spare artillery and surplus transportation were sent back to the Chatta¬

hoochee bridge ; Stanley's Fourth corps drew out from the left and moved to the right, closing up with the Fourteenth near Utoy, and the

Twentieth corps fell back to an entrenched posi¬

tion covering the Chattahoochee bridge and the hospitals. On the night of the 26th the Army of the Tennessee (General Howard) drew out, rapidly made a wide circuit and came up on the right of the Army of the Cumberland, under General Thomas, along Utoy Creek, facing south. The Army of the Ohio remained in position, now on the extreme left. On the 28th, making a general left wheel, pivoting on Scho¬

field's army, both Thomas and Howard reached the West Point road extending from East Point to Red Oak and Fairburn, Schofield closing in upon the left of Thomas, but a short distance from the Confederate works covering the junc¬

tion of the road at East Point. The next day was devoted to the railroad, of which nearly 13 miles was destroyed, and on the 30th the entire army moved eastward for the Macon Rail¬

road. Schofield, on the left, approached it near Rough and Ready, and presented a bold front toward East Point; Thomas, in the centre, reached Couch's, on the Fayetteville and De¬

catur road, with but little opposition ; and How¬

ard, on the right, driving before him the enemy's cavalry, saved the bridge over Flint River after a sharp engagement; then, crossing part of his command, halted at night within half a mile of Jonesboro. On the morning of the 31st How¬

ard, finding himself in the presence of a large force, disposed the Army of the Tennessee for battle and entrenched, Logan's Fifteenth corps on the left, Ransom's Sixteenth corps on the right and Blair's Seventeenth corps in rear of Logan's left. When Sherman began his move¬

ment on the night of the 25th S. D. Lee's corps of Hood's army covered the railroad, from near Atlanta to a place nearly a mile south of East Point. Hardee's co.rps was on Lee's left, while Hood held Atlanta with Stewart's corps and the Georgia militia. Hood had been deceived ; he knew of Sherman's earlier movement, but mis¬

interpreted it as preliminary to a retreat across the Chattahoochee ; but when undeceived on the 30th, he ordered Hardee with his own corps and Lee's to move rapidly to Jonesboro and crush Howard on the morning of the 31st.

Hardee, who was near Rough and Ready, four miles below East Point, began moving about 4 p.m., followed later by Lee, and at noon of the 31st both were in Howard's front. At 3 p.m.

Hardee attacked with Lee's corps and part of his own, under Cleburne, with the expectation of driving Howard into the river, and for two hours the fighting was severe, but Hardee was repulsed. Lee, who, on the Confederate side, bore the brunt of the fight, says : ((The attack was a feeble one and a failure, with a loss to my corps of about 1,300 men killed and wounded.® Hardee's entire loss was about 1,700.

The Union loss was 179 killed and wounded, al¬

most entirely of Logan's corps.

When. Sherman heard the noise of this bat¬

tle he was with Thomas, who, with Schofield, had reached and was destroying the road from Rough and Ready southward. Thomas and

Schofield were marched to the assistance of Howard, and Kilpatrick was sent down the western bankˆ of the Flint to strike the road south of Jonesboro. Davis' Fourteenth corps joined Howard's left at noon of 1 September, relieving Blair, who was disposed to support Kilpatrick. Lee's corps had gone, but Hardee's was still in position and entrenched, covering Jonesboro on the north. At 4 p.m. Davis charged Hardee's works and, after a hard fight, carried parts of them, capturing General Govan and the greater part of his brigade and two batteries of four guns each. Stanley and Scho¬

field reached the field too late to take part in the engagement. During the night Hardee retreated to Lovejoy's Station, and next morning Sherman started in pursuit. The Union loss 1 September was 223 killed, 946 wounded and 105 missing.

The Confederate loss is not fully known; of the three divisions engaged Cleburne's sustained a loss of 55 killed, 197 wounded and 659 missing.

There is no return of losses in the other two divisions.

The result of the battle of Jonesboro was the fall of Atlanta. Six hours before Hood heard of the result of Hardee's attack 31 August, he sent an order to Lee to return in the direction of Atlanta, to make a movement on Sherman's flank or to cover the evacuation of the city.

Lee received the order at midnight, and was halted next morning about six miles from At¬

lanta. Meanwhile Hood had heard of the result of Hardee's attack; its <(failure necessitated the evacuation of Atlanta. Lee was ordered to join Hardee, which he did on the 2d, and at 5 p.m. of the 1st Hood marched out of the city with Stewart's corps on the McDonough road ; the Georgia militia was sent to Covington, and at night the rear-guard blew up some abandoned ammunition trains. Slocum's Twentieth corps entered the city on the morning of the 2d.

Sherman received the news on the 4th, and, turning his back on the Confederates at Love-

joy's, marched his army to East Point and Atlanta.

The campaign for Atlanta, which began 6

May 1864, was marked by brilliant flanking movements on both sides, by almost uninter¬

rupted skirmishing, growing at times to the dimensions, of a battle, and by many heavy engagements, most, of them of a desperate char¬

acter. The Union losses in the entire campaign were 4,423 killed, 22,822 wounded and 4,442

missing, a- grand aggregate of 31,687. The Con¬

federate losses were 3,044 killed and 18,952

wounded. Add to this the number of prisoners captured, 12,938, makes a grand aggregate of 34,979. Consult (Official Records) (Vol.

XXXVIII) ; Cox, J. D., (Atlanta) (New York 1882) ; Van Horne, J. B., 'History of the Army of the Cumberland) (Vol. II, Cincinnati 1875) ; id., 'Life of Gen. George H. Thomas) (New York 1882) ; Bowman, S. M., (Sherman and His Campaigns) (Cincinnati 1865) ; Sherman, W. T., (Personal Memoirs) (New York 1875) ; Cen¬

tury Company, (Battles and Leaders of the Civil War) (New York

1887-88).

JONESVILLE, jonz'vil, Va., the scene of a Civil War action. On 1 Jan. 1864 Major Beeres, who had been operating with a battalion of tthe 16th Illinois Cavalry and a battery, near Cumberland Gap, attacked and drove a small Confederate cavalry force from Jonesville and occupied the place. On the morning of the 3d he was attacked by Gen. W. E. Jones' cavalry brigade and, after a spirited resistance, con¬

tinuing nearly the entire day, in which he lost 10 killed and over 40 wounded, was finally sur¬

rounded and obliged to surrender. The Con¬

federates reported that he surrendered 383 offi¬

cers and men, 45 of whom were wounded, 3 pieces of artillery and 27 wagons. The Con¬

federate loss was about 30 killed and wounded.

Consult (Official Records,) (Vol. XXXII).

JONGE, yong'e, Johannes Cornelius de,

Dutch historian: b. Zierikzee, 9 March 1793; d. Zeeland, 11 June 1853. He was educated at Leyden and in 1831 succeeded Van Wijn, whose assistant he had been, as keeper of the Dutch archives. The most important of his historical works are ' Verhandeling over dem oorsprong der Hoeksche en Kabeljaauwsche twisten) (1817); cHet derde Staat in de Statenverga-

deringen) (1824) ; and (Geschiedenis van het Nederlandsche Zeewezen) (1833-48; 2d ed., 1858). He also published a biography of Van Wijn in 1832.

JONGKIND, yong'kint, Johann Barthold,

Dutch landscape painter : b. Latrop, near Rot¬

terdam, 1819; d. 1891. He received most of his instruction in art from Isabey of Paris, where he became acquainted with Zola, Corot and others of the elite of that period. His life was one of great privations and misery and during the last 30 years of his existence he was insane.

He was equally proficient in oils, water color, etching, lithography or pencil. In etching he was_ one of the great lights of the century.

He is well represented in the galleries of Am¬

sterdam, in the Louvre and at Brussels. Con¬

sult Frantz, (Johann Barthold Jongkind) (in International Studio, Vol. XXXVI, New York 1908-09).

JONGLEUR DE NOTRE DAME, zhon'-

gler de no'tr'dam, Le, 'The Juggler of Our Lady,) an operatic miracle play by Jules Mas¬

senet, libretto by M. Lena ; first produced at Monte Carlo on 18 Feb. 1902; in New York, 27 Nov. 1908. The story is based on a play by Anatole France entitled Etui de Nacre, 'The Mother-of-Pearl Box.) The scene is laid in Cluny ; time, Middle Ages. A poor young street mountebank, Jean, amuses the villagers with his tricks in front of the monastery.

The prior of the abbey threatens him with eternal punishment for his ungodly trade and advises him to enter the monastery, which the boy agrees to do. Anxious to do something to please the Holy Virgin, he bemoans his inability to the cook, Boniface, who tells him a fable, "The Legend of the Sage-Brush)) and assures him that every sincere offering meets with divine acceptance. In the final scene the young novitiate stands before the altar in the chapel, having doffed his monk's garb and re¬

sumed that of his old trade. Standing before the image oi the Virgin he performs his street tricks and is surprised in this occupation by the entrance of the prior and the monks, hor¬

rified at the act of sacrilege. They attempt to seize and throw him out when the figure of the Virgin assumes life and blesses him.

He falls back dying and happy.

JONKOPING, yon'cho-ping, Sweden, a

town located at the southern end of Lake Wet¬

ter, about 170 miles southwest of Stockholm.

The town is beautifullv situated in a valley be¬

tween Lake Wetter and two smaller lakes' and is backed by pine-clad hills. The chief build¬

ing is the church of Saint Christina. The manufacturing industries of the town are of considerable importance; the largest single in¬

dustry is match-making, the safety-matches made here being used throughout the world.

There are also manufactures of machinery and arms, perfumes, cigars, snuff, paper and wood-

pulp, etc. The maritime trade was greatly in¬

creased by the completion of the Gdta Canal in 1832, connecting the Baltic and North seas (Goteborg with Stockholm), thus making Jbn-

koping a seaport. The town's record goes back to legendary times; it is named in history in the early part of the 13th century; and in 1284 received its town charter. In 1357, 1439

and 1599 Parliament met here; in 1448 occurred the conference of the Swedish and Danish plen¬

ipotentiaries ; in 1612 the town was destroyed jONQUIERES – JONSON

by order of GustLiViis Adolphus to prevent it from falling into the hands of the Danes, but -was soon afterward rebuilt; and in 1809 a peace treaty was signed here between Denmark and Sweden. Pop. 26,969.

JONQUIERES, zhon'kyar, Canada, town

in Chicoutimi County, Quebec, 10 miles east of Chicoutimi, on the Quebec and Lake Saint John Railway. It contains sash and door factories, planing mills, pulp and paper factories, found¬

ries and furniture factory. Pop. 2,354.

JONQUIL, jon'kwil. See Narcissus.

JONSON, Ben or Benjamin, English poet

and dramatist, contemporary and friend of Shakespeare: b. 1573; d. 6 Aug. 1637. Accord¬

ing to his conversations with Drummond, his father was a gentleman,

who lost his estate under Queen Mary and then turned minister.

Benjamin was born after his father's death, and his mother afterward married a bricklayer, an occupation in which Ben Jonson was en¬

gaged for some time, and with which he was frequently taunted by his enemies. He was educated at Westminster School, under the in¬

struction of William Camden, whose scholarship and friendship he afterward praised in the high¬

est terms. He proceeded to Cambridge but remained there for only a short time, later receiving the degree of master of arts from both universities <(by their favour, not his studies.® After his return to London, he seems to have worked for a time at his father's trade, then to have served as a soldier in the Low Countries, after which he returned to England, married, and by 1595, became an actor and playwright.

In 1598, his famous comedy (Every Man in His Humour) was acted by the Lord Chamber¬

lain's servants (Shakespeare's company). This play marks the full beginning of his dramatic career; it is the first of his long series of humoristic comedies, and is the first outcome of his life-long effort to infuse into the drama critical consciousness and painstaking art. In the same year Jonson quarreled with a well-

known actor, Gabriel Spenser, and killed him in a duel on 22 September. Jonson escaped serious penalty by pleading benefit of clergy; and in the following year his (Every Man Out of His Humour) was acted before the queen.

Jonson's quarrelsome temper was apparently little abated by his recent imprisonment, for his (Cynthia's Revels, > acted 1600, satirized Marston and Dekker, and (The Poetaster, >

1601, provoked by retorts actual or intended, continued the attack in unmistakable terms.

Dekker retorted in the same year with his (Satironmastix, or the Untrussing of the Hu¬

mourous PoetP But this ((war of the theatres®

shortly subsided.

The accession of James I in 1603 brought a great improvement in Jonson's circumstances through the patronage of the court, exhibited in various employments, honors and eventually a pension. Henceforth he counted among his friends and patrons the most distinguished men of the time, and he was able to devote his pro¬

digious energies to scholarship and poetry with¬

out leaning too heavily upon the stage for pecuniary aid. His immediate access to royal favor seems to have been maintained by his success in writing masks. These musical and spectacular entertainments assumed an elabo¬

rate form at the court of James, and Jonson at once became the chief literary purveyor to this fashion, a position which he maintained until his quarrels with Inigo Jones and the super¬

sedence of the literary by the scenic elements of these shows put an end to his employment.

The first half of the reign of James was also the time of Jonson's dramatic masterpieces.

His tragedies,

1605, (The Silent Woman, > 1609, (The Alchem¬

ist, > 1610, and Bartholomew Fair,> 1614. Dur¬

ing the same years, Jonson was maintaining many friendships with scholars and poets, with Camden, Selden and Bacon, with Chapman, Beaumont, Fletcher and Shakespeare; and he was becoming the recognized chief of the wits whose gatherings have made the Mermaid Tav¬

ern famous in literature.

Jonson's life however, was by no means free from vicissitude. In 1605 he was impris¬

oned along with Marston and Chapman on ac¬

count of a passage reflecting on the Scotch in (Eastward Hoe.> a play on which they had col¬

laborated. He had become a Roman Catholic in 1598, but after 12 years returned again to the Protestant faith. In 1613 he was in France

as tutor of the son of Sir Walter Raleigh; and in 1618 he made a pedestrian expedition to Scotland. Here he was received with honors and banquets, and entertained for several weeks by the poet, William Drummond, at his seat, Hawthornden. Drummond's notes of his conversations with Jonson furnish us with most interesting and valuable records of Jonson's character and opinions, but it must be remembered that Jonson was talking with great freedom and with no idea of being reported, and that the reports were doubtless colored by the temper and prejudices of the reporter.

Some of Jonson's weaknesses as well as his host's sourness of temper are to be found in Drummond's well-known postscript: ((He is a great lover and praiser of himself ; a con¬

temner and scorner of others; given rather to lose a friend than a jest; jealous of every word and action of those about him (especially after drink, which is one of the elements in which he liveth) ; ... he is passionately kynde and angry; careless either to gain or keep; vindic¬

tive, but, if he be well answered, at himself.®

From 1616 to 1625 Jonson wrote no plays for the public stage but he wrote numerous masks and remained in high favor at court.

After the death of James he seems to have fallen on unprosperous days; his occupation as a writer of masks ceased, and he turned again to the stage. His (Staple of News) was acted in 1625, and (The New Inn,} 1629, the latter proving an utter failure. He had suffered an irreparable loss in the burning of his library which included many manuscripts of his incom-

pleted works as well as a notable collection of books in which he had a scholar's pride. Want and disease added to his troubles, and we have many appeals for aid addressed by him to his noble patrons. Fortunately these met with re¬

sponse and King Charles increased his annuity.

The few plays and entertainments composed at this time give evidence of his failing powers; and give force to the conjecture that the beau¬

tiful pastoral drama, (The Sad Shepherd, > left unfinished at his death, must have been written 206

at a much earlier date. In old age and sick¬

ness, however, Jonson held his place at the head of English men of letters. (The Mermaid) had given place to (The Devil Tavern,5 and the old friends to a set of young disciples who sealed themselves “of the tribe of Ben.® But his liter¬

ary dictatorship was recognized outside of this intimate circle, and contemporary literature abounds in tributes of respect and admiration.

The most famous of these is the ‘brief epitaph carved on the stone that marks his grave in Westminster Abbey: <(0 rare Ben Jonson.®

Jonson’s character is better known to us than that of any of his literary contemporaries.

Combative, arrogant, opinionated, outspoken and generous, he drank deeply, swore freely, learned his Latin thoroughly, wrote his plays carefully, went to prison for his friends and fought every fight to the finish. His failings were due to excess not weakness ; his virtues were full-grown; whatever he did, he did vig¬

orously, ponderously perhaps, but always whole¬

heartedly. To scholarship, to criticism, to poetry and the drama, he brought this vehement positiveness and this whole-hearted laborious¬

ness. His personality is stamped on all his work, hut in the enjoyment of some of its sa¬

lient manifestations, one must not lose sight of the range and power and fineness of his liter¬

ary achievement as a scholar, a critic, a trans¬

lator and a lyric poet as well as a dramatist, nor the great importance of his 40 years of activity in the development of the drama and the history of literature. His non-dramatic work includes an (English Grammar,5 discov¬

eries^ a prose tract treating among other mat¬

ters of literary and dramatic criticism, (The Forest,5 a collection of his epigrams and other poetry, and Bnderwoods,5 another collection of minor poems and translations. His drama¬

tic work comprises masks, tragedies and com¬

edies, three forms that Jonson kept distinct.

His influence upon the drama was in large part that of a critic and a reformer. He began his important work at a time when, through the efforts of Shakespeare, Marlowe, Lyly and others, the popular drama had already attained eminence as a form of literature; and Jonson was ardent to advance and secure this eminence.

In the preceding drama he saw much that was crude and absurd, and from the start he urged an abandonment of the incongruities of the chronicle plays and the romantic comedies, and the adoption of fixed rules and more regular models. In the reliance of the dramatists upon the applause of unlettered audiences, he saw a menace to the highest development of the drama ; hence he constantly advocated the ap¬

peal to the taste of the more judicious through an elevated purpose and a conscientious art.

Recognizing that the English drama had already attained greatness under conditions so different from those of antiquity that they forbade the rigid application of the precedents of the classic drama, he nevertheless believed that improve¬

ment could be secured by intelligent adoption of classic rules and models. He insisted there¬

fore upon the discrimination between tragedy and comedy and the recognition of the pur¬

pose and function of each species according to the precepts of Aristotle, protesting pedantically enough, not only against the incongruities of the old histories but also against such combinations of comedy and mask as Shakespeare's (Tem¬

pest.5 A more coherent construction and the application of the unities of time and place, so far as the English stage would permit, were other articles of his theory which he supported by precept and practice. Still farther, he con¬

tended that characterization should not depend on an impossible plot or a hap-hazard colloca¬

tion of heroism, sentiment and nonsense, but upon a careful representation of certain types as illustrative of human motive, such as the tyrant or the conspirator in tragedy, . or the braggart soldier, the gull or the cheat in com¬

edy. In opposition to the extravagant roman¬

ticism that had prevailed up to 1600, Jonson stood for a comedy that should attempt the realistic portrayal of manners. In dramatic criticism and practice Jonson was consequently at most points on the other side from Shake¬

speare, though he bore splendid testimony to his appreciation of Shakespeare's friendship and genius.

His masks and entertainments, so famous in their day, have little interest now, except as they illustrate the curious literary fashion, or as they exhibit Jonson's charming lyrics. Of the 34 complete, some of the most notable are, (Hymen3ei,5 (The Mask of Queens,5 (The Penates,5 and (The Metamorphosed Gypsies.5

His two tragedies, (Sejanus) and

trating study of historical characters, and to retain as much as possible of classical decorum while conforming in the main to the form of tragedy established by his great Elizabethan predecessors. But his genius found its best field in comedies. Though modeled on the comedies of Plautus and Terence, they fulfil his promise to show an image of his own times, its fads and follies, or "humours® ; and though their plots are constructecf overelaborately, their ar¬

tificiality is redeemed by an abundance of humor. The (Alchemist) with its extraor¬

dinarily skilful structure, and Bartholomew Fair) with its broad and lively presentation of the London of the day are perhaps the greatest English masterpieces of the strict comedy of manners. Jonson's example turned comedy for a while from romantic to realistic, and satir¬

ical themes and treatment ; and the influence was potent at least into the 18th century. In humor and the; delineation of character, Jonson ranks first of English dramatists after Shakespeare.

His plays, excluding masks, are (Every Man in His Humour, 5 (Every Man Out of His Humour,5 (Cynthia's Revels,5 (The Poetaster,5

(Sejanus,5 (Volpone,5 (Epicaene,5 (The Al¬

chemist,5 (Catiline, 5 Bartholomew Fair,5 (The Devil Is An Ass,5 (The Staple of News,5

mer5 (a fragment). See Alchemist, The; Volopone; Drama; English Literature —Elizabethan Drama.

Bibliography.— Jonson edited a folio of his works which appeared in 1616; a second folio in 1640. The standard edition is that of Gif¬

ford, 1816 (9 vols., frequently reprinted). The separate plays have often been reprinted, and recently with extended introductions and notes in (Yale Studies in English.5 For criticism JOPLIN — JORDAN

consult Baskerville, C. R., (English Elements in Jonson s Early Comedy* (University of Texas Bulletin Humamstic Series No. 178, Austin, Tex., 1911) • Birck, Paul, (Literarische Anspie-

lungen in den Werken Ben Jonson V (Strass-

burg 1908), with bibliography; Dryden, John, Bssay on Dramatic Poesy> (London 1668) ; £leag, (A Biographical Chronicle of the English Diama* (ib. 1891) ; Gifford, W., (Memoirs of roˆoJ0ˆ5011-‘ in his (Works> (Vol. I, London ~P > lverr» Mina, influence of Ben Jonson on ern o\1S Y- Comedy, 1598-1642* (Philadelphia 19D) ; Koeppel, (quellen-Studien zu den Dramen Ben Jonsons* (Leipzig 1895); Laing, (ed.), Jonson s Conversations with Drummond*

(London 1842) ; Schelling, F. E.,

(London 1889) ; Symonds, J. A.,

son (ib. 1886) ; Thorndike, A. H., «Ben Jon¬

son (m ˆCambridge History of English Litera¬

te,* Vol. VI, Cambridge 1907-10); Ward, History of English Dramatic Literature*

(London 1899) ; Woodbridge, (Studies in Jon-

son’s Comedy.)

Ashley H. Thorndike,

Professor of English, Columbia University.

JOPLIN, Mo., city and a county-seat of Jasper County, 155 miles south of Kansas City, on the Missouri, Kansas and Texas, the South¬

western Missouri, the Southern Pacific and other railroads. The city contains several note¬

worthy buildings, including the Federal build¬

ing, the Carnegie library, municipal market house, police building, the opera house and the courthouse. It has two business colleges, a high school and several public and parochial schools. Joplin is a distributing centre for a wide agricultural area and has extensive mining interests, being the centre of the zinc and lead iildustries of southwestern. Missouri.

The city's industrial establishments include smelting, white lead and paint works, foundries and machine shops, iron works, wagon and cooperage factories and flour mills. There are three national and four State 'banks and the value of the taxable property is $33,000,000.

The general revenues amount to about $240,000

annually. Joplin adopted the commission form of government in 20 April 1914. The city owns one of the lighting plants. Joplin was settled about 1870 and was incorporated in 1873. Pop. (1920) 29,902.

JOPPA. See Jaffa.

JORAM, or JEHORAM, name of two He¬

brew kings, one of Israel (852-842 b.c.) and the other of Judah (849-842 b.c.). (1) Jehoram, king of Israel, was the second son of Ahab, and succeeded his brother Ahaziah. He was not sincere in his transient repression, of Baal wor¬

ship, and was rebuked by Elisha. He joined with the king of Judah in a war with the Moabites. In his reign Benhadad, king of Da¬

mascus, invaded Israel, and besieged Samaria, but retreated to meet a hostile invasion in his own country. In a battle with Hazael, king of Syria, Jehoram was wounded and retired to Jezreel, where he was slain by Jehu whom Elisha had anointed king over Israel, thus ful¬

filling Elijah's prophecy (1 Kings, xxi, 21-29).

(2) Joram, king of Judah, eldest son and successor of Jehosaphat, regent in 854 on his father s alliance with Ahab against the Assyrians ˆ ' ***» 1 i viii, 16), then king in the 23d year of his father's reign (849), ruling eight years. After his father's death, he slew his six brothers and

other men of influence, and led a life of wickedness. The Edomites re¬

volted, also Libnah and Jerusalem was captured by invading Philistines and Arabians. Jehoram died of an incurable disease, as foretold by the prophet. He was buried in the city of David, but not in the sepulchres of the kings (2 Chron'

xxi, 19, 20).

JpRDAENS, Jacob, ya'kob yor'dans,

blemish painter: b. Antwerp, 19 May 1593- d.

Oct. 1679. From his early boyhood in

1607 he was the pupil of Van Noort, whose daughter he afterward married, and in 1615 was made master in the Guild of Saint Luke at Antwerp. He was the most eminent painter of the Flemish school next to Rubens to whom, however, he was inferior in force and concep¬

tion. The most renowned among his religious pictures are (The Last Supper * in the Antwerp Museum; and (The Martyrdom of Saint Apol¬

lo111ˆ in the church of the Augustines, Ant¬

werp. Consult the monograph by Max Rooses (1908) .

JORDAN, Camille, French politician: b

Lyons, 11 Jan. 1771 ; d. Paris, 19 May 1821. He was a pupil of the Oratorians at Lyons and when still young became imbued with Royalist principles, later developing into an active op¬

ponent of the French Revolution. When only 20 years of age he published a pamphlet satir¬

izing the Constitutional Church, entitled (His-

toire de le conversion dune dame parisienne>

(1792). When L3x>ns fell in October 1793, Jordan was proscribed by the Directory for his participation in the insurrection and fled to Switzerland, subsequently passing six months in England. In 1796 he returned to France and in 1797 was sent by Lyons to the Council of Five Hundred. In the Revolution of 4

Sept. 1797 Jordan escaped to Basel and later went to Germany where

he met Goethe. In 1800 he returned and in 1802 exposed the schemes of Bonaparte in a pamphlet (Vrai Sens du Vote National pour le Consulat a Vied From that time till 1814 he devoted his time in retirement to literature, but at the Restoration was made a councillor of state by Louis XVIII, and from 1816 till his death represented Ain in the Chamber of Deputies. Besides the above mentioned works he wrote (Lettre a M. La-

mourette> (1791) ; (La Loi et la Religion Ven-

gees* (1792);

edites* (in Correspondant, Vol. CCV [U. S.

Vol. CLXIX], p. 718, Paris 1901); Sainte-

Beuve, C. A., (Jordan et Madame de Stael*

(in Revue des Deux Mondes, Paris 1868).

JORDAN, jor'dan, Conrad N., American

financier: b. New York, 20 April 1830; d. there, 26 Feb. 1903. He entered a printing office, but soon exchanged this for a banking establish¬

ment, was cashier of a New York bank in 1864-80, and in 1880-84 was treasurer of the New York, Ontario and Western Railroad. In 208

JORDAN

1885-87 he was Treasurer of the United States, and introduced in the accounts of the Treasury a revised form of debt and cash statements by which the exact condition of the Treasury might be readily ascertained. He was an organizer of the Western National Bank of New York and for a time its president. In 1893 at the recommendation of all important New York banks, he was appointed Assistant United States Treasurer in New York, and this post he held until his death. He rendered im¬

portant services during the monetary crisis of 1893-95.

JORDAN, David Starr, American edu¬

cator and naturalist : b. Gainesville, N. Y., 19

Jan. 1851. He was graduated from Cornell University in 1872 and was

instructor in botany there 1871-72. He was professor of natural history at Lombard University, Illinois, 1872-73, and taught the same subject in the Indianapolis High School, 1874-75. From 1875 to 1879 he was professor of biology at Butler University, Indianapolis; professor of zoology at Indiana University 1879-85, and president of the last named institution 1885-91. From 1891 to 1913

he was president of Leland Stanford Junior University, and from 1913 chancellor, the office being divided to enable him to undertake in Europe and America work in the interest of international conciliation and peace. In 1906-

09 he was International Fish Commissioner for Canada and the United States, having the pur¬

pose' of the unification of the fishing laws of the boundary waters. Since 1909 he has been director of the World Peace Foundation, and has spoken and written largely in opposition to the war system of the world. Beside some 400 scientific monographs and reports, among which may be named (Synopsis of the Fishes of North America) with C. H. Gilbert (1882) ; enlarged in 1896 with the aid of B. W. Ever-

mann to (The Fishes of North and Middle America) ; and (Report of Fur Seal Investiga-

tions) ; he has published (Science Sketches) (1896) ; (Footnotes to Evolution) (1898) ; (Im¬

perial Democracy5 (1899) ; (Evolution and Ani¬

mal Life) (1908) ; (Animal Life5 (1900) ; (The Heredity of Richard Roe5 (1909) ; (The Blood of the Nation5 (1900) ; (The Human Harvest5

(1907) ; (War and the Breed5 (1915) ; (Ways to Lasting Peace5 (1916) ; (The Strength of Being Clean5 (1900) ; (The Stability of Truth5

(1909) ; (The Fate of Iciodorum5 (1908) ; (Guide to the Study of Fishes5 (1908) ;

W. Evermann (1908) ; (War and Waste5

(1912) ; (Fish Stories5 (1910), etc. He was president of the California Academy of Scien¬

ces at intervals from 1896 to 1909, and has been in charge of the

United States Fish Commission investigations in the Pacific Ocean from 1901-04 and of the salmon investi¬

gations for Alaska 1903-04.

JORDAN, Dorothea, English actress : b.

Waterford, Ireland, 1762; d. probably at Saint Cloud, near Paris, 3 July 1816. Her mother was an actress whose husband is said to have been an army captain. Dorothea made her first stage appearance in Dublin in 1777 as Phoebe in (As You like It.5 In 1782 she ap¬

peared at Leeds and subsequently toured the English provinces. In 1785 she appeared at Drury Lane in (A Country Girl.5 She was most successful and remained at Drury Lane until 1809. In 1811 she appeared at the Covent Garden, excelling in comedy role. She retired from the stage in 1815. Her private life was a scandal. She had four children by Sir Richard Ford, and for several years was known as Mrs.

Ford. In 1790 she became the mistress of the Duke of Clarence, afterward William IV, by whom she had 10 children, who were ennobled under the name of FitzClarence. William IV

erected a statue of her in 1831. Consult Boaden, James, (Life of Mrs. Jordan5 (1831) and Tate Wilkinson, (Memoirs and Amorous Adventures by Sea and Land of King William IV5 (1830).

JORDAN, Elizabeth Garver, American

journalist: b. Milwaukee, Wis., 9 May 1867.

She was educated at the convent of Notre Dame, Milwaukee, was for 10 years on the edi¬

torial staff of the New York World, assistant editor of the Sunday World for three years and editor of Harper's Bazaar from 1900 to 1913, when she became literary adviser to Har¬

per and Brothers. She is a member of the National Institute of Social Sciences and re¬

gent of jthe National Woman Suffrage Asso¬

ciation. She has published (Tales of the City Room5 (1898) ; (Tales of the Cloister5 (1901) ; (Tales of Destiny5 (1902) ; (May Iverson, Her Book5 (1904) ; (Many Kingdoms5 (1908) ; (May Iverson Tackles Life5

(1913) ; (May Iverson's Career5 (1914) ; (The Lady from Oklahoma,5 comedy in 1911, 1912 and 1913, also in book form; (Beauty is Skin Deep,5 play produced in 1913 and 1914; (Lovers' Knots5

(1916) ; (The Story of a Pioneer,5 with Anna Howard Shaw; (The Whole Family,5 with

Henry James, William Dean Howells and

others, and numerous short stories to leading American and English magazines.

JORDAN, John Woolf, American libra¬

rian and editor : b. Philadelphia, 14 Sept. 1840.

He was graduated at Nazareth Hall in 1856

and since 1888 has edited the Pennsylvania Magazine of History and Biography. He is also librarian of the Historical Society of Pennsylvania and vice-president of the Colonial Society of Pennsylvania since 1895. He is the author of (Narrative of John Heckewelder's Journey to the Wabash in 1 792 5 ; (Bethlehem during the Revolution5 ; (The Military Hospi¬

tals at Bethlehem and Lititz during the Revolu¬

tion5 ; (Bishop Spangenburg's Notes of Travel to Onondaga in 17465 ; (Notes of Travel of John Heckewelder to Ohio, 17975 ; (Franklin as a Genealogist5 (1895). In 1902 he received the degree of LL.D. from Lafayette College.

JORDAN, Jules, American composer : b.

Willimantic, Conn., 10 Nov. 1850. He first be¬

came known musically as a tenor singer, after¬

ward as a conductor and finally as a composer.

Among his compositions are the romantic opera, (Rip Van Winkle,5 produced in Providence 1897, and several cantatas, including (Barbara Frietohie5 and (Wind Swept Wheat5 ; and many sacred and secular songs.

JORDAN, Louis Henry, Canadian clergy¬

man : b. Halifax, Canada, 27 July 1855. He was educated at Dalhousie University, Prince¬

ton, Oxford, Marburg, Leipzig and Berlin.

In 1882-85 he was minister of Saint Andrew's, Halifax ; in 1885-90 minister of Erskine JORDAN – JORDANES

Church, Montreal; in 1894-1900 at Saint James Square Church, Toronto. From 1887 to 1889

'he was lecturer on church polity at the Mon¬

treal Theological College, was special lecturer on comparative religion at the University of Chicago,. in 1902. He has published Compar¬

ative Religion : Its Genesis and Growth5 (1905); 'Comparative Religion: A Survey of its Re¬

cent Literature > (1906; 1910; 1914); Compar¬

ative Religion: Its Methods and Scope* (1908); ' The Study of Religion in the Italian Universi¬

ties, > with Labanca (1909); 'Modernism in Italy : Its Origin, its Incentive, its Leaders and its Aims5 (1909); Comparative Religion: Its Adjuncts and Allies) (1915) ; contributions to the Review of Theology and Philosophy , the Expository Times, Hibbert Journal, Princeton Theological Review, Biblical World, etc.

JORDAN, Marie Ennemond Camille,

French mathematician: b. Lyons, 1838. In 1860 he was graduated at the Lcole des Mines of Paris; in 1861 became engineer of mines and in 1885 became' chief engineer. In 1872 he be¬

came a teacher of mathematics, succeeding Liouville in 1883 as professor at the College de France. He made several important discov¬

eries in geometry and analysis and is perhaps the world's greatest teacher of n-dimensional geometry. His memoirs are over 100 in num¬

ber and have appeared in all the principal mathematical journals of Europe. He wrote 'Theorie des substitutions et des equations alge-

braiques) (1870) ; Cours d'analyse de l'Ecole Polytechnique5 (3 vols., 1882-87; 3d ed., 1909).

JORDAN, Thomas, American soldier: b.

Luray, Va., 30 Sept. 1819; d. New York, 27

Nov. 1895. He was graduated from West Point in 1840; and distinguishing himself in the Mexican War, was promoted captain in March 1847. He was stationed on the Pacific coast in 1856-60, during which time he intro¬

duced steam navigation above the Dalles, on the Columbia River. He served in the Confed¬

erate army during the Civil War and was pro¬

moted brigadier-general for gallantry at the bat¬

tle of Shiloh. In 1869 he went to Cuba, where he was made chief of the general staff of the insurgent army and soon afterward comman¬

der-in-chief of the revolutionists, winning a battle at Guarmaro, in January 1870. In the fol¬

lowing year he resigned1 and settled in New York, where he became editor of The Financial and Mining Record. He published ' Campaigns of Lieutenant-General Forrest5 (with J. B.

Pryor. 1868).

JORDAN, William George, American

journalist: b. New York, 6 March 1864. He was graduated at the College of the City of New York; became editor of Book Chat in 1884, later became editor of Current Literature, became managing editor of the Ladies' Home Journal in 1897 and was editor of The Satur¬

day Evening Post in 1898-99. In 1899-1905 he was editor and vice-president of the Continental Publishing Company, and in 1905-06 edited The Search-Light. In 1907 he proposed the organ¬

ization of the governors of the country as a house of governors to work for uniform leg¬

islation between the States; this led to the call by President Roosevelt of a convention of the governors at Washington in 1908, at which a

committee was appointed to arrange for a per¬

manent organization, the first conference being vol. 16 — 14

held in January 1910. He has published Cen¬

tal Training by Analysis, Law and Analogy5 ; ‘Mental Training a Remedy for Education) (1896) ; ‘The Kingship of Self ControP

(1899) ; ‘The Majesty of Calmness 5 (1900) ; ‘The Power of Truth > (1902) ; ‘The House of Governors5 (1907) ; ‘The Crown of Individual-

ityj (1909); ‘The Power of Purpose5 (1910); ‘Little Problems of Married Life5 (1910) ; and ‘The Wood-Carver5 (1915).

JORDAN, United States of North Amer¬

ica, a river in the State of Utah which drains Utah Lake and also the north central part of the State, follows a northerly course and flows into Great Salt Lake after a course of 40

miles. It is utilized as a feeder for irrigation systems.

JORDAN, the largest river of Palestine and one of the most celebrated in the world, called Esh-She-riah or Esh-Sheriah-el-Kebir by the Arabs. It rises from three main sources at the foot of Hermon, and these upper streams unite in Lake Huleh, the ancient Waters of Merom. . From this point it sinks with a rapid current in a narrow rocky bed below the level of the sea, and falls after a course of nine miles into the Lake of Galilee. Shortly after leaving the south end of this lake it enters a broad valley called by the Arabs Ghor, and in the Bible “the plain55 ; and continuing a singularly crooked course of about. 65 miles direct dis¬

tance, or 200 including windings, falls into the north end of the Dead Sea, having received the Zerka or Jabbok and numerous smaller affluents.

The Ghor expands at Bethlehem and Jericho into a wide plain, but elsewhere is from three to five miles across. The upper part of the valley of the Jordan is hilly, arid and barren, but it becomes more level and fertile as it ap¬

proaches the Zerka. The river is muddy and full of small fish. In the dry season it is shal¬

low, with an average width of from 30 to 50

yards. At its mouth it is about 180 yards broad and about three feet deep. It is subject to great inundations during the winter season. The climate is tropical. Cereals, chiefly barley, are*

raised in some parts of the river's valley. The valley of the Jordan forms one of the most re¬

markable depressions in the world, the Dead Sea being 1,312 feet below sea-level, and the total fall of the river being about 2,300 feet.

Molyneux and Lynch made explorations of the river in 1847-48. Consult 'Official Report5

(Washington 1852) ; 'Survey of Western Palestine5 (London 1859) ; Smith, 'Historical Geography of the Holy Land5 ; Molyneux (in the Journal of the Royal Geographic Society 1848) ; Lynch, 'Narrative of the United States Expedition to the River Jordan and the Dead Sea5 (1849) ; McGregor, 'Rob Rov on the Jor¬

dan5 (1870); Costello, 'Gospel Story5; Mac¬

millan, 'Guide to Palestine and Egypt5 ; Thomas, (Two Years in Palestine.5

JORDANES, jor-da'nez, historian of the

Gothic nation; flourished about the middle of 6th century; by birth a Goth, or both of Alan and of Gothic descent. He was first a notary, but afterward became a monk, and is supposed by some to have been made bishop of Croton, in Italy, but of this there is no certain evidence.

He wrote two historical works in the Latin language; the first 'De Regnorum ac Temporam Successione,5 is a short compendium of the JORIS

JOSE

210

most important events in history from the crea¬

tion to a.d. 552; but the work is valuable only from its accounts of several barbarous northern nations. Hi-s other work, (De Getarum Origine et Rebus Gestis (concerning the origin and deeds of the

Goths), has obtained great re¬

nown, chiefly as our only source of information about the Goths and other ‘barbarian tribes, ex¬

cept when they are casually mentioned by some Greek or Latin historian. The work is, how¬

ever, full of inaccuracies, both of time, place and person ; and it is evidently based upon, or copied from, the 12 lost books of the Roman senator Cassidorius. There are many editions of both works, the best being Mommsen’s in (Monumenta Germanise Historica, Auctores Antiquissimri (Vol. V, Berlin 1882).

JORIS, yo’ris, or JORISZOON, yo’ris-zon, David, leader of the Anabaptists : b. Bruges, 1501 ; d. Basel, 25 Aug. 1556. In 1524 he settled in Delft as a glass painter; sometime after¬

ward he embraced the Reformed faith and for an attack upon a religious procession was ban¬

ished for three years in 1528. He returned to Delft in 1536 and established a sect. He pre¬

tended to be the Messiah, denied the Resur¬

rection and held various heretical opinions.

The sect existed in Holland nearly a century after his death. In 1544 he fled to avoid persecution and lived quietly at Basel under the pseudonym of John of Bruges, as a member of the Reformed Church, unsuspected by the magistracy of being the notorious sectary. In 1559 the truth came out, whereupon his body was exhumed and burned. See Anabaptists.

JORN UHL, yern-ool, by Gustav Frenssen is one of those novels, found in the literature of every nation, in which not a man but a well-

established national type is the hero. The author who makes such a type the central figure of a romantic story is sure of popular approval in just the proportion in which his character is true to life and recognizable, em¬

phasizing the universal in the portrait, distin¬

guishing the typical, shading down the personal.

Gustav Frenssen was peculiarly successful in his attempt to create, through Jorn Uhl, the picture of the young German peasant-farmer, industrious, idealistic, imaginative, doing his duty not only with patience but with high cour¬

age, loving the land, but loving the stars more, and with a vision of something even ‘beyond the stars. Contrasted with him are the equally life¬

like figures of his drunken, pompous, spend¬

thrift father, his drunken, idle, thieving older brothers, who waste the land beyond all power of Jorn U’hl’s labor to redeem it. Together they are the personification of a German peasant family a generation ago. The straight¬

forward, provincial simplicity of Frenssen’s style is thoroughly in harmony with the story and the character of the hero and deepens the sense of reality. It undoubtedly contributed to the almost unprecedented popularity of the book in Germany, a success which has never been duplicated outside. One chapter of the book, detailing the drafting of the young peasant for war service and his experience in the battle of Gravelotte, has the quality of permanent international literature, and has been translated for use in schools ; the rest of the story, besides its undoubted value as pure fic¬

tion, is interesting principally for that very qual¬

ity of sincere but limited nationality which has narrowed its audience to Germany.

Edith J. R. Isaacs

JORTIN, John, Engl ish clergyman of

French Huguenot parentage : b. London, 23

Oct. 1698; d. Kensington, 5 Sept. 1770. He was educated at the Charterhouse School, and at Jesus College, Cambridge, where he held a fel¬

lowship 1721-28. He was ordained in 1723-24.

At first, 1723-26, he held the living of Sevanesey near Cambridge, but resigned and removed to London and became the preacher in a chapel in New street, 1731-47. He was editor of a magazine Miscellaneous

Observations upon Authors Ancient and Modern (1731-33);

preacher in a chapel in Oxenden street (1747—50) ; assistant to Dr. Warburton at Lincoln's Inn (1747-50) ; rector of Saint Dunstans in the East, 1751 until his death; also vicar of Kensington, prebend of Saint Paul's and chap¬

lain to the bishop of London from 1762 and archdeacon of London from 1764. He was Boyle lecturer in 1749. He was considered one of the great scholars of the time credited with liberal views. He was the author of a notable volume of Latin poems, and his principal works include (Truth of the Christian Re¬

ligion (1746) ; (Remarks Upon Ecclesiastical History) (5 vols., 1751-73) ; (Six Dissertations) (1755) ; (Life of Erasmus) (2 vols., 1758-60) ;

logical, Critical and Miscellaneous) (2 vols., 1790). Consult Disney, N., (Memoirs of the Life and Writings of John Jortin) (1792) ; also the memoirs prefixed to the (Sermons, >

(Tracts* and (Remarks. >

JORULLO, ho-roolyuj a volcano of Mex¬

ico in the state of Michoacan, 160 miles south¬

west of Mexico, and 80 miles from the Pacific.

The district had continued undisturbad from the discovery of the New World when, in June 1759, earthquakes occurred, followed 29 Sep¬

tember by one more violent. On the line of a chasm which was made, six volcanic cones were formed, the loftiest, Jorullo, 1,600 feet above the plain. The total height of the volcano above the sea is 4,265 feet. It shows but few signs of activity at present.

JOSE, no-sa\ The

porary Spanish novelist, Armando Palacio Valdes (born 1853) is not one of the more ambitious of his works. An interesting novelette of manners, portraying actual con¬

ditions of life in the northern maritime dis¬

tricts of Spain, it tells in simple and direct fashion of the tribulations encountered by two lovers of humble station, whose union is thwarted

for a while by the machinations of the girl's avaricious and heartless mother and by the operations of a national law which gives parents a tyrannical control over their children contemplating matrimony. The characters are presented in vivid colors on a background of sea and shore, and even the figure of the de¬

cayed gentleman, the modern Don Quixote, here called Don Fernando de Meira, escapes the charge of conventionality by conforming so naturally to type. One might wish, however, that the author had not seen fit to make Fernando's end so wretched; perhaps, not¬

withstanding, he felt it imperative to drive home the lesson that for the melancholy aberra-

tions of hidalgism a corrective is not easily found. In some of the scenes in which the -fishwives play a part with their wordy quarrels and hair-pulling exercises, Valdes must per¬

force descend to the vulgar; but he realizes the danger of the situation and never ventures too far into repugnant detail. Taking him all in all, Valdes, as the author of this successful little idyll and of about a score of novels of the acknowledged worth of his (Marta y Maria, 5 his (Majos de Madrid) and his (Alegria del Capitan Ribot,5 has proved himself a talent of high order among our modern writers of prose fiction and has well merited the generous meed of praise accorded him by so competent a judge as Mr. Howells.

Jeremiah D. M. Ford.

JOSEFFY, yo-sef'i, Rafael, Hungarian-

American pianist: b. Miskolcz, Hungary, 1853; d. 1915. He was a pupil of Moscheles at the Leipzig Conservatory and of Tausig at Berlin, won distinction in a concert tour of Holland and Germany, and later appeared with large success throughout Europe and the United States. For several years he was a professor in the National Conservatory at New York, where he resided from about 1880. He was a member of the faculty of the National Con¬

servatory of Music, New York, from 1885 to 1906. As a virtuoso he

evinced great facility and technical finish, and won particular rec¬

ognition through his interpretations of Chopin.

His compositions include (Ungarisches Album) (6 works for pianoforte) ; (Die Miihle) (op.

23), a (Marche Turque,5 and (Conzert-Studien nach Chopin.5 He is also the author of the popular work (School of Advanced Piano Playing5 (1892).

JOSEPH, a son of the patriarch Jacob by his favorite wife, Rachel. His father's prefer¬

ence for him and his own relation of dreams which predicted his future exaltation above those of his household drew upon him the envy of his brothers, who sold him to Ishmaelitish and Midianite slave-dealers, by whom he was sold to Potiphar, a captain of the guard in Egypt. The story of his condemnation to prison on the false accusation of Potiphar's wife, of his release and subsequent elevation to the posi¬

tion of vice-regent of Egypt and the final settle¬

ment there of his father and brothers is related in the book of Genesis. Authorities still differ as to the period in Egyptian history to which Joseph's life belongs, but the majority agree in placing it under the Hyksos or shepherd kings.

JOSEPH, North American Indian chief of the Nez Perce tribe: b. about 1830; d. Nespelim, Colville Reservation, Wash., 21 Sept. 1904. Of remarkably fine physical build and endowed with superb mental gifts, Joseph (Hinmaton-Yalat-

kit) was one of the most remarkable men of his race. In 1863 he refused to recognize the treaty by which the whites obtained entry to the Wallowa Valley, the ancient home of his people, in northeastern Oregon. Many of the Indians sympathized with him and continued to dwell there in spite of frequent bickerings with the white settlers. The government undertook to remove these Indians to the Lapwai Reserva¬

tion in Idaho, and things were proceeding peace¬

fully when outrages by the whites drove the Nez Perces to fury and caused them to attack the settlements. A declaration of war ensued

and Joseph skilfully led his neople in a mem¬

orable retreat to within 50 miles of the Cana¬

dian border, when his retreat was cut off by fresh troops and on 5 Oct. 1877 he was forced to surrender. His skill won praise from his conquerors, General Howard, Colonels Miles, Sturgis, etc. The promises made to Joseph and his people were ignored, and the Indians, num¬

bering 431, were removed to Fort Leavenworth, Kans., and afterward to Indian Territory, where they remained for many years, always yearning for, the mountains and valleys of Idaho. In 1883 the government permitted a party of 33

women and children to go back to their old home and in 1884, 118 others were allowed to go.

Joseph, however, and 150 others were not per¬

mitted to return to Idaho but were sent to Col¬

ville, Wash. Chief Joseph visited President Roosevelt and General Miles at Washington in 1903. In his later years he had become recon¬

ciled' to civilization and encouraged education among the children of his tribe.

JOSEPH, Father (Francois Leclerc du

Tremblay), French propagandist and states¬

man: b. Paris, 4 Nov. 1577; d. Rueil, 18 Dec.

1638. He belonged to a distinguished family, traveled much in his youth, and served in the army under an assumed name, but in 1599 he entered the Capuchin order, in which he sub¬

sequently attained a high position. Attracting the attention of Cardinal Richelieu, in 1611, that statesman made Father Joseph his secretary and confidential adviser. In this capacity, and as provincial of his order in France, he wielded immense influence and power for many years and ably seconded the cardinal's efforts to con¬

vert the Huguenots. He was eager for the de¬

fense of Christianity against the Turks and advocated a crusade

against them. He left several volumes of memoirs which are still in manuscript in the Paris Library. Consult O'Connor, R. F., (His Grey Eminence, the true Friar Joseph: An Historical Study5 (Phila¬

delphia 1912).

JOSEPH, Saint, the husband of Mary the mother of Jesus Christ, was a descendant of the house of David, born at Bethlehem, but resident at Nazareth, where he practised the trade of a carpenter. Tradition and art repre¬

sent him as an old man at the time of Christ's birth and he is said to have died before the be¬

ginning of Christ's public ministry. His day in the Roman Catholic calendar is 19 March.

JOSEPH I, emperor of Germany: b. Vi¬

enna, 26 July 1678; d. 17 April 1711. He suc¬

ceeded his father, Leopold I, and was employed for nearly the whole of his reign in war. With England and Holland he continued the war against France, to seat the Archduke Charles on the throne of Spain. The great victories gained by the allies under Marlborough in the Low Countries and Prince Eugene on the Rhine made the reign of Joseph especially noteworthy. He was equally triumphant in Italy and Hungary ; in the latter kingdom driving the revolted Ba-

gotski from the country and forcing him to seek safety in Turkey; while in the Italian penin¬

sula great cities from Mantua to Genoa were laid under heavy contributions.

JOSEPH II, German emperor, oldest son

of Francis I and Maria Theresa: b. Vienna, 13

March 1741 ; d. there, 20 Feb. 1790. He was 212

elected king of the Romans in 1764, and on the death of his father, 1765, German emperor. His mother declared him coregent in the hereditary states of the house of Austria and gave him the command of the army; but the real authority remained in her hands. In the

earlier part of his reign he employed his time in traveling and becoming acquainted with his estates. He visited his sister, Marie Antoinette, at Paris, and Catherine of Russia in 1780. It was also in those years that he began his intimacy with Frederic II of Prussia, resulting later in , the partition of Poland. In November 1780 Maria Theresa died and Joseph came into the posses¬

sion of full dominion over his hereditary states.

He allowed a greater freedom of the press, put an end to the connection between Rome and the religious orders, diminished the pensions, placed the Jews on a better footing, abolished bondage, suppressed all nunneries and many monasteries, particularly those of the purely contemplative orders. All branches of the government, public education, the police and the peasantry were reformed. By a new code of laws capital pun¬

ishments were abolished. On 9 Feb. 1788 he declared war against the Turks. By the defeat at Lugos (20 Sept. 1788) the army was obliged to retreat, but in the following year fortune favored the Austrian arms and Belgrade sur¬

rendered. With the tax law, introduced in November 1789, nobility and peasantry showed themselves equally dissatisfied and the signal was given for open rebellion. The Netherlands declared themselves independent and expelled the imperial forces from all the provinces, and Luxemburg alone remained in the possession of the imperial troops. The Hungarians also re¬

belled and demanded the restoration of their ancient rights and constitution. Joseph, in Jan¬

uary 1790, declared all the acts of his govern¬

ment in that country revoked, even to the edict of toleration (22 June 1781). Joseph was a man of considerable ability, but arbitrary and despotic. Whatever his own reflections or his knowledge of other countries showed to be useful he wished to introduce. But he did not sufficiently consider that he had to do with men who would not see things in the same light as himself ; and that long habit rendered it difficult to change, at once, usages sanctified by time.

Being a freethinker he often grossly overrode the rights of the Church. Toward the end of his reign his friends and even members of his own family treated him with cruel neglect and he died a disappointed, broken-hearted man.

There is a large literature on his rule, much of which consists of his correspondence. Consult Arneth, A. von, ed., ‘Marie Antoinette, Josef II und Leopold II, Ihr BriefwechseP (Vienna 1866) ; id., ‘Maria Theresia und Josef II, Ihre Korrespondenz, etcP (Vienna 1867-68) ; id., (Josef II und Katharina von Russland, Ihr BriefwechseP (Vienna 1869) ; id., (Josef II und Leopold von Toskana, Ihr Briefwechsel von 1781—1790> (2 vols., Vienna 1872) ; Beer, A., ed., (Josef II, Leopold II und Kaunitz, Ihr Brief¬

wechseP (Vienna 1873) ; id., (Josef IP (Vienna 1882) ; id., (Joseph H tlncl Graf L. Cobenzl, Ihr BriefwechseP (Vienna 1901) ; Bright, J. F., (Joseph IP (London 1897) ; Brunner, S., ed., (Die Theologische Dienerschaft am Hofe Jo¬

sef’s IP (Vienna 1868) ; id., ‘Correspondances Intimes de l’Empereur Josef II avec le Comte de Cobenzl et le Prince de Kaunitz) (Vienna 1871); id., ‘Josef II> (Freiburg 1885); Delplace, L., ‘Josef II et la Revolution Brabarcqonne) (Bruges 1890) ; Fournier, A., (Josef IP

(Prague 1885) ; Gross-Hoffinger, A. T., ‘Ge-

schichte Josefs IP (Stuttgart 1847) ; Jager, A., (Kaiser Josef II und Leopold II> (Vienna 1867) ; Juste, T., ‘Histoire du Regne de l’Em-

pereur Josef II et de la Revolution Beige de 1790J (2 vols., Brussels 1845-46) ; Kohut, A., ‘Kaiser Josef IP (Dresden 1890) ; Lorenz, O., ‘Josef II und die Belgische Revolution (Vi¬

enna 1862) ; Lustkandl, W., ‘Die Josephinischen Ideen und ihr Erfolg> (Vienna 1881) ; Meynert, H., ‘Kaiser Josef IP (Vienna 1862); Paganel, C., ‘Histoire de Tosef IP (Paris 1843) ; Schlit-

ter, H, ‘Pius VI und Josef II, 1782-84> (Vi¬

enna 1894); id., ‘Die Regierung Josefs II in den Oestereichischen Niederlanden> (Vienna 1900); id., ‘Geheime Korrespondenz Jo¬

sefs II mit Graf TrauttmansdorfP (Vienna 1902) ; Temperley, H. W. V., ‘Frederic the Great and Kaiser Joseph) (London 1915) ; Wendriski, J., ‘Kaiser Josef IP (Vienna 1880) ; Wolf, A., and H. von Zwiedeneck-Siidenhorst, ‘Oestereich unter Maria Theresia, Josef II und Leopold IP (Berlin 1882-84); Wolf, G., ‘Das Unterrichtswesen in Oesterreich unter Tosef IP

(Vienna 1880).

JOSEPH OF ARIMATH2EA, member of

the Jewish Sanhedrim, who believed in Jesus, but had not the courage to make profession of faith. He was born in Rathaim, a city of Ben¬

jamin, near Lydda. After the crucifixion he went to Pilate, begged the body of Jesus, wound it in fine linen and buried it in his own new tomb. According to tradition he came as apostle to Glastonbury, England. His day is 17 March m the Roman Catholic calendar and 31 Julv in the Greek Church.

JU-ZLI 1, _

artist: b. New York, 1859. His artistic educa¬

tion was obtained at the Art Students' League, New York, and with Leon Bonnat, Paris. He is l- Painter miniatures and landscapes, has exhibited at many exhibitions, receiving honor¬

able mention at the Paris Exposition of 1900 and f silver medal at the Charleston Exposition of I y\)Z.

daK?EPHINE (Fr- zh5-ze-fen), or MARIE

ROSE, empress of the French : b. Trois Islets Martinique 23 June 1763; d. Malmaison, near 1 aris, 29 May 1814. She was the daughter of Lieut. Joseph Tascher de la Pagerie and was married in 1779 to Vicomte Alexandre de Beau-

harnais, by whom she had two children, Eugene and Hortense. In 1794 her husband, who had been commander of the army of the Rhine was eXirCute? by order of the Convention. She' her-

selt had a narrow escape, having been included in the list of proscription. After the fall of Robespierre she is said to have paid a visit to Napoleon to thank him for restoring the sword o her husband, and so pleased him that he soon after married her (1796). When Napoleon be¬

came emperor in 1804 she was crowned with mi But the fact that the union was childless stood in the way of Napoleon's ambition to be-

P"eT founder of a dynasty, and accordingly in 18U9 Josephine was divorced, retiring to her seat of Malmaison with the title of empress-

queen-dowager and an annual grant of 2,000 000

rancs. Though frivolous, extravagant and flirtatious, her influence on Napoleon seems to JOSEPHINITE — JOSHUA, BOOK OF

have been* on the whole for his benefit. He greatly appreciated, not only her beauty, but her tact and common sense, which he proved by maintaining friendly relations with her even after his second marriage and by treating her two children as if they had been his own. (See France; Napoleon I). Consult Abbott, J. S. C., (Kings and Queens, etc.5 (New York 1848); id., ‘History of the Empress Josephine) (New York 1863) ; Aubenas, G. A., ‘Histoire de rimperatrice Josephine5 (2 vols., Paris 1858—59) ; Hall, H. F., ed., (Napoleon’s Letters to Josephine, 1796-18125 (New York 1903) ; Head-

ley, P. C., (The Life of the Empress Josephine5

(Auburn 1853) ; Imbert de Saint- Amant, A. L., ‘Josephine5 (translated into English by T. S.

Perry, 4 vols., New York 1891—99) ; Le Nor-

mand, M. A., ‘Memoires Historiques et Secrets de Josephine5 (2 vols., Paris 1820; New York 1904.) ; id., ‘Lettres de Napoleon a Josephine5

(Paris 1833) ; Masson, F., ‘Josephine5

(3 vols., Paris 1899-1902) ; Memes, J. S., ‘Memoirs of the Empress Josephine5 (New York 1835); Meneval, N.‘ J. E. de, ‘The Empress Josephine5 (translated by D. D. Fraser, Philadelphia 1912) ; Ober, F., ‘Josephine, Em¬

press of the French5 (London 1901) ; Pichevin, R., ‘L’Imperatrice Josephine5 (Paris 1909) ; Remusat, Madame de, ‘Memoires5 (London

1880) ; Sergeant, P. W., ‘The Empress Jo¬

sephine5 (2 vols., London 1908) ; Tarbell, I., ‘Life of the Emperor Napoleon5 (New York 1901) ; Turquan, J., ‘La Generale Bonaparte5

(Paris 1895) ; id., ‘L’Imperatrice Josephine5

(2 vols., Paris 1895-96) ; Welschinger, L., ‘Le Divorce de Napoleon I5 (Paris 1889).

JOSEPHINITE. A natural iron-nickel

alloy, Fe2Ni5, found in placer washings on Josephine Creek, Josephine County, Ore.

JOSEPHUS, jo-se'fus, Flavius (Jewish

name, Joseph ben Matthias), Jewish histo¬

rian: b. Jerusalem, 37 a.d. ; d. about 95 a.d. He was carefully educated and in 64 a.d. he made a journey to Rome. On his return he found his countrymen preparing to throw off the Roman yoke, and having tried in vain to persuade them of the hopelessness of such a struggle, accepted the post of defending the province of Galilee, and actually held the fortified town of Jota-

pata against the whole Roman army for 47 days.

He was captured at the fall of the city, was afterward present in the Roman army at the destruction of Jerusalem (70 a.d.), and went with Titus to Rome, where, assuming the fam¬

ily name of his patron, Flavius, he lived in learned leisure. Here he wrote (in Aramaic and Greek) 'The History of the Jewish War,5

in seven books, and 'The Antiquities of the Jews,5 in 20 books; giving a history of the Jews from the earliest times to the reign of Nero. He also wrote an autobiography and a work entitled 'Against Apion,5 in two books, which was a defense against false accusations raised against the Jews. He was a fluent, graceful writer and, on the whole, a truthful, accurate historian. That part of his work re¬

ferring to Christ is no longer considered genu¬

ine. There are many editions of his two major works and the autobiography, the most import¬

ant of which are by B. Niese (7 vols., Berlin 1885-95), and by T. Bekker and _S. A. Naber (6 vols., Leipzig 1888-96). There are also many translations into different languages, both of the collected and of single works. A good list of these will be found in British Museum, 'Catalogue of Printed Books5 (London 1889).

The most important English translation is that by Whiston, 'The Works of Flavius Josephus5

(5 vols., London 1889-1900). There is a very complete bibliography in Schfirer, E., 'History of the Jewish People in the Time of Christ5

(5 vols., New York 1896). Consult Arnold, C., ‘Die Bibel, Joseph und Jerusalem5 (Leipzig 1865-66) ; Barwald, A., ‘Josephus in Galilaa5

(Breslau 1877) ; Bentwich, N. de M., ‘Jose¬

phus5 (Philadelphia 1914) ; Bloch, H., ‘Die Quellen des Josephus in seiner Archaologie5

(Leipzig 1879) ; Bottger, G., ‘Topographisch-

Historisches Lexicon zu dem Schriften des Josephus5 (Leipzig 1879) ; Destinon, J. von, ‘Die Chronologie des Josephus5 (Kiel 1880) ; id., ‘Die Quellen des Flavius Josephus5 (Kiel 1882) ; Drfiner, H., ‘Untersuchungen fiber Jose¬

phus5 (Marburg 1897) ; Krauss, S., ‘Josephus Flavius5 (in ‘Jewish Encyclopedia,5 Vol. VII, New York, 1904) ; Krenkel, M., ‘Josephus und Lucas5 (Leipzig 1894) ; Mez, A., ‘Die Bibel des Josephus5 (Basel 1895) ; Mfiller, G. A., ‘Christus bei Flavius Josephus5 (Freiburg 1895) ; Mfiller, J. G., ‘Des Flavius Josephus Schrift Gegen den Apion5 (Basel 1877).

JOSH BILLINGS. See Shaw, Henry

Wheeler.

JOSHUA, the leader of the Israelites after the death of Moses. He was the son of Nun, of the tribe of Ephraim, and upon him fell the task of conducting the people over the Jordan, and commanding their armies in battle against the heathen they were ordained to dispossess.

He succeeded in ravaging a large portion of Palestine, and dividing it among the people. He died at the age of 110 and was buried at Tim-

nath-Serah, in Mount Ephraim.

JOSHUA, Book of. The first 12 chapters of the book of Joshua continue the history of Israel from the point reached at the end of Deuteronomy, the death of Moses, to the con¬

clusion of the conquest of western Palestine; and chapters xiii-xxi tell of the division of the land among the tribes. The remaining chapters, xxii-xxiv, constitute an appendix, giving various details concerning ‘the closing days of Joshua, including his death and the death of Eleazer the son of Aaron.

It is now generally agreed that the docu¬

ments found in the Pentateuch are to be dis¬

cerned also in Joshua. This results from evi¬

dence of the same kind as in the Pentateuch.

Their distribution, however, is peculiar. The bulk of chapters i-xii is from JE, and of xiii-

xxi from P. A considerable part, in detached portions, of i-xii is from D, but very little in xiii-xxi. All .three sources are found m con¬

siderable measure in the appendix xxii-xxiv.

The JE source shows evidence of being com¬

posite, especially in double accounts of the same event, but most of it cannot be separated definitely into the J and E portions, in this re¬

spect differing from the Pentateuch. The D

and P portions are probably not from the same documents as tho-se which are called by these terms in the Pentateuch, but from writings by other authors of these schools. Concerning the details of the compilation of the book there is much difference of opinion. The best opin-

ion seems to be that the book was never actu¬

ally joined with the Pentateuch, but always an independent book. It is often joined with the Pentateuch under the term Hexateuch because of the use of the same or similar documents.

There are various indications in the book itself that portions of it, at any rate, were writ¬

ten considerably later than the events described.

The idealizing of the history, which will be mentioned later, is such an indication. Such also is the reference to “until this day® in Joshua xv, 63, and the reference to the book of Jashar, x, 13, which was a book

of poetry later than David. The evidence of the documents indicates that the book contains portions writ¬

ten at various times. The final compilation, however, must have been as late at P, i.e., as late as 500 b.c. Some think it was considerably later, but there is no strong evidence of this, although some slight additions may very pos¬

sibly have been made considerably later.

The degree of historicity of the book varies with the documents. The presumption would be that the JE portions are more fully histori¬

cal, a presumption which is confirmed by a detailed examination. In the D and P portions the history is strongly idealized. Especially, the D and P portions present the view that the conquest of the land was completed by Joshua, the inhabitants exterminated, and the land di¬

vided among the tribes. Scattered notices from JE, however, in agreement with Judges i, 1-

ii, 5, teach that the conquest was effected only gradually by the individual tribes. The view of JE is the earlier, historical one; the other, of D and P, i-s later and much idealized. The his¬

torical data of the book need careful examina¬

tion in order to ascertain the probable facts.

Further, the history of the book is fragmen¬

tary, the omission of any account of the con¬

quest of central Palestine being especially re-

makable. The D portions present the same religious view of the history that is found in the book of Deuteronomy.

Bibliography. — Blaikie, W. G., New York 1893); Mac-

lear, G. F., (Joshua } ((Cambridge Bible, >

Cambridge 1897) ; Robinson, H. W., (Deuter¬

onomy and Joshua } ((Century Bible, > Edin¬

burgh).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

JOSIAH, king of Judah. He succeeded his father, Amon (638 b.c.). He is said in the Scriptures to have done “that which was right in the sight of the Lord.® He took an active part in the reform of temple worship, and in the abolition of idolatry throughout the land, and. commenced the restoration of the temple, during the progress of which the high-priest Hilkiah -discovered the book of the law, that is, the book of Deuteronomy. In his 30th year he marched out against Pharoah Necho, king of Egypt, who was on his way to attack the kingdom of Assyria. Josiah was slain in the battle at Megiddo where he had attempted to check the northward march of the Egyptians.

Consult Wellhausen, Hsraelitische und jiidische Geschichte) (7th ed., Berlin 1914).

JOSIAH ALLEN’S WIFE. See Holley,

Marietta,

JOSIKA, yd’shi-ka, Miklos, Bai*on, Hun¬

garian novelist: b. Torda, Transylvania, 28

April 1794; d. 27 Feb. 1865. He entered the army, reaching the rank of Captain, in 1818

turned to politics, and finally in 1834 devoted himself to literature. He took an active part in the Hungarian uprising of 1848, fled in 1850 to Brussels, and went in 1864 to Dresden, where he died. In September 1851, he was, with Kossuth and 35 others, hanged in effigy at Pest. Al¬

though the government subsequently offered him amnesty he never returned to Hungary.

Up to 1848 he produced 60 volumes of ro¬

mances, illustrating Hungarian life and his¬

tory. His principal works are (1851).

Most of his novels have been translated into German, and one— Eamilie Mailly*— was

written in Uno language. Profoundly versed in the life of his people, and master of a pleasing style, he was very popular. Four volumes of memoirs appeared soon after his death (Pest 1865).

JOSS, a Pidgin-English term derived from the Portuguese “deos,® meaning God. The word denotes a Chinese god or idol. A Joss-

house is. the place or temple where the idol is worshipped. There are three such houses in San Francisco, one in Chicago and two in New York. Joss paper refers to the gold and silver paper ornaments which are burned as sacrifice to the gods. Joss stick is a small stick made of a paste formed by compounding the dust of various scented woods mixed with clay. These are burned in the temples as incense for the gods.

JOSSELYN, jos lln, John, English traveler: b. England, early in the 17th century. He sailed for New England on 26 April, arriving in Bos¬

ton on 2 July 1638, and “presented his respects to Mr. Winthrop, the governor, and to Mr.

Cotton, the teacher of Boston church, to whom he delivered from Mr. Francis Ouarles the poet, the translation of several Psalms ’ into English meter.® He returned to England in October 1639, and made a second voyage on 23 May 1663, to New England, where he spent eight years. On his return in December 1671

he published a book entitled (New England’s Rarities Discovered in Birds, Beasts, Fishes Serpents and Plants of that Country etc *

With a picture of Boston in 1663 (London 1672; reprinted in Boston 1865). He also wrote (An Account of Two Voyages to New England etcP (1674) and

icatb 1673. > Reprints were issued in Boston (1865) .

/-7 Y[r\g. of Judah, who succeeded

(/3b b.c.) LIzziah, his father, after having acted as regent for a number of years previously as a result of his father’s illness. He ascended the throne at the age of 25 and reigned 16

years. He vanquished the Ammonites and fur¬

thered public works in Jerusalem to a consid¬

erable extent The prophets Isaiah, Hosea and Micah hved during his reign. Consult Graetz.

H., History of the Jews> (Vol. I, London JOUBERT — JOUFFROY D'ABBANS

1891) ; Young, R., c Analytical Concordance io the Bible > (New York 1893).

' JOUBERT, yow'bert, Petrus Jacobus, Boer military officer : b. Kongo, Oudtshoorn district, Cape Colony, 20 Jan. 1834; d. Pretoria, 28

March 1900. After an elementary education he settled as a farmer in the Wakkerstroom dis¬

trict of the Transvaal, about 1863 was elected for that district to the Volksraad, and in 1870

became attorney-general of the South African Republic. During the visit of President Burgers to Europe in 1875 he was acting Presi¬

dent. In 1880 he became one of the trium¬

virate administering the provisional Boer gov¬

ernment and commander-in-chief of the Boer forces at the outbreak of the war with England, and three times defeated the British, at Laing's Nek, Ingogo and Majuba Hill, the last battle (27 Feb. 1881) deciding the war in favor of the Boers. He was again acting President dur¬

ing the absence of President Kruger in Europe in 1883-84. Three times he unsuccessfully con¬

tested the presidency with Kruger, the vote be¬

ing 3,431 to 1,171 in 4883; 7,911 to 7,246 in 1893; and 12,858 to 2,001 in 1898. In the second Boer war also he was commandant-general, and di¬

rected the campaign in northern Natal which resulted in a succession of disasters for the British. He became ill early in 1900, however, and was obliged to withdraw from active serv¬

ice. He was in many ways the ablest of the Boer military leaders, though his excessive caution, lack of determination and ready will¬

ingness to compromise with the opinions of other Boer leaders frequently resulted in his failure to carry his successes against the British to their logical conclusions. However, his valor, strict honesty and generosity brought him well-deserved admiration even from his enemies. Consult Anon., (General JouberD (in Review of Reviews, Vol. XXI, p. 574, New York 1900) ; Maurice, Sir F., ed., (History of the War in South Africa 1899—1902 J (4 vols., London 1906-10).

JOUETT, jow'et, James Edward, American

naval officer: b. Lexington, Ivy., 7 Feb. 1827; d.

Sandy Springs, Md., 30 Sept. 1902. He entered the navy in 1841, served with distinction during the Mexican War, was promoted to passed midshipman in 1847, in 1861 with a detachment of marines entered Galveston Harbor and destroyed the Confederate war-vessel Royal Yacht, and for his services was appointed to the command of the United States steamship Montgomery. As lieutenant-commander, he was prominent in Farragut's entrance of Mobile Bay (August 1864), and in 1885, when in command of the North Atlantic squadron he opened the transit across the Isthmus of Panama, closed by the enemy. He was promoted rear-admiral in 1886, subsequently president of the

Board of Inspection and Survey, and in 1890 was retired.

By a special act of Congress, passed March 1893, he was granted full pay during his retire¬

ment in appreciation of his great services to his country. Consult Anon., (J. E. JouetD (in United Service, Vol. XVI, p. 523; Vol. XVII, p. 17, Philadelphia 1896-97) ; Baber, G., (Rear Admiral J. E. JouetD (in Kentucky State His¬

torical Society Register, Vol. XII, No. 35, p, 9, Frankfort 1914) ; Clark, C. E., {Prince and Boatswain) (Greenfield 1915) ; United States, Navy Department, (Memorandum in the Case of Captain J. E. JouetD (Washington 1880).

JOUETT, Matthew Harris, American art¬

ist : b. Mercer County, Ky., 22 April 1788; d.

Lexington, Ky., 10 Aug. 1827. His ancestors vvere Huguenots, who emigrated to North Caro¬

lina, and finally settled in Virginia. They were staunch patriots during the Revolution. His father eluded the British commander Tarleton, and gave the alarm to the legislature, then in session at Charlottesville, Va., for which action he received complimentary resolutions from Congress. Matthew was educated for the law, but devoted much time to drawing and painting.

He enlisted in the War of 1812 as lieutenant of the 28th Infantry, serving in the Northwest and was appointed captain. In 1815 he taught himself portrait and miniature painting, but in 1816 went to Boston, where he studied four months under Gilbert Stuart. In October 1816, he returned to Lexington, achieving reputation as a portrait painter, practising his art with success in New Orleans and Natchez, and throughout Kentucky. He painted more than 300 portraits, among which one of Lafayette was ordered by the legislature of Kentucky. In the Metropolitan Museum of New York is preserved his portrait of John Grimes.

JOUFFROY, zhoo’frwa, Frangois, French

sculptor: b. Dijon, 1806; d. Laval, 1882. He studied under Ramey and won the Roman prize in 1832 with (Capanee fondroye sous les murs de Thebes.) In 1857 he was made member of the Institut and officer of the Legion of Honor in 1861. Two years later he was appointed

pro¬

fessor at the Ecole des Beaux-Arts. His best works are (Cain maudiD ; (Jenne fille confiant son premier secret a Venus* ;

tomne) (1845) ;

and (La Protection for the Palais de Justice, Paris (1865) ; a marble Saint Bernard for the Pantheon.

JOUFFROY D'ABBANS, Claude Fran¬

gois Dorothee, klod fran-swa do-ro-ta zhoo-

frwa dab-ban, Marquis de, French inventor: b.

Roche-sur Rognon (Haute-Marne) , 30 Sept.

1751 ; d. Paris, 18 July 1832. He is claimed by the French as the inventor of steam navigation.

He served in the army, and in 1783 succeeded in propelling a small paddle-wheel steamboat up the Rhone at Lyons — the connection between piston and paddle-wheel axle being rack-and-

pinion. However, he found it impossible to get either the scientific or financial backing neces¬

sary to develop his idea and to commercialize it. In 1816 he attempted again to get the necessary support. This time he succeeded in founding a stock company. He built another boat, but its lack of success deprived him of further financial support. In 1830 he was ad¬

mitted to the Invalides where he died from an attack of cholera. A statue was erected in his memory at Besangon in 1884. He published (Des Bateaux a Vapeur* (Paris 1816). Con¬

sult Jouffroy d'Abbans, A. F. E. de, (Des Bateaux a Vapeur; Precis Historique de leur Invention, etc.* (Paris, 1841) ; Jouffroy d'Ab¬

bans, S. de,

Comte an XVIIIe Siecle-* (Besangon 1881); Pradel, P. de, (Le Marquis

de Jouffroy d’ Ab¬

ba1)ˆ (Paris 1890) ; Prost, J. C. A.,

quis de Jouffroy d’Abbans* (Paris 1889) ; Swiwny, S. H., ‘Jouffroy, the Inventor of the MeamjioaC (in Gentleman’s Magazine, n. s.

\ ol. XXXIV, p. 78, London 1885).

JOUKOVSKY, zhu-kof’ske, Vasily An-

~!Tievitch, Russian poet and translator: b.

1783, d. 1852. He was the son of a country land-owner and a Turkish slave named Salkha.

the lather, Bounine, turned the child over to Andrew Grigorovitch Joukovsky, who ulti¬

mately gave him into the care of Madame louchkov, sister of Bounine, a rich and talented lady of great musical ability living at Tula, where she was the life of an artistic circle.

Music, literature, plays, concerts were of fre¬

quent occurrence and awakened the latent tal-

ent °f boy who wrote two plays, (Camilla,) and ‘Paul and Virginia,) both of which were presented on the stage. In 1797 Joukovsky was sent to school in Moscow, where he at once be¬

gan contributing to the local papers poems that attracted attention; and making transla¬

tions for publishers to meet expenses, as his aunt died soon after his arrival at college.

Among his translations were Kotzebue’s entire plays and most of his novels. Becoming editor °f. the European Messenger, he proceeded to write each complete edition himself, making up the contents of translations, sketches, stories criticisms and poems. In 1810 his natural father gave him money enough to buy a small landed property on which he settled. There he found congenial neighbors in a rich land-

owner named Pletcheieve and his wife who were fond of literature, music, poetry and the drama. Madame Pletcheieve was musical and

Joukovsky wrote poems .and ballads which she set to music. The poet left with the national forces for the defense of the country in 1812 •

and his poem, ‘The Bard in the Russian CampJ

descriptive of the first battle, became immensely popular throughout Russia. A second poem ad¬

dressed to the Tsar on the capture of Paris in 1814 increased his reputation and brought him into direct contact with the court, where he became first reader to the empress and later on, tutor to the royal children. There he acquired .a reputation as a great teacher, a mas¬

ter translator and a good poet. He was a great favorite with the whole royal family who paid him _ liberally for his services. Joukovsky, judging from his original work, was possessed of considerable poetical feeling, but of com¬

paratively little originality. Thus he fell short of rising to real greatness. His translations in¬

troduced to Russia some of the best Romantic literature of Germany, France and England which he admired very much himself without apparently entering into the true spirit of the revival which this literature represents. How¬

ever, his long and enthusiastic labors and trans¬

lations inspired succeeding Russian writers who were destined to enter more fully into the spirit of the western Romanticism. A master of poetical ar}a literary form, Joukovsky was rather in¬

clined to be conservative, though his friends have> somewhat inadvisedly, claimed for him the honor of having been the leader of the Romantic movement in Russia. His classical taste is shown in his excellent translation of the ‘ Odyssey. (By his distribution throughout Russia of translations of English and German literature and his presentation of the authors and the interpretation of their work he proved himself an even more successful teacher of the literary part of the nation than he had been of the children of the court. His influence upon Alexander II and the literary genius, Pouch-

kine, was alike strong and, in a sense, epoch-

making, perhaps more so than that of any one other contemporary personage. Consult Grot, (Sketches of the Life and Poetical Works of

Joukovsky A Jarintzov, N., (Russian Poets and Poems) (New York 1917) ; John, ‘Speci¬

mens of the Russian Poets > ; Seidlitz, VW. A.

Joukovsky, ein russisches Dichtersleben> (Mit-

tau 1870) ; Waliszewski, K., (A History of Rus¬

sian Literature. }

o ir i ’ Jauics> -rrescon, Ingush physicist: b Salford, Lancashire, 24 Dec. 1818; d. Sale, Cheshire, 11 Oct. 1889. He was educated by private tutors at his father’s house near Man¬

chester and also received special instruction in chemistry from John Dalton (q.v.). His ˆther, a brewer, was a man of considerable wealth. This enabled young Joule during his early manhood to pursue scientific research for which he quickly developed great enthusiasm.

As early as January 1838 he described in the Annals of Electricity) an electromagnetic en-

?me While it was afterward

found that this invention was impracticable as a substitute for the steam-engine, the further investigation to which it led brought to light many important facts concerning the laws of heat, its electrical and mechanical nature and evolution, chemical affinity as related to heat etc. The mechanical equivalent of heat (see . was ascertained by Joule, who also, in 1847, announced the doctrine of the correla-

Hon and conservation of energy, in a paper read at Manchester which failed at the time to im¬

press men of science, as did also an address of like import before the British Association, but which was taken up by William Thomson (Lord Kelvin) (q.v.) with whom, from that time on, he collaborated to a. considerable extent and bv whom its momentous significance was brought home to the scientific world. No principle of science is now more fully established than Joules law for determining the energy de¬

veloped by an electric current in overcoming the resistance of a circuit, a law which he verified by experiment He received the highest honors oi scientific bodies and universities, amongst which were a gold medal from the Royal So¬

ciety in 85 2, the Copley Gold Medal from the same body m 1866, and the Albert Medal from the Society of Arts in 1880. In 1872 and 1887

he was made president of the British Asso¬

ciation for the Advancement of Science A statue has been erected to his memory in Man¬

chester and a tablet in Westminster Abbev His writings are to be found mainly in the proceedings of scientific societies and in Eng-

hsh periodicals, but were collected and pub-

‘shed by the Physical Society of London as Jbhe Scientific Papers of J. P. Ioule> (2 vnL

London 1884 and 1887) . Consult Kelvin, Lord!

J- V J°u W (in C assier* s Magazine, Vol Vi’

405, New York 1894); Reynolds. 0., • < Memoir °* }■ v,1 0 , (rn Memoirs and Proceedings of the Manchester Lit. and Phil Society, Series JOULE JOURNALISM

217

1VIVManchester 1892>; Tyndall, J.,

lhe Copley Medalist of 1870 > (in Nature , Vol.

V, p. 137, London 1872).

JOULE, International. See Electrical

Ierms.

JOURNAL OF THE REV. JOHN WES-

.EY, The. <(It was in pursuance of an advice given by Bishop Taylor . . . that I began to take a more exact account ... of the manner wherein I spent my time, writing down how I had employed every hour? From the (diary >

kept as a result of this advice John Wesley transcribed from time to time the more ma¬

terial parts** in order that he might ((openly de¬

clare to all mankind, what it is that the Metho¬

dists (so-called) have done and are doing now; or rather what it is that God hath done and is still doing in our land.® That is the origin and scheme of (The JournaP as set forth by the Rev. John Wesley himself. It begins with the entry of Tuesday, 14 Oct. 1735, the day he and his brother, Charles, «took boat for Grave¬

send, in order to embark f.or Georgia,® and ends with Sunday, 24 Oct. 1790, about four months before the author's death, covering a period of almost exactly 55 years. (The Jour¬

nalˆ is <(a curious, monotonous, wonderful nar¬

rative® of the goings and comings, the manner of life, the mental attitude toward the world, rubric, religious doctrine and practice ; the tem¬

perament, the ideas, the whole purpose of this most itinerant of all itinerant preachers. With the exception of the first part which deals with his visit to America, and a few pages covering his trip to Germany, taken in the hope that a stay among the Moravian Brethren would bring order out of the chaos of religious emotions and notions which filled his soul, this journal of nearly 2,000 closely printed pages is devoted to Wesley's unceasing and unparalleled activ¬

ities throughout the whole of Great Britain and Ireland. Perhaps no journal of so public a man ever reflected so little of the general life, or contained less information concerning the men and events of the time. For example, there is not a word referring to the epoch-

making struggles of the American Revolution.

It is the journal of a man who could see only the religious scheme which filled his whole being. It is a carefully prepared record of when he preached and where, what he preached about, the size and the character and conduct of the audiences and the influence of his preaching upon them, together with remarks upon the difficulties and personal damages encountered.

The brief and frequent mention of the opposi¬

tion of the clergy of the ((Church as by law established in England,® of which he considered himself to be . a true and loyal member, and the controversies with all other sectaries make (The JournaP of value for the study of reli¬

gious persons and institutions other than John Wesley. Although one must needs go to other sources to get a well-balanced and true measure of Wesley and his religious movement. (The JournaP must needs be carefully and sympathet¬

ically read by anyone who would know the author and Methodism from the inside. Sin¬

gularly enough, no one would ever suspect, from the reading of this journal, that Wesley had any social or home life; perhaps he didn't.

His religion was all in all to him. The people he talked and associated with are presented either as believers or unbelievers. All the events through which he and others passed and even natural phenomena are set forth in such a way as to make them appear as the workings of providence or the activities of demons, and all this is done with a modesty and reverence that is both attractive and sur¬

prising. Had.it not been for what Wesley be¬

lieved was wilful misunderstanding and mali¬

cious misrepresentation it is hardly likely this r˚ur j3 • wofu!d, have been prepared and pub¬

lished, in which case the world would have lost an intimate and revealing history of one of the most conspicuous figures and important reli-

gious movements of the world. Unquestionably .The JournaP is just John Wesley. What of his life is not here he counted as being of no value and so not worth being recorded. The kst section, covering the period from 29 June 1786 to the end was prepared for publication by some one after the death of the great Wes¬

ley and so is of different value from the other portion.

Charles Graves.

JOURNALISM. Journalism is a compre¬

hensive term which signifies the business of producing a public journal. In a general way it is applied to the vocation of making news¬

papers. Broadly speaking it is both a business and a profession, though

the name of journalist as commonly understood is limited to those who are engaged on the editorial or news or literary side of the production rather than on the business side. While editor and journalist are not strictly synonymous — the former mean¬

ing the head of a paper or a department and the latter any literary worker on a newspaper —they are often used as convertible terms.

In a large, sense the subject involves the functions of journalism as collector and pur¬

veyor of news and as leader and exponent of public opinion; the ethics of journalism in its various fields of political, religious, literary, social and commercial aim and representation; the relations of the counting room to the edi¬

torial department; the training and qualifica¬

tions of the journalist; in short, the mission, methods, responsibilities and obligations of journalism. All of these general phases are deeply affected by the physical conditions of the business. During the closing years of the 19th century these conditions were practically revolutionized. In the mechanical facilities of production, in the cheapening of white paper and in the instrumentalities of news collection there has been an extraordinary advance. This great change in the material factors wrought a corresponding change in the scope and character of journalism. Not only as a business enter¬

prise but as a public influence it took on new aspects.

The remarkable development of later years touches every side of the material production of a newspaper. The old, limited, slow-moving printing press has been transformed into the ingenious and gigantic quadruple or octuple which converts the plain white roll into com¬

plete, folded papers at the rate of 30,000 to 40,000 an hour. The number of pages may be determined at will, even at the last moment before going to press, thus responding to the exigencies of the news ; and the application of the half-tone and of color at undiminished speed

permits pictorial effects. Simultaneously with this improvement in the printing press has come the linotype which substitutes machine type¬

setting for hand composition. A third vital advance has been the perfection of the process of making paper out of wood-pulp, which has vastly increased the supply and greatly de¬

creased the cost of white paper.

These radical changes in the elemental busi¬

ness factors have largely modified the con¬

ditions of journalism. They have opened the way to unlimited production and have enor¬

mously cheapened the cost of the single copy.

Penny and two-cent papers have become the prevailing rule. Immense circulations have thus been rendered possible, and where, about 1875, the edition even of the most widely read papers was comparatively limited not a few now issue scores and even hundreds of thousands of copies a day. At the same time the initial cost of the newspaper plant with its expensive ma¬

chinery and the magnitude of the daily trans¬

actions require a far larger outlay than in the earlier time and the business has come to be one demanding much greater capital.

All of these circumstances have inevitably and powerfully molded the course and char¬

acter of journalism. They have given increased importance to its business side, and have tended to make business considerations in the publica¬

tion still more dominant. The effect has been twofold and somewhat contradictory. The great capabilities of the business with the re¬

duced cost of telegraphing have stimulated and quickened journalistic enterprise and have broadened the range, of the journalistic field.

The scope of journalism has been enlarged and in many cases its standard has been elevated.

Within a sphere, perhaps too limited, the best and worthiest effort is accepted as the best busi¬

ness. But, on the other hand, the competition for great circulations has

bred sensationalism and a pandering to the taste for personal and piquant matters. There is an eager and fever¬

ish struggle for the unusual, the dramatic and the spectacular, a constant straining for effect, a lavishness of ˆscareheads® and garish pic¬

tures, a studied and persistent search for ob¬

jects of criticism and attack. The appetite for the effervescent grows by what it feeds on, and must be met by new excitation. This rivalry of explosive and paroxysmal journalism is car¬

ried on with too little sense of responsibility and verification, and while the notable manifes¬

tations are exceptional and it would not be just to say that the infection has extended through journalism, it is nevertheless true that its in¬

jurious influence is widely perceptible.

In one important . and conspicuous respect the development of journalism as a business has palpably improved its character. It has produced a greater degree of independence than ever distinguished it before. In the earlier days political and official advertising might be a large item in the income of a newspaper.

Its monetary value gave it potency in con¬

trolling editorial policy. But in the expansion of the business under modern conditions official patronage is unimportant compared with gen¬

eral commercial advertising, and its relative de¬

cline in value has greatly reduced its power of influencing newspaper expression. The favor of the public is far more advantageous than that of the party manager. It brings popular circulation and consequently business advertis¬

ing, and there is less concern about the crumbs that fall from the official table. Even party journalism has greatly advanced in independ¬

ence. While standing as the recognized ex¬

ponents of party principles and policies the im¬

portant party papers have become much more free in their judgment of men, methods and measures. A more critical standard is applied and a more rigorous public accountability is enforced under which there has been a visible improvement in general civic administration.

Under the same influences distinctive inde¬

pendent journalism has increased. It professes to have no connection with any party and dis¬

claims a representative party position. Its theory is that it addresses itself not to party sentiment but to independent public judgment, and its claim for support is based on its journalistic quality without regard to political association. It is the extraordinary advance of newspaper-making as a business that has ren¬

dered independent journalism on a large scale possible. A quarter of a century ago it would have been difficult to name more than two or three important examples in the United States.

Now there are many conspicuous and success¬

ful papers which are thus classed, and even more significant of the change in journalism is the greater independence of the party jour¬

nals already referred to. Indeed, in essential independence, which consists of free judgment and candid expression on public questions, the line of demarcation between the better class of party papers and the professedly independ¬

ent papers is. scarcely perceptible and it would be hard to distinguish between them.

There has been a signal advance in other directions. Against the false and meretricious tendencies to sensationalism which have been indicated must be placed -a higher and broader treatment of all the varied interests of life.

In news collection the journalism of to-day is as much ahead of that of 1875 as the railroad express is ahead of the stage coach. It spares no expense, reaches everywhere,' sends its cor¬

respondents to all parts of the world, employs the best experts and specialists, caters equally to the lover of literature and the lover of

sports, keeps pace with scientific discovery and development, rivals the best periodicals in com¬

manding the most famous writers and artists, makes its own special missions of public serv¬

ice, reports all business, social, educational, philanthropic and religious movements, and, in short' treats whatever concerns mankind as within its boundless domain. Its range, enter¬

prise and comprehensiveness are a constant marvel. With all its faults the breadth, full¬

ness and accuracy which are combined with so much celerity of action attest a thoroughness of organization and extent of resources never before equalled.

There are marked differences, however, in its development in different lands. Continental journalism in Europe is of a type quite dis¬

tinct from English journalism, and that again is unlike American. In Paris the news is not the conspicuous feature of the newspapers. It holds, a subordinate place and is limited in its quantity. Literary and dramatic criticism and political discussion command the first rank, and JOURNALISM

the feuilleton is a popular and important part.

Literary excellence with a flavor of characteris¬

tic French wit is the dominant trait. The Parisian type with variations, generally soberer and heavier, is the prevailing Continental model.

English journalism is weightier and more en¬

terprising in news. It covers the field of inter¬

national politics and war with special thorough¬

ness. It lacks the variety and vivacity of American newspapers, but within its chosen and more limited range it is more complete. Its reports of parliamentary proceedings and of important political, social and scientific meet¬

ings are copious and intelligent, and its discus¬

sions are distinguished by sobriety and infor¬

mation.

In life, spirit, minuteness of news gleaning, emphasis of display and preponderance of per¬

sonal flavor American journalism far outstrips all others. It does not surpass, oftentimes does not equal, British journalism in .the presentation of great events, but in the multiplicity of its news of all sorts not only from its own country, but from all the world, there is no approach to it elsewhere. Its dominant tone is a light and airy freedom. There is a manifest tendency even on the part of the most respectable news¬

papers to avoid being heavy. The general aim is to be breezy, pungent and picturesque, and this often leads to the flippancy which is re¬

marked in American papers. Perhaps the pub¬

lic taste which is thus indicated and cultivated will serve to explain in part why there are no serious and masterful weekly journals of liter¬

ary and political discussion in the United States like the Spectator and the Saturday Re¬

view, and why even the monthly periodicals run chiefly to fiction and light matter. There are excellent trade journals of a high grade, showing a demand for the searching and care¬

ful treatment of special interests, but outside of these immediate representatives of the stupen¬

dous material enterprises of the land, the trend is toward the lighter vein.

Somewhat analogous is the explanation of the fact that journalism has grown more im¬

personal in its sources and impress. It is no longer distinguished by the great overshadow¬

ing personalities which marked it a generation ago. No editorial chief puts his individual stamp on a paper as Horace Greeley did, with his controversial power, his moral earnestness and his incisive force, which seemed to make the whole paper breathe his spirit and speak

his voice. There are no successors to Ray¬

mond, Bennett, Weed, Bowles and Dana.

Henry Watterson is perhaps the only survivor of the old school of journalists. The differ¬

ence is due, however, not so much to the lack of men as to the change of conditions. In its immeasurably wider range and larger demands the great journal of to-day is the product of-

no single mind, but of a vast organization and of a whole galaxy of stars. The elder journal¬

ism was largely political pamphleteering. The later journalism is the complete mirror of daily life, and no individual throws so great a shadow across its comprehensive face.

It is a question much mooted whether jour¬

nalism has declined in influence. It never was as universally read as now; it never was so much a common practice to read several news¬

papers ; and whether in this multiplicity of reading and frequent contrariety of represen¬

tation as serious an impression is made as when the appeal was more earnest and less di¬

vided may well be doubted. The editorial page has not actually fallen off in interest and im¬

portance ; on the contrary, it is all in all better written, more varied and more instructive than when it had more of a polemic character. But in the broad development and great advance of the news departments the editorial page has receded in relative importance, and the drift to the light 'treatment of topics has tended to detract from its distinct and superior position.

The greater absorption of the public mind in multiplied interests operates in the same direc¬

tion. In the stress of modern business life and in the variety of diversions the body of readers have less time to follow public dis¬

cussion. If it be true, as it often is, that the favorite journal does the thinking for its read¬

ers on current questions, it is equally true that many of the questions take less hold than when life was more simple and feeling more tense.

When the press is in substantial accord on any public matter, except where party tradition rules, it generally carries the public judgment, and united expression makes it invincible; but when there is a discord of journalistic voices little heed is apt to be paid to any. The power of the press in its aggregate force, in the sweep of its activities and in a certain ap¬

prehension of its publicity, has steadily aug¬

mented ; but at the same time the impression that it is too intrusive, too little restrained, too little governed by a just sense of responsibility, has grown and has impaired the influence it would otherwise exert.

It remains true, however, and probably grows more true with the decadence of other influences, that the press is the most effective force in protecting the moral and social well¬

being of the community. It is the belief of many observers that under our modern condi¬

tions the weight of mere authority is declining.

In the intense strife and eagerness of the times the efficacy of the old standards in enforcing true principles and restraining wrongdoing grows weaken With this advance of individual assertion and independence the power of public opinion is becoming the surest defense of social and business morality. The blaze of publicity gives a protection which nothing else furnishes.

In the financial and social world there is a wide margin along the shadowy and undefined line between law and lawlessness, between ethical duty and questionable interest where the search-light of exposure is the only secu¬

rity. Much would be done under cover of darkness which fears the light. Despite a free¬

dom which often degenerates into license the press is thus recognized not only as the most effective safeguard against political and admin¬

istrative debauchery but as the best bulwark against that social and business misconduct which becomes a public offense.

The relation of the counting-room to the editorial department involves both the business and the ethics of journalism. The business side cannot be disregarded. In its ultimate purpose it is a commercial proposition. Newspapers are published to make money. The counting-

room considers both income and outgo. It ad¬

justs expenditures to receipts. It properly 220

studies to augment revenue in every legitimate way. But while newspapers are business enter¬

prises they are such with recognized limita¬

tions and obligations. They are not simply business undertakings but public representa¬

tives, and the former object, while consistent with the latter, is subordinate to it. The foundation of the newspaper is the confidence of the public. It is the history of yesterday and the interpreter and teacher of to-day. In the very nature of the relation it assumes dis¬

tinct obligations. It is bound to give the news and to treat public questions in absolute good faith. The counting-room is warranted in do¬

ing business in every way compatible with the fulfilment of that duty, but in all legitimate journalism it is a fundamental rule that edi¬

torial opinion and news publication must be beyond the reach of any questionable influence.

The editorial department must be entirely free from commercialism. Public confidence and moral power depend on full faith that editorial and news conduct is honest, fearless and up¬

right. The publication of a newspaper, like any other enterprise, is founded on business principles; its sphere or field of operations, whether general, political, literary or other, is chosen; the relation of counting-room and edi¬

torial-room in organizing and maintaining it on a sound business basis is of the most intimate character; but when the general lines of the enterprise are determined, the independence and integrity of the

editorial management and fidelity to its declared aim as a public repre¬

sentative within its chosen sphere are abso¬

lutely indispensable. This rule lies at the foundation of the whole ethical code of journalism.

The question of the training and qualifica¬

tions of the journalist has assumed new inter¬

est and importance both through the general growth of the profession and through special movements for its advancement. Schools or chairs of journalism have been established in a few instances and in a limited way, and the munificent endowment by Mr. Pulitzer of a college of journalism in Columbia University — the first large and distinct project of the kind — has presented the proposition in a prac¬

tical and definite form. There are two systems of thought on the subject. The first holds that the best and most efficient school of journalism is the newspaper office. It believes that the true journalist is born, not made; that knack, aptitude, native talent, the sense of news and proportion lie at the foundation of success ; and that the most useful training is that of actual experience. It does not dispute that broad education and culture are essential to the journalist, and recognizes that particular studies, like history, political economy, the fundamentals of law, social science and kindred matters, may be followed with special advan¬

tage. But it urges that these may be gathered from the general college course, and that the college or university has no distinctive profes¬

sional knowledge to teach journalists in the special sense that it has to teach lawyers or physicians. The technicalities of the newspaper art — a suitable style, phonography, proof read¬

ing, the treatment of news and the like — are best acquired in practice, and the rest is the quickest and surest application of knowledge which is power, and of instinct or intuition which in dealing with public intelligence and currents is no less power, to the activities of the world.

The other system of opinion is represented in the scheme and scope of Mr. Pulitzer's Col¬

lege of Journalism. It is based on the theory that -the journalist can be prepared for his voca¬

tion, like the lawyer, by a special course of study adapted to its requirements. Its aim and its tendency are to elevate and dignify the pro¬

fession, and to establish a higher standard both of obligation and of performance. It seeks to teach not merely the technical necessities in newspaper-making but the true ideals of public service to which the newspaper should be dedi¬

cated, and the wide range of knowledge with which the journalist should be equipped. This includes style, ethics, law, literature, history, sociology, statistics and particularly the prin¬

ciples and methods of journalism. It embraces an examination and comparison of existing newspapers by experts, an exposition of the functions of editor, correspondent and reporter, and the production of an experimental journal under the necessary limitations with its prac¬

tical application of the instruction. In its main features this plan is an enlargement of the ordi¬

nary academic course directed to a particular end, and it is claimed that the establishment of such a college with liberal endowment would not only provide a large body of trained jour¬

nalists but would set a standard for the pro¬

fession.

On the whole, notwithstanding the faults of the ((new journalism,® the position of the press in the public estimate is increasing. One evi¬

dence of this truth is the more liberal character of libel legislation. In some States the greater license has prompted efforts at more restrictive measures, but the general trend of legislation has been toward reasonable liberality with just accountability. The prevailing movement has been to provide reparation for any wrong or injury that may be done, to assure just restitu¬

tion for actual damages, but not to permit puni¬

tive damages to trammel the free expression of opinion. Journalism is advancing and is ac¬

quiring a higher position and recognition as a distinct profession. With the enlightened spirit of the age and with the marvelous agencies of instant and united expression the power of pub¬

lic opinion steadily grows, and the journalist is its medium and prophet. See American News¬

papers ; Periodical Literature.

Charles Emory Smith,

Late Editor of cThe Press,' Philadelphia.

JOURNALISM, Agricultural. As with the

press in general, agricultural journalism has grown in this country as nowhere else in the world. This is due, of course, to the wide¬

spread literacy of our people, as compared with the general agricultural populations of other modern countries. But it is also due to the demands of the new farming and rural life.

The extension of the reading habit among farmers has undoubtedly furthered the rapid expansion of agricultural journalism. Its growth in this country really began about the middle of the last century, but since 1900 there has been a tremendous growth in the number the variety, the circulation and the influence of the farm papers and journals of all kinds.

This period of most rapid expansion is coinci¬

dent with that of the extension of public edu¬

cation and the various phases of rural progress.

Until recent years there have been few books that treated the farmer's problem from his point of view. Moreover, he had to learn the habit of dependence upon books. The farmer now can find specific help in books, for farm experience is rapidly being put into print. The present-day farmer who would succeed among his fellows must read. The reading habit has naturally developed. The experience of the experiment stations as indicated by their "lists* shows the demand for the ordinary bulletins growing quite rapidly, but not so universal as

could be wished. The extension departments have sought to encourage the read¬

ing habit by the development of farmers' read¬

ing courses. The agricultural colleges have also widely cultivated the habit of "correspond¬

ence* in their constituents.

The sympathetic editor of an agricultural paper has an even greater opportunity. An important phase of the work of the farm journals is nearly always this "correspondence"

feature. They also bring to the farmer digests of the books and bulletins elsewhere appearing which might be of interest to him. They thus furnish to the farmer practically the only litera¬

ture adapted to his needs and tastes except the technical agricultural books and bulletins. The proportional scarcity of books and papers in the farm home is a result of the lack of adapta¬

tion of general literature to the farmer's special needs. The daily newspapers — and especially the weeklies and semi-weeklies — have to some degree adapted their columns to the needs of their farmer readers, by, in many cases, pages and supplements which practically amount to farm papers. The farmer's need for suitable reading matter is thus rapidly and successfully being met.

In 1918 there were listed in the various an¬

nual newspaper directories some 400 specifically agricultural journals. From 1908 the number had increased by nearly 100 (25 per cent). This rate of increase was much more rapid for this and other special journals and periodicals than for the press of the country in general, and is indicative of the adaptation of the American press to the special needs of the various classes and occupations of our people. The number of those which the directories call agricultural pub¬

lications, and which have some agricultural ma¬

terial and interest, but are often agricultural only in name, is much larger, probably 900. This listing does not include the very large number of government bulletins and other publications which might legitimately be added. The "weekly* seems to be the most popular form of American journalism, in general, for of the 25,000 newspapers

and periodicals published nearly two-thirds, or more than 16,000, are weeklies. This is even truer of “die more special¬

ized periodicals, and specifically7 ox the agricul¬

tural press. “Quarterlies* are rare, as are “bi¬

monthlies* ; but “monthlies* are fairly com¬

mon ; the “semi-monthly* or “bi-weekly* much less so; the “weekly* by far the most common.

There are also “dailies,* but they are only in the form of brief bulletins of information. The weeklies also have by far the larger circulations, indicating that they best meet the popular de¬

mand. The agricultural press has specialized with amazing rapidity, showing the intensive special and local interest of the farmer. The number, variety and circulation of the papers that cannot be classed as agricultural, but are devoted to forestry, horticulture, floriculture, stock and stock-raising, irrigation, poultry, bee¬

keeping, dairying, as well as to a multitude of still more special interests, steadily increases.

The foreign language press appears also in agricultural journalism. There are already a score and more in Hungarian, Japanese, Swiss-Italian, Bohemian, Hollandish, Finnish, Swedish, German, Polish. The largest number hitherto are in German.

No attempt has been made to arrive at the total circulation of farm papers. There is a full score of them with sworn circulation of more than 500,000; probably one-quarter of all have a circulation of more than 100,000. The more special and local papers naturally have the smallest circulation. The more important of the farm papers thus equal in circulation the greatest city dailies. In general, they are largely confined to State areas for their re¬

spective constituencies, but a number are re¬

gional in influence. There are none that ap¬

proximate to the status of a national farm journal. There has, however, been some ap¬

proach to such in the case of the Orange Judd Farmer with its various

regional editions.

Thus, while its latter-day expansion has been most noticeable, agricultural journalism has nevertheless had a long history and a sound development and evolution. It is by no means of such recent appearance as is so often suggested. While there was no sign of an agri¬

cultural paper until the beginning of last cen¬

tury, the rise of the agricultural societies at that time brought such into existence in the form of the regular organs of the societies for collecting and distributing information. Such were, however, rather in the nature of a “record* than in the form of a “journal.*

Probably the first of these was the Massachu¬

setts Agricultural Repository and Journal of the Massachusetts Society for Promoting Agri¬

culture, established in 1793.

Agricultural journalism in this country is usually, however, dated from 1819 when the American Farmer was established in Baltimore as an eight-page weekly. This lasted till 1862.

Other notable early farm papers were The Plough Boy, of Albany, New York; the New England Farmer, of Boston, 1822 ; the first New York Farmer, New York, 1827. Few of these early publications have survived. The Country Gentleman, originating in 1853, has probably had the longest continuous history.

But a number of farm papers, appearing first about the middle of the century, still survive, and have given a substantial nucleus to the rapidly expanding agricultural press. From 1850

the development has been rapid. Independent horticultural papers began to appear about 1835

and other special journals rapidly followed.

Agricultural journalism has doubtless played its part in the adjustments necessary under the rapidly changing conditions of agriculture and rural life in the United States. Its prints have doubtless taken the place of traditional experi¬

ence, so important a factor in agricultural prog¬

ress in other lands. It has served as a neces-

sary and invaluable link between the progres¬

sive leaders of American agriculture in the gov¬

ernment offices, the colleges, and on the farm, and the general farm population. It has served to distinguish and dignify the farmer's occupa¬

tion and life by its recognition of his special needs and tastes. Its greatest lack at present seems to be that it is still largely devoted to the technical and economic aspects of the farm¬

er's life and fails to devote sufficient attention to the social. This defect is, however, being remedied by the development of special farm home and family journals.

William L. Bailey,

Associate Professor of Political Science, Grin-

nell College.

JOURNALISM, Class Publications. The

story of American journalism is incomplete vvithout consideration of the influence of maga¬

zines as distinguished from newspapers, of technical and trade papers, foreign language papers, college periodicals, and a long line of what are called <(Class Publications, ranging all the way from religious papers and women's magazines ito medical journals and anarchistic periodicals. All these are a part of journalism, and each class contributes its share to the mold¬

ing of public thought and action. For it must be admitted that the republic is largely gov¬

erned by its journalism ; this has come to be the accepted mode of interchanging thought, and when many great newspapers or maga¬

zines or periodicals act in unison on definite lines, public thought is molded, and action re¬

sults. We have to judge our public men mainly by what the press says of them; we have to form opinions of our industries largely by the trade papers; we have to measure the work of colleges in considerable degree by the sort of college papers they create. The great divines, the great surgeons, the great scientists have to be made by the press or remain unknown. So, whether we like it or not, we are forced to the conclusion that the charge that America is governed by its press is largely true ; hence the great importance of keeping that press pure and devoted to the highest ideals. Magazines of nation-wide circulation have come to exer¬

cise a strong influence on national policies and the government at Washington. They thus serve as a wholesome balance to the influence of a local press that must largely represent its own locality rather than the people as a whole.

The religious press has a wide influence on the development of the churches, which are gen¬

erally recognized as the saving element of every community that makes for advance in morality and ideals. The agricultural press is almost as numerous, and has undoubtedly had a large share in the movement to make farm¬

ing more profitable and to rescue agriculturists from handing all their profits to middlemen.

Through public agitation and development of granges, selling societies and the Farmers' Na¬

tional Congress the farmer has taken his right¬

ful place as a business man, and seems likely to maintain it in spite of industrial trusts. The technical and trade press has had a tremendous development, belonging almost wholly to the period since 1880. Every great industry has numerous important periodicals, and the minor industries have from one to half a dozen each.

These have come to wield a wide influence, and are very informative to the outside world, as well as the special industry concerned. They afford a field for discussing and thrashing out differences of opinion in the trades, both as to business measures and mechanical and tech¬

nical problems. This sort of journalism has reached its highest development in America, and has done a large share toward bringing together the active men in each industry and helping them to work on harmonious lines.

College journalism was long looked upon as amateurish, and merely illustrative of boyish effort and imitation ; but it is now apparent that it has found a deeper and fuller meaning.

In the colleges are developed most of the men who are to be the leaders of the coming busi¬

ness generation. Their college papers are the trying-out ground, where young college men first test themselves against the world, and be¬

gin to learn something of the conditions of life and society under which each must work out a place for himself, if at all. They afford a much needed expression of the younger minds, and dull is the college professor who cannot gain lessons from the sprightly scrib-

blings of his own students. The foreign lan¬

guage press was regarded by most journalists as being a wholly negligible feature in Ameri¬

can journalism until the advent of the war.

Then it became apparent that visitors to our shores who clung to their mother tongues were largely influenced in their views by our foreign language papers, and that many of them were quite un-American in tone and utterance. It is well that the eyes of the great public were opened to what is the average character of foreign language papers, because an under¬

standing of their position and influence carries its own remedy for any abuses of the power to influence those on American soil, where Liberty should be maintained as the national watchword _ and the ideals of the Fathers of the Republic upheld at all costs. The number and importance of these various class papers can be ascertained by reference to the article on Newspapers, American. They are a per¬

manent addition to Journalism, and must be reckoned with in any broad-minded effort to judge of the influence of the press on the peoples of the New World.

Charles H. Cochrane,

Formerly of the Editorial Staff of Newspaper-

dom.

JOURNALISM, School of, a college of

journalism, endowed by a gift of $2,000,000 by Joseph Pulitzer, editor and proprietor of the New York World, to Columbia University, New York, in 1903. With the advance of civ¬

ilization and genera! culture and intelligence the demands upon the journalists of the present day are constantly becoming greater and this college is the recognition of the importance and place of journalism as a profession, and a prac¬

tical endeavor to equip those who adopt it, by a course of thorough instruction, for its exact¬

ing and laborious duties. Mr. Pulitzer consid¬

ered the creation and rendering effective of pub¬

lic opinion a task of which the press alone is capable of successfully accomplishing. The College of Journalism is therefore a means to an end — to raise the character and standing of journalism, to increase its power and pres¬

tige, and to attract to the profession men of JOURNALISTS — JOUTEL

highest capacity and the loftiest ideals, \vho, because of special training, will advance vlhe professional to a higher standard of thought and action. This school was the first institu¬

tion of the kind in the world. It opened 30

Sept. 1912. On 1 Nov. 1916 there were in all 180 students, of whom 36 were women. Stu¬

dents of maturity, experience and marked fit¬

ness are admitted without examination. The degree of bachelor of literature in journalism was conferred on 24 students in 1916. While there are universities and colleges which give courses in various phases of journalism, no other school is so well endowed, none has a course giving so much time to the solid study needed for the training

of the journalist, and the school has also the crowning, advantage of a metropolis like New York in which to train its students in reporting by sending them to see and to write upon events as they come in the life of a great city. Attendance on first-

night performances is employed in training for dramatic criticism. This, practical training in the work of the journalist comes in the last two years, but of the four years' course four-

fifths are devoted to the study of history, con¬

stitutional law,, political science, economics, statistics, American and European literature, etc. ; a mastery of either French or German is insisted on. In 1918 the school was placed on a full professional standing. Five years are required for a degree from the high school, the first two in college and the last three in the School of Journalism. See Journalism.

JOURNALISTS, The ((Die Journalisten>).

This comedy of four acts in prose was played for the first time in 1852, the year in which it was written. It originated in the personal experience of its author, Gustav Freytag, who from 1848-70 had been a partner and joint-

editor of the Grenzboten, a German weekly for literature and politics. The scene is laid in a provincial town in Germany, and the signifi¬

cance of journalism in politics is dealt with, as well as the character and the social position of journalists. In the electoral campaign be¬

tween the Conservative and the Liberal party —the pivot of the plot — victory for Oldendorf, the candidate of the Liberals, is won through Bolz, one of the editors of the Liberal paper The Union. Bolz is the hero of the play. He can get along well with any one, he is never upset, least of all when he pretends to be, he is humorous and peppery, he can even venture on risky enterprises, for his heart is and always remains in the right place. In his person the journalists are also granted their esteemed place in modern society, for Adelheid Runeck, a young lady of wealth and noble birth, gives him her hand in marriage.

The strength of this comedy lies largely in a clearly drawn up scheme, a quick, witty dia¬

logue, a smooth delineation of characters, and a sympathetic insight

into human nature whose weaknesses are smiled at rather than satirized.

Consult G. Freytag's works (Leipzig, 1887-88, Vol. Ill, pp. 1-112) ; English translation in (The German Classics* (Vol. XII, pp. 10-108) ; Seiler, F., (G. Freytag) (1898, pp. 81-91) ; Stern, A., ˆStudien zur Literatur der Gegen-

wart) (Vol. I, 3d ed., 1905) ; Lindau, H., (G.

Freytag) (Leipzig 1907).

Ewald Eiserhardt.

JOURNEY AROUND MY ROOM

(\7oyage autour de ma chambre). We owe this "exquisite morsel, ** as the French admir¬

ingly call it, to a happy accident. Xavier de Maistre (1763-1852) having been arrested as a young officer for duelling was sentenced to con¬

finement for six weeks. He wrote 42 chapters, one for each day, descriptive of his wanderings around his room. He had no thought of pub¬

lishing the work, but his elder brother, the philosophic writer, Count Joseph de Maistre, secured its publication. It is a little the irony of fate that, as David says in his introduction to the volume containing it in the French series known as the (Library of the Bibliot'heque Na¬

tional, > the younger brother's unvalued literary *

diversion promises to outlive the elder brother's philosophic speculations. The book is known particularly for its sympathetic treatment of the. duality of man's nature. His animal body is in prison, but his mind can go wandering far beyond the walls.. His mind can occupy it¬

self satisfactorily while his animal is doing the ordinary things of life. His mind watches his animal make coffee in the morning, and some¬

times, lost in happy memories or occupied with poetic distractions, permits the animal without sense in such matters to 'burn itself with the fire irons or do something equally foolish. A favorite mode, of

journeying, since he is not hurried, is while seated on an armchair to lift the forelegs a few inches from the floor and then, swinging backward and forward, to move gradually, almost, imperceptibly, around the room. Almost invariably his animal makes his way toward the portrait of a charming lady that hangs on the wall. Thirty years after (The Journey Around My Room,* its author wrote (The Nocturnal Expedition Around My Room) in the same vein and, surprisingly enough, with equal charm. Consult Sainte-

Beuve, Portraits. Contemporains) ; Bibliotheque Nationale Collection des Meilleurs Auteurs An-

ciens et Modernes (complete works in single small volume) ; Eng. translation, Philadelphia 1829; New York 1907.

James J. Walsh.

JOUTEL, zhoo'tel, Henri, French pioneer in America: b. Rouen, late in the I7>th century; d. there early in the 18th. He was a soldier in early life. When La Salle was commis¬

sioned in 1684 to reconnoitre the mouth of the Mississippi by sea, Joutel accompanied him as intendant. In 1685 he was appointed by La Salle to finish Fort Saint Louis, which the latter had begun. After the departure of La Salle on his expedition, two of the colonists formed a plot to murder Joutel, but he dis¬

covered it in time, and, having received an order to join La Salle with all his force, he delivered the criminals to the latter. In Octo¬

ber, Joutel was again made commander at Fort Saint Louis with 34 men under him, and was again disturbed by plots to kill him or deprive him of his office. He set out for the Illinois on 12 Jan. 1687, with La Salle, and, after the assassination of the latter on 19 March, Joutel's death was also decided on, but his life was finally spared. Not long afterward he set out for Illinois accompanied by six other French¬

men and after various adventures reached Fort Saint Louis on 14 September, and arrived in Mackinaw on 10 May. Joutel went to Mont¬

real and Quebec shortly afterward and err-

barked for Rouen, where he appears to have spent the rest of his life. Charlevoix saw him there in 1723. Joutel was the only one of La Salle's party on whom that explorer could rely and his account of the last expedition of La Salle is the only trustworthy one. This work is entitled, (Journal historique du dernier voy¬

age, que feu M. de la Salle fit dans le Golfe de Mexique, pour trouver I'embouchure et le cours de la Riviere de Saint Louis, qui traverse la Louisiane. Au Ton voit 1'histoire tragique de sa mort et plusieurs choses curieuses du nouveau monde) (Paris 1713; Eng. translation by H. R. Stiles, Albany 1906).

JOVANOVIC, yo-va'no-vich, J o v a n

(ˆZmaj®), Serbian journalist and poet: b.

Novi Sad, Neusatz, 1833; d. 1904. He studied law in Pest, Prague and Vienna and returned to his native place to practise his profession.

There he drifted into journalism, becoming editor of the Javor (Acorn) in 1861. In 1862

he returned to Pest to study medicine in which he graduated six years later. All the while he continued to contribute to the press humorous and other articles in prose and verse which attained considerable popularity. In 1864 he founded the Zamaj (Dragon) , which served as the medium of publication of some of his best work. Two years later his successful play (Saran) was presented. His growing reputa¬

tion led him more and more insensibly into literature. Part of this activity resulted in the founding of Starmali, a humorous periodical (1878), and Neven, a juvenile publication (1880). In addition to his extensive creative poetical and prose work Jovanovic was a very active and successful translator into Serbian of the literary productions of other poets. Good editions of his own works were published in 1880 and in 1887.

JOVANOVIC, Stephan, Baron von, Aus¬

trian general: b. Pazariste, 1828; d. 1885. En¬

tering the army young and without any previous military education, he rose rapidly by his appli¬

cation and ability. In 1848 he took part in the Italian campaign ; and in 1852 he went to Tur¬

key, where he ultimately became consul-general with headquarters at Bosnia (1861—65) . He served in the army in Italy in 1865h56, and was commander in Dalmatia in 1869. Nine years later he became military governor of Herzegovina; defeated the revolutionists in Krivosije in 1882 and returned to Dalmatia as civil governor the following year.

JOVANOVIC, Valdimir, Serbian states¬

man and author: b. Shabatz, 1833. Studying in Vienna and Berlin, he obtained a position in the Department of Finance, which he soon lost on account of his radicalism. He ven¬

tured into journalism with the same result. He was finally forced into exile, going to Switzer¬

land. Returning to Serbia he became leader of the younger and more radical element. In 1869 he was arrested and tried for the murder of Prince Michael, but was acquitted. His radical views gradually changing, he was elected a member of the Skupshtina in 1872 and ap¬

pointed Minister of Finance four years later.

The latter position he held until 1889 when he became a member of the Council of State (1889-93). Among his works are (The Serbes and their Mission in Europe and the East) (1870); and Emancipation and Unity of Ser¬

bia* (1871). He also made extensive transla¬

tions into Serbian.

JOVEITE, jov'it, is a nitro-substitution ex¬

plosive used in blasting, and as charges for high-explosive shells, which was invented by J. E. Blomen, Washington, D. C. It consists of nitro-naphthalenes 6 to 8 per cent, nitro-

phenols 16 to 30 per cent, and nitrate of soda 64 to 76 per cent. It is made by melting the nitro-naphthalenes in a steam-jacketed kettle, adding the nitro-phenols and continuing the heating until they are melted, and then stirring into this liquid mixture the solid nitrate of

soda in a finely ground and perfectly dry condi¬

tion until each of the solid particles of the ni¬

trate is coated and impregnated with the liquid.

On cooling, the particles of the nitrate are protected from deliquescence by the coating of scarcely soluble nitro-substitution compounds, while on explosion, the nitrate causes the reac¬

tion to be most complete. For blasting pur¬

poses this explosive is used in a granulated condition, but in loading armor-piercing projec¬

tiles _ it is poured into the shell while in the plastic condition and on cooling sets to a hard mass which completely fills the cavity except for a canal in the centre where the fuse is placed. For blasting purposes the explosive is fired by means of a mercuric fulminate detona¬

tor, but the charges in shells are fired by means of gunpowder fuses. In tests of the explosive by the United States navy, made at Indian Head, Md., in 1897, a 10-inch Carpenter armor-

piercing shell containing 8.25 pounds of joveite, fired with a velocity of 1,860 foot-seconds at a Harveyized nickel-steel armor plate, 14.5 inches thick, passed completely through the plate and burst on the other side. See Explosives.

JOVELLANOS, ho-vel-ya'nos, Gaspar

Melchior de, Spanish statesman and writer : b.

Gijon, Spain, 5 Jan. 1744; d. Vega, Spain, 27

Nov. 1811. He was educated at the universities of Oviedo, Avila and Alcala, became in 1770 a member of the Royal Academy, in 1778 chief justice of the Criminal Court at Madrid and in 1780 a member of the council of state. Subse¬

quently he was for a time Minister of Justice, but in 1801, through the agency of his enemy, Don Manuel Godoy, was imprisoned at Ma¬

jorca. Released at the French invasion (1808), he joined the patriots and became a member of the supreme junta. His writings are various, including treatises on political economy, a dis¬

sertation on English architecture, a (Memoir on Law Applied to Agriculture,) the tragedy

Pelayoˆ and (E1 Delincuente Honrado* (

JOVELLAR Y SOLER, Ho-va-lyar', Joa¬

quin, Spanish statesman and soldier: b. Palma de Majorca, 1819; d. 1892. He saw military service in Cuba (1842-49); later in Spain (1849-53) ; and afterward in Morocco (1853-

60). In all of his military campaigns he made a brilliant record and rose to the rank of colonel. In 1863 he was made brigadier-gen¬

eral and the following year he became assist¬

ant Secretary of War. He left Spain on" the proclamation of the republic ; but he was in¬

duced to return and was appointed governor-

general of the island of Cuba, a position he gave up to become Minister of War under Al¬

fonso XII. But he was needed in Cuba and he again became governor-general of the island.

He was very largely instrumental in bring¬

ing the Ten Years' War to a close (1878). On his return to Spain he became captain-general of the Spanish army and head of the Spanish forces in the Philippines.

JOVIANUS, jo-vi-a-nus, Flavius Claudius, Roman emperor : d. Dadastana, Bithynia, 17

Feb. 364 a.d. He was originally captain of the household troops of the Emperor Julian, whom he accompanied in the disastrous campaign against the Persians in which Julian lost his life (363 a.d.) . After Julian's death he was proclaimed emperor by the troops, but could only extricate his army by ceding to the Persian monarch the five provinces beyond the Tigris.

He was succeeded by Valentinianus I.

JOVINIAN, an Italian opponent of the

regular form of the Christian Church who flourished in the 4th century. He was one of the first great protesters in that body. He op¬

posed the celibacy of the priests, though he never was himself married. He also opposed fasting and penance and the adoration of the Virgin. Driven out of Milan for his opinions he went to Rome, where he and his followers were excommunicated (388). On the confirmation of this sentence by the Pope, Jovinian was ban¬

ished to the island of Boa by the Emperor Hono-

rius, where he remained until his death in 406.

But notwithstanding the banishment of Jovin¬

ian his ideas continued to spread. But the ac¬

tivity of Augustine and Jerome, their strong defense of the ascetics, their thunders against Jovinian and the support of the temporal au¬

thorities were ultimately successful in stamp¬

ing out the Jovinian sect. Consult Karnack, Adolf, (History of Dogma) (Boston 1894-

1900) ; Jerome, (Adversus Jovinianum* (Nicene and Post-Nicene Fathers, Vol. VI, 2d series, New York 1893).

JOWETT, Benjamin, English scholar and

educator: b. Camberwell, London, 1817; d. 1 Oct.

1893. He studied at Oxford, was ordained in 1842, and became regius professor of Greek in 1855. In 1855 he published a notable commen¬

tary on the Epistles of Saint Paul. In 1860 he contributed an essay (On the Interpretation of Scripture) to the celebrated volume (Essays and Reviews,* for which he was tried on a charge of heresy before the Chancellor's Court, but was acquitted. In 1870 he became master of Balliol College, and in 1871 published his most important work, a translation of the (Dialogues of Plato, * of which a fifth edition was issued in 1892. He subsequently published translations of Thucydides (1881) and the (Politics* of Aristotle (1885). He was vice-chancellor

of the university (1882-86). Consult (Life and Letters) (edited by Abbott and Campbell, 1897) ; Tollemache, (Benjamin Jowett, Master of Bal-

liol* (1895).

JOWETT, John Henry, English clergy¬

man : b. Halifax, England, 25 Aug. 1864. He was educated at the University of Edinburgh and Oxford University. In 1890 he was or¬

dained a Congregational minister and became minister of Saint James Church, New Castle-on-

Tvne 1890-95 ; minister of Carr's Lane Church, Birmingham, England, 1895-1911; pastor of the Fifth Avenue Presbyterian Church, New York city, 1911-18; returned to England in 1918 and became pastor of Westminster Chapel, London.

He is author of (Apostolic Optimism and Other Sermons* (1901) ; (Brooks by the Traveller's Way* (1902) ;

(1903) ; Wet Another Day* (1905) ; (Passion for Souls* (1905) ; (Folly of Unbelief and other Meditations* (1906); (Daily Altar*

(1907);

mor of God* (1916).

JOWF, or DJOWF, jouf, oasis in north¬

ern Arabia between the Syrian and Shammar deserts. It is also the name of a district of South Arabia. The oasis, which is really what its name implies, a fertile spot in the desert, produces a variety of products peculiar to the climatic conditions of that region, among them being excellent dates. Pop. about 40,000. The capital, El-Djof, contains about 4,000 people, while Sekakah has a population of about 5,000.

JOY, Charles Arad, American chemist : b.

Ludlowville, N. Y., 1823; d. 1891. He was edu¬

cated at Union College and the Harvard Law School. He also studied at Berlin and Gottin¬

gen and received the degree of Ph.D. from the latter in 1852, and after a few years spent as professor of chemistry at Union, became in 1857 professor of chemistry at Columbia, where he remained for 20 years. In 1866 he became president of the Lyceum of Natural History (later the New York Academy of Sciences) and was long one of the editorial staff of the Scientific American.

JOY, George William, English painter : b.

Dublin, Ireland, 1844. He was educated at Har¬

row and studied art at Kensington, at the Royal Academy and under Charles Jalabert and Bon-

nat, at Paris. His principal pictures are (Do-

menica* ; (Chess Players* ; (Laodamia* ; (Young Nelson's First Farewell* ; (Wellington at Angers* ; (Prince Charlie and Flora Mac¬

donald* ; (The Death of General Gordon* ; (Princess Alice of Albany* (for Queen Vic¬

toria) ; (Reverie* ; (Truth* ; (Joan of Arc* ; (Lear and Cordelia,* etc. He has also painted many portraits.

JOY, Thomas, American colonist : b. Nor¬

folk, England, 1610; d. Boston, 1678. Upon emigrating to America in 1635 he established himself in Boston as an architect and builder and in 1657 erected the townhouse of Boston, the earliest civic structure of any note in New England. In 1646 for his share in the (Child Memorial,* protesting against both the civil and ecclesiastical government of the Bay Colony, he was fined and imprisoned.

JOYCE, Isaac Wilson, American clergy¬

man: b. Coleraine Township, Ohio, 11 Oct.

1836; d. Minneapolis, Minn., 28 July 1905. He was educated at Hartsville College of the Uni¬

ted Brethren Church and was first licensed as a local preacher in that Church. In 1859 he en¬

tered the ministry of the Methodist Episcopal Church, joining the Northwest Indiana Confer¬

ence. He served as pastor of several import¬

ant churches and a term as presiding elder, the 226

last churches located in the Cincinnati Confer¬

ence. He was elected bishop in 1888. In 1886

he was fraternal delegate to the Canadian Meth¬

odist Church. He was president of the Ep-

worth League (1900-04). In 1892 he had super¬

vision of the missions in. Europe; Mexico in 1895; China, Japan and Korea (1896—97) ; South America (1903-04). He was a preacher of an intense evangelical type. Consult Sheridan, Wilbur F., (The Life of Isaac Wilson Joyce*

(Cincinnati 1907).

JOYCE, Robert Dwyer, Irish poet and

physician : b. in County Limerick, September 1836; d. Dublin, 23 Oct. 1883. In 1866 he came to the United States and practised medicine for several years in Boston, Mass., contributing dur¬

ing that period to the Pilot and other Irish jour¬

nals. He published (Ballads, Romances, and Songs) (1872) ; (Deirdre,* a much-admired epic poem, which appeared anonymously as one of the (No Name Series* (1876) ; ‘Legends of the Wars in Ireland) (1868); ‘Fireside Stories of Ireland) (1871) ; ‘Blanid,* a poem (1879) ; (The Squire of Castleton,* etc.

JOYEUSE ENTREE, zhwa-yez on-tra,

the name given to the important privileges of the estates of Brabant and Limburg, with Ant¬

werp, which the dukes were obliged to swear to maintain before they were allowed to enter the ducal residence, from which circumstance the name was taken. It dates from 3 Jan. 1356, from the entry of Duke Wenceslas into Lou¬

vain. The most important of these privileges was that the people were released from an al¬

legiance whenever the duke should attempt to violate their rights. So important were these privileges considered that many women went to Brabant to be confined there, that their children might enjoy the rights of a citizen of Brabant.

See Boulger, D. C., (History of Belgium *

(London 1902).

JOYNES, Edward Southey, American edu¬

cator: b. Accomac County, Va., 2 March 1834; A*. June 1917. Educated at the University of Virginia and Berlin, in 1858 he was appointed professor of Greek at William and Mary Col¬

lege, in 1866-75 was professor of modern languages at Washington College now (Wash¬

ington and Lee University, Lexington, Va.), and subsequently held chairs in Vanderbilt Uni¬

versity and the University of Tennessee. In 1882 he became professor of modern languages in South Carolina College (Columbia), retiring as professor emeritus in 1908. He published textbooks of French, and German, most im¬

portant of which is the ‘Joynes-Meissner German Grammar* (1887).

JOYOUS ENTRY. This became a cus¬

tom in the Belgic Low Countries and the occa¬

sion of concessions and privileges in the north¬

ern Netherlands also. That of Queen Wilhel-

mina into Amsterdam, the political capital of the kingdom and in which she was inaugu¬

rated queen, was on 31 Aug. 1898. At The Hague, the seat of administration, a similar function, with spectacles, was given with un¬

usual demonstrations of joy, the inauguration festivities lasting in the

two cities a fortnight.

In this, modern instance, 100 invited foreign journalists as guests participated. The joyous entry of Leopold and those of his successors in Belgium were each made the theme of paint¬

ings by first-class artists.

JUAN DE BAENA, Hwan da ba-a'na, a

Spanish writer and editor of the 15th century who made an anthology of the writings of con¬

temporary literary men. Baena was a con¬

verted Jew who seems to have entered heart and soul into the life of the Christian commu¬

nity in which he lived. He rose to be one of the secretaries of John II. His 'Cancionero,*

as his anthology was called, seems to have been composed between 1449 and 1454, as the author himself states in his preface, chiefly to please the king, but with an eye to pleasing also the queen, the heir-apparent and the court and no¬

bility. It contains 384 manuscript pages and gives, extracts from the works of nearly 60

Spanish writers, some of them dating back to the reign of Henry III. The (Cancionero de Baena) is interesting and valuable historically, not on account of the literary and critical abil¬

ity of the author, which was certainly not very great, but rather because of the light it throws upon the literary condition of the first half of the 15th century and the list of writers which it furnishes. Consult Castro, (Biblioteca Es-

panola* (Madrid 1784, Vol. I) ; Ochoa, 'Manu-

scritos* . (Paris 1844); Puybusque, 'Histoire Comparee des Literatures Espagnole et Fran-

qaise' (Paris 1843) ; Ticknor, G., (History of Spanish Literature* (New York 1854).

JUAN FERNANDEZ, joo'an fer'nan-dez

(Sp. hoo-an' fer-nan'deth), a group of islands in the south Pacific Ocean, 300 miles west of Chile and belonging to that country. They are named from a Spanish pilot who discovered them in 1563 and obtaining a grant from his country started a settlement. There are two principal islands, Mas a Tierra (nearest to land) and Mas Afuera (farther out), the latter 90, miles west of the former, both on lat. 33°

40 south. Mas a Tierra is 12 miles long, 22/z miles wide, of rugged configuration with its higher peak, El Yunque (the anvil), rising 2,500

feet above sea-level. Cumberland Bay, or bay of San Juan Bautista, on the north side is the principal harbor, but the water is too deep for safe anchorage in bad weather. This island was occupied by the Spanish in 1750 and taken by Chile when that country became independent in 1818. It was used as a penal colony prior to 1840. It has a population of about 300 which lives mainly by supplying water, wood and food to whaling and other vessels. Parts are fertile and produce vegetables, peaches, figs, grapes, etc., and originally there was considerable san¬

dalwood, but it has all been taken. Plenty of fish are obtained from the surrounding waters and also a lobster (Palinurus frontalis) which is an important source of subsistence and also is canned for export in two factories. In 1914

a wireless station was erected. Just off the southwest corner of Mas a Tierra is the small, rocky island of Santa Cruz. Mas Afuera, six miles long by three and one-half miles wide, is very mountainous, its highest summit being 5,300 feet above the sea. It presents fine scenery and its remarkable flora makes a most dis¬

tinctive landscape. The islands consist of Ter¬

tiary volcanic rocks in thick layers comprising a succession of lava flows and tuffs, mostly hori¬

zontal. The climate is more humid than that JUAN DE FUCA—JUBAINVILLE

of \ alparaiso, with mild winters, moderate sum¬

mers and frequent gales. The islands had no original wild land animals, but the flora is unique. Some Megallanic types have recently been found high on Mas Afuera. One remark¬

able plant, gunnera, has leaves 10 feet in di¬

ameter. The (Robinson Crusoe* of Defoe is said to be based on the experiences of Alexan¬

der Selkirk, a Scotch sailor, who lived alone on the larger island from 1704-09.

JUAN DE FUCA, joo'an de fu'ka (Sp.

hoo-an da foo'ka), Strait of, an ocean passage between the State of Washington and Van¬

couver Island. It connects the Pacific with the Strait of Georgia on the north and Puget Sound on the south. It is 100 miles long and about 15 miles wide. It contains several islands, some of which were at one time in dispute between the United States and Great Britain.

JUAREZ, Benito Pablo, ba-ne'to pab'ld

hoo-a'reth, Mexican statesman : b. San Pueblo Guelatao, Oajaca, 21 March 1806; d. Mexico, 18 July 1872. He was admitted to the bar in 1834; became a judge of the Civil Court in 1842; in 1847-52 was governor of the state of Oajaca, in which post he greatly improved provincial conditions; and after a period of exile (1853—55) joined the revolutionists under Alvarez, by whom he was later made Minister of Justice and Ecclesiastical Affairs. In 1855 he was appointed provisional governor of Oajaca by Comonfort, the successor of Alvarez, and in 1857 elected constitutional governor. He was made Secre¬

tary of the Interior and chief justice in the latter year (the office of chief justice being by the constitution the equivalent of a vice-presi¬

dency), and when Comonfort was driven from power (1858) duly succeeded to the presidency, was recognized by the Mexican states and the United States, but was opposed by the Conserva¬

tives in a long civil war and did not enter Mexico City until 11 Jan. 1861. In March he was elected President for a four-years' term.

The bankrupt government published a decree suspending for two years the payment on the foreign debt and an alliance of intervention was at once entered into by England, Spain and France. On Juarez' agreement to protect the interests of foreign debtors, the English and Spanish troops evacuated the country, but France proceeded to a war

of conquest. Juarez was driven to the extreme north and Maxi¬

milian assumed imperial power. Upon the in¬

terference of the United States, however, the French troops were withdrawn in 1867 and in the same year Maximilian was executed and Juarez elected President. He was re-elected in 1871. His vigorous and liberal policy was of great benefit to the nation and he has sometimes been called the (

sult Baz, (Vida de Benito Juarez) (1874) ; and the

JUAREZ CELMAN, Miguel, me-gel' hoo-

a'reth sal-man', Argentine statesman : b. Cor¬

doba, Argentina, 29 Sept. 1844. He was graduated from the University of Cordoba in 1870 and after holding several political posts became governor of his province of Cor¬

doba and in 1884 a senator in the national Con¬

gress. In 1886 he was chosen President and the speculation rife during his administration, as well as the inflation of the currency and the magnitude of the public works undertaken at this time, induced a financial panic in 1890.

The Celman administration was held respon¬

sible for this disaster and the President himself charged with having amassed a fortune from sums known to have been taken from the treas¬

ury. The cabinet resigned, but revolt broke out in Buenos Aires 26 July 1890, and fighting in the streets continued for several days. On 6 August, however, the President resigned and the Vice-President, Pellegrini, assumed his duties for the remainder of the term.

JUBA, joo'ba, an African king who flour¬

ished during the supremacy of Caesar in the affairs of Rome. He was ruler of Numidia.

When open hostilities broke out between Pom-

pey and Caesar he sided with the former and defeated the forces of Caesar under Curio (49

B.c.). He also extended aid to two of Pompey's other backers, Scipio and Cato. He committed suicide, after the battle of Thapsus, which marked the definite defeat of the Pompeian party (6 April 46 b.c.).

JUBA, a Numidian king, son of the pre¬

ceding ruler of the same name : d. 19 b.c. Af¬

ter the suicide of his father, he was taken to Rome by Caesar where he was given an excel¬

lent education. Octavius, by whose good will he had been enabled to marry a daughter of Antonius and Cleopatra, sent him back as king of Numidia (30 b.c.). This latter country was made a Roman province in 25 b.c. and Juba was made king of Mauretania. Apparently the exchange suited him as he was very much given to literary pursuits. Although all his works have been lost, he is known to have written extensively on philology, Roman history and painting. He was especially interested in the languages of Assyria, Libya and adjoining countries. Consult Liibker, (Reallexikon des klassischen Altertums) (Leipzig 1914) ; Sandy, (History of Classical Scholarship* (Cambridge 1908).

JUBA ISLANDS. See Dundas Islands.

JUBA RIVER, East Africa, flows into the Indian Ocean at about lat. 0° 5′ S., formed to the north of 3° N., by the junction of several streams, mainly the Webi Ganana or Ganale Gudda, rising about 7° N., 38° E., and forming from 6° N. downward, S.E. and S., part of the frontier of British East Africa.

By the Anglo-Italian agreement of 1891 all the seaboard north of the Juba was ceded to Italy, and the river became the dividing line between British territory and Italian Somaliland. It is navigable by small steamers to about 20 miles above Bardera (Bal Tir).

JUB2EA, a genus of palms named after

Juba, king of Numidia (q.v.). It is closely allied to the coconut. The Jaggery palm of Chile which belongs to this family often is 60

or more feet in height. From the sap of this latter plant the native Chilean palm honey (miel de palma) is made. The Jubsea also fur¬

nishes an edible nut.

JUBAINVILLE, zhu'ban'vel, Marie Henri

d'Arbois de, French historian and philologist: b. Nancy, 1827 ; d. 1910. Graduating from the College Royal at Nancy and the Universitv of Konigsberg he entered upon the practice of law in Paris (1850), where he became archivist for the department of Aube (1852-80), and pro¬

fessor of Celtic languages and literature at the 228

JUBAL

JUDAH I

College de France (1882). He edited 20 vol¬

umes of the Revue Celtique. He was the re¬

cipient of numerous honors and distinctions, among them being that of Officer of the Legion of Honor, and member of the Academie des Inscriptions et Belles-Lettres. Among his pub¬

lished works are c Etudes sur les abbayes cister-

ciennes) (1858); (Repertoire archeologique du department de l'Aube > (1861); (Histoire des Dues et Comtes de Champagne* (7 vols., 1859-

66) ; (Cours de litterature celtique) (12 vols., 1883—1902, with the help of other writers) ; (Elements de la grammaire celtique, declina-

cion, conjugaison) (1903) ; (Les Celtes depuis les 'temps les plus anciens jusqu' en Tan 100

avant notre ere-* (1904) ; (La famille celtique) (1905); (Les Druides et les dieux celtiques a forme d'animaux* (1906).

JUBAL, joo'bal, or JABAL, son of Lamech and Adah. According to Genesis iv, 21, the in¬

ventor of the reed-flute and harp, or lyre, and the father, or predecessor, of all those who play upon such instruments, that is, the discoverer of musical science.

JUBILATE, ju'bi-la'te, third Sunday after Easter. The name is derived from the open¬

ing words of the 66th psalm, which forms part of the Mass on that occasion. In the Church of England and the Protestant Episcopal Church the same name is given to the 100th psalm which is chanted at the morning service im¬

mediately before the Creed.

JUBILEE, an observance among the Jews

(from Heb. Jobel, i.e., the ((ram's horn**) which recurred every fiftieth year; the land was to rest, as in sabbatical years ; land and houses in the open country and in unwalled villages reverted to their original owners or the heirs of such; all slaves were to go free. The law as a whole was distinctly theocratic; it vin¬

dicated the absolutism of Jehovah; it meant that Hebrews were the servants of Him, and could not therefore continue to be the slaves of their fellow-men; the land belonged to Him, and was only lent to the Hebrew tribes and families, who could not therefore be driven out by any human arrangement.

In the Roman Catholic Church a jubilee oc¬

curs every 25th year in which the Pope pro¬

claims a remission, from Christmas to Christ¬

mas, of the penal consequences of sin, on condi¬

tion of repentance, restitution and the perform¬

ance of certain pious works. The first Roman Catholic jubilee was given in 1300. Ordinarily, the term is applied to any 50th anniversary.

JUBILEES, Book of. A pseudepigraphal

production written in Hebrew by a Pharisee sometime between the accession of Hyroanus to the priesthood 135 b.c. and his breach with the Pharisees 105 b.c. It is an attempt to rewrite the history of Israel and include with it a vast amount of traditional lore. The object of the author was, as R. H. Charles states it, to (

ters and besides the historical element it in¬

troduces the Messianic hope of Israel. It was translated from the Hebrew into the Greek and may also have been in the Aramaic. Four manuscripts of the book are preserved in the Ethiopic. C. F. A. Dillman

has translated it into the German and G. H. Schodde and R. H.

Charles have each translated it into English.

R. H. Charles lists a bibliography of 31 titles of (

Consult especially Charles, R. H., (The Book of Jubilees) (London 1902) ; also Vol. II of his larger work on (The Apocrypha and Pseudepigrapha of the Old Testament* (Ox¬

ford 1913).

JUCHEREAU, zush'ro', Louis, Sieur de

Saint-Denis, a French-Canadian soldier: b.

Quebec, 1676; d. 1731. He became a soldier in Louisiana, where he served, on several oc¬

casions, as intermediary between the repre¬

sentatives of the government and the Indians.

He became commander of the fort at the mouth of the Mississippi (1700). Later on he went to Mexico where he arranged a treaty with the vicero}/- for the encouragement of commerce (1714—16). Ihree years later he was in com¬

mand of a band of Indians at the battle of Dauphin Island where the Spaniards were de¬

feated (1719). He became commander of

Nachitoches fort in 1720 and 11 years later he defended it from an attack of Naches Indians whom he overwhelmingly defeated.

JUDAH (Hebrew, Yehudah, celebrated),

fourth son of Jacob and Leah, and the tradi¬

tional ancestor of the tribe which bears his name. In Genesis he is said to have advised n-urSeˆnˆ Joseph into Egypt. That the

Biblical account given of Judah was derived from traditional history there seems little doubt ; but these latter accounts appear to have been dressed up to suit the readers of the times m which the commitment to paper was made.

Just how much, therefore, of the account of Judah, that has come down to modern times is historical, semi-historical or purely traditional or mythical it is very hard to determine Ac¬

cording to the Biblical record Judah married a woman of the Canaanites by whom he had three children, Er, Oman and Shelah. By his daughter-in-law, Tamar, he also had two sons, Pharez and Zarah. See Judah, Tribe of.

JUDAH I, a noted Jewish rabbi, scholar and expounder of the law: b. about 175; d. 219.

Lie was the son of Simon II, and on the death of the latter he became president of the San¬

hedrin to which he had been admitted in his youth on account of his extensive knowledge of Jewish law. His wealth, position and talents enabled him to control, in a thoroughly arbi¬

trary manner, all the actions of the Sanhedrin which he made the centre of much of his re-

Hgious activity. His home at Sepphoris became the shrine to whi8h thousands went in search of knowledge.. From there he exercised a strong and widely extended influence There he lectured and the textbook which he wrote for these lectures ultimately acquired such an authoritative position that it was used as the basis for the compilation of the Talmud Judah was known, during his life, as ((The Rabbi,® and as the prince (Ha-Nasi) ; and after his death he was remembered as «the holy one®

(Ha-Kadosh).

JUDAH, Ben-Samuel (Arabic Abu'l-

Hasan), a Spanish-Jewish poet and philoso¬

pher: b. Castile, about 1086; d. after 1140.

Graduating in medicine he practised his profes¬

sion for a while, but he seems to have finally abandoned it to devote his time to philosophy and poetry. His reputation as the greatest

Hebrew poet of the Middle Ages was gained largely through his poems of longing for the home of his race. Finally he set out from Toledo in 1140 with the avowed intention of visiting Jerusalem, a journey from which he never returned. In his own day and for many years afterward he was looked upon as a great philosopher; but his fame to-day rests almost entirely upon his poetical work; for he was too much of a poet to be a deep and formal philosopher or theologian. His principal phil¬

osophical work is (Al-Kha-zariF which pur¬

ports to expound, in Arabic, the principles of Christianity, Islam and Judaism and to present the philosophy of Aristotle. There are two translations of this work in German, the better of which is by Hirschfeld (Breslau 1885).

Many of his poems have also been published in German and Emma Lazarus has translated some of them into English (Boston 1899).

Others are also to be found in (Songs of Exile, J by Nina Davis (Philadelphia 1901).

Consult Kaufman, David, (Jehuda HelewP

(Breslau 1877).

JUDAH, Ben Samuel, Jewish mystic : b.

Speyer, probably about the middle of the 12th century; d. 1217. His school at Ratisbon, founded in 1195, became noted far and wide and was attended by many pupils destined to become famous and influential. So noted did he become as a moralist and mystic that many works appear to have been ascribed to him in which he had no part. Among the numerous works attributed to him, he appears to be the author of (Sefer ha-kabod) (the (Book of the Divine Majesty*); (Sefer Hasidirn* (the (Book of the Pious*); and a commentary on the Pentateuch. The latter, which has been lost, i'3 known only by references to it in more recent works and in citations from it in later commentaries. The (Book of the Pious,*, which is considered his most important work, is par¬

tially a treatise on morality and mysticism ; in which a fine distinction is made between the <(divine Majesty® which is revealed to angels and men, and the <(divine Being, ** who is not so revealed to humanity because he is too infinitely great for all human conception. This work became the text for the Judah sect which placed great stress

on this fanciful distinction between the ((divine Majesty® and the ((divine Being.®

Critics are now inclined to dispute Judah's authorship of all of this work except the first 26 sections. Judah Ben Samuel had a great influence over his followers, not so much on account of the originality of his thought and the accuracy of his reasoning and philosophical speculations as because of his deep earnestness, his loftiness of aspiration and his real nobility of character. This influence was increased by his strong desire and tireless efforts to discover the great truths of the Bible and the hidden meaning of its priests, prophets and philoso¬

phers. Consult Gratz. (Geschichte der Juden*

(Vol. VI, Leipzig 1894) ; Schlossinger,

New York 1914) ; Zung, (Literaturgeschichte der Synagogalen Poesie) (Berlin 1864).

JUDAH, Tribe of, one of the Israelitish clans most frequently mentioned in the Bible.

It is supposed to have had a strong Canaanitish admixture ; and by some critics the story of Judah's marriage to a Canaanitish woman is believed to be but an anecdotal method of re¬

cording this fact of the introduction of for¬

eign blood into the family. In the days of David the tribe of Judah comes, for the first time, into prominence. The book of Joshua states that the land of Judah extended from the Mediterranean to the Dead Sea, including in its territory the plain of the Philistines.

It bordered on the land of Benjamin on the north. The land of Judah, of a rugged, hilly character, tended to separate the tribe from the other Israelitish clans; and this may account for the fact that it does not receive prominence earlier in Biblical history. The kingdom of Judah, brought into prominence by David, does not correspond in extent to that recorded in the book of Joshua, since the latter embraced the Jerahmeelites, Kenites, Kenizzites, part of the original tribe of Judah and some other small tribes. At no time in history is there a verified record of the tribe of Judah having actual possession of the plain of the Canaan-

ites; though they may have done so in prehis¬

toric times and have still preferred a claim against it. This seems probable from the afore¬

mentioned statement in the book of Joshua.

The tribe of Judah, which was among the Jews who were carried into Egypt, seems to have prospered there, for when the Israelites left the latter country, it outnumbered all the other Jewish tribes, having 74,000 adult males, this being 12,000 more than Dan, the next most nu¬

merous tribe. After the hardships of the long journey home through the desert, the tribe of Judah still numbered 76,500 able-bodied men of fighting age. The clan totem of the tribe of Judah was a lion's whelp, which was later on converted into a standard with the motto <(Rise up, O Lord, and let thine enemies be scattered!®

In the person of David, the tribe of Judah be¬

came the ruling clan ; but this superiority was disputed by Ephraim, especially after the re¬

moval of the head sacerdotal functionaries to Jerusalem; and the result was the setting up, by the latter, of a separate ecclesiastical estab¬

lishment. Judah lost its identity as a tribe under Rehoboam and Jeroboam, when the ancient kingdom was divided and the clan of Judah became identified with the kingdom of Judah, which included the tribes of Judah and Benja¬

min and a large body of Levite priests. Consult Haupt,

(Halle 1906) ; Schmidt, N., (The Jerahmeel Theory and the Historical importance of the Negeb* (in the Hibbard Journal, 1908, pp. 322-

342) ; Wellhausen, (De gentibus et familiis Judaeorum) (Gottingen 1869) ; Wi'nckler, (Ge-

schichte Israels) (Berlin 1895). See Judah; Benjamin; Jews and Judaism.

JUDAISM. See Jews and Judaism.

JUDAIZERS, ju'da-iz'-erz, certain early

Christian converts who insisted on retaining the rites and ceremonies

of the Jewish law. They were naturally Jews; and among the conces¬

sions that they insisted should be made to them 230

as new Christians was permission to observe the rite of circumcision. The Apostolic Coun¬

cil decided that these Jewish customs were not binding on Christians under the new gospel dis¬

pensation. Paul opposes the views of these Jewish converts very strongly in the letter to the Galatians. See Paul; Ebionites; Naza-

rene.

JUDAS, JUDA, or JUDE, one of the

brothers of Jesus. Practically nothing is known concerning him save the meagre details found in the New Testament and what has come to us from tradition. Some scholars assume that, according to John vii, 7, Judas and the other brethren did not believe in the Messiahship of Christ until after the Resur¬

rection (Acts i, 14). That he was a married man we would infer from Paul's writing (1 Cor.

ix, 5). Scholars ascribe to him the authorship of the Epistle of Jude wherein he speaks of himself as «the servant of Jesus Christ.» See Jude, Epistle of.

JUDAS, or JUDE, one of the 12 apostles.

He appears in the apostolic catalogue of Saint Luke as (

JUDAS BARSABBAS, the companion of

Silas in the bearing of a decree from the apos¬

tles and elder brethren to the brethren in An¬

tioch, Syria and Cicilia, according to Acts xv, 22-23. He has been supposed, without satis¬

factory proof, to have been a brother of Jo¬

seph .Barsabbas. All that is definitely known of him is that he was a member of the Jerusa¬

lem church, that he was a man of influence in his community and that, furthermore, he was looked upon as a prophet.

JUDAS OF GALILEE, a Jewish popular

leader who led an uprising against the Roman power about 6 or 7 a.d. According to Acts v, 37, he was killed and his followers dis¬

persed; but Josephus, who records the insurrec¬

tion, which according to the Acts was at the time of the census, states that Jacob and Simon, two sons o f Judas, were put to death; but he gives no information as to the fate of Judas himself.

JUDAS ISCARIOT, is-kar'i-ot (that is, of the family of Cariot in the tribe of Judah).

One of the 12 apostles of Christ. He is styled the son of Simon, and was treasurer to the little company that attended Jesus, whom he betrayed, with a kiss, into the hands of the Jewish priests, for 30 pieces of silver. His divine Master addressed to him the mild re¬

proof — «Dost thou betray the Son of Man with a kiss?® Remorse drove him to suicide.

JUDAS MACCABEUS, Jewish warrior

and national hero, who flourished in the 2d century b.c. He was one of five sons of Mattathias, a Joarib priest of Modin, not far from Jerusalem. The father, in 168, killed the officer in command o>f the troops sent to Modin > to overthrow the Jewish religion, and, with his five sons, took to the mountains. On the death of Mattathias, shortly afterward, Judas became the recognized leader of the revolt, which he managed with very great skill and military wisdom which enabled him to de¬

feat, in succession, four Syrian armies, each of them much stronger and better armed than his own mountaineers. After three years' success¬

ful warfare he again established the head¬

quarters of the Jewish faith in the temple at Jerusalem. Tudas

Maccabaeus disputes with David the honor of being the greatest of the Jewish national military heroes. In so high esteem was he held that the memory of his great achievement was kept green by means of a commemoration service in the annual Feast of Dedication. His brothers, too, seem to have been highly honored on account of the heroic part they had all played in the war of liberation; and one of them, Tonathan, became high priest. Under the leadership of Judas Maccabaeus, the Jews undertook extensive mili¬

tary campaigns against their enemies on all sides, and with signal success which resulted in the conquest of some and the punishment of others. These warlike expeditions reached into the territory of the Arabs. In 164 b.c. Lysias, the guardian of Antiochus V, determined to punish this activity of the Jews; and to this end he marched against Jerusalem with a picked force of 100,000. Judas found himself unable to oppose a force so much larger than his own. But chance came to his aid in the shape of troubles inˆ Antioch which forced the return of Lysias. Taking advantage of the circumstance and the occasion, Judas secured fr°m the Syrian government recognition of the rights of the Jews to exercise their own re¬

ligious worship. In the eyes of his followers, this was perhaps his greatest victory. But not content with this, he attempted to secure the recognition of the political independence of his country. But the intrigues of the Syrian party in Jerusalem and the quarrels among his own people weakened his own power in both a moral and a military sense. Though he signally defeated a Syrian army under Nicanor and fought a very successful campaign (163-62 bc) the discontent at home increased and tended greatly to weaken his organization and mili¬

tary strength to resist a second and still more formidable Syrian army, against which he fell m jrattie ft Elasa (161 b.c.). He was suc¬

ceeded by his brother Jonathan, the high priest (q.v.). See Maccabees.

, r — J ubepnus,

Maccabees I and IP

iuiU4UUiC5, Ail' '

, , Schurer, Emil, 'His-

lory °f the Jewish People in the Time of Jesus 9ns' • S5 7° sVr ,ew York 1896) ; Stade, Geschichte des Volkes IsraeP (Berlin 1888 •

ˆtreainQe6o’IThA,Age of the Maccabees* (Lon-

don 1898) ; Weirs H,

(breiburg 1897) ; Wellhausen, Usraelitische und Judische Geschichte > (Berlin 1898).

„ JUDAS MACCABEUS, an oratorio

Handel which was first produced in London April 1747; and in Boston, United States, December of the same year. See Handel of

in

in

JUDAS TREE, a tree so named because of the tradition that upon one of this family Judas hanged himself. The Cercis siliqiiastrum the common European Judas tree, is to be found throughout southern Europe and Asia •

while the American member of the family’

JUDD — JUDE,

231

EPISTLE OF

Cercis canadensis, is a much hardier tree and is found in northern regions. It is, however, -very similar to the Old-World species. The dark-veined wood of both species takes a fine polish. Two other species are known in the United States, the Cercis occidentalis, found in the West, and the Cercis chinensis introduced into the country from Japan.

JUDD, Charles Hubbard, American psy¬

chologist : b. Bareille, British India, 1873; and at the age of six he was sent to the United States, where he graduated from the Wesleyan University 15 years later. After a two years’

course in philosophy in Leipzig he taught philosophy in his native college until 1898, when he became professor of psychology in New York University. From 1901 until 1909 he was successively in Cincinnati and Yale universities, when he went to Chicago University as director of the school of education. Among his pub-

ished works are (Genetic Psychology for Teachers) (1903); (Psychology) (1907);

laboratory Manual of Psychology J (1907) ; laboratory Equipment for Psychological

Experiments) (1909); Psychology of High School Subjects) (1915).

JUDD, Garritt Parmlee, Hawaiian states¬

man : b. Paris, Oneida County, N. Y., 23 April 1803; d. Honolulu, Hawaiian Islands, 12 July 1873. In 1828 he went to Honolulu as a medi¬

cal missionary, and in 1842 was appointed recorder and interpreter to the native govern¬

ment. He organized the first Hawaiian minis¬

try for Kamehamaha III in 1843, and held the portfolio of finance from 1844 until his retire¬

ment in 1853. He placed Hawaiian finance on a sound basis.

JUDD, Norman Buel, American states¬

man : b. Rome, N. Y., 1815 ; d. 1878. He began the practice of law in Chicago in 1836, where he soon became city attorney and was a mem¬

ber of the State legislature from 1844 to 1860.

Going over from the Democrat to the Republi¬

can party in 1856, he became prominent in local politics and chairman of the Illinois State Cen¬

tral Committee, a (position which gave him great influence at the Second National Conven¬

tion at Chicago which, in 1860, nominated Abraham Lincoln for the presidency. Lincoln sent him, the following year, as Minister to Prussia, where his influence, for over four years, prevented the recognition of the Southern Confederacy. On his return home (in 1865) he was re-elected to Congress for two succes¬

sive terms; following which he became collec¬

tor of United States customs at Chicago. In his capacity of railway and corporation law¬

yer, in which he stood in the fore rank, he was closely connected with the projection and de¬

velopment of most of the great railways of the United States in his day. He was also a very active figure in the legislature. He took a prominent part in the impeachment of Presi¬

dent Johnson and he was the author of the act which created inland ports of entry and provided for the shipment, in bond, of goods into the interior.

JUDE. See Judas, one of the brothers of Jesus.

JUDE, Epistle of. One of the so-called Catholic (i.e., general) epistles of the New Testament, whose author names himself ((Jude, a servant of Jesus Christ, but a brother of James,® thus reverently contrasting his blood-

relationship to James, the head of the Jerusalem church (Acts xv, 13; xxi, 18; Gal. ii, 9, 12) with his higher relationship to Jesus (Mark iii, 34-35), who also was his and James' own brother (Matt, xiii, 55; Mark vi, 3; Gal. i, 19; 1 Cor. ix, 5) according to the flesh. The au¬

thor describes his document as being an exhor¬

tation to his readers to ((contend earnestly for the faith once for all delivered unto the saints,®

(3) and as taking the place of a treatise of a more general doctrinal character, on which he was engaged when occasion arose for this more direct form of address. That a dangerous situation had developed quite as ominous as that of which Paul forewarned both the Ephesians (Acts xx, 29-31) and the Philip-

pians (iii, 18-19) (

truders was supported, the author assumes as too well known to his readers to require any detailed statement, but only a delineation of its fruits in resultant character and retribution.

Only a precarious basis can, therefore, be found for any identification of the heresy with that of the Cainites, the Carpocratians or other Gnostic sects of the post-apostolic age. Simi¬

larly indecisive as to a late date are the cita¬

tions in verses 9 and 14f. from such apocryphal books as The Assumption of Moses (7 to 30

a.d.) and The Book of Enoch (written before 170 b.c.) ; the necessary uncertainty as to the local habitat of the readers, whether Palestine, Syria or the Diaspora ; and, the intimate rela¬

tion of this document to the text of 2 Peter, in casting suspicion upon the claim made in verse 1 as to authorship.

In its biting invective and hortatory fervor this epistle equals if it does not. surpass Gala¬

tians and 2 Corinthians. The interlopers are characterized as ungodly persons who, profes-

ing godliness, have ((crept in privily® to the (

and to ((deny our only Master and Lord, Jesus Christ® (consult Phil, iii, 18-19) ; as pretend¬

ing to have received divine revelations, which their conduct demonstrates to have been vile, lascivious dreams (8) ; as flouting all authority, even that of angels, and railing at sacred mys¬

teries which their carnal minds cannot under¬

stand (8-10) ; as continually swayed by un¬

godly lusts (16, 18) and sensual rather than spiritual in their judgments (19); as compar¬

able therefore, to sunken reefs in a ship's chan¬

nel or a foaming surf (Is. liii, 20) casting up mire and dirt; to clouds that bring no rain, or to fruit-trees fruitless in autumn, and fit only for winter's fire-wood. (12) and to meteors dis¬

appearing in eternal night (13). The dissolute character and the impending doom of these cor¬

rupters of the Church, prefigured in the punish¬

ment of Israel in the wilderness (5) ; the fall of the angels (6) ; the fate of Sodom and Gomorrah (7) ; the legend of the archangel Michael

(8-9) ; and the history of Cain, Ba¬

laam and Korah (11); were foretold in. the prophecy of Enoch (14-15) and were explicitly 232

confirmed to them by the apostles of Christ (17-18). Re-enforced by this tragic warning, the epistle ends with a tender exhortation and a triumphant doxology (20-25).

Bibliography.— Introductions : T. Zahn

(Eng. tr., 1909) ; H. J. Holtzmann (1892) ; A.

Juelicher (Eng. tr., 1904); J. Moffatt (1911).

Commentaries: Meyer (Kuehl 1897); von

Soden in (Handcommentar) (3d ed., 1899); C.

Bigg (in International Critical Commentary, 2d ed., 1902); J. B. Mayor in Expositors' Greek Testament (1910).

Marcus D. Buell,

Professor of New Testament Greek and Exe¬

gesis, Boston University School of Theology.

JUDEICH, yoo'dik, Johann Friedrich,

German forester: b. Dresden, 1828; d. 1894.

After extensive experience in the forestry de¬

partments of Saxony and Bohemia he finally became director at Tharandt, where he made his name widely known in forestry. Among his published works are

tung) (1903) ; and contributions to Lorey's (Handbuch der ForstwissenschafP (1887-88).

He wrote for numerous periodicals and edited Ratzebury's (Die Waldverderber und ihre Feinde> (7th ed., 1876 ; 8th ed., 1885-95); and other publications.

JUDGE, William Quan, Irish-American

theosophist: b. Dublin, 1851; d. 1896. Coming to America in 1864 with his father he studied law and entered into legal practice with him in New York city in 1872. He was one of the founders of the Theosophical Society of America, to which he finally gave up all his time, traveling, as its secretary, throughout Europe and the American continents. See Theosophical Society.

JUDGE, public officer to whom is commit¬

ted the exercise of judicial power of the state in the administration of justice in its courts. It is his province to decide questions of law, and in cases in which facts are to be decided by a jury to instruct the jury as to the law which is applicable and to point out to them what the exact questions for their determination are.

(See Jury). He pronounces the sentence, or enters the judgment, of the court.

The word is not a technical one. The offi¬

cers of the King's Court, when that tribunal began to take definite shape, were known offi¬

cially as justices. Until the recent Judicature Acts in England it was customary formally, as well as popularly, to speak of the judges of the superior courts at Westminster, though the members of the courts of King's Bench and Common Pleas were properly justices, and of the Court of Exchequer barons, and at the present time the members of the Supreme Court of Judicature, including the Lord Chancellor, the Lord Chief Justice, the Master of the Rolls and the Lords of Appeal are spoken of as the judges of that court. English judges are ap¬

pointed by the Crown '(this patronage being exercised by the Lord Chancellor, who is the head of the legal profession) from the leaders of the bar, and hold office during good behavior.

In all the Federal courts, in all the higher courts of the several States and in most of the inferior courts, judges must be trained in the law, though lay judges were common in the State courts of first instance until quite recent times, Federal judges are appointed by the President, by and with the advice and consent of the Senate, and hold office during good be¬

havior, being removable only by impeachment.

Any Federal judge who has served for 10

years and is 70 years of age may retire on full pay for life. The choice of judges in the States is determined by the State constitutions.

As a general rule they are elected for a term of years. The fear was quite generallv ex¬

pressed at the time the tendency to make the office an elective one became general, that judges so chosen would be inferior to those ap¬

pointed by the State governors, but does not seem to have been justified by the result. In most of the State courts the small salaries paid and the limited terms of office prevent the leading members of the bar from seeking, and in many cases from accepting, the office of judge. _

A judge must be impartial and any interest in the cause or the parties will disqualify him from presiding at the trial. While in office he is precluded from practising before the court of which he is a member, and he is commonly, and should be universally, precluded from prac¬

tising before any court. He is not answerable to any suitor for the correctness of his rulings or decisions, and in the absence of positive fraud is not answerable in damages for any decision he may render. Every judge has power to punish for contempt of court in case of acts committed during the court's session, and even of such acts committed outside the court, though this latter power is to be exer¬

cised with care, and its limits are naturally not defined with certainty. For Jhe peculiar Junc¬

tions exercised by American judges as interpre¬

ters of the Federal and State constitutions see Jurisdiction.

Bibliography.— Pollock and Maitland, his¬

tory of English Law) ; Blackstone, Commen¬

taries > (Bk. Ill, Chap. 4) ; Brodie-Innes, < Com¬

parative Principles of the Laws of England and Scotland? (Bk. I) ; Kent, (Commentaries y , Cooley, Constitutional Limitations. >

John Douglass Brown.

JUDGE— ADVOCATE, a title given the

prosecutor in a court-martial or military com¬

mission. In the United States the judge-advo¬

cate is generally a member of the judge-advo¬

cate-general's department. In Great Britain the duties of judge-advocate usually devolve upon a detailed staff officer, or the prisoner's commanding officer. The prisoner has a right to call on any regimental officer to speak in his behalf. See Law, Military.

head of the United States army bureau of mili¬

tary justice. He has the rank of brigadier-

general and officiates as the legal adviser of the Secretary of War and of the Department of jar., All European armies have a similar functionary and a similar department. The Judge-Advocate-General is the legal custodian oj all general courts-martial, military commis-

sions, courts of inquiry and papers relating to title of land under control of the War Depart-

ment, except the public buildings and grounds in the District of Columbia.

JUDGE LYNCH. See Lynch Law.

JUDGES, Book of. This book in the He¬

brew Bible derives its name from the deliverers whose exploits it records. In its present form, JUDGES, RECALL OF- JUDGES OF ISRAEL

the book is the product of that active era of historical interpretation inaugurated by the publication of Deuteronomy in 621 b.c. (See Deuteronomy). The narrative of the struggle between the Hebrews and the earlier inhabitants tor the possession of the land furnished ma¬

terial especially adapted to exemplify the doc¬

trine of Deuteronomy, that Israel's prosperous possession of the land was contingent upon her faithfulness to Jehovah. It was one of the first tasks of the historians who were dominated by the thought of the

great law book to edit the stories of the Judges and compose the book now contained in chapters ii, 6-xvi. They had at hand for their purposes a history of the early heroes, which may have formed a part of the great, composite work already compiled from the histories of Judah and Ephraim (JE), or may have been a separate work. In any case, the earlier document contained some of the oldest and most authentic historical traditions of the nation. The Song of Deborah (Chap, v), for example, is the oldest considerable com¬

position preserved in the Hebrew Bible. It must have been sung immediately after the events which it celebrates. Taking this price¬

less collection of hero tales, that had been gathered and combined in the three centuries preceding their time, the Deuteronomic editors introduced a heading and conclusion for each tale designed to enforce the great doctrine which they found so well exemplified in the varying fortunes of the times. When Israel forgot Jehovah ani turned to other gods, her enemies prevailed ; when she returned to him in penitence, a deliverer was raised up and peace secured throughout his rule. They in¬

troduced their readers to this new interpreta¬

tion of the old stories by a summary statement of the facts and principles (ii, 6-iii, 6) which they were to find fully illustrated in the separate stories and their interpretation of each. Seven principal stories form the main body of the work, those of Othniel, Ehud, Deb¬

orah and Barak, Gideon- Jerubbaal,, Abime-

lech, Jephthah, Samson. Of these leaders, Abimelech is styled a prince and king, rather than a judge; in truth the brief hereditary rule set up by this man and his son may be counted the first attempt at establishing a monarchy in Israel. Between the longer narra¬

tives short notices of six other judges are in¬

serted. The little that is told of them is in the characteristic language and style of the editors.

Perhaps they were included in order to bring the number of the judges to 12. To this original book, edited not far from 600 b.c., there was prefixed as an historical introduction an ancient account of the entrance into Canaan and of the failure of the tribes to dispossess the in¬

habitants (i, 1— ii, 5), and. there were added two appendixes (xvii-xviii, xix-xxi) which did not receive the editorial interpretation characteris¬

tic of the body of the book. The former of these, telling of the migration- of Dan to the northern borders of Israel's territory, is ob¬

viously a very old narrative, but the latter, the story of the outrage at Gibeah, gives many in¬

dications of a relatively late date.

Fortunately the exilic editors confined their interpretations of the history to the framework which they composed and left the stories them¬

selves in their ancient form, so- that they afford the student of Israel's early political, social, and religious development a mine of information and preserve for the general reader the rugged spirit of the pioneer days of struggle against many and varied dangers. The chronology of the book belongs to the editorial framework; it is based on the theory that the heroes ruled united Israel, whereas the stories themselves leveal the fact that the judges were local leaders in their different tribes and districts.

Their lives may have been, in some cases, con¬

temporaneous. An historical use of the book requires careful discrimination between its earlier and later elements, varying in date of composition by as much as 500 years.

From a literary point of view, the older por¬

tions of the book give some of the best speci¬

mens of rapid, picturesque narrative, full of human interest and of simple loyalty and faith toward Jehovah, which make Israel's early prose so vital, while the Song of Deborah ranks as one of the finest examples of a vic¬

tory ode preserved in the early literature of any language. On the other hand, the com¬

pleted book is a monument of great interest in the art of historical composition. It is per¬

haps our first important example of a deliberate interpretation of events long past from the standpoint of a conscious philosophy of his¬

tory. The distinction so clearly visible be¬

tween the naive stories themselves and the rigid, solemn interpretation of the editors marks a great transition in the development of historical writing in Israel. Since Israel was the first people to develop a true historical literature, this transition is an important land¬

mark in the story of the world's historical writing.

Bibliography — Cornill, C. H., Hntroduc-

tion to the Canonical Books of the Old Testa¬

ment (London 1909) ; Creelman, H., (Intro-

duction to the Old Testament (New York 1917) ; Driver, S. R., Untroduction to the Literature of the Old Testament (New York, revised ed., 1914) ; Encyclopaedia Biblica) (New York 1901) ; Fowler, H. T., 'History of the Literature of Ancient Israel> (New York 1912) ; Hastings, J., dictionary of the Bible) (New York 1900) ; Kent, C. F., beginnings of Hebrew History) (New York 1904) ; (Jewish Encyclopaedia > (New York 1904) ; Moore, G.

F., 'Judges* (International Critical Com¬

mentary* (New York 1895).

Henry Thatcher Fowler,

Professor of Biblical Literature and History, Brown University.

JUDGES, Recall of. See Recall.

JUDGES' CAVE, a crevice between some

large fallen rocks on West Rock, New Haven, Conn., now a municipal park, which in 1661

was a temporary hiding-place for Goffe and Whalley, two of the English regicides.

JUDGES OF ISRAEL (Hebrew, shophe-

tim), the leaders managing the affairs of Israel from Joshua to Saul. Their position was partially judicial and partially one of leader¬

ship, though the former function, as time went on, seems to have gained in importance at the expense of the latter. The names of these judges usually given are Othniel, Ehud, Sham-

gar, Barak, Gideon, Tola, Jair, Jephthah, Ibzan, Elone Abdon and Samson, an account of whose deeds and various administrations may be found in the books of Judges and First Samuel.

Some accounts add to these names those of Eli, Samuel, Deborah and Abimelech, making 16 in all. The recorded exploits and actions of these judges seem to be more tradition than real his¬

tory. According to the records, these ˆjudges®

are supposed to have covered a period of 400

years, or an average of 25 years for each func¬

tionary, a considerable length of time for the conditions under which they must have held office and the dangers of the age. This average length of time is increased if the estimated period of 480 years for 12 judges is accepted, making 40 years of government for each indi¬

vidual. The functions, characters and actions of these judges were so different in individuals that modern critics are inclined to look upon them rather as legendary traditional or mytho¬

logical heroes rather than as sober historical characters. Notably Samson has been looked upon as an old sun god ; and Deborah, the prophetess, and Samuel, the powerful and in¬

fluential seer, might well be traditional types of early semi-religious, semi-tribal leaders. See Judges, Book of.

JUDGMENT, the decision rendered by the authority to which a question or issue has been submitted for determination. In a more re¬

stricted sense, the decision by a court of law of an issue raised by parties litigant, or the determination and declaration by such court of a legal right. There are many rulings by suchja court which are not

judgments, but de¬

termine merely some incidental question, and there are judgments which are interlocutory, as well as final judgments which put an end to the controversy. But every judgment in a judicial proceeding is an adjudication by the court of some right of a suitor, and until set aside or reversed, is the law governing such right.

In early times the solemn character of a court record and the means which the law fur¬

nished for the enforcement of an obligation thus established caused such a record to be adopted for the purpose of entering into an obligation as distinguished from resort to a court for the vindication of the obligation when disputed by the other party. A modern survival is found in the confession of judgment, by which a man causes his obligation to pay a sum of money to be entered upon the court records in the form of a judgment against him for the amount due. In consequence of the early practice— aided also by the fact that a judgment may be sued upon outside the juris¬

diction of the court in which it was entered, like a contract — the older legal writers speak of judgments as a species of contract. But this classification has been shown to be unscientific by recent writers, since the courts have pointed out that these obligations are not contractual in either their origin or their incidents, and it is now customary to speak of them as quasi-

contracts.

It is stated above that a judgment is inter¬

locutory or final. In a suit for partition of real estate a judgment that partition be made is interlocutory, and is the basis of further proceedings which result in the final judgment establishing the partition. A final judgment is one which ends the controversy, at least as to some of the parties. It is a general rule that no appeal can be taken, except from a final judgment, and while there can rarely be a case of doubt as to the finality of a technical judg¬

ment, that is the decision rendered by a court of common-law jurisdiction, questions fre¬

quently arise as to the finality of decrees (which correspond to judgments) entered by courts of equity. The test is whether the right is finally settled by the decree; for example, when a creditor has claimed

to intervene in an equity proceeding to establish his right to share in a fund being distributed, a decree excluding him is final as to him and appealable, though in all other respects the suit remains unde¬

termined by the court below.

A judgment of a competent court having jurisdiction of the parties and the subject mat¬

ter is conclusive, except so far as it may be the subject of appeal to a higher court. The direct issue thus determined will not be retried by another court, and such a determination cannot be attacked collaterally except on the ground of fraud or lack of jurisdiction of the court in which the judgment was rendered. A judg¬

ment in personam binds only parties to the cause and those in privity with them; a judg¬

ment in rent, which is a judgment determining the status of person or property, binds all the world. Decrees of courts of admirality are judgments in rem and conclusive of the status of the subject matter of the cause upon every one. Decrees of divorce are judgments in rem, and determine the status of the parties to the proceeding. In the United States they are pro¬

nounced by the State courts in the administra¬

tion of very diverse statutes relating to the sub¬

ject of divorce, and as the courts of all the States, in addition to the general principles of comity observed between courts of different jurisdictions, are bound by the mandate of the Federal Constitution requiring that ((Full faith and credit shall be given in each State to the public acts, records and judicial proceedings of every other State® many perplexing questions have arisen. These cases afford good illustra¬

tions of successful collateral attacks upon judg¬

ments on the ground of fraud or lack of juris¬

diction of the court entering the judgment. It is now well settled that a decree of divorce may be successfully attacked collaterally on the ground of fraudulent collusion between the parties or lack of jurisdiction of the court pro¬

nouncing it over the person of the defendant.

It is to be observed that a final judgment is conclusive of the particular cause, and finally determines the right therein litigated, and may be pleaded in bar of any future attempt to as¬

sert the right, except in a case in which there has been no determination on the merits ; as for example, where the plaintiff has suffered a voluntary non-suit, that is, has elected in ad¬

vance of a verdict to abandon his case. He loses that particular case and must pay the costs, but is not prevented from bringing an¬

other action.

In most of the United States a judgment for a sum of money found to be due, from the date of. its entry, and without the issuance of a writ of execution, constitutes a lien upon the real estate of the judgment debtor; that is, a claim which must be paid out of the proceeds of any judicial sale of the property in its due order of priority as compared with other liens upon the same property. This lien usually ex¬

tends only to real estate within the jurisdiction

of the court in which the judgment was entered with provision for filing a transcript to create ‘a lien in other counties of the same State in which the debtor owns real estate. A foreign judgment, in which are included the judgments of others of the United States, must be sued on and a judgment recovered upon it to make it effective in any of the States. In such suit no defense which could have been interposed in the original suit will be allowed to the judg¬

ment debtor.

John Douglass Brown.

JUDIC, zhu'dik, Anna Damiens, French

actress: b. Semur, 1850; d. 1911. In 1868, shortly after her graduation from the Conserva¬

toire, she became very popular at the Eldorado Theatre. In 1871 she visited Belgium ; and then returned to the Gaite and other Parisian theatres where her popularity increased by leaps and bounds. Among her notable creations were Niniche, Mimi, Lili and Mademoiselle

Nitouche. She made a two years' tour (1885-

86) of the principal cities of Europe and the United States. Retiring from the stage for some time, she returned to it in 1898.

JUDICA, joo'di-ka (<(judge,® or (

tence®), the first word in the 43d Psalm, used as an introit in the Church of England (1549) for the 3d Sunday in Lent, and in the Roman Catholic Church for the 5th Sunday in Lent.

Hence (

JUDICATURE ACTS, in English law , a

number of statutes, dating from 1873, simplify¬

ing procedure and consolidating numerous courts into one Supreme Court of judicature.

Demurrers were abolished, and important changes made in the rules as to the right of trial by jury. The acts in question are 36 and 37 Viet., c. 66, and 38 and 39 Viet., c. 77, with various amendments. A 12th amending act was passed in 1899. By the first of these acts the Court of Queen's (or King's) Bench, the Court of Chancery, the Court of Exchequer, the Court of Common Pleas, the High Court of Admiralty, the Court of Probate and the Court of Divorce and Matrimony were consolidated into one Supreme Court of Judicature, consist¬

ing of a High Court of Justice and a Court of Appeal. By these acts laws and equity were administered by the same court, and equitable defenses allowed in legal actions. Another ob¬

ject of these acts was to simplify pleading and practice, and this was

done by abolishing the old forms of action. The former arbitrary modes of pleading were supplanted by concise state¬

ments of claim or defense. The House of Lords under these acts remains the highest court of appeal. In case a point of law is raised by the pleadings, it is left for settlement until the trial or until after the issues of fact have been disposed of. It is claimed by some that the abolition of demurrers and settling questions of law after the beginning of the action has led to great laxity and inaccuracy in pleading. Upon notice without order, either party has a right to trial by jury in actions of false imprisonment, malicious prosecution, slander, libel, seduction or breach of promise of marriage. By the act of 40 and 41 Viet., c. 57, a Supreme Court of Judicature was established in Ireland in 1878, and by this act and later ones, a substantially similar system to that of England is now in effect.

JUDICIAL DECISIONS, Recall of. See

Recall.

JUDICIAL DISTRICT. See District.

JUDICIAL NOTICE, recognition by a

court of some certain feature involved in an action as being self-evident and, therefore, in no necessity of proof. It is a very old doctrine in English and American law. The determining of what facts come under the term judicial notice is almost altogether in the hands of the court which is generally supposed to take ju¬

dicial notice of the common and the public statute law, the public offices and officers, rules of courts, matters of public record in its own State, the State and the United States political constitutions ; and, in addition, all other factors or claims which might, in reason, affect any decision to be made, such as the existence and title of foreign state and sovereign recognized by the United States and public proclamations of the national or State chief executive. In short, the court, in making its decision in case of judicial notice, is supposed to be fully and truly possessed of all the facts, conditions and bearings of the question at issue. The judge must at some time either previous to the trial or during it become convinced that the fact in question is self-evident and that it therefore does not admit of dispute nor require proof.

This condition also applies to courts and juries, but the jury cannot take cognizance of a law without instruction from the court, since

such is not the function of a jury. An appeal may be made to the appellate court against the decision of the court, and it may, if it finds reason therefor, reverse the judgment and order a new trial. See Evidence.

JUDICIAL SEPARATION, the termina¬

tion by process of law of the conjugal rights and obligations of husband and wife. In many countries where divorce is either not recog¬

nized at all or is very difficult to obtain, judicial separation affords a legal relief against, if not a remedy for, intolerable marriage conditions.

It is therefore frequently resorted to in coun¬

tries that are strongly Roman Catholic, owing to the stand taken by that Church against the dissolution of the marriage contract, which is considered in the light of a sacrament of re¬

ligion. In most of the countries of Europe, where old customs, laws and traditions change slowly, the securing of a divorce is a very diffi¬

cult matter, even where the provisions of the law make it possible; and here judicial separa¬

tion is resorted to as affording quicker and easier relief and less public notice. This con¬

dition obtains in England and her colonies. In the United States, however, where many at¬

tempts have been made by the various States of the Union to regulate the question of the legal separation of man and wife, more or less liberal divorce laws have been placed upon the statute books of most of the States. In the legal sense of the term judicial separation is not a divorce since it does not dissolve the marriage bonds, but simply requires the con¬

tracting parties to live apart as though they were not husband and wife. Divorce, on the other hand, is the dissolution of the marriage ties. The parties to the divorce are generally 236

permitted to marry again, though the divorce decree sometimes prohibits one or both of them permanently, or for a certain specified time.

In effect the judicial separation is, in many respects, similar to that of the decree of divorce.

It destroys the right of husband and wife to cohabit {consortium') or to enjoy one an¬

other's society as married parties. As it has the result of making the parties to the judicial separation, in a legal sense, individuals, it re¬

lieves the husband of the support of his wife or of the payment of all debts and obligations contracted by her. But as the parties to the decree of judicial separation are still husband and wife, in the eyes of the law, neither, under the terms and intent of the decree, can marry again. Any such attempt would be legal bigamy and adultery. Nor does legal separation gen¬

erally interfere with the property relationship of husband and wife or any business contracts, obligations or relationships they may have en¬

tered into previous to the decree of judicial separation. The husband, as the head of the family, is still the legal guardian of his chil¬

dren unless expressly deprived of this, or hav¬

ing voluntarily resigned it in the legal process of the securing of the decree. Although legally separated, the wife, on the death of her husband, has the same relation to him and his estate and other possessions as though no separation had taken place. The husband, in the same manner, in the case of the death of his wife, has all the rights given by the marriage contract. See Divorce.

JUDICIARY, the body of judges or mag¬

istrates who exercise their authority either singly or as tribunals, interpreting the laws which the legislatures make and the executives execute. The highest courts in all countries, and those mostly of an intermediate character, are held by a bench of judges, rather than by a single magistrate. Dominating all is usually a supreme court which determines all legal con¬

troversies of national concern. In nations un¬

der a federal system of government, the judicial power is usually divided between two separate and distinct classes of courts: federal courts exercising judicial power in respect to questions of national concern and state courts established for the determination of legal controversies of a local character.

The Judiciary Act of the United States Con¬

gress, 24 Sept. 1789 (1 Stat. 73), is non-

embodied with the amendments in the provisions of the United States. The act established the Federal courts of the United States, defined their jurisdiction and powers and regulated procedure. The basis of the whole legal system of the country is the common law (q.v.), 'with¬

out. which there would be an extraordinary variety of judicial organization and procedure throughout the nation, each State having its own separate and distinct judicial system and procedure; framed according to its own notions of its local needs and conditions. Above all other governmental departments the Federal judiciary especially, and the judiciary in general, command popular confidence and respect. The importance and political influence the judiciary possesses have been largely increased from the power which the American courts have attained in declaring statutes null and void when they *ire found to conflict with the Constitution.

From the beginning this power has been recog¬

nized almost without dispute. While State judges are for the most part elected by the people, all Federal judges are appointed by the President with the advice and consent of the Senate. In regard to terms of judicial tenure, there is a great variety of opinion and practice throughout the United States. See Court ; Judge; Supreme Court of the United States.

JUDICIARY AND EXECUTIVE. See

Executive.

JUDITH, Jewish heroine. She was the

widow of Manasses, a citizen of Bethulia.

When Holofernes, general of King Nebuchad¬

nezzar, according to the book of Judith, be¬

sieged Bethulia, a city of unknown geographical position, she went armed with faith in Jehovah to the tent of the invader and was admitted be¬

cause of her stately beauty. While he slept she cut off his head with his own sword and thus delivered Israel. This incident has been a favorite subject with artists, for in the first place the book of Judith is written with abun¬

dant literary point and skill and is naturally suggestive to the sculptor or painter. It is the subject of Donatello's bronze group in the Lanzi palace at Florence, and of many pictures, notably that of Cranach in the Dresden Gallery, and those of Florace Vernet, (Judith on Her Way to Holof ernes* and (Judith in the Tent of Holofernes.*

JUDITH, zhu'det', Julie Bernat, French

actress: b. Paris, 1827; d. 1912. She was a relative of Rachel (q.v.). She played in the principal theatres of Paris, making her debut at Les Folies in 1845. Among her many successful roles were Penelope, Alcemene, Rosine, Char¬

lotte Corday and Mademoiselle Aise. She was married to Bernard Derosne and with him made translations from English into French.

Under the pen name Judith Barnard she wrote (Le Chateau du Tremble) (1872).

JUDSON, Adoniram, American mission¬

ary: b. Malden, Mass., 9 Aug. 1788; d. at sea, 12 Aug. 1850. He was a member of the first American Board of Commissioners of Foreign Missions, consisting of five members. Sent to London to confer with the London Missionary Society, he was captured, on the way, by a French privateer and imprisoned at Bayonne.

Released, later on, he proceeded to London and accomplished his mission. Returning to Amer¬

ica, he and four other missionaries, Hall, Newell, Nott and Rice, were sent to India (or Burma) by the American Board of Foreign Missions (February 1812). In Calcutta Judson and his wife joined the Baptists, and their activities resulted in the formation of the American Bap¬

tist Missionary Union (1814). After consider¬

able wandering, Mr. and Mrs. Judson settled in Rangoon (1813). Although they do not seem to have had very great success in gaining con¬

verts among the natives, the government, never-

theless, did not show itself at all friendly toward their efforts, which had netted them a score or more of converts in 11 years. On the breaking out of war between Burma and the East India Company, Judson was imprisoned for a year and seven months, and even then was released only on a peremptory demand on the part of Gen. Sir Archibald Campbell. After a year at Amherst in Lower Burma, he went

to Maulmain, where he was successful in found¬

ing a church. Returning to America in 1845

on account of his own ill health and that of his family, he went back to Rangoon in 1847, where he occupied a goodly part of his time in the preparation of a dictionary. Forced by returned ill health to leave the country, he was cariied on board ship at Maulmain and died on the voyage four days later. His body was buried at sea. Judson was an indefatigable and tireless worker, and his work must be judged from two points of view, the aims actually ac¬

complished and the general results of his labor upon conditions not only in the country in which he labored but upon all of India and Further In¬

dia. In his 37 years of missionary labor he suc¬

ceeded in gradually working up a sentiment in the East in favor of religious toleration which is to-day bearing fruit in many quarters. One of his most successful efforts was the organization of an extensive, . trained body of native assist¬

ants to aid him in the translation of the Bible and other works into Burmese, and in the com¬

pilation of his Burmese-English and English-

Burmese dictionary, Burmese grammar and Pali dictionary. These works, though intended pri¬

marily as aids for missionaries in Burma and the India countries generally, have been great aids to the study, by students and scholars of the languages of the East, in which Judson's missionary efforts and the publicity they had received had helped to increase the growing interest. Consult lives of Judson by his son, Edward Judson (New York 1883 and 1898) ; and by Wayland. See Judson, Ann Hassel-

tine; Judson, Sarah Hall; Judson, Emily Chubbock.

JUDSON, Adoniram Brown, American

surgeon : b. Maulmain, Burma, 7 April 1837 ; d.

New York, 21 Sept. 1916. He was a son of the missionary Adoniram Judson. His mother was Sarah Hall Boardman Judson. He was gradu¬

ated from Brown University in 1859, Harvard Medical School in 1860, Jefferson Medical Col¬

lege in 1865 and College of Physicians and Sur¬

geons in 1868. He became assistant surgeon in the United States navy in 1861 ; surgeon in 1866

and resigned in 1868. Since then he had en¬

gaged in the practice of medicine in New York city. He was a specialist in orthopedic surgery, inspector of the New York board of health from 1869 to 1877 ; pension examining surgeon from 1877 to 1884 and from 1901 to 1914; medi-

ical examiner of the New York State Civil Service Commission from 1901 to 1909; ortho¬

pedic surgeon to the out-patient department of New' York Hospital from 1878 to 1908. Dr.

Judson wras president of the American Ortho¬

pedic Association in 1891, member of the Amer¬

ican Medical Association, Fellow of the Amer¬

ican College of Surgeons, American Academy of Medicine and the

Academy of Medicine and was a member of Lafayette Post, G. A. R. He wrote on medical and surgical subjects.

JUDSON, Ann Hasseltine, American mis¬

sionary to India : b. Bradford, Mass., 22 Dec.

1789; d. Amherst, Lower Burma, 24 Oct. 1826.

She was the wife of Adoniram Judson (q.v.), whom she accompanied on his first visit to India (1812) and with wrhom she labored as a mis¬

sionary. She published a (History of the Burma Mission. > Consult Knowdes, (Life of Ann Hasseltine Judson. >

JUDSON, Edward, American Baptist cler¬

gyman : b. Maulmain, Burma, 27 Dec. 1844; d.

New York, 23 Oct. 1914. He was the son of Adoniram Judson (q.v.) and came to the Uni¬

ted States in 1850 after the death of his father.

He studied at Madison (now Colgate) Univer¬

sity and was graduated from Brown in 1865.

He was^ principal of the academy at Townsend, Vt. . (1865-67) and subsequently professor of Latin at Madison (now Colgate) University.

In 1875 he accepted the pastorate of the Baptist Church at Orange, N. J., then became pastor of the Berean Baptist Church, New York city, and later secured a site on Washington square, New York, and erected the Judson Memorial Church (in memory of his father), of which he was pastor. Here he built up an institutional church, with many different lines of work, in¬

cluding gymnasium classes, a dispensary and a children's fresh air fund. He lectured on the¬

ology at the University of Chicago, 1904-06, and on Baptist principles and polity at Union Theo¬

logical Seminary, 1906-08, and was made pro¬

fessor of pastoral polity at Colgate in the latter year. In 1899 he published a (Life) of his father, and he wrote also (The Institutional Church. >

JUDSON, Emily Chubbock, American

writer and missionary: b. Eaton, N. Y., 22 Aug.

1817 ; d. Hamilton, N. Y., 1 June 1854. She was the, third wife of Adoniram Judson (q.v.) whom she married in 1846, and at once accom¬

panied to India. Even at this time she had at¬

tained a reputation as a writer under the pen name of Fanny Forester. She wrote the life of Sarah Hall (Boardman) Judson, second wife of Adoniram Judson. On the death of her husband she returned to America in 1850.

Ill-health prevented her continuing her literary labor. She, however, assisted Dr. Wayland in writing the biography of Judson. Consult Kendrick, A. C., who has written her biography.

JUDSON, Frederick Newton, American

author: b. Saint Mary's, Ga., 1845; d. 18 Oct.

1919. Graduating from Yale University and the Saint Louis Law School (1871) he became private secretary for Gov. Gratz Brown, when he entered upon the practice of law. He lectured at Washington University (1903), and was Storrs lecturer at Yale (1913). He was counsel for the United States on several im¬

portant occasions, and acquired a reputation as a corporation lawyer. Among his published works are (Law Practice of Taxation in Mis-

sourP (1900) ; (The Taxing Power, State and Federal, in the United States) (1902) ; (The Law of Interstate Commerce) (1905) ; (The Ju¬

diciary and the People) (1913).

JUDSON, Harry Pratt, American educa¬

tor: b. Jamestown, N. Y., 20 Dec. 1849. He was graduated from Williams College in 1870, was professor of history in the University of Minnesota 1885-92, professor of international law and head of the department of political science since 1892 in, and president since

of, the University of Chicago. He is a mem¬

ber of the General Education Board since 1906, and member of the Rockefeller Foundation since 1913. He was chairman of the China Medical Commission 1914, and is a member of the China Medical Board since 1914. His works include (Caesar's ArmyP a study of the military art of the Romans (1888) ; (Europe 238

in the Nineteenth Century* (1894);

JUDSON, Sarah Hall (Boardman), Amer¬

ican missionary to Burma: b. Alstead, 4 Nov.

1803 ; d. Saint Helena, 1 Sept. 1845, while on way home to United States. She married Rev.

George Dana Boardman in 1825 and went with him to the Baptist missionary work in Burma.

On the death of Boardman she was married to Dr. Adoniram Judson (q.y.) In 1834. She helped the latter in his religious and literary labors and acquired such a good knowledge of Burmese that she translated into it numerous tracts, Biblical selections and a part of the ˆPilgrim's Progress.) She also made a hymn-

book in Burmese and supervised the translation of the New Testament into Peguan. Consult her life by Emily C. Judson.

JUDY, the wife of Punch, in the puppet show, Punch and Judy. See Punch and Judy.

. JFˆF' Jˆ jo*6l, yens, Danish statesman: b- 15 July 1631 ; d. 1700. He joined the suite of Count Christian Rantzau, with whom he visited Vienna an-d Ratisbon in 1652. Five years later Juel was sent as minister to the Polish court. Here he was not successful in deterring King John from making a separate treaty with Sweden. On Juel's return to his native country he was made privy councillor.

About this time the misunderstanding between his uncle, Hannibal Sehested and Frederick III was composed and Juel's prospects were

en¬

hanced thereby. As his uncle's representative he negotiated the Peace of Copenhagen with Charles X. From 1660 to 1668 Juel was Danish minister to Sweden. Griffenfeldt, the chan¬

cellor, was a great admirer of Juel and on two occasions (1672 and 1674) sent the latter on special missions to Sweden with the avowed object of cementing closer relations between Sweden and Denmark but really to form an alliance with the former. . Juel admired his chancellor s policy, which aimed at the weaken¬

ing of Sweden and so forming a just balance between her and Denmark. Juel desired by all means to avoid a war with Sweden, the latter state being far the superior of Denmark in military strength. Despite his endeavors the unfortunate Scanian war broke out in 1675

and lasted for four years. At its close Juel was one of the Danish representatives who signed the peace treaty at Lund. At that con¬

ference he still aimed at the formation of an alliance with Sweden and afterward followed out this policy even bringing about the marriage of Charles XI and Ulrica Leonora, daughter of King Christian V. In 1680 Juel's plans for an amicable understanding with Sweden were upset by the death of Gyllenstjerna, the Swedish statesman who shared his views. In 1697 Juel irpresented his country at the coronation of Charles XII at which time he concluded a new tieaty with Sweden. Juel was the shrewdest diplomatist of his time, taking for his motto : ((We should wish for what we can get.® He was greatly worried over the state of his coun¬

ty which he regarded as placed at the mercy of the Great Powers, a mercy as tender then as now! He opposed the establishment of an clastic political system and did all in his power to advance commerce and industry. The

emancipation of the serfs Juel thought im¬

practicable and about the only reforms he championed were a few petty changes in the agricultural system. He showed himself a faith¬

ful friend by remaining steadfast to Griffen¬

feldt in the latter's days of adversity. Consult article (

. JUEL, jool, Niels, Danish admiral : b. Chris¬

tiana, 1629 ; d. 1697. Going to Holland in 1650, he served under De Ruyter and Tromp in the war against England and the Barbary states. He also fought with allied Dutch fleets against Sweden in 1659, and also in the later war with the same country in 1676, when being himself in command at the battle of Jassmund, he de¬

feated, and swept the enemy's fleet out of the sea with a very much smaller number of ves¬

sels. _ The following year, with 25 ships to the Swedish 36, he again obtained the victory at the battle of the Bay of Kjbge.

JUENGLING, yung'lmg, Frederick, Amer¬

ican wood engraver: b. 1846; d. 1889. He was one of the founders and the first secretary of the American Society of Wood Engravers (1881). In his art he was one of the most consistent advocates and practicers of the new American system of wood engraving which substituted short broken lines, dots and so forth for the regulation long lines and regular sweep of the graver. He was a bold and clever workman and met with very considerable suc¬

cess. Consult Weitenkampf, Frank, (American Graphic Art* (New York 1912).

r JUG, a V,?SSF °f earth, glass or metal, used tor holding liquids and characterized by having one handle and a lip for ease in pouring. The origin of the word is uncertain. In slang the term is employed to denote a prison, and there is not wanting evidence that in this latter sense it is an adaptation of the Latin jag-urn, a yoke.

U the United States the word pitcher has super-

seded jug to a great extent. The Metropolitan Museum, New York, and the British Museum, London, contain very fine examples of this kind of vessel in the latter is a remarkable bronze jug found at Kumasi in 1896. It was made in England in the reign of Richard II, whose arms and badge it bears. It is furnished with a lid handle and spout. The ewer is a jug with a ip an<^ .was f°rmerly in general use at table for pouring water over the hands after meals, a practice very essential when we re¬

member that table forks were still unknown Much variety in form and design appears in the early specimens, some are balanced on three feet and some take the form of animals. The l«th and 19th centuries saw the production in England of pottery vessels known as «Toby Jugs,®

«Nelson Jugs,® etc., usually in the form of a stout old man with a hat the corners of which form the spouts.

JUGGERNAUT, jug'er-nat. See Jagan-

NATH, J

• JUGGLER (Old French, jangleur, Latin,]o ciilator, joker, jester), a skilful and dexter¬

ous performer of feats of different kinds in¬

cluding slight of hand (legerdemain). The juggler is or was to be found in all lands He was a favorite with the Greeks and the Ro¬

mans, and has been, for centuries, with the JUGLANDACZE

Japanese and Chinese; and he has long been an msUtmion in India, Further India, Persia and Tibet. The Aztecs and many other Amer¬

ican native races had very skilful jugglers who seem to have been frequently connected with the religious or mythological beliefs of the peoples. Very skilful jugglers formed one of the most striking features of the elaborate court entertainments of Montezuma II, who was so fond of this sport that he had his own favorite private jugglers, some of whom were dwarfs and people otherwise deformed. See Legerdemain; Fakir; Fire-Eaters; Jongleur.

JUGLANDACZE, the walnut family, dicoty¬

ledonous plants, native of the north temperate zone. Most of the 40 or more species of this family consist of trees, all nut-bearing and pro¬

ducers of excellent wood for cabinet and other work. The most valuable in this respect is the black walnut. The best known and most ex¬

tensive genera are the Juglans or walnuts, and the Hicoria or hickories. The family is distin¬

guished by alternate compound leaves.

JUGOSLAVIA, or YUGOSLAVIA, a

term signifying the Southern Slav State (jugo comes from jug or yug, meaning south). The word derives from the geographical situation of the country, and includes the three branches of a single people known under the names of Serbians, Croatians and Slovenians. The area of the new state is about 75,000 square miles (nearly as large as England and Scotland to¬

gether, or about two-thirds of the size of Italy). Its boundaries are formed by the Adri¬

atic Sea and Isonzo River on the west, and the Hungarian Republic on the north. On the east it is bounded by Rumania and Bulgaria, and on the south by Greece and Albania. The provinces included in . Jugoslavia are Serbia, Montenegro, Macedonia, Bosnia-Herzegovina, Croatia-Slavonia, Dalmatia, Carniola, Bachka, Banat and parts of Istria, southern Styria and southern Carinthia. The population within the border limits given above is estimated at 14,-

000,000 inhabitants, of whom 90 per cent are Slavs and 10 per cent belong to other nation¬

alities, scattered on the borders : Rumanians, Albanians and Bulgarians.

The first attempt at Jugoslav unity, which the European War has consummated, dates from the 9th century. Ljudevit Posavski roused the Slavic people, fought the Franks and assembled under his authority the Croa¬

tians of Pannonia, the Slovenes and the Ser¬

bians of the Danube region (819-22.) Dur¬

ing a very short time all the Jugoslav countries situated between the Sava and the Timok rec¬

ognized a common sovereign. But this ephem¬

eral realm was soon destroyed by the Frank and Byzantine powers. However, even dis¬

counting enemies from without, its existence would not; have lasted long. Difficulty of rela¬

tionship and communication in the Middle Ages prevented different parts of the same kingdom from becoming acquainted and known to

each other. The least natural obstacle was an insurmountable barrier separating members of a single race.

It was thus that the Jugoslav provinces con¬

tinued like fiefs hidden away in their geograph¬

ical limits, ignorant of one another. Every¬

thing held them apart; the numerous rivers and mountains of the rough, hilly country; the ambition and independence of their grand feu¬

dal chiefs, for whom the natural isolation of their subjects was a necessity; rivalry between the two churches : the Catholicism of Rome and the Orthodoxy of Byzance, which split up and disputed over the Jugoslavs placed under their two-fold influence. But in spite of all these obstacles, a feeling for inter-communica¬

tion was to be noted among the southern Slavs every time an idea of centralization agitated Europe. A Jugoslav prince arose who tried to realize the union of Serbs, Croats and Slovenes, Zvonimir, king of Croatia (1076-88), as also Dushan the Mighty (1331-55), emperor of Ser¬

bia, and Tvrtko (1351-91), king of Bosnia, who reunited for a little while the three crowns of Bosnia, Serbia and Croatia.

From the 16th to 18th century most Jugo¬

slav provinces fell under the Turkish rule, and the only link which kept the southern Slavs to¬

gether was their language and common litera¬

ture, known under the name of the Ragusan literature. The feeling of national unity was reflected in the writings of Ivan Gundulic (1588-1638), George Krizanic (1617-86), Jovan Raic (1726-1801), Urban Jarnik (1784-1844), Dositheus Obradovic (1739-1811) and many others. Thanks to the efforts of all these writers and thinkers, the idea of southern Slav unity was already widely disseminated among the people. Religious intolerance had lost much of its force. Liberal and democratic ideas prevailed for the moment, and the prin¬

ciple of nationality was proclaimed. Not long afterward the introduction of railroads facili¬

tated communication between the different provinces, heretofore divided by impassable mountains. From this time onward the idea of Jugoslav unity showed itself not only in the works and thoughts of individual men of let¬

ters but in the great achievements of militant nationalism as well. Serbia emancipated her¬

self politically (1804) and with Montenegro became the centre toward which the ejˆes of all the southern Slavs involuntarily turned.

Side by side with great political events arose an intellectual movement of equal importance and likewise tending strongly toward emancipation and national unity. The celebrated scholar, Vuk Karadzic (1787-1864), completely re¬

formed the Serbian literary language by his introduction of the vernacular into literature as the only fit and worthy vehicle of the writ¬

ten thoughts of the nation. His reform found an echo in Croatia where Ljudevit Gaj (1809-

72) and his fellow-workers adopted the same tongue. Among the Slovene writers, Stranko Vraz (1810-51) and other contemporary au¬

thors endeavored to adopt the Serbo-Croat tongue as their literary language. Thus the three separate literatures, known before as the Serbian, the Croatian and the Slovenian, were unified and have since then formed one south¬

ern Slav literature. The mental and spiritual union between the different branches of the na¬

tion assumed a definite form and at the end of the 19th century attained its full development.

At the beginning of the 20th century the Jugoslav movement was more intensively felt throughout all the provinces. In Serbia the Austrophile parties with the dynasty of Obre-

novic were overturned in 1903. In Croatia tbfe movement was marked by the fall of the reao tmnary Ban Khuen-Hedervary, who for 20

years had tyrannized over this sorely-tried country. Bosnia-Herzegovina was freed from the absolutism of its administrator, Benjamin Kalay, by his death. In 1905 Dalmatia rid her¬

self of the obnoxious rule of the governor, Baron Handel ; and in Montenegro a constitu¬

tion was introduced. Soon after these events economic relations with Vienna and Budapest were discontinued. Austria-Hungary annexed Bosnia-Herzegovina (1908), which action stirred up all the jugoslav people. The approach of the storm was felt more and more. The Serbian national organizations cpenly demanded the evacuation of the annexed country by the Habsburgs. To justify its regime, Austria es¬

tablished a reign of prosecutions and false trials. She proposed to unite all the Jugoslav provinces, including Serbia and Montenegro, under the Habsburg sceptre. The southern Slavs became wrought up by such actions and vowed vengeance among themselves. In 1912

the Balkan Confederation was formed against both Austria and Turkey, and Turkish rule subsided with the ending of the Balkan wars.

Whereupon Austria-Hungary wanted to fill the vacancy and to bridge over Austro-German rule into Asia Minor. To accomplish this purpose the government of Vienna induced the Bul¬

garians to break the Balkan League and to sep¬

arate from the Slavic nations, which they ac¬

cordingly did.

After the Sarajevo tragedy in 1914, the war between Austria and Serbia began. In the be¬

ginning of the war Serbia twice defeated the Austrian arm}', but in 1915, attacked by Bul¬

garia in the rear, and by the Austro-German forces to the north, she succumbed. The coun¬

try was occupied by the enemy for three years.

In 1918 Bulgaria was the first of the Central Powers to surrender to the Entente Powers.

Whereupon the Austrian army was forced to evacuate not only Serbia and Montenegro but all the other Jugoslav provinces. National councils of the Serbs, Croats and Slovenes elected a central executive committee to estab¬

lish a sovereign Jugoslav state. This conven¬

tion was held in Geneva during November 1918, bringing a resolution to set up a national gov¬

ernment representing' all the Jugoslav provinces and preparing ground for the election of a con¬

stituent assembly. In Montenegro a National Assembly met in the city of Podgorica, de¬

throned its king, Nicholas, and decided to join the Jugoslav union. The Allied Powers, Great Britain, France and the United States, first en¬

couraged the unification of Jugoslavia, and later on gave a more definite form to their rec¬

ognition. On 7 Feb. 1919 the United States government, through its Secretary of State, is¬

sued a formal statement of the following con¬

tent : "On 29 May 1918, the Government of the United States expressed its sympathy for the nationalistic aspirations of the Jugoslav races, and on 28 June declared that all branches of the Slav race should be completely freed from German and Austrian rule. After having achieved their freedom from foreign oppres¬

sion, the Jugoslavs, formerly under Austro-

Hungarian rule, on various occasions ex¬

pressed the desire to unite with the kingdom of Serbia. The Serbian government, on its part, has publicly and officially accepted the union of the Serbian, Croatian and Slovenian peoples. The Government of the United States.

— JUHLKE

therefore, welcomes the union, while recogniz¬

ing that the final settlement of territorial fron¬

tiers must be left to the Peace Conference for adjudication according to the desires of the peoples concerned.®

Bibliography.— Cvijic, ‘Unite Ethnique et National des Yougoslaves) (Scientia , Vol.

XXIII, pp. 455-463, Bologna 1918) ; Forbes, ‘The Southern Slavs } (Oxford University, pp.

1-32, 1915); Gauvain, ‘La Question Yougoslav) (Revue de Paris, t. 2, pp. 411-448, 1918) ; Harris, ‘Southern Slav Question1* (Amcr . Polit. Sci¬

ence Review, Vol. IX, pp. 227-251, 1915) ; Hinko-

vic, (Les Yougoslaves, leur passe, leur avenir) (Revue Anthropologique, Vol. XXVI, pp. 205-

230, Paris 1916); Holdich, (A Jugo-Slav Feder¬

ation , (Fortnightly Review, Vol. CII, pp. 185—195, 1918) ; Krek, (Les Slovenes) (Paris 1917) ; Lanux, ‘La Yougoslavie) (Paris 1916) ; Ma-

ritch, (Ce que sont les Yougoslaves) {La Revue, Vol. CXXIV, pp. 109-124, 1918), Marja-

novic, ‘Jugoslavija) (New York 1916) ; Nie-

derle, (La Race Slave) (Paris 1911) ; Primorac, (La Question Yougo-Slave) (Paris 1918) ; Radonich, (Srbi u Ugarskoj) (‘The Serbians in Hungary, > Nish 1915) ; Seton-Watson, ‘German, Slav, and Magyar* (London 1916) ; ib., (The Southern Slav Question and the Habsburg Monarchy* (London 1911) ; Stanoy-

evich, ‘Jugoslavia, a New European State*

{Century, March 1918) ; ib., ‘The Ethno¬

graphy of the Jugoslavs* {Geographical Re¬

view, ‘ February 1919) ; Stoyanovich, ‘La Bosnie-Herzegovine* (Geneve 1917) ; Sisic, ‘Povjest Hrvatskog Naroda) (‘The His¬

tory of the Croatian People,* Zagreb 1916) ; Taylor, ‘The Future of the Southern Slavs>

(London 1917); Vercesi, ‘LTtalie et la Yugo¬

slavs au Congress de Rome) {Revue Politique et Parlementaire, t. 95, pp. 25-32, 1918) ; Voino-

vitch, ‘La Dalmatie, l’ltalie, et l’Unite Yougo-

slave) (Geneve 1917) ; Vosnjak, ‘Jugoslav Na¬

tionalism* (London 1916) ; Zuiovich, ‘Les Serbes) (Paris 1917).

Milivoy S. Stanoyevich.

JUGULAR (joo’gu-lar) VEIN, one of the

large trunks by which the greater part of the blood that has circulated in the head, face and neck is returned to the heart. There are two on each side, an external or superficial and an internal or deeper.

JUGURTHA, joo-ger’tha, king of Numidia: d. Rome, 104 b.c. He was a natural son of Masinissa. Micipsa, his father’s brother, and king of Numidia after Masinissa (149 b.c.), adopted him and brought him up with his own sons, Adherbal and Hiempsal. Micipsa did his best to conciliate him, and declared him joint-

heir to the crown with his two sons. But after the death of Micipsa, Jugurtha had Hiempsal murdered and drove Adherbal from the coun¬

try. Adherbal appealed to Rome, and after sev¬

eral Roman expeditions into Numidia, Jugur¬

tha was. captured (106 b.c.), led in the triumph of Marius at Rome, and finally thrown into a dungeon, where he was starved to death.

JUHLKE, yul’ke, Ferdinand, German horti¬

culturist: b. Barth, Pomerania, 1815; d. 1893.

In 1854 he became royal horticultural inspector in charge of an experimental station ; and four years later he became owner of a private horti¬

cultural establishment in Erfurt, which he han-

died so successfully that he was appointed di¬

rector of the Prussian Royal Gardens (1866-

91). Among his numerous and important

works are (Gartnerische Reiseberichte) (1853) ; 'Gartenbuch fur Damen) (1874, 3rd edition) ; (Ueber die Stellung der Botanik zur Land-

wirtschaft und zum Gartenbau) (1865); (Die konigliche Gartnerlehranstalt und Landesbaum-

schule' (1872). He edited the Eldenaer Archiv (1854-59); and Schmidlin's (Blumenzucht im Zimmer) (1880, 4th ed.).

JUIF ERRANT, zhwef er-an, Le, a ro¬

mance written by Eugene Sue in 1845. It has been translated into all the languages of Eu¬

rope; and in English it bears the title (The Wandering Jew.' See Wandering Jew, The.

JUJUBE, joo'joob, a spiny and deciduous shrub of the family Rhamnacece, Zizyphus ju-

juba, a native of Syria, whence it was intro¬

duced into Europe. The fruit is blood-red or saffron-colored, with a sweet, granular pulp.

The species of the genus are numerous, and of several the fruit is wholesome and pleasant to eat, both fresh and dried, and forms an article of commerce; and in southern Europe it is used at table in desserts as a dry sweetmeat.

Z. lotus, which gave its name to the ancient Lotophagi, a shrub 2 or 3 feet high, is a na¬

tive of Persia and the north of Africa. Its berries, which are about as large as a cherry, are collected for food by the Arabs of Bar¬

bary, are made into cakes, and a kind of wine is sometimes made from them. Z. spina-

christi, or Christ's thorn, is said to have fur¬

nished the branches of which Jesus' crown of thorns was made.

JUJUY, hoo-hwe', Argentina, a province sit¬

uated in the extreme northwest of the republic, between Bolivia and the province of Salta.

Nearly the entire area, estimated at 18,977

square miles, is occupied by mountains in which are extensive deposits of gold, silver, copper, mercury, salt, petroleum and asphalt. This mountainous section is a continuation of the great Bolivian table-land, and here the climate is cold, and the vegetation poor. Fertile val¬

leys in the eastern part of the province pro¬

duce sugar-cane, wheat, tobacco and rice. The climate in this portion is hot and moist. There are immense forests and an abundant supply of water. The Rio Grande de Jujuy traverses the province and reaches the Paraguay, through the Rio Bermejo. In the elevated plateau known as the Puna de Jujuy are two large lakes, Toro and Casabindo, the latter of which pro¬

duces great quantities of salt. The provincial capital, also called Jujuy, a town of about 6,000

inhabitants, is connected by railway with Buenos Aires, and has two banks, a custom-house, a national college, a normal school for girls, and seven public schools. The population of the province is about 65,000.

JUKES, The, the name given to a family of New York State that had an unusual record of crime and pauperism. In 1874, Mr. R. L.

Dugdale, while making investigations in behalf of the New York Prison Association, found several of the same family imprisoned for vari¬

ous crimes. Becoming interested in the subject, he traced the history of the family through several generations; they were descendants of the two sons of a backwoodsman, called Max, who married two of the Jukes sisters, one of

whom is known as (

prisoned for crime, 280 had been paupers, de¬

pendent upon public support, and the large majority were of low physical r.nd moral stand¬

ard. Consult Dugdale, (The Jukes.)

JUKES, Joseph Beete, English geologist : b. near Birmingham, 1811 ; d. 1869. He became geological surveyor of Newfoundland (1839-

40) ; and, in 1842, naturalist to H. M. S. Fly engaged in exploring the east coast of Australia and part of New Guinea. Four years later he did excellent work on the Geological Survey of Great Britain (1846-50) ; and on that of Ire¬

land; after which he became professor of geol¬

ogy in the Royal Dublin Society and the Royal College of Science of Dublin. Among his num¬

erous published works are Excursions in and about Newfoundland' (2 vols., 1842) ; (A Sketch of the Physical Structure of Australia'

(1850) ; (Popular Physical Geology' (1853) ; (Students' Manual of Geology' (1857), of which numerous editions have been issued.

JUKES-BROWN, Alfred John, English

geologist: b. Penn Fields, 1851; d. 1914. He was a member of the Geological Survey most of his active life (1874-1902). He investigated the upper cretaceous rocks of Great Britain and the geology of the Barbadoes. Among his published works are (Student's Handbook of Physical Geology' (1884) ; (Historical Geology'

(1886) ; (Stratigeographical Geology' (1902) ; (The Building of the British Isles' (1888) ; (The Cretaceous Rocks of Great Britain' (3

vols., 1902).

JULG, yulk, Bernhard, German philolo¬

gist : b. Ringelbach, 1825 ; d. 1886. He was educated at Heidelberg and Berlin, graduating in 1848. He became a teacher and finally pro¬

fessor of classical philology at Lemberg (1851), Cracow (1853) and

Innsbruck (1863), where he made a special study of comparative philology and Oriental folklore. Among his published works are (Litteratur der Grammatiken, Lexika und Wortersammlungen aller Sprachen der Erde' (1847) ; (Die Marchen des Siddhi-kur'

(1866).; (Mongolische Marchen' (1867) ; (Ueber Wesen und Aufgabe der Sprachwissen-

schaft' (1868) 4 (Die griechischen Heldensagen im Widerschein by den Mongolen' (1869) ; (On the present State of Mongolian Researches'

(1882).

JULIA, only child of the emperor Augus¬

tus : b. 39 b.c. ; d. 14 a.d. She was his daughter by his second wife Scribonia, and was first married (25 b.c.) to her cousin, the young Mar-

cellus, and afterward to Marcus Vipsanius Agrippa, to whom she bore three sons and two daughters. On Agrippa's death, in 12 b.c., she was married to Tiberius, who left her on ac¬

count of her licentiousness. Augustus banished her to Pandataria, a desolate island on the coast of Campania, ultimately allowing her to live in Rhegium. After the death of the emperor, Ti¬

berius treated her with great severity. She died in poverty and distress. Her son, Agrippa, had been put to death by Tiberius shortly before.

JULIA DOMNA, Roman empress : b.

Emesa, Syria, 170 a.d.; d. 217 a.d. She was the second wife of the Emperor Severus, and 242

mother of Caracalla and Geta, and a distin¬

guished patroness of art and science.

JULIAN, joo'lyan (Flavius Claudius Juli-

anus), Roman emperor, surnamed the Apos¬

tate V;MCons,tant,inople> 17 Nov- 331 ; d. 26 June d6J. When

hardly six years old his father and several members of his family were murdered by the soldiers of his cousin, the Emperor Constantius. He was brought up in the Chris¬

tian religion, studied philosophy and letters, and resided in Athens, where he was induced to em¬

brace Paganism. Having received command of an army against the Germans, he defeated them at btrassburg and drove them beyond the Rhine.

He also displayed great talent as an adminis¬

trator in Gaul. The emperor now became jeal¬

ous of Julian, and recalled his best troops under pretense that he wanted to employ them against the Persians. This order caused a re¬

bellion among the soldiers, who proclaimed their leader, Julian, emperor in March 360, in spite of his own resistance. Constantius prepared to proceed against him, but soon after died, and Julian was generally recognized as emperor. He began by putting a stop to many abuses and limiting the splendor of the court and was thus able to remit to the people the f^part of all their taxes. He sought to restore the heathen worship in all its splendor, and on that account opposed Christianity as much as was in his power, without, however, persecuting the Christians themselves. In 363 he headed an expedition against the Persians and took several cities. He was an able ruler, and had also a reputation as an author. Some of his works have come down to us, including speeches, letters and satirical pieces; the lat¬

ter are distinguished for wit and humor. He wrote also a work against the Christian reli-

gmn, of which some extracts remain. Con¬

sult Gardner, ‘Julian: Philosopher and Em-

peror^ (1895); Hoffmann, ‘Julianus der Ab-

‘ J Negri, ‘ Julian the Apostate>

(1905); Rendall, ‘The Emperor Julian, Pagan¬

ism and Christianity) (1879).

JULIAN (Cesarini), Cardinal, churchman:

VTome' 1398 i d- m or after battle of Varna, 10 Aov. 1444. Born of noble family and edu¬

cated at the University of Perugia, he became professor of jurisprudence at Padua. Through the good will of the Pope he was advanced rapidly, finally being made Cardinal Bishop of f rascati. As president of the Council of Basel he attempted to win over the Hussites, after having first attempted, unsuccessfully to coerce them. He attempted to hold an even way be¬

tween them and Pope Eugenius; but when he ound that this was not possible he became a strong supporter of the Pope. He continued prominent in the negotiations carried on with "le Eastern Church until the Pope sent him to stir up a crusade in Hungary against the lurks. Consult Jenkins, 'The Last Crusader >

in °r?°n * Pastor» Ludwig, 'History of the Popes) (London 1899).

JULIAN, George Washington, American

politician: b. Centerville, Ind., 5 May 1817- d.

rvington, Ind., 7 July 1899. He studied law t11 io'!?Sta™ltte<^ t0 kar at I*16 affe of 21.

In 1845 he was elected to the State legislature, as a Whig, but being a strong opponent of seYered his Party connection with

the Whigs and became one of the founders of the Free Soil party in 1848. In 1849 he was elected to Congress; in 1852 was candidate of the Free Soil party for Vice-President, and m 1856 a delegate to the first national conven¬

tion of the Republican party, where he was vice-president of the convention and chairman of the committee on organization. In 1860 he was again elected to Congress, and served con¬

tinuously for ten years. He was a member of the committees on the conduct of the war, on reconstruction, on the preparation of the articles of impeachment against President Johnson, and on public lands, being chairman of the latter.

He opposed any monopoly of the public lands, was an advocate of the homestead system, and strongly favored giving the franchise to the negro In 1868 he proposed a constitutional amendment providing for woman's suffrage. In 18/2 he joined the Liberal Republicans, and after

that became a Democrat; in 1885-89 was surveyor-general of New Mexico; and after 889 retired from public life. He published Speeches on Political Questions) (1872) –

‘Political Recollections) (1884); and ‘Life of Joshua R. Giddings) (1892).

JULIAN ALPS, the southern extension of the Eastern Alps, from the Venetian Alps, on the northeast, through the Trentino to the neighborhood of Trieste. The highest peak, Tnglave, is 9,395 feet. The whole range which ls. very rough and broken is covered largely with handsome forest. Among them are rich valleys.

JULIAN CALENDAR. See Calendar;

Epoch. ’

JULIANNUS SALVIUS, Roman jurist:

b. about 92 d- about 155 a.d. He held offices under Hadrian and Antoninus Pius, and codi-

hed Roman equity and succeeded in having his codification officially accepted and made binding upon praetors and other government officials. He was an extensive writer; but most of our knowl¬

edge of his works is obtained through quota¬

tions from them contained in the writings of iaˆr writers. Consult Buhl, ‘Salvius Julianus) (Heidelberg 1886) ; Schanz, ‘Geschichte der r,o-

mischen Litteratur) (1905).

yu lik (Juliers, in French), town

on the Roer 18 miles northeast of Aix-la-

Lnapelle. It has some interesting old buildings and modern schools and churches. It is a cen¬

tre of considerable industry, among its chief manufactures being paper, sugar, silk and leather. It was once a strongly fortified city and the capital of a district and an independent Nil G nS successively in the hands of Holland (1610), Spam (1622), France (1 794—5 4:’*7Amn !t was i°lned to Prussia. Pop about 7,000. y

JULICHER, yu’lik-er, Gustav Adolf, Ger-

man biblical authority and scholar: b. Falkeru berg, 85 7. Graduated from the University of Berlin (1888) , he became a preacher and finally docent of church history in the University of . a,nd ater professor of the same subject at Marburg. Among his works are (Die

G dschmssredcn JesiP (1888); 'Einleitung in das Neue Tesˆment) (1894). This latter which is of very real value, was translated into English by Janet Ward in 1904.

JULIE OU LA NOUVELLE HELOISE

one of Jean Jacque Rousseau's most famous'

works. It is a novel of the sentimental kind that pleased the reading public of his day and for a generation later, when Goethe and his 'school carried sentimentality to the highest pitch of art and incidentally of artificiality.

The story, which is told in the form of love letters which passed between Julie d'Etanges and Saint-Preux, her lover-tutor, was written between 1557 and 1559. It therefore preceded by 15 years Goethe's famous (Sorrows of Werther) upon the conception and form of which it undoubtedly had a strong influence.

The same sickly sentimentality pervades both ; and in both cases it is expressed in the form of letters. Goethe's work was the culmination of the Rousseau literary idea. All over Europe in the original German and in all the languages of the Continent, people "sorrowed55 with Werther, and a wave of suicide swept over the land, a hysterical imitation of the tragic exit from this earthly sphere of action of the hero of the 'Sorrows.5 This sentimentality of 'Julie,5 which had so strongly affected the earlier work of Goethe and the German writers of his day, continued to retain a strong hold upon European writers well on past the middle of the 19th century; and in one form or an¬

other it marks 'the work of the romantic writers of this period. It is especially noticeable in the best of the novels of Hugo. If was one of the literary spots at which the realists, espe¬

cially those of the French school of the latter half of the 19th century, pointed the finger of scorn.

JULIEN, Alexis Anastay, American geol¬

ogist: b. New York, N. Y., 13 Feb. 1840; d. 7

May 1919. Graduated at Union College in 1859, studied chemistry there for a year, and in 1860-

64, while resident chemist on the Guano Island of Sombrero, carried on a variety of scientific researches. He served on the Michigan Geo¬

logical Survey in 1872 and on the North Caro¬

lina Survey in 1875-78, but from 1865 to 1909

was regularly connected with the School of Mines, Columbia University, as assistant in chemistry, instructor in biology, and (1897 —1911) curator of geology. He retired in 1911.

His writings include a report on “Lithology55

in the Michigan Geological Survey’s ‘Geology of Michigan5 (Vol. II, 1872) ; a “Microscopic Examination of Eleven Rocks from Ashland County, Wis.,55 in the Wisconsin Geological Survey’s ‘Geology of Wisconsin (Vol. Ill, 1880) ; <(On the Geological Action of the Humus Acids,55 in the Poceedings of the American Association for the Advancement of Science (1880) ; and “Building Stones, Ele¬

ments of Strength in their Constitution and Structure,55 Journal of the Franklin Institute (1899).

JULIEN, zhii-li-aii, Stanislas Aignan,

French sinologist: b. Orleans, 20 Sept. 1799; d. Paris, 14 Feb. 1873. Possessed of an extraor¬

dinary linguistic faculty, he taught himself Greek, English, Italian, Spanish, Portuguese and German, and in 1823 commenced the study of Chinese. At the end of a year he published a Latin translation of the philosopher Mencius.

Henceforth ancient and modern Chinese, Man-

chu, the Mongolian tongues, and Sanskrit, were the subjects of exact and profound study. In 1832 he became professor of Chinese at the College de France ; librarian at the Biblio-

theque Nationale, 1839; president of the col¬

lege, 1855 ; commander of the Legion of Honor, 1863. His most important works are ‘Voyages des Pelerins Boudhistes5 (1853-58); (Syntaxe nouvelle de Langue chinoise5 (1869-70).

Julien was the foremost Chinese scholar of his time.

JULIEN, one of Charpentier’s more recent operas, first presented at Paris (4 June 1913), and in New York the following February.

JULIET, one of the two leading characters m Shakespeare’s tragedy of ‘Romeo and Juliet5

(Q-v.). Juliet also appears in another of Shakespeare’s plays, ‘Measure for Measure5

(q.v.), as the lady beloved of Claudio.

JULIUS I, Pope: d. 12 April 352. He be¬

came Pope in February 337, and was a staunch defender of Athanasius, who, under the protec¬

tion of Julius, sought refuge in Rome against the enmity of the Eastern prelates.

JULIUS II, Pope (Giuliano della Ro-

vere) : b. Albezuola, 1443 ; d. Rome, 21 Feb.

1513. He was elevated by his uncle Sixtus IV

to the rank of a bishop and cardinal in 1471, and subsequently held eight bishoprics and the archbishopric of Avignon. He was appointed papal legate to France in 1480 and in 1503 was elected Pope. Immediately on his elevation to the pontificate he planned the complete re¬

establishment of the papal sovereignty in its ancient territory, and the extinction of foreign domination and influence in Italy. Refusing to attend the Council of Pisa convened by the King of France, he in 1511 formed the “Holy League,55 to which Spain, England and Switzer¬

land were parties. In 1512 he made open war against Louis XII, and the Fifth Lateran Council was convoked by him in the same year.

The French defeated the papal army near Ravenna, but were soon after driven out of Italy. He was a far-sighted and patriotic sov¬

ereign, and a liberal and judicious patron of art and literature, Michelangelo, Raphael and other great artists of the time receiving com¬

missions from him. To procure means for building Saint Peter's he ordered the preaching of indulgences, which was one of the immediate causes of the Reformation. Consult 'Life,5 by Du Mesnil (1873) ; Brosch, 'Papst Julius II, und die Griindung des Kirchenstaates5 (1878).

JULIUS III, Pope (Giovanni Maria del

Monte) : b. Arezzo, 10 Sept. 1487 ; d. Rome, 23

March 1555. He was made archbishop of Si-

ponto in 1512 and of Pavia in 1520 and was appointed cardinal by Paul III in 1536. He took an active part in the Council of Trent as papal legate, was elected Pope in 1550, and in the following year reopened the Council of Trent, which had been suspended for two years.

He endeavored to effect a union with the Nes-

torians, and commissioned Cardinal Pole to organize, in conjunction with Mary, the reunion of England with Rome.

JULIUS, Duke of Brunswick, a German

prince and ruler: b. 1528; d. 1589. He suc¬

ceeded his father as Duke of Brunswick in 1568. He made himself prominent in Europe by reversing the Catholic policy of his house and becoming himself the backer of the Ref¬

ormation. He founded the University of Helm-

stedt as a foil to the great Catholic educa¬

tional interests with which he was contending.

JULIUS cje SAR. See Caesar, Gaius

Julius.

JULIUS CiESAR. This play was first pro¬

duced about 1601, though not printed until 1623 with the publication of the first Folio. It is in a sense a continuation of the historical plays, the background of Rome being substituted for that of England. At the same time it is the first in the series of great tragedies. Based upon the lives of Brutus, Julius Caesar and Mark Antony in North's translation of

Plutarch's (Lives, J it is a striking illustration of the way in which Shakespeare closely fol¬

lowed his original in spirit and sometimes in language, while at the same time he organized this material into a dramatic whole. If one compares Plutarch's text with the play itself, he can best see the dramatist in the very act of dramatic construction.

"The little more and how much it is

The little less and what worlds away!"

In the play we find ourselves in Rome about 44 b.c. : we see the Roman populace running here and there through the streets; we hear the voices of Brutus and Antony in the forum or catch glimpses of Cicero and Cassius on a stormy night; when the scene shifts from Rome, we see the battlefield of Philippi — and along with all these men and guiding the destiny of events, we see and feel the presence of the mighty Julius. The question inevitably arises as to why Shakespeare named the play after Caesar, who disappears in the middle of the play. Unquestionably the impression gained from what he says as well as from what others say about him would not indicate that the dramatist thought of him as highly as passages in other plays, notably 'Hamlet,* 'Antony and Cleopatra* and (Richard the Thirds would in¬

dicate. He is rather presented as one whose bodily presence is weak and whose mind is de¬

clining in strength and in sure-footed energy.

Emphasis is placed upon the weakness rather than strength of this character. But that is not all of Caesar. There may be a sort of irony in the presentation of him ; for after his murder the speech of Antony serves to set him before the imagination of the reader as a mighty

spirit whose power was to be sought, not only in the days of his earlier conquests, but in the drift toward imperialism which the conspirators tried in vain to resist. Brutus realizes the futility of his efforts when he cries out on the battlefield of Philippi, ((0 Julius Caesar, thou art mighty yet!®

Whatever may be said of Shakespeare's con¬

ception of Caesar, there can be no doubt that Brutus is the tragic figure of the play — a fore¬

runner of that group of tragic heroes so soon to be created. A student of philosophy, a lover of books and fond of the quiet domestic scenes which had connected him with one of the noblest of women, and above all, a devoted citizen with an instinctive love of the old re¬

public, he is totally unfitted for the stirring scenes into which he is drawn. His lack of knowledge of human nature makes him an easy prey for a more calculating man, while his fail¬

ing to understand the drift of history brought upon him and his country tragic consequences.

He is caught in the tangled web of things. The rare nobility of his soul combined with his tragic end raises the question of the burden of the mystery, the heavy and the weary weight of all this unintelligible world. Of the other characters of the play Mark Antony, Cassius and Portia are drawn with consummate art.

Their words have by frequent quotation be¬

come so hackneyed that the reader is apt to miss their greatness. Charles Lamb's remark about the frequent acting and reciting of Shakespeare's plays applies with special force to 'Julius Caesar* ; <(The very custom of hear¬

ing anything

zens justifying the murder of Caesar, Antony's funeral oration, the appeal of Cassius to Brutus, the dialogue between Portia and Brutus and Antony's tribute to Brutus are among the glories of human speech.

Edwin Mims.

JULIUS ECHTER VON MESPEL-

BRONN, yoo'li-us ek'ter fon mes'pel-bron', German Catholic prelate: b. Mespelbronn Cas¬

tle, 1545; d. 1619. He received a Jesuit educa¬

tion at Paris and Rome and became the leader of the Counter-Reformation in his own country.

Owing to his religious zeal he was made bishop of Wurzburg with princely powers. He set to work to eradicate Protestantism from his see by removing all the Protestant clergy and by other coercive means; and it was his boast that he had accomplished his aims and had made more than 60,000 converts to Catholicism in three years. He founded schools, colleges and charitable institutions, among the most notable of which were Julius Hospital (1579) and the University of Wurzburg (1582). Thus he became noted as one of the most active and constructive members of the Catholic League.

JULLIEN, zhu'lyan, Adolphe, French mu¬

sical and dramatic critic: b. Paris, 1845. He graduated in law taking, at the same time, very extensive studies in music which he continued after graduation. He began writing for mu¬

sical journals, and in addition to musical criti¬

cisms and chronicles he contributed short stories to the Frangais, the Moniteur Universal and other periodicals. Among his published works are 'La Musique et les philosophes au XVIIIeme siecle* (1873) ; (Histoire du theatre de Mde. de Pompadour* (1874) ; 'La comedie a la cour de Louis XVP (1875) ; 'Goethe et la Musique* (1880); (L'Opera secret au XVIIIeme siecle.*

JULY, the seventh month of the calendar, which in the Roman year bore the name of Quintilis, as the fifth in the computation of Romulus, even after Numa had prefixed Janu¬

ary and February. Mark Antony effected a change in its name in honor of Julius Caesar, who was born on the 12th of the month, and thenceforth by a decree of the senate it was called Julius. It originally contained 36 days.

It is said that Romulus reduced them to 31 and R uma to 30. Julius Caesar fixed the number at 31, which is still retained. The Dog-days are supposed to commence on the 3d of this month.

JULY, Column of, a bronze column erected on the Place de la. Bastille, Paris, 28 July 1840, to the ((French citizens who fought for the defense of the public liberties on the memorable days of the 27th, 28th and 29th of July, 1830®

On four bands encircling the column are the names of 615 victims of the revolution.

v JULY, Revolution of, the uprising in 1830

which overthrew the Bourbon dynasty and re¬

stored the house of Orleans to the throne of France. This was the natural outcome of the reactionary tendency which had been the gov¬

erning principle of the sovereigns in France since 1814. Revolutionary France was not dead and the democratic spirit was far from being smothered. But the rulers of the country seemed to believe that their own safety and that of the stable government of the country depended upon the establishment of as much arbitrary rule and autocracy as could be achieved. The Church and the extreme royal¬

ists were in the saddle ; and they proposed to make the best of their opportunities to strengthen their position for all time. Louis XVIII (1814-24), with whom the restoration began, had some little ability and the advantage of having a more or less fixed policy whose one great objective was to restore the power of his family and to consistently offer opposi¬

tion to the growth of the influence of the bourgeoisie. To secure his ends and bind the nobility to himself he had been forced to make a partial restoration of the property, titles and positions of influence of the ˆexiles® in the.

face of strenuous opposition on the part of a strong and influential section of the population.

The backing which the Church had given the royal family made the interests of the sov¬

ereign, the nobility and the clergy one in com¬

mon. In order that these common interests and objective might be strengthened by the education of the masses in the right direction, from the view point of the Crown, all public and private instruction was placed in the hands of. the Church, which proceeded to carry out an aggressive program which ran counter, at every turn, to the ideas of the strong revolu¬

tionary and democratic part of the population, the natural and legitimate heirs to the senti¬

ments and aims of the Revolution of 1789.

This ever-growing revolutionary body could only be kept from expressing itself, in a man¬

ner dangerous in the extreme to the ruling house, by the enforcement of severe laws against the liberty and freedom of the press.

The Jesuits, who had been readmitted to the country following the restoration, became very active, not only as educators, but as propaga¬

tors of royalist teachings, all of which were radical and extreme. Louis XVIII managed to maintain his position as head of the nation in the midst of many threatening dangers. But his successor, Charles X, who had been edu¬

cated under clerical influence to the most ex¬

treme of royalistic views, was a man of little ability, weak will and poor judgment, warped by his training. He was, therefore, incapable of judging of the magnitude of the dangers by which he was surrounded. At the most critical moment in his career, when only the coolest and most liberal judgment could have saved the situation for him, he made his confident and representative Count Jules Polignac (9

Aug. 1829), the most bigoted royalist and churchman among the French nobility, a man who could only see one side of the question and that only through his colored glasses. He succeeded in antagonizing the opposition as even the unwise and undemocratic acts of the sovereigns had not done. The assemblies which met the following year (March 1830), both upper and lower houses, demanded the dis¬

missal of the new and actively royalist min¬

isters, who largely represented clerical influence and interests. Charles' answer, dictated by the court party, was the immediate prorogation and final dissolution of the Chambers. The nat¬

ural result was that the new election in¬

creased the strength of the Anti-royalist party.

This the king realized and he determined to anticipate the trouble he saw coming by the suspension of the liberty of the press and declaring the elections null and void (26

July 1830). To make sure that the next Chambers should not prove dangerous or ob¬

structive, the edict of dissolution of the new Chambers prescribed changes in the franchise which practically restored arbitrary govern¬

ment. The newspapers defied the government to carry out the edict of the suspension of the liberty of the press, and the trouble at once began in Paris. Barricades were thrown up everywhere in the eastern section of the city and the city hall and Notre Dame Cathedral were seized by the revolutionists. After three days' fighting under Lafayette and Laffitte, the revolutionists held possession of all of Paris. Suddenly, the king realizing the strength of the revolution and his own danger, with¬

drew his various edicts. But it was already too late and he was forced to abdicate in favor of his own grandson, the Duke of Bordeaux.

Fearing the temper of the revolutionists, he fled across the border. But the Duke of Bordeaux was not destined to become sovereign of France, if for no other reason, because he was the choice of the late king. On the night of 30 July Louis Philippe, Difke of Orleans, ar¬

rived in Paris, at the call of Talleyrand, one¬

time minister of Napoleon I, and other prom¬

inent men of his party who had been intriguing for some time in his favor. He was at once made lieutenant general of the realm. But the choice of Louis Philippe as sovereign was op¬

posed by Lafayette, commander of the National Guard, and his faction, who favored a republic^

However, the necessity of not antagonizing the powerful Royalist party, and the diplomatic conduct of Louis Philippe, finally won over the Republicans to a continuation of the monarchy on a restricted and constitutional basis, and the Chambers bestowed the crown upon Louis Philippe (7 Aug. 1830). Although the principal part in the revolution had been played by the workingmen of Paris, still it was represented for the country as a whole by the middle classes who were still royalist in sentiment. A knowl¬

edge of the general feeling of the country in¬

duced Lafayette and the municipal committee who were, like the Paris workmen, strongly republican, to accept the compromise offered by Laffitte, Thiers and the Orleanists. But in this compromise the laboring class was singularly forgotten, an act which was pregnant with future trouble. According to the agreement with Louis Philippe a new constitution was adopted. This recognized a property qualifica¬

tion which gave the middle classes a very strong voting power and, consequently, in¬

fluence in the affairs of the nation. But it shut out the laboring classes, who found that they 246

still had^ their battle to fight for political free¬

dom. The Belgian and Polish revolutionary movements were more or less directly the re¬

sult of the success of the July Revolution in France. Consult Fyffe, (History of Modern Europe) (Vol. II, London 1886) ; Hazen (Europe Since 1815> (New York 1911); La-

visse and Rambaud, (Histoire generale> (Vol X, Paris 1898) ; Seignobos, (Political History of Europe since 1814) (New York 1899) ; Rob¬

inson and Beard, development of Modern Europe) (Boston 1908).

JUMBO, the name of a large African ele¬

phant for 25 years on exhibition at the Royal Zoological Gardens in London. The animal was purchased in 1882 by P. T. Barnum (q.v.), American showman, for $10,000, and for three years was exhibited in

the United States.

Jumbo was killed in 1885 by a railroad train in Canada. He was 11 feet 6 inches in height and weighed six tons. His skeleton is pre¬

served at the Smithsonian Institution, Wash¬

ington, D. C.

JUMEL, zhu'mel, Eliza, American heiress: b. at sea, 1769; d. New York, 16 July 1865.

Her maiden name was Capet, and after her mother's death she was adopted by Mrs.

Thompson, of Newport. She was a wayward, beautiful girl; at 17 she eloped with a British officer named Peter Croix, with whom she lived in New York. There she was greatly ad¬

mired, and soon after her first husband's death married Stephen Jumel, who took her to Paris, where her social success was as great as in New York. After Jumel's death she married M 61 Aaron Burr (q.v.), from whom she sepa¬

rated soon afterward. Her home during her last years was the famous Jumel mansion, built by Roger Morris in 1758, the home of Mary Philipse Rogers and Washington's head¬

quarters during the New York campaign. It was bought by Madame Jumel in 1810, and is still preserved, its site being the Roger Morris Park, New York, which was opened 28 Dec.

1 903*

JUMET, zooh'ma', a town in Belgium, about tfiree miles northwest of Charleroi. It is the centre of numerous industries, including iron and coal mines, smelters, foundries and glass factories. Pop. about 30,000.

JUMILLA, hoo-me lya, a city in Murcia, Spain, on the river Jua, 35 miles northwest of the city of Murcia. It is the centre of vine¬

yards and fruit orchards, and possesses a few industries, among them being soap, cognac and wine factories. Pop. about 20,000.

JUMNA, or JAMNA (Sanskrit Yamuna),

a river of India which rises in the Himalayas at the height of 10,849

feet. It flows in its upper course in a generally southwest direction, then bends to the southeast and, passing the cities of Delhi and Agra, falls into the Ganges of which it is the chief tributary, at Allahabad'

after a course of 860 miles. Important irriga¬

tion works derive their supply of water from this river.

JUMPERS, a class of religionists who mani¬

fest their devotion and feeling by jumping from the ground during the time they are assembled for worship and exhortation. They are said to have originated in the Methodist congrega¬

tions of Wales during the preaching of Whit¬

field (1760). They were also called "Barkers'*

from the incoherent guttural sounds they ut¬

tered during their excitement. They still exist in some parts of the eastern States, having emigrated to America after being repudiated by English Methodists.

JUMPING BEANS, the fruits of certain

euphorbiaceous plants of the genus Sehastiana, infested with the larvae of certain small moths (Carpocapsa saltitans and Grapholitha Sebas¬

tians), which by their movements make the capsules roll, and even jump as if alive. The larvae spin cocoons in the capsules, a large part of the interior of which they have devoured, and when ready to emerge as adults, push open a previously cut circular door which has been held shut by sjlken threads. Several species are found in Central America and Mexico, where they are called ((broncho beans?

JUMPING FISH. See Mud-Sicipper.

JUMPING FROG OF CALAVERAS,

The Celebrated, one of the earliest works of Mark Twain. It was published in the Cali¬

fornian and attracted considerable attention to the author, since it was at once taken up by the general public as a piece of good humorous writing. It made its way into recitation books and was widely read on

public and private stages by elocutionists and other public readers.

It was also widely quoted.

JUMPING HARE, or SPRINGHAAS, a

jerboa-like animal (Pedetes caffer) of South Africa, as large as a hare, and much resembling one, which is now set apart in a family (Pcdetids) by itself. It will leap 25 or more times its own length, and where numerous does great damage at night to growing crops.

JUMPING MOUSE. See Jerboas.

JUMPING PLANT LOUSE, an insect

belonging to the Psyllids family. It receives its name, on account of its prowess as a jumper.

The majority of the members of this family pass their lives upon the leaves of various kinds of vegetation. Some, however, live m gulls The adults sleep through the winter, but be¬

come veiy active with the return of warm weather when breeding begins, resulting in sev¬

eral successive families during the season.

JUMPING SHREW, a curious little ani¬

mat of Africa, one of the insectivora of the Elephant-shrew family (Macroscelids) , which has very large hindquarters and moves by leap¬

ing like a jerboa. They inhabit rocky and desert places, remain in holes and hiding places c tiring the day and go abroad at night in search of insect food. The best known perhaps is the Cape jumping-shrew of South Africa (Macro –

scelxdus typicus) , which is tawny brown, about five inches in length, has a long, flexible proboscis and a long naked tail.

JUMPING SPIDERS, small spiders of the

family Attxds , which dwell in low vegetation, and are exceedingly agile. They are usually short and stout in form, rarely more than a quarter of an inch long, and are often brightlv colored, especially in the case of the males, which take curious attitudes in order to dis¬

play their ornaments to the females. Consult Emerton, (Common Spiders of the United States > (1902).

JUNAGARH, joo'na-gur', a native Gujarat state, Kathiawar peninsula, Bombay, India.

The surface of the country which contains an area of 3,284 square miles, is comparatively level, except to the north where it is broken by hills (Girnar), the highest of which rise about three-quarters of a mile above sea-level. Its capital bears the same name as the state. Since 1808 the interests of Junagarh, which ranks as a first class native state, have been closely iden¬

tified with those of the British. Among its products are cereals, sugar cane, rice and cot¬

ton. Consult (The Imperial Gazetteer of In¬

dia' (Oxford 1908).

JUNAGARH, capital of the state of the same name (q.v.), in Bombay, India. It is pic¬

turesquely situated on the Rajputana Railway, about 45 miles north of Verawal. The city possesses fortifications built in 1472, and a very ancient fortress said to date back to 250 b.c.

Among its modern buildings are the palace of the Nawab, hospital, public library and College of Arts. Pop. 36,000. Consult Burgess, (The Antiquities of Cutch and Kathiawar' (London 1887) ; (The Imperial Gazetteer of India' (Ox¬

ford 1908).

JUNCO, a genus of slate-colored and white sparrows, present in the United States mostly in winter. See Snowbirds.

JUNCOS, hoon'kos, a town and district in the eastern end of Porto Rico. Both are en¬

gaged in the production of tropical fruits, to¬

bacco and sugar cane and the manufacture of the products of the

latter. Population of the district about 14,000; of the town about 6,000.

JUNCTION CITY, Kan., city and county-

seat of Geary County, at the junction of the Republican and Smoky Hill rivers, 135 miles west of Kansas City; and on the Missouri, Kan¬

sas and Texas and the Union Pacific railroads.

The two rivers here form the Kansas River, and make an important shipping point for grain, flour, live stock and limestone. It contains boot and shoe factories, glove, cigar, sheet metal, cement-block and harness factories, and flour mills and lumber yards. A government military post, Foit Riley, is located three miles east of the city. It was settled in 1858 and adopted the commission form of government in 1911. The city owns the waterworks. Pop.

7,516.

JUNE, Jennie. See Croly, Jane C.

JUNE, the sixth month in the calendar. The etymology is uncertain. Vossius gives three etymologies of the name — one from Juno; an¬

other from jungo (to join), referring to the union between the Romans and Sabines under Romulus and Titus Tatius; a third from jun-

iores (the young men), Romulus having been said to have assigned the month of May to the elders, and that of June to the young men, when he divided the people into these two great classes, the former to serve in counsel, the lat¬

ter in war. The name has also been traced to Junius Brutus, the first consul. It consisted originally of 26 davs. to which it is said Rom¬

ulus added four, . and Numa took away one.

Julius Caesar again lengthened it to 30 days, and it has ever since remained unaltered.

JUNE BEETLE, or FIG-EATER, a green

and brown beetle (Allorhina nitida) of the family Scarabceidce common in the central and southern United States. The adults often eat figs, peaches, small fruits, corn, etc. The larvae are white grubs which resemble their northern relatives (see May Beetle), but are far

less in¬

jurious since they normally feed upon decaying vegetable matter in the soil and not on living roots of plants. The adults may be decoyed away from rioe fruit by placing little piles of decaying fruit within their reach; but since they are probably beneficial they should not be destroyed.

JUNE BERRY. See Amelanchier.

JUNE BUG. See May Beetle.

JUNE GRASS. See Blue Grass ; Grasses

in the United States.

JUNEAU, joo-no', Laurent Solomon,

American pioneer: b. L'Assumption parish, near Montreal, Canada, 9 Aug. 1793; d. Shawano, Wis., 14 Nov. 1856. He emigrated to Green Bay, Wis., and thence in 1818 to Milwaukee, where he was active in trade with the Indians.

He was not, as has been sometimes stated, the first white settler on the site of Milwaukee. A grant of considerable land had there been made by the Indians to one Mirandeau, a previous resident, and of this grant, Juneau, on Miran-

deau's death, secured possession. Juneau made the first survey of Milwaukee village, was its first postmaster and president, and the first mayor of the subsequent city. On ground pre¬

sented by him, he helped to build the first court-house in the State. For years he was agent for the American Fur Company. A heroic statue of him was placed in Juneau Park, Milwaukee, in 1884.

JUNEAU, Alaska, city in the southern dis¬

trict, on a promontory between the Taku River and Lynn Canal, opposite Douglas Island, about 100 miles north of Sitka. It was settled in 1880, is incorporated, and has been selected by Con¬

gress as the capital of Alaska. From its situa¬

tion in the mining region it has become a centre of trade in outfitters' articles and general sup¬

plies ; while its exports, including gold, furs and other products of Alaska, have grown to a considerable commerce. Among the manufac¬

tories are iron-works, breweries, sawmills, cigar factories, etc. In the vicinity are the Tread¬

well gold mine and the Silver Bow mine. Vil¬

lages of the Auk and Taku Indians in the neigh¬

borhood are of interest to tourists. At Juneau are located the Territorial Legislature and courts and Federal officials. Its public schools are well conducted, there are several churches, hospitals, newspapers, a fire department, police, drainage, and waterworks and electric-light sys¬

tems. These and other public improvements give it all the essential conveniences of a mod¬

ern American city. Cable service is estab¬

lished here. Steamship lines connect it with Seattle, Sitka, Skagway, and all parts of the Copper River, Prince William Sound, Cook In¬

let, and Unalaska. Over $60,000,000 of gold have been mined in the Juneau region and there is room for even greater development. Consult Greely, A. W., (Handbook of Alaska' (New York 1914). The population is estimated at about 5,000.

JUNG, zhun', Henri Felix Theodore,

French writer and military man; b. Paris, 1833; d. 1896. Educated for the . army he entered Upon a military career on- graduation, from 248

Saint Cyr in 1853. After spending' five years in the artillery in Africa and taking part in the campaign in Italy, he became a member of the war council (1869). He fought through the Franco-Prussian War; became brigadier-

general in 1887 and Governor of Dunkirk, a position he resigned in 1891. He frequently wrote under the nom de plume of ((Mustapha.55

Among his published works are (Le depot de la guerre5 (1872) ; (La republique et l'armee5

(1872); (La verite sur le masque de fer5

(1873); (France et Rome5 (1874); (Bonaparte et son, temps* (1881) ; (Lucien Bonaparte et ses memoires5 (1883) ; biography of Dubois-

Crance (1884).

JUNG, yung, JUNGE, or JUNGIUS,

Joachim, German naturalist: b. Lfibeck, 1587; d. 1657. He was professor of mathematics at Giessen (1609-14). He received his doctor's degree in medicine from Padua in 1618.

He was professor of mathematics at Ro¬

stock in 1625 and rector of the Hamburg Johanneum (1628-40). He was one of the first consistent students of the natural sciences more particularly physics, entomology and botany.

He attempted to make a classification of plants by genera and species and to provide nomen¬

clature. Consult Goethe, (Fragmente fiber Jungius5. (Stuttgart 1850); Martini Fogelii, 'Memoria J. Jungii > (Hamburg 1657) ; Ave-

Lallemant, (Des Dr. Jungius Briefwechsel5

(Lubeck 1863) ; (Das Leben des Dr. Jungius5

(Breslau 1882).

JUNG, jung, Sir Salar, East Indian prince: J- 1883- He came of a notable family and he became Premier of the Deccan in 1853.

He was faithful to the government during the Indian mutiny (1857—58) ; thus his relations pith the British continued to be very cordial.

He proved an excellent ruler and succeeded in organizing the country and government com¬

mitted to his care. Much attention was paid to him by the British public on his visit to Eng¬

land in 1876, when he was knighted with the 0Pˆr ,9ˆ Knight Grand Commander of the Star of India.

, JUNG BAHADUR, ba-ha'dur, Sir Ma¬

harajah East Indian ruler: b. 1816; d. 1877.

After holding various important offices, he be¬

came Prime Minister of Nepal. Several at¬

tempts were made to assassinate him; hut he succeeded in getting the better of his enemies of becoming practicaly an absolute ruler and of establishing order throughout his domains. He the British during the' Indian mutiny

JUNG-DEUTSCHLAND, more orooerb

DAS JUNGE DEUTSCHLAND, a literar

• i£?r ltlcaI movement in Germany culminating m 1833, and not related with the simultaneou and more important movements known a

Young Italy and Young Europe. There neve1

was much organization or consultation betweer the writers composing it (Heine, Laube, Gutz kow, Mundt, Wienbarg), but they were con-

nected by the similarity of their aims and methods and by the fact that the Bundestag at Frankfort in 1835 (having read a denuncia¬

tion of these men, written by Wolfgang Men-

zel) issued a decree forbidding the circulatior of all past and future writings of the five men concerned, and characterized their ˆmovement as ((Jung-Deutschland,55 a term first used by Wien¬

barg in his (2Esthetische Feldzfige.5 Basing their principles on stimulus received from re¬

cent emancipated French writers, these Young Germans opposed, in a literary way, the political reaction in Germany, the predominant tend¬

encies in literature, and the sectarian Chris¬

tianity of their day. Both Jesuitism and Prot¬

estant orthodoxy were then very strong in Ger¬

many, and to these influences the Young Ger¬

mans opposed the socialistic tendencies ema¬

nating from the French July Revolution (1830).

Their chief object was to reinvigorate both State and Church by the injection of an esthe¬

tic culture, thus making both institutions more accessible to larger outlooks.. Soon, however, the free unfolding of the individual character became their principal goal. State and Church came to be regarded as mere hindrances, and national affiliation was considered to be a base ideal, in no way comparable with Goethe's great conception of a world literature (Welthtter –

atur). The immediate demands of the Young Germans included an emancipation of the Jews and complete freedom for women. Consult Houben, H. H., (Jungdeutscher Sturm und Drang5 (Leipzig 1911); Bloesch, H., (Das junge Deutschland in seiner Beziehung zu Frankreich5 (Bern 1903); Proelss, Johann, (Das junge Deutschland5 (Stuttgart 1892); Brandes, Georg,

_ Jacob Wittmer Hartmann.

JUNGBUNZLAU, yung-bunts'lau-, Bohe¬

mian town on the Iser 30 miles northeast of Prague. It consists of two parts, the old and the new towns. Among the activities of the city are factories for the making of earthen-

vvare glass, woolens, textiles, carriages, car-

wheels, liquors, candles, soap and starch, « JUNGFRAU, yoong'frow (Ger. ((virgin,55 or maiden), a mountain of Switzerland, in the Bernese or Helvetic Alps, on the frontiers be¬

tween the cantons of Bern and Valais, 12 miles southeast of Interlaken. It is one of the most rCen* mountain- in Switzerland ; height 15,670 feet. It was first ascended in 1811.

JUNGFRAU VON ORLEANS, Die (The

Maid of Orleans), one of Schiller's most noted tragedies which was finished in 1801.

junnniMo, yoongnans, Sophie, German

novelist : b. Cassel, 3 Dec. 1845 : d. 1907. She be¬

came well known by the publication of

- rtˆy of life during the Thirty Years' War (1878) ; 'Die Erbin wider Willen5 (1881) • (Die Gaste der Madame Santines5 (1884) • ' (1902V

nodnˆStmm0llsly' 0908) ;

(1908); (Der geraubte Schleier5 (1910).

JUNGLE BOOKS, The, that is to say, the two volumes entitled,

lished 2 June and 16 Nov. 1894. " The first volume, (The Jungle Book,5 narrates in nine magical tales theˆ history of Mowgli, reared trom babyhood in the iungle by fostering wolves — how he is adopted as one of the wolf-

pack, how he is instructed and befriended by Baloo the wise bear, Kaa the python and Bag-

-heera the black panther, how he is rescued ! rom the Bandar-Log or Monkey People, how he slays Shere Khan, the tiger, how he be¬

comes the acknowledged master of the jungle, and finally how he returns to his own kind, yet still remains in touch with the jungle-

dwellers. The collection is diversified by inter¬

ludes in verse, such as <(The Law of the Jungle® and the ((Road-Song of the Bandar-

Log® which accentuates the satire embodied in the description of the boastful, scatterbrained Monkey Folk. 'The Second Jungle Book* con¬

tainsˆ seven stories, among them that of (

Tikki-Tavi® the mongoose, ((Toomai of the Elephants,® (

cerned with three sinister scavengers, the croco¬

dile, the jackal and the adjutant crane, — and <(The Miracle of Purun Bhagat,® a beautiful tale of an old recluse and the beasts that loved him. (

says Frederic Taber Cooper, ((the Jungle Books are far more than a new childhood classic.

They are the life of modern India, told in allegory, and in Kaa and Bagheera and all the rest we have the types of native life, with its stored-up wisdom of old, primeval instincts, its simplicity of outlook upon the present-day world.® Kipling's animals are peculiarly con¬

vincing. They act and talk — when they do talk,— in accordance with their animal char¬

acteristics, and never give the impression that they are humans masking in fur, feathers or scales.

Arthur Guiterman.

JUNGLE-CAT, or CHAUS, the common

wildcat of India (Felis chans). It is 26 inches long in head and body, has a short tail, reach¬

ing only to the heel, and is yellowish gray, more or less dark and unspotted, tinged with reddish on the sides, marked by a dark stripe from the eyes to the muzzle, and with reddish black ears slightly tufted. Another Indian ((jungle-cat® is the handsome F. ornata, which is profusely spotted ; it dwells in the desert regions of the Northwestern provinces. Both these cats are said to interbreed with domestic cats, and thus no doubt long ago influenced the varieties of the tamed stock.

JUNGLE-FEVER, a severe variety of re¬

mittent fever, prevalent in the East Indies and other tropical regions. It is characterized by the recurrence of paroxysms and of cold and hot stages. The remissions occur usually in the morning and last from 8 to 12 hours, the fever being mostly typically developed at night.

JUNGLE-FOWL, the English book-name

of a genus of pheasants, the source of domestic fowls, characterized by a fleshy frontal comb and wattles and the peculiarly laterally com¬

pressed tail with its long, drooping, curved feathers. This genus (Gallus) is represented by several species in southern Asia, especially India and the Malay and Philippine Islands.

The common jungle-fowl (Gallus gallus or bau-

kiva) is especially noteworthy as the original stock of our barnyard fowls. The wild birds, which are quite common in cultivated parts of central India and about the bases of the Hima¬

layas up to an elevation of 5,000 feet, closely re¬

semble some of the varieties of game cocks and hens. The sexes differ as in the domestic birds in size, character of tail feathers, combs, wattles, spurs and color. Although naturally living in flocks in the jungles and forests, these haunts are often forsaken for the purpose of feeding upon grain in the cultivated fields. They run with great speed, are tolerably good flyers and roost in trees. The cock crows and the hen clucks and cackles much as domestic fowls do.

In the wild state the jungle-fowl is said to be monogamous ; eggs to the number of 10 or 12 are laid in a simple depression in the ground lined with leaves and grass. Consult Darwin, Ani¬

mals and Plants under Domestication) ; Teget-

meier, (Ibis 5 (1891) ; and Blanford, (Fauna of British India.*

In Australia this name is often given to the mound-birds.

JUNGMANN, yoong'man, Jozef Jakob,

Czech philologist and literary man: b. Hudlitz, Bohemia, 1773; d. 1847. Graduated from Prague in law and philosophy, he became a teacher in the gymnasium at Leitmeritz (1 799—1815) ; and in the same capacity at Prague (1815-35). He was rector for the following 10

years. He attempted to awaken the Czech spirit of nationality and to interest the people as a whole in their national language, to prove the literary capacity of which he made translations from English, French and German, among his translations being Milton's (Paradise Lost,*

Chateaubriand's (Atala,* and Goethe's Her¬

mann and Dorothea.) His original work con¬

sisted of (A History of Czech Literature and Language*. and a dictionary of the Czech lan¬

guage. His influence for good was very pow¬

erful on his own language and his help to phi¬

lology very considerable.

JUNIATA, joo-ni-at'a, borough in Blair

County, Pa., close to Altoona on the Pennsyl¬

vania Railway. Among its industrial establish¬

ments are railway repair shops and silk mills.

Pop. 6,000.

JUNIATA, joo-ni-at'a, a river of Pennsyl¬

vania formed at Petersburg, about six miles northeast of Huntingdon, near the centre of the State, by two streams rising in the Alleghany Mountains — the Little Juniata and the Franks-

town Branch. Its course is winding, but it flows in a generally eastern direction for about 150 miles, entering the Susquehanna at Dun-

cannon, 14 miles above Harrisburg. Along the greater part of its course the scenery is pic¬

turesque, often marked by grandeur where the river breaks through the mountains that rise in parallel ridges across its path. The Juniata is not a navigable stream, but from its source to its mouth its banks are followed by the Penn¬

sylvania Canal and the Pennsylvania Railroad, the latter crossing the river several times.

JUNIATA COLLEGE, a coeducational in¬

stitution, located at Huntingdon, Pa. ; estab¬

lished in 1876 under the auspices of the German Baptist Brethren. Special attention is given to the religious education of the students ; one of its principal courses is the history and literature of the Bible. It has art, music, normal and com¬

mercial departments, also a preparatory school.

The courses lead to the degrees of bachelor of arts and of English and sacred literature. In 1920 there were in attendance 420 students and

25 professors and instructors were connected with the school. There were about 28,000

bound volumes and over 4,000 pamphlets in the library. Ihe endowment was about $185,000

and the college property was valued at $250,000.

JUNILIUS, an African bishop of the 6th century. He was the author of Hnstituta Regularia Divinas Legist written about 550.

This work is of importance on account of being one of the earliest known introductions to the sacred writings, and also to the fact that Juni-

hus does not include among the canonical books Chronicles, Ezra, Nehemiah, Job, Judith, Esther and the Maccabees. Consult Becker, (Das Sys¬

tem des Ivirchenvaters Junilius) (Liibeck 1787) : Klim, (Theodor von Mopsuestia und Junilius Africanus) (Freiburg 1880).

JUNIN, hoo-nen, Peru, department in the interior, bounded on the north by Huanuco, east by Cuzco, south by Ayacucho and Huancavelica and west by Lima. It has an area of 23,347

square miles. It is located in the wildest parts of the Cordilleras. The western portion is more elevated than the eastern, but the latter is densely wooded. Agriculture is neglected and large deposits of silver, copper, coal and salt remain unworked. Cereals, coffee and sugar are the principal crops. A railroad con¬

nects the southern part with Lima on the coast.

The capital city is Cerro de Pasco. Pop. 394,393.

JUNIN, or CHINCHAYCOCHA, chen-

chi-kocha, a Peruvian lake situated at an alti¬

tude of 13,000 feet in the department of the same name. It is 37 miles long and seven wide JUNIOR HIGH SCHOOLS. See Educa¬

tion, Secondary ; Education in the United States — (Educational Organization) .

JUNIOR ORDER OF UNITED AMER¬

ICAN MECHANICS. See United American

Mechanics, Junior Order of.

JUNIPER, a genus (Juniperns) of orna¬

mental evergreen trees and shrubs of the family Juniperacea ?, consisting of about 40 species, dis¬

tributed mainly throughout the cooler parts of the northern hemisphere. The species have branches which spread in all directions from the main trunk and limbs, small, rigid, needle-like or scale-like, opposite leaves ; unisexual flowers, the two sexes usually upon separate plants, the staminate yellow and in catkins, the greenish pistillate ones followed by fleshy or dry, berry¬

like cones containing from one to six, some¬

times 12 seeds, which may not attain maturity until the second or third year. The best-known species in the United States is probably the Vir¬

ginia juniper, red cedar or savin (Juniperns vir-

giniana) , to be found widely dispersed east of the Rocky Mountains, upon rocky and sandy soils, mountain sides, etc. It sometimes attains 100 feet in height, its upright or spreading branches forming a handsome conical head. Its numerous attractive horticultural varieties are largely planted in parks and cemeteries. The trunks are highly prized for fence posts, being exceedingly durable; the handsome red heart-

wood is valued for turning, cabinet-work, cooperage and especially for lead pencils; but the tree is looked upon with disfavor by the oichaidist, because it is one of the hosts of ap-

ple rust. See Apple, paragraph Diseases.

The common juniper (/. communis) is a smaller species, rarely reaching 50 feet in height and usually less than 25 feet tall, and many of tfs numerous varieties less than 10 feet, It is widely distributed

throughout the northern hemisphere, especially in the colder latitudes and altitudes. Like the preceding species its wood is valued, when of sufficient size, for posts, veneers, pencils and for turning. The tree itself is also used for ornamental planting. Its bark is sometimes twisted into ropes and its long, tough, fibrous roots are used for making baskets. Its blue-black fruit, which it yields profusely, is used for flavoring certain liquors, as is also the oil obtained from them and from the twigs by distillation with water. This oil has been used in medicine as a stimulant, but is less popular than formerly. The Bermuda cedar (/. barbadensis) resembles the Virginia juniper, but is of stouter build, though it rarely exceeds 40 feet in height. Its wood is rather more fragrant than that of the preceding species like which it is used. Formerly it was employed in the ships built in the Bermudas, but the forests which supplied this industry were mis¬

managed and the industry perished. Several other species are of more or less economic im¬

portance; for instance, the Spanish juniper (/. oxycedrus) , a shrub which attains a height of about 12 feet, whose fruits yield a disagree¬

able smelling oil (oil of cade), used in veteri¬

nary medicine; and African juniper (/. pro-

cera), a useful timber species and probably the largest of the genus, often attaining heights of 150 feet in the mountains of eastern Africa, where it is native. A number of species occur¬

ring in western North America are of great economic importance.

Junipers succeed best in moderately moist, sandy loam in open, sunny situations. They make excellent windbreaks and shelter belts, especially where the soil is too dry, rocky, or gravelly for other trees. They may be propa¬

gated by seeds which, however, usually require two, sometimes three, years to germinate. Cut¬

tings of almost mature wood may be taken in the autumn from the needle-leaved kinds and grown under glass or in the open ; species with scale-like leaves are generally side-grafted in the greenhouse during winter. Some of the shrubby species are propagated by layers.

- J-VN?RRRO’ Miguel Jose Serra, me-gel hd-sa ser ra hoo-ne’pa-ro, Spanish missionary m America : b. island of Majorca, 24 Nov. 1713 ;

d. Monteiey, Cal., 28 Aug. 1784. He became a member of the Franciscan order in 1729 in 1750 arrived in Mexico City as a missionary and m 1750-69 was active among the native tribes. In 1769 he went to the site of San Diego, Cal., where he founded a mission. He gathered about him a band of 16 of his order and these missionaries converted over 3,000 Indians, of whom Tunipero himself is said to have baptized more than 1,000. He instructed the natives in the arts of civilization and the colonies which assembled about the mission stations constituted the first settlements in California. His head-

quarters were at Monterey, but he founded several other missions. Bret Harte incorrectly gives his name as Serro.

JUNIUS, yoo'ne-us, Franciscus, known as 1 he Younger, German philologist: b. Heidel-

beigˆ 1589; d. 1677. The boy was brought to Leyden when three years old and there he was educated under his brother-in-law, Gerhard Vossius, a noted philologist. In 1821 he went to England, where he became librarian to the 251

Earl of A run die, a position he held for 30 years.

During these and following years he devoted his time to study, research and writing. Among nis works are (De Pictura VeterunP (with an English version, 1637) ; (The Gothic Gospels of Ulfilas> (1665) ; and (Glossarium GoticunP

(1664—65). This latter is in five languages.

These and other valuable manuscripts of his are in the Bodleian Library, Oxford.

JUNIUS, Letters of, a remarkable series of political letters that were published in the London Public Advertiser over the pseudonym of (< Junius,® between 21 Jan. 1769 and 21 Jan.

1772. These epistles greatly stirred the English political world, for they were written with a wide and intimate knowledge of affairs, shrewd political sagacity, literary felicity and a certain waspish malignity. No bolder or more audaci¬

ous comments on the actions and characters of public men have ever

appeared in the English language. _ So merciless were they in their cold¬

blooded vivisection and more or les. polished abuse of the policies of Granby, Bute, Grafton, Bedford, Mansfield and, to Burke's horror, scathing even the sacred majestv of the king, that extraordinary efforts were made to dis¬

cover their author. But Junius, whoever he was, escaped detection in his lifetime and, since the days of George III, the question of his identity, though frequently raised in England and America, has never been satisfactorily settled. At the close of his correspondence Junius edited the letters for the publisher of the Public Advertiser , Henry Sampson Wood-

fall, with an explanatory preface and a <(Dedi-

cation to the English Nation.® He also in¬

cluded a few letters he had written under other pseudonyms than <(Junius.® The whole was published in two volumes by Woodfall in 1772.

A later edition, published by Woodfall's son and edited by Dr. Mason Good, appeared in 1812. Good introduced 113 extra letters; some of these had passed between Woodfall senior and Junius, but the majority had been collected by Good from the Public Advertiser and at¬

tributed to Junius without the slightest proof of their authenticity. It was these interpolated letters that gave rise to the accusation of incon¬

sistency frequently leveled against Junius. Some 40 different individuals have at various times been brought forward as the real Junius, among them being Edmund Burke, Edward

Gibbon, Lord George Sackville, Lord Chatham, Sir Philip Francis, Colonel Barre, John Horne Tooke, Lord Temple, General Charles Lee, Hugh M. Boyd, Lord Chesterfield, Horace Walpole, etc. Junius wrote his letters in a dis¬

guised hand ; he described himself as (

dence and fortuitous coincidences, plausible cases have been made out to establish the iden¬

tity of at least 10 different contemporaries with the unknown Junius. From internal evidence, however, including style, ability, circumstances, ages, chronology and motives, in addition to solemn denials by several reputed authors of the letters, the claims and pretensions of any of the remainder have hitherto failed to obtain a unanimous verdict. Curiously enough, all the advocates base their evidence on similaritv of handwriting. Apparently the strongest claim was that made on behalf of Sir Philip Francis (1740-1818) by Taylor in 1816 and elaborated by a grandson, H. R. Francis, in (Tunius Re¬

vealed) (London 1894). The publication of (The Francis Letters > (2 vols., London 1901), a mass of private and public correspondence, went some way, negatively, to prove that Sir Philip was not Junius. The best criticisms on the disputed authorship may be found in C. W.

Dilke's < Papers of a Critic) (Vol. II, London 1875) and the North American Review of and April 1832. Consult Britton,

J., (The Authorship of the Letters of Junius Elucidated) (London 1848) ; Chabot, C., hand¬

writing of Junius > (London 1871) ; Coventry, (Critical Inquiry into the Letters of Junius) (1825); Dwarris, Sir F., (Some New Facts as to the Authorship of the Letters of Junius>

(London 1850) ; (Junius Unmasked) (Boston 1828); Jacques, history of Junius) (1843); Newhall, I., betters of Junius) (Boston 1818) ; Parke and Merivale, (Life of Francis) (London) ; Vicarius, (The Junius Letters) (London 1903) ; Wade, J., (Junius) (2 vols., London 1850), generally called IVoodf all's Edi¬

tion, and occasionally reprinted; based entirely upon Good (1812) it contains all his blunders.

Waterhouse, B., (An Essay on Junius and his Letters) (Boston 1831).

JUNKER, yun'ker, Wilhelm, Russian ex¬

plorer: b. Moscow, 1840; d. 1892. Educated at Saint Petersburg, Gottingen, Berlin and Prague, he visited Iceland (1869), Western Africa (1873), Tunis (1874), lower Egypt (1875), and went up the Blue Nile to Khartum (1876).

After three years spent in this region, he re¬

turned to Europe, but went back the following year (1879) to continue his explorations at the head waters of the Nile. In 1886, after numer¬

ous adventures, he reached Zanzibar. On his return to Germany he published (Reisen in Afrika) (Vienna 1889-91), in which he gives an account in three volumes of his travels and ad¬

ventures.

JUNKERS, yoong'kerz, a name given to the younger members of the nobility of Prussia and the adjoining states. ((Junkerthum® (aristo¬

cratic manners) was a term of reproach used in the 19th century to designate the party of reaction in Prussia, which found its most strenuous supporters among the nobility.

((Junkerei® signifies the behavior of young aristocrats; aristocratic arrogance; in German slang a baker's apprentice is sometimes called a junker.

JUNKIN, George, American Presbyterian

clergyman: b. near Carlisle, Pa., 1790; d. 1868.

He was graduated from Jefferson College (Pa.), in 1813 and entered the Presbyterian ministry in which he became prominent as a leader of the party known as Old School Presbyterians.

He founded Lafayette College at Easton, Pa., in 1832, and was its president till 1841 ; return¬

ing thither in 1845, after three years spent as president of Miami College at Oxford, Ohio.

In 1848 he became president of Washington College (now Washington and Lee). He was an outspoken upholder of slavery, but was op¬

posed to secession, and on account of his Union sentiments resigned the presidency of the col¬

lege in 1861. He spent over $10,000 of his own and his wife's fortune to meet the current ex¬

penses of Lafayette College. He was the 252

father-in-law of Gen. ˆStonewall* Jackson.

He published (Political Fallacies) (New York 1863) and several religious works. Consult

JUNKS, large flat-bottomed vessels, ranging from 100 up to 1,000 tons burden, used by the Chinese. They have three masts, and a short bowsprit placed on the starboard bow. The masts are supported by two or three shrouds, which, at times, are all carried on the wind¬

ward side. On the fore and main mast is a sort of lug-sail, of cane or bamboo matting.

JUNO, the most exalted divinity of the Latin races in Italy next to Jupiter, of whom she was the sister and wife; the equivalent of the Greek Hera. She was the queen of heaven, and under the name of Regina (queen) vras worshiped in Italy at an early period. She bore the same relation to women* that Jupiter did to men. She was regarded as the special protectress of whatever was connected with marriage. She was also the guardian of the national finances, and a temple, which contained the mint, was erected to her under the name of Juno Moneta on the Capitoline. ‘

JUNOT, Andoche, an-dosh zhu-nd, Duke

of Abrantes, French marshal: b. Bussy-le-

Grand, Cote d’Or, 23 Oct. 1771; d. Montbard, 22 July 1813. He was intended for the bar, but on the outbreak of the revolution joined a volunteer battalion, and soon attracted notice.

At the siege of Toulon, in 1793, he became secretary to Napoleon, and went with him into Italy and Egypt in the capacity of aide-de-

camp. In Egypt he was advanced to the rank of general of brigade. In 1800 he was made commandant of Paris, and he particularly dis¬

tinguished himself at the battle of Austerlitz in 1805. In 1807 he was sent with an army into Portugal, and made his entry without opposition into Lisbon, his success being rewarded with the title of Duke of Abrantes. On the arrival of the British he was defeated at Vimeira, and was then obliged to submit to the humiliating convention of Cintra. Although he subsequently took part in the campaigns (1809) against Austria, (1810) against Spain and (1812)

against Russia, be failed to retrieve his reputa¬

tion. In 1813 he became insane, and lost his life by leaping from a window.

JUNOT, Laure, Duchess of Abrantes, a

French writer: b. 1784; d. Paris, 1838. Her real name was Laurette de Saint-Martrn-Per-

mon. She was married to General Junot in 1799; and she eventually became a social leader at the court of Napoleon I. Her extravagance ruined her husband who died in 1813. About this time she turned to literature of a historical and reminiscent nature ; and succeeded in keep¬

ing herself, for some considerable time, in the public eye. Her (Memoires> (1831-35) consist of 18 volumes of diffuse material, much of it of interest as reflecting the manners and customs of the times. She also published other works of a like nature from which she earned consider¬

able income ; but her boundless extravagance finally left her penniless and she died in a charitable institution.

JUNTA, hoon'ta, Spanish assembly ; a high council of state ; a term common in all Spanish¬

speaking countries. It is generally also applied to any gathering or body of men. It was originally applied to an irregularlv summoned assembly of the states, as distinguished from the cortes or parliament regularly called together by the authority of the king. In Cuba the term was adopted by the insurgents before the Span-

ish-American war, to designate the general lega¬

tion of the Cuban republic abroad. This lega¬

tion or junta was first appointed 19 Sept. 1895, by the Constituent Assembly that formed the in¬

surgent Cuban government, which at the same time made T. Estrada Palma head of the junta and chief Cuban representative abroad, with authority to appoint ministers to all gov¬

ernments and to have control of Cuba's diplo¬

matic relations and representatives throughout the world. See Cuba.

JUNTO, The, a club formed in Philadel¬

phia by Benjamin Franklin for mutual improve¬

ment. Morals, politics and natural philosophy, as well as the social well-being of man, were the main subjects discussed. It continued for about 30 years. The name was also applied to all English Whig ministry in the reign of Wil¬

liam III, the chief members of which were Admiral Russell, Somers, Lord Wharton and Montague, the great financier. This was the first ministry ever made of one and the same party politics. It was the suggestion of Robert, earl of Sunderland, to William III, who shrewdly said, if all the ministers were of one party they would pull together.

JUON, yoo'on, Paul, Russian musician: b.

Moscow, 1872. Educated in music in Moscow and Berlin, where he won the Mendelssohn scholarship, he became a teacher in the Baker Conservatory. In 1906 he became professor of Musical composition in the Hochschule at Berlin. As a composer he has paid consider¬

able attention to the folk-lore of Russia. He has inventive power and originality, and his music covers a wide range; but throughout it is Slavic in character. His chamber music is undoubtedly his best; for in this he is un¬

surpassed by any of his contemporaries.

JUPATI, joo'pa-te, a palm (Raphia tcodi-

gera) of the tide-flooded lands of the lower Amazon and Para rivers, remarkable for its leaves, probably the largest in the vegetable kingdom. The trunk is only six or eight feet high, and one foot in diameter. The leaves rise nearly vertically from the trunk, bending out on every side in graceful curves, forming a magnificent plume 70 feet in height and 40 in diameter. Leaves have been measured 50 feet long, and the leaf-stalk is often 12 or 15 feet long below the first segments of the leaf, and four or five inches in diameter, perfectly straight and cylindrical, and when dried light and strong as the quill of a bird. The Indians split it into laths for a variety of purposes —window-shutters, boxes, bird-cages, partitions, and even entire houses being constructed of it, with the addition of a few supporting: posts at the angles. The fruit, a large oblong drupe, has a bitter oily flesh.

JUPITER, joo’pi-ter, or JUPPITER, the

supreme deity of ancient Rome, the same as the Greek Zeus. As the supreme deity Jupiter re¬

ceived from the Romans the title of optivnus maximus (best greatest), and as the deity pre¬

siding over the sky he was considered as the originator of all the changes that took place in the sky. From him accordingly proceeded JUPITER

a

bib

a

w

T3

cc

M

oT

G

co

G

>— >

w

S

Cvf

►— <

e

H

Ci

CO

£ >

O

t-H

05

<

>

H

<

Q

w

>

05

w

CO

1.

CQ

-4-»

a

O

bi

05

•

W

s

H

0,

1.

Co

‘Tf

H

T3

W

o

£5

M

<

•

i-I

0,

G

<

w

a

O

O

H

C5

Oh

o

H

W

Oh

CO

<5

W

a

H

a

i— i

CO

1.

w

•*->

o

a

a

bi

<

•

a

G

o

•C

T3

a

<

cT

X

1.

I

rain, hail and the thunderbolt, and he it was that restored serenity to the sky after it had been obscured by clouds. Hence the epithets ‘°f Pluvius (rainy), Tonans (thundering), etc., were applied to him. The most celebrated of his temples was that on the Capitoline Hill dedi¬

cated to him as Jupiter Optimus Maximus, jointly with Juno and Minerva. He was repre¬

sented with a sceptre as symbolical of his su¬

preme authority. He was the guardian of all property ; and every Roman was believed to be under his protection and that of his consort Juno, the queen of heaven. White animals were offered up to him in sacrifice, his priests wore white caps, and his chariot was represented as drawn by four white horses. See Juno.

JUPITER, the largest planet of the solar system, and the fifth (excluding the asteroids) in order of distance from the sun. Its mean diameter is about 86,500 miles ; polar diameter about 83,000; its mean distance from the sun 483,300,000 miles ; its period of revolution round it 11 years lORj months; its orbit is inclined to the ecliptic at the angle 1° 18′ 40.3”. The in¬

clination of its axis is 3° 5′ 30”, so that changes in the seasons must be almost unknown ; its volume is 1,309 times that of the earth, but its

mas? is only 317.7 times.

Jupiter's satellite system is the most in¬

teresting of that of any of the planets. Alto¬

gether, nine moons are known ; the four bright¬

est, which were discovered three centuries ago, are visible in a very small telescope and even in a good field glass; the others are far too faint to be seen in any but the very largest telescopes, and there is indeed one of them so faint that it cannot be viewed visually with any telescope now in existence : it can only be detected by the employment of the photographic plate. The four brightest satellites were dis¬

covered by Galileo in 1610, and are sometimes referred to as the Galilean Stars. They are very large objects, their diameters ranging from 2,100 to 3,550 miles; the largest of them thus exceeds Mercury and approaches closely to Mars in size. These moons are compara¬

tively very close to the planet, yet in 1892

Barnard, at the Lick Observatory, discovered a fifth, excessively faint, satellite whose orbit lies so far within all of them that this moon is but 69,000 miles from the planet's surface.

The remaining four were discovered by photog¬

raphy. The sixth, seventh and ninth were found at the Lick Observatory, the first two by Perrine and the last by Nicholson, while the eighth was discovered by Melotte at the Obser-

vastory of Greenwich. It is remarkable that no less than four of the. Jovian satellites were thus discovered at a single observatory. The orbits of the four newest satellites differ greatlv from those of the older ones. While the five inner moons form a compact system whose nearly circular orbits all lie very approximately in one plane, the outer ones move in highly ec¬

centric orbits which are greatly inclined to the planes of the others, and at great distances from the planet. Thus the ninth satellite is nearly twenty times as far away as the outermost of the older satellites; moreover, the eighth and ninth satellites revolve about Jupiter in a retrograde direction,. This last fact raises interesting questions as to the mode of development of the system and even

suggests the possibility that these fainter satel¬

lites may originally not have belonged to the system, but that they may be outriding members of the asteroid swarm, or some other bodies which approached so near to Jupiter that they were captured and forced to revolve around the planet. The following table contains the prin¬

cipal data referring to the nine known satellites.

Satellite

Discoverer

Distance

from planet

in miles

Period

Nameless. . . .

Io. . . .

Barnard, 1892. . .

Galileo, 1610. . . .

Galileo, 1610. . . .

Galileo, 1610. . . .

Galileo, 1610. . . .

Perrine, 1904.. . .

Perrine, 1905.. . .

Melotte, 1908. . .

Nicholson, 1914.

112,500

261 , 000

664,000

415,000

1,167,000

7,110,500

7,273,800

17,042,000

18,993,000

11 h. 57 m.

42 h. 28 m.

171 h. 43 m.

85 h. 14 m.

400 h. 32 m.

251.0 days

259. 7 days

2.55 years

3 . 0 years

Europa .

Ganymede.. .

Callisto .

VI .

VII .

VIII .

IX .

The disk of Jupiter is crossed in a direction parallel with the equator by three or four vividly marked bands or belts ; other of these belts

vary in density and distinctness. Spots also appear and remain for some time on its sur¬

face. In particular, a large red spot of varying dimensions has been observed from time to time. Prof. George Washington Hough

sums up the results of his 23 years of obser¬

vations of Jupiter somewhat as follows: First, its equatorial belt changes both in size and position slowly and gradually. Second, the fainter belts also vary. Third, the circular white spots are very permanent in latitude, but are not fixed in position one with another.

Fourth, the dark spots of the same size as the circular white spots are not so stable as they, and probably lie at the level of the equatorial belt. Fifth, the large, irregular white spots near the equator make one rotation in 9 hours 50 minutes. As to the constitution of the planet, Professor Hough concludes that the matter at the visible boundary of Jupiter has a density about half that of water (the average density of the planet is 1.37 times that of water). The medium at the boundary is in the nature of a liquid. In it the great red spot and the circular white spots are located. In such a medium all motions would be slow and gradual and the shape and size of an object would be very permanent. The equatorial and polar belts may be located on the surface or at a higher level than the red spot. In middle latitudes within 20° of the equator the higher atmosphere car¬

ries a layer of dark matter. In this envelope are formed the openings that we call white spots, and by unequal distribution black spots.

The belts may be assumed to be some sort of vapor of considerable density. The planet is at a high temperature, but not noticeably self-

luminous.

JUPITER CAPITOLINUS, Temple of,

the national shrine of ancient Rome. Situated on the Capitol, it was dedicated to Jupiter Optimus Maximus, Juno and Minerva. It is said to have been built by Tarquinius Superbus and completed in 509 b.c. It was built against the side of Monte Caprino, the southern summit of the Capitoline Hill and was supposed to stand on sacred ground. On account of its 254

position it could be approached only from one side. Owing to the early date of its structure it was Etruscan in style and had three rows of columns in front, to represent the trunks of the trees of the ancient forest shrines. This huge primitive building, which was destroyed by fire (83 b.c.) was rebuilt by Sulla and Caesar.

Augustus, also rebuilt it in 9 b.c., and Vespasian restored it in 74 a.d., and Domitian in 82 a.d.

It was finally plundered in 455 by the Vandals, who left it a ruin. Some of its buried remains have been unearthed at the foot of the hill.

Consult Lanciani, R., (Pagan and Christian Rome> (Boston 1893) ; Platner, S. B.,

JUPITER SERAPIS, Temple of, a build¬

ing at Pozzuoli, near Naples, which was at one time supposed to be a temple, and now popularly so called. It is now believed to be a market. The base of the building is now and apparently has been long under water. It at one time had 46 very high pillars of which only three are now standing.

JUPITER STATOR, Temple of, a re¬

ligious edifice at Rome said to have been vowed by Romulus to Jupiter the (

so called because he answered the supplication of the Romans and restrained the flight of the latter before the Sabines, according to Livy (Book 1-12). Romulus apparently was not able to carry out his vow. But this was done, several hundred years later, by M. Atilius Regulus who erected the Jupiter Stator in 296

b.c. This, which was in the Corinthian style, is believed to have stood east of the Arch of Titus and close to the Sacred Way. Consult Lanciani, R., (The Ruins and Excavations of Ancient Rome) (Boston 1897).

JURA, zhu'ra, a department of France sit¬

uated on the eastern frontier. It is bounded on the north by Haute-Saone, on the east by Swit¬

zerland, on the south by the department of Ain and on the west by the department of Cote-d'Or and Saone-et-Loire. It is generally of a rugged

nature, over two-thirds of its territory being covered by the Jura Mountains, which rise, in places, to over 5,000 feet. The lower level lands are on the west. Here the regular crops of France are grown in abundance. Among the industries of Jura are the mining of rock salt, coal, iron, marble and various other classes of stone, the manufacture of cheese and the cutting of timber. Area, 1,952 square miles. Pop.

153,000.

JURA, joo'ra, a chain of mountains in cen¬

tral Europe, partly belonging to France, partly to Switzerland, between which they form a sort of natural barrier, extending from southwest to northeast, and exhibiting a number of parallel ridges. The greatest length is nearly 200 miles, from Belley in France, department of Ain, to the banks of the Rhine; and the greatest breadth about 60 miles, between the Lake of Geneva and the banks of the Doubs. The principal geologi¬

cal formation is the Jura limestone, with green¬

sand, belonging to the lower Cretaceous series.

Stalactite caves are numerous. The two chief rivers having their source in the chain — the Ain and the Doubs — are both French. They descend from its western slopes, and belong to the basin of the Rhone. The highest peaks of the Jura are Cret de la Neige, Reculet, Mont Tendre and La Dole, all over 5,500 feet.

JURASSIC, a term used to indicate the second period of the Mesozoic era and the sys¬

tem of rocks formed at that time. Jurassic is preceded by Triassic and followed by Creta¬

ceous. The formations of this period take their name from their prominent exposure in the Jura Mountains; but are known in Great Britain as the Oolites because there made up of granular (oolitic) limestones below the Cretaceous and above the Lias, from the latter of which the series is separated by no very definite boundary.

In portions of America, Triassic and Jurassic are not easily differentiated and the inclusive term Jura-trias is often used. No definitely recognizable Jurassic rocks are known in United States east of the Mississippi River. In the Rocky Mountain region, the area was above water throughout early Jurassic as in Triassic, but late in the

period an arm of the sea en¬

croached from the Arctic, extending as far south as Wyoming, and thin marine limestones, sandstones and shales were laid down. These contain many fossils of Arctic relationships.

Before the end of the period this sea had again retreated. On the Pacific Coast, marine con¬

ditions prevailed over the present site <5f the Sierra Nevada Ranges. The period was brought to a close by a great mountain-making revolu¬

tion that upheaved the Sierra Nevadas and Cas¬

cades. At the same time great masses of granite (batholiths) were intruded.

Life of the Period. — During the Jurassic the most notable development of invertebrate life was among the Ammonite Cephalopods, which differentiated rapidly, and hence formed valu¬

able time markers. Among vertebrates, the rep¬

tiles are easily dominant. The dinosaurs de¬

veloped along several lines. Bipedal forms were common and were of two groups, the carniv¬

orous and the herbivorous. Quadrupedal forms grew to be of enormous size, brontosaurus reaching a length of 60 or 80 feet and weighing over 30 tons. Strange armored forms also de¬

veloped with long spikes on their tails. Marine reptiles also were abundant, ichthyosaur (fish reptile) haying a truly fish-like tail and fins.

Flying reptiles, known as pterosaurs (wing rep¬

tiles) became common. The larger ones had a wing spread of 20 feet and had hollow bones as do birds. The first true bird (Archceopteryx) (q.v.) has been found preserved in Jurassic rocks. It had feathers like modern birds, but was furnished with long, sharp teeth. A few minute remains believed to represent mammals have been found, the earliest remains of the mammal group. The plant life was very similar to that of the Triassic (q.v.).

JUREL, joo'rel, or XUREL, a fish of the genus Caranx, especially C. crysos, more widely known as the yellow mackerel and hard tail.

Unlike most members of this tropical genus, the jurel is common as far north as Cape Cod. In Florida and the Gulf States it is an important food-fish, caught in _ seines during the spring and summer when in shallow water for the purpose of spawning. It is migratory, and like most wandering fishes carnivorous and vora¬

cious.

JURI, zhoo-re', a once powerful Indian tribe belonging to the Arawakan family. They 255

are closely related in customs, racial appearance, traits and language to the Passe. Their terri¬

tory once extended from the Lower Putumayo and Japura into the northern tributaries of the Amazon. They are experts in the use of the canoe and were at one time very much feared by neighboring tribes on account of their deadly blowpipes. Their extensive dwellings are con¬

structed of poles thatched with palm or other leaves, much like those in use everywhere throughout tropical America.

JURIEN DE LA GRAVIERE, zhu're'an'

de la gra've'ar', Jean Pierre Edmond, French writer and soldier: b. Brest, 1812; d. 1892. He began his active life in the sea service and be¬

came rear-admiral in 1855. He had charge of the French naval interests in the expedition to Mexico in 1861. The following year he ar¬

ranged the Treaty of La Soledad with the other sharers in the expedition, Spain and England.

On his return to Europe he was put in com-

mand of the Mediterranean fleet (1868-70). He J prepared all the plans for the escape of the empress in 1870. The following year he became director of charts in the Naval Office and in 1888 he was

made a member of the Academy on account of his literary and other services to his country. Among his published works, which are all on naval subjects, are (Guerres mari-

times sous la Republique et sous l,Empire) (1847) ; (Voyage en Chine pendant les annees 1847-50) (1854) ; (Les Campagnes d'Alexandre) (1883-84) ; (Les gloires maritimes de la France* (1888); (L'Amiral Roussin) (1889); (Les Anglais et les Hollandais dans les mers polaires et dans les mers des Indes) (1890) ; (Le siege de la Rochelle) (1891) ; (La flotille de l'Euphrate) (1892) ; (Les Gueux de mere) (1892).

JURIEUX, zhu're'e', Pierre, French writer and theologian: b. 1637; d. 1713. Although a voluminous writer and bitter controversialist in behalf of Protestantism, he is remembered now for two works, (Histoire du Calvanisme et celle du Papisme) (1682) and (Histoire critique des dogmes et des cultes) (1704).

JURISCONSULT (French jurisconsults,

Latin, juris consultus, one skilled in the law), one who gives opinion on cases of law; one learned in the law ; and, specifically, a master of civil law. During the Republican period of Rome the jurisconsults, who were almost always men of independent means and good family, trained in the law, gave their legal advice free of charge as a means of adding to their friends and influence to aid them in securing some elective office. Under the Empire certain men were given the right to* respond (jus respon¬

dent) by the emperor. As these were among the most noted of Roman jurists, their decisions were ordered to be followed by the judges. Be¬

fore long the jurists thus honored were almost all selected from the members of the Imperial Auditory; and as this was the highest court of appeal there arose the custom of making the lower courts follow the decisions of the higher ; a custom now universally followed. The famous digest of Justinian was compiled from the writ¬

ings of the imperial jurists, who had left, in a digested form, the case law of the latter part of the Republic and the first part of the Empire.

Throughout the Latin countries the term juris¬

consult is used in the sense of jurist. See Civil Law ; Jurisprudence; Attorney at Law. Con¬

sult Muirhead, (Historical Introduction to the Private Law of Rome.*

JURISDICTION includes both the right

to exercise authority (imperium) and the field within which such authority may properly be exercised (dominium) , whether its limits be territorial or personal. In early law, jurisdic¬

tion in the second sense was rather personal than territorial, and the same must be. true wherever distinct races occupy together the same territory. While the tendency is to grad¬

ually work out a system of law applicable to all inhabitants, the state must of necessity recognize the fact that its subjects of different races will consent to be governed only by sep¬

arate and often contrasting systems. Such is the case, for example, in British India to-day.

So, too, jurisdiction was divided according to the subject matter, and the Church secured and jealously maintained authority over all matters of conscience, and managed to extend the juris¬

diction of the Ecclesiastical Courts to very im¬

portant questions, including marriage, legiti¬

macy, wills and administrations, and to actions affecting the personal rights of the clergy.

The Constitution of the United States dis¬

criminates clearly and sharply between the ex¬

ecutive, the legislative and the judicial powers of government, and its provision that the Con¬

stitution and the laws of the United States made in pursuance thereof shall be the supreme law of the land, taken in connection with the pro¬

vision that the judicial power shall extend to all cases arising under the Constitution, forms the basis of a jurisdiction which, at least in the extent to which it has been carried, is without precedent outside of the United States. It is by virtue of these provisions that the Federal courts exercise the power of declaring void acts of Congress or of the State legislatures which conflict with the Constitution of the United States. To this power and the energy and ability of the Supreme Court in its

exercise are due the vigor and efficiency of the Federal government and the establishment of its su¬

premacy within the field of its jurisdiction.

This feature has been imitated in the several State constitutions with results unquestionably beneficial as a whole, and so important that the courts have come to be spoken of as the guard¬

ians of the constitution. But one result not so fortunate is that the legislative branch of the government, though in theory as much bound by constitutional restrictions as though there were no authority to which an appeal against the validity of its enactments can be taken, is manifesting a disposition to disregard them altogether, leaving the whole question of con¬

stitutionality to the courts. As our system of government provides no method by which the question can be raised, except in the course of a litigation in which one party relies upon the right conferred by such a statute, there are possibly many unconstitutional acts in force in the various States. A more important consider¬

ation is that a disposition on the part of the judiciary to interfere with matters properly legislative may thus be created, and lead to forced constructions by which any law which the judges believe to be bad is held obnoxious to the Constitution — resulting in illogical and 256

JURISDICTION

inconsistent decisions and a weakening of the authority of the courts.

The Constitution provides that the judicial power of the United States shall extend to controversies ((between citizens of different States. w The purpose was to open the way for legislation which would provide a tribunal in which the right of a citizen of any State to pursue his legal remedies could not be de¬

nied ; probably, too, to afford him a tribunal less likely to be affected by local prejudice than a State tribunal of first instance, probably a County Court. It is not contended that any-

thing further was designed, but upon this clause depends the most extensive and, except for the provision as to. constitutional interpretation which we have just considered, the most im¬

portant body of Federal decisions. The tend¬

ency of the Supreme Court was at first to hold that the Federal court should administer the law of the State in which it was sitting and that while a citizen of Pennsylvania, for exam¬

ple, having a claim against a citizen of New York, might, if he saw fit, bring his action in the Federal, rather than in the State, court — the law to be applied would be the law of the State of New York. But this rule has been departed from in the later decisions, and while the Federal courts still hold themselves bound to follow the interpretation put upon State statutes by the State courts (unless, of course such statutes are attacked as in conflict with the Constitution of the United States), they hold themselves free to disregard the interpretation of the common law by the State courts, and the system of law built up within the State by the adjudications of its courts, and to adopt their own interpreta¬

tion, and follow their own judgment. That the Federal courts are popular is shown by the fact that the most important litigation, estimated on the basis of the amount at stake is, where pos¬

sible, usually brought before them, notably pro¬

ceedings against corporations and especially the foreclosure of corporation mortgages where it is quite common for the trustee for the bond¬

holders to be a corporation or individual of an¬

other State, or where a committee of bond¬

holders, or even a single bondholder, residing outside the State which is the domicile of the debtor corporation, is the plaintiff. This is sufficient to give jurisdiction to the Federal court.

We have therefore a most interesting condi¬

tion of concurrent jurisdictions applying – to every inhabitant of the United States. The Fed¬

eral courts are courts of limited jurisdiction —limited to authority expressly conferred by the Constitution and laws of the United States, but once jurisdiction is established, unlimited in the scope of its exercise. Congress has prescribed that the jurisdiction shall only exist when the matter in controversy has a pecuniary value exceeding $2,000, and that actions shall be brought only in the district within which the plaintiff or the defendant resides and has made provision

for the removal from the State courts of causes which might originally have been brought in the Federal courts. Some of the States have attempted to prevent this increas¬

ing jurisdiction of the Federal courts; for ex¬

ample, by the passage of acts providing as a condition of a license to a foreign corporation to do business within the State, that such cor¬

poration, if sued, would not remove the cause into the Federal court.

The field in which a State of the American Union may exercise its political or judicial au¬

thority is circumscribed by its geographical boundaries. The process of its courts can reach only persons who reside in, or voluntarily come into, their jurisdictional limits, or property which is located in, or is brought into, the ter¬

ritory of the State. An action for debt against a non-resident can be conducted only as a pro¬

ceeding in rem against his property found in the State and held by writ of attachment ; a judgment in personam against a non-resident de¬

fendant, who had not been served with initia¬

tory process within the State or voluntarily en¬

tered an appearance, would be a nullity. A suit for divorce is a proceeding in rem, the res being the status of the parties ; and, when brought in the proper matrimonial domicile, substituted service of the summons and bill outside the State will give the court jurisdiction. Criminals, who have become fugitives from justice, are brought into the State from which they have fled on requisition to the governor of the State in which they have taken refuge.

National governments are similarly restricted, though their jurisdiction has wider limits.

These may extend far beyond their national frontiers to lands and peoples over which the governments hold complete sovereignty or even a mere suzerainty or protectorate. Or the dominium of a government may extend to per¬

sons of its own nationality living abroad, over whom, or in whose behalf, it claims extra-terri¬

torial rights. The extra-territorial jurisdiction formerly exercised by the nations of European race in the non-Christian and imperfectly or¬

ganized polities of the Orient and the Far East has been greatly narrowed. It was abolished in Japan by treaties; it was declared no longer ex¬

istent in Turkey by the law suppressing the capitularies and without regard for treaties. In Persia, China and a few other countries it is still the rule that nationals of European and American states can be tried for crime only in the consular courts of their own nationality; likewise these courts have exclusive jurisdic¬

tion in civil actions in which their nationals are defendants, or which involve their civil status.

Controversies between natives and extraterri-

torialized foreigners are sometimes triable in mixed courts. The most important of these was the one long maintained in Egypt, and to which the principal nations, including the United States, each appointed a judge. There is a regularly organized United States District Court at Shanghai, forming part of the Federal judi¬

ciary system.

Some national governments claim permanent dominium over their nationals wherever they go and contest, the jurisdiction even of the countries to which their former subjects have emigrated, and in which they have become nat¬

uralized. The Italian government, for instance, declined several years ago to surrender to the American authorities a former Italian subject, who had fled to Italy to escape trial in the Uni¬

ted States for a crime alleged to have been committed by him in the latter country; the ground of refusal being that an Italian by birth or descent was answerable to courts of Italy alone for his delicts. His liability was not di-

mmished by or altered by long absence from Italy, or by a voluntary change of civic status or allegiance, nor even by the accident of having been born in another country. The locus of the crime was considered quite immaterial. To prove its consistency the Italian government about the same time declined to accept jurisdic¬

tion in a case involving a young American, the body of whose wife had been put into a trunk and thrown into Lake Como. The nativity of the offender, not the place of the offense, fixed the jurisdiction; let American courts try Americans and the Italian courts administer correction to Italians. This is the American and English rule of jurisdiction turned upside down and inside out. The Italian government receded some¬

what from its position, but from considerations of comity, and without abandonment of its principles. The rule of dominium in personam also permits the French and other Continental European courts to take criminal jurisdiction oyer persons who are not, and never were, within the orbit of their territorial authority, and to try and convict such persons in their ab-

scence — which is the direct opposite of one of the fundamental principles of the common law.

Stephen Pfeil.

JURISPRUDENCE. The use of this term

as an equivalent for “Law® is confusing and apt to conceal its real import. “Medical Juris¬

prudence,® so called, is not even law, but a compilation of facts, taken from the science of medicine, which may be useful in the determina¬

tion of questions of law. The title “Equity Jurisprudence® on a book generally indicates that it is a treatise on pleadings and procedure in the Court of Chancery, and when one speaks of American jurisprudence what is usually meant is the administration and prac¬

tice of the law in America, specifically in the United States. These and many other similar uses of the term are incorrect. Jurisprudence is the science which concerns itself with the discovery and presentation in a systematic man¬

ner of the relatively few and simple ideas underlying the infinite

variety of legal rules.

In making its observations and deductions jurisprudence recognizes no limits of time and place; a rule stated in, or inferred from, a section of the Code of Hammurabi (b.c. 2340) is within its sphere of inquiry just as much as one declared in an act passed by Congress or a State legislature during the present year. Nor does the science take cognizance of the different classes of people whose wants were satisfied by the invention of a legal rule, nor the circum¬

stances under which it was invented. The gen¬

eral rules of hypothec are applicable alike to a bottomry bond, a mortgage on land or a pledge of chattels ; the general rules of possession, ownership and contract are applicable alike to mariners, landlords or pawnbrokers. Jurispru¬

dence should not be confounded with the his¬

tory of laws or of the law; a science which re¬

duces legal phenomena to order and coherence is obviously something quite different from an historic exposition of the law of one or of many countries, or even the juxtaposition for the purpose of comparison of the rules embodied in various systems of law. The comparative study of laws engrossed the attention of Roman jurists, and in the jus gentium they put together the rules which they found to be common to a VOL. 16 — 17

great number of legal systems. Their ideal was a universal code, from which all systems were imagined to be derivable, or toward which they were supposed to tend. It was in their efforts to realize this ideal that the Romans made a discovery of far greater importance than that of a merely material unity in the laws of many nations. There was disclosed to them a formal unity which enabled them to rubricate the essential principles of their ideal or “Natural law® in spite of the heterogeneous origin of their material and the differences of the methods of grouping the topics adopted in the various legal systems. In a word, the Roman jurists invented the science of jurisprudence, which differs from comparative law as much as it differs from legal history. In making this in¬

vention the Romans did a service for law, parallel to the service done by the Alexandrian Greeks for language when they invented gram¬

mar. The difference between comparative law and our science is well

stated by Dr. T. E. Hol¬

land in his (Elements of Jurisprudence* by the following illustrations : “It is the office of com¬

parative law to ascertain what have been at dif¬

ferent times and in different communities the periods of prescription or the requisites of a good marriage; it is for jurisprudence to eluci¬

date the meaning of prescription in its relation to ownership and to actions at law, or to explain the legal aspects of a marriage and its connec¬

tions with property and the family.® A science of jurisprudence, to be sure, might be deduced from the observation of the laws of a single nation, just as the Alexandrian Greeks deduced a science of grammar from Greek, the only language they familiarly knew — and just as the general formulae of grammar thus derived are applicable to all languages, so would a formal science of jurisprudence, though de¬

duced from but one system of laws, be of uni¬

versal application. While comparative law and legal history are not prerequisites, nevertheless they are invaluable aids toward the formulation of the science. Comparison of the laws en¬

forced in the same country at different times, or of similar though not identical laws of vari¬

ous countries, greatly improves the possibility of separating the essential elements of the science from their historical accidents, and of discovering the relative importance of human wants by the universality (or the reverse) of legal provisions respecting these wants. The means whereby humanity has satisfied its wants are as infinite in number as the wants them¬

selves, but humanity has not always, nor often, had clear conceptions of the ends to be at¬

tained by the means employed. Legal history, therefore, is a vast accumulation of complex and perverse facts. Jurisprudence obtains unity out of this complexity by observing the human wants for the satisfaction of which laws have been invented, and .the modes in which such wants have been actually satisfied; by collating and digesting the facts observed, with no regard for their historical or

geographical associations, and arranging the formal rules deduced from this matter in categories, according to logical principles derived from other practical sciences.

A formal science must necessarily begin with an understanding of the character of the phenomena about which it rationalizes; it can have no coherence if the thing with which it is concerned is given a name with complex and 258

shifting meanings. A discussion of the great variety of ideas expressed by the word <(Law®

is deferred to another part of this work. (See Law). It must suffice here to define <(Positive Law,® with which alone the science of juris¬

prudence is concerned, as <(a rule of external human action, recognized and enforced by a sovereign political authority.® This definition is narrow enough not only to exclude the con¬

ceptions expressed by such terms as the ((laws of nature® where the word ((law® is used merely figuratively, but also to differentiate positive law from moral law, ethics, etiquette or the (

tom when they have obtained recognition from the State, and regulations made by municipali¬

ties, corporations or other agencies, to which the sovereign political power has delegated some part of its authority. The action regulated must be a human action and it must be exter¬

nal; i.e., it must affect a thing or a person other than him who does the act. A thought is not an act until it finds expression in words or deeds. An omission, however, may be an act in law. Jurisprudence naturally falls into two divisions, public and private. The latter com¬

prises the rationale of legal rules governing the relations of individuals among themselves.

Public jurisprudence is that division of the science which is concerned with the rationale of the leeal rules which govern the relations be¬

tween individuals and the State. A third di¬

vision of the science is sometimes made to in¬

clude the rules governing the interrelation of States. Inasmuch, however, as there is no super¬

national authority to compel observance of these rules by mutually independent sovereignties, international law is lacking of the fundamental characteristic of positive law. It, therefore, fits only imperfectly into the scheme of our science. ((The most obvious characteristic of the law is that it is coercive; it was invented be¬

cause of transgressions. Even when it operates in favor of the legitimate action of individuals, the law does so by restraining interference with such action.® This carries us forward to the subject of legal rights, the creation and pro¬

tection of which are the primary objects of law. The elements of a right are, the person entitled, the act or omission, the object and the person obligated. A right has been defined by Holland as <(one man's capacity of influenc¬

ing the acts of another, not by his own strength, but by means of the opinion or force of society.

When one is said to have a right to anything, or over something, or the right to be treated in a certain way, what is meant is that public opin¬

ion would regard with approbation, or acqui¬

escence, his doing the act or his use of the thing, and would reprobate the conduct of any person who should prevent his doing the act or using the thing, or who should fail to treat him in the manner to which he is believed to be entitled.® A right thus sanctioned is a moral right. When the capacity residing in one man to control a thing or the action of another is exercised with the assent and assistance, if need be, of the State, it becomes a legal right — and this irrespective of the moral

sanction of the community. The distinction between public and private rights lies upon the surface. The State has the right not to be conspired against or not to have its peace disturbed. An act of treason is a violation of a public right residing in the State, and the State intervenes not only to pun¬

ish the traitor, but to protect itself — for the State is to be regarded as a (

ogy, with rights that need to be safeguarded by itself as well as it safeguards the rights of pri¬

vate persons. Some trespasses are violative of a private as well as of a public right. A libel or an assault, for instance, infringes upon pri¬

vate rights and, also, upon the public right of the State not to be disturbed by acts consti¬

tuting, or tending toward, breaches of the peace. All legal rights fall into one of the two categories, public or private. The division of the science of jurisprudence in two correspond¬

ing departments is, therefore, logically con¬

sistent. It commends itself also by the con¬

venience of an arrangement whereby constitu¬

tional, ecclesiastical, criminal and administra¬

tive law, on the one hand, and the law of con¬

tracts, property, succession and torts, on the other hand, fall into groups, to one or the other of which all legal topics may be referred.

The classification of rights under the heads, ((Rights of Persons® and <(Rights of Things,®

is logically imperfect as well as inconvenient in practice. The right to receive rent does not depend upon some distinctive characteristic of landlords as a class; nor would this right be affected because

the landlord should happen to be following an occupation, say that of a pawn¬

broker, whose business is conducted under some special kind of administrative regulations.

These regulations of the pawnbroking business in no way increase or impair the right of a pawnbroker, as landlord, to rent from a tenant.

If a landlord should be an infant, however, a whole set of legal disabilities would come into play, affecting and modifying the antecedent right of this specific landlord to receive rent or the remedial right of the infant to enforce payment thereof. These modifying causes, affecting the relations between an infant land¬

lord and his tenant, are entirely unconnected with the general rules of possession, owner¬

ship and contract, which govern the relations between landlord and tenant — and when both parties concerned are normal the ((personal di¬

mensions® of a right need not be considered at all. In most cases they could be utterly dis¬

regarded, for the conditions of abnormability in natural persons are not numerous. They are lunacy, infancy, coverture, alienage, outlawry and a very few others. By abstracting the rubric <(rights of persons,® which means nothing more than the law relating to varying legal capacities, and relegating this topic to a sepa¬

rate head — such as ((the law of abnormal per¬

sonality® — the definition and consideration of legal rights would be greatly simplified.

A legal right is either antecedent or reme¬

dial. An antecedent right is an exceptional advantage enjoyed by the person clothed with it. The right of an heir to a house and land devised to him,

or the right of a merchant to goods purchased by him, are antecedent rights ; and they are exclusive, because they are en¬

joyed by nobody else. Antecedent rights may be in rem, meaning that they are available against the whole world, as in the' cases just mentioned ; or they may be in personam, mean¬

ing that they are available only against a par-

ticular person. The right of ownership is a right in rent, it is available against the whole world; the right of a landlord to rent is a right in personam, for it is available only against his tenant. A remedial right arises when an ante¬

cedent right is violated. It is available only in personam, that is to say, against the person by whose infringement of an antecedent right the remedial right comes into being. Public as well as private rights may be either ante¬

cedent or remedial. The right of the State not to be betrayed is antecedent and is a right in rem because it is available against the whole world. When a traitor violates this antecedent right a remedial right in personam, available against the offender, is created. Antecedent private rights in rem, available against the en¬

tire world by those entitled to the enjoyment thereof, are: (1) The right to personal safety and freedom; (2) to the society and control of one’s family and dependents; (3) to reputa¬

tion ; (4) to advantages open to the commu¬

nity generally, such as the free exercise of one’s calling; (5) to possession and ownership; (6) to immunity from damage by fraud. Many of these, of course, become the objects of par¬

ticular legal intervention only when they are infringed, as the right to personal safety is in¬

fringed by a menace, an assault or an act of negligence. Antecedent rights when not in¬

fringed, or when they are not (

ble or intangible. The ((bubble, reputation,® is an intangible thing, to the enjoyment of which a man has a right, but which he cannot reduce to possession. The rights of possession and ownership, generally speaking, are extensions of the power of a person over tangible physical objects. Possession and ownership *are not identical. The Roman jurists even maintained that the custody of a thing by a bailee did not constitute possession, and that the abstraction of the thing from his custody did not give the bailee any remedial right against the abstractor — no more than a servant could claim legal recovery of his master's goods left in his care and stolen by a thief. The modern English law holds just the opposite, as also did the ancient Teutonic law. ((Violations of posses¬

sion give rights of action independently of rights of property. Such rights of action are extensions of the protection which the law throws around the person.® (13 Meeson and Wellsby, 581). The Salic law gave the person from whose custody cattle had been taken the sole right of recovery, exclusive even of the owner. To be in possession of a thing one must have it sufficiently in one's control to ex¬

clude others ; but possession may be symbolical.

By entry on any part of an estate an heir will be assumed to be in possession of the whole, and one who buys goods in storage may be put into possession by receiving the keys of the warehouse wherein they are stored, or by the transfer to himself of a warehouse receipt.

The essentials of possession are the will and the power to possess and the exercise of both.

((Neither the mere wish to catch a bird out of reach, nor the mere power to take a horse standing unguarded will suffice to put one in possession of the bird or the horse.® The will to possess, or animus domini, rather than mere physical possession, is ((nine points of the law.®

It is manifested in the largest and the smallest human relations — by a nation, which fights the world to keep a province, down to the individ¬

ual, who defends property in his hands in the honest belief that he owns it, and the thief, who knows perfectly well he does not. The incidents of ownership are the right to possess, the right to enjoy and the right to dispose of property. The right to possess is lost or sus¬

pended by letting, lending, pledging or mort¬

gaging property. The right to enjoy includes the right to the increase — growing timber, ac¬

cretions of alluvion, the young of cattle, etc.

The right of ownership is limited by the State through taxation, the prohibition of obnoxious use, or by taking in virtue of eminent domain ; or it may be limited by individuals, as coparce¬

ners, neighbors having rights of way, rights of access to water or other easements, or right of support from adjacent soil. The right of dis¬

posal includes the right to destroy what one owns. A few kinds of things other than phys¬

ical may be objects of ownership — patents and copyrights, for instance. Property is either movable or immovable — the distinction be¬

tween real and personal is not quite the same, though nearly so. Property may be lawfully acquired by purchase, succession or prescrip¬

tion. Gift is a mode of succession. The right of

ownership is terminated by the death of the owner. A dead man is not a legal person.

In the foregoing is shown the method

whereby scientific jurisprudence prepares, its material by formulating the myriads of juristic facts in a relatively small number of statements, capable of orderly arrangements within the compass of a single volume of moderate size.

The nomenclature of the science, though an important element thereof, has not always been adhered to. It could have been adhered to strictly only at the sacrifice of popularity in treatment. Clarity seemed more desirable than profundity. It was possible to deal with only one class of private rights, and antecedent rights in rem, more specifically rights of . pos¬

session and ownership, were selected for illus¬

tration because they present the fewest diffi¬

culties. A very much larger class of private rights than the one discussed are the rights in personam. To this class belong all the rights conceded by contract and, though these really partake of the character of antecedent rights, they are never available in rem against the world, but always against specific individuals.

Under the general title <(rights in personam ®

are gathered also all other remedial rights, whether they arise from breaches of contract or out of what the Roman jurists call ((obliga-

tions ex delicto ® which our lawyers . classify as the laws of torts. A further division of law must still be considered. The rules wherein are defined the rights, whether public or private, which the State will support or protect, constitute the "substantive law.® The rules prescribing the modes of aiding or pro¬

tecting either public or private rights are classed as "adjective law® or procedure. Ju-

dicial intervention may be either preventive, as by injunction, or redressive. Redressive inter¬

vention is by far the more frequent mode, and in respect to private rights the redress usually takes the form of indemnity or damages. In some cases, however, the remedy is more di¬

rect, as when a nuisance is ordered abated, or the specific performance of a contract is de¬

creed, or a mortgagor is put in possession of the property mortgaged by summary process.

Rights of action are extinguished by release, waiver or condonation; by bankruptcy of the person liable ; by set-off ; by merger, as in the case of the substitution of a covenant or a judgment note for a simple contract — the sub¬

stantive right is not extinguished, but the right of action on the less solemn evidence of the debt or obligation would be merged. Estoppel by Judgment for the defendant, and by pre¬

scription or limitation, are the remaining modes of extinguishing remedial rights. The death of the person of incidence, i.e., the plaintiff in an action for tort, not merely extinguishes the procedural remedy, but the right itself. To this there is an exception when death caused by negligence or other tortious act is the ground of action. In such case the right and the rem¬

edy pass to the executor or administrator.

Remedial rights may be suspended without be¬

ing lost — as, when an action is pending in a court

of concurrent jurisdiction, another court will not proceed with a suit to enforce the same right. Finally there is a private, as well as a public, international law. The questions that arise in this department of the law are mainly jurisdictional. When parties are na¬

tionals of, or are domiciled in, different coun¬

tries a suit may be brought in a court of the country where the plaintiff is domiciled; where the defendant is domiciled; where the object of: the controversy is situated; where a mar¬

riage, a will or other agreement, whereby a right was created, was performed or made; in a court of the country where a contract was to produce results or of the country where the plaintiff chooses to bring his action. The courts of the situs of the object of a contro¬

versy (forum rei) have always assumed juris¬

diction in such cases. Jurisdiction is declined by the English courts in suits for divorce if the husband is not domiciled in the country, but there is no uniform rule on this subject in the United States. English and American courts will take jurisdiction in actions on con¬

tracts no matter where they have been made or where they are to be executed, provided the parties are within reach of their process. More complex than the question of the competency of the court is the question as to what country’s law should be applicable in any given case.

Some states claim exclusive rights to punish persons of their nationality for crimes, no matter where committed. There is such diver¬

sity in the rules that have been applied that a basis for general formulae can hardly be said to have been laid in this department of juris¬

prudence. The formulation of the science was

practically completed by the Roman jurists, who invented it, in the domain of private law at least. The (Institutes) of Gaius, whereof those bearing the. name of Justinian and produced four centuries later are merely a recension, are still the point of departure for all scientific studies of the law. Among English writers Jeremy Bentham (1748-1832) was the first to bring really scientific methods to bear on the subject. He was followed by John Austin, Sir Henry Maine and others. Thomas Erskine Holland in his (Elements of Jurisprudence,) which first appeared in 1880, and whose ar¬

rangement of the topics and definitions have been followed herein, has set forth the sub¬

ject in an exhaustive yet very compact form.

Bibliography — Austin, John, jurispru¬

dence or the Philosophy of Positive Law) (5th ed., London 1885 ; abridgment by Campbell, 9th ed., London 1895) ; Bentham, Jeremy, Princi¬

ples of Morals and Legislation (Clarendon Press 1879) ; (Collected Works) (ed. by Bow¬

ring, 11 vols., London 1843) ; Gaius, (Insti-

tutes) (English ed. by E. Poste, Oxford 1890) ; Holland, Thomas Erskine, (Elements of Juris-

prudence) (11th ed., Oxford 1910); Lee, Guy Carleton, (Historical Jurisprudence) (New York 1900) ; Maine, Henry Sumner, (Ancient Law> (with introduction by Theodore W.

Dwight, New York 1888; ed. with notes by F.

Pollock, London 1906) ; Parly Law and Cus¬

tom > (London 1883) ; Markby, W., (Elements of Law) (6th ed., Oxford 1905); Pollock, F., (First Book of Jurisprudence> (2d ed., London 1904) ; Salmond, J. W.,

Stephen Pfeil.

JURUA, zhoo-roo-a', a tributary of the Amazon rising in the Andes of Peru and flow¬

ing northeast through Brazil toward the Ama¬

zon, which it joins at Fonteboa after a meander¬

ing course of 1,200 miles, about one-third of which is navigable. The country along the greater part of its course is subject to great floods during the rainy season. The vast dis¬

tricts of the upper waters of Jurua and its many tributaries have been little explored ; and some of it is still unvisited by white men.

JURY, 12 impartial men, legally competent to act, who, under the sanction of their oaths, determine by their unanimous verdict the inno¬

cence or guilt of the accused in a criminal trial, or decide the issues of fact which are contested between plaintiff and defendant in a civil trial.

The jury is the characteristic feature of English or common law, distinguishing it from the systems of continental Europe derived from the law of the Roman Empire. It is peculiar in itself and incidentally it has produced charac¬

teristic developments of our law not found in the Roman or civil law systems, of which per¬

haps the most noteworthy is our law of Evi¬

dence. The history of the jury system has been most thoroughly and ably investigated, especially in recent years.

Its function has completely changed. Orig¬

inally those persons from the vicinity who had knowledge of the subject matter were sum¬

moned to court to state, upon their solemn oaths,

what the common opinion of the neigh¬

borhood was as to those facts which formed the basis of the criminal charge to be tried, or the basis of the right to possession or enjoy¬

ment of land which was at issue, which were the typical cases of early days. It seems to have been soon established that 12 substantial men were a sufficient number to determine this question. As the judicial system developed, JURY

courts came to have more extended territorial jurisdiction, and litigation grew more exten¬

sive. Attendance of 12 persons acquainted with the facts of each cause to be tried would im¬

pose an intolerable burden upon the commu¬

nity, and our forefathers worked out the plan of submitting their legal controversies to the decision of an impartial jury sworn to deter¬

mine the facts in issue upon testimony given under oath by witnesses summoned by the parties.

Students of English and American history would probably unanimously agree that as a part of our system of civil government the jury has been a valuable institution. There can be no doubt of its educational value, and of its importance in making each freeholder who served on a jury feel that he was individually performing an important public duty. Juries played a conspicuous part in defense of popular rights against attempts at tyrannical exercise of authority by the executive government. In the libel cases of the 18th century the contest was bitterly fought, the judges, under the lead of Lord Mansfield, maintaining that whether a document was libelous or not libelous was a question of law for the court (that is, for the judge) to determine, the jury being limited to finding affirmatively or negatively the fact of publication; while the

juries, on the other hand, contended for their right to find general ver¬

dicts (®guilty® or <(not guilty®). The contest was settled by Fox’s Libel Act in favor of the right of the jury to determine the guilt or inno¬

cence of the accused.

Students of law differ as to the merits of the jury system. Arguments drawn from the supposed mental inferiority of juries need not be considered, since this is not an inherent defect, and there is no more reason why a com¬

munity should have inferior jurymen than in¬

ferior officials of any other class. But weighty objections of an essential character have been suggested. The chief is as to the requirement of an unanimous verdict, which, it is argued, must constantly produce a disagreement and failure to reach a conclusion, or the sacrifice of opinions conscientiously held by some of the jurors. There is no doubt that this require¬

ment is an essential feature of the jury system as known to English law ; it has been expressly so decided by the Supreme Court of the United States Which, in interpreting the cl use of the Federal Constitution which provides that in civil suits in the Federal courts <(the right of trial by jury shall be preserved,® has held that this requires the unanimous verdict of 12 men. A small number of the State' have modified the system by providing for juries of less than 12, or of verdicts rendered by a vote less than unanimous. When such legislation is not in conflict with the State constitution it is lawful, as is doubtess the provision authorizing the service of women on juries.

Another objection is the doubt as to whether the jury is the best means of arriving at deter¬

minations of fact. This controversy has been bittery fought, one side maintaining that the jury is not

fitted, either by training or capacity, to decide fairly and intelligently doubtful ques¬

tions of fact, and that one of its most import¬

ant functions, that of assessing damages, is not properly performed, especially where the re¬

quirement of unanimity necessarily leads to compromise verdicts. On the other hand it is argued that the jury, if properly drawn, rep¬

resents the average intelligence of the com¬

munity, and that when it does so, no fairer tribunal can be discovered, and not, perhaps, very consistently, that in civil matters control of the case is really in the judge, who by care¬

ful instructions can usually so direct the jury as to bring about an intelligent verdict, or, as a last resort, can set aside one which is clearly wrong, and award a new trial.

A verdict of acquittal in a criminal proceed¬

ing finally disposes of the charge against the defendant both by the common law and, in this country, by the provisions of the Federal Con¬

stitution (and of most, if not all, of the State constitutions) that no person shall (

trine was discussed by Chief Justice Mitchell, of Pennsylvania, in a capital case in 1891, and pronounced by him to be ((unsound in every point of view, historical, logical, or technical,®

and in 1895 the Supreme Court of the United ^States (speaking by Mr. Justice Harlan) reached the same conclusion and held that in the courts of the United States it is the duty of the jury in criminal cases to receive the law from the court, and to apply it as given by the court, subject to the condition that by a general ver¬

dict a jury of necessity determines both law and fact as compounded in the issue submitted to them in the particular case. Mr. Justice Gray filed a long and able dissenting opinion concurred in by Mr. Justice Shiras, and in this case, reported in 156 United States Reports (page 51), all the arguments on both sides can be found.

The grand jury is, historically, a sort of representative committee of the people of the district throughout which the jurisdiction of the court extends, charged with the duty of report¬

ing to the court offenses which have been com¬

mitted which they consider should be inquired into, and persons whom they believe to have committed criminal acts for which they should be punished. Its development into the modern grand jury is not well understood. The highest authorities on our early legal history say of it, <(The details of this process will never be known until large piles of records have been system¬

atically perused. This task we must leave for the historian of the 14th century.®

The grand jury as an existing institution consists of a number of persons drawn from the same class as the ordinary or petit jurors. At the common law the number summoned was 23.

They are sworn to the faithful discharge of their duties, and the court then delivers a charge to them, calling their attention to the duties they are to perform, either generally or with reference to any matters of special public in¬

terest falling within their jurisdiction to which the court thinks proper to direct their attention, and they can then proceed to business. All in¬

dictments are submitted to them and, according 262

as they determine, after hearing the prosecutor's evidence, whether they are well founded or not, they endorse them ((true bill® or <(ignoramus®

(or equivalent words). In the former case the accused is held for trial, in the latter dis¬

charged. It is the custom for them to make report to the court on such matters as seem to them of public interest and importance, and to make such recommendations as seem good to them. The report made by them of any offense from their own knowledge or observation, with¬

out a bill of indictment laid before them, is called a Presentment. See Verdict.

For the history of the origin and develop¬

ment of the j.ury, consult Pollock and Mait¬

land, 'History of English Law) (Boston 1899) ; Thayer, 'Preliminary Treatise on Evidence at the Common Law> (chaps, ii-iv, ib. 1898) ; Stephen, Commentaries on the Laws of Eng¬

land) (Bk. V., ch. xiv) ; Stubbs, Constitutional History of England> (Oxford 1883) ; Cooley, Constitutional Limitations) ; Lesser, develop¬

ment of the Jury System) (1893) ; Forsyth, Trial by Jury); Edwards, G. J., Che Grand Jury Considered from an Historical, Political and Legal Standpoint) (Philadelphia 1906) ; Hamilton, T. F., (Handbook for Grand Jurors) (Albany 1906) ; Sackett, Frederick, 'Instruc-

tions to Juries) (3 vols., Chicago 1908) ; Train, A. C., Che Jury System: Defects and Pro¬

posed Remedies) (Philadelphia 1910). For a discussion of the merits of the institution under modern conditions which is generally accepted, as full and impartial, consult Che System of Trial by Jury,) by the late Mr. Justice Samuel F. Miller (21 Amer. Law Review, 859). For the origin of the grand

jury, Pollock and Mait¬

land, (History of English LaW) (Bk. II, ch. ix, § 4).

John Douglass Brown,

Attorney at Law , Philadelphia.

JURY, a temporary contrivance employed to replace some oart of a ship which has been lost or disabled. The word is supposed to come from the old French mast d'ajuirie (helping mast) ; but its origin, is uncertain. The terms jury mast, jury rig, jury rudder, jury anchor all designate temporary structures. The word is usually used as an adjective.

JUS GENTIUM, jus jen'shi -um, a term

which, in its broader sense, means international law. Among the Romans the flaw of nations®

was used with a very wide application, including the laws observed by the civilized nations with whom they came into contact, that is, had rela¬

tions with. It extended not only to diplomatic but. also. to commercial relationships. At a later period jus gentium became restricted' to the rules and regulations observed by independent governments in their dealings with each other.

See Civil Law; International Law; Jus

Naturae.

JUS NATURiE, or NATURALE, natural

law, the principles believed to be common to all minds and necessary to 'the comfort and prog¬

ress of humanity. The Romans sometimes con¬

founded the jus naturae with the jus gentium, or law of nations (q.v.). The Stoics developed the. idea of the jus naturae as an altogether ethical conception

to designate the law as it should be for the benefit of humanity as con¬

trasted with the law as it existed with its many imperfections and injustices.

JUS PRIMiE NOCTIS, the privilege

granted to other persons than the husband to cohabit with the bride on the first one or several nights after the wedding. That such a custom existed there seems to be plenty of evidence; but that it was ever a law of tribes, peoples or nations is, at least, unproved. That there was a time in the history of humanity when the marriage custom did not exist and men and women cohabited promiscuously

seems almost certain, and it may be that the custom of jus primse noctis was a survival of this more primitive condition of human society.

There is considerable evidence to prove that this right was allowed and exacted among certain savage tribes, the favored persons being the high, priests and chiefs. In most cases the conditions of society where this privilege pre¬

vailed permitted a husband to have as many wives as he could support. In general, as a race advanced in civilization and culture and monogamy became a fixed institution the cus¬

tom of jus primse noctis became more and more frowned upon. Consult De Labessade,

JUS RELICTiE, in Scots law, the share of the widow in the movable property of her husband after his death, amounting to one-third if there are surviving children or grand-chil¬

dren and to one-half if there are none. The husband by will could not take this share away from the widow, but by express contract she could accept an equivalent provision. However, if the husband dies insolvent, the creditors must be paid in preference to the widow.

JUS.SERAND, zhuV-raii', Jean Adrien

Aubm Jules, French philologist, historian and diplomat : b. Leon, 18 Feb. 1855. He graduated in law and, entering the diplomatic service in 1876, he became legal adviser to the French embassy in London in 1887; Minister to Den¬

mark in 1898; and Ambassador to the United States in 1902. He is vice-president of the Historical and Literarv Society of France, Grand Officer of the Legion of Honor and Corresponding Fellow of the British Academy.

Among his published works are

decesseurs immediats de Shakespeare) (1878) •

(Les Anglais au Moyen Age) (1884) •

sador at the Court of Charles IP (1892); /ioS? pee(TTmystique de William Langford) 5 onf 1 s t o me du peuple Anglais) (3 vols., 1895-1909). His 'History of the English in the Middle Ages,) which was crowned by the rrench Academy, was translated into English under the title of (English Wayfaring Life m the Middle Ages) (1889) by Lucy T. Smith; and the (Roman Anglais) was also translated into English by Miss E. Lee in 1890. In 1913

he published (Ronsard.)

JUSSIEU, zhu'se-e', Laurent Pierre de,

a French writer: b. Villeurbanne, 1792; d. 1866.

A nephew of Antoine Jussieu and grand¬

nephew of Joseph, Bernard and Antoine (the elder) de Jussieu, he inherited much of the talent of his illustrious ancestors. After the Revolution of 1830 he became secretary-general of the Seine and in 1839 a member of the JUSTE — JUSTICE

Chamber of Deputies. After the fall of Louis Philippe he retired to private life. He was a strong and consistent advocate of general pri¬

mary instruction and fought for the extinction of illiteracy from among the French laboring classes. He wrote extensively for the public press and published numerous educational works that had wide circulation and extended influence. Among the latter are { Simon de Nantua) (Paris 1818), which has been pub¬

lished many times and in all kinds of edi¬

tions and translations into several foreign lan¬

guages ; (L'Abbe Gauthier, de Montegre, Mo¬

reau de Saint Mery et Mesnier) (Paris 1819) ; (Le village de Valdore) (Paris 1820) ; An¬

toine et Maurice* (Paris 1821), which was crowned by the Society for the Improvement of Prisons; (Expose analytique de l'Abbe Gau-

thier) (Paris 1822) ; (Pierre de Gi'berne) (Paris 1825) ; (GEuvre Posthumes de Simon de Nan-

tua) (Paris 1829), which won the Montyon prize of the Academy; (Les Petits Livres du pere Lamp (6 vols., Paris 1830-42) ; (Fables et contes en vers) (Paris 1844) ; (Cloud Gran-

gambe) (Paris 1854).

JUSTE, zhust, Theodore, Belgian his¬

torian: b. Brussels, 11 Jan. 1818; d. August 1888. He was secretary of the Belgian Board of Education and as such made many beneficial changes in the national methods of instruction.

He was a prolific writer on Belgian and French history, the most noteworthy of his works being (Histoire elementaire de la Belgique *

(1838) ; (Histoire de la revolution Beige de 179CP
(1846) ; (Precis de l'histoire du moyen age*
(1847-49) ; (Le soulevement de la Hol-

lande en 1813, et la fondation du royaume des Pays-
Bas) (1870); (Guillaume de Taciturne'

(1873) ; (Leopold I et Leopold II, rois de Beiges*
(1878) ; (Les fondateurs de la Mon¬

archy Beige > (27 vols., 1865-81) ; (La revolu¬

tion de juillet, 1830) (1883), etc.

JUSTI, yus'te, Ferdinand, German writer and philologist: b. Marburg, 1837; d. 1907.

Educated at Gottingen, he became professor of comparative philology in his native town in 1865. There he devoted his time to the study of Oriental languages. Among his published works are (Ueber die Zusammensetzung der Namen in den indogermanischen Sprachen*

(1861) ; (Handbuch der Zundsprache) (1864) ;
(Geschichte des alten Persiens* (1879) ; (Dic-

tionnaire Kurd-f rangaise* (1879) ; (Kurdische
Grammatik) (1880); (Geschichte der Oriental-

ischen Volker im Altertum) (1884) ; Hranisches
Namenbuch* (1895); (Hessisches Tractenbuch*

(1900) ; (Geschichte Irans von den altesten Zeiten
bis zum Ausgan der Sassaniden.*

JUSTICE (French, justice, Latin, justitia), one of the cardinal virtues of the Greeks and the Romans. It seems to have been a person¬

ification of social and moral duty, that is, of the moral law, which might or might not cor¬

respond with the temporal law. Justice was the highest idea of the correct bearing of all the members of a community to one another and of the law

of the state to the. individuals constituting its population. An action or con¬

dition might be legally right and morally wrong, as the holding of slaves, the torturing of pris¬

oners taken in war, the exactions often made by the ruling classes upon the peasantry the persecution of the members of one sect by those of another. The customs, conditions and laws of states and communities change with the changing times; but Justice remains the same in all ages and among all peoples, since it is based neither upon man's conception of what justice really is nor upon his administration of what he calls justice, but upon the intrinsic and inherent rights of all, born of the social equalitv of all before the law. Thus the ancient conception of justice, carried to its natural conclusion, was purely democratic ; and among the philosophers it maintained this complexion even in the most autocratic periods in the life of Greece and Rome. But as the conception of Justice as one of the graces was largely academic, autocracy had little to fear from it. Yet to this per¬

sistent personification of Justice later democ¬

racy owes much of its ability to state concisely and clearly its position as champion of the rights and obligations of humanity as a whole.

The conception of absolute justice as the secur¬

ing to humanity security of possessions, free¬

dom of action and the right to realize expecta¬

tions in so far as these do not conflict with similar rights and privileges of the community as a whole is not new. It is as old, at least, as the struggle of the upper and the lower classes in Rome, and probably much older; but it has remained for the present age to analyze more closely the attributes, functions and field of action of ideal justice, which, from the very fact of its being ideal, is never fully attainable, since there is and cannot be

any such a thing as absolute justice, the adminis¬

tration of which would presuppose absolute. per¬

fection in the human race. Justice, as an ideal virtue (or as the personification of such), is therefore an aim in the administration of the law to be continuously striven for with the hope of getting constantly nearer to it; but also with the moral certainty of never ultimately reaching it in this world. See Ethics.

Bibliography. — Alexander, (Moral Order

and Progress) (London. 1899) ; Albee, (History of English Utilitarianism) (London 1902) ; Aristotle, (Nicomachean Ethics* (Peters' trans¬

lation, London 1881; Willdon's, London 1897); Hegel, (Philosophy of Rights) (London 1896) ; Hobbes, (Human Nature* (1650); Hume,

(Treatise of Human Nature* (1740) ; < Enquiry Concerning the Principles of Mora.ls* (1751); Plato, 'Republic* (Towett's translation, London 1893) ; Santavana, 'The Life of Reason) (New York 1905) ; Sidgwick, (The Methods of Ethics >

(Oxford 1893) ; Spencer, Principles of Ethics*

(London 1879-93) ; Sutherland, 'Origin and Growth of the Moral Instinct* (London 1898) ; Westermarck, 'Origin and Development of Moral Ideas* (London 1908).

JUSTICE. John Galsworthy's play 'Jus-

tice> belongs to that imported school of drama that found some lodgment in England and America during the .first years of the 20th century and accompanied the movement for re¬

pertory theatres to play to the few rather than to the many. While it deals with English characters the spirit and the manner of attack are characteristically continental. In no respect does

this play nor the class to which it belongs connect with the historic strains of the Eng¬

lish theatre. This isolation from English man¬

ners and molds of thinking in the theatre is revealed as much in the extraordinary technical 264

and moral honesty of the work as in its diver¬

gence from conventional British themes. As a novelist Galsworthy had been influenced in turn by French and Russian schools of literary man¬

ners. From the first he derived a certain schol¬

arly detachment, a certain lack of heat in deal¬

ing with pregnant topics; from the second a brooding note of high cosmic seriousness.

Clearly as he sees facts, and few modern writers are better students of detail than he, Gals¬

worthy is most interested in the truth behind the facts. The pressure of larger issues gov¬

erns the plots of most of his novels and all ot his plays, and provides the explanation of that <(locked® type of the tragedy of footless discontent that he has written so much. In the handling of the characters, in the display of the petty lives of infinitesimal men and women working under the sway of mighty forces the play is like many of Hauptmann’s. In attack¬

ing a code of justice it is like Brieux’s

sage does justice* command a large audience.

This fact should not blind us to the unusuai claims of the play for high consideration as a stage work. For sheer vividness of unlit¬

erary appeals, for the power to project an im¬

pression without words and even without move¬

ment, for the power to turn the glass on nature and make even dull hours intense with interest the play takes high rank. There can be no question as to the effectiveness of the author's artistry. Whether his general theme has the relevancy he attaches to it may be open to ques¬

tion.

Theatre under the direction of Granville Par¬

ker, 21 Feb. 1910. It 'has often appeared in the repertories of "new® theatres, and was given a distinguished production in 1916 in New York city. Consult Dukes, A., (Modern Dram¬

atist^ (1912); Herford, C. H,

Thomas H. Dickinson.

JUSTICE, Department of, in the United

States, an executive branch of the government, the supreme head of which, the Attorney-Gen¬

eral, is appointed by the President and con¬

firmed by the Senate. He is a member of the Cabinet, according to the provisions of the Act of Congress of 19 Jan. 1886, ranking fourth, after the Vice-President, in the line of suc¬

cession to the Presidency in case of a vacancy in that office, and his salary is $12,000 a year.

The office of Attorney-General was estab¬

lished in 1789, almost at the beginning of the government, being provided for bv the great act that established the Federal courts, but the Department of Justice was not organized into a separate department nor placed under the charge of the Attorney-General until 1870, when by the act of 22 June of that year the estab¬

lishment of this department brought under his control all United States district attorneys and marshals and secured uniformity in the trial and prosecution of cases. By this act the so¬

licitors from the Interior, Navy and Treasury departments and the examiner of claims of the State Department were also brought under the control of the Department of Justice.

As head of the Department of Justice, the Attorney-General is the chief law officer of the government, is the legal adviser of the Presi¬

dent on any questions of law which may arise in the conduct of administrative affairs, and is also required by statute to give his advice and opinion, when requested, to the head of any executive department on any question of law arising in his department. The Attorney-Gen¬

eral represents the government in all cases at law to which it may be a party, but he rarely argues the case in person, this work 'being per¬

formed by. his subordinates, whom he appoints, or by special counsel whom he is authorized to employ in cases of especial importance to fhe government. The Attorney-General passes upon the validity of the title to public lands or other property to be purchased bv the govern¬

ment for the erection of public buildings or for other public purposes; he also exercises general superintendence and direction over the attorneys and marshals of all the districts in the United States and the Territories as to the manner of discharging their respective duties, and makes an annual report to Congress on the business of the Department. The supervision of the penal and reformatory institutions of the United States, the supervision of the revision and cod¬

ification of the criminal and penal laws, the recommendation of judicial appointments, the

administration of the national bankruptcy laws, investigation of applications for clemency, etc., are other duties which come under' the direction of the Department of Justice. Two assistant attorney-generals were provided for in 1868 — one of whom was placed in the Supreme Court, the other in the Court of Claims. There is also an assistant for the Interior Depart¬

ment, one for the Post-Office Department, and one to handle Indian depredations claims.

The solicitor-general, whose office was cre¬

ated in 1870, ranks as second officer of the Department of Justice; takes the place of the Attorney-General in the latter's absence, and also has charge of the conduct of cases in the courts at Washington.

JUSTICE, Legal, a term used in two

senses, one of which makes it equivalent to the justice meted out by the administration of the law, and the other of which considers it as the equivalent of the moral right in a question at issue, irrespective of the attitude taken by the law itself or its administrators. A decision may be,. and sometimes is, legally correct, but morallv unjust. In this latter sense there is a survival of the classical idea of justice personified as a cardinal virtue. Legal justice, in adjudging a case, is required to take into consideration all the. facts . and circumstances in the case and their bearing upon one another and upon the in¬

dividuals and rights and other matters con¬

cerned in the legal decision or decree. All this must be done in conformity with the law and its particular bearing on the case. The object of the law is to do justice to the individual while protecting the community as a whole.

Through its inflexibility the law may occasion¬

ally work a hardship upon the individual. This

is because it is finite and the ever-changing con¬

ditions of humanity are infinite. The tendency ot the whole body of the law is gradually to provide a fuller and freer administration of justice to the members of all classes of society.

But one of the troubles in the administration of strict legal justice is the fact that the various parts and sects of society have, more especially in the past, had a tendency to be notoriously unjust to one another. The upper classes have exploited the ignorance and impotence of the lower classes. In modern times men with vast capital at their command have been able to secure legal decisions that were not conducive to the general good of the community and which worked hardships on individuals. Under the shadow of the law powerful financial concerns have driven weaker ones to the wall and made their possessions their own in as joyfully a freebooter's way as the barons of the Middle Ages gathered to themselves, by the sovereign right of might, the possessions of their neigh¬

bor, including his men-servants and his maid¬

servants. Legal justice aims at administering right to all; but the imperfection of its ma¬

chinery makes the attainment of these aims not always possible. The law has within in itself the power to remedy the evils inherent in itself.

This makes possible the continuous improve¬

ment in the administration of justice. See Law; Jurisprudence; Justice.

JUSTICE, Lord, a person invested with

royal authority in England for limited purposes and

for a short period, during the absence of the monarch. The practice has entirely fallen into desuetude. Queen Victoria and her suc¬

cessors have never appointed lord justices in their absence ; George IV was the last king of England to do so. The powers of lord justices have been confined to pardoning or reprieving convicts, summoning or proroguing Parliament, disposing of treasury funds, and making Church preferments. In the absence of the viceroy from Ireland lord justices have sometimes been appointed to perform his functions.

JUSTICE, Lord Chief, the title of the chief judge of the King’s Bench division of the High Court of Justice in England. Before the abolition of the Common Pleas division of the High Court in 1881 the title lord chief justice was also used to designate the chief judges of the latter.

JUSTICE OF THE PEACE, minor

magistrates in English-speaking countries ap¬

pointed to keep the peace in the jurisdiction to which they are assigned. In England these officials are appointed by commission of the Crown, by act of Parliament, or by char¬

ter, with well-defined duties ((to keep all ordi¬

nances and statutes for the good of the peace, and for the good rule and government of all the people.® In the United States, in some cases justices of the peace are appointed by the executive, in others they are elected by popular suffrage. . Their powers, and . duties differ somewhat in the several jurisdictions, but in general they have jurisdiction in minor civil and criminal cases, their powers being ex¬

pressly defined by statute. They also conduct a preliminary inquest or examination of offen¬

ders charged with felony and hold such for the upper

court, bail being allowed in nearly all cases except murder, Consult Baylies, E, (cd.) , (Bender's Justices Manual of Civil and Criminal Law and Practice for Justices of the Peace and Police Justices in New York) (3d ed., New York 1913) ; and Haines, E. M., Prac¬

tical Treatise on Powers and Duties of Justices of the Peace and Police Magistrates) (16th ed., Chicago 1905).

JUSTICES' CLERK, an officer in Eng¬

land who assists the justices of the peace. He is always a lawyer and generally has much in¬

fluence owing to the fact that many of the justices of the peace fall short of the require¬

ments of their office in so far as familiarity with the law is concerned. Though the justices'

clerk is not looked upon as a public officer, he has a certain legal standing and is permitted to collect fees for the business of his court.

JUSTICIARY, High Court of, the su¬

preme criminal court of Scotland, having au¬

thority to try all crimes except those excluded by statute. It is said that decisions of this court are not subject to appeal or review, but it is probable that the House of Lords could hear an appeal on a question of law. The lords of judiciary hold circuits twice a year, there being three circuits, the northern, southern and western.

JUSTIFICATION. Under this head fall

many intricate problems toward the solution of which theology contributes in its discussions of that very abstract subject: Grace. The term explains itself and no matter where it is applied the fundamental idea is the same and means pardon, acquittal, readjustment, restoration.

In divinity it aligns' itself very closely with atonement and imputation (q.v.). No matter how opinions may differ as to its nature, there is agreement on this, that justification may be defined as that process whereby fallen man is forgiven his transgression and restored as much as is compatible with his changed condition to the state and privileges which were his before his disobedience. All Christians admit that this repristination came and comes through Christ.

It has been and is the duelling ground of the two religions which have most largely divided the world. Relating to this topic the attitude of Catholics and Reformers is antipodal. The leader of Protestantism is clear in his affirma¬

tion. Catholic teaching and dogmatic enuncia¬

tion is not one whit less positive. The question is cardinal for both. In the process of justifica¬

tion the agent is God through Christ ; the ob¬

ject, man. The crux of the difficulty is how does God effect it and how is man affected by it. Is righteousness imparted or infused?

Luther and his disciples consider justification as imputed to the individual. This restored con¬

dition is something outside himself, with which he has nothing to do. ((The justified man is not only acquitted as innocent but regarded as having perfectly obeyed the Law in the person of Christ. There is to him the non-imputation of sin and the imputation of righteousness.®

<(The faith doth not shut out repentance, hope and the fear of God in every man justified, bur it shutteth them out from the. office of justify¬

ing.® (Church of Eng. Homily). It becomes imperative for every attempt to solve this prob¬

lem to consider man’s will and divine grace.

Luther apprehensive lest by anv concession he might minimize the value of the latter denied free will in human nature and asserted that by 266

faith, a strong faith in the special mercy of God, and by that alone man was justified. To use his own words (Cap. 2 ad Galat.) : (

Faith does not cause justice in any way — it is not the cause but the organ of justification.

Man is in no way intrinsically affected by it and its essence is in the imputation of the justice of Christ. Calvin referring everything to the elect teaches that faith once received can never be lost, that is, a man justified is so forever, inde¬

pendently of his actions. Baptism is not neces¬

sary for salvation. The predestination of the elect is their salvation. The breaking up of Protestantism into the many denominations which now exists necessarily brought variants in this doctrine, yet it may be put down as the generally accepted formula. The idea was not new if we are to credit what Saint Augustine says (De fide et oper. 14) wherein he remarks that even in the time of the apostles some, not understanding, concluded from the epistles of Saint Paul that faith alone was necessary for salvation, whereupon Peter, James and Jude wrote to instruct the faithful that such was not the meaning of Saint Paul's words. The Cath¬

olic theology has been reproached with em¬

phasizing the worth of man's works to the detri¬

ment _ of divine grace. The doctrine of Cath¬

olics is that Pope, councils, the fathers, the doc¬

tors and the apostles, and hence Christ, affirmed that justification is of a nature to require, ex¬

cept in infant baptism, good works on the part of man to ripen unto salvation. Faith alone will not suffice. It is gratuitous and unmerited save through Christ. It is supernatural. It is a created gift and when bestowed, as in justifi¬

cation, the recipient becomes inherently just, not accidentally nor vicariously. Initial justifi¬

cation is infused in baptism, which sacrament incorporates the one baptized into and with the mystical body of Christ, his church, and lives by grace, which is living of the life of Christ as an engrafted branch lives the life of the vine. In this incorporation, since Christ is Son of God, is founded the adoption and heirship of the baptized as sons of God. What is said of baptism is held concerning justification as administered by the other sacraments. It is not contended that by it sin is blotted out "his¬

torically/0 that is, sins committed do not cease to be part of man's past, but are remitted inas¬

much as they are provocative of God's anger and as truly pardoned as if the sinner had never rendered himself guilty of them; they are effaced in the moral order and in the physical order the stains they leave on the soul are washed out, stains which make the soul dis¬

pleasing to God. Natural powers, no more than the Mosaic law, •suffice for salvation which is to be reached through Christ only and for which in the adult some disposition of his own con¬

tributing is requisite. Moreover, while by justi¬

fication sin is remitted, this remission calls for an interior disposition and renovation of soul, whence justification is a quality superadded to the soul to which it is inherent and therefore is more than transference or imputation. The fruits of justification are the rendering of man pleasing to God, just, beautiful, like unto Christ, a living

member of Christ and God’s son by adoption, heir to the kingdom of heaven, a participant in the divine nature (Consors divines natures) and capable of condign merit.

When a man is justified there is within him a special indwelling of the Holy Spirit. There is no understanding with accuracy these different theories of justification save by a thorough in¬

quiry into the views of theologians on the very abstruse questions of the incarnation and grace.

Bibliography — Denziger, (Enchiridion > ; Humphrey, (The One Mediator) ; Mohler,

(Symbolism*; Newman, justification*; Oxen-

ham, (The Catholic Doctrine of the Atone¬

ment ; the works of Luther, Melanchthon, Cal¬

vin, etc.; Decrees of the Council of Trent; Systematic Theologies; Art, Rechtfertigung, Kirchenlexicon.

Patrick A. Halpin,

Late Professor of Ethics, New Rochelle College.

JUSTIFICATION (Latin, justification

justification), a defense in a civil or criminal action showing that the defendant was legally justified in doing what, it had been admitted in court, he did do, and that, therefore, the alleged cause of action is not legally sufficient. All the facts to be used in the justification must be legally set forth as such and as constituting an answer to the action; and the conclusion to be drawn therefrom depends upon those having the legal power of decision in the case. The presentation of facts of justification is common in cases of accusation of crime. A man ac¬

cused of homicide may plead that the act was

committed in self-defense, or in the execution of the law by an officer of the law or his aiders or . assistants. A policeman may plead that he killed a man to prevent his escape or because he showed fight, or because he refused to surrender when called upon to do so. An automobile driver may defend himself against an action for homicide on the ground that he had taken all possible care, that he had not ex¬

ceeded the speed limit and that the death of the party in the case was due to his own care¬

lessness, or to some accident or condition over which the accused had no control.

JUSTIFICATION, or PROOF BY

SURETIES, is a term employed in the legal action taken by the said sureties on a 'bond or undertaking to prove that they possess the requisite legal property qualifications.

JUSTIN (Marcus Justinianus Tus-

tinus) , a Latin historian, who probably l'ived at Rome in the 2d or 3d century a.d. He made an epitome of the general history of antiquity by Trogus Pompeius, a native of Gaul, who lived in the time of Augustus, and whose work is no longer extant. This epitome, although incorrect in detail, is valuable for its compressed reproduction, of the old histories. The first English version, by Goldinge, appeared in 1574.

JUSTIN I, Byzantine emperor: b. 450;

d. 1 Aug. 527. He was a peasant of Dacia and rose from the rank of a common -soldier to tbe commander of the imperial guard, and on the death of Anastasius .1. in 518 became emperor.

He relegated the civil administration to the quaestor Proclus, and between them the empire was governed with a fair amount of success.

Consult Bury,

JUSTIN II, Byzantine emperor: d. 5 Aug.

He succeeded his uncle Justinian I in 565. . In 574 his difficulties led him to abdi¬

cate, in favor of Tiberius, captain of the guard During his reign northern Italy was conquered by the Lombards, and the Persians took pos-

session of several Asiastic provinces of the empire.

JUSTIN MARTYR (Justinus Martyr),

a Christian apologist and martyr : b. Flavia Neapolis, Shechem, Palestine, 100 a.d. ; d. Rome, 165. He began active life as a professor of Platonic philosophy, and subsequently embraced Christianity without abandoning Platonism. He was a staunch adherent of the Christian party in the empire, a keen confuter of Gnosticism and an unwearied defender of the Christian doctrine of the Logos. In every department of Christian dogmas he stood foremost as a teacher. Event¬

ually he went to Rome (150 a.d.) and during 10 years of activity he wrote his (Apology^

with a supplement known as the (Second Apol¬

ogy, } addressed to the Emperor Marcus Aure¬

lius. He afterward had a controversy with a Jew, an account of which is embodied in his (Dialogue with Trypho the JewP He was put to death for his. faith, and his day on the Church calendar is 31 April. .Consult Migne,

tyrer) ; Aube, (Justin, Philosophe et Martyr*

(1874).

JUSTINA, the second wife of Valentinian I, and mother of Valentinian II. She was successful in her efforts to restore her son to the throne. Her influence was not powerful enough to prevent Valentinian from accepting baptism at the hands of Ambrose, in spite of her sympathy with the Arians and her antip¬

athy for Ambrose.

JUSTINIAN I (Flavius Anicius Justin-

ianus) , surnamed The Great, emperor of the East: b. of Gothic peasant parentage at Taure-

sium, Ulyricum, probably 11 May 483 a.d.; d.

14 Nov. 565. Patronized by his uncle, Justin I, who, from a Thracian peasant, had become em¬

peror, he so flattered the Senate and dazzled the people that he was made consul, and took the title of N obilissimus. On the death of his uncle, with whom he had latterly shared the imperial power, he was proclaimed emperor, and married an actress named Theodora. During his reign the party disputes of the Greens and the Blues became so violent, that in his attempt to quell the tumults the emperor’s own life was in jeop¬

ardy, and a great part of Constantinople was destroyed by fire in 532. Aided by his gen¬

erals, he was able subsequently to restore to the Roman Empire a part of its former possessions, as when Belisarius in 523 and 529 defeated the Persians, and achieved victories in Africa, and when Narses put an end to the Ostrogoth rule in Italy. Turning his attention to the laws, Justinian commissioned 10 learned civilians to draw up a new code, and the result was the (Corpus Juris Civilis, > or body of civil law.

He took great interest in building cities, fortifi¬

cations and churches; among the latter he re¬

built the church of Saint Sophia at Constan¬

tinople. To maintain his public munificence he oppressed the people with taxes. Consult Fin¬

lay, (History of Greece) (1880); Hodgkin, Htaly and her Invaders) (Vol. IV, 1880) ; Bury, (Later Roman Empire) (1889) ; Hutton, (The Church in the Sixth Century* (1897); Gibbon, (Decline and Fall of the Roman Em¬

pire* (ed. by Bury 1896-1900).

JUSTINIAN II, surnamed Rhinotmetus,

Byzantine emperor: b. 669; d. December 711.

He succeeded his father, Constantine IV, in 685, and was deposed and banished for his cruelty, by his general, Leontius, in 695. He re¬

gained his throne 10 years afterward, and was overthrown by Philippicus Bardens and killed.

JUTE. Two species of plants yield the jute of commerce, Corchorus capsularis and C.

olitorius. They are tall shrubs, 8 to 15 feet high, the fibre being produced in the bark, and known as bast fibre. Supposed to be indige¬

nous to India, where the species grows wild, cultivated to a limited extent by other Eastern people, as the Chinese and Malays, C. olitorius is naturalized in all parts of the tropics to the shores of the Mediterranean. Jute was intro¬

duced into the United States by the Depart¬

ment of Agriculture in 1870 (consult various articles in Monthly Reports of department 1870-75), and was found to be adapted to culti¬

vation along the line of Gulf States from Texas to South Carolina. It should be noted that the China jute of commerce is not jute at all, but a similar

bast fibre derived from Abutilon avicennce. This plant was experimented with in New Jersey 25 years ago, though unsuccess¬

fully, the fibre being wrongly called American jute. In India many kinds of jute are rec¬

ognized, all being known under local trade names, which are unimportant here. The value of jute as a textile lies wholly in its fineness, silkiness and adaptability to spinning, low cost of the raw material being another advantage.

Several American fibre plants classed as weeds yield a better, whiter and stronger fibre, though they cannot be utilized for economic reasons.

(Consult special report on bast fibres, No. 6, Office of Fibre Investigations of Department of Agriculture). The fibre of jute, compared with other textiles, is quite inferior, the bleached filasse soon losing its whiteness and becoming a dingy, dirty brown, while its strength rapidly deteriorates. Nevertheless it may be regarded as one of our most useful fibres — too useful in certain directions, as its fineness and lustre, as well as cheapness, adapt it most readily to pur¬

poses of adulteration, and as it takes colors easily it can be stained or dyed to imitate many of the other fibres, though such frauds can be readily detected. The uses of the fibre are many, and it enters into all classes of textiles from woven fabrics of great beauty to coarse ropes and bagging. In the manufacture of fabrics it goes into curtains, chair coverings, and other forms of upholstery, carpets, webbing, burlap and bagging (especially cotton bagging), and it has been employed for imitation silk fabrics, although for this purpose the fibre re¬

quires a special treatment in order to subdivide it more finely and render it more glossy. The fibre is also made into all kinds of cordage, either honestly, as jute, or as an adulterant, con¬

siderable quantities having been used in past time for the manufacture of binding twine.

It is largely employed for fine and coarse twines, small rope, sash cords, etc., and where cheapness is a desideratum it fills the demand.

The commercial use of jute dates back less than, a century, the first exports in noticeable quantity (about 18 tons) having been made, to England, in 1828. By 1850 the exports had reached 30,000 tons; in 1871, 310,000 tons. Now some 3,500,000 acres are cultivated in jute in India. Both high and low lands are employed

for this culture, although the larger part of the crop is produced upon the (

Twelve to fifteen pounds of seed is the aver¬

age quantity sown per acre, though Spon gives nearly double this amount. In India the yield is about 400 pounds of fibre per acre. Little or no cultivation is given the crop save thinning out where overcrowded. The plants mature in three months and the crop is harvested with a bill hook and sickle at the time when the flowers have begun to show and the seed has not yet ap¬

peared. If the plants are allowed to seed, the fibre will be stronger and heavier, but harsher.

In some districts, after harvesting the stalks are stacked in the field until the leaves drop off, while in other localities stacking is not prac¬

tised. The stalks are sorted as to length into three sizes, and made into bundles that one man can carry. The extraction of the fibre is accomplished by steeping the bundles in stag¬

nant water, covering them with jungle plants, clods of earth or cow dung. When the setting is completed the ryots go into the water waist deep, and by

thrashing the surface of the water with the stalks, assisting the loosening of the bark with the fingers, the fibre is separated from the wood. Afterward it is wrung out and hung upon lines to dry. It is next made into drums of 70 or 80 pounds. If for exporta¬

tion, it is pressed into bales of 300 pounds or over. _ Little may be said regarding jute cul¬

ture in this country. At the low prices which prevail for the imported jute, it is doubtful if it could be made a paying crop. The plant is adapted to cultivation in the United States and produces a superb fibre, but it would not be able to compete with India jute at ll/2 to 2y2

cents per pound. Jute is treated by processes similar to those employed in turning flax into linen. Special machines are used for the vari¬

ous processes, such as heckling, spreading, draw¬

ing, roving and spinning. Hand looms have long 'been used in India for weaving jute.

Since 1857 a great number of jute mills have been fitted with modern textile machinery.

There are now over 60 such mills in India, em¬

ploying over 200,000 hands. The production of fibre is about 4,215,000,000 pounds annually. In 1914 the United States imported 242,711,237

pounds of jute and jute butts, valued at $12,-

273,422. Jute bags were imported to the value of $4,250,000, and other jute fabrics to the value of $38,000,000 in the same year. There are about 33 establishments manufacturing jute products in the United States. These employ 7,000 hands and turn out a product valued at $11,000,000 annually. Consult Special Report (No. 8) office of Fibre Investigation of Depart¬

ment of Agriculture; dictionary of the Eco¬

nomic Products of India> and various Bulletins of the Royal Gardens, Kew, England. See Cordage; Fibre; India.

JUTES, or JUTS, one of the Low German tribes who share in the occupation and conquest of England in the 5th century a.d. They came from the European continent but from just what part of its western coast is not certain.

It has been customary to identify their original habitat with that of modern Jutland. It is contended, however, by some investigators that the Jutes spoke quite a different tongue dialectically from that of the people of modern Jutland, which is Danish. An attempt has been made to identify the Jutes with the Frisians and to thus reconcile the apparently conflicting statements of Bede, who states that the invading tribes of England were Angles, Jutes and Saxons; and of Procopius who as¬

serts that they were Angles, Saxons and Frisians. Modern research has attempted, with more or less satisfactory results, to identify the Jutes, with the roving Low German bands who, spreading over the North Sea and adjacent islands and British coast to the west, took pos¬

session of much of the south of England, parts of the Lowlands of Scotland, the Shetland, Ork¬

ney and Hebrides islands. The same investiga¬

tion identifies them with Teutonic bands that landed, about the same time, on the Irish coast.

Efforts have also been expended in attempting to prove the persistence of the Jute type in southern England and the Lowlands of Scot¬

land to-day, as distinct from other English types, existing or supposed to still exist from the days of the Germanic and other tribal invasions, occupations and conquests. It has been claimed by investigators

that the traditions of the settlement of Jutes around Canterbury in Kent, on the Isle of Wight, and in South Hants are still sustained by the presence in these regions of physical types, in certain ways distinct from those of neighboring districts.

Consult Ripley, W. Z.,

JUTLAND, the peninsular portion of Den¬

mark (q.v.).

JUTLAND BANK, Battle of, the greatest

naval battle in history, also known as the battle of the Skagerrak, was fought in the North Sea on 31 May–1 June 1916 between the British and German fleets. According to the German Ad¬

miralty, the High Sea Fleet was bent on ((an en¬

terprise directed northward® — probably to sup¬

port Hindenburg in the Baltic. There is little reason to believe that it was the German inten¬

tion to challenge the entire, overwhelming naval power of Britain. Admirals Von Scheer and Von Hipper encountered the Battle Cruiser Fleet under Admiral Beatty, who was steaming north to rejoin the Grand Fleet of Sir John Jellicoe. The battle opened at 3.30 p.m.

and lasted throughout the night. Though Ger¬

man reports at first claimed the victory, the lesult failed to raise the blockade and only con¬

firmed the Allied command of the sea. A re¬

markable expose on the battle by Colonel Von Schroeder was published in the New York American on 15 Dec. 1918. See War, Euro¬

pean — Naval Operations.

JUTURNA, Fountain of, a spring at the foot of the

Palatine Hill, Rome, which tradi¬

tion says was named by Jupiter after a water nymph with whom he was in love. The spring or fountain was just south of the celebrated temple of Castor and Pollux, where it is said that these two appeared, in 496 b.c., to announce the defeat of the Latins at the hands of the Romans at the battle of Lake Regillius.

The spring, though neglected and partially filled up, is still active. (See Castor and Pollux-

Nymphs). Consult ITulsen-Carter, (The Ro¬

man Forum) (Rome 1906) ; Macaulay, Ways of JUVARA — JUVENAL'S SATIRES

Ancient Rome>; Virgil, WEneid, XIP ; Wis-

sowa, (Religion und Kultur der R6mer) (Mu¬

nich 1912).

JUVARA, yoo-va'ra, Filippo, Italian archi¬

tect: b. Messina, 1685; d. Madrid, 1735. He was a pupil and follower of Carlo Fontana, but developed considerable individuality. In an age when ornamentation ran to the gro¬

tesque and delighted in the extravagance of Baroque, he led a reaction for more plainness and simplicity. Among the edifices planned by Juvara are a dozen or more in Turin, among them being the Superga church and the Palazzo Madonna ; and the Royal Palace at Madrid constructed for Philip V (1734).

JUVENAL (Decimus Junius Juvenalis),

a famous Roman satirist. The evidence for his life, while fairly abundant, is of so dubious and conflicting a character that it is impossible to reconstruct the poet's career with any certainty.

It is probable, however, that he was born at Aquinum, about 55 a.d., and that he was known during the first half of his life, simply as an accomplished declaimer and rhetorician. After the accession of Trajan in 98, he began to pub¬

lish satires in which, with extraordinary force and indignation, he described the conditions of life at Rome, for the most part as they existed during the reign of Domitian, 81–96. An in¬

scription found at Aquinum records an offering to Ceres by a certain Junius Juvenalis (the stone was broken, so that the first name is lacking), tribune of the first cohort of Dalma¬

tians duumvir quinquennalis of the town, and priest of the deified Vespasian. This man has been generally identified with the poet (cf. ^SatP

3, 319–320), but may be only a kinsman of his.

There is a consistent tradition that he was banished for a number of years because of offense given to an imperial favorite, the actor Paris, but neither the time nor place can now be determined. He was apparently an intimate friend of Martial (who mentions him in three epigrams, VII, 24 and 91; XII, 18), though the two men were widely different in their outlook upon human life. The date of Juvenal's death is not known, but the fifth and last book of satires, comprising 13–16, was published in 128, and he may have lived seven or eight years thereafter.

In the hands of Juvenal, satire becomes al¬

most a new literary type. Horace, who brought to perfection the method and manner of Lu-

cilius, the first of the Roman satirists, says of his art GSatP 1, 10, 9–14) that it aims at terse¬

ness, at a style that changes from grave to gay, that suggests now an orator who is a poet also, now a polished and witty talker who masks his strength. But Juvenal's passionate revolt against the

hideousness of a time of which he could see only the dark side, gives to his verse one unchanging tone. For him satire is invec¬

tive, biting, pitiless and unrestrained, the ex¬

pression of a towering moral indignation. Such humor as there is is always grotesaue or of the grimmest kind. This is true, at least, of the first nine poems, which alone are really satires upon the Roman life that he knew. The re¬

maining seven (the sixteenth is, of course, a mere fragment) are rather moral essays of a general character. He is, however, singularly deficient in power to discriminate. Mere offenses against good taste are classed with atrocious crimes; <(Orestes (unlike Nero) did not mix poison for any of his relatives; he never sang upon the stage; he did not write an epic upon the Fall of Troy» (

Such passages (and they are numerous) have raised at times the question of Juvenal’s sin¬

cerity. But this should not be doubted. He was, on the one hand, swayed by the intense and narrow prejudices of a Roman of the old school ; on the other, his long rhetorical train¬

ing had developed to the utmost an inborn capacity and love for epigrammatic phrase.

The possession of this power, while it some¬

times led him astray, is one of his just claims to greatness. No Roman writer lends himself more admirably to effective quotation; none can describe a scene with more graphic realism.

See Juvenal's Satires.

Bibliography — The best text is the Jahn-

Biicheler (Berlin 1893). There are excellent editions by J. D. Lewis, with a translation (2d ed., New York 1882), J. E. B. Mayor (London, Vol. I, 4th

ed., 1889; Vol. II, 3d ed., 1881); Pearson and Strong (Oxford 1892) ; L. Fried-

lander (Leipzig 1895) ; J. D. Duff (Cambridge 1900) ; H. L. Wilson (New York 1903). Dry-

den translated five of the satires. There is a spirited verse translation by Gifford (London 1817) ; and good prose translations by Strong and Leeper (New York 1882), and S. G. Owen (London 1903). Dr. Samuel Johnson's para¬

phrases of the third and tenth satires in his (London) and (The Vanity of Human Wishes) are deservedly as famous as the originals. Con¬

sult also Durr, J., (Das Leben Juvenals* (Ulm 1888) ; Martha, C., (Les Moralistes sous ['Em¬

pire Romain* (Paris 1865) ; Boissier, G., (La Religion Romaine) (Paris 1884), and ^'Op¬

position sous les Cesars* (Paris 1892).

Nelson G. McCrea,

Professor of Latin Language and Literature , Columbia University.

JUVENALIA (Latin, meaning youthful),

the private scenic games which Nero estab¬

lished at Rome to celebrate his attaining his age of manhood (59 a.d.). About this time the Palatine games at the beginning of the year also began to be called Juvenalia, if in¬

deed they had not been so designated earlier as emblematic of the youthful year. The most noted private actors took place in the Juvenalia, among them being Nero himself.

JUVENAL'S SATIRES. The 16 satires

of the Roman poet Juvenal (about 55 to 135

a.d.) were the product of his maturer life.

None of them was with certainty composed before the year 100 a.d. For the most part, they are poems of moderate length, seldom ex¬

ceeding 300 lines. Several are much briefer.

The Satires deal with the social defects of the times, and cover a fairly extensive range of topics. The first satire gives the poet's ex¬

cuse for writing. Everyone else is composing.

Why should not he ! Moreover, whoever con¬

templates the social degeneracy of the day must naturally feel impelled to write in arraignment of existing conditions and tendencies. <(In-

dignation forces composition. w The second satire deals with a phase of sexual perversion more characteristic of antiquity, probably, than of modern times. In the third, Tuvenal de¬

plores the fact that Rome is no longer an en-

durable place of residence for an honest man.

Only he who will lie, cheat, steal, murder, can win advancement in the Rome of Juvenal's day.

Foreigners, — especially Syrians and Greeks —have invaded the capital in such numbers that it is no longer Roman but Greek (non possum ferre, Quirites, Grsecam urbem). Houses are so poorly constructed that they often fall in ruins.

Rent and provisions are high. Conflagrations are common. The noise of traffic has become unbearable; while theft and assault are the order of the day. The fourth satire touches upon the degeneracy of the Senate. In the reign of Domitian, this body had so

deteriorated in dignity, that Juvenal represents senators as¬

sembling in a council of state to discuss the fitting way of serving an unusually large turbot at the imperial table. The fifth satire deals with the trials and indignities of clients or parasites. A large class of dependents had sprung up in the empire, men often of respec¬

table antecedents but now in reduced circum¬

stances. These clients danced attendance on the great men of the day, and in return received a small daily dole of money and an occasional invitation to their patron's table. The studied discrimination of which they are made the ob¬

ject on such occasions is the special theme of the satire. The sixth satire deals with the license practised by a certain class of the women of the day. The seventh bewails the unfortunate lot of literary men. Poets, his¬

torians, orators, rhetoricians, teachers alike are all ill paid, neglected and unhappy. The eighth satire arraigns the pretensions of those who pride themselves on their descent. Virtue alone, says the poet, is true nobility. Noble birth should impose responsibilities, but the nobles of Juvenal's day go on the stage and appear as gladiators in the arena. The theme of the ninth satire is similar to that of the second. The tenth (probably the most famous of the whole collection) is on the vanity of human wishes, — the desire for power, for money, for office, for long life, for beauty.

The emptiness of all these is illustrated by examples. Shall we then pray for nothing?

Yes, «a sound mind in a sound body® (mens sana in corpore sano), a contempt for death, and a willingness to endure toil. The eleventh satire exalts the ((simple life® and country joys.

The twelfth is aimed at the legacy-hunter.

The thirteenth returns to the general degeneracy of the times and pictures the torments of a guilty conscience. The fourteenth emphasizes the contagion of a bad example, especially in the home, and exhorts parents to be worthy of imitation by their children. The fifteenth aims to illustrate Egyptian barbarity by an account of an Egyptian custom. The sixteenth (a frag¬

ment) enumerates some of the advantages of the soldier's life and status.

Juvenal lacks the urbanity of Horace. Con¬

scious of his own rectitude, he is unscathing in his denunciation of the faults of others. At times he almost deserves the name of scold.

Yet his purpose was loftv and he not infre¬

quently rises to great nobility of sentiment and expression. The three satires in which he descants on certain of the more odious forms of vice (2, 6, 9) probably give an entirely incor¬

rect picture of the prevailing morality of the day.

The third and tenth satires have been imi¬

tated in Johnson's (London) and (Vanity of Human Wishes.* A recent translation is that by S. G. Owen (London 1903).

Charles E. Bennett,

Late Professor of Lathi, Cornell University.

JUVENCUS, Gaius Vetticus Aquilinus,

an early Christian poet, generally supposed to have been a native of Spain: b. about 290; d. about 331. His style, which is excellent, and his poetical form, which is classical, show that he must have received an excellent education.

He was a Spanish presbyter and it has been claimed

for him that he was of noble family.

The only work of his known to have survived to the present is his (Historia Evangelica : Ver¬

sus de Quattuor Evangelicis,* which is sup¬

posed to have been written about 330. In this he imitates the best of the Latin poets, with considerable show of originality. In this ver¬

sion the author seems to have made use of both the (Jala) and the original Greek version.

Consult Hatfield, (A Study of Juveneus) (1890) ; Mantius, (Geschichte der christlich-

lateinischen Poesie* (Stuttgart 1891) ; Teuffel, (Geschichte der romischen Literatur* (Leipzig 1913).

JUVENILE COURTS. See Childrens,

Courts.

JUVENILE FORMS, those forms as¬

sumed, in early growth by plants, which are supposed to be similar to the adult forms of an earlier stage in the development of the plant.

See Plants ; Plants, Hybrids in ; Plants, Recapitulation in ; Plants, Structure of.

JUVENILE OFFENDERS. See Chil¬

dren, Delinquent.

JUVENILE WATER. See Ground

Water.

JUVENTAS, the goddess of youth, in Ro¬

man mythology. Her shrine was in the temple of Jupiter, on the Capitol. All Roman young men, on coming of age, paid their respects at the shrine of Juventas, on whose altar they laid offerings. _

Juventas and the Greek goddess Hebe, which seem to have had m'uch the same functions and attributes, and probably had the same primitive origin, became confounded in Rome early in the 3d century b.c., and the tem¬

ple of Juventas, near the Circus Maximus, was dedicated to Hebe, with apparently the same functions and attributes as Juventas (about 218 b.c.) . Consult Wissowa, (Religion und Kul-

tur der Romer* (Munich 1912).

JUXON, William, English prelate, arch¬

bishop of Canterbury: b. Chichester, Sussex, 1582; d. London, 4 June 1663. He was edu¬

cated at Oxford, took orders and after hold¬

ing church livings (in 1609 at Oxford, and then in 1614 at Somerton) in 1621 succeeded Laud as president of Saint John’s College. In 1627 he was appointed vice-chancellor of the university, and about the same time chaplain in ordinary to Charles I, who gave him the deanery of Worcester, and then the bishopric of London (1633). He attended the king on the scaffold. His fidelity cost him his bishopric, but at the Restoration he was made archbishop of Canterbury.

K

the 11th letter in the English and other alphabets of the modern languages of

western Europe.

The character is derived, through

the Greek from the alphabet of the early Phoenicians, where its form is that of K

reversed, q. The k represents the sound pro¬

duced when the back of the tongue is brought into

contact with the palate and the breath expelled. The sound-value of k is the same in all languages ; but k is not employed in the modern Latin languages save in spelling for¬

eign words or names. Nor does it occur in Latin save as an abbreviation (K or Kal.) for Kalendse, K for the name Caeso, or for Car¬

thago, etc.

In English the c of the Latin orthography of words from the Greek is always retained, even when it represents the sound of k, for example, sceptic, pronounced skeptic; and we are begin¬

ning to pronounce ceramic, keramic. We even substitute c for k in Greek words and names, though in reading Greek we give to the k al¬

ways its hard guttural sound ; hence for us Alkibiades is (in sound) alsibiades, and even Kimon is simon.

The k in Greek names suffers a similar change in the modern Latin languages ; but in German speech the true k sound and spelling in such names is retained: Ankyra, not ansyra; Korkyra, not corsyra; Kephalos, not sephalos.

In Anglo-Saxon and in Gaelic the k is always represented by c.

The guttural sound of k seems to have stood unchanged in ancient Greek and Latin, whether represented by that letter or by c ; but in the modern languages derived from the Latin the k sound underwent great changes, becoming a sibilant equal to as ((sezar ,® for Ccesar, or being ((palatized® into the sound tsh, for ex¬

ample, Gr. kyriake, Ger. kirche, Scotch kirk, Eng. church; to produce this change the middle of the tongue, instead of the back of it, is brought into contact with the palate; in French pronunciation the &-sound of c in Latin words, as camera, carbo,

carnalis, is changed to sh, and the words are written chambre, charbon, charnel.

K AS A SYMBOL. It has numerous sig¬

nifications, according to the connection in which it is used. Thus, for instance, K in chemistry stands for kalium or potassium. In heraldry and titulary honors it stands for knight, as for example, K.B., Knight of the Bath ; K.G. Knight of the Garter. In the expression O. K. the K stands for correct or right, in sense at least, whatever be the derivation of the expression itself. K 2 is a sign sometimes used to represent Mount Godwin-Austen, while. Ka, in Egyptian mythology, represents the spirit of the dead.

See Ka.

KA, the spirit of the dead, the second self, which formed a very important part of the religious belief of the Egyptians. Each Egyp¬

tian was thought to possess his own par¬

ticular Ka, which constituted the spirit of his life in the future world where all the in¬

habitants, whether earth-born or heaven-born, possessed each his Ka. To this rule not even the gods were exempt, the Creator of the universe and of men being as much dependent upon (

Every human being, while on earth, according to Egyptian belief, possessed two spirit beings, the Ka, which remained in the future world, and the Ba, which accompanied the body on earth and deserted it at death. The Ba was thought to be the earthly being or soul of man ; and the root form of the word and its significa¬

tion are suggestively like the form and use of the Indo-European root word for being or to be. As the Ba was the essence of life in this world, so was the K,a believed to be the essence of life in the world to come. This is why its possession could not be

dispensed with even by the gods of creation. The Ba and the Ka were, therefore, both used as the symbols of being or existence, each in its own sphere. The substantive or copulative verb to be, though lacking in many languages, is a very pronounced feature of the Indo-European tongues, the race-

possessors of which had early highly developed the idea of the spirit or soul within the earthly body. The similarity between the root be, ex¬

pressing existence, and the Egyptian ba, is very striking, and it becomes still more so when the comparison is made with the various forms of the root throughout all the languages of the Indo-European family. From the Sanskrit bhu it glides into ba and bi (as in Russian bit), everywhere retaining the primitive idea of ex¬

istence. So strongly has this idea persisted that some branches of the family even to-day, as Spanish, for instance, have developed two verbs to express the English (

dition that is limited and dependent upon the idea of existence, but not forming an essential part of it. Thus, man is an animal (El hombre es un animal) expresses a condition of man's existence throughout life, or in other words, of his being. <(The man is in his house® (El hombre estd en casa) expresses only a tem¬

porary condition and one in no way essential to being. It is therefore expressed by the second Spanish verb to be (estar) which is purely locative in use and derivation. These two sentences bring out . strongly, by contrast, the idea of life-long existence and accidental occupation or position. Man exists all his life [2711

as an animal; but he stands (the original root sense of the verb) or is located in his house.

In the second case there is none of the spiritual sense of existence, since the verb expresses sim¬

ply location in time.

The Royal Ka . — The Egyptians carried this idea of relation of time to existence to a con¬

clusion that legitimately followed their belief in the divine character of their sovereigns.

They represented their king as possessing, while on earth, both a Ba and a Ka, ever present in his person. Being of earth, the sovereign must, while on earth, possess his Ba, or second earthly person ; but being, at the same time, the heaven-

born child and the representative upon earth of the divine power, and not having relin¬

quished his heavenly or future-world estate, he necessarily also had to possess his Ka, without which he could not retain his future world connections. This endowing of their sovereigns by the Egyptians with the earthly and the heavenly ((second self,® the Ba and the Ka, throws a light on these two much-disputed terms. The Ba was the breath of earthly life; the Ka was the breath of heavenly or divine life; and the sovereign, forming the link be¬

tween earth and heaven, between the temporal and the divine, could do so only by virtue of possessing the essential animating forces of both. Each dead person was euphemistically said to have ((gone to his Ka? that is, to have died or ^departed this life.® But the sovereign, when he died, was picturesquely said to have gone with his Ka, that is, to have accompanied the Ka to the future world. This shows the popular Egyptian belief that the heavenly «sec-

ond self® never for a moment deserted the heaven-born sovereign, either in the future world from which he had come, or while on his earthly mission, as the heaven-sent ruler of the people. When a mortal left this earth, be he sovereign, potentate,

noble, priest or com¬

mon laborer, mechanic or tradesman, ((his Ba flew away, at death, as a bird,® and the departed went on to take possession of his new <(second self,® or Ka. With the disappearance of this earthly life, sovereign, noble and commoner .

were alike in possessing but one spiritual self.

But, for all that, they were not placed on an equality in the future life; for the king, being of divine origin, returned to the society of the gods from which he had come when he ap¬

peared upon earth. There his earthly rule was transformed into a spiritual one.

Apparently the Egyptians had the idea that the unity of all the kas constituted the vital forces, which they seem to have represented by the plural of Ka. If this interpretation is cor¬

rect. then the Ka would seem to have been closely connected with the granting of life upon earth. Just as it constituted the essence of life in the world to come. The Ka seems to have been able to move about, at will, throughout the uni¬

verse. It was believed to enter the statue of the deceased, to animate it, at times, and to receive the mortuary offerings, or the essence or spirit thereof, which were made in behalf of the de¬

ceased. On accompanying to earth the new-born royal infant and destined future sovereign, the Ka continued to be his guardian and protecting spirit throughout his earthly career. Thus, too, the gods, when they visited the earth, as they were believed to have done in the earlier days of Egyptian national life, came, each accom¬

panied by his Ka.

The Guardian Ka — The Ka seems also to have, in the popular belief, descended from the heavenly regions

to become the guardian companion through life of certain favored beings who were neither gods nor sovereigns, though they would appear to have acquired god-like qualities. They seem to have been the forerunners of the saints in the more modern religions, to whom were accorded pref¬

erential places in the future world on account of their earthly virtues and divine accomplish¬

ments. The presence of the symbol of the Ka was expressive of protection or blessing in the case of the sovereign, a favor not granted to other mortals. Hence the symbol of the Ka seems to have acquired the general signification of good luck or divine favor, just as the swastika or cross of the rain gods was thought to be a potent sign of good fortune. It would seem, therefore, that though the Ka generally remained in the future world, it nevertheless had some influence in the affairs of terrestrial life, if not on all occasions, at least under special conditions. That the Ka was believed to have influence on earth would seem to be further indicated by the fact that it was cus¬

tomary, in Egypt, to erect «Ka Chapels.®

Khnemu-hetep, so a surviving record states, built a Ka chapel to the memory of his royal father and appointed to take charge of it a ((priest of the double,® endowing both priest and chapel richly with lands and servants and pro¬

viding for regular stated offerings for all time to come. The symbol of the Ka was inscribed prominently on the standard of this same filial and pious sovereign, perhaps as a talesman, or as a symbol of his divine origin. The kings of Egypt possessed several names, one of which was known as their «Ka® or "banner® name.

This signified that they were the representative on earth of Horus. It seems to have been cus¬

tomary m Egypt to pray to the «Ka» or soul of the

king which was believed to take a special interest in the accomplishment of all that per¬

tained to the work and glory of the sovereign.

Una (one of the most trusted and capable of the "royal servants® of Pepi I) a noted soldier and administrator (about 3233 b.c.) states ex¬

plicitly that he was able to work efficiently for the glory of his king and to perform the great and many duties confided to him "because he prayed unto the (Kas y of the king more than to any other god and, for this reason, every¬

thing happened as it had been commanded to happen by the double or Ka of the king.® Every Egyptian sovereign prepared his own monumen¬

tal tomb and provided for the perpetual per¬

formance, at stated periods, in his Ka chapel, of mortuary services supposed to be necessary to maintain the power and influence of the de¬

ceased in the future world, and perhaps even his spiritual existence. Nobles and people of wealth generally followed the example of the king, while similar services were performed for the deceased of humble rank by his direct descend¬

ants. Thus it was a great misfortune for an Egyptian, in the lower walks of life, to die with¬

out leaving a son behind him to perform for him these pious offices. The statue of a de¬

ceased sovereign or person of high rank was frequently placed in his tomb. On each such KAAB IBN ZUHAiR — KAABA

statue were represented the characteristic symbols of* the Ka and also the K'a-name of the deceased potentate.

Disagreement of Critics. — Among writers on Egypt there has been much confusion as to the meaning and place of the Ba and the Ka in Egyptian religion. This want of agreement still continues ; and it is due to lack of complete documentary evidence on the subject; to in¬

adequate study of the documents already acr quired, to want of co-ordination in the work being done to elucidate the subject; and to an inability to comprehend the signification of the information already acquired and the relation of its parts to one another. This has led some writers to represent the Ka as being an earthly spirit and an inhabitant of the temporal body, under more or less the same terms and condi¬

tions as the Ba, the latter being treated as a sort of wandering spirit while the Ka, they regarded as more stationary and domesticated.

This view of the relation of the Ba to the Ka has led to learned discussion which has failed to take into account that there is apparently no evidence to support the view that the Ka was in any way a spirit of living body except in the case of sovereigns and specially favored persons, as already indicated. On the most primitive tombstones of the 1st dynasty the khu bird is depicted between the arms of the Ka, indicating that the shining, glorious intelligence dwelt in the Ka. Already at this early date all funeral offerings seem to have been made to the Ka or in the name of the Ka, which was thought to possess all the bodily perceptions and power of enjoyment. It is this connection of the Ka with these temporal qualities, its sup¬

posed presence in the tomb and the personal interest it took in the sovereign or other favored person, probably, that have given rise to the belief that the Ka was one of two spirits pos¬

sessed by every mortal while on earth.

Development of the Ka. — There is no

Egyptian religion that covers the period from 7,000 to 9,000 or more years of the life of the Egyptian people. During most of this long period there was no one form of religion su¬

preme or anything like to nearly supreme. The various beliefs were constantly changing, with the centuries. There was an ever-present tendency for certain more powerful gods to be¬

come still more powerful and to take to them¬

selves the powers and attributes of other less fortunate deities who had lost out in the race of time. Local gods became lost in the more powerful state deity, much as the local Hindu gods were incarnate in Vishnu, who was rep¬

resented as having had many reincarnations, each of which probably represented one of these local deities. The Egyptians seem to have in¬

corporated into the victorious god the Kas of all the local or other deities displaced by him. This accounts for the fact that Ra, for instance, was represented as having 14 Kas. Some of the divine kings of Egypt seem to have had as many Kas as the deities they represented on earth. Thus Rameses II is represented as possessing 30 Kas. The later Egyptian belief, which was the result of an evolution of 7,000

years, seems to have held that the Ka was a god-like principle, the presence of the divine dwelling in and saving the soul. Thus it ulti¬

mately came very close to the Jewish conception VOL. 16 — 18

of the Holy Ghost. There seems to be plenty of evidence to demonstrate that Jewish and Egyptian doctrines concerning the soul acted and reacted upon one another from the first years of the contact of the two nations until the decline of Egypt. The mystical and imaginative Egyptian doctrine of the Ka and its interest in the affairs of the individual to¬

gether with its relation to the Ba exercised a strong influence on early Christian religious thought and the development of the religious dogma of the soul. John’s description of the Holy Ghost might have been the late Egyptian definition of the Ka as the indwelling divine principle whose presence saved the soul. This is essentially the doctrine of the logos in its highest development. Both the logos and the Ka came ultimately to signify a saving, divine principle. From this to the conception of the Ka immortal principle or soul was but a step, which had been already taken in Egypt before Christianity had put in its appearance. See Egyptian Religion and Sociology ; Soul ; Book of the Dead.

Bibliography. — Bissing, Koniglich bayer-

ische Akademie

ligion and Thought in Ancient Egypt) (New York 1912) ; Budge, E. A. W., (A History of Egypt5 (London 1902) ; Erman, (Life in Ancient Egypt) (London 1894) ; Maspero, (Les Contes populaires de l'Egypte ancienne) (Paris 1899) ; Petrie, W. M. F., (Egyptian Tales) (London 1895-99) ; (History of Egypt5 (Oxford 1902) ; Wiedmann, (Religion of the Ancient Egyptians5

(New York 1897).

John Hubert Cornyn.

KAAB IBN ZUHAIR, kab ibn zoo'har,

an Arabian poet contemporary with Mohammed, and thus flourished in the 7th century. He was the son of a poet of some note, Zuhair ibn Abi Sulman Rabia at Muzani. All the members of the family became converts to the preaching of Mohammed, except Kaab, who was finally out¬

lawed on account of his hostility to the latter.

Later on he became reconciled to the prophet, with whom he seems to have become a favorite.

One of the most famous of Kaab's poems is an eulogy on Mohammed, entitled (Banat Su'dad,5

which has been translated into German by Brockleman, and into Italian by Gabrieli.

KAABA, or CAABA, pro; erly a quadrangu¬

lar structure, but a name particularly applied to a celebrated temple at Mecca. According to Mussulman tradition, the first Kaaba was built by the angels on the model of the pavilion which surrounds the throne of the Most High ; the second was built by Adam, with whom it was removed to the skies, where it still exists in a right line above the Kaaba of

Mecca ; the third was built by Seth, but perished in the del¬

uge ; the fourth, which now exists, was built by Abraham and Ishmael. The name is soecially given to a small oratory in the temple in the centre of a large space surrounded by galleries.

It is an irregular cube, 40 feet long, 33 feet in width and about 50 feet in height. This is the point toward which the prayers of all Mussul¬

mans are directed. In a corner (the southeast) fixed at a height of five feet from the ground is the famous black stone, believed to be one of the precious stones of paradise, and to have been brought by the angel Gabriel to Abraham, 274

when he was constructing the Kaaba. At first, according to one version, of a dazzling white¬

ness, the Moslems say that it grieved and wept so long for the sins of the human race that it became gradually opaque, and at length abso¬

lutely black; or, in another version, that it has been blackened by the tears of pilgrims, shed for sin. It is an object of profound venera¬

tion to the pilgrims who resort to the sacred dty. Ihis inner Kaaba is surrounded with a veil of black silk, and is opened but three times a year, and none but the faithful are permitted to approach it. The temple of the Kaaba is older than the time of Mohammed, previous to whom it was the Arab pantheon, containing the nation’s idols. The Prophet destroyed the idols, but suffered the most characteristic form of worship to remain — -the tawaf, or seven¬

fold circuit of the sanctuary. In the Prophet’s day the outer walls were covered by a veil of striped cloth. This gave way under the caliphate to a covering of figured brocade and the Khedive of Egypt still sends such a covering with each pilgrim

caravan. A broad band on these coverings is embroidered with inscrip¬

tions fiom the Koran. The door as well as the posts and lintel is of gilt silver. Modern de¬

scriptions of the interior do not always tally, which difference is due to the difficulty of ob¬

servation. It is well agreed, however, that little change has been made since the days of Ibn Jubair, who speaks of the upper parts of the walls as plated with silver and gilt, the roof veiled with silk and the floor and lower part of the walls covered with rich marbles. He also mentions windows of stained glass hut modern travelers appear to have overlooked these.

Thirteen silver lamps hung between the teak pillars. A silver-plated door opens on a stair leading to the roof. The caliph Mahdi expended lavishly on the decorations and in beautifying the place of prayer around ((the Ancient House.®

He brought pillars from Egypt and Syria. The work was. extended by his successors and re¬

pairs continued down to Turkish times

Bibliography.— Burckhardt, (Travels in

Arabia } (London 1829) ; Burton, ^Pilgrimage to El-Medinah and Meccah> (ib. 1855) ; Wiis-

tenfeld, (Die Chroniken der Stadt Mekka>

fefTzig 1861); Snouk-Hurgronj e,

>(The^Haglie 1889)- Sahib Soubhi, (Cairo 1894) ; Well-

hausen, (Skizzen und Vorarbeiten) (Berlin 1897) ; Grimme, (Mohammed) (Munich 19041 •

Huart, (Paris 1912) ’

KAALUND, ka'lund, Hans Vilhelm, Dan-

ish poet: b. Copenhagen, 1818; d. 1885. He studied painting and sculpture, and wrote poetry at the same time. But his success in the latter so far surpassed his achievements in the former that he decided in 1838 to make literature his life work. For 20 years, however, he published poems with just enough success to .warrant his. continuing with the prospect of ultimately achieving the success he so much desired and had so earnestly worked for. In 1858. a collection of his best poems (Et Foraar) (spring) written to the date of publication, was received with warmer welcome than had been given to previous editions of his works In 1875 he published a drama (). Among his other works are (Fabler og blandede Digte) ((Tales and Mixed Poems, > 1844), -and (Fabler for Born> ((Stories for Children, > 1845). Con¬

sult Nielsen, (Hans Vilhelm Kaalund> (1886).

KAALUND, Peter Erasmus Kristian,

Danish philologist: b. Sdllested (in Laaland), 1844. He made a special study of Northern philology, sagas and learning while at the uni¬

versity of Copenhagen. After graduation he .continued studies of a similar nature. He gave special attention to the sagas of Iceland in (Historisk-topografisk Beskrivelse af Island*

(1877-82). His appointment as librarian of yl? Arnamagnaean Collection of Manuscripts (Copenhagen) gave him special facilities and incentive to continue his life work His rata-

logue of this collection (1888-94) and his cata¬

logue of the Icelandic manuscripts of the Royal Library, his edited sagas and his (Palaeogra-

fisk Atlas* (1903-07) have done much for the study of the wide field of Danish, Norwegian and Icelandic lore and manuscripts.

- . . , . ^ 'ta, territory in Senegal, West Africa, having an area of about 21,000 square miles. The east is fertile and most of the country is fairly level. Population about 300,-

000 natives belonging to Soninkis and Bam-

baras. The capital, Kuniakari, has about 5,000

inhabitants. Nioro, in the north, a town of about like proportions is an important centre of trade.. The original rulers of Kaarta within historical times were the Soninkis who were overcome by the Bambaras. In 1855 the coun¬

try became a part of Segu and in 1891 it came under the control of the French.

KABALASSOU, ka-ba-las'soo, the native

name of a large armadillo, native of Brazil, which feeds upon carrion and termites. It is from three to five feet long from nose to end of tail.

KABALE UND LIEBE, ka-ba'le unt

lebf; ,OIie.°f the earliest dramas of Schiller published in 1784. It has been translated into English under the title of (Intrigue and Love.*

KABARDS, or KABERTAI, ka-ber'ti, an

independent Circassian family of about 30,000

people, most of whom are Mohammedans

I hey live in the central and western Caucasus on an upland broken plateau-like country at an elevation of some 5,000 feet above sea-level.

KABASSOU, ka-bas'soo, CABAS.SOU, a

native South American armadillo of the genus Kenurus noted for its curious movable plates and by the extra long first two digits. Like the Kabalassou (q.v.), the Kabassou is fond of burrowing at which it is quite adept.

KABBALA, kab'a-la. See Cabala.

KABUL, ka-bool , or CABOOL, Afghanis-

tan capital of the country and of the province of Kabul, situated at the western extremity of a spacious plain, in an angle formed by the ap¬

proach of two ranges of hills, and (with the exception of a suburb) on the right bank of the Kabul River, which is spanned, in or near the city, by several bridges. It is a place of great strategic strength, and stands at a height of about 6,900 feet above sea-level. It has a de¬

lightful summer climate, but the winter is severe. Since the eighties of last century great improvements have been effected in the citv and under the enlightened rule of Abd-ur-Rah-

PILGRIMS AROUND THE CAABA

–

.

. .

–

maii (died ^01) important industries were in¬

troduced and electrical powers developed under European tutelage. Good highways have also been constructed, and a local railway has been built. The mosques are spacious and com¬

modious, and the town is an important centre of trade with India and central Asia.

Kabul has had a stirring and eventful his¬

tory. It fell to the arms of Tamerlane in 1394.

It was captured bv Nadir Shah in 1739, whose son, AJimed Khan, founded the Durani dynasty.

The city was taken by the British in 1839; was the scene of the capitulation of British forces in 1842, who, guaranteed safe conduct to the frontier, were brutally massacred, only one man out of a total of 16,000 soldiers and camp followers reaching safety. In retaliation the city was again occupied by British troops, and on evacuation partially destroyed by them. It afterward became the centre of a dynastic struggle between rival claimants to the throne of Afghanistan. In 1879 the British resident and his staff were massacred, and this was followed by General Robert's march on the city, the defeat of the Afghan forces at the battle of Charasaib, and occupation of the city for a twelve month. Pop. 180,000.

KABUL, a river in Afghanistan which

rises in the Paghman Mountains in the north¬

east at an altitude of 8,400 feet above sea-level.

It is about 300 miles in length at its junction with the Indies at Attock (in the Punjab). It supports considerable commerce carried on in small boats and rafts. On its shores are Kabul and Jelalabad.

KABYLES, ka-bilz'. See Berbers.

KACZKOWSKI, kach-kof'ske, Zygmunt,

Polish historical writer and novelist: b. Berez-

nia (Galicia), 1826; d. 1896. He showed him¬

self an ardent revolutionist in the outbreak of 1848. In 1861 he was imprisoned for treason¬

able writings, but was liberated on his agreeing to leave the country. Going to Paris he con¬

tinued his literary work there for considerable time. After his return to Vienna he gave all his

attention to literature, which was the gainer thereby. His extensive historical studies helped to giye true local color, incident and truthful¬

ness to his brilliant historical novels, among which are (Bitwa o Horonzanken) (1852) ; (Le tombeau de Nieczuii* (1858) ; and (Le porte-

feuille de Nieczjua) (1883). His novels of modern life include (The Strange Woman) ((Dziwozona,* 1855);

ata* (1858) ; ^odalis Marianus) (1858) ; and (Le Comte Rak* (1862).

KADELiyjRG, ka'del-burk, Gustav, Aus¬

trian actor and dramatist: b. Budapest, 1851.

Making his debut in Vienna in 1868, he went to Berlin three years later, where he remained 12 years, gaining in power and reputation ; after which he returned to Vienna as stage manager of the Vclks theatre only to make his way back to Berlin, where he found the life more con¬

genial. He successfully toured the United States for two seasons. He was the author of many farces and comedies and collaborated in the writings of others and translated dramatic works from English into German. His works were published in 1899 under the title (Dramatic Works of Franz von Schonthan und Gustav Kadelburg,* in four volumes.

KADEN, ka'den, Waldemar, German

writer: b. Dresden, 1838; d. 1907. He was a teacher by profession but gave all his spare time to folklore and literature. Among his pub¬

lished works are (Wandertage in Italien) (1874) ; (Unter den Olivenbaumen* (1880) ; (Skizzen und Kulturbilder aus Italien) (1884) ; (Pompejanische Novellen> (1882);

viera* (1888) ; Utalienische Gypsfiguren*

(1891) ; **Auf Capri** (1900) ; (Volkstumliches aus Suditalien* (1896-1900); and numerous works dealing with folklore.

KADESH-BARNEA. The name of a

place mentioned as a stopping-place for the Children of Israel on their way to Palestine.

For 38 years it was the centre of the activities of the budding nation. Here the tabernacle was set up. Many fateful affairs occurred here, including the death of Miriam, the sister of Moses, the serious rebellion of Korah and the disobedience to divine command of Moses him¬

self. From this place the spies were sent to make their survey of Palestine, and here their report was made. Then the march was resumed from this point. The exact site of Kadesh-

Barnea has been the subject of much conjecture and considerable controversy. It was not until 1842 that anything like certitude was attained.

Rev. John Rowland, then residing at Gaza, was directed to the spot by some Arabs. The adop¬

tion of the site, however, was met by the ob¬

jection of Edward Robinson, Dean Stanley and others. Many scholars of equal authority defended Rowland's discovery. It remained for H. Clay Trumbull to establish the correctness of this site, which he did in 1883, publishing his results in what is considered <(the most import¬

ant work yet published on the subject,** (Kadesh-

Barnea* (1884). It is located in the Badiet et-Tih, ((the great expanse of treeless limestone plateau which intervenes between the valley of the Arabah, opposite Mount Hor on the east, and the coast of Philistia about Gaza on the West.**

KADIAK, kad-yak'. See Kodiak.

KADIAK BEARS. See Bears.

KADMONITE.S, people of the land of

Kedem, the (

KAFFA, a tributary state of Abyssinia, toward the southern part of the country. It is mountainous for the most part and covered with thick forests in the higher regions. Capi¬

tal, Araderacha; other important cities, Bonga and Jimma; area, about 5,000 square miles. No census of the country has ever been taken.

KAFFA, kaf'fa. See Feoposia.

KAFFRARIA, a part of the province of

the Cape of Good Hope east of the Kei River.

It became a part of Cape Colony in 1875 and now forms East Griqualand, Transkei, Pondo-

land and Tambuland, comprising a total area of about 22,000 square miles and having a population of about 850,000. Like most of the southern and western country of Africa which has had a considerable native population the principal industry is the raising of grain and cattle.

KAFIR-BREAD

KAHLENBERG

KAFIR-BREAD, kaf'er-bred, the edible

spongy pith of the stems and cones of any of several species of cycads (q.v.) growing in South Africa, especially Encephalartos caffer.

This substance resembles sago in its farinaceous character.

KAFIR-CORN, Indian millet (Sorghum

vulgar e) extensively cultivated by the half-

civilized negroes of south-central Africa. It is called kaoliang by the Chinese. See Grasses ; Millet.

KAFIRISTAN, ka-fe-ris-tan' (Persian,

((land of the infidels^), a region of central Asia northeast of Afghanistan, on the south slope of the Hindu Kush, and having as its southern boundary the Kabul River. Formerly the name was vaguely given to a much greater territory ; it is now restricted to a country with an area of about 5,000 square miles, nominally under the government of the Amir of Afghanistan, but virtually belonging to an independent people.

In the northern portion, which is mountainous, the surface is rugged and broken ; in the south the land is mostly level or moderately undu¬

lating. Much of the soil has a high degree of fertility and is adapted, especially in the val¬

leys, to the cultivation of fruits and cereals of various kinds. Grapes are largely produced, from which is made an excellent wine. They are said to be skilful workers in wood and metals, but their main pursuits are agriculture and stock-raising. In features and complexion, as well as in beliefs, manners and customs, they differ much from neighboring tribes. They appear to be of Aryan extraction and claim descent from soldiers of Alexander the Great.

They are not without dissensions in the various tribal divisions in which they exist, but their isolation in a region of natural strength has enabled them to maintain a kind of political unity despite internal discords, as well as to preserve their independence against the invas¬

ions of other tribes. They have no literature, and in their language appear mingled traits of the Indo-Iranian dialects in their Iranian and Indian divisions. In religion they withstood Mohammedan

influences until in 1895 they be¬

came subjects of Afghanistan, when Moham¬

medanism was imposed upon them outwardly ; but they cling with fondness to their old super¬

stitious beliefs. Consult Biddulph, (Tribes of the Hindu Kush> (1880); Leitner,

(1881) ; McNair, (A Visit to Kafiristan) (Proc Royal Geog. Soc. 1884) ; Robertson, < Kafirs of the Hindu Kush) (1896).

KAFIRS.kaf'erz, KAFFIRS, KAFFRES,

or C'AFFRES (from Arabic Kafir, infidel or unbeliever), the principal race inhabiting south¬

eastern Africa, a branch of the great Bantu family. The name is now chiefly restricted to the tribes occupying the coast districts between Gape Colony and Delagoa Bay. They differ from the negroes in the shape of the head being more like that of Europeans ; in the high nose, frizzled hair and brown complexion, which becomes lighter in shade in the tribes of the more southern districts. They are a tall, mus-

cular race, the average height being from 5 feet 9 inches to 5 feet 11 inches, and frugal and simple, in their habits. Their chief occupa¬

tion is raising and tending cattle, and hunting; they are also employed in the mining industry; garden and field work is mainly performed by women. They are of a peaceful disposition, but in times of war they display considerable bravery, tactical skill and dexterity in the handling of their assagais or spears, shields and clubs, as has been shown in their engage¬

ments with the British forces. There are sev¬

eral distinct branches or families of Kafirs, but the tribes which recent events have specially

brought to the front are the Pondos, the Fin-

goes, the Zulus and the Swazi. Kafirs, espe¬

cially of the Zulu tribe, are distributed in large numbers over Natal and Cape Colony, and have become to some extent civilized. There were frequent wars between them and the Dutch and British.

KAGA, ka'ga, or KASHU, province in the west of the Japanese island of Hondo, and forming a part of the ken of Ishikawa. It is a place of very considerable industry, which embraces the manufacture of silk yarns and goods, inlaid and other bronzes of very beauti¬

ful designs, Kaga porcelains and many other distinctly native products. Kanazawa, the capi¬

tal of Kaga, which has a population of about 115,000, is situated five miles inland from its port, Takama, a place of considerable shipping activity.

KAGOSHIMA, ka'go-she'ma, Japan, a city

m the island of Kiushiu, capital of Satsuma province and of the prefectural ken of the same name, on the northwest shore of Kago¬

shima Bay. The town it well built 2nd is an important industrial centre with a considerable export trade. Ihe celebrated Satsuma porce¬

lain is manufactured in suburban Tanoura.

Kagoshima was the feudal seat of the powerful Shimadzu daimios, and in 1863 was bombarded and destroyed by the British, owing to the murder of an Englishman; the reigning daimio refusing satisfaction. Here in 1877 Saigo (q.v.) set up the standard of rebellion, and here also he was overwhelmingly defeated a few months later. A great disaster took place on 12 Jan.

1914, when the volcano of Takurajima, situ¬

ated on a small island directly facing the city, after being quiescent for 130 years, burst into flame, rendering 100,000 people homeless and compelling the inhabitants of Kagoshima temporarily to vacate the city. Pop. 75,907.

KAGU, ka'goo, the native name of the re¬

markable bird (Rhino chetus jubatus) peculiar to New Caledonia, where it was discovered only m 1860 and is now rapidly disappearing. It is the only species of a distinct family most nearly related to the sun-bitterns. The kagu is about the size of a domestic fowl, with short wings, rather long legs, a ralliform beak and a long crest. When the wings are folded, the colors are mottled gray, the wings and tail barred with a darker shade ; but when they are spread the wings are seen to be barred and spotted with white and black arranged in a conspicuous pat¬

tern. The kagu is noteworthy for the extraor¬

dinary dances and antics which it performs.

KAGUAN, ka-goo-an'. See Colugo.

KAHLENBERG, ka'len-berg, Louis, Amer¬

ican chemist: b. Two Rivers, Wis., 1870 Edu¬

cated at universities of Wisconsin and Leipzig he became professor of physical chemistrv in the former 1897 and head of the chemical department 10 years later. He has been asso-

ciate editor of the Journal of Physical Chemis¬

try and of the Journal de Chimie Physique and president of the Wisconsin Academy of Science, Arts and Letters, and vice-president of the American Electro-Chemical Society (on sev¬

eral occasions). Among his published works are laboratory Exercises in General Chemis¬

try* ; (Outlines of Chemistry) ; Qualitative Chemical Analysis.*

KAHN, kan, Gustave, French poet, novel¬

ist and literary critic : b. Metz, 1859. During his school days he began contributing poems, short stories, sketches and reviews to the newspapers and journals, and this he continued actively from 1880 on. He took a trip to Africa of which he made good literary use; and on his return to France in 1886, he joined hands with Moreas and Paul Adam founding Le Symboliste and La Vogue. From this time on he took a very active part in the ((Symbolis-

tic** movement of which he became, in a sense, the most active leader. With Catulle Mendes and others he organized, in 1897, the <(Mati-

nees of poets,** with the avowed object of en¬

couraging the younger symbolistic writers to be¬

come still more symbolistic. These matinees were held successively at the Odeon, Antoine and Sarah Bernhardt theatres. Kahn has been largely interested in the vers libre movement, and he has been put forward as the inventor of this form of poetry which has been so much abused, especially in the United States;. and which has consequently borne such notoriously bad fruit. This claim, however, has been strenuously contested. There is something at¬

tractive about much of the symbolistic vers libre of Kahn ; but the brood that he and his symbolistic followers have encouraged in the journals and reviews under their control or at their disposition, have proved scarcely worth the rearing, since most of them are compelled to limp through their literary life in a manner painful to themselves and to their readers. In recognition of his services to literature Kahn has been made an officer of the Legion of Honor. Among his published works are ‘Les

palais nomades) (1887) ; (Chansons d'amant*

(1891); (Premiers poemes* (1897); (Le roi fou* (1895) ; (Les fleurs de passion) (1900) ; 'L'Adultere sentimentaP (1902) ; 'Symbolistes et decadents* (1903) ; 'Contes Hollandais) (1904) ; 'L'Esthetique de la rue) (1905) ; 'Boucher* (1909).

KAHN, Otto Hermann, American banker

and promoter of opera : b. Mannheim, Germany, 1867. He came to the United States in 1893 to the banking firm of Speyer and Company, after five years in the Deutsche Bank branch in Lon¬

don and he joined Kuhn, Loeb and Company, five years later. There he soon became promi¬

nent in railroad and corporation finances. Of a strong musical disposition he has long taken a very prominent part in the encouragement of grand opera in this country. He has been chair¬

man of the board of directors of both the Metropolitan and Century Opera companies, vice-president of the Chicago Grand Opera Company and one of the directors of the Bos¬

ton Opera Company.

KAHOKA, ka-ho'ka, Mo., city and county-

seat of Clark County, on the Burlington route, 20 miles west of Keokuk, Iowa. It is an im¬

portant shipping point for a large farming and stock-raising region and there are numerous grain elevators, besides flour-mills, cement-

block factories, brick yards and fruit canning establishments. The city is governed by a mayor and council elected biennially and owns the water and electric-lighting plants. Pop.

1,758.

KAI-PING, ki-ping', China, town in the province of Pe-chi-li, 80 miles northeast of Tien-Tsin. It is the centre of a large coal field, over 11,000 persons being employed in the mines. The output in 1911-12 was 1,461,8 22

tons. A branch railroad connects Kai-ping with the Trans-Siberian Railway.

KAI-POMO, ki-po'mo, a tribe of Athapas¬

can Indians who formerly inhabited the Cahto Valley, Mendocino County, California. See Kato.

KAIANIAN, ki-an'i-an (Persian kai,

king), an ancient Iranian dynasty belonging to the early days of the history of the country. It bridges over the semi-historical, semi-traditional and semi-mythical period extending between the shadowy mythical age of Iran and the time when the country emerges into the light of formal history and loses itself in the later Archsemenian sovereigns. According to a Persian account, which is probably more mythi¬

cal than historical, the dynastic Kaianians began with the establishment on the throne of Iran of Kai Kobad by the great legendary Persian hero, Rustam. All the succeeding members of this royal family bore the title ((Kai)) thus giving rise to their titular dynastic designation. The Kaianian rule came to an end with the conquest of Persia by Alexander the Great, in the 4th century b.c., after a little less than 700 years'

duration, if the semi-legendary records on the case are to be accepted as authoritative.

Throughout this long period certain names stand out so prominently that they have given their titles to families or dynasties; as seems to have been the case in early Biblical chrono¬

logical records. Thus Kai Vishtasp is gravely recorded to have reigned 120 years ; and other

Kaianian sovereigns are credited with like un¬

natural age. (See Persia — History). Consult Dubeux, (La Perse) (Paris 1881) ; Jackson, ‘Zoroaster, the Prophet of Ancient Iran> (New York 1889).

KAIETUR (ka-e-toor') FALL, a famous

waterfall in British Guiana, on the Potaro River, a tributary of the Essequibo. It was dis¬

covered in 1870. Its total height is over 800

feet, and the sheer descent of the water 741

feet, the width of the hard rock over which it plunges being 370 feet. The water has worn a great cavern in the softer underlying layers, and against the dark background thus formed the whiteness of the spray is contrasted with magical effects. The scenery about this great waterfall enhances its beauty and grandeur.

KAIFUNG, kl-fung', or K’AI-FENG-FU,

China, a walled city, capital of the province of Ho-nan, 450 miles southwest of Peking, and 11

miles distant from the. Ho-ang-ho, or Yellow River. It was the capital city of China from 960 to 1129 and was then known as Pien-liang.

The city has been visited 14 times by flood, 9

times by earthquake and 6 times by fire. Kai-

fting is a station on the new Hankow-Peking Railway. It has a large commercial trade with 278

the interior. A colony of Jews, established here about 1163 a.d., for hundreds of years maintained itself apart from the other inhabi¬

tants, but has now almost entirely lost its iden¬

tity. The city was taken by assault by the in¬

surgents in the Taiping rebellion of 1853. The inhabitants are mainly Mohammedan. Poo

about 200,000. y'

KAILAS, ki'las, the highest summit of the Gangri Mountains in 1 ibet, between the sources of the Indus and the Brahmaputra, having an altitude of over 20,000 feet. It is a sacred mountain of the Hindus, who formerly re¬

garded it as the abode of their gods.

KAILASA, ki-la'sa, the best known of the rock-temples of Ellora. It stands not far from Aurangabad, completely separated by a passage¬

way of considerable extent, from the mother rock from which it was cut probably about the 10th century a.d. The main chamber of the temple which is 244 by 137 feet is ap¬

proached by a corridor or entrance hall 137 by 88 feet. The former is the sanctuary. Another room 100 by 56 feet forms the temple proper which rises in a magnificent dome, the summit of which is 90 feet above the floor and sup¬

ported by four rows of handsome columns with sculptured elephants. Sculptured figures and painted designs cover the greater part of the whole vast edifice adding to the grotesque yet grand effect of the ensemble. Consult Ferguson and Burgess, (Lon¬

don 1880).

KAILYARD SCHOOL, a popular name

used to designate the Scotch writers who deal with Scotch peasant life. The use of the term is said to have had its origin in the motto used by Ian Maclaren for his (Bonnie Brier-Bush, J

(

yard.®

KAIN, kan, John Joseph, American Ro¬

man Catholic archbishop : b. Martinsburg, W.

Va., 31 May 1841; d. Baltimore, 13 Oct. 1903.

Educated at Saint Mary's Seminary he was ordained priest in 1860 and was for several years stationed at Harpers Ferry, W. Va. In 1875 he was consecrated bishop of Wheeling, and m 1893 he was appointed titular archbishop of Oxyrychia as coadjutor to Archbishop Ken-*

rick of Saint Louis, succeeding to the arch¬

bishopric of Saint Louis on the death of Arch¬

bishop Kenrick in 1895. Owing to failing health, Bishop GHnnon of Kansas City was made coadjutor in 1902, and succeeded him.

KAINITE, kl nitj KAINIT (Greek, kainos, new) a hydrous magnesium sulphate with potassium chloride., An impure kainite contain¬

ing 12 per cent or over of potash is used ex¬

tensively as a fertilizer. Kainite is a natural salt containing, when pure, 35.1 per cent of potassium sulphate, 24.2 per cent of magnesium sulphate, 18.9 per cent of magnesium chloride and 21.8 per cent of water of hydration. The fertilizing kainite is used for the production of potash and magnesium compounds. See Fer¬

tilizers.

kInts' J°sePh, Austrian actor: b.

Wieselburg, Hungary, 1858; d. 1910. He was popular in Austria and Germany and played leading roles at Vienna, Munich and Berlin, and visited the United States several times Among his many roles were Romeo, Mortimer in (Maria StuarU (Schiller);

Ferdinand in ‘Kabale und Liebe) (Schiller), and Alceste in ‘Misanthrope* (Moliere).

KAIPING, ki'ping, a city in the Liaotung peninsula, Manchuria, 30 miles southeast of Niuchwang. It is one of the towns captured by the Japanese in 1904 during the Russo-

Japanese War. Kaiping is on the Port Arthur Railway.

KAIRA, ki'ra, a district and capital in northern Bombay, British India. The founda¬

tion of the city; is supposed to date back to 1400 b.c., and it is definitely known to have ex¬

isted as a flourishing commercial centre in the 5th century a.d. Pop. about 10.000.

KAIRWAN, kir-wan', Tunis, a town 80

miles ’southeast of Tunis the capital, situated in a barren, sandy plain, and surrounded by a wall; founded about 670. It is connected by rail with Tunis and with the port of Susa, 30

miles distant. It ranks next to Tunis in popu¬

lation and trade, and is one of the sacred cities of Islam; it was formerly almost inaccessible to Christians. Under the administration of the French, by whom it was taken in 1881, many modern improvements have been made, among which not the least important is a good water supply.. It has a variety of useful manufac¬

tures, including morocco, carpets, copper uten¬

sils, saltpeter, etc. Kairwan was the first seat of Saracenic empire in Barbary, and still has many fine relics of its ancient grandeur in the fragments of beautiful architecture which abound there, besides a number of interesting mosques. One of them, the Okbah mosque, re¬

built in 827, is a noble edifice, and is held in

great veneration as one of the reputed four gates of Paradise. Pop. 25,000.

KAISARIEH, ki'sa-re'e, a town in the

Vailayet of Angora, Asiatic Turkey. It is par¬

tially surrounded by the walls of an ancient fortification rampart, and most of its streets are. narrow and crooked, thus betraying its antiquity.. The town is the centre of extensive trade which reaches over a very considerable extent of local, country. Hides, carpets, cloth, fruits and raisins are among its chief exports.

It is a place of numerous bazars and mosques^

one of the later of which dates back to 1238*

Religious interests are strongly represented in Kaisarieh, the city being the seat of Greek and Roman Catholic bishops and of an

Armenian archbishop. Thus it maintains the very ancient tradition that it occupies the site of Caesarea (in Cappadocia). Pop. 50,000, half of whom are Turks.

. KAISER, Isabelle, Swiss writer : b. Becken-

ried (on Lake Lucerne), 1866. With a com¬

mand of French and German, she has written m both languages, though most of her writing has been done in French so successfully that she received the prize of the French Academy.

Among her published French works are (Ici-

bas> (1888) ; (Sous les etoiles* (1890) • (Des ailes> (1897); (1903); j US]ai„r dans U voile) (1907); 'Marcienne de Flue* . (1909), novels and stories. Her works, written in German, include (Wenn die Sonne untergeht* (1901), a novel; KAISER — KARA

Herz) (1908), poems; (Die Friedensucherin*

(1908), a romance; (Der wandernde See) (1910), and (Von ewiger Liebe) (1913).

KAISER, ki'zer, a title, the German equiva¬

lent for emperor. The Romans added the name of Ccesar to their own rulers in honor of the ((divine Julius.® Diocletian first made it a distinctive title, and in 395 a.d., on the divi¬

sion of the empire, the title was borne by both the Eastern and Western emperors. It lapsed in 476 a.d. with the last emperor, but was re¬

vived in 800 a.d. by Charlemagne, who was crowned emperor of the West at Rome in that year, after which the title was associated with the king of the Franks and after 962 with the Germans, whose kings became emperors of the Holy Roman Empire. The kings continued to be crowned by the Roman pontiffs at Rome, or at least in Italy, until 1530, when Charles V was crowned at Bologna. On the fall of Constantinople in 1453 the sultan assumed the title, but his claim was not recognized by the Holy Roman emperors until 1718. In 1721 the title of czar was assumed by Peter the Great of Russia. In 1806 the title of Holy Roman emperor was dropped by Francis II of Austria, who retained that of emperor of Austria. After the Franco-Prussian War of 1871 William I of Prussia assumed the title of German em¬

peror, and this title is distinct from the older title of emperor of Germany. See Cesarism ; Czar ; Emperor.

KAISER-FRANZENSBAD. See Fran-

ZENSBAD.

KAISER WILHELM, or KIEL, CANAL.

One of the important ship canals of the world, extending from the mouth of the Elbe, on the North Sea, to Kiel, on the Baltic, a distance of 61 miles.

The military policy of Germany, however, has played a larger part in the purpose behind the digging- of this canal than have the advantages to shipping. When Bismarck pro¬

voked the war with Denmark in 1864 it was generally considered that one of his main mo¬

tives was the acquisition of such territory in Holstein as it would afford a suitable terminal for a canal connecting the Baltic with the North Sea and so permit German vessels, and more especially German war vessels, a means of passing from the one sea to the other with¬

out making the dangerous coastal voyage around Denmark, a distance of 'nearly 600 miles. Wi-

helmshafen on the North Sea, and Kiel, on the Baltic, each an important naval station, have been the centers of gravity of the German naval war strategv, which has oscillated between the North Sea and the Baltic. The canal effects an inland passage between these two naval bases, so that in case of need the forces sta¬

tioned at one base can quicklv support those at the other, or the entire German naval power can be readily mobilized, at short notice, either in the Baltic or in the North Sea.

The digging of the canal was begun in June 1887 and completed, as first planned, in June 1895. The depth then was 29l/2 feet and the average width at the bottom was 72 feet, while the width at water level was 220 feet. The locks, as first constructed, were 492 feet long, 82 feet wide and 32 feet deep.

Then came the advent of the dreadnought, a war vessel of a size and draught which had not been contemplated at the time the canal was originally planned. This brought before the German strategists the need of having the canal widened and deepened, a work which was begun in 1907, and which is supposed to have deferred the great European War for some

years.

In 1914 the alterations were completed, the canal having then cost upward of $55,000,000.

The waterway is now 335 feet wide at water level, 144 feet wide at the bottom and 36 feet deep. The locks are 147*4 feet wide and have an available length greater than the big locks on the Panama canal; 1,082*4 feet. It is now possible for two of the largest ocean liners to pass each other in the canal and still leave 200 feet to spare between them. The official opening was celebrated 24 June 1914. Consult Wharton, A., (Kiel: its Naval and Engineering Features,) (in the Engineer, London, Vol. 120, p. 20, 1915).

KAISER WILHELM DER GROSSE, a

German converted liner of 14,350 tons which escaped from Bremerhaven at the beginning of the World War and, eluding the British squad¬

rons, reached the South Atlantic. After two weeks of commerce raiding she was sunk by H.M.S. Highflyer off Cape Verde Islands on 27

Aug. 1914. See War, European — Naval Op¬

erations.

KAISER WILHELM LAND. See New

Guinea.

KAISERSLAUTERN, kl'zers-lau'tarn, a

city of Bavarian Palatinate, Germany, about 40 miles west of Mannheim. It is the centre of spinning and weaving interests and possesses factories for the production of structural steel, car wheels, boiler engines, safes, sewing ma¬

chines, furniture, clothing, shoes, bells, bricks, oils and blank-books. In the neighborhood are extensive quarries of fine stone and forests that

supply building and cabinet lumber. The city is also the centre of iron works and rail¬

way shops. It possesses the usual schools, churches and public buildings of German and Austrian cities of its size. The town dates back to 1152 when Frederick Barbarossa built a magnificent palace there. In 1357 the free imperial city of Kaiserslautern became subject to the Palatinate. The French took it in 1801 ; Bavaria seized it in 1816; and it returned to the Palatinate in 1849, v/hile still remaining an integral part of Bavaria. Pop. about 60,000.

KAJANUS, ka-ya'nus, Robert, Finnish

composer and orchestral leader : b. Helsingfors, 1856. Graduating from the Leipzig Conserva¬

tory in 1880 and finishing his musical course in Paris and Dresden, he began the production of orchestral works which soon attracted at¬

tention. Returning to Helsingfors in 1886 he founded there a native orchestral association which was destined soon to achieve a more than national reputation. His appointment as di¬

rector of music at the University pf Helsingfors helped greatly the national musical movement that he was striving to encourage. Much of his music he has consciously and deliberately made national in subject and character. This covers a pretty wide range, including symphonic poems, rhapsodies, orchestral suites and numer¬

ous cantatas, songs and piano pieces.

KAKA, a large, slow-flying, brownish par¬

rot (Nestor meridionalis) of New Zealand, which inhabits forests, where it goes about in 280

noisy flocks, and nests in hollows of trees. Its

food is miscellaneous, but consists principally of nectarous flowers and of the grubs hiding under bark, which it tears away by its powerful hawk¬

like beak. A near relative is the Kea (q.v.), and other species on New Zealand, Norfolk and neighboring islands have become wholly ex¬

tinct since the occupation of those islands.

KAKABEKA FALLS, a cataract of the

Kamimstiquia River, Ontario, Canada, 14 miles west of Port Arthur. The falls, which are noted for their picturesqueness, have a height of 130 feet, and their width is about 450 feet.

KAKAPO, the Maori name of a large,

ground-keeping, owl-like parrot (Strigops hab-

roptilus), vvhich is now nearly extinct, owing to its inability to withstand the dogs, cats, rats, etc., introduced by civilization, in addition to which its flesh is good to eat. Its terrestrial habits have led to such a reduction of the wing-muscles that the keel has nearly disap¬

peared from the sternum. Consult Hutton and Drummond, < Animals of New Zealand> (1905).

KAKAR, a sportsman’s name for a muntjac (q.v.).

KAKARALI, kak-a-ral'!, a South American tree (Lecythis ollaria), whose timber is much used in British Guiana for piling and struc¬

tures exposed to salt water, since it endures well, and resists the boring of shipworms and [he attacks of barnacles. The Indians beat its bark until it separates into thin layers conven¬

ient for use.

KAKHYENS, kak-hi enz, Kahyen, Kakan,

the Burmese designation of certain, more or less

primitive, tribes inhabiting the mountain districts of Arakan and northern Burma to the frontiers of Assam and Tibet. See Chins.

KAKKE, kak'ka', a Japanese disease be¬

lieved to be identical with or very similar to the beriberi of India and the Malay peninsula.

It is endemic in parts of Japan and is to be found occasionally all over the country. Some¬

times it becomes epidemic. It is not known when the disease appeared in Japan or from whence it came. Kakke results, at times, in the loss of motive power from an affection of the lower extremities of the body which presents itself in the shape of swelling of the legs, numbness of the skin, cramps in the calf of the legs and, in the more extreme cases, dropsy and even heart failure. (See Beriberi). Consult Anderson, (Kakke } (in The Transactions of the Asiatic Society of Japan, Vol. VI, Yokohama 1878) ; Chamberlain, (Things Japanese > (Lon¬

don 1891) ; Miura and Baelz, (Beriberi oder Kakke > (in Mense’s

krankheiten,> Leipzig 1905).

KALAAZAR FEBRILE, Tropical, a

feverish disease prevalent in India and the east, generally from the west of northern Africa to southern China. It is accompanied by sores and pimples and is frequently fatal.

It is also found among camels and they are believed to help propagate it. It is also known to be conveyed by bedbugs.

KALAFAT, ka'la-fat', a fortified Ru¬

manian town on the Danube, about 150 miles southwest of Bucharest with which it is con¬

nected by rail. At ICalafat the Russians lost over

10,000 men during the Russo-Turkish War of 1828-29. Pop. about 8,000.

KALAHARI (ka-la-ha're) DESERT, a

region of South Africa, extending from the Orange River to Lake Ngami, and from Ion.

26° E. nearly to the west coast; sifuated in the Cape Province, Rhodesia, and German Southwest Africa. It occupies an elevation of 3,000 to 4,000 feet, and is called a desert be¬

cause it contains little water; but besides grass and creeping plants there are large growths of bushes, and also trees ; great herds of antelopes roam over its plains; and on the game thus provided, as well as on the vegetable products, particularly water-melons and large tubers, a great number of Bushmen and Bakalahari sub¬

sist. The Kalahari is remarkably flat, and is intersected in different parts by the beds of an¬

cient rivers. The soil is in general a light-

colored soft sand, but in the ancient river-beds there is a good deal of alluvium, which, when baked hard, is so retentive that in some cases pools formed by the rain contain water for several months.

Recent studies have brought to light very interesting facts regarding the limestone basins of this region — peculiar formations, in which can be traced the influence of higher animal life on the shape of the earth’s surface. These crater-like depressions served as watering-

places for the larger wild animals, and the crowding of great herds to these places, to drink and bathe, changed them from simple depressions to the walled basins which they now are. Elephants and other animals, by roll¬

ing in the mud and rubbing against the walls, gave to the 'hollows their depth — sometimes 20

to 30 feet — and a diameter commonly of sev¬

eral hundred yards. The water in these basins contain lime carbonate in solution and with the water drunk by the animals this carbonate dis¬

appeared, and the fresh spring-water absorbed ai?jer su?ply froiT1 the rock> thus deepening the depression. Scientists estimate that 600 to 800 years may have passed before the natural water-pools became basins. It is surmised that similar depressions in calcareous districts of the American prairies are due, in the same way, to the enormous herds of bisons which formerly inhabit them.

KALAKAUA (kal-a-kow'a) I, David,

king of Hawaii: b. 16 Nov. 1836; d. San Fran¬

cisco, Cal., 30 Jan. 1891. He was the son of Kepaakea and Keohokalole, the niece of Kame-

hameha I, and was elected, 12 Feb. 1874, to succeed Lunalilo, and reigned till his death. ' In 1887 he was compelled to grant a new constitu¬

tion, which very greatly restricted the royal authority.

KALAMATA, ka'la-ma'ta, a seaport of

Messema, Greece, near the mouth of the Nedon.

It is on the Gulf of Messenia, and is the centre of an extensive industrial activity and com¬

merce in oranges, figs, mulberries, olives, silk and food-stuffs. It was in Kalamata that the first Grecian National Assembly was held (1821). Pop. about 16,000.

KALAMAZOO, kal-a-ma-zoo, Mich., city,

railway centre and county-seat of Kalamazoo County; on the Kalamazoo River and on the Michigan Central, the Lake Shore and Michigan Southern, the Kalamazoo

and South Haven, the Grand Rapids and Indiana aqd the Chicago, Kalampzoo and Saginaw railways; 143 miles west of Detroit, 60 miles southwest of Lansing

and 4a miles south of Grand Rapids. It is in a nch agricultural region, the chief products ol which are celery, fruit and grains. Unlike the average city in western Michigan, Kalama¬

zoo never was a lumber town. Located in the midst of a broad area of prairie land and oak openings, it was from the beginning an agri¬

cultural centre with fresh water, inland lakes in all directions, and with the Kalamazoo River flowing along its eastern portion. Few cities of the United States of a corresponding popu¬

lation show such a diversity of industrial cor¬

porations. There are over 276 factories em¬

ploying about 10,000 persons, and representing an investment of $28,745,000. The chief manu¬

factures of the city are paper, medicines, wom¬

en's clothing, wagons and carriages, machinery, caskets, coffins, foundry products, windmills, furniture, stoves, corsets, shoes, automobiles and motor-trucks and regalia. The 13 paper mills employ mori than 5,000 workers; the regalia and clothing factories, 1,000. The celery raising industry, by which Kalamazoo is per¬

haps best known, employs more than 700 skilled workmen, chiefly from Holland, and represents an annual output valued at nearly $3,000,000.

The four national and savings bank reported in 1916, $1,000,000 capital; $539,367 surplus; $9,804,867.62 loans, discounts and stocks ; and $10,455,063.15 deposits. The total bank clear¬

ings were $38,650,359. The freight shipped and received in 1915 aggregated 876,432 tons. The total postal receipts were $461,044.26. Some of the prominent public institutions are the Kala¬

mazoo College, opened in 1855 under the aus¬

pices of the Baptist Church; Nazareth Acad¬

emy, Roman Catholic; Western State Normal School, Borgess and Bronson Hospitals, Tuber¬

culosis Hospital, Saint Anthony's School for Feeble-Minded Children, Michigan Asylum foi*

the Insane, Academy of Music, Fuller Theatre and the public library. Other prominent build¬

ings are the Y. M. C. A., the City Hall, several fine churches and the high school, also the County Court House and the Masonic Temple.

The government is vested in a mayor, public commissioners and a council of nine members, elected annually. The school board is chosen by popular election. Kalamazoo was settled in June 1829 by Titus Bronson of Connecticut.

It was incorporated as a village in April 1843, and for many years enjoyed the distinction of being the largest village in the United States.

It was made a city in April 1884. The water¬

works and electric-plant are the property of the municipality. Pop. 48,4 87.

KALAMAZOO, a river which has its rise in the northwestern part of Hillsdale County, Mich., and flows west and northwest into Lake Michigan. From the source to the city of Kala¬

mazoo it makes three southward curves, but from Kalamazoo the course is generally north¬

west. Its whole length is about 200 miles, only 50

of which are navigable. At the mouth is a good harbor for vessels of about 100 tons.

The water-power is extensive, and has been of great value in the development of the south¬

western part of Michigan. Allegan, Kalama¬

zoo, Battle Creek and Marshall are on this river.

KALANG.S, ka-langz', one of the primitive races of Japan who have now become pretty nearly extinct partially through intermingling with and absorption into the Japanese people.

Consult Meyer, (Die Kalangs auf Java* (Leip¬

zig 1877).

KALAPUYA, ka'la poo'ya, CALLA

POOYA, the family name of a group of In¬

dians tribes in northwestern Oregon, princi¬

pally in the Willamette River valley. They were of a decidedly peaceful character and con¬

sequently have not figured prominently in the history of the country. Never very numerous in historical times, the Kalapuya are repre¬

sented by descendants who are for the most part American citizens who have adapted them¬

selves to the ways of civilization. The Tak-

mint, Mary’s River, Santiam, and Yamhill on the Grande Ronde Reservation belong to this group. Consult Lewis, (Tribes of the Columbia Valley and the Coast of Washington and Ore-

gon) (Lancaster, Pa., 1906).

KALAT, KELAT, KHELAT, ka-lat',

capital of state of same name in Baluchistan.

It is about 90 miles in a southerly direction from Quetta. It has grown rapidly since 1900

when it numbered less than 2,000 inhabitants.

It was a walled town, but the population has lately spread beyond the walls. The residence of the Khan, a combined castle and fortress, is an imposing _ structure, but the town has nothing of the picturesque or prosperous about it. The British have retained a garrison at Kalat since 1854 and a resident agent with mili¬

tary escort since 1877. The town has become the centre of considerable local trade and is growing in importance as the centre of the caravan routes to Quetta, Khozdar, Gondava, Nushki and other centres of traffic. Kalat has a bazar which does an extensive local trade in the produce of the surrounding country and in native goods. Pop. about 18,000.

KALB, Johann, Baron de. See DeKalb,

Johann.

KALBECK, kal'bek, Max (<(Jeremias

Deutlich**), German dramatist, poet and critic: b. Breslau, 1850. In 1880 he went to Vienna with the intention of making literature his life work. There he became a journalist, working on several of the chief newspapers of the capi¬

tal and contributing lyrical and other poems to them and to magazines. He had already published a book of poems, (Aus Natur und LeberP (1870), before he had thought of going to Vienna. But the favorable reception ac¬

corded this first work stirred his ambition to be a lyrical poet. His newspaper work, how¬

ever, insensibly made him a critic ranking among the best in the capital, and this in its turn gave him an interest in ';he stage, which resulted in his

becoming a successful dramatist and librettist. His work as a critic had been begun before he went to Vienna and the result was the publication of (Neue Beitrage zur Biographie des Dichters Gun, ther* (1879).

This was followed by numerous other critical articles of a higher order than is generally pro¬

duced by even good newspaper critics. These embraced, among others, Wagner's (Nibelun-

gen) ; 'HarsifaP ; (Wiener Opernabende* and (>Opernabende.) Among his original produc¬

tions are (Die Maienkonigen) (1888) and (Das Stille DorP (1898). He translated or adapted to German numerous foreign dramas and works of librettists, among them being Massenet's 282

(Le Cid5 and (Werther) ; Verdi's

k-owsky. He also wrote an appreciative and critical biography of Brahms (1904).

KALCKREUTH, kalk'roit, Stanislaus,

Count, German landscape painter: b. Kozmin, 1821 ; d. 1894. He began life as a soldier and served as lieutenant in the First Guards Regi¬

ment from 1840 to 1845. Resigning from the service he went to Berlin and there studied painting under some of the most famous Ger¬

man teachers. He possessed a certain poetical and mystical bent which became early evident in his paintings which were highly idealized.

This gained him great popularity and won for him the appointment of art professor from William IV of Prussia (1859) and permission to organize the new art school, opened the fol¬

lowing year in Weimar. He became director of this school, upon which he stamped his in¬

dividuality for 16 years; during which he had considerable influence on the trend of art in Germany and Austria. But the day of Kalck-

reuth is already past, for his artificiality has become apparent to modern art critics. Among his best known and most popular paintings are (Lac de Glaube) (1855) ; (Canigai Valley>

(1856) ; (Rosenlaui Glacier5 (1878), all three in the Berlin National Gallery; (Lake in the Pyrenees5 (1858), in the Konigsberg Museum, and a notable series of landscapes in the Orangery near Potsdam.

KALE, or BORECOLE, a cruciferous

plant (Brassica oleracea, var. acephala), differ¬

ing from cabbage most strikingly in the non¬

formation of heads, the leaves being loose and free. It is largely cultivated as a pot-herb, especially in the South, where it generally with¬

stands the winter. It is rather coarse in texture and flavor, but frosts modify both somewhat.

In some sections it is extensively used for cattle-feeding. One of the largest producing regions is that in the vicinity of Norfolk, Va., which ships about 200,000 barrels to the markets each year. The varieties cultivated in America are nearly all treated as annuals, being grown from seed much like late cabbage. Some varieties, however, are perennial and may be propagated by cuttings, etc. For cultivation see Cabbage.

KALEEGE, ka-lej, or KALIJ, PHEAS¬

ANTS, a sportsmen’s name in India for the pheasants of the genus Genaus, which range along the foot-hills of the Himalayan range and eastward to the Ghina and down the Malay peninsula to Java. They are

of medium size, richly dressed, with flattened crests, naked cheeks and spurs on the male. White is con¬

spicuous in the plumage of most, so that they are sometimes called silver pheasants, especially the Chinese > species (G . nycthemerus) , fre¬

quently seen in parks and menageries. All are attractive as game birds, especially the Hima¬

layan white-crested and black-crested.

KALEIDOSCOPE, ka-li'do-skop, an op¬

tical instrument invented by Sir David Brew¬

ster in 1817. It consists of a tube through the length of which pass two mirrors or re¬

flecting planes, which are hinged together along one edge, and make with each other an angle of 180 degrees; while the one end is fitted up with an eye-glass, and the other is closed by two glasses, at a small distance from each other, between which are placed little frag¬

ments of glass or other colored objects. The eye looking into the tube perceives these ob¬

jects multiplied, and the slightest moving of the instrument produces new figures.

KALENDS. See Calendar.

KALERGIS, ka-ler'ges, Demetrius, Greek

soldier and statesman : b. on the island of Crete, 1803; d. 1867. Educated at Saint Petersburg, he studied medicine at Vienna and Paris, but left his course unfinished to take part in the Greek War of Independence (1821), during which he was taken prisoner by the Turks. He took part in the revolution of 1845 and was forced to exile himself, spending the next three years in London. After the residence of some time in Paris, he became Minister

of War in the Mavrocordatos Ministry (1854-61), after which he was sent as Ambassador to Paris, where he played an important part in the negotiations which finally bestowed the throne of Greece on Prince George of Den¬

mark.

KALEVALA. The Romantic movement,

which in Germany began by the collection of folk-songs and fairy-tales, frequently led in the outlying countries to literary creations of national epics on the basis of actual epic songs.

Thus arose in Finland the (Kalevala, 5 syste¬

matically arranged by Dr. A. Lonnrot in 1835, and in 1849 totally rearranged and enlarged to 22,800 verses. Almqvist showed how Lonn¬

rot had eclectically glued together actual variants, sometimes composing himself a few lines in order to bridge over discordant pas¬

sages, more frequently rejecting verses which clashed with the general scheme he had in mind. However, if we disregard the unity of the Kalevala as a whole and the unimportant literary transitions, we have in Lonnrot's pro¬

duction an extremely valuable collection of Finnish heroic and magical songs, which throw a light upon the formation of a popular litera¬

ture among the Finnish tribes. Some archaeol¬

ogists have assumed that in this kalevala5

we have a documentary record of a primitive state of society, but Comparetti, with far more justice, holds that it is not an invariable docu¬

ment of antiquity, but reflects, in ever changing form, the intellectual condition of the simple folk not far removed from the time when these songs were

written down. Therefore it is not correct to speak of the (Kalevala5 as an epic, especially since the indeterminateness of images represented and the arbitrary personi¬

fication of nature permit no set classification.

The Finnish mythology is based on shamanistic polydaemonism and is not as highly developed as it was among the Romans, Assyrians or other cultured nations of antiquity, hence it yields no well-defined theogony. Similarly the hero is not always to be separated from the poet and magician, and his chief exploit con¬

sists in song competitions, as is the case with the shamanic wizard, or in wooing of the bride.

The most cherished possession of such a hero is the sampo, a treasure which is hazily iden¬

tified with a precious casket or a mill, but which Comparetti takes to be a Scandinavian word meaning ((the commonwealth,55 and which KALEVIPOEG — KALINGA

here has become a concrete object to be striven for. Just as indefinite is the Kalevala, the country of Kaleva, one of the heroes, though some authors take it to be ^Finland,® while the Pohjola, with which it is in conflict, has been supposed to represent the country of the North or the abode of the dead. But, while the Kalevala loses in importance as a national epic with a well-sustained plot, it justly main¬

tains its place in popular literature, on account of the vivid imagery displayed by the popular poet.

The poem is now accessible to English readers in several translations: (The Kalevala, the Epic Poem of Finland, } rendered into Eng¬

lish by J. M. Crawford (2 vols., New York 1888); (Kalevala, the Land of Heroes, } trans¬

lated from the original Finnish by W. F.

Kirby (London 1907, in (Everyman's Library,*

2 vols.). Selections from the (Kalevala) are given in Selections from the Kalevala,* trans¬

lated from a German version by J. A. Porter (New York 1868) ;* (People of Finland in Archaic Times, * by J. C. Brown (London 1892) ; (The Sampo, Hero Adventures from the Finnish Kalevala, * by James Baldwin (New York 1912). The best study of the poem is still that by Comparetti, (The Traditional Poetry of the Finns,* translated by Isabella M.

Anderson, with introduction by Andrew Lang (London 1898). The obligation of Long¬

fellow's (Hiawatha* to the VIII, 1856).

Leo Wiener,

Professor of Slavic Languages and Literatures, Harvard University.

KALEVIPOEG, ka-la've-peg (son of

Kalev), the chief Esthonian epic poem, based upon popular songs collected by Kreutzwald (1857-59). As the material used by the col¬

lector was destroyed, much discussion has re¬

sulted as to the position occupied by the poem among real national epics. Consult Kirby, (Hero of Esthonia and Other Studies* (Vol.

I, London 1895) ; Reinthal, (Kalewipoeg, eine estniche Sage) (including the text of the poem with a German translation, Dorpal 1857-61).

KALGAN, kal-gan' (Chinese, Chang-Kia

K'ow), a walled city in the province of Pechili, China, about 125 miles northwest of Peking and at an elevation of 2,800 feet above sea-level.

With a population of 80,000 or more, it is an important centre of local trade and the dis¬

trict centre of the overland tea commerce which is carried on by the use of immense caravans of camels. Its local trade extends into the Mongolian territory and to Shensi and Kansu to the west, and to Peking, with which it is connected by rail to the southeast.

KALHANA, kal'ha na, a noted Sanskrit

writer, author of (Rajataragini,* the chronicle of the kings of Kashmir.

KALI, ka'le, a Hindu goddess represented with four arms, wearing a necklace of skulls, and the hands of slaughtered giants round her waist as a girdle. Her eyebrows and breast appear streaming with the blood of monsters she has slain and devoured. One hand holds a sword, another a human head. She is the goddess of death and destruction, and goats and other animals are sacrificed on her altars.

KALIDASA, ka-li-da'sa, the greatest poet and dramatist of India and one of the great world poets. Native tradition assigns him to the 1st century b.c., but western 'scholars place him as late as the 6th century a.d. He was one of the nine <(gems,® or poets, at the court of King Vikramanditya, in Ujjain, but the fact that several monarchs were so named makes his date no more definite. The present tendency of scholars is to place him earlier than the 6th century *but not so early as the traditional date.

His most famous work is the drama (Sakun-

tala,* translated by Sir William Jones in 1789

and highly praised by Goethe. This translation helped to call the attention of the Occidental world to Sanskrit studies. Kalidasa wrote two other plays, the WikramorvasP and (Mala-

vika and Agnimitra.* His great lyrical mas¬

terpiece is the

ger), in which a cloud is made the envoy of a lover to his absent sweetheart. Other poems are (Ritu-samhara,* a poem on the seasons; the Kumara-sambhava,* in 18 cantos, and the (Raghuvamsa,* a eulogy of the great house of Rama, Prince of India. Many other works have also been attributed to him with various degrees of probability. His literary value has long been conceded. He excels in artistic form and his conceptions are full and rich. Edi¬

tions and translations of Kalidasa have come forth in great number within recent years.

Consult Schuyler, (Bibliography of the San¬

skrit Drama) (New York 1906) ; Foulker, Ka¬

lidasa: A Complete Collection of the Various Readings of the Madras Manuscripts * (4 vols., Madras 1904-07) ; Pansikar, Kumarasamb-

hava,* with the commentary of Mallinath and Sitaram (5th ed., Bombay 1908) ; Cappeller, (Sakuntala, kurzere Textform mit Anmer-

kungen) (Leipzig 1909) ; Hultzsch, (Megha-

duta* (London 1911). Of the English ver¬

sions of the (Sakuntala* the following are of importance: Jones, Sir William, (Sacountala, or the Fatal Ring) (Calcutta 1789; London 1790; 1870); Monier-Williams, (Sakuntala, or the Lost Ring) (6th ed., London 1890) ; Ed-

gren, (Shakuntala, or the Recovered Ring) (New York 1894). There is a fairly complete bibliography of Kalidasa and a discussion of his date in Macdonell, (History of Sanskrit Literature) (London 1913). For details of Kalidasa’s life and period, consult Beckh, Kin Beitrag zur Texthritik von Kalidasa’s Megfia-

duta* (Berlin 1907) ; Bhao Daji, <(On the San¬

skrit Poet, Kalidasa,® in Journal of the Bom¬

bay Branch of the Royal Asiatic Society (Bom¬

bay 1860) ; Huth, (Das Zeitalter des Kalidasa*

(Berlin 1892) ; Seviratne, (Life of Kalidas) (Colombo 1901) ; Ray, (Age of Kalidasa,* in Journal of the Asiatic Society of Bengal (Vol.

IV, Calcutta 1908).

KALINGA, ka lmg'ga, a sub-province in

northern Luzon and also a tribe inhabiting it.

Part of the tribe has become partially civilized.

Among the members of this part agriculture is practised and metal work is carried on success¬

fully. They adhere to the Catholic faith and live much as the natives do on other parts of the island. Other members of the tribe live in the interior where they have little communica¬

tion with the whites and are, therefore, but im¬

perfectly known. They are reputed head-hunt¬

ers and tree-dwellers. The Kalinga are closely 284

related linguistically and racially to the Tin-

guians of the Abra.

KALINITE, a natural potash alum,

K2S04.A123.24 H20 occurring at various places in California and Nevada, but appar¬

ently not in sufficient amount to be a source of potash.

KALINJAR, or CALLINGER, kal-lin-

jar', India, a town locally known as Tarahti and a hill fort in the United Province^, divi¬

sion of Allahabad and district of Banda, 90

miles southwest of the town of Allahabad. It is a very ancient fort of Bundelkhand and its history reaches back through the three prehis¬

toric periods of Hindu chronology; and its present name of Kalinjar is very ancient. The summit of the hill on which it stands is about 1,200 feet above the plains below. At the southeastern base of the hill is a decaying vil¬

lage, which was formerly a place of consid¬

erable importance and the capital of a rajah-

ship. The whole summit of the hill, compre¬

hending a plain five miles in circuit, is encom¬

passed by an immense rampart of Mohamme¬

dan construction. It was surrendered to the British in 1812. There are a number of inter¬

esting caves, tombs, temples and statues here.

Very early in history it is recorded as one of the sacred places of India and pilgrims came to the shrine from far-distant places. The hill was covered with temples long before the erec¬

tion of the present fort ; and in the ramparts of the latter are carved stones from the ancient buildings. It was captured by the Mohamme¬

dans toward the close of the 13th century and since that date it has been the scene of many conflicts.

KALI.SCH, ka'lish, Isidor, American rabbi and author: b. Krotoschin, Prussia, 15 Nov.

1816; d. Newark, N. J., 11 Nov. 1886. Edu¬

cated at the universities of Berlin, Breslau and Prague, on the outbreak of the revolution of 1848, he left Germany and after a brief stay in London came to New York in 1849. For some years he officiated as rabbi in Cleveland, Cin¬

cinnati, Milwaukee, Indianapolis, Detroit and Leavenworth, Kan. In 1868 he established a school in New York, which did not succeed.

In 1870 he was called to Newark, N. J., as rabbi, and two years later to Nashville, Tenn.

In 1875 he returned to Newark, where he de¬

voted himself until his death mainly to literary work. He was a versatile author and his works cover a wide field, from a volume of German poems and a translation of Lessing's (Nathan the Wise) to a decipherment of a Phoenician inscription found near Sidon, a sketch of the (Sefer YetsiraP a Kabbalistic work. He took an active part in the American Jewish reform movement and was a frequent contributor to the Jewish press.

KALISH, ka'lish, Poland, a district of the republic, occupying the most western section of the country, which is quite flat and watered by the Prosna and the Warta. While agriculture is the chief occupation of the inhabitants and the land, which is fertile, is generally fairly well cultivated, the methods employed are somewhat primitive. Area 4,377 square miles ; popula¬

tion over 1,300,000, principally Poles. The capi¬

tal is Kalish, which is in the valley of the Prosna, not far from the old Prussian frcntiei.

It is noted for its annual, fairs.. Among its industries are milling, weaving, distilling, sugar refining and tobacco raising. It also produces excellent leathers and woolens. Pop. 55,000, mostlv Poles. Kalish, which was occupied by the Germans in 1914, was the scene of con¬

siderable severe fighting.

KALISPEL, or PEND D' OREILLE,

pan do' ra'y' a Salishan tribe formerly living in Idaho and Washington about Pend d' Oreille lake and river. When they became known to the whites they had already attained to consid¬

erable advancement along the lines of civiliza¬

tion. This was largely increased through con¬

tact with the Jesuit missions which began to be established among them shortly before the mid¬

dle of the 19th century. A few are still in Washington, but most of the tribe live upon the Flathead Reservation in Montana. Pop.

about 600. •

KALISPELL, county-seat of Flathead

County, Montana. It is on Flathead Lake and the Great Northern Railroa'd in a region of no¬

table scenic beauty. Boulevards constructed at the expense of the city connect it with the Gla¬

cier National Park, some 37 miles distant.

Farming, mining, lumbering and horticulture constitute the chief activities of the town and county. Pop. 6,000.

KALIUM, another name for the metal po¬

tassium, whence its symbol K is derived.

KALIYUGA, ka'le-yoo'ga (Sanskrit word

meaning age of strife), the fourth and last of the Hindu ages contained in a mahayuga or great yuga. According to the Hindu belief each succeeding age marked the increased moral and physical degeneration of all created things. Naturally, therefore, the

kaliyuga being the last of the ages of this constant degenera¬

tion, is the worst. It is believed to have begun in 3102 b.c. According to the followers of the Tantras, the Kaliyuga is the age of Kali, the goddess of epidemics and diseases of all kinds and more especially of cholera.

KALK, kalk, town on the Rhine, in the Rhine provinces, Prussia, across the river from Cologne. It is the scene of a large annual pilgrimage. Since 1910 it has formed a part of the incorporated city of Cologne with which it is connected by a fine bridge. It formed a part of Deutz until 1881 when it became a sep¬

arate corporation.

KALKAR, or CALCAR, kal'kar, Jan

Stephan von, German painter : b. Kalcar, Cleves, 1499; d. Naples, 1550. He eloped to Venice with the daughter of an inn-keeper or Dordrecht (1536) and there became a pupil of Titian. Sometime later he went to Naples, where he continued to reside and to paint ex¬

cellent portraits whose coloring were, at’ their best, little inferior to the best done by Titian.

Quite a number of his works have survived and bear testimony to the high esteem in which lie was held by his fellow painters in his own day and in succeeding generations.

KALKAS, kal'kaz, a people who at one

time formed a section of the eastern Mongols, but who now dwell in northeastern Mongolia.

They are nomadic in habits and typical of the nomadic inhabitants of the steppes. They are supposed to number about a quarter of a mil-

lion; but no definite census has been taken of them. Consult Haddon, (The Races of Man and their Distribution) (London 1910).

KALLAY, kol'li, Benjamin von, Aus¬

trian statesman : b. 1839 ; d. 1903. He was Consul-General at Belgrade (1869-75). In 1879 he became departmental chief in the For¬

eign Ministry, and in 1882 Minister of Finance.

In this connection it fell to his lot to have charge of the reconstruction of Bosnia and Herzegovinia which had been recently occu¬

pied. This latter office he held until his death ; and in the administration of it he showed much foresight and constructive ability.

Among his numerous published works is a good 1 History of the Serbs) (1877).

KALLINIKOV, ka-lm'i-kof', Wassili

Sergeivich, Russian musician : b. Voina, Orlov, 1866; d. Yalta, 1901. Graduating from the Philharmonic Society Music School at Mos¬

cow in 1892, he conducted the Italian opera there the following year. He also became active as a composer, but consumption forced him to the Crimea, where the disease finally took him off at the early age of 35 ; but not before he had shown signs of becoming one of the greatest of Russian composers. His work includes symphonies, symphonic poems, intermezzi, orchestral suites, songs and quartet and piano music.

KALMAR, kal'mar, or CALMAR, Swe¬

den, city, the capital of Kalmar Lan (county), on Kalmar Sound, at a place where the dis¬

tance to the island of Oland is not more than five miles. Kalmar is about 190 miles, in di¬

rect line, southwest of Stockholm. A part of the city is on the mainland and a part on two small islands. The town, which was formerly strongly fortified, though the fortifications are now in great part leveled, has a good harbor, a handsome cathedral, and a fine castle dating partly from the 12th century, in which, on 20

July 1397, the ((Union of Kalmar® was signed, which settled the succession to the kingdoms of Sweden, Denmark and Norway upon Mar¬

garet of Denmark and her heirs. The com¬

merce of the town is considerable, and it has manufactures of matches, chicory and tobacco, paper and some shipbuilding. Pop. 15,796.

KALMIA. See Mountain-Laurel.

KALMUCKS, a nomadic, warlike Mongol

race, inhabiting parts of the Chinese Empire, Siberia and European Russia. They have been great warriors from very early times, fought many bloody battles with the Tartars, with the Chinese and among themselves, and made predatory expeditions as far west as Asia Minor. They are intrepid soldiers, splendid horsemen, and troops of them are attached to almost every Cossack regiment. Physically the Kalmucks are small of stature. They number altogether perhaps 700,000.

KALNOKY, kal'no-ke, Gustav, Count:

b. Lettowitz, Moravia, 1832 ; d. 1898. At the age of 22 he entered the diplomatic service and was successively at Munich, Berlin, London, Rome and Copenhagen. Finally in 1880 he be¬

came Ambassador at Saint Petersburg, and the following year Minister of Foreign Affairs for Austria-Hungary, a post he held until 1895

when he became life member of the upper house. He bent all his energies to strengthen-

ing the friendly relations of his country with Russia and Italy, the latter of which he was instrumental in bringing into the Triple Alli¬

ance (Austria, Germany and Italy).

KALOCSA, ko'-lo-cho, a Hungarian grand

commone near the Danube and 100 miles south of Budapest, with which it is connected by rail. Population about 12,000, principally Mag¬

yars. Fishing and cattle-raising are the prin¬

cipal industries of the inhabitants, the fisher¬

men plying their trade in the waters of the Danube. The town has the usual buildings of a place of its size, among them being a hand¬

some cathedral.

KALONG. See Flying-fox.

KALP, kalp, Charlotte von, a German

literary woman: b. 1761; d. 1843. She was a great friend of Schiller whom she first met at Mannheim in 1784. Three years later she was instrumental in having him come to Weimar, which he and Goethe were destined to make one of the most famous literary centres of Europe. Schiller wanted to marry her, but she refused him. She was also a close friend of Jean Paul Richter, who portrays her as Linda in

ness. She finally found a protector in the Princess Marianne in Berlin. She left a novel, (Cornelia, } which was published by her daughter Edda in 1851, eight years after her death. This is believed to be, in part, an auto¬

biography. Consult Boy-Ed, (Charlotte von Kalb) (Jena 1912) ; Klarmann, (Geschichte der Familie von Kalb auf KalbsrietlP (Erlangen 1902) ; Kopke, (

Charlotte von Kalb> (Berlin 1852).

KALPA, in Hindu chronology, a day, or a day and night of Brahma, or a period of 4,320,000 or 8,640,000 solar-sidereal years. A •

great kalpa comprises the life of Brahma.

KALPA SUTRA, kal'pa soo'tra (San¬

skrit ritual manual), the Sanskrit work treat¬

ing of the ceremonial governing the perform¬

ance of Vedic sacrifice. It is also the name of the most sacred of all the Jainas religious works. .This work, which was written by Bhadra Bahu in the 7th century a.d. is still held in the greatest reverence. Consult Jacobi, (The Kalpa-Sutra of Bhadra bahtP (Leipzig; 1879) ; Macdonell, (History of Sanskrit Litera-

ture) (London 1913) ; Stevenson, (The Kalpa-

Sutra and Nava Tava) (London 1848).

KALPI, kal'pe, or CALPEE, British India, a town in Jalaun district, United Provinces, on the right bank of the Jumna, about 45

miles south-southwest of Cawnpore. The orig¬

inal town stood near the river on an elevated site, but repeated Mahratta incursions induced the inhabitants to remove it to its present position among extensive ravines, where there is a small fort, which commands the navigation of the Jumna. After a long period of decay it is again reviving, and it carries on a con¬

siderable trade, principally in cotton, and is noted for its manufactures of paper and re¬

fined sugar, the latter said to be the finest in the world, but too high-priced to be in general demand. During the Sepoy mutiny Kalpi be¬

came a principal rendezvous of the revolted Gwalior contingent, which was signally de-

feated, first by Sir Colin Campbell, in the vicinity of Cawnpore, on which it had previ¬

ously made an unsuccessful attack, and after¬

ward at Kalpi itself by Sir Hugh Rose, 26 May 1858.

KALSOMINE, or CALCIMINE (Latin,

calx, lime), a name given to the more common preparation used to whiten or otherwise finish the walls and ceiling of a house. The usual composition of kalsomine is zinc white and glue sizing mixed with water.

KALTAG, kal-tag', an unimportant Alas¬

kan Indian village on the Yukon River where it forms the east end of the Kaltag-Unalaklik portage on the land route to Nome and the Seward Peninsula by way of the Yukon Valley.

KALTENBRUNNER, kal'ten-brun'ner,

Karl Adam, an Austrian dialect poet : b. Enns, 1804; d. 1867. In addition to his dialect poems, which are still popular in Austria and Ger¬

many, he wrote a successful drama and con¬

siderable formal poems much inferior to his dialect writings. Consult Wihan, Josef, (Karl Adam Kaltenbrunner als Mundartlicher Dich-

ter> (Linz 1904).

KALUQA, ka-loo'ga, a government of

Great Russia, situated between the governments of Moscow, Tula, Orel and Smolensk. For the most part

the country is flat and inclined to be sandy; for this reason the chief product is hemp, though there is also considerable agri¬

culture along other lines. Vast extents of primeval forests which cover many parts of the country have as yet been exploited but comparatively little. Mining is being carried on to some considerable extent, especially in iron and copper ores. Of late years the manu¬

facturing interests of the country have ex¬

panded and broadened in variety. They in¬

clude the making of paper, matches, leather goods, iron products, leather, linseed oil and furniture. The yearly increasing commerce of Kaluga is carried on principally by waterways, the chief of which is the Oka River which traverses the country for over 200 miles. The capital of the district is Kaluga, a commercial centre of about 50,000. Area of government of Kaluga 11,942 miles. Pop. 1,500,000.

KAMA, ka'ma, the largest tributary of the Volga, rises in the Ural Mountains,' on the eastern frontiers of the government of Vyatka, in eastern Russia ; flows first north, then north¬

east into the government of Perm, then cir¬

cuitously south-southeast to the town of Perm, then southwest into the government of Kasan, and about 40 miles below the town of that name, after a course of about 1,200 miles, joins the left bank of the Volga, almost doubling its volume. It is navigable almost throughout its whole course, and a canal connecting it with a tributary of the Dwina, gives water commu¬

nication between the Caspian Sea and the Arctic Ocean.

KAMA, or KAMADiVA, in Hindu myth¬

ology, the god of love and marriage. The ac-

counts of his origin vary in the sacred writings of India. According to one authority he sprang from Brahma's heart. His wife is Rati or ^Pleasure.®

KAMAKURA, ka-ma-koo'ra, Japan, vil¬

lage, about 11 miles south of Yokohama. It is said to have been founded in the 7th century.

From about 1190 for 400 years it was the polit¬

ical centre of Japan, the residence of many of the shoguns and frequently the battle-ground for supremacy and power. Since the adoption of Tokio as the capital it has lost its political importance; but it is still much visited on ac¬

count of its beautiful surroundings, with many interesting relics of antiquity. See Daibutsu.

KAMAL-UD-DIN, Isma'il Isfahani, ka'-

mal-ud-den es'ma-el es'fa-ha'ne, a Persian poet active during t)he first half of the 13th cen¬

tury; d. 1237. He was born at Ispahan, but the date of his birth is uncertain. His father, Jamal-ud-din Abdur Razzak, was also a poet of some considerable reputation. After enjoy¬

ing to the full the pleasures of the world for a time, he finally turned his back on his wealth and high family connections, assumed the garb of a Sufi and took up his abode in a hut on the outskirts of Ispahan. There he was finally tortured to death when the city fell into the hands of Uktai Khan, son of Genghis Khan.

His most famous work is

sult Browne, (Literary History of Persia* (New York 1906) ; Gray and Mumford, (One Hun¬

dred Love Songs of Kamal-ud-Din of Ispahan*

(New York 1904).

KAMALA, a drug known, under vari¬

ous names, to Indian and Arab physicians, as a specific against the tapeworm. It occurs as a brick-red powder, adherent to the fruit of the euphorbiaceous plant Mallotus philip pinensis, formed by minute roundish, semi-transparent granules, mixed with stellate hairs. The active principle of the powder lies in the 80 per cent of resin it contains, which also supplies the coloring matter, called rottlerin, used as silk dye.

KAMBALU, kam-ba'loo (meaning in Mon¬

gol, <(the Khan’s City,® Kanbaligh) , the capital of China during the Mongol dynasty founded by Kublai Khan. The city was captured by Genghis Khan in 1215, and 51 years later his son, Kublai, made it his capital; and it con¬

tinued to be the seat of Mongol government for 108 years until Hung-wu finally succeeded in expelling the Mongols from the “Tartar City,® which later came to form a part of Peking. Marco Polo, who visited it in the 13th century, has left an interesting descrip¬

tion of it. Consult Marco Polo, (Travels*

(New York 1904) ; Yule, Henry, (Cathay and the Way Thither* (Hakluyt Society, London 1866). The city is also variouslv known as Kambaluc, Kanbalu, Cambalu and Cambalech.

KAMBODJA, kam-bo'ja, a Burmese tree

(Plumeria acutifolia) related to the oleander, which is commonly used as a shade-tree in the villages of that country.

KAMCHATKA, kam-chat'ka, or KAMT-

CHATKA, Siberia, a large peninsula of the Russian Empire, situated between the 50th and 60th parallels of latitude, 850 miles long from north to south, and of irregular breadth, the maximum being about 250

miles. It has an area of 104.260 square miles. The coasts are dangerous of approach on account of outlying reefs. A lofty range of volcanic mountains traverses the country in a southwesterly direc-

tion, vvith many peaks between 7,000 and 17,000

feet high. The snow line, in lat. 56° 40', is at an elevation of 5,260 feet. Dittmar, a Russian trav devoted three years to the exploration of the geology of Kamchatka. He traced five successive formations, and found 17 volcanoes in active operation. Numerous rivers have their rise in the heights. The Kamchatka, with its affluent the Yelovka, is navigable for 150

miles. The most fertile portion of the penin¬

sula for agricultural purposes lies along the valley of this river. The Russian settlers here raise oats, barley, rye, potatoes and garden vegetables, but the rest of the country is little adapted for culture. The climate' is very severe; the winter lasts nine months, and frost is common at all seasons. The mean annual temperature at Petropavlovsk on the east coast is 28.5°, while at Tigil on the west is 43°.

The average temperature of summer at the former place is 55.5°, and that of winter 19°, but the thermometer has been known to fall as low as 25°. Earthquakes are frequent and violent. Animal life is very abundant, and fish swarm in the seas and rivers. The wild ani¬

mals, still abundant in the more sequestered localities, are bears, wolves, reindeer, argalis or wild sheep, black, red and gray foxes, er¬

mines, sables and otters. Wild fowl are very numerous. The principal varieties of fish are herrings, cod and salmon. Whales are numer¬

ous in the adjacent seas. The mountains are covered with forests of birch, larch, pine and cedar, of considerable size in the south, but diminishing northward until the northernmost portion of the territory is covered only with reindeer moss.

The Kamchadales, the principal native tribe, are of diminutive stature, but stout, with flat features, small eyes, thin lips, lank black hair, * and scarcely any beard. They are a peaceable, honest, lazy and intemperate race. In winter they reside in sunken huts, in summer in dwellings elevated on poles some 13 feet from the ground. Their dress is well adapted to the changes of temperature, being of fur in winter and nankeen in summer. They are nominally governed by their own chiefs, under the jurisdiction of the Russian ispravnik or chief judge, and the most of them are Greek Catholics. Dog trains are used as the means of transport. The other principal tribe are the Koryaks, who live north of lat. 58°. While the Kamchadales are hunters and fishermen with fixed habitations, the Koryaks are a wan¬

dering tribe, subsisting on the produce of the reindeer, and differing from the Kamchadales in language and mode of life. The commerce of Kamchatka is chiefly with Okhotsk. Its ex¬

ports are furs, skins, oil, etc. Its imports are flour, sugar, dry goods, whisky, rice and coffee, almost all passing through the port of Petro¬

pavlovsk, the capital, on Avatska Bay. Pop. of peninsula, 7,270. Consult article by Barett-

Hamilton in the Scottish Geographical Maga¬

zine (Vol. XV, pp. 224-56), in which there is a bibliography.

KAME, low hills of glacial sands and

gravels arranged in stratified order. These hills are more or less isolated and frequently form ridges sometimes reaching about 100 feet in height above

the surrounding level country.

They are frequently found in the vicinity of the terminal moraines along the line of retreat of the Pleistocene continental ice sheets. See Drift, Glacial Period.

ka-ma"ha-ma'ha or

ka-me-ha'me-ha, the name of five kings of the Sandwich or Hawaiian Islands. Kamehameha I, surnamed the «Great» : b. 1753; d. Kailua, Hawaii, 8 May 1817. As head chief of part of the island of Hawaii in 1781 he subdued the entire group of islands and became ruler of the whole in 1811. He was progressive in his views and encouraged intercourse with Europeans.

He was succeeded by his eldest son, Kame¬

hameha II (Liholiho) : b. Hawaii, 1797; d.

London, 14 July 1824. He was intemperate but treated the missionaries kindly, professed Chris¬

tianity, and recommende'1 his subjects to do like¬

wise. Anxious to secure the friendship of Eng¬

land he went thither with his queen, Kamamalu, but both died soon after arriving in London.

He was succeeded by his brother, Kamehame¬

ha III (Kavikeaouli), surnamed the Good : b. 7 March 1814; d. Honolulu, 15 Dec. 1854.

He came to the throne in 1833, the islands having been ruled by a regency since 1824. He introduced a constitutional form of government in 1840, and the independence of the islands was acknowledged by the United States in 1842

and by Belgium, Great Britain and France in 1844. The more important public offices in his reign were filled by foreigners. He was suc¬

ceeded by his adopted nephew, Kamehameha IV (Alexander Liholiho) : b. 9 Feb. 1834; d.

Honolulu, 30 Nov. 1863. He married in 1856

Emma, adopted daughter of Dr. Rooke. In 1860 he founded the Queen’s Hospital in Hono¬

lulu, personally soliciting subscriptions for this object, in which he took the deepest interest. His elder brother, Lot Kamehameha, succeeded him as Kamehameha V: b. 11 Dec. 1830; d. Hono¬

lulu, 11 Dec. 1872. He proclaimed a new con¬

stitution (less democratic than its predecessor), in 1864, satisfactory to the majority of the Hawaiians but distasteful to the foreign popu¬

lation. He never married and left no heir to the throne.

KAMEHAMEHA, Order of, an Hawaiian

secret society founded in Honolulu in 1864 by Kamehameha V, the then reigning king of the Sandwich Islands. The order is divided into three classes. The badge of the order is a white enameled cross with gold rays surmounted by a crown.

KAMENETZ-PODOLSK, ka-me-nyets'

po-dolsk', capital of Podolia, Russia, situated on the Smotritch River, 235 miles northwest of Odessa. It was, at one time, one of the strong¬

est fortresses in Poland, and to the west of the city there still stands an ancient and massively-

built castle, the fortifications of which, together with those of the city, were destroyed in 1813.

It was held by the Turks in the 17th century and became part of Russia in 1795. ■ At present it is divided into two distinct parts, one of which lies at the foot of the mountain and the other of which

crowns the heights above. It is an important religious centre, being the resi¬

dence of a Roman Catholic and a Greek Church bishop. Pop. 50,000, about half of whom are Jews.

KAMERUN, ka-me-roon'. See Came-

ROONS.

KAMES, irregular hills of stratified drift formed near the ice front, either from super¬

glacial or subglacial drainage. In rare cases they may have been formed under the ice.

They are frequently associated with eskers, though the two terms are not to be confused.

KAMES, Lord. See Home, Henry.

KAMICHI, ka-me'che, the horned screamer (Palamedea cornuta). See Screamer.

KAMIMURA, Hikonojo, Baron, Japan¬

ese admiral: b. Kagoshima, 1849; d. 7 Aug.

1916. He joined the navy in 1871, rose to com¬

mander and was later captain of the cruiser Akitsushima in the war with China. He was rear-admiral in 1899, and in 1903 became vice-

admiral and Chief of the Educational Bureau.

As commander of the armored cruiser squadron he served in the Russo-Japanese War, defeated a Russian fleet off the coast of Korea and later took a prominent part in the battle of Tsushima, when the Russian fleet under Rojdestvensky was destroyed. He spent three years in England (1900-03) as chief Japanese naval inspector.

He was created a haron in 1907 and became admiral in 1910. It is believed that he led the attack on Tsingtau against the Germans in 1914.

KAMINISTIQUIA, ka-mi-ms-tike'a, a

river in Canada which has its rise near Lake Nipigon in the province of Ontario, and flows south into Thunder Bay, an inlet of Lake Su¬

perior. The town where the Canadian Pacific Railroad crosses this river is named after the river. Along its course are several expansions of the river or lak , and the Kakateka Falls.

Before the railroad entered this section this river and its tributaries formed important routes of travel to the northwest.

KAMLOOPS, Canada, city in the province of British Columbia ; on the Thompson River at the junction of the north and south branches, and on the Canadian Pacific Railroad ; about 255 miles northwest of Rossland and 250 miles northeast of Vancouver. The place where the city now stands was once used as a trading post by the Hudson’s Bay Company, but a permanent settlement was made in 1820. Its growth was slow until mining began in the vicinity, and in 1892 it was incorporated. It has lumber mills, railroad and machine shops, foundry, brick¬

yard, cold storage and ice plant, brewery and a sash and door factory. The waterworks and the electric-light plant are owned by the city.

The government seat for the Yale District is Kamloops, and the Dominion and Provincial governments have here land and registry offices.

It has a mild climate, and in the vicinity in the river valley are many fine farms. Nearby are mountains and small lakes noted for the beauty of their scenery. Pop. 3,772.

KAMLOOPS TROUT, a name given to

a variety of the Steelhead of the rivers of British Columbia. See Steelhead.

KAMPANERTHAL, kam-pan'er-tal', a

work on the immortality of the soul by Jean Paul Richter.

KAMPEN, kam'pen, or CAMPEN, Jacob

de, Dutch Anabaptist leader. When he and his followers were driven out of Upper Germany, they attempted to diffuse their dogmas over the low 'countries. In 1534 John of Leyden nominated him bishop of Amsterdam, but on attempting to take possession of his see, he met with a cruel death at the hands of the people.

KAMPEN, or CAMPEN, Jan van (so

called from the town of Kampen), Dutch scholar: b. Kampen, Holland, about 1490; d.

Freiburg, 1538. He was professor of Hebrew at Louvain, 1519-31. He wrote a Latin para¬

phrase of the Psalms, which has been trans¬

lated into the chief European languages.

KAMPEN, Nikolaas Godfried van, Dutch

historian: b. Haarlem, 15 May 1776; d. Amster¬

dam, 15 March 1839. He became professor of English and German in the University of Ley¬

den in 1815. Among his historical and literary works, many of which were translated into Ger¬

man, are: (History of the Literature of the Netherlands* (1812) ; (History of French Dom¬

ination in Europe) (1815-23) ; (Historv of the Influences of the Netherlands Outside of Europe* (1831-33). Consult: 'Life,* by S. R.

Von Campen (1887).

KAMPEN, or CAMPEN, Holland, a

town and port in the province of Overyssel, 45

miles east-northeast of Amsterdam, on the Yes-

sel near its influx into the Zuyder Zee, and where it is crossed by a bridge. Its principal buildings are a church of the 14th century, an elegant town-house, built in an antique style, and a theological school is located here. An¬

ciently it was one of the most flourishing of the Hanse towns; the silting up of the Yessel caused it to decline in importance; but its com¬

merce after a period of decline has again to some extent revived. It produces machinery, steam-engines, hosiery, paper, harness and bricks, etc. It has also ship-building yards.

Steamer service connects it with Amsterdam and other important centres, several canals in¬

tersect it, and a railway line from Germany through Zwolle terminates here. Pop. 19,745.

KAMPERS, Franz, German professor and

author: b. Oesede, Hanover, 16 Oct. 1868. He was educated at the gymnasia of Meppen and Essen-an-der-Ruhr and at the universities of Munster and Munich. From 1894 to 1902 he served as academic assistant at the Royal Pub¬

lic Library of Munich. In 1902-03 he was special professor, and since the latter year has been professor of mediaeval and modern his¬

tory at the University of Breslau. He is the author of many important historical works, in¬

cluding (Die tiburtinische Sibylle des Mittel-

alters) (1894) ; (Kaiserprophetien und Kaiser-

sagen in mittelalter* (1895, 2d ed., entitled (Die deutsche Kaiseridee in Prophetie und Sage,. (1896);

(1897) ; (Die lehninsche Weissagung fiber das Haus Hohenzollern* (1897) ; (Alexander der Grosse und die Idee des Weltimperiums in Prophetie and Sage* (1901; 2d ed., 1912); (Dantes Kaisertraum* (1908) ; (Karl der Grosse) (1910). He collaborates in and is joint editor of the Historisches Jahrbuch der Gorresgesellschaft and contributes to the Kolnische Volkszeitung.

KAMPF, kampf, Arthur, German painter :

b. Aix-la-Chapelle, 1864. Educated in art at the Dfisseldorf Academy, he soon showed strong individuality and attracted attention both as a portrait and historical painter. He is an excellent draftsman and has a good com-

mand of coloring. Among his historical paint¬

ings are 'Blessing the Volunteers of 1813 '

(Karlsruhe Gallery) ; (Frederick the Great Addressing his Generals) (Diisseldorf Gal-

s lery) ; (A People's Sacrifice) (Leipzig Mu¬

seum) ; and among his other paintings are sev¬

eral portraits of Kaiser William II ; 'Two Sisters* (Ravene Gallery, Berlin) ; 'Benev-

o!ence) ; 'Before the Chapel of Kevelaer) (Dresden Gallery) ; 'Bridge Building.* Kampf has also done some very fine mural painting, the most notable examples of which are in the Kreishaus at Aix-la-Chapelle and in the Royal Library, Berlin.

KAMPF UM ROM, Ein, 'A Struggle for

Rome,* one of the most noted of the novels of Felix

Dahn (q.v.).

KAMPHAUSEN, Adolf Hermann Hein¬

rich, a'do-lf her'man hm'riH kamp'how-zen, German theologian: b. Solingen, 10 Sept. 1829; d. 1909. He was educated at Bonn, in 1855 be¬

came secretary of Karl Josias Bunsen, whom he assisted in the latter's 'Bibelwerke,* and in 1863 was appointed professor of theology at Bonn. In 1871-90 he was active as a member of the theological commission for the revision of Luther's translation of the Old Testament.

He resigned all professional duties in 1901.

His publications include 'Das Lied Moses) (1862) ; 'Die Hagiographen des Alten Bundes nach den iiberlieferten Grundtexten iibersetzD

(1868) ; 'Das Buch Daniel* (1893) ; 'Das Verhaltnis des Menschenopfers zur israel-

itischen Religion) (1896). He also edited Daniel (1896) for Haupt's 'Polychrome Bible.*

KAMPTULICON (Greek kamptos, flex¬

ible, and oulos, thick), floor cloth made from rubber and powdered cork, the two substances being heated and pressed into sheets after mix¬

ing by being pressed between steam-heated cylinder rollers.

KAN-SU, kan-soo', an inland province of China, in the northwestern part; area, about 125,450 square miles. At one time Shan-Si, on the east, was a part of Kan-Su, and until 1865

its jurisdiction extended over a much greater extent of territory than at present. The capital is Lan-Chau. The province is rich in coal fields and in deposits of copper ore. Copper smelting works have been established at Yaokai, 70 miles west of the

capital under government auspices and hunting for the sake of the fur is one of the chief occupations. Tobacco of a superior quality is raised in this province. Pop. about 3,810,000. _

KANADA, ka-na'da (Sanskrit kana, atom,

ad, eat, atom eater), Hindu philosopher and founder of Vaiseshika (atomic school) in Hindu philosophy. He held the individuality of single spirits to be distinct from the supreme spirit. The name Kanada, which was giyen him in derision of his theories, by his enemies, was so descriptive of his philosophical methods, that it finally supplanted his real name. It has now become synonymous with deep and exact thinking. Consult Macdonell, `Flistory of Sanskrit Literature) (London 1913).

KANAGAWA, ka-na-ga'wa (Japanese,

golden stream), a Japanese town on the Bay of Tokio, not far from Yokohama. The seat of a prefecture, it was formerly of more im¬

portance than now. It was also at one time the vol. le — 19

official site of a treaty port. But in this latter office it has given way to Yokohama. Pop.

about 20,000.

KANAKAS, ka-nak'az, a popular name

given the natives of Hawaii, New Caledonia.

New Hebrides and other islands in the South Seas.

KANANUR, ka-na-noor', or CANNA-

NORE, British India, a seaport town in the district of Malabar, presidency of Madras, 44

miles northwest of Calicut. It became an im¬

portant centre of trade in the 12th and 13th centuries, and was visited by Vasco da Gama in 1498.

It has somewhat lost importance as a trade centre, ranking fourth among the ports of Malabar. Pepper, grain, timber and cocoa-

nuts are its main products. There is a fort of triangular area, built by the Dutch and oc¬

cupied by them till 1766. It was taken by the British in 1783. Pop. 28,957.

KANARESE, kan'a-res', a part of the Hin¬

dustan Dravidians who inhabit the Mysore table-land, a section of southern Bombay and a part of the Kanara territory. Their lan¬

guage which is highly developed and the vehicle of a very ancient civilization, possesses a litera¬

ture of some considerable extent and import¬

ance and serves as the popular speech of the 10,000,000 people of the Kanarese, who are ranked among the civilized races of India. See Dravidians.

KANARI, or CANARI, a tree of the

genus Canarium (q.v.), many species of which flourish from India to Australia and the Philip¬

pines. The foliage is abundant and handsome, and the wood is hard, heavy and suitable for cabinet work, house-trimming, etc. The fruit is a drupe with a hard oily kernel, which forms the particular food of the great cockatoos of the region. The kernel of C. commune, known as Java almond, is eaten by the natives either fresh or roasted; and the Amboinese dry it, grind it and bake the flour. Some other species also furnish edible kernels; and from all an oil may be pressed, said to be better than cocoanut oil, both for cooking and for use in lamps. An oil is obtained from the bark re¬

sembling balsam copaiba (see Copaiba).

These trees also yield the medical resin elemi, and

a gum called black damar.

KANARIS, ka-na'ris, Konstantine, Greek

soldier and statesman : b. on the island of Ipsara, in the Grecian archipelago, 1790; d. 15

Sept. 1877. He has been magnified into a sort of modern edition of the ancient Greek hero, on account of his venturesome deeds during the Greek War of Independence. Among his exploits were the blowing up of the staff ship of the Turkish admiral in the Strait of Chios (June 1822) ; the burning of the ship of the Turkish admiral in the harbor of Tenedos (November 1822) ; the burning of a Turkish frigate and transport ships carrying troops to Samos (August 1824) ; attempting to burn the whole Egyptian fleet in the harbor of Alexandria where it was making ready to transport troops to the Peloponnesus (1825). He was elected a member of the national legislature in 1827, and held important military positions up to 1848

when he became Minister of Marine and president of the Cabinet. At the age of 72

he took an active part in the revolution of 1862,

and even after this he held numerous important offices under King George. At the time of his death when he was 87, he was still president of the Cabinet and Minister of Marine.

KANAUJ, ka-nouj', or KUNNOJ, ancient

capital of the pergunnah of same name, in Farrukhabad District, India. The ruined vil¬

lage which to-day represents its ancient great¬

ness is situated on the Kali Nadi near its junc¬

tion with the Ganges. Kanauj (Kanyakubja) one of the

oldest and greatest of early Indian cities, dates back to 900 b.c. Even at this early date, and for over 2,000 years afterward, it continued to be the centre of intense Brahman activity. This and its other energies made it the chief of the cities of India. But from its conquest in 1193 by the Sultan of Delhi, it suffered one disaster after another until to-day it is simply a great ruin amidst which live a miserable straggling population.

KANAWHA (kat-na'wa) RIVER, a trib¬

utary of the Ohio River, has its rise between the Blue Ridge and Iron Mountains in the northwestern part of North Carolina, flows northeast by north through the southwestern part of Virginia, then changes its course north¬

west and west into West Virginia, and flows into the Ohio River at Point Pleasant. It re¬

ceives the Gauley River in Fayette County, West Virginia, and from thence to its mouth is known by the name of Great Kanawha. The river, at a cost of over $4,000,000, has been made navigable from the Ohio to Great Kanawha Falls, about three miles from the mouth of the Gauley River. It is about 450 miles in length.

KANAZAWA, ka-na-za'-wa, the largest

city on the western coast of Japan, on the main line railway, five miles from the sea. It was founded in 1583 and the fief, given by Hideyoshi to Mayeda, one of his captains, made thus feudal ruler of Kago, Noto and Etchiu (one city, eight counties, and 774,091 inhabi¬

tants), the wealthiest of all in Japan. Like other cities in Japan, it declined after the fall of feudalism, in 1871 ; but, like most of them also, regained prosperity with the help of Yatoi or foreign assistants, through manufactures, modern improvements and increase of the out¬

put of bronze and lacquer work, red decorated

pottery (kutani), and habutai (see Fukui) silk.

Its public buildings are notable and its re¬

nowned public gardens are the finest in Tapan.

The Kenroku Park of the Six Combinations —vastness, solemn solitude, labor bestowed, venerable moss-covered appearance, running water and charming prospect, is one of several places of recreation. Public library, commer¬

cial museum, and most of the features of a modern city are here. Hakusan, or White Mountains, and one of the most noted in all Japan (8,794 feet high), is in view. The thousands of pilgrims annually ascending it usually start from this place. Consult Guide to Eastern Asia, Vol. Ill (1914). Pop. 129,084.

KANCHIL, the smallest species of chev-

rotam (q.v.). It inhabits Java and neighboring islands, is less than a foot tall, and is proverb¬

ially quick and clever in its movements and hid¬

ing in the forest. Its scientific name is Tragu-

lus javanicus.

KANDAHAR, kan-da-har', or CANDA-

HAR, Afghanistan, one of the largest cities of the principality, on a fertile and well-culti¬

vated plain, 3,462 feet above the sea, 313 miles southwest of Kabul. It is enclosed by a mud wall 27 feet high, with a large tower at each of the four corners, 54 semi-cylindrical bas¬

tions, and a broad and deep ditch in front, cap¬

able of being filled with water from the river.

There are six gates, each protected by double bastions. The circumference of the city is over

three miles. One of the most imposing build¬

ings is the octagonal, domed structure contain¬

ing the tomb of Ahmed Shah. There are 180

mosques in the city. It is claimed that this city was founded by Alexander the Great.

Kandahar is famous for the fruits grown in the vicinity, and tobacco is cultivated for ex¬

port supported by the transit trade, but it has important manufactures of felt and silk It was held by the British in 1839–42, and again in 1879–81. Pop. estimated at 31,000.

KANDY, kan de, or CANDY, Ceylon, one

of the chief towns on the island, is situated near the centre, 72 miles northeast of Colombo at the height of about 2,000 feet. «Kandy is uniquely beautiful — the most charming little town in the world,® travelers usually describe it. It is situated in a valley surrounded by hills, and boasts an artificial lake, Buddhist and Hindu temples, including the Dalada Maligawa, the most sacred Buddhist temple in the world.

This contains the so-called relic of Buddha's tooth, and also many ancient manuscripts writ¬

ten in Pali and Sanskrit. <(The Pavilion,® or official residence of the governor, is one of the finest structures in Ceylon. Kandy is connected by railroad with Colombo. The botanic gar¬

dens of Peradenia are three miles from Kandy.

Kandy was the capital of the ancient kings of Ceylon. Pop. 30,148.

KANE, Elisha Kent, American Arctic

voyager: b. Philadelphia, 20 Feb. 1820; d.

Havana, Cuba, 16 Feb. 1857. He was graduated as M.D.

in the University of Pennsylvania in 1842, and shortly afterward became surgeon to the American embassy to China. After ex¬

tended travels in India, Egypt, and the con¬

tinent of Europe he returned to America in 1846, and was employed in the government sur¬

vey of the Gulf of Mexico. In 1850 he ob¬

tained the appointment of senior medical offi¬

cer to the expedition of two vessels, the Ad¬

vance and the Rescue, which sailed from New York on the 22d of May in that year in search of Sir John Franklin. On the return of the ex¬

pedition Dr. Kane published

Kane's command, sailed again from New York to resume the search, and proceeding up Baffin's Bay and through Smith's Strait, reached lat.

/8° 43′ N. Here the Advance remained frozen up for 21 months, and was finally abandoned because provisions were becoming scarce and scurvy and other diseases had made their ap¬

pearance. The object, now was to reach the Danish settlements in Greenland, about 1,300

miles distant. This long and perilous journey, partly in boats and partly in sledges, was ac¬

complished, after 10 weeks of severe privation, with the loss of only one man, and that by an accident. In 1856 Dr. Kane published (The Sec¬

ond Grinnell Expedition,* and was awarded

gold medals from Congress, the New York legislature and the Royal Geographical Society.

Consult Elder, (Biography of Elisha Kent Kane) (1857) ; Greely, (American Explorers >

(1894).

KANE, John Kintzing, American jurist: b.

Albany, N. Y., 16 May 1795; d. Philadelphia, Pa., 21 Feb. 1858. He was graduated from Yale in 1814, was admitted to the bar in 1817, entered practice in Philadelphia, was elected to the Pennsylvania legislature as a Federalist in 1823, later became a Democrat, and supported Jackson in the canvass of 1828. In 1845 he became attorney-general of Pennsylvania, in 1846 United States district judge for Pennsyl¬

vania, in 1856 president of the American Philo¬

sophical Society. He won distinction by his legal attainments and his decisions in patent and admiralty law, but his commitment of Passmore Williamson for contempt of court in an action under the Fugitive Slave Law was attacked by the Abolitionists.

KANE, Paul, Canadian artist : b. Toronto, 1810; d. 1871. He received his early art educa¬

tion at Upper Canada College, and was in¬

spired with the ambition to depict the Indians.

After spending some years in the United States, he went to Europe in 1841, studied art in Italy, and returned to Toronto in 1845. He made a transcontinental journey in 1846-47, in the course of which he visited many of the western tribes, and brought back with him some hun¬

dred sketches of great ethnological value, and developed later into an important series of paintings of Indian life and western scenery.

In 1859 he published the literary result of his travels, (Wanderings of an Artist among the Indian

Tribes of North America,* illustrated by his own sketches.

KANE, Sir Robert John, Irish chemist:

b. Dublin, Ireland, 24 Sept. 1809; d. there, 16

Feb. 1890. He was educated for th: medical profession and in 1832 became a member of the Royal Irish Academy. In the same year he founded the Dublin Journal of Medical Science and was its editor for two years. From 1834

to 1837 he was professor of natural philosophy to the Royal Dublin Society; in 1846 originated the Museum of Industry in Ireland. He was knighted the same year, was president of Queen's College, Cork, for several years prior to his resignation in 1873, and in 1876 was elected president of the Royal Irish Academy.

He wrote (Elements of Chemistry * (1842) ; Undustrial Resources of Ireland1* (1884), etc.

KANE, Pa., borough in McKean County,

on the Baltimore and Ohio, tl e Pennsylvania and other railroads, 95 miles southeast of Erie, 175

miles north of Pittsburgh and 122 miles from Buffalo. There are here several of the largest window glass factories in the world, plate glass and bottle factories, lumber-mills, wooden-ware factories, saws, cutlery, screen doors and win¬

dow factories and other flourishing industries.

There are extensive natural gas and oil wells and deposits of silica in the surrounding coun¬

try which are of great commercial benefit to the town. On account of its elevation of 2,200 feet, Kane is an attractive summer resort, with good hunting and fishing grounds in the vicinity.

It was first settled in 1859 and became a borough in

1887. The government is vested in a burgess and a council of nine members elected every three years. Pop. (1920) 7,283.

KANEKO, ka'na-ko (Viscount) Kentaro,

Japanese statesman: b. Fuknoka, 1853. He came of an old Samurai family, and receiyed foreign education in the United States, being graduated from the Harvard Law School in 1878. He began his career as a professor in the school that was the forerunner of the Tokio Imperial University. In 1885 he became private secretary to Prince Ito, then Premier of Japan; was sent abroad for the purpose of investigat¬

ing constitutional systems ; served as president of the Privy Council (1888-90), and chief secre¬

tary of the House of Peers, 1890. Two years later, he was a delegate to the International Law Conference in Switzerland. He was vice-

minister for agriculture and commerce in 1894; minister of the same department in 1898, and in 1900 Minister of Justice. During the Russo-Japanese War (1904—05) he was non-

official representative of his government in this country, and a powerful factor in effecting the peace negotiations at Portsmouth. In 1890

Kaneko was made baron, after the war, was created viscount, and appointed Privy Coun¬

cillor.

K'ANG-HI, or KANG-HSI, the sec¬

ond emperor of the Ta Tsing dynasty estab¬

lished in China by the Manchu Tartars : b. 1655; d. 1722. He began to reign in 1661, under a regency and assumed the reigns of government in 1669, when only 14 years of age. When he was 19 he was forced to face a rebellion of the Chinese under Wu San-Kuei,

which spread throughout the whole vast empire. But K'ang-

Hi struggled against many very great difficulties and was finally successful in restoring the country to order and in even extending his au¬

thority to Khokand, Badakhshan and Thibet.

He proceeded to consolidate his power bv in¬

creasing the number of provinces to 18 and ex¬

tending his dominion most intimatelv over each of them. The Jesuits, who were welcomed by him, contributed to his victories by supplying him with the most modern cannon and arms then in use in Europe, and to the scientific glories of his court by the reformation of the calendar (1669), the taking of a complete census and the surveying of the whole empire. Under these and other influences K'ang-Hi became a great and consistent patron of art and litera¬

ture. In this field his energies, very active at court, extended to other literary centres of the empire. So strong became the influence of the Jesuits that Christianity was officially rec¬

ognized in 1692. A break, however, occurred with Rome in 1698, when the Pope decided against ancestor worship to which the emperor clung tenaciously as a vital part not only of his religious faith but also of his family creed.

The breech between the emperor and Rome continued to widen until finally the former is¬

sued an edict banishing from the country all the Christian missionaries who dared to differ from his own expressed opinion on these or other matters. Among the literary activities patronized by K'ang-Hi and supervised by him were the great Imperial Dictionary of Chinese; a concordance to all Chinese literature ((Pei-

Wen-Yun-Foo*) in 110 large volumes; two great encyclopaedias, the largest of which (the (Ku-Kin T'oo Shu-Tseih-Ching*) consists of 2i)2

over 5,000 volumes. For this latter vast under¬

taking movable copper type was used. These, though the most notable, were only a few of his many art and literary activities. He encour¬

aged commerce with foreigners and granted permission to the East India Company to es¬

tablish an agency in China (1677). Consult Giles, (China and the Manchus> (Cambridge 1912) ; Remusat, (Nouvelles Melanges asiatique) (Paris 1829).

K'ANG-WA, kang'wa', or KANG-HOA

(Japanese at the river mouth), an island situ¬

ated at the mouth of the Han River, Korea.

From a military point of view it is held to be of great importance, guarding as it does the waterway to Seoul, the capital. Modern war¬

fare methods have rendered it of much less military value than it possessed in the past when it formed the one great fortified place of refuge of the court in times of extreme danger due to the many invasions suffered by the country. During the independence of Korea it formed the place of deposit (in duplicate) of the archives of the government, which were kept in a strongly fortified Budd¬

hist monastery and guarded by clerical militia.

So strong was this place that the French, who had captured K'ang-wa, under Admiral Rose, were unable to take the island by storm and suffered a severe defeat and great loss though it was defended by only 5,000 Koreans. Five years later, however, the American Admiral John Rodgers, whose survey boats of

the United States squadron then in Korean waters, had been fired upon, landed a force commanded by Winfield Scott Schley and captured all five , of the forts. In September 1875, the Japanese, under similar conditions, stormed the place and dictated a treaty of peace. Naturally, being so intimately connected with the life of the court and the nation, K'ang-Wa and the immediate neighborhood are rich in historical and other monuments. Consult Griffis, W. E., (Corea, the Hermit Nation> (New York 1911) ; Ham¬

ilton, (Korea > (New York 1907).

K'ANG-YU-WEI, kang' yo-o'wa', Chinese

scholar and reformer: b. Canton, 1858. Com¬

ing under the influence of the missionaries he became greatly interested in western civilization which he studied deeply. This led him to be¬

come the leader of the Reform party in China.

His influence spread to all the provinces where it was especially strong in the schools of higher learning. This brought him to the attention of the court and he became the chief adviser of the emperor and the very spirit of the re¬

form movement of 1898, the failure of which forced K'ang into exile. Wandering about from Hongkong, to Singapore and other places in the east he organized the (

or Empire Reform Society, the object of which was to modernize China. It was ex¬

tended to England, America and wherever Chinese were in strength, and played a very con¬

siderable part in the overthrow of the monarchy and the establishment of the republic (1911).

K'ang Yu-Wei and his associates had a power¬

ful influence in Republican China, especially in 1913. Among his published works are a (New Commentary on the Chinese Classics, > and (Modern Japan.)

KANGAROO, an Australian marsupial of

the family Macropodidce. The word is derived from a native name of the giant kangaroo.

The Macropodidce are readily distinguished from other marsupials by their shape. The head is small, with large mule-like ears ; the neck slender, the trunk narrow before and very massive behind; the fore limbs small and weak with five toes and used chiefly as hands; the hind limbs long, extremely powerful, four-toed and serving as the chief organs of locomotion; and the tail thick, heavy and muscular, serving to support the body, in combination with the hind legs, as on a tripod. The dentition is note¬

worthy, having a somewhat rodent-like appear¬

ance. There are three pairs of incisors above, presenting a sharp cutting edge which the sin¬

gle pair of lower incisors passes like the blade of a shears. The molars are flat-crowned. The kangaroos are strictly vegetarian, and in Aus¬

tralia represent the deer, antelopes and hares of other regions. About 50 species belonging to 12 or 15 genera have been described from Aus¬

tralia and the neighboring islands. The giant kangaroo (Macropus giganteus) , the largest, is frequently exhibited in zoological gardens.

This, the first of the kangaroos known to white men, was discovered by Captain Cook during his exploring voyage in 1770, and was described under the name Didelphys gigantea from speci¬

mens brought home by him. When standing erect in the attitude of scenting danger it is nearly as tall as

a man, and when in full flight propels itself by bounds of 12 to 15 feet. It often gathers into large bands, or did so form¬

erly, when more abundant. On account of its destructiveness to herbage on the sheep-ranges, as well as for sport, it is much hunted by the colonists, a favorite method being coursing.

When brought to bay by the hounds it proves no mean antagonist, and frequently kills a dog by seizing it in its arms and ripping it open with the great hind toe. As in other kangaroos the hind feet have a peculiar structure; the fourth toe is enormously developed and fur¬

nishes almost the sole support; the fifth is of moderate size; in sharp contrast the second and third toes are minute, slender and bound to¬

gether so that only their sharp claws project from the skin, their only function being to comb and cleanse the fur. The one or two young are born in an exceedingly helpless state, and after being placed in the pouch of the female remain attached by their mouths to the nipples for several weeks or months; at first they are quite incapable of sucking, and the milk is injected into their mouths by the period¬

ical contraction of the muscles of the mammary glands. Even after they are able to run about, they return to the mother's pouch for temporary rest and shelter. Closely related are the red kangaroo (M . riifus) and other species inhabit¬

ing the mountains, and the numerous species of large and small . wallabies or brush-kangaroos, some of which inhabit New Britain and New Guinea, as well as Australia. The genus Den-

drolagus includes the arboreal tree-kangaroos.

The large rock-kangaroos (genus Petrogale) dwell among rocks, leaping about them with great agility and using their long tails like a balancing-pole.

The rat-kangaroos (sub-family Potorince) are a small group of species some¬

what resembling rats and rabbits in size and habits. Thev are nocturnal and obtain their food largely by digging roots. Fossil forms are ex¬

humed from the Pleistocene rocks of Australia GIANT KANGAROO {Macropus ruf us)

KANGAROOS

1 Kangaroo Rat

2 Hypsiprymnodon

3 Tree Kangaroo

4 Rock Kangaroo

5 Hare Wallaby

6 Pademelon Wallaby

very similar to modern genera, but some of the older ones were much larger than any ex¬

isting species. Consult Waterhouse, (Nat. Hist, of the Mammalia) (London 1846) ; Gould, 'Monograph of the MacropodidaP (London

1841) ; and (Mammals of Australia) (London 1863) ; Flower and Lydekker, (Mammals Liv¬

ing and Extinct* (London 1891); Ingersoll, (Life of Mammals) (New York 1906), and systematic works.

KANGAROO GRASS (Anthistriria cili-

ata), an Australian fodder grass cultivated there and in India where it is highly esteemed.

It, like all its family, is very nutritious and

affords excellent pasture, the plant growing not only high but thick.

KANGAROO-RAT, a small and pretty

jerboa-like rodent of the southwestern

United States. It has very long and strong hind legs, and runs 'by a series of leaps with great swiftness. It inhabits arid re¬

gions, dwells in extensive burrows of its own digging, and feeds mainly upon sun¬

flower-seeds, great quantities of which are stored up for winter use, when the burrows are warmly furnished with grass. It belongs to the pocket-mouse family (Heteromyidce) and is named Perodipus ordi by systematists. Consult Stone and Cram, (American Animals) (1902).

Kangaroo-mice are smaller American

rodents of the genus Perognathus. See Pocket-

mice.

KANITZ, ka'mts, Felix Phillip, Hunga¬

rian archaeologist and ethnologist : b. Buda¬

pest, 1829; d. 1904. Well educated and pos¬

sessing private means, he traveled through Ger¬

many, Belgium, France and Italy and the south Slavic countries, devoting his time and atten¬

tion, for the most part, to the study of the archaeology, art and ethnology of these coun¬

tries. Finding his greatest interest, in these studies, in Albania, Herzegovinia, Serbia and Bulgaria, he deliberately determined to con¬

centrate his studies and investigations on these countries. Among his published works are (Die

romischen Funde in Serbien* (1861) ; (Serbiens byzantinische Monumente) (1862) ; (Reise in Sudserbian und Nordbulgarien>

(1868) ;

KANKAKEE, kan-ka-ke', Ill., city, county-

seat of Kankakee County; on the Kankakee River, and on the Illinois Central and the Cleveland, Cincinnati, Chicago and Saint Louis and other railroads, about 133 miles northeast of Springfield and 56 miles south of Chicago.

It was settled in 1850 and incorporated as a city in 1854. The water power of the Kankakee River is extensive at Kankakee, and as a result the city is largely engaged in manufacturing, and the water power is also used for electric¬

lighting plants and electric tramways. It is situated in an excellent agricultural region, and its good railroad facilities make it an im¬

portant commercial centre for a large extent of country. The chief industrial establishments are agricultural implement works, piano fac¬

tories, furniture factories, knitting- works, sew¬

ing machines and stone quarries. Some of the other manufactures are starch, flour, wagons, bricks, tiles, nails, foundry products, mattresses, cigars, some dairy products. The churches are two Methodist Episcopal, one Presbyterian, four Roman Catholic, one Lutheran, one Ger¬

man Methodist, one Reformed Lutheran, one Seventh Day Adventist and one Christian Science. The educational institutions are the public and parish schools, Saint Joseph’s Semi¬

nary, a Conservatory of Music and in Bour-

bonnais Grove, a suburb of the city, Saint Via-

teur's College and Notre Dame Academy. It has the Illinois Eastern Hospital for Insane and the Emergency Hospital, a public library, the Y. M. C. A. building, and the city buildings.

There are two national banks and two savings banks with a combined capital of over $300,000.

The government is vested in a mayor, who holds office two years, and a council of 10 mem¬

bers, one-half of whom are elected each year.

The council elects the administrative officials and the health and local improvement boards.

Pop. (1920) 16,721

KANKAKEE, a river of northern Illinois, which has its rise in English Lake, Starke County, in northern Indiana, flows west and southwest and enters Kankakee County in Illinois. From where it receives the waters of the Iroquois from the south, the course changes to the northwest until it enters Grundy County, where it unites with the Des Plaines River and forms the Illinois. Consult Twenty-

second Annual Report of the State Geologist of Indiana (1898, pp. 55-65).

KANNEGIESER, kan'ne-ge'ser, Karl

Friedrich Ludwig, German author and critic: b. Wendemark, 1781 ; d. 1861. Educated at Halle, he was a teacher from 1807-43. He wrote spirited lyrics and successful dramas; but much of his literary activity was given to translations from ancient and modern lan¬

guages. Among these are the (Divina Com-

media) ; Beaumont and Fletcher (1808) ; Dante's lyrics (1842); Horace's

KANO, ka-no', in the British protectorate of northern Nigeria, (1) the chief town and a province

of the extensive Sudanese sultanate annexed by Great Britain in 1903. Kano is the point of convergence of many caravan routes and is the principal market and centre of trade for the interior of Africa. Leather and cotton goods are extensively manufactured and dye¬

ing is carried on. On account of its industries Kano has been called the Manchester and Bir¬

mingham combined of the Dark Continent.

The annual attendance of the market at Kano exceeds 1,000,000 persons from all parts of Africa; Morrell estimates the attendance as twice as large. The market is held daily throughout the year and is believed to have ex¬

isted at this place for over 1,000 years. Sign language is largely used by the heterogeneous crowd in making bargains. In addition to native wares and produce, such as ivory and ostrich feathers, European merchandise and ammunition are on sale. The objectionable feature of the old market was the trade in slaves, but that has disappeared under British rule. The wall surrounding Kano is 11 miles in circumference, is 40 feet thick at the base, and from 40 to 50

feet in height. The houses are chiefly of 294

adobe and the streets are wide and clean. Kano was occupied by a British punitive expedition in 1903. Pop. about 100,000. (2) The province of Kano has an area of 31,000 square miles, and a population of 2,250,000. See also Sokoto.

KANSA, or KAW, kan'sa, ka, a Siouan

tribe, formerly living on the lower Kansas River in Kansas. See Kaw.

KANSAS, the 21st State admitted into the Union, has been an important pivot in Ameri¬

can history for more than half a century. The activities and achievements incident to its for¬

mation and development caused George Ban¬

croft, the historian, to designate Kansas as ((the miracle of the age.® Exclusive of Alaska, and the island possessions recently acquired, Kansas is the geographical centre of the United States, which fact inspired Senator Ingalls'

characteristic simile : "Kansas is the navel of the Nation.® The name of the State is derived from the Sioux Indian word ((Kanza,® mean¬

ing "swift wind® or ((smoky wind,® the latter significance being associated with an early period when prairie fires raged over the plains.

In the beginning Kansas was referred to as the "Sunflower State,® on account of the rank growth of that plant on the unbroken sod, but thi-3 distinction no longer applies because the sunflower is now a cultivated rather than a voluntary product. Another designation is the "Jayhawker State,® derived from a marauding bird indigenous to the locality. This nickname is perpetuated in the college yell of the Uni¬

versity of Kansas, "Rock-Chalk-Jay-hawk-K-U.®

The motto of the State is Ad Astra per Asp era, and its meaning exemplifies the State's history — ((Th rough difficulties to the stars.® The State is situated in latitude 37° to 40° N., long.

94° 40′ to 102° W. ; is bounded on the north by Nebraska, on the northeast and east by Mis¬

souri, on the south by Oklahoma, and on the west by Colorado.

Topography.— -Although a part of the great plains which form the eastern slope of the Rocky Mountains, the physical character of the Kansas country is best described as rolling prairie. There are no

mountains, and no marshes. The altitude varies from 750 feet in the eastern to 4,000 feet in the western part of the State. The bulk of the land is tillable, but crops are uncertain in the western third of the State on account of deficient rainfall. In this deficient area the vast stretches of prairie are largely used for grazing purposes. The rivers are the Kansas, Arkansas, Republican, Smoky Hill, Solomon, Saline, Neosho and Verdigris — none of them navigable. There are numerous smaller streams, giving abundant water and drainage in the eastern two-thirds of the State.

The land area comprises 82,080 square miles (52,531,200 acres), extending 408 miles from east to west and 207 miles from north to south.

Climate. — The climate is mild, the great proportion of the days being fair and sunny.

In summer the temperature ranges from 80°

to 100°, with cool nights, and dry, pure air.

In winter it rarely falls below zero. The vio¬

lent winds of winter and spring, known to the early settlers, have been greatly mitigated by I he cultivation of the soil and the planting of trees,

Mineral Resources.— These consist prin¬

cipally of coal, zinc, lead, natural gas, petro¬

leum, cement and gypsum. With the exception of the three last-named commodities the mining industry is chiefly located in the southeast corner of the State, embracing the counties of Cherokee, Crawford, Labette, Bourbon, Mont¬

gomery, Chautauqua, Neosho and Allen. Ex¬

tensive mines of coal are also found in Leaven¬

worth and Osage counties. The principal salt mines are in Reno County, and there are limited mines in

Ellsworth, Harper, Kingman and Rice counties. Building stone of excellent quality is found in various parts of the State. Under¬

lying the surface of Kansas are the three com¬

mon formations known as the Carboniferous, Triassic and Cretaceous systems, running from north to south, and dividing the State into three belts of nearly equal extent. In the year 1914 the values of the mineral products of Kansas were: Coal, $11,238,253; brick and tile, $1,905,961; salt, $924,550; stone, $825,607; lead, $194,043; zinc, $2,338,796; gypsum, $308,308; cement, $3,180,669; natural gas, $3,340,025 ; pe¬

troleum, $2,433,074; total, $26,689,286.

Kansas now ranks ninth among the States in the production of petroleum, her output for 1916 being estimated at 7,500,000 barrels. New fields recently developed in Butler County have a daily capacity of more than 35,000 barrels, from upward of 600 producing wells. Addi¬

tional development is in progress in other parts of the State, both in oil and gas. At the close of the year 1916 there were more than 3,500

wells in active operation and fully 300,000 acres of oil lands under lease.

Agriculture and Stock-raising. — The yields and values of the crops and products for the year 1917 were:

Winter and spring wheat,

bushels .

Corn, bushels .

Oats, bushels .

Rye, bushels .

Barley, bushels .

Emmer ("Speltz"), bushels _

Irish and sweet potatoes,

bushels .

Cowpeas, tons .

Flax, bushels .

Broom corn, pounds .

Millet, tons .

Sugar beets, tons .

Sorghum for syrup, gallons. . . .

Kafir, bushels .

Milo, bushels .

Feterita, bushels .

Sorghum hay, forage and

stover, tons .

Saccharine sorghum for seed,

bushels .

Jerusalem corn, tons . .

Sudan grass, tons .

Alfalfa, tons .

Tame hay (not alfalfa), tons.. .

Prairie hay, tons .

Wool clip,* lbs .

Cheese, pounds .

Butter, pounds .

Condensed milk, pounds .

Milk sold, other than for butter

and cheese .

Animals slaughtered or sold for

slaughter .

Poultry and eggs sold .

Horticultural products* .

Honey and beeswax, pounds. . .

Wood marketed .

Value

41,563,387

106,166,517

60,611,849

1,293,371

4,010,860

5,234

3,592,231

3,575

357,043

18,571,095

128,419

108,699

422,118

11,818,215

3,327,329

1,715,379

$85,679,211

120,540,411

36,612,776

2,203,521

4,013,793

3,466

5,183,229

57,200

964,016

2,495,999

1,280,641

694,754

295,483

16,809,378

4,753,391

2,481,448

4,802,380 27,986,475

598,235

3,507

62 , 065

3,069,548

*486,174

1,031,986

360,857

49 , 605

43,813,454

10,749,605

966,264

25,936

574,038

56,570,863

7,896,851

14,782,475

101,040

8,465

13,923,875

644,976

1 *654,962

. 81,289,411

. 14,159,909

. 2,251,434

1,256,836 227,921

. 92,476

Total value of all farm products . $507 , 225 , 488

- Product of 1916,

KANSAS.

Estimated population, 1,829,545

COUNTIES

Pop. Pop.

23,515 Allen . F 14 15,013

13,204 Anderson . E 14 3,013

27,227 Atchison . C 14 26,468

9,203 Barber . G 7 21,233

28,028 Barton . E 7 21,577

25,032 Bourbon . F 15 21,757

40,684 Brown . B 13 5,276

20,788 Butler . F 11 18,676

7,154 Chase . Ell 13,731

11,236 Chautauqua . G 12 49,824

36,370 Cherokee . G 15 11,810

4,114 Cheyenne.. . B 1 1,729

4.290 Clark . G5 18,309

14,902 Clay . C 10 23,050

19.316 Cloud . C 9 5,547

14,986 Coffey . E 13 10,393

4,608 Comanche . G6 20,072

29,979 Cowley . ....Gil 12,973

60,289 Crawford . G 15 11,605

7,502 Decatur . B4 8,651

25,339 Dickinson . D10 13,220

14,544 Doniphan . B 14 16,105

25,130 Douglas . D 14 11,642

6,734 Edwards . F 6 5,702

10,035 Elk . G 12 10,448

13,197 Ellis . D 6 16,915

10,481 Ellsworth . D 8 14,437

6,016 Finney . E 3 16,518

13,152 Ford . F5 10,596

22,103 Franklin . E 14 8,065

10,063 Geary . D 11 11,047

4,010 Gove . D 3 20,665

7,466 Graham . C 5 2,288

900 Grant . F 2 3,294

3,674 Gray . F4 64,498

913 Greeley . D 1 64,661

14,500 Greenwood . F 12 4,873

2,253 Hamilton . E 1 4,043

13.316 Harper . G8 15,308

18,663 Harvey . F 10 11,383

995 Haskell . F 3 824

3,165 Hodgeman . E 5 2,370

15,668 Jackson . C 13 28,027

15,769 Jefferson . C 14 3,996

17,165 Jewell . B 8 4,623

18,507 Johnson . D 15 11,904

2,316 Kearney . E 2 2,090

12,612 Kingman . G8 19,001

6,464 Kiowa . G6 1,519

31,014 Labette . G 14 20,067

2,120 Lane . D 4 9,331

40,625 Leavenworth C14 110,549

10,433 Lincoln . D8

Linn . E 15

Logan . D 2

Lyon . E 12

McPherson . E 9

Marion . E10

Marshall . B 11

Meade . . G 4

Miami . D15

Mitchell . C 8

Montgomery . G 13

Morris . Dll

Morton . G 1

Nemaha . B 13

Neosho . G 14

Ness . E 5

Norton . B 5

Osage . D 13

Osborne . C 7

Ottawa . C 9

Pawnee . E 6

Phillips . BO

Pottawatomie. . . .C 12 .

Pratt . G 7

Rawlins . B 2

Reno . F 8

Republic . B 9

Rice . E 8

Riley . C 11

Rooks . C 6

Rush . E 6

Russell . D 7

Saline . . . D 9

Scott . E 3

Sedgwick . F 9

Seward . G 3

Shawnee . D 13

Sheridan . C 4

Sherman . C1

Smith . B 7

Stafford . E 7

Stanton . F 1

Stevens . G 2

Sumner . G 9

Thomas . C 2

Trego . D 5

Wabaunsee . D 12

Wallace . D 1

Washington . B 10

Wichita . D 2

Wilson . G 13

Wilodson . F 13

Wyandotte . C 15

Incorporated Cities, Towns, and Villages 4,267

347

311

794

543

467

691

428

1,279

462

296

2,435

1746

*450

7,775

465

1,792

904

237

16,735

319

639

502

1.378

269

710

1,231

,408

454

269

310

1,343

478

817

2,216

3,240

411

239

402

206

334

249

636

1,326

258

1,541

612

261

4

778

736

235

410

Abilene . D 10

Agra . B 6

Allen . D 12

Alma . C 12

Almena . B 5

Alta Vista . D 12

Altamont . G 14

Alton . C 7

Altoona. . . . F 13

Americus . D 12

Andale . F 9

Anthony . G 8

Arcadia . F 15

Argonia . G 9

Arkansas City ...Gil

Arlington . F 8

Arma . F15

Ashland . G 5

Assaria . D 9

Atchison . B 15

Atlanta . Gil

Attica . G 8

Atwood . B 3

Augusta . F 11

Aurora . C 9

Axtell . B 12

Baldwin . D 14

Barnard . C 8

Barnes . B 11

Bartlett . G 14

Bassett, Allen… F 14

Baxter Springs . . . G 15

Beattie . B 12

Belle Plalne . G 10

Belleville . B 10

Beloit . C 8

Belpre . F 6

Benedict . F 13

Bennington . C 10

Benton . F 10

Beverly . D 8

Bird City . B 1

Blue Mound . . . . E 15

Blue Rapids . B 11

Bluff City . G 9

Bonner Springs . .C 15

Bronson . F 14

Brookville . D 9

Bruce, Crawford. G 15

Bucklin . F 5

Buffalo . F 13

Bunkerhill . D 7

Burden . G 11

1,474

2,251

417

723

655

222

2,215

3,104

659

456

840

978

596

12,455

746

252

348

662

1,149

4,235

1,899

559

269

554

3,742

|173

547

638

1,211

269

17,548

767

1,088

504

3,500

257

5.229

941

105

419

921

2,405

441

192

475

151

356

395

773

Burlingame . D 13

Burlington . E 13

Burns . E 11

Burr Oak . B 8

Burrton . E 9

Bushton . E 8

Caldwell . G 9

Caney . G 3

Canton . E 9

Carbondale . D 13

Cawker City . C 7

Cedarvale . G 12

Centralia . B 12

Chanute . F14

Chapman . D 10

Chase . E 8

Chautauqua Springs,

Chautauqua. . .G 12

Cheney . F 9

Cherokee . G 15

Cherry vale . G 13

Chetopa . H 14

Cimarron . F 3

Circle ville . C 13

Claflin . E 7

Clay Center . C 10

Clayton . B 4

Clearwater . G 9

Clifton . B 10

Clyde . C 10

Coates . G 7

Coffey ville . H 13

Colby . C 2

Cold water . G 6

Colony . E 14

Columbus . G 15

Colwich . F 9

Concordia . C 9

Conway Springs . . . G 9

Coolidge . El

Corning . B 12

Cottonwood Falls

E 12

Council Grove .. ,D 10

Courtland . B 9

Coy ville . F 13

Cuba . B 9

Cullison . F 7

Culver . D 9

Cunningham . F 8

Curransville,

Crawford . F 15

De Soto.. . . . D 15

Pop.

193 Bearing . G 13

212 Deerfield . F 2

879 Delphos . C 9

216 Denison . C 13

182 Denton . B 14

468 Dexter . G 11

272 Dighton . E 3

4,101 Dodge City . F 4

128 Doniphan . B 14

238 Dorrance . D 8

633 Douglass . G 1 1

I, 552 Downs . C7

320 Dunlap . E 12

283 Durham . E 10

268 Dwight . D 11

292 Easton . C 14

286 Edgerton . D 14

467 Edna . H 8

736 Effingham . B 13

2,710 Eldorado . F 11

653 Elk City . G 13

332 Elk Falls . G 12

1,032 Ellinwood . E 7

1,457 Ellis . D 6

1,982 Ellsworth . D8

255 Elmdale . Ell

235 El Paso, Sedgwick

F 9

249 Elsmore . F 14

652 Elwood . B 15

9,622 Emporia . E 12

446 Englewood…' . G5

778 Enterprise . D 10

1,202 Erie . F14

337 Esbon . B 8

808 Eskridge D12

624 Eudora . D 14

2,261 Eureka . F 12

416 Everest . B 13

413 Fairview . B 13

334 Fall River . F 13

1,258 Florence . E 10

246 Fontana . E 15*

205 Ford . F 5

412 Formosa . B 8

II, 442 Fort Scott . F 15

469 Fowler . G 4

1,256 Frankfort . B 11

151 Frederick . E 8

3,473 Fredonia… . F 13

108 Freeport . G 9

3,338 Frontenac . G 15

440 Fulton . F 15

5,926 Galena . G15

204 Galesburg . G 14

347 Galva . E 9

3,016 Garden City . F3

288 Garden Plain . F 9

514 Gardner . D 14

320 Garfield . E 6

1,999 Garnett . E 14

631 Gas . F 14

368 Gaylord . B 7

543 Geneseo . E 8

268 Geuda Springs. . .H 10

2,917 Girard . G 15

860 Glasco . . . C 9

506 Glen Elder . C 8

253 Goddard . F 9

343 Goff . B 13

1,742 Goodland . Cl

134 Gove . D 3

193 Grainfield . D 3

4,751 Great Bend . E 7

527 Greeley . E14

291 Green . C 10

797 Greenleaf . B 10

1,298 Greensburg . F 6

585 Grenola . G 12

638 Gypsum . D 9

412 Haddam . B 10

1,040 Halstead . F 9

325 Hamilton . F 12

205 Hamlin . B 13

1,000 Hanover . B*11

1,458 Harper . G 8

678 Hartford . E 12

282 Harvey ville . D 12

276 Havana . G 13

528 Haven . F 9

335 Havensville . C 1 2

565 Haviland . F 6

2,339 Hays . D 6

331 Hazelton . G7

259 Hepler . F 14

4,255 Herington . D 10

279 Herndon . B 3

2,878 Hiawatha . B 14

763 Highland . B 14

647 Hill City . C 5

1,223 Hillsboro . E 10

2,089 Hoislngton . E7

2,666 Holton . C 13

438 Holyrood . D 8

570 Hope . D 10

135 Horace . -El

3,839 Horton . B 13

1,080 Howard . G 12

532 Hoxie . C 3

251 Hudson . E 7

308 Hugoton . G 2

2,131 Humboldt . F 14

187 Hunnewell . H 10

200 Huron . B 14

20,753 Hutchinson . F8

14,506 Independence …. G 13

Pop. _ „

478 Inman . . E 9

11,068 Iola . F 14

388 Irving . B 11

245 Isabel . G 7

228 Iuka . . • • ■•F 7

462 Jamestown . C9

227 Jennings . B 4

391 Jetmore . E 5

839 Jewell . C 8

5,798 Junction City … .Dll

658 Kanopolis . D 8

99,437 Kansas City . C 15

608 Kensington . B 7

402 Kincaid . E 14

2,255 Kingman . '...F8

1,794 Kinsley . F6

954 Kiowa . H 7

584 Kirwin . Bo

767 La Crosse . Do

997 Lacygne . E 15

1,182 Laharpe . F 14

337 Lakin . F 2

220 Lancaster . B 14

323 Lane . E 14

2,900 Larned . E 6

287 Latham . F 11

13,324 Lawrence . D 14

19,363 Leavenworth . C 15

695 Lebanon . B 7

535 Lebo . E 13

414 Lecompton . D 14

366 Lehigh . E 10

423 Lenexa . D 15

447 Lenora . B4

385 Leon . F11

374 Leonardville . C 11

273 Leoti . E 2

773 Le Roy . E 13

412 Lewis . F 6

2,314 Liberal . G 3

283 Liberty . G 13

1,142 Lincoln . D8

1,953 Lindsborg . E9

373 Lihwood . C 14

625 Little River . :E9

670 Logan . B 5

225 Long Island . B 6

590 Longton . G 12

261 Lost Springs . . . .D 10

621 Louisburg . D 15

231 Louisville . C 12

658 Lucas . D 7

469 Luray . C 7

808 Lyndon . D 13

2,130 Lyons . E 8

371 McCracken . E5

662 McCune . G 14

438 McFarland . C 12

580 McLouth . C 14

4,057 McPherson . E 9

753 Macksville . F 7

629 Madison . E 12

201 Mahaska . B 10

288 Manchester . C 10

6,816 Manhattan . C 11

1,054 Mankato . B 8

266 Maple Hill . C 12

230 Mapleton . E 15

1,951 Marion . E H

751 Marquette . E 9

2.166 Marysville . B 11

279 Mayetta . C 13

764 Meade . G 4

1,304 Medicine Lodge. .. .G 7

415 Melvern . E 13

471 Meriden . C 13

912 Milton vale . C9

1,462 Mineral . G 15

1,922 Minneapolis . C9

448 Minneola . G 5

910 Moline . G12

685 Moran . F 14

252 Morgan ville . C 10

225 Morland . C 5

533 Morrill . B 13

718 Mound City . E 15

694 Mound Ridge . E 9

888 Mound Valley . . .G 13

516 Mount Hope . F 9

1,662 Mulberry . F 15

441 Mullinville . F 6

1,024 Mulvane . G 10

244 Munden . D 9

491 Muscotah . C 13

278 Narka . B 9

561 Natoma . C7

3,011 Neodesha . G 13

536 Neosho Falls . F 13

321 Neosho Rapids.. E 12

675 Ness City . E 5

327 Netawaka . B 13

238 New Albany . F 12

7,620 Newton . F 10

1.167 Nickerson . E 8

313 Niotaze . G 13

482 Norcatur . B 4

1,513 Norton . B 5

661 Nortonville . C 14

432 Norwich . G 9

1,651 Oakland . C 14

542 Oakley . C 3

1,019 Oberlin . B 3

275 Ogden . C 11

288 Oketo . B 11

3,335 Olathe . D 15

245 Olpe . . E 12

Hickman

;nesaw

OTOE o

Talmai^

Crete

SALINE I

Wilber

Stockville

Hayes Center

KEARNEY

a- Hastings/

ADAMjS

Imperial

KANSAS

MORE

Iloldrege

Tobias

.Mindeu c7T"b7

tecuiu*ek

Davenpo it

Lawrence

\\elson/

Statute Miles, 35 = 1 Inch,

10 20 30 40 _ 6C

Yrenfon

HITCHCOCK

FRANKLIN

iigmiaj^

Armour

HARLAi

S.Orleax

WEBS

Rand McNally's New 11 * 14 Map of Kansas.

Copyright by Rand McNally k Co.

REDWILLOW

Lester

Thlell Jc. l m

"T A To fcV/Summertiel

'a.'?0 !cet0 Mil

arietta

/Hull

lutchisoao I ilom&^__/

"C/. Lv$\

Padonia '

lovra Poiubj

Hlawjx\ha,

tkson

Herndon!

^woodruff

Cedar Bluffs

izes

Reamsville

Almena J^TLoug Island

PHILLIPS

NiPrairie View

'w^^sStuttgart

PriniipsburfT3^':'

LoC,Spee,J G^p.r-.p

CHEWENNE

,m',L / McD°,

y. /Ludell

o// Ait w ood

'R A'W LINS

/ Achilles

J 0 cChardon /

Linda Tu'lly°^-^tr

Norcatur

Jalvert

Lebanoi

``tJn

J E W E\L L K

Ionia^ V^ewell

^ RandalT'0'^

IPow- x £

hattank

TUantuwir

S' Kanona

C/0E CATUR J*

Sassett v ule 0 ;

Lund ^

Alf ./—h'esdenl

Sel den J~"'

'r^v°

^ Lucerne

.'S-H E R I D A N

L-^^^TDellvale

^..NORTON

MissougL-^

Lenora Edmond

r? ^^Bellairel

SMITH

lell

——^Gaylord

VxVHarliin

C«*X

itralia\0^

Corn in;

Barnes

buohawan

»V ok

NetaxTaki?T~

—»X—— sit»"

PACIFIC

TliisoK''

Jainesteg^e~— « _ ^ .

W*°—LA&»P

kherville -\Cla'

boi^o M"foor«'ALl

Nolan?

•^inJZ°~&ZicS

;WcHisqAA

Hawthorno^^/C

3Quickville

V arren ^ 1

'harlotte.

'lla'yenBvllle

Glebxxrne

Rex ford,

7

.^"7 .Moodjyill. /

^tg sWe9tmoreli

•arriflon , —

c POTTAWATOMIE \

vhStockdnle „ . £iumett

Xv^ O Flush

Rhine0

SHE

Cummings/ p,,ttei

Alton

Arrinfflun

I Holton, v __ _ ,Vft.v v „

f j ACKSOlN ViiUj*^t5^?T"Tc\'E"vEH

A f '-h cJ jJjEF PERSON , ^diwi

- X- — «r # / OrKuIoos a .^SSSrt

I Alcorn

ytlatte I,

•«`x ;■

LcavenwortJ

iaveiivti

NEon.1 MW. I«{

inSvn^^kj

Nicodemusl

ot\o^ Beloit

MITCHELL

Tipton Sin

Osho***^

OSBORNE

UNION

Cf. ROCK^

'SfeT

Lois

,vland Cl

G|R A HAM1

Wter Callison

Togoo

-J - &i?er _

Datum

Itenrexv

Idana oN- \v?&

c 1 a ycT3|

SOakhill

\ WakefteldSA d

Longford

_ \ _ clndustr U

xTillancTicster '

'tXf»lwaPe Allicl|

Orange

Louisvlllo0 4/A

; St.'VoiDe

,eor^o

—7SZrKlVE*'

.Pal co

Plainville

^.o Lamar'

^selu8 Sat/ng.

Victor

Kingery"

» Zurich PaCif^>

Natoma Cheyenne

Mm 1 ^rd

lT^unct^01

CodelT

AV abaun8ee

^/•Paxlco*

Jurkvillc,

Paradise

FinchVAkJFairport ^/(/c

'Wiles

VV^akeeney

L^v Vesper

[•mdota

\lnin

ACE %

Wallace

Lucas

^C/Tj City

reford

^ VGEARY

|eLyon\s'lalc _

Ti \S kiddy Ci.

I^1 Whit^V^^'T

City/\ Vtfjj

Hyacinth

S H AW fc

f-^v. Paulirei

iburnt»B2*r,w>|

WakarU«a-<

Carbondale,

Scranton^,

I ^ Sibley]

nd spjue Star- J

; DOUGL(/

J"; Baldwin Cityj

VyABANUNSEE - J

ya°ueu |

gJvAb^ssell Spring* Gove

I>etrx)it,

JJijE L L I S [■'»)

Catharine _ J

lentos^v o G^rhan

IlaySVSM'T'

, Antocim.

p— v 0 Munj'ur^^,'

Schoen^hen Pfeifer °~il^T*l I

OgaJLtlyi

Bosna ^ 3

R E G O Y

v wvv LOU(

Saline

R USSEL

11 ^XRuswc

VjN, N – –

Bunkerhill^;

Alalifax

^Aralland

/vita Vista

iiliL

KeQueu

lonita a–

Stilwelll

I Chances– Dinas0'^^

_ oStoc k h ° lup^uTde t; A Poe

! >Idney ^ oungsyimN. Sunny sidt

Hackbe ny° r

atalpa A °Jerich|

i vcr/m~r^>

V ancura |

Eakrid-^hT^

Bradfuru^Lj

HarveyvlUo

\ i Navarre

t1Wi' DlCKINl

IE A£4"Whcu°3^

•ance Elkhorn1

^U>SOn ,v\?olf

Janssen jr ^ -

Iellswo f

"^>Aorr«lne

'OcbeUreo

Smolan / y

SAL/IN.

Falun /Assuria^

Br/idgeport A

Smofry p»

SmokyBillj

Tweed

Ss-7^ni.?dingame o'

OS AG E *

r- I Michigan Y*U?TTf

I*> 1 ,OUQueu cTuTt/tlFT

arijlay Maxsonj/|,jon

Wiverlrj^gE

.riUll. Summit/*^

COFF/tV 1,

Sharped . If

| . , J.M

• ^r^Sk^we»tphf(a

1 11 gt Ol lioeviUelr

Earns Forth,

J.ottftwaL>ria-vV«

3^45v0oV®ot1

mood^ aUo

Princeton

FRAN\KL1N

iicbmondV- Lane

, w,uuci o o °

Locust Thelma

`o Pendennis!

Brownell

Carwood

Saunders *»

Liebenthal

Galatia

^ Shields

LANE

Ransom

Hampton,

V,

1 WICHITA

McCracken"

LYO.N

Read ii

i Atnoricxis ^

/n lEiit

CottFI?us00 *F&

W t o- rG 01-l

_ Burdick*

lVk

y7 oprinj.

Lincolnvill;

isawatomie

. \ Fontana

IMISSOURI

/Linds borg

TarnpiP

Durham /.

ov svvxi'qL • a>

Vxfeveat Benldd *

■i.^LTsAlliV R I

Amy

ATCH.

DigB'

iVater

^IGrigsbS

0j T T

■*£

^-A Friend S

l>o'.e a park.

Tg \La Cygne 11 >

Parker |\H

I DolcourtS 1 1

f Farlinville V , im

l.i i ° N \N • I co

^ L PleaeantoiAp^Yp

/1>lo'ifiuTcitJr 1 o

y Linton b-14-'

>s4lue Mound ^ II

Prescott

-MO— — - 7" "■ |*

MnpletonT' Pulton^ 'I

iot GUeelcy/l "

>Glonloali'* yP | (

Llr . .

Francis Wellman

a V

^ - ai.Uiversid<

co^°1lUy^T i

Aulne f Florence,

»Goessel

w.T.r^f^bcdy'

Division^

iji -"ir t

f^ii

UaskellY i

. o Conquest J ^

Oanica I

• Kearny/ I

| KEARN Y%j,

J _ w«1il'T=:-riLt<'ci

f°&d

° Terry toa

Aifaifu Eminence

Stowell

Federal

X?~~T Hodgeman^

'kidderville

hoIdgeman

Jetmore^r^

s/lnman

Moundridge*

Radium

■° 'raSew;

Ravanna

| HAMILTON

• Coolidge

urPVgeward f

a N Hudson ,

STAFFORD

a diet 11 Ni,

Madison

— Madison Jc.

Ruwcda HU1

Lar

tBbad

fZook

I lln we

HosstoU'

"tm; /

MildTedtS"

Bayard* 2

ijTne.r ori

Hanston P,0.

Fullertons

El bin;

^rop^rj

Eirmrr — }

Cassoday

Deerfield

SLJohn

BOURBION

Hamilton

La Ivin

o Aikmani

Keck S ^

■s ('eutori

lulncT,^^

SANTA,

lCeWA'X j

Meuno

EliaCtldgo ,

Utopia(

GREEN j

Eureka

Dlllwvrx^v^

'a<' '»iU.StaffocJ

d e''e /y/Lewls ij — —

_ _ — yj Bel|

^Arddl/HKinsley I Mai

outE/D\w A R D\S

y -r\ _ V d

ADx^o

*TPattersoDS

Mot at'

?r^6

ALLEN

.Humboldt

>< S«routu

I Leanna b

Durachen.

Darloxv ,

Castleton /

iP rorsba ,

)a V/ Mount

. .yPretty Prairie -

°n"/ ft o,t,

^Charleston i

ngalls 'ii

^s^gyFg <•<•,

Clmarroii£i ■ "I

Dotlgrt

GRAY

Tost Fntfgn^

s. J ?c\au4-L-S^Tia(.

o ntez itt)

■^ler C®ve1

Irene

/WOOD

K.J'onovay

MO'SgNcal

v °Faiuep

.0* \CUmox

Uedftel

Pierccville

ort ^

Ronald /» -.

ttville /OO/

e\\ Spearville,

attburg

'Kechi,

leLchcu

Toronto

Preston

y Natrona

/Ucd«M0-

T L E R

Ra.erhUl

Qrednwicji,

'Stricklcr]

Fisher

-■SfLa;

Buffalo,

Warrendale o

GRANT

?u^ New

/^TvlJlysses

^e^VIchita;

L«u«y_S, — —sfluFtF^

KimLiVS-'

9lia« /•' .

tiagtun?

,ut Eag levsle-

Benedict

VGuilfor'

^S.tU»Usi;t.T.t6uvgg„s°'FS'

° °rn 'rriv

^ Joll 1 1 SO 11

STANTON

[Augusta'

H A S K E L° L

I . ® Folsom

Buckli^^ —

^^Kingsdotrn

PACIFIC

rL

Clevdand P-0\;

whlowdale k I N (V

:ity

Xake City

\ Erit^

i • tiUrbnna

N&OSH

0,Ra\«*'

„ \

UorebeadXi

Gordon

PRATT *

L/vDgvalc Lawndale

— CQfrtiLsawyer.

io Greensburg

KIOWA

/ Croft

Bel vide re tf

Santa Feft

Toi''™^*su)

& J Satanta

Latham

GlrariL

lound l'r

) Benloh'

I vi^-

M. u-., Flcmi

5?,. PS,..

V.' : Ibuin

lEelmont »l«»t IlfV^Vtuk, (

Aati.aj TyV - (7| y ' L

4— RTiVlu|b'‘«'

a S r°p»i

Eo^n^—Apsou I

Spring^ Riverdale

Roanoke o

J HotvaYd./1'

' f V°o,

rP Moline / tM-

- Crooked

Helen

Har xr ood

Minneola

italne

look Cjt^^Atlanta) 1

sVc0yr^N^nl0t /

Sfi"/ y'

/ /New SaleinTCambrU

Xvii'IH'lfl /

h — -^TitfduUrN 1 I

W L EV Y/ I

Akney |

^^j/Viaton

prrw.1 ^Cameron City or

Townsend P.0.I4i

o. o Otto u

-'nCN '^f'e City _ '

Dennlsi

FowJer/

'-fcv -l lloj

^ca morel

LEthelton

Cleaverdale

Moscow

restola v

Rlchflel

Missler.

DuquoinVltuni

.Wilsonton/

TTrenola.^ ^ Oak Valley-

Wopdsdale.v/ Mosc

-'o T E V,E N S »p.

Lexingtol

CLARK

Ashlantl _ 12

Plain, /Meade ,

M E Ja D E

xcer<7V

lxford\

"Dalton

Medici iiev

o Lodge \ —

lead BARB E\R

Eagle YCtUI

Lasswello °

Hazeluon

"X. tT ,* iovva\/

Xjl^^dtner 3

/ Mbund-vtCT

f Valley /.Altamotlr^Lil

L>bprtJ § Oswego

■'■W LABETTE a

"yyilmUStr Car»e,(•

jLjrfcoldwater

Piotection Deei

'COMANCHE

M 0 R T 0 N/0^

Point Hocks ^vT.

MayCfte!d

C H A U T A U Q U A/I u,.l I H' 1 1 '1^1 J' 'S-

Spnngcrcek p 1 hoi ton/ /.mv

^^^LElgm^Chautauqxyl , y

.Hugo ton j!

Eraaton0 j

Lafayette i

Arkalon 1

Lakeland

/Faulkner

Bailor Spj

TrrrEje^: .

Unedao

Ikhart

Liberal

'.don9 Chetoj

Caldwell

Inglewoof

iHunnewell

\Yf Miami

o7r\A w a

Cimar]

Beaver

Avard

Puwhuska

ToHtk^

Xelagony ,l< ^

Carmen

DELAWARE

SHERMAN

>V ood xx a rd

Ochiltree

from Greenwich.

Longitude WestNH1

KANSAS — Continued

Fop.

SI 7 Onaga . C12

243 Oneida . B 12

2.S23 Osage City . D 13

2,870 Osawatomie . E 15

1,001 Osborne . C7

808 Oskaloosa . C 14

2,258 Oswego . G 14

9,127 Ottawa . D 14

641 Oxford . G10

268 Palco . C 6

3,392 Paola . D 15

394 Parker . E 15

172 Parkerville . D 11

15,468 Parsons . G 14

231 Partridge . E 8

458 Pawnee Rock . E7

1,401 Peabody . E 10

464 Perry . C 14

541 Peru . . . G 12

1,237 Phillipsburg . B 6

17,832 Pittsburg . G 15

1,008 Plainville . C 6

1,516 Pleasanton ..... E 15

467 Pomona . D 14

321 Portis . C 7

251 Potwin . F 10

294 Powhatan . B 13

180 Prairie View . B 6

3,797 Pratt . F 7

228 Prescott . E 1 5

278 Preston . F 7

379 Pretty Prairie . . . .F 9

721 Protection . G 6

630 Quenemo . D 13

289 Quinter. . . . C 4

259 Ramona . E 10

338 Randall . B 8

363 Randolph . C 11

201 Ransom . D 5

350 Reading . E 12

255 Redfield . F 15

427 Republic . . . . . B 9

53 Richfield . G 1

326 Riley . C 11

508 Robinson . B 13

7,498 Rosedale . C 15

396 Roseland,

Cherokee, . G 15

647 Rossville . C 12

1,601 Russell . D 7

115 Russell Springs. ,,D 3

1,856 Sabetha . B 13

12,098 Salina . D 9

221 Savonburg . F 14

2,364 Scammon . G 15

621 Scandia . B 9

772 Scott . E 3

236 Scottsville . . C 8

717 Scranton . D 13

1,454 Sedan . G12

673 Sedgwick . F 10

308 Selden . C 4

1,961 Seneca . B 12

334 Severance . B 14

635 Severy . F12

308 Sharon . G 7

645 Sharon Springs . . . D 1

202 Silver Lake . C 13

290 Simpson . C 8

1,405 Smith Center . B 7

Pop.

327 Soldier . C12

1,110 Solomon . D 10

433 South Haven ....G 10

387 South Hutchinson,

Reno . F 8

576 Spearville . F 5

252 Spivey . G8

540 Springhill . D 15

498 St. Francis . B 1

1,637 St. John . F 7

1,031 St. Marys . C 12

906 St. Paul . F 14

1,728 Stafford . F7

208 Stark . F 14

2,214 Sterling . E 8

1,291 Stockton . C 6

858 Strong . Ell

554 Summerfield . B 12

555 Sylvan Grove . D 8

593 Sylvia . F 8

900 Syracuse . FI

210 Tampa . E 10

501 Tescott . C 9

512 Thayer . G 13

954 Tonganoxie . C 14

48,726 Topeka . D 13

694 Toronto . F 13

320 To wanda . F 11

159 Tribune . E1

1,109 Troy . . .B 14

567 Turon . F 8

308 Tyro . G 13

323 Udall . G 10

256 Uniontown . F 14

356 Valley Center .... F 10

1,244 Valley Falls . C 13

295 Vermillion . B 12

181 Vining . CIO

f 1 63 Viola . F 9

702 Wakeeney . D 5

[520 Wakefield . C 10

[262 Waldron . G 8

620 Walnut . G15

207 Walton . E 10

1,572 Wamego . C 12

1,405 Washington . B 10

704* Waterville . B 11

709 Wathena . B 15

689 Waverly . E 13

2,159 Weir . G15

5,642 Wellington . G9

735 Wellsville . D 14

323 West Plains . G 4

469 Westmoreland . . .C 12

544 Wetmore . B 13

608 White City . Dll

563 White Cloud . . . . B 14

485 Whitewater . F 10

390 Whiting . B 13

70,722 Wichita . F 9

390 Williamsburg. . . .E 13

210 Willis . . .B 13

1,026 Wilson . D 8

457 Winchester . C 14

193 Windom . E 9

6,138 Winfield . G 11

302 Woodbine . D 10

367 Woodston . C 6

2,199 Yates Center. ... .F 13

KANSAS

295

Numbers and Values of Live Stock.

Number Value

Horses . 1,048,733 $125,847,960

Mules and asses . 271,254 36,619,290

s Milk cows . 580,213 43,515,975

Other cattle . 2 , 337 , 592 116,879,600

Sheep . 180,877 1,989,647

Swine . 1,356,703 27,812,411

Total value of livestock . $352,664,883

Kansas ranks high in the production of fruits, the horticultural products for the year 1916 aggregated a value of $2,2 51,434. The State is also a leading one in the growth of nursery stock.

Timber. — The forest tracts of the State are of limited extent, mostly confined to the intervals of the larger streams. In these are found elm, oak, black walnut, hickory, syca¬

more, cottonwood, catalpa and basswood, none of them in sufficient quantity to supply build¬

ing or manufacturing material, but affording a considerable amount of fuel. During the past year most of the walnut trees were utilized by the government in the manufacture of gun-

stocks for the use of the American army.

Animals. — Formerly the Kansas plains

swarmed with buffalo, elk, deer and antelope, making a vast hunting-ground. All of these have disappeared with the advance of civiliza¬

tion, and are now found only in parks.

The prairie chicken, quail, wild 'turkey, wild goose, squirrel and other small game, together with many varieties of birds, still are to be found.

Manufactures. — Kansas is an agricultural rather than a manufacturing State. The nat¬

ural resources for manufacturing are limited, there being no timber lands of consequence, and no

deposits of iron. The principal manu¬

facturing is represented by the flour milling and meat packing industries. New establishments such as brick plants, foundries, car shops and glass factories, have recently been attracted to the State by reason of the abundant supply of natural gas for fuel. The government cen¬

sus report for the year 1914 gives this sum¬

mary for Kansas: Number of manufacturing establishments, 3,136; value of products, $323,-

234,000; capital, $163,790,000 ; salaried employees, 7,526; salaries paid, $9,013,000; wage earners, 41,259; wages, $25,970,000; cost of materials, $261,148,000.

Banking. — There are 1,043 State and pri¬

vate banks and trust companies in Kansas, with deposits amounting to $266,290,140; and 236 national banks, with deposits amounting to $179,700,000; total deposits, $445,990,140.

Wealth and Property Values. — With a

per capita wealth of $2,652, Kansas ranks eleventh in the list of States, coming between Illinois and New York. The aggregate value of all property in Kansas is $4,581 ,091,918, in¬

clusive of property exempt from taxation. The values of property as assessed for taxation are : Lands and improvements, $1,447,882,799 ; lots and improvements, $457,924,219 ; personal prop¬

erty, $635,283,766 ; public service corporations, $439,803,853 ; total taxable wealth, $2,980,894,-

637. Kansas has no State bonded indebtedness.

Railroads. — The total mileage of railway tracks operated in Kansas is 9,572. The prom¬

inent lines and systems are Atchison, Topeka and Santa Fe, Union Pacific, Chicago, Rock Island and Pacific, Missouri Pacific, Saint Louis and San Francisco, Missouri, Kansas and Texas. The gross earnings of all Kansas rail¬

roads for the year 1916 were $87,885,658. No statistics of the roads are available for the period in which they were under Federal control.

Education. — The higher institutions of learning maintained by the State are the Uni¬

versity of Kansas, State Agricultural College, Emporia Normal School, Hays Normal School, Pittsburg Normal School and the Kansas School of Mines, Weir City. These are man¬

aged by a single board of administration, which also has charge of the schools for the blind and the deaf. The public schools proper are under the direction of a State Superintendent of Public Instruction and a State Board of Edu¬

cation. In 1897 the legislature prescribed State uniformity of school books, fixed the subjects and established prices. In 1913 provision was made for the State publication and distribution of such books, and a State School Book Com¬

mission was created. It is estimated that 1,000,000 school textbooks were printed by the State during the year 1917. There are 8,636 school districts in Kansas ; school popu¬

lation, 507,601 ; enrollment, 394,823 ; average at¬

tendance, 308,892 ; number of teachers em¬

ployed, 15,009; annual cost of public schools, $12,573,540; value of public school buildings, $27,927,740. The percentage of illiteracy in the State, 2.2, is smaller than that in any other State in the Union excepting Iowa, 1.7, Nebraska 1.9 and Oregon 1.9.

The colleges in the State, are Baker Uni¬

versity, Baldwin; Bethany, Lindsborg; Bethel, Newton; Campbell, Holton; Cooper, Sterling; Emporia, Emporia; Fairmount, Wichita;

Friends, Wichita; Highland University, High¬

land; Kansas City University, Kansas City, Kansas; Kansas Wesleyan, Salina; Midland, Atchison ; Ottawa University, Ottawa ; Sisters of Bethany, Topeka; Southwestern. Winfield; State Agricultural, Manhattan ; Saint Bene¬

dict's, Atchison; Saint John's,. Salina; Saint Mary's, Saint Marys ; University of Kansas, Lawrence ; Washburn, Topeka.

Religion. — A careful estimate shows the religious population to be 475,000. All of the denominations are represented, the Methodist being the largest numerically, followed in order by the Roman Catholic, Baptist, Lutheran, Dis¬

ciple, Presbyterian, United Brethern, Congre¬

gational, Friends, African M. E. and Evan¬

gelical Association. The moral standard of the population is very high, Kansas being one of the first States to adopt an amendment to its constitution prohibiting the manufacture and sale of intoxicating liquors. The State has also taken the lead in the adoption of many laws for safeguarding the public health and for the promotion of civic betterment.

Charitable and Penal Institutions. — The State institutions of this class and the. number of inmates of each are: Insane Hospital, To¬

peka (1,550) ; Insane Hospital, Osawatomie (1,363); Insane Hospital, Larned (102); Epi¬

leptic Hospital, Parsons (523) ; Home for Feeble-Minded Children. Winfield (627) ; Sanatorium for

Tuberculosis, Norton (23) ; Orphans' Home, Atchison (187) ; Soldiers'

Home, Dodge City (650) ; Deaf and Dumb School, Olathe (267) ; Blind Asylum, Kansas City (85) ; Mother Bickerdyke Home for Sol¬

diers' Widows, Ellsworth (87) ; State Peni¬

tentiary, Lansing (841) ; Industrial Reforma¬

tory, Hutchinson (420) ; Industrial School (girls), Beloit (152) ; Reform School (boys), Topeka (251). The Federal government main¬

tains a military prison and a branch of the National Soldiers' Home at Leavenworth.

Newspapers and Libraries. — Kansas has

727 newspapers, inclusive of 45 dailies, 565

weeklies, 2 semi-weeklies, 98 monthlies, 9 semi¬

monthlies, 8 quarterlies. Of public, institu¬

tional and college libraries there are 193, with a total of 1,244,794 volumes. Incomplete re¬

ports from 6,638 public school libraries increase this total by 669,821 volumes. There are 58

Carnegie-built libraries in the State, valued at $957,700, and 32 publicly-built libraries, valued at $1,076,350; total valuation of these buildings, $2,034,050.

Early History. — As early as 1541 Francisco de Coronado, commanding a Spanish expedi¬

tion, marched across the plains which are now a part of the State, and there are evidences of French and Spanish adventures in subsequent years. French fur

traders from Louisiana and Canada were in the country in 1700. In 1719

Du Tissenet, a French explorer, visited the valley of the Missouri, and he was followed by Spaniards from Santa Fe, who came to the present site of Leavenworth, where they were destroyed in a battle with Indians, this being the last attempt at Spanish occupation of the territory.

The Lewis and Clark expedition, planned by President Jefferson, reached Kansas in June 1804, and, two years later, the expedition com¬

manded by Zebulon Montgomery Pike, who gave his name to ((Pike's Peak.® crossed the territory from the Missouri River to the Rocky Mountains. The expedition of Maj. Stephen H. Long was made in 1819, and in 1824 was established the ((Santa Fe Trail,® the famous highway of Kansas, extending 400 miles di¬

rectly across the Territory, and from Inde¬

pendence, Mo., to Santa Fe, a distance of 780

miles. Col. John C. Fremont made his first expedition across the plains in 1842, blazing the way for an extensive overland travel to Oregon, California and Mexico.

The territory forming the present State of Kansas was a part of the Louisiana Purchase of 1803, except a fraction in the southwest corner acquired from Texas in 1850. Follow¬

ing the several expeditions referred to, and the opening of the Santa Fe trail, Kansas became Indian Territory, and remained such from 1830 to 1854. Within this period the outposts of civilization were being extended from the Mississippi River. The Indians of Missouri and other Mississippi Valley States were con¬

centrated and combined with the tribes already occupying the country west of the Missouri River.

These included the Osage, Shawnee, Pawnee, Delaware, Kicapoo and Kansas tribes, to which were added the Cherokee and other tribes from the States of the south, the Otta-

was, Pottawatomies, Wyandottes and others from Ohio, Michigan and Indiana. Occupation of the country by white settlers was fraught with peril and hardship, and only accomplished by marvelous heroism, perserverance and en¬

durance. To aid in the work of civilization missions were established on the frontier, and military posts located at Fort Leavenworth, Fort Scott and Fort Riley. These missions and posts are rich in historical and romantic in¬

cidents.

Territorial Days. — The admission of Kan¬

sas as an organized Territory dates from 30

May 1854, when President Pierce signed the Kansas-Nebraska Act. This brought on the political troubles of Kansas, and later, as a re¬

sult of the slavery agitation, precipitated the great armed conflict between the North and the South in 1861-65. It was on Kansas soil that the first battle was fought for the freedom of the negro, and it was Kansas that developed the heroic figure of John Brown, who struck hard for human liberty, and of whom a local poet, Eugene F. Ware, pronounced this epitaph : <(John Brown of Kansas :

He Dared Begin;

He Lost,

But Losing, Won.®

From the time Congress took the first step for the admission of Kansas, with or without slavery, the Territory became the scene of contention, pillage and bloodshed. The pro¬

slavery men of Missouri endeavored to gain control of the Territory in 1854, and established the first city, Leavenworth. Soon afterward an anti-slavery colony from Massachusetts set¬

tled at Lawrence. No more bitter factions ever struggled for supremacy on this continent.

Andrew H. Reeder, of Pennsylvania, was appointed to be the first governor of the Terri¬

tory. At the first contest for territorial delegate to Congress the slavery men of Missouri crossed the river and participated in the elec¬

tion, the candidate of the pro-slavery party being successful by reason of these illegal votes.

The Free-Soilers protested and held indigna¬

tion meetings at Lawrence and other points.

At the election in the spring of 1855 for rep¬

resentatives to the legislature, the Missourians repeated the same tactics. When the legisla¬

ture met at Pawnee the Pro-Slaverv members were in the majority, and controlled the pro¬

ceedings, even going to the extent of driving out the Free-Soil members and changing the seat of government.

The Free-Soil party repudiated the acts of the legislature and refused to abide by them.

Governor Reeder was removed from office and succeeded by Wilson Shannon, of Ohio. John W. Whitfield was elected delegate to Congress by the Pro-Slavery party, and ex-Governor Reeder chosen to the same position by the opposition, but Congress refused to give either delegate a seat. A Free-Soil constitution was adopted in December 1855, under which Charles Robinson was elected governor, but the election was repudiated by President Pierce, who had

recognized the (

Soil legislature ignored the action of President Pierce, and, to meet this and other menacing circumstances, the military forces of the United States government were placed in command of Governor Shannon, and Governor Robinson and Congressman-elect Reeder were indicted for high treason. The Pro-Slavery party received large accessions from Georgia, Alabama and South Carolina. In the troubles resulting from this conflict of authority the Emigrant Aid KANSAS

WMts',

, – „

, '

Capitol at Topeka

•

■

Society Hotel and the Herald of Freedom and Kansas Free State printing offices at Lawrence were destroyed, and the town of Osawatomie —the home of John Brown — was sacked and burned.

Struggles for Statehood.— A bill for the admission of Kansas as a State was passed by the Lower House of Congress in June 1856, but was defeated in the Senate on account of the recognition it gave to the Free-soil Con¬

stitution. A meeting of the Free-soil legis¬

lature in Topeka was dispersed by United States troops acting, under orders from Presi¬

dent Pierce. By this time the interest in the Kansas struggle became general throughout the United

States. The suppression of slavery be¬

came a national instead of a State issue. While Congress debated and legislated, the Pro¬

slavery and Free-State factions continued to war against each other for possession of the Territory and control of the law-making ma¬

chinery. Conflicting constitutions were adopted, rival legislatures elected, and civil government overthrown. Public meetings were held in all parts of the North to lend encouragement to the movement for making Kansas a free State.

Similar sympathy and help came to the Pro¬

slavery party from the States of the South.

Horace Greeley and Abraham Lincoln visited the Territory and made speeches in opposition to the further extension of slavery on Ameri¬

can soil. Governor Shannon was removed from office, and the several governors ap¬

pointed to succeed him found the duties of the position so dangerous that they resigned in rapid succession.

After numerous battles, elections and vicis¬

situdes a constitutional convention was called to meet at Wyandotte 5 July 1859. It was composed of 35 Free-State and 17 Pro-slavery delegates, who were now known as Republicans and Democrats, respectively. Under the con¬

stitution adopted by this convention slavery was prohibited and Kansas admitted as a State 29 Jan. 1861. Although the act of admission was signed by President Buchanan, Kansas was by association and sentiment Abraham Lincoln's State. The seat of government was located at Topeka. At the election held in December 1859, under the Wyandotte consti¬

tution, Charles Robinson was chosen to be the first governor of the State, and Martin F.

Conway the first representative in Congress.

When the first State legislature assembled at Topeka in March 1861, James H. Lane and Samuel C. Pomeroy were elected the first two United States senators from the new State.

In the Civil War which followed the inaugu¬

ration of President Lincoln in 1861, Kansas showed its loyalty to the Union by furnishing 20,000 trained soldiers out of a total population of but little more than 100,000 — a number greatly in excess of her quota, none of them drafted, and in proportion exceeding the en¬

listments from any other State. A large part of this force was employed in defending the borders of the State from invasion by southern troops, Indians and guerrillas. During one of these border raids a force of 400 men under command of Quantrell invaded Lawrence, burn¬

ing and pillaging the town and killing 150 de¬

fenseless citizens. The war and the troubles with the Indians, together with a visitation of drought in 1860, greatly retarded the growth of Kansas, but when these obstacles were over¬

come an era of progress and development set in which has never since abated. The splendid soil and auspicious climate and the general adaptability of the State to farming and stock-

raising purposes have attracted thousands of settlers to the State, and the advancement in all lines has been rapid, substantial and per¬

manent.

List of Governors.

TERRITORIAL

Andrew H. Reeder .

Wilson Shannon .

John W. Geary .

Robert J. Walker .

James W. Denver .

Samuel Medary .

1854- 55

1855- 56

1856- 57

1857-

1857- 58

1858- 60

STATE

Charles Robinson . Republican .

Thomas Carney . "

Samuel J. Crawford . " .

Nehemiah Green . " .....

James M. Harvey . " !.!!!!..!!

Thomas A. Osborn . "

George T. Anthony . " .

John P. St. John . " .

George W. Glick . Democrat .

John A. Martin . Republican .

Lyman U. Humphrey. ... " . .

Lorenzo D. Lewelling . Populist- Democrat . . .

Edmund N. Morrill . Republican .

John W. Leedy . Populist-Democrat.. . .

William E. Stanley . Republican .

J. W. Bailey . " .

Edward W. Hoch . , " .....

Walter R. Stubbs . " .

George W. Hodges . Democrat .

Arthur Capper . Republican .

Henry Allen . "

1861-63

1863-65

1865-68

1868- 69

1869- 73

1873-77

1877-79

1879-83

1883-85

1885-89

1889-93

1893-95

1895-97

1897–99

1899–1903

1903–05

1905–09

1909–13

1913–15

1915–19

1919–

For limited periods during the official inter¬

ruptions incident to the organization of the Territory the following persons served terms as. acting governor: Daniel Woodson, Fred¬

erick P. Stanton, James W. Denver, Hugh S.

Walsh, George M. Beebe.

United States Senators. — James H. Lane (1861–66), Samuel C. Pomeroy (1861–73), Ed¬

mund G. Ross (1866–71), Alexander Caldwell (1871–73), Robert Crozier (1873–74), James M.

Harvey (1874–77), John J. Ingalls (1873–91), Preston B. Plumb (1877–91), William A. Peffer (1891–97), Bishop W. Perkins (1892–93), John Martin (1893–95), Lucien Baker (1895–1901), William A. Harris (1897–1903), Joseph R.

Burton (1901–06), Chester I. Long (1903–09), Alfred W. Benson (1906–07), Charles Curtis (1907–13), Joseph L. Bristow (1909–15), Wil¬

liam H. Thompson (1913–19), Charles Curtis (1915 —), Arthur Capper (1919 —).

State Government.— The State legislature consists of 40 senators and 125 representatives.

Sessions are. held biennially in odd-numbered years. Political complexion of the legislature of 1917 : Senate, 31 Republicans, 9 Democrats.

House, 86 Republicans, 37 Democrats, 2 Social¬

ists. The elective State officers include gov¬

ernor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general, state super¬

intendent of public instruction, commissioner of insurance, state printer and seven justices of the Supreme Court. Supreme Court jus¬

tices are elected for a term of six years, and other State officers for two years. United States senators are chosen by the primary election method. In 1917 Kansas adopted the State manager plan of governing the various State institutions and the experiment has been uniformly successful. Kansas is divided into 298

eight congressional districts, of which six are now filled by Democrats and two by Republi¬

cans. At the November 1918 election the Re¬

publicans gained control of'seven congressional districts, leaving one district in control of the Democrats. At the general election of 1914

Kansas women were given the right of unre¬

stricted suffrage, the vote on the proposition being 175,246 for and 159,197 against. In nearly every county in the State women have been elected to county, municipal and school offices.

National Defense. — The State of Kansas furnished a total of 82,000 soldiers, sailors and marines during the progress of the great World War, including National Guard units, enlist¬

ments in the regular army and men drafted for the service. A record equal to that of any other State was made in all of the miscel¬

laneous activities connected with the war. One of the largest cantonments in the United States was maintained by the government at Camp Funston, Kansas, adjacent to Fort Riley.

Every demand made. upon the State in the form of popular subscriptions for the support of the war and the relief and comfort of the military and naval forces was promptly met, and in amounts exceeding the apportionment, the investment subscriptions showing a per¬

centage of 120 plus. The principal subscrip¬

tions are comprised in the following table: First Liberty loan. .

Second Liberty loan

Third Liberty loan.

Fourth Liberty loan

Quota

$11,108,750

27,840,000

30.301.900

67.413.900

Subscription

$13,967,250

30,104,500

47,390,700

72,807,100

Total .	$136,664,550
First Red Cross drive	$164,269,550
Second Red Cross drive. . .	800,000
First Y. M. C. A. drive. . .	2,058,000
Second Y. M. C. A. drive.	1,854, 000
War Savings stamps .	2,829,107
United war work .	75,000
Miscellaneous .	76,000
Grand total .	525,000
	675,000
	37,000,000
	37,000,000
	2,850.000
	2,976,000
	500,000

500,000

$180,268,550

$210,383,657

Population. — Statistics of 1855 gave Kan¬

sas a population of 8,501 ; this increased in 1860 to 107,206; in 1870 to 364,399; in 1880 to 396,096; in 1890 to 1,427,096; in 1900 to 1,470,-

495; in 1910 to 1,699,944; in 1920 to 1,769,257.

There are 29 cities and towns having a population of 5,000 or more, the number of in¬

habitants in cities of 5,000 or more being 503,191, or over 28 per cent of the total popu¬

lation. The 12 largest cities and their present population are Kansas City, 101,177; Wichita, 72,128; Topeka, 50,022; Hutchinson, 23,298; Leavenworth, 16,901; Pittsburg, 18,052; Par¬

sons, 16,028; Atchison, 12,630; Coffeyville, 13,452; Lawrence, 12,456; Salina, 15,085; In¬

dependence 11,920.

Bibliography.— Blackmar, Frank W., Kan¬

sas: a Cyclopedia of State History5 (Chicago 1912) ; Connelley, William E., (Kansas and Kansans5 (Chicago 1918) ; Cordley, Richard, (Pioneer Days in Kansas) (Boston 1903) ; Coues, Elliott, Expeditions of Zebulon Mont¬

gomery Pike1* (New York 1895) ; Crawford, Samuel J., ^Kansas in the Sixties) (Chicago 1911) ; Cutler, William G., (History of Kansas) (Chicago 1883) ; Goss, N. S., Eirds of Kan¬

sas5 (Topeka 1891) ; Haworth, Erasmus, (Geological Survey of Kansas5 (Topeka 1896—1908) ; Hazelrigg, Clara H., (History of Kan¬

sas5 (Topeka 1895); Hinton, Richard J., (John Brown and His Men5 (New York 1894) ; Hod-

der, F. H., ^Government of the People of Kansas5 (Philadelphia 1895) ; Inman, Henry, (01d Santa Fe Trail5 (Topeka 1898); McCoy, Joseph G., (Historic Sketches of the Cattle Trade of the West and Southwest5 (Kansas City 1874) ; Phillips, William A., (Conquest of Kansas5 (Boston 1856) ; Prentis, Noble L., ^History of Kansas5 (Topeka 1889) ; Robinson, Charles, (Kansas Conflict5 (Lawrence, Kansas, 1898) ; Robinson, Sara D. T., Eansas: Its Ex¬

terior and Interior Life5 (Lawrence, Kansas, 1899) ; Sanborn, Frank B., (Life and Letters of John Brown5 (Boston 1891); Speer, John, (Life of Gen. James H. Lane5 (Topeka 1897) ; Spring, Leverett W., Eansas5 (Boston 1906) ; Taylor, Albert R., (Civil Government of Kan¬

sas5 (Topeka 1911) ; Thayer, Eli, Eansas Crusade5 (New York 1889) ; Tuttle, C. R., (New Centennial History of Kansas5 (Madi¬

son, Wis., 1876) ; Villard, Oswald Garrison, (John Brown, a Biography Fifty Years After5

(Boston 1904) ; Wilder, Daniel W., (Annals of Kansas5 (Topeka 1886) ; Wilson, Hill P., Em¬

inent Men of Kansas5 (Topeka 1901) ; Kan¬

sas State Historical Society Collections5 (To¬

peka 1881 et seq.).

James L. King,

Kansas State Librarian.

KANSAS, University of, a State educa¬

tional institution, situated at Lawrence, Kan.

The establishment of a State university was provided

for in the State constitution, and an act of the legislature incorporated the univer¬

sity in 1863. In 1865 a preparatory department was opened, and in 1866 one building was erected and the collegiate department estab¬

lished; in 1891 the preparatory department was discontinued. The present organization in¬

cludes the school of arts, with classical and literary courses leading to the degree of A.B.

and A.M. ; the school of engineering conferring the degree of B.S. in engineering; the graduate school giving advanced courses in arts and engineering; the school of law; the school of fine arts, offering courses in music painting and elocution; the school of pharmacy; the school of medicine, offering a regular four-year medical course; the school of ' education 'and the summer session of 10 weeks. The univer¬

sity is the head of the State's public school system, and is in. direct connection with the high schools,, admitting those who have com¬

pleted the . high school course, or a similar course, . without examination ; a minimum tuition is charged, and the university is open to both men and women. The library contains about 107,000 volumes and 44,000 pamphlets; $15,000 are annually appropriated for the pur¬

chase. of books ; the natural historv museum contains over 250,000 specimens. Number of students about 4,000; number of professors and instructors, 250.

KANSAS CITY, Kan., city, county-seat

of Wyandotte County, on the Kansas and Mis¬

souri rivers, and on the Union Pacific, the Missouri Pacific, the Chicago, Rock Island and Pacific, the Chicago Great Western and the Atchison, Topeka and

Santa Fe railroads.

Branches of other railroads enter the city and the nearby towns are connected by electric-

c

D

E

F

G

1 1 — ig — i iEaraUfn cf!]

^-Troup czi nfA"i

- -cseiinuu

I I ! _ 1 I 1 ..1 I

nriMan^!:

1 _ 1 1 _ 1 , - s — .Troup, r - 1 pAve.-

rFranklin-Av a.

.WrWalkei

New- Jersey-

11 -_i 1_

I* reemait

A-irginia,

LZHIffi]

ve.

ern Depptf] j~lS

\n _

i iv . „ .

Main Portion

KANSAS CITY, KAN.

AND

KANSAS CITY, MO.

^□a

i i 1 1 _

Everetti -

1 i

II

- Washington - - - -

rMinneso,ta-

1 ^ .ymstrcjPg-

P<^t Office

Ann

Barnett

6

.Tauroiiije

rSandusky ,

Foitv n.nrAVU'~l

Ave.

pOr-v-Ule— | f

f - EVla—]

^j-GWo - | t - |(— if

] |-Sorthrup13j _ |°f

-Tenny— |

j-SpUtiog-j | - Ave. — j

- 7^* r

T n

— Ave. —

— Reynolds-.

nrAveninfvi5

□QDH

n I

uL!

IIoii|Ri-Ave.-

StL M u rgaret'

10

11

n u iifl

12

13

14

15

16

17

17

1 1 rin rTH-1

Cj^auiJi

anno

i V,erino i|— .

0\> rVOt^rouvrO^

^ Of2l O c

!!d □ O

'l« paci QaflflWnng

a rf □ □ □ ad_ona^q[^

aDOODDOKgjfflqgQi

Lm UULJLJLII |l — II — 1

□'0 ODD DO ′ □ □ ■<©c‘Q □ 0

□□□qdduddqddod

FMflnmpQD«roro

d'h|z] □ □□□£) Li □ □ □ no

i npp B″&s°0,9,d □□□:

u □ oti □ □ □ s.g □ c

□ □dtlOODSfiDl

St-

VI

.Miami,

lOUDDODOOOi

— pawnee

yyODJjDQODDl

DOflOOODT

UD* □□tB DOOd

□ QJ

I (A ,

lO

11

st.

□□□an

□ □c

-Fulton

r34th —

r35th— S

A

Spring-,

4rSted-

HID

Linwood

33rd

12

13

14

15

16

17

.

KANSAS CITY

trolley lines. Kansas City, Mo. (q.v.), con¬

tinuous on the east is one with Kansas City, Kan., in commercial development, but each has an independent municipal organization. Sev¬

eral bridges connect the two cities. In one part of the city, east of the Kansas River and south of the Missouri, the dividing line be¬

tween the two cities is a street.

Kansas City is the largest city in the State.

It was formerly known as Wyandotte, until :n 1886 the municipalities of Armourdale, Arm¬

strong, Wyandotte and Kansas City united un¬

der the name of Kansas City. The area is 10j4

square miles. A portion of the city is built on the river bottoms, and many fine public and private buildings are on the high bluffs and extend back on the level land. The city is on both sides of the Kansas River, so the bound-

■ / line between the States of Missouri and Kansas is in part the boundary line between the twin cities. It is noted for its live-stock and meat-packing industries ; but the second largest live-stock-interest establishments in the country are on the boundary dividing the two cities. Some of its other chief industrial estab¬

lishments are railroad car shops, machine shops, grain elevators, smelters, iron and steel works, flour mills, soap and candle factories, box and barrel factories, foundries, wholesale grocery houses, slaughter yards, lumber and brick yards. The manufacturing interests of the city represent a capital investment of $45,000,000, an annual production of $175,000,000, giving em¬

ployment to over 15,000 persons. The city is the seat of Kansas City University (Methodist Episcopal), established in 1896; Western Uni¬

versity (colored) ; the State Institution for the Blind; College of Medicine and Surgery; Saint Margaret's and Bethany hospitals, and Carnegie Library. It has fine public parks, high schools and excellent public and parish schools. The waterworks representing an in¬

vestment of over $2,000,000, and the electric-

light plant are civic property. Since 1909 the city is administered under the commission form of government. Pop. 101,177.

KANSAS CITY, Mo., the second in the

State of Missouri and the 19th in population in the United States, is located in the.north-

western part of Jackson County in the angle formed by ihe Kansas River at its i unc¬

tion with the Missouri. Kansas City, Kan., while in an adjoining State, is served by the same railroad terminals, the same street car service and the same telephone system. These two cities are contiguous, their only diyision being an imaginary State line. At the inter¬

section of Fourteenth and Washington streets the latitude is 39° north and the longitude is 94° 36' 16.18" west.

Topography. — The original site of Kansas City presented a rugged, precipitous and un¬

inviting aspect, — high bluffs composed chiefly of limestone facing the Kansas River as it sweeps in from the southwest, thence veering west of north till it empties into the Missouri River, thence continuing along the south bank of the Missouri River four miles to the valley of the Big Blue. Owing to the _ changeable nature of the Missouri

River in cutting through the bottom land on either side of it, the town had to be built between the river and the bluffs, along the deep ravines and on the hills. Per¬

sons who see the city as it is now can scarcely realize the obstructions that had to be removed in grading down streets to a level and in fill¬

ing cuts. The city is topographically divided into three parts, one, the largest, including all that part of the town on the highlands, extend¬

ing east and south into level upland which is of great beauty; the West Bottoms, including the lowlands lying between the State line on the west and the east bluff of the Kansas River, and the East Bottom which takes in all the lowland lying east of the foot of Grand avenue where it runs to the Missouri River.

All of the site was originally covered with dense forests, and it was not till after the Civil War that the timber was cut off the West Bot¬

toms ; since then it has become the busiest part of Kansas City, in which are located the stock-

yards, elevators, most of the local freight depots and a large part of the wholesale busi¬

ness houses of the city. From its earliest his¬

tory as Westport Landing, Kansas City was noted for its steamboat traffic. Here were landed the goods from the Mexican and Indian trade, west and southwest, and in exchange were received the wool, furs, buffalo robes and other articles for the Eastern markets. The location of the city at the most southern bend eastward in the Missouri River, even before the age of continental railroads, was the nat¬

ural route through which the Santa Fe and the Indian trade of the west and southwest must pass to be exchanged for the products these people desired.

Commerce. — The men who contributed so much toward making Kansas City the metrop¬

olis of the Missouri Valley turned their at¬

tention to the grain and produce market of this vast region in the 70's of last century. From a small local trade in 1871 of a few hundred thousand bushels of grain handled that year, the business has grown now to 100,000,000

bushels ann.iiallv. In a recent year there were received 77,786,650 bushels of wheat, 22,186,250

bushels of corn, 7,961,100 bushels of oats, 414,700 bushels of rye, 2,043,000 bushels of barley and 436,000 tons of hay (it is the largest hay market in the world), while the export of grain was 36,206,400 bushels. In the elevators and mills the storage capacity is 24,165,000

bushels, while the total mill products aggregate 2,900,000 barrels. The numerous grain eleva¬

tors enable the railroads to handle the trans¬

port grain to other points with facility and dis¬

patch. Its title as the (

souri and Oklahoma grain are annually shipped by Kansas City exporters. It is not alone as a centre for the accumulation of wheat, corn and oats that it is famous, but also as a distributing point for cereals to be consumed in the South, East and in foreign countries. Kansas City s bank clearings in 1918 were $9,940,881,940 and the bank deposits were about $280,000,000. At present Kansas City occupies the second posi¬

tion in the world as a live-stock market. The stock-yards are the most convenient for the quick and safe handling of stock in the United States. The aggregate value of live-stock han¬

dled annually is about $200,000,000. The packing¬

houses are eight in number, having a com¬

bined capacity for daily slaughter of 15,000 cat-

tie, 50,000 hogs and 15,000 sheep. These prod¬

ucts are marketed in every civilized country.

The stock-yards cover 207 acres, containing 3,688 cattle-pens. The receipts of cattle at the stock-yards for 1918 were 2,993,776; hogs, 3,327,7 22; sheep, 1,667,463; horses and mules, 84,628; shipped in 161,812 cars. The cost of the packing plants is estimated at $15,000,000

and the number of hands employed approxi¬

mates 20,000; while the annual value of the output is over $231,150,000. In 1918 the whole¬

sale trade exceeded $629,000,000.

Railroads. — Thirteen different railroad systems enter the city, operating 30 different lines, representing more than 50,000 miles in length. The magnitude of this business may be inferred from the fact that 260 passenger trains arrive and depart daily from the Union Station, which is the third largest in America, costing $6,000,000, while $54,000,000 more is in¬

vested in the city's terminal facilities. Two thousand five hundred cars of freight come into and go out of the freight yards every day, thus rendering Kansas City one of the great transfer and distributing points on the conti¬

nent. Two railroad bridges span the Missouri River. In telegraphic communications Kansas City is only surpassed by New York and Chi¬

cago in the number of wires entering the city and in

the volume of business transacted.

Manufactures. — The manufacturing indus¬

tries of Kansas City developed in less than three decades to a position where the city is ranked as the 10th manufacturing city in Amer¬

ica. Statistics gathered at the close of the year 1918 show that Greater Kansas City's plants turned out more than $677,000,000 worth of products during that year or more than $2,000,000 worth for each working day. There are more than 1,250 manufacturing plants in the city, the principal products being automo¬

biles, chemicals, flour, iron and steel products, crude and refined oil, packing-house products and soap.

Distributing Point. — In addition to Kan¬

sas City's position as a manufacturing city, it is also a very large wholesale market, being the natural gateway to the great southwest terri¬

tory. Kansas City's jobbing trade for the year 1918 amounted to more than $629,000,000. Many eastern manufacturing concerns maintain dis¬

tributing plants, and over $90,000,000 worth of agricultural implements and farm tractors and $70,000,000 of automobiles and accessories were distributed through Kansas City alone, in 1917. The rapid growth and development of the southwest territory, to which Kansas City is the gateway, is likewise responsible for the city's growth. Kansas City's standing with other American cities -is indicated by the follow¬

ing: First — in Pullman business, sale of agri¬

cultural implements, yellow pine lumber, hay market, farming territory, tributary trade, miles of park boulevards, winter wheat, stock and feed cattle. Second — as a railroad cen¬

tre, live-stock market, packing centre, horse and mule market. Third — in flour-milling ca¬

pacity and production, grain market, lumber, poultry and egg business, telegraphic business.

Fifth — in bank clearings and grain-elevator capacity. Tenth — in manufacturing pursuits.

Government. — At the head of the city gov¬

ernment are the mayor whose term of office is two years ; upper house aldermen consisting of 16 members whose term of service is four years, elected at large ; lower house councilmen, 16 members whose term of service is two years, elected one from each ward; city treasurer, comptroller and police judges elected biennially.

The other officers are nominated by the mayor and confirmed by the upper house. The board system is used to some extent, there being a hospital and health board, board of park com¬

missioners, board of public works, fire and water board, board of public welfare and board of civil service. The police department is controlled by a board of police commissioners of three members, two of whom are appointed by the governor of the State, and the third of whom is the mayor of the city. Kansas City has a degree of home rule under the State con¬

stitution which at the time of its adoption was very advanced but which is now considered re¬

strictive. Efforts are being made to secure a constitutional amendment to extend the city's power of self-government.

Public Service. — The assessed valuation of taxable property was $270,000,000 in 1918, 40

per cent of the actual value. The bonded in¬

debtedness of the city is $7,590,000, not includ¬

ing school debt. The city is also the owner of much valuable property, valued at $22,000,000, not including street improvements, sewers, bridges, etc. The comptroller's last report, 1917, shows the expenditures for operating ex¬

penses of the several departments : Police de¬

partment, $683,798.62; fire department, $475,-

453.25 ; hospital and board of health, $464,076.08 ; board of public works, $496,207.86; street light¬

ing, $187,224.00; parks and boulevards, $415,-

443.39; water department, $1,447,121.66; other administrative expenses, $672,453.45. The city purchased the waterworks in 1895. The street railway service, which traverses all parts of the city, has 302*4 miles of track, connecting with all suburban trolley lines. The city has an area of 75^4 square miles, with 1,075 miles of streets, of which about 500 are paved.

Parks and Cemeteries. — The city has spent nearly $16,500,000 for its park and boulevard system which contains 3,400 acres and 71 miles of continuous boulevards and are divided into seven park districts. The system is divided into 21 different parks, nearly all of which are con¬

nected by an extensive system of boulevards.

Located in different parts of the city and easy of access are eight cemeteries, the largest of which are Mount Washington, Elmwood, Saint Mary's and Forest Hill.

Public Buildings. — Among the public build¬

ings are Convention Hall, which will seat 12,000

persons, city hall, county courthouse, postoffice, public library, many large modern office build¬

ings, large theatres and also libraries and read¬

ing-rooms. The public library, art gallery and museum, located at Ninth and Locust streets, cost $500,000 and is under the management of the board of education. There are 260,000 vol¬

umes in the library, paintings in the art gal¬

lery of the value of $200,000 and a rare collec¬

tion of natural history specimens in the mu¬

seum which is especially rich in Indian curios.

There are 40 hospitals, asylums and homes.

Public Schools. — The present public school system was organized August 1867 and in Oc¬

tober of that year the schools were formally opened in rented rooms. Bonds were issued, sites were purchased and schoolhouses erected.

KANSAS CITY, MO

1 Part of the Business District

2 Convention Hall, seating 12,000

3 The Twelfth Street Viaduct

KANSAS CITY, MO

....

1 Along the beautiful Cliff Drive

2 Old Santa Fe Trail. The beginning in Penn Valley Park KANSAS INDIANS — KANSAS-NEBRASKA BILL

301

Sixteen teachers were employed during the hist year and about 1,200 pupils were enrolled, from this small beginning the school district ha$ been enlarged till there are 130 elementary and high schools, including a junior college, cm nnn • gs» includinff sites valued at $11,-

300,000; with an enrolment of 51,994 pupils, pf. whom 6,427 are in the four high schools, being the largest per cent of high school pupils in any city in the United States having a popu¬

lation of more than 100,000 inhabitants. There are 1,400 teachers employed in the public schools. The public library in which there are 105 persons employed is also under the control of the board of education. In addition to the public school system there are 60 other schools of various kinds, including private and parochial schools, medical and dental colleges, commercial schools, a school of oratory, fine arts and an excellent school of law. The cost of operating the schools and public library is $2,575,000.

Religion. — The number of churches in Kan¬

sas City is 379. The religious organizations now number: Baptist 78, Catholic 46, Chris¬

tian 28, Church of Christ Scientist 6, Congre¬

gational 13, Jewish 9, Lutheran 17, Methodist Episcopal 82, Presbyterian 27, Protestant Epis¬

copal 15, Reorganized Latter Day Saints 15

miscellaneous 43.

. History. — The name is derived from an In¬

dian tribe that formerly occupied and owned much of this section of the country, their title to which was extinguished in 1808, except for a narrow strip of land 24 miles wide lying east¬

ward of the State line from Fort Clarke, later known as Fort Osage, and extending south¬

ward to the Arkansas River. The Indians re¬

linquished their title to this strip of land in 1825 and in. it lies nearly all of Jackson County. Trading-posts had been established at different

points along the Missouri River from 1765 to 1809 as far upward as what is now Saint Joseph by adventurous French trap¬

pers and traders who first explored much of this western country. The settlers who had been checked at the eastern limit of the Kan¬

sas Indian Reservation made a general rush into the newly-acquired purchase. In 1826 a census was taken with the view of forming a county organization, which was effected 15 De¬

cember in the same year. Prior to this date, however, Daniel Morgan Boone, third son of Daniel Boone, the noted pioneer, came from Kentucky in 1787 to Saint Louis, where he made his home for 12 years, residing there during the summers, but in winters hunting and trapping beaver chiefly on the Big and Little Blue, in Jackson County. It was reserved for Lewis and Clarke to give the first distinct ac¬

count of the country at the mouth of the Kan¬

sas River, dated 26 June 1804. In 1800 Louis Barthelot, known in the early history as Grand Louis, moved from Saint Charles, Mo., and set¬

tled at the mouth of the Kansas River, his wife being the first white woman to have a home on the present site of Kansas City. In 1821, the Chouteaus (q.v.) established a fur-trading camp opposite Randolph Bluffs. In 1825 the Jesuit fathers organized a mission near the mouth of the Kansas River and. built a small log house near the foot of what is now Troost avenue, just below the bluff, where thev wor¬

shipped for several years. A flood in 1826 de¬

stroyed Chouteau's trading-post, the first per¬

manent white settlement within the corporate limits of Kansas City. These settlers were trappers, traders, laborers and voyagers with their families. Father Roux came in 1830 and took charge of the

congregation and five years later he purchased from a Canadian French¬

man a tract of 40 acres upon the hill adjoining the present site of the Roman Catholic cathe-

dial and the bishop's residence. A part of this tract was cleared of the heavy timber and a log church was erected, and here the congre¬

gation, composed chiefly of French-Canadians and half-breeds, scattered over more than 400

square miles, worshipped for 20 years. As soon as the Indian land was purchased settlers poured into it from the settlements east of it.

What is now the busiest part of Kansas City was called at first Westport Landing. The town of Westport was platted in 1833 and lies about four miles south of the landing on the Missouri River. Kansas City proper, that is, 250 acres of land, was laid out in town blocks and lots in 1838, but owing to a disagreement among the stockholders the project was aban¬

doned till 1846, when a new company was formed who advertised and sold 150 lots. The town began to grow and soon had 600 inhabit¬

ants. At this time the chief agency in build¬

ing up the new town was the trade with the In¬

dians and with New Mexico. Besides the French settlers who had established themselves in the vicinity of what is now Kansas City was James H. McGee, who came here in 1828 and whose family was prominently identified with the early history and development of this part of Missouri. Prior to 1828 the only means of crossing the Missouri River at this point was by canoes, but that year a ferry was estab¬

lished, so that the few settlers could cross the river to take their corn to a horse-mill on the

north side of the river.

Population. — The population in 1838 was 300; 1880, 55,785; 1900, 163,750; 1920, 324,410.

The population of Greater Kansas City, which includes Kansas City, Kan., Independence, Mo., and Rosedale, Kan., is 450,000. Consult Case, (History of Kansas City) (1888) ; Miller, his¬

tory of Kansas City) (1881).

E. W. Mentel,

Industrial Co m m is si oner.

KANSAS INDIANS, a Siouan tribe

which formerly occupied territory on the lower Kansas River in Kansas. See Kaw,

KANSAS-NEBRASKA BILL, a bill

passed by Congress in 1854; the last of three compromises between the aggressive slavery expansionists of the South and their anti-slav¬

ery opponents in the North. It is famous be¬

cause, by its repeal of the first, the Missouri Compromise (q.v.), it precipitated the organ¬

ization and rapid growth of the Republican party and especially incited the radical aboli¬

tion sentiment of the North to aggressive ac¬

tion, thus causing or hastening the secession of the Southern States and the resulting Civil War. Its passage was mainly due to the leader¬

ship of Stephen A. Douglas (q.v.), of Illinois.

The second compromise occurred when New Mexico and Utah came to be organized as Ter¬

ritories in 1850. The compromise consisted of the

provision, which was also one of the two principal features of the Kansas-Nebraska 302

KANSAS-NEBRASKA BILL

Bill, that when these Territories came to be ad¬

mitted as States they should come in with or without slavery as their constitutions, which would be framed by the people, might pre¬

scribe. The strengthening of the Fugitive Slave Law was the other feature of this com¬

promise. This settlement of 1850 was the first 'step toward the final compromise, the Kansas-

Nebraska Bill.

As early as 1844 Stephen A. Douglas intro¬

duced in the House of Representatives a bill <(to establish the territory of Nebraska,® and Douglas afterward asserted that he took this method of serving notice on the Secretary of War to discontinue using that Territory as the dumping-ground for Indians. In 1848 Douglas, now chairman of the Committee on Territories in the Senate, introduced in that body a bill for the same purpose. In December 1851 Willard P. Hall of Missouri gave notice in the House of a bill for the organization of Nebraska; but none of these bills got beyond the committee stage. On 2 Feb. 1853 William A. Richardson of Illinois, the leading lieutenant of Douglas in the House, introduced still another bill <(to organize the Territory of Nebraska.® This bill, which, like all of its predecessors in ques¬

tion, made no reference to slavery, passed the House, 10 Feb. 1853 ; but in spite of the strenu¬

ous endeavors of Douglas in its behalf, it failed of consideration in the Senate. The long debate over this bill in the House disclosed clearly that the primary object of members from the Northwest, who were its champions, was to protect and encourage

travel over the great upper line to the Pacific Coast and make way for the ultimate construction of the already much talked of Pacific Railroad ; while members from the South, and especially from the South¬

west, were bent on keeping this northern region open for the colonization of their undesirable Indian tribes, with the purpose of. securing travel and the railroad to the Pacific Coast through their own country.

Early in the session of the next Congress —14 Dec. 1853 — Senator Dodge of Iowa, a co¬

adjutor of Douglas in this enterprise, intro¬

duced <(a bill to organize the Territory of Nebraska.® This bill also originally contained no reference to slavery; but by amendment it became the famous Kansas-Nebraska Bill, which finally became a law 30 May 1854. On 4 Jan. 1854 the Senate Committee on Terri¬

tories, through Douglas, reported a substitute for the Dodge bill which contained the com¬

promise provision of the Utah and New Mexico acts; namely, that <(the Territory of Nebraska, or any portion of the same, when admitted as a State or States, shall be received into the Union with or without slavery, as their consti¬

tutions may prescribe at the time of their ad¬

mission.® In his famous report, accompanying this bill, Douglas points out that <(eminent statesmen hold that Congress is invested with no rightful authority to legislate upon the sub¬

ject of slavery in the Territories, and that therefore the 8th section of the Missouri Com¬

promise is null and void; while the prevailing sentiment in large sections of the Union sus¬

tains the doctrine that the Constitution of the United States secures to every citizen the in¬

alienable right to move into any of the Terri¬

tories with his property of whatever kind or description, and to hold and enjoy the same under the sanction of law.® The report pointed out also that under this section it was . a dis¬

puted point whether slavery was prohibited in the new country by valid enactment, and advised against the undertaking by Congress to decide these disputed questions. The bill was further amended so as to provide that all questions per¬

taining to slavery in the Territories and the new States to be formed therefrom be left to the decision of the people residing therein; that cases involving title to slaves be left to the courts; and that the provision of the Con¬

stitution in respect to fugitive slaves should be carried out in the Territories the same as in the States. On 16 January Senator Dixon of Kentucky offered an amendment, which was accepted by Douglas, expressly repealing the sJavery restriction clause of the Missouri Com¬

promise; and the bill passed with these amend¬

ments.

The repeal of the Missouri Compromise re¬

striction was hotly denounced by the anti¬

slavery element and was seized with alacrity and used with great effect as a political weapon by anti-slavery agitators and politicians ; and Douglas was also savagely denounced for selfish subserviency to the South for the sake of win¬

ning the Presidency. But Douglas and his friends ably and plausibly defended the repeal of the Missouri restriction on the ground that it was

consistent with and the natural sequence of the popular sovereignty compromise of 1850 ; that there was danger that it would be held unconstitutional by the courts ; that there was ground for fear that Dixon's amendment, as he proposed it, would legislate slavery into the Territories, and that on the whole Douglas, as leader of the dominant party, and having regard to the preservation of the Union as well as to the vexatious slavery question, made the safest and best terms practicable in securing the right of the people to decide the question of slavery for themselves. In the course of the debate on the bill Douglas, as well as Thomas H. Benton, who was opposed to the repeal of the Missouri restriction, insisted that, left to the people, slavery could never be successfully introduced into Kansas or Nebraska.

Impartial consideration of all the facts bear¬

ing upon this phase of the question leaves no ground for the charge preferred by leading his¬

torians and others that the proposed Nebraska Territory was at last divided into Kansas and Nebraska at the instance of Southern members to gain opportunity to make Kansas a slave State. The ^provisional® delegate in Congress at that time from Nebraska well known by contemporary citizens of the Territory as a reliable man, in his published account of his part in the transaction asserts that, before he went to Washington to attend the session of December 1853, it was agreed among the enters prising citizens of western Iowa — there were then no citizens of Nebraska — who were push¬

ing the project for Territorial organization, that division was desirable so that one of the Terri¬

tories might be directly opposite their State, and that he urged this change upon Douglas, who assented to it. In the debate on this feature of the bill Senator Dodge of anti¬

slavery Iowa and Representative Henn of the Iowa

district bordering on Nebraska urged the KANSAS RIVER — KANT

A A A

oju

division for the frankly expressed reasons that it would be to their advantage to have the capi¬

tal of an important commonwealth opposite them and would aid in securing the route of the Pacific Railroad through their part of the country ; while the representatives of slave¬

holding Missouri were indifferent to the ques¬

tion of division. Douglas himself specified the wish of the Iowa members as the basis of his reason for the division of the Territory. It is significant, moreover, that Douglas had al¬

ways stood for a northern Territory, as shown by his original bills of 1844 and 1848. It is a very significant fact that the northern boundary of the Territory in each of these bijls was the 43d parallel, which is identical with the northern boundary of the present State; and that the southern boundary described in the bill of 1848

was also identical with the same boundary of the State, while the southern boundary described in the bill of 1844 was only two degrees farther south. These and other incidents of a like kind show a remarkable prescience and a persistent consistency in interpreting the wishes and in¬

terests of those most directly interested in the Territory opposite the State of Iowa and on the line of the great natural highway connect¬

ing Chicago, the commercial mart of the North¬

west, and the home of Douglas, with the Pacific Coast. Mr. Henn in resenting ((the unjust charge made on this floor by several that it (the proposed

division) was the scheme of Southern men whereby one of the States to be formed out of these Territories was to be a slave State,® put the case concisely: «The bill is of more practical importance to the State of Iowa and the people I represent than to any other State or constituency in the Union.®

The Kansas-Nebraska Bill was also distin¬

guished by more completely safeguarding the rights of Indian occupants than any previous Territorial organic acts had done; and likewise in being the first Territorial bill of that class which provided for the choice of the members of both houses of the legislature by popular election, to drop the provision requiring the submission of all acts of the legislative assem¬

bly to Congress for approval. The Territory organized by this bill comprised all of the unorganized part of the Louisiana Purchase north of the 37th parallel, which comprised all of the purchase north of that line ex-cept the States of Iowa and Missouri, and that part of the Territory of Minnesota between the Missis¬

sippi River on the east and the Missouri and White Earth rivers on the south and west.

Albert Watkins,

Editor (History of Nebraska.*

KANSAS RIVER, a river in the State of Kansas, formed in Geary County by the junc¬

tion of the Smoky Hill and Republican rivers.

The direction of its course. is mainly east; but it makes one gradual curve toward the north between Junction City, at the source, and To¬

peka. After a course of about 250 miles through a rich agricultural region, the river flows into the Missouri at Kansas City. The largest tributary is the Little Blue River from the north. Several small

tributaries enter the Kansas from the south.

KANSAS STATE AGRICULTURAL

COLLEGE, a coeducational institution, lo¬

cated at Manhattan, Kan. ; established in 1863

by the presentation to the State of Bluemont College. The college has excellent opportu¬

nities for experimental works as it cultivates 1,270 acres of land; 748 acres of which is owned by the college, and 522 acres leased. A branch station is located at Hays, Kan., with about 3,500 acres of land; two with 320 acres each at Colby and Garden City, and two of 160 acres each at Dodge and Tribune. It is not a classical school ; the departments, the courses of which lead to the degree of bachelor of science, are agriculture, English, civil and high¬

way, mechanical and electrical engineering, home economics, agricultural engineering, gen¬

eral and domestic science. It has also a pre¬

paratory department, a music school and a trade school. It has several short courses, as dairying, 12 weeks in winter; agriculture and mechanics, 12 weeks in winter, for two years ; horticulture and mechanics, 12 weeks in winter, for two years; and domestic science, 12 weeks in fall, for two years. The faculty numbered in 1917 190, and the number of pupils in at¬

tendance was over 3,000. The school has an income from tuitions: from the State; from the. ((Land Grant Fund® of 1862; and by the United States Appropriation Act of 30 Aug.

1890, with a total annual revenue of about $870,000. A weekly periodical, devoted to the interests of the subjects taught in the school and called the Kansas Industrialist, is published by the faculty. The library has about 47,400

volumes and 25,000 pamphlets, and the value of the college property is about $1,980,000.

KANSAS WESLEYAN UNIVERSITY,

a coeducational institution, founded in 1886

under the auspices of the Methodist Episcopal Church, at Salina, Kan. It maintains college, academic, education, elocution and art depart¬

ments and colleges of music and commerce.

The endowment is about $110,000, total enrol¬

ment about 1,400 students and 47 professors and instructors. There were in the library 12,000 volumes.

KANSU, kan'soo', the most northwesterly of the Chinese provinces. It once formed a part of Shensi which lies to the east of it. It is bounded on the north by the Ordos Mongols territory and the desert of Gobi; on the south by Szechwan, and on the southwest by Ko-

Konor. Sinkiang (New Frontier), which now forms the western boundary of Kansu, made a part of Kansu previous to the Mohammedan rebellion of 1865. Present area 125,400 square miles. Pop. 5,000,000.

KANT, Immanuel, one of the greatest of modern philosophers : b. Konigsberg, Eastern Prussia, 22 April 1724; d there, 12 Feb. 1804.

His father, who spelled his name Cant, was a poor saddler, and was said to be of Scottish origin, though this is denied by some authori¬

ties. Kant was educated in his native city at the Collegium Fredericianum and the univer¬

sity. After the completion of his studies at the university in 1746. he was a tutor in pri¬

vate families until 1755, when he became a teacher

in the university. He did not receive a professorship, however, until 1770, when he was appointed to the chair of logic and meta¬

physics. In 1797 he retired from teaching. In the university he lectured at first on mathe¬

matics and physics in addition to the various philosophical subjects, and later added courses

on physical geography and anthropology, lec¬

turing also occasionally on pedagogy. He was small and weak physically; but by imposing upon himself a strict regimen he was able to accomplish a vast amount of work, and to live to be 80 years of age.

Kant's Critical Philosophy is contained in his three Critiques — (Kritik der reinen Ver-

nunft) (1781) ((Critique of Pure Reason, most important of alP) ; (Kritik der practischen Ver-

nunft) (1788) ((Critique of Practical Reason*), and (Kritik der Urtheilskraft* (1790) (Criti¬

que of Judgment). In these works Kant passed beyond the Rationalism (q.v.) of Wolff, in which he had been educated, and the Em¬

piricism (q.v.) of Hume (q.v.), to which he had for a time been inclined, and originated the transcendental method of philosophy. For him there is no knowledge without experience ; but experience is a compound, and implies not only a matter given in sensation, but also forms and principles of arrangement and synthesis which come from the mind. Experience gets its char¬

acter from the knowing mind, and to under¬

stand the objects of ordinary experience it is necessary to know what forms and principles the mind employs in constructing them. Kant's transcendental

inquiry, then, asks what the na¬

ture of the mind must be, our experience being as it is. He finds that experience can be under¬

stood only on the assumption that the mind has certain a priori forms and principles which belong to its very nature. These Kant calls transcendental elements of experience, and the procedure by means of which he attempts to discover these and demonstrate their applica¬

tion in experience he names a transcendental method of inquiry. It is necessary carefully to distinguish Kant's use of "transcendental® from what he calls "transcendent.® As we have seen, transcendental elements do not themselves de¬

pend upon experience, but belong to the mind as the forms and principles which all experi¬

ence presupposes, and through which alone it is possible. The transcendent, on the other hand, is that which lies beyond the sphere of all possible experience, and consequently that which can never be known. Kant's purpose in the (Critique of Pure Reason* is at once to dis¬

cover the transcendental forms of experience, and thus justify its validity, and to criticize and overthrow the false pretense of knowledge which professes to deal with transcendent ob¬

jects. With respect to the first of these pur¬

poses Kant's undertaking was epoch-making, for he introduced a change in the point of view which he himself likens to that which Coper¬

nicus effected in astronomy. Whereas it had previously been held that the object had a fixed form and constitution which the mind in know¬

ing had to passively copy, Kant teaches that objects to be known at all must conform to the concepts and principles of the knowing intelli¬

gence. In order to understand the nature of experience, then, it is necessary to ask what are the mind's ways of knowing, and what are the a priori forms and concepts under which it brings objects? In answering this question Kant makes a sharp division between percep¬

tive knowledge and knowledge gained through concepts. It is true that he goes on to break down the grounds for this distinction by show¬

ing that neither perception nor thought can give knowledge apart from the other, — that "concepts without perceptions are empty, and perceptions without concepts are blind.® Never¬

theless, he himself always maintains this dual¬

ism in the constitution of experience. The transcendental basis of each form of knowledge is therefore investigated under a separate di¬

vision of Kant's work, that of Perception in the (Transcendental Aesthetic,* and that of conceptual experience in the (Transcendental Analytic. * In Perception the transcendental forms are found to be space and time. Space and time are not objective entities existing apart from the mind ; nor are they concepts or general ideas. Kant shows that perceptive ex¬

perience such as ours is only possible if we regard space and time as belonging to the mind as forms of perceptive arrangement. Space and time do not belong to objects in themselves, therefore, apart from their being known, but are the universal forms under which all per¬

ceptive experience is known. But, for experi¬

ence, objects must be thought as well as per¬

ceived. That is to say, what we call experience is not a mere series of perceptively arranged objects, but a unity whose parts have been systematized by thought in accordance with certain principles or

points of view which it supplies. These transcendental principles, or points of view, Kant calls the Categories of the Understanding. Since to think is to judge in order to discover the complete list of catego¬

ries he falls back upon Aristotle's classification of judgments under the headings of Quantity, Quality, Relation and Modality. To each of these general divisions again three categories belong, so that Kant presents his list of 12

categories with a great show of system and completeness, which however has no real war¬

rant. Apart from the fact that there are sev¬

eral obvious repetitions and some omissions in the list, Kant does not find any organic rela¬

tion between the different categories, such as might be shown to exist, for example, by exhib¬

iting them as successive stages in the evolution of thought. It is true that Kant tells us that all of the categories are subordinated to the central unity of consciousness, the "transcen¬

dental Ego® or "transcendental unity of Apper¬

ception,® but he never explains concretely the relation of the various categories to each other and to this unity. The "transcendental Ego,®

the supreme category, is not a thing or an un¬

changing soul-substance, but an immanent and ever active principle of organization. It is impossible to make an object of it, or to de¬

scribe it as something existing by itself ; for it exists only in relation to experience. It is at once the presupposition and the necessary cor¬

relate of a coherent and unitary experience of objects, a universal principle, not a particular

substance.

The world of objects which is thus consti¬

tuted through the forms of perception and the categories is only phenomenal ; that is, only tiae world as it appears to us, not the world of things-in-themselves. These things-in-them-

selves always remain for Kant a real back¬

ground with which he contrasts the world of phenomena. We can know only phenomena, but we are. obliged to think things-in-them-

selves as existing, though we cannot give them any positive determination. Kant seems to re-

.

,

gard 'them as the causes of the sensations which arise in the mind. But, since casuality is a category ■supplied by the mind, it can only „ apply to objects as known, and hence cannot consistently be taken to apply to things-in-

themselves. It is very difficult to make Kant consistent on this point. It is certain that he continues to contrast the world as known with a more ultimate form of reality which remains beyond the sphere of knowledge but whose cer¬

tainty is guaranteed by faith or practical rea¬

son ; and it is equally certain that the spirit of his philosophy tends to break down the very opposition which he has set up so carefully.

The Understanding (der Verstand) , as Kant says, is

the faculty of rules. It is its function to reflect on the objects presented to it by sense-perception in order to find the rule or category according to which one part can be united to another. But its objects must always be given to it in sense-perception, and it can do nothing but unite one object as given in space and time with another according to some gen¬

eral rule. From the very nature of the case, then, it can never complete its task and rise to deal with and determine the nature of a real totality. Its concern is always with phenomena, with objects in space and time and their syn¬

thesis ; and, as these extend indefinitely, the understanding, 'therefore, never can find rest in the establishment of a completed totality. Now for Kant the limits of the Understanding are the limits of valid knowledge. We cannot know anything but phenomena and the laws of their connection. But there is another theo¬

retical faculty which he opposes to Under¬

standing under the name of Reason (die Ver-

nunft). This is the great source of illusion.

Reason transcends the sphere of the Under¬

standing and attempts to find for objects an unconditioned basis in the ideal or Idea of an absolute and non-phenomenal unity. In this it has a certain justification as affording an ideal of unity toward which the Understand¬

ing must always strive in its investigations; but it leads to illusion when this idea of a unity is taken as a real object of knowledge and positive determinations are ascribed to it.

Kant proceeds to apply this criticism in detail to the so-called sciences of the Rationalism (q.v.) of his day, — psychology, cosmology and theology, — pointing out that all these are illu- 4

sory, since they are based on concepts of ob¬

jects (the soul, the world, God) that lie beyond the sphere of possible experience. The conclu¬

sions drawn by rational psychology regarding the simplicity and immortality of the soul Kant rejects as paralogisms.® For, as he shows, we have no valid concept of the soul as a thing or substance, upon which to base our conclu¬

sions. The "transcendental ego® is not some¬

thing which can be determined as a. soul-sub¬

stance or an object of a particular kind.. It is always subject and never object, — the universal presupposition of experience, not an, experi¬

enced thing; for an object can only. be known when a sensation corresponding to it is given or may be given in experience. All the wisdom of rational psychology, which is based on the pure concept of the soul, Kant therefore re¬

jects. In the same way he shows that over against the various theses demonstrated by rational cosmology regarding the nature of the world as a whole (that it is limited in time VOL. 16 — 20

and space ; is composed of simple parts ; that in addition to natural causality it admits of free causality; that it has a necessary ground), the antithesis or direct contradictory of each prop¬

osition can be demonstrated with equal co¬

gency. The inevitable contradictions which thus result in the field of cosmology when we attempt to go beyond possible experience and make assertions regarding the world as a whole, Kant names the "Antinomies of Pure Reason.®

Those regarding the extension and divisibility of the world disappear as soon as we remem¬

ber tha.t space and time do not belong to things-

in-themselves, but are only forms of perceptive experience. With regard to the possibility of freedom Kant points out that although the principle of natural causation must hold with¬

out exception of phenomena, the question still remains open whether freedom may not find place in the intelligible world of things-in-

themselves. This question cannot be answered on theoretical grounds but remains a mere possibility which can only be settled by appeal¬

ing to practical considerations. Kant's criti¬

cism of theology is still more famous. He finds that all the proofs for the existence of God may be classified as the Ontological, the Cosmological and the Teleological. He shows that none of these proofs is valid from a log¬

ical point of view, and that the existence of God is therefore incapable of theoretical dem¬

onstration.

These negative conclusions are not, how¬

ever, the goal of Kant's inquiry. As he him¬

self said, he sought only to remove the false pretense of knowledge in order to prepare the way for rational faith. Knowledge, as we have seen, deals only with phenomena ; regarding the nature of ultimate reality cognitive experi¬

ence is silent. In the (Critique of Practical Reason> Kant shows that our experience as practical and moral beings, which recognizes an absolute obligation to obey the moral law has implied in it certain presuppositions regard¬

ing our own nature and the nature of ultimate reality. In the first place, our recognition of the

absolute authority of the moral law and our obligation to obey it presupposes that we have the power to do so. Moral obligation would have no meaning for a being whose will was not free. In the same way, Kant shows that moral experience implies a belief in God as the moral governor of the universe, and in immortality as affording an opportunity for the demands of the moral law to be progressively realized. Thus these problems which cannot be demonstrated on theoretical grounds find their solution from the point of view of prac¬

tical experience. God, Freedom and Immor¬

tality are never matters of knowledge or sci¬

ence, but moral certainties or matters of faith.

One constantly finds in Kant's writings a tend¬

ency to make sharp divisions, to separate expe¬

rience into different spheres. He contrasts and opposes to each other a ((phenomenal® and an "intelligible® world, and again, "knowledge®

and "faith® without any. effort to' bring these divisions again into relation. It is true, that in the (Critique of Judgment* (where he discusses the nature of aesthetic experience, and the question whether we can anply the conceotion of purpose to the interpretation of the organic world), Kant does at least suggest a synthesis 306

of the two opposing points of view. The spirit of his philosophy really transcends the opposition between phenomena that can only be known through mechanical categories, and an unknowable ultimate reality where we may believe that freedom and the realization of ideals are possible. But, even in the third (Critique) his formal treatment is unsatisfac¬

tory, and at least the letter of his treatment appears to maintain the opposition to the end.

In addition to the three Critiques, Kant's most important works are the (General His¬

tory of Nature and Theory of the Heavens) (1755), in which Laplace's mechanical account of the evolution of the planetary systems is anticipated (translation by W. Hastie with an introduction under the title of (Kant's Cos¬

mogony,^ 1900) ; the dissertation1* of 1770, which inaugurates the critical movement ; and the Prolegomena,* published in 1783, as a popular exposition and defense of the first (Critique.) See Critique of Pure Reason.

There are also works by him on physical geography, neural pathology, ethnography, anthropology, aesthetics, criticism, meteorology, logic, politics and pedagogy. His complete works were edited by K. Rosenkranz and F. W.

Schubert (12 vols., Leipzig 1842), by G. Har-

tenstein (8 vols., ib. 1869), by Kirchmann (8

vols, Berlin 1873), the Royal Prussian Acad¬

emy (Berlin 1900- —). The most noteworthy English translations of Kant are (Critique of Pure Reason, > translated by J. M. D. Meikle-

john (London 1854), and by Max Muller (2d ed., ib. 1896) ; Prolegomena and Metaphysical Foundations of Natural Science,) translated by Ernest Belford Bax (ib. 1909) ; Philosophy of Law* (Edinburgh 1887) and Principles of Politics * (ib. 1891), both by W. Hastie; (Critique of Judgment, * translated by J. H.

Bernard (ib. 1892) ; (The Philosophy of Kant as Contained in Extracts from his own Writ¬

ings, * translated by Watson (New York 1908) ; (Critique of Practical Reason, and Other Works on the Theory of Ethics, * by T. Abbott (6th ed., London 1909) ; (Cosmogony, * by W.

Hastie (ib. 1900) ; (Dreams of a Spirit Seer,*

by E. F. Goerwitz (ib. 1900) ; (Educational Theory of Kant,* by E. F. Buchner (Philadel¬

phia 1904) ; (Critique of ^Esthetic Judgment,*

by J. C Meredith (Oxford 1911) ; Pternal Peace,* translated by W. Hastie (Boston 1914).

Bibliography.— Adamson, R.,

losophy of Kant* (Edinburgh 1879) ; Borow-

ski, Hmmanuel Kant, ein Lebensbild) (Halle 1907) ; Caird, E., (Critical Philosophy of Kant*

(New York 1889) ; Chamberlain, H. S., (Im¬

manuel Kant, a Study and a Comparison with Goethe, Leonardo da Vinci, Bruno, Plato and Descartes,* translated from the German by Lord Redesdale (London and New York

1914) ; Fichte, J. C., <(Kant's System of Tran¬

scendentalism,® in (New Exposition of the Sci¬

ence of Knowledge) (New York 1869) ;

Fischer, Kuno, Hmmanuel Kant und seine Lehre* (4th-ed., Heidelberg 1899) ; Mahaffy, J. P., and Bernard, J. H., Pant's Critical Phi¬

losophy for English Readers> (London 1874; new ed., 2 vols., 1889) ; Morris, G. S., Pant's Critique of Pure Reason) (Chicago 1882) ; Paulsen, F., Hmmanuel Kant, sein Leben und seine Lehre* (Stuttgart 1898; Eng. trans.

1902) ; Prichard, H. A., Pant's Theory of Knowledge* (New York 1909) ; Renouvier, C. B., (Critique de la doctrine de Kant* (Paris 1906) ; Sidgwick, H., Philosophy of Kant*

(New York 1905) ; Simmel, G., Pant* (Leip¬

zig 1904) ; Stahlin, L., Pant, Lotze und Ritschl* (Leipzig 1889) ; Stirling, J. H., (Text-

Book to Kant* (Edinburgh 1881); Vaihinger, H., Pommentar zu Kants Kritik der reinen Vernunft* (Leipzig, Vol. I, 1881 ; Vol. II, 1892) ; Watson, J., Pant and his English Critics* (Glasgow 1881) ; Wenley, R. M., Out¬

line Introductory to Kant's Critique* (New York 1897) ; id., Pant and his Philosophical Revolution* (ib. 1911).

There is an immense bibliography largely German, of works on Kant, which is given in Ueberweg-Heinze's (History of Philosophy.*

Consult also Adickes, (Bibliography of Writ¬

ings by Kant and on Kant which have appeared in Germany up to the End of 1887,* in the Philosophical Reviezv (Boston 1892 et seq.) and the periodical, Kant-Studien (1897 —). .

Tames E. Creighton,

Professor of Philosophy, Cornell University.

KANTEMIR, kan'tye-mer', a noble Mol¬

davian family notable in the history of the country. The most celebrated of its three princely members- was Demetrius Kantemir J1673-1723), who, coming into power as prince in 1710, joined hands with Peter the Great for the overthrow of Turkish supremacy. The fail¬

ure of Peter's campaign forced Demetrius into exile in Russia where he became one of the most noted characters at the Russian court in his day. Among his numerous historical works are (Discriptio Moldavia:* ; (Hronicul Romino-

Moldovlahilor* ; and! (Historia de Ortu et De-

fectione Imperii Turcici.* See Kantemir, An-

TIOKH DMITRIYEVITCH.

KANTEMIR, Antiokh Dmitriyevitch, a

celebrated Russian satirical poet and diplomatist : b. Constantinople, 1708; d. 1744. He was the son of Demetrius Kantemir (q.v.) and of noble birth. Though born in Constantinople, he was educated in Russia where he became an officer in the army and a favorite of Peter the Great, who sent him, at the early age of 23, as Minister to Great Britain, and seven years later, in the same capacity, to France. In both countries he was a great favorite and highly regarded in literary circles as a writer and poet of talent.

He was a great admirer of Horace, Juvenal, Anacreon and other classical poets whom he s o successfully imitated as to make of his imita¬

tion something that appeared very like origi¬

nality. Like Horace, he lashed the vices of the society of his day in a general way; but he never descended to personalities. His influ¬

ence was strong in Russian literature and he is the father of the pseudo-classical movement there. He was an experimenter in verse and meter which, filled with the classical spirit, he attempted unsuccessfully to make a feature of Russian, poetry. An edition of his works was published in 1762; but a translation of his satires had already appeared in French (London 1749); and in German (Berlin 1752).

KANURIS, ka-noo'rez, certain negroes of the Sudan and especially of Bornu, Kanem and Chad parts of the country. They number about 3,500,000, most of whom are said to have an admixture of Hamite blood. Their features KAOLIN — KARADZIC

are broad, flat and decidedly negroid. They be¬

long to the Mohammedan faith.

KAOLIN, ka'6-lm, certain white-burning

clays of a residual nature formed by the wear¬

ing away of granite, pegmatite, schist, limestone or feldspathic quartzite. It is a soft clay of low plasticity and very refractory when burned.

After burning it becomes of a beautiful white color, which makes it a very valuable material for the manufacture of porcelain, wall-tile and similar white-wares, and for paper-filling. Kao¬

lin is found in various parts of the United States and it is mined, among other States, in Pennsylvania, Delaware, Georgia and North Carolina. There is a- large production of kao¬

lin in Europe, where it is mined principally in England, France and Germany, one of the rich¬

est mining districts being in Cornwall, England.

The United States imports considerable kaolin from Europe, especially for the manufacture of paper; but the home output is steadily in¬

creasing. Consult Ries, (Clays, Occurrence, Properties and Uses) (New York 1908).

KAPELLMEISTER, ka'pel-mis'ter, the

musical director in a royal or ducal palace.

He was incidentally also the choir-master. The word came into early use in German court life and still survives in the sense of musical con¬

ductor.

KAPILA, ka-pe'la, the founder of the

Sankhya system of philosophy. He was one of the Hindu rationalistic thinkers. He probably lived about the 6th century b.c., but legend credits him with having flourished be¬

fore the time of Buddha. Some writers have doubted that he ever existed and have looked upon him as a purely legendary or mythological character. He taught that only two things without beginning or end existed, that is spirit and matter. Consult Macdonell, (History of Sanskrit Literature' (London 1913).

KAPNIST, kap' mst, Vasilii Yakovlevitch, Russian poet, author and satirist : b. Obukhovka, government of Poltava, 1756 or 1757 ; d. there, 28 Oct. 1824. He was a member of the Russian Academy and was the author of several odes, epigrams and satirical poems. His chief and most successful work was the play (Yabeda) (Chicanery'), a satire on the prevalent cor¬

ruption and abuse of justice. The play achieved an immediate success, but was suppressed by Tsar Paul and nearly caused the author's exile to Siberia. It was subsequently translated into French (Ghent 1886) but was not sold to any great extent. Of his other plays, only two, the tragedy,

liere's (Squanarelle,' were of particular merit, but neither achieved a marked degree of success.

There were three editions of Kapnist's works printed, two during his lifetime and the third in 1849.

KAPOK, a kind of silk-cotton. See Silk-

cotton Tree.

KAPOSI, ka-pd'shi, Moritz, Austrian

dermatologist : b. Kaposvar, 1837 ; d. 1902.

Educated at the University of Vienna, he be¬

came a teacher there in dermatology in 1866, where he succeeded Hebra as professor (1881).

In collaboration with the later he wrote (Handbuch der Hautkrankheiten' (1872-76).

He became a great authority on skin diseases and wrote numerous works on the subject, the latest of which was (Handatlas der Hautkrank¬

heiten' (1898-1900).

KAPOSOVAR, ko'posh-var, a town in

Hungary, capital of Somogy district. It has the usual buildings of a town of its size, including a handsome Romanesque cathedral. Its indus¬

tries include cement works, tobacco and brick factories, sugar refinery and wine presses. It is the centre of a very considerable live stock business.

KAPP, Friedrich, fred'riH kap, German

biographer and historian: b. in Hamm, West¬

phalia, 13 April 1824; d. Berlin, 27 Oct. 1884.

He left Germany at the outbreak of the Revo¬

lution of 1848, and settling in New York in 1850 took active part in American politics. In 1860 he was a presidential elector and in 1867

commissioner of immigration. Returing to Ger¬

many in 1870, he entered the Reichstag in 1872. His works, < which mainly refer to the United States, include (American Soldier Traffic by German Princes) (1864) ; (German Emigration to America' (1868) ; (History of the German Migration into America) (1867); Frederick the Great and the United States*

(1871), etc.

KAPPEL, kap'el, town in Zurich canton, Switzerland; noted as the scene of the death of the Protestant reformer Zwingli in 1531.

The place contains a monument to his memory.

Pop. about 700.

KAPTCHAK. See Kiptchak.

KARA, or CZERNY GEORGE. See

Czerny George.

KARA-HISSAR. See Afiun-Kara-His-

SAR.

KARA MUSTAPHA, ka'ra mus'ta-fa, a

grand vizier of Turkey, who flourished in the middle of the 17th century and who died in 1683, strangled by the order of the Sultan.

He became grand vizier in 1676 under Mo¬

hammed IV ; and for the next seven years he had much to do with the affairs of Turkey, which he was accused by his enemies of mis¬

managing on all occasions and of always seek¬

ing his own interests to the neglect of those of the state. He laid siege to Vienna in 1683 ; but this was raised by Ian Sobieski of Poland who defeated the Turks with great slaughter. It was on account of this last misadventure that Kara Mustapha fell in the bad graces of the Sultan.

KARA SEA, an arm of the Arctic Ocean indenting the north coast of Siberia, between Nova Zembla and Yalmal Peninsula; it is about 300 miles long and 170 miles wide. The Yenisei and Ob rivers flow into this sea. Since 1875

when Nordenskjold made his voyage in the Vega, several navigators have sailed on this sea and found that it is not, as once supposed, ice-

locked all the year; but is open between July and September. Consult Hovgaard, an article in the (Scottish Geographical Magazine) (January 1890) on a route to the North Pole.

KARADZIC, ka-ra'jech, Vuk Stefanovic,

Serbian author: b. Trschitsch, Serbia, 7 Nov.

1787; d. Vienna, 7 Feb. 1864. The two great works of his life were the reformation of the Serbian literary language (which up to his time has been a very debased medium, being either rude Slavonian or a hybrid jumble of 308

Serb and Slavonian), and the publication of the (Popular Serb Songs' (4 vols., 1814–33; 3d ed., 1841^46). His epoch-making Serbian-Ger-

man-Latin (Dictionary > appeared in 1818. The songs attracted widespread attention, and were translated into every European tongue. He was the founder of modern Serbian literature.

KARAGEORGEVITCH, ka' ra-ga-or'ga-

vich, Alexander, Prince of Serbia: b. Topola, 1806; d. 1885. After having served in the Rus¬

sian army he became Prince of Serbia in 1842.

1 hough he had lived in Russia and served under the Crown, his sympathies were all with Austria ; and when the Crimean War broke out, he refused to come to the aid of Russia which was inclined to still look upon him as a member of its military organization. In this difficult position Alexander elected to remain neutral, a course which pleased neither Austria nor Russia; and much less did it satisfy the National party. Through the influence of the latter he was deposed in 1858. He was accused of conspiring against the authority of the country and of having -a part in the murder of Prince Michael in 1868. As a result of his trial he was sentenced to 20 years' imprisonment.

KARAGEORGEVITCH, Peter, Prince,

king of Serbia : b. Belgrade, 1846. He was educated at Belgrade, but when his father, Alex¬

ander Karageorgevitch, was driven from the throne in 1858, he became a soldier of fortune and pretender. After training in France at the Saint Cyr School and the Military Staff College, he fought in the Foreign Legion during the FrancO-Prussian War. Later he took part in Herzegovina's struggle for liberty. Upon the assassination of Alexander I. Obrenovitch in 1903, Prince Peter was proclaimed king of Serbia by the armv. He has always heen dis¬

tinguished by his Slay sympathies ; entered a vigorous protest against the annexation of Bosnia-Herzegovina by Austria-Hungary in 1908, and strongly opposed the restoration of the territory won by Serbia from Turkey in the Balkan War of 1912-13. The embittered feeling accruing from that surrender of terri¬

tory nrepared the way, in part at least, for the outbreak of the Great European War. When in 1915 Serbia was overrun by the Austro-Ger-

man troops, the aged king took the field with his army, and accompanied it on its retreat be¬

yond the frontiers of Serbia. See Serbia, His¬

tory.

KARAISKAKIS, ka-res'ka-ke, Georgios,

Greek soldier: b. Agrapha, 1782: d. 1827. He had a very varied career. At one time he was a soldier in the forces of Ali Pasha, the op¬

ponent of Turkey; but he deserted him and went over to the Turks, it is said because he disagreed with Ali Pasha, or as his critics maintained, because the Turks made it worth his while to change masters. When the Greeks rose against the Turks he turned against the latter and fought for his native country in the defense of which he fell in the attack upon the Acropolis. For his biography consult Papar-

rhigopoulos (Athens 1877).

KARAITES. See Jews and Judaism —

The Karaites.

KARAKORAM, ka-ra-ko'rum, a range of

mountains in central Asia in the northwestern end of the Himalayas. It is also known under the name of Mustagh Mountains. This range of mountains skirts the right bank of the Indus through the north of the Indian province of Kashmir, terminating in the Hindu Kush range at Pamir. The Karakoram Moun¬

tains, while not so excessively high when judged from the surrounding country, reach a very great altitude from the fact that their base is a vast upland series plateau the lowest parts of which are from 11,000 to 15,000 feet above sea-

level. Some of the peaks rising from 10,000 to 15,000 feet above this, reach a really high alti¬

tude which places them among the highest mountain elevations in the world. Of those the highest is Godwin- Austen (28,265 feet). A score or more peaks are over 20,000 feet and at least five reach 25,000. Naturally, at such a high elevation with respect to uplands, valleys and mountain peaks, the range contains numer¬

ous mountain passes, at very high altitudes.

Of these one of the most famous is named after the range itself which lies at an altitude of 18,550 feet above sea-level. Practically these upper regions of the Karakoram range are bleak and forbidding and very rarely blessed with vegetation of any kind, and this only in the lower regions of the foothills.

Bibliography.— Conway, Sir W. M., < Climb¬

ing and Exploration in the Karakoram-Hima-

layas) (London 1892) ; Eskenstein, Oscar, (The Karakorams and Kashmir' (London 1896) ; Filippi,

Filippo de, (Karakoram and Western Himalaya' (1909) ; (The Expedition of his Royal Highness Prince Luigi Amadeo of Savoy, Duke of the Abruzzi' (London 1912) ; Urgperial Gazetteer of India' (Oxford 1909) ; Workman, F. B., (In the Ice World of Himalaya' (London 1901).

KARAKORUM, ka'ra-kdr'um (Mongol,

kara, black, kuren, camp), the ancient capital of the Mongol Empire. It is on the Orkhon river near Urga. It remained the capital of the Mongol rulers from 1234 to .1409. The ruins of this ancient camp and capital of Ghengis Khan, which was visited and described by Marco Polo, lay long unknown to Europeans.

In 1889 it was visited by Yadrintsev, the Russian explorer, and in 1902 by W. C. Camp¬

bell, both of whom have left descriptions of them showing that they covered a very con¬

siderable space and to have been at one time connected by a system of canals with the Jirmanta River, an evidence that Karakorum must, in the days of its prosperity, have carried on an extensive trad*- and been a place of con¬

siderable importance.

KARAMAN, ka-ra-man', or CARAMAN,

a city in ICaramania (in the south of Asia Minor). It is connected with Constantinople by rail and has a very considerable transit trade much of which goes by wav of Konia, which is on the railway line to Constantinople!

Karaman, which in earlier days was known as Laranda, carries on a very considerable trade in hides, woolen and cotton goods. Pop. 10,000.

KARAMANIA, ka-ra-man'e-a, a part of

southern Asia Minor, comprising the eastern and

central parts of Konieh. It consists of an elevated sandy plain lying between Lake Tuz Tcholli on the north, < the Taurus Moun¬

tains to the south, the Anti-Taurus to the east, and the Sultan Dagh to the west. It was once subject to high cultivation in parts and pro-

duced much wealth : but its population has very greatly declined and the chief occupation of the remaining inhabitants is the raising of cattle.

Its decline as a centre of industrial activity dates from its conquest by the Turks in the 14th and 15th centuries.

KARAMNASSA, ka'ram-nas'sa, a river in

Bengal, India, which is known to the natives, who have a religious horror of it, as the (

As to be touched by the waters of the Karam-

nassa means defilement to Hindus of Caste, in crossing it, they all have to be carried over it by the non-Caste population or on some beast of burden or in some other manner which pre¬

vents them coming into contact with the stream.

KARAMZIN, ka'ram-zen, Nicholas Mik-

hailovitch, Russian historian: b. 1766; d. 1826.

Descended from a noble Tartar family, he re¬

ceived an excellent education combined with travel in England, France, Germany and Switzerland. Of a highly sentimental nature, he appears to have looked back into the ro¬

mantic past of history and ignored the prosaic and reformed conditions of his time. Though profoundly influenced by French and English literature, he was intensely Russian in spirit, re¬

garding his own country as the acme of national perfection and totally separate or self-contained from the rest of Europe. He expounded his faith in two novels, c Natalia, the Boyard's Daughter and

(Poor Liza* in 1792, striving, above all, to rid the Russian language from the <(heavy antiquated forms® of German influence.

<(Pseudo-classicism® was the key-note of such literature as Russia then possessed. His Gen¬

eral History of Russia) (Saint Petersburg 1816-17) was a grandiose work, rich in labori¬

ous research as well as errors, and proved an instantaneous success. He added to it during the next 10 years, making a total of 12 volumes.

Together with Novikoff, author of the his¬

torical Dictionary of Russian Writers,* and the poet Joukovsky, Karamzin gave the death-blow to ((pseudo-classicism® and there arose, as by magic, that brilliant band of poets and novelists who created a Russian national literature worthy of the name, and of whom the greatest was Pushkin. Consult Bruckner, A., (A Liter¬

ary History of Russia) (New York 1908) ; Kropotkin, P., (Ideals and Realities in Russian Literature) (New York 1916) ; Waliszewski, K., (A History of Russian Literature) (New York 1910).

KARANKAWAN, ka-ran'ka-wan, an Amer¬

ican Indian tribe, now extinct. They formerly lived along the Texas coast in the vicinity of Mattagorda Bay, and originally came from Central America. They were first mentioned in 1687, by the French explorer Joutel, and were regarded as cannibals. They were un¬

compromisingly hostile to the whites. In 1843, 50 survivors of the race removed to Mexico, where in 1858 the last of them were exterminated by Mexican ranchers.

KARASU-BAZAR, ka-ra'soo, a town in

Russian Crimea, the centre of an important trade in

fruits and other articles of commerce among which are hides, tallow, wool and cer¬

tain manufactured goods. The place is decid¬

edly oriental in appearance owing to the pres¬

ence of numerous minarets and Khans. This oriental atmosphere is increased by crooked streets and a congested population of a decid¬

edly cosmopolitan composition, including Ar¬

menians, Tartars, Jews, Greeks and Russians.

Pop. about 15,000.

KARATEGIN, ka'ra-ta-gen', the northeast

province of Bokhara under the suzerainty of Rticda formerly. It contains an area of over 4,000 square miles, most of which is very mountainous, the mountains rising, in places, to an altitude of 18,000 feet. The valleys are fertile and the mountain slopes afford excel¬

lent feed for cattle, the raising of which forms, with agriculture, the chief occupation of the inhabitants. Among the agricultural products of the lower lands are fruits, grains, especially corn and wheat, cotton and hemp. The capital, Garm (Harm), is a place of no great import¬

ance. In fact the population of the total dis¬

trict is only about 100,000, consisting, for the most part, of Tajiks and Kirghiz.

KARATHEODORI, ka/ra-ta'd-do-re',

Alexander, Pasha, a Turkish Christian states¬

man : b.. Constantinople, 1833 ; d. 1906. On the completion of his education in Paris, he entered the Turkish diplomatic service, in which he made rapid progress,. becoming councillor to the Minister of Foreign Affairs, Savet Pasha (1876-77). In 1878 he

was sent as a commis¬

sioner from Turkey to the congress at Berlin and the same year he had the distinction of being appointed the first Christian Minister of Foreign Affairs in Turkey. He was Prince of Samos from 1885 to 1895 inclusive and gov¬

ernor of Crete, during the two following years, until the uprising of the inhabitants.

KARAULI, one of the native states of

India. See Kerauli.

KARAWALA. See Carawala.

KARELIANS, a Finnish tribe living in

eastern Finland and Russia. They have the characteristic Finnish features and appearance, light hair and blue eyes. They are very active, aggressive and progressive and are among the most intelligent of the Finnish tribes. Their country, which lies at an average height of about 5,000 feet above sea level, is very un¬

promising and the people wring a scanty living from it through agriculture and the raising of reindeer. The culture of this Finnish folk-divi¬

sion, which numbers about 1,000,000, is very old and its literature is the most imaginative, epic, dramatic and picturesque of all the Finnish people. To them is due the great Finnish epic poem

Christian times. See Finland, Language and Literature ; Kalevala.

KARENINA, Anna, ka-ra'nye-na', one of

the best of the novels of Count Leo Tolstoy.

See Anna Karenina.

KARENS, ka'renz, a primitive Burmese

people inhabiting the mountain regions of Upper Burma, Tenasserim and Pegu. Many of the Karens are still nature-worshipers while 20 per cent or more are nominally Chris¬

tians. The race is very intelligent and capable of greater progress than it has yet made. The Christian part of the Karens has advanced rap¬

idly in civilization, due in part to the fact that

its language has been reduced to writing by Christian missionaries. Pop. over 1,000,000.

Consult Colqiihoun, (Among the Shans) (Lon¬

don 1885) ; Macmahon, < Karens of the Golden Chersonese > (London 1876); Mason, Civiliz¬

ing Mountain Men> (1862) ; Smeaton,

(1847-50).

KARIKAL, ka're'kal', one of the provinces of French India. It lies surrounded by British lanjore and extends along the Coromandel coast. Its chief commercial and business centre is Karikal, a town on the coast about 150

miles south of Madras. Had it a better harbor it would undoubtedly enjoy more 'business patronage. The province is governed from Pondicherry, capital of the French possessions in India. The principal foreign trade of Kari¬

kal is with Europe and Ceylon. It has been in the possession of the French since 1749 when it was ceded to them by the Rajah of Tanjore.

During the Napoleonic wars it was seized by the British who restored it to France as part of the general settlement of 1814, one of the conditions of the restoration being that it should henceforth

erect no fortifications and maintain no garrisons except for police purposes. Popu¬

lation over 60,000; that of Karikal, the chief city, 20,000.

KARL, Tom, Irish- American tenor: b.

Dublin, Ireland, 1846. Educated in Italy he sang for many years in Italian opera. He ap¬

peared in English opera in the United States in 1871 ; and in 1887 he was one of the found¬

ers of the "Bostonians,® a light opera company which was more than ordinarily successful in the days when the Gilbert and Sullivan operas were at the height of their popularity. In these Karl took leading parts. He also sang Robin Hood in De Koven's -famous production. Re¬

tiring from the stage in 1906 Karl gave vocal and other concerts and taught singing and dra¬

matic-musical training, being for a while di¬

rector of the Academy of Dramatic Arts, New York City (1899). Later he followed the same work in Rochester.

KARLI, kar'le, a Buddhist cave-temple of India, 25 miles south-east of Bombay, rich in sculpture, and divided like a church into nave and aisles, with an apse. The temple probably belongs to the 1st century.

KARLOWITZ, kar'15-vits, or CARLO-

VITZ, a town on the frontier of the province of Slavonia, 45 miles northwest of Bel¬

grade. The great vine mountain in the vicinity yields the best and strongest qualities of Slavonian wines. A peace was concluded here in 1699, between Austria, Poland, Russia, Venice and Turkey. In 1848-49, Karlowitz was the focus of the Serbian

rebellion against Hungary, and the theatre of collision between the Serbians and the Magyars, and at a later period between the Hungarians and the Aus¬

trians. The town contains a Greek cathedral and is the seat of the Greek archbishop of the Serbian nationality. Pop. about 6,000.

KARLSBAD. See Carlsbad.

KARLSHAMN. See Carlshamn.

KARLSKRONA. See Carlscrona.

KARLSRUHE. See Carlsruhe.

KARLSTAD. See Carlstad.

KARLSTADT. See Carlstadt.

KARLUK, kar-luk', a large island of

Alaska. See Kodiak.

KARMA, (1) in Buddhism, the judgment

at death which determines the future state of the deceased. It is also the fiat of the Budd¬

hists on actions, pronouncing them to be meri¬

torious, or otherwise. (2) In theosophy, Karma means the unbroken sequence of cause and effect, each effect being in its turn the cause of a subsequent effect. It is a Sanskrit word meaning "action® or "sequence.® See Buddhism ; Theosophy.

KARMATHIANS, a former Mohammedan

sect, founded in Irak by Karmath during the 9th century. Missionaries were trained to spread his creed, and one of them, Abu Said, gained a strong hold on the people of the Persian Gulf. The caliph, afraid of the influ¬

ence of the new sect, sent an army for its sup¬

pression, but he was defeated, and Abu Said took possession of the whole country.

KARNAK. See Thebes.

KAROK, ka'rok (Indian "karuk,® up

stream), the name by which the Indians of the Quoratean stock are generally known. Their territory was in northwestern California be¬

tween the Yuroh tribe on the south and the Shasta on the north. The language of the Karok is distinct from that of the other tribes by which they are surrounded; but the Karok have been so long in contact with the other races of northern California that they have assimilated their customs, habits and culture.

They are good canoe men, but owing to the lack of large trees in' their country they buy their boats from neighboring tribes. The gov¬

ernment of the Karok was that of the village community; and there seems to have been no sort of tribal unity. The different villages had different ceremonies. There were two distinct dialects of the Karok tongue.

KAROLYI, ka'ro-lye, Counts, a Hun¬

garian family descended from the Kaplyon fam¬

ily of the 13th century. Among their ancestors are many illustrious names connected with the history of Hungary and Austria. The first baron of the family was Michael Karolyi, who attained this rank in 1609, while Alexander Karolyi, his lineal descendant, raised the dig¬

nity of the Karolyis to that of count in 1712.

The most distinguished modern representative of the family was Count Aloys Karolyi, who was Austrian Ambassador to Berlin, representa-

Uve of that country at the Berlin Congress in 1878 and Ambassador at London for the following 10 years, where he won for himself the reputation of being a very clever diplomat.

The ancestral seat of the Karolyi familv is at Nagy-Karoly in Szatmar.

KARPELES, kar'pe-les, Gustav, Austrian

critic and historian : b. Eiwanowitz, Moravia, 1848; d. 1909. On the completion of his studies at Breslau he became a journalist there; but ambition took him to Berlin in 1877. There he gradually attained the reputation of being one of the soundest critics in Germany and an authority on Heine and his literary work Among his published works are his 'Autobiog¬

raphy' of Heine collected from his letters and

works (1888); (Ludwig Borne) ; (Nikolaus Lenau*; (Friedrich Spielhagen) (1889); (Goethe in Polen> (1889) ; (Graf Moltke als Redner) (1890) ; (Die Frauen in der Jiidischen Littera-

tur} ; (Geschichte der Jiidischen Litteratur) ; (Allgemeine Geschichte der Litteratur) (1891) ; (Jewish Literature) (1895) ; (A Sketch of Jew¬

ish History0 (1897). Karpeles was of a Jewish family, hence his interest in Jewish history.

KARPINSKI, kar-pen'ske, Franciszek,

Polish poet : b. Holoskow, Galicia, 1741 ; d.

1825. After graduation in theology and law at Lemberg, he entered the service of Prince Czar-

torski. Through his position he came into con¬

tact with the court and the king, Stanislas

Augustus, who became a great admirer of the lyrical genius of the young poet, upon whom he lavished favors, and in 1794 he presented him with two estates, to one of which Karpinski retired to devote his attention more uninter¬

ruptedly to literary pursuits. Though Kar¬

pinski essayed nearly every form of poetry his genius shows itself at best advantage in his love songs and idyls and his religious hymns, which are among the best in the Polish tongue.

These are universally popular with all classes through Poland. Several editions of his. works have been published ; notably by Dmochowski, (4 vols., Warsaw 1804; new ed., 3 vols., Cracow 1862). For his autobiography consult Mora-

czewski (Lemberg 1849).

KARR, Jean Baptiste Alphonse, zhon

bap-test al-fons kar, French novelist and satir¬

ist: b. Paris, 24 Nov. 1808; d. Nice, France, 30

Sept. 1890. He was educated at the College Bourbon, where he subsequently taught, and began in 1832 to write for the Figaro, becoming its editor-in-chief in 1839. In that year he es¬

tablished Les Guepes (The Wasps), a monthly journal of satire which aroused many enmities.

His earliest books were novels, among them

maines) (1870) ; (Dieu et Diable : le Credo du Jardinier) (1875). The latter portion of his life was passed at Nice where he was a devoted gardener, several flowers having been named in honor of him.

KARROO BEDS, a series of sandstones

and shales covering extensive districts of South Africa, extending through Cape Colony, Trans¬

vaal and Orange. These beds, which are nearly horizontal, contain many fossils and volcanic remains in which exist the South African diamonds.

KARROOS, ka-rooz', the Hottentot name,

now adopted by physical geographers, for the table-land or extensive plains between the mountain ranges of Cape Colony. They are fertile during the short rainy season, but during the dry season they assume the appearance of parched arid deserts, though even then flocks and herds find a. certain amount of food on them. In recent times artificial methods of procuring water for these tracts have been adopted. In some places great reservoirs have been made to impound the water of permanent streams, or streams that exist only in time of rain; many wells have also been sunk, from which water may be pumped by means of wind¬

mills if it does not rise of itself. In this way large areas of the Karroos are now occupied as farms on which more or less grain is grown.

Kloof, a sort of companion name to karroo, is applied to the longitudinal valleys extending between the ranges of the adjacent hills.

KARS, kars, (1) Russia, a province in the southwestern part of Transcaucasia; area, 7,239

square miles. It is mountainous, but the chief occupations are agriculture and stock-raising.

Pop. (estimated) 396,200. (2) Kars, the capital of the province of Kars, is about in the centre of the province, on a high plateau, barren in part but productive in the vicinity of the city. It was formerly a Turkish fortified city. During the Crimean War in 1855 it suffered a pro¬

tracted siege, the defending force, under a British officer, General Fenwick Williams, sur¬

rendering only after cholera had decimated the garrison. It was captured by Russian troops during

the Russo-Turkish War of 1877-78, and was thereafter ceded to Russia. The city has some manufactories, carpet-mills, cotton and woolen factories. Pop. 35,462.

KAR.SHI, kar'she, a town in Bokhara,

about 100 miles southeast of the capital. It is noted for its cutlery which is used* all over central Asia and which finds an even wider market. This distribution is the more easy because of the fact that Karshi is the centre of the very extensive caravan routes which branch out in several directions from it. The sur¬

rounding country, which is given to some ex¬

tent to agriculture, grows poppies and tobacco and these form an important part of the ex¬

ports of the city. Pop. 25,000, in which are represented most of the races of central Asia.

KARST, a European plateau. It stretches around the top of the Gulf of Triest, across the Istrian peninsula and through parts of Gradisca Carniola, Gorz and Istria proper.

The limestone formation of the plateau is hol¬

lowed out into caves, well-like cavities and pits often of very considerable depth and some¬

times several miles in width or length. Some of these form deep valleys in which are villages, cultivated lands and even forests, forming fertile spots in the great desert of the lime¬

stone plateau above. As the limestone is more or less porous, the water makes its way through it and forms underground rivers as in Yucatan, though more water is seen above ground in Karst than in Yucatan. Tradition says that the plateau was once covered with extensive forests which were depopulated by the conquerors, probably the Romans, thus drying up all the sources of the streams that once flowed much

more over ground than they do now.

KARST TOPOGRAPHY, topography in

a limestone region which has been controlled largely by solution. The drainage is chiefly underground through caves and the surface is dominated by sink holes (q.v.). The name is derived from the region known as The Karst, along the northern shores of the Adriatic. See Karst; also Dolomitic Alps.

KARTIKEYA, kar-ti-ka'ya, or SKANDA,

the Hindu god of war to whom is attributed a miraculous birth without human medium or agency. According to the Sanskrit legends, the seed of the god Siva passed through fire 312

into the sacred waters of the Ganges. Six nymphs bathing in the water conceived and bore a son each. By some supernatural agency these children were united into one who re¬

tained six faces. This six-faced hero child be¬

came the leader of the embattled heavenly hosts. Yet notvvithstanding his warlike prow¬

ess and his military renown which outshines that of all other Hindu gods and heroes, he rides upon a peacock. He is credited with haying overcome innumerable giants and other active enemies of the gods. A legend, evi¬

dently of more recent origin, credits him with being the son of Siva, the destroyer (q.v.) and his wife, Parvati, the mountain-born (q.v.). Consult Dowson, (Hindu Mythology >

(London 1879); Wilkins, W J.,

thology) (London 1900).

KARUN, ka -roon', the only navigable

river of Persia, and important as a route to the interior. About 117 miles from the mouth navigation is impeded by the rapids of Ahwaz.

Formerly the Karun flowed direct to the sea, but now it traverses an artificial channel lead¬

ing it into the Shat-el-Arab, which it joins at Mohammerah. It has recently been opened to foreign trade as far as Ahwaz.

•

KARWIN, kar-ven', a free city existing within the former Silesian Crownland, Austria.

It is a place of considerable activity, being the centre of an extensive trade in coal, coke, beer and lumber, the latter of which is sawn in the district. Pop. 16,000.

KARYOKINESIS, kar"i-6-ki-ne'sis, the

process of development of the ovum under the influence of fertilization. See Cell; Embry¬

ology.

KASAN. See Kazan.

KA.SBIN, kas-ben', or KAZVIN (also

spelled Casveen, Casein and Kazbin), Persia, a town in the province of Irak-Ajemi, about 90

miles west-northwest of Teheran. It is built of kiln-burned bricks, and had once a great number of elegant mosques and well-con¬

structed bazaars, but a large proportion of the buildings are now ruinous and deserted, partly as the result of repeated earthquakes. The manufactures include tanning, weaving, etc., and there is a considerable transit trade. There are many vineyards and gardens in the neigh¬

borhood. Pop. about 40,000.

KASCHAU, or KASSA, Czecho-Slovakia

free town, capital of Abanj-Torna, situated 170 miles northeast of Budapest with" which it is connected by rail. It is a place of some con¬

siderable commercial and industrial import¬

ance, among its manufactures being stoneware, starch, paper, dextrin, alcohol, liquors, steel and iron goods, bricks, pottery, powder, furni¬

ture, tobacco, flour and house fittings. It has a large local trade and does an extensive busi¬

ness with Hungary and Galicia. Grape-grow¬

ing and the manufacture of wine have supplied Kaschau with picturesque dress for the sur¬

rounding hills and mountains making it one of the most attractive cities in Hungary. It pos¬

sesses excellent buildings, wide and well-kept streets and fine parks. Among its attractive buildings are Saint Elizabeth Cathedral, a fine gothic structure of the Uth century and Saint Michael's Church which dates back to the 13th century; and the municipal theatre, which, it is claimed, is the oldest theatre in Hungary.

The city contains other attractive churches, fine schools and colleges and good administration buildings. Pop. 5U.000, Maygars, for the most part.

KASHAN, ka'shan, capital of the Persian province of the same name. Situated on the caravan trade route between the two important commercial centres of Ispahan and Teheran, it is the centre of considerable commercial and other activity. Among its industries are the manufacture of woolen and silk goods, brass and other artisan work, jewelry, copper vessels and household articles. It is surrounded on three sides by picturesque mountains which give an attractive air to the city while, at the same time, visiting earthquakes upon it from

time to time, one of which nearly destroyed it in 1895. Among the minerals mined in the vicin¬

ity is cobalt. Pop. 37,000.

KASHGAR, kash-gar'. See Cashgar.

KASHMIR. See Cashmere.

KASHMIRI, kash-me're, the Aryan lan¬

guage of Cashmere (q.v.), an ancient Sanskrit tongue which has, in the course of centuries, received the addition of many foreign words principally from Persian and Arabic. Kash¬

miri is rich, in folk-tales and mythological lore most of which have never been collected owing to the fact that the people were, until lately, cut off from the art of writing. Most of the literature of the language which is all very modern and of very limited extent, is the work of foreigners among the most prominent of whom are the foreign missionaries by whom parts of the Bible, hymns and other devotional literature have been translated into Kashmiri, through the aid of the Persian alphabet which has been adapted to the needs of the native tongue. Consult Elmslie,

lish and English-Kashmiri . Vocabulary*

(London 1872) ; Grierson, (Manual of the Kashmiri Language) (Oxford 1911); Wade, (Grammar of the Cashmiri Language* (Lon¬

don 1888).

KASIKUMUKS, ka'se-koo-mooks', a Les-

ghian race of central Daghestan, who call themselves Lak and who are known to the Avars as Tumal. They are a distinctly differ¬

ent race of people from the Kumuks, their northern neighbors, who appear to be of Turk¬

ish origin. Consult Eckert,

KASKASKIA, an American Indian tribe of the Algonquian family, formerly occupying a part of southern Illinois. In 1832, the surviv¬

ors of the race, .with the Peorias, removed to Kansas, and affiliated with the Weas and Pian-

kishaws. The four tribes removed to Indian Territory in 1867, and in 1903 scarcely 100

members of the four tribes remained. See Indians.

KASKASKIA, kas-kas'ki-a, Ill., a township in Randolph County, on both sides of the Kas¬

kaskia or Oka w River, at its junction with the Mississippi opposite Saint Genevieve, Mo. A part of it now obliterated was the oldest town in the West, the first nermanent white settlement in the Mississippi Valley. Marquette in 1675

had established a. mission among the Kaskaskia Indians near the present Utica, Ill., on the

Illinois River; the Jesuits Marest and Saint Cosme, guided by Tonty (q.v.), removed the mission in 1700 to the Mississippi bottoms three miles from the river, near the Kaskaskia. It throve greatly, and was not only a large Indian market, but sent produce and furs to New Orleans. > Fort Chartres was built there in 1720; eminent French officers and adventurers came thither — as Vaudreuil and the command¬

ant Chevalier de Bertel — and with its gay French life it was named (

tory (1809) and a State (1818) ; but on removal of the seat of government to Vandalia in 1819, it began to decline. The river steadily en¬

croached on the meadow ; and in 1892 united its course with the Okaw, converting a large part of the old site, with most of the ancient build¬

ings, into an island, which in 1899 crumbled into the river after several great floods. North of the junction still remains about a third of the town site, with the foundations of a church and of the capitol building. In 1891 the Illinois legislature appropriated $50,000 to remove the old cemetery to a point on the bluffs, and a large monument has been erected there. Pop.

142. Consult (Kaskaskia: A Vanished Capi¬

tal } (in Chantauquan, Vol. XXX, Chautauqua, N. Y., 1900); (Kaskaskia and its Parish Rec¬

ords } (in Magazine of American History. Vol.

VI., New York 1880).

KASKASKIA RIVER, rises in Champaign

County, Ill., and flows southwest through Moul¬

trie, Shelby, Clinton, Fayette and Saint Clair counties, finally joining the Mississippi in Ran¬

dolph County. It formerly entered at Chester, but in 1891 the great river cut away the neck of land at Kaskaskia and joined it there. It is nearly 300 miles long, and navigable to Vandalia, 150 miles. It flows through a fertile rolling country which is part of the Illinois coal field.

KASSAI, kas-si', a tributary of the Kongo, which it enters from the south a short distance above Stanley Pool, pouring into the Kongo a vast volume. It is navigable for hundreds of miles.

KAS.SALA, ka-sa'la, North Africa, a town at the southeastern extremity of the Egyptian Sudan, near the border of Abyssinia, formerly belonging to Egypt, and once a commercial centre. Before the Mahdi’s uprising it had a population of perhaps

20,000. Italians captured it from the Mahdists in 1894, and in 1897 it was restored to Egypt. Pop. 10,000.

KASSIMOV, ka-se'mov, district and capital in the government of Riazan, Russia. The city is a place of considerable trade and com¬

merce and the site of a popular and extensively attended fair; and it was, in the 15th century, the chief residence of the Tartar, Kasim Khan.

To the time of the latter dates one of the picturesque mosques of the city.

KASSITES, an ancient dynastic family of Babylonia who ruled it from about 1761 to 1185

B-c* They were probably the same people as the Cossaeans. The first king of" the Kassites was Gandash (1761 — 45 b.c.); but history sheds little real light on his origin, though he was probably the chief or leader of one of the tribes of Babylonian districts. The list of his suc¬

cessors has been pretty accurately ascertained with the dates of their kingship. A great deal has been gathered in the way of excavated material from the ruins of Nicasa but most of this still remains to be deciphered and corre¬

lated in order to make it furnish a consecutive and in any way satisfactory account of the almost six centuries of Kassite rule in Baby¬

lonia, which must have been one of the most in¬

teresting periods in the history of the great an¬

cient city. The recovered records show these apparently foreign rulers (to the city) coming gradually under the uplifting influence of Babylonian culture. In all there were 36 kings who ruled over Babvlon almost 577 years. The records so far recovered and deciphered show, in a fragmentary manner, yet in a most inter¬

esting way, many of the activities of this an¬

cient line of Babylonian kings, who played the several parts in many of the historic events of their day known to us through the records of other countries. In the 8th century b.c. we find one of their sovereigns making an offensive and defensive treaty with Assyria. According to an account preserved, the daughter of the Assyrian king, Asuruballit I, became the wife of the Kassite ruler Burnaburiash (1381–56) who was on friendly relations with Amenkotep IV (1375–50) of Egvpt and with other foreign potentates, with one of which at least he formed a treaty of friendship. Others of Kassite sovereigns are shown as carrying on wars against neighboring sovereigns, . punishing traitors, placing their sons on foreign thrones and marrying their daughters to friendly potentates and thus strengthening their foreign relations. Behind the forbidding form of the clay tablets which record the events of the reigns of Kassites and display their activities, lies a very human story of which only glimpses are displayed. The Kassites, on account of their relationship with the development of the great cultural region surrounding Babylonia and their contact with Egypt, Assyria and other historic peoples are of historic interest ; and slowly their story is. being unfolded and further material to throw light on obscure or missing parts, is being sought.

KAS.SON, John Adam, American lawver

and diplomatist: b. Charlotte, Vt., 11 Jan. 1822; d. Washington, D. C., 18 May 1911. He was graduated from the University of Vermont in 1842. studied law, was admitted to the bar, and in 1857 moved to Iowa and continued his law practice. He became active in the Republican party, was a delegate to the national conven¬

tion in 1860 and chairman of the State com¬

mittee in the .campaign ; was assistant post¬

master-general in 1861—62 ; and commissioner to the International Postal Congress at Paris in 1863. He was elected to Congress in 1863 and served until 1867 ; in the next year was elected to the Iowa State legislature, and from 1873 to 314

1877 was again a member of Congress. He was then appointed Minister to Austria, which posi¬

tion he held till 1881. In 1881—84 he served again in Congress, and from 1884-85 was Min¬

ister to Germany; in 1885 he was commissioner to the Kongo International Conference at Ber¬

lin, and special envoy to the Samoan Interna¬

tional Conference in 1893. In 1897 he was ap¬

pointed special commissioner plenipotentiary to negotiate reciprocity treaties as provided for by the Dingley Tariff Law, and in 1898 was a member of the American Canadian Joint High Commission. He has written (History of the Monroe Doctrine) (in the North American Re¬

view 1881) ; (History of the Formation of the United States Constitution (1889).

KASTAMUNI, kas-ta-moo'ne, a vilayet

and its capital in Asiatic Turkey, 250 miles east from Constantinople. The city has consider¬

able trade and a few industries, among the lat¬

ter being leather goods and cotton factories, and among the former grain, timber, fruit and vegetables. Ivastamuni is also noted for its ex¬

cellent mohair ; and it still makes its famous copper ware though on a much less extensive scale than formerly on account of the abandon¬

ment of the copper mines in the vicinity of the

city. Pop. 16,000.

KASTEL-POMO, one of the three di¬

visions of the Kato Indians (q.v.).

KASTNER, kest'ner, Abraham Gotthelf,

German mathematician and poet : b. Leipzig, 27

Sept. 1719; d. Gottingen, 20 June 1800. He re¬

ceived an appointment at Gottingen, where, in accordance with the reformatory spirit which animated that university in the latter part of the 18th century, he exerted a powerful influence in delivering mathematical and natural sciences from the bondage of antiquated textbooks. His (Anfangsgriinde der Mathematik) (6th ed.

1800), and his various other writings, inaugu¬

rated a more enlightened era of scientific study in Germany. He took a conspicuous part in the formation of the celebrated union of Gottingen poets, and by his assistance the elder Boye suc¬

ceeded in introducing, through the instrumental¬

ity of the ^Musenalmanach,® an entirely new generation of poets to the public. His general popularity was chiefly due to bis ^inngedichteP

A portion of his epigrammatic poems were in¬

cluded in his Miscellaneous Writings) (1783).

KASTNER, kast'ner, Johann Georg, Ger¬

man composer and writer on music: b. Stras-

burg, 9 March 1810; d. Paris, 19 Dec. 1867. He studied with Maurer and Romer; in 1832-35

composed four operas, of which (Die Konigin der SarmateiP (1835) is chief ; and then re¬

moved to Paris, where he wrote other operas, among them his best work, (Le dernier Roi de JudaP presented at the Conservatoire in 1844.

From 1837 he also published a series of ele¬

mentary treaties on music, a once authoritative work on instrumentation being perhaps the best. He was made an associate of the Academie Franqaise.

KASTRI, or CASTRI, Grecian village on

the southern slope of Mount Parnassus, and built upon the site of Delphi (q.v.). The greater part of the village has been moved re¬

cently farther to the west to permit of the ex¬

cavations of ruins of the ancient city under¬

taken by French scientists in 1893.

KASTRO, ka'stro, or KASTRON, the

principal town and capital of the islands of Mytilene, Chios and Lininos or Lemnos. It is also called Lemnos and Mytilene. Kastro is situated on the east coast of the island of Lesbos and possesses an ancient acropolis crowned by a magnificent castle dating back to the 14th century. Until the island was ceded to Greece at tlhe close of the Balkan War, it had long been a Turkish Sanjak and at the same time, the seat of a Greek church arch¬

bishop. Being thus a place of considerable ecclesiastical importance, Kastro possesses numerous churches and mosques. Situated in the Grecian archipelago midway between

Mount Athos and the coast of Asia Minor, Lemnos and the town of Kastro are the centre of an extensive trade reaching to all the sur¬

rounding islands and to the coast country.

The island is divided into two peninsular por¬

tions by the bays of Paradise and Saint An¬

thony, both of which have excellent harbors each of which is named after the bay on which it is situated. Lemnos produces, in its rich valleys, tobacco, fruits, grain, wine and oil and these form the principal exports of the city.

From Kastro and the surrounding country was exported to Greece and all the islands of the archipelago the famous Lemnian earth which was believed to be an effective remedy against snake bites and wounds. Kastro is connected with the mainland of Mytilene by a causeway, while the Island of Lesbos has extensive harbor facilities on two sides thus increasing the city's commercial importance as the centre of its trade and that of the neighboring islands. The island and the city are intimatelv connected with Greek history and mythology. Population of the city of Kastro about 60,000 principally Moslems.

The. city and the island are frequently called Stalimene. See Lemnos ; Mitylene.

KASTRON, capital of the island of Myti¬

lene. See Kastro.

KASVIN, kaz'ven, a town in Irak-Ajemi, Persia, consisting of a modern city and an ex¬

tensive ruined town. See Kazvin.

KATABOLISM, otherwise known as de¬

structive jrnetabolism ; the chemical changes occurring within an organism and resulting in the formation of simpler products through the decomposition of more complex ones.

KATAHDIN, ka-ta'dTn, or KTAADN, the

highest mountain in Maine, situated in Pisca¬

taquis county and in the central part of the State. The region is difficult of access, the Penobscot

River being the only thoroughfare, and its course being interrupted by frequent shoals and falls. The mountain, which has an altitude of 5,385 feet, is entirely of granite, and stands in abrupt walls with acres of sur¬

face exposed in naked floors. Its sides which are marked by bare spots caused by sliding rock, present a striking appearance. On its summit are found only lichens and a few dwarfish plants; half-way down, the birch and other forest trees are stunted. Over the gran¬

ite rocks, even to the summit, are found boulders of trap and of other rocks not be¬

longing to the mountain, . and among them pieces of sandstone containing fossil shells The view of the country from the summit em¬

braces scattered mountains rising in conical

granite peaks, among which are interspersed hundreds of lakes, many of them large, and innumerable streams.

KATAKIUCHI, ka'ta-ke-oo'che (Japan¬

ese, killing one's enemy®), a very old vendetta popular in Japan. Custom prescribed the slay¬

ing, without process of law, of any one who had murdered one's lord, father or very near relative. The law came to frown on this prac¬

tice but custom proved itself more powerful than the might of the properly constituted au¬

thorities. To such an extent did this popular method of righting personal injuries prevail that one who failed to perform his part in the scheme of vengeance, became thereby ostracised from the society of his class. The law pre¬

scribed capital punishment for any one taking vengeance in his own hands in the exercise of Katakiuchi ; and through the continual pressure of the authorities exercised over a considerable space of time, this old custom has been com¬

pletely abolished from the country. Katakiu¬

chi, being one of the oldest and most pictur¬

esque customs of Japan with strong power to appeal to the popular imagination, the love of the romantic and reverence of the heroic, has impressed itself on the literature of the people.

It forms the main motive of hundreds of sto¬

ries, novels and plays, and has thus, to a consid¬

erable extent, influenced the form of Japanese popular literature.- Among the many historico-

dramatic works having for its chief motive the katakiuchi is the (Forty-seven Rouins) which is still one of the standard popular pieces at all Japanese theatres. Consult Dickens,

shingura, or the Loyal League > (New York 1876) ; Mitford, (Tales of Old Japan* (Lon¬

don 1874).

KATALLA, Alaskan port situated on Con¬

troller Bay. It is a small town and its chief importance consists in the fact that it is the terminus of the Copper River and Northwest¬

ern Railroad, forming connection with the Cop¬

per River Railroad which connects Cordova with Kennicott, one of the great copper re¬

gions of Alaska.

KATAMANDU, capital of Nepal. See

Khatmandu.

KATAMORPHISM. See Metamorphism.

KATE, ka'te, Jan Jacob Lodewijk Ten,

Dutch poet : b. The Hague, 1819 ; d. 1889. He studied theology at Utrecht and entered the Reformed Church ministry and was actively engaged in ministerial duties until his death.

Among his charges was a church in Amster¬

dam to which he went in 1860. He devoted his spare time to literature and has left many orig¬

inal poems, principally of a religious nature, which are still popular in Holland and Flan¬

ders. Ten Kate had the gift of fluent satirical poetry which he displayed from 1842 to 1843

in his writings in the Braga, which he and Prius published and wrote. He was an ex¬

tensive translator from Hebrew, Luther, Cha-

misso, Schiller, Goethe, Tegner, Andersen, Hugo, Tasso, Dante, Oehlenschlager, Byron and Milton. In turn many of his own most popular poems have been translated into French, German and other foreign languages.

Among his best known works are (De Schep-

ping* (1866) ; De Jaargetidjen) (1871) ; (Palm-

bladen en dichtbloemen) (1884). Several edi¬

tions of his works have appeared, the best and most complete being that published in Leyden in 12 vols. (1890-1901). Consult Ten Brink, Jan (in Ouze Hedendaagsche letterkundigen met bijschriften, Amsterdam 1884).

KATER, Henry, English physicist : b.

Bristol, 16 April 1777 ; d. London, 26 April 1835.

In 1799 he went to India as an ensign, where he was engaged on the great trigonometrical survey, a work to which he rendered important service. In 1814 he retired on half-pay, and henceforth occupied himself exclusively with scientific studies. He was employed by the Emperor of Russia to construct standards for the weights and measures of that country; de¬

termined the length of the seconds pendulum, investigated the diminution of terrestrial grav¬

ity from the pole to the equator; and invented the (

KATHIAWAR, ka'te-a-war', peninsula on

the. west coast of India, forming a part of Gujarat Province in Bombay. It is bounded on the northwest of the Gulf of Cutch, on the southeast by the Gulf of Cambay and on the west and south by the Arabian Sea. The coun¬

try forms a British protectorate under whose protection and supervision are nearly 200 native chiefs. The political agency, which has an area of only about 21,000 square miles, contains a population of about 2,500,000. Among the chief towns of Kathiawar are Rajkot, Navana-

gar, Somnath and Junagarh.

KATHLEEN MAVOURNEEN, kath'len

ma-voor'nen, a famous Irish song, written by Mrs. Julia Crawford (b. Cavan, about 1798) ; the music was composed by an Englishman, Frederick Nicholls Crouch (q.v.), who first sang it at a concert in Plymouth, England, about 1832. He received five guineas ($26.25) for the song. In 1866 the plates were sold at auction for £532 ($2,660). Crouch composed another song called (Kathleen Avourneen,* the words of which were written about 1844 by Desmond Ryan.

KATIPO, the New Zealand name for al¬

leged poisonous spiders of the genus Latrodec-

tus (q.v.).

KATIPUNAN (ka-te-poo'nan) SOCI¬

ETY, a secret society in the Philippines, or¬

ganized originally to oppose Spanish suprem¬

acy, but one of its principal objects was to drive all foreigners from the Philippines. At the ad¬

journment of the Filipino Congress it was de¬

creed that the supreme council of the Katipunan Society should assume, control of native affairs.

The society organization was purely military, with a chief or colonel assigned to each 100

members. Each member signs an oath written in his own blood, swearing under most revolt¬

ing penalties to serve and obey the society. A conspiracy was discovered in 1895—96 and about 300 leaders of the society were arrested. There¬

after the society was openly opposed to the Spaniards and later to the United States.

Aguinaldo placed all males under the regula¬

tions of the society, and after his defeat, the members took up guerrilla warfare against the troops of the United States. The membership in the organization is said to have gradually decreased since the American occupation.

KATKOV, kat-kof', Mikhail Nikiforo-

vitch: Russian writer and nationalist: b. 1818; 316

d. 1887. Educated at Moscow, Konigsberg and Berlin, he became a teacher of philosophy in Moscow in 1845

and in 1851 he was appointed editor of the Moscoiv Intelligencer. He had already become much more conservative than in his youth when he sympathized with liberalism and revolutionary doctrines. He attacked the Nihilists bitterly through his paper, accusing them of being the fountainhead of all the po¬

litical troubles that had flooded over Russia.

Gradually he became one of the strongest sup¬

porters of absolutism while, at the same time he criticised the government for failing to use the iron hand in putting down insurrection and uprooting treason. He became the personal adviser of Alexander III, and was accused of simply echoing the sentiments of his sovereign.

But this criticism was unjust for Katkov does not seem to have always sided with the tsar.

The proof of this is that his name became known internationally and hi'S reputation and influence were world-wide. As a journalist he was very active throughout his long life, and his chief writings have been published in 25

volumes of very ill-digested and selected mate¬

rial (Moscow 1863-87). Consult Nord und Sud (Vol. XCIV), (Michail Nikiforowitsch Katkof* (Breslau 1900).

KATMAI, Alaska, a volcano of the Alaskan peninsula, situated long. 155° 30" W., lat. 58°

N. on Shelikof Strait almost opposite Karluk on Kodiak Island. Its altitude is 7,500 feet, and until its outbreak 6 June 1912 it was sup¬

posed to be extinct. The main crater is one of the greatest in the world, according to a statement made 22 Aug. 1916 by Robert F.

Griggs, after a careful study of the volcano, in the

interests of the American Geographic Society. (

The explorers said the most wonderful of all sights at the crater was a place where a glacier, blown in two by the eruption, still formed part of the crater wall, the intense heat being in¬

sufficient to melt this palisade of ice. Part of the crater wall is composed of igneous rock of brilliant color. Eruptions on a smaller scale occurred in 1914. Consult (The Valley of Ten Thousand Smokes1* (National Geographic

Magazine, Vol. XXXI, pp. 13-68, Washington 1917).

KATO, ka'to, Tomosaburo, Japanese naval officer: b. Hiroshima, 1859. Entering the naval service he became professor in the Japanese Naval Academy with the rank of captain in 1899, and three years later he was appointed chief staff officer of the stationary squadron.

The Russo-Japanese War found him chief of staff of the Kamimura squadron, a position in which he showed marked administrative ability which secured him the appointment of bureau head when the war had ended. At the age of 49 he was vice-admiral and a year later com¬

mander of the Kure admiralty. In 1914 he was in command of the Japanese fleet which fought the Germans at Tsing-Tao and forced them to surrender the city after a four months' strug¬

gle.

KATO, ka'to, Yakaakira, Baron, Japanese statesman: b. Nagoya, 1859. Educated at the University of Tokio, he entered the services of a Japanese steamship company, a position he left to become private secretary to the Minister of Foreign Affairs, Count Okuma, in 1888. In 1891 he became director of the banking and taxation bureaus in the Finance Department of the government. Three years later he was ap¬

pointed Japanese envoy to Great Britain, a position he held until 1899, and again from 1908 to 1913. In the meantime he became Japanese Minister of Fore-gn Affairs, 1900-01, 1906 and 1913. The following year he was created baron as a recognition of his services to the nation. Through his newspaper, Nichi-

Nichi, which he acquired in 1904, Kato has ex¬

ercised considerable influence upon Japanese politics and national thought.

KATO, a .Kuneste tribe of American In¬

dians, belonging to the great Athapascan family, which, at one time, lived in Cahto and Long valleys, in Mendocino County, Cal. Ac¬

cording to Powers the Kato consisted of the Kai-Pomo, Kastel-Pomo and the Kato-Pomo.

They resemble the Porno in culture but belong linguistically to the Athapascans, and are closely related to the Wailaki.

KATONA, ko-to'no, Joszef, Hungarian

poet: b. Kecskemet, 1792; d. 1830. . He was a close student of the German dramatic poets and he began his career with a rather close imita¬

tion of his models; and he never entirely freed himself from German influence especially in the drama, a field in which he was most success¬

ful. Howeyer he produced one play, (Bank Ban* in which he broke awav from his models and became truly national. (Bank Ban* became immensely popular and is still frequently pre¬

sented upon the stage. In Hungary it is looked upon as one of the best efforts of the national drama. Katona was active in other literary fields besides the drama but it was not until 1880, half a century after his death, that his unpublished works,

consisting principally of es¬

says and poems and fragments of unfinished dramas, appeared in print in three volumes.

These volumes reveal a prolific second side of him whom Austria had come to consider as purely a dramatist.

KATRINE, kat'rin, Loch, a lake in Perth¬

shire, Scotland. Scott has sung its beauties in the cLady of the Lake* and others of his works and Wordsworth, too, has presented its at¬

tractions. The grandeur of the Trossachs, Ben A'an and Ben Venue are most vividlv presented in the opening canto of the (Lady of the Lake* and, in a lesser degree, in following cantos. Loch Katrine is a comparatively small lake, being only, about nine miles long and less than a mile wide on an average, though it stretches out to greater width in places

ia^e ^e. ^amous Ellen's Island, the home of the exiles, in the (Ladv of the Lake> whom James of Scotland visited in the guise of a lost hunter, without revealing his real name and rank. The celebrated mountains surrounding the lake are comparatively low when considered from their actual elevation above the level of the sea, Ben Venue, the highest, being only 2,393 feet. But as thev rise from a low level they present jointly and severally a majestic appearance. Owing to its great natural beauty and its many romantic, traditional, historical and literary interests, Loch Katrine and the surrounding region are annually visited by many tourists and students. Modern steamers now take care of this tourist trade on the lake. In 1885 the waters of Loch Katrine were raised five feet by artificial means and its capacity as a great natural reservoir increased in order to make it furnish a greater supply of potable water to the city of

Glasgow which, as far back as 1859, had made use of the lake for this purpose. This greatly reduced the dimensions of –Ellen's Isle and covered up the ((Silver Strand,® made famous in the (Lady of the Lake.5 The water from Loch Katrine is car¬

ried over a distance of 25 miles in reaching Glasgow. The lake lies at an altitude of 365

feet above sea-level ; but as its maximum depth is 500 feet, a part of it is 135 feet below sea-

level. Consult Scott's (Lady of the Lake5 and (Rob Roy5 for descriptions of Loch Katrine and surrounding country.

KATSENA, kat'se-na, the former capital

of the Hausa territories, situated in the north of Kano, British Nigeria, Africa. It has been under British rule since 1903. It was at one time the most important city of the very exten¬

sive district in which it is situated; but tribal wars, which began over 100 years ago, largely depopulated it and left the greater part of it in ruins. Its present population is about 10,000

which is about one-tenth of that which it pos¬

sessed at the height of its prosperity.

KATSU AWA, katz' ah'wa, Japanese

statesman: b. 1823; d. 1900. A disciple of Yokoi He'shiro and ardent adherent of the Oyomei philosophy, which taught that all knowledge was useless unless expressed in action, and which sought ever for constructive change, as against the hardened conservatism that becomes dry rot, Katsu went to Nagasaki. From the Dutch of¬

ficers sent out by the king of Holland in the early 50's, he, with others, who later became famous, learned about steam machinery and built the first Japanese warship on a foreign model. In 1859 Katsu

navigated this, the first ocean-going Japanese steamship, the Kanda Maru, across the Pacific in 37 days. When in 1861 Tsushima was seized and occupied by the Russians, Katsu called in the aid of the British fleet and had them expelled. In 1868, during the civil war in Japan, by reasoning with his former fellow-student, General Saigo of the Imperial forces, he saved Yedo from attack and the war torch. He laid the foundation of Japan's modern navy with purchased Dutch and Amer¬

ican warships. He was several times member of the Cabinet. He brought American teachers to Shidzuoka and sent his son to study at New Brunswick, N. J., and in the United States Naval Academy at Annapolis, and other young men to America, and assisted in the formation of the first Commercial College in Tokio. Post¬

humous honors were awarded and his family ennobled. Consult Griffis, (The Rutgers Gradu¬

ates in Japan5 (1916), and Clark, (Katsu Awa : The Bismarck of Japan5 (1904).

KAT.SUO, kat'soo-o', the general name in Japan for tunnies, which are extensively fished and dried. In this latter shape they form a very important part of Japanese commerce amounting annually to over 5,000,000 catties (a catty is V/3 pounds).

KATSURA, kats-we'a, Taro, Prince, Jap¬

anese soldier and statesman: b. Choshu. 1847; d. 1913. He received a military training in Prussia, entered the Japanese army in 1867, fought in the war of the Mikado's restoration, was vice-minister of the army in 1886-91, and in the Chino-Japanese War (1894-95) com¬

manded the 3d division, with which 4 March 1895 he captured New-chwang. For his serv¬

ices he was made viscount. In 1896 he was governor-general of Formosa, in 1898-1900

Minister of War, from 1901-06 was Prime Min¬

ister. In the latter year the general dissatis¬

faction over the Peace of Portsmouth forced his resignation. In 1908-11 he was again Prime Minister and Minister of Finance, and for the third time from December 1912 to February 1913. His services in forming the alliance with England brought him the title of count, and in 1905 he became marquis. He was made prince in 1911 after the annexation of Chosen.

In 1912 he founded the political party called Rikkendoshikai.

KATTE, kat, Edwin Britton, American

electrical engineer, son of Walter Katte (q.v.) : b. Saint Louis, Mo., 1871. Graduated from Cornell University he took up electrical engi¬

neering and became assistant engineer to the Park Avenue Improvement Commission, New York (1897-98). He then joined the engineer¬

ing department of the New York Central and Hudson River Railway where he finally became chief engineer of the electrical traction systems in 1906.

KATTE, kat'te, Hans Hermann von, an

historically notable frend of Frederick the Great: b. 1704; d. 1730. He was very much attached to the young crown prince who had incurred the ill will of his father. Frederick ordered Katte to sever all relations with the crown prince; but he disobeyed this command, and plotted to liberate the heir to the throne.

This attempt was discovered and Katte was condemned to death and executed for his part in it.

KATTE, Walter, American civil engineer: b. London, England 14 Nov. 1830; d. 5 March 1917. Coming to the United States in 1850 he was resident engineer of

the Pennsylvania State canals 1857–58, and subsequently held various engineering posts of responsibility. In 1861—62 he served the Federal government as mili¬

tary railway engineer. From 1865 to 1875 he was in the employ of the Keystone Bridge Company of Pittsburgh, superintending at this time the building of the steel arch bridge at Saint Louis. He was chief engineer of the New York Elevated Railroad 1877–80, and from 1880 to 1898 held similar posts on other im¬

portant railroads, including the New York Central.

KATTIMUNDOO, or CATTIMUNDOO,

a scmi–elastic, semi–resinous substance obtained from the gum of the Euphorbia trigonia, a plant which grows extensively in East India. The name itself is a native East Indian term. As the elastic resinous gum becomes older it be¬

comes harder and more brittle and loses prac¬

tically all of its elasticity.

KATTOWITZ, ka'to–vits, town in Silesia, Prussia, about 100 miles southeast of Breslau.

It is a place of considerable commercial and industrial importance. Among its manufactur¬

ing interests are the making of paving blocks, especially those treated with creosote, bricks, machinery of different kinds, roofing paper, furniture, household fittings, bronze castings; there are also zinc, iron and brass factories and railway and machine repair shops. In ad¬

dition to its commerce in all the products from these interests, Kattowitz is the great centre of

the coal trade for a considerable part of Silesia.

Pop. 50,000.

KATUN, ka-toon, a cycle of years em¬

ployed by the Mayas in computing time. The exact length of a katun has not been exactly and definitely settled. Some authorities claim that it consisted of 20 years while others assert that it covered, like the ancient Mexican cal¬

endar, 52 years. Among those who support the latter theory are Bancroft, Spence and several Mexican scientists. On the other hand, the word kate, among the Mosquito Indians of Central America, signifies the 28 days of the lunar month. Others of the Central American tribes follow the Mexican system of 18 months of 20 days and a cycle of 52 years. Most au¬

thorities, however, claim that the katun con¬

tained only 20 years. Pio Perez, a noted Mexi¬

can scholar and the discoverer of an important manuscript detailing the ancient chronology of Yucatan, was of the opinion that the katun consisted of 24 years, according to his state¬

ment made to John L. Stephens, the explorer of Yucatan and Central America.

KATUNGA, a town in the British Sudan, West Africa. It has long been a place of very considerable commercial activity, forming the centre of trade of extensive surrounding terri¬

tory. Pop. 20,000.

KATYA YANA, kat-ya'ya-na, the name of

several noted Hindu personages, among them some of the chief disciples of Buddha. One person of this name was a critic of great celeb¬

rity in India, chiefly on account of his criti¬

cisms of the work of Panini, the famous native grammarian and writer. The name Katyayana is signed to various important works on the White Yajur-Veda. The grammarian of this name lived probably about the 3d cen¬

tury of the present era ; and so important was his work that he is still regarded as one of the chief authorities of the Hindu language of the Vedics and of the tongue of the Deccan.

Consult Macdonell, (History of Sanskrit Lit-

erature5 (London 1913) ; Wiber, (White Yajur-Veda } (London 1859).

KATYDIDS, large neuropterous insects of the grasshopper family Locustidce, remarkable for their loud and shrill call. The katydids belong to several allied genera which have the head obtuse in front, the wings and wing-covers large and leaf-like, and the color bright green.

Highly developed striduling organs are found in the males in the form of transparent drum¬

like structures at the base of the wing-covers, by the friction of which, one against the other, as the wings are raised and lowered, the well-

known call is produced. This is heard only at night (though some species have quite differ¬

ent day calls as well) and is so loud and shrill as to be distinctly audible at a distance of a quarter of a mile. The call of the males is answered by chirps from the females. The characteristic eggs are gummed to twigs in two contiguous over-lapping rows. Katydids are peculiarly American. The common species is Cystophyllus concavus, known by its very broad coarse-veined wing-covers and long ovipositor.

In Phylloptera oblongifolia the wing-covers are narrower and the yeins finer. Other related genera

are Phaneroptera and Microcentrum.

Consult Howard, Hnsect Book) (New York 1901) which contains a further bibliography.

KATZBACH (kats'baH) RIVER, a small

stream in Silesia, Prussia, falling into the Oder at Parchwitz. On its bank 26 Aug. 1813 a battle was fought between the French and the Prussians in which the latter under Bdiicher won a signal victory. The French lost 12,000

and 18,000 were taken prisoners.

KATZER, Frederic Xavier, American

Roman Catholic archbishop : b. Ebenesee, Aus¬

tria, 7 Feb. 1844; d. Fond du Lac, Wis., 20

July 1903. He came to this country in 1864, and was ordained to the priesthood in 1866.

Until 1875 he wa-s a professor in the Seminary of Saint Francis in Milwaukee, when he be¬

came pastor of the cathedral at Green Bay and secretary to Bishop Krautbauer. After four years of labor in this capacity he was ap¬

pointed vicar-general of the diocese of Green Bay, and on the death of Bishop Krautbauer.

in December 1885, became administrator, and in May 1886 bishop of Green Bay. In Decem¬

ber 1900 he was chosen archbishop of Mil¬

waukee.

KAUAI, kow-i', one of the Hawaiian

Islands, the most northern of the group, in lat.

22° N. and long. 159° 30' W. ; area, 590 square miles. It _ is of volcanic origin, its high¬

est elevation reaching nearly 6,000 feet; but although mountainous in character the island has a soil of great fertility, a considerable por¬

tion of which, mainly in the northern part, is under cultivation. Sugar is the chief product, and tropical fruits are also largely grown.

There is great extent of forest land^ and the island is well supplied with streams, the largest of which is Hanalei. The principal harbors are Hanalei, Koloa, Nawiliwili and Waimea.

Pop., with Niihau Island, 11,859. See Ha¬

waiian Islands.

KAUFFMAN, kowf'man, Marie Ange-

lique Catherine, commonly known as An¬

gelica Kauffman, Swiss painter: b. Coire, Switzerland, 20 Oct. 1741 ; d. Rome, 5 Nov.

1807. She was the pupil of her father, John Joseph Kauffman, a painter of little note. Her first work of importance was a portrait of the Duke of Modena and his duchess. She then collaborated with her father in the decoration of the parish church and castle of Schwarzen-

burg, his birthplace, painting many portraits in the meantime. Going to Florence, she was

hindered in her artistic career by her passion¬

ate devotion to music and singing, but in 1763

finally abandoned all other pursuits for that of painting. She fell under the influence of W inckelmann at Rome, and produced the 'Mother of the Gracchi.' She also did some work in co-operation with the Venetian land¬

scape painter Zucchi, whom she subsequently married. It was at this point in her life that she developed the particular sentimental syle of her paintings as seen in (Anna and Abra' ; and (Samma at the Grave of Bennoni,' which created a furore. In London (1765) she be¬

came a favorite with court and aristocracy, and acquired great wealth and honor; she was made member of the Royal Academy and was thought to have inspired Sir Joshua Reynolds with tender feelings. She was, however, un¬

fortunate in marrying a Swede who called him¬

self Count Horn, from whom she was later divorced. She eventually married Zucchi and settled in Rome (1781), where her house be¬

came a rendezvous for scholars and artists, the most famous of whom was Goethe, who has left us a remarkable characterization of her art. While her tenderness borders on mawkish¬

ness and her designs are monotonous, her im¬

aginative figures have an elevated charm which was not without its influence in circles where George Morland was typical of English art.

Her personality cast a reflection which en¬

hanced the impression which her pictures made on her contemporaries, and the

of Mrs. Thackeray Ritchie exhibits with tact and fidelity this interpretation of her somewhat remarkable career. Other works by her are (Psyche Drying Cupid's Tears' ; (Death of Leonardo da Vinci' (1781) ; (Servius Tullius as a Child) (1784); (Abelard and Heloise' ; (Hermitage, St. Petersburg' ; (The Vestal Virgin' (Dresden _ Gallery) ; (Chrfst and the Woman of Samaria) ; (Virtue, Prudence and Folly' (Philadelphia, Pa.). There are over 200

of her original drawings in the British Mu¬

seum. The best of her portraits are those of Mengs and Lady Hamilton in Kensington Mu¬

seum, and of herself in the Berlin Museum, the National Gallery, London, and the Munich and Uffizi galleries. Consult De Rossi, (Vita di Angelica Kauffmann' (Florence 1810) ; Dohme, (Kunst und Kiinstler) (Leipzig 1817) ; Engels, (Angelika Kauffmann) (Bielefeld 1892) ; Gerard, (Angelica Kauffmann) (London 1893) ; Schram, (Die Malerin Angelika Kauff-

mann) (Briinn 1890), and (Angelica Kauff¬

man, ' in Illustrirte Zeitung (Leipzig, June 1903).

KAUFFMAN, Reginald Wright, Ameri¬

can author : b. Columbia, Pa., 1877. Educated at Harvard University, he joined the Philadel¬

phia Press , and finally became associate editor of the Saturday Evening Post (1904-07). He held the same position on the Delineator, was dramatic critic on the North American (Phila¬

delphia) and managing editor of Hampton's Magazine (1909). He was United States rep¬

resentative to the first International Congress for Woman's Suffrage held in London in 1912, and member of the Criminal Law Amendment Commission of Great Britain (1912-13). He was in Europe, especially in Belgium, during the first year of the Euronean War, and was active in war work to 1919. Contributor of poems, essays and stories to newspapers, journals and magazines, he has also written numerous photo plays and compiled and edited (The Book of Love' ; (The Book of Grati¬

tude' ; (The Book of Friendship,' and (The Book of Good Cheer. ' Among his original works are

(1903) ; (Miss Frances Baird, Detective) (1906) ; the dramatization of the latter (with the help of Channing Pollock, 1907) ; (What is Socialism' (1910)

; (My Heart and

Stephanie' (1910) ; (The House of Bondage'

(1910) ; (The Girl that Goes Wrong) (1911) ; (The Way of Peace' (1911) ; (The Sentence of Silence' (1912); (The Latter Day Saints'

(with Ruth Kauffman, 1913) ; (Running Sands'

(1913); (The Spider's Web' (1913); (Little Old Belgium' (1914) ; (In a Moment of Time'

(1915) ; (The Silver Spoon' (1915) ; (The Mark of the Beast' (1916) ; (The Ancient Guest' (a book of poems, 1917).

KAUFMAN, David S., American poli¬

tician: b. Cumberland County, Pa., 1813; d.

Washington, D. C., 13 Jan. 1851. A graduate of Princeton University, he removed to Natchez, Miss., where he studied law. In 1837

he settled in Nacogdoches, Tex., and the next year was elected to the Texas Congress. He was twice re-elected and twice chosen speaker of the House. In 1843 he entered the Texan Senate, taking an active part in favor of an¬

nexation, and being elected one of the first members of the House of Representatives from Texas (1846-51).

KAUFMANN, Alexander, German poet:

b. Bonn, 1817 ; d. 1893. After studying law in Bonn and Berlin he turned to literature, and some time later became archivist to the Prince of Lowenstein (Wertheim) which allowed him time and opportunity to follow his investiga¬

tions into historical subjects and more espe¬

cially the history and customs of the Middle Ages. Notwithstanding his love of history he was a poet of

some power, freshness and originality. It is probable that his poetic bent was encouraged by his marriage to Mathilde Binder ((

bach' (1852) ; (Gedichte' (1852) ; (Mainsagen'

(1853) ; (Unter den Reben' (1872) ; (Mytho-

terpe' (with his wife, 1858).

KAUFMANN, Carl Maria, German arch¬

aeologist: b. Frankfort-on-the-Main, Germany, 2 March 1872. He was educated at Berlin and the University of Fribourg, Switzerland, and subsequently studied archaeology at Rome. In 1899 he was ordained to the Catholic priest¬

hood. From 1905 to 1908 as member of the Frankfort Expedition he was engaged in archaeological explorations in the Libyan Desert. He discovered, in company with Ewald Falls, the old Christian city of Menas, a cele¬

brated place of pilgrimage in early Christian days. He is the author of (Die Jenseitshoff-

ungen der Griechen und Romer nach den Sepulkralinschrif ten' (1897); .(Die Legende der Aberkiosstele im Lichte urchristhcher Eschatol-

ogie' (1897) ; (Der Letzte Flavier' (a novel, 1897) ; (Das Dokument der Lady' (a novel, 1899, 1909) ; (Die sepulkralen Terseitsdenk-

maler der Antike und des Urchristentums'

(1900) ; (Die Wunder der Kirche der Kata-

koniben und Martyred (a novel, 1900) ; (Sant Elia, Erinnerungen an eine archaeologische Streife in

Etrunen) (1901); (Das Kaisergrab in den Vatikanischen Grotten) (1901) ; vDie Grotten des Vatikan) (1902) ; (Ein altchrist-

liches Pompeji in der Libyschen Wiiste) (1902) ; (Handbuch der christlichen Archaeolo-

gie) (1905); (Die Ausgrabung der Minas-

heiligtiimer in der Mareotiswuste) (3 vols., 1906-08) ;

len} (1910) ; (Die Menasstadt und das National-

heiligtum der altchristlichen ^Egypter} (Vol. I, 1910), and contributions' to periodicals. His fiction appears under the nom-de-plume of Marchese di San Callisto.

KAUFMANN, Konstantin Petrovitch,

Russian soldier: b. near Ivangorod, 1818; d.

1882. Serving as engineer and soldier he be¬

came eventually attached to the War Depart¬

ment, where he was largely instrumental in the reorganization of the Russian army. Hi.s talent for organization won him the appointment of commander of the military division of Vilna and governor-general of northwestern Russia (1865), and of Turkestan (1867). The latter di¬

vision, which had just been organized, permitted him again to show his talent for organization which enabled him to very much extend Russian influence throughout central Asia. He defeated Bokhara, conquered Samarkand, overcame the Khan of Kiva and generally extended Russian power.

KAUFMANN, Nicolaus, German mathe¬

matician and engineer: b. Cismar, Holstein, about 1620; d. 1687. Educated at the univer¬

sities of . Copenhagen and Rostock, where he paid

special attention to mathematics and astron¬

omy, he became an engineer, and, having ac¬

quired some local reputation, he went to Lon¬

don in 1660 where he became very much inter¬

ested in the formation of the Royal Society of which he was a charter member and with which he remained closely connected all his life. Later on he went to France where he seems to have won a reputation as a skilful architect and engineer. He contributed by his writings to much of the scientific literature of his day and many of his papers appeared in the transactions of the Royal Society. Among his most notable works are

(1651) ; (Astronomia Sph?erica> (1651) ; (Ra-

tiones Mathematicae Subductae) (1653) ; (Lo-

garithmotechnia5 (1668-74) ; Unstitutionum Astronomicarum, Libri Duo) (published first in 1876). Consult Kaestner, (Geschichte der Mathematik> (Gottingen 1796-1800) ; Montucla, (Histoire des mathematiques) (Paris 1799—1802). Nicolaus Kaufmann generally went under the name of Nicolaus Mercator, or at any rate his writings, for the most part, were signed with this signature.

KAUKAUNA, ka-ka'na, Wis., city, in

Outagamie County, on the Fox River, and on two divisions of the Chicago and Northwestern Railroad, about 21 miles southwest of the city of Green Bay and seven miles northeast of Appleton. At this point the Fox River has a fall of 50 feet within one mile, which gives the city excellent water power. A government ship canal has been built to overcome the obstruc¬

tion to navigation caused by the rapids. The place was first settled in 1790 by Dominick Ducharme, and was incorporated as a town in 1850. It was chartered as a city 5 April 1885.

The city has three banks with a combined cap¬

ital of $1,200,000. The value of taxable prop¬

erty is about $3,500,000, and the receipts and expenses are each about $75,000 annually. The chief industrial wealth of the city is derived from railroad shops, bag and paper works, pulp works, fibre mills, brick and tile works, foundry and machine shops, sulphite mills. The city has 10 churches, one high school, two graded public schools and two graded parish schools. About one-half the population are Germans. The city owns the water and elec¬

tric-lighting plants. The government is vested in a mayor and council. Pop. 5,951.

KAULBACH, Friedrich, German portrait

painter: b. Arolsen, Waldeck, 1822; d. 1903.

He was one of the members of the famous Kaulbach family and a nephew of Wilhelm von Kaulbach (q.v.), under whom he studied. He had much of the talent of his uncle and might have made a noted success at the painting of large canvasses containing groups and many figures, but his success as a portrait painter made him such a favorite that most of his time was taken up with this especially remuner¬

ative work which led to his appointment as court .painter and professor in the Hanover Polytechnic Institute. He painted most of the celebrities of his day, and among the best of his portraits are those of the Empress Eliza¬

beth of Austria and Elizabeth Ney, the sculp¬

tor. Among his large historical paintings the most meritorious is the (Coronation of Charle-

magne) (Munich).

KAULBACH, Friedrich August, German

portrait and genre painter: b. Munich, 1850.

Son of Friedrich Kaulbach (q.v.) and grand¬

son of Wilhelm von Kaulbach, he received his first instruction in art from his father and later continued his studies with Raupp and Kreling at Nuremberg, and later on with Diez in Munich. Under his father's teaching he early displayed a facility of coloring which he steadily improved under his subsequent teach¬

ers. His work shows much more boldness than that of his father and a sympathy with the German renaissance which the older Kaul¬

bach did not possess. His facility in portrait painting and the reputation in art of the Kaul¬

bach family together with his own evident talent and modernity early won for him wide local popularity which he gradually extended to include all of Germany. If not a really great artist, he has proved a versatile one. He has painted miniatures perhaps better than any one else of his day in Germany and he has won for himself the reputation of being a good caricaturist. An excellent teacher of painting and drawing, he became director of the Munich Academy in 1886, a position he held until 1891.

His appointment to this office was probably due to his success in winning the Berlin gold medal for painting in 1886. Among his best-

known paintings are (Cavalier and Lady's Maid) (1873); (A Day in May* (1879);

^chiitzenlis'l* (1881) ; ^Lute-player* (1882) ; portraits of (Fnda Scotta,* Princess Gisela,*

(Prince Regent of Bavarian (Emperor Wil-

l.am II,5 (Empress Auguste Victoria and Daughter, > and- < Entomb¬

ment, } and numerous pictures of his wife, his x family and his friends. Consult Graul and also Rosenberg who have both written interesting biographies of him.

KAULBACH, Hermann, German genre

painter : b. Munich, 1846 ; d. 1909. He was a .

son of Wilhelm von Kaulbach (q.v.), who gave him early instruction in painting. Later he studied under Piloty, who seems to have influenced him more than his father had. He has considerable talent, but he stands apart from the sketchy style of his age in his love for minuteness of detail. He tends largely to¬

ward historical subjects which he handles in a manner that is always interesting and gen¬

erally notable for the excellent handling of coloring. Among his best paintings are han¬

sel and Gretel and the Witch5 (1872, Riga Municipal Gallery) ; (Last Days of Mozart5

(1873, Vienna Municipal Gallery); (Sebastian Bach Playing the Organ in the Presence of Frederick the Great5 (1875, Berlin Gallery) ; (Coronation of Saint Elizabeth5 (1886, Wies¬

baden Gallery) ; (At the Grave of a Friend>

(1888, Munich).

KAULBACH, Wdlhelm von, German

painter: b^ Arolsen, 15 Oct. 1805; d. Munich, 7 April 1874. He learned the rudiments of his art from his father who was a goldsmith and engraver on copper. He was a good drafts¬

man when he went to Diisseldorf in 1821 and entered the Art Academy where his chief teacher was Cornelius, already acknowledged as the head of the Diisseldorf school of his¬

toric painting. When Cornelius in 1825 re¬

moved to Munich, at the invitation of King Ludwig of Bavaria, he followed him and soon became his disciple in the art of ceiling decora¬

tion, examples of which are (Apollo and the Muses5 in the great hall of the Odeon, and the allegorical figures of the (Four Chief Rivers of Bavaria5 and of (Bavaria5 in the portico of the royal palace. His pure and classic power of design is well exhibited in the 16 wall paint¬

ings, illustrating the story of (Cupid and Psyche,5 in the palace of Duke Maximilian at Munich. He was at this time attracted to the study of Hogarth's works, the fruit of which appeared in h:s illustration of books, including the works of Shakespeare, Goethe and Schiller, and the Reineke Fuchs. He painted many great incidents in the history of Germany, in¬

cluding 12 scenes from Klopstock's (Hermann's Fight,5 and the (Death of Hermann,5 wall paintings in the queen's palace at Kingsbau.

But his most ambitious and comprehensive works are those in which he endeavored to rep¬

resent the progress of the human race by a series of typical historic tableaux. These com¬

prise the (Tower of Babel5; (Age of Homer5; destruction of Jerusalem5 ; (Battle of the Huns and Romans5 ; (The Crusaders5 ; (The Reformation5 (1847-63). The range of his in¬

tellectual ideas, his wonderful power of gen¬

eralization, his mastery of every style of paint¬

ing from caricature to the sublimity of the Italian cinquecentists, as represented by Michel¬

angelo. have no parallel among modern paint¬

ers. His coloring may be a little cold, some¬

times a little crude, but his sense of form, his

loftiness of conception and his genius for har¬

monious composition have won for him the first place among German artists of the transi¬

tion period between the idealism of Cornelius and the realism of the modern historic school.

KAULBARS, kowl'bars, Alexander,

Baron, Russian soldier and explorer : b. Saint Petersburg, 1844. Educated for military life in his native town, he was sent on military duty to central Asia. There he spent much of his time in exploration and was the first known European to explore the country beyond Lake Issyk-Kul (1869). This he followed by other extensive exploration work in 1870-73 in China, the Russo-Japanese boundary land and the country in the neighborhood of the Sea of Aral and the Amu-Darya. After a successful part in the Russo-Turkish War he became the Russian delegate to the Balkan Boundary Commission (1878) ; and Bulgarian Minister of War (1882).

Ten years later he became commanding officer of a new cavalry division which he had been given a commission to organize. Commander general in China in 1900 ; governor-general of the district of Odessa (1904) and commander of the third and afterward of the second Man¬

churian armies (1904), he suffered defeat at the hands of the Japanese leaders, Generals Oku and Nogi, at the battle of Mukden, where he had been entrusted with holding the right of the Russian army. His rabid anti-Jewish policy and his

incompetence for higher military duties caused his removal from command at Odessa in 1913. He was a brother of Baron Nikolai Kaulbars (q.v.).

KAULBARS, Nikolai, Baron, Russian

soldier: b. Saint Petersburg, 1842; d. 1906. He was an elder brother of Baron Alexander Kaul¬

bars (q.v.). Educated for the army in his native city and in Berlin, he was appointed member of the Russian general staff (1868).

Like his brother he took part in the Russo-

Turkish War (1877-78) and afterward he held several important government posts and finally became chief of staff of the Sixth Army Corps at Warsaw (1889) which he left 10 years later to join the general staff at Saint Petersburg.

He wrote on military subjects and did some important work as a cartographer.

KAUN, kown, Hugo, German musical

composer : b. Berlin, 1863. After a good edu¬

cation in Germany along musical lines, he came to the United States and settled in Milwaukee in 1887, where he took an important part in the musical life of the city for the next four years, organizing choral and other musical so¬

cieties. He returned to Berlin in 1900. He has written much chamber music and numerous choral pieces, songs, prologues, piano music of various kinds and two one-act operas, (Der Pietist5 and (01iver Brown5 ; a symphonic poem, (Falstaff,5 and a symphonic prologue, (Maria Magdalena.5

KAUNITZ, kow'mts, Wenzel Anton

Domin:k, Prince, Austrian statesman : b. Vi¬

enna, 2 Feb. 1711; d 27 June 1794. After traveling

in England, France and Italy he was appointed an Imperial Councillor in 1735 and was later sent on diplomatic business to Italy (1741–42) ; and filled other important diplo¬

matic posts, being Imperial Ambassador (1748) at Aix-la-Chapelle in the negotiations which 322

brought to a close the War of the Austrian Succession. As a member of the Privy Coun¬

cil of Austria he brought about an alliance between Austria and France during his term of office as Ambassador to the latter country (1750–53). This he turned into an Austro-

French coalition against Frederick the Great (q.v.) during the Seven Years' War (q.v.) while he was Chancellor and Minister of For¬

eign Affairs. He was instrumental in the parti¬

tion of Poland (1772) and the acquisition of Bukowina from Turkey (1775). He was in, many ways, a more modern statesman than most of his contemporaries and his influence was, for a long time, very strong with the Austrian court and the French government.

He was one of the first statesmen to see the danger of Prussian power and ambitions against which he struggled most of his life, though not over successfully. Consult Beer, (Denkschriften des Fiirsten Kaunitz) (Vienna 1872) ; Schlitter, Correspondence secrete entre le comte Kaunitz et le baron Ignatz de Koch) (Paris 1899) ; Von Arneth, A., (Biographie des Fiirsten Kau-

nitz) (Vienna 1899).

• KAUPERT, kow'pert, Gustav, German

sculptor: b. Cassel, 1819; d. 1897. After study¬

ing art at Munich he went to Rome on a gov¬

ernment pension to continue his studies. There he worked on the figures on the Washington monument and on the sculpture work of the capitol at Washington; among his sculptures in the latter being the colossal ^America** and the frontispiece figures. While art professor in the Stadel Institute at Frankfort later on, he did much excellent creative work, among which are the deeping Lion> at Cassel; Christ and the Four Evangelists) (1877, in the Treves Basilica); (Emperor William I> (1891, Frankfort).

KAURI, kow'ri, the native name of a tree and of the valuable gum derived from it. It is the most conspicuous species (A. australis) of the East Indian and Australian genus Agathis of coniferous trees, — a native of New Zealand, where it grows only at the northern extremity of the North Island. It reaches the height of .

150-200 feet, and its timber is much valued for building purposes, for making furniture, etc., and still more for masts and ship-building, but it is becoming very rare. The resin of this tree, the kauri gum, forms a valuable export, and is used in making fine varnish, etc. Most of it is obtained in a semi-fossil state, by dig¬

ging in places where the tree no longer grows.

See Dammar.

KAUTSKY, kowts'ke, Karl Johann, Aus¬

trian socialist: b. Prague, 1854. Educated at University of Vienna, he entered journalism as an ardent socialist. This led to his wandering about from town to town, where the socialist press always welcomed him. A follower of Marx and Engels he did much to spread their political doctrines and to explain them. After having lived in London, Stuttgart, Zurich and other European cities, he finally settled in Ber¬

lin in 1897, where he became a power in Social¬

istic circles. Among his best-known works are (Geschichte des Sozialismus* ; (Die soziale Rev¬

olution ; (Der Ursprung des Christentums* ; (Vermehrung und Entwicklung in Natur und Gesellschaft. * Most of his writings have been translated into English and French while some of them have appeared in nearly every language in Europe and are listed among the publications of the Socialists of the United States and Canada.

KAUTZ, kowtz, Albert, American naval

officer: b. Georgetown, Ohio, 29 Jan. 1839; d.

Florence, Italy, 1907. He was graduated at the United States Naval Academy in 1859, became a lieutenant in 1861 and rose through gradual promotion to the rank of rear-admiral in 1898.

He was flag-lieutenant to Farragut in 1862, and when New Orleans was surrendered he entered the city and raised the national flag over the custom-house. He took command of the Pacific station and in the following March was promi¬

nent in the settlement of the Samoan troubles.

He was retired in January 1901.

KAUTZ, August Valentine, American

general: b. Isppngen, Germany, 5 Jan. 1828; d. Seattle, Wash., 4 Sept. 1895. He was a brother of Albert Kautz (q.v.), and his parents settling in Ohio in 1832, he was graduated from West Point in 1852. He served through the Civil War in the Federal army, distinguishing himself in several engagements, was promoted colonel in 1874, and brigadier-general in 1891.

He published (The Company Clerk) (1863) ; (Customs of Service for Non-Commissioned Officers and Soldiers> (1864) ; and (Customs of Service for

Officers * (1866).

KAUTZSCH, kowch, Emil Friedrich,

German Protestant theologian : b. Plauen, Sax¬

ony, 4 Sept. 1841 ; d. 1910. He was educated at the University of Leipzig where he became tutor in Old Testament exegesis in 1869, and professor extraordinary in 1871. From 1872 to 1880 he was professor at Basel, at Tubingen 1880-88 and at Halle from the last-named date With Socin and Zimmerman he founded the Palestine Exploration Society of Germany in 1877, and among important works which he has edited are the 22d to the 26th editions of Gese-

nius' (Hebrew Grammar > (1878-96) ; and the 10th and 11th editions of Hagenbach's (Ency-

klopadia und Methodologie der theologischen Wissenschaften) (1880-84).

KAVA-KAVA. See Ava.

KAVANAGH, kav'a-na, Hubbard Hind,

bishop of the Methodist Episcopal Church South, and educator: b. Clark County, Ky., 1802; d. 1884. He was superintendent of public instruction in Kentucky 1837-38, and after serving 14 years in the pulpit and the exercise of ^ ministerial duties was elected bishop in 1854. He subsequently had the distinction of being the only bishop of the Methodist Episcopal Church South within the Federal lines during the Civil War, during which he had the respect of both parties. Consult Rexford, A. N.,

KAVANAGH, Julia, Irish novelist: b.

Thurles, Ireland, 7 Jan. 1824; d. Nice, France, 28 Oct. 1877. She wrote a large number of novels, the. scenes of which were almost in¬

variably laid in France, where her life was mainly spent until she began a literary career in London in 1844. Among her works are (Nathalie) (1851); (1853);

'Two Lilies> (1877) ; (Woman in France Dur¬

ing the 18th Century > (1850) ; KAVELIN — KA Y-
SHUTTLEWORTH

323

of Letters* (1862).

works were popular

England.

Her novels and other

both in America and in

• KAVELIN, ka-ve-len', Konstantin Dmi-

trievitch, Russian writer and jurist: b. Saint Petersburg, 1818; d. 1885. Graduated from Moscow University he became assistant profes¬

sor there in civil law (1844—48), held a similar position in Saint Petersburg (184S— 61) and was piofessor of law in the Military Law Academy.

He became law teacher to Grand Duke Nich¬

olas and legal adviser to the Finance Minister, positions which gave him considerable influence which he used for the good of the country, especially for the liberation of the serfs and agrarian reforms in the reign of Alexander II.

An edition of his works in four volumes ap-

*n 1872 ; and a more complete edition (1897-1900) included his later writings.

KAVERI, or KAVERY. See Cauvery.

KAVI, ka've, the ancient language of Java in use down to about the year 1400. It is a Malayo-Polynesian tongue resembling, in its in¬

flections, the Javanese language, but has many words

borrowed from Sanskrit. This Sanskrit vocabulary is due to various influence, all com¬

ing .from contact with the earlier language of India. Many of the Sanskrit words were intro¬

duced into Kavi by Brahmans from India shortly before the beginning of the Christian era. Since then the contact of the two peoples has been almost continuous. This contact with Brahmanism resulted in making Kavi the ecclesiastical and, hence, semi-sacred language of Java, which it remains to-day. This rela¬

tionship with India is strongly marked by the fact that much of the religious literature of Java is based on that of India. Now Kavi is no longer the spoken language of Java, having been superseded, in the 15th century, by the so-called vulgar tongue of Javanese, which is in reality but a modern development of the ancient Kavi tongue subject to various foreign and internal influences. This, in its turn, dif¬

fers considerably from the educated or polite dialect or speech in use in Java. These three developments of the ancient Javanese tongue are written in alphabets borrowed from the alphabet of the Devanagari script and adapted to the needs of the borrowers. Consult Fried¬

rich, (Arjuna-Vivaha) (Batavia 1850) ; Kern, various native texts (The Hague 1871); Raf¬

fles, cHistory of Java* (London 1817) for English translations of Javanese literature.

Consult also Friedrich, (Voorloopig Verslag van het Eiland Bali* (Batavia 1849-50) ; Humboldt, (Ueber die Kawi-Spreche* (Berlin 1836-39) ; Jonker, (En Oud-Javaansch Wet-

boek* (Leyden 1875) ; Juynboll, (Drie Boeken van het Oud-Javaansche Mahabharata* (Ley¬

den 1893) ; Stuart, (Kawi-Oordkonden* (Ley¬

den 1875) ; van der Tuunk, H. N., (Kawi-

balineesch-nederlandsch woordenboek* (4 vols., Batavia 1907-12, an excellent and extensive dic¬

tionary of the Kavi language).

KAW (more correctly Kanza), a branch

of the Osage division of the Siouan Indian stock, formerly living on the lower Kansas River, and early in the 19th century estimated at 1,300. In 1846 the government removed them to a reservation in the present Oklahoma, west of the Osage River, where they dwindled so rapidly that in 1910 there were only 238, -over half of them of mixed blood.

KAWAIISU, ka-wa'i-soo, a division of the Ute-Chemehuevi linguistic division of the Shoshonean family of American Indians. Their territory lay the farthest west of these tribes, occupying an isolated area on both sides of the Tehachapi Mountains in California and more especially in the basin of the valley of Walker and that of Caliente. They were thus cut off from all the other members of the great Amer¬

ican family and thus developed special traits and customs.

KAWAMURA, ka/wa-moo' ra, Kageaki,

Viscount, Japanese soldier: b. Satsuma, 1850.

Entering military life early he took part in the close of the Chino-Japanese War so success¬

fully that he was made a baron. He also fought through the Russo-Japanese War, in¬

creasing his reputation as a successful soldier.

He commanded the right of the Japanese forces at the battle of Mukden, to the winning of which he materially contributed. As a result of this and other services of a public nature he was raised to

the rank of viscount and ap¬

pointed special inspector-general of the Japan¬

ese army and chief military councillor, while at the same time he was commander of the gar¬

rison at Tokio, the most important military post in Japan. Thus his influence on the de¬

velopment of the military program of the Jap¬

anese government has been very strong and far-reaching.

KAY, John, English inventor: b. Walmers-

ley, Lancashire, England, 16 July 1704; d.

France, after 1764. In 1733 he invented the fly-shuttle, for which a patent was granted him, and in 1745 a power loom for the weaving of narrow goods, a patent for which was also granted. These inventions, however, so greatly aroused the anger of the working classes, who feared that the machines would entirely super¬

sede hand labor, that they stole Kay's machines, wrecked his home and obliged him to flee to France, where he died in poverty.

KAY, John, Scotch painter, etcher and

caricaturist: b. Dalkeith, 1742; d. 1826. He was a barber and worked at his trade until he was over 40 years of age ; giving, however, all his spare time to painting miniatures, making etchings and drawing caricatures of the noted people and curious personages of Edinburgh who most attracted hi^attention. He showed decided talent in all three lines of endeavor and he gradually attracted attention by his work, especially his sketches which he disposed of to customers in the barber-shop. Finally in 1785, encouraged by the patrons of the shop and the friends his talent had made for him, he opened a shop for the production of etchings,

caricatures and miniatures. He did a good business and became himself one of the noted characters of the city. His work, especially his portraits, appeared at the various art exhibits of Edinburgh from 1811 to 1822 and probably later. Consult Paton, Hugh, (A Series of Original Portraits and Caricature Etchings by the Late John Kav* (Edinburgh 1838 and 1877).

KAY-SHUTTLEWORTH, Sir James

Phillips, English educator: b. Rochdale, Lan¬

cashire, 1804; d. 1877. He began life as a bank 324

KAYE

KAZINCZY

clerk, studied medicine and finally interesting himself in education and the exercise of the medical profession, he worked numerous re¬

forms in English educational methods and be¬

came ultimately the founder of the English na¬

tional system of elementary education. He was a pronounced free-trader and he gave much at¬

tention to the subject of public sanitary re¬

forms in the city of Manchester, where he re¬

sided. As assistant poor law commissioner, an office he received in 1835, he paid much atten¬

tion to education, establishing a normal school at Battersea (1839) where he worked out his own ideas, for the most part, at his own ex¬

pense. These experiments and his reports of them formed a basis upon which the subse¬

quently organized English system of primary public education was based. Among his works on education are (Four Periods of Public Edu¬

cation } (1862) ; and numerous reports. He also published two novels, (Scarsdale) (1860) ; and (1874).

KAYE, Sir John William, English mili¬

tary historian: b. Acton, Middlesex, 1814; d.

London, 24 July 1876. He was for a number of years an officer in the Bengal artillery, but re¬

signed in 1841. In 1856 he entered the home civil service of the East India Company and upon the transfer of the government of India to the Crown succeeded John Stuart Mill in the political department of the India office. His works consist of histories and biographies re¬

lating to the East, among them being (A His¬

tory of Afghanistan5 (1851-53) ; (History of the Administration of the East India Com¬

pany5 (1853); (A History of the Sepoy War in India, 1857-585 (1864-75) ; (Lives of Indian Officers5 (1867) ; (Essays of an Optimist5

(1870).

KAZAKS. See Kirghiz.

KAZAN, ka-zan', Russia, a fortified city, capital of the government of the same name, on the Ivazanka, about four miles above its junc¬

tion with the Volga, 460 miles east of Moscow.

It properly forms three towns — the kremlin or citadel, the middle town and the lower town.

Many Mohammedan Tartars still reside here, engaged in business. It is a bishop's see and the seat of a university, founded in 1803, with an attendance of 1,200 students and a library of 235,000 volumes. Here are large soap-

works and tanneries, c^so manufactures of iron and

steel, woolens, cotton, lace and earthen¬

ware. It carries on an extensive trade. The caravans to Bokhara and China pass through Kazan. At a little distance from Kazan is an admiralty establishment, with a navigation school, magazines and a dock-yard, where ves¬

sels are constructed and sent down the Volga to the Caspian Sea. Pop. 138,100, including 30,000 Tartars.

KAZANLIK, ka-zan'lek, city in Rumelia,

Bulgaria, at the foot of the Balkan Mountains near Shipka Pass. It has been called the gar¬

den of roses on account of the great number of these flowers grown by the gardeners of the surrounding country for the extraction of oil of roses, which constitutes the chief industry of the city and the district. The town itself was captured by the Russian army (7 Jan. 1878) during the Russo-Turkish War. Pop. 11,000.

KAZINCZY, koz'Int-se, Ferencz, Hun¬

garian dramatist and poet : b. Erhemlyen, 27

Oct. 1759; d. Izephalom, 22 Aug. 1831. Edu¬

cated in law, he early turned to literature at a time when no one had as yet dared to make of it a profession. With decided literary ability, he was forced to gain the greater part of his living, especially during the earlier years of his career, by making translations from foreign languages, including English, French, German, Latin and Greek. Notwithstanding his good classical education and his love for these lan¬

guages, he was largely instrumental in forcing them from the controlling position they had held in the schools of Hungary and establishing the supremacy of the Magyar tongue. From the beginning of the 19th century to his death, a period of over 30 years, he was the undis¬

puted leader of the Hungarian literary move¬

ment and of the ^innovators,55 as the promoters of the Magyar literary party were called. Pre¬

vious to this, in his younger and more ardent days, his revolutionary tendencies had led him into trouble. In 1793 he was arrested, tried for participation in the political conspir¬

acy of Abbot Martinovics, convicted and con¬

demned to death. This sentence was commuted to six years' imprisonment, which he served in government military prisons. His trial created great interest in Hungary owing to the fact that Kazinczy had already become a national character through the popularity of his works and his office of inspector of the national school of the district of Kaschan, a position he had held until 1791 and which he is believed to have lost on account of the revolutionary tone of much of his writings and his ultra-protest-

ant views. After his imprisonment he became much less revolutionary in sentiment and ex¬

pression and busied himself in promoting the growth of a truly national literature written in the Magyar tongue. Among his original works are (Magyar Muzeum5 (1788-92) ; (Orpheus5

(1790) ; (Lanassa, a Tragedy5 (1791) ; Mag¬

yar Regisegek5 (Hungarian Antiquities, 1808) ; (Poetai Berke5 (1813); (Reise5 (1813);

new ed., (1831). Numerous editions of his works have been published before and since his death. Of these the most extensive are that which appeared at Pesth in nine volumes, un¬

der his own supervision and consisting largely of translations (1814-16) and a collection of his original poems and other writings pub¬

lished at the same city (1843-44). Many par¬

tial editions have also appeared ; one consist¬

ing of his plays, another (in popular form) of his poems, others of his translations and still others of his essays, sketches and travels. Even his voluminous correspondence has been pub¬

lished by the Hungarian Academy as important documentary material for the literary and po¬

litical history of the first quarter of the 19th century. Though not really a great or original thinker, Kazinczy was really one of the great¬

est of benefactors of Magyar literature at a time when it was beginning seriously to assert itself. Through his translations of the more striking works of great German waiters, such as Lessing, Wieland, Goethe and Klopstock and other notable literary masterpieces from Mo-

liere, La Rochefoucauld, Marmontel, Sterne, Shakespeare, Metastasio and the classical writers, he furnished the Magyar people with

a literature already made and done over into their own tongue in a most pleasing manner and in good literary form. At that stage of its history it was the best possible food for the ris¬

ing school of young literary men who fed upon it, imitated it, as Kazinczy himself had done, and finally created a national literature. His numerous followers exaggerated his work and placed a higher literary value upon it than pos- •

terity has sustained. What he accomplished was in reality the rehabilitation of the Hun¬

garian tongue which had lagged woefully be¬

hind in the literary march of Europe. At the beginning of the 19th century the Hungarian language had come face to face with the fact that it had neither the wealth of vocabulary nor the perfected literary form fitted to ex¬

press the new ideas and the rising culture of the nation, most of which were being rapidly introduced from abroad or developed at home.

At this moment, Kazinczy, liberated from his years of prison life, appeared upon the scene, his reform proclivities still strongly alive. The evolutionary condition offered him an oppor¬

tunity which he eagerly seized upon. He boldly introduced new words wherever and whenever he had need of them to express his own thoughts in his original composition or in those of the galaxy of foreign authors whom he introduced to the Hungarian reading pub¬

lic. The purists rose in arms against him.

Everywhere he met with opposition. All liter¬

ary Hungary became divided into two bitterly hostile camps. Kazinczy's works were more than once burned by the public hangman. But the reform, being a necessity, eventually triumphed, though with many, modifications of its exaggerated claims following the death of Kazinczy of Asiatic cholera at Szephalom in 1831. Kazinczy had two somewhat idealistic aims in view, to embellish the Hungarian language and to improve its facilities of ex¬

pression, while at the same time improving its literary form and manner of thought. To this end he wrote critical essays on the works of Hungarian authors. This gave him the repu¬

tation of being the greatest living native liter¬

ary critic and this, in turn, led to a very exten¬

sive literary correspondence, which alone amounted to over a score of volumes, all of which was used directly or indirectly to fur¬

ther the work of reform, his one great passion.

Bibliography.— Frigyes-Riedl, History of

Hungarian Literature) (London 1909) : Ivont, <
Bibliographic frangaise de la Hongre> (Pans 1913);
Petrik,

garian Literature) (London 1900) ; Riedl, F.,
Hungarian Literature> (1906); Schwicker, (Geschichte
der ungarischen Litteratur> (Leip¬

zig 1889).

KAZVIN, kaz-ven', KASVIN, KASBIN,

or CASBIN, a town in Irak-Ajemi, Persia, about 100
miles northwest of Teheran. It con¬

sists of an old and a modern town, the former being
mostly a ruin of extensive proportions.

Among these ruins are great walled enclosures and
massive palaces and other buildings, which,
originally shattered and rendered uninhabit¬

able by earthquakes, have become still more ruined
through the same natural agencies. The modern town,
which is connected by highway and caravan with the
two great trade centres of Resht and Teheran, is a
place of some con¬

siderable commercial and industrial importance.

It is a centre of leather, cotton, silk and velvet
trade and it exports rice, fish and raisins. It is a
comparativelv rapidly growing city. Pop.

about 50,000.

KEA, a large olive-green parrot of New Zealand (
Nestor notabilis) with the hawk-like beak of its
race, which in its former wild con¬

dition fed chiefly upon insects, but since the
introduction of sheep into the South Island (to
which it is confined) has become a meat eater.

These birds haunt the vicinity of slaughtering pens,
and feed with avidity upon offal, sheep-

heads and the like. This led them to attack wounded sheep, or these with sores, and finally taught some of these parrots to alight upon the back of a sheep, pull out the wool and even tear away the living flesh. These injuries were usually upon the loins, and the fat about the kidneys seems to be the special attraction. So many keas have been killed by herdsmen that the species is now rare. (See Kara). Consult Buffer, (Birds of New Zealand) (1888).

KEACH, kech, Benjamin, English author:

b. Stoke Hammond, 1640; d. 1704. He became a Baptist preacher at the age of 19 and after an eventful life, which included imprisonment for his religious opinions, he finally became pastor of a London church where he was popu¬

lar as a preacher. He wrote much of a con¬

troversial nature and published two stories allegorical in form which enjoyed considerable popularity, being republished as late as 1849.

These bore the titles (The Travels of True Godliness) (1683) ; (The Progress of Sin, or The Travels of Ungodliness) (1684).

KEAN, ken, Charles John, English actor; b. Waterford, Ireland, 18 Jan. 1811; d. Queens-

borough Terrace, Chelsea, London, 22 Jan.

1868. He was second son of Edmund Kean (q.v.). He made his first stage appearance 1

Oct. 1827 as Young Norval in (Douglas. > In 1830 he visited the United States, where he was favorably received before he had made a Lon¬

don reputation. In 1850-59 he managed the Princess Theatre, where he introduced more elaborate machinery and setting than had yet been seen on the English stage, revived Byron's (Sardanapalus,> and appeared (13 Jan. 1855) in his greatest role, Louis XI, in Boucicault's adaptation of de la Vigne's play

of the name.

His Hamlet was his chief tragic part, but he was best in melodrama. He withdrew from the stage 28 May 1867. Consult Cole, 'Life and Theatrical Times of Charles Kean) (1859); Cook, Hours with the Players) (Vol. II, 1881).

KEAN, Edmund, English tragedian : b.

London, 4 Nov. 1787 ; d. Richmond, Surrey, 15

May 1833. His supposed parents were con¬

nected in a low capacity with the theatrical pro¬

fession. He was early on the stage, and for several years wandered about the provinces, now as reciter and singer, now as tumbler in a circus and later as a member of itinerant com¬

panies. He married Miss Chambers, an actress in his company, in 1808. In 1814 he anneared at Drury Lane as Shylock. His triumph was decided and he at once commanded large sal¬

aries. Hazlitt and Lamb eulogized him.

Coleridge said <(To see Kean act is like reading 326

Shakespeare by flashes of lightning.® At Kem¬

ble's retirement in 1817 Kean took the fore¬

most place on the English stage. He appeared in several other tragic roles, among them Rich¬

ard III, Hamlet, Lear, Sir Giles Overreach and Othello. In these characters he has perhaps never been equaled. He first came to the United Slates in 1820, when he was seen with enthusiasm in New York, Boston and Philadel¬

phia. A second, but much less successful tour in 1826, was extended to Canada, where he was chosen a

chief of the Huron Indians. His hold on the public remained uninterrupted until 1825, when he appeared in the character of co¬

respondent in a divorce case. He never re¬

gained public favor; his dissolute habits also began to tell on him, and he made his last appearance in Othello, in company with his son Charles, in 1833, but broke down during the performance, and his death took place some three months later. Consult biographies by Barry Cornwall (1835) and F. W. Hawkins 0869), and Stirling's (01d Drury Lane)

KEANE, James John, American Roman

Catholic archbishop : b. Joliet, Ill., 26 Aug. 1857.

Educated in his native town. Saint John's Uni¬

versity, Minnesota, and the Grand Seminary, Montreal, Canada, he was ordained a priest in 1882. Serving in various ministerial and peda¬

gogical capacities, among them that of presi¬

dent of Saint Thomas Seminary, Saint Paul, and that of pastor of the church of the Im¬

maculate Conception in rthe same city (1892-

1902), he became bishop of Cheyenne diocese, Wyoming, in the latter year, and nine years later he was raised to the archbishopric of Dubuque, Iowa.

KEANE, John, Baron, an Irish soldier: b.

Belmont, County Waterford, 1781; d. 1844.

Entering the army at the age of 13, he served in the Egyptian campaign, in Gibraltar, Ireland, Bermuda, Martinique (1809) and the Spanish Peninsular War from which he issued with the rank of major-general. In 1814 he commanded the British expedition to New Orleans and the following year he was knighted. Serving as governor and commander-in-chief of the

British forces in the West Indies (1823-30) he won the rank of lieutenant-general. Three years later he became commander-in-chief at Bombay, and there, in 1839, he led the British into Afghanistan and captured Ghuzni, an ex¬

ploit which won for him the rank and title of Baron Keane of Ghuzni and Cappoquin.

KEANE, John Joseph, American Roman

Catholic prelate: b. Ballyshannon, Ireland, 12

Sept. 1839; d. Dubuque, Iowa, 22 June 1918.

When seven years old he came to America with his parents, who settled in Baltimore, Md., pur¬

sued his classical studies at Saint Charles Col¬

lege, Baltimore, and later took a complete philosophical and theological course at Saint Mary's Seminary, where, on 2 July 1866, he was ordained priest. He was then appointed assist¬

ant pastor at Saint Patrick's Church, Wash¬

ington, D. C., and about 12 years afterward, 25 Aug. 1878, was consecrated bishop of Rich¬

mond, Va. In this new field he labored in-

defatigably, much of his attention being be¬

stowed upon ithe negroes, and when, in 1884, the American hierarchy decreed the founda¬

tion of the Catholic University, Bishop Keane was selected to devise plans for its organization.

On 12 Aug. 1888 the university was formally opened, he being chosen its first rector, and under his efficient administration it attained*

most gratifying success. Its generous endow¬

ments and splendid equipment were the result of his

tireless efforts, and when, in January 1897, his rectorship ceased, he left the institu¬

tion established upon a solid basis. The next two years he spent in Rome, where his skill in oratory won due recognition and numerous favors were lavished on him by Leo XIII. In 1899 Bishop Keane returned to America at the earnest solicitation of the board of trustees of the university, and for two years labored to augment its endowments. In 1890 he deliv¬

ered the Dudleian lecture at Harvard. On 24

July 1900 he was appointed to the archiepiscopal see of Dubuque, the pallium being conferred upon him by Cardinal Gibbons, 17 April 1901.

He was likewise an ardent advocate of Catholic education.. He resigned in 1911 and was ap¬

pointed titular archbishop of Ciana. James John Keane succeeded him in 1911. He wrote on education, especially on the question of denominational schools; a selection from his writings, edited by M. F. Egan, appeared in 1902, as (Onward and Upward.)

KEARNEY, kar'ni, Denis, American labor

agitator: b. Oakmont, County Cork, Ireland 1847; d. Alameda, Cal., 24 April 1907. He went to sea from 1858 to 1872, and in 1872

settled in San Francisco, becoming foreman of stevedores and later going into the draying business. In 1877 he began an agitation among the workingmen, his attacks being directed mostly against the rights of capital and the im¬

portation of Chinese labor. Large mass-meet¬

ings were held in the so-called «Sand Lots®

near the city, and the movement grew rapidly in power and importance, but dominated en¬

tirely by Kearney. Finally he was able to pack a convention which adopted a new State con¬

stitution in the interests of his movement, and very detrimental to capital and property inter¬

ests. In 1878 he visited the Eastern States speaking in the large cities, but failed to gain an important following; on his return to Cali¬

fornia he gradually lost his influence and his party sank into obscurity. Consult the chapter ((Kearneyism in California,® in Bryce's Ameri¬

can Commonwealths (Vol. II, New York 1910).

I£EARNEY, Neb., the county-seat of Buf¬

falo County, is located in the fertile Platte River Valley, 191 miles west of Omaha, on the Union Pacific, Chicago, Burlington and Quincy, Hastings and North Western railroads, with interurban electric railroad communication. It is on the Lincoln Highway which follows the line of the old Overland and Oregon trail of 49 It is half way across the continent, 1,733

miles from Boston and a like distance from San rrancisco. In this community it was demon¬

strated that alfalfa could be raised without irri¬

gation and from its original culture here its growth has spread over the Middle Western States and has become one of the most profi¬

table crops of the farmers. This city is the centre of a vast agricultural and stock-raising industry The first power canal dug in the btate of . Nebraska furnishes light and power to the city. It is 16 miles long and is so equipped that it takes the underflow of the KEARNS

Platte River when the surface of the stream is absolutely dry. The canal can also be used for irrigation. The Kearney State Normal with an enrolment of 1,400 stu¬

dents and a teaching staff of 42 is located in Kearney ; also the Kearney Military School, the Saint James Parochial School. The city school system consists of well-equipped High School and six ward schools. Kearney has 11 churches; a public library with 12,000 volumes, the lar¬

gest opera house between Omaha and Denver; a country club that maintains one of the best natural golf courses in the west ; a County Fair Association with well-kept grounds and the second largest fair in the State ; a Chautauqua Association that does credit to the Chautauqua Idea; two hospitals; the State Hospital for Tubercular Patients; the State Industrial School for Boys; Lake Kearney, a beautiful sheet of water within the city limits ; two daily news¬

papers ; three parks and several manufactur¬

ing industries among which are two flour mills, grain elevators, concrete mixing machine fac¬

tory, canning factory, bottling works, cigar factories, broom factory, foundry, alfalfa meal mill, advertising novelties, etc. Places of in¬

terest are, Old Fort Kearney, maintained by the government in the early 50's as a protection against the Indians to travelers on the Overland Trail; the mile bridge across the Platte River; 1733 Ranch and Lake Kearney. The first set¬

tlement was made here in 1872, it was incorpo¬

rated in 1873 and received its first city charter in 1889. It is governed by a mayor and eight councilmen. The city owns its own water plant. Pop. 8.000.

KEARNS, Thomas, American politician :

b. near Woodstock, Ontario, 11 April 1862; d.

18 Oct. 1918. He attended the public schools until his father's removal to Holt County, Neb., in 1872, then worked on the home farm till he was 14. After several years spent as a freighter in Nebraska he removed to Utah in 1883, where he worked at first as a miner, becoming sub¬

sequently one of the owners of the Mayflower and Silver King mines. He was a member of the common council of Park City, Utah, in 1895, and was a delegate to the National Re¬

publican Convention the next year. He was also a delegate to the Philadelphia convention • in 1900, and was a member of the United States Senate in 1901-05. He was largely identified with the mining interests of Utah and was also known as a railroad promoter.

KEARNY, Lawrence, American naval of¬

ficer: b. Perth Amboy, N. J., 30 Nov. 1789; d.

there, 29 Nov. 1868. Having entered the navy in 1807, he was active in the defense of the coast of South Carolina and States adjacent during the War of 1812, and in 1826 in com¬

mand of the Warren effectually put an end to the depredations of the Greek pirates in the Levant. Promoted captain (1832), he was as¬

signed (1841) to the command of the East India squadron, and began the negotiations for a commercial treaty between China and the United States, later concluded by the special envoy, Cushing. On his return voyage to the United States, Kearny stopped at the Hawaiian Islands to protest against the contemplated transfer of the islands to Great Britain. . In 1867 he was made commodore on the retired list.

KEARNY, Philip, American soldier: b.

New York, 2 June 1815; d. near Chantilly, Va., 1 Sept. 1862. He was graduated from Co¬

lumbia in 1833, studied law, but in 1837 entered the United States army as lieutenant of the 1st dragoons, and in 1830-40 was in Europe for the study of the cavalry service of the French army, with which he fought in the Algerine war. In 1841 he was on the staff of General Scott, in 1846 resigned from the army, but soon afterward enlisted for the Mexican War, fought at Contreras and Churubusco, and at the close of the latter engagement charged and pursued into Mexico City 'the retreating enemy.

He again resigned from the army in 1851, in 1859 entered the French service, and partici¬

pated in the war in Italy, where he fought at Solferino. On 17 May 1861 he was appointed brigadier-general in the Union service, and given command of the 1st New Jersey brigade in the Army of the Potomac. Later he was assigned to the command of the cavalry of that army, and served conspicuously in the Penin¬

sula. He was commissioned major-general of volunteers 7 July 1862, took part in the second Bull Run, and subsequently at Chantilly was shot while reconnoitering. Kearny was a brilliant cavalry leader, termed by Scott <(the most perfect soldier® he ever knew. Consult De Peyster, Personal and Military History of Philip Kearny > (1869).

KEARNY, Stephen Watts, American gen¬

eral : b. Newark, N. J., 30 Aug. 1794; d. Saint Louis, Mo., 31 Oct. 1848. He entered the United States army in 1812 as lieutenant, and distinguished himself in the action at Queens¬

town Heights in the same year. He served throughout the war, and became, in June 1846, a brigadier-general. At the commencement of the Mexican War he commanded the ((Army of the West,® which marched from Bent's Fort on the Arkansas westward, and

conquered New Mexico. Having established a provisional civil government in Santa Fe, he proceeded to Cali¬

fornia, and participated with his command in the battle of San Pascual, in December 1846.

For his services in this campaign he was ap¬

pointed brevet major-general, his commission being dated from the battle of San Pascual.

He was governor of California from March to June 1847, but subsequently joined the army in Mexico, where he continued until the close of the war. He wrote (Manual for the Exercise and Maneuvering of United States Dragoons'

(1837) ; < Organic Law/ ;

ernment of New Mexico) (1846).

KEARNY, N. J., town in Hudson County, on Newark Bay, between the Passaic and Hackensack rivers, and on the Pennsylvania, the Lehigh Valley, the Erie and the Delaware, Lackawanna and Western railroads, opposite the city of Newark. The first permanent set¬

tlement was made in 1765, by Germans, and the place was called New Barbadoes. Later it became a part of Harrison, but in 1871 it was incorporated and named in honor of Gen. Philip Kearny (q.v.) who once lived in the place, , and whose residence still stands within the. limits of the town. It has several manufacturing es¬

tablishments, the chief of which are linoleum works, celluloid works and thread factories.

Other' manufactures are golf balls, metal bed¬

steads, roofing material, brass novelties, lamps,

buttons, dyestuffs, fertilizers, roofing material and white metal. The town has a State Sol-

£*e.ls Home, the Sacred Heart Industrial School for Boys, public and parish schools and nine churches. In Arlington, or the third and fourth wards, there are many fine residences with large and well-kept grounds. The gov¬

ernment is vested in an alderman-at-large, practically a mayor without veto power, and a council of eight members, elected every two years. Pop. 21,967.

KEARSARGE, ker'sarj, the name of two

mountain peaks of the White Mountains. (1) Mount Kearsarge in Carroll County, N. H., is 3,260 feet in height. The Federal vessel which sank the Confederate cruiser Alabama was named after this mountain. (2) Kearsarge Mount, in Merrimac County, N. H., is 2,943

feet in height. This mountain was once called Kyar-Sarga.

KEARSARGE, The, a ship of the United

otates navy which played a conspicuous part in the only sea fight of the Civil War, when it destroyed the Alabama, a ship built in England at Birkenhead on the Mersey by the Lairds under contract with the Confederate States at a cost of $250,000, and sent to sea as a priva¬

teer, in the spring of 1862. The vessel was known as «290.» The name indicated only that the vessel was number 290 in order of launch from the builders' yards. Protest had gone to the British government from the American Minister at the Court of Saint James, Charles hrancis Adams (q.v.), against the sailing of the ship. Meantime Capt. Raphael Semmes and 24 young naval officers from the Confed-

eracy arrived in Liverpool with commissions in their pockets to take command. For sake of prudence

Captain Semmes ordered the <(290)) to sail for the island of Terceira, one of the Azores, under command of Captain Butcher a young officer

Semmes immediately followed as a passenger on an English ship. His armament had been already shipped to the same rendezvous. At Terceira the privateer ran up the Confederate colors, took her name as ordered by the Con¬

federate government, and received on board as armament two. pivot guns amidshins and six c ~P5*U , Us> eight guns in all. The manning of the ship was 25 officers in all and about 120

men. Stores for a long cruise were taken aboard and the vessel, equipped for both steam and sail, entered promptly upon her memorable career On the night of 11 Jan. 1863, the United States steamer Hatteras engaged the Alabama off the coast of Texas and was sunk.

I he Alabama roved the seas for two years seeking the commerce of the United States from both hemispheres. The privateer was supposed to have destroyed one-half the Amer¬

ican merchant marine, then second in tonnage only to that of Great Britain among the nations On the forenoon of 11 June 1864 the Alabama anchored in the port of Cherbourg, France.

The intent of Captain Semmes was to dock his ship for much-needed repairs. While Semmes was awaiting the consent of the Emperor Napo¬

leon III to the use. of the government docks, the news of the arrival of the privateer spread over the land. Captain. Winslow, command-

mg the United States ■ship Kearsarge, lving at Flushing, was apprised of the fact by Dayton, United States Minister to France, and made for Cherbourg, sailed into the harbor and out without anchoring, but took position outside.

Semmes rightly construed the conduct of the Kearsarge^ as the equivalent of a challenge to combat. The Alabama steamed out on Sunday morning in faultless weather. The Kearsarge's machinery was additionally protected by a chain-armor covered with one-inch deal boards.

However, as that part of the ship was struck but twice, the armor was of no material aid.

The Kearsarge had 163 men and seven guns ; the Alabama 149 men and eight guns. The metal carried by the Kearsarge guns was heav¬

ier than the metal of the A abama puns. The battle was fought in a circle and lasted one hour and two minutes, resulting in the sinking of the Alabama. In the first 30 minutes the Alabama lodged a rifled percussion shell near the sternpost of the Kearsarge, which from a faulty cap failed to explode. The shell is now to be seen, in the wood where it buried itself, in the ordnance museum of the navy yard at Washington. Captain Semmes remained on

the deck of his ship until it went down. He and 41 others from the sunken vessel were res¬

cued by the Deerhound, a pleasure yacht be¬

longing to John Lancaster, an Englishman.

Many persons had come from Paris to view the battle and the hills along the coast were lined with 'spectators as it progressed. After the close of the war the British government paid an indemnity to American shippers of $15,500,-

000, representing losses inflicted by the Shenan¬

doah (in part), the Florida (in full), and the Alabama (in full). Consult Semmes,

cret Service of the Confederate States* (1883) ; Sinclair, Two Years on the Alabama * (1895) ; Battles and Leaders of the Civil War* (1887-

88) edited by Johnson and Buell; Edge,

KEARY, ker ri, Annie, English novelist : ?oo?!tt "ear, Wetherby, Yorkshire, 3 March 1825; d. Eastbourne, Sussex, 3 March 1879.

Beginning a literary career with books for chil-

dr.en, she made her reputation with stories of [PfL hJf0 and became very popular, < Castle Da!y> (1875) being her best work. Among °A o£Lfictl°w her are (Clemency Franklvn>

(1866), and (A Doubting Heart,* left unfinished at her death and completed by. Mrs. Katharine Macquiod She also published such historical works as

• f ' j rAe S Frapcis, English novel¬

ist: b. 1848; d. 26 Oct. 1917. He was educated at Cambridge University and was for some years in the Department of Coins in the British Museum. . In 1882 he published

tne Ladas, both works now superseded bv later research, whde (The Vikings in Western Christendom* (1890) is still a standard book on the subject. The projected second volume was never written. His first novel, (A Mar-

lage de Convenance* appeared in 1889, fol¬

lowed by (The Two Lancrofts* (1893) • (Her f? 8n«tVa,?bnTarD / !896) ;

flSSb Policy* 0902) ; 'Bloomsbury*

09051; 'The Mount* . 0909), none of which can be said to have enjoyed a large public cir-

culation, though they were highly thought of in the limited literary circles. After the style of the great Russian writers, Keary aimed at depicting life

in its chaotic reality and avoided conventional methods of selection and arrange¬

ment. The finest of his prose works is (The Wanderer) (1888), and a little book of weird short sketches, (Twixt Dog and Wolf) (1901).

KEASBEY, kez'bi, Lindley Miller, Amer¬

ican political economist: b. Newark, N. J., 24

Feb. 1867. He was graduated from Harvard in 1888 and went alroad to study at Strassburg.

He was appointed professor of political science at the University of Colorado in 1892, where he remained for two years, and in 1894 became professor in the same department at Bryn Mawr. In 1905 he was appointed professor of political science at the University of Texas, be¬

coming professor of institutional history there in 1911. He has written a number of mono¬

graphs and magazine articles, also (The Nicaragua Canal and the Monroe Doctrine*

(1896); and has translated (The Economic Foundations of Society, > from Loria.

KEATS, John, English poet: b. London,

29 or 31 Oct. 1795; d. Rome, 23 Feb. 1821. He was the eldest child of Thomas Keats, employee and son-in-law of a livery-stable keeper named Jennings, and was born at the stable in Fins¬

bury Pavement. There were four other chil¬

dren, three of whom reached maturity, George, Thomas and Frances (Mrs. Llanos). In 1804, Thomas Keats, who like his wife, Frances, seems to have been a strong character, died from a fall from his horse. His widow soon remarried, but was speedily forced to leave her new husband and to reside with her mother at Edmonton, where she died, after a rapid de¬

cline, in 1810.

Meanwhile the bovs had been placed at Mr.

John Clarke's school at Enfield, where John dis¬

tinguished himself by his manly pugnaciousness and, later, by his zeal for literary studies, par¬

ticularly mythology. He formed a friendship with the master's son, Charles Cowden Clarke (q.v.), an under teacher, who encouraged his literary tastes ; but unfortunately Keats' guard¬

ian, in 1810, took him from school before he had begun Greek, and apprenticed him for five years to a surgeon at Edmonton.

He was still near enough to young Clarke to profit from the latter's influence, and Eliza¬

bethan poetry, especially (The Faerie Queene>

awoke his poetic genius. His earliest known poem, (Imitation of Spenser, > dates probably from 1813. The study of medicine became dis¬

tasteful to him and a break with Hammond, the surgeon, followed in 1814. Keats went to Lon¬

don, studied fitfully in the hospitals, and more and more gave himself up to reading and writ¬

ing verse. The best of his early poems, the (On First Looking into Chapman's Homer,*

seems to date from the summer of 1815, and was composed after a night of reading with Clarke. Besides this friend certain fellow students and his brothers formed Keats' chief society. In the winter of 1816 Clarke intro¬

duced him to Leigh Hunt (q.v.) whose influence upon him was at first very strong. Through Hunt Keats was led to widen his reading, es¬

pecially in the direction of Italian poetry, and to

develop an appreciation of the arts ; but the elder poet also encouraged his new protege's luxuriant sentimentality and, through his own unpopularity, prepared the way for the critical hostility which Keats encountered as a member of the so-called <(Cockney School.®

The first of his poems to be printed was the sonnet (0 Solitude,* which appeared in Hunt's Examiner for 5 May 1816. A little later Keats, who had previously been appointed a dresser at Guy's Hospital, passed his examina¬

tion as licentiate at Apothecaries' Hall ; but we hear more of literary plans and of acquaint¬

ances, such as Shelley and John Hamilton Rey¬

nolds, than of preparations for practice. He was much at Hunt's cottage at Hampstead, he visited the sea shore, he wrote epistles in verse and prose to friends and relatives. By the winter of 1816-17 he had become intimate with the painter, Haydon (q.v.), had published sev¬

eral sonnets in The Examiner, and had made up his mind definitely to abandon medicine for poetry. His first volume (Poems by John Keats, > with a dedication to Hunt, was pub¬

lished early in March 1817.

The book, naturally, fell flat. Keats was still immature in thought and feeling, he had reacted too far from the pseudo-classical taste of the majority of readers toward the unre¬

strained luxuriance of style of the later Eliza¬

bethans, and he had submitted too unreservedly to the mawkish and shallow aestheticism of Hunt. The young poet took his disappointment well and resolved to improve himself by study.

In April 1817 he went alone to the Isle of Wight, then with his brother Tom he visited other places,

and by midsummer he was domi¬

ciled with 'both his brothers at Hampstead, where he saw much of literary and artistic friends, including Charles Wentworth Dilke, Charles Armitage Brown and the painter, Joseph Severn. More important for his poetical development, however, was the growing in¬

fluence of Shakespeare and of the loftier, more spiritual portion of Wordsworth's verse, which may be seen in (Endymion.* This ambitious poem was begun on the Isle of Wight, steadilv labored upon during the summer and fall despite distractions such as a visit to Oxford, and finished at the end of November 1817, at Burford Bridge, near Dorking. Keats spent the winter of 1817–18 in London, seeing (Endymion> through the press, frequenting theatres, and having a rather gay time with his friends. Before (Endymion) was published in April 1817, he had begun with Revnolds the ex¬

periment of makings metrical versions of tales from Boccaccio, and in 'Isabella, or the Pot of Basil* he had given evidence, not only of maturing thought and of increasing control of his emotions, but of a manly faculty of self-

criticism that enabled him to perceive without flinching the faults that jostled the beauties of

The last-named poem received a few favor¬

able _ reviews, 'but made little impression on the public. Still fascinated with Greek mythology, Keats chose another subject from it, that of the fall of the Titans; but, before beginning 'Hyperion* he wisely resolved to study a more restrained model than his beloved exuberant Elizabethans — to wit, Milton. Meanwhile his brother George married and removed to Ken¬

tucky, and Keats with Armitage Brown took a tour, partly on foot, through the Lake Region and a portion of Scotland. Exposure and 330

strain undermined Keats' health so much that a physician at Inverness had to order him home.

He reached London in August 1818, where the sad task awaited him of nursing without hope his consumptive 'brother Tom through more than three months of decline. Just at this time an ironical fate decreed that the Quarterly and Blackwood's should publish their now notorious diatribes upon

tively). Keats on the whole bore the attacks well ; but unfortunatel}r Byron and Shelley have made the world think otherwise.

During the fall of 1818 Keats began (Hy¬

perion^ and wrote long letters to George and his wife in America. He also made the acquaintance of a handsome girl of 17, Miss Fanny Brawne, and speedily falling in love, be¬

came engaged to her. Rarely at his best in his relations with women, owing partly perhaps to his antecedents, partly to his sensuousness, partly to the struggles of his spirit to escape from its actual environment to the ideal world of beauty and romance, Keats gave himself up to this passion with an abandonment that might be described as disgusting, did not one make allowances for his slowly failing health.

After the death of Tom Keats, 1 Dec. 1818, the poet resided for a time with Armitage Brown at Wentworth Place. Here he not onh worked at (Hyperion, > but wrote many of the poems that mark the zenith of his genius, such as (The Eve of Saint Agnes, } the odes (On a Grecian Urn,* (To a Nightingale,) and (To Psyche,* and the ballad (La Belle Dame sans Merci.* It was an extraordinary six months'

work (December 1818–May 1819) for an ailing poet in his 24th year. And he was not merely sick in body but poor in purse, most of his patrimony having been tangled up by his guardian, or spent, or loaned to impecunious friends. Other friends, like Brown,

stood by him, however, though this fact can scarcely have made the marriage he dreamed of seem much more pos¬

sible. ' He took summer excursions, wrote on a tragedy, (Otho the Great, * with Brown, and completed his own (Lamia, * in some respects the most individual and promising of his nar¬

rative poems. He abandoned (Hyperion,*

rightly judging that it was too Miltonic, yet he did not cease to form literary plans and to face the present and the future bravely. But on his return to London, he came once more under the influence of Miss Brawne, and he lost ground in health, courage and literary power.

His work in the drama and in satire proved on the whole unavailing; he recast (Hyperion* for the worse ((The Fall of Hyperion*); and he lost his cheerfulness, becoming moody, sus¬

picious and somewhat dissipated.

Early in February 1820 he had his first haemorrhage from the lungs and was confined for several weeks, Brown being his indefatigable nurse. With Fanny Brawne, who was living next door, he kept up a correspondence which many of his admirers could spare. When he was stronger, Brown having left for Scotland, Keats occupied himself by seeing through the press his third volume — one of the most mem¬

orable in the history of our literature, for it can scarcely be disputed that in color and form latter-day English poetry owes more to Keats than to any other writer among the moderns.

It was entitled (Lamia, Isabella, The Eve of Saint Agnes and Other Poems, } and was wel¬

comed, not only by friends like Hunt, but by such a critic as Jeffrey, in the Edinburgh. It appeared early in July 1820, just after two haemorrhages had shown that its author must be soon cut short in what

promised to be noth¬

ing less than a marvelous career.

During his new illness, Keats was kindly nursed by the Hunts ; then ungrounded suspi¬

cions of their friendship caused him to leave them, and he was welcomed bv Mrs. Brawne and her daughter. Becoming more tranquil, he determined to see what the climate of Italy could do for him, and with Severn he sailed for Naples in September. On the voyage he wrote his last poem, the fine sonnet (Bright star, would I were steadfast as thou art.* After reaching Rome about the middle of December, he suffered many violent attacks of fever and pain ; then he lingered in a calmer state of mind and body until death took him from the arms of the faithful Severn, in the early morn¬

ing of 23 Feb. 1821. He was buried three days later in the old Protestant cemetery at Rome, and on his tomb was placed at his desire the non-prophetic epitaph. <(Here lies one whose name was writ in water.® In 1881 Severn was laid by his side; long before (December 1822) the ashes of the author of (Adonais* had been buried nearby.

In person Keats was small, but evidently in his early years strong and well made. His features were clear cut and his eyes large, dark and full of meditative depth. In character he seems to have been essentially open, kindly and manly. That his social status and his exception¬

ally sensuous nature were without deleterious effects upon his life, as well as upon his poetry, it would be idle to assert ; yet it would be equally beside the mark to think of him chiefly as a hyperaesthetic anomaly among the men of his day. He was far more than a lower middle-

class Briton of the Regency; but he was also more than the neo-Greek, or the neo-Eliza-

bethan, or the idolatrous priest of beauty that some

have fancied him. He was a wonderfully endowed poet of strong human interests, keen intelligence, ever deepening moral sense, extraor¬

dinary sensitiveness to physical impressions —not only upon eye and ear, but upon taste and touch — growing appreciation of artistic form, and steadily developing power of self-control.

He filled all the roles his admirers have claimed for him; but he filled them, or was learning to fill them, in combination — a fact which makes him greater than even some warm admirers have fancied.

His rank among English poets is not easy to determine. In a sense Matthew Arnold was right when he declared that Keats <(is with Shakespeare.® It might be added that he is with Milton also ; but he is with these supreme poets only in respect to certain qualities of genius. He is obviously not with them in sus¬

tained power, in unexcelled majestic achieve¬

ments, in breadth and duration of popular ap¬

peal. Even when he is compared with his con¬

temporaries he is found to lack, in a measure, Byron's passion and cosmopolitan influence, Wordsworth's power to calm and ennoble the spirit and quicken the vision, Coleridge's in¬

effable secret of casting glamour, and Shelley's gift of interpenetrating poetry and life with the radiance of a pure idealism. In quantity of KEBBEL — KECSKEMET

approximately perfect work he falls short: of course through no fault of his own. The juvenile volume of 1817 and (Endymion,) though in a sense the latter confirms the truth of its hi st line that (

mg in merits, are uneven in value and below the

highest excellence. It is mainly on the magnificent volume of 1820 — on the impressive artistic mastery shown in (Lamia, ! on the romantic charm of (The Eve of Saint Agnes, >

on the tender pathos of (Isabella, > on the matchless harmonies, the deep, subtle appeal to mind and heart, and the indescribable rich¬

ness of the great odes, on what it is hardly rash to call the dewy felicity of some of the less elaborate lyrics that the claim of Keats to rank among the greater English poets rests, and rests securely. To lovers of poetry he has long been almost an idol : the public has scarcely yet real¬

ized the full significance of his noble, and in some respects unique, genius.

Bibliography. — Keats' poems were first collected, with those of Coleridge and Shelley, in 1829. In 1848 R. M. Milnes (Lord Hough¬

ton) published the (Life, Letters and Literary Remains> (revised 1867) ; biographical material then began to accumulate through such books as Leigh Hunt's (Autobiography.! In 1876 Mr. H.

B. Forman edited the letters to Fanny Brawne, and in 1885 the works in prose and verse in four volumes (reissued and augmented in 1889). In 1883 J. G. Speed, of the American branch of the family, issued a volume of < Letters and Poems.!

In 1887 brief lives of the poet appeared in (Great Writers* and the (English Men of Let¬

ters! by W. M. Rossetti and Sidney Colvin re¬

spectively.^ In 1891 Mr. Colvin edited (Letters of John Keats to His Family and Friends? In 1895 Mr. Forman issued the complete corre¬

spondence (1 vol.), and in 1901 what is the best edition of the entire works (5 vols.). The [American] Cambridge edition of the poems and

letters is also good. There are numerous editions of the poems, including several by Lord Houghton (especially the Aldine, 5th edi¬

tion, 1890), one by W. T. Arnold (1883), the (Golden Treasury! by F. T. Palgrave (1884), and J'he latest and best by E. de Selincourt (1905). On 18 May 1914 the London Times published two previously unpublished sonnets by Keats. Books dealing with Byron, Shelley and Hunt usually touch on Keats, and the mass of criticism upon him is large. Among his chief critics are Matthew Arnold, Robert Bridges, DeQuincey, Dowden, Leigh Hunt, (Imagination and Fancy*), Lowell, Masson, J.

M. Robertson, Swinburne and Woodberry.

Consult also Sharp's (Life and Letters of Joseph Severn! (1892) ; Marie Gotheim's (John Keats, Leben und Werke! (1897) ; Colvin, S., (John Keats; His Life and Poetry; His Friends, Critics and After-Fame! (New York 1917). See also Endymion; Hyperion; Isa¬

bella; Lamia; Ode to a Grecian Urn; Ode to a Nightingale.

William P. Trent,

Professor of Literature, Columbia University.

KEBBEL, Thomas Edward, English jour¬

nalist: b. 1826; d. November 1917. Educated in London and Oxford, he was called to the bar in 1862; but he had already drifted into jour¬

nalism in 1855, and for 60 years he strenuously followed that profession. In 1873 he joined the Standard in London, and contributed political; biographical and literary articles to its columns until that paper ceased publication in 1916. He also wrote freely on sporting matters and coun¬

try life. Kebbel was for many years a close personal friend of Disraeli (Lord Beacons-

field), whose biography he wrote. Among his publications in book form are lives of Lord Derby, the poet Crabbe, a collection of Beacons-

field's speeches, (Essays on History and Poli¬

tics,! and a history of Tory administrations.

His (Agricultural Labourer * is a successful study of country life and ways. In 1911 he published a volume of recollections of his long career entitled, (The Battle of Life?

KEBLAH. See Kiblah.

KEBLE, ke'bl, John, English Anglican

clergyman and poet: b. Fairford, Gloucester¬

shire, 25 April 1792; d. Bournemouth, Hamp¬

shire, 29 March 1866. He was educated at Corpus Christi College, Oxford, and took his degree in 1811 with high honors. Going to Oriel College as a Fellow, he became tutor and public examiner, and in 1831-41 was professor of poetry. He took priest's orders in 1816 and was his father's curate for some time. He was appointed vicar of Hursley, near Winchester, in 1836, a position which he held until his death.

To the world at large he is best known as the author of the famous volume of religious verse, (The Christian Year.! He also wrote the (Lyra Innocentium? and, with Newman and others, the (Lyrica Apostolica? He was a zealous High Churchman, and wrote several -of the celebrated (Tracts for the Times) (1833).

Keble College, Oxford, was founded as a me¬

morial of him. Consult (Lives* by J. T. Cole¬

ridge (1869), and Lock (1892); Yonge, bus¬

ings over the Christian Year! and (Lyra Inno¬

centium* ; Shairp, < Studies in Poetry and Philosophy! (1868) ; Newman, (Apologia pro Vita sua) (1864); Yonge,

KEBLE COLLEGE, one of the colleges

of Oxford University, built by subscription as a memorial of the Rev. John Keble, the author of (The Christian Year,! and incorporated in 1870 by royal charter. The intention of its founders was to establish a ^college wherein sober living and high cultivation of mind may be combined with Christian teaching based upon the principles of the Church of England?

It is governed by a warden and a council com¬

posed of not less than nine and not more than 12 members. There are from 250 to 300

undergraduates in attendance. One of the adornments of its beautiful chapel is Holman Hunt's famous picture, (The Light of the World?

KECSKEMET, kech'ke-mat, city in Pest,

Hungary, about 65 miles from Budapest. It is noted for its great annual cattle fair. It is the centre of an agricultural district which is en¬

gaged principally in the raising of grapes, and other fruit, tobacco, grain, cattle and vegetables.

Large quantities of wine are exported and a very extensive trade is carried on in brick and flour, which are home products, and apples and apricots. Pop. 70,000, principally Magyars.

KEDAH, or KIDAH, a western native

state in the Malay Peninsula. It is a British

protectorate but is ruled by a native sultan.

Area, 3,800 square miles. Kedah has made great progress since it came under the control of the British government. The capital, Alor Star, is already connected with the rest of the isthmus and through that, with all India, by means of a branch of the Federated Malay States Rail¬

road; and other side lines are planned or in actual process of construction. This line has helped materially to develop the trade of the state in rice, tapioca and rubber and other native products which continue to increase from year to year. Much of the Kedah trade is with the Straits Settlements. Pop. about 250,000.

KEDAR'S TENTS, an expression bor¬

rowed from Psalms exx, 5: <(Woe is me, that I sojourn in Mesech, that I dwell in the tents of Kedar.55 It conveys an idea of unsatisfactory or uncongenial environment.

KEDDIE, Henrietta, ((Sarah Tytler.®

Scottish novelist: b. Cupar, Fifeshire, 4 March 1827 ; d. 6 Jan. 1914. From 1848 to 1870 she was joint owner of a girls' school in her native town, and from 1870 to 1884 was engaged in literary work in London. She afterward re¬

sided in Oxford. Her best work is (Citoyenne Jacqueline) (1865), a well-told story of the French Revolution. Among other works of hers are (Papers for Thoughtful Girls) (1862) ; (St. Mungo's City* (1885) ; (Six Royal Ladies of the House of Hanover5

(1898) ; (Women Must Weep) (1901) ; (Three Men of Mark) (1901) ; ^he Machinations of Janet5 (1903) ; (The Countess of Huntingdon and Her Circle5 (1907); and an interesting history of her family, (Three Generations5

(1911).

KEDGE, a small anchor used for the

handling of ships under various conditions, generally while in the harbor. The kedge has an iron stock and is frequently used as an ordinary anchor for small vessels and boats.

The English sailor, who has forgotten that kedge means, in itself, anchor, frequently speaks of a kedge-anchor.

KEDGE-ANCHOR, a small. ship or boat's

anchor attached to an iron stock and generally used in harbors and rivers. See Kedge.

KEDZIE, Robert Clark, American chem¬

ist: b. Delhi, N. Y., 1823; d. 1902. Graduated from the University of Michigan he took up medicine and served as a doctor in the Northern army during the Civil War. Becoming pro¬

fessor of practical chemistry in the Michigan Agricultural College he developed the science of agricultural chemistry along original and practical lines which attracted great attention and largely helped the development of scientific agriculture in the United States and Canada.

KEEBLE, Samuel Edward, English au¬

thor: b. London, 1853. Educated at Didsbury College he became a minister of the Wesleyan Methodist Church in 1876 in the service of which he has led a very active life, among his activities being the foundation of the Weslevan Union for Social Service. Among his pub¬

lished works are Undustrial Day Dreams5

(1896) ; Christianity and our Wages System5

(1905) ; (The Ideal of the Material Life5

(1908); (A Legal Minimum Wage5 (1912).

KEEFE, Daniel J., American labor leader: b. South Chicago, Ill., 1855. From the position of a laborer he attained high rank and influence in labor societies. At the age of 27 he was president of the Lumber Unloaders' Associa¬

tion; and 11 years later he became president of the International Longshoremen, Marine and Transport Workers' Association. After hold¬

ing various important labor offices he became vice-president of the American Federation of Labor, member of the Industrial Peace Com¬

mission at Washington (1906) and United States Commissioner-General of Immigration (1908-13).

KEEFER, ke'fer, George Alexander, Ca¬

nadian engineer: b. Cornwall, Ontario, 1836; d.

1912. Educated at Upper Canada College, Toronto, as engineer, he entered the employ of the Grand Trunk Railway as surveyor. At the age of 36 he became engineer to the govern¬

ment of Canada, working on railway construct¬

ing and survey until 1886; during which period he built an important section of the Canadian Pacific Railway and later on constructed the waterworks system of the city of Vancouver.

After serving from 1900 as resident engineer of the Dominion Public Works in the province of British Columbia, he became head of a com¬

mission of Canadian engineers appointed by a Canadian syndicate to make a report upon the proposed route of the Trans-Siberian Railway between Vladivostok and the Amur River.

This report, which was made, was subsequently used by the Canadian company for the building of the section of the road from Vladivostok.

KEEFER, Samuel, Canadian engineer : b.

Thorold, Ontario, 22 Jan. 1811; d. 1896. He was a brother of T. C. Keefer (q.v.). In 1841—53 he was chief engineer of the government Board of Public Works, in 1853 was appointed resident engineer of the Grand Trunk Railway, and in 1857-64 was government inspector of railways and deputy commissioner of public works. He completed in 1869 the Niagara Falls suspension bridge, then the longest exist¬

ing single-span structure.

KEEFER, Thomas Coltrain, Canadian

engineer: b. Thorold, Ontario, 4 Nov. 1821; d.

Ottawa, 7 Jan. 1915. He was a brother of Samuel Keefer (q.v.). He was educated at Upper Canada College (Toronto), began prac¬

tice as a civil engineer in 1838, and in 1850 was appointed by the government to survey the rapids of the Saint Lawrence and explore the region between the headwaters of the Saint John and the Saint Lawrence. In 1851 he be¬

came engineer-in-chief of the Toronto and Kingston section of the Grand Trunk Railway, and made surveys at Montreal for the present Victoria bridge across the Saint Lawrence.

He wrote (The Philosophy of Railways5

(1849) ; and an essay on (The Influence of the Canals of Canada on her Agriculture5 (1850).

KEELER, ke'ler, James Edward, Amer¬

ican astronomer: b. La Salle, III, 10 Sept. 1857; d. San Francisco, Cal, 12 Aug. 1900. He was graduated from the Johns Hopkins University in 1881, was appointed assistant to Prof. S. P.

Langley (q.v.) in the Mount Whitney (Cal.)

expedition (1881), was in 1881-83 at the Alle¬

gheny Observatory, and after study in Germany (1883-84), was appointed assistant at Lick Ob-

servatory (1886), and later astronomer there (1888). In 1891-98 he was active at the Alle¬

gheny Observatory as its director and profes¬

sor of astrophysics in the Western University of Pennsylvania, and from 1898 until his death was director of the Lick Observatory. His spectroscopic work included valuable studies of the nebula in Orion and of Saturn's rings.

KEELEY, ke'li, Leslie E., American phy¬

sician : b. in 1842; d. Los Angeles, Cal., 21 Feb.

1900. He was graduated at Rush Medical Col¬

lege (Chicago) in 1863, was a surgeon in the Federal army during the Civil War, practised medicine at Dwight, Ill., there opened (1880) a sanitarium for the cure of inebriety and the use of narcotics, and later established branches.

His system was based on a secret compound said by him to contain bichloride of gold, and hence called the "gold® cure. He published (The Morphine Eater > (1881).

KEELEY, Mary Anne Goward, English

comic actress: b. Ipswich, 1806; d. London, 12

March 1899. She made her first appearance in Dublin in 1823 ; and two years later she went to London where she joined a Covent Garden company and married one of its prominent members, Robert Keeley (q.v.)

in 1829. She made a great reputation for herself in import¬

ant parts like Nerissa (in the Merchant of Venice), Smike (in Nicholas Nickleby), Sairey Gamp and Betty Martin. In company with her husband she toured the United States (1836-37) where she was everywhere received enthusi¬

astically. On their return to England, the Keeleys took over the Lyceum Theatre in Lon¬

don, which they managed very successfully from 1844 to 1847. After 12 years' further suc¬

cess Mrs. Keeley retired from the stage at the age of 53, a retirement which was destined to last 40 years. Consult Goodman, (The Keeleys on the Stage and OfP (London 1895) ; Lewes, (On Actors and the Art of Acting) (New York 1878) ; Scott, (The Drama of Yesterday and To-day> (London 1890).

KEELEY, Robert, English comic actor:

b. London, 1793; d. London, 1869. After play¬

ing in comic parts throughout the interior of England he reached the London stage in 1818.

He almost at once became a favorite in im¬

portant comic roles like Touchstone Jimmy Green (in (Tom and Jerry*), Mr. Bounceable (in (What Have I Done?), Peter Pall Mall (in (The Prisoner of War) and Sir Andrew Aguecheek. He married Mary Anne Goward in 1829. (See Keeley, Mary Anne Goward).

Consult Goodman, (The Keeleys on the Stage and Off-* (London 1895) ; Lewes, (On Actors and the Art of Acting) (New York 1878) ; Marston, (Our Recent Actors> (London

1890) ; Scott, (The Drama of Yesterday) (London 1890).

KEELHAULING, the dragging of an of¬

fender in the navy underneath the ship across the keel from side to side.^ This punishment was at one time common in the British and Netherlands navies; and was greatly dreaded by seamen and marines.

KEELING ISLANDS. See Cocos.

KEELSON, or KELSON, kil'son, a line

of timbers on the middle of the floor, timbers of a ship over the keel. They are jointed and bolted together, and, by means of long bolts, they help to bind the floor-timbers to the keel.

In iron vessels a combination of steel or iron plates takes the place of the timber keelson of the wooden ship. The word which was also formerly written "kilson® and "kelsine® ap¬

pears, in one form or another, in all the Norse and Germanic tongues.

KEELY, John Ernest Worrell, American

adventurer: b. Philadelphia, Pa., 3 Sept. 1837; d. there, 18 Nov. 1898. In early life he was a carpenter. Prior to 1872 he became interested in music, and afterward claimed that the tun¬

ing-fork had suggested to him a new motive power. In 1874 a stock company was formed for the purpose of •supplying funds for the perfection and promotion of the alleged dis¬

covery. Keely built and destroyed many mod¬

els, gave exhibitions at which numerous re¬

markable and unexplained effects were pro¬

duced, but never attained any important result.

Upon his death it was found that the so-called Keely motor was operated by an invisible com¬

pressed-air apparatus, and that the entire scheme was fraudulent.

KEELY MOTOR. See Keely, J. E. W.

KEEN, Dora, American explorer: b. Phila¬

delphia, 1871. Educated at Bryn Mawr Col¬

lege, she returned to Philadelphia, to interest herself in civic reforms while holding respon¬

sible civic positions. She has traveled exten¬

sively throughout the continents of the eastern and western hemisphere and become noted as a mountain climber and as an Alaskan explorer.

She has written much for geographical and other magazines and is known as a lecturer.

KEEN, ken, William Williams, American

surgeon: b. Philadelphia, 19 Jan. 1837. He was graduated at Brown University in 1859, and from Jefferson Medical College in 1862; and during the Civil War period was an as¬

sistant surgeon in the Federal army. He then studied in Europe 1864–66; was at the head of the Philadelphia School of Anatomy 1866–75 ; and at the same time lecturer on pathological anatomy at Jefferson Medical College. From 1875 to 1890 he was professor of artistic anat¬

omy at the Pennsylvania Academy of Fine Arts, and also of surgery at the Women's Medical College 1884–89, and of surgery at Jef¬

ferson Medical College till 4 Jan. 1907 when he became professor emeritus.

In 1912, on the 50th anniversary of his graduation, the Jefferson Medical College gave him the honorary degree of Sc.D. He has also received the degree of LL.D. from Brown Uni¬

versity (1891), Northwestern and Toronto universities (1903), The University of Edin¬

burgh (1905), Yale University (1906), Univer¬

sity of Saint Andrews (1911) ; an honorary M.D. from University of Greifswald (1906) and honorary Ph.D. from the University of Upsala (1907). He is the senior member of the Cor¬

poration of Brown University, having been elected in 1873. He was elected president of the American Sureical Association in 1898; of the American Medical Association in 1899) of the College of Physicians of Ph'Udeloh'a in 1900; of the Congress of American Physicians and Surgeons in 1903 and of the International Congress of Surgery for the session of 1917, and has been president of the American Philo-

sophical Society since 1907. He is also foreign corresponding member of the Surgical Society of Paris, the Belgian Surgical Society, the Clinical Society of London. He is an honorary Fellow of the Royal College of Surgeons of England and the Royal College of Surgeons of Edinburgh, of the German, the Italian, the Palermo Surgical societies, the Berlin Medical Society, a Fellow of the American Academy of Arts and Sciences and of the American Col¬

lege of Surgeons. He is the author of his¬

tory of the First Baptist Church of Philadel¬

phia' (1898); (Surgical Complications and Sequels of Typhoid Fever) (1898); (Addresses and Other Papers' (1905); (Animal Experi¬

mentation and Medical Progress) (1914). He is also editor of (Gray's Anatomy) ; of the (American Text Book of Surgery' ; of (Keen's System of Surgery' ; and of a number of other similar publications. He has written a very large number of articles in various medical anil other journals.

KEENE, Charles Samuel, English artist,

illustrator and humorist: b. 1823; d. 1891. He began to study architecture, only to give it up for the study of wood engraving. Gaining some reputation on the London News (Illus¬

trated), he attracted the attention of Punch, the staff of which he joined in 1851 and con¬

tinued on it until his death. Keene also won a reputation as a book illustrator and etcher.

Consult Keene, C. J., (Four Hundred Pictures of Our People) (London 1888) ; Layard, G. S., (Life and Letters of Charles Keene) (London 1892) ; (The Work of Charles Keene' (New York 1897).

KEENE, Laura, American actress and

manager: b. England, 1820; d. Montclair, N. J., 4 Nov. 1873. Her real name was Mary Moss, and as (

der of her life. She was for a time manager of the Varieties Theatre in New York, and 1855-63 was lessee of the Olympic, at first called <(Laura Keene's Theatre." She was mar¬

ried to H. W. Taylor in 1847, and to J. Lutz 10 years afterward. The most noted play pro¬

duced by her was (Our American Cousin,) brought out in 1858 with Jefferson and Sothern in the cast. While he was witnessing this play at Ford's Theatre in Washington, President .

Lincoln was assassinated.

KEENE, N. H., city, county-seat of Chesh¬

ire County, on the Ashuelot River, and on four divisions of the Boston and* Maine Rail¬

road, about 45 miles southwest of Concord and 43 miles west of Manchester. Mount Monad-

nock is 10 miles from the city. The city, known as

Upper Ashuelot, was settled in 1734

and incorporated in 1753 when it took the name of Keene. It received its city charter in 1874.

Keene manufactures chairs, woolens, shoes, toys, combs, machinery, loose leaf ledgers, manifold books, ornamental narrow web fab¬

rics, wood novelties, overalls, manicure arti¬

cles, mica products, etc. There are four na¬

tional banks and two savings banks in Keene with combined resources of over $7,000,000.

Nearly 2,000 persons are employed in the fac¬

tories. The annual output of manufactured goods is about $3,500,000. The products of the fertile farms of the vicinity add to the wealth of the city. Pop. (1920) 11,210.

KEENER, ke'ner, John Christian, Ameri-

ican Methodist bishop: b. Baltimore, 7 Feb.

1819; d. 1906. In 1835 he was graduated with the first class from Wesleyan University.

After entering the Methodist ministry in 1841

he preached in Alabama till 1848 and was pas¬

tor and presiding elder in New Orleans 1848-

61. He edited the New Orleans Christian Ad¬

vocate (1865-70), and in the year last named was appointed a bishop of the Methodist Church, South. He published (Post Oak Cir¬

cuit (1857; 1875); 'Studies of Bible Truths'

(1899); (The Garden of Eden and the Flood'

(1900).

KEENER, William Albert, American

jurist and educator: b. Augusta, Ga., 1856; d.

1913. Graduated from Harvard Law School in 1877 he practised law in New York city; became a justice of the Supreme Court of the State of New York and professor of law at Harvard (1883-90) and at Columbia University (1890-1902) and Dean of the Law School (1891-1901). Among his law writings are (Treatise on the Law of Quasi-Contracts'

(1893), and various articles on private corpo¬

rations and equity jurisprudence.

KEEP, Robert Porter, American writer

and educator: b. Farmington, Conn., 1844; d.

1904. Graduated from Yale University in 1865; he became instructor in his alma mater, a position he resigned to become United States consul at the Piraeus, Greece (1869-71). On his return home he continued teaching in vari¬

ous colleges. Among_ his published works are Autenrieth's (Homeric Dictionary' (transla¬

tion 1876); (Stories from Herodotus' (1879); (Essential Uses of the Moods in Greek and Latin' (1882) ; (Homer's Iliad' (first four books, 1883).

KEEP, William John, American inventor

and manufacturer: b. Oberlin, Ohio, 3 June 1842 ; d. 30 Sept. 1918. Graduated as a civil engineer from Union College (1865), he began the manufacture of stoves to which he later added that of testing machines. After many experiments he discovered the relation existing between the shrinkage and the chemical com¬

position of cast iron (1885). He contributed to many technical journals on the chemistry, shrinkage and composotion of cast iron. He published (Cast Iron'

(1902).

KEESOO, or TEESOO, the flowers of

certain species of Butea (q.v.).

KEEWATIN, Canada, a former district

lying west and south of Hudson Bav and ex¬

tending north to the Arctic Ocean. ' Its orig¬

inal area was 516,571 square miles and it was created in 1876. The northern part of Lake Winnipeg and its outlet, Nelson River, are in Keewatin. There are a large number of small lakes, all of which belong in the basin of Hud¬

son Bay. The district has undergone division and reorganization at different times, and is now partly included in the recently acquired portions (1912) of Manitoba and Ontario, the remainder belonging to the Northwest Terri¬

tories (q.v.).

KEEWATIN, the earliest epoch of the

Archaean period, and the series of rocks then formed, consequently the oldest known rocks.

The name is derived from the territory of Kee-

watin in Canada. In the type region around Lake Superior, the Keewatin rocks consist mostly of much metamorphosed lava flows interbedded with small amounts of sedimentary rocks. Ihe whole series is usually much meta¬

morphosed and is commonly spoken of as the Greenstone series. The iron ores of the Ver¬

milion Range in Minnesota are of Keewatin age.

KEFF, or EL-KEFF, el-kef', fortified town in northern Tunis, over 100 miles from the city of Tunis. Its fortress crowning the rocky height above the town is looked upon as one of the strongest French fortresses in Africa.

Keff, which dates back to the days of the Phoe¬

nicians and was once occupied by the Romans, contains several interesting ruins of these early days of its history. It is the centre of consid¬

erable trade and commerce, especially in olives and grain.

KEFIR, or KEPHIR, kef'-er (Turkish

kaif, delight), a native drink of the people of the Caucasus. It is made from fermented milk, the fermentation being caused by kefir-

grains which require from two to three days to complete their action. This fermentation when properly effected, leaves the kefir effer¬

vescent. Kefir is prescribed for lung dis¬

eases, stomach trouble and anaemia by the Caucasians. It has already become recognized in Europe and the United States as a helpful remedy in cases of intestinal putrefaction and auto-intoxication.

KEGOUSA, a lake in Dane County, Wis., about 10 miles southeast of Madison. It is one of the ((Four Lake-s® and the furthest south of them.

KEI, ki, or KEY ISLANDS, a group of

islands situated in the east of the Banda Sea (East Indian Archipelago). The group con¬

sists of numerous islands the most important of which are the Great Kei and the Little Kei, the former of which is rough and mountainous.

All the islands are well wooded, and with the exception of the Great Kei, low and fertile, as are most of the islands of coal formation.

Total area, over 570 square miles. Pop. 23,000, principally natives.

KEIDEL, George C., American philologian, librarian and literary man : b. Catonsville, Md., 16 June 1868. After elementary studies he matriculated at Johns Hopkins University, Baltimore ; won competitive scholarships, and in 1889 was graduated B.A. from the Latin-

Mathematical group. Continuing studies, es¬

pecially in French, Italian and Latin, and twice winning the Romance Fellowship, he was made Ph.D. in 1895 ; and was appointed assistant in Romance languages at his alma mater. Hav¬

ing published a (Manual of Esopic Fable Literature 5 in 1896, he was advanced to the position of instructor and associate in the same department. Here he came under the direct personal influence of Prof. A. Marshall Elliott, the nestor of the Romance scholars of America, and for 20 years made investigations in com¬

parative literature in connection with a critical edition of the

nary were engaged. Travel abroad in 1897

and 1902 was devoted chiefly to the study of manuscripts and incunabula in the libraries of Belgium, France and Germany. His published writings comprise bibliographical rarities and scores of articles in leading scholarly journals of Europe and America. In 1911 Dr. Keidel resigned his position in the faculty of the Johns Hopkins University to become the foreign language expert of the copyright office in the Library of Congress at Washington, where he has been engaged in preparing for publication an extensive (Drama Index. >

KEIFER, ki'fer, Joseph Warren, Ameri¬

can soldier and politician: b. Bethel, Clark County, Ohio, 30 Jan. 1836. He was educated at Antioch College and in 1856 settled in Spring-

field, Ohio, where he began to study law. In 1858 he was admitted to the bar, but at the out¬

break of the Civil War gave up his practice to accept a commission as major of the 3d Ohio Infantry, and rose to the rank of major-

general of volunteers in 1865. During Lee's last campaign General Keifer's troops were among those which compelled the surrender of Ewell's corps at Sailor's Creek, and General Keifer received the surrender of Commodore Tucker and the Marine Brigade, which num¬

bered about 2,000 men. At the close of the war he declined a commission as lieutenant-

colonel of the 26th United States Infantry. He served in the Ohio State senate in 1868-69, held a number of offices in the Grand Army of the Republic, was chosen a delegate to the Repub¬

lican National Convention in 1876, and the same year was sent to Congress, of which body he continued to be a member until 1883. During the last two years he was speaker of the House.

At the outbreak of the Spanish-American War he was commissioned a major-general of volun¬

teers, and for a time commanded the 7th corps, encamped near Havana. He was re¬

elected to the 61st Congress, his term ending 4 March 1911. He is a member of the Perry Monument Commission and a life member of the Interparliamentary Union and Conference for Arbitration and Peace of the World. He wrote (Slavery and Four Years of War5 (2

vols., 1900).

KEIGHLEY, ke'li, a West Yorkshire

municipal borough, England. It is connected with Hull by the Leeds and Liverpool Canal which has contributed to its commercial and in¬

dustrial expansion. Among its industrial in¬

terests are machinery, tools, worsted goods and paper. Pop. about 45,000.

KEIKI, ka'ke, or HITOTSUBASHI. See

Hitotsubashi.

KEITH, keth, Alexander, Scottish ecclesi¬

astical writer : b. Keith Hall, Aberdeenshire, 30

Nov. 1791 ; d. Buxton, England, 8 Feb. 1880.

Graduated from Aberdeen University, he be¬

came a minister of the Established Church of Scotland but joined the Free Church movement in 1843. He became noted as a lecturer and as a defender of the principles of the Free Church party. Among his published works are Evi¬

dence of the Truth of the Christian Religion) (1828) ; (Signs of the Times> (1832) ; demon¬

stration of the Truth of the Christian Religion >

(1838) ; (The Mission to the Tews) (1841) ; (The Land of Israel5 (1843) ; (The Harmony of Prophecy5 (1851).

KEITH, Arthur, American geologist : b.

Saint Louis, Mo., 30 Sept. 1864. He received 336

the degree of A.M., from Harvard College in 1886,

and has been geologist on the United States Geological Survey since 1887, having charge of areal geology east of 100th meridian.

He is a Fellow of the Geological Society of America and of the American Association for the Advancement of Science. Author of vari¬

ous folios and reports on geology of southern Appalachian region published by United States Geological Survey.

KEITH, Benjamin Franklin, Amercian

theatrical manager: b. Hillsboro Bridge, N. H., 26 Jan. 1846; d. 26 March 1914. He began his show life as employee of a circus; and eventu¬

ally became manager of one. In 1885 he pur¬

chased a part interest in the Gaiety Theatre, Boston, to the management of which he brought some of the experience he had gained as mana¬

ger of the circus. One of his innovations was the continuous performance program. Joining hands with F. F. Proctor (1906), he formed the Keith and Proctor Amusement Company for the establishment of vaudeville theatres through various cities of the United States. As president of the United Booking Office of America, he did much to improve the theatrical situation throughout the United States.

KEITH, George, Scottish Quaker: b. prob¬

ably in Aberdeenshire about 1639; d. Edburton, Sussex, England, 27 March 1716. He was edu¬

cated at Marischal College, Aberdeen ; became a Quaker in 1662, and in 1677 he accompanied George Fox and William Penn to Holland on a missionary journey; came to Philadelphia in 1689 ; and was there accused of heresy and in¬

terdicted from preaching in 1692. He then held separate meetings of his followers, known first as

Keithites and later as <(Christian Quakers.®

Disowned by the yearly meeting of 1694, he established a congregation in which the Quaker externals were observed but the Lord's Supper and baptism were administered. In 1700 he conformed to the Anglican Church, in 1702-04

was a missionary in America for the Society for the Propagation of the Gospel, and from 1705 until his death was rector of Edburton, Sussex. Among his writings were (The Deism of William Penn and his Brethren (1699) ; (The Standard of the Quakers Examined*

(1702), and (A Journal of Travels> (1706).

KEITH, George Elphinstone, Viscount,

British admiral : b. Elphinstone, Scotland, 7

Jan. 1746; d. Tullyallan, Perthshire, Scotland, 10 March 1823. After continuous and varied service in the. navy from his boyhood, he played a prominent part in the war with the American colonies from 1775-80, looking after privateers and intercepting blockade runners.

He was in command of frigate Perseus, which took part in the reduction of Charleston (1780) and in several other American land engage¬

ments. In 1793 he was second in command of the Mediterranean squadron and the following year was promoted to the rank of rear-admiral.

In 1705, as commander of an expedition against the Dutch colonies, he seized Cape Colony, Ceylon, Cochin, Malacca, the Molucca Islands and captured the Dutch West Africa squadron.

These exploits earned him promotion to the rank of Baron Keith of Stonehaven Marischal (in the lush peerage) in 1796. Four years later he aided the Austrians in the capture of Genoa ; and in 1803 he became commander-in¬

chief of the North Sea fleet, a position he held until 1807. He continued to operate against the French throughout the Napoleonic wars and it was the Channel fleet which he com¬

manded that prevented Napoleon's escape in 1815. For his continuous and excellent services he was elevated to the peerage of the United Kingdom as Viscount Keith. Consult Allardyce, (Memoir of the Honorable G. K. Elphinstone, K. B., Viscount Keith) (London 1882).

KEITH, James, Scottish soldier: b. In-

verugie, Aberdeenshire, 14 June 1696; d. Hoch-

kirch, Saxony, 14 Oct. 1758. He was of noble birth, his father being William Earl Marischal of Scotland, and his mother daughter of the Earl of Perth. Educated for law at the Uni¬

versity, of Edinburgh, he joined the Stuart in¬

surrection in 1715. He was taken prisoner and attainted of treason, but succeeded in making his escape to France. In 1719 he joined the expedition against Scotland which had been fitted out in Spain, and on its defeat he again escaped, this time to Spain. After military service there for some time he entered the Russian army as major-general and fought against the Turks and Swedes. Frederick the Great tempted him to Prussia with the rank of field-marshal (1747). Keith and his elder brother, the Earl-Marischal and head of the Keith family, became the most trusted of the friends of the great Frederick; and their names are inseparably connected with his cam¬

paigns. The elder Keith proved to be a genius of diplomacy, the younger a military master.

From the time he entered the service of Prus¬

sia James Keith became known as Marshal Keith, the title generally given him in history.

For his brilliant exploits in Prussia see the history of the Seven Years' War or any good history of Prussia. Marshal Keith met his death at the battle of Hochkirch at which the Austrians defeated the Prussians. Consult Carlyle, (The Life of Frederick the Great>

(New York 1858).

KEITH, Sir William, British colonial

officer: b. near Peterhead, Scotland, 1680; d.

18 Nov. 1749 in Old Bailey prison, London. He was son of Sir William Keith of Ludquhairn, Aberdeenshire, Scotland. Like all the Keiths, a. supporter of the Stuart cause, he spent his life at the French court where he seems to have been known as a profligate. Making his peace with the British government, he was appointed surveyor-general of customs in the southern colonies of North America. He was governor of Pennsylvania (1717-26) and held other government offices in America. Among his writings are

KEKULE VON STRADONITZ, ka'koo-

la fon stra'dd-mtz, Friedrich August, German chemist: b. Darmstadt, 1829; d. Bonn, 1896.

Educated at Giessen and Paris, he became tutor at Heidelberg and professor of chemistry at Ghent (1858) and later held the same position in Bonn. He was one of the great and original thinkers in chemistry of his day and his in¬

fluence on the development of the science was worldwide. He established the valence theory, developed the constitutional formula of benzene and applied his knowledge thus gained to the

study of numerous compounds. His work in synthetic dyes gave Germany a start in their manufacture which

she held until the European War deprived her of it. Kekule wrote con¬

siderable on chemical subjects.

KEKULE VON STRADONITZ, Rein-

hard, German writer on archaeological sub¬

jects: b. Darmstadt, 1839; d. 1911. Educated at. Gottingen and Berlin, he became professor of archaeology at Bonn and later at Berlin.

Among his published works, most of which are the result of personal investigation, are (Hebe) (1867) ; (Die Balustrade des Temples der Athena Nike) (1869); (Die Antiken Bildwerke in Theseion) (1869) ; (Die Gruppe des Kiinst-

lers Menelaos in Villa LudovisP (1870) ; (Ueber die Entstehung der Gotterideale der griechischen Kunst) (1877) ; (Zur Deutung und Zeitbestimmung des Laokoon) (1883) ; (Die antiken Terra-kotten) (1880-84) ; (Das Leben Friedrick Gottlieb Wilckers) (1880) ; (A His¬

tory of Greek Art> (1890).

KE'LANTAN, or KFLANTAN, a na¬

tive Malay state under British protection. It is situated on the east side of the peninsula and its chief port of the same name maintains steamship communication with Siam, Singapore and all the important coast cities and with the interior of the country and of neighboring Malay states, by means of a branch line of the Federated Malay States Railroad system. The industries of the state are chiefly agriculture, the chief products of which are rice, tapioca, rubber, resin, fruits and copra. Silk weaving is carried on extensively and the manufacture of boats is one of the chief occupations of the port towns. The country is rich in mineral wealth which has, so far, been but poorly ex¬

ploited ; but British capital has begun to de¬

velop the best known of its mining regions.

Kota Bharu, the state capital, has 12,000 inhab¬

itants while the whole country has a population of 290,000 to an area of 5,500 square miles.

KELAT, ke-lat, a city in Baluchistan, of which it is the capital and the residence of the Khan. See Khelat.

KELCEY, Herbert Lamb, Anglo-Ameri¬

can actor: b. London, England, 1856; d. 10 July 1917. He made his first stage appearance at Brighton in 1877, and three years later he was on the cast of Bow Beds in London. After playing important parts in the principal Lon¬

don theatres he went to the United States in 1882 where he continued to make his home.

In New York he was connected with Wallack's Theatre and Daniel Frohman's Lyceum com¬

pany and played important parts in New York and in companies traveling throughout the principal cities of the United States.

KELER-BISLA, ka'ler-ba la, Albert Von,

Austrian musical composer and violinist : b.

Bartfeld, Hungary, 1820; d. 1882. Educated at Vienna, he became leader of the Gungl Band in Berlin in 1854. After several years' experi¬

ence in the. orchestra of the Theater an der Wien in Vienna in 1867 he became conduc¬

tor of the Kur Orchestra in Vienna, a position he held until 1873. He was very popular as a composer of orchestra and dance music and he is still looked upon as one of the best of writers of violin solos.

KELETI, kel'e-te, Gustav Friedrich,

Hungarian painter: b. Pressburg, 1834; d. 1902.

Graduated in law in Vienna he followed teach¬

ing for a while and finally studied painting in Munich. He developed a talent for landscape painting into which he threw a touch of Ro¬

manticism; but he was never successful as a painter of figures. He helped to establish the Royal Hungarian School of Drawing and the School of Industrial Art of both of which he was head. As a critic he deserves a high place in the history of art in Hungary.

KELLER, Arthur Ignatius, American

painter and illustrator: b. New York, 1867.

His art studies were made at the National Academy, New York, and in Munich. He has won a reputation as one of the best of Amer¬

ican illustrators, and he is also a skilful oil and water-color artrst. He has illustrated a long list of books, among them (The Virginian*

(Wister) ; (Kate Bonnet* (Stockton) ; (The Right of Wav> (Gilbert Parker) ; and the sto¬

ries of Bret Harte. He has won many medals for paintings and some of his oil and water-

color productions are hung in prominent gal¬

leries at home and abroad.

KELLER, kel'ar', Emile, French writer

and statesman: b. Belfort, 1828; d. 1909. He became leader of the Roman Catholic party among the French deputies, and was com¬

mander of a company of volunteers during the Franco-Prussian War. After the war he op¬

posed the cession of Alsace-Lorraine to Ger¬

many. Among his numerous writings are (His-

toire de France) (1888) ;

clique et les principes de 1 789) (1865) ; (Le General de Lamoriciere* (1873); 'Les con¬

gregations religieuses en France-' (1880). These works are written from the Catholic point of view and, for this reason, they have been read and are still popular in Catholic circles.

KELLER, Ferdinand, German painter: b.

Karlsruhe, 5 Aug. 1842. He was educated at Karlsruhe; studied from nature in Brazil in 1857-62 ; was a student in landscape painting under Schirmer in Karlsruhe in 1862 and of figure painting under Canon in Karlsruhe in 1863 ; and studied in Rome in 1863-67. His works embrace Brazilian landscapes, allegorical and historical paintings and portraits. Among his sitters are members of the Imperial family.

In 1881 he was appointed director of the school of art in Karlsruhe. His (Death of Phillip ID

(1867), won first prize at the International Art Exposition in Rio de Janiero and his (Burning of Rome under Nero* was awarded a medal at the Vienna Exposition in 1873. Among other works are (Victory of Margrave Ludwig Wil¬

helm of Baden over the Turks at Salankamen, 1691 } (1879) ; (Hero Finding the Body of Le-

ander) (1880) ; (Triumphal Progress of Pallas Athene before Elector RuprecD (1886), etc.

KELLER, Friedrich Ludwig, von, Swiss-

German jurist: b. Zurich, 17 Oct. 1799; d. Ber¬

lin, 11 Sept. 1860. He was educated at Berlin and

Gottingen and in 1825 returned to Zurich where he was appointed professor of civil law in the university. He was a leader of the Liberal Radical party and in 1831 became head of the Swiss justiciary. In 1843— 47 he was pro¬

fessor in the University of Halle. He then 338

KELLER

removed to Berlin where he was active polit¬

ically, and was later ennobled. He wrote (Ucber Litiskontestation und Urteil* (Zurich 1827) ; (Der rbmische Zivilprozess und die Ak-

tionen> (Leipzig 1852; 6th ed., 1883), etc.

KELLER, Gottfried, the best writer of

short stories (Novellen) in German literature: b. Zurich, Switzerland, 19 July 1819: d. there, 17 July 1890. His father was a lathe-worker from Glattfelden (1791-1824) ; his mother's maiden name was Soheuchzer (1787-1864).

After his father's death, Keller's family lived in constant poverty, and, because of his dif¬

ficulties with his teachers, in continual disagree¬

ment with school authorities. Keller later gave a good rendering of his experiences in this per-

iod in his long novel, 'Der grime Heinrich) (1850-55; 2d version, 1879). His mother seems to have brought him up in as carefree a condi¬

tion as possible, sparing for him from her scanty meals, and allowing him the greatest possible liberty in the disposition of his time, the choice of a calling, etc. With some changes, a treatment of her relations to him may be found in his short story, (Frau Regel Amrain und ihr jiingster> (in the collection (Die Leute von Seldwyla*). After numerous unsuccessful attempts to find a good teacher of

painting, which was Keller's first passion, in his native town, he went to Munich in 1840 to study at the Royal Academy of Arts. But he soon rec¬

ognized that painting was not for him and spent six years at Zurich in almost total inactivity (1842-48), inclining strongly toward radicalism in politics, but subject to much temptation and sef-indulgence. In 1848 he went to Heidelberg to pursue serious studies, coming under the in¬

fluence of the philosopher Feuerbach and ex¬

tending his radicalism also to matters of reli¬

gion. But it was chiefly his stay in Berlin (1850-56) which molded Keller's character into its final shape, toned down his rather bitter pessimism to a more moderate form and pre¬

pared him (not without the privations of hun¬

ger), in the whirl of a large city, for an enjoy¬

ment of the more restricted pleasures of his native Zurich. It was in Berlin that he turned definitely away from other pursuits and took up literature as a career. In this period fall (Der grune Heinrich and the first collection of 'Die Leute von Seldwyla, > (five stories averaging 60 pages each: 'Pankraz der Schmoller,> 'Frau Regel Amrain und ihr jiingster,> (Die drei gerechten Kammacher,* 'Romeo und Julie auf dem Dorfe,* (Spiegel das Kiitzchen*). 'Der grune Heinrich * is the most personal of all his works; under the influence of J. J. Rousseau's doctrine of a return to nature, this book, at first intended as a short narrative of the col¬*

*lapse of the life of a young artist, expanded, as its composition progressed, into a huge work that treats, in poetically transfigured manner, all the events in Keller's life up to his return to Zurich in 1842. Its reception by the literary world was cool, but the later version (1879) *s a rounded and satisfying artistic product.*

Die Leute von Seldwyla* includes at least two stories that are immortal: (Die drei gerechten Kammacher, * the most satvric and scorching attack on the sordid petit bourgeois morality ever penned by any writer, and (Romeo und Julie auf dem Dorfe,* one of the most pathetic tales in literature (Shakespeare's plot in a Swiss village setting). In 1861 Keller became city registrar (Staatsschreiber) of Zurich. The routine duties of this position were a sort of fixed point about which his artistic activities could revolve, but he produced little of per¬

manent value in these years. After 15 years at this post he was retired in 1876, and began a period of literary activity that was to last to his death, living the life of an old bachelor with his sister Regula as his housekeeper. In spite of his often unsympathetic manner, his extreme reserve and idiosyncrasy in dealing with others, he had gained the affection of his fellow-townsmen and an almost universal rep¬

utation before his death.

His fame is based chiefly on 15 short stories, the five mentioned above, the five contained in the second volume of 'Die Leute von Seldwyla) (1874); 'Die missbrauchten Liebesbriefe,* 'Der Schmied seines Glucks, * 'Dietegen,* 'Kleider machen Leute,* 'Das verlorene Lachen) ; and five in (Ziiricher Novellen) (1878) ; 'Hadlaub,*

(Der Narr auf Manegg,> 'Der Landvogt von Greifensee, * (Das Fahnlein der sieben Aufrech-

ten,* 'Ursula.* The milieu is always that of an orderly bourgeois existence, within which the most manifold 1 uman destinies, the most humorous relations are progressing, the most peculiar and hardy types of endurance and ret¬

icence being formed. Some of the stories con¬

tain a note that is new in German literature, that

has endeared them particularly to Ger¬

mans, as embodying an ideal as yet unrealized in their own country: they narrate the develop¬

ment of character under the relatively free con¬

ditions of little Switzerland, picturing an un-

bureaucratic civic life and an independence of business initiative that cannot but attract those who have been denied these privileges. As short stories, they cannot compare with Mau¬

passant's or Thomas Mann's for artistic con¬

struction; they resemble those of Henry James chiefly in complexity and wealth of detail, not in sophistication and elegance; but they deal intimately and understanding^, often by carica-

tU-rLand exa88eration- with the motives of plain middle class persons, or those on the lower fringe of the middle class ('Romeo und Julie auf dem Dorfe*). Physical description of a painfully detailed, yet entrancing variety, is their chief external grace : pages are devoted to the portrayal of the tiled stove (Dietegen) or a cheap cabinet (Kammacher). Keller's most mature collection of short stories is 'Das Smngedicht,* containing 'Die arme Baronin *

Der Geisterseher > 'Regine,* 'Don Correa,*

Berlocken (1882). In the form of what the Germans call "eine Rahmenerzahlung** (a framework story, stories within a story), it unites a continuous narrative with a number of interposed, independent tales, a device of which Boccaccio is the most illustrious exponent, and which German _ writers have consciously de¬

veloped to a high degree of perfection Die sieben Legenden> (1872, containine 'Eugenia*

'Die Jungfrau und der Teufel,* 'Die Jungfrau und der

Ritter,) 'Das Tanzlegendchen,* etc) is a similar collection, in which the author has adopted his merry art of narrative to an ecclesi¬

astical outline. His last work is 'Martin Salan-

der,> in which his creative and descriptive powers seem no longer at their full height.

It is the old opposition of the risen and the rising generation, in his usual Swiss setting.

The significance of family life and the rela-

**on the individual to society are well put.

ff.y German critics, Keller is also placed very high as a lyric poet. (See Der Grune Hein¬

rich).

The (German Classics) (Vol. XIV, New

York 1914) has translations of (A Village Romeo and Juliet, > cThe Governor of Grei-

fenseeR (The Company of the Upright Seven, >

Consult (Werke) (10 vols., Stuttgart 1909) ; (Nachgelassene Schriften und Dichtungen) (Berlin 1893) ; Hauch, Edward F., (Gottfried Keller as a Democratic Idealist* (New York 1916) ; Baechtold, Jakob, (Gottfried Kellers Leben, Briefe, und Tagebiicher* (3 vols., Stutt¬

gart and Berlin 1894-97); Baechtold, (Keller; Bibliographic* (Berlin 1897) ; Baldensperger, Fernand, (Gottfried Keller, sa vie et ses oeuvres) (Paris 1899); Huch, Ricarda, (Gottfried Keller) (Berlin n.d.) ; Koster, Albert, (Gottfried Kel¬

ler^ (Leipzig 1907) ; Koster, (Der Brief wechsel

zwischen Theodor Storm und Gottfried Keller) (Berlin 1909).

Jacob Wittmer Hartmann.

KELLER, Helen Adams, American blind,

deaf and dumb girl who has been successfully educated: b. Tuscumbia, Ala., 27 June 1880.

When about two years old she was deprived of sight and hearing by a severe illness. Her edu¬

cation was not begun till she was seven, when Miss Anna Mansfield Sullivan (Mrs. John A.

Macy), of the Perkins Institute of the Blind, went to her home to take charge of her. She learned the deaf and dumb language by touch, learned to read by the braille system, and to write, using a special typewriter; in 1890 she also learned to speak under the instruction of Miss Sarah Fuller, of the Horace Mann School, New York. When 12 years old she went to Boston, where she has since lived; in 1896 she entered the Cambridge School for Young Ladies to prepare for college. Miss Sullivan went with her to all classes and repeated the lectures and discussions by touch. In 1900 she entered Radcliffe College and was graduated with honors in 1904. The work of her college course was done with aid of Miss Sullivan, as in the preparatory school ; the textbooks were printed in braille ; she wrote her examina¬

tions with her own typewriter; and had special conferences with her instructors instead of tak¬

ing part in recitations. In addition to doing the full college work, she took part in the social life and was very popular with her classmates.

After graduation she served on the Massachu¬

setts Commission for the Blind and on various committees in aid of the blind. She has be¬

come well known as a lecturer and writer on her experiences and on the educational and cul¬

tural possibilities for the blind. She has written her autobiography under the title of (Story of My Life> (1903), and (Optimism (1903); (The World I Live In* (1908) ; (Song of the Stone Wall> (1910) ;*

sult Harry, Gerard, (Man's Miracle: The Story of Helen Keller and her European Sisters) (New York 1913) ; Hitz, John, (Helen Keller) in the American Anthropologist (Vol. VIII, Lancaster, Pa., 1906) ; and Madame Maeter¬

linck,

KELLER, Otto, German classical philol¬

ogist: b. Tubingen, 28 May 1838. He was edu¬

cated at the universities of Tubingen and Bonn and later specialized in the study of Horace.

He was_ professor at Freiburg 1872-76, at Graz 1876-81 and from then until his retire¬

ment on a pension in 1909 he was at Prague.

Chief among his critical works on Horace are (Horatii Opera Rec. Holder et Keller) (1864—70; Vol. I, 2d ed.. 1899); (Epilegomena zu Horaz (3 vols., Leipzig 1879-80) ; (Pseudo-*

acrouis Scholia in Horatium Vetustiora) (2

vols., 1902-04). Among other works are 'Tiere des klassischen Altertums in kultur-

geschichtlicher Beziehung> (Innsbruck 1887) ; (Lateinische Etymologies (1893) ; (Kultur-

geschichtliches aus der Tierwelt (1904); (Die antike Tierwelt* (Vol. I, 1909; Vol. II, 1914), etc.*

KELLERMAN, William Ashbrook, Amer¬

ican botanist: b. Ashville, Ohio, 1 May 1850; d. 8

March 1908. He was graduated at Cor¬

nell in 1874, and received his Ph.D. from the University of Zurich in 1881. He was a pro¬

fessor in the State Normal School, Oshkosh, Wis., five years ; in the State College, Lexing¬

ton, Ky., one year, and at the Kansas Agricul¬

tural College eight years. He was botanist to the Kansas Experimental Station four years, and from 1891 until his death was professor of botany in the Ohio State University. He lec¬

tured extensively, contributed to various bo¬

tanical journals and investigated parasitic fungi. He wrote (Elements of Botany* ; (Plant Analysis) ; (Spring Flora of Ohio) ; (lCatalogue of Ohio Plants) (1899) ; (Non-Indigenous Flora of Ohio* (1900), etc.

KELLERMANN, Bernhard, German nov¬

elist, author of a number of very sensational works: b. Fiirth, Bavaria, 4 March 1879. He traveled considerably and lived in a number of cities: Rome (1904-05), Berlin (1905-06), Griin-

wald bei Miinchen (1906-09), Schoneberg bei Berlin (from 1909). His most famous work is (Der TunneP (1913; English translation, (The Tunnel,* New York 1914), of which 100,000

copies were printed in its first year. It is a romance of iron and steel, a study of commer¬

cial expansion and consequent clash of inter¬

ests, _ centring about the construction of a tun¬

nel joining the continents of Europe and North America under the Atlantic Ocean: in short, a typical product of the imperialistic imagination as molded under the hothouse conditions of modern industrial life. He has traveled in the Orient to

obtain impressions of Eastern life and has rendered these impressions in the last two of the works enumerated below. His works include Wester und Li* (1904) ; (Inge-

borg* (1906) ; (Der Tor) (1907) ; (Das Meer) (1910) ; (Ein Spaziergang in Japan* (1911) ; (Sassayo Yassa* (1913). An English transla¬

tion, (God's Beloved, * of a story written by Kellermann in 1911 appears in (German Class-

ics> (Vol. XX, New York 1914).

KELLERMANN, Frangois Chistophe,

fraii swa kres-tof kel'ler-man (originally Georg Michael Kellermann), Duke of Valmy, French marshal : b. WolfsbuchwTeiler-an-der Tauber, Bavaria, 28 May 1735; d. 12 Sept. 1820.

He entered the Conflans Legion as a hussar in 1752 and engaged in the first campaigns of the 340

Seven Years' War. In 1792 he received the command of the army of the Moselle, formed a junction in September with the main army un¬

der Dumouriez and sustained 20 Sept. 1792 the celebrated attack of the Duke of Brunswick.

In the following wars of France Kellermann re¬

ceived various general commands. He became marshal of France in 1804 and Duke of Valmy in 1809. After the Bourbon restoration he was appointed a member of the Chamber of Peers, where he espoused the Liberal side.

KELLERMANN, Francois Etienne de,

Duke of Valmy: b. Metz, 4 Aug. 1770; d. 2

June 1835. Son of Franqois Christophe de Kel¬

lermann (q.v.). He served in his father's regi¬

ment before entering the diplomatic service in 1791, returning to the army in 1793 and again serving under his father in the army of the First Consul. In 1796 he became Napoleon's adjutant-general and in 1797 his services at Tagliamento won his promotion to brigadier-

general. At Marengo he conducted a cavalry charge that won the battle and gained for him rank as general of division. He was at Auster-

litz and served in the Peninsular campaign. He remained in the army throughout the Restora¬

tion, but rejoined Napoleon's service upon his return from Elba. He commanded a cavalry corps at the battle of Waterloo. He was con¬

sidered the ablest of Napoleon's cavalry gen¬

erals, but his fame was clouded by his undoubt¬

edly merited personal unpopularity; Napoleon, however, ever kept in mind de Kellermann's service at Marengo. He sat in the House of Peers from 1820 and vigorously opposed the Bourbons until the fall of Charles X in 1830.

His unpublished memoirs were used by his son, Franqois Christophe Edmond de Kellermann in the preparation of (Histoire de la Cam-

pagne de 1800) (Paris 1854).

KELLEY, ken, Benjamin Franklin,

American soldier: b. New Hampton, N. J., 10 April 1807; d. Oakland, Md., 17 July 1891.

In 1861 he recruited and became colonel of the first Virginia regiment enlisted in the Federal service, on 17 May became brigadier-general, captured Romney 26 October and was for a time until January 1862, commander of the De¬

partment of Harper's Ferry and Cumberland.

In July 1863 he was appointed to command the Department of West Virginia, in November 1863 destroyed the Confederate camp near Morefield, Va., and in August 1864 defeated the enemy at Cumberland, Md., and New Creek and Mor,efield, Va. He was brevetted major-gen¬

eral of volunteers in 1865, and subsequent to the war was from 1876 superintendent of the Hot Springs (Ark.) reservation, and from 1883

an examiner of pensions.

KELLEY, Charles H., English Wesleyan

clergyman and publisher: b. Salford, Man¬

chester, 25 Nov. 1833; d. London, 5 April 1911.

He was educated at Didsbury College. He en¬

tered the Wesleyan Methodist ministry in 1857

and served as pastor for many years. He was secretary of the Wesleyan Sunday School Union, 1875–89; book steward or manager of the Methodist Publishing House, London, 1889–1907. He was elected to the ((Legal Hun¬

dred,® 1878 ; president of the Wesleyan Confer¬

ence, 1889–90, 1906–07; president of the Na¬

tional Council of Evangelical Free Churches, 1900–01. He served as fraternal delegate to the General Conference of the Methodist Epis¬

copal Church, 1888. He was the first Wesleyan minister to conduct services in military prisons under War Office authority. Fie was a man¬

ager of the Wandsworth Boys' Home and Re¬

formatory for many years. He was also vice–

president of the British and Foreign Bible So¬

ciety and of the Sunday School Union. He is said to have preached in over 800 churches and dedicated many churches. He published his (Memories, or Autobiographical Reminis–

cences) (1910).

KELLEY, Edgar Stillman, American com¬

poser : b. Sparta, Wis., 14 April 1857. He studied with Merriam, Clarence Eddy and Ledo–

chowski in Chicago, 1874— 76, and afterward with Seifriz, Kriiger, Speidel and Finck at Stuttgart, graduating from the conservatory there in 1880. Upon his return he held several church appointments and

for a short period conducted a comic opera. Later he taught in San Francisco, where he became musical critic of the Examiner. In 1896 he settled in New York, teaching in the New York College of Music and lecturing for the extension depart¬

ment of New York University in 1901-02.

From 1902 to 1910 he resided in Berlin. Upon his return to the United States he became pro¬

fessor of music at the Western College for Women in Columbus, Ohio, and professor of composition at the Cincinnati Conservatory of Music. He became a member of the National Institute of Arts and Letters. His works in¬

clude a comic opera, (Puritania) ; two sym¬

phonies ; an orchestral suite, (Aladdin* ; a piano quartet; a string quartet; incidental music to (Ben Hur,* (Prometheus Bound,*

'Macbeth*; songs; piano pieces, etc. Flis book (Chopin the Composer* (1913) attracted wide attention for its scholarly analysis of the mas¬

ter's works.

KELLEY, Florence, American social

worker: b. Philadelphia, 12 Sept. 1859. She was graduated at Cornell in 1882 and took her LL.B. at the Northwestern University in 1894.

She was State inspector of factories in Illi¬

nois in 1893-97 ; served as American editor of the Arcliiv fiir Sozialegesetzgebung, Berlin, in 1897-98 ; and since 1899 has been general sec¬

retary of the National Consumers' League.

Through a marriage, later dissolved, she is known as Mrs. Kelley. She is associate editor of the Survey and a trustee of the National Child Labor Committee.

Besides a translation of Friedrich Engel's Condition of the Work¬

ing Classes in England) she has written Tome Ethical Gains Through Legislation* (1905); (The Fate of Felix Brand* (1913) ; 'Modern Industry in Relation to the F'amily) (1914).

She edited Edmond Kelly's (Twentieth Cen¬

tury Socialism* (1910).

KELLEY, James Douglas Jerrold, Ameri¬

can naval commander: b. New York, 25 Dec.

1847. He was graduated from the United States Naval Academy in 1868; became lieuten¬

ant-commander in 1893 and commander in 1899. He was successively inspector of mer¬

chant vessels at New York, senior aide to the commandant at the navy yard there, commanded the Resolute and for a second time was in¬

spector of merchant vessels. He was retired 1

April 1901. He has published (The Question of Ships* ; k Our Navy' ; (A Desperate Chance) ; (American Men-o'-War* ; (History of the Na¬

val Experimental Battery * ; (American Yachts * ; v Typical Yachts*; (The Ship's Company) ; (The Story of Coast Defense) ; (The Navy of the United States 1 775— 1899 J ; and is the naval editor of the New York Herald.

KELLEY, William Darragh, American

legislator: b. Philadelphia, Pa., 12 April 1814: d. Washington, D. C., 9 Jan. 1890. He was ap¬

prenticed first to a jeweler and later to a printer, studied law at Philadelphia and in 1841

was admitted to the bar there, in 1845-46 was attorney-general of Pennsylvania, and in 1846-

56 judge of the Court of Common Pleas at Phil¬

adelphia. Previously a Democrat, he became a Republican in 1854, and in that year gave at Philadelphia a once well-known address on <(Slavery in the Territories.** In 1860 he was a delegate to the National Republican Conven¬

tion, and from that year until his death was a member of the House of Representatives, where he was chairman of the Committee on the Centennial Exposition and was known as (

tions> (1872) ; (Letters from Europe) (1880) ; (The New South> (1887).

KELLEY, William Valentine, American

Methodist clergyman and editor : b. Plainfield, N. J., 13 Feb. 1845. He was educated at Wes¬

leyan University, graduating in 1865. Two years later he entered the ministry of the Methodist Episcopal Church. He served

prominent churches in Camden, N. J., New Brunswick, N. J., Buffalo, N. Y., Philadelphia, Pa., Newark, N. J., Brooklyn and New Haven, Conn. Since 1893 he has been editor of The Methodist Review. He has been a member of every session of the General Conference begin¬

ning with 1896. He is a manager of the Board of Foreign Missions of the Methodist Episco¬

pal Church and also of the American Bible So¬

ciety. He is author of (The Ripening Experi¬

ence of Life and Other Essays) (1907) ; Town the

Road and Other Essays) (1911) ; (The Il¬

luminated Face> (1911) ; (Glimpses of the Soul of Gilder* (1911); (Trees and Men*

(1911); (A Pilgrim of the Infinite) (1914); (With the Children in Lewis Carroll's Com-

pany> (1917).

KELLGREN, Johan Hendrik, Swedish

poet and critic: b. Floby, West Gothland, 1

Dec. 1751 ; d. Stockholm, 20 April 1795. He was educated at the University of Abo and when he became a privatdocent there in 1774, he had already gained recognition as a poet. In 1777

he removed to Stockholm and in 1778 with Assessor Carl Lenngren he founded the Stock -

holmsposten, of which he became editor. He was librarian to Gustavus III from 1780 and in 1785 became his private secretary. He collab¬

orated with the monarch in the production of four operas, Killgren supplying the verse.

Upon the establishment of the Swedish Acad¬

emy in 1786 he was made one of its original members. His fame rests chiefly upon his ly¬

rics, which are among the most notable fruits of the Gustavian period of Swedish letters.

His earlier work is keenly satirical, controver¬

sial and light in tone, but deep feeling and wise sympathy characterize his later writings.

Among his most bitter satires is (Nyt forsok till orimmad vers.* Of his earlier work the spring song, (Vinterns viilde lyktar,* and the satirical (Mina lojen,* are most notable; while of his later writings the finest are the satire, (Ljusets

fiender,* the inspired patriotic song, (Kantat den 1 januari, 1789, } the ode, (Till KristinaP and the song, (Nya SkapelsenP He personally revised his collected works, (Sam-

lade skrifter* (3 vols., 1796; later edition, 1884-85).

KELLICOTT, William Erskine, American

biologist: b. Buffalo, N. Y., 5 April 1878; d.

Hastings, N. Y., 29 Jan. 1919. He graduated at Ohio State University, 1898; Ph.D. Colum¬

bia, 1904. He was instructor in zoology at Barnard College in 1901-06. In 1906-08 was professor of biology at Goucher College, Balti¬

more, from 1908—17 was director of the Marine Biological Laboratory, Wood's Hole, Mass.; served for a year on the Federal Food Admin¬

istration; then became professor of biology at the College of the City of New York. He wrote (Social Direction in Human Evolution) (1911) ; (Textbook of General Embryology * (1913); (Outlines of Chordate Development (1913).

KELLNER, MAX, American theologian

and Orientalist: b. Detroit, Mich., 21 May 1861.

He was graduated from Hobart College in 1881, Cambridge Theological School in 1885, took his A.M. at Harvard in 1886 and his D.D.

at Hobart in 1895. He was instructor in He¬

brew at the Cambridge Theological School in 1887-91; assistant professor in Old Testament language there in 1891-98, and professor, 1898-

1907; since 1907 he has been professor of the literature and -interpretation of the Old Testa¬

ment. He has written cThe Prophecies of Isaiah)

(1900) ; (The Standard Inscription of AsshurnazirpaP (1895) ; (The Assyrian Monu¬

ments Illustrating the Sermons of IsaialP

(1900) ; (An Outline Study of the Old Testa¬

ment Literature and Religion) (1902).

KELLOGG, kel'og, Amos Markham,

American educator: b. Utica, N. Y., 5 June 1832; d. New Rochelle, N. Y„ 3 Oct. 1914. He was graduated from the Albany (N. Y.) State Normal School in 1851 and was instructor there 1852-56. Afterward he held other educational posts and edited the School Journal from 1874

to 1904. He published (School Management* ; (Life of PestalozzP (1891) ; (How to be a Successful Teacher > (1901), also numerous school entertainment books.

KELLOGG, Clara Louise, American

opera singer: b. Sumterville, S. C., 12 July 1842; d. 13 May 1916. She obtained her musical education chiefly in New York, where her first appearance in opera was in 1861 at the Academy of Music, in the role of Gilda in (RigolettoP

Henceforward she was one of the most popu¬

lar of American singers, and was also most cordially received in England, where she sang in opera 1867-68 and again in 1872 with Chris¬

tine Nilsson. Her voice was a pure and flex¬

ible soprano and her execution brilliant. She had an extensive repertoire, including 45 operas.

In 1874 she organized an English opera com¬

pany and with it visited nearly every part of the United States. In 1876 she organized an 342

Italian opera company and later appeared on the concert stage. In 1887 she married her manager, Carl Strakosch, and soon after re¬

tired from professional life. She published her memoirs in 1913 under the title (Memoirs of an American Prima Donna.5

KELLOGG, Elijah, American Congrega¬

tional minister and writer for the young: b.

Portland, Me., 20 May 1813; d. Harpswell, Me., 17 March 1901. He was graduated from Bow-

doin. College in 1840, from the Andover The¬

ological Seminary in 1843, was pastor of the Congregational church at Harpswell, Me., in 1844-55, in 1855-65 was chaplain of the Boston (Mass.) Seamen's Friend Society, was later for a time in charge of a congregation at Rock-

port, Mass., but soon returned to Harpswell, and there devoted himself to literary work.

He published over a score of juveniles, includ¬

ing (The Elm Island Series) (1868-70) ; (Pleasant Cove Series) (1870-74), and (Good Old Time Series1* (1877-82). But he is best known for his familiar blank verse addresses, ^Spartacus to the Gladiators, > (Regulus to the Carthaginians5 and (Pericles to the Peopled Consult Mitchell, (Elijah Kellogg: the Man and His Work1* (1903).

KELLOGG, Frank Billings, American

lawyer and senator: b. Potsdam, N. Y., 2 Dec.

1856. He removed to Minnesota with his parents in 1865, and was admitted to the bar in 1877. He was city attorney of Rochester, Minn., for three years and county attorney of Olmstead County for five

years. In 1887 he went to Saint Paul, joining the law firm Davis, Kellogg and Severance. He was counsel for different railroads and mining concerns and later served as special counsel for the United States government in its cases against the Standard Oil Company, the paper trust, the Union Pacific, Southern Pacific and Harriman railroads. He was elected president of the American Bar Association in 1912 and in 1916

was elected to the United Stales Senate.

KELLOGG, George, American inventor:

b. New Hartford, Conn., 19 June 1812; d. there, 6 May 1901. Albert Kellogg, the botanist, was his brother. He was graduated from Wes¬

leyan University in 1837, in 1841 became a man¬

ufacturer in Birmingham, Conn., removed in 1855 to New York, was a United States revenue officer in 1863-66, and later was active in manu¬

facturing and experimentation at Cold Spring, N. Y. Among his inventions were a machine for the manufacture of jack-chain, with a ca¬

pacity of a yard per minute; a type-distributer; an adding apparatus and a dovetailing machine.

KELLOGG, John Harvey, American phv-

sician: b. Tyrone, Mich., 26 Feb. 1852. He was a student at the Michigan State Normal School and received his M.D. from the Bellevue Hos¬

pital Medical College in 1875. He studied in Europe in 1883, '89, '99, 1902, '07, '11. He has practised at Battle Creek, Mich., since 1875 and has served as superintendent and surgeon of the Battle Creek Sanatorium since 1876. He was a member of the Michigan State Board of Health in 1878-90 and 1912—16. He is founder and president of the American Medical Mis¬

sionary College ; and has invented improved apparatus for medical and surgical purposes.

He has written many technical papers, and text¬

books and charts for the use of schools in addi¬

tion to (The Art of Massage5 (1895); *Ra-

tional Hydrotherapy5 (1901; 4th ed., 1910); (The Home Book of Modern Medicine5

(1906) ; (Neurasthenia or Nervous Exhaustion (1914), etc.

KELLOGG, Martin, American Latinist

and educator: b. Vernon, Conn., 15 March 1828; d. San Francisco, 26 Aug. 1903. He was graduated from Yale in 1850, from the Union Theological Seminary in 1854; having removed to California about 1855 there held a pastorate at Grass Valley, Nevada County; was profes¬

sor of Latin and mathematics in the College of California (1860-69) ; and when the college was merged into the university held the chair of Latin and Greek in the latter institution in 1869-76. In 1876-94 he was professor of Latin language and literature, in 1890-93 acting presi¬

dent, and in 1893-99 president of the university.

He resumed his professional duties in 1900. He published (Ars Oratoria,5 an edition of selec¬

tions from Cicero and Quintilian (1872), and (The Brutus of Cicero5 (1889).

KELLOGG, Paul Underwood, American

editor and social worker: b. Kalamazoo, Mich., 30 Sept. 1879. He was graduated at the Kala¬

mazoo High School, and took special courses at Columbia University 1901-06, and at the New York School of Philanthropy in 1902. He was reporter,

then city editor, on the Kalamazoo Daily 7 elegraph in 1898-1901 ; managing editor, associate editor and now editor of the Survey of which he has made a notable success. He was director of the Pittsburgh Survey in 1907-

08; and edited (Findings of the Pittsburgh Sur¬

vey5 (6 vols., 1910) for the Russell Sage Foun¬

dation. He was one of the directors of the New York City Committee on Congestion of Population and served as chairman of the com¬

mission on Occupational Standards of the Na¬

tional Conference of Charities and Correction in 1910. He also served on the board of man¬

agers of the Cabot Fund in 1915.

KELLOGG, Samuel Henry, American

Presbyterian missionary and scholar: b.

Quogue, Long Island, N. Y., 6 Sept. 1839; d.

Landour, India, 2 May 1899. He was gradu¬

ated at Princeton College in 1861 and at the Theological Seminary in 1864, and after being ordained to the Presbyterian ministry, went as a missionary to India, where he remained till 1877. He was professor of systematic theology in Western Theological Seminary 1877-86, and pastor of Saint James' Square Presbyterian Church, Toronto, 1886-92. He returned to India in 1892 and remained there till his death.

His publications include

diction and Fulfilment5 (1883); (The Light of Asia and the Light of the World5 (1885); (The Genesis and Growth of Religion5 (1892) ; (From Death to Resurrection5 (1885), etc.

KELLOGG, Vernon Lyman, American

entomologist and zoologist: b. Emporia, Kan., 1 Dec. 1867. He was graduated at the Uni¬

versity of Kansas in 1889, from Cornell in 1891, studied at the . University of Leipzig in 1893 and at the University of Paris in 1904.

He was assistant and associate professor of entomology in the University of Kansas in 1890-94 and since 1894 has been professor of 343

entomology and lecturer at Leland Stanford Jr. University. He has been associate editor of the Philosophy of Nature series since 1911; and in 1915 was in charge of food distribution in northern France and Belgium under the American Commission for Relief in Belgium.

In 1917 Mr. Kellogg was appointed assistant to Herbert Hoover, the United States food administrator. He has written (Common In¬

jurious Insects of Kansas y (1892) ; Elemen¬

tary Zoology* (1903) ; 'American Insects) (1904) ; (Darwinism To-day* (1907) ; (The Animals and Man' (1911) ; (Beyond War*

(1912), etc.

KELLOGG, William Pitt, American law¬

yer: b. Orwell, Vt., 8 Dec. 1830; d. 10 Aug. 1918.

He was educated at the Norwich Military Insti¬

tute and removed to Illinois, where he studied law. Being admitted to the bar in 1852 he began his practice at Canton. He became ac¬

tive in the Republican party, was chairman of his delegation from Fulton County at the Bloomington Convention on 29 May 1856. Mr.

Lincoln was chairman of his delegation from Sangamon

County in the same convention.

Here the Republican party of Illinois was or¬

ganized. He was a delegate to the National convention in 1860, and one of the presidential electors in the same year, voting for Lincoln.

In 1861 the President appointed him chief justice of the State of Nebraska, then a Federal territory, but later granted him leave of absence that he might raise a regiment of cavalry in Illinois, of which he became colonel.

He remained in the army two years, serving in the Missouri campaign with Pope, but was compelled to resign on account of ill health.

He was collector of the port at New Orleans (1865-68). His commission as collector is dated 13 April 1865, the day before President Lincoln was assassinated. He was United States senator in 1868-72, governor of Louisi¬

ana in 1873-77, and a member of Congress in 1883-85. He was a delegate at every Republi¬

can National Convention from 1876 to 1896. He was one of the 306 delegates who voted for Grant in the Republican Convention of 1880.

He was delegate-at-large from Louisiana in 1896, and after the election of President Mc¬

Kinley he retired from active politics. After 1900 he resided most of the time in Wash¬

ington, where he had considerable interest. He was a member of the Loyal Legion Com-

mandery of the District of Columbia.

KELLOR, Frances Alice, American soci¬

ologist and author: b. Columbus, Ohio, 20 Oct.

1873. She was graduated at the Cornell Law School in

1897, studied at the University of Chicago 1898, 1904, at the New York Summer School of Philanthropy in 1901, and was Fellow of the College Settlements Association in 1902-

04. She was secretary and treasurer of the New York State Immigration Commission in 1909; and chief investigator for the Bureau of Industries and Immigration of New York State in 1910-13. She then became managing di¬

rector of the North American Civic League for Immigrants. She has written Experimental Sociology* (1902) ; 'Out of Work) (1904) ; Education of Women by Athletics* (1909) ; 'Straight America, a Call to Service* (1916).

KELLOW SAFETY POWDER, one of

the explosive combinations of chlorates and perchlorates exploding by friction and sup¬

posed by its composition largely to overcome the danger of spontaneous combustion as well as the sensitiveness to percussion characteristic of such mixtures. It is composed of spent, saw- and tan-dust, saturated with sodium nitrate or potassium and a small quantity of potassium chlorate, to which is added sulphur.

KELLS, Ireland, a market town of County Meath, and on the Blackwater, 36 miles north¬

west of Dublin. The town is noted for its anti¬

quarian remains, chief of which are Saint Columba's house ; a round tower of the 12th century 99 feet in height ; and several fine stone crosses. Conn of the Hundred Fights resided there in the 2d century and a palace of Der-

mot, king of Ireland, existed in 544-65. In the 6th century Kells was granted to Saint Columba but there are no remains of the monastery said to have been built. A bishopric founded there about 807 became a noted seat of learning, a testimonial of which

exists in the famous 'Book of Kells,* an illuminated manu¬

script copy of the Gospels in Latin and con¬

taining local records, said to be one of the finest of its kind in existence. The manuscript dates from the 8th century and is in possession of Trinity College, Dublin. Pop. 2,395.

KELLY, Edmond, American lawyer and

Socialist: b. Toulouse, France, 28 May 1841; d.

Paris, 4 Oct. 1909. He was educated in early years in England and was graduated from Columbia University in 1870, was admitted to the bar and later studied at Cambridge Univer¬

sity. He opened a law office in Paris, where he became known as an authority on international marriages and where he served also as counsel to the American legation. Returning to New York in 1890, he was active in municipal re¬

form, founded the City Club, and assisted in the election of Mayor Strong. He made an attempt to organize workingmen into good-

government clubs but did not meet with much success, and he returned to his law practice in France. Again in the United States in 1905 he participated actively in Socialistic propaganda and made special investigations of the tramp problem. One of his ambitions was to have tramp colonies established in New York State.

In Paris he was counsel of Princess de Sagan (Anna Gould) in the divorce suit against her husband, Count Boni de Castellane. His writ¬

ings include Evolution and Effort and their Relation to Religion and Politics) (1895; 2d ed., 1898) ; 'Government, or Human Evolution*

(2 vols., 1900-01) ; 'The Unemployables*

(1907) ; 'Twentieth Century Socialism* (1910).

KELLY, Howard Atwood, American

gynecologist : b. Camden, N. J., 20 Feb. 1858.

He was graduated at the University of Pennsyl¬

vania in 1882 and was associate professor of obstetrics there is 1888-89. Since 1889 he has been professor of gynecology in the Johns Hopkins University, and since 1899 gynecologi¬

cal surgeon in the Johns Hopkins Hospital. He founded the Kensington Hospital at Philadel¬

phia, and besides several hundred articles con¬

tributed to medical journals is the author of 'Operative Gynecology* (2 vols 1899) ; 'The Vermiform Appendix and its Diseases) (1905) ; 'Medical Gynecology) (1908); 'American

Medical Botanists) (1913), etc.

KELLY, Hugh, Irish dramatist and poet: b. Killarney, Ireland, 1739; d. London, 3 Feb.

1777. Possessed of little education and origi¬

nally apprenticed to a staymaker he went to London in 1760 to embark upon a literary career.

He secured employment as a newspaper and magazine worker, wrote a novel, some satiric verse and several plays. His adroitness in securing the favor of Garrick doubtless had much to do with the success of his play 'False Delicacy) produced at the Drury Lane Theatre in 1768; the play had little merit but was suc¬

cessful and afterward was translated into French, German and Portuguese. It was fol¬

lowed by 'A Word to the Wise) (1770) which was withdrawn from the Drury Lane Theatre because of factional enmity engendered by Kelly's service as newspaper writer for Lord North, but was successful in the provinces al¬

though of inferior quality. Clementina) (1771, Covent Garden) was played only nine nights, but (A School for Wives) was successful on the stage and ran through five large printed editions (1774–75). Other plays were die Romance of an Hour) (1774), and die Man of Reason) (1776). Kelly's success was now dwindling and he abandoned playwriting, was called to the bar from the Middle Temple in 1774 and devote 1 himself to the practice of law.

He failed at this and died in poverty. He wrote one novel, 'Memoirs of a Magdalen, or the History of Louisa Mildmay) (2 vols., 1767).

KELLY, James Edward, American sculp¬

tor: b. New York, 30 July 1855. He studied at the National Academy of Design, and up to 1881 was known as an illustrator of books and magazines. Since that time he has successfully devoted himself to sculpture, and chosen sub¬

jects from American history for treatment by his patriotic chisel ; so great has been his suc¬

cess that he has won the title of <(Sculptor of American History.)) His well-known works in¬

clude (Sheridan's Ride) (1878) ; (Paul Revere,) a statuette (1882) ; 'Monmouth Battle Monu¬

ment,) with five illustrative panels (1883–85) ; groups for the 'Saratoga Monument) (1887); 'Grant at Fort Donelson) (1886) ; 'General Devens) and the 'Sixth New York Cavalry Monument) at Gettysburg (1890) ; 'Call to Arms); colossal figure for the Troy 'Soldiers'

Monument) (1891); 'Buford Monument) at

Gettysburg (1895) : 'Battle of Harlem Heights) (executed for the Sons of the Revolution at Columbia University, 1897) ; and a colossal monument to commemorate the defense of New Haven (1909) ; 'Count Rocham'beau) at South¬

ington, Conn.; 'Father Hecker, Founder of the Paulist Congregation.) A remarkable series of military portraits has also been produced by him. Forty generals of the Civil War, includ¬

ing Grant, Sherman and Sheridan, gave sittings for the sculptor. A series illustrating the lead¬

ing generals and admirals of the Spanish-Amer-

ican _War has followed, witnessing to his skill and industry as a portrait sculptor. Wheeler, Dewey and Sampson are included in this latter gallery of busts. He was one of the founders of the Art Students' League.

KELLY, John, American politician : b.

New York, 21 April 1821; d. there, 1 June 1886.

After a public school education, he was appren¬

ticed to the mason's trade, in 1845 established a successful business of his own, was elected alderman in 1854, in 1855-59 was a Democratic representative from New York in the 34th and 35th Congresses, and in 1859-62 and 1865-67

was sheriff of New York County. In 1868 he was the candidate of the Democratic Union for mayor, but was defeated by Oakey Hall ; and in 1871 assisted Charles O'Conor, Samuel J. Tilden and others in the reorganization of Tammany Hall which followed the Tweed "ring)) troubles.

He became comptroller of New York in 1876, but was removed in 1879 by Mayor Cooper. In 1878 he caused the city delegates to bolt the Democratic State Convention of that year, and was himself nominated for governor by the bolters on an independent ticket

in opposition to Robinson, the regular candidate. He received 77,566 votes, and thus caused the election of Alonzo B. Cornell, Republican. In 1885 and 1886 he was chairman of the Tammany Hall general committee. See Tammany Society.

KELLY, Myra (Mrs. Allan MacNaugh-

ton), American author and educator: b. Dublin, Ireland; d. 30 March 1910. She came to the United States when a child and was graduated at the Teachers' College, Columbia University, in 1899. She was a teacher in the New York public school system in 1899-1901 ; and in 1902-

03 she was critic teacher at Speyer School, Teachers' College. She came swiftly into prominence as a writer of short magazine fic¬

tion; her material, that of the pathetic children of the lower East Side of New York, being handled with charming sympathy and humor.

She also wrote several novels. She was the author of 'Little Citizens) (1904) ; 'The Isle of Dreams) (1907); 'Wards of Liberty)

(1907); 'Rosnah) (1908); 'Golden Season) (1909) ; 'Her Little Ladyship) (1911).

KELLY, Thomas, Irish hymn writer and

clergyman: b. Dublin, Ireland, 13 July 1769; d. there, 14 May 1855. He was graduated at Trinity College, Dublin, in 1789, abandoned law for theology and was ordained in the Church of England in 1792; but later he be¬

came a Non-Conformist. He wrote 767 hymns, of which 'On the Mountain Tops Appearing) is one of those still in use.

KELLY, William, American inventor : b.

Pittsburgh, Pa., 22 Aug. 1811 ; d. Louisville, Ky., 11 Feb. 1888. He early turned his attention to

invention, engaged in the forwarding and com¬

mission business at Pittsburgh, Pa., and from 1846 in the iron business in Kentucky. In 1851

he finally perfected his process in decarbonizing iron by means of a current of air, and thus 'by a converter directly transforming pig-iron into steel. This method, “Kelly’s air-boiling proc¬

ess,)) was the same as that patented by Sir Henry Bessemer in England in 1856 (or 1857), and Kelly asserted that Bessemer had gained knowledge of it through American workmen.

Bessemer’s application in the United States was refused, and the patent awarded to Kelly.

Kelly’s interests were safeguarded by a syndi¬

cate, and steel was first manufactured under his patents in the foundry at Wyandotte, Mich. He is said to have introduced Chinese labor into the United States.

KELLY, William, American mining engi¬

neer: b. New York, 17 April 1854. In 1874

he was graduated at Yale University and in 1877 from the Engineering School of Columbia KELLY’S FORD — KELPIE, KELPY

T mvorsity. He was assistant superintendent of me Chemical Copper Company of 'Ph'oenixville, im., in 1879-80 ; superintendent of the Kemble ■ ° iooTo— ron Company of Riddlesburg, Pa., m 1881-85; of the Glamorgan Iron Company of Lewistown, Pa., in 1885: of the Kemble Iron (ompany from 1886-89. Since 1889 he has been general superintendent of the Penn. Iron Min¬

ing Company of Vulcan, Mich.

KELLY'S FORD, Engagements at. This

point on the Rappahannock River six miles above its junction with the Rapidan and about five miles below Rappahannock Station was the scene of several engagements 'between the Fed-

erals and Confederates during the Civil War.

In August 1862, the Union cavalry of the Army of Virginia had a spirited encounter with the Confederate cavalry, and 17 March 1863 General Averell, with 2,100 Union cavalry and a battery of six guns, crossed at the ford, after a sharp engagement, and moved on Culpeper Court House, under orders to rout and destroy Fitz-

hugh Lee's cavalry brigade, reported at that place. Lee was found in his immediate front with, five regiments and a battery, and when about noon Averell advanced, a hard fight en¬

sued, during which Lee was gradually forced back over a mile ; then Averell was checked, finally driven back and recrossed the river at dark. It was the first purely cavalry battle of the war, and was closely contested on both sides. The Union loss was 65 killed and wounded and 22 missing; the Confederate loss, 99 killed and wounded and 34 missing. Among the Confederate killed was Capt. John Pel¬

ham, a young artillerist of much promise. A portion of Pleasanton's cavalry division crossed the ford and took part in the battle of Fleet-

wood (q.v.) 9 June 1863. When General Meade began his Mine Run campaign (see Mine Run) two corns of the Army of the Potomac under General Sedgwick forced the passage of the Rappahannock at the railroad crossing, 7 Nov.

1863, while General French, with two corps, forced the passage at Kelly's Ford, five miles below. The advance of the Third corps crossed with a loss of 36 killed and wounded, the Con¬

federate loss being 64 killed and wounded and 295 captured, and the Army of the Potomac was united at Brandy Station. Preceding and following these engagements the ford was the scene of many stirring events.

KELOID, or CHELOID, a cutaneous tu¬

mor, non-malignant in character, similar in ap¬

pearance to the ridge-like scar which sometimes completes the healing of a wound. The disease was named by Alibert because of the claw¬

shaped processes which radiate from its ex¬

tremities. It is now thought to be due to an injury, although earlier medical authorities at¬

tributed its growth to an inherent tendency.

Investigations show that it follows an injury to the cuticle such as bruises, scratches, abrasions, undue pressure of clothing, an incision, as vac¬

cination, piercing the ears or a leech bite, and from boil, acne or smallpox scars. The keloid rises about an eighth of an inch above the surface of the skin, is smooth and flat, devoid of hairs and either red or white in coloring.

It is fibrous in its nature and changes the walls of the neighboring blood vessels so that in removing it the surrounding affected tissue must likewise be taken. Cauterization is some¬

times practised for its removal but the keloid usually returns, and excision is not always of permanent value. The growth remains station¬

ary after reaching a certain stage. The keloid occasionally causes pain or itching which under the direction of a physician may be relieved by applications of resorcin, lead salicylated plaster or mercurial preparations.

KELOWNA, British Columbia, Canada,

village in the Yale and Caribou districts, 80

miles southwest of Sicamous and 28 miles from Okanagan Landing, on the Canadian Pacific Railway and on Okanagan Lake. The village had in 1905 a population of 200, which had increased to about 3,000 in 1918 owing to the development of some 50,000 acres of surround¬

ing fruit land. There is likewise a considerable acreage in tobacco and the timber industry is important. The town is modern in its equip¬

ment, owning its park, recreation grounds, light, power and water systems, and possesses mills, factories and plants to care for the prod¬

ucts of the neighboring fruit, tobacco and tim¬

ber land. Pop. est. 3,000.

KELP, any of several large broad-leaved fucoid seaweeds (q.v.), which were formerly burned for their content of potash, iodine, sodium, etc., and used for other purposes and which have attracted renewed attention since the German embargo upon Stassfurt potash salts. The ash is known as ((kelp)) (or in France as varcc), and was formerly produced in large quantities by slowly charring several tons of the weed in shallow pits. The yield in ash was about 5 per cent of the weight of the mass burned. This crude ash contains sev¬

eral salts, especially carbonates and sulphates of sodium and potassium, with other substances in smaller proportions.

KELP-CRAB, a large, squarish, edible crab (Epialtus productus) , numerous in rocky weed-

covered places along the Pacific coast from Monterey to Puget Sound.

KELP-FISH, a large blenny (Heterosti -

chus rostratus) of the Californian coast, which is sold for food in the local markets. It is reddish brown, much streaked and mottled, so that it is practically invisible among the sea¬

weeds (kelp) where it usually lurks. Many other more or less similar fishes are called kelp-fishes in other parts of the world.

KELP GOOSE, a white plumaged goose

similar to the brant and closely related to the Magellanic and other southern hemisphere species. It is native to Patagonia and Falkland Islands and is variously classified as cliloephaga antartica and chloephaga hybrida.

KELP PIGEON, a popular name for the

sheathbill, especially the Chionis minor, or the Chionis alba of the Falklands. It is said to be so called by sailors on account of its habitual resorts, size and white color. See Sheathbill.

KELPIE, or KELPY, the angry spirit of the water, a Scottish mythological personage who figures prominently in folklore. He is de¬

scribed as a fearful water spirit who delights in rushing out of the lake, the river or the sea to catch some poor human victim and to devour him or to drag him down to his death beneath the surface of the water. As he rushes out of his native element the water tumbles from his back with a terrible swishing noise like the

roar of the angry sea. According to some stories the kelpie was so named because he lurked among the kelpie or sea-weed, which grows very high and tangled in many parts along the coasts of Scotland. Blown by the sea breezes and lashed by the tide at high water, it assumes fantastic forms which are pictured by the Scotch story-tellers as taking the form of the kelpie himself whom tradition says has,

like the Grecian Cyclops (q.v.), but one eye, but that more fearful than any two eyes. Other authorities claim that the word kelpie is related to the German <(chalp® or <(kalb® derived from the roar which it was supposed to make when it rushed upon its victims. This idea no doubt originated in the roaring of the ocean waves, which seem to have been personified in the person of the kelpie, which is also often repre¬

sented to be a white horse which frequently presents itself in the most beautiful form, thus inducing people to mount on its back. When this is accomplished it rushes off at such fear¬

ful speed that the rider cannot dismount and so is drowned in the sea or eaten by the horse.

An Irish myth makes Mananan, son of the sea-god Lir, and himself Lord of the Sea, ride on . the ((white horses,® a poetical personifi¬

cation of the crested waves of the ocean. His great cloak flapped like the clapping of thunder as he rode his fearful white horses around his island home (the Island of Man), especially at midnight. This island is said to have derived its name from the idea that it was the favorite home of the Lord of the Sea. The devouring or malignant water spirit is a mythological character known to most of the Indian tribes of America. Among the Aztecs the ((Crying woman® whom .the Spaniards name the (

rona® (q.v.) hid in deep pools of water to which she attracted people at night by imi¬

tating the crying of a lost child. When the victim, following the voice, fell into the pool, she dragged him by the feet down to his death.

The Greeks and the Romans believed in a similar character who, the myth said, lured people to death in the water. The kelpie, like the Mexican ((woman with the light,® fore¬

warned people of coming death. Often this ((fool's

light® or ((will of the wisp® or <(ignis fatuus® (q.v.) lead people on to death. This superstition, no doubt, had its origin in the fact that people, following the naturr.i lights that frequently appear in swampy places, sank in the boggy soil and lost their lives. The kelpie, like the Aztec Llorona, was also represented as dragging its victims down to death in the boggy or marshy lands of its habitat. The fact that there were frequent deaths of this kind would easily explain the superstition that the roaring of the kelpie presaged death. That this death should be through the agency of water was quite natural since the kelpie was a water-spirit.

Though this kelpie myth takes various forms among different races it seems to have been a very primitive myth of the great Indo-European family among all the members of which it ap¬

pears. The special (

tive force of the sea which almost surrounds the country. It seems, therefore, to be but a local development of the great white sea-horses of Mananan (Welsh Manawyddan) in whose sea lay the ((Islands of the Dead.® This latter belief would also account for the superstition that the roaring or appearance of a kelpie presaged death.

KELSEY, Francis Willey, American edu¬

cator and writer: b. Ogden, 1858. Graduated from the University of Rochester and after two years' study in Europe, he became professor of Latin in Lake Forest University (1880-89) and later in the University of Michigan (1889).

He has edited many Latin and Greek textbooks for schools. Working cojointly with Prof.

Percy Gardner of Oxford University they edited (Handbooks of Archaeology and Antiqui¬

ties, > a series to be found in most public and school libraries. Professor Kelsey edited (Latin and Greek in American Education) (1911), and (Pompeii:

Its Life and Art* (a translation of Augustus Maw's work, 1902).

He has been president of the American Philological Association (1907-12), and of the Archaeological Institute of America.

KELSO, James Anderson, American cler¬

gyman and educator : b. Rawal Pindi, India, 6

June 1873. He received his college education at Washington and Jefferson College; and his theological training at Western Theological Seminary, Pittsburgh, Pa., supplemented by work in the universities of Berlin and Leipzig.

He was ordained to the Presbyterian ministry in 1898. He was instructor in Hebrew in Western Theological Seminary, 1897-1900; since then professor of Hebrew and Old Testament Liter¬

ature. He was acting president 1908-09, and president since May 1909. He is the author of several articles in Hastings' (Encyclopaedia of Religion and Ethics* ; Hastings' dictionary of the Bible, > and the Standard Bible Dictionary. *

He has published (Die Klagelieder, der Masoretische Text und die Versionem* (1901) ; with Culley, David E., (Hebrew-English

Vocabulary to the Book of Genesis* (1917).

KELSON, KEELSON, a line of timbers

on the middle of the floor limbers of a wooden ship over the keel. See Keelson.

KELT, in Scotch, a salmon that has

spawned, or as the local term expresses it, <(spent themselves.® Salmon in this condition are also popularly known as black salmon.

KELTIE, Sir John Scott, Scottish geog¬

rapher: b. Dundee, Scotland, 29 March 1840.

He is editor of the Statesman's Year Book) since 1880, was editor of the Geographical Jour¬

nal, 1915—17, and has written extensively on geo¬

graphical and scientific topics in newspapers and periodicals. He has published (History of Scottish Highlands and Clans* (1874) ; deport on Geographical Education (1886) ; (Applied Geography) (1890); (The Partition of Africa*

(1894) ; and with Howarth, O. J. R., (History of Geography) (1913). He has also edited (Works of the British Dramatists) (Edinburgh 1872) ; (The Story of Emin's Rescue As Told in H. M. Stanley's Letters * (New York 1890) ; (The Story of Exploration (3 vols., New York 1903-04), and with H. J. Mackinder and E. G. Ravenstein, (The World's Great Ex¬

plorers* (2 vols., London 1891V He is a member of geographical societies all over the world, has received a number of honorary de¬

grees, holds many medals, amongst them the Cullum gold medal of . the American Geographi¬

cal Society (1915), and was knighted 2 Jan.

1918.

KELTON, John Cunningham, American

soicher; b. Delaware County, Pa, 1828; d.

Washington, D. C, 15 July 1893. He was graduated at West Point in 1851, received the commission of lieutenant in the infantry and served for six years in the frontier garrisons of Minnesota, Kansas and Dakota. At the con¬

clusion of that period he was ordered to West Point

as instructor in the use of small arms.

During the Civil War he returned to active serv¬

ice and in 1861 became purchasing agent for the Western Department. The same year he was put in command of the 9th Missouri Volunteers, with the commission of colonel. In 1862 he was appointed to the staff of Major-General Halleck, as assistant adjutant-general, and in 1865 brevetted brigadier-general in the regular army. He was appointed after the war a staff colonel and assistant adjutant-general of the Pacific Department and later at Washington; and invented improvements in military firearms which met with the acceptance of the Ordnance Department. He retired from active service 24 June 1892 and from then on till his death was governor of the Soldiers' Home, Washing¬

ton, D. C. Among his works on military sub¬

jects may be mentioned a (New Manual of the Bayonet > (New York 1861) ; ^Information for Riflemen on the Range and Battlefield* (San Francisco 1884).

KELTS. See Celts.

KELUNG, ke-lung, KILUNG, the prin¬

cipal shipping port of the island of Formosa.

It has an excellent modern harbor, which has comparatively recently been dredged and made to accommodate large ocean-going vessels, espe¬

cially deep-draught freighters. It is sur¬

rounded by excellent coal mines whose output furnish the chief cause of the harbor activity.

Kelung has grown rapidly, within recent years, from a little fishing village of about 1,000 in¬

habitants, to a flourishing, more or less mod¬

ern city of over 20,000. This is due principally to

its extensive export business in coal, with minor shipments of sulphur and gold from the local mines. Kelung has railway connection with Daihoku (Taipeh), Kagi, Shinchiku and Tamsui.

KELVIN, Lord. See Thomson, Sir Wil¬

liam.

KEMBLE, Adelaide. See Sartoris, Ade¬

laide Kemble.

KEMBLE, Charles, English actor, 11th

child of Roger Kemble (q.v.), and younger brother of John Philip Kemble (q.v.) : b. Bre¬

con, South Wales, 25 Nov. 1775 ; d. London, 12

Nov. 1854. He was educated at the English Roman Catholic College at Douai, France, and in 1794 made his first appearance at Drury Lane as Malcolm to his brother's Macbeth. In 1800

he produced at the Haymarket Theatre his adaptation of Mercier's Reserteur,* under the title of (The Point of Honor,* which achieved considerable success. In 1807 his play of (The Wanderer,) adapted from Kotzebue, and in 1808 his farce of Riot and Counterplot, * were both successfully brought on the stage. As an actor he gained special celebrity by the per¬

formance of such characters as Falconbridge, Edgar, Romeo, Charles Surface, Cassio, Don Felix and Benedick. His impersonations were greatly heightened by the physical advantages which he possessed of a fine voice, handsome features and a tall athletic figure. About 1840

he was appointed to the office of examiner of plays and shortly afterward made his last ap¬

pearance on the stage. He subsequently gave occasionally public readings from Shakespeare.

He was the father of John Mitchell Kemble (q.v.), the philologist, and of Fanny and Ade¬

laide Kemble (q.v.). Consult Fitzgerald, (The Kembles > (1871).

KEMBLE, Edward Windsor, American

caricaturist and illustrator : b. Sacramento, Cal. 1861. After a short time spent at the Art Students League, in New York city, he be¬

came regular art contributor to the Graphic and, later on, to the Century and other New York illustrated magazines. He made a specialty of negro characters; and (Kemble's Coons) (1898-

1900) became very popular. Among his vari¬

ous books of drawings are Rosemary,* (Vir-

ginia Creeper,* (Billy-Goat and Other Comi¬

calities, > blackberries, > < Kemble's Sketch Bookp (Coontown's 400) and (A Pickaninny Calendar. He was illustrator for Collier's (1903-07) and Harper's Weekly (1907-12). He has also illustrated (The Knickerbocker History of New York) and other books.

KEMBLE, Elizabeth. See Whitlock,

Elizabeth Kemble.

KEMBLE, Frances Anne, English actress

and author, daughter of Charles Kemble (q.v.) : b. London, 27 Nov. 1809; d. here, 16 Jan. 1893.

She manifested no special predilection for the stage, but made her debut at Covent Garden, then under the management of her father, in October 1829. On this occasion she played Ju¬

liet, her father taking the part of Romeo, and her mother that of the nurse, with complete success. For the three succeeding years she performed leading parts in tragedy and comedy with great applause,

distinguishing herself par¬

ticularly in Juliet, Portia, Bianca in Milman's (Fazio, * Julia in the (Hunchback* (the latter being originally personated by her), Belvidera, Isabella, Lady Teazle and Louise de Savoy in her own play of brands the First,* written when she was 17 and received with approba¬

tion. In 1832 she accompanied her father to the United States and met with an enthusiastic reception in the chief cities. In 1834 she was married to Pierce Butler, a Georgia planter, and retired from the stage. The union proving un¬

happy, a separation took place at the end of a few years, and Mrs. Butler fixed her residence in Lenox, Mass. In 1849 she secured a divorce and resumed the name of Kemble. Her first work in prose, (A Journal of a Residence in America) (1835) was chiefly devoted to a de¬

scription of her tour through the United States.

It was followed in 1837 by a drama, (The Star of Seville,* acted with success; and in 1844 ap¬

peared a collection of her poems. Later works were (A Year of Consolation (1847) ; Resi¬

dence on a Georgia Plantation (1863) ; Rec¬

ord of a Girlhood) (1878–79) ; Records of Later Life) (1882) ; Rotes upon Some of Shakespeare's Plays > (1882); Roems) (1883); Rar Away and Long Ago,* a story (1889); (Further Records* (1891). In the winter of 1848–49 she commenced in Boston a series of Shakespearean readings which drew crowded audiences, and during the next two years 348

repeated the course in some of the principal American cities. In 1851 she returned to Eng¬

land, reappeared for a brief period on the stage and gave readings in London and other parts of the United Kingdom. In 1856 she re¬

turned to the United States and continued for several years at intervals to give readings in Boston and elsewhere. Her grandson, Owen Wister (q.v.), is a well-known American writer.

KEMBLE, Gouverneur, American manu¬

facturer: b. New York city, 1786; d. 1875.

Graduated from Columbia in 1803, he became United States consul at Cadiz, where he made himself active in the securing of war and other materials needed by the American government during the war with Algiers (1815). While in Europe he took great interest in the study of arms and ammunition, which was partly

forced on him owing to the needs of the Uni¬

ted States government ; and on his return home in 1817, he put his European acquired knowl¬

edge into practice by the establishment, at Cold Spring, N. Y., of the West Point foundry, for the manufacture of cannon on the latest Euro¬

pean models. Kemble was a politician as well as a diplomat and manufacturer, and he was Congressional Democratic member from 1837

to 1841. He was also interested in the studjr of the history of New York and New Jersey (States.) and among his literary friends was Washington Irving, who took Kemble's house in Newark, N. J., as the model for his Cock¬

loft Hall in ^alamagundiP

KEMBLE, John Mitchell, English Anglo-

Saxon scholar : b. London, 2 April 1807 ; d. Dub¬

lin, 26 March 1857. He was educated at Trinity

College, Cambridge, and having early directed his attention to Anglo-Saxon language and his¬

tory, employed himself in the ancient MSS. in the libraries of the university. The first fruits of his researches appeared in 1833, in the publi¬

cation of the Anglo-Saxon poem

succeeded his father, Charles Kemble (q.v.), as censor of plays, which office he occupied till his death.

KEMBLE, John Philip, English trage¬

dian, eldest son of Roger Kemble (q.v.) : b.

Prescott, Lancashire, 1 Feb. 1757 ; d. Lausanne, Switzerland, 26 Feb. 1823. He was educated at the Roman Catholic seminary of Sedgley Park, Staffordshire, and the College of Douai, France, where he early distinguished himself by his pro¬

ficiency in elocution. On his return to England he entered immediately upon the profession of an actor and appeared for the first time in Lon¬

don at Drury Lane, 30 Sept. 1783, in the part of Hamlet and was received with great applause.

It was not, however, till 1788 that he took a decided lead in tragedy. He afterward ob¬

tained the management of Drury Lane Theatre, where his sister, Mrs. Siddons (q.v.), was the leading actress. In 1794 he brought out a mu¬

sical entertainment of his own, entitled (Lodo-

iskaP which had a great run. In 1802 he be¬

came manager of the Covent Garden Theatre, where he continued his career with great suc¬

cess till the destruction of the theatre by fire in 1808. In the autumn of 1809 the new edifice which had been constructed opened with an in¬

crease of prices, which, with certain obnoxious arrangements in regard to the private boxes, created for a series of nights the disturbances known by the name of the O. P. riots. Kemble retired from the stage 23 June 1817. As an actor he was distinguished for dignity, precision and studious preparation. His merits were dif¬

ferently appreciated, but by all he was regarded as a highly gifted actor, and the impressions made in characters more immediately adapted to his style of excellence, such as Cato, Corio-

lanus, Hamlet, John, Jaques, Penruddock, was very great. Consult Boaden, (Memoirs of the Life of John Philip Kemble-1 (1825).

KEMBLE, Marie Therese de Camp, an

English actress: b. Vienna, Austria, 1774; d.

1838. Her parents and several of her ancestors had been actors ; and while still a child she was taken to England by her parents, who had found an engagement there. She early appeared on the English stage ; and in 1806

she married Charles Kemble (q.v.) with whom she continued to appear on the stage for the next 13 years. She understood the technic of the stage well and wrote several plays which were popular in their day. These were of a fragmentary character. Her daughter, Fanny Kemble, inherited her dramatic ability as actor and writer.

KEMBLE, Roger, English actor and the¬

atrical manager: b. Hereford, 1 March 1721; d.

6 Dec. 1802. John Philip Kemble (q.v.) and Mrs. Siddons (q.v.) were his children. He organized in 1753 a traveling company in which many members of his family appeared. In 1788 he appeared at the Haymarket as Falstaff and the Miller in (The Miller of Mansfield,*

when, although rated as a mediocre actor, he is said to have played ((with very superior effect.®

KEMBLE PLAYS, a collection of Eng¬

lish dramas made by the English actor John Philip Kemble (q.v.). This collection, which includes many original manuscripts of early English dramatic works, among them first edi¬

tions of Shakespeare's plays, is now in the library of Devonshire House, London.

KEMENY, ke'ma-ny, Zsigmond, Baron,

Hungarian novelist, essayist and political writer: b. Magyar-Kapud, Transylvania, 1816; d. 1875. He combined newspaper work with his serious literary efforts and played politics on the side, being editor of Pesti Hirlap and Pesti Naplo and deputy to the National As¬

sembly. Among his novels, which are gener¬

ally long and of a semi-historical semi-psycho¬

logical character, are (Gyulai PaP (5 vols., 1846) ; (Ferj es no (1852) ; (Sziv orvenvei*

(1854) ; (Az ozvegy es leanya* (1856) ; (Zord ido) (1859). A collection of his essays, under the title of ^Studies,® appeared in English.

KEMEYS, Edward, American sculptor: b.

Savannah, Ga., 31 Jan. 1843; d. 11 May 1907.

He was educated in New York and served in

the Civil War as captain in the artillery. He resigned in 1866 and went west, where he saw something of Indian life, and became familiar with the habits and forms of big game. He returned to New York and worked as a civil engineer in the laying

out of Central Park, but did not choose the profession of art until 1870, when he resolved to become a sculptor.

He went abroad in 1877 and his exhibits in Paris and London attracted attention, especially his (Fight between a Buffalo and Wolves5 in the Salon of 1878. He made American wild animals his specialty. He was in short the American Barye: his (Panther and Deer,5 his (Coyote and Raven,5 are noteworthy for their fidelity to nature and life-like expression, and!

he was also remarkably successful in his figures of the North American Indian.

KEMMERER, Edwin Walter, American

educator and writer on economics : b. Scranton, Pa., 1875. Graduated from Cornell University in 1903, he became instructor in economics at Perdue University (1901-03), assistant profes¬

sor at Cornell of political economy and later professor of economics and finance (1906-12), professor of economics and finance at Prince¬

ton (1912-17). In 1903 he was financial ad¬

viser to the United States Philippine Commis¬

sion and for the following three years was chief of the currency division of the Philip¬

pine Islands; and special commissioner

to Egypt from the Philippine govern¬

ment (1906) and financial adviser to the Mexi¬

can government. He has been a constant con¬

tributor to economic publications of various kinds and edited the American Economic Re¬

view' (1911-14). His numerous published works are all on economic subjects, most of them in connection with the special work in which he has 'been

interested either as univer¬

sity professor or government adviser on eco¬

nomic subjects. Among his latest works are (Modern Currency Reforms5 (1916) ; and (The United States Postal Savings System5 (1917).

KEMNITZ, or CHEMNITZ. See Chem¬

nitz, Martin.

KEMP, James Furman, American educa¬

tor and geologist: b. New York city, 1859.

Graduated from Columbia School of Mines in 1884, he became assistant professor of geology there in 1891 and professor in 1892. In addi¬

tion to his university work he has acted as United States geologist and served in the same capacity for the State of New York. He has also been lecturer on his special subjects at Johns Hopkins, Massachusetts Institute of Technology and McGill University, Canada, from all of which institutions he has received honorary degrees. He has been president of the New York Academy of Science and of the American Institute of Mining Engineers.

Among his published works are (Ore Deposits of the United States and Canada5 (1893 and 1900), and (Handbook of Rocks5 (1896 and 1911).

KEMPE, Charles Earner, English artist

in stained glass: b. Ovingdeane, Sussex, 29 June 1837; d. 30 May 1907. He received his early education at Rugby, and was graduated at Ox¬

ford University. His principal works were in stained glass of the 13th century style in which were color, drawing and expression of a unique excellence. He was distinctly a religious painter, who chose as his medium the most difficult and intractable of materials, and achieved supreme artistic and

devotional suc¬

cess. His principal production in this country is the remarkable Jesse window in the church of the Advent, Boston, which bears comparison with the more famous Jesse window of Troyes, France. He designed and executed many fine windows for the cathedrals of Lichfield and Durham. (

chester Cathedral was one of his later creations.

KEMPE, John, English cardinal, archbishop of Canterbury and Chancellor: b. about 1380; d. 22 March 1454. He received his education at Merton College, Oxford; took up the practice of ecclesiastical law, was an assessor at Old-

castle's trial and became dean of the Court of Arches in 1415. Soon afterward he was at¬

tracted to the service of the king, by whom he was given a place in the government of Nor¬

mandy. Later Kempe was appointed chancellor of the Duchy of Normandy; and in 1419 was chosen bishop of Rochester, and was consecrated at Rouen in the same year. He was translated to Chichester early in 1421 and after a few months to London. In 1426 Kempe was made chancellor and in the same year became arch¬

bishop of York. He remained in the office of chancellor until 1432 and succeeded in keeping a close restraint on Humphrey of Gloucester.

To placate the latter Kempe's resignation was brought about in 1432. Fie was still an im¬

portant member of the council and in 1435

was sent to the Congress of Arras and in 1438

to that at Calais. Kempe was created cardinal in 1439 and for a time remained aloof from politics. In 1450 Kempe for the second time became chancellor, being the most acceptable candidate to the opposing parties. He dealt firmly with Cade's rebellion and

vigorously upheld the royal authority. In 1452 he was made archbishop of Canterbury.

KEMPENEER, Peter de. See Campana,

Pedro.

KEMPER, James Lawson, American sol •

dier and politician: b. Madison County, Va., 11

June 1823; d. Orange Countv, Va., 7 April 1895. Graduated from Washington College (Lexington, Va.) in 1842, . he studied law at Charlestown (Va.), served in the Mexican War as captain of volunteers, and for 10 years was a representative in the Virginia legislature, dur¬

ing two of which he was speaker of the house.

In 1861 he was appointed colonel of the 7th Vir¬

ginia, C. S. A. ; in 1862 fought at Fair Oaks (31 May-1 June), where he was commissioned brigadier-general; and later also at Frayser's Farm (30 June), South Mountain (14 Septem¬

ber), Antietam (16-17 September), and Freder¬

icksburg (13 December). He was severely wounded at Gettysburg, was subsequently de¬

tailed to command the forces in and about Rich¬

mond, and 1 March 1864 was promoted major-

general. After the war he practised law in Madison County, was Democratic governor of the State in 1874-78 and at the close of his term became a planter in Orange County. He pub¬

lished a collection of messages to the State legislature (1876).

KEMPER, Reuben, American soldier: b.

Fauquier County, Va., 1770; d. Natchez, Miss., 10

Oct. 1826. IFe emigrated to Ohio in 1800, and subsequently removed with two of his brothers to the Territory of Mississippi, where 350

they were leaders in the movement to rid West Florida of Spanish rule. The Spanish authori¬

ties caused the Kempers to be kidnapped, but they were rescued by the commander of the American fort at Point Coupee. The Kempers pursued with great ferocity all who were en¬

gaged in this wronq upon them, and Reuben de¬

voted himself to the task of driving the Span¬

iards from the American continent. He was engaged in an attempt to capture Mobile, which failed ; and on the fitting out of the formidable expedition of Gutierrez and Toledo, in 1812, against the Spanish authority in Mexico, was assigned the rank of major, and afterward chosen colonel of the force, which co-operated with the Mexican insurgents. The expedition advanced into Texas, fought several bloody bat¬

tles, in which Kemper and his Americans per¬

formed extraordinary feats of valor, and won brilliant victories. Kemper was subsequently engaged under General Jackson in the defense of New Orleans, and added greatly to his repu¬

tation as a soldier by his activity and efficiency.

At the conclusion of the war he became a planter in Mississippi.

KEMPFF, Louis, American rear-admiral:

b. Belleville, Ill., 11 Oct. 1841. He was gradu¬

ated at the United States Naval Academy in 1861 and served with distinction throughout the Civil War. He was promoted captain in 1891

and became rear-admiral in 1899. When the Boxer troubles began in China in 1900 he was placed in command of the United States naval forces in Chinese waters. On 29 May he sent 108 marines ashore, who co-operated with the men landed from the other foreign warships in the harbor at Taku. When on 16 June the senior naval officers of the other foreign nations drew up and signed a demand for the surrender of the Taku forts Rear-Admiral Kempff de¬

clined on the ground that as long as the Chinese Imperial authorities placed no obstacle in the way of his going to the assistance of his coun¬

trymen he had no just ground to commit an act of war against a country with which his own was at peace. During the subsequent bom¬

bardment the United States ship Monocacy, which was some distance up the river above Taku and had her flag flying, was struck by a shot from the forts. When this fact was officially established Rear-Admiral Kempff joined in with forces at hand for protection of life and property of Americans. For the judg¬

ment displayed on that occasion a joint resolu¬

tion was pending in the 57th Congress confer¬

ring on him the thanks of Congress. He was retired from active service in October 1903.

KEMPIS, Thomas a, German mystic and

devotional writer : b. Kempen, near Cologne, 1380; d. Mount Saint Agnes, near Zwolle, Netherlands, 26 Julv 1471. His real name was Hamerken or Hammerlein. He was educated at Deventer by the Brethren of the Common Life, a religious . order of men who passed a contemplative existence in transcribing manu¬

scripts, . compiling and writing religious books of various sorts, and religious exercises. In 1399 he entered the monastery of Mount Saint Agnes, near Zwolle, of which his brother was prior, took the

monastic vows in 1406, was ordained priest six years afterward and in 1425

was elected silb-prior. He excelled as a copyist, and delighted to transcribe the Scriptures, the Church fathers and works of ascetic piety, while the fame of his eloquence and zeal was widely extended. He owes his present renown to his treatise (De Imitatione Christie which has been translated into every language in Christendom.

Over 2,000 editions have appeared. It has been wrongly but somewhat naturally attributed to the renowned theologian Gerson, chancellor of the University of Paris, and the question was debated with a view to national honor and the interests of ecclesiastical orders. The evidence in favor of the authorship of a Kempis is over¬

whelming. Three writers nearly his contem¬

poraries mention him as the author. Moreover several copies written in his own hand are ex¬

tant, and in one ancient copy he is expressly named as the author. Both the literary style and the tone of refined piety which characterize this work are also distinguishing features of other devotional works of which he is certainly the author. The first English translation of the (Imitatione } was made by W. Atkinson and Princess Margaret, mother of King Henry VII, and was published in London in 1502. (See Imitation of Christ). Consult Bahring, B., (Thomas von Kempen, der Prediger der Nach-

folge ChristP (Leipzig 1872) ; Cruise, T„

(Thomas a Kempis> (London 1887) ; Kettle-

well, S., (Thomas a Kempis and the Brothers of the Common Life) (London 1884) ; Wheat-

ley, L. A., (Story of the Imitation of Christ*

(London 1891) ; Wolfsgruber, (Giovanni Ger¬

son, ^ sein Leben und sein Werk De Imitatione ChristP (1880) ; Schaff-Herzog Encyclopedia of Religious Knowledge (New York 1910).

KEMPT, Sir James, British soldier and

administrator: b. 1764; d. 1854. He entered the army in 1783, and saw service in Holland, in Egypt, commanded a brigade in the Peninsula and was wounded at Badajoz, and was in com¬

mand of a division at Quatre Bras and Water¬

loo. He was lieutenant-governor of Nova Scotia 1820-28, and governor-in-chief of Canada 1828-30.

KEMPTEN, kemp'ten, a city in Swabia,

Bavaria, about 80 miles southwest of Munich by which it is connected by rail. Old and new Kempten were united in 1803 to form one cor¬

poration. The town contains the usual pic¬

turesque buildings of a Bavarian city of its size and age. Kempten is quite a commercial and manufacturing place and possesses fac¬

tories for the produce of machinery, cotton goods, mathematical and other instruments, matches, paper, wooden vvare, cheese, thread, hosiery, powder and firearms. Pop. 25,000.

KEN, or KENN, Thomas, English bishop

and hymnologist : b. Great or Little Berkham-

stead, Hertfordshire, July 1637; d. Longleat, Wiltshire, 19 March 1711. He was educated at Winchester School, graduated from New College, Oxford and became successively do¬

mestic chaplain to Bishop Morley (1665); rector of Brightstone, Isle of Wight (1667); and prebend of Winchester (1669). He spent five years traveling on the Continent with his nephew, the younger Izaak

Walton, living prin¬

cipally at Rome (1675-80), and accompanied Mary, Princess of Orange, to Holland, as do¬

mestic chaplain. In 1680 he was appointed chaplain to Charles II, attended him in his last illness, and was nominated by him to the bishopric of Bath and Wells (1684). He suf-

fered deprivation with other non-jurors (q.v.) on the accession of William of Orange, for maintaining allegiance to James II (1691). He was one of the lights of the English Church an one of the darkest periods of English social life, and by his zeal and devotion did much to maintain the standard of Christian conduct, his personal example of goodness being backed by learning, taste and breadth of sympathy. His theological and devotional writings are princi¬

pally valuable for the personality with which they are connected, but his famous (Doxology,*

as well as the (Morning HymnJ beginning with (< Awake, my soul,** and the (Evening Hymn*

have won him imperishable fame as a guide and inspirer of Christian devotion. Consult (Dic¬

tionary of National Biography* (Vol. XXX, London 1892) ; Plumptre, Dean, (Life of Bishop Ken* (London 1890).

KENA, ken'a, KENEH, GENEH, capital

of an Egyptian province of same name on the Nile. See Keneh.

KENAI, ke-ni', a peninsula in the south¬

ern part of Alaska, with Prince William Sound on the

east, Gulf of Alaska east and south and Cook Inlet on the west. It is about 160 miles long and 110 miles across the widest part.

It has good harbors, valuable coal fields, and some gold has been discovered.

KENDAL, Margaret Brunton Robertson

(Grimston), English actress: b. Great Grimsby, 15 March 1849. She was a sister of T. W. Rob¬

ertson, the dramatist (q.v.) ; was known on the stage as (

On her marriage to W. H. Grimston (q.v.) in 1869 she assumed with him the stage name of Kendal. Together they achieved great success at the Haymarket Theatre in a series of Shakespearean and Old English comedy re¬

vivals. Later from 1879-89 they were asso¬

ciated with Mr. (afterward Sir) John Hare.

They made several phenomenally successful tours in the United States and Canada from 1889, and retired from the stage in 1908.

KENDAL, William Hunter (William

Hunter Grimston). English actor: b. London, 16 Dec. 1843; d. 7 Nov. 1917. After his mar¬

riage to Madge Robertson (see Kendal, M. B.

R.) in 1869, he played leading parts with her.

He commenced his career on the stage at Glas¬

gow in 1862, where he remained till 1866, sup¬

porting such stars as Mr. and Mrs. Charles Kean, Helen Faucit, G. O. Brooks, etc. ; made his first appearance in London at the Hay-

market Theatre in 1866, in (A Dangerous Friend,*

played there such parts as Charles Sur¬

face, Captain Absolute, Romeo, Orlando, Pyg¬

malion, and in 1879–88 was lessee and manager with John Hare of the Saint James Theatre, where were produced (The Queen's Shilling* ; (The Squire* ; Hmpulse* ; (The Ironmaster* ; (A Scrap of Paper* ; (Lady of Lyons*, and fAs You Like It.* He toured with Mrs. Ken¬

dal in the United States and Canada in 1889–95.

KENDAL, KIRBY KENDAL, a town

and municipal borough in Westmoreland, Eng¬

land. It dates back to 1576 as an incorporated town. It is a noted centre of the woolen trade, and the woolen cloths manufactured there are known as ((kindols.** In Kendal are also produced excellent carpets, cottons, worsted stockings, doeskins, tweeds, linsey–

woolseys and linings of various kinds (especially those for coats), machinery, gunpowder, shoes, leather, paper, combs and cards. Pop. 14,000.

KENDALL, Amos, American journalist

and statesman : b. Dunstable, Mass., 16 Aug.

1789; d. Washington, D. C., 11 Nov. 1869. He was graduated from Dartmouth in 1811, studied law at Groton, Mass., in 1811—14, was admitted to the bar at Frankfort, Ky., in 1814, was post¬

master and editor of the Patriot at Georgetown, Ky., in 1815–16, and in 1816–29 coeditor and part owner of the Argus of Western America at Frankfort. In 1829 he was appointed fourth auditor of the United States treasury, and dur¬

ing the Jackson administration he was extremely influential. He aided in the formation of the President's anti–bank policy (see Jackson, An¬

drew), was a special treasury agent to conduct negotiations with State banks, and is thought to have written several of Jackson's state papers.

Appointed Postmaster-General by Jackson in 1835, he was retained by Van Buren, but in 1840 resigned because of ill health. He cleared the Post-Office Department of debt, and intro¬

duced numerous reforms. He established Ken¬

dall's Expositor, bi-weekly, in 1841, and the Union Democrat, weekly, in 1842, but both jour¬

nals shortly ceased publication. In 1845 he be¬

came associated with S. F. B. Morse (q.v.) in the ownership and management of the Morse electric telegraph patents, and by his able direc¬

tion ensured their commercial success and a for¬

tune for himself. He gave largely in Washing¬

ton for philanthropic purposes. Though calling himself a Jackson Democrat, he strongly op¬

posed secession. He wrote an incomplete (Life of Andrew Jackson, Private, Military, and Civil*

(1843) ; (Full Exposure of Dr. C. T. Jackson's Pretensions to the Invention of the Electro¬

magnetic Telegraph* (1867), and an < Autobi¬

ography* (posthumously published, 1872).

KENDALL, George Wilkins, American

journalist: b. Amherst (now Mount Vernon), N. H., 1809; d. Oak Springs, Tex., 22 Oct. 1867.

Settling in New Orleans in 1835, he was one of the founders of the New Orleans Picayune in 1837, which became under his direction one of the leading journals of the South. He was one of the earliest war correspondents, seeking most of the fighting in

Mexico during the Mexican War as his paper's representative with the United States army of occupation under Gen¬

eral Scott. He wrote (Narrative of the Texan Santa Fe Expedition* (2 vols., New York 1844), an expedition in which he took part; and (The War Between the United States and Mexico* (New York 1851). Consult Bullard, F. L., (Famous War Correspondents* (Boston 1914).

KENDALL, Henry Clarence, Australian

poet: b. Ulladulla district, New South Wales, 18 April 1841 ; d. Redfern, near Sydney, 1 Aug.

1882. He became a lawyer's clerk at Sydney in 1860, in 1863 a clerk in the Lands Department of the New South Wales public service; later was in the colonial secretary's office ; in 1869–73 was active as a journalist at Melbourne; and for some time previous to his death was an inspec¬

tor of forests. His chief volumes are (Poems and Songs* (Sydney 1862) ; (Leaves from Australian Forests* (Melbourne 1869), and (Songs from the Mountains* (Sydney 1880). He 352

has been called the ((poet of the buslV because of his skilful delineation of the character of Aus¬

tralian landscape. In 1886 appeared a collected edition of his verse, with a memoir. Consult Martin, A. P., Concerning Australian Poets*

(in Sladen, D. B. W., ed., Australian Poets, 1788–1888*, London 1888) ; Rowland, P. F., (The Literature of the Australian Commonwealth*

(in Nineteenth Century, Vol. LI, p. 657, London 1902) ; Sladen, D. B. W., A Study of Henry Kendall as a Bush Poet* (in id., ed., Australian Ballads and Rhymes,* London 1888).

KENDALL, William Mitchell, American

architect: b. Jamaica Plain, Mass., 1856. After an extended course in architecture at home and in Italy and France, he returned to New York city. He has taken part in the designing of many important edifices, among them the post-

office, municipal building, Avery Library (Co¬

lumbia University), School of Journalism (Co¬

lumbia University) all in New York City. He has also extended his work to Chicago and other American cities.

KENDALL, William Sergeant, American

painter and sculptor: b. Spuyten Duyvil, N. Y., 20 Jan. 1869. He began as a member of the Art Students' League of New York, and subse¬

quently was a pupil of Thomas Eakins of Philadelphia. He went to France and attended the Ecole des Beaux Arts, and also studied under Olivier Merson. He is equally successful in figure, portrait and landscape, and in recent years also has taken up sculpture with consider¬

able success. His best work, however, is to be found amongst his many charming portraits of children. He has received many honors —amongst which were gold medals at Saint Louis (1904) and San Francisco (1915) and member¬

ship in the National Academy since 1905 — and in many domestic and foreign art associations —in acknowledgment of his merit as a fine color¬

ist and powerful draftsman. One of his best pictures is (The End of the Day,* in which ten¬

der sentiment is united with workmanship of excellence. It is now in the National Gallery, Washington, D. C., where may also be seen An Interlude.* Other well-known paintings from his

brush are (Psyche* and (The Seer,* both in the Metropolitan Museum of Art, New York; (Beatrice, * in the Academy of Fine Arts, Phil¬

adelphia; (Narcissa,* in the Corcoran Gallery, Washington, D. C. ; (CrosslightsP in the Mu¬

seum of Art, Detroit, Mich.; (Intermezzo,* in the Rhode Island School of Design, Providence, R. I. Since 1913 he has been director of the School of Fine Arts and William LeffingwelJ, professor of painting and design at Yale Uni¬

versity, New Haven, Conn., where he makes his home. Consult Caffin, C. H., (The Art of Ser¬

geant KendalP (in Harper's Monthly Magazine, Vol. CXVII, p. 568, New York 1908) ; Mather, F. J., jr. (Kendall Painter of Children* (in Arts and Decoration, Vol. I, p. 15, New York 1910).

KENDALLVILLE, a city situated on the

Lake Shore and Michigan Southern and_ Grand Rapids and Indiana railways, about 25 miles north of Fort Wayne, in Noble County, Ind. It is quite a manufacturing town, producing flour, lumber, refrigerators, iron products, pumps, heaters, tiles, bricks and numerous novelties.

Pop. 5,000.

KENDRICK, Asahel Clark, American

Baptist clergyman and scholar: b. Poultney, Vt., 7 Dec. 1809; d. Rochester, N. Y., 21 Oct. 1895.

He was graduated from Hamilton College, Clin¬

ton, N. Y., in 1831, and was professor of Greek at Madison (now Colgate) University, Hamil¬

ton, N. Y., 1831-50; and' held a similar post in the University of Rochester from 1850. Besides translations and several textbooks, and revising and editing Olshausen's (01d Testament Com¬

mentary * and Meyer's Commentary on JohnP

he published Cur Poetical Favorites) (1880);

KENDRICK, John, American navigator:

b. Boston, about 1745; d. Hawaii, 1800. During the Revolution he sailed a privateer, and in 1787, while in command of the Columbia and the Washington, explored the northwestern coast of America and various Pacific islands. In 1791

he voyaged to the South Seas, and established the Chinese trade in sandalwood, which for a long time he successfully carried on. He was among the earliest American sailors to attempt voyages for discovery.

KENEALY, ke-ne'li, Edward Vaughan

Hyde, Irish poet, writer and barrister: b. Cork, 1819; d. 1880. He became somewhat noted for his prominent connection with the defense of Orton, the claimant in the Tichborne Case, and of the two Fenians, Casey and Burke (1867).

His conduct in both cases was considered so unprofessional that he was disbenched, later on by Grays Inn and expelled from the Oxford circuit. Among his publications are (The Tich¬

borne Case) ;

KENEH, GENEH, or KEN A, ken'e, capi¬

tal of the Egyptian province of the same name.

It is situated on the Nile about 35 miles north of Thebes and is a place of about 30,000, frequented by pilgrims throughout the year from the interior of Africa, and by tourists from down the river and from various parts of Egypt. The Nile steamers have a station at Keneh and the Nile Valley Railroad has a station on the opposite side of the river from the town.

Keneh produces sugar and has some native manufactories, among them distinctive pottery.

KENESAW (ken-e-sa) MOUNTAIN, a

mountain in Georgia 25 miles northwest of At¬

lanta. It is famous as the scene of a battle in the Civil War between the Union troops under Sherman and the Confederates under Johnston.

KENESAW MOUNTAIN Battle of. On

the night of 18 June 1864, Gen. J. E. Johnston fell back before General Sherman's persistent advance and took a new line with Kenesaw Mountain as its salient, his right wing thrown back so as to cover Marietta, and his left cover¬

ing the railroad back to the Chattahoochee.

Sherman worked to the right, threatening the railroad, and was attacked by Hood's corps at Kolb's Farm (q.v.), 22 June. After much study of the ground, Sherman concluded that he had no alternative but to assault Johnston's line or turn his position. Either course had its difficul¬

ties and dangers, but as the enemy and his own

officers had settled down to the conviction that he would not assault fortified lines, but would execute flanking movements only, he considered that a successful assault would have a good moral effect and show that he could move against an enemy behind breastworks ; so he resolved to attack the left centre of Johnston's position, and orders were given on the 24th that on the 27th McPherson should assault near Little Kenesaw and that Thomas should assault about a mile further south. Kenesaw was strongly intrenched and held by Loring's and Hardee's corps, Loring on the right, opposite McPherson, Hardee, on the left, opposite Thomas.

About 9 a.m. of the 27th the troops moved to the assault, and all along the lines for 10 miles a furious fire of artillery and musketry was kept up. A part of Logan's Fifteenth corps, formed in two lines, fought its way up the slope of Lit tie Kenesaw, carried the Confederate skirmish-pits, and tried to go further, but was checked by the rough nature of the ground and the fire of artillery and musketry delivered at short range from behind breastworks. Logan's assault failed, with a loss of 600 men, and his troops were withdrawn to the captured skirmish-

pits. About a mile to the right Thomas as¬

saulted with Newton's and Davis' divisions. The troops charged up the face of the mountain, drove in the skirmish line and reached the main works, but were unable to carrry them under the heavy fire of canister and musketry at short range ; after heroic effort and the loss of Gens.

C. G. Harker and Daniel McCook, commanding brigades, and 1,580 killed, wounded and missing, fell back and intrenched 75 yards from the enemy's works. The assault was over by 11.30

a. m., and was a failure. It was the most serious reverse sustained by Sherman in the campaign.

The entire Union loss was nearly 2,500; John¬

ston admits a Confederate loss of 808 killed and wounded. Consult (Official Records y (Vol.

XXXVIII) ; Cox, (Atlanta) ; Van Horne, his¬

tory of the Army of the Cumberland* (Vol.

II) ; Sherman, (Personal Memoirs) (Vol. II) ; Johnston, Battles and Leaders of the Civil War (Vol.

IV).

KENIA, ka'ne-a, Mount, an isolated ex¬

tinct volcano situated in British East Africa, a few miles south of the equator. Its summit is covered with perpetual snow, and for this reason it is known as Doenyo Ebor or White Moun¬

tain. Its height is from 18,000 to 19,000 feet.

It was discovered by Krapf in 1849, and its summit was first reached (by Kolb) in 1895.

KENILWORTH, England, a town in War¬

wickshire, near Warwick, noted as the seat of the famous Kenilworth Castle, the scene of Scott's novel of the same name. It has figured prominently in the history of northern Eng¬

land; and the castle was once the scene of the 19 days' entertainment given to Queen Elizabeth by the Earl of Leicester in 1575. Pop. about б, 000. Consult Beck, (Kenilworth Castle) (1878).

KENILWORTH. Sir Walter Scott's

(Kenilworth,* published 1821, is a historical romance of the time of Elizabeth, involving the relations between the queen and the Earl _ of Leicester. Leicester is represented as having contracted a secret marriage with Amy Rob-

sart and a's being torn between the two motives of love for his beautiful bride and a consum¬

ing ambition to rise superior to all his rivals in the royal favor. It is for fear of his jealous sovereign's displeasure that he has concealed his marriage and hidden his wife in Cumnor Hall. At the opening of the story Tressilian, her former lover, discovers her whereabouts and attempts to get her to return to her fa¬

ther's house. He is opposed by the machinations of Richard Varney, a retainer of Leicester's.

Tressilian appeals to the queen to restore the lady to her parents. Discovery is imminent, but Varney temporarily saves the situation by claiming that she i'S his wife. Elizabeth com¬

mands that Amy be brought before her at her approaching visit to Lord Leicester's castle of Kenilworth. Varney, after trying in vain to induce her to pose as his wife, gives her a drug intended to produce an illness which will make her removal impossible, but, fortified with an antidote administered by a servant of Tres-

silian's, she escapes from Cumnor Hall and journeys to Kenilworth seeking her husband.

During the revels at the castle the queen in¬

flames Lord Leicester's ambitions by letting him •see that he may even aspire to her hand. Var¬

ney convinces him that Amy has been unfaith¬

ful and he gives orders for her death. Later, learning that Varney has deceived him, Leices¬

ter confesses the truth to Elizabeth in a par¬

oxysm of remorse and is subjected to an out¬

burst of the royal anger. The messengers which he has sent to Cumnor Hall, whither Amy has been carried, arrive too late, and the unfortunate countess is killed by falling through a trap door laid at the entrance of her chamber by the hand of Varney.

In no novel of Scott's is the historical set¬

ting elaborated with more care than in (Kenil¬

worth.) While indifferent to literal accuracy Scott has brilliantly rendered the atmosphere of the time by a multitude of characteristic de¬

tails drawn from his wide reading of Eliza¬

bethan literature. The revels at Kenilworth, for example, are elaborately described after the contemporary account of Laneham. The de¬

lineation of Elizabeth is a fine specimen of Scott's characteristic art of reading romance and human nature into the outlines afforded by historical record. The Amy Robsart story is based on rumors and traditions current in Lei¬

cester's time and recorded in contemporary documents, but Scott has combined the. actual circumstances of more than one of Leicester's marriages and has also drawn heavily on his imagination. For references, consult article Ivanhoe. The facts of Leicester's marriage to Amy Robsart are given in the article on Leices¬

ter in the dictionary of National Biography.*

James H. Hanford.

KENITES. The name of a tribe which

inhabited the rocky desert region between •southern Palestine and the mountains adjoining Sinai. At the time of the exodus of Israel they pastured their flocks around Mount Horeb and Sinai. Jethro or Hobab the father-in-law of Moses was a Kenite. He is also called a Midianite. It may be that the names are in¬

terchangeable or that the Kenites and Midian-

ites were closely related. A third conjecture is that the Kenites were the older family of Midianites, the later family descending from 354

Abraham and Keturah. Because of their great kindness to the Children of Israel on their march from Egypt, they were highly esteemed.

When Saul attacked the Amalakites, he warned the Kenites to separate from them. In the time of David they still held their possessions in the south of

Judah. In the time of Jehora-

kim, the small number left from the Assyrian onrush over the land took refuge in Jerusalem.

They were a gypsy-like people. It is thought by A. H. Sayce and some other scholars that they were blacksmiths and went from place to place pursuing their vocation. This opinion is largely based, however, on the supposed mean¬

ing of the Hebrew root from which their name is derived which is ((to work in iron?

KENIZZITES. A tribe descended from

Kenaz, the grandson of Esau or from Caleb who is called a Kenizzite (1 Chr. iv, 15). He may have been the grandfather of Caleb (Judges i, 13). The Israelites and Edomites had many names in common. The tribe was located somewhere in the neighborhood of Mount Seir. They seem as Bochart suggests to have become almost entirely extinct between the time of Abraham and Joshua.

KENMARE, Mary Frances Cusack, Nun

of: b. Dublin, Ireland, 1820; d. 1899. She was educated in England in the Episcopal Church.

Returning to Ireland she became a convert to Catholicism. She conducted the convent of <(Poor Clares® which she herself had estab¬

lished at Kenmare (1861-84). In 1884 she founded, with papal sanction, the order of the Sisters of Peace, a branch of which order was founded by her in Jersey City, N. J., the fol¬

lowing year. Among her published works are (Manual of Irish History5 (1870) ; a biography of O'Connell (1872) ; (Woman's Work in Modern Society5 (1874) ; (The Book of the Blessed Ones,5 (The Trias Thaumaturga5

(1877). In addition to these she wrote the lives of

many saints, devotional works and arti¬

cles on Irish Shrines. Consult (The Nun of Kenmare, An Autobiography5 (Boston 1888).

KENNAN, George, American traveler, au¬

thor and lecturer: b. Norwalk, Ohio, 16 Feb.

1845. He received a secondary education, be¬

came a telegraph operator, in 1865 went to northeastern Siberia as an explorer and tele¬

graph engineer, and in 1866-68 superintended the construction of the middle division of the Russo-American telegraph line. In 1870-71 he explored the mountain region of eastern Cau¬

casus and Daghestan, upon his return to Amer¬

ica was active as lecturer and journalist, and in 1877-85 was night manager of the Associated Press at Washington, D. C. In 1885-86, with G. A. Frost, an artist, he accomplished a jour¬

ney of 15,000 miles through Russia and Siberia in investigation of the Russian exile system.

He visited all the mines and prisons between the Ural Mountains and the headwaters of the Amur, and published an account of his observa¬

tions in (Siberia and the Exile System5 (1891), first printed in the Century Magazine (1889-

90). From 1886 he lectured in Great Britain and the United States on his Siberian experi¬

ences. In 1898, during the Spanish-American war, he visited Cuba with the Red Cross Society and as special commissioner of the Outlook of New York, to which he contributed valuable articles.

In 1901 he went to Russia to visit Count Tolstoy and make a further study of Russian conditions. He was arrested in Saint Peters¬

burg, by order of the Minister of the Interior, and sent out of the empire under guard as a ((politically untrustworthy55 person. In 1902 in company with American scientists he explored Mount Pelee, Martinique, and the scene of the Saint Pierre disaster. In 1904, upon the out¬

break of the Russo-Japanese war, he went to the Far East as correspondent of the Outlook; reported the siege of Port Arthur, which he witnessed from the Japanese side; and spent nearly two years in travel through Japan, China, Manchuria and Korea. In 1906-07 he inves¬

tigated for McClure's Magazine municipal cor¬

ruption in San Francisco. In 1908 he went to England to translate from the original Russian manuscript General Kuropatkin's (History of the Japanese War.5 In addition to the two volumes on the Siberian exile system noted above he is the author of Campaigning in Cuba5 (1899) ; (The Tragedy of Pelee5 (1902) ;

Since 1912 he has been on the staff of the Outlook.

KENNEBEC (ken-e bek) RIVER, a river

in Maine, next to the Penobscot the most im¬

portant in the State. Its principal source is Moosehead Lake, on the boundary line between Somerset and Piscataquis counties. After a course of 20 miles it receives Dead River from the right. It enters the Atlantic in Sagadahoc County through Sheepscott Bay, an irregular indentation of the coast studded with many islands. The largest tributary of the Kennebec is the Androscoggin, which joins it 18 miles from the ocean at Merrymeeting Bay. The outlets of a number of small ponds, and Sebas-

ticook and Sandy rivers, also flow into it. The most important towns on its banks are Bath, Richmond, Gardiner, Hallowed, Augusta and Waterville. It has falls at Waterville and at three points above, which afford excellent mo¬

tive power. Its whole length is about 150

miles, in which it has a descent of 1,000 feet.

The influence of the tide extends to Augusta, 42 miles from the sea. A dam with locks was constructed at Augusta for the purpose of im¬

proving the navigation above that point, and increasing the water power. The structure is 584 feet long and 15 feet above ordinary high water mark, and cost $300,000. It forms a pond 16t/2 miles in extent, with an average depth of 16 feet. The river is closed by ice at H&llowell from the middle of. December to about 1 April ; below Bath it is open at all seasons except during winters of unusual severity.

KENNEBUNK, ken-e-bunk', Me., town

in York County, on the Kennebunk and

Mousan rivers and the Boston and Maine Rail¬

road, west division, 24 miles southwest of Port¬

land. The ample water power here, is utilized for various manufacturing industries, among the articles produced being auto top fabrics and straw mattings, leatheroid, sample-cases, shoe-stiffenings, fibre-board and lumber. The town has a free circulating library containing several thousand volumes. It is one of the old KENNEBUNKPORT— KENNEDY

towns o f Maine, its settlement dating from about 1650. Until 1820, the year in which Maine became a separate State, Kennebunk was a part of Wells. Pop. 3,500.

KENNEBUNKPORT, Me., town in York

County, 25 miles southwest of Portland, on the Atlantic Ocean, at the mouth of the Kennebunk River, and on the Boston and Maine Railroad. It is situated

on a good harbor, has an excellent 'beach, fine boating facilities on the river, and is a favorite summer resort with superior hotel and boarding-house accommoda¬

tions. Besides Talbot's Library, the town has public and circulating libraries. Its industries include the manufacture of lumber and the building of boats and canoes. The town was settled in 1629, and incorporated as Cape Por¬

poise in 1653. Having been nearly destroyed by Indians in 1703, it was reincorporated in 1717 as Arundel, and in 1821 took its present name.

The population is about 2,200.

KENNEDY, Sir Alexander (William

Blackie), English educator and engineer: b.

Stepney, 1847. Graduated from Royal College of Mines he became a marine engineer and es¬

tablished a reputation for inventiveness. Be¬

coming professor of engineering at University College, London, he carried on his experiments there and established the first engineering laboratory. He did special and important work in devising means of testing machines of various kinds and he invented a recorder for testing the strength of materials. He has de¬

signed lighting and power plants in Edinburgh, Manchester, Loch Leven, Calcutta and Japan.

He has also acted extensively in the capacity of consulting engineer and has been chief engi¬

neer to the Westminster Electric, Central Elec¬

tric and Saint James and Pall Mall Electric Supply Companies, member of the Naval Boiler Committee, president of the Admiralty Com¬

mittee on Machinery Design, associate member of the Ordnance Committee; member of Com¬

mittee on Wireless Telegraphy; consulting elec¬

trical engineer to the London and Northwestern and London and Southwestern railways and to the London County Council Tramways; mem¬

ber of the Advisory Committee of the Ministry of Munitions, of the Munitions Inventions Panel, and vice-chairman of the Anti-Air Craft Equipment Committee. Among his published works are (The Mechanics of Machinery>

(1886); (Moore's Alps in 1864) (1902), and a translation of Reuleaux's Einematik.*

KENNEDY, Archibald R. S., Scottish edu¬

cator and Semitic scholar: b. White Hills, Banffshire, 1859. He was educated at the universities Aberdeen, Glasgow, Gottingen and Berlin (1875-85). In the latter year he became Fellow of Glasgow University (1885-87), going to Aberdeen University three years later as professor Semitic languages (1887-94) ; and in 1894 to University of Edinburgh as professor in the same capacity (1894-). Among his pub¬

lished works are a series of grammars in the Porta Linguarum Orientalium Series, including Hebrew (1885) ; Seriac (1889) ; Assyrian (1890), and Arabic (1895); Exodus* (in Temple Bible, 1901) ; (Joshua and Judges1*

(1902) ; ^Samuel* (1905) ; Eeviticus and Numbers* _ (in Century Bible, 1910). He has also contributed extensively to Hastings dic¬

tionary of the Bible) ; Encyclopedia Biblica, *

and the Encyclopedia Britannica.*

KENNEDY, Benjamin Hall, English edu¬

cator and classical scholar : b. Birmingham, 1804; d. 1889. Graduated from Cambridge in 1827 he became Fellow and lecturer in classics at Saint John's College in his alma mater; assistant master at Harrow, and head master of Shrewsbury School (1836-66). In the latter year he became regius professor of Greek at Cambridge and canon of Eli the following year. In 1870 he became a member of the University Council, and also of the Committee on the Revision of the New Testament. He edited popular classical textbooks; made trans¬

lations from Greek and Hebrew into English and wrote poetry in Latin, Greek and Eng¬

lish, a volume of which was published in 1882

under the title of (Between Whiles. * Consult Sandys, (A History of Classical Scholarship) (Vol. Ill, Cambridge 1908).

KENNEDY, Charles Rann, Anglo-Ameri¬

can dramatist : b. Derby, England. 14 Feb.

1871. He began life as an office boy, largely educated himself and early began lecturing and writing. He later became an actor and press agent and theatrical business manager. This led to the production of dramas for the stage with which he combined the writing of short stories, critical articles and poems. Among his dramas are (The Servant in the House) (1908); (The Winter Feast> (1908); (The Terrible Meek* (1911) ; (The Necessary EviP

(1913) ; (The IdoUBreaker* (1914) ; (The Rib of the Man* (1916) ; (The Army with Ban¬

ners* (1917). In the composition of these dramas, all of which deal with problems of so¬

ciety and are of a serious, reforming tendency he has had the advice of his wife, the actress, Edith Wynne Matthison, whom he married in 1898.

KENNEDY, Grace, Scottish novelist: b.

Pinmore, Ayrshire, 1782; d. 1825. Her novels, which are of a decidedly religious caste, were very popular in her day, though now when the age has become more liberal, they have lost most of their interest and are very little read.

Her works which have been translated in full into German, and in part, into several other languages, show considerable talent and de¬

pict the religious spirit of her age in Scotland very well. They will, therefore, be of a secondary interest at least, to students of the religious tendencies of the first quarter of the 19th century. Her most popular story, Eather Clement* (1823) is strongly anti-Roman

Catholic, and for this reason and on account of the vividness of the characters and situa¬

tions, became immensely popular and was translated into most of the languages of Europe. Among her other novels are (Anna Ross* ; (Dunallan*; (Jessy Allan,* and (De¬

cision.* The best edition of her works is that published in Edinburgh in 1827.

KENNEDY, Sir James Shaw, British

soldier and military writer: b. Straiton parish, Ayrshire, 1788; d. 1865. His family name was Shaw and the Kennedy was added afterward.

He became a general in 1863 after having seen much military service abroad in the Wellington Peninsular Campaigns and in other similar service. His (Notes on Waterloo* were published 356

in 1865. He also left an autobiography; (A Plan for the Defense of Canada) ; and (Notes on the Defense of Great Britain and Ireland) (1859), the latter of

which has been frequently reprinted.

KENNEDY, John, Scottish religious

writer : b. Aberfeldy, Perthshire, 1813 ; d. 1900.

Educated at Aberdeen, Glasgow and Edinburgh universities he 'became a Congregational minis¬

ter stationed in Aberdeen (1836-46). In the latter year he went to London to Stepney Con¬

gregation (1846-82). There he became pro¬

fessor of apologetics at New College (1872-76) and chairman of the council of that institution (1884-95) and was editor of The Christian Witness (1866-73) and The Evangelical Maga¬

zine (1887-90). Among his published works are (The Divine Life) (1858) ; (A Handbook of Christian Evidence5 (1880) ; (The Gospels; their Age and Authorship5 (1884) ; *Gld Testa¬

ment Criticism and the Rights of Non-Experts5

(1897).

KENNEDY, Sir John, Canadian engineer :

b. Spencerville, Ontario, 26 Sept. 1838. He was educated at McGill University, he be¬

came assistant city engineer of Montreal in 1863; division engineer (1871) and chief engi¬

neer of the Great Western Railways of Canada (1872-75) ; chief engineer of the Montreal Harbor Commission (1875-1907) and consult¬

ing engineer of same since 1907. Among his important public works are the deepening to 27*4 feet of the ship canal between Montreal and Quebec and all the improvements made in Montreal harbor for nearly a third of a cen¬

tury. As a member of numerous important engineering

committees, among them those on Lachine Canal, Floods at Montreal and Trent Valley Canal System, all of them royal commis¬

sions, he has influenced strongly many great public undertakings in Canada.

KENNEDY, John Pendleton, American

novelist: b. Baltimore, Md., 25 Oct. 1795; d.

Newport, R. I., 18 Aug. 1870. He was gradu¬

ated at Baltimore College in 1812, and in 1814

served as a volunteer in the ranks, taking part in the battles of Bladensburg and North Point.

In 1816 he was admitted to the practice of the law, which he followed successfully for 20

years. In 1818 he commenced authorship, by the publication, in connection with his friend Peter Hoffman Cruse, of the (Red Book,5 a serial of light character in prose and verse issued about once a fortnight, and continuing two years. In 1820 he was elected to the Maryland house of delegates, and re-chosen the two next years. In 1832 he published his first novel, (Swallow Barn, or a Sojourn in the Old Dominion,5 descriptive of the plantation life of Virginia. In 1835 appeared (Horseshoe Robinson, a Tale of the Tory Ascendency,5

the most successful of his writings. In 1838

he published (Rob of the Bowl, a Legend of Saint Inigoes,5 relating to the Maryland prov¬

ince in the days of Cecilius Calvert, second Lord Baltimore. Kennedy was a member of Congress 1839-45, and was prominent among the Whig members. In 1849 appeared his (Life of William Wirt, Attorney-General of the United States,5 and in 1852 he became Secre¬

tary of the Navy. His works not previously named include (Annals of Quodlibet5 (1840) ; (Mr.

(1865). He was a friend of Thackeray, and wrote or sketched in outline the fourth chapter of the second volume of (The Virginians.5

Consult (Life5 by Tuckerman. See Horseshoe Robinson.

KENNEDY, John Pitt, an Irish author,

educator and engineer : b. Donogh, Donegal County, Ireland, 1796; d. 1879. He superin¬

tended harbor construction in many parts of the world and built lighthouses, roads and quays. He was sub-inspector of militia in the Ionian Isles (1828-31). After a long absence from the army he returned to it in 1849, serv¬

ing as secretary to Sir Charles Napier whom he accompanied to India. There Kennedy su¬

perintended the construction of the military road from Kalka, through Simla and Kuna-

wur to Tibet. John Pitt Kennedy, notwith¬

standing the importance of his public engineer¬

ing works, is best remembered on account of his efforts to settle, in a sensible way, the Irish question. He returned to Ireland in 1831 ; and he was at once struck with the lamentable con¬

dition of the people and filled with a desire to remedy it. He realized that any permanent improvement in the Irish situation must be pro¬

ceeded by a betterment of agricultural condi¬

tions. He seems to have got nearer the heart of the Irish people than any previous reformer and to have realized that the British methods of dealing with the people had been largely faulty if not vicious. He became convinced that force would never conquer Ireland though it might hold her in subjection

indefinitely. In 1835 he published a book which embraced his ideas on Ireland, and which bore the curious, though very suggestive title Unstruct; Em¬

ploy; Don't Hang Them: or Ireland Tranquil-

ized without Soldiers and Enriched without English Capital.5 As inspector general of Irish Education, for a time; secretary of the Devon Commission (1843) ; and the Famine Relief Committee (1845) he labored to im¬

prove agricultural and social conditions and to advance public instruction in Ireland. To this end he wrote several works, all dealing with the problems he found in Ireland and suggesting solutions. He also wrote technical engineering works and was publisher and editor of the British Home and Colonial Empire.

KENNEDY, John Stewart, Scottish-Ameri-

can philanthropist : b. near Glasgow, Scotland, 1830; d. 1909. At the age of 24_he came to New York as the representative of a London iron firm. There he entered the firm of Morris K. Jesup in which he remained until 1867. On his retirement he began the reorganization of concerns on trouble through mismanagement or other causes ; and was receiver for numer¬

ous concerns, among them The New Jersey Central Railroad; and in these enterprises he eventually made a large fortune; the greater part of which he expended in charities and in the encouragement of education. Of the $30,000,000 which he is credited with having disposed of in this way he gave by will to Co¬

lumbia University, the New York Public Li¬

brary, the Metropolitan Museum of Art, the Presbyterian Board of Home Missions, the Presbyterian Board of Foreign Missions, the Presbyterian Church Erection Fund and the Presbyterian Hospital, $2,500,000, or a total of

$17,500,000. His will also provided for many KENNEDY — KENNETT

$50000° C°llegeS ranging from $1,500,000 to KENNEDY, Joseph Camp Griffith, Amer¬

ican statistician: b. Meadville, Pa., 1813; d.

1887. He practised law for a time, edited country newspapers, and finally, in 1849, he as¬

sumed charge of the reorganization of the United States Census Bureau; and 10 years later became head of the census. He was largely instrumental in the holding of the Con¬

gress of Statisticians held in Brussels in 1853.

Later on he became examiner of National Banks. To him the United States owes much of her early organization of statistical reports of all kinds.

KENNEDY, Thomas Francis, Scotch re¬

former: b. Greenan, 1788; d. 1879. Graduated in law from Edinburgh University he went into politics and became a member of the Parlia¬

ment in 1818. He became greatly interested in political reforms and in these matters he saw more clearly than most of his fellow members of Parliament. He obtained numerous rights for prisoners, among them that of peremptory challenge, under a ballot method for the selec¬

tion of jurors. He was largely instrumental in securing the extension of the franchise, the abolition of religious disabilities, the extinction of the Scottish Court of the Exchequer and the lowering of the duties on corn (that is grain).

His efforts in this direction and in others were recognized by his successive appointment as clerk of ordinance (1832), Junior Lord of the Treasury,

paymaster of civil service in Ireland (1837) ; and Commissioner of Woods and Forests (1850-54).

KENNEDY, William, Irish poet and prose writer: b. Dublin, 1799; d. Paris, 1871. Edu¬

cated at Belfast College, he drifted into liter¬

ature, working on the Paisley Magazine, Scot¬

land. Following this he followed literature in London until 1838 when he accompanied Lord Durham, as secretary to Canada, going to Texas in 1841 and becoming British consul at Galveston (1842-49). In the latter year he was retired on a pension which allowed him to devote his time to literary work. He returned to London and finally went to reside in Paris.

Among his published works are 'Fitful Fan-

eies) (1827) ; (The Arrow and the Rose and Other Poems* (1830, both volumes of lyrical poetry for the most part) ; (The Siege of Ant¬

werp* (drama) ; 'The Rise, Progress and Prospects of the Republic of Texas* (2 vols., 1841).

KENNEDY, William Sloane, American

author: b. Breckville, Ohio, 1850. Educated in Yale and Harvard he joined the staff of the Boston Transcript, and later devoted consider¬

able time to literature, doing magazine work, criticisms, translation from French and Italian and published original works. Among the lat¬

ter are 'Henry Wadsworth Longfellow)

(1882); 'John Greenleaf Whittier* (1882); 'Oliver Wendell Holmes) (1883) ; (Won¬

ders and Curiosities of the Railway* (1884

and 1906) ; 'John G. Whittier, the Poet of Freedom* (1892) ; 'Reminiscences of Walt Whitman (1896) ; 'In

Portia's Gardens) (1897) ; 'Walt Whitman's Diary in Canada*

(1904).

KENNELLY, Arthur Edwin, Anglo-Amer¬

ican engineer: b. Bombay, India, 17 Dec. 1861.

Educated at University of London. After ex¬

tensive experience as an electric engineer in England, he came to the United States in 1887

as electrical assistant to Thomas A. Edison.

Seven years later he established a business for himself in Philadelphia as consulting electrical engineer (1894-1901). In 1902 he was ap¬

pointed professor of electrical engineering at Harvard University, a position he still holds.

He is also professor of electrical engineering at the Massachusetts Institute of Technology.

Among the important public works which he has undertaken was the laying, for the Vera Cruz-Frontera-'Campeche Cables for the Mexican government in 1903. Among his pub¬

lished works are (Notes for Electrical Stu¬

dents > (a collaboration with Wilkinson) ; the¬

oretical Elements of Electro- Dynamic Ma¬

chinery } (1893) ; (Electrical Engineering Leaf-

lets) (in collaboration with Edwin J. Houston 1897) ; 'Electro Dynamic Machinery* (1899) ; (Electricity Made Easy* (1899) ; the Inter¬

pretation of Mathematical Formula (1899); 'Wireless Telegraphy> (1907); the Applica¬

tion of Hyperbolic Functions to Electrical

Engineering Problems) (1911); tables and Atlas of Complex Hyperbolic Functions>

(1914) ; 'Artificial Electric Lines) (1917).

KENNERLEY, Mitchell, American pub¬

lisher: b. Burslem, England, 14 Aug. 1878. He came to the United States at the age of 18 as representative of John Lane publishing house, London, with headquarters in New York City (1896-1900) ; after which he became business manager of the Smart Set (1900-01) ; founder and editor-proprietor of The Reader Magazine (1901-04) ; and publisher (1905 —). In this latter capacity he published The Forum (1910-

lb) ; The Papyrus (1910-12).

KENNET RIVER, a tributary of the

Thames, in England. It rises in Wiltshire, flowing east through . Berkshire, emptying into the Thames at Reading, after a course of 46

miles. It is a part of the waterway connecting the North Sea with Saint George's Channel.

KENNETH I (ruled 832-360), a Scottish

king belonging to the MacALine family. At first his influence extended over a restricted territory in Galloway; but this he gradually ex¬

tended by successful military expeditions which resulted in the expulsion of the Danes (841) and the union of the Scottish and Pictish prin¬

cipalities. He made Dunkeld the ecclesiastical capital of his enlarged domains; and to this new capital he removed the relics of Saint Columba. This made the city the centre of increased ecclesiastical activity which served as an inspiration to the Christians to maintain a desperate struggle against expiring- paganism.

Kenneth, among . his other warlike activities, made six expeditions against Lothian, into which he penetrated on each occasion. Consult Lang, Andrew, 'History of Scotland, > or any other good history of Scotland.

KENNETT, Robert Hatch, English edu¬

cator, scholar and writer: b. Saint Lawrence, Ramsgate, 1864. Educated at Cambridge, he served in that institution as chaplain, lecturer in Hebrew and Syriac (1887-93) ; and lecturer in Aramaic (1893-1903), becoming, on the lat-

ter date, regius professor of Hebrew ; canon of Eli (1905); Schweich lecturer (1900), and Bishop of Manchester (1913). Among his publications are (The Hebrew Tenses) (1901) ; (In Our Tongues* (1907) ; 'The Servant of the Lord* (1911) ; (The Composition o.f the Book of Isaiah in the Light of History and Archaeology.* He has also contributed ex¬

tensively to the Journal of Theological Studies; the Encyclopaedia Americana) ; (Hastings Encyclopaedia of Religion and Ethics/ the Hih-

bert Journal and other publications of a like nature.

KENNETT, White, English Episcopal prel¬

ate and writer: b. Dover, 10 Aug. 1660; d.

Westminster, 19 Dec. 1728. Graduated from Oxford he entered the Church of England where he distinguished himself as a preacher, antiquarian, theologian and historian, and also on account of his strongly-pronounced anti-

high church attitude. Rector of Ambrosden (1685) ; tutor and vice-principal of Edmund Hall, Oxford (1691) ; Archdeacon of Hunting¬

don (1701) ; Dean of Peterborough (1707) ; Bishop of Peterborough (1718) ; he made his mark upon the church politics of his day in England. Among his numerous works are

'Parochial Antiquities) (1695, 1818) ; 'Com-

pleat History of England) (of which only one volume was published anonymously in 1706) ; 'A Register and Chronicle, Ecclesiastical and Civil, for the Restoration of King Charles IP

(Vol. I, 1728). Many of his historical and other valuable manuscripts, most o± which have not yet been published, are in the Lansdowne collection in the British Museum. His life was written by Newton (London 1730).

KENNEY, Charles Lamb, English author

and journalist, son of the Irish dramatist, James Kenney (q.v.) : b. Bellevue (near Paris), 1821; d. 1881. He began active life as a clerk in the London general post office ; and while there devoted his spare time to writing for the local press, and he thus gradually drifted into jour¬

nalism becoming dramatic critic for the London Times. In the meantime he studied law and was admitted to the bar in 1856. Among his published works are (The Gates of the East) (in support of the building of the Suez Canal, 1857); (M. W. Balfe> (1875); 'Balzac’s Correspondence) (a translation, 1878), and light verse, and several very good light operas and musical sketches which were popular in their day. Consult Clavden, W. P., 'Rogers and his Contemporaries0 (London 1889) ; Genest, John, 'English Stage) (Vols. VII and VIII, London 1832).

KENNEY, James, British dramatist: b.

1780; d. 1849. Beginning as a bank clerk in London, where his father was manager of "Boodles’ Club,® he gave more attention to amateur acting and play writing than to the banking business, which he soon gave up for dramatic writing. His plays were very

popu¬

lar in his day and some of them are still seen upon the stage. He had excellent dramatic talent and the power of character development.

Among his numerous plays the most popular and successful are 'Sweethearts and Wives) (1823) ; 'Turn Him Out) (a musical afterpiece, 1812) ; 'Love, Law and Phvsic) (1812) ; 'The Illustrious Stranger* (1827) ; 'Masaniello*

(1829) ; 'Sicilian Vespers) (1840). Consult authorities quoted under Kenney, Charles Lamb.

KENNICOTT, Benjamin, English clergy¬

man and scholar : b. Totness in Devonshire, 4

April 1718; d. Oxford, 18 Sept. 1783. When his father died he was quite young but suc¬

ceeded him as master of a charity school in his home village. Through the kindness of friends he entered Wadham College, Oxford. In his undergraduate days he published two books, the second one 'On the Oblations of Cain and AbeP (2d ed., 1747) won for him his degree before the statute time had expired. Soon after he was elected Fellow of Exeter College.

His fame as a scholar rests on a great under¬

taking which he began in 1753. It was no less a task than the collation of all the Hebrew manuscripts to be found in the libraries of Eng¬

land and on the Continent so that a more cor¬

rect Hebrew text of the Old Testament might be ascertained. Several persons were employed collating manuscripts for him. Professor Bruns of the University of Helmstadt collated manu¬

scripts in Germany, Switzerland and Italy. Af¬

ter 16 years of the most intense labor, the first

volume of his Hebrew Bible appeared.

The second appeared four years later. The variations of the text included collations from Hebrew and Samaritan' manuscripts, the Greek testament and from the former editions of the printed text. Dr. Kennicott was librarian of Radcliffe Library from 1767 until his death, he was also canon of Christ Church at the same time. His works include, in addition to pam¬

phlets and sermons, 'The State of the Printed Hebrew Text of the Old Testament* (2 vols., 1753, 1759); ' Critici Sacri : or Short Introduc¬

tion to Hebrew Criticism0 (1774) ; 'Ten Annual Accounts of the Collation of Hebrew Manu¬

scripts of the Old Testament, 1760-69) (1770) ; 'Vetus Testamentum Hebraicum Cum variis Lectionibus* (2 vols., 1776, 1780) ; 'Dissertatio Generalis in Vetus Testamentum Hebraicum*

(1780) ; 'Epistola ad celeberrimum professorem Joannem Davidem Michaelis, de censura primi tomi Bibliorum Hebraicum Nuper editi) (1777) ; 'Editionis Veteris Testamenti Hebraici cum variis lectionibus brevis defensio, contra Ephemeridum, Goettingensium Criminationes>

(1782) ; 'Remarks on Selected Passages in the Old Testament, to which are added eight Ser-

mons) (1787).

KENNICOTT, or KATALLA, a seaport

on Controller Bay, Alaska. It is of importance as the terminus of the Copper River and North¬

western Railway, which, with its other railway connections, connects Cordova, Kennicott and the Nizina valley generally. It thus forms the outlet for the Kennicott-Bonanza Copper Com¬

pany and the other mining companies of the region

through which it passes or which it taps, including the Bhering coal fields.

KENNY, Sir Edward, Canadian statesman : b. County Kerrv, Ireland, 1800; d. Halifax, N. S., 16 May 1891. He removed to Halifax in 1824, where he engaged in business, and was mayor at one time. He was member for 26

years of the legislative council of Nova Scotia, during 11 of which he was president; served as receiver-general of Canada 0867-69) ; presi¬

dent of the privy council (1869-70) ; and sena¬

tor (1867-76). He was knighted in 1870.

KENNY, Sir Thomas Kelly-, British

soldier: b. Kilrush, County Clare, Ireland, 1840; d. 1914. He took part in the war in China in 1867, and after continuous military service he took part in the South African War as major general and commander of the sixth division.

Promoted for his services there to the rank of lieutenant general ; he became, at the war office, adjutant general to the forces (1901-04).

Knighted in 1902, he was commissioned gen¬

eral in 1905.

KENO, or KINO, ke'no, a variation of

lotto (q.v.). In its modern form it is used for gambling purposes. For this purpose a hollow globe and 99 balls, each numbered consecutively from one upwards, are used, the balls are well shaken while in the globe, from which they are allowed to issue one by one upon which each number is called by the roller as it appears.

The game, which, in its gambling form, is said to be of American origin, is purely one of chance. The players purchase cards upon each of which are printed four rows of five figures each. As the balls make their appearance, they are checked up by the holder of the cards, and the first one getting ffive numbers in a row on his card calls out "Keno® indicating that he is the winner and, as such, entitled to the stakes of all the players minus the percentage allowed to the "bank®. The hollow globe in which the numbered balls are placed is called a "goose®. It is so placed that it can be revolved rapidly on its own axis, thus securing a proper mixing of the balls.

KENORA, formerly Rat Portage, Can¬

ada, town and port of entry, Ontario, at the outlet of the Lake of the Woods and on the Ca¬

nadian Pacific Railway, 133 miles by rail east of Winnipeg. It is the chief town of the Rainy River district and the distributing cen¬

tre for the neighboring gold mines. The Winni¬

peg River with a fall of 16 feet from the lake, furnishes inexhaustible water power for saw¬

mills, flour-mills and other industrial establish¬

ments. The neighboring lake fisheries, espe¬

cially of sturgeon, are valuable. Telephone, light, water and sewerage systems are munici¬

pally owned. The town was within the dis¬

puted boundaries of Manitoba and Ontario, and in July 1883 serious riots occurred, when police¬

men belonging to the contestant provinces fought with and arrested each other. Pop.

6,158.

KENOSHA, ke-no'sha, Wis., city, county-

seat of Kenosha County ; on Lake Michigan and on the Chicago and Northwestern and the Pere Marquette railroads; about 35 miles south of Milwaukee. It has steamer communication with many of the ports on the Great Lakes. It is a trade centre for quite an extent of country.

Its chief manufactures are leather, typewriters, furniture, wagons, lamps, machinery, carriage and automobile lamps, automobiles, springs, hosiery, underwear, iron bedsteads and flour.

It is the seat of Kemper Hall School (P. E.).

The Simmons Memorial Library contains about 6,000 volumes. The city owns and operates the waterworks ; the water is obtained from the lake and artesian wells. Kenosha was incorpo¬

rated in 1841 and chartered as a city in 1850.

Pop. (1920) 40,472.

KENOSIS, ke-no'sis (Greek, an -emptying, a depletion), the self-renunciation and self-lim¬

itation of the Son of God manifested in the in¬

carnation. Even in very early Christian times there were at least three distinct views held as to the relation of the God-Christ to the man-

Christ. These views were influenced by the Jewish conception of a traditional Christ, the Egyptian doctrine of the incarnation of Osiris, spn of the great sun god, Ra, and the specula¬

tions of the Romans, Greeks and Persians as to the nature of their own gods which strangely mingled human with divine attributes. From Egypt, Rome and the Eastern Empire came views of the Kenosis, influenced by local tradi¬

tions and the early training and education of the

contestants, in the days when Christian the¬

ology and dogma were in the making. The mys¬

tery of the self-emptying of the divine manner of being that took place at the incarnation of the second person of the trinity; the laying aside of the eternal and the assumption of a time form of existence formed an ever-fruitful sub¬

ject of speculation in an age long given to specu¬

lation as to the manner of being of things di¬

vine. Christianity introduced a new feature in the speculation, that of the self-abasement of the God-Christ, a feature upon which the Chris¬

tians laid great stress, no doubt owing to the strong character of Paul and some of the earlier fathers who linked the historical Christ firmly with the Jewish traditional Christ. This link¬

ing of the two created a wide field for specula¬

tion as the subject was viewed from the Jewish or the Christian point of view or it was influ¬

enced by the traditions and philosophical specu¬

lations of the. scholars of the Eastern and the Western Empires and the mythological concep¬

tions of the new converts to Christianity in Egypt and from among the Germanic and other races of Europe and southwestern Asia. The relation of the incarnate God to his own self-

abasement in the assumption of humanity and the occultation of his own divinity; the restric¬

tions, pains and penalties to which he submitted during his earthly life ; and the exhibition of his divine power on noted occasions like the resur¬

rection, ascension and transfiguration, intro¬

duced a new element into the religious specula¬

tion of the early centuries of Christianity, an element that proved very attractive to the mysti¬

cal, speculative spirit of the age with which Paul seems to have been well acquainted.

Speculation concerned itself as to what extent the God-Christ laid aside his divine form of existence, dignity and glory -on becoming in¬

carnate; and as to how much of the divine es¬

sence he divested himself of in the kenosis .

Some speculative theologians maintained that the kenosis consisted in the simple laying aside the attributes of divine glory and the divine form of existence. Others held that with these went the divine power which could not be a co¬

dweller with incarnation ; and that Christ's mira¬

cles were performed not by power that he had retained from his divine existence, but through the power that came to him from God the father. Other theologians went the extreme limit and upheld the doctrine that, at the in carnation, the Son of God completely emptied himself of the divine essence, thus altogether suspending the union and the divine function¬

ing of the trinity during his incarnate existence

upon earth. Between these three more or less distinct views of the relation of Christ to his incarnation, there were various different shades of opinion, most of them influenced by the speculative thought of the age and the popular and the priestly doctrine of a paganism still vigorous in many strongholds. The Eastern and Western churches held different views of the Kenosis; and the opinions of

the early church fathers did not agree with those who followed Augustine whose personality, so thoroughly im¬

pressed on his contemporaries, was destined to powerfully influence all future Christian thought.

The word Kenosis, used by Liebner about 1840, as an appropriate term to designate the field of discussion indicated above, is really the modern application of an old term which, if not nominally so extensively employed, was vir¬

tually as widely used. The modern idea of the doctrine of the kenosis, which is Protestant, and especially Lutheran, is based on the statement of Paul, who said that Christ (

(Phil, ii, 6-8).

Modern Doctrine. — As early as 1832 Ernst Sartorius and Johann Konig each separately ap¬

plied the expression of Kenosis, almost in the sense of a doctrine, to the Christ. Little by lit¬

tle the term and what it stood for gained ground, especially among Lutheran theologists until in 1845 it had assumed the form of a doc¬

trine widely accepted in Protestant Germany.

The position taken by those who adhered to the modern doctrine of Kenosis was that there is a perfect oneness in the person of Christ; since by his own will and in his divine form he laid aside the fullness of his divine nature in so far as all its external relations were con¬

cerned, thus making it possible for him to be¬

come fully incarnate, that is human, and capa¬

ble of human existence and development. The doctrine of Kenosis, however, recognizes that Christ retained the use of his divine power for such special cases

as were necessary for the re¬

demption of his work. Reformed and United theologians followed the Lutheran leaders in their discussions and explanations of kenosis, which its defenders claimed was the natural out¬

come of the previous development of dogma.

In this view they are mistaken since early ortho¬

dox exegesis was in no sense kenotic, nor were new theories, for a long time, kenotic. The idea that Christ left all his divine power behind him on his incarnation, obtained no hold in Christian theology previous to the 19th century.

In fact the tendency of belief was to hold that, even on earth, the glory and the power of Christ were still intact and that a veil had been drawn over them. This veil might be partially drawn, revealing glimpses of the divine power.

Even Calvin, the iconoclast in many other re¬

spects, seems to have held this view.

The present doctrine of kenosis, which seemed, about the middle of the last century, as destined to incorporate itself firmly in Chris¬

tian dogma, has been steadily losing ground, and the strenuous efforts of its champions have only succeeded in bringing out clearly and defi¬

nitely the fact that Christian ecclesiastical the¬

ology has never admitted or held the views pro¬

pounded by the modern Kenotic creed.

Bibliography. — Bensow, (Die Lehre von

der Kenose) (Leipzig 1903) ; Dorner, (History of the Development of the Doctrine of the Per¬

son of ChrisD (Edinburgh 1861-63) ; Frank, (System

der christlichen GewissheiD (Erlan¬

gen 1870-73) ; Gess, (Die Lehre von der Per¬

son ChristP (Basel 1856) ; Hall, F. J., (The Kenotic Theory Considered with Particular Reference to the Anglican Forms) (London 1898) ; Mackintosh, (The Doctrine of the Per¬

son of Jesus Christ) (New York 1912) ; Mor¬

gan, R. C., (God's Self-emptied Servant*

(1906) ; Simon, Reconciliation by Incarnation>

(Edinburgh 1898) ; Tomasius, (Christi Person and Werk) (Erlangen 1861).

KENRICK, Francis Patrick, American Ro¬

man Catholic bishop: b. Dublin, Ireland, 3 Dec.

1797; d. Baltimore, 6 July 1863. After studying in Rome (1815-21), he was ordained priest in the latter year and sent to this country to take charge of a seminary at Bardstown, Ky. He remained at Bardstown nine years till his ap¬

pointment as coadjutor bishop of Philadelphia in 1830. Twelve years later he became bishop of Philadelphia and there founded the seminary of Saint Charles Borromeo. In 1851 he was in¬

stalled archbishop of Baltimore and the next year presided over the first plenary council of American Roman Catholic prelates. He be¬

came honorary primate of the United States in 1859. He was prominent as a controversialist and a Biblical scholar, and published (Dogmatic Theology) (1839-40); (Moral Theology*

(1841-43) ; a revision of the Douai English Bible, with notes, etc.

KENRICK, Peter Richard, American Ro¬

man Catholic archbishop: b. Dublin, Ireland, 17

Aug. 1806; d. Saint Louis, Mo., 4 March 1896.

After studying at Maynooth he was ordained priest in 1830, and came to the United States in 1833. He was professor of dogmatics in the seminary of the diocese of Philadelphia and subsequently became vicar-general. In 1841 he was appointed coadjutor to Bishop Rosati of Saint Louis, succeeded to that bishopric in 1843, and was created first archbishop of Saint Louis in 1847. He opposed the dogma of papal in¬

fallibility but acquiesced in its final decree.

He published (The Holy House of Loretto) ; (Anglican Ordinations) ;

sult O'Shea, (The Two Archbishops Kenrick>

(1904).

KENDRICK, William, American horticultur¬

ist : b. 1795; d. 1872. He is noted for his in¬

troduction of the mulberry tree into the United States and his attempts to establish there the silk industry. It is interesting to note that his pioneer nursery gardens were planted on the ground where John Eliot first preached to the Indians.

KEN.SAL-GREEN, a famous London

cemetery in which are buried many noted peo¬

ple, among them Thackerav, Leigh Hunt, Sidney Smith, Kem'ble and Sir Charles Eastlake. The dead in the cemetery, which contains 60 acres, form in themselves a large city, numbering, as they do, over 70,000.

KENSETT, John Frederick, American

painter: b. Cheshire, Conn., 22 March 1818; d.

New \ ork, 14 Dec. 1872. His uncle, Alfred Daggett, an engraver, gave him his first lessons in art, but in 1840 he went abroad and for seven years traveled in England, Switzerland and Italy. The fruit of this student-ramble was a large number of sketches and paintings, out of which he exhibited in 1845 in the Royal Academy. The sale of one of his pictures, a view of Windsor Castle, encouraged him to per¬

severe. On returning to America he lived chiefly in New York. His (View on the Arno>

and (Shrine, 5 exhibited in New York in 1848, established his reputation in America, and he was elected in 1849 a National academician.

His landscapes are more remarkable for sweet¬

ness than for strength, but he maintains a uni¬

form standard of merit in all of them. His technique is delicate and refined, especially in his small canvases. He delights in the scenery of the Hudson, and of the sea-coast, and some of his effects are exquisitely charming. Among his landscapes the most interesting are (Sunset on the iCoast) (1858); (October Afternoon) (1864), both in the Corcoran Gallery, Wash¬

ington; (Noon on the Sea-Shore,5 which has been engraved by Hunt. Several of his pic¬

tures are in the Metropolitan Museum of Art, New \ork, the finest of them being (White Mountains,5 a masterpiece of its class. He was for some years a member of the national art commission appointed to direct the decoration of the National Capital.

KENSINGTON, England, a metropolitan

and parliamentary borough of West London.

Area, 2,291 acres. Owing to its salubrious situation, it became a favorite place of resi¬

dence in the 17th century when William III purchased a house that afterward became the royal palace. Isaac Newton died at Kensing¬

ton (1727). Queen Victoria was born in Ken¬

sington Palace, and at Kensington Palace her succession to the throne was announced to her.

The borough is replete with literary associa¬

tions, among those who have resided here be¬

ing Addison the essayist, Talleyrand, Thackeray, John Stuart Mill and Green the historian. Hol¬

land House was famous as a social centre dur¬

ing the time of the third Lord Holland. Bromp-

ton Road Oratory is perhaps the most cele¬

brated of its churches. The South Kensington Museum and the Natural History Museum are the most interesting public buildings. Kensing¬

ton returns two members to Parliament. Pop.

about 172,317. Consult Burt, (Historical Notices of Kensington) (1871); Faulkner, 1 Kensington 5 (1820) ; Hunt, Leigh, (01d Court Suburb5 (1885) ; Loftie, J. W., (Kensing-

ton> (1888).

KENSINGTON GARDENS, a celebrated

public park in London four miles west of Saint Paul's, and well known for its royal palace. In former times Kensington Palace was a favorite royal residence. King William III, Queen Mary, Queen Anne and George II died here.

Kensington Gardens and Hyde Park are much frequented

in summer and form a great orna¬

ment to the metropolis. They cover about 350

acres, and contain the Albert Memorial. In South Kensington the chief attractions are the South Kensington or Victoria and Albert Mu¬

seum, the Indian Museum, the Natural History Museum and the Imperial Institute. The scene of (The Little White Bird,5 from which Sir James M. Barrie adapted his delightful play (Peter Pan5 is laid in Kensington Gardens.

KENSINGTON PALACE. See Kensing¬

ton Gardens.

KENT, Charles Foster, American Biblical scholar: b. Palmyra, N. Y., 13 Aug. 1867. He was graduated at the universities of Yale (1889) and Berlin (1892), and the following year became an instructor in the University of Chicago. In 1895 he was elected professor of Biblical literature and history at Brown Uni¬

versity, a position which he held until 1901.

He is at present Woolsey professor of Biblical literature at Yale University. Among his writ¬

ings are ^Outlines of Hebrew History5 (1895) ; (lhe Wise Men of Ancient Israel and Their proverbs) (1895) ; (History of the Hebrew People, the United Kingdom5 (1896) ; his¬

tory of the Hebrew People, the Divided King¬

dom^ (1899) ; (Messages of the Earlier Prophets5 (1899); (Messages of the Later Prophets5 (1900) ; Usrael’s Historical and Bi¬

ographical Narratives5 (1905);

dents5 (1907) ; (The Heroes and Crises of Early Hebrew History5 (1908; 1912); (T'he Kings and

Prophets of Israel and Judah5

(1912); (The Makers and Teachers of Juda¬

ism* (1911); (Biblical Geography and History5

(1911) ; (Life and Teachings of Jesus Accord¬

ing to the Earliest Records5 (1913) ; (The Songs, Hymns and Prayers of the Old Testa¬

ment5 (1914); (Testing of a Nation's Ideals,5

with J. W. Jenks (1915).

KENT, Edward Augustus, Duke of, Eng¬

lish prince: b. 1767; d. 1820. He was son of George III, and elected to be a soldier, in which capacity he gave very efficient service against the French West India Islands and other cam¬

paigns. He was one of the most popular of British princes and numerous places were named after him, among them Fort Edward in Martinique (Fort Royal) and Prince Edward Island (formerly Saint John). Made Duke of Kent in 1799, he became commander-in-chief of the British forces in North America in the same year, rising to the rank of field marshal in 1805. His daughter became queen of Great Britain under the title of Victoria.

KENT, Jacob Ford, American general : b.

Philadelphia, Pa., 14 Sept. 1835 ; d. 22 Dec.

1918. Graduated West Point 1861. he entered the army as 2d lieutenant 6 May 1861, became captain in January 1864, and was brevetted colonel of volunteers in October 1864 for faith¬

ful and meritorious services in the field during the campaign before Richmond. After the war he was assistant instructor in tactics at West Point and from 1869 to 1898 was on frontier and garrison duty. At the opening of the war with Spain he was colonel

of the 24th infantry.

He was made major-general of volunteers 8

July 1898, and served with distinction in Cuba and afterward in the Philippines. He was retired in October 1898, soon after attaining the rank of brigadier-general.

KENT, James, American jurist: b. Philiopi, Putnam County, N. Y., 31 July 1763; d. New York, 12 Dec. 1847* Kent was graduated at Yale College in 1781, studied law, was admitted in 1785 as an attorney, and in 1787 as a coun-

sellor and commenced the practice of his pro¬

fession in Poughkeepsie. He soon became re¬

markable among his contemporaries for his legal learning and literary attainments. He was elected successively in 1790 and 1792 a member of the legislature for Dutchess County. Kent became an active and leading Federalist, at¬

tracting the notice and confidence of Hamilton and Jay. It was by Hamilton's counsel that the reading of the young lawyer was directed to the doctrines of the civil law and the treatises of the jurists of continental Europe. In 1793

Kent removed to New York, was appointed one of the two masters in chancery for the city of New York. In 1796 he became a member of the legislature. He was also elected professor of law in Columbia College. The body of his lectures at Columbia formed in after years, in some degree, the basis of his celebrated Com¬

mentaries^ In 1797 he was appointed recorder of the city and in 1798 judge of the Supreme Court. He continued a member of this tri¬

bunal till 1814, having been from 1804 chief justice. The Supreme Court at that time dif¬

fered widely from the court as at present con¬

stituted. It was formed after the model of the English King's Bench, being composed of five judges, who rode the circuits to try jury cases, and convened during the year at four appointed terms to decide reserved questions of law.

There were no American law books and no reports of American decisions, except those of Dallas just commenced. The proceedings of the court were languid and dilatory, and re¬

sort was had for rules of procedure and prin¬

ciples of law almost exclusively to English precedents and decisions. The accession to the bench of a young, energetic and able judge produced a striking change. It was the task of the court to expound the principles of the common law, as applicable to American institu¬

tions; to define and limit our new constitutional provisions ; to construe recent statutes ; to bring the principles of commercial law to bear upon transactions of trade and commerce; to devise rules of practice, and in short, to adapt to a young and rising nation a complicated yet practical code of laws. By the constitution of New York as it then existed an important political duty was imposed on the judiciary of the State. The judges of the Supreme Court and the Chancellor formed with the governor a council of revision with a qualified veto on legislative acts. This council was abolished in 1822. In 1814 Kent became chancellor and the seven volumes of Johnson's (Chancery Re¬

ports, > which contain Chancellor Kent's de¬

cisions, afford a profound exposition of the system of equity law. His term of office as chancellor expired in 1823, and returning to New York he resumed his professorship at Columbia and his

lectures there were given to the world, in his Commentaries on American Law) (1826-30). This work has since passed through 14 editions and acquired a world-wide celebrity. It has assumed in the United States the position which Blackstone in his own coun¬

try has long filled by his Commentaries on the Laws of England^ It embraces not merely the jurisprudence of the Federal Union, but the municipal law, written and unwritten, of the several States. Consult Kent, William, Me¬

moirs and Letters of Chancellor Kent) (1898).

KENT, William, English artist, architect and landscape gardener: b. Yorkshire, 1684; d.

London, 12 April 1748. He was apprenticed to a coachmaker in 1698, went to London in 1703, and there made some attempts at painting, and to Rome where he was a pupil of the Cavalier Luti, and whence he was brought to England by the Earl of Burlington, his patron for the rest of his life. He was employed in portrait¬

painting and the decoration of walls and ceil¬

ings, but Hogarth said that <(neither England nor Italy ever produced a more contemptible dauber.® However, he did invent a less formal method of gardening and planting and excelled as an architect. The Horse Guards and treas¬

ury buildings and Devonshire House, Piccadilly, are his work. He published the (Designs of Inigo Jones) (1727).

KENT, William, American engineer: b.

Philadelphia, 5 March 1851 ; d. 18 Sept. 1918.

Graduated Stephens Institute of Technology and Syracuse University, he became editor of the American Manufacturer and Iron World (1877-79), at the same time exercising his pro¬

fession of engineer from the latter date to 1890. Later he became editor of Engineering News (1895-1903) when he was chosen as dean of the L. C. Smith College of Applied Science, Syracuse University (1903-08). In 1910 he again became editor of the Industrial Section of the Engineering News. He was lecturer on engineering subjects in several well-known col¬

leges; was the holder of numerous patents on his own inventions ; and was well known as a contributor to encyclopaedias and technical magazines. Among his published works are (The Strength of Materials) (1879) ; (Strength of Wrought Iron and Chain Cables* (1879); (The Mechanical Engineer's Pocket-book)

(1895) ; (Steam Boiler Economy) (1901) ; (In¬

vestigating an Industry) (1915) : (Bookkeeping and Cost Accounting for Factories* (1918).

KENT, William Charles Mark, English

poet and journalist: b. London, 1823; d. 1902.

He entered' journalism and soon became editor of the Sun (1845-70). He graduted in law in 1859; but did not give much attention to law, journalism and literature having much more attraction for him. He was a constant contributor to the magazines and literary columns of daily and weekly papers, among them Dickens' Household Words and All the Year .Round. He was editor of the Roman Catholic Weekly Register (1874-81). He also gave much of his time to the publication of complete editions with memoirs and critical notes of famous British writers, among them, Burns (1874), Lamb (1875), Moore (1879), Father Prout (1881), Lord Lytton (1875-98).

Among his more original publications are

(1888); (The Wit and Wisdom of Lord Lyt-

ton* (1883) ; (The Humor and Pathos of Charles Dickens* (1884). Consult Francis, J.

C., (Notes bv the Way* (1909).

KENT, a county of England, forming the southeast extremity of Great Britain and ad¬

joining the counties of Essex (from which it is separated by the Thames), Middlesex, Surrey and Sussex. The Strait of Dover bounds it on the southeast. Its area is 1,570 square miles.

Two principal ranges of hills, a continuation of the North Downs of Surrey and Hants ex-

tend through the county from west to east, terminating in the cliffs of Dover, Folkstone and Hythe, which is elsewhere diversified with many minor ranges. In the south are Romney marshes and the tract termed the <(Weald,®

formerly extensive forests. In the north are the islands of Sheppey and Thanet and the mouths of the Medway, Stour and Darent rivers. The products are varied. Fruit culture, sheep raising, wool manufacture and the manu¬

factures of paper, tiles, pottery, gunpowder, hopbags, etc., are extensively carried on. The capital is Maidstone. In this county are dock¬

yards, arsenals, the famous cathedral of Can¬

terbury, the ports of Dover and Folkstone and several well-known watering places at Margate, Ramsgate and Tunbridge Wells. It was the ancient country of Cantium (q.v.) and the first established kingdom of the Saxon heptarchy.

It was settled by the Jutes and became promi¬

nent when its king, Ethelbert was converted to Christianity by Saint Augustine (597). It rapidly declined in power and in the course of the eighth

century, lost all of its independence.

It has eight parliamentary divisions apart from the parliamentary borough. Pop. 1,020,965.

Consult Hasted, (The History and Topo¬

graphical, Survey of Kent> (Canterbury 1801); (Victoria History of the County of Kent) (London 1908).

. KENT, a town near Akron, in Ohio. It is in Portage County and is situated on the Balti¬

more and Ohio, the Erie, the Northern Ohio Traction and Light and the Wheeling and Lake Erie railways. It is a town of 7,070 (1920) inhabitants and possessed of numerous active industries, for its population. Among these are railroad machine shops, nut, bolt and lock fac¬

tories, flour mills, concrete mixers, all of which are operated by power supplied by water. The town also possesses a normal school and is the centre of considerable local trade.

KENT, Fair Maid of, wife of Edward the <(Black Prince® and mother of Richard II. See Fair Maid of Kent.

KENT ISLAND, the largest island in

Chesapeake Bay, Md., some 15 miles long and situated seven miles east of Annapolis. It was here the first settlement in Maryland was made by William Claiborne (q.v.) in 1631. Pop.

2,600.

KENTON, Simon, American pioneer: b.

Fauquier County, Va., 3 April 1755; d. Logan County, Ohio, in 1836. At 16 he had an affray with a young man, and believing he had killed his adversary, fled beyond the Alleghanies and became a companion of Boone and the other early pioneers of Kentucky. For

a time he acted as a spy of Governor Dunmore, and sub¬

sequently participated in the warfare waged against the British and the Indians west of the Alleghanies, showing remarkable courage, sagacity and endurance. In 1782, learning that his former opponent was living, he returned to his native place, and soon after removed with his father's family to Kentucky. He was fre¬

quently engaged in Indian warfare, until the expedition under Wayne in 1793-94 restored tranquillity to the western frontier. As the country began to fill up with settlers his lands, to which, in consequence of his ignorance of or indifference to legal forms, he had never se¬

cured perfect titles, were taken from him, and by repeated lawsuits he was reduced to penury.

He nevertheless in the War of 1812 fought with the Kentucky troops at the battle of the Thames.

In 1824 he appeared in Frankfort in tattered garments to petition the legislature of Ken¬

tucky to release the claim of the State upon some mountain land owned by him. His ap¬

pearance at first excited ridicule, but upon be¬

ing recognized he was treated with much dis¬

tinction by the legislature ; his lands were re¬

leased and a pension of $240 was procured for him from Congress. lie died near the spot where, 58 years previous, he had narrowly escaped death at the hands of the Indians.

KENTON, Ohio, city, county-seat of Hardin County; on the Scioto River, and on the Erie, the Toledo and Ohio Central and the Cleveland, Cincinnati, Chicago and Saint Louis railroads ; about 54 miles northwest of Columbus and 67

miles south of Toledo. It is situated on the divide which separates the waters of the Ohio River from those of Lake Erie. It was settled in 1833 and incorporated in 1885. The sur¬

rounding country is a farming section, with some large forests. The chief manufactures of the city are hardware, agricultural implements, iron, lumber and dairy products. Its principal public buildings are the armory, jail, court-house and the municipal buildings. The mayor holds office two years. The waterworks plant is owned by the city. Pop. 7,690.

KENT'S HOLE, a station and cave near

Torquay, Devonshire, England, noted for its implements of the Paleolithic Age. It has been actively explored several times since 1825.

Under successive layers of limestone, black mold stalagmite in red cave earth lie the archae¬

ological remains which consist of bones of primitive horses, mammoths, wolves, lions and rhinoceroses, together with stone implements of an early type. On the top of the red clay, in a deposit of black earth, evidently long exposed to the action of the air, are implements of the life of a comparatively early age in the history of human culture, such as flint chisels, scrapers and bone and horn implements. This black deposit evidently represents a very considerable period of human progress, stretching from the rude stone age to the days of Roman occupa¬

tion which are represented by copper and bronze implements and weapons. The latter naturally form the upper part of the layer.

KENTUCKY (Cherokee, <(prairie,® <(the

Barrens,® and not meaning «dark and bloody ground® as popularly supposed), a south-central State of the Union, one of the (

(q.v.) bounded on the north by the Ohio River; the

second district settled beyond the Alle¬

ghanies and the first to become a State; ad¬

mitted to the Union 1 June 1792, next after Vermont. Capital, Frankfort; largest city, Louisville. It is irregular in shape, varying from a breadth of 171 miles between Cincinnati and Cumberland Gap to about 40 miles in the narrow part near the Tennessee, and being 458

miles in length from east to west. Total area, 41,283 square miles. Lat. 36° 30' to 39° 9''

N.; long. 82° 2' to 89° 40' W. It ranks first in caves and caverns, cannel coal, hemp, race horses and tobacco; fifth in coal production; and formerly third in distilled liquors.

Topography and Hydrography. — Its

northern boundary is the low-water mark on the northern bank of the Ohio River; its western, the course of the Mississippi as described in 1763. The eastern boundary is a large angle formed by the Tug Fork of Big Sandy and the main Big Sandy flowing northwest, the other side lying against Virginia, along the main Cumberland Range to Stone Mountain ; thence across a divide to Little Black Mountain, thence by the range northward to Pine Mountain Range, to the breaks of the Russell fork of the Levisa Fork of the Big Sandy, thence north¬

east to the Tug Fork. The southern line separates it from Tennessee by a boundary which is nearly straight excepting a ^jog® of 12 miles at the Tennessee River, where the original surveyors made an error. The surface is mainly a plateau averaging about 800 feet above sea-level, sloping in a northwesterly direction to the Ohio from the southeastern mountains. The Poor Fork Valley of the Cumberland, lying between Pine Mountain and the main

Cumberland Range, is 15 miles wide and 75 miles long, from 1,000 to 1,500 feet in elevation, and is buttressed by peaks sometimes 3,500 feet high, thus presenting the finest scenic portion of the southern Appalachian Mountains. The Pine Mountain, which is an erosion scarp fault, forms a long even-topped ridge about 2,500 feet above sea-level, with its steep face toward the northwest. The high¬

est points in the State are in Harlan County, from 3,600 to 4,100 feet above sea-level. The great north and central Blue Grass region (limestone) is an undulating plateau circled by a continuous hill-ridge taking many different local names (Muldraugh Hill, King's Mountain and Big Hill), and extending in a great curv¬

ing sweep from the mouth of Salt River to the mouth of the Scioto. In the west it forms the edge of a limestone plateau, while in the east this limestone is surmounted with the basal conglomerate of the coal measures, giving to it a very rugged aspect.

The drainage system is mainly a series of rivers flowing northwest into the Ohio, follow¬

ing the surface trend: the Big Sandy with its Levisa Fork, the Licking, Kentucky, Salt and Green. In the western end of the State the great rivers Cumberland and Tennessee, after pursuing widely eccentric courses, follow the same direction to the same goal 15 miles apart.

The Cumberland, rising near the eastern edge, flows crookedly through the southern part, dips into Tennessee, and returns to Kentucky. The Tennessee takes a wider sweep southward into Alabama, but turning back almost joins the Cumberland. These streams are noteworthy for their rock channels. The Kentucky, in particular, has cut a superb gorge through more than 300 feet of limestone in its lower courses ; and where it trenches across the Cin¬

cinnati Arch has walls nearly perpindicular, as at High Bridge.

Southwest from the centre of the State only the larger stream channels appear on the sur¬

face. . Here is a ((Karst® region, full of de¬

pressions through which the water sinks away, finding subterranean paths to the master stream, the Green River. A clogging of these passages frequently results in forming ponds.

This is the great cavernous district of the State, made famous by Mammoth Cave (q.v.), the largest in the world. As in all limestone dis¬

tricts, the underground waters have dissolved the rocks irregularly, leaving fantastic chan¬

nels and sculptures, huge chambers and narrow flumes, making deep pools and cascades, and creating stalactites and stalagmites, pendant and upright shafts. Its magnificent propor¬

tions, with the presence of a considerable stream navigable in one of its pools for row¬

boats, make it convenient for exploration and a fascinating spot for tourists. Colossal Cave and Great White Onyx are equally attractive.

Geology. — This district was at one time the bed of a vast lake of the Lower Silurian period; on its floor were laid several sedi¬

mentary deposits : Upper Silurian, Devonian, Subcarboniferous some 5,000 feet deep, and on these Carboniferous, (coal measures) to 3,000 feet more. The great Appalachian uplift raised this some 5,000 feet, the surface forming a dome in the centre; then forces of denuda¬

tion acted planewise across the top, cutting away all the upper strata down to the original Lower Silurian in the middle — whence the outcrop of blue limestone in the Blue Grass region — and other strata to varying degrees in other parts, leaving the coal measures exposed in two great patches 100

miles apart at the edges. In the southwest the Subcarboniferous limestone is at the top — the region of caves and sinks.

Mineral Wealth. — Bituminous coal mining has grown rapidly in recent years, the output rising in 1917 to 27,809,976 tons, and giving Kentucky fifth place in the Union. While the Western field yielded the larger proportion in 1907, the Eastern field produced two-thirds of the total in 1917. Rich veins from six to eight feet thick occur at shallow depths permitting easy exploitation at minimum expense. This condition has invited capital from other States.

Practically all the increased railroad mileage along the Louisville and Nashville and Chesa¬

peake and Ohio lines is in the coal districts.

Company towns, such as Jenkins and Mc-

Roberts, grew up quickly to serve the mining communities. The chief markets are the lake ports, though the rich content of some of these coals for coking and by-products has created special demand in Saint Louis and Pittsburgh.

Cannel, or gas coal, is plentiful in Morgan County, yielding 43,000 tons a year. Petroleum and gas wells, slightly utilized by the early settlers, and almost undeveloped even a decade ago, sprang into prominence with the outbreak of the World War. Traces of oil and gas occur in more than 50 counties. While gas production is vastly exceeded by the West Vir¬

ginia fields, the smaller Kentucky field is now tapped by lines which supply Mount Sterling, Winchester, Lexington and other cities of the Blue Grass, and Louisville. Gas production in 1910 attained a value of $891,000. The oil in¬

dustry, however, has caused much more excite¬

ment. The older fields in Wayne County on the

Tennessee border, extending northeast through Wolfe County, and served by pipe lines for many years, seemed to be stationary in pro¬

duction ; but the high prices created by war demands led to tests in adjoining counties, with most surprising results. _ At depths rarely ex¬

ceeding 1,300 feet in Estill and Lee counties in the eastern section, and about Allen County on the Tennessee border, new supplies appeared.

KENTUCKY.

(TENNESSEE.)

Estimated population, 2,379,639

COUNTIES

Pop.

16,503

Adair .

E 11

14,882

Allen .

. F 9

10,146

Anderson .

.C 12

12,690

Ballard .

.E 3

25,293

Barren .

F 10

13,988

Bath .

.C 14

28,447

Bell .

. F 14

9,420

Boone .

B 12

17 462

Bourbon .

.C 13

23,444

Boyd .

.C 16

14,668

Boyle .

D 12

10,308

Bracken .

. B 13

17,540

Breathitt .

D 15

21,034

Breckinridge . . . .

. D 9

9,487

Bullitt .

D 10

15,805

Butler . .

. .E 8

14,063

Caldwell .

. . E 6

19,867

Calloway .

. ,F 5

59,369

Campbell .

B 13

9.048

Carlisle .

. .F 4

8,110

Carroll .

B 11

21,966

Carter .

.C 15

15,479

Casey .

E 12

38,845

Christian .

. .F 6

17,987

Clark .

D 13

17,789

Clay .

.E 14

8,153

Clinton .

.F 11

13,296

Crittenden . .

. .E 5

9,846

Cumberland .

G 11

41 020

Daviess .

.D 7

10 469

Edmonson . .

. .E 9

9,814

Elliott .

C 15

12,273

E still .

D 14

47,715

Fayette .

,C 12

16,066

Fleming .

.C 14

18,623

Floyd .

D 16

21,135

Franklin .

.C 12

14,114

Fulton .

. .F 3

4,697

Gallatin .

. B 12

11,894

Garrard .

D 12

10,581

Grant .

B 12

33,539

Graves .

. .F 4

19,958

Grayson .

. ,E 9

11,871

Green .

. E 10

18,475

Greenup .

. B 16

8,512

Hancock .

.D 8

22,696

Hardin .

. D 9

10,566

Harlan .

. F 15

16,873

Harrison .

.C 13

18,173

Hart .

.E 10

29,352

Henderson .

. D 6

13,716

Henry .

.C 11

11,750

Hickman .

. ,F 4

34,291

Hopkins .

,.E6

10,734

Jackson .

. E 13

262,920 Jefferson .

.C 10

12,613

Jessamine .

D 12

17,482

Johnson .

D 16

70,355

Kenton .

. B 12

10,791

Knott .

.E 16

22,116

Knox .

. F 14

Incorporated Cities

683

Adairville .

. .F 8

579

Albany .

. F 11

353

Alexandria .

. B 13

436

Allensville .

. .F 7

384

Anchorage .

C 10

555

Arlington .

9,874

Ashland .

,C 16

197

Athens, Fayette.

.C 12

631

Auburn .

. .F 8

1,787

Augusta .

.B 14

184

Bagdad .

.C 11

337

Bandana, Ballard.. E 3

1,633

Barbourville. . . .

.F 14

2,126

Bardstown .

.D 11

1,087

Bard well .

. .F 4

532

Barlow, Ballard

. ,E 3

357

Barnsley, Hopkins E 6

270

Baskett, Hender

son .

. D 6

1,360

Beatty ville .

D 14

762

Beaver Dam .

. E 8

269

Bedford .

B 11

208

Beech Grove . . . .

. D 7

6,683

Bellevue .

. .F 5

824

Benton .

. .F 5

1,510

Berea .

D 13

339

Berry .

.C 13

68

Bethlehem, Henry

C 11

349

Birmingham .

. F 5

449

Blackford,

Webster .

.D 6

136

Blaine .

C 16

229

Blandville .

.F 4

352

Bloomfield .

D 11

132

Bluff City, Hen-

derson .

.D 6

257

Bonnieville .

E 10

236

Booneville .

E 14

9,799

Bowling Green. . .

. ,F 9

330

Bradfordsville . . .

E 11

482

Brandenburg .

. .D 9

254

Bremen,

Muhlenberg . . .

. E 7

77

Briensburg, Mar-

shall .

F 5

Pop.

10 701 Larue . E 10

19,872 Laurel . . E 13

20,067 Lawrence . C 16

9,531 Lee . D 14

8.976 Leslie . E 15

10,623 Letcher . E 16

16,887 Lewis . C 15

17,897 Lincoln . E 12

10,627 Livingston . E 5

24,977 Logan . F8

9,423 Lyon . F 5

35,064 McCracken . E 4

. McCreary . F 13

(Pop. incl. in Pulaski,

Wayne, and Whitley Cos.)

13,241 McLean . D7

26,951 Madison . D 13

13,654 Magoffin . D 15

16,330 Marion . . . ; . Dll

15,771 Marshall . F 5

7,291 Martin . D 16

18,611 Mason . B 14

9,783 Meade . D 9

6,153 Menifee . D 14

14,063 Mercer . D 12

10,453 Metcalfe . F 10

13,663 Monroe . F 10

12,868 Montgomery . C 14

16,259 Morgan . D 15

28,598 Muhlenberg . E 7

16,830 Nelson . D 10

10,601 Nicholas . C 13

27,642 Ohio . D 8

7,248 Oldham . .C 11

14,248 Owen . C 12

7,979 Owsley . E 14

11.985 Pendleton . B 13

11,255 Perry . E 15

31,679 Pike . E 16

6,268 Powell . D 14

35.986 Pulaski . E 12

4,121 Robertson . B 13

14,473 Rockcastle . E 13

9,438 Rowan . C 15

10,861 Russell . E 11

16,956 Scott . C 12

18,041 Shelby . C 11

11,460 Simpson . F8

7,567 Spencer . Dll

11,961 Taylor . Ell

16,488 Todd . F 7

14,539 Trigg . F6

6,512 Trimble . B 11

19,886 Union . D 6

30,579 Warren . F9

13,940 Washington . Dll

17,518 Wayne . F 12

20,974 Webster . D 6

31,982 Whitley . F 13

9,864 Wolfe . D 14

12,571 Woodford . 0 12

Towns, and Villages

477 Brodhead . E 13

819 Bromley . B 12

492 Brooksville . B 13

313 Brownsville . E 9

85 Bryantsville . D 12

298 Buffalo . E10

679 Burgin . D 12

817 Burkesville . F 11

183 Burkley, Carlisle. . . F 4

172 Burlington . A 12

1,117 Burnside . E 12

426 Butler . B 13

1,005 Cadiz . F6

121 Cairo . D 6

742 Calhoun . D7

248 California . B 13

124 Calvert City . F 5

269 Campbellsburg. . C 11

1,206 Campbellsville . . . E 11

326 Campton . D 15

1 63 Cane Valley . E 11

430 Caneyville . E 9

131 Canmer . E10

1.293 Carlisle . C 13

1,906 Carrollton . B 11

298 Carrs ville . E 5

259 Carter . C 15

230 Casey ville . D 5

3,520 Catlettsburg . C 16

645 Cave City . F Id

299 Centertown, Ohio..D 8

2,545 Central City . E7

272 Cerulean . F6

170 Chaplin, Nelson. D 10

155 Chicago, Marion. .D 11

376 Clarkson, Grayson E 9

1.098 Clay . E 6

581 Clay City . D 13

1,497 Clinton . F4

1,403 Cloverport . D8

1,022 Columbia . E 11

970 Columbus . F4

213 Concord . B 15

2,589 Corbin, Whitley. .F 13

252 Corinth . C 12

942 Corydon . D 6

Pop.

57,144 Covington . B 12

467 Crab Orchard . . . . E 12

189 Crittenden . B 13

402 Crofton . F 7

163 Cromwell, Ohio… D 8

159 Cropper . C 11

235 Curdsville . D7

3,603 Cynthiana . C 13

5.420 Danville . D 12

1,350 Dawsonsprings ...E 6

6,979 Dayton, Campbell

B 13

75 Deanefield, Ohio. .D 8

141 Defoe . C 12

260 Dexter . F 5

741 Dixon . E 6

386 Dover . B 14

1,126 Drakesboro,

Muhlenberg. . . . E 7

143 Dry Ridge . B 12

125 Dublin, Graves …. F 4

138 Dunmor . E7

144 Dunnville . E 12

176 Dycusburg . E5

3,931 Earlington . E7

698 East Bernstadt. . E 13

77 Eastview, Hardin. D 9

1,442 Eddyville . E 5

381 Eden, Martin . ,D 16

1 68 Ekron, Meade . . . . D 9

1,970 Elizabethtown. .D10

135 Eliza ville . C 14

94 Elkhorn, Taylor. .Ell

1,228 Elkton . F 7

900 Elsmere, Kenton B 12

1,274 Eminence . C 11

700 Erlanger . A 12

182 Eubank . E 12

128 Ezel, Morgan. ... D 15

292 Fairfield. Nelson. D 10

108 Fairview . F 7

134 Fallsburg, Lawrence

C 16

1,180 Falmouth . B 13

271 Fancy Farm, Graves "

F 4

427 Farmers . D 14

136 Farmington . F 4

404 Ferguson, Pulaski . E 12

68 Flat Gap, Johnson D16

1,219 Flemingsburg _ C 14

250 Florence, Boone .B 12

702 Ford, Clark . D 13

649 Fordsville . D8

80 Fort Mitchell, Ken¬
ton . B 1 2
158 Foster . B 13
188 Fountain Run. . .F 10
11,080 Frankfort . C 12
3,063 Franklin . F8
421 Fredonia . '. . E 6
172 Frenchburg . D 14
2,575 Fulton . F4
404 Furguson, Pulaski E 12
4,533 Georgetown . C 12
287 Germantown . . . .B 14
87 Gest, Henry . C 11
421 Ghent . B 12
458 Gllbertsville, Mar¬
shall . F 5
2,316 Glasgow. . F 10
303 Glasgow Junction
E 10
237 Glencoe . B 12
43 Gordonsville . F 7
157 Gracey . F 6
106 Grange City, Fleming
C 14

213 Gratz, Owen . C 12

735 Grayson . C 15

450 Greensburg . E 10

680 Greenup . B 15

1,604 Greenville . E 7

1,096 Guthrie . F7

300 Hamilton (Render P.

O.) Ohio . D 8

509 Hanson . E 7

366 Hardin, Marshall.. F 5

737 Hardinsburg . D8

657 Harlan . F 15

3,147 Harrodsburg . D 12

976 Hartford . E8

1,002 Hawesville . D8

537 Hazard . E 15

395 Hazel . F 5

257 Hazel Green . D 15

525 Helller . . E 16

12,192 Henderson . D6

242 Henshaw . D 5

2,736 Hickman . F3

148 Hickory Grove. . . .F 4

1,977 Highland Park,

Jefferson . CIO

182 Hillsboro . B 14

370 Hindman . E 15

179 Hiseville, Barren. F 10

744 Hodgensville . D10

10,762 Hopkinsville . F7

103 Horse Branch. . . .D 8

881 Horse Cave . E 10

118 Huntsville, Butler. . E 8

384 Huston ville . E 12

316 Hyden . E 14

153 Independence… . B 12

381 Inez . D 16

272 Irvine . D 14

Pop.

665 Irvington, Breckin¬

ridge . D 9

647 Island, McLean . D 7

1,346 Jackson . D 15

177 Jamestown . F 11

345 Jeffersontown. . C 10

86 Jeffersonville, Mont¬

gomery . C 14

1546 Jellicocreek,

Whitley . F 13

150 Jonesvllle . C 12

747 Junction City …. D 1 2

304 Kevil, Ballard .... E 3

200 Kirkmanville . F7

212 Knottsville. Daviess

D 7

889 Kuttawa . E 5

266 Lafayette . F6

426 La Center, Ballard E 3

1,152 La Grange . Cll

12 Lairsville, Russell Ell

1,507 Lancaster . D 12

1,723 Lawrenceburg _ C 11

3,077 Lebanon . Dll

807 Lebanon JunctionD 10

269 Lea City. Wolfe. . D 14

1,053 Leitchfield . E 9

65 Lenoxburg,

Bracken . B 13

253 Lewisburg . F7

596 Lewisport . D8

41,097 Lexington . C 13

330 Liberty . E 11

161 Lily . E 13

154 Lisman, Webster.. D 6

1,220 Livermore . E7

685 Livingston . E 13

153 Lockport, Henry .Cll

1,638 London . E 13

1,356 Louisa . C 16

238,910 Louisville . C 10

4,163 Ludlow . A 12

118 Ly nn ville, Graves. .F 4

530 McHenry . E 8

146 McKee . E 13

190 Mackville, Wash¬

ington . Dll

4,966 Madisonville . E 7

626 Manchester . E 14

109 Mannsville, Taylor

E 11

1,627 Marion . E 5

160 Martinsburg,

Elliott . C 15

5,916 Mayfield . F4

308 Mays Lick . B 14

6,141 Mays ville . B 14

98 Middleburg.Casey E 12

7,305 Middlesboro . F 14

937 Midway . C12

207 Milburn . F4

799 Millersburg . C 13

355 Milton . B 11

154 Minerva . B 14

260 Monterey . C 12

1,338 Monticello . F 12

1,105 Morehead . C 15

2,725 Morganfield . D 6

569 Morgantown . E8

1,266 Mortons Gap . E 6

81 Mt. Carmel,

Fleming . C 14

157 Mt. Eden, Shelby .C 11

321 Mt. Olivet . C 13

657 Mount Pleasant,

Harlan . F 15

3,932 Mt. Sterling . C 14

930 Mt. Vernon . E 13

475 Munford ville ... .E 10

2,089 Murray . F 5

298 Nebo . E 6

235 Nepton, Fleming .C 14

468 New Castle . C 11

118 New Columbus,

Owen . ; . . . .C 12

72 Newfoundland,

Elliott . C 15

405 New Haven . D 10

240 New Hope . D 11

214 New Liberty ... .D 12

79 New Market,

Marion . D 11

31,927 Newport . A 13

2,935 Nicholasville . . . . D 12

390 North Middletown

C 13

235 North Pleasure-

ville, Henry ...Cll

254 Nortonville . E 7

2,073 Oakdale, Jefferson C 10

257 Oakland . E 9

1,132 Olive Hill . C 15

17,784 Owensboro . D 8

1,024 Owenton . B 12

942 Owingsville . C 14

24,842 Paducah . E 4

942 Paintsville . D 16

91 Paradise,

Muhlenberg .... E 7

5,859 Paris . C 13

104 Pell ville, Hancock. D 8

731 Pembroke . F 7

68 Penrod . E 7

407 Perryville . D 12

393 Petersburg . A 12

651 Pewee Valley Cll

/

Laurel ville

Xongitude West from Greenwich.

Wilmington.

Chillicothe

KENTUCKY and

TENNESSEE

Greeuburg

Hillsboro

Column

Bloomingtoir

-•Dayton" — ■

\\'c\vj>o'rf

Cop'd Sprin

.yXvRuSS

Statute Miles, "9 —1 Inch.

lndopondcsce/o'

BOQNE [Wfcl

Jllct.WOO.1

altoUB j? p

tCalitornla

wMentor

.AVloacow*

,eto*n

N«w 11 * II Mnp r.f Kco'urky and 1.

it by Rand McNally U Cj.

rLRedford

leasanl

"w Uerkshii

lSW«Vno»ti ry'ri’""

5 IPENDYpETOI

Arj/f nluiii lAV

Lynn°

Jq/r'i* ret* n i i |n

gUGREENUJ

Laurel/

’ : i r F*b 1 1 ton “r" S .1 n ./c r SUL— ’

hwAuL O'ABROLL

rd«

f :v|

^viwGiy^Campbelts^Z/a/^a

_^Tl*endletou bum _ C

■SJJ* H E N P IY

.W A,<9Ae«cnsllo

'^t'LIIiTI Spr. ijrtilUOaL.

X> vj. XCrof.-ler fo V

*>S H E U B y/s4

l^Chrl«lUn^\ r-r; £NVP-

)Tv'**. P^l. -Hattnif / ,

/r 'N^A veiislokeii^V»vC5/i

'/ T.v»ri4t,ri,mir\ r'?»

^ll>rj^D"ERlSON

'(Tree**

Uedt

fsW7/'

l.'^/yikr& ulU^sAoro

LEWIS '

oh iwon'j) c, o Cnim°i

'W\,FI e nwngs burg Wafe j

f u E m i 'jOftT-k cm

. ■n>'»n ° Poplar / fripVj

£ * Plains/ rt

B.AT H 1'^

j^trrCT niuOUXl^0 A»£

Pru^' HDarnct^E sOf / ^

Ko HAR«?ISON 'ey *V

f'$ufiaai ^*oindextc/g?W*ih

[.Sdiicvillc

jt'.rilfluiiniy/

^vPjMil'e^b.ir

•-//NICHOLAS.

/ArtrlKritrit

BO IN '

'nr is l>

Ccntralia

(&o y d '

iLockwooi.i

Princeton

Stajppllng Gt

>s<. /ihilupl

/V«M4_n

fulsv'^

SJLoulsylll

btraw.lier/

loci' "I'E X .

VTUPiiwood

< ^Ratcliff |

|OWebbville '

| o Cherokee

LAWRENCES

:thsoLlaindj\\

" 74«xO V

. Jorehei

inestoos

^ o\w A Nl

iincola

Praky Bach Bpm

= LLlO TIT

^ » FieulPn0

WolfiCreclc .

„Bft\tlctown

n

Oonc„^fjr^,

Chcnaul(fc Rrni

■fT-d

B U L t L I T T X SF1

llown Jo } Cl-rmoaf W.yA

Ufli'lmoiitl ”^JluUb*

'^SSlpVren<4li-

[gomerv/^. ©bui-l

uChlFEEx

vV'0 '^>1 an ton °u/>|

Ihiion *h

. OfruttO/^dhi^Hoix.

JOHNSON / luel®

;Vr.° ; ,\';ui.tk>ille

Canneij

O^CAElm \

;f2rs

AJluvcrport fj?0£n

llnnlinsTii^g o •

^"^ilarflald

KINHIDGF.

, Co7i8tanfi7i4j

^ltock 1-iclt o f

AyN 1mer\cer?

WD S Jlraianll//,// jS

^ake« llarrO(C,ba/. lcurdif

V aIIoi Dill V | ,f-CvC' I

KahINGTON I; uui«n»P

\ 'JF€"

> 1 1 tlrlV4iri »'*V'p

•Springflehtf boy lVe

T-rrj 1) anvil lor r

POWEVL1

(SkiUniaifN,

M/T 0‘ '.^HANCOCK/

/j\v c»'«>hyV;0 Patti I

•AuJe & 8'\7yfc|t«i.BRE!

L 'w„r OilaM I’. \

FSutkijrlauil (X,

\ rhitL!i(‘ J1'

it . ' O Bulot'!^.>l

^JK55i‘ vs» T..

f er DanV.:

— iJi ■ 1, £'«-c('rv,‘V

nd" !V.ojP, r, Broot

F/NIBE RG S fAberder^<-tfor, »

VllHiliiT Vt i'ouMv/A,,lI(»rKniito'

\0N '\jU.i'jr v£-*lli

V_Belf,X[Jgi ^R1 versipcTYU.

> JtichdhJ^yy

’jeSSAMlNf

IE1 Dorailt

WOLF

i Torrant

Vr blitiikin '

IH EN DYE RSO

k' crly r I JViauvir y

L/tP- ’ iltdbttrdi

£ Cairo I \f'-i

Llhxie*

vrtxl \V\YilUa>nBon

ShawneetowiT

VQv m |Uonant«K)W»i]

umbrT^' o U!ood\oe ^iirn|i,|

N. \AVpbor<’tt1?'a'2T,

■\ N Mlrtin/\rt

\

luck ' 0/f 00 Y D

Vest LacKEy4« avlland

: KNOTT 5UtSS

|l>»»rf| Raveno jtdDow/:

X , o ^Ao/;

Utndumn pine x

lylaril \V\el&^ffr>7

GARRARD

2iwLuncas(i

.,4 uckson,-^

Vthitt

\oLost Cr. /

Cullvl'r

DeKo\N

CnaeyiK

Parker City

Deskin

- .^-WayB«R0.\i/gTV*WI^AUving3toi

■ f S £ *Y f^AKahaak f^uel Qrct

k' if

\ '• 9 Atintnn Ari'MO.ii-e Hill O A.

ilton ■r/roca.BVS«0r,' ^Somerset \

U HA S K I j

u\v^Bur^idt d&ckcutle

'/Clover

,r °Botto%

HrRce-

I'T R /

! SI ail -'It

lllans'jn.

)laton|

irmua-

roubles*

I .

'Repton/|^Ai- N

iCRITTErJoEN -Ti

• lfarlou® Pro^lg

Sf -;fef

blnsgn

Carrei

'Ulackey

'•dtfadboti

HOPK l

k suT'"?®.,

Uunfardl

'ayouJtfiih

Smith Ian]

Thiej JNorton -9?TS

llVY YManniog^yl

^JEmpire fc.

?< agCrofton z-^

As sPelloni'.

War bran*

t'^ruito

iaM A: V\ . -r

AR RE Ml -METCALFE)^

Twnp7e 27

xT/o1[l , i Summer /

CHRIJSTIAN NwOL.vti.Vure

v y. oMlll

8tauboav.il -0(u

WAYNE

ea°Coappr*vIlla i©

yo^er&.bm'F

lartinfburg ^Sav&efl Ip

fpin® Vjf,

B# ii

Fla? /y

.liock 1L;

Willinntsl

LR E A R Y

\S hit ley

is^Clty

1 Stearns

fRnsseTh illo

GAN,

l-Re.l Oak J

7

W oodliurn /■ J»agevla

:S«/0ALLEN

SIM/pSON Stottsvill*!

"" Tii|lklli,4siiapi3i S"le?et^

AdairviSa 1? o A*™ ™

'anN>nl o

Calrtfonia jA

I G.G fu

Roaring0 a

■ ‘nturlte ^prtnj;ii#indouY

k La Tapeae jw

lurgf-NT^K

[w hV.it LEYX

k l Pleasant V it

El’S-.

Akers

.Bristol)

RTcnclft’N

lountvillb^^

P«»rjAo Hear

Dover'0 sr^prli

? T E WoY\R

Stribllog^LN^

'X^Cedur Hill Mulloyt 9q \\Portland

»7ma^wwt?T^c^P*‘in^(leM / v ^

ROB HR T S ONf'fe v;

. %r'i\Tjc

.Idenci’Y A ^uiRcysr

ii»oorf^^Qn rksvllJty/1

3NIWTTO1ERT.

> JJ V> o\\ °Qrt

\WA^V\ ✓

'Louise) _t\-7

end Pro ^ C1

'Infield!

OboiV

r„.C UA1|B\0 R N E

g u',,-o\Tnovi/~J^

©B.TPfTstOV 7|®. I l.lr ,V

OOljrfpU6°Pall MnlcL*

N /0LUtfoCr»b^^-5gU'<,iti |t ,

tOW °Rifcrton i*.^o-f^««Vo>a» T-UJIunts

' St F.vrlr J a m Oslo " Yi(-//^i.0il'V'V Q c k '

Fj.rr oAIU,dA t/llobbmEJUwj

UildwrArniatliwua* \ ' A R llgl,y

F E T R E s£Ya Road^'g

Glej^TaiyJr ^0° La Db»

j^yfUi right /A ^ Brancb*/^

Render oi. « . , Uo*»c

A rev leCrtcJc'o^

^ f Monroe^

HilhamV''''''8' .

5 P) CrawTor

Love/rton

yf* n

I Mills i t

1-ulnnV

...tilNl)

CAMP/BELU 5*

ot/^W.l18p

wt^LafolIdtU

Cfyrin lV'n™i Xoitm

Vet him Tret » Cottager Jf-JL .

[c k t* \ r v * cGrouc /Chester kS. \J

fOlartlii ^ i H ElN R Y OJ

» /\T)resdeii ParKL_L_i—

sRopiDavic^o ^Fdl

'7/ 7 / X:

C.v3 '„7"l „ /r>G O U S D A L E.

TTorll SprGJP**./^

J^CKSqN

Meag-ivil|(T

Un lues »oro/^\/

Ihyhlaiul f*jk;uc~h l

irtllHgm; MarongoO

WASHiNoNrorT]

/►Qirlloi

»nckslK

lodletts V.

it ml City

lao)awood /

s oJ\

pt'ft nT

Mosbcmi Sfi

'~\eOd'i^//' J ,

GreeneviHy ■

Unitc/a^J o'l'l^j

tpc j .: i 5

Mb stone^** a

Oram

LEN / V>;

lorclsiotvfP"

'uiTtynil'lr-v;

JtleWi

ARankins Aid

|^Depot ,

ld]g«

H dAniJona »^C,'

jrdotuHr-o'g'ym^

loiiersl

Cz Trimble Jr A,

P p/ ItV'i lieifordo (n,n

L TyN.-pberu

Pyorsbu}-gDjer V 7 7;

-iL Ellen] G | 8\S

Irccnficl*

ii 2J5S?

w 1‘cseKi

^,r OUdcrllle AVatertow

uQ^sk'ar,CufNcP‘li ia,J

3iintj?W'v.^ Cainsville

j^LaVAgiN^: o Z

RUS®RF0RD .WX'SSSJP

“oc Murfreesboro ! Dirfrelfi L

Rock valA'Vinstid *'Voofe,,rJ Ro-'an7

Rockxa^ 0 , S CANN0N [^Danenpori /

.el.villA (IhHstAina 31f UpBnvllle_^/

^ Xr Sinartt

\ft-r Morrison

..«*irAoueny

'gXiceptae

LsiIVilLLE.

lf .'lr[ijVirN\Y\

OHrer Bpiyaug

/Kansas

F.ER6CN

ioffton

i Liberty

.Nemo1

cfaenesis

Trezevaul

IU\MBE^LANp

31untIngdon II 0 :

OS^A RROU

'•'H.Ames\k,b',l^f A.

zLavinUL

?J^rAfEu ttf-n-Vi nWty^pring

fJ/W. ■

l/j/'twkp'S hook* y Jlarriaours

7s .RccWtd oC,ugp v\|er vine o

Ps*iiu %.^a . c f\v 1 E R

^lv° O V.McOvCi';';'I/5a

- - ° Wears YjiHcvlUHV'o

noxvillj

'^jUtok* Sr*/ ~d°L'aiforf 1

/lT*lleX Friendship j |oM

6/W^ \ \ Gllison

p TJCROCKCnTTXTN \S'

dM aul >; L'iijv ,Aluh*4ift*'

70 FvHoi Gad.V.en,/jr*

O Toulon

fDll'Os ». ^tMC.iwfpa.^N

>rv£"-yC h %o "

HAYWfOOD kS "

ii epard* i^T^

Jingo l ilren V V/ V;''°cr V,

s.°01*a!»VCYffi

teipera TbrJc w/t 1 a bPal b

ws el M-sg®Vi.

1 'iAhi'.nJ's"tAS

f>**apart**)sr^ priueNCi-osst

ffyljylatLjiamYl.

r^JVirhon dU. r

Sparkman J®' 7

JVAN BUREN/it2

t/ease ^ "Sw^tgua,

AS Spencer /' 5 Her

\\ LVa^t°

lykcY 1 1 1 0 * r,y

>H«b • jB L E D/S 0 E r

icewheba Spring*/ Lees /

I t.Mt. AirjjN^TN-

L'*U uulup /aW freak,

PrT^"> - R >/iburu70

le ~WooU pi oWarnoi

4^>/CantreU j

Grahnru'/jLiok Cr.0 1

HJCKiMAN ./

Eskota

WLobel V.<

uDensont

'Laiui

l cards r;

ervvUe

I P**°iPFNP3RSP*

iy,^epX ffmiA^Se^UariS

Cdntervlllc"

v f- Pleasant 1

,V/ K */

ini(e>n s«toJ/

Foster*

sal

/Sweet

Water

•agana

Uc>8*?»«o-^o <

Bell Buckle

iR 0 Sl&mnitviU<

A’Vartjacp 0/

v Ju LCOFA

Ashe' llle

, FauoettK;

« t Urakevnlle7uT

CreeC * /Mad ivon vl I Ie>v0’S

OudgevA/1 O N R

T Englewood [a

rK^Nt. Vernon^l^a

„S? AY

fcr1s.-^v2

fr Brigl.tv.i7 Q Munch |

> T I fVT O N «

Atoka S Keellng|c«<2JUr that.,

Tipton jf Almira ihlSOn^ff f ‘a ncfi l‘.o I SalnvTTu
]

[A I lit If Ml II l1*

1 GRU&NC

7 /sjfofArccPs

e/ Lynnville.

Ca'mpbjff t°i lb Cl

AR/SHA* L ; ' Nnrui.nJ *

„ L*"*M

l.\r.h*r Yf" Buonevtlle

Xir«u-isbM^h^- «\

i ViS|.e.drn VHowell

.or|L I N C\OL

Fnl ettev IlltL^

^JHnr ™Jx

^xw-^sio.i.!V-,,0X

77; /cJdd- F lintrllloi

? 1 1 Rn| portion Tin coin ,

'nsoiv

j o^artya v

| &»lti I lo^ I

ftlledgmnlle

■ I\-Snvauuuh

oiconou

Rutherfordton

.irUanrluAter. 1

PmmontFxCyU

ahom j

mg4iinn7>

nice V llle y

fi |\5p*/ iv'k, .rSanford

/ %Tfa,hJSc, Cog Hill

- tatdpj

. y B R A'D Jl F

' 0|Tenlo n ,

: ^^Clevelfanil '

jP ^^/CoahuIW P lO "■Li/*

^BtaA6!

^Ethridge j

j/iallaway

[Laoonia,

[land**.

dcNairy -<

Coffee Lon

Jlethel Spi

t A 'Ian

h r Y-

Janetta

j HARD!

T'Hlco>

r ° Houston o.Modn ' enus

”K <^,;;‘la9vr.

Victory ty-yX

illmtJtiUs w«t lYimt J? .

[Wayland SpringUr/V

Jrovc IronCityfAX^-

Q /«

lynfliburgAv^.

WfHeliestej^v^

^yiderer<^r

I R/R A N K LJl

SoraDf^an^ -Vri'lcT.

Some

Wli 1 * arc II

'tV iclonY

%S»1raed.f'""SVy® R D I

.av o\Falcon p 9f Pittsburg

$irUf ^iUamburg

S'L-ariarweld

ispen Hill*

a _aaby | Lesters

/ Loretto JPi»pect Sta.

St.Joaeph %ethel° \

Kimball.

Pittsburg^

Orraeu'

ikwiok i

laLclla

jWalnui

Corinth

CohuttJ

Springs

Greenville

Hernando

/ Madi/son Cross °J

'tbens /Roads - ej

HJ5K3, A

Stev

nson

ZDaltoiy

Longitude ^Hest. from Greenwich.

KENTUCKY— Continued

Pop.

1,280 Pikevllle . E 16

2,161 Pineville . F 14

934 Pittsburg . E 13

522 Pleasureville . C 11

179 Poole. Webster . . .D 6

190 Poplar Plains ... .C 14

152 Port Royal . C 11

1,120 Prestonsburg ... .D 16

162 Prestonville,

Carroll . B 11

3,015 Princeton . E 6

2,084 Providence . E 6

242 Pryorsburg . F 4

285 Quincy . B 15

182 Ray wick, Marion. D 11

5,340 Richmond . D 13

115 Richpond, Warren. F 9

334 Robard . D 7

437 Rochester . E 8

658 Rockport . E 8

138 Rocky Hill Station E9

89 Rosewood, Muhl¬

enberg . E 7

166 Rosine . . E 8

12 Rowena, Russell .Ell

233 Rowletts, Hart . .E 10

413 Rumsey . E 7

1,038 Russell . C 16

104 Russell Springs. . E 11

3,111 Russellville . F 8

438 Sacramento . E 7

467 Sadieville . C 12

320 Salem . E 5

45 Saloma, Taylor ..Ell

532 Salt Lick ..... .C 14

310 Salyersville . D 15

250 Sanders . B 12

160 Sandy Hook . C 15

261 Sardis, Mason . . . . B 14

257 Science Hill . E 12

1,327 Scottsville . F9

1,500 Sebree . E 6

410 Sharpsburg . C 14

3,412 Shelbyville . C 11

318 Shepherdsville . . .C 10

253 Sherburne . C 14

185 Simpsonville.

Shelby . C 11

53 Skilesville, Muhl¬

enberg . E 7

443 Slaughtersville . ...E 7

557 Smithland . E4

726 Smiths Grove . E 9

4,491 Somerset . E 12

250 Sonora . D10

365 South Carrollton . .E 7

627 Southgate,

Campbell . B 13

Pop.

107 Sparta, Gallatin . B 12

448 Spottsville . D 7

1,329 Springfield . D 11

660 St. Charles . . ,E 6

151 St. Helens, Lee ..I) 14

154 St. Mary . D 11

381 Stamping Ground C 12

1,532 Stanford . E 12

278 Stanton, Powell. . D 14

205 Stephensport . D 9

1,467 Sturgis . D 6

171 Sullivan . D 6

255 wSulphur .- . C 11

320 Summersville . . . .E 10

622 Taylorsville . D 11

113 Tilton . C 14

180 Tolu, Crittenden. .E 5

639 Tompkinsville . . . .F 10

653 Trenton . . F 7

115 Turners Station,

Henry . Cll

544 Tyrone, Anderson C 12

1,356 Uniontown . D5

141 Upton . E 10

1,145 Vanceburg . B 15

208 Verona . B 12

2,268 Versailles . D 12

570 Vine Grove . D 10

254 Waddy . Cll

174 WTalnut Grove,

Morgan . D 15

650 Walton . B 12

900 Warsaw . B 12

433 Washington . B 14

228 Water Valley . F 4

311 Waverly . D 6

1,751 West Covington,

Kenton . B 12

442 West Liberty .... D 1 5

192 West Louisville . . . D 7

782 West Point . C 10

490 Wheatcroft . E 6

281 White Plains,

Hopkins . E 6

321 Whitesburg . E 16

452 Whitesville,

Daviess . D 7

157 Whitley, Pulaski . E 12

989 Wickliffe . E 4

177 Willard . C15

2,004 Williamsburg .... F 13

800 Williamstown . . . B 12

7,156 Winchester . D 13

404 Wingo . F 4

217 Woodburn . F9

173 Woodbury, Butler. E 8

326 Worthville . B 11

98 Yosemite . E 12

224 Zion . D 7

\ *

KENTUCKY

365

}he old marketing facilities proved utterly inadequate A pipe line which in 1914 marketed ?ndnoS °;000 ,barrels received in 1918 over 4,000,000 barrels, an increase of 800 per cent in tour years. The total yield of the two fields, east and west, now exceeds 8,000,000 barrels annually. The oil is of the best grade, com¬

manding a high price. Iron, which gave good promises of expansion about the year 1880, has faded away before the advance of the north¬

western ores, which are used in the mills at Ashland. Kentucky iron is profitably mined only near Cumberland Gap, and in Trigg, Lyon and Caldwell counties in the west. Of minor minerals one may mention the limestone prod¬

ucts, such as Kentucky River marble, asphalt, sandstones, clays, barytes and phosphates used for fertilizers. Extensive mining of fluor spar occurs in Crittenden and Livingston counties adjoining the Illinois field. Mineral springs are numerous, but

only 12 were ranked as com¬

mercial in 1915.

Climate and Rainfall. — The Mississippi bottoms are malarious, but the rest of the State is free from objectionable tendencies.

The death rate normally 15.2 per thousand in¬

creased to 17 per thousand during the influenza epidemic in 1918. Mean winter tempeature is 35°_ F., while the annual average is 55° F.

Owing to its exposure to storms from south¬

west and northwest alike, considerable varia¬

tion may occur, tempered, however, by the proximity of the mountains to the east.

Water is abundant in all parts of the State.

The average precipitation is 44 inches without a record of excessive drouth in any year.

Forests. — About a third of the State is cov¬

ered with commercial forests. Along the Alleghany slopes there is a great quantity of fine timber, most of it being hardwood of astonishing variety. Oaks of many different kinds — white, red, black, post, overcup, chest¬

nut and black-jack — hickory, black walnut, blue ash, maple, elm, beech, chestnut, poplar, sweet gum, yellow pine, sycamore and hack-

berry are only a portion of its wealth, still largely virgin, though now being rapidly ex¬

ploited. Poplar, black walnut and cherry are now scarce. Some cypress occurs about Reel-

foot Lake.

Soils. — There are 10 main soil areas, cor¬

responding to the chief geological formations.

The most fertile of these, the Trenton, in¬

cludes the best parts of Fayette, Woodford, Jessamine and adjoining counties, 1,200 square miles. This soil is residual, formed by the disintegration of the gray Lexington lime¬

stone, which is rich in phosphorus ; conse¬

quently some fields of this region a century old show no sign of exhaustion. Surrounding this area is the Cincinnatian, 7,900 square miles, with somewhat less phosphorus in their blue limestones. Northeastward from Allen County to the Ohio River stretches the Waverlv area, 4,400 square miles, whose soils wash badly and lack plant food. The Western coal field 4,500

square miles, is in need of drainage and proper fertilizers to become valuable agriculturally.

Surrounding this is a belt of varying width, equal to 8,000 square miles — one-fifth of the State's area. It contains limestone which, if used in connection with the phosphate beds of Tennessee, would build up its soil to a high de¬

gree of fertility. One of these counties, War-

len, is the centre of the strawberry industry of the State Eight counties west of the Tennes¬

see, called the Purchase, an area of 2,360 miles, are composed of transported soils. The largest f'K area is the Eastern coal field, some 10,000 square miles, or one-fourth of the entire otate, mountainous and easily eroded Through¬

out the principal areas described thus far, how¬

ever, are river alluvium sections, highly pro¬

ductive because of overflows. Also, in the best agricultural districts are found belts of poor land,

thus presenting problems of scientific sod tieatment. (Consult Exper. Station Bull.

No. 193).

Agriculture. Although Kentucky and Ten¬

nessee are apparently artificial divisions of the same body of. land, the slight difference in latitude and soils, works a complete change in their characteristic products. Tennessee pro¬

duces large quantities of cotton, while Ken¬

tucky produced but 3,469 bales in 1909, nearly a" county, Fulton. The leading farm

products are corn, tobacco, hay and wheat ; and the State raises nearly all the hemp in the United States. Truck farms and orchards are frequent along the Ohio, especially near Louisville and Cincinnati. In 1910, 86.3 per cent of the land surface was in farms, and 64.7

per cent of this was improved. From 1900 to 1910 the number of farms increased 24,518 or 10.4 per cent, compared with 6.6 per cent in¬

crease in population. Intensive cultivation de¬

creased the size of the farms to 85.6 acres ; over one-fourth ranging from 50 to 99 acres!

Those farms over 175 acres are only one-ninth of the total number, which was 259,185.

Colored farmers operated only 11,709 farms, or about 2 per cent of the area. The most conspicuous change in the decade was in tenure; the number of cash tenants remained about the same while share tenants doubled.

The farms owned by their operators constituted two-thirds of all; the value of all farms was $773,797,000.

The best-known crop is tobacco, of which Kentucky produces far more than any other State, and usually one-third of the total crop of the LInion. In 1910 the total crop was 1 -

103,000,000 pounds; that of Kentucky, 425 000'-

000 pounds; in 1915 Kentucky raised 356,000,000

pounds, or 33 per cent of the total, North Carolina being next with 198,000,000 pounds.

In 1918 the yield was 360,000,000 pounds, mar¬

keted at the highest prices ever recorded in the State, about 30 cents a pound, compared with averages as low as six cents in 1907.

From the depressed markets of 1907, when good tobacco was sold at three and four cents, or was taken home by angry farmers, the re¬

covery is due first to the unions of growers against the Tobacco Trust,, in Burley and Dark districts alike. These unions, attempting to coerce, reluctant neighbors to join with them, precipitated the Night Riders' disturbances, which led to the posting of sentries by the militia to prevent the destruction of property.

Pools, legalized by the legislature in 1910, took charge of the sales and raised prices by collec¬

tive selling. With the outbreak of war in Eu¬

rope came a large demand from the armies; and finally the rapid spread of prohibition seems to have intensified the civilian demand for tobacco products. Christian and Daviess counties pro¬

duce large quantities of the Dark or Pryor to-

bacoo, much sought by French and Italian buy¬

ers, and popularly called <(regie® tobacco, while the Blue Grass counties, such as Fayette and Bourbon, raise the light or Burley variety, sought for its absorptive qualities, and mar¬

keted at Lexington first in 1905 in baskets on the floor of warehouses. This practice has made Lexington the largest ((loose leaf® market in the world, and has taken the supremacy from Louisville where the marketing is done by hogsheads.

Hemp is almost as famous as tobacco, but its decline is unchecked ; in 1859, 78,818,000

pounds; in 1909, only 6,420,000 pounds. The high prices created by the World War revived this industry but little, the acreage for 1917

being 19,200 — all in the Blue Grass counties.

Other fibres from Mexico and the Philippines have supplanted it in the factories.

The largest crop in value and volume is corn, 124,372,000 bushels in 1917, valued at $160,000,-

000. Corn has furnished the material for the great distilling interests as well as food, and provender for animals on the farm.

Wheat from 1907 to 1917 yielded 10,000,000

bushels annually, aided by the fine crop of 12,540,000 bushels in 1914, the largest in recent years. The superb pastures yield large quan¬

tities of hay and forage. Blue Grass seed varies widely in output, from 200,000 bushels in 1910 to 1,500,000 in 1912 and back to 200,000

in 1917. Minor products are butter and cheese, 38,680,000 pounds in 1909; potatoes, 6,426,000

bushels in 1915 ; wool, 3,550,000 pounds in 1915; sorghum cane, 226,000 tons in 1909.

Oats yielded 7,000,000 bushels for the first time in 1917. The value of miscellaneous crops in 1909 was placed in the census at $50,000,000.

Stock-raising. — The mild winter climate, permitting cattle to remain out with little feed, the excellent pastures of blue-grass which grows thick in the shade as well as in the open, and the abundant limestone water which pro¬

duces strong growth of bone materials, all together promote the rearing of livestock with unexampled success. These advantages were seized by a rare group of breeders who have made Kentucky the centre of the Union for blooded stock. Especially is this true of thoroughbred horses. The old Virginia stock, bred from choice imported English animals, themselves bred to combine speed and endur¬

ance, were taken by the Kentucky breeders and kept pure or mixed with equally good fresh blood. Complete records and pedigrees

constitute an important part of this work.

Kentucky horses have made three-fourths of all the winnings on the American turf.

The Stalte Racing Commission, created by a law of 1906, has sustained the breeding industry at a critical period; and the demand for thoroughbred horses for remounts in the army and replenishment in foreign lands now exceeds the supply. Other breeders have applied similar principles to the improvement of sheep, swine and cattle. The number of horses reported in 1919 was 439,000; mules, 231,000; swine, 1,768,-

000 ; sheep, 1 274,000 ; cows, 440,000 ; total value of all livestock on farms, $177,396,000. Poultry and poultry products are important. Turkeys, in particular, are shipped to the Eastern mar¬

kets.

Manufactures. — The immense hardwood

forests, large coal fields and natural water¬

ways for half a century after her admission to the Union kept Kentucky abreast of her neighbors industrially. But the rise of steam navigation built up the river cities at the ex¬

pense of the inland towns, so that Lexington which had 114 factories in 1810, was eclipsed in a short time by her rivals. Other elements contributing to the same end were tardiness in building railroads into the forests and coal fields, and the absence of a wage-earning class such as immigration supplies. In 1850 the number of wage-earners was reported as 21,-

476; in 1900 51,735; and in 1914 only 64,586.

In 1914 the total value of manufactured products was $230,248,909. This was less than 1 per cent of the total value of the output of the nation in that year. In order of value, dis¬

tilled liquors stood first, $48,862,526: 157 es¬

tablishments giving the State second rank in the Union in this trade ; the next in value was flour-milling of a value of $21,229,000; third was lumber products, valued at $20,667,000, with the largest number of operatives in any industry; fourth, tobacco products, $16,146,000; fifth, cars and car-shop work, $13,344,000. No other industry reached $10,000,000 in value.

The total number of establishments was 4,184, with a capital of $193,423,000. The tobacco industry, which claimed its small factories in every town in the 18th century, has declined relatively. Louisville, the principal hogshead market of the world, has some 17 plants for tobacco manufacturing. Owensboro and

Henderson have establishments preparing the leaf for shipment. Bourbon whisky, so named from the county of Kentucky to which many Pennsylvania ^moonshiners® removed after the suppression of the Whisky Insurrection in 1794 (q.v.), has become famous all

over the world. Distilleries were set up as early as 1783 at Louisville, a little later in other towns and in 1787 along Salt River by a Maryland colony. Large establishments found favorable situations in many parts of the State. Their payments for internal revenue, checked by officers of the department, gave Kentucky fifth place in the Union in 1916, the total for liquors and tobacco being $35,870,087. The manufac-

ture. of malt liquors was concentrated largely in Louisville and Newport. Pork packing was a prominent industry until the grain fields of the Northwest caused its removal from the Ohio Valley. Nevertheless, Louisville has maintained a livestock market, receiving in 1918, 180,000 cattle, 46,000 calves, 780,000 hogs and 256,000 sheep and lambs. Her packing plants converted a large proportion of these receipts into food and other products. The firm position of the lumber industry is shown at each census. Logging is promoted by river improvement at the expense of the Federal government, whereby rafts may be sent to the cities from the upper courses of the Cumber¬

land, Licking and Kentucky. During the World War some 2,000,000 walnut gunstocks were made for the Allies in the factories about Louisville. Carriages and wagons are made in Louisville, Henderson and Owensboro from the easily supplied forest woods. Iron and steel works are declining from their earlier position. The first furnaces were abandoned for lack of transportation facilities; in 1846

others were built at Eddyville on the lower Cumberland by William Kelly; and .in 1851, five years before the Bessemer process was patented, Kelly began his "air-boiling® process, v essentially the same, for turning iron into steel. During these years steamboats were built at Cincinnati with boiler plates made by the Kelly process, and the

latter finally secured a royalty.

Louisville is prominent in the manufacture of jeans clothing, now being replaced by the cassimeres. Her proportion of the total manu¬

facturing of the State is nearly one-half, being $105,000,000 in $230,000,000. Her fuel rates are the lowest in the Union among large cities not located in the coal fields. Her manufactures of sanitary ware, boxes and farm implements are noteworthy. She is the largest importer of mahogany logs in the United States.

Transportation.— Kentucky has 813 miles

of navigable waters on her boundaries — the Ohio 643 miles, the Mississippi 50 miles, the Big Sandy 120 miles. The Cumberland and Tennessee are navigable their entire courses within the State ; improvements now far ad¬

vanced have made the Kentucky, Licking, Salt and Green much more valuable than formerly.

The canal around the falls of the Ohio at Louisville has been widened recently. Still, the supremacy of the railroad is revealed in the statistics of coal shipments into Louisville in 1918: 84,142 tons by river, and 1,636,258 tons by rail. The railroad, however, has not over¬

come the difficulties of the mountains of the eastern and southeastern regions; until lately, hundreds of square miles of territory had not a mile of railroad track. This mountain area is a part of Appalachian America — picturesque, beautiful, full of survivals of the English of Elizabethan days. Unable to sell the grain from their small fields in the valleys and "coves,® they converted it into whisky in home-made stills and fought off or evaded the revenue collectors until miners, oil pros¬

pectors and travelers broke the seclusion of the hills. Then the settlers, in many cases, left their homes and sought places in the Blue Grass or

elsewhere as farmers. Branches of the Baltimore and Ohio, Chesapeake and Ohio and the Louisville and Nashville roads have penetrated many of these remote districts.

The total mileage in 1918 was 4,200, of which about 200 represented the two electric sys¬

tems centering at Lexington for the Blue Grass towns and at Louisville for the suburban serv¬

ice. In western Kentucky the Illinois Central affords connection with Chicago and the South. The assessed valuation of all steam and electric lines 30 June 1917, was $160,262,38 7.

Improved roads, especially those of the macadam type, have been common in the Blue Grass counties for nearly a century. When, therefore, a campaign was started in 1908 for a State tax for this purpose, these counties were reluctant to support such a measure.

The new law (1912) imposed a road tax of five cents on each $100 of assessed property, created a State engineer and provided for the inter-county-seat roads first. On this basis not only county but national highway projects have been advanced, such as the Lincoln High¬

way, Jackson Highway, etc. A natural accom¬

paniment is the increase in automobiles and motor trucks. The licenses taken out in 1911

were 2,868; in 1914, 11,746; in 1915, 19,500; in 1917, 47,416; in 1918, 65,870.

Population. — The population of the State at the various censuses has been as follows: 1790, 73,677; 1800, 220,955; 1810, 406,511; 1820, 564,-

317; 1830 687,917; 1840, 779,828; 1850, 982,405; 1860, 1,155,684, including 10,684 free negroes, |£? 2,!&281 slaves; 187°- 1,321,011; 1880, 1,648,-

690; 1890, 1,858,635; 1900, 2,147,174; 1910, 2,289,-

903; 1920, 2,416,630. The foreign-born in 1910

were 40,162, or 1.8 per cent; half Germans, the Irish following with 5,900. The colored popu¬

lation was 261,656, not so large as in 11 other States ; nor are the colored people increasing so whites, there having been a decrease

of 23,200 since 1900. Classified by city and county, 75 per cent is rural, while 25 per cent is urban. There seems also to have been some tendency among the negroes to emigrate, and a large emigration of whites, especially to Oklahoma and Texas, has occurred. The in¬

crease was 6.6 per cent and the density is 57

per square mile.

The one great independent city of Kentucky is Louisville (234,891) at the falls of the Ohio, the third in size on the river, excelled only by Cincinnati and Pittsburgh. Covington (57,121), Newport (29,317), Bellevue (7,379) and Day-

ton. (7,646) are virtually suburbs of Cincin¬

nati, the first-named west of the Licking, the last three east of it. Other cities on the Ohio, which monopolizes much the greater part of the urban development and manufacturing of the State, are in the west, Paducah (27,738) at the mouth of the Tennessee, Owensboro

(17,424) and Henderson (12,312) ; in the north-

east Maysville (6,141); on the east, Ashland (14,729), now head of a rapidly growing iron and coke district. Lexington (41,534). the first capital, once called "Athens of the West,® is the head of the Blue Grass region. Frankfort (9,805), the capital; Bowling Green (9,638), the head of navigation on the Barren River a tributary of the

Green ; Hopkinsville (9,696) ; Winchester (7,866) ; Danville (5.034) ; May-

field (6,583); Middlesboro (8,041); Paris (6,310) and Richmond (5,622) are also over 5,000.

Charitable and Penal Institutions. — There are insane asylums at Lexington, Hopkinsville and Lakeland; a notable institution for the education of the blind at Louisville; a State school for deaf-mutes at Danville; and an in¬

stitution for feeble-minded children at Frank¬

fort, which, however, restricts the ages to the period of 6 to 18, and requires that they shall not be too feeble-minded for training. The State penitentiaries are at Frankfort and Eddy¬

ville, and the Reform School is at Greendale, near Lexington. About 2,000 feeble minded are maintained in homes at State expense. Con¬

federate veterans are aided by the Home at Pewee Valley, and by pensions voted in 1912.

Government.— The State officers are elected for four years, in the November preceding the Presidential election; they cannot be re-elected.

The governor has a veto by items, but a major¬

ity vote overrides it. The legislature consists of 38 senators chosen for four years, and 100

representatives for two years. Sessions are biennial, and limited to 60 legislative days.

Provisions concerning revenue bills and im¬

peachments follow the model of Congress.

Women (by a law of 1912) can hold office on 368

school boards and vote on school issues. No State,

county, city or town .officers except mem¬

bers of city legislative boards can be elected in the year of a Presidential election. The judi¬

ciary is headed by a Court of Appeals, consist¬

ing of not over seven or under five elective judges, with terms of eight years. There are no townships, only ^magisterial districts,® and the county, as in old Virginia, is the political unit.

There are 120 counties. Each county is entitled to three sittings of a Circuit Court each year.

The circuit judges are elected for six years, in districts. There is a county judge, and a monthly court day. County officers are elected for four years, except a Circuit Court clerk for two years, and the sheriff is ineligible to re-election except in alternate terms. Counties must have a minimum area of 400 square miles, and the county-seat must te at least 10 miles from the boundary. There are 11 representatives in Congress.

Banks. — The main features of the banking history of the State include the Bank of Frank¬

fort in 1806, and the Clearing House at Louis¬

ville, established in 1875, which has more than once saved many of the better banks from disaster in panics. The clearings at Louis¬

ville in 1918 were $1,159,000,000; those at Lexington, $64,248,000. Not until 1912 was a State Department of Banking legally established, although Secretary Bruner, under Governor Willson, in 1910 began to inspect State banks in consequence of several' failures. The re¬

port for 1918 included 444 banks and trust companies, with aggregate capital stock of $19,-

117,650; surplus, $8,030,000; deposits, $131,-

000,000. Including the national banks the total deposits were $266,951,865.

Finances. — The assessed valuation for 1917

was $922,456,000; for 1918, $1,403,978,000, an increase due to war prices and to new valua¬

tions by the Tax Commission which was created in 1917, under the authority of a con¬

stitutional amendment of 1915. This law re¬

quires the classification of property, and ex¬

empts certain classes from local taxes. Its various provisions make Kentucky as progres¬

sive as any State in taxation. The tax rate is reduced from 55 cents to 40 cents per $100.

The income, however, is divided into parts, or funds, arbitrarily, so that some expenditures are not fully met, while other departments are self-sustaining. No funded debt is allowed, but the deficiency of about $3,000,000, mostly incurred since the construction of a new capi-

tol, is carried as a floating debt in the form of treasury warrants which are redeemed as surplus accumulates in the treasury. The revenues and receipts are close to $10,000,000

yearly, of which sum the city of Louisville con¬

tributes one-fourth. Losses of revenue oc¬

casioned by prohibition will delay the reduc¬

tion of the debt. On the other hand some re¬

lief is seen in the growth of public service corporations now assessed at $70,941,824, as well as in that of oil companies. Local con¬

ditions are among the best in the Union, the per capita debt of cities and counties be¬

ing, in 1913, $10.95, placing the State in fifth rank in this respect. In consequence the credit of local bonds is very high.

Social Legislation. — Kentucky's lawmakers have in the past 15 years adopted most of the progressive legislation of the age : Conserva¬

tion of natural resources, mine safety appli¬

ances, child labor restrictions, compulsory school attendance, workmen's compensation acts, tax reform, high schools, agricultural ex¬

tension programs, juvenile courts, prison pro¬

bation, care for delinquents and dependents, bank inspection, training for teachers, fire prevention and insurance. They have quickly accepted the various proposals of co-operation extended by the Federal government in educa¬

tional and improvement matters, and ratified the amendments on income taxes and pro¬

hibition. To apply most of these reforms they have appointed competent commissions.

Churches. — The religious census of 1906

placed the church membership in Kentucky in the following rank: Baptists ot all bodies, 311,-

583 or 36 per cent of the total number of mem¬

bers; Roman Catholic, 165,908 or 20 per cent; Methodist bodies, 156,007 or 18 per cent; Disciples of Christ, 136,110 or 16 per cent.

These figures of course include colored as well as white communicants.

Education. — The school census of 1916-17

reported 740,576, of whom 352,059 or 48 per cent attended school. Those enrolled were 555,568 or 75 per cent of the total number of school age. Those

above the age of 20 and below 6, in school, were 12,807. The total number of teachers was 13,031, mostly women.

The number of schoolhouses was 8,616, of which 7,035, or about seven-eighths, had one room.

Progress was evident, however, in the construc¬

tion of 407 new buildings during the year.

The value of all school buildings and grounds was $14,090,709; of apparatus and furniture, $1,523,468 more. In 1917—18 the expenditures on the public schools were $8,142,484.28, or an average of $14.66 for each pupil enrolled. The terms have happily been extended. A deter¬

mined effort along this line has put the great majority of schools — 7,567 — in the seven months group ; 335 have eight months and 306

have nine months. This result is in marked contrast with conditions a few years earlier.

Obviously, attention has been given to the matter of attendance, which is coupled with child labor laws. The Kentucky Child Labor Law of 1908, improved since that date, is one of the most advanced in the Union. In some of the cities a Juvenile Court with proba¬

tion officers assist the labor inspector and the school officers in requiring attendance at school. These results flow from a general re¬

vision of the educational laws and requirements in 1908. Volunteer speakers and workers car¬

ried on educational campaigns throughout the State to awaken public sentiment, and each session of the general assembly since then has taken deep interest in legislation affecting the schools. Besides other features one may men¬

tion the Truancy Act of 1908; the Illiteracy Commission of 1916; County High School Act of 1908;

and its modification in 1916 permit¬

ting co-operation by two or more counties ; increased sources of revenue by various acts ; addition of agriculture and domestic science to the curriculum.

The effort to eradicate illiteracy, the extent of which is subject to various estimates in the absence of accurate figures, was begun in Rowan County, September 1911, in what were called ^moonlight® schools, intended for adult illiterates. Volunteer workers taught older KENTUCKY

Confederate Monument at Frankfort

t

i

♦

KENTUCKY

300

tnen and women to read and write. Their w ork created a better attitude toward the day schools, and has been extended to the army cantonments where illiterate soldiers are taught by workers from various associations. The legislature voted $5,000 for this commission in 1916. Other States have followed Kentucky in this reform.

High schools are of comparatively recent origin. They were preceded by private schools and colleges for the wealthy class, so that pub¬

lic education languished. After the reorgan¬

ization of 1908, the General Education Board provided an inspector and examiner for several years. Under these influences the private schools have given place to high schools, often selling their bu-ildings and equipment to the board of education. County high schools have grown rapidly in

the rural counties, about 20

each year since 1909, and the total, city and county, in 1917 was 376, with 20,800 pupils, 1,288 teachers and 2,208 graduates. Two-thirds of the teachers were college or normal gradu¬

ates,^ and libraries were found in 272.

Kentucky provides for colored pupils in separate schools, and the United States Su¬

preme Court upheld the principle by requiring Berea College to remove colored students to a separate place — Lincoln Institute, near Shel¬

by ville. The Kentucky Normal and Industrial Institute is at Frankfort.

In 1916 there were 4 private normals, 17

commercial and 83 private schools of secondary or collegiate rank. Both white and colored schools are supported bv taxes which pass through the State treasury, thus making the richer counties assist the poorer. The reports, however, may create a misleading impression because many communities keep local taxes low under cover of State aid. Recent legislation per¬

mits counties to levy local taxes up to 30 cents per $100 for their schools. This act, aided by better inspection, will probably complete the reform and give Kentucky schools equal to the best in rural States.

Kentucky's school fund for 1917 consisted of the following: Interest on bonds (perpet¬

ual), $138,939; license taxes, $156,000; sheriff's collections, $2,285,000; fines, $30,000; tax on distilled spirits and liquor dealers, $320,000; banks and bank deposits, $200 000 ; oil (1 per cent of market value), $100,000; railroads, $332,000; dog tax, $35,000; race track licenses, $25,000; corporations, $110,000; inheritances, $70,000.

Total, about $3,800,000. These sums represent parts or in a few cases the whole of various items named by law for support of the schools. Other portions are devoted to other (as they are called.

The head of the public school system is the University of Kentucky at Lexington, formerly the A. & M. College, founded under the Morrill Act of 1862. In 1878 it was detached from Kentucky (Transylvania) University, and by subsequent acts of the legislature its func¬

tions were enlarged. It has colleges of arts and science, agriculture, engineering and mining, and law. In conjunction with the Experiment Station and the State health laboratories it has the facilities of 300 acres of land, property worth $1,200,000, and a combined income of $900,000 annually. Transylvania University, founded in 1798, once known as Kentucky Uni-

versity, is now under control of the Christian denomination. Both Transylvania and Center College, at Danville, long under Presbyterian control which was broken by the terms of the Carnegie Foundation, maintained profes¬

sional colleges in Louisville. The Baptists established Georgetown College at Georgetown; the Methodists, South, the Kentucky Wesleyan College at Winchester; and an anti-slavery element founded at Berea an institution admit-

ting both white and colored students until required to separate them, as explained above.

Louisville is the seat of a Baptist and a south¬

ern Presbyterian seminary, as well as the Uni¬

versity of Louisville, which has medical, scien¬

tific and liberal arts departments and enjoys a small appropriation from the city.

In the educational changes beginning in 1906, the legislature authorized two State normal schools, later located at Richmond and Bowling Green.

History. — The earliest inhabitants built mounds in the northern and western parts of the State. They left burials in rocky cliffs, caves, or mounds. A fortified hill remains in Madison County (Indian Fort). Relics of Indian occupation, however, are plentiful. A large Indian town existed at Indian Fields, Clark County, but no other town has been identified. Despite an abundance of game no nation held Kentucky in force, but Iroquois and southern tribes knew it well. Their war par¬

ties and hunters and even traders came from remote regions as we learn from stone and metal relics. Copper from Lake Superior, hard substances from the Rocky Mountains, shells from the Gulf of Mexico, and other mute evi¬

dences of trade and travel attest the popularity of this region before 1750. In that year the Loyal Land Company sent Thomas Walker by way of Cumberland Gap. which he named, into the new country as far as the Kentucky River.

He returned without finding good lands and made an unfavorable report. In 1750 also, Christopher Gist (q.v.), a Yadkin man, em¬

ployed by the Ohio Land Company, traveled from Pittsburgh to a point near the falls of the Ohio (Louisville). Thence in a wide sweep he crossed the Blue Grass and returned to the Yadkin. In 1752 a trader, John Finley, on a trip down the Ohio was captured by Shawnees, taken to Indian Fields and held captive several months. The French and Indian War delayed further exploration until 1765. In May 1769

Finley' took several Yadkin farmers, among them Daniel Boone, later a hero of both frontiersmen and Indians, on what proved to be a protracted visit to Kentucky. A company from the Holstein and New River

district fol¬

lowed in 1770. Stories circulated by these pioneers created an intense desire on the part of many to move there, and surveyors were active in 1773 locating bounty lands for Vir¬

ginia soldiers. Harrodsburg was founded in 1774; Boonesborough, where the first conven¬

tion was held, was laid off in 1775. In the meantime Richard Henderson purchased from the Cherokees their claim to the vast area be¬

tween the Kentucky and the Cumberland for the Transylvania Company (February 1775), which began to sell land to actual settlers.

Both Virginia and North Carolina disapproved of this policy and in 1776 the former incor¬

porated the region as Kentucky County, sue-

ceeding Fincastle County. Henderson received tardy justice in later years with another grant.

During the Revolution Kentucky was

harassed by British and Indian attacks from be¬

yond the Ohio. Many settlers went away but others remained and a few even joined Clarke at the Falls for his expedition to Vincennes.

Louisville and Lexington were laid off in 1779

and Lexington colonists founded Cincinnati. In November 1780 Kentucky was divided into Fay¬

ette, Jefferson and Lincoln counties, thus losing its name for three years. Indian attacks in 1782 were severe: Estill's defeat and Lower Blue Licks proving disastrous for the whites, and leading to

Clarke's retaliatory attack on the Miami towns. Kentucky was born with the Republic in the decade 1782-92. Despite In¬

dian depredations, population rose to 30,000 in a few years. Danville was the seat of the new judicial district of Kentucky. The failure of Virginia on numerous occasions to protect the growing settlements from Indian attack so alienated the people that rumors of separation were rife; moreover, most of the settlers were from Maryland, Pennsylvania and Carolina.

Reports of a Cherokee attack in 1784 led to a demand for separation by a convention at Danville, delegates being chosen according to population. Nine other conventions voiced this demand in petitions to Virginia and Congress.

Wilkinson and Spanish agents thought this sentiment might be turned to Spain's advantage ; economic conditions pointed the same way; but the Kentuckians did not respond. On 1 June 1792 the State was admitted with a constitution granting full manhood suffrage — one of the earliest in the Union. For six months Lexing¬

ton was the capital; then Frankfort replaced her. Kentucky was from the first fiercely dem¬

ocratic and, like all frontier States, sensitive to complaints of injustice and discrimination.

The difficulty of shipping produce to the sea¬

board seemed to support the plots of Wilkinson and Burr. Similarly, the harsh aspects of the Alien and Sedition Acts of Adams drew forth the spirited response of the Kentucky Resolu¬

tions of 1798 and 1799. Clay and other young leaders so fanned the embers of their fathers'

bitterness against British and Indian warfare that the State raised for the War of 1812 7,000

soldiers though her quota was 5,500. Her troops saw service at the Raisin, the Thames and at New Orleans. In 1818 the western boundary was extended to the Mississippi through the purchase by the United States of the Chickasaw lands west of the Tennessee.

This area extended into Tennessee, so that t southern boundary also required accurate ad¬

justment. This was eff cted by a joint com¬

mission. The financial depression after 1818

created a large debtor class to which the legis¬

lature promised relief. This it did by charter¬

ing the Bank of the Commonwealth and making its notes a legal tender. Opponents, called the Anti-Relief party, secured a decision of the courts declaring the act unconstitutional. Un¬

daunted, the Relief party elected a legislature pledged to destroy the court and create a new court in its place. After five years' struggle the old judges were restored in 1826. The census of 1820 reported 564,317 inhabitants, which gave Kentucky the sixth place. Keenly alive to the need of an outlet for produce, the Blue Grass built the first railroad west of the mountains, between Lexington and Frankfort, running the first train in 1835. Under the leadership of Clay the State voted the Whig and American tickets to 1855. In the Mexican War the State again exceeded her allotment of troops, offering 10,000 for her quota of 2,400.

The diverse elements of Blue Grass and mountains created sharp differences of senti¬

ment on slavery. Families were often divided, and Kentucky furnished both presidents of the opposing sections — Lincoln and Davis. Gov¬

ernor Magoffin refused to honor Lincoln's call for troops ; yet the State sent 80,000 men to the Union

armies, while 40,000 joined the Con¬

federacy. Bragg's invasion of 1862 and Mor¬

gan's frequent attacks caused much suffering.

An attempt to install a Confederate govern¬

ment preceded the severe battle of Perryville, after which Bragg retreated leaving 'the State in Federal control. The emancipation of slaves without the compensation which Lincoln often recommended, caused a loss of $150,000,000; and the harsh measures of Burbridge and other commanders turned many Union men against the government so that the Democrats have carried every election with very few excep¬

tions. In 1896 the Republicans secured 12 of the 13 presidential electoral votes. Kentucky rejected the XIII, XIV, XV and XVII amend¬

ments to the Constitution. The Goebel Election Law of 1898 put the supervision of elections in the hands of three commissioners appointed by the legislature. After the election of 1899

these commissioners certified that Taylor had a plurality of 2,383 votes over his opponent Goebel. Irregularities in Louisville and else¬

where caused one commissioner to dissent from this decision, and the Democratic candidates gave notice after Taylor was seated that they would contest his election before the legisla¬

ture. Two contest committees were appointed, one from each House, and Taylor's supporters, alarmed at the prospect of his losing his seat, gathered in Frankfort. On 30 Jan. 1900 Goebel was mortally wounded by a concealed rifleman.

The legislature assembled the next day to hear the report of its committees, which declared Goebel and Beckham had received a plurality «of the legal votes.® They took the oath of office the same night, Goebel ser.ing as gover¬

nor until he died, 3 February. These events caused much excitement and confusion, the con¬

sequences of which cannot be related here.

The disorders of the Civil War period have died hard. Survivals of guerilla bands appeared in the Regulators of 1868 and in the Ku-Klux of 1871. In 1897 sporadic uprisings against toll gates on the highways ultimately resulted in freeing the roads of tolls in most counties. In 1907 the Night Riders, endeavoring to obtain fair prices for their tobacco, precipitated an¬

other crisis during which barns were burned and a costly fire visited Hopkinsville. During the Great War the same spirit was more profit¬

ably and patriotically devoted by similar bands to the suppression of German sympathizers.

Kentucky fully maintained her military reputa¬

tion in our recent wars. The call for volun¬

teers for the Spanish-American War attracted more men than were needed. Lexington was the concentration camp from which after a period of preliminary training the men were 371

moved to Chickamauga. Of the four regiments organized, the First, took part in the conquest of Porto Rico, while the Third was sent to Luba. Under the Selective Draft Act of 1917

volunteer units were merged in the National army, making it impossible to trace the fortunes of former commands. As in the previous war, Lexington was again made the preliminary camp, though Winchester received the Second Regiment. Upon the completion of the canton¬

ments, however, most of these soldiers were sent to Camp Shelby. The largest camp, Zachary Taylor, was

prepared at Louisville for the training of infantry; while artillery ranges were provided at West Point and Camp Knox. The various drafts took 58,330 men into the army; 13,934 enlisted in the army and 5,619 in the navy; a total of 77,883. Of these nearly 3,000 made the supreme sacrifice for their country. The civilian population loyally sus¬

tained the government in Red Cross work, the sale of bonds and all other activies. A list of Kentucky's distinguished sons would include Joel T. Hart, sculptor; Ephraim McDowell, surgeon ; N. S. Shaler, geologist ; Theodore O'Hara, elegiac poet; Henry Clay (born in Virginia), J. J. Crittenden and J. G. Carlisle, statesmen. Several living authors also enjoy a wide reputation in letters and science.

Governors of Kentucky.

Isaac Shelby, Democratic-Re¬

publican .

James Garrard, Democratic-

Republican .

Christopher Greenup, Demo¬

cratic-Republican .

Charles Scott, Democratic-Re¬

publican .

Isaac Shelby, Democratic-Re¬

publican . .

George Madison, Democratic-

Republican .

Gabriel Slaughter, Democratic-

Republican .

John Adair, Democratic-Re¬

publican .

Joseph Desha, Democratic-Re¬

publican .

Thomas Metcalfe, National Re¬

publican .

John Breathitt …. Democrat

James T. Morehead "

James Clark . Whig. . . .

Charles A. Wickliffe " ....

Robert P. Letcher.. "

William Owsley. ... " ....

John J. Crittenden. " ....

John L. Helm . Democrat

Lazarus W. Powell. "

Charles S. Morehead, American

Beriah Magoffin . . . Democrat

James P. Robinson. "

Thomas E. Bramlette "

John L. Helm .

John W. Stevenson . "

Preston H. Leslie . . "

James B. McCreary "

Luke P. Blackburn.

J. Proctor Knott . . .

Simon B. Buckner.. "

John Young Brown. "

William O. Bradley, Repub¬

lican .

William S. Taylor, Repub¬

lican .

William Goebel. . . . Democrat

J. C. W. Beckham.. "

Augustus E. Willson, Repub¬

lican .

James B. McCreary, Democrat

Aguustus O. Stanley,

Edwin P. Morrow, Republican

4 June 1792-7 June 1796

7 June 1796-1 June 1804

1 June 1804-1 June 1808

1 June 1808-1 June 1812

1 June 1812-1 June 1816

1 June 1816-14 Oct. 1816

21 Oct. 1816-1 June 1820

1 June 1820-1 June 1824

1 June 1824-1 June 1828

1 June 1828-1 June 1832

1 June 1832–21 Feb. 1834

22 Feb. 1834–1 June 1836

. 1 June 1836–27 Sept. 1839

5 Oct. 1839–1 June 1840

1 June 1840–1 June 1844

1 June 1844–1 June 1848

1 June 1848–31 July 1850

July 1850–Sept. 1851

Sept. 1851–Sept. 1855

Sept. 1855–Sept. 1859

Sept. 185 9– Aug. 1862

Aug. 1862–Sept. 1863

Sept. 1863–Sept. 1867

3 Sept. 1867–8 Sept. 1867

13 Sept. 1867–13 Feb. 1871

13 Feb. 1871–Sept. 1875

Sept. 1875–Sept. 1879

Sept. 1879–Sept. 1883

Sept. 1883–Sept. 1887

Sept. 1887–Sept. 1891

Sept. 1891–Dec. 1895

Dec. 1895–Dec. 1899

Dec. 1899–31 Jan. 1900

31 Jan. 1900–3 Feb. 1900

3 Feb. 1900–Dec. 1907

Dec. 1907– Dec. 1911

12 Dec. 1911–7 Dec. 1915

7 Dec. 1915–Dec. 1919

Dec. 1919–

Edward Tuthill,

Professor of History and Political Science, University of Kentucky.

KENTUCKY, Oil and Gas Resources of.

Petroleum, commonly called (

ley of the South Fork of the Cumberland River, close to the Tennessee line in what is now Mc¬

Creary County, but was then Wayne County.

Thq strike was made by Martin Beatty, of Abingdon, Va., while drilling a shallow well for salt. Cumberland County followed with a flow¬

ing production from the Upper Ordovician rocks in 1829 and a few years later oil was found in the lower Coal Measures near Barbourville, Knox County. In the late 60's a wave of oil and gas prospecting spread over Kentucky, fol¬

lowing the great depression caused by the Civil War. Allen, Barren, Clinton and many other counties joined the list of growing producers.

During the latter part of the 19th century wells were drilled in every county in the State, and substantial, though small, new oil production came from deeper sands in Floyd, Knox and Wayne counties. Martin, Meade and Brecken-

ndge counties at the same time developed gas in commercial quantity. In 1900 the now nearly exhausted Ragland Field, in Bath and Rowan counties,

producing black, thick, low gravity oil, was first drilled in, production coming from the ((Corniferous® or Onondaga limestone —the (

sippian <(sands.» Deeper drilling in all the old fields above noted continued with varying success, the greater part of the oil being trans¬

ported to the northeastern markets by the Cum¬

berland pipe line. The Cannel City pool, in Morgan County, was discovered in 1912, and in 1913 this small field produced its maximum, 12,000 barrels of crude oil a month. This pro¬

duction came from the same Onondaga lime¬

stone and in large quantity was relatively short lived. In 1903 the Campton pool of 'Wolfe County was discovered, oil being found in the Onondaga limestone at about 1,250 feet. About 300 wells were drilled in this field with an aver¬

age production of 50 barrels each. The widely known Menefee Gas Field was drilled in 1901, gas coming from the Onondaga limestone at an average depth of 600 feet. Small oil pro¬

duction was obtained in Estill County, near Irvine, in 1903 at the time of the Campton ac¬

tivity. Due to the extreme shallowness of the producing sands — the Onondaga limestone —this was soon drilled up and exhausted. Due to low prices and the corresponding decreasing active development, the years 1913, 1914 and 1915 saw a steady decrease of oil production for Kentucky. Increased prices due to war¬

time demands restimulated activities and in 1916 the rediscovery of the Irvine pool a little to the east of the Irvine town site ushered in the present era of State-wide activity, greatly in¬

creasing production. In Powell County the Ash¬

ley pool in 1917; in Lee County, the Big Sink¬

ing pool in 1918, and in Allen County, the Johnson pool of 1919, are the present centres of greatest activity, and there are probably 800 to 1,000 rigs now drilling in the State.

Kentucky crude sells for $2.60 per barrel, with the exception of the small Ragland pro¬

duction. The oil is light green and has an average gravity from 32-40 Baume. Practically all of the eastern Kentucky production is taken 372

by the Cumberland Pipe Line Company, and the greater part of that of Allen County is taken in tank cars by the Indian Refining Com¬

pany from Scottsville, where the present pipe line runs show about 10,000 barrels per week.

The large plants of the Etna Refining Comnany, the Standard Oil Refining Company of Ken¬

tucky and the Stoll Oil Company are located at Louisville. The total Kentucky oil production for 1919 is estimated at 7,500,000 barrels. Geo¬

logically 'the accumulation of petroleum in Ken¬

tucky is generally anticlinal below the top of the Mississippi system and synclinal above.

Sand porosity is perhaps the greatest accom¬

panying factor in the recently large developed fields. The geological range of production is from Ordovician to Pennington inclusive.

Production of Eastern Kentucky Petroleum Fields — Cumberland Pipe Line Company

Runs from Wells.

YEAR

Total runs

for year

Daily

average

Remarks

1913 .

Barrels

522,550

479,609

407,081

1,144,750

3,015,640

4,035,950

Barrels

1,431.6

1,313.9

1.115.3

3.136.3

8,262.0

11,057.7

15,370

16,160

January

February

1914 .

1915 .

1916 .

1917 .

1918 .

1919 .

1919. .

During the latter part of 1918 and early 1919, the Indian Refining Company and several local pipe line concerns took oil from the Lee County fields, and their totals materially affect the foregoing figures.

Willard R. Jillson,

Kentucky State Geologist,

KENTUCKY, the State University of,

a coeducational institution at Lexington, Ky., founded in 1865, as a part of Kentucky Uni¬

versity now known as Transylvania College. It was reorganized in 1878 under the name of the Agricultural and Mechanical College ; as the State University of Kentucky in 1908, and as the University of Kentucky in 1916. It has agri¬

cultural, engineering, law, scientific, collegiate and graduate courses which lead to the bach¬

elor and master's degrees. The campus con¬

tains 72 acres, presented in part by the city of Lexington, and the agricultural experiment sta¬

tion farm contains 250 acres. The income from both Federal and State appropriations is about $820,000. The number of instructors in 1919

was 104, experimental station experts and clubs and agricultural extension staff, 121, and the number of students in attendance was 1,355.

The value of the buildings, equipment and land is about $1,200,000. The number of volumes in the library is 40,000. In co-operation with the United States Department of Agriculture, the University carries on a State-wide agricultural extension.

KENTUCKY BLUEGRASS. See

Grasses.

KENTUCKY COFFEE-TREE, a large

tree (Gymnocladus dioica), allied to the locusts and redbuds, of the family Ccesalpinaceoe , and growing rather sparsely throughout the middle region of the Mississippi Valley. See Gym¬

nocladus.

KENTUCKY RESOLUTIONS, a famous

series of nine resolutions introduced into the Kentucky legislature in 1798, by George Nich¬

olas, though it was afterward known that Thomas Jefferson was the author of them.

They were directed against the Alien and Sedi¬

tion laws, and against acts passed to punish frauds on the Bank of the United States, and emphasized the rights of the several States.

These resolutions were the outgrowth, together with a similar series known as the Virginia Resolutions, of a feeling that the Federal party was making a strained and illegitimate use of the powers granted to the Federal government by the Constitution. The Kentucky Resolutions were passed for the purpose of defining the strict-construction view of the relative powers of State and Government. They declared that the Union was not based on the

^principle of unlimited submission to the General Govern¬

ment ; that the Constitution was a compact, to which each State was a party as over against its fellow States ; and that, in all cases not specified in the compact, each party had a right to judge for itself, as well of infractions as of the mode and measure of redress. They proceeded to set forth the unconstitutionality of the Alien and Sedition Acts, and invited other States to join in declaring them void. No favorable response was evoked. In 1799 the Kentucky legislature went further, and declared a nullification of a Federal law by a State to be the rightful remedy in cases of Federal usurpation. Upon these resolutions the doc¬

trines of nullification and secession were later founded.

KENTUCKY RIVER, a river of Ken¬

tucky, formed by two forks which rise in the Cumberland Mountains, and, after a winding northwest course of about 250 miles, enters the Ohio, 12 miles above Madison, Ind., midway between Cincinnati and Louisville. The river runs through part of its course between perpen¬

dicular limestone walls. It is navigable by steamboat beyond Frankfort, a distance of 60

miles, and flatboats can ascend 100 miles far¬

ther. At High Bridge, Jessamine County, midway between Nicholasville and Harrods-

burg, spanning the gorge is the famous old Kentucky River high bridge erected late in the 70s of the 19th century. Its daring construc¬

tion at the time as one of the first long span cantilever bridges in the United States and its reconstruction in 1910 are notable. The new structure 'built 31.3 feet above the grade of the old bridge was erected on the line of the old

structure without false work and without any serious delay to the traffic of the Queen and Crescent Route over the old bridge. The new structure has three spans, each 353 feet long, resting upon steel towers and abutments, with two spans 55 feet and 69 feet long, one at each end of the bridge. The track crosses the river at an elevation of 307 feet above low water, and the total height of the top chord above the bottom of the foundation of the piers is over 319 feet.

KENTUCKY UNIVERSITY. See Tran¬

sylvania University.

KENTVILLE, county town of Kings

County, Nova Scotia, Canada. It lies about 70

miles northwest of Halifax with which it is connected by rail. Among its manufactures are sashes and doors and other woodwork, milling machinery, gasoline engines, carriages, wagons and automobiles. A dominion experimental farm is situated close to the town, and in the neighborhood there is also a military camp while within the corporation is a provincial sani¬

tarium. Pop. 3,000.

KENYON, ken'yon, Sir Frederick George,

English classical scholar: b. London, 15 Jan.

1863. Graduated from Oxford, he became fel¬

low in Magdalen College, there, in 1888 and assistant in the British Museum the following year, and nine years later assistant keeper of manuscripts. In 1917 he was president of the British Academy. When the European War broke out he went as major of the Territorial forces to France where he

served through the war. Among his numerous publications are 'Aristotle's Constitution of Athens > (1891); translation of same (1891); 'Classical Texts from Papyri in the British Museum5 (1891); 'Orations Against Athenogenes and Philip¬

pines5 (1892); 'Catalogue of Greek Papyri in the British Museum5 (1893-1907) ; 'Our Bible and the Ancient Manuscripts) (1895); 'Bac-

chylides5 (1897) ; 'Paleography of Greek Papyri5 (1899); 'Facsimiles of Biblical Manu¬

scripts in the British Museum5 (1900) ; 'Hand¬

book of the Textual 'Criticism of the New Tes¬

tament5 (1901) ; 'Robert Browning and Alfred Domett- (1906) ; 'Buildings of the British Mu¬*

seum5 (1914). He has also published much about the work of the Brownings. He was knighted in 1911.

KENYON, James Benjamin, American

poet and Methodist clergyman: b. Frankfort, N. Y., 26 April 1858. After his graduation from Hungerford Collegiate Institute in 1875

he studied theology, entered the Methodist min¬

istry and after holding various important pastorates retired in 1906. He was a member of the editorial staff of 'The Standard Dic-

tionary) (1910-12), was associate editor of 'The American Biographical Cyclop3edia)

(1912), and has been a member of the editorial staff of 'The National Cyclopaedia of American Biography5 from 1913 until the present time.

He is a frequent contributor to the leading magazines. He is well known among American verse writers of the present, his published col¬

lections of poems including 'The Fallen and Other

Poems) (1876) ; 'Out of the Shadows) (1880) ; 'Songs in All Seasons5 (1885) ; 'In Realms of Gold5 (1887) ; 'At the Gate of Dreams5 (1892) ; 'A Little Book of Lullabies5

(1898) ; 'Poems5 (1901). In prose he has pub¬

lished 'Loiterings in Old Fields5 (1901) ; 'Re¬

membered Days5 (1902) ; 'Retribution: A Tale of the Canadian Border5 (1903).

KENYON, William Squire, American sen¬

ator: b. Elyria, Ohio, 10 June 1869. Educated in law at the State University of Iowa, he be¬

gan to practice his profession at Fort Dodge, Iowa. After filling the offices of county prose¬

cuting attorney, district judge, district attorney and general attorney for the Illinois Central Railroad (1907-10), he became assistant to the Attorney-General of the United States (1910—11), and United States Senator (1913-19). In the Senate he advocated considerable progress¬

ive legislation directed against child labor and lobbying, and he attracted nation-wide atten¬

tion by his support of the miners in their vari¬

ous public troubles.

KENYON COLLEGE, founded in 1824,

Worthington, Ohio, under the auspices of the Protestant Episcopal Church. It was then called Theological Seminary of the Protestant Episcopal Church, in the Diocese of Ohio. In 1827 it was removed to Gambier, Ohio, where it is now. In 1891 the name was changed to Kenyon College. The school is now composed of a college and a theological seminary. A preparatory department was maintained until 1906. In 1917 the endowment fund was $520,000.

Marcus A. Hanna gave (1901) $60,000 to aid in the building of a new dormitory. The gross in¬

come is about $60,000. The 'number of pro¬

fessors and instructors, in 1917, was 19, and the number of students, 150. The library con¬

tains over 40,000 volumes. The courses lead to the degrees of A.B., Ph.B. and B.S. and in the seminary the course leads to the degree of B.D.

On the graduate roll of this school are the names of many distinguished men, among them Rutherford B. Hayes, Edwin M. Stanton, David Davis and Stanley Matthews.

KEOKUK, ke’dkuk, Iowa, is situated in the southeast corner of the State at the confluence of the Mississippi and Des Moines rivers and at the foot of the Des Moines rapids of the Mississippi River. In 1873 the government, at a cost of $8,000,000, built a seven-mile canal around the rapids and made continuous naviga¬

tion possible between New Orleans and Saint Paul, but in February 1905 Congress passed a bill granting the Keokuk and Hamilton Water Power Company the right to dam the river and construct a hydro-electric plant at this point, and the seven-mile canal with its three locks, which was far too small for present day traffic, was displaced by the power plant. The new lock built to replace the old canal is one of the largest in the world. The cost of this lock and a new "up to the minute55 dry dock was borne by the power company. Keokuk, called the Power City and the Gate City, is served by five railroads and several water transporta¬

tion lines. The old single deck bridge at this point has been reconstructed into a double deck bridge, the railroads and street cars using the lower level and the upper level forming a high bridge that lands the highway traffic at the summit of the hill on the Iowa side. The cheap hydro-electric power, generated

by the $27,000,-

000 power plant, has attracted factories of all descriptions to Keokuk, among them being a $2,250,000 smelter — a subsidiary of the National Lead Company — lumber mills, nower works, cereal mills, box factories, starch and drug works, etc.

Situated on a bluff 120 feet above the river level, the city has ideal drainage which no doubt accounts for the healthful condition of the city and surrounding country.

Besides those mentioned, other notable

features are the Federal building, the govern¬

ment weather bureau station, Union railway depot, courthouse, Masonic temple, public li¬

brary, school buildings, National cemetery and Rand Park containing the grave of Keokuk, the Indian chief after whom the city is named.

Keokuk is operated under the commission 374

form of government and has a population of 14,423.

KEOKUK, Moses, an American Indian

of the Sac and Fox tribe, after whom the city of Keokuk, Iowa, was named: b. 1818; d. near Kansas City, Mo., October 1903. Probably the best description of Keokuk's boyhood is con¬

tained in Drake's (History of the North Ameri¬

can Indians.) It tells of his visit to Washing¬

ton after the Black Hawk War. Keokuk suc¬

ceeded his father as chief of the Sac and Fox tribe, and removed with his people from Quenemo, Ivan., to their reservation in what is now Oklahoma, in 1868.

KEPHIR, kef'er, a native Caucasian drink made from fermented milk. See Kefir.

KEPI, ka'pe', French infantry forage cap.

In derivation the word is apparently related to the English cap, though its origin is uncertain.

It was first worn by French troops in Algeria; but the use spread to all the French infantry soldiers, and to school boys first in France, but afterward to students of other countries. It has been much affected as a military cap by military schools and schools having a military department and student uniforms in the United States. It varies in style, but is always flat-

topped with horizontal or slightly inclined vizor.

KEPLER, Johann, German astronomer

and mathematician: b. Weil der Stadt, Wurttem-

berg, 27 Dec. 1571; d. Regensburg (Ratisbon), 15 Nov. 1630. A contemporary of Galileo and Tycho Brahe, Kepler was one of the world's greatest astronomers, the real founder of mod¬

ern astronomy; the one who first reduced the theory of the telescope to its true principles and laid down the common rules for finding the focal lengths of single lenses, and the magnify¬

ing power of telescopes. His excursions in geometry produced epoch-making results ; he established the symbolism of the sectio divina or proportio divina , now known as the ((golden sec¬*

tion,® and towered above all his contemporaries in stereometric investigation. Prematurely born of youthful, ill-matched parents, Kepler was physically a weakling, neglected in childhood and spending his early student years between strug¬

gling for an education and working in his father's tavern. He worked his way through elementary schools

by winning scholarships which enabled him to reach the University of Tubingen. In 1593 he was appointed a teacher of mathematics at Gratz (Styria), where he de¬

voted himself with much ardor to the study of astronomy, and attracted the attention of Tycho Brahe (q.v.) by dissertations on celestial orbits.

But in 1599 religious persecutions commenced in Styria, and Kepler, being a Protestant, gladly accepted Tycho Brahe's invitation to Prague, to assist in the preparation of the new astro¬

nomical tables, called the Rodolphine tables.

Tycho died in 1601 and Kepler continued the work alone, being appointed imperial mathe¬

matician and astronomer. After many years of incessant labor ihe tables were completed in 1624 and published in 1627 at Ulm. Kepler had become the possessor of all Tycho Brahe's papers and the mass of observations made by that astronomer during 20 years, with a precision till then unsurpassed, enabled Kepler to establish the famous (Kepler's Laws (q.v.), which have proved so fruitful in the develop¬*

ment of astronomical science. Kepler enjoyed the patronage of the Emperors. Rodolph and Ferdinand, the dukes of Wiirttemberg and Wal¬

lenstein, but his life was a continued struggle with poverty; his salary was frequently in arrears and he was exposed to much religious persecution, while his domestic relations were equally unfortunate. The latter part of his life was chiefly passed at Linz as professor of mathematics. He wrote much, but the work that has rendered him immortal is his (Astro-

nomia Nova, seu Physica Ccclestis tradita Com¬

mentaries de Motibus Stellae Martis (New As¬*

tronomy, or Celestial Physics delivered in Com¬

mentaries on the Motions of Mars) (1609).

His (Harmonice Mundi* appeared in 1619; and among other works may be cited (De Stella Nova in Pede Serpentarii* (1606) ; (De Come¬

tis * (1619-20) ; (Chilias Logarithmorum* (1624).

Consult

don 1907).

KEPLER'S LAWS, in astronomy, three

laws of motion discovered by Johann Kepler (q.v.) on which were founded Newton's dis¬

coveries, as well as the whole modern theory of the planets: (1) Every planet describes an ellipse, the sun occupying its focus. (2) The radius vector (line joining the centre of the sun with the centre of the planet) of each planet sweeps over equal areas in equal times. (3) The squares of the periodic times (the periods of complete revolution round the sun) of any planets are proportional to the cubes of their mean distances from the sun. These laws en¬

abled Newton to determine the laws of the at¬

traction of gravitation, while another result of these discoveries was to ensure for the Rodol¬

phine tables an accuracy far exceeding that of any previous ones. Kepler did not apply his theory to comets, as he believed that they never returned. According to his idea the tail of the comet was evidence that the sun was driving the body of the comet away and dissipating its sub¬

stance forever. See Astronomy; Comet; Law of Gravitation. Consult Astrand, ; Closs, (Kepler und Newton und das Problem der Gravitation (1908).

KEPPEL, Augustus, British admiral : b. 25

April 1725 ; d. 2 Oct. 1786. He was the second son

of the 2d Earl of Albemarle, entered the sea service at an early age, and in 1755 commanded the North American squadron in Hampton Roads. He was placed in command of the Channel fleet in 1778, and in July of that year engaged the French fleet off Ushant. Having become partly disabled he signaled for his van and rear divisions, but Palliser in command of the rear ignored the signal until too late. Pal¬

liser accused him of incapacity and cowardice, but Keppel was honorably acquitted. In 1782 he was created Viscount Keppel and Baron Eldon.

He was first lord of the admiralty 1782-83.

KEPPEL, Sir Colin Richard, British ad¬

miral. b. 1862. After long military service in

Egyptian waters and the Mediterranean princi¬

pally, he became commander in 1895. His serv¬

ices in command of gunboats on the Nile (1897—98) were very effective, as was also his work in the Soudan the following year. He became rear-admiral and was in command of the At¬

lantic Fleet (1909-10).

KEPPEL, Frederick, American writer on

art: b. Tullow, Ireland, 1846; d. 1912. Edu¬

cated at Wesley College, Dublin, he came to the United States on graduation and opened, in New York city, a place as an art dealer, in which he acquired a national reputation, espe¬

cially as a judge of etchings and engravings.

He lectured, translated and wrote original works on art. Among his publications are (The Etched Work of Jean Franqois MilleU (trans¬

lation) ; (Modern Disciples of Rembrandt) (1890); (Christmas in Art> (1909); (The Golden Age of Engraving) (1910). He opened branch houses in Paris and London.

KEPPEL, Sir Henry, English admiral and author: b. Kensington, 1809; d. 1904. Son of the Earl of Albemarle, he was educated for the navy, in which he served from 1822, becoming successively, lieutenant (1829), commander (1833) and post-captain (1837). He saw serv¬

ice in India, the Mediterranean, South Africa and the Pacific Ocean, and commanded the naval brigade during the Crimean War (1854-

55). During his second service on the Chinese coast, he destroyed the Chinese navy at Fatshan.

He later held, in succession, the following of¬

fices, naval commander in chief at the Cane of Good Hope and on the Brazilian coast (1860-

67) ; vice-admiral in chief of the China-Japanese squadron (1867-69); admiral (1869), stationed in England, where he was knighted for services (1871) and became admiral of the fleet in 1877.

Among his published works are Expedition of H. M. S. Dodo to Borneo) (2 vols., 1847) ; (A Visit to the Indian Archipelago) (2 vols., 1853) ; (Reminiscences) (1898) ; (A Soldier's Life under Four Sovereigns) (3 vols., 1899). Con¬

sult West, Algernon, (Sir Henry KeppeP (Lon¬

don 1906).

KEPPLER, Joseph, American caricaturist : b. Vienna, Austria, 1 Feb. 1838; d. New York, 19 Feb. 1894. He early made his reputation as a satiric artist and the leading periodicals of his native city were publishing his witty sketches, almost before he had left the Academy of Fine Arts. But art was not then a serious business to him and he took to the stage as a comedian and opera singer, and actually began to study medicine at Saint Louis, Mo., where he made his residence in 1868. But it was in Saint Louis that he found his real vocation. There he es¬

tablished the German Puck, which, while it failed as a commercial enterprise, made his rep¬

utation. It was seen at once that a caricaturist of rare skill as a draftsman, of mental fertility and freshness, of witty and incisive satire, had appeared. He was engaged from 1872 to 1877

as caricaturist for Frank Leslie's Illustrated Newspaper in New York, to which city he had removed, and in 1875 he started a New York German Puck in association with Adolph Schwartzman. This was followed in 1877 by the English Puck. He was the first to use col¬

ored cartoons in caricature and drew upon a vast store of classical and historical incidents for adaptation in criticising modern social and political life.

KER, John, Scottish ecclesiastical writer and minister: b. Tweedmuir, 1819; d. 1886.

Educated at Edinburgh University, he spent some time

in Germany in post-graduate work.

He became pastor of East Campbell Church, Glasgow, in 1851 ; and in 1876 was appointed professor of practical training in the United Presbyterian Theological Hall. Among his published works are (Sermons) (1868-88) ; (The Psalms in History and Biography) (1886) ; 1 Scottish Nationality) (1887) ; (The History of Preaching) (1888); 'Letters) (1890).

KERATIN (from Gr. kcras, a horn), a

substance obtained from claws, feathers, hair, horn, nails, wool and other epidermal appen¬

dages. This tissue or substance is distinguished from gelatinous tissue by becoming soft when acted on by water for some time but no glue is produced. It is insoluble in alcohol and in ether and contains a high percentage of sul¬

phur.

KERATRY, ka'ra'tre', Auguste Hilarion

de, French author and statesman : b. Rennes, 1769; d. 1859. During the French Revolution he was twice imprisoned and ran great danger of being executed on account of his high family connections. Later he became a member of the Chamber of Deputies and worked with the Lib¬

erals for the overthrow of Charles X. Louis Philippe for this work in his behalf made Keratry a peer of France (1837). Among his published works are (Inductions Morales et physjologiques) (1817) ;

manoirs) (1824) ; 'Frederic StyndalP (1827) ; 'Saphira) (1835).

KERATRY, Count Emile de, French sol¬

dier, journalist and dramatist: b. Paris, 1832.

Entering the army at the age of 22 he served in Africa, Russia and Mexico. After 11 years'

military life he resigned from the army and re¬

turned to Paris and devoted himself to litera¬

ture, contributing to the chief reviews of the capital. His articles on the French occupation of Mexico during the Maximilian Empire ex¬

pedition, which appeared in the Revue Modcrne, made his name well known in France. Elected to the Deputies in 1869 he made himself con¬

spicuous by his advocacy of reforms in the suffrage and the national militia. After the fall of the Empire he was successively Prefect of Paris, diplomat in Spain, commander-in¬

chief of the forces in Brittany, Prefect of Haute-

Garonne, Prefect of the Department Bouches-

du-Rhone and editor of Le Soir. He wrote political pamphlets, comedies, dramas and other works. Among his published books are 'La Vie du Club); (La guerre des blasons,) dramas; 'La Contre-Guerrilla franqaise au Mexique) (1867) ; 'L'Elevation et la Chute de l'empereur Maximilien) (1867) ; (Le Creance Jecker) (1868) ; (Le quatre Septembre>

(1872) ; (Murad V, prince, sultan^ prisonnier d'etat (1878) ; 'A travers le passe, souvenirs militaires) (1887).

KERAULI, or KARAULI, ke-roo'le, a na¬

tive state of India which is ruled over by a rajah. It lies northwest of Gwalior and of the Chumbul River which forms its southeastern 376

boundary. The British government maintains an adviser at the court of the rajah. The whole state contains much valuable wooded land which is generally of a more or less hilly na¬

ture. The chief industry is agriculture and the principal products rice, barley and wheat, most of which is consumed at home. Area 1,242

square miles. Capital, Kerauli. Pop. about 150,000.

KERBELA, ker'be-la, Meshhed Hosein,

mesh'hed ho san', city in Bagdad vilayet, and some 50 miles southwest of the city of Bagdad.

It is connected by canal with the Euphrates.

The city is Persian in the character of its build¬

ings and its inhabitants and is looked upon as a very sacred place by the Shiahs. In com¬

memoration of the death of Hosein, son of the Caliph Ali, who was murdered there (680) and whose body is buried in one of the mosques of the city, a passion, or historic play is performed there yearly on the anniversary of his death, just as the greater play is held periodically in Theheran in commemoration of the death of Mohammed's nephew, claimant for the robes of the prophet. For many years the sacred city was a place of refuge for criminals of all kinds 'who, once they had placed themselves beneath her protection, could not be extradited or brought to justice. The presence of this unde¬

sirable element was the cause of many revolts and much trouble within the city; and condi¬

tions got so bad that finally, in 1843, the right of sanctuary was formally done away with.

Being a holy city in the eyes of the Shiahs and Sunnis, Kerbela possesses five fine mosques, the most striking of which is that containing the tornb of Hosein, the golden-plated domes and minarets of which can be seen glistening from afar as though beckoning the pilgrims to the sacred shrine to which none but the faithful are permitted entrance. The number of pilgrims visiting the city annually is in the neighborhood of 200,000. More pilgrims probably

visit Ker¬

bela because it is en route for Mecca. The mosques are among the richest in Asiatic Tur¬

key and their wealth is steadily increasing from year to year. Kerbela is the centre of an ex¬

tensive trade and commerce which extends throughout northwest Arabia. Among its manu¬

factures are kneeling-bricks and shrouds. The old city, which forms the central portion of Kerbela, has crooked, narrow, dirty and ill-

paved streets. This part is surrounded by a very old massive wall. Outside this wall, which is 24 feet thick, is the new city which is quite modern and attractive.

KEREN-HAPPUCH. The name of the

daughter of Job, born in the time of his re¬

stored prosperity. The name means horn of the face paint, i.e., a cosmetic box, or as we might say Joy-face. In the Septuagint the word is Amalthea-Keras, meaning horn of plenty, and in that sense has reference to Job's gratitude for his prosperity.

KERENS, ker-enz, Richard C., Irish-

American diplomat : b. Killberry, County Meath, Ireland, 1842; d. 4 Sept. 1916. He fought in the Union side throughout the American Civil War. Later he became contractor for the over¬

land mail and interested in railroad construc¬

tion. From 1892 he was a member of the Re¬

publican National Committee until he was appointed ambassador to Austria-Hungary in 1909.

KERENSKY, Alexander Feodorovitch,

Russian revolutionary statesman : b. Tashkent,

Central Asia, 1881. A lawyer and journalist by profession, a dvoryaneen or ((gentleman® in social rank, his early life was a struggle for existence and education. He took a degree at the University of Saint Petersburg and practised in the courts as a <(poor man's lawyer.® His ex¬

treme socialistic and republican tendencies, his hatred of autocracy and strong sympathy with the masses prevented him from attracting clients among the higher range of society.

Possessed of boundless ambition and a passion¬

ate flow of oratory, he turned to politics and became a member of the Duma. Those who know him best declare that his eloquence met with appreciative response only from the work¬

ing classes. An object of suspicion, his foot¬

steps were continually dogged by secret police ; in the summer of 1915 the attention of the au¬

thorities was drawn to the <(criminal activity®

of Kerensky in inciting the workers to struggle for power and for a constituent assembly. For some unknown reason he was not arrested and sent to Siberia, as thousands of his kind had gone before him, and for much less transgres¬

sion. The Russian revolution of March 1917

and the fall of the tsar — events for which he had long striven, brought Kerensky to the front.

In the first provisional government he was made Minister of Justice. Prince Lvov, the Premier, announced that the Grand Duke Michael would be appointed regent. The Soviet, or Council of Workmen's and Soldiers' Delegates, at once demanded a republic, and for an hour or two it seemed as if the new government would dis¬

appear in the horrors of a commune. Kerensky saved

the situation by breaking in upon the Soviet meeting and with a short speech led the assembly to pass a resolution in support of the provisional government by a majority of 1,000

to 15. ((We shall have our republic,® he told them, <(but we must first win the war, and then we can do what we will.® The meteoric rise of Kerensky to the supreme power in the em¬

pire, and his dramatic fall and disappearance, are fully recorded under Russian Revolution (q.v.).

KERESAN, or OUERE.S (the aboriginal

stock name), a group of Pueblo Indian tribes, in seven permanent villages on the Rio Grande and to the westward thereof, in New Mexico.

They form the Queres, or Keresan, linguistic family, speaking a distinct stock language. The Indians claim to have had their origin at Ship-

apu, a mythic place in the north, from which they gradually drifted southward and occupied, still in prehistoric times, the Rito de los Frijoles, west of the Rio Grande, where they excavated the cavate lodges in the soft volcanic tufa cliffs still to be seen. These were abandoned before the coming of Coronado, in 1540, who found the Queres in seven pueblos (excluding Acoma and probably Sia) forming the province of ((Quirix,» along the Rio Grande. In 1630 they were reported by Fray Alonzo de Benavides to number 4,000, but this and other early estimates did not include Acoma. (See Pueblo). The present queres pueblos are as follows : KERESAN

Cochiti (native Kotviti).— On the west bank of the Rio Grande, 27 miles southwest of banta re. In prehistoric times the natives of Cochiti and San Felipe formed one tribe, but on - account of the hostility of the Tewas (see Ta-

noan Family), they divided, the latter build¬

ing a village near their present pueblo, the for¬

mer settling in the Potrero Viejo, which they later abandoned, moving to near their present location, where they were found by Onate in 1598. The Cochiti villagers were active partici¬

pants in the Pueblo revolt of 1680, killing their missionary, but continuing to occupy their town.

On learning of the approach of the Spaniards to reconquer their town a couple of years later, they fled, with the people of Santo Domingo and San Felipe, to the Potrero Viejo, where they remained almost uninterruptedly until 1692, when they were induced by Vargas to return to their homes. The Cochiti and Santo Domingo people again fled to the Potrero, however, where they were assaulted by Vargas in 1693 and severely defeated, 200 of their women being captured and their pueblo burned. Cochiti be¬

came the seat of the mission of San Buena¬

ventura early in the 17th century. Of the 16

clans 4 are extinct.

San Felipe (native name Katishtya). — On the west bank of the Rio Grande, 12 miles above Bernalillo. Formerly combined with the peo-

ple of Cochiti, but independently occupying the vicinity of the present site at least since 1540.

It was the seat of one of the earliest missions of New Mexico, its first church being erected prior to 1607. The inhabitants participated with those of Cochiti and Santo Domingo in the great revolt of 1680, but aided Vargas in dis¬

lodging the Cochitenos from the Potrero Viejo in 1693. They had no resident missionary at the time of the revolt, but aided in murdering the priests of Cochiti and Santo Domingo. After leaving the Potrero in 1692 the San Felipe peo¬

ple built a new pueblo on a mesa northwest of their present town, where a church (the walls of which are still standing) was erected in 1694.

This was abandoned early in the 18th century and the present pueblo established, the fourth to bear the name Katishtya. Of the 30 San Felipe dans 9 are extinct.

Santo Domingo (native name Kiwa or

Dyiwa). — On the east bank of the Rio Grande, 18 miles above Bernalillo. In prehistoric times the inhabitants occupied successively the Po¬

trero de la Canada Quemada and two pueblos called Guipuy, in the latter of which, on the Rio Grande, they were found by Onate in 1598.

Like its predecessor, the second Guipuy, as well as Huashpatzena, the settlement which followed, was swept away by flood, and the present Santo Domingo had three similar but less severe disasters between its founding in 1692 and 1886, when a freshet destroyed its fine old church with carved doors bearing the Spanish coat of arms. At the time of the Pueblo rebellion of 1680, it was an important mission seat and the residence of the custodian of the province, who, with two other priests, were slain. The pueblo has 18 surviving clans.

Santa Ana (native name Tamaya). — On

the northern bank of the Rio Temez, a western tributary of the Rio Grande. Before the Span¬

ish advent the inhabitants lived nearer the Rio Grande and in 1598 resided on a mesa between the present pueblo and San Felipe. They joined the San Felipe and Santo Domingo people in the great revolt, but in 1687 their village was carried by storm and burned, several of the natives perishing. The present town was built ?'7tJr It became a mission early in the 17th century, but had no resident missionary at the time of the rebellion. Santa Ana has 7 clans.

Sia (native Tsia).— On' the north bank of Jemez River, 16 miles northwest of Bernalillo.

It was formerly a pueblo of great importance, and in 1583 was said by Espejo to be the chief one of five towns forming the province of Punames. It early became the seat of Nuestra Senora de la Asuncion. Its inhabitants made a most determined stand during the revolt of 1680, but in 1689 they were assaulted by the Spaniards, their pueblo wrecked, and the tribe decimated in the bloodiest engagement of the rebellion. Since this time the little tribe has been declining; Sia formerly had 37 clans, but of these only 16 survive.

Aconia (from Akome, ((People of the

White Rock®). This pueblo and Laguna form the western division of the Queres stock.

Acoma is picturesquely and strongly situated on a rock mesa, 357 feet high, about 60 miles west of the Rio Grande. It was first mentioned as ((Acus® by Marcos de Niza in 1539 and visited by Coronado in 1540. Acoma has the distinc¬

tion of being the oldest continuously occupied town in the United States. The natives treach¬

erously killed several Spaniards of Onate's force late in 1598, but in the following January the Spaniards led an expedition against the mesa, stormed and captured the town, killed about half the inhabitants, and burned some of the houses. Acoma became the seat of the mis¬

sion of San Estevan in 1629; the natives mur¬

dered their missionary in the revolt of 1680, and remained in their fortified retreat until 1699, when they were induced to submit to the Spanish authorities. The present large adobe church, with its remarkable cemetery filled in with earth carried from the valley below, dates from the _ reconquest. In prehistoric times the Acomas lived on the summit of an even loftier mesa, known as Katzima, or the

((Enchanted Mesa,® three miles northeastward. According to tradition (verified by an examination of the summit and the surroundings of the mesa by F. W. Hodge in, 1897), the only trail was washed away in a storm, leaving some of the inhabitants to perish; the village was hence¬

forth abandoned. Population in 1680, 1,500; in 1760, 1,052; in 1902, 566. Of the 20 original clans 6 are now extinct.

Laguna (Span. <(lagoon,® from a lake for¬

merly west of the pueblo ; native name Ka-

waik). — The largest of the Queres towns, and the most recently established of all the south¬

western pueblos, having been founded in 1697

by refugee Queres from other villages, partic¬

ularly Acoma, as well as by Indians of other stocks. It is situated on the Santa Fe Pacific Railroad, 17 miles northeast of Acoma. The town js being gradually 'abandoned, many of its inhabitants^ having moved permanently to their eight farming villages to the north and west.

The Lagunas are very intelligent, honest and industrious, and are largely in demand as rail¬

road laborers. The mission name of Laguna is 378

San Jose, applied also to the rivulet on which the town is situated. The tribe has 20 clans.

The total population of the Keresan Indians is between 4,000 and 5,000. (See Pueblo Indians).

Consult Goddard, P. E., Indians of the South¬

west (New York 1913).

F. W. Hodge,

Smithsonian Institution, Washington, D. C.

KERGUELEN (kerg'e-len) LAND, or

DESOLATION ISLAND, an island in the

Indian Ocean, intersected by lat. 49° 3' S., long.

68° 18' E. ; length about 100 miles; greatest breadth about 50 miles ; area, about 2,500 square miles. It has a remarkably barren and desolate appearance, due to the fact that it consists of lofty masses of basalt and other volcanic rocks.

These rise to the height of 2,500 feet, present¬

ing numerous bold headlands and ranges of precipitous cliffs, and possessing a very scanty vegetation. The highest point, Mount Ross, is over 6,000 feet. Sea-fowl are numerous but no indigenous land animals exist on it. Its inden¬

tations furnish several bays and inlets affording good harbors. It was annexed by France in 1893, and some settlers have made their abode there at Port Jeanne d'Arc since 1907. Of the flora, which is arctic, the most noteworthy spe¬

cies is the Kerguelen cabbage (Pringlea antis-

corbutica) , a large edible plant, in many ways resembling common garden cabbage, and which has been valued on account of its antiscorbutic properties. The name of the island is derived from Kerguelen-Tremarec (q.v.), a Breton navigator who discovered it in 1772. Captain Cook (who named it Desolation Island) visited there in 1776, as also did the Challenger in 1874. There are some 300 smaller islands scat¬

tered around, and the waters abound in fish, whales and seals.

KERGUELEN-TREMAREC, kar'ge-lan-

tra'ma'rek, Yves Joseph de, French explorer: b.

Brittany, 1734; d. 1797. He served in the navy and in 1771 was sent in command of a corvette by the French government to explore a great continent that was supposed to lie southeast of Africa. He discovered Kerguelen island (q.v.), took possession in the name of France, and returned home with the news that he had found the ^continent.*' His claim was discredited, though he was promoted as a re¬

ward by Louis XV. A second voyage in 1773—74 still failed to convince him that he had only found an island. Various charges were brought against him ; he was court-martialed and im¬

prisoned, but pardoned by the king and ordered to write an account of his explorations. Cap¬

tain Cook explored the archipelago 1776-77

and dispelled the continental theory, which led the French government to order the destruction of the copies of Kerguelen's (Relation de deux voyages dans les mers australes . faits de 1770

a 1774\ of which very few copies now exist.

He wrote some other works and was made vice-admiral during the Revolution.

KERKI, ker-ke, capital and province, in Bokhara, Central Asia. The city is over 100

miles southeast of Bokhara city. Kerki, which has Russian-built fortifications which, a few years ago, were considered very strong, is situ¬

ated on the Russian frontier and constitutes a centre of caravan trade, several routes of which stretch out from it in different directions.

Pop. 5,000.

KERKUK, ker-kook', a city in Mesopo¬

tamia, 140 milbs almost straight north of Bagdad. It is the centre of an important trade in petroleum and

naphtha, the products of a neighboring oil region. Among the other in¬

dustries are pottery-making, cotton goods and tanning; while its commerce includes fruit, timber, silk and hides. Tradition says that in the city is the tomb of Daniel the prophet.

Pop. 23,000, nearly all of which are Kurds.

KERLEREC, kar'lar'ek', Louis Billouart,

Chevalier de, French sailor and colonial states¬

man : b. Quimper, France, 1704; d. in France, 1770. After serving in the French navy and making a brilliant record for himself he be¬

came governor of Louisiana in 1752. He strove to defend the colony from the English pri¬

vateers, the assaults of the Indians and the intrigues of British agents up the Mississippi.

He worked under great difficulties for the French king took no interest in his great American possession. On his return to France, Kerlerec was tried and found guilty of mal¬

feasance in office, apparently unjustly. He ap¬

pealed from the decision of the court but died before the case was decided.

KERMAN, or KIRMAN, Persia, province

in the southern part, bounded on the north by Yezd and Khorasan, on the south by Balu¬

chistan and Gulf of Oman, on the east by Seistan and Baluchistan and on the west by Fars. The northern part is largely covered by desert, while the south is a more or less mount¬

ainous region. Although the climate varies greatly because of the different elevations it is generally disagreeable and unhealthful. Cattle raising is

extensive, also that of the well-

known Kerman goats from whose soft hair is manufactured the beautiful shawls of the same name. The principal exports are shawls, car¬

pets, cotton, silk, gum and dates. Area, 65,000

square miles. Pop. about 600,000. The capital Kerman, is located in a fertile region at an elevation of about 6,100 feet. Nearby are the ruins of two ancient forts ; in many places the walls are still in perfect condition. Among others of less importance, the two mosques which deserve mention are Mas j id i Malik, built in the 11th century, and Masjid i Tama, dating from about the middle of the 14th century.

Pop. of city 60,000.

KERMANSHAH, or KIRMAN.SHAH,

Persia, town, capital of the province of same name. It is situated on a small river at an altitude of 5,100 feet, about 250 miles south¬

west of Teheran. Formerlv strongly fortified it is now practically an open town, and its location on the high road between Bagdad and Teheran greatly increases its commercial im¬

portance. It is noted for the manufacture of fine carpets, and also for its splendid horses.

It has a very good trade in barley, wheat and fruit. Pop. about 40,000.

KERMES, the scarlet grain of Poland, co¬

chineal, lac-lake, lac-dye, and all the modifica¬

tions of gum-lac (see Lac) are either the per¬

fect insects dried, or the secretions which they form. The first-mentioned substance is the Coccus ilicis. It is found in great abundance upon a

species of evergreen oak (Quercus coc-

cifera), which grows in many parts of Europe, and has been the basis of a crimson dye from the earliest ages of the arts. It was known to 379

the Phoenicians before the time of Moses; the Greeks used it under the name of kokkos, and the Arabians under that of kermes. From the Greek and Arabian terms, and from the Latin name vermiculatum, given to it when it was known to be the product of a worm, have been derived the 'Latin coccineus, the French cramoisi and vermeil, and the English «crim-

son and "vermilion.® The early Jews, the Greeks, the Romans, and until lately the tap¬

estry-makers of Europe, have used it as the most brilliant red dye known. The scarlet grain of Poland (Coccus polonicus) is found on the roots of the Scleranthus perennis, which grov\ s in large quantities in the northeast of Europe and in some parts of England. This as well as several other species, which afford a. similar red dye, have, however, fallen into disuse since the introduction of cochineal; and the introduction of aniline dyes has greatly injured the cochineal industry.

KERMES MINERAL, a name given to

amorphous antimony trisulphide. The native antimony trisulphide occurs in well-developed orthorhombic prisms. When this compound is used for some time, and suddenly thrown into cold water, its crystalline structure is entirely destroyed. Kermes is a brown-red powder, becoming blackish-gray when washed with boil¬

ing water. By fusion it may be obtained as a solid mass, but it is totally devoid of crystalline structure. See Antimony.

tv/tt?ERMESS' k^r'mgs, KIRMESS, or KER¬

MIS, formerly a church festival held by the Dutch and in Flanders, and later in other parts of Europe, on the feast-day of the principal saint of a place or church. In the United States the word has come into general use for enter¬

tainments given for charitable purposes.

KERN, John Worth, American senator: b.

Alto, Ind., 20 Dec. 1849; d. 17 Aug. 1917. Grad¬

uated in law from the University of Michigan (1869) ; he was city attorney for Kokomo (1871-84) ; reporter of the Indiana Supreme Court; member of Indiana State senate (1893—97) ; city solicitor of Indianapolis (1897-1901) ; candidate for governor of the State (1900 and 1904); vice-president (1908); senator (1911); and floorleader of the senate (1913).

KERN, kern, Hendrick, Dutch Oriental

scholar and writer: b. Island of Java, 1833.

Educated at Leyden and Berlin. He taught Latin in Maestricht Athenaeum (1858-62) and from 1865 on has been professor at Leyden.

Among his principal published writings are 'Handleiding bij het onderwijs der Neder-

landsche taaP 0879-83); (Cakuntata> (1862); 'Die Glossen in der ’Lex Salica und die Sprache der Salischen Franken) (1869) ; (A Manual of Astronomy) (1874) ; 'Over’ de aartelling der zuidelijke Buddhisten> (1875) -

'Geschiedenis van ’het Buddhisme in Indie) (1881-83) ; 'De Fidji-taal vergeleken mil hore verwanten in Indonesie en Polynesie) (1886) •

'Manual of Indian Buddhism) (1896).

KERN LAKE, a body of water in Kern

County, in the southern part of California; one of a small group of basins in the midst of an almost and part of the State. Part of the year there is no apparent outlet, but at the period of high water the lake overflows into Kern River. The country around this lake and in the vicinity is noted for its large amount of game.

EEEN RIVER, a stream in the southern

part of California; almost its whole course is among the mountains of the southeast. The country in the vicinity is noted for game, and at one time valuable mining interests. In the western part of Kern County, the slough of the Kern River occupies an area of about 80

square miles. It flows into Tulare Lake. The valuable water power of this river furnishes electric light and power for the city of Los Angeles.

KERN RIVER SHOSHONEANS, a

*small body of Indians of the Shoshonean family m southern California, isolated from the parent stock. It is so linguistically different rom the other members of this very extensive family of languages that it has been classed a ?laj0r d*visi°n of the Shoshonean tongue.*

Lhe few surviving members of this linguistic branch bear every evidence of having been long separated from the other linguistic groups of the common family. That they were strong enough to find thfir way to California would seem to indicate that they must have, at one time, been numerous and possessed of consider¬

able military strength. It is still an unsettled question whether the Kern River Indians repre-

cint Jhe ^llrtkest advance westward of the Shoshoneans; or are the remains of members of this latter family which once probably held possession of the coast lands of California as they did other vast

tracts of the North Ameri¬

can continent. The historic Kern River Shosho-

neans consist of two tribes, dialectically very similar The Tubatulabal who live in the val-

ley of the Kern River above the falls, and the Bankalachi who occupy the upper stretches of Deer Creek.

KERNAHAN, Coulson, English novelist:

b. Ilfracombe, Devonshire, 1 Aug. 1858. He was for many years literary adviser to Ward, Lock and Company, London. He has con¬

tributed criticisms, verses, essays and stories to numerous periodicals. Among his published works are 'A Dead Man's Diary) ; (A Book of Strange Sins) ; 'Sorrow and Song) • 'God and the Ant> ; 'The Child, the Wise Man and the Devil) ; 'Captain Shannon) ; 'Scoundrels and Co); 'Wise Men and a FooP ; (The Face Beyond the Door); 'A World Without a

Child); 'The Jackal) ; 'Visions); 'The Dump-

hng) ; 'The Red PeriP ; (An Author in the Territorials) ; 'Dreams) ; 'The Man of No Sorrows) ; 'The Bow-Wow Book) ; 'The Ex¬

perience of a Recruiting Officer); 'In Good Company); 'Bed-time Stories.)

. EERNER, k^r n^r» Justinius, German poet : b. 1786; d. 1862. Fie belonged to the Schwa-

bian school. He was at times morbid, fanciful, dreamy, sensitive and poetic and endowed with a strange, # fantastic humor that gained him many admirers. He graduated in medicine and practised his profession in several towns of Germany. Among his popular works are

'Reiseschatten) (1811), and 'Die Seherin von Provost) (1829).

beyond Strasburg. Shields was recalled to Winchester on the 20th, and Jackson followed him, his advance cavalry under Turner Ashby engaging Shields on the afternoon of the 22d, near Kernstown, in which Shields received a severe shell-wound. Jackson came up on the afternoon of the 23d and, being informed that Williams' division of Banks' corps had left Winchester and was moving through the Blue Ridge for Manassas Junction, and that Shields had but four regiments in his front, determined to crush these and thus recall Williams and de¬

tain him in the valley. Shields had nearly 8,000

infantry and cavalry and 23 guns, two of his brigades on a ridge covering the road half a mile north of Kernstown, both under command of Col. N. Kimball. Jackson had about 3,000

infantry and 27 guns. Kimball was too well posted to be attacked in front, so leaving Ashby with the cavalry and a small brigade of infantry to hold the road and threaten Kimball's centre and left, Jackson seized a low ridge on Kim¬

ball's right, and placed on it his artillery and infantry. Tyler's brigade, which had been held in reserve, was brought up and made unsuccess¬

ful efforts to dislodge him, upon which Kimball, drawing from his left and centre, formed a column of seven regiments and, under a terrific fire of artillery and musketry, led it forward, came up on Tyler's left and after a fierce com¬

bat broke Jackson's line. Kimball pressed his advantage, and as night closed in, Jackson was in

full retreat, leaving his dead and wounded and two guns on the field of his first defeat.

He said that he considered the engagement <(a fiercer fight during its continuance than any portion of the battle of Manassas.® The Union loss was 118 killed, 450 wounded, and 22 miss¬

ing; the Confederate loss, 80 killed, 375 wounded and 263 missing. Consult Official Records) (Vol. XII) ; Allan, (Jackson's Valley Cam¬

paign ; The Century Company's (Battles and Leaders of the Civil War5 (Vol. II).

KERNSTOWN (Winchester), Second

Battle of. On 22 July 1864 General Crook, with four small divisions of infantry and cavalry, joined General Averell's cavalry di¬

vision at Winchester, Va., Crook assuming chief command of the united force of 11,000 men.

On the 23d Crook advanced four miles south to Kernstown and skirmished with Confederate cavalry, and on the 24th went into position on the same ground held by the Union troops in the battle of 23 March 1862. The infantry di¬

visions of Colonels Thoburn, Duval and Mulli¬

gan covered the valley pike, with the cavalry of Duffie and Averell on either flank. Upon the approach of the enemy Averell was sent down the Front Royal road to turn his right. . Gen¬

eral Early, who, after his raid on Washington, had recrossed the Potomac and taken position beyond Cedar Creek on the 21st, hearing of Crook's advance, put all his army in motion on the morning of the 24th to attack him. At Bartonsville Ramseur's division moved by a road to get around Crook's right, while the di¬

visions of Gordon, Rodes, Breckinridge and Wharton

moved along the vallev nike and on either side of it. The cavalry was divided and moved in two columns, one on the right along the Front Royal and Winchester road, the other on the left and west of Winchester, the two to unite in rear of Winchester and cut off Crook's retreat. At 10 a.m. Crook's skirmishers were driven in, and it was discovered that his left extended through Kernstown, and that Averell having left, that flank wa; exposed; whereupon Wharton's division was moved

under cover of some ravines on the right to attack it. The movement was promptly exe¬

cuted, and Wharton struck the left flank and rear of Col. Rutherford B. Hayes' command as it was advancing and threw its left into some confusion. Hayes changed front and, forming behind a stone fence, held Wharton in tem¬

porary check. Almost simultaneously with Wharton's flank attack, Rodes, Gordon and Ramseur advanced on Crook's centre and right, and the entire line gave way and retreated through Winchester, followed by Early's in¬

fantry and artillery beyond Winchester, and by Rodes' division as far as Stephenson's Depot.

The retreat was continued on the 25th through Martinsburg to the Potomac, Crook crossing at Williamsport and marching down the north side of the river to Maryland Heights and Harper's Ferry. Early occupied Martinsburg and began the destruction of the Baltimore and Ohio Rail¬

road. The Union loss, 23-26 July, was 100

killed, 606 wounded and 479 missing. Among the mortally wounded was Colonel Mulligan, commanding division. The Confederate loss is not accurately known, but it was comparatively light. Consult (Official Records> (Vol.

XXXVII) ; Pond,

KEROSENE, an illuminating oil; the prin¬

cipal product of the distillation of petroleum, the crude domestic oil yielding 70 per cent of its weight. The oil is colorless, possessing a characteristic taste and smell ; insoluble in water, moderately soluble in alcohol, but very soluble in ether, chloroform and benzene. It dissolves camphor, iodine, phosphorus, sulphur, fats, wax and many resins. The flashing point of a safe kerosene should not be less than 34° and the igniting point 43°. The finest quality of illuminating oil is produced from distillate, ranging in. specific gravity from 0.775 to 0.780. It has a high flashing point, 48°

to 60°, and contains none of the lighter parts of the crude oil. A good illuminating oil should neither be too viscous nor too volatile, and it should not take fire when a light is applied to it. See Oil; Petroleum.

KERR, Alfred, German critic and publicist: b. Breslau, 25 Dec. 1867, living at Berlin, con¬

tributes to the ultra-modernist publications (Neue deutsche Rundschau, and others).

His works are (Hermann Sudermann) (1903) ; (Das neue Drama5 (1904) ; (Schauspielkunst5

(1904).

KERR, ker, Michael Crawford, American

politician: b. Titusville, Pa., 15 March 1827 ; d.

Rockbridge, Alum Springs, Va., 17 Aug. 1876.

He was graduated from the law school of Louisville University in 1851. The next year he moved to New Albany, Ind., and began the practice of his profession; in 1854 he was city attorney, and in 1855 prosecuting attorney for the county. In 1856 he was elected to the State legislature; in 1862 he was reporter for the Supreme Court of Indiana, and published five volumes of reports of unusual value.

In 1864 he was elected to Congress as a War

Democrat, and served till 1872. In that year he refused the nomination from his own dis¬

trict, but ran as congressman-at-large, and was defeated by a very small majority; in 1874 he was re-elected to Congress in spite of much opposition, and was made speaker on the organi¬

zation of the House. He served, however, only during the first session of that Congress (the 44th), as he died four days after its adjourn¬

ment. While a member of the House he served on several important committees, including the committee on ways and means ; he opposed the reconstruction policy of the Republican party and was an advocate of free trade. He was also a close student of financial problems, favored the resumption of specie payment, and was strongly against the Greenback movement in regard to which he opposed a large part of his constituency and many of the politicians of his State.

KERR, Orpheus C. See Newell, Robert

Henry.

KERR, Washington Caruthers, geologist:

b. Guilford County, N. C., 1827; d. 1885. Edu¬

cated at the university of his native State, he became computer in the office of the National Almanac at Cambridge, Mass. (1850) ; and five years later he was appointed professor of geology, mineralogy and chemistry in David¬

son College, North Carolina. Serving through the Civil War on the Southern side, he became, after the war, a member of the United States Geological Survey (1882-83). Among his pub¬

lished works are (Report of the Geological Survey of North Carolina) (2 vols., 1875-81) ; (Report on the Cotton Production of Virginia) (1884) ; (Ores of North Carolina) (1888).

KERRIL, a sea-snake (Distira cyano-

cincta), olive with blue-black bands, numerous along the coasts from Persia to Japan, and considered one of the most venomous of its race. See Sea-Snake.

KERRVILLE, ker'vil, Texas, town, county-

seat of Kerr County; on the Guadalupe River, and on a branch of the San Antonio and Aran¬

sas Pass Railroad. It is the seat of the Kerr-

ville Sanitarium and the Schofield School for Girls. It is situated in an excellent agricultural region in which cotton cultivation and sheep raising are the principal occupations. The alti¬

tude of the town is about 1,800 feet, which ac¬

counts for its agreeable climate. The chief in¬

dustrial establishments are stockyards, flour¬

mills, cotton gins and, in the vicinity, stone quarries. The town has considerable trade in lumber, cotton, hides, live stock, and is one of the principal wool markets of the State. Pop.

(1920) 2,353.

KERRY, a county in Munster, Ireland,

lying between the Atlantic Ocean on the west and the mouth of the Shannon on the north. It is noted for its beautiful mountain scenery and the far-famed Lakes of Killarney. The county is, for the most part, rugged and inclined to he wild; and the mountains there rise to the high¬

est elevation attained in Ireland, in the peak of Carran Tual. The chief products of Kerry are cattle,

butter, oats and fish. The county town is Tralee; and the other places of importance are Killarney, Listowel, Cahersiveen and Ken-

mare. Area, 1,811 square miles. Pop. about 160,000.

KERSAINT, ker'san', Armand Guy Simon

de Contemperen, Count of, French naval officer: b. Paris, 29 July 1742; executed 4 Dec.

1793. Following the family traditions he early entered the navy (1755) and was rapidly pro¬

moted. Though of noble birth he sided with the party of progress, and became one of the noted figures of the Revolution. Made vice-

admiral in 1793 he attempted to effect far-

reaching reforms in the navy, which were balked by the excesses of the Revolution culmi¬

nating in the mock trial and execution of the king. Against these acts Kersaint protested vigorously, with the only result that he himself suffered the same fate as his late sovereign.

KERSEY, ker'ze, a village in Suffolk, Eng¬

land, noted for its trade in woolen goods. The name «kersey» is also given to a light woolen cloth, which is looked upon as characteristic of the town. This cloth is most carefully finished; and this results in giving it a smooth surface and soft touch.

KERSHAW, Joseph Brevard, American

soldier: b. Camden, S. C., 5 Jan. 1822; d. there, 13 April 1894. He entered the Confederate army at the outbreak of the Civil War, and as brigadier-general commanded a brigade in the Peninsular campaign of 1862. He took part in the capture of Harper’s Ferry, 15 Sept. 1862, and was active at Antietam, Fredericksburg, Chancellorsville, Gettysburg and

Chickamauga.

After the war he became president of the South Carolina Senate, and was judge of the 5th cir¬

cuit of South Carolina, 1877-93.

KERTBENY, kirt'ba-ne, Karl Maria, Hun¬

garian writer: b. Pest, 1842; d. 1882. Many of his works are laborious and almost purely bib¬

liographical and hence useful, but not of a dis¬

tinctly literary character. He also translated into German the works of several Hungarian poets. His distinctively original work is found in his essays and literary criticism.

KERTCH, kerch, a Russian seaport in the Crimea, at . the farthest eastern point. The town itself is old, dating to the first centuries *of the Christian era; but it is built upon the site of a prehistoric city, the ancient mounds of which are still standing close by. Near by there are also some old catacombs the walls of which are covered with inscriptions of an early date. The Church of Saint John

the Baptist which dates back to the year 717, shows strongly the Byzantine influence in its architecture. Kertch is a place of some com¬

mercial and industrial importance. This is due to its favorable situation between the Azov and the Black Seas, which makes it one of the im¬

portant carrying ports of the South of Russia.

It handles iron, grain, wool, hides, fish, oil and fruit (dried, and in its natural state), in addition to its own manufactured products, the most important of which are flour, lumber, lime, beer, tobacco, soap, candles, cement and leather. The history of Kertch merges into that of Panticapaeum, an ancient city which, in its later days, became the capital of the kingdom of the Bosporus. The Tartars captured it

in the 13th century; and it fell into the hands of the Genoese in the following century. By the latter it was called Cerchio. Hence its modern name, slightly modified by the Turks, who came into possession of the city the following cen-

tury, only to yield it to the Russians in 1773.

Kertch, owing to its situation, naturally suffered severely during the Crimean War (1854-55) at the end of which it was practically in ruins.

It has been since rebuilt on much more modern lines than those of the destroyed city. Pop.

60,000.

KERVYN DE LETTEN HOVE, ker van'

de let'ten ho've, Joseph Marie Bruno Constan¬

tin, Belgian historian ; b. Saint Michel, Flanders, 1817 ; d. 1891. He was Minister of Public In¬

struction (1870-71), a careful, intelligent and laborious antiquarian and an authority, in his field, on matters relating to his native country.

Among his published works are (Histoire de la Flandre) (1847-50); (Jacques d'Artevelde5

(1863) ; (Histoire et chroniques de Flandres) (1879-80) ; (Relations politiques des Pays-Bas et de l'Angleterre) (1882-87); (Les Huguenots et les gueux5 (1883-86) ; (Marie Stuart5

(1889) ; and numerous translations and edited volumes.

KESSEL, van, the family name of a num¬

ber of notable Flemish painters, the first of whom was Jeroom van Kessel. They covered a period from

the beginning of the 17th century to the middle of the 18th and collectively entered almost every department of painting. For the members of this family see the biographies given under the family name, which follow.

KESSEL, Ferdinand van, Flemish painter: b. Antwerp, 1648; d. 1696. He was a son of Jan van Kessel the Elder and a pupil of his father, whose style and mannerisms he fol¬

lowed. He was a favorite of King John So-

bieski of Poland who encouraged him to step beyond the bounds which his father had set for himself and to paint larger historical scenes.

For this enlightened ruler he painted two large pictures entitled (The Four Elements) and (The Four Continents5 which pleased the sovereign greatly. These were destroyed by fire ; and Kessel repainted them, according to the judg¬

ment of his contemporaries, on a larger and better scale. He also did decorative work for palaces and churches ; and a good sample of this work was done in the palace of King Wil¬

liam III at Breda where he went to live in 1688.

KESSEL, Jan Van, The Elder, Flemish

painter: b. Antwerp, 1626; d. 1679. He was a son of Jeroom Van Kessel (q.v.) and a pupil of his father, his grandfather, Simon de Vos and Jan Breughel and studied in Madrid, where he was highly esteemed as a painter of landscapes, flowers, fruits and animals. He displayed much of the talent of his father and his grand¬

father, qualities which he transmitted to his son Jan the Younger (q.v.). Considerable of his work still exists. The Madrid Museum pos¬

sesses (A Garland) (in one of his and Van Thuden's pictures) and some 40 other pictures.

Among his other works are (Concert of Birds>

(Antwerp Museum) ; (Fight between a Bear and a Snake,) (Birds Set in a Landscape,5

(Boar-hunt,5 (Fable of Stork and Fox)

(Vienna Museum). But these are only a few of his many pictures which are to be found in many art galleries, among them those of Paris, Florence, The Hague, Stockholm, Nuremberg, Stuttgart, Berlin, Austria and Brunswick.

KESSEL, Jan Van, The Later, a Flemish painter, supposed to belong to the famous Van Kessel family of painters : b. Amsterdam, about 1641 ; d. 1690. He seems to have been a pupil of Jacob Ruysdael and Hobbema; at any rate he followed their style of painting. He was looked upon as one of the best landscape painters of his day. Of his surviving works there are can¬

vases in many of. the galleries of Holland and Germany, among them Munich, Darmstadt,

Amsterdam, Antwerp and Rotterdam.

KESSEL, Jan Van, The Younger, a son

and pupil of Jan Van Kessel, the Elder, whom he accompanied to Spain: b. 1654; d. 1708. In Spain father and son seem to have worked to¬

gether. Jan the Younger, however, seems to.

have prospered better than the Elder. In six years after his arrival in Madrid he had become court painter to Charles II. He was very popu¬

lar as a portrait painter and he had the patronage of the court nobility. He followed his father’s methods in other lines of painting all of which he did. Like his brother Ferdinand, he also successfully attempted large historical scenes.

Owing to the fact that most of his attention was

given to portrait painting, there are not so many survivals of his work as there are of his father's (Jan, the Elder), or of his grand¬

father's (Jeroom Van Kessel) ; and as most of his active life was spent in Madrid, nearly all of his work remained in Spain. Among his notable works are portrait of Philip IV

(Madrid Museum) ; (Psyche Surrounded by Wild Animals,5 (Psyche and Cupid) (Alcazar, Madrid) .

KESSEL, Jeroom Van, a noted Flemish

painter and the founder of the famous Van Kessel family of painters: b. Antwerp, 1578; d. about 1636. He was the most distinguished pupil of Cornells Floris; and was the son-in-

law of Jan Breughel, the famous landscape painter. Kessel worked considerable in col¬

laboration with his father-in-law into whose landscapes he is said to have infused more animation by introducing animals and other figures. He traveled about Germany and the Low Countries painting portraits in various large cities, such as Frankfort, Cologne and Strassburg. He also gained a reputation as a painter of still life and animals. His chief wanderings seem to have begun when he was about 28. and to have lasted some 12 years.

After this he probably made his home in Antwerp.

KESSEL, Theodorus Van, Dutch painter,

engraver and etcher: b. probably in Holland, about 1620. The date of his death is uncertain.

He went to Antwerp in 1652. where he became noted as an etcher of the great masters, espe¬

cially those of the Low Countries. Van Dyck, Titian, Rubens and Guido Reni were among the painters whose works he reproduced. Copies of his etchings are still held in high esteem.

KESTER, Paul, American dramatist : b.

Delaware, Ohio, 1870. He is a brother of Vaughan Kester. He has been active in prose and verse;. but his greatest success has been in the dramatic field. Among his published works are (His Own Country5 ; (Tales of the Real Gypsy5 ; and the following plays : (The Countess Roudine5 (with Minnie Maddern Fiske) ; (Zamar5 ; (What Dreams May Come5 ; (The KESTER — KETTELER

Cousin of the Ring5 (with Vaughan Kester) ; |Sfne Aram ; < Sweet Nell of Old Drury5

W hen Knighthood was in Flower5;

"?is.^lc Mars5 ;

ote ; 1 he Bill Toppers5; (The Lady in the Castle ; Beverly's Balance5 ;

KESTER, Vaughan, American novelist: b.

New Brunswick, N. J., 1869; d. 1911. He de¬

voted his life to literary work. Much of his l>cst work was contributed to the Cosmopolitan Magazine on whose staff he was for some considerable time. Among his more serious published works are (The Prodigal Tudge5 ; (The Manager of the B. and A.5;

tunes of the Landrays'5 ; (John o'James¬

town5 ;

KESTREL, one of the smaller of the Euro¬

pean falcons (Tinnnnculns alaudarius), resem¬

bling the sparrow-hawk, and formerly much used in falconry by the peasantry. The Amer¬

ican sparrow-hawk and sharpshin (qq.v.) mav be called kestrels.

KESWICK MOVEMENT, The. In 1874

Canon Harford-Battersby attended a confer-

enc at Oxford and there passed through a deep spiritual experience. On his return to his parish, Saint John's, Keswick, he was very desirous that his people should have the same experience. So the first Keswick Convention was called by the vicar and his helper, Mr.

Robert Wilson,' in the year 1875. Its title was (

1. Come waiting on the Lord, desiring and expecting blessing to your own soul individually.

2. Be ready to learn whatever God may teach you by His word, however opposed to human prejudices and tra¬

ditions.

3. Heartily renounce all known evil and even doubtful things (" not of faith ").

4. Lay aside for the time all reading except the Bible.

5. Avoid conversation which has a tendency to divert your mind from the object of the meetings. Do not dispute with any, but rather pray with those who differ from you.

6. Eat moderately, dress simply, retire to rest early.

The convention became an annual affair at¬

tended by hundreds of people. The meetings were held in two tents each having a capacity of 2,250. Many subjects were discussed such as (The Renunciation of Evil,5 (Holiness by Faith,5

tersby died in 1883, but the work has been continued. The movement has been productive of considerable devotional literature by such writers

as F. B. Meyer, W. H. A. Hay Aitkin, Bishop H. C. G. Moule, Andrew Murray, Hu¬

bert Brook, J. Stuart Holden, Arthur T. Pier¬

son and G. H. C. Macgregor.

At the Keswick Convention of 1891, those present from Scotland decided to hold a like meeting in their own land. As a result, for many years, beginning with 1892, an annual meeting has been held at Bridge-of-Allan. It was called ((The Scottish National Christian Convention for the Deepening of Spiritual Life.55 The movement js world-wide and of great influence in Christian circles. Consult Harford, Charles F., (The Keswick Conven-

Message, Its Methods and Its Men5

(1907), also Macfarlane, Scotland's Keswick; Sketches and Reminiscences5 (1917).

KETCH, a vessel equipped with two masts, namelv, the mainmast and the mizzenmast, and usually from 100 to 250 tons burden. Ketches were principally used in former times as yachts for conveying princes of the blood, ambassa¬

dors or other great personages from one place to another. Ketches in use at the present day are chiefly coasters.

KETCHAM, William Henry, American

missionary: b. Sumner, Iowa, 1 June 1868. He was educated at Saint Charles College, Grand Coteau, La., and the Seminary of Mount Saint Mary s of the West, Cincinnati, Ohio. In 1885

he became a Roman Catholic, and was ordained a priest in 1892. Until 1897 he was missionary to Creek and Cherokee Indians and other tribes m and about Muskogee, I. T. From 1897 to 1900 he was missionary to the Choctaws at Antlers, I. T., and in the latter year was ap¬

pointed assistant in the Catholic Bureau of Indian Missions, Washington, of which he was made director in 1901. Since 1913 he has served as United States Indian Commissioner.

During his sojourn in the Indian Territory, he founded many schools and churches and con¬

verted many Indians to the Christian faith.

He helped heal the breach between the govern¬

ment authorities and the Catholic Indian Bu¬

reau, and secured the abolition of the rule for¬

bidding Catholic Indian children in government schools from attending Catholic religious serv¬

ices. He founded the Indian Sentinel and in 1908 was delegate to the First American Mis¬

sionary Congress at Chicago. In the same year and again in 1910 he attended the Lake Mohonk conferences of Friends of the Indian.

KETONES, ke'tdnz. See Acetone.

KETTELER, ket'tel-er, Clemens August,

Baron von, German diplomat : b. Potsdam, 1853; d. Peking, 20 June 1900. He served for a time in the army, but entered the diplomatic service, in 1882 as attache at Peking drew up the first treaty between Germany and Korea, in 1883 was appointed acting consul at Canton, in 1892 became secretary of the German lega¬

tion at Washington, and when in 1893 the lega¬

tion was made an embassy was appointed first secretary to the embassy and councillor of state. In 1896 he became Minister to Mexico, in 1899 Minister to China. In 1900, at the time of the ((Boxer55 disturbance in northern China, he was selected, owing to his familiarity with the Chinese language,

to represent the foreign diplomats in their communications with the government. While on such a mission he was shot in the street. Prince Chun, brother of the emperor, was sent to Germany to apologize for the murder, and 18 Jan. 1903 a memorial arch, set up at the expense of the Chinese govern¬

ment, was dedicated at Peking.

KETTELER, Wilhelm Emanuel, Baron

von, German ecclesiastical leader: b. Munster, Prussia, 1811 ; d. 1877. Graduating in law after studies at Gottingen, Berlin, Munich and Heidelberg, he entered the civil service at Munster. This be soon left to study for the priesthood in the Catholic Church. Ordained in 1844, he became, through his talents and 384

his family connections, Bishop of Mainz in 1850. He at once became the champion of the Catholic Church whose power and freedom from State control in Germany he labored to build up. He was, therefore, constantly in opposition to the policies of the Chancellor and the royal family, a position he maintained to his death. Among his published works are (Freiheit, Autoritiit und Kirche) ; (Die wah-

ren Grundlagen des religiosens Friedens) ; (Des allgemeine Konzil und seine Bedeutung fur unsere zeit) ; (Der Kulturkampf gegen die katolische Kirche) ; (Die Katoliken im Deut-

schen ReicheP His works are still read^ in Catholic circles in Germany, where von Ket-

teler is looked upon as the greatest of modern German champions of the Church.

KETTENBERG, ket'ten-berg, Susanne

Katharine von, German essayist and poet : b.

Frankfort, 1723; d. 1774. She was a strong Pietist and her religious tendencies are re¬

flected in her essays and poems, which are gen¬

erally of a religious cast even when they are not distinctly religious. She was also strongly mystical, as were many people of religious at¬

titude in Protestant circles in her day, and she had a love of alchemistic studies to which she devoted considerable time and investigation. A close friend of Goethe's mother, she exercised a strong influence over the youthful poet, who had an ardent admiration for her which is clearly painted in (Bekenntnisse einer schonen Seele) (in (Wilhelm Meisters Lehrjahre*).

Through Goethe she afterward became ac¬

quainted with people notable in the literary life of her time, among them Lavater, who came to admire her very much. Consult Dechent, (Goethe's Schone Seele) (Gotha 1896), and De-

litzsch, (Philemon, oder von der christlichen Freundschaftp which contains a number of her religious essays and songs.

KETTERING, city in Northamptonshire,

England. It is a place of considerable import¬

ance on account of its manufacturing interest, among which are iron ore mines and stone quarries, shoe, agricultural tool and brush fac¬

tories and the making of clothes. It has some good modern buildings, an old church tower dating back to 1450 and excellent municipal edifices.

KETTLE DRUM, a musical instrument,

formed of thin copper and has a head of parch¬

ment or vellum. Kettle drums are used in pairs,

slung on each side of the withers of a cavalry horse. One drum is tuned to the key note and the other to the fifth of the key in which the piece in which they are to be used is written. The tuning is by a hoop and screws.

Also a name for a tea party held by fashionable people in the afternoon before dinner.

KETTLE HOLE, a pit or depression in a glacial outwash or morainic plain. These kettles are often occupied by small lakes.

They may be merely depressions due to unequal deposition, but are more often caused by the melting of buried blocks of ice.

KETT'S REBELLION, an uprising in

England under the leadership of the Kett brothers, in 1549. William and Robert Kett, landowners of Wvmondham, Norfolk, were

men of considerable influence in their own neighborhood. The people of the district rose in arms against the enclosure of 'common land and the eviction of tenants therefrom. Robert Ketts, lord of the manor of Wymondham, was induced to join them as their leader; and with him went his three brothers. He soon had at his command 16,000 men under excellent dis¬

cipline. This force proceeded to petition the Privy Council in London, stating respectfully but fully their grievances. The answer of the government was to send against the insurgents a strong force under the Earl of Warwick. In the meantime Kett had captured Norfolk (1

Aug. 1549). But he was finally defeated at Dussindale, a bloody battle in which both sides suffered heavily. The government forces won the day with the help of German troops provided with firearms which gave them a great superior¬

ity over the peasantry provided only with long¬

bows and cross-bows. In the battle 3,500 of the insurgents perished and many more met death on the scaffold. Among them the two Kett brothers. Consult Clayton, (Robert Kett and the Norfolk Rising) (London 1912) ; Rus¬

sel, (Kett's Rebellion) (London 1850).

KETUPA, the generic and vernacular name of a group of the large owls of the East Indies, specifically the Javan one (K. javanensis) , which subsist mainly on fish, crabs and the like, which they are expert in catching along the shores of sea and rivers. Their legs and talons are long and not feathered.

KEUKA (ke-u'ka) LAKE, or CROOKED

LAKE, a body of water in New York State extending from Steuben County to Yates County, a distance of 20 miles. It is about two miles wide and of irregular form. It has a depth of 200 feet and lies 718 feet above the sea. Steamboats navigate the lake in summer between Hammondsport and Penn Yan. The waters flow eastward to Seneca Lake.

KEUPER, koi'per, a red sandy clay, in its primary signification, and in its secondary, the topmost division of the Triassic system (in Europe). In Germany it is about 1,000 feet in depth while in England it is 3,000. Through¬

out it are found bones of animal and other geological deposits. In both Germany and England the chief factors in the Keuper are marl, sandstone and gypsum.

KEW, ku, England, a village in the county of Surrey, six miles from Hyde Park Corner, on the right bank of the Thames, opposite Brentford, with which it is connected by a bridge. The royal botanic gardens and the connected pleasure grounds, the former cover¬

ing about 75 acres, the latter 250, are the chief attraction of visitors to Kew. They contain the finest collection of plants in the world, and are decorated with various ornamental buildings,

including a Chinese pagoda 163 feet high. The botanical constructions here are really magnifi¬

cent, are of great extent, and have been much augmented in recent years. Kew Palace is close by the northern entrance. Gainsborough, the celebrated artist, is buried in Kew churchyard.

KEW OBSERVATORY, a celebrated as¬

tronomical structure in Richmond Park, be¬

tween Kew and Richmond, Surrey, England. It was built by George III as a private enterprise for the observation of the transit of Venus in 1769 and was then called the King's Observa¬

tory. It was transferred to the British Asso-

ciation as a physical observatory in 1841, and given its present name. In 1871 it was placed under the control of the Royal Society.

KEWANEE, ke-wa'ne, Ill., city in Henry County ; on the Chicago, Burlington and Quincy Railroad ; about 100 miles north by west of Springfield and 131 miles southwest of Chicago, on the Cannon Ball Trail. Kewanee is situated in an agricultural region, and coal fields are in the vicinity. The chief manufac¬

tures are valves, fittings, boilers, tanks, radi-

ators, gloves, mittens, pumps, agricultural im¬

plements, water supply systems, private electric¬

lighting plants, seed corn hangers, live stock supplies, steel coal chutes, brooms, core making machines. The tube and boiler works employ about 4,000 men. The public library has about 10,000 volumes. Among hotel accommodations is a modern structure erected at a cost of $100,-

000. The commission form of government is in operation. The city owns and operates the waterworks. Pop. 17,000.

KEWATIN. See Keewatin.

KEWAUNEE, ke-wa'ne, Wis., city, county-

seat of Kewaunee County; on Lake Michigan at the mouth of the Kewaunee River, and on the Kewaunee, Green Bay and Western Rail¬

road. The first permanent settlement was made in 1850, and tin city received its charter in 1882. It is situated in a fertile agricultural and dairying centre. Its chief industrial estab¬

lishments are foundries, machine-shops, agri¬

cultural implement works, pea-canning works and coffin factory. The city owns the electric-

lighting plant. Pop. 1,900.

KEWEENAW (ke'we-na) BAY, an arm of

Lake Superior, north of Michigan. It is eight miles long, by two to six miles in width. The town of Baraga lies at the head of the bay.

KEWEENAWAN (ke'we-na-an) SERIES,

a great series of rocks, believed to be of Pre-

Cambrian age, typically developed on Keweenaw Point, Mich., but found over a large area in Michigan, Wisconsin and Minnesota. Rocks of the same age occur also in Canada, and pos¬

sibly in the Adirondack Mountains in New York. They constitute the upper series of the Algonkian system. The series on Keweenaw Point and southward has a maximum thickness of perhaps 50,000 feet; the lower part consists mostly of thick sheets of lava and intrusive rocks with some sandstone and conglomerate; the upper part is a mass of

sedimentary rocks.

In the series, occur the famous Lake Superior copper deposits. See Geology.

KEY, Sir Astley Cooper, British admiral : b. London, 1821 ; d. 1888. After varied service in the British navy,, in South American waters, the Baltic and China, he became director of naval ordnance in 1866, and 12 years later presi¬

dent of the Royal Naval College at Greenwich, which he had organized. The following year he was knighted and raised to the rank of vice-

admiral and to full admiral in 1878 after hav¬

ing been commander-in-chief on the North American and West Indian stations. He had been steadily working to increase the efficiency of the British navy which owes very much to his well-directed and sustained efforts. In 1882 in recognition of his services he was made senior naval lord of the Admiralty.

KEY, David McKendree, American jurist

and cabinet officer : b. Greene County, Tenn., 27 Jan. 1824; d. Chattanooga, Tenn., 3 Feb.

1900. After studying law he was admitted to the bar in 1849, and in 1853 took up his resi¬

dence in Tennessee, establishing a successful law practice at Chattanooga. After vainly at¬

tempting to prevent the secession of Tennessee, when once that step was taken he joined the Confederate army and served through the war, but at its close joined the Republican party, succeeded Andrew Johnson in the United States Senate (1875); in 1877 was made postmaster-

general ; and in 1880 was appointed United States

district judge for the Eastern and Middle Districts of Tennessee, a position he held till 1894.

KEY, ki, Ellen (Karolina Sofia), Swedish social writer: b. Sundsholm, 1849; of a family well connected and of a line of semi-noble an¬

cestors. At the age of 20 she became secretary to her father who was then a prominent mem¬

ber of the Riksdag. About this time she be¬

came noted as a contributor to the magazines and periodicals of her native country, dealing with literary, historical and later sociological subjects. She was forced to teach in a pri¬

vate school when her father lost his fortune but this did not prevent her lecturing and continuing her magazine and newspaper writ¬

ing which was yearly increasing her reputation.

The . sale of her writings soon permitted her to give up teaching and to travel and lecture in foreign countries. She was a very advanced thinker and so she became a storm centre be¬

tween 1890 and 1910. Bitterly assailed by her opponents she was admired and supported and read by every one, with the result that her books have been translated into most of the languages of Europe. Among her publications, all of which have appeared in English, are the following: 'The Century of the Child) (1909) ; 'Love and Ethics) (1911) ; (Rahel Varnhagen) (1913); 'The Renaissance of Motherhood*

(1914); 'The Younger Generation (1914); 'The Misuse of Woman's Power* ; 'Woman's Psychology and Woman's Login ; 'Life Lines.*

Consult for her life and ideals her own work cited above, 'Rahel Varnhagen,* and Hamilton, L. N., 'Ellen Key: Her Life and her Work) (New York 1913).

KEY, Francis Scott, American lawyer and song writer:

b. Frederick County, Md., 9 Aug.

1780; d. Baltimore, 11 Jan. 1843. He was edu¬

cated at Saint John's College, Annapolis, and commenced to practise law in Frederick City Subsequently he removed to Washington, where he was for many years district attorney of the District of Columbia. As a song writer he is chiefly known by his 'Star-Spangled Banner, 5

a popular national lyric, suggested and partially written while the author was detained in the British fleet during the bombardment of Fort McHenry, near Baltimore, of which he was a:: anxious and interested witness. A posthumous collection of his miscellaneous poems was pub¬

lished in 1856. Consult Key-Smith, F. S , 'Francis S. Key* (Washington 1911). See Star-Spangled Banner.

KEY, in heraldry, a heraldic bearing used in ecclesiastical connections. The idea of its use originally seems to be that the places bearing it were under the protection of Saint Peter, the 386

traditional bearer of the keys of heaven. It seems probable that the use of the key grew out of that of the official insigniae of some 011c of the ancient heathen deities; and this view is borne out by the many peculiarly heathen leg¬

ends and superstitions connected with the key, among others, the one already cited, that Saint Peter is the bearer of the keys of the gate of heaven. See Heraldry.

KEY, in music: (1) A mechanical contriv¬

ance for closing or opening ventages, as in ilutes, clarinets, ophicleides, etc. By means of keys on such instruments, apertures too remote to be reached by the outstretched fingers are brought under control of the player. (2) A lever which brings the

pallets of an organ under the control of the hand or foot of an organist.

(3) A lever which controls the striking appar¬

atus of a key-stringed instrument. In the harp¬

sichord it acted on the jack; in the pianoforte it acts on the hammer. (4) The wrest or key used for tuning instruments having metal pegs.

Its end is hollowed out so as to fit over the four-sided end of the peg, and the cross-bar with which it is surmounted gives leverage to the hand of the tuner, so that he is enabled to tighten or loosen a string, or (in the case of a drum) slacken or strain a parchment. (5) The sign placed at the commencement of the musical stave which shows the pitch of the notes, was originally called a clavis or key. This sign is called in modern music a clef. (6) Key, in its modern sense, is the starting point of the defi¬

nite series of sounds which form the recognized scale. Different starting points require the rela¬

tive proportion of the steps of the scale to be maintained by means of sharps or flats in the signature. The key of C major requires no flats or sharps for this purpose, hence it is called the normal key.

KEY ISLANDS, a group of islands in the Banda Sea, East Indian Archipelago. See Kei Islands.

KEY WEST, Fla., city, port of entry,

county-seat of Monroe County; about 60 miles southwest of Cape Sable and nearly 100 miles north by east of Havana, Cuba. The city is on Key West Island, one of a group of coral islands, called Florida Keys. It is the farthest south of any city in the United States. The first permanent settlement was made in 1822

and the city received its charter in 1832. Key West Island is covered by only a thin layer of soil upon

which vegetation grows luxuriantly.

The island averages about 11 feet above the sea.

The harbor is excellent ; at the main entrance, on an artificial island, is located Fort Taylor.

The city has regular steamer communication with the large cities on the Atlantic and Gulf coasts and with the West Indies and Central America. It is on the Florida East Coast Rail¬

road and is the terminus of the ocean ferry to Havana. There is through passenger and freight car service between Havana and New York via Key West. It is a United States naval station, with machine shops, dock, marine rail¬

way, hospital, barracks, etc., and during the war with Spain, it was the rendezvous of the United States navy. The chief industries are manufac¬

turing of cigars, gathering sponges and fishing.

There is a large trade in fish, fruit, vegetables, turtles, turtle-shell ornaments, salt, tobacco, both raw and manufactured. In connection with the naval station there are barracks, machine-shops, marine hospital, docks, etc. Some of the chief public buildings are the government buildings, post-office and custom-house, county court¬

house, city-hall, and the Martello towers. The principal educational institutions are a Meth¬

odist Seminary and the Holy Name Academy.

The convent of the Holy Name was used as a hospital for soldiers during the Spanish War.

The free public library and the public and parish schools are excellent. There are two banks with a combined capital of $150,000. The gov¬

ernment has erected two light-houses in the harbor and others among the islands ; but still many wrecks

occur each year. The city owns and operates the waterworks. Key West in 1890 was the largest city in the State. Pop.

(1920) 18,749.

KEYBOARD, the name given to a set of <(keys® through which the tones of certain mu¬

sical instruments are produced. The principal instruments wdiich are at present operated in this way are the piano and organ. It is in connection with the latter that keys and key¬

boards were first used. Their employment can be traced back to pre-Christian times, but little is known concerning them until we come to the Middle Ages. The organ keys of this time were huge, unwieldy affairs, each key being from three to six inches wide and correspond¬

ingly long. They were not operated by the fingers, of course, but the entire fist or elbow was used in their manipulation, a circumstance which made it impossible to play more than one note at a time with each hand. The keyboards of the period were limited in range, and con¬

fined almost entirely to the so-called diatonic tones (represented at present by the white keys). Later the sharps and flats (black keys) were added, and the size of the keys was gradually reduced to the present dimensions.

The clavichord and harpsichord (precursors of the piano) were further keyboard instru¬

ments. Here, also, there was a development from primitive conditions, but essentially the nature of the keyboard, when once established, was similar to that of the modern piano. Only the range was smaller and the color was some¬

times different, the keys which are now white being black, and those which are black being white. The harpsichord also made use of a double keyboard, each

with its specific tonal effects.

piano keyboard, which is shown in the illustration, consists of 88 members or keys, .2 being white and 36 black. As is apparent, the latter arc arranged in alternate groups of two and . three keys. Thus the keyboard is divided into recurrent sections, known as octaves. More specifically, an octave is the dis¬

tance from one key to the next one that is similarly placed. For example, the distance Irom the middle one of the three black keys, near the centre of the keyboard, to the same key either right or left, is an octave. C is the white key immediately to the left of the group of two black keys. B and A successively follow to the left of this, D, E, F and G to the right.

After G a new octave commences with A. The black keys are named after the adjoining white keys, and are called sharps when derived from the white keys immediately to the left, and flats when derived from those immediately to the right. Thus the first of the group of three black keys, counting from the left, may be either F sharp or G flat, the next, G sharp or A flat.

The organ keyboard is similar to that of the piano, only the number of keys is smaller.

This does not imply, however, that the range is smaller too, for it is possible to raise or lower the pitch of the keys by means of the mechanical devices known as stops. The organ, unlike the piano, generally makes use of several keyboards, which are called manuals. These are placed above each other, and their number may reach up to five. Besides, there is a distinct series of keys to be operated by the feet, which is known as the pedal board. *By means of the various manuals it is possible to produce a variety of successive effects; likewise to

com¬

bine these effects through the use of different manuals for the two hands, and the reinforce¬

ment of the same, if desirable, by the pedal board. Furthermore, it is possible to combine all the manuals and pedal board in a grand total effect.

Although improvements and changes have

constantly been made in the tone and mechan¬

ism of keyboard instruments, so great in some cases as to result in the formation of new in¬

struments, no change has been made for cen¬

turies in the arrangement of the keys. Under the circumstances it is natural that this matter should also receive the attention of innovators.

Is it likely, we are asked, that an arrangement which grew up under conditions as primitive as those of the Middle Ages, and which was in¬

tended for the crude application of fist and elbow, should also be the ideal one for the delicate fingers, so different in strength and shape? This supposition being rejected, vari¬

ous changes have been suggested, some of a mild nature, some radical in their scope. For example, instead of the straight, side-by-side alignment of the keys, one which is slightly fan-shaped, and with an inward curve, has been suggested. But entire redispositions of the keys, too, have been proposed, the most notable recent attempt in this direction being that of Paul von Janko, a Hungarian inventor. He has devised a keyboard with six parallel rows of keys, one row behind the other, and each successive row slightly elevated above its an¬

terior neighbor. One advantage of this arrange¬

ment is to be found in the immense simplifica¬

tion of performance in the different keys which it allows. It is necessary to learn only two scales — one major, one minor — instead of the present 24. Furthermore, an octave can be spanned with about the same ease as a sixth on our actual pianos.

The invention is ingenious, and the new key¬

board made considerable headway for a time; but the prospects for its universal adoption are meagre. Whatever the disadvantages of the present keyboard, it has the advantage of actual possession of the field. The substitution of a new system would involve the discarding of present instruments, the relearning of the art by those who were educated in the old way, and the abandonment of valuable pedagogical works adapted to the piano _ and organ as they are.

It would correspond, in the realm of music, to the introduction of radical changes in the sys¬

tem of weights and measures, or in the spelling of entire languages. So great are the difficul¬

ties involved, indeed, that it is doubtful whether the change will ever be made. The present keyboard, firmly imbedded in the musical life of the world as it is, seems destined to retain the supremacy which it has so long enjoyed.

Albert Gehring,

Author of (The Basis of Musical Pleasure ,' etc.

KEYES, Charles Rollin, American geolo¬

gist : b. Des Moines, la, 24 Dec. 1864. Educated at State University of Iowa and Johns Hop¬

kins, he became assistant to the United States Geological Survey (1889-90) ; paleontologist to the State of Missouri (1890-92); assistant geol¬

ogist for the State of Iowa (1892-94) ; director of the geological survey of the State of Missouri

(1894-97). The following two years he spent in travel and geological studies in Europe, Asia and Africa. On his return he became president of the School of Mines of the State of New Mexico, a position he gave up in 1906 to con¬

tinue his geological foreign studies. Since then he has been consulting mining engineer in Des Moines, Iowa. Among his published works are /Geological Formations) (1892) ; 'Coal De¬

posits' (1893); Organization of Geological Surveys) (1894); (Paleontology of Missouri'

(1894) ; Surveys' (1894) ; (Maryland Granites'

(1895); Origin and Classification of Ore De¬

posits' (1907) ; Ozark Lead and Zinc Depos¬

its' (1909); (Deflation' (1910); 'Mid-Conti¬

nental Eolation' (1911); 'Bibliography of Geology' (1913); 'Mechanics of Laccolithic Intrusion' (1917).

KEYES, kez, Edward Laurence, American

surgeon : b. Charleston, S. C, 28 Aug. 1843. He is a son of Erasmus D. Keyes (q.v.) and was graduated from Yale in 1863 and from the medical department of the University of New York in 1866. He practised his profession in New York from 1867, and from 1869 to 1890

was a member of the faculty of Bellevue Hos¬

pital Medical College. He published 'Tonic Treatment of Syphilis' (1877; rev. ed, 1896); 'The. Venereal Diseases' (1880); 'Treatise on Surgical Diseases of the Genito-Urinary Or¬

gans' (1881; 2d rev. ed. by E. L. Keyes and E. L. Keyes, Jr, 1905), etc.

KEYES, Erasmus Darwin, American

soldier: b. Brimfield, Mass, 1810; d. 1895. In 1832

he was graduated at the United States Military Academy, West Point, and in the same year was stationed in Charleston, S. C, subse¬

quently he was for several years engaged .in sup¬

pressing Indian outbreaks on the frontier and in 388

garrison duty. When the Civil War broke out Keyes was made colonel of the 11th Infantry and deputed to New York to organize the re¬

lief expedition to Fort Pickens. In May 1861

he was made brigadier-general of volunteers and two months later participated in the first battle of Bull Run. Subsequently Keyes com¬

manded the Fourth Corps in the Peninsular Campaign during which he was constantly in active service. In 1864 he resigned. General Keyes published (Fifty Years' Observation of Men and Events, Civil and Military0 (1884).

KEYES, Henry Wilder, American pub¬

lic official : b. Newbury, Vt., 23 May 1863. In 1887 he was graduated at Harvard University and thereafter became extensively engaged in farming for many years. He was a member of the New Hampshire house of representatives for six years and of the senate for two years.

He served as governor of New Hampshire for the term 1917-19. In 1918 he was elected to the United States Senate for a term of six years, beginning 4 March 1919. He is interested in several commercial enterprises as corporate officer, director or trustee.

KEYNES, kanz, John Neville, English

educationalist and economist : b. Salisbury, 1852.

Educated at the universities of London and Cambridge, he served successively as Fellow in both of them, becoming lecturer in moral sci¬

ence in the latter (1884-1911) and secretary of the university senate (1893) and registrar (1910). Among his published works are

(Studies and Exercises in Formal Logic) (1884) and (Scope and Method of Political Economy >

(1891 and 1904).

KEYPORT, a town in New Jersey, Mon¬

mouth County, known as a popular summer resort. It is about 20 miles southwest of New York City, with which it is connected by rail¬

way and boat. Its principal industries are con¬

fined to the manufacture of wagons, carriages, sewing machines and rubber goods and the handling of oysters and clams. Pop. (1920) 4,415.

KEYS, the name given to coral and other reefs or slightly sunken rocks off the shores of Florida, Central America and the West India Islands. The term is derived from the Spanish cayo (an islet, rock).

KEYS, Power of the. A doctrine based

on the saying of Jesus recorded in the gospel of Matthew xvi, 19: (

Some have held that only a priest of a pure life could absolve from sin, while others have held that any priest could pronounce absolution as the messenger and representative of God. Some have held that the priest could release only from ^transitory® punishment and that only God can release from ((eternal punishment® and that often by words of the priest. Another difference has arisen; some have declared that the priest is absolving as a judsre, and others that he is acting as a mediator, while a third group has declared that he combined both func¬

tions. Thomas Aquinas gave the doctrine its importance giving a sacramental power to the keys, and uniting in this central power not only absolution, but penance and discipline. In h;s various relations to penance the priest holds the relation that water holds to baptism.

The Protestant view is based on an entirely different interpretation of the passage. The power of the keys was given to Peter as a sign of apostolical authority to establish the Church by the preachine of the forgiveness of sin and the establishment of the doctrine of the gospel. The power to bind and loose was not only conferred upon Peter but upon the other Apostles, and also upon their successors, the whole Church (Matt, xviii, 18). The Protes¬

tant doctrine of the priesthood of all believers is based in part upon the teaching of the Epistle to the Hebrews.

KEYSER, Cassius Jackson, American

mathematician and author : b. Rawson, Ohio, 1862. Educated at Ohio Normal University and universities of Michigan, Missouri and Colum¬

bia, he taught in public schools and became professor in Washington University, Saint Louis, Mo. (1894-95) ; and going to Columbia University he became professor of mathematics in 1904 and head of the department in 1910.

He wrote (Science and Religion: The Rational and the Super-Rational > (1914).

KEYSER, Id 'zer, Ephraim, American

sculptor: b. Baltimore, Md., 6 Oct. 1850. On the completion of his academic course in his native city, he studied art at the Royal Acad¬

emies in Munich and Berlin, where his success was marked. He has had studios in Rome, Italy, New York and Baltimore, where he now resides; in charge of

the sculpture and modeling classes at the Maryland Institute School of Art. His most important public works are the De Kalb statue at Annapolis, Md., the Stein memorial in Baltimore and President Arthur's tomb at the Rural Cemetery, Albany, N. Y.

He has made numerous portrait busts, among others those of Cardinal Gibbons, Henry Har-

land, Daniel Coit Gilman and Sidney Lanier.

While abroad he received the Michael Beerche scholarship.

KEYSER, Leander Sylvester, American

Lutheran clergyman, theological teacher, and naturalist: b. Tuscarawas County, Ohio, 13

March 1856. He was educated at several nor¬

mal schools, the Ohio Northern University and the Indiana University, and was graduated from the Hanna Divinity School, Wittenberg College, Springfield, Ohio, in 1883. He was pastor suc¬

cessively at Elkhart, Ind., Springfield, Ohio, Atchison, Kans., and Canal Dover, Ohio. In 1911 he became professor of systematic theology in Hanna Divinity School, which position he now occupies. He also teaches ethics, theism and Christian evidence in Wittenberg College, which conferred upon him the degrees of A.M.

and D.D. Besides theology, he has also been deeply interested in natural history, and has specialized in ornithology. His books are as follows: (The Only Way Out) (1888, rev.

ed., 1906) : (Bird-dom) (1892) ; (In Bird Land*

(1894) ; (Birds of the Rockies1* (1902) ; (Our Bird Comrades) (1907) ; (The Rational Test) (1908); (A System of Christian Ethics-* (1913) ; Election and Conversion* (1914) ; (A System KEYSER — KHANDESH

of Christian Evidence) (1913) • (Theological Outlines and Theses y (1915); {A System of Natural Theism) (1917).

KEYSER, the county-seat of Mineral

County, W. Va. It is situated on the Potomac River, not far from Piedmont, in a stock-raising and fruit district. It is well supplied with rail¬

way connections, which include the Baltimore and Ohio, the Western Maryland and the Twin Mountain and Potomac. These facilities have given rise to railway machine shops, woolen and silk mills, furniture and canning factories and other industries. Population (1920) 6,003, which is larger in the summer season as the place is a summer resort. The town contains a State preparatory school.

KEYSERLING, Eduard, Graf (Count)

von, German novelist: b. Pelss-Paddernin Kur¬

land, 15 May 1855. His early dramas showed excellent observation and detailed and impres¬

sive mood-painting, but he is stronger in the novel and short story, in which these qualities are capable of better application than in the drama. He has published (Rose Herz,> novel (Munich 1883) ; (Die dritte Stiege,* novel (Munich 1890) ; ^ruhlingsopferC drama (Ber¬

lin 1890) ; (Der dumme Hans,* drama (Berlin 1901); (Beate und Mareile,* a novel; (Peter Hawelp a drama (Berlin 1903) ; (Benignens ErlebnisP a drama (Berlin 1903) ; (Schwule TageP short stories (Berlin 1906) ; (DumalaP

a novel (Berlin 1908) ; (Bunte Herzen,* short stories (Berlin 1909). A translation of the last of these, under the title (Gay Hearts,* appears in (German Classics) (Vol. XIX, New York 1914). Consult Martens, Kurt, (Literatur in Deutschland) (Berlin

1910).

KEYSERLING, Margarethe, Grafin

(Countess) von, German authoress : b. Ber¬

lin, 22 Feb. 1846. Her maiden name was von Donniges and she is sister of the famous Helene von Donniges and wife of Eduard von Keyserling (q.v.), whom she married in 1864. She moved with her parents to Munich in 1847 and to Geneva in 1859. She has lived and worked in various cities : Gorlitz (1868-75), Glogau (1875-88), Reichenbach (1888-98) and Breslau, near which she is still living (at Kleinburg). She is a popular novel¬

ist, whose works are widely read and soon for¬

gotten. They include the novels

(1899), and the dramas (Sordello* (1899) ; (Ein Todesurteil* (1908) ; (Auf Ruhmeshohen*

(1909).

KEYSTONE STATE, a name given to

Pennsylvania, because it was the seventh, or central, of the original 13 States.

KHABAROVSK, ka'ba-rofsk', capital of

Priniorsk (Maritime province), Siberia, and seat of the governor-general of Amur. It is situated at the junction of the Amur and Us¬

suri rivers, and is therefore a place of con¬

siderable commercial importance, which has grown steadily since its foundation as a mili¬

tary station in 1858. Pop. over 60,000. It was formerly known as Khabarovka.

KHAIBAR (ki'ber) PASS, a high moun¬

tain pass between India and Afghanistan. See Khyber

Pass.

KHAKI, ka'ki, a kind of light-brown,

drab, or dust-colored cloth, originally used for making the uniforms of British East Indian regiments. In the South African War of 1899-

1902 the British troops wore khaki uniforms for purposes of protective coloration, and khaki was also worn by the United States troops in the Spanish- American War. The name is de¬

rived from the Persian "khak,** earth, dust, hence earth-colored, to render the wearer in¬

conspicuous. Consult Forbes, (Hindustani Dic-

tionary) ; Gubbins, (Mutinies in Oudh) (p.

296) ; Yule and Burnell, (Hobson- Jobson,* a dictionary of Anglo-Indian terms.

KHALIFA, ka-le'fa, The (Sayed Abdul¬

lah Ibu-Sayed Mohammed), Arab religious leader: b. Darfur, 1846; d. battle of Om-

Debraket, Egypt, November 1899. He fought against the Egyptian invasion of Darfur, and subsequently, having heard of the troubles of the Mad Mullah (q.v.), Mohammed Ahmed, with the Egyptian authorities, he visited Mo¬

hammed and proclaimed that the latter was the divinely-sent Mahdi, or "director,** appointed for the regeneration of Islam. It was by his councils that the Mahdi caused the troubles in Kordofan and Darfur. Ere long he was made "khalifa/0 or vice-gerent, his acts to be re¬

garded as equivalent to the Mahdi's own. He was named by the Mahdi as successor, and from 1885 ruled over the Sudan and such ad¬

jacent districts as he brought within his sway.

His capital was situated at Omdurman, near which, on 2 Sept. 1898, his army, though fight¬

ing with great bravery, was almost annihilated by the British and Egyptian forces under Sir Horatio (afterward Earl) Kitchener (q.v.).

He escaped northward, but on 24 Nov. 1899

was slain at the combat of Om-Debrakat. Con¬

sult Ohrwalder, Father, (Ten Years' Captivity in the Mahdi's Camp) (London); Slatin, Sir R., (Fire and Sword in the Sudan* (London 1895). See also Egypt — History; Sudan.

KHAMA, ruler of Bechuanaland : b. about 1846. He was originally head only of the Bamangwato, a northern tribe of his country, but owing to his struggle against the Boers he came to represent the interests of all of Bechuanaland. In 1884, after 12 years' strug¬

gle against the Boers on the part of Khama and other native chiefs, the whole of Bechuana¬

land was formally taken under British protec¬

tion. Khama, who had become Christianized, stood the firm friend of the British and assisted them against other insurgent tribes.

KHAMMURABI. See Hammurabi, The

Code of.

KHAN, kan or kan, or CARAVANSARY,

an unfurnished inn for travelers common in Turkey and other Eastern countries. There are two kinds, those for poor travelers and pilgrims, where a lodging is furnished gratis, and those for traders, which are usually more convenient, a small charge being made for each chamber. Khan is also the title of an Eastern or Asiatic ruler, as khan of Khiva. Such gov¬

ernment is a khanate.

KHANDESH, khan-desh', or CAN-

DEISH, British India, an inland district in the presidency of Bombay, with an area of 10,041 square miles. In 1906 the district was divided into two new districts called West and 390 KHARGEH

East Khandesh, with headquarters at Dhulia and Jalgaon. The former has 5,497 square miles and pop. about 470,000; th ' latter 4,544

square miles, pop. about 960,000. Consult im¬

perial Gazetteer of India) (London 1908).

KHARGEH, El, khar'ge, or KHARGA,

Upper Egypt, town, capital of the oasis of the same name in the Libyan Desert, 100 miles west of Thebes, in 25° 28' N., 30° 40' E. Among its numerous ruins are those of a temple of Ammon, and near-by is a remarkable necropolis.

Pop. about 6,000.

KHARKOV, Har-kof', or CHARKOV,

Russia, (1) a southern government in Little Russia, bounded north by Kursk and Voronezh; west and southwest by Poltava ; south by Ekaterinoslav ; east by the Don Cossacks ; area, 21,041 square miles. It is watered by affluents of the Dneiper and the Don. There are forests in a few parts, but the country generally is open, the soil dry and of a mixed loamy and sandy nature, but usually fertile. The climate is mild, though the winter is somewhat severe; the summer is frequently very hot. Agriculture and stock-raising form the chief employment of the inhabitants. Sugar and tobacco are manu¬

factured. Pop. 3,329,700. The principal town is (2) Kharkov, the capital, at the confluence of the Kharkovka and Lopanj, 400 miles south¬

west of Moscow. The houses are mostly of wood, whitewashed, and have a cleanly appear¬

ance. The city is the see of an archbishop, con¬

tains a university with an attendance of 1,800

students and valuable library containing over 175,000 volumes, a museum and botanical gar¬

den, a technological institute and a veterinary institute, etc. The inhabitants carry on a con¬

siderable trade

KHARTUM, Har-toom', or KHAR¬

TOUM, capital of the Egyptian Sudan, on the left bank of the Blue Nile, near its junction with the White Nile. Founded under Mehemet Ali in 1823, it rapidly rose to be the chief town of the Egyptian Sudan, but after its conquest by the Mahdi it was abandoned for Omdurman, on the opposite bank of the river. In the latter part of 1898 it was again occupied by British and Egyptian troons, who found it in a ruined and neglected condition. It was then a straggling place covering a wide area, with irregular streets and houses mostly built of sun-

dried bricks. Since the British occupation the town has prospered, great improvements have been carried out, and a handsome broad avenue on the bank of the Blue Nile has been laid out.

There are a number of mosques, a Coptic church and the palace of the governor-general.

The strong strategic situation of Khartum, with rail connections to Upper Egypt and the Red Sea, and water routes to Abyssinia, Uganda and the Belgian Kongo, make it the natural emporium of a vast region. It was the scene of Gordon’s heroic defense against the insur¬

gent Sudanese and of his death in January 1885. The Gordon College, established here after the British

occupation, was named in honor of him. This college trains aspirants for minor magistracies in their work, has a manual - KHEDIVE

training school and a well-equipped research laboratory. Pop. 69,349.

KHAT, the favorite stimulant of south¬

western Arabia, especially in the Yemen region.

It is leaves from the plant Catha cdulis, a thick¬

set, dark-green, leafy shrub, 5 to 12 feet high, growing in the mountains of Arabia mostly be¬

tween altitudes of 4,000 and 6,000 feet. There are many varieties differing greatly in value According to Beitter the active principle is an alkaloid, katin. The leaves are chewed and the effect is a prompt stimulation of the brain, re¬

lieving fatigue and dispelling gloom.

KHATMANDU, kat'man-doo', KAT¬

MANDU, capital of Nepal (q.v.), situated at the junction of Vishnumati and Bagmati rivers.

It is the largest city in Nepal, and was orig¬

inally known as Manju Patan, having been named after the Buddhist saint Manjsri, who tradition says cut the harrier of mountains with his celestial sword and released the waters that once flooded the plain of Katmandu. The na¬

tives believe that the irregular, crescent-like shape of the city represents the traditional sword of the war-like saint. Previous to the Gurkha conquest of the country (1769) Kat¬

mandu was the capital of the Newar sover¬

eigns, who reigned over a considerable part of Nepal and adjacent country. The city was once surrounded by strong, high and imposing walls, but these are no

longer of military value and have fallen into picturesque ruin in several places. This picturesqueness is added to by the narrow, winding streets, most of which are obstructed in places and generally only wide enough for foot passengers. The four-story brick buildings which form the chief edifices of the city are closely crowded together and throw their shadows for the greater part of the day upon the filthy streets, making them still more unhealthful. The one redeeming feature in this unsanitary condition is to be found in the many public squares of the city into which the streets lead. In the midst of its filth the city presents a very picturesque ap¬

pearance owing to the decidedly Chinese atmos¬

phere and style of its architecture and its pagoda-like temples, many of them with brass or copper roofs which gleam in the sun so that they are seen from afar from their many-

storied heights. Many of the doorways are also of the same materials. Wood-carving is everywhere in. evidence in the temples, and the fagades. of private buildings and especially in the projecting balconies or Moorish windows.

A British residency is stationed just outside the city and in the town is a British post office.

Pop. about 80,000.

KHAYYAM, Omar. See Omar Khay¬

yam.

KHEDIVE, ke-dev' (Khidiv), a Persian

word signifying lord, the former title of the pasha of Egypt, granted by a firman from the sultan 12 June 1867. In Persia it was at differ¬

ent eras adopted by provincial governors who were independent of the shah. The title, which had fallen into disuse both among Persian and Turkish governors

was revived in Egypt to give additional honor to Ismail Pasha (1830-95), after whom the title was borne by his son and grandson, Mohammed Tewfik and Abbas Hilmi II (q.v.). The latter was deposed 18 Dec.

1914; the title of khedive was abolished and that of sultan substituted in its place.

KHELAT, or KELAT, ke-lat, capital of

Baluchistan, and residence of the chief khan of all the khans of Baluchistan. It is situated at an elevation of 6,780 feet above sea level on the sloping side of a mountain and it is sur¬

rounded by an ancient, massive abode wall, in places over 30 feet in height and of great thick¬

ness. The chief fortification of the city con¬

sists of the citadel surrounding the royal palace, the residence of the khan. The town has few industries but it is the centre of considerable local and foreign trade, the latter coming to it through its situation on various caravan routes reaching out to important neighboring industrial and commercial centres. The English forces took possession of Khelat during the Afghan War (1839) ; and since then the country has continued to maintain more or less close rela¬

tionship with the British government, which ob¬

tained by treaty the right to have a British agent and military escort housed in the palace (1877). Since then British influence has been steadily on the increase. Pop. about 18,000.

KHERA.SKOV, ker'a-skof', Mikhail Mat-

veevitch, Russian poet: b. Pereyaslavl, Pol¬

tava, of a Wallachian family, 1733 ; d. 1807.

He began life as a soldier, but became. assessor of the University of Moscow in 1755, in which institution he remained most of his life (1755—1801), devoting all his spare time to literature, pedagogy and journalism. He attempted almost every field of literary endeavor, but met with most success in the tragic drama, novel and fables. His most lengthy work is the

vasion of Kazan by Ivan the Terrible. It shows distinctly in form and manner of treat¬

ment, the influence of the (Hfiieid) but it is quite Russian nevertheless.

KHERSON, ker son', a government and

capital of the same name in southern Russia.

It lies between Kiev and Poltava on the north, Yekaterinoslav on the east, the Black Sea on the south and Padolia and Bessarabia, and has an area of over 27,000 square miles, of prac¬

tically flat country lying at a very low eleva¬

tion. Though watered by the Dniester, Bug and Dnieper, much of the country suffers fre¬

quently from insufficient rainfall. Among the industries of Kherson are foundries (principally for iron), machine shops, carriage and wagon factories, flour mills, agricultural machinery works, leather, hemp and wool establishments and marble and granite quarries. Stock raising and fruit growing form the chief agricultural pursuits of the south while grain growing is more popular in the north, and tobacco and wine are produced in favored localities through¬

out the whole ^governments Population 3.500,-

000, principally Russians with an admixture of Greeks, Germans, Bulgarians and Jews. Kher¬

son, the capital, has a population of over 90,000, composed about the same as that of the <(gov-

ernment® except that the Jews number oyer 30,000. It lies on the Dnieper about 20 miles from its mouth. It is a distributing point to the interior for Odessa and Nilkolavev of the imports of these centres of trade; and it helps to furnish exports for the foreign commerce of the district, especially in hides, > flour, tallow, beer, wool and soap. Kherson is one of the most progressive cities of southern Russia; it is modern in appearance and pleasing and the buildings are well constructed. It possesses an obelisk erected to the memory of John Howard who died there (1790). Among the industrial establishments of the city are tobacco factories and grain and woolen mills. The city, which was founded in 1778 by Prince Potemkin as a naval port with very strong fortifications, has erected a fine bronze statue to the memory of its founder. The fortifications of the new city were, however, scarcely completed when the plans were changed and Nikolayev replaced Kherson as the great southern naval port.

KHINGAN, km gan', a mountain range

separating Mongolia from Manchuria, and run¬

ning from the southeastern end of the Desert of Gobi to the Amur River, passing, in its course, through eastern Mongolia and western Manchuria. In some places the mountains reach an elevation of about a mile and a half above sea-level. Further south in northeastern Manchuria on the southern side of the Amur the continuation of the range is known as the Little Khingan Mountains, while the larger range is known as the Great Khingan.

KHIVA, ke'va, or CHIVA, a vassal state of Russia, in central Asia. It lies between 43° 40' and 40° N. lat., and 57° and 62° 20' E. long.

It is bounded on the north by the Sea of Aral, on the east by the river Oxus, and south and west by

the Russian Transcaspian province.

It formerly occupied a large extent of surface on both sides of the Amu-Daria or Oxus, but since the cession to Russia, in 1873, of its terri¬

tory on the east of the Amu, is now confined to the west side of this river. Its area is 24,000

square miles. A great part of the surface con¬

sists of deserts, thinly inhabited or uninhabit¬

able, but along the Amu the land is of a very different character, consisting of rich alluvial loam of the greatest natural fertility. Owing to the great dryness of the atmosphere, how¬

ever, it soon becomes so stiff and hard that it cannot be penetrated by any ordinarv imple¬

ment. For this the obvious remedy is irriga¬

tion ; and accordingly, from the earliest period, a mode of culture resembling that of Egypt has been practised. Large canals from the river, with numerous minor branches, intersect every part of the surface, supplying moisture where it is wanted or removing it where it is in excess, and securing the most luxuriant crops of wheat, maize, rice, barley and legumes. Cotton, silk and madder are also generally cultivated. The vine thrives well, but requires to be defended against the winter cold by a covering of straw and earth ; all the ordinary fruits, including apples, plums, cherries, apricots, figs and pome¬

granates, are common. Trade is carried on chiefly with Russia. The principal exports are raw and spun cotton, in return for which are received various articles of European manufac¬

ture, as metals and ironware, woolen, cotton and silk goods, etc. The government of Khiva is an unmitigated despotism. The greater part of the inhabitants are Tajiks and Uzbeks, in nearly equal

numbers. After these are Per¬

sians, Karakalpaks, Jamshids and Turcomans.

They are Mohammedan in faith. The designs of Russia on Khiva long caused disquietude in Britain, which has always been jealous of Rus¬

sian advances in Asia, mainly from a dread of 392

interference with her Indian Empire. Accord¬

ingly Count Schouvaloff was dispatched to Eng¬

land in January 1873, to give explanation re¬

specting an intended expedition to Khiva. Its object was represented as simply the suppres¬

sion of brigandage, the recovery of a few Rus¬

sian prisoners, and to teach the Khan to desist from acts of violence in the future. The em¬

peror, it was said, had given positive instruction that Khiva should not be taken possession of.

In spite of these protestations, however, Khiva was taken possession of on 10 June; and later in the year, though the nominal independence of the Khan was stipulated for, it was decided to annex to the Russian dominions the Khivan territory on the right bank of the Amu. The Khan also renounced all right of making wars or treaties without Russian sanction. The pop¬

ulation is estimated at 646,000. Consult Abbott, (Narrative of a Journey from Herat to Khiva) ; Burnaby, (A Ride to Khiva) (1887); Col-

quhoun, (Russia against India) (1900).

KHLESL, kla'sl, Melchior, or KLESEL,

Austrian prelate: b. Vienna, 1552; d. 1630.

Educated in the Protestant faith, he became, early in life, a very strong Roman Catholic and an advocate of a united Christian faith, but one in which all should bow to the teachings of Mother Church. He soon became looked upon as the champion of Catholicism in Aus¬

tria ; and his influence extended throughout all the German-speaking countries. Owing to his earnestness and ability, he rose rapidly and be¬

came bishop of Vienna at the age of 50 and cardinal 13 years later. With each successive dignity his power increased. A great friend of the Archduke Mattias, he was appointed by the latter Chancellor on his coming to the throne.

This gave him political as well as ecclesiastical power which he exercised with' all his accus¬

tomed energy. But unfortunately he became mixed up in politics, took part against the Em¬

peror Rudolph and tried to persuade Ferdinand II and Duke Maximilian of Bavaria to discon¬

tinue the war with Bohemia. As a result of this political interference he was imprisoned in the Castle of Ambras (in the Tirol). The case was appealed to Rome and Klesel was acquitted by the papal authority and sent back to Austria, where an armed truce existed be¬

tween him and Ferdinand (1627). His corre¬

spondence and controversial works published in Vienna in four volumes (1847-51) form very valuable material for political and ecclesiastical history of his time. Consult Kerschbaumer, (Kardinal KleseP (Vienna 1865).

KHLY.STI, or KHLISTI, klis-ti', a Rus¬

sian sect which made its appearance in the 17th century under the leadership of Daniel Philipo-

vitch, a fanatic soldier, who, deserting the army, wandered about the country proclaiming him¬

self the incarnate God. With him went an adopted son whom he asserted was Jesus, the Christ, and the Son of God; and an adopted daughter whom he put forward as the Virgin Mary. Khlysti was a man of great

oratorical power and exercised a strange influence over the country people who followed him and be¬

came fanatically attached to him. The sect grew with wonderful swiftness and its presence was everywhere made manifest by hysteria and religious exaggeration. In vain the govern¬

ment attempted to stamp out the movement ; for the adherents met in secret and the sect is still in existence. Out of it grew other sects of similar tendencies, all of which are noted for austerity of life and simplicity of dress. Fast¬

ing and other methods of weakening of the flesh were a part of their regular procedure from the beginning and still signalizes them.

They all look upon themselves as gods, or chil¬

dren in the flesh of God and as such pray to one another and they address one another as God, Saviour, Redeemer and Mother of God.

The heavy hand of the Russian Church and government fell upon them and they were ac¬

cused of blasphemy. Hundreds of them were exiled to Siberia or imprisoned in Russia. The Khylsti are also commonly known as Danielites, from the baptismal name of their founders.

KHMERS, kmerz, the earliest-known in¬

habitants of Cambodia. In the course of time they have been forced to retreat to the low, marshy lands of the country and neighboring sections of Cochin-China and Siam. At this late date it is very difficult to tell whether they were originally a pure race consisting of one linguistic stock when they first came into the country they now occupy, or were then a mixed race. It is certain that they are now linguisti¬

cally and ethnologically made up of different races ; but this may be the result of their con¬

stant contact for many years with the various races by which they have been surrounded and with which they have come into touch. In their language are to be found traces of Mongolian, Dravidian and Aryan influences ; but to which of these races they originally belonged, if any, does not seem to have been definitely decided though much has been written on the subject and extensive investigations, chiefly of a lin¬

guistic nature, have been undertaken. These would seem to place the Khmers either among the Malays or Polynesians or among both, mak¬

ing them a hybrid race. Although their lan¬

guage retains many Mongolian affinities, yet their appearance is not typically Mongolian ; and they have normally neither Mongolian hair nor Mongolian eyes, the hair being inclined to be wavy and the eyes very like those of the Indo-European races. But these physical char¬

acteristics are not a sure indication that they may not have originally been of Mongolian stock; for the Turks, for instance, have lost, through intermarriage and mixture of races, their very marked original racial characteristics.

The Khmers are taller, darker and more slen¬

der of form than the races among which they live or by which they are surrounded. That they have long been a cultured race there seems little room for doubt; and it is generally con¬

ceded that they were the builders of the mag¬

nificent ruins of very ancient edifices to be found in what is generally conceded to be the primitive area of Khmers occupation. These consist of noteworthy pyramids, temples, pal¬

aces and other buildings executed with consid¬

erable taste, skill and knowledge of the princi¬

ples of architecture as generally known in the more primitive stages of Indian culture. These edifices show progressive stages of develop¬

ment, just as do the buildings of pre-Colum¬

bian America, more especially those of Yuca¬

tan, Central America and Peru. There are in¬

dications that the later Khmers edifices were influenced by the lighter and more artistic In-

dian architecture and cultural taste. How far back the earliest existing Ivhmers ruins date is a much disputed question ; some authorities claiming for them an existence in the pre-

v Christian days, while others as stoutly main¬

tain that they do not date further back than the 1st or 2d century of the present era, if in¬

deed they were in existence at that time. Evi¬

dence goes to show, however, that the best of their architectural age stretched from about 700

to 1400 a.d. This span of 700 years was un¬

doubtedly influenced by the then prevailing In¬

dian architecture; but the bases of all the Khmers building was undoubtedly indigenous and not, as has been claimed, derived from In¬

dia ; and the proof of this rests in the fact that these buildings are so different from anything that India produced at that time or since. The modern Khmers are still skilled mechanics and are especially noted as gold and silver smiths.

See Cambodia; Siam; Cochin-China.

Bibliography.— Aymonier, (Tentes Khmers) (Paris 1878—9 1) ; (A Khmers-French Diction¬

ary } (Saigon 1876) ; and various other works on Cambodia and Cochin-China; Barre, Leon, (De l'influence frangaise au royaume des Khmers > (1902) ; Combanaire, A., (Etude sur les peuples prehistoriques du Cambodge et de la region d'Angkor) (in Bulletin de la Societe des Etudes indo-chinoises de Saigon, No.

LVII, Saigon 1909) ; Fournereau (and Por-

cher), (Les ruines d'AngkoD (Paris 1890); (Le Siam ancien) (Paris , 1895) ; and various works on Cambodia, Cochin-China and Siam by Gamier, Lemire and Maura.

KHNOPFF, knopf, Fernand, Belgian

painter, etcher and sculptor : b. Grembergen, Flanders, 1858. He began the study of law, but soon abandoned it for that of painting. He early developed excellent technique and breadth of view, in which, however, there is no evidence of marked originality. His work is modern in every way; but it is none the better for that reason. Yet he often comes to the borderland of originality without overstepping it. His failure to. go farther seems to be due to his lack of vigor and strength of imagination, as he has frequently shown in his beautiful and harmonious pictures and exquisitely conceived and executed female figures; but his originality is not of that forceful kind that has the power of creating original conceptions and presenting them in a vigorous and convincing form. His most beautiful creations, therefore, have their birth more often in imitation than in original thought. The best of his works is his por¬

traits; and he seemed to find more than his usual inspiration in many of the faces he was called upon to reproduce. He was a very popular artist, especially as a portrait painter, and consequently much of his best and most interesting pictures are

in the hands of private individuals. Among his better known works are (The Crisis) ; (The Temptation of Saint Anthony1* ; (Memories) ; (I Lock My Door upon Myself > (Brussels Gallery) ; (White, Black and Gold* (Brussels Museum) ; (The Idea of Jus-

tice) ; HsoldeP Consult Dumont- Wilden, (Fernand KhnopfP (Brussels 1907).

KHNUM, knoom (khnm, a stem), or

CHNUM, a very ancient divinity worshiped in Egypt in primitive times. He was a native god and probably a water deity. He became of great influence as a local divinity and was worshiped as the presiding spirit of the cataract of the Nile. Being a deity of growth and fruition, Khnum was looked upon in the local sec¬

tion, where he was all powerful, as the cre¬

ator of gods and men. This indicates that he was a tribal god which had been intro¬

duced, probably at a very early period, into the hieraichy of the gods of Egypt. He was as¬

sociated with, two other tribal deities, Satet and Anuket, which also came into prominence among the deities of Egypt. Khnum is fre¬

quently mentioned in the Egyptian texts that have survived, and in them he is generally looked upon as the former and creator ; and is represented as turning the new-born child upon the potter's wheel or officiating at the birth of kings and princes. In the course of time the attributes and functions of Khnum were ex¬

tended and enlarged and he became looked upon as a cosmical deity. Pictorially he was repre¬

sented and is so presented in the manuscripts in human figure with the horned head of a ram. For this reason his sacred emblem was the ram. Consult Budge,

(The Gods of the Egyptians > (London 1904) ; Steindorff, (The Religion of the Ancient Egyptians) (New York 1905) ; Wiedermann, ^Religion of the Ancient Egyptians* (New York 1897).

KHODAVENDIKYAR, ko'da-ven-de-

kyar', or BRUSA, a Turkish vilayet situated in the northwest of Asia Minor. ' It comprises historic ground since it is made up principally of ancient Phrygia and Bithynia which are as noted to-day for their fertility as they were in the days of their ancient renown. The manu¬

factures of the country have been steadily but slowly growing into importance ; and under a more liberal rule they would probably be of much more importance than they now are.

Area, 26,000 square miles; population nearly 2,000,000, of which about 20 per cent are Ar¬

menians. Capital Brusa.

KHOKAND, Ho-kand'. See Ferghanah.

KHOLM, kolm, a district and capital city of the same name in the district of Lublin, Poland. The city of Kholm is situated about 45 miles to the east of Lublin, with which it is connected by railway. It is an excellent market for. grain, cattle and other local prod¬

ucts and is the centre of considerable im¬

port trade. Its railway interests are consider¬

able and it possesses a railway school, a fine cathedral and other church and educational fa¬

cilities. Kholm is written Chelm in Polish.

Pop. about 30,000.

KHOLMOGORY, kormo-gd're, a dis¬

trict and capital city of the same name in the

Russian, government of Archangel. The city which is situated on an island in the Dvina River is about 50 miles southeast of the city of Archangel. The . district is noted for its excel¬

lent cattle which it raises in large quantities and exports in considerable numbers. It is said that the origin of these fine Russian cattle dates back to the reign of Peter the Great who brought back with him to Russia from his ship-ibuil ding trip to Holland a number of fine Holland cattle, and with these the natives of Kholmogory so improved the native breed that it soon became noted not only at home but also abroad. To Peter the Great was also due the 394

prosperity of the town as a point of shipping on the line of the White Sea trade. With the decline, in comparatively recent years, of this northern trade, owing to change of conditions of commercial expansion, Kholmogory de¬

clined during the latter part of the past cen¬

tury; but it had again begun to improve before the European War broke out. On the outskirts of the town is the village of Denisovka which prides itself on being the place of birth of Lo-

monossoff, who is generally reputed to be the father of Russian literature. Pop. 1,053.

KHOMYAKOFF, ko'mya-kof', Aleksey

Stepanovitch, Russian dramatist, poet and con¬

troversial writer: b. Moscow, 1804; d. 1860. He was for a time a soldier and served through the Russo-Turkish War (1828-29). During this period he gained very considerable experi¬

ence which was of very great use to him in his later career as a literary man, upon which he entered as soon as he returned home from the Turkish campaign.

He soon became distin¬

guished as a lyrical poet and a very pronounced Slavophile, a role in which he attracted much attention throughout the Slav countries, and a little later on throughout all Europe. He be¬

came the leader of the pro-Russian school of writers, which was distinguished for its in¬

tense love of Russia or, in the case of the imi¬

tators, the blatant praise of it to the disparage¬

ment of all foreign countries. Khomyakoff was accused by his enemies and detractors of being (

self inclined to admit the charge without cavil.

With the strongly imaginative sight of the born poet he sees in Russia the most beautiful, most wonderful, most nearly perfect, most ideal country in all the world. In the Slavs he saw the coming of a new race, destined to take the place of the effete West, the empire founded by the Germanic tribes upon the ruins of the Roman Empire. In the west, in the Germanic-

Roman people, he could see nothing good; in the Pan-Slav countries, headed by Russia, he could see only through a vision in which every¬

thing was altogether lovely and alluring. Thus he naturally found a very large following of pro-Russians more inclined to listen to flattery than to the naked truth. Yet it would be prob¬

ably unfair to accuse Khomyakoff of insincerity or a desire to flatter in his fervent praise of Russia and Pan-Slavism. His was an intense nature incapable of doing anything in a really temperate manner; and he pictured Russia as the all-lovely just as he saw nature in the most lovely of garments through the eyes of the ly¬

rical poet. The same qualities that give life,

inspiration and beauty to his masterly lyrics in¬

spired his pro-Slavic love and vision. But many of his followers, who lacked the vision of the master, became blatant, tiresome, insin¬

cere, characteristics of the Khomyakoff school of literature at a later period in its history. The first notable work of Khomyakoff appeared in 1832. This was a drama entitled

out his whole literary activity. It at once at¬

tracted attention to the writer and marked him as one of the coming literary lights of Russia.

This drama was followed the following year by a second, entitled dseudo-DemetriusP This latter drama is built up about the dramatic and romantic career of one of the false pretenders to the Russian throne, who actually succeeded in making good his pretensions for a time and in deceiving a large percentage of the Russian people. The story itself was dramatic and re¬

quired only the breath of the creative genius to make it a great drama ; and this Khomyakoff succeeded in doing. He was a great linguist and wrote fluently in Russian, German, French and English, and through these linguistic eifts he was able to keep in touch with the Pan-

Russian party wherever members of it were to be found. Naturally all his writings in foreign languages were written with a view to reach his followers or of inspiring a love for Russia or to denounce the ((rotten western world, w and of exalting Russia as head of the Pan-Slavic world. One of his notable efforts in this direc¬

tion was his (A Message from Moscow to the Servians) which appeared in Leipzig in 1860

and created intense interest throughout the whole Slav world. In this ^message® he em¬

bodied his most ultra ideas on the Pan-Slavic question. Khomyakoff was one of the greatest and most gifted of Russian poets and most felicitous of her prose writers. He wrote, in addition to the fields already mentioned, on his¬

torical, philosophical and theological subjects in a masterly manner.

KHONDS, khondz, or KUS, a people of

Dravidian race living in parts of Orissa and Bengal. They are of low stature, well built and muscular and of a warlike disposition which has made them good soldiers and consequently high¬

ly respected by their neighbors. They are less cultured than the races by which they are sur¬

rounded. They cling to the ancient Dravidian beliefs, in which nature worship forms the chief role. But among them almost every sect of In¬

dia and some of the European religions have a formal hold, though even where they prevail, they are grafted on the ancient religious be¬

liefs and superstitions. The Khonds are said to have all the virtues of races in their stage of social evolution. They are kind and generous to one another, hospitable, faithful to their friends and allies and implacable to their ene¬

mies. In one respect they are above the moral standard of many races much more advanced than they, in that they are noted for their mo¬

rality. Among their picturesque customs which have now practically disappeared were their practice of capture marriages and their human sacrifices which were offered to the earth deity or to the mother of fertility and production.

This latter custom seems to have 'been at one time common to all the Indo-European races, among whom the great Earth Mother was one of the most revered

of deities, under one name or another. Pop. about 500,000. Consult Campbell, (A Personal Narrative of Thirteen Years' Service among the Wild Tribes of Khondistan) (London 1864) ; Dalton, descrip¬

tive Ethnology of BengaP (Calcutta 1872); Lewin, (Wild Races of Southeastern India) (London 1870) ; Reclus, (Primitive Folk) (New York 1891) ; Roney, (The Wild Tribes of India* (London 1882).

KHOOZISTAN. See Elam.

KHOPA, ko'pa, a seaport in the vilayet of Trebizond, Asia Minor. For many years

previous to the European War of 1914-18 it v as a fortified place; but its fortifications were altogether unfit to withstand modern artillery.

In the beginning of the war the Russian war¬

ships bombarded the port-works, the barracks and the town ; set the latter on fire and de¬

stroyed great stores of ammunition and parts of the town on the port side. This rendered the place useless, for the time being, to the Turks who had_ been preparing to occupy it with a heavy military force.

KHORASAN, ko-ra-san', Persia, an exten¬

sive northeastern province ; area, about 140,000

square miles. The surface is to a great extent uninhabitable. The mountainous region of the north has many well-watered valleys with a fertile soil. The most valuable mineral is the turquoise. In many parts cotton, hemp and to¬

bacco grow freely and aromatic plants and drugs are numerous and valuable. The princi¬

pal manufactures are silk and woolen stuffs, carpets, firearms and sword-blades. About two-thirds of the inhabitants are Persians ; the remainder are Turcomans, Kurds and other tribes, who lead a nomadic life. The chief town is Meshed. Pop. estimated at 860,000.

KHORSABAD, khor-sa-bad'. See Nine¬

veh.

KHOSRU, kos-roo' (meaning, having good

or great renown), a semi-legendary king of Persia, known as Kai (king) Khosru. About his name have collected many legends, and at¬

tempts have been made to identify him with Cyrus the Great. _ He belonged to the Kaianian dynasty of Persia, which seems itself to be more legendary than historical in so far as the present records are concerned. See Kaianian.

KHOSRU I, or Khusrau, known as Anu-

shirvan (whe of the noble soul®), the Sassanian king of Persia, who reigned from 531 to 579.

In Byzantine history he was known as Chosroes I; His reign was the most eventful one in the line of his dynasty. Though a younger son he succeeded to the throne by the conditions of the will of his father, Kobad, king of .Persia. He was forced to face a rebellion on the part of his elder brother whom he defeated and put to death. In the ninth year of his reign he began war upon the Byzantines, between whom and the Persians there had long been a standing enmity, and a bloody contest opened which was destined to continue for 20 years, to see numer¬

ous battles, some of them gigantic for their age and the conditions under which they were fought and of varying fortunes. In the be¬

ginning of the campaign the Persians were the victors, but Khosru gained very little but glory out

of the campaign, which finally ended in a patched-up treaty in which neither side could claim a real victory. Peace lasted 10 years with¬

out the Persians feeling that they were able to renew hostilities, when they were stirred to action by the young Emperor Justin II, who treated the Persian representatives at his court with notable disrespect and added to this in¬

dignity by the seizure of Armenia (570).

Khosru retaliated by seizing Dara, which formed the advance garrison of Grecian terri¬

tory to the east. After over seven years of war and varying fortunes Khosru was very badly defeated at Melitine (577) by Justinian, who was himself routed in Armenia two years later, shortly after the death of Khosru, who died in the midst of the fiercest part of the struggie. He was long remembered as one of the greatest of Persian sovereigns. He divided the country into the four provinces subsequently very noted in history, and he gave to each a governor or viceroy responsible directly to the Crown. In this way he very greatly improved the government of the whole country and pro¬

tected the people from the exactions and mis¬

rule of the governors. He encouraged trade and commerce, promoted native industries, colonized unpopulated parts of the country, re¬

built cities and restored to normal conditions the parts of the land which had been ravaged by war. He also extended the boundaries of Persia so that it stretched from the Arabian Sea to far into central Asia and from the Indus to the Red Sea. So notably did Khosru impress his personality upon his country that his name passed down into history with a cloud of striking legends and folk-tales attached to it; so that he became, to the masses of the people, more a legendary than a real historical character. In many of these folk tales he figured as a native

Haroon al Raschid, a sort of Aaron the Just, dispensing the strictest if the sternest justice to rich and poor, to noble and peasant alike. Consult any good history of Persia or of Greece or of the Byzantine Empire.

KHOSRU II, king of Persia from 590 to 628. He was a grandson of Khosru I (q.v.), and was surnamed Parvez (the victorious) on account of his many victories. In the first year of his reign he had serious trouble on his hands through an insurrection stirred up by the Armenian insurgent, Braham Chubin. This he was enabled to put down through help oppor¬

tunely rendered him by the Greeks to whom he surrendered most of Armenia and all of Nisibis and Dara which his grandfather had taken from them; and for 12 years he maintained peaceful relations with them. These relations were broken by the Greeks themselves. For 19 years Khosru carried on war against Byzam tium with almost unvarying success, inflicting one defeat after another upon them and pun¬

ishing them as they had never before been punished in all their history. He took from them all the land he had given them in the beginning of his reign out of gratitude for services rendered him, and he invaded and con¬

quered Syria (611), Palestine (614), Egypt and Asia Minor (616) and the following year Chal-

cedon. Finally the tide of battle began to turn on account of trouble which Khosru found at home where the discontented plotted against him. The war continued to drag on with vary¬

ing successes until finally Khosru was signally defeated and dethroned only to be murdered by his eldest son Sheroe, who led the party of dis¬

content (628). . Consult Justi, (Grundriss der iranischen Philologie) (Vol. II, Strassburg 1896-1904).

^ KHOTAN, ko-tan, or ILCHI, a city on the Khotan Darya, on the outer edge of the desert of the Tarim Basin, at an elevation of 4,600

feet, in the south of East Turkistan, China.

Owing to the fact that it is on one of the great¬

est trade routes of the district it is a place of considerable importance, though it has only 396

about 50,000 inhabitants and is a straggling, poorly-built town such as may be found on the outskirts of eastern civilization quite frequently.

For years the Khotan country was either inde¬

pendent or semi-independent, and during this time the city of Khotan was its capital and the official residence of the khan. For this reason it was strongly fortified in the olden days, and the fortifications still exist. Although strong enough to protect the city from raids of wandering nomads these fortifications would be useless against modern artillery. The chief in¬

dustry of Khotan is the manufacture of silk, and its principal exports consist of silk, carpets and gold. Throughout the district of Khotan and in the city of the same name the chief in¬

habitants are Tartars. Round about Khotan are the ruins of very many ancient and once flourishing cities which are now covered up, for the most part, by the sands of the desert. Sev¬

eral excavating parties have been at work among them with interesting results to science.

Consult Stein, A. M. (one of the excavators), (Sand-buried Ruins of Khotan) (London

1903) ; (Ruins of Desert Cathaay* (London 1912).

KHOTIN, ko'tyen, or CHOTIN, a dis¬

trict and capital city of the same name in the district of Bessarabia, Rumania. The city is situated on the Dniester close to the frontier.

It is noted historically as the scene of the severe defeat which John Sobieski administered to the Turks in 1673. For the most part the district is given over to agriculture, and the town is, in consequence, little more than a centre of local trade, which has increased in importance but little for years. Pop. about 25,000.

KHUEN-BELASI-HEDEVARY, Charles

(Karoly), Count, Hungarian statesman : b.

Freiwaldau, Upper Silesia, 1849; d. 1914. Soon after graduation he began to take a great in¬

terest in public life and, at the age of 25, he became a member of the Hungarian House of Deputies, representing the Liberal party; and seven years later he fell heir to the title of Count of Raab. Shortlv afterward he became governor of Croatia (1883-1903). In his score of years in this important office, in which he seems to have had the unqualified support of the Austrian government, he displayed a con¬

stant inability to understand the people and a facility for antagonizing them that amounted almost to genius. Finally, in 1903, he was ap¬

pointed by the emperor Premier of Hungary.

But his national unpopularity and his native want of tact and constructive ability made it impossible for him to maintain the confidence of the people, and his short-lived government (26

June-3 November) was forced to resign with¬

out accomplishing anything. The following two years Khuen held office in the Tiza Cabinet.

Through the favor in which he stood with the emperor, he again became Minister-President of Hungary, a position that gave h;m great power, which he once more misused. He again failed to agree with the House, which he antagonized by his autocratic conduct and haughty bearing.

After constant administrative troubles, he was again forced to resign in 1912. From this time on he dropped out of sight, and disappeared from public life.

KHUFU. See Cheops.

KHUSRAU I, a Sassanian king of Persia who reigned from 521 to 579, and during most of these years carried on wars against the Byzantines. To the Byzantines he was known as Chosroes I. See Khosru I.

KHUZISTAN, koo-ze-stan', Arabian prov¬

ince in western Persia, lying between Luristan, Ispahan, Faristan, Asiatic Turkey and the Per¬

sian Gulf. From the lowlands in the east, which are often wet and unhealthful, the coun¬

try rises into a hilly, healthful climate in the west. Unlike much of the surrounding terri¬

tory, Khuzistan is but comparatively sparsely populated and most of the inhabitants are Arabs, many of whom are still nomadic. In the more fertile portions of the upland regions rice, barley, wheat, maize and other grains, cotton, indigo and fruit are the chief products. Among the manufacturing activities of Khuzistan are cotton and woolen goods, carpets and silk cloths. This activity is confined, for the most part, to the chief cities, Dizful, Shuster and Mohammerah. Area about 40,000 square. miles.

Pop. 200,000.

KHVOSHT.SCHINSKAYA, kvosh'schens'-

ki-a, Nadezha Dmitrievna, a Russian writer: b. Ryazan, 1825; d. 1889. She began writing under the pseudonym of V. Krestovski, a desig¬

nation which she long continued to use. She was one of the most notable of the Russian realists of the middle of the 19th century, and her power of vivid description and intimate knowledge of Russian life gained her great popularity with her countrymen, especially with those belonging to the middle classes. The Russian country life she knew intimately and depicted with a vividness never before shown by any native woman writer of Russia. Through the Annals of the Fatherland she appealed to a very large audience for many years, so that at last she became an institution of that pub¬

lication, which takes, in Russia, the place occu¬

pied in the United States and Great Britain by the monthly magazine. Many of her most im¬

portant works first appeared in this, magazine, more especially those depicting rustic life and characters. Many of her stories have been translated into Russian and several of them into most of the languages of Europe. Some have been retranslated from German or French into English. Among her most important published works are (The Great Bear,> (In Trust of Better Things,) from the Immediate PastP

Numerous editions of her works have been published in Russia, the first appearing in Saint Petersburg in 1883. A fairly complete edition also appeared in Italian shortly before her death, and from this some of the French trans¬

lations were made. See any good historv of Russian literature; also Koltonovskaya fem¬

inine Silhouettes* (Saint Petersburg 1912).

KHYBER, ki'ber, or KHAIBAR PASS, a

mountain pass on the frontiers of India and Afghanistan, leading from Punjab to Jelalabad and

Cabul. The pass — a narrow defile —winds northwest through a range of hills, called by the same name, for a distance of about 33

miles and forms the bed of two streams, the one flowing northwest, the other south-south¬

east. It is at one part as narrow as 40 feet in width, ranging up to 450 feet wide, and in KI-TSE — KIABOUCCA

many places the hills on either side are quite precipitous and inaccessible, rising at one point to the height of 1,300 feet. At 9 ^ miles dis-

tance from the Indian entrance of the pass is the fort of Ali Masjid, which has several times been taken by the British from the Afghans during the wars of 1839-42, 1878-80 and the Atridi campaign of 1897. The highest point of the pass is Lundi Kotal, 3,373 feet above sea-

level. The pass forms the northern military route from India to Afghanistan, and is now under British control. Consult Umperial Gazetteer of India* (Vol. XV, Oxford 1908).

KI-TSE, ke'tse, CHI-TSE, or KI-JA, Vis¬

count Ki, Chinese statesman who flourished about the middle of the 12th century b.c. Tra¬

dition credits him with being the founder of Korean civilization and an ancestor of the Chinese philosopher and religious teacher Con¬

fucius. Semi-leneendary semi-historical ac¬

counts of his life show him as a man of great strength of character and determination coupled with honesty of purpose. According to these accounts he attempted to reform the licentious Chinese Emperor Chow-sin (1154-1123 b.c.), who had developed into a ferocious and bloody tyrant, and being imprisoned

for his pains until the overthrow of Chow-sin. Liberated from prison by the conqueror, Wu-Wang, Ki-tse still remained loyal and faithful to his sovereign and sooner than remain under the domination or submit to the government of the new ruler of China, he is represented as going off with his thousands of adherents far eastward and there founding a new kingdom in what is now modern Korea. The capital of this new king¬

dom was Ping-yang, situated on the Ta-Dong River, where the remains of a very ancient tomb are still pointed out to the tourist and visitor as his. There seems to be some doubt as to whether Ki-tse ever really existed, or if he did, that he performed all the things attrib¬

uted to him. In fact the catalogue of his doings reads very much like those attributed to the legendary hero ancestors or culture gods of so many races. He was to the Koreans what Moses was to the Jews, their great law-giver, leader, and, in a sense, prophet. He taught them most of the important activities of their na¬

tional life, among them agriculture, in all its branches, and especially the rearing of the mul¬

berry tree and of silk worms, the manufacture of silk, including its spinning and weaving.

Ki -tse seems to have been more than a law¬

giver and teacher of industrial activity, for he is credited with having formulated the Korean conception of morality, the proper relations of man to man and to society and the court; and he is credited with having laid great stress upon honesty and integrity in all the relations of life.

tory > (Shu-king) is attributed to him by the Koreans. It is more than probable that Korean civilization was largely derived from China, but there is nothing in Chinese history which would back the Korean story of the coming of the founder and

philosopher Ki-tse. In fact the account of his wanderings and of his forced exile from his own country is exactly in line with the adventures attributed to most of the great culture heroes of the world ; and the myths that have become attached to him are in no respect different from those that cluster around the other known culture heroes and fabled ancestors of nations. Like most of the culture gods he had to struggle against evil to bring good to the people he had chosen to honor with. his favors and his gifts of the knowledge of. civilization. For the legendary stories of Ki-tse consult any good history of Korea; and ^ ;TThe Great Plan* consult 'Chinese Classics*

(Vol. Ill, Hongkong 1865).

, KIA-KTHQ, kya'keng, or CHIA-CH'ING,

chya cheng, the 5th emperor of the last Manchu dynasty of China; began to resign 1796; d. 1820.

probably to him more than to any one ei/-3,^er dynasty that the downfall of the Chinese imperial family was due. He showed little ability for government; he neg¬

lected affairs of state in favor of the prosecu¬

tion of his own dissolute pleasures and he con¬

sorted with people of more than questionable morality in preference to those who might have enabled him to steer amidst the rocks of poli¬

tics that threatened to wreck the ship of state.

Not only did he neglect altogether the business of government but he managed, by his sense¬

less conduct, to stir up family feuds and he thus estranged from him many of his best friends and those who had been supporters of the royal family through a long line of ances¬

tors. This line of action weakened the power of the

ruling classes over the masses of the Chinese people and prepared the way for the revolution which followed many years later.

His actions and his conduct were imitated bv subsequent rulers of China and thus the empire plunged headlong to her fate. The evidence of the decay of the influence and solidarity of the royal power was seen in the insurrections through the country, in plots against the em¬

peror and the royal family and in the general unrest of the nation. The incompetency of the emperor led to disorganization in the resources of the country and to the maladministration of its laws and affairs. Pirates and smugglers played havoc with the revenue of the crown which soon proved insufficient for the needs of the government and of the dissolute monarch, who was forced to use illegal means to increase his income. This led to further discontent and unrest on the part of the Chinese people and to further plots and insurrections. One of the acts of Kia-King which brought him to the attention of Europe perhaps more than any other movement of his reign, was his persecu¬

tion of the Roman Catholic missionaries who had acquired a certain amount of influence during preceding reigns. He accused them of meddling in the political affairs of the country; and on this charge he expelled many of them from China. It may be that our opinion of Kia-King is too highly colored as our informa¬

tion relative to his reign comes, for the most part, from his enemies. But even allowing for all this, the fact remains that he left to his successor, Tao-Kwang, in a thoroughly disor¬

ganized condition a country which he found, on his accession to the throne, fairly prosperous and contented. Consult Giles, (China and the Manchus) (Cambridge 1912).

KIABOUCCA, KIABOOCA, KYA-

BUCCA, a beautiful mottled wood coming, for the most part, from Moluccas and Guinea, though it is also found in other countries. It is formed much in the manner of curly maple 308

and other similar woods, by the union of the branch with the tree or through excrescences on the outer part of the trunk and larger limbs.

The darker shades of Kiaboucca resemble the lighter shades of gateado wood of Mexico and the Central American countries, while the lighter shades run into varying yellows or red¬

dish yellows and oranges. This gives it a very rich appearance which makes it valuable for cabinet work and fancy caskets of various kinds, among them snuff and tobacco boxes.

Wood of a somewhat similar appearance is to be found in India, though the Indian shades are neither so rich in color nor so varied in shades and combinations of shades. These Indian woods are obtained from the Petrospermum rubiginosum and the Petrospermum suberi-

folium and several other allied trees all of which produce valuable cabinet or building woods. Some of these have been successfully exported from India to Europe and there em¬

ployed in the manufacture of fancy furniture.

In general the representatives of these Indian woods in Guinea and Moluccas, with the one ex¬

ception of the kiaboucca, have not been, to any extent, used outside their native country. Kia¬

boucca is frequently known on the market as Amboyna wood.

KIAKHTA, ke-ak'ta, a town in Transbai¬

kalia, Siberia, Russia, not far from the Chinese border. It was originally surrounded by a wooden wall but the growth of the original trading station has been so great that it has spread beyond the fortress enclosure. Previ¬

ous to 1860 it was the chief point through which the trade between Russia and China passed. The tea trade, which formed the chief international business of Kiakhta, amounted to over $10,000,000 yearly in 1895. Since then this trade has declined to some extent, and with it went, for some time, the prosperity of the city, which had declined in inhabitants to about 5,000 in 1895. But since then Kiakhta has again begun to prosper on account of the rapid growth of Siberia and the general extension of trade, commerce and agriculture throughout the more habitable parts of these great eastern Russian domains. Pop. 32,000.

KIAMIL PASHA, Turkish statesman: b.

Cyprus, 1833; d. there, 14 Nov. 1913. The son of an artillery officer, he was educated at the military school at Alexandria, Egypt, devoting himself mainly to the study of languages. Be¬

sides his native tongue, he learned English, Frendh, Arabic, Greek and Persian. His first post was that of dragoman (interpreter) to the governor of Crete ; after holding various offices in Cyprus and several governorships he became Minister of the Interior at Constanti¬

nople in 1878, followed by three other minis¬

terial portfolios. From 1885 to 1891 he was Grand Vizier, and again in 1895 for a few weeks, when he was dismissed and made gov¬

ernor of Aleppo and later of Smyrna. Sus¬

pected of liberal views, he was deposed in 1907

and declared exiled. He took refuge at the British consulate, and after the intervention of the British

Embassv was allowed to return to Constantinople. He was again made Grand Vizier after the revolution of 1908, but resent¬

ing the dictation of the Young Turk Com¬

mittee he dismissed the ministers of War and Marine in 1909, which led to a censure by the Turkish Parliament and his resignation. For the fourth time he was called to the helm of state in 1912 in succession to Ghazi Mukhtar Pasha. In January 1913 he was driven from office by the Young Turk coup d'etat and retired to Cyprus, where he died the same year. Kia-

mil Pasha was a cordial friend of Great Britain, and it was his boast that he had been a reader of The Times for over half a century.

KIANG, ke-ang', DZIGGETAI or

KULAN, the large wild ass of Tibet and Mon¬

golia, characterized by its large size (11 to 12

hands high), dark reddish color and the nar¬

rowness of the black stripe along the spine; some have faintly barred legs. They dwell upon the lofty, sterile plateaus north of the Himalayas, moving about in bands which travel at amazing speed over the stony plains and up and down the steep hillsides, feeding mainly on twigs of woody desert plants, and acquiring great hardiness. They are hunted by the Mon¬

gols as game, yet are not shy as a rule, coming close to a traveling party or camp, apparently actuated by extreme curiosity, unless driven away. The voice has been described as like the neigh of a horse ; but the general and truer opinion is that it is more nearly the shrieking bray of the ass. The animal is nowhere domes¬

ticated, except a few captive specimens in zoo¬

logical gardens. See Onager.

KIANG-SI, ke-ang'se, or KIANGSE, an

island province of China. It is bounded on the north by Hupeh and Ngan-Hui, on the east by Che-Kiang and Fu-Kien, on the south by Kwang-Tung, and on the west by Kwang-Si and Hunan. The area is 69,480 square miles.

The province contains the treaty port of Kiu-

Kiang on the Yang-tse-Kiang. The Nan-Ling or Southern Mountains traverse the eastern half of Kiang-Si, and in the north is the large inland lake of Po-Yang-Hu. Here are estab¬

lished famous manufactories of porcelain. The principal river aside from the Yang-tse-Kiang, is the Kin-Kiang. The province produces tea and silk and tobacco. There is great mineral wealth, especially of copper and iron. The English have large railway concessions. There are telegraph lines connecting the treaty port with other centres of commerce. The capital is Manchang. Pop. 16,255,000.

KIANG-SU, ke-ang'soo, an important

maritime province of China proper, bounded north by the province of Shan-Tung; east by the Yellow Sea; south by the province of Che-

Kiang, and west by the provinces of Ngan-Hui and Ho-Nan. Kiang-Su has an area of 38,600

square miles (about that of Pennsylvania). The great commercial importance of this province is denoted by its possession of four treaty ports, Shanghai, Nankin, Su-Chau and Chin-Kiang.

Kiang-Su was in fact the first province opened to foreign commerce by means of a treaty port.

It is traversed almost its whole length by the Grand Canal, the ancient Chinese system of canalized rivers and lakes. The British have valuable railway

concessions and the Germans claim mining rights here. Half the foreign population of China is established in this province.

The Yang-tse-Kiang empties into the sea through this province and enables it to control KIANGANES — KICKING BIRD

*the trade of all southern China. Possessed of a soil of great fertility it is famous for its pioduction of rice and silk. There are large cotton mills. 1 he capital of the province is ' *ankln' whlcT was formerly the capital of the iQc!ierSe empire. The Tai-Ping rebellion of 1853-54 had its headquarters in this province.*

Kiang-Su is rapidly becoming the centre of Chinese manufacturing industries, especially in textiles. Commercially, the province is con¬

trolled by the English, who have invested largely in railways, mills and government concessions.

Pop. estimated 15,380,000.

KIANGANES, a Philippine tribe. See

Quianganes.

KIAO-CHAU, ke-a-6-chow', or KIAO-

CHOW, a Chinese walled city and the name of a German leased territory which since 1915

has been held by Japan. The territory lies around the shores of Kiao-Chau Bay on the east coast of the province of Shan-tung and the city lies outside the German sphere of in¬

fluence. The bay is some 15 miles from east to west and from north to south, and has deep water anchorages in its southeastern portion.

The territory of Kiao-Chau was seized by Ger¬

many in November 1897 in retaliation for the murder of two German missionaries by the Chinese, and in March 1898 Tsing-tau harbor, on the east of the bay, and the district adjoin¬

ing, about 200 square miles, were transferred to Germany by treaty on a lease for 99 years. It was then declared a protectorate of the German Empire, placed under control of the navy de¬

partment, and declared a free port. The terri¬

tory comprises 33 townships, with a population of 192,000. Around the leased territory is a neutral zone, 2,500 square miles in area. Great improvements and construction works were then set on foot; a sum of $7,000,000 was ex¬

pended on the harbor of Tsing-Tau, a great floating dock being constructed. An excellent water supply, electric lighting and telephone service were introduced into the city. The city was placed in 1906 under the Chinese Maritime Customs, 20 per cent of the receipts to be handed over to the German authorities. A railway was constructed from Tsing-Tau to Tsinang, 252 miles in length, through the Shan¬

tung province, tapping a rich agricultural and mining section. The revenue of the protectorate in 1914 was £463,000, and expenditure £920,500.

In 1913, 923 vessels cleared at Tsing-Tau (pop.

34,000), with a tonnage of 1,298,622 tons.

On 16 Aug. 1914, after the outbreak of the Great European War, Japan called upon the German authorities to deliver up the leased territory by the 15th of September, and on 23

August declared war. The investment began on 27 August, and after a heroic resistance on the part of the German garrison, the city sur¬

rendered to the combined Japanese and British forces

on 7 November, and since that time it has been occupied by the Japanese. On 25 May 1915, it was announced that; following on negotiations between China and Japan, the terri¬

tory would be returned to China on the con¬

clusion of peace, on condition that the German privileges in the leased territory be transferred to Japan. The Chinese Maritime Customs was re-opened on 6 Aug. 1915. The number of Japanese residents on 20 April 1915, exclusive of military, was 9,264.

KIBITKA, a covered carriage without

springs used in Russia ; also the name of a tent used by the nomad tribes of Kirghiz Tartars.

KIBLAH, or KEBLAH, the point to¬

ward which the Mohammedans turn their faces in prayer. 4 he term literally means (

posite" and is derived from the Arabian "kabala® which bears this meaning, it being understood that the point indicated is opposite to the south. This point is, for those at a dis¬

tance, the temple at Mecca, or rather the Kaab (q.v.) contained therein. It is said that Mohammed changed three times the direction in which his followers should face when praying.

Finally he settled upon the Kaab (16 Jan. 624)!

KICKAPOOS, a tribe of Algonquin In¬

dians, formerlv occupying a portion of the Ohio Valley. They were a powerful nation in the early history of that region, and were con¬

stantly in arms against the whites until in 1819

they concluded the sale of most of their lands and removed to the Osage River Reservation in Kansas. In 1852 a considerable number of them went to Texas and

from there to Mexico; some of these returned, however, and settled in the Indian Territory. See Indians.

KICKHAM, kik'am, Charles Joseph,

Irish novelist: b. Mulinahone, County Tippe¬

rary, 1836; d. 1882. He was very active in anti-government and revolutionary circles; and he appeared, at the age of 22, prominently in the Young Ireland Movement. He received a warning, and later on he was arrested, tried and convicted of treasonable acts and sentenced to fourteen years' imprisonment (1865), only four years of which he served when he re¬

ceived a pardon. Previous to his arrest he had been active in the editorial department of The Irish People, the Fenian organ ; but, on his liberation from prison he did his best to keep faith with the governmennt. Then began the most active and brilliant period of his pub¬

lic career. • He possessed a strange, tragic, though somewhat uncontrolled power which re¬

quired only more mastery on his part to have made of him a notable novelist. Among his published works are (Sally CavanagtP (1869) ; (Knocknagow) (1879) ; and

KICKING BIRD (Tene-angpote), Kiowa

Indian chief: b. about 1810; d. 5 May 1875.

His grandfather was a Crow captive who had been adopted into the Kiowa tribe. The youth early distinguished himself by his men¬

tal gifts. He also won fame as a warrior but saw the hopelessness of the struggle with the whites and used all his influence to induce the tribe to submit to the inevitable. He signed the first agreement to accept a reservation on 15 Aug. 1865 at Wichita, and the treaty con¬

cluded at Medicine Lodge 21 Oct. 1867, defi¬

nitely fixing the Kiowa-Comanche- Apache res¬

ervation in the present Oklahoma. He took no part in the resistance of the Indians to removal in 1868 nor in their raids into Texas. When the Federal authorities in 1873 failed to carry out their agreement to release the Kiowa chiefs 400

imprisoned in Texas, he lost faith in 'the gov¬

ernment and was induced to join the hostiles for a short period, but later he induced two-

thirds of his tribe to return to the agency at Fort Sill, and thereafter he was recognized as the head chief of the Kiowa. In 1873 Kicking Bird invited and assisted in the establishment of the first school among the Kiowa. He died suddenly, by poison, according to the suspi¬

cions of his friends and at the request of his family was buried with Christian rites.

KIDD, Benjamin, English sociologist : b.

9 Sept. 1858. He entered the inland revenue service of Great Britain in 1877, and rose to sudden fame by the publication of (Social Evo¬

lution in 1894. The volume was translated into most of the languages of Europe and gave rise to considerable controversy, President Roosevelt publishing a series of papers in oppo¬

sition of the views propounded in it. Its main proposition was that high moral and religious development in society was a process that ran exactly contrary to natural evolution and the Darwinian process of survival. He has also published (The Control of the Tropics'

(1898) ; and Principles of Western Civiliza¬

tion (1902) ; (Herbert Spencer and After >

(1908) ; Two Principal Laws of Sociology) (1909).

KIDD, John, English writer and geologist : b. London, 1775 ; d. 1851. Graduated in medi¬

cine at Oxford he became assistant in chemis¬

try at the latter university (1801-03) and pro¬

fessor of the same subject (1803-22) ; regius professor of medicine (1822-34) ; and keeper of the Radcliff Library (1834-51). Though his main work was devoted to . chemistry, he also lectured on geology and mineralogy in which he took a very active interest and toward the popularization of which he contributed very considerably. Among his published works are Outlines of Mineralogy) (2 vols. 1809) ; (A Geological Essay on the Imperfect Evidence in Support of a Theory of the Earth) (1815) ; Adaptation of Eternal Nature to the Physical Condition of Man> (1833) ; /Medical RefornP

(1841) ; Purther Observations) (1842).

KIDD, William, American pirate: b. prob¬

ably Greenock, Scotland, about the middle of the 17th century, executed London, 24 May 1701. He appears to have followed the sea from his youth, and about 1695 was known as one of the boldest and most successful ship¬

masters that sailed from New York. At this time the depredations of pirates upon British commerce had become so extensive that a com¬

pany was organized in England, in which Wil¬

liam III and several noblemen were sharehold¬

ers, to fit out an armed vessel for the purpose of suppressing the practice, as well as of deriv¬

ing a profit from recaptures. Kidd, who had obtained

some experience as captain of a pri¬

vateer against the French, received a commis¬

sion signed by the king, and directed to <(the trusty and well beloved Captain Kidd, com¬

mander of the ship Adventure Galley / a ves¬

sel of 30 guns. Sailing from Plymouth, Eng¬

land, in April 1696, he cruised off the Amer¬

ican coast for some months, occasionally enter¬

ing New York, and finally sailed for the East Indies and the east coast of Africa. Upon his way he resolved to turn pirate, and finding his crew not averse to the project, forthwith com¬

menced a career of plunder and outrage among the shipping which frequented the coasts of Malabar and Madagascar, returning in 1698

with a large store of booty to New York. He took the precaution to bury a portion of his treasure on Gardiner's Island at the east end of Long Island, and subsequently went to Bos¬

ton, where he boldly made his appearance in the streets, not doubting that under his com¬

mission he could clear himself from any charge of piracy. Such, however, had been the scandal which the report of Kidd's depredations had caused in England, that the Earl of Beilamont, governor of Massachusetts and New York, and one of the shareholders in the enterprise, caused him promptly to be arrested and con¬

veyed to England for trial. The charge of piracy was difficult to prove; but having been arraigned for killing one of his crew, named Moore, in an altercation, he was convicted after a grossly unfair trial, and hanged at Exe¬

cution dock. His name and deeds have been interwoven into popular romance, and forrn the subject of the well-known ballad commencing: ((My name is Captain Kidd, as I sailed, as I sailed,)) many of the incidents of which, how¬

ever, are apocryphal. The treasures he had left, consisting of 738 ounces of gold, . 847

ounces of silver, and several bags of silver ornaments and precious stones, were secured by Beilamont. But according to popular belief this inconsiderable amount constituted but a tithe of all he had collected, and down to the present time the shores of Long Island Sound and various parts of the banks of the Hudson River continue occasionally to be explored in the hope of discovering the abandoned wealth of the great pirate.

KIDDER, Daniel Parrish, American cler¬

gyman and educator : b. Darien, N. Y., 18 Oct.

1815; d. Evanston, Ill., 29 July 1891. He was educated at Hamilton College and Wesleyan University. He entered the ministry of the Methodist Episcopal Church in 1836. He was missionary to Brazil 1837-40. The death of his wife necessitated his return to the United States with his two little children. After brief pastorates in Paterson and Trenton, N. J., he was elected secretary of the Sunday School Union of the M. E. Church, 1844-56. At the same time he was editor of the Sunday School publications and tracts of the Church ; profes¬

sor of Practical Theology in Garrett Biblical Institute, Evanston, Ill., 1856-71; professor of Practical Theology in Drew Theological Semi¬

nary, 1871-81 ; secretary of the Board of Edu¬

cation of the Methodist Episcopal Church, 1880-87, resigning because of poor health. He was editor of the Sunday School Advocate, 1844-56. While secretary of the Sunday School Union he edited 819 volumes. He was a pro¬

lific writer. His most important works are (Brazil and the Brazilians) (8th ed., 1857, 1868) ; (A Treatise on Homiletics) (1864; rev.

ed., 1868) ; (The Christian Pastorate* (1871) ; (Helps to Prayer* (1874).

KIDDER, Frederic, American historical

writer: b. New Ipswich, N. H., 1804; d. Mel¬

rose, Mass., 1885. He was an authority on the language and religion of the New" England Indians, and published (The Expeditions of KIDDER — KIDNEYS

Capt. John Lovewell* (1865) ; (History of the First New Hampshire Regiment in the War of the Revolution (1868) ; (History of the Bos¬

ton Massacre) (1870) ; etc.

KIDDER, Kathryn, the stage and family

name of Mrs. L. K. Anspacher, American ac¬

tress : b. Newark, N. J., 1868. After having studied dramatic art in New York, London and Paris she made her debut as Lucy Fairweather in (The Streets of New York* by Mayo, in Chicago in 1885. Her success was almost in¬

stantaneous ; and she followed it up by playing the leading role in (Davy CrocketP also by Mayo. Among the other characters which she played successfully are Wanda, in (Nordeck) ; Rachel McCreery in (Held by the Enemy* ; Dearest, in (Little Lord Fauntleroy) ; (Mme.

Sans Gene) ; (Lady TeazeP ; (Lydia Languish* ; (The Country Girl*; the Shakesperian charac¬

ters, Helena, Ophelia, Lady Macbeth, Desde-

mona, Portia, Hermione, Perdita, Rosalind; Molly Pitcher; Francillon; Princess George; Salammbo ;

Elizabeth in (Embarrassment of Riches) ; Leonora in (A Woman of Impulse* ; Elinor, in (The Glass House* (1911) ; Kathe¬

rine, in (The Washerwoman Duchess* (1912).

KIDDERMINSTER, a city in Worcester¬

shire, England, on the Stour River. It is noted for its carpets which are famous the world over. This industry which dates back to 1735

has gradually increased in importance and efficiency until now it is one of the largest and best conducted in the world. Already when the carpet industry first began in Kiddermin¬

ster, the town was an incorporated place and its own establishment dated back as far as the Norman Conquest of England if not to an earlier date. It is probable that the making of carpets there had really begun before the date usually given as that of the establishment of the industry there, as it was a favorite town with the Norman aristocracy of the neighbor¬

hood who were given to patronizing the conti¬

nental arts and crafts. The city has canal and rail communication with Hull, Bristol and Liverpool with which it does considerable busi¬

ness. Kidderminster has other very active in¬

dustries besides that of carpets, among them being spinning and weaving mills, tin-plate fac¬

tories and dye-works. Among the persons of note who were born in Kidderminster are Ro¬

land Hill, father of cheap and universal post¬

age, and Richard Baxter the noted and elo¬

quent nonconformist minister. The trade be¬

tween the United States and Kidderminster is

considerable and the former keeps a consul there. Pop. 25,000.

KIDDERMINSTER CARPET, so called

from being made in the town of that name in England. Another of its names, ingrain, sig¬

nifies that it is made of wool or worsted dyed in the grain; that is, before manufacture. Its names two-ply or three-ply indicate the number of webs which go to the making of the fabric.

KIDERLEN-WAECHTER, ke'der-len-

vek'ter, Alfred von, German Foreign Minister: b. Stuttgart, 1852; d. there, 30 Dec. 1912. The son of a banker, he served in the war of 1870

and afterward studied law. He entered the Foreign Office in 1879 and some years later accompanied the emperor to Russia, Sweden and Denmark. He was minister in the free VOL. 16 — 26

town of Hamburg in 1894, in Copenhagen 1895-96, and later at Bucharest. In Rumania he gathered a deep knowledge of Eastern poli¬

tics, which led to his acting temporarily as ambassador at Constantinople and as chief at the Foreign Office. He became Foreign Min¬

ister in 1910. He conducted the Agadir nego¬

tiations in 1911 and was severely criticised both at home and abroad for his provocative attitude in the Panther incident. He suc¬

ceeded, however, in relieving the strained rela¬

tions between Germany and Great Britain, and endeavored to make a friend of Russia.

See Morocco.

KIDNAPPED, by Robert Louis Stevenson,

purports to be, as the subtitle sets forth, the (

ance with Alan Breck Stewart and other noto¬

rious Highland Jacobites; with all that he suf¬

fered at the hands of his uncle, Ebenezer Bal¬

four of Shaws, falsely so called.** This ro¬

mance, with a hero bearing a name taken from his own family tree, Stevenson declares to be the only one of his books in which (

<(I began it,** he confesses, (

Arthur Guiterman.

KIDNAPPING, though not a legal term,

is frequently applied as such in popular lan¬

guage, both in Great Britain and the United States, to the offense of stealing or carrying off by force a child or adult. In its more limited sense, it is applied to the obtaining of slaves or native labor by force, as practised by the Arabs in Africa. This barbarous traffic ex¬

isted in very recent years in the South Seas, carried on by Europeans, but now happily suppressed by the appointment of government labor agents. In Great Britain this term was formerly also applied to the illegitimate re¬

cruiting for the army and navy. See Abduc¬

tion.

KIDNEY BEAN, a bean of the genus

Phaseolus, of which European species and varieties have been cultivated from a time im¬

memorial. (See Bean). The. wild kidney bean of the United States is a high-climbing vine (P. polystachyus) , bearing small purple flow¬

ers. The so-called ((kidney-bean tree** is Wis¬

taria (q.v.).

KIDNEY-ROOT, the purple boneset (q.v.).

KIDNEYS, the principal excreting organs of the body. They are two in number, fixed at 402

the back of the abdominal cavity by a thick layer of fat and the peritoneum which passes in front of them; their lower border is slightly below the last ribs ; they have an outer, upper and lower convex margin and an inner margin deeply indented, allowing the entrance of the renal artery and exit for the veins and ureter.

This indentation corresponds to a considerable hollowing of the interior, which is occupied by the funnel-like origin of the ureter (the pel¬

vis). The kidney is surrounded by a firm mem¬

brane called the capsule ; inside of this is the substance proper, made up of a connective-tissue groundwork, in which are embedded the blood¬

vessels and the secreting glands called the uri-

niferous tubules. These tubules start in tiny rounded bodies (Malpighian bodies), and after an orderly arrangement of windings a number of the tubules form slightly larger tubules (col¬

lecting tubules), so grouped together as to form striated pyramids which have their apices pro¬

jecting into the pelvis of the kidney. By a process similar to filtration the excess of water in the blood passes through these walls and out of the body. There is a similar arrangement of the blood-vessels around the winding tu¬

bules, but through these the solids in solution in

the blood that are of no further use to the body are taken up by the epithelium of the tubules 1, 1, The two kidneys. 2, 2, Fibrous capsules. 3, Pelvis of the kidney. 4, Ureter. 5, Renal artery. 6, Renal vein.

7, Suprarenal body. 8, 8, Liver raised to show relation of its lower surface to right kidney. 9, Gall-bladder.

10, Terminus of portal vein. 11, Origin of common bile duct. 12, Spleen turned outward to show relations with left kidney. 13, Semicircular pouch on wnich the lower end of the spleen rests. 14, Abdominal aorta. 15, Vena cava inferior. 16, Left spermatic vein and artery. 17, Right spermatic vein opening into vena cava inferior.

18, Subperitoneal fibrous layer or fascia propria dividing to form renal sheath. 19, Lower end of quadratus lum-

borum muscle.

and added to the watery element inside the tubes. The purpose of the kidneys is the ex¬

cretion of constituents, all of which are formed before they are delivered to the kidney by other organs, with the exception of hippuric acid, which alone is secreted by the kidneys them¬

selves. Their duty, therefore, is to rid the blood of abnormal constituents or indeed any of its normal constituents if they or any of them occur in too great a proportion. This implies an extraordinary adaptability of the functions of the kidneys to the requirements of the animal organism. It registers and re¬

acts to the formation by metabolism of sub¬

stances soluble and non-volatile in every tis¬

sue of the body wherever located. When urea,

TRANSVERSE SECTION OF KIDNEY.

Cortex. 1', Medullary rays. 1", Labyrinth cr ccrtcx proper. 2, Medulla. 2', Papillary portion of medulla, or medulla proper. 2", Border layer of the medulla.

3, 3, Transverse section through the axes of the tubules of the border layer. 4, Fat of renal sinus. 5, 5, Arterial branches. A, Branch of renal artery. U, Ureter. C, Renal calyx.

uric acid or water is taken up from the sur¬

rounding lymph, it is discharged into the cavi¬

ties of the kidneys, from which it is drawn off by the ureter . into the bladder, where it is stored until a time suitable for its ejection. Not only is this the case, but if for any reason too much of any given ingredient has been taken out of the blood it is returned. As an exact measurement it is interesting to note that about 1,700 litres of blood flow through the two kid¬

neys in a living human each 24 hours, and from the blood 30 litres of waste matters are finally taken out and ejected. The ureters are about 16 inches long, with the diameter of a goose-

quill; they are lined by a mucous membrane, outside of which there are thin muscular and fibrous layers of tissue.

Urine. — The urine is an amber or yellow¬

ish fluid containing about 95 per cent of water, haying a specific gravity of 1.018 to 1.025, an acid reaction and rather characteristic ammo-

niacal odor. The inorganic solids held in solu¬

tion are the chlorides, phosphates and sulphates of sodium, magnesium, potassium, calcium and iron. More important than these is a group of substances elaborated in the body during meta-

holism (q.v.), some of which may act as poi¬

sons if not properly discharged; the principal ones being urea, uric acid, creatinine, hippuric acid and the xanthin bases. That of most im¬

portance is urea, which should in normal adults be excreted to the amount of 500 grains daily. In certain forms of kidney disease the deficiency of this substance is taken as an in¬

dex of the organ's impairment in respect to this one function. Other disturbances of function are tested by other tests. Thus chloride reten¬

tion or water retention are other types of dis¬

ordered function.

Visible Abnormalities of the Urine. — While the average amount of urine passed by a healthy adult in 24 hours is 50 ounces (three pints), there are constant variations from this rule, de¬

pending on the amount of water ingested and the amount lost through the skin and bowels ; so also do the amount of solids vary with the diet and amount of exertion. White cloudiness of the urine may be caused by the presence of pus, phosphates, mucus or bacterial growths.

Reddish or ^brick-dust® deposit is caused by an excess of urates, a condition ordinarily of no importance and never an indication of kidney disease. There is apt to be a diminution of the amount, of urine in nephritis and a great in¬

crease in diabetes.

Albumen in the urine is the serum albumen of the blood. In health the kidneys may allow'

the passage of faint traces of this substance, but the presence of amounts large enough to be

discovered by the (

thelium of the tubules — congestion of these organs, inflammation of the ureter, bladder or urethra, or an admixture of blood with the urine. Albumen may appear in the urine after severe exertion without apparent congestion of the kidneys. Certain individuals go on for years showing albumen in the urine at certain times of the day and never develop any further evi¬

dence of Bright's disease. In some persons certain articles of food, particularly those rich in albumen, cause a temporary albuminuria.

Although these forms are called Afunctional,®

there is always a possibility that they may indi¬

cate some slight kidney impairment and it is the custom of the insurance companies to re¬

fuse applicants with albuminous urine.

Urinary casts are tiny cylinders or plugs formed in the uriniferous tubules under abnor¬

mal conditions. They are formed of coagulated albumen, blood and epithelial cells, granular matter the result of epithelial cell degeneration, and so-called waxy matter. The clear (

bers in the urine from normal kidneys, but the constant presence of casts indicates a disease of the kidneys. These bodies are entirely invisible to the naked eye.

Uraemia. — This term denotes a group of symptoms that may appear in the course of diseases of the kidneys and during pregnancy.

(See Puerperal Eclampsia). Some toxic sub¬

stance is held in the blood and causes one or more of such symptoms, which may not be characteristic of uraemia but to which, because of the general complex

of symptoms and the known condition of the urine, the term uraemic is applied. The various symptoms which it is customary to include in the category are head¬

ache and sleeplessness, hemiplegia and aphasia, general convulsions and spasms of groups of muscles, blindness, delirium and coma, vomit¬

ing; dyspnoea and increased arterial tension.

This last condition is due to spasm of the smaller arteries and to hypertrophy of the heart.

Diseases of the Kidneys. — Acute con¬

gestion may result from sudden obstruction of the veins, certain irritant poisons, exposure to cold, severe surgical operations, overexertion or from the infectious diseases. Besides the changes seen in the urine, albuminuria and casts, if the congestion be severe there may be fever, abdominal pain, nausea and vomiting and par¬

tial or complete suppression of urine. The treatment consists in the removal of the cause and the relief of congestion by the hot pack over the lower half of the body. In its severe forms the conditions may be fatal.

Chronic Congestion. — This condition re¬

sults from obstruction to the venous outflow, as seen in disease of the lungs, heart and liver and from the pressure of tumors: it leads to actual change of structure.

Acute Nephritis, Acute Bright's Disease. —This is an inflammation of the vital part of the kidney structure, the secreting membrane of the uriniferous tubules and of the structures around them. In such an inflammation there is congestion of the whole organ, degeneration of the epithelial lining of the tubes, exudation of serum from the blood-vessels into the tubes and consequent disturbance of the function of the organ. The most common causes of

this condition are exposure to cold and wet, the poisons of scarlet fever, pregnancy, etc., certain causes being undiscoverable. The condition may also be due to other infectious diseases, to the ingestion of poisons, or to the presence of large burns of the body surface.

Some cases are so mild that the kidneys are not suspected, the patient having a slight fever, headache, loss of appetite and general malaise. The ordinary cases show considerable diminution of- urine, which is loaded with al¬

bumen and casts; there is considerable fever; nausea and vomiting are usual ; and these are accompanied by more or less of dropsy, head¬

ache and other manifestations referred to under the name of uraemia, and by a rapidly developing waxy pallor. These various symp¬

toms are not constant, but the picture is suffi¬

cient when the condition of the urine is investi¬

gated. As a rule, when this condition lasts only a few weeks these cases recover com¬

pletely and the kidneys are as good as before, but the cases of longer duration and of great severity may be fatal, or may leave permanent changes in the organ. This last effect is par¬

ticularly liable to follow when nephritis begins late in the course of scarlet fever, because of the permanent changes of structure induced by some particular poison generated at that time.

The treatment of these conditions consists in absolute rest, diet of the simplest sort, pref¬

erably milk, opening of the various emunc-

tories (the bowels and skin) and attending to such symptoms as threaten ’the life of the patient.

Chronic Bright's, Chronic Nephritis. — This disorder is characterized by a permanent change in the tissue of the kidney, which may follow acute inflammation, or may come on insidiously as a result of poisoning by alcohol, of syphilis, of prolonged nervous strain, with consequent 404

disturbance of digestion and metabolism, of suppurative inflammations in other parts of the body and of many undiscoverable causes. The changes in the kidneys consist in growth of connective tissue around the glomeruli and tu¬

bules, more or less degeneration of the epithe¬

lium lining the tubes, and arteritis. The dis¬

ease may be very insidious in development, al¬

bumen and casts being discovered on routine examination of the urine. Loss of nutrition may be noticed, or a disturbance of the gastro¬

intestinal tract may first call attention to the disease. The urine may be increased in amount or diminished, but as the disease progresses the specific gravity grows less from the decrease of urea. Dropsy appears around the ankles and spreads usually as the disease advances. Anae¬

mia is fairly constant, but not severe. Sooner or later that general condition of poisoning known as uraemia is apt to develop because of the inability of the kidneys to excrete the toxic substances. Some cases suddenly develop one or more of the various symptoms, either dys¬

pnoea, dropsy, failure of the heart's action, coma, convulsions or hemiplegia, without the nephritis having occasioned distinct symptoms previously.

Prognosis in Chronic Nephritis. — The

prognosis is not necessarily bad, although as a rule

the disease progresses and causes the death of the patient. Intercurrent diseases throw extra strain on the kidneys and may hasten a fatal termination. Many cases live for years in comparative health and are carried off by another affection. The actual prognosis of a case is determined by the work the kidneys are able to do on a known diet and under stated conditions of work. This is best determined by an estimation of the excretion of urea in a 24-hour collection of urine.

Treatment. — Many things can be done for a chronic nephritis. In the first place it should be remembered that the work done by the kid¬

neys is really enormous. Millions of foot pounds of energy are utilized in kidney func¬

tioning. Then again it should be recalled that although the term chronic nephritis is a single term, it stands not for one disease, but for a large group of diseases, many of them quite different in causation. Some of these are dif¬

ficult to treat, others are very fruitful in treat¬

ment. The group due to definite irritants, such as alcohol or syphilis, can be handled by getting at the causes of the alcoholism — which are usually mental — and thus relieving the double effect of mental strain and chemical poisoning.

The syphilitic cases need proper medicinal treatment. The whole group of hyperadrenale-

mia nephritides, often on a mental basis, are particularly favorable to treatment by compe¬

tent psychoanalysis. Such analysis can be per¬

formed only by a well-trained physician ac¬

quainted with the dynamics of the kidney func¬

tion. Consult Cushney, (The Secretion of Urine> (1917). Other types of chronic nephri¬

tis are as yet unanalyzed. They usually progress but are held in check largely by diet and hy¬

giene. There are many ups and downs in the course of the various nephritides.

At the time of acute exacerbations symp¬

toms are relieved as they arise and the skin and bowels are called upon to assist the kid¬

neys in the work of excretion by diaphoresis (by the hot pack) and catharsis. When the out¬

put of urine becomes small, some benefit may result from the administration of diuretics.

For the disturbance of the circulation arterial dilators and cardiac stimulants are employed, and sometimes bloodletting, with the greatest benefits.

Renal Calculi or Kidney-Stones. — See

Calculus.

Tuberculosis of the Kidney. — This malady occurs in the form of tiny miliary tubercles scattered through the kidney, usually as a part of a general tuberculosis and in the form of a tubercular pyonephrosis due to extension from the bladder ; more rarely the process may be primary in the kidney and then extend to the bladder. The symptoms are frequent micturi¬

tion, pyuria, hematuria and occasionally the presence of a tumor. The diagnosis is difficult unless there be tuberculosis of the bladder, testes or seminal vesicles. Although the prog¬

nosis is always grave, cases have recovered where the kidney has been inspected but not removed. Nephrectomy is not performed unless the other kidney can be proven sound.

Injuries of the Kidney. — Severe contu¬

sions of the abdomen or loins may cause lacera¬

tion of the kidney substance and the capsule, or the kidney may be perforated by stab or gunshot wounds. Slight contusions cause pain and transient hematuria, but the more severe contusions and wounds allow the urine to flow out into the surrounding tissue, sometimes with inflammation following. The wound may re¬

quire sutures, or the kidney may have to be removed.

Suppuration in and around the Kidney. —This condition is due to the infection of the part with micro-organisms, which may reach the part in three ways — through the blood, from the bladder and through the perforating wounds. It is now commonly noticed that per¬

sons in health may pass bacteria through their kidneys without resulting suppuration ; and it seems that some injury must take place to allow them to grow there and cause actual dam¬

age. Such damage may be made by calculi or contusions. Pylitis is an inflammation of the pelvis of the kidney and this part is first in¬

volved when the inflammation travels up from the bladder. Pyelonephritis is an inflammation of both pelvis and kidney structure. Pyone¬

phrosis is the name used to describe the condi¬

tion of dilatation of the pelvis and the kidneys with pus : the organ may be entirely destroyed.

Perinephritis is an inflammation of the cellular tissue and fat around the kidney. In pyaemia there may be many small abscesses in the kid¬

ney substance.

The symptoms of these various forms de¬

pend on the severity and site of the inflamma¬

tion : there are the changes in the urine (the presence of pus, blood and epithelium from the various parts), the local signs (pain and possibly swelling) and the general signs of poisoning (fever, rigors, septic look, nausea, vomiting, etc.). An abscess in the kidney may burrow through to the surface ; it may drain sufficiently through the normal channels and become chronic; or the patient may die of acute sepsis.

In the treatment of the milder forms it may be sufficient to remove the cause ; the bladder may be cleansed by irrigation ; or if a penetrat-

ing wound be the cause it may be enlarged and cleansed. If there be a perinephritis or a se¬

vere pyelonephritis, the abscess-cavity must be drained. The kidney is removed (nephrectomy) , if destruction has gone too far.

Movable or Floating Kidneys. — By this phrase is meant a condition in which the kid¬

neys leave their fatty bed and travel downward or otherwise through the abdomen. In the milder grades of this condition the kidney is displaced downward during inspiration, but in the more severe grades one or both are con¬

stantly low, even down to the pelvis. No symp¬

toms whatever may arise from this condition; but on the other hand the dragging on the ves¬

sels and nerves may give rise to pain in the back and sides, minor disturbances of digestion or nausea and vomiting. The nervous system is so deranged that it is common to have most confusing symptoms. Occasionally the ureter becomes twisted and dams back the urine, caus¬

ing marked distention of the pelvis of that organ, a condition called hydronephrosis. When such an obstruction persists, the kidney struc¬

ture is gradually thinned until its function is lost. It is customary to have the sufferer from a floating kidney wear a support around the abdomen; at times the operation of fixation of the kidney in its normal place may be advisable.

KIDO, ke'do, Takayoshi, Japanese states¬

man: b. Hagi, Choshiu, 1832; d. Kioto, 27 May 1877. His father, a prominent physician, gave his son the best education obtainable in Japan in his day, and the boy, intelligent, quick and ambitious, made the best of his opportunities.

Coming of a semi-noble family he found al¬

most any office open to him that he cared to aspire to. He had a strong faculty for taking infinite pains and doing things well; and the story is told of him that when Commodore Perry's forces visited Japan in 1854, he secured employment with it disguised as a laborer in order to learn all he could about the western nation that seemed to be forcing upon Japan conditions for which she had no love nor in¬

clination. He did his work so well and main¬

tained his disguise so completely that he was never discovered. This feat was characteristic of the man. But the adventure seems to have changed the whole trend of his thought. His contact with western life in this intimate man¬

ner gave him an insight into western ways that set him thinking in a new direction ; and the result was that he continued to study the new conditions and civilization that he had thus un¬

expectedly discovered, with the result that he became convinced that Japan could no longer afford to continue isolating herself _ from the world. The

natural result was that in 1868 he finally joined the revolutionary party of which he became the greatest thinker and planner.

With Okubo, Saigo and Iwakura he worked out the details of the coup d'etat of 3 Jan. 1868, which placed a new government in power sub¬

ject to the Mikado alone and in reality changed the whole trend of the life of Japan, political as well as social. 'This revolution overthrew the power of the daimios and caused the abol¬

ishment of the feudal system. As a result 270

daimios relinquished their feudal power and agreed to hold their landed property directly from the Crown. Thus Japan was placed, at one blow, on the road to that modern progress which astonished the western world. Kido, with his eyes ever turned westward, realized the power of the modern press and he founded the first real newspaper in Japan, the Shimbun Zasshi, which, under his able management, be¬

came a power for progress and modern ideas ; and thus helped greatly to the leading of Japan along the pathway of western progress. This paper, founded in 1868, linked him firmly to western ideas; and turned his face ever west¬

ward. It also increased his desire to see and to know at first hand the civilization of which he had become, in a sense, in his own country, the champion. So, in 1873, ' he started out for a voyage round the world, as vice-president of a "traveling Japanese embassy, » an idea of which he had himself been, in a sense, the sponsor. With him went another notable Japa¬

nese character, Prince Tomomi Iwakura

(q.v.), one of the most intelligent of the Japa¬

nese revolutionary leaders. This world-wide trip made Kido a still stronger advocate of western

civilization which he made every ef¬

fort, through his court influence and his news¬

paper, to introduce into Japan. The transla¬

tion which he had made of Montesquieu's (L'esprk des lois,* which he caused to be pub¬

lished at his own expense, and which he largely advertised, did a great deal to influence the thinking class of the country in favor of a new and liberal constitution for Japan, which was finally secured in 1889. This constitution did away with the last vestiges of the feudal system and provided the machinery for a much more democratic administration of the affairs of the country, though it left it still firmly monarchial. Thus the result of his life-long labors bore fruit 11 years after his death. On his return to Japan in 1874, from his trip around the world, Kido became Privy Coun¬

cilor to the emperor, a position which he re¬

tained until his death, and which enabled him to still further work for* the ideas which had ever guided his life from the time he first made the acquaintance with western civilization through his first hand knowledge gained from his adventure with the Perry expeditionary party. His great qualities as a statesman and his single-heartedness in working for the good of Japan were recognized by posthumous hon¬

ors during the exercises held in connection with the promulgation of the constitution of 1889 and in the raising of his son to the rank of a noble. Consult any modern history of Japan.

KIDRON, ke'dron, the Valley of Siloah

(Wady Silwan), or the Valley of the Lady Mary (Wady Sitti Maryam), which lies to the east of Jerusalem, stretching from the foot of Mount Scipus north of the city, southward, then eastward, passing between Jerusalem and the Mount of Olives to En Rogel, south

of the city, from whence it continues on southward to the Dead Sea under the name of Wady en Nar.

The Valley of Kidron is frequently mentioned in Biblical narrative; and recent excavations show that it was, at one time, a place of much more importance than it is at present, for now it is the dried bed of a stream which flowed in Biblical times. Recent excavations show that the bed of the ancient stream now lies buried beneath nearly 40 feet of debris. An aqueduct cut into the rock in ancient times was 406

unearthed in 1880; and'since then other evidence of the importance of the valley have been found buried beneath the sands that have blown in upon them. Among the important references to the Kidron are the following. When David fled from Absalom, he is credited with having crossed it ; Absalom forbade Shimei to cross it; there Asa burned the idol which his mother had erected; and there Josiah also burned the ashera w/hich had been taken from the temple ; and there Hezekiah is said to have thrown into the Kidron the altars found in Jerusalem.

Kidron is now a vast burial place and has been so for many years for both Mohammedans and Jews, because of the belief that this spot is to witness the last judgment; the territory has been divided up between the two creeds, the Mo¬

hammedans occupying the side toward the tem¬

ple, that is to the west, while the Jews occupy that part toward the Mount of Olives, that is to the east. To the Christians the Valley of Kidron is of especial historical interest because, according to the account of John, Jesus visited a garden therein, in company with his disciples, shortly before his betrayal, judgment and crucifixion. Now that Palestine has passed out of the hands of the Mohammedans and that facilities for the excavation of the remains of the valley will undoubtedly be afforded, it is more than probable that work on

uncovering the remains of the past importance of the valley will be undertaken.

Bibliography. — Benzinger, (Hebraisch Ar-

chaologie (Freiburg 1894) ; Buhl, (Geographic des Alten Palastina5 (Freiburg 1896) ; Cheyne, Ridron5 (Encyclopedia Biblica, London

1901); Guthe, (Jerusalem) (Kurzes Bibelworter-

buch , Freiburg 1903) ; Kennedy, Ridron5

(Dictionary of the Bible, New York 1899) ; Robinson, (Biblical Researches in Palestine) (New York 1857) ; Tober, (Die Siloahquelle und der Oelberg> (Berlin 1852) ; Warren and Conder,

KIEFFER, kef'er, Henry Martyn, Ameri¬

can clergyman and author: b. Mifflinburg, Pa., 5 Oct. 1845. He was graduated from Franklin and Marshall College, Lancaster, Pa., 1870, and from the Theological Seminary there in 1873.

Enlisting at 16 as a drummer in a Pennsylvania regiment he served three years, his experiences in that capacity appearing in his popular Rec¬

ollections of a Drummer Boy) (1883). He was pastor of a German Reformed Church at Norristown, Pa., 1873-84, and held a similar pastorate at Easton, Pa., from 1884 to 1903. He was received into the Protestant Episcopal Church in 1904, and for a time assistant at the Church of the Ascension at Atlantic City, N. J., but is now retired. His works include (College Chapel Sermons) (1891) ; (First Set¬

tlers of the Forks of the Delaware5 (1905) ; (It is to Laugh5 (1907) ; (The Funny-Bone5

(1910) ; Raugh Again5 (1912) ; (Short Stories of the Hymns5 (1913). He was joint editor of the Reformed Church Hymnal5 (1890).

KIEFT, keft, William, Dutch administrator in

America: b. Holland, about 1600: d. off the Welsh coast, 1647. He came as the fifth gov¬

ernor of New Netherlands, and arrived in the colony 28 March 1638. He was greedy, choleric, and tyrannous ; began his administration by con¬

centrating the executive power; and was soon involved in troubles with the Indians. In 1640

he despatched a force to murder the Raritan tribe. He was not wholly successful ; the act was avenged, and when in 1643 he arranged for the destruction of the River tribe, which had sought the protection of the colony against the Mohawks, he deemed it wise to obtain sanction for the proceeding through the signatures of three citizens. A desolating war ensued, almost to the extinction of the colony. Public senti¬

ment was strong against him, and he finally con¬

ceded the selection of a <(Council of Twelve,55

who stood for the beginning of representative government in New Netherlands, but practically were figure-heads quite disregarded by the gov¬

ernor. The Puritans at the east and the Swedes at the west were making encroachments upon Dutch territory, and Kieft was finally recalled and succeeded by Peter Stuyvesant. On 16 Aug.

1647 he sailed for Holland with his enemy, Dominie Bogardus, who had denounced his tyranny, and whose services he had revengefully disturbed by having soldiers make noises under the meeting-house windows. The vessel was wrecked on the coast of Wales, and Kieft, Bo¬

gardus, and nearly all the rest on board were drowned. Kieft rebuilt Fort Amsterdam, im¬

proved the appearance of the settlement, and effected several administrative reforms.

KIEL, kel, Friedrich, Ge rrrian musical com¬

poser : b. Puderbach, 1821; d. 1885. After teach¬

ing music and the ordinary branches in a pub¬

lic school and studying music between times, he attained a local reputation as a musician which finally enabled him to become a member of the orchestra of Prince Karl von Wittgenstein, where he made very rapid progress in many branches of music. He followed this up with further studies at Coburg and Berlin from 1842 to 1844. In the latter city he became, 26

years later, professor in the Conservatory of Music, a position he retained until his death.

He composed religious music, a Requiem,5

which is still popular, and numerous pieces for voice, instruments and orchestra. As a teacher of music he had considerable influence on the pupils of his day who centred in Berlin ; and he was counted one of the best musical in¬

structors in that city.

KIEL, Henry William, American public

official: b. Saint Louis, Mo., 21 Feb. 1872. He received his education in the public schools and at Smith Academy. He learned the trade of bricklayer under his father's supervision and throughout his life has been identified with that industry. For many years he served as vice-president of Kiel and Danes Bricklaying and Contracting Company, established in 1868, and of which he is now president. He executed many important contracts in Saint Louis. He also took a keen interest in Missouri politics and _ has held the following public offices : Chairman of the Republican Citv Committee; chairman of the Twelfth Congressional Commit¬

tee of Saint Louis; presidential elector-at-large,

Missouri, 1908, and delivered the State electoral vote of Missouri to the President of the United States Senate; mayor of Saint Louis 1913-17

and 1917-21.

KIEL, Prussia, town and chief naval port of Germany in the Baltic. It is situated in Holstein on _ a deep bay with finelv wooded banks, 70 miles by rail north from Hamburg.

It was formerly the place of meeting for the Schleswig and Holstein states, and the seat of a superior appeal court for the duchies. The church of Saint Nicholas founded in 1240, and 'restored 1877-84, is the most noteworthy ecclesiastical building. The university, founded in 1665, has an attendance of some 2,000 stu¬

dents, is famed for its medical school, and con¬

tains a library of over 320,000 volumes. There is a museum of national antiquities, and a zoological institute. Kiel is admirably situated for trade as well as for defense, the whole bay on which it stands forming a safe roadstead, and the town being provided with spacious quays. The celebrated Kieler Sprotte (smoked sprat) is caught in the bay and prepared here.

Sugar, soap and machinery are manufactured; and there are woolen factories, tanning and tobacco works. It is as a naval dockyard and arsenal, however, that Kiel is most widely known. The great government docks are on the east side facing the city, contain basins capable of accommodating the largest warships afloat, and form the focal point of the great shipbuild¬

ing establishments, as well as of other important industries, dependent on a naval station of the first class. It is also the seat of the largest

naval hospital in Germany. A famous regatta is held annually in June. The Kaiser-Wilhelm Ship Canal from the mouth of the Elbe joins Kiel Bay at Holtenan, somewhat north of Kiel proper. Kiel 'became in 1284 one of the cities of the Hanseatic League ; in 1773 it became a part of the kingdom of Denmark; and in 1866

it passed, with the rest of Schleswig-Holstein, into the possession of Prussia. In 1814 the Peace of Kiel was concluded, under which Nor¬

way was ceded to Sweden. During the Four Years World War Kiel was the headquarters of the German Imperial fleet from which it issued to defeat in the naval battle of Jutland in May 1916 and to surrender in November 1918. See War, European. The population in 1919 was 205,330.

KIEL CANAL. See Kaiser Wilhelm

Canal; Ship Canals.

KIELCE, kyel'se, a government and capi¬

tal of the same name in Poland. It is one of the smallest of the Polish governments, con¬

taining as it does only 3,897 square miles.

Lying in the southwest it runs into the Carpa¬

thians and into the mineral regions which furnish it with coal, iron, zinc, sulphur and other metals which have been only partially developed. It has also valuable deposits of marble and build¬

ing stone, considerable of which are still unex¬

ploited owing to the fact that they are too far from the market, or the transportation facilities are too poor. The Vistula forms the boundary line between Kielce and Galicia. Kielce, the capital city, situated in the mountains, over a hundred miles from Warsaw, was once noted as a copper-producing centre ; but these mines are not being worked to any great

extent at present, though attempts have been made dur¬

ing the present century to reopen some of them.

The chief industry of the government is agri¬

culture, whidh embraces the ordinary cereals of Europe, beet-root, mulberries and vegetables.

Among the manufacturing activities are the making of paper, spirituous liquors, cotton goods, leather, glass, sugar, brick and ma¬

chinery of various kinds ; while the capital city specializes in brick, paint, sugar and articles made from hemp. Population of the govern¬

ment over 800,000, while that of the city is about 30,000, most of whom are Poles, with about from 15 to 20 per cent Jews.

KIELHORN, kel'horn, Lorenz Franz,

German Sanskrit scholar and writer : b. Osna-

briick, 1840. Educated at Gottingen, Breslau, Berlin, London and Oxford, he became pro¬

fessor of Sanskrit at the Deccan College at Poona (1866-81) and Gottingen in 1882. He gave a great deal of attention to the Sanskrit texts and published several of them with notes and translations; and he founded (with Buhler) the Bombay Sanskrit Series in 1866.

He wrote an exhaustive Sanskrit grammar which has gone through several editions and is extensively used in European colleges where Sanskrit is taught. Among his interesting works are ^Report on the Search of Sanskrit Manuscripts) and his contributions to Indian Antiquary and Epigrqphia Indica. As editor of Grundriss der indo-arischen Philologie, he did much for the study of Sanskrit and things Indian.

KIELLAND, kyel'land, Alexander Lange,

Norwegian novelist and dramatist: b. Stavan¬

ger, 1849 ; d. 1906. He came of a family occupy¬

ing a high social position, and he received an excellent education which he completed at the University of Christiania where he was gradu¬

ated in law. On leaving school he drifted into business instead of following his profession and became the successful manager of a large brick and tile concern. He continued his study of French literature and his reading was wide and varied. In imitation of Daudet, whom he greatly admired, he published (Novelettes) (1879). which he followed with (New Novel-

ettes) (1880) ; (Garman and Worse) (1880) ; laboring People) (1881). These were fol¬

lowed by other novels in which he appears to be working under varying interests and influ¬

ences, for the most part French, among them (Skipper Worse) (1882); (Poison) (1883); fortune5 (1884) ; (1891);

fessor LoodhaP (1904). Among his dramatic works, which are all comedies, are (Homeward Bound) (1878) ; (1886) ; (Betty’s Guardian) (1887) ; (Professors) (1888). Kiel-

land has dealt with many social questions and problems in his various published works, which are, from this point of view, of considerable interest and importance in the history of the literature of Norway. He attacks conventional religion and the corruptions of the masses and the classes alike ; and he has laid a ruthless hand upon many of the smug customs and foi¬

bles of the age. Naturallv, owing to his manner of working and his didactic aims, his novels are better than his plays.

KIELMANSEGG, kel-man'seg, (Count)

Erich von, Austrian statesman : b. Hanover, 1847. On graduation from the university in 1870 he entered the service of the Austrian government and passed through the usual rou¬

tine of various administrative posts in the prov¬

inces and the Ministry of the Interior (1886-

89), becoming finally governor of Lower Austria and Minister of the Interior (1895) and later Prime Minister over a temporary 408

cabinet. In his official capacity he showed him¬

self a man of action, intelligence and desire to better the conditions of affairs as he found them. He extended the confines and increased the size and importance of Vienna by taking into the city limits the suburban towns and villages; and he passed sanitary laws and other measures for the benefit of the capital and for other parts of the country.

K'lEN-LUNG, ke-en-loong', emperor of

China: b. 1710; d. Peking, 7 Feb. 1799. He succeeded his father, Yung-Ching, in 1735. He favored the Christian religion in private, but in 1753 interdicted its exercise by a formal order; and the missionaries were, in consequence, obliged to proceed with great caution, although several of them were in the emperor's service, and treated with great respect as men of science and learning. On the suppression of the Jesuits in 1774 China was less visited by scientific per¬

sons than formerly, which induced K'ien-Lung to send to Canton and invite artists and learned men of all the European nations, and particu¬

larly astronomers. Resolving to immortalize the remembrance of his victories by the graver, he

engaged French artists to copy some Chinese paintings in which they were represented ; but Louis XV had them engraved for him at his own expense. The larger Chinese collection on agriculture contains several poems of this mon¬

arch on rural occupations and incidents; and he established a library of 600,000 volumes, con¬

taining copies of all the most interesting works in China. In 1795 he abdicated in favor of his son.

KIENZL, ken'z'l, Wilhelm, Austrian mu¬

sician: b. Waizenkirchen, 1857. Studying music in all its branches under several famous teachers and professors in Prague, Gratz and Munich, he went through Europe on a concert tour (1881-82) : and on his return he became head kapellmeister in Amsterdam of the Ger¬

man Opera Company, and he held similar posi¬

tions in Hamburg, Munich and Gratz. He wrote good operas, a variety of concert and other music, and several books. Among his operas are

(1892); (Der Evangelimann) (1895) and (Don Quixote) (1898). Among his other works are

1880) and (Miscellen) (Leipzig 1885). He has edited several important and interesting musical works and has contributed extensively to the musical periodicals of Germany.

KIEPERT, ke'part, Heinrich, German

writer, geographer and cartographer : b. Berlin, 1818; d. 1899. His life was spent in the interest of geography and map-making in all their branches; and in this connection he did exten¬

sive traveling and exploration and thus ad¬

vanced the science of accurate map-making very materially. He early began his exploration work with

Asia Minor (1841-42). This was followed by the publication of his (Atlas von Hellas,) which was begun in 1841 but not finished until 1844. This made his name well known in his particular field. He published several other maps of Asia or parts thereof, among the most notable being his (Karte von Kleinasien) (1843-45). In the meantime he continued his explorations of western Asia with happy results for his cartography which also included maps and descriptions of arch¬

aeological subjects. All this labor, intelligently planned and carried out, gained for him a national reputation and secured his appoint¬

ment as director of the Geographical Institute of Weimar (1845-52), and professor in the University of Berlin (1859-99). Among his published works other than maps are (Lehrbuch der alten Geographic) (1878); (Travels in Asia Minor) (1842-90) ; (Historisch-Geog-

raphische Erlauterung der Kriege zwischen dem ost-romischen Reiche und den persischen Konigen der Sassaniden-Dynastie.)

KIERKEGAARD, ker'ke-gard', Soren

Abye, Danish writer and philosopher : b. Co¬

penhagen, 1813; d. 1855. He was educated at Copenhagen and in Germany; and, on his return to his native city in 1842, he settled down to the life of a student and literary man.

Constant ill health made him morbid and in¬

clined him to live by himself. In this way he estranged himself from the world and retarded the acknowledgment due him on account of his genius and originality. He wrote a great deal on theological subjects, upholding the genius and mission of Christianity but not always maintaining the attitude of the orthodox sects.

His brilliancy of style, profoundness of thought and

ability of argument and presentation of ideas gained for him a large and influential following and enabled him to widely influence thought not only in his own country but throughout Protestant Europe. He wrote under various pseudonyms, which were often con¬

venient for the hiding of his identity when he did not care to reveal it for the time being at least. Among his published works of most interest are (Either, or) (Enten-Eller 1843) ; (Stages of Life) ((Stadier paa Li vets VeP

1845) ; (On Christian Training) (1850). Con¬

sult Barthold, (Die Bedeutung der asthetischen Schriften Soren Kierkegaards) (Halle. 1879) ; Brandes, (Soren Kierkegaards) (Copenhagen 1877).

KIERSY, kyar'se', Edict of, a capitulary of Charles the Bald, supposed, without any real reason, to have originated the feudal system.

The measure was intended by the sovereign to be merely temporary. It was issued in 877 to protect the interests of the king during his expedition into Italy. While it recognized as hereditary the fiefs of the vassals taking part in the expedition as supporters of Charles, it also maintained the right of the sovereign to dispose of vacant fiefs, two important provisions which became, later on, striking features of the feudal system. This act may have helped to develop the system but the germs from which it sprang had long been in existence ; and the growth of society, even before this date, had been toward a concentration of power which could only be attained through some combina¬

tion similar to that of the feudal system.

Consult any good history of the period and also (Monumenta Germanise Historica, Leges) (Vol. I).

KIESEWETTER, ke'ze-vet’er, Raphael

Georg, Austrian writer on musical subjects: b.

Holleschau, Moravia, 1783; d. Baden (near Vienna), 1850. After having been for a time employed in the offices of the Minister of War, he traveled extensively before finally settling down in Vienna to continue his historical re¬

searches to make a collection of old musical KIEV

instruments superior to any other in the city, and to write. Among his published works, in addition to numerous articles on ancient musical instruments, on which subjects he was an excel¬

lent authority, are (Geschichte der europaisch-

abenlandischen oder Unserer heutigen Musik) (Leipzig 1834 and 1846); (Guido von Arezzo; sein Leben und Wirken> (Leipzig 1840); (Die Musik der Araber Originalquellen) (Leipzig KIEV, ke'yef, a city in Little Russia, capital of the government of the same name. It has long been a fortified place but the fortifications are now of little or no use against modern artillery. The city, which lies amidst hills, is on the Dnieper which annually overflows the lower parts . of the place. Kiev is a curious and interesting mingling of the past and the present, of ancient feudal and modern progres¬

sive Russia. The main part of the city, which consists of the low-lying sections and numerous suburbs which have been, from time to time, taken into the incorporated part of the town, are overlooked by the castle-crowned heights with their walls and ancient fortifications, which still preserve an air of the past. Kiev may be said to be divided into three parts or sections, Old Kiev, the upper town and the lower town. The fortified part is known as Ptschersk, and the business part as Podol.

Kiev is one of the oldest cities in Russia and it figures in its history for many centuries so prominently that it is known in Russia as ((the mother of cities.® It was already a town in the 5th

century; and during the following four centuries it continued to grow in import¬

ance and wealth until it finally became the capital and chief city of a principality of the same name. This principalitv figures in nearly every war in which Little Russia was interested, and for centuries the history of I ussia may be said to . have been nothing else but one almost continuous war carried on by the am¬

bitious princes of the various independent or semi-independent sections of what is now mod¬

ern Russia. It has the distinction of being one of the first principalities in Russia to adopt Christianity. This brought it into close con¬

nection with Rome and Western civilization and led it to adopt more of Western ways than the other political factions of Russia. Under the famous Vladimir I in the 10th century it became Christian in a characteristic Russian way. The prince had become convinced that connection with Rome would be very much to his advan¬

tage; and he decided to become a Christian.

But he would not beg for baptism. He would get it flhe Russian way. He would conquer it by force of arms. So he set out with a large force against the Byzantine Empire, forced the Emperor Basil to give him his sister Anna in marriage and scared the Pope into baptizing him. On his return to Kiev he sent forth a proclamation that all who did not come to the river to be baptized should be looked upon as rebels. The people came together to the Dnie¬

per, bringing their idols with them, as they had been ordered to do ; and they were there bap¬

tized and their idols broken into pieces by order of Vladimir, who is said to have himself helped in the destruction. Not satisfied with this work in his capital, Vladimir sent word to all the villages, cities and districts of his king¬

dom that the inhabitants, without exception, should follow the example of Kiev and be¬

come Christians. Riots broke out in many parts of the country, but Vladimir carried through his plan of making Kiev Christian, to all outward appearance, though for many years afterward the peasants continued to worship their ancient gods in the depths of the forest and to be married, baptized and blessed by the ancient heathen rites. (See Vladimir). From the time of Vladimir Kiev continued to grow and prosper and to attract great attention as the religious centre of Russia and its richest and most famous city. Accumulating great wealth and containing famous palaces and pri¬

vate edifices, it attracted the attention of the conquering Mongols of the 13th century, who descended upon it as they did upon other wealthy centres of Russia. The struggle was long and bitter ; but finally! the wealth, power and glory of Kiev passed away temporarily be¬

fore the ravages of the Mongol hordes.

In 1320, however, Kiev, coming under the rule of Lithuania, became a place of some con¬

siderable importance and retrieved a part of its past prestige and glory as a commercial and industrial city and the religious centre of west¬

ern Russia. When Lithuania became a part of Poland in 1569 Kiev formed still a part of Lithuanian territory. It. remained united with Poland until 1668 when it became Russian ter¬

ritory. Peter the Great, remembering its past glorious history, paid considerable attention to Kiev, restored its fortifications and made it one of the strongest fortresses in Russia in his day. Naturally, with so much interesting and momentous history, Kiev has many relics of her past greatness in the shape of buildings.

Among these are numerous churches dating to the time

when she was the <(city of churches.®

Of these ecclesiastical remains the monastery of Caves (Petcherskaya Lavre) is one of the most noteworthy, forming as it does in itself a walled town dedicated to monastic life, with its schools and inns for the entertainment of pilgrims and its many rows of cells and numer¬

ous streets, all overlooking the Dnieper and surrounding the great central church of the monastery, one of the richest ecclesiastical edi¬

fices in Russia and the tomb of many persons of note, ecclesiastical and non-ecclesiastical, among them the remains of various saints.

These too are found in the cave-like cells of the monks. All this makes Kiev one of the places most frequented in Russia by pilgrims who make journeys to it from all over the country wherever the Greek Church has ad¬

herents. Among the other noteworthy ecclesi¬

astical edifices of Kiev are the monastery and church of Saint Vladimir, the cathedral of Saint Sophia, the church of the Three Saints and that of Saint Cyril, the cathedral of Saint Andrew, the new cathedral of Saint Vladimir, the Imperial Palace, the University of Saint Vladimir and the city hall. The university, which has been steadily growing in importance and usefulness, has a library of over 200,000

books and full arts and other departments usu¬

ally found in such an institution. Kiev, which is a city of over 300,000, is a place of consid¬

erable industrial and commercial importance, its activities finding vent in the sugar beet trade, grain, live stock, timber, fruits, qhemi-

cals, machinery, hardware, paper, tobacco, sugar and extensive shipping, comprising ex¬

ports and imports. The city was the scene of massacres of Jews in 1905, in which the offi¬

cials were accused of taking part in a clan¬

destine manner. For an account of the part played by Kiev in the many wars and other struggles of Russia consult any good history of the country.

KIFTI (Ibn al-Kifti, lbffi al kef'te), Ara¬

bian historian and vizier: b. Kift, Upper Egypt, 1172; d. 1248. Born of one of the best families in the country he was well educated at Kift and Cairo. His father holding a position under the Sultan in Jerusalem, which had lately-

been conquered by Saladin (1187), Al-Kifti went to that city, where he became interested in studying the life of the people and the result of the conquest of the country on the inhabit¬

ants. These historical studies he was destined to continue all his life. In 1202 he was made vizier by the Sultan, a position he held until the death of the latter in 1216. But he was soon again called to the highest office in the land under the Sultan (1219-31) and again for the latter part of his life (1236-48). His ad¬

ministration was notable in the history of Ara¬

bian viziers. He not only attended strictly to state affairs and succeeded in helping greatly the prosperity of the country as a whole, but he encouraged literature and art and learning of every kind; and he set the example himself by undertaking extensive research work and writing histories. His work in this latter field was very extensive and highly esteemed in his day; but only one of his histories has, sur¬

vived to our day, the others having been de¬

stroyed during the Mongol invasion of 1260, only 12 years after his death. His one sur¬

viving work is known as Unformation of the Wise Men Regarding the History of the Sci-

entists) (Kitab Ikhbar al'Ulama bikhbar al-

Hukama), and has come down to us only in part and that simply in extensive extracts made in another work in 1249. It treated of Mo¬

hammedan, Syriac and Greek philosophers and scientists. Consult Muller, A., (Ueber das sogenannte ta'rikh al-hukama des Ibn el QiftP

(Proceedings of the Eighth International Con¬

gress of Orientalists, Vol. I, Leyden 1891).

KIKUYU, ke-koo'yoo, a part of the south of the British East African Protectorate, situ¬

ated upon the equator. It is principally noted for the controversy in the Anglican Church there, between the extreme High Church and the Low Church, the accusation being on the part of the former, that the bishop of Uganda, Dr. Willis, and the bishop of Mombasa had admitted to communion persons not members of the Church of England. On this charge Dr. Weston, bishop of Zanzibar, demanded the impeachment of the offenders. The matter was finally brought to the archbishop of Canterbury, who appointed a council to decide the question at issue.

KILAUEA, ke-low-a'a, an active volcano in Hawaii. It has an oval crater, nine miles in cir¬

cumference, with a lake of red and boiling lava at the bottom over 1,000 feet below the crater's mouth. The volcano lies 10 miles from the sea, and 30 miles from Hilo, on the eastern slope of Mauna Loa, 4,000 feet above the sea. Kilauea crater forms a great

cavity on the side of the mountain, 3 miles long, 2 miles wide and 800

feet deep. At the southwestern end is a small lake of boiling lava called Halemanman, or House of Everlasting Fire. Great eruptions occurred here in 1789, 1823, 1832, 1840 and 1868.

KILBOURNE, James, American pioneer :

b. New Britain, Conn., 19 Oct. 1770; d. Worth¬

ington, Ohio, 9 April 1850. He was succes¬

sively employed as an apprentice, clerk, mer¬

chant and manufacturer, and having secured a competence, presented himself as a candidate for orders in the Protestant Episcopal Church, and was ordained about 1800. In 1801-02 he or¬

ganized the Scioto Company, under whose aus¬

pices a colony of about 100 persons, under the lead of Kilbourne, was in 1803 established in what is now the township of Worthington, Ohio. Having organized here the Episcopal parish of Saint John's, as well as others in the neighborhood, and procured the establishment of a western diocese by the General Convention of the Protestant Episcopal Church, he retired from the ministry in 1804, and was soon after appointed a civil magistrate, an officer of fron¬

tier militia, and surveyor of a large portion of the public lands. In 1812 he was one of the commissioners to settle the boundary between the public lands and the great Virginia reser¬

vation, and also commissioned as a colonel in the frontier regiment; and in the succeeding year he entered Congress, of which he re¬

mained a member until 1817. He was the first to propose donations of lands to actual settlers in the northwest territory and afterward served for some

years in the Ohio legislature.

KILDARE, kil-dar, parish, county and town of the same name in Ireland. The town, which is 25 miles southwest of Dublin, dates back to the 5th century when the present site was the seat of a monastery said to have been founded by Saint Bridget, daughter of an Irish king or chief, as the legend or story is vari¬

ously stated. Bridget later became a nun, re¬

ceiving the veil at the hands of no less a per¬

sonage than Saint Patrick himself, according to the church legend which bears marks of authenticity. The famous monastery and the town itself are both in a somewhat decayed condition but they are still interesting on ac¬

count of the many legends, stories and histori¬

cal associations which cluster around them.

Among the historical buildings of the town are the Round Tower, over 100 feet in height, on the top of the most elevated part of the site of the town; the convent of Saint Francis with its abbey and 'the abbey of the Carmelites.

A very interesting relic of the past is the ^Fire-house,® a part of the chapel of Saint Bridget, in which there was maintained, accord¬

ing to the legend, perpetual fire for centuries, probably a remembrance of the pre-Christian fire worship of the Irish people. Pop. 3,000.

KILDEER. See Killdeer.

KILGO, John Charles, American eccle-

siast and educator: b. Laurens, S. C, 22 July 1861. He entered the ministry of the Methodist Episcopal Church South in 1882, continuing his college studies afterward so that he was grad¬

uated with the degree of M.A. from Wofford College 10 years later. He became agent for Wafford College (1889-94) and professor of KILHAM — KILLARNEY

philosophy there during the same period, and tor the loll owing six years he was president of lrimty College, Durham, S. C. This position ne lesigned to accept the appointment of ishop (1910). He has been a member of various conferences and has held other im¬

portant offices in church and educational circles.

. kilam, Alexander, founder of

the Kdhamites or New Connection Methodists'

b. Epworth, Lincolnshire, 10 July 1762; d. Not¬

tingham, 20 Dec. 1798. He professed conver¬

sion at 18, became a preacher in 1783 and two years later was enrolled by Wesley as a regu-

lar itinerant. He was strongly in favor of complete separation from the Established Church, a step to which Wesley had always been opposed. On the death of the latter this subject came under discussion. He at once urged separation and sought moreover for the distribution of administrative power between the ministry and the lay members. For several ?i7nc\1Ve passa&es in his. (Progress of Liberty >

(1795), the pamphlet in which these views \\ ere expounded, he was tried at a conference held in 1796 and expelled from the denomina-

upon which he immediately organized the New Connection Methodists or Kilhamites.®

KILIAN, kil'yan, or KULN, Saint, the

apostle of Franconia. He was of noble Scot¬

tish extraction and had entered a monastery m

Ireland, when hearing of the spiritual desti¬

tution of German Franconia he asked and re¬

ceived from the Pope a commission to preach the Gospel to the German idolators, and with Colman, his priest, and Totnan, his deacon, was instrumental in converting great numbers at Wurzburg, and among them Duke Gosbert.

On being rebuked by Kilian for marrying Geilana, his brother's widow, Duke Gosbert promised to put her away, and hearing this, Geilana caused the three missionaries to be secretly assassinated (690) without her hus¬

band's knowledge. Kilian is honored as the first bishop of Wurzburg, and his festival is 8 July.

KILIMANJARO, kfl-e-man-ja'rd (the

Great Mountain), a double-peaked, snow-clad mountain of Africa, in German East Africa, about 100 miles inland from the port of Mom¬

basa. . The highest peak, estimated at 19,270

feet, is the highest known in the African con¬

tinent.

KILKENNY, an island capital and county of the same name in Ireland. It is probable that the county received its name from the town since the word means the church of Saint Kenny (Canice). The town, which is itself a civic county, is situated on the Nore some 70 miles south by southwest of Dublin, with which it is connected by rail. It dates back to the 12th century, and like many other towns in Ireland is said to owe its origin to the establishment of a Christian church on the .site of the present town; but it is very probable that there was a village established there previous to the founding of the church.

In fact the Anglican cathedral of Saint Canice dates

back to 1052. From the time of the first English invasion Kilkenny was the centre of strong British power, and consequently its relics are largely non-Catholic. The Catholic Disabilities Act and the efforts mad& to destroy all Catholic education in the countv also helped (o place the interesting buildings of the town in the hands of the Anglicans. Kilkenny has at least two famous schools, and at one of these, the College of Kilkenny, many notable men have been educated, among them Berke¬

ley, Congreve and Swift. The oldest Roman Catholic college of the town is known as Saint Kyran s, but it dates back only to the time of the comparatively recent liberality which per¬

mitted the establishment of Catholic colleges and schools in Ireland. The town which has a population of over 10,000 is of considerable commercial and industrial importance. It is a centre of extensive manufactures of woolen, linen cloths and blankets, and is a distributing centre for provisions of various kinds. A great part of the home trade in this latter industry . finds, its outlet through Waterford, with which Kilkenny is connected by rail and with which it has water communication. The Kilkenny people have the reputation of being quarrelsome, but this is very largely unde¬

served, and is due principally to Swift's famous story of the Kilkenny cats which fought until there was nothing left of either of them but the tails, and also to the fact that Kilkenny had a long standing dispute over boundary lines with her neighbor Irishtown. This dis¬

trict of Ireland was also noted, in earlier days, for the animosities maintained by local chief¬

tains for one another. But the people of Kil¬

kenny are to-day, notwithstanding this historical reputation, of a very friendly disposition. Con¬

sult Donelan, J., (The Confederation of Kil¬

kenny > (Dublin 1906) ; Healy, (History of Kilkenny* (Kilkenny 1893) ; Hogan, ^Kil¬

kenny } (Kilkenny 1884).

KILLARNEY, capital of Souris District,

Manitoba, Canada. Situated on the line of the Canadian Pacific Railway some 160 miles direct west of Winnipeg, it is the centre of an agricultural country with which it carries on commercial relations somewhat important for the size of its population. Its extensive han¬

dling of grain from the local farms has neces¬

sitated the erection of a number of very mod¬

ern grain elevators. The town also does a good trade in flour and in such articles as are required by the surrounding farming commu¬

nity. It has lumber yards, a sash and door factory, a cement plant and depots for the sale of agricultural machinery. Killarney is grow¬

ing and becoming of more interest and im¬

portance. Pop. 2,500.

KILLARNEY, ki-lar'm, market town in

Ireland, in the county of Kerry, on the Great Southern and Western Railway. In summer, Killarney is thronged with visitors to the lakes and the delightful scenery in the neighborhood.

Fancy articles of wood, particularly of arbutus, which attains to great perfection in the environs, are made to a considerable extent, and are in great demand by tourists. Pop. 5,796.

KILLARNEY, Lakes of, three connected

bodies of water, the lowermost of whitih is within \y2 miles of the town of Killarney, Ire¬

land. .These famous lakes are situated in a basin in the. midst of the mountains of Kerry, some of which rise abruptly from the water's edge densely clothed with trees from base to summit. In the lower lake (Lough Leane) are a number of finely wooded islands, on the prin-

cipal of which are the remains of Ross Castle.

Between the lower and the middle lakes is the fine ruin of Muckross Abbey. The upper lake is the most enchanting of the three, and is thickly studded with islets.

KILLDEER, the most common and best-

known species of American plover (JEgialitis vocifera). It is found throughout temperate North America, especially in the western United States, breeding northward to New¬

foundland and in winter migrating to South and Central America. It is 9 or 10 inches long and the sexes are similarly colored — brown above with a chestnut tinge on the rump; around the neck a white ring bounded in front by a complete, and behind by an incomplete, black ring; the lower parts are white and there is a white stripe through the eye; the wing-

quills and tail are variegated black and white.

The killdeer is distinctively a bird of the in¬

terior, spreading over the prairie lands and fields, and frequenting the seashore chiefly dur¬

ing the winter. During the summer it is usually found in pairs, breeding in corn and hay fields or along water-courses. The four clay-colored, spotted, pyriform eggs are deposited in a slight depression in the ground. Though always noisy birds, the cry or

whistle from which their name is derived is heard in its perfection when the nest is approached, and the frightened hen en¬

deavors by various devices to lead the intruder away. Like that of other plovers, the food is chiefly insects. In the late summer and early autumn the killdeer is sought by gunners, but much less so than related migratory species of the same genus.

KILLER, a kind of whale, or large por¬

poise, also called orca or grampus, of the family Delphinidcc, and constituting the genus Orcinus.

It reaches a length of about 25 feet. The head is rounded and the lower jaw is a little shorter than the upper. The dorsal fin is extraor¬

dinarily high in the adult males, like a broad¬

sword, nearly vertical and about six feet in length from base to tip; in the female it is prominent but much lower. The pectoral fins are large, broad and rounded, and the flukes, or tail-fin, also broad and thick. The color is peculiar, being black above and on the fins, and white below; the margins of the two colors sharply defined. The white of the belly ex¬

tends forward to the end of the lower jaw, and upward on each side where it forms a large, oblong, white area. Above and somewhat be¬

hind the eye is a conspicuous oblong, white spot. In the young the white areas are tinged with yellow. The upper and lower jaws are armed with thick, powerful, somewhat curved teeth, numbering in all from 40 to 56. The killer is the largest and most powerful repre¬

sentative of the dolphin family. It hunts in packs and is rapacious and exceedingly vora¬

cious. Unlike all other cetaceans it feeds upon warm-blooded aquatic animals, and chiefly on young seals, porpoises and whales. It attacks the larger

whales without hesitation, biting them on the lips and throat, sometimes in order to force them to surrender their young, which are torn to pieces and devoured. In on2 instance the stomach of a killer was found to contain the bodies of 13 porpoises and 14 seals. . The best-known species (Orcinus orca) inhabits all seas. A second species is found in the South Pacific. Others have been described, but their validity is doubtful.

KILLIECRANKIE, kil-i-krang'ki, pass of

Scotland, in the Grampians of northern Perth¬

shire, on the Highland Railway, three miles southeast of Blair-Athole. A viaduct of 10

arches carries the railway over the pass. Here Claverhouse, Viscount Dundee, defeated the forces of William III under Mackay on 7 July 1689, but was killed in the moment of victory.

KILLIFISH, one of a group of small

fishes of the family Cyprinodontidce. They have broad, depressed, scaly heads, large cycloid scales, no lateral line, small very protractile mouths with several rows of pointed teeth, and a well-developed air-bladder which possesses somewhat of a pulmonary function. The com¬

mon killifish, mud-fish or mummichog (Fundu -

lus heteroclitus) seldom exceeds three inches in length, and is exceedingly abundant in shallow waters along the shores of bays and estuaries, in brackish pools and tidal rivers from Maine to Mexico. It is extremely hardy and is import¬

ant economically as food for larger fishes.

The sexes differ in color. The larger killifish (F. majalis) reaches a length of six inches, and is found in shallow salt and brackish bays from Florida to Cape Cod. The males have trans¬

verse and the females longitudinal black bars.

The species of Fundulus are oviparous, but some genera of the family are viviparous and strongly dimorphic, sexually.

KILLING, kil mg, Wilhelm, German

writer and mathematician: b. Burbach, West¬

phalia, 1847. Graduated from Berlin Univer¬

sity, he became a teacher, first privately, and afterward in the gymnasia, becoming finally professor of mathematics in the University of Munster. There he distinguished himself by his works on mathematical subjects which were noted for their depth of thought and accuracy of reasoning. He gave special attention to the field of non-Euclidian geometry in which de¬

partment he won the Lobachevsky prize of the Kazan Academy (1910). Among his published works are

(1884); (Die Lieschen Transformationsgrup-

pen) (1886) • (Einfuhrung in der Grundlagen der Geometrie) (1893-98) ; (Lehrbuch der ana-

lytischen Geometrie in homogenischen Koordi-

naten* (1900-02) ; (Handbuch des mathema-

tischen UnterrechD (1910-13, with Hovestadt).

KILLINGLY, kil'ing-li, Conn., town, in¬

cluding several villages in Windham County, on the Quinebaug and Five Mile rivers, 25

miles northeast of Norwich, on the New York, New Haven and Hartford Railroad. It has a nublic library, a high school, churches and town-

hall, and manufactures of cotton and woolen goods, harness, mill supplies, boots and shoes, etc. It was settled in 1693, and until 1708 was known as

Aspinock. It was the greatest cotton manufacturing town in the State in 1836; Pop.

6,564. Consult Bayles, < History of Windham County, Conn.* (New York 1889) ; and Larned, (History of Windham County, Conn.* (2 vols., Worcester 1874).

KILLINGTON (kiTIng-ton) PEAK, an

elevation of the Green Mountains, in the State of Vermont, about 10 miles southeast of Rut¬

land. It is 4,241 feet high, and the view from 413

its summit is most beautiful; a large number ot pretty villages and charming valleys may be seen on a clear day.

KILMAINHAM, kfl-man'ham, a township

oi Dublin County and a suburb of Dublin City. It lies to the west of the city and is known generally throughout the British Empire on account of its military hospital which bears the name of the place itself, and its jail in which numerous political offenders have been confined, among them Parnell, who was placed there in 1882. The hospital, which is as well known in Ireland as Chelsea Hospital is throughout the British Empire, is a very old institution, as hospitals go, having been founded by Charles II for the reception of wounded and pensioned soldiers. Kilmainham has figured in the politics of the British Empire on several occasions, the most notable being probably the secret agreement entered into between Parnell and Gladstone on the question of the commis¬

sion of agrarian crimes in Ireland, an agree¬

ment which has been popularly known as (

KILMARNOCK, a town situated on the

Kilmarnock, in Scotland. It is in Ayrshire, only 12

miles north of the city of Ayr, and is the largest town in the shire. It is noted for its connection with the national poet, Robert Burns, whose first book was published there.

Burns has celebrated many scenes in Ayrshire, and the city of Kilmarnock has taken great pride in its relationship to the Scottish bard and possesses a very interesting museum of things relating to him, his work and his vari¬

ous connections. The neighborhood of the city is given greatly to the production of cheese and one of tne yearly events of its life is a great cheese show to which people come from far and near with exhibits. These amount to thousands of dollars yearly. The city, which has grown rapidly within the past 30 years, has a very active industrial life. It possesses large engi¬

neering establishments and factories, including those for the manufacture of calico, machinery, liquors, leathers, woolen goods and carpets. Its blast furnaces also form one of the most promi¬

nent features of its industrial life. These are enabled to work at very advantageous condi¬

tions owing to the fact that the iron and the coal which keep them running arc found in abundance and of good quality in the neighbor¬

hood. In addition to its extensive production of cheese Kilmarnock also gives a great deal of attention to all other kinds of dairy prod¬

ucts. Pop. about 35,000.

KILN POTTERY. In modern practice,

kilns as used in the clay industries may be described in three general types, up-draft, down-

draft and muffle kilns. The last named stands alone, as its distinctive feature lies not in the method of firing or the direction of the draft but in the fact

that the kiln consists of a single laboratory closed to the direct entrance of flame and heated by radiation through the walls.

This type of kiln is used in cases where it is necessary that the contained wares should be protected from dust and smoke, but where it is not convenient to enclose them in saggers.

Large ware such as porcelain bath-tubs and sinks, heavy pieces of terra-cotta, etc., cannot be set in saggers as pottery is on account of weight and size. They are best burned in a muffled kiln, being set directly upon the brick floor. Muffled kilns are also used for burning painted wares. These are smaller than the kilns for heavy goods and are burned to a much lower temperature. Such kilns can be set, burned, cooled and drawn in 24 hours, while the large muffles cannot be turned in less than 10

days.

General kilns for pottery burning are of the open type. The wares are enclosed in saggers which are set over one another in tiers (bungs).

are cases made of refractory clay and suited as to size to the wares they are to con¬

tain. The flames and kiln gases pass freely round the saggers and the whole chamber is uniformly heated.

The usual form of kiln is cylindrical with a slightly domed crown. Outside this is the Mhovel» or conical top familiar to the inhabit¬

ants of pottery towns. The hovel serves the purpose of a chimney, and collects the smoke from a number of apertures in the kiln crown.

The fire mouths range in number from 6 to 10 according to the size of the kiln. In the ffP-

ranged for the purpose. The structure of the down-draft kiln is more complicated than the up-draft,

but a considerable economy of fuel is effected. The kiln also cools more rapidly.

Kilns for burning bricks follow the same general lines but vary in form. For this pur¬

pose the square kiln is among the most popular, being usually operated on the down-draft prin¬

ciple.

Many plans have been devised for the per¬

fect utilization of heat, but none that is entirely satisfactory. One of the best is that of the con¬

tinuous kiln. This has been applied in Germany to the burning of porcelain, and its use in America increases. The continuous kiln is a long low tunnel built in the form of a paral¬

lelogram with rounded ends. This is divided into as many chambers as may be necessary, each chamber having an entrance at each side and two fire mouths. Paper partitions are used in order to secure the correct movem nt of the draft, and as each successive chamber is filled with ware and the proper dampers opened the heat from the burning chambers is drawn through the unburned brick, bringing them up to a high temperature without any additional fuel. Meanwhile the chambers in which the firing has been completed are beginning to cool and so the work goes on continuously. The economy of the method is very great, but a considerable output is necessary in order to avoid stoppage. Kilns are, for the most part, burned with coal, both hard and soft coals being used. Those in the gas belt are success¬

fully burned with natural gas and in some places oil is used. The temperatures at which differ¬

ent wares are burned are about as follows; Roofing tile and paving brick . 1030°-1070°C

Common brick and drain tile . 1090°-1170°C

Faience art pottery — glaze . 1150°C

Faience art pottery — body . 1230°C

Sewer-pipe and stoneware . 1250°-1290°C

Earthenware dishes . 1290°-1310°C

Hotel china . 1330°C

Bone china . 1330°C

Hard porcelain . 1390°-1410°C

KILO. See Metric System.

KILOGRAMME, or KILOGRAM, a French measure of weight = 1,000 grammes. See Metric System.

KILOLITER, or KILOLITRE, a French measure of capacity for fluids, 1,000 litres. See Metric System.

KILOWATT. See Electrical Terms; Units ; Watt.

KILPATRICK, Hugh Judson, American soldier: b. Deckertown, N. J., 14 Jan. 1836; d. Valparaiso, Chile, 4 Dec. 1881. He was graduated at West Point in 1861, and in the autumn of that year became a lieutenant-colonel of cavalry. He was appointed a brigadier-general of volunteers in May 1863, and in the following March was active in a raid to Richmond for the release of

Federal prisoners. He com¬

manded the cavalry of Sherman's army in its march from Atlanta to Savannah in 1864, and '.p. June 1865 was promoted major-general of volunteers. After the War he was prominent as a lecturer and a Republican political speaker, lie was Minister to Chile from 1865 to 1870, and was reappointed in 1881. In 1887 his re¬

mains were removed from Chile and interred at West Point. Consult Moore, (Kilpatrick and our Cavalry> (1865).

KILWA (kel'wa) KIVINJE, ke-ven'ya, or

QUILOA, ke-lo'a, seaport town in Tanganyika Territory. It is situated on the east coast about 180 miles south of Zanzibar, and was, before the outbreak of the European War, the chief port of entry of the German government in German East Africa. At that period its extensive roadstead was frequented by trading vessels from all parts of the world, for its trade and commerce were very extensive. Be¬

fore the German occupation of the country the city was a place of considerable importance in the native economy, but it was extremely un¬

healthy for Europeans and not any too sani¬

tary for the natives. The Germans did a great deal to improve the health conditions of the town which they made fairly habitable for white people and blacks alike. All the neigh¬

borhood of Kilwa was noted, during the Arab occupation of the coast, as one of the hotbeds of the African slave trade. Kilwa (Kilwa JCisiwani), the centre of these Arab operations, which is some 17 miles further down the coast, has fallen into decay and is almost deserted, and there is little commercial or industrial activity on the island on which it is situated or in the immediate neighborhood. The popu¬

lation of the modern city, which is known as Kilwa Kivinje, is over 100,000.

KILWINNING, an industrial town in

Ayrshire, Scotland, quite close to Irvine. It possesses woolen . factories, coal mines, iron works, engineering and fire-clay establishments.

It is situated in historic ground and the whole neighborhood is rich in Highland and Lowland traditions. Near to the town is Eglinton which possesses extensive iron works and the famous castle of the same name, the scene of the Eglinton Tournament (1839). Kilwinning

claims the honor of being the mother of the freemasonry of Scotland. Pop. about 5,000.

KIM, bv Rudvard Kipling, ranked by some critics as <(tne author's highest attainment in fiction,® narrates the colorful adventures of young Kimball O'Hara, son of an Irish soldier in India, reared from babyhood as a waif among low-caste Hindus and known among his variegated native acquaintances as (

pean parentage is discovered, and Kim, with the lama's aid, is sent to school where he is educated with a view to his employment in the British secret service, for which he is peculiarly fitted by his natural gifts and his intimate knowledge of native life. Then, still in his teens, and unofficially attached to the secret service, he resumes his wanderings with the lama through India and far into the Himalayas, where he is instrumental in defeating the machinations of foreign spies among the na¬

tive princes. On its first appearance in book form, 19 Oct. 1901, was enthusiastically hailed as a marvelous revelation of Hindustan.

Thus a reviewer in The Academy (London) writes, (((Kim) is hardly a novel. It is a kinemetograph of a people, telling what they feel — what they have felt through time, and the effect of that immemorial feeling on those of to-day.® And Edgar Allen Forbes

who fol¬

lowed the route of the tale through India de¬

clares (((Kim) is to me the best guide book and the most faithful interpreter that the traveler may find in India. No other book that I know of so clearly unfolds that wonderful Jand and its mysterious customs.®

Arthur Guiterman.

KIMBALL, Arthur Lalanne, American

writer: b. Succasunna Plains, N. J., 16 Oct.

1856. Educated at Princeton and Johns Hop¬

kins universities, he became a member of the teaching staff of the latter institution for a while, being finally called to the chair in physics in Amherst College in 1891. Among his published works, which are almost alto¬

gether on physics, are (The Physical Property of Gases) (1890), and (College Physics*

(1911).

KIMBALL, Heber Chase, American Mor¬

mon leader: b. Sheldon, Franklin County, Vt., 14 June 1801; d. Salt Lake City, Utah, 22 June 1868. In 1832 he was baptized into the Church of Latter-Day Saints, in the same year was ordained an elder of the Church by Joseph Smith and in 1835 became one of the 12 Mor¬

mon apostles. In 1838 with Brigham Young he led the Mormons from Missouri into Illi¬

nois, where they finally settled at Nauvoo, and in 1847 was a pioneer in the exodus to the valley of Great Salt Lake. He was succes¬

sively chief priest of the order of Melchizidek (1846), a councillor to Young (1847) and chief

justice and lieutenant-governor of Deseret.-

KIMBALL, James Putnam, American

geologist: b. Salem, Mass., 26 April 1836; d.

23 Oct. 1913. Educated at Harvard, Berlin, Gottingen and Freiberg (Saxony, school of mines), he became professor of chemistry and economic geology in the New York State Agri¬

cultural College (1861-62), and assistant ad¬

jutant-general of United States volunteers, KIMBALL — KIMBERLEY

ranking as captain. lie took a very active Pft m the Civil War and was with the Army oi the Potomas, serving on the staffs of Mc¬

Clellan, Burnside, Hooker and Meade. At the conclusion of the war he became a mining engineer, serving in the meantime as honorary professor of geology at Lehigh University (1874-85), becoming, upon the latter date, di¬

rector of the United States Mint (1885-88).

He contributed extensively on his special sub¬

jects to American and other magazines.

KIMBALL, Martha Gertrude, American

philanthropist: b. Portland, Me., 1840; d. 1894.

She led a very active life which was marked by charitable impulses. . During the Civil War she acted as a nurse with Sherman's army on its march into Georgia. She took a very great interest in the soldiers, and finally became in¬

spector of hospitals. Her first connection with the army in the field was when she accom¬

panied her husband to the front during the early part of the war. The fact that her hus¬

band was appraiser of captured cotton, an im¬

portant position in the army, gave her an op¬

portunity of seeing army life that she could not easily have otherwise obtained without be¬

coming a part of the military organization as she later on actually did. She is credited with being the originator of the decoration idea, which she is said to have suggested to General Sherman, who at once welcomed it and put it into practice.

KIMBALL, Richard Burleigh, American

author: b. Plainfield, N. H., 11 Oct. 1816; d.

New York, 28 Dec. 1892. He was graduated at Dartmouth College in 1834 and later ad¬

mitted to the bar; practised his profession at first in Waterford, N. Y., and afterward in New York. He founded the town of Kimball, Tex., and constructed the first railroad in that State, extending from Galveston to and be¬

yond Houston. His publications include (Let¬

ters from England) (1842) ; (Cuba and the Cubans* (1850); (Saint Leger) (1850);

(Romance of Student Life Abroad) (1853) ; (Under-Currents of Wall Street* (1862); (Henry Powers, Banker * (1868) ; (To-day in New York) (1870) ; (Stories of Exceptional Life) (1887).

KIMBALL, Sumner Increase, organizer

and superintendent of the United States Life Saving Service: b. Lebanon, York County, Me., 2 Sept. 1834. He was graduated from Bow-

doin in 1855 ; studied law and was admitted to the bar in 1858. In 1859 he served in the State

legislature and was a member of the committee on judiciary. In 1862 he. became a clerk in the second auditor's office in the Treasury De¬

partment at Washington, and in 1871 was made chief of the Revenue Marine Service. In that position he had occasion to investigate the con¬

dition of the government stations on the New Jersey and Long Island coast where surf boats and other apparatus were stored under the .charge of a keeper for use in case of ship¬

wreck; he found the property badly cared for and the. service inefficient. Obtaining an ap¬

propriation from Congress he entirely reorgan¬

ized the service, and so successfullv that it was soon extended to Cape Cod and other points on the Atlantic Coast. In 1878 the Life Saving Service was organized as a separate bureau and was extended to the Pacific Coast and the Great Lakes. He was made the head of the bureau and introduced many improved methods, including the patrol system and telephonic con¬

nection between adjacent stations; he also ob¬

tained the passage of the law, to the effect that inspectors, keepers and crews in the service should be appointed on a strictly non-partisan basis ((with reference solely to their fitness.**

He has also been acting register, acting comp¬

troller and acting solicitor of the Treasury, and in 1889 he was the LInited States delegate to the International Marine Conference. He has written Organization and Methods of the United States Life Saving Service* (1889, the most complete monograph on the subject, and (Joshua James — Life Saver* (1909).

KIMBALL, William Wirt, American

naval officer: b. Paris, Me., 9 Jan. 1848. Grad¬

uated from the United States Naval Academy (1869), he entered at once uoon military life and was promoted as rapidly as the service permitted, becoming captain (1905) and rear-

admiral. (1908). He has seen a great deal of service in almost every water where the United States fleet is stationed. Among his other ex¬

periences^ he was one of the first of American naval officers to see service on an American torpedo boat. Aside from this he gave much attention to the development and perfection of machine and magazine guns and submarines.

.For this reason he was given command of the American Atlantic torpedo boat flotilla during the Hispano-American War. After the close of the war he was a . member of the boards of construction, examination and retirement, and he was In command of the Nicaraguan ex¬

peditionary squadron (1909-10), notwithstand¬

ing the fact that, by law, he was automatically retired in 1909.

KIMBERLEY, kim'ber-le, John Wode-

house, Earl of, English statesman: b. London, 1826; d. 1902. Educated at Oxford, he suc¬

ceeded his father as third Baron Wodehouse while still in his teens, and he soon entered public life as Under Secretary of State for Foreign Affairs (1852-56 and also 1858-61).

The intervening time he spent as encumbent of the Russian Embassy. He was special envoy to Copenhagen to represent the government in the Schleswig-Holstein affair (1863), and on his return to England the following year he was appointed Under Secretary at the* Indian Office, a position he soon relinquished to be¬

come Lord Lieutenant of Ireland (1864-66).

He was recalled to England by the Gladstone government as Lord of the Privy Seal (1868—70) and Secretary for the Colonies (1870-74).

The latter position he again held (1880-82) until he was appointed Secretary of State for India (1882-86), a position he was again called to occupy (1892-94), but relinquished to be¬

come Foreign Secretary in the Rosebery Cab¬

inet (1894-95). . Two years later he became leader of the Liberals in the House of Lords, and in 1899 he was elected chancellor of Lon¬

don University. In 1866, at a comparatively young age,, he was raised to the dignity of Earl, of Kimberley, for services rendered the empire. Kimberley was a man of brilliant ex¬

ecutive gifts and his work in Ireland and as Colonial Secretary and Secretary of State for India redounded to his credit and that of the British government.

KIMBERLEY, Lewis Ashfield, American

rear-admiral: b. Troy, N. Y., 2 April 1830; d. 1902. He was appoined to the navy 1846, graduated from Naval Academy in 1852. In the Civil War as executive officer of the Hart¬

ford, Farragut's flagship, he took part in the contests at Port Hudson, Grand Gulf, War¬

rington and Mobile Bay, and in 1871 accom¬

panied the United States expedition to Korea.

In 1880-83 he commanded the navy yard at New York, in 1884—85 was a member of the ex¬

amining and retiring board, in 1885-86 was in command of the Boston navy yard, in 1887 was promoted to rear-admiral and in 1892 was re¬

tired.

KIMBERLEY, South Africa, town of

Cape Colony, the capital of Griqualand West and of the South African diamond fields, is situated 4,012 feet above sea-level at a distance of 647 miles by rail from Cape Town, and close to the westen boundary of the Orange Free State province. Kimberley owes its ex¬

istence and prosperity to the mining of dia¬

monds, an industry that began in 1870. It stands on an open plain, has wide straight streets, good public and other buildings and receives a supply of water from the Vaal, 17

miles distant. The most important diamond mines are those called Kimberlev, De Beers, Bultfontein, Du Toits Pan and Wesselton.

During the South African War Kimberley was invested by the Boers for 123 days, from 15

Oct. 1899 till its relief by General French on 15 Feb. 1900. A fine breed of horses is raised in the neighborhood. Pop. 49,832, of which 17,059 were whites.

KIMBERLEY, Australia, a northern dis¬

trict of western Australia, brought into notice by the discovery of gold fields in 1886. It con¬

tains immense tracts of splendid pasture and much land suitable for cultivation. The chief port for the district is Derby, on the Fitzroy River, near King Sound. The district, which has an area of 144,000 square miles, is. divided into East and West Kimberley. It is sepa¬

rated from the more populous part of the colony by a stretch of sandy desert.

KIMCHI, kim'ke, David, or Rdak (Rabbi

David Kimchi), Hdbrew philologist: b. Nar-

bonne, 1160; d. 1240. He was the most learned member of a learned family, and maintains to¬

day his reputation as grammarian, lexicographer and exegete. Besides his commentary on Genesis, Chronicles, the Prophets and the Psalms he wrote a grammar,

raschin,5 which was practically a list of roots (Naples 1490). He also wrote a tract under the title <(E1 Sofer,55 which treated of the Mas-

sora and the Hebrew Accents and was pub¬

lished for the first time in 1864.

KINAH, ki'na, The, a Hebrew metrical

form, usually employed in dirges and songs of mourning, such as the Lamentations of Jere¬

miah. Each verse member is divided by a caesura into two unequal parts, of which the first is the longer. The shorter, clause simply enforces the thought expressed in the longer; as in the following example:

((He was unto me as a bear lying in wait ||

a lion in secret places.55

((And thou hast removed my soul far off from peace l| I forgot prosperity.55

The kinah, with its long drawn out clause and its short abrupt closing phrase, is still em¬

ployed in Oriental countries. It has the effect of a cry, followed by a sob. It seems to halt like the metre which in classic times was called the halting

iambus and it might fittingly be styled the Semitic choliambus.

KINCARDINE, km-kar'din, a maritime

town in Bruce County, province of Ontario, Canada. It is situated on Lake Huron, be¬

tween Goderich and Collingwood, and is one of the most thriving towns of the western Ontario peninsula. It is a port of entry and has ex¬

tensive fisheries, salt works and furniture fac¬

tories, while its agricultural interests and gen¬

eral trade are extensive for the size of the place. Pop. 2,500.

KINCARDINSHIRE, or THE MEARNS,

a maritime county in the northern part of Scotland lying south of Aberdeenshire and the Dee River and facing the North Sea. About half the century is under cultivations and the chief interest is agriculture though some of the towns such as Banchory, Storehaven, Inver¬

bervie and Laurencekirk have a certain amount of manufacturing activity. The shire is crossed by the Grampian Mountains which give it a fugged aspect. Area, 381 square miles. Pop.

over 50,000.

. KIND, kint, Johann Friedrich, German poet, dramatist and novelist: b. Leipzig, 1768; d. 1843. Graduating in law he practised his profession for 21 years. He was a very in¬

dustrious writer in many fields of literature, in all of which he was popular in his day with a large class of leaders. Though he published five volumes of sentimental and popular poetry his poetry is the weakest of his literary efforts.

His popular tales have somewhat more rner.it than his poems; but it is in the line of operatic plays that he is best and most generally known.

Among his opera productions the best are (Das Nachtlager von Granada5 (to Kreutzer's

music) ;

able literary works; but scattered throughout his various compositions are many passages which read well and are capable of being sepa¬

rated from their contexts and used as selected readings.

KINDERGARTEN, The, a system of edu¬

cation for young children from four to six years of age, which came into existence in Germany about the year 1837. Frederic Froebel, the originator of the movement, had grown more interested in the neglect, and the unde¬

veloped possibilities of this period of child¬

hood, from his extraordinary success as a ^teacher of older boys in the elementary and high school period, and at his school for boys at Keilhau which had won the interest of progres¬

sive thinkers in Germany. But, because of its radical innovations in education and the atmos¬

phere of freedom which prevailed in the school, his work was under the constant inspection of Prussian officials, which finally resulted in the prohibition of kindergartens just before Froe-

hel's death in 1851.

KINDERGARTEN

Courtesy Teachers College, New York

1 Learning to work and play together in carrying out group plan

3 Learning to cooperate. Building two-story houses large enough to play inside

5 First, second and third attempt at patterns for doll dresses 7 Building Furniture with small blocks 2 Learning to wash and iron doll clothes 4 Comparison of old and new method of sewing — old, on cards; new, on doll clothes

6 Playing inside of house built of large blocks 8 Cooperative play with large floor blocks. Plan initiated and executed by group of three

KINDERGARTEN

Courtesy Teachers College, New York

Physical Apparatus to stimulate play with large muscles of body KINDERGARTEN

Froebel was a remarkably close student of child life, searching eagerly for the causes of difficulty in their early learning and instruction.

As he lived, worked and played with boys of school age, he was convinced that much of the difficulty in later education was due to starting children wrong in the first place. As he traced these difficulties back into the earlier years of instruction, his interest in the pre-school period increased. Thus began his study of the pre-school period, which finally resulted in the establishment of kindergartens for the education of the child at this period.

He thought first of remedying the neglect of children at this pre-school period through educating mothers. It was not until this scheme failed that he decided to try an ex¬

periment with a group of young children under his care in an orphanage in Switzerland where he had been called because of his success in teaching in his native land. He accepted this opportunity,

because Switzerland offered a freer field for experiments in education than Germany. After having convinced himself through this short experiment that many powers go to waste by postponing the education of the child to the sixth year, he returned to Germany to make an investigation as to what was being done for children of this age in any institutions where children of this age were to be found. When he returned to Ber¬

lin he found that the creche, or day nursery, had been founded — one as early as 1801. He found that these were opened to give relief to mothers engaged in bread-winning for their families. He also discovered that the day nurseries and orphan homes were the only in¬

stitutions interested in the pre-school age.

When he visited them for suggestion he was impressed with the fact that no effort was being made to develop the intellectual interests and powers of children at this period of de¬

velopment. The care given was almost exclu¬

sively along physical lines, and poor care at that.

Had this been a day of international inter¬

est and intercourse Froebel would have found a greater interest in young children in Great Britain and France, where some interesting efforts had been made to rescue young chil¬

dren from neglect and crime. This disin¬

tegrating influence on home life was caused by the introduction of steam into industries, transforming the small shop into the factory.

In England especially the rural populations had moved into the cities in large numbers in order to secure work in the factories and mines.

The lack of proper housing conditions, the crowding

of families into limited areas and quarters, due to limited space, higher rentals and the higher cost of food and fuel, soon drove the mothers and older children out of the homes into the mines and factories, and the younger children in the families were de¬

serted and neglected. Disease, filth and crime resulted, and society had to meet this new social problem by some effort to care for, pro¬

tect and develop the young children who were too young for the school or the factory.

Among those philanthropists and religious leaders who made initial efforts to rescue these pitiful specimens of humanity in Great Britain were Robert Owen, James Buchanan, David Stow, Samuel Wilderspin and Joseph Wilson.

Pastor Oberljn had tried to do the same work for young children in Alsace as far back as 1767, and Madame Pastoret, Madame Millet and Monsieur Cochin were absorbed in a like effort to solve this social problem for France.

Some of these preceded Froebel, while others were contemporaries and successors, but as far as we know Froebel knew nothing of them or their work on the problem which he had in hand.

It would seem from a comparison of the work done by Great Britain and France with that accomplished by Froebel, that, while they were working for the children of the poor from a philanthropic and preventive point of view, Froebel had in mind the development and education of children of all classes. There was no industrial problem to speak of in the isolated locality in which Froebel lived in Ger¬

many. He was surrounded by simple plain folk, largely undisturbed by the changed in¬

dustrial and social conditions which were stir¬

ring the municipal centres of Great Britain.

There were two motives which stirred Froe¬

bel in his experiments with these young chil¬

dren — first, the practical one which grew out of his experiences in teaching older boys. Here he saw the effects of a poor foundation laid in early education, as well as the neglect of powers which developed before the school age.

In the second place, his interest in the educa¬

tion of women and young children was greatly stimulated by his contact with the Romantic and Idealistic philosophy which was influencing thought and action so profoundly at this pe¬

riod^ Romanticism particularly, with its em¬

phasis on feeling, intuition , and the study of nature, brought a new sentiment toward both women and children — a sentiment which easily slipped into sentimentality. In his early educational, experiments Froebel was distinctly under the. influence of Romanticism, but later he came into, touch with the Idealistic move¬

ment— the kindergarten being the most noted attempt to apply the ideals and principles of this philosophy in education.

While we know that Froebel was un¬

familiar with what was being done in Great Britain and France with children of the pre¬

school age, we have every evidence that he was somewhat familiar with Rousseau and his emphasis upon nature as the surest guide in re¬

constructing education and social life. We also know that Froebel was familiar with Comenius, and while

he studied with Pesta-

lozzi, and was profoundly influenced by him, he was never in complete sympathy with many of his most fundamental ideas. Pestalozzi em¬

phasized the importance of sense impression and industrial training, but to Froebel, self-

expression in play and creative work was the keynote of education. In this sense he was in closer sympathy with Rousseau's <(return to nature® than, with Pestalozzi's ((A B C of sense perception,® and training for the imme¬

diate, practical demands of industry.

There are times when Froebel comes very close to the idea that education is a mere mat¬

ter of removing obstacles, so that the self may have unrestricted freedom in expression; but in practice. he puts much time and attention on the educational value of the outer world and environment, especially as it affects young chil¬

dren. In this he is not always consistent, as

there would be no need of planning the ex¬

ternals of environment so carefully for young children with a selected educative stimuli if education consists solely in removing all obstacles that nature may have free play and an unrestricted expression. In fact the kindergarten may be defined as one of the first conscious efforts to provide young children with a carefully selected, educative environment, — an environment which offers iiot only the best sensory impressions, but what to Froebel was a still more important point, the very best materials as stimuli to the self¬

activity of the child. To Froebel, children were by nature good, and he looked upon humanity, nature and

God as one. He was an optimist, as well ?s an idealist, and was so convinced of the possibilities in education that , he said, ((I see in every child the possibility of a perfect man.®

While Froebel lived in a day when psychol¬

ogy as a science was just dawning, and scien¬

tific child-study an unknown factor, he un¬

doubtedly saw, as no predecessor or contempo¬

rary, that the natural powers of the child must be used. He sincerely believed that the native instincts of children could all be utilized so as to gain the child's co-operation in his own education. As he believed that child nature and human nature were inherently good, he looked upon every expression of child life as worthy of respect and reverence. His deeply-

rooted faith in the oneness of God, nature and man made him take this new attitude toward the apparently aimless activities of play and the so-called bad child. As Rousseau laid the blame for most of the evils in society upon civilization, so Froebel traced most of the evil tendencies in child life to wrong curricula in ,the schools. For this reason he tried to create a new curriculum — a curriculum made to fit the nature and the needs of the child. He firmly believed that if we could create such a curriculum, the old war between the child and the curriculum, the pupil and the teacher would cease and peace be declared. In his daily con¬

tact with children we see practical evidence of his faith in the native instincts and interests of children as worthy of study and utilization.

He believed that happiness indirectly resulted when the needs of nature were met with an intelligence and sympathy which provided the right kind of materials for children to act upon.

The keynote of his interpretation of child life was

self-activity. He at once set to work to make a self-active school where children could actually learn through activity — through play. As a result, we see a curriculum, not of the three R's simplified for children of the pre¬

school stage as in England and France, but one made up of songs, games, dances, pictures, nature, art and manual training to meet the native tendencies of young children. These were given an honorable place in the curricu¬

lum, and respected as highly as the reading and writing approved by all education. Thus the school was transformed; the silent child was allowed to sing and talk; the suppressed child to work and play. The schools under his care were a combination of workshops, studios, playgrounds, laboratories and gardens, where children were singing, playing, talking, looking at pictures, listening to stories, gardening, painting, drawing, modelling, sewing and weav¬

ing. While this is commonplace to-day, the transformation was very largely due to Froebel.

,It is due to his influence, more than to any other educator, that the still child began to move, to act, to think, to work, to play; the silent child to sing, to talk, to ask questions, and thus we see the emphasis of education laid upon activity, growth, development, freedom, happiness and interest.

Froebel's extraordinary sympathetic insight into children stood him in good stead at a period when little was known of the science of child study as we know it to-day. He made many mistakes in applying his theories, but a new epoch was undoubtedly the result of his effort.

The kindergarten was brought to America by a student of Froebel, Miss Meyer, who afterward married Carl Schurz. Through Mrs.

Schurz's work with her own children Miss Elizabeth

Peabody of Boston became inter¬

ested. Miss Peabody was a member of the celebrated Peabody family of Massachusetts —one sister marrying Nathaniel Hawthorne, the .other, Horace Mann. She was prominent in the transcendental group of thinkers in the Concord School of Philosophy which in¬

fluenced many of the pioneer workers in the kindergarten field. Dr. William T. Harris, Miss Susan Blow and Dr. Denton Snyder, as well as Miss Peabody herself, were profoundly in¬

fluenced by this school of thought, and all in turn devoted themselves to the promotion of the kindergarten idea. After reading Froebel's theories in 1867, Miss Peabody opened a kinder¬

garten in Boston, but without any training.

While her kindergarten was pronounced a suc¬

cess by her patrons, to her it was not a true embodiment of the theories of Froebel as she interpreted them. For this reason she closed her kindergarten and sailed for Germany to study at. the fountain source. In the mean¬

time Miss Maria Boelte, a young woman trained by Froebel's widow in Germany, was called from London to New York, where she opened a kindergarten in 1872. This was a great success, and finally developed into a training school for kindergartners. Madame Kraus Boelte, after her marriage with Dr. John Kraus, had charge of the work with both chil¬

dren and normal students for many years. She, in New York, Miss Elizabeth Peabody in Bos¬

ton, Miss Susan Blow in Saint Louis and Mrs.

Alice Putnam in Chicago, were the best-known pioneer leaders in the introduction of the kindergarten into America, where it spread with unprecedented rapidity and success. The United States still leads in its

appreciation and care of children at the pre-school age, there being between five and six hundred thousand children in the kindergartens in this country in the statistics of 1916. It is a part of the public school, system in all of our large cities, and the majority of the cities of the second, third and fourth class.

The training of kindergartners was for many years in the hands of private normal schools, but in the last decade most city and State normal schools in the United States have opened kindergarten departments, and a goodly number of the universities as well. This has KINDERGARTEN

proved to be an effective means in unifying the kindeigarten and primary work. In the past the kindergarten child who entered the primary was at a serious disadvantage, due to the dif-

feient educational ideals held by the teachers of both kindergarten and primary. This great difference in ideals was gradually altered as the kindergarten went into the public schools.

That the kindergarten, in time, reconstructed the practice in primary education is a generally accepted fact by students of educational his¬

tory. Self-activity came to be the cardinal principle in elementary education as well as in the kindergarten, and in many modern schools the kindergarten and primary are so closely organized that a child passes from one to the other without waste of time or energy in ad¬

justing himself to the new work peculiar to the primary grade. These happy changes are due to several causes — first, to the training of kindergartners in city and State normal schools and in universities, with other teach¬

ers, instead of the isolated private schools of the early days. Second, to an increasing effori to train

teachers of young children in both kindergarten and primary. In the third place, to a movement in favor of training super¬

visors in both kindergarten and primary, so that the schools may have the advantage of one supervisor who is an expert in each field.

It is unfortunately true that there was a tendency in kindergarten circles for many years to cling too tenaciously to Froebelian theory and practice. In the early history of the kindergarten, it was far in advance of primary education, in both theory and practice. This explains the transformation of primary prac¬

tice wherever kindergartens were introduced.

In time, however, an unwholesome pedagogic self-satisfaction grew up within the kindergar¬

ten ranks, which finally resulted in a period of arrested development for the kindergartners and the system. This followed the reconstruc¬

tion of the primary in the light of kindergarten principles and practice.

When the new science of child study came into education, kindergartners as a whole turned a cold shoulder to its observations and returns, if they did not coincide with the in¬

terpretations of child nature made by Froebel and his immediate followers. It must be ac¬

knowledged, however, that a small minority of kindergartners gladly gave ear to the new sci¬

ence of child study, especially when it seemed to correspond to their daily experiences in studying and training young children. Dif¬

ference of opinion was very decided, and grad¬

ually and unconsciously, kindergartners divided into

two parties — those in favor of modifica¬

tion and reconstruction of kindergarten pro¬

cedure in the light of modern psychology and child study, and those who clung with loyalty and devotion to the traditions of the past. The progressive movement among kindergartners immediately won the support of psychologist's, physicians and the leading educators of the day, all of whom cooperated in reconstruct¬

ing kindergarten practice. The first form of the reconstructive movement was noticed in the demand for larger handwork for the children in the place of the small processes and materials involved in the perforating, weaving and sewing in use in the early kinder¬

gartens. Later, this was either discarded or enlarged, as psychologists, oculists and nerve specialists repeatedly criticised this minute work in both kindergarten and primary. They were equally urgent in demanding that there be less minute accuracy in the use of the small undeveloped muscles of the eye and hand in all of the work done by the children in the kinder¬

garten. Another criticism which followed was that the work with the hand was cultivated at the cost of play with the larger muscles of the body. Sedentary habits were encouraged, when children should be running, jumping, climbing and throwing. It was urged that larger materials be introduced, where the Comparison of Small Ball and Block of Past with Large Ones of To-day.

fundamental muscles of the legs, arms, hands, back, thorax and abdomen be called into play.

The vigorous use of these larger muscles was urged, because through this type of play respi¬

ration and circulation are deepened, promoting the health of the child at a period when phys¬

ical growth is more important than any intel¬

lectual acquirement the child may make. As a result,. the so-called new school of kinder¬

garten introduced swings, slides, seesaws, ropes, etc., in order to offer every inducement to the children to vigorous physical activity.

There was also a demand for introducing larger and. more durable materials for the handwork, instead of sewing and weaving with narrow paper strips and cardboard. Weaving with strips of cloth, and sewing more in ac¬

cord with the type of sewing in use in the schools and society, gradually came into use.

One of the first effects of this type of work was seen in the health of the child, but an equally beneficial intellectual stimulus was ob-

servable. With this larger and more durable material the child could make articles which were both interesting and useful in his play and home life. Instead of sewing geometric designs on cardboard, the child was given a coarse needle, thread and cloth, with which dolls could be dressed. As a substitute for paper strips which were woven into geometric designs in a flat paper mat which was of no use to him or to society, the children were given opportunities to make rugs, or hats, or hammocks for the dolls. Instead of folding, cutting and pasting a geometric figure vaguely resembling a kite, the children were given material which made it possible to construct a real kite which could be taken into the open air for experiment. The immediate effect was deepened interest, and marked increase in effort and self-initiative. As a result the necessity for direction and help from the teacher declined and ability to pursue an end with determination and perseverance increased.

All kindergartners who experimented in the reconstruction of the kindergarten were con¬

vinced that this new type of work exemplified Froebel's principles of self-activity and crea¬

tivity far better than the traditional handwork supposed to have been originated by Froebel himself. As time passed, less emphasis was laid upon the practice of Froebel, and more time and attention was given to better applica¬

tions of his fundamental principles. Froebel's small building blocks were either enlarged, or new ones invented, better adapted to stimulate healthful, active play. The very mediocre music of the children's songs and games com¬

posed for Froebel gave place to standard folk music, or modern music written especially for the kindergarten by musicians of high grade.

Gradually the whole scheme of practice, in¬

cluding^ songs, games and stories, building and occupation materials, was reshaped, until, in many of the most progressive kindergartens of to-day, little of the traditional material is left.

The kindergartners grew bolder in throwing off tradition, introducing not only better mate¬

rials, but better methods, in their effort to meet the nature and needs of young children, un¬

trammeled by the interpretations of Froebel and the pioneer workers.

The effort to cling to Froebelian material and methods is dying out, and kindergartners on the whole seem to be more than eager in their study of children, and their search for better means of educating them. This recon¬

structive movement was greatly increased by the appearance of the first rival institution for

educating children of the kindergarten age.

At first there was some marked difference of opinion regarding the value of Dr. Montessori's experiment with children of kindergarten age.

Some kindergartners utterly denounced the whole movement without investigation, while others, with equal lack of discrimination, went over into the Montessori ranks, with little evi¬

dence of distinguishing between the values of the two systems of education. It seems fair to say, however, that in. America kindergartners have made an intelligent adaptation of the values of the Montessori System to kindergar¬

ten practice, making an effort to discard the weaknesses of both, and organizing their strong points into a new and most promising educa¬

tion for children of this period.

To-day it can be truthfully said that there is no body of teachers more earnestly recon¬

structing their theory and practice than the kindergartners. They are to be found in large numbers in all summer schools — whether in normal schools or universities, and the number of teachers asking for leave of absence to se¬

cure their degrees in the universities gives un¬

questioned evidence of the fact that the ambi¬

tion of the kindergartner of to-day is to hold as high a standard for her preparation as a teacher as that required for the teachers in high schools and colleges.

Bibliography. — Atwood, N., (The Theory

*and Practice of the Kindergarten) (Boston) ; Blow, Hill and Harrison, (The Kindergarten**

(Boston) ; Boyd, W., (From Locke to Mon¬

tessori.* (New York) ; Burk, F., (A Study of the Kindergarten Problem* in Kindergarten and First Grade (Feb. to Dec. 1917, Spring-

field, Mass.) ; Burnham, W. H., (The Hygiene of the Kindergarten* in Kindergarten Review (June 1909) ; Eby, F., Reconstruction of the Kindergarten* (Vol. VII, Pedagogical Semi¬

nary, Worcester, Mass.) ; Findlay and Steele, (Educative Toys* (London) ; Froebel, (Mother Play Songs and Games* ; and (Education of Man* (New York) ; Hill, P. S., Experimen¬

tal Studies in Kindergarten Education* in Publications, Teachers' College (New York) ; Jennings, Watson, Meyer and Thomas, (Some Suggestions of Modern Science Concerning Education* (New York) ; Kilpatrick, W. H., (Froebel's Kindergarten Principles Critically Examined* (New York) ; and Hhe Montes¬

sori System Examined* (Boston) ; McVannel and Hill, P. S., (Kindergarten Problems* in Teachers College Record (New York Nov.

1909) ; Mizuno, T., (The Kindergarten in Japan* (Boston) ; Montessori, M., (The Mon¬

tessori Method* ; and Spontaneous Activity in Education* (New York) ; Read, M , (Mothercraft Manual* (Boston) ; Scates, G., and Dewey, J., (The Subprimary (Kindergar¬

ten) Department* in Elementary School Rec¬

ord, .No. 5 (Chicago 1900) ; Sisson, G., Stud¬

ies in Education* in Barnes, E., Children's Plays* (Vol. I) ; Temple, A., Survey of the Kindergartens of Richmond, Ind.* (Chicago) ; Terman, L. M., (The Hygiene of the School Child* (Boston) ; Thorndike, E. L.,

College Record, Vol. V, New York Nov. 1903) ; Tyler, J. M., (Growth and Education* (Bos¬

ton) ; and (The Kindergarten Child* in Kin¬

dergarten Review (Jan. 1910) ; Vandewalker, N., (The Kindergarten in American Educa¬

tion* (New York). Consult also (The Kin¬

dergarten in Relation to Elementary Educa¬

tion,* Pt. II, 6th Year Book; and (The Coordi¬

nation of the Kindergarten and the Elementary School,* 7th Year Book; National Society for Scientific Study of Education (Chicago).

Patty S. Hill,

Associate Professor in Education, and Director of Lower Primary Education, Teachers' Col¬

lege, Columbia University, Nezv York City.

KINDI, ken'de, ALCHINDIU.S, al-km'-

di-iis, Abu Yusuf Ya'kub Ibn Ishak Al-Kindi, Arabian philosopher of the 9th century: b.

Kufa and educated at Basra and Bagdad.

He. came of good family and received the best of instruction through the efforts of his father

\ no Governor under two famous Arabian rdcrs, Mahdi (775-85) and Harun al-Rashid (789-809). He was a very prolific writer and is credited with having written over 200 treat-

' ises on philosophy and science, over the whole field of which as known in his day he wan¬

dered. He was a very clever and original thinker and

even to-day, after a lapse of nearly 1,000 years, his name stands high among the Arabs. Many of his works are now only a name, having long since been lost; yet some relating principally to astrology and medicine, remain to attest his worth as a philosopher and original thinker. Probably numbers of his works disappeared when his library was seized, during the reign of Motawakkil (847-61). Con¬

sult De Boer, (Geschichte der Philosophic im lslam) (Stuttgart 1901) ; Fliigel, (A1 Kindi genannt der Philosoph der Araber* (Leipzig 1857) ; Nagy, (Die philosophischen Abhand-

lungen des al-kindP (Munster 1897).

KINEALY, ki-ne'H, John Henry, Amer¬

ican engineer and educator: b. Hannibal, Mo., 18 March, 1864. Graduated from Washington University as a mining engineer, he became instructor in that institution (1886-87) ; pro¬

fessor of agriculture and mechanics in the Col¬

lege of Texas (1887-89) ; professor of agri¬

culture in the North Carolina College of Agri¬

culture and Mechanical Arts (1889-92) ; and professor of mechanical engineering in Wash¬

ington University (1809-1902). On the latter date he retired from college work and became consulting and mechanical engineer, first in Boston (1902-04) and then in Saint Louis.

He has invented a number of useful devices which are in general use. Among his published works are (Steam Engines and Boilers >

(1895) ; (Charts of Low Pressure Steam Heat¬

ing* (1899); (Slide Valve* (1899); < Cen¬

trifugal Fans) (1905) ; (Mechanical Draft*

(1906) ; and numerous magazine articles on similar subjects.

KINEMATICS OF MACHINERY. Me¬

chanics may be defined as the study of motion and of the circumstances which influence or affect it. The study of motion alone is a branch of geometry in which the element of time en¬

ters. Ampere, (Philosophie des sciences1* (1843), gave to this geometry of motion the name kinematics ; Reuleaux, (Theoretische Kinematik) (1875) and others before him called it phoro-

nomics but this term has not been accepted in mechanics. Kinematics of machinery — also called kinematics of mechanism, theory of mechanism, applied or technical kinematics — is that phase of the subject which is useful in engineering. It deals with the motions of a complex deformable system subjected to such constraints as will make the motion unique or determinate. According to Koenigs, Untroduc-

tion a une theorie nouvelle des mecanismes*

(1905), it is the study of the constraints in machines, a machine being an assemblage of resistant bodies (rigid, flexible or fluid) under mutual constraint upon which force may act.

All the methods necessary for the mathemat¬

ical, as distinguished from the graphical, solu¬

tion of the most complicated problems were known long before kinematics existed as a separate science. The first attempt to separate it from mechanics in general was made by Monge in 1794; his program was elaborated and published in 1808 by Lanz and Betancourt, (Essai sur la composition des machines.) Their system aroused interest, but whatever benefit to the science may have accrued

through this stimulus was certainly outweighed by the harm that arose through emphasizing the idea that it was more the province of kinematics to classify and describe machines than to devise simple methods of finding velocities and accel¬

erations. This point of view was strengthened by Willis, who published his famous Principles of Mechanism* in 1841. To judge from the 20-page preface to his second edition (1870) Willis regarded classification as of first and last importance. Nevertheless he gave proper kinematic descriptions of an enormous number of mechanisms, was the first to investigate velocity ratios — the ratio of the velocity of the driver to that of the follower — and oc¬

casionally improved methods of designing and calculating. It is not easy to-day to understand how Willis exerted so deep an influence for a generation. When one considers the brilliant work done in mathematical kinematics by Euler, Lagrange, Laplace, Poisson, Poinsot and Cori¬

olis, it is not unfair to say that Willis was as antiquated in his own time as he is now. The next noteworthy book in the development of kinematics is Reuleaux, (Theoretische Kine-

matik: Grundzuge einer Theorie des Maschin-

enwesens* (1875), English edition by Kennedy in 1876. To Reuleaux classification is still of fundamental importance. Willis classifies ma¬

chines according to the way they transmit mo¬

tion, for example, by rolling contact, sliding contact, wrapping connectors (belts and chains), linkwork and ratchets, each being sub¬

divided according to whether the velocity ratio or the direction of the velocity is constant or variable. Reuleaux on the other hand examines the elements of which machines consist and finds that they always occur in pairs, a number of pairs being

connected to form a chain. In kinematic pairs there may be relative sliding (e.g., crosshead and guide), turning (hinge or pin joint) or sliding and turning (screw and nut). If the contact is between surfaces, as in these examples, the .pair is called lower; if there is line contact, as in gear wheels, the pair is higher. Reuleaux showed that many differ¬

ent mechanisms may be made from the same kinematic chain by holding different elements or links fixed. Neither Willis nor Reuleaux had an efficient method of finding velocities in a mechanism ; neither attempted to find accel¬

erations and neither gave sufficient emphasis to the fundamental problem of kinematics, namely, to devise general methods for the determination of velocities and accelerations. The most im¬

portant treatise on kinematics from this point of view is Burmester's (Lehrbuch der Kine-

matik* (1888) ; this is decidedly superior to anything written before that time and has not yet been surpassed.

Fundamental Theorems. — Three theorems

suffice as a basis for the analysis of velocity and acceleration in mechanisms. On account of their importance a rigorous mathematical proof will be given. It is customary to base their derivation on the postulate of superposi¬

tion which states, briefly, that kinematic vectors may be superposed according to the parallelo¬

gram law ; this method is not convincing when 422

applied to accelerations and sometimes leads to serious mistakes.

In Fig. 1 it is required to find the velocity of any point P of a rigid body moving in a Y ^ .

P (m

/

X

Fig. 1.

plane, the velocity of 0 and the angular velocity u of the body being given. The body has three degrees of constraint specified by the co-ordi¬

nates f, v, i.e., given values of them will fix its position. If a constraint is removed by permitting the corresponding co-ordinate to vary, the body has one degree of freedom. In the following equations one dot over a letter will denote the first time-derivative. From Fig. 1

#=£+ r cos 0, y — v + r sin 6;

hence since r is constant and 6=o

• • • • •

x=£ — sin 6, y=v -fro cos 9 ... (1)

• • • •

where (f, v) and (.*, y) are respectively the velocities of O and P with reference to the fixed axes xy and are thus the so-called ab¬

solute as distinguished from the relative veloc¬

ities. is that part of the velocity of P

which is due to the rotation of P about O ; it is normal to OP and is the relative velocity of P

with respect to O. Equations (1), giving the components of the relative and absolute ve¬

locities of 0 and P, state that P has two super¬

posed velocities : the absolute velocity (£, v) of O and the linear velocity r due to the rotation of P

about O. Hence

Theorem I. — The velocity of any point P of a rigid body having plane motion is the re¬

sultant of the velocity of any other point 0 and the linear velocity due to the rotation of P

about O. Let u and v be the absolute veloc-

Fig. 2.

ities of 0 and P; then Fig. 2 shows v as the resultant of u and r«. In symbols

v=u + rco, vectorially.

This theorem is the basis of the graphical method of velocity diagrams devised by R. H.

Smith (Royal Society of Edinburgh, 1885) and now in general use. Consult also his Graphics'

(1889); and Burmester's ^inematikP

By differentiating equations (1) and denot¬

ing the angular acceleration w by a we find X— £ — ra sin 0 — ru cos 9

y=V + ra cos 9 — ro2 sin 9

where (£, v) is the absolute acceleration of O, ro 2 the radial acceleration, directed from P to O, due to angular velocity; ra is the tangential acceleration normal to OP due to angular accel¬

eration. Hence

Theorem II. — The acceleration of any point P

of a rigid body having plane motion is the resultant of the acceleration of any other point O and the linear accelerations of P due to the angular velocity and acceleration of P about O. <*> and a specify the absolute rotation of the body. The theorem may be expressed in a vector equation; if a

and a0 are the accelera¬

tions of P and O

a=a0- f- ra + rw2, vectorially. . . . (3) Theorem II is the basis of all graphical solu¬

tions. It can be put into another form. In Fig. 3 let the point C be fixed and let O be a hinged or pin-connected joint so that CO and P

OP may have independent angular motions. If <*V and ar specify the relative motion of r with respect to l and if w and a are the absolute motions of r, and «0 and a0 those of /, u ■ — w o H- c)ff a = a.Q j ar

all quantities being measured in the same sense.

By substitution in the previous equation and putting rur—vr we get

a=(l + r)a0 f (/ + r)f -\-2vr .... (4) The plus signs indicate vector addition; for example, / + r is CP. Therefore (l r) a0 is normal to, and (/ + r)w*o along, CP; rar+ruh-

is the acceleration of P relative to the system CO. The term 2vr^o is called the Coriolis ac¬

celeration after Coriolis, who is 1835 discovered the theorem of which equation (4) is a special case. Since it came from r(w0 f wv) it is directed from P toward O ; if "o and ur are opposite it points from O toward P. Hence we have

Theorem III. — The acceleration of any point P

of a body in motion zvith respect to a moving system is the resultant of (1) the acceleration of P regarded as fixed to the moving system, (2) the acceleration of P relative to the moving system, (3) the Coriolis acceleration 2vr^o zvhere vr is the relative velocity of P and the absolute velocity of the moving system ; KINEMATICS OF MACHINERY

2 vr(do is directed toward the centre of curva-

ture of the relative path of P unless u0 and ur are opposite. For other demonstrations consult Routh, (Advanced Rigid Dynamics) (1905) ; ' Burmester. was the first to apply the theorem to mechanisms.

Analysis of Velocities. — The following are practically all of the typical velocity problems occurring in the theory of plane mechanisms : I. Given the velocity of one point of a rigid body, to find the velocity of another point con¬

strained, as by a guide, to move in a given manner.

Fig. 2 illustrates this case; u is the given velocity, and the direction but not the mag¬

nitude of v is known ; the construction deter¬

mines v completely. The drawing of the two parallels u may be avoided by noticing that u and v have equal projections on the line be¬

tween the two points; this means that the line is inextensible.

II. Two rods AP and BP are hinged at P, the velocities u and u of A and B being given and v, that of P, is required. At P draw the vectors u and v ; from the head of u draw a line a perpendicular to AP, and from the head of \ / /

V I '

' ' /

\ I /

\ I /

VC

Fig. 4.

v a perpendicular b to BP. Now P is on the rod AP, therefore if the arrow representing its velocity

starts at P it must, by I, end on a; v must also end on b. Hence v goes from P to the intersection of a and b.

III. Given the velocities of two points of a rigid body to find that of any other point.

In Fig. 4 u and v are given and w is re¬

quired. From equation (1) if the velocity • _ • •

(, y) of P in Fig. 1 is zero %/v= — tan 0; therefore since k/v is the cotangent of the angle the velocity of O makes with X, that point whose velocity is zero at a certain in¬*

stant lies on a normal to the velocity of O.

There is evidently only one such point for if there were two the whole body would be in¬

stantaneously at rest. This point is called the instantaneous centre of rotation ; it was discov¬

ered by John Bernoulli, (De Centro Spontaneo Rotationis) (1742) but Descartes had previously noticed it in studying the cycloid. In Fig. 4

the normals to u and v intersect at C which, being the instantaneous centre, lies on a normal to w. As the body rotates instantaneously about C, the velocities are proportional to the instantaneous radii, which fact furnishes an obvious method for getting w.

When C lies off the drawing paper proceed thus. Since the body is rigid u and w must have equal projections on PR, and v and w equal projections on QR. Draw the projections at R and erect normals at their ends ; the head of w wall lie at the intersection of these nor¬

mals. This method fails when P, Q, R are col-

linear. If the instantaneous centre cannot be used note that (a) the projections of u,v,w on PR must be

equal, and (b) as the body cannot bend, the components of u, v, w normal to PR, at P, Q, R must end on a straight line; w is then found from its two components.

IV. To find the velocity of any point on a rod moving in a sleeve. There are several cases which are shown in Figs. 5–7. In Fig. 5

the sleeve is a tube free to rotate about a fixed axis ; the rod slides in the sleeve and turns with it. Suppose u to be known. The only point, besides P, whose direction of motion is known is that point R on the rod which is also 424

at the axis of rotation of the sleeve: it moves along the rod but has no transverse component.

Hence the velocity of R is found as in II, and that of any other point as in III.

In Fig. 6 the sleeve slides on A and turns about the end of B. The centre of the sleeve has two motions : s along and u normal to A, their resultant v being perpendicular to B, so that if one of these three velocities is known the vector triangle in Fig. 6 gives the other two.

If, as in Fig. 7, the sleeve is fixed at the end of a rod B, any point P on A will have two motions : j along A, and u normal to OP, their resultant being v. The reader should ob¬

serve that Figs. 6 and 7 were solved by using the principle of superposition.

V. Sliding pieces. These occur in two forms.

In an iris diaphragm, a photographic shutter, or a pair of shears, two blades slide over each other, it being required to find the velocity of the point common to the two overlapping edges ; in cams and gear teeth two tangential surfaces slide and roll on each other, the prob¬

lem being to find the velocity ratio of the two pieces.

In Fig. 8 i, A is fixed and B rotates. The velocity v of P is the resultant of u, due to rotation, and .? due to sliding along B; u is tangent to A and P. In the toe and lift mech¬

anism, shown schematically in Fig. 8 ii, v is the resultant of u, due to rotation, and s due to sliding, along the common tangent. If both pieces in Fig. 8 i turn use the method of super¬

position: hold A and B fixed in succession.

Fig. 9 shows two cams or parts of two gear Fig. 9.

teeth turning about fixed centres Cx and Cz\ it is required to find the angular velocity ratio wi/w2. The point of contact on A has a veloc¬

ity v% normal to C\P and on B the velocity Vz is normal to CzP ; these are the actual velocities of points fixed on A and B but coincident at the point of tangency. If the two surfaces are not to separate, vi and Vz must have equal projec¬

tions on the common normal. If the normal components are equal the tangential components cannot be, for otherwise vx and Vz would be along the same line; hence sliding takes place and the motion is not pure rolling. Now sup¬

pose the contours to touch at some other point C. The velocities there can be collinear only if C lies on CiCz; if they are equal there will be pure rolling without sliding. In this case the relative motions of A and B are rotations about C, hence as the relative velocities at P

are along the tangent and are due to relative rotations about C, C must lie on the normal at P. C is the pitch point and CxC and CzC

the radii of the pitch circles. The angular ve¬

locity ratio is found from CiC^x — CzC w2; if it is constant, as in gear wheels, C must remain fixed, whence the normals at successive points of contact of the teeth must pass through the pitch point. This is the basic law of gear teeth design.

VI. Pure Rolling. The simplest case of pure rolling is that of a gear or wheel train; Fig. 10 shows the pitch circles, all centres being fixed in position. By equating rim velocities, Ri

the product of which gives

RiRzRz^i = rzr3r^i

in which capitals refer to drivers and lower case letters to followers. Sometimes the shafts of all the wheels are mounted in a rigid frame.

Let the frame turn + n times around the shaft of the second wheel while this wheel is pre¬

vented from turning. The number of turns made by the other wheels is found by the method of superposition as follows. First let Rz (and of course r2) turn with the frame; then Ri, Rz and n make + n turns, there being how¬

ever no relative motion of the wheels. Now hold the frame fixed and give — n turns to rz

Rz ; then Rx, rz and n turn respectively + n i Ri , RzRz .

-r n and — - n times. Superpose the r3

two motions or imagine them to occur simul¬

taneously. Similar considerations lead to the occasionally surprising result that if a 25-cent piece is rolled once around the circumference of a fixed 25-cent piece it will made two turns around its own centre.

Qiiadrie Chain; Inversion; Theorem of

Ihree Centres. — The simplest mechanism con¬

sists of tour pin-connected or hinged links, Fig.

11, called by Reuleaux the quadric chain ; it ' ma\
• regarded as the kinematic unit of mechanisms
having surface contact. A con¬

siderable number of different mechanisms may be
derived from it by inversion ; this consists in (/3)
/\

/ \

/ \

/ \

Fig. 11.

fixing any two points on any one link. The idea, due
to Reuleaux, is useful in giving an insight into the
relationships in families of mechanisms. (Consult
Durley, 'Kinematics of Machines, > 1903). Inversion
does not change relative motions. The points (12),
(23), (34) and (14) are the relative instantaneous
centres of the links whose numbers they bear. By
holding 4 or 2 fixed we find that (24) is the I. C.
(instantaneous centre) of 2 and 4 for motion
relative to each other; likewise (13) is the
relative I. C. of 1 and 3. Observe that (24), (23)
and (34), and (12), (23) and (13) are colhnear
triplets of the form (xy), (yz), (xz).

This is a special case of the theorem of three
centres now to be proved. Consider Fig. 12,
representing three bodies having relative plane
motion.

The I. C. of the relative motion of two pieces is
that pair of coincident points (one on each body,,
extended if necessary) having the same velocity, for

their relative velocity is then zero ; each body thus turns about the I. C. relatively to the other. Let (12) and (13) be known in Fig. 12. If (23) is at some such point as C

the velocity of C, considered, as being part of 2, is normal to (12) C; when it belongs to 3 its velocity is normal to (13) C. These velocities have different directions and cannot be vectori-

ally equal unless they are colhnear, whence (23), the correct position of C, must lie on (12) (13). The utility of the theorem of three centres is illustrated in Fig. 13; the two crosses indicate fixed centres. By the theorem, (13) >si colhnear with (12) and (23), and also with (15) and (53) ; therefore it lies at the intersec¬

tion of two lines through these pairs. The most detailed discussion of the theorem is given by Klein, 'Kinematics of Machinery) (1917).

Kinematically Determinate Mechanisms., —

Any system of interconnected bodies is kine¬

matically determinate when the velocity of one Point determines the relative velocity of every other point. When the mechanism consists of P pins interconnected by l links the criterion of determinateness is found as follows: It takes 3 links to connect 3 of the pins into a rigid triangle; each remaining pin requires 2 links to fasten it rigidly to the frame already formed, .'.3 + 2 (p — 3) = 2 p — 3 links will connect p pins into a rigid coplanar net¬

work. Each link represents a constraint. If one link is removed one degree of freedom will be introduced and the frame will be uniquely deformable. Hence

$$l = 2p - 4$$

is the relation between the number of links and pins in a kinematically determinate mechanism.

/ \

The criterion requires interpretation in special cases.

(i) . Fixed pins are those fastened to some frame of reference. Two such pins are equiva¬

lent to one link; for / fixed pins there are virtually 2/ — 3 links. If / of the p pins are fixed and there are / actual links

/ + 2 / — 3 = 2 p — 4.

(ii) . One link having 3 pins on it counts as 3

links since it may be regarded as a collapsed triangle ; a link with m pins counts as 2 m — 3

links.

(iii) . A crosshead or sleeve is equivalent to a link of zero length ; it must therefore be counted as 2 pins and 1 link.

(iv) . A point at which there is line contact, as in cams and gears, counts as 2 pins and 1

link.

Centrodes.— The locus in space of the in¬

stantaneous centre is called the space centrode) the locus in the body is the body centrode .

The term centrode is due to Clifford, Elements of Dynamics* (1878) ; the idea, however, is found in Poinsot, 'Theorie nouvelle de la rotation) (1851) and Reuleaux. The latter used it in 426

place of the foregoing methods. In Fig. 14

C Ci Ci and C Ci c2 represent simultaneous or corresponding points on the two centrodes.

Since the instantaneous centre will take the positions Ci and C2, ct and c2 must fall on them during the motion. No sliding will occur since the body rotates about the instantaneous centre, hence the body centrode rolls on the space centrode. For example, the circum¬

ference of a wheel is the body centrode and the line along which it rolls is the space centrode.

Accelerations. — It is not easy to find accel¬

erations except in simple mechanisms; fortu¬

nately only simple cases arise in practice. In the four-bar linkage or quadric chain, Fig. 15 i, if (J0 and a0 are known, u and ui can be found because the linear velocity of P can be found by the method shown in Fig. 2. Hence lu 2 and Ru, the radial accelerations of P, can be computed. If v is the velocity of P relative to Oy v—lo or vi/l—lo* ; i.e., /w2 is a third pro¬*

portional to / and v and may therefore be found by geometric methods; this applies also to ruo2

and R«i2. By Theorem II above the acceleration of P is the resultant of r«o2, ra0, /"2, /«; it is also the resultant of and Ra 1, whence the con¬

struction in Fig. 15 ii. Other methods are given by Land ((Geschw. — und Beschl. — Plan fiir Mechanismen® (Zeit . d. Ver. deut. Ing, 1896) and Rittenhaus, (Der Civilingenieur> (1880, p.

244). The ordinary connecting rod mechanism may be solved by special methods which are quicker. Let the crank in Fig. 16 turn at constant speed <>. The velocity of C is given according to Fig. 2 by the con¬*

struction at C; v is the velocity of C

relative to P. Draw OQ vertical, then OPQ

is similar to the velocity triangle. If <> is*

called unity the triangles .will be equal so that PQ

represents the relative velocity v and OP repre¬

sents both riu and rw2. With P as centre and radius PQ=v draw an arc; on the connecting rod as diameter draw an arc intersecting the former in two points and through them draw the chord. Since BD is a common ordinate in the two semi-circles on CQ

BD'-=(v+BP) (v — BP)=(l — BP) BP

Hence as two sides (PO=rco 2 and BP) and all directions of the acceleration polygon of C are known the remaining quantities are determined ; i.e., AO is the acceleration of the crosshead.

This construction was found independently by Kirsch, <(Graphische Bestimmung der Kolben-

beschleunigung® (Zeit. d. Ver. deut. Ing. 1890) and Klein, <(Force of Inertia of Connecting Rods® (Journal Franklin Institute, 1891). The following method is due to Mohr, ((Konstruktion der Beschleunigung am Kurbelgetriebe,® Der Civilingenieur (1880). From where the hori¬

zontal through Q in Fig. 16 cuts the crank draw a vertical RB and then BA perpendicular to the connecting rod. AO is the acceleration of C because from similar triangles

BP PR v

v ~ PO ~ l

or • BP=Vy

t'

as before.

The acceleration of any other point C' on the connecting rod is needed in Dynamics of Machinery (q.v.). AB+BP=AP is the accel-

eration of C relative to P and, being of the form la-\-uozf is proportional to /—PC. The relative acceleration of any other point C' is thus pro¬

portional to PC'; consequently if C'A' is drawn ' parallel to CO, A'P will be the relative accele¬

ration of C' , PO the acceleration of P, and A'O the resultant acceleration of C' .

Richard F. Deimel,

Assistant Professor of Mechanics, Stevens In¬

stitute of Technology.

KINETIC THEORY OF GASES. See

Gases, Kinetic Theory of.

KINETOGENESIS, in evolution, the

mechanical process of a transformation of parts, especially parts belonging to the internal skele¬

ton, skull and limbs, is very ingeniously inter¬

preted by Cope as having been accomplished in mammals through the agency molar motions, use and food. The motion itself is neo-Lamarckian.

Cope's proposal (it was he who brought the term into existence) is to <(cite examples of the direct modifying effect of external influ¬

ences on the characters of individual animals and plants.® The influences which thus play a part in evolution fall into two classes. They are either physico-chemical, or molecular; or, they are mechanical, or molar. A gradual transformation of the parts of an organism is supposed by Cope to be the result of these influences. The two types of influence which thus express themselves in evolution, Cope calls Physiogenesis, which operates through molecu¬

lar action; and Kinetogenesis, which expresses itself as molar motion. Cope has likewise traced the line of progression in fossil genera as exemplified by numerous series of inter¬

mediate forms. But Herbert Spencer also con¬

tributed much in this direction by his theory of the mechanical origin of the segmentation of the body in vertebrates, leading (as he thought) to the formation of vertebrae.

This term suggested by E. D. Cope, meaning development by motion, or the exercise of parts or organs, is nearly the equivalent of use (q.v.).

The examples given by Cope are the develop¬

ment by use of muscles of any hard

parts or bone. He claims that muscular tissue is highly plastic, and since it is directly con¬

trolled by nervous or equivalent stimuli, <(the effect of the latter in building structure is evi¬

dent.® Another example, overlooked by late students, is the beautiful study on the mechan¬

ical genesis of bone structure published by Wyman in 1857. This anatomist shows that the cancellated structure of the bone (see Bone) in the lumbar vertebrae, the thigh-bone, tibia, as¬

tragalus and os calcis of man is peculiar to him, and has <(a definite relation to the erect position which is naturally assumed by man alone.®

The fibres or cancelli of such bones as assist in supporting the weighty ((are arranged either in the direction of that weight, or in such a man¬

ner as to support and brace those cancelli which are in that direction. In a mechanical point of view they may be regarded in nearly all these bones as a series of studs and braces.® Wyman dealing with the

individual bones shows in what direction force or weight is applied to them, and the corresponding direction the cancelli assume.

On the lumbar vertebrae there is vertical pres¬

sure, and the principal bone fibres within are also vertical. On the neck of the thigh bone the weight of the body is applied obliquely to the end of an arm, ((within it there is a com¬

bination of fibres giving strength with lightness, which forms a frame mechanically adapted for resisting the weight which rests upon it,® and so with the astragalus. ((A certain direction of fibres in all these instances co-exists with a certain direction, or certain directions, of the transmission of pressure. From this constant association of structures and function the in¬

ference seems unavoidable, that they are means and ends.®

Comparing the bones in question with those of the gorilla and chimpanzee, only <(slight traces of the trusswork described in man ex¬

ist.® As they practically exist in man alone, Wyman maintains that «they relate to the kind of locomotion which he alone of the whole ani¬

mal series can be said to possess, namely, that of walking erect, and which requires in the pas¬

sive and resting organs subservient to it, in order that it may be effected with ease and grace, a nice combination of lightness with strength in the materials. His attitude more than any other, in consequence ot the pillars of support being arranged in vertical planes, requires the most effectual means for counter¬

acting shocks.®

Cope’s contributions to this subject in the way of materials drawn from fossil vertebrates are

extensive and weighty. He, and also Ry¬

der, have discussed the molding of the limb-

joints as the result of mechanical strains; also the origin of the teeth, through mechanical strains or impacts. Thus the origin of the canine, pseudo-canine and canine-like incisor teeth ((is due to the strains sustained by them on account of their position in the jaws at points which are naturally utilized in the seizing of prey, or the fighting of enemies.® For example the greatly increased size of the canine teeth of the walrus is due to the use of these teeth in the breaking of ice, and in climbing from the water upon the edge of the floe ice. It is so, adds Cope, with the straight incisors of the hippopotamus, (

tical direction, a change which is also partially accomplished in the true pigs (Sus).®

The molar teeth owe their increased diam¬

eters to much more severe direct irritation and impact. The origin of the sectorial or shear¬

like molar teeth of the cat, lion and other carnivora is thus explained by Cope: ((The specialization of one tooth to the exclusion of others as a sectorial appears to be due to the following causes : It is to be observed in the first place that when a carnivore devours a carcass, it cuts off masses with its sectorials, using them as shears. In so doing it brings the part to be divided to the angle or canthus of the soft walls of the mouth, which is at the front of the masseter muscle. At this point the greatest amount of force is gained, since the weight is thus brought immediately to the power, which would not be the case were the sectorial situated much in front of the mas¬

seter. On the other hand, the sectorial could not be situated farther back, since it would then be inaccessible to a carcass or mass too large to be taken into the mouth.®

The great length and chisel-like incisor teeth of the squirrel and other rodents also illustrate this subject. Their progressive lengthening 428

through exercise has been explained by Ryder, who shows that the mechanical action involving backward pressure is precisely the opposite of that which has occurred to the carnivora, where the pressure has always been forward owing to the development of the canines.

The direct evidence in favor of the kineto-

genetic mode of evolution is greatly strength¬

ened by the discovery of Ameghino in the Tertiary beds of the Argentina of one-toed ungulates with two splint bones, and with teeth strikingly like those of the horse, though the animal belongs to a quite different order. The similarity or divergence in shape of the parts is due to the action of similar mechanical con¬

ditions in two quite unrelated groups. The same results of strains involved in digging are seen in the fore legs of the fossorial edentates, in the mole, as well as in the mole cricket.

Thus as Cope concludes, (

duce identical results.®

It is to be observed, however, that <(ordi-

nary mechanics® does not state that ^identical causes produce identical results.® The truth appears to be that in the great paleontologist, Cope, we have another instance of a man’s thought being much wider and richer than his system. M. Bergson has recently made a point aganst a mechanical mode of intellectual appropriation and just because he understood the law of causality in the sense mentioned by Cope. The principle, <(identical cause, identical effect,® which is sometimes said to be the

prin¬

ciple of causality, is much narrower in its scope than the principle which really occurs in physics and chemistry, — in science in gen¬

eral. Indeed, the principle (

What is constant in a truly causal law is not the object or objects given, nor yet the object inferred, both of which may vary within wide limits, but the relation between what is given and what is inferred. It is not asserted here that the great naturalist was unconscious of the significance of the principle. On the contrary we feel that it was plainly operative in his thought world. But in view of the great ado nowadays over teleology and aetiology as modes of intellectual appropriation of the subject called life, it appears that science cannot too often remind itself that freedom is the postulate of teleology, and determinism (causation) the postulate of science. Further, it is not so much required to deny teleology in the domain of organized nature as to purify and sift our views of teleology. There is a kind of teleology which does not stand in contradiction to the causation of efficient causes so called. The kind of causation in question has just been mentioned. Consult Cope, E. D., (The Pri¬

mary Factors of Organic Evolution) (Chicago 1896) ; Wyman, (On the Cancellated Structure of Some of the Bones of the Human Body*

(in Journal of the Boston Society of Natural History, Vol. VI, Boston 1857).

KINETOPHONOGRAPH, an electro¬

photographic apparatus combining the prin¬

ciples of the kinetograph, the vitascope, and the phonograph, invented by Thomas A. Edison.

It is a combination of a motion picture machine and a phonograph operating synchronously.

See Moving Pictures.

KING, Albert Freeman Africanus, Amer¬

ican physician: b. Oxfordshire, England, 18 Jan.

1841 ; d. Washington, D. C, 13 Dec. 1914. He was graduated from Columbian (now George Washington) University in 1861, and from the University of Pennsylvania in 1865. He was professor of obstetrics in the medical school of George Washington University from 1871 to 1913 and dean 1879-94, and was also professor of obstetrics at the University of Vermont 1871-1913, and was president of the Washing¬

ton Obstetrical and Gynecological Society 1885-

87. He wrote a (Manual of Obstetrics'* (1882; 11th ed., 1910) ; (Effect of Ultra-Violet Rays on Malarial Fever* (1902). He urged with enthusiasm the theory of the mosquito transmis¬

sion of malaria, a claim which, republished in 1883, was accepted in 1899 by the medical world as correct ; and he was the first to advocate measures for personal and municipal use in the way of prevention.

KING, Anna Eichberg. See Lane, Anna

Eichberg King.

KING, Charles, American journalist, presi¬

dent of Columbia College: b. New York, 16

March 1789; d. Frascati, Italy, 27 Sept. 1867.

He was the second son of Rufus King (q.v.), and during the residence of his father as Amer¬

ican Minister at Saint James he was sent with his brother to Harrow school. Upon the break¬

ing out of hostilities with Great Britain, King, though a Federalist, deemed it right that the war should be prosecuted to an honorable and successful result ; and as a member of the legis¬

lature of his native State in 1813, and as a volunteer in the autumn of 1814, he acted upon those sentiments. In 1823 he became associated with Johnston Verplanck in the publication of the New York American, a conservative news¬

paper, of much political influence and a high literary character, until 1827 when Verplanck retired and Mr. King continued sole editor.

After its publication was discontinued Mr. King was associated in the conduct of the New York Courier and Enquirer 1845-49, when he was chosen president of Columbia College, which office he occupied until 1864.

KING, Charles, American soldier and nov¬

elist: b. Albany, N. Y., 12 Oct. 1844. He was graduated from West Point in 1866 and was in active service in the United States army till his retirement because of wounds in 1879. In the war with Spain he was a brigadier-general of volunteers and served in the Philippines under Generals Otis, Anderson and Lawton. He has published a long series of popular novels treat¬

ing of army and frontier life and people, among the best of which are (The Colonel’s Daughter*

(1883) ; (Between the Lines> (1886) ; (The General’s Double* (1897) ; (The Iron Brigade) (1902) and (The True Ulysses S. Grant*

(1915). For thirty years he has been the instructor of the Wisconsin National Guard.

KING, Clarence, American geologist: b.

Newport, R. I., 6 Jan. 1842; d. Phoenix, Ariz., KING

24 Dec. 1901. He was graduated from the Sheffield Scientific School of Yale University in 1862, in 1863-66 was a member of the Cali¬

fornia geological survey under the direction of , Prof. J. D. Whitney (q.v.), discovered Mounts Whitney and Tyndall, the highest group in California, and with J. T. Gardiner executed the first survey of the Yosemite Valley. In 1866

he originated the plan for a survey of the western Cordilleran region at its widest point.

This plan was finally sanctioned by the govern¬

ment and under the auspices of the army engi¬

neering department and King’s direction, was executed as the (

and completed in 1872. The survey has been characterized as a <(signal contribution to the material of science.® The volume on Sys¬

tematic Geology > (1878), the first of six con¬

stituting the report, was written by King and has been highly esteemed. In 1872 certain swindlers sowed a tract in Arizona broadcast with rough gems ; the discovery of valuable diamond fields was announced, and companies were organized for the

exploration of the find.

The <(fields® proved to be within the official limits of the 40th parallel survey, and were thereupon examined by King, who detected and proclaimed the fraud. In 1878 King organized the various surveys then active into the United States Geological Survey under the general di¬

rection of the Secretary of the Interior, and was appointed director of the survey. He resigned in 1881, attained a large practice as a mining expert, and undertook an uncompleted series of experiments to determine the action of the primal constituents of the earth under the con¬

ditions assumed as existing at the time of its separation from the sun. Partial results were published by him in Silliman's Journal (Janu¬

ary 1893) in an article on ((The Age of the Earth.® He wrote also, (Mountaineering in the Sierra Nevada) (1871), a description of his explorations, and a work of literary as well as scientific value.

KING, Dan, American physician, writer,

philanthropist and statesman : b. Mansfield, Conn., 1791 ; d. 1864. Graduating in medicine, he practised his profession in his native town and in Preston, Conn., and Charleston, R. I.

He served in the legislature of the latter State (1828-34). Throughout his legislative career he was one of the strongest advocates of suf¬

frage and as such became known in political and other circles throughout the United States.

In this same connection his attention became directed to the pitiable condition of the Narra-

gansett Indians. His efforts directed the atten¬

tion of the State to them, and he was appointed one of a commission to inquire into the condi¬

tion of the Indians and to report on them and the best manner of dealing with the difficulty.

He succeeded in having an Indian school estab¬

lished and other measures of relief made for the Indians. This was practically the beginning of the measures that have since been taken to help the Indians toward American citizenship and a place in the great American community.

Dr. King wrote considerable, generally on sub¬

jects that interested him deeply; but of all his writings perhaps the most interesting is his

KING, Edward, Anglo-Irish poet: b. Ire¬

land, 1612 ; d. in shipwreck off Welsh coast, 1637. Educated at Cambridge University, he became Fellow there in 1631. He was a man of scholarly attainments and good poetic taste which was shown in his Latin poems. He met Milton at Cambridge and the two became very close friends. Milton had a strong influence over King and, had the latter lived, he might have produced some literary work of more general interest than that which he left at his premature death. As it is, he is chiefly noted as being the inspiration of 13 poems by Milton published under the title of (Obesquies to the Memory of Mr. Edward King) (1638), among these being ^ycidas.*

KING, Edward Viscount Kingsborough,

Irish writer and archaeologist: b. 1795; d. 1837.

He was the eldest son of the third earl of Kingston and was educated at Oxford. Leav¬

ing college he became a member of Parliament (1818-26) ; but after eight years of public life he resigned his seat in favor of his brother, who took a great deal more interest in politics than did the elder member of the family who had already become a confirmed antiquarian, deeply attracted toward the ancient civilizations of Mexico. In fact

Kingsborough, as he is usually called, is one of the most interesting of all the collectors of the remains of the ancient Mexican civilizations. After several years spent in the work of examining and collecting the Aztecs and other manuscripts of the pre-

Columbian Mexican civilization, he began, in 1830, the publication of his monumental work on (The Antiquities of Mexico, which was gradually issued in London in nine superb volumes, profusely illustrated. No author prob¬*

ably in all history has accomplished so much in a direction he was not consciously working as Kingsborough. He set out with the inten¬

tion of proving that the people of Mexico were of Jewish origin and the descendants of the lost 10 tribes of Israel. To this all his acute reasoning, his undoubted erudition and his en¬

thusiasm combined with his diligence were directed. From all the libraries of the Old and the New World he collected manuscripts and codices and other remains of pre-Columbian life supplemented with other documents follow¬

ing the conquest of Mexico. All the docu¬

mentary material in the form of codices and several most valuable documents of post-con¬

quest days, he included in his publications, the codices being reproduced in color at an enor¬

mous expense. In fact so great was the cost of collection, examination and publication of this material that it exhausted Kingsborough's fortune, and he was arrested by his printer and cast into a debtor's prison in Dublin where he died of typhus contracted in what was then one of the most insanitary prisons of the British domains. Among the valuable texts published in Kingsborough's work is the (History of New Spain by Sahagun, which is the most fruitful and interesting of the existing*

documentary evidence of the pre-Columbian civilization of Mexico and Central America, with perhaps the one exception of the existing codices relating to pre-conquest Mexico. Kingsborough's work

was looked upon as a marvel of the printer's and engraver's art in his day; and the present generation is little inclined to dispute this esti¬

mate, when the circumstances under which it was executed are taken into account. How costly and on what a grand scale the work was done may be gathered from the fact that, though the edition with colored plates sold for £175 and the uncolored for £120, yet the author came far from meeting the expenses incurred in its production. (The Mexican Antiquities) is a storehouse of material and documents relating to native Mexican civilization, and is for this reason invaluable to the student of this period in the history of America and of the civilization of the western hemisphere. But there is little order in the arrangement of the contents of the work which contain the com¬

paratively few interpretations of the manu¬

scripts existing in Kingsborough's time. The author has added copious notes of his own, which lose a great part of their authority and effectiveness owing to the fact that he bent every argument and investigation to prove his theory of the Jewish origin of the Mexican people. Thus his erudition and his industry run too often to waste. His work itself is generally in a disorder bordering on chaos and his notes and explanations are frequently tiresome, for this reason and the fact that he intrudes every¬

where, in the most serious discussion, his pet theory. Yet so great is the amount of valuable material of a past age that he has brought within reach of the student and the antiquarian, that the world of science readily acknowledges its debt to

him ; for in presenting the civilization of pre-conquest Mexico he has furnished docu¬

mentary evidence and material for the investi¬

gator into all the civilizations of America in the ages preceding the middle of the 16th century.

Consult Bancroft, (Native Races) ; Kings-

borough, 'Mexican Antiquities } ; Prescott, 'Conquest of Mexico.)

KING, Edward, English theologian : b.

Westminster, 1829; d. 1910. Graduated from Oxford University (1851), he studied theology and was ordained priest four years later. He joined theTractarian movement and, after hold¬

ing several churches, became canon of Christ Church, Oxford, and professor of pastoral theology in the university there (1873). He was extremely High Church and was charged with practices of a ritualistic nature ((not in accord with the laws of the Church" and tried be¬

fore the bishop of Canterbury. In the con¬

test he had rather the better of his oppo¬

nents. That he did not suffer in the estima¬

tion of the public is seen in the fact that he was very popular and had a great influence over young men. He became bishop of Lincoln in 1885. Among his published works are Medita¬

tions on the last Seven Words) (1874); 'The Love and Wisdom of God) (sermons, 1910) ; 'Counsels to Nurses> (1911); 'Duty and Con-

science) (1911) ; 'Sermons and Addresses) (1911).

KING, Grace Elizabeth, American writer: b. New Orleans, 1852. She was educated in New Orleans, contributed much to periodicals, and published in

the New Princeton Review in 1886-88 Creole sketches which won consider¬

able reputation and constituted the story 'Monsieur Motte> (1888). Among her further works are 'Tales of Time and Place) (1888) ; (Earthlings) (1889) ; 'Chevalier Alain de Tri-

ton) (1889) ; 'Jean Baptiste Lemoine, Founder of New Orleans) (1892); 'Balcony Stories>

(1893) ; 'New Orleans: The Place and the Peo¬

ple (1896) ; 'De Soto and his Men in the Land of Florida) (1898) ; 'History of Louisiana>

(1893), and 'Stories from Louisiana History) (1905).

KING, Helen Dean, American biologist:

b. Oswego, N. Y., 1869. Graduated from Vas-

sar and Bryn Mawr colleges, she taught biology at the latter school (1897-1907), during a part of which time she was fellow in research work at the University of Pennsylvania and she became assistant, in this latter institution, in anatomy (1908-09). She has also been con¬

nected with other colleges and has devoted much of her time and efforts to the determina¬

tion of sex and the problems connected there¬

with, a subject on which she has written and lectured extensively.

KING, Henry Churchill, American theo¬

logian and educator: b. Hillsdale, Mich., 18

Sept. 1858. He was graduated from Oberlin in 1879, from the Oberlin Theological Seminary in 1882, studied also at Harvard and Berlin, vvas associate professor of mathematics at Ober¬

lin in 1884–90, associate professor of philosophy in 1890–91, and professor of philosophy in 1891–97. In 1897 he was appointed professor of theology, and in 1902 president. In 1893 he was a member of the National Educational Association's committee of ten. He lectured at Yale (1907), Harvard (1909), and Columbia (1913) universities and in India, China and Japan in 1909–10. His works are 'Outline of Erdmann's History of Philosophy > (1892); 'Outline of the Microcosmus of Hermann Lotze) (1895) ; 'The Appeal of the Child) (1900) ; 'Reconstruction of Theology) (1901) ; 'Theology and the Social Consciousness) (1902); 'Personal and Ideal Elements in Education) (1904) ; 'Rational Living) (1905) ; 'Letters on the Greatness and Simplicity of the Christian Faith) (1906); 'The Seeming Unreality of the Soiritual Life) 0908); 'The Laws of Friendship, Human and Divine)

(1909) ; 'The Ethics of Jesus) (1909) ; 'The Moral and Religious Challenge of Our Times) (1911), and 'Religion as Life) (1913).

KING, Henry Melville, American Baptist

clergyman: b. 3 Sept. 1838; d. 6 June 1919. Edu¬

cated at Bowdoin College and Newton Theo¬

logical Institution he was ordained to the Baptist ministry 28 Aug. 1862. He was instructor in He¬

brew in Newton Theological Institution, 1862–63, and then served in turn Dudley Street Church, Boston, 1863–82; Emmanuel Church, Albany, N. Y., 1882–91, and First Church, Providence, R. I., 1891–1906, when he was made pastor emer¬

itus. He was an officer and trustee of several church societies and institutions. He was presi¬

dent of the Northern Baptist Education Society, 1875–82, and of the Rhode Island Baptist State Convention, 1891–95. He was an authority on the history of his denomination. His works include 'Early Baptists Defended) (1880) ; 'Mary's Alabaster

Box) (1883) ; 'Our Gospels) (1895) ; 'Summer Visit of Three Rhode Islanders to Massachusetts Bay) (1896) ; 'The Mother Church > (1896) ; 'The Baptism of Roger Williams" (1897); 'The Messiah in KING

the Psalms' (1899); (Why we Believe the Bible) (1902); ' Religious ' Liberty ' (1903); 'John Myles and the founding of the first Baptist Church in Massachusetts ' (1905) ; 'Historical Catalogue of the First Baptist Church in Providence) (1908) ; 'Sir Henry Vane' (1909) ; 'Prayer and its Relation to Life) (1912) ; 'Thinking God's Thoughts after Him' (1914).

KING, Horatio, American statesman: b.

Paris, Me., 21 June 1811; d. Washington, D. C., 20 May 1897. He learned the printer's trade and published The Jeffersonian in his native town, and subsequently in Portland, 1831-38. The next year he was appointed clerk in the Post Office Department in Washington; became First Assistant Postmaster-General in 1854; was Postmaster-General January-March 1861 ; and was the first man in public office to deny the power of a State to withdraw from the Union. He published 'An Oration before the Union Literary Society of Washington (1841) ; 'Sketches of Travel; or Twelve Months in Europe) (1878).

KING, James Marcus, an American cler¬

gyman: b. Girard, Pa., 18 March 1839; d. Phila¬

delphia, Pa., 3 Oct. 1907. After graduating from Wesleyan University, 1862, he taught six years in the Fort Edward Collegiate Institute, of which his brother, Rev. Joseph E. King, was principal for 59 years. He entered the ministry of the Methodist Episcopal Church in 1866.

After serving various important churches in the Troy and New York conferences, he became in 1899 assistant corresponding secretary of the Board of Church Extension, and the follow¬

ing year became secretary, following Dr. W. A.

Spencer. The work of the society was en¬

larged in 1907 and became the Board of Home Missions and Church Extension of the Metho¬

dist Episcopal Church. Dr. King was the first corresponding secretary and served until his death. He was a member of the Ecumenical Conferences of 1881, 1891 and 1901. He was honorary corresponding secretary and chairman of the Evangelical Alliance. He served the League for the Protection of American Institu¬

tions as its secretary from 1889 until his death.

He was the author of several pamphlets and 'Facing the Twentieth Century — Our Country: Its Power and Peril) (1899).

KING, John, American eclectic physician and author: b. near New York city, 1 Jan. 1813; d. North Bend, Ohio, 19 June 1893. Received a liberal education and was graduated in medi¬

cine at the Reformed Medical College of the city of New York, in 1838, under the celebrated Dr. Wooster Beach. In 1848, he was the first secretary of the National Eclectic Medical Asso¬

ciation, and, in 1878, president of that body as reorganized in 1870. From 1849 to 1851 he was professor of materia medica, therapeutics and medical jurisprudence in the Memphis Medical Institute at Memphis, Tenn., from 1851 to 1856

and 1859 to 1890, professor of obstetrics and diseases of women and children in the Eclectic Medical Institute of Cincinnati, Ohio. From 1856

to 1859 he taught obstetrics in the Cincinnati College of Eclectic Medicine and Surgery. Dr.

King discovered the resins of podophyllum (podophyllin) and macrotys, and the oleo-resins of

capsicum and iris. He wrote 'Urological Dictionary, ' 'American Dispensatory) (1853) ; 'American Obstetrics) (1855) ; 'Women: Their Diseases and TreatmenC (1858) : 'The Micro-

scopist's Companion ' (1859); 'The American Family Physician' (1860): 'Chronic Diseases'

(1866), and the 'Coming Freeman' (1886), the last named in behalf of the laboring classes and dedicated to the Knights of Labor. He is re¬

garded as the father of American Materia Medica.

KING, John Alsop, American politician : b. New York city, 1788; d. 1867. He was the son of Rufus King (q.v.) ; was educated at Harrow, England, then returned to New York to study law, and was admitted to the bar. In 1812 he served as lieutenant of cavalry, was elected to the State assembly in 1819, and several times re-elected till 1823, when he was elected to the senate. Though an opponent of Clinton, he strongly favored the building of the Erie Canal. In 1825 he went with his father to England as secretary of the legation, and on his father's return to the United States on ac¬

count of ill health, he remained as charge d'affaires. In 1838 he was again a member of the New York legislature for several terms; and in 1849 he was elected to Congress as a Whig and there opposed all compromise

measures, especially the Fugitive Slave Law.

He was one of those active in the founding of the Republican party; presided at the Syracuse convention of 1855 ; and was a delegate" to the Philadelphia convention of 1856. In 1857 he became governor of New York State and in that office gave special attention to educational matters and internal improvements; he declined a renomination in 1860. He was one of the presidential electors in 1860, voting for Lincoln, and in 1861 was a member of the Peace Con¬

vention.

KING, Jonas, American missionary and

writer: b. Hawley, Mass., 29 July 1792; d.

Athens, 22 May 1869. After graduation at Wil¬

liams College and Andover Seminary, he turned to home missionary work; but, after a while he determined to prepare himself for the foreign mission field. To this end he went to Paris to study Arabic under Dr. De Sacy, one of the great Arabic scholars of his day. On his re¬

turn he entered Amherst College as professor of Oriental Languages (1822-28). Resigning his position at Amherst he went as a missionary to Greece, where he was soon in trouble with the Greek Church which ordered his arrest on the charge of profaning things sacred. He seems to have been very aggressive and to have had very little tact in the prosecution of his work, which promised well in the beginning but which virtually went to pieces toward the end. He was a man of scholarly attainments and wrote in both English and Greek. His miscellaneous works in the latter language were published in Athens. His best-known work in English, 'The Oriental Church and the Latin 5

was published in 1865. An account of his life and work was published in New York in 1879, the writer signing himself F. E. H. H.

KING, Leonard William, English writer

on Semitic subjects and educationalist: b. Lon¬

don, 1869. Educated at Rugby and Cambridge, he became greatly interested in the earlier civilizations of western Asia; and in 1903-04

he was commissioned by the British Museum to carry on for it excavations at Nineveh; 432

KING

which he did successfully, collecting many very interesting and valuable rock inscriptions dat¬

ing back to a comparatively early period of Assyrian civilization and culture. Through this and other work of a like nature he was chosen lecturer in King's College, London, and assistant keeper of Egyptian and Assyrian antiquities in the British Museum. In connection with this position he prepared a guide of the treasures under his care (1900). Among his published works are (Babylonian Magic and Sorcery) (1896) ; Cuneiform Texts in the British Museum* (1896-1914); (Assyrian Chrestom-

athy* (1898) ; (Letters and Inscriptions of Hammurabi* (1898-1900); (Babylonian Re¬

ligion and Mythology* (1899) ; (Assyrian Lan¬

guage J (1901) : (Annals of the Kings of Assy-

ria) (1902) ; inscriptions of Darius on the rock of Behistun* (1907, with R. C. Thompson) ; (Egypt and Western Asia in the Light of Re¬

cent Discoveries) (1906, with H. R. Hall) ; (A History of Sumer and Akkad* (1910) ; bound¬

ary Stones and Memorial Tablets in the British Museum) (1912).

KING, Lida Shaw, American educator : b.

Boston, 1868. Graduated from Vassar College, she continued post-graduate work at Brown, Vassar, Radcliffe, Bryn Mawr and the Ameri¬

can School of Archaeology, Athens, Greece (1894-1901). In the meantime she was pro¬

fessor of classics at Vassar (1894-97) and the ,Cacker Collegiate Institute (1898-1902). In 1905 she became assistant professor of classical philology at Brown University, and dean of the Woman's College, and in 1910 professor of classical literature and archaeology.

KING, Philip Parker, English writer and naval officer: b. Norfolk Island, in the Pacific Ocean, 1793; d. 1856. Entering the naval serv¬

ice at the age of 14, he had been raised to the rank of lieutenant by the time he had attained his majority, and by the time he was 24 he was given complete charge of an important survey in Australian waters which covered five years and greatly improved the Torres Strait and Sydney route. Later on he spent four years in making surveys and charts of the southern coast of South America (1826-30).

This expedition consisted of two vessels of which King was in charge of one, the Adven¬

ture, and Capt. Robert Fitzroy of the other, the Beagle. Some time afterward King went to Australia where he identified himself with the interests and progress of the country. He set¬

tled in Sydney, capital of New South Wales, where he became, among other things, a legis¬

lative councillor and manager of the Australian Agricultural Society. Later on he was raised to the rank of rear-admiral and placed on the retired list, an honor which was probably in¬

tended to be shown as much to Australia as to himself, for he was the first Australian to attain to his rank. Among his published works are (Narrative of the Survey of the Inter-

tropical and Western Coasts of Australia> (2

*vols., 1827) ; bailing Directions to the Coasts of Patagonia * (1830) ; (Voyages of the Ad¬*

*venture and the Beagle * (3 vols., of which King wrote the second only, Robert Fitzroy writing one and Charles Darwin the other, 1839). He also made many very important charts which were long in use and upon which Some of the charts of to-day are based. These charts were issued by the Admiralty Hydro-*

graphic Department in 1825, and at subsequent dates. Some of his later charts saw publicity through other sources.

KING, Preston, American statesman: b.

Ogdensburg, N. Y., 1806; d. New York, 12

Nov. 1865. Graduating in law he practised his profession for some time in Saint Lawrence County, but constantly with an eye on politics and a hand in it. In 1830, prompted by his political inclinations, he founded the Saint Lawrence Republican as the organ of the Jack-

son party in northern New York. This paper he edited vigorously in the interest of party politics, and he received his reward at the hands of Jackson in the shape of the post¬

mastership of Ogdensburg (1833). The fol¬

lowing year he was elected a member of the New York legislature, and in 1842 a member of the United States Congress (1843-54).

Throughout all this time he had been a mem¬

ber of the Democratic party though he held different views than those of the majority of his party on the slavery question. Finally he separated from the Democrats and joined the Republicans in 1854. He continued doing strenuous political work for the party of his adoption, and again he had his reward by be¬

ing elected to the United States Senate (1857—63). As a delegate to the Republican Conven¬

tion at Baltimore in 1864 he was largely instru¬

mental in securing for Andrew Johnson the nomination for the Vice-Presidency of the United States. Later on King became collector of the port of New York. While holding this latter office he became deranged and finally committed suicide by jumping from a

ferry¬

boat on the Hudson River.

KING, Rufus, American statesman: b.

Scarboro, Me., 24 March 1755; d. Jamaica, L. I., 29 April 1827. He was graduated from Harvard in 1777 and admitted to the bar in 1778. In 1782 he entered the Massachusetts legislature, and Congress in 1784. He took an active part in the convention which framed the Federal Constitution, and removing to New York in 1788 became a senator from that State the next year, serving 1789-96. He was United States Minister to Great Britain (1796-1803), and after some years spent in partial retire¬

ment was sent for the third time to the Senate in 1813, and won renown as an orator by the brilliant speech he made on the burning of Washington by the British. In 1819 he was again elected to the Senate, serving till 1825, when he was appointed the second time Min¬

ister to the court of Saint James. He was the Federalist candidate for the Vice-Presidency in 1804 and 1808. In collaboration with Hamil¬

ton he wrote the (Camillus Letters. >

KING, Rufus, American journalist and

soldier: b. New York, 26 Jan. 1814; d. there, 13 Oct. 1876. He was graduated from West Point in 1833, entered the engineer corps, re¬

signed from the army in 1836, became assist¬

ant engineer of the New York and Erie Rail¬

way, and was adjutant-general of New York State 1839-43. He was associate editor of the Albany Evening Journal, and in 1841-45 editor of the Albany Advertiser. Having then re¬

moved to Wisconsin, he was editor of the Milwaukee

Sentinel and Gazette in 1845-61, and KING

in 1847-48 a member of the State Constitu¬

tional Convention. In May 1861 he was com¬

missioned brigadier-general of Wisconsin vol¬

unteers. He commanded the first division of the Third Army corps in the Department of the Rappahannock in March-August 1862, was a member of the court-martial for the trial of Maj.-Gen. Fitz-John Porter (1862-63), resigned 20 Oct. 1863, and was Minister at Rome in 1863-67. In 1867-69 he was deputy customs collector of New York port.

KING, Samuel Archer, American aero¬

naut and scientist: b. Philadelphia, 1828; d.

1914. At the age of 21 he began making balloons in which he took a great interest. This led him to make ascensions himself two years later at Philadelphia. His interest in the mat¬

ter created interest in others, so that balloon ascensions became features of expositions, traveling shows and other affairs in which many people were collected together. King himself sometimes made ascensions at such places, notably at the World's Columbian Ex¬

position (Chicago 1893). Between this date and his ascensions at the Centennial Exposi¬

tion in 1876 much had been done by himself and others of his followers to increase the general interest in the navigation of the air.

King led the way in the scientific study of the means of air navigation and in the photograph¬

ing of objects, especially towns and cities, from the air.

KING, Thomas Starr, American Unitarian

clergyman and lecturer, generally known as Starr King: b. New York, 17 Dec. 1824; d. San Francisco, 4 March 1864. He was a clerk in a dry goods store at Charlestown, Mass., in 1836-40, a teacher at Boston and Medford in 1840-42, studied theology with Hosea Ballou at Medford, preached for a time to a Universal-

ist congregation of Boston, and in 1846-48 was pastor of the Universalist Church at Charles¬

town. In 1848-60 he was pastor of the Hollis Street Unitarian Church of Boston, and during this period gained great popularity as a lyceum lecturer in the Northern States. Best known was his (Substance and Show, but other familiar subjects were 'Goethe,* 'Sight and Insight,) (The Laws of Disorder, > 'Socrates.*

He became pastor of the First Unitarian So¬

ciety of San Francisco in 1860; was among the first, by newspaper article and lecture, to call attention to the Yosemite Valley, and when, in the Presidential campaign of 1860, the idea of the establishment of California as an independ¬

ent Pacific republic was discussed, denounced the project from the lecture platform and pre¬

served the State to the Union. During the Civil War he was active in obtaining in Cali¬

fornia large and necessary funds for the Sani¬

tary Commission. His name was at one time associated with the White Mountains, which he thoroughly explored, and which became known chiefly through his writings, particularly 'The White Hills: Their Legends, Landscape and Poetry (1859; new ed., 1887). One of the peaks of the White Mountains has been called Starr King in his honor. A memorial to him was set up in Golden Gate Park, San Francisco, Cal., in 1889. King was one of the leading figures*

of the American Lyceum in the most flourishing days of that institution. 'Patriot¬

ism and other Papers) appeared posthumously vol. 16 — 28

(1865), as did the sermon 'Christianity and Humanity* (1877), with a memoir by E. P.

Whipple, and the collection of lectures, 'Sub¬

stance and Show) (Boston 1877). Consult also Frothingham, 'A Tribute to Thomas Starr King* (1865), and Whipple, E. P., 'American Literature and Other Papers* (Boston 1887).

KING, William, English author: b.

London, 1663; d. 1712. Graduating from Ox¬

ford in 1665 he spent five years in preparing for literary life. He soon proved himself a caustic critic who unerringly found the weak spots in human nature. Yet there was enough of humor in his work to lighten his caustic vein and to make it popular. His first dramatic effort, which was directed in favor of the Tory High Church Party, was entitled 'Dialogue Showing the Way to Modern Preferment. * He was, from this time on, in favor with the court and the recipient of successive political prefer¬

ments, among them the judge of the Admi¬

ralty Court in Ireland, vicar-general of Armagh and keeper of the records of Dublin Castle. These offices all left him plenty of time for his literary labors which he did not employ to the best of advantage. Nor did he wisely use the time he did dedicate to litera¬

ture. Thus his undoubtedly great talents were often misdirected or not directed at all. His indolence went even to the neglect of the preservation and publication of his manuscripts, some of which were lost and others of which were not published during the lifetime of the author. Among his published

works are

'Journey to London in the Year 1698,) 'An¬

imadversions,* 'Dialogues of the Dead,* 'The Art of Cookery,* 'The Art of Love,* 'Useful Transactions in Philosophy and Other Sorts of Learning,* 'Historical Account of the Heathen Gods and Heroes,* all sparkling with humor and originality. It was not until more than half a century after his death that his works were published as a whole, that is, such as were still preserved. This edition was due to John Nichols, who issued it in three volumes in 1776.

KING, William, American politician, first governor of the State of Maine : b. Scarboro, Me., 1768; d. Bath, Me., 17 June 1852. He was, during the greater part of his life, the last 50

years of which were passed in Bath, an active and successful merchant, but is better known by his public services in his native State. At an early period of his career he became a member of the Massachusetts legislature, and in that capacity was distinguished by his efforts in be¬

half of religious freedom, and of securing to original settlers upon wild lands the benefit of their improvements. He was an early and ardent advocate of the separation of Maine from Massachusetts, and upon the consumma¬

tion of that act presided over the convention which met in 1819 to frame the constitution of the new State. He was subsequently elected the first governor of Maine, and, after holding office a little more than a year, became one of the United States commissioners for the ad¬

justment of Spanish claims. He also held other offices of importance under the general and State governments, including that of collector of the port of Bath.

KING, William Frederick, Canadian as¬

tronomer and surveyor: b. Stowmarket, Suffolk, 434

England, 1854. He was brought, as a small child, by his parents to Canada, and received his education in Toronto University. On graduation, he entered the employ 'of the Dominion government as land surveyor in the great Northwest, becoming finally chief in¬

spector of surveys in 1886. Four years later lie became chief astronomer of the Department of the Interior, and in 1905 director of the Dominion Astronomical Observatory at Ottawa, and in 1909 superintendent of the Geodetic Survey of Canada. For this and other work for the encouragement of science he was knighted in 1908. Among his numerous writ¬

ings is (Astronomy in Canada. >

KING, William Lyon Mackenzie, Cana¬

dian statesman and economist: b. Berlin, On¬

tario, Canada, 1874. He was named after his grandfather, William Lyon Mackenzie.

Educated at Toronto and Harvard universities, he entered journalism as a member of the editorial staff of the Toronto Globe (1895-96).

In 1896 he went to Europe as a commissioner of the Dominion to report on the execution of contracts let by the government, a position he held for three years, when he became instructor m political economy in Harvard University and Deputy Minister of Labor in the Canadian Parliament (1900-08). Elected Liberal mem¬

ber of the Dominion Parliament in 1909, he became Minister of Labor in the Laurier Cab-

met (1909-11). He was the author of the Canadian Industrial Disputes Investigation Act, and he served on important industrial and other commissions, and was government conciliator in stiikes, all of which

offices he performed with signal success. He was a Royal Commis¬

sioner appointed to settle the losses of the vic-

the Japanese riots in Vancouver, Brit¬

ish Columbia (1908); delegate to the Interna-

°,plum Commission, Shanghai, China

(1909) ; delegate to the International Social and Industrial Congress, The Hague (1910), and delegate to the International Peace Conference Lake Mohonk, N. Y. (1911), and three years later he was commissioned by the Rockefeller Foundation to investigate the relations between laboi and capital. The British government conferred upon him, in 1906, the decoration C.M.G. for services done in behalf of society and the betterment of the relations between labor and capital.

Rufus, American states¬

man, 13th Vice-President of the LTnited States'

E Sampson County, N. C., 6 April 1786; d. in Dallas County, Ala., 17 April 1853. He entered the University of North Carolina at 12 and \\as graduated in 1803. He then commenced the study of law and was admitted to the bar in 1806. In 1806 he was elected to the legis-

!onnre Tfr01r^1ohi,s native county, and again in 1809. In 1810 he was elected to Congress and was twice re-elected. In Congress he united himself with Clay, Calhoun and others who advocated the war policy of Mr. Madison’s administration, and voted for the declaration of war in June 1812. In the spring of 1816 he Resigned his seat to become secretary of lega¬

tion to Naples under William Pinckney. The latter was afterward transferred to' Saint J etersburg, and was accompanied to that court a. , by Kiug as secretary. Having removed to Alabama, he was elected

in 1819 one of the United States senators from the new State, and was successively re-elected in 1823, 1828, ' 1834

and 1840. In April 1844 he was appointed Minister to France. The proposition for the annexation of Texas was then pending. Eng¬

land was known to be decidedly opposed to the scheme and there was a general belief that her government was urging France to join in a protest against it. King was an active advocate of the annexation, and upon reaching Paris directed his efforts to prevent this joint pro¬

test, in which he was successful. He returned the United States in November 1846. In 1848 Senator Arthur P. Bagby was sent as Minister to Russia, and King was appointed to fill the vacancy thus created. In 1849 the term lor which he was appointed having expired, he iQ^n e ecte.d tor a full term of six years. In 18AJ, on the accession of Vice-President Fill-

moie to the Presidency, King was unanimously ejected president of the Senate. In 1852 he was elected Vice-President of the United States, at the time Franklin Pierce was elected President.

KING, a person vested with supreme power in a foreign state, territory or nation. Ac¬

cording to feudal usages the king was the source, from which all command, honor and authority flowed, and he delegated to his fol¬

lowers the power by which they exercise sub¬

ordinate rule or authority. There is now no very clearly marked distinction between a king and an emperor. A queen-regent, or a prin¬

cess who has inherited the sovereign power in countries where female succession to the throne is recognized, possesses all the political rights ot a king.

KING-AT-ARMS, an officer of great an¬

tiquity, whose business it is to direct the her-

alds, preside at their chapters and have the jurisdiction of armory. There are three kings-

at-arms in England, Garter, Clarencieux and Norroy. The first is called the principal king-

at-arms, the other two provincial kings-at-

Spaniel0 CHARLES SPANIEL. See Dog;

KING CONCH, the great wing-shells of

e genus Strombus, especially A. gigas of the West Indies and A. pugilis of Florida. The arge helmet-shells (Cassis) of the same re-

gion are often called ^queen conchs.®

KING COTTON, a popular name given

the cotton plant in the United States. «Cotton is. was a frequent declaration before the Givil War, when the supremacy of cotton in commerce and politics was strongly asserted bv public men, especially in the South.

KING-CRAB. See Horsefoot Crab.

KING-CROW. See Drongo.

, a bird-dealers' name for

the Australian parrots of the genus AsPro-

mictus. r

KING DUCK, the spectacled eider. See

Eider Duck.

KING GEORGE V LAND, a name given

recently to a part of the Antarctic Continent

discovered by Sir Douglas Mawson in 1911

and explored by him in that and the follow¬

ing two years. It covers a very considerable extent of country, stretching as it does from KING GEORGE'S SOUND — KING HENRY THE FIFTH

long. 144° E. to 153° E. ; and the whole region is covered by a great cap of ice.

KING GEORGE'S SOUND, an inlet in

western Australia, five miles broad ; it is an - excellent roadstead and contains two land¬

locked recesses. Princess Royal and Oyster harbors. Albany, on Princess Royal Harbor, is a port of call for mail steamers.

KING GEORGE'S WAR, a war of Great

Britain and its American colonies, against France and its Indian allies (1743-48), so named from King George II. See Colonial Wars in America.

KING HAAKON VII LAND, the name

given by its explorer, Hansen, who spent the years 1903 and 1904 there. This territory, which forms the northeastern coast of Vic¬

toria Land, lies opposite Melville Sound.

KING HENRY THE FOURTH. This

play in its first and second parts may be con¬

sidered as one play, though as in all sequels, the second is 'lacking in the freshness and per¬

fection of the first. The two plays were writ¬

ten at the time when Shakespeare was com¬

pleting his series of historical dramas and comedies. By. combining these two types in one play he achieves one of his greatest triumphs.

At first sight the two types of drama might be thought incompatible, but by the connection of Prince Hal with Falstaff and his companions on the one hand and with the great historical characters and incidents on the other, the suc¬

cess is complete.

In the two plays Shakespeare's ability to re¬

produce for his age the outstanding figures of English history reaches its climax. They are not only a link in the chain of his other histor¬

ical plays, but they throw a light over them.

We have here all the pomp and circumstance of war — chivalry reaching its climax in the fig¬

ures of Hotspur and Prince Hal. We have revolutions, wars, conspiracies and rebellions ; in fact every incident is connected with some great and memorable movement. If Henry the Fourth is cold and restrained and his court conventional, he yet represents the unity of England, against which the fiery Hotspur and his comrades fight in vain. But the real hero of the plays — and one of the heroes of English people ever since they were written — is Prince Hal, who <(passes from the gay and giddy youth of idle pleasure into wise counsel, mag¬

nanimous sentiment and heroic action.® In these plays, as in (Henry the Fifth, > he is Shakespeare's ideal man of action, with a hold upon the life of the nation and a personal mag¬

netism that have endeared him to English hearts. Popular as were the historical por¬

tions of these plays, from the very beginning Falstaff was perhaps the chief point of inter¬

est. In the title pages to both plays the <(hu-

morous conceits of John Falstaff® were fea¬

tured. The traditional story of Prince Hal in relation to the boisterous companions of his youth and the complete change in his life when he came into manhood was a challenge to Shakespeare's creative imagination. It is clear that the genius of Falstaff, his inexhaustible humor and imagination, is a sufficient reason for the fascination that he had for Prince Hal.

The companions of Falstaff — real figures con¬

veying the manners of their class, not only in the Middle Ages but in the Elizabethan Age —are necessary instruments in the plot, but they furnish no adequate explanation of the Prince's wild escapades. Falstaff is as supreme a comic character as Hamlet and King Lear in their roles. He openly assumes the character of braggart, coward and glutton that he may en¬

joy the play of his imagination; he is an actor in himself. His physical properties are in per¬

fect harmony with his intellect ; his resource¬

fulness is inexhaustible. Whether disputing with the hostess about his bills or ! his promises of marriage, or explaining his running away from the robbers, or justifying his words against the Prince, or answering the condem¬

nation of the Chief Justice, or characterizing his ragged regiment of soldiers, he has a range of ideas, a happiness of fancy and a genius of expression that are beyond all praise. <(He is a comic Hamlet, stronger in practical resource and hardly less rich in thought, and without any of his melancholy.® He is the exuberance of good humor and good nature ; he nourishes his mind with jest as he does his body with sack and sugar. He is not only witty, but the cause of wittiness that is in others. His 'say¬

ings have become proverbs, while his acts are almost beyond the power of any actor to re¬

produce.

The difficult problem in the relation of Prince Hal and Falstaff is the almost cruel speech that the former makes when he be¬

comes king and banishes his old comrade. This is clearly anticipated, however, in the opening act of the first part when the Prince compares himself to the sun, and his companions to the (

lific, the Prince has inherent in him a substan¬

tial seriousness that must eventually cause him to escape from the irresponsibility of his youth.

He is a judge of Falstaff's humor, even as the dramatist was himself. Falstaff endeavors *to coruscate away the realities of life; he be¬

lieves that the facts and laws of the world may be bated or set at defiance, if only the re¬

sources of inexhaustible wit be called upon to supply by brilliant ingenuity whatever de¬

ficiencies may be found in character and con¬

duct.® Therefore Shakespeare condemned

Falstaff inexorably, and so did Prince Hal when he faced the responsibilities of leading a great nation.

Edwin Mims.

KING HENRY THE FIFTH. ^King

Henry V> is the last of the group of history plays to which were devoted so large a part of Shakespeare's energies during the first decade of his career. It brings to culmination the exposition of national issues which eight earlier adaptations of chronicle history had essayed with steadily

increasing power. After (Henry VP Shakespeare entered this field only once again — when (Henry VHP was produced a dozen years later ; but the nature of Shake¬

speare's concern in this last play is proble¬

matical and it should not be considered among the earlier group of histories. (Henry V> is the final fanfare of Elizabethan patriotic exul¬

tation and marks the close of the dramatic epoch inaugurated in the time of the Armada by

From this play Shakespeare himself passed to the treatment of more philosophic questions in the subsequent dramas of (Julius Caesar* and 'Hamlet,* and save for a few weak echoes the note of nationalism on the English stage died away.

'Henry V* was printed in 1600, and was clearly popular. A second quarto edition, of which only two copies seem now extant, ap¬

peared in 1602, and a third (falsely dated 1608) in 1619. Modern texts, however, are not based upon any of these, but upon the much more complete and accurate version of the folio of 1623. Composition of the play apparently pre¬

ceded the publication of the first quarto by a very short interval, for the allusion by 'the Chorus at the opening of Act V to (

eral of our gracious empress . . . from Ire¬

land coming, Bringing rebellion broached on his sword* must from the context have been written during the absence of the Earl of Es¬

sex in Ireland (15 April-28 Sept. 1599). The fact that this passage and all the other speeches oi the

Chorus are wanting in the quarto ver¬

sions is probably of no significance except to show the imperfectness of those versions.

It is likely that (Henry V) was one of the very first plays acted at the Globe Theatre (constructed in the spring of 1599) and that the first speech of the play alludes specifically to the new playhouse :

" Can this cockpit hold

The vasty fields of France? Or may we cram Within this wooden O the very casques That did aflright the air at Agincourt?"

While not one of the most permanent fa¬

vorites, the play has been frequently revived.

The most memorable performances in America were those of Richard Mansfield in 1900. By the reading public 'Henry V> has been gen¬

erally beloved as one of the heartiest and sin-

cerest of the poet's works. Recently, however, the king's character, as Shakespeare depicts it in this play and in the two parts of (Henry IV, }

has been subjected to unsympathetic scrutiny by three very distinguished critics : W. B.

Yeats ((Ideas of Good and Evil.* 1903), Prof A. C. Bradley ((The Rejection of Falstaff,*

1902, in (Oxford Lectures on Poetry *) and John Masefield ((William Shakespeare, * Home University Library, 1911). They all protest against the strain . of cal'ous selfishness in Henry, finding distinct discomfort in the idea that Shakespeare could have intended him as a hero. The limitations in the king, when com¬

pared with such characters as Hamlet and Brutus, are undeniable, and perhaps they ex¬

plain in part why Shakespeare abandoned the patriotic history play for works of greater moral depth. Yet it certainly appears that in 'Henry V> the dramatist accepted in good faith the encomiums of Holinshed and permit¬

ted his satisfaction in the performances of the conquering hero to blind him to the lack of qualities with which he regularly endowed his great ideal figures. As in the case of most of Shakespeare's "errors,* the matter is a ques¬

tion for academic speculation only; the ordi¬

nary reader or spectator is too much fired by the lambent brilliance of the piece to admit any qualification of his hero-worship. The sub¬

ject has been judicially treated by Prof. J. W.

Cunliffe ('The Character of Henry V as Prince and King) in the Columbia University 'Shakesperian Studies,* 1916).

Tucker Brooke.

KING HENRY THE SIXTH. The

three parts of (King Henry VP offer some of the most complex problems in Elizabethan drama; and it is indeed rather as problems than as literature that they now attract most readers. Nearly all the dramatists conspicuous during the period from 1590 to 1595 — Shake¬

speare, Marlowe, Greene, Peele, Nashe, Lodge — have been conjecturally associated with their authorship, but the many resultant diffi¬

culties, like others connected with their respec¬

tive dates of composition and precise relation¬

ship to one another, are in large part still un¬

settled.

The first part of (King Henry VP is ex¬

tant only in a single form, that found in the Shakespeare Folio of 1623, but the second and third parts each appeared during the preceding 30 years in at least three different versions.

Lender the title of 'The First Part of the Con¬

tention betwixt the two famous Houses of York and Lancaster, Thomas Millington pub¬*

lished, in 1594, the earliest known text of '2

Henry VI, a text containing only about half as many lines as that of the Folio. In the fol¬*

lowing year (1595), the same publisher brought out 'The True Tragedy of Richard Duke of Yorkp which bears an analogous relation to '3

Henry VIP Both these early plays were re¬

printed in 1600 with only inessential changes, and again, with slightly greater alterations, in 1619. In the last edition thev were for the first time combined under the title of 'The Whole Contention between the Two famous Houses, Lancaster and York,1 and for the first time the phrase ((Written by William Shakespeare, Gent.,* was introduced. All editions previous to 1619 are anonymous.*

Of the three plays as printed in the Folio, the first part contains fewest evidences of Shakespeare's work. Modern critics have been inclined to recognize his hand, with varying de¬

grees of assurance, in the scene that depicts the plucking of roses in the Temple Garden (II, iv), in the next one (II, v) which intro¬

duces the dying Mortimer, in several, at least, of the series of^ short scenes dealing with Tal¬

bot's death (IV, ii-vii), and possibly in Suf¬

folk s wooing of Margaret (V, iii).

More positiveness is allowable in regard to the second and third parts, where Shakespeare's hand seems perceptible in virtually all the ex¬

tensive Folio additions to the text of the (Whole Contention of 1619. Study of this added material, carefully inlaid upon the origi¬*

nal dramas, leads to valuable inferences regard-

ing Shakespeare's early style and mode of com¬

position. That Shakespeare had any hand in writing the (First Part of the Contention) and 'True Tragedy) themselves is not likely, though the Jack Cade scenes of the former bear a gen¬

eral similarity to his work and particularly re¬

semble a comic scene in the contemporary play of 'Sir Thomas More,) plausibly ascribed to Shakespeare. Hardlv more convincing are the specific evidences hitherto adduced in support of Greene's or Peek's part authorship of the early plays. The trend of recent investigation is to justify the dictum of the judicial Hal-

lam ('Introduction to the Literature of Eu-

rope,) ed. 1839, ii, 377) : <(The greater part of the plays in question ((First Part of the Con¬

tention) and (True Tragedy)) is in the judg¬

ment, I conceive, of all competent critics, far sabove the powers either of Greene or Peele, and exhibits a much greater share of the spir¬

ited versification, called by Jonson the (mighty line) of Christopher Marlowe.)) In short, the lion's share in the two fundamental dramas seems to belong

to Marlowe, while the ampli¬

fication by which they were converted into c2) and (3 Henry VP is largely, if not wholly, the work of Shakespeare. Further discussion of moot points alluded to above will be found in the following recent articles : Gray, H. D., Shakespeare's Contribution to 1 Henry VP

(Publications of the Modern Language Asso¬

ciation of America, September 1917) ; Brooke, C. F. T.,

versity Press 1912).

Tucker Brooke.

KING HENRY VIII is certainly one of

the latest plays with which Shakespeare was concerned. It was performed, apparently for the first time, at the Globe Theatre, 29 June 1613. A spectator on that occasion. Sir Henry Wotton, speaks of it as ((a new play, called CA11 is True,) representing some principal pieces of the reign of Henry the Eighth, which was set forth with many extraordinary circum¬

stances of pomp and majesty, even to the matting of the stage; the Knights of the Order with their Georges and Garter, the guards with their embroidered coats.)) The elaborateness of the production proved disastrous, for the eyewitness continues: ((Now King Henry, making a masque at the Cardinal Wolsey's house, and certain cannons being shot off at his entry (cf. I, iv, 49, s. d.), some of the paper or other stuff wherewith one of them was stopped, did light on the thatch, where be¬

ing thought at first but an idle smoke ... it consuming within less than an hour the whole kindled inwardly and ran round like a train, house to the very ground.® Thus perished the Shakespearean Globe Theatre in the first mod¬

ern theatrical conflagration. The building was reconstructed the next year, but in the mean¬

while it is probable that Shakespeare's com¬

pany continued the performance of (Henry VHP at their other theatre of Blackfriars, where, it has been pointed out, they would have been acting the scene of Queen Catherine's trial (II, iv) in the very building in which the actual trial had taken place 84 years pre¬

viously. (Henry VHP was first published in the Folio of 1623. There it appears as the last in order of the history plays and in conform¬

ity to the others is entitled (The Famous His¬

tory of the Life of King Henry the Eight.) The Prologue, 11, 18-22, evidently alludes to the other title, (All is True,) under which it. is natural that the drama should have been orig¬

inally advertised since at the time of its presen¬

tation in 1613 interest in the strict history play had been dead for a dozen years. In 1613

Shakespeare's active participation in the affairs of the King's Company had virtually or en¬

tirely ceased, and his post of chief poet for the company had fallen upon John Fletcher. It was Fletcher, undoubtedly, who wrote most of (Henry VIII,) though Shakespeare's hand and the features of his latest style are clear in some of the earlier scenes (I, i, II, iii, iv) and occa¬

sionally elsewhere. In III, ii, the great scene of Wolsey's fall, Shakespeare appears to have written the first 200 lines and Fletcher the re¬

mainder. Here the continuator cannot be said to fall short of his pattern. It is Fletcher who contributes Wolsey's soliloquy, ((Farewell! a long farewell, to all my greatness 1® and his even more famous speech

to Cromwell, of which the concluding lines, ((Cromwell, I charge thee, fling away ambition,® etc., form the best-

known passage in the play. The brilliance of this part of the work, which rises above Fletcher's usual level, has even evoked the bold suggestion that Shakespeare was here paying his collaborator the compliment of showing what he could himself do in Fletcher's par¬

ticular style. Other theories regarding the play which deserve mention, though controverted by the evidence in the case, are that Shakespeare originally wrote the play before the death of Queen Elizabeth in 1603 (consult Elze, K .,Jahr-

bucli of the German Shakespeare Society, Vol.

IX, 55-86) and that Fletcher's collaborator was not Shakespeare but Massinger (consult Boyle, R., transactions of the New Shakespeare So¬

ciety)). It is quite possible that Fletcher and Massinger were both employed in revising and completing the play when Shakespeare's retire¬

ment left it a fragment. The part of King Henry in the play is said to have been created by John Lowin (1576-1659), acting presumably to the Wolsey of Burbage. Sir William Dav-

enant passed' on his recollection of Lowin's in¬

terpretation to Betterton who performed the part after the Restoration. In 1727 an elabo¬

rate performance was given in connection with the coronation of George II. The most notable modern productions were those in which Sir Henry Irving (1892) and Sir Herbert Tree (1910) respectively took the part of Wolsey.

Tucker Brooke.

KING JOHN.

King John} is mentioned among Shakespeare's works by Francis Meres in 1598, but was not printed till the appearance of the Folio in 1623.

In historic time it stands at the head of the history plays, and in date of composition it probably preceded all except (Henry VP and (Richard III.) Critics assign it to 1593 or 1594.

This play is an interesting mark of the transi¬

tion from Shakespeare's earliest manner to his mature mode of composition. Like the second and third parts of (Henrv VI,) it is based upon an earlier drama in two parts. This . latter work was printed in 1591 under the title of

ence is shown in (King John) in that, though making few important changes in the story, he retains practically nothing of the original lan¬

guage. The plot, therefore, of the later play is essentially that of the unknown author of the (Troublesome Reign,) while the language and in great degree the psychology are Shake¬

speare's own. The condensation of 10 acts of the original into five has been skillfully done, but evidences of cramping appears, especially toward the close, where the entire second part of the (Troublesome Reign) is shortened into Act IV, sc. iii, and Act V of (King John.) As might be assumed from the circumstances 438

KING LEAR

KING-MONKEY

of composition, the dramatic value of (King John lies less in structure or even character¬*

ization than in the emotional beauty of many speeches. Typical of Shakespeare's earliest per¬

iod of real mastery are, for example, the famous sentimental scene between Hubert and Prince Arthur

(IV, i) ; the expressions of Con¬

stance's mother-love, e.g., Ill, iv, 93ff : " Grief fills the room up of my absent child, Lies in his bed, walks up and down with me"; and the closing patriotic declamation of the Bastard Faulconbridge,

" This England never did, nor never shall Lie at the proud foot of a conqueror," etc.

Of the first passage mentioned, Hazlitt writes ((Characters of Shakespeare's Plays, > 1817); (

mixing the extremes of terror an I pity, of that which shocks and that which soothes the mind, it is this scene.®

There seems to be no record of any actual performance of (King John > before 1737. Gar¬

rick acted the title role at Drury Lane in 1744.

and in 1755 took the part of the Bastard with less success. On the whole, the play offers more opportunity for actresses than for actors, many heroines of the stage — among others, Mrs. Cibber, Mrs. Siddons and Ellen Terry —having won fame either as Constance or as Prince Arthur.

Tucker Brooke.

KING LEAR. The important editions of

'King Lear) are the first quarto (1607), the second quarto (1608) and the first folio (1623).

The various readings of these texts constitute interesting problems of textual criticism. The record in the Stationers' Register, 26 Nov. 1607, indicates that the play was acted before the king at Christmas the preceding year. Certain internal evidence, such as the reference to the Hate eclipses® (October 1605) and the Gun¬

powder Plot (5 Nov. 1605), would point to a probable earlier date. The verse, the dramatic technique and

the high seriousness of the tragedy all indicate that Shakespeare wrote the play at a time when his genius had reached its highest point of development.

The story upon which the play is based had been current since Geoffrey of Monmouth's (Historia Britannorum, and Laymon's (Brut.>*

Shakespeare was mainly dependent, however, upon Holinshed's (Chronicles (1577), Spen¬*

*ser's version of the second book of the (Faerie Queene, * and an older play (The True Chron¬*

icle History of King Leir and His Three Daughters (1594). The story of Gloucester and his two sons was not a part of the original story, but had been set forth in Sidney's (Ar¬*

cadia. No play illustrates better the drama¬*

tist's indebtedness to his sources, and at the same time the dramatic power with which he changed all the details into a dramatic unity.

"The little more and how much it is, The little less and what worlds away!"

(King Lear in its complexity of plot, its large number of characters, and its immense physical background, is the best possible illus¬*

tration of the difference between the romantic drama and the classic. A detailed comparison with

icle history and the tragedy of blood. And yet this varied wealth of character, passion, pathos and high philosophy, all subordinated to one harmonious whole, constitutes the glory of the play.

While many of the details of character and plot deserve consideration, it is well to em¬

phasize the nature of the play as a tragedy.

In no other play does Shakespeare represent or

interpret so well the tragedy of the universe.

All that is evil in man and woman comes to the surface. The animal world in all its ferocity, and nature, red in tooth and claw, are blended with the representation of man at his worst.

The serpent, the wolf, the vulture, the wild boar — monsters of the deep that tear each other in their slime — are the counterparts of evil human creatures. Humanity preys upon itself, while the winds and the storms and sheets of fire turn upon human creatures ((to complete the ruin they have wrought upon themselves.®

When the light begins to break toward the end of the play, the storm comes again as Cordelia is hanged and Lear comes upon the stage with his daughter in his arms, crying, _((Never, never, never, never, never.® In their impotence Gloucester and Lear appeal to the higher powers — the stars, the heavens, the gods — but in vain. One thing alone is evident from the play — namely, that evil finally comes to definite defeat and that good, though mutilated and sacrificed, is its own reward. Tragic suf¬

fering is the privilege of great souls. But we remain confronted with ((the inexplicable fact, or the no less inexplicable appearance, of a world travailing for protection, but bringing to birth, together with glorious good, an evil which it is able to overcome only by self-torture and self-waste. If this is, as Professor Bradley has suggested, the essence of tragedy as Shake¬

speare conceived it, surely

Edwin Mims.

KING LOG, a log that, in one of 2Esop's fables, was given to the frogs to be their king or ruler. The character of the ((king log® has become famous in literature. When the frogs found out what had been foisted upon them as a ruler by the god they

petitioned him to remove this wooden king and to send them an¬

other in his place. This Jupiter did, replacing the log with a stork who at once began eating his subjects. Thus the frogs experienced the truth of the saying that a stupid ruler is better by far than a vicious and evil-disposed one.

KING OF THE MACKERELS, a strange

oceanic fish of the genus Ranzania, allied to the ocean sunfish (Mold), various species of which are superstitiously so-called in various parts of the world. One kind (R. truncata) is now and then taken in the north Atlantic; and a Ha¬

waiian and Japanese species is R. makua. Con¬

sult Goode and Bean, (Oceanic Ichthyology*

(1895).

KING-MONKEY, a monkey of the Afri¬

can semnopithecine genus Colobus, of which there are several species, one of which is the guereza (q.v.).

KING OF THE MULLETS. See Car¬

dinal-fish.

KING-NUT, the shag-bark hickory.

KING PENGUIN. See Penguin.

KING PHILIP'S WAR. See Colonial

Wars in America.

KING RAIL. See Rail.

KING RENE'S DAUGHTER (La Hija

del Ray Rene). Henrik Hertz's lyrical drama, 'King Rene's Daughter,5 was written in 1845.

Besides (Svend Dyrings Hus) it is the best known of all the dramas, about 40 in number, by this Danish author. The play met at once with great success and has been translated sev¬

eral times into German and English, also into Polish and Spanish. It is based on an event in the life of Rene, king of Provence in the 15th century, celebrated as a troubadour. His daughter, Yolande, married Tristan. In the play Yolande is blind, and the plot turns on her being awakened by Tristan and informed of her blindness, of which she has been brought up in ignorance, on the very day when such a proceeding was necessary to the recovery of her sight by the arts of a Moorish physician.

'King Rene's Daughter) is an exceedingly beau¬

tiful poem, as effective on the stage as psycho¬

logically interesting and charming by the grace and glow of the language. To those who can read the Danish original the fascination lies principally in the fine, chivalrous tone of the style, the lyric soaring of the expressions, the courteous and choice language. ((It is a dainty piece of dessert for fastidious palates,®

as Brandes says in his critical analysis of the play. It is not to be criticized, but read or heard and enjoyed. Tschaikowsky, in the opera,

There is an English translation by Theodore Martin.

Gisle Bothne.

KING RICHARD THE SECOND. 'King

Richard IP seems to have been composed after Samuel Daniel's (Civil Wars) (1595), a narrative poem from which the play

takes several hints. In 1597 the latter was printed

under the title of 'The Tragedy of King Richard the Second.) The appearance in all of three editions (one brought to light in 1916) before the close of 1598 testifies to the interest of the reading public, an interest ex¬

plainable on three grounds : the growing fame of Shakespeare, who was just becoming widely known; the easy florid beauty of the poetry; and the distinct novelty with which a popular dramatic type is here embellished. The material is taken chiefly from Holinshed's (Chronicle) and deals with only the last two years of Richard's life (1398-1400). This tragedy is distinguished from Shakespeare's other history, plays by the strain of imaginative fantasy that everywhere pervades it. There is much rime and no prose at all : it is not like Shakespeare to make the gardener (III, iv) do his homely moralizing in Miltonic verse, or to find no place whatever for humor. A youthful leaning toward artificiality exposes itself also in the mock chivalry of the tournament scenes (I, i and iii, IV, i, 1-106), which read like dramatized versions of a Waverley novel. The poet's tem¬

porary obsession with sentimental, as opposed to strictly dramatic issues, appears again, and more effectively, in his characterization of the king. The real Richard II, though infirm of purpose, was not the charming aesthete here de¬

picted: he was a man of wild and ruthless vio¬

lence and remarkable physical courage, whose troubles were the retribution for a long period of the most treacherous misgovernment. His wild death scene, in which Shakespeare follows history, was quite in keeping with the real king's life, but involves a reversal of the poet's psychologic values. It cannot be reasonably doubted that in fashioning his material Shakespeare was under the influence of Mar¬

lowe's (Edward II,5 where the reign of a genuine sentimental weakling had been magnifi¬

cently interpreted. However, in thus rendering a hardly legitimate homage to his model, the young poet was also yielding to a natural temp¬

tation, evidenced also in Biron of (Love's Labour's Lost5 and in Romeo, to dally with the charms of emotional fancy at the peril of losing touch with the truer purposes of life. Yet the essential justice meted out, almost unwillingly, to the prosaic, efficient Bolingbioke gives the play a firmness it would otherwise lack, and argues the fundamental soundness of the author's philosophy. Editions of (Richard IP

published before Queen Elizabeth's death in 1603 omitted the abdication scene (IV, i, 154-

318) out of respect for the queen's objection to such themes. On 7 Feb. 1601, adherents of the Earl of Essex attempted to move public opinion in favor of their purposed insurrection by securing the performance of what was then an old play ((of King Harry the Fourth and the killing of King Richard the Second.® This was acted at the Globe, and also, it is said, ((in open streets and houses.® The play in question (which failed of its design to predispose the people toward the queen's deposition) can hardly have been any other than Shakespeare's (Richard II. 5 Through the 17th century the tragedy's implied negation of the divine right of kings continued to render it unpalatable to the censors. Nahum Tate's effort to stage a modified version under the innocent title of (The Sicilian Usurper5 (1681) failed, as did also Theobald's adaptation in 1718. In recent times (Richard IP has been elegantly produced by Sir Henry Irving, F. R. Benson, Sir Her¬

bert Tree, and other actors; but its theme is not one which to-day vitally interests Anglo-

Saxons, and it lacks the complexity of story and broad range of mood which audiences look for in Shakespeare.

Tucker Brooke.

ard IIP is probably Shakespeare’s first unaided effort at dramatizing history. It may have been written as early as 1593, but specific evidence of date is lacking. It was first printed (like ‘Richard IP and ‘Romeo and Juliet5) in 1597; by 1634 eight editions had been called for. The features of this tragedy are most conspicuous when it is compared with ‘Richard II,5 which in date of composition cannot long have fol¬

lowed it. ‘Richard II5 is marked by reflective grace, ‘Richard IIP bv force. Neither yet shows much variety of interest or any humor¬

ous power. It happens that each play belongs to a tetralogy. ‘Richard IIP points back to 440

the three parts of 'Henry VI,) concludes and interprets them; 'Richard IP points forward to the two parts of 'Henry IV) and to (Henry V, * stating the problem of kingly responsibility out of which those plays grow. Like (Richard II, > 'Richard IIP owes much to Marlowe’s in¬

fluence, but while the later play emulates the cool judiciousness of Marlowe’s mature

(Edward II, > the earlier lies still under the spell of the splendid violence of 'Tamburlaine.*

The material of the play under discussion comes for the most part from Holinshed’s chronicle, but the influence of three earlier dramas on the same subject is probably trace¬

able: (1) Dr. Thomas Legge’s Latin play, (Richardus Tertius) (acted at Cambridge 1580), (2) (The True Tragedy of Richard IIP (pub¬

lished 1594), (3) 'The True Tragedy of Richard Duke of York) (published 1595). The last work, which Shakespeare rewrote as the Third Part of 'Henry VI,*

evidently suggested 'Richard IIP as its natural sequel. Through (1) and (2) doubtless came, at least in part, the marked reminiscence of Senecan melodrama.

This shows itself in 'Richard IIP in the special emphasis laid upon soliloquy, the power of the curse (cf. Queen Margaret in I, iii and IV, iv), and ill omen. Like Seneca, Shake¬

speare here makes much of evil dreams. Three of the most notable passages centre about night¬

*mares : Clarence's in I, iv, Stanley's in III, ii, and Richard's m V, iii. More than 'Hamlet,**

'Richard IIP is a one-man drama. The entire play unrolls around the single figure of the villain-hero, and — by means of devices which Shakespeare was to employ more subtly in later works — Richard is made far more significant and interesting than he is in '3 Henry VIP His hypocritical, sardonic assumption of guileless¬

ness, the attractive power which he owes solely to his blazing intellectual fire, the frankness with which he confesses his villainy to himself, and the casuistical wit with which he seeks to explain it, are all traits hardly to be found in the Gloucester of 'Henry VI, and all mark him as the first real precursor of Iago. This play is crude and immature; some critics, among them Lowell, have wished to deny that Shakespeare wrote it. It lacks moderation and true wisdom and even life-likeness; but it has power beyond measure, it bears the indubitable stamp of genius and the promise of higher things. Very few of Shakespeare's plays en¬*

joyed a wider popular success. In the Eliz¬

abethan Age it passed through as many editions as the first part of (Henry IV, > more than anv other Shakespearean play. Richard was one of Burbage's greatest roles, and two centuries later became one of the greatest of Edmund Kean's.

There have been various adaptations, one of which by Cibber still holds the stage in per¬

formances of Mr. Mantell.

Tucker Brooke.

KING OF OCKHAM, Peter, First

Baron, English statesman and writer : b. Ex¬

eter, 1669; d. 1734. Graduated in law in 1698, he became a member of Parliament three years later for Beeralston, Devonshire, as a member of the Whig party. His advancement was rapid because of his active and aggressive character and he was knighted in 1708, was created chief justice of Common Pleas in 1714 and a mem¬

ber of the Privy Council in 1715. For the fol¬

lowing 10 years he continued very active in politics, becoming in that year, in succession, speaker of the House of Lords, Baron and Lord Chancellor, a position he held until 1733

when paralysis forced his resignation. Among his published works are 'An Inquiry into the Constitution, Discipline and Unity and Worship of the Primitive Church* (1691) ; 'A History of the Apostles' Creed* (1702). Consult Campbell, 'Lives of the Lord Chancellors) (London 1858) ; Welsby, 'Lives of Eminent English Judges* (London 1846).

KING OF OCKHAM, Peter, Seventh

Baron, English writer and economist. Edu¬

cated at Eton and Cambridge, he succeeded to the family title in 1793, entering the House of Lords three years later. Like the first baron of the same name (q.v.), he was a Whig, though not of such a determined and uncom¬

promising type. He took a great interest in the finances of the country and especially in the

currency, to the study of which he gave much of his time. He was also in favor of the removal of the restrictions then still placed upon Roman Catholics and deeply interested in the welfare of Ireland which he clearly saw was not being either fairly or wisely handled by the British government. His liberality of thought is also shown in his opposition to the Corn Laws. Among his published works are 'Catholic Emancipation*; 'On the Conduct of the British Government toward the Catholics of Ireland* ; 'A Short History of the Job of Job's*; 'Life of John Locke* (2 vols.).

KING SALMON, or QUINNAT, the

most important of the several species of salmon found on the Pacific Coast of the United States ; called also Chinook or Columbia River salmon (Oncorliynchus tschawytscha) . It is especially abundant in the Columbia and Sacramento rivers, and its great economic importance is due to the fact that it enters the rivers in large numbers in the spring. See Salmon of the Pacific.

KING SNAKE, a large colubrine snake of the southern part of the United States (Osce¬

ola doliata } of which the northern house-snake is a variety), so called on account of the belief in its power and prowess, especially in over¬

coming rattlesnakes. It is grayish white, marked by a series of black rings in a manner so viariable that many color-varieties have been named. It sometimes reaches a length of 10

feet, is extremely muscular and swift, and preys upon frogs, toads and upon snakes, in¬

cluding poisonous ones. Hence this serpent is much respected and rarely killed in the less settled parts of the Southern States. Several other species are known, one of which (O. coc-

cmea) is red with black bands, and called the red king snake.. These snakes are reproduced by eggs

buried in sandy soil or loose dust, like that of a rotting stump. The chain-snakes (q.v.) of the allied genus Ophiobolus, have an equal right to the name ''king snake,** and fre¬

quently receive it. Consult Holbrook. 'North American Herpetology* (Vol. Ill, Philadelphia 1842) ; Ditmars, 'Reptile Book* (New York .

1907). K

KING VULTUR. See Condor.

KING WILLIAM'S WAR, a war waged

by Great Britain and its colonies in America against France and its Indian allies in 1689-

1697. See Colonial Wars in America.

KINGBIRD, one of the most familiar rep¬

resentatives in the United States of the tyrant ily-catchers (TyrannicLce) . The typical genus is distinguished by the concealed flame-colored crest, attenuate outer primaries and square tail and contains many species. The eastern king¬

bird (Tyrannus carolinensis) is found through¬

out the United States, but rarely in the South¬

west or west of the Rocky Mountains; it also enters the British provinces and breeds through¬

out this range ; in winter it migrates into Mex¬

ico, Central and South America. It is a plain little bird about eight inches long, nearly black above and quite so on the head, this color there contrasting greatly with the brilliant .flame color of the crest, which can be con¬

cealed or erected at will ; the tail is tipped with white and the under parts are wholly white.

The young lack the highly colored crown. The most distinctive trait of the kingbird is pug¬

nacity, and during the nesting season no bird may come near its home without being attacked and almost invariably routed. Even crows, hawks and eagles fly before its fearless and vigorous onslaughts. On account of the large gape of the mouth, the spreading bristles at its sides, and the flat, broad bill, the kingbird, in common with related species, is an adept in capturing flying insects, which constitute its almost exclusive food. In some localities it is known as the bee-martin, and has gained a bad reputation as a destroyer of honey-bees, but it destroys a thousand noxious insects for every bee it eats. The nest is a crude, bulky structure saddled in a conspicuous position on a limb or fork usually of an apple-tree, and the eggs are usually rosy White, boldly spotted with brown and lilac. Two additional species of kingbirds are found in the West and two in the South. Consult Wilson, < American Orni¬

thology* (1834); Baird, Brewer and Ridgway, /History of North American Birds* (1874) ; Coues, (Birds of the Northwest* (1874).

KINGDOM OF GOD. The idea of the

JCingdom of God is prominent in the Old Testa¬

ment, but especially so in the New Testament, finding its centre in the teachings of Jesus.

The Kingdom of God is a goal set before the race; not a Utopian dream, but a realization through character development. It is also a philosophy of history. The phrase Kingdom of God or Kingdom of Heaven is not found in the Old Testament, but the idea was early de¬

veloped (Judges xvii, 6, xviii, 1, xxi, 25) and all the prophets foretold it. Back of their be¬

lief in a coming Kingdom of God was faith in God himself and their earliest political unity was theocentric. Their faith was built on a future in which there was to be a more perfect kingdom. The idea of a Messianic reign is carried from the prophets into Apocryphal literature where it is sometimes strongly stated.

Archibald Robertson well sums up the Jewish faith in the Kingdom of God as Christ found it: (

2. Israel as it was was not the Kingdom of God, for it contained unworthy elements. The existing faithful Jews are the nucleus of the future kingdom.

3. The future kingdom was to be on earth, with Jerusalem with its seat and centre. It was variously conceived as (a) eternal or (b) of limited duration.

4. It was to include the faithful who are dead, and will be raised again.

5. It was to be inaugurated by a Day of Judgment, which appears to be identified with the day of the Messiah's appearance.

6. It was to be an embodiment of all elements of national well-being — social, ethical, spiritual.

7. It was to embrace all peoples, who would come to worship at Jerusalem."

From the beginning Jesus connected his own person with the Messianic Kingdom and dis¬

tinctly taught that it was to be a spiritual kingdom, culminating in the heavenly kingdom.

The members of the kingdom were to be, first of all, his immediate followers, and then their successors in the years to come. The fully de¬

veloped kingdom cannot be recognized here, only in heaven. In the Book of Revelation be¬

gan ithe idea of the millennial reign of Christ on

earth before His final reign in heaven.

The Gnostics and Montanists held their own views of the Kingdom of God — a puritanical rigor of morals was fundamental. The mil¬

lennial idea continued until it was superseded under Constantine with the idea of a Christian empire. Monasticism next arose as a possible method for the seeker after the Kingdom of God.

Augustine developed the idea that the

Church is the Kingdom of God on earth. This was in two parts — the visible and invisible.

The mediaeval theologians built on that con¬

ception 'the idea of an omnipotent Church with its complete centralization of power, culminat¬

ing finally in the work of Gregory VII and Innocent III.

Dante combated this idea in his (De Mon-

archia in which he argues for the divine sanc¬*

tion for the secular life apart from the spirit¬

ual, and demands that the Pope be only the spiritual head of the spiritual Church. And again, as in the early Church, monastic poverty was sought as a means for entrance into the kingdom and so the Orders of Friars flourished.

William of Ockham and Marsilius continued to develop the idea of Dante. John Wyclif was the first to oppose the mediaeval idea theo¬

logically. Then came the Reformation follow¬

ing the intellectual awakening of Europe, in which many voices protested against an om¬

nipotent Church. As a universal idea it was a failure. The Reformation, however, did not put an

ideal in its place. The Counter-Ref¬

ormation and the Renaissance were Catholic attempts to reconstruct the idea. The present-

day tendency in Protestant circles is to rein¬

terpret the biblical sources of the doctrine. It is a part of the growth of the new science of biblical theology. The present idea is that ((the Church is the Kingdom of God in the making** as far as she represents the ideals of the sources of the doctrine. The bibliography of the subject is very extensive. Consult Robertson, Archibald, (Regnum Dei' — Eight Lectures on the Kingdom of God in the His¬

tory of Christian Thought* (1901).

KINGFISH, the name of various fishes of notable power or superior excellence, espe¬

cially certain <(Spanish mackerels® of the genus 6 comberomorus . One, the cavalla or ((King is a favorite game fish in Florida (see - kingfish of New York waters

(Mentictrrhus saxatilis) is one of the whitings, of the family Scicenidce t closely allied to the drums (see Whiting). It is a moderately large migratory marine fish, Musky gray above, sometimes blackish, the back and sides with distinct dark oblique cross-bands running down and forward,® and a V-shaped blotch on each side of the nape. It is also known as (

mink,® and is an- excellent food-fish, but has be¬

come rare, although formerly ascending the Hudson River in schools, in early spring, for 40 miles or so. Other fishes so called are the little roncador (q.v.) of California, and the opah (q.v.). Consult

Jordan and Evermann, jAmerican Food and Game Fishes) (New York KINGFISHER, city, county-seat and

county of the same name in Oklahoma, some 30 miles west of Guthrie. The town is situated on the Chicago, Rock Island and Pacific Rail¬

road, and its shipping facilities and central position made it a centre of distribution for imports and for the products of the surround¬

ing country which are mainly agricultural, de¬

voting considerable attention to stock-raising Pop. 3,000. 6'

,. KINGFISHER, a bird of the family Alce-

dimdcB, characterized by the short, compact body and large head, with a large, straight, acute bill; the somewhat usually short, square tail of 12 rectrices, the short rounded wings having 10 primary quills ; the short, Wvjj e^s and nearly unique cohesion of the middle and outer toes. Two sub-families are commonly recognized, the Dacelonince, or «Kmghunters,® with a broader, depressed, sometimes curved bill and usually insectivorous habits; and the Alcedinidce , or true kingfish¬

ers, with a compressed, carinated bill, and usu¬

ally piscivorous. About 20 genera and 125

species have been described, half of which are confined to the Australian region. About five genera and 50 species are distributed between tropical Africa and Asia, one species alone, the brilliantly colored Alee do ispida, is found in Europe , while all of America has only eight species of Ceryle, three of which extend their range into the United States. Of these three, tw° (Ceryle tor quota and C. americana) are really Mexican and Central American, but the •I i helted kingfisher (C . Alcyon), is a widely distributed 3.nd highly ch3.r3.cterisfir member of the North American avifaunL

Ihroughout North America, from the shores of the Arctic Ocean to the Gulf of Mexico and from the Atlantic to the Pacific is the summer breeding-home of the belted king¬

fisher, which in winter retreats south of the limit of freezing. The large, crested head very large bill and deep blue color, with black and white markings and largely white under parts, give to this bird a very characteristic aspect, which is heightened by its peculiar hab¬

its^ Each pair selects a hunting-ground some¬

where in the vicinity of water, and other pairs sddorn intrude upon this preserve. There the .kingfisher perches on a tree overhanging the water and watches for the passage of a fish, when it plunges headlong and usually emerges with a small fish held firmly in the beak. As it rises a spasmodic shake dispels the water from its compact oily plumage, and on return¬

ing to its perch, the fish is usually tossed into the air and swallowed head first. Sometimes the kingfisher hunts more in the manner of a tern and plunges from a suspended position in mid-air. The only call is a peculiarly loud, harsh, rattling cry. A burrow six to nine feet long, dug horizontally into a bank, serves as a nesting place, in the slightly enlarged end of which the six or eight pure white eggs are laid on a bed of regurgitated fish bones.

The dacelonine kingfishers have very differ¬

ent habits, and might more properly be called kinghunters. They are usually woodland birds, caring little for the neighborhood of water, since their food consists of insects caught mainly on the wing, or else of tree-frogs, liz¬

ards and other small reptiles found on the ground or about trees. The jackass kingfisher (q.v.) of Australia is a prominent example. A peculiar group

of the Papuan Islands (genus Tanysiptera) has long, racket-shaped tail-

feathers and other peculiarities of plumage.

The small East Indian species have only three toes. Those of Africa are inhabitants of deep woods, but when hard pressed for food will resort to streams and pick up small fishes. All these breed in holes in trees and not in earth-

burrows.

Consult Coues, E.,

bridge Natural History, Vol. IX); Sharpe, (Monograph of the AlcedinidaP ; and American and European ornithologies.

family Dacelonince ; specifically the jackass kingfisher (q.v.).

■ KINGLAKE, Alexander William, Eng-

historian : b. Taunton, Somerset, 5 Aug.

1809; d. 2 Jan. 1891. He was educated a«t Eton and Cambridge, was called to the bar in 1837, but ceased to practice in 1856. He represented Bridgewater as a Liberal in Parliament from u- }°r when Bridgewater was disfran-

chiscd for bribery. His distinction a.s a. writer rests upon two books: (Eothen, or Traces of Travel Brought Home From the East) (1844) •

and (The Invasion of the Crimea, > in eight volumes (1863-87). The former is marked by truth to nature, poetry, humor and imagina¬

tion; the latter (which is partly the result of personal observation) is an equally brilliant per-

ormance in its own way, almost exhaustive in its details, picturesque and telling in descrip¬

tion and narrative, but open to the charge of

prejudice m some points, his great dislike of Napoleon III frequently appearing. (See othen). Consult Tuckwell. (Alexander Wil¬

liam Kinglake> (1901); (Dictionary of Na¬

tional Biography) (London).

, ver>\sma11 bird of die thrush

family dwelling in northern forests and visiting southern Europe and the United States only in wmtei These > smallest of songsters, hardlv more than four inches in total length, are olive-

green and gray in color, with a half-concealed yellow crest in one of the two species, the gold-

crest. {Reg ulus satrapa), and a flame-colored one in the other (R . calendula), called ruby-

crown. These tiny birds go about in small lively flocks and have no hesitation in attack¬

ing a crow, jay or hawk with the spiteful fury that long ago won them the name "kinglet®

v among European peasants. Both, especially the ruby-crown, sing sweetly in the spring be¬

fore going to some mountain-top or northern forest to make their cup-like nests in some evergreen tree. See Gold-crest.

KINGMAN, Kansas, city, county-seat of

Kingman County, situated on the Atchison, Topeka and Santa Fe and the Missouri Pacific railroads, some 45 miles west of Wichita, in the midst of a rich agricultural and cattle dis¬

trict. It has butter and salt factories, flour mills and grain elevators and is well supplied with water

motive power. Pop. 3,200.

KINGS, Books of. These two books in the Hebrew Bible formed originally one work. In the Greek version (the Septuagint), Kings and Samuel were reckoned as four Books of King¬

doms. This fourfold division passed into the Christian Bibles through the Vulgate, and was adopted in the printed editions of the Hebrew.

Jerome, however, preferred the title Kings, hence our present name for the second two¬

fold work.

Like Judges, Kings is a product of the era of historical interpretation inaugurated by the publication of Deuteronomy in 621 b.c. (See Deuteronomy and Judges). The reign of Solo¬

mon and the history of the divided kingdom furnished more abundant and varied illustra¬

tion of the central principles of the prophetic law book than even the age of the Judges. The dependence of national prosperity upon abso¬

lute loyalty to Jehovah was illustrated more impressively by the division and downfall of the kingdom than by the vicissitudes of the early struggles, while the second great principle, the sinfulness of worship in the high places and the duty of centralization in the Jerusalem Temple, was exemplified constantly in the his¬

tory from Solomon to the exile. For the pe¬

riod' included in Kings, the writers of the exile did not have, as they did for the time of the Judges, a completed history already at hand, which they needed only to edit. For this era, they must themselves compile the earlier docu¬

ments. Kings is therefore the great, original contribution of the Deuteronomic school of his¬

torians. Some passages, implying that the Tem¬

ple is still standing and the Davidic dynasty un¬

interrupted, suggest that the compilation was undertaken in pre-exilic days, but the work as a whole carries the history in detail to the events following the destruction of Jerusalem in 586 b.c., and cannot have been finished be¬

fore the exile.

The completed work falls into three great sections: (1) The reign of Solomon (1 Kings i-xi) ; (2) The divided kingdom (1 Kings xii-

2 Kings xvii) ; (3) Judah after the fall of Is¬

rael (2 Kings xviii-xxv). At the close of the first and second sections, the compilers intro¬

duce at length their own interpretation of the preceding events in characteristic Deuterono¬

mic terms. At the opening and close of each reign they give their judgments on the succes¬

sive kings in stereotyped formulas. These for¬

mulas include also the chronological data in ac¬

cordance with which they arrange the synchron¬

isms of the reigns. For their sources the com¬

pilers had on hand a book of the Acts of Solo¬

mon and separate Chronicles (Hebrew, Acts of Days) of Isreal and Judah. Thev also had collections of stories concerning Elijah, Elisha and other prophets. Reference is made by title to the Acts of Solomon and the Chronicles of Israel and Judah for additional information not included in Kings. Whether these books were the original state documents we cannot be sure.

From the time of David a Recorder (Hebrew,

Remembrancer) seems to have been a regular officer of the court. Directly or indirectly his records may be supposed to underlie the sources on which the compilers rely for information concerning the public activities of the kings, but it is commonly felt that the Chronicles to which they refer were not the original court records.

They seem, rather, to have been compositions based on these and including also materials that would find no place in official annals. The narratives concerning Elijah, who appears so prominently in the fateful reign of Ahab of Israel, were doubtless composed in prophetic circles not long after his death. The sudden way in which the prophet is introduced (1

Kings xvii, 1) implies that the stories are taken out of a larger work in which fuller informa¬

tion is given concerning him. Some of the other stories in which prophets appear show more traces of the accretions which indicate oral transmission ; those may have been handed down by word of mouth for some time before they were committed to writing. As a whole the books of Kings give the national his¬

tory for a period of 400 years from the death of David to the exile, in a form that commends itself as affording one of the most reliable histories composed in pre-Christian times. Taken in connection with the books of Judges and Samuel, they give a comprehen¬

sive survey of Hebrew history, covering a period of nearly 600 years, from the struggles of the tribes for the possession of the land, through the federation into the monarchy, the division into two kingdoms, their inter-related history, and the separate history of Judah after the fall of Israel until her own downfall. In this series of books, Samuel was already in a form which so satisfied the exilic historians that they made very slight editorial additions, but Judges received much editing from their hands, and Kings, as has been

indicated, is their own compilation. When their work was accomplished, a century before the time of Herodotus, their nation had a history of re¬

markable completeness and reliability, as com¬

pared with other ancient peoples.

In literary form, the books of Kings offer an interesting study. The 11 chapters concern¬

ing Solomon's reign centre in the description of the building and dedication of the Temple. To this central part are prefixed the account of the king's accession and notices of his wisdom, power, and wealth, and there are appended further notices of his wisdom and splendor and of his apostasy and adversaries. The histories of the divided kingdom are most skil¬

fully interwoven so that the contemporary events are kept in close connection and yet the distinction between the two kingdoms is made clear. From the downfall of Israel in 722 b.c., the compilers' task was comparatively simple as they dealt with the records of Judah alone.

The brief epitomes of many of the reigns attord little scope for literary art, but the iuller narratives concerning Elijah and Ahab are among the best told and most inspiring stories of antiquity. Other narratives which show the vigor of Israel's early prose concern the wars with Damascus (1 Kings xx, xxii).

1 ne sections in which the compilers pass their judgment upon Solomon or Israel are marked by the solemn earnestness and rhythmic speech so characteristic of Deuteronomy and of the writers influenced by its noble style and pro¬

found convictions. Even the monotonous

formula, condemning all the kings of Israel for walking in the way of Jeroboam and in his sin w erewith he made Israel to sin, gives some¬

thing of the impressiveness of the tolling of a d,feP *oned bell, that adds its own element to the effect of the whole work

Bibliography.— Cornill, C. H., 'Introduc-

tion to the Canonical Books of the Old Testa¬

ment (London 1909) ; Creelman, H.,

S;on ^o the Old Testament (New York

1917) Driver, S. R., introduction to the Literature of the Old Testament (New York levised ed 1914); Encyclopaedia Biblica^

(New York 1901) ; Fowler, H. T.,

(New York 1900); < Jewish Encyclopaedia) (New \ ork 1904) ; Kent, C. F., 'Israel's His¬

torical and Biographical Narratives* (in Stu¬

dents Old Testament,* New York 1910)-

Cambridge ("

r> r , Henry Thatcher Fowler,

rrofessor of Biblical Literature and History, Brown University.

KING S BENCH, Court of. See Court.

KING S CHAPEL, a religious edifice in iremont street, Boston, Mass., built in 1745 on r.uSltet>of 1an.old.er church. During the War of the Revolution it was for a time forsaken by Hs. Loyalist congregation. In the burial ground adjoining which has been in use since 1630

man\ o the eaily Puritans, including Governor Winthrop, are interred.

KING S COLLEGE, a college of Cam-

VT Hrl1iversity; EnSland, founded by Henry VI in 1441, as the College of Saint Nicholas for a provost and 70 scholars, with Eton Col-

, .as a PreParatory school. Exemption from the jurisdiction of the archbishop of Canter¬

bury* the bishop of Ely, and even of the university in matters scholastic, were some of Us unusual privileges, and until 1857 members of King s College could take a degree without PmS1ug^e llnlvers,ity examinations, a course winch did not conduce to a high standard of scholarship In its roll of celebrated alumni ar.e Archbishop Sumner, Bishoo Pearson, n'c Jri Croke, the Greek scholar, the first ■fir William Temple, Sir Robert Walpole and ^°ridm? tr^tford de Redcliffe. The college had Vca 91j16 a Provost, 46 fellows, 48 scholars, 156 undergraduates. The college chapel is the finest in the world in size, form and decoration.

It contains some of the best stained glass and wood carving examples in England.

COLLEGE, London, a college

established by private subscription and incor¬

porated in 1829, its constitution being amended by an act of Parliament in 1882. It was estab¬

lished for the purpose of providing an edu-

catmn m accordance with the principles of the Established Church. Education is imparted in the departments of theology, general literature and science, applied sciences and engineering, laws and medicine. The department of general literature and science is intended to prepare stu¬

dents for the universities, for the army and the Indian and home civil service; and there are also special classes for civil service candidates.

I here is a department for women. The college possesses a library and a museum, the latter containing Babbage's calculating machine and Kmg George the Third's collection of philo¬

sophical instruments and mechaiycal models It is now a constituent college of London University. Among its celebrated scholars are Prof. Thorold Rogers and Cayley, Sir James Fitzjames Stephen, Dean Farrer, Dante Gabriel Rossetti and his brother William.

KING S COLLEGE, Windsor, is the old¬

est university in what is now the Dominion of Canada, and, with the exception of the French foundation of Laval (q.v.) at Quebec, is the oldest college. It has the distinction of being the oldest university in the British dominions overseas Its establishment was the work of British Loyalists, chiefly from the State of New York, after the close of the War of the Revolution. Of these about 18,000 settled in the Nova Scotia Peninsula. As early as 8

March 1783 a meeting of Loyalists was held in New York, and «A Plan of Religious and Literary Instruction for the Province of Nova bcotia was drawn up and forwarded to the whnmh JeCfetary 1 ,anCL When Df- Charles Ing>is-

nu fad formerly been rector of Trinity Church New York, was consecrated first bishop of Nova Scotia in 1787, one of his first cares was to carry the scheme into effect.

irst a grant was obtained from the provincial legislature for an academy at Windsor. This academy (now known as the Collegiate School) was opened 1 Nov. 1788, and the following year an act was passed for "the permanent estab-

W^dent »nd *;ffe£Ulal suPPort of a college at Windsor, and the sum of £400 sterling per annum granted toward its maintenance. Under this act King s College was opened in 1790 in temporary quarters, and the erection of a build-

mg of wood was begun the following year.

urn- r-St President °f the college was Rev U flham Cochran, a grndu^e of Trinity Col-

Lge, Dublm, who had been professor of Greek and Latin in King's (now Columbia) College New York, but who, on account of his Loyalist resigned and came to Nova Scotia

fll1,A^oyaI-,charter' giving t0 KinS's College TTT CH9S y i)OWerS' Was Sranted by George ill m 18CL and was accompanied by an imne-

untiMSU °V,T a ?eai> which was continued t 1 1834. The board of governors under this charter was a political body, consisting of the leutenant-governor, the bishop and six mem-

berS of the government. The task of framing statutes for the college was entrusted to a com¬

mittee of three, two of whom were uncompro-

7° jies' a!1(J by their rigid adherence to he Oxford model in the matter of religious tests inflicted a lasting injury upon the college almost effected its ruin. The requirement KING'S COLLEGE, WINDSOR, N. S,

1 Convocation Hall

*7

King's College

KING'S (QUEEN'S) COUNSEL — KING'S LYNN

445

was made that all students, on matriculation, must subscribe to the Thirty-nine Articles. To this the bishop strenuously objected, and sent his protest to the archbishop of Canterbury, „ who was, under the charter, patron of the col-

lege. 1 he archbishop compromised by with¬

drawing the test at matriculation, but requiring it of all those who were admitted to degrees.

Instead of at once publishing this amendment, the governors kept the matter quiet, and Lord Dalhousie, who became governor of the prov¬

ince in 1816, seems not to have heard of it until after he had arranged for the establishment of another institution (Dalhousie College) (q.v.) in Halifax.

Although the religious tests were finally re¬

moved in 1829, in spite of repeated attempts to secularize it and amalgamate it with Dal¬

housie College, Halifax, King's College still re¬

tained its connection with the Church of Eng¬

land, and indeed the requirement that the presi¬

dent should be a clergyman was only abolished in 1902. Of the three King's Colleges estab¬

lished at Windsor, N. S., Fredericton, N. B., and Toronto, it is the only one which has main¬

tained its original status, the others having re¬

linquished their charters and become secu¬

larized.

In 1846 a meeting of alumni of the college was held, and it was determined to form an association for furthering the interests of the college. Accordingly a provincial act incor¬

porating (

sor, w was obtained in 1847, and six years later another act abolished the old political board of governors and constituted a new board, the members of which were, for the most part, to be elected by the alumni. The provincial grant of £400 was

discontinued in 1849, and for some years the smaller grant of $1,000 a year was continued, but this ceased in 1881, and since that time the college has been thrown upon its own resources. The progress of the college was rapid under the new regime. The number of students increased. A beautiful stone con¬

vocation hall and library was erected in 1861

and a chapel in 1877.

The library of the college, which owes its inception to John Inglis, who went to England in 1802 to collect books, contains some of the most valuable bibliographical treasures in Can¬

ada. There are no less than 18 volumes from the famous Aldine Press, including the Aristotle of 1495-98. Then there are 20 volumes from the Elzevir Press and 16 from that of Stephens of Paris. One of the treasures is a copy of the Coberger Bible of 1475, of which there is per¬

haps not another copy in America. Among the valuable books of a later date may be men¬

*tioned the Boydell edition of Shakespeare and Milton, and a presentation copy of the Marquis of Buckingham's Corner.**

The present teaching staff of the college consists of a president and professors of divin¬

ity (2), classics, philosophy and ethics, science, English literature, mathematics, . physics _ and engineering. Degrees are given in arts, divin¬

ity, engineering and science, and a school of law, established at Saint John, N. B., in con¬

nection with the University of King's College, in 1892, is doing good work. The Engineering School, which is the oldest in Nova Scotia, was removed in 1904 to the Sydneys to take advan¬

tage of the splendid plant in operation in the Cape Breton metropolis. In 1915-16 there were 57 students in attendance, and at the Law School 27 students. The university is affiliated with Oxford, Cambridge and Dublin univer¬

sities.

KING'S (QUEEN'S) COUNSEL, in

England, Ireland and several of the British colonial possessions, a title given to a barrister at law, by letters patent, to be the counsel of the Crown. It is a title much prized by the legal profession, simply because it is now largely one of advancement in the profession.

There is no general law title and dignity which correspond to the British King's Counsel, be¬

cause the latter is based upon the privileges of the Crown, which, in this respect, are little more than nominal.

KING'S DAUGHTERS AND SONS,

International Order of the, an organization of men, women and children of all religious denominations, whose object is to minister to the sick and needy wherever found, and to do good to all with whom they come in contact.

The original circle (of women) was formed in New

York in 1886, and its members are found in 32 States in the Union, in eight Canadian provinces and circles in China, Japan, India, etc. It is organized in circles, county and city unions, chapters, national, state and provinical branches, and a central council. The badge is a small silver Maltese cross, generally sus¬

pended by a purple ribbon and bearing the initials ((I. H. N.» (In His name). The Soci¬

ety publishes a weekly paper,

dred institutions of different kinds in different localities. Consult the

Yearbook (New York).

KING'S (or QUEEN'S) EVIDENCE,

the British equivalent of State's evidence. See Informer.

KING'S EVIL. See Scrofula.

KING'S LYNN, or LYNN REGIS, a port

town in Norfolk, England, near the mouth of the Great Ouse. It is noted for its fine docks covering more than 100 acres, and its excellent harbor. King's Lynn was once strongly forti¬

fied by a massive wall and moat, the ruins of which still exist. Of these ruins one of the interesting features is the so-called "South Gates, >* a handsome Gothic structure. The town is one of the oldest in England. After years of life as a local municipality, it received a charter as an incorporated place in the reign of King John (1204). During its official civic career it has been variously known as Lynn Episcopi, Bishop's Lynn, Lynn Regis and King's Lynn. It was several times, during the European War, the victim oj aerial attacks on the part of the German air fleet, the first of which took place in 1914. King's Lynn is noted for its fine churches and schools and other

public buildings, some of which are of considerable age. Among the industrial estab¬

lishments of the town are iron foundries, machine shops, beer and malt establishments, oil mills and shipyards. It does a very consid¬

erable export and import business. Among the famous natives of the place were Eugene Aram and Frances Burney.

KING'S MOUNTAIN, N. C., a village in

\ ork County, 80 miles northeast of Colum¬

bia. In the vicinity is a high hill where a battle took place 7 Oct. 1780, between about 1,000 Americans, under Sevier, Shelby, Camp¬

bell and Williams, and 1,100 British, under Fer¬

*guson. The latter were defeated with a loss of 250 killed and wounded, among whom was the commander, and 664 taken prisoners after an hour's fighting. Ferguson, shouting to his men : <(Crush the dammed rebels to the earth,**

prepared for one final charge, and fell at the head of his regulars pierced 'by seven bullets, dying, according to tradition, by the hand of Colonel Williams, who was also slain. His men, disheartened by his fall, surrendered. The Americans lost only 28 men killed, although a large number were wounded. After the battle 10 of the prisoners notorious for their crimes were hanged, having first been regularly tried and condemned by their captors. This was one of the most brilliant victories of the war, and exercised an important influence in precip¬

itating the downfall of British power in the South. The 75th anniversary of the battle was commemorated by a celebration on the ground.

Consult Draper, (King's Mountain and its Heroes* (Cincinnati 1881) and McCrady,

(South Carolina in the Revolution (New York 1901).

KING'S PEAKS, the highest points in

Utah, two nearby summits of Uintah Moun¬

tains in northern part of the State. Altitude 13,496 and 13,498 feet. Named from Clarence King, director of the 40th Parallel Survey.

Nearby are Emmons Peak, 13,428 feet, and Gil¬

bert Peak, 13,422 feet.

KING'S SPEECH, The, in British Par¬

liamentary procedure, is the speech read from the throne in the House of Lords at the com¬

mencement of each session. It reviews the political situation and outlines the ministerial legislative program. The Parliament is opened by the king in person, accompanied by the queen; he reads the speech, which is com¬

posed by the Prime Minister in consultation with his Cabinet. In the absence of the king Parliament is opened by commission, when the speech is read by the Lord Chancellor. The reply to the speech is called the address. Con¬

sult Anson's (Law and Custom of the Consti¬

tution. J

KINGSBOROUGH, Viscount, Edward

King, Irish writer and antiquarian, generally known as Lord Kingsborough, a title which he held only by courtesy: b. 1795; d. 1837, in a debtor's prison in Dublin. He is noted for his great work < Mexican Antiquities,* the publica¬

tion of which was begun .in London in 1830

and continued for several years. See- King, Edward Viscount Kingsborough.

KINGSFORD, Charles Lethbridge, Eng¬

lish historical writer: b. Ludlow, Shropshire, 1862. Educated at Oxford, on graduation he became a member of the editorial staff of the dictionary of National Biography.* From that time on he devoted most of 'his time to literary work in one form or another. He was assistant secretary and examiner in the Edu¬

cational Department (1905-12), since which latter date he has given still greater attention to historical writing and to matters historical.

He takes a great interest in the Royal His¬

torical Society of which he is one of the most active members. Among his published works are (Song of Lewes* ; (The Crusades* (with T. A. Archer, 1894) ; Henry V, in (Heroes of the Nations* (1904) ; ^Chronicles of London*

(1905); (Stow's Survey of London* (1908.

This contains an introduction and notes) ; (Sir Otho de Grandison* (1909); (J- Pecham, De Paupertate* (in collaboration with Little and Tocco, 1910) ; (The First English Life of Henry V* (1911); (English Historical Liter¬

ature in the Fifteenth Century* (1913) ; (The Grey Friars of London* (1915). Much of his work, which appeared in the dictionary of National Biography,* (English Historical Re¬

view ,* (Encyclopaedia Britannica,* Camden Miscellany, Archceology and London Topo¬

graphical Record, has not reappeared in sepa¬

rate book form.

KINGSFORD, William, Canadian histo¬

rian: b. London, England, 12 Dec. 1819; d.

Ottawa, Ontario, 29 Sept. 1898. He entered the army and came to Canada in 1837 with the 1st Dragoon Guards, receiving his discharge in 1841. He then took up surveying and engineer¬

ing, and was at various times employed upon the construction of the Hudson River, Panama, Grand Trunk and Canadian Pacific railways.

He made his home in Canada and published (Plank Roads in the United States and Can¬

ada* (1851);

a voluminous work in 10 volumes which was published in 1880, and on which he was engaged for 13 years.

KINGSLEY, kingz'li, Calvin, American

clergyman, educator and editor: b. Amesville, N. Y., 8 Sept. 1812; d. Beirut, Syria, 6 April 1870. He entered the ministry of the Metho¬

dist Episcopal Church in 1841, the same year he graduated from Allegheny College. He was professor of mathematics in his Alma Mater (1846—56), editor of the Western Chris¬

tian Advocate (1856-64). The General Con¬

ference of 1864 elected him bishop. In 1867 he visited the mission stations in Europe and two years later he set out to visit all the mission stations of the Orient, beginning with Japan.

It was on his home journey that he was sud¬

denly stricken at Beirut, where he is buried in the Protestant Prussian cemetery. He was author of (The Resurrection of the Dead*

(1847, several eds.) ; (Round the World- a Series of Letters* (2 vols., 1871).

KINGSLEY, Charles, English clergyman,

novelist and poet: b. Holne Vicarage, near Dartmouth, Devonshire, 12 June 1819- d Eversley, Hampshire, 23 Jan. 1875. He was a pupil of Derwent Coleridge (q.v.) from whose care he passed to King's College, London, and thence to Magdalen College, Cambridge, where he was graduated with high honors in 1842

Soon after graduation he took orders in the Established Church and obtained the curacy of Eversley, and became its rector in 1844. This living he retained till his death, but he also held in succession two canonries, one in the cathe¬

dral of Chester (1869-73), and one in the chan¬

ter of Westminster from 1873 till his death.

From 1860 to 1869 he was professor of -modern history at Cambridge. Earlvin his career as a clergyman of the Church of England, he asso¬

ciated himself with F. D. Maurice, Julius Hure

and others, both in their religious views and in their social aims. With them he considered it the peculiar duty of the Church to improve the condition of the working-classes, not only by inspiring them with Christian feeling and Christian principle, 'but also by encouraging and aiding them in bettering their material position.

With the latter object he was a strong advo¬

cate of co-operative association. His first lit¬

erary works of importance, (Alton Locke, Tailor and Poet) (1850), and (Yeast, a Prob¬

lem } (1851), gave expression to his sentiments on social questions, and both of them, but espe¬

cially the first, made a great impression when they

appeared. The principal of his later nov¬

els are (Hypatia) (1853), 'Westward Ho!) (1855), perhaps the most popular of his stories, and 'Hereward the Wake,* 'Last of the Eng¬

lish > (1866). Other works of his are 'Glaucus, or The Wonders of the Shore) ; (Town Geol¬

ogy > ; 'The Roman and the Teuton,* historical lectures ; 'The Water Babies,* a fairy-tale of sci¬

ence; and (At Last, 5 a visit to the West Indies.

He was also the author of numerous sermons, lectures and essays, and of various poems, the chief of which are (The Saint's Tragedy,* and 'Andromeda,* the latter one of the most suc¬

cessful experiments in English hexameter. He was a strong opponent of the Tractarian move¬

ment in the Church of England. A statement he made in a review, especially directed at John Henry Newman, that regard for truth for its own sake was not a characteristic of Roman Catholic theologians, was followed by some sharp correspondence, and incidentally was the cause of the writing of the famous "Apologia**

of Newman. Consult 'Letters and Memories of Charles Kingsley,* by his wife (1877). See (Hypatia) ; (The Water Babies) ; (Westward Ho.>

KINGSLEY, James Luce, American

scholar and educationalist : b. Scotland, Conn., 1778; d. 1852. Graduated from Yale he soon became a teacher there and, in 1805, first pro¬

fessor of ancient languages, a position he re¬

tained for 26 years, during which he raised his department to one of the most progressive in the college. On his retirement from active duty as the head of the department he had created, he retained

the title of professor of Latin until his death. He was one of the best authorities of his day in American history, though his many duties prevented him giving attention to literature and especially to histor¬

ical composition, which his lectures showed he might have made a success. Among his pub¬

lished works are 'A History of Yale Col-

lege) (1835) ; and (Ezra Stiles) (a biography of the president of Yale College, published in Sparks' 'American Biography*). Consult

sketch of his life by D. C. Gilman.

KINGSLEY, John Sterling, American

zoologist : b. Cincinnatus, N. Y., 7 April 1854, graduated from Williams College in 1875, was professor of zoology at the University of In¬

diana (1887-89) ; at the University of Nebraska (1889-91), filled a similar position at Tufts Col¬

lege from 1892 to 1913, and at the University of Illinois since 1913. He edited The American * Naturalist (1886-96) and after 1910 the Journal of Morphology and has published (Elements of Comparative Zoology) (1896; 2d ed., 1904); (Vertebrate Zoology* (1899); (Popular Natural History* (1890); (Guides for Vertebrate Dis¬

section * (1907), and translated Hertwig's (Manual of Zoology> (1902, 1912), and (Anatomy of Vertebrates> (1912).

KINGSLEY, Mary H., English author: b.

London, 1862; d. 1900. She came of rather noted literary stock, being daughter of George Henry Kingsley and niece of Charles Kingsley; and she was thus thrown frequently into the society of the noted writers and thinkers of her day in England. As a result she was a much more advanced thinker than the

women of the latter half of the 19th century. She was a great admirer of Darwin, Lubbock and Hux¬

ley and others of their school who were then teaching the world of science to think along new lines of thought and investigation. She became a deep student of biology and in 1893

went to Portuguese West Africa to continue her studies in this field. While there she visited parts of the country never before visited by Europeans. Biology and botany took her again to Africa three years later, when she again showed the same venturesome spirit and desire to investigate the country in the interest of science. She traveled through great stretches of the country, including the Niger Coast, Gabun and Kamerun. Later on she continued her African studies and explorations in South Africa where she was attached to the hospital at Simons Town. There she did good work in nursing sick Boer prisoners but virtually at the expense of her own life. Among her pub¬

lished works, which are all well written and of great charm and interest, are 'Travels in West Africa (1897), and 'West African Studies**

(1899).

KINGSMILL GROUP. See Gilbert

Islands.

KINGSTON, Charles Cameron, Austra¬

lian statesman: b. Adelaide, 1850; d. 1908.

Graduated in law at his native city, he at once became interested and active in politics, and was, in 1881, elected to the assembly of Ade¬

laide, a seat he held for years. After holding the office of Attorney-General he became Premier in 1893 and held the chief executive office for eight years, when he entered the Federal Cabinet of the Australian Common¬

wealth, with the Cabinet office of Minister of Trade and Commerce (1901-03) from which date until his death he was a member of the Commonwealth. He was very advanced in his politics and favored most of the measures put forward by the Labor and Socialist parties.

Among the measures which he strongly advo¬

cated were a very radical adjustment of the franchise and fundamental changes in the laws relating to tenure of land and the position of labor. He was instrumental in the passage of laws of a very radical character for the regula¬

tion of factories and the employment of labor, for the extension of the franchise to women, and the regulation of many other social ques¬

tions, among them inheritance and income taxes and progressive regulations for the protection of workmen.

KINGSTON, Duchess of (Elizabeth

Chudleigh), English adventuress: b. 1720; d.

Paris, 1788. She was the daughter of Thomas Chudleigh, a man of no particular social stand¬

ing, who died when his daughter was only six years old, leaving the family in poverty.

Elizabeth Chudleigh grew up to be a young woman of remarkable beauty, wit and intelli¬

gence. Through these gifts and some distant family connections she succeeded in being ap¬

pointed maid of honor to the Princess of Wales. Of this advantage she made the best possible use for her own advancement. This was not particularly

difficult since the Princess was the mother of Prince George who was destined to become king as George III in 1760. At the age of 24 she was privately mar¬

ried to Captain Hervey, a man of high social standing; but his and her own irregular con¬

duct caused their separation in a short time.

She then became openly, in succession, the mistress of several prominent men until finally she succeeded in becoming the wife of the second Duke of Kingston with whom she had been living in irregular union for some years. The latter, who was passionately at¬

tached to her, left her his large fortune by will (1773), which she was able to retain in spite of an attempt on the part of the relatives of Kingston to break the will on the plea that the Duchess was a bigamist, having one husband living when she married Kingston.

After Kingston's death she wandered about Europe, England proving uncongenial on ac¬

count of the attitude of the relatives of her late consort. She was for a while in Russia, principally at Saint Petersburg; but the cold weather of the northern land disagreeing with her, she went to Paris where, notwithstanding her advanced age, she continued to lead as dissolute a life as she had in her youth, since the Kingston wealth enabled her to keep open house, at a time when the court of France was noted for its disregard of the formalities of family life. Elizabeth Chudleigh has another interest apart from the romance of her life, in the fact that she is stated, on very good authority, to have been the original from which were drawn the characters of Beatrice, in Thackeray's (Esmond } and Baroness Berustine in his (Virginians.)

KINGSTON, Canada, city, port of entry, capital of Frontenac County, in the province of Ontario. Situated at the mouth of the Cataraqui River and at

the outflow of the Saint Lawrence from Lake Ontario. At Kingston the Rideau Canal from the Ottawa River at Ottawa City connects with the Saint Law¬

rence River and the system of the Great Lakes.

It is on the main line of the Grand Trunk Railway, between Montreal and Toronto, and is connected with the Canadian Pacific Railway, east, west and north, by means of the Kingston and Pembroke Railway. During the season of navigation, the Richelieu and Ontario and other lines of steamers connect it with Montreal and other points on the Saint Lawrence River, and with Rochester, Toronto, Bay of Quinte and intermediate points, in the West. Kingston is midway between Montreal and Toronto, being 170 miles to the west of the former, and 163

miles to the east of the latter.

The harbor, sheltered from Lake Ontario by Amherst, Simcoe and Wolfe islands, is con¬

sidered one of the best on the lake. The for¬

tifications of Kingston are third in importance in Canada, those of Quebec and Halifax taking precedence.

Kingston was for many years the most im¬

portant commercial and shipping centre in Upper Canada. There the first mill was built in 1784, the first regular newspaper established in 1810; in the neighborhood the first steam¬

boat was built in 1816, and others soon fol¬

lowed.

The city has large grain elevators and is an important point for the transshipment of grain coming down from the western lakes. Some of the chief manufactures of the city are loco¬

motives, cotton, hosiery, leather, flour and

cereals, boats and shipbuilding.

The leading educational institutions are Queen's University (q.v.), with which is incorporated the Kingston School of Mines; the Royal Military College, the Dairy School, Regiopolis College, the Kingston Business Col¬

lege and the Collegiate Institute. The city has a General Hospital, the Hotel Dieu Hospital, an Orphans' Home and House of Providence, while just outside the city limits are the Provin¬

cial Penitentiary and Rockwood Llospital for the Insane. The Anglican and Roman

Catholic cathedrals and the city, county and university buildings are handsome stone edifices, adding to the attractions of the city, which has electric and gas lighting, waterworks and street railways. A bronze statue of Sir John A. Macdonald stands at the main entrance to the city park, while the Sir George A. Kirk¬

patrick memorial fountain faces the park in front of the county buildings.

In July 1673, the site of Kingston was first visited by Frontenac, the French governor of Canada, accompanied by La Salle. There the Indians were assembled for a conference, and during his stay the governor erected a fort built of wood and surrounded by palisades. Thus originated Fort Frontenac at Cataraqui, the first fort on the lower lakes west of Montreal.

In 1675, La Salle obtained from Louis XIV a grant of Fort Frontenac and the seigniory of Cataraqui, with the adjoining islands, and two years later he partially completed a new stone fort replacing the wooden one. The fort and the mainland subsequently reverted to the French Crown, but a large part of Wolfe Island is still held by titles originally derived from La Salle. Owing to Indian incursions Fort Frontenac was abandoned and partly destroyed in

1689. In 1695, however, during Frontenac's second term as governor, the fort was rebuilt, and, until the time of the English conquest, was maintained as one of the chief French centres of authority, communication and trade for the West. From there, in 1756, Montcalm launched his successful attack upon the British post of Oswego. But in 1758 Brad-

street captured and partly destroyed Fort Frontenac.

After the British conquest of Canada,

Cataraqui was practically deserted until the ar¬

rival of the Loyalist refugees during the Revo¬

lutionary War. When Carleton Island was ceded to the United States by the treatv of 1783, Cataraqui was again occupied by the British government as a military and naval station; and in 1784 it was made the centre of the Loyalist settlements in the West, the place being renamed Kingston in honor of George III. Kingston was the chief naval and mili¬

tary post in Upper Canada during the War of 1812-15. A new fort was constructed on Point KINGSTON, CANADA

1 Military College and City

2 The Fort

t

.

Henry, in 1815-16, which was rebuilt in its present form in 1832-36, the advance battery being added in 1842. The four martello towers which, with the fort on Point Frederic, com-

„ plcte the present fortifications of the city, were built between 1846 and 1848. After the con¬

vention of 1818, by which the United States and Great Britain agreed not to maintain naval establishments upon the Great Lakes, the naval depot at Kingston was given up.

In 1838 Kingston received the charter of a city, though still called a town. In 1841, on the reunion of the provinces of Upper and Lower Canada, it was selected by Lord Syden¬

ham as the capital of the new province of Canada. In 1844 the capital was transferred to Montreal. From Kingston have come many of the leading statesmen of the Canadian Do¬

minion, such as Sir John Macdonald, Sir Oliver Mowat, Sir Richard Cartwright, Sir Archibald Campbell and Sir George Kirk¬

patrick. Pop. 19,000.

Adam Shortt.

KINGSTON, Jamaica, the capital of the

island. See Jamaica.

KINGSTON, N. Y., city, county-seat of

Ulster County, on the Hudson River and on the West Shore, the Walkill Valley, the On¬

tario and Western and the Ulster and Dela¬

ware railroads ; and is connected by ferry with main line of the New York Central and Hud¬

son River Railroad, also Central New England, on the east side of the Hudson; 88 miles north of New York city, and 55 miles south of Al¬

bany. The Walkill River and Rondout Creek enter the Hudson at Kingston and the Esopus Creek passes through the upper section of the city. The first settlement was made here in 1652 by the Dutch who named the place ((Esopus.® On 16 May 1661, Governor

Stuy-

vesant granted a charter to the village which he named (

lace, changing the name to ^Kingston® in honor of his family seat, Kingston L'Isle, near Wantage, Berkshire, England. On 19

Feb. 1777 the first State Convention of the State of New York adjourned from Fishkill to Kingston, and the first State constitution was proclaimed in front of the courthouse on 22 April 1777. On 9 September of the same year, Chief Justice Jay opened in Kingston the first State court. The first State legislature met here in September of the same year, but was dispersed by the approach of the British who, under General Vaughn, entered the place on 16 October and destroyed nearly the whole town by fire, in revenge for the part taken in the War for Independence by Kingstonians.

It was rebuilt and on 6 April 1805 incor¬

porated as <(Kingston Village,® and chartered as ((City of Kingston.® 29 March 1872, com¬

prising the former villages of Kingston, Ron¬

dout (incorporated 4 April 1849), Wiltwick which connected the two, and the hamlet of Wilbur.

The chief manufactures are bricks, cement, boats, cigars, shirts, brushes, stone tubs, hard¬

ware and machinery. It is the commercial centre for a large extent of country, and has vol 16 — 29

an extensive trade in farm products, coal, cement, brick, bluestone, cigars, grain, lumber, clothing, hardware. It has eight grade schools and new High School, two business colleges, City Library, Armory, City Hall, Court House, central post office building and two branch offices at respective ends of the city, several fine churches, Y. M. C. A. building, K. of C.

building, Women's Federation House, D. A. R.

Chapter House, three modernly equipped hos¬

pitals, a large sanitarium, an industrial home, a Catholic orphanage, five national and three savings banks. The bridge owned by the West Shore Railroad is about 150 feet above tide¬

water. The ((Senate House,® the first home of the New York legislature, contains a collection of relics connected with the early settlement of the country. Kingston Point Park, about 50 acres in extent, on the Hudson, is being made more at¬

tractive each year. The large steamers land at this park. Daily boat service is maintained tc New York and Albany and intermediate points.

The city government is vested in a mayor, who holds office two years, a common council and board of public works. The executive appoints the subordinate officials, subject to approval by the council, excepting the city judge and the recorder, who are elected by the people, and officials directly responsible to the Board of Public Works. Pop. 26,688.

KINGSTON, Pa., borough in Luzerne

County, on the Susquehanna River, opposite Wilkes-Barre; on the Lehigh Valley and the Delaware and Lackawanna railroads. Here is the seat of the Wyoming Methodist Seminary.

The principal industry is coal mining. The re¬

pair shops of the Lackawanna Railroad are lo¬

cated here. Kingston was incorporated as a borough in 1858. In the near vicinity in 1778

occurred the famous Wyoming Massacre. Pop.

(1920) 8,952.

KINGSTON, Ireland, a seaport and water¬

ing place on Dublin Bay, a short distance southeast of Dublin. Its present name was given it in 1821 on a visit of George IV after whom it was renamed, its old name being Dun-

leary. Owing to the fact that it has a fine har¬

bor it has long been a place of extensive ship¬

ping, among the many imports being coal, iron, lumber, timber and other raw building mate¬

rial; while its exports consist of the products of an extensive range of local territory from which come cattle, grain, stone and lead ore.

Pop. 20,000.

KINGSTON-ON-THAMES, England, a

town near Richmond, on the Thames and in Surrey. The derivation of the name is uncer¬

tain, but it is said to have had its origin in an ancient stone in the market place of the city upon which were engraved the names of sev¬

eral early kings of England of Saxon line.

This stone, tradition says, was, like the famous stone of the Scottish kings, a sacred object upon which the kings were crowned; and it was intimately connected with the traditional life of the Saxon sovereigns and people and with their mythology and religio-trfbal cere¬

monies, according to certain archaeologists who have given it close attention and study. This stone -was in the church of Saint Mary until 1779. The town itself is a place of consider¬

able commercial and industrial importance ; and has grown outside its original boundaries 450

since 1880. It possesses an extensive market and mills and factories of several kinds ; and it has long been a place of summer residence for the people of London. As will be gathered from the fact that there were crowned there several of the Saxon sovereigns, it was a place of importance at an early date in the history of England, and it never altogether lost its air of prosperity. On account of its social rela¬

tions it figures frequently in English literature.

Pop. 40,000.

j^^^^VILLE, Tex., town, county-seat

of Kkberg County, on the Saint Louis, Browns¬

ville and Mexico Railway, 118 miles north of Brownsville and 235 miles southwest of Hous¬

ton, Tex. Its chief manufacturing industries are cotton-oil mill, creamery with annual out¬

put of 200,000 pounds, broom factory, railroad shops, electric-power plant and ice factory. A considerable domestic and export trade is car¬

ried on in the agricultural products of the county, comprising corn, cane, non-saccharine sorghums, broom corn, melons, potatoes and winter vegetables, and the Hereford, Shorthorn emu Jersey cattle of the famous ranges and dairy farms of the neighborhood. In addition to substantial business buildings, the town has costly and handsome brick or concrete struc¬

tures, including courthouse, county hospital, geneial railroad offices, hotel, Masonic Temple two brick ward public schoolhouses and a high school. It is the seat of the Texas-Mexican Industrial Institute and of the projected South 1 exas State Normal College. Formed out of the 10,000,000-acre King Ranch owned by Mrs.

Henrietta M. King and managed by her son-

in-law, Mr. Robert J. Kleberg, after whom the county is named. Kleberg County borders on the Gulf of Mexico and has a semi-arid and semi-tropical climate. The summers are

pleasant and the winters are so mild that palms and citrus fruits are grown. The topography of the country is slightly rolling and has an average elevation of 60 feet abov* sea-level.

It is free from malaria and otherwise healthful!

lhe King Ranch home is one of the most magnificent residences in the South. Paved highways, one of which leads to the celebrated iuo Grande Valley, extend throughout county and State. Pop. (1920) 4,770.

„ Marcus Phillips,

o ecretary , Kleberg County Commercial Club.

KINGTEHCHIN, kinghe-chen or

CHINGTECHEN, China, province of Kiang-

si, one of the great porcelain manufacturing and market centres of the nation, a city of great antiquity. Pop. over 500,000.

KINGWOOD, a very handsome Brazilian

wood believed by many to be a derived species by crossing, while others claim that it belongs to the Dalbergia, which has numerous repre¬

sentatives in India and the southern countries of Asia generally. . It has been claimed for it that it is a species of Triptolomsea while others have maintained that it belongs to the brya ebenus. Kingwood, which is generally very handsomely streaked with violet of differ¬

ent shades and densities of color, is used in the making of fancy cabinets, and cabinet orna¬

ments of smaller dimensions.

KINKEL, kin kel, Gottfried, German poet and critic: b. Oberkassel, 12 Aug. 1815; d.

Zurich, 13 Nov. 1882. Graduated in theology he entered the Protestant ministry where he distinguished himself as an eloquent preacher, lecturer and public speaker. Among his other duties he was lecturer in the University of Bonn from 1836 to 1848, from time to time, though not regularly, his special subjects being poetry, the history of art and ecclesiastical history.

His usefulness was cut short in his own coun¬

try through his getting mixed up in the revolu¬

tion of 1848. His arrest followed; but he man¬

aged to escape and made his way to the United States, where he made his living for some time as a teacher of languages. Later on he was in London and Zurich in the same capacity.

But he was never able to return to Germany.

It was probably his love of his native country that brought him to Zurich. He was a poet of some power and originality. Among his published works are (2 vols., 1843) ; (Otto der SchutzR a narrative poem of which nearly 100 editions were published (1845); cDie altchristliche Kunst) (1845);

(1845); (Nimrod) (a tragedy, 1857); (1876);

KINNICUTT, Leonard Parker, American

chemist and sanitary expert: b. Worcester Mass., 1854; d. 1911. Educated at the Massa¬

chusetts Institute of Technology, Johns Hop¬

kins, Harvard, Heidelberg and Bonn, he be¬

came instructor of chemistry at Harvard (1880-83) and full professor of chemistry (1885-90), being

appointed, on the latter date, head of the chemistry department of Worces¬

ter Polytechnic Institute. He carried on ex¬

tensive chemical investigations, extending them to the effects of chemical action on sewage, lhis and other more practical work made him °f ihe &reatest sewage experts in the United States. He also gave a great deal of attention to the supply of water, its purification and preservation from impurities. His connec¬

tion with the Connecticut Sewage Commission in the capacity of consulting chemist gave a very practical turn to his laboratory experi¬

ments of which he made full use In his capacity of associate editor of The Journal of Industrial and Engineering Chemistry he wrote a great deal on industrial chemistry in all its many phases ; but all this material, with the exception of some recast and incorporated in 'Sewage D.sposaP (1910), has remained un-

published in separate book form.

KINO, ke'no, an American gambling game evolved out of the juvenile game of lotto (q v) KINO, ke no, a kind of gum which exudes irom. certain trees when an incision is made and is dried without artificial heat. The East Indian or Malabar kino comes from a legumi-

mous tree (Pterocarpus marsupium) ; Bengal or J alas kino from Bute a frondosa; and Austral¬

ian or Botany Bay kino from Eucalyptus ros-

trata: West Indian from a third plant (Coc-

coloba uni f era). It consists of dark red angu-

!ar fragments, rarely larger than a pea, and easily splitting into, still smaller pieces. It is \eiy soluble in spirits of wine, and in general behavior

by similar treatment the same products. In medicine it is an astringent and tonic.

KINSOLVING, George Herbert, Ameri¬

can Protestant Episcopal bishop: b. Bedford .County, Va„ 28 April 1849. He was graduated trom the Theological Seminary at Alexandria, \ a., and was ordained to the priesthood in 1875.

He was successively rector of churches in Bal¬

timore, Cincinnati and Philadelphia, and in 1892

was consecrated assistant bishop of Texas. He succeeded the late bishop Gregg as bishop of Texas 11 July 1893. He was a delegate to the General Convention of his church in 1892 and has published 'The Church's Burden. >

KINSTON, N. C., town, county-seat of

Lenoir County; on the Neuse River, and on the Atlantic and North Carolina, the Atlantic Coast Line, Kinston-Snow Hill and Carolina railroads, and the Southern National Highway from Pamlico Sound, the Atlantic Ocean and the Harbor of Refuge at Cape Look Out, about 78 miles southeast of Raleigh and about 60 miles from Pamlico Sound. It is situated in a fertile agricultural, stock raising and trucking region, in which tobacco and cotton are the chief productive crops. Kinston is an important trade centre and contains a number of large warehouses. Its chief industrial es¬

tablishments are stemmeries, packing houses, ice plants, machine-shops, foundry, wagon works, turpentine distillery, box and barrel factories, shingle mills, knitting mills, silk mills, lumber mills, cotton and cotton-seed oil mills, guano mills, carriage factories, wholesale groceries,

mattress factory. It is the seat of the Rhodes Military Institute, of the Herritage mansion, formerly the State Capitol, and has a handsome post office, high schools and public library. The city owns all its public utilities, has a modern sewerage system, asphalt paved streets and new light plant. While on the Neuse River and near Southwest Creek, Trent River, Stonington and other creeks, it secures a pure water supply from 10-inch overflowing artesian wells, over 400 feet deep. Pop. 10,000.

KINSTON, Battle of. On 1 March 1865

General Cox, with three divisions of infantry, pushed forward from Newbern, N. C., toward Goldsboro to open communication with General Sherman, who was marching northward from Savannah, and on the 7th two of his divisions were at Wise's Forks, near Southwest Creek, a tributary of the Neuse River, with one division three miles in rear. A brigade was advanced to a cross-road about midway between the main line and the creek. General Hoke, with his Confederate division, crossed the creek on the night and early morning of the 7th and 8th, flanked, surprised, and routed the advance brigade, taking over 900 prisoners and, pressing on, fell upon the left of Cox's line, but was re¬

pulsed. He renewed the attack and was again repulsed. On the 9th there was sharp skirmish¬

ing and the Confederates made repeated efforts to turn Cox's right, which were foiled. On the morning of the 10th Hoke and D. H. Hill made vigorous and successive attacks first upon the left and then on the right of Cox's line, but were repulsed, and General Bragg, who was in supreme command, made no further effort, re¬

treated across Neuse River during the night, burning all bridges behind him, left a small guard at Kinston and, with the rest of his command, hastened through Goldsboro to join J-.E. Johnston, who was concentrating every¬

thing available to oppose Sherman. General Schofield joined Cox with troops from Wil¬

mington, and reached Goldsboro on the 21st, Sherman joining him two days later. The Union .loss- at Kinston was 65 killed, 319

wounded and 930 missing; the Confederate loss is not known. D. H. Hill reports a loss in five brigades of 118 killed and wounded and 16 missing. Schofield estimated the entire Confederate loss at 1,500, which is probably excessive. Consult 'Official Records> (Vol.

XLVII) ; Cox, J. D., 'The March to the Sea) (New York 1882), and 'Military Reminiscences of the Civil War> (Vol. II, New York 1900).

KINTYRE, kin-tir', a peninsula of Scot¬

land, between the Firth of Clyde and the At¬

lantic, forming the division of Argyleshire. It is 40 miles long from the Isthmus of Tarbet to the Mull of Cantyre, and has an average breadth of about 7 miles.

f KINYOUN, kin 'yun, Joseph James, Amer¬

ican pathologist: b. East Bend, N. C., 1860; d.

15 Feb. 1919. Educated at New York Univer¬

sity, he soon afterward entered the United States Marine Hospital service (1886-1900).

He became professor of hygiene and bacteriol¬

ogy at Georgetown Universitv in 1890, and he was connected with that institution until 1907

when he became professor of Pathology at George Washington University (1907-09) and later pathologist to the Washington Tuber¬

culosis Hospital. He was decorated with the Order of Bolivar of Venezuela in 1895.

KINZIE, kin'zl, John, American pioneer: b. Quebec, Canada, 3 Dec. 1763; d. Chicago, Ill-, 6 Jan. 1828. His name was originally Mc¬

Kenzie. His father, a British army surgeon, dyings soon after the boy's birth, his mother married again and removed to New York, John Kinzie was educated there, but, at the age of 10, ran away from home and made his way to Quebec where he was a jeweler's assistant for some years. He then returned home and a few years later went with his step-father's family to Detroit. He became now a trader in the western United States, and in 1803 estab¬

lished a post outside of Fort Dearborn on the site of the present Chicago, ©f which he was the earliest white settler. He also set up sta¬

tions on the Illinois, Kankakee and Rock rivers.

He was very successful as a trader and, as a result of his honesty and generosity, made many friends amongst the Indians. It was due to this fact that his life and the lives of his family were saved during the massacre in 1812.

After the end of our second war with England John Kinzie and his family returned to Chicago from Detroit where they had sought safety, though he himself had finally been taken prisoner by the British and sent to Quebec.

He early recognized the possibilities of Chicago and acquired extensive real estate holdings.

Consult Gordon, E. L. K., 'John Kinzie, the "Father of Chicago" (Savannah 1910) ; Kinzie, Mrs. J. H., 'Wau-bun, the Early Day in the Northwest (New York 1856) ; Laut, A. C., 'First Families of Chicago) (in Outing, Vol.

LIII, p. 591, New York 1909).

KIOSK, ke-osk, a Turkish word meaning

pavilion. It has a tent-shaped roof, open on all

sides and is supported by pillars, round the 452

foot of which is a balustrade. It is built of wood, roofed with straw or similar materials, ?nd js chiefly erected to afford a free prospect in the shade, but it also serves to embellish a rural or garden view. This kind of pavilion has been introduced from the Turk and Persian into the English, French and German gardens. The word has, however, gradually acquired a wider meaning and is now applied to temporary or permanent structures of the type described above, irrespective of the pur¬

pose for which they are used or of the material from which they have been built. Thus pavilions for musicians in public parks, booths for the sale of newspapers and similar articles, are now called Kiosks. The most famous Turkish kiosks are Bagdad Kiosk (Constanti¬

nople), dating from the early 16th century; Chmli Kiosk (Constantinople), dating probably from the 15th century and now housing part of the collection of the Imperial Museum of Antiquities; Yildiz Kiosk (near Constanti¬

nople), summer palace of the Turkish Sultan and frequently used to designate the Turkish court and government.

. KIOTO, ke-6'to, or KYOTO, Japan, a city in the province of Yamashiro, and for over 1,000 years the capital ; situated on a flat plain about 26 miles inland from Osaka. A high range of hills to the east separates this plain from Lake Biwa, and on these some of the finest temples connected with the city are built.

The city is rectangular in form, the longer streets running north and south parallel to the Ivamo River, which flows along the base of the ridge. At the north end are situated in an enclosure the plain wooden buildings where the emperors of Japan dwelt

so long in seclu¬

sion. The Honganji temples of the Monto sect of Buddhists, fine structures of their kind and the centre of the Buddhist faith in Japan, rise at the south end of the city. The univer¬

sity has six colleges, a staff of 356 professors and lecturers, and over 5,000 students, and possesses a library with over 225,000 volumes.

The Doshisha, or Christian college, is a well-

equipped institution, under American control.

1 he streets, though narrow, are clean and at¬

tractive, there is a street railway, and the whole cit}/ has an air of refinement. The singing girls of Kioto are noted for their graceful dances. The pottery, porcelain, crapes, velvets and brocades of Kioto are highly esteemed ; its embroidei les, enamels and inlaid bronze-works are marvels of skilful handicraft. The capital was not removed from Kioto until 1868, when the Mikado and his court took up residence at Tokio (Yeddo). Pop. (1920) 591,305.

KIOWA, ki o-wa (properly kai-gwu mean¬

ing "Principal People"), a considerable Indian trihe now in Oklahoma, whose language forms a distinct stock, who have resisted with un¬

usual virility the physical decay so common among the tribes, and whose pictograph calen¬

dar from about 1830 is of scientific interest They, were first noticed in 1732. In dress and dwellings they are civilized, but otherwise tenacious of their old customs ; of which the most prominent were the sun dance, and de¬

votion to a stone image called the Taime a sort of guardian deity. They had a militirv order of six degrees, and were organized in six bands ; one of which, inaccurately called the Kiowa Apache (by

themselves "Nadiishah-

dina"), is an Athapascan tribe immemorially confederated with them. First living (accord¬

ing to their and other tribes' traditions) in the Montana Rockies along the head waters of the Missouri and Columbia, they followed the re¬

treating buffalo herds southward along the plains, allying themselves with the Crows and assailed by the Cheyenne and Sioux; halted for a while successively in the Black Hills and along the Platte and Arkansas. At first warr¬

ing with the Comanches, but since 1790 in con¬

federacy with them they finally made peace with the Cheyennes and Arapahoes. They be¬

came one of the most formidable scourges of the plains, harrying the frontiers of the United States and Mexico. The treaty of Medicine Lodge, Kan., in 1867, enforced (after their dis¬

obedience) by Custer's troops during the next winter, placed them, with the Comanches, Cheyennes and Arapahoes, upon reservations in Oklahoma. They broke loose in 1874 and Mackenzie was obliged to kill their horses and deport their leaders and chief men to Florida.

In 1892 measles and typhoid fever destroyed over 300 Kiowas. Thenceforth they remained on the reservation. This was thrown open to settlement in 1901, and thev accepted Ameri¬

can citizenship. Their number, about 1,300, is not very much less than at any time for a century. Mooney, (Calendar History of the Kiowa Indians > ((17th Report, Bureau of American Ethnology > 1898) ; < Ghost Dance Religion > (14th Report, Bureau of American Ethnology).

y T v AAiiam

' - O ■ »**»A*** y J. 1. 1 1. 1 1 L-ltl <2 V

man: b. New York, 3 Oct. 1811; d. San Fran¬

cisco, 7 April 1893. He was educated at Rutgers College and at Yale, where he was graduated in 1831. His theological training was acquired at the Protestant Episcopal Ideological Seminary of New York City from which he graduated in 1835. T.he same year he was ordained deacon and priest. He was y^tor °f Saint Peter's, Morristown, N. J., Curate of Grace Church, New York,'

J836-37; rector of Saint Paul's, Albany, N. Y., \oilrZ ; rst m.ls,slonary bishop of California, 1853 57; first bishop of California, 1857 until his death. He was the author of (The His-

TTT Object and Proper Observance of the Holy Season of Lent> (1843; 4th ed„ 1853); 1 he Double Witness of the Church > (1844

other eds); (The Christmas Holidays in Pomf (1845); Early Jesuit Missions in

North America> (1846); a tale of domestic life m Italy (1855) ; The Unnoticed things of Scripture) (1868 ; 3d ed„ 1879); (Anon. 1872) ; Historical Scenes from the Old Tesuit Mis-

(T8n77) °875); KIPLING, John Lockwood, British Indian

S™1 iSQTiVanli b' Plckfr\ng' 1837; d. 26

Jan. 1911. He entered the Indian Educational Service • was architectural sculptor in the Bom-

M choo'°t Art, 1865-75; and principal in the Mayo School of Art and curator of the Central Museum, Lahore, 1875-93. He is the author of Beast and Man in India> (1891), KIPLING

Mr. Rudyard Kipling (q.v.), the distinguished

novelist, is his only son.

KIPLING, Rudyard, English novelist and

poet: b. Bombay, India, 30 Dec. 1865. His lather, John Lockwood Kipling, known as the author of (Beast and Man in India, * was at that time a professor of sculpture in the school of art at Bombay. The novelist’s mother, Alice Macdonald, a woman of beauty and tal¬

ent, was a daughter of a Methodist preacher at Endon, in Staffordshire. The boy was named, it is said, from Rudyard Lake in Staffordshire, where his parents first met. Taught to read by his mother, he was taken to England, at the age of five,' and placed, with a younger sister, in the care of a relative at Southsea, a suburb of Portsmouth, where he remained for seven years, subject, it has been inferred from the opening chapter of (The Light That Failed,*

to narrow and irksome discipline. In 1878, he was sent to the United Service College of Westward Ho, near Bideford, in Devonshire.

It was a school managed by civil and military officers for young men who intended to enter the Indian service. The rough life passed there is described in (Stalky and Co.* (1899), wherein Kipling, who edited for two years the College Chronicle, figures as Beetle, the clever versemaker. In 1882 Kipling went out to In¬

dia and obtained, by the aid of his father, a position qn the editorial staff of the Lahore Civil and Military Gazette. After five years of this, he became assistant editor of the Pioneer at Allahabad, a position which he held until 1889. While on these papers he gained his wide and intimate knowledge of Indian life and affairs at first hand. The newspaper office of his time, he has said, attracted <(every con¬

ceivable sort of person® from respectable army-

officers and missionaries down to inventors of ((unbreakable swords® and (

peared departmental Ditties and Other

Verses) in a buff paper wrapper, he was known to a large circle of readers in India by short-stories, local verse-satires and parodies, wrhich he was contributing to his own and other newspapers. Then came 1888, the annus mira-

bilis. In that year Kipling published seven volumes of stories: (Plain Tales from the Hills J ; (Soldiers Three) ; (The Story of the Gadsbys) ; (In Black and White1* ; Hinder the Deodars) ; (The Phantom Rickshaw and Other Tales) ; and (Wee Willie Winkie and Other Child Stories.* In 1889, he made a tour of the world, with his stories and manuscripts, hop¬

ing especially to find a publisher in the United States. In this aim he was immediately disap¬

pointed. His severe strictures on America, contributed to the Pioneer, were afterward published in New York, and are now included in his works as a part of (From Sea to Sea.1*

After a hard struggle, recognition in the western world came to him in 1890, while he was staying in London. To this and the next year belong (The Courting of Dinah Shadd and Other Stories) ; (The City of Dreadful Night and Other Sketches) ; Hife's Handi¬

cap > ; and

boro, Vt., eventually building on the hillside a long, low bungalow, called the Naulahka.

There he wrote many of his best poems and stories. For verse may be cited some of the cBarrack-Room Ballads* (1892) and (The

Seven Seas* (1896); and for fiction, (Many Inventions* (1893) ; (The Jungle Books* (1894-

95), and (Captains Courageous* (1897). Leav¬

ing Vermont in 1896, Kipling went out to South Africa in 1898, and paid a brief visit to New York in 1899, where he barely escaped death from pneumonia. He had already made his home in a little English village near Brigh¬

ton, in Sussex. To this later period belong (The Day's Work* (1898) ; (From Sea to Sea*

(1899) ; (Kim* (1901) ; (Just-So Stories*

(1902) ; (The Five Nations* (1903), a volume of verse; (Traffics and Discoveries* (1904), and (Puck of Pook's Hill* (1906) ; (Actions and Reactions* (1909) ; (Rewards and Fairies*

(1910) ; (A History of England,* with R. C. L.

Fletcher (1911) ; (Songs from Books* (1913) ; (The Harbour Watch* (1913).

Kipling has been one of the most striking figures in English literature since tie first came to his own in 1890. It is now a commonplace to say that he revealed India to the western world, not after the romantic manner of Scott's dealing with Scotland, but in a wonderfully direct and realistic way. Of rare perceptive powers, he sees the import of things and is able to convey it to his reader exactly. Per¬

haps there was no set plan about it, but his early tales comprehended nearly every phase of the English government in India so far as it came under his eyes. In them jostle the Eng¬

lish soldier, the English civilian, and the native man and woman. He kept most closely to the Punjab, which he best knew; to its sweltering heat under which the mercury climbs slowly to the top of the glass and the printing-presses grow red hot ; to its drenching rains, fever and cholera, in other seasons ; its blinding sand storms, and the picnics and intrigues they inter¬

fere with; the immense perspective of a star-lit heaven; the filth and superstition of the na¬

tives; the hap-hazard process of law-making; villages invaded and blotted out by the jungle; and barrack-room yarns in which Tommy At¬

kins tells of his practical jokes, adventures and death grapples on the battle-field with giant Afghans.

The conditions under which he first worked demanded great concentration of incident and style. Engaged to sort telegrams and clippings or to write editorials for his newspaper, he had little time for developing his stories at length. They were dashed off rapidly from first impressions and made to fit into the scant space that was left for them. Merely the sketch or the outline was given in short jerky sentences, and the salient points in character were suggested by the epithet that comes only under the intense pressure of the moment. No other story-teller was ever able to put so much as Kipling into so little space. When more at his ease, he developed a type of his own running from 25 to 50 pages. Taken all in all, considering matter and treatment, the best story Kipling ever wrote is (Tlie Man Who Would be King.* What happens to one or 454

the other when the Englishman involves him¬

self with the affairs of the Hindoo woman is told in (Without Benefit of Clergy,' and 'Beyond the Pale.' For the uncanny and ghast¬

ly may stand and (The Gates of a Hundred Sorrows, ' and for ludi¬

crous extravaganza (My Lord the Elephant'

and 'The Incarnation of Krishna Mulvaney. '

Among superb battle pieces are 'The Taking of Lungtungpen,' (The Lost Legion, > (With the Main

Guard,' and (Drums of the Fore and Aft.' In the 'Jungle Books' Kipling gave fresh life and meaning to the ancient beast-

fables of India.

Trained, from the beginning in the short story, Kipling seems unable to break from its limitations. 'The Light that Failed,' and Captains Courageous' are most readable, but m neither case was the theme thoroughly grasped or the treatment adequate. (Kim' is not so much a novel as a short story long drawn out. But within the province of the short story Kipling may be classed with Ste¬

venson. A tendency to obscure symbolism, ap¬

parent now and then in his early work, has grown upon him, to the harm, it would seem, of his art. 'They,' for example, beautiful as it is, was difficult to understand, and some of the other stories in (Trafifics and Discoveries'

were clearly an attempt to transfer to prose the dramatic monologue of Browning. Combined with this endeavor is also a fondness for coin¬

cidences, which, though cleverly managed, are unnecessary and unconvincing. The romanc¬

ing of machinery in <.007, ' and

tation Enforced' is certainly a fine story, and Puck of Pook's Hill' is a notable experiment in English folk-lore and legend, 4 he later work of Kipling includes three volumes deal¬

ing with phases of the Great European War.

'France at War' (1915) is a tribute no less, to the iron nerve and valor of the soldiers of that country than it is to the quiet, patient, day-by-day heroism and self-sacrifice of the women. 'Fringes of the Fleet' (1915) visu¬

alises the work of the submarines, destroyers and

smaller craft of the British navy. 'Tales of The Trade' (1916) tells of the remarkably daring and successful work of the British sub¬

marines, especially at the Dardanelles, while

stinct for the inevitable word, that first brought him into fame. •

It should be remembered that Kipling was a verse-maker before he wrote tales. As early as 1881 appeared for private circulation his 'School Boy Lyrics.'

ties' were humorous and satirical jingles, which were originally thrown off without effort to fill in the blank spaces of his newspaper when other copy was wanting. His first great success was with < Barrack-Room Ballads '

mostly in the slang of the British 'Tommv'

dialect. They are not narrative ballads of the traditional type ; they are rather songs with choruses and refrains, easily lending themselves to memory. In their kind there is nothing bet¬

ter than (Tommy, ' < Danny Deever,' 'Fuzzy-

Wuzzy,'

wherein ''the very refuse of language" is made poetical. Kipling’s theme has broadened with time. No poems of the present generation are better known than (The Recessional' (1897), composed on witnessing the naval review at Spithead on the occasion of Queen Victoria’s diamond jubilee, and

den' (1899), an appeal to the spirit of impe¬

rialism in the United States. Something of the same exalted strain characterizes his short poem written on the outbreak of the Great European War, "For All We Have and Are."

He was awarded the Nobel prize in literature in

1907. See Barrack-Room Ballads; Jungle

Books, The; Soldiers Three; Kim.

. Bibliography.— Among the collected edi¬

tions of Kipling's works in verse and prose are the .'Outward Bound' and the

Kipling Primer,' by F. L. Knowles (Bos¬

ton 1899) contains a brief biography, and a bibliography to date: Richard Le Gallienne's (Rudyard Kipling' (London and New York 1900) is the most complete estimate. Consult also < Rudyard Kipling, the Man and His Work' (London 1899) by G. F. Monkshood (the pen-name of W. J. Clarke) ; Young, 'Dic-

tionary of Characters and Scenes in the Stories and Poetry of Rudyard Kipling' (1911); Du¬

rand, < Handbook to the Poetry of Rudyard Kipling' (1914). .

Professor of English, Yale University.

KIPPER, a kippered herring, that is one preserved by smoking or pickling. Anciently in Scotland the word signified a salmon taken after the spawning season, and split, salted and dried, because of its inutility when fresh.

KIPS BAY, Battle of, in the American

Revolution. When Washington retreated from Brooklyn after the battle of Long Island (q.v.) he took position on Harlem Heights, New York, leaving troops lower on the island to oppose Howe's advance. On 15 Sept. 1776

Howe began to land his troops at Kip's Bay where the Americans had thrown up defensive works. When the British advanced the Ameri¬

cans became panic-stricken and, despite the efforts

of Washingtn and Putnam, fled in dis¬

order, whereupon all the troops were with¬

drawn to the position at Harlem Heights (q.v.). Consult Johnston, H. P.,

paign of 1776' ; id., 'Battle of Harlem Heights' ; Lossing,

tion,' (Vol. II, p. 610 et seq .) ; Lowell, E. J

'Hessians in the Revolution' (p. 72) • Tones (New York in the Revolution' (Vol I p'

604) ; Livingston, William F.,

nam' (pp. 308-309).

KIPTCHAK, kep-chak', or KAPTCHAK,

the Kingdom of the Golden Horde," the suc¬

cessor to the kingdom of the famous Mongol conqueror, Genghis Khan, by whose descend¬

ants it has been ruled since his day. It was very much mixed up with the affairs of Russia for many years, and the Romanoffs, the late royal Russian family, had in their veins the blood of the rulers of the Golden Horde, which at one time included much of modern Russia reaching as it did westward to the Dnieper

and extending far into central Asia. Its cap¬

ital, Sarai, which was founded on the Volga in 1242, became, in the course of time, noted for its wealth, barbaric splendor and slave market, where the Russians taken in the al¬

most ceaseless contests between Mongol and Slav, were sold. Timur the Terrible plundered Sarai and the surrounding country in 1395, and it suffered several times in later years at the hands of the

Russians. The kingdom of the Golden Horde before whose magnificent bar¬

baric court many a powerful Russian prince was forced to bow for centuries finally fell because of dissensions within itself which di¬

vided the kingdom into two independent gov¬

ernments. These fell, one by one, before the growing power of the grand princess of Rus¬

sia, but not without many a bloody struggle which the Slavs long remembered. (See

Genghis Khan). Consult any good history of Russia; also Curtin, (The Mongols' (Boston 1908) ; Douglas, (Life of Genghis Khan'

(London 1877) ; Erdmann, (Temudschin der Unerschiitterliche' (Leipzig 1862) ; Holworth, (History of the Mongols' (London 1877-88) ; Hoyle, (History of the Mongols' (London 1890) ; Johnston, (Famous Cavalry Leaders'

(Boston 1908).

KIRBY, ker'bi, Wiiliam, Canadian author; b. Kingston-upon-Hull, England, 13 Oct. 1817 ; d. 1906. He removed to Canada in 1832. In 1839 he went to Niagara, Ontario, where he edited and published the Mail for 25 years, and from 1871 to 1895 was collector of customs.

He published (U. E., a Tale of Upper Canada,'

a poem (1859); (Le Chien d'Or,' a novel (1877) ; (Pontiac) (1887) ; (Canadian Idylls J

(1888) ; (Annals of Niagara ' (1896). His title to fame rests on his great historical romance,

bec, in which the scene of the romance is laid.

KIRCHBACH, kirh'baH, Wolfgang, Ger¬

man critic and poet: b. London, England, 18

Sept. 1857 ; d. 1906. He was the son of a German artist and studied in Dresden and Leipzig. Settling in the former city in 1888 he was editor of the Magazin fur Litteratur des In-und Auslandes ; but from 1896 lived in Ber¬

lin. Among his works may be cited (Marchen) (1879); (Salvator Rosa,' a romance (1880); (Gedichte) (1883) ; (Das Leben auf der Walze>

(1892) ; (Die letzten Menschen,' a drama (1892) ; (Miniatured (Stuttgart 1892) ; (Des Sonnenreichs Untergang) (Dresden 1895) ; < Gordon Pascha' (it). 1895) ; (Eginhardt. und Emma' (ib. 1896) ; (Der Lieder vom Zweirad'

(1900).

KIRCHHOFF, kerk'hoff, Charles William

Henry, American editor and steel expert : b.

San Francisco, Cal., 28 March 1853; d. Asbury Park, N. J., 22 Tuly 1916. He attended school in the United States and Germany and was graduated from the Royal School of Mines at Clausthal, Germany, in 1874, taking the degree of mining engineer and metallurgist. During the next three years he was chemist, assayer and assistant superintendent of the Delaware Lead Mills at Philadelphia. Beginning his ca¬

reer in technical journalism in 1876, when he was correspondent of English, German and Capetown, Africa, papers, he became con¬

nected with the Metallurgical Review in 1877, and a little later joined the staff of the Iron Age, leaving it for a time to be managing edi¬

tor of the Engineering and Mining Journal, but returning in 1884. Four years later he be¬

came its editor-in-chief and vice-president of the David Williams Company, the publishers.

Mr. Kirchhoff kept up his editorial work, in which he won distinction, until his resigna¬

tion in 1909, although he had been asked by Mr. Andrew Carnegie to quit New York for Pittsburgh and the Carnegie Steel Company.

From 1898-99 and 1911-12 he was president of the American Institute of Mining Engineer¬

ing. He was at one time a special agent of the United States Geological Survey for the collection of statistics of the production of copper, lead and zinc. He was a member of the Iron and Steel Institute, was once presi¬

dent of the Germania Club and was a member of the American Society of Mechanical En¬

gineers.

KIRCHHOFF, Gustav Robert, German

physicist : b. Konigsberg, 1824 ; d. 1887. Grad¬

uated from the university of his native city, he was elected professor of physics at Breslau (1850), and four years later he went in the same capacity to Heidelberg, and from there to Berlin (1875-87). He made many original investigations in the realm of physics and was joint discoverer with Bunsen of the spectro¬

scope. His collected works, consisting prin¬

cipally of essays on his special subject of teach¬

ing, physics, were published in 1882, and a second edition was issued four years after his death.

KIRCHHOFF, kerk'hof, Johann Wilhelm

Adolf, German writer and classical scholar : b.

Berlin, 1826; d. 1908. Educated in his native city he was a teacher in various colleges, finally becoming professor in Berlin University (1865-

1908). He was an indefatigable worker in the field of classical philology, linguistics, mythol¬

ogy and antiquities. A great deal of his in¬

vestigations saw the light in print, hence his publications are many, and all of them are dis¬

tinguished by depth of thought, excellent judg¬

ment and careful and minute investigation.

Among the most noteworthy of his published •works are (Umbrische Sprachdekmaler'

(1849-51) ; (Die Stadtrecht von Bantia'

(1853); (Euripides) (1855); (Die homerische Odyssee und thre Entstehung) (1859) ; (Ueber die Entste'hungszeit des herodotischen Ge-

schichtswerkes) (1870); (Studien zur Ge-

schichte des griesischen Alphabets) (1874) ; (Thucydides und sein LThrkundenmaterial'

(1895), and edited editions of 'Plotinus'

(1856); 'Tfschylus' (1880); (Respublica

Atheniensium' 0881); 'Christian Inscrip¬

tions. }

KIRCHMANN, kerk'man, Julius von,

German writer and philosopher: b. near Meres-

burg, 1802; d. 1884. Educated in law at Leip¬

zig and Halle, he became, some time after¬

ward, state attorney in the Berlin Criminal Court (1846). He was successively a member of the National Assembly of Prussia (1848) and of the German Reichstag (1871-76). He studied and wrote much upon philosophy of 456

which he was recognized as one of the leading writers of his day. _ Among his published works are (Die Wertlosigkeit der Jurisprudenz als Wissenschaft) (1848);

(1865) ; (Aesthetik auf realistischer Grundlage) (1868), and many translations from the great philosophers, including Aristotle, Grotius, Hume, Bacon, Spinoza and Leibnitz. Consult Lasson and Meineke, (Julius von Kirchmann als Philosoph) (Halle 1885).

KIRCHWEY, George Washington, Amer¬

ican writer on legal subjects: b. Detroit, Mich., 3 July 1855. Graduated in law from Yale Uni¬

versity, he practised his profession in Albany, N. \ for 10 years (1882-91), where he was dean of the Albany Law School and professor of law in Union University (1889-91). On leaving Albany he became professor of law in Columbia University (1891-1901), dean of the law school there (1901-10), and Kent professor of law Columbia University (1902-16), warden of Sing Sing Prison (1916). Professor Kirch-

wey has been president of numerous societies of note, legal and otherwise, among them the American Peace Society, American Society of International Law and the American Institute of Criminal Law and Criminology, and he has contributed extensively to legal, technical and other magazines. At the close of 1918 he was appointed director of the United States Em¬

ployment Service for New York State. Among his published works are ^Historical Manu¬

scripts of the State of New York) (which he edited, 1887-89) ; (Readings in the Law of Real Property) (1900); (Select Cases and other Authorities on the Law of Mortgage) (1901).

KIRGHIZ, kir-gez', KIRGHIS, or KIR¬

GHIZ-KAZAKS, a widely-spread nomadic

people of Asia, of Turkish-Tartar race, who inhabit the steppes that extend from the lower Volga and the Caspian Sea in the west to the Altai and Thian-Shan Mountains in the east, and from the Sea of Aral in the south to the Tobol on the north. They are divided into hordes, the Great Horde inhabiting both Russian and Chinese territory; the Middle Horde, Siberia, and the Little Horde the Volga-Ural steppes in European Russia. The term Kirghiz, though applied by Europeans to the whole of these peoples, properly belongs only to the Kara-Kirghiz (Black Kirghiz, called also Buruts or Pruts). Those to whom

Europeans give the name Kirghiz are called by the Asiatics Kazaks. The Kirghiz-Kazaks speak the Turkish dialect of the Uzbeks. In their physical type they belong to the Mongo¬

lian race. They profess the Mohammedan faith, though they do not practise polygamy.

They are below the general average of Euro¬

pean stature, and are remarkably healthy and vigorous. Their food is chiefly mutton and horse-flesh, with koumiss or fermented mare's milk, from which they extract an intoxicating spirit. Their dwellings consist of a hemispher¬

ical tent, the frame of which is of boughs, the covering of felt. Their manufactures are ex¬

clusively domestic, and consist of woolen cloths, felts, carpets, hair-ropes, leather, metal orna¬

ments for horse-trappings, knives, etc. They carry on a trade by barter with the Chinese and Russians, exchanging sheep, horses, camels, cattle, wool, skins, etc., for tea, cutlery, silks and other manufactured goods.. A considerable portion of the Kirghiz dwell in Chinese terri¬

tory, for the most part in Turkestan, but the greater number of them are nominally undei Russian

dominion. Of these European Russia contains some 150,000. Consult Levshin, Alexis, (Description des hordes et des steppes des Kirghiz-Kazaks) (trans. from the Russian by Ferry de Cigny, 1840) ; Vambery,

tive Kultur des turko-tartarischen Volkes) (Leipzig 1879) ; Karutz, R., (Unten Kirgisen und Turkmenen aus dem Leben der Steppe) (Leipzig 1911); Parker, E. H, (A Thousand Years of the Tartars) (1895).

ivixviin, xe-ren , tne central province of Manchuria and its capital of the same name.

The name, which means ((Lucky-f orest/) is in Chinese Ki-lin. Kirin province lies between the Sungari River on the north, the Usuri River and Russia on the east, Korea and Sheng-

kmg province on the south, and the Sungari River on the west. A part of the country is very mountainous, the elevation rising, in places, t

clined to be low in places. The highest range of mountains in Kirin is the Shan-a-lin, the upper ranges of which are known as C'hang-

Peh-Shan, or Ever-white Mountains. These rise, in places, to an elevation of over 10,000 feet, are covered, in their highest peaks, throughout the year with snow, hence their name. In addition to the two important rivers already mentioned Kirin has a third great river, the Hurka, which is inferior only to the Sungari, which, after a long and tortuous course, ulti¬

mately reaches the Amur. The Usuri, which is over 500 miles in length, is also a tributary of the Amur. A large part of the province is level and well adapted to agriculture and cattle¬

raising, but it is not so largely cultivated as the provinces of China. The mountainous regions are still in a state of sylvan wildness and there tigers, mountain cats and various species of wild animals and birds abound, and the rivers and streams

in the upland course are abun¬

dantly filled with fish. Among the products of the agricultural section of the country are barley; corn, millet, pulse and other grains, pota¬

toes and other root crops, and in the low sec-

tions rice, while poppies are grown everywhere.

Among the important cities of the province are Kirin 100,000; Ashiho, 60,000; Petuna, 40,000; ?caA^Sln&. 30’000.; Lalin, 26,000, and Ninguta, ^b,U0U. I he capital, Kirin, which lies among the foothills on the shore of the Sungari River, is the most handsome and favorably situated town of the province. It is surrounded by tobacco plantations and upland forests, which furnish it with a very considerable portion of its export trade. The tobacco goes to China, the timber to the regions farther down in the flat country where timber is not so plentiful.

Owing to the abundance and excellent quality of the wood in the market the city does an ex¬

tensive business in the building of boats for river trade; for this reason the Chinese call the city the «Navy Yard» («Chuen Chang))) The neighboring mountains are rich in ore, some of which has been exploited, especially silver, but most of it awaits future develop¬

ment. Kirin is well paved and is one of the cleanest cities in the province. Its many well-

attended squares and small parks give it a decided home-like appearance. Pop. of prov¬

ince 2,000,000.

KIRK, kerk, Edward Norris, American

' Congregational clergyman: b. New York, 14

Aug. 1802 ; d. Boston, 27 March 1874. He was graduated at Princeton (then the College of New Jersey), in 1820, studied law in New York, was graduated from the Princeton The¬

ological Seminary in 1825 and licensed to preach in 1826, was agent for the Board of Foreign Missions in the Middle States, and South Carolina, Georgia and Virginia, in 1829-

37 was pastor of the Fourth Presbyterian Church of Albany, N. Y., and while there established with N. S. S. Beman and others the Troy Theological Seminary, the forerunner of the Union Theological Seminary of New York City (q.v.). From 1837-39 he traveled extensively in Europe, becoming upon his re¬

turn secretary of the Foreign Evangelical So¬

ciety. From 1842 until his resignation in 1871

he was pastor of the Mount Vernon Congrega¬

tional Church of Boston. In 1856 at the re¬

quest of the American and Foreign Christian Union he inaugurated regular worship for American Protestants in Paris. Previous to and during the Civil War he was one of the most outspoken and strongest supporters of anti-slavery. He was president of the Ameri¬

can Missionary Association, and published (Sermons in England and America) (New

York 1840) ; (Lectures on the Parables of Our Saviour* (New York 1856) ; discourses, Doc¬

trinal and Practical* (Boston 1860), and many other single sermons and addresses. He also translated and edited with introductions S, R.

L. Gaussen's (Theopneusty, or the Plenary In¬

spiration of the Holy Scripture) (New York 1842) ; the same writer's (Canon of the Holy Scriptures) (Boston 1862), and J. F. Astie's (Louis XIV and the Writers of His Age.*

His (Lectures on Revivals) were collected and edited by D. O. Mears (Boston 1874). Consult Mears, D. O., (Life of E. N. Kirk) (Boston 1877), and other writings.

KIRKBRIDE, Thomas Story, American

physician : b. near Morrisville, Bucks County, Pa., 31 July 1809; d. Philadelphia, 16 Dec. 1883.

His ancestors, who had come to this country with William Penn, were, like himself, mem¬

bers of the Society of Friends. He received the degree of M.D. from the University of Pennsylvania in 1832, and was appointed resi¬

dent physician of the Friends' insane asylum at Frankfort, Pa. A year later he was elected resident physician of the Pennsylvania hospital, in which he continued two years, when he be¬

gan general practice in Philadelphia. In Janu¬

ary 1841 he became superintendent and physi¬

cian-in-chief of the Pennsylvania Hospital for the Insane, then first opened, and continued in that office till his death. He was one of the most active members, and successively secre¬

tary, vice-president and president of the Asso¬

ciation of Medical Superintendents of Ameri¬

can Institutions for the Insane. He published (Rules and Regulations of the Pennsylvania Hospital for the Insane) (1850), which has been a textbook and guide in the regulations of new hospitals, and a work (On the Con¬

struction, Organization and General Arrange¬

ments of Hospitals for the Insane) (Philadel-

i

phia 1854, enlarged 1880). In 1853 he pro¬

posed the erection of a new hospital, and the separation of the sexes in two distinct build¬

ings, and was the first superintendent in the United States to carry such an arrangement into effect. In many other respects he was in the fore-rank of American alienists, holding advanced views in regard to the medical and hygienic treatment of insane persons. He was one of the most ardent and successful fighters for more humane and rational treatment of such sufferers and much of the admirable con¬

ditions now existing in public institutions for the insane is due to his efforts and initiative.

Consult Anon.,. (A Memorial of T. S. Kirk-

bride, M. D. (in Pennsylvania Hospital of the Insane, Report for the Year 1883, p. 26, Phila¬*

delphia 1884) ; Curwen, J., (Thomas S. Kirk-

bride (in Proceedings, American Philosophical Society, Vol. XXII, p. 217, Philadelphia 1885).*

KIRKCALDY, Sir William, Scottish

leader, politician and adventurer: b. 1520; d.

1573. He had a very checkered and unsavory career. Faithlessness to party and principles, treachery, intrigue and murder formed a dis¬

tinctive feature of his life, and to him nothing that stood in the way of his ambition seems to have been sacred. He took part in the murder of Cardinal Beaton at Saint Andrews (1546).

He served as secret agent for Edward VI of England in France and elsewhere for several years, but later on he took up the cause of the king of France. On his return to Scotland he became prominent as an ultra-Protestant leader, and as such took part in the murder of Rizzio, the favorite of Mary* Queen of Scots. Then turning his arms and his influence against the latter queen he contributed powerfully to her defeat at Langside. But finding Protestantism not altogether conducive to his ambitious schemes, he deserted the Protestant party and took up the cause of Mary Queen of Scots.

The latter step led to his own downfall. The English government sent a powerful force against him, and the Regent Morton, second¬

ing the efforts of the latter, defeated Kirkcaldy and forced him to retreat to his strongly forti¬

fied castle. There, after standing a siege for some time, he was captured and later on he was hanged. Playing false with friends and enemies alike, he finally found himself without friends. John Knox, with whom he had been hand in glove in the days of his ultra-Prot¬

estant attitude, later on denounced him as a traitor, murderer and cut-throat. Consult any good history of Scotland or life of Mary Queen of Scots.

KIRKCALDY, ker-ka'di, a seaport town

in Fifeshire, Scotland. It is situated on the Firth of Forth, north of Edinburgh. It has excellent and extensive harbor and wet dock facilities and a large maritime trade, both coast and overseas. Its vessels do a direct trade with New York, Canada and parts of Central America. So important is this foreign trade of Kirkcaldy that the United States is repre¬

sented there by a consular agent who has been instrumental in increasing the extent of trade between American ports and Kirkcaldy. It is an old town, having been in existence in the 12th century,

and a place of some considerable importance by the middle of 'the 15th. It is a long, straggling town, which has been built up 458

considerably of late, blit it is still known as the long town, on account of its covering close upon five miles in length, largely along the water-front. It has numerous fine buildings, and is supplied with libraries, schools and all other facilities for education. Its imports are large and varied, while its exports include coal, coke and patent fuel. Its local industries con¬

sist largely in the making of linen and other kinds of yarns, linoleum, carpets and ma¬

chinery. Pop. 43,000.

KIRKDALE CAVE, in Yorkshire, Eng¬

land, 28 miles west of Scarborough, is famous for the numerous remains of Tertiary mam¬

mals. It was discovered in 1821, in the cutting back of an oolitic limestone rock in which it is situated. Its greatest length is 245 feet. The fossil bones are contained in a deposit of .mud that lies on the floor of the cave. The remains of the following animals have been discovered : Hyena, tiger, bear, wolf, weasel, elephant, rhinoceros, hippopotamus, horse, ox, deer, hare, rabbit, water-rat, raven, pigeon, lark and duck.

KIRKE, Sir David, English adventurer:

b. Dieppe, France, 1597; d. Ferryland, New¬

foundland, 1656. The (

of London were at the beginning of his life a powerful body of associated privateers, and his father, Gervase Kirke, a dealer in French wine, who had left France to escape from the perils of the religious wars, joined the adventurers and projected

with Sir William Alexander a plan for capturing New France* and colonizing Nova Scotia. Tney obtained letters of marque and a monopoly of the fur trade, and David Kirke sailed in 1627 as commodore of three privateers, his brothers, Lewis and Thomas, being each in command of one. Off Quebec they captured 20 French ships with cargoes and passengers. In 1629 he captured another vessel and compelled Champlain to surrender Quebec.

In the meantime peace had been made with France, the captured territory was restored, but Kirke was knighted for his services. He seemed doomed to disappointed ambition to the end, for Cromwell's council revoked, after the execution of Charles I, the grant of all New¬

foundland made to Kirke in 1637 by the king, although the adventurer eventually recovered most of the lands thus confiscated. Consult Kirke, 'H., (The First English Conquest of Canada) (London 1871).

KIRKLAND, Caroline Matilda Stans-

bury, American author: b. New York, 12 Jan.

1801 : d. there, 6 April 1864. In 1827 she mar¬

ried William Kirkland, a professor in Hamil¬

ton College, Clinton, N. Y., removing with him to Michigan in 1839. She lived for a few years a pioneer life and her experiences furnished the basis of her earlier books published under the pseudonym, ((Mary Clavers.^ These in¬

clude (A New Home; Who'll Follow?) her best work (1839) ; (Forest Life) (1844), and (Western Clearings) (1846). In 1842 she made her home in New York, where she established a boarding school for girls and contributed frequently to periodicals. Among her later works are ^he Helping Hand* (1853); Me¬

moirs of Washington (1857) ; (The Destiny of Our Country* (1864).

KIRKLAND, James Hampton, American

educator: b. Spartanburg S. C., 9 Sept. 1859.

He was graduated from Wofford College

(Spartanburg, S. C.) in 1877, was assistant professor of Latin and Greek there in 1881-82, and professor of Latin and German in 1882-83.

After European study (1883—86) , he was pro¬

fessor of Latin in Vanderbilt University (Nash¬

ville, Tenn.) in 1886-93, and in 1893 became chancellor and professor of Latin language and literature. He has written several monographs, and published a (Study of the Anglo-Saxon Poem called by Grein <(Die Hollenfahrt Christi** * (1885), and an edition of the Sat¬

ires and Epistles of Horace) (1893). Since 1893 he has made many contributions to educa¬

tional journals, and has filled positions in numerous educational societies. For 14 years he was secretary of the Southern Association of Colleges and High Schools; in 1911 presi¬

dent of the Religious Education Association ; in 1914 president of the Classical Association of the Middle West and South. He was a member of the Southern Education Board and is at present connected with many educational movements and organizations. He has re¬

ceived the degree of D.C.L. from the Univer¬

sity of the South, and LL.D. from the Univer¬

sities of North Carolina, Pittsburgh, Missouri and from Wesleyan University.

KIRKLAND, John Thornton, American

Unitarian clergyman and college president : b.

Little Falls, N. Y., 1770; d. Boston, 26 April 1840. He was the son of Samuel Kirkland (q.v.), was graduated at Harvard College in 1789, and ordained pastor of the Congregational (Unitarian) Church in Summer Street, Boston, in 1794, where he remained till elected president of Harvard College in 1810. He held this office until 1828. His (Life of Fisher Ames) (1809) is perhaps the most valuable of the several biographies of which he was the author, and his (Eulogy of General Washington) was much admired. He exerted a very great influence during his life, by the force of his intellect and character, and during his presidency the college flourished, both in its internal condition and in its external relations.

KIRKLAND, Joseph, American novelist :

b. Geneva, N. Y., 7 Jan. 1830; d. Chicago, 1894.

He was a son of Caroline Kirkland (q.v.), was educated in the schools of Michigan, re¬

sided with his parents in New York, making his home in Illinois after 1856. During the Civil War he served in the Federal army, at¬

taining the rank of major, and after engaging in coal mining in Illinois and Indiana for a time, practised law in Chicago. He published (Zury, the Meanest Man in Spring County) (1887), a faithful story of the beginning of pioneer life in Illinois; (The McVeys> (1888); (The Captain of Company K) appeared in 1891; KIRKLAND, Samuel, American mission¬

ary to the Indians: b. Norwich, Conn., 1741; d. 1808. He was graduated at Princeton 1765.

He had previously visited the Senecas, for the purpose of studying their language. In 1766

he was ordained, and sent by the Congrega¬

tional Church to preach to the'lndians. After living among the Senecas for a year and a half he went to

the Oneidas, whom he considered to be the highest type of the Iroquois. During KIRKMAN — KIRSCH

the Revolution he persuaded the Oneidas and Tuscaroras, who were bent on taking one side or other, to join the Americans, instead of the British. He saw considerable war service as military chaplain, especially with General Sulli¬

van on the Susquehanna, in 1779. In 1793 he founded the Hamilton Oneida Academy for the education of Indian boys. This is now known as Hamilton College. In 1794 the Indians made complaints concerning his administration, and he published a vindication, which with his letters and journals, furnishes a unique picture of life among the Iroquois. Consult Lothrop, (Life of Samuel Kirkland) (1848).

KIRKMAN, Marshall Monroe, American

railway official : b. Illinois, 10 July 1842. He entered the railway service of the Chicago and Northwestern Line in 1856, held various posts in different departments, was comptroller in 1881-89, and in 1889 became second vice-presi¬

dent. He has been a constant writer on rail¬

way subjects since 1877. His chief works are (The Science of Railways) (1894; revised and republished in 17 volumes 1909) ; (The Class¬

ical Portfolio of Primitive Carriers) (1896) ; (The Air Brake) (1901) ; (Building and Re¬

pairing Railways) (1901); (The Romance of Gilbert Holmes) (1900) ; (Iskander) (1903) ; (The Alexandrian Novels) (3 vols., 1909) ; (History of Alexander the Great) (1913).

KIRKPATRICK, Alexander Francis,

English clergyman and educator ; b. Lewes, Sussex, 25 Tune 1849. He was educated at Trinity College,

Cambridge, and elected one of its Fellows in 1871. He was ordained deacon in 1874 and priest in 1875. He was assistant tutor in Trinity College, 1871-82; also junior dean, 1876-82; regius professor of Hebrew and at the same time canon of Ely 1882-1903 ; honorary canon of Ely and Lady Margaret Professor of Divinity, 1903-06; master of Sel-

wyn College, Cambridge University, 1898-1907 ; dean of Ely since 1907. He is the editor of the Old Testament and apocryphal volumes of (The Cambridge Bible for Schools and Col¬

leges. } To this series he contributed (The First Book of Samuel) (1880) ; (The Second Book of SamueP (1881); (The Book of the Psalms) (3 vols., 1890-1901). He is also the author of (Divine Library of the Old Testa¬

ment) (1891: new ed. 1914); the

KIRKSVILLE, kerks'vil. Mo., city and

county-seat of Adair County, on the Omaha and Kansas City and the Wabash railroads, 204 miles northwest of Saint Louis. It was first settled in 1840, and adopted the commis¬

sion form of government in 1914. There is a normal school here, court-house, public library and numerous churches. It is the seat of the original school of osteopathy. It lies in the centre of an extensive agricultural district and has coal mines and manufactures of iron, wag¬

ons, carriages, shoes, etc. The waterworks are the property of the municipality. Pop. 7,213.

KIRKUP, kerk'up, Thomas, English writer on economical and social subjects: b. 1844; d. 1912. Educated at the universities of Edin¬

burgh, Berlin, Paris, Gottingen, Tubingen and Geneva, he entered literature and gave much attention to the study of socialism and to other subjects and social movements of the latter half of

the 19th century and the first decade of the present. History and economics, especially their modern phases, occupied much of his at¬

tention. On all of these subjects he contributed extensively to various works of reference, es¬

pecially to Chambers' Encyclopaedia) and the (Encyclopaedia Britannica.) Among his pub¬

lished works are (An Inquiry into Socialism) (1887) ; (History of Socialism) (1892) ; (South Africa, Old and New) (1903); (Progress and the Fiscal Problem) (1905) ; (Primer of Social¬

ism) (1908).

KIRKWALL, kerk'wal, capital of the Ork¬

ney Islands. It is a seaport and has an exten¬

sive import and export trade and regular steam¬

ship communication with all the important ports of Scotland and England and with Leith, Aber¬

deen and Berwick, ports of the Shetland Is¬

lands. It imports timber, flour and other arti¬

cles of food and exports principally herrings, the fishing of which forms the occupation of most of the coast people. Kirkwall is quite an old city and has numerous ruins of ancient places that played a part in its past history. It is first mentioned in the 10th century and it was made a royal burg in 1486. Its fine old Norman-Gothic cathedral dates back to the first half of the 12th century. Pop. about 4,000.

KIRKWOOD, kerk'wud, Samuel Jordan,

American political leader : b. Hartford County, Md., 20 Dec. 1813; d. Iowa City, Iowa, 1 Sept.

1894. Having removed to Richland County, Ohio, in 1835, he studied law, was admitted to the bar in

1843, in 1845-49 was prosecuting at¬

torney of the county, and in 1850—5 1 a member of the State Constitutional Convention. In 1855 he established himself in milling and farm¬

ing in Iowa, the next year was a member of the State Senate and in 1860-64 Republican governor of Iowa. During the Civil War he levied 48 regiments of volunteers and equipped them at $500,000 less than the usual cost. He was United States Senator in 1865-67 (com¬

pleting the unexpired term of Tames Harlan, resigned), was again elected governor of Iowa in 1875, in 1877-81 was a member of the Senate, and from 5 March 1881 to 6 April 1882, when he resigned, was Secretary of the Interior in Garfield's Cabinet. He then withdrew from political life.

KIRMESS. See Kermess.

KIRSCH, Johann Peter, German ecclesi¬

astic and author: b. Dippach, Luxemburg, 3

Nov. 1861. He received his education at the Luxemburg Seminary, the Campo Santo Te-

desco and the Vatican Archives Palaeographic School, Rome. In 1884 he was ordained priest of the Roman Catholic Church and in 1888-90

was director of the Historical Institute of the Gorres Society. Since 1890 he has been pro¬

fessor of pathology and Christian archaeology at the University of Fribourg, Switzerland. He has published (Die christlichen Culturgebaude im Alterthum) (1893) ; (Die papstlichen Kol-

lektorien in Deutschland wahrend des 14.

JahrhunderP (1894) ; (Die Finanzverwaltung des Kardinalkollegiums im 13. und 14. Jahr-

hundert) (1895) ; (Die Akklamationen und Gebete der altchristlichen Grabschriften) (1897) ; (Die christliche Epigraphik und deren Bedentung fur die kirchengeschichtliche For-

schung) (1898) ;

der Heiligen im christlichen AltertunP (1900; English trans.,. by J. R. McKee, 1910) ; 'Illus-

trierte Geschicte der katholischen Kirche) (Part I, 1905) ; (Die Geschichte der Kirche, ein Zeugnis ihrer hoheren Sendung) (1912); and (Die Frauen des Altertums) (1912). Pie collaborated in other historical works, notably with Ehrhard in 'Forschungen zur christlichen Literatur- und Dogmen-geschichte> and with Buchi in Zeitschrift fiir Schweizerische Kirch-

engeschichte, and contributed several articles to 'The Catholic Encyclopedia. y

M KIRSCH, or KIRSCHWASSER, kersh'-

vas er, a liquor in general use in Germany. It is made from cherries, hence its name which signifies literally (

tilled liquor and is made chiefly in the Black Forest and in Switzerland. In English-speak¬

ing countries kirschwasser is frequently called cherry-brandy. This is really what it is ; but it must be distinguished from the ordinary cherry brandy which is made from a mixture of the juice of cherries and ordinary brandy.

KIRSCPINER, kersh'ner, Lola (Aloy-

sia), Austrian novelist : b. Prague, 1854. She wrote very much under the pseudonym of Ossip Schubin, a name by which she is still generally better known to the reading public of her works than by her own. Her nom-de-

plume she took from ' Helena, > a novel by Tur-

geneff. She came of good family and was privately educated by excellent tutors at home, at Lockov. She traveled extensively and fre¬

quented the capitals of Europe where the fash¬

ionable sets of the various nations were and still are accustomed to meet. This society in Berlin, Brussels, Paris and Rome attracted her irresistibly and she set herself to study it. She soon began to reproduce it in works of vivid presentation and truth of characterization. She is especially severe on the military and ruling classes .of Austria which she depicts with great detail intermingled with biting sarcasm. All her works show great talent; but they are too often marred by haste and want of care in de¬

tails. Among her published works are (Ehre) (1882); (Die Geschichte eines Genies) (1884); 'Unter 'Uns> (1884); 'Gloria Victis* (1885); 'ErlachhoU (1887); 'Es fiel ein Reif in der Fruhlingsnacht> (1888); 'Ausbein aus dem Leben ernes VirtuoserP (1888); 'Boris Len¬

sky) (1889) ; (Unheimliche Geschichten) (1889); (1897); (Slawische Liebe) (1900); (Marska) (1902) ; 'Refugium PecatorunP

(1903) ; 'Der Guadenschuss) (1905) ; (Der arme NickP (1906); 'Primavera* (1908);

'Miserere nobis) (1910).

KIRTLAND, kert'land, Jared Potter,

American physician and educator: b. Walling¬

ford, Conn., 10 Nov. 1793; d. Cleveland, Ohio, 10 Dec. 1877. He. studied in the medical depart¬

ment of the University of Pennsylvania and was graduated from that of Yale in 1815 *

practised at Wallingford (1815-18) and Dur¬

ham (1818-23), Conn., from 1823 at Poland, Ohio; in 1829-32 and 1834—35 was a member of the Ohio Legislature; and was professor of the theory and practice of medicine in the Ohio Medical College (Cincinnati) in 1837-42. In 1843 he assisted in founding the medical de¬

partment of the Western Reserve University, where he was professor of the theory and prac¬

tice of medicine in 1843-64. He assisted in founding and became president (1845) of the Cincinnati Academy of Sciences, from 1865 the Kirtland Society of Natural History. His zoo¬

logical studies are of great importance. He discovered parthenogenesis in insects and the distinction of sex in the species Unionidce.

KIRWAN, ker'wan, Richard, Irish writer

and scientist : b. Cloughballymore, County Gal¬

way, 1733; d. 1812. Educated in France by the Jesuits he was graduated in law and began the practice of his profession, which he soon largely neglected for the study of the natural sciences, for which he had shown special apti¬

tude while in college. He was one of the first great and accurate students in English of min¬

eralogy and the composition of acids. He also gave considerable attention to scientific agri¬

culture. He was looked upon, in his day, as one of the greatest of scientific thinkers and honors came to him from many quarters. He was elected a member of the Royal Society in 1780 and of the Royal Dublin Society, both of which societies presented him with gold med¬

als for brilliant work done in connection with them. He had a very wide range of acquaint¬

ances among the scientific and learned of Europe, with all of whom he was very popular on account of his great learning, his ability for consecutive and careful thought and his genu¬

ine Irish wit and good humor. Among his writings which cover a wide range of subjects, all of which are handled in a truly scientific manner, are (Elements of Mineralogy > (1784) ; 'Essay on Phlogiston and the Composition of Acids* (1787); 'Temperatures of Different Latitudes) (1787); 'Geological Essays)

(1799); 'The Analysis of Mineral Waters*

(1799) ; 'Logick' (1807) ; and 'Metaphysical Essays* (1811).

KIRYU, ker'yoo', a Japanese city in the prefecture of Gumma. It lies north by north¬

west of Tokio, by which it is connected by rail over a distance of some 80 miles. It has a very considerable local trade, has been growing steadily of late and produces exten¬

sive quantities of excellent silk, for the manu¬

facture of which and of satin it has large mills fitted with the latest modern machinery.

Kiryu is one of the most progressive of the smaller cities of Japan. Pop. about 40,000.

KISER, lci-zer, Samuel Ellsworth, Amer¬

ican journalist and author: b. Shippensville, I a., 2 Feb. 1862. During the Civil War was taken by his mother to Washington, D. C., where his father, a soldier, was stationed for brief period. *He entered journalism in Cleve¬

land, later engaged in editorial work in Chi¬

cago and has been a regular contributor since 1900 to magazines and newspapers. He is also a lecturer

and advertising specialist. He pub¬

lished 'Budd Wilkins) (1898) ; 'Georgie*

(1900); 'Love Sonnets of an Office Boy) (1902); 'Ballads of the Busy Days* (1905) -

'Charles the Chauffeur* (1905); 'The Whole Glad^YeaU (1911) ; 'The Land of Little Care*

KISFALUDY, kish'fo-lu-di, Alexander

(Sandor), Hungarian poet and dramatist: b.

Sum eg, Zala County, 27 Sept. 1772; d. in his native town, 28 Oct. 1844. He was an elder brother of Karoly Kisfaludv (q.v.) and with him exercised a notable influence upon Hun-

v garian literature and language. Coming of a good family he received an excellent education at Raab and Pressburg; and on graduation en¬

tered the Austrian army where he proved a very active and efficient soldier during several campaigns, in one of which he was made pris¬

oner and remained in captivity for some time in Provence. This captivity brought him into contact with Western literature and gave him a new view of literary life. On his return to Hungary he at once began devoting all his at¬

tention to literature; and he soon met with flattering success. As the elder brother, to him fell the paternal estate, which he continued to make his home and where he led the life of a country gentleman. His literary genius lay not, like that of his brother, in drama and com¬

edy, but in lyrical poetry. Curiously enough he was the same age (29) as his brother when he appeared

before the public with a serious literary effort, which in his case was (Himfy's Loves* ((Himfy szerelmei*). His first effort was met with general approbation, and he awoke one morning to find that he had literally become famous over night. His poem was read and recited everywhere and by everyone in mid¬

dle and upper class society in Hungary. This was followed in 1807 by a continuation of the poem now generally known as the second part of (Himfy's Loves, * which was also well re¬

ceived by the public. This was followed, in the same year, by (Legends of the Olden Time in Hungary* ((Regek a magyar eloidoboP) ; Ju¬

lia's Love* ((Gyula szereme*); and his histor¬

ical dramas, mostly tragedies, of which the most noteworthy are (Hunyadi Janos* and (Kun Laszlo.* Many of his works have been translated into German, and some of them from this latter language into French, English and other of the languages of Europe. Both Gaal and Machik have turned his (Legends of the Olden Time* into German; and (Julia's Love* has also been translated into German by Gebell-Ennisburg. An excellent edition of Kisfaludy's works appeared in Budapest in 1892.

KISFALUDY, Charles (Karoly), Hun¬

garian poet and dramatist: b. Tet, 5 Feb. 1788; d. Pest, 21 Nov. 1830. A brother of Sandor Kisfaludy (q.v.), he early showed the family bent for literature and its talent for imagina¬

tive thinking and description. After some time spent in literary preparation he went to Pest in 1817 and there began turning out, with won¬

derful rapidity, work covering almost every field of literary endeavor, until he soon placed himself in the fore rank of poets and drama¬

tists in his own country. He became by far the most

popular of the Hungarian dramatists of his day; and he made of comedy a feature of the Hungarian stage to such an extent that he is to-day looked upon as the founder of the Hungarian drama. Many of his comedies have been translated into German, French and other European languages. He also wrote tragedies which are only slightly inferior to his comedies, but superior to the work of his contemporaries.

The best of his tragedies is (Irene* ; and of his comedies are (The Murderer* and (The Suit¬

ors.* He also wrote good poems and excel¬

lent short stories and longer tales and talented humorous pictures of Hungarian life. His ef¬

forts in this direction created a school of younger writers who, if they did not equal the work of their master, at least helped to make the literature of the country imaginative and truthful to life. But his services in the devel¬

opment of the Hungarian theatre surpass all his other efforts and have justly made him one of the foremost figures in Hungarian literary life. The Kisfaludy Society, founded in honor of him and his brother, to promote the in¬

terests of Hungarian literature, has recog¬

nized, to the full, his literary services and has made his work well known, not only at home but in foreign countries. Consult Banoczi, for his life and works (Budapest 1882) ; Gaal, (Theater der Magyaren* (a translation of the best of his dramatic works, Bonn 1820) ; Hornyanszky, J., (Irene* (translated into Ger¬

man, 1868). One of the best collections of his works is that published by Banoczi at Buda¬

pest in 1893. Previous to this six other edi¬

tions had already been published, and several

complete or partial editions have been issued since then.

KISH, Dynasty of (4401 to 3815 b.c.), the second of the Babylonian dynasties of the Su¬

merian rulers. It followed the Opis dynasty, which appeared in the north of Arabia, and east of the Tigris, and counted six known rulers. The Kish dynasty arose in the east of Babylonia superseding "the Opis rulers ; and the sovereigns appear to have been both tem¬

poral and spiritual rulers, that is, they were both high priests and kings ; and it seems prob¬

able that, at this time in the history of Baby¬

lonia, belief was held that the sovereigns were of divine origin and hence the representatives of the gods, or at least the chief of the deity upon earth. That the .Kish sovereigns played an important role in Babylonia in their day is evident from their written records which have survived the ravages of time. These are comparatively plentiful. They show that the dynasty consisted of at least eight rulers des¬

ignated as follows: Azag Bau, who is said to have been a woman and to have reigned 100 years; Basha Enzu, 25 years; Ur Zamama, 6 years ; Zimudar, 30 years ; Uziwidar, 6 years ; Elmuti, 11 years; Igu Babbar, 11 years; Nani-

yachi, 3 years ; a total of only 192 years, more than half of which time is occupied by the reign of one sovereign out of the eight. Yet the total length of the duration of the dynasty is given as 586 years. Undoubtedly the first sovereign, Azag Bau, is either altogether tradi¬

tional, or is the family or tribal name of a number of sovereigns. Even at this early pe¬

riod in their history the Sumerian people gave every evidence of having been highly advanced in

civilization. They had their own peculiar system of writing which was quite different from that of the Semitic races, by whom they were surrounded then or at a later date. From the nature of the existing records of the Kish dynasty it seems probable that they recount the deeds of the more prominent of the rulers of the Sumerians at this comparatively early period in their national existence. The records give lists of other rulers who flour¬

ished on or about the same time as the kings 462

of the Kish dynasty; but, so far, there seems to be no reason for supposing that they be¬

longed to the dynasty itself ; but rather that they were rulers of adjacent territory over which they held independent sovereignty. Prob¬

ably further discoveries of records and the decipherment thereof may bring to light more definite and detailed information relative to the Kish rulers, those ancient Asiatic sovereigns who appear upon the sun-line of the horizon of semi-mythical history, behind which even the brightest tradition grows cloudy. See Egypt, History.

KISHINEFF, kesh-e-nef', Rumania, the

capital of the government of Bessarabia, 86

miles northwest of Odessa, on the Byk, an affluent of the Dniester. It is a bishop’s see, is well laid out on a picturesque site, and among its. educational institutions are a seminary for priests, two gymnasia, a public library and bo¬

tanic garden. The grapevine, plums and to¬

bacco are cultivated in the vicinity; it has manufactures of flour and woolens, candle and soap works, and a considerable commerce with the East.

Kishineff arose around the monas¬

tery of Kishnosaref in the 1 5th century. Dur¬

ing the 18th century it was subjected to attacks from the Turks and in 1812 was annexed by Russia. It came into world-wide prominence in 1903 owing to a shocking massacre of Jews on the Russian Easter and succeeding days.

Pop. 128,200, consisting of Russians, Molda¬

vians, Jews, Bulgarians, Wallachians and Tartars.

KISHON, ki'shon, the biblical name of a river in Palestine. It is called El-Mukatta by the modern Arabs. It rises on Mount Gilboa, and pursues a northwesterly course through the plain of Esdraeldon, and empties into the Bay of Acre. Here Elijah slaughtered the priests of Baal, and Deborah and Barak de¬

feated Sisera. The French and Turks fought a battle on its banks in 1799.

KISS, kis, August, German sculptor: b.

*near Pies, 11 Oct. 1802; d. Berlin, 24 March 1865. Educated to his profession in Berlin, he soon showed, after graduation, considerable originality which one of his teachers, Rauch, had early discovered in him. His first notable work, (A Mounted Amazon attacked by a Tiger, * was produced for Louis I of Bavaria (1842), in marble and afterward cast in bronze by the noted founder, Fischer, for the portico of the Berlin Museum, where it still forms one of the notable and attractive features of the art treasure of the German capital. Kiss made a very careful study of animals at rest and in action and was able to seize, in a notable man¬*

ner, the striking features of animal life and to couple them with infinite and carefully wrought-out details. These and other qual¬

ities, especially dramatic action and clever grouping, which distinguish all his work, are especially present in this, his first great effort,

which is, by the general consensus of opinion, looked upon as the best expression of his ideals, his planning and his execution. Kiss made numerous statues, all executed on a high plane, some of them of notable persons and others of them developing some incident or scene.

Among the most notable of his works are (Equestrian Statue of Frederick the Great*

(1847, at Breslau) ; one statue of Frederick William II at Potsdam, and another at Konigs-

berg; (Saint Michael Fighting the Dragon) (Babelsberg Castle) ; (Saint George Slaying the Dragon) (in the courtyard of the Schloss-

hof, Berlin) ; (Faith, Hope and Charity) (mar¬

ble group, National Gallery, Berlin) ; six fine bronze statues of Prussian generals (Wilhelms Platz, Berlin).

KISS, kish, Josef, Hungarian Jewish poet: b. Temesvar, 1843. His name was originally Klein. His poems which deal principally with Jewish life, legend and history are often mingled with Magyar life, customs and tradi¬

tions. His work is of two distinct kinds, reli¬

gious and non-religious. His general popular¬

ity, which grew from year to year, was ac¬

quired, for the most part, from his non-reli¬

gious writings, while he gained an added hold on the deeply-religious Jews of Hungary through his religious poems. He wrote lyrical, narrative and descriptive poems and excellent ballads and hymns. His first volume of lyrics, though displaying considerable power, attracted little attention because the author had not as yet acquired the individuality of style and sub¬

ject matter which afterward was to distinguish him from the other writers of Hungary. He owes his popularity more to his ballads than to any other of his literary efforts, because of their life and his individualistic manner of treatment of his subjects. He has published a volume of (Poems* (1868) ; ^Lyrics* (1878), and

garian Society of Science and special festivities were held in his honor throughout the cities of Hungary.

KISS. See Salutation.

KISSIMMEE, Fla., city and county-seat of Osceola County, on Tohopekaliga Lake, on the Atlantic Coast Line, 18 miles south of Orlando.

It has extensive fruit and vegetable interests and is well known as a hunting and fishing resort. The headquarters of the cattle raising industry of the State are here. The water¬

works and lighting plants are the property of the municipality. Pop. 2,722.

KISSING-BUG. See Cone-nose.

KISSINGEN, kis'ing-en, Bavaria, a cele¬

brated watering-place on the Saale, 43 miles north of Wurzburg by rail. It is surrounded by walls flanked with towers, and has a mag¬

nificent bathing establishment. The springs, celebrated from the 9th century, are five in number, and all saline, contain a large quantity of carbonic acid gas, are used both internally and as baths, and are considered efficacious in gout and affections of the stomach and chest.

Besides 30,000 visitors annually attracted by the baths, great quantities are bottled for ex¬

port. Pop. about 5,000.

KISTNA, India, a river which separates the Deccan from southern India. It rises among the Western Ghats, 4,500 feet above sea-level, in the province of Bijapur, 42 miles KIT — KITCHENER

trom the Malabar coast, passes through Hai-

darabad, where it receives the Bhema on its eft and the Tungabudra on its right bank, both flowing, like it, from the Western Ghats.

Previous to the junction it is commonly called ihe Krishna, a name which is frequently given to the whole river. The united river falls into the Bay of Bengal. Its course is estimated at 700 miles. A canal 90 miles long connects it with the Godavari River, and numerous chan¬

nels make its waters available for irrigation purposes. The Kistna is, perhaps, richer in gems than any other river of India. In the dry season, diamonds, cat's eyes, onyxes and chalcedonies are found along its course as well as minute portions of gold.

KIT, originally that which contained tools or necessaries ; hence the tools or necessaries themselves. The term, which was probably derived from the Dutch, "kit® or Middle Dutch "kittie,® a large bottle, beaker or decanter, has to-day various significations, among them a large bottle, wooden tub for milk, fish, butter and other household articles, a soldier's kit, a sailor's chest and contents and a shoemaker's kit; and is also used in the sense of the whole outfit, the whole amount, the whole company, as in the expression "the whole kit of them.®

Used in this way it is often employed in a deprecatory sense. As a military term kit generally signifies the more intimately related articles of a soldier such as shoes, boots, socks, shirts, undershirts, brushes, combs. The sol¬

dier's kit weighs from 50 pounds upward, the wreight depending upon whether the soldier is under ordinary or heavy marching orders.

The heavy marching outfit of the British in¬

fantry soldier is a knapsack containing shirts, extra uniform, boots, socks, brushes and a few other personal articles, mess tin, bread, rations for a certain time, generally of short duration, coat, cap, rifle, bayonet, ammunition and cart¬

ridge belt. This outfit, however, varies, ac¬

cording to the work for which a detachment of troops is destined for the moment. The German, Austrian and Italian soldiers are often more heavily laden than the British, they being frequently required to carry a part of a tent, and a great coat. The German, too, carried, before the outbreak of the European War, a ground sheet. But the latter war has tended to considerably change the kit of the infantry soldier under heavy marching orders and to make it somewhat more variable than it was formerly.

KIT-CAT CLUB, a club formed in Lon¬

don about 1688, originally for convivial pur¬

poses, but which soon assumed a political char¬

acter, having in the reign of Queen Anne be¬

come the resort of Marlborough, Walpole, Ad¬

dison, Steele and other leading Whigs. Its founder was Jacob Touson, the eminent pub¬

lisher, and its name was derived from that of Christopher Cat, who supplied the club with mutton-pies. It was originally composed of 39 members, later enlarged to 48. The portraits (about three-quarters length) of the members were painted by Sir Godfrey Kneller, and hence a portrait of this length is called a "kit-cat.® The club was dissolved about 1720.

KIT-FOX, or SWIFT-FOX, a small fox

(Vulpes velox) found in the central and north¬

western parts of the United States, and espe¬

cially common in the upper Columbia River region. It is about 20 inches long, with a broad, short face, and has the soles of the feet densely hairy. In summer its fur is of a brownish gray color, tinged with orange on the flanks and white below ; in winter it becomes much paler. It is especially noted for its activity, and for the deep burrows which it digs, and in which its young are born and nurtured. It feeds mainly on ground squirrels and small birds.

KITCHEN CABINET, a popular name

applied to certain intimate political friends of President Andrew Jackson, who were supposed to have more influence over his actions than his official advisers. They were Gen. Duff Green, editor of the United States Telegraph at Washington, the confidential organ of the administration; Maj. William B. Lewis, of Nashville, Tenn., second auditor of the Treas¬

ury; Isaac Hill, editor of the New Hampshire Patriot , and Amos Kendall (q.v.) of Ken¬

tucky. He was leader of the kitchen cabinet; worked for the Jackson "second choice® move¬

ment in Kentucky; and received the office of fourth auditor of the Treasury. He was a man of exceeding ability, but of low moral per¬

ceptions, and, as a politician, was the incarna¬

tion of the worst evils of the American sys¬

tem. Harriet Martineau wrote of him, "I was fortunate enough once to catch a glimpse of the invisible Amos Kendall, one of the most remarkable men in America. He is supposed to be the moving spring of the whole adminis¬

tration.® Consult Parton, James, (The Life of Andrew Jackson> (Vol. Ill, New York 1860).

KITCHEN-MIDDENS, or KJOKKEN-

MODDINGS, mounds of shells, bones, char¬

coal and refuse, remaining upon the site of prehistoric settlements along the coasts of seas, lakes and rivers in many parts of the world.

The exploration of them has brought to light many relics of the Palaeolithic and Neolithic men who formed them, and contributed greatly to the knowledge of prehistoric archaeology.

Extensive deposits of this kind occur in various parts of the United States, where they are known as shell-heaps (q.v.); and their forma¬

tion is going on wherever savage conditions still exist.

KITCHENER, kich'e-ner, Horatio Her¬

bert, 1st Earl Kitchener of Khartoum and of Broome, British soldier: b. Crotter House, Ballylongford, County Kerry, Ireland, 24 June 1850; drowned west of the Orkney Islands, Scotland, 5 June 1916. Though of Irish birth, lie was of English descent, his father being Lieut. -Col. H. Jl. Kitchener, of the 13th Dra¬

goons. He was educated at the Royal Mili¬

tary Academy, Woolwich, and received his commission in the Royal Engineers on 4 Tan.

1871. Between the time of his entering the mili¬

tary academy and receiving his commission he had seen service in the Franco-German War.

He was at Dinan when war broke out, offered his services to the French authorities and served as a private in the Second Army of the Loire under the

command of General Chanzy.

As a subaltern Kitchener was mainly employed on survey work in Palestine and Cyprus. The whole of the survey of Galilee for the Palestine Exploration Fund's map was executed by him.

He was employed from 1882-92 in assisting in,

the reorganization of the Egyptian army, and in 1892 became sirdar or commander-in-chief.

The next four years were spent in preparations for the reconquest of the Soudan, and in 1896

he began operations against the Khalifa, whose forces he defeated at Firket. The result of this engagement was the recovery of the prov¬

ince of Dongola. In 1898 he again defeated the Khalifa's forces at Atbara. Kitchener had learned well the lessons of warfare in Egypt and behind each advance constructed a railroad.

On 2 September of that year the Khalifa's forces were utterly deated at Omdurman and two days after the battle Kitchener entered Khartoum. For these services Kitchener was raised to the peerage as Baron Kitchener of Khartoum. A remarkable feature in the con¬

quests was the economy with which the three campaigns from 1896-98 were conducted, the total cost exceeding little more than $12,000,000.

Then occurred an episode that might have led to war between England and France, when a French officer, Colonel Marchand, with a small force of Senegalese soldiers, established themselves at Fashoda, on the White Nile, 600

miles above Khartoum on territory claimed for Egypt. Kitchener met the situation very tact¬

fully; he visited Fashoda, permitted the tri¬

color to remain hoisted and arranged with Mar¬

chand that the disputed occupancy should be re¬

ferred to the diplomatists of the two countries.

In 1899 Kitchener was summoned from

Egypt to join Lord Roberts as chief of the staff when the latter took over the supreme command of the British forces during the Great Boer War. Here his untiring energy was devoted first to the work of organization.

He was responsible for the decision to attack the Boers at Paardeberg and his tactical dispo¬

sitions on that occasion were subjected at the time to severe criticism. In November 1900, after both of the Boer capitals had been occu¬

pied, and it appeared as if the object of the war had been attained, Lord Roberts handed oyer the command to Lord Kitchener and to him fell the difficult and arduous task of coping with the guerrilla methods thereafter adopted by the Boers, and to which the country was well adapted. He first made his railway com¬

munications safe and secured the important cen¬

tres ; then he brought the non-combatant popu¬

lation into concentration camps; and finally he established a vast system of protective block¬

houses hugging the railway lines, which were finally used as armed bases against which long lines of mounted men swept parties of the Boers. In the negotiations preceding the Treaty of Vereeniging in 1902, which ended the war, Kitchener took an active part, and he favored the granting of generous conditions of peace.

As a mark of appreciation for his services he was raised a step in the peerage by being cre¬

ated a viscount, promoted to the rank of gen¬

eral and was awarded the Order of Merit.

Shortly after the conclusion of the Boer Way he was anpointed commander-in-chief in India, and this post he held till 1907, carrying through a number of important reforms in the organization of the Indian army. At the end of his term he was appointed commander-in-

chief in the Mediterranean, but this appoint¬

ment he subsequently declined. In leaving India he paid a visit to Japan and then proceeded tc Australia and New Zealand, where he drew up schemes for the defense of these dominions which were subsequently put in operation. In April 1910 he returned to England, when there ensued a brief respite from military duties and a relapse into civil life.

In 1911 Kitchener succeeded Sir Eldon

Gorst as British Resident in Cairo. In this position he devoted himself to the suppression of the disloi^al and anarchist agitation which had been gathering head during Sir Eldon Gorst's regime, and to the initiation and fur¬

therance of measures for the economic develop¬

ment of the country. Largely owing to his ex¬

ertions the value of the Egyptian cotton fields has largely increased, roads were constructed and improved, public health safeguarded by ade¬

quate sanitary measures and the fellaheen pro¬

tected by legislation against the exactions of usurers.

The summer of 1914 found Kitchener in England in consultation with the imperial au¬

thorities. On 2 August he was boarding a steamship at Dover on his return to Egypt, when, owing to the threatening situation in Europe, he was summoned back to London.

On the 4th war was declared and on the fol¬

lowing day he was appointed Secretary of State for War — an announcement that was hailed with enthusiastic approval in Great Bri¬

tain. The task that fell to him then was one of unexampled difficulty. The British army for effective^ purposes was composed of a striking force of 160,000 men; he expanded it into an army of 5,000,000, in a country traditionally de¬

voted to voluntary enlistment, and his prestige and personality were main factors in the strik¬

ing results achieved under the voluntary sys¬

tem and in the acceptance by the nation with so little friction of the final resort to conscrip¬

tion. Certain it is, however, that he took on himself a burden that was too heavy for one man to bear. Following on a campaign of criticism in a section of the press the Ministry ot Munitions was created and the powers of chief of the staff enlarged with a view to keep¬

ing the War Secretary to matters strictly within his own department. On 2 June 1916 he invited the members of the House of Commons, some of whom had attacked his conduct as War Minister, to a secret conference at the House, and there he is said to have emerged triumph¬

antly from what must have been for him a try¬

ing and somewhat distasteful experience.

The termination of his career followed a few days thereafter with tragic and appalling suddenness. Accompanied by the members of his staff, he embarked on 5 June on the cruiser Hampshire at an unknown port in the north of Scotland, with the intention of proceeding to Archangel, and thence to Petrograd to con¬

fer ^ with the Russian government. The cruiser was accompanied by two destroyers, but owing to the heavy seas that were running these had to be detached. At eight o'clock in the evening an explosion occurred on board, which was observed from the shore; four boats were seen to leave the vessel, but these were apparently swamped and the sole survi¬

vors of the wreck were 12 sailors who man¬

aged to reach shore on a raft. It was after¬

ward officially stated that the Hampshire had struck a mine Th^ of the disaster was KITES

1 Black-winged Kite

2 Egyptian Kite

3 Black Kite and Common Kite

4 Mississippi Kite

received with consternation and grief in all parts of the British Empire. Kitchener was followed as Minister of War by Mr. Lloyd George, and his elder brother, Lieut.-Col. Henry Elliott Chevallier Kitchener, succeeded to the 'title.

Kitchener in popular tradition was regarded as a stern, austere and somewhat unapproach¬

able man ; but his aloofness was due in the main to

shyness, the conditions of his early service in Palestine, Cyprus and Egypt foster¬

ing a love of solitude that became a second nature with him. From the time of his Sudan campaigns he was regarded by the British public as an organizer of victory, one who never struck without making full and adequate preparation for the blow. This characteristic was fully revealed in his final task. When, at the outset of the great European conflict, a short war was generally anticipated, he had the courage and foresight to state the dis¬

agreeable truth and to make adequate prepa¬

rations for a long war. No hope of temporary successes in the early stages of the conflict could divert him from his purpose, to ensure that, in what he conceived would be a war of exhaustion, the superiority in man power, mu¬

nitions and equipment should in its later stages rest incontestably with the allied powers.

Consult Begbie, H., (Lord Kitchener> (Lon¬

don 1915) ; Burleigh, B., (Twixt Sirdar and Khalifa) (London 1898) ; Doyle, Sir A. Conan, (The Great Boer War5 (London 1903) ;

Groser, H. G., (Lord Kitchener5 (London 1914) ; Hackwood, F. W., (Life of Lord Kitchener5 (London 1913) ; Steevens, G. W., (With Kitchener to Khartum5 (1899-1914) ; Wheeler, H. F., (Life of Lord Kitchener5

(London 1914) ; (The Boys' Life of Lord Kitchener5 (New York 1917).

KITCHENER, Canada, city and county-

seat of Waterloo County, Ontario, on the Grand Trunk Railway, 62 miles west of Toronto. It was settled originally by German immigrants from the United States and until the period of the Great War was called Berlin. The city has manufactories of boots

and shoes, rubber, foundry products, furniture, automobiles . and automobile tires, leather, buttons, gloves, pianos and organs, shirts and collars, white wear, etc.

It possesses an excellent sewerage system and a modern water-supply system. There are also gas and electric lighting and power plants and a street railway system. The city is the seat of a Roman Catholic college. There are several banks, two daily and one weekly newspapers.

There are 15 Christian churches. Pop. 19,000.

KITE, a bird of prey associated with the buzzards in the sub-family Buteonince of the family Falconidco, characterized by weak grasp¬

ing-power in the feet, slender form, usually a forked tail, and long wings suited to the swift and graceful flight that distinguishes the group.

"These buoyant birds,55 says Evans, "are fond of perching but soar with ease, quartering the plains like harriers, or hovering with uplifted wings to dart down on their prey of insects, snakes, small mammals, and more rarely birds.55

They build their nests op trees, or in some cases on bushes and reeds in marshes; and their eggs are whitish, marked in various degrees of spotting. The cries of most kites are loud vol. 16 — 30

and mournful, but some utter sharp, whistling notes. The Brahminy kite is exceedingly nu¬

merous in India and eastward, and is valued for its vermin-killing ; and an Australian species, the whistling kite, is a powerful aid in sup¬

pressing insect-plagues. The red kite, or ((gleed,55 of Europe eats almost every sort of small creature, and like some of the others does not disdain carrion. In the 16th century large flocks of gleeds dwelt in and about London, and were welcome as scavengers, as they are to-day in Cairo and other

Oriental towns, but they have suffered almost total extermination in Britain, mainly because of their depredations on poultry, pheasants, etc. The gavinda, or Pariah kite, is the scavenger of Hindustan.

Several species of these handsome hawks in¬

habit tropical America, one of which, the Everglade kite, comes to southern Florida, where it subsists exclusively on the snails (Ampullaria , etc.) that throng on the bushes in the mangrove swamps : hence it is locally known as snail-hawk. The swallow-tailed kite, black with purple and blue reflections, is com¬

monly seen in the southern United States, and is pre-eminently a bird of the air. ((It captures its prey, devours it, and drinks, while under way. Its flight possesses all the marvelous ease and grace of a swallow's.55 The white-tailed is a species of Texas and southward, haunting marshes rather than uplands. The Mississippi kite, however, wanders in summer all over the southerly interior, where it is generally known as the blue kite. All these are migratory.

Consult Newton, dictionary of Birds5 (Lon¬

don 1896) ; Evans, (Birds5 (New York 1900) ; and American ornithologies, especially Bendire, (Life Histories of North American Birds5

(Vol. I, Washington 1892).

KITE, a common aerial toy in the form of two crossed sticks covered with paper and bal¬

anced with a tail or string, on which are tied bits of cloth or paper. Kites were first em¬

ployed in aid of science in 1749 by Dr. Alex¬

ander Wilson and Thomas Mellville of Scot¬

land, who by means of a thermometer attached to a

kite were able to take temperatures above the 'earth's surface. Franklin's experiments with electricity by means of a kite and key are familiar to everyone. Among the men who have given much thought and labor to improve kite making are W. A. Eddy, S. P. Langley, Octave Chanute, Lawrence Hargrave, J. B.

Millet, J. W. Davis, C. F. Lamson, H. D. Wise, Captain Baden-Powell, Professor Marvin, C. F.

Moore and others. The first improvement was to make a tailless kite, and this was perfected by Mr. Eddy.

In 1895 Captain Baden-Powell of England, weighing 150 pounds, was enabled to hoist him¬

self 100 feet in the air by a tandem of five kites. Mr. Hargrave, with three kites, raised a total weight of 208 pounds to the height of 16

feet, as far as he cared to go. Lieutenant Wise, in 1897, with four kites, rose to 42 feet, the entire weight raised being 229 pounds. Mr.

Eddy has done much to develop tandem kite flying. In 1897 he made a tandem, of nine Eddy-Malay kites on a cord two miles long, with an elevation of 5,595 feet, the same being kept up for 15 hours. At Blue Hill Observa¬

tory, near Boston, this height was exceeded, by the tandem of seven Malay and two Hargrave 466

kites, with an area of 170 feet, rising 8,740 feet above Blue Hill, or 9,375 feet above sea-level.

It took three miles of piano-wire and the work of three men for 12 hours to accomplish this feat. Piano wire has been found preferable to cord, having greater tensile strength and pre¬

senting less surface to the wind.

In the United States Weather Bureau para-

kites are used for the purpose of recording the velocity of the wind and the humidity and tem¬

perature at high altitudes, by the meteorograph.

These can be obtained at a single observation and several hours before the effects are known in the lower atmosphere. Photographs have been taken by means of a camera fastened on the frame of a kite and operated by a cord, and Mr. Eddy had an arrangement of eight cameras strapped together in which all the shutters can be opened at once, and by this means a com¬

plete view of the horizon can be taken. In¬

ventors of flying and soaring machines have made extensive use of kites in planning the construction of their various contrivances.

Since 1905 meteorological observations by kites have been carried on continuously by the Weather Bureau at Mount Weather, Va. The instruments were raised to 23,835 feet on 5

May 1910 when 10 kites and 8^2 miles of wire were used.

The first permanent station for kite flying in Europe, and the first in the world estab¬

lished under governmental auspices, is that at Viborg, in the extreme northern part of Den¬

mark, the governments of Denmark, Sweden and France co-operating in the scheme. The most important building at the station is a tower 33 feet high, mounted on circular rails, so that it can be rotated easily and left open on one side. No matter from which direction the winds blows the tower is turned with this gap to leeward. Thus the operator can sit within, where the windlasses are, and watch his kites.

The latter, of course, naturally take their lines down the wind. There are two windlasses, controlled by electric motors, one being held in reserve for immediate use in case the wire on the other breaks while in service. Kites have also been used to throw lines across streams or chasms or to bring life-lines > to stranded ships. Consult ^Proceedings of the International Conference on Aerial Naviga¬

tion (Chicago 1893) ; Marvin, C. F., Me¬

chanics of the Kite) ; Hnstructions for Aerial Observations) ; Hnvestigation of the Sluggish¬

ness of the Meteorograph) ; and other bulletins of the Weather Bureau (Washington 1898 et seq.) ; L. Teisserenc de Bort, (Etudes sur la temperature et ses variations,) in the (Annals of the Central Meteorological BureaiP (Paris 1897) ; (Sur l'organization des sondages aeriennes,5 in the Memoirs of the Interna¬

tional Congress for Meteorologv^ (ib. 1900) ; Rotch, A. L., (Use of Kites to Obtain Meteoro¬

logical Observations^ (Boston 1900) ; Assmann and Berson, (Ergebnisse der Arbeiten am aeronautischen Observatorium in den Jahren 1900 and 1901 > (Berlin 1902) ; (Arbeiten des Konigliche preussischen aeronautischen Obser-

vatoriums5 (Lindenberg 1904-13), and paper bv Millet, J. B., in the Aeronautical Annual for 1896.

KITSON, Henry Hudson, American sculp¬

tor: b. Huddersfield, England, 7 April 1865. At Paris he studied at the Ecole des Beaux Arts under Bonnaissieux. He was awarded three gold medals by the Massachusetts Charitable Mechanics' Association, a gold medal of honor by the American Art Association of New York.

He received a medal at the Universal Exposi¬

tion, Paris, 1889, as well as that in 1900. He also

received the order of Bene Merenti from the king of Rumania. His more important works are (Music of the Sea,5 in the Boston Museum; the Major Doyle monument, Provi¬

dence, R. I. ; the statute of General Lee at Vicksburg, Miss.; (The Minute Man,5 at Lex¬

ington, Mass. ; the Hayes Memorial Fountain at Providence; the W. H. Hunt Memorial. Bos¬

ton, and the statue of Roger Conant, Salem, Mass.

KITSON, Theo Alice Ruggles, American

sculptor: b. Brookline, Mass., 1871. Her maiden name was Ruggles. Educated in art in Boston and Paris, she married her most distinguished teacher in the former city, Henry Hudson Kitson (q.v.). From her earliest stu¬

dent days she showed peculiar talent for her work as a sculptor ; and in Paris, under the in¬

struction of Dagnan-Bouvert, she especially distinguished herself, and was the first Ameri¬

can woman to receive honors in sculpture at the Paris Salon. In Paris her work is held to-day in high regard for its simplicity, force and directness coupled with its strength of vision and beauty and precision of execution.

Her sculptures have been on exhibition in al¬

most every great exposition in the United States and in numerous art clubs. Among her notable works are (Woods of Michigan5 (two bronze figures at the Chicago Exposition) ; (Statue of Volunteer for Soldiers' Monument5

(Newburyport, Mass.) ; (Soldiers' Monument5

(Ashburnham, Mass.) ; Massachusetts State Monument5 (National Military Park, Vicks¬

burg) ; (Portrait Medallions of Dodge, Blair, Howard, Logan, Ransome, Grierson and other generals for the Sherman Monument5 (Wash¬

ington) ; (Statue of Minute Man5 (Farming-

ton, Mass.) ; (Soldiers' Monument5 (Walden, N. Y.) ; Mother5 (Blickerdyke group) ; Stu¬

dents' Monument5 (Spanish- American War, University of Minnesota) ; Soldiers' Monu¬

ment5 (Pasadena, Cal.).. Her work also in¬

cludes a long list of similar monuments, a list which is growing in length and importance from year to year.

KITTANNING, Pa., borough and county-

seat, on Allegheny River, 45 miles north of Pittsburgh, on Pennsylvania Railroad, Buffalo and Allegheny Division. Bituminous coal, oil and gas are the chief products in minerals, also limestone and fire-clays in vast quantities, with some iron ore in places. The manufacture of plate-glass, basic iron, manganese, buff building brick, chinaware and flour milling are the chief industries. Connected with the town of Ford City by trolley. Ford City has a population of about 8,000 and is the location of the largest plate-glass manufactory in the world, works 4 and 5 of the Pittsburgh Plate-Glass Company.

The Allegheny River Mining Company with over 3,000 miners and laborers are operating in the immediate vicinity of Kittanning and Ford City, increasing the suburban population greatly in recent years. Pop. 8,000, excluding suburbs.

KITTATINNY (kit'a-tin-i) MOUN¬

TAINS, a range which extends from Ulster County, N.

Y., south and southwest, through the northwestern part of New Jersey and into Pennsylvania. The names by which the range is generally known are in New York, the Sha-

wangunk, in New Jersey, the Kittatinny and in Pennsylvania the Blue Mountains. The range varies in height from 500 to 1,800 feet. The mountains belong to the Appalachians, and form the eastern ridge of the main part of the system.

KITTATINNY PENEPLAIN. See

Peneplain.

KITTERY, kit'e-ri, Me., town in York

County, on the Piscataqua River and the Bos¬

ton and Maine Railroad, four miles from the Atlantic Ocean, opposite Portsmouth, N. H.

The United States Naval Station and Ship¬

building Yards are located here on Corifincutal Island, but are known as the Portsmouth Navy Yard. The town is one of the oldest in New England. It was settled in 1624 and incorpo¬

rated in 1647. It was the birthplace and for¬

mer home of Sir William Pepperell. There are numerous hotels and churches here, public schools and the Rice Public Library containing 5,000 volumes and the Traipe Academy. Pop.

3,533.

KITTIM, or CHITTIM, a term of Bibli¬

cal origin for the inhabitants of the island of Cyprus, derived from the important town of Kition or Cition, the modern Lanarca. The (

KITTIWAKE. See Gulls.

KITTO, John, English Bible student: b.

Plymouth, England, 4 Dec. 1804; d. Cannstadt, near Stuttgart, Germany, 25 Nov. 1854. He was the son of a mason at Plymouth, and after obtaining a very scanty education began to assist his father, but met with a fall which deprived him of the sense of hearing. Sent to the workhouse he was presently apprenticed to a shoemaker, who used him so cruelly that the magistrates canceled his indentures. He there¬

fore returned to the workhouse, where some philanthropic gentlemen became interested in him, made provision for his support and pro¬

cured for him permission to read in the pub¬

lic library. In 1824 he became the pupil of Mr. Groves, a dentist of Exeter, who supported him and gave him a small salary for his serv¬

ices. In 1825 he was sent to the Missionary College at Islington for the purpose of receiv¬

ing. training as printer for the foreign press of the Church Missionary Society. Shortly afterward he was sent abroad by the society, but returned two years later. In 1829 Mr.

Groves organized a private missionary party which set sail for the Persian court, where from 1829-33 Kitto acquired that familiar ac¬

quaintance with the East which he afterward employed in his writing. He had opened a school for Armenians at Bagdad, which he was forced to abandon because of the ravages of disease and floods in the neighborhood. He founded and edited the Journal of Sacred Lit¬

erature (1848-53), and although a layman of the English Church received in 1844 the degree of D.D. from Giessen. He published (The Pictorial Bible) (1835-38) ; (Pictorial History of Palestine (1841) ; (Gallery of Scripture Engravings* (1841-43); Cyclopaedia of Bibli¬*

cal Literature* (edited 1843-45) ; (The Lost Senses: Deafness and Blindness) (1845); (Physical Geography of the Holy Land*

(1848); (Daily Bible Illustrations: Morning Readings * (1849-51); (Evening Readings*; and many other similar works. In his latter years he enjoyed a pension of £100 a year from the Crown.

KITTON, Frederic George, English au¬

thor and artist: b. Norwich, 5 May 1856; d. 10

Sept. 1904. After receiving his education at a private school in Norwich, he was put under the training of W. L. Thomas, managing direc¬

tor of the London ■ Graphic , and became an expert draftsman and wood engraver. In 1882

he added literature to his profession of book illustration. Among his delightful appreciations of artists, illustrators and authors of his time may be mentioned

tist and HumorisD (1883); Charles Dickens by Pen and Pencil* (1890) ; (Dickens and his Illustrators) (1898) ; Charles Dickens, his Life, Writings and Personality* (1902).

KITTREDGE, George Lyman, American

educator and author: b. 1858. Graduated from Harvard University (1882) he became instruc¬

tor in English in that university, being raised to the rank of full professor 12 years later.

He has given much attention to English philol¬

ogy and the study of English literature.

Among his published works are (The Mother Tongue) (with Sarah Louise Arnold, 1900) ; (Words and their Ways in English Speech*

(with James B. Greenough 1901) ; (01d Farmer and his

Almanac) (1905) ; (Essays on Chau-

cer) (1914) ; Chaucer and his Poetry) (Johns Hopkins lectures, 1915).

KITT'S, Saint. See Christopher, Saint.

KITTUL, ki-tool, or KITTOOL. See

Fibre.

KIU-KIANG, keoo'keang', a city in the

province of Kiang-si, China. The name means, in Chinese, <(Nine Rivers,** and the city, which is the official head of the province, is situated on Yang-tse-kiang, a short distance above the entrance to Lake Poyang. The city which, like most Chinese cities, is walled, is, within this rampart, about five miles in circumference; but the modern town has outgrown the wall and a considerable important suburbs exists without it. The city is well drained and lighted and possesses a better police force than is usually to be met with in a Chinese city of its size. This may be due to the fact that it has a large foreign population both within the city limits and in the suburban residence por¬

tion. Within the city are Protestant and Cath¬

olic churches, some of them fine buildings ; and the British government maintains a consulate there. The greater number of the foreign resi¬

dents occupy a stretch to the west of the city along the river, between the Chinese suburban quarters and the stretch of shallow lakes which lie some distance to the west of the city. The town exports considerable of the products gathered in from the surrounding neighbor¬

hood, but the range of its industrial and com-

mercial activities does not extend far inland.

The exports consist, for the most part, of rice, tea, paper, tobacco, chinaware, hemp and other agricultural products in a lesser degree, and grass-cloth ; while the greater percentage of the imports consists of cotton and woolen goods, metals, provisions and leather articles. In the past a great deal of opium was sold in the city and shipped to interior points in China.

Pop. about 50,000.

KIUSHU, kyoo'shoo', or KYUSHU,

Japan, one of five large islands of the empire; area, 16,840 square miles. It contains nine provinces but for administrative purposes is divided into seven Ken or prefectures. The island is mountainous and volcanic. The prin¬

cipal harbor is the treaty port, Nagasaki, but in 1889 five special ports of export were opened.

Pop. 7,727,000.

KIVA, the sacred ceremonial chamber of the Pueblo Indians. The name is Hopi and the institution is to be found in every Hopi and other village throughout the Pueblo country.

The kiva, which was generally known to the first Spanish visitors and explorers in the Pueblo territory, as estufa (stove or furnace) is so old an institution that its origin is lost in tradition. At one time its use was much more extensive than at present, or even within historical times, as is evidenced by the remains of kivas in the ruins of prehistoric villages in Arizona, Colorado, Utah and New Mexico. It was probably also in use at one time in parts of Mexico. Some kivas were quite large ; and some of those in use in prehistoric times seem to have been larger than those existing at the present time, if we are to judge from existing remains." Castaneda, writing in 1540, tells ^ of one which had ((twelve pillars, four of which, in the

centre, were each as large as two men could reach around.® He is also the authority for the statement that some of the kivas that he had seen Svere large enough- for a game of ball.® The early Spanish missionaries and other visitors to the land of the Pueblos gave the name estufa to the kiva because they mis¬

took it for a sweat house, losing complete sight of its sacred character and the part it had long played in the past (and still plays) in the religious life of the Pueblos. Four hundred years ago the kivas of the Rio Grande country were much the same as they are now. They were large underground, or semi-underground, square or round structures, the roofs of which were supported by handsome pillars. About the time of the discovery of America, and for some time afterward, the young unmarried men of marriageable age lived in the kiva, and with them also lived widowers or men who had re¬

pudiated their wives. Women were forbidden, under dire penalties, to sleep in the kivas, which they could visit only to bring to their relatives food and other prime necessities. This restriction upon the visit of women is still in force in all the Pueblo villages. Women, how¬

ever, are permitted to visit the kivas on the occasion of certain public festivals or other ceremonies of a religious or other tribal nature.

There are also, in the Pueblo villages, though much more rarely, kivas for women. These latter may not be visited by men except under certain prescribed conditions similar to those already indicated. These kivas of the women are also the club houses of secret religious ceremonies of a peculiarly sacred nature. The kivas were and still are the common property of the village and never belonged to one individual or set of individuals notwithstanding the fact that they are the home of secret societies. In some villages the kivas are rectangular, in others square, and in still others, circular. They were originally built in the courtyard of the village;

but they are to-day usually hidden among the houses ; and they are still partially or altogether under ground. One Pueblo may have from one to a dozen kivas, according to its population, wealth and interests. Even those kivas that have the walls partly above the ground have few or no openings at all in the walls, and where the openings exist, they are invariably very small, the entrance to the build¬

ings themselves being invariably from the flat roof, which is reached by means of a ladder that can be drawn up. A second ladder con¬

nects the inside of the kiva with the roof, through a trap-door. The roof, which is very strong and thick, is generally made of well tramped earth or adobe bricks overlying beams or rushes, which are supported by the pillars already mentioned. The trap-door which is placed in the centre of the roof, also serves as a hole to permit the escape of the smoke from the fireplace of the kiva which almost invariably occupies the centre of the edifice, and consists of a shallow fire pit. The kiva floor is usually covered with smooth sandstone slabs ; and around three sides of the walls run stone benches supported by adobe brick-work.

Against the fourth wall is a low ceremonial platform and a ceremonial altar. Many of the kivas have the walls, or parts thereof cov¬

ered with hieroglyphic paintings, symbolic in nature, and serving to remind the master of ceremonies of the main incidents in the cere¬

monies to be performed on certain stated occasions.

Bibliography. — Bandelier, A. F., (Report of Investigations Among the Indians of the Southwestern United States 5 (1880-92) ; (The Delight Makers) ; Hewett, E. I., (Antiquities of the Jemez Plateau) (1908) ; Hodge, hand¬

book of American Indians5 (Washington 1907) ;

Nordenskiold, (Cliff Dwellers of the Mesa Verde) (1893) ; Stevenson, M. C., (The Sia>

(11th Report of the Bureau of American Ethnology, 1896) ; (The Zuni Indians5 (23d Report of the Bureau of American Ethnology, Washington 1904) ; Tewkes, J. W., (Two Sum¬

mers' Work in Pueblo Ruins5 (Washington 1904) ; Winship, G. P., (Coronado Expedition5

(Washington 1896).

KIVINJE, ke-ven'ya, the modern name of the town of Kilwa, in Tanganyika Territory, which is so called to distinguish it from the ancient Arabian town of the same name on an island some 17 miles farther down the coast.

See Kilwa Kivinje.

KIWI-KIWI, ke'wi-ke'wi. See Apteryx.

KIZIL-IRMAK, kiz'il-ir-mak' (the Turk¬

ish for Red River), a river known to the an¬

cients as the Halys, the principal river of Asia Minor. Rising in the east of the peninsula, it flows in a circuitous route for over 500 miles and enters the Black Sea near Sinope.

KJERULF, kya'rulf, Halfdan, Norwegian

musical composer: b. 1815; d. Christiania, 1868.

He began the study of theology; but his musi¬

cal inclination was too strong and he finally gave up his theological studies and went to Leipzig to study music. He displayed a strong lyrical talent and a facility for the writing of popular songs much above the average of compositions of this class. He

was undoubt¬

edly encouraged to do his best in this field from the fact that his songs were sung in public by some of the greatest stage favorites of his day, among them Jenny Lind, Nilsson and Sontag, all singers of world-wide reputa¬

tion, who made the compositions of Kjerulf almost as popular and well known as them¬

selves. He also composed much excellent piano music. All his work shows melodic gifts and power of thought presentation equalled by few of 'his fellow-countrymen. His great popular¬

ity and his real musical gifts enabled him to exercise a noteworthy influence upon the national music of his native land and to create a school of his own, of which the most brilliant pupil was Grieg, who, in some respects, sur¬

passed his master.

KLAGENFURT, kla'gen'foort, capital of

Carinthia, Austria. It practically forms a suburb of Worther, though it is not within the city corporation of the latter place. The city has the usual educational and other buildings to be found in a German city of its size, and this may be accounted for from the fact that most of its inhabitants are German. In the cathedral built in the 16th century is the stone on which the dukes of Carinthia sat to receive the homage of their vassals. This stone has many legends attached to it ; and it seems to have been originally connected with the ancient pre-Christian religious beliefs of the people of the country. The stone appears to have a his¬

tory similar to that of stones in the history of England, Ireland and Scotland. Among the principal industries of the city are the manu¬

facture of leather, tobacco, cloth, machinery, white lead and shoes. Agriculture and mining occupy

considerable of the attention of the people of the city and the surrounding coun¬

try; and the place possesses an excellent school of agriculture and mining. Pop. 35,000, prin¬

cipally Germans.

KLAMATH, kla-mat, a name applied to

several tribes of American Indians formerly living along the Klamath River in Oregon and California, but now settled on a reservation at Klamath Lake. Their present lands were given them by treaty in 1864, the reservation contain¬

ing 1,360 square miles. The Klamaths who now number about 700 are fairly civilized and are expert stock-raisers.

KLAMATH LAKE, Ore., a small lake in

Klamath County, at the base of the Cascade Range. It is 44 miles long by. 6 to 14 miles wide. It consists of two considerable bodies of water connected by a narrow strait less than two miles wide. Klamath River is the outlet, and issues from the south end, or Lower Kla¬

math Lake, and flows thence into California.

KLAMATH FALLS, Ore., county, city

and county-seat, situated on Lake Fwanna and is on the line of the Southern Pacific Rail¬

road. The precipitous river sink, which passes through it, furnishes a vast amount of natural motive power, the fall of the river for the mile and a half before entering the town be¬

ing on an average of 58 feet per mile. These natural facilities have been made use of by the United States government which has estab¬

lished, in the immediate vicinity of Klamath Falls,

a vast irrigation project for the rec¬

lamation of a considerable extent of territory.

These and other conditions have made the town the centre of very active agricultural interests and of extensive cattle raising. The industrial activities of Klamath Falls are very largely centred in lumbering, milling, the bottling of mineral waters and the manufacture of cereal foods. Not far from Klamath Falls is the Klamath Indian Reservation with a population of some 1,200 Indians; and near to it are also the extensive lava beds which were the scene of the Modoc Indian War (1873).

Pop. (1920) 4,801.

KLAPKA, klop'ko, Gyorgy (George),

Hungarian general: b. Temesvar, 7 April 1820; d. Budapest, 17 May 1892. He entered the Austrian army in 1838 and rose to high rank.

In 1848, at the beginning of the revolution he joined the Hungarians and distinguished him¬

self in nearly all the battles with the Austrians; in more than one the fortune of the day was decided by the troops under his command.

His most noted exploit was his defense of Komorn, which he continued to hold for some weeks after all the rest of Hungary had sub¬

mitted. He lived in exile in England, France and Italy, and remained at Geneva many years, occupied with plans for the liberation of his country. He assisted in the plans of Sardinia to form a Hungarian legion. He took an active part in the War of 1866, and after the amnesty of 1867 he returned home, and then became a member of the Hungarian Diet. He published (The National War in Hungary and Transylvania* (1851), one of the best works on the subject; (The War in the East) (1855) ; ^Memoirs* (1869); (Recollections) (1887).

KLAPROTH, klap'rot, Martin Heinrich,

German chemist: b. Wernigerode, 1743; d.

1817. His position as professor in the Uni¬

versity of Berlin permitted him to follow up his studies on the analyses of minerals which he carried to a perfection and exactness never before attempted or obtained. He was very liberal minded and quite willing to accept at their full value the work of any of his con¬

temporaries and to encourage the young aspirants to honor and place. Thus he was one of the first to recognize and publicly point out the great value of the work per¬

formed for science by Lavoisier in his re¬

markable discoveries. His chief work (Beit-

rage zur chemischen Kenntniss der Miner-

alkorper* appeared in six volumes between 1793 and 1815.

KLATTAU, kla'tou, or KLATOVY, a city

in Bohemia. About 30 miles south of Pilsen, with which it is connected by rail. Its chief in¬

dustries are the manufacture of woolen and cotton cloth, matches, machinery and chicory. It has the usual buildings of a city of its size and imoortance and, in addition, a fine oid church dating back to the 13th century. Pop.

17,000.

KLAUSENBURG, klou'sen-boork, or KO-

LOZ.SVAR, a county and capital town of the same name

in Rumania. The town was at one time the capital of Transylvania. It con¬

sists of the old town and several growing suburbs, and possesses a historical cathedral, dating back to the 15th century, a reform church of the same century and a citadel erected by General Steinville in 1715, as a protecting fortress for the town. The city is well provided with educational institutions, the most noteworthy of which is the Francis Joseph University founded in 1872. The attendance has increased from year to year; and the facilities of the institution have improved with the increase in attendance. It now has com¬

plete university faculties and over 3,000

students in normal times ; and a library of over 100,000 books. The city also possesses machine shops, distilleries, paper, cloth and sugar mills, cigar factories, railway shops and a very extensive farm implements factory.

Klausenburg has had, like most of the older Transylvanian .towns, an eventful career.

Founded by German colonists, probably on the site of an older town, in 1178, it became a free royal town in 1405 ; and it was more or less mixed up in the numerous political and other I disturbances of the centuries. Finally in 1848

the revolutionists under Bern captured it ; and it was the scene of revolutionary demonstra¬

tions in 1918, following the surrender of Austria to the French, English, American and Italian allies. Klausenburg has grown from 34,800 in 1890 to almost double that popula¬

tion. Notwithstanding this rapid growth of population the people are notably homogeneous, most of them being Magyars, and of the Prot¬

estant faith.

KLAW, Marc, American theatrical man¬

ager: b. Paducah, Ky., 1858. He graduated in law, but turned to theatre management and be¬

came a member of various theatrical combina¬

tions the most successful and best known of which is Klaw and Erlanger. During the European War (1914-18) he was very active in charge of the entertainment service of the war department, Commission on Training Camp Activities, United States army. As a theatre manager he has introduced many novel and in¬

teresting features into stage life.

KLEBER, kla'bar, Jean Baptiste, French

general: b. Strassburg, 9 March 1753; d. Cairo, Egypt, 14 June 1800. He first studied archi¬

tecture in Paris, then entered the military school at Munich; and having joined the Revolutionary army was appointed brigadier-

general and sent to La Vendee. He afterward commanded the left wing of the army of Jourdan, directed both the passage of the Rhine at Diisseldorf and the subsequent re¬

treat; defeated the Prince of Wiirttemberg, took Maestricht and Frankfort, and subse¬

quently Prince Charles. Under the Directory he had command of the French armies. Bona¬

parte entrusted the command of the army in Egypt to Kleber, who, deeming resistance use¬

less, concluded the convention of El Arish with the British, by which the French were to be conveyed home with arms and baggage. This being disowned by the British government, Kleber determined upon the resubjugation of the country, in which he was successfully en¬

gaged when he was assassinated. A monu¬

ment has been erected to him at Strassburg.

Consult Ernouf, (Le general Kleber' (Paris 1867).

KLEIN, Charles, Anglo-American drama¬

tist: b. London, England, 1867; d. 191 5. ^ Edu¬

cated at North London College, he emigrated to New York City shortly after graduation and there he became play censor for the Charles Frohman Company, a position that gave him immediate and helpful contact with the theatre. His constant exercise of judgment on plays presented to Frohman gave Klein a deep sense of the prime requisites of a good play. He frequently helped to fix up and to recast the plays presented; and from this it was only a step to the production of plays on his own account. His dramatic works show considerable power and no lack of original situations and some of them have been notable successes, among the latter being 'The Auc¬

tioneer^ 'The Music Master, > and 'The Lion and the Mouse.' Among his other dramas are (A Mile a Minute) ; 'By Proxy' ; 'The District Attorney) ; 'Two Little Vagrants) ; 'Heartsease) ; 'The Hon. John Grigsby'; 'Mr.

Pickwick0 ; 'The Daughters of Men' ; 'The Step Sister' ; 'The Third Degree' ; 'The Next of Kin'; 'The Gamblers'; 'Maggie Pepper'; 'The Outsiders' ; 'The Ne'er Do Well' ; 'The Money-makers.'

KLEIN, klin, Felix, German mathemati¬

cian : b. Diisseldorf, 25 April 1849. He was educated at Bonn, became Pliicker's assistant in the physical institute in 1866, was appointed lecturer at Gottingen in 1871, professor at Erlangen in 1872, and held chairs from 1875 in the Technical High School of Munich, from 1880 at Leipzig, and from 1886 at Gottingen.

In 1893 he represented Gottingen at the World's

Columbian Exposition at Chicago. He exer¬

cised large influence on American mathematics, having taught many instructors in institutions in this country. In 1875 he became one of the editors of the Mathematisclien Annalen, and in 1898 of the 'Encyclopadie der mathematischen Wissenschaften.' In 1897 he collaborated with Fricke in the publication of 'Vorlesungen fiber die Theorie der antomorphen Funktionen.'

He was chosen president of the International Commission on the Teaching of Mathematics in 1908. Among his more important works are 'Ueber Riemanns Theorie der algebrais-

chen Funktionen' (1882) ; 'Vorlesungen fiber das Ikosaeder und die Auflosung der Gleichun-

gen vom ffinften Grad' (1884) ; 'Einleitung in die hohere Geometrie' (1893) ; 'Evanston Colloquium' (1893) ; 'Ueber die hypergeom-

etrische Funktion' (1894) ; 'Ueber lineare Differentialgleichungen der 2. Ordnung'

(1894); 'Theorie des Kreisels' (2 vols., 1897-

98) ; 'Vorlesungen fiber die Theorie der elliptischen Modulfunktionen' (1890-1912); 'Mathematical Theory of the Top' (New

York 1897) ; 'Vortrage fiber ausgewahlte Fragen der Elementargeometrie' (1895; Eng.

trans. by Beman and Smith, 'Famous Problems of Elementary Geometry,' Boston 1897). He also edited the works of Mobius (1887).

KLEIN, Felix, French clergyman and

writer: b. Chateau-Chinon, department of Nievre, 12 July 1862. Educated at the seminaries of Meaux and Saint Sulpice, the Institut Cathol-

ique de Paris and the Sorbonne, he became pro¬

fessor of philosophy at the ficole Saint Etienne at Meaux in 1890, and in 1893 was appointed professor of French literature at the Institut Catholique. A tolerant, broad-minded ecclesias¬

tic of democratic sentiments, his preface to a French translation of a life of Father Hecker (q.v.) in 1897 laid him open to the charge of <(Americanism.® The papal interdiction of that heresy in 1899 led the abbe to retract and withdraw the book. In 1904 he visited the United States and Canada, an experience that still further strengthened his keen interest in, and admiration for, American institutions and ideals. He was received by President Roose¬

velt in Washington, and on his return pub¬

lished a record of his travels entitled (Au pays de la vie intense) ((In the Land of the Strenuous Life,' Chicago 1905) and dedicated to Mr. Roosevelt. In 1907 he made a lecturing tour in America, which furnished materials for his book, (America of To-morrow) (1910).

During the European War the Abbe Klein was attached as chaplain to the American War Hospital in Paris. In this capacity he kept a record of events in a careful diary, published in 1915 as (La guerre vue d'une ambulance,'

of which an English translation appeared in the same year, 'Diary of a French Army Chaplain.' It is a simple, profoundly moving account of what war means to the wounded combatants. In October 1916 he published a volume of reflections, (Les douleurs qui esperent,' translated by G. Bailey under the title of (Hope in Suffering.' Made up of short studies of types of French character, the book reveals finest aspects of French faith and patriotism. His other writings are (An American Student in France,' a

peculiar work of semi-fiction with its original title of (The Discovery of the Old World by a Student from Chicago, ' drawing comparisons between the two countries; biographies of Bishop Dupont of Metz, and Cardinal Lavigerie ; (New Tendencies in Religion and in Literature' ; 'Higher Education of Women'; an edition of Montaigne and of Corneille; (Autour du dillettantisme' ; 'Le fait religieux,' and trans¬

lations from Archbishops Ireland and Spalding.

KLEINITE, a mineral consisting of mer¬

cury ammonium chloride, of uncertain formula.

A source of mercury in the Terlingua district, Brewster County, Tex., with other rare mer¬

cury minerals, montroyd'ite, eglestonite and terlinguaite.

KLEIST, klist, Ewald Christian von, Ger¬

man lyric poet : b. at Zeblin, an estate near Kdslin, 7 March 1715; d. Frankfort on the Oder, 24 Aug. 1759. He studied law, philos¬

ophy and mathematics at the University of Konigsberg (1731), and entered the military service of Denmark in 1736, of Prussia in 1740.

Being assigned to the garrison at Potsdam, he had occasion to meet Gleim, Ramler and Nicolai, literary lights, and to conceive an un¬

requited affection for Wilhelmine von der Goltz. He was an active military campaigner, and his death was due to wounds received at the battle of Kunersdorf. His early lyrics were of anachreontic type, but he gradually drifted under the influence of Klopstock (q.v.), later, however, developing those original lyric qualities that are his principal charm. His most famous work is the fragment 'Der Friihling' (Berlin 1749) ; his 'Gedichte' ap¬

peared 1756; 'Neue Gedicht' (1758). A

critical edition of his works, edited by August Sauer, appeared at Berlin in three volumes (1882-83).

KLEIST, Heinrich Bernt Wilhelm von,

hin'riH bernt vfl'helm fon klist, German dramatist: b. Frankfort-on-the-Oder, 18 Oct.

1777; d. Wannansee, near Potsdam, 21 Nov.

1811. He entered the army in 1795, but left it in 1799 to study at Frankfort and Berlin, and later engaged in journalism in Dresden and Berlin. His first drama, (Die Familie Schrof-

fenstein,' was published in 1803, and was fol¬

lowed by 'Amphitryon' (1807) ; 'Penthisilea,'

a tragedy (1808) ; 'Das Katchen von Heil-

bronn' (q.v.) (1810), a popular poetic drama; 'Der zerbrochene Krug' (The Broken Jug) (1811). A volume of 'Tales' appeared

(1810-11), and posthumously, 'The Battle of Hermann,' and 'Der Prinz Von Homburg.'

He exhibits some of the worst faults of the Romantic school, to which he belongs, but nevertheless his best plays, such as 'The Prince of Homburg' and 'The Broken Pitcher'

possess sufficient vigor and fidelity to life to make them popular even at the present day.

The best of his tales is 'Michael Kohlhaas,' a story of Brandenburg in the Middle Ages.

He failed to gain recognition and shot himself, after first shooting a woman whom he loved, and who like him was weary of life. His works did not receive notice till after his death, when they were made known by Tieck.

An incomplete edition of his works appeared at Berlin (3 vols., 1826). The best modern edition is that by Schmidt, Minde-Pouet and Steig (5 vols., 1904). His letters were edited by Biilow (Berlin 1848), Koberstein (ib. 1860) and Biedermann (Breslau 1888). Consult

Becker, K. H., 'Kleist and Hebbel' (1904); Brahm, 'Heinrich von Kleist' (new ed., Ber¬

lin 1913) ; Hart, Julius, 'Das Kleist-Buch'

(1912); Herzog, 'Heinrich von Kleist' (1911); Roettcker, 'Heinrich von Kleist' (1907) ; Wildbrandt, 'Heinrich von Kleist' (Ndrd-

lingen 1863), and Lloyd and Newman, 'Prus¬

sia's Representative Men' (London 1875).

KLENCK (klenk) -CHEZY, Wilhelmine

Christine von, German poet and novelist : b.

Berlin, 26 Jan. 1783; d. Geneva, Switzerland, 28

Feb. 1856. She was married to Antoine Leonard de Chezy (q.v.) in 1801. She acquired con¬

siderable celebrity by her 'Poems' (1812) ; 'Heart Notes During a Pilgrimage' (1833) ; and 'Emma's Ordeal' and other novels, but is perhaps best known as the writer of the li¬

bretto of Weber's opera of 'Euryanthe.'

KLENGEL, kleng'el, August Alexander,

German composer: b. Dresden, 1784; d. 1852.

After studying art in his native city under several notable teachers, he went with Clementi, one of his teachers, to Saint Petersburg and other parts of Russia after having first traveled with him through Ger¬

many. He liked Russia so well that he re¬

mained in Saint Petersburg six years (1805—11).. He acquired quite a reputation in Russia as a musician; but a desire to further his musi¬

cal studies took him to Paris where he spent two years; after which he visited England and Italy, improving his execution and his know!-

edge of his art. On his return to his native city in 1816 he became organist in the chief Roman Catholic church there. His music in the church soon became a feature of the musi¬

cal life of the city; and many people not of the Catholic faith went to listen to his playing. He was as accomplished a pianist as organist ; but his ability as a composer to-day outshines his work as a performer on these instruments.

He wrote good salon music and numerous not¬

able fugues and canons, among a multiplicity of other work, all of which is well done.

KLEPHTS, klefts (Greek, «thieves))),

Greek bandits who, after the conquest of Greece by the Turks in the 15th century, kept themselves free in the mountains of northern Greece and Macedonia, and carried on a per¬

petual war against Turkish rule, considering everything belonging to a Turk a lawful prize.

During the war of independence these Klephts furnished the Greeks with some of their best soldiers and leaders. Whole tribes, as the Su-

liotes and Chimariots in Epirus, and the Spha-

kiots in Crete, are to be numbered among them. They developed a considerable litera¬

ture of their own, especially in the form of ballads, usually composed in the vernacular.

The gradual development of the country after its independence had been established resulted in the disappearance of this picturesque class.

See Greece.

KLEPTOMANIA (from Greek kMirretv,

steal, and fiav'ia , madness), a mania for stealing, a propensity often regarded as being irresistible and involving a kind of moral in¬

sanity. It is frequently pleaded in law courts as an excuse for theft, although the act consti¬

tutes a legal offense. See Insanity.

KLESEL, Melchior. See Khlesl.

KLIKITAT, a shapatian tribe of North

American Indians who once made their home in Klikitat and Kamania Counties, in the State of Washington. They are closely related lin¬

guistically to the Yakima who were their neighbors on the east. The Klikitat seem to have never, since they have come within the knowledge of the white man, been very numer¬

ous. Lewis and Clark, who visited them in 1805, placed their number at 700. This may not, however, have included all those speaking the same tongue. Between 1820 and 1830 they crossed the Columbia river and dispossessed the cognate tribes then occupying the Willamett Valley; but they were driven back over the river to their former habitat. The Klikitat were among the greatest traders of the western United States and Canada. They carried on an extensive trade, or exchange of commodities between the coast tribes and those living to the east, north and south of them. They were among the first of the western Indian tribes to cede their lands to the

United States, which they did by the Yakima treaty (9 June 1855).

In the more than 60 years which have passed since then, thev have become so mixed with other Indian stocks and tribes that they are now undistinguishable as a separate race, though their descendants are still, for the most part, to be found on the Yakima reservation, Washington. It is, therefore, impossible to estimate their present numerical strength. The word Klikitat means, in Chinookan, <(beyond or on the other side of® and was used with reference to the Cascade mountains, which lay between the Klikitats and the coast tribes.

KLINGER, klmg'er, Friedrich Maximil¬

ian von, German dramatist, novelist and essay¬

ist : b. Frankfort-on-the-Main, 1752; d. 1831.

By profession he was a soldier, though he early showed his literary tendencies when, as a student at Giessen, he was awarded a special prize for his tragedy (Die Zwillinge) which was published in 1775. He was a man of con¬

siderable force of character; and he made rapid advancement in his military life just as he made a strong impression on the literature of his day. In 1776, the year following his literary debut, he published a drama entitled (Sturm und Drang) which was destined not only to profoundly influence the German liter¬

ary tendencies of his day but to give its name to one of the most intensive literary move¬

ments in German literature. Klinger, after several years' military service in Germany, went to Saint Petersburg and there entered the Russian army where he remained most of his life, though in more or less close contact with the leaders of the literary movement in Germany. He rose, through gradual and suc¬

cessive promotions, to the rank of lieutenant-

general, and he was held in high esteem by the Russian military authorities. In the army, too, he found some congenial literary spirits over whom he exercised considerable influence.

Klinger was one of the first novelists in Ger¬

many who worked toward a certain definite purpose ethical in its tendencies ; and this in itself attracted many literary men to his stand¬

ard and gained many readers and critics for his works. Unfortunately his literary taste falls generally below his inventiveness ; and so his works are constantly offending through the crudeness of their presentations and their lack of literary discrimination and good form.

But the vehemence with which he presented his opinions, more or less novel, and therefore attractive in his day, outbalanced all the short¬

comings of their author; gained for him a very extensive following and gave him an in¬

fluence over literary thought and form of ex¬

pression of his day out of all proportion to the real value and importance of his literary work. Yet, in the midst of much that offends good taste and of presentations and character¬

izations that are untrue to life, there is also much in Klinger's work that gave inspiration to the writers of his age and that left their impression indelibly imprinted upon the literary movement not only in Germany but upon that of most of Europe ; for he was, in some senses, the most aggressive of the leaders of the ftStorm and Stress® period in German lit¬

erature. His work was very considerable and most of his writings have appeared in various editions. Among his works most worthy of at¬

tention for their own intrinsic merits and for the influence they have had on Germany lit¬

erary thought are, in addition to those already mentioned, (Faustus Leben, Thaten und Hollen-

fahrt) ; (Der Weltmann und der DichteU ; (Betrachtungen und Gedanken fiber verschie-

dene Gegenstande der Welt und der Littera-

turJ ; and his dramas, all of which are inter¬

esting as reflecting the thought and the literary influences of the age in which he was actively at work. A complete edition of his works was KLINGER — KLONDIKE

published at Stuttgart in 1841, and a second edition, more or less selected in character, ap¬

peared in the same city in 1878-80 (8 vols.).

Consult Erdmann, (Klingers dramatische Dich-

tungen> (1877) ; Kiirschner, (Deutsche Nation-

allitteratur y (Vol. I, which contains (Slimmer und D ranger, } Stuttgart 1883) ; Prosch, (Klingers philosophische Romanne) (Vienna 1883) ; Schmidt, (Lenz und Klinger) (Berlin 1878). To these might be added a study of his life and work by Rieger (2 vols., Darm¬

stadt 1880-96). This is very exhaustive, though not always reliable. It has been trans¬

lated into French.

KLINGER, klmg'er, Max, German painter,

etcher and sculptor : b. Leipzig, 18 Feb. 1857. He was a pupil of Gussow at Karlsruhe and later at Berlin; studied also at the Berlin Academy; was active at Rome in 1888-92; and from 1893

in Leipzig. Of unusual versatility he was at first chiefly an etcher (1879-86), perhaps the best of his work in this line being the (Brahms-

Phantasien) (1894), deriving their subjects from various works of that composer. Then he directed his attention to painting in oils, and executed heroic canvases of (The Cruci¬

fixion (1890), now in the Hanover Museum, and (Christ on Olympus > (1897) at Vienna.

In 1894 he began to devote himself to poly¬

chromatic sculpture and one of the best of his plastic works is his statue of • Beethoven (1902, Leipzig Museum), in which onyx, bronze and differently colored marbles are com¬

bined. Later works include (The Drama) (1904), a colossal marble group in the Alber-

tinum, Dresden; (The Athlete, > a colossal bronze at Leipzig, and the striking bust of Nietzsche at Weimar. Klinger was the re¬

cipient of numerous awards, academic and knightly honors in recognition of his art. He published (Malerei und Zeichnung) (3d ed., 1899).

KLIPSPRINGER, a small, robust ante¬

lope (Oreotragus saltator), about equal in size to the chamois, and resembling it in habits, found in the mountainous districts of South Africa. It is yellowish-gray, and the hair is long and makes a rough fur. The flesh of the klipspringer is particularly esteemed; the hair is also valued for stuffing saddles; and it has therefore become rare in localities where it was once common. The pinnacles and precipices in which it delights make hunting it with dogs impossible, but to get within rifle shot of it is not difficult. Many interesting habits are given by writers on South African zoology and nat¬

ural history.

KLODEN, kler'den, Karl Friedrich von,

German educator and geographer : b. Berlin, 1786; d. 1856. He received his education while apprenticed to a goldsmith ; became ' Potsdam normal school director in 1817, and director, seven years later, in a Berlin commercial school. His chief geographical works are (Landeskunde von Palastina) (1816) ; (Grund-

linien zu einer neuen Theorie der Erdgestal-

tung) (1824). Pominent among his historical works are (Ueber die Enstchung, das Alter und die friiheste geschichte der Stadte. Berlin und Koln) (1839) ; (Lebens und Regierungs geschichte Friedrich Wilhelms IIP (1840); (Die Quitzows und ihre Zeit) (3d ed., 1889).

Consult (Jugend Errin-nerungen Karl Fried¬

richs von KlodenB an autobiography (Leip¬

zig 1874).

KLOET, a volcano on the island of Java.

Although among the smaller of the numerous volcanoes there, it came prominently into no¬

tice on account of its eruption in May 1901, in connection with which, besides its destructive effects, there were peculiar atmospheric phe¬

nomena.

KLONDIKE, The, a famous gold-bearing

stream which enters the Yukon, the principal river of the Yukon Territory, Canada, 45 miles below the mouth of Sixty Mile Creek. In re¬

cent years the term Klondike is applied to the region surrounding the river and its tributaries, which lies between Alaska and the British pos¬

sessions. As early as 1862 gold was discovered in Alaska, but no special notice was taken of it; 13 years later gold was found at the head of the Stikine River. In 1879, Juneau, a Frenchman, discovered gold in a creek which they named Gold Creek, and at the mouth of this creek founded a town first called Harris¬

burg and later Juneau. In 1884 a rich find was reported on Stewart River, in the Yukon dis¬

trict, two years afterward gold was discovered on Forty-mile River close to the international boundary.

It was not till 1897 that the wonderful riches of the Klondike region were made known through George Carmack, who went from Illi¬

nois to Alaska in 1890 and there married an Indian squaw. On 16 Aug. 1896 he discovered coarse gold on Rabbit Creek, afterward called Bonanza Creek ; the discovery got wind, and immediately all the people in the neighborhood made a rush for Bonanza Creek, which was staked from source to mouth. But it was not till the following summer that the outside world knew of the discovery, when a steamer reached Seattle with a load of gold from the Klondike. In the following year there was a great rush over the Chilkoot and White Passes and down the Yukon River to the district, no fewer than 28,000 persons entering the Terri¬

tory. . Dawson City, the first hut in which was built in September 1896, was founded, and in six months it had 500 houses, in 1901 had a population of 9,142, which had declined in 1911

to 3,103. Towns were also built at Granville and Grand Forks, and at White Horse at the northern terminus of the White Horse Railway.

The Klondike is not far from the Arctic regions, and for seven months of the year in¬

tense cold prevails, varied by furious snow storms

which begin in September and occur at intervals till May. The mean temperature at Dawson City is minus 24° in January and 60° in July. By 20 October ice is formed over all the rivers, and the gravel deposits, from which the gold is mined, remain frozen winter and sum¬

mer alike, and are covered by layers, from two feet to as much as 100 in depth of vegetable mold or "muck,® also frozen into a solid mass. The conditions of gold mining in this region are therefore unique. The gravel must be thawed before it can be raised; and in the early days of mining in the Klondike, two methods, "ground-sluicing and shovelling-in,®

and "drifting,® were employed, the cost of min¬

ing running at from $10 to $25 a cubic yard. Steam-thawing was later introduced by McGillivray, a Californian mining engineer; 474

in some mines ptdsometers are used to thaw the pay-dirt in the drifts; the mechanical move¬

ment of pay-dirt is accomplished by a self¬

dumping cable tram called the ((Dawson car¬

rier^ which carries a bucket with a capacity of from 9 to 11 cubic feet; and gold-washing and separating plant has been installed. Many rich claims have been worked ; one, the Eldorado paystreak, four miles in length, yielded gold of the value of $25,000,000, or $1,200 a running foot for the bottom of the valley. The total value of production in 1887 was $70,000, the highest yield (1900) being valued at $22,000,000.

There has since been a decline in value, that for 1915 showing $4,758,098. From 1885 to 1915 (inclusive) the total production was valued at $162,233,984. See Alaska.

KLONOWICZ, klo'no'vich, Sebastian-

Fabian, Polish satirical poet: b. Sulmierzyce, 1551 ; d. Lublin, 1608. Studied at Cracow Uni¬

versity, acquired the Latin name Acernus and established himself at Lublin, where he became burgomaster and president of the civil tribunal of the Jewish community. Of modest, and vir¬

tuous character, his wife was a dissipated, vicious woman who brought him to poverty, obliging him in age to take refuge in the city retreat as an object of Catholic charity. He wrote (Victoria deorum,5 a poem concerning the ills of the poor at the hands of the rich ; (Roxolania) (1584), poem descriptive of Red Russia (Galicia) ; (Flis, or the boatman navi¬

gating on the Vistula from Cracow to Danzig) (1600) ; (Worek Judaszow,5 or Judas purse, decrying the wicked acquisitions of the rich (1600) ; (Memorial of the Dukes and Kings of Poland) (1600, 1620 and 1639). The Jesuits, against whom Klonowiez leveled so many of his satires and who helped him when in mis¬

fortune, burned all his works they could ac¬

quire, and some have become very rare.

KLOPP, klop, Onno, German historian :

b. Leer, East Friesland, 9 Oct. 1822; d. .1903.

He studied at Bonn, Berlin and Gottingen (1841-45), and taught at Osnabriick Gymna¬

sium (1845-58). He shared as intimate friend the exile of King George V of Hanover (1866). Becoming Roman Catholic (1873) his aversion to the Prussians increased and is dis¬

tinctly marked in his writings. Later he went to Austria. He wrote Hie Geschichte Ost-

frieslands> (1854-81), (Konig Friedrich II von

Preussen und die deutsche Nation) (1860; 2d ed., 1867) ; (Der Konig Friedrich II von Preussen und seine Pol itik) (1861); (Tilly im Dreissigjahrigen Kriege) (1861); (Der Fall des Hanses Stuart5 (14 vols., 1875-83); Has Jahr 1683 5 (1882); (Konig Georg V5 (1878); 'Her Dreissigjahrige Krieg bis zum Tode Gustav Adolfs, 1632 5 (1891-96). He also ed¬

ited the correspondence of Leopold I with Father Marco d'Aviano (1888).

KLOPSTOCK, k-lop'stock, Friedrich Gott¬

lieb, German poet: b. Quedlinburg, Prussia, 2 July 1724; d. Hamburg, 14 March 1803. He studied at the school in his native town and at Schulpforta, and later pursued the course in theology at Jena and Leipzig. He is widely famous as the author of the sacred epic, (Der Messias,5 the first three cantos, of which, were published in 1748. They are in' the Miltonic style, and excited general attention. In conse¬

quence, Klopstock was invited to Copenhagen by the minister Bernstoff, and offered a small pension. In 1764 he wrote his drama Her¬

manns Schlacht5 (Battle of Arminius), and in 1771 left Copenhagen for Hamburg, under the character of Danish secretary of legation and counsellor of the margraviate of Baden.

In Hamburg he finished his (Messias5 (1773).

He also wrote (Die Gelehrtenrepublik5 (The Scholar's Republic) (1744), his chief work in prose; (Geistliche Lieder5 (1758); HdetP

(1771) ; and several dramas, in addition to the one already named. His reputation did not survive, but he is still known for his great service to German literature in assisting to free it from foreign, especially French, influence.

His collected works were published in 12 vol¬

umes at Leipzig 1798-1817. A fine edition by Muncker appeared in 4 volumes, 1887. (See Messiah, The). Consult Lyon, (Ueber Ivlop-

stocks Verhaltniss zu Goethe5 (1879) ; Lappen-

berg, (Briefe von und an Klopstock) (1867) ; Habler, (Milton und Klopstock5 (1893).

KLO.SS, kids, Georg Franz Burkhard,

German phvsician and bibliophile: b. Frankfort, 31 July 1787; d. there, 10 Feb. 1854. He was the son of a doctor and studied medicine in Heidelberg and Gottingen, but soon turned to book collecting, and gathered a fine collection of old manuscripts, purchasing entire libraries of monasteries. Obtaining Masonic degrees, he started -collecting books referring to Free¬

masonry. In 1844 appeared, at Frankfort, a bibliography of the Masonic works in his collec¬

tion, another in 1846. His work Hie Frei-

maurerei in ihrer wahren Bedeutung aus den alten und ac'hten Urkunden5 reached its second edition in 1854; he published (1848) (Ge¬

schichte der Freimaurerei in England, Ireland und Schottland,5 then (Geschichte der Frei¬

maurerei in Frankreich5 (1852-53). His mag¬

nificent library of Masonic works is now at The Hague.

KLOSTERMANN, klos'ter-man, August

Heinrich, German Lutheran theologian : b.

Steinhude, Schaumburg-Lippe, 16 May 1837. He studied at Erlangen University and Berlin (1855-58), was assistant pastor in Biickeburg (1859-64), and was repetent and private teacher (docent) at Gottingen (1864-68) and has since been professor of Old

Testament exegesis at Kiel. He wrote (Vindicae Lucanse5 (Gottingen 1866) ; Has Markus evangelium nach seinem Quellenwerthe fiir die evangelische geschichte5

(1867) ; Hntersuchungen zur alttestamentli-

chen Theologie5 (Gotha 1868) ; (Ueber deutsche Art bei Martin Luther5 (1884) ; Hie Bucher Samuelis und der Konige ausgelegt5 (Nord-

lingen 1887) ; (Zur Theorie der hiblischen Weissagung und zur Charakteristik des He-

hraerbriefes5 (1889); Heuterojesaia, he-

braisch und deutsch5 (Munich 1893) ; (Schul-

wesen sin alten Israel5 (Leipzig 1908).

KLOTZ, klots, Christian Adolf, German

critic and Latin scholar: b. Bishopswerda, 13

Nov. 1.738; d. Halle, 31 Dec. 1771. He studied at Leipzig and Jena; became professor of philosophy at Gottingen 1763; and professor of oratory at Halle 1765. He proved himself e pert in philology through his Latin poems (col¬

lected in (Opuscula poetica,5 1766) ; Her Aus-

gabe des Tyrtaoa,5 (1764) ; numerous treatises such as (Opuscula varii argumenti5 (1766) ; (Opuscula philologica et oratoria5 (1772). He KLOTZ — KLUCKHOHN

475

got into controversy with the Algemeinen Bibliothek , to which he had contributed, and by his (Ueber den Niitzen und gebrauch der alten geschnittenen Steine) (1768), criticizing Lessing's 'Laokoon,-* he brought forth that poets response in the (Briefe antiquarischen Inhalts' (1768-69). His disputes were carried on in Acta Literaria and Dentschen

Bibliothek der schonen Wissenschaften (1767-72) ; Gen¬

ius Saeculi' (1760) had a satirical purpose, as also had his (Mores Eruditorum) and (Opuscula Latina) (1760). Consult Hausen. (Leben und Charakter Herrn Klotz) (Halle 1772) ; Hagen, (Briefe deutschen gelehrten an Klotz) (1773); Sandys, (A History of Classical Scholarship) (Cambridge 1903-08).

KLOTZ, Louis Lucien, French statesman : b. Paris, 11 Jan. 1868, of Alsatian descent. Edu¬

cated as advocate, he founded in 1888 the Vie Franco-Russe, in 1892 edited the Voltaire , and in 1895 established the Francais Quotidien.

After two unsuccessful attempts, he was elected in 1898 as radical socialist to the French legislature, being prominent since that date in French politics, and many terms holding the portfolio of Minister of Finance. In 1914 on the outbreak of the Great War Klotz was made head of the Press Department of the Ministry of War. In 1919 he was appointed one of the French delegates to the Peace Con¬

ference.

KLOTZ, klots, or CLOTZ, Matthias,

Tyrolese violin-maker: b. about 1640; d. about 1696. He was a pupil of Jakob Stainer at Ab-

son near Innsbruck, there established himself, and made violins much in Stainer's manner, so that only the less metallic tone of Klotz's in¬

struments offers a distinguishing feature. His violins range in date from 1675 to 1696.

KLOTZ, Reinhold, German philologist: b.

Stollberg, 13 March 1807 ; d. Kleinschacher, near Leipzig, 10 Aug. 1870. He studied at Leipzig and became assistant professor there (1832), and, in 1849, full professor. He was one of the editors

(1831-55) of (Neuen Jahr-

biicher fur Philologies and produced editions of the Greek (Gallus> and (Clement of Alex¬

andria, > ^uripedes' (1840-60) ; also working on Davarius' (Liber de Grsecse Lingua partic-

ulis) (1835-42). In the Latin he made com¬

plete editions of Cicero (1851-56); Terence (1838-40) ; Andria, Nepos, etc. He ■ worked with Liibker and Hudemann on a Latin dic¬

tionary (1847-57). Consult Jahn,

KLUBER, klu'ber, Johann Ludwig, Ger¬

man law professor, author and state official : b.

Tann, near Fulda, 10 Nov. 1762; d. Frankfort, 16 Feb. 1837. He became professor of law at the University of Erlangen (1786), privat-refer-

endar, state and cabinet counsel, in Karlsruhe (1804), and professor of law at Heidelberg (1807). During the congress at Vienna

(1814-15), by government permission, he re¬

sided there and published (Akten des Wiener Kongresses in den Jahren 1814 and 1815> (8

vols.) ; an enlarged edition was published 1830

under the title of (Quellensammlung zu dem offentlicchen ReChte des Deutschen BundesS

Under von Hardenberg, chancellor of state, he became privy councillor in the Ministry of For¬

eign Affairs (1817) and, under its auspices he assisted in the congress at Aix-la-Chapelle (1818), and in political negotiations in Frank¬

fort and Saint Petersburg. In 1822 he pub¬

lished the second edition of his (Offentlichen Rechto des Deutschen Blindest which brought on political persecution, his resignation and re¬

tirement to Frankfort, where he died. Other prominent works are (Staatsrecht des Rhein-

bundes) (1808) ; (Die Selbstandigkeit des Richteramtes und die Unabhangigkeit seiner Urteile in Rechtsprechen> (1832) ; (Pragma-

tische Geschichte der nationalen und politischen Wiedergeburt Griechenlandes> (1835).

KLUCK, kluk, Alexander H. R. von, Ger¬

man general: b. Munster, Westphalia, 20 May 1846. He entered the army in 1865 and served in the Austrian campaign of 1866 and the Franco-German War, 1870-71. In the latter he was twice wounded at Metz and awarded the Iron Cross (second class) for bravery. At the opening of the European War he commanded the First German Army (the right wing) in the invasion of Belgium and the subsequent drive on Paris. Von Kluck had long been re¬

garded as one of the best infantry leaders in the German army. Starting from Aix-la-

Chapelle, he marched through Vise, took Brus¬

sels and Louvain, fought the battles of Mons and le Cateau, and finally came almost into touch with the outer defenses of Paris. In¬

stead, however, of moving straight on to the French capital from Senlis, he turned in a southeasterly direction, leaving Paris and the British forces on his right. This unexpected move led to w'hat has been calleff the turning-

point of the war. Unknown to von Kluck, General Joffre had placed a new French army under Maunoury at the left of the British, and another army under Foch at the right, adjoin¬

ing the command of Franchet d'Esperey, which stood immediately on the British right. Maun¬

oury attacked von Kluck on his exposed flank and caused that gap in the German line into which General Foch threw all his strength, thereby deciding the battle of the Marne and forcing the Germans to retreat beyond the Aisne. Most military writers maintain that the strategy of von Kluck was responsible for the breakdown of the original German plan of campaign. Toward the end of March 1915, while inspecting an advanced position, he was struck by shrapnel, which caused seven wounds.

Shortly afterward he received the Order Pour le Merite. In October 1916 the Militdr Wochenblatt announced that Field-Marshal von Kluck had been placed on half-pay, in accord¬

ance with his request to be allowed to retire.

His son, Lieutenant Egon von Kluck, was killed early in 1915. See Foch, General; War, European: Battle of the Marne.

KLUCKHOHN, klook'hon, August, Ger¬

man educator and historian : b. Bavenhausen, 6

July 1832; d. Munich, 19 May 1893. He stud¬

ied at Heidelberg and Gottingen ; and in 1850

became editor at Munich of a critical division of von Sybel's (Historischen Zeitschrif tP

After acting as teacher (docent) in Munich University from 1860, in 1865 he was made full professor and was professor in the technical high school in 1869. He was appointed pro¬

fessor of history in Gottingen University in 1883. He wrote (Die Geschichte des Gottes-

friedens> (1857) ; (Wilhem III, Herzug von Beyern-Munchen* (1861) ; (Ludwig der Reiche, 476

Herzog von Bayern-Landshut) (1865) ; 'Fried¬

rich der Fromme, Kurfurst von der Pfalz }

(1876) ; (Luise Konigin von Preussen) (1876) ;

von Westenrieders Leben und SchrifteiP

(1890). His 'Vortrage und Aufsatze' (1894) was issued as a posthumous work by Heigel and Wrede, Munich.

KLUGE, kloo'ge, Friedrich, German philol¬

ogist and educator: b. Cologne, 22 June 1856.

He studied philology and Germanics in Leip¬

zig, Strassburg and Freiburg; became teacher of English and German philology at Strassburg (1880), assistant professor at Jena in 1884, full professor in 1886, and in 1893 was appointed professor of German language and literature at Freiburg. He wrote 'Etymologisches Worter-

buch der deutschen Sprache) (1881, 7th ed., 1910) ; ' Stammbildungslehre der altgerman-

ischen Dialekte) (2d ed., 1899) ; (Von Luther bis Lessing, sprachgeschichtliche Aufsatze) (4th ed., 1904) ; ' Angelsachsiges Lesebuch) (3d ed., 1902) ; 'Deutsche Studentensprache) (1895) ; 'English Etymology) (in collaboration with F. Lutz, 1898) ; 'Roithwelsch, Quellen und Wortschatz der Gaunersprache) (1901) ; 'Mit-

telenglisches Lesebuch) (glossary by Kolbing, 1904; 2d ed., 1912). For Paul's 'Grundriss der altgermanischen Philologie) he wrote 'Vorge-

schichte der altgermanischen Dialekte) (1897) and 'Geschichte der Englischen Sprache) (1899). In 1900 he founded the Zeitschrift fur deutsche Wortforschung.

KNABL, kna'b'l, Joseph, Austrian sculptor: b. Fliess, Tyrol, 17 July 1819; d. Munich, 3

Nov. 1881. As son of a peasant he learned carving with F. Renn in Imst. He went to Munich in 1836 and studied wood-carvings of the Middle Ages under J. Otto Entres and, later, Sickinger, when he worked on images of saints. Working independently from 1842, he created the heroic size group 'Baptism of Christ J for the Mergentheim Church, Wiirttem-

berg (1852) ; several statues for the cathedral altar at Augsburg (1854); 'Christ and the Apostles,) a life-sized group for the high altar at Velden, Lower Bavaria (1855). His group of Saints Ann and Mary for 'the Eichstatt Cathedral was awarded a prize at the Munich Exposition in 1858. His chef-d'oeuvre is con¬

sidered to be a 'Coronation of Mary) for the Munich Frauenkirche high altar. He was ap¬

pointed professor of sculpture (1862) in the Munich Academy.

KNACKFUSS, knack'foos, Hermann, Ger¬

man artist and writer on art: b. Wissen, Rhen¬

ish Prussia, 11 Aug. 1848. He studied in the Dusseldorf Academy (1865-69) ; went through the Franco-Prussian War (1870-71) ; then con¬

tinued art study under E. Bendemann, later under E. von Gebhardt. He won the state prize (1874) which paid for his studies at Rome (1875-78). He taught anatomy in the Cassel Academy (1880) and history of art (1890). His noted works are 'Battle of Miihl-

dorf) (belonging to the Kaiser) ; 'Battle of Turing in Berlin Zeughaus ; mural decorations in the Potsdam Treppenhaus of the officers'

casino; 'Entry of the Kaiser and Kaiserin into Jerusalem) (1902); a 'Holy Family) altar picture in the Fulda Cathedral (1893) ; mural decorations in

the Wohlau (Silesia) Gymna¬

sium. He is author of the following works, among others: 'Deutsche Kunstgeschichte) (1888) ; for the serial Knnstlermonograpliien he has contributed articles on Raphael, Rem¬

brandt, Rubens, Michelangelo, Diirer, Mu¬

rillo, Holbein, Titian, Velazquez, Frans Hals, yan Dyck, Menzel, etc.

KNAPP, knap, Albert, German clergyman

and poet: b. Alpirsbach, 25 July 1798; d. Stutt¬

gart, 18 June 1864. He studied theology at Tubingen, became vicar in Feuerbach (1820) and filled other positions till he made a repu¬

tation in the Hospitalkirche at Stuttgart (1836).

Was archdeacon in the Stiftskirche (1839), later to become Stadtpfarrer. His poetry was of a religious character chiefly; among his works are 'Christliche gedichten) (1829); 'Neuern gedichte) (1834) ; the cycles, 'Hohen-

stauffen) (1839) ; 'Bilder der VorwelC (1862) ; and in hymnology, 'Evangelische Liederschatz fur Kirche und Haus) (1837). He wrote 'Das Leben von Ludwig. Hof acker) ; 'Gesam-

melten prosaischen Schriften) (1870-75; pub¬

lished posthumously). Consult Gerok, K., 'Al¬

bert Knapp) (Stuttgart 1881) ; Knapp, A., 'Knapp als Dichter und Schriftsteller) (Tu¬

bingen 1913).

KNAPP, nap, Charles, American philol¬

ogist: b. New York, 22 June 1868. He was graduated at Columbia University (1887), took the degree Ph.D. (1890) and was prize fellow in classics (1887-90).

He became tutorial fel¬

low in Latin (1890-91) and was appointed in¬

structor in Latin and Greek (1891-1902), ad¬

junct-professor of classical philology (1902-06), and was made professor in 1906. He became editor of the Columbia University Classical Weekly in 1907. Fie wrote 'Stories from Aulus Gallius) (1895) ; 'Selections from Viri Romae) (1896), in collaboration with R. Arrowsmith; 'The ZEneid of VirgiP (1901, books I-VI, se¬

lections VII-XII). He has contributed many articles on classical subjects to periodicals and encyclopedic works.

KNAPP, George Friedrich, German econ¬

omist and educator : b. Giessen, 7 March 1842-

He studied in Munich, Berlin and Gottingen, and in 1867 became director of the Statistical Bureau of Leipzig. Two years later he was appointed assistant professor of economics and statistics in the University of Leipzig and in 1874 professor of political economy in Strass¬

burg University. His writings dealing chiefly with population and agricultural topics include 'Ueber die Ermittelung der Sterblichkeit) (1868) ; 'Die Sterblichkeit der Sachsen) (1869); 'Theorie des Bewolkerungswechsels) (1874) ; 'Die Bauernbefreiung und der Ur-

sprung der Landarbeiter in den alteren Teilen Preussens) (1887) ; 'Die Landarbeiter in Knechtschaft und FreiheiD (1891) ; 'Grund-

herrschaft und Rittergut) (1897). In 1886 he founded the periodical Abhandlungen aus dem staatszvissenschaftlichen Seminar zu Strass¬

burg.

KNAPP, Hermann, German-American phy¬

sician : b. Dauborn, 17 March 1832; d. 1911.

He studied in Munich, Wurzburg, Berlin, Leip¬

zig, Zurich, Vienna, Paris, London and Utrecht, and was appointed private teacher (docent) at Heidelberg (1860), becoming professor of ophthalmology at the university (1865). Com-

mg to America he founded (1869) the New York Ophthalmic and Aural Institute, and was made professor (1882) of the New York Uni¬

versity Medical College. He was appointed professor of ophthalmology (1888) at the Col¬

lege of Physicians and Surgeons, Columbia Uni¬

versity, and (1902) emeritus professor. He did valuable service in optical surgery and wrote many valuable treatises on his special subjects, the eye and ear. Among his works are (Die Kriimmung der Hornhaut des mensch-

lichen Auges^ (Heidelberg 1860) ; (Die intraokularen geschwiilste) (Carlsruhe 1868) ; (Cocaine and its Use) (New York 1885) ; Unvestigations on Fermentation, Putrefac¬

tion and Suppuration (ib. 1886) ; Cataract Extraction without Iridectomy) (ib. 1887). In collaboration with Moos, he published Archives of Ophthalmology and Otology, from 1869, in English and German.

KNAPP, Martin Augustine, American

judge: b. Spafford, N. Y., 6 Nov. 1843. He was graduated at Wesleyan University, Connec¬

ticut (1868), received the degree of LL.D., and was

admitted to the bar (1869), being ap¬

pointed corporation counsel (1877–83) in Syra¬

cuse. In 1891 he was appointed interstate commerce commissioner by President Harrison, reappointed (1897) by President Cleveland, and again reappointed (1902) by President Roose¬

velt, becoming chairman of the commission from 1898. Under the Erdman Act as ex of¬

ficio mediator, he assisted in the work of settlement of numerous labor disputes. He was appointed by President Taft additional circuit judge and assigned for five years to the United States Commercial Court as presiding judge, entering office 31 Dec. 1910, but immediately re¬

signing. He was appointed a mediator for two years from 4 March 1911, becoming member of the Board of Mediation and Conciliation under the Newlands Act (1913), by appoint¬

ment of President Wilson. On the dissolution of the Commerce Court (13 Dec. 1913) he was assigned by the chief justice to the Circuit Court of Appeals, 4th Judicial Circuit He is member of the American Academy of Political and Social Science, the American Economic Association, American Political Science Asso¬

ciation, National Geographical Society, etc.

KNAPP, Samuel Lorenzo, American law¬

yer and author: b. Newburyport, Mass., 19 June 1774; d. Hopkinton, Mass., 8 July 1838. He was educated at Phillips Academy and gradu¬

ated at Dartmouth College (1804). He studied law under Chief Justice Theophilus Parsons, at Newburyport and quickly achieved a reputa¬

tion as an eminent counsellor and as active member in the State legislature. In the War of 1812 he

commanded a regiment of State militia on the coast; became editor of the Boston Monthly Magazine and established (1826) the National Republican, but went to New York after two years to practise his profession. He was given the degree of LL.D.

from the Paris College. He wrote (The Bache¬

lor and other Tales> (1836); (American Biog¬

raphy* (1833) ; (Travels in North America, by Ali Bey) (1818) ; (Life of Aaron Burr> (1835) ;

KNAPSACK, a bag or case of leather or strong cloth, used by soldiers, tourists and other travelers for carrying light personal bag¬

gage. Knapsacks are made in various styles, and are usually strapped to the back.

KNAU.S, knous, Ludwig, German painter : b. Wiesbaden, 5 Oct. 1829; d. 1910. From 1845

to 1852 he studied art at Diisseldorf under Sohn and Schadow, but soon shook himself free from their influence and started on a path of his own. He chose scenes from country life and in 1850 painted (The Country Dance * ; cThe Players,* now in the gallery at Diissel-

dorf, a replica being in the gallery of Leip¬

zig. His early pictures in this style were re¬

ceived with favor, although characterized by the dark, dull coloring of the Diisseldorf school.

In 1852 he went to Paris, and resided there for eight years, which were fruitful in many well-known pictures of his early style, (The Golden Wedding* (1858); (The Baptism>

(1859) ; and (Starting for the Dance.) Re¬

turning to Diisseldorf in 1866, he remained there for eight years, during which period he produced the

pictures on which his reputation as a genre painter is chiefly founded. Among these are (The Child's Party* (1869), in the Berlin National Gallery; (Funeral in a Hes¬

sian Village-' (1871) ; (The Goose-Girl * (1872).

These works are distinguished by naturalness and naivete, by delicate humor, mastery of detail, lifelike coloring and vivid expression.

After his appointment to the direction of a studio in the Art Academy at Berlin he reached his latest manner, which was formed largely by his study of the Dutch school, from which he acquired his final skill as a colorist. His pictures, however, no longer showed the na¬

ivete, the directness of his earlier productions; which were replaced by thoughtfulness and a striving after the didactic or admonitory. The most remarkable paintings of this period are (The Holy Family* (1876); (Tavern Scene —Bad Ways} (1876) ; (The Refractory ModeP

(1877), etc. He also painted many por¬

traits combining the picturesqueness of genre with lifelike expression. Among his miscel¬

laneous works are his designs in Watteau style for room decorations, his lead pencil sketches and aquarelles. Very many of his works have been reproduced by photography or engraving.

Consult Pietsch in (Kiinstlermonographien) (Bielefeld 1896), and id., an album of Knaus'

work, published by the Berlin Photographic Society.

KNEBEL, kna'bel, Karl Ludwig, German

translator and poet : b. Wallerstein Castle, Franken, 30 Nov. 1744; d. Jena, 23 Feb. 1834.

He studied law in Halle, was officer in a Potsdam

regiment (1765-73), tutor to Prince Constantine at Weimar from 1774. During a trip to Paris with his princely pupil and the Crown-Prince Karl August, he visited the poet Goethe at Frankfort and introduced his royal companions. He retired in 1779 on a pension with the rank of major and lived in intimate and close fellowship with the gifted Weimar group of contemporaries : Goethe, Schiller, Herder, Wieland, Duke Karl August, etc., in Weimar, Ilmenau and Jena. As poet his best-

known works are (Sammlung kleine Gedichte*

(1815) ; (Distychs) (1827) ; but better known are his translations, such as (Elegien des Pro-

perz) (1798); (Lucretiius* (18211; Alfieri's Caul* (1829). His Correspondence with

Goethe) (Leipzig 1851, 5 vo'ls.) ; 'Letters from Duke Karl August of Saxe-Weimar-EisenaclP

(ib. 1883) ; and a collection 'From Knebel's Correspondence with his Sister Henrietta*

(Jena 1858), all afford very interesting light on the social culture of the noted period at the court of Weimar.

KNEE JERK, or PATELLAR REFLEX,

a useful reflex test in diagnosis. When the leg is resting in an easy position, crossed over the other leg, for instance, a sharp blow given to the patella (knee-cap) tendon causes a sudden jerking forward of the leg. This action is brought about by a contraction of part of the quadriceps of the femur bone. This sudden extension of the leg is known as "knee-jerk®

and it is generally considered as a reflex ac¬

tion and is often tested for the symptoms of disease, the action being restricted in cases of locomotor ataxia, lead poisoning, chronic alco¬

holism, and even absent in severe cases, while in other diseases as neurasthenia, hemiphlegia, spastic paraphlegia, etc., the kick becomes ab¬

normally extended.

KNEELAND, ne'land, Abner, American

theologian and deist : b. Gardner, Mass., 6

April 1774; d. Farmington, Iowa, 27 Aug. 1884.

He was at first Baptist, then entered the Uni-

versalist ministry, but later became deist. He edited Universalist literature at Philadelphia and New York, then went to Boston where he founded (1831) the Investigator. His ex¬

pressed tenets brought him into the Boston Supreme Court (1836) where he was given a short sentence of imprisonment as guilty of blasphemy. He wrote 'The New Testament in Greek and English1* (Philadelphia 1822) ; 'Lectures on the Doctrine of Universal Salva¬

tion > (1824) ; 'A Review of the Evidences of Christianity > (New York 1829). Consult Kneeland, A., 'Review of the Trial, Conviction and Final Imprisonment ... of A. Kneeland) (Boston 1838) ; Parker, S. D., 'Report of the Arguments of the Attorney ... at the Trial of A. Kneeland) (ib., 1834) ; 'Review of the Prosecution against A. Kneeland) (in Cos¬

mopolite, ib. 1853).

KNEELAND, .Samuel, American natural¬

ist : b. Boston, Mass., 1 Aug. 1821 ; d. Ham¬

burg, Germany, 27 Sept. 1888. He was gradu¬

ated from Harvard in 1840, practised medicine in Boston 1845-50, and was an army surgeon during the Civil War. In 1866 he became pro¬

fessor of zoology and physiology in the Massa¬

chusetts Institute of Technology. He was a member of numerous scientific societies, and in addition to editing 'The Annual of Scientific Discovery > (1886-89), a translation of 'Andry's Diseases of the Heart > (1847), and Smithes 'History of the Human Species,* he wrote 'Sci¬

ence and Mechanism* (1854) ; 'The Wonders of the Yosemite Valley and of California) (1871) ; 'An American in Iceland) (1876) ; 'Volcanoes and Earthquakes1* (1888).

KNEIPP, knlp, Sebestian, German clergy¬

man : b. Stefansried, Bavaria, 17 May 1821 ; d.

Worishofen, Swabia, 17 June 1897. He studied theology at Dillingen and Munich, became a Roman Catholic priest in 1852 and pastor at Worishofen in 1881. He became known for the "Kneipp cure,® which he advocated for years.

This method was based on water, fresh air, sun¬

shine and a scheme of regular activity, and in¬

cluded walking barefoot in dew-moistened grass and on snow. Kneipp wrote 'Meine Was-

serkur* (1887; Eng. trans. 1891); 'Mein Tes¬

tament (1894); 'Vortrage in Worishofen*

(1894-98) ; and other works. His collected works were published at Kempten (1898-99).

Consult Verus, 'Vater Kneipp, sein Leben und Wirken) (Kempten 1897).

KNEISEL, ni'zel or kni'zel, Franz, Ger¬

man- American musician : b. Rumania, 26 J an.

1865. He was a pupil in violin-method of Grim and Hellmesberger, became concert-master of the orchestra at Hofburg Theatre of Vienna, of Bilse's orchestra at Berlin, and later (1885) of the Boston Symphony Orchestra.

He appeared prominently with the Symphony as solo violinist and in 1886 organized under his leadership the Kneisel quartet for cham¬

ber-music, in which he played the first violin part. This quartet, all of whom were also members of the Symphony, withdrew from the latter in 1903 to undertake an extensive tour.

Several European tours were undertaken with success.

He removed to New York where since 1905 he is chief of the violin department of the Institute of Musical Art. He was mem¬

ber of the jury of the violin competition at the Paris Conservatory. He received the degree of Mus.D. from Yale in 1911 and from Prince¬

ton in 1915. He has compiled 'The Kneisel Collection for Violin and Piano) (3 vols., 1900) and composed 'Advanced Studies for the Violin) (1910) and a concert etude.

KNELLER, nel'er, Sir Godfrey, originally Gottfriep Kniller, Anglo-German portrait painter: b. Lubeck, 8 Aug. 1646; d. Twicken¬

ham, England, 7 Nov. 1723. He studied under Bol and Rembrandt at Amsterdam. He visited Italy in 1672, where he studied under Maratti and Bernin and painted several historical pieces and portraits, both at Rome and Venice. On his return he visited England, in 1674, and was in¬

troduced to Charles II, by wThom he was much patronized and thereby enabled to quickly out¬

strip Lely (q.v.) in popularity. He was equally favored by James II, William III and Queen Mary, for the latter of whom he painted the "beauties® at Hampton Court, and several of the portraits in the Gallery of Admirals. He also painted the portraits of the Tsar Peter the Great, Louis XIV and Charles VI of Spain for the same sovereign, who in 1692 knighted him and made him gentleman of the privy chamber.

Queen Anne continued him in the same office, and George I, in 1715, made him a baronet.

There was hardly a person of note, at least resi¬

dent in or visiting England, of whom he did not paint a portrait. Among his works should be mentioned also a series of 43 portraits of his co-members in the famous Kit-Cat-Club. He continued to

practise his art to an advanced age. Naturally his earnings were very large.

Although he lost a good deal of money in the South Sea Bubble and lived in great style, both in London and on his estate, Kneller Hall near Twickenham — now an army college for mili¬

tary musicians — he left a large fortune. He left money and instructions for a splendid mon¬

ument to himself in Westminster Abbey, erected by Rysbrack in 1729, which bears an epitaph by Pope. His coloring is true and har¬

monious and his drawing correct, but he dis-

plays a great want of imagination in his pic¬

tures, the attitudes, action and drapery being insipid, unvarying and ungraceful. Many of the portraits bearing his name were only partly painted by himself, the less important portions being done by assistants. His fame has de¬

clined considerably as time passed, a natural enough fact considering the great superiority possessed by later English portrait painters, such as Reynolds, Gainsborough, etc. His work can be studied to greatest advantage at Hampton Court and in the National Portrait Gallery, London. Comparatively few of his paintings are owned outside England, though there are specimens in the galleries at Ant¬

werp, Brunswick, Munich and Vienna. Con¬

sult Ackermann, W. A., (Der Portrat-Maler Sir G. Kneller im Verhaltuiss zur Kunstboldung Seiner ZeiC (Liibeck 1845) ; Anon., (Lely and Kneller } (in Munsey's Magazine, Vol. XVII, p. 542, New York 1897) ; Baker, C. H. C, (Lely and the Stuart Portrait Painters) (2 vols., Lon¬

don 1912) ; Buckeridge, B., (Life of Sir G.

KnelleH (in Piles, R. de, (The Art of Paint¬

ing, > 3d ed., London 1750).

KNESEBECK, kna'ze-bek, Karl Friedrich

von dem, Prussian general field marshal: b.

Karwe, near Neuruppin, 5 May 1768; d. 12

Jan. 1848. He entered the army (1782) and gained distinction in the campaigns of 1792-94

and was made captain (1799), major (1802), being on the general staff at Auerstadt (1806), when he saved the king from being taken pris¬

oner. He drew up the plan of battle at Pul-

tusk (1806) in the Russian campaign but re¬

tired, at the Treaty of Peace of Tilsit, to his estate. He was sent (1809) on a diplomatic mission to Austria during the Franco-Austrian War and went on a mission to Russia in the winter of 1811-12, advising peace. He was made general-adjutant to the king in 1813 and carried on the negotiations with Austria for a coalition, failing which he took a prominent part in the plan of action, hindering the bold schemes of Bliicher and Gneissenau. He was a prominent figure in the continuation of the campaign (1813-14) and in the plan of action.

In 1847 he was appointed commander-general of the army of observation against Poland, and, on his retirement, was created field-mar¬

shal. His memoirs are said to be unreliable.

He wrote also (Lob des Kriegs) (1805), a poem which had great popularity. Consult Dunker, (Die Mission des Obersten von dem Knesebeck) (in Abhandlungen zur preussischen Geschichte, Leipzig 1876) ; Lehmann, M., 'Knesebeck und SchoiL (ib. 1875).

KNIAZHNIN, knyazh-nen, Jakov Boriso¬

vich, Russian litterateur and dramatic author: b. Pskov, 3 Oct. 1743; d. 14 Jan. 1791. He was educated in the University of Saint Petersburg, entered the army, where, however, he stayed only a short time, and for a number of years was connected with the civil service. In 1783 he became a member of the Russian Academy at Saint Petersburg. Of his tragedies the major¬

ity are but imitations of French plays, contain¬

ing with the exception of one or two nothing original. His comedies are replete with bright passages and full of spirit. The tragedies most worthy of mention are (Didon) (1769) ; (Vladi¬

mir i Iaropolh) (1779) ; (Vladisan) (1786); (Roslav) (1784); (Vadim NovgorodskiP

(1789). The two last were patriotic plays, some of the passages of the

Of his comedies the most noteworthy are (Khvastum) ; (Chudakhi}; and the light -opera (Neschastie ot KaretyP A complete edition of his works, in four volumes, was published in 1787, several subsequent editions being pub¬

lished in two volumes in 1847-48.

KNICKERBOCKER, nik'er-bok-er, the

cognomen of an old Dutch burgher family of colonists in New York. The word has been used colloquially for many years as expressive generically of the old elite resident families of New York City, but more properly restricted to the persons descended from the old Dutch settlers of Manhattan Island. Washington Irving, in his (History of New York) (1809) names the author as (

KNICKERBOCKER, Herman, American

lawyer and legislator: b. Albany, N. Y., 27 July

1782; d. Williamsburg, N. Y., 30 Jan. 1855. He studied law at Albany, N. Y., was admitted to the bar in 1803 and entered practice in Albany.

In 1809-11 he was a Federalist representative from New York in the 11th Congress, in 1816

was elected to the New York State Assembly from Rensselaer County, and for some time also held the office of county judge. He be¬

came a Democrat during Jackson's administra¬

tion. Through his hospitality he was known as (

KNICKERBOCKER HISTORY OF

NEW YORK, The. Knickerbocker's (History of New York from the Beginning of the World to the End of the Dutch Dynasty,*

planned and partly written by Peter and Wash¬

ington Irving together, was later replanned by the younger brother, entirely executed by him and published in 1809 under the whimsical pre¬

tense of being by an eccentric Dutch antiquary, Diedrich Knickerbocker. It was originajly meant to be a mere skit by which two gay young men might poke fun at their fellow-

townsmen, but it grew unconsciously into a full-bodied masterpiece of good-humored satire which established the settlers of an obscure Dutch colony as permanent citizens of the wider world of historical legend. Irving did not derive from facts his conception of the first New Yorkers, nor did he invent it; he merely followed a tradition current - in British satire since the wars with Holland in the 17th cen¬

tury. The idea of writing burlesque history, too, was not novel. Moreover, Book I of the Knickerbocker (History, } with its parodies of pedantic learning, belongs rather with the plan relinquished than with

the mature performance.

But Irving's indebtedness and his halting over¬

ture only slightly modify the credit due him for his comic masterpiece. Hearty affection for New York, tenderness toward any past with a touch of myth in it, natural mellowness of lan¬

guage — these lend substance to a gay and im¬

pudent wit. In the third book, which deals with the unforgettable Wouter Van Twiller and the manners of his reign, Irving is at once brilliant and charming. The books recording the deeds of Peter Stuyvesant are even more spirited, particularlv in the passages of mock-

heroic, which are hardly to be matched else-

where in English. Illustrations for the (His¬

tory > have been made by Allston, Leslie, Jar¬

vis and Darley.

Carl Van Doren.

KNIFE. A cutting tool of steel, german-

silver, silver, gold, bone, horn, wood or other material. According to the purposes f

knife, table-knife, erasing-knife, paper-knife butchers'-knife, etc. Knives can be divided into two broad classifications as having blades that fold into or onto the handle and those that have fixed blades. The essential parts of a knife are its blades and its handle (known as a haft) ; exceptions to the rule are those con¬

sisting solely of a blade, as those used by furriers, cigarmakers, etc. The knife haft generally

consists of wood, bone, ivory, horn, metal, mother-of-pearl, etc. For the technical make-up of knives see under article Cutlery.

History. — In its most primitive form the knife was formed from a piece of flint or other stone. The chipped and polished flint knives of the Stone Age (many are extant) are frequently wonderfully formed and show con¬

summate skill in construction. They have keen, practical cutting edges, the ends usually pointed.

These are found in nearly all parts of the globe.

With the discovery of bronze (Bronze Age), knife blades were among the earliest utensils to be made from this metal. These are found in numbers in the ancient prehistoric ((lacustrian®

villages of Switzerland, some being fastened to handles of the same metal. In the antique classical period knife blades were made of bronze, iron and copper ; the copper being hard¬

ened, probably by hammering. In ancient Rome bronze knives were reserved for religious rites.

The hafts (handles) of this period are found in ivory, bone or bronze and of varying forms, sometimes the blades of these early knives folded into a groove in the handle. Some were carried in a sheath hung from the belt; the Gallo-Romanesque tombs furnish such, the ex¬

terior being of wood and the inside of iron.

The ancient sacrificial knife often figures on carved monuments. While a few of the early Greeks used knives at meals, it was usual to serve the meat and other foods cut up, the guests picking up the viands with their fingers and tearing it up with their teeth. For cutting up fruit they used bone knives ; they also knew the use of hunting knives. In the 1st century b.c. the Chinese used copper knives as coins, known as Dau tsien.

The Franks (Germanic tribes, about 240

a.d.) carried an iron knife suspended from the belt, often enclosed within the same sheath as the dagger. In the Middle Ages steel-bladed knives appear, toward the 14th century.

Sheffield, England, was the centre of a steel industry and Langres, France, was renowned, as well as Moulins, already for their steel knives in 1427. By the 17th century the blades were often decorated with chased and gold inlaid designs. Knife handles of that period are found in ivory, bone, mother-of-pearl, silver, copper, steel, and wood. By the 16th century knife handles often assume the form of fig¬

urines or caryatids. During the Middle Ages one of the luxuries of the seigneurs consisted of having a table service of knives of which the handles varied according to the period of the liturgical year; the ebony handles were re¬

served for the period of Lent, those of ivory for Easter. Knives were employed in battle ; the French termed them, in the 1 5th century, couteaux de breche. Knives figuring among the knights were often highly decorated; that of Louis le Bon (extant) has its handle of hard¬

wood ornamented with bands of silver-gilt and enamels. On the handles were initials, ciphers, the owners' coats-of-arms ; enamel work, inlaid precious stones vie with arabesques and engrav¬

ings in the decoration. The knight's knife was generally in a sheath or scabbard. The knife sheath in Bamberg Castle dates back, probably, to the 10th century and is, perhaps, the oldest extant; it is of ivory w.th metal ornamentation.

The hunting knife of the Middle Ages (the couteau de chasse of the French) was a most elaborate equipment and consisted of a highly decorated sheath containing, besides the heavy-

bladed huntsman's knife for killing the game and

cutting it up, a set of smaller utensils arranged around it in the sheath. These latter were three small knives, a fork and a bodkin.

In the sheath or case for use at table there were three knives: one large one called a trencher knife (couteau a trancher) for cutting into slices or pieces (tranche) of which the very large blade terminated in a crescent-shaped point with which to pick up the pieces and serve on the guests' plates; another large knife with two cutting edges ; a smaller knife that was placed in front of the host. A favorite method of decorating leather sheaths in the 14th and 1 5th centuries was to burn or brand designs on the outside. In the refectories of the convents they used knives whose blades had engraved on one side the Benediction and on the other side ((Dei Gratias® (grace after meals), the musical notes of the chant being cut into the metal. The oyster knife appeared as early as the 16th century. As to folding knives, after being already known to the Romans they prob¬

ably never went out of use entirely; we read in an inventory of 1380 of (

Clement W. Coumbe.

KNIFE MONEY, a bronze currency in the form of knives long in use in China. These money knives were often highly ornamented and each bore on the blade hieroglyphical mark¬

ings which indicated its value in the money market. The handle of the knife money was usually in the form of a disk in the centre of which there was a circular hole by means of which it was strung on a string with other similar money. See Numismatics.

KNIGGE, Adolphus Francis Frederic

Louis, Baron de, German author: b. Brenden-

beck, near Hanover, 16 Oct. 1752; d. Bremen, 6 May 1796. In 1769 he went to the University of Gottingen, where he studied law, later be¬

came assessor at Cassel, in 1777 was made a chamberlain at Weimar, and finally in 1791, KNIGHT

after leading a very unsettled life, became a resident of Bremen. Here he joined the Illu¬

minati and later became implicated in the dis¬

putes relating to that secret order. Of his writings by far the most important is his (Ueber den Umgang mit MenscheiP ((On

Intercourse with Men), which contains much good advice and a collection of upright methods of living so as to get the greatest joy and happiness at the same time being useful. Of his other wTorks those most read were (Der Roman meines Lebens) (1781-87); and 'Die Rei$e nach Braunschweig) (1792), a humor¬

ous romance; and 'Des seligen Etatsrates von Schafskoff hinterlassene Papiere) (1792). Con¬

sult Goedeke, (Adolf Freiherr Knigge^ (1844).

KNIGHT, Austin Melvin, American rear-

admiral : b. Ware, Mass., 16 Dec. 1854. He was graduated at the United States Naval Academy (1873) and commissioned ensign

(1874), promoted to master (1879), lieutenant, junior grade (1883), and made lieutenant in 1885, becoming lieutenant-commander in 1889

and commander in 1907. He became captain in 1907 and rear-admiral in 1911. He served on the Tuscarora on the Pacific station (1873—74) ; on the Kearsarge on the Asiatic station (1874-75). In 1876 he was appointed to the Naval Academy, later serving on the Quinne -

bang on the European station (1878-79) ; on the Galena on the European and Atlantic sta¬

tions (1880–83). He was stationed at the Minneapolis ordnance proving ground (1883—85) and had charge of same from 1885–89.

He served on the flagship Chicago on the North Atlantic, European and South Atlantic stations (1889–92), and was at the Naval Acad¬

emy from 1892–95. From 1895–97 he served on the Lancaster and Castine on the South Atlantic station, and on the Puritan on the North At¬

lantic station from 1897–98.. In the Spanish–

American War he assisted in the blockade :>f the north coast of Cuba, and in the Porto Rican expedition. He was stationed (1898–

1901) at the Naval Academy and at the War College (1901). He commanded the Yankton on the survey of Cuba's south coast (1901–03), and on the Castine on the North Atlantic squadron (1903–04), and presided over a special board on naval ordnance and on a smokeless powder board (1904–07). He commanded on the Washington from 1907 to 1909, later was commander at Narragansett Bay, R. I., station, and commandant of same and president of Naval War College from 1913–1917 ; and in 1917

he was appointed commander of the Asiatic fleet with rank of admiral. He retired in 1918.

KNIGHT, Charles, English editor and pub¬

lisher : b. Windsor, 15 March 1791 ; d. Addle–

stone, Surrey, 9 May 1873. He succeeded his father as a bookseller in Windsor, and for several years edited a Windsor newspaper.

Having removed to London in 1823, he estab¬

lished Knighfs Quarterly Magazine, in 1827

undertook the superintendence of the publica¬

tions of the Society for the Diffusion of Use¬

ful Knowledge, for which he superintended and published the 'Library of Entertaining Knowl-

edge) ; the Penny Magazine and the 'Penny Cyclopaedia,* afterward remodeled as. the Eng¬

lish Cyclopaedia,* etc. Other publications of his were the 'Pictorial Bible.* the 'Pictorial Prayer-book,* (Pictorial Shakespeare) and VOL. 16 — 31

many others. The Shakespeare (8 vols., Lon¬

don 1839-43) was edited by Knight himself, and has, both for its text and notes, taken a high place among editions of the great dram¬

atist. It went through many editions, and was published in the United States as 'The Strat¬

ford Shakespere) (5 vols., New York 1881).

The most important of his own writings, the 'Popular History of England,* appeared 1854—61 (1st American edition, 4 vols., New York 1881). His autobiography, (Passages of a Working Life During Half a Century) (3

vols.), was issue in 1864-65. It would be very difficult to giye a complete list of all books in the publication of which he had a part, either as author or editor, because it is frequently impossible to determine just how large his share was in either of these capacities, instead of only in that of publisher. However, the following books, to which must be added a num¬

ber of articles and pamphlets, are, beyond all doubt, results of either his authorship or edi¬

torial care: 'The Menageries) (1828); (The Elephant* (1830) ; 'The Results of Machinery0

(1831) ; (Capital and Labour) (1831) ; (Trades Unions and Strikes) (1834); ' William Shakes-

peare) (1843) ; (William CaxtoiP (1844) ; ,'Old England, etc.* (2 vols., 1845) ; (Studies of Shakespeare* (1849) ; 'The Struggles of a Book against Excessive Taxation > (1850); 'The Old Printer and the Modern Press) (1854) ; (Once Upon a Time) (1854) ; knowl¬

edge is Power) (1855) ; 'Begged at Court) (1866); 'Shadows of the Old Booksellers) (1867). Consult Clowes, A. A., knight, a Sketch* (London 1892).

KNIGHT, Daniel Ridgeway, American

painter : b. Philadelphia, Pa., 1850. He has been a pupil of Gleyre and a student at the Lcole des Beaux Arts at Paris (1872), and.

four years later was in the studio of Meissonier, from whom he learned many of the secrets of brilliant technique. He has received honors from Paris, Munich and Antwerp for his ex¬

hibited works, and has also been awarded medals at Chicago 1893 and at Philadelphia Academy of Fine Arts 1893. He is a painter, rather French than American, and he has ideal¬

ized the French peasantry in more than one of his refined and delicately designed pictures, among which we may mention as especially characteristic of his charming qualities (The Veteran* (1870); (The Old Beau* (1873); (Washerwoman) (1875) ; (Harvest Scene)

(1877) ; (Sans Dot) (1883);

(Brooklyn Institute Museum). Knight was made an officer of the Legion of Honor in 1909 and has received also the Cross of Saint Michael of Bavaria.

KNIGHT, Edward Frederick, English

journalist and author: b. 23 April 1852. He was graduated at Cambridge and in 1891 be¬

came a member of the staff of the London Times as a

correspondent, being with the armies in the Sudan campaign of 1896, and in Greece in 1897, and in the Cuban and South African wars. He is an expert yachtsman, and has made voyages on small sailing yachts to South America, the West Indies and the Baltic. He has written ^Albania and Montenegro) ; (The Cruise of the Falcon) ; (The Threatening Eye) ;

(Sailing) ; the Falcon on the Baltic ; (The Cruise of the Alerte* ; (Save Me from My Friends* ; (Where Three Empires Meet* ; (Madagascar in War Time* ; (Rhodesia of To¬*

day ; cWith the Royal Tour* ; the Awaken¬*

ing of Turkey, etc.*

KNIGHT, Edward Henry, American me¬

chanical expert: b. London, England, 1 June 1824; d. Belief ontaine, Ohio, 22 Jan. 1883.

After studying both surgery and steel engrav¬

ing he came to this country in 1845 and settling in Cincinnati was a patent attorney for several years. In 1863 he entered the civil service in Washington, D. C., where he prepared the an¬

nual reports of the Patent Office and estab¬

lished and edited the Official Gazelle of the United States Patent Office in 1871. He served on the international juries of world's fairs at Philadelphia (1876), Paris (1878), Atlanta (1881), and was made a chevalier of the Legion of Honor in 1878. He published the Ameri¬

can Mechanical Dictionary (1872-76) ; the New Mechanical Dictionary* (1876-80) ; (A Study of the Savage Weapons at the Centennial Exhibition* (in Smithsonian Institution, An¬*

nual Reports, 1879, p. 213, Washington 1880).

KNIGHT, Ellis Cornelia, English author¬

ess : b. 1757 ; d. Paris, 17 Dec. 1837. She went to Italy with her mother on the death of her father, Rear-Admiral Sir Joseph Knight

(1775). She lived under the protection of Lady Hamilton and Admiral Nelson after her mother's death (1799) and returned with them to England. She was appointed companion to Queen Charlotte (1805) and to a similar position, later, in the household of Charlotte Augusta, Princess of Wales (1813). Her auto¬

biography is a most valuable source of in¬

formation for the court history of those days.

The most important statements in the work were edited and published (1861) after her death. She wrote also (Dinarbas* (1790) ; fFlaminnis,* a romance of old Roman life (1792) ; (Sir Guy de Lusignan* (1833), another romance. Her principal work was A Descrip¬

tion of Latium, or La Campagna di Roma*

(1805), with etchings by the author. She trans¬

lated a number of German hymns and prayers which were printed privately (1822) and pub¬

lished in 1832.

KNIGHT, John James, Australian journal¬

ist and historian: b. Hanley, England, 7 June 1863. He has worked as a journalist in Aus¬

tralia and England. He arrived in Australia at the age of 11, and in 1884 he joined the staff of the Brisbane Courier. Five years later he went over to the Observer as sub-editor and was made editor the following year. In 1906

he became editor-in-chief of the Courier.

Knight is one of the best writers on Australian history, and especially on that of Queensland.

Among his published works are (Brisbane, Past and Present* ; Australian Pioneers,* and (The Story of South Africa* (collaboration).

KNIGHT, Richard Payne, English numis¬

matist and archaeologist: b. Wormsley Grange, near Ludlow, Herefordshire, 1750; d. London, 23 April 1824. Having been bequeathed a for¬

tune, he traveled extensively, and wherever he went, especially in Italy, where he was in 1767, 1777 and 1785, he made a specialty of col¬

lecting ancient coins, bronzes, gems, drawings and other antiques. From 1780 to 1806 he was a member of Parliament, and for 10 years, 1814—24, served as one of the trustees of the British Museum, to which, upon his death, he left his magnificent archaeological collection, especially rich in bronzes and Greek coins. The trustees in 1830 published his manuscript cata¬

logue of his coin collection. His works, which were numerous, included (An Account of the Remains of the Worship of Priapus lately ex¬

isting at Isernia in the Kingdom of Naples*

(1786) ; Analytical Essay on the Greek Alpha¬

bet* (1791); An Inquiry into the Symbolic Language of Ancient Art and Mythology*

(London 1818) ; Analytical Inquiry into the Principles of Taste* (1805), etc. He alsp pub¬

lished several volumes of poems and an edition of Homer (1808). Consult Edwards, E., (Lives of the Founders of the British Museum, etc.*

(Vol. I, London 1870).

KNIGHT, Sarah Kemble* American

author: b. Boston, 19 April 1666; d. near New.

London, Conn., 25 Sept. 1727. In 1706-13 she conducted at Boston a school in which Samuel Mather and Benjamin Franklin were at one time pupils. By New England custom she was styled <(Madam** Knight as a token of respect.

Her (Journal Kept on a Journey from Boston to New York in the Year 1704* (New York 1825) is a diary record evidently compiled from daily notes made on the way. It is valuable for its account of customs and manners and its descriptions of the settlements, being at the same time interesting for its original orthogra¬

phy and interspersed rhymes. A reprint with additional notes was published by F. H. Little (Albany 1865). Consult Caulkins, F. M., his¬

tory of New London, 1612-1860* (New Lon¬

don 1895) ; id., (History of Norwich, Conn.*

(Hartford 1866) ; Deane, W. R., < Journal of Madam Knight* (in Living Age, Vol. LVII, Boston 1858) ; Tyler, M. C., (History of Amer¬

ican Literature* (Vol. II, New York 1879).

KNIGHT, Thomas Andrew, English hor¬

ticulturist : b. Wormsley Grange, near Ludlow, Herefordshire, 10 Oct. 1758; d. London, 11 May 1838. He was a younger brother of Richard Payne Knight (q.v.). After graduating fj*om Baliol College, Oxford, he took up the study of horticulture. He first brought himself be¬

fore the public in 1795 by the publication of the results of his researches into the propagation of fruit-trees and the diseases prevalent among them.

He raised new varieties of many fruits and vegetables, many of which bear his name.

He was one of the original members of the Horticultural Society, founded in 1804, and from 1811 until his death its president. He was also a fellow of the Royal Society (1805), recipient of its Copley medal (1806), and a fellow of the Linnaean Society (1807). Beside the papers, 46 in number, which he contributed to the transactions* of the Royal Society, and the papers, more than 100 in number, which he contributed to the transactions* of the Horti¬

cultural Society, he wrote A treatise on the Culture of the Apple and Pear, and on the Manufacture of Cider and Perry* (1797) ; (Pomona Herefordiensis, or Natural History of the Old Cider and Perry Fruits of the County of Hereford* (1811). A Selection from the Physiological and Horticultural KNIGHT

Papcrs) of the late T. A. Knight was published in 1841 (G. Bentham and J. Lindley, editors), together with a biographical sketch of his life.

Consult Royal Society of London, Proceedings, Vol. IV, p. 92, London 1838.

KNIGHT, William Angus, Scottish phi¬

losopher and author: b. Mordington, Scotland, 22 Feb. 1836; d. 4 March 1916. He was edu¬

cated at the University of Edinburgh, and from 1876–1902 was professor of moral philosophy at the University of Saint Andrews. He was widely known as a student of Wordsworth, whose works he edited in 12 volumes (1896–

97). Among his own writings may be cited (Studies in Philosophy and Literature) (1879) ; (Essays in Philosophy, Old and New) (1890) ; (The English Lake District as Interpreted in the Poems of Wordsworth) (1878–91);

(Through the Wordsworth Country } (1892) ; (Memorials of Thomas Davidson > (1907) ; (The Glamour of Oxford> (1911) ; (Pro Patria et Rege) (war poems, 1915).

KNIGHT. The word is said to be derived from the Anglo-Saxon Cniht, a servant, one who serves. Hence in feudal times it was used for certain persons doing service to a superior lord or the king, the same as duke expressed leadership. As to our knowledge of the origin of the knightly status we must go back as far as the foundation of Rome. Among the early Romans the mounted warriors (equites) held a certain special position socially. Its origin has been placed with Romulus who is said (about 750 b.c.) to have made of the three patrician tribes — Ramnes (Latins), Taties (Sabines) and Luceres (Etruscans) — three centurion (300) of riders in war service. Under the kings this number was raised to six, later, by additions of plebeians raising the rank to 18 and forming the basis of a special order (ordo equester) adapted for cavalry. As the service entailed no extra expense the standing of this body of armed riders was raised above that of citizenship. By law of Roscius (267

b.c.) the condition was imposed of owning a fortune 4,000,000 sesterces. The external badge on the campaign uniform of this body of cavalry was a narrow stripe on the tunic, also the distinction of wearing a gold ring and having special seats in the theatre and circus, besides other political and social features. Un¬

der the Caesars this order of riders (equester) was drawn on for imperial officials, to carry on the financial rule of the provinces, etc.

During the Saxon heptarchy, in England, the order of knighthood was conferred by a priest at the altar, Athelstan (900 a.d.) being the first king to create a knight. The receiving of arms at the arrival of the age of manhood was from the days of the Germanic hordes accompanied by a solemn ceremonial, and the candidate to wear arms had to prove fitness in

capacity. By the 11th century the ceremony of the investiture of arms had become general.

Under the feudal laws some tenants and the owners of lands free from rent or service (allodial) had to be ready on call to serve their lord or king on horseback and wearing a coat of mail. (See Chain Armor). They were called Caballarii, from whence the French term chevalier is derived. And we now read of a "knight's fee* in England, or the feudum lori-

cce, fief de haubert (coat of mail) being «a certain value of land* ; these vassals, we are told, were "serving as knights, mounted and equipped.*

The origin of the knight of chivalry is one involved in the history of morals of the Euro¬

pean nations — the institution of chivalry.

The knighthood of chivalry is an independent and voluntary service. The obligation of the landowner to service of knight in arms did not extend to the rest of the family except the heir. The younger sons ambitious of gaining glory and dignity as knights had to submit their military service to some wealthy lord in the hope of gaining an income by their prowess as well as that social distinction which was theirs by birth, and from this field of achieved per¬

sonal ambition arose a social advance in which the voluntary seeker of fame in arms raised himself a step higher in the social scale than the knight by legal right regardless of merit or valor in the field. These were the first knights of chivalry. The Crusades increased the num¬

ber and ranks of these hired knights and at the same time altered and advanced the status of chivalry itself. While the ritual of invest¬

ing the hired officer with knighthood included such mandates as oaths of fidelity and honor, as well as gallantry and protection to women over and beyond the former claim to discipline demanded of the

common soldier (milites), this act of crusading for the capture of Jeru¬

salem and the Holy Land introduced a reli¬

gious feature that did not before enter into the realm of knighthood's services. And we read of the applicant for knighthood first confess¬

ing his sins before the priest, spending nights in prayer and passing through pious rites be¬

fore receiving his titular rank. And the order was conferred on him by a priest instead of being "dubbed* by a knight. Chivalry had be¬

come a religious institution and the crusading knight of the 12th centurv was the militant bearer of the Cross and protector of his Church. Gallantry and protection of the fair sex became a living force among the knights and at tournaments the ladies took a prominent and distinguished part. And we now arrive at the time when the following were the quali¬

fications of a deserving knight : Great respect for the female and three other virtues were enjoined on knighthood, namely, loyalty, cour¬

tesy and munificence.

The first of these three virtues included, as paramount, fidelity to engagements, and these engagements were the feudal obligation to supe¬

riors and keeping of every promise, besides fidelity to one's lady love. Any breach of en¬

gagement was looked upon and condemned with such epithets as : "False, perjured, disloyal, recreant.* It forbade the savage instinct to treachery. The knight who perpetrated an of¬

fense against this virtue was considered unfit to bear the title of knight. The virtue of courtesy was the display of ((modestv, self-

denial and respect for others,* and included chivalric treatment of prisoners. Under the term munificence was intended the behest of liberality and hospitality to the visitor, freedom in the use of coin to recompense the traveling minstrel, largesse to the poor, and financial aid to relatives in need. Besides the qualification of valor in the knight a fixed purpose of en¬

forcing justice and redress of wrongs was 484

strongly inculcated. In return for his vows of renunciation of vices the knight received numerous privileges. These were the right to wear distinctive and resplendent armor-crested helm, heavy armor displaying his heraldic bear¬

ings, spurs of gold, etc. His horse was gay in its bards (see Bards) and gaudy "housings.®

In his castle or palace he was permitted the dignity of wearing scarlet robes. Certain civil offices were filled by members of the order.

He had the power (to be used not lightly) of conferring knighthood on others (if gentle-

men). There were class distinctions of knighthood such as knights bannerets and bachelors. The former belonged to those hay¬

ing large estates and able to summon a certain number of lances for battle. A squire carried his master's sign of distinction in the form of a banner on the end of a lance. The knight bachelor was permitted only a pointed pennant.

But the above high moral plane of action in the knight's life code, though acting as an in¬

centive to good work and restraint from evil, did not prevent abuse of power from entering the valorous rank. The very elevation of rank entailed a sense of degradation of those be¬

neath. It was but human that this breach ex¬

tended and cases increased in which the popu¬

lace received disdainful treatment while some members became more and more haughty.

Such irregularities or abuses tended to bring the Orders into disfavor. The rapacity of the Knights Templars impaired the fair name of chivalry and brought with it retribution.

But the cause of the decline and fall of the institution of chivalry's knighthood is placed by some authorities as brought about by the French kings Charles VI and Charles VII be¬

stowing the order of knighthood profusely, and the act of Francis I conferring knight¬

hood on lawyers and other classes of civilians.

The efficiency of gunpowder in rendering armor useless, however, is generally accepted as the chief cause of the extinction of the order of knighthood. (See Chivalry). And the loth and 1 7th centuries saw the displace¬

ment of knights by gentlemen and cavaliers.

By the 16th century we find the honor of knighthood conferred by the sovereign as a civil more than military honor, as reward for services to state or ruler. And with more peaceful times have arisen numerous orders or fraternities in the social and commercial world utilizing the title, such as the Knights of Columbus, Knights of Labor, etc.

The term knight is applied to a certain piece in the game of chess which is identified by a horse's head; the term has been vulgarly applied in commerce to the traveling sales¬

man as "knight of the grip.®

Bibliography. — Gautier, Leon Emile Theo¬

dore, (New York 1835);, Weber, Karl Ju¬

lius, (Das Ritterwesen und die Templer, Johan-

niter und MarianeD (Stuttgart 1835).

Clement W. Coumbe.

KNIGHTS OF COLUMBUS. The

Knights of Columbus is a fraternal, beneficiary society organized under a special charter granted by the State of Connecticut, 29 March 1882. It is open only to male Catholics, whose pastors testify that they practice their religion, and receives insurance members from age 18 to 50; associate or non-insured members are re¬

ceived from age 21 and upward. Its system of insurance is based upon the Fraternal-American Table of Mortality and was prepared by David Parks Fackler, ex-president and one of the founders of the Actuarial Society of America.

The insurance is based on a combination step rate — level rate plan, with very moderate advances every five years from entry, to age 55, thereafter on a 15-year level rate with fully paid-up at age 70, with optional selection from age 55 of either Level Whole Life Plan with full insurance in force, or Economic Plan with reducing insurance after age 60; with paid-up and extended insurance and credits allowable toward payment of assessments after payment for specified time on level rates, all based on competent actuarial computation of the highest order. The Order has in force 1 April 1918

insurance certificates of $132,344,151.33. Its reserve fund amounts to $8,532,967.89. Ratio of assets to liabilities (calculation made as of 31 Dec. 1917) 132.35 per cent. Mortality rate for the year 1917, 7.7 members per thousand.

Insurance certificates issued for one, two and three thousand dollars. The order has now been established in every State and territory of Continental United

States, every province of the Dominion of Canada, in Newfoundland, Alaska, the Philippines, Cuba, Porto Rico, Mexico, the Canal Zone and Panama.

In addition to the insurance features it is devoted to the promotion and protection of Catholic interests and the interest of Catholic men and women. Has the commendation of the entire Catholic Hierarchy, and special commendation from several popes. Endowed at $50,000 a chair of American History at the Catholic University of America. Later en¬

dowed at $500,000 fifty perpetual free scholar¬

ships at same institution. Aims to propagate Catholic doctrine from platform and by liter¬

ature ; publishes monthly a 24-page magazine known as The Columbiad; has issued special editions of (The Popes and Science) and (The Thirteenth, Greatest of Centuries) by Dr.

James J. Walsh; has published a special edi¬

tion of (The Catholic Encyclopedia ; took large part in relief work in San Francisco earthquake, Kansas flood, Chelsea fire, Ohio flood and Halifax disaster, and also rendered large and efficient service in the Great World War both in America and abroad.*

Has no oath, only obligation of secrecy.

Four degrees of ceremonial teaching charity, unity, fraternity and patriotism. Has con¬

ducted propaganda by lecturers throughout the United States and Canada against Socialism for three years. Organized a Commission on Reli¬

gious Prejudices to combat the spirit of bigotry through platform and publications, by setting forth, in answer, the Catholic position and endeavoring to promote a spirit of fraternity among citizens of all races and creeds. Sub¬

ordinate body known as council ; governing body, supreme council. Chief officers known as supreme. Representative form of government.

Laws forbid activity in politics and excludes from membership those in liquor business. No affiliation with any other society.

KNIGHTS OF THE CROSS, The. The

title of one of the novels of Henryk Sienkie-

vvicz. It covers the period of the struggle of Poland with the German military Order of the Teutonic Knights, culminating in the great vic¬

tory over the Knights at Tanneberg. Some of the atrocities described are re-echoed in like cruelties of the Great European War. The hero of the story is a young giant Polish coun¬

try lad, who became a great soldier. The story of his father-in-law Yurand is pathetic and strongly appeals to the emotions. The battle of Tanneberg is wonderfully depicted. The novel was translated by the late Jeremiah Cur¬

tin (2 vols., 1900).

KNIGHTS OF THE GOLDEN

CIRCLE, a secret organization in the Uni¬

ted States, established a few years before the Civil War, and formed with the object of de¬

stroying the republic and setting up a great Southern empire with negro slavery as its cor¬

nerstone, and also with the purpose of con¬

trolling the great commercial interests of cot¬

ton, sugar and tobacco. With its centre at Havana, Cuba, the ((Golden Circle® intended to embrace in the territory of the new govern¬

ment a radius of 1,200 miles, and to include parts of Central America. The organization was never fully consummated, although thou¬

sands of persons joined in the movement and many lodges or councils were instituted. The society was strongest in Ohio, Indiana and Illinois. In 1863 the order was disbanded and was succeeded by the order of American Knights, which in turn was replaced by the Sons of Liberty. Its most ambitious project was one for an uprising in Ohio, Indiana, Illi¬

nois and Missouri, which should free all Con¬

federate prisoners in those States and set up a Northwestern Confederacy. Three of the

leaders were condemned to death by a military commission but were released after 18 months'

imprisonment, the Supreme Court holding that the commission had no jurisdiction. Consult (An Authentic Exposition of the Knights of the Golden Circle) (Indianapolis 1861) ; Holt, <(Report on Secret Orders® (in McPherson's (History of the Rebellion, } Washington 1876) ; Rhodes, J. F., (History of the United States) (New York 1904) ; and Foulke, (Life of Oliver P. MortoiP (2 vols., ib. 1898).

KNIGHTS OF THE GOLDEN EAGLE.

Founded in the city of Baltimore, Md., 6 Feb.

1873. Is now located in 22 States. Has a su¬

preme or governing body, 14 Grand or State bodies and more than one thousand subordinate bodies, called castles, with a membership of more than 60,000. A female branch, composed of ladies, relatives of members, with six grand temples and several hundred subordinate bodies with more than

20,000 members. Its motto is

ciples of benevolence by associating its mem¬

bers in different locations for purposes of mutual relief against the trials and vicissitudes attending sickness, distress and death, by. sym¬

pathy and pecuniary assistance. To assist in business, elevate its membership and aid in advance to higher life. A person qualified to be a beneficial member must be white, of the age of 18 years, of sound body and good moral character, a believer in the Supreme Being and of the Christian Faith, and competent to pur¬

sue some useful and lawful occupation, and not engaged directly or indirectly in the manu¬

facture or sale of spirituous or malt liquors.

It has a feature paying $250 at the death of a member ; pays weekly sick benefits and a ben-

fit for a deceased wife. Has a military branch composed of members formed into command-

eries, with neat and attractive uniform. Is semi-military in its ritualistic work. Its teach¬

ings are founded upon the history of the Cru¬

sades. Members are known as Sir Knights.

Ladies are called Companions. It has a Home and-Orphanage, where aged couples are not separated. It maintains a periodical published monthly and seeks to ennoble and refine. The American flag is used in its meetings.

KNIGHTS OF HONOR, a fraternal

benevolent society founded in the United States in 1873. The social, moral and intellec¬

tual advancement of its members are among the society's principal objects, as also the pay¬

ment of death benefits to the widows and or¬

phans of deceased members. The headquarters of the society are at Saint Louis, Mo. Its membership is estimated at about 20,000 ; bene¬

fits disbursed since organization, $100,000,000.

It has a supreme dictator, over 30 grand lodges and about 1,150 subordinate lodges.

KNIGHTS HOSPITALLERS. See Or¬

ders, Religious.

KNIGHTS OF LABOR, an American

labor organization which originated among the garment-cutters of Philadelphia in 1869. It was founded by 10 members of the trade under the leadership of Uriah Stevens, as a secret society, with a rather elaborate ritual. It grew slowly at first ; though workingmen of all trades were admitted, it was not until 1872 that the second local assembly was formed, but in that year 27 locals were organized, all in Phila¬

delphia; the first local organized outside that city was that of the gold-beaters of New York.

In its first organization politicians, physicians, lawyers and liquor-dealers were excluded from membership; the two latter classes are still ex¬

cluded. The first general assembly was held at Reading, Pa., in 1878, where seven States were represented. At this meeting a declaration of principles was adopted which remains substan¬

tially the same ; the purpose was declared to be the <(organizing, educating, and directing of the power of the industrial masses,® in order to ((make industrial and moral worth, and not wealth, the true standard of national and indi¬

vidual greatness,® and to ((secure to the work¬

ers the full enjoyment of the wealth they cre¬

ate.® To secure these aims, the organization demanded certain legislative remedies, includ¬

ing the referendum, the establishment of a bureau of labor staitstics, abrogation of. class laws, prohibition of the employment of children under the age of 15, abolition of the contract system on public works, and of the convict-

labor system, and reforms in the financial and land laws; and in the industrial field it pro¬

posed to <(establish co-operative institutions which will tend to supersede the wage-system,®

to secure both sexes equal rights, and gradually to reduce the hours of labor to eight per day.

In 1881 all secrecy was abolished, and in 1882

a revised constitution adopted, in accordance with which the organization consists of local assemblies, of not. less than 10 members, of whom three-fourths must be wage-earners or farmers; district assemblies, formed by not less than five locals,' and' the general assembly, which meets annually for the election of officers and the transaction of business. The executive officers are a general master workman, general worthy foreman, general secretary-treasurer, and general executive board. The constitution provides also for the support of strikes ap¬

proved by the executive board after all attempts at conciliation have failed. The organization grew rapidly after this time, till in 1886 dele¬

gates at the general assembly represented over 300,000; at that time, however, dissensions be¬

gan which resulted in a split and the formation of the American Federation of Labor (q.v.).

Though the organization remained powerful for several years, its numbers began to de¬

crease, and at present it has less than 100,000

members, and its influence has gradually de¬

clined. In 1890 The Journal of United Labor was established; later the name was changed to Journal of the Knights of I^abor, and it is the official journal of the organization.

The Knights differ radically from the trades unions in the basis of their organization ; their ideal is to organize labor without distinction of trade, and to harmonize individual and trade interests with the interest of the whole ; though locals may be organized on trade lines, no autonomy of trades is allowed. This and the fact that the general executive board tried to exercise a too centralized authority were among the chief causes of dissatisfaction. Strikes were at one time condemned by the general assembly (1880), but later the organization took part in a number of strikes and also made use of the boycott; violence has been at all times con¬

demned. (See American Federation of Labor; Labor Organizations). Consult McNeill,

(The Labor Movement; the Problem of To-

day> ; Powderly, (Thirty Years of Labor-* ; Wright, (Historical Sketch of the Knights of Labor > (in Quarterly Journal of Economics, Vol. I, p. 137, Boston 1887) ; Ely, R. T., (Labor Movement in America1* (New York 1886) ; Kirk, William, (Knights of Labor and the American Federation of Labor > (ib. 1906).

KNIGHTS AND LADIES OF HONOR,

a fraternal beneficiary society founded in the

United States in 1877. It was merged and con¬

solidated with the North American Union of Chicago 24 Aug. 1916. Men and women were admitted on equal terms. The central author¬

ity was the supreme lodge, and the chief officer was styled the supreme protector. It reported a membership of about 70,000; benefits dis¬

bursed since organization, $34,470,000.

KNIGHTS OF THE MACCABEES OF

THE WORLD. See Maccabees, The.

KNIGHTS OF MALTA, Ancient and

Illustrious Order of. See John, Saint, Order of.

KNIGHTS OF THE MODERN MAC¬

CABEES. See Maccabees, The.

KNIGHTS OF PYTHIAS, a brotherhood

organized to disseminate the principles of friendship, charity and benevolence. The order was founded at Washington, D. C, 19 Feb. 1864, by Justus Henry Rathbone and four associates.

An official declaration affirms that ((toleration in religion, obedience to law, and loyalty to gov¬

ernment are its three cardinal tenets. The theme upon which the entire fabric of the so¬

ciety rests is the story of Damon and Pythias, — friendship even unto death being a paramount doctrine. The order at present is confined, in its jurisdiction, to the continent of North America; efforts earlier in its history to include the world as its field of action having proved futile. The name chosen, Knights of Pythias, rather than the more historically accurate des¬

ignation of "Knights of Damon, ® was probably due to

dramatic license, the reasons for which, like that of poetry, are obscure.

On 15 Feb. 1864, in Washington, D. C, five clerks of the government met to organize the new order. (< Washington Lodge, No. 1, was organized in Temperance Hall, 19 Feb. 1864,®

so run the minutes. The number of members is not stated; but, at the close of the year, these had increased to 52. The "founder® was elected worthy chancellor, with associate of¬

ficers : Vice chancellor, venerable patriarch, worthy scribe, assistant scribe, banker, assistant banker, worthy guide, inside steward, and four choral knights. Evidently the resolution, adop¬

ted on the 15th, had not yet gone into effect.

The grand lodge of the District of Columbia was formed 8 April 1864, with J. T. K. Plant as grand chancellor. The other grand officers followed the titles adopted by the subordinate lodge. Franklin Lodge No. 2 was organized at Washington Navy Yard 12 April 1864, and others followed in rapid succession. Then the order waned, until, 1 Aug. 1865, Franklin No. 2 was the only lodge in existence; and it was an acting grand, as well as a subordinate lodge. When the year 1865 closed, the mem¬

bership in No. 2 was nearly 60, there was a treasury of $200, and the ((sole survivor® was in a prosperous condition, notwithstanding a loss of $255.55 through its "banker.® On 1 May 1866 the grand lodge was reorganized, and the order spread to other jurisdictions. When the supreme lodge was constituted, 15 May 1868, the grand lodges of the District of Columbia, Pennsylvania, New Jersey, Maryland and Dela¬

ware were represented. Through many trials, beset at times with disloyalty within and liti¬

gation without, from this beginning sprang the great order of the Knights of Pythias.

Government. — This is representative, and threefold, like the society's tenets. It is di¬

vided into three departments', namely: Legisla¬

tive, executive and judicial. These are regu¬

lated by statutes based upon constitutional pro¬

visions. In these particulars, and, in its methods of administration, the order has dif¬

ferentiated itself from others of its class. The government is vested in a supreme lodge, the source of all authority in the order; in State and provincial grand lodges, possessing sub¬

ordinate authority over 10 or more lodges ; in subordinate lodges, which create the member¬

ship by the acceptance of petitioners, and con¬

ferring upon them the ranks of "page,®

"esquire,® and "knight.® The supreme lodge was incorporated 5 Aug. 1870, under an Act of Congress approved the previous 5th of May, and many of the grand and subordinate lodges are, also, corporations. The order has, in ad-

dition to its three ranks, or degrees, an <(endow-

ment® rank, the insurance feature ; and a (

form® rank, the military division, — affiliation with which is voluntary, and predicated on regularity and good standing in the lodge.

The titles borne by officers naturally follow the ritualistic structure.

Uniform Rank. — The organization of the display branch dates from 1878. The <(rank®

sprang at once into popularity, and the notable parade at Cincinnati in 1888 served to induce the supreme body to perfect its rules and regu¬

lations. Before that year creditable appear¬

ances had been made, but then trained soldiers, properly officered, were in line. Since that time the Pythian army has been a regular feature of all assemblages. The ritual is em¬

phatically patriotic ; and the offer made to the United States government by this army of disciplined troops, for service in the Spanish-

American War, is worthy of note. The powers of this branch are delegated to a supreme as¬

sembly, — with a representation in the aforesaid governing bodies, — and the organization fol¬

lows the lines of the United States army, the <(uniformed knights® using the government tactics.

Documents are dated by the Pythian

era, beginning with 1864. To find it, subtract 1863 from the common era. For example: 1917 — 1863 = 54.

Statistics. — The reports for 1917 show 722,075 members, gathered in over 5,000 sub¬

ordinate lodges, governed by nine grand lodges, and a supreme lodge. The total benefits dis¬

bursed since organization are about $50,000,000, and more than 40 periodicals are published in the interest of the order.

Bibliography. — Carnahan, (Pythian Knight¬

hood, its History and Literature) ; Van Valken-

burg, (Jevvels of Pythian Knighthood^; Con¬

stitutions of the Supreme Lodge Knights of Pythias. >

KNIGHTS OF THE ROUND TABLE,

the knights of King Arthur, according to some accounts 12 in number, famed for their valor, who sat at a round table in token of their perfect equality. Other versions of the legend give their number as 50 or more. The most famous of them are Lancelot, Tristram, Gala-

had and Gawayne. See Arthur; Arthurian Legends; Grail, The Holy.

KNIGHTS OF THE ROYAL ARCH,

The, is an organization which confines its mem¬

bership to white, male persons engaged in the retail liquor business. It was founded in Cali¬

fornia in the year 1901, the first lodge being instituted in the city of Los Angeles. At one period of its existence it had branch lodges in Oregon, Washington, California Arizona and Utah, but owing to the fact that Oregon, Wash¬

ington and Arizona have gone ((dry® and that Utah has become a separate State organization, membership is now confined to California ex¬

clusively. The organization consists of a grand lodge, associate membership and 40 sub¬

ordinate lodges, the latter being located in the larger cities and towns of the State. The grand lodge consists of delegates from each subordinate lodge in proportion to its mem¬

bership and holds a convention annually. The associate membership consists of wholesale liquor dealers, brewers and all classes of busi¬

ness which sell goods to the retail liquor dealer. Provision is also made for retail liquor dealers, in localities where there are not a sufficient number to form a lodge, to become certificate members upon payment of annual dues. The Knights of the Royal

Arch is organized for the purpose of mutual protection of its members and elevation of their business and to combat adverse legislation instituted by those opposed to the liquor industry. It also has a fraternal feature and has expended in that direction since its organization, approxi¬

mately $300,000. Its annual disbursements in sick and death benefits and charitable work exceeds $30,000. It has a membership of 4,900

and is supported by monthly dues.

KNIGHTS OF SAINT JOHN AND

MALTA, a secret society founded 1883. It has a grand encampment, 52 subordinate encamp¬

ments and 3,147 members. Since organization the society has disbursed $906,275 in benefits ; and during 1910, the amount was $31,188.

KNIGHTS TEMPLARS. See Masonic

Fraternity, The.

KNIGHTSTOWN, Ind., town in Henry

County, on the Blue River, and on the Cleve¬

land, Cincinnati, Chicago and Saint Louis, and the Pittsburgh, Cincinnati and Saint Louis rail¬

roads, 34 miles east of Indianapolis. Near the town are the State Soldiers and Sailors'

Orphans' Home. The town has excellent water power, natural gas, flour-mills, torpedo works, saw and planing miffs, poultry-packing estab¬

lishments, cigar factory, automobile works, machine shops, wire-fence factory, ice plant, cement blocks and other industries, and owns the electric light and waterworks plants. There are two national banks, with combined re¬

sources totaling $821,092. The value of tax¬

able property is placed at $1,217,470. There are a public school and a high school, and a Carnegie library. The government is vested in a town council. The receipts in 1915 were $51,-

908 and the expenditures $47,263. Pop. 2,008.

KNILLE, knil'le, Otto, German historical painter: b. Osnabriick, 10 Sept. 1832; d. Meran, 7 April 1898. He studied at the Diisseldorf Academy till 1856 under Karl Sohn, Th. Hilde-

brandt and W. von Schadow, then under Couture at Paris. He next spent three years in Munich and another three years in Italy.

In 1865 he was commissioned to decorate the Castle of Marienberg with frescoes. At this time he did the oil painting (Fra Angelico painting in S. Marco Monastery, Florence.) Other noted works were (Tannhauser und Venus, > in the Berlin National Gallery) (1873); he finished his four (Culture Epochs > in 1884, in the Berlin Treppenhaus of the University Library, which contain in their groups por¬

traits of the famous men of these periods. He was elected (1880) member of the Academy of Art, and was leader of a "masters studio® in the academy (1885). Since then he painted little except small genre pictures, landscapes, studies from the Tyrol and Italy. He did considerable illustrating, and wrote (Grfibe-

leien eines Malers fiber seine Kunst> (Berlin 1887), and (Wollen und Honnen in der

MalereL (ib. 1897).

KNIT GOODS. See Hosiery and Knit

Goods.

KNITTING, an industrial and ornamental

art akin to weaving, but of much later origin.

It does not appear to be more than three or four centuries old, and seems to have been first used in the manufacture of stockings. It consists in forming a series of loops with a single thread, through which another row of loops is passed, and so on consecutively in spiraled circles, the garment being shaped by variations in the num¬

ber of loops in a row. In hand-knitting, steel-

wires or bone or composition needles are used, termed knitting needles, and on these the loops are formed. For manufacturing purposes

hand-knitting has been entirely superseded by machinery (see Knitting-Machine), which

is constantly receiving new improvements.

Hand-knitting, however, still forms an agree¬

able domestic occupation and also furnishes many women in some parts of the world with means of subsistenc . Promptly upon America's entrance into the World War, many patriotic societies, and women of the Red Cross in particular, started a work of knitting sweaters for soldiers and sailors. The movement was taken up by thousands of women, who devoted their otherwise idle time to knitting, and it be¬

came common to see women everywhere with knitting bags on their arms, that they might work whenever they had spare moments. On the street cars, at social gatherings, in inter¬

vals of business, there was industrious knitting, resulting in a great volume of very serviceable sweaters and some other knitted garments be¬

ing provided for the ((boys at the front. }) KNITTING-MACHINE. Of the many

kinds of knitting-machines in use, one of the best known has a bed-plate with a vertically projecting and grooved needle-guiding cylinder or bed, secured to a table or support. On the bed-plate is a loose ring with a thread-guide for conducting the thread to the needles, and about the needle-cylinder is a revolving cylinder with an annular groove interrupted by a cam-

portion and provided with adjustable cams, which govern the downward motion of the needles, and consequently the length of • the loops, and raise the needles; two of these latter cams being needed for reversing the machine for knitting a heel or a flat web. The cam-

cylinder is moved by a bevel-gear connected to a driving-crank, and when moved continuously in one direction knits a circular web; and this web may be narrowed as desired, to fashion the leg of a stocking, by removing needles, and placing their loops on adjacent needles. One needle receives the thread within its hook, and is subsequently moved by the cam-cylinder so as to form the thread so taken into a loop.

When the heel is to be formed some of the needles are drawn up, their loops thus being re¬

tained and the number of needles left in action corresponds with the width of the heel to be formed. The cam-cylinder is now to be reciprocated in opposite directions, and in order to keep the thread-guide in advance of the descending needles sufficiently far, so that the thread will be caught, pins are inserted in the bed-plate to engage the heel of the thread-

carrier and stop it just before the cam-cylinder is stopped. See Textile Industry.

KNOBEL, kno'bel, Karl August, German

Protestant theologian: b. Tzschecheln, near Sorau, Silesia, 7 Aug. 1807 ; d. Giessen, 25 May 1863. He

became private teacher (docent) at Breslau (1831), assistant professor of theology (1835) and professor at Giessen (1838). He wrote (Der Prophetismus der Hebraer)

(Breslau 1837) ; (Die Volkertafel der Genesis) (Giessen 1850) ; (Kommentare fiber KoheletlP

(Leipzig 1836) ;

KNOBELSDORFF - BRENKENHOFF,

kno'bels-dorf-brenk'en-hof, Nataly von, Ger¬

man novelist: b. Hofgeismar, 17 May 1860.

She wrote under her maiden name, Nataly von Eschstruth. She was daughter of a Hes¬

sian officer and was educated in Berlin ; mar¬

ried Capt. Franz Knobelsdorff-Brenkenhoff (1880), and after her travels lived at Schwerin. She started early writing short sto¬

ries and plays; of the latter (Karl Augusts Brautfahrt,* (Die Sturmnixe,? were placed on the stage. Her rapidly sketched novels and stories soon gained popularity and some reached several editions. She wrote (YVolfs-

burg> (Jena 1884) ; (GansebieseP (Berlin 1886) ; (Katz und Maus* (ib. 1886) ; (Pot¬

pourri* (1886) ; (Humoresken* (1887) ; (Pal-

nisch Blut) (1887, 2 vols.) ; (Die Erlkdnigin*

(1887) ; (Hazard* (1888, 2 vols.) ; (Hoflust*

(1889; 9th ed., 1899) ; (Sternschuppen) (1890) ; (Im Schell enhemd* (1894, 2 vols.). Other two-

volume works were Won Gottes Gnaden)

(1894); (Der Stern des Glucks> (1897); (Der Majoratskerr* (1898); (Der verlorene Sohn) (1902) ;

(Die Baren von Hohen-Esp) (1902; 8th ed., 1904). She brought out a volume of her poems under the title (Wegekraut*

(Dresden 1887), and a collection of her works has been published serially since 1899 in Leip¬

zig.

KNOBKERRIE, nob'ker'i. A South Afri¬

can weapon used, either as a missile or as a club at close quarters, by the natives. The word is derived from the local Dutch term knop-kirie, composed of the words knop, a knob, and kerrie, the Hottentot word for stick.

It consists of a stick long enough to be used as a walking stick, but is thrown, as a weapon, with unerring accuracy, for quite a distance.

Similar native weapons are found in Austral¬

asia.

KNOBLAUCH, knop'louk, Hermann, Ger¬

man physicist: b. Berlin, 11 April 1820; d.

Baden-Baden, 1 July 1895. He became private teacher (docent) in Berlin (1848) and Bonn (1849). In the latter year he was appointed assistant professor at Berlin and professor of physics at Halle (1854). From 1878 he was president of the Imperial Leopoldinisch-Karo-

linischen Academy of German Natural-History Research. His work consisted largely of ex¬

amining ithe phenomenon of heat rays, and, through his and Melloni’s researches it was proved that light rays and heat rays do not differ.

KNOCHE, kno'ke, Walter Alfred, Ger¬

man meteorologist: b. Berlin, 7 March 1881.

He studied at the Berlin Oberrealschule and the universities of Geneva and Berlin. He was appointed assistant professor at the Royal KNOCKE

Prussian Meteorological Institute (1906) and to the Public Weather Bureau (1907). In 1908 he accompanied the scientific expedition to the Bolivian plateaus, and entered (1910) the service of the Chilean government's meteor¬

ological department. He wrote three publica¬

tions of the Central Meteorological Institute of Chile, also (Observaciones en la mina Aguila, 5,200) ; (Observaciones de provincias) (1910). He edited the periodical Anuario Meteorological de Chile (1911), and con¬

tributed many important essays to the con¬

temporary journals on meteorology, ethnology and ethnography.

KNOCKE, knok'e, or KNOKKE, Belgium,

a seaside resort on the North Sea coast near Bruges, destroyed by bombardment of the British fleet when used by the Central Powers, in the World War, as an offensive base.

KNOLLES, nolz, or KNOWLLES, Rich¬

ard, English historian : b. probably Cold Ashby, Northamptonshire, about 1550; d. Sandwich, Kent, 1610. He was graduated from Lincoln College, Oxford, in 1565, and became first a Fellow of his college and about 1571 master of the grammar school of Sandwich. He wrote a (Generall Histone of the Turkes) (London 1603), the style of which is highly commended by Johnson, Hallam and other critics. A number of later editions were brought out, most of which had been brought up to the date of

publication; the last of these with continuations, by Sir Paul Rycaut, was published (London 1687-1700). An abridged edition was published by John Savage (2 vols., London 1701). Knolles also published a trans¬

lation from the French and Latin of J. Bodin's (The Six Bookes of a Common Weale) (Lon¬

don 1606). A (Grammatica Latina, Graeca et HebraicaP frequently attributed to him, was the work of the Rev. Hanserd Knollys.

KNOLLYS, Sir Francis, English states¬

man : b. about 1514; d. 1596. He was favored by Henry VIII who secured to him the estate of Rotherfield Greys (1538) and made him a gentleman-pensioner at court. He entered the House of Commons (1542) as member for Horsham. As a staunch Protestant he threw in has allegiance with Edward VI and accom¬

panied his army to Scotland. He was knighted (1547) and received the grant of the manors of Caversham (about 1551). With Mary's acces¬

sion his religious opinions necessitated his exile to Germany but he returned before the queen's death. He was appointed a member of Elizabeth's privy council (1558) and was made vice-chamberlain of the household and captain of the halberdiers. He was elected (1559) member of Parliament for Arundee and (1562) for Oxford. He was made gover¬

nor of Portsmouth (1563), went to Ireland (1566) on a diplomatic mission and was ap¬

pointed treasurer of the Queen's Chamber in the same year. When Mary, Queen of Scots fled (1568) to England he and Baron Henry Scrope were jointly entrusted with taking charge of the fugitive, first at Carlisle Castle, then at Bolton Castle. He strived to convert his prisoner to the Protestant faith. He plainly told Elizabeth to bring charges against the prisoner or acquit her, but in 1587

urged her execution. He headed the land forces (1588-89) of Hertfordshire and Cambridge¬

shire led to resist the Spanish Armada. He was created K. G. (1593). Many of his letters are printed in Wright's (Queen Elizabeth > in the Calendars of the Hatfield MSS , and in Haynes' (State Papers. >

KNOLLYS, Hanserd, English Baptist

clergyman : b. Cawkwell, Lincolnshire, about 1599; d. London, 1691. He was graduated at Cambridge and ordained there. He became Separatist (1636), renounced his orders and re¬

moved to London, then fled to New England to escape imprisonment for his expressed heterodox opinions concerning ritual and ad¬

mission -to the communion. The English High Commission court warrant reached him at Boston and he suffered a short imprisonment but was soon preaching at Dover, N. H., when Cotton Mather enumerated him among <(godly Anabaptists.® He returned (1641) to England, taught in London, then became army chaplain.

By 1644 he was preaching his own peculiar doctrines ; his popularity leading (

mittee of Parliament. From 1645 to the Restor¬

ation he was not interfered with, but escaped (1661) prosecution by exile to Holland and Germany for several years. Returning to Lon¬

don he continued his pastorate and was ar¬

rested (1670) and imprisoned, but soon freed.

He wrote several grammars on Hebrew, Latin, Greek, etc. The Hanserd Knollys Society published a number of his works. Consult also Crosby's (History of English Baptists) (1738) ; (Confessions of Faith > (1854), and (Records of the Churches at Fenstanton,

etc.}

(1854), both the latter by Hanserd Knollys Society.

KNOLLYS, or KNOLLES, Sir Robert,

English military commander : a native of Cheshire, birth date unknown ; d. 1407. His first military service was in Brittany under Sir Thomas Dagworth (1346) at the siege of La Roche d'Orient. He was a knight when he took part in the (

On his release he remained in Brittany and ac¬

quired renown on the field. He aided Henry of Lancaster on his raid into Normandy in sup¬

port of Philip of Navarre and Godfrey de Har-

court (1356), and was head of the plunderers known as the ((Great Company® (1358), his share in the loot being 100,000 crowns. In the Loire Valley he captured 40 castles and rav¬

aged the country from Tonnerre to Vezelay and Nevers to Orleans, sacking and burning the suburbs of the latter city. He declared this warfare was neither for the English king or for Charles of Navarre, but for himself alone. He sacked Auxerre and enforced a great ransom, captured Chatillon-sur-Loing (1359), then raided through Berri into Auvergne. He aided Simon de Montfort

against Charles de Blois at the siege of Auray and defeated de Blois, then joined the Black Prince (1367) in his Spanish expedition. He aided in the capture of Navarrete, and was present at the battle of Najara. Soon he re¬

turned to Brittany, but was given command of an expedition in Aquitaine (1369). France having prepared a military expedition against Wales (1370), he was given command of a force to land at Calais. Thence he continued and sacked the suburbs of Arras and went 400

through Artois into Picardy and Varmandois, plundering till he reached Rheims, and thence to Villejuif , near Paris. This raiding counter attack averted the planned French onslaught on Wales which did not take place. He was residing in London in 1381 when the Wat Tyler rebellion broke out, and the city gave him the leadership. He quickly suppressed the rising.

Having acquired immense wealth in his cam¬

paigns, he used some in frequent loans to the king and much was spent in building English churches, a hospital at Rome, the house of the Carmelites in London; at Pontefract he founded a college and hospital and endowed them. Consult Froissart's

(Vols. IV-VIII) ; Fuller's 'Worthies* (1811); Lobineau's (Histoire de Bretagne/ etc.

KNOOP, knop, Gerhard Julius Ouckama,

German novelist: b. Bremen, 9 June 1861; d Innsbruck, 6 Sept. 1913. His health in early youth was poor, with the result that in his en¬

forced summer vacations in the country, as well as in his winter quarters in the city, he was cut off from association with boys of his own age, and thus became somewhat sin¬

gular and exclusive in manner. In 1878, a year after the death of his father, he was graduated from the Bremen Realschule, and an uncle, Baron L. Knoop, undertook to pay for his further education, sending him to the Polytechnic Institute at Hanover, to qualify as an industrial chemist. In 1881 he changed for the corresponding institution at Miinchen, and in 1883 he went' to Miilhausen in Alsace, first attending the school of chemistry, and then entering a factory for further study. In 1885 he took an important position in the calico-

printing works at Moscow, which he retained until

1911, when he settled in Miinchen. His literary work, which he regarded almost en¬

tirely as a pastime, was chiefly in the field of narrative satire. Particularly interesting for Americans are the two novels of which Se-

bald Soeker is the hero ; they describe the adventures in Germany of a young German-

American who for many years regarded Ger¬

many as the land of his ideal, but who finds, on acquaintance with actual conditions there, that the Fatherland contains much that is vulgar, meretricious and base. His novels are (Das Element (1901); (Hermann Osleb)

(Berlin 1904) ; (Sebald Soekers Pilgerfahrt) (1903); (Sebald Soekers Vollendung) (1905); 'Nadeshda Bachini* (Berlin 1906) ; (Aus den Papieren des Freiherrn von SkarpP (1909) ;

Jacob Wittmer Hartmann.

KNOPF, nopf, Siegmund Adolphus, Ger¬

man- American physician: b. Halle, 27 Nov. 1857.

He gained his early education at the Higher Municipal School, Halle, was graduated at the Sorbonne (Paris 1890). He gained his medical diplomas at Bellevue Hospital Medical College, New York (1888) and the Faculty of Medicine, Paris University (1895). He was made pro¬

fessor of medicine, department of phthisio-

therapy at the New York Post-Graduate Medi¬

cal School (1908), and was appointed visiting physician, Health Department's Riverside Sana¬

torium for Consumptives. He became honorary director, Gaylord Farm Sanatorium, Walling¬

ford, Conn., honorary president, medical board

Bruchesi Tuberculosis Institute, Montreal, Canada, etc. He was consulting physician at Saint Gabriel's, N. Y., Sanatorium for Con¬

sumptives; West Mountain Sanatorium, Scran¬

ton, Pa., etc., and is Fellow of the American Academy of Medicine, American Public Health Association, New York Academy of Medicine, Society of American Jurisprudence, American Medico-Psychological Association. Among his numerous honorary appointments were honorary vice-president, British Congress on Tubercu¬

losis; government delegate International Prison Congress, Paris ; vice-president Sec¬

tion V Tuberculosis Congress, Washington (1908). He took a leading part in subsequent tuberculosis propaganda and was first lieu¬

tenant Medical Reserve Corps, United States America. He wrote (Les Sanatoria Traitement et Prophylaxie de la Phthsie pulmonaire* (the¬

sis of 1895); (Pulmonary Tuberculosis — Its Modern Prophylaxy, etc/ (1899) ; 'Die Tuber-

culose als Volks-Krankheit und deren Bekamp-

fung* (1900) ; the latter work was translated into English and 27 other languages. He also wrote (Tuberculosis a Preventable and Curable Disease* (1913) and other works, besides nu¬

merous articles contributed to leading medical journals on tuberculosis and kindred subjects.

KNORR, knor, Iwan Otto Armand, Ger¬

man composer: b. Mewe, West Prussia, 3 Jan.

1853. He was educated at the Leipzig Nikolai Gymnasium, Riga Realgymnasium and the

Leipzig Conservatory. He was appointed mu¬

sical teacher at the Royal Ladies' Institute and Conservatory, Charkow (1874-83), and on the recommendation of Brahms was made (1883) theory and composition teacher at Dr. Hoch's conservatory at Frankfort, becoming director in 1908. Of his compositions should be cited the operas, 'Dunja* and 'Durch's Fenster/ His other compositions consist of piano-quartets, orchestral pieces, solos, etc. His 'Ukrainische Liebesbilde* are popular. He wrote a biography of Peter Tschaikowsky and several works on music such as (Aufgabe fur die Harmonie-

lehre* ; 'Lehrbuch der Fugencomposition/ etc.

KNORR, Ludwig, German chemist : b.

Munich, 2 Dec. 1859. He studied at his home town and at Heidelberg and Erlangen, becoming (1885) private teacher at the latter university, but, in the same year, went to Wurzburg, where he was raised to assistant professor (1888), becoming professor at Jena (1889) and Frei¬

burg. His experimental research brought to light synthetics of chinolin and pyrol deriva¬

tives, also discovering (1884) .the pyrazole compounds to which antipyrin belongs.

KNORTZ, nortz, Karl, American author:

b. Garbenheim, near Wetzlar, 28 Aug. 1841.

He was educated at Heidelberg University and came to the United States in 1863. He taught in Detroit, Oshkosh and Cincinnati, 1864-74, edited a German daily in Indianapolis for some years, and from 1892 to. 1905 was superintendent of German schools in Evansville, Ind. In the latter year he removed to North Tarrytown, N. Y., and has devoted himself to letters.

Among his numerous works are (Tales and Legends of the North-American Indians)

(1871) ; (American Sketches) (1876) ; 'Long-

fellow) (1879); 'From the Wigwam* (1880); Capital and Labor in America) (1881) ; 'In-

? oq ^e&enc!s> 5 Pictures of American Life) (1884); 'History of American Literature,* in German (1891); 'Individuality) (1897); 'Child Study > (1899) ; 'Ein amerikanischer Diogenes >

(1898) ; 'Poetischer Hauschatz der Nordameri-

kaner) (1902) ; 'Nackklange germanischer Glau¬

bers und Brauchs in Amerika) (1903) ; 'Streif-

ziige auf dem Gebiete amerikanischer Volks-

kunde* (1903) ; 'Friedrich Nietzsche, der Un-

zeitgemasse* (1009) ; 'Die Insekten in Sage, Brauch, und Literatur) (1910) ; 'Walt Whitman und seine Nachfolger* (1910) ; 'Reptilien und Amphibien in Sitte, Sage, und Literatur* (1911) ; 'Teufel, Hexe, und Blocksbergspuk* (1913) ; 'Die Vogel im Sage, Sitte, und Literatur) (1913); 'American Jews* (1914); 'American Superstitions of To-day > (1913). He has very materially assisted in making American authors known in Germany through his translations into German poems of Longfellow, Whittier and Walt Whitman.

KNOT, a snipe (Tringa canuta) known in its migrations throughout the world, but breed¬

ing only in the extreme north, where its pale-

green, spotted eggs have been found in only one instance. It appears in small flocks along all shores, and is a favorite with gunners under the names robin-snipe and gray snipe. Its plumage is a mingling of black and white suffused with a reddish tint on the under parts.

The book-names refer to its habit of seeking its food just at the edge of the surface, where King Canute is fabled to have seated himself in defiance of the tide.

KNOT, a term synonymous for a nautical mile. The log-line is divided by knots (or otherwise) into sections 1/120 of a geographical mile in length, hence the number of sections run out in half a minute (the 120th of an hour) indicates the number of knots or geographical miles per hour at which the ship is going. The rate at which a vessel sails, or can sail, is usu¬

ally given in knots per hour, the Admiralty kncxt or measured m'ile being 6,080 feet. It is longer than an ordinary statute mile by about one mile in seven; = 1.151 statute miles.

KNOT-GRASS. See Grasses.

KNOTS. See Knotting and Splicing.

KNOTT, A(loysius) Leo, American law¬

yer: b. near New Market, Frederick County, Mo., 12 May 1829; d. Baltimore, 21 July 1918.

He received his education at Saint Mary's Col¬

lege, Baltimore, and studied law with William Schley of that city. He began his career as a teacher at the Cumberland Academy; taught Greek and algebra at Saint Mary's College, Baltimore, and founded the Howard Latin School of Howard County, Md. After his ad¬

mission to the bar he practised law with James H. Bevans for two years. Becoming interested in politics he was active in the Reform move¬

ment of 1859 and in the Democratic party from 1864 to 1866. In 1866-67 he was a member of the Maryland house of delegates and from 1867 to 1879 was district attorney of Baltimore.

In 1899-1900 he was a member of the Maryland assembly and from 1900 to 1904 was professor of elementary law and constitutional law, and since 1904 of international law at the Law School of the University of Baltimore. In 1907

he retired from the practice of law. He was a delegate to the Democratic Convention at Baltimore in 1860 and to the Chicago Conven¬

tion of the same party in 1864, also the con¬

ventions of 1872 and 1900. He has participated in cases tried before international commis¬

sions, principally in Latin- American affairs.

He was sent as special envoy to Cuba in 1886

to arrange a mail route between the United States and that island. He is a member of the Maryland Historical Society and many other learned bodies. His works include 'A Relation of Some Political Transactions in Maryland * (1898) and contributions to the 'Encyclopedia Americana* ; 'The Catholic Encyclopedia, * newspapers and periodicals.

KNOTT, not, Cargill Gilston, British

physicist; b. Penicuik, Scotland, 30 June 1856.

He studied at Edinburgh University and was appointed assistant professor of natural philos¬

ophy there (1879-83). He next became pro¬

fessor of physics at the Imperial University, Tokio, Japan, conducting a magnetic survey of the empire (1887). Returning to Scotland (1892), he lectured on applied mathematics and was awarded the Keith Prize of the Royal So¬

ciety of Edinburgh for special research work on magnetic strains (1897). He was selected as Thomson lecturer, subject earthquakes, at the United Free Church College, Aberdeen (1905-06) and on radio-

activity (1913-14).

Among his many works are 'Electricity and Magnetism * ; 'Physics of Earthquake Phenom¬

ena) (1908). His 'Photometry) is in its 11th edition ; he revised Kelland and Taits, 'Quater-

nions) (1904, 3d ed.).

KNOTT, James Proctor, American leg¬

islator and legal scholar : b. near Lebanon, Ky., 29 Aug. 1830; d. Lebanon, Ky., 18 June 1911.

He studied law, was admitted to the Missouri bar in 1851, and entered practice at Memphis, Mo. In 1858 he was elected to the Missouri legislature, in 1859 was appointed to the office of attorney-general of Missouri to fill a vacancy and in 1860 was elected to that post. Having refused, at the beginning of the Civil War, to take an oath of allegiance which he con¬

sidered too severe, he was for a time im¬

prisoned in the Saint Louis arsenal. In 1862

he removed to Kentucky, where he established himself as a practitioner at Lebanon; and in 1867-71 and 1875-83 served in Congress as Democratic representative from the 4th Ken¬

tucky district. He was long chairman of the House Committee on the Judiciary. In the 41st Congress he made his well-known speech on Duluth, ridiculing the pretensions of the lake town, and gaining a national reputation as a humorist. He was governor of Kentucky in 1883-87, a delegate to the Kentucky Constitu¬

tional Convention in 1891, professor of civics and economics in Centre College (Danville, Ky.) in 1892-94, and from 1894-1901 professor of law and dean of the law faculty of Central University.

KNOTTING AND SPLICING, the fast¬

ening or tying of ropes or cords. There are hundreds of varieties of knots, most of which are used only on shipboard. Generally the re¬

quirements of a useful knot may be stated to be that it should neither "slip® nor "jam,® that, while it holds without danger of slipping while the strain is on it, when slackened it should be easily untied again. The simplest knot is the common one tied on the end of a thread or 492

cord to prevent it slipping. By passing a loop instead of the end of the cord the common slip-knot is formed; and a useful fixed loop is got by tying a simple knot, or the "figure of 8

knot* on the loop of a cord. One of the simplest and most useful running knots for a small cord is made by means of two simple knots. The most secure method of fastening a line to, say, a bucket is the standing bow¬

line; and a running bowline is formed by pass¬

ing the end through the loop, thus making a running loop. Out of the score or so of methods of fastening a boat's painter the one which will be found most useful is the well-known two half-hitches. The timber hitch is useful for attaching a line to a spar or a stone, and the clove hitch is invaluable for many purposes. It is very simple and cannot slip. A simple method of fastening a rope to a hook is the blackwall hitch, where the strain on the main rope jams the end so tightly against the hook that it can¬

not slip. There are many methods for short¬

ening a rope temporarily, one of them being the sheepshank.

Of the methods for uniting the ends of two cords the

simplest and one of the most secure is the common reef knot, which must be carefully distinguished from the "granny

which will jam if it does not slip; the reef knot will do neither. For very small cords or thread the 'best knot is the weaver's. The fish¬

erman's knot is a very useful one for anglers, and is formed by a simple knot in each cord being slipped over the other ; when drawn taut it is very secure, and it is easily separated by pulling the short ends. A useful method of uniting large ropes is to .tie a simple knot on the end of one rope and interlace the .end of the other, and draw taut. This tie may also be made with the figure of 8 knot. _ For very large ropes the carrick bend is the simplest and most secure. The bowline bend is formed by looping two bowline knots into each other.

For attaching a small line to a thick rope the becket hitch is very useful.

"Splicing is the process employed to join two ropes when it is not advisable to use. a knot. The three chief varieties of the splice are the short splice, the long splice and the eye splice. The short splice is made by unlaying the ends of two ropes for a short distance and fitting them closely together; then, by the help of a marlinspike, the ends are laced over and under the strands of the opposite rope. When each strand has been passed through once,, half of its thickness is cut away and the remainder passed through again; half of the remainder being also cut away, it is passed a third time, and, when all the strands are so treated, they are hauled taut and cut close. This reducing the thickness of the strands tapers off the splice. The long splice is employed when the rope is used to run through a block, as it does not thicken it. The ends of the two ropes are unlaid for a much longer distance than for the short splice, and similarly placed together.*

Then one strand is taken and further unwound for a

considerable distance, and its vacant place filled up with the corresponding strand of the other rope, and the ends fastened as in the short splice. Other two of the strands are similarly spliced in the opposite direction,, and the remaining two fastened at the original join¬

ing place. The eye splice is, as the term im¬

plies, used to form an eye, or round a dead eye. . ,

To prevent a rope fraying at the ends a variety of methods are employed, the simplest being to serve or whip the end with small cord.

KNOUT, nowt, or noot, the official instru¬

ment of punishment formerly used in Russia, dating from about 1450, made in various forms, but usually being a heavy whip of leather thongs artificially hardened, twisted with wire and sometimes hooked at the ends, etc. One hundred strokes were considered equivalent to a sentence of death, as the victim seldom sur¬

vived. On account of the severity of the pun¬

ishment Nicholas I issued an order substituting punishment with a lighter whip of three thongs, known as the pleti.

KNOWER, Henry McElderry, American

anatomist : b. Baltimore, 5 Aug. 1868. He was graduated (1890) at Johns Hopkins, was ap¬

pointed assistant in biology (1891-93), and be¬

came Adam T. Bruce Fellow (1895-96) and PhD (1896). He became instructor of biol¬

ogy at Williams College (1896-97), instructor of 'anatomy (1899-1908) and associate at Johns Hopkins (1908-09). In 1909-10 he lectured on anatomy at the University of Toronto, be¬

coming in the latter year professor of anatomy of the University of Cincinnati. He was ap¬

pointed (1897) assistant in zoology at the Ma¬

rine Biological Laboratory, Woods Hole, Mass., (1897) and librarian (1900). He was co¬

editor and secretary of the American Journal of Anatomy. He specialized chiefly in em¬

bryology and anatomy of termites research, and in lymphatic and vascular systems of frog em¬

bryos experimentally and by injection; muscles of the human heart, etc.

KNOWLEDGE, Theory of. See Episte¬

mology.

KNOWLES, nolz, Frederic Lawrence,

American poet: b. Lawrence, Mass., 8 Sept.

1869; d. Boston, Mass., 20 Sept. 1905. He was educated at the New Hampshire Conference Seminary of which his father, Daniel C.

Knowles, was president for many years. After graduation he taught for some time in his father's seminary and at Wesleyan University and Harvard. His verse attracted attention even in college days. His poems appeared in the best magazines and received wide quotation.

The week before he died he wrote:

" This body is my house- — it is not I, Triumphant in this faith I live and die."

He was the author of (Love Triumphant (1904, also 2d ed.) ; (On Life's Stairway5

(1900; 3d ed., 1905). He compiled and edited several collections of poetry, the most important of which are (Poetry of American Wit and Humor) (1899); (Cap

and Gown5; (College Verse — Second Series) (1900); (Golden Treasury of American Songs and Lyrics 5

(1901) ; (Yearbook of Famous Lyrics) (1901) ; (Treasury of Humorous Poetry) (1902);

(Value of Friendship) (1904) ; (Value of Courage) (1905); (Value of Love5 (1906).

KNOWLES, James Sheridan, Irish drama¬

tist and actor: b. Cork, Ireland, 21 May 1784; d. Torquay, Devonshire, 30 Nov. 1862. He served as an ensign in the militia, became a M.D. of Aberdeen University, and then went upon the stage, but meeting with small success.

KNOTS

Overhand

Knot

Half Hitch

Two Half

Hitches

Midshipman’s

Hitch

Granny Knot

Fisherman’s Knot

Sheet Bend

1

>

ft

Bowline Knot

Sheepshank

Running

Bowline

Inside Clinch

Long Splice

Figure Eight

Knot

Carrick Bend

KNOTS, HITCHES AND SPLICES

KNOTS

Studding-Sail

Halyard Hitch

KNOTS, HITCHES AND SPLICES

KNOWLES

KNOWLTON

493

taught school in Belfast and Glasgow. His tragedy of Eaius Gracchus) was performed at Belfast in 1815 with success, and from this time he had a prosperous career. He visited the United States in 1834. In 1844 he under¬

went conversion and became a Baptist ; he then took a prominent part in the work of religious revival, became known as an anti-Roman Catholic controversialist, but never preached against the stage. In 1848 he received a pen¬

sion of £200 a year from government. Among his principal works are the dramas (Caius Gracchus5 (1815) ; (William Tell5 (1825) ;

lished besides various poetical pieces, tales and

novels, and in his later years works denuncia¬

tory of Roman Catholicism.

KNOWLES, Lucius James, American in¬

ventor: b. Hardwick, Mass., 2 July 1819; d.

Washington, D. C., 25 Feb. 1884. He became a clerk in a shop at Shrewsbury, Mass., the first photographer using the system of Daguerre in Worcester, Mass., turned his attention to inventing, devised the Knowles safety steam-

boiler feed-regulator, and constructed and operated several models of steam-engines. In 1843 he invented a machine for the spooling of thread, and this machine he manufactured at New Worcester in 1843-45. He then built spinning-machines for the manufacture of four- and six-cord thread, and manufactured cotton thread and warps at Spencer and War¬

ren, Mass. (1847-53), and woolen goods at Warren (1853-59). Subsequently he manufac¬

tured a safety 'boiler-feeder, a steam pump and a tape loom, under his own patents. He took out over 100 patents, mostly for loom improve¬

ments. His plant for the manufacture of looms and their accessories was located at Worcester, Mass., where it was later combined with an English concern and now, under the name Crompton and Knowles Loom Works, has

branches in all parts of the world. The Knowles Pump Works, too, have grown to be one of the largest in the world. He was elected to the lower house of the Massachusetts legis¬

lature in 1862 and 1865, and in 1869 became State senator. Williams College in 1865 gave him the degree of A.M. Consult Roe, A. S., (Lucius J. and Francis B. Knowles5 (in New England Magazine , N. S. Vol. XXXI, p. 483, Boston 1904).

KNOWLES, Robert Edward, Canadian

novelist: b. Maxville, Ontario, 30 March 1868.

He is a graduate of Manitoba College and of Queen's College, Kingston, was appointed min¬

ister of Stewart on Church, Ottawa, 1891, and from 1898 has been pastor of Knox Church, Galt Ontario. He is the author of (St. Cuth-

bert's5 (1905); (The Undertow5 (1906);

(Dawn at Shantv Bay5 (1907) ; (The Attic Guest5 (1909) ; (The Singer of the Kootenay5

(1911).

KNOWLING, no'lmg, Richard John,

English clergvman and educator: b. Devonport, Devonshire, 16 Sept. 1851. He was educated at Balliol College, Oxford, and was ordained deacon in 1875 and priest 1876 in the Church of England. He was classical master in the Abingdon Grammar School, 1874-76; curate of Wellington Somerset, 1876-78 and of Saint Martin-in-the-Fields, London, 1878-84; censor and lecturer in King's College, London, 1884—90; vice-principal of King's College, 1890—97 ; professor of New Testament exegesis 1894 —1905 ; professor of divinity in Durham Univer¬

sity and canon of Durham since 1905. He was select-preacher at Cambridge University 1895 ; and became Fellow of King's College, London 1899. He was examiner at Oxford University 1897, 1905, and at the University of London 1905-06; examining chaplain to the archbishop of Canterbury and the bishop of Exeter, 1903-

OS, and Boyle lecturer for the same period. His writings include cThe Witness of the Epistles5

(1892); (Acts of the Apostles,5 in the Ex¬

positors Greek Testament5 (1901) ; (Our Lord's

Virgin Birth and the Criticism of To¬

day5 (1903) ; (The Epistle of Saint James5

(1904) ; (The Testimony of Saint Paul to Christ5 (1905; new ed., 1911); Eiterary Crit¬

icism and the New Testament5 (1907) ; Mes¬

sianic Interpretations and Other Studies5

(1911).

KNOWLTON, nol'ton, Frank Hall,

American botanist and palaeontologist : b.

Brandon, Vt., 2 Sept. 1860. He was graduated from Middlebury College, Vt., in 1884, and in 1898 took the degree of Ph D., George Wash¬

ington University; was assistant palaeontologist on the United States Geological Survey, 1889-

1900, and palaeontologist from 1900 to 1907, and geologist from the latter year. Among his scientific monographs are Eossil Wood and Lignite of the Potomac Formation5 (1889) ; Eossil Flora of Alaska5 (1894) ; (Catalogue of the Cretaceous and Tertiary Plants of North America5 (1896) ; Eossil Flora of the Yellow¬

stone National Park5 (1898) ; Elora of the Montana Formation5 (1900) ; (Birds of the World5 (1909) ; Elora of the Raton Mesa Region of Colorado and New Mexico5 (1916) ; Elora of the Laramie of the Denver Basin of Colorado5 (1916). The Plant World, which he had founded in 1897, he edited until 1904.

He was a contributor to the Century, Stand¬

ard .and Webster’s dictionaries and to the Jew¬

ish Encyclopaedia.5

KNOWLTON, Thomas, American sol¬

dier: b. West Boxford, Mass., 30 Nov. 1740; d. battle of Harlem Plains, N. Y., 16 Sept. 1776.

He enlisted in the last French and Indian War, took partin the capture of Ticonderoga (1759), and in 1762 went with General Lyman's forces to Cuba as second lieutenant. After the siege of Havana he took up farming. Living at Ash¬

ford, Conn., at the beginning of the Revolu¬

tion, he was elected captain of a militia com¬

pany organized after Lexington, and with 200

other Connecticut troops was sent to Charles¬

town. His detachment, ununiformed farmers with shot-guns, fought at Bunker. Hill. On 8 Jan. 1776 he made a successful invasion of Charlestown, and subsequently became lieuten¬

ant-colonel of the 20th regiment and then of a regiment of Connecticut rangers, usually known as "Knowlton's Rangers.55 He was killed while leading his command at the battle of Harlem Heights, and was highly praised .by Washington in general orders. A statue was erected to his memory by his State in 1895

on the capitol grounds at Hartford. Consult 494

KNOW-NOTHING PARTY

Coffin, C., ed., (The Lives and Services of Major-General J. Thomas, Colonel Thomas Knowlton, etc. 1 (New York 1845) ; Woodward, A., (Memoir of Col. T. Knowlton1 (Boston 1861) ; Woodward, P. H., and others, (Statue of Col. Thomas Knowlton1 (Hartford 1895).

KNOW-NOTHING PARTY, The, re¬

sulted from nativism in American politics and from the organization of secret political asso¬

ciations such as the United American Me¬

chanics and the Order of the Sons of America in Pennsylvania; the Order of United Ameri¬

cans and the Order of the Star Spangled Ban¬

ner in New York, founded for the purpose of obtaining the repeal of the Naturalization Law and of the law which permitted others than native Americans to hold office. As a definite political party it may be said to have started in 1852 and existed two or three years. The principles of the Know-nothing party were em¬

bodied in the following propositions (at New York, 1855) : (1) The Americans shall rule America. (2) The perpetuation of the union of these States. (3) No North, no South, no East, no West. (4) The United States of America — as they are — one and inseparable.

(5) No sectarian interferences in our legisla¬

tion or in the administration of American law.

(6) Hostility to the assumption of the Pope, through the bishops, etc., in a republic sancti¬

fied by Protestant blood. (7) Thorough re¬

form in the naturalization laws. (8) Free and liberal educational institutions for all sects and classes, with the Bible, God's holy word, as a universal textbook. A society was formed in 1855 in opposition to the above, called Know-

somethings. Both bodies were absorbed into the two parties, Democrats and Republicans, at the Presidential election in 1856.

The Know-nothing organization was pri¬

marily the result of foreign emigration. In 20

years from 1825 to 1845 the immigration amounted to 1,028,225. The consequence was a sharp awakening of native American preju¬

dice and alarm. The sentiment first showed itself in New York, where the alien population had reached portentous proportions, in the esti¬

mation of citizens of the old stock. A native organization for political purposes was effected, and in 1844 it succeeded in electing James Harper mayor on a native American ticket.

About this time began the great immigration due to the Irish famine, and in the five years from 1845 to 1850 there came in about as many aliens as had been received during the whole 20 years before. Native > Americanism flamed up hotter than ever, and its political conflagra¬

tion extended to other cities and States. The great volume of the Irish _ immigration was Roman Catholic, and animosity to that Church gave it fire. At Philadelphia two Roman Cath¬

olic churches were destroyed in riots between natives and Irish; at Boston a convent was burned. Six native American representatives were elected to the 29th Congress, that of 1845, four from New York and two from Pennsyl¬

vania. Between 1850 and 1855 the immigration amounted to nearly 2,000,000, and the native spirit was aroused even more hotly. Moreover, the anti-slavery agitation, expressing itself in opposition to the extension of slavery to the Territories, was disturbing party allegiance, and special efforts were made to kindle the native American spirit into a hot flame, with an ul¬

terior motive, it was believed, of turning the current of public sentiment into other channels.

In 1852 the Know-nothing organization, dis¬

tinctly, made its appearance. It was so-called because it was a secret oath-bound fraternity, regarding whose objects and whose real name its members always answered when questioned : (

ica !® was its rally cry, and relentless hostility to the increasing power of the Roman Catholic Church and a demand for the extension of the qualification for naturalization to a residence of 21 years were its main purposes. The Know-

nothings started off brilliantly. In 1854 they carried the State elections in Massachusetts and Delaware, and polled a great number of votes in New York. In 1855 they elected governors and legislatures in New York and four New England. States, and in the South and West they were successful or nearly approached suc¬

cess in nine States. In 1856 eight of the 32

States had native American governors, but in the Presidential election of that year the party cast only about one-fifth of the popular vote and obtained only eight electoral votes, the votes of the single State of Maryland. In the 34th Congress, 1855, it had 5 senators, 43 out-

and-out Know-nothings as Congressmen and 70, nominally Republicans, but members of Know-nothing councils. In the 35th Congress, 1857, it had 5 senators and 14 representatives.

In the next Congress it had 2 senators and 23

representatives, all of them from Southern States. Soon thereafter Know-nothingism went to pieces rapidly and no more of it was heard in politics. It had no representation in Con¬

gress after the 36th. Amongst its most deter¬

mined opponents were Henry Ward Beecher and Horace Greeley. (See alro American Party). Consult Carroll, A. E., (The Great American Battle® (New York 1856) ; Cluskey, M. W., (Political Text-Book and Encyclo¬

pedia1 (Philadelphia 1860) ; Cross, I., (The Origin, Principles and History of the Ameri¬

can Party1 (in Iowa Journal of History and Politics, Vol. IV, p. 526, Iowa City 1906) ; Davis, H. W., (Speeches and Addresses1 (New York 1867) ; Desmond, H. J., (The Know-

Nothing Party) (Washington 1904) ; Gay, C.

M., (The Campaign of 1855 in Virginia and the Fall of the Know-Nothing Party1 (in Richmond College Historical Papers, Vol. I, p. 309, Richmond 1906) ; Haynes, G. H., (Causes of Know-nothing Success in Massa¬

chusetts } (in American Historical Review, Vol. Ill, p. 67, New York 1897) ; id.,

nothing Legislature; Mass., 1855 ® (in Amer¬

ican Historical Association, Annual Report for 1896, Vol. I, p. 175, Washington 1897) ; Hutch¬

inson, E., <((Young Sam®; or Native Ameri¬

cans' Own Book1 (New York 1855) ; McMas-

ter, J. B., (Riotous Career of Know-nothing-

ism1 (in Forum, Vol. XVII, p. 524, New York 1894) ; Rhodes, J. F., (History of the United States, 1850—18771 (Vol. II, New York 1893) ; Schmeckebier, L.

F., (History of the Know-

Nothing Party in Maryland1 (in Johns Hop¬

kins University Studies in Historical and Polit¬

ical Science, Series XVII, Nos. 4-5, Baltimore 1899) ; Sc.isco, L. D., (Nativism in New York State1 (New York 1901) ; Senning, J. P., (The Know-nothing Movement in Illinois, 1854-561

(in Illinois State Historical Society Journal, Vol. VII, p. 7, Springfield 1914); Stickney, C., (Know-Nothingism in Rhode Island> (in

Papers from Historical Seminary, Brown Uni¬

versity, Vol. Ill, Providence 1894) ; Wise, H.

A., 'Religious Liberty, etcP (Alexander, Va., 1854) ; id., (The Life and Death of Sam, in Virginia* (Richmond 1856) ; Woodburn, J. A., (Political Parties and Party Problems in the United States) (New York 1914).

KNOX, George William, American Pres¬

byterian clergyman: b. Rome, N. Y., 11 Aug.

1853; d. 1912. He was graduated from Ham¬

ilton College, Clinton, N. Y., in 1874, and from Auburn Theological Seminary in 1877. He subsequently was employed in missionary la¬

bors in Japan and was professor of philosophy and ethics in the Imperial University of Japan in 1880. He made profound researches in Jap¬

anese philosophy and had no equal among American scholars in his knowledge of Con¬

fucianism in its Japanese form. On returning to the

United States he became pastor of a Presbyterian church in Rye, N. Y., and was a professor at Union Seminary, New York, 1897-99, and thereafter professor of philoso¬

phy and the history of religion. He published (in English) (A Japanese Philosopher)

(1893) ; 'The Christian Point of View) (1902) ; 'The Direct and Fundamental Proofs of the Christian Religion) (1903; 1908), re¬

garded as one of the great books of the cen¬

tury; Japanese Life in Town and Country) (1904) ; Umperial Japan* (1905) ; 'Spirit of the Orient) (1906) ; (The Development of Re¬

ligion in Japan* (1907) ; (The Gospel of Jesus) (1909) ; (in Japanese) (A Brief Sys¬

tem of Theology* ; 'Outlines of Homiletics> ; 'Christ, the Son of God) ; (The Basis of Eth-

ics) ; (The Mystery of Life.*

KNOX, noks, Henry, American general

and statesman: b. Boston, Mass., 25 July 1750; d. Thomaston, Me., 25 Oct. 1806. He was the seventh son of William Knox, of Scotch ex¬

traction, who settled in Boston and became a shipmaster. After the father's death in 1762, the son was employed by a Boston bookseller, and in 1771 he opened a bookstore of his own.

When a young man he threw in his lot with the patriot cause and spent his leisure studying books on the military art, supplementing his reading by observing and questioning the Brit¬

ish officers stationed in Boston. He also joined a military company and, upon its or¬

ganization, became second in command of the Boston

grenadier corps. He was interested in athletics and sports and, in 1773, while hunt¬

ing lost two fingers of his left hand. His marriage (16 June 1774) to Lucy Flucker, the daughter of an aristocratic Loyalist of Boston, did not prevent him from joining the Colonial army at the outbreak' of hostilities in the spring of 1775. He fought in the battle of Bunker Hill, acting as aide of General Ward, and then aided in constructing the defenses of the camps around Boston. The army being in pressing need of artillery, Knox proposed to Washing¬

ton the plan of bringing heavy cannon and stores from Fort Ticonderoga near the Cana¬

dian frontier. He set out (15 Nov. 1775) on this perilous enterprise with a squad of mounted men. In the face of great difficul¬

ties he succeeded in getting 55 (by some ac¬

counts 59) guns, loaded them on sleds, with 23

boxes of lead and a barrel of flints, and reached Cambridge in safety (24 Jan. 1776). For this brilliant exploit he was warmly complimented by Washington. After his return he received his commission as colonel of the one artillery regiment, the appointment having been made by the Continental Congress (17 Nov. 1775).

The cannonade of Knox's batteries (on the nights of 1-4 March 1776) enabled General Thomas to take possession of Dorchester Heights, which resulted in the evacuation of Boston by the British forces. In the summer of 1776 he was stationed at New York City with Washington, who found him a true friend and an able officer. In December he was pro¬

moted to brigadier-general of the artillery. He distinguished himself in the battles of Trenton and Princeton and took part in the engage¬

ments at Brandywine, Germantown and Mon¬

mouth. He helped (May 1777) General Greene in planning the defenses of the Hudson River.

In the trying winter of 1777-78 he was in camp at Valley Forge, with his young wife.

Many of Washington's letters refer to Knox in terms of high appreciation. He rendered valu¬

able service in the operations against Cornwal¬

lis in October 1781, his skill as an artillerist being praised by the Frenchman, De Chastellax.

He was made major-general (22 March 1782) and appointed to the command at West Point (29 Aug. 1782). Upon him devolved the deli¬

cate task of disbanding the army late in 1783.

He had already formed the Society of the Cin¬

cinnati (q.v.) to keep alive the friendships of officers formed during the war.

Congress appointed Knox Secretary of

War (8 March 1785), a position he worthily filled for 10 years. In 1794 he was also at the head of the Navy Department, just organized.

Owing to insufficient salary, he resigned from Washington's Cabinet (2 Jan. 1795). His re¬

maining years were passed on his estate, Mont¬

pelier, near Thomaston, Me. Consult Brooks, N., (Henry Knox, a Soldier of the Revolu¬

tion (New York 1900) ; Drake, F. S., 'Life and Correspondence of Henry Knox* (Bos¬

ton 1873) ; Lindley, E. M., 'Montpelier, Home of Major-General Henry Knox) (in Magazine of American History, Vol. XVI, p. 121, New York 1886) ; Stimpson, M. S., 'Thomaston —The Home of Knox) (in New England Maga¬

zine, N. S. Vol. XXIX, p. 730, Boston 1904).

KNOX, John, Scottish Protestant re¬

former: b. Giffordgate, Haddington, Scotland, 1505; d. Edinburgh, 24 Nov. 1572. (The So¬

ciety of Antiquaries of Scotland discussed the subject of his birthplace in 1858, when Mr.

John Richardson of Haddington brought for¬

ward evidence that he was born in Gifford¬

gate, a suburb of Haddington, and not in Gif¬

ford, a village near that town. He was sup¬

ported in this view by Mr. Laing, the editor of the reformer's works). After receiving his preliminary education at the grammar school of Haddington, he went in 1521 to the Univer¬

sity of Glasgow, where for several years he studied scholastic philosophy and theology.

Noted as a master of dialectic subtleties, he was ordained prior to 1530 and became a teacher of philosophy at Saint Andrew's. The study of the fathers, especially of Jerome and Augustine, had shaken his religious opinions as 496

early as 1535, but it was not till 1542 that he became an avowed and marked reformer. The long period of silence, before in mature age he explained his views with completeness, has been regarded as proof that he was naturally of a prudent and peaceful disposition and not a turbulent partisan, as his after career would indicate. His reprehension of certain practices of the Church caused him to retire from Saint Andrews to the south of Scotland, where he was declared a heretic. After the death of his friend, George Wishart, he remained in retire¬

ment till he took refuge with many other Prot¬

estants (1547) in the castle of Saint Andrews, which the regent was vainly attempting to re¬

duce. There for the first time he became known as a powerful preacher against the pa¬

pacy. The regent, re-enforced by a French squadron, obliged the garrison to . surrender.

The terms of the capitulation were violated and Knox with his comrades was transported to France, where he was imprisoned on the gal¬

leys for 19 months. He experienced extreme hardships, and on his release (1549) directed his course to England, where he was appointed to preach at Berwick and at Newcastle and be¬

came one of the chaplains of Edward VI. For the boldness of his discourses he was several times called to account, but was able to vindi¬

cate himself. A bishopric was offered to him, but he declined it from scruples as to the divine authority of the episcopal order. On the ac¬

cession of Queen Mary he fled from England to Dieppe and passed thence to Geneva, where, after taking part in the memorable troubles at Frankfort and after a short visit to Scotland, he became pastor (1556) of a small English congregation. The two years of his residence in Geneva, in the society of Calvin, Beza and other learned men, were among the happiest of his life. While in Scotland he had been cited to appear before an assembly of the clergy to be held at Edinburgh, and a-fter his return to Geneva the citation was renewed and he was condemned to be burned as a heretic and the sentence was executed on his effigy. Against this condemnation he published the Appella¬

tion of John Knoxe.* He also wrote a tract entitled the (First Blast of the Trumpet against the Monstrous Regiment of Women) (1558), a vehement

attack on the political government of women, at a time when Mary of Guise was re¬

gent of Scotland and Mary Tudor queen of England, and the nearest in succession to both thrones were females. Invited by. the Scottish Protestants to resume his labors in his native country, he landed at Leith in 1559. The queen regent had laid her plans for the forcible over¬

throw of the reformation. At a convention of the nobility and clergy in Edinburgh all the de¬

mands of the Protestants were refused. Sev¬

eral of the reforming preachers were summoned to appear at Stirling for trial, but by the dis¬

simulation of the regent were prevented from attending and then outlawed for their failure.

Knox hastened to meet them at Perth, where he preached against the ^idolatry of the mass®

and the veneration of images. At the conclu¬

sion of the service there was a violent out¬

break. The images in the churches were de¬

molished, the pictures torn from the walls and trampled under foot, the holy recesses invaded and the (

ciscan friars and the Carthusian monastery.

The queen regent advanced upon Perth with an army, but, finding the Protestants well pre¬

pared for resistance, proposed terms of ac¬

commodation which were accepted. . The Prot¬

estants, in order to consolidate their strength, formed a religious bond or covenant and began to be distinguished as the congregation and their leaders as the lords of the congregation.

Iconoclasm was a prominent feature in the Scottish reformation. Events similar to those at Perth followed at Stirling, Lindores, Cupar, Saint Andrews and other places. . Knox had preached in the cathedral of Saint Andrews with such success that the magistrates united with the inhabitants in desolating the churches and monasteries and in establishing the re¬

formed worship. Meantime civil war raged throughout the kingdom between the regent, assisted by French troops, and the lords of the congregation. In political as well as ecclesias¬

tical affairs Knox was a conspicuous adviser and took up his residence in Edinburgh after an extensive circuit through the southern and eastern counties. After a contest of 12 months, the vigorous assistance rendered by Elizabeth and the death of the queen regent while the English troops were investing Edinburgh led to a truce and to the summons of the Parlia¬

ment to settle differences. Parliament assem¬

bled in August 1560, the reformed religion was established and Roman Catholicism interdicted by law in Scotland. Soon after the arrival of the young Queen Mary (21 Aug. 1561) she summoned the influential and noted reformer to her presence. Six interviews are recorded between him and the queen, and the questions which she raised were discussed by him with a rude vehemence and rigor, which once drove her to tears. She caused his arrest on a charge of treason in 1563, but all the councillors ex¬

cept the immediate dependents of the court voted for his acquittal. The vehemence of his public discourses led him into frequent difficul¬

ties. In 1562 he disputed publicly for three days with Abbot Quentin Kennedy at May-

bole; in 1565 he quoted certain texts which gave

offense to the court and was for a short time prohibited from preaching. He fled from Edinburgh when the queen returned from Dun¬

bar after the death of Rizzio ; and he preached a sermon at the coronation of the infant king at Stirling (29 July 1567). Under the brief re¬

gency of Moray, the work of Knox seemed to be completed, but after the assassination of Moray, civil and religious confusion returned under the regency successively of Lennox and Mar. Weakened by a stroke of apoplexy in 1570, Knox yet reappeared in the pulpit, but so violent was the enmity excited by his animad¬

versions that he left Edinburgh for. Saint An¬

drews, 5 May 1571. He returned in the fol¬

lowing year and his last energies were put forth in denunciations of the perpetrators of the massacre of 'Saint Bartholomew's. The doctrines of Knox embraced a Calvinistic creed and a Presbyterian polity. The ^Order of Geneva,® a liturgy which he shared in pre¬

paring for the use of the church at Frank¬

fort, and subsequently employed in his congre¬

gation at Geneva, was introduced into Scottish KNOX

Protestant churches in 1565. His character was marked by a stern realism, which could be beguiled by no social pretensions, no conven¬

tional dignities, no pompous traditions. From this sprang his scornful bitterness and his in¬

sensibility to the social graces and refinements which Mary exhibited. He was not a thinker except on political topics. His (History of the Reformation of Religioun in the Realme of Scotland) is the best known of his writings.

The liturgy prepared by him has been edited by Sprott under the title (The Book of Common Order of the Church of Scotland) (London 1911). Consult

(John Knox and the Church of England }

(1875) ; Carrick, (John Knox and his Land*

(1902) ; Hart, A. B., (John Knox as a Man of the WorlcP (in American Historical Re¬

view, Vol. XIII, Lancaster, Pa., 1908).

KNOX, John, English military chronicler: d. Berwick, England, 1778. He became an en¬

sign in the 43d Foot, rose to be captain, was present at the sieges of Louisbourg in 1757

and 1758, served in Wolfe's forces before Que¬

bec, and remained in Canada until after the capitulation of Montreal in September 1760.

His historical Journal of the Campaigns in North America, 1757-60, 5 is the most valuable first-hand record of the events described that has ever been published. Consult Dr. A. G.

Doughty's edition, published by the Champlain Society (3 vols., 1914, 1916).

KNOX, John Barnett, American lawyer:

b. Talladega, Ala., 16 Feb. 1857. His educa¬

tion was received at private schools, and after studying law, he was admitted to practise in 1878. Ten years later he removed to Annis¬

ton, Ala., where he has since resided, and soon became one of the most prominent lawyers in the State. He has taken an important part in State politics, was delegate to Democratic Na¬

tional conventions of 1892, 1896 and 1912 and was twice chairman of the Democratic State Executive

Committee. In the State Constitu¬

tional Convention of 1901 he was the presi¬

dent. In the debates of this convention and in the framing of the constitution he took an ac¬

tive part. His arguments on the legal prob¬

lems involved showed that he was a master of constitutional law.

KNOX, John Jay, American financier: b.

Knoxboro, N. Y., 19 March 1828; d. New York, 9 Feb. 1892. He was graduated at Ham¬

ilton College in 1849, and was a banker till 1862. In that year he received an appointment from Secretary Chase, and subsequently had charge of the mint coinage correspondence of the Treasury Department, becoming in 1867

deputy comptroller of the currency. A bill which he proposed was passed with a few mod¬

ifications and is known as the Coinage Act of 1873. In 1872 he was appointed comptroller of the currency, resigning in 1884, to become president of the National Bank of the Repub¬

lic, New York. In addition to various Re¬

ports and addresses on financial subjects he published (United States Notes, a History of the Various Issues of Paper Money by the Government of the United States* (New York 1884, revised 1887). Some years after his death there was brought out by B. Rhodes and E. H. Youngman, his (A Plistorv of Banking vol 16 — 32

in the United States* (New York 1900). Con¬

sult Chamber of Commerce of the State of New York, (Tribute to the Memory of John Jay Knox) (New York 1892).

KNOX, Philander Chase, American law¬

yer and statesman : b. Brownsville, Pa., 6 May 1853; d. Washington, D. C., 12 Oct. 1921.

Graduated, Mount Union College, Ohio, 1872 : studied law and was admitted to the bar in 1875. He was assistant United States district attorney for the western district of Pennsyl¬

vania in 1876-77; resigning this position he took up the practice of law in Pittsburgh in partner¬

ship with J. H. Reed. The firm's practice grew rapidly and Knox became known as one of the most successful corporation lawyers in the United States ; in 1892 he was counsel for Car¬

negie during the Homestead strike. April 1901

he was appointed Attorney-General of the United States and held this office till June 1904

when he became senator from Pennsylvania for the unexpired term of Senator Quay, and in 1905 was elected for a full term. He served on the Judiciary Committee and took a promi¬

nent part in the debate relating to the Panama Canal. As Attorney-General he was involved in the ^anti-trust® agitation, and in 1902 brought suit against the Northern Securities Company and the so-called <(Beef Trust® on the ground that they were violating Federal statutes. In 1908 Senator Knox received 68 votes for the Presidential nomination in the Republican Na¬

tional Convention. In 1909 he became Secretary of State in President Taft's Cabinet and served until 1913. In 1912 he made a tour of the Latin-American countries for the purpose of cementing closer relations between them and the United States. He was re-elected to United States Senate in 1916 for term 1917-23. He published (Future of Commerce* (1908);

^International Unity) (1910); (Speeches*

(1912), made during his tour of South America.

KNOX, Robert, Scotch writer on Ceylon: b. about 1640; d. 1720. He, together with his lather — a commander in the East Indian Company's service — and 14 others were taken into captivity by the Ceylon natives when forced by storms to put into Cottiar Bay in 1657. His father died in captivity but the son escaped, after several unsuccessful attempts, after 19 1/2 years, to Aripo, a Dutch settlement.

The East India Company, in 1680, took him into their service and he made a number of other voyages through the Indian seas, becom¬

ing a commander. He wrote a number of let¬

ters to his cousin, John Strype, now preserved in the University Library, Cambridge, but most interesting reading is furnished by his account of Ceylon, the first ever written. It is entitled (An Historical Relation of the Island of Cey¬

lon in the West Indies ; together with an Ac¬

count of the Detaining in Captivity the Author and divers other Englishmen now living there, and of the Author's Miraculous Escape* (Lon¬

don 1681) ; it has been translated into Dutch, French, German, etc.

KNOX, Thomas Wallace, American

journalist and traveler: b. Pembroke, N. H., 26

June 1835; d. New York, 6 Jan. 1896. He lost his parents -while still a small child and was brought up on a farm, but managed to get enough schooling to become head of an acad¬

emy at Kingston, N. H., in 1858. He went to

Colorado in I860 and there engaged in journal¬

ism and during the Civil War served as volun¬

teer aide, rising to the rank of lieutenant-

colonel. For a time he acted as war corre¬

spondent for the New York Herald. Some of his war letters were published as (Camp-fire and Cotton Field) (New York 1865). With T. M. Cook he wrote (Horatio Seymour) (New York 1868). He made a journey around the world as a newspaper correspondent in 1866

and again in 1877. and wrote many popular books for young people. From 1865 on he re¬

sided, when not traveling, in New York in the literary and artistic life of which he took an active part. He was one of the founder and early officers of the Lotos Club. Among his other very numerous published works are (Overland through Asia5 (New York 1870) ; Underground World5 (1873) ; (How to

Travel5 (1880) ; (Boy Travelers Series) (15

vols., 1880-94) ; (Lives of Blaine and Logan) (1884) ; (Decisive Battles since Waterloo 5

(1887) ; (Life and Work of Henry Ward Beecher5 (Hartford 1887) ; (The Life of Rob¬

ert Fulton; and a History of Steam Naviga¬

tion (New York 1887) ; (The Republican Party and its Leaders) (New York 1892) ; (The Lost Army5 (1894); ^Hunters Three5

(1895);

KNOX, William, British official and

pamphleteer: b. in Ireland, 1732; d. Ealing, near London, 25 Aug. 1810. He was appointed by Lord Halifax (

He suggested a colonized aristocracy and rep¬

resentatives in Parliament, then (1765) wrote two pamphlets defending the Stamp Act, and his services were dispensed with. He was Un¬

der Secretary of State for America from 1770—82. Lord North (1776) based conciliatory propositions on Knox's views. In 1772 the (

version of the place of secretary of New York®

was granted to him without pay. The prov¬

ince of New Brunswick, Canada, was created in 1784 at his suggestion, lands there being granted to the expelled Loyalists. He wrote numerous pamphlets, most important of which were (A Letter to a Member of Parliament, wherein the Power of the British Legislature and the case of the Colonists are briefly and impartially considered-* (1764) ; {The Claim of the Colonies to an Exemption from Internal Taxes imposed by authority of Parliament ex¬

amined* (1765) ; these two pamphlets lost him his post. (A Defense of the Quebec Act5

passed through two editions in 1774, its year of issue; Considerations on the State of Ire-

land) was written in 1778; a number of pamphlets were written by him on controver¬

sies in the Church.

KNOX COLLEGE, a coeducational in¬

stitution, founded in 1837 at Galesburg, Ill., as Knox Manual Labor College. The school was opened in 1841 and in 1857 the name was changed to Knox College. The original plan for founding and maintaining the school was to secure subscriptions to the amount of $40,000 and to purchase lands in the Missis¬

sippi Valley, at government price, the lands to be resold at a profit. Every subscriber who purchased 80 acres of land was given free tui¬

tion for one student for 25 years. In 1917 the productive fund amounted to about $400,000.

There are in the library about 13,700 volumes ; there were connected with the school 34 in¬

structors and professors and about 600 stu¬

dents. A music department was established in 1883. The famous Lincoln-Douglas debate, in 1858, was held on the grounds of this college.

The 40th anniversary of this event was cele¬

brated on 7 Oct. 1898, President McKinley and his Cabinet taking part.

KNOX-LITTLE, William John, Eng¬

lish Anglican clergyman and author : b. Stu-

artstown, County Tyrone, Ireland, 1839. He was educated at Cambridge University, took or¬

ders in the Church of England; and after holding several curacies was rector of Saint Alban's, Cheetwood, Manchester, 1875-85.

Since 1885 he has been canon residentiary of Worcester Cathedral and vicar of Hoar Cross.

He is an ((advanced® churchman and has sev-

ral times visited the United States, where he has preached in many Episcopal churches as¬

sociated with High Church teaching. He is a popular religious writer and among his many books are (Meditations on the Three Hours'

Agony of Our Blessed Redeemed (1877) ; (The Broken Vow: a Story) (1887); (The Child of Stafferton5 (1888) ; (The Perfect Life> (1899) ; (Studies in South Africa) (1899); (Holy Matrimony5 (1900); Con¬

firmation and Holy Communion5 (1901) ; (The Conflict of Ideals in the Church of England5

(1905).

KNOXVILLE, noks'vfl, Iowa, city and

county-seat of Marion County, on the Chicago, Burlington and Quincy and on the Chicago, Rock Island and Pacific railroads, 35 miles southeast of Des Moines. Here is the State Industrial Home for the Blind, courthouse, high school and public library. It is the cen¬

tre of an extensive coal-mining, stock-raising and agricultural district and has flour-mills, canneries and machine shops. Pop. Pop. 3,523.

KNOXVILLE, Tenn., city, county-seat

of Knox County, 110 miles northeast of Chat¬

tanooga and 160 miles east of Nashville, is lo¬

cated on the main lines of the Southern and the Louisville and Nashville railroads and on the Tennessee River, at the head of steam navigation. It is connected with South Knox¬

ville, on the south side of the river, by an im¬

posing steel bridge. Eleven railway lines radi¬

ate in all directions from the two railway sys¬

tems ; and 72 passenger trains go in and out of Knoxville daily.

East Tennessee scenery is noted for its vari¬

ety and beauty, and Knoxville is its central point. The variety of scenery around Knox¬

ville embraces river, valley, mountain, forest — all within easy reach. Less than an hour’s ride are the foothills of the Great Smoky Mountains. In the Appalachian Mountains splendidly equipped hotels and cottages are open to guests. The air, rarefied and made pure by the forests of the mountains and hills of the country around about, is both healthful and

invigorating. Numerous watering places, boasting mineral and fresh waters, are within easy reach of Knoxville. In point of climate and scenery, Knoxville is unsurpassed. The KNOXVILLE

city is laid out with an idea to beauty and the ' architecture of residences corresponds to the general street plan.

Natural and Economic Resources. — This

particular section of East Tennessee has al¬

most inexhaustible quantities of resources of coal, zinc, copper, iron, timber and marble.

Knoxville, is in the heart of the hardwood sec¬

tion, large quantities of which are shipped throughout the country. The lumber dealers of Knoxville proper do an annual business of ap¬

proximately $2,500,000. Practically all Tennes¬

see marble is quarried in the Knoxville district.

Annual shipments of marble approximate

$5,000,000 in value, and even then the ground is scarcely scratched, for the hills surround¬

ing Knoxville are literally filled with marble.

It is the leading industry in Knoxville. Tennes¬

see marble is noted for its variety, beauty, strength and durability, and therefore has all of the requisites for satisfactory building ma¬

terial, both exterior and interior. It is pro¬

nounced by Dr. Albert Colby, School of Mines, New York, as the purest marble he ever ex¬

amined. It will stand 20,000 pounds per cubic inch

crushing strain. Its absorption is only .007 per cent. Knoxville is within a few miles of the great Tennessee-Kentucky coal area.

Some 18,000,000 to 20,000,000 tons of coal are handled through Knoxville jobbers annually, a large proportion of which passes through Knoxville. A zinc producing plant now ships some 1,200 tons of ore per day and additional capacity is in contemplation. Nearly 400 men are now employed at the two shafts now being operated. The copper industry in the Knox¬

ville district ships annually copper to the value of many millions of dollars. There is more undeveloped hydro-electric power within 50

miles of Knoxville than within any other equal area of the United States. It is estimated that the amount of power thus available is upwards of 1,000,000 horse power. The topography of the country in the Knoxville district is par¬

ticularly adapted to the harnessing of the water in basins formed by the mountains and, as there are many mountain streams well located for the establishment of power plants, the pro¬

spective enormous development of hydro¬

electric power in this section is a natural one.

The Ocoee River Power Company supplies Knoxville with its power. The Aluminum Company of America has one of their branch plants within a few miles of Knoxville. The use of electric current as heat gives them the best results in the process of making aluminum pig. The present site of the Aluminum Com¬

pany's plant in the Knoxville district covers some 600 acres of ground. The plant as at present constructed is only a nucleus for the larger plant which will approximate in size the plants at Niagara Falls, Pittsburgh and Mas-

sena. The company now ships from its plant near Knoxville aluminum pig to the value of several

millions of dollars annually.

Business Conditions. — The three rail¬

roads in Knoxville haul over 1,524,000 tons of freight (in and out) annually. Knoxville has 50 jobbing houses doing a business of $50,-

000,000 annually, while its manufacturing ap¬

proximates $30,000,000 annually. The coal handled by Knoxville jobbers runs around $20,000,000 annually. Knoxville's marble brings in $3,000,000 to $4,000,000 annually, while the zinc, aluminum and copper industries in the Knoxville district do a volume of business run¬

ning well up into the millions. Money for all legitimate business purposes is available at all times in Knoxville.

Financial Strength. — Owing to the geo¬

graphic location of Knoxville in relation to inexhaustible quantities of economic and natural resources, and of the diversification of interests in the Knoxville district, this city is always the last to feel any sort of business depression.

At the beginning of the World War in 1914, Knoxville was the only city in the entire South to show an increase in bank clearings, and one of the five cities in the United States to show an increase in clearings during that period.

During the first six months of the war — a period of lowered financial vitality — Knox¬

ville showed decreased bank clearings of less than 5 per cent, as compared with decreases at other important points reaching as high as •

35 and 40 per cent. The figures given below show that as a financial centre Knoxville is stronger than ever before in the history of the city. Its rating in bank circles throughout the country is

high. There are now 12 financial institutions in Knoxville, of which six are national banks. Both banking capital and deposits have materially increased in the past 10 to 15 years. The banking capital of Knox¬

ville and the surplus and profits are now $4,090,036.13, while the deposits total at this time $19,902,589.13. In 1901, the banking capital and the surplus and profits were only $1,256,-

205.81, and the deposits $4,152,220.08. In the past 18 years, therefore, the banking capital and surplus and profits have increased over 300 per cent, while the deposits during that time show an increase in almost equal propor¬

tion. The combined resources of Knoxville's banking institutions are approximated $24,-

000,000. Bank clearings in 1901 were $32,496,-

361.73, while in 1917 they were $125,097,419.84.

Government. — Knoxville has a commis¬

sion form of government, consisting of a mayor and four commissioners, elected by the people for a term of four years. The assessed value of property for taxation is $45,000,000

which is not exceeding 75 per cent of its actual value. The bonded debt of the city is $3,942,283, most of which was created for constructing sewers, building bridges and other public im¬

provements. The city is supplied with pure wholesome water from the Tennessee River, by a municipality owned plant. The lighting plants, gas and electric, are owned by private corporations. Practically all telephone wires are underground. Everything is sightly. The main business thoroughfare has all the wires —electric light, telegraph and telephone — in underground conduits. There are 28 miles of paved streets in the city. The city fire depart¬

ment is a striking example of efficiency, it being partially motorized. The street clean¬

ing department and police department are motor-equipped. The traction company has 53

miles of track in operation and 136 cars in serv¬

ice. Cheap electric current and gas are avail¬

able. The city operates a splendidly equipped free public library. A marble post office, with seven sub-stations throughout the citv and suburbs, ensures prompt mail service. Youth¬

ful violators of the law are tried in a juvenile court. While awaiting trial they are kept in a 500

detention-house instead of being sent to jail.

Charities are looked after by a central organiza¬

tion known as The Associated Charities, which is conducted under the auspices of the city and other dispensers of charities.

Knoxville is headquarters for the Third Regiment of the National Guard of the State of Tennessee. Knoxville's chief benevolent institu¬

tions are the Industrial School for Juveniles, sustained at the expense of Knox County, ca¬

pable of housing and giving instruction to 200

girls and boys; the Home for Aged Women and an orphanage. The Knoxville General Hos¬

pital was erected at a cost of more than $50,000, and is one of the leading institutions of its kind in the South.

The City Market. — The city market is unqualifiedly the best in the South, where the housewife can find, at reasonable prices, a wide variety of foodstuffs.

A rich agricultural coun¬

try surrounds Knoxville. Truck farming is practised on a large scale. Supplementing the market, farmers' wagons each morning bring their produce to town. The wagons flank both sides of the market house, and sell direct to the consumer. This makes for cheap living con¬

ditions, and, being under the supervision of the city, is excellently managed.

Social Life. — The people of Knoxville are most hospitable. Strangers are made to feel at home in short order. Knoxville is truly a "home city.® Knoxville has an efficient Y. M.

C. A. and Y. W. C. A. There are several men's clubs of different kinds, including the Cherokee Country Club, University Club, Cumberland Club, Irving Club, Elks' Home, Eagles' Home and a number of others. Among the women's clubs and societies are included the Lyceum and Art Museum, Nicholson Art League, Newman Circle, Ossoli Circle, United Daughters of the Confederacy and Daughters of the American Revolution. There are 35 secret orders in Knoxville and suburbs. There are five posts of the G. A. R. and U. C. V. Camps, one Sons of Veterans and one Society of the Sons of the Revolution. Knoxville has eight hospitals and sanitariums; also two training schools for nurses. There are 106 white and 29 colored churches, with 15 different denominations, in the city and suburbs.

Home and Amusements. — Knoxville has

well-constructed and well-kept apartment-

houses. Many new dwellings, quite a few being of the bungalow type, are constantly being erected. Rents are reasonable in Knoxville.

Convenient car service to all of the outlying suburbs makes living within 15 to 20 minutes'

ride from the city both a convenience and a

pleasure. All suburbs are growing rapidly.

There are several parks in and around the city.

The most prominent of these is beautiful Chilhowee Park, the site of the National Con¬

servation Exposition. Two artificial lakes only serve to accentuate the attractiveness of this popular park. What nature has failed to supply to beautify the place, Knoxville's enterprise has abundantlv supplied. The city government has well in hand plans for additional parks and playgrounds. Eight theatres and moving pic¬

ture houses furnish varied entertainments both afternoon and evening. Knoxville has two bands and orchestras.

School System. — There are splendidly

equipped city schools, county schools, private schools, parochial schools, the State Deaf and Dumb School and the State University. There are two Catholic and one German-Lutheran parochial schools, three private schools and five high schools. Manual training and domestic science are taught in the several high schools.

A part-time school curriculum obtains in the Knoxville High School. Graduates of Knox¬

ville High School are admitted to West Point without test, upon recommendation of the prin¬

cipal or superintendent of the high school.

The public school student enrollment is 13,000.

The State enforces a compulsory school law.

Approximately 80 per cent of the scholastic population can read and write. The Summer School of the South for teachers is also held in Knoxville, under the auspices of the State University. The Summer School has an annual attendance of more than

2,000 teachers from all over the country, and is the oldest Summer School in the South. The University of Ten¬

nessee is a coeducational institution. The loca¬

tion of the State Experiment Station here makes it possible to conduct agricultural exten¬

sion courses on a large scale. The University of Tennessee taught a larger number of indi¬

viduals during its last session than any other university in the South. The number taught reached nearly 3,500, while the agricultural ex¬

tension course enrolled 2,400. It is one of the 10 Southern colleges whose bachelor degrees are accepted by the University of Berlin.

History. — Named in honor of General

Knox of Revolutionary fame, the first Secre¬

tary of War, Knoxville was founded in 1792 by Gen. James White, who had been an officer in the American army in the War for Independ¬

ence. In the valley of East Tennessee, where Knoxville is located, civilization was first planted west of the Alleghany Mountains.

The pioneers faced the red men and an un¬

broken forest as they pushed forward with axe and rifle to plant the church and the schoolhouse and law and order. The city, therefore, has been for long years the centre of a region of country embracing eastern Kentucky, southwest Vir¬

ginia, we'stern North Carolina and North Georgia, and the commercial metropolis of this section. Some of its wholesale houses go back to the days when transportation was by wagon and goods delivered over almost impassable roads.

During the Civil War of 1861 to 1865 the city was alternately taken and retaken by the respective armies and suffered greatly. It be¬

gan to grow actively in 1880, and since that time it has taken its place abreast of other Southern cities that date their growth from about that period. Being an old city it has a population which is essentially conservative, many of whom date their ancestry back to the original founders of more than a century ago. It has always been a university town, the University of Tennessee, located here, having been founded in the year 1807.

Climate and Population. — Knoxville is

one of the healthiest cities in the United States.

It is 1,000 feet above sea-level. An equable climate causes few extremes in heat or cold.

The average mean temperature for a period of 33 years is 57 degrees. The average tempera¬

ture for the three hottest months of the year June, July and August, is less than 75 degrees, while for the three coldest months, December, KNOXVILLE — KNYPHAUSEN

January and February, it is 31.4 degrees. Sud¬

den changes in temperature are comparatively rare. The growth of population is shown in the following census statistics: (1880) 9,693; (1890) 22,535; (1900) 32,637; (1910) 36,346.

The Federal census (1920) gives Knoxville a population of 77,818, about 20 per cent of which is colored.

O. T. Stephens,

General Secretary, Knoxville Board of Com¬

merce.

KNOXVILLE, Siege of. On 3 Nov. 1863,

before the battle of Chattanooga (q.v.), General Bragg sent General Longstreet to capture or destroy the Union army under General Burnside at Knoxville. The next day Longstreet moved from Tyner's Station with the divisions of McLaws and Hood, two artillery battalions and Wheeler's cavalry, and on 14 November crossed the Tennessee near Loudon. After the engage¬

ment at Campbell's Station (q.V.), Burnside re¬

sumed his march, reaching Knoxville on the morning of 17 November, Longstreet closely following and laying siege to the town. The town had been thoroughly fortified, the line of defense extending from the Holston River on the left, a double line of works fronting west, a strong work called Fort Sanders on the northwest salient and a line from that point across the railroad and again to the right as far as the river. On the south side of the river were some detached works connected with the town by a pontoon bridge. On the night of 16 November communication with Cumberland Gap was cut and by the night of the 18th the siege was well established. Long¬

street believed he could starve out Burnside and compel his surrender but Grant's success at Chattanooga rendered Longstreet's position critical, wherefore he resolved to carry the works by assault. On the night of 28 Novem¬

ber he advanced his sharpshooters to within rifle range of the Union defenses and prepared a column to attack Fort Sanders. Early the next morning the assaulting party of three brigades approached unharmed to within 100

yards of the fort. At dawn Longstreet opened a furious artillery fire and a half hour later his columns charged the fort. The Union troops had placed in front of the fort an abatis and

entanglements of wire, on reaching which the forward Confederates became con¬

fused, but the heavy mass behind them pushed resolutely onward and some gained the ditch and the parapet. The Union guns then opened up with triple charges of canister and the in¬

fantry shot down the defenseless Confederates in the ditch, which soon was piled high with dead and wounded. After a long fight Long¬

street withdrew with a loss of 1,000 killed, wounded and prisoners, while Burnside lost only 13 killed and wounded. Meanwhile Sher¬

man had been sent from Chattanooga with re¬

inforcements for Burnside and as Sherman's advance prevented his junction with Bragg, Longstreet on the night of 4 December passed around the north side of Knoxville and took up his line of march to Holston, Sherman reaching Knoxville the same day. A force was sent after Longstreet but it proved inadquate to cope with him and accordingly he moved without hindrance to the south side of the Holston where during the winter he con¬

tinued to harass the Union troops in Tennessee, in the spring joining Lee for the campaign of 1864. Meanwhile at his own request Burnside was relieved from duty and on 11 December the command was formally transferred to Gen.

J. G. Foster. Sherman left a part of his troops at Knoxville and returned with the rest to Chattanooga. Consult (Battles and Leaders of the Civil War> (Vol. Ill, pp. 731-752, New York 1888) ; Cist, H. M., (The Army of the Cumberland) (pp. 256-258, New York 1882) ; Cox, Jacob D.,

tary History (Vol. VI, pp. 264-267; Vol. VII, pp. 174-176; Vol. VIII, pp. 123-124, Atlanta 1899) ; Nicolay, J. G., and Hay, John, (Life of Lincoln* (Vol. VIII, pp. 155-188, New York 1886-96) ; Woodbury, A., (Burnside and the Ninth Army Corps)*

(pp. 327-351, Providence 1867).

KNUDSON, nood'son, Albert Cornelius,

American theologian : b. Grandmeadow, Minn., 23 Jan. 1873. He was graduated at the Uni¬

versity of Minnesota (1893), received the de¬

gree S.T.B. at Boston University (1896), studied at the School of All Sciences, Boston (1896-97), and the universities of Jena and Berlin (1897-98). In 1900 he received the de¬

gree of Ph.D., Boston University. He was appointed professor of church history at the Denver University (1898-1900), professor of philosophy and the English Bible at Baker University (1900-02), and professor of the English Bible and philosophy at Allegheny Col¬

lege (1902-06), professor of Hebrew and the Old Testament exegesis at Boston School of Theology from 1906. He wrote (The Old Testament Problem* (1908) and (The Beacon Lights of Prophecy) (1914).

KNUDTZON, knut'son, Jorgen Alexan¬

der, Norwegian Semitic scholar and philolo¬

gist: b. Trondhjem, 9 Sept. 1854. He studied at the Trondhjem Cathedral School, Christiania University, Berlin and Leipzig. He became doc¬

tor of philosophy at Christiania (1889) and gave Semitic lectures on the Old Testament (1890-

91) at the university. Renouncing theology, he devoted himself to Assyriology. He wrote many articles on philological, especially Semitic and Assyrian, subjects. Among such are (Zur assyrischen und allgemeinen semitischen Gram-

matik) (1891-92) ; (Assyrische Gebete an den Sonnengott* (1893) ; (Die El-Armarna Tafeln) (1899-1901); (Die Arzawa — Brief e die altesten

Urkunden in indo-germanischen Sprache)

(1902).

KNURR-AND-SPELL. See Nur-and-

Spell.

KNYPHAUSEN, kmp'how-zen, Baron

Wilhelm von, German soldier : b. Liitzberg, 4

Nov. 1716; d. Cassel, 7 Dec. 1800. Educated at Berlin, he entered the Prussian army in 1734, in which he became in 1775 a general officer under Frederick II (the Great). He came to the United States in that year as second in command of the Hessians in the English serv¬

ice, and superseded General von Heister as commander-in-chief in 1777. He fought at Long Island, White Plains, Brandywine and Monmouth ; and during the temporary absence of Clinton in 1780, commanded New York.

In 1782 he returned to Germany, where he later 502

KOALA — KOBELL

became military governor of Cassel. He was a capable soldier, and had no high opinion of his unreliable mercenaries.

KOALA, a remarkable marsupial (Pha -

scolarctos cinereus) of the family Phalangeridce, found chiefly in the interior of New South Wales, and known to the colonists as (

scending only occasionally to dig for roots.

It is especially active at night and feeds on leaves and buds of eucalyptus trees. It is timid and defenseless, and is killed with clubs by the Australian blackfellows, who eat its flesh.

(See Wombat). Consult authorities cited under

Marsupialia.

KOBBE, kob'ba, Gustav, American au¬

thor and journalist: b. New York, 4 March 1857 ; a. 1918. He was graduated at Columbia University in 1877, and from its Law School in 1879, and received the degree of M.A. from this institution in 1880; was on the staff of the New York Sun in 1881, and correspondent of the New York World at the first perform¬

ance of (ParsifaP at Bayreuth in 1882. As a journalist he' always specialized in music, drama and art, and after 1905 was art critic of the New York Herald. His Wagner

books (1889-90), after going through many edi¬

tions, were combined in (Wagner's Music-

Dramas Analyzed5 (1904); Besides these and many magazine articles in the Century , the North American Review, the Forum, the

Ladies' Home Journal, the Delineator, etc., he has published (My Rosary and Other Poems) (1896) ; (Plays for Amateurs) (1892) ; Mi¬

riam,5 a story (1898) ; (Opera Singers) (1901) ; (Signora, a Child of the Opera House,5 a novel (1902); (Famous Actors and Actresses and Their Homes) (1903) ; (Loves of the Great Composers5 (1905) ; (Wagner and His Isolde5

(1905) ; (Famous American Songs5 (1906) ; (How to Appreciate Music5 (1906) ; (The Pianolist5 (1907) ; (A Tribute to the Dog5

(1911) ; (Portrait Gallery of Great Composers5

(1911) ; (Modern Women5 (1916). He was editor of the Lotus Magazine from 1909 to 1918.

KOBBE, William August, American army

officer: b. New York, 10 May 1840. He was educated there and in Germany where he studied mining engineering until 1862, when he enlisted in the volunteer service and served until the end of the Civil War, rising to rank of captain, brevet-major and lieutenant-colonel.

He was appointed lieutenant in the regular army (infantry) in 1866, serving on frontier in New Mexico and Kansas during Indian hostilities until 1872 when he was transferred to the artillery arm. He was graduated at the artillery school in 1873 ; was in the Philippine service, 1898-1901, as major of the 3d United States Artillery, colonel of the 35th United States Volunteers, brigadier-general of the Uni¬

ted States volunteers and brigadier-general of the United States army. He was in command of joint army and naval expedition to open the Hemp Ports to commerce and was made mili¬

tary governor of Mindanao and Jolo; and com¬

manded the Department of Dakota at Saint Paul from 1902 until retired as major-general in 1904.

KOBE, ko be, Japan, a treaty port and former municipality of the main island Hondo, on the west short of the Gulf of Osaka, ad¬

joining on the northeast the prefectural city of Hiogo, with which it was united in 1892v It is the most important of the treaty ports with the largest trade and shipping, a fine harbor, docks, wharves for ocean steamers, ship-build¬

ing yards, railway shops and other important industrial establishments. Kobe is well laid out with wide streets, electrically lighted. Pop.

(1920) 608,268.

KOBELL, ko'bel, German family of ar¬

tists, descendants of Johann Heinrich Kobell, who

came to Mannheim from Frankfort in 1720.

The most noted are Ferdinand, Franz, Hen¬

drik and Wilhelm (q.v.).

KOBELL, Ferdinand, German painter

and engraver: b. Mannheim, 7 June 1740; d.

Munich, 1 Feb. 1799. He studied first at Heidelberg when the Elector of Bavaria, ad¬

miring a landscape, aided him to devote his entire time to painting. He next studied art in Paris and became, on his return, painter to the Cabinet and was appointed director of the Mannheim Gallery (1798) but died before en¬

tering on his duties. He specialized on land¬

scapes, following the style of Berchem, and his work shows a jealous study of natural effects. His oil paintings are in a number of German galleries, but his work as an engraver has more importance. His etchings (about 300) were published by Frauenholz, in Munich (1809), as (CEuvres completes de F. K.,5 another of 179 pages were published by Kugler (Stutt¬

gart 1842). Consult Von Stengel, Baron S., (Nuremberg 1822), for his biography.

KOBELL, Franz, German painter and

etcher: b. Mannheim, 23 Nov. 1749; d. Munich, .

14 Jan. 1822. The Elector Karl Theodor of Bavaria sent him to Italy (1776) to study art and he remained there till 1785, working from nature and monumental buildings. He next lived at Munich, where he became painter to the court. He produced only a few oil paint¬

ings but left 20,000 landscape and architecture pen drawings and etchings.

KOBELL, Hendrik, German painter: b.

Rotterdam, 13 Sept. 1751; d. there, 3 Aug. 1799.

He painted, in oils and water colors, landscapes and marines. He studied art in his home town, then for some time in England, next in Am¬

sterdam and France, when he settled in Rotter¬

dam. His work is distinguished by skilful manipulation and life-like depiction. * He did good work in etching as well as painting.

KOBELL, Jan, Dutch engraver: b. Rot¬

terdam, 1756; d. 1833. His only well-known work was a series of historical portraits (1787).

KOBELL, Jan, Dutch animal painter: b.

Delfshagen, 1779; d. Amsterdam, 14 Sept. 1814.

He was a pupil of Van der Wall, but studied later under Paul Potter, acquiring his talent for animal as well as landscape work. He is called often ((Jan the Elder,55 in distinction from his uncle Tan Kobell (q.v.).

KOBELL, Wilhelm von, German painter

and etcher: b. Mannheim, 6 April 1766; d.

Munich, 15 July 1855. He worked under his father, Ferdinand (q.v.), then studied the works in the galleries of Mannheim and Diisseldorf, especially those of Wouvermann, which he copied. He gained a reputation through clever work on battle scenes and horses, as well as very fine etchings and aquatints, the latter espe¬

cially. His favorite subjects were landscapes and life studies of the Dutch. His works are displayed

in the Pinakothek at Munich and in the galleries of Frankfort, Schliessheim, Darmstadt, Stuttgart, etc. In the banquet hall of the Munich Festsaalhau is his cycle of battle scenes. Consult Kobell, Luise von, (Unter den vier Konigen Bayerns) (Munich 1894).

KOBERLE, ke'ber-le, Georg, German au¬

thor and dramatist: b. Nonnenhorn, on Lake Constance, 21 March 1819; d. Dresden, 7 June 1898. He studied at the Augsburg Gymnasium and then at the Collegium Germanicum, Rome, from which he ran away. He next studied philosophy and law at Munich. He went to Leipzig (1846) where he published (Aufzeich-

nungen eines Jesuitenzoglings im deutschen Kolleg in RomP His dramatic career com¬

menced with his five-act play (Die Mediceer>

(Mannheim 1849), followed by the tragedy, 'Heinrich IV von Frankreich) (Leipzig 1851).

Later came the festival play, 'Des Kiinstlers Weihe) ; (Zweischen Himmel und Erde) ; (George Washington) ; 'Die Heldin von York-

townC etc. He was stage-manager at Heidel¬

berg (1853-56). He wrote 'Die Theaterkrisis im neuen deutschen Reich) (Stuttgart 1872), which led to his being appointed director of the Court Theatre at Karlsruhe the same year.

He lived at Mannheim in 1873, then went to Vienna and Dresden and wrote since then the following works: (Meine Erlebnisse als Hof-

theaterdirektor) (2d ed., Leipzig 1874) ; Ber¬

liner Leimruten und deutsche GimpeP (ib.

1875) ; 'Brennende Theaterfragen) (Vienna 1877) ; 'Das Drangsal der deutschen Schau-

biihne) (Dresden 1890). He also wrote the novel

(Alles um ein Nichts) (3 vols., Leipzig 1871). The Archduke of Baden allowed him a pension of 5,000 marks annually.

KOBERSTEIN, ko'ber-stin, Karl, Ger¬

man dramatist: b. Schulpforta, 15 Feb. 1836; d. Wilmersdorf, 15 Sept. 1899. He was son of Karl August K. (q.v.). He studied at the Stettin Gymnasium, then dedicated his life to the stage (1856). He was a member of the Dresden Court Theatre from 1862 till his re¬

tirement (1883). He gained renown through his tragedies 'Florian Geyer) (Dresden 1863) and 'Konig Erich XIV* (ib. 1869), and the comedy (Was Gott zuzammenfugt, das soil der Mensch r.icht scheiden> (ib. 1872). He pub¬

lished the Breussisches Bilderbuck) (Leip¬

zig 1887).

KOBERSTEIN, Karl August, German

writer on literature and history: b. Riigen-

walde, 10 Tan. 1797; d. Pforta, 8 March 1870.

He studied at Stolpe and Potsdam, then (1812) at Berlin. He was appointed professor at the great royal school at Pforta, where he was actively engaged till his death. His literary career commenced with his work entitled

(1827), which, in its fourth revision (1847-66), became a comprehensive history of German national literature. This work was extended, after his death, in a fifth edition by Bartsch (Leipzig 1872-75). His other works include 'Vermischte Aufsatze zur Literaturgeschichte und Aesthetik) (ib. 1858) ; 'Heinrich von Kleists Brief e an seine Schwester Ulrike) (Ber¬

lin 1860). He contributed to Lobell's 'Ent-

wicklung der deutschen PoesieP the volume on 'Lessing* (1865).

KOBO, ko-bo, the Cadmus, Philo and

Euhemerus of Japan, all in one. The posthu¬

mous title of the Buddhist priest Kukai (koo-

kigh), to whom is attributed the invention of the Japanese syllabary i ro ha, of 47 letters.

He proposed and carried out the scheme, by which Shintoism (q.v.) was occulted and swal¬

lowed up in Buddhism. In 804 he went to China to study under the most renowned masters. On his return in 806 he excelled all by his erudition and eloquence, and founded the Shingun, or Sect of the True Word, which makes use of verbal formula

vided both for the scholars and the common people. He sent forth his pupils to preach the new theology, which soon captured the whole nation, thus establishing for a thousand years Ryobu, or mixed Shinto. In 816 he built on Mount Koya one of the most splendid temples in the empire. In 921 Kukai was canonized by the emperor, under the name of Kobo Daishi (the Great Teacher, who promulgates the law).

The popular legends concerning Kobo's amaz¬

ing powers of learning, writing, literary ac¬

complishments and painting form the favorite subjects of the art of Hokusai (q.v.) and other artists. Consult Reischauer, (Studies in Jap¬

anese Buddhism* (1918), and Griffis, (The Re¬

ligions of Japan* (1895).

KOBOLD, ko'bolt', Hermann Albert,

German astronomer : b. Hanover, 5 Oct. 1858.

He studied at a private school and the Royal

Gymnasium, Hanover, and' at Gottingen Uni¬

versity. He was attached to the O'Gyalla Ob¬

servatory in Hungary (1886-33), was astron¬

omer on the German Venus Expedition to Aiken, S. C., and was appointed (1883-36) to the commission of observation of the transit of Venus. He was attached to the Strassburg Observatory (1886-1902) and at Kiel Observa¬

tory (1902). In 1908 he became editor of the Astronomische Nachrichten. He wrote Bau des Fixsternsystems, mit besondere Riichsicht der photometrische Resultate) in Die Wisseti-

schaft (1906).

KOBOLD, a species of elf in the popu¬

lar superstition of Germany, corresponding to the English goblin. The kobold is connected with a house or a family, and appears in bodily shape.

KOCH, kok, Christian Friedrich, Ger¬

man jurist: b. Mohrin, 9 Feb. 1798; d. Neisse, Silesia, 21 Jan. 1872. He studied under Savigny until 1825 and wrote (Versuch einer systematischen Darstellung der Lehre vom Besitz nach preussischem RechD (Berlin

1826). This brought him immediate recogni¬

tion and led to his numerous appointments.

He studied French law in Cologne and Aix-

la-Chapelle and was appointed justice of the Supreme Court at Marienwerder (1829). He was appointed director of the law courts, suc¬

cessively, at Kulm (1832) ; Grossglogau (1834) ; Halle (1840). He received the appointment of director of the Court of Justice of the princi¬

pality at Neisse, where he worked zealously till his death. He reconstructed the entire Prussian jurisprudence. He wrote (Das Recht der Forderungen nach gemeinem und preussis¬

chem RechC (Breslau 1836-43; Berlin 1858-59).; (Lehrbuch des preussischen Privatrechts) (Berlin 1845; 2d ed., 1857-58); (Das preus-

sische Erbrecht aus dem gemeinen deutschen Recht entwickelD (Berlin 1866) ; (Das preus-

sische ZivilprozessrechD (lb. 1847 ; 6th ed., 1871). Another important work of his was (Kommentar zum Allgemeinen Landrecht)

(Berlin 1852-55; 8th ed., 1883-87). He was founder of the Schlesisches Archiv _ fiir die praktische Rechtswissenschaft (Berlin 1837-

46). Consult Behrend, J. F., c Christian Fried¬

rich Koch* (Berlin 1872).

KOCH, Joseph Anton, Austrian land¬

scape painter and etcher : b. Obergiebeln, Tyrol, 27 July 1768; d. Rome, 12 Jan. 1839. He started life tending cattle; was given instruction at the Stuttgart Karlschule through the recommenda¬

tion of Bishop Umgelder (1785). He ran away from the strict discipline (1791) and reached Strassburg and, later, Rome (1795), where he became acquainted with and a follower of the classic tendency of Carstens. He adopted the style of Poussin and Claude Lorraine in land¬

scape work. In his early days at Rome he etched the pages of Carstens (Les Argonautes, selon Pindar, Orphee at Apollonius de Rhode) (Rome 1799). He also etched 20 Italian land¬

scapes and a large sheet representing ((the Oath of the French at Millesimo® ; 14 pages after Dante, adding later another 30 (published Vicenza 1904), and 36 after Ossian. He con¬

tributed American landscape scenes to the works of von Humboldt (1805). At the Pina-

kothek, Munich, are his Sacrifice of Noah) and landscapes. He was forced, through inade¬

quate income from his work, to go to Vienna, where he worked prolifically (1812-15). He returned to Rome, where he painted, among other works, the four frescoes in the Dante Room of the Villa Massimi (1824-29). His presence and personality had considerable in¬

fluence among the younger generation in the art life of Rome. His work, directed humor¬

ously against unjustifiable criticism and false connoisseurship, was entitled (Moderne Kunst-

chronik oder die Rumfordische Suppege kocht und geschrieben von J. A. KP (Stuttgart 1834).

His last years were spent in great poverty.

Consult Frimmel, (Joseph Anton Koch) (in Dohne's (Kunst und Kiinstler des 19ten Jahr-

hunderts,* Leipzig 1884).

KOCH, Karl, German botanist: b. Etters-

berg, near Weimar, 6 June 1809; d. Berlin, 25

May 1879. He studied in Jena and Wurzburg and taught, as privatdocent, in Jena (1834).

He undertook a journey of research into Rus¬

sia (1836-38) and a second (1843—44), then settled in Berlin (1847), being later appointed assistant professor, also general secretary, of the V erein zur Beforderung des Gartenbau of the state of

Prussia, in which position he pub¬

lished Wachenschrift fiir Gdrtnerei und Pflan-

zenkunde (1858-72). He was appointed pro¬

fessor of the Agricultural High School in Ber¬

lin (1859). He wrote (Reise durch Russland nach dem kaukasisohen Isthmus) (Stuttgart 1842-43) ; (Wanderungen im Orient* (Weimar 1846-47) ; (Hartus dendrologicus* (Berlin 1853-54) ; ^endrologie* (Erlangen 1869-72), etc.

KOCH, Max, German historian and critic: b. Munich, 22 Dec. 1855. He studied in Munich and Berlin, and taught (as docent) at Mar¬

burg (1880). He was appointed assistant pro¬

fessor and later professor at Breslau. He wrote (Helferich Peter Sturz und die Schles-

wigschen Literaturbriefe* (Munich 1879) ; (Ueber die Beziehungen der englischen Litera-

tur zur deutschen im 18 Jahrhundert* (Leip¬

zig 1883) ; Shakespeare1* (Stuttgart 1885) ; (Geschichte der deutschen Literatur von den altesten Zeiten bis zur Gegenwart* (Leipzig; 2d ed., 1904). He compiled for Goedeke's Srundriss1* the Goethe and Schiller literature, later to be followed by his compilations on Shakespeare* and

mann, Schulze, Immermann and Lenau for Kiirchener's (Deutsche National Literature etc. He founded Zeitschrift fiir vergleichende Literaturgeschichte (Berlin 1886, later Weimar).

KOCH, Robert, German bacteriologist :

b. Klausthal, Hanover, 11 Dec. 1843; d. 28 May 1910. He received a medical education at Gottingen (1862-66), was assistant surgeon in the Hamburg general hospital, was in private practice at

Langenhagen, Rakwitz and Woll-

stein, and in 1872 was appointed to the Impe¬

rial board of health. In 1882 he succeeded in isolating the tubercle bacillus, in 1883 was made privy councillor and became director of the cholera commission to India and Egypt. He discovered in 1884 the cholera spirillum, or comma bacillus, regarded as a positive test of the presence of Asiatic cholera. For this serv¬

ice he received by legislative act a gift of 100,000 marks ($25,000). In 1885 he was ap¬

pointed professor in the University of Berlin, director of the newly established Hygienic In¬

stitute of Berlin, and also director of the Prus¬

sian board of health. One of his pupils pre¬

maturely announced in 1890 the discovery of a substance called tuberculin, which, he asserted, would cause to cease the growth of the tubercle bacillus. Subsequent experiment failed in the judgment of scientists to confirm this claim.

In 1905 he was awarded the Nobel prize in medicine. In 1906 the German government sent Koch to investigate the ^sleeping sickness® in West Africa. He had previously studied blood infections in East Africa in 1903, had found the spirochetcC of African relapsing fever in the ticks through whose bites it is transmitted.

In the tick he found also the piroplasma which causes ((Texas fever,® and proved that the tsetse

fly transmits the trypanosomata at the moment of biting. Among his writings are 'Unter-

suchungen iiber die Aetiologie der Wundinfek-

tionskrankheiteiP (1878; Eng. trans., 1880); (Ueber die Milzbrandimpfung : Eine Entgeg-

nung auf den von Pasteur in Genf gehaltenen Vortrag) (1882) ; 'Beitrag zur Aetiologie der Tuberculose) (1882; 1886); (Ueber die Choie-

ra,bakterien) (1884; 1886) ; (Ueber Naturhei-

lung und medizinische Kunst) (1885) ; 'On Disinfection) (1886) ; 'Ueber bakteriologische Forschung> (1890) ; 'Ergebnisse der vom deutschen Reich ausgesandten Malaria-Expedi-

tionen) (1900) ; 'Aerztliche Beo'bachtungen in den TropeaP (1898) ; (Diagnosis, Treatment and Prophylaxis of Tropical Malaria) (1898).

Consult Biggs, H. M., (Robert Koch and his Work) (in American Review of Reviews, Vol.

XXIV, New York 1901) ; Fischer, Bernhard 'Robert Koch) (in Deutsche Rundschau, Vol.

XXXVII, Berlin 1910) ; Wyeth, J. A., 'Memo¬

rial Address) (New York 1911).

KOCHANOWSKI, ko'ka-nof'ske, Jan,

Polish poet: b. Sycyna, 1530; d. Lublin, 22 Aug.

1584. He was educated at the High School, Cracow; studied at Padua (1552), and traveled in Italy. He then went to Paris (1555) and was inspired by Ronsard to write poetry. Re¬

turning ito his mative country he was appointed secretary to King Sigismund Augustu. He was -

granted two benefices (1565 and 1566), but re¬

turned to live on his family estate, Czarnlyas (1568), where he devoted his time to the Muses. In 1575 he resigned from the duties of his religious offices and was invited to reside at the court by the newly-crowned king, Stephan Bathory, but refused

the honor, as also the 'office of Kastellan, tendered him by Chan¬

cellor Zamojski. Next to Mickiewicz, he was the most important poet of Poland. His

His drama (Odprawa poslow grekich) ((The Despatching of the Greek Ambassadors*) was written (1578) in honor of the marriage of Zamojski to Princess Bathory. Other well-

known poems of his are (Proporzec albo hold pruski* ('The Banner or Homage to Prus-

sia)) ; the satiric poem (Z goda* ('Unity 0 ap¬

peared in 1564; 'Fraszki* ('Fragments*) was published in 1584 and is in the gayest strain, re¬

minding of the ' Decameron. * His transla¬

tions of the (Psalms) is considered to be the best in existence. He wrote also, in Latin, such works as 'Lyricorum libellus) (1580) ; 'Ele-

giarum libri quatuor* (1584), and numerous poems composed for special occasions. The perfection of the Polish language is due to him ; he greatly enriched Polish poetry by naturaliz¬

ing foreign poetic forms which he understood how to imbue with national spirit. Collections of his works appeared from 1584 .to 1641, but the last and best (Warsaw 1884) is in four volumes. Consult Przyborowski, 'Biography of Kochanowski* (Posen 1857), also Lowen-

felt, 'Jan Kochanowski und seine lateinischen Dichtungen) (Posen 1878).

KOCHER, kog'er, Emil Theodor, Swiss

surgeon: b. Berne, 1841; d. there, 1 Aug. 1917.

He studied medicine in his native city and sur¬

gery in Berlin, London and Paris. He re¬

turned to his native place and in 1866 began his long connection with the university there. In 1872 he became full professor and director of the surgical clinic there. He was the first sur¬

geon to operate successfully for goitre. His treatment consisted in withdrawing from func¬

tional activity part of the thyroid gland in the neck. This was accomplished by removing the lobes of the gland or by tying off its blood supply. His later work included study of the blood in exophthalmic goitre study of cancer of the thyroid, curability of cancer of the stomach and the prevention of cretinism. He was awarded the Nobel prize for medicine in 1909. His works include 'Die antiseptische Wundbehandlung* (1881) ; 'Vorlesungen fiber chirurgische Infektionskrankheiten* (1895) ; 'Chirurgische Operationslehre* (1894) ; Eng.

trans. as 'Textbook of Operative Surgery) (2

vols., 1911). The last work is esteemed as a classic in its field.

KOCK, kok, Charles Paul de, French

novelist: b. Passy, France, 21 May 1794; d.

Paris, 29 Aug. 1871. He was the son of a Dutch banker who was guillotined in 1794. At 15 he was placed in a banking-house, but pres¬

ently took to writing, and his reputation was soon established by such works as 'Georgette) (1820) ; 'Gustave, ou le mauvais Sujet) (1821) ; 'Mon Voisin Raymond) (1822). The last is re¬

garded as the typical romance of its kind.

His scenes are cast in the lower ranks of mid¬

dle-class life. His narrative is a constant suc¬

cession of stirring incidents without catas¬

trophe. The incidents are always gay and lively, frequently somewhat gross, but scarcely to the extent of indecency. The worst feature of Paul de Kock's works is his style, which is barely presentable, a fault evidently due to deficiency of education. This accounts for his popularity being greater abroad than at home, as the defects of style disappear in translation.

Besides his novels, which are very numerous, he wrote several dramas, chiefly taken from them.

Two complete English translations of his works have appeared in 1902 and 1903-04, respectively.

Consult Trimm, 'La Vie de Charles Paul de Kock* (1873).

KOCKLY, kock'li, Hermann, German

philologist: b. Leipzig, 5 Aug. 1815; d. Trieste, 3 Dec. 1876. He studied at Leipzig, taught at the Saalfeld Progymnasium (1837) and at the Dresden Kreuzschule (1840). He fled to Brus¬

sels (1849) on account of his participation in the May insurrection, and was appointed pro¬

fessor of classical philology at Zfirich (1851), and at Heidelberg (1864). He was a member of the Reichstag (1871-73) where he attached himself to the Progressive party. He wrote useful works on the Grecian epics and ancient military writers. To the first belong critical essays on Quintus Smyrnseus (Leipzig 1850) ; 'Hesiods in collaboration with Kinkel (1870) •

and an edition of 'Aratus, Manethonis, Maximi et aliorum astrologica) (Paris 1851) ; an edition of the text of

(Zfirich 1850-59) ; 'De diversis Hesiodeae Theogoniae partibus) (Zfirich 1860) ; three dis¬

sertations on 'De Odysseae carminibus) (ib.

1862-63); 'Opuscula epica IV* (ib. 1864). On ancient military subjects were 'Geschichte des Griechischen Kriegswissens* (Aarau 1852) ; 506

(GrieschischeKriegsschriftstelles) (Leipzig 1853—55) ; (Einleitung in Casars Kommentarien iiber den gallischen Krieg} (Gotha 1857) ; (Onosandri de imperatoris officio Liber* (Leipzig I860).

Others of his works are editions of Arrian's < Anabasis > (1861) ; (Euripides 5 and Hphigenia in Taurien) (1863) ;

tal translations, especially of Caesar, Aaeschylus, etc. A collection of his smaller works is found in his (Opuscula academica) (Leipzig 1853-56) ; (Akademische V outrage und Reden > (Zurich 1856) ; (Opuscula philologica) (Leipzig 1881—82). Consult Hug, (Hermann Kockly* (Basle 1878) ; Bockel, (Hermann Kockly, ein Bild seines Lebens und seiner Persdnlichkeit*

(Heidelberg 1904).

KODAK. The Kodak camera is the in¬

vention of George Eastman, and the first model appeared in the year 1888. It is now manufac¬

tured in a number of sizes and styles, some making use of both cartridge roll film and dry plates. The original Kodak camera took round pictures 2 y2 inches in diameter, was of the fixed focus type and carried a roll of film sufficient for 100 exposures. Its invention prac¬

tically marked the advent of amateur photog¬

raphy, as before that time both apparatus and processes were too burdensome to permit of classification in the field of recreation. The roll film used in the first model of the Kodak camera had a paper base but was soon super¬

seded by a film with a cellulose base, a prac¬

tical, transparent, flexible film. The first films had to be loaded into the camera and unloaded in the dark room, but the film cartridge system with its protecting strip of non-actinic paper made it possible to load and unload the camera in ordinary light. The Kodak Developing Machine and it. simplified successor, the Kodak Film Tank, provided the means for day¬

light development of film, so that now the dark room is not necessary for any of the operations of amateur photography. The earlier types of the Kodak cameras were of the box form and of fixed focus, and as various sizes were added, devices for focusing the lenses were incor¬

porated. The first folding Kodak cameras were introduced early in the nineties ; these were equipped with folding bellows which per¬

mitted much greater compactness. The first pocket Kodak camera was introduced in 1895.

It was of the box form type, slipping easily into an ordinary coat pocket, and producing negatives 1J4 x 2 inches. The first folding pocket Kodak camera was introduced in 1897, and at the present time all the Kodak cameras are of the folding type, except one especially designed for taking panoramic pictures, which is of the box type. A recent invention, the Autographic Feature, provides a means for re¬

cording data on the margin of the negative it¬

self at the time of exposure. This feature is now supplied on all Kodak cameras with the ex¬

ception of the one for making panoramic pic¬

tures. The Kodak system of photography for the amateur had been so perfected that to-day the amateur has a wide range in optical equip¬

ment, and every essential for the producing of a

finished photograph may readily be carried in any ordinary Gladstone bag with room to spare.

KODAMA, ko'da-ma, Gentaro, Viscount,

Japanese general: b. Tokuyama, 5 Feb. 1852; d. Tokio, 23 July 1906, He was early drawn into the conspiracy that destroyed the shogun-

ate. He fought to restore the power of the Mikado in the north island, and took part in the suppression of the insurrection in Saga (1874), also in an expedition to the Riukiu Islands (1876). In 1891 he undertook a journey to study European conditions and was appointed, on his return, Assistant Minister of War (1892). He was chief of staff at Hiro-

shimo headquarters during the Chino- Japanese War (1894-95). In 1897 he was made a noble and appointed governor of Formosa, and en¬

tered Prince Ito's cabinet (1900) as Minister of War. Under his direction the masterly Japanese victory over the Russians (1904-05) was carried out by the generals Kuroki, Oku, Nodzu and Nogi, with Okuma, as chief, fol¬

lowing his plans. He was created viscount, and shortly before his death he was made chief of the general staff.

KODIAK, kod-yak', a large Alaskan island lying to the south of Cook Inlet. It is com¬

paratively sparsely populated, its largest town, Karluk, having only about 500 inhabitants. The population of the island is principally engaged in fishing, Kodiak being the greatest home of the salmon in Alaska. The fur industry is also carried on to some extent and the Kodiak great bear is valued for its hide. Cattle-raising and agriculture are growing industries, thanks to the constant efforts of the United States Department of Agriculture to make these a prominent part of the activities of the island¬

ers, who have also been provided with an efficient system of public education. Owing to its comparatively mild and equable climate the future of Kodiak seems assured in the field of agriculture which is favored by an average annual rainfall of over 60 inches. Churches are found all over the island which has an area of 36,000 square miles. See Katmai.

KOEHLER, ke'ler, Robert, American

artist: b. Hamburg, Germany, 28 Nov. 1850; d.

23 April 1917. Brought to the United States in 1854, he was educated at Milwaukee, Wis., and learned lithography which he practised in Pittsburgh, Pa., and New York. After studying drawing in the night classes of the National Academy of Design, he went to Munich where he learned painting under Loefftz and Defreg-

ger and chose genre and portraiture as his special field of activity. In 1893 he was ap¬

pointed director of the Minneapolis School of Art, and director emeritus after 1914; presi¬

dent of the Minnesota State Art Commission from 1903 to 1910; member of the Artists'

League of Minneapolis; honorary member of the Minnesota State Art Society; honorary member of the Alumni Association of the Minneapolis School of Art; member of the So¬

ciety of Western Artists; member of Institute des Beaux Arts et des Lettres of Paris, France.

Author and lecturer on art subjects. Organ¬

ized the American Department at the Interna¬

tional Art Exhibitions at Munich in 1883 and 1888. Received bronze and silver medals at the Munich Academy, honorable mention at the Paris World's Fair, 1889, bronze medal at the International Art

Exhibition at Buenos Aires in 1910, cross of the Order of Saint Michael of Bavaria in 1888. Represented by paintings in the Pennsylvania Academy of the Fine Arts KOEL — KOGEL

((A Holiday Occupation5), the Public Library Gallery- at Minneapolis ((T.he Strike5), Minne¬

apolis Institute of Arts ((Study Head5), Min¬

neapolis Athletic Club ((Violet5), State Uni¬

versity of Minnesota ((Portrait of Dean Wull-

ing*), Public Library at Alexandria, Minn.

('Portrait5), Memorial Library at Blue Earth, Minn. ((Portrait5) ; other paintings, (The Car¬

penter's Family,5 (Her Only Support,5 (The Socialist,5 (The Family Bible,5 (Salve Luna.5

KOEL, one of a group of East Indian and Australian fruit-eating cuckoos, of the genus Eudynamis, which are popularly known as ((rain-birds.55 They are parasitic, but have many peculiarities, among which are the glossy black plumage of the males, and the fact that, con¬

trary to the rule, the immature young resemble the males instead of the females, which have a reddish dress. A Philippines' species (E .

mindanensis) is locally called <(phow.55 They utter loud whistling cries.

KOENIGSBERGER, ke'niks-ber'ger, Leo,

German mathematician: b. Posen, 15 Oct.

1837. He was educated at Posen and Berlin, and taught mathematics and physics at

Berlin (1860-64). He was appointed assistant professor at Greifswald (1864-66) and pro¬

fessor (1866-69), and successively at Heidel¬

berg (1869-75), Dresden (1875-77) and Vienna (1877-84), after which he was active at Heidel¬

berg. He wrote the biographies of Hermann von Helmholtz and C. G. J. Jacobi, besides many articles contributed to mathematical periodicals.

KOESTER, ke'ster, Frank, German- Amer¬

ican engineer and author : b. Sterkrade, Ger¬

many, 28 Aug. 1876. After 10 years of theo¬

retical training and practical engineering and municipal experience in Germany, including four years of shop and field practice, he came to the United States in 1902. He was con¬

nected with the construction of the New York subway system and other large engineering undertakings in the United States, South America, Alaska and the Philippines. A con¬

siderable part of his practice has been devoted to the design, construction and operation of electric generating stations. Recognizing the great field in modern city planning he made a special study of modern methods in this field, taking up the city planning courses at Charlot-

tenburg College, Germany. He was a delegate to the City Planning Congress at Diisseldorf, Germany, in 1912, and to the International Con¬

gress of City Planning and City Maintenance held at Ghent, Belgium, in 1913, in both of which he made addresses. He has published (Steam Electric Power Plants5 (New York and London 1908) ; (Hydro-electric Develop¬

ments and Engineering5 (ib. 1909) ; rThe Price of Inefficiency5 (New York 1913) ; < Electricity for the Farm and Home5 (ib.

1913) ; Modern City Planning and Mainte-.

nance5 (New York and London 1914) ;

KOETSVELD, koots'velt, Cornelis Eliza

van, Dutch theologian and novelist: b. Rotter¬

dam, 24 May 1807; d. The Hague, 4 Nov. 1893.

He studied at Leyden, and was pastor at West-

maas, Berkel and Schoonhoven. He went to The Hague (1849) and was appointed preacher to the court (1878). He wrote numerous re¬

ligious works, but is better known through his 'Schetsen uit de Pastorij te Mastland5 (Schoon¬

hoven 1843; 13th ed., 1902), which is humor¬

ous, true to nature and has been translated into English and German. His novels, sketches, etc., have been collected and published in 10

volumes (Arnheim 1897-98). Consult Brink, Jan Ten (in Geschiednis der noord neder-

landsche Letteren in de 19c Eeuw, Rotterdam 1904), and in Levensberichten van de Maat-

schappij der Nederlandsche Letteren (1893-94).

KOFOID, ko'foid, Charles Atwood,

American zoologist: b. Granville, Ill., 11 Oct.

1865. He was graduated at Oberlin College (1890), took the A.M. degree at Harvard Uni¬

versity (1892) and Ph.D. (1894). He was ap¬

pointed teacher at the Oberlin Academy (1888-

90), teaching Fellow (1890-91) and instructor of vertebrate morphology at the University of Michigan

(1894-95). From 1895-1900 he was superintendent at the biological station of the University of Illinois at Havana, Ill., and assist¬

ant professor of zoology at the Illinois Uni¬

versity (1897-1900). He was appointed to various positions at the University of Cali¬

fornia, being acting head of the department of zoology 1905-06, and professor of zoology and head of the department from 1910. In 1905-06

he was acting director of the San Diego Biological Station. He was associate natural¬

ist of the Agassiz expedition to the eastern tropical Pacific on the United States steamer Albatross (1904-05), and assistant director at Scripps Institute of Biological Research from 1912. He invented several plankton nets, a deepjsea water sampler, etc., and received the Saint Louis Exposition gold medal (1904).

Many valuable contributions from his pen have been published in the numerous scientific pe¬

riodicals of both America and Europe. He was associate editor of the American Naturalist from 1897-1908; zoological editor of the Journal of Applied Microscopy from 1900-04, etc.

KOFU, ko'foo, Japan, the capital city of Kai province; on the island Nippon, north of Fujiyama. It has an old castle, /teachers' sem¬

inary and large silk mills, and does consider¬

able .trade in silk, rock-crystal, fruit, wine and resin. The district is very fertile and pro¬

duces a grade of grapes which make a fine wine. The population has grown very rapidly, being 37,561 in 1898 and over 50,000 in 1918.

KOGEL, ke'gel, Rudolf, German theolo¬

gian and court preacher : b. Birnbaum, prov¬

ince of Posen, 18 Feb. 1829; d. Berlin, 2 July 1896. He studied theology and philosophy at Halle and Berlin (1847-52) ; was appointed teacher of religion at

nasium, Dresden (1852-54), then pastor in Nakel (1854-57), and was preacher of the German-Evangelical community at The Hague (1857-63). He was appointed simultaneously to the positions of court preacher and member of the Consistorium of the Margrave Branden¬

burg and counsellor to the Minister of Public Worship. In 1880 he was appointed chief preacher of the court and was chosen member of the Privy Council (1884). He used his in¬

fluence at court against the free-thought church policy of Falk and Hermann with suc¬

cess. His sickness (1892-94) enforced retire¬

ment from his official functions. A collection 508

of his sermons was published under the title

predigt' (4th ed., 1895). Other prominent works are (Der erste Brief Petri' (ib., 3d ed., 1890) ; (Der Brief Pauli an die Romer' (ib., 4th ed., 1904) ; 'Vaterlandische und kirchliche gedenktage' (ib. 1887). He published, in col¬

laboration with W. Baur and C. Frommel, the yearbook (Neue Christoterpe' from the year 1880. Consult 'his son's biography, (Rudolf Kogel, sein Werden und Wirken' (Berlin 1899-

1903).

KOGIA, ko'ji-a, the generic and ordinary name of the "pigmy® sperm whales of the Pacific, which differ from the true sperm whales (q.v.) in anatomical

particulars, and conspicuously in size, not exceeding about 15

feet in length. There are several species of these cetaceans which belong mainly to the New Zealand region, although one species visits the coast of California, but they are little known.

KOH-I-NUR, ko'e-noor', or KOHI-

NOOR. See Diamond.

KOHL, kol, Johann Georg, German

traveler and historian : b. Bremen, 28 April 1808; d. there, 28 Oct. 1878. Nearly his entire life was devoted to travel and historical in¬

vestigation in Europe and in North America, where he spent four years and published as the fruits of researches (Travels in Canada'

(1855) ; (Travels in the Northwestern Parts of the United States) (1857) ; 'History of the Discovery of America' (1861); and several essays on American cartography. Other works are (Travels in the Interior of Russia and Roland' (1841); 'The British Isles and Their Inhabitants' (1844); (The Rhine' (1851); 'The Danube' (1853).

KOHL-RABI, kol-ra'bi, a botanical variety of the same species as cabbage (q.v.), from which it differs in the swelled, turnipdike stem with a tuft of loose leaves on the top. This bulbous stem, which may be six inches in diam¬

eter, is used for human and stock food, less in America than in Europe. Its quality and tex¬

ture are less agreeable, except in very young plants, than are those of turnips and cabbage.

KOHLER, ko'ler, Josef, German jurist,

author and poet : b. Offenburg, 9 March 1849.

He studied at Offenburg and Rastatt gymna¬

siums and Freiburg and Heidelberg univer¬

sities. He became doctor of laws (1873) and was appointed judge at Mannheim (1874). He obtained the degree of professor at Wurzburg (1878) and Berlin (1888). Through his many contributions to the Zeitschrift fiir verglexch-

ende Rechtswissensclicift and other law jour¬

nals he aided much in advancing the compara¬

tive history of law. He wrote on this subject such important works as 'Moderne Rechts-

fragen bei islamitischen Juristen' (Wurzburg 1885) ; 'Das chinesische Strafrecht' (ib.

1886) ; 'Rechtsvergleichende Studien fiber islamitisches Recht, das Recht der Berbern das chinesische Recht und das Recht auf Ceylon'

(Berlin 1889) ; 'Altdeutsches Prozessrecht'

(Stuttgart 1891). On civil law < he wrote 'Einf filming in die RechtswissenschafP

(Leipzig 1902) : (Beitrage zur germamschen Privatrechtsgeschichte' (Wfirzburg 1883-88) ; (Deutsches Patentrecht' (Mannheim 1878) ; 'Handbuch des deutsches Patentrechts' (ib.

1900-01) ; (Forschungen aus dem Patentrecht'

(ib. 1888) ; (Das Autorrecht' (Jena 1880) ; (Aus dem Patent- und Industrierecht' (Mann¬

heim 1888) ; (Das literarische und artistische Kunstwerk und sein Autorsohutz' (Mannheim 1892) ; (Das Recht des Markenschutzes'

(Wfirzburg 1885); 'Kunstwerkrecht' (1908).

He treated the philosophical side of law in such works as (Shakespeare vor dem Forum der

Jurisprudenz' (Wfirzburg 1883) ; (Das Recht als Kulturer scheinung' (ib. 1885) ; (Das Wesen der Strafe' (ib. 1888). On the sub¬

ject of the history of art he wrote 'Aus dem Lande der Kunst' (Wfirzburg 1882) ; 'Aesthet-

ische Streifereien' (Mannheim 1889) ; 'Zur-

Charakteristik Richard Wagners' (ib. 1893).

As poet he wrote 'Lyrische Gedichte und Bal-

laden' (Berlin 1892) ; 'Feuermythus oder Apotheose des Mensohengeistes ; nach Motiven der polynesischen Sage' (ib. 1893) ; . (Der Liebestod: nach motiven der mexikanischen Ueberlieferung' (ib. 1893) ; 'Neue Dichtun-

gen' (ib. 1895) ' Dantes Heilige Reise' (Co¬

logne 1901-03) ; (Aus Petrarcas Sonettenschatz'

(Berlin 1902-03). He, together with Viktor Ring, founded and published Archiv fiir biir-

gerliches Recht und Berliner juristischen Beitrdge.

KOHLER, Kaufmann, American rabbi:

b. Ffirth, Bavaria, 10 May 1843. After com¬

pleting his studies at the universities of Munich, Berlin and Leipzig, he was chosen as rabbi in Detroit in 1869, and two years later elected rabbi of Temple Sinai, Chicago, where he introduced Sunday lectures, a novelty in those days. In 1879 he was called to Temple Beth El, New York. At his initiative in 1885

a rabbinical conference was held at Pittsburgh, Pa., which formulated a platform for Reformed Judaism. In later years he frankly receded from the radical standpoint and assumed a more conservative position. In 1903 he was elected president of the Hebrew Union Col¬

lege. He has been a frequent contributor to the Jewish press, edited the Sabbath Visitor (1881-82), the Jewish Reformer (1886), was one of the editors of the 'Jewish Encyclo¬

paedia,' and in addition to various volumes and critical papers has written 'Der Segen Jakobs'

(1868) ; (Guide to Instructions in Judaism'

(1900) ; (On Capital Punishment' (1869) ; (On Song of Songs' (1877) ; (Ethical Basis of Tudaism' (1877) ; Backwards or Forwards —Lectures on Reform Judaism' (1885) ; (Church and Synagogue in their Mutual Relations'

(1889); 'Systematische Theologie des Juden-

thurns auf geschichtlicher Grundlage' (1909); 'Well of Living Waters' (1916).

KOHLER, Ulrich, German archaeologist:

b. Klein-Neuhausen, grand duchy of Weimar, 6 Nov. 1838; d. Berlin, 24 Oot. 1903. He studied at Jena and was appointed secretary of the Prussian embassy at Athens (1865) and later was made professor of archaeology at Strassburg. He was governor of the newly-

founded Archaeological Institute at Athens (1875) and was appointed professor of ancient history at Berlin (1886). His principal > work is the second volume of 'Corpus inscriptionum atticarum' (Berlin 1877-95), which contains the inscriptions from the time of the Archon KOHLER -

Euclidcs to Augustus. Important also is his (Urkunden mid Untersuchungen zur Ge-

schiohte des delisch-attischen Bundes) (Berlin 1870).

KOHLER, Walther Erich, German

church historian : b. Elberfeld, 27 Dec. 1870.

He studied at Halle, Heidelberg, Strassburg, Bonn and Tubingen. He became private teacher (docent) of church history at Giessen (1900), and associate professor (1904) and was ap¬

pointed professor of church history at Zurich (1909). He belongs ito the critical school of theology. Among his works are (Die katho-

lischen Kirchen des Morgenlandes1 (Darm¬*

stadt 1896) ; (Luther und die Kirohenge-

schichte) (Erlangen 1900) ; (Reformation und Ketzerprozess) (Tubingen 1901) ; (Dokumente zum Ablasstreit von 1517) (1902) ; (Die Ent-

stehung des Problems Staat und Kirche) (1903) ; (Ein Wort zu Denifles Luther }

(1904) ; (Die Anfange des Pietismus in Gies¬

sen 1689-95) (Giessen 1907) ; (Kritische Aus-

gabe von Luthers fiinjhundneunzig Thesen mit Gegenschriften* (Leipzig 1903) ; (Der Gnos-

tizismus) (1911) ; (Ausgewahlte Schriften des Erasmus von Rotterdam* (1914).

KOHLRAUSCH, kol'roush, Friedrich,

German physicist : b. Rinteln, 14 Oct. 1840 ; d.

Marburg, 1910. He studied at Erlangen and Gottingen, and was teacher (docent) at the Frankfort Physikalischer Verein (1864). He became assistant professor (1870) and was ap¬

pointed professor, successively, of the Poly-

technikum, Zurich (1870); Darmstadter Poly-

technikum (1871), and at Wurzburg (1875) and Strassburg (1888). He was appointed president of the Physikalischtechnischen Aus-

talt (Imperial Physico-technical Institute) of Berlin (1895), and honorary professor of the Berlin University (1899). In 1905 he retired to reside at Marburg. His work was chiefly in the realm of electric currents, resistance, the constitution of galvanic currents, the defining of the Ohm and electro-chemical equivalents, thermo-electricity and conductivity of heat, total reflection of light, elasticity of matter, and especially reaction of elasticity.. He constructed numerous magnetic and

electric measuring in¬

struments, a bifilar-magnetometer, an intensity-

variation meter, a voltmeter, a switch-rheostat, etc. His exposition of the most important methods of measurements in physics is ex¬

pounded in his (Leitfaden der praktischen Physik) (Leipzig 1870; 10th ed., 1905), and (Lehrbuch der praktischen Physik* (1910) which latter was a 10th revised edition. His work in the field of electrolysis has been termed ^epoch-making.® He wrote also (Ueber die Leitungswiderstand des Quicksilbers) (Munich 1888) ; (Das Leitvermogen der Elec¬

trolyte, bis besondere der Losungen) (Leipzig 1898) ;' (Kleiner Leitfaden der praktischen Physik* (lb. 1900). The latter is an elemen¬

tary work based on his (Leitfaden. *

KOHLRAUSCH, Rud

German physicist: b. Gottingen, 6 Nov. 1809; d. Erlangen, 9 March 1858. He was succes¬

sively teacher of mathematics and physics at Liineberg, Rinteln, Cassell, Marburg. He was appointed professor of physics of the Univer¬

sity of Erlangen (1857). In collaboration with W. Weber, he carried out ithe first mechanical measurements of electric currents, laying the KOKOMO 509

ground for the absolute system of electrical measurement. Consult Weber, W., and Kohl-

rausch, R., cFfinf Abhandlungen fiber absolute elektrische Stromung Widerstandsmessung)

(in Paper No. 142 of Ostwald's (Klassikern der exakten Wissenschaften, * Leipzig 1904).

KOHLS AAT, kol'sat, Herman Henry,

American publisher: b. Albion, Ill., 22 March 1853. He was educated in the public schools of Galena and Chicago, Ill., and after acting as traveling salesman for several years for Chicago firms became in 1880 a junior partner in a wholesale bakery. He became the orig¬

inator of the (

quired a fortune in the bakery business and other enterprises. From 1891—93 he was part owner of the Inter-Ocean of Chicago. From 1894-1901 he was editor and publisher of the Chicago Evening Post and the Times-Herald.

The latter, in 1901, was amalgamated with the Chicago Record into the Record-Herald of which paper he was editor, 1910-12. In 1912

he bought the Inter-Ocean, then bankrupt, suc¬

ceeded in seeing it through another receiver¬

ship in 1914 in which year he combined it with the Record-Herald, the new paper being known as -the Chicago Herald. At the same time he retired from the publishing field. Consult Flower, E., (H. H. Kohlsaat* (in Cosmopolitan Magazine, Vol. XXXV, p. 338, New York 1903) ; Wellman, W., (Mr. Kohlsaat of Chicago and His Part in the Political History Making of 1896) (in Review of Reviews, Vol. XV, p.

41, New York 1897).

KOHN, kon, Salomon, German novelist:

b. Prague, 8 March 1825; d. there, 6 Nov. 1904.

He was the son of a Jewish merchant; studied at the local university (1844-46), then became partner in his father’s business and was sole proprietor from 1863. But (since 1873) he de¬

voted his entire time to literary work. His novel

(GabrieP was first published anony¬

mously in a collection of works entitled (Sip-

purim* (Prague 1852), and had various trans¬

lations, but, strangely, only obtained circula¬

tion in Germany in the English, the author's name being unknown and his right to the authorship not being proven till 20 years later.

Of his other works should be cited (Ein Spiegel der Gegenwart* (Jena 1875) ; (Die silberne Hochzeit* (Leipzig 1882) ; (Prager GhettobildeD (ib. 1884) ; (Neue Ghettobilder*

(ib. 1886) ; (Der Lebensretter und andere Erzahlungen* (Berlin 1893) ; (Ffirstenguns.t) (ib. 1894) ; (Ein deutscher Handelsherr*

(Zfirich 1896) ; (Judith Lohrich* (Strassburg 1897).

KOKO-NOR, ko'ko-nor', or KUKU-

NOR, a lake in Tibet, not far from the Chinese province of Kan-su, 100° E. and 37° N. It lies 9,975 feet above the level of the sea. Its very salt waters, exquisitely blue, in color, cover 66 miles by 40. It is very rich in fish, in spite of the fact .that its surface is frequently frozen for two to three months. It contains five islands, one with a Buddhist monastery. In the west it receives the waters of the river Buhain-

gol. In the south it is bordered by the south¬

ern part of the Kokonor Mountains (10,000

feet).

KOKOMO, Ind., city, county-seat of How¬

ard County, on the Wildcat River, and on the 510

Toledo, Saint Louis and Western, the Pitts¬

burgh, Cincinnati, Chicago and Saint Louis, and the Lake Erie and Western railroads, about 55

miles north of Indianapolis. It was settled in 1844 by Daniel Foster, incorporated as^ a town in 1845 and chartered as a city in 1855. Ko¬

komo is located in a region of good farms, but it is a manufacturing and commercial city. The chief manufacturing establishments are plate, opalescent and table glass works, potteries, steel-mills, a fibre-bond mill, stove works, rub¬

ber works, automobile factories, bit works, pulp and paper-mills, bits, nails, tools, rods, electrical goods, trunks and mitten works.

There are seven churches, a classical school, a high school, public and parish schools, a hos¬

pital and a public library. The three banks have a combined capital of over $300,000. The government is vested in a mayor and 10 council-

men, elected for four years. Pop. 30,067.

KOLA, ko'la, Russia, a county town in government of Archangel, on the Kola Penin¬

sula, at the confluence of the rivers Tuloma and Kola. It is near the district Alexandrovsk with its harbor and naval station, and its sparse inhabitants live mostly by fishing and hunting. As early as 1264 mention is made of this place, and it was fortified in the 16th cen¬

tury, serving as a location for exiles. It faces Katerinenhafen, which, in spite of its extreme northerly Arctic position, is an open harbor the year round, frequently.

KOLA-NUT. See Cola-nut.

KOLA PENINSULA, Russia, # situated

between the White Sea and the Arctic Ocean, and consisting largely of mountain ranges with pine forests covering their bases interspersed with large lakes. The Arctic coast here, some 260 miles long, is known as the Murman Coast, and has been recently brought very prominently before the eyes of the world by the landing of the Allied troops, including an American contingent. Its rocky coast has numerous sheltering bays, one of which, Kola Bay, forms the government naval harbor and station Alexandrovsk. The peninsula has an area of about 50,000 square miles.

KOLAR, ko'lar, Josef Jiri, Bohemian

actor, dramatist and novelist: b. Prague, 2 Feb.

1812; d. 1896. He studied philosophy at Prague University, but soon devoted himself to the theatre and became (1839) a member of the Prague State Theatre, gaining fame in Shake¬

spearean roles. He was appointed director of the Czech Theatre at Prague (1869), becoming later a novelist. Among his numerous plays are < Monika* .(1847) ; (Zizkova smrt> (1859); (1872); (1881); (Primator> (1883), etc. He made excellent translations of the plays of Shakespeare, Goethe and Schiller.

KOLB, kolp, Georg Friedrich, German

politician, statistician and publicist: b. Speyer, 14 Sept. 1808; d. Munich, 16 May 1884. He was elected member of the Bavarian Landtag (1849) and published the Neue Speyerer Zeitung, which was suppressed in 1853. He escaped persecution by living in Zurich, but again became member of the Bavarian Land¬

tag (1863), when he strenuously opposed the union of Bavaria in the German Bund. His principal works are (Handbuch der vergleich-

enden Statistic (Zurich 1857; 8th ed., Leip¬

zig 1879); (Statistisches Handbuchlein. der Volkerstands- und Staatenkunde* (Leipzig, 5th ed., 1875) ; 'Kulturgeschichte der Mensch-

heit> (ib. 1868-70). Under the pseudonym "Broch** he wrote Utalien und jetzige poli-

tische Luge des fibrigen Europas* (Zurich 1859), and

KOLBE, kol'be, Adolph Wilhelm Her¬

mann, German chemist : b. Elliehausen, near Gottingen, 27 Sept. 1818; d. Leipzig, 25 Nov.

1884. He studied at Gottingen and became as¬

sistant to Bunsen (1842) in Marburg. He was assistant to Playfair at London (184a), but re¬

turned to Marburg (1847) in order to con¬

tinue, with Frankland, work on the nitrites started in London. He moved to Brunswick the same year and edited cHandworterbuch der Chemie) of Liebig and Wohler. He was made professor at Marburg (1852) and at Leipzig (1865). Very important work of his was research into the action of chlorine on carbon-disulphide ; on the decomposition of the organic acids by electric currents; on the production of acids with higher carbonic-acid from cyanogen combinations with the alcohol-

radicles; on the synthesis of cacodyl, etc.

Based on the doctrine of the para radicles he attempted to advance chemistry on the radicle theory and remained antagonistic to the type and structural theory. He discovered the syn¬

thesis of corallin from phenol (1861) and in¬

vented a simple process of salicylic acid pro¬

duction from phenol and carbonic acid, learn¬

ing the next year the antiseptic properties of this composition. He wrote (Ausffihrliches Lehrbuch der

organischen Chemie) (Bruns¬

wick 1855-64), which has had many revised editions; (Kurzes Lehrbuch der inorganischen Chemie> (ib. 1883) ; (Zur Entwicklungsge-

schichte der theoretischen Chemie> (Leipzig 1881). He edited the Journal fur praktische Chemie from 1870. Consult Hofmann, (Ne-

krolog auf H. Ivolbe) in Berichte der deutschen chemischen gesellschaft (Berlin 1884).

KOLBERG. See Colberg.

KOLBING, kel'bing, Eugen, German

scholar: b. Herrnhut, 21 Sept. 1846; d. Hen-

renalb, 10 Aug. 1899. He studied at Leipzig and taught in the Chemnitz Gymnasium

(1871-72). He was appointed librarian at Strassburg and became private teacher (docent) at the Breslau University (1873). In 1880 he received the degree of assistant professor and was made (1886) professor of the English language and literature. He made a specialty of mediaeval English literature. He wrote (Untersuchungen fiber den Ausfall des Rela-

tiv-Pronomens in den germanischen Sprachen*

(Strassburg 1872), and edited a number of old Norse sagas. Among his other works are (Beitrage zur vergleichenden geschichte der romantischen Poesie und Prosa des Mittelal-

ters) (Breslau 1876) ; (Chanson de Roland,*

after the Venetian manuscript (Heilbroun 1877) ; (Die nordische und englische Version der Tristansage,* with translation (ib. 1878-

82) ; (Amis and Amiloun,* the Middle-Eng-

lish romances (ib. 1884) ; (Sir Bevis of Ham-

toun) (London 1885-94) ; Hpomedon* (Bres¬

lau 1889) ; (Arthour and Merlin> (Leipzig 1890) ; Byron's (Siege of Corinth* (1893) and (Prisoner of Chillon) (1896). He founded KOLB'S FARM — KOLIN

(1877) the periodical Englische Studien. Con¬

sult his biography in Englische Studien (Leip¬

zig 1900).

KOLB'S FARM, Engagement at. After

the action at Pine Mountain (q.v.), 15 June 1864, General Sherman closed in on the Con¬

federate army defending Marietta and the rail¬

road south to the Chattahoochee, and began the extension of his lines to the right. The Con¬

federates made a corresponding move to the left, and on the night of the 21st Hood's corps of two divisions, Hindman's and Stevenson's, moved from the right, near the railroad north of Mariettta. to the Marietta and Powder Springs road, near Zion Church, about four miles southwest of Marietta and a mile east of Kolb's farm. Hood now occupied the extreme left of the Confederate line, and had been in¬

structed by Gen. J. E. Johnston to endeavor to prevent any progress of Sherman's right toward the railroad, the course of which was nearly parallel to the Confederate left and centre, and which was seriously menaced by Hooker's and Schofield's corps. On the morn¬

ing of the 22d Schofield had advanced one division, Hascall's, on the road from Powder Springs Church to Marietta, with orders to take position on Hooker's right, near Kolb's house. Hooker, in going to the right and for¬

ward, reached to the Marietta road at Kolb's, and made connection with Hascall's division.

Williams' division, massed by brigades, held Hooker's right, Geary's division was on the left of Williams and Butterfield's division was further to the left on the line of Howard s Fourth corps. Williams and Hascall had very sharp skirmishing in getting into position, and from prisoners taken of Hood's corps it was learned that Hood, supported by Hardee, was about to attack, upon which both Williams^ and Hascall were ordered to deploy their divisions, and they threw up breastworks, Hascall in heavy woods and Williams, for the. greater part, on open, commanding ground, giving good positions for artillery. The deployment had not been completed and but few breastworks had been thrown up when, about 5 p. m., Hood made his attack. As he advanced from the .woods which had sheltered him and concealed his line, his right was met by a terrific fire of shell, case-shot and canister that tore great gaps in the line and partially broke up his formation; but he pressed on and, coming under still closer canister fire and deadly volleys of musketry, was repulsed after a most desperate struggle of less than an hour. The attack fell upon the divisions of Williams and Hascall, Williams losing only 130 killed and wounded and Has¬

call a less number. Hood's loss was. 1,012

killed and wounded and about 100 missing.

Consult (Official Records> (Vol. XXXVIII) ; Cox J D, (Atlanta > (New York 1882) ; John¬

ston', J. E., (Narrative of Military Operations*

(New York 1874).

KOLCSEY, kel'se, Ferencz, Hungarian

poet and critic: b. Szodemeter, Transvlvania, 8 Aug. 1790; d. Szathmar, 24 Aug. 1838. He studied at Debreczin and went to Pest as a royal officer of the law (1809), where he gave out his first efforts in

poetry (1813) and founded (1826) the periodical Elet es irodalom (Life and Literature), for which he contributed a large number of articles on philosophy, art, history and criticism. He was a member of the Hungarian Diet (1832-36) and the chief orator of the Liberal party. The Hungarian Acad¬

emy elected him a member. His (J°urnal of the Landtag, 1832-36* (Pest 1848) is interest¬

ing. He *was the author of the Hungarian na¬

tional hymn. His complete works were pub¬

lished by P. Szemere (2d ed., Pest 1863).

KOLDING, kol'ding, Denmark, a town on

the east coast of Jutland, situated qn Kolding Fiord, a small bay of the Little Belt, and the junction of several railways. The town does a good shipping business as well as considerable trade in lumber, grain and other products. On the northwest side is the picturesque ruin of the burned (1808) royal castle Koldinghuus, built in the 13th century for the residence of the Danish kings. In 1849 the Schleswig-Hol¬

stein army under Bonin defeated the Danes here, causing much damage to the town. An antiquarian and historical museum is here.

The population, about 14,219. Consult Fiihn, (Efterretninger om Kjobstaden Kolding)

(Kolding 1848-60).

KOLHAPUR, ko'la-poor', or KOLAPUR,

India, capital of the state of the same name, is lerminus of one of the Southern Mahratta Railway’s branches. It is 144 miles south by east of Poona and 188 miles south-southeast of Bombay, situated on the Panchganga

River, which is crossed here by a bridge. Nu¬

merous fine modern buildings include the pal¬

ace of the Rajah, government offices, city hall, treasury, etc. From its interesting Budd¬

hist remains this must have been once a reli¬

gious centre of importance, evidenced in tem¬

ples, shrines, caves cut into the rock and dec¬

orated, etc. Pop. 48,122.

KOLHAPUR, or KOLAPUR, India, the

principal state under the Bombay government, covering an area of 3,165 square miles. In the western division it is covered with its moun¬

tainous Ghats, but the eastern section has the fertile Deccan plain. The western Ghats fur¬

nish little else than lumber and are the strong¬

holds of the feudatory Mahrattas. The vege¬

table produce of the valleys and plains are rice, millet, cotton, tobacco, sugar-cane, etc.

The overlords, or rajahs, claim descent from Sivaji the Great, the Mahratta Empire's founder. Pop. 883,441.

KOLIN, kd-len, Czecho-Slovakia, this Bo¬

hemian city is in part termed Neukolin and is built on two islands produced by the river Elbe at this point and crossed by two iron bridges.

It is reached by two railways, the Austro-Hun¬

garian State Railroad and the Northwestern Railroad, and is the seat of government offices.

It contains the 14th century Gothic Bar¬

tholomew church, an Evangelical church and a

synagogue, an ancient palace and townhall, gymnasium, commercial and trade schools, two sugar and two machine factories, several chemical works, petroleum refinery, two brew¬

eries, etc. It does a large trade in vegetables and fruit grown in the vicinity. A noted battle was fought here 18 June 1757 between the Aus¬

trians under Daun and . the _ Prussians under Frederick the Great, ending in the latter's de¬

feat and the consequent raising of the siege of Prague as well as the evacuation of Bohe¬

mia, together with a battle loss of 14,000 casu-

alties, 29 standards and 43 cannon, while the Austrians lost about 8,000. Pop. 17,000, mostly Czechs.

KOLLAR, kol'lar, Jan, Czech poet and

archaeologist: b. Mossocz, Hungary, # 29 July 1793; d. Vienna, 24 Jan. 1852. He studied at the Pressburg Lyceum (1812-15) and then at Jena, becoming Slovak preacher (1819) to the newly-founded Evangelical Community in

Pest. His .first work was a collection of short poems, the Daughter of Slava, (Pest 1832). The work was added to in further editions (Pest 1845; Vienna 1852; Prague 1862). In these celebrated poems he gives expression to his pain over the suppres¬

sion of his race under German kultur. He next brought out a praiseworthy collection of Slovak folk-songs,

tioned (Rozpravy o jmenach, etc.* (ib. 1830) concerning the names and ancient monuments of the Slovak peoples. With the fight for the freedom of

his language in Hungary the en¬

tire Slovak youth congregated around the noted poet, although he tried to repress the tendency to Panslavism. He was appointed professor of archaeology at the University of Vienna (1849). After his death appeared the archaeological work (Staroitalia slavjanska*

(Vienna 1853; Prague 1863) concerning Sla¬

vonic Italy. A collection of his works, con¬

taining the poet's autobiography, was pub¬

lished (Prague 1862-63) and. a second edition (1868), but both are incomplete.

KOLLIKER, ke'li-ker, Rudolph Albert

von, Swiss anatomist and physiologist: b. Zu¬

rich, 6 July 1817; d. Wurzburg, Bavaria, 13

Nov. 1905. He studied at Zurich, Bonn and Berlin and became an assistant o*f Henle (1842), and was admitted to the faculty of the university at Zurich (1843) as docent. He re¬

ceived the degree of professor of physiology and comparative anatomy (1845) but moved to Wurzburg (1847) where he was appointed pro¬

fessor of physiology and comparative anatomy.

He taught anatomy, microscopies and compar¬

ative anatomy (1866—1902) and was acknowl¬

edged the highest authority on general micro¬

scopical anatomy from the time of the publica¬

tion of his (Handbuch der Gewebelehre) (1852; 6th ed., Leipzig 1889-96). Much honor is due him for his epoch-making researches in evolution and zoology, more especially re¬

specting the molluscs and worms in which he was a pioneer. He wrote voluminously; his principal works include (Ueber die Pacinischen Korperchen) (Zurich 1843), written in col¬

laboration with Henle;

omie oder Gewebelehre des Menschen> (Leip¬

zig 1850-54) ; (Entwickelungsgeschichte des Menschen und der hohern Tiere* (ib. 1861) ; Hcones histologicaP (ib. 1863-65) ;

elungsgeschichte der Cephalopoden* (Zurich 1844) ; (Die Schwimmpolypen von Messina) (Leipzig 1853) ; (Die normale Resorption des Knochengewebes* (Leipzig 1873) ; (Grundriss der Entwickelungsgeschichte des Menschen und der hohern Tiere) (ib. 1880). He edited Zcitschrift fur zvissenschaftliche Zodlogie from 1849 in collaboration with Siebold, and with Ernest Ehlers, later. An accomplished linguist, he was also a great traveler, well known in all leading European educational centres. Con¬

sult his (Errinnerungen aus meinem Leben (Leipzig 1899).

KOLMAR, kol'mar, France, city

capital of the district of the same name in the liberated provinces of Alsace-

Lorraine, in the French department of Haut Rhin, 40 miles south-southwest of Stmss-

burg. Its fortifications were destroyed in 1673

and it is now surrounded by boulevards and entered by three gates. Here is the public li¬

brary with 80,000 volumes and some pictures by Schon, Albert Diirer, etc. ; and the museum, where, among other curiosities, a remarkable aerolite is preserved, which fell near Ensis-

heim in 1492 and originally weighed about 284

pounds. The portion here weighs about 142

pounds. Kolmar has manufactures of printed goods, calicoes, silks, etc., besides cotton-spin¬

ning mills, tanneries and chamois-leather works. It has a considerable trade in the man¬

ufactured goods of Alsace, and in iron, grain, wine, madder, etc. ; and in colonial produce, with which it supplies Switzerland. It became one of the free imperial cities in 1226, and as such became a place of consideration. In 1632

it was taken by the Swedes, who maintained possession for two years. It was united to France in 1697 by the Peace of Ryswick, and surrendered to Germany by the Treaty of Ver¬

sailles, 26 Feb. 1871. In the French invasion of Alsace which followed the outbreak of the Great European War in 1914, Kolmar was cap¬

tured; but the city was soon reoccupied as a result of a German counterstroke Pop. 43,808.

KOLO, ko 15, Poland, a town in the

Polish government of Kalisch, situated on an island in the river Warthe. It has a Bene¬

dictine church, several factories and a popula¬

tion of 11,655 in 1910. In the World War this town was one of the bases of the Germans in their first drive at Warsaw and it was a pass¬

ing point for troops in the following expedi¬

tions against Warsaw. The neighborhood con¬

tains a" number of important brick kilns.

KOLOKOTRONIS,k6'15k-6-tro'ms,Theo-

doros, Greek general: b. Karytena, Arcadia, 15

April 1770; d. Athens, 15 March 1843. He took part in the sieges of Tripolitza, Nauplia and Corinth and invaded Livadia (1821) as a leader of the Klephts against the Turks. In the next campaign he beat the Turks at Kleones and Phlius. He seized Nauplia and made him¬

self governor (1823) and, by force of threats, was appointed commander-in-chief and, later, vice-president of executive council. Fighting adversely against the government troops under Guras, he withdrew to Karytena and was made state's prisoner (1825). The campaign losses of the Greeks caused them to entrust him with an army-corps and he fought adversely against Ibrahim Pasha. Under Count d'lstria he acted as general in the Peloponnesus and was chosen a member of the provisional government com¬

mission on the death of the president, but sided with the Russians against the government.

He turned against the regency, but was ar¬

rested (1834) and condemned to death for high treason, but the sentence was changed by King Otho to 10 years' imprisonment. On the king coming of age and ascending the throne KOLOMAN — KOMURA

(1835), he was released and his rank of gen¬

eral restored, besides honors being bestowed on him. He lived thenceforth at Athens. Con¬

sult Edmond's translation of (Kolokotronis the Klepht and the warrior, an autobiography*

(London 1891) ; Bikelas, (Un heros de la Guerre de l'Independance) (in (La Grece by-

zantine et moderne,* Paris 1893).

KOLOMAN, kol'o-mati, spelled also

KOLOMANUS, KALMAN and COLO-

MAN, king of Hungary (1095-1116). He was son of Gezas I and overthrew (1097) an in¬

surrection of the Croats. Conquering the greater part of Dalmatia, he attacked Galicia (1096). He suppressed the efforts of Em¬

peror Heinrich V to place his brother Almos on the throne, and, after several revolts, he had Almos and his son Bela blinded. He was active as a lawmaker, regulating the taxes and treasury as well as the right of succession of the nobility. The Church was greatly benefited by his acts and the Jews were forbidden trad¬

ing rights. His son Stephan II succeeded him.

KOLOMEA, kd'ld-ma'a, Poland, a town

in Galicia, situated on the Pruth and on the Lemberg-Czernowitz Railroad, the local De-

latyn-Stefanowka and Kolomea-Sloboda Run-

gurska lines, 42 miles from Czernowitz and 122

miles from Lemberg by rail. It possesses a number of churches of different denominations, monuments to King Kasimir IV and the poet Karpinski, a Polish and a Ruthenian gymnasium, trade schools for the wood industry and for pottery work, the latter being its leading in¬

dustry. Other manufactures are flour-milling, petroleum refining, textile and embroidery work; it also does a large trade in agricul¬

tural products. The population in 1910 was 42,676, consisting chiefly of Jews and Poles.

KOLOMNA, ko'lom-na, Russia, county-

. town of the government of Moscow, on the junction of the Moskva and Kolomenka rivers and on the

Moscow-Ryazan Railroad. It pos¬

sesses the ancient remains of the fortified Kreml, the beautiful 17th century Assumption of the Blessed Virgin Cathedral, church of the Resurrection, 12 other churches, a monastery and a nunnery. Among its institutions are a gymnasium, city bank, several factories — no¬

tably the Kolorpna Machine Factory — and it has a large agricultural trade. As early as 1177 mention is made of this town and it was here that the Mongols (1237) under Batu beat the Russian Grand Duke Jurie. Pop.

26,324.

KOLYMA, ko-le'ma, Siberia, a river in

the government of Yakutsk, which rises in the mountains of Stanovoi-Krebet. After a course of about 1,000 miles it falls into the Arctic Ocean. The chief tributaries are the Greater and the Lesser Aniuj and the Omolon, which enter it on the left not far from the sea. After¬

ward the river divides into two, and subse¬

quently into three, branches, forming a delta.

The Kolyma from May to September is ice-

free and has sufficient depth for any vessel, but navigation, especially at the entrance, is ren¬

dered dangerous by shifting sand-banks.

KOLZOV, kol-tsof, Alexej Vasil jevitch,

Russian national poet : b. Woronezh. 14 Oct.

1809; d. there, 31 Oct. 1842. He carried on, as a youth, his father's business of cattle-trader, vol 16 — 33

but educated himself by a study of the works of Lomonossov, Derzhavin, Zhukovsky, Push¬

kin and others. He then practised versification.

In Moscow (1831) he found an opportunity to get his poems published, and through them gained numerous and influential patrons. One of the latter, Stankevitch, published (1835) a collection of 18 of his poems. An edition of his complete poems, with his biography by Belinsky, was published (Saint Petersburg 1846 ; last ed., 1909). He was the first poet to treat the Russian folklore in truly artistic manner, and has been termed the Russian Burns. Most of his poems have been translated into German by Fridler and published in Reclam's Universal Bibliothek (Leipzig 1885) ; also by M. Michel-

son (Saint Petersburg 1891).

KOMORN, ko'morn, Magyar KOMA-

ROM, Czecho-Slovakia, free town with mu¬

nicipal powers and a fortification on the left bank of' the Donau River, capital of the county of the same name. It is 65 miles west-northwest of Budapest by rail, and has seven churches, three monasteries, an important grain and lumber industry, besides fisheries. Its institu¬

tions include also a Benedictine gymnasium and officers' pavilion, and a monument to the Hun¬

garian general Klapka, who held the old for¬

tress (built originally by Matthias Corvinus, in the 15fh century) long after the suppression of the Hungarian revolution elswhere, but capitu¬

lating to the Austrian army 27 Sept. 1849.

This is the seat of a Reformed bishop, and it was here that the noted novelist Maurice Jokai was born. Its population in 1910 was ***22,337. Consult Szillanyi, (Komorn in Jahr 1849*** *(Leipzig 1851) ; Szinnyei, HComorn in the Year 1848-1849 * (Budapest 1887, in Hun¬*

garian) .

KOMPERT, kom'pert, Leopold, Austrian

novelist : b. Miinchengratz, Bohemia, 15 May 1822; d. Vienna, 23 Nov. 1886. He studied at the Prague University and was appointed tutor of the children of Count Andrassy at Press-

burg. He continued his studies (1847) at Vienna University. The revolution of the year 1848 drew him into politico- journalistic activ¬

ity and he became editor of Oestreichischen Lloyd. In 1852 he accepted a tutor's position in Pest, but returned lo Vienna (1857) where he devoted himself to literature. Of Jewish descent his stories treat of Jewish life and con¬

ditions ; in them he combined a large measure of truthful poetic action and description with great originality. His principal works are (Geschichte aus dem Ghetto) (Leipzig 1848; 3d ed., 1886) ; Bohmische Juden* (Vienna 1851) ; (Am Pflug* (Berlin 1855) ; (Neue Ge-

schichten aus dem Ghetto* (Prague 1860) ;

streute Geschichten) (ib. 1883). His collective works were published in eight volumes as (Gesammelte Schriften) (Berlin 1882, and Leipzig 1887). Consult Allgemeine deutsche Biographie (Leipzig).

KOMURA, ko'moo'ra. Jutaro, Marquis,

Tapanese statesman and diplomat: b. 1855; d.

Havama, 24 Nov. 1911. In 1875 he was one of the first group of students sent by the Japanese 514

government

partment of Justice and that of Foreign Affairs.

Appointed secretary of legation in Peking, he acted

as charge-d'affaires during the negotia¬

tions that culminated in the Chino- Japanese War of 1894-95. He next served as civil ad¬

ministrator at Antung, then on a special mis¬

sion to Korea, and subsequently as Vice-Min¬

ister of Foreign Affairs in Tokio. From this post he was launched on his ambassadorial ca¬

reer, being successively Minister to Washing¬

ton, Saint Petersburg (Petrograd) and Peking, where he served during the troublous period of the Boxer Rebellion. In 1901 he became Foreign Minister in the Katsura Cabinet; he conducted the negotiations preceding the Russo-

Japanese War and also the peace negotiations at Portsmouth. While the results of that were displeasing to the Japanese people, it is gen¬

erally regarded 'that Komura really achieved a diplomatic victory by 'the Treaty of Ports¬

mouth, which brought Japan the peace she sorely needed as well as the prime objects of the war. As Foreign Minister Komura had formed the Anglo-Japanese Alliance in 1902; three years later he was sent to England —the first Japanese Ambassador to that country.

He returned in 1908 to take again the Foreign Office in the second Katsura Cabinet. He re¬

mained at work until a few weeks before his death— of tuberculosis — and left a profound impression on Japan's foreign relations. The late King Edward bestowed two decorations upon him in 1905 and 1907. On the renewal of the Anglo-Japanese Alliance in July 1911, modifications were introduced into the treaty to permit its obligations from clashing with the provisions of the arbitration treaty then signed, but not ratified, between Great Britain and

the United States, the two countries for which Komura entertained sincere admiration and personal regards.

KONDRATOWICZ, kon'dra-to'vich, Lud-

vik Vladislaw, Polish poet: b. Jaskowicze, Lithuania, 17 Sept. 1823; d. Vilna, 15 Sept.

1862. He is better known under his heraldic nom-de-plume, Vladislaw Syrokomla. He lived as a farmer in Zalucze on the Niemen and, later, near Vilna, but always in the greatest poverty. His poetry was not given . over to high flights, but was fired with enthusiasm and deep, honest feeling, expressed with unusual simplicity. Among his folk stories are (Urodzony Jan Deborog) (1854); (Janko

Cmentarnik> (1856) ; (Nocleg hetmanskP

(1857) ; (Zgon Acerna> (1856) ; the latter dedi¬

cated to the poet Klonowicz (q.v.), whose said life story mirrored his own. His dramatic at¬

tempts, such as (Kasper Karlinski,* were not so successful. He wrote a history of Polish literature — (Dzieje literatury w Polsce) (2d ed., Warsaw 1875), and his metrical transla¬

tions of the Polish-Latin poets are excellent.

A collective edition ot his poems was pub¬

lished (10 vols., Warsaw 1872) His biography was written by J. J. Kraszewski (ib. 1863).

KONG, West Africa, an inland city of im-

nortance in the district of the same name be¬

longing to the French Ivory .Coast, colony.

Prosperous cotton goods factories exist here, but its native commerce is chiefly in gold, coco¬

nuts and salt. Its population is about 15,000,

consisting chiefly of Mohammedans. One of the first Europeans to visit this section was the French captain L. G. Binger, who in 1888 did much toward bringing the natives under French protection.

KONGO, kong'go, or CONGO, The,

once an independent state in central Africa (1882) ; a Belgian colony, 1907. It is bounded northwest and north by French Kongo and British East Africa, the dividing line being partly the Kongo itself and its tributary,, the Ubangi ; on the east 'it is bounded by British Itast Africa, Tanganyika Territory, Lake Tan¬

ganyika and British Central Africa;

It reaches -the Atlantic at the mouth of the Kongo by a narrow neck of land. The terri¬

tory has an area of 913,127 square miles, and is divided into 22 administrative districts, each of the districts being under a commissioner. In 1913 there were 350 posts and stations. The estimated revenue for 1914 was £1,218,050 and the expenditures £2,077,440. The public debt in 1912 stood at £1,149,888. The northeastern portion of the state, forming fully one-third of the whole, is mostly under dense and almost impenetrable forest, but the remainder largely consists of arable land of considerable fertility.

Among the cultivated plants are maize, millet, manioc, tobacco, coffee, sugar-cane, hemp, bananas, etc., and most of the fruits and vege¬

tables of Europe have been found to thrive ex¬

cellently. The wild animals include the ele¬

phant, hippopotamus, crocodile, buffalo, ante¬

lopes of various kinds, the chimpanzee, soko, etc. The imports consist mostly of woven goods, spirits, tobacco and firearms, and the ex¬

ports comprise ivory, rubber, ground-nuts, palm-oil, gum-copal, wax, etc. The climate is very unhealthful to white men owing to the combination of great heat with a very moist atmosphere, but in a few of the more elevated spots it is much better. There are two rainy seasons, namely, October-December and Febru-

ary-May, the latter being much the wetter, and between these intervene the two dry seasons.

There are not as yet many good roads in the state, but there are thousands of miles of navigable rivers. The Kongo is navigable from the sea up to Matadi, and again, for 1,200 miles between Stanley Pool and Stanley Falls, but the portion between Matadi and the Pool is obstructed by cataracts. In 1913 there were 1,039 miles of railway. The Great Lakes Rail¬

way, completed in 1915, links up the Upper Kongo with the German railway from Dar-es-

Salaam to Udjidji. The colony is also linked up, via Elizabethville, with the Cape-to-Cairo Railway. In 1912 the tonnage entered at the ports was 1,044,864 tons. The bulk of the in¬

habitants are of Bantu stock, but in the extreme north the proper negro tvpe is found, and in some of the eastern parts of the state Arabs and other ethnical groups occur. Large num¬

bers of the inhabitants are cannibals of the most pronounced type, and the vast majority are heathens.

After Stanley had proved the. identity of the Lualaba with the Kongo, a Comite d' Etudes du Haut Kongo was formed under the auspices of Leopold II, king of the Belgians, and in 1879

this body commissioned Stanley to return to KONGO — KONGO-SNAKE

the Kongo region with a view to preparing for the

development of its resources. He estab¬

lished his first station at Vivi, and afterward founded others at Isangila, Manyanga, Leopold¬

ville, Equatorville, Stanley Falls and elsewhere, several of these being connected by good roads.

In 1884 the African International Association replaced the committee, and in the following year it secured the foundation of the Kongo Free State and the recognition of its independ¬

ence by the Congress of Berlin. Trade and navigation on the Kongo and all the rivers, lakes and canals connected with it were de¬

clared absolutely free, and the suppression of the slave-trade was provided for. Leopold II was made sovereign, and Brussels was named as the seat of the government. In 1889 Leo—, pold bequeathed his sovereign rights to Bel¬

gium. In 1890 the territories of the state were declared inalienable, and in that year also the right was reserved to Belgium of annexing it after 10 years. This convention expired on 3

June 1903, when the Belgian government de¬

cided to abandon the project of annexation, allowing the option to expire, the reasons given being popular onoosition and the attitude of Great Britain. Scandals connected with the administration, especially in regard to the treat¬

ment of the natives, aroused m 1904 and 1905

world-wide interest, commissions of inquiry were, appointed and remedies introduced. Un¬

der treaty of 28 Nov. 1907 cession of the terri¬

tories was made to Belgium. The central gov¬

ernment, located at Brussels, comprises the king of

the Belgians as sovereign, and a secre¬

tary of state, etc. At Boma there is a gover¬

nor-general, under whom of course there are numerous officials. There is an army of native Africans, having an effective strength of about 18,000, commanded by European officers. Be¬

sides Boma, the capital, the chief stations are Banana, Matadi, Vivi, Isangila, Manyanga, Leopoldville, Mswata, Kwamouth, Bolobo, Lu-

bolela, Equatorville, Bolombo, Stanley Falls, Nyangwe, Yambuya, Basoko, Benabendi, etc.

Pop. estimated at 15,000,000; in 1912 there were 5,465 Europeans, including 3,307 Belgians.

KONGO, or CONGO RIVER, Africa, a

large river in southwest Africa, flowing into the Atlantic Ocean in lat. 6° S. ; long. 12° 40' E.

Its estuary was discovered by the Portuguese, Diego Cam, in 1482; and the lower part of its course was first explored by Captain Tuckey in 1816. The upper part of the river remained unknown until Stanlev, by descending from Nyangwe on the Lualaba to the mouth of the Kongo (1876-77), proved the two rivers to be identical. The Kongo is formed by the junc¬

tion of the Luapula andi the Lualaba in about the same latitude as the mouth. Of these the former issues from the south end of Lake Bangweolo, bends northward and flows into Lake Moero, on leaving which it pursues a northwesterly course. The chief inflowing river of Bangweolo is the Chambezi, which enters the lake on the east after flowing south¬

west from the mountains of northeastern Rhodesia. The Lualaba rises by several head-

streams in the south of Kongo Free State and flows north and north-northeast through a series of lakes to its junction with the Luapula.

The river thence flows north and slightly west to Nyangwe, receiving the Lukuga on the right from Lake Tanganyika, thus being connected immediately with the great lake system of cen¬

tral Africa. It then follows a northerly course for about four degrees, near the equator turns to the northwest and holds that direction till it reaches about lat. 1° 45' N., when it turns first west and then gradually southwest. About the place where the river first crosses the equator there are seven falls, called Stanley Falls, and about long. 17° E. and lat. 2° 30' S. there be¬

gins a series of cataracts and rapids. In this part of its course it receives some very large tributaries, the most important of which are the Aruwimi, the Rubi, the Mongalla and the Mobangi (or Ubangi), which join it on the right, and the Boloko, Lopori, Ikelemba, Ruki and Kwa, which join it from the left, the latter representing the collected waters of the Kas-

sai, the Kwango, Sankuru, etc. Below the Liv¬

ingstone Falls, near Stanley Pool, the course of the river, which is there contracted, again ex¬

pands, till at its mouth it attains a breadth of 10 miles. It is navigable for about 110 miles from its mouth up to the cataracts, and above Stanley Pool steamers ply about for about 1,200 miles. The amount of water which the river discharges is greater than that discharged by the Mississippi, the volume of water being next to the Amazon. The length of the river is estimated at 3,000 miles, the entire navigable system of 6,000 miles and the area of its basin about 1,600,000 square miles. The Kongo ex¬

pedition of the American Museum of Natural History, financed by a group of public-spirited members and friends of the museum, and led by Herbert Lang and James Chopin, left Stan¬

leyville on 4 Sept. 1909 and plunged into the great

forests and swamps of the Kongo. After six years in the African jungle, during which time the expedition had been many times given up as lost, it returned in 1915, with some 45

tons of scientific specimens, the most valuable collection ever brought out of Africa. Water and rail communications lead from the mouth of the Kongo to Lake Tanganyika, and from thence southward to the Cape-to-Cairo Rail¬

way. Consult Stanley, (Through the Dark Con¬

tinent (1878).

KONGO-SNAKE, one of the slender am¬

phibians of the family Amphiumida ?, which take an intermediate place between the coecilians and the salamanders as the lowest family of the tailed (urodelous) amphibians. Several genera occur in Asia and North America. The giant "salamander® (Cryptobranchus maximus) of the mountain streams of Japan, sometimes more than five feet long, and the American hellbender (q.v.) are of the same family. The term "Kongo-snake,® however, belongs spe¬

cifically to the typical genus and species, Am-

phiama means, which inhabits suitable localities in all the warmer parts of the United States, where it receives its name from the negroes of the Southern States. It is an eel-like creature, with very small, three-toed and almost useless limbs, one pair near the head and the other almost at the caudal extremity, which haunts shallow stagnant waters, is numerous in the Southern rice-fields and is superstitiously feared by many persons although perfectly harmless.

It feeds on small fishes, snails, crayfish, insects, etc., which it darts upon in the water or roots out of the mud. It reproduces by eggs, de-

posited at the end of the summer in a damp place, as under a rotting log, which, provided with shells, are connected by a gelatinous cord, and are protected by the female who coils her body about them and afterward takes care of the young. The embryos have well-developed external gills, but these disappear with growth, and even gill-clefts are greatly reduced in adults. Consult Cope,

tiles5 (New York 1901).

KONGSBERG, kongs-bark, Norway, a

mountain town in the county of Buskerud, on the river Laagen and the Hougsund-Kongsberg Railroad. It is the seat of the royal mint and has a silver mine, an arms factory and a monu¬

ment of Christian IV, its founder. The silver mine was discovered in 1623 and its output averages about 180,000 ounces pure silver an¬

nually. Pop. 6,260.

KONIA, ko'nl-e, or KONI, EH, Turkey,

the capital city of the Asia Minor vilayet of that name. It stands at an elevation of 3,300

feet and contains beautiful but ruined mediaeval palaces, mosques, madrassas (Moslem semina¬

ries), etc. As the crossing point of important roads, it has remained the chief staple market for county produce, has rug, glove and hose factories, and from 44,000 to 52,000 population, mostly Mohammedan. It has numerous Mo¬

hammedan schools and two directed by French Catholics as well as one Greek school. Besides its tombs of saints, it possesses the _ first monastery of the Mawlawi (whirling) dervishes.

This is the starting point of the railroad ex¬

tension toward Bagdad and is connected with Constantinople. Russian and French consular agents are stationed here. It is the ancient Ikonion (Iconium) of Phrygian origin, and under the Diadochi (Persians) and Romans it was the capital of Lycaonia, and from 1073

became the splendid residential city of the Seljuk sultans of Rum, but fell under the Osmanli rule. The Persian poet Jelal ud Din Rumi (1207-73) lived at the Seljuk court here.

The battle of Ikonion, 18 May 1190, was Frederick Barbarossa's last great fight. This city was captured later by Bajesid I (1392), by Mohammed II (1460), and by Ahmed, son of Bajesid II (1511). It was occupied by Ibrahim Pasha when he captured Reshid Pasha (1832) near here. Consult Huart, (Konia, la Ville des Dervishes tourneurs5 ^Paris 1897).

KONIG, ke'mk, Friedrich, German printer and inventor: b. Eisleben, 17 April 1774;' d.

Oberzell, 17 Jan. 1833. He learned the art of printing at Leipzig (1790-94), and was active (1803-05) in improving the. printing press at Meiningen and Suhl. Lacking the means to carry out his experiments, he appealed, unsuc¬

cessfully, to the Saxon and Austrian govern¬

ments, then traveled to Saint Petersburg (1806) to be again disappointed. He then went to London and made an agreement with the printer Bensley (1809) to carry out his plans for a book-printing machine. They obtained a

patent for a platen-press (1810), but the flat-

plate principle was soon discarded for the cylinder press. Patents followed (1811, 1813, 1814). He returned to Germany (1817) and formed a company (Konig and Bauer) at Ober¬

zell and established a steam-press factory. In

partnership with Cotta, of Stuttgart, they built a factory for machine-made paper at Schwarz-

ach, near Wurzburg (1828). In combination with the inventor's sons the printing-press fac¬

tory thrived, greatly extending its work with color-printing machinery, etc. (1886). Consult Goebel, (Friedrich Konig und die Erfindung der Schnellpresse5 (Stuttgart 1883).

KONIG, Friedrich Eduard, Semitic

scholar: b. Reichenbach, Saxony, 15 Nov. 1846.

He studied theology and taught under the faculty of Leipzig University (1879), became professor of theology at Rostock (1888) and Bonn (1900). He wrote

zig 1881—97) ; (Der Offenbarungsgriff des Alten Testaments5 (ib. 1882) ;

iiber den Entwickelungstheoretikern beleuchtet5

(ib. 1884) ; (Die glaubensakt des Christen nach Begriff und Fundament untersucht5 (ib. 1891); (Einleitung in das Alte Testament5 (Bonn 1893); (The Exiles' Book of Consolation5

(Edinburgh 1899) ; (Neueste Prinzipien der alttestamentlichen Kritik5 (Berlin 1902) ; (Bibel und Babel5 (ib. 1903) ; (Die Babel, Bibel-

Frage und die wissenschaftliche Methode5 (ib.

1904) ; (Im Kampf um das Alte Testament5 (ib.

1903) ; (Geschichte der alttestamentlichen Re¬

ligion5 (1912).

KONIG, Heinrich Joseph, German au¬

thor and politician: b. Fulda, 19 March 1790; d.

Wiesbaden, 23 Sept. 1869. He studied in the Fulda Gymnasium and Lyceum, and was given an official

position in the city government at Frankfort. He was appointed secretary of finance at Fulda (1817), and was sent officially to Hanau (1819) and sent back to Fulda (1840).

His treatises (Rosenkranz eines Katholiken5

(Frankfort 1829) brought him into conflict with the clergy which caused him to more clearly express his religious views in (Der Christbaum des Lebens5 (ib. 1831). He was, in consequence, excommunicated by the bishop and joined the reform community. He wrote (Liebwacht und Verfassungswacht, oder fiber die Bedeutung der Bfirgergarden5 (Hanau 1831) in his fight for political freedom. As member of the Landtag (1832-33) he was in direct opposition to the Ministry of Hassen-

pflug and was forbidden to act as representative in the next Landtag. He retired to Hanau (1847) and then Wiesbaden (1860). His

tragedy (Die Bussfahrt5 (Leipzig 1836) stands prominent as a dramatic work, but he wrote, for the most part, historical romances and short, sketchy stories. Of such works we might mention (Die hohe Braut5 (Leipzig 1833) ; (Die Waldepser5 (ib. 1836) ; (Williams Dichten und Trachten5 (ib. 1839) ; (William Shakespeare5 (ib. 1850) ; (Veronika 5 (ib.

1844) ; (Tauschungen5 (Wiesbaden 1858) ; (Die Klubisten in Mainz5 (Leipzig 1847) ; (Konig Jeromes Karneval5 (ib. 1855) ; (Deutsche Familien5 (Wiesbaden 1862). Auto¬

biographical works are (Auch eine Jugend5

(Leipzig 1852) ; (Ein Still-leben5 (ib. 1861) and several descriptions of his travels. His chief romances have been published collectively in 20 volumes (Leipzig 1854-69).

KONIG, Otto, German sculptor: b. Meis¬

sen, 28 Jan. 1838. He studied art at the Dres¬

den Academy and under Hahnel, and later re¬

sided at Vienna, where he was appointed (1868)
KONIG-GRATZ

professor of the Arts and Crafts School of the Austrian Museum. His small groups are in¬

spirations of graceful form and finish. Among his large works are the sepulchral monument of his wife and three children (1874), a <(Mourn-

ing Victoria® for the monument of Emperor Maximilian of Mexico erected by the marine officers at Pola; a life-size marble group in the Imperial Museum of Art, Vienna ; a mar¬

ble crucifix in the mausoleum of Archduke Sigismund in Gmund; a fountain group in bronze executed for Queen Olga in Stuttgart, and a bronze statue of Emperor Franz Joseph in Waidhofen.

KONIG-GRATZ, kemg-grats, Czecho-Slo-

vakia, city in Bohemia, situated in a great fertile region at the confluence of the river Adler and the Elbe and connected with the surrounding country by three lines of railroads. It is the episcopal see of Bohemia and among its institu¬

tions are an obergymnasium, oberrealschule, teachers' college, trade academy, industrial school of locksmithing, theological-diocesan teachers' institute, boy's seminary, museum and deaf-mute institute. It has manufactures of musical instruments, pianos and organs, roofing-

paper, soap, a brewery, a branch of the Austro-

Hungarian Bank and a savings bank. Its Gothic cathedral dates from the 14th century.

The town was fortified till 1884. King Przemyol Ottokar I raised the status of the location to a town and it became the residence (1363) and a dower town of Queen Elizabeth with its name changed from

Hradec (Gratz) to the present one. The city suffered during the Hassite War and the Thirty Year War. The name of this city is especially noted for the bloody battle, fought in its proximity (1866), which decided the Prusso- Austrian War, and which is more generallv known to the French and English as the battle of Sadowa. In this engagement the losses of the victorious Prus¬

sian army amounted to 360 officers and 8,812

men, dead and wounded, while the Austrian cas¬

ualties amounted to 373 officers and 12,695 men dead, with 738 officers and 16,127 men wounded, not mentioning the Saxon casualties. Pop.

11,000.

KONIGIN LUISE, a small Hamburg-

American converted liner, was the first vessel lost in the European War. She was found laying mines off the estuary of the Thames on 5 Aug. 1914, and was sunk by a British destroyer. Of 130 in the crew about 50 were saved.

KONIGS, ken'igz, Paul Xavier Gabriel,

French mathematician: b. Toulouse, 17 Jan.

1858. He studied at the Ecole Normale and was given the degree of doctor of sciences (1882). He was appointed an official with the Faculty of Besanqon (1883) and with the Faculty of Toulouse (1885) ; and then was made professor of mechanics at the Sorbonne.

Many articles in the principal French con¬

temporary scientific journals came from his pen, treating chiefly of geometry and mechanics.

He wrote (Sur les Proprietes infinitesimales de l'Espace regie* (thesis) ; (Sur les Lignes geodesiques> (1893) ; (Leqons de l'Agregation

classique de Mathematiques) (1892) ; (Lecon de Cinematique* (1895) ; (La Geometrie reglee et ses Applications) (1895) ; Introduction a une Theorie nouvelle des mechanismes* (1905).

KONIGSBERG, ken'igz-berg, Prussia, a

seaport town, capital of the province of East Prussia and of the government of the same name, on the Pregel, about 4^ miles above where it enters the northeast extremity of the Frische Haff. It was once the Prussian capital, and the residence of the electors of Branden¬

burg, and was also a residence of the sovereigns and the place of coronation. It is surrounded by ramparts and detached forts. The larger part of the town is on the north bank of the Pregel, on hilly ground, a feature being an ornamental sheet of water with richly wooded banks, called the Schloss-Teich (Castle Pond).

The older portion is divided into three parts — Altstadt, or Old Town, on the west, Lobenicht on the east, and Kneiphof, on an island of the Pregel. The town, provided with electric street railroads, has on the whole a modern appear¬

ance. The principal public buildings are the cathedral, begun in 1333, an interesting Gothic structure, situated in the Kneiphof ; a new Gothic church in the Altstadt; the Haberberg Kirche, a conspicuous church in the southern portion of the city; the Schloss, or palace, a large building, containing apartments for the royal family, once the residence of the grand¬

masters of the Teutonic Order; the Schloss-

kirche, occupying a wing of the palace, in which Frederick I in 1701 and William I in 1861

placed the crown on their own heads as kings of Prussia; the old citadel of Fredericksburg; the

handsome exchange, of recent erection ; the university, founded in 1554 by the Margrave Albert, and hence called the Albertine, attended (1914) by 1,700 students, accommodated in hand¬

some new buildings in the Renaissance style, and having connected with it a library of 320,-

000 volumes, a zoological museum, etc. ; an ob¬

servatory which the labors of Bessel have ren¬

dered famous, a botanical garden, a conserva¬

tory of music, museums and an ecclesiastical seminary. The town contains other valuable libraries in addition to that of the university.

The manufactures include locomotives, ma¬

chinery and iron castings, woolen cloth, yarn and thread, leather, sail-cloth, copper, steel and ironware, chemicals, tobacco and cigars, flour, cement, articles made of amber, earthen and stone ware, liqueurs and artificial mineral waters. There are also breweries and distil¬

leries, and some ship-building. The Konigs-

berg Ship Canal, 29 miles in length, and terminating on the Bay of Danzig, was opened in 1901. The principal exports are grain, flax, hemp, oil-cake, bones, timber, etc. Konigsberg is the seat of important provincial courts and public offices. Waterworks, gas and electricity are municipally owned. It was founded in 1255. In 1365 it became a member of the Hanseatic League ; was the residence of the grandmaster of Teutonic Knights from 1457-

1528; in 1626 was surrounded with walls; in 1657 it received a strong additional defense in the citadel of Fredericksburg, though the object of the' margrave who built it is said not to have been so much to defend the town as to overawe its citizens. It suffered much during the Seven Years' War and from the French in 1807. The town suffered

investment and bom¬

bardment at the hands of the Russians in 1914, but speedy relief was given by the German counter-offensive. Pop. is predominantly Prot¬

estant, 245,994. See War, European.

KONIGSHOF, ken'igz'hof, Bohemia, city

on the Elbe. Its Czech name is Dvur Kralove, and it has a department staff, Circuit Court, deanery, church and church of the Holy Cross.

It also has a gymnasium, textile school, manu¬

factories of cotton goods, bleach, printing-

presses, besides flax and jute mills, tanneries, four breweries, etc. It was here that Wenceslas Hanka hoaxed (1817) so many antiquarians with his pseudo-discovery of the oldest Czech manuscript in the ancient church tower. Pop.

11,065, mostly Czechs.

KONIGSHUTTE, ken'igz-hiit'e, Prussia, a

town in the province of Silesia, central point of the coal and iron district and junction of several railways and electric car lines' running to the nearby towns of Gleiwitz, Beuthen, Kattowitz, Bismarckhutte, etc. It has two Evangelical and three Roman Catholic churches, a synagogue, gymnasium, seminary for women trade-school teachers, theatre, offices of mine officials, etc.

Its chief industry is its great smelting works with allied ammonia, tar and benzine factories, with iron and steel foundries, puddling and rolling mills. It has a considerable manufactur¬

ing industry in bricks, glass, bridge metal and

wheels. Pop. 72,640. Consult Mohr, (Ge-

schichte der Stadt K6nigshiitte) (Konigshiitte 1890).

KONIGSKINDER, ken igz-kin'der (Ger.,

^Children of the King,® or, more correctly, (

politan Opera House, 28 Dec. 1910. An old witch dwelling in the hills above the town of Hellabrunn had thrown a spell over a king's daughter and held her to watch a flock of geese.

A ragged youth, the son of another king, en¬

counters the goose girl in the wilds and falls in love with her, but the spell does not permit her to leave the forest. Three ambassadors from Hellabrunn, respectively disguised as a woodchopper, a broommaker and a fiddler, arrive to seek the missing prince, who had meanwhile gone to the city and accepted em¬

ployment as a swineherd. The witch tells the ambassadors that the first person to enter the city gates shall be their future king. The multitude are gathered to receive their king when the ragged youth enters, accompanied by the goose girl, who had been delivered from the witch's power. The mob drive the two arrivals away with scorn. The outcasts return to the hut and are poisoned with some pastry left by the witch. A band of children sent out to find the couple discover their dead bodies lying side by side in the snow.

KONIGSMARK, ken'igz-mark, Hans

Christopher, Count von, Swedish general : b.

Kotzlin, Brandenburg, 7 March, 1600; d. Stock¬

holm, 2 March, 1663. He served first as an offi-

er in the Imperal army, then joined (1630) the Swedish forces, becoming colonel (1636) and made

several predatory expeditions through half of Germany. He fought under Johann von Baner (1640-41), under Torstenson (1642), drove the Imperialists out of Pomerania (1643) and became (1645) governor-general of the conquered duchies of Bremen and Verdern, forcing the Elector of Saxony to an armis¬

tice. He operated on his own account as cav¬

alry general (1646) in northwest Germany and joined forces with Wrangel in the battle of Zusmarshausen (1648) and took enormous

booty at the capture of Prague. He was raised to the rank of count (1651), then field-

marshal (1655). He was taken prisoner by the Poles and held in captivity till 1660. His biography has been written by K. G. Nordin (Stockholm 1813). Consult Cramer,

wiirdigkeiten der Grafin Maria Aurora Konigs-

mark und der Konigsmarkschen Familie) (Leip¬

zig 1836).

KONIGSMARK, Philipp Christopher,

Count von, Swedish nobleman : b. Stade, 14

March 1665; d. 1694(?). He started his travels early in life and became acquainted with the Crown-Prince August of Saxony and lived, as a Saxon colonel, for a time in Dresden. He fought under Bjelke in Hungary against the Turks (1685-86) and then went into the service of the Elector of Hanover. On the discovery that he was a secret lover of the Princess Sophia Dorothea, wife of the Crown-Prince (later King George of England) he fled, 1 July 1694, and was probably assassinated or com¬

mitted suicide. The (Brief wechsel des Grafen Konigsmark und der Prinzessin Sophia Doro¬

thea von Celle, > published by Palmblad (Leip¬

zig 1847) is said to have been forged by the Hanoverian court. Consult Havemann, (Ge-

schichte der Lande Braunschweig und Liineburg>

(Gottingen 1857) ; Wilckens, W. H., (The Love of an uncrowned Queen) (London 1900; Stock¬

holm 1903) ; Biilau, F., (Geheime Geschichten und rathselpafte MenschenP in special edition Reclaim's Universal-Bibliothek, 1901, Vol. XII.

KONIGSTEIN, ken'igz-stin, Germany, a

town in Saxony, 25 miles from Dresden by rail, situated at the confluence of the Biela and Elbe rivers. It has an Evangelical and a Catholic church, a monument to the composer Julius Otto, saw mills, iron foundry, manufactures of cellulose, machinery, metal buttons, etc. A very noteworthy feature of the town is its great fortress lying to the northwest and serv¬

ing chiefly for the storage of the archives, treasury-gold and other valuables, as well as for a prison for the military. Pop. about 5,000.

KONINCK, ko'nink, David de, Dutch

painter of still life: b. Antwerp, 1636; d. about 1699. He was a pupil of Peter Boel at Antwerp and was made master in the Saint Luke's Guild.

He painted animals, alive and dead, fruits, flowers and other still life after the style of Jan Fyt. Having traveled through Germany and France he went to Rome (1670), returning, in 1697, to Antwerp. He took up his residence at Brussels in 1699. His pictures are rare; the Royal Museum, Vienna, has one of his still life (dead ducks) work.

KONINCK, or CONINGH, Philips,

Dutch landscape painter: b. Amsterdam, 5 Nov.

1619; d. there, October 1688. He studied and

perfected himself in landscape painting under Rembrandt, and favored the depiction of flat lands which distinguish themselves by the vastness of the view. His pictures are rare, a few being in the Royal Museum, Amsterdam, the Boymans Museum, Rotterdam, the Berlin Museum and in Frankfort. The New York Metropolitan Museum of Art owns several.

KONINCK, or CONINGH, Salomon,

Dutch painter: b. Amsterdam, 1609; d. there,

August 1656. He was a pupil of David Colyns Francois Venant and Nicolaas Moeijaert, and became (1630) member of the guild of master painters. . He kept in close touch with Rem¬

brandt, in whose style he painted portraits, historical paintings and genre pictures. His work is to be seen in the galleries of Berlin ({ Call of Matthew as an Apostle*); Dresden (the (Hermit) and (Astronomer)) ; Schwerin ((Joseph as Interpreter of Dreams)) ; also in Brunswick, etc.

KONOTOP, ko'no'top, Russia, a district

town in the government of Tchernigov, situated on the left bank of the Jesutch River and the junction of two railways. It has five churches and a technical school. The district is es¬

pecially fertile and produces grain far beyond its own needs, and does profitable bee-keeping.

Pop. 28,100.

KONRAD VON HOCHSTADEN, kon'-

rot fon hog'sta-den, German prelate and states¬

man : d. 28 Sept. 1261. He became archbishop of Cologne (1238) and was in constant feud with his neighbors, especially with the Duke of Brabant and

Counts von Limburg and von Jiilich. He joined the archbishop of Mainz against the Emperor Frederick II and was de¬

feated, badly wounded and made prisoner (1242) by Count von Jiilich near Lechenich.

Obtaining his freedom he renewed the conflict and crowned William of Holland at Aix-la-

Chapelle as emperor (1248), upon whose death he crowned Richard of Cornwall as successor (1257). The erection of Cologne Cathedral was commenced (1248) by him. Consult

Cardauns, (Konrad von Hochstaden, Erzbis-

chop von Koln) (Cologne 1880).

KONRAD VON MARBURG, mar'burk,

German Roman Catholic inquisitor : d. near Marburg, 30 July 1233. He belonged to the Dominican Order, and was appointed by Pope Gregory IX inquisitor of the monasteries of Germany. His fanatical and limitless perse¬

cution of heretics carried out indiscriminately along the Rhine, Thuringen and Hesse (1232) brought him into contests with the nobility and he was hailed before an Imperial Convention at Mainz and was released with censure. On his return journey he was assassinated near Mar¬

burg (1233). He was canonized as martyr by the Pope. Consult Henke, (Konrad von Mar-

burg) (Marburg 1861); Beck, (Konrad von Marburg) (Breslau 1871); Hausrath, (Konrad von Marburg) (in Kleinen Schriften, Leipzig 1883) ; Kaltner, (Konrad von Marburg in die Inquisition in Deutschland* (Prague 1882).

KONRAD VON MEGENBERG, ma'-

gen-berk, German author and naturalist : b.

Bavaria, 1309; d. Regensburg, 1374. He trans¬

lated among other numerous Latin works the book of John Holywood into German under the title of (Sphara,* the first handbook on physics in Germany; it was printed in several editions by 1539. His (Buch der Natur* was based on (Liber de Naturis rerum) by Thomas of Cantimpre, and is a general and fairly systematic natural history; it is interesting as evidence of the knowledge of that day. The work was written between the years 1349-51

and appeared in quarto without mention of place or year, then it was published in Augs¬

burg (1475), It has been published by Pfeiffer (Stuttgart 1861) and translated into modem High German by H. Schulz (Greifswald 1897).

KONRAD DER PFAFFE (the priest),

German mediaeval poet. He lived in the first half of the 12th century, belonged to the priesthood and was in the service of Heinrich the Proud. He composed the (Rolandslied) (about 1135), a version of the French (Chanson de Roland. * It was published by W. Grimm (Gottingen 1838) with preface on the history of the legend; also by Bartsch (Leipzig 1874).

The (Kaiserchronik) (1150) is said also to have emanated from his pen. Consult Wald, W., (Ueber Konrad der Pfaffe, dem Dichter des deutschen Rolandslieds* (Halle 1879) ; Golther, (Das Rolandslied des Pfaffen Konrad)

(Munich 1887).

KONRAD VON WURZBURG, vurts'-

burk, Middle High German epic and lyric poet : b. possibly at Wurzburg about 1220; d. Basle, 31

Aug. 1287. For his time he had developed, through the study of the poems of Hartmann von Aue (q.v.) and Gottfried of Strassburg (q.v.), an extreme perfection of verse and style, and delighted in the

play of synonyms, which contribute much to the beauty of his short poems, narratives and legends. His longer romances seem never to achieve the same degree of artistic unity as his shorter works. His earliest poems were the (Nantes Tournament * and the (Legend of Saint Nicholas) (which Bartsch published together with Konrad's later and longest work, (Parte-

nopier and Meliur,* Vienna 1870). After set¬

tling at Strassburg, where most of his literary life was spent, he wrote the poetic short stories (Otto mit dem Bart,* (Der Schwanritter,* (Das Herzmare,* the allegorical scene, (Der Welt Lohn) (reprinted in Muller's (German Classics,*

New York 1900), and his best tale, (Engelhart und Engeltraut* (published by Haupt, 1844, by Joseph, 1885). His huge epic (Partenopier and Meliur) was written in 1277, after the French poem of Denis Piramus, of which Kon¬

rad had a translation made for his own use, and was followed by the incomplete (Trojan Warp for which Konrad used as sources not only Benoit de Saint More, but also Statius and Ovid. Consult translations into Modern German in Reclam's (Universal-bibliothek* ; Janson, (Studien fiber Konrad von Wfirzburg) (Marburg 1902) ; Rosier, Marg., (Die Fassungen der Alexiuslegende) (Wien 1905).

Jacob Wittmer Hartmann.

KONTI, kon'te, Isidore, American sculp¬

tor: b. Vienna, Austria, 9 July 1862. He studied at the Imperial Academy, winning later a scholarship at the Meisterschule of Professor Kundmann (1886) affording him two years'

study at Rome. In 1890 he came to America, worked on the Chicago Exposition buildings and has since created in New York numerous monumental works, such as (West Indies* and (East and North River) for the

Dewey Arch; groups decorating the Temple of Music and, (The Despotic Age,* both at the Buffalo Pan-

American Exposition esplanade (1901) and numerous other decorative groups for exposi¬

tions; a group Progress) for the Manufac¬

turers' building and two grand cascade foun¬

tains, < Atlantic and Pacific Oceans) at the Saint Louis Exposition (1904) caused much favorable comment. Among his other numer-

ous creations are the McKinley Memorial, Philadelphia ; a monument to Kit Carson and Lieutenant Beal at the National Museum, Washington; statues of Justinian and Alfred the Great for the Cleveland, Ohio, courthouse.

He is a member of the council of the National Sculpture Society, of the Architectural League, New York Municipal Art Society, etc. His work is considered by contemporary experts as full of charm and refinement.

KOO-CHA-BEE, koo-cha'be, a food pre¬

pared formerly by the Indians from the dried pupae of certain flies of the family Ephydridce, which form in the water of some of the lakes of northern California and Nevada, and drift ashore in vast numbers in midsummer. They are dried, ground into meal, and baked into edible cakes. A similar food is obtained in Mexico by gathering the eggs of another aquatic fly of the same family, and is called <(ahuatle.®

KOODOO, one of the largest species of antelope (Strepsiceros kudu), originally found throughout the entire southern and eastern parts of Africa but now nearly extinct in Cape Colony. The males bear great,

rough, twisted horns nearly four feet long, and wound in a wide, open spiral of about two turns ; the females are hornless. Both sexes have short hoofs, a fringe of rough hair along the middle of the back and a similar one on the throat; and are marked with narrow vertical stripes on the flanks, a spinal band and a chevron on the face, all of white. The koodoo lives in pairs or small parties in thick forests, especially on the rough hilly districts of Nyasaland. In many districts it has been decimated by the hide-hunters. A smaller species (S. imberbis) inhabits the low bushy countries of Somaliland and the Kilima Njaro region.

KOOKAS, koo'kaz, or KUKAS, a sect of

fanatical Hindus in the Punjab,, which originated after the annexation of that territory to British India (1849). in consequence of jealousy of the equal political rights granted to the Moham¬

medans of that region under British rule.

They are a body of reformers of extreme views, and are hence regarded with as much hostility by orthodox Sikhs as they are by the Mohammedans, whose rights they are anxious to invade. The chief right conceded to the Mohammedans by the British government of India, and objected to by the Kookas, is that of killing cows, which are regarded as sacred ani¬

mals in the Sikh religion; and it was mainly this practice that led to the consolidation of the most violent and fanatical adherents of the Sikh religion into a distinct sect. Their num¬

ber has been variously estimated at from 50,000

to 800,000. In 1871 they were incited to attack and massacre the Mohammedan butchers who killed cows in different parts of the Punjab, but they were quickly suppressed by the British government.

KOOSOO, or KOSIN, a bitter drug pre¬

pared from the dried flowers of an Abyssinian plant {Bray era anthelmintica) , which contains much tannin, and is used as a vermifuge.

KOOTENAY (koo'te-na) RIVER, a tribu¬

tary of the Columbia, rising in British Columbia.

It is 400 miles long. After flowing south into Montana and Idaho it again enters British Co¬

lumbia. It was discovered by David Thompson in 1808.

KOPI.SCH, ko'pish, August, German poet

and painter: b. Breslau, 26 May 1799; d. Berlin, 3 Feb. 1853. He studied art in the Prague Academy (1815) and in Vienna. From 1819

to 1822 he continued painting, when an injury to his hand disabled him, and he started on travels through Italy, and in Rome and Naples applied himself to the study of local poetry and archaeology. It was he who discovered the famous (

KOPITAR, ko'pe-tar, Bartholomaeus or

Jernej, Austrian philologist : b. Carniola, then Austria-Hungary, 1780; d. 1844. He was edu¬

cated at the German gymnasium of Laibach, and completed his studies at Vienna, where he became curator of the imperial library. In 1814 he set out on his travels through Europe, his tour embracing Germany, England, Italy and France, to which last country he went with the special mission of recovering the Slavic manuscripts carried off by the French in 1809.

His contribution to philological science con¬

sists in pioneer work in Slavic grammar. His principal works are (Grammatik tier slawischen Sprache in Krain, Karnten, und Steiermark*

(1808); (Glagolita Clozianus> (1836), and (Hesychii

Glossographi Discipulus Russus) (1839).

KOPP, kop, Georg, German cardinal and

statesman: b. Duderstadt, 27 July 1837; d.

1914. He was the son of a poor weaver and attended the gymnasium at Hildesheim. In 1856 he became a telegraph operator in the em¬

ploy of the Hanoverian government. From 1858 to 1861 he studied theology and in 1862

entered the priesthood. He rose rapidly in his profession and in 1872 was made vicar-general at Hildesheim and three years later bishop of Fulda. His reasonable ultramontanism was ex¬

ercised in bringing about a better understanding between the German government and the papal curia. After his election to the House of Lords he obtained a mitigation of the harsh anti-

Catholic provisions which characterized the May laws. In 1887, with the approval of the Prussian government, the Pope appointed him prince-bishop of Breslau, and in 1893 he was made cardinal.

KOPP, Joseph Eutychius, Swiss antiqua¬

rian : b. Beromiinster, canton of Lucerne, 25

April 1793; d. Lucerne, 25 Oct. 1866. He studied theology and philology in Lucerne and Freiburg, and in 1819 was appointed professor of Greek in the lyceum of the former town.

While serving in the legislative body of the re¬

public, he was led as a ^conservative Catholic®

into such bitter controversy with the Jesuits, that in 1845 he was compelled to retire into pri¬

vate life and undertook a tour by way of Vienna to Rome, for the purpose of examining such archives as might throw light upon the history KOPPEN — KORAN

of his native country. He was elected cor-

' responding member of the academies of Berlin and Vienna. Self-taught as he was, he became the Niebuhr of Swiss history, and proved how her true annals had been obscured by such legends as those of William Tell, etc. Among his chief publications are (Geschichte der Eid-

genossisch^n Biinde) (1862) ; (Geschichtsblat-

ter aus des Schweiz* (1856) ; (Dramatische Gedichte) (1866).

KOPPEN, kep'pen, Peter Ivanovitch, Rus¬

sian archaeologist : b. Kharkov, Russia, 19 Feb.

1793; d. Karabagh, Crimea, 4 June 1864. He was educated at the University of Kharkov and subsequently traveled widely in order to procure historical and archaeological material for his work. The outcome of his investiga¬

tions, written in German, is comprised in the reports of the Academy of Saint Petersburg, but among other works of his are (Kultur-

geschichte Russlands) (1825) and his famous (Ethnographical Map of European Russia) (1851).

KORAN, ko'ran or ko-ran' (Ar. quran,

qoran, reading, from qara, read; with the Arabic article, Alkoran; also called Furkan, salvation, Al-Mushaf, the volume, Al-Kitab, the book, Al-Dhikr, the reminder or the admonition), the sacred scripture of the Mohammedans, written in Arabic and pro¬

fessing to be the revelation of Allah (God) to Mohammed. It contains a code for the gov¬

ernment of all Moslem transactions, and is ac¬

cepted by true Mussulmans as uncreated and eternal. According to orthodox Mohammedan belief it was written from the beginning in golden rays on a magnificent tablet in heaven, and was communicated to Mohammed on the night of Al-Kadr, in the sacred month of Ra¬

madan, by the angel Gabriel, chapter and verse as they stand, on parchment made of the skin of the ram which Abraham sacrificed instead of his son Isaac, in a volume ornamented with precious stones, gold and silver from paradise.

Other traditions are different, one being that Mohammed was assisted in composing it by a Persian Jew and a Nestorian monk. Its reve¬

lations cover Mohammed's entire prophetic career, 610-32 a.d. It is the first work known in Arabian prose, its scattered discourses being preserved on stones, palm leaf ribs, leather, etc.

Except in a few instances, Allah is the speaker.

Mohammed named the book at the time of im¬

parting the first revelations, and the name was retained for the collection when this was made in 633 by Zaid, son of Thabit, under direction of Abu-Bekr, father-in-law of the prophet. The authorized text, ever since accepted, was pro¬

duced under the Caliph Othman, 650 A.D., from the fragments, originally thrown together with¬

out order, and afterward gathered in a volume with no attempt at arrangement, not long after Mohammed's death. In order to free the book from various readings, Othman commanded the destruction of all other copies, and in purity of text the Koran stands alone among religious scriptures. The chronological order has never been clearly determined, and many conjectural rearrangements and subdivisions have been made by Mohammedan and other scholars.

In size the Koran is nearly the same as the New

Testament; it is divided into 114 suras or chapters, each beginning: (

try, where numerous and diverse faiths already existed.

Mohammed lived much in solitude, medi¬

tating on his mission and his doctrine; he did not reject the teaching of any sect; asserted his desire to restore the purity of the trup faith ; announced as his fundamental doctrine the unity of God. This idea, together with conceptions of divine might, sovereignty, com¬

passion and other attributes of Godhead, is all-

pervading in the pages of the Koran; ((God is God,® it declares, ((and Mohammed is his prophet.® He felt that the unity of God had been the essential doctrine of all true religion, in which custom and ceremony were but acci¬

dents. ((We make no difference,® he says, <(be-

tween that which God has taught us and that which Abraham, Isaac, Ishmael, the twelve tribes, Moses and Jesus have learned from the Lord.® <(God commands thee to receive the re¬

ligion which he prescribed to Noah, which he has revealed unto thee, and which he imparted to Abraham, Moses, and Jesus.® To Jesus Mo¬

hammed assigns a place in the seventh or high¬

est heaven, in the immediate presence of God.

The Koran dwells much on the resurrection and the last judgment, setting these forth some¬

what after the manner of the Apostle Paul : ((When the trumpet sounds the second time, they shall rise quickly from the graves to ap¬

pear before God.® ((A sound of the trumpet of

judgment will assemble all men before my throne, and every one shall there receive the re¬

ward of his deeds.® In its presentation of the last judgment the Koran resembles the teach¬

ings of the Jews and the Magians; in the pas¬

sage of the narrow bridge to paradise — Al-

Sirat, over the abyss of hell, finer than a hair, sharper than a razor; in the book wherein all the actions of men are set down, and the scale in which they are weighed. Quite Jewish and Magian also are the Mohammedan views of paradise. The doctrine of predestination as contained in the Koran was successfully em¬

ployed by Mohammed to encourage his follow¬

ers in the face of every trial and danger.

Herein he probably availed himself of beliefs already widely held, especially among the Sa¬

bians, with their worship of intelligences sup¬

posed to reside in the heavenly bodies, control¬

ling the lives of men and the course of events, and by the Magians, who held a system of dual¬

ism, the influence of these beliefs having ex¬

erted itself upon the Arabians.

In the matter of religious exercises Moham¬

med largely adopted such as he found, to those which were narrow or vague giving more of universality and precision. The Koran pre¬

scribes prayer, fasting, alms and the pilgrimage to Mecca ; prayer embraces ablutions, purifica-

tions and all other exercises needful to prepara¬

tion for it; to those who sought to be relieved from these observances Mohammed replied, <(Religion without prayer is nothing® ; prayer he calls "the key to paradise.® Surpassing the severity of the rabbis, he prescribed prayer five times a day, with the face of the suppliant turned toward Mecca. To give alms was al¬

ways an Arabian practice, but the Koran makes it obligatory. Concerning polygamy, divorce, inheritance, etc., it follows the law of Moses and the decisions of the rabbis, adapting them to the prejudices and customs of the prophet's people ; it forbids few. of the old practices save idolatry; ((God,® it says, intended that his reli¬

gion should be easy, else, as he well knew, you would only become hypocrites.®

Although the Koran is written in prose, the different parts of a sentence end in Thymes, and there is marked diversity of style, yet withal an impressive unity, characterized by a free and forcible eloquence unequaled in any other Arabic writings. The earlier utterances of the prophet seem often to be outbursts of unbridled imagination, though still the solemn words of prophetic earnestness proclaiming God with power to reach and sway the hearts of men. In later portions of the book the tone takes more of calmness ; imagination is subdued ; the au¬

thor dictates extended passages to be taken down by his hearers. The highest elevations are where he speaks of the greatness of God and describes the last judgment, the pleasures of paradise and the pains of hell.

The moral precepts of the Koran exhibit a lofty feeling of humanity and a profound sense of ethical law reduced to most practical forms.

They inculcate all the noblest virtues and pie¬

ties — obedience to divine commandments, char¬

ity, humility, mildness, temperance, toleration, and the strong virtues of courage, faith and justice. To death in the cause of religion it ascribes a peculiar merit. The influence of this book through many centuries and among many peoples has been vast, and it still controls the lives of a great portion of the human race.

"From the Atlantic to the Ganges,® says Gib¬

bon, "the Koran is acknowledged as the funda¬

mental code, not only of theology, but of civil and criminal jurisprudence; and the laws which regulate the actions and the property of man¬

kind are guarded by the infallible and immuta¬

ble sanction of the will of God.® The divinity and authority of the Koran have at times been assailed among Mohammedans themselves. The first serious heresy, about 740, was suppressed by the execution of its chief author, but ap¬

peared again in the next century, and was not finally crushed out until 842, when Harun II prohibited all discussion regarding the charac¬

ter of the Koran, which has since been every¬

where held by Mohammedans in admiration as the great Arabian classic, and in reverence as the book of religious authority. Once each day it is read through in the mosques of the Sultan and in the adjoining chapels. By the faithful it is never carried below the girdle ; not without their own purification may they even touch it; and on walls, doors, banners, etc., its texts are frequently written.

Commentaries on the Koran are almost in¬

numerable. The library of Tripoli, in Syria, is said to have contained no less than 20,000 of ihem. Many editions have been published in different countries. For English readers that of Sale (1734), with its comprehensive intro¬

duction, covering all the important aspects of Mohammedanism, is still of prime value. The translation of E. H. Palmer (1880) is authori¬

tative, as is also that of Rodwell (2d ed., 1876).

Several versions in German have appeared in which it was attempted to reproduce the rhym¬

ing style of the original : J. von Hammer's (1811), A. Sprenger's (1861-65), Fr. Riickert's (1888), and M. Klaproth's (1890). Other edi¬

tions which have their special values are Hin-

kelmann's (1694), Maracci's (1698), and Flugel's (1883). Consult Sprenger, (Leben und Lehre des Mohammed* (1865) ; Deutsch, (Islam* ; Dozy, (L'Histoire d'Islamisme) ; Muir, (Life of Mahomet and History of Islam> ; Lane, ^elec¬

tions from the Koran) ; Johnson, (Oriental Religions: Persia, * sec. "Islam®; Conway, (The Sacred Anthology > (for many good extracts from the Koran); Hirsdhfield, (Eng. trans., London 1902) ; Murdock, Selections from the Qorun with Introductions and Explanatory Notes*

(London 1902) ; Noldeke,

zig 1909) ; Grimme, (Mohammed* ; (Einleitung in den Koran* ; System der koranischen Theol-

ogie) (1895) ; Tisdale, Sources of the Qur'an) (London 1905). See also Mohammed; Mo¬

hammedanism, and consult the lives of Mo¬

hammed and other works referred to under these articles.

KORAS. See Hottentots.

KORCE, or KORITSA, also KORTCHA,

GORITZA, a new and probably temporary

republic situated in southeastern Albania. This state was created in the late autumn of 1916

by a French cavalry colonel. The bulk of Albania was at that time held by the Austrians.

In the south the Italians held Avlona, on the Adriatic, but between them and the Allied Sa-

lonica forces was a solid wedge of Austrians and King Constantine's unfriendly Greeks. In the autumn General Sarrail pushed forward in a northwesterly direction, and occupied Koritsa and the region near Lake Malik. This was the first time that French troops from Salonica had found themselves in Albanian territory and the colonel in command was faced with the problem of setting up a civil administration.

Northeast lay Serbia and southeast lay Greece, but Koritsa was neither. According to the Treaty of Bucharest, the only legal instrument recognized by the Allies, it was part of Albania.

The colonel solved the difficulty by proclaiming Koritsa, and the caza, or administrative dis¬

trict of which it is the capital, to be an auton¬

omous Albanian republic under the protection of the Allies. General Sarrail accepted the situ¬

ation, and the republic remained. A council of 12 elders, mixed Christian and Mohammedan, was set up as the governing body; Essad Pasha uttered a blessing in Albanian, a flag was de¬

vised, a postal system instituted and stamps issued. Meantime, up to the summer of 1918, owing to various advances of the Allies, the republic had gained

several extensions of ter¬

ritory.

KORDOFAN, kor-do-fan\ Africa, a prov¬

ince of Egyptian Sudan, between the White Nile and Darfur; area, about 130,000 square miles.

The principal articles of export are gum, hides and senna leaves, all monopolized by the govern¬

ment as most lucrative ; ivory, cattle, tamarinds, ostrich eggs and feathers, gold, salt, slaves, etc. ; the imports spices, sugar, coffee, sulphur, rice, soap, cotton and linen cloth, etc. From 1821 onward Kordofan was subject to the vice¬

roy of Egypt, the country having been subdued by Mehemet Ali. In 1883 it took part in the successful Mahdist revolt, but was regained for Great Britain and Egypt in 1898. Pop. about 300,000.

KORDYAN. The revolution of 1830-31

was a prolific source for Polish literary works.

Julius Stowacki seized upon the historic incident of the attempted assassination of Tsar Nicholas, who came to Warsaw to be crowned king of Poland, to create a Polish hero for the troubled times. Imitating Byron's ironical attitude, Sto¬

wacki in the introduction to his poem treats the contemporary actors in the revolution rather flippantly. Then, representing his own early excesses and lack of faith and the change of mind which he experienced in Switzerland, he makes the hero, Kordyan, look with contempt upon his aristocratic habits and abandon his life of a lovelace, and lets him return to the sands of Mazovia, there by an inner trans¬

formation to do good to his native country.

Kordyan attends a meeting of revolutionists in Saint John's Church in Warsaw, where he makes an impassioned appeal, one that has become a classic passage in Polish literature, that Nicholas be killed. But the only scene which by modern Polish critics is considered as devoid of ro¬

mantic exaggeration is where Kordyan, under the influence of the mood induced by the tragic situation, is trying to combat his own hallucina¬

tion and terror. This, no doubt, is a correct representation of the poet's own struggle with his feverish imagination, caused by his abhor¬

rence of war, just as he became conscious of the moral necessity of joining the ranks of the revolutionists. A good discussion of the poem may be found in G. Sarrazin, (Les grands poetes romantiques de la Pologne> (Paris 1906, pp. 221-225).

Leo Wiener.

KOREA, ko-re'a, COREA, or CHOSEN,

since 29 Aug. 1910, an integral part of the em¬

pire of Japan. The name means Morning Splen¬

dor. By the census of 1910 it contains 2,274,263

native dwellings and a population of 13,115,449, the females numbering 6,169,610 and the males 6,945,539, the discrepancy in sex numbers arising from the neglect of female infants, 146,147

Japanese, 1,818 Chinese and 889 other foreign¬

ers. It comprises a strip of coast and a penin¬

sula projecting southward from Manchuria, di¬

vided from it by the great valleys of Yalu or Amnok northwest and the Tuman northeast, both rising in the colossal peak of Paik-tu (White Head), 8,300

feet high. The Japan Sea divides it from Japan, whose southern¬

most island (Kiushu) approaches its southern tip within 100 miles, separated by Korea Strait with large islands midway; to the west, Korea Bay and the Yellow Sea, marked off by Shan¬

tung Peninsula, divide it from China. A dense archipelago fringes it south and west. Its parallels are from 33° 12' to 43° 2' N., or about the same as from Concord, N. H., to Wilming¬

ton, N. C., and average much south of Italy; its meridians, 124° 13' to 130° 54' E. It is about 600 miles long by 135 broad; area, 84,738

square miles.

Korea is traversed north to south by a mountain backbone of striking individuality : a perpetual zigzag, skirting the eastern shore with slender coast-lands, in a steep solid wall unbroken for hundreds of miles save by Yung-

hing or Broughton's Bay at the northern neck.

In the north it has summits 4,000 to 8,000 feet high, and at Cape Pelissier, about lat. 37°, cul¬

minates in Mount Popoff (4,800 feet) ; thence the main chain turns southwest and ends in the extinct volcano of Mount Auckland (6,700

feet), on Quelpaert Island, while to the east it throws out low hills and plateaus. The islands of the southern archipelago, verdant rocks worn into the semblance of fantastic castellated ruins, are the ends of its spurs. On the eastern side the ridge is timbered to the summit; on the west almost treeless, and seamed with deep ravines shallowing out into broad fertile plains, occupying most of Korea.

On the east below the boundary there is but one river of any size, the Nak-tong along the

southeastern uplands, and almost no islands; the west has 10 considerable streams, and the coast is thickly notched with harbors and fringed with fertile islets.

The chief rivers are, from the north: The great Yalu or Amnok, a mile wide and rising 40 feet in flood, navigable 30 miles for sea¬

going junks, and 175 for boats, to Wi-won, and now crossed by a superb steel highway bridge uniting Korea with the trunk lines through Russia to Europe. Opposite is the Tuman. The Taidong or Ta-tong, navigable for boats 75

miles to Ping-yang. The Han (C(the river*), rises on the western slopes of the eastern ridge but 30 miles from the Japan Sea, drain¬

ing nearly the whole breadth of the peninsula with two main arms, and flowing into a bay of the Yellow Sea among islands. About 30

miles up lies Keijo, or Seoul, the capital, and a line of small steamers runs between it and Chemulpo, on Imperatrice Gulf as much

farther south; boats ascend nearly 100 miles more. The Nak-tong (above) empties into Korea Strait near Fusan, and is navigable 140

miles for vessels drawing four and one-half feet. The best harbors are Gen-san and Port Lazareff, on Broughton's Bay; the best, on the south coast is Fusan on Korea Strait, now finely equipped with docks for large steamers.

The tides on the west and south are very high and rapid, often leaving vessels stranded on mud banks.

The climate is much like that of the eastern coast of America in the same latitudes; the north and centre have very hot summers and severe winters; the south is like the Carolinas, and tempered by the ocean breezes. The Han is frozen in winter so that at Seoul, where it is 400 yards wide, it is

available for cart traffic three months of the year, from December to February. The rainfall averages 36 inches, 22

in the crop season. A fall of only 4.1 inches in 1901 created a famine.

Flora and Fauna. — There is a great variety of excellent hardwood 'timber on the east slopes 524

and the northern mountains; in the west it is scarce and sparingly used; lack of coal has caused much wasteful denudation in other parts. The one surpassing animal of the na¬

tive fauna is the man-eating tiger, who fills the native proverbs and literature, depopulates whole villages and even besieges houses for days, sometimes leaping on the thatched roof and tearing his way down through. Besides him there are leopards, tiger-cats and foxes; deer, beaver, badgers, otters, martens, etc., and a great variety of birds.

Products. — The great native crop is gin¬

seng, which grows wild in the distant moun¬

tains, and is extensively cultivated about Sunto ; it is a government monopoly, and despite much smuggling yields a large part of the state revenue. Among other products are rice, wheat, millet, sesame, Indian corn, beans, cot¬

ton, hemp and perilla (for oil and pigment).

The domestic animals are few. The cattle are excellent, the bull being the usual beast of burden; the ponies very small but hardy, fowls good, pigs inferior. Iron ores of excellent quality are mined, and there are copper mines in several places. In 1910 the value of gold exported was $3,053,038; the silver output is very small. Three-fourths of the trade is with Japan, and over four-fifths of the

remainder with China.

Government. — Formerly a hereditary ab¬

solute monarchy : till 1895 tributary to and re¬

ceiving investiture from China, and like it in administrative forms, with officials appointed by examination in the classics. On the decla¬

ration of independence (see History), the en¬

tire system was abolished, as well as. the privi¬

leges of the aristocracy, and a cabinet of 10

ministers in charge of different departments formed, who with five councillors formed a grand council of state to lay measures befoie the emperor. Till 1896 the country was di¬

vided into eight do or provinces ; it was then redivided into 13, including a metropolitan province around the capital. There are now 12 urban prefectures, 317 local districts, 4,351

villages and 12 treaty ports.

Social Conditions and Education. — The

usual dwellings are one-storied. Fire is built at one end for the cooking and the heat is utilized by being carried along through the house by means of a system of flues, the chim¬

ney being low down at the other end. Smoke is seen hanging at most Korean towns in the morning and evening, and the conditions of life for the masses, as in China, are hard and squalid; but actual distress is rare and beggars are few. Caste till recently was iron-bound, and no offices of even local importance could be held by other than nobles, who are distin¬

guished by colored clothing and horsehair hats.

Women are secluded ; concubinage is allowed, but

only one legal wife at a time. The im¬

memorial system of education, was almost wholly in Chinese, which contained the only written memorials needing it, and was of Chinese classics. The general course of cul¬

ture, philosophy and the creed of the Korean educated gentleman was nearly the. same in Korea as in China. In the reconstruction of the national education by the Japanese there were, in 1914, 366 public or government schools at¬

tended by 50,000 children, and 814 private (mostly missionary) schools for Koreans, at¬

tended by 22,273 pupils, taught by 311 Japanese and 695 Korean teachers, female scholars num¬

bering one-fifteenth of the whole. Under gov¬

ernment auspices are 60 industrial, 14 agricul¬

tural and 2 commercial schools. There are also 149 schools with 17,264 pupils, with teach¬

ers for Japanese.

Religion.— See History. There are now, by the Japanese official report of 1911, over 370,000 native Christians. The popular re¬

ligion is the degraded Shamanism (q.v.) ; the higher classes are Confucians ; the anciently all-

powerful Buddhism, crushed by the revolution of 1392, is slight and uninfluential, with a few ignorant monks.

Population.— The people are a mixed race of disputed elements, apparently Mongoloid and Ain with Manchu and Malayan infusions.

In 1920 the population was 17,284,207. The chief cities are Seoul (Han-yang), the capital, Pingyang and Kai-seng. A trolley line nine miles long, built

1899, is operated in Seoul by Americans, and a trunk-line of railways with branches traversing the peninsula from Wiju on the Yalu River to. Fusan. The total mileage of railroads open in 1914 was .934.7, and of light railways and trams, 109.8 miles.

History. — The traditional founder of Ko¬

rean nationality is the Chinese noble Ki-ja, who left China with 5,000 followers 1122 B.C., and established a kingdom with capital at Pjeng-yang. The first authentic history is the annexation to China 108 b.c. A century or. so later it split into three princedoms, of which, about 960, Korai (Kao-li) came to the front, probably from borrowing the higher Chinese civilization. It recast the administration upon -the Chinese model, introduced Chinese methods and arts, and initiated several centuries of brilliant progress and prosperity, enriched by art and literature. Buddhism was the para¬

mount religion, and developed a powerful and rigid ecclesiastical hierarchy. As a result, a protestant movement -took place, and in 1392 a revolution resulted in the fall of Buddhism and the exculpation of Confucianism. The cap¬

ital (Seoul) was fixed at Han-yang. When the Manchu power began to rise in the 15th cen¬

tury, China, to protect herself against its rav¬

ages, desolated a strip of fertile territory many thousand square miles in extent, then . or early in the 17th century destroying four cities and many villages and removing 300,000 inhabit¬

ants; and down to 1875 this zone of 60 miles wide by 300 long was kept as a permanent buffer between China and Korea. During the rise of the Japanese shogunate out of the 16th century anarchy, Hideyoshi, as a preliminary to invading China, sent an army into Korea, rapidly overrunning it. But Korea is like Spain, easy to conquer and impossible

to hold ; and the stolid resistance of the natives, with the Chinese armies, gradually forced the Japa¬

nese out of the peninsula six years later, re¬

taining Fusan on the southeast coast as a trading station. Thirty years later the Manchus, previous to their conquest of China, invaded it and exacted a tribute, which was continued to the Manchu dynasty in China ; in 1653 it was reduced to a third, and for genera¬

tions down to 1894, when it was finally abol¬

ished, had been only nominal, as an acknowl-

1 Experimental Farm and School, in Korea 2 Bureau of Printing, Seoul, Korea 3 Chemical Laboratory, Government School, Seoul, Korea KOREA

1 Round Gate, on the Palace Grounds, Seoul 2 Big East Gate, Seoul

- edgment of Chinese supremacy and a trading license. But the Chinese wisely attempted no permanent occupation.

Korea had as intense a determination to seclude herself from foreign influences as an¬

cient Egypt, and practically the first knowledge obtained of it by modern Europe was through the shipwreck of some Dutch on the coast in 1653, though the Jesuit missionary Cespedcs had entered it in 1594. In 1784 new mission¬

aries came and planted Christianity in the peninsula, despite steady persecution ; in 1835

the French missionaries reinforced them. But in 1864 came a fiercer blast. The then king died childless, and his oldest widow set aside the natural successor, her nephew, and nom¬

inated Yi-Hevi, the present king — the 12-year-

old son of a royal prince, whom she made re¬

gent. The latter was a savage reactionist, and let loose fire and blood to extirpate the for¬

eigners, rigidly excluding all new ones. A futile French expedition was sent against him in 1866; the same year a stranded American schooner, the General

Sherman, was burned and her crew murdered in sight, of Pingyang. An American expedition sent in 1871 had slight success. Meantime several nations were at¬

tempting to force Korea into treaties of com¬

merce and gain trading privileges, but Japan was the first, in 1876, to succeed, having the ports of Gensan and Fusan opened in 1876 and Chemulpo in 1880. Meantime the <(neutral strip,® for many years a nest of brigands and pirates, was abolished by Li Hung Chang in 1875. In 1882 Commodore Shufeldt negotiated a treaty of friendship between the United States and Korea, and thence on, other nations were rapidly admitted — Great Britain and Germany in 1883, Italy and Russia in 1884, France in 1886, Austria in 1892 and China in 1897.

The flood of new ideas and habits aggra¬

vated the conflict between the progressives and the reactionaries, in which the former won, and Korean embassies began to visit other countries — Japan in 1880, the United States in 1883. The nativists raised an insurrection in 1884. The greatest breach with the past, how¬

ever, was the result of the Chino-Japanese War of 1894-95, one of the pretexts of which was the action of China in reasserting her an¬

cient suzerainty over Korea. It was at Ping¬

yang that the first heavy defeat was inflicted on the Chinese, and off the Yalu River that the Chinese fleet was destroyed. On 8 Jan.

1895 the king of Korea proclaimed its inde¬

pendence, and the Chinese gate near Seoul was publicly destroyed with impressive ceremonies.

In 1897 the king proclaimed the country an empire, named it Dai Han and took the title of emperor. Under the Treaty of Shimonoseki, Korea became a <(sphere of influence® for the Japanese, whose

struggle against Russian en¬

croachments culminated in the war of 1904-05.

(See Manchuria). By the Treaty of Ports¬

mouth (q.v.) Japan's preponderating interests in Korea were acknowledged, and a Japanese protectorate was established in November 1905.

On 18 July 1907 the emperor abdicated in favor of the crown prince, but Japan's pro¬

tectorate continued until, by virtue of a treaty made with the Korean emperor, the sovereignty and territory of Korea passed to Japan. Fol¬

lowing this act, the royal family of Korea re¬

ceived ((such titles, dignities and honors as are appropriate to their respective ranks and suffi¬

cient grants to be made for the maintenance of such titles, dignities and honors.® Relatives, meritorious Koreans and men of rank, old per¬

sons, virtuous widows, etc., to the number of 87,643, also received monetary rewards. Since the Japanese occupation, new public buildings, roads, a national coinage, survey, systems of banking, postal communication, taxation, edu¬

cation, encouragement of agriculture, com¬

merce, fisheries, etc., have given Korea most of the features of a modern state. Consult Annual Report of Reforms and Progress in Chosen, for 1913-14.

As Korea passes out of existence as an in¬

dependent state, and her people increasingly conform, both in outward circumstances and inward characteristics, to modern conditions and requirements, it may be well to inquire as to Korea's place in history, to note her con¬

tributions to civilization and to survey the

progress made in the 20th century. The Koreans rebuilt Kija's (Kitse's) tomb at Ping¬

yang, which was injured during the Chino-

Japanese War of 1894, because they consider this historical character as the founder of their social order in 1122 b.c. Their literature con¬

tains many references to him as their national hero, while popular and especially local tradi¬

tion, in the north especially, concerning him is abundant and voluble. To him is credited the name of the country, Chosen, or Morning Splendor, which is now the modern, as it was the ancient, name. Critical scholars, however, incline rather to the belief that it was from some centuries later reading, in Chinese annals of the story of Kija, that the Koreans became acquainted with the name and work of this ancient patriarch. In any event, only a small part of modern Korea lay within the area of the Kija domain, which came to an end in 203

b.c. In 108 b.c. Korea formed a part of the Chinese Empire under the Han dynasty, but the people revolted in 30 b.c. paying tribute to China, however, until 9 a.d. The early history of Korea resembles that of Britain, in which, after the Romans, men of three ethnic stocks contended for centuries together, Welsh, Scot¬

tish, English. Three states arose (Chinese , Kaokuli, Sinlo and Petsi ; Japanese Korai, Shinra and Pechi) and for 10 centuries border wars, with alternate invasions and succor from China and the mixed people of the eastern islands, who, later known as Japanese, were gradually attaining political unity. There were long intervals of peace, also, during which more or less trade and communication with China and Japan are noted in the annals of the three countries and by comparison many of the events and dates, asserted to be historical, may be verified. In the modern reconstruction of the state under Japanese auspices, very inter¬

esting antiquities, in the form of mortuary art and literary relics, have been recovered and scrupulously cared for. Although Korea's in¬

terior history is interesting, yet the story of progress and civilization is best expressed in that of Buddhism which, introduced into the peninsula in the 4th century, was destined to enjoy a thousand years of successful propaganda.

Its career of material and spiritual splendor 526

lends strong color to the idea held by scholars that the story of Korea and its civilization dur¬

ing the last 500 years forms a chapter of decay rather than of the progress, the Koreans from about 1500 a.d. having steadily degenerated.

However this may be, it is certain that in the train of the faith, imported from India and China and Tibet, came elements that fertilized the Korean imagination and supplied the spirit¬

ual forces in which early Confucianism was lacking. Art, literature, folklore, noble monu¬

ments in sculpture and architecture, splendid temples and monasteries followed with the coming or as the result of. this vast synthesis of Asiatic beliefs, forces, intellectual achieve¬

ments, science and craftsmanship, called Bud¬

dhism. Not content with the spiritual conquest of the peninsula, the Buddhist missionary activ¬

ities overflowed into the islands of the Rising Sun. Japan received at the hands of Buddhist teachers those prinoipia, of art, literature and civilization which link her history with the great world of the West, besides thousands of Korean colonists, many of them skilled artists and craftsmen. This explains why, until lately, the Koreans were apt to look on

them¬

selves as vastly superior and the Japanese as semi-savages. The political outcome of the factors of evolution in these early centuries was the strong state of Silla (Shinra). whose people, beside having the richest soil, were nearest to China, had first received Buddhism, traded with the Arabs and sent their students to Nankin in China for study. One of their literary statesmen invented what (except the Sanskrit letters imported from India) was a new thing in Chinese Asia — a true alphabet, of 14 consonants and 11 vowels (the en-mun), classified according to the organs of speech.

This system, however, was not perfected and put into general practice until the 15th century, nor ever made nation-wide until the Christian missionaries made reading democratic and popular. With Confucianism the system was never given opportunity to develop. In the 10th century Shinra's rule extended over the entire peninsula, but in the north the hardy men of Korai were uniting under Wang-gon (Chinese, Wu Wang) who made himself

master of the rival states and unified the penin¬

sula, making his capital at Song-do (Sunto).

All historians agree that luxury was the chief cause of the downfall of Silla. Buddhism was now endowed as the state religion and the country was divided for administrative pur¬

poses into eight districts based on the river basins, provinces and capitals having the first syllable of their names in common. The evolu¬

tion of government was away from feudal forms to centralized monarchy, after the Chi¬

nese model. The mariner's compass is recorded as used on Chinese ships voyaging to Korea, 1122 a.d. The Mongol invasions of the 12th and 13th centuries made apparently little im¬

pression on the country. In 1392, a new dynasty coming into power banned Buddhism.

The first half of the 15th century was a period of inventions, the improvement of the alphabet (en-mun), printing by means of movable or "living" metal types, notable literary produc¬

tions, 'the casting of great bells and improve¬

ments on agriculture being among these. In politics, political parties arose. Yet while both China and Japan felt, for evil and good, the contact of Europe, Korea became, in spirit and fact, more and more a hermit kingdom, for¬

eign trade being tabooed and the educated classes shrivelling into self-conceit and the pride of ignorance. The invasions of the Jap¬

anese, 1592-97, called forth the inventive powers of the Koreans. Admiral Yang invented an ironclad, propelled by oars, which destroyed the enemy's fleets. The use of bomb shells ("heaven shaking thunder") by the Koreans hampered the enemy's siege operations. The Manchus in 1627, • the entrance of Roman Christianity in 1777, through books, and by French priests (in 1836), and of Reformed Christianity in 1884, with the treaties made since 1876 and the presence of large armies on her soil during the Chino- Japanese War of 1894, form the nuclei around which recent events may be grouped. Repeated endeavors, made by Japan during 30 years, to have the Korean dynasty and nobility reform their cor¬

rupt administration and create a modern state were made, during which the Japanese legation was twice attacked and burned and the. Jap¬

anese driven from Seoul. Plot, counterplot, insurrection and foreign complications followed in monotonous repetition. Japan, to .maintain the independence of Korea as necessary to her own existence, was compelled to engage in two foreign

wars — with China and with Rus¬

sia. Finding Korea never free from anarchy and incapable of governing herself, Japan felt compelled to assume that responsibility of a protectorate. It had been made evident by the logic of events, that the interests of Japan and Korea were identical — a view that was recog¬

nized almost immediately and unanimously in the West, all governments promptly withdraw¬

ing their legations from Seoul. Japan, sending her ablest statesman, Prince Ito, as resident-

general, assumed the control of Korea's for¬

eign affairs and during three years attempted internal reforms according to an agreement signed 24 July 1907. The Korean soldiery re¬

sisted the attempts to disarm them and in the two years of intermittent fighting 21,000 natives and 1,300 Japanese lost their lives. At Har¬

bin, 26 Oct. 1909, Prince Ito, and shortly after¬

ward, in California, Mr. D. W. Stevens, an American adviser, were shot to death by Korean assassins. To this date, 1910, Japan's outlay of money for railways, military and reforms in Korea had amounted to $72,000,000.

Driven by necessity to the final step of annexa¬

tion, which was taken 22 Aug. 1910, the Mikado declared that "all Koreans under his sway shall enjoy growing prosperity and wel¬

fare and be assured of repose and security,"

while he called upon "all his officials and au¬

thorities to fulfil their duties in appreciation of his will." How thoroughly Japan has carried out her purpose of reconstruction, in every department of

human activity and the opening to the Koreans of all avenues to prosperity —the purpose being to give, in time, to Koreans the same privileges as Japanese subjects en¬

joy — may be seen in the annual reports, issued by the resident-general from 1908 to 1914 and copiously illustrated. In Count S. Terauchi, born in Choshi in 1852, the year of Com¬

modore Perry's arrival, a worthy successor of versatile ability and indomitable energy was KOREA

found to Prince Lto. The first work was in sanitation and cleanliness. Smallpox, always epidemic (exactly as in old Japan), and formerly an almost annual visitant, causing at times nearly a 'thousand deaths in a day in Seoul alone, is now only sporadic. In one year 5,400,000 Koreans were compelled to receive vaccination. Cholera, typhoid fever, dysentery, diphtheria were also chronic visitants' — often brought from China — and have almost ceased to be epidemics. Housecleaning twice a year is now compulsory. In 1913, with cholera almost unknown, the cases and deaths from all epi¬

demic diseases were 4,068 and 805, respectively.

In 1913, 384,006 patients were treated in the government charity hospitals and 2,408,126

visits made to patients. Silk raising is now a native industry, over 13,000,000 mulberry seedlings furnished the food material for the worms. The annual rice, wheat and barley crops have been doubled. In 1915, a great national exhibition was held in Seoul which showed that in every one of the 13 divisions of Korea modern methods in sanitation, agri¬

culture, education and industry were in opera¬

tion or had made beginnings. The revenue for 1914-15 was 59,412,966 yen. The total trade for 1914 was

97,620,248 yen. In March 1913, 49,328 native pupils attended the government schools and 2,190 the private schools, besides 28,173 Japanese were under instruction; the official expenditures being 1,141,952 yen. The work of railways, road-making, harbor im¬

provements and survey, sanitation, silk culture, agricultural development, banking (one family in 600 having a savings account) and finance, and the general prosperity and uplift of the people, as shown in annual publications both official and private, are remarkable. Japan, as a devotee of science and a pastmaster in the art of rejuvenating nations, profits by her own ex¬

perience in renewing her own body politic, after the long marasmus and anaemia of centuries brought on in all three countries under Chinese culture by hermitage and bad government.

Hence the vigor and thoroughness with Korea — apart from any question of political moral¬

ity — for Japan, is scarcely less severe with Korea than she has been with herself. Great as is the work done for the Koreans, their con¬

tact with the world, by changing the status from one of hermitage and degeneration to one of brotherhood and progress, bids fair to pro¬

duce even greater ultimate results for the good of themselves and the race.

Language. — Korea since early times has employed two languages : Chinese for writings and native Korean for speech, Chinese if spoken being an acquirement like French in America. The literature in Chinese is some¬

times translated into Korean, however; and the work of the missionaries in making general use of the en-mun or native script has reacted to the great appreciation by the Koreans of their own language. The reforms are pro¬

claimed in the vernacular.

Korean is of a not extreme agglutinative type, belonging to the polysyllabic branch of the Mongol-Tartar languages like Japanese, and unlike the monosyllabic Chinese; it is structurally unrelated to the latter, though it has very many Chinese loan-words, pronounced after its own phonology. Its resemblances to Japanese are far closer: mutual translations word for word, and even particle for particle, are quite feasible. The particles and gram¬

matical terminations in both represent punctua¬

tion, emphasis and inflection of nouns and verbs. The honorific vocabulary — almost a complete ceremonial language even in construc¬

tion, to express relations between superiors and inferiors and equals — is common to both. The differences are mainly euphonic : Korean vowels are heavily assimilated to those which follow, the syllables need not end with a vowel, and the. spelling is as irregular as English, none of which is true of Japanese.

The grammar of Korean is extremely flexi¬

ble and pregnant; like Chinese, the roots are invariable. There are no inflectional forms for number, person or case, or conjunction of verbs, and no form for gender; all are indi¬

cated by particles without meaning, or whose meaning has been lost, affixed to the stem, and varying with its terminal letter, as consonant, vowel or liquid. There are no pronouns of the first and second person; the third, with rela¬

tional particles, serving for both. Development has expended itself on the verbs, which are marvels of varied, flexible and ingenious ex¬

pressiveness. Many words not primarily verbs can be turned into them (as in English), and these with the

true verbs constitute 20 per cent of the entire vocabulary. The grammatical forms of the verb are said to average 300. Adjectives and adverbs are not distinguished from the verbs, and the prepositions are verb forms. All conditions expressed by inflections in Western languages — present, continuing, past, unfin¬

ished or completed, optative, subjunctive, po¬

tential, interrogative, participial, etc. — exist in Korean, and a vast number of others expressed by us in long sentences. Some verbs have no passive, but all have a negative voice. There is no number; the three persons in every vari¬

ant are expressed by courtesy forms — one to or of superiors, one for equals, one for in¬

feriors or of things. The syntax is positional, as with Chinese. The object precedes the verb or other governing word, the prepositions are postpositions, the adjective precedes the noun it qualifies and the adverb its verb or adjective (as in English). A dependent clause precedes its principal.

Korean has an alphabet of 25 letters, 14

consonants and 11 vowels, a very simple and scientific one, analyzed by organs of speech.

The vowels are a, ya, u, yu, o, yo, u, yu, i, eu, a ; with the diphthongs e, e, e'. The consonants are — labials, p, ph, m ; dentals, t, th, n, 1 ; palatals, ch, chh, s; gutturals, k, kh ; laryngeals.

(?) h, ng final. There are no letters f, v, w, b, d, g, j or z, though (except the first, which is replaced by p) they exist in speech. There is but one character for 1 and r, and neither of them can begin a word, their place being taken by n. The characters — women and children’s only, the true ^learned® characters being Chi¬

nese — are of an extreme simplicity, contrast¬

ing strongly with the complex Chinese ; and there is a cursive form. This alphabet is called en-mun, ((the vulgar® ; and there is a system called nido, in which the letters are grouped in the 199 possible combinations and learned by rote. The writing is in syllables, in columns from right to left, as with Chinese. There is already a very respectable volume of Christian literature expressed in en-mun and the news-

papers of 'the capital and large cities are printed in this character.

Bibliography. — Allen, H. N., (Korea, Fact and Fancy ' (Seoul 1904) ; id., 'Things Korean'

(New York 1908); Aston, W. G., (Q>rean Popular Literature' (in (Asiatic Society of Japan Proceedings,' Vol. XVIII, Tokio 1890) : Bishop, I. B., 'Korea and her Neighbors' (New York 1898); Blakeslee, G. H. (ed.), (China and the Far East' (Clark University Lectures, New York 1910) ; Braecke, Gustave, 'La Coree, sa situation economique et ses richesses min-

ieres' (in Revue JJniverselle des Mines, Vol.

LIX, 3d series, Liege 1902) ; Carles, W.. R., (Life in Corea' (London 1888) ; Cavendish and Goold-Adams, 'Korea' (ib. 1894) ; Coulson, C. G. D„ (Korea' (ib. 1910); Crist, R. F., (Report on Trade Conditions in Japan and Korea' (Washington 1906) ; Curzon, 'Problems of the Far East' (rev. ed., New York 1896) ; Gale, J. S., (Korean-English Dictionary' (Yoko¬

hama 1897) ; id., (Korea in Transition' (1909) ; Gilmore, G. W., (Korea from its Capital'

(Philadelphia 1892) ; Griffis, W. E., (Corea Without and Within' (Philadelphia 1885) ; id., 'Corea, the Hermit Nation' (9th ed., New York 1911) ; id., 'A Modern Pioneer in Korea: The Life Story of

Henry G. Appenzeller'

(New York 1912) ; Haegeholz, 'Korea und die Koreaner' (Stuttgart 1913) ; Hamilton, Angus, 'Korea' (New York 1904) ; Hamilton and Aus¬

tin, (Korea : Its History, its People, and its Commerce' (Boston 1910) ; Hough, Walter, (The Bernadon, Allen and Jouy Korean Collec¬

tions in the United States National Museum'

(in Annual Report of the United States National Museum, Washington 1892) ; Hulbert, H. B., (Korean Language' (in Smithsonian Institution Annual Report of 1903, ib. 1904) ; id., Com¬

parative Grammar of the Korean Language and the Dravidian Languages of India' (Seoul 1905) ; id., 'The Passing of Korea' (New York 1906); lones, G. H., (Korea: The Land, People, and Customs' (ib. 1907) ; Keir, R. M., (Modern Korea' (in Bulletin of the American Geographical Society, Vol. XLVI, ib. 1914) ; Kemp, E. G., 'Face of Manchuria, Korea, and Russian Turkestan' (ib. 1911) ; Ladd, G. T., (In Korea with Marquis Ito' (London 1908) ; id., 'The Annexation of Korea' (in Yale Re¬

view, Vol. I, New Haven 1912) ; .Longford, J. H., 'The Story of Korea' (London 1911) ; Lowell, Percival, 'Choson, the Land of the Morning Calm' (Boston 1886) ; Madralle, Claude, (Northern China, the Valley of the Blue River, Korea' (Paris 1912) ; McKenzie, F. A., (The Tragedy of Korea' (London 1908) ; Moose, J. R., (Village Life in Korea' (Nash¬

ville, Tenn., 1911); Norman, Sir H., 'People and Politics of the Far East' (London 1907) ; Oppert, E. J., (Forbidden Land: Voyages to the Korea' (London 1880) ; Residency-General in Korea, (National Progress of Korea for Last Five Years, 1905-10' (Tokio 1910) ; Rock-

hill, W. W., 'Treaties and Conventions with or concerning China and Korea, 1894-1904'

(Washington 1904) Rosny, Leon de, 'Les Coreens' (Paris 1888) ; Ross, John, (History of Corea, Ancient and Modern' (London 1891) ; Savage-Landor, A. H., Corea, or Cho-sen'

(New York 1895) ; Terriou, Rene, 'Le status international de la Coree anterieurement au 29

aout 1910' (Paris 1911) ; Terry, T. P., 'The Japanese Empire, Including Korea and For¬

mosa' (Boston 1914) ; Villetard de Laguerie, (La Coree independante' (Paris 1898)

William Elliot Griffis,

Author of ' Corea, the Hermit Nation, ' etc.

KORN, korn, Arthur, German physicist:

b. Breslau, 20 May 1870. He studied at the Breslau and Berlin gymnasiums and, consecu¬

tively, at the universities of Freiburg, Leipzig (1886), Paris (1890) and Berlin (1891). # He was given degrees and (1890) became private teacher (docent) of physics in Munich (1895), then assistant professor (1903) and professor, and has resided, since 1908, at Charlottenburg.

His work consisted of experiment and writing on long-distance photography, the phototelau¬

tograph, physical phenomena, mechanics ; but he has devoted his best labors to the potential theory and the mathematics of physics. Among his numerous published works are 'Eine Theorie der Gravitation und der elektrischen Erscheinungen auf Grundlage der Hydrody-

namik' (2d ed., 1896) ; (Ueber Molecular-

Funktion' (1897) ; Cehrbuch der Potential-

theorie' (Berlin 1899-1901); (Freie und erz-

wungene Schwingungen' (1910) ; 'Handbuch der

Phototelegraphie und Telautographie'

(1911). He has also contributed numerous articles to such journals as Berichte der Bay-

rischen Akademie der Wissenschaft ; Comptes rendus de VAcademie des Sciences; Naturwis-

senschaftliches IV ochenschrift , etc.

KORNEMANN, kor'ne-man, Ernst W. G.,

German historian: b. Rosenthal, 11 Oct. 1868.

He studied at Giessen (1878-89) and Berlin (1889-92), and took the degree of doctor of philosophy (1891) ; he was appointed assistant professor teaching under the faculty (1892).

He became private teacher (docent) of ancient history at Giessen (1892) and took the degree of professor at Tubingen (1902). With Dr.

Lehmann-Haupt, of Liverpool, he established the periodical Klio, dedicated to ancient history, and later took up his residence in Tubingen.

He wrote 'De civibus Romanis in provinces imperii consistentibus' (1891) ; 'Die historische Schriftstellerei des Consuls Asinius Pollio'

(1896) ; 'Zur Geschichte der Gracchenzeit'

(1903) ; 'Die neue Livius-epitome aus Oxy-

rhynchus' (1904) ; 'Kaiser Hadrian und der letzte grosse Historiker von Rom' (1905) ; 'Priesterkodex in der Regia und die Entstehung der altromische Pseudogeschichte' (1912). Be¬

sides numerous articles written for Klio he con¬

tributed on classical subjects to the Realency-

klopedia of Pauly-Wissowa-Kroll.

KORNER, ker'ner, Christian Gottfried,

German jurist and intimate of Schiller: b.

Leipzig, 2 July 1756; d. Berlin, 13 May 1831.

He studied law at Gottingen and Leipzig and took his degrees in the latter. He then traveled abroad (1779), was appointed councillor of the Consistorial Court at Leipzig (1781), chief judge of the Court of Appeals (1790), privy referendarius in the Privy Council (1798), and was then returned to the Court of Appeals (1811). His strong tendency toward science and art made his home the rendezvous of prom¬

inent men in this sphere. He was one of the most trusted and influential friends of Schiller, who resided (1785-87) on his Loschwitz vine¬

yard or his home at Dresden. While Leipzig was under the occupation of the Russian army KORNER — KOROLENKO

lie was created government councillor, and was „ appointed (1815) Privy Councillor of the Prus¬

sian Ministry of the Interior, becoming Privy Councillor in Chief. He instigated the first edi¬

tion of Schiller's works with a biographical sketch (Stuttgart 1812-15). Among his well-

known works are (ZEsthetische Ansichten) (Leipzig 1808) ; (Versuche fiber Gegenstande der innern Stadtsverwaltung> (Dresden 1812) ; (Deutschlands HoffnungeiP (Leipzig 1813).

Of much importance are his (Schillers Brief-

wechsel mit Korner) (Berlin 1847), enlarged edition by Goedeke (Leipzig 1874) ; (Briefe Wilhelm von Humboldts an Korner,* issued by F. Jonas (Berlin 1879). His collected works, (Gesammelte Schriften,* together with a biog¬

raphy, were published by A. Stern (Leipzig 1881). Consult Jonas, (Christian Gottfried Kor-

ner, biographischer Nachrichten fiber ihn und sein Haus) (Berlin 1882) ; Weber, W., (Briefe der Familie Korner) (in Deutsche Rundschau , Vols. XV-XVI).

KORNER, Karl Theodor, German poet: b.

Dresden, 23 Sept. 1791 ; d. 26 Aug. 1813. After studies at Freiberg, Leipzig and Berlin, young Korner, through Kotzebue's influence, was ap¬

pointed dramatist to a Vienna theatre, and wrote light comedies such as (The Green Mask) and (The Night Watches, > and some tragedies, of which (Zriny) was the most successful. In the uprising of the German nation against Napoleon, Korner not only displayed heroic personal courage in many encounters, but wrote numerous patriotic songs These were pub¬

lished in 1814 under the title of (Lyre and Sword. * The most famous of these pieces is the (Sword Song,* composed only a few hours before the author fell in a skirmish between Schwerin and Gadebusch.

KORNILOFF, kor'ne'lov, Laurus Gregor-

ovitch, Russian general: b. Siberia, 30 June 1870. The son of humble Cossack parents, he had to work hard from childhood, but managed to educate himself sufficiently to enter the Cadet Corps at the age of 13. At 19 he had learned several languages, entered the Artillery College in Saint Petersburg and at 22 obtained his commission. An excellent mathematician and learned scholar, he might have had an easy career in the metropolis, but he chose to be stationed in Turkestan. He entered the Staff College in 1895 and graduated with the highest honors. Between 1896 and 1902 he carried out a series of daring missions in Persia and Afghanistan, disguised as a native. These ex¬

plorations enabled him to make important con¬

tributions to science. In the Russo-Japanese War he commanded a brigade and displayed military talents of a high order. He was at¬

tached to the General Staff after that war, spending most of his time traveling in Asia and Europe. From 1907 to 1911 he was mili¬

tary attache at Peking, after which he com¬

manded the Trans- Amur frontier force, which accompanied him in the European War in 1914.

He led the 49th division in the conquest of Galicia earlv in the war. He was trapped in the Dukla Pass in the Carpathians during the Austro-German offensive in May 1915. Sur¬

rounded by superior forces, he hacked his way through the enemy lines and saved a large por¬

tion of his forces. Wounded, he fought with a small rearguard till all had fallen. He was VOL. 16 — 34

captured by the Austrians, but escaped from prison and returned to Russia in 1916. In the early stages of the Russian revolution he was placed in command of the troops in Petro-

grad, but, unable to endure the systematic mis¬

rule of the provisional committees, he asked to return to the front. His capture of Halicz 10 July 1917 marked him as a great commander, and on the resignation of General Brussilov he was appointed commander-in-chief of the Rus¬

sian armies in August 1917. He immediately entered into negotiations with the provisional government concerning the necessary steps to be taken in order to re-establish the fighting strength of the army. The greater part of the measures proposed by Korniloff were accepted by the government, which took a final decision on the questions involved on 26 August. The decision, however, was not carried out owing to the unexpected demand of Korniloff that the powers of dictatorship should be conferred upon him. On 9 Sept. 1917 he led a counter-revolu¬

tion against Kerensky and marched on Petro-

grad with his troops. Kerensky deposed him from his command, and Korniloff issued a bold proclamation to the people and the government pleading for a vigorous prosecution of the war.

However, he surrendered on 13 September and was arrested with 23 generals and other officers.

The affair was smoothed over eventually as a ^misunderstanding® between the Premier and the general. See Russian Revolution; War, European.

KOROLENKO, kor'o-len'ko, Vladimir

Galaktionovitch, Russian novelist : b. Zhitomir in Volhynia, 27 July 1853. His father, a mem¬

ber of an old Cossack family, was a judge, of stern and honorable character, who believed in a Spartan education for his children. His mother was of aristocratic Polish origin, and when she was left a widow in straitened cir¬

cumstances, she opened a boys' boarding-school.

Korolenko, a boy of 15, assisted her and also gave lessons outside. In 1C70 he entered the Technical School at Saint Petersburg, earning his way by teaching and doing copying. His mother was unable to aid him and he often suffered from hunger. In 1872 he entered the Agricultural Institute at Moscow, but having become affected with revolutionary opinions he was expelled and sent to Kronstadt. He man¬

aged to return to Saint Petersburg where he finally secured a position as reader in a pub¬

lishing house. He embodied his experience in a small volume entitled, (Episodes in the Life of a Seeker) or (Prokhan and the Students.) This was begun in Russian Thought (Russkaya Muisl) but was stopped by the censor. He was already a marked man and was arrested in 1879 and sent to Viatka, Kama and Tomsk.

He wrote a letter protesting against such per¬

secution and as a reward was transferred to Yakutsk in eastern Siberia, where, amid the immense forests known as ((taiga,® in a filthy, smoky village, he spent three miserable years.

«My tiny hut,® he says, <(was like an island lost in a boundless ocean.® He experienced the terrible sadness of exile and absolute loneli¬

ness, amid a degraded and hopeless people. He wrote his first notable story, (Makar's Dream) ((Son Makara*), which was published several years later, as well as a number of tales, giving remarkably realistic pictures of life in that 530

desolate region and of suffering humanity, and introducing various types of revolutionists, exiles and vagabonds as he saw them in the frozen Siberian forests and in far-distant Sag-

halien. His (Sketches of a Siberian Traveler'

was published in 1896. In these stories and in (The Tramp' ((Brodyag') he gives many remi¬

niscences of his own experiences, as a boy and as a young man. (The Murmuring Forest,'

published in the same year as (Brodyag,' con¬

siderably added to his reputation, which was wholly confirmed by (The Blind Musician'

((Slepoi Musikant'), which is an idyllic tale of that Ukraine where his childhood was spent.

(Translated by Aline Delano, with introduction by George Kennan, Boston 1890). In 1888 he began the publication of a long novel in Russian Thought (Russkaya Muisl), but as soon as its plot began to develop, the censor interposed a veto and the publishers were compelled to announce that ((on

account of circumstances beyond their control" the rest of the work could not be printed. In supposed answer to Tol¬

stoi's doctrine of non-resistance, he wrote (The Legend of Florus' which is regarded as one of his most beautiful tales. The subject was taken from Josephus. Other stories and arti¬

cles were elicited by famine conditions in Rus¬

sia and by the evil customs of duelling. In the 90's he was permitted to return from Siberia and engaged in journalism and other literary activities. In 1903 the 50th anniversary of his birth was celebrated all over Russia and in 1908 the occasion of the 30th anniversary of his commencement as an author was made a jubi¬

lee. He is one of the freshest and most vivid of Russian writers and, as shown in his (Yom Kippur' has a sense of humor unusual in Rus¬

sian novelists.

Nathan Haskell Dole.

KORTE, Christoph E. Gustav, German

archaeologist : b. Berlin, 8 Feb. 1852. He studied in the universities of Gottingen, Munich and Berlin (1870-75), then traveled in Italy and Greece. He was private teacher (docent) at Gottingen (1880) and received the degree of assistant professor at Rostock (1881) and pro¬

fessor (1883). He was appointed secretary of the Imperial German Archaeological Institute at Rome (1905), and succeeded Dilthey at Gottin¬

gen University (1907). He has written (Die antique Skulptur aus Bceotien' (1878) ; (Etrus-

kische Spiegel' (1884-97), in collaboration with the late A. Kliigmann; (I rilievi delle Urne etruske' (1890-96), a continuation of the work of H. Brunn.

He compiled a report of the results of excavations he and his brother made at Gordium in 1900 (Berlin 1904).

KORTING, ker'ting, Gustav, German phi¬

lologist: b. Dresden, 25 June 1845; d. 1913. He studied in Leipzig (1863-67), was appointed head teacher at Dresden (1868) and became professor of Romance and English philology at Munster (1876) and at Kiel (1892). He wrote (Ueber die Quellen des Roman de Rou' (1867) ; (Diktys und Dares' (Halle 1874) ; (Petrarcas Leben und Werke' (Leipzig 1878) ; (Boccac-

cios Leben und Werke' (Leipzig 1880) ; (Enzy-

klopadie und Methodologie der Romanischen Philologie' (Leipzig 1884—88) ; (Neuphilol-

ogische Essays' (Leipzig 1887) ; (Grundriss der Gesdiichte der englischen Literatur' (Munster 1887; 5th ed., 1910);

zosische Philologie' (Leipzig 1894) ; 'Ge¬

schichte des griechischen und romischen Thea¬

ters' (Paderborn 1897) ; (Lateinisch-roman-

isches Warterbuch' (Paderborn 1890-91 ; 3d ed., 1907).

KORTING ENGINE. See Internal

Combustion Engine.

KORTUM, kor'tum, Karl Arnold, Ger¬

man physician and author : b. Miilheim, 5

July 1745; d. Bochum, 15 Aug. 1824. He prac¬

tised as physician at Duisberg, but moved to Bochum (1771). He wrote

der Alchemie' (Duisberg 1789), but is better known

through his comical epic poem in dog¬

gerel rhyme, (Leben, Meinungen und Taten von Hieronymus Jobs dem Kandidaten* (Munster 1784), published anonymously, but later ap¬

pearing under the title, 'Die Jobsiade' (Dort¬

mund 1799) and going through many editions.

Besides a number of medical works, he wrote on subjects of general utility such as bee cul¬

ture and antiquarian matters. Consult Deicke's two works, (Der Jobsiadendichter Karl Arnold Kortum' (Miilheim 1893), and (Des Jobsi-

adendichters Karl Arnold Kortum : Lebensge-

schichte von ihm selbst erzahlt' (Dortmund 1910).

KOSCHAT, ko'shat, Thomas, Austrian

composer and singer : b. Viktring, near Klagen-

furt, 8 Aug. 1845. He studied philosophy at the Vienna University, but took part as bass singer in small entertainments, joining the chorus of the Vienna Court Opera (1867).

He became a member of the cathedral choir (1874) and rose to the position of court band¬

master (1878). He is known through his many choruses, quartets and songs and the waltz-

idylls, (Ein Sonntag auf der Aim,' (Bauern-

hochzeit in Karnten,' etc. The success of them led him to write (Hadrich,' poems in the Carinthian dialect (1877). He wrote also (Errinnerungsbilder' (Klagenfurt 1889) ; (Dorfbilder aus Karnten' (Leipzig 1878).

Consult Schmidt, O., 'Thomas Koschat' (Leip¬

zig 1887) ; Marold, (Das Karntner Volkslied und

Thomas Koschat' (Leipzig 1895) ; Kro-

bath, (Thomas Koschat, der Sanger Karntens'

(Leipzig 1912).

KOSCIUSKO, kos'i-us'ko, Mo., capital

town of Attala County, on the Yockanockany Creek, and on the Mississippi division of the Illinois Central Railroad, about 60 miles from Jackson. It has a Baptist college, negro school, seven churches, two banks and two newspaper offices. Its industrial resources are derived from cotton and oil mills and wood-working factories, etc. Pop. 2,385.

KOSCIUSKO, Mount, in Australia, the

highest mountain peak in the continent, in the Muniong Alps, in New South Wales, near the frontier of Victoria. It is 7,308 feet high.

KOSCIUSZKO, kos-i-us'ko (Polish kos-

choosh'ko), Thaddeus (Polish Tadeusz), Pol¬

ish patriot : b. Mereczowszczyzna, Lithuania, 12

Feb. 1746; d. Solothurn, Switzerland, 15 Oct.

1817. He was educated in the military school at Warsaw, and completed his studies in France.

On his return to Poland he became suitor to the daughter of Sosnovski, marshal of Lithu¬

ania, but his love meeting no return he betook himself to America (1777). Having attracted the notice of Washington, he was appointed

engineer, with the rank of colonel, and after¬

ward general of brigade. He performed excel¬

lent service and at the end of the war received the thanks of Congress, with the brevet of major-general. He returned to Poland in 1786, and on the occasion of the reorganization of the Polish armv in 1789 was appointed major-

general, and having declared for the constitu¬

tion of 3 May 1791, he fought in the war which soon after broke out, with the rank of lieuten¬

ant-general. When Stanislaus Augustus in 1793

agreed to the second partition of Poland, Kos-

ciuszko withdrew from the army and retired to Leipzig. At this time the Legislative Assem¬

bly in France conferred on him the title of French citizen. When a new insurrection broke out in Poland in 1794 for the purpose of delivering the country from the Russians, Kosciuszko was recalled and made commander-

in-chief of the insurgent army. He defeated the Russians at Raclavice, but at the battle of Maciejovice his army was defeated and he him¬

self wounded and taken prisoner. He remained in captivity for two years, and then proceeded to England, and thence to America. In 1798

he returned to Europe on a mission from Con¬

gress to France, and contributed to bring about an understanding between the latter country and the United States. In April 1814, he ad¬

dressed a petition to Alexander I, emperor of Russia, requesting him to grant an amnesty to all expatriated Poles, to accept the title of king of Poland and to give that country a free constitution similar to that of England; but the petition remained without effect. In April 1817 he issued a letter of emancipation to the serfs on his estate in Poland. His death was occasioned by a fall from his

horse. In 1818 his body was removed at the expense of the Emperor Alexander of Russia to Cracow, where it was buried in the cathedral, and a monument erected to him. Consult

KOSEGARTEN, ko'ze-gar'ten, Johann

Gottfried Ludwig, German Orientalist and historian: b. Altenkirchen, island of Riigen, 10

Sept. 1792; d. Greifswald, 18 Aug. 1860. He studied theology and philosophy at Greifswald and Oriental languages at Paris (1812-14), be¬

coming adjunct professor of the faculty at Greifswald (1815). He was appointed pro¬

fessor of Oriental languages at Jena (1817), but returned to Greifswald (1824) where he died leaving many valuable works uncompleted, such as (Taberistanensis annales) (Vols. I— III, Greifswald 1831-53) ;

1840) ; (Pantsohatantra) (Bonn 1848 and Greifs¬

wald 1859). Among his early works are (Car-

minum orientalium Triga) (Stralsund 1815); (Stuttgart 1822), a collection of Persian stories translated into German; the

thum, with Latin translation (Jena 1819); (Chrestomathia arabica> (Leipzig 1828). Of his later works might be cited (Pommersche und rtigische Geschichts denk maler) (Greifs¬

wald 1834) ; (Codex Pomeraniae diplomaticus) (ib. 1843-62) in collaboration with Hasselbach; (The Hudsailian poems) (Greifswald and Lon¬

don 1854). His Arabian Grammar and Dic¬

tionary of the Low German Language were un¬

finished. He also wrote (Geschichte der Uni-

versitat Greifswald) (Greifswald 1856-57).

KOSER, ko'zer, Reinhold, German histo¬

rian : b. Schmarsow, Prussia, 7 Feb. 1852. He studied history and philology in Berlin, Vi¬

enna and Halle and was appointed to work in the Berlin Academy on the correspondence of Frederick the Great. Lie was appointed keeper of the state archives at Berlin (1882) and was given the degree of assistant professor at Berlin (1884), professor at Bonn (1891) and succeeded Sybel as general director of the Prussian state archives (1896). At the same time he was made a member of the Akademie der Wissenschaften and Prussian state histori¬

ographer (1898). He wrote (Friedrich der Grosse als Kronprinz) (Stuttgart 1886) ; (Konig Friedrich der Grosse> (ib. 1890-1904) ; (Preus-

sische Staatsschriften aus der Regierungszeit Friedrichs ID (Berlin 1877-85) ; (Politischen Korrespondenz Konig Friedrichs der Grosse) (ib. 1879-83) ; (Unterhaltungen Friedrichs der Grosse mit H. de CatD (Leipzig 1885) ; (Brief-

wechsel Friedrichs der Grossen mit Grumbkow und Maupertius) (ib. 1898) ; (Mitteilungen der koniglichpreussischen Archivverwaltung) (ib.

1900-04).

KOSHER, kd'sher, KASHER, or CO¬

SHER, in Hebrew meaning lawful,

pure, clean, in conformity with the laws of the Talmud. It is the antithesis of terefo or tref, the unclean. Food, utensils, etc., which have undergone the operations and rituals laid down for the orthodox Jews, such as meats slaugh¬

tered under the ritual of the Mosaic law. The slaughterer (schochat) acts under the license of a chief rabbi. As the far-reaching rules of the Jewish authorities render it impossible for a Jew to obtain sustenance among communities of other religions

without breach of some or other of these Mosaic laws or their renderings, there are ever-increasing numbers of Jews who give the matter secondary consideration accord¬

ing to their surroundings and who are known as Liberal Jews.

KOSLIN, kes-len, or COSLIN, Prussia,

town in Pomerania at the foot of Gollenberg Mountain, junction of several railways, five miles from the Baltic. It has two Evangelical, a Catholic and an Apostolic church, and a synagogue; a statue of Frederick William I on the market place ; a war monument, a monument of Government-president Fritsche, cadet school, gymnasium, seminary, deaf and dumb institute, agricultural school, iron foundries and manu¬

factures of machinery, paper, soap, railroad sig¬

nals ; a brewery, three steam sawmills, etc. It is a garrison town. The foundation dates back to about 1188, being incorporated as a town 1266. Pop. 23,200, chiefly Protestants.

KOSLOV, koz-lof', Russia, county-town of the government of Tambo, junction of two rail¬

roads. It has nine Greek Catholic churches, several banks, more than 50 factories, large grain and cattle trade, etc. Its origin is said to date back to 1627. In the neighborhood is the monastery Troitzkoi, where a great market is held yearly. Pop. 50,300.

KOSMOS. See Cosmos.

KOSSEL, Albrecht, German physiologist:

b. Rostock, 16 Sept. 1853. He studied medicine 532

at Strassburg and Rostock and became assist¬

ant to Hoppe-Seyler (1877-81) in Strassburg and private teacher (docent). He studied physiological chemistry (1881) and became assistant professor and principal of the chem¬

ical division of the Physiological Institute, Ber¬

lin (1883). He was appointed professor of physiology at Marburg (1895) and at Heidel¬

berg (1901). In 1910 he took the Nobel prize.

His chief work was the study of the cell and its nucleus elements ; the decomposition of albu¬

men in its conversion to peptones ; discovery of adenin, thymin; action of the nucleic acids on bacteria. He also made researches in trypsin digestion. He wrote (Untersuchungen iiber die Nukleine und ihre Spaltungsprodukte) (Strass¬

burg 1881) ; (Die Gewebe des mensohlichen Korpers und ihre mikroskopische Untersuch-

ung5 (Brunswick 1889-91) in collaboration with Behrens and Schiefferdecker ; (Leitfaden fur medizinisch-chemische Kurse) (5th ed., Berlin 1904). Numerous valuable contributions to the journals on physiological chemistry are from his pen.

KOSSINNA, kosTna, H. Gustaf, German

archaeologist: b. Tilsit, 28 Sept. 1858. He studied at Gottingen, Leipzig, Berlin and Strass¬

burg and was promoted to doctor of philoso¬

phy at Strassburg University (1881). He was appointed to a position in the University Li¬

brary at Halle (1886) and in the Berlin Library the same year ; and became curator of the Bonn Library (1887), and of the Royal Berlin Library (1892) and librarian (1894). He was given the degree of professor (1900) and un¬

dertook a prolonged trip to study the German museums of archaeology. In 1902 he was made professor of German archaeology of the Berlin University and founded the Deutsche Gesell-

schaft fiir Vorgeschichte (1909). He was a prolific contributor to the archaeological jour¬

nals. On ethnology he wrote (Die ethnolo-

gische Stellung der Ostgermanen5 (1896) ; (Die indo-germanen Frage archaeologisch beautwor-

tet5 (1902) ; (Die Herkunft der Germanen) (1911). Among his works on archaeological subjects should be cited (Die vorgeschichtliche Ausbreitung der Germanen in Deutschland) (1896) ; (Ursprung des Germanen-namens5

(1895) ; (Zur Geschichte des Volksnamens Griechen5 (1896). He also edited Mannus, Zeitschrift fiir Vorgeschichte.

KOSSOVO, koos'6-vd, Serbia, a vilayet bor¬

dering on Bulgaria, Albania and Greece, hav¬

ing within its confines the sandjaks Uskub, Prizren, Prishtina, Ipek and Plevlje. Its capital is Uskub. Its population consists of Turks, Christians and Mohammedans

to the number of 1,100,000 in 1905.. On the plain of Kossovo west of Prishtina is said to have occurred the historic battle (1389) be¬

tween the Serbians and Turks, after which de¬

feat Serbia lost her power.

KOSSUTH, kosh'ut, Francis, Hungarian

statesman : b. Budapest, 1841 ; d. there, 25 May 1914. The son of the famous Hungarian revo¬

lutionist, he was educated in London and Paris and became an engineer. Pie took part in the

construction of the Mont Cenis Tunnel and acted as managing engineer of a British coal¬

mining undertaking in the Romagna. He be¬

gan to take an active part in Hungarian politics after the restoration of the constitution, and in 1894 became titular head of the ((Party of 1848. 55 He took the oath of allegiance and was elected a deputy, leading the ultra-Nationalist opposition against five consecutive ministries.

His party gained a decisive victory in the elec¬

tion of 1905 and it was expected that Kossuth would be appointed Premier. Baron Fejervary, however, stepped into the post, but a National¬

ist ministry came into power in 1906 and Kos¬

suth became Minister of Commerce. The cabi¬

net fell in 1909. Though a man. of many ac¬

complishments, he was not a striking politician ; the inheritance of his name was alone respon¬

sible for his entry into public life.

KOSSUTH, kos-sooth' (Hung, kosh'ut),

Lajos (Louis), Hungarian patriot: b. Monok, Hungary, 19 Sept. 1802; d. Turin, Italy, 20

March 1894. He came of a family of noble rank and of the Protestant religion, studied and practised law, and in 1832 entered the Parlia¬

ment of Pesth as the deputy of absent mag¬

nates, becoming also editor of a newspaper which, owing to the stringent press laws, had to be circulated in manuscript. For persist¬

ing in publishing the Parliamentary debates he was condemned to four years' imprisonment, but was released in 1840 before the end of this period. In

1841 he became editor of the Pesth Journal, a paper that advocated very advanced views and in 1844 founded the na¬

tional league in opposition to the Viennese goverment. In 1847 he was elected to the Hungarian Diet by the National party and in 1848 became Minister of Finance in the Hun¬

garian government. His influence had much to do in bringing about the revolution which followed and in which he played the most prominent part, being appointed governor or dictator by his fellow-countrymen; but the intervention of Russia rendered all the ef¬

forts of the Magyars unavailing. He re¬

signed his position in favor of Gorgei (whom he accused of treachery), and in 1849 he found it necessary to take refuge in Turkey, wlhere he was kept as a prisoner. Being released in 1851

through the influence of Great Britain and the United States, he soon after visited both these countries and was received in the most enthu¬

siastic manner. He endeavored subsequently to induce Napoleon III as well as Victor Em¬

manuel to act against Austria in favor of Hun- *

garian independence, but without success.

Though by the amnesty of 1867 he might have returned to his native land he did not do so, but lived chiefly in Italy and was never fully reconciled to the union that had taken place be¬

tween Austria and Hungary. His (Memories of My Exile) appeared in English in 1880.

KOST, Frederick W., American painter:

b. New York, 1861. He studied at the National Academy of Design under William S. Macy and later at

Munich and Paris. He specializes on landscapes. In 1900 he received honorable men¬

tion from the Paris Exposition; a bronze medal, in 1901, from the Buffalo Exposition; silver medal, in 1904, from the Saint Louis Exposi¬

tion. In the New York Metropolitan Museum of Art is his (Frosty Morning5 ; his (Smith-

field Marshes, Staten Island,5 hangs in the Brooklyn Institute; (On the Saint John River, N. B.,5 is in the Philadelphia, Pa., Academy, KOSTER — KOSTOMAROV

533

„ etc. He is a member of the Society of Land¬

scape Painters, of the Brooklyn Society of Arts and Crafts, the Artists' Fund Society, the Soci¬

ety of American Artists, etc.

KOSTER, ke'ster, Hans, German dra¬

matic poet : b. Kritzow, 16 Aug. 1818 ; d. Lud-

wigslust, 6 Sept. 1900. He studied philosophy, traveled in Italy and France and then took up residence in Berlin. He moved later to Weimar and then to Villa Priorsberg, near Neuzelle, Brandenburg, for agricultural work. His dra¬

matic works treat mostly of historical events and show lively action and frequently capital Characteristics; the earlier ones obtained the approval of the critics but did not reach the stage. Later dramas of his, often performed, are (Ulrich von Hutten) (Breslau 1846) ; Her¬

mann der Cherusker) (Berlin 1861) ; (Der Grosse KurfiirsC (ib. 1851), etc. He also wrote the tales (Liebe und Leiden) (Breslau 1862) and (Erlebnisse und Gestattungen) (Ber¬

lin 1872). The publications entitled (Konig Wil¬

helm und sein Heer) (Berlin 1868) and (Kaiser und Reich) (ib. 1872) are collections of his pa¬

triotic poems. He also wrote biblical poetry such as and (Die BergpredigC (Biele¬

feld 1885). His Prusso-German sentiments, so forcibly expressed in a number of political pamphlets, were also made manifest in his speeches as member of the North German and later of the first German Reichstag.

KOSTER, Hans Ludwig Raimund von,

German admiral : b. Schwerin, 29 April 1844.

He studied at the Werder Gymnasium, Berlin, and was candidate for cadet in the navy (1859), being appointed to active service on the coast.

He was promoted to lieutenant before reaching his 20t*h birthday and made a cruise around the world (1878-80). He was chief of staff in the Admiralty (1884-87) and rear-admiral in 1889.

Till the end of 1893 he was director of the De¬

partment of Marine, and, until 1896, was in com¬

mand of the first squadron, then chief of the Baltic marine station. In 1899 he was in¬

spector-general of marine, in which capacity he commanded the squadrons of manoeuvre. In 1900 he was given the rank of 'hereditary noble and appointed to the command of the active battle fleet (1903). He was raised to the rank of great admiral in 1905, retiring from active service (1906) to devote his time to the advance of the (

ber of the Prussian House of Lords.

KOSTER, or COSTER, Samuel, Dutch

dramatist: b. Amsterdam, 16 Sept. 1579; d.

some time after 1662. He obtained his medical

diploma (1610) and practised as a physician at Amsterdam where he was director of the in¬

firmary till 1662. He founded, after Italian style (1617), tfhe Duytsche Academie. He is es¬

pecially noted for his delightful comedies (Tij-

sken van der Schilden) (1613) and (Teeuwis de boer) (1612), which show up his talents in drawing up a plot and giving color to the char¬

acters. He wrote tragedies, such as (Ithys) (1615) ; HphigemV (1617), a political satire, and Usabella,* after Ariosto, in conjunction with Hooft; also (Polyxena) (1619). His works are published in collective form, edited bv R- M.

Kollewyn (Haarlem 1883). Consult Rossing, who wrote his biography (Leyden 1875).

KOSTLIN, kest-len, Christian Reinhold,

German poet and criminologist: b. Tubingen, 29

Jan. 1813; d. there, 14 Sept. 1856. He practised law in Stuttgart (1836) but settled in Tubingen as private teacher {docent). He was writing, in the meanwhile, poems, also stories for the N ovellenzeitung , all under the name of C. Rein¬

hold, which were published collectively later (Bremen 1847-48). The success in his career as a jurist was established by his

fassung) (ib. 1839). He was given the degree of professor _ (1851). His most important works on criminal law in his later life are (Der Wendepunkt des deutschen Strafverfahrens im 19 JahrhunderH (Tubingen 1849) ;

wornen gerichte) (Leipzig 1851) ; (Geschichte des deutschen Strafrechts) (Tubingen 1859).

KOSTLIN, Julius, German Protestant the¬

ologian: b. Stuttgart, 17 May 1826; d. 12 May 1902. He traveled in England and Scotland (1849) and was appointed vicar at Stuttgart (1850), soon to become private instructor (Re -

petent) at the theological seminary at Tubingen.

He was given the appointment of professor of Theology at Gottingen (1855), Breslau (1860) and Halle (1870), and retired in 1896. He wrote, among other numerous works, (Luthers Lehre von der Kirche) (Stuttgart 1854) ; (Das Wesen der Kirche, beleuchtet nach Lehre und Geschichte des Neuen Testaments) (ib. 1854) ;

a very popular work (Leipzig 1882; 9th ed., 1891); (Der Glaube und seine Bedeutung fur Erkenntnis, Leben und Kirche) (Berlin 1895) ; (Ohristliche Ethik) (Berlin 1898). He was editor of Theologischen Studien und Kritiken from 1873. Consult (J- Kostlin, Autobiog¬

raphy (Danzig 1891).

KOSTLIN, Karl Reinhold, German theo¬

logian and aesthetic: b. Urach, 28 Sept. 1819; d. Tubingen, 12 April 1894. He studied philoso¬

phy and theology at Tubingen and Berlin but soon devoted himself solely to philosophy. He was given the degree of assistant professor (1857) and made professor of aesthetics and art history (1863). He wrote (Der Lehr-

begriff des Evangeliums und der Briefe Jo-

hannis) (Berlin 1843) ; (Der Ursprung der synoptischen Evangelien) (Tubingen 1853) ; (Goethes Faust, seine Kritiker und Ausleger) (Tubingen 1860) ; (Hegel in philosophischer, politischer und nationaler Beziekung) (Tubin¬

gen 1870) ;

gen 1889).

KOSTOMAROV, ko'sto-ma'rof, Nikolai

Ivanovitch, Russian historian: b. Ostrogosz, Government Veronezh, 1817; d. Saint Peters¬

burg, 19 April 1885. He studied in the Khar¬

kov and Moscow universities and entered a dragoon regiment (1836) but obtained his re¬

lease and was appointed teacher (docent) at the Kiev University (1846). He was dismissed the following year for his activities in Little 534

Russian literature, and joined his friends Szewczenko, Kulisz and Bitozerski in a secret literary society to resuscitate the Slavophile propaganda. His action caused his arrest and deportation to Saratow. After the death of Tsar Nikolas I he obtained permission to travel abroad, and was appointed (1859) professor of history at Saint Petersburg. On the closing of the university in consequence of a students riot (1861) he retired to take up literary work alone, assuming the no m- de- plume of Jeremija Halka. His poetic works were written in Lit¬

tle Russia vernacular and were published in Odessa (1875) in a collective issue, the dramas, (Sawa Czalyi* (1838) and (Ukrainskie bal-

lady> (1839), among them. In 1847 he was forbidden further publication of his works in Little Russian version and he then devoted him¬

self to historical research. Among his principal works are historical Monographs > (Saint Petersburg 1863-72, 12 vols.) ; history of the old Slavic republics, Novgorod and Iskov (1863) ; (Russian history in Biographies of her most important Personages> (Saint Petersburg 1873; translation by Henckel, Leipzig 1886-89).

Consult Pypin, (Nikolai Kostomarov* (in his¬

tory of Russian Ethnography,** Saint Peters¬

burg 1893).

KOSTROMA, Russia, a government

bounded on the north, east and south by the governments Vologda, Aiatka, Nizhni Nov¬

gorod and Vladimir, respectively, and on the west by Jaroslav. Its area is 32,432 square miles and its population, 1,745,800 in 1912, con-

sists chiefly of orthodox Russians with a sprinkling of Tartars and Cherimisses. From an agricultural standpoint this government be¬

longs to the so-called central-Russian indus¬

trial territory; its chief commerce is in lumber, but it has a considerable agricultural production of oats, rye, wheat and barley, and its flax industry is valuable, grown chiefly in the Ne-

rechta district. Its bee industry and fisheries, formerly important, have fallen off. Of its inconsiderable manufactures might be cited cot¬

ton goods and linen ware, leather products and brandy distilling.

KOSTROMA, kos'tro-ma', Russia, capital

of the government of the same name, situated at the confluence of the rivers Kostroma and Volga and on the Jaroslav-Kostroma Railway.

It has a monument erected to Ivan Sussanin with a bronze bust of Tsar Michael Feodoro-

witch, whom he saved (1613) from the Poles.

Here are no less than 38 churches, the 14th century, richly adorned cathedral of the As¬

sumption and the beautiful Bogojavlensky Church (18th century) among them; also two monasteries, a

gymnasium, a gymnasium for girls, a high school, priests' seminary, lady-

teachers' seminary and a theatre figure among the prominent public buildings. Among the commercial features are two banks, numerous manufactures, of linen especially, besides a con¬

siderable trade in salt and other products and its shipping. It is said to have been founded in 1152 by Juri Dolgouruky. Pop. 67,274.

KOSZTA (ko'sta) AFFAIR, a diplomatic

incident. A Hungarian refugee to the United States, named Martin Koszta, obtained his "declaration of intentions** or first citizenship papers in 1850. He visited Smyrna in 1853 and was seized by members of the crew of the Austrian brig Huzar on 21 June. Captain Ingraham, of the American war sloop Saint Louis, under instructions from the American Minister at Constantinople, demanded his re¬

lease. Hearing that the prisoner was to be transported secretly to Trieste, Captain Ingra¬

ham set a time limit to the surrender and made preparations to attack the Huzar on 2 July.

The prisoner was surrendered. The Austrian government issued to the European courts a note of protest against the American procedure.

Baron Hulsemann, Austrian Charge d'affaires at Washington, asked Secretary of State Marcy "to disavow the conduct of its agents . . .

hasten to call them to a severe account and tender to Austria a satisfaction proportionate to the magnitude of the outrage,** # claiming the arrested man to be an Austrian citizen and the action of Ingraham violative of international law. Marcy's reply, within a month, declared Koszta was not a citizen of Austria but "that Koszta, when seized and imprisoned, was in¬

vested with the nationality of the United States, and they therefore had the right, if they chose to exercise it, to extend their protection to him; that from international law — the only law which can rightfully be appealed to for rules in this case — Austria could receive no author¬

*ity to obstruct or interfere with the United States in the exercise of this right, in effecting the liberation of Koszta; and that Captain Ingraham's interposition for his release was, under the extraordinary circumstances of the case, right and proper.** The Congress passed a joint resolution of thanks to Captain In¬*

graham and invested him with a medal in com¬

memoration of his services. Consult Corre¬

spondence between the Secretary of State and the Charge d'Affaires of Austria relative to the Case of Martin Koszta (Washington 1853) ; Rhodes, J. F., (History of the United States from the Compromise of 1850* (New York 1910), this contains a bibliography of the controversy. See Ingraham, Duncan*

Nathaniel.

KOTLIAREVSKI, kot'lya-ref'ski, Ivan

Petrovitch, Russian poet : b. Poltava, 9 Sept.

1769; d. there, 10 Nov. 1838. He first entered state service but in 1796 joined the army, and was advanced, in the Turkish War, to captain of the staff. He undertook (1808) the man¬

agement of an educational establishment for the children of poor nobility at Poltava, and superintended (1827) the local poorhouse until 1835. He raised the Little Russia idiom to a literary language and thereby became the founder of Little Russia national literature.

His most important work is the travesty on Virgil's (2Eneid (Saint Petersburg 1798; last ed., 1890),*

which overflows with transcen¬

dent, sparkling humor and was intended to shake off the apathy that had lost the Cossacks their freedom and which chastised without mercy the crimes of the lower classes. On the other hand his dramatic pictures of customs display the moral capacity of the people in his plays, (Natalka Poltawka* ((Natalie of Pol¬

tava*) and (Moskal cariwnyk* ((The Soldier as Conjuror*). His entire works were published in Kiev (last ed., 1890).

KOTO, a Japanese musical instrument, hav¬

ing a long box. larger at one end than the other, and with a convex top over which 13 silk

strings are strung and fastened tightly at each end, each string having a bridge. To tune the instrument it is necessary to move the bridges.

The instrument is played with both hand-s like a harp.

KOTOTSHIKHIN, ko'to-she'kin, Gregory,

Russian writer: b. 1630; d. 1667. He was an official in the Ministry of Foreign Affairs under Tsar Alexis and was suddenly deposed on ac¬

count of a conflict with his superiors. He went to Poland (1664), then Prussia, then Stockholm, where he wrote a book concerning the internal condition of Muscovy (1666-67) for the Swed¬

ish Imperial Chancellor de la Gardie. He was tried and executed for murder soon after this, and his name forgotten. His memory was re¬

vived by the discovery (1838) of his interesting work, in the original manuscript, in the Upsala

University Library. Under the title (About Russia under the Rule of Alexis Michaelovitch'

it was published by the Imperial Russian Archse-

ographical Commission (last ed., 1884).

KOTOW, kd tow' or -to', a Chinese form of obeisance; a ceremony in which an inferior, kneeling, touches his forehead to the ground.

KOTZEBUE, kot'se-boo, Alexander von,

German painter: b. Konigsberg, 9 June 1815; d. Munich, 24 Feb. 1889. He studied art at the Saint Petersburg Academy under Sauer-

weid, and after six years went (1846) to Paris to continue his art cultivation. In 1848 he started on a tour of Belgium, Holland, Italy and Germany, settling at last in Munich. He painted numerous battle scenes of the Russians in the Seven Years' War and of the campaigns of Suvorov for the tsar. The most important are (Storming of Schliisselburg) ; (Battle of Poltava) ; (Storming of Narva' ; (Passage over the Devil's Bridget ' His pictures are note¬

worthy for distinctness of composition, care in details and exquisite color work.

KOTZEBUE, August Friedrich Ferdi¬

nand von, German dramatist and Russian offi¬

cial : b. Weimar, 3 May 1761; d. Mannheim, 23 March 1819. In 1781 he went to Saint Petersburg, where, obtaining the patronage of the empress, he was made governor of Esthonia and ennobled. About 1800 he returned to Ger¬

many, and attacked Goethe and other great German authors who had refused to associate with him. In 1806 he went again to Russia, and lived from 1807 on his estate, Schwartze, in Esthonia. In 1813, as counsellor of state, he followed the Russian

headquarters, con-

stantly writing to excite the nations against Napoleon. In 1817 he received a salary of 15,000 roubles, with directions to reside in Ger-

many and to report upon literature and public opinion. Kotzebue, who during the whole cam¬

paign had written in favor of the Russians, even at the expense of his native country, and had expressed the utmost contempt for liberal orincinles and institutions, was now odious in fhe eves of most of his countrymen and re¬

garded as a spy. This feeling was so strong in the case of a young enthusiast named Sand that he assassinated him as a traitor to liberty.

Kotzebue wrote more than 200 plays, a history of Germany and other wotks, most of which are now forgotten.

KOTZEBUE, Otto von, Russian naviga¬

tor ; second son of A. F. F. Kotzebue : b. Reval, 30 Dec. 1787; d. there, 15 Feb. 1846. In his 17th year he accompanied Krusenstern in his voyage round the world. »In 1815 he was ap¬

pointed to the command of the ship Rurik, destined to ascertain the practicability of a northeast passage in the direction of Bering Strait. He discovered several groups of islands in the Pacific, and a large sound on the southeast of Bering Strait, which now bears his name; and returned after a three years'

absence. The results of the voyage were pub¬

lished in a work called 'A Voyage of Discovery in the South Sea and to Bering's Strait in Search of a Northeast Passage' (1821-23). In 1823 he was commissioned by the Emperor Alexander to make a third voyage round the world. He returned in 1826, publishing the results of the voyage in a work which

has been of great importance to hydrography, particularly that of the Pacific, (A New Voyage Round the World' (1830).

KOUMISS. See Kumiss.

KOUROPATKIN, koo'ro-pat'kin, Alexei

Nikolayevitch, Russian soldier: b. 17/29

March 1848. He was trained for the army in •the Imperial Military College and the Academy of the General Staff ; was sent abroad to study military conditions in various European coun¬

tries ; in 1874 became a member of the general staff of the army; in 1876-77 assisted Skobeleit in the conquest of Khokand, Turkestan, and its reorganization as the territory of Ferghana, and in 1877-78 won high distinction in the Russo-Turkish War by his services at Plevna and the Chipka Pass. In 1878 he was made colonel and in 1878-79 was chief of the Asiatic bureau of the general staff. In 1880-81 he was in Middle Asia, where he commanded the main detachment against the Tekke-Turkomans, and, after a forced march of 600 miles across the desert, stormed Geok-Tepa, by which victory he won his greatest reputation. He was made major-general in 1882, lieutenant-general in 1890, governor of the Trans-Kaspian district and commander of the troops in that district in 1890, and Minister of War in 1898. In 1901

he became general of infantry. At the out¬

break of the hostilities with Japan he was sent to command the Russian forces in the Far East. After the battle, of Mukden he was superseded by General Linievitch, under whom he continued in service as commander of the First Manchurian army. His failure in the Far East was attributable, in part at least, to his position of subordination _ to the viceroy, and to dissensions among his generals. In October 1915 he was appointed chief of the Russian Grenadier Guards, and acted in an advisory capacity to the

tsar when the latter took up the chief command of the army during the Great European War in succession to the Grand Duke Nicholas. He was later com¬

mander-in-chief on the northern front, includ¬

ing the Riga-Dvinsk line, and in August 1916

was transferred to the governor-generalship of Turkestan. As a military writer he is favor¬

ably known bv several volumes, including (Kashgarie' (1879), for which he received the gold medal of the Imperial Russian Geograph¬

ical Society; 'The Operations of the Troops of General Skobeleff during the War of Russia with the Turks' (1885); (The Conquest of Turkomania' (1889); 'Russia for Russians: 536

the Past and Future Problems of the Russian Army0 (1910).

KOVALEVSKY, ko'va-lyef'ski, Alexander,

Russian embryologist: b. Dfinaburg, 7 Nov.

1840; d. there. 22 Nov. 1901. He studied in Heidelberg and Tubingen, and, after traveling, became professor at the Saint Petersburg Uni¬

versity and member of the Academy of Science.

He rendered useful service by his researches into the formation of the ascidians (1866-71) and the Amphions (1867) and evolved the first acceptable hypothesis of the relationship be¬

tween vertebrates and invertebrates. He did similar research work effectively on nearly all branches of the animal kingdom; among them was his useful work on the anatomy of the Balanoglossus (1866), on the formation of the Ctenophora coelenterates (1865), the em¬

bryology of worms and arthropods (1871).

Other work concerned the organs of secretion and lymphcysts of the vertebrates ; brachiopods and coelenterates (1874). He wrote (Entwicke-

lungsgeschichte des Amphioxus lanceolatus'

(1877) ; ^celoplana metschnikoviP (1882); (Entwickelung der Musciden* (1887) ;

(Anatomie de l'Archoeobdella esmontiP (1896) ; (Anatomie de l'Acanthobdella peledina) (1896).

KOVALEVSKY, Sophie, Russian mathe¬

matician and writer: b. Moscow, 15 Jan. 1850; d. Stockholm, 10 Feb. 1891. She wrote much under the name ^Sonia.® She received her early education through her father, a general of artillery, then studied mathematics at Heidel¬

berg (1869) after a sham wedding ceremony to legalize her as a college student. She next studied in Berlin (1871-74) under the private tuition of Weierstrass, her sex not being ad¬

mitted to the university. Her thesis (Zur Theorie der partiellen DifferentialgleichungeiP

gained her a degree at Gottingen. Beside her thesis she wrote two no less important pam¬

phlets (Ueber die Reduktion einer Klasse Abelscher Integrale dritten grades in elliptische Integrale) and (Zusatze und Bemerkungen zu Laplaces Untersuchungen fiber die Gestalt des Saturnringes) (both published in Acta Mathe-

matica, 1884). She returned to Russia, thence to Paris (1878), and, becoming widowed through her husband's suicide, she went to Berlin (1883). In 1884 she was appointed pro¬

fessor of the higher analysis at Stockholm.

Other works of hers are (Ueber die Brechung des Lichtes in kristallinischen MitteP (in Acta Mathematica, 1885) ; (Ueber den besondern Fall des Problems der Rotation eines schweren Korpers um einen festen PunkP (ib. 1889), for which she received the Bordin prize of the Paris Academy, raised from 3,000 to 5,000

francs for the extraordinary production. In the realm of light literature she wrote such works as (Der PrivatdozentC a description of German university life; (Die Schwestern RajewskU an account of her own childhood; (Die Nihilisten) (Vienna 1896), etc. Her sketches from Russian life appear collectively in Literaturnyja socinenija (Saint Petersburg 1893). Consult (Jugenderrinnerungen) (Berlin 1896) ; Leffler, Anna, ^onja Kovalevsky) (Stockholm 1892), and the necrology of Mittag-

Leffler in Acta Mathematica (Vol. XVI).

KOVNO, Lithuania, the government of this name is bounded on the north by Courland, on the east and south by Vilna and Suvalky and on the west by Prussia. It has an area of 15, 518 square miles, mostly flat lands and small lakes and watered by the rivers Niemen, Vilija and Sventa, Nevjasha, Dubessa, etc., of which all but the last are navigable. The climate is relatively mild. Its inhabitants, 1,819,540 in 1912, are about three-quarters Lithuanians, the Jews 14 per cent, Slavs over 9 per cent and Germans nearly 3 per cent. Agriculture is the chief branch of industry but there is an im¬

proving cattle breeding industry and its growth of wheat, rye and other grains, as well as potatoes, is sufficient to permit a considerable export.

KOWLOON, or KAULUN, a district in

China, forming a peninsula at the mouth of the Canton River. A concession four miles square was granted to the British in 1860, and augmented by 376 square miles in 1898. The town is a free port, and the European section is fast growing. Pop. 85,000.

KOYUNJIK, koo-yoon-jek', or KUYUN-

JIK. See Nineveh.

KRAAL, krai, a South African word used to designate a native village whose huts are surrounded and protected by a circular hedge or stockade. The word may be derived from an African source, but is probablv taken from the Spanish corral or the Portuguese curral, a cattle pen or fold. Hence the term is used to define the folds or enclosures built for the pro¬

tection of cattle.

KRAFFT-EBING, kraft-a'bmg, Richard,

Baron von, German neurologist : b. Mannheim, 14 Aug. 1840; d. Mariengrfin, near Graz, 22

Dec. 1902. He studied at Heidelberg, Zfirich, Vienna and Prague and was appointed (1864) assistant physician in the lunatic asylum at Illenau. He went to Heidelberg to study psychology (1868) and then settled at Baden-

Baden as nerve specialist. After the Franco-

Prussian War, in which he was army physician, he directed an electro-therapeutical establish¬

ment at Baden-Baden. In 1872 he went to Strassburg as assistant professor of psychiatry and director of the Clinic of Psychiatry, but, in the following year became professor of psychiatry, director of the national insane asylum at Feldhoff, and practised at Graz.

In 1886 he was appointed professor of psychiatry and neurology at the enlarged Graz clinic. He founded a private sanatorium at Mariengrfin, but went to Vienna (1889) as professor of psychiatry and nervous diseases.

In 1902 he returned to Graz. His

gart 1879—80 ; 7th ed., 1903) and his (LehrbuCh der gerichtlichen Psychopathologies (ib. 1875; 3d ed., J900) determined the place of psychiatry in clinical science. In neurology also he did great service by his work on epilepsy, hemi-

crania, paralysis agitans, etc. He also wrote (Grundzfige der KriminalpsychologieS (Stutt¬

gart, 1872) ; (Ueber gesunde und kranke NervenS (5th ed., Tfibingen 1903) ; (Psycho-

pathia sexualis> _ (Stuttgart 1886; 12th ed., 1903) was translated into seven languages; (Hypno-

tische Experimental (ib. ; 2d ed., 1892); (Die progressive allgemeine Paralyse, > in Nothnagel's Pathologie und Therapie (Vienna 1894, Vol IX), etc,

KRAFT, kraft, Adam, German sculptor: b.

Nuremberg, 1440; d. Schwabach, Bavaria, 1507.

Nothing is known of his teachers, his student travels or his fortunes. His known productions begin with the seven reliefs (Stations of the Cross) set up in Nuremberg (1490) near the en¬

trance of Saint John's Church; these are now in the German Museum, their original place being taken by sandstone copies. He executed many sepulchral monuments ; in the dhurch of Saint Sebaldus is the statue he made for Sebald Schreyer (1492). In the choir of the same church is his bas-relief of three scenes from the Passion, the figures being life-size. He also carved the monument for the Pergerstorff family in the Frauenkirche (church of Saint Mary the Virgin) ; that for the Landauer family in a chapel of the church of Saint Higidius. His last work was the (Entombment,) a group of 15 life-size figures in the mortuary chapel of the Holzschuherschen family, a part of the church of

Saint John (1507). He also executed several works of minor importance, as decorations of private and public buildings.

His masterpiece is the tabernacle in the church of Saint Lawrence, which he took seven years (1493-1500) in completing. It is more than 50

feet high, and is an example of gorgeous Gothic carving enriched with numerous figures.

At the foot he has placed his own portrait, life-

size. His style is bold and vigorous, his con¬

ceptions are profoundly religious, and his power of lifelike characterization is wonderful. He is the finest exponent of the Nuremberg school of Gothic sculpture.

KRAGUYEVATS, kra-gu'ya-vats, Serbia,

a district town on the river Lepenitsa and the Lapovo-Kraguyevats State Railway. It is in the fertile Sumadia plain and has a gymnasium, cannon foundry, munitions and small-arms fac¬

tory as well as an arsenal. It was built in 1431

and restored in 1860 by Count Milosh Obreno-

witch, when it was the seat of government, and had a population of 18,452 in 1910.

KRAIT, krit, one of the most dreaded of Oriental poisonous snakes (Bungarus • cooru-

leus), nearly related to the cobras. It inhabits nearly all India and Ceylon, is very common in Bengal and southern India, and causes more deaths than any other snake, since in its pur¬

suit of rats, lizards and snakes, it frequently enters camps and village houses; furthermore, its venom is astonishingly rapid in its effects.

It reaches a length of four feet, has smooth scales,

a ridge along the spine, no hood, and is bluish or brownish black with highly variable bars and markings of yellow and white. Other deadly species of the same genus of bungars or rock-snakes are the larger raj-samp or «king-

snake» (B. fasciatus), noted for its active kill¬

ing of cobras and other snakes; and other species in Ceylon and the Indo-Chinese region.

Consult Ewart, (Poisonous Snakes of India*

(London 1878); Fayrer, XVI, Bombay 1906) ; the Proceedings* of the Zoological Society of London for 1899.

KRAKATOA, kra'ka-to'a, a volcanic island in Sunda Strait, between Sumatra and Java; area, six square miles, formerly about 12 square miles. The island, now uninhabited, is known as having been the scene of a terrific volcanic eruption on the night of 26-27 Aug. 1883. The volcano had been practically inactive for over 200 years until May of 1883, when there were indications of an eruption, which culminated at the date mentioned. A number of explosions occurred, the noise of which was heard for many miles. A mass of rock, in the form of dust, ashes and small stones, and of the volume of about a cubic mile, was thrown up for a considerable distance. The dust was projected, vertically, nearly 20 miles, and distributed to all parts of the globe by the upper air currents.

The effect, especially as shown in brilliant sun¬

rises and sunsets, was visible for many months.

The disturbance created a series of extensive sea-waves which swept over the shores of Java and Sumatra, destroying many villages and causing the loss of more than 30,000 people.

The wave-motion was observed in South

America. About one-half of the island was destroyed,

including the highest mountain.

One immediate effect was the darkness which alarmed many people, and which made 27 Aug.

1883 known as one of the dark days.

KRAKEN, kra'- or kra'ken, the term, of Norwegian origin, applied to a fabulous sea-

monster, generally assumed to be a gigantic squid (q.v.). It was first described by Pontop-

pidan, bishop of Bergen in Norway, but other old writers have accounts of substantially the same kind of monster. It is described as of enormous size ; rising from the sea like an island about 1J4 miles in circumference, with enormous mast-like arms with which it wrecked ships, created whirlpools, and realized all that was prodigious and strange in size, habits and appearance. The kraken stories led to a similar creation by Victor Hugo in his (Toilers of the Sea, which, considered zoologically, is almost as far from possible truth as was that of old Pontoppidan.*

KRAMBAMBULI, kram-bam'boo-le, a

Slavic term referring originally to Danzig cherry brandy, concerning which Wittekind (1745) wrote a students' drinking song of last¬

ing and widespread popularity in the colleges.

The term has come to define any spirituous drinks at this day.

KRANACH, Lucas. See Cranach.

KRASICKI, kra-shik-ske, Ignacy, Count,

Polish poet and writer : b. Dubiecko, 3 Feb.

1735; d. Berlin, 14 March 1801. He was edu¬

cated at Lemberg and studied at Rome (1760-

61). He was appointed Fiirstbischof of Ermeland and lived, alternately, at Heilsberg and Warsaw. Becoming a favorite of Frederick the Great at Sansouci, he was appointed arch¬

bishop of Gnesen (1795). His (Fabeln* and (Satiren* (Warsaw 1779) display irrepressible humor and finished form. The mock heroic poem (Myszeis* (Warsaw 1778) was trans¬

lated into the German and French as (Die Mauseade* (ib. 1790), and (La Souriade*

(Vilna 1817), respectively, and concerns the legend of King Popiel who was eaten up by mice, and contains allusions to the contem¬

porary political conditions. His (Monac.ho-

machia* (Monks' War), published in 1778, chastises the idleness, lack of learning and.

drunkenness of certain monastic orders; while his (Anti-monachomachia* (1780), under the appearance of attempting to soften the rage 538

brought about by his first work, simply flays in stronger measure. Among his numerous prose works were (Mikol Doswiadczynskis) (1775), and (Pan Podstoli> (1778). His col¬

lective works were edited by Dmochowski (Warsaw 1803-04) ; later extended editions were published in Berlin (1845) and Warsaw (1878). His biography, written by Ignacy Krasewski, was published under the title (Zycie i dziela) (Warsaw 1879).

KRASINSKI, kra'she'ny'-ske, Zygmunt,

Count, Polish poet: b. Paris, 19 Feb. 1812; d.

there, 23 Feb. 1859. Son of a general, he was educated at the paternal home, which was a rendezvous for Polish authors and poets, under the

tuition of Korzeniovski, an author. In his 14th year he wrote several historical romances in Sir Walter Scott's style. He en¬

tered the Warsaw Lyceum (1826), then studied law at the university (1828) but left Poland (1829) on account of the animosities against his father and which he inherited. He traveled through Italy and Switzerland and became acquainted (1830) with Mickiewicz (q.v.) who led him into writing poetry. Along with Mickiewicz and Slowacki he was one of the most notable poets of recent Polish literature.

His poems were published under the noms-de-

plume Konst, Gaszynski, Spiridion Prawdzicki, Ligenza and Mielikowski. First appeared the poetic stories (Agay Han) (Breslau 1833) ; then came dramatic poems (Nieboska Komedya>

(Paris 1834) ; the (Undivine Comedy, > in which the writer attempts to solve the greatest prob¬

lems in the political and social spheres. His chief work,

tween the spoiled Rome of the Caesars and the vengeance planned by enslaved Hellas, described in most glowing colors, allegorical of the suf¬

fering Poland. In his

(Psalms of the Future > (1845-48), glorifies the heroism of martyrdom and brought forth hot opposition, some terming the work <(lyric cowardice,® and by it he lost the friendship of Slowacki. His works have all been translated into the German and a selection, in three volumes, appeared (Leipzig 1863), the most comprehensive, in four volumes (Lemberg 1880-88). Consult Tarnowski, (Zygmunt

KrasinskP (Cracow 1892) ; Endler, Anna, (Sigismondo KrasinskP (in Nuova Antoiogia, 5th series, Rome 1913). His letters were pub¬

lished (Lemberg 1882-90) in four volumes.

See Iridion.

KRASNIK, kras'nik, Poland, a town

in the province of Lublin_ and contain¬

ing an ancient castle.. It had a population in 1910 of 9,178. In the World War this was the scene of a prolonged battle in which the Austrians attempting to force their way to Lublin were at first successful but the Russians, reinforced, drove them back into Galicia.

KRASNOYARSK, kras'no-yarsk', capital

city of the circuit of same name in the Russo-

Siberian government Yeniseisk, located on the Yenisei and on the Trans-Siberian Railway.

The name means red- cliff, derived from the quality of the marly soil of the river's banks.

It is the seat of the governor and iU manufac¬

tures consist of 1 trick kilns, tannery, soap-

works, iron foundry, etc., while its trade is in grain and supplies for the gold washeries of the neighborhood. Pop. 80,102.

KRASNOYE SELO, kras'no-ye sa-lo,

Russia, a summer resort in the government of Petrograd, at the foot of the Duderhoff Mountain and situated on the Ligovka River and the Petrograd-Riga Railway. It con¬

tains an Imperial palace and park, a. church erected by Catherine II and 3,741 inhabit I./'" in 1912. The yearly manoeuvres of the Imperial Guard were held here and it was their summer camp.

KRASZEWSKI, kra-shef'ske, Josef Ig¬

nacy, Polish novelist, dramatist and historian : b. Warsaw, 28 July 1812; d. Geneva, 19 March 1887. He was educated in Biala, Lublin and Swisloch and studied history, literature and languages at Vilna University. He was im¬

prisoned (1831-33) for participating in the Polish insurrection, after which he returned to his family estate Dolhe, government Grodno, and rented (1837) the Omelno estate in Volhynia. He went to Schitomir (1853) where he filled several honorary positions, then went to Warsaw (1860) as editor of the Gazeta codzienna. Being exiled, for participating in the rebellion, he went to Dresden (1863), be¬

coming a naturalized citizen (1876). In 1884

he was sentenced, at Leipzig, to three and a half years' imprisonment for high treason, but was permitted six months' absence (1885) to re¬

cover his health. He traveled to Switzerland and Italy but never returned. At Cracow he was banished and died at Geneva. He was the most prolific of Polish writers, entering every branch of literature in prose and poetry, but his most substantial success lay in his romances.

His stories, that have made up a total of 400

volumes, may be divided into two categories ; up to 1863 dealing with social matters, then entering the realm of politics. Of his first works (Pan Walery> (Vilna 1831) and a few following the world1 took little notice, but his novel (Poeta i swiat> — the Poet and the World (Posen 1839) made him the pet of the Polish public. To the novels of the first period be¬

long (Ulana> (Vilna 1843) ;

1852) ; (Chata za _wsia) (Saint Petersburg 1854-55). His political novels, written under the pseudonym Boleslavita, include (Dziecie, starego miasta,> attractively relates the prep¬

arations that were made for the 1863 insur¬

rection; (The Spy) was translated into German as (Der Spion> (Dresden 1864) as were also (The Pair) ;

turP (1874— 75), and (ResurrecturP (1876), both translated into German in Reclam's Universal-Bibliothek. Of his poetical works should be mentioned (Anafielas) (Vilna 1843-

45), concerning the ancient history of Lithuania, and (Hymny bolescP (Paris 1857). Most im¬

portant of his dramatical works are the comedy (Mjod KasztelanskP (Kief 1860) and the his¬

torical drama (Trzeci maja* (Cracow 1876).

His literary-historical dissertations were is¬

sued collectively, in part, as (Studja literackie>

(Vilna 1842) and (Nowe studja literacki) (Warsaw 1843). Of his histories must be cited his (History of Vilna) (1750) ;

(Warsaw 1847-50), concerning ancient monu¬

ments of Lithuania. Besides which he wrote many philosophical, aesthetic art and archaeo¬

logical treatises. Consult Bohdanowicz, (J- I.

von Kraszewski in seinem Wirken und seine WerkeiP (Leipzig 1879).

KRAUSE, krou'ze, Ernst Ludwig, Ger¬

man writer: b. Zielenzig, 22 Nov. 1839; d. 1903.

He studied pharmacy, but after passing the state examinations he turned to the study of natural history and the history of civilization.

He settled in Berlin (1886) and advanced the new Darwinian theory of life, especially through his connection with Darwin and Haeckel in the publication of the monthly journal Kosmos (Leipzig 1877-82). He wrote numerous articles to the newspapers and periodicals that raised deep interest and caused deeper research, as did that concerning the color sense of primitive peoples. His historical studies led him to the recognition that Charles Darwin's grandfather, Erasmus Darwin, the English physician and poet, originated the theory of the descent of man. He wrote under the pseudonym Carus Sterne. Among his more important works are

geschichte des Naturganzen) (Berlin 1876; 6th ed., 1905) ; (Sommerblumen) (Leipzig 1884) ; (Herbst und Winterblumen) (ib. 1885) ; (Die Krone der Schopfung) (Teschen 1884) ; (Ch.

Darwin und sein Verhaltniss zu Deutschland*

(Leipzig 1885) ; (Die allgemeine Weltan¬

schauung in ihrer historischen Entwickelung*

(Stuttgart 1889) ; (Natur und Kunst) (Berlin 1891) ; (Die Trojaburgen Nordeuropas* (Glo-

gau 1893) ; (Die nordische Herkunft der Tro-

jasage* (ib. 1893) ; (Geschichte der biologischen Wissenschaft in 19ten Jahrhundert* (Berlin 1901).

KRAUSE, Karl Christian Friedrich, Ger¬

man philosopher and writer : b. Eisenberg, 6

May 1781 ; d. Munich, 27 Sept. 1832. He studied philosophy at Jena under Fichte and Sdhelling and took his degree (1802) as private teacher (docent), becoming instructor at the Dresden Academy of Engineering (1805). He returned to Berlin (1814) after Fichte's death, but settled in Gottingen (1824), as private teacher without gaining the professorial degree. Tn 1831 he removed to Munich but without accomplishing his desire of a

professorship. He was a prolific writer as he had to care for a large family. He was the originator of a philosophical system all his own, which he differentiated from that of the Schelling-Hegel Pantheismus (all-God doc¬

trine) with the name Panentheismus (all-in-God doctrine) and defined as the union of Absolu¬

tism, of Schelling-Hegel, with the Subjectivism, of Kant-Fichte. He contended that the duty of man was to combine in one single union (Bund) composed of an organism of branch unions, each member and branch belonging, fully and harmoniously, a part of the living whole. He hoped to gain advance in his propa¬

ganda by joining the Freemasons (1805), in which organization he thought he saw certain fundamental social features coinciding with his theories, and he wrote a number of articles on Freemasonry, but his expressed theories brought him into contest with the fraternity and he was expelled (1810). Among his followers were, Ahrens, Leonhardi, Lindemann, Roeder, etc., who spread the philosophical tenets through Belgium, Spain and South America. Foremost of his published works are (Abriss des Sys¬

tems der Logik als philosophischer Wissen-

schafC (Gottingen 1828) ; (Vorlesungen fiber das System der Philosophy (ib. 1828) ; (Abriss des Systems der Philosophic des Rechts) (ib. 1828) ; (Vorlesungen fiber die Grund-

wahrheiten der Wissenschaft (ib. 1829).*

Since his death a large mass of his unpub¬

lished manuscripts have been issued in numer¬

ous volumes by Leonhardi, Leutbecher and others (Gottingen 1834-48), by Roder (Sys¬

tem der Rechtsphilosophie, Leipzig 1874) and more recently by Hohlfelts. Consult Hohfeld, (Die Krausesche Philosophy (Jena 1879) ; Procksch, (Karl*

Christian Friedrich Krause, ein Lebensbild nach seinen BriefeiP (Leipzig 1880) ; Eucken, (Zur Errinnerung an Krause>

(ib. 1881) ; Martin, (Chr. F. Krauses Leben, Lehre und Bedeutung* (ib. 1881) ; Leonhardi, (K. Chr. Friedr. Krauses Leben und Lehre>

(ib. 1902), and (K. Chr. F. Krause als philos¬

ophischer Denker gewfirdigkeit* (ib. 1905) ; Kohler, Per Philosoph Krause als Geograph *

(ib. 1904).

KRAUTH, krouth, Charles Porterfield,

American Lutheran theologian : b. Martins-

burg, Va., 17 March 1823; d. Philadelphia, 2

Jan. 1883. He was graduated (1839) at Penn¬

sylvania College and was given charge (1841) of a Baltimore mission, fife served congrega¬

tions (1842-55) at Baltimore, Martinsburg and Winchester, Va. He was appointed minister (1855) of the Pittsburgh First Lutheran Church and (1859) at the Philadelphia Saint Mark's Church. He became editor of The Lutheran. He composed the ^Fundamental

Articles of Faith and Church Polity** (1866) which was adopted at the Reading Convention, as basis of the General Council of the Evan¬

gelical Lutheran Church in North America, also the ^Constitution for Congregations**

(1880) adopted by the General Council. He was for 10 years president of the council. He was elected a trustee of the University of Pennsylvania and (1868) professor there of mental and moral philosophy, and undertook the department of history there in 1881. He was a member of the American Committee for the revision of the English version of the Bible.

He wrote (The Conservative Reformation and its Theology* (1872) ; translations of Tholuck's commentary on the gospel of Saint John (Phila¬

delphia 1859) ; of the Augsburg Confession, with introduction and annotations (1868). He edited a new edition of Berkeley's Principles of Human Knowledge) (1874). Consult Spaeth, A., (Charles Porterfield Krauth) (New York I898) ; Schmucker, B. M., in Lutheran Church Review, July 1883.

KREATINE, or CREATINE, methylgly-

cocyamin methylguanadinaceticacid, C4H9N3O2 or NH2

NH=C

N(CH3). CH2. COOH

An organic substance found in the muscular fibre of all vertebrates, it is present also in the 540

brain, urine, blood and in meat-extract. It occurs synthetically in combining sarcosine with cyanamide, and forms colorless and odorless crystals with one molecule water of crystalliza¬

tion, tastes slightly bitter and is water soluble barely in alcohol. Its reaction is neutral, pro¬

ducing with acids unstable salts and creates : with the action of baryta water on bones, uric acid and sarcosine; with oxide of quicksilver methylguaridine and oxalic acid, with weak acid solutions kreatinine (q.v.).

KREATININE, or CREATININE,

methylglycocyamidin, C4H7N3O or

NH— CO

NH=C

N(CH3). ch2

This organic substance is found in urine. It forms colorless and odorless crystals, is slightly soluble in water and alcohol, tastes ammoniacal, has strong alkaline reaction. It forms crystallizable salts and is transformed by basic action easily back to kreatine (q.v.)^ It was formerly held as very valuable for nourish¬

ing qualities on account of its nitrogenous com¬

position, but it is known now it belongs to the waste of the organs and, with slight changes, passes into the excreta.

KREFELD, kra'feld, or CREFELD,

Prussia, a town in the government of Diissel-

dorf, 12 miles northwest of the town of Diissel-

dorf, about four miles west of the Rhine and 35 miles northwest of Cologne. It consists of straight, spacious streets and well-built houses ; is the seat of several courts and public offices ; contains churches for Roman Catholics, Old Catholics, Protestants, Mennonites and Jews; a royal textile college, gymnasia, a monument of Moltke erected in 1897, hospitals, etc. ; and is the principal locality in Prussia for the manu¬

facture of silk and mixed silk goods, which was introduced by refugees from Juliers and Berg in the 17th and 18th centuries. The number of factories producing silk goods is about 120, exclusive of nearly 50 silk-dyeing works. The town also contains railroad shops, boiler-works, machine-shops, iron-foundries, chemical works, distilleries, sugar-refineries, soap-works, tan¬

neries, paper-mills, etc. Krefeld dates from 1166: it came into the possession of Prussia in 1702 ; it was occupied by the French during the Napoleonic ascendency. During the Great European War 1914-18, in common with other Rhenish towns its war industrial works were frequently bombarded by Allied aviators. Pop.

129,400.

KREHBIEL, kra'bel, Henry Edward,

American musical critic : b. Ann Arbor, Mich., 10 March 1854. He was musical critic on the Cincinnati Gazette (1874-80) and the New York Tribune since 1880. His published works include (The Technics of Violin Playing>

(1880); (How to listen to Music* (1896); (Studies in the Wagnerian Drama) (1891); (The Philharmonic Society of New York: a MemoriaP (1892) ; (Music and Manners in the Classical Period) (1898) ; (Music of the Modern World) (1897) ; (How to Listen to Music) (1896) ; 'Chapters of Opera* (1908) ; 'The Pianoforte and its Music) (1910) ; (Afro-

American Folk-Songs) (1913) ; (A Book of Operas) (1909). He also edited an Annotated Bibliography of Fine Art* (1897). He was American editor of the new edition of Groves'

dictionary of Music and Musicians' (1904-

10).

KREIL, kril, Karl, Austrian meteorolo¬

gist and astronomer: b. Ried, 4 Nov. 1798; d.

Vienna, 21 Dec. 1862. He studied law and astronomy, and was appointed (1827) assistant at the Vienna Observatory, then acted suc¬

cessively at the Milan (1831) and the Prague observatories (1845). He became (1851) di¬

rector of the Central Institute of Meteorology and the Earth's Magnetism, Vienna. Numerous magnetic and geographical observations were made by him, and he improved the magnetic instruments as well . as constructing a series of automatic registering instruments. He wrote 'Cenni storici e teoretici sulle comete* (Milan 1832) ; 'Versuch, den Einfluss des Mondes auf den atmospharischen Zustand unsrer

Erde zu erkennen* (Prague 1841), establishing by his researches that the moon had little, if any, in¬

fluence on the earth's magnetism; 'Ueber die Natur und Bewegung der Kometen* (ib.

1843). He published Astronomisch-meteoroT

ogische Jahrbuch fiir Prag (Prague 1842-45) and the Jahrbiicher der Zentralanstalt fiir Meteor oligie und Erdmaqnetismus (from

1849 on).

KREITTMAYR, krit'mir, Wigulaus Xavier

Aloys, Baron von, Bavarian jurist and states¬

man: b. Munich, 14 Dec. 1705; d. 27 Oct. 1790.

He practised law in Wetzlar in the Supreme Court and was made Aulic councillor (1725) at Munich. He was appointed judge-lateral of the Court of Justice, Bavarian Palatinate, of the Imperial Vice-Regency (1741) and was created (1745) a baron of the empire. He became chancellor of the Aulic Council and privy councillor, to be promoted (1749) vice-council¬

lor of the Privy Council and a Minister of the Cabinet, in which position he died. The most important branches of Bavarian law were codi¬

fied by him in such works as 'Codex juris bavarici criminalis) (Munich 1751) ; 'Codex juris bavarici iudiciarii* (ib. 1753) ; Codex Maximilianus bavaricus civilis* (ib. 1756).

These were followed and enhanced by ((Annota¬

tions" to each part (1752-68). He also wrote (Grundriss der allgemeinen deutschen und bayrischen Staatsrechts* (Munich 1770). In 1845 a monument was erected to his memory.

His biography was written by J. A. Kalb (Munich 1825). Consult Bechmann, A., (Der kurbayrischer

Kanzler Alois Freiherr von Kreittmayr* (Munich 1896).

KRELING, kra'lmg, August von, German

sculptor and painter : b. Osnabriick, 23 May 1819; d. Nuremberg, 23 April 1876. He studied at the Hanover Polytechnic, and, at the age of 17, was a pupil of Schwanthaler at Munich, but soon devoted himself to painting. His first im¬

portant work was the ceiling decoration at the Hanover Court Theatre. In 1853 he was ap¬

pointed to reorganize the Nuremberg school of art, during which work he painted the Corona¬

tion of Ludwig of Bavaria in the Maximilian-

eum at Munich, and drew the cartoons for the pictures of German emperors, as well as a cycle of pictures from the traditions of Karl der Grosse. For his great service in advancing the arts and crafts he was honored with civil Order of Merit. He modeled the colossal bronze statues of Prince Heinrich of Reuss, at Gera, KRELL — KREMSIER

and of Kepler, at Weil, and a great fountain which was presented to Cincinnati by Mr. Pro-

basco.

KRELL, or CRELL, Nikolaus, Saxon

chancellor and anti-Lutheran reformer: b. Leip¬

zig, about 1551 ; d. 9 Oct. 1601. He studied law and was appointed Aulic councillor at Dresden and secretary to the Elector Christian, who, on his accession to the throne (1586), made him privy councillor and (1589) chancellor. His opposition to the orthodox Lutheran Church and leaning toward Calvinism brought the hatred of the citizens and members of the court.

By his introduction of a new catechism and edition of the Bible with his Calvinistic glossary he brought about his downfall when Friedrich Wilhelm von Weimar succeeded the deceased Christian. Involved in the meshes of law he was imprisoned and after much litigation be¬

tween the higher powers of the different states he was finally condemned to death and was beheaded at Dresden. Consult Richard, (Der Kurfiirstliche sachsische Kanzler Nikolaus CrelP (Dresden 1859) ; Brandes, (Der Kranzler Crell, ein Opfer des Orthodoxismus) (Leipzig 1873).

KREMENETZ, krem'ye-nyets, Russia, a

district town in the government of Volhynia, situated on the Ikva River and a branch of the South-West Railway. It has six churches, is the seat of the chief magistracy of the Radzivilou customs division. Above the town on a sandstone cliff are the ruins of an ancient castle. The town dates back to the 8th century, belonging formerly to the principality Vladimir but was included in Poland; it was fortified by Sigismond I but was captured (1648) by a small body of Cossacks in revenge for persecu¬

tion on account of their fidelity to Poland. It is a very fertile district. Its population is about 18,752 with about one-third Jews.

KREMENTCHUG, krem'en-choog', Rus¬

sia, district town in the government of Poltava, situated on the Dnieper River and junction of two railways. It has an iron railway bridge, nine Greek-Catholic churches, three churches of sectarians, a Lutheran prayer house, three synagogues, a high school, girls' progymnasium, several banks ; also numerous manufactures as sawrmills, tobacco factories, etc. It does con¬

siderable trade in grain and wood and holds four annual markets. The town was founded 1571 and was, from 1765-89, the capital of New Russia. It has a

suburb across the river called Krukow. Together they had about 98,652

inhabitants, of whom nearly half were Jews.

KREMERS, kre'merz, Edward, American

pharmacist : b. Milwaukee, Wis., 23 Feb. 1865.

He studied at the University of Wisconsin, re¬

ceiving the degree Ph.G. (1886) and B.S.

(1888), and Ph.D. at the Gottingen University (1890). He was appointed instructor of phar¬

macy at the University of Wisconsin (1890-92), professor of pharmaceutical chemistry and director of a course in pharmacy from 1892, and director of the Pharmaceutical Experiment Station from 1913. He was editor of the Phar¬

maceutical Review (1896-1909), scientific editor of the Midland Druggist and Pharmaceutical Review (1909-10), coeditor Standard National Dispensary , etc. In collaboration with Gilde-

meister and Hoffmann, he compiled (The Volatile Oils > (1900 ; 2d ed., 1913).

KREMLIN, a Russian citadel, especially

the citadel of Moscow (q.v.). It lies in the centre of the city, and contains the royal edifices and churches, particularly the residence of the emperor.

KREMNITZ, Marie (Mite), German

author: b. Greifswald, 4 Jan. 1852. She .mar¬

ried and moved to Bucharest (1875), where she became acquainted with the Rumanian queen (Carmen Sylva). She removed to Berlin

(1897) and settled there. In collaboration with Carmen Sylva she published the (Rumanischen Dichtungen> (3d ed., translation Bonn 1889), and under the pseudonym Dito und Idem the following novels: (Aus zwei Welten) (Leipzig 1884 ; 7th ed., Bonn 1901) ; (Astra) (Bonn 1886 ; 6th ed., 1903); (Feldpost) (ib. 1887); and the tragedy (Anna Boleyn)

(ib. 1886) ; also (In der Irre) (ib. 1888), and (Rache, und andre Novellen) (ib. 1889) , stories. Individually she wrote (Rumanische ,Skizzen) (Bucharest 1877) ; (Rumanische MarcheiP (Leipzig 1882) ; (Carmen Sylva ein Lebensbild) (Breslau 1882) ; an extensive biography, (Carmen Sylva J (Leip¬

zig 1903). She also wrote the novel (Ausge-

wanderte> (Bonn 1890), and the stories (Elina: Zwischen Kirche undPastoraD (Breslau 1895) ;

1901) ; (Mann und Weib) (ib. 1902) ; (Fatum) (ib. 1903). Under the pseudonym George Allan she wrote (Fluch der Liebe* (Leipzig 1880), and other stories as well as the novels, (Aus der Rumanischen Gesellschaft* (ib. 1881), and (Ein Fiirstenkind) (ib. 1883).

KREMNITZ, krem 'nits, or CREMNITZ,

Hungary, a royal free town (called in Hun¬

garian Kormoczbanya), in the county of Bars, in a deep valley surrounded by lofty hills, 15

miles northeast of Schemnitz. It consists of the town proper, surrounded by walls, and con¬

taining two ancient churches and a castle; and of several large suburbs, in which are almost all the public buildings. There are some old churches, a Franciscan monastery of the 17th century, a mint, hospitals, etc. The manufac¬

tures consist of paper, delft-ware, vitriol and cinnabar ; but the prosperity of the town de¬

pends chiefly on the gold and silver mines in the vicinity. Pop. 4,515.

KREMS, krems, Austria, a town on the

confluence of the rivers Krems and Danube and on two branches of the State Railway, one of which crosses

the Danube here on a great bridge. It is the official seat of the district and has four churches, a town-hall with archives, monuments to Joseph II and General Schmidt, an obergymnasium, upper high school, trade school, teachers' institute, wine and fruit industrial schools, Piarist College, lady-teach¬

ers' institute, city museum, theatre, sav¬

ings bank, etc. Among its various manufac¬

tures are breweries and mustard, cognac, preserves, chocolate, coffee-substitute, machine, mill, garden tool and other factories. Pop.

14,384.

KREMSIER, Czecho-Slovakia, a town in

Moravia, 37 miles from Briinn by rail, situated in the fertile Hanna region, on the March and on two railways. It is the official seat of the district, has a Collegiate church, archbishop's palace, finished 1711, library, great park and menagerie, a German and a Czech obergymnasium, German and Czech national upper high school, archie-

piscopal boys' seminary, teachers' institute, agricultural school, etc. Its manufactures con¬

sist of machinery, iron foundries, two malt factories, two breweries, sugar factory, electric works, and it does considerable trade in barley, fruit, cattle, etc. In 1110 it was one o f the estates of the 1,063 newly formed bishoprics of Olmutz by the purchase of the Olmutz Count Otto, and obtained town rights through Bishop Bruno (1266) and Bishop Theodor (1290), be¬

coming the episcopal residence. It was be¬

sieged and stormed by the Swedes, in 1643, and burned. During the 1848 insurrection _ the Reichstag was held here. Pop. 16,528, chiefly Czechs.

KRENNERITE. A rare mineral con¬

sisting of telluride of gold and silver in orthorhombic form. Composition variable

(AuAg) Te2. Carries 43.86 per cent of gold and a very small amount of silver. Occurs in mines of Cripple Cre'ek, Colo.

KRESTOVSKI, kres:tof'ski, V., the pseu¬

donym of Nadezhda Dmitrievna Khvoshtchin-

skaya, one of the most noted of Russian women novelists and writers : b. Ryazan, 1825 ; d. 1889.

See Khvoshtchinskaya, Nadezhda Dmitri¬

evna.

KRETSCHMAR, krech'mar, August Fer¬

dinand Hermann, German musician : b. Olbern-

hau, 19 Jan. 1848. He graduated at the Leipzig Conservatory, was appointed (1876) band¬

master at the opera house at Metz, became (1887) music director at the Leipzig University, and was called to Berlin (1904) where he be¬

came professor of the history of music for the state. He wrote numerous choral and organ pieces and many monographs, essays on the lives of noted musicians, etc. His (Fiihrer durch den KonzertsaaP (3 vols., Leipzig 1887-90) is highly praised.

KRETSCHMER, krech'mer, Edmund, Ger¬

man musician and composer: b. Ostritz, 31

Aug. 1830; d. 1908. He was a pupil of Julius Otto and Johann Schneider at Dresden and was appointed court organist there (1854). He became (1872) instructor of the royal Kapell-

knabeninstituts and was leader of a number of choral unions. In 1892 he was given the de¬

gree of professor. He first became favorably known as a composer by his opera (Die Fol-

kunger) (1874) that was followed by (Heinrich der Lowe* (1877) ; (Der Fliichtling* (1881); and (Schon Rothraut* (1887). He also wrote several Masses and other church compositions, also profane choir pieces, such as

(Festgesang,> (Sieg im Gesang.* His (Geister-

schlacht,* written for a man's choir with orchestra, won a first prize. Consult Schmid, O., (Edmund Kretschmer * (Dresden 1890).

KRETSCHMER, Paul W., German phi¬

lologist: b. Berlin, 2 June 1866. He studied at the Luisenstadt gymnasium and the Berlin University, becoming private teacher (docent) there (1891). He became assistant professor (1897) at Marburg University, and professor (1899) at the Vienna University. He traveled in Greece (1896-1901) and write (Griechischen Vaseninschriften* (1894); (1900); (Die heutige Lesbische Dialekt> (1905). He was editor of Glotta, a periodical in the Greek and Latin languages, from 1907 and is member of the Imperial Academy of Science of Vienna.

KRETZER, kret'ser, Max, German novel¬

ist : b. Posen, 7 June 1854. He went to Berlin at an early age and worked in various capacities, as a factory laborer, a house painter, etc. He met with an accident, and during the period of convalescence began to write, becoming one of the most popular German novelists for a time. His naturalistic novels dealing with the common people of Berlin are

interesting pictures of contemporary life. The best are (Die beiden Genossen) (1880); (Die Betrogenen* (1882); (Im Sturmwind des Sozialismus) (1883) ; (Meister Timpe* (1888).

KREUTZER, kroi'tser, Konradin, German

composer: b. Messkirch, Baden, 22 Nov. 1780; d. Riga, 14 Dec. 1849. He studied law at first but produced an operetta (1800) that was played while he was a student at Freiburg, and he then undertook the study of counterpoint (1804) under Albrechtsberger at Vienna. He was appointed bandmaster (1812) at Stuttgart and (1817) filled the same position for Count von Furstenberg in Donaueschingen. In 1822

he returned to Vienna where he became band¬

master of the Karntnerthor Theatre, after the successful production of his opera

turned to Vienna. He wrote 30 operas of which only (Nachtlager zu Granada) (1834) and Raimund's (Verschwender,* for which he wrote the score, have remained popular. On the other hand his male choruses are still pet pieces with the Vereine. A monument to his memory has been erected in his birthplace.

KREUTZER, Rodolphe, French violinist

and composer: b. Versailles, 16 Nov. 1766; d.

Geneva, 6 Jam. 1831. He studied the violin under Anton Stamitz., under whom he was per¬

fected and was able to appear in public in his 13th year. He became solo-violinist in the Italian theatre orchestra (1790) where he pro¬

duced his first opera, (Jeanne d'Arc) in the same year, to be followed by 39 other dramatic works such as (Paul and Virginia* ; (Lodo-

iska) (1701) ;

ing a tour through Italy and Germany (1796) he was appointed teacher of the violin at the Paris Conservatoire. In 1801 he took Rode's place as solo-violinst at the Grand Opera, and (1817) became its bandmaster till his retire¬

ment in great honor (1826). Of his many com¬

positions only those for the violin have survived to this day in popularity, among which his (40

Etudes ou Caprices) is a necessity in training a violinst. Beethoven dedicated his (Kreutzer Sonata* to him.

KREUTZER SONATA, the popular title

of Beethoven's Sonata for piano and violin in A, op. 47, dedicated to his friend R. Kreutzer, and played first in 1803. Leo Tolstoy, the Russian reformer and author, used the title for one of his novels, published in 1880, in which he placed the modern conventional marriage in a hideous light. It caused bitter debate for a rather prolonged period.

KREUTZNACH, kroits'nagh, Prussia, dis¬

trict town and popular bathing resort in the jurisdiction of Coblenz, situated on the Nahe

and junction of several railways. It was for-

rnei ly capital of the County Sponheim and con¬

sists ol a new and old city; it has a Kursaal, or bathing establishment on an island, also tbc medicinal salt springs, Elizabeth-Quelle and others. The mineral waters of this location have been known since 1478 as having curative qualifications in skin diseases. In the near neighborhood is the ruin of an ancient Roman castrum, the so-called ((heathen wall.® It has two Evangelical and three Catholic churches, synagogues, a marble statue to the

sanitary professor Prieger, considered founder of the baths, a war memorial, Bismarck fountain and other monuments. Among the leading manu¬

factures are tanneries, tobacco, leather, comb and glass factories, marble works and vineyards and considerable grain trade. It has among its public buildings a gymnasium, high school, pro¬

vincial wine and fruit, industrial schools, a collection of antiquities, etc. Pop. 23,167.

KRIEGSPIEL, kreg'spel, (<(war -game®), a game of German origin, played with maps on a large scale, and colored metal blocks, on the same scale as the map, representing bodies of troops of various strength (brigades of infan¬

try*. battalions of rifles, regiments of cavalry, besides artillery, engineers, etc.). The players are usually two on each side, and the game forms an exact miniature of tactical operations.

It is played by alternate moves ; each move represents the lapse of two minutes, and rules are given to determine the distance that each branch of the service may move over in that time. When two bodies of men on opposite sides come into contact, the weaker in numbers and position is held to be defeated; but when they are equal in these respects victory is determined to one side or the other by the use of a die. A game of the same name has been introduced in chess clubs, the contestants play¬

ing on different boards screened from view of their opponents, and being obliged to guess from certain arbitrary conditions what moves are made on the other board.

KRIEHN, kren, George, American profes¬

sor and art lecturer : b. Lexington, Mo., 1868.

He received his education at the Wentworth Military Academy, Lexington, the William Jewell College, Liberty, Mo., and at the univer¬

sities of Berlin, Freiburg, Zurich and S trass-

burg. From 1892 to 1895 he was instructor in history at the University of Johns Hopkins, and from 1895 to 1898 was assistant professor at Stanford University, California. Since 1898

he has become widely known as a writer and leoturer on art subjects, and since 1908 has been instructor in the history of art at the Woman's Art School of Cooper Union, New York. Since 1910 he has been lecturer in the Department of Extension Teaching of Colum¬

bia University. In 1911-12 he was preceptor at the University of Princeton and in the same years lectured at the Catholic Summer School of America, Plattsburgh, N. Y. He is a mem¬

ber of the American Historical Association and of the Metropolitan Museum of Art and secre¬

tary of the department of fine arts of the Brooklyn Institute of Arts and Sciences. He has published (English Rising in 1450* (1892) ; (Studies in the Social Revolt of 1381 > (1902) ; a translation of Muther, (History of Painting*

(2 vols., 1909), and numerous articles in ency¬

clopaedias, periodicals, etc.

KRIEKER, kre'ker, a gunner's name for

jacksnipe (q.v.).

KRIS. See Creese.

KRISHNA, krish'na, in Hindu mythology,

the eighth avatar of Vishnu and the most popular deity in the Hindu pantheon. Krishna is regarded as an incarnation of Vishnu (q.v.).

In the (Bhagavad Gita* he stands as revealing the doctrine of (

At the close of the 15th century two East Indian teachers — Chaitanya and Vallabha — es¬

tablished sects in worship of Krishna. A mod¬

ern teacher who has advocated Krishna doc¬

trines is Swami Harayan of Gujurat. See Avatar ; Hinduism.

KRIS KRINGLE, a sort of Saint Nicholas.

On Christmas eve, Kris Kringle, arrayed in a fur cap and strange apparel, goes to the bed¬

room of all good children, where he finds a stocking or sock hung up in expectation of his visit, in which depository he leaves a present for the young wearer. The word means Christ-

child, and the eve is called Kriss-Kringle eve.

See Nicholas, Saint.

KROEBER, kro'ber, Alfred L., American

anthropoligist : b. Hoboken, N. J., 11 June 1876.

He was graduated (1896) at Columbia Univer¬

sity, receiving the Ph.D. diploma (1901) and was appointed instructor (1901-06) at the Uni¬

versity of California, became assistant professor of anthropology (1906-11), associate professor in 1911. He was curator of anthropology at the California Academy of Sciences in 1900 and 1903-11 and curator of the Museum of An¬

thropology from 1908. He was founder of the American Anthropological Association, be¬

coming its president in 1917. In 1906 he was president of the California branch of the American Folklore Society and is correspond¬

ing member of the Anthropological Society,

Washington, member of the American Ethno¬

logical Society of Japan, Fellow of the Ameri¬

can Academy of Arts and Sciences. He has been a frequent contributor to the periodicals on the subjects anthropology, folklore, etc.

KROL, crul, Sebastian Jansen (Bastiaein Jansz Krol), church officer, commissary and vice-director in New Netherland: b. Harlingen 1595; d. after 1645. Appointed in Holland by the Classis of Amsterdam, 12 Oct. 1623, he sailed 25 Jan. 1624. In November of same year he was in Holland again pleading for ministers to serve in the new colony. In 1625 he was agaiin in New Netherland, as <(Kranken-

bezoeker® or comforter of the sick, whose office in the Reformed Church was to minister to the poor, to those in sickness or trouble, or in absence of the ((voorsanger® (precentor) to read from the desk under the pulpit the commandments and the creed, and to marry the living or bury the dead. In many cases these officers read sermons and conducted divine service when there was no minister. For over two centuries this functionary was regularly supplied by the Classis of Amsterdam for the Dutch churches in the West and East Indies.

Krol, with great efficiency, labored at Fort Orange (Albany), in behalf of the West India Company, to make the settlement of the Wal¬

loons and Dutch successful. In 1628, under Domine Miichaelius, he was made an elder and member of the Consistory of the Reformed Dutch (now the Collegiate on Fifth avenue)

Church inside the fort, on Manhattan. He crossed the ocean four or five times and acted as agent for Van Rensselaer in his manor.

According to local tradition, during one winter, when provisions were scarce, he made a nourishing

and palatable fried cake of flour and honey, which took its name from his, the cruller. The word is unknown in Holland and the pronunciation, very similar in the personal name and the actual thing, points to the prob¬

able origin of this American delicacy. On Van Twiller's arrival, in 1633, he was succeeded m the command of Fort Orange by Hans Jorissen Houten. On 28 Sept. 1645 he was at holy communion in the church in Amsterdam, Hol¬

land. A handsome memorial of this zealous and efficient pioneer has been erected in the Reformed Church edifice on Second avenue in New York. Consult Van Laer, the (Van Rens-

selaer-Bower Manuscripts,* published by the State (1906); and Eckhoff,

Krol* (1910); Hofstede, (Oost Indien Kerk-

Zaken,> Rotterdam (1779), and (Ecclesiastical Records of the State of New York' (1901).

KROLL, krol, Wilhelm, German classical

scholar: b. Frankenstein, Silesia, 7 Oct. 1869.

He studied at Breslau, Berlin and Bonn, and, after a journey through Italy and Sicily, he entered the faculty at Breslau University, foi classical philology. He was made professor at Greifswald (1899), Munster (1906) and Bres¬

lau (1913). He contributed numerous essays to the Rheinisches Museum , Jahresberichte iiber die Fortschritte der Altertumswissen-

schaft, Glotta, and the Realcnzyklopadie of Pauly-Wissowa. He edited the 6th edition of Teuffel's (Geschichte der Romischen Literatur*

(1910-13). Among his other works are (An-

tiker Aberglaube> (1897) ; (Die Altertumswis-

senschaft im letzten Vierteljahrhundert*

(1905) ; (Geschichte der klassischen Philologie) (1908).

KROMAYER, kroml'er, Johannes, Ger¬

man historian of ancient battles : b. Stralsund, 31 July 1859. He studied at Stralsund, Metz, Weissenberg and at the universities of Jena and Strassburg. He was appointed as teacher at the gymnasiums of Strassburg, Thann and Metz and "then traveled through Italy and Greece (1887-88). In 1898 he became teacher at the Kaiser-Wilhelm University,. Strassburg, but headed the scientific expedition in Greece and Turkey making research of the ancient battle¬

fields (1900), and a similar expedition to Italy and North Africa (1907). He was appointed professor of ancient history at the Czernowitz University (1901) and filled the same post at • Leipzig (1913). He wrote (Antike Schlacht-

felde) (1902-11) ; (Roms Kampf um die Welt-

herrschaft* (1912).

KRONBERG, kron'bar-g\ Julius, Swedish

painter; b. Karlskrona, 11 Dec. 1850. He studied at the Stockholm Academy of Art and gained a scholarship which permitted him to visit Dfisseldorf, Paris, Munich and Rome.

Upon his return he made his reputation with his biblical, mythological and historical pic¬

tures and became the leading colorist. His principal works are (Death of Cleopatra) ; < David and SauP (1885), in the Stockholm National Gallery; < Romeo and Juliet* ; (Queen of Sheba* ; Hypatia,* and the ceiling decora¬

tion of the Treppenhaus of the Royal Palace, Stockholm (1890-92). He was elected member of the

Stockholm Academy of Art (1881) and was made professor in 1885.

KRONBERG, Louis, American painter : b.

Boston, 20 Dec. 1872. He studied art at the Boston Museum of Fine Arts, the Art Students'

League, New York, and the Academie Julien.

Paris. He is instructor of the portrait class of the Copley Society, Boston, received the silver medal of the Massachusetts Charitable Asso¬

ciation and the Longfellow Travelling scholar¬

ship. His works have been exhibited at the Paris Exposition (1900) and are represented m the permanent collections of the Pennsylvania Academy of Fine Arts, Philadelphia ((Behind the Footlights*) ; New York Metropolitan Mu¬

seum of Art ((The Pink Sash*) ; Boston Mu¬

seum of Fine Arts, etc. Other works of his are in the private collections of Mrs. J. L.

Gardner and F. Gair Macomber.

KRONECKER, kro'nek-er, Leopold, Ger¬

man mathematician : b. Liegmitz, 7 Dec. 1823 ; d.

Berlin, 29 Dec. 1891. He studied at Berlin, Bonn, Breslau and took his degree (1845) in Berlin, when he returned to Liegnitz. He was made a member of the Berlin Academy of Science (1860) and held lectures at the univer¬

sity (1861). In 1883 he was made professor of mathematics of the university. He did excep¬

tional service in the advancement and sys¬

tematizing of algebra, and his graduates', feast essay, (Grundziige einer rein arithmetischen Theorie der algebraischen Grossen* (Berlin 1882), is of

lasting value. He edited, at first with Weierstrass, later alone, Crelle's Journal fur Mathematik, and commenced publishing the works of Lejeune Dirichlet at the request of the Academy. His

tions reducing the science to whole numbers altogether is quite interesting. His biography by H. Weber is in Jaliresbericht der deutschen Mathematiker vereinigang (Berlin 1893).

KRONES, kro'nes, Therese, Austrian

actress: b. Freudenthal, 7 Oct. 1801; d. Vienna, 28 Dec. 1830. She became a member of the Leopoldstadter Theatre, Vienna (1821), after numerous engagements at provincial theatres.

She learned greatly to. improve her technique here through playing with Raimund, and, being of a lively and cheerful temperament, besides possessing graceful form, she became a great favorite in comedies and national plays. Sev¬

eral plays were written by her,, such as (Sylphide,* (Nebelgeist,* etc. Her life figures in a novel by Bauerle and in a play by Haffner.

KRONSTADT, kron'stat, or CRON-

STADT, Rumania, called bv Hungarians

Brasso, a town in the county of the same name in Transylvania, junction of four railways and most picturesquely situated. It is wedged in by a valley gorge of the Schuler Mountains, open only on the northwest. In front of the mouth of 'the gorge rises the Schlossberg, an old fortification or citadel dating back to 1554. The suburbs lie an small neighboring ravines, some built on terraces. In the. middle of the old former fortified central city is the cathedral erected under King Sigismond (1385-1425) in imposing Gothic style, but serving now as an KRONSTADT - KROUT

Evangelical parish church and termed locally v the (

The triangular market place contains the an¬

cient town-hall with its archives, erected 1420

and renovated (1770) in Baroque style; also the great Kaufhaus, built 1545. There is also a Catholic parsonage in Italian style, a Rumanian church in Byzantine style, besides several other Catholic, Evangelical and Grecian churches and a Reformed church. Other prominent public edifices are the Franciscan monastery, the Treasury building, etc. There are monuments erected in memory of Honterus, one to Bishop Teutsch and the Millennium monument. Its population was about 41,056, of whom most are Magyars, the remainder Wallachs, Saxons, Greeks and other Orientals. Considerable com¬

merce is carried on, the metal and wood indus¬

tries being important. There are manufactures of earthenware, bed-coverings, cement, leather, paper, as well as sugar and petroleum refineries.

Among its institutions are three gymnasiums, a state upper high school, trade academy, theatre, etc. This city suffered many times by war ravages; it was destroyed by the Tartars (13th century) several times, was conquered by the Turks (1421), becoming a frontier town of Protestantism in the days of Honterus the Re¬

former (16th century), it was plundered by Gabriel Bathori (1610), besieged in 1611 and 1612. General Caraffa executed (1688) many of its citizens and plundered the city ; it was burned down the next year by the soldiery. In 1718 and 1755 the pest decimated its inhabitants; in 1849 it was besieged twice and the Russians took possession. Consult Herrmann-Meltzl, von,

mannstadt 1885-88); Filtsch, (Die Stadt Kron¬

stadt und deren Umgebung) (Vienna 1886).

KRONSTADT, kron'stat, or CRON-

STADT, Russia, a maritime fortress in the government of Petrograd, and about 25 miles west of that city. It stands in the nar¬

rowest part of the Gulf of Finland, opposite to the mouth of the Neva, on a height of the long, narrow, rocky island of Kotlin, forming, both by its position and the strength of its fortifica¬

tions, the bulwark of the capital, and the most important naval station of the empire. It was founded by Peter the Great in 1710, and has spacious, regular streets, with many handsome houses; Greek, Lutheran, English and Roman Catholic churches ; very large marine establish¬

ments, a navigation school, a naval arsenal, a cannon-foundry, a barracks, building-yards, docks, etc. The harbor consists of three sepa¬

rate basins — a merchant haven, capable of con¬

taining 1,000 ships; a central haven for the re¬

pair of ships of war, and the war haven, which, in addition to the other works of the place, is defended by the strong fort of Kronslot, built on two small adjoining islands. The chief dis¬

advantage of Kronstadt as a port is the long period during which the harbor is blocked up by ice. The construction of a canal affording better access by sea to the capital has dimin¬

ished the trade of Kronstadt, which in conse¬

quence will cease to be a commercial port. A revolt of the fleet personnel took place in May 1917 The local administration passed to the hands of the Committee of Workmen’s and Soldiers’ Delegates on 2 June 1917. The pro-

visional government at Petrograd was defied by the president of the local committee. Drastic measures were decided upon by the former, but the fall of the Kerensky government gave the malcontents and others an opportunity of escaping from the consequences of their acts.

See Ship Canals; War, European.

KROPOTKIN, kro-pot'km, Peter Alex-

eievitch, Russian geographer and revolutionist : b. Moscow, 9 Dec. 1842; d. 1921. He was edu¬

cated in the Corps of Pages at Saint Petersburg, and joining a regiment of Cossacks of the Amur went to eastern Siberia as aide-de-camp to the military governor of Transbaikalia, becoming later attache for Cossacks' affairs to the gov¬

ernor-general of eastern Siberia. He was con¬

nected with a prison commission and strove to get some reforms introduced into Siberian con¬

vict prisons, but his efforts proved of no avail.

From 1863 he devoted his energies to a scien¬

tific investigation of Manchuria and the neigh¬

boring parts of Siberia, and his work in this department gained him, in 1864, the gold medal of the Russian Geographical Society. In 1871

he was sent by -the Geographical Society to Fin¬

land to study glacial phenomena. Arrested in 1874 for promulgating radical ideas of social reform, he was confined in the prison of the military hospital, from which he contrived to escape to England in 1876. In the following year he went to Switzerland, where he founded at Geneva an anarchist journal called Le Revolte, but in 1881 was expelled by the Swiss authorities on the demand of Russia. Return¬

ing to England in 1882, he wrote and lectured against the government of Alexander III.

Having gone to France, he was arrested by the authorities and condemned (January 1883) to five years' imprisonment for participation in the International, but he was released in Janu¬

ary 1886, in consequence of a strong appeal made by leading French and English savants.

Afterward he lived in England, and en¬

gaged in literary work. He wrote much on scientific subjects and contributed to various encyclopaedias. His separate publications include (Paroles d'un Revolte (1885) ; (In Russian and French Prisons) (1887) ; (La Con-*

quete du Pain) (1888); (L'Anarchie, sa Phi¬

losophic, son Ideal (1896; Eng. trans. 1897); (The State: its Part in History) (1898); < Fields, Factories and Workshops* (1899) ; (Memoirs of a Revolutionist, > first issued serially in The Atlantic Monthly (1899) ; (The Orography of Asia) (1904) ; (Ideals and Realities in Russian Literature* (1905) ; (The Great Revolution, 1789-93) (1908); 'Terror in Russia) (1909). Prince Kropotkin was one of the ablest representatives and most eloquent ex¬*

ponents of that theory of society known as anarchist-communism. He was opposed to all societies based on force or restraint, and looked forward to the advent of a purely voluntary society on a communistic basis. He desired to see the division of labor, which is the dominant factor in modern industry, replaced by what he called the "integration of labor,® and was a stanch believer in the immense possibilities of intensive agriculture. In 1901 he lectured at the Lowell Institute in Boston.

KROUT, Mary Hannah, American journal¬

ist and author: b. Crawfordsville, Ind., 3 Nov.

1857. She was educated at home, became asso-

date editor of the Crawfordsville Journal in 1881, and editor on the Terre Haute Express in 1882. She was for 10 years on the staff of the Chicago Inter-Ocean, was its staff corre¬

spondent in Hawaii during the revolution in 1893, furnishing special data subsequently for the State Department. She was also staff cor¬

respondent in London from 1895 to 1898, then went to China for a syndicate of representative newspapers specially to investigate the com¬

mercial relations of China and the United States. In 1907 she visited Australia for the second 'time, lecturing on American political and economic conditions and writing a series of articles for the Sydney and Auckland press on American topics. In recent years she has en¬

gaged in miscellaneous literary work, and lec¬

turing on literary and general topics. She has published (Hawaii and a Revolution (1888); (Alice in the Hawaiian Islands) (1899) ; (A Looker-on in London' (1899) ; (Two Girls in China) (1900) ; completed the

cences of Mary S. Rice' (1908) ; (Platters and Pipkins) (1908) ; (The Coign of Vantage'

(1909).

KRU, kroo, or KRUMEN, a negro tribe

of Cape Palmas, West Africa, of exceptional stature and very dark skinned. They hire themselves as able sailors and boat crews along the entire northwest

African coast and work also in the factories, being efficient workers and fairly reliable, which good characteristics have aided them to the principal trade of their sec¬

tion of country. They were found useful fac¬

tors in the building of the Panama Canal. Con¬

sult Biittikofer, cReisebilder aus Liberia' (Vol.

II, Leyden 1890).

KRUDENER, kru'den-er, Barbara Juliane,

Baroness von, Russian novelist and pietist : b.

Riga, 11 Nov. 1764; d. Karazu-Bazar, 26 Dec.

1824. She received through her father, Privy Councillor von Vietinghoff, in Russia and later at Paris, a very liberal education. In 1872 she married Baron Burchard von Kriidener, an able diplomat attached to the Russian embassy at Paris, but who was already divorced from two wives. She accompanied him to Venice where he was appointed Russian Ambassador, and later (1786) to Copenhagen, where he filled the same position. Being of a coquettish dis¬

position she appears to have led an extravagant life, and, after bearing two children, her nervous condition caused her to leave her hus¬

band (1789) and live in Paris, where she be¬

came involved in a love affair with a young officer, Count Fregeville, and, dropping her family name but not divorced, she spent the next few years in travel, returning to her hus¬

band in 1800, but leaving him again in 1801.

She next became intimate with Coppet while living with Madame de Stael and in Paris. In Paris she then became companion of Chateau¬

briand and Bernardin de Sainte-Pierre, author of

Raul and Virginia,' when she was in¬

formed of the death of her husband (1802).

Her novel (Valerie' (Paris 1803) was now pub¬

lished, in which she built up a romantic story in charming style from an early actual clandes¬

tine love episode of hers at Venice. In 1804, at the age of 40, she came under the religious in¬

fluence of the Moravian sect, then that of the South German cult ((Chiliasm," and she now ardently devoted herself to a fantastic religion, her whole being becoming at last absorbed in mysticism and superstition. In 1806 she went to North Germany and, in the following year, did great service tending the wounded after the battle of Eylau (1807) ; in 1808 she fell under the influence of the teaching of Jung-Stilling in Carlsruhe, who acquainted her with the Swedenborgian cult, and a month later she was in Alsace imbued with the visionary doctrines of Pastor Fontaine and the seeress Marie Gott-

liebin Kummer. She next held great religious meetings in Wiirttemberg, Switzerland, Alsace, etc., to which the newly converted and the pious flocked. Turning her eyes toward political events, she placed Napoleon as the Apollyon of the Apocalypse and Alexander of Russia as the deliverer. She obtained audience with the Tsar Alexander (1815) and gained temporary in¬

fluence over him. It was partly, some claim, through her influence that the ((Holy Alliance''

was born, but she had not part in its drawing up. With the arrival of peace she traveled to Switzerland where she renewed her pietistic conventicles and preached repentance, spending prodigally of her wealth on the poor and suffer¬

ing; but her immense popularity created alarm with the authorities and they expelled her from Switzerland in 1817. A similar fate met her in

several German states, till she was taken (1818), under police escort, to the Russian border.

Placed within bounds by her former convert, Alexander I, she now lived on her estate at Kosse, but in 1824, with her daughter and son-

in-law, she went to the Crimea, where she died in the pietist colony of Princess Golytzyn at Karasu-Bazar. Consult Eynard,

Madame Kriidener' (Paris 1849) ; Capefigue, (La Baronne de Kriidener et l'Enyiereur Alex¬

andre I' (ib. 1866) ; (Frau von Kriidener,' in Zeitgemalde (Berne 1868) ; Lacroix, (Madame de Kriidener ses Lettres et ses Ouvrages in¬

edits' (Paris 1880) ; Ford, Clarence, Rife and Letters of Madame de Kriidener' (London 1893) ; Turguan, (La Baronne de Kriidener '

(Paris 1900) ; Miihlenbeck, (Etude sur les Origines de la Sainte-Alliance' (ib. 1888).

KRUG, kroog, Wilhelm Traugott, German

philosopher: b. Radis, Prussia, 22 June 1770; d. Leipzig, 13 Jan. 1842. He studied at Witten¬

berg under Reinhard and Jehnichen, then at Jena and Gottingen, and was appointed (1801) assistant professor of philosophy at Frankfort-

on-the-Oder. After Kant's death he was ap¬

pointed his successor (1804) at Konigsberg, and, in 1809, was called to Leipzig, where he became riding master of the Saxon Mounted Jager and went through the War of Liberation (1813-14), returning to resume his chair at Leipzig, from which he retired, voluntarily (1834). He then devoted his time to writing on philosophical and rationalistic-theological subjects till his death. Of his numerous works should be cited (System der theoretischen Phi¬

losophic' (Konigsberg 1806 ; 3d ed., 1830); (System der praktischen Philosophic' (ib. ; 2d ed., 1829-38) ; (Handbuch der Philosophic und philosophischen Literatur' (Leipzig; 3d ed., 1828) ; (Allgemeine Handworterbuch der phi¬

losophischen Wissenschaften' (ib. 1827-34).

The basic idea of his philosophical system which he explains in his (Fundamental philoso-

phie> (Ziilichau 1803; 3d ed, Leipzig 1827), as a transcendental synthesis of being and knowl¬

edge, is that we have in our consciousness an original connection with the being and knowl¬

edge of the subject and the external world, which is not further explainable. Consult his autobiography, (Meine Lebensreise in sechs Stationen, beschrieben von Urceus) (Leipzig 1826), with its sequel, (Leipziger Freuden und Leiden in Jahr 1830, oder das merkwurdigste Jahr meines Lebens) (ib. 1831).

KRUGER, kru'ger, Gustav, German Prot¬

estant theological historian: b. Bremen, 29 June 1862. He studied church history and was graduated at Heidelberg, Jena and the Giessen University (1886), where he became assistant professor (1889) and (1891) regular professor.

He wrote (Lucifer von Calaris und das Schisma der Luciferianer) (Leipzig 1886) ; (Die Apologieen Justins) (Freiburg 1891) ; (Geschichte der altchristlichen LiteratuD (ib.

1895; addenda 1898); (Die Entstehung des Neuen Testaments) (ib. 1896) ; (Kritik und Ueberlieferung auf dem gebiete der Er-

forschung des Urchristenthums) (Giessen

1903) ; (Das Gogma von der Dreieinigkeit und Gottmenschheit in seiner geschichtlichen Ent-

wickelung) (Tubingen 1905) ; (Handbuch der Kirchen geschichte) (1909-13).

KRUGER, kroo'ger, Stephanus Johannes

Paulus, Boer statesman : b. Colesberg, Cape Colony, 10 Oct. 1825 ; d. Clarens, Switzerland, 14 July 1904. At 11 he accompanied his parents in the <(great trek® or migration of Boers, whom the British administrators had antagonized, from the Cape Colony, — a movement which resulted in the colonization by Boers of Natal, the Orange Free State and the Transvaal. He and his parents resided for a time in the Orange Free State, but they ultimately made their home north of the river Vaal. At 16 he was assist¬

ant to a field cornet, and not long afterward became a field cornet himself. From that time he was constantly connected with either the military or the civil government of the Trans¬

vaal, and his force of character gradually brought him to the front. In 1863 he became commandant-general, and in that capacity put down civil feuds and defeated the Basutos. At the time of the annexation of the Transvaal to the British territories in 1877 he was Vice-Presi¬

dent under President Burgers. Upon the re¬

organization of the Boer government by the national committee in 1880, he again assumed the office of Vice-President, and in the war of 1880-81 with Great Britain he took a leading part. He was elected President in 1883, and re-elected in 1888, 1893 and 1898. He. visited England in 1883 in order to obtain a revision of the Pretoria Convention of 1881, and before his return in the following year he secured its re¬

placement by a new convention practically granting independence — except in so far as re¬

lations with foreign countries were concerned —and authorizing the renaming of the state as the South African Republic. Kruger's position in the republic was now one of almost unlim¬

ited influence and authority. The enormous in¬

flux of foreigners after the discovery of the rich gold deposits of the Witwatersrand created problems of the utmost gravity. The greed of the British South Africa Company was ex¬

treme, the Uitlanders complained of injustice in being debarred from the franchise, and the Boers on their part were determined to resist foreign aggression. A crisis presented itself in the so-called wJameson Raid® of December 1895, which was easily crushed by the Boers, and at the same time led them to look forward to another and greater struggle with the Eng¬

lish and to accumulate in anticipation a large supply of military stores. Kruger managed with much diplomatic skill the difficult matters connected with this affair. In the second war with Great Britain Kruger remained in the country till the fall of Pretoria (5 June 1900), then escaped into Portuguese territory, and thence 19 October sailed for Europe, hoping to enlist some of the European powers on behalf of the Boer republics, but failing in this he took up his residence in the Netherlands. In the summer of 1901 he proposed visiting the United States for the purpose of inducing the government to give its. moral support to the Boers, but on being informed that neither President McKinley nor after him President Roosevelt would receive him in other than a strictly unofficial manner, the project was aban¬

doned. His wife died at Pretoria in July 1901.

Kruger was buried in Pretoria. (See also South African War). Consult Van Dordt,

lished in 1900.

KRUMBACHER, kriim'bah-er, Karl, Ger¬

man Byzantine scholar : b. Kiirnach, Bavaria, 23 Sept. 1856; d. 1909. He studied classical philology at Munich and Leipzig and was ap¬

pointed (1879) teacher of the Gymnasium at Munich, becoming assistant professor (1891) and professor of middle and modern Grecian philol¬

ogy (1897) till his death. He is best known through his (Geschichte der byzantinischen Lit-

eratur* (Munich 1891; 2d ed., 1897), covering from Justinian to the fall of the Eastern Em¬

pire, 1453. He founded the Byzantinische Zeit-

schrift (Leipzig from 1892), and Byzantinische Archiv (ib. from 1898). He wrote (Griech-

ische Reise) (Berlin 1886), a consequence of his residence in the Orient in 1884 and 1885.

Numerous works of his on middle and modern Grecian philology are in Reports of Proceed¬

ings of the Bavarian Academy. He wrote (Codex der Grammatik des Dositheus* (1884) ; (Beitrage zu einer Geschichte der griechischen Sprache* (1885-89) : (Mittelgriechische Sprich-

worter) (1893) ; (Das Problem der neugriech-

ischen Schriftsprache) (1902) ; (Populare Auf-

satze* (1909).

KRUMMACHER, kroom'mah-er, Fried¬

rich Adolf, German theologian : b. Tecklen-

burg, 13 July 1767; d. Bremen, 4 April 1845.

A minister in the German Reformed Church and a professor of theology, he became widely known by his (Parables) (1805), which ran through many editions

and are familiar in an English translation. They were as a rule short, written in simple prose, on such subjects as

KRUPP, kroop, Alfred, German inventor

and metallurgist : b. Essen, Prussia, 26 April 1812; d. there, 14 July 1887. He was a son 548

of Friedrich Krupp (q.v.). In 1848 he assumed charge of the Krupp Steel Works at Essen and presently discovered the method of casting steel in very 'large masses. In 1851 he sent to the London Exhibition a block of steel weighing 4,500 pounds, and was able to cast steel in one mass weighing more than 100,000 pounds. Al¬

though he manufactured a great variety of articles for use in various peaceful industries, his world-wide fame arose from his production of the enormous siege guns used by the Ger¬

mans when they invested Paris. Several of Krupp' s processes in the manufacture of steel and in the making of cannon were very care¬

fully kept from the knowledge of the outside world and only employees were admitted to his foundries.

KRUPP, Friedrich, German manufacturer:

b. 1787; d. 1826. He established a small forge at Essen, Rhenish Prussia, in 1810, experi¬

mented in the making of cast-steel, the secret of which was then carefully kept in Great Britain, and was able in 1812 to manufacture some of the material. In 1818, on the site of the present large Krupp establishment, he built a small plant of eight smelting furnaces, each with one crucible. He turned out a steel of ex¬

cellent quality, though not perfectly successful ; but demand for the product was then slight, despite

its use for mint-dies and some other purposes, and the activity of the manufactory was correspondingly small.

KRUPP, Friedrich Alfred, German gun-

maker : b. Essen, Germany, 17 Feb. 1854; d.

there, 22 Nov. 1902. He was known as the "Cannon King® in Germany, and was the son of Alfred Krupp, who invented a new Bes¬

semer steel, out of which he made rifles and cannons; a seamless tire for car-wheels and discovered a new method of hardening armor plate. His grandfather, Friedrich Krupp (q.v.), founded the steel industry of Essen, beginning in 1817 with two laborers. The Krupps have been head of the iron and steel industry of Prussia for many years; their establishment is one of the greatest in the world. Friedrich Alfred Krupp was the richest man in the em¬

pire. He was generous to his operatives, built for them 5,469 dwellings, each with its garden, besides providing convalescent hospitals and orphanages. He also maintained a pension fund of $4,125,000 for their benefit. He vastly improved the capacity of the business by taking in other steel works at Rheinhausen and in the neighborhood of Magdeburg; acquiring coal and iron mines in Germany, and iron mines in Spain. The shipyards and engine shops of Kiel and Berlin which he amalgamated with the mining and founding business were sources of great wealth, and he owned a fleet of steamers for the exportation of his goods. Although he took no active part in his business on its tech¬

nical side (in which he differed from his father and grandfather) 'his skill in finance was so great that in 15 years he almost doubled his inherited fortune.

KRUPP FOUNDRIES, Social Work at,

one of the early difficulties encountered by the great Essen works was that by 1861 the em¬

ployees had outgrown the living accommoda¬

tions to such an extent as to create disturbance to the growth of the industry. Two rows of houses were constructed (1861-62) for the fore¬

men and the workmen's dwellings were started in 1863, and became the colony known as Alt-

Westend. The buildings were of simple con¬

struction, but sanitary, and rents were low. By the beginning of 1872 the second colony ■ —called New-Westend — was completed. There were 3,659 dwellings built by 1891, besides 43

for widows free of rent, flhe capital expended had a net income of 2.5 per cent, which was invested in other improvements. The small Essen Co-operative Society had its management undertaken by the firm in 1868 and its title was changed to Consum-Anstalt, and all varieties of goods were supplied at lowest possible prices to the workmen. This work was done at the responsibility and risk of the firm for numerous years at cost, but the work was later turned over to the employees for free co-operation.

All sales are done for cash, and the balance of profit is returned yearly to the purchasers pro rata of value of purchases.

A boarding establishment, known as the "Menage,® was started in 1856 with 200 un¬

married men. By 1873 the number had grown to 1,775, falling off to less than 500 in 1875, then growing to about 800. The lack of freedom caused its falling off. The health of the em¬

ployees is looked after by a board of physicians, and a large bathing establishment is assisting the hygienic work. Three insurance associa¬

tions have been formed, against accident, for life insurance and against sickness, to which the firm contributes $60,000 per year, $2,500 of which is

paid under the Imperial Insurance Law. A trust fund, of $250,000 produces from its inter¬

est pension funds for the use of those whose needs are not covered by other sources. Under the employees' widows pension plan payments are made annually amounting to nearly $952,000.

The city of Essen also has a gift of $500,000

provided for building material and moral im¬

provement from the interest. There are also numerous scientific and manual training schools.

The rapid growth of socialistic propaganda centre is remarkable, however, and of recent years has kept pace with the advance in the social and economical program.

In the last few years the colonies of Sche-

derhof, Nordhof and Cronenberg were added to the two Westends, and Baumhof was built a short distance from the city in 1890 on cheaper land, affording detached buildings of two stories to accommodate three or four fam¬

ilies and permitting larger gardens to surround the dwellings, at a rental of 85 cents per week for five rooms and garden. Following these came Alfredshof (erected 1894) a model village, and Altenhof, started a little later, built on still more attractive lines. The latter accommodates aged employees and widows free of rent.

Friedrichshof was the next colony erected, on advanced lines. Each of these numerous colo¬

nies has its market place, beer-hall, co-operative store, park and music pavilion. The dwellings, some few years ago, figured 4,300 about Essen and 700 in the colonies of Bredcney, Annen, Gaarden and Bochum. Consult Blencke, Al¬

fred Krupp1 (1898) ; Klein and Hehnemann, Friedrich*

Alfred Krupp* (1903).

KRUPP PROCESS OF ARMOR PLATE.

See Armor Plate.

KRUSE, kroo' ze, Heinrich, German dra¬

matic poet: b. Stralsund, 15 Dec. 1815; d.

Biickeburg, 13 Jan. 1902. He studied phi¬

lology at Bonn and Berlin after which he dwelt abroad several years, chiefly in England. He was appointed (1844) teacher at the gymnasium, Minden, but joined (1847) the editorial staff of the Kolnische Zeitung. As successor to Gervinus he managed (1848-49) the Deutsche Zeitung at Frankfort, but returned to the Kolnische Zeitung and became chief editor in 1855, remaining in that post till he took up residence (1872) in Berlin. He lived at Biicke-

burg from 1884. Among his dramatic works are (Die Grafin' (Leipzig 1868; 4th ed., 1873), a tragedy which won the Schiller prize ;

Verbannte) (1879), etc., all tragedies. Of his short plays and poems might be mentioned (Festnachtspiele) (Leipzig 1887) ; and his clever 'Seegeschichten' (Stuttgart 1880). Consult Brandes, F. FI., (Heinrich Kruse als Dramat-

iker) (Hanover 1898) ; Lange, E., 'Heinrich Kruses pommersche Dramen) (Greifswald

1902).

KRUSENSTERN, kroo'zen-stern, Adam

Johann von, Russian navigator: b. Haggud, Esthonia, 19 Nov. 1770; d. there, 24 Aug. 1846.

He entered the cadet corps and took part in the war (1788) with Sweden, and served in the English fleet (1793-99). He was given (1803) command of an expedition to the northwest coast of America and Asia, with the object of opening up the fur trade of the Pacific coast and renewing the Japanese commercial relations.

He failed in the latter object but the scientific outcome of the world's circumnavigation was important. From 1827 to 1842 he was director of the naval school and, in 1841, was made general-admiral. His bronze statue was erected (1876) at the naval school, Saint Petersburg.

He wrote (Voyage round the World in 1803-

06) (Saint Petersburg 1810-12), translated into several languages and containing an atlas and 104 plates; 'Atlas de'l Ocean Pacifique) (Saint Petersburg 1824-27, with supplements).

KRYLOV, kre-lof, Ivan Andreievitch,

Russian fable writer: b. Moscow, 13 Feb. 1768; d. Saint Petersburg, 21 Nov. 1844. He was the son of a poor subaltern officer, yet in his 15th year he wrote the successful opera 'Ivofejnica'

((The Coffee Fortune-teller)) and was ap¬

pointed Unterkanzlist in a circuit town (1781) and Kanzlist at Tver end of the same year.

He received a position in the Chamber of Finance at Saint Petersburg (1782) and in the cabinet of the empress (1788) but retired in 1790. He then published several periodicals unsuccessfully though they established his repu¬

tation as journalist, the fine satiric talent dis¬

played in his contributions, and by gift of ob¬

servation and masterly language. Meanwhile he was writing odes, tragedies, a comic opera 'The Crazy

Family) (1793) and comedies, all in the French taste but none important. From 1797-1801 he lived on the estate of Prince Golitzyn in the Ukraine, becoming his secre¬

*tary (*1803). In 1806 he went 'to Moscow, then Saint Petersburg, where he wrote (1907) his most popular comedy (The Fashion Magazine, >*

and 'A Lesson for Daughters,' the 'Magic Opera,' 'Iljd. the Hero,' etc. He next turned to poetry, his true field soon appearing to be fables. The first issue of his fables (23) ap¬

peared in 1809, the second (21 new) in 1811, in which year he was elected member of the Saint Petersburg Academy. The last collection under his supervision (1843) contained 197 fables and reached its 26th edition in Saint Petersburg in 1891. He was appointed assistant at the Im¬

perial Library in 1812. A memorial in his honor was erected (1885) in the Saint Peters¬

burg Summer Garden. Through their Russian sentiment, humor and naturalness, wit and good nature, his fables have become the favorite book of the people and new editions continue to appear rapidly. Translations in the French (Paris 1825) and the Italian languages have been published, and German versions by Torney (Mitau 1842), Lowe (Leipzig 1874) and Frau von Gernet (ib. 1881) find wide circulation.

A comprehensive collection of his works was published (1847 and 1859) in Saint Peters¬

burg with a biography by Pletnev, and another by Kalasha (Saint Petersburg 1914). W. Kene-

vitch's 'Bibliographical and Historical Notes on the Fables of Krylov' (Saint Petersburg, 2d ed., 1878) contains perhaps, the best com¬

mentaries.

KRYPTON, a gaseous element discovered

in the atmosphere by Ramsay and Travers, in 1898. (The history of this member of the argon group is so bound up with that of argon itself that reference should be made to the article Argon, and to the references there given).

Krypton was discovered in the last fraction re¬

maining after the evaporation of a considerable quantity of liquid air. The residue consisted chiefly of argon, oxygen and nitrogen ; but when the oxygen and nitrogen had been removed, a spectroscopic examination of what remained showed lines that indicated the existence of at least one new element, in addition to argon and helium. To this new element the name "kryp¬

ton" was assigned, from a Greek word signify¬

ing "hidden," in allusion to the circumstances under which the discovery was made. (See also Neon and Xenon). Little is known, as yet, concerning the properties of krypton. When it was isolated by means of a tedious diffusion process, it was found by Ramsay and Travers to have a density about 40.75 times as great as that of hydrogen and an atomic weight of about 81.5. The ratio of its specific heat at constant pressure to its specific heat at constant volume was found to be 1.66, as in the cases of argon and helium. Subsequent experiments by Laden-

burg and Kriigel have indicated a density of about 29.5, and therefore an atomic weight of about 59. Travers, in his book issued subse¬

quently to these later experiments, makes no reference to them. Considerations based upon the periodic law (q.v.) appear to indicate that the results of Ramsay and Travers are the more probable ; but this point is as yet undecided.

Krypton exists in the air in the proportion of about one part in a million. It has the chemical symbol Kr

and appears to be as inert, chemi¬

cally, as argon.

KTISTOLATR2E. See Monophysites.

KU-KLUX (ku'kluks') KLAN, a secret

society which existed in the Southern States of the United States during the period immediately following the Civil War (1865-76). It was originally established at Pulaski, Term., about 550

1865 and its purpose was at first the amusement of its members. However, the sudden enfran¬

chisement of the blacks of the South brought to the white population the serious problem of social readjustment. Politicians and unscrupu¬

lous business men (carpet-baggers) were among the many Northerners who flocked to the South to exploit the new citizens, while the negroes, loosed from the restraining influence of their masters, and ignorant of and unprepared for the responsibilities of full citizenship, were demoralized and lawless. The Ku-Klux Klan, therefore, took upon itself the duty of fright¬

ening the blacks into good behavior and obedi¬

ence. From this beginning, all sorts of lawless deeds of violence were performed in the Klan's name, until the band became notorious. At the first meeting a name was suggested — (

Kloi,® from the Greek ^Kuklos,® a band or cir¬

cle. On the mention of this name someone cried out, <(Call it ^ukluxP ® Nearly all pres¬

ent were Tennesseeans, with only one or two from farther south. The name was adopted and the society provided for the following of¬

ficers : A grand cyclops or president ; a grand magus or vice-president ; a grand turk or mar¬

shal ; a grand exchequer or treasurer and two lictors. There were the outer and inner guards of the <(Den,® as the place of meeting was desig¬

nated. Each member was required to provide himself with the following outfit : A white mask for the face, with orifices for the eyes and nose; a tall, fantastic cardboard hat, so con¬

structed as to increase the wearer's apparent height, and in shape like those placed on the heads of the heretics formerly burnt in the Por¬

tuguese and Spanish auto-de-fes ; a gown or robe of sufficient length to cover the entire per¬

son. The color and material were left to the wearer's fancy and each selected what would in his judgment be most hideous and fantastic.

Each member carried also a small whistle, with which, by means of a code of signals agreed on, they held communication with one another.

The Klan increased in numbers and in power, an impcrium in imperio, until its decrees were far more potent and its powers more dreaded than that of the visible commonwealths which it either dominated or terrorized. In April 1867 the grand cyclops of the Pulaski den sent out a re¬

quest to all the dens scattered over the South to appoint delegates to meet in convention at Nashville, Tenn., in the early summer of 1867.

At the time appointed this convention was held.

Delegates were present from the Carolinas, Ala¬

bama, Georgia, Louisiana and other Southern States. A plan of reorganization previously prepared was submitted to the convention and adopted and the delegates returned to their va¬

rious States as secretly as they had come.

The grand officers were : The grand wiz¬

ard of the invisible empire and his 10 genii.

The powers of this officer were almost auto¬

cratic. The grand dragon of the realm and his eight hydras; the grand titian of the dominion and his six furies ; the grand cy¬

clops of the den and his two nighthawks ; a grrand monk; a grand exchequer, a grand lictor ; a grand scribe ; a grand turk ; a grand sentinel. The genii, hydras, furies, goblins and nighthawks were staff officers. The gradation and distribution of authority were perfect.

One of the most important things done by this Nashville convention was to make a posi¬

tive and emphatic declaration of the principles of the order. It was in the following terms: (

stitution ; the constitutional laws thereof ; and the union of the States thereunder.®

This Nashville convention also defined and set forth the peculiar objects of the order as follows :

1. To protect the weak, the innocent and the defenseless from the indignities, wrongs and outrages of the lawless, the violent and the brutal ; to relieve the injured and the oppressed; to succor the suffering and especially the wid¬

ows and orphans of Confederate soldiers.

2. To protect and defend the Constitution of the United States and all laws passed in con¬

formity thereto, and to protect the States and people from all invasion from any source what¬

ever.

3. To aid and assist in the execution of all constitutional laws, and to protect the people from unlawful seizure, and from trial except by their peers in conformity to the laws of the land.

The Klan had a very large membership ; it exerted a vast, terrifying and wholesome power, but its influence was never at any time depend¬

ent on or proportioned to its membership. A careful estimate placed the number of Kuklux in Tennessee at 40,000, and in the entire South at 550,000. In 1871, a special message was sent to Congress by President Grant, pointing out the fact that the constitutional rights of some of the citizens and officials of the United States were being rendered insecure by the lawless members of the country and urging a Congressional enactment to put a stop to this condition of affairs. An investigation followed, and Congress passed the ((Force Bill® for the purpose of enforcing the 14th Amendment and dealing with all offenders against that amend¬

ment. In October of the same year, the Presi¬

dent issued a proclamation calling on the mem¬

bers of all illegal associations in nine counties in South Carolina to disperse and surrender their arms and disguises. Five days later a proclamation was issued suspending the privi¬

leges of the writ of habeas corpus in the counties named. Several hundred persons were arrested, and this demonstration caused the gradual dissolution of the organization. Its purpose — to check the threatening political supremacy of the blacks in the South — had been accomplished. It was revived in the South about 1916, was incorporated in Georgia in 1920, and then began to extend its activities into the North and West.

KUBAN, koo-ba'ny’, Russia, a province in the Ciscaucasian government, bounded on the northwest by the Caucasus, on the east by the district Terek and

the government of Stavro¬

pol and on the north by the Don. Its entire length is traversed from east to west, by the Kuban River (q.v.), the southern division is mountainous and covered with forests, while the northern section is broken up into steppes, lakes and swamps. The inhabitants exist chiefly from agriculture, the main production being grain, with tobacco of next importance ; but cattle and wine afford considerable source of wealth. On the steppes are bred sheep, horses, oxen and camels, and bee-culture has fair proportions.

The Kuban River and the lakes afford profitable fisheries, and salt is produced in the lagoons.

Trade consists chiefly of grain, wool, wood, fish, etc. The Rostov-Vladikavkas Railway runs through the province. Ekatorinodar is the capital. Pop. 2,830,200, consisting of 40 per cent Cossack. In 1901 there were but 467

schools and 41,086 pupils.

KUBAN RIVER, Russia, a river travers¬

ing the government of the same name; it is the ancient Hypamis or Vardanes and is known to the Tchergese as the Pstchitchie. It is fed by the glaciers of the Caucasus Mountains and extends over 525 miles, running through the northern slopes of the range in a northerly direction, bends west and, forming immense swamps, discharges into a gulf of the Black Sea. Several arms fall into the Sea of Azof and are navigable to the mouth of the Laba, a tributary.

KUBANGO RIVER, or OKAVANGO,

southwest Africa, a river flowing from the high¬

lands of Bihe, Portuguese Angola, between Koanza and Kunene, first southward then southeastward. It reaches and crosses the bor¬

der of German Southwest Africa after making a sharp bend and creates, in British Zambesia, the Nona Falls; continuing in devious direc¬

tions it reaches the plains and marshes of west¬

ern Rhodesia north of Lake Ngami. In the rainy season especially, an arm of the river above the falls forms a tributary of the Zambezi.

KUBELIK, Jan, yan koo'be-lek, Bohemian

violinist: b. Miehle, near Prague, 1880. Born of humble parentage, he studied at the Prague Conservatory and subsequently performed at semi-private musicales. In 1898 he appeared at a public orchestral concert, and in 1900 with the Berlin Philharmonic Society, and made his debut in London in June of that year. Subse¬

quently he made a brief but successful tour on the Continent and in England, and in December 1901 came to the United States, where he was most enthusiastically received. He has since made tours in Europe, the Americas and Aus¬

tralia, and has been the recipient of many honors and decorations.

KUBLA KHAN. Coleridge’s cKubla

Khan) is a poetic fragment of 54 lines describ¬

ing in highly imaginative language the stately pleasure palace built by an Eastern prince amid strange and visionary surroundings. Accord¬

ing to Coleridge’s own account the poem came to him as an opium dream, after he had been reading an account of Kubla Khan in Purchas’

(Pilgrimages.5 On sitting down to write he

remembered the entire vision perfectly, but an interruption prevented his completing the poem at the time, and on returning to the work he found that he could not recall the rest. f Kubla Khan) was published at the request of Byron in 1816. It belongs to the brief period of Cole¬

ridge's creative activity and is akin in imagina¬

tive and poetic qualities to the two other master¬

pieces of Coleridge s muse, ' Christabel and (The Ancient Mariner, 5 though less coherent than either of these longer works. The vision has no meaning and needs none. It is simply a succession of images, dreamlike and unreal but vivid and colorful. Coleridge is a master of the magic suggestiveness of words, and he has a unique faculty (III).

James H. Hanford.

KUBLAI KHAN, koob'li khan (more

properly Khubilai Khan), called by the Chin¬

ese Chi-Tson, Mongol emperor: b. 1216; d.

1294. He was the founder of the twentieth Chinese dynasty, that of the Mongols or Yuen.

He was a grandson of Genghis Khan, and in 1259 succeeded his brother Mangu as Khagan or Grand Khan of the Mongols, and in 1260 he conquered the whole of northern China, driving out the Tartar or Kin dynasty. He then ruled over the conquered territory himself, and 19

years later added to it southern China, the dominion of the Song dynasty, which had originally summoned his assistance in driving out the Tartars from the north. Kublai thus became sole ruler of an empire extending over a large part of Asia, as well as over those parts of Europe that had belonged to the dominion of Genghis Khan. He repaired the evils of so many wars by a wise administration, and by the encouragement which he gave to letters, com¬

merce, industry and agriculture brought them all to a very flourishing condition. Marco Polo, the celebrated Venetian traveler, who lived 17

years at the court of this prince, gives some interesting information regarding him. He in¬

vited European Christian missionaries to take up work in his dominions ; but the opportunity was lost, and Buddhism was the gainer thereby.

Kublai Kahn is the subject of a poetical frag¬

ment by Coleridge. Consult Yale, (Marco Polo5

(1875) ; and Howorth, (History of the Mon¬

gols5 (1876-88).

KUCH BEHAR. See Cooch Behar.

KUCHENMEISTER, kfik'en-mi'ster, Gott¬

lieb Friedrich Heinrich, German physician: b.

Buchheim, 22 Jan. 1821 ; d. Dresden, 13 April 1890. He studied at Leipzig and Prague and started practice as physician (1846) in Zittau, but removed (1859) to Dresden. His most useful work was in the research into intestinal parasites. He differentiated the human tape¬

worms, described (1853) the mate of the itch-

worm and interested himself deeply in the trichinae infection problem. He proved the value of vermifuges, and recognized (1850) the toxic action of balsam of Peru on the itch-

worm, etc. He was an advocate of cremation and was chief founder of the Gotha Cremato¬

rium. He wrote (Versuche fiber die Metamor¬

phose der Finnen in Bandwfirmer5 (1852) ; 'Die Parasiten des Menschen5 (Leipzig 1855; 2d ed., 1878-81). Consult (Die Tatenbestuttungen der Bibel

und die Feuerbestattung5 (Stuttgart 1893), which has a biography.

KUEHL, kfil, Gotthardt J., German

painter: b. Lubeck, 28 Nov. 1850. He studied at Paris, Munich and in Holland. His range of subjects runs from peasantry interiors, ancient city views, churches, etc. Among his works are

News) (ib.) ; (In the Danzig Orphan Asylum, >

in the Leipzig Museum; 'The Old Slaughter¬

house^ in Magdeburg Museum; 'Sunday

Morn, in New Pinakothek, Munich; 'The Visit,* in Hanover Museum; 'King Arthur's Court in Danzig,* in Vienna Museum; 'View of the Frauenkirche,* etc. He has been created privy councillor and professor of the Dresden Academy, and is honorary member of the Imperial Academy of the Plastic Arts, Munich, etc.*

KUEN-LUN, kwen-loon', a great moun¬

tain system of central Asia, a branch of the Himalayas, on the northern fringe of the Tibetan Plateau. It varies in breadth, both extremities being compressed, its middle portion consisting of numerous more or less parallel chains. Nearly the whole group is between lat.

30° and 40° N. The most northern part on the west is a continuous mountain-wall having several names and being farther continued by the Nan-shan and other chains well into China.

Toward the south are three roughly parallel shorter ranges, the last of which, with its east¬

ern continuations, forms the southern boundary of a mountainous region in which are the Tsai-

dam salt waste and the Koko-Nor lakes. Be¬

tween the last-named group and one farther south the Hoang-ho rises. The most southerly chain of the central Kuen-lun is that of the Yang-la Mountains. The greatest elevation of the Kuen-lun is in the western ranges, and reaches over 22,500 feet, while the chief western ranges average about 20,000 feet. Most of the peaks of the eastern chains, in China proper, are under 17,000 feet.

KUENEN, kii'nen, Abraham, Dutch theo¬

logian : b. Haarlem, 16 Sept. 1828; d. Leyden, 9

Dec. 1891. He studied at Leyden, becoming (1853) assistant professor and (1855) professor of theology. His chief works are 'His¬

toric — Critical Research into the Origin and Collection of Books in the Old Testament (Leyden 1861-65, 3 vols. ; 2d ed., 1885-93) ; 'De Godsdienst van Israel tot den Ondergang van den Joodschen Staat* (Haarlem 1869-70) ; 'De Profeten en de Profetie onder Israel* (Leyden 1875) ; 'National Religions and Universal Re¬

ligion (5 Hibbert Lectures 1882). He pub¬

lished the Theologisch Tijdschrift from 1867.

Karl Budde has issued translations into the German since his death, in 'Gesammelte Ab-

handlungen zur biblischen Wissenschaft*

(Freiburg 1894).

KUGLER, koog'ler, Franz Theodor, Ger¬

man writer on art: b. Stettin, 19 Jan. 1808; d. Berlin, 18 March 1858. He was appointed a professor of fine arts in the University of Berlin in 1833, and subsequently became a member of the Academy of Berlin. His works have un¬

doubtedly exercised great influence on German art and culture; notably a 'History of Painting from

Constantine the Great to the Present Times) (1837) ; 'Handbook of the History of Art* (1841—42) ; 'Historv of Architecture) (1856). He also wrote a 'History of Frederick the Great) (1840), which is popular in Ger¬

many. His 'History of Art* was continued by W. Liibke.

KUHLAU, koo'lou, Friedrich, German

composer; b. Uelzen, Hanover, 11 Sept. 1786; d. Lyngbye near Copenhagen, 12 March 1832.

He was trained by Schwenke at Hamburg but fled (1810) to Copenhagen to escape conscrip¬

tion. There he became violinist in an orchestra without salary, but became, in consequence composer to the court and professor of music.

He wrote several operas using Danish folklore as subjects besides a number of voice, instru¬

mental and piano pieces, but his sonatinas alone are heard at this day and these because they afford useful instruction material for beginners.

Consult Thrane, 'Friedrich Kuhlau) (Leipzig 1886).

KUHN, koon, Franz Felix Adalbert, Ger¬

man philologist and mythologist : b. Konigs-

berg-in-der-Neumark, 19 Nov. 1812; d. Berlin, 5

May 1881. He studied in Berlin, becoming in¬

structor (1841), then professor and (1870) di¬

rector of the Kollniscnes Gymnasium at Berlin.

He did great research work in comparative philology and, especially, in comparative my¬

thology of the Indo-Germanic peoples. He was editor of the Zeitschrift fur vergleichende Sprachforschung

from 1851, which combined (1862) with Beitrage zur vergleichenden Sprach¬

forschung, their combined title becoming (1875) Zeitschrift fiir vergleichende Sprachforschung auf dem gebiete der indo-germanischen

Sprachen. His most important works in his sphere of thought are 'Zur altesten geschichte der indo-germanischen Volker) (Berlin 1845) ; 'Die Herabkunft des Feuers und des Got-

tertranks) (ib. 1859) ; Ueber Entwickeliing-

stufen der Myt'henbildung* (Berlin 1874). Other works are 'Markische Sagen und Marchen*

(Berlin 1842) ; 'Norddeutsche Sagen, Marchen und Gebrauche* (with Schwartz, Leipzig 1848) and 'Sagen, Gebrauche und Marchen aus

Westfalen) (ib. 1859).

KUHNAU, koo'nou, Johann, German com¬

poser: b. Neugeising, Saxony, 6 April 1660; d.

Leipzig, 5 June 1722. He was educated at the Kreuzschule, Dresden, and later under the band¬

master Albrici, then entering (1682) the Leip¬

zig University to study law. Continuing, his musical activities as well he was appointed (1684) organist at the Thomaskirche, practising law at the same time but resigning from legal activity in favor of the position of musical di¬

rector of the university in 1700. In 1701 he became cantor at the Thomaskirche, J. Sebastian Bach succeeding him. Of historic interest is his being the creator of compositions for the piano. Among his chief compositions are his piano sonatas, his works for this instrument being second only to Bach. Consult Wagner, 'Johann Kuhnau* (Frauenstein 1912).

KUHNE, kii'ne, Ferdinand Gustav, Ger¬

man novelist and critic : b. Magdeburg, 27 Dec.

1806; d. Dresden, 22 April 1888. He studied philosophy in Berlin under Hegel, became editor (1835-42) of the Zeitung fur die elegante Welt and, from 1846, he was editor of the periodical Europa but removed (1856) to Dresden. He published 'Mein Tagebuch in bewegter Zeit) (Leipzig 1863) ; 'Christus auf der Wander-

schaft* (ib. 1870), a poetical satire on the papacy; also the popularly received 'Romischen Sonette'

(ib. 1869) ; 'Romanzen, Legenden und Fabeln) (Dresden 1880). During his journalistic days he followed the "Young Germany® movement, keeping free from its extremes. Other works of his are 'Gedichten) (Leipzig 1831) ; 'Die KUKA — KULPE

553

beiden Magdalenen) (ib. 1833) ; (Eine Quaran¬

tine im Irrenhaus) (ib. 1835) ; (Klosternovel-

len) (ib. 1838) ; (Die Rebellen von Irland) (ib.

1840) ; (Die Freimaurer) (Frankfort 1854), his most entertaining novel. His critical articles stand in high repute, such as (Weibliche und mannliche Charaktere> (Feipzig 1838) ; (Sos-

piri, Blatter aus Venedig) (Brunswick 1841) ; (Mein Karnival in Berlin* (ib. 1843) ; (Por-

trats und Silhouetten) (Hanover 1843). He wrote the dramas Hsaura von Kastilien) ; (Kaiser Friedrich III,> and (Die Verschworung von Dublin,* but they were not favorably re¬

ceived. (Empfundenes und Gedachtes, Lose Blatter aus Gustav Kiihnes Schriften* is a posthumous work edited by Edgar Pierson (Dresden 1890). Consult Pierson, (Gustav Kiihne, sein Lebensbild und Brief

wechsel*

(Dresden 1890).

KUKA, koo'ka, or KUKAUA, Africa, the

half-ruined town in the negro kingdom Bornu in the Soudan and formerly one of the largest towns of central Africa. It is situated a few miles west of Lake Chad, which often inundates it. Its former prosperity was caused by its be¬

ing a thriving market for slaves, horses, leather and cotton goods, and then boasted a population of about 60,000 in the city proper and 100,000 in its suburbs. In 1898 Rabbeh con¬

quered all Bornu and leveled the city to the ground. In 1902 the British took possession, making it a government residence and garrison town.

KUKIS, a tribe living in the mountain re¬

gions between Lower Bengal and Upper Burma.

See Chins.

KUKU NOR, koo'koo nor', Tibet, the large salt lake in northeast Tibet near the boundary of Kansu on an altitude of 10,000 feet above the sea. It is richly stocked with fish, and has a Buddhist monastery on one of its five islands.

The lake is 40 miles wide and 60 miles in length. From its southern shore rises the South Kuku Nor range of mountains with an altitude of about 15,000 feet. Its name is de¬

rived from Mongolian Kokonor, wblue sea*' ; it is the Chinese Tsing hai.

KUKUI, koo'koo-e', CANDLENUT,

TUNG, or CHINESE-WOOD OIL, the oil

obtained from the different Aleurites. The three chief sources are as follows: (1) That obtained from

the Aleurites triloba (candlenut tree) of the tropics and subtropics of the Old World, the Antilles and Brazil whose seeds are similar to small walnuts and are used by the Polynesians as a lighting fuel. They contain 62 per cent of fatty oil known as banku, kukui or kukun. When dried in the air these are eatable and serviceable for painting, and pressed into cakes are used as cattle food and manure.

(2) Aleurites cordata, or tung-tree of China, Japan and tropical South Asia, at Bourbon, Zanzibar, West Indies and the United States, yields Chinese-Wood oil, tung-oil, the Japanese abwagiri, Yani-giri, much used for furniture lac, waterproofing of woods, as well as burning for light and medicinal purposes. Cold pressed it is' light-yellow. (3) Aleurites fordn, a species which is being successfully cultivated in the Southern States (Florida, California, etc.).

KUKULJEVIC-SAKCINSKI,

yaVich-sak-chin'ske, Ivan, Croatian historian and jurist: b. Warasdin, 29 May 1816; d.

Zagorien, 1 Aug. 1889. He served in the army (1833-42), then devoted himself to poetry but taking up actively the political movement of 1848. He was appointed a keeper of the archives, becoming (1875) president of the dis¬

trict schools commission. He did much useful research into ancient history besides his energetic activity on behalf of the Croatian nationality and endeavors to reform the laws.

He wrote (Jura regni Croatise, Dalmatiae et Slavoniae) (Agram 1861-62); (Monumenta

historica Slavorum meridionalium (ib. 1868-*

75). He assisted greatly in publishing Slavonic works, a Croatian bibliography (1860-63), dictionary of southern Slav artists (1869), his¬

torical dissertations in Arkio, a publication brought out by him (1850-75) for the Histori¬

*cal Society of Southern Slavs. Of his poems, dramatical works and stories a collection was published under the title of (Razlicita djela,**

Mixed Writings (Agram 1842-47).

KULJA, kool'ja, or KULDJA, Turkestan,

principal city of a district of the same name and situated on the Hi River. It has a 30-foot high clay wall forming a citadel inhabited al¬

most entirely by Manchus, and outer gardens and plantations making a wide-spreading suburb. It is the seat of a Russian consul, has several mosques, two Buddhist temples, a Roman Catholic and a Greek Catholic church.

Its chief industrial importance is created by its bazaars, caravans coming here from Bokhara, Khokand, etc., and the outlying lands are productive of wheat, barley, poppies, etc. The population of about 10,000 is mostly Mohamme¬

dan. This city is often termed Old Kulja to differentiate it from New Kulja, situated further down the valley and which lies in ruins, having been destroyed by the insurgent Dun-

gans, in 1868, its inhabitants all being massacred.

KULLAK, kiil'ak, Theodor, German piano¬

forte musician: b. Krotoschin, Posen, 12 Sept.

1818; d. Berlin, 1 March 1882. He was a pupil of Albrecht Agthe at Posen, of Greulich at Berlin, Czerny and Sechter at Vienna and was popularly acknowledged in 1842 as a piano virtuoso. In the following years he lived at Berlin as piano instructor of Princess Anna of Prussia and was appointed (1846) court pianist. With Julius Stern and A. B. Marx he founded (1850) the Conservatory of

Music and (1855) the ((Neue Akademie der Tonkunst.**

He is not claimed to have been great as a composer but his instruction works are highly .

valued, especially his Schule des Oktavenspiels and his Kinderleben.

KULM, kulm, Bohemia, a town in the dis¬

trict Aussig, at the foot of the Erzgebirge. _ It has a brewery, iron-foundry, brown-coal mine, etc., and has a population of about 1,000. It is chiefly noted as being the scene of a battle 29

and 30 Aug. 1813, between the French, under Vandamme, and the allied Prussian, Russian and Austrian armies. It ended in the sur¬

render of Vandamme and 10,000 men, 5,000

French being killed and many cannon and equipments captured.

KULPE, kiil'pe, Oswald, German philoso¬

pher and psychologist : b. Candau, in Courland, 3 Aug. ' 1862. He was educated at Liban, be¬

coming private teacher, then studying at the universities of Leipzig, Berlin, Gottingen and 554

Dorpat. He received the degree of doctor of philosophy in Leipzig (1887) and was made adjunct professor of philosophy and aesthetics (1894) at Wurzburg where he, as director of the Psychological Institute, has done very effective service. Aside from many contribu¬

tions to scientific periodicals he wrote (Grun-

driss der Psychologie, auf experimenteller Grundlage dargestellt) (Leipzig 1893) ; (Einlei-

tung in die Philosophy (ib. ; 6th ed., 1913); (Die

Philosophic der Gegenwart in Deutsch¬

land) (ib. ; 2d ed., 1904 ; 5th ed, 1911); 'Im¬

manuel Kant) (3d ed, 1912) ; (Psychologie und Medezin) (1912) ; (Die Realisierung) (1912).

KULTURKAMPF, kool'toor-kampf, a

German term denoting the contest for political and legal rights waged between the authorities of Germany on the one hand and the authorities of the Catholic Church on the other. The con¬

flict was begun by Bismarck in 1872 and had for its main point of dispute the control by the state of educational and ecclesiastical appoint¬

ments. He urged that the declaration of Papal infallibility by the Vatican council in 1870 was an arrogation of rights dangerous to the state and that the Catholic Church had assumed an attitude of aggression dangerous to the laws of the state. The ill feeling arising from the ques¬

tions at issue led the Reichstag to pass a law in 1872 expelling the Jesuits from the German Em¬

pire. The outbreak of the Kulturkampf, how¬

ever, dated from the enactment of the May Laws (1873) aiming at state control of the clergy. The Catholic bishops, clergy and people refused to recognize the validity of the new laws. This opposition was met by still more drastic government measures and in 1875 all recusant priests were deprived of their salaries and all religious orders were abolished. The accession of Pope Leo XIII prepared the way, however, for a resumption of friendly relations between the Imperial government and the Catholic Church, and negotiations began in 1878 resulting in a nullification of the laws of 1873. "The only remnants of the repressive legislation that remained were the proscription of the Jesuits and compulsory civil marriage.

KUM, koom, Persia, capital of the former province Irak Adjmi, southwest of Teheran.

It is in an arid section on the trade route from Shiraz, via Ispahan, to Teheran, and is noted for the number of graves of Mohammedan saints, many thousands of pilgrims visiting yearly the supposed grave of Fatima, sister of Iman Riza. The town was destroyed by the Afghans early in the 18th century. Pop. about 28,000.

KUMAMOTO, koo'ma-mo'to, Japan, city,

capital of the province of Hiogo, on the is¬

land Kiusiu in the river Shirakawa. It has a formidable 16th century castle famous in connection with Kiyomasa, invader of Korea, and with the Satsuma rebellion in 1877, and now the headquarters of one of the 10 mili¬

tary districts of the kingdom. It is noted as an educational centre where American teachers have included Lafcadio Hearn and Capt. L.

L. Japes; and its silk industries are important.

Its harbor is passable only for flat-bottomed junks. It had 61,233 inhabitants in 1908.

KUMASSI. See Coomassie.

KUMAUN, ku-ma'un, India, a division of the British-Indian northwest province, situated entirely in the Himalaya Mountains, bordered on the north by Tibet, on the east by Nepaul, and having an area of 13,725 square miles.

Part of the division consists of high mountains, the more southerly Babhar being densely wooded highlands winch, by artificial irrigation, afford good crops, the remainder being the swampy, unhealthy Terai. While possessing iron, copper, lead, asbestos, etc., they are but little exploited. The valuable forests are under the protection of the government as also are the numerous elephant herds. Barely one-fifth of

the area is capable of agriculture and but little is tilled, but tea plantations have been cultivated recently. The division is made of three districts: Kumaun, Garwhal and Terai.

The only true industry is the weaving of coarse cloths, but there is considerable trading done, chiefly in Almora. The health station, Naini Tal, is the summer residence of the lieutenant-

governor of the Northwest Provinces and has its garrison. Consult Oakley, (Holy Himalaya) (London 1905).

KUMBHAKONAM, kom'ba-ko'num, or

CUMBACONUM, India, a town in the dis¬

trict of Tanjore of the presidency of Madras, in the Cauvery delta. There is a college estab¬

lished here by the British, but the inhabitants, about 65,000, are mostly Mohammedans and Hindus. The town was once the capital of an ancient kingdom and is one of the oldest and holiest of India. It contains many ancient tem¬

ples and palaces and is visited by large numbers of pilgrims.

KUMISS, koo'mis, a preparation of milk, whether cow's, mare's, ass's or goat's, which is said to possess wonderful nutritive and assimi¬

lable properties, so that it is very valuable in the treatment of consumption, scrofula, chronic diarrhoea and debility and emaciation in gen¬

eral. It consists essentially of milk in process of fermentation, and cow's milk is what is used for making it in Great Britain. On the Asiatic steppes, where it has been long used as a bever¬

age, it is made of mare's milk, but kumiss of mare's milk or goat's milk has a somewhat un¬

pleasant smell. The manufacture of kumiss is carried on in Switzerland, Russia and else¬

where. An analysis of a Swiss variety showed that it was composed of fully 90 per cent of water, nearly 3*4 of alcohol, rather more than 2 of sugar, about 1J4 each of butter and albu¬

minates, besides lactic acid, free carbonic acid and inorganic salts.

KUMMEL, kim'el, Henry Barnard, Amer¬

ican geologist : b. Milwaukee, 25 May 1867.

He was graduated at Beloit College (1889) and took A.M. degree (1892) at Harvard, Ph.D. (1895) at Chicago University. He was appointed instructor (1889-91) at Beloit College Academy, assistant in geology (1891-92) at Harvard. He was made Fellow in geology (1892-95) at Chicago University and became assistant geologist to the New Jersey State Geological Survey (1892-98) ; he was assistant professor of physiography (1896-99) at Lewis Institute, Chicago, and assistant State geologist (1899-1902) for New Jersey, and executive offi¬

cer to the Forest Commission of New Jersey (1905-15). From 1897-1901 he was associate editor of the Journal of Geography, and was

president of the Association of American State Geologists from 1908-13. He has contributed numerous useful articles to the periodicals, espe¬

cially on the stratification of the New Jersey soils and similar subjects.

KUMMEL, or DOPPELKUMMEL, dop

el-kiim'el, a liqueur produced by the distillation of alcohol with caraway seed or by mixing oil of caraway with alcohol, and adding sugar and water. The best-known kinds are Gilka ((Ge-

treidekiimmel,® from the Gilka factory at Ber¬

lin ; Ekauer, a very strong and fine liqueur having much oil of caraway; and Allasch, the Russian kiimmel made at Allasch, near Riga, and containing aniseed, fennel and coriander as well as caraway.

KUMMER, kum'er, Ernst Eduard, Ger¬

man mathematician: b. Sorau, Silesia, 29 Jan.

1810; d. Berlin, 14 May 1893. He studied (1828-31) theology at Halle, then mathematics under Scherk, becoming gymnasium teacher at Sorau. From 1832-42 he taught mathematics at Liegnitz, where Ivronecker was among his pupils. During this period he worked on the appendix to Gauss, especially on the hyper¬

geometric (Gauss) series (Crelle's Journal, Vol. XV). In 1842 he became assistant pro¬

fessor at Breslau, then professor of mathe¬

matics, and was called to Berlin (1855) to suc¬

ceed Dirichlet, teaching there in the Military Academy till 1874. He was permanent secre¬

tary of .the Academy of Sciences from 1863, retiring from active work in 1884. In his sec¬

ond period he worked on the theory of numbers, led up to it by his work on cubic remainders (Crelle's Journal, Vols. XXIII and XXXII).

He created the system of ideal prime numbers in order to overcome difficulties encountered in his work on complex numbers. In 1857 he was awarded the Grand Prize by the Paris Academy.

He also devoted work later to advance the science of geometry. His (Allgemeine Theorie der Strahlensysteme) (Crelle's Journal, Vol.

LVII) led him on to the <(Kummer surf aces, }) named after him. Other works by him are (t)ber die Wirkung

des Luftwiderstandes auf Korper von verschiedener Gestalt inbesondere auf die Geschosse) (1875). Consult Jalires-

berickt der deutschen Mathematiker-Verein (Berlin 1894), Vol. III.

KUMMER, Friedrich, German literary his¬

torian and dramatist : b. Dresden, 30 March 1865. His family was cultivated and artistic, particularly in the field of music. He was educated at the gymnasium of his native, city, and at the universities of Leipzig, Tubingen and Berlin, where his studies were chiefly in philosophy, aesthetics and modern languages.

His doctoral dissertation was on Schiller's (Demetrius) (1889). His literary activity be¬

gan at Berlin (1890-94), but since 1894 he has lived at Dresden, becoming a member of the staff of the journal Dresdener Anzcigcr, in 1897. His principal work is in the field of 19th century German literature, (Deutsche Literaturgeschichte des 19 Jahrhunderts) (1st ed., 1908, numerous reprints since), in which Kummer for the first time introduces into the study of literature the conception of the writer's generation as the dominant factor in his work.

He divides the history of German literature in the 19th century into five generations, culmi¬

nating, respectively, about 1820, 1835, 1850, 1871

and 1889 (the latter date indicating the rise of the naturalistic movement), and outlines the predominating causes of the attitude of each generation, together with a spirited and interest¬

ing elaboration of the contribution of each writer to the work of his specific generation.

The book immediately produced a profound effect on students of literary history, as it led them to see

the value of a social rather than a merely individual treatment of literary merit, and earned for Kummer the title of <(Pro-

fessor,^ conferred upon him the same year (1908). Kummer underestimates the material factors in literary history and exaggerates the factors of race (thus he attempts an explana¬

tion of the various groups of German writers on the basis of their origin from different German tribes, and their birth in different parts of the country), but the book has a perma¬

nent value as well as a sensational appeal.

His dramas are (Tarquin> (tragedy, 1889) ; (Michael Weitmoser) (historical, 1892) ; (E1-

friede) (modern, 1892).

Jacob Wittmer Hartmann.

KUMQUAT. kum'kwot, a genus of shrubs,

F ortunella, of the family Rutacece, related to the orange. Several species are known, natives of China and Japan. The plants are 10 to 15

feet high, with small fragrant white flowers, and oblong or globose fruits 1 to 1J4 inches in diameter. Kumquats were introduced into the United States about 1850 and are now exten¬

sively grown along the Gulf Coast and in Cali¬

fornia. They are the hardiest of the citrus fruits, being able to withstand temperatures as low as 15° F. without injury. The fruits are eaten raw but are more generally used for making marmalade, jelly and candied fruit.

KUMUNDOROS, koo-moon'du-ras, Alex-

andros, Greek statesman: b. Messenia, 1814; d. Athens, 27 Feb. 1883. He studied law at Athens. On

his return to Crete he became one of the' supporters of the revolution of 1841, and in 1843 was also an active revolutionist in the capacitv of secretary to General Grivas.

In 1851 he entered the Chamber of Deputies, becoming its president in 1855. He was sub¬

sequently appointed Minister of State with charge of the Department of Finance. After the fall of King Otto (1862), he was rewarded for his efforts by the appointment under George I to the chair of Minister of Justice. In 1864

and 1865 he was Minister of the Interior, and in the latter year became president of the Ministry, an office to which he was repeatedly re-elected until 1880. His home policy was to develop parliamentary power. He worked

also for the extension of Greek power and the exclusion of Turkey, but this foreign policy was annulled by the Congress of Constantinople and he was compelled to withdraw (1882).

Consult Bikelas, (Coumoundouros) (Montpellier 1884).

KUNCHINJINGA, koon-chm'jTn-ga, or

KINCHINJUNGA, India, one of the highest peaks of the Himalaya Mountains. It has been computed at 28,146 feet, whereas Mount Everest is said to be 29,002 feet. Its location is in the northeast corner of Nepal.

KUNDT, koont, August Adolf, German

physicist: b. Schwerin, 18 Nov. 1839; d. Israels-

dorf, near Liibeck, 21 May 1894. He gradu-

ated at the Berlin University (1867), becoming

teacher (privatdocent) , going to the Zurich Polytechnikum (1868) as professor of ohysics, then (1870) to Wurzburg, next (1872) to Strassburg and being called (1888) to Berlin.

He investigated first the acoustic vibratory mo¬

tion of solids and gaseous bodies and discov¬

ered the dust figures in closed sounding tubes, which offer a medium for calculating the veloc¬

ity of sound in gases and to compare these with those in solid bodies. He investigated the phenomena of the anomalous dispersion of light of substances which show strong absorption of certain colors. His researches in heat conduc¬

tivity and friction in gases were very fruitful, also those into the rotation of the plane of polarization in gases and the optical character¬

istics of metals. His (Vorlesungen fiber Experi-

mentalphysik) was published by Scheel (Bruns¬

wick 1903). Consult von Siemens memorial in Konigliche p reus sis clie Akademie der Wissen-

schaften, Abhandlungen (Vol. II, Berlin 1893).

KUNENE, koo-na'ne, or CUNENE,

Africa, a river having its source in the Portu¬

guese province of Angola on the plateau of Bihe, receiving a number of lateral streams and flowing southward forms an immense swamp near Kiteve, to turn next in southeasterly direc¬

tion where it receives the Kakulovar flowing from the Sierra da Chella. Thence it flows to the boundary of German Southwest Africa in a westerly direction and enters the Atlantic Ocean. It covers a course of 700 miles and at the outlet forms a sandbar hindering navigation besides having

cataracts. Consult Baum, (Ku-

nene-Sambesi Expedition (Berlin 1903).

KUNERSDORF, koo'ners-dorf, a village in the province of Brandenburg, Prussia, 10 miles north-northeast of Frankfurt-on-the-Oder, the scene of an important battle in the Seven Years'

War, fought 12 Aug. 1759. A Prussian army of between 40,000 and 50,000 men under Fred¬

erick the Great attacked nearly twice that num¬

ber of Austrians and Russians under Generals Landon and Soltykoff. In his initial' attack on the Russian flank, Frederick gained considerable advantages, capturing 180 guns. Disregarding the advice of General Seidlitz, he next pro¬

ceeded against the Austrians, who, however, held their ground and brought all their artillery to bear at close quarters, with the result that the Prussians were totally routed with a loss of 20 000. The other side lost even more, about 25,000.

KUNG TS'IN WANG, koong tch'en wang,

or KONG CH'IN WANG, Chinese prince and statesman: b. 11 Jan. 1833; d. 2 May 1898.

He was brother of the Emperor Hienfong and first (1860) became noted in the conflict with England and France as diplomatic mediator, when he made concessions to the Europeans, and was elected (1861) Minister of Foreign Affairs. On the death of the emperor, in the same year, he was appointed regent for his five-year-old nephew, Tungchi, after beheading the chiefs of the Old China party who tried to get the young emperor under their power.

He rewarded the English and French for their assistance in suppressing the Taiping insurrec¬

tion by carrying out reforms and affording religious tolerance. Several times, last of all in 1884,

during the war with France he was in disgrace on account of his reforms and was robbed of his titles. From 1887 he was again regent, and, in 1894, was made president of the T sung-li-Y amen. He was exceptionally progressive for a Chinese statesman.

KUNGUR, koon-goor', Russia, a circuit

town in the government of Perm, situated at the junction of the rivers Iren and Sylva. It has 11 churches, a city bank, numerous tan¬

neries and shoe factories, iron foundries, machine shops, etc. Its industrial resources in¬

clude trade in grain, leather goods, hardware, etc. In 1910 it had a population of 19,638.

In the vicinity are great caves on the banks of the Iren.

KUNIGUNDE, koo'ne-gun'de, Saint;

d. Kaufungen, near Cassel, 3 March 1039.

She was a daughter of Count Siegfried of Luxemburg and wife of Emperor Heinrich II.

Legend says both vowed to live in celibacy.

She was active during the foundation of the bishopric of Bamberg in 1007. The legend that she passed unscathed through the fire test in order to prove her innocence when accused of infidelity has been proven false. After Henry's death (1024) she became a nun in the convent at Kaufungen, which she had founded, and died there. She was buried in Bamberg Cathedral.

In 1200 she was canonized by Pope Innocence III. Her saint's day is 3 March. Consult Looshorn, (Grfindung und erstes Jahrhundert des Bistums Bamberg) (Munich 1886) ; Tous-

saint, (Geschichte der heiligen Kungigunde von Luxemburg) (Paderborn 1901) ; Gunther, kai¬

ser Heinrich II, der Heilige> (Kempten 1904).

KUNTH, koonth, Karl Sigismund, German

botanist: b. Leipzig, 18 June 1788; d. Berlin, 22 March 1850. He went to Berlin in a com¬

mercial capacity but was influenced by Alex¬

ander von Humboldt to take up the study of botany and classified and described the collec¬

tion of plant life collected in America by Hum¬

boldt and Bonpland, settling in Paris (1813) for this purpose. It was here that his (Synop-

sis) (Paris 1822-25) was published concerning the Humboldt and Bonpland plant collection; also his (Mimoses et autres plantes legumineuse du Nouveau Continent recueillies par Hum¬

boldt et Bonpland* (ib. 1819-24, with 60 colored plates) ; distribution methodique de la famille des graminees* (id. 1835, 2 vols., with 220

plates), also (Nova genera et species plan-

tarum* (ib. 1815-28, 7 vols., with 700 copper¬

plate engravings) issued in conjunction with Humboldt. At the same time he planned a herbarium containing 30,000 kinds. After trav¬

eling in England and Switzerland he was ap¬

pointed (1819) professor of the Berlin Uni¬

versity and made vice-director of the Botanical Gardens. He wrote also (Enumeratio plan-

tarum omnium hucusque cognitarum secundum familias naturales disposita) (Stuttgart 1833—50, 5 vols.), which work treats of the greater part of the monocotyledons.

KUNZ, koonts', George Frederick, Ameri¬

can gem expert: 'b. New York city, 29 Sept.

1856. He was educated in the public schools and Cooper Union, and has received the de¬

grees of A.M. from Columbia University in 1898; Ph.D. from the University of Marburg, 1903; D.Sc. from Knox College, 1907. He is president of the American Scenic and His-

tone Preservation Society; vice-president of the City History Club; past president and Fellow of the New York Academy of Science; past president and Fellow of the American Association for the Advancement of Science; president of the Museum of Peaceful Arts ; past president of the New York Mineralogical Club, 1915; past vice-president of the American Institute of Mining Engineers; Fellow of the Geological Society of America ; honorary mem¬

ber of the Uralian Natural History Society of the Ural Mountains; correspondent of the His-

toire Naturel, Paris; honorary correspondent of the Ohambre Syndicale Pierres Precieuses, of Paris. He was special agent of the United States Geological Survey, 1882-1909. He was placed in charge of the department of mines at the Omaha, Atlanta, World's Columbian and Paris expositions. He was juror of the Nash¬

ville Exposition in 1898 and of the Jamestown Exposition in 1907. Chairman of the Honorary Committee of the Berlin Exposition, 1910; chairman sub-committee on Scientific Ex¬

hibits of the Hudson-Fulton Celebration Commission; president of the Joan of Arc Statue Committee. He is third vice-president and gem expert of Tiffany and Company; honorary curator of precious stones in the American Museum of Natural History. He has the decoration of the Order of the Red Eagle, fourth

class, of Germany; he is Chevalier of the Legion d'Honneur of France; Officer de¬

struction Publique de France; Knight of Saint Olaf of Norway; Officer of the Order of the Rising Sun of Japan. He has written annual reports (1882-1905) on the production of pre¬

cious stones in mineral resources of the United States. He has published 200 pam¬

phlets on gems, precious stones, mineralogy, meteorites, folklore and scenic conservation.

He has published (Gems and Precious Stones of North America) ; (Precious Stones of Mex-

ico) ; (Gem Materials of California) ; (The Curious Lore of Precious Stones) ; (The Magic of Jewels and Charms5 ; (Ivory and the Ele¬

phant.5 He is also senior editor of the (Book of the Pearl5 ; (Rings of All Ages.5 Dr. Kunz is a member of the Century Association, the Union League, Grolier, Mineralogical clubs, and is honorary vice-president of the Tuna Club of California.

KUNZE, koon'tse, John Christopher,

American Lutheran theologian : b. Artern, Saxony, 4 Aug. 1744; d. New York, 24 July 1807. He studied theology in the gymnasiums of Bossleben and Merseburg, and at the Leip¬

zig University. After several years teaching as docent, he came to Philadelphia (1770), ap¬

pointed associate pastor of the Lutheran church, keeping a theological seminary at the same time and acting as professor of Oriental languages at the Pennsylvania University (1780-84). He became pastor of the Lutheran church at New York in 1784, serving as pro¬

fessor of Oriental languages and literature at Columbia (1784-87) and again (1792-99). He was one

of the early advocates of the need of teaching English to German youth, and he aided in introducing the English language in German churches in the United States. He wrote (A Hymn and Prayer Book for . . . Lu¬

theran Churches5 (New York 1795), the first American-published Lutheran hymnbook. Con¬

sult Norton, C. E., (Four American Univer¬

sities > (New York 1895) ; Appleton's Cyclo¬

pedia of American Biography (Vol. Ill, ib.

1898).

KUNZITE, koon'tsit, the name of a precious stone found in southern California ; so called in honor of Dr. George F. Kunz, the

special agent in charge of precious stones, United States Geological Survey, since 1882.

It is a brilliant gem and is between the topaz and pink sapphire in color. A rose-lilac is the tint which marks this stone, a color new among gems ; and its radiance is peculiar and beautiful.

Kunzite was brought to light in 1902 near Pala, in San Diego County, Cal., and was sent for classification to Dr. Kunz, the eminent min¬

eralogist of New York. Much attention was attracted by the beautiful lilac-colored crystals, for nowhere in the country, not even in the American Museum of Natural History at New York, which has the finest collection of spodu-

mene, under which the new gem was classed, had there been seen such remarkable and per¬

fect specimens as these. Dr. Kunz identified the gem and described it; but Dr. Charles Basker-

ville, professor of chemistry in the University of North Carolina, finally subjected it to ultra¬

violet light, then to the rays of high penetra¬

tive power, and lastly to the bombardment of the corpuscles shooting out from radium, which resulted in some wonderful effects new to the scientific world. Of these effects Dr. Charles Baskerville, who took the liberty of naming the gem <(Kunzite,55 for his friend, gives the fol¬

lowing account :

((On examining this gem we directed our at¬

tention to discovering the effect of radium on

precious stones. It was shown early in the ex¬

periments ot the French mineralogist, Curie, that many diamonds phosphoresce, that is, glow in the dark, after being exposed to the emana¬

tions of radium. All diamonds phosphoresce with radium, as we learned by applying the test to about two thousand gems collected from some fifteen thousand. The gem in which we .were particularly interested belongs to the class of spodumene. Mineral spodumene is usually obtained in large opaque whitish crystals, but from time to time small specimens, often richly colored and transparent, are found. The three characteristic varieties of the latter are a clear yellow gem spodumene of Brazil, the green hi d-

denite, or lithia emerald of North Carolina, and the lilac sometimes found in Connecticut. These are without doubt remnants of large specimens, which must have been elegant. Spodumene is very subject to alteration and has usually lost all its transparency and beauty of tint.55

The California spodumene crystals are of a rose-lilac tint, varying with the spodumene di-

chroism, from a very pale tinge when observed transversely to the prism, to a rich amethystine hue longitudinally. No such crystals of spodu¬

mene have ever been seen before, and the dis¬

covery is of great mineralogical interest. The crystals have been etched by weathering and have a twinning like the hiddenite variety.

When cut and mounted parallel to the base, they yield gems of great beauty. Baskerville, Kunz and Crookes have found this almost as luminously responsive to the action of radium as the diamond.

KUOPIO, Finland, a government in the

eastern part of the northern republic, sur¬

Saint Michel and Wiborg and in the east by the government of Olones. It has an area of about 16,498 square miles, of which over 16 per cent consists of lakes. 'The chief in¬

dustries are the fisheries, forestry, agriculture and cattle breeding, also butter production. A considerable amount of iron ore is produced.

Pop. 327,573, mostly Finns.

KUOPIO, -ku-op'i-o, Finland, capital of the government of the same name, situated on Lake Isalmi Railway. It is the bishop's seat and has Kalla-vesi and on the Kuivola, Kuopio and a modern cathedral, fine park, two lyceums and several trade schools and has considerable com¬

merce. Pop. 15,845.

KUR, koor, or KURA, koo'ra, Russia,

largest river in Transcaucasia, known in ancient days as ICyros. Its source is in the province of Kars, whence it runs, edged in by mountains, flowing in a southeasterly direction through the governments of Tiflis, Jelissavetpol and Baku; it enters an arid steppe and, branching out into several arms, falls into the Caspian Sea. Its course runs for 830 miles and is. navigable for steamers for 130 miles up to the junction of the Aras branch. The leasing of the fisheries near Saljany and Boshij Promsyl afford the state 1,000,000 rubles yearly. The most important places along its shores are Ardagan, Gori, Mzchet, Tiflis and Djwat.

KURANDA, koo-ran'da, Ignaz, Austrian

publicist and statesman : b. Prague, 1 May 1812 ; d. 4 April 1884. He was the son of a Jewish bookseller, studied in Vienna and did journal¬

istic work on the leading papers at Leipzig, Stuttgart and Brussels. He founded (1841) in Brussels a weekly, Die Grenzboten, the editorial offices of which were transferred to. Leipzig, where he issued the work, (Belgien in seiner Revolution } (Leipzig 1846). In the same year his drama, (Die letzte weisse Rose,* was per¬

formed successfully at the Hofburg Theatre, Vienna. In 1848 he was elected member of the Frankfort Parliament. He went to Vienna and founded the Ostdeutsche Post, a political paper conducted with dignity, which lasted till 1866.

He was a common councillor and elected mem¬

ber of the Reichsrat in 1867, where he became one of its most noteworthy political orators.

KURDISTAN, koor-de-stan' (Persian,

«land of the Kurds®), an extensive territory of western Asia, comprehending the greater part of the mountainous region which borders on the western side of the great plateau of Iran or Persia, and stretches westward till it overhangs the low plains of Mesopotamia on the southwest, and reaches the borders^ of the Turkish provinces of Diarbekir and Erzerum on the northwest. The surface is very moun¬

tainous, and is traversed by lofty ranges with summits reaching above 10,000 leet in height, stretching northwest to southeast. The whole surface on the west of the Persian frontier is drained by the Tigris and the Euphrates and their tributaries. Unless Lake Van is consid¬

ered as partly within the territory, there are no lakes of any consequence. The mountains are covered with forests of oak and other hard timber. Many of the valleys are under regular culture, with corn-fields, orchards and vine¬

yards. One of the most remarkable vegetables is manna, expressively called in Turkish Kudret-

hal-vctssiz, or the Divine sweet-meat, which is used as food. Fine horses and oxen are bred, and sheep and goats are kept in large numbers.

The Kurds are a stout, dark race, well formed, with dark hair, small eyes, wide mouth and a fierce look. Most of the men are^ armed, using lances, sabres, daggers, muskets and pis¬

tols. Many of the tribes are still nomadic. The language is of the same stock as the modern Persian. The great body of the Kurds are Mo¬

hammedans. They care little for trade, although they send to Kirkuk, Hamadan, etc., gall-nuts, tobacco, honey, sheep-skins and cattle; obtain¬

ing in return coffee, rice, leather and clothing, (chiefly cotton goods). Their allegiance to the Turkish sultan is but slight*. The famous Sul¬

tan Saladin was a Kurd. In the terrible massacres of Armenian Christians instigated and carried through by the Turkish government in 1914 and 1915, during the progress of the Great European War, the Kurds took an active and sinister part. It is very difficult to form even an approximate estimate of the whole Kurd population; the Turkish portion is sup¬

posed to contain about 2,500,000, and the Per¬

sian portion 400,000; but another estimate would give for these numbers 1,300,000 and 500,000, respectively.

KURDS, koordz, or KOORDS, an Asiatic

people of Iranian descent dwelling in a section named after them Kurdistan, ((the land of the Kurds® (q.v.), located in Persia and Turkey in Asia. They number about 2,300,000 and are nearly all Islamites. They are of mixed char¬

acter, brave, freedom loving, hospitable, rather shy, and, to some extent, true to their word; on the

other hand they have no liking for orderly work, are firmly devoted to bloody revenge and consider a robbery equally honor¬

able as heroic acts. They have great family love, the nomads wandering with their tents of black skins or the settlers living in low houses with flat wooden roofs, that serve in summer time as sleeping quarters. Their women have more freedom than is usual among Orientals, going -outdoors unveiled, dealing with men without timidity. The girls, as a rule, are given in marriage at from 10 to 12 years of age upon a dower payment. Only the rich and elite have a plurality of wives. For head covering they use the Turkish turban or a globular yellow fur cap ; they shave the head generally, wearing only a mustache, the aged alone wearing a full beard. Their weapons are long riders' lances, sabres and pistols ; the fighters on foot carry guns, and a dagger in the belt. Their history dates back to the Gutu of ancient Assyria in which empire they ap¬

pear to have had an independent political posi¬

tion ; they were merged with the Medes after the fall of Nineveh. Cyrus subjugated them, since which they have been under the domina¬

tion of the Macedonians, Parthians and Sas-

sanians, successively. After numerous insur¬

rections their chief fortress, Sermaj, was cap¬

tured, in the 9th century, and reduced by the caliphate of Bagdad, but they appear to have been in the zenith of their power in the 12th century and held sway over the Kurdistan Mountains, and included Khorasan, Egypt and Yemen. The invading Mongolians and Tatars appear to have held them later in subjection.

For further facts consult Lerch, (Forschung fiber die Kurden* (Saint Petersburg 1857-58) ; KURENBERG — KURO SHIWO

Roediger and Pott, (Kurdische StudieiP (in Zeitscrift fiir Kunde des Morgenlandes, Vols.

Ill — VII); Schlafli, Beitrage zur Ethnographie Kurdistams (in Petermann's Mitteilungen, 1863) ; Milligen, (Wild Life among the Koords) (London 1870) ; Creagh, (Armenians, Koords and Turks) (ib. 1880) ; Chantre, (Les Kurdesp in Bulletins de la Societe d' Anthropologie de Lyon (Lyons 1889).

KURENBERG, kii'ren-berk, Der von, or

der Kiirenberger, a German minstrel of the 12th century. His short love songs belong to the ancient folklore as to their subjects and are composed in Nibelungen stanzas. He came of knightly family of Austrian origin located either at Linz, Burghausen or Schala, each of which places had branches of this family. He is called the oldest Minnesinger, and his songs are collected by Hauptin (Arnstadt 1901-02). Pfeiffer and Bartsch considered he was the originator of the Nibelungenlied. Consult Vollmiiller, (Kiiren-

berg und die Nibelungen) (Stuttgart 1874) ; Eugen, Joseph, (Die Friihzeit des deutschen Minnesangs, Quellen und Forschungen) (Strass-

burg 1886).

KURIA MURIA (koo're-a moo're-a)

ISLANDS, a group of five islands situated off the southern coast of Arabia at distances vary¬

ing from 10 to about 30 miles, with a total area of over 25 square miles. Guano deposits are found in these islands, but they are considered to be barren and have very few inhabitants. In 1854 they were ceded to Great Britain.

KURIHAMA, koo're-a'ma, Japan, a mile

west of the village of Uraga, where, on 14 July

1853, Commodore M. C. Perry anchored his four vessels. On 14 July 1901, the monument, a monolith of Sendai granite, inscribed in letters of gold (now in black), penned by the Marquis Ito and reared by the America's Friends Asso¬

ciation, and to which the Mikado subscribed a thousand yen, was unveiled in the presence of Perry's grandson, Commodore Rogers, with three American men-of-war, part of the im¬

perial navy and a great company of distin¬

guished Japanese. The military and naval dis¬

play included the various types in the devel¬

opment of the Japanese fleet, showing progress from the war junk to the battleship. A dozen or so of natives, who remembered the scene of 1853, were present. The Perry monument stands enclosed by 36 granite posts, linked by ship's anchor chains, in the centre of a broad square enclosed by banks faced with stone. In 1917, Capt. Thomas Hardy of Seattle, Wash., aged 84, one of the oarsmen who rowed Perry ashore, visited Japan at the invitation and ex¬

pense of the school children of the empire and received honors from the emperor, officials and people and children everywhere. . Ten miles down the bay is the Marine Biological Labora¬

tory of Misaki, from or to which many Japa¬

nese students in the American institution of similar purpose at Wood's Hole, Mass., have studied.

KURILES, koo'rilz, a chain of 31 islands in the north Pacific Ocean, belonging to Japan (q.v.). Area, 6,068 square miles. The highest elevation is 7,382 feet. The chain extends south¬

west to northeast from Yezo to Kamchatka.

They are divided into the Great and the Little Kuriles. Pop. 4,400. Consult Snow, (Notes on the

Kurile Islands* (1896).

KURISCHES HAFF, koo’rish-es haf,

Prussia, the largest of Prussia’s lagoons, reach¬

ing from Labiau to Memel, 60 miles long and separated from the sea by a sand-bar called the Kurishce Nehrung. A number of rivers are discharged into this lagoon, such as the Dange, Minge, Russ and Gilge, etc. While navigation is carried on in the ((Memel Deeps,® a channel connecting with the North Sea and 12 feet deep and about 1,000 feet wide, this lagoon has little shipping value. The water is fresh, being fed by the above-mentioned rivers and the much larger Memel or Niemen.

KURNBERGER, kiirn'berg-er, Ferdinand,

German novelist and critic: b. Vienna, 3 July 1823 ; d. Munich, 14 Oct. 1879. He studied phi¬

losophy at Vienna, but turned to journalism (1846), fled from his native town (1848) as a revolutionist, but returned (1859) and settled in Graz (1865), then Vienna (1867). His novel (Der Amerikamiide) (Frankfort 1856) made his reputation. Other works of his are (Das Goldmarchen* (Vienna 1857) ; (Hamburg 1855). He was a pes¬

simist but made a good critic with his frankness and deep poetic understanding. W. Laufer brought out a volume of posthumous works en¬

titled

(Leipzig 1904), a novel. Consult Mulfinger, (Kiirnbergers Roman der Amerikamude*

(Philadelphia 1903).

KURO SHIWO, koo-roo she'wo (literally,

<(dark blue salt®), or, in common parlance, the black current or stream. It was distinguished from the water on either side of it and named by the

Japanese ages ago. An old Japanese map shows the general features of the north¬

ern Pacific, Bering's Strait and islands and its shores quite accurately delineated. Yet this river of warm water in the Pacific Ocean was first scientifically studied and described by Lieut. Silas Bent, U.S.N., in Perry's expedi¬

tion 1852-54, who made a report, the state¬

ments and suggestions in which have been in the main confirmed by later investigators. In history, this stream of black brine contributed notably to the peopling of both Japan and America and to its flora and fauna. The first host of invaders from the Asian continent through Korea y?ere aided by it to reach Id-

zumo and Hiuga, and the second set, or the great drift of humanity, from the Malay world, made good use of the current and landed at many points on the coasts of Japan. The Kuro Shiwo is bent southward, not by impinging on the land, but is prevented from entering the Arctic Ocean by the Bering Strait, which at its deepest is only 30 fathoms, or 180 feet deep, and much less than 50 miles wide, and in it are three islands. Through this opening the 560

cold water rushes from the icy seas, drawing or pushing the Kuro Shiwo eastward. Though fogs abound, only a little polar ice comes through, with no icebergs, as in the Atlantic Gulf Stream. One curious effect was to sup¬

ply the Hawaiian Islands with the splendid timber of ((Oregon" - — a word which ultimately came to mean anything unusually fine and is. so used, as an adjective, in the Hawaiian version of the Bible. Consult Perry's 'Narrative of the Japan Expedition' (1857) ; Rein's 'Japan'

(1884) ; transactions of the Asiatic Society of Japan.)

KUROPATKIN. See Kouropatkin.

KURSCHNER, kiirsh'ner, Joseph, Ger¬

man author and editor: b. Gotha, 20 Sept. 1853 ; d. on a journey to Huben, 29 July 1902. His first employment was in mechanical engineering, then he studied at the Leipzig University, there¬

upon (1875) living several years in Berlin. He managed the Stuttgart periodical Vom Fels zum Meer (1881—89) and founded Deutsche Nationalliteratur; he was appointed literary di¬

rector of the Deutsche Verlagsantalt and re¬

moved (1893) to Eisenach. He devoted some time to compiling theatrical history, then be¬

came editor (1880-82) of Ncne Zeit, official organ of German dramatical authors and com¬

posers, then (1885-86) he edited Deutsche Schriftstellerzeitung , etc. After editing sev¬

eral encyclopedias he compiled Allegemeiner deutscher Literaturkalender from the fifth to 24th yearly issue. He wrote also (Konrad Ek-

hof' (1872) ; 'Fleil Kaiser, dir!' (1897) ; (Frau Musika' (1898) ; 'Kaiser Wilhelm II als Sol-

dat und Seemann' (1902).

KURSK, Russia, a government bounded by the governments Tchernigov on the northwest, Orel on the north, Voronesh on the east and Charkov and Poltava on the south and south¬

west. It covers an area of about 17,937 square miles. It consists of a wide plain framed in by heights which discharge their water by over 400 rivers of which the Sein is chief. It has a

population of about 3,133,500, mostly Great Russians, who have, however, adopted many of the customs of the Little Russians, all belong¬

ing to the orthodox Greek Church. It is one of Russia's most fertile governments. The chief industry is agriculture with a large out¬

put of wheat, rye, oats, barley, buckwheat, sugar-beets, hemp, etc. It has a great growth of fruit such as apples, cherries and plums; the bee-culture, has, however, declined greatly and its cattle trade is small. Manufactures are inconsiderable, sugar being the most promi¬

nent along with oil-pressing.

KURSK, kursk, Russia, capital of the gov¬

ernment of the same name situated on the mouth of the Kur River and a junction of sev¬

eral railways. It has 16 orthodox Greek churches, a Lutheran church, priests' and teach¬

ers' seminaries, two gymnasia, a high school and a school of geodetics, besides banks, theatre, commercial exchange, etc. Considerable indus¬

try is carried on in leather work, steam grinding mills, oil-pressing, pottery, tobacco manufactur¬

ing, as well as commerce in grain, tallow, hemp and hemp-oil, and bristles. Pop. 83,330.

KURTH, kerth, Godefroid, Belgian histo¬

rian: b. Arlon, 11 May 1847; d. Assche, Bra¬

bant, 4 Jan. 1916. From 1872 to 1906 he was professor at the University of Liege, and from the latter year until his death was director of the Belgian Historical Institute, Rome. He was a member of the Academy of the Catholic Religion of Rome, of the Royal Society of Literature of London, of the Dutch Literary Society of Leyden, of the Royal

Academy of Belgian and of other societies Belgiah and foreign. He was president of the board of administration of the Royal Library, Com¬

mander of the Order of Leopold and Knight of the Order of Pius IX. He wrote 'Caton l'ancien' ; (Etude critique sur Saint-Lambert et son premier biographe' ; (La loi de Beau¬

mont en Belgique' ; 'Les origines de la civil¬

isation moderne' ; (Les origines de la ville de Liege' ; 'Histoire poetique des Merovin-

giens' ; 'La frontiere linguistique en Belgique et dans le nord de la France' (2 vols.) ; 'Les etudes franques' ; 'L'eglise aux courants de l'histoire' ; 'Clovis' (2 vols.) ; 'Chartes de l'Abbaye de Saint-Hubert en Ardenne' ; 'Not-

ger de Liege et la civilisation au Xe siecle'

(2 vols.); (La cite de Liege au moyen age'

(3 vols.) ; 'Manuel de l'histore de Belgique' ; ' Abrege de l'histoire de Belgique'; 'Manuel d'histoire universelle' (2 vols.) ; 'Notre nom national' ; 'Mizraim, souvenirs d'Egypte' ; (La nationalite Beige.' He founded and became first director of Archives Beiges, revue critique d'historiographie nationale.

KURZ, kiirts, Heinrich, German historian of literature : b. Paris, 28 April 1805 ; d. Aarau, 24 Feb. 1873. Of German parents, he studied at Leipzig and Paris, and lived in Munich and Augsburg from 1830, in the latter city pub¬

lishing a constitutional opposition paper, Die Zeit, which caused his incarceration after a few weeks. He next removed to Switzerland teach¬

ing German and literature in Saint Gall and was promoted to professor (1839) at Aarau and made librarian also (1846). The rich treasures of the Aarau Library furnished him material for the study

and research in German literature. He wrote 'Handbuch der poetischen Nationalliteratur der Deutschen'seit Haller'

(Zurich 1840 ; 3d ed., 1859) ; 'Handbuch der deutschen Prosa von Gottsched bis auf die neueste zeit' (ib. 1845-53) ; (Geschichte der deutschen Literatur' (Vols. I— III, Leipzig 1851 ; Vol. IV, 1868-72), his greatest work, which reached its seventh edition in 1876. He also edited 'Esopus von Burkard Waldis' ; 'Sim-

plizianische Schriften' of Christoffel von Grimmelshausen ; Fischart's * Dichtungen' ; Wickram's 'Rollwagenbuchlein.' He edited collective works of Goethe (1867-68) and of Schiller (1867-68) in 12 and 9 volumes, re¬

spectively, also of selected works of Lessing, Herder, Wieland, Chamisso, von Kleist and E. T. A. Hoffmann, and compiled (Die deutsche Literatur im Elsass' (Berlin 1874).

KUS, a semi-wild tribe of Dravidians in¬

habiting parts of Bengal and Orissa. They are also generally known as Khonds and number over half a million. See Khonds.

KUSI, koo se. See Coosy.

KUSKOQUIM, kus'ko-kwim, Alaska, the

second river in size in the Territory, rising on the northern slopes of Mount McKinley, and after a southwestern course of over 650 miles, flowing through the wide estuary of Kusko-

quim Bay into Bering Sea, about 200 miles south of the Yukon Delta. It is navigable for about 500 miles. The trading stations along its banks are lvolmakof, Oknagamut, Odgavigamut, Gavi-

mamutt and Bethel. The inhabitants in the region are chiefly Indians and Eskimos. Gold was discovered in the valley of the Kuskoquim in 1903 and the valley is now dotted with mining camps.

KUSSMAUL, kus'moul, Adolf, German

physician: b. Graben, near Carlsruhe, 22 Feb.

1822; d. Heidelberg, 28 May 1902. He studied at Heidelberg, became assistant of Nagele and Pfeufer, and removed (1847) to Vienna, then Prague and became (1848) military surgeon for Baden. He became instructor (1855) at Heidel¬

berg University, and was appointed adjunct professor (1857) and professor (1859) and di¬

rector of the medical clinic and polyclinic at Erlangen. In 1863 he practised in Freiburg in Breisgau and (1876) at Strassburg. He retired (1889) and lived at Heidelberg. He made useful researches in epilepsy, advanced the treatment of diseases of the stomach by usage of the stomach-pump. He wrote (Die Far-

benerscheinungen im Grunde des menschlichen Auges) (Heidelberg 1845), an invaluable work; (Untersuchungen iiber das Seelenleben des neugebornen Menschen) (Leipzig 1859; 3d ed., Tubingen 1896) ; (Untersuchungen iiber den constitutionellen Merkurialismus und sein Verhaltnis zur constitutionellen Syphilis) (Wurzburg 1861) ; (Ueber die Behandlung der Magenerweiterung durch eine neue Methode) (Freiburg 1869) ; (Zwanzig Briefe der Mens schenpocken und Kuhpockenimpfung) (Frei¬

burg 1870) ; (Die Storungen der Sprache) (Leipzig 1885), in Ziemssen’s (Handbuch der Pathologie) ; (Jugenderrinnerungen eines alten Arztes) (Stuttgart 1899; 8th ed., 1909).

KUSSNACHT, kus'naht, recently called

KUSSNACH, Switzerland, a village, the capi¬

tal of a district in Canton Schwyz, located at the foot of the Rigi Mountain on the shore of the Kussnach Lake, an arm of Lake Lucerne.

It is the landing station for the lake steamers that ply round this superbly beautiful region.

A fountain has been erected here in memory of William Tell, and on the spot nearby, where legend states Gessler was shot, is Tell's Chapel, and the ruins of the castle supposed to have been the Gessler abode. Pop. 3,981.

KUSTENDJE, kii-sten'je, or CON-

STANTZA, Rumania, capital city of the

Dobrudja, located on the Black Sea and on the Constantza-Tchernavoda Railway, which here bridges the Danube. The ancient remains of the end of the so-called Trajan's Wall is located here. Among its public and prominent buildings are a cathedral, Greek, Protestant, Catholic, Armenian and Bulgarian churches, eight state subsidized mosques, a gymnasium, four public schools, etc. The modern constructed harbor, finished 1902, has a breakwater and docking basins, freight elevators, etc. A large export trade is done in grain, sheep and petro¬

leum and considerable merchandise is imported here, chiefly textiles, cast-iron goods and colo¬

nial wares. It stands in direct communication by steamer with Constantinople, and its im¬

portance led to its early seizure by the Central Powers when war entered this kingdom (see War, European). This city is the site of the vol. 16 — 36

old Roman town Constantiana and was the place of exile of Ovid. The Russians and Turks met here in the War of 1854. Pop.

26,628.

KUSTENLAND, kii'sten-lant, Italy, the

coastal lands or littoral comprising the three Crown lands : Gorz, Gradisca, Istria and the city of Trieste with its district. In the former administration of these lands Trieste was the focal point; Gorz, Gradisca and Istria had inde¬

pendent representatives, Gorz and Gradisca hav¬

ing 22 delegates and Istria 33, the conventions meeting at Gorz and Parenzo. The political administration was at Trieste, vested in the gov¬

ernor, judiciary and finance branches. The area of the littoral lands is 3,077 square miles, with about 894,457 inhabitants. Consult Czoernig, von, (Die ethnologischen Verhalnisse des Oesterreichischen Kustenlands) (Trieste 1885) ; id., (Spezialortsreportarium des aster-

reichisch-illyrischen Kiistenlandes) (Vienna 1894), published by the Central Commission on Statistics.

KUSTRIN, kiis'tren', or CUSTRIN, Prus¬

sia, a town and fortress of the first rank in the government district Frankfurt, located at the confluence of the Warthe and Oder rivers and the junction of several railways. Its chief prominent buildings are three Evangelical churches, one being the Saint Mary Church containing the graves of the Margrave Johann and his wife, Katharina ; a Catholic church, synagogue, handsome towmhall and newly-

erected bridges spanning the Oder and Warthe.

There is a noteworthy monument to the Mar¬

grave Johann von Kiistrin in the palace grounds, and a statue of the Grosser Kurfiirst. Its in¬

dustries consist of a potato meal factory and manufactures of fire-extinguishing apparatus, pianos, varnishes, roofing paper, hot-bed frames, wagons, furniture, cigars, ovens, etc., besides flour mills, saw mills, machine works, wood-

cresoting works, pottery, etc. The crown prince, later Frederick the Great, was held prisoner here by his father from 1730-32. The town was bombarded by the Russians in 1758, and the fortification was surrendered, 1 Nov. 1806, to the French upon the arrival of a small party of cavalry and was held till 1814. Pop. 17,600.

KUTAIA, koo-tl'a, or KUTAHIA, Turkey,

the capital of a sandjak in the vilavet Brusa, Asia Minor. It is located in a fertile district, has an ancient Byzantine fortification, numer¬

ous mosques and baths, and a number of churches. The agricultural products are grain, tobacco, poppy, vegetables and fruit. Very pretty faience is made here, but. the former thriving potteries are mostly extinct. Jt has considerable commerce in wool, goats' hair, hare-pelts, opium and meerschaum. The

Mehemed Ali neace with the Porte was made here 14 May 1833, and it was here that Kossuth was interned from 1850-51. Pop. 27,000, mostly Mohammedans.

KUTAIS, Russia, a government in Trans¬

caucasia, bordered on the west by the Black Sea, on the north by the provinces, Kuban and Terek, on the east, southeast and southwest by the governments Tiflis, Kars and the vdavets Erzeroum and Trebizond. respectivelv. It has an area of 8,145 square miles, consisting largely of mountains, the Ryon River and its tributaries, 562

flowing through the only level lands. The southwesterly part is the most fertile in the Caucasus. The agricultural products raised are corn, wine, tea, ramie, wheat, nuts, figs, pom¬

egranates, cherries, rye and barley, and the cattle, horses, asses, mules of this country are noted. Silk also enters into the cultivation.

Of its mineral output manganese is the most important, but coal, lead, silver and copper are mined, also marble and fire-clay. Its popula¬

tion is about 1,025,300, represented chiefly by the numerous tribal races of the Caucasus, fol¬

lowers of the orthodox Greek Church chiefly, the remainder being mostly Mohammedans.

KUTAIS, koo-tis, capital of the govern¬

ment of the same name, in Transcaucasia, lo¬

cated on the Rion River and the Rion-Kutais-

Tkvibuli Railway. It is the seat of govern¬

ment and has two gymnasiums, a high school and district school. Its magnificent cathedral of Georgian architecture dating from the 11th century was laid in ruins by the Turks in 1692, and has not been restored. The chief in¬

dustries are hats and silks. Pop. 57,361, includ¬

ing many Armenians and Jews.

KUTCHIN, ku-chin', a name given to the tribes of the Athabascan Indians who live near the Yukon River in Alaska, and in British North America down to the lower Mackenzie Valley. They are also called Loucheux and Quarrelers. They number less than 2,000. They are very fond of games and athletic contests, and are of a hardy, manly and warlike disposi¬

tion. They are among the most hospitable of the Indian tribes of the American continents.

Guests are entertained for weeks and even months at a- time. Property is carefully recognized by the Kutchin and the chiefs, medicine men and those in general, who possess wealth or rank or both, have several wives.

They have somewhat complicated religious cere¬

monies and myths, and the medicine men possess very great authority, exceeding that of the chiefs. Consult Petitot, (Autour du lac des Esclaves5 (1891); (Geographie de l'Athabas-

kaw — Mackenzie et des grands lacs du bassin artique> (Paris 1875) ; Schoolcraft, (Indian Tribes. y

KUTTENBERG, kut'ten-berk, Bohemia,

known to the Czechs as Hora Kutna, a town on the Vienna-Tetschen branch of the Austrian North-West Railway. It has nine churches, among them the beautiful unfinished Saint Barbara Church of the 14th and 1 5th centuries, in Gothic style, and the Saint Jacob's with its high tower. The old royal Walsche Hof castle of the 13th century and its beautiful chapel as well as the Mint are notable structures, also the town-hall. It has several industrial schools, the old Headek castle converted into a Czech teachers' seminary, the Ursuline convent, etc.

Its industries consist of fruit and vegetable raising, sugar, alcohol factories, a brewery, machine works, iron foundry, organ factory, etc. The foundation of the town originated from the discovery of silver ore and mining flourished in the 13th century. Pop. 15,542.

KUTUSOV, Michail Ilarionovitch Gole-

nishtchev, Prince of Smolensk, Russian field-

marshal : b. 16 Sept. 1745 ; d. Bunzlau, 28 April 1813. Entering the army in 1765 he fought against the Poles from 1769, against the Turks 1770; he lost an eye (1774) in the Crimean campaign, and then dwelt abroad for some years. He was made major-general (1784), and, at the sieges of Odessa (1790), Bender and battle of Rimnik, and of Ismail and Matchin (1791) under Suvarov, he gained fame. In 1793 he was appointed Ambassador to Con¬

stantinople and later Ambassador at Berlin.

After the tsar's assassination (1801) he was appointed governor-general of Saint Petersburg, for a While going thence to his estates in Volhynia. In 1805 he was given command of the First Army Corp. He gained a signal vic¬

tory, on 18 and 19 November over Marshal Mortier at Diirrenstein, and comnianded, under Tsar Alexander I, on 2 Dec. 1805, the allied armies in the battle of Austerlitz, where he was wounded for the third time. From 1806-11 he was governor-general at Kiev, then at Vilna, to become (1811) commander-in-diief in the Russo-Turkish War, for which he was created a prince. After the Peace of Bucharest (May 1812) he succeeded Barclay de Tolly as com-

mander-in-chief in the army against Napoleon I. He fought the bloody battle of Borodino (7 Sept. 1812) and became field-marshal. He was granted the title Smolensky for his victory over Davout and Ney at Smolensk. Calling on all Europe by proclamation he carried on the campaign but died early at Bunzlau, where a monument was erected in his memory, as also at Saint Petersburg. Consult Buchholz, Fried¬

rich von, (Der Feldmarschal, Fiirst Kutusov SmolenskoP in Geschichte der europdischen Staaten (Berlin 1814) ; Schnitzler, J. H. (La Russie 1812: Rostoptchine et KoutousoP

(Paris 1863).

KUTZING, kii'tsing, Friedrich Traugott,

German botanist : b. Ritteburg, near Artern, 8

Dec. 1807; d. Nordhausen, 9 Sept. 1893. He studied natural science at Halle, was appointed (1838) teacher of natural science at the high school at Nordhausen, retiring in 1883. He wrote and studied on the algae species specially, establishing a new epoch in the knowledge of the subject. Among his most important works are 'Species Algarum> (Leipzig 1849) ; (Algae aquae dulcis > (Halle 1833-36),

containing dried specimens; (Grundziige der philosophischen Botanik) (Leipzig 1851-52), in which he fought against the theory of stability of the species and advocated spontaneous generation.

KUTZTOWN, koots'toun, Pa., borough in

Berks County, on the Philadelphia and Reading Railroad, 18 miles northeast of Reading. There is a normal school here and manufactures of flour, leather, shoes, hosiery, shirts, silk goods and iron foundries and marble and granite works. The electric-lighting plant is the prop¬

erty of the borough. Pop. (1920) 2,684.

KUYP, Albert. See Cuyp, Albert.

KUYPER, koi'per, Abraham, ex-Premier

of the Netherlands, exponent of Calvinism, es¬

pecially in its relation to art, literature and democracy: b. 29 Oct. 1837, at Maasluis. He was educated in Leyden, where he received the degree of doctor of theology. He held pastorates at Beesd, Utrecht and Amsterdam (1867-74). He was the chief founder of the Free University of Amsterdam (1880), now aided by the state, and has been for over 30

years leader of the Anti-Revolutionary party KVICALA — KYD

563

and editor-in-chief of De Standaand (the ' Standard) . Among Dutch folks all over the world, especially in the Western States, he is reckoned not only a theologician, philosopher and statesman of great ability, but as standing in the front rank of writers of pure and forcible Dutch. He has tens of thousands of admirers in America, who read his writings, which in¬

clude incisive editorials, an Encyclopaedia of Theology) and various essays of general liter¬

ary interest, such as (Calvinism and Art>

(1893); (Pantheism) (1893), and Ealvinism: The Origin and Safeguard of our Constitutional Liberties) (1895). He was Premier of the kingdom during the Boer War. In 1891 he visited the United States and delivered the Stone lectures at Princeton. Rev. J. Hendrick de Vries has translated into English some of Dr. Kuyper's 'best books and essays. His daughter Henriette, noted as an authoress, wrote (in Dutch), (Six Months in the Homes of Eastern America) ; (Vacations in England) ; (A Visit to Russia,) and (Henry Hudson, in Dutch Service> (1909) and has written her ex¬

periences as a nurse during the World War of 1914-18.

KVICALA, kve-cha'la, Jan, Bohemian

classical scholar and politician : b. Miinchen-

gratz, 6 May 1834 ; d. 1908. He studied in Prague and Bonn and became (1867) adjunct-

pr.ofessor of classical philology at the Prague University. He wrote (Beitrage zur Kritik und Erklarung des Sophokles) (Vienna 1864 —69) ; (Vergilstudien) (Prague 1878) ; (Studien zu Euripides* (Vienna 1879) ; (Neue Beitrage der 2Eneis> (Prague 1881), etc. As a politician of the Old-Czech party he was elected (1880-

83) to the Reichsrat and from 1881 he was a member of the Bohemian Chamber of Deputies in which capacity he put through a bill com¬

pelling the erection in Bohemia of special schools for Czech children (the lex Kvicala).

In the Reichsrat he took a leading part in creating the law for the separation of the Prague University into Czech and German divisions, taking an instructor's position in the former.

KWALHIOKWA, kwal-he-6'kwa, a tribe

of Athabascan Indians, formerly living on Willopah River, Washington, near the Lower Chinook Indians. They are frequently con¬

founded with the Owilapsh or Whilpah.

KWANGSI, kwang'se, China, a province in the southern kingdom, bordered by Kwangtung on the east and southeast, by Tungking on the southwest, Yunnan on the west and by

Kweichou and Hunan on the north. It has an area of 77,200 square miles. The greater part of the section is composed of Mesozoic red sandstone forming a basin; the easterly and southerly portions of the province are moun¬

tainous. The almost unnaviga'ble Si-kiang River and its tributaries water the province, whose chief products are rice, maize, aniseed, cinna¬

mon, sugar, tea, indigo, lumber, etc. Its in¬

dustries consist of silk and cotton textiles; mining scarcely exists. It is China's poorest province, and is the place of refuge for robber bands. Its capital city, Kweilin, is in the northeast of the province. The harbor of Wuchou has important foreign commerce ; of importance also are Nanning on the Yanking, and Lungchou on the Tonking border. It is in this province that such insurrections as the Taiping and others have arisen.

KWANZA, kwan'za, or COANZA, ko-

an'za, Portuguese West Africa, a large river rising in Lake Mussombo, it flows at first in a northeasterly direction, then north, and finally in a westerly and northwesterly course, and enters the Atlantic Ocean near lat. 9° 10' S., not far south of Saint Paul de Loanda. In the lower part of its course there are many falls, the last being the Livingstone or Kambambe Falls, below which for a distance of about 160

miles the river is navigable for small steamers.

Its total length is about 700 miles.

KWEICHOU, or KUEICHOU, China, a

southwestern province bounded by the provinces Yunnan on the west, Kwangsi on the south, Hunan on the east and Szetchwan on the north.

It is largely a mountainous region and fertile only in small stretches of the valley of the Wukiang River which runs into the Yangtse-

kiang. There is therefore little agriculture but more cattle breeding; its horses being con¬

sidered the best in China. Its richness in minerals is important ; copper for all the Chinese coinage is mined here; also quicksilver is becoming an important product. The coun¬

try is very much denuded of inhabitants since the war of annihilation (starting 1848) of the Chinese against the mountain tribes known as Miaotse. Its exports are paper and raw silk stuffs and salt is its chief import. The capital is Kweiyang, and other large towns are Tsuni in the north, Singi in the south and Tchun-yuen on the Yuenkiang River. The population is about 9,265,000 according to the Chinese census.

KYABUCCA, a beautifully mottled wood

found principally in Guinea, Moluccas, and to some extent in India. It is made use of in the manufacture of fancy furniture, caskets and tobacco and snuff boxes. See Kiabocca.

KYANIZING, ki'an-Iz'ing, a process for

preserving timber, cordage, etc., from the effects of dry-rot named from an inventor of the name of Kyan. It consists in immersing the material to be preserved in a solution of corrosive sublimate and water, in the proportion of one pound of the former to from 10 to 15 gallons of the latter, according to the strength required.

The time during which timber must be allowed to remain in the solution depends upon its size and thickness. For boards and small timbers 24 hours are required for each inch of thick¬

ness. This process is now almost entirely dis¬

used, as wood is much better preserved by be¬

ing saturated with creosote or coal-tar.

KYD, Thomas, English dramatist: b. Lon¬

don, about 5 Nov. 1558; d. December 1594.

While one of the most important of the pre¬

cursors of Shakespeare, Kyd's very name was scarcely known until the closing years of the 19th century. In 1773 Thomas Hawkins dis¬

covered his 'name in connection with The Spanish Tragedy in Heywood's (Apologie for Actors.* Much concerning his troubled career has been unearthed by scholars within the last quarter-century. Kyd was entered at the Mer¬

chant Taylors' School late in 1565, where Ed¬

mund Spenser was his school-fellow. Kyd re¬

ceived no university training but after leaving the school above mentioned he entered his 564

father's profession of scrivener. He was greatly influenced by Seneca and Lyly. As far as known at present Kyd brought out his (The Spanish Tragedie containing the Lamentable End of Don Horatio and JBel-imperia ; with the Pitiful Death of Old Hieronimo) in the period between 1584 and 1589. For over 60

years (The Spanish Tragedy } was the most successful play on the English stage and long retained its great popularity. A prologue was added in 1592

entitled (The First Part of Jero¬

nimo, or The Warres of PortugaP (first printed in 1605). It is now believed on good ground that Kyd was the author of the original draft of the tragedy of Hamlet, Prince of Den¬

mark, which was drawn upon extensively by Shakespeare. Another work of Kyd, (Soliman and Perseda) appears to have been written about 1588. In 1590 or thereabouts Kyd aban¬

doned his career of playwright and entered the service of a lord who kept a troop of players.

Boas thinks this lord was Robert Radcliffe, 5th earl of Sussex. Kyd dedicated his translation of Garnier's

Other works of Kyd are '■The Householder's Philosophy) a translation from Tasso, and (The Most Wicked and Secret Murdering of John Brewer, Goldsmith) (1592). Other works are lost with the exception of fragments. When Marlowe was arrested in 1593 for ihis <(lewd libels,® some of Kyd's papers were found among his effects and the latter was also ar¬

rested. When papers at his house were exam¬

ined there was discovered one of Wile heretical conceits denying the deity of Jesus Christ.®

Kyd was tortured at Bridewell, but maintained his innocence and blamed Marlowe for his pre¬

dicament. Released after a time, he was aban¬

doned by his patron and died in destitute cir¬

cumstances. Kyd's importance in the literature of his period lies not in any inherent excellencies of his verse but rather in the fact that he was a pioneer who exerted a marked influence on Ben Jonson, Fletcher and Shakespeare. Con¬

sult the collected edition of Kyd's works with biography edited by F. S. Boas (Oxford 1901) ; Manly, J. M., Specimens of Pre-Shakes-

pearean Drama* (Vol. II, Boston 1897) ; edition of (The Spanish Tragedy) by Schick (in tem¬

ple Dramatists,* 1898) ; Sarrozin, (Thomas Kyd und sein Kreis) (Berlin 1882) ; Ward, (History of English Dramatic Literature >

(Vol. II, London 1881).

KYMRY. See Cymri.

KYNETT, ki'net, Alpha Jefferson, Ameri¬

can clergyman : b. on the site of the 'battle of Gettysburg, Pa., 12 Aug. 1829; d. Harrisburg, Pa., 23 Feb. 1899. His people moved to Iowa in 1842. He was a self-educated man and taught for sometime in the public schools. In 1852 he entered the ministry of the Methodist Episcopal Church, uniting with the Iowa Con¬

ference, becoming a charter member of the Upper Iowa Conference in 1856. After 12 years in the pastorate he became secretary of the Church Extension Society of the Methodist Episcopal Church in Philadelphia in 1866 and served until his death. It was through his in¬

fluence that the society was organized in 1864.

Its headquarters were located in Philadelphia.

He was a member of eight General Confer¬

ences, beginning with 1864. During the Civil War he was on the staff of Governor Kirkwood and was active in recruiting several regiments as well as in the Sanitary and Christian com¬

missions. Under his management the Church Extension Society aided over 11,000 churches to erect edifices to the extent of nearly $6,500,000, which was mostly

raised by church collections.

KYRIE ELEISON, kir'i-a a-la'i-son (from the Greek Kyrie eleeson, <(Lord, have mercy®), an invocation following the Introit of the Mass.

It is almost the only part of the liturgy in which the Roman Catholic Church has retained the use of Greek words. Just after the Introit the priest celebrating the Mass and the servers repeat alternately three times ((Kyrie eleison,®

and then as many times in the same manner <(Christe eleison,® and so on alternately. When it is sung the leading singer takes the part of the priest, and the choir that of the servers.

The introduction of the Kyrie into the Mass is attributed to Pope Sylvester I, in the beginning of the 4th century.

L

Lthe twelfth letter of the English and most of the other modern European

languages. Its definitive form in the

Greek alphabet is A, but in very early Grecian, Hebrew and Phoenician monuments it has the form V or L . Its name in Hebrew and Phoenician is lamed and in Greek lambda, in Arabic lam.

The sound of 1 is produced when the tip of the tongue is brought into contact with the palate behind the upper front teeth, and, with the jaws apart, the breath is emitted. The sound of r is produced in nearly the same way, but in sounding the r the tongue is not in con¬

tact with the palate and may vibrate. Thus these two letters represent sounds that are much alike. But there are nations that cannot sound the r, as the Chinese and sundry other races ; these substitute 1 for r : the technical name for this vice of utterance is lambdacism ; the opposite vice is an

inability to pronounce 1, for which r is substituted, as by the Japanese.

In languages whose syllabaries admit both these sounds the two letters are freely interchanged or confounded. In languages belonging to one common family, the Aryan, for example, a word which in one language has r, in another has 1, and vice-versa ; examples : Lat. primus, Eng.

plum; Lat. ulmus (elm), Fr. orme. The like is seen in the formation of derivatives within one language. Thus in Latin the adjective termina¬

tion alis (Eng. al, as in liberal) is changed to aris when the word has already an 1 ; for ex¬

ample : from peculium comes peculiaris, from auxilium, auxiliaris, and vice-versa, r for a like reason is changed to 1 : thus from per and lucidus comes pellucidus, from inter and lectus, intellectus. L is also substituted in one language for n in another; for example: Gr. pneumon (lung), Lat. pulmo. Or d and 1 are inter¬

changed: Gr. Odysseus, Lat. Ulysses; the like is seen in the two Latin words odor and olor; and the Latin lingua was once written dingua, allied to Eng. tongue and Ger. zunge.

In Italian the 1 of Latin words is often changed to i: Lat. planus, plumbum (lead), Ital. Piano, piombo.

In English 1 is often silent: palm, calm. In French al becomes au; a le becomes aw, cheval (horse) plu. chevaux ; and the English auburn is from Latin alburnus. In English and most of the other languages 1, whether single or double, has one sound-value only, the same which it has in pale, pallid; but in French some¬

times 11 has a sound resembling that of Hi in million, and like y in meilleur; in Spanish 11

may commence a word, for example: liana (wool), and is classed as a distinct alphabetic character: its

sound- value is the same as that of 11 in French. In Welsh, on the other hand, 11 has a most peculiar, indescribable sound, partly 1 and partly a sibilant sh.

L. E. L., the nom-de-plume initials of an English novelist, Letitia Elizabeth Landon (q.v.), later Mrs. Maclean.

L'ABBE CONSTANTIN, la-ba kon'stawn-

tan, the best of Halevy's works of fiction, has enjoyed an immense popularity in France and abroad. Published as a serial in the Revue des Deux Mondes in 1887, it did much to bring about the author's election to the French Acad¬

emy two years later. The number of editions has run into the hundreds and the book is widely used as a text in the classroom.

This unusual success is due largely to its sound moral tone and the worthy attitude toward the problems of life on the part of the principal characters. From the old country priest whose life has been one of self-sacrifice and charitable deeds, to the young American heiress who finally offers to marry the priest's godson, a modest artillery officer, all the characters show the same sense of honor combined with un¬

affected virtue and sincerity of purpose. A touch of exotism due to the introduction of American characters and a lesson in patriotism drawn from events of the Franco-Prussian War, contributed in no small wav to the great favor with which the book was received by the French public. Besides, it is written in a charminely simple almost conversational style, admirably suited to the characters. The book contains a number of dramatic situations, and a play based upon it has been almost as popular as the novel itself. Many editions in the original French and in translations have been published.

Louis A. Loiseaux.

^L’AIGLONP la'glon. Edmond Rostand,

having gained world-wide fame in 1897 by his romantic fantasy, (Cyrano de Bergerac,) en¬

deavored to confirm that success in ‘L’Aiglon,*

or (The Eaglet, } produced three years later by Sarah Bernhardt in France and by Maude Ad¬

ams in America. The play is less charming and spontaneous than its predecessor, but more fully grounded on history, more ambitious as a study of character, and more elaborate as a spectacle. Napoleon’s son, the Duke of Reich-

stadt, known as ((The Eaglet,® is kept under the watchful eye of Metternich at the Austrian court. But he is the hope of a Bonapartist plot, and though physically unfit to rule, and encom¬

passed by enemies who will prevent his escape to France, he yearns to emulate his great father.

His inheritance descends from the decadent Austrian house, however, rather than from the all-conquering Corsican. His environment, too, determines his fate; and after forfeiting his one opportunity to evade the relentless Metternich, [565]

he recognizes his weakness. In his vision be¬

fore dawn upon the battlefield of Wagram, he perceives that, in a sense, he must atone by his sufferings for all the blood that has been spilt to win his father’s glory. He accepts his des¬

tiny, a passive hero to the last, and. dies a the¬

atric death, lying beside his cradle, in the pres¬

ence of the weeping Austrian court.

The six acts of the play present a few major characters, a host of those that merely come and go, and several striking scenes. Flambeau, the old grenadier of Napoleon, is the most al¬

luring figure. Surprises and coincidences abound, and the atmosphere of the piece is dis¬

tinctly romantic, although its careful detail and its central conception are almost naturalistic.

Rostand's poetic imagination is sufficient to the task of making real here much that might oth¬

erwise seem mechanical melodrama. (L'Aig-

lon5 has been translated into English by Louis N. Parker (1900).

Frank W. Chandler.

L'ALLEGRO, la-la'gro. and

(I1 Penseroso) (q.v.) are companion poems by Milton. They are assigned to the period (1632-

38) after his life at Cambridge, in which he retired to his father's house at Horton, Buck¬

inghamshire, for study and reflection. That is, they were written about the same time as

ings and most of his sonnets and his greater poems. They are really poetic exercises ; the young poet expresses his thoughts on life in the forms common in the literary poetry of the day. The two poems are companion pieces; ^'Allegro* gives the gay or cheerful mood or humor, while (I1 Penseroso5 gives the contem¬

plative mood. They give their ideas in much the same way : each begins by driving away the mood opposed to the subject of the poem; in (L' Allegro } it is Hoathed Melancholy.® Each goes on with an invocation, as one may say, to the goddess of the mood; «Thou Goddess fair and free, in Heaven yclept

Euphrosyne, and by men heart-easing Mirth.® The main part of each poem, however, presents the mood of the poet by describing a characteristic day; in (L' Allegro) the poet is waked by the lark, hears the huntsman on the hill and the plowman nearer by, takes a country walk and joins the youths and maidens of the upland hamlets in their merry-making, he goes home and spends the evening in reading and music, or, accord¬

ing to another intepretation, he goes to town and enjoys the gay life of society. The poem is to the average mind old-fashioned and for¬

mal ; it is classic in form and allusion and has little in it that seems inspired by deep poetic feeling. But on the other hand each word and phrase is so full of meaning and so character¬

istic of the poetic mood that it makes a definite place in the mind of every lover of poetry.

Some other general considerations are noted under HI Penseroso. There are a good many editions of Milton's Minor Poems, mostly made for school purposes. The first volume of Masson's edition of Milton or Verity's edi¬*

tion of the Minor Poems may be especially noted.

Edward E. Hale.

L'AMI FRITZ, la'me frits (

Fritz), published in 1864, formed for Erck-*

mann-Chatrian a restful interlude between two stirring patriotic novels, (Le Conscrit de 1813

(1864) and (Waterloo) (1865). Indirectly it is like them a plea for quiet living, toleration, peace and concord between nations and be¬

tween religious confessions as well. The scene, significantly for one writing in the year of the Austro-Prussian attack on Denmark for Schles¬

wig-Holstein, is laid in an idealized Bavarian Highlands. The time is about 1850. The theme is an epicurean idyl, the unobtruded moral that the shortest road to a middle-aged bachelor's heart is by way of his stomach. Seldom have the joys of eating and drinking been so affec¬

tionately dwelt upon in fiction. As the story opens, Fritz Kobus, a well-to-do bachelor of 36, rejoicing in his freedom, jests at the matri¬

monial counsels of his father's friend, the ge¬

nial old Rabbi Sichel, a matchmaker by in¬

stinct and predilection. How in the next two years Fritz comes, step by step, and uncon¬

sciously almost to the last, under the spell of Suzel, the ingenious, charming and house¬

wifely young daughter of his anabaptist tenant farmer Christel, is told with rare quiet humor and genial irony. With modifications, natural after the Franco-Prussian War of 1870, _ (L'ami Fritz) was dramatized by its authors in 1876.

The play was very popular and has been trans¬

lated as (Friend Fritz.)

Benjamin W. Wells.

L'ASSOMPTION, la'son'syon', Canada,

village and capital of L'Assomption County, Quebec, 23 miles northeast of Montreal, on the Canada Northern Railroad. L'Assomption Col¬

lege is located there and the village is also the site of a Roman Catholic convent and hospital.

It has several manufacturing industries. Pop.

1,747.

LA BALLERINA, la bal'ler'ina (

Ballet Dancer). This short realistic novel, by Matilde Serao, which first appeared in the Nuova Antologia (No. 165, 1899), and then in the form of a novel (Catania, 2 vols., 1899) portrays the trials of a poor young Neapolitan girl, Carmela Menino, in her efforts to earn a livelihood in the rank and file of the ballet dancers employed at the San Carlo Theatre in Naples and at other resorts in the vicinity.*

The interest of the romance centres in the description of the sinister conditions that pre¬

vail rather than in the characters themselves, which are of secondary importance and whose sensuality and material needs furnish the dominating motive of their every action. In the case of the heroine of the novel, Carmela Menino, however, it is not sensuality, but a kind of religious sentimentality, together with her poverty, which is the mainspring of her conduct in life. This sentimentality is the cause of her fetich worship for her godmother, the ballet artist, Amina Boschetti, and of her loyalty to the memory of the latter years after her death. It also figures prominently at the end of the novel in the night watch of Carmela Menino at the bedside of the prodigal suicide, Count Ferdinando Terzi di Torre-

grande. The entire descriptive material is characterized by that vividness and realism dis¬

played in the best of the author's earlier books : HI paese di Cuccagna, 1891 ((The Land of Cockaigne*), showing those keen powers of observation which have placed Matilde Serao LA BREA*

V

£

at

O

<

V

in

w

►4

W

O

£

in

O

►4

o

w

o

£

<

OS

<1

w

OS

CO

<

►4

w'

W

<

►4

H

pJ

<

X

a.

cfl

<

W

W

H

£

Q

g

OS

W

w

w

OS

0,

t/)

H

&

<

>— i

o

H

U

£

t-H

H

X

W

h

ai

WJ

H

.c

-*-»

o

o

I

0)

u,

XJ

cd

C/3

d

3

x:

cu

W

a>

a

s

d

o

T3

o

+i

C/1

CCJ

S

in the front rank of the contemporary writers of fiction in Italy. Among the salient features clearly drawn in (La Ballerina,5 three stand out conspicuously: (1) The rottenness of the entire ballet system as carried on in Naples.

So vivid and effective is the description of the ballet Conditions, analagous to that of the lot¬

tery system Itl (I1 paese di Cuccagna,5 as to create

a strong impulse on the part of the reader never to lose an opportunity, if ever one be presented, of doing his best to purge the entire 9y9teftls (2) The very important role that sentimentality plays in the life of the Neapolitan yotith of both sexes, nullifying the possible advantages which the use of ordinary common sense would, in all likelihood, provide.

*The well-nigh uncontrollable desire Of the youth of Naples to pose continually as million^*

aires is exposed so forcefully as to bring out strikingly the absurdity of creating so false a situation. (3) The distinction between the feel¬

ing of reverence, akin to love, as seen in Carmela Menino's life, and the varied and multitudinous congeners of love as seen in the lives of the sensual ballet personnel of which Carmela Menino is one of the links. The inane relations between the ballet dancers and their sentimental lovers contrast rudely with the sincere sentimental loyalty and worship, not, however, very well accounted for by the author, shown by Carmela Menino toward the victim of the suicide with which the romance ends, thus producing a strong revulsion from the false pleasures of life. Together with (Addio amore) ((Good-bye Love5) and (Dopo il perdono) ((After the Pardon5), (La bal¬

lerina5 is among the best of the author's later novels. A translation of it was published in England without the translator's name, and is¬

sued in London 1901. James GeddeS, Jr.

LA BARCA, la bar'ka, Mexico, town in the state of Jalisco, east of Lake Chapala, and 60

miles southeast of Guadalajara, on the Inter¬

national Railroad between that city and Mexico.

The town was founded in 1529 by Nuno de Guzman, and during the Mexican war for independence the town was

the scene of two serious battles. Pop. 7,437.

LA BARRACA, la bar-rak'a ((The Farm¬

house5), a novel by Vincente Blasco Ibanez (q.v.). In (La Barraca,5 the agrarian problem as existing in the territory about Valencia engages the attention. First published in 1893, this work soon made its way into French and, appearing as (Terres maudites5 in the Revue de Paris in 1901, it established the authors fame abroad and brought him more note at home. With a sure eye and a firm hand, Blasco Ibanez has outlined for us, on the back¬

ground of the huerta or suburban district of Valencia, types of character such as Pimento, the local bully, and Batiste, the industrious small farmer. Batiste has the misfortune to take up a farm from which the avaricious land¬

lord had evicted the previous tenant and upon the occupancy of which the people of the huerta had put a ban. The result is the boy¬

cotting and ruthless persecution of Batiste by the huerta under the leadership of the worth¬

less bravo, Pimento, the killing of Piment6 by Batiste in defense of his own life and the burn¬

ing of Batiste's farmhouse by his neighbors.

In the face of a systematic boycott the honest, home-providing Batiste has no redress, and he must depart sadly to try his fortunes elsewhere*

Jeremiah D. M. Ford.

LA BARRE, la bar', Antoine Joseph Le-

fevre de, French sailor : b. about the beginning of the 17th century; d. 4 May 1688. He rose to early prominence as an officer of the F rench navy, and was appointed governor of Guiana in 1663. He was successful in recapturing Cayenne (1*667), which had been occupied by the Dutch. On being commissioned

lieutenant-

general he sailed for the West Indies, and, in a fight with the English in the Antilles, compelled them to raise the blockade of Saint Christopher.

Succeeding Frontenac as governor of Canada in 1682, his irresolution in his negotiations with the Indians was so disastrous that he was re¬

called in 1685. He obstructed La Salle in his western explorations.

LA BREA, Los Angeles, Cal., a park, west of and within the. city limits, on an almost level area bordered by the Santa Monica Range to the north. It is famous as the site of the ((La Brea Tar Swamp,55 a prehistoric petroleum "trap55 which has contributed to paleo-zoology the most extraordinary remains of extinct ani¬

mals ever discovered. Major Hancock, then owner of the ranch on which the pool was lo¬

cated, as early as 1875, was presumably the first person to take particular notice of the bones in the asphalt, William Denton in that year mentioning a canine of the large sabre¬

tooth tiger received from him. After the definite discovery of the historical value of the deposits in 1906, excavation work was car¬

ried on by the University of California, and within a space of about 1,400 feet long, north¬

west by southeast, and 150 feet wide, thousands of skeletons were discovered, many hitherto un¬

known to science. Pools of water and tar still are characteristic features of this section of California, and in the Pleistocene period were natural drinking places for many kinds of herbivorous animals and for the carnivorous types which preyed upon them. Both in their struggles became trapped in the treacherous tar seep or pool,

which has been an excellent pre¬

servative of their skeletons. The remains of mammals and birds of extinct type determined thus far in the university collection include 630 sabre-tooth tigers ; over 700 ((big wolves55 ; 7 mastodons; 39 giant ground sloths; 39 bison, 39 horses; 39 camels; 17 elephants (including the skeleton of the first "Imperial55 elephant found), besides skeletons of the great American lion; the gigantic teratornis, with a 14 foot wing spread; California peacock and a vast number of minor specimens. In 1914 a human skull, possibly several thousand years old, was recovered from the pit. Fifteen mounted exam¬

ples of the most important of these lemarkable prehistoric animals and a great quantity of un¬

mounted specimens are exhibited in the Museum of History, Science and Art in Los Angeles.

Mrs Ida Hancock, the owner of the property, donated 32 acres of the land enclosing the pool to Los Angeles County, which now maintains a park and subsidiary museum around this inter¬

esting "death-trap.55 Consult Mernam J. C., (A Death-trap which antedates Adam and Eve5 (in Harper's Weekly, 18 Dec. 1909).

LA BRUYERE, la brii-yar, Jean de,

French moralist: b. Paris, 17 Aug. 1645; d.

Versailles, 10 May 1696. He was educated for the law, became treasurer at Caen, and through the influence of Bossuet was employed in the education of the Duke of Bourbon, grandson of the great Conde, with a pension of 3,000 livres, and was attached to his person during the re¬

mainder of his life. In 1688 he published the Characters of Theophrastus,5 translated into French, to which he added others of his own, in which he represented the manners, of his time with great accuracy, and in a style epigram-

matical, ingenious and witty. The work con¬

tained 386 ^characters® ; the 4th edition (1689), 340 additional ones, while the 9th, in press at the time of the author's death, included over 1,100 Characters.® Consult Rahstede, (La Bruyere und seine Charaktere> (1886) ; Allaire, (La Bruyere dans la maison de Conde5 (1886) ; Pellisson, (La Bruyere5 (1893). See Char¬

acters of Theophrastus.

LA CALPRENEDE, la kal'pre'nad, Gau¬

tier de Costes de, French novelist: b. Sarlat, Dordogne, 1610; d. 1663. He went (1632) to Paris and entered the guards' regiment as officer, becoming royal chamberlain. His chivalry novels, copying the style of (Amadis,5

brought him fame, especially his Cleopatre,5

extending into 12 volumes (1647-58). He selected names from the period of Augustus as a framework in which to describe persons of his own day, the subtlety and stale sentimental¬

ity of the work finding favor. The characters, however, are, for the most part, well drawn and some scenes are excellent. Notable among the novels are (Cassandre5 and other works in 10 volumes (1642-50) ; (Faramond5 and others in seven volumes (1661-70) ; (Les nouvelles, ou les divertissements de la princesse Alcidiane5

(1661). He also wrote a number of plays, most notable being (La Mort de Mithridate5

(1637) ; (Le Comte d' Essex 5 (1639) ; Edou¬

ard, roi d’Angleterre5 (1640). Consult Kort-

ing, (Geschichte des franzosischen Romans im XVII ten Jahrhundert5 (Vol. I, Oppeln 1891) ; Hill, H. W., (La Calprenede’s Romances and the Restoration Drama5 (Chicago 1911).

LA CHALOTAIS, la sha'lo'ta, Louis

Rene de Caradeuc de, French magistrate: b. Rennes, 6 March 1701; d. Rennes, 12 July 1785. He was a procureur-general of the Parlia¬

ment of Brittany and one of the most ardent adversaries of the Jesuits in the reign of Louis XV. His notes under title of (Compte rendu des constitution des jesuites,5 placed before the Brittany government (1761) led to the abolition of the order from France. He next hoped to reorganize public education and wrote (Essai d’education nationale5 (Geneva 1763, Paris 1825), a remarkable treatise and translated into several languages, which was highly eulogized by Voltaire. The enmity of the Duke d’Aiguillon and others brought false persecution against him successfully and he was arrested in 1765 and imprisoned. Failing to bring about a fair trial after several attempts his friends demanded justice and Louis XVI placed him back in his former parliamentary position at Rennes in 1775. Consult Robidou,

LA CHARTREUSE DE PARME, la

zhar'triiz de parm'. (La Chartreuse de Parrne,5

esteemed the best of the novels of Stendhal (Henri Beyle), was written in 1830, though not published till 1839. In time it belongs to the first flush of the Romantic movement, and it has highly romantic passages, but there are others which seem clearly to foreshadow the naturalistic and the psychological schools of fiction. Some descriptive passages are of rare brilliancy. The story, opening in 1796, passes rapidly to the decade following Waterloo. The scene is chiefly in Milan or Parma ; the plot, ingenious

but over-tortuous, deals with the in¬

trigues of a petty Italian court ; the interest, whether for author or reader, is almost wholly in character. Though crude in coloring and melodramatic in treatment the novel seems the first serious attempt in French fiction to exhibit not merely foreign scenes but foreign ideals and psychic life. Fabrice, the hero, his mili¬

tary career closed by the fall of Napoleon, turns his ambition, though not his heart, to the Church, and after adventures that show him, in Sainte-Beuve's phrase, <(like an animal given over to his appetites or like a wanton child who follows his caprices,® not, indeed, without shrewdness, dies an archbishop in a Carthusian monastery, whence the story's title. The hero¬

ine, Duchess Sanseverina, beautiful, witty and loving Fabrice, her nephew, with the despera¬

tion of a last passion, murders, marries and forgets her marriage vows in his behalf, rein¬

carnating the intense passions of some familiar female figures of the Italian renaissance.

Count Mosca, to Balzac a glorified Metternich, is for us a diplomatic courtier, ingeniously un¬

scrupulous in reconciling the duties of his sta¬

tion with the demands of his lusts. Palla, a political outlaw and highwayman, the philander¬

ing agent of the duchess' criminal designs, is an interesting age-fellow of Hugo's Hernani.

All four illustrate as many phases of Stendhal's conception of the unreasoning fatality of love.

Benjamin W. Wells.

LA CHAU.SSEE, la sho-sa, Pierre Claude Nivelle de, French dramatist, founder of the so-called Apathetic

comedy® or melodrama : b.

Paris, 1692; d. there, 14 March 1754. (Le Pre-

juge a la Mode5 (1735) by him was the first French pathetic comedy. Of 18 dramas by him, among the best are (School of Friendship5

(1737) ; (Melanide5 (1741) ; (Love for Love5

(1742); (Pamela 5 (1743) ; ^School of Moth¬

ers5 (1745) ; (The Governess5 (1747). His plays were all written in verse and followed strictly the rules of the classic drama.

LA CITTA MORTA ((The City of the

Dead5), a modern tragedy in five acts and in prose, by Gabriele d'Annunzio, performed for the first time in Paris at the Renaissance Theatre, 21 Jan. 1898. Although every effort was made to expose to the best advantage the artistic possibilities of the tragedy, Sara ^Bern-

hardt playing the part of the blind Anna with all her rare skill and intelligence, the play was not a success. It has been played in England and in America, but received rather coldly, and for several reasons, one of which may be said to be its lack oj dramatic action; for it is more a lyric poem in dialogue, or a succession of descriptions artistically composed, than a drama as ordinarily understood.

The scene is laid in Argalis, near the ruins ' of Mycenae. The dramatis personas consist of five characters ; an archaeologist of a most fervent type, Leonardo; his sister, Bianca, Maria, a young woman, endowed with ex¬

uberant health and beauty and possessing rare

personal charm, who accompanies the archaeolo¬

gist and shares his keen interest in his excava¬

tions and discoveries ; Alessandro, a poet and scholar, ever inspiring and helping Leonardo in all he undertakes ; Anna, the wife of Ales¬

sandro, who is blind although not from her birth. This misfortune gives Anna's mental vision a sensitiveness and acuteness which makes up in no small degree for her loss of sight; lastly, a nurse, an attendant of Anna, whose informing role suggests somewhat the part filled in a certain measure by the old Greek chorus. As in the plays of Sophocles and Euripides and of 'Racine's

In the air itself, breathed by the archaeologist and the poet in their passionate search for the tomb of the house of Atreus, is rank poison emanating from the crimes committed by the Atridae. So atrocious is the curse over this ill-

starred house that, as Alessandro tells his wife (1-4) some direful traces must still remain in the dust trampled by the sons of Atreus. This gives the key to the trend of events.

That a tragedy having the three mainsprings of its action in incest, adultery and fratricide, even with a Greek setting, should be received coolly by Anglo-Saxon audiences is readily understood. That it received such acceptance as it secured is due in a measure to the remark¬

able acting of Eleonora Duse, who impersonated Anna. The tragedy has been the subject of much diverse criticism. It is better adapted for reading than for representation. However re¬*

pellent the subject may appear, enwrapped as it is in a sullen and depressing atmosphere, the tragedy itself is unquestionably a highly artistic production. The author not only possesses the inherent qualities ascribed to the Latin and Italian temperament, but the old pagan strain reveals itself

in utterly ignoring the convention¬

alities usually adhered to more or less by writers in general. Moreover, his accurate knowledge, gained on the spot, of ancient his¬

tory and literature, together with unusual poetical gifts make up a combination producing a result that has rightly attracted the attention of the literary world. Revolting as may be his remorseless brutality, especially to the non-

Latin temperament, it is impossible not to recognize an artist exceptionally gifted and a literal production quite out of the ordinary.

A translation of (La citta mortal by G. A.

Symons, was published in 1900; another by G.

Mantellini (New York 1902). Consult also Muret, Maurice, (La Litterature italienne d'aujourd 'hui) (pp. 90-105, Paris. 1906) ; Huneker, J., (Duse and d'AnnunzkP (in (Icon-

oclasts> (pp. 338-344, New York 1907).

James Geddes, Jr.

LA CONDAMINE, la-kon-da-men, Charles

Marie de, French scientist: b. Paris, 28 Jan.

1701 ; d. there, 4 Feb. 1774. He entered the military profession, but soon renounced this career, and devoted himself to the sciences. In 1736 he was chosen, with Godin and Bouguer, to determine the figure of the earth by meas¬

urements to be made in the equatorial regions of South America, and remained abroad for eight years. In 1748 he was elected a Fellow of the Royal Society of London, and in 1760 a member of the Academy of Sciences of Paris.

His principal works are his account of his travels

(1745), his work on the figures of the earth (1749), and that on the measurement of three degrees of the meridian in the equatorial regions.

LA CONFESSION D’UN ENFANT DU

SIECLE, la koii'fes'syon d’ung'on'fon du syacl'

((Confession of a child of the century*) is one of the most characteristic works of Alfred de Musset. It owed not a little of its immediate great success to the fact that, while ostensibly a novel, it was a thinly veiled history of the poet’s love affair with George Sand, which she had already begun to use as literary material in her <(Lettres d’un voyageur.® Written (1835) shortly after that ultra-romantic adventure in ecstacy and torture, it is very generous to the heroine of that experiment and without the bitterness that later marked the references of each of the principals to the other. For the frankness and sincerity of its self-revelation it is a personal document of great interest. But it is more. It is a wonderfully striking ex¬

pression of that peculiar state of mind, often called ^Byronic® in English, so common among the youth of the generation coming after the French Revolution and the Napoleonic wars, and known in France as the ((maladie du siecle.** Its opening pages contain a famous description of that malady and an analysis of the conditions out of which it grew. So it is a document even more precious for what it tells us of the century than for what it reveals of the child. An English translation by Kendall ♦ Warren appeared in a privately printed edition of Alfred de Musset’s works (New York 1908).

Arthur G. Canfield.

LA COSA, la ko'sa, Juan de, Spanish navi¬

gator : b. about 1460; d. November 1509. He was the companion of Columbus in the dis¬

coverer’s voyage to Hispaniola in 1493 and settling

at Santona, in Aranham, made his liv¬

ing and reputation as a draughter of charts (1496). He accompanied Ojeda in an expedi¬

tion to the Pearl coast in 1499; and in 1501 ex¬

plored the northern coast of South America from Venezuela to Panama. In the course of an expedition on which he accompanied Ojeda, the party on landing in the bay of Cartagena was attacked by Indians, and he perished with his companions, of whom Ojeda alone escaped.

His map of the World, beautifully illustrated on vellum, is in possession of the Spanish gov¬

ernment, and is the earliest known to include the New World, having been made in 1500.

LA CROIX, la krwa', Alfred, French

geologist: b. Macon (Saone-et-Loire) , 4 Feb.

1863. He is director of the laboratory of mineralogy of the School of Higher Studies, Paris. He was head of the scientific expedition sent to Martinique (1902-03) and of numerous other scientific parties, to United States, Can¬

ada, Asia Minor, Greece, Italy, Germany and England. He was also head of the Committee on Historical and Scientific Work in 1895, and that charged with the geological map of France in the following year. His published 570

works include (Mineralogie et de ses colonies) (1893-1902); (Les Enclaves des roches vol-

oaniques> ; (La Montague Pelee et ses erup-

tions) (1904). He has also contributed very extensively to scientific journals and maga¬

zines, especially on the metamorphism of erup¬

tive rocks, volcanic action and causes and mineralogy.

LA CROSSE, la kros', Wis., city and

county-seat of La Crosse County, on the Miss¬

issippi River and the Chicago, Milwaukee and Saint Paul, the Chicago, Burlington and Quincy, the Chicago and Northwestern and several other railroads, 200 miles northwest of Mil¬

waukee, and 130 miles south of Saint Paul. La Crosse is the centre of the farming, manufac¬

turing and dairying trade of western Wisconsin, southern Minnesota and northern Iowa. There are manufactories of boots and shoes, sashes, doors, blinds, automobile parts, gasoline en¬

gines, tents and awnings, plows, agricultural implements, boilers and heavy machinery, ex¬

tensive carriage works, rubber mills, cracker and knitting factories, etc., large flour mills, pearl button factories, steel and corrugated roofing works, woolen mills, a large tannery, mammoth cooperages, five large breweries, affording a market for 150,000 bushels of bar¬

ley and 100,000 pounds of hops per annum ; extensive cigar manufactories and various other industries. Sand, gravel and limestone are found in the neighborhood. The manufac¬

tures are valued at $20,000,000 annually. The city 'has five banks. La Crosse has a public library, the Washburn, containing 25,000 vol¬

umes, two business colleges, a high school, pub¬

lic school buildings and several Catholic and Lutheran parish schools. The city has a fine city hall, a Federal building, a convent, asylum for chronic insane, Saint Francis, the Lutheran, and La Crosse hospitals, opera houses, weather bureau

station, four parks, a wagon bridge over the Mississippi, etc. There are numerous church edifices.

La Crosse was first permanently settled in 1841 by Nathan Myrick, John M. Levy and others. It became a village in 1851 and was incorporated as a city in 1856. Under a revised charter of 1891 the government is administered by a mayor, elected every two years, and a council of 20 aldermen, one-half elected bi¬

ennially. The council appoints the minor offi¬

cials. The city owns and operates the water¬

works, and has electric light and street rail¬

road plants. Pop, 31,367.

LA CROSSE, a Canadian outdoor game

played with a ball and a stick of light hickory, bent at the top like a bishop's crozier, from which the game derives its name. It was very popular among the Indians of North America, being sometimes taken part in, according to Catlin, by 800 to 1,000 players, in which tribe was set against tribe, the game lasting for days, broken arms and legs being common among the players, and some even killed. The games were preceded by rigorous training on the part of the contestants. A game of ball, played at Michillimackinac on the king's birthday, 4

June 1763, was by Pontiac made the occasion of an ingenious stratagem by which the garrison was surprised and massacred.

The stick employed in the game is 5 or 6

feet in length. Strings of deerskin are stretched diagonally across the hooked portion of the crosse, forming a network. Only one ball is employed, made of india-rubber, and eight or nine inches in circumference. Posts or poles about six feet high, with a small flag at the top of each, complete the equipment. The play¬

ers are usually 12 on each side, but their num¬

ber, as well as the distance of the goals apart, is nearly optional. The object of the game is for one side to drive the ball through their opponents' goal. The ball must not be touched with the hand or foot, but is scooped up from the ground with the bent end of the crosse, on which it is carried horizontally, while the player runs toward one of the goals, dodging his antagonists. The game is played in two halves, of a half-hour's duration. A club was formed at Montreal in 1846; in 1860 it began to attain popularity in Canada, and it was in¬

troduced into the United States in the early 70 s.

The National La Crosse Association of Canada was organized in 1867. Consult Beers, (La Crosse: the National Game of Canada) (Mont¬

real 1869); Schweisser, (La Crosse: an Ex¬

pert's Instruction > (New York ^1904).

LA DAME AUX CAMELIAS la dam

6 ka-ma'lya ((the Lady of the CamelliasQ.

This play by Alexandre Dumas, the Younger, first appeared (1848) as a novel written under stress of debts gathered in accumulating ex¬

periences that it in part reflects. The novel was dramatized in 1849, but, owing to _ the failure of a theatre and curious complications with the censorship, of which a preface gives vivacious account, it was first acted 2 Feb. 1852.

Success was immediate and lasting. In mani¬

fold adaptations it has been played in many lands and has engaged the talent of many noted actresses. In America it is known in eight editions as (Camille,* in two as (The Lady of the Camellias.* It had immediate origin in the life and death at 23 of an acquaintance of the dramatist, Alphonsine

Plessis, a Parisian courtesan, once maid on a farm, who died of consumption in 1847. Her unselfish charm was celebrated in a brief funeral address by Theophile Gautier and is commemorated in a much visited monument at the cemetery of Pere La Chaise. Dumas' <(Lady of the Camel¬

lias,® Marguerite Gautier, is so drawn by a requited love to Armand Duval that she makes all material sacrifices to live wholly with and for him. His father shows her what this will involve for Armand's career. Then, rising to the height of immolation, she deliberately estranges her lover, sacrificing his esteem and her life to Armand, who learns too late the price of her devotion. The theme of the courtesan redeemed by love is at least as old as Prevost's (Manon LescauD (1731). It had been dramatized by Palissot (1782) and again by Hugo in (Marion de Lorme. But (La Dame aux camelias* marks for the French stage the beginnings of the realistic study of social problems which has since so largely engaged its attention.*

Benjamin W. Wells.

LA DEBACLE, la da'bakl', (

istic method which he had used with remark¬

able, if unpleasing, effect in his studies of domestic and social life and which has become celebrated as ((Zolaism.® In (La Debacle1 the reader is hurried from disaster to disaster, from horror to horror. He beholds the people of France in the grasp of uncontrollable events, which move and crush as surely and inexor¬

ably as a glacier. Of what importance, in the play of these giant social forces, are the lives of Maurice, Jean, Henritte and untold thou¬

sands of others? Of what avail are courage and

innocence? Justice seems to have disap¬

peared from the face of the earth. Zola's pic¬

tures of the defense of the plateau of Illy, culminating in the magnificent but hopeless cav¬

alry charge, and of the horrors of Sedan, are among the most powerful in literature. The effect is heightened by the author's objective treatment, his apparent indifference to the ruin of his country Here the patriot, as Zola cer¬

tainly was, is subordinate to the artist, as he shows himself to be in this his masterpiece.

Whatever th reader's attitude toward (

ism,® it is doubtful if the naturalistic method could be carried farther than in (La Debacle1

or applied with more telling effect. And what¬

ever the future fate of <(Zolaism,® it is probable that this arch example of the method, presenting so graphic a picture of a fateful epoch, is secure of a permanent place in literature.

LA FAMILIA DE ALVAREDA of

Fernan Caballero, pseudonym of Cecilia Bohl de Faber, is one of the best-known works of that author. The outline was first sketched in German in 1822 but the book in its present form was not published until 1856. It is one of the first novels of manners in modern Spanish literature and bears the sub-title, ttNovel of popular customs.® The author states in the preface that the story was taken in its essential details from events narrated to her. The plot centres about the murder of Ventura by his jealous friend, Perico de Alva-

reda, and the degradation of the latter into bandit and outlaw. The tragedy culminates in the execution of Perico and the death and dis¬

integration of his own family and that of his victim. The tale merely serves as a vehicle for a vivid and picturesque description of An¬

dalusian village life in the early part of the 19th century. Popular legends, traditions, and folksongs are generously interspersed. The au¬

thor constantly obtrudes her moral both in the narrative itself and in footnotes, and insists that the Spanish peasant can be happy only by clinging to the religious faith and the simple customs of his forefathers. The book is liked by Spaniards because of its didactic and moral note, and is valued by foreigners because it is one of the many human documents of Spanish literature. There is a German translation of this tale. Caballero, much to her annoyance, was claimed as a German because of her father's German origin. There is a good an¬

notated American edition by P. B. Burnet. An account of the author's life, and work may be found in the complete edition of her works, Vol. I, in the (Colecci6n de Escritores Castel¬

lanos.1

Samuel M. Waxman.

LA FARE-ALAIS, la far-a'la', Christophe-

Valentin, Marquis of, a provenqal poet and one of the forerunners of the Felibrige move¬

ment: b. Lacoste (Gard), 1791; d. 1846. He came of a family celebrated in statesmanship, literature and military life, among his ancestors being the famous poet, La Fare, and the no less notable French marshal of the same name.

After having studied law at Toulouse he en¬

tered the army in 1814. but left it five years later and returned to his native place where he continued to reside and to devote himself to literature. In 1830 he began publishing in L'Echo d'Alais his

southern dialect poems, which became very popular in the langue d'oc country. These poems were published in book form in 1844 under the title, (Las Castognados,1

at Alais. In these poems the music-loving south felt an echo of their own life. Their harmony, their gentle sweetness, and their brilliancy at once made La Fare a literary leader among the Provencal people, until then without one in later years. His poems, therefore, did much to further the elevation once more of the langue d'oc into a literary tongue.

LA FARGE, la farj, Christopher, Ameri¬

can architect: b. Newport, R. I., 5 Jan. 1862.

He studied at the Massachusetts Institute of Technology (1880-81), and in the office of H. H.

Richardson (q.v.), and in 1884, with G. L.

Heins, took charge of the architectural works of his father, John La Farge (q.v.). Since 1886 he has been a member of the firm of Heins & La Farge, whose principal work is the cathedral of Saint John the Divine, New York. Other works that may be named are the Houghton Chapel at Wellesley College; the Roman Catholic chapel at West Point; and Saint Matthew's Church, Washington, D. C, church of the Blessed Sacrament, Providence, R. I. ; Saint Paul's Rochester, N. Y. ; Roman Catholic cathedral, Seattle, Wash. ; all stations of the New York subway. From 1910 to 1915

he was a member of the firm of La Farge and Morris. He is Fellow and director of the American Institute of Architects and an asso¬

ciate of the National Academy since 1910 and past president of the Architectural League of New York.

LA FARGE, John, American artist : b.

New York, 31 March 1835; d. 14 Nov. 1910.

He was the son of Jean Frederic de la Farge, French midshipman, who escaped imprisonment at San Domingo, 1806, and eventually settled at Philadelphia. He studied drawing with his grandfather Binsse and went abroad in 1856.

He studied for some time under Couture in Paris and later settled down in a lawyer's office in New York. He became much attracted by the Arundel prints of Giotto and formed a.

deep, appreciation of Japanese art. He found a friend and master in William Hunt. He married Margaret Perry, great-granddaughter of Benjamin Franklin, in 1860. He originally developed a taste founded on Japanese liberal¬

ism, pre-Raphaelite conventionality and imagi¬

native conventionalism. In 1876-77 he was en¬

gaged on the mural decoration of Trinity Church, Boston. He began glass painting and window designing in 1878 and was successful in the manufacture and designing of stained glasses. He was connected with Saint-Gaudens in the erection of the King mausoleum at New¬

port, R. I. He visited Japan and the islands of the Pacific in 1886. Many water-color 572

sketches of native life resulted from this trip.

One of his greatest works is the large altarpiece in the church of the Ascension, New York (1888). Other noteworthy works are (Christ and NicodemusP Trinity Church, Boston; (The Muse of Painting, > Metropolitan Museum, New York; (Coming of the Magi,* church of the Incarnation, New York; among his mural dec¬

orations are those in the Brick Church, New York; Paulists' Church, New York; Congrega¬

tional Church, Newport, R. I.; Minnesota State Capitol, Saint Paul; his glass designs include (Samuel > in Judson Memorial Church, New York; (The Philosopher,* Crane Memorial Library, Quincy, Mass. ; window in Second Presbyterian Church, Chicago; (Battle Win¬

dow, } Memorial Hall, Harvard; (Paul at Athens,) Columbia University Chapel. In 1869

he became a member of the National Academy; in 1891 was made officer of the Legion of Honor, and was one of the seven original mem¬

bers of the American Academy of Arts and Letters. La Farge was skilful as a. colorist, however much we may criticise his inadequate conception and weakness in drawing. He is an important figure in the history of American painting and was a real pioneer in mural paint¬

ing. He also painted portraits, flowers and landscapes. He contributed frequently to the magazines and published Consideration on Painting) (1895) ; (Great Masters) (1903) ; Higher Life in Art* (1910) ; (Reminiscences of the" South Seas* (1912). Consult Coffin, C. H., (American Masters of Painting* (New York 1892) ; Cary, E. L., (International Studio) (Vol.

XXXVIII, ib. 1909) ; Cortissoz, Royal, (John La Farge: A Memoir and a Study* (ib. 1911) ; Isham, Samuel, < History of American Painting*

(ib. 1905) ; Waern, (John La Farge: Artist and Writer* (London 1896).

LA FARINA, la fa-re'na, Giuseppe, Italian statesman and historian: b. Messina, Sicily, 20

July 1815; d. Turin, 5 Sept. 1863. He studied at the University of Catania ; entered the law ; implicated in a revolutionary conspiracy, was compelled to flee from Sicily (1837) ; and finally settled in Florence (1841), where he devoted himself to historical composition. Having returned to Sicily in 1848, he

was there succes¬

sively member of Parliament, and Minister of Education, Public Works and the Interior.

After the suppression of the revolution in Sicily (1849), he resided in France and Italy, was secretary of the National Italian Society, and strongly advocated Italian unity. Following the war of 1859, he reorganized the National Italian Society, of which he became president; in 1860

was sent to Sicily to represent Victor Emman¬

uel ; and from 1861 sat for Messina in the Italian Parliament. His chief work is (Storia dTtalia dal 1815 al 1850) (2d ed., 1860). He wrote other historical studies, such as (Storia della rivoluzione siciliana nel 1848 e 49* (1851), dramas, and works of fiction.

LA FAYETTE, la fa-yet, Marie Made¬

leine Pioche de la Vergne, Comtesse de, French novelist: b. Paris, 16 March 1634; d.

there, 25 May 1693. All her life she was in the foremost literary circles, after marriage her house being a noted rendezvous of wits and scholars, including Mme. de Sevigne, La Fon¬

taine and La Rochefoucaulde. Her first novel was (The Princess de Montpensier* (1660); followed by (Zaide* (1670), which among her works ranks next after (The Princess of Cleves* (1678), her most celebrated work, re¬

vealing the conflict between love and duty in a woman’s heart, and one of the classics of French literature. She wrote also a (History of Henrietta of England) (1720), and Mem¬

oirs of the Court of France for the Years 1688 and 1689> (1731). Consult (Lives, } Haus-

sonville and Rea (1909). See Princess ok Cleves,

The.

LA FERE, la far', France, city in the de¬

partment of the Aisne and the arrondissement Laon, on the river Oise which is joined here by the Serre. It is a fortification of second class with several outer forts and has a church of the 15th century, an artillery school, arsenal, college, theatre, museum, machine works, oil-

factory, etc. When the World War broke out (1914) it had about 5,000 inhabitants. It was captured by the Prussians under Billow on 27 Feb. 1814, but held out in 1815 against bombardment and investment. In 1870 it sur¬

rendered to the Germans after two days' bom¬

bardment and an ineffectual sortie.

LA FLECHE, la flesh', France, town and capital of an arrondissement in the department of Sarthe, on the Loire, 30 miles southwest of Le Mans. It is the seat of the famous Pry-

tanee, a school for the sons of officers, origi¬

nally a college founded for the Jesuits in 1607

by Henry IV. It is a preparatory school for Saint-Cyr. The town carries on tanning, flour milling, paper making and also has establish¬

ments for the manufacture of bicycles, gloves, wooden shoes, etc. Pop. (town) 7,800; (com¬

mune) 10,830.

LA FLESCHE, Susette. See "Bright

Eyes.®

LA FOLLETTE, la fol-let, Robert Ma¬

rion, American statesman: b. Primrose, Wis., 14 June 1855. He was graduated from the University of

Wisconsin in 1879, and the next year was admitted to the bar. He became dis¬

trict attorney of Dane County in 1880, retaining that position till 1884, when he took up the regular practice of his profession. In 1887 he was elected to Congress, serving till 1891 ; he won reputation as an orator, and as a member of the Committee of Ways and Means took a prominent part in the framing of the McKinley Tariff Bill. At the close of his sendee in Con¬

gress he resumed his practice, and remained active in politics, becoming one of the leaders of the younger men in the Republican party.

He took part in a campaign against the exclu¬

sive privileges of corporations and against the boss system. His two pamphlets, (Menace of the Machine) and (The Nomination of Candi¬

dates by Australian Ballot* (1897), attracted wide attention. In them he outlined his pro¬

gram for electoral reform in Wisconsin. _ He was elected governor of his State three times, 1900, 1902 and 1904. As governor he led in the movement for a direct primary law, for the equalization of taxation and the regulation of railroad rates. He resigned the governorship in 1905 to become United States senator and was re-elected in 1911 and 1916. In the Senate he has demanded progressive legislation and has become well known for his advocacy of the physical valuation of railroads, his speeches on LA FONTAINE

railr°ad subjects showing him to be a profound student of these questions. He was prominently ? noot10ne^ ^or t^1e Presidential nomination in iyU8, receiving 25 votes, and again in 1912.

During the Taft administration he voted with the Democrats on some of the tariff schedules which were

vetoed by the President. He re¬

mained in the Republican ranks in 1912, being strongly opposed to Roosevelt, the Progressive leader of that year. In the first Wilson admin¬

istration his opinion was often consulted. He was the chief of a small filibustering pacifist group in the Senate which opposed the arming of American merchant vessels in the European War zone. His action was severely criticised by the people and press of the country.

LA FONTAINE, la fon-ten, Jean de,

French poet: b. Chateau-Thierry, Champagne 8 July 1621; d. Paris, 13 April 1695. He was the son of Charles de la Fontaine, a forest ranger of the highest middle class. Jean was the _ eldest child and was sent to school at Rheims. After finishing at the grammar school he studied for a time without much seriousness for the priesthood, but abandoned it because of lack of interest At the age of 26 his father resigned his position in Jean's favor, and mar¬

ried him to Marie Hericart, a girl of 16, with considerable fortune. The marriage was not altogether satisfactory, for La Fontaine was absent most of the time, squandered his wife's fortune, in 1658 consented to a ((separation des biens » For the greater part of his life he lived at Paris, while his wife remained at Chateau-Thierry.

It was not until he was 30 that La Fon¬

taine began to devote himself to literature. Con¬

tent at first with the lighter forms of poetical composition, he wrote his first serious work, 'Eunuque, an adaptation of the (Eunuchus) of Terence in 1654. This was addressed to Fouquet, and won for the author his first patron. A number of minor poems and ballads were also written for the superintendent.

When the displeasure of the sovereign was in¬

curred by Fouquet, La Fontaine found new patrons in the Duke and Duchess of Bouillon, who settled some of his legal difficulties and made him welcome at their home. In 1664 his first book of the

tions of legends, reanimated by his swift and easy power of narration and his keen analysis of the characters. Among his best friends of this period were Racine, Boileau and Moliere, with whom he formed the famous quartet of the Rue du Vieux Colombier, which made the literary history of the time. The Duchess Dowager of Orleans was his next powerful friend. He lived for a few years under her protection, and at her death was invited to the home of Madame de la Sabliere, where he re¬

mained for the next 20 years.

His (Les Amours de Psyche* and (Adonis,) romantic novels, were printed in 1669. His second volume of Contes5 had.appeared in 1666, and two years later six books of the

were published. Contemporary critics gave high estimates of his works, and public recognition came in 1683, when despite considerable oppo¬

sition he was elected to the Academy. His health began to fail, and it was during a severe illness (about 1692) that he was converted and re¬

pented of the improprieties of many of his stories. The death of Madame de Sabliere in 1693 affected him profoundly, and, broken in health and old, he accepted the patronage of Monsieur and Madame Hervait who cared for him in his last days.

. The curious personality of La Fontaine has given rise to many stories concerning his life and) habits. The candor and simplicity of his character acquired for him the title of <(le bon homme.® He was proverbially absent-minded, awkward and rude in society. The best of his works are the and (La Coupe en-

chantee.) His separate poetical works are represented by (La captivite de Saint Malo) (1673) and the (Poeme du Quinquina* (1682).

A volume of mystically religious verse was pub¬

lished by him in 1671, and several unimportant comedies (collected in 1702). His letters, scat¬

tered poems, etc., were edited as ((Euvres diverses) in 1729. Both the (Contes*. and the tables) have been superbly printed. The latter were illustrated by Oudry (1755-59), and the former by Eisen 1762. Gustave Dore also did illustrations for the (Fables.* The best scholarly edition is that by Walcknenaer (1826-

27), who has also written an excellent biogra¬

phy and critical estimate of La Fontaine. Most well known is the edition by Regnier in the (Grand Ecrivains) series (9 vols., 1888-92).

Other good editions are by Moland (7 vols., 1872-76) and Marty-Laveaux (5 vols., 1857-77).

Consult Lafenestre, G., (Jean de la Fontaine) (1885); Faguet, E., (Jean de la Fontaine*

(1900) ; Taine, (La Fontaine et ses fables*

(15th ed., 1901) ; Hookum, P., (The Master¬

pieces of La Fontaine* (New York 1916). See La Fontaine Fables.

LA FONTAINE, Sir Louis Hippolyte,

Canadian statesman and judge: b. Boucherville, Lower Canada, October 1807; d. Montreal, 26

Feb. 1864. He early achieved prominence at the bar, and after the rebellion of 1837, in which he was accused of complicity, he went to Eng¬

land and afterward to France, and on return¬

ing to Canada in 1838 was imprisoned but re¬

leased without being brought to trial. He be¬

came prominent in the Assembly of United Canada, was joint first minister in the La Fon-

taine-Baldwin administrations (1842-43, 1848-

51). In the second of these important meas¬

ures were passed and reforms effected — Uni¬

versity and Rebellion Losses bills, the introduc¬

tion of the decimal currency, reorganization of the postal system and the reduction of rates.

La Fontaine worked steadily to create a better feeling between the French and British elements in the two provinces. His was the first cabinet 574

in which the principle of colonial government was recognized. In 1853 he became chief jus¬

tice of the Court of Queen's Bench of Quebec, and as such presided over the special Seig-

neurial Court which met in 1855 to adjudicate on claims under the act of the previous year abolishing feudal rights and duties in Lower Canada. He was created a baronet in 1854.

Consult (Baldwin, Lafontaine, Hincks,) by S.

Leacock, in the (Makers of Canada > series (Toronto 1907).

LA FONTAINE FABLES. The Fables

of La Fontaine are part and parcel of French literary consciousness to a greater degree than any ' other classic of its literature. For gen¬

erations many of these little apologues have been read, committed to memory, recited, para¬

phrased, by every French school boy and school girl. Countless phrases from them are current coin of conversation; familiarity with them is assumed among all who have more than the rudiments of education.

The first collection of these Fables appeared in 1668 when La Fontaine was already 47 and known to readers chiefly as the author of < Contest lively stories in verse, grazing and sometimes transgressing the bounds of license.

The

ditional groups of them appeared in 1678-79 and in 1694. After 1683 La Fontaine's mellowed genius expressed itself in this form alone. In all there are 239 of the (Fables^ varying in length from a few lines to some hundred, those written later being

as a rule longer than the earlier. They are divided into 12 books. The first six books, collected in 1668, were in the main adapted from the classical fabulists 2Esop, Babrius and Phaedrus. In the later books there is a wider range. The Indian Bidpai is drawn upon, as those Eastern fables had come to the French through the Persian. Avienus and Horace are laid under contribution and the earlier French writers, Rabelais, Marot, Ma-

turin Regnier and Des Periers. Contemporary happenings, too, were occasionally turned to account, as for instance an accident at the funeral of M. de Boufflers (vii, II). No fable, so far as appears, is of La Fontaine's invention.

The subject is often common property of many ages and races. What gives La Fontaine's (Fables > their rare distinction is the freshness in narration, the deftness of touch, the uncon¬

strained suppleness of metrical structure, the unfailing humor of the pointed moral, the con¬

summate art of their apparent artlessness.

The personages of the are usually animals, each, as Taine has observed, standing as a rule, of course with frequent exceptions, for a distinct class in French society in the age of Louis XIV. The lion is the king ; so, too, the rarely introduced elephant. The tiger and the bear stand for the great nobles and the arrogant officials. The ape, the fox and the wolf represent different types of courtiers, as they might be observed at Versailles, shallow imitators of royalty, shrewd self-seekers, time¬

servers, knavish fops. The dog is the gentle¬

man in waiting, obsequious and supercilious by turns ; the cat the hypocrite, watching his chance of advantage ; the ass the eternal dupe.

But, though these animals stand for men, La Fontaine never forgets that they are animals, and shows himself always a keen, if desultory, observer of

nature. Where men are introduced, these too are social types, the king, the lord, the priest, the monk, the recluse, the burgher, the pedant, the doctor, the coward, the vain man, the arrogant man, the hypocrite, the self-

seeker, and, most sympathetically treated of all, the peasant laborer. It has been well said of La Fontaine that he knew men like Moliere and society like Saint-Simon. Keen insight into the foibles of human nature is found throughout the (Fables, > but in the later books admirable ingenuity is employed to make the fable cover, yet convey, social doctrines and sympathies more democratic than the age would have tol¬

erated in unmasked expression. So these 'Fables, first delighting the child for their own sake, delight the man as social parables, full of ageless teachings of worldly wisdom, of ironic observation, of broad humanity, for all their seeming child-like simplicity. # f Lamartine could find in La Fontaine s 'Fables* only ''limping, disjointed, unequal verses, without symmetry either to the ear or on the page.® But the poets of the Romantic School, Hugo, Musset, Gautier and their fel¬*

lows, found in the popular favor these verses had attained and held an incentive to under¬

take an emancipation of French prosody which they in large measure achieved. Yet it may be doubted if any lines they wrote awaken so mani¬

fold an echo wherever French is spoken as. the little apologues of the Grasshopper and the Ant, the Crow and the Fox, Death and the Wood-cutter, the Animals in the Pestilence, the Two Pigeons and many more that crowd to memory. <(La Fontaine's Fables,® wrote

Madame de Sevigne, "are like a basket of strawberries. You begin by selecting the largest and best, but, little by little, you eat first one, then another, till at last the basket is empty.®

There are translations into English verse by E. Wright and Rev. W. L. Collins. An at¬

tractive edition of the original text with a preface by Jules Claretie was published in two volumes (New York 1910).

Benjamin W. Wells.

LA FOURCHE, la foorsh, a bayou in

southeast Louisiana, and an outlet of the Mis¬

sissippi River, which begins at Donaldson-

ville, on the right bank, and flows southeast to the Gulf of Mexico, through Fourchon and Timbalier passes, about 50 miles west of the Delta of the Mississippi. It has a total length of 150 miles and is navigable by steamboats 100

miles from its mouth.

LA GIOCONDA, la gi'o-kon'dq, a trag¬

edy in four acts, in prose by Gabriele d'An-

nunzio and dedicated to "Eleonora Duse delle belle mani.® It was first played 15 April 1899, at the theatre Bellini, Palermo, and was not very warmly received. Although the prose form and modern language of the play, the time and the place of the events differentiate it from the old Greek drama, nevertheless, the inexora¬

ble fatality which dominates the course < of events and against which human defense is im¬

potent renders the play tragic as in the case of the fateful tragedies of antiquity. And yet this fatality is not the predestination of the Greek drama, but a conception of Beauty, whether created by art or nature, as the sovereign power of the world, to which must necessarily be sacrificed goodness, morality, and even life LA GRANDE — LA HIRE

itself. The three principal characters are Lucio Settala, a sculptor, his wife, Silvia, and his model and the inspirer of his works of art, Gioconda Diante, a woman of marvelous beauty, with whom he is infatuated. Silvia represents virtue, and Giooonda the supremely beautiful in art. The battle between these two for the soul of the sculptor forms the dramatic struggle of the tragedy. Finally Art triumphs over Virtue, just as a man triumphed over destiny in "La Citta Morta* ; or, rather, in both cases, the triumph is with Eros, the instigator and di¬

rector of the motif in d'Annunzio s productions.

In (La Gioconda* aesthetic fatality has its ful¬

filment amid the tears of the good and inno¬

cent, upon the ruin of whom the work of im¬

mortal art rises, Beauty reigns supreme over the moral virtues trampled in the dust. Despite the lack of action throughout the play, its non¬

conformity by reason of very long passages to what is supposed to be the conventional dra¬

matic procedure; despite its reversal of gen¬

erally accepted standards of the conduct of life and the horrible mutilation with which the tragedy ends; despite the supposed influence of German and French writers, the play remains, none the less, as in the case of (La Citta Morta,* a thoroughly^ original production such as only d'Annunzio is capable of producing.

(La Gioconda* has been \yell translated by Arthur Symons (Chicago 1913). Consult

Dornis, Jean, (Le theatre de Gabriel d'An¬

nunzio,* in Revue des deux mondes (pp. 655—681,

February 1904) ; Mantovani, D., (Lettera-

ture contemporanea* (Turin-Rome 1913) ; Maz-

zoni, Guido, (La Gioconda* (in Nuova Antolo -

gia, No. 165, 1899, pp. 314-337).

James Geddes. Jr.

LA GRANDE, la-grand', Ore., city and

county seat of Union County, on the Grande Ronde River, and on the Oregon Railroad, branch of the Union Pacific, 300 miles east of Portland.. It is the commercial and trading centre of an extensive live-stock, grain and fruit growing region, and has flour mills, brick works, railroad shops, cigar factories, sash, door and box factory, creameries, foundry, soda-

water works, lumber mills, beet sugar and other factories. There are two national banks, and the value of the city's taxable property is $3,700,000. It contains a high school, three grade schools, courthouse, city hall, Federal building, and Elks', Masonic and Odd Fellows'

buildings. The city is governed under a com¬

mission-manager charter. Pop. 7,000.

LA GRANGE, la-granj', Ga., city and

county-seat of Troup County, on the Macon and Birmingham and on the Atlanta and West Point railroads, 70 miles southwest of Atlanta.

A Baptist female college and a Methodist fe¬

male college are located here. The town was settled in 1826 and was incorporated two years later. Under a charter of 1891 the city is gov¬

erned by a mayor, elected annually, and a coun¬

cil elected every two years. It has numerous

industries, including cotton and cottonseed-oil mills, a creamery, and is of importance as a trading centre. The waterworks, , electric-light and sewage systems are municipally owned.

Pop. (1920) 17,038.

LA GRANGE, Ill., town in Cook County, on the Chicago, Burlington and Quincy Rail¬

road, 15 miles west from Chicago. It is a sub¬

urban and residential town largely populated by Chicago business men, and has numerous churches, public and private schools and two weekly newspapers. It contains Broadview Seminary, Saint Joseph's Institute, Nazareth Academy and a State Masonic Orphans' Home.

Pop. (1920) 6,525.

LA GRANGE, Ind., town and county-seat

of La Grange County, on the Grand Rapids and Indiana Railroad, 45 miles northwest of Fort Wayne. It is the centre of a considerable agriculture section and has numerous manufac¬

turing interests, including flour and lumber mills, chair factories, agricultural implement works, pickles, ice, ice cream, cement-brick works, etc. The waterworks are municipally owned. Pop. 1,772.

LA GRANGE, Tex., city and county-seat

of Fayette County, on the Colorado River and on the Southern Pacific and the Missouri, Kan¬

sas and Texas railroads, 80 miles southeast of Austin. It has a cotton trade of 15,000 bales annually, and is an important shipping point for oottonseed-oil, grain and live-stock. There are cotton gins, compresses and cottonseed-oil mills and other industries here. The water¬

works are owned by the city. Pop. 1,850.

LA GRANGE COLLEGE, an educational

institution in La Grange, Mo., founded in 1858

under the auspices of the Baptist Church. It has 13 professors and instructors, 175 students, 8,000 volumes in library and productive endow¬

ment of $50,000. Its grounds and buildings are valued at $65,000; its income is $7,000.

LA GRITA, la gre'ta, town in Venezuela, in the state of Tachira, located in a beautiful mountain region 5,000 feet above the sea, and surrounded by coffee, sugar, wheat, cacao, rice and tobacco plantations. It lies 75 miles south of Lake Maracaibo and 60 miles southwest of Merida. The town, which has a most delightful climate, was founded in 1576 by Francisco de Caceres. It has suffered from several destruc¬

tive earthquakes. Pop. (commune) 26,000.

LA GUAYRA, la gwi'ra, or LA

GUAIRA, city and seaport in Venezuela, about five miles from Caracas, on the Caribbean Sea.

It was founded in 1588 and is the most import¬

ant commercial city in the republic. The har¬

bor which was formerly an open roadstead has been improved by a breakwater, and is well protected by a fort. It has a floating dry dock and shipbuilding plant. La Guayra exports coffee, cocoa and skins, and imports chiefly manufactured goods. Its annual trade amounts to about $12,000,000. It contains cigar, cigar¬

ettes, shoes and hat factories, the products of which go entirely into the home market. It has steamship communication with Europe and North America. It is connected with the cap¬

ital by a railway 29 miles long, winding around the

bases of the mountains. The port was blockaded in 1903 by the British and German fleets, pending the settlement of claims against the government. The climate is very hot and its unhealthfulness has been lessened by mod¬

ern sanitary improvements. Pop. 12,000.

LA HABANA, Cuba. See Havana, Prov¬

ince.

LA HIRE, la hir', Etienne de Vignolles, French general: b. about 1390; d. 11 Jan. 1443.

On the fall of the town of Coucy (1418), be¬

sieged by the Duke of Burgundy, he bravely fought his way through the enemy at the head of the garrison. He hurried (1429) with Jeanne d'Arc to the aid of Orleans and showed his bravery at Jargeau and Patay. In 1431 he pressed forward to Rouen to release the Maid of Orleans and was captured by the English, but was ransomed and devastated the provinces occupied by the English and Burgundians. His romantic bravery and his faimful adherence to the Maid of Orleans caused him to be called La Hire, meaning, in Burgundian dialect, the snarling of a dog, his rough style also making him a favorite French cavalier and furnishing the reason for using his name in court-cards for the knave of hearts.

LA HONTAN, la on'tan, Armand Louis,

Baron de, French soldier and traveler: b.

Mont-de-Marsan, about 1666; d. Hanover, 1715.

He went to Canada (1683) and served as a common soldier till he was advanced in the ranks, and as commander of several inland forts explored the great lakes. In 1691 he returned to France to attempt to

regain his patri¬

mony. He returned to Canada (1693) and was made king's lieutenant in Newfoundland and promptly picked a quarrel with the gover¬

nor, fleeing on a merchant vessel to escape arrest, and landed (1694) in Portugal to arrive in Paris in time to receive his dismissal from office. Leaving Paris he went to his native province in Gascony, but hearing he was about to be arrested, he fled to Spain, then retired to Hanover and died there. He published an ac¬

count of his adventures in America, together with his description of <(the different inhabit¬

ants, the nature of their government, their commerce, costumes and religion® under the title (Nouveaux voyages dans l'Amerique septentrionale) (The Hague 1703, 1709; Am¬

sterdam 1705, 1742) with maps and drawings.

A third volume appeared (Amsterdam 1704) under title of (Suite du voyage de l'Amerique,) both the works being published together later (Amsterdam 1728). He relates the points in his campaign at Michillimakinac, which he left to reach the Mississippi via Wisconsin, using Carver's route. He describes a trip along a river which he names the Riviere Long and gives considerable details, but some writers de¬

clare this part to be fiction.

LA JONQUIERE, la zhon'kyar', Jacques

Pierre Taffanel, Marquis de, French naval officer : b. Lagra'isses, near Alby, 1680 ; d. Que¬

bec, Canada, 1753. He accompanied Duguay-

Frouin at the taking of Rio Janeiro (1711), was captain under Admiral de Court (1744) at the battle of Toulon and commanded the French fleet at the

battle of Finisterre (1747), with his six vessels fighting against 17 British men of the line. Taken prisoner, he gained his liberty on the Treaty of Aix-la-Chapelle when (1749) he went to Quebec as governor of Canada to which he had been appointed in 1746, but his two former attempts to cross the ocean had been frustrated1. He proved an able gov¬

ernor.

LA LANDELLE, la lan'del, Guillaume

Joseph Gabriel de, French author: b. Mont¬

pellier, 5 May 1812; d. 19 Jan. 1886. After finishing his studies at Strassburg he entered (1828) the navy, becoming lieutenant after 11

years' service. He wrote quite copiously novels depicting maritime warfare, the manners and customs of seafaring men, and other phases of life he had experienced. His voyages and ac¬

tivities in South America afford the basis of some of his plots. Among the best-known novels are (La Grogone) (1844) ; (Frise-Poulet ou les epaulettes d'amiraP (1847) ; (La cou-

ronne navale) (1848) ; (Une haine a bord}

(1851) (Les princes d'ebene) (1852) ; (Le dernier des Flibustiers> (1858) ; (Sans-Peur le corsaire> (1859). In deeper vein are his works,

LA LINEA, la le na-a, Spain, town in the province Cadiz, on the border or line (from whence its name) bounding on Gibraltar. Some consider it a suburb of San Roque. It is of recent growth and its chief buildings are the theatre and bull-ring, the casinos and the bar¬

racks; this being a frontier-post it has its garrison. The British razed the old fortifi¬

cations in 1910. Gibraltar gets much of her fruit and vegetables from the market-garden¬

ers and the laborers of Gibraltar make this their dwelling place.

LA MARE AU DIABLE, la mar 6 dy'-

abl ((The Devil's #PooP). The most perfect of the works of George Sand was undoubtedly (La Mare au Diable> (18<6). Its perfection is due to the fact that it escapes most of her char¬

acteristic defects and possesses her finest quali¬

ties in their full maturity. This resulted quite naturally from the choice of a simple plot — the love a lonely ploughman feels for a poor shep¬

herdess just emerging into womanhood, and a setting laid in the heart of Berri, the country where the author had lived, as a child, and to which she had now returned. The characters, simple Berrichon peasants, as well as the coun¬

try, were known to her, therefore, not through an imagination only too easily fired, but through observation and long years of sym¬

pathetic interest. There is consequently a re¬

freshing absence of that impassioned pleading which frequently threw her early works out of artistic focus and gave us threats and tears for facts and blood. Intense individualist that she was, her distrust of the perplexities of so¬

ciety had been re-enforced by her own un¬

happy marriage, and from the first she had, with Rousseau and Wordsworth, favored the primitive, the simple soul, close to nature.

Here she found warrant for her faith that both man and nature are good. This had been indi¬

cated in many earlier incidental characters, the flower girls in

(1841). But throughout that earlier period her mind had been tense with the social problem.

This nervous tension had disappeared with the years, and now among the scenes of her child¬

hood her native genius had its way. There is here a sureness of touch and the sense of being on firmer ground. It is not impossible that in the peasants she also saw the salvation and fu¬

ture of France. Their way of life, their homes, the country roads, the night in the woods about the Devil's Pool are truly and beautifully de¬

scribed, and the idealized peasants themselves are likewise true, at least in the sense that they LA MARMORA — LA NOUE

are psychologically consistent and conform to a healthy ideal. The style is simple, limpid and musical, like a woodland brook. In spite of the seemingly unpremeditated manner of her narration, the author keeps steadily to her story and in construction it is superior to (Frangois le Champi) or (La Petite Fadette) which followed it. The student of George Sand feels that she had turned with a sense of relief to ((these Georgies of France,® as Ste.

Beuve aptly called them, and there was some¬

thing undoubtedly fresh and reassuring to readers stirred by the revolutionary spirit of '48

in this new and hopeful portrayal of a realm that promised humanity health, stability and strength. Consult Krenine, (George Sand}

(Vol. III).

Christian Gauss.

LA MARMORA, la mar'mo-ra, Alfonso

Ferrero, Marquis of, Italian general and statesman: b. Turin, 18 Nov. 1804; d. Florence, 5 Jan. 1878. He was educated at the Sardinian Military Academy, was advanced (1823) to lieutenant of artillery and (1831) captain. He distinguished himself in the war (1848) against Austria at the siege of Peschiera and was advanced to the rank of brigadier-general.

In 1849 he suppressed the rebellion in Genoa and took the portfolio of Minister of War to thoroughly reorganize a disrupted army. In 1855 he commanded the Sardinian expedition¬

ary forces to the Crimea. From 1856 to 1859

he was Minister of War and Marine and be¬

came chief of the general staff on the outbreak of war with Austria. After the treaty of peace of Villa-Franca he again became Minister of War and Marine (1860). Late in 1861 he be¬

came first prefect at Naples and showed ener¬

getic action against the movements of Gari¬

baldi and of the Camorra. He headed (1864) the cabinet, after the Turin troubles, as Min¬

ister of Foreign Affairs and carried out the September convention with France. In 1866 he concluded a trade treaty with Germany and an alliance with Prussia, and when the war broke out he joined the king and army as chief of general staff. The unsuccessful plan of cam¬

paign was his and he fell into great disfavor after the unfortunate battle of Custozza, resign¬

ing his portfolio. He wrote much in defense of his military plans and after the death of his former adjutant and friend, Govone, he pub¬

lished the dispatches of the Berlin (1866) mis¬

sion in (Un po-piu di luce (Florence 1873) to prove*

faithlessness and traitorous intent of the Bismarck policy. The denunciations of Bis¬

marck and Prussia stopped him from issuing the second volume of the work, but he. issued (I segreti di stato nel governo constitutional (ib. 1877) in self-defense. In 1891 a statue on horseback was erected in his memory at Turin.

Consult Massari, (I1 generale Alfonso di La Marmora) (Milan 1880) and a similar work by Chiala, (Le general La Marmora et l'Alli-

ance prussienne) (Paris 1878).

LA MESA, la ma'sa, Colombia, a pic¬

turesque city located on a high plain about 25

miles from Bogota. Owing to its elevation above sea-level (4,225 feet), its climate is ge¬

nial. The surrounding country is a fertile ag¬

ricultural region. Trade is carried on in cacao, salt, grain and hats. Pop. about 5,250.

LA METTRIE, la me-tre, Julien Offray

pe, French physician and atheist: b. Saint Malo, 25 Dec. 1709; d. Berlin, 11 Nov. 1751.

He studied theology in the Jansenist schools, then decided upon the pursuit of medicine and in 1733 went to Leyden to study under Boer-

haave. In 1742 he was appointed surgeon to the guards in Paris. His medical observations led him to believe that physical phenomena were purely physical in their origin. His (His-

toire naturelle de l'ame* (1745) voiced this conviction and raised so strong a feeling against him that he fled to Leyden. There he elabo¬

rated his theories, presenting them forcibly in T'Homme Machine) (1748). He further ex¬

pressed his beliefs in (Discours sur le bonheur) and (L'Art de jouir.* He maintained that hap¬

piness for the world could be found only in atheism, thereby ending theological strife and the ban on pleasures of the senses. He was forced to leave Leyden in 1748 and found a refuge at the court of Frederick the Great, who appointed him court reader. Among other writings are Observations de Medicine pra-

tique) (1743) ; (Reflexions sur l'origin des aminaux) (1750), etc.

LA MORRA, la mor'ra, an ancient Roman game still played in Italy; the Romans desig¬

nated the game micare digitis , ((to flash with the fingers.® The game requires two players and1 consists of the simultaneous throwing out of the right hands of the players and the call¬

ing of a number which, in order to score, must total the number of fingers extended upon the right hands of both players. A tie means no score, a correct guess one point; and the game is played for 5 or 10 points. It is commonly used as a gambling game. Consult Story, W.

W., (Rota ali Roma) (8th ed., Boston 1887).

LA MOTTE FOUQUE, la mot foo'ka,

Friedrich Heinrich Karl, Baron von. See Fouque, Friedrich Heinrich Karl.

LA NAVIDAD, la na-ve-dad'. See Na-

vidad, La.

LA NOUE, la noo', Frangois de (Bras de Fer), Huguenot captain: b. near Nantes, 1531; d. Moncontour, 4 Aug. 1591. He came of an ancient

Breton family and saw his first military service in Italy. He was in the first Huguenot War and in the second one distinguished him¬

self by capturing Orleans in 1567 with only 15

followers. He commanded the rear guard at the battle of Jarnac in March 1569 and was taken prisoner at Moncontour in October of that year. However, he was soon exchanged, resumed the governorship of Poitou and de¬

feated the royalist army at Rochefort. He lost his left arm at the battle of Fontenay in 1570, but an iron one was made for him, thus giving him the name ((Bras de fer.® With the dawn of peace in France he joined the Dutch Protestants in 1571, but was captured and sent as a prisoner to France. He was requested by Charles IX, after the massacre of Saint Bartholomew, to attempt the reconciliation of the Huguenots with the king, but finding the task impossible and war inevitable he gave up his royal commission and served as general of La Rochelle from 1574-78. With the conclusion of peace, La Noue served the Huguenot cause in Holland, but in 1580 he was taken prisoner by the Span¬

iards; they, holding him dangerous through the 578

splendid character he bore, confined him for five years in prison. While in prison he wrote (Discours politiques et militaires,* a work of great value, which has been translated into English and German. He was exchanged in 1585 and bound not to take arms against his captors. In 1589 he joined Henry of Navarre, saw service through the siege of Paris, at Argues, Ivry and other battles, and was fatally wounded at the siege of Lamballe in Brittany.

He wrote declaration pour prise d'armes et la defense de Sedan et Jamets) (1588) ; Ob¬

servations sur I'histoire de Guicciardini* (2

vols., 1592), etc. His (Correspondence) was published in 1854.

LA NOUVELLE HELOISE, la noo'vel

a-lo'e'z ((The New Heloisa*). In

belled. It was a creation of pure fiction, of unhampered imagination, touching life only on the sides to which he was most attracted, and it left him the largest possible freedom of procedure. W riting, furthermore, in the epistol¬

ary style so common in 18th century French and English novels, he took full advantage of the discursive manner of his time. No little of the interest of the novel, therefore, lies out¬

side of the plot proper, in eloquent passages on the right to love, the morality of duelling and suicide, the equality of men, the advan¬

tages of country as against city life, and above all on the beauties of lake and mountain scenery in Switzerland. Some 30 years before, Thomson had published his (Seasons^ and more than 20 had passed since Haller had written his stilted but historically important descriptive poem (The Alps.* Switzerland, however, had not yet become a place of pil¬

grimage for tourists. The success of the (New Heloisa) was to bring them to the shores of Lake Geneva in increasing numbers, and not a few came to visit the scenes described in the famous novel and to wander about in them book in hand.

It would, however, be a serious mistake to overlook the extraordinary interest which the passionate love story itself aroused in Rous¬

seau’s contemporaries. The editions could not be printed rapidly enough, and persons of quality stood in line before circulating libraries for an opportunity to rent it at 10 sous an hour.

Rousseau's heroine was to him the model and type of the virtuous woman of sentiment.

She had, to be sure, yielded to her plebeian lover and tutor, Saint Preux. Her later marriage she explains as due to motives of duty, devo¬

tion and friendship. That after Saint Preux's long absence he should have been invited to live at the house of his former mistress and her husband, and should have accepted, may well appear to have produced an unnecessarily strained situation, fraught with dangers for the virtuous but once passionate lovers. The ten¬

sion is therefore relieved when Julie loses her life in attempting to save her child from drowning.

To attribute the genesis of Rousseau's fa¬

mous story to his own attachment for Mme.

d'Houdetot is no longer possible; for it seems well established that the novel had been planned before that episode. That he was indebted to Richardson and England is beyond question.

For all this, however, most of his novel re¬

ceived its character and quality from the fact that it was prompted and colored by his own eager and vivid hopes, desires and aspirations.

It is the expression of Rousseau's ideal of social and domestic life. Christian Gauss.

LA PAZ, la pas (Sp. la path), depart¬

ment in the northwest of Bolivia, bounded on the north by Brazil, on the east and south by the departments of Beni, Cochabamba and Oruro, and on the west by Peru. Its area has never been accurately determined; according to a recent conservative estimate it is 75,742

square miles. Extensive tracts in the northern

portion are still unexplored, and the boundary disputes with Brazil and Peru add a large element of uncertainty. Calculations based upon the extreme Bolivian claims give the fabulous area of 275,413 square miles. The department is divided into nine provinces andi these are subdivided into cantons. The entire department is subject to a prefect, representing the national government. Some of the highest peaks of the Bolivian Andes rise above the great Titicaca Basin (itself 13,000 feet above sea-level) in the southern half of this depart¬

ment, which portion has a temperate and mode¬

rately salubrious climate (see La Paz, the capi¬

tal, etc.). Chief products are copper, silver, tin, gold, coca, wheat, maize, barley, potatoes ; in the torrid lowlands of the north, sugar-cane, rice, tobacco and coffee; and from the forests along the tributaries to the Amazon are ob¬

tained rubber and cinchona. Cattle and sheep are bred in large numbers on the upland pas¬

tures. The population, according to an official estimate, is 726,357.

LA PAZ, Bolivia, capital of the depart¬

ment of the same name, and, temporarily, of the republic (see Sucre). It is the metropolis and commercial centre of Bolivia, situated in the Quebrada del Choqueyapu, 650 feet lower than Lake Titicaca (from which the distance by road is about 45 miles) and yet quite 12,120 feet above the level of the sea. The mean annual temperature is about 54° F„ and the extremes of temperature 19° F. to 75° F. The clearness of the sky occasions rapid loss of heat by radia¬

tion ; the nights are therefore much colder than the days. Though the thermometer often falls below freezing-point, plants are rarely frozen, for the reason that the air at this great height is very dry. It is substantially built on 40

hills, bridged by 20 bridges, with clean, well-

paved streets. The Plaza Murillo, a fashionable promenade bordered with beautiful flowers, and the fine tree-bordered Alamada, are the best of its thoroughfares. The cathedral is distinguished by the fine carved stone work of its faqades. There are some noteworthy public institutions — a museum, library, university with four faculties, professional schools of various kinds and courts. Railways connect with Antofagasta and the port of Arica. The city was founded in 1549 by Alonzo de Mendoza.

Pop. 78,856.

LA PAZ, Mexico, port on the east shore and capital of the southern district of Baja California. It is pleasantly situated between

the coast range and the bay, and has commercial dealings principally with San Francisco, Mazat-

lan, Guaymas, San Bias and Manzanillo. Silver mining and agriculture are among principal in¬

dustries, and the most valuable pearl fishery on the Pacific coast is here located. Pop. 5,536.

LA PELTRIE, la pel'tre, Marie Madeline de, nee Chauvigny, French-Canadian edu¬

cator: b. Alengon, 1603; d. Quebec, 1671. She was of a religious turn of mind, but was re¬

fused permission to enter a convent, was mar¬

ried at 17 and widowed at 22. She answered Father La Jeunes' appeal for help in the edu¬

cation of Indian girls in the Jesuit religion in Canada, and decided to employ her fortune in founding an institution for the work. In 1639

she went to Canada, accompanied by three nuns and several hospital sisters, and founded the Ursuline Convent at Quebec, the first school in Canada for the instruction of girls, teaching both whites and Indians. She was with the Montreal colony in 1642-46, when she returned to Quebec and became a nun, devoting her en¬

tire means to the convent.

LA PEROUSE, la pa'rooz', Jean Fran¬

cois de Galaup de, French navigator: b. near Albi, Languedoc, France, 22 Aug. 1741; d. after 1788. He served in the French navy against England (1778-83), and was in command of the frigate Astree in the attack on a British convoy off the coast of Nova Scotia in July 1781. He sailed in August 1785 with two ships on an exploring expedition to the Pacific, one of the objects of which was to discover the northwest passage from the Pacific side. By sailing through La Perouse Strait, between Sag-

halien and Yezo, he discovered that each of these was a separate island. He touched at points in China and Japan and visited the Solomon Islands and Australia. In February 1788 he sailed from Botany Bay, and after this no more was heard from him. In 1826 it was fully ascer¬

tained by the English Captain Dillon that both of the French ships had been wrecked in a storm on a coral reef off Vanikoro, an island lying north of the New Hebrides, and in 1898

a few relics of his party were found there. An account of the early portions of La Perouse's voyage, prepared from journals sent home by him, was published under the title of (Journey Round the World.)

LA PEYROUSE, Philippe Picot de,

French naturalist: b. near Toulouse, 1744; d.

1818. He was advocate-general in the parlia¬

ment of his native town in 1768-71 ; thereafter until 1789 engaging in natural history re¬

searches. He was then named president of the administration of Toulouse, became inspector of mines and professor of natural science at Toulouse, and in 1800 he was mayor. He be¬

came perpetual secretary of the Toulouse Acad¬

emy of Sciences in 181 1, and during the period of the Hundred Days he served as president of the electoral college of Haute-Garonne. He wrote description de plusieures especes nou-

velles d'orthoceratites et d'ostracites* (1781);

(1819).

LA PIEDAD, la pe-a-dad', Mexico, city in the state of Michoacan, near the northern boundary, on the Lerma River, 62 miles south¬

west of Guanajuato. It is the centre of a large agricultural district. A fine bridge crosses the Lerma at this point. Pop. 10,604.

LA PLACE, la'plas', or PLACEUS, Jo-

sue de, French Protestant clergyman: b. Brit¬

tany about 1606; d. 17 Aug. 1665. He was edu¬

cated at Saumur, became pastor of the Re¬

formed church at Nantes in 1625 and pro¬

fessor of theology at Saumur in 1632. He wrote. (Theses theologicse de statu hominis lapsi ante gratianP (1640), in which he set forth liberal views on the subject of original sin. His views were rejected at the Formula consensus of 1765. He also wrote disputa¬

tions academicae* (3 vols., 1649-51), and de imputatione primi peccati Adami* (1655). His collected works were published (1699, 1702).

LA PLACE'S HYPOTHESIS. See La

Place, Pierre Simon, Marquis de; Nebular Hypothesis, the.

LA PLATA, la pla'ta, Argentine Republic, capital of the province of Buenos Aires. After the Congress of the republic declared Buenos Aires to be the capital, the legislature of the province of Buenos Aires decided to build a new city, which should be the provincial capital.

The cornerstone of La Plata was laid on 19

Nov. 1882, in a barren waste a few miles from the village of Ensenada and about 24 miles below Buenos Aires, on the south shore of the Rio de la Plata. The port of La Plata, built in Ensenada, five miles distant, is in communi¬

cation with the city by means of a railroad and a canal, which is navigable by seagoing vessels.

The city is laid out on the same plan as Wash¬

ington, D. C., with diagonal avenues 97^4 feet wide, streets 58j4 feet wide, and 23 public squares. The principal buildings are the gov¬

ernment house, the capitol, and the various public departments, have been erected on_ a magnificent scale. To the National University there is attached an astronomical observatory, and it possesses one of the finest museums in South America, especially rich in the depart¬

ments of palaeontology and anthropology. There is an excellent water supply. There are several handsome churches, three theatres, a race¬

course, a splendid park planted with eucalyptus trees and street railway service. Railways con¬

nect this port with nearly every province of the republic, and there is steamer connection with Liverpool. Pop. 106,382.

LA PLATA, Rio de, re'o da, an estuary on the southeastern coast of South America, between Uruguay and Argentina ; an outlet for the united waters of the Parana and Uruguay rivers. The enormous outflow, estimated at 2,000,000 cubic feet per second, which in volume is exceeded only by that of the Amazon, creates powerful currents; treacherous shallows are formed over the washings brought down from the interior of the continent ; and the low-lying southern shores afford no shelter from storm winds. Therefore navigation in this estuary, which is 143 miles wide at its mouth, and about 190 miles long, narrowing. gradually above Montevideo and Buenos Aires, combines the perils of river and open sea. On the north shore there is one good natural . harbor — that of Montevideo; on the Argentine side well-

directed efforts are being made to supply natural deficiencies by building massive docks, dredg¬

ing deep-water channels and completing other extcnsive harbor improvements (see Argentina ; Buenos Aires; and La Plata). The region to which the Rio de la Plata, with the Uruguay, Parana and Paraguay rivers, gives access, is of vast extent. The estuary was discovered in 1509 by Diaz de Solis, received its name (silver-

river) from Sebastian Cabot, and was explored by Day in 1853 and by Page from 1853 to 1856.

In the later years of Spanish dominion it was comprised in the vice-royalty of La Plata, from which the states of Argentina, Uruguay, Para¬

guay and Bolivia have been carved; and to-day the southern portions of that region sustain some of the most progressive of all Latin-

American communities. Early in the last cen¬

tury Great Britain attempted to secure control of

this continental gateway, a position which, as it now appears, would have enabled her to win in the south a colony possessing very great resources — another Canada, at least. In 1806, when England and Spain were at war, Spain being the ally of Napoleon, Maj.-Gen. William Carr Beresford, with about 1,600 men, arrived off Buenos Aires, and captured the city quite easily. But a few weeks later the invaders were driven out. A much larger army, com¬

manded by General Whitelocke, was sent in 1808 to recapture Buenos Aires, and a separate force succeeded in taking possession of Monte¬

video. But the British were defeated on the south shore ; General Whitelocke capitulated on the day of the attack, withdrew to his ships and surrendered Montevideo.

LA PORTE DU THIEL, la port du ta'y\

Frangois Jean Gabriel, French Hellenist: b.

Paris, 13 July 1742; d. 28 May 1815. He served in the army, but after 1763 he engaged wholly in the study of Greek language and literature.

In 1779 he gained the privilege of studying the archives of the Vatican, and his discoveries and collections of material there form an im¬

portant addition to mediaeval history. He re¬

turned to France with more than 17,000 docu¬

ments, which formed a basis for much of his later work, and many of which were published at the expense of the French government. He published (Oreste, ou les choephores, tragedie d'Eschyle,5 with notes (1770) ; (ITymnes de Callimaque, nouvelle edition avec une version frangaise et des notes5 (1775) ; (Theatre d'Eschyle, traduit du grec en frangais5 (2 vols., 1794) ; (Geogrephie de Straton5 (3 vols., 1 805—15), etc.

LA RABIDA, la ra'be-da, Spanish Fran¬

ciscan convent of Santa Maria de Rabida on a hill near Pelos. The convent had fallen into ruins but was restored in 1855. Its historical interest identifies it with Christopher Columbus, who stopped there on the occasion of his pro¬

jected visit to France to arouse interest in his theories. He succeeded in gaining the attention of the prior, who besought and gained for him the interest of Queen Isabella. A monument to Columbus, consisting of a column 225 feet in height, surmounted bv a globe, was erected here in 1892.

LA RIVIERE, la reVyar', Alphonse Al¬

fred Clement, Canadian statesman: b. Mont¬

real, 24 July 1842. He was educated at the Jacques Cartier Normal School and at Saint Mary's College, Montreal. He entered govern¬

ment service in 1871, going to Manitoba as secretary of the board of education and serving as superintendent of Catholic schools. He also edited Le Manitoba. He served in the Mani¬

toba legislative assembly in 1878-89, and in the Canadian House of Commons in 1889-1904.

He was Provincial Secretary, Minister of Agri¬

culture and Provincial Treasurer in the gov¬

ernment of Manitoba in 1878-89, and since 1905

has been immigration commissioner for Mani¬

toba with headquarters at Montreal. He was appointed a senator by the Duke of Connaught in 1911.

LA ROCHE, la rosh, Sophie, German nov¬

elist : b. Kaufteuren, 6 Dec. 1731 ; d. Offenbach, 18 Feb. 1807. She was married to Georg Michael Frank von La Roche (or Lichtenfels) in 1754 and her home became a literary centre.

The poets Goethe and Christoph Martin Weiland were both warm friends and admirers. Her earlier work shows the influence of Richard¬

son’s (Clarissa Marlowe.5 Author of (Ge-

schichte des Fraulein von Sternheim5 (1771) ; (Moralische Erzahlungen5 (1782); ^Geschichte von Miss Long5 (1789) ; (Schones Bild der Resignation5 (1795), and (Melusinems Som-

merabende5 (1806).

LA ROCHEFOUCAULD, la rosh-foo-ko,

Frangois, Due de, Prince de Marcillac, French courtier and moralist: b. Paris, 1613; d.

there, 17 March 1680. He entered on a military career and was engaged as an officer at the age of 16 at the siege of Casale. In the wars and intrigues of the Fronde he served the party of the Parliament, took part in the defense of Bordeaux (1650), less from conviction than to please the Due de Longueville, and he was wounded at the battle of Faubourg, Saint An¬

toine (1652). At the end of the civil war he abandoned the pursuits of ambition for a life of repose and reflection. He frequented the salon of Madame de Sable, and his house be¬

came a resort of the most distinguished wits and people of culture of the time, Boileau, Racine, Moliere, Madame de Sevigne and Madame de La Fayette. The first fruits of his literary activity were his (Memoires sur la Regence d’Anne d’Autriche,5 a spirited repre¬

sentation c>f that time, published surreptitiously in 1662 without the author’s knowledge, and by him repudiated ; but his denial of the authorship was not generally credited. It is now believed that only about a third of this work is his.

In 1665 appeared anonymously the work that has made

his name immortal, (Reflexions, ou Sentences et Maximes Nouvelles,5 which passed through five editions in the course of the author's life, was subjected to careful revision by him and have frequently been republished.

There are about 700 maxims, varying from two or three lines to half a page in length. No one prior to his day or since has given so much point, brevity replete with fullness, and cut¬

ting edge to his thoughts. The prevailing thought in the book is that self-love is the dominating spring of human action : virtue has its recompense, but in being virtuous it is only our desire to gain the recompense. This view is presented with so much piquancy and variety of aspect that the reader is much enamored of the author's skill in presenting his point of view that he forgets to condemn this libeller of the LA ROCHEFOUCAULD-LIANCOURT — LA SALLE

human race. An English version by G. H.

s Powell appeared in 1903. Consult) his correspondence published 1818; Bourdeau, (La Rochefoucauld > (1895) ; Hemon, (La Rochefoucauld* (1896) ; Rahlstede, (Studien zu La RochefoucaukP (1888). See Maxims.

LA ROCHEFOUCAULD-LIANCOURT,

lyan'koor', Frangois Alexandre Frederic, French philanthropist and social reformer: b.

La Roche Guyon, 11 Jan. 1747 ; d. Paris, 27

March 1827. He early entered the carbineers as an officer, and after a visit to England he established a model farm and a school for the children of soldiers. The school from 1788 re¬

ceived royal support as the Ecole des Enfants de la Patrie. He was elected to the States-

General in 1789 and there carried forward his measures for social reform. While devoted to the person of Louis XVI he was by principle opposed to the government and endeavored to warn the king of the dangerous trend of public affairs. On 18 July, four days after the fall of the Bastile, he became president of the National Assembly, and afterward he was ap¬

pointed to the command of a military division in Normandy. He hoped to secure the per¬

sonal safety of the king and sought to have him take refuge in Rouen. Failing in this he aided the king with a large sum of money. Dur¬

ing the Terror he found safety in England, and in 1795-97 he visited America. He returned to Paris in 1799 but took no part in politics, de¬

voting himself to his projects of social better¬

ment, and especially to the furtherance of vaccination. After the Restoration he entered the House of Peers. His school, the Ecole des Enfants de la Patrie, received the favor and support of the successive governments and for 23 years he was government inspector of it.

He founded the first savings bank in France and served as a member of boards of adminis¬

tration for hospitals, prisons and agriculture.

He refused to support the government in 1823, Which led to the loss of his positions and the abolition of his vaccination committee, the wel¬

fare of which he had greatly at heart. In pro¬

test the academies of science and medicine elected him to their membership. He never regained official favor. Author of (Voyage dans les Estats — Unis d'Amerique (8 vols., 1798) ; (Les Prisons de Philadelphie* (1796).*

LA ROCHEJACQUELEIN, la rosh-zhak-

lan, Henri Du Verger, Comte de, French Ven-

dean royalist: b. Chatillon, 20 Aug. 1772; d.

Nouaille, 4 Mardh 1794. On the outbreak of the Revolution he retired to La Vendee, and the peasants of La Vendee having taken up arms in the royal cause, he placed himself at their head and addressed them in the short and pithy harangue: <(Let us go to meet the enemy; if I draw back, kill me ; if I advance, follow me; if I die, avenge me.® After gaining 16

victories in 10 months he fell at Nouaille, shot by a Republican soldier whom he was offering quarter.

LA ROCHELLE. See Rochelle, La.

LA RONCIERE LE NOURY, la ron'-

syar le noo're', Camille Adalbert Marie Cle¬

ment, Baron de, French vice-admiral: b. Turin, 1813- d. Paris, 1881. He was admitted to the Ecole Navale in 1829, received rank as ensign in 1834, captain in 1855, rear-admiral in 1861, and vice-admiral in 1868. He was in charge of the evacuation of Mexico in 1867 ; and at the outbreak of the Franco-Prussian War he was placed in command of the marines in the forts of Paris. He was at Saint Denis as com-

mander-in-chief and participated in the battles before Paris, receiving the Grand Cross of the Legion of Honor in acknowledgment of his services. He was elected to the National As¬

sembly in 1871 and to the Senate in 1876. He was an ardent supporter of the Bonapartes.

Author of Considerations sur les marines a violes et a vapeur de France et d’Angleterre) (1844) ; (La marine au seige de Paris) (1872).

LA ROTHIERE, la ro'tyar' France, vil¬

lage- in the department of Aube, seven miles southwest of Brienne and 23 miles east of Troyes. It has historical prominence as the scene of a battle between the Allies under Bliicher with 100,000 men and the French under Napoleon with 45,000 men, 1 Feb. 1814. Napo¬

leon was defeated. The combined losses of the armies was 8,000 men, about evenly divided.

LA SALE, la' sal', Antoine de, French writer: b. in Provence, probably at Arles, about 1388; d. 1462. Lie entered the court of Anjou in 1402, doubtless as a page, and spent his life in the employment of various kings and princes.

He is reckoned the most important satirist of his day but there is considerable doubt as to his authorship of several works ascribed to him, as he never acknowledged them. There is no doubt that (Le petit Jehan de Saintre (1459) is from his pen, and it is the work upon which his fame rests. It is dedicated to Jean d'Anjou, Duke de Calabre, one of the several princes he tutored; and (La Salade* (1438-47), a textbook of studies suited to a prince, was likewise ded¬*

*icated to his pupil. He is credited with the authorship of (Les Quinze Joyes de Mariage,**

one of the most celebrated of French satires and his claim is fairly well, substantiated. The Cent nouvelles nouvelles were long ascribed to Louis XI, but critics in general now credit the work to La Sale. The stories are modeled on the style of the Italian novella and are of a licentious character. There are numerous other works credited to him by various critics.*

*(La Salade) was printed several times in the 16th century, while the 19th century saw editions of his other works. The best editions are Guichard, J. M., (Petit Jehan de Saintre**

(1843) ; Wright, T., (Les Cent Nouvelles Nou-

velles) (1858) ; and Jannet, P., (Les Quinze Joyes de Mariage) (1857).

LA S ALETTE, la sa'let, France, place of pilgrimage in the parish of La Salette-Falla-

vaux, department of Isere, 23 miles southeast of Grenoble. On 19 Sept. 1846, in an afternoon of full sunlight, the Virgin Mary is said to have appeared before two peasant children, Melanie Calvat, called Mathieu, aged 15, and Maximin Giraud, aged 11. While the story was openly discredited outside the Church, and violently disputed within it, a great church was built there, the foundation for which was laid 25

May 1852. Miraculous cures are said to be wrought there and the church as a place of pil¬

grimage is second in fame only to the Lourdes.

Consult Verdunoy, (La Salette, etude critique) (Paris 1906).

LA SALLE, Jean Baptiste de, Saint,

French priest and educator, called the father of modern pedagogy : b. Rheims, 30 April 1651 ,*

d. Saint-Yon, 7 April 1719. After completing the preparatory course of humanities, he en¬

tered the university of his native city where, at the age of 19, he took his master’s degree.

Shortly afterward he went to the Seminary of Saint Sulpice at Paris; and, while living there, followed the theological courses of the Sorbonne. On Easter eve 1678, he was or¬

dained priest, being already a titular canon at the Cathedral Church of Rheims ; two years later, in 1681, after defending a thesis before the faculty of

the University of Rheims he ob¬

tained the degree of doctor in sacred theology.

A man of means and academic culture, he was also a friend of the people, a true philan¬

thropist, giving away all his patrimony in alms to help the deserving poor. He interested him¬

self at an early period in education, especially the education of children belonging to the humbler classes. He noticed that nowhere was there a clear distinction drawn between primary and secondary education and that nowhere was there any provision made for instructing school-

children in subjects of acknowledged utility to them in after life. To correct this state of affairs he founded in 1681 a society of teachers under the name of Brothers of the Christian Schools (q.v.), enjoining them by rule to take the vows of religion but not to enter holy or¬

ders. By this latter regulation, he sought to free them from ecclesiastical duties so that they might be able to devote themselves unreservedly to the work of education. The rules and con¬

stitutions of the society were approved in 1724

by Pope Benedict XIII.

The first great change introduced by De la Salle and successfully carried out by his follow¬

ers was the substitution of French for Latin as the language of the classroom. As in the case of antecedent reforms, this roused a swarm of wrathful critics ; but it soon met with the approval of the universities and highest author¬

ities in church and state.

The individual system of teaching was then in vogue, and as it seemed to him to involve loss of time and

to favor idleness, he replaced it by the ^simultaneous® method in which the teacher addresses himself to a numerous divi¬

sion and frequently to a whole class at a time.

He insisted on the Socratic method of teaching for all subjects, rejecting the lecturing style as unsuited to elementary instruction. He also recommended the frequent use of object-lessons.

Such thorough-going changes gave a great impetus to education inasmuch as it increased the efficiency of the teacher while diminishing his drudgery, and ensuring substantial results.

In due time, these bold innovations in educa¬

tional method brought about a general system of popular education in France as well as in other European countries, and merited for their author the title of Father of Modern Pedagogy.

In 1684 he opened a Seminaire de Maitres d'Ecole for the formation of competent masters for the rural districts, which seminary was the first normal school or training college founded in Europe. Admission was by examination ; and during the course, opportunities were af¬

forded for practice-work by the free schools attached to the institution. In his endeavors to instruct the masses and educate the people, De la Salle established in Paris in 1699 regular public courses in science and art in which in¬

struction was given to all comers on Sunday from 12 to 3, the session being always con¬

cluded by a short religious instruction. These schools were called Ecoles Dorninicalcs and were, in some respects, the prototype of our Sunday schools. At Saint- Yon, near Rouen, he also founded a school of higher studies in which the students were allowed to select the courses best adapted to their wants. De la Salle lived to see his society firmly

established in France and his educational work appreciated at home and abroad. Among his published writings are (Le Devoir du Chretien5 and (La Conduite des Ecoles5 ; others are of an ascetical character and refer to the religious life.

This great educator and benefactor of the people was of a gentle yet firm disposition; severe to himself but kind and encouraging to others. The holiness of his life was proclaimed to the world by Pope Leo XIII, who on 24

May 1900 conferred on him the honors of canonization and enrolled him among the saints of the Catholic Church.

LA SALLE, Rene Robert Cavalier,

Sieur de, French explorer: b. Rouen, France, 21 Nov. 1643; d. Texas, 19 March 1687. Born of a wealthy family, he became a novice of the Jesuit order, 5 Oct. 1658, and two years later took the vows and was known as Brother Robert Ignace. In October 1667 he left the order. He sailed for Canada in 1668 with the hope of making his fortune there ; became owner of a seigniory and a fur trader at La Chin'e (so named for its supposed position on the route to China), explored Lake Ontario, established forts on the Saint Lawrence, was made by Frontenac commander of a fort which stood where Kingston, Ontario, now stands, and was the discoverer of the Niagara and Ohio rivers. Returning to France he received large grants of land in Canada, and was ennobled, but on the discovery by Marquette of the Mississippi, he left his new estate to seek the mouth of the great stream. His designs were favored by the French Minister of Marine, who supplied him with men and ships. In 1679 he had built and launched on the Niagara River a bark of 45 tons, the Griffin, crossed Lake Erie and Lake Saint Clair, and reached Green Bay.

Here he loaded the Griffin with rich furs and sent it to meet the claims of his creditors at Montreal. He then proceeded in bark canoes and reached the

banks of Lake Peoria, Illinois, where he built Fort Crevecoeur, and from thence he made a memorable journey, mostly on foot, back to Fort Frontenac, where he learned of the wreck of the Griffin, and another ship sent with supplies for him from France.

In the meantime his little band of explorers had been scattered through dissensions, but he succeeded in gathering them and, late in 1681

he set out with an expedition and descended to the mouth of the Mississippi, of which he took formal possession in name of the French king (9 April 1682), and named the adjacent lands Louisiana, and built a fort. This was the great achievement of his life. In 1683 he constructed Fort Saint Louis, on (

terest ; his successor, La Barre, was hostile to western expansion. After a visit to France he failed on his return (1684) with 4 vessels and 280 men, to locate the mouth of the Missis-

sippi. He had a difference on this point with Beaujeu, the naval commander, who persisted in sailing on to Matagorda Bay in Texas.

Here La Salle, to avoid further quarrels and recriminations, abandoned his companions ; the colonists who followed him lost most of their supplies in a gale of wind, but managed to fortify the fort of Saint Louis; they failed in their agricultural attempts, and sought in vain for gold. Their numbers were reduced to 35, and in 1687 he set out for a return to Canada.

Two men, Dubant and L'Archeveque, who had embarked capital in the enterprise, were in¬

censed at its failure, and in a quarrel murdered the nephew of La Salle, who, when he en¬

quired into the matter, was shot dead from ambush.

Consult for memoir, in French, his¬

torical Collections of Louisiana) (2d series, Vol.

II); for letters and other documents, Pierre Margry's (Decouvertes5 ; Abbott, (Adventures of Chevalier de la Salle and his Companions) (New York 1903) ; Parkman, (La Salle and the Discovery of the Great West5 (in (French and English in North America,5 Boston 1907) ; Shea, (Early Voyage up and down the

Mississippi5 (Albany 1861) ; Justin Winson, (Cartier to Frontenac5 (Boston 1894).

LA SALLE, la-sal', Ill., city in La Salle County, on the Illinois River, the Illinois and Michigan Canal, and on the Illinois Central and the Chicago, Rock Island and Pacific and other railroads, 99 miles southwest of Chicago. It is the centre of a large trade by river, canal and rail ; is in a rich bituminous coal region ; and is engaged in coal mining, zinc smelting and the manufacture of sulphuric acid, hydraulic cement, sewer pipe, bottles, clocks _ and orna¬

mental pressed brick, common brick, plows, nickeloid, tools, machinery. Besides coal, cement rock, silica sand and fire clay are found in the neighborhood. It is the seat of Saint Bede College and Saint Mary's Hospital ; has a public library; a'State mine-rescue station, a bridge of the Illinois Central Railroad; good sewerage system, waterworks, hospitals, a national bank, electric light and street railroad plants, and daily and weekly newspapers. The city was settled in 1830, and named in honor of La Salle, the explorer who made a settlement at Starved Rock, near here. It was chartered in 1852. The government is vested in a mayor and council. The city owns and controls the electric-light plant and waterworks. Pop.

13.050. Consult (History of La Salle County, Ill.5 (2 vols., Chicago 1886).

LA SALLE COLLEGE, an educational

institution in Philadelphia, Pa., founded in 1863 under the auspices of the Roman Catholic Church. It is under the management of the Brothers of the Christian Schools. In 1916

there were 26 instructors, 310 students, 11,700

volumes in the library, and the grounds and buildings were valued at $250,000.

LA SAUSSAYE, la so'sa, Pierre Daniel

Chantepie de, Dutch theological scholar: b.

Leeuwarden, 1848. He was professor at the University of Amsterdam in 1878-1900, _ and in 1900 was appointed professor of theological his¬

tory and related branches at Leyden. Author of (Lehrbuch der Religiousgeschichte5 (2 vols 1887-89 2d ed., 1897), translated into English under the title (Manual of the Science of Re¬*

ligion5 (1891), and (The Religion of the Teutons5 (1902).

LA SERENA, la sa-ra'na, Chile, city, and capital of the department of Coquimbo (q.v.), on the Pacific Coast, 215 miles north of Val¬

paraiso. A railroad connects it with Coquimbo, eight miles distant. Other railroads connect it with Vicuna and Rivadavia in the interior, and with Valparaiso and Santiago to the south. It is the seat of a bishopric and a Court of Ap¬

peals is located here. The city has a delightful climate, is surrounded by gardens and has fine straight streets bordered by well-built resi¬

dences. It contains several plazas and promen¬

ades. Pop. 15,996.

LA SERNA Y DE HINOJOSA, la sar'na

e da e'no-Ho'sa, Jose de, Spanish general and viceroy: b. Jerez de la Frontera, 1770; d. Cadiz, 1832. He served in the Peninsular War and was with Wellington in 1813, and in 1815 re¬

ceived rank as field-marshal. In 1816 he com¬

manded the Royalist army in Upper Peru. Act¬

ing against his own judgment, but in accordance with that of the viceroy, Pezuela, he was de¬

feated by the patriots at Salta and Jujuy and resigned in 1819. The threatened invasion of San Martin induced him to accept the post of commander-in-chief of the forces against the patriot chief, and on 29 Jan. 1821, he succeeded his old antagonist, Pezuela, as viceroy. He was compelled to evacuate Lima, 6 July 1821, but set up his capital at Cuzco, and although cut off from Spain for three and a half years defended the interior successfully until the battle of Syacucho, 9 Dec. 1824, when he was defeated and with his army captured by Sucree. He returned to Spain in 1825, was created Count of the Slides, and otherwise honored.

LA SIZERANNE, la sez'ran', Maurice de, French philanthropist: 'b. Tain, in the depart¬

ment of Drome, 1857. He was blind from the age of nine years, was educated at the Jeunes Aveugles in Paris and later was ap¬

pointed professor there. He especially occupied himself in connection with literature for the blind, perfecting an abbreviated orthography for the blind widely adopted in France. He was the founder of La Revue Braille, and is a chevalier of the Legion of Honor. Author of (Les aveugles utiles5 (1881) ; (Les Aveugles par u'n aveugles5 (1888; 5th ed., 1912); (Les Soeurs aveugles5 (1901); (La question des aveugles5 (1911), etc.

LA SIZERANNE, Robert de, French

writer and art critic, brother of Maurice de La

Sizeranne (q.v.) : b. Tain, in the department of Drome, 1866. He was educated at the College de Vaugirard, Paris, was admitted to the 'bai¬

rn 1895, but turned to the study of art for a career. He received the Vitet prize from the French Academy in 1909. He was a contributor to the Revue des Deux Mondes and the Rezme Encyclopedique, author of (La Referundum communal5 (1893); (La peintre anglarse con-

temporaine5 (1895); (Ruskin et la religion de la beaute5 (1897) ; (Le miroir de la vie5 (1902; 2d series, 1909) ; (Pages choisies de Ruskin5

(1908), etc.

LA TENE (la tain') PERIOD, name

given an European period of culture known as the second early Iron Age, extending about 584 .

LA TOUCHE-TREVILLE — LA TREMOILLE

500 b.c. — 100 a.d., although some authorities lengthen the period to 700 b.c.— 100 a.d., and as late as 1000 a.d. in Scandinavia. It succeeds the Hallstalt phase, and pervaded France, Bohemia and England as well as the Scandi¬

navian countries. In England the period has been called Nate Celtic^ and there have been important finds in Aylesford, Kent. The re¬

mains consist of swords, spear-heads, axes, scythes, knives, brooches, bronze kettles, belt-

hooks, pins for fastening clothing and other articles for use or adornment.

LA TOUCHE-TREVILLE, la toosh'

tra'vel', Louis Rene Vassor, Viscount de, French naval officer: b. Rochefort, 3 June 1745; d. Toulon, 20 Aug. 1804. He became a midshipman at the age of 12 and remained in the navy all his life. He served

in the Ameri¬

can Revolution, and for the capture of an English frigate off Newport, R. I., in 1780 he was promoted frigate-captain. He served under De Grasse and De Quichen, subsequently in the war, and was wounded at Yorktown in 1781. He was one of the framers of the Mari¬

time Code in 1786, and in 1789 he was elected to the States-General. He attained rank as rear-admiral in 1792, served in the Mediter¬

ranean and off South America, and in 1795 was given command of the fleet at Aix, which, in conjunction with that of Admiral Joyeuse, was to operate against Santo Domingo. A mis¬

understanding concerning the supreme com¬

mand caused the fleets to separate, La Touche-

Treville proceeding to Port-au-Prince, where he landed in time to save the city from being burned by the negroes. He fortified the city and remained in command of the French navy in those waters until 1803, making many at¬

tacks on British shipping and succeeding in forcing the strong fleet sent _ against him to retire in October 1803. Returning to Rochefort in December 1803 he received his commission as vice-admiral and was given command of the French fleet in the Mediterranean. However, a lingering fever contracted while in the West Indies ended his career a few months later.

LA TOUR, la'toor, Maurice Quentin de,

French artist: b. Saint Quentin, 5 Sept. 1704; d. there, 18 Feb. 1788. His art was practically self-developed although his early teacher, Spoede, influenced him in taking up pastel work, which was not at the time in favor, although it became fashionable later and was the medium through which La Tour won his fame as a portraitist. _ He was at

Cambrai when the con¬

gress was in session in 1724 and later visited England, supposedly upon the invitation of the English ambassador. In 1737 La Tour first exhibited in the Salon, and in the succeeding 37

years exhibited there some 150 portraits of exceptional beauty and excellence. He was electedQo the Academy in 1751 and became coun¬

cillor in the following year upon his appoint¬

ment as painter to the king. His art was two¬

fold in that he possessed the faculty of paint¬

ing his sitters at their best, often with sur¬

roundings of exceptional beauty, and at the same time produced an indisputable likeness so that he both pleased his patrons and disarmed the criticism of his fellow artists. His sitters included the royal family and the fashionable followers of the court, and as he painted until the age of 80 he amassed a large fortune with which he was very liberal. He founded three perpetual prizes for the ficole des Beaux-Arts in Paris, and endowed a school of design and other useful institutions at Saint Quentin.

Probably the finest specimen of his art is the portrait of Madame de Pompadour, executed in life size and exhibited in the Salon in 1755, and now the most highly prized of the Louvre's collection of pastels. His portraits of Louis XV, his queen, the Dauphin and Dauphiness, Voltaire and Rousseau are regarded as being almost as valuable for their historical exacti¬

tude as for their high art value. The splendid collection of his work owned by the museum at Saint Quentin consists of works which were in his own possession at the time of his death and were bequeathed to the museum by La Tour's brother. Many of these are sketches for his finished portraits and

afford a rich field for study. Consult Desmeze, C., (M. Q.

de La Tour, peintres du roi) (1854) ; Goncourt, E. and J. de., (La Tour> (1867) ; Tourneux, (La Tour, biographie critique) (1904).

LA TRAPPE, la trap', the name of a Cis¬

tercian abbey founded by Count Rotrou of Perche in 1140. It was known as Notre Dame de la Maison Dieu and from its situation in a damp, unhealthy glen, accessible only by a nar¬

row stony passage was called La Trappe (((the trap)}). The monks were as distinguished for austerity during the 14th and the 15th century as they subsequently became for licentiousness and violence when they were known as the ^Bandits of La Trappe. }) The monastery, how¬

ever, passed into the hands of Armand Jean le Bouthilier de Ranee in the middle of the 17th century. This brilliant abbot had early aban¬

doned himself to worldliness, but became con¬

verted, introduced Benedictine monks into La Trappe and enforced severe discipline. The brethren rose at 2 a m., retired at 7, slept on straw, were forbidden wine and flesh, spent each evening some time in digging their own graves, and never spoke excepting to say to each other, ((Memento mori.® Ranee discour¬

aged literary pursuits but enforced constant manual labor; he died in 1700, and the Trappists were driven out of France by the Revolution.

They founded a house at Valsainte, Switzer¬

land, which was destroved by the French in 1798, but they were again put in possession of La Trappe on the restoration of the Bourbons.

In 1829 the Trappist houses were closed by a royal

decree, and all but nine monasteries were suppressed; these were compelled to seek refuge in Algiers 1844, and the United States in 1848, where they established houses in Kentucky, Iowa and Rhode Island. Consult Gaillardin, (Les Trappistes ou l'Ordre de Citeaux au XIX

Siecle, Histoire de la Trappe depuis sa Fonda-

tion) (1844).

LA TREMOILLE, la tra'mwa'y', or

TREMOUILLE, Louis II de, Viscount de

Thouars, Prince de Talmont (^chevalier

sans reproche"), French soldier: b. 20 Sept.

1460; d. Pavia, 24 Feb. 1525. He came of a distinguished family, commanded the army of Charles VIII in 1488, and at the battle of Saint-Aubin du Cormier defeated and captured the Duke of Orleans. He was appointed to the command of the army of Italy by Louis XII, captured Milan in 1500, but was defeated in the Neapolitan territories in 1503, and by the LA TUQUE — LA VICTORIA DE JUNIN

585

Swiss at Novara in 1513. He fought at ' Marignano in 1515 and in 1522-23 he held Picardy against the English and Imperialists.

He was killed in battle at Pavia. Consult Sandret, L., (Louis II de la Tremoille, le cheva¬

lier sans reproche) (Paris 1881).

LA TUQUE, la tuk\ Canada, village in the province of Quebec, 87 miles northwest of Quebec, on the Bostonnais and Saint Maurice rivers, and on the Quebec and Lake Saint John Railroad. The Saint Maurice River furnishes a water route to Grandes Piles. The town* is chiefly interested in pulp manufacture. It has a Roman Catholic college,

convent and hospi¬

tal. Pop. about 4,000.

LA VALETTE, la val'let, Antoine Marie

Chamans, Count de, French statesman: b.

Paris, 1769; d. 15 Feb. 1830. He was in sym¬

pathy with the Revolution, but advocated leniency for Louis XVI and particularly for Marie Antoinette, whom he admired. He

served under Napoleon in the Italian and Egyp¬

tian campaigns ; was appointed Ambassador to Saxony by Napoleon, and was post director and Councillor of State during the First Em¬

pire and the Hundred Days. After the Restora¬

tion he was sentenced to death but was smug¬

gled out of prison by his wife, who paid with her own life for the exploit. He wrote a series of memoirs which were published after his death and which constitute an important source of information concerning the First Empire, (Memoires et Souvenirs du Comte de La Valette) (2 vols., 1831; new ed., 1905).

LA VALLIERE, Louise Frangoise de la

Baume le Blanc de, loo-ez fran-swaz de la bom le blah de la va-le-ar, French mistress of Louis XIV: b. Tours, 7 Aug. 1644; d.

Paris, 6 June 1710. She was descended from an ancient and noble family, and in 1661 was brought to court by her

mother, where Louis presently noticed her.

Her manners were amiable and winning,

and her sweet and tender disposition rendered her

attractive. What is still more extraordinary, notwithstanding her equivocal position, she pos¬

sessed extreme, indeed morbid, delicacy and modesty. She bore Louis four children, but was always painfully sensible of the disgrace of their birth. Two of them died in infancy.

When superseded by Madame de Montespan she retired into the Carmelite convent in the suburb of Saint Jacques, where she took the veil in 1675. She is considered the author of (Reflexions sur la Misericorde de Dieu- (1680), a copy of which dated 1688, with corrections by Bossuet, was discovered in the Louvre in 1852.*

A collection of her letters was published, in 1767. Madame de Genlis wrote a historical romance founded on the events of her life, and Lebrun executed a penitent Magdalene, of which the face is from her portrait.

LA VAULX, la vo, Henry, Count de,

French aeronaut and author: b. Bierville, 2

*April 1870. He served on scientific missions to Africa and Patagonia under the auspices of the French government. He delivered a series of lectures on aeronautics in the United States in 1905 and was credited with arousing interest in his subject resulting in the establishment of a number of aero clubs. He held several long distance records for aerial flights, one of which was from Paris to Kiev. He was a member of the Academy of Sciences and of the Geographical Society of Paris, and an officer in various French and international aero clubs. As an owner as well as an aviator he did much to further the development of aeronautics. Author of (Sieze mille kilometers en ballon) (1901) ; (Voyage in Patagonie**

(1901) ; (Le triomphe de navigation aerienne) (1912), and collaborated with A. Galoupin in writing (Cent mille lieues dans les airs) (7

vols., 1904-05) ; (Le tour du monde de deux gosses) (1909) ; (Le tour du monde en aero-

plane> (1910).

LA VICTORIA DE JUNIN, la vik'tor-ya'

da hoo' nin by Joaquin Olmedo. During the Peninsular War in Spain the patriotic poet, Quintana, cried out in his heroic odes against the conquest attempted by the tyrant, Napoleon.

In similar fashion the Spanish-American poet, Joaquin Olmedo (1780-1847), voiced the spirit of revolt in the Spanish colonies which rose against the tyrannous exactions of the mother¬

land and combatted the Spaniard as a tyran¬

nous dominator. On 6 Aug. 1824, the forces of the Liberator, Bolivar, won a signal victory over the Spaniards at Junin in the vice-royalty of Peru. This triumph was followed on 9

December of the same year by the decisive bat¬

tle of Ayacucho, in which Sucre, a lieutenant of Bolivar, vanquished a Spanish army with his smaller body of American patriots. As a result of the two victories, the independence of Peru, and ultimately of all Spanish America, was achieved. The Liberator requested Olmedo to celebrate the two battles and he responded with the long ode entitled (La Victoria de Junin, Canto a Bolivar, > which was published at London in 1826, while Olmedo was there as the diplomatic representative of Peru. With Quintana's odes as his model — and he doubt¬

less had Gallege's heroic verse in mind also, — Olmedo has written a noble paean to Bolivar, which bears witness to the magnitude of that warrior's whole military career and not merely to the significance of the two military exploits which the poet was asked to commemorate.

The magnificent scenery of the American forests

provides a background; the poet's reminiscences of Horace, Virgil and other classic writers supply no small part of the imagery abounding throughout the 800 verses of the Canto. Unfortunately, the supernatural is introduced without the support of a vision or dream and there is all too much hyperbole in the terms of praise lavished upon Bolivar and his generals. This latter fact was stressed by Bolivar himself in a letter to the poet, which shows that the Liberator was a man of sur¬

prising modesty in his conception of himself and of wonderful good taste in matters of literary criticism. The ode opens with an ac¬

count of the thunderous effect of the. victory of Junin and of the revelry in which the Spanish-American camp is engaged on the night following it. Suddenly there appears in the clouds the shade of the. Inca, Huayna-Capac, who apostrophizes and vilifies the Spaniards and, prophesying the approaching ^ victory of Ayacucho, gives good counsel to Bolivar. When the Inca has ended his long address, the Vir¬

gins of the Sun surround him and break out into beautiful choral song. Then, as all are still listening in rapt wonder, the supernatural visitors disappear. Critics agree in finding the 586

ode a work of freshness and vigor, containing brilliant passages of an epic and a lyric nature.

Jeremiah D. M. Ford.

LA VILLEMARQUE, la vel'mar'ka,

Theodore Claude Henri Hersart, Vicomte de, French antiquarj' and Celtic scholar: b.

Quimperle, Brittany, 7 July 1815; d. there, 8

Dec. 1895. His first notable literary achieve¬

ment was the collection and translation into French of the folksongs of Brittany, accom¬

panied by their melodies. These were followed by the prose legends of the same district, and he next made an important contribution to the knowledge of Celtic verse of the 6th century, also translated into French, thereby establish¬

ing his reputation as an authority in that field.

His further labors included the collection and translating of the prose legends of Ireland, Cambria and Brittany. He wrote a number of textbooks on the subject, and edited after the death of De Le Gonidec his (Dictionnaire fran-

Qais-breton5 (1847-50). Author of (Barzas-

Breiz5 (2 vols., 1839; 6th ed., 1867); cContes populaires des anciens Bretons5 (2 vols., 1842) ;

(1850) ; (Notices des principeaux manuscrits des anciens Bretons5 (1856) ; (Legende celtique en Irelands, en Cambrie et en Bretagne5

(1859) ; (Myrdhinn ou l'Euchanteur Merlin5

(1861) ; a Breton drama of the Middle Ages, (Le Grande Mystere de Jesus5 (1865) ;

LA VITA NUOVA, la ve'ta noo-6'va,

((The New Life5). (La Vita Nuova5 is the proper introduction of the reading and under¬

standing of Dante's (Divina Commedia5 (q.v.).

It is autobiographical, in that it purports to tell of his first meeting with Beatrice, when he was nine years of age, and how from that time <(Love lorded it over his soul,55 how he saw her from time to time and with constantly in¬

creasing devotion attempted to keep secret his passion for her. He predicts her early death, and

when his prediction is verified he portrays his intense sufferings. Then in an interlude he tells of the change that has taken place in his life, and in the last part he enlarges on his renewed love for the glorified Beatrice and his resolve to study so as to compose a suitable memorial for her. The first 17 chapters em¬

body nine sonnets and a ballade, describing his youthful love and the physical charms of his bellissima donna. Then follow 11 chapters which glorify her spiritual beauties, with seven sonnets and three canzoni, which he calls (

The poems in these chapters were composed between the age of 22 and 25. The next seven chapters tell of Beatrice's early death, and con¬

tain two canzoni and two sonnets expressing his grief. The last makes a false start and begins anew. Four chapters treat of his love for another lady, who had shown him com¬

passion. Each of them leads up to a sonnet.

Then his love for Beatrice reawakens and in three chapters, each ending with a sonnet, he relates his acts and thoughts till he is 35, when, according to his chronology, he had the ex¬

periences described in the comedy. In the last chapter he has a wonderful vision and prom¬

ises to say of Beatrice <(what was never said of any woman.55

It will be seen that the prose narration of (La Vita Nuova5 is a setting for Dante's love-

poems. It explains how each sonnet, ballade and canzone came to be written. Moreover, he appends to almost every one an elaborate and very artificial analysis of it. Dante when he was writing this work was studying the Com¬

mentaries of Saint Thomas Aquinas, and as that

learned man often treated Aristotle's statements with a formal analysis, the poet followed his example. Boccaccio tells us that the poet regarded these as a blemish and wished that he had omitted them. They have annoyed many students of the Vita Nuova.

Dante Gabriel Rossetti left them out of his translation.

Students of Dante have differed widely in their interpretation of the meaning of the title of the work, as well of the work itself. Some have regarded it as wholly symbolical and have understood Beatrice to be not a woman of flesh and blood but a type of mystical love.

The same differences are found in the various commentaries of the Comedy. The truth is that Dante incorporated in the (Vita Nuova5

and in the (Convito5 ((The Banquet or Love-

Feast5) the minor poems which he wrote at various periods of his life. His earliest son¬

net, written in 1283 when he was 18, is found in the third chapter, where he tells of having had a marvelous vision, and writes the sonnet, saluting all the ((faithful of Love55 and request¬

ing that they expound it for him ; he adds that many made answer, in many diverse ways. The sonnets and other lyrics in the first part of the (Vi.ta Nuova5 are imitations of the Provenqal troubadours; in the latter part, where Dante is supposed to have freed himself from this in¬

fluence, the poems show more maturity, as of course they were written later. Dante in this brief composition, especially in the prose frame¬

work, betrays his recent study of Aristotle's (Physics, 5 (Metaphysics5 and (Ethics. 5 This is particularly evident in the pedantry of the style, which is artificial ; and yet it breathes of that

gay and beautiful Florence which was then coming to be one of the most prosperous cities of Italy. Dante's delineation of Beatrice has been the admiration of poets and artists for cen¬

turies. Charles Eliot Norton calls her (

(La Vita Nuova5 was first printed in

Florence in 1576, with reprints in 1723, 1877, and was copied in Pesaro 1529, in Venice 1840 and in Livorno 1843. It was published with Eng¬

lish and Italian text by Luigi Ricci (London 1903). It was translated into English by Dante Gabriel Rossetti (London 1861) ; by Theodore Mertin (London 1862) ; by Charles Eliot Norton (Boston 1867; revised ed., 1892, with essays and notes) ; by Charles Stuart Boswell, with notes and introduction (London 1895). It was published with illustrations and with music by Alfred Mercer (New York 1914).

Nathan Haskell Dole.

LA VOISIN, la vwa'zan' (real name

Catherine Monvoisin), French sorceress: d.

Paris, 20 Feb. 1680. She was a fortune-teller, practising the most obnoxious arts of the pro-

fession, and was a midwife and medical practi-

„ tioner of evil repute, but enjoyed a wide patron¬

age among the grande dames of the court of Louis XIV. She also belonged to the coterie of professional poisoners whose activities at length became so notorious that in 1679 a royal com¬

mission was appointed to investigate and bring the offenders to justice. La Voisin was accused in particular of an attempt to poison Louise de La

Valliere, mistress of Louis XIV, supposedly at the instigation of the Comtesse de Soissons.

The sessions of the commission were for a time interrupted owing to the fact that its find¬

ings established guilt in such high quarters that exposure would have brought intolerable scandal upon the court, but while several of the chief offenders were shielded the commis¬

sion resumed its work and many of the poison¬

ers were convicted and executed. La Voisin was the first to be executed, first having been tortured. Consult Funck-Brentano, F., (Le drame des poisons) (1900) ; Masson, A., (La sorcellerie el la science des poisons au XVIIe siecle> (1903).

LAAGER, la'ger (Dutch, ((a camp®), in

South Africa, an encampment more or less fortified. The original Boer laager was an en¬

closure formed by the wagons of a traveling party for defense against enemies.

LAALAND, la’land, or LOL'LAND, an

island of Denmark, in .the Baltic Sea, between the islands of Falster and Langeland. Its greatest length, southeast to northwest, is 36

miles; breadth, va^ing from 9 miles to 17

miles ; area, 447 square miles. It forms with Falster the district of Naribo. The surface, as implied by its name, meaning <(low land,® is so very little raised above the sea, the highest part being only 95 feet above sea-level, that parts of it along the coast are subject to fre¬

quent inundations, and for a considerable dis¬

tance around it the water is so shallow that there are few places in which vessels drawing eight feet

can approach it without danger. The soil, consisting generally of a heavy loam, is very fertile, and yields excellent crops of corn.

Beans, hops and hemp are extensively grown.

Varieties of hardwood timber are abundant.

Pop. 71,280.

LAAR, lar, or LAER, Peter van, Dutch

painter: b. Haarlem, Netherlands, 1590; d.

sometime after 1658. Early in life he went to France, and subsequently visited Italy (1623).

Here he mainly resided at Rome, where he be¬

came associated with Claude Lorraine, Poussin and Sandrart. He was small and crooked in stature and was thus called by the Italians ((Bamboccio,® and the comic scenes of rustic life painted in his style became known as <(Bam-

bocciads.® He returned to Haarlem in 1639.

He painted pastoral and banditti scenes, fairs and such like rural incidents, with spirited and vigorous brush, although his coloring is some¬

what hard. A masterpiece of his, (The Market Crier, > is in the gallery at Cassel. Other pic¬

tures of his are to be found at London. Paris, Dresden, Vienna and Munich. About 20 etch¬

ings from his hand are also extant, chiefly ani¬

mals and landscape, which are spirited and finely executed

LAAS, las, Ernst, German philosopher and pedagogue: b. Fiirstenwalde, 16 June 1837; d.

Strassburg, 16 June 1885. He studied at the Berlin University, at first theology then phi¬

losophy, under Trendelenburg. He became teacher (1860) at the Friedrich Gymnasium, then (1868) at the Wilhelms Gymnasium, and was given (1872) the degree of adjunct-pro¬

fessor of philosophy at the newly founded Strassburg University. He leaned toward em¬

piricism which induced him to write (Ideal-

ismus und Positivismus) (Berlin 1879-84), dif¬

fering from Plato and Kant and more nearly following the English theories of Hume and Mill. He became a leading representative of positivism in Germany. As pedagogue an epoch-

making work of his was (Der deutsche Auf-

satz in den obern gymnasialklassen) (Berlin 1868 ; 3d ed., by Imefmann, 1898). He wrote also (Der deutsche Unterricbt auf hoheren Lehranstalten) (ib. 1872) ; (Gymnasium und Realschule) (ib. 1875) ; (Kants Analogien der Erfahrung) (ib. 1876). His (Literarischer Nacklass) was edited by Keriy (Vienna 1887) and contains a short dissertation on pedagogy.

Consult Hanisch, (Der Positivismus von Ernst Laas) (Halle 1902) ; Gjurits, (Die Erkenntriss Theorie des Ernst Laas> (Leipzig 1903) ; Kohn, P., (Der Positivismus von Ernst Laas) (Bern 1907).

LABADIE, Jean de, French mystic and

separarist: b. Bourg en Guienne, 13 Feb. 1610; d. Altona, Prussia, 13 Feb. 1674. He was edu¬

cated at Bordeaux by the Jesuits and belonged to their order till 1639. He then quitted it, both because irregularities were detected in his conduct and he was found to have adopted many very peculiar and extravagant views. For these he was cited before the Parliament, but fled to Geneva. At a later period he returned to France and took up his residence in Amiens, whose bishop entrusted him with the visitation of the monasteries in his diocese. He

also found a patron in the archbishop of Toulouse.

His zealous opposition to some of the clergy subjected him again to persecution, and to escape from it he, in 1650, went over to the Reformed Church, but not finding himself so comfortable as he expected, he thought he had received a call to found an apostolic church for himself. He now became a preacher in Mont-

auban, and afterward, on being obliged to leave it, in the town of Orange, from which he pro¬

ceeded successively to Geneva, Middleburg and Amsterdam. In the last city he collected his followers into a distinct church or society under the name of Labadists. They were ana-

Baptists, believed in the community of goods, held that marriage with the unregenerate was not binding, and that the children of the re¬

generate were born without original sin. Tolera¬

tion being now denied him, he in 1670 pro¬

ceeded to Herford, where the Palsgravine Eliza¬

beth gave him protection. Driven thence by an imperial edict in 1672, he went first to Bremen and finally to Altona, where he held private meetings. See Labadists.

LABADISTS, followers of Jean de La-

badie (q.v.), whose doctrines were a compound of mysticism and Calvinism. The sect was formed at Amsterdam in 1669. Its two most prominent defenders were Anna van Schur-

mann and Antoinette Bourignon. The La¬

badists, proposing to form a colony in America after failure in Surinam, S. A., sent over (1678-79) two of their number, Dankers

and Sluyter, to spy out the land and report.

To these men, in their journal, translated into English and published by the Long Island His¬

torical Society, we owe the existence of a most lively, not to say rather tart descriptions and criticisms of the Dutch and other folk in the middle colonies. The Labadists made a settlement, first in New York, which misman¬

aged, impoverished the home congregations and failed. Another was made later in Maryland which continued during a generation or two, but after the death in 1722 of Dankers, the leading spirit, was abandoned and the name and faith were lost among the dispersed. Consult the (Journal of Our Voyage to Neuw Nederlandt, begun in the Name of the Lord and for His Glory.5

LABAND, la'bant, Paul, German jurist : b.

Breslau, 24 May 1838. He studied law at Bres¬

lau, then Heidelberg and Berlin and was ap¬

pointed private teacher (1861) of German law at Heidelberg. He was made adjunct-professor (1866) at Konigsberg, and went (1872) in the same capacity to Strassburg. He devoted his work chiefly to state law and commercial law, on which subjects he wrote (Das Budgetrecht nach den Bestimmungen der preussischen Ver-

fassungsurkunde5 (Berlin 1871) ; (Das Finanz-

recht des Deutschen Reichs) (in Hirth’s An-

nalen 1873) ; (Das Staatsreoht des Deutschen Reiohs) (Tubingen 1876-82; 5th ed., 1901), his greatest work, of which he issued an abridged edition in Marquardsen’s (Handbuch des

affentlichen Rechts der Gegenwart.5 (Freiburg 1883;

6th ed., 1912). He was coeditor of Zeit-

schrift fiir das gesamte Handelsrecht from 1864, and founded (1886), with F. Stoerk, the Archiv fiir affentliches Recht, and was. long editor of Deutsche Juristenzeitung. (Direkte Reichssteuern) was published 1908.

LABARUM, the name given from the time of Constantine to the imperial, banner and in¬

tended to commemorate the vision of the cross in the sky which was the cause of the emperor's conversion. Eusebius has described it with much particularity. It was in . the form of a long pike, crossed at a certain height by a beam, from which depended a banner richly embroidered with gold and adorned with precious stones. The pike was surmounted by a crown of gold, enclosing within it a mono¬

gram of the two initial letters of the name of Christ.

LABAT, Jean Baptiste, zhon bap'test lii-ba, French Dominican missionary and traveler: b.

Paris, 1664; d. there, 6 Jan. 1738. In 1693 he went as a missionary to the French Antilles, landed at Martinique and undertook the care of the parish of Macouba, which he superintended for two years, after which he was sent to Guadaloupe. His mathematical knowledge

recommended him to the governor there, whom he accompanied during a tour through the island to assist him in selecting the points best adapted for works of defense. On his return to Mar¬

tinique Labat received the office of proc'iireur-

general of the mission, in which an opportunity was afforded him of displaying the whole ex¬

tent of his useful activity at the. same time that he served the government by his mathematical knowledge. In 1705 he was sent to Europe on business

of the order, and, landing at Cadiz, surveyed geometrically and scientifically the environs and the whole coast of Andalusia as far as Gibraltar. He returned to Paris in. 1716.

His (Nouveau voyage aux lies de l'Amerique, '

which has been translated into several lan¬

guages, contains an account of the natural his¬

tory, particularly of some of the smaller and less frequented islands; of their productions; the origin, customs, religion and governments of the inhabitants. He also published a (Nouvelle relation de l'Afrique occidentale5 ; (Voyage en Espagne et Italie * ; (Relation his

torique de l'Ethiopie occidentale5 ; (Memoires du chevalier d'Arvieu.5

LABBE, lab, Philippe, French Jesuit: b.

Bourges, 10 July 1607 ; d. Paris, 25 March 1667.

He taught philosophy and theology for a time at Bourges, but he was soon called to Paris where he spent his life in writing and research.

He was quite a prolific writer, but his most prominent works are (Sacrosancta concilia ad regiam editionem exacta) (Paris 1662-72, 18

vols., reprinted by Coletus, Venice 1728-32, 23

vols.), Gabriel Cossart edited the last 10 vol¬

umes after the author's death; (Gallise syno-

dorum eonciliorumque brevis et accurata his-

toria) (Paris 1646) ;

ciliorum nationalium, provincialium,5 etc.

(1661). Chronological works of his are Con¬

cordia chronolgica5 (Paris 1656) ; (Abrege qhronologique de l'histoire sacree et profane5

(1663-66). On martyrology he wrote (Hagio-

logium Franco-Gallias excerptum ex antiquo martyrologia sanctse obliatise Sancti Laurentii Biturecensis> (1643). On history he wrote (Michcelis Glycae annales5 (1660) ; (Melanges curieux de plusieurs sujets rares) (1650) ; (Bibliotheca bibliothecarum5 (1664). Consult Michaud, (Biographie universelle) (Paris 1843-65, Vol. XXII) ; Backer, (Bibliotheque des ecrivains de la Societe de Jesus 5 (Liege 1869-76, Vol. II).

LABE, la'ba, Louise, French poet: b. Par-

cieux, Ain, about 1526; d. Lyons, March 1566.

Her true name was Charly and her father was a ropemaker, hence, on account of her beauty, she was called ((la belle cordiere.55 Her talent in acquiring foreign languages and her bold and dauntless disposition in her early years created wonder among her companions. While

scarcely 16 years of age she took part, dressed as a cavalier, and in the name of Captain Loys, in the siege of Perpignon (1542). She mar¬

ried and devoted herself to poetry and music and her home became the rendezvous of poets, sages and artists ; the street on which she lived was called, in 1607, rue de la Belle Cordiere.

Her poems, sonnets and elegies show Petrarch influence, but have lyric flights and a purity of expression of great rarity. We have of hers also an allegory in prose (Le Debat de Folie et d'Amour.5 The earliest editions of her works (1555 and later) are very rare; the latest appeared in Paris (1887). Consult Gonon, (Documents historiques sur la vie et les mceurs de Louise Labe5 (Lyons 1844) ; Laur, (Louise Labe5 (Strassburg 1873).

LABEDOYERE, Charles Angelique Hu-

chet, sharl an-zha-lek hu-sha la-ba-dwa-yar, Comte de, French general: b. Paris, 17 April 1786; d. there, 19 Aug. 1815. He entered the army in his 20th year and served with much dis¬

tinction in Spain, Germany and elsewhere.

Napoeon raised him to the rank of general of LABEL

division in 1815 and he fought with great courage at Waterloo. After the battle he hur¬

ried to Paris and there distinguished himself by his hostility to the Bourbons. On the capitu¬

lation of Paris he followed the army behind the Loire, but returning to Paris was taken, tried by court-martial and shot.

LABEL, Union. See Union Label.

LABEO, la'ba'o, Marcus Antistius, Roman jurist. He was a man of unbending firmness of character, of strong republican sentiment, that turned him against Augustus, and of all¬

round training. Hiis juridical works compose 400 volumes. Notable among them are found in the pandects of the Justinian (Corpus Juris. >

Seeking to extend the law he became the founder of a special juridical school, which was called the Proculeian, after his pupil Proc-

ulus. Consult Pernice, (Marcus Antistius La-

beo> (Halle 1873-92) ; Sohm-Ledlie, < Insti¬

tutes of Roman Law) (2d ed., Oxford 1901) ; Teuffel, (Geschichte der rdmischen LiteratuD

(Vol. II, 6th ed., Leipzig 1910).

LABERIUS, la'ba'ri-us, Decimus, Roman knight and writer of mimes: b. 106 b.c. ; d. 43 b.c. At the age of 60 he was commanded by Caesar to appear on the stage in one of his own mimes, a disgrace for nobility which forfeited all titles, actors being of the lower and slave class. His prologue was filled with touching complaint of the insult and its wording has come down to us. The knightly honors lost by the act were later restored to him. Ribbeck has collected the existing fragments of some 40 mimes of his in (Comicorum romanorum f rag¬ men, ta} (3d ed., Leipzig 1898) ; they show orig¬ inal wit and keen expression.

LABEZARES, Guido de, gwe-do da la- ba-tha'res, Spanish adventurer: b. Bilbao, Spain, 1510; d. Manila, 1580. He began his ca¬ reer in South America, from which he made a voyage to Java and Sumatra, 1542. In 1550 he discovered the Bay Filipina, in Florida, and in the following year with Luna de Arellano vis¬ ited and renamed the place Bay Santa Maria.

He entered with Legaspi upon the project of conquering and converting the Philippine Islands. His success was complete in the mat¬ ter of conquest, and in 1574 he was appointed governor-general of Manila. By means of new fortifications he so strengthened the place against the Chinese corsairs and the Dutch pi¬ rates that these were driven from the adjacent islands. In 1575 he took the position of lieu¬ tenant-governor, under a new governor-gen¬ eral from Spain and kept his position until his

death.

LABIATAE. See Menthace^:.

LABICHE, Eugene Marin, e-zhan ma-ran

la-besh, French dramatist: b. Paris, 5 May 1815; d. there, 23 Jan. 1888. He wrote, chiefly in collaboration with other authors, upward of 100 plays, many of them very successful. It was the qualities that he brought to the collabora¬

tion that made them a success. His long series included a few real comedies of character and manners. His farces and vaudevilles are dis-

Fnguished by extravagant plots, crisp and sparkling dialogue which is at times a little broad, by the absence of the love element and admirable stage technique, and they form capi¬

tal characterizations of the bourgeoisie of his time. In 1880 he was elected to the Academy and after that date ceased to write for the stage. His dramatic works were collected in 10

volumes (1878-79) and met with a notable and, for the author, an unexpected success. Among the best of them may be mentioned ^risette*

(1846), the original of the famous farce, (Box and Cox) ; (The Italian Straw Hat} (1857) ; (Le Voyage de M. Perrichon) (1860), a de¬

lightful picture of middle-class vanity;

tists) (1901).

LABLACHE, Luigi, loo-e'je la-blash', op¬

eratic singer: b. Naples, Italy, 6 Dec. 1794; d.

there, 23 Jan. 1858. He studied at the local Conservatorio della Pieta della Turchini under the guidance of Valesi and made his debut as a bass singer, buffo Napoletano, in Fioravanti's ^lolinaraP

Later he enlarged his repertoire by singing in grand opera, to which his voice, which was one of wonderful range and volume, was admirably adapted and appeared as Mercadente in (Elisa and Claudio.) His reputation soon extended over Italy. In his 20th year, when the triumph of Rossini was at its height, he stood forth as the greatest interpreter of that master, and reached the summit of his fame.

A medal was struck off in his honor at Vienna in 1825. For the next 17 years he annually ap¬

peared in Italian opera in London, Paris and Saint Petersburg. He was the singing-master of Queen Victoria. He was equally admirable in comic and serious operas and the school of music which he opened in Paris had considera¬

ble success in handing on the traditions of his style. Don Giovanni and Leporello were his greatest parts.

LABOR. Definition. — Labor may be de¬

fined as the physical or mental effort of human beings for the attainment of some object other than the pleasure of the effort itself. Simple as this definition is there is scarcely a word in it but what has been the subject of discussion.

The popular use of the word labor restricts it to those who engage in manual toil, but this is of course too narrow. Any scientific defini¬

tion must include mental effort. In modern industry brains are needed as well as muscle.

Men must organize the productive forces and direct their employment along chosen lines.

Upon their ability quite as much as upon the skill and strength of the manual workers, and indeed to an even greater degree, depends the success of modern enterprise. To-day this con¬

cept is fully recognized and not even the most

extreme socialist would deny the productive character of mental effort.

Labor is generally limited in popular usage to that of human beings but not all economists have so defined it. Adam Smith spoke of ((la-

bouring cattle,® and said more than once that <(nature labours along with man.® J. R. Mc¬

Culloch, who always exaggerated or distorted any half-truth of his intellectual father, Adam Smith, went so far as to say that no distinction should be made between the operations of do¬

mestic animals, of machinery, of nature and of man. Labor, he said, is ((any sort of action or co-operation, whether performed by man, the lower animals, machinery, or natural agents, that tends to bring about any desirable result.®

Such a definition is, however, confusing rather

than helpful. To-day practically all economists restrict the term labor to that of human beings.

Labor means human labor.

More difficult of restriction within the ring-

fence of a definition is the next concept. Some writers have denied the term labor to any ex¬

ertions which yield pleasure or are undertaken for the sake of the pleasure accompanying them. Painful effort only is labor. Thus W. S.

Jevons wrote, ((Labor, I should say, is any pain¬

ful exertion of mind or body undergone partly or wholly with a view to future good.® And yet even Jevons pointed out that most forms of labor, after the initial irksomeness had been overcome, yielded distinct pleasure to the worker, a principle which

the French socialist Fournier had earlier ma e the basis of his scheme for the organization of labor. It is im¬

possible thus to limit the term, for it would ex¬

clude some of the highest forms of creative art or literature or even handicraft and confine it only to distasteful or painful occupations. In¬

deed the same kind of exertion might at one time be called labor and at another time be de¬

nied that name. The whole psychology of la¬

bor is moreover involved in this limitation of the idea. Labor is regarded as a curse. But the purpose of economic progress and of human invention is, or should be, to lighten the burden upon labor, to associate with the performance of necessary tasks a pleasure and pride in workmanship. In its highest aspect labor should be regarded as a privilege rather than a curse.

The final notion involved in this definition is that the labor is performed for the sake of some ulterior object or some useful purpose.

Quite aside from the question of whether pleas-

ureable effort is entitled to the name of labor, it is contended that it must be productive. The distinction was early made between productive and unproductive labor. The Physiocrats, for instance, insisted that only the work of agricul¬

ture was productive, the labors of manufactur¬

ers, merchants and others being sterile. Even Adam Smith thought that the work of serv¬

ants was unproductive. The modern concep¬

tion, however, is that any effort which satisfies a want or creates a utility is productive — that of the actor, the fireman or the judge, as well as that

of the farmer, the miner, the cotton-

spinner or the locomotive engineer. Effort di¬

rected toward the rendering of some intangible or transient pleasure is held to be productive as well as. that engaged in extractive industry or in fashioning some durable object. In no case does man create anything; he can never do more than change the form or the place of ma¬

terial things. It is, therefore, as impossible to draw a line of distinction between the labor of those engaged in raising grain and those em-

ployed in serving bread at the table as it is to make a distinction between manual and men¬

tal effort.

Free and Slave Labor. — Thus far only free labor has been considered, but historically prob¬

ably more of the work of the world has been performed. by unfree labor than by free. Slav¬

ery has existed as far back as historical records go into the dim past. Indeed it has been as¬

sorted, rather paradoxicallv, that the institu¬

tion of human slavery marked the greatest step forward that had yet been made in human progress. From an ethical standpoint slavery was certainly an improvement oyer cannibalism, and from an economic standpoint it marked a great advance because now for the first time there was provided a fund of labor that could be directed to steady and arduous toil. Until this time man had lived by hunting and fishing primarily; but now settled agriculture became possible, permanent homes were established, cattle domesticated and some accumulation of property began. Primitive man did not work willingly and the compulsion of slavery fur¬

nished the training school in which the human race

painfully and slowly learned the lessons of labor.

The question has been raised and much de¬

bated as to whether the course of human prog¬

ress has been from a state of original freedom and equality to one of inequality and bondage, or the reverse. The view was formerly widely held that the original tribal organization early gave place to a closer union in the village com¬

munity or mark. Freedom, equality of rank and possessions, and in the case of the mark communal ownership and cultivation of the land characterized these early communities. As a result of conquest and other forces this origi¬

nal state of freedom gave way to one of in¬

equality, both political and economic, which has persisted to this day. Modern democracy and socialism are simply efforts to restore the original and natural heritage of mankind.

About 1880 however another school developed, in England and France especially, which denied the accuracy of the historical data upon which the mark theory had been built up, and gave a different explanation of the existing economic constitution of society and the position of labor.

These writers denied that early societies had enjoyed freedom and communal ownership of the land, but insisted that as far back as his¬

tory can be traced there had always existed a system of primitive serfdom and private property. The evolution of human progress has therefore been from a condition of slavery and inequality to one of increasing freedom and equality of opportunity and possessions. Labor has progressed from bondage to freedom and is ever moving further in the same direction.

Perhaps the best evidence of the growing dignity and importance, as well as the well¬

being of labor, is the esteem in which it has been held by economists. In this respect there has been steady progress. By the Greeks and Romans, if we may accept as typical the utter¬

ances of their leading philosophers, labor was held in low esteem. Artisans belonged to the lowest caste, and labor was held to be degrad¬

ing. Slavery was generally practised and of course did not help to elevate the status of the free laborer. The later Roman writers, how¬

ever, condemned this institution on economic grounds. The spread of Christianity led also to moral condemnation, and during the Middle Ages slavery was generally modified into serf¬

dom, according to which the serf was bound to the soil but was personally free. Although the Church taught the equality and brother¬

hood of man,, these doctrines did not amelio¬

rate his condition during this period. Men's chief intellectual interests were theological rather than economic, war absorbed the ener¬

gies of the ruling classes, and the primitive

methods of agriculture, manufactures and transportation as well as insecurity of life and

property prevented the working classes from making any economic advance.

Economic Views.— The Renaissance and

the discovery of the New World made far-

reaching changes in economic institutions and thought which were reflected in the conceptions of labor. By the Mercantilists labor was assigned a position of considerable importance ; according to Locke (1690) labor is the almost exclusive source of value, for, he wrote, <(it is labour indeed that puts the difference of value on everything.® But the Mercantilists after all emphasized trade and money rather than labor. The Physiocrats introduced the distinction between productive and unproduc¬

tive labor; according to them the only produc¬

tive labor was that which added something material to the world's stock of goods. They therefore confined the term to agricultural laborers and the extractive industries ; mer¬

chants and manufacturers were unproductive or sterile. Emphasis was laid by them there¬

fore more upon the direction of labor than upon its well-being. Land and the bounty of nature was the real centre of the Physiocratic system.

Adam Smith placed labor in the very arch of his economic philosophy; his book on (The Wealth of Nations) begins with a discussion of labor as the source of the annual wealth of a nation, and the first chapter describes the divi¬

sion of labor as a means of increasing produc¬

tion. The opening sentence of this book is, (

sults in the hands of his followers were bad.

He had insisted upon the need of greater free¬

dom of enterprise and of contract and this doctrine was erected into the principle

tition was given full sway and all restrictive barriers were swept away. This meant the exploitation and degradation of labor. Ricardo and Malthus register in their writings the hopeless attitude of economists as to the im¬

possibility of improving the condition of labor, a view which persists even in John Stuart Mill.

A reaction against this position soon set in.

The Socialists insisted upon the rights of labor and the injustice of existing methods of dis¬

tribution. The changes wrought by the Indus¬

trial Revolution brought many industrial re¬

adjustments and serious economic ills such as poverty, unemployment and crises. Increasing attention began to be given to the subject of distribution instead of production or ex¬

change. Social reformers interested them¬

selves in the practical work of abolishing specific abuses. The labor movement became too important to ignore, and not only has it secured an increasing amount of space in recent economic literature, but it has been treated with greater sympathy and understand¬

ing. In many of our colleges and universities courses in labor problems are given, and an increasing amount of study is being devoted to the subject.

Bibliography. — Lauck, W. J., and Syden-

sU'icker, Edgar, (The Conditions of Labor in the American Industries) (1916) ; Willoughby, W. F., ed., (The Principles of Labor Legisla-

tioiP (1916); (The American Labor Year Book) (Current).

Ernest L. Bogart,

Professor of Economics, University of Illinois.

LABOR, American Federation of. See

American Federation of Labor.

LABOR, Department of. A government

department of the United States established by Act of Congress, approved 4 March 1913, ((to foster, promote, and develop tihe welfare of the wage earners of the United States, to improve their working conditions, and to advance their opportunities for profitable employment.® Be¬

fore the passage of this act 'the affairs of this department were administered by the Bureau of Labor, a sub department of the Department of Commerce and Labor. Originally the Bureau of Labor was a part of the Department of the Interior, but at the creation of the new de¬

partment by the Congress, 11 Feb. 1903, the bureau was transferred. It was organized in 1885, and Carroll D. Wright, who had been very successful as chief of 'the Bureau of Statis¬

tics in Massachusetts, was appointed Commis¬

sioner of Labor. At the end of three years Commissioner Wright had made such signal success in the new department that the bureau was changed to the Department of Labor, with independent functions. Under the Act of 1913

the bureaus of labor, immigration and natural¬

ization and the children's bureau were included in the new department. The Bureau of Labor is now the Bureau of Labor Statistics, and the heads of the divisions are known as commis¬

sioners, with 'the exception of the heads of the children's 'bureau and the bureau of informa¬

tion, who are entitled chiefs. The head of the department is a secretary, with last rank among the members of the Cabinet. There is also an assistant secretary of the department. The Bureau of Labor Statistics conducts investiga¬

tions in all disputes between capital and labor and issues a bimonthly bulletin reviewing the condition of labor in the United States and abroad. The Bureau of Immigation maintains local offices at the several ports of entry, and through these it administers 'the immigration laws and kindred statutes. The Bureau of Naturalization has charge of the returns from the clerks of the United States courts through¬

out the land who issue declarations of inten¬

tion certificates and final naturalization certifi¬

cates to applicants for naturalization. The Children's Bureau deals with all matters affect¬

ing child-life, infant mortality, birth rate, orphanage, juvenile delinquents, dangerous oc¬

cupations for children, children's diseases and child labor, especially the State laws in regard to the latter evil. Consult (Annual Reports) of the Secretary of Labor. See Commerce, De¬

partment of.

LABOR BUREAU. See Labor, Depart¬

ment OF.

LABOR BUREAUS. Nearly every State

in the Union has a labor bureau, or department of labor, the oldest being that of Massachu¬

setts, organized in 1869. Several of the State bureaus, particularly those of New York and Connecticut, maintain free employment agencies.

These State bureaus have been kept remarkably 592

free from partisan politics, and they have been decidedly successful in the settling of labor disputes and in preventing strikes and lockouts.

The chief functions delegated to be performed by the State bureaus are assistance in bettering the condition of toilers, investigating complaints of ill-treatment, grievances, etc., to furnish in¬

formation as a basis for enlightened legisla¬

tion, to keep a record of the labor supply and labor condition in the State and to inform the general public of the results of its work. In some States the administration of the labor laws was committed to the bureaus, as also ad¬

ministering employment offices, compensation laws, etc. These organizations proved so suc¬

cessful that European nations soon followed the American example. In 1891 France organ¬

ized a bureau of labor and in 1892 Germany followed with a labor commission. In 1893 a labor department under the direction of a com¬

mission for labor was instituted in England. Aus¬

tria, Italy, Sweden, New Zealand, New South Wales, and Canada have since established similar bureaus. Consult Wright, (The Work¬

ings of the Department of Labor, > and (The Value and Influence of Labor Statistics, •*_ in (

Monographs on Social Economics) (Washing¬

ton 1901); (American Year Book> (annual); American Labor Legislation Reznew (1911, I, No. 2, 123-134; No. 3, 59-68; No. 4, 61-104).

LABOR CHURCH, a movement started

in England to bring religious work into the labor movement. John Trevor was the founder (1891), the first Labor Church service opening in Charlton Town Hall, Manchester. The growth of the movement was such that, at a conference held in 1893, the Labor Church Union was organized with 10 churches repre¬

sented, and by 1894 there were 24 labor churches in England and Scotland. Five prin¬

ciples were adopted at the inauguration de¬

claring religion part of the labor movement, that it is no class movement or class religion, but non-sectarian, etc. In 1903 a restatement of principles was drawn up embodying the condi¬

tions of the former one and declaring the labor movement, besides its religious activity, includes improvement of social conditions, development of personal character, both essential to <(emanci-

pation from moral and social bondage, w and therefore insists on the study of the economic and moral forces of society. Over 30 labor churches were eventually established, but since 1907 the movement apparently has lost vitality.

LABOR COLONIES, or agricultural

communities, are common in Europe but almost unknown in the United States, lhey are main¬

tained for the purpose of giving employment and training to individuals who, on account of misfortune or inefficiency, find it difficult to earn a living. In Holland there are four of these labor colonies, at Wilhelmsoord, Fred-

eriksoord, Wilhelminasoord, which have been established for three-quarters of a century.

They occupy 5,000 acres of land and have a membership of over 2,000. At La Chalmelle, France, is a colony established in 1892. It occupies 370 acres of land and has 300 colo¬

nists. In Germany there are nearly 40 colonies all established since 1882. New Zealand has a government farm of 1,000 acres. In Belgium are three colonies which are practically penal institutions for vagrants and beggars. There are several colonies in England and Scotland, and in the United States three small colonies have been established by the Salvation Army, one each in Colorado, California and Ohio.

The most successful is the Colorado colony which has 150 members. The colony system in all the European countries is practically com¬

munism under government control, all the colonies being conducted on the co-operative plan. Consult (Encyclopaedia of Social Re¬

form, } edited by Bliss (1908).

LABOR AND COMMERCE, Depart¬

ments of. See Commerce, Department of; Labor, Department of; Labor Departments, Foreign.

LABOR CONGRESS, an assemblage,

either national or international, of representa¬

tives of organized labor. The first attempt to form an international organization of workers was made by a group of continental exiles at a conference held in London in 1847, in which Karl Marx took part. The Communist League was that formed, which issued Marx' and Engel's famous manifesto just before the revo¬

lution of 1848, but the organization disappeared in the succeeding reaction. In 1866 the first

International Labor Congress was held . at Geneva, Switzerland, about 60 delegates being present from England, France, Germany, Hol¬

land and Switzerland. The results of this meeting were the condemnation of the indus¬

trial employment of women, the advocating of technical education and the organization of mutual credit associations. At the congress of 1869, held at Basel, Switzerland, labor repre¬

sentatives were in attendance from Russia, Austria, Germany, France, England, Spain, Italy and Switzerland. This assembly by a vote of 54 to 4 declared that landed property should be abolished. Other similar congresses were held at Dresden, 1871; The Hague, 1872; Paris, 1886; Berlin, 1891, and Zurich. 1897.

Two International Socialist-Labor Con¬

gresses were held in Paris in 1889, one, the Marxest, by 400 delegates, and the other, the Possiblist, by 600 delegates. In 1891 a Socialist-

Labor Congress was held at Brussels, at which 400 delegates were present from nearly every country in the world, including Canada and the United States. Among the topics discussed were the eight-hour day, militarism, universal suffrage and legislative protection of labor. At the Congress of 1893 at Zurich, Switzerland, 385 delegates were present, and admission was denied to all avowed anarchists. The congress, now assuming definite organization, met in London in 1896 and arranged to meet every four years thereafter. The anarchists were again denied admission, and resolutions were adopted opposing standing armies, advocating the nationalization of land and the socialization of industry.

The next meeting of the International So¬

cialist-Labor Congress was held in Paris in 1900, when the assembly discussed the laws regulating strikes and boycotts and favored the abolition of

the capitalistic class. Resolutions were passed favoring a fixed minimum wage and the nationalization of mines. Subsequent meetings have been held at Amsterdam (1904), Stuttgart (1907), Copenhagen (1910) and Stockholm (1917). Of this organization which meets every four years there is a standing com-

mittee known as the International Socialist v Bureau, which meets annually.

Various national labor congresses are held in several countries, particularly in England, where an annual convention has been held since 1868. Congresses of anarchists convening un¬

der the disguise of labor have been held at in¬

tervals in Lyons, Havre, Brussels, Barcelona and other cities. See also Unionism ; Social¬

ism.

LABOR DAY, in the United States, the

first Monday in September, a legal holiday in all the States and District of Columbia, Porto Rico, Hawaii and Alaska. The celebration of this day was inaugurated by the Knights of Labor, who in 1882 held a parade in New York, and again in 1884, when a resolution by George R. Lloyd, one of the Knights of Labor, was passed to hold all parades on that day. Work¬

ingmen of all organizations then began agita¬

tion to have the day made a legal holiday, and on 15 March 1887 the first law to that effect was passed in Colorado. New York, New Jer¬

sey and Massachusetts soon followed this ex¬

ample. The day is celebrated by parades and by meetings addressed by prominent labor lead¬

ers. In Europe the celebration of the first of May as Labor Day was begun in 1890 with a demonstration in favor of the eight-hour day; it was at that time and for a few years later much feared and violently opposed by the various governments, and there were many clashes between the police and soldiers and the workingmen. It is now usually celebrated with¬

out trouble. In the United States May Day is celebrated by the Socialist-Labor party, but there is no attempt to cease work on that day.

LABOR DEPARTMENTS, Foreign.

The development of early labor legislation in all countries soon pointed out the fact that labor laws are useless unless properly enforced by special authorities. Accordingly most coun¬

tries sooner or later created one or more de¬

partments to deal with the ever-increasing number of labor laws. The functions of these departments is first of all to administer all exist¬

ing labor laws and then to conduct investiga¬

tions that will lay foundations for future legis¬

lation. Under their administrative functions labor departments appoint inspectors to enforce workshop regulations, regulate social insurance laws, conduct labor exchanges to help unem¬

ployed and serve as or create boards to settle industrial disputes or fix wages and hours of labor. Under their functions as investigators labor departments conduct research, gather statistical data, issue reports and often draft laws. In the larger European countries the de¬

partments are under the guidance of ministers of labor, while in smaller countries they are attached to other ministries.

In England factory inspectors to enforce workshop

regulations were for the first time provided for under the Factory Act of 1833.

They were placed under the supervision of the Secretary of State for Home Affairs. At present the Home Office has a factory inspection department supervised by an undei-seci etary.

Other labor laws before the war were admin¬

istered by the Labor Department of the Board of Trade, established in 1893. The depart¬

ment administered the Labor Exchanges Act of 1909, the Trade Boards Act of 1909, and the vol. 16 — 38

National Unemployment Insurance Acts of 1911 and 1916. The Board of Trade also is¬

sued a monthly paper, and annual and special reports on wages, hours and labor in other countries. During the war its powers and authorities were transferred to a Ministry of Labor. Health insurance is regulated 'by boards of insurance commissioners.

In Germany the enforcement of the labor law is mainly left to the individual states. Each state has a labor or inspection bureau that en¬

forces workshop regulations with the help of the police authorities. Imperial supervision is very slight. In Prussia the factory inspection department is under the Ministry of Commerce and Industry. At the head of the insurance system is the Imperial Insurance Office assisted by district and local insurance offices. The above departments also conduct investigations and research work.

In France a Bureau of Inspection of Labor was for the first time established in 1841. In 1891 the Superior Council of Labor, represent¬

ing employers, employees and the government, was founded to investigate labor conditions and act as adviser to the government in labor problems. At the present time the Inspection Service, like the

Superior Council, is a part of the Ministry of Labor, established in 1906, at the head of which is a member of the Cabinet.

Accident insurance is regulated by a special bureau and old-age pensions are under the supervision of a Superior Council in the Ministry of Labor.

Austrian labor laws are administered by the Ministry of Commerce and at the head of the inspection service is a central industrial in¬

spector. In Holland a Bureau of Labor was established in the Department of Public Works in 1916 to institute unemployment insurance and supervise labor exchanges. In Belgium there is a Ministry of Industry and Labor, under which there is a Labor Office. The latter was organized in 1895. It administers all labor laws, investigates labor problems, inspects factories and supervises insurance. In Italy a Labor Department was established in 1902, in Switzerland in 1886, in Denmark in 1859, Sweden in 1902 and in Spain in 1903.

Selig Perlman.

LABOR EXCHANGES, a name errone¬

ously applied to employment bureaus. It was also a term given to a class of institutions founded by the followers of Robert Owen (q.v.) in 1832-35. These were designed to bring about an exchange of products of labor without the intervention of money. Many stores were founded for the purchase and sale of commodities for <(labor notes," the amount of time spent in producing a commodity being the basis of its value. Different classes of labor were all valued alike. The plan was soon found impracticable.

LABOR LEGISLATION. The term

,f(Labor Legislation" is now used to cover a broad field of lawmaking for the benefit of wage earners in particular and of society in general. It includes the factory acts of earlier days, but is much

broader in its scope.

History.— In the United States labor legis¬

lation has passed through several stages of transformation. In the early period of our nation the propertyless man was viewed with 594

suspicion and contempt, and coercive laws were passed for the capture and virtual enslavement of the (

In the 20’ s and 30’s of the 19th century prop¬

ertyless men were clothed with full rights of citizenship. Legislation for their benefit soon began, taking the form of abolition of im¬

prisonment for debt, of indenture and finally of slavery, and providing wage and homestead ex¬

emptions, and free schools. Following the Civil War labor and capital entered the stage of definite class consciousness and the contest between them became sharp and bitter. From the legislatures labor secured favorable laws ; from the courts capital secured favorable de-

cisons which declared such laws unconsitu-

tional because taking property without due proc¬

ess of law and violating freedom of contract.

The limit in this stage was reached in 1885

when the court (In re Jacobs) voided a law of New York designed to end sweating, because the act would force the laborer (

fluences, to ply his trade elsewhere.® The next stage, that of the public welfare, received definite recognition in 1898 when the Supreme Court held1 (Holden v. Hardy) that a law which on its face was class legislation or deprived of property without

due process of law was yet a valid exercise of the police power because it was for the good of society at large that the freedom of both employer and em¬

ployee be restricted.

The last stage is still in the process of de¬

veloping out of the preceding. It avoids (

Equality before the law is maintained by treat¬

ing alike all within any given class. If an em¬

ployer thinks that his bargaining power has been unduly curtailed and that of the employee un¬

duly enlarged, it is his privilege to change classes and secure the larger privileges. For the employee to do the same is not yet equally easy. Neither is he quite on an equality in dis¬

posing of his property, which is his labor.

When a man engages to sell a farm and de¬

livers titles to the same he may be held to strict accountability for the performance of the contract and required to pay damage for failure to do so. But here every item of property is transferable from himself. When a man en¬

gages to sell his labor he is selling something now recognized as property, but it is not a commodity; it cannot be separated from himself and is closely identified with his liberty. To compel the performance of a labor contract would mean slavery. On the other hand, the propertyless man is at a decided disadvantage in bargaining for the delivery of his labor. He is free to engage for 12 hours a day or refuse the job. The employer is free to take him for 10 hours a day or wait for another man. But the employer can much better afford to wait for another man than the employee can afford to go without his dinner. Their equality in bargaining is not real. Society now says that the nominal freedom

of both should be re¬

stricted to the end that the laborer may be more secure in the possession of his property right to work and the social welfare be enlarged. This is the basic principle of present day labor legis¬

lation under the police power.

State and Federal Laws. — Labor legisla¬

tion in the United States is covered largely by the States though there is a considerable body of national laws affecting labor. The right of Congress in such matters is based on its power of control over interstate commerce.

Among the earliest laws were those affecting wages. The first mechanic's lien law was passed by New York in 1830 and similar laws have been passed by all the States. Such laws aim to protect the laborer by making the goods, structure or land on which he works security for his pay. Railroads and public works are now covered by these laws. State and Federal laws also make wages a nreferred claim in re¬

ceiverships and in administrations due to bank¬

ruptcy or death. Following close upon the abolition of imprisonment for debt (beginning with Kentucky in 1821) came the exemption of wages from attachment for debt. This is now the law in every State. The amount of pro¬

tection varies, some States exempting by days (30 to 60), others by amounts ($20 to $100).

There is also considerable lack of uniformity in the persons protected. Some exempt ((all laborers, mechanics and day laborers,® others all ((householders,® or ^resident debtors® or <(all who support themselves and their families by the labor of their hands® (Wis.). There are also exemptions of homesteads and of tools in all the States, the amounts varying from $500 to $5,000. Some States

forbid the assign¬

ment of future wages, while others put very strict limitations on such assignments.

A good many laws govern indirectly the amount of wages. Except as affecting women there is no general law providing a minimum wage. The National and State governments regulate employment on their public works, generally prescribing that the customary wages shall be paid, in some cases fixing a minimum.

In recent years several States have forbidden payment in store checks or truck; a few require cash payments. Two-thirds of the States regu¬

late the time of payment, a great many re¬

quiring settlements at least twice a month, some weekly. Some of these laws have been declared unconstitutional by the courts but most of them have been upheld. Many States require payment on the premises, a few dur¬

ing working hours, and a few forbid payment in saloons. Several States have the ((mine run®

law, forbidding the screening of coal before it is weighed. A dozen States regulate Mock¬

ing® or deductions in the way of fines.

A great many laborers receive a part of their pay in houses or ((furnishings.® Legislation aimed to regulate houses furnished by em¬

ployers is only in the formative stage. There are three types of legislation on truck stores: 0) Laws that seek to eliminate such payments in certain industries; (2) permitting the sys¬

tem, but regulating the prices; and (3) eliminat¬

ing the coercion of employees to patronize com¬

pany stores.

Laws regulating hours of labor have a direct bearing on wages. The first law of the kind was passed by Massachusetts in 1842 and made 10 hours a working day in factories for children under 12. In 1847 the law was ex¬*

tended to women. Several States followed this example, but no enforceable law was passed before 1879. In 1895 the Illinois Supreme Court declared void an 8-hour law for women LABOR LEGISLATION

on the ground that it unduly limited the free-

' dom of contract. In 1908 the Oregon 10-

hour law for women was upheld by the United States Supreme Court, and in 1915 the 8-hour law. By 1915 there were only seven States with no restrictions on hours of labor for women, and these States have few women workers. The laws vary considerably, but most of them fix daily and weekly maximum hours in the principal industrial occupations, agriculture and domestic service being ex¬

cepted. They are based on the health of the worker and the public welfare, but have an im¬

portant effect on wages. A few States recog¬

nize that the determination of what is necessary for the health of the worker and for the pub¬

lic welfare is not a legislative question and leave it to their commissions. Laws regulating the hours for men are fragmentary. Most of them relate to public or semi-public works.

In 1840 President Van Buren, by executive order, fixed the 10-hour day in the navy yards.

A Congressional law of 1868 (amended 1892 and 1912) fixes the 8-hour day for laborers on pub¬

lic works. Over half the States and many cities now

have similar laws. The first law of the kind applying to private industry was that of Illinois in 1867. It applied only in the ab¬

sence of a contract and was not really enforce¬

able. Over half the States and the United States now have laws shortening the hours for employees on steam and electric railways and a dozen or more protect miners with 8-hour laws.

Mississippi (1912) and Oregon (1913) have 10-

hour laws for factories. The hours in trans¬

portation are arranged by ^runs® — a maximum of 16 hours, with 8 hours of rest before starting again. This applies particularly to engineers and conductors. Many States have similar laws applying to operators of street cars. Teleg¬

raphers, train dispatchers and signalmen in continuous employment are commonly limited to eight hours. Under the extreme pressure of a strike called by the trainmen for 4 Sept.

1916, Congress passed a law (signed 3 Septem¬

ber) fixing eight hours as a day's work after 1

Jan. 1917, for men engaged in interstate trans¬

portation and allowing extra pay for overtime.

The same act provided for a commission to observe the effects of the law and report to Congress. The constitutionality of such laws has been contended many times, but they have generally been upheld as a valid exercise of the police power for the public welfare. The traveling public has a vital interest in having trains handled by men not so worn out by long hours of toil that they cannot assure them of a reasonable degree of safety. However, this par¬

ticular law unquestionably was a wage law.

The most notable decision sustaining such laws was that of Holden v. Hardy upholding the 8-

hour day law of Utah for miners. Agricultural laborers are still practically untouched by such legislation. . . ,

Partial protection against cheap labor is furnished in the Chinese Exclusion Act (1882) and the act of 1885 (amended 1907) forbidding the importation of laborers under contract.

The Arizona law requiring employers employ¬

ing 20 or more workers to see that at least 80

per cent were citizens was declared unconstitu¬

tional on the basis of unjust discrimination, but the New York law limiting employment on pub¬

lic works to citizens was upheld.

Competition of convict labor has been re¬

garded as a serious menace by free labor.

Four States now forbid the employ/nent of convicts where there would be such competition.

Five prohibit the employment of convicts in certain industries, several provide for the em¬

ployment of their convicts in certain industries, and five seek to distribute them among the various industries. Several seek to regulate the sale of convict-made goods. The agitation for a Federal law on the subject has not yet met with success.

Recognition of the Union. — There is vir¬

tually no law forbidding the organization of public employees, but executive orders dis¬

courage it. In private industry unions could secure legal recognition by incorporating, but they have little to gain and much to lose by this form of

recognition, hence they have sought it in other ways. At least one-third of the States have passed laws forbidding em¬

ployers to discriminate against members of unions. A similar law of the United States (Erdman Act) and several of the State laws have been declared void because unduly limit¬

ing the freedom of contract. (Case of Cop-

page v. Kansas). Texas and several other States have exempted labor unions from the operation of their anti-trust laws, and Congress made a slight modification of the Sherman Law in favor of the unions after the adverse de¬

cision in the case of the Danbury hatters. Over 40 States provide for the registration of union labels and protect them against counterfeiting.

A few States have legalized the peaceful boy¬

cott, whether declared by unions or collections of individuals.

Special Legislation. — The so-called <(fac-

tory acts® of the United States vary greatly in scope and effectiveness. Some date as far back as the seventies, but most of them are much more recent.

The first law requiring the reporting of in¬

dustrial accidents was passed by Massachusetts in 1886, the first covering occupational disease by California in 1911. The reporting of acci¬

dents has gradually spread to other States, but the laws vary greatly and are not altogether satisfactory. Sixteen States now require the reporting of occupational diseases and some of the laws are very comprehensive.

Laws excluding certain persons from

particular industries are becoming common.

The age limit, educational and physical qualifi¬

cations for children in many occupations are gradually being raised. Women are excluded from a few industries in some States, in four States from all industries for some weeks be¬

fore and after maternity confinement. There are many laws requiring certain physical and technical qualifications of men for particular industries. In general the physical qualifica¬

tions cover a reasonable immunity from dis¬

ease common in the vocation, freedom from diseases easily communicated to others, and strength sufficient for the performance of one's duty. Ohio and Pennsylvania require monthly examinations of workers exposed to poisonous lead salts. The technical qualifications range all the way from such as may oe required of aeronauts and electricians in one State to those expected of plumbers and chauffeurs . in 22

States. These requirements are made primarily 596

for the public safety, secondarily for the good of the worker.

A few substances have been outlawed. A national law (1912) virtually prohibits the manufacture of matches containing white phosphorus. Several States forbid the manu¬

facture and sale of alcoholic drinks. This was made national by constitutional amendment in 1919. Massachusetts forbids the use of a shuttle touched by the lips of the operator, but no State forbids the use of the same blowpipe in glass industries by more than one person.

Safety is aimed at in many drastic laws re¬

quiring the fencing of dangerous machinery and provision for stopping of machinery at once, forbidding the running of such machines without guards or cleaning or repairing while in motion. Laws designed for safety also re¬

quire certain amounts of space ; they call for the screening of stairways and elevator shafts, and require inspection of steam boilers. Laws for protection against fire are found in all the States. Some of them comprise a code in themselves, going into great details about things ranging from the material used in con¬

structing a building to how often the floors shall be swept and how the gas shall be turned off.

The health of a factory worker is fairly well guarded in some cases, very poorly in others.

Few States have any legislation on lighting, heat and humidity. Half the States require ventilation though most of the laws are too vague to be of much value. The Illinois law of 1909 sets a good standard. Some States for¬

bid sleeping in workrooms and make certain regulations for cleanliness. It was difficult to regulate ^sweating® after the decision of the Jacobs case, but attempts are made through licenses and inspection. All the mining States have more or less comprehensive laws for safety in underground works, but the pro¬

visions for health are less adequate.

Employment in transportation is regulated by both national and State laws. Navigation is controlled mainly by national laws. The act of 1915 sought to abolish virtual slavery among seamen by taking away the right to enforce contracts by imprisonment and provided for health and safety under regulations comparable to the factory acts. All the States seek to regulate employment in railroads, but Federal laws supersede in cases involving interstate

commerce. Both seek to make full provision for the protection of employees and the safety of the public. There has been a sharp contest over the <(full crew® law which fixes the num¬

ber of employees in proportion to the kind and size of the train. Twenty States have enacted such laws over the protests of the railway managers on the ground of useless expense, but the laws have been sustained by the courts as police regulations. In Missouri this law was defeated by popular vote.

Many of the earlier laws were incomplete in definition or inclusion. Lack of responsi¬

bility for enforcement, lack of responsibility for violation, inadequate penalties, failure to de¬

velop standards and lack of responsiveness to changing conditions were common defects of most of the legislations of most of the States.

Of late the tendency has been to remedy these defects by defining in the law the end aimed at and leaving to commissions large discretion¬

ary powers in defining the means necessary and the methods to be followed.

In recent years a great deal of legislation has centred around the question of liability for accidents. The old common-law rule was that responsibility for an accident must be fixed on some individual. If the employer could show that he had exercised ordinary care, he was exempt. Even when he had vio¬

lated a law in failing to provide safe ma¬

chinery, if it could be shown that the laborer knew of the danger, the courts held that he had assumed the risk. Or if the accident was due to the negligence of another employee (fel¬

low-servant), this released the employer of all responsibility. In recent years a hard fight has

been waged to change this law and make the industry bear the cost of accidents to its workers, just as it bears the accidents to its ma¬

chinery. Georgia led the way as far back as 1856 in abolishing the fellow-servant rule on railways, but so far has been followed by only half the States. In 1910 New York shifted the burden of proof to the employer. A natural corollary of such legislation is some provision for compensation without lawsuit. By the opening of this century some of the European governments had enacted laws requiring def¬

inite compensations to workers in cases of accident. Some countries put the whole burden on the employers, who take out insurance in regular companies or in government bonds and pass the cost on to the consumers. The first law looking to this end in the United States was passed by Maryland in 1902 as a sort of co¬

operative insurance law. This and several more advanced laws by other States were declared unconstitutional. In 1908 Congress made a beginning for public employees and since 1911

no less than 32 States have legislated on the subject. In order to avoid the rock of uncon¬

stitutionally, most of the statutes have been made elective, but coupled with the abolition of the employers' old points of refuge, such as fellow-servant rule, contributory negligence and assumption of risk. New York amended her constitution and made the law compulsory.

Five States provide State insurance funds, but employers may elect to carry their insurance in stock or mutual companies.

Health insurance is being agitated and the American Association for Labor Legislation has drafted a model (1915) for introduction in State legislatures,, but so far no State has passed this or any bill like it.

Except for some kinds of public service lia¬

bility and old age, pensions are practically un¬

known in the United States. National, State and municipal governments provide pensions for several classes of employees, especially soldiers, sailors, policemen, firemen and teachers. Massachusetts and Wisconsin offer State assistance for voluntary old age pensions and Alaska and Arizona have recently legis¬

lated on the subject. For pensions for women see Mothers' Pensions.

Unemployment — The problem of unem¬

ployment is attracting more and more attention.

No State requires or even offers any insurance against it. Twenty-three States and a dozen or more municipalities maintain employment exchanges,, some of which have placed a great manv applicants. At least seven States require licenses of private employment agencies, and LABOR LEGISLATION

Idaho forbids the running of such agencies for profit. Emergency work is provided by several municipalities and bv Idaho. The lat¬

ter offers work on the public roads to citizens who have resided in the State six months. In the course of the World War the national gov¬

ernment greatly enlarged its activity in bringing workers and jobs together.

Administrative Agencies. — Massachusetts

created the first bureau of labor in 1869. Con¬

gress followed with the National Bureau of Labor in 1884, the Department of Commerce and Labor in 1903, and the Department of Labor in 1913. Nearly every

State now has such a bureau. The chief duty of such bureaus is to collect and distribute statistical information re¬

lating to the various fields of labor and to the development of productive industries. In some States they are expected to enforce the im¬

portant labor laws. In recent years there has been a decided movement for the creation of industrial commissions, uniting in one authority the administration of such related laws as those dealing with workmen's compensation, factory inspection, etc. Five States — Colorado, Indiana, Montana, Nevada and New York —went over to this system in 1915. The entrust¬

ing of discretionary power to these _ commis¬

sions has gone a long way in remedying early laws, especially where they were defective in definition and inclusion or not responsive to changing conditions. 'For example, Congress now merely demands safety of the railroads and leaves it to the Interstate Commerce Com¬

mission to determine what devices are neces¬

sary to meet this requirement. See Child Labor; Labor Movement; Labor Unions.

Bibliography. — Labor Laws of the United States in Bulletin of the Bureau of Labor Statistics, Nos. 148, 186 (1915); Commons, J.

R., and Andrews, John B. Principles of Labor Legislation (New York 1916) ; Kelley,

Florence, Pome Ethical Gains Through Legis¬

lation (ib. 1905) ; (Report of the Executive Council American Federation of Labor } (1916) ; various publications of American Association for Labor Legislation.

David Y. Thomas,

Professor of History and Political Science, University of Arkansas.

LABOR LEGISLATION, Foreign. La¬

bor legislation is an attempt to lessen or abolish the evils resulting from the factory system in industry. The rapid advent of modern capital¬

ism and the broadening of markets enormously increased the keenness of competition among employers, compelling the latter to exploit labor to the fullest possible extent in order to lessen the cost of production. As a result the state was sooner or later obliged to step in and pro¬

tect the worker from the consequences of his unequal bargaining power with the employer, especially the women and child workers. At present each of the more important countries in Europe and elsewhere possesses some sort of system of labor laws, the scope and extent of which varies with the development, of the factory system in each country.

Great Britain. — Great Britain, which is the country of origin of modern capitalism, is also the country of origin of modern labor legislation. The first important factory law here was passed in 1802 and is known as the ((Health and Morals Act? This act forbids the employment of children under nine years of age, restricts the working hours of children to 12 a day and provides for sanitary conditions and education for the latter. The act was hardly enforced, and like a similar act of 1819, remained a dead letter. It was not until 1833

that an extensive and strict factory law passed through Parliament. The Factory Act of 1833

applied to all textile establishments and pro¬

vided for a system of inspection by a specially trained group of men. It again forbade the work of children under nine years of age, and limited the number of hours for children under 13 to nine a day or 48 a week, and for per¬

sons under 18 to 12 a day and 69 a week.

Night work was entirely prohibited and school¬

ing was provided for. This notable law was followed by a series of other laws, wider in scope and stricter in enforcement, the most important of which are the Laws of 1844 and 1847, the first extending the protection to women and the second establishing a 10-hour day for children and women. In 1878 the Factory Consolidation Act was passed, which systematized and strengthened all previous labor laws. Since then many labor laws were passed extending protection to workingmen. In 1901 work was prohibited for children under 11 years of age. There is also a vast body of regulation in regard to sanitation and safety in the factories. Night work and Sunday labor for women and children under 18 is entirely prohibited.

No less remarkable is the development of the labor laws in England dealing with the legal¬

ization of labor unions and with industrial arbitration. Up to 1824 English labor unions were illegal under the common law and statutes of Parliament. In 1824-25 all Combination Laws previously passed against unions were re¬

pealed and freedom of association was granted to a limited extent. In 1871 the Trade Union Act was passed, which declared unions not to be illegal combinations in restraint of trade.

This act was followed in 1875 by the Conspiracy and Protection of Property Act, which freed labor from the conspiracy laws in their crim¬

inal aspects and gave some protection to union funds. In 1906 the Trade Disputes Act freed unions from civil conspiracy laws and gave them complete exemption from responsibility for damages as a result of acts committed by laborers. Peaceful picketing, strikes, boycotts and blacklists were made legal. The first im¬

portant Conciliation Act was passed in 1896.

According to this act the Board of Trade was given certain powers to help bring about con¬

ciliation between employers and employees. In 1911 an industrial national council of concilia¬

tion was organized. A notable step toward arbitration was taken by the Trade Boards Act of 1909. The latter provides for the establish¬

ment of wage boards by the order of the Board of Trade to make minimum wage laws for employees working in industries where wages are very low. This law was especially directed against sweating industries. In 1909

also was passed the Labor Exchanges Act, ac¬

cording to which labor exchanges were organ¬

ized all over the country to furnish workers with information in regard to employment and help to distribute them all over the country.

The development of social insurance in Eng¬

land is quite recent. Various laws recognizing employers' liability were passed beginning with 1880. These laws, however, were narrow in scope and voluntary in character. The first ex¬

tensive piece of social legislation was only accomplished with the passage in 1906 of a Workmen's Compensation Act. This act did away with all previous legislation and reorgan¬

ized accident insurance on a new basis, ex¬

tending it to workmen in almost every kind of employment. According to the act employees in event of disability exceeding seven days are entitled to

one-half the average weekly wage.

In case of permanent disability the compensa¬

tion continues until the death of the employee.

The law also provides for funeral and medical expenses and for dependents in case of death.

The Act of 1906 was followed by the Old-Age Pensions Act of 1908, which provides that all persons over 70, having an annual income less than $153, are entitled to a pension varying with the yearly income of the recipient and not exceeding $3.12 a week. Money for this pur¬

pose is raised by general taxation. In 1911 the system of social insurance was made complete by the passage of the National Insurance Act, which provides for sickness and unemployment insurance for some trades. Sickness and in¬

validity insurance was made compulsory for all workmen doing manual labor and for other persons whose income do not exceed $800 a year. The law is administered by local benefit societies and contributions come from the em¬

ployer, employee and the state. It provides for medical aid and for sickness, invalidity, and maternity benefits, the amount varying with sex or age. As far as unemployment is concerned the government instituted an experimental scheme of insurance against unemployment in the building and engineering trades. According to the law all laborers above 16 in these trades are required to be insured against unemployment.

The system is supported by joint contribution from employees and employers and a govern¬

ment subsidy.

Germany. — Labor legislation in Germany came later than in England, owing to the be¬

lated rise of the factory system. The first im¬

portant German labor law was passed by Prus¬

sia in 1839 and dealt mainly with the restriction of hours of labor of children. The employment of children under nine years of age was en¬

tirely prohibited, and the working day of children under 16 was limited to 10 hours.

The law was a complete failure, as it was not enforced. In 1853 another child labor law was passed, raising the minimum working age of children to 12 years and restricting the working day of children under 14 to six hours. The law also provides for the education of the children and for factory inspectors, but like similar laws in other German states and the law of 1839 it remained a dead letter. In 1869 an Industrial Code was adopted by the North Ger¬

man Federation, putting on the statute books Prussian regulations of earlier laws.

The rapid development of German industry after the Franco-Prussian War of 1870 greatly increased the factory evils. As a result great demands began to be made for uniform labor laws and strict factory inspection. In 1878

the inspection of factories were made com¬

pulsory throughout the empire. In 1891 a uni¬

form industrial code was passed for the entire German Empire. Children under 13 years of age were prohibited to work in factories and children above 13 could work only if they had received a primary education. The code also regulates the employment of women, limiting their working day to 10 hours, as well as that of children under 16, and prohibiting night work. The law also provides for Sunday rest and sanitation in the factories. Since 1891 the Industrial Code has been amended in many ways. The Industrial Code expressly legalizes strikes and

lockouts and allows the organization of labor unions for the improvement of eco¬

nomic conditions. In 1890 Germany passed a general law establishing industrial courts throughout the empire to settle industrial dis¬

putes. The courts have an equal number of representatives from labor and capital and are presided over by a chairman who represents neither.

By far the greatest progress in labor legisla¬

tion was made by Germany in the field of social insurance. The latter is used by the Imperial German government as a check on the ever-growing influence of Social-Democ¬

racy among the workingmen. The first im¬

portant insurance act was the Sickness Insur¬

ance Law, passed in 1883. It provides for sickness benefits, free medical aid and ma¬

ternity and funeral benefits. The funds are sustained by the employers and employees, the former contributing one-third and the latter two-thirds of the fund, and are administered by boards representing both sides. According to provisions of the law sickness benefits begin on the third day and amount usually to one-

half of the wage. The Accident Insurance Law was passed in 1884. It provides that accident funds are to be contributed entirely by em¬

ployers and to be administered by associations of employers engaged in the same general trades or industries. The latter fix rates, classify trades and pass on safety requirements.

Compensation for the first 13 weeks comes from the sick fund. After that compensation comes from the accident fund. In case of total dis¬

ability a workman gets 50 per cent of his wages the first four weeks and later 66 2/s per cent. In case of partial disability, he receives a pension in proportion to the degree of dis¬

ablement. In case of death funeral benefits are paid and dependents are given a liberal pen¬

sion. The Compulsory Old-Age and Invalid¬

ity Insurance Law was passed in 1889. Ac¬

cording to it all wage earners above 16 must insure against old age and invalidity. Liberal contributions are also made by capital and the state. Pensions usually amount to two-thirds of the average wage of the class to which the worker belongs. As far as unemployment in¬

surance is concerned, some beginnings nave been made by a few municipalities, but a na¬

tional system against unemployment is still under consideration. All the original insurance laws have been many times amended until they now include practically all workers. In 1911

all insurance laws were revised and combined into one law.

France. — 'The first half of the 19th cen¬

tury brought the industrial revolution to France and together with it all the evils of the factory system. Very little protective legislation, how¬

ever, was enacted before 1841, but in that LABOR LEGISLATION

year, owing to strong public pressure, a child labor law was passed declaring that the mini¬

mum age of children working in factories, mills and workshops should be eight and limit¬

ing the working day of children between eight and 12 years of age to eight hours and between 12 and 16 to 12 hours. The law was hardly enforced, as factory inspection was inadequate.

The Revolution of 1848 brought more labor legislation to France. Under the influence of Louis Blanc, national workshops providing everybody with work were established, but failed. In 1848 a law was also passed establish¬

ing a 12-hour labor day all over France. The law was not enforced. In 1874 a law_ was en¬

acted reorganizing factory legislation. It limited the age of child workers to 12 years, restricted the working day of children from 12 to 16 years of age to 12 hours, and pro¬

hibited night work for children under 16 and for women under 21. It also established sani¬

tary requirements and instituted an inspection service. In 1892 the law was replaced by an¬

other law more liberal in scope. A law of 1893 deals with the protection of health and safety of employees and requires that all accidents be reported and investigated. In 1900

the Act of 1848 for a 12-hour day was amended and put into force. In factories where women and children work the working day is limited to 10 hours. In 1915 a minimum wage law was enacted, according to which wages for women are to be fixed by wage boards.

In the field of legislation in regard to legalization of unions France was rather slow.

A law passed in 1791 prohibited labor organi¬

zations altogether. This law remained in power till 1884, when the Syndicate Law, making labor organizations and strikes lawful, was passed.

Yet by 1909 an order was issued prohibiting strikes on public works and restricting the right of public employees to organize. In 1887 the government took a favorable step toward unionism by establishing labor ex¬

changes, which serve as employment bureaus and headquarters for unions. In the field ot arbitration France has progressed consider¬

ably through the help of industrial courts or conseil de prnd'hommes, originated at Lyons and since then spread over France and Europe.

These courts represent equally labor and capital and settle quickly and cheaply all disputes.

The idea of social insurance in France is quite old, but it is by no means as well developed as in Germany or even England. During the 18th century accident and sickness insurance was conducted by trade guilds, but after the Revolution these activities were taken over by voluntary societies. At present sickness bene¬

fits are entirely in the hands of triendly so¬

cieties, which since about 1850 are closely regu¬

lated by the government. The benefit funds are mainly supplied by the members of the so¬

cieties, though sometimes contributions are made by employers. Accident insurance, like sickness insurance, is also voluntary. In 1898

employers were made liable for accidents which disable their employees and at present most ot the emplovers carry insurance for their work¬

men. Old-age insurance was made compulsory for most of the industries in 1910 Contribu¬

tions come from the employer and employees, besides a subsidy being granted by the state.

Granting of pensions usually starts at the age of 55, but they may be granted earlier if the worker becomes infirm.

Austria. — Protective labor legislation in Austria began as early as 1853 and factory in¬

spection was instituted in 1883. The Indus¬

trial Code of 1907 provides for sanitation in factories, for an 11-hour day in all industrial establishments and for protection of child workers. Children under the age of 12 are prohibited from labor and children from 12 to 14 can work only eight hours a day. Accident insurance was made compulsory in 1887 and sickness insurance in 1888. These laws closely resemble the German laws. In 1906 a com¬

pulsory old-age and invalidity law was passed.

It provides for pensions to widows and orphans of the insured and applies only to salaried employees.

Switzerland. — In Switzerland up to 1877

most of the labor laws were passed by the several cantons, but in that year a uniform federal factory law was enacted. This law, amended and supplemented several times, regu¬

lated child labor, hours of work and con¬

ditions. In 1914 it was repealed and replaced by an industrial code. The latter provides for the health and safety of employees. It estab¬

lished a 10-hour day (nine hours on Saturday) and restricts the amount of overtime work.

Night and Sunday work are with some ex¬

ceptions entirely prohibited. Children under 14 years of age may not be employed in fac¬

tories and children under 16 cannot work more than 10 hours a day. The law also established voluntary

conciliation boards to settle indus¬

trial disputes and provided for inspectors under cantonal and federal supervision. In 1911 a law was passed, which provides for voluntary sickness and compulsory accident insurance.

The insurance includes medical aid and in¬

demnity for time lost.

Belgium and Holland. — Belgium has an

advanced system of labor regulation dating from 1813. Industrial courts were established in 1859. Since 1850 many measures in regard to workmen's insurance were passed. The in¬

surance covers health, accidents, invalidity and old age. In 1901 the Ghent system of unem¬

ployment insurance was introduced in the city of Ghent. According to this plan the govern¬

ment subsidizes labor unions furnishing unem¬

ployment insurance. The system has spread rapidly over Belgium and other important countries of Europe. Holland s system of protective legislation dates since 1874 and pro¬

vides for mediation and arbitration, regulation of work of women and children and super¬

vision of sanitation. In 1901 compulsory acci¬

dent insurance was established by law in al¬

most all branches of industry. Holland has also taken important steps toward sickness and old age insurance and has introduced the Ghent system of unemployment insurance.

Scandinavia. — Sweden introduced a com¬

prehensive scheme of labor laws in 1901 and additional laws have been passed since then.

They provide for mediation and arbitration protection of women and children, placing ot workmen on land, etc. Social insurance was started in 1891, and in 1916 an entirely new compensation law was passed. It embraces all wage earners in all industries and provides 600

for medical aid, cash benefits in case of tem¬

porary disability and pension payments in case of permanent disability. Denmark passed its basic labor law in 1901. A permanent arbitra¬

tion court representing both labor and capital was established in 1910. In 1913 a law was passed establishing a central labor exchange in Copenhagen with many branch exchanges all over the country. An old-age pension system was passed in 1891, sickness insurance was established in 1892 and accident insurance in 1898. In 1916 all compensation laws were re¬

vised and combined into one. Norway's im¬

portant labor legislation dates since 1872. Acci¬

dent insurance began in 1895 and sickness insur¬

ance in 1909.

Australia and New Zealand— Australia is highly advanced in the field of labor legisla¬

tion owing to the fact that the governments of the commonwealth and of all the states ex¬

cept Victoria are in control of labor minis¬

tries. The labor laws for which Australia is most famous are the compulsory arbitration laws. Compulsory arbitration was first

adopted by New South Wales in 1901 and is now present in all the states. The Common¬

wealth Compulsory Arbitration Act was passed in 1904. It provides for a court with a presi¬

dent as its sole member whose decisions are final. Strikes and lockouts are strictly forbid¬

den. Australia also has an eight-hour law and most of the states have passed minimum wage laws and compensation insurance. In New Zealand a Compulsory Arbitration Act was passed in 1894 as a result of the great strikes of 1890-93. In 1908 the law was changed and now provides for the appointment of commis¬

sioners of conciliation who in turn appoint ad¬

visers nominated by both parties. Registered unions are prohibited from striking under pen¬

alty. Either side may demand arbitration and the decisions are binding. Like Australia, New Zealand has an eight-hour day and laws protecting women and children in the facto¬

ries. It also has a broad system of social in¬

surance, including old-age and mothers' pen¬

sions.

Other Countries. — Most of the European countries possess some system of labor regu¬

lation and inspection. Since 1880 many laws protecting children and women have been passed in Russia. Before the Revolution Rus¬

sia also possessed a fairly advanced system of factory inspection. In Italy many import¬

ant labor laws have been passed since 1886, in Spain since 1900. The most important labor law of Canada is the Industrial Disputes In¬

vestigation Act, passed in 1907 after the great Alberta mining strike of 1906. The object of the act

is to prevent strikes and lockouts in mines and industries connected with public utilities. When a strike is threatened, the gov¬

ernment appoints a board of conciliation and investigation, having one capitalist, one labor representative and a chairman appointed by the latter or by the government. Before the re¬

port of the board is published strikes are for¬

bidden under penalty, but after publication each side is free to act. The idea is to arouse pub¬

lic opinion against the side which refuses ar¬

bitration. Practically all of the countries pos¬

sess more or less of a system of workmen's compensation. In Italy a law of 1898 makes insurance against accidents compulsory at the expense of employers. At the same time an old-

age invalidity insurance law was enacted.

International Association for Labor Leg¬

islation. — Considerable impetus to labor legis¬

lation in Europe and America was given by the International Association for Labor Legis¬

lation. The association was organized at the Paris Exposition in 1900 and has branches in most of the European countries and in the United States. Biennial conventions arc held in Switzerland, where uniform laws are drafted and recommended to the different countries.

After such laws are adopted by a country, they become equivalent to a treaty.

The World War greatly added to the im¬

portance of labor legislation and administra¬

tion. For instance, the work performed by labor

exchanges had formerly interested mainly social reformers and wage earners ; the war made it a cornerstone of the nation's industrial efficiency. For industrial labor suddenly be¬

came a rare and precious commodity. In the first rush of necessity governments and em¬

ployers permitted a lowering of the existing standards of labor protection. Soon, how¬

ever, investigations proved that the enforcement of the existing labor laws was not so much a matter of social justice as one of a continuous industrial efficiency. The inflow of millions of women into the munitions industries greatly broadened the scope of factory inspection.

Thus it led to the creation of posts of special welfare supervisors. Another side of labor legislation which the war strongly developed was that which deals with the prevention and settlement of industrial disputes. Special tri¬

bunals as well as special administrative organs were created with this in view.

Bibliography — Commons, J. R., and An¬

drews, J. B., Principles of Labor Legislation1

(New York 1916) ; Dawson, W. H.,

man Workman1 (London 1906) ; Hayes, C.

J. H., (British Social Politics1 (Boston 1913) ; Fyfe, F. E., Employers and Workmen Under the Munitions Act1 (Glasgow 1917) ; Hutchin¬

son, B. L., and Harrison, A., (History of Fac¬

tory Legislation1 (London 1911); Ogg, F. A., (Economic Development of Modern Europe1

(New York 1917) ; Webb, S. and B., Prob¬

lems of Modern Industry1 (London 1902).

Selig Perlman,

Department of Political Economy , University of Wisconsin.

LABOR MOVEMENT IN AMERICA,

The. ((Labor Movement11 is a term applied to the conscious, united and persistent efforts of the laboring people to improve their economic and social conditions. <(Laboring people11 has come to mean those who work for wages. Or¬

ganizations of laborers have existed from time immemorial. The guilds of the Middle Ages were exclusive and monopolistic, caring noth¬

ing for other workers. This form appeared among the. shoemakers in Massachusetts in 1648, organized mainly for the purpose of con¬

trolling inferior workmen. Like organizations appeared in other industries from time to time, always local in character and more or less tem¬

porary. Several strikes for higher wages oc¬

curred before the close of the 18th century.

History. — The birth of modern trade union¬

ism may be assigned to the closing years of the 18th century, though it never attained the dignity of a movement until the 19th was well under way. The cordwainers (Phila¬

delphia 1789 and 1794), the shipwrights, car¬

penters and tailors (New York 1803, 1806) were the pioneers.

The labor movement grew out of the in¬

dustrial revolution which brought about a change in the manner and means of production and so caused a wider separation between mas¬

ter and journeyman. The change is well illus¬

trated in the shoe industry. At first the master made only a ((bespoke® product and employed journeymen to meet this demand. Then came the capitalists, (

who stocked up and held shoes for chance pur¬

chasers. Changes of this character, which brought about the factory system, were espe¬

cially noteworthy 1820-40, but were noticeable before this. This stocking up and the compe¬

tition between the capitalists for sales necessi¬

tated a reduction of wages. The labor move¬

ment came as a protest against such conditions.

While the aims of the labor organizations were industrial in its earlier stages the move¬

ment assumed a political character and a work¬

ingmen's party appeared in various places in the later twenties and early thirties. No doubt this was largely due to the fact that the suf¬

frage was a new instrument in the hands of the propertyless laboring man. As a separate body the labor party accomplished little that was good while doing some harm to the cause.

It was impossible to make a complete divorce between labor and politics, for many of its de¬

mands could be realized only through legisla¬

tion. But to insist upon the passage of certain laws was one thing, to enter politics as a party was another. The experiment in politics brought out this

truth, though its significance has been lost a few times since, in labor organ¬

izations and in recent years, efforts have been made to launch a labor party. The organization soon learned that better results could be secured by formulating their demands and then leaving it to the members to support the party which promised and performed most. .

In the platforms of the later twenties and early thirties may be found the causes of the movement and the ends sought. They demand the abolition of special privileges to the strong and the giving of protection to the weak. The specific demands were free schools, the aboli¬

tion of imprisonment for debt, of the militia system and of payment in store checks, the en¬

actment of a mechanic's lien law, cheaper legal procedure equal taxation, no chartered monop¬

olies no inflation of the currency, the leasing of the public lands to actual settlers and the taxation of unearned increments in town prop-

Crt The specific demands have varied from time to time, but the essential principles have re¬

mained the same, though stated at times in more passionate language. Throughout the whole movement most emphasis has been laid upon a shorter working day and better pay.

The working day of the farm, ((from sun to sun ® had been carried over into the industries and even extended there, for in some industries men worked longer in winter than did the farmer. The weapons used to remedy the situ¬

ation were organization and the strike, backed up by appeal to public sentiment.

Trade unionism reached the ((coming out®

stage with the organization of the Mechanic's Union of Trade Associations at Philadelphia in 1827. Others soon followed. After a brief flirtation with politics they settled down to in¬

dustrial and social questions. The rising tide of prosperity and the mounting cost of living in the first half of the fourth decade stimulated them to feverish activity. Though it was the conditions which are most apparent in fac¬

tories that caused unrest, it was not the factory workers, but skilled artisans who took the lead.

By 1836 the Trades' Union at Philadelphia con¬

sisted of 48 societies, two of which had over 900 members and four others over 700 each.

The journeymen tailors, cordwainers, printers and hatters represented the skilled workers, the cotton spinners and "female operatives,® the factory workers. The printers included at least 24 cities in their organization. The pio¬

neer national union was the National Trades'

Union, which met at New York in 1834. This may be taken as the progenitor of the American Federation of to-day.

The Right to Organize.— The right of la¬

borers to organize has never been questioned.

What they may do after organization has al¬

ways been a disputed question, for our courts have generally held that a good many things which may be legally done by individuals may not be done by combinations of individuals.

The first thing for the laborers to do was to establish the right to strike and make col¬

lective bargains. In this they have always been at a

decided disadvantage. A dozen men may combine as a corporation for the purpose of doing business and employing others. It then becomes in law a person. It may employ only a dozen men. No act of the corporation (composed of a dozen men) to reduce wages is illegal. Each of the 12 employees may work or refuse to work, but if they combine in such ac¬

tion then legal difficulties may arise. Such dif¬

ficulties were swept away in England in a series of acts beginning in 1824 and ending in 1906.

In America strikes (<(turnouts®) occurred every few years throughout the first quarter of the 19th century. Sometimes they were for shorter hours, generally for higher pay. In 1803 the striking sailors at New York used in¬

timidation against strikebreakers. "Scab® and «rat® came into use, and occasionally lists of «rats® were published. The elementary form of picketing and the boycott also appeared.

The answer of the employers was appeal to the courts and organization. In 1806 eight strikers were fined at Philadelphia, and three years later DeWitt Clinton, mayor of New York, fined 24. The charge was conspiracy to raise wages and the court held that this was il¬

legal even when there was no intimidation or violence. Several other like prosecutions fol¬

lowed. In 1834 the carpet manufacturers of Thompsonville, Conn., even secured judgment for $15,000 damages. The defendants not being able to pay were put in jail. In 1836 certain manufacturers at New York combined and agreed not to meet the demands of their strik¬

ing employees; they further agreed not to em¬

ploy anybody who was a member of Trades'

Union Society or any other society whose ob¬

ject was to dictate wages. The grand jury re-

fused to indict these employers for conspiracy, but the striking tailors were fined $50 to $150 each.

These prosecutions were one of the fac¬

tors, though not the only one and probably not the most important, which led to the de¬

cline of the labor movement. Organization had been overdone and the unions were quarreling with each other. There had already been a tendency toward politics. After the conviction of the tailors a mass meeting was held in the park to protest against it, and a State conven¬

tion was called. The tide of discontent and the spirit of reform were rising throughout the nation and every kind of <(ism® was going into politics. One labor candidate was elected to Congress, but the laboring men ruined their cause by admitting outsiders and championing various issues which had no direct bearing upon their objective. The various parties now played for the labor vote, the Whigs supporting the tariff as a protection to labor instead of capital and Tammany Hall turning to the workingmen instead of the wealthy class.

<(Thus,® says Professor Commons, <(did the la¬

bor movement of the thirties furnish to the 19th century both its philosophy of labor's pri¬

ority over property and its secret of maneuver¬

ing labor to the advantage of capital.®

Some results worth while had been accom¬

plished : (1) A mechanic's lien law; (2) the abolition of imprisonment for debt, and (3)

improvement of the public schools, had all come by legislative enactment, mainly because of the pressure of the laboring class. The ap¬

peal to public sentiment was strong, both through the platform and the press. Between 1820 and 1837 no less than 68 papers were pro¬

jected. The best known of these were the Mechanic's Free Press (Philadelphia 1828), the Workingman's Advocate (New York

1829) and The Man (New York 1835), the last two under the editorship of George H.

Evans. The denunciation of employers in the papers was direct, often bitter. But no legis¬

lative enactment was secured for the shorter day and very little was accomplished by agree¬

ment, but an executive order was secured for the 10-hour day from President Van Buren.

More important perhaps was the cessation of fines for mere strikes. The same year that the tailors were fined the cordwainers were ac¬

quitted and in 1842 the Massachusetts Supreme Court established the right of men to quit work for the improvement of their condition.

However, this did not establish any general right to quit work. Men might quit work to benefit themselves but not to injure others, and prosecutions for conspiracy continued in the fifties, especially where acts of violence were committed.

The lean years following the panic of 1837

saw little activity in the labor world. The ris¬

ing prices following the partial business revival of 1843 witnessed some sporadic union activity.

Factory operatives now began to take part in the

movement, but their real significance be¬

longs to a later period.

The period of the forties is one of the most loquacious in all our history. It was a <(hot air® period and the heat of discussion germi¬

nated a great many issues, some of which have taken root. The old democracy had stood for a negative, laissez-faire policy. The call now was for a constructive democracy, one that would take hold and guide and help. There were two avenues of approach, that of higher idealism along which came the humanitarians and transcendentalists ; the lower, on which the workers traveled. The former called for justice; the latter demanded rights. Gradu¬

ally, especially after the panic of 1837, the transcendentalists got down to earth and sought to experience the feelings of labor. It assumed concrete form in the experiment at Brook Farm (q.v.) and the various efforts to establish Fourierism (q.v.) and Owenism. The tran¬

scendentalists soon vanished into thin air, but not before they had served a useful pur¬

pose. They opened the eyes of society as they had not been opened before to the grievances of labor, and touched a chord of sympathy; in the laboring class they at least touched the chord of aspiration and caused them to think a little more of duties if no less of rights. One of the most powerful agents in bringing about these results and a partial fusion of the two ideals was Horace Greeley.

The Homestead Act. — The most signifi¬

cant concrete thing in the labor movement of this period was the agitation which led to the passage of the Homestead Act. Among the natural rights ascribed to man in the Declara¬

tion of Independence was the right to (

Wages, he said, were low and strikes were fu¬

tile because the Western lands were bottled up and the vacant lands of the East were in the hands of speculators. If these lands were opened up, enough settlers would be drawn off to cause a rise in wages. In 1844, mainly through his activity, the National Reformers'

Association was organized for the purpose of restoring man to his ((natural right to land,®

and proceeded to demand of candidates a pledge to vote for a homestead law. At first Greeley opposed, holding that the ills of labor were social, not political, and that they were to be remedied by mutual agreement in a congress made up of representatives of employers and employees. The first ^Industrial Congress®

met at New York in October 1845. It stood for land reform and a 10-hour law. It con¬

tinued to meet at intervals until 1856, but Gree¬

ley soon saw the futility of its efforts and came out for legislative action (1845), endors¬

ing in particular the homestead idea. In 1848

he introduced such a bill in Congress. In 1852

Andrew Johnson introduced another. Ten

years later it became a law.

Along with this went the movement to ex¬

empt homesteads from execution for debt, the first response to which came from Wisconsin in 1847, though similar laws had been enacted in several Southern States prior to this. En-

tailment or absolute inalienability was de¬

manded by some, but voluntary alienation un¬

der mortgage was allowed everywhere.

Weary of waiting on philosophy and legisla¬

tion the workers again resorted to strikes fol-

lowing the period of 1843, generally with suc¬

cess. However, the Phalanx denounced the ^degrading bitterness and insufficency of this attempt at a compromise® of the rights of la¬

boring men, holding that it did not <(change the terms of dependence on masters and only converted them from 12 and 14 hours to 10

hour slaves.® The only remedy was <(to asso¬

ciate and combine® and secure ownership of ((the land on which they live and the tools and machinery with which they work.®

The influence of the Fourierists appears in the action of a convention representing several unions. It endorsed the homestead proposi¬

tion, the 10-hour movement and the Working¬

men's Protection Union which was working out distributive co-operation and rejected a pro¬

posal looking to political action. All efforts to secure a 10-hour law failed in Massachu¬

setts, but they were successful in New Hamp¬

shire (1847), Pennsylvania (1848), New Jer¬

sey (1857). Ohio (1852) and Rhode Island (1853). However, the laws were not en¬

forced. The movement for co-operation (q.v.) had some tangible results and by 1838, 769 co¬

operative stores had been started. About this time the movement began to decline and by the opening of the Civil War the stores had all dis¬

appeared or passed into private ownership.

The failure was due to two things, bad manage¬

ment and greed for gain. The Boston Tailors'

Association Union (1849) was organized for productive co-operation, but lasted only a few years.

Nationalization of the unions was hardly possible until industries were enlarged and dis¬

tribution more rapid and general. This trans¬

formation was under way in the fifties. Rail¬

roads were being built and disconnected lines were being consolidated into greater systems.

Epoch-making inventions, such as the sewing-

machine, the reaper and mower and shoe ma¬

chinery had already been registered in the Pat¬

ent Office. Expansion and consolidation were going on. In 1840 there were 1,240 cotton fac¬

tories with $51,000,000 capital, employing 72,000

workers. In 1850 the number had been re¬

duced to 1,074, the capital increased to $76,-

000,000 and the workers to 95,000. The woolen and other industries were undergoing the same change. Many local unions were formed, sev¬

eral of larger scope. At least two national or¬

ganizations still in existence date from this period, the International Typographical Union (1850)

and the Iron Moulders (1839). The revolution in industry, instead of being checked, was rather stimulated by the Civil War the next decade. Associations of manufacturers were common and business was assuming the monopolistic type. The absence of so many workers on the firing line weakened the labor¬

ing classes and their organization was strength¬

ened but little while the war lasted, though one union, that of the cigar-makers, dates from 1864. ' The increased use of woman, child and convict labor, the influx of immigrants, espe-

ci ally from southern Europe, and the freeing of the negroes, whose low standards were said by the workers to misfit him for ((a fair com¬

petition of the white worker,® and multiplica¬

tion of machineiy, all added to the perplexities of the laboring men and made organization in¬

evitable.

The most significant demand of this period was the 8-hour day. The basic philosophy of this demand was somewhat different from that for the 10-hour day. As formulated by Ora Stewart, a Boston mechanic, this philoso¬

phy held that this increase of the worker's lei¬

sure would raise the standard of living. This would cause a rise in wages and an increased use of machinery. The carrying out of the program would, he said, eliminate the capital¬

ists for the rise in wages would make the cap¬

italist and laborer one. The specific program naturally arising from such a philosophy called for the establishment of co-operative production and distribution and of emigration to the West¬

ern lands as a remedy for unemployment ; it demanded the abolition of monopoly, of the contract system of convict labor, educational advantages suitable for laboring people and better housing. Gresham's law, said Stewart, operated in the labor world as surely as in money and these measures should be taken to guard against it.

A natural corollary of this last was oppo¬

sition to convict labor, Chinese immigration and the coming of Europeans under contract. Even the recently freed negro was an object of fear, and demands were made for some kind of pro¬

tective regulations. With the help of the human¬

itarians the convict lease system has been prac¬

tically abolished and the working of convicts under contract considerably modified. The agi¬

tation for Chinese exclusion was finally success¬

ful in 1882 and other Asiatics except Japanese were included in 1916. A law against the im¬

portation of laborers under contract was passed in 1885, amended in 1907.

Coincident with some of the significant changes in production was the development of the middleman who pushed in as a connecting link between producer of raw materials and the manufacturer and the manufacturer and the consumer. This was particularly noticeable 1860-80. The same period also saw the capi¬

talization of intangible wealth, good will, trade marks, franchises, etc., interference with which was a violation of property rights. Intangible capital became an effective security for bank¬

ing and credit business through which the mer¬

chant could control the products of laborer and

employer. Such a situation was of first im¬ portance to the farmers and laborers and con¬ tributed largely to the first greenback move¬ ment, which aimed to take this control out of the hands of the middleman. The proposition for legal tender currency convertible into bonds and bonds convertible into legal tender, as backed by several labor unions, was stoutly resisted then, even when limited in quantity and based on 3 per cent bonds, and has since been condemned by historians and economists.

Consolidation and concentration moved on apace. Between 1870 and 1905 the factory, me¬ chanical and neighborhood industries a little more than doubled in number, but the number of workmen trebled, the value of the products quadrupled and the capital was multiplied by six. The number of establishments making agricultural implements declined (1870-1900) 66 per cent, but the capital per establishment rose from $16,780 to $220,571 and the products from $25,080 to $141,549. The close of the 19th century and the opening of the 20th wit¬ nessed the appearance of the giant corporations.

This in itself destroyed the personal nexus be-

tween the employer and employee. More than that, there was a union of industries through interlocking stockholders and directors. The result was that capital, instead of passing into the hands of laborers and farmers, itself be¬ came the master or the ally of big business.

A very small part of the demand of labor in the sixties was granted at the request of busi¬

ness in 1913 in the Federal reserve banks; of the farmers to the farmers in the rural credit bill of 1916.

The answer of labor to concentration and to the rising prices of the war period was organ¬

ization. By September 1864 the local unions had over 200,000 members, and then nationalization began with the organization of the International Industrial Assembly of North America. The preamble to the constitution of this union gives causes of unions and expresses the feelings of that age. It may also be said to give the basic motives of unionism from that day to this, though their expression has been modified.

Capital is denounced as ^aggressive® and seek¬

ing to <(enslave the working masses.® It <(has assumed to itself the right to own and control labor for the accomplishment of its own greedy and selfish ends, regardless of the laws of nature, and of nature's God.® Experience has demonstrated that ((if the dignity of labor is to be preserved, it must be done by our united action.® Therefore, (

tution.®

The objects of the order were the social and moral elevation of the workers, the correction of abuses so as to secure to them their rights and privileges. This was 'to be secured through promoting organization and the adjustment of difficulties between employers and employees.

Other orders soon grew more specific in their demands and brought into the foreground such questions as the recognition of the union, the closed shop, limitations on apprenticeship, im¬

migration and the importation of labor under contract, prison labor, hours, wages, the boy¬

cott, the blacklist, picketing, sanitation and safety. All of these questions have been prom¬

inent since the Civil War, some of them all the time, others at particular periods.

Organizations now multiplied and grew

rapidly. The National Labor Union was formed in 1866 and by 1868 had 640,000 members. It now boldly entered politics, largely to support Greenbackism. The result was decline, death and dissolution, though the American Labor party arose out of its ruins and put forth a candidate for President in 1872. The Knights of Saint Crispin was organized among the shoe¬

makers in 1867 as a secret society and became an influential order, but it played with politics and died soon after 1873. For 10 years national organizations floundered in the mire of secrecy and politics.

But national unions of particular workers were now found to be insufficient. Unions of skilled workers, based on the wage-fund theory, gradually gave place to industrial unions, which arose from a class consciousness and included all skilled and unskilled workers in a particular industry, though the process has never been completed. It was found that strikes conducted by such unions were more effective. The next extension was the sympathetic strike, a good example of which is found in the trouble of 1894. The most radical extension of this move¬

ment appears in the Industrial Workers of the World (q.v.).

The Knights of Labor (q.v.), which was organized at Philadelphia in 1869 as a secret order of garment workers, was gradually trans¬

formed into an order for all workers. Its pro¬

gram of reform was extensive, demanding the referendum, bureaus of labor, the reservation of land for actual occupiers, prohibition of child labor, income and inheritance taxes, postal sav¬

ings banks, government ownership of railways, the 8-hour day and arbitration of labor diffi¬

culties. The membership grew somewhat slowly until it reached 100,000 in 1885. This was a period of great unrest and the membership sud¬

denly leaped to 600,000. It relied more upon co-operation than upon strikes to realize its in¬

dustrial aims. But these men had come in, not to discuss patiently, adopt calmly and execute bravely plans for the amelioration of all work¬

ers. They wanted concrete results for the mem¬

bership at once and turned to strikes and pol¬

itics. The result was a rapid decline.

The Knights was a highly centralized order and had many disputes with local orders. The American Federation of Labor (q.v.) was founded in 1881 on the trade union basis and the federal idea of government. The former was a retrograde idea, but it, combined with the fed¬

eral idea in government, was more in harmony with the aspirations and ideals of the members and the order continued to grow. The in¬

creasing number of Socialists sought to control it, but failed, and many withdrew (since 1900) to join more socialistic orders, such as the Trade and Labor Alliance and The American Labor Union, tin forming the Industrial Work¬

ers of the World. In spite of this the strength of the Federation has hardly been impaired.

Its largest affiliated order, the Mine Workers'

Union, is of the industrial type.

The large number of women entering indus¬

try since the Civil War has led to the forma¬

tion of many unions of women workers. The National Women's Trade Union League was organized in 1903. Its platform is: Organiza¬

tion of all workers into trade unions, equal pay for equal work, an 8-hour day, a minimum wage scale and full citizenship for women. This order and its local units are really auxiliaries of the Federation. In recent years the school teachers have been entering the Federation, and in 1916 the actors came over. The membership to-day is over 2,000,000.

The pen has developed into a powerful ad¬

junct of the unions. There are many papers devoted entirely to the cause of labor, the most influential of which is the American Fcdera-

tionist. In addition many newspapers have col¬

umns or pages devoted to labor news.

The fundamental aims of the unions have al¬

ready been stated in giving their platforms.

Better wages and a shorter working day have been in the foreground. As already indicated, several unions favored co-operation and op¬

posed strikes. A good many experiments were made in co-operation and a few of the later ones have succeeded. But neither co-operation

nor profit-sharing, which was introduced by the. operators, has displaced the wage system, and for the improvement of wages the strike or threat to strike is still common. From 1881

to 1905 there were 36,757 strikes involving 8,703,824 workers. Fully 35 per cent of these strikes called directly for an increase of wages and 10 per cent were to oppose a reduction, while nearly

5 per cent called for a reduction in hours.

The question of hours has been a vital one.

The 12-hour day was still common in some of the large scale industries and to this should be added the 7-day week, especially in those in¬

dustries such as steel which depended upon the continuous process. The humanitarians again entered the field and, basing their demand upon social welfare rather than upon simply the wel¬

fare of 'the workers directly affected, they and the workers together succeeded in getting the 8-hour day enacted into law in certain indus¬

tries. This marks the beginning of the indus¬

trial hygiene period. On the same basis con¬

siderable limitations have been put upon woman and child labor (q.v.).

Since the Civil War strikes have been marked by increasing violence. The great rail¬

road strikes of 1877 and 1894, the strike in the steel mills at Homestead in 1892, in the textile mills at Lawrence in 1912 and in various coal mines culminating in 'the troubles in Colorado and Arkansas in 1914 are good examples of this.

The legal position of the strikers has ex¬

perienced little change. The New York law of 1820 legalizing the strike added little to the rights already held, that of merely striking. In 1894 Eugene V. Debs was acquitted of a charge of conspiracy, but convicted and sent to prison for violating an injunction forbidding the American Railway Union and ((all other persons whatsoever® to interfere with certain trains carrying United States mail and inter¬

state commerce. The use of the injunction since the

Civil War has been of far greater consequence than the fines for conspiracy be¬

fore the war,, even with the slight limitations imposed upon its use in recent years. Such prosecutions as that of Mr. Debs and of the Federation officers (Messrs. Gompers, Mitchell and Morrison) for violating an injunction against the publication of unfair lists and the awarding of damages against the Danbury hatters for boycotting under the Sherman Anti-

Trust Act have virtually nullified picketing and the boycott (q.v.), two of labor's effective weapons, though three States nominally legalize the boycott and a recent decision has upheld picketing.

Under the circumstances it is no wonder that the unions have expended considerable energy in fighting for recognition. Iin the pe¬

riod 1881-1905, 18 per cent of the strikes, or nearly one-third of those ordered by unions, were for recognition of the union and another 7 per cent really involved this question. Many employers have agreed to recognize and deal with unions; a few have agreed to the closed shop ; some, on the other hand, keep their shops open to non-union labor and closed ^to ^unio^n labor. In large scale production unionism is weak, practically non-existent in> some cases.

In 1908 the Federation began active participa¬

tion in politics in furtherance of its aims. It does not have official candidates, but works for those in sympathy with the cause and against those known to be hostile. Among the demands presented to the national conventions of the political parties in 1916 was one for the legal¬

ization of unions.

A general recognition of labor unions would make employers' unions almost necessary. Such unions exist and they seek to work with the labor unions.

There is also another employers'

union which is bitterly hostile to labor unions and uses every means to break them up. Unions of this type began in the sixties. Refusal to employ union men, blacklists and lockouts are the weapons used.

One of the most significant things in all the history of the labor movement is the compara¬

tively recent entrance of a third party to the trouble, the public. Quarrels and disputes are vexatious to the disinterested where they have to listen to them. They disturb repose. But 'with the modern social organization such as it is, disputes long protracted may cause incon¬

venience, even when they do not terminate in violence and war. The movement for concilia¬

tion and arbitration to end such disputes has gained considerable headway in the last quarter century. The United States and most of the several States have provided official machinery for this work. A few notable cases of success¬

ful operation could be cited, but the general attitude of both labor and capital toward this movement is hostile. Compulsory arbitration would have to be adopted to cover anything like all the cases. This, says capital, is taking property without due process of law. This, says labor, with the enforcement of the award would mean compulsory labor or slavery. But the public is beginning to ask whether the right of operators and miners to keep a mine closed while they dispute over the terms of 'operating it, as in 1902, or to close a city by tying up the railways, as in 1894, is any more sacred than the right of the public to keep from freezing and starving. A negative answer may mean taking property without due process of law, but it does not mean slavery. It simply means that it is to the welfare of society that the mines be kept open and the railroads in opera¬

tion. It may mean that the present capitaliza¬

tion of industry will be displaced, not by in¬

dustrial democracy, but by the democratization of industry. See Labor Legislation; Profit-

Sharing; Labor Unions; Wages.

Bibliography. — Adams and Sumner, (Labor Problems* (New York 1915) ; Commons, J. R., and others, documentary History of Ameri¬

can Industrial Society* (10 vols., Cleveland 1910) ; Carlton, F. T., (History and Problems of Organized Labor) (New York 1911) ; Ely, Richard T., (The Labor Movement in America) (new ed., ib., 1905) ; Groat, George G., (An Introduction to the Study of Organized Labor in America1* (ib. 1916) ; Schaffner,

ing J (Madison 1907).

David Y. Thomas,

Professor of History and Political Science, University of Arkansas.

LABOR ORGANIZATIONS, Foreign.

Modern trade unionism in Europe has its origin in the industrial revolution, which began in England during the latter part of the 18th cen¬

tury and spread during the next century over 606

the greater part of the Continent. The de¬

velopment of the factory system, the extension of markets and the increase in competition be¬

tween employers led to the breakdown of the mediaeval guild system and resulted in an open breach between employers and employees. The latter soon began to organize for protection and improvement of conditions. As a result we have the

modern trade union, which after many difficulties, partly with the aid of strikes and partly through politics, has been able to assert itself, and now plays an important part in all of the principal manufacturing countries of Europe.

Great Britain. — In Great Britain modern trade unions began to appear during the 18th century, earlier than in any other country in the world. Such unions had to disguise them¬

selves as friendly societies, since combinations in restraint of trade were contrary to the com¬

mon law and thus illegal. The persecution of'

trade unions increased during the Napoleonic Wars, but in 1824 all Combination Laws pre¬

viously passed were repealed and freedom of association granted. In 1825, however, part of the laws against combinations were re-enacted and persecutions of unions renewed.

From 1825 to 1850 English trade unionism was revolutionary and political in character.

The falling of prices and the lack of prosperity gave rise in 1832 to the Grand National Con¬

solidated Trade Union, established by Robert Owen. This union included many workmen, skilled as well as unskilled, and was co-opera¬

tive and revolutionary. This movement was followed by the Chartist movement, which aimed at the attainment of economic equality through political equality or universal suffrage.

It went to pieces in the latter forties with the return of prosperity and its place was taken by the modern trade union of England.

The English labor unions established after 1850 differed from their predecessors in that they took in only skilled labor and placed little confidence

in political action. They believed in and tried to establish collective bargaining, lim¬

itation of apprenticeship and big reserve funds for strikes. In 1867 labor was given the right of suffrage and in 1875 the Conspiracy Laws were greatly limited. Between 1858 and 1867

many federations of branches in all principal towns formed under the name of trade coun¬

cils. The trades councils united into a trade union council in 1868.

Beginning with 1880 English unionism again turned its eyes toward politics. Radical leaders like Mann and Burns became dissatisfied with the conservatism of the unions and turned to organize the unskilled workmen, a move which culminated in the famous dockers' strike of 1889. In 1883 they launched the Independent Labor party upon a socialistic platform, with James Keir Hardie as the most prominent leader. For a time the trade unions continued aloof until they were forced into the new move¬

ment by the Taff Vale decision in 1901 which threatened their very existence. Already, in 1899 the Trades Union Congress, which since the sixties had kept watch over the parliamen¬

tary interests of the trade union, endorsed in¬

dependent political action and in 1900 the ((Labour Representation Committee" was organ¬

ized, containing representatives from the trade unions and the several Socialist organizations, including the Independent Labor party. The name was later changed to ((Labor Party."

In 1906 the new party scored its first great success, electing 29 members of Parliament and 11 others unaffiliated with the party but repre¬

senting the miners. In the same year Parlia¬

ment passed the Trade Union and Trade Dis¬

pute Act, which did away with the effects of the Taff Vale decision. The Labor party con¬

tinued to influence British legislation through¬

out the succeeding years, aligning itself on the side of the Liberal government. The Great War caused British labor to give up many of its cherished privileges in order to hasten war production. In 1917 the Labor party modified its constitution to take in individuals, brain workers and unorganized individuals, and worked out a comprehensive reconstruction program. Since 1915 the Labor party was represented in the Cabinet.

In 1915 the trade unions affiliated with the Trades Union Congress numbered 190 with a membership of 2,66 7,357. The General Federa¬

tion of Trade Unions, founded in 1899, is not a legislative but an economic organization, akin to the American Federation of Labor. It has a membership of about 800,000. The total number of trade unions, including those un¬

affiliated with any general organization at the end of 1915, was 1,123 with a total membership of

3,960,000.

Germany. — In Germany the medieval guild system came to an end about 1880 and its place was taken by modern guilds, made up mainly of employees and encouraged by the government. Modern trade unions were started in 1865 and at present are of three kinds, each being in opposition to the others : the ((free”

or Social Democratic unions, the Hirsch-

Duncker or Liberal unions, and the Christian unions. Each of these groups has its separate federal organization.

The Social Democratic unions started in 1865 and grew very rapidly in membership till now they make up the largest and most power¬

ful organization in the German labor movement.

Their rapid growth started in 1868, when the workingmen succeeded in getting freedom, of association. From 1878 to 1890 the unions were persecuted together with the Socialists and many unions were dissolved. The majority of them, however, were able to survive and pros¬

per. All the Socialist unions are closely united in the General Commission, which is allied with the Social Democratic party. The Socialist unions are characterized by a centralized and efficient organization. In 1914 they numbered 2,548,763 members, including 223,676 women, and divided into 47 unions. They are very strong among the metal and mineral workers, in the building trades, and among the transport and factory workers. During the war the Socialist unions have lost more than 60 per cent of their membership. The Hirsch-Duncker or Liberal unions were started in 1868 in order to unite the workmen who supported the Radical Parlia¬

mentary . party. They have since lost their political interests and are now mainly economic in character. They recognize the equal rights and

duties of capital and labor and are non-

socialistic. Their members are mostly skilled workmen, and in 1912 they numbered 109,225, LABOR ORGANIZATIONS

Socialists being: barred from membership. The Christian or Catholic unions were started in 1894 as a result of the anti-religious bias of the Socialist unions. They are most numerous in the Catholic industrial and mining districts of Westphalia and the Rhine Valley. They repudiate Socialism and class conflict and sup¬

port only the Centre, or Catholic Party. They are less aggressive than the other unions. In 1912 they had a membership of 344,687, which is gradually decreasing.

Besides these three principal classes of unions there are several minor groups. There are some independent unions, yellow unions pro¬

moted and subsidized by employers, and some Polish unions.

France. — Modern trade unionism in France was greatly retarded by the Law of 1791, which prohibited labor combinations. The old guild system was thereby overthrown and no organ¬

izations were allowed to take its place. Na¬

poleon I tried to form compulsory organiza¬

tions of employers and employees, but failed.

Before 1884, however, many unions sprang up secretly all over France. Most of these unions were friendly societies or under such a disguise.

The revolutionary activities during the middle part of the century gave great momentum to the labor movement and workingmen began to demand strongly the

right of combination.

In 1868 trade unions began to be tolerated, though they were still illegal. During the seventies numerous unions were formed and several labor congresses held in Paris. All during this time unionism was closely con¬

nected with the various factions of the Social¬

istic party.

In 1884 the Syndicat law was passed, legal-

■ izing trade unions and strikes. Since then French trade unionism developed rapidly. In 1886 a National Federation of Syndicates or Unions was formed. In 1887 the first bourse du travail, or labor exchange, formed by workers opposed to the Federation, was opened in Paris. The latter takes in workers of all trades. It spread all over France and in 1892

a National Association of Labor Exchanges was formed. In 1902 the latter united with the General Confederation of Labor, which in 1895 took the place of the National Federation.

The General Confederation is revolutionary in spirit and believes in direct action, such as general strikes, boycotts and sabotage rather than in political action. It consists of national federations of trades and industries, national unions, single local unions and labor exchanges.

It is characterized by a lack of centralized au¬

thority, discipline and stability. Owing to its revolutionary spirit France has had many strikes. In 1912 the Confederation had a mem¬

bership of 600,000 workingmen.

Italy. — In Italy trade unionism is closely connected with Socialism and its growth is very recent. The first important Italian labor organizations were formed in 1861 and 1871

at Rome, under the influence of Mazzini, and were mostly co-operative. At present the Italian labor unions are of several kinds. The General Italian Federation of Labor is made up of Socialist unions and was formed in 1906. It is the most important organization and in 1912 had a membership of 400,000. The «Unione Sindicale® is syndicalistic and believes in direct action. It has a membership of 100,000. The Catholic unions include mostly women and are as yet not united. They also have a membership of about 100,000. The agricultural laborers form a National Federa¬

tion of Rural Workers and have more than 150,000 members.

Austro-Hungary. — In 1859 Austria tried to compel by law employers and employees to unite into trade guilds, but failed. In 1869 the work¬

ingmen of Vienna won through demonstrations the right of combination. Since then trade unions came into existence, but owing to racial differentiation and antagonism their growth was rather slow. Most of the trade unions are found in Vienna and the industrial districts of Bohemia and Lower Austria. The General Commission of Austrian Trade Unions had in 1912 a membership of 428,000, 50,000 of whom were women. To this organization also be¬

longed 70,000 Bohemians, some Poles, Italians and Slavs. In addition there are two inde¬

pendent movements, one among Bohemians and one among Germans, each having a membership of 85,000. The Catholic unions had 82,000

members, 45,000 belonging to the General Com¬

mission. During the war Austrian unions have lost more than 60 per cent of their member¬

ship.

Hungary has a separate trade union move¬

ment, whose centre is Budapest. The National Centre had in 1912 a membership of 112,000.

Besides that we have the Christian unions and separate movements in Bosnia, Herzegovina and Croatia-Slavonia. At the beginning of the war Hungarian trade unions lost 50 per cent of their membership, but since 1916 thousands of miners, iron and metal workers and govern¬

ment employees have joined the trade union movement.

Russia. — Under the old regime the devel¬

opment of Russian trade unions was greatly hampered by the autocratic government. Labor began to organize in the later seventies under the leadership of the intellectuals and the Social Democrats. The unions were suppressed and continued to revive under different names only to be suppressed again. Numerous strikes dur¬

ing the middle of the nineties taught labor how to organize secretly under the banners of the Social Democratic party. Many strikes followed and several general strikes took place during the Revolution of 1905-06. The Constitution granted at the end of the Revolution gave labor the right of association and of striking. The latter was a dead letter and unions continued to be persecuted up till the Revolution of 1917.

While the larger part of the labor movement was absorbed in the Socialist movement, there were numerous non-Socialist labor organiza¬

tions, which were benefit or friendly societies.

Some of the latter kind were supported by the government. After the Revolution of 1917

unionism spread like wildfire. The Bolshevist Revolution in November 1917 resulted in the government passing over into the hands of the workingmen.

Belgium and Holland. — The abolition of guilds in Belgium occurred in 1795 and since then trade unionism gradually developed out of trade benefit societies. In 1879 Belgian work¬

men started co-operation and, in 1885, a Social¬

ist workingmen's party was launched. The 608

latter conducted general strikes in 1893, 1902

and 1913. The unions affiliated with the Labor party have a membership of 116,000. The Catholic unions have 82,761 members. In Holland the trade union movement has been weakened by religious differences and legal repression. The Federation of Trade Unions of the Netherlands in 1912 had 61,535 members, the Catholic unions 25,000 and the Protestant unions some 7,000. There were 50,000 more union men belonging to other organizations.

Scandinavia. — The trade union movements in Sweden, Denmark and Norway are closely allied. In Sweden trade unions began to form in 1880 and in 1890 a national organization was formed, which in 1912 had a membership of 85,000. The latter was greatly weakened by strikes and lockout during 1909, when it lost more than half of its membership. The syndicalist unions have some 35,000 workmen.

In Denmark trade guilds came to an end in 1857 and trade unions began to appear in the early seventies, uniting into a General Federa¬

tion in 1898. It had in 1912 a membership of more than 100,000 and was allied with the Socialists. There are also some Christian and some Syndicate unions. The General Federa¬

tion of Norway has a membership of 64,000.

In Sweden and Denmark trade unions greatly increased their membership during the war.

Switzerland. — Swiss unions resemble closely the German trade unions. The National Fed¬

eration in 1912 had 86,000 members, the Syn¬

dicalists 7,000 and the Catholics 4,000. Besides there were some 45,000 organized engineers and railwaymen. Since 1886 all the unions are united into a Worker's League, which meets every three years in a congress and elects a labor sectariat to represent the unions in the government. The Swiss unions are very con¬

servative.

Australia and New Zealand. — Trade

unionism in Australia and New Zealand is very common and extends in almost every in¬

dustry. In 1916 Australia had 705 unions with 546,556 members. Extensive strikes took place in Australia in 1890 in which the unions lost.

The latter organized a labor party and entered politics. By 1915 the Labor party was in control of the government of Australia and of the governments of all the states of the com¬

monwealth except Victoria. New Zealand in 1912 had 322 unions with 60,000 members. The strike of 1917, in which the unions were beaten, weakened the unions considerably.

Other Countries. — The National Federa¬

tion of Trade Unions of Spain has a member¬

ship of 100,000 and is growing rapidly. Legal repression hampers its growth and railway strikes are still prohibited. South Africa has 100,000 union men, mostly miners, engineers, railwaymen and building workers. Canadian trade unions are closely allied with the Ameri¬

can unions and the American Federation of Labor.

There are also some independent unions.

The former has 86,542 members, and the latter 13,717. There are also trade union movements in Finland and the Balkans.

Bibliography. — Cole, G. D. H., (The World of Labour: a Discussion of the Present and Future of Trade Unionism* (London 1915) ; Howell, G., (Labour Legislation, Labour Move¬

ments, and Labour Leaders* (London 1905, 2

vols.) ; (Labor Year Book) (published in London) ; Levine, L.,

ism > (New York 1912) ; Ogg. F. A., (Economic Development of Modern Europe) (New York 1917) ; Orth, S. P., Socialism and Democracy in Europe) (New York 1913) ; Webb, S. and B., (History of Trade Unionism* (London 1911).

Selig Perlman,

Department of Political Economy , University of W is cons in.

LABOR PARTY, The, a British political

party made up of trade unions, trades councils, Socialist societies and labor associations. The name was adopted by the Labor Representation Committee in 1906 and its purpose was de¬

clared to be the maintaining of a parliamentary Labor party acting independently as to policy and workings. In order to secure the election of truly representative candidates, these candi¬

dates must accept their constitution and fol¬

low the decisions of the groups. An affiliated society has to become financially responsible for its candidates selected in conference in the constituency. The Labor party business is carried on by an executive committee of 13

members, nine representing trades unions, one trade councils and three Socialist societies.

Funds are raised by assessing affiliated societies at two pence per member per annum. The candi¬

dates must appear before their constituents under the title of Labor candidates only.

While, in 1910, the Labor party had but 42

representatives in the House of Commons with its 670 members it had even then proved itself a powerful factor in legislation. In 1916 the voting power of the Labor party was approxi¬

mately 1,500,000 and became, politically, the central Socialist body for Great Britain, with 37 members in Parliament and its ex-chairman, J. Ramsay MacDonald, M.P. The Independent Labor party is an off-shoot of the Labor party and was established in 1893 but actively sup¬

ports members of the parent concern at times.

Dissenting from the majority on a vote at the beginning of the war on absolute co-operation during the war, Chairman MacDonald resigned and Arthur Henderson succeeded and on enter¬

ing the Coalition Cabinet (1915) the chair¬

manship devolved on John Hodge. W. Brace, M.P. and G. H. Roberts, M.P., former offi¬

cials of the Labor party were also taken into the ministry.

LABOR TURNOVER. Definition.— The

first definition of the term (

that has been presented with any considerable degree of authority was offered by the Bureau of Labor Statistics of the United States Depart¬

ment of Labor, in 1918. Prior to this time there had

been so great a diversity of opinion upon this subject that it was difficult to find two au¬

thorities who agreed in every particular. At the National Employment Managers' Confer¬

ence, held at Rochester, N. Y., in 1918, a special committee was appointed to define the term and fix a method of computing the percentages of turnover, but the original report of the com¬

mittee was not favorably received, its rejection being due to the fact that it was based on net hirings instead of separations.

Adopting the conclusions that were reached by a majority of the delegates to the Roches¬

ter conference, the Bureau of Labor Statistics LABOR TURNOVER

prepared a report which has since been very generally accepted as the standard definition and method of computation in the matter of labor turnover. This report defines labor turn¬

over as follows :

((Labor turnover for any period consists of the number of separations from service during that period. Separations include all quits, dis¬

charges and lay-offs for any reason whatso¬

ever."

Computing Turnover. — The bureau's report was also the first official attempt to establish a standard method by which the percentages of labor turnover might be computed. This follows :

((The percentage of labor turnover for any period considered is the ratio of the total num¬

ber of separations during the period 'to the average

number of employees on the force report during that period. The force report gives the number of men actually working each day as shown by the attendance records.

((It is recommended that the percentage of turnover be computed for each week. All turn¬

over percentages for a week or for any other period should always be reduced to a yearly basis.

<(To compute the percentage of labor turn¬

over for any period find the total separations for the period considered and divide by the average of the number actually working each day throughout that period. Then multiply by the proper factor to reduce to a yearly basis.

(

age of labor turnover for one week : .

(

<(Daily force report (workers actually on the job) : Monday, 1,020; Tuesday, 1,065; Wednes¬

day, 1,070; Thursday, 1,035; Friday, 1,040; Saturday, 990. Average for week, 1,037.

<(Percentage of labor turnover :

300

- X 52= 1,505 per cent.

1,037

^Method of computing percentage of labor turnover for one year (assuming that records of daily attendance are averaged for each month) :

® Total number of separations during the year, 5,020.

((Average number working each month as determined

from the force reports or daily at¬

tendance records: May, 2,040; June, 2,100; July, 2,000; August, 1,980; September, 2,200; October, 2,220; November, 2,280; December, 2,240; January, 2,250; February, 2,170; March, 2,230; April, 2,400. Average for year, 2,176.

Percentage of labor turnover:

5,020

- = 231 per cent.

2,176

«In case the number employed by a plant or a department of a plant decreases because it is the deliberate policy of the plant, manage¬

ment to reduce permanently its working force, this fact should be explicitly stated.”

Cost of Turnover — The large significance of employment matters in their relation to the cost of production is clearly demonstrated bv the fact that the best authorities in industrial efficiency, both in the government service and in private industry, are devoting so much time vol. 16 — 39

to the study of these problems. They have long since reached the conclusion that the shift¬

ing working force represents one of the most enormous sources of wastage with which the manufacturer has to contend, as well as one of the greatest avenues of personal loss for the individual worker, and they assert that time and money are not wasted when these expendi¬

tures result in a reduction of the labor turn¬

over.

There are, of course, no methods sufficiently comprehensive to apply in computing the cost of the

labor turnover in all plants, because, of necessity, this expense, depending upon the cost of employing and training skilled workers, must differ, not only in each industry, but to some degree in each factory as well. Magnus W.

Alexander, who has made a most thorough study of this question, estimated that the 12

metal working factories of which he made a survey lost $831,000 in a single year in the effort to maintain a normal force of workers.

During this period 42,571 persons had been em¬

ployed and 37,274 employees had quit the organizations for one reason or another, making a net increase in the working force of only 6,697.

While few reliable investigations have been made regarding the actual cost of changing help in industrial plants, it is generally agreed that the estimate of $40 per operative is ex¬

tremely conservative. As Mr. Alexander says ((Hiring and Firing^: ((While one manager estimated the cost of hiring and breaking in an employee at $30, the estimates of all others ranged from $50 to $200 per employee. The great difference in these estimates is.no doubt due to the diversity of the industries repre¬

sented by these managers. Most estimates ranged between $50 and $100.

In view of Mr. Alexander's estimate that it costs $73.50 to engage and break in a new semi¬

skilled operative and $8.50 to make an un¬

skilled laborer fit into this part of the organi¬

zation, it would seem that the lower estimate of $40 might safely be adopted as a minimum cost of a new worker, yet, even at this figure, the labor turnover becomes an item of expense that is worthy of the

most serious considera¬

tion, the loss from this source undoubtedly be¬

ing greater than that due to strikes.

For example, it is generally admitted that a labor turnover of 100 per cent should provide for every contingency, including all weaknesses in the labor situation and the inefficiency of the employment force. This estimate is based upon the assumption that about 1 per cent of the employees will die annually; that from 4 to 5

per cent will have to be replaced because of prolonged absence due to illness or other un¬

avoidable causes; that about 5 per cent will be discharged for justifiable reasons; that about 8 per cent will leave with legitimate excuses, and that another 8 per cent will be released on account of natural fluctuation of production.

It is also admitted, of course, that no employ¬

ment department can be operated on a 100 per cent efficiency basis, but, assuming these esti¬

mates of the percentage of unavoidable changes to be reasonably correct, the difference between them and the 100 per cent turnover should make ample provisions for all conditions that might arise, including human frailties and all normal changes in the labor situation.

As a matter of fact, however, a 100 per cent labor turnover is an exception and not the rule, for in plants where no special efforts have been made to stabilize the working force it is not uncommon to find the turnover ranging from 200 to even 700 per cent, and this under con¬

ditions that are not regarded as abnormal. For example, the United States Bureau of Labor Statistics, in a study of the turnover of 12 com¬

panies in the San Francisco Bay region, for year ending 1 June. 1918, found it had been necessary to hire 32,489 persons to keep 14,083

jobs filled. This means an annual turnover percentage of 224 for the aggregate labor forces of these concerns. To compute the cost of this changing force, estimating the expense at the conservative figure of $40 per man, indicates how stupendous must be the economic waste that is traceable directly to this source, an amount running into the tens of thousands — if not hundreds of thousands —for the average employer every year.

Computing Turnover Cost. — The difficul¬

ties in computing the cost of labor turnover are many, as this item of expense is one that depends largely upon the character of the in¬

dustry and individual plant conditions. Thus, in plants where highly skilled workers are re¬

quired an operative is not easily replaced and the cost of finding a successor for such a work¬

man is much greater than that of employing an unskilled or even a semi-skilled laborer.

Other factors besides those of skill and ex¬

perience also have a bearing upon this question, for the cost of breaking in new operatives must necessarily depend upon such considerations as the value of the tools or machinery with which they work, or the value of the materials which they must handle.

In spite of all these difficulties, however, there are certain basic principles that may be followed in making an analysis of the cost of employing workers. These include (1) the cost of hiring; (2) the cost

of instruction; (3) the loss through wear and tear on tools and ma¬

chinery used by unskilled hands ; (4) the loss through excessive waste made by inexperienced hands; (5) the loss through reduced produc¬

tion, including the excess plant equipment re¬

quired to offset the smaller production made by inexperienced operatives.

In detail these items of expense may be summarized as follows :

(1) In figuring the cost of hiring include (a) the salaries of employment department officials and clerical help; (b) the cost of ad¬

vertising and printing; (c) the cost of physical examinations; (d) all such miscellaneous ex¬

penses as fees to labor bureaus, cost of badges, etc. In regard to the item of employment de¬

partment salaries, Boyd Fisher (in determin¬

ing Cost of Labor Turnover^ calls attention to the fact that while other costs of hiring may be spread over the total number hired, the same rule does not apply in the case of em¬

ployment department expense. (

roll. The ratio of remainder of names to the total on

ber of men hired.®

(2) A computation of the cost of instruc¬

tion should include: (a) the time of foremen spent in the instruction of new employees; (b) the time of workmen devoted to breaking in new help; (c) the time of inspectors or investi¬

gators required in handling work of new em¬

ployees ; or, if segregated schools are in opera¬

tion in the plant: (a) the salary of the di¬

rector of the department schools; (b) the wages of the instructors; (c) the cost of the equip¬

ment devoted to school purposes, including all such items as interest on capital invested, de¬

preciation, power, repairs, etc.

(3) In finding the cost of wear and tear include (a) the excess time spent by mainte¬

nance department on machines used by learn¬

ers and new operatives; (b) cost of excess materials used for repairing these machines; (c) excess breakage and wear on tools, etc., and, when possible, (d) the cost for premature depreciation of machinery.

(4) The loss through spoiled work and other waste may be found by comparing the total scrap and waste made by new men with that made by old men. By dividing the differ¬

ence by the number of men in the group, the total per new employee will be obtained.

(5) The loss due to reduced production de¬

pends, of course, upon the value of the article produced and the skill and experience neces¬

sary for its production, but there are various ways iin which the cost can be estimated with approximate correctness. One of these is pre¬

sented by Mr. Fisher in his study of turnover costs. He says: (((a) Select a number of ma¬

chines worked by new men and an equal num¬

ber of like machines worked by men over a year in service; (b) record the production of each group

until the total of new men reaches the total of old men; (c) time required to reach this may be taken as average learning time; (d) total difference of production during this time may be spread over the number observed and the average taken as the loss for the average man hired; (e) for men dropping out of the group while under consideration sub¬

stitute other men with approximately equal pro¬

duction and equal length of service.® The ex¬

cess plant cost and the loss due to reduced pro¬

duction should be figured separately and then added together, because, as Mr. Fisher points out, (

quired is 20 per cent.®

Methods of Reducing the Turnover. — In view of the generally admitted fact that the labor turnover is one of the greatest sources of waste with which industry has to contend, it is not surprising that so many employers of labor should have adopted methods that tend to check the shifting tendency in the working force, especially when it has been shown so LABOR TURNOVER

611

clearly that the desired results may be attained • by these means. Of course, this does not mean that the inauguration of the various ((welfare”

schemes in lieu of a fair wage and otherwise decent working conditions will be permanently effective as a remedy for industrial unrest, for nothing could be further from the truth. The first step in stabilizing employment is to make certain that the wages paid will compare favor¬

ably with the wage prevailing in competitive plants and that the hours of labor and shop conditions are the best that can be offered.

Once these foundation principles have been firmly

established, however, the work of creat¬

ing a loyal, efficient and stable force of workers can be undertaken with confidence.

In accomplishing these results it is not necessary that all, or even a greater part, of the suggestions embodied in this article should be adopted. The ideas suggested represent many of the plans that have been put into practice by a large number of different employ¬

ers in various sections of the country and all tend toward the same end by giving assurance to the worker that it is the purpose of the em¬

ployer to see that he receives a square deal.

In other words, so-called <(welfare work" is successful only when it assumes a logical place in the program of a <(square deal shop."

The first step in the reduction of the labor turnover is the establishment of a properly-

equipped employment department under the di¬

rection of a high grade man who must be given all necessary authority and one of his first duties will be to ascertain, by the study of care¬

fully compiled statistics, the sources of the ex¬

cessive turnover and, as far as possible, its causes.

These facts ascertained, .as they will be by an efficient employment manager, ways will be found to remedy existing defects in the organ¬

ization. By hiring men in accordance with property prepared <(job specifications" he will greatly reduce the danger of assigning new employees to jobs that they are not fitted to perform; by seeing that they are given ade¬

quate instructions he paves the way for more speedy efficiency in service, which means a higher earning capacity for the worker as well as greater and better production for the firm, while, by standing as an intermediary between the employees and the employer he is in a posi¬

tion to receive the grievances of the workers, to see that any injustices are made right, errors are adjusted or misunderstandings explained to the satisfaction of those who may feel that they have cause for complaint. A plant which provides steady work at good wages for men who have been properly hired and who have the assurance that they will not be discharged hastily or unjustly, has put into effect the fundamental remedies for a labor turnover.

The supplementary remedies that have been adopted by those who have interested them¬

selves in the effort to make employment con¬

genial for the employed include a wide variety of activities. In many plants a number of these ideas have been inaugurated and, so far as the writer's knowledge extends, in no case where a well-defined program of such activities has been adopted has the plan ever been dropped. Un¬

doubtedly, as Boyd Fisher says, it is hard to make an industrial program succeed promptly owing to the difficulty that a plant has in estab¬

lishing its character with its workmen. . . .

Workmen have been disappointed too often to be anything but skeptical. They have tested too many mere paper plans for their weliare to place any easy reliance upon new ones. But when a management, by undeviating honesty, determination and good spirit, carries through during a term of years a program of em¬

ployees' betterment, it cannot fail to win their confidence and friendship" — two factors which, he

might have added, constitute one of the strongest incentives to loyal and efficient service.

These plans include :

Health, Sanitation and Safety— The pro¬

vision of standardized sanitary working condi¬

tions, with sufficient light, proper temperature and adequate ventilation, properly maintained toilets and well-equipped washing and dressing-

rooms. While many plants now provide for a physical examination of applicants for employ¬

ment, others who do not make this requirement have established an emergency, or first-aid, hos¬

pital where quick and efficient treatment can be given to those who meet with accidents or who are taken ill. In some instances regular physi¬

cians are kept in attendance, in others graduate nurses are in charge of the emergency work, and the nurses frequently perform equally im¬

portant functions as home visitors or by acting as friends and advisers to the female workers.

There are plants in this country where a dentist and an optician are regular members of the physical staff and in a few cases the medical supervision includes attendance upon the work¬

ers even when they are confined to their homes.

Where there is a physician on the staff he is almost invariably a member of the safety organ¬

ization and is intrusted with the duty of seeing that the plans of the management regarding the enforcement of all safety regulations and the adoption of standardized equipment for the pro¬

tection of the operatives are effectively carried out. . , ,

Lunchroom. — The maintenance of lunch¬

rooms where properly selected and carefully prepared foods are served, practically at cost price, is common. In some plants three regular meals are served daily that workers who do not live at home may have an opportunity to secure the right kinds of food at reasonable prices ; in the majority of plants, however, the service is confined to one meal — luncheon or dinner— for each shift of operatives.

Co-operative Stores — For the advantage of those who are housekeepers many plants maintain co-operative stores, thus using the purchasing power of the company to buy com¬

modities cheaply -and dispose of them to the workers with little or no profit. Some con¬

cerns have .developed this plan to so high a degree that they supply their employees with bakery products baked in their own ovens, and vegetables and dairy products from their own farms, as well as the commodities which are ordinarily found in such stores.

Promotion of Thrift. — Many of the activ¬

ities that have been adopted along betterment lines are designed to promote thrift and a more proper use of the income on the part of the employees. To accomplish this result, different avenues of approach are required. These in¬

clude (a) the promotion of a mutual aid asso¬

ciation, providing sickness, death and other benefits for the employees; (b) the establish¬

ment of a home building association; (c) the 612

maintenance of banking facilities (either in connection with or independent of a local bank), through which employees may deposit and with¬

draw their savings and transact other banking business without loss of time or danger of loss through fraud or error; (d) payment at dis¬

count of the debts of overburdened employees, the money to be repaid in small weekly instal¬

ments; (e) furnishing free legal aid in safe¬

guarding real estate transactions of the work¬

ers, in preventing their exploitation by unprin¬

cipled professional men and tradesmen and in affording them advice and assistance in case of other legal troubles; (f) discourage the use of alcoholic drinks and other habits that lead to extravagance; (g) encourage the employees to purchase stock in the company as an avenue for the investment of their savings, thus giving them a personal interest in the prosperity of the plant.

Educational. — The establishment of classes in English for foreign-born workers, supple¬

mented by instructions in citizenship. In some plants the work of instruction is carried still further, classes being formed for those who desire to pursue the studies that will fit them for higher positions in the employ of the com¬

pany, while others encourage the employees to improve their education by reimbursing them for the money they may spend in courses of study when completed.

Housing. — In many cases companies have found it advantageous to inaugurate housing developments, thus enabling the workers to live under decent conditions in a proper environ¬

ment, either by the payment of rent or on an instalment-purchase basis. In several instances thriving communities have been established, with all the attractions of small city life, and under conditions that are conducive to health, contentment

and efficiency.

Developing a Plant Spirit. — Many of the activities adopted by different plants are par¬ ticularly designed to develop a spirit of friend¬ ship and loyalty on the part of the employee. Among these are (a) the plant paper, a period¬ ical which details the gossip and news happen¬ ings in the plant and which has almost in¬ variably proved a source of great mutual en¬ joyment and profit; (b) the promotion of social functions, such as picnics during the summer months and entertainments, amateur theatricals, minstrel shows, amateur circuses, lectures and dances in the winter; in some plants foremen's meetings or dinners are held ; in others, depart¬ mental gatherings for various social purposes ; (c) the encouragement of any form of self- directed organization on the part of the em¬ ployees so long as they are not contrary to the interests of the plant ; such organizations in¬ cluding singing societies, bands, drum corps and all kinds of athletic activities. In many plants such facilities as athletic fields, hand-ball courts, tennis courts, indoor gymnasiums, bowling alleys, billiard tables and even playgrounds for the children or the employees are provided.

Day Nurseries. — In several instances day nurseries have been established in manufactur¬ ing plants for the care of the small children of women who are compelled to support their families and who would otherwise be unable to work and properly care for their little ones.

Suggestion Box. — Many employers have re¬

ported the success of plans for considering written suggestions submitted by employees, the reward being such commendation, promotion or prizes as the suggestions were found to deserve.

Protection for Workers. — During the past few years many plans have been adopted for the better remuneration and fuller protection of employees. These include (a) the payment of bonuses for efficient and faithful service; (b) the purchase of group insurance providing for payments in case of sickness or death; (c) the pensioning of aged or disabled employees, and (d) various plans for profit-sharing that have been adopted as a substitute for the pension.

In addition, there are the several systems of co-operative management that have been

adopted as a means of reducing the labor turn¬

over through the promotion of industrial peace and contentment and which range from a slight variation from the ordinary shop committee to the more radical industrial democracy. Con¬

sult Slichter, S. H., (The Turnover of Factory Labor } (1919).

John R. Meader,

Labor and Service Department, Brighton Mills, Passaic, N. J.

LABOR UNION, The American, a So¬

cialist-Labor organization founded in May 1898, as the Western Labor Union. At a convention held in Denver, Colo., in 1902, the scope of the organization was widened and the name

changed. It favors international socialism, and the government of the body is more centralized than ordinary federations of trade unions. The Union is

composed largely of trade unions in the States of Colorado, Idaho, Montana, Wash¬

ington and Wyoming. The organization is governed by an executive board of nine, and the usual president, vice-president and secre¬

tary-treasurer of such unions. The term of the officers is two years and they are voted for by the entire body of members. It has about 173 local unions, 5 district unions and a mem¬

bership of 150,000. The most important affiliated organization is the Western Federa¬

tion of Miners. The official organ is the Voice of Labor, published at Butte, Mont.

LABOR UNIONS. The government of

labor unions has developed somewhat like our political institutions. First there was the local union, which confined its activities to one place and was very democratic. The members all came together in primary assembly where they decided all questions and elected a few officers for short terms. In time several unions in the same industry came together and formed a State or interstate union. These soon evolved into national organizations, such as the United Mine Workers, or the Brotherhood of Locomo¬

tive Engineers. Then there seems to have been a conscious effort to model after our political institutions. The local unions still exist. Some such organizations in a particular State have a State union though there is little State organiza¬

tion except in federations. City and State federations exist largely for political purposes, to _ influence elections and secure favorable legislation. _ At the top of the unions in any particular industry stands the national union.

This is governed by a convention of delegates from the local unions and a set of executive officers.

However, direct legislation by the initiative and referendum has gone a long wa»'

toward displacing convention legislation. X\ LABOR UNIONS

also solves the vexatious problem of propor¬

tional representation.

Centralization. — The extent of centraliza¬

tion varies greatly in the different unions.

The Cigar Makers' International Union has taken over a great many matters formerly left to the local unions * and still left to them in some organizations. Extensive supervisory powers are vested in the hands of the presi¬

dent and the ^financier.® Sick, disabled and unemployment benefit funds are left with the locals, but the administration of these funds is rigidly inspected by the ^financier.5* The use of the union label is another matter of national control and fines may be imposed for violation of the rules governing it. The United Mine Workers is a very democratic organization.

Since 1911 the constitution has provided that no strike shall be ordered or called off by dis¬

trict or national officers without a referendum.

The centralization of industry has done much to centralize *the unions, though it is still pos¬

sible for local strikes to be called in some in¬

dustries. At the top of the orders stands the American Federation of Labor (q.v.), though several of the larger unions never have affiliated with the Federation. This is, strictly speaking, more nearly a confederation. It is a federation of federations. Local unions, with few excep¬

tions, are known to it only through city, dis¬

trict, State or national federations. Exceptions are made in favor of unions for which no national federation exists. The executive coun¬

cil may levy a tax of one cent a week per member on the affiliated unions for not more than 10 weeks, the proceeds to be used to sup¬

port an affiliated union on strike.

Membership. — Previous to 1880 member¬

ship in the unions was controlled mainly by the locals, but since that time this has passed more and more into the hands of the national authorities. Especially have thev been active in forming new local unions. The race ques¬

tion has proved a vexatious problem. Twelve unions, mostly in the railway service, absolutely exclude the negro. The Knights and the American Federation are favorable to him, but he has a hard row in many unions from which he is nominally not excluded. The fees to be exacted of new members is generally left to the locals, but this is some times abused to exclude persons not desired by the particular local. To correct this some national unions prescribe maximum and minimum fees. Some require actual instruction and work in the trade amounting virtually to an apprenticeship and this must be in a ((fair)} shop.. Kinship often plays a part. For example, in 1905 a local of the Plumbers' United Association ac¬

cepted none but sons of journeymen or boss plumbers as apprentices. Limitations upon the number of apprentices are common. Compe¬

tency for membership is tested in most unions by wage-earning capacity. The applicant must be competent to command the minimum wages established by the local union. A few apply the time test, that he shall have worked three years at the trade. A few combine the tests of wages and time. Some unions

will not admit foreigners unless naturalized, or exact high fees of them or require the consent of the national union, or the presentation of a foreign card. Under certain conditions members may be required to withdraw or they are automat¬

ically dropped, for example, when a member advances to the position of foreman or em¬

ployer.

The control exercised by unions over their members is considerable. The only punish¬

ments they can impose are fine and suspension or expulsion, but the force of these is very great. The courts have held that such fines are not unlawful and a few decisions intimate that that they may be collected by law. At least they may expel from membership for failure to pay the fine and this renders it very difficult for the one thus expelled to secure em¬

ployment. The legality of such expulsion will be looked into by the courts and in one case a New York court has ordered restoration to membership. In some unions these penalties may be imposed by the locals. The Carpenters and Joiners Union requires trial by the district council, where one exists.

Benefits. — American unions were much

later than the English in developing benefits, although until recent times there was no system of State insurance against accidents, sickness and unemployment, and no old age pensions.

The leaders in this work have been the Inter¬

national Typographical Union, The Cigar Makers' International Union, The United Brotherhood of Carpenters and Joiners and the Street Railway Employees. The Typo¬

graphical Union began paying burial benefits in 1892 and the same year it opened a home for disabled printers at Colorado Springs. In 1916 it paid $274,822 in death benefits, $352,920

in old age pensions and $109,431 for the main¬

tenance of the home. The death benefits paid by the Carpenters in 1916 amounted to $314,977, by the Street Railway Employees, $353,294.

The total of such benefits paid by over 70

unions in the American Federation amounted to $2,264,610, the sick benefits, $1,068,609, death benefits to members' wives, $63,662, for unem¬

ployment, $120,770, traveling benefits (in search of employment), $26,283. In 1916 the Car¬

penters voted almost unanimously for an assess¬

ment of 20 cents a month for an old age dona¬

tion fund. A man 60 years old and for 25 years a member of the union is entitled to $10 a month. Some unions not affiliated with the Federation have similar arrangements, es¬

pecially the railroad brotherhoods.

The accumulation of strike benefit funds is a common practice. The funds paid out by the members of the Federation in 1916

amounted to $2,708,789 to which should be added $154,009 paid by unions to aid other unions.

For the relief of the Danbury Hatters, who were heavily fined for boycotting, the Federa¬

tion collected $158,636.

By far the larger part of organized laborers belong to crafts unions. The industrial revo¬

lution and its continued evolution has brought about

a disintegrating tendency in unions, crafts becoming subdivided into many new crafts. The result has been many and bitter jurisdictional disputes. For example, in the building trades, steam fitters and plumbers have often disputed over the handling of certain pipes. Some now show a tendency toward more comprehensive organization along industrial lines, such as the United Mine Workers, which includes all workers about mines. Another still broader organization is the Independent Workers of the World (q.v.).

Women's Organizations. — Previous to

the Civil War most of the organizations of women were local and more or less temporary.

The mill operators at Dover organized for a strike in 1828 and those at Lowell in 1838. In the fifties there was a renewal of activity and there were many strikes for fewer hours and better pay, but practically all failed. Attempts at peaceful trade agreements also failed, but the public was sufficiently aroused to secure a few laws limiting the hours.

The Civil War had been particularly hard on the working women and brought many into the clan who had never been there before. Organi¬

zation now began anew, though conditions were so bad in the sewing trade that organiza¬

tion from within was almost impossible. Two States-wide organizations for women were soon formed, one in Massachusetts and one in New York. Only two national unions of men at this time admitted women. In the Typographical Union there was great opposition to the admis¬

sion of women, mainly because of the low wages for which women worked. In 1868 the Woman's

Typographical Union was formed, secured recognition of the national convention and Miss Augusta Lewis was elected corre¬

sponding secretary of the national union, but no woman has ever since held a national office.

In 1881 women were admitted to the Knights of Labor. At the Richmond convention in 1886

the women delegates (76) formed a permanent organization to investigate the condition of women workers and to demand equal pay for equal work and the abolition of child labor.

The organization of locals was now taken up by Mrs. Leonora Barry and carried on for four years with energy. The American Federa¬

tion admitted women from the beginning (1881). In 1891 the office ot national organizer to be filled by a woman was created, but little was done for several years, partly due to the panic of 1893. More male unions now began to admit women. In the later nineties there was a renewal of activity in the organization of women and many locals were formed, notably in the laundries and packing industries.

Real national organization began in 1904

with the Woman's Trade Union League, the main object of which was to secure the organ¬

ization of women, a work in which Mrs. Ray¬

mond Robins (elected president in 1907) be¬

came very active. This organization aided the strikes in the sewing trades in 1909-11. To it is largely due the present unions of the cloak makers, waist makers and other white goods workers. It established with Hart, Schaffner and Marx the ^Preferential Shop,® on which was based the <(Peace Protocol® in the New York cloak and suit industry, affecting 300,000

workers.

The great strike of 1909 gave a great im¬

petus to the organization of women. The Ladies' Garment Worker's Union soon rose to third place in the American Federation, though it now holds fourth, having been passed by the Machinists. Yet this organization is officered by men.

The attitude of the unions of men toward admitting women is determined partly by geography — more favorable in the West than in the East, — mainly by the character of the trade. Those trades in which men supply the greater part of the labor have tended to be hostile though most have ultimately realized that it was better to have the women with them than against them.

It is the policy of the unions to promote the interests of the members first of all. They seek to do this in many ways, among them by securing the following: (1) Shorter day, now generally eight hours. This is done partly out of consideration for personal welfare, partly to make work for more people. (2) Higher pay, through the closed shop, limiting appren¬

tices, restricting immigration, and sometimes the tariff. (3) The closed shop, through the union label, the boycott, extending the boycott even to the use of machinery made by non¬

union labor, and using it to control commerce and even the retail business. Dealers some¬

times have to get the consent of unions to move perishable goods, simply because they were handled by non-union men in a distant State.

Even the United States government has been forced to secure permits. In 1916 a non-union competitor sought an injunction against the cigarmakers' boycott, the object of which was to stop the sale of his cigars at retail. (4) Em¬

ployment for many — through government em¬

ployment at times, such devices as Mull crew®

laws, opposition to "scientific management,® but opposition to new machinery has about ceased.

(5) Limitation of production. Probably this is one reason for opposition to convict labor, though there are others. (6) Compensation for accidents. All are agreed on the employers'

liability, but not on a fixed scale of compensa¬

tion fixed by law. (7) The safety of workers.

(8) The extension of mutual aid, through strike benefits, insurance, etc. (9) The mold¬

ing of public opinion — through publicity.

The demands of the political parties as formulated in 1916 were: (1) Adequate compen¬

sation for employees of the government, includ¬

ing a minimum wage; (2) a compensation law; (3) a retiring allowance; (4) a tribunal of ap¬

peal and (5) the right to organize; (6) govern¬

ment ownership and operation of the telegraph and telephone lines; (7) equal suffrage and (8) restriction of immigration. The unions do not enter politics as a party, but they work for the election of candidates who will promise most for the defeat of men known to be hostile.

The unions composed of women or in which the women predominate seek primarily the bet¬

terment of women. The specific things they call for vary according to geography and in¬

dustry, but all are pretty well agreed on the need for greater safety and they have been in¬

fluential in securing better protection against fire in factories. Some are strong for coedu¬

cational industrial training, industrial history, the teaching of the philosophy of collective bar¬

gaining, and of t-he relation of government to labor. They demand equal suffrage and protest against the anti-woman's suffrage activity of the leisure class.

Legal Status. — The legal status of the unions, what they may do and what they may not do, is well established in some particulars, in others it is not. Collective agreements are legal and an employee who has contracted for a certain sum may recover more, if it afterward transpires that his union has made an agreement for more for its members. Whether the em¬

ployer could recover from an employee after having made a lower contract with the union LABOR VOTE — LABORATORY

615

does not seem to have been decided. The closed shop by agreement has been held legal, but the State may not require private busi¬

ness to be run on this principle, as Arizona sought to do. It may require only union labor on public works, as in the New York case, though the Nebraska Supreme Court has ren¬

dered a decision to the contrary, and quotes cases in six States to sustain it. Neither can the State favor unions by forbidding employers to exact as a condition of employment a promise from the employee not to affiliate with any union (Coppage v. Kans.). Several States had fol¬

lowed the lead of Kansas in attempting to give such protection only to have their acts declared null and void.

Picketing is a common practice, but is stubbornly resisted by employers. In 1913

Judge Sater (Ohio) declared that picketing was lawful when done <(in a peaceful manner and by such limited numbers as not to awaken the fear and lead to the intimidation of workmen, but the following year the majority of the Supreme Court of Michigan held that there could be no such thing as peaceable picketing (In re Langwell) and quoted several cases to sustain the opinion.

The boycott has been declared legal by the courts of California and Montana. Elsewhere it is illegal, unless made legal by legislation.

California, Maryland and Montana have legal¬

ized the peaceful boycott. Alabama, Colorado and Illinois have outlawed it by name. The publication of ((unfair):> lists has been held illegal several times (Buck Stove case, and Loewe v. Lawler), but the union papers con¬

tinue to print them. Suits for damages have been instituted, the most noted of which was the Danbury Hat case (Loewe v. Lawler), in which the court awarded damages against the members of the union. Several decisions have held that the unions, not being incorporated, are not liable. For that reason suits are brought against the members as individuals.

However, in a few recent cases (1917) suits have been brought against both the individuals and the unions, and the courts have declared the unions liable.

Several acts have been passed to exempt unions from the operation of anti-trust laws (restraint of trade) and they have been held not to violate that clause of the Constitution which guarantees to all the equal protection of the laws. The Clayton Act (1914) gives a very limited legality to the peaceful boycott and the peaceful picket so far as the

Sherman Act is concerned.

On the other hand, the very existence of certain unions has been declared illegal. Unions may exercise considerable control over their members, even to the collection of fines, but there are limits of control over members and of interference with outsiders to which they may not go. The Amalgamated Window Glass

Workers had rules forbidding any except mem¬

bers and apprentices to work at certain trades and fixing the number who should be allowed to work in certain departments. Every mem¬

ber of such a union, declared Judge Phillips (Ohio), had surrendered his industrial freedom, making a contract he had no right to make.

For this reason he ordered the dissolution of the company and the apoointment of a receiver.

For similar reasons Judge Dayton declared the United Mine Workers an illegal combination, though he did not order a dissolution and some points of his decision were overruled. So far full legal responsibility has been avoided by refusing to incorporate and the exact legal status is yet to be determined. See Arbitra¬

tion, Industrial; Eight- Hour Law; Labor Legislation; Labor Movement in America.

Bibliography. — Henry, (The Trade Union Woman) (New York 1915) ; Marot, (American Labor Unions) (New York 1914) ; Wolfe, (Admission to American Trade Unions>

(Baltimore 1912) ; Whitney, Uurischcdon in American Building-Trades Unions (Baltimore 1914) ; Wolman, 'The Boycott in American Trade Unions) (Baltimore 1916).*

David Y. Thomas,

Professor of History of Political Science, University of Arkansas.

LABOR VOTE. See Vote, Voters, Vot¬

ing.

LABORATORY (from the mediaeval

Latin laboratorinm, a workshop). The word is used to denote any room or building devoted to experimental investigations in technics and the sciences for the purpose of advancing man's knowledge of special applications of natural law or of human physiology and mentality. Lab¬

oratories have been introduced into educational institutions to teach scientific and technical knowledge by means of experiments. The term is used to denote the workroom of a manu¬

facturing chemist, or to the testing-rooms of an industry. In early times the nature of the chemical work of making drugs and potions was more or less disguised by the priesthood who called the place where they were made simply a workshop. Out of these early labora¬

tories grew those of the Middle Ages. In this later period they were devoted to astrology, the making of drugs, potions and charms and to the search for the philosopher's stone by means of which it might be possible to change the baser metals into gold. Some of these laboratories were very important in that day, being patronized by the nobility or maintained at the public expense.

Among the first laboratories open to students were those of Purkinje, who established a physiological laboratory at Breslau in 1825, and the chemical laboratory of Baron von Liebig at the University of Giessen in the same year.

The first physical laboratories for students were founded about 1846; one at Heidelberg, by Philipp Gustav Jolly, and one at the University of Glasgow

by William Thomson — Lord

Kelvin.

Among the great laboratories of the world may be noted that of the Royal Institution, established in 1800 by Count Rumford, which was to be devoted to the applied sciences, but which soon became the seat of great activity in researches in pure science, conducted by such men as Davy, Faraday and Tyndall. The Physikalische Reichsanstalt, in Charlottenburg, near Berlin, was a very famous laboratory where there were departments devoted to re¬

search in pure science, and other departments for the study of the application of science to industrial pursuits. In 1875 a committee of weights and measures, made up of represen¬

tatives of 18 nations, was organized for the purpose of reproducing and furnishing inter-

national metric standards to the members. A laboratory for their manufacture and for re¬

search was established near Paris. Great Britain has placed with the Royal Society the control of its National Physical Laboratory , where standards of weights and measures are to be kept, duplicates made, instruments tested and research is to be carried on. In the United States the Smithsonian Institution (q.v.) was established in 1846. Many important lines of research have been developed there, out of some of which have grown up some govern¬

mental departments, as the United States Weather Bureau and the United States Fish Commission. The United States government has established, by act of Congress, approved 3 March 1901, a National Bureau of Standards, a suitable building and equipment also being provided. The buildings and equipment have

been added to until there are over half a dozen well-appointed buildings in use. The bureau has the custody of the standards of weights and measures, and has power to manufacture duplicates, multiples and submultiples. It also has the power officially to test and calibrate physical and chemical apparatus and issue cer¬

tificates for them. A great deal of work is done in standardizing and calibrating physical, chemical and technical apparatus and machines for educational institutions, manufacturing plants and various governmental departments.

Tests of commercial products are carried out and standard specifications adopted, unifying and in many cases simplifying them. Re¬

searches in pure and applied sciences carried on have been of the greatest importance in technical and commercial work. Especially have important results been attained during the World War, in solving such problems as the production of optical glass, increasing the pro¬

duction of fuel for internal combustion en¬

gines and aid in the further development of wireless telegraphy and wireless telephony.

In practically all American institutions of learning laboratories for studying science by means of experiment and for research have been established. In many preparatory schools, and in an ever-increasing number of high schools, elementary laboratories are included for the study of physics, chemistry and biology.

Chemical laboratories for educational purposes were introduced by the Rensselaer Polytechnic Institute and by the Massachusetts Institute of Technology.

Industrial Laboratories. — Laboratories for research and testing form an ever-increasing part of many industrial enterprises. Materials are treated either chemically or physically or both at various stages

of the processes of manu¬

facture, these tests often indicating the subse¬

quent treatment of the products. 'Still another is the laboratory maintained by a large firm making paper from wood pulp. As an illustra¬

tion of the gains made by such laboratories it may be remarked that much of what was formerly cast aside in the making of pulp paper is now manufactured into products which increase the profits of the business. In the paper manufacturer's laboratory there are not only machines for testing every possible quality of the paper, such as its ability to resist fold¬

ing and creasing and exactly to measure the weight necessary to break it, but also a com¬

plete chemical laboratory, whose chemist, after years of experimentation, has found a means of making from a by-product of the paper a variety of charcoal much needed in clarifying certain drugs for pharmaceutical and other pur¬

poses.

Many industries of to-day are based on proc¬

esses devised and worked out in laboratories for research. Some examples are the great plants at Niagara Falls, where metallic aluminum, calcium carbide, sodium hydrate and many other compounds are made. The basis of the progress in applied electricity is research in physics and chemistry. In many lines of industry scien¬

tific research in public and private laboratories has made possible new and better processes.

Notable examples of such progress are the recent developments in X-ray theory and appa¬

ratus, both wireless telegraphy and telephony, new alloy steels, chemical processes and prod¬

ucts. The laboratory work done in the educa¬

tional and technical chemical laboratories dur¬

ing the World War aside from purely war work have been of inestimable value in making the United States independent of foreign coun¬

tries for certain products in which this country was previously almost entirely dependent. In those countries where there is the greatest ac¬

tivity in research in sciences and its applica¬

tions there is also the greatest industrial activ¬

ity. And it may be expected with confidence that in view of recent developments that many more commercial laboratories will be estab¬

lished and a greater degree of co-operation will be developed between the industrial and great educational laboratories.

Biological Laboratory. — Research in the biological sciences has helped to a better under¬

standing of life and to its prolongation. The causes of many infections and contagious dis¬

eases have been discovered and effective methods of prevention and of combating them have been found. The Pasteur institutes in many large cities all over the world are wit¬

nesses to these facts.

In psychology research and laboratory tests have lead to a better understanding of the lim¬

itations and adaptability of the individual for various lines of work. This matter has been brought to the attention of the world very forci¬

bly in choosing men for various activities dur¬

ing these times of change and the lessons so learned

will not be lost in peace times.

A general outline and some of the details of construction, equipment and uses of a few of the most common types of laboratories found in educational institutions and in industrial lab¬

oratories of the present day are given below.

Many laboratories where excellent work is be¬

ing done are very much simpler than those de¬

scribed; and, on the other hand, some are much more elaborate in construction and equipment.

Some features are common to them all, one of which is the lecture-room, where experi¬

mental demonstrations are given before many students at one time.

Louis Agassiz led the movement in the United States in the establishment of biological laboratories, by establishing a zoological lab¬

oratory at Harvard.

Agassiz also developed the modern marine laboratory which has led to the establishment of many such laboratories in all parts of the world. The researches in these laboratories have been of greatest value in the biological LABORATORY

sciences. Among the marine laboratories of the world must be enumerated the great labora¬

tory established in 1872 by Dr. Anton Dohrn at Naples. Specialists from all parts of the world go to this laboratory to do research work. The United States Fish 'Commission has established two very important marine labora¬

tories in the United States : one at Woods Hole, Mass., the other at Beaufort, N. C., in 1899.

Woods Hole was the centre of activity in 1871

and again in 1875. The first building of the present fish culture and experiment station was completed in 1884. This laboratory has been open to voluntary investigators, tables being assigned to them. The investigators have num¬

bered among them men from the principal uni¬

versities of the country, and much valuable work both of economic and scientific value has been done there. The marine laboratory estab¬

lished at Beaufort, N. C., promises to be one of the greatest, if not the greatest, biological station in the world; larger than the one at Woods Hole or the one at Naples on the Medi¬

terranean.

Other marine laboratories are the Chesa¬

peake Zoological Laboratory of the Johns Hopkins University, the Hopkins Seaside Lab¬

oratory of the Leland Stanford Junior Univer¬

sity in California and the Tufts College Lab¬

oratory at Harpswell, Me. Another great biological laboratory is that of the Carnegie Institution at Cold Spring Harbor.

Many special problems in biology, in med¬

icine and other branches are studied in labora¬

tories such as the Crocker Cancer Laboratory at Columbia University. Investigation into physiological processes in health and disease has been in late years so highly specialized that individual physicians are no longer able to fol¬

low them up, even in their own specialty, but now send specimens obtained from their patients to the larger laboratories. One of the most famous of the

biological laboratories is that of the Rockefeller Institute for Medical Research, which was founded by John D.

Rockefeller in 1901, situated at 66th street and the East River in New York City. This institu¬

tion, endowed with nearly $3,000,000, contains pathological, chemical, bacteriological, phar¬

macological, experimental biological and experi¬

mental surgical laboratories, a hospital and an animal house. Animals are bred and farm products are supplied from a farm belonging to the institute and situated at Clyde, N. J., and an additional biological laboratory is main¬

tained at Woods Hole, Mass. The institute publishes its findings in various branches of research through the media of its Journal of Experimental Medicine and in Studies and Monographs, issued from time to time.

A second very important marine biological laboratory for research exists at Woods Hole, where scientists from many institutions congre¬

gate. This laboratory is devoted entirely to research. There are many other important biological stations along the Atlantic, Pa¬

cific and Gulf coasts and a few on the Great Lcikcs.

The special appliances necessary to meet the needs of marine laboratories are boats, both large and small, nets, apparatus for obtaining the vegetable as well as the animal life of the salt and fresh water bodies and aquariums.

The researches of Pasteur in France on bacteria have led to the establishment of im¬

portant bacteriological laboratories throughout the world. The universities and colleges in the United States have many laboratories devoted to teaching

and investigation along the differ¬

ent groups of the biological sciences.

The botanical laboratory is devoted to the study of the life of plants and their classifica¬

tion according to their distinguishing charac¬

teristics and structure.

The laboratories for the whole group of biological sciences have much equipment in com¬

mon. The laboratory rooms should be well lighted, preferably with north light and with window bars done away with as much as possi¬

ble; the building should be situated so as to have a low horizon. This is important in micro¬

scopic and microphotographic work, in order to get a uniform lighting of the slide on the microscope stage. The rooms should be pro¬

vided with tables, on which is placed a full equipment of reagents, staining and preserving solutions. Dissecting instruments are among the individual needs of the students. Micro¬

tomes are needed for cutting sections, to be mounted on slides for examination under the microscope. The photomicrographic camera aids very materially in the careful, systematic study of specimens. The negatives thus ob¬

tained are available for making lantern slides for projection purposes and for making en¬

larged photographs. In some lines of research work, as in bacteriology, culture media, in which the particular form of life may grow and mul¬

tiply, may be used. Often the cultures must be kept for hours at a certain temperature, thus necessitating incubators, of which the temper¬

ature is regulated by thermostats. Frequently rooms are set apart for cultures. Dark rooms are essential for the development of negatives resulting from the photographic work.

Chemical Laboratory. — The chemical lab¬

oratory is one of the most important factors in the educational and industrial systems of our civilization. The rooms of the chemical labor¬

atory should be well lighted and ventilated.

Special lines of work should be isolated. The lecture-room for demonstration purposes should be much the same in its general features as the physical lecture-room (q.v.). The lecture-room should be supplied with different gases, includ¬

ing common illuminating gas, oxygen and hydrogen. The oxygen and hydrogen are gen¬

erally supplied in heavy steel tanks under high pressure. A demonstration lantern should be conveniently placed. The table top should have one or two holes in it connected to the suction fan for carrying off fumes and gases, thus keep¬

ing them from being disseminated through the room.

The inorganic laboratories, for elementary purposes, may be divided into three principal divisions : first, that devoted to the study of the simple reactions by the beginner, who there learns experimentally what takes place in the simple reactions, as that of the production of hydrogen gas by pouring sulphuric acid on zinc, forming zinc sulphate and liberating the gas.

The second division is that part devoted to qual¬

itative analysis, where more complex reactions are studied and where the student learns to recognize and to test for the presence of the different elements. Under the third division is found quantitative analysis, which, as the name 618

implies, is devoted to the study of the quanti¬

tative relations of compounds.

The work in these three divisions leads up to the more complex work of organic chemistry and research work. The equipment of these laboratories will give a general outline of the whole. Wide top tables should be provided.

The tops should be impervious to water and as little acted on by acids as possible. Alberene stone is excellent material for such purposes.

A good construction is to have the tops slope a little from both sides to the centre line, where a trough is placed to carry off the wastes to the sewer. Racks for the storing of bottles contain¬

ing reagents should be placed so as to be easily reached by the students from both sides of the table. Beneath the top should be drawers and shelving so subdivided that each student may keep his apparatus separate. The tables should be provided with gas and water, with plenty of taps and with electrical connections.

Means should also be furnished for boiling under reduced pressure. For the experiments where noxious gases are given off, hoods should be provided, the bases being of the same mate¬

rial as the table tops, the sides and top of fixed glass with a glass window that may be opened in front. For ventilation within the hood there should be openings to a flue connected with a blower which produces a suction of the gases from the hood. One of the openings should be well toward the top and the other at the bottom of the hood. If artificial lighting is required it should be from above the glass top. Plenty of stop-cocks for gas, water and suction should be provided for each hood.

Among the independent rooms needed are those for the

following purposes : A hydrogen sulphide plant is an absolute necessity, and it should be isolated to the extent of having a wefl-ventilated room of its own. It should, however, be situated as conveniently as possible to the main divisions of the laboratory. Some¬

times it may be advantageous to pipe the gas to different rooms. Near the quantitative laboratory should be a balance-room well stocked with analytical balances supported on solid tables or wall brackets. A combustion-

room and a furnace-room are often required.

The furnace-room should be so located as to get a good draft or so as to be connected to a suction fan system.

The study of the spectrum of gases makes it necessary to have a good, induction coil to produce a spark spectrum, which may be viewed by the eye, or which may be photographed. The range of temperatures at which chemical phenomena are now studied calls for very high and very low temperatures, which means that the electric furnace and a liquid air plant are often desirable. Apparatus for distillation un¬

der different pressures and for obtaining con¬

stant temperatures are very necessary in some phases of the work. The rooms for gas analy¬

sis should be so situated as to make it pos¬

sible to have but small temperature fluctuations.

A north exposure, thus getting rid . of direct sunlight and yet getting good illumination, is preferable. The principal part of the equip¬

ment needed for gas analysis by the Hempel method includes gas buretts, to measure vol¬

umes, absorption pipettes for the different re¬

agents used to absorb different gases, com¬

bustion pipettes and oxygen generators, The physical chemistry laboratory requires much apparatus and equipment needed in phys¬

ics and in the other divisions of chemical work, including analytical balances, thermome¬

ters, barometers, manometers, calorimeters, thermostats, motors, stirring gear, refractom-

eters, spectrometers, apparatus for studying polarized light, ammeters, voltmeters, resistances and many other pieces. Among the subjects studied in the student laboratory are density, viscosity, vapor pressure, boiling and freezing points, heats of fusion and vaporization, crit¬

ical temperatures, pressures and volumes, heats of combustion, solubility and the various divi¬

sions of electrolysis and electro-chemistry.

Electrical Laboratory. — The student and investigator in the field of electricity should have a thorough grounding in general physics and physical laboratory methods. The student in the electrical laboratory becomes acquainted with the relations of electric currents, electro¬

motive forces and resistances ; and the pro¬

duction and transmission of electrical energy, electrical quantity, capacity, magnetism and the relations between electricity and magnetism.

The laboratory should be of strong construc¬

tion on account of the lines of shafting and the heavy machines used. In the general labora¬

tory will be found for purposes of investiga¬

tion dynamos of the various direct and alter¬

nating current types; direct and alternating current

motors, the latter covering synchronous, two-phase and three-phase motors, induction motors and rotary converters. Portable and variable inductive and non-inductive resist¬

ances; portable and fixed instruments for meas¬

uring current, electrical pressure or potential and power should be plentifullv supplied. The fixed machines, instruments, the private rooms and tables should have lines of wire connecting them with a central switchboard through which any desired grouping of stations may be made. Among the separate departments may be one for testing and studying transformers; one for investigating the magnetic properties of iron, steel ana other metals ; a potentiometer-

room in which to test and calibrate the instru¬

ments used in electrical measurements. Some interesting and important parts of the work are the investigation of the resistance and strength of insulators and conductors; the study of condensers and their effect in a cir¬

cuit; the study of self and mutual induction and the measurements of them. Separate rooms which can be made dark, the walls of which absorb as much light as possible, or which can be made any color desired by a prooer arrangement of coverings, where work in light¬

ing and photometry may be performed, are also important parts of the equipment of an electrical laboratory.

The electrical engineering student should find it possible to make tests in all lines of his profession, approximating, as nearly as pos¬

sible, actual working conditions in the commer¬

cial world. In order to give the greatest useful¬

ness to the laboratory, the equipment should be kept

abreast with the advances in the best engi¬

neering practice.

Engineering Laboratory. — Engineering

laboratories have been developed within the past 40 years along all lines of engineering and technical education. The divisions are many, but only a few of them will be considered here.

The electrical engineering laboratory has been discussed above under the head of Electrical Laboratory. Under the division of Mechanical Engineering may be placed railroad engineering, marine engineering and the like. Among the subdivisions under Civil Engineering are mining engineering, hydraulic engineering, sanitary en¬

gineering and bridge engineering, for all of which laboraories have been developed.

The laboratory should be a solid structure with massive foundations for the heavy ma¬

chines used. Boiler-rooms, engine-rooms, mate¬

rial testing-rooms and general experimental rooms on mechanical devices, are the requisites.

The boilers tested comprise fire-tube, water-

tube and shell boilers. Tests are made of fuels, as to their steaming qualities, the ash and flue gases, by means of calorimeters, gas meters, thermometers, thermo-elements and balances.

Engine tests may be made on many steam motors comprising steam turbines, simple slide valve, Corliss and compound engines of high and low pressure types. For these tests are needed steam gauges, thermometers, indicators communicating

directly with the inside of the cylinders, together with <(reducing motions® for obtaining automatic records of the steam pres¬

sure within the cylinders during a complete stroke, from which data may be obtained bv means of which to compute the energy put into the engine ; and dynamometers to measure the output in useful work.

Another department is devoted to internal combustion motors. Under this class are in¬

cluded hot air engines, oil and gas engines, which require dynamometers, gas meters and other measurers of the fuel supplied, and means for testing the products of combustion.

In the mechanical laboratory, water motors, fans, blowers, air compressors, compressed air machines and tools, different methods of power transmission, as by shafting, gearing, belts, ropes and chains and the like, are studied.

Measurements of the coefficients of friction of different substances are found, and the effects of lubrication by different substances are in¬

vestigated. Lubricants are tested under various conditions, such as at various temperatures, pressures and in the presence of different va¬

pors or gases. The testing of materials is com¬

mon to mechanical and civil engineering labo¬

ratories. It will be outlined under the latter head.

In the civil engineering laboratories, calcu¬

lating and measuring instruments are tested and calibrated. Among these instruments are tran¬

sits and levels, and all instruments having graduated circles, cross-hairs and spirit levels; steel tapes; chains and bars for measuring lengths; chronometers for measuring time; barometers and

thermometers. Here also is studied the magnetometer; and by means of it the strength of the horizontal component of the earth's magnetic field. The variation and dip of the earth field are also investigated. The "acceleration of gravity® is determined.

In the hydraulic division of these labora¬

tories are studied the flow of water in pipes, "skin friction,® the flow of water through dif¬

ferent orifices under different conditions, the flow of water over weirs and itsmeasurement.

This is very important in irrigation.

The laboratory devoted to the testing of materials is a very important one in all engi¬

neering work. All kinds of materials used in engineering work are tested. The apparatus re¬

quired comprises machines for testing the resist¬

ance to compression, of tensile strength, of tor¬

sion and flexure of materials. Cements are tested for their resistance to tension and com¬

pression and for the length of time required for them to set. For the last test named, automatic apparatus has been devised which registers time and amount of "set.® Forms in which to mold the briquettes, and water tanks in which to immerse them for setting, are among the required equipment. Tests on con¬

cretes are made in a similar manner. Abra¬

sion machines are used to make tests on paving material and other material subject to wear.

Physical Laboratory. — The housing and

equipment of a physical laboratory is of very great importance. The building in which the laboratory is

to be located should be so situated as to reduce to a minimum all jar and tremor, and to do away with all outside magnetic dis¬

turbances, such as those due to electric car lines.

Many rooms are needed for special divisions of the work; such as constant temperature rooms, which require special precautions in de¬

sign and construction and which are best situ¬

ated below ground. Special rooms are de¬

manded for radiometers, spectrometers, poten¬

tiometers and such other instruments as re¬

quire constant conditions to ensure good results.

Dark rooms are necessary for work in light, which includes experiments requiring diffrac¬

tion gratings, photometers and the phenomena of light in general. Since photography has be¬

come of very great practical importance, fully equipped dark rooms are desired; also a sky¬

light room where enlargements and reductions of negatives may be made, and lantern slides prepared. It should be possible to introduce sunlight into some of the rooms.

A lecture-room in which. experimental dem¬

onstrations may be given is a necessity, and much attention should be given to its arrange¬

ment. The lecture-room should be well lighted but should be provided with arrangements for readily darkening it. The experimental lecture table should be placed so as to be easily seen from all parts of the room. This table should have water, gas, ai/r blast, suction, water motors and other motors, sink and terminals for ob¬

taining direct and alternating currents. A solid masonry pier upon which to set up deli¬

cate apparatus and that requiring no vibration should be provided. The table tops should be impervious to water and so far as possible acid-

resisting.

An apparatus-room in which is kept demon¬

stration apparatus should be situated conveni¬

ently to the lecture-room ; general apparatus may also be kept there. The opening between the apparatus-room and the lecture-room should be large enough to admit the passage of large pieces of apparatus, and also to allow exoeri-

ments to be set up on wheeled tables in the apparatus-room, then wheeled directly into the lecture room.

Separate rooms should be provided for re¬

search work. It is desirable that it be possible to connect some of the rooms in suites, and to provide dark rooms for some of the suites.

Research-rooms should contain water and gas, both ordinary illuminating and acetylene

gas. They should have electrical connections to a central switchboard sufficient to obtain various types of current at one time. The floors of the building should be solid. Stone tables built in the walls form good supports for instruments, but there should be provided in some cases stone piers with independent foundations.

The general laboratories should have plenty of light and should be provided with separate rooms for some classes of work, as in light and sound, where it is often necessary to have dark¬

ened rooms. A heat bench or table should be provided; it should have an impervious top with enough pitch to drain into a central trough or hole to conduct away the waste. A rack with hooks above the bench, from which to sus¬

pend thermometers, is convenient. The rooms should be well supplied with tables, and along the walls stone shelving built in the walls will be found useful. The dirt incident to primary batteries may be concentrated if all the cells be kept together, their terminals leading to a switchboard to which are connected the termi¬

nals of lines leading to the various stations in the rooms.

The laboratory should also have storage bat¬

teries, and, if necessary, have its own dynamos in order to procure direct and alternating cur¬

rents. An acetylene gas plant, and a com¬

pressor and liquefier for obtaining liquid air and other gases, are becoming necessary parts of the general equipment of a physical labora¬

tory. A plant for the production of oxygen and hydrogen is also often desirable. A workshop in which to repair and build apparatus is a great convenience. The wiring and plumbing should be open and accessible as possible. All dark rooms as well as other rooms should be well ventilated, as it is often imperative for an ob¬

server to be confined in a room for hours at a time. Further reference to phvsical laboratory equipment will be found under the head of Electrical Laboratory.

Psychological Laboratory. — Since the es¬

tablishment of the first psychological laboratory in Leipzig in 1875, bv Wilhelm Wundt, where one room was devoted to apparatus and re¬

search, the development of the psychological laboratory has been rapid. One of Wundt's first students, G. Stanley Hall, established the first psychological laboratory in America at Johns Hopkins University in 1881, since which time many others have been started in the United States and foreign countries, including Japan.

The requirements of the psychological

laboratory have increased very rapidly with the development of the subject, until its housing and equipment has become a problem of great importance and interest. Many rooms and much equipment are now required for a detailed study of the various expressions of conscious mentality. Beside the rooms necessary in teaching psychology by means of experiments, other rooms for research are needed. Quiet and relaxation being of^en necessary, it is im¬

portant so to arrange the rooms that the work of one student will in no way interfere with that of another student. The separate rooms should be provided with gas, electric lights and water. Where absolute quiet is required, pip¬

ing of all kinds should be excluded, the heating being done by indirect radiation if necessary, and only incandescent electric lighting being used. The rooms should be wired for electrical intercommunication between those which may likely be desired to be used in suites where, as is frequently the case, the experimenter must be in one room and the "subject in the other.*

They should also have wires leading to the rooms where chronometers and electrical record¬

ing devices are located.

For the study of the sensations of light and the eye, its capacity and limitations, suites of rooms are desirable in many instances. These rooms should be capable of being either, well lighted or darkened

to any desired degree. The equipment of this part of the laboratory includes models of the eye and the muscles governing its movements, sectional models ; apparatus for studying color sensations, color mixing, color blindness, contrast, brightness independent of the color sensation ; apparatus for studying op¬

tical illusions, the sensitiveness of the retina at different points, the sensitiveness of the eye to changes in position, the sense of location and the imperfections of the eye; and apparatus for studying reactions and reaction times.

The sensation of sound requires isolated rooms where the noises produced may not reach other parts of the laboratory, and for certain parts of the work rooms that are sound and light proof. In this part of the laboratory the sensitiveness, range and analyzing power of the ear are studied. The equipment for the work in sound comprises models of the ear; instru¬

ments for producing sound, such as tuning-

forks, sirens, organ pipes and other sources of vibrations ; and resonators for analyzing com¬

plex sounds.

Other rooms are needed for studying the sense of heat and cold, pressure, pain and the locations of the various end organs. The ap¬

paratus necessary is that required to produce the corresponding sensations. The effects of different sensations on the respiratory organs and heart action is another subject for investi¬

gation. Other parts of the laboratory are de¬

voted to the senses of taste and smell. The equipment comprises the substances with which to test the various parts of the tongue, and also substances to produce different odors.

An essential feature of the psychological laboratory

is a workshop where the many special forms of apparatus may be made, which are necessary to be used in the ever-changing problems which the scientific study of the con¬

scious mind presents. Such a workshop con¬

tains a fairly complete equipment for both wood and metal working with a plentiful supply of power for running the machines.

Among the special pieces of apparatus

necessary may be mentioned the chronometer, the chronograph, electrically driven tuning-

forks, sources of mechanical and electrical energy and induction coils.

Aeronautical Laboratories. — The Central Establishment for Military Aeronautics at Chalais-Meudon near Paris led the way for aeronautical laboratories in 1884. A second was that of G. Eiffel, and a third that of de la Meurthe at Saint Cyr — the Aerotechnical In¬

stitute of the University of Paris. The Lang¬

ley Aerodynamical Laboratory was opened in 1913. Other aeronautical laboratories which have been very productive are those at Gottin¬

gen, the English National Physical Laboratory, and the Bureau of Standards at Washington,

In these laboratories there are wind-tunnels spc-

' dally constructed to give uniform wind streams at various velocities. In connection with these tunnels there are specially constructed balances to measure the left and drag on wing surfaces, the resistances of parts and the forces on vari¬

ous shapes, and the retarding forces on air¬

planes as a whole. One very important labor¬

atory established at the Bureau of Standards in 1917 is that for testing engines at reduced at¬

mospheric pressures and the corresponding re¬

duced temperatures simulating conditions for varying altitudes.

Municipal laboratories for the standard¬

ization of supplies bought by cities, such as asphalt, fire hose, food for various municipal institutions and many other commodities are maintained by several cities. These labora¬

tories not only test what is supplied for the city's use, acquired through the purchasing de¬

partments, but also enable their agents to form more accurate specifications for further sup¬

plies. Water, coal, gas and other things for public use are submitted to regular examina¬

tions in such laboratories.

Bibliography. — Chandler, (The Construc¬

tion of Chemical Laboratories) (1893) ; Davis, (Handbook of Chemical Engineering) (1901) ; von Meyer, ^History of Chemistry) (translated by McGowan, 1898) ; Dodge, Elementary Prac¬

tical Biology* (1894) ; Jamieson, (London Elec¬

trical Engineering Laboratory * (1893) ; Minot, laboratory Construction (Philadelphia Medi¬

cal Journal 1900-01) ; Cajori, (History of Physics) (1899); Sanford, Experimental Psy¬

chology* (1898) ; Scripture, (The New Psychol-

ogy) (1897); Titchener, Experimental Psy¬

chology * (1901).

Ernest Blaker,

Assistant Professor of Physics, Cornell Univer¬

sity.

LABORDE, la'bord', Leon Emmanuel

Simon Joseph, Count de, French archaeolo¬

gist and author : b. Paris, 12 June 1807 ; d.

there, 25 March 1869. He accompanied his father, Alexander Louis Joseph on a jour¬

ney to the Orient concerning which he wrote (Voyage dans l'Arabie Petree* (Paris 1830-33), and was appointed secretary of lega¬

tion at Rome (1828) and became (1831) Tal¬

leyrand's secretary at London, to fill later the same position at The Hague and Cassel. He was elected a member of the Academy in 1842.

He became later curator of modern sculpture at the Louvre and (1856) director of the Imperial archives and was made a senator. Notable among his works are (Histoire de la Gravure en maniere noire) (1839) ; (Voyage en Orient: Asie-Mineure et Syrie) (1837-62), with 180

plates; Ee Parthenon* (1854), with 30 plates, but unfinished; (De l'Union des Arts et de l'lndustrie* (1856). _ He also wrote a number of works on the Paris libraries and monuments, etc.

LABORI, Fernand Gustave Gaston, fer-

nan gus-tav gas-ton la-bo-re, French lawyer and editor: b. Rheims, 18 April 1860; d. 14

March 1917. He studied at the Rheims Lycee and for

two years in Germany and England; took his degrees in the law faculty of Paris in 1881 and 1883, and was enrolled at the bar of the Court of Appeals in 1884; was secretary of the conference of advocates in 1887-88; took a high professional rank; and was especially prominent as counsel for the defense in notable cases, as the libel action by Compayre against Numa Gilly, and the trials of the anarchists Duval and Vaillant. In 1898 he was chosen deputy for Fontainebleu. In the same year he defended Emile Zola (q.v.), accused of libel¬

ing the army and the President of the republic in the letter concerning the Dreyfus case. He was junior counsel to Demange in the defense of Dreyfus at the trial at Rennes in 1899, and thoroughly confuted his opponents by his logic and his brilliant cross-questioning. He did not make the final plea, but his (Notes de Plaiderie*

were published in the (Compte-rendu Stenog-

raphique In-extenso du Proces Dreyfus a Rennes. * On 14 August, while on his way to the court, he was dangerously wounded by a revolver bullet fired by a fanatic or mercenary.

He was shortly enabled, however, to continue the case. In' 1903 he defended the Humbert swindlers (see Humbert Swindle) and in 1914

defended Madame Caillaux (see Caillaux ; Calme^e) and secured her acquittal. He was editor-inTchief of the judicial daily La Gazette du Palais in 1888-94; established the Revue du Palais and Grande Revue in 1897 ; and is joint author of (Repertoire encyclopedique de Droit Frangais,* in 12 volumes (1898). See Dreyfus, Alfred.

LABOUCHERE, la-boo-shar, Henry Du

Pre, English politician and editor: b. London, 9 Nov. 1831 ; d. Florence, Italy, 15 Jan. 1912. He was of Huguenot origin, was educated at Eton and Trinity College, Cambridge; was in the British diplomatic

service in 1854-64, being at one time a member of the British legation at Washington; in 1865-66 sat in Parliament for Windsor; was then unseated on petition; but represented Middlesex in 1867-68 and North¬

ampton in 1880-1906. During his parliamentary career he strongly advocated Home Rule. He was at one time part proprietor of the London Daily News, to which he contributed letters from Paris during the siege (1870-71). In 1876

he established and became editor of Truth, a weekly journal, in which he expressed his opinions with great vigor. The denunciations of all manner of public frauds in the columns of Truth brought him frequentlv into, the law courts for libel, and though he almost invariably won his cases, he frequently lost heavily on them through being unable to recover costs from the unsuccessful litigants. He was an extreme Radical in politics, was a strong op¬

ponent of the South African War of 1899-1902, a man of cosmopolitan sympathies, and on ac¬

count of his wit and incisiveness popular with all parties in the House of Commons.

LABOULAYE, Edouard Rene Lefebvre

de, a-doo-ar re-na le-favr la-boo-la, French publicist and jurist: b. Paris, 18 Jan. 1811; d.

there, 23 May 1883. He studied law and in 1842

he joined the Paris bar. He was a close student of the great German writers on juris¬

prudence, whose works and researches he in¬

troduced to his countrymen in a series of able essays, written in an admirable.style. The Acad¬

emy of Inscriptions and Belles-Lettres crowned his (Histoire du Droit de Propriete Fonciere*

(1839), and elected him to fts membership in 1845. An Essai sur la Vie et les Ouvrages ae Savigny) (1840), was followed by (Recherches 622

sur la Condition civile et politique des Femmes) (1843), and an (Essai sur les Lois criminelles des Romains) (1845), both crowned by the Academy of Moral Sciences. In 1849 he was appointed professor of comparative legislation in the College de France. After the foundation of the Second Empire he constantly strove to rouse opposition to it, and in several published works as well as in his lectures held up the American Constitution to the admiration of his countrymen. In his (Paris en Amerique) (1863), an ingenious and delightful satirical romance, which passed rapidly through 30 edi¬

tions, he held up to a ridicule that was but thinly disguised the Napoleonic regime.

(Prince Caniche) was another extremely popu¬

lar novel on the same lines, and had the effect of disintegrating in the minds of the French people attachment to the empire. The popular¬

ity of Laboulaye, however, declined somewhat through his support of the plebiscite in 1870, and soon afterward he resigned his chair at the College de France. After the fall of the em¬

pire he was elected for Paris in 1871. In 1875

he was elected a life senator. Besides the works above mentioned he wrote (Histoire des Etats-Unis d'Amerique> (1854) ; (Etudes Con-

temporaines sur l'Allemagne et les Pays Slaves) (1854) ; (Souvenirs d'un Voyageur>

(1857); (Liberte Religieuse} (1858); (Etudes sur la Propriete Litteraire en France et en Angleterre) (1858) ; (Abdallah > (1859), an Arab romance; (L'Etat et Ses Limites) (1863); (Paris en Amerique)

(1863), an ingenious and extremely popular satirical romance; Contes Bleus) (1864), a series of admirably told tales; (Bleus) (1865); (Contes et Nouvelles) (1868); (Discours Populaires) (1869), etc. He trans¬

lated into French several of Channing's works and the (Memoirs and Correspondence of Franklin) with an introduction. Consult Bige¬

low, J., 'Some Recollections of the Late Edouard Laboulaye) (New York 1889). See Contes Bleus.

LABRADOR. History. — The peninsula

of Labrador is doubly distinguished as the first part of North America to be discovered by Europeans, and by being the last portion of the continent in which large areas remain unex¬

plored by white men.

Lief, the Norseman, voyaging westward

from Greenland in the year 1000 reached its northeastern part and sailed south along its Atlantic coast to more temperate regions. Cor-

tereal rediscovered this coast and traced it northward from the Strait of Belle Isle to the entrance to Hudson Strait, in 1500. A cargo of Eskimo slaves carried by him to Portugal ac¬

counts for the name Labrador given to the country. Jacques Cartier, on his voyage up the Gulf of Saint Lawrence, in 1535, outlined the southern coast of the peninsula ; while the northern and western coasts w?ere discovered by Henry Hudson in 1610. The valuable fish¬

eries of the western Atlantic early attracted the fishermen of Europe and the town of Brest was founded, near the Strait of Belle Isle, in 1504. At the height of its prosperity about the year 1600 it contained upwards of 200 houses and was visited by fishing vessels from France, England, Spain and Portugal.

Exploration. — Although the coasts of the peninsula were early known, their barren char¬

acter and the mountainous-looking interior, which could only be penetrated by the ascent of difficult and dangerous rivers, long delayed the exploration of the interior and led to much misinformation concerning it. During the past 40 years surveyors of the province of Que¬

bec have accurately mapped the principal rivers of (he southern watershed to their heads, thus giving a good idea of the geography of the southern third of the peninsula. The explora¬

tion of the more inaccessible northern two-

thirds has been undertaken by the Canadian Geological Survey; work began in 1880 and it has been the fortune of the writer to have been in charge of these explorations. In this work the northern and western coasts have been closely examined and exploratory lines have been carried along a number of the largest streams of the eastern, northern and western watersheds. Much still remains unknown, but sufficient has been learned to give a good gen¬

eral idea of the geography and resources of these northern parts.

Topography. — The peninsula of Labrador forms the northeastern part of Canada and has an area of 511,000 square miles. Its southern boundary is an arbitrary line drawn eastward 600 miles from the south end of Hudson Bay to the Gulf of Saint Lawrence, thence 500 miles along the north shore of the gulf to the Strait of Belle Isle. The Atlantic coast runs north-

northwest 700 miles to the eastern entrance of Hudson Strait ; the south shore of the strait has a general trend of west-northwest for about 500 miles, while the western boundary is a north-and-south line along the east side of Hudson Bay, and is 800 miles in length. The Atlantic coast is indented by many long, narrow bays, or fiords, of which Hamilton Inlet is the largest, extending inland 150 miles, while sev¬

eral of the others exceed 50 miles in length.

Abrupt, partly-wooded hills surround the fiords and rise from 1,000 to 5,000 feet above their deep waters. Numerous rocky islands fringe the coast outside, and afford protected 'naviga¬

tion for long distances in the channels between them, thus rendering the coast an ideal one for a safe summer cruise amid scenery rivalling in beauty and grandeur that of the coast of Nor¬

way.

The southern and 'northern coasts are similar in character to that on the Atlantic, but are on a scale less grand, while the eastern shores of Hudson Bay are generally low and fringed with shallow, dangerous waters.

The peninsula as a whole may be considered a plateau that rises somewhat abruptly from the sea on the north, east and south 'sides and more gently from

the west to heights varying from 1,500 to 2,500 feet. The only mountain range lies close to the sea along the northern half of the Atlantic coast with summits rising from 3,000 to 6,000 feet above the ocean.

Geology.— - The crystalline rocks which form the peninsula belong to the earliest crust of the earth, the newest dating back to Huron-

ian time. Since then the plateau has stood con¬

tinuously . above the level of the sea and has been subjected to the degrading action of at¬

mosphere and stream. Great thicknesses of rock became rotten and rains and small streams removed much of the loose material from the heights to the depressions while the larger

rivers cut deep valleys into the granites and ' other hard rocks. In recent geological times a thick cap of ice covered the peninsula moving slowly outward from the interior. This motion of the ice removed the rotted rock from the hills and deposited it in the valleys, thus block¬

ing many of the deep river valleys and reducing the surface of 'the interior to a general level with a gentle slope toward the coasts. No physical changes have occurred since the melting of the ice-cap and the interior country is still slightly undulating with low ridges of rock, or of glacial drift separated by wide, shallow valleys.

Lakes. — Myriads of lakes, great and small, occupy the lower parts of the valleys and are connected by networks of streams so that canoe travel is possible in any direction. Mistassini and Michigamau having areas exceeding 500

square miles are the largest, while dozens of others range in surface-area from 50 to 250

square miles.

Rivers. — The rivers in the central portion flow in the depressions without distinct valleys and in fact are chains of lake-expansions con¬

nected by short stretches of rapids. As they approach the coast they fall into their ancient valleys cut deep below the surface of the plateau. The descent is usually abrupt and is often accompanied by a great development of power and beauty. The Hamilton River, one of the largest streams of Labrador, falls from the surface of the plateau into its ancient valley about 200 miles above its mouth. The descent of 900 feet is accomplished in a distance of less than 10 miles and includes one direct fall of 315 feet where the river shoots from a gigan¬

tic trough into a circular basin at the head of a narrow canyon in which the last part of the descent is made. A rough estimate of the energy developed by the water in this descent gives the enormous sum of 9,000,000 horse power. This wonderful display of energy and the grand beauty of the fall and canyon place the Grand Falls of the Hamilton among the marvels of the world. With light rock-cuttings the river might be diverted into a side channel, where, passing through small lakes, it would fall sheer 700 feet into the ancient valley; this actually happens on a small scale when the river is in freshet.

Climate. — The climate of Labrador varies from cold temperate in the south to Arctic on the northern highlands and about the shores of Hudson Strait; it is generally so rigorous that it is doubtful if the country will ever be fit for agriculture except in the southern val¬

leys and on the low lands fronting the southern part of Hudson Bay. In the interior the mer¬

cury often drops to — 50° F. during the winter.

Forests. — The southern half of the penin¬

sula is included in the sub-Arctic forest belt, which contains the following trees : White birch, aspen, balsam, poplar, cedar, banksian pine, white and black spruce, balsam fir and larch. The forest is continuous over the south¬

ern interior ; to the northward of latitude 54°

N. the higher hills are treeless, open glades appear and the trees branch from the ground.

Proceeding north the size and number of the treeless areas increase rapidly until trees to¬

tally disappear on the northern third. At least one-half of the forests has been destroyed by frequent fires.

Resources. — Among the resources of the peninsula are the fur-bearing animals, all prized for their dark glossy pelts and all fairly nu¬

merous throughout the region. Of these the most valuable are the silver fox, marten, otter, mink, beaver, cross, red and white foxes and white and black bears. The barren-ground caribou of the interior and seals along the coasts are the chief source of animal food for the natives.

Fisheries. — The cod and salmon fisheries of the Atlantic coast have long been sources of wealth to Newfoundland. The fisheries of Hudson Strait and Hudson Bay are still unde¬

veloped, but enough is known of them to pre¬

dict their future great value. All the lakes and streams of the interior swarm with su¬

perior food fishes, including land-locked sal¬

mon, lake and brook trout, whitefish, pike and pickerel.

Minerals. — The mineral wealth of the pen¬

insula is totally undeveloped. Immense depos¬

its of valuable iron ore have been found in the interior and along the northern and western coasts. Over great areas are found rocks simi¬

lar to those from which the more precious met¬

als — gold, silver, copper and nickel — are taken in southern parts of Canada and they only await discovery by the prospector.

Population. — The total population is about 14,000, of which 8,000 are whites, living along the southern and eastern shores. The remain¬

ing 6,000 are Indians and Eskimos, the former being confined to the wooded country, while the Eskimos live along the northern coasts and on the northern barrens of the interior.

Government. — A strip of land along the Atlantic coast, extending from Blanc Sablon on the Strait of Belle Isle to Cape Chidley, is un¬

der the jurisdiction of the government of New¬

foundland. The province of Quebec has juris¬

diction over the remainder of the peninsula.

A. P. Low,

Of the Geological Survey of Canada.

LABRADOR DUCK, a rather small,

handsome sea-duck (Camptolcemus labradorius) , allied to the eiders, of the northeastern Ameri¬

can coa9t; it bred in Labrador, and migrated in winter as far south as Chesapeake Bay, but was never very numerous, and became extinct about 1875, leaving only about 35 specimen-skins in the museums of the world. No very satis¬

factory theory exists to account for the closure of

the species, since the fault does not seem chargeable to excessive shooting or disturbance of breeding-places. The race seemed to be waning, and an epidemic of disease or some weather-disaster destroying many eggs and young may have been a final blow. The last one seems to have been killed in 1875. Consult Stejneger, (Birds) (Vol. IV, of Standard Nat¬

ural History,) 1885) ; Lucas, (Annual Report Smithsonian Institution,* 1888; Dutcher, article in The Auk (January 1894).

LABRADOR TEA, or MARSH TEA,

either of two species of heath of the genus Ledum (L . latifolium and L. palustre). They grow in the northern parts of both Europe and America, and are low shrubs with alternate entire leaves clothed underneath with rusty wool. The fragrant crushed leaves are used by the natives of Labrador as a substitute for tea, and were used by Franklin in his expedi-

tion of 1819-22. They possess narcotic prop¬

erties, render beer heady and are used in Rus¬

sia in the manufacture of leather, yielding an oil known to druggists as ledum oil, rich in tannin and resinous properties. The plant finds a place in medicine as an astringent and tonic.

LABRADORITE, a plagioclase feldspar

of the albite-anorthite series, corresponding chiefly to AbiAn3. (See Feldspars).. It is, therefore, a silicate of aluminum, calcium and sodium. It has a hardness of 5 to 6 and a specific gravity of 2.73. It ordinarily occurs in cleavable or granular masses, or as an essen¬

tial constituent of certain basic eruptive rocks, such as norite, gabbro, diabase, basalt, dolerite or andesite. In these it is associated with some member of the pyroxene or amphibole groups.

Labradorite abounds in the Adirondacks, but its type locality is along the coast of Labrador, where it occurs in pure masses of enormous size which exhibit a wonderful change of colors, from dull gray to a gorgeous blue, or more rarely green, copper-red, purple or yellow. It has been used as an ornamental stone, espe¬

cially in inlaid work.

LABRID.ZE, a family of marine fishes, the wrasses, representing the highly specialized sub¬

order Pharyngognathi by a large number of beautiful and useful species inhabiting all the warmer seas, and traceable as far back as the Eocene period. These are brilliantly colored fishes, usually elongate in form and of large size, with cycloid scales and thick fleshy lips.

There are powerful teeth on the margins of the jaws, but none on the palate; while the united lower pharyngeals are much thickened and form a plate beset with rounded, rarely acuminate grinding-teeth. The upper pharyngeals are usu¬

ally separate, bearing similar teeth. Jordan enumerates 60 genera and 450 species, "chiefly of the tropical seas, living among rocks or kelp.® The typical genus Labrus is almost wholly European. The principal genera repre¬

sented in American waters are Ctenolabrus (dinners), Tautoga (tautogs), Harpe (lady-

fishes), Pimelometopon (fatheads), and Iridio (doncellas) ; and by some authors the parrot-

fishes (Scaridce) are included.

LABUAN, la-boo-an', an island of the

Malay Archipelago, in the administration of the Straits Settlement, belonging to Great Britain, situated 6 miles off the northwest coast of Borneo; about 12 miles in greatest length by 7 miles in greatest breadth ; area, 28j-> square miles. It is mostly low and marshy, and not very fertile; the climate is hot and humid, but the island is well supplied with water with an annual rainfall of 168 inches, and has a good harbor at the settlement of Victoria (the capi¬

tal; pop. 1,500) on its southeast side. Coal of excellent quality is plentiful, and has been mined for many years. Pop. estimated, 6,746, mostly Malays.

LABURNUM, GOLDEN-CHAIN, or

BEAN-TREE, a genus of trees and shrubs of the order Leguminosce . The few species, which are natives of southern Europe and western Asia, are characterized by trifoliate leaves and brilliant yellow blossoms in pendulous many-

flowered racemes produced during late spring and early summer. The larger species yield a very hard, heavy, tough, fine-grained, dark green or brown wood, which can be highly polished and is valued for inlaying, cabinet work, turning, etc. The species are also prized for ornamental planting in shrubberies, not only for their flowers, but also for their glossy foliage, which remains green until late in the autumn. No part of the plant is relished by insects, and all parts, but particularly the seeds, are reputed poisonous, containing cytisine, a purgative and narcotic. Nevertheless the young stems are greedily eaten by rabbits and hares, and may thus be made to serve as a sacrificial protection to other shrub¬

bery. The best-known species, probably, is the English laburnum (L. vulgare), which some¬

times attains a height of 40 feet but usually not more than 20 feet. It is hardy nearly as far north

as Massachusetts. The Scotch la¬

burnum (L. alpinum) is hardier, more erect and rigid, bears broader leaves and much longer and slenderer racemes of dark yellow flowers, and continues in blossom about two weeks later than the preceding. In America they are known as golden-chain or bean-tree. By some botanists it is considered only a form or variety of L. vulgare. Laburnums thrive in any well-

drained soil in either partial shade or full sun.

They are readily propagated by seeds generally spring-sown, and also by layers. Choice vari¬

eties, of which there are many, are grafted upon seedlings.

LABYRINTH, a structure having many

intricate, winding passages ; specifically, the legendary labyrinth of Crete, out of which no one could find his way, but became the prey of the Minotaur. This Greek legend has been interpreted as a sun-myth, and in various other ways, but excavations in Crete since 1900 have shown its foundation in fact, and have local¬

ized the labyrinth beyond reasonable doubt in the ruined "palace® of the Minoan kingdom at Knossos, near Candia. Minos may probably be regarded as a title, like Pharaoh or Caesar, for a line of kings ; but the legend of the Minotaur seems to refer to an individual, one of the sea-kings of Crete whose period was about 2000 b.c. This king's son, according to the legend, went to Athens to contend in the games, and becoming victor was murdered by direction of the Athenian king, yEgeus. There¬

upon Minos sent a fleet which subjugated Athens. One condition of the peace was that thereafter, in every ninth year, seven youths and seven maidens should be sent to Crete by Athens, to become the prey of the Minotaur —a monster half (human, half bull. When the second time for this ghastly tribute arrived a hero

of great prowess, Theseus, volunteered to go. Arrived in Crete he and his companions were immured in a great prison — the Laby¬

rinth; but Ariadne, the daughter of Minos, enamored of Theseus, gave him a sword with which to kill the Minotaur, and a thread to unwind as he was led into the prison-maze, by means of which he could find his way out.

The plan succeeded. Theseus and his fellow captives escaped, and the tribute cease'd.

When the royal house at Knossos came to be excavated, first by. Dr. A. J. Evans in 1900, it was found, "with its long corridors and repeated succession of blind galleries, its tor¬

tuous passages and spacious underground con¬

duit, its bewildering system of small chambers,®

that it does, in fact, present many of the char¬

acteristics of a maze. Throughout the ruins of

this ancl all other Minoan buildings, the design ' called the (

The coincidence of this term with (

together with other evidences of the connec¬

tion of ideas, makes indubitable in the minds of antiquaries that the labyrinth of the legend was this very building. The chief god of the Minoan cult was represented as a bull. Once every nine vears the reigning king was obliged to go into the Dictaean Cave (near the present town Lyttos) and renew communication with heaven. It is thought probable that human sacrifices may have been offered to the divinity in the cave on these occasions; that probably captives would be slain rather than

citizens ; and that the Athenian youths were destined to this sacrifice. Another theory is that vigorous war-captives were resei ved for the national sport of the bull-ring, in which an athlete seized by the horns a charging bull, then skil¬

fully vaulted to safety over the animal's back.

Both men and women acted in this dangerous ^bull-grappling® ; and captives were probably kept and trained as toreadors for the amuse¬

ment of the populace.

A vast and wonderful temple in Egypt, con¬

structed by Amenemhat III at Hawara, about the time when the Minoan kingdom was in the height of its power, came to be called Labyrinth by the time Herodotus visited it, evidently in allusion to the similarly vast and complicated edifice at Knossas. More recent labyrinths are small, and often merely ornamental in their purpose. That at Clusium, in Italy, was erected by the Etruscans, according to Varro, for the sepulchre of King Porsenna. Imitations of labyrinths, called mazes, were once fashionable in gardening. They were made of hedges ; the best known is that at Hampton Court, near London. Consult for the Cretan labyrinth, be¬

sides the reports of exploration, Mosso, (Nu Palaces of Crete* ; Baikie, (Nu Sea-Kings of Crete) (London 1913)

LABYRINTH, The. In

((Le Dedale*), played in 1903, Paul Hervieu, the most logical and abstract of contemporary French dramatists, has developed a theme sug¬

gested five years earlier by Brieux in (The Cradle * ((Le Berceau)). What, both writers ask, will be the results of divorce and remarriage when a wife meets again her first husband at the sick bed of their child? Will she revert to the first husband or remain true to the second? Will the husbands contend

to the death or be reconciled? According to both playwrights, the wife's reversion to the father of her child is inevitable, but Hervieu has sharpened the conflict and given it a tragic conclusion. Marianne, having divorced her temperamental Max, has married the brusque but correct Guillaume. Max resents the rigor¬

ous education proposed for his son by Guillaume, and Marianne, to avoid legal complications, agrees that the boy shall visit his father. . Dur¬

ing this visit, little Louis falls ill, and Marianne, summoned to attend him, is thrown daily into the closest companionship with her former husband. In their mutual relief after an agony of anxiety, they forgot everything except their original love. When Marianne confesses her error to her parents and to Guillaume, the

latter is enraged, but her mother excuses her deed as only natural. Since divorce is reli¬

giously unlawful, Marianne has never been truly wedded to her second husband. Guillaume is now ready to renounce her, upon condition that Max will do as much. But Max, refusing, taunts his rival ; and, as the two men clinch, they fall from a cliff into the Rhone. Although the play is strongly emotional in its crises, it is little more than the illustration of an idea, every word and scene being nicely adapted to that end. Its characters live, only to confirm the playwright's thesis. The piece was played in English in 1905 ; it may be read in the trans¬

lation of B. H. Clark and L. MacClintock, pub¬

lished in 1913.

Frank W. Chandler.

LABYRINTHODONTA, or STEGO-

CEPHALI, a group of primitive four-footed animals, forerunners of modern amphibians and reptiles, whose

remains are found fossil in Peruvian, Carboniferous and Triassic strata, and which are the oldest known lung-breathing terrestrial quadrupeds. They were first discov¬

ered through finding their footprints imprinted in the Triassic rocks (Keuper beds) of Ger¬

many, long before the actual fossilized remains were brought to light. The footprints were described at first as those of a hypothetical form to which the name Cheirotherium (<(hand beast®) was given. As geological science and research progressed, the remains of the laby-

rinthodonts were discovered, when a compar¬

ison of their structure with the footprints showed that some of the latter were made by these creatures ; many of the tracks, however, are unidentified. Later, when a great variety of related remains had been discovered, the term Labyrinthodonta, which relates to the curi¬

ous (

This suborder contains highly developed and mostly large forms, characterized by the com¬

plication in tooth structure above mentioned, and by co-ordinate anatomical distinctions. The principal genera are Laxomma, T rematosaurus, Metopias, Capitosaurus, Mastodonsaurus and Labyrinthodon, the last including the most re¬

cent forms of the Upper Trias, at the close of which period the group appears to have be¬

come extinct. See Stegocephalia.

LAC is the product of one of the scale-

insects (Coccus , or Tachardia, lacca) of the family Coccidcc, which is the source of an im¬

portant Oriental industry. This species, like other

scale-insects, multiples with amazing rapidity, and feeds in compact colonies of tens of thousands, carrying the twigs of certain trees, especially the banyan or ((religious® fig and related species of Fious, the dhak ' Butea frondosa) and some other trees in India and Assam, and on privet trees in Yunnan and Szchuen provinces in southwestern China. In¬

serting their beaks into the bark females of these insects suck the sap, a large part of which passes out as excrement, transformed into a sort of resin that accumulates over the insect's back and forms the (

off, is known as "stick lac." By tieing a few of these sticks on fresh parts of trees the natives induce the insects to spread to and over fresh branches, and thus obtain two crops a year. The industry is a very ancient one and gives a living to a large number of people; and the value of lac products exported from India alone approaches 35,000,000 of rupees (about $17,500,000) annually. The best lac comes from Bengal and the central provinces.

The original method of preparing the lac for use and market was by pulverizing the in¬

sect-covered twigs, at the proper time, and placing the fragments in hot water. This separated the scales from the wood, softened the resin, and dissolved the coloring-matter of their interior tissues, especially strong in the egg-sacks. The remains of the insects are then taken out and dried; and this operation of washing and drying is repeated until the resin from the melted scales is (or ought to be) entirely colorless. The mass is then put into a bag of coarse cotton cloth which is held near enough a fire to melt the lac, and is squeezed by twisting. The melted resin drips on small sticks arranged to receive it, and con¬

geals into thin, light-colored, transparent flakes called shell-lac, the shellac of commerce. Large and small drops falling on the ground form button-lac, lump-lac, and so forth. Latterly this work has been done by machines made to grind the sticks, and melt and wash the mate¬

rial in steam-heated apparatus, which quickens the process and improves the product.

The water in which the first washings are made is deeply reddened by the dissolved color¬

ing-matter in the insects. This water is saved, strained and evaporated, or cleared by the aid of alum, and the residue is deposited. This, when dried, is molded into cakes that furnish a rich dye. Previous to the invention of aniline colors this was very valuable, but now, like cochineal, it has nearly disappeared from trade.

It furnishes, however, the basis of many "lake"

tints among artist's colors, particularly the exquisite carmine-lake. "Lake" is a modified form of the Sanskrit (and modern Hindu) word lak, or lac, which means a hundred thou¬

sand, and here refers to the multitude of insects in a colony; it is also familiar to us in the financial term lakh, meaning 100,000 rupees.

Lac is of great value for making varnish, because easily dissolved, furnishing a hard coating susceptible of fine polish, and easily taking a dye. The Indian, Burmese and Chi¬

nese use it for making and coating ornaments, and various artistic objects, usually rich in color. It also enters into the composition of the fancy sealing wax sold by stationers, and serves other useful purposes ; but it must not be con¬

founded with lacquer (q.v.), an Oriental vege¬

table product that resembles lac, when applied as a

coating of boxes, bowls, etc.

LAC, or LAK, from the Sanskrit laksha, or laksha, that is, 100,000. In the East Indies it is applied to the computation of money.

Thus, a lac of rupees is 100,000 rupees. A lac is equal to about $46,350. A lac of Sicca rupees was equal to about $50,000; 100 lacs, or 10,000,000 rupees, make a crore. In 1835

the British government remodeled the currency of India, establishing a more uniform system, and the value of the rupee is now fixed at 32

cents (15 to the sterling £), divided into 16

annas of 12 pies.

LACAILLE, Nicolas Louis de, ne-ko-la

loo-e de la-ka-e, French mathematician and as¬

tronomer: b. Rumigny, France, 15 March 1713; d. Paris. 21 March 1762. He was educated for the Church, but soon renounced theology for astronomy. He took an important part in the work of measuring an arc of the meridian, and in 1746 was appointed professor of mathematics in the College Mazarin. In 1751 he went to the Cape of Good Hope at the expense of the gov¬

ernment, where he determined the position of some 10,000 stars with -wonderful accuracy. As his departure from the Cape was delayed, he employed the interval in measuring a degree of the southern - hemisphere. His works on geom¬

etry, mechanics, astronomy and optics were nu¬

merous. Among them are (Legons d'astrono-

mie) and (Astronomiae Fundamental (Ccelum Australe StellifernP ; (Journal historique du voyage fait au Cap de Bonne EsperanceP

LACANDONES, la-kan-do'nes, an Indian

tribe living in Guatemala and Mexico. At one time numerous and powerful, they waged war against the whites. They are now about 300

left, of whom a part are friendly to the white people, though retaining their native customs.

LACAZE - DUTHIERS, la'kaz-dii'tya,

Henri de, French comparative zoologist: b.

Montpozat, 15 May 1821 ; d. Las Fous, 21 July 1901. He studied medicine at Paris and re¬

ceived (1854) the degree of professor of zool¬

ogy at Lille, and was appointed to the chair (1865) of zoology at the Paris Museum of Nat¬

ural History and (1868) at the university there.

He edited, from 1872, (Archives de zoologie generale et experimentale^ and directed the Zoological Station at Roscoff, which he founded (1873) on the Brittany coast. In 1881 he started the Laboratoire Arago at Banyuls on the Med¬

iterranean. For a number of years he devoted -his researches to the study of the comparative anatomy of aquatic life, especially molluscs, and wrote, among other works, (Histoire naturelle du CoraiP (1864) ; (Le monde de la mer et ses laboratoires) (1889). His letters to Alex¬

ander Dedekind appeared in 1902 (Paris).

LACCADIVE (lak'a-div) ISLES, a group

of small coral islands in the Indian Ocean, about 200 miles off the west coast of Malabar and politically part of the Madras Presidency.

They form 17 separate reefs, containing, how¬

ever, but 14 islands, only 9 of which are in¬

habited. The surface soil is naturally so bar¬

ren that there is little or no spontaneous vege¬

tation on the majority of the islands, and their prosperity must ever depend on the cultivation of the coconut. The natives of these islands, a race of Mohammedans called Moplas (of mixed Hindu and Arab descent), are mild and inoffensive and dwell in low, thatched, stone-

built houses, and live poorly. Vasco de Gama discovered these islands in 1498. They were ceded to the British in 1792. Pop. 10,600.

LACCOLITH, lak o-lith, or LACCOLITE

(Greek, "stone-pit"), a mushroom-shaped mass of molten rock which 'has been forced along bedding planes, between layers of sedimentary rock, and which has arched up the overlying beds into a dome. It differs from a sill in that a sill does not produce doming of the over-

lying bed. The Henry Mountains of Utah afford a famous example of a group of laccoliths.

LACE, a cobweb background of threads

with delicate patterns of flowers, figures and scrolls, also of threads, and used for ruffs, cuffs, collars, caps, scarves, handkerchiefs, cravats and aprons, and to trim articles of clothing, was first made in the 16th century.

It reached perfection in the 17th and 18th cen¬

turies and deteriorated after the introduction of machinery. The word comes from laris, meaning braid. The translators of the Bible used the word lace to denote braid. This defini¬

tion survives in the gold and silver lace on uniforms and liveries. What is now called lace was anciently called "cut-work,® "purls® and "points.® It was also known as passament or passemerit; and passenient dentele (from the French dent, tooth) occurs in the inventory of Henri II of France (1547-1559) . Dentelle de Florence, occurring in an inventory of 1545, in¬

troduces the French word for lace — dentelle.

The word guipure, applied to all large patterned and coarse laces which have no threads joining pattern to pattern and no delicate net back¬

ground, was also anciently used for braid. The tape guipures of Italy and France were famous.

Before the days of point-lace and pillow-lace people wore "cut-work® and "drawn-thread work,® also known as reticella, point gotico and needle-point gotico. Its effect is much the same as that of diaphanous lace.

Reticella, or cut-work, originated in the Ionian Islands and spread thence to Italy and throughout Europe. Reticella was made from about 1480 to 1620. The patterns, handed down for generations, are stiff and geometrical and consist of circles, triangles and wheels, often decorated with tiny, spiky knots. Reticella was largely used for collars and cuffs and to edge ruffs and handkerchiefs. It appears in por¬

traits of the 15th and 16th centuries and in old pattern-books. Laris, which also antedated filmy lace, was the darned netting, or "spider-

work,® known as filet. It was popular in Italy.

One of its names is "Siena Point.® The pat¬

tern was darned with the needle upon a plain ground of coarse net. Laris was made in squares and stripes and then joined. It was muc'h used for household decoration. Catherine de'Medici had a bed draped, with such squares.

Laris was sometimes combined with reticella, as the pattern book of Isabella Catanea Para-

sole (1616) shows.

Filmy lace appeared in the 16th century and in Italy. Antiquaries have sought in vain for its origin. It was probably an effort to imitate by woven threads the exquisite cut-linen that had reached perfection in Italy. There are but two classes of this diaphanous fabric: one, made with the needle; the other, with bobbins.

The first variety is called point-lace, or needle¬

point; and the second, pillow-lace. Point takes its name from the French point (stitch). The French call it point d'aiguille (point of . the needle). By extension, "pom/® has been given to a few laces of high quality to denote their excellence, such as point d'Angleterre , point de Valenciennes, point de Malines and punto di Milano, which are not made with the needle, but are bobbin (or pillow) laces. This produces more confusion regarding the classification of lace, already made difficult by the term pillow-

lace instead of bobbin lace. As the pillow is also used for making point-lace, the name pil¬

low-lace is misleading; but the classification of point and pillow is, however, too well estab¬

lished to admit of any change. The technical words used to describe lace are French. In both point and pillow the groundwork consists of a net of fine threads called reseau; or, in¬

stead of this reseau, slender threads called brides connect the patterns with each other.

These brides are sometimes tipped here and there with little spiky knots, called picots. The edge, or border, is often decorated also with these picots. In some laces the background consists of both reseau and brides. The solid part of the design is called toile. In point there is but one kind of stitch, —

the old familiar button-hole, or looped; and no matter from what country the lace comes, or how intricate, oi how solid its pattern, or how fine its reseau, every stitch is the button-hole. If brides occur, they are also button-holed over, and if picot ornamentation is used, that, too, is button-holed over.

Pillow-laces are divided into two classes : (1) the pattern is first made on the pillow and the reseau filled in afterward; (2) pattern and reseau made in one continuous piece. Charles Blanc shows the difference as follows: "The dominant character of pillow-lace is the soft blending of its forms. The needle is to the bobbin what the pencil point is to the stump.

The pattern softened when wrought in pillow-

lace is depicted with crispness by the needle.®

Pillow-lace is produced by the intercrossing and plaiting of the threads which are rolled at one end around bobbins and fastened at the other upon a cushion by means of pins. Bob¬

bins are elongated spindles, tapering and swell¬

ing into little handles. They are made of wood, bone, or lead. They vary in size according to the thickness of the threads; and the more delicate the lace the greater the number of bobbins. A pattern is pricked out by pins on the pillow to guide the worker. The pillow varies in size and shape.

Italian Point. — Italian Point lace, poet¬

ically called Punta in Aria (stitches in the air), was developed in Venice. The graceful scrolls and lovely flowers of the earliest lace resemble the arabesques of Persian ornament. Venetian Point is the richest and most beautiful of all laces. There are three classes: (1) Venetian Raised Point and Venetian Rose Point; (2) Venetian Flat Point (including the famous Coralline), and (3) Venetian Grounded Point (including Punta di Burano). Venetian

Raised Point has large fantastic flowers issuing from rich scrolls and foliage in the Renaissance style.

These designs are outlined with a heavy, padded thread, called cordonnet, button-holed over.

The designs are connected by brides and often decorated with picots. Rose Point has smaller patterns and more brides and more picots. It has a whirling, snowy effect and is also called Point de Neige in consequence. (2) Venetian Flat Point has no cordonnet; but brides and picots are plentiful. Coralline Point represents a tangle of seaweed; and, though lacking in clear outlines, is extremely beautiful. Venetian Grounded Point has a net background. It was inspired by the new Point d'Alengon, which the 628

LACE

French had created in imitation of Venetian Raised Point. The pattern of Venetian

Grounded Point is usually the lily and the edge is a shallow scallop. It has a cordonnet, stitched down around the outline of the pattern. Burano was the chief place where this Grounded Point was made, and it was manufactured there until the beginning of the 19th century. In 1872

Burano lace was revived under the patronage of the king and queen of Italy. The Burano makers copied the Point d' Along on designs and also the square mes'h of the reseau. The un¬

evenness of the thread gives Burano ground a somewhat cloudy appearance, which aids in identifying it.

Italian Pillow Lace. — Milan and Genoa were also famous marts for lace. The most beautiful of all Italian pillow-laces is punta di Milano, or Milan point (the name describing the quality). The tape pattern was made first and the ground net-work filled in afterward.

The meshes of this net are diamond shaped with a plait of four threads. The Genoese lace was of two kinds: (1) a ((tape guipure,® the tape arranged in spirals connected with brides and decorated with picots, and (2) pointed scallops decorated with little ornaments called "wheat-ears.® Genoese lace was much used for collars and cuffs and appears in portraits by Rubens, Van Dyck, Rembrandt and Frans Hals, as well as in portraits by Italian masters.

French Point Lace. — <(Venetian points,® or "points,® were bought by the wealthy and fas¬

tidious of high degree throughout Europe. To encourage home industry, Colbert, Prime Min¬

ister of Louis XIV, established a school at Alengon with lace-makers from Venice. Point d'Alengon was at first an exact imitation of Venetian Raised Point; but after a time the French invented a beautiful reseau in imitation of the bobbin net-work ground of Flemish lace. This was an entirely new idea, for point lace had never before been grounded on net ; and, as noted above, the Venetians, hoping to win back their trade, imitated the Point d'Alen¬

gon in their Venetian Grounded Point, or Point de Venise d reseau. Point d'Alengon is called "the Queen of lace.® It was first made in 1665.

By royal decree it was called (cPoint de France .®

The effect of this lace is delicacy; but the wonder of it can only be appreciated by apply¬

ing a magnifying-glass. How human fingers can execute such delicate and minute stitches is beyond understanding. The average size of a diagonal taken from angle to angle in an Alengon hexagon is about one-sixth of an inch and each side of the hexagon is about one-tenth of an inch. An idea of the minuteness of the work can be gathered from the fact that a side of the hexagon is overcast with 9 or 10 but¬

ton-hole stitches. One characteristic of Point

d'Alengon is a heavy outline (cordonnet) but¬

ton-holed over horsehair, which makes it firmer and heavier than any other fine lace. The de¬

signs are flowers, foliage, scrolls and arabesques, in the style of the decoration of the period.

Spots, tears, sprigs and insects were used for designs in the days of Louis XVI. The fac¬

tory became extinct during the Revolution. It was revived by Napoleon, when Bonaparte bees were used for motives in combination with flowers. This superb lace has always com¬

manded fabulous prices. The Empress Eugenie had a dress of Point d'Alengon, for which Napoleon III paid 200,000 francs ($40,000) in 1859. In later years she gave it to Pope Leo XIII, who wore it as a rochet.

Argentan was established at the same time as Alengon and also produced lace in imitation of Venetian Point. It can only be distinguished from Alengon after Alengon adopted the reseau.

Argentan kept to the bride ground of a six-sided mesh worked over with button-holed stitches.

The large bride ground could support bolder and larger flowers and in heavier and higher relief than the reseau ground. The bride picotee is also a characteristic of the Argentan Point. Checked by the Revolution, it was re¬

vived in 1810; but in 1830 cotton, instead of linen thread, was used and debased the quality.

Argentan Point became rare about 1858 and the secret of making it was lost in 1869. Although France borrowed the technique of lace-making from Italy, she put her own stamp upon it, and gradually brought it to such perfection that both Point d'Alengon and Point d' Argentan enjoyed enormous vogue. Other workshops were

founded at Le Quesnoy, Arras, Rheims, Paris and Sedan.

French Pillow Lace. — Ten years before Colbert made French lace such an item of trade Le Puy had become a centre for lace¬

making, and the Duchesse de Longueville, Conde's sister, had established lace-makers at Chantilly. Le Puy was the oldest lace-centre in France. It was noted for its thread laces and silk guipures. These guipures were made in bands, for which designs of geometric char¬

acter, squares, stars and formal blossoms were used. Some of the Le Puy laces were known as "guipures de Cluny,® from the Cluny Museum in Paris. Flax, silk, worsted, goat's hair and Angora rabbits' hair were used with equal facility at Le Puy.

Valenciennes is the most beautiful of all French pillow laces. Bobbin lace was made in Valenciennes in the 15th century, when the town belonged to Flemish Hainault. After Colbert founded Le Quesnoy the lace industry at Valen¬

ciennes revived and supplanted that in the neighboring town. Owing to the number of bobbins required, Valenciennes was the most expensive of all pillow-lace, though the workers who sat in dark cellars from four in the morn¬

ing until eight at night, with only a little light concentrated on the pillow, received but a few pennies a day. Many went blind. A piece of lace "worked all by the same hand,® therefore, was rare and commanded a large sum. In the town was made what the trade called "true Valenciennes® and in the suburbs "false Valen¬

ciennes® was produced. At the Revolution many workers fled into Belgium and settled in Alost, Ypres, Ghent, Menin, Courtrai and Bruges. Every town made a characteristic reseau. Valenciennes was revived, but the mod¬

ern productions are not so fine as old Valen¬

ciennes. In the 18th century Valenciennes was much used for ruffles, cravats and trimmings.

It was not regarded as a lace for full dress, nor was it a Church lace. Valenciennes is all made in one piece, the threads forming a continuous reseau and toile. There is no cordonnet. The reseau is composed of circles in the earliest ex¬

amples, but of squares in later examples. The flowers in early examples are tulips, anemones, iris, or carnations and have almost the appear¬

ance of cambric. Later specimens usually have LACE

Emrfmxr /$**'& •$£ ■Jfci£3tE*Zs- %* ■ &£

i •#«wJ6&tTii/^!'^ $&»£&£&$;**■

priMI

aw«niife'

ffipS&VVW' i<*'fi'-«ffl :

4-. w . *V':'^5S^y^0 *

m*#:m*miflmaee*

^lti&«e!@i£SKte£

"5™? ' IF /' "jg< Jjjfc < ^0

wf/*'4ra» raaJSS

liJSfc'i ,r ^giSjjBte K itesR

c^uMn^;

|*j$? ifs^vk' • ** $*?3®

>Si;

-^fiS^SSfe • •

wi«

-'^ri ^

rfsftraife

1 English 1780 Honiton bobbin 2 French early 18th century needlepoint. Flounce-Point de France detail LACE

^ &&&!+$ V^?

•*. . »>vx—>' . ■«• in Hm*,

<•: ft Vi £ >

y., ■&>?&**. it

v * * '

mm

mSS#

:*M ' W®$

yww

mm#-* .-~*v

► A* aV*

Sssh*~ •'•'"”

S-'sasKfe"*

teVsSSfiffSSt

iOT

• ...

1 Italian 16th and 17th centuries needlepoint 2 French late 18th century Valenciennes bobbin 3 French early 18th century needlepoint. Point d'Argentan 4 French late 18th century bobbin. Valenciennes — enlarged detail LACE

,\v;«vV.v.

mmwrw

. * >v-**$f; ip;

>*• J%C.

r ^,vv-v-

m

ML :• ?• sis

■ 5

••M^'v-^:" W'ai^

'% i4if'

»■• -W"

J

■i£k;

£V SC* >• -w m

w v> Jr

• * Vi -v.

m >**/% f

"#4

JW

M

WPw?

,'4v,< * r ^r :' *

fii'-il 2

5£f$$£

%->< .< * *5<

,*$11

35 «•

C< V

• ,M « 38 »

V," > ■ • .'

yv- : , v m

:>;■ ■ . 1 fv^BSS

v %•<** ,

•Vi 2 ■ ■■ V

4f^

mff:yw.

h M**- " *1

cfef*

Flemish 18th century bobbin

LACE

W ' '

| *

-w>

II®:

■ » Vi « » V » • • '» » • • »« » 'i > ' , X Italian 18th century needlepoint in relief. Gros Point de Venise 2, 3, 4 Flemish 18th century bobbin

LACE

629

a scalloped border containing a leaf, petal or leather, and the rSseau is sprinkled with dots.

Machinery has imitated this lace very success¬

fully and a vast amount of it is sold. It is commonly called ((Val.»

Chantilly. — Chantilly was also famous for its lace. After having produced lace of second-

rate value of the Valenciennes and Mechlin type, Chantilly suddenly achieved reputation by making silk lace, especially black. The mate¬

rial used was a silk, called grenadine cl' Alois.

The peculiar twist in spinning these threads so diminished the lustre that people frequently imagine Chantilly is made of flax, dyed black.

The rescan is a six-pointed star known as i{Fond Chant A an abbreviation of Chantilly, often used by other workshops. Chantilly also used the Alenqon ground and sometimes used the Alengon and the Fond Chant in the same piece. ^ The patterns of old Chantilly (whether in white or black) were often of vases of flow¬

ers and other decorations similar to ornaments on Chantilly pottery. Chantilly lace ceased to be made during the Revolution, but was popu¬

lar again under the Empire, when ((blonde)) lace became the rage in Paris. Chantilly was first made in bands and invisibly joined. After 1840 (in the reign of Louis Philippe) it en¬

joyed great favor and large pieces were made, such as shawls, fichus and bridal-veils, and smaller articles such as ((barbesP parasol-

covers, handkerchiefs, fan-mounts, etc. In the days of Napoleon III flounces and dresses and all other articles of Chantilly were made even more popular by the Empress Eugenie and they found a large market among wealthy Ameri¬

cans. In 1870 the workshops became bankrupt.

Modern Chantilly is made at Calvados, Caen and Bayeux.

Bayeux. — Bayeux made exquisite black lace in which the elaborate patterns of flowers and other ornaments are rendered with the utmost delicacy of shading. At first Bayeux made lace in the Venetian style, then it followed the styles of Chantilly, and so beautifully that experts are puzzled to tell the difference. Many so-called <(Chantilly shawls® were made in Bayeux, but are none the less valuable for that.

Blonde. — Blonde lace came in fashion about 1745. . It was made of unbleached silk im¬

ported from Nankin, whence the name ((nan-

kins,® as well as ((blondes.® Soon the French made it of white and black silk. Marie An¬

toinette gave it special vogue. Blonde lace was made at Chantilly, Le Puy, Bayeux and Caen.

Spain almost made it her own lace ; but old Spanish blondes do not equal those of Chantilly and Bayeux. Of blonde are made the Spanish mantillas that so gracefully drape the heads of the Spanish women. Those of white are worn on full dress occasions only ; black blonde is used for <(second-best.® During the Second Empire, owing to the taste of the Em¬

press Eugenie, the big Spanish floral designs were made in the French workshops. These patterns have never gone out of favor.

Spanish Lace. — Spanish blonde is the

typical lace of Spain. Barcelona early attained a reputation for it and is still the centre for its manufacture. Comparatively little is known re¬

garding Spanish lace, for it has not been studied so thoroughly as the lace of other countries.

We know, however, that cut-work (reticella) and

lads were made in Spain in the 1 5th and 16th centuries and that ((Spanish Point® was as celebrated in its day as the ((Points® of Italy or France. Regarding it Mrs. Palliser says: (

inally. It was imported for the Spanish churches and then imitated in the convents by the nuns, but was little known to the commercial world of Europe until the dissolution of the Spanish monasteries in 1830, when the most splendid specimens of nuns' work came sud¬

denly into the market, not only the heavy lace generally designated as Spanish Point, but pieces of the very finest description (like Point de Venise), so exquisite as to have been the work only of those whose time was not money and whose devotion to the Church and to their favorite saints rendered this work a labor of love.® A great deal of fine lace went to Spain from Flanders; for in the 16th century Flanders was a part of the Spanish domain and the Em¬

peror Charles V, therefore, ruled both coun-

tries. He, a native of Ghent, preferred the Netherlands to Spain and brought here as much of his native atmosphere as possible. Tapestry

weavers, lace-makers, embroiderers, furniture-

makers and other artists were transported in large numbers and Spanish workers were also sent to the Netherlands. Consequently, there was an interchange of styles between the two countries.

Flemish Lace. — Flanders was superior to all other countries in its flax and the fineness of the linen thread the people were able to pro¬

duce. An immense quantity of bobbin (or pillow) lace had been made in this country from an early period, and also ((tape guipure®

(the tape following the lines of the pattern and connected by brides), lightened by holes called

<(bird's eye® (single, or arranged in groups). As soon as Alenqon began to succeed, Flanders began to make artistic needle-point, too.

Brussels Point and Pillow.— The Needle¬

point made in Brussels from about 1720 closely resembled Alen^on in pattern and in general effect ; but it was not so firm, and the toile was looser than Alengon and the button-hole stitched cordonnet (so distinctive of Alengon) was ab¬

sent in Brussels. The fineness of the thread was almost fabulous.

It had to be spun in dark, cold, underground rooms, for light and heat were said to hurt it.

The earliest patterns of Brussels Point resem¬

ble the Venetian and the Alengon designs; and as Brussels lace enjoyed such patronage at the French court it followed the ornamentation in fashion. Brussels lace of the days of Louis XIV shows the designs of Marot, Berain and Lepautre ; in the days of Louis XV zig-zags, pagodas and Chinese figures appear ; then come leaves and flowers (particularly the pink, tulip and rose), insects, birds, trophies, feath¬

ers and striped ribbons of the Louis XVI pe¬

riod ; and then the pseudo-classic motives of the Napoleonic period, as well as flowers, sprigs, wreaths, columns, stars, crosses and spots. The palm and pyramid were also frequent during the empire. Brussels Needle-point was and is still known as point gaze. It is famous for the variety of its patterns, the great diversity of the ^fillings® between them and its marvelous filmi¬

ness. There were two kinds of grounds: the rescan (or net) and the bride. Sometimes, too, rescan and bride grounds are mixed in the G30

same piece. The reseou was made in two ways — by needle and with bobbins. Hence Brus¬

sels is sometimes both a point and a pillow-lace.

There are also two ways of producing the flowers and other ornaments — with the needle and with bobbins. When the ornaments are made with bobbins on the pillow, the lace is called point plat. In old lace the plat flowers were worked in with the ground, for the (

plied® method was unknown. <(In the modern point gaze/' according to Mrs. Palliser, ((the flowers are made with the same thread as the ground (as in old Brussels). It is made in small pieces, the joining concealed by small sprigs, or leaves. Brussels point de gaze is the most filmy and delicate of all point-lace. Its forms are not accentuated by a raised outline of button-hole stitching as in point d'Alenqon; but are simply outlined by a thread. The exe¬

cution is more open than in the early lace and part of the toile (heavy part of the design) is made in close and part in open stitch to give an appearance of shading. The style of the de¬

signs is naturalistic.® The introduction of ma¬

chine-made net (tulle), the famous (

veils were multiplied. The flowers and other ornaments, after being made by hand, were ap¬

plied on the net (sewn on delicately). Some¬

times these were needle-point and sometimes bobbin-made (pillow). Great ingenuity, vari¬

ety and skill were displayed in the fillings be¬

tween these ornaments. Ghent and Alost, as well as Brussels, derived great profit from this kind of lace.

Point-plat applique is the name given to bobbin-made sprigs applied to machine-made net. Point Duchesse is also a Brussels lace. It is a bobbin (or pillow) lace of fine quality in which the sprigs (resembling Honiton) are connected by brides. Duchesse is a modern name. The lace resembles the old tape-gui-

pure of Flanders, made at Bruges in the 17th and 18th centuries and much used for cravats.

Mechlin. — Mechlin lace is ranked very high by connoisseurs. It is also called Point de M alines. Mechlin is made in one piece on a pillow with bobbins, the ground and the pattern being worked together with various fancy stitches. Its distinguishing feature is 'the cordon-

net, here a flat, silky thread which outlines the pattern and gives this lace almost the character of embroidery. The hexagonal mesh of the re-

seau is made of two threads twisted twice on four sides and four threads plaited three times on the other two sides. Sometimes the pat¬

tern is ccfond de neige/ sometimes ((oeil de per-

drix ® and sometimes Fond Chant. Very early Mechlin has points d'Esprit (little square dots) ; but this is rare. The characteristic pattern is a sort of sunflower, rose, or pink, in full blos¬

som and also with closing petals. The border is a shallow scallop, or it is slightly waved.

The flower appears on the edge and the rest of the ground is sprinkled with square spots, quatrefoils, or leaflets. The flower is Flemish in character and the powderings (semes) are French in style. Open spaces, filled in with brides, that make a kind of lattice-work, are characteristic and give Mechlin a charming delicacy. A four-petaled flower often fills in the spaces in the scrolls. Mechlin was always a costly lace. ((It is without question,® writes Lefebure, <(the prettiest of all pillow-laces.®

Mechlin was in great request during the reign of Louis XV and the rococo style of ornament prevailed in its designs. To some extent, in their lightness and delicacy, they may be com¬

pared with similar patterns upon contemporary engraved glass from Saxony and Bohemia.

Under Louis XVI, floral sprays and delicate interleavings were used in the patterns. No better lace can be found to assimilate with and adorn light textures, such as gauze and muslin.

Our great-grandmothers showed appreciation of its appropriateness in using it to adorn their mountains of powdered hair. Mechlin was also made in Lierre, Turnhout and Antwerp.

Antwerp. — Antwerp was a great mart. Its distinctive lace had a vase, or pot of flowers, whence its name ((Potten Kant / The blossoms are pinks, roses and sunflowers, and sometimes straggling branches are thrown from the flow¬

ers. The ground varies : sometimes it is the six-pointed star; sometimes the partridge eye, etc.

Lille, the old capital of Flanders, was not a French town until after the Treaty of Aix-la-

Chapelle. Its lace resembles Mechlin. The chief difference is in the reseau, which is even lighter than that of Mechlin. It uses the Fond Chant (six-pointed star) and the (< fond sim-

ple ,® Square dots, known as ((points d'esprit/

are also characteristic of Lille. The laces of Mons are also Flemish. Ypres, Alost, Coutrai and Bruges made lace of the Valenciennes type. Ghent, Binche, Liege and Saint Trond were also centres. In fact, for three centuries lace-making has been the chief industry of Flanders and of Belgium.

German Lace. — Germany claims the inven¬

tion of lace. A tombstone in Annaberg reads: ((Here lies Barbara Uttmann, died, 14 Jan. 1575, whose invention of lace in 1561 made her the benefactress of the Harz Mountains.® Barbara Uttmann, wife of a rich mining overseer, how¬

ever, learned to make pillow-lace from a Brea-

bant exile. She set up a workshop in Annaberg, which employed 30,000 workers. French refu¬

gees in northern Germany (most of them from Alengon) improved lace-making there and Ital¬

ians influenced work in Bavaria and Saxony; but German lace never acquired artistic repu¬

tation outside of Germany.

English Lace. — England was never a great lace-making country ; but the wealthy lords and ladies purchased lavishly of the fine laces of other countries. English flax was poor in com¬

parison with that of the Continent, which may have been the reason that Point lace was little made. Tudor inventories mention the fine (

bethan literature, a name, of course, for bob¬

bins (sometimes made of bone). In the sec¬

ond half of the 17th century Flemish Point sup¬

planted Venetian and French in the estimation of the English. When Cromwell's body lay in state it was draped with superb Flemish Point.

LACE

**«

is A

1 Austrian 19th century pillow and bobbins 2 French 19th century bobbin, Chantilly black LACE

mm

mm

wmm

Jpni

B

1 Brussels 19th century needlepoint

2 French early 18th century needlepoint. Flounce-
Point de France LACE BARK — LACE BUG

631

The enormous demand for Flemish Point occa¬

sioned smuggling on such a vast scale that Par¬

liament prohibited all importations of it. Then, to supply their customers, merchants bought lace in Belgium and smuggled it into England where they sold it under the name of Point d'Angleterre, or English Point; and under this name it often was taken to France and sold.

This lace was Brussels Point. Flemish lace continued popular for a long time in England.

Defoe makes Robinson Crusoe send from Lis¬

bon (

Moniton Pillow. — The most famous Eng¬

lish lace is Honiton. It resembles the old tape guipure of Flanders with open brides. The pat¬

terns are large and are made first and then joined. The ((Honiton Sprigs® were (and still are) famous, although the poppy, butterfly, acorn, etc., have not always been of fine de¬

sign. Honiton resembles in some degree the ((Duchesse Point® of Brussels. It still keeps to the

Flemish type. Its value was determined by covering a piece of lace with shillings. Queen Victoria's wedding-dress was of Honiton and cost £1,000 ($5,000). Honiton lace-veils, worth hundreds of guineas, are treasured heirlooms in America and in England. England has had two centres of lace-making; Devonshire; and the South Midlands (Nottingham, Bedford and Buckingham). In the latter town lace was made after the style of Mechlin, Antwerp and Lille, always grounded and never guipure (as in Honiton). Machinery for making lace was in¬

vented in Nottingham. In 1768 a workman, Hammond, conceived the idea of making a net tissue on a stocking-knitting machine. This was improved by Heathcote's bobbin net loom in 1809. The French then established manufac¬

tories in Lyons and Saint Pierre-des-Calais. In 1837 Jacquard invented his apparatus for fancy weaving; and an adoption of it to net-weaving machines produced tulles, broches, or flow¬

ered nets. This gave a severe blow to hand¬

made lace. Buckingham and Nottingham have also been famous for their Yak lace, made from the wool of the Yak. The designs, fol¬

lowing those of Malta and Genoa, are deco¬

rated with wheat-ears and resemble the ancient ((cut-work.®

Irish Lace. — Lace began to be an industry in Ireland in 1829-30 in Limerick and Carrick-

macross. Limerick is a tambour, i.e., threads embroidered on net, and Carrickmacross is dis¬

tinguished by patterns cut in cambric and ap¬

plied on a net ground. Beautiful, ornate stitches like latticework are also characteristic of Carrickmacross. The style came from Italy.

Vasari says it was invented by the painter Bot¬

ticelli. Point lace, in the style of the 17th cen¬

tury, is now made at Youghal (County Cork), the chief centre, and also in Kenmare, Killar-

ney, Waterford, Kinsa'le and New Ross. Linen thread of the finest kind is used and the meshes are so small that the stitches are almost invis¬

ible. Irish Point owes its existence to the failure of the potato crop in 1847. The Irish then tried to gain money by the Point Lace industry. It is a beautiful production and is worked entirely by the needle.

Peasants make pillow lace in every country, differing in style and pattern in every place. In many countries Torchon is made. This is also called (

cessfully by machinery. The knotted lace known as Macrame, made in convents in the Riviera, is taught by the nuns to the peasants.

It is a survival of the old knotted lace made in Spain and Italy in the 15th and 16th centuries.

It is tied with the fingers. Macrame is much used in Genoa. The name is Arabic in origin.

Of late years beautiful handmade lace has been produced in the United States in the newly established ((lace-schools,® particularly after Italian methods. Some of these schools are un¬

der wealthy patronage ; others are connected with settlement work.

Lace is made in the Latin-American coun¬

tries after the Spanish styles. In Fayal lace is fashioned out of the fibre of the aloe. In the Philippines lace is made from the fibre of the pineapple.

The machine-lace industry of Europe is cen¬

tred in Paris, Lyons, Calais, Saint Gall, Not¬

tingham and Plauen. The importations of laces and embroideries (including nets, veilings and curtains) at the port of New York during the years 1914 to 1917 were: March 1914, $3,164,594; March 1915, $1,810,376; March 1916, $2,306,618; March 1917, $1,388,26 2.

Bibliography. — Palliser, F. B., (History of Lace) (London 1869); Seguin, J., (Dentelle: histoire, description, fabrication (Paris 1875) ; Jourdain, M., (01d Lace) (London 1909) ; Clifford, C. R., ^The Lace Dictionary) (New York 1913) ; A. M. S., (Point and Pillow Lace*

(London 1899) ; Pollen, Mrs. J. H., (Seven Centuries of Lace* (London 1908) ; Jackson, Mrs. E. Nevill, (Hand-made Lace) (London 1908) ; Ricci, Elisa, (Antiche Trine Italiane,*

superbly illustrated (2 vols., Bergamo 1908-11) ; Lefebure, Ernest, (Les Points de France, trans¬

lated by M. T. Johnson (New York 1913).

Esther Singleton,

Author of iThe Art of the Belgian Galleries'1 ; (French and English Furniture ,* etc.

LACE BARK, is derived from the inner

bark of several species of trees and is readily detached in sheets or layers like birch bark, each layer being a delicate network of fibre, which when gently stretched a pentagonal or hexagonal mesh is formed which resembles lace. The most commonly known species is the lace bark tree of Jamaica, Lagetta lintearia.

It is said that Charles II was presented by the governor of Jamaica with a cravat, frill and pair of ruffles made from this substance. • The fibre can

also be twisted into strong ropes and in past time thongs and whips were made from it, with which the negroes were beaten. The lace bark tree of New Zealand is an Australian species, Plagianthus betulinus, more commonly known as the ribbon tree; its layers of bark showing the same beautiful lace-like texture as the Jamaica form. Another species producing a delicate, white lace-like tissue is the Birabira of South America, Daphnopsis tenuifolia.

LACE BUG, vulgar name for some of the Tingitidce, given on account of the gauze-like or lace-like meshes of the wing covers, lacking membrane and almost transparent, widely ex¬

panded beyond the body. A hood-like process, also filled with meshes, sometimes projects for¬

ward. The Corythuca arcuafa is an example 632

of the group and is found in vast numbers on the under-sides of leaves of oak trees. It lays its eggs next the mid-rib and veins and stays there drawing sap from midsummer till frost.

It measures about a sixth of an inch. The Corythuca ciliata abounds on the sycamore.

They are both white.

LACEDAEMON, las-^-de'mon. See

Sparta.

LACEPEDE, Bernard Germain Etienne

de la Ville, bar-nar zhar-mari a-te-en de la vel la-sa-pad, Count de, French naturalist: b.

Agen, France, 26 Dec. 1756; d. Epinay, France, 6 Oct. 1825. He abandoned the military pro¬

fession, for which he was destined, and de¬

voted himself to the study of natural history.

His teachers and friends, Buffon and Dauben-

ton, procured him the important situation of keeper of the collections belonging to the de¬

partment of natural history in the Jardin des Plantes. In 1791 he was elected member of the Legislative Assembly and belonged to the Moderate party. Napoleon made Lacepede a member of the Conservative Senate and con¬

ferred on him the dignity of grand-chancellor of the Legion of Honor. After the restoration he was made peer of France. He continued Buffon's

pents > (1788-89) and (Hi s+oire naturelle des reptiles) (1789) and published also (Histoire naturelle des poissons) (1798-1803) ; (His-

toire des ceteces) (1804), etc.

LACERTILIA, las-er-til'ia, or AUTO-

SAURI, the order of saurian reptiles which contains the lizards. These are distinguished from the serpents (Ophidia), to which they are most nearly allied by the fact that the right and left halves of the mandibles (lower jaws) are connected by a sutural symphysis, whereas those of serpents are connected by a more or less distensible cartilage. The great majority possess well-developed limbs, movable eyelids and cutaneous scales, covered by a horny epi¬

dermis, usually thin, but sometimes thick and rising into pointed projections. In a few de¬

graded and burrowing forms the limbs have been greatly reduced, or one pair or even both pairs completely lost, while the eyes may have become buried beneath the skin and the scales nearly or wholly obsolete. The vertebrae are proccelous, except in some of the geckos, where they are amphiccelous ; the ribs of the trunk ar¬

ticulate by their capitular heads only, the re¬

duced tubercula being attached to the vertebrae by ligaments. The limbs are typically formed after the pentadactyl pattern ; and the shoulder girdle and sternum are complete. The hvoid apparatus resembles that of birds. In the skull the quadrate bone is movable except in a few degraded forms. The skin is covered with scales formed within it, and the epidermis is horny and is periodically shed in flakes ; but in many cases these scales do not overlap and look like scales, but are represented by bony granules, giving a "pebbly® aspect to the sur¬

face; or these osteoderms (which never occur in snakes) may form in the ordinary scales.

The skin contains no glands; but in many liz¬

ards abounds in chromatophores (q.v.) con¬

trolled by muscles whose action causes the va¬

riations in surface color of which many lizards arc capable and of which they avail themselves as an aid in hiding from their enemies'. . In their reproduction lizards never undergo any metamorphosis and are generally oviparous, but in some the eggs are retained until they hatch within the abdomen of the mother. Sali¬

vary glands are found which in Heloderma act as poison glands. The lungs are thin-walled sacs, from which terminal pouches may arise.

The movement of the ribs assists in respiration.

The lizards are most abundant in tropical re¬

gions, but are absent only from the cooler tem¬

perature and the frigid regions of the globe.

The group possesses strong power of regenerat¬

ing lost parts and especially of renewing the tail,

which in many families breaks off under a very slight strain.

Fossil History. — The Lacertilia are a comparatively recent development of the rep¬

tilian race, not traceable beyond the beginning of the Tertiary. Fragmentary remains of sev¬

eral existing families occur in the Eocene and Miocene rocks ; and the Pleistocene river-de¬

posits of Queensland, among which was a monitor-lizard 30 feet long. The line prob¬

ably originated in the Prosauria (q.v.), repre¬

sented by a single living form — the tuatera (q.v.). Lizards are now scattered over all the warmer parts of the world and seem to be in¬

creasing and developing. They are said by Hoffman to include 434 genera and 1,925

species.

Classification.— The Lacertilia are di¬

vided into three sub-orders, of which the fol¬

lowing is an outline :

Sub-order 1. Geckones. — Lacertilia with four legs, amphiccelous vertebrae and clavicles dilated ventrally. The chorda persists and grows throughout life, in the centre of and between the vertebrae; the ribs are bifurcated, arid dentition is pleurodont. Some species have mechanically adhesive discs. The one family (Geckonidce) is coextensive with the sub-order.

This is a yery old group, modern species exist-

ing in tropical and southern European countries.

See Gecko.

Sub-order 2. Lacertae. — Lacertilia with proccelous vertebrae and the ventral part of clavicles not dilated. Eighteen families, as fol¬

lows :

1. Agamidce. — A family of exclusively Old World lizards, containing some 200 species, among which the Malayan dragon (q.v.), and the frill-lizard (q.v.) are remarkable species.

Many have a very chameleon-like appearance.

2. Iguanidce. — A large and chiefly American family with pleurodont dentition, and a short, thick, non-protractile tongue. The genus Anolis contains the common "chameleon® of the southeastern United States. (See Anolis; Chameleon). Basiliscus of Central America has a great, erectile vestigial crest on the back and tail. (See Basilisk). Iguana (q.v) in¬

cludes large edible lizards of Central and South America. PJirynosoma is the genus of the "horned toad® (q.v.).

3. Xenosauridce.— A Mexican family inter¬

mediate between the Iguanidce and the

Anguidce; represented in Africa by (4) the Zonuridce.

5. Angjiidce. — Terrestrial pleurodont liz¬

ards, with bony plates in the skin and the tail long and brittle, dwelling in Central America.

Europe and India. Ophisaurus, the genus of the glass snakes (q.v.) of the Central States, LACEWING

has the limbs reduced to mere spikes. Anguis, the ''slow-worm" (q.v.), has no limbs at all, and the

eyes well developed.

6. Helodermatidce. — Pleurodont, poison¬

ous lizards of New Mexico and Arizona. See Gila Monster. The (7) Lanthanotidce are Asiatic representatives of the foregoing.

8. Va rauidce. — Pleurodont aquatic lizards of the Old World, with bifid, protractile tongue.

See Monitor Lizards.

9. Xantusiidce. — Three Central American genera.

10. Tejidce. — A large tropical- American family of large forest-dwelling, carnivorous lizards of great strength and swiftness. See Teju.

11. Lacertidce. — Typical small lizards of the Old World, with pleurodont dentition, and bony dermal plates over the temporals. About 100 species. All live on animal food, chiefly insects, worms and snails.

12. Gerrlwsauridce. — African lizards, inter¬

mediate between Lacertidce and Scincidce.

13. Scincidce. — Pleurodont, viviparous liz¬

ards, with feebly nicked, scaly tongue. They burrow in sandy ground. The family contains about 400 species distributed all over the world.

See Skink.

The following five families have become de¬

graded on account of their burrowing instincts: (14) Anelytropidce, worm-like, legless lizards of the tropics; (15) Dibamidce, of Malay Archi¬

pelago; (16) Anjelhdce, worm-like lizards of California, limbs entirely absent; (17) Am-

phisbcenidce , worm-like, blind lizards which burrow

like earthworms, especially in ants'

nests and manure heaps. Chirotes of Mexico and California has the fore-limbs remaining.

See Amphisb^ena.

18. Pygopodidce.— Snake-like lizards ; fore¬

legs absent; hind-legs a pair of scaly flaps; Australasia.

Sub-order 3. Chamaeleontes. — Old-World

saurians, with compressed body and prehensile tail ; tongue club-shaped and capable of being protruded to a distance equal to the length of the body; two digits of the feet are permanently opposed to three ; head crested ; eye-balls very large and movable on the two sides indepen¬

dently of each other; capacity for changing color conspicuous. (See Chameleon). Con¬

sult Boulenger, Catalogue of Lizards in the British MuseunP (London 1887) ; Cope,

(Crocodilians, Lizards and Snakes of the United States) (Washington, U. S. Nat. Museum, 1900) ; Gadow, 'Amphibia and Reptiles) (in 'Cambridge Natural History, > Vol. VIII, Lon¬

don 1902).

LACEWING, a neuropterous insect of the families Hemerobiidce and Chrysopidce. About 40 species are found in the United States, the most common perhaps being the golden-eyed flies of the genus Chrysopa. These are green¬

ish, ill-smelling, gauzy-winged creatures usually less than two inches long and feeding little or not at all in the adult state. The females lay their eggs upon the summits of silky threads, by which means they are protected from predaceous enemies. The larvae, as soon as hatched, crawl down the

threads and feed upon the first soft-

bodied insect they reach — perhaps a brother.

They are considered useful in destroying plant-

lice, hence the name "aphis-lions" (q.v.), but in California they attack the larvae of the useful ladybirds.

LACHAISE, Frangois d'Aix de, fraii-

swa da de la-shaz, French Tesuit confessor of Louis, XIV: b. Chateau d'Aix, 25 Aug. 1624; d. Paris, 20 Jan. 1709. He was the provincial of his order when Louis, on the death of his former confessor, appointed Lachaise to that office. The new confessor with admirable tact kept himself clear of the innumerable meshes of court intrigue. Jansenism was at the time a powerful factor in ecclesiastical and political circles, and the Jesuits were its most formidable adversaries, but Lachaise knew how to conduct himself under all circumstances with address, coolness and sagacity ; and never allowed him¬

self to be drawn into violent measures against his opponents. That Louis XIV married Mme.

de Maintenon was owing principally to the counsels of his Jesuit confessor. Lachaise re¬

tained the favor of his monarch till his death, and Louis had a country-house built for him to the west of Paris, on an eminence which had received the name oi Mount-Louis. Its ex¬

tensive garden now forms the cemetery of Pere Lachaise, the largest in Paris.

LACHAMBEAUDIE,la'shan'b6,'de', Pierre,

French fable writer: b. Sarlat, Dordogne, 15 Dec. 1807; d. Brunoy, 6 July 1872.

He was son of a poor peasant and became bookkeeper

for a Lyons commercial house, then obtaining a position on the railway while edit¬

ing Echos de la Loire until, after much poverty and misfortune, his 'Fables populaires) were published (1839; 7th ed., 1849) with such bril¬

liant success that his future was well assured and his name honored. During his period of exile at Brussels for activity in the 1848 revolu¬

tion he published 'Fleurs d'exile) (1851); 'Fleurs de Villemomble) (1861) and 'Hors d'ceuvre) (1867).

LACHES, lash'e', a legal term derived

from the Old French lachesse, remissness, which in turn was derived from the Latin laxus, slack.

Unreasonable delay; neglect to do a thing or to seek to enforce a right at a proper time.

Courts of equity withhold relief from those who have delayed the assertion of their claims for an unreasonable time. The question of laches depends not upon the fact that a cer¬

tain definite time has elapsed since the cause of action has accrued, but upon whether, under all the circumstances, the plaintiff is charge¬

able with want of due diligence in not insti¬

tuting the proceeding sooner. To constitute laches to bar a suit there must be knowledge, actual or imputable, of the facts which should have prompted action or, if there were igno¬

rance, it must be without just excuse. Laches may be excused from the obscurity of the transaction ; by the pendency of a suit ; and where the party labors under a legal disability, as insanity, but poverty is no excuse for laches, nor ignorance and absence from country.

Laches on the part of its officers cannot be imputed

to the government and no period of delay on the part of the sovereign power will serve to bar its right either in a court of law or equity when it sees fit to enforce it for the public benefit.

LACHESIS, lak'e-sis, in classical mythol¬

ogy, one of the three Fates (q.v.).

LACHINE, la-shen, Canada, town in

Jacques Cartier County, Quebec, on the Grand Trunk Railway, eight miles southwest of Mont¬

real, on Montreal Island, which is here con¬

nected with Caughnawaga, on the south bank of the Saint Lawrence, by a bridge. It is a popular resort for pleasure parties in the win¬

ter, and in summer is largely a residential place for Montreal business men. It is best known as the terminus of the Lachine Canal, nine miles long, connecting it with Montreal and built to carry steamers around the Lachine Rapids. All the commerce of Montreal by the Great Lakes passes through this canal. Lachine is the starting point of steamers for Kingston, Toronto and Hamilton. Lachine has some manufactories, and here are the electric works of the Lachine Power Company, furnishing power and light for the city of Montreal. It was first named Saint Sulpice, but was changed in derision to Lachine after the return of La Salle's expedition of 1669, which, it was mock¬

ingly said, set out to find China by ascending the Saint Lawrence. In 1689 the Indians burned the town and massacred all the inhabitants.

Pop. 10,699.

LACHINE CANAL. See Canadian

Canals.

LACHI.SH, la'kish, Palestine, a city of Judah. It was destroyed by Joshua and given to the tribe of Judah, and was fortified by Rehoboam. King Amaziah sought refuge there but was slain. Sennacherib, in his campaign against Judah, captured this town and King Hezekiah sent a deputation there with presents to placate Sennacherib. Micah denounced the place as "the beginning of sin to the daughter of Zion,® the intent of which is not clear. Its site is identified with Tell-el-Hesi, the hillock excavated by Flinders-Petrie and Bliss (1890-

93) for the Palestine Exploration Fund, some 16 miles east of Gaza. Consult Flinders-Petrie, 'Tell-el-Hesy5 and Bliss, (A Mound of many Cities,5 both published by the Palestine Ex¬

ploration Fund in 1891 and 1894, respectively; Rogers, 'Cuneiform Parallels to the Old Testa¬

ment (New York 1913) ; Schrader, 'Cuneiform Inscriptions and the Old Testament (Vol. II, London 1885-88).

LACHLAN, lak'lan, a river of New

South Wales, having its source in the Cullarin-

range, 175 miles southwest of Sydney. The river makes a semi-circular sweep north of about 240 miles, when, pursuing a generally southwest course, it joins the Murrumbidgee, the united stream afterward falling into the Murray. The total course is about 700 miles.

LACHMANN, lagh'man, Karl Konrad

Friedrich Wilhelm, Teutonic and classical philologist: b. Brunswick, 4 March 1793; d. 1851.

As a student at Leipzig and Gottingen his work lay in Italian, English and Old German poetry, as well as in Greek and Latin. As a teacher he passed from various gymnasium positions to professorships in the

universities of Konigsberg and Berlin. His work in textual criticism, both in the early German and the classics, was epoch-

making. Editions of Walther von der Vogel-

weide, Wolfram von Eschenbach, Lucretius (his greatest achievement as an epoch-making work), Catullus, Tibullus, Propertius, the New Testament and Shakespeare's sonnets and Mac¬

beth deserve mention among his numerous pub¬

lications. Consult his 'Life5 by Hertz (Ber¬

lin 1851).

LACHNER, lagh'ner, Franz, German

orchestral composer: b. Rain, Bavaria, 2 April 1804; d. Munich, 1890. He studied music at Vienna under Stadler and Sechter (1822) and became familiar with Schubert. He was ap¬

pointed (1826) vice-bandmaster of the Karnth-

nerthor Theatre and bandmaster in the follow¬

ing year. In 1834 he went to Mannheim to conduct the opera and became court-bandmaster (1836), general music director at Munich (1852), retiring (1865) on a pension. His works are prodigious in number, consisting of an oratorio, a sacred cantata, four operas, requiems, three grand masses, besides other cantatas, entr'actes, etc. Also eight symphonies, one winning the prize offered by the Gesell-

schaft der Musikfreunde, overtures, serenades for orchestra. His suites for orchestra are considered his best work. Critics declare he lacked fire but was a prodigy of conscientious industry.

LACHRYMAL (lak'nmal) ORGANS.

See Eye.

LACHUTE, la-shoot', Canada, town in Ar-

genteuil County, province of Quebec, on the North River, and Canadian Pacific and

Canadian Northern railroads, 44 miles from Montreal. It is an important shipping centre for farm and dairy products and has large paper mills, pulp mills and wood-working indus¬

tries. Pop. 2,400.

LACINARIA, la-sin-a'ri-a, a genus of

plants of the thistle family containing about 30 species of tall perennial herbs growing in dry soil throughout the eastern and central United States and known as blazing-stars and button snake-roots. They bear late in the sea¬

son dense spikes of purplish flowers, often in the south a foot in length and of a delicate lavender tint very effective when seen in a mass of goldenrod or autumnal grasses. L. squarrosa is known as colic-root, and all the species are in repute among the southern country folk, not only as good family medicine in the form of a decoction made from the root, but as a specific against rattlesnake venom.

LACKAWANNA, lak'a-won'na, N. Y.,

town of Erie County, on the Lackawanna River and on the Lake Shore and Michigan, the Pennsylvania, the Lehigh Valley and other rail¬

roads, and six miles from Buffalo. Coal is mined here and there are blast furnaces and coking plants, and a number of coal-breaks.

It has six churches and a hospital. Among its manufactures figure chiefly the large steel plant and the bridgeworks. Pop. (1920) 17,918.

LACKAWANNA RIVER, a considerable

stream which rises in the northeast part of Pennsylvania and flows through the

valley formed by the Shawnee and Moosie mountains, discharging into the Susquehanna at Pittston ; length about 50 miles. Great quan¬

tities of the best anthracite coal are mined in the valleys adjacent to this river, the entire dis¬

trict being given over to collieries, rolling mills, blasting furnaces and factories, Scranton being the principal town. The greatest thickness of strata belonging to the coal measures amounts in the central portion of the basin to nearly 1,800 feet, On each side they dip toward the LACLOS — LACOSTE

central axis at angles sometimes exceeding 30

degrees, gradually lessening till they are found in horizontal and undulating positions near the centre. Toward each extremity of the basin they gradually shelve upward till replaced by the outcrop of the older rocks.

LACLOS, la'klo, Pierre Ambroise Fran¬

cois Choderlos de, French author: b. Amiens, 19 Oct. 1741 ; d. Tarent, 5 Nov. 1803. He was a captain of artillery and private secretary of the Duke of Orleans, becoming notorious through his obscene novel (Les liaisons danger-

euses> (Amsterdam and Paris 1782). He was editor of Journal des amis de la Constitution (1791) and was made (1792) brigadier-general.

He got entangled in the Duke of Orleans case, but Robespierre spared him, and he became in¬

spector-general of artillery.

LACMUS. See Litmus.

LACOLLE MILL, Battle of, in the War

of 1812. Shortly after Gen. Wade Hampton went into

winter quarters following the battle of Chateauguay (q.v.), Gen. James Wilkinson went to Plattsburg and wrote a letter to the Secretary of War demanding a review of his conduct by a court-martial. Pending a re¬

ply he determined to strike a blow at Montreal, the road to which was barred by small gar¬

risons at Saint John and Isle Aux Noix and by outposts at Lacadie and Lacolle. At Lacolle were 200 troops stationed in a stone mill with thick walls and solid front. On 30 March 1814

Wilkinson led 4,000 men and two 12-pound field guns against the mill. The gunfire inflicted no damage, whereupon, having received reinforce¬

ments from Isle Aux Noix, the British garri¬

son made two sorties, but were repulsed, and the Americans continued their bombardment.

As the British now numbered about 1,000

troops and as his losses amounted to 200 and little damage was being done by the guns, Wil¬

kinson ordered a retreat and returned to Cham¬

plain. The British loss was 11 killed, 46

wounded and 4 missing. Wilkinson was then relieved of duty and Gen. George Izard (q.v.) took command. Consult Brackenridge, H. M., (History of the Late War> (p. 198) ; Dawson, (Battles of the United States) (Vol. II, p. 337) ; Fay, H. A., (Official Accounts) (pp. 181-183) ; Wiley and Rines, (The United States* (Vol.

V, pp. 418-420) ; Wilkinson, James, VII).

LACON, la'lcon, Ill., town and county-

sear ot Marshall County, on the Illinois River, and on the Chicago and Alton Railroad, 30

miles north of Peoria and 128 miles southwest of Chicago. Steamboats ascend the river as far as this point and there are a number of grain elevators and other shipping _ facilities here; manufactures of wagons, carriages and woolen goods ; marble works, a national bank, several newspapers and numerous churches.

There is a school library and a modern high school building. The waterworks are munici¬

pally owned. Pop. 1,495.

LACONIA, la-kd'm-a, the name for a

large tract of land granted by royal patent to Ferdinand Gorges and John Mason in 1622. It was located between the Merrimac and Kenne¬

bec rivers, the ocean and the Saint Lawrence River of Canada. The present State of New Hampshire formed a considerable portion of Laconia,

LACONIA, a territory in ancient Greece.

See Sparta.

LACONIA, N. H., city and county-seat of Belknap County, on the YVinnipesaukee River, and on two divisions of the Boston and Maine Railroad, about 28 miles north of Concord, the capital of the State, and 100 miles north of Boston. It was settled in 1780-82 by English people from the southern part of New Hamp¬

shire. It was incorporated as a town in 1852

and chartered as a city in 1893. It is in an agricultural and manufacturing section, in a beautiful lake region. Its charming scenery, cool climate and opportunities for fishing make it a favorite summer resort. Its principal manu¬

factures are hosiery and knit goods, railroad cars, machinery, lumber, clutches, needles and paper boxes. The State Home for Feeble-

Minded Children is located here, also the State Fish Hatchery. The educational institutions of the city are the public and parish schools and the Gale Memorial Library. The prominent buildings are 12 churches, an opera house, cot¬

tage hospital, three national banks, public library and the courthouse. The government is Vested in a mayor and six councilmen. Pop. 11,094.

LACONIA GRANT. See Boundaries of

the United States.

LACORDAIRE, la'kor'dar, Jean Baptiste

Henri Dominique, French preacher: b. Recy-

sur-Ource, 12 March 1802; d. Soreze, 22 Nov.

1861. After studying law in Paris he began practice in that city. He was in religion a deist ' of the Voltairian school, and it was only after reading the (Essai sur lTndifference* of Lamen-

nais (q.v.) that he came to the conclusion that Roman Catholicism was a primal factor in the development of political life. It was with this view that he determined .to become a priest.

Entering the Seminary of Saint Sulpice in 1824 he was ordained priest in 1827. In 1835

he was appointed preacher at Notre Dame, where his sermons attracted crowded congrega¬

tions. He was, however, bent on a wider proj¬

ect, the revival of the Dominican order, the great order of preachers in France. With this view he revisited Rome in 1838, and after the usual novitiate became a Dominican. The Do¬

minican is originally a Spanish order, and was never popular in France, and Lacordaire, who was appointed provincial of the order in 1850, had little success

in establishing it there. _ He was in 1848 elected a member of the National Assembly. He was, however, rebuked by his bishop for calling himself a Republican and re¬

tired from politics in 1852. His honest indigna¬

tion against the coup d'etat expressed in a ser¬

mon roused the animosity of Napoleon III, and he was driven from the pulpit and became di¬

rector of the Lycee at Soreze. He was elected to the Academy in 1860. A collected edition ot his works appeared at Paris in nine volumes in 1872. Consult (Lives) by Montalembert (1862); Foisset (2d ed., 1874); Chocarne (8th ed., 1894); Greenwell (1877); Lear (1882); D'Haussonville (1895); Nicolas. (Le Pere La¬

cordaire et le Liberalisme* (1880) ; Fesch, la¬

cordaire, Journaliste) (1897).

LACOSTE, la-kost, Sir Alexander, Cana¬

dian jurist: b. Boucherville, Quebec, 12 Jan.

1842. He was educated at the College Saint Hyacinthe and at Laval University and was called to the bar in 1863. He sat in the Legis-

lative Council of Quebec 1882-84, became a Dominion senator in 1884 and chief justice of the Queen's Bench of Quebec 1891-1907.

He was knighted in 1892.

LACQUERING, lak'er-ing, the art of

giving a smooth and brilliant surface with vari¬

ous preparations of shellac (see Japan¬

ning). In Chinese lacquering they first stop up the holes and crevices, covering all the imper¬

fections with a coating of diluted lac by means of a flat, close, short brush. Then they cover the whole with a thick coating of lac and white clay. This clay, oily to the touch, is found at the bottom of certain lakes in Tonking; it is dried, pulverized and sifted with a piece of fine silk before being embodied with the lac. This operation is designed to conceal the inequalities of the wood and produce a uniform surface, which, when completely dry, is rendered smooth with pumice stone. If the object has portions cut or sunk the clayey mixture is not applied, for it would make the details clammy, but in its place a single, uniform layer of pure lac. _ In any case, after the pumicing, a third coating, now pure lac, is passed over the piece which at this time has a mouse-gray color. This layer, known under the name of sou lot , colors the piece a brilliant black. As the lac possesses the remarkable property of not drying in dry air, the object is left in a damp place. When per¬

fectly dried the piece is varnished and the de¬

sired color imparted by a single operation. If the metallic applications are excepted, the lac is colored only black, brown or red.

The operation of lacquering is then ended, but there are parts to be gilded. These are again covered with a mixture of lac and of oil of trail. When this layer is dry the metallic leaves are applied, which are themselves pro¬

tected by a coating composed also of lac and oil of trail. All these lac and oil of trau mix¬

tures are carefully filtered, which the natives effect by pressing the liquid on a double filtering surface formed of wadding and of a tissue on which it rests. It can only be applied after several months when the metallic leaf is of gold. In the case of silver or tin the protect¬

ing coat can be laid on in a few days.

The wood to be lacquered should be abso¬

lutely dry. In Japan when wood is well pre¬

pared and the faults have been corrected with pure lac it is dried, pumiced and covered with a coat composed of crushed flax mixed with glue. Then a layer of lac is applied and cov¬

ered with a fine linen fabric which should per¬

fectly adhere in all its parts. This first prepara¬

tion, suitably dried, serves as a foundation for the successive applications of 33 layers. Each coating is rubbed with a fine-grained stone be¬

fore drying in the moist chamber. This is done with the greatest precaution, so as to avoid im¬

purities and dust. The last polish is obtained by rubbing with the powder of calcined deer horn. The piece is then ready to receive the application of gold or of silver, which is effected as follows: The design to be reproduced is drawn on very fine paper prepared with a mix¬

ture of glue and alum, and on the back of the paper the outlines are traced with a brush of fine rat's hair, dipped in lac previously, boiled over a brisk charcoal fire. This paper is then applied to the object to be decorated, and it is made to adhere by rubbing with a spatula, either of minoki wood or of whalebone. When the paper is removed the design is found trans¬

ferred damp and is rendered more distinct by the application of a white powder by means of a piece of wadding. With one of these trans¬

fer papers 20 reproductions can be secured, and the lines can be retraced with the boiled lac, it is said, so as to procure copies almost indefi¬

nitely. The outlines remain damp in conse¬

quence of the use of the boiled lac, and imper¬

fections can be corrected. In this case the out¬

lines are retraced with a pencil of hare's hair lightly charged with a preparation of lac not boiled. This operation is delicate and requires great care not to displace the lac from the orig¬

inal outlines. When ended the whole is cov¬

ered with fine gold, silver or tin powder, as desired; the powder is applied by means of a piece of wadding. If the object to be deco¬

rated is of large dimensions the process is con¬

ducted on separate parts, and at each step the piece is placed in a damp closet tightly closed, so as to exclude the dust. .When the metallic coating has hardened sufficiently the piece is taken out, and the design is covered with a fine transparent lac laid on with a brush of hare's hair. The gilding or silvering of the succeeding part is never attempted until the preceding has been completely dried in the damp chamber. All the parts of the object are finally rubbed with a piece of camelia wood charcoal in order to equalize the thickness, . and then polished with the fingers moistened with a mixture of calcined deer horn powder and oil.

Indian lacquer is a natural black varnish ob¬

tained from the inspissated juice of the unripe rind of the fruit of the Semecorpus anacardium or some related tree. Burmese lacquer is ob¬

tained from the black varnish tree (Melan -

orrhcea usitata). European and American imitations of Oriental lacquering may be re¬

garded as identical with japanning. Late in the 18th century lacquering was regarded as a polite art or

fad of the well-to-do, and a va¬

riety of ornamental varnishing was performed under this name. The art possessed quite a literature. Consult Audsley, (Ornamental Arts of Japan) (1882) ; McQuoid, (History of Eng¬

lish Furniture* (1908) ; Seeligmann, (Hand-

buch der Lach- und Firnis-Industrice) (1910).

LACQUERS AND LACQUERWORK.

Japanese. — While the art of lacquerwork was first known to the Chinese and taught by them to the Japanese, this latter nation has so far excelled all others as to make its lacquer product stand out as a class by itself. Louis Gonse says: ((Japanese lacquer objects are the most perfect works of art that have issued from the hand of man.® W. T. Walters says: ((Lacquer is the vehicle exclusively identified with Japanese art and art industries. The Chinese have attempted its use, and in Europe the connoisseurs are familiar with the vernis of the Martins. But lacquer in all its beautiful uses and decorations is a truly Japanese belong-

ing.** In this context it must be said that, while Nippon’s natives far outrank all others in this work, there is a very great and distinct difference between the ((01d Japan, }) prized by the connoisseur, and the commercial ware's made for export by the Dutch during the 18th century and since. This difference was forcibly LACQUERS AND LACQUERWORK

displayed when a steamer laden with both kinds was returning the fine exhibits from a world’s fair and sank. The precious cargo lay for two years at the bottom of the ocean and was then salvaged. The commercial pieces were dam¬

aged beyond repair, the ((01d Japan,® made many centuries ago, was in perfect condition, not a joint

or seam affected. A short descrip¬

tion of the elaborate processes and styles of Japanese lacquers will aid to a better knowledge of an admiration for the greatly prized ((01d Japan.®

Japanese lacquer (urushi) is the sap of the Rhus vernicifera, a plant the cultivation of which is Japan's most important branch of agri¬

culture. The sap is gained by puncturing the bark, and the varieties and treatment are as follows: (1) Seshime-urushi, the crude lac¬

quer drawn from the branches (and termed (

moner lacquer (Ki-no urushi) is full of im¬

purities and a viscous liquid of a dirty gray tone. The impurities are allowed to settle and the lacquer then drawn off is strained. (3) Shunkei urushi, used for furniture, is so trans¬

parent as to show the grain of the wood through it ; it is prepared by mixing pure lac¬

quer with oil of perilla. (4) Roiro urushi is the black lacquer oxidized by two days' stirring of the crude gum in the open air and adding, toward the end, a little water that has had iron filings standing in it. (5) Mixing crude lac¬

quer with either Prussian blue, cinnabar, red oxide of iron, orpiment, or other pigment, then straining, produces the different colored lac¬

quers. (6) Nashiji, the gold-flecked lacquer, is made by sifting powdered gold leaf on the fresh soft lacquer. When hard the surface is smoothed and ground to transparency with charcoal and then polished. (7) Tsi-shu, or carved lacquer, was brought from China to Japan about 1600 and this style of work is done mostly on red lacquer, imitating Soo chou, but the black and brown are sometimes carved.

(8) Guribori effect is produced by superim¬

posing several thick layers of different colored lacquers, each layer having deeply engraved scroll lines which expose the underlying layers.

(9) Beautiful effects are produced by inlays of gold, silver, bronze, mother-of-pearl, ivory, stones, even porcelain. (10) Tsugaru lacquer has a marbled effect showing veins of red, brown and green. The first layer is composed of black lacquer mixed with the white of an egg, or bean powder, and tamped, while soft, with a ball of cotton to produce irregularities of the surface. After reducing by grinding, a layer of another color is added and treated in the same way; and so on till every color has been used. (11) Wekasa ware has a green and red lustrous surface caused by tin foil beneath the upper coating. (12) Makiye effect is produced by using gold of 60 different color shades.

The cultivation of the Japanese lacquer art is claimed to cover over 2,000 years. The quality of the objects made depends upon the length of time allowed for the drying of the priming, in fact to extend the duration of the siccative ac¬

tion the primed body is set in a damp place and kept under cover to exclude all dust particles.

First a composition of the hard (

quer, ox gall, dust or fine stone powder is used to cover the base of the body. Then commences the first polishing and the object is left to dry slowly; then another coat of lacquer is applied and allowed a long period to dry, when the polishing is renewed. This process is continued till, sometimes, as many as 20 applica¬

tions have been superimposed, dried and rubbed down with clay. The painting or other decoration follows next.

When the great European demand started, about 1700, inferior goods were rushed to market and decadence

in the industry soon followed. The Japanese government, middle of last century, started an attempt to raise the artistic level of the art, and met with con¬

siderable success, so that Tokio, Kioto and Osaka produced really meritable pieces. Cheap, inferior ware is made in the provinces of Aidzu and Yechizen. The hardness of fine lacquer pieces is such that lacquer bowls are used to serve hot wines, liquors, soups, etc.

Japanese lacquer periods are Kamakura,

1100 to 1336; Ashikaga, 1336 to 1573; Momo-

yana, 1573 to 1603; Tokugawa, 1603 to 1868.

Noted lacquer artists are Koetsu, end of the 16th century; Shunsho, 18th century; Yosai (imported from China and produced the first carved red lacquer), about 1600; Koma

Kwanzai, 17th century; Ritsuo, early 18th century; Hanzan (Ritsuo's pupil); Kadjikova, Kiyokava, Shiomi, Toyo, Kwanshio, Toshide, Yoyusai, Zeishin.

A fairly exhaustive list of Japanese lacquer articles is medicine boxes (inros) ; paint-boxes (sudsuri-bako) ; clothes-presses, chests; small tables for incense burners; dinner tables (sen), sake tables; traveling trunks (hasa-mibako) ; tobacco boxes (tobacobon) ; palanquins or Sedan chairs (norimonos) ; clothes-horses (iko) ; writing and toilet sets; book coffers (oi) ; dinner sets; sake sets; smoking sets; din¬

ner and sake dishes; sake bottles; sake dish stands; water pots; incense boxes; picture easels ; hair combs and pins ; neck rests ; boxes to hold tea services (chadansu) ; tea trays; urns ; fans ; foot baths ; hats ; braziers ; (hibachi) ; letter boxes; bowls and covers (hira) ; little boxes for perfumes (ko-bako) ; rouge boxes ; kake boxes ; mirror stands ; sword racks (katanakake) ; horse saddles; stirrups; brush jars; incense burners (koro) ; tea caddies (c ha-ire) ; tea bowls (chawan) ; pipe cases (kisernire) ; dinner chests (bentobako) ; sweet¬

meat boxes (kwashi-bachi) ; book chests (bunko) ; fruit dishes (takasuki) ; screens, slid¬

ing doors, etc. Besides their furniture and utensils, the Japanese, as protection against atmospheric action, coat their light wood houses (pillars, pilasters, verandas, movable wall frames) with lacquer.

Chinese Lacquerwork. — The Chinese term for their lacquer is tsi. They were the pre¬

cursors in this as in many other arts and taught the Japanese, but the date of origin is obscure.

In the esteem of the Chinese their coral-red Soo-chou carved lacquer stands foremost. Dr.

Bushell says Pekin and Soo-chou have done no highly artistic work since Ch'ien Lung (1736-

95). There are, however, a large number of fine specimens extant of coral-red. The term ((Coromandel® lacquer has been for two cen¬

turies used for some very fine incised and decorated old Chinese work; the reason for the term is conjectural. The Celestials produced a 638

style of lacquer done by placing a very thin layer

of iridescent shell in black lacquer, be¬

sides the thick mother-of-pearl inlays. This peculiarly pretty effect was very much admired by the French who termed it ((laque burgautee®

and the production thrived greatly late in the 17th century (Kang-he) . The Chinese also ex¬

celled in coating porcelain with black lacquer decorations. As in other lines of decorative art of the Chinese the crafts are very much "specialized.® Thus the different operations of cabinetworkers, lacquerers, decorators, metal¬

workers, etc., often necessitate each piece pass¬

ing under the hands of many workmen. Like the Japanese the Chinese extend the use of lac¬

quer in many directions ; as Semper says : (

boo wickerwork, leather, skins, etc.

Indian and Persian Lacquerwork. — The

method of production of these natives is quite different from that of China or Japan, inasmuch as the lacquer is utilized only as a covering or coating to preserve the decoration beneath.

The best work emanates from the northwest provinces of East India. They show a close relationship in style to the Persian painting.

Indian pieces have been divided into two cate¬

gories : (

trast with the Chinese and Japanese the Indian and Persian method of decorative treatment covers the entire surface ; borders, sides, covers of the object show harmonious repeats of the same motifs. Another difference lies in the fact that Indian and Persian decoration is confined almost exclusively to plant life motifs. The Persians, however,

intersperse medallions and human figures, though of distorted or unnatural form. A common method of the Indian dec¬

oration is stippling on a white, yellow or light scarlet ground. Several coats of transparent lacquer are laid over the painting. The Indians also do a relief decoration under lacquer, the embossed parts being made up of a lead and glue substance placed on the surface of the ob¬

ject, coated with white, then allowed to dry thoroughly, after which it is carefully carved.

The surface then receives a coat of lacquer of the desired color and, lastly, several more layers of transparent lacquer. Indian lacquer pieces range from bowls, boxes, fan-holders and plates to book-covers. And in Cashmere, where the best lacquer ware is made, the product extends to chairs, tables, even bed¬

steads. The body of Indian and Persian pieces is paper, papiermache or very light wood.

French Lacquerwork. — The beautiful

pieces of old Japanese and Chinese lacquerwork that were being imported to France created a great vogue for making up French modern furniture to include Oriental lacquer panels.

This extravagant fashion lasted from 1680 to say 1793 ; that is to say, under Louis XIV, during the Regency, and under Louis XV and the Pompadour and still under Louis XVI and Marie Antoinette. Thus for a hundred years French ebenistes were breaking up the finest old Oriental etageres, boxes, folding screens, etc., to produce their armoires and cabinets; and the lovely effects produced when bronze and gilt carved mounts were added from the artistic hands of the Caffieris and other clever metal carvers are shown in the costly extant pieces. Marie Antoinette had a fine collection of Oriental pieces, now to be seen in the Louvre.

Even under Napoleon lacquers were much favored. It is not to be wondered at, consid¬

ering the great demand and remunerative prices paid for lacquerwork, that French artisans should attempt creations in imitation. They were not without success, though the product is one created from varnish gums combined with shellacs, not lacquer. Most successful in this field of endeavor was Robert Martin (1706-

65), a decorator of furniture, Sedan-chairs, etc. By 1733 he received the title of "varnisher to the King.® His panels with Chinese land¬

scapes, figures, etc. (chinoiseries) and other French decoration were of a high quality, as were those of his descendants, equalled by the excellent workmanship of the cabinet work.

Good pieces of "vernis Martin® fetch high prices to this day, and the product includes small ware such as snuffboxes, etc.

English Lacquerwork. — From the last

quarter of the 17th century and during first half of the 18th century England was passing through a veritable rage for lacquered furni¬

ture. Oriental imports on a large scale gave impulse to the fad. This style of decoration was termed ((Indian.® It became so popular that the art was taught to young ladies in the schools. Cabinetworkers, when Queen Mary led the fashion and placed all her ((china® in "japanned® closets, became proficient lacquerers.

The fashion came so suddenly and became so extremely popular that lacquer coatings began to cover furniture of every description as is evidenced by the fact that (

ten disclose walnut veneer beneath. English lac pieces of this period are, generally, in red, green blue, violet, some buff. These pieces are now

getting scarce and are prized by collectors, espe¬

cially those in red. A survival of this "lac¬

querwork® occurred in the 80's of last century during the Adams' style vogue. The product was termed "Japanned work® and was

in black, green or gray, mostly, and heightened with gilt or painted decoration. The execution of this furniture was poor and few pieces (unless retouched) exist that are not dilapi¬

dated.

Bibliography.— Audsley, G. A., Ornamen¬

tal Arts in Japan > (London 1882-84) ; Breuer, A. A., 'Chinese Inlaid Lacquer) (in Burlington Magazine, 1914) ; Bucher, B., Oeschichte der technischen Kiinste) (Stuttgart 1875) ; Bushell, Dr. S. W., (Chinese ArC (London 1909) ; Gonse, L., {L'Art japonais* (Paris 1883) ; Hart, E., (Notes on the History of Lacquer J

(in Japanese Society Transactions and Pro¬

ceedings, London 1897) ; Hendley, T. H., 'Lacquer Industrial Art in Bikanir, India* (in Journal of Indian Art, London 1891) ; Ilg, A., ' Einiges fiber die Technik orientalische Lackar-

beiterC (in Mitheilungen des K. K. Oesterr.

Museums, Vienna 1872) ; Jacquemart, A.,

(in Connoisseur, London 1910—14) ; Moorcroft, W., (Description of Cashmere> (London 1841) •

Quin, J. J., (The Lacquer Industry of Japan>

(in Asiatic Society of Japan, transactions,*

Yokohama 1881) ; Semper, G., (Der Stil in den techn. und tekton. Kiinsten (Frankfort 1860) ; Smith, W. H., (A Description and History of Japanese Lacquer) (in Japan Society, trans¬*

actions and Proceedings, London 1907) ; Teall, G., (Lacquers from further East than Manda¬*

lay (in House and Garden, New York 1917) ; Walters, W. T., (Oriental Collection) (Balti¬*

more 1884).

Clement W. Coumbe.

LACROIX, la'krwa' Paul, French his¬

torian and novelist: b. Paris, 27 Feb. 1806; d.

there, 16 Oct. 1884. He wrote under the nom-

de-plume P. L. Jacob, Bibliophile, and is best known under that name. He was a prolific writer. Among his early works are disserta¬

tions sur quelques points curieux de l'histoire de France et de l'histoire litteraire (Paris 1838-47) ; (Histoire du XVIe siecle en France**

(1834) ; (Histoire de la vie et du regne de Nico-

'las Ier) (1864), in eight volumes. His novels are on romantic history subjects. He edited (from 1829) in collaboration with Pichot, Mercure du XI Xe siecle and founded (1830) Gastronome and Garde national. In cultural art he pub¬

*lished a series of richly illustrated works, among them (Costumes historiques^ de la France**

(1852, 10 vols.) ; (Le Moyen-Age et la Renais¬

sance (1847-52, 5 vols.) ; (Moeurs, usages et costumes au moyen-age et a l'epoque de la ren-*

aissance) (1870; 2d ed. 1872); (Vie militaire et religieuse> (1872).

LACROIX, Sylvestre Frangois, French

mathematician: b. Paris, 1765; d. there, 25 May 1843. He was (1787) instructor at the Paris Military School, became (1788) professor at the artillery school at Besangon and examiner (1793) of artillery officers. In 1794 he was appointed chief of the Bureau of Committee for the Restoration of Public Instruction, and professor of mathematics at the Lcole Normale.

He was appointed (1799) professor of the Poly¬

technic School and then professor of mathe¬

matics at the university, and in the same capac¬

ity (1815) at the College de France. He re¬

signed from most vocations in 182L He wrote excellent books of instruction still in use; also

graP (Paris 1797; 7th ed., 1867); (Traite des differences et des series) (1800) ; (Traite elementaire du calcul des probability (1816; 4th ed., 1833) ; (Cours des mathematiques*

(1797-1816). These have found German ver¬

sions on account of their high value.

LACRYM.7E CHRISTI, la'kri'mi kris'ti,

an Italian red wine produced from grapes so named grown on the slopes of Vesuvius near the Lacrymae Christi monastery. Its delicate, spicy flavor, fire and aromatic bouquet give it a popularity higher than other Italian wines.

On which account vintages from elsewhere in Italy are often labeled with this name when the wine has a more or less similar character, especially as the true vintage is a small one.

It is numbered among the liqueur wines. The dark, amber-yellow Lacrymae Christi of Mount Somma is the

closest in quality to the true vintage.

LACTANTIUS, Firmianus, often called

the Christian Cicero, on account of his pure Latin style, lived in the last hali of the 3d cen¬

tury and at the beginning of the 4th. Con¬

stantine the Great made him tutor of his son Crispus. His most important work is the (Institutions Divinae,* a manual of Christian doctrine written to defend the religion to which he had been converted. His works appear in Migne's (Patrologia,* and have also been edited by G. Laubmann and S. Brandt (Vienna 1891).

LACTARENE, lak'ta-ren, the casein of

milk as commercially prepared by being freed from fat, precipitated by an acid, thoroughly purified, dried and powdered. It is insoluble in water, but is soluble in an alkali, such as ammonia, and in this form is used, like albumen, for fixing pigment colors in calico-printing. The cloth, after it has been printed, is steamed, the ammonia is driven off and the pigment is thereafter able to resist the action of water.

LACTATION. See Milk, Human.

LACTEALS, lak'te-alz, vessels which, to¬

gether with the lymphatics, constitute one sys¬

tem for conveying a fluid or fluids from various organs of the body to the veins near their terminations in the heart. The fluid which the lacteals convey is milky after a full meal, and is called chyle, though during intervals of fasting it is a yellowish lymph, as in the lymphatics.

The lacteal vessels commence on the intestinal villi, unite with one another in the mesentery and, after leaving the mesenteric glands, dis¬

charge their contents for the nourishment of the body into the receptaculum chyli, in front of the second lumbar vertebra. See also Lymph ; Lymphatic Glands.

LACTIC ACID (CalLOa). Scheele, in

1780, was the first to describe the acid present in sour milk. In 1832 Liebig and Mitscherlich showed it to be a distinct acid. Lactic acid is widely distributed in nature, occurring in the sap of several plant families, in sour milk, in the saliva, blood and urine, and the brain and gastric juice of animals. Lactic acid is a result of the fermentation of the various sugars, and of dextrin and mannitol. There are many modes of preparing it artificially; and its iso¬

meric varieties, of which four have been de¬

scribed, have excited much attention. Its two principal kinds are fermentation lactic acid and paralactic or sarcolactic acid. The former is got from concentrated sour whey by remov¬

ing the curd, adding lime, filtering, diluting with water, removing the lime with oxalic acid, evaporating and extracting the lactic acid with alcohol. It is more usual, however, to get it by what is called the lactic fermentation, from sugar or saccharine substances. The sugar is dissolved in water ; to the solution is added sour milk or decaying cheese and a quantity of fine, well-washed prepared chalk, and the mix¬

ture is kept for about four weeks at between 86° and 95° F. Fermentation ensues and much lactic acid is formed, which combines with the chalk and forms lactate of calcium. . This salt is then decomposed by sulphuric acid, filtered, and the fluid is boiled with carbonate of zinc.

Lactate of zinc is formed, which is collected and decomposed by sulphureted hydrogen.

The fluid filtered from the sulphide of zinc is

evaporated, and the syrupy fluid which remains contains the lactic acid. Lactic acid of com¬

merce is a syrup (specific gravity/ 1.215) which contains a small percentage of water. It re¬

mains liquid even at very low temperatures. It 640

deliquesces in moist air, dissolves in all propor¬

tions in alcohol and water, has no odor and has a purely sour taste. It cannot be distilled, or even heated, without undergoing decompo^

sition, lactic anhydride or lactolactic acid being formed ; at a higher temperature carbonic oxide is evolved, and a variety of products distil over, and charcoal is left in the retort.

By oxidizing agents, such as bleaching-powder and nitric acid, it is converted into oxalic acid ; by oxide of manganese into aldehyde.

The paralactic or sarcolactic acid was ob¬

served in flesh by Berzelius in 1806, and he con¬

sidered it the same as that derived from milk.

Liebig showed that they were not absolutely identical, but the 'nature of their differences is at present unknown. This acid is readily got from the cold aqueous extract of meat by add¬

ing a solution of baryta, coagulating and re¬

moving albumen, concentrating the solution, precipitating the baryta, filtering and evaporat¬

ing. The syrupy residue contains the acid.

Paralactic acid can be distinguished from lactic acid by its property of rotating the plane of polarization to the right, lactic acid being inactive. The calcium salt of the fermentation acid

contains more water of crystallization; when heated it retains it for a shorter time; and it is more soluble than the sarcolactate.

Again, the zymolactate of zinc, contains more water, loses it more quickly on heating, but itself endures a much higher temperature with¬

out decomposition than the sarcolactate. The zymolactate is much less soluble in water and in alcohol than the other; the crystalline forms of the two salts also are different. The other salts of lactic acid are for the most part crystalline, and soluble in water. . Lactic acid forms compound ethers and substitution acids.

In the arts, lactic acid is used in the dyeing of wool when mordanting with potassium dichromate, supplanting tartaric and oxalic acids. It is less corrosive, and imparts a finer feel and lustre. With an equal part of potas¬

sium lactate it forms lactolin, regarded as su¬

perior to the plain acid. Lactic acid is a solvent for several dyestuffs which are in¬

soluble in water, and is of special use in the dyeing and printing of cotton textiles. It is also used in the tanning industry, in coloring, bating and plumping the skins, to which it imparts a fine grain. In the distilling industry it is used to check the development of delete¬

rious bacteria.

In medicine, lactic acid is used in laryngeal tuberculosis, and diluted with six parts of water, it is applied local^ in diphtheria and croup to dissolve the false membrane. It is also used as a local application in tuberculous ulcers, lupus and epithelioma.

LACTIC FERMENT, a minute organism

which, under the microscope, is seen to consist of

small elliptical cells, generally detached, but sometimes occurring in chains of two or three.

It is developed in milk when it is allowed to stand for some time, and is the cause of the milk becoming sour, the sugar of the milk changing into lactic acid. It is also developed when cheese is added to a solution of sugar, and kept at a temperature of 35° to 40°. See also Fermentation ; Lactic Acid.

LACTOMETER, or GALACTOMETER,

an instrument for ascertaining the different qualities of milk. Several instruments of this sort have been invented. One consists of a glass tube one foot long, graduated into 100

parts. New milk is filled into it and allowed to stand until the cream has fully separated when its relative quantity is shown by the number of parts in the 100 which it occupies. Another is a specially constructed hydrometer used to determine the specific gravity of milk for the purpose of detecting adulteration with water.

It has been learned by experience that the specific gravity of the milk of healthy cows does not fall below 1.029. See Milk Adultera¬

tion.

LACTOSE, sugar of milk (C1TL2O11), a

substance obtained by evaporating whey, filter¬

ing through animal charcoal and crystallizing.

It forms hard, white, semi-transparent trimetric crystals, which have a slightly sweet taste, and grate between the teeth. It is convertible like starch into glucose by boiling with very dilute sulphuric acid.

LACTUCARIUM, the brown viscid juice

of > the common garden lettuce, obtained by incision

from the leaves and flowering stems, and dried in the air. It is a mixture of various substances, including lactucone, lactucin, lac-

tucic acid, mannite, albumin, etc. Lactucarium is hypnotic, a'nti-spasmodic and sedative, and has been recommended in cases in which opium is inadmissible, particularly for children. It has been administered with advantage in chronic rheumatism, diarrhoea and asthma, in doses of two to five grains.

LACUNAR, la/ku'nar, the Latin word de¬

fines a wainscoted and gilded ceiling, a panel¬

ceiling, and obtains its intent from the sunken spaces (coffers) of the paneling. It applies in architecture also to the under surface of the member of an order, the under side of the larmier or corona of a cornice, etc.

LACUSTRINE DEPOSITS, sediments

laid down in lakes. They may be gravels consolidated into conglomerates, sands into sandstones, clays into shales, or marls into limestones. See Lakes, section on Lakes in article on Geology, and section on Sediment -

ary Rocks in article on Rocks.

LADAKH, la/dak', India, a province of

Kashmir including the valley of the upper Indus and its tributaries. It is located be¬

tween the Himalayas and Karakorum and has a climate ranging from fierce heat in the day time to icy nights. Vegetation is hindered by the dryness of the atmosphere, grain and fruit growing being restricted to the sheltered valleys and then only in stunted growths ; and forests are few. The area is about 8,000 square miles, all at a great elevation, from 9,000 to 14,000

feet. A number of salt lakes furnish an end¬

less supply of borax. Its game consists of wild horses, ibex, wild sheep, hares, etc. Goats supply a short wool which is used in the pro¬

duction of shawls. The inhabitants, 186,656, ap¬

proximately, are small, unclean Turanians, strong of body and for the most part agricul¬

turists. They are Buddhists and each village has its monastery. Except by the wealthy, polyandry is the rule. Commerce consists chiefly of the passage through from China of wool, tea, gold dust, silver, Indian cotton, skins, leather, grain, fire-arms, etc.; but native wool, LADARIO

borax, sulphur and dried fruit are exported.

Consult Cunningham, (Ladakh, physical, statis¬

tical and historical ' (London 1854) ; De Bour-

bel, 'Routes in Jammu et Kashmir' (Calcutta 1897) ; Adair, (Sport and Travel in Baltistan and Ladakh' (London 1899) ; Younghusband, 'Kashmir' (London 1911) ; Neve, (Thirty Years in Kashmir' (New York 1913).

LADARIO, la'da-ryo, an arsenal and small town in Matto Grosso, Brazil, about five miles east-southeast of Corumba on the Paraguay River ; one of the three arsenals of the Brazilian navy. See Brazil — Navy.

LADD, George Trumbull, American edu¬

cator: b. Painesville, Ohio, 19 Jan. 1842; d. 8

Aug. 1921. The Ladds, originally of Norman French extraction, intermarried with the Welsh family of Williams and the name appears in English history as early as the 13th century.

Dr. Ladd was a lineal descendant, through the paternal line, of Elder William Brewster and Gov. William Bradford. He was graduated at Western Reserve University, A.B., in 1864 ; A.M., in 1867 ; and his honorary degrees were D.D. (1879), LL.D. (1895), Andover Theologi¬

cal Seminary; A.M., Yale (1881); LL.D., Princeton (1896). After graduation at

Western Reserve University he spent two years in business, and then entered Andover

Theological Seminary, whence he graduated in 1869. In 1869-71 he preached in Edinburg, Ohio, and in 1871-79 he was pastor of Spring Street Congregational Church, Milwaukee, Wis. In 1879 he was called to the chair of philosophy at Bowdoin College, and held that position until he became professor of philosophy at Yale College in 1881. After the death of President Porter (1892) lie was made Clarke professor of metaphysics and moral philosophy, which position he held until 1906, when he resigned. His services to the cause of edu¬

cation carried him, at various times. __ be¬

yond Yale. During the academic year 1895-%

he was chosen a member of the faculty of Harvard University and conducted the graduate seminary in ethics, and in 1906-07 he was sub¬

stitute professor in Western Reserve Univer¬

sity; thereafter, much of his time was spent in lecturing and travel upon important educa¬

tional missions in foreign lands. Twice he was invited by the Imperial Educational So¬

ciety of Japan to deliver courses of lectures, and in the summer of 1892 and again in 1899 he visited and lectured at Doshisha, Kioto, Tokio, Hakone and Kobe. In this period Professor Ladd for 16 months delivered courses in the Imperial Universities of

Tokio and Kioto, and in Count Okuma's and other private univer¬

sities, and in the government business colleges where he spoke on ((Commercial Ethics," and made many other public addresses. His lectures on ((Commercial Ethics" were later adopted as a textbook, and his other writings have been adopted as textbooks in Russia and other coun¬

tries, as well as in Tapan and India. In the spring of 1907 he went to Korea as guest and "unofficial adviser" of Marquis Ito, returning to the United States by way of Honolulu, where a month was spent in lecturing to teachers. For his services to the cause of education in Japan he was thrice admitted into audience with the emperor, the last in private when he was in¬

vested with the third degree of the order of vol. 16 — 41

the Rising Sun. He was elected Gold Medalist of the Imperial Educational Society, and on the occasion of his third and last visit received the second degree of the order of the Rising Sun at the hands of the emperor.

In 1899-1900 he lectured on philosophy be¬

fore the University of Bombay, India, and on the philosophy of religion at Calcutta, Madras, Benares and elsewhere. The lectures in Convo¬

cation Hall, Bombay University, were unique, inasmuch as no one before that time had lectured under its auspices, which honor was, in part, an official justification of the substitu¬

tion of Professor Ladd's books for those of Herbert Spencer as required reading for the M.A. degree. His visits to Japan, and es¬

pecially to Korea in the critical time of the readjustment of the political and social relations of the two countries, constitute an important factor

in their history.

His contributions to the science of psy¬

chology and philosophy are widely known. He was one of the founders of the American Psychological Association, was its second presi¬

dent and its delegate to the International Con¬

gress at Paris in 1910. Among the most permanent of his achievements is the founding of the psychological laboratory at Yale, which, under his guidance, became one of the best equipped in the world. Up to the time of his resignation in 1906 there proceeded from Yale a continuous stream of teachers of philosophy, whose success has been largely due to the teaching and influence of Professor Ladd.

His position in American philosophy is sufficiently indicated by the appended list of his works. By some critics he has been erroneously called a disciple of Lotze and Porter, a theological apologist and defender of the traditional views, none of which appraise¬

ments is supported by the facts of his mental development. The fact is Ladd never studied with either Lotze or Porter, or became ac¬

quainted with their works until he had been a student of philosophy for 20 years. For many years he devoted himself to his great work, (The Doctrine of Sacred Scripture,' from which, when completed, he turned exclusively to the problems of philosophy; but at no time was he anybody's disciple, or adopted any system, still less did he found any "school."

His freedom from scholastic bias, combined with sagacity of judgment and catholicity of taste, accompanied by great patience and capacity for hard work, which are the strongest marked elements of his personality and tem¬

perament, scarcely warrant his being called a

"dogmatist," but rather a "critical realist," or "radical rationalist."

Professor Ladd's published works include volumes on technical theology, psychology, philosophy and education. Besides these works he wrote extensively on his travels in Japan, Korea and India, and on questions connected with politics and the Great War, upon so¬

cial criticism and practical ethics. He was also a frequent contributor to the techni¬

cal journals, whose indices will serve as guides. His more important publications are 'Principles of Church Polity' (1882) ; 'Doctrine of Sacred Scripture' (1884) ; 'Outlines of Philosophy' (trans. of Lotze, 5 vols., 1887); 'Elements of Physiological Psychologv'

(1887, revised with R. S. Woodworth 1914) ; 642

LADD — LADIES OF THE MACCABEES OF THE WORLD

(What is the Bible ?) (1888); (Introduction to Philosophy) (1889) ; (Outlines of Physiological Psychology) (1890); (Philosophy of Mind}

(1891); (Primer of Psychology) (1894);

*Psychology Descriptive and Explanatory) (1894) ; Philosophy of Knowledge) (1897) ; (Outlines of Descriptive Psychology > (1898) **

(Essays on the Higher Education (1899) ; (A Theory of Reality) (1899); Pectures to Teachers on Educational Psychology) (in Japanese); Philosophy of Conduct (1902); (What Can I Know?* (What ought I to*

Do? (What Should I Believe ?* (1914-15).*

LADD, Herbert Warren, American jour¬

nalist and politician: lx New Bedford. Mass., 15 Oct. 1843. After a high school education he secured a position on the staff of the New Bedford Mercury,

and during the Civil War went to the field with the 43d and 44th Massa¬

chusetts regiments. His report of General Foster's Tarboro march was published in the Boston Journal before the New York papers had news of it. He issued a Sunday edition of the Mercury to announce the battle of Fredericksburg, the first Sunday paper pub¬

lished in New England outside of Boston. In 1864 he entered the dry goods business and in 1871 formed the firm of Ladd and Davis in Providence, which in 1887 was incorporated as the H. W. Ladd Company, of which he was president. He founded the Commercial Clu'b in Providence, was vice-president of the Board of Trade for two years, was a generous patron of Brown University, and in 1891 presented to the university a fully equipped astronomical observatory. In 1889 he was elected governor of Rhode Island, was a candidate for that office in 1890 and was defeated, but was re-elected in 1891.

LADD, William, American philanthropist:

b. Exeter, N. H., 1778; d. Portsmouth, N. H., 9 April 1841. He was graduated at Harvard College in 1797, became a sea captain, but re¬

tired at the outbreak of the War of 1812, and subsequently took an active part in organizing the American Peace Society, of which he was for many years president, and in behalf of which he labored efficiently until the close of his life. In the interests of this society he edited the Friend of Peace, commenced by Dr.

Noah Worcester, and the Harbinger of Peace, and published a number of essays and oc¬

casional addresses on the subject of peace. He carried his views to the extent of denying the right to maintain defensive war, and caused this principle to be incorporated into the constitution of the American Peace Society.

LADEGAST, Friedrich, German organ

builder: b. Hermsdorf, 30 Aug. 1818; d. 1905.

He learned organ construction at Rochlitz, Saxony, through his brother Christlieb, then worked in several localities and established himself (1846) at Weissenfels. Most notable of his works were the reconstruction of the organ in Merseburg Cathedral (1855) and the construction of the Leipzig Nikolaikirche organ (1859-62) with four manuals and 85 stops.

He trained his son Oskar, who was born 26

Sept. 1856, in the profession and they have built many large as well as ordinary organs.

LADENBURG, Albert, German chemist:

b. Mannheim, 2 July 1842; d. 1911. He studied at Heidelberg, Berlin, Ghent and Paris and be¬

came instructor (1868) at Heidelberg, adjunct professor (1872) and professor at Kiel (1873) and then (1889) at Breslau. He did useful work on the synthesis of alkaloids and the constitu¬

tion of benzol. He wrote (Vortrage fiber die Entwickelungsgeschichte der Chemie in den letzten 100 Jahren* (Brunswick 1869 ; 3d ed., 1902) ; (Theorie der aromatischen Verbindun-

gen* (ib. 1876) ; (Handworterbuch der Chemie) (13 vols., Breslau 1883-95) ; (Naturwissen-

schaftliche Vortrage in gemeinverstandlicher Darstellung) (1908).

LADIES' CATHOLIC BENEVOLENT

ASSOCIATION, The. This association was

instituted 9 April 1890, and chartered under the laws of Pennsylvania in June of the same year. The association proposes as its objects, as set forth in

its incorporation articles, are to write into a fraternal sisterhood all Catholic women ; to elevate them morally, mentally and socially; to educate them in integrity and frugality, and to mutually aid and assist each other by providing relief and death benefits to its members. On_l Jan. 1916 it had a mem¬

bership oj 157,525 in 1,253 subordinate branches, located in 29 States. Its disbursements in death benefits to that date was $13,640,007.48, with relief benefits of $23,560. Its disburse¬

ments in 1915 were $1,369,920.46 — death bene¬

fits, $1,327,989.51 ; other disbursements, $41,-

930.95. Its recording and financial office is located at 443 West 11th street, Erie, Pa.

LADIES' LOYAL ORANGE ASSOCIA¬

TION. See Orangemen.

LADIES OF THE MACCABEES. A

woman's beneficial society, organized 24 March 1886. This was the first society in North America composed exclusively of women,

to give fraternal life insurance to women. The society has a beautiful ritual used by its lodges, and inculcates the principles of sisterly love and fraternal assistance. In its inception the society was an auxiliary socially of the Knights of the Maccabees, but always had entire charge of its own finances. The slight connection was severed in a few years and it became an ab¬

solutely independent society. It offers insur¬

ance to women for whole life with disability and old age benefits, also a term plan and a maternity benefit. Several years ago the life benefit protection was changed from the current cost plan to adequate rates and the field ex¬

tended from the State of Michigan only to any pf the States of the Union in which it was considered advisable to organize. The order now has 51,000 members and is doing business in 21 States. It has beds in several hospitals, endowed in perpetuity, where the members may receive free treatment; also a bed for the little ones in the Children's Free Hospital, Detroit. It has a relief fund for the benefit of its members in financial distress. The society has paid for claims nearly $10,000,000 and has a reserve fund of a million and a quarter dollars. The finances are managed en¬

tirely by women. The president, Mrs. Frances E. Burns, has filled this office since 1896, and the secretary, Dr. Emma E. Bower, has held her office since 1893. The headquarters are at Port Huron, Mich.

LADIES OF THE MACCABEES OF

THE WORLD. See Woman's Benefit As¬

sociation of the Maccabees, The.

LADIES OF THE MODERN MACCA¬

BEES. See Maccabees, The Ladies of the.

LADINO, la-de'no, (1) a hybrid language of the Jews of Hamburg, London, Amsterdam, southern France, North Africa and Constanti¬

nople. (2) The old Castilian language. (3) In Central America and Mexico the word is used to designate the descendants of whites from Indian mothers. (4) The Romansch

dialect used in the Engadin, etc.

LADISLAS, lad'is-las, or LADISLAUS I,

the Saint, king of Hungary: b. Poland, 1040; d.

29 July 1095. He was son of Belas, fought and conquered the Cumans (1074) and was made king of Hungary (1077) after the death of his brother Gejza. In 1091 he overthrew the Croatians and placed his nephew Almos as ruler over them. He organized the con¬

ditions of the Christian Church in Hungary, killed out the remnants of heathendom, con¬

verted the colonized Cumans and issued strict laws. On account of his services to Christian¬

ity he was canonized in 1192.

LADISLAS IV, The Curnan, king of Hun¬

gary : born about 1262 ; d. Korosszeg, 1290.

He was son of King Stephan V and reigned from 1272 to 1290, when he was assassinated by three Cumans for attempting to get rid of his wife so as to marry another. With the Magyars and Cumanians he fought with Rudolph of Hapsburg at Durnkriit (26 Aug. 1278), over¬

throwing Ottokar of Bohemia. Later in life he threw in his destiny with the Cumanians he had favored, and of whose blood he was on his mother's side. The country, however, fell into '

dire anarchy and he died fighting his enemies and the Pope.

LADISLAS V, called the Posthumous,

king of Hungary and Bohemia : b. Komarum, 27 Feb. 1440; d. Prague, 23 Nov. 1457. He was son of Emperor and King Albrecht II and Elizabeth, daughter of Emperor Sigismund, and born four months after his father's death.

The estates of Hungary had elected Wladislas III of Poland as king, but Elizabeth forced the infant's

coronation. He was placed in the care of Frederick III, his uncle, as guardian, and he was acknowledged king of Hungary on the death (1444) of Wladislas and was crowned in 1453. Under the evil t itelage of his uncle Ulrich Cillei he cared little for his duties as ruler and took no part in the glorious raising of the siege of Belgrade (1456) by Janos Hunyadi. the great general who ad¬

ministered the government during his minor¬

ity. On the assassination of the traitorous Ulrich he had young Hunyadi beheaded, but was forced to liee from Hungary to Prague, where he died suddenly, presumably of poison, as he was preparing to marry a French princess.

LADISLAS, king of Naples: b. 1375; d.

Castelnuovo, 6 Aug. 1414. He was the son of Charles of Durazzo, and on his father's assas¬

sination, the regency was conducted by his mother, Margaret, who won the support of the Pope when the nobility set up Louis II of Anjou as candidate to the throne. In 1390

Pope Boniface IX had him crowned, and after eight years' warfare he drove the invaders out.

He attempted (1403) to gain the Hungarian throne, utilizing the great schism and the con¬

sequent political confusion to gain power over the Church and Rome. Failing in his schemes he was forced to sign the peace (25 June 1412) after his defeat at Rocca Secca by Pope John XXIII; but he took Rome the following year.

Consult Creighton, (History of the Papacy*

(Vol. I, London 1882).

LADISLAS II, Jagello, king of Poland:

b. 1348; d. Grodek, 31 May 1434. He was the son of

Grand Duke Olgierd of Lithuania and succeeded his father (1377) and was baptized as a Christian (1386), receiving the name Vladislas. He married, in the same year, Hedwig, daughter and heiress of Louis the Great, and was crowned king of Poland under the title Ladislas II. Under his rule Poland progressed greatly, and, in the battle of Tannen-

berg (1410), he defeated the Teutonic Order of Knights. He granted the nobility great rights and freedom ; in 1400 he founded the CracoAV

University.

LADISLAS III, king of Poland: b. 1424; d. Varna, 10 Nov. 1444. He was son of Ladislas II, was crowned in 1434 and took over the government in 1439, becoming elected in 1440 king of Hungary. But his coronation, at Stuhlweissenburg, did not take place till he had successfully fought against the widow of Albrecht II, who upheld the rights of her infant son Ladislas Posthumous ; he, in 1442, married the widow, Elizabeth, who died three days later leaving him an undivided throne.

With an army of 20,000 Hungarian and Wal-

lachs under the great general Hunyadi he entered Bulgaria against the Turks and, after some successes, was defeated and killed at the battle of Varna (1444).

LADISLAS IV, king of Poland : b. Cra¬

cow, 1595; d. Merecz, 20 March 1648. He was son of Sigismund III, and was elected tsar of Russia (1610), making Moscow his residence.

But the Russians (1612) rose in rebellion and elected another tsar (Michael Romanav) and he was ejected. In 1632, on Sigismund's death, he was called to the throne of Poland, when he started a successful campaign against Russia, defeating the tsar's force and compelling sur¬

render (1633), and meeting with equal success

against the Turks. The nobility gained gre. L

supremacy over the monarch's powers, taking over the army and leaving him 1,200 guards, and great disturbances occurred among the Cossacks in his last years.

LADISLAV I, la-dis'laf, or VLADISLAV

I, king of Poland: b. 1260; d. 1333. He was called ^Lokietek,® the Yard-long, and was son of Duke Casimir of Cuiavia and was acknowl¬

edged king (1288) by a part of the nobility. It was not, however, till after the death of the Bohemian King Venceslas and after fighting unsuccessfully against the former and Duke Heinrich of Breslau and being exiled, that he (1305) conquered Cracow to rule there. In 1312 he crushed his enemies, becoming crowned, finally, at Cracow as king of Poland in 1320.

Through the marriage of his daughter Anna with Prince Gedimin Lithuania became united with Poland.

LADMIRAULT, lad'me'ro, Louis Rene

Paul de, French general: b. Montmorillon, 17

Feb. 1808: d. Paris, 3 Feb. 1898. He went to Algiers (1831) as lieutenant, serving 22 years there and becoming general of a division. He 644

commanded a division (1859) in the war with Italy and was wounded at the battle of Sol-

ferino. In 1870 he was given command of the 4th corps with which he took part in the battles before Metz. On 18 August he defended Aman-

villers with great bravery and success against the Prussian 9th corps. He was taken prisoner in Metz, but on his release took part in the fight againsj the Commune, becoming governor of Paris till 1878.

He was member of the Senate 1876-91. He wrote (Bases d'un projet pour le recrutement de l'armee de terre) (Paris 1871).

LADOGA, la'do-ga, the largest lake of

Europe, situated in the northwest of Russia, 40

miles east of Saint Petersburg. Greatest length, north to south, 130 miles ; average breadth, about 75 miles; area, 7,156 square miles or 31 times as large as the Lake of Geneva. It receives no fewer than 70 streams, the principal of which are the Volkhov and Sias, which enters it on the south, and the Svir, which enters it on the east, bearing the surplus water of Lake Onega and has the Neva for its outlet.

It is icefree from May to October; its fauna, Arctic in character, is exceptionally rich and varied. It contains numerous islands, and its shores are generally low. Peter the Great Canal (1718-31) and the Alexander II Canal (1861—66) connect the Neva and the Volkhov; Sias Canal (1764—1802) and the Empress Maria Feodorovna Canal (1883) connect the Volkhov and the Sias ; the Svir Canal and the Alexander III Canal connect the Sias and the Svir. These canals form a navigable chain around the south of the lake. On two of the islands in the north of the lake there are ancient monasteries, founded, respectively, in 960 and 1393, which are regarded with great veneration, and to which thousands of pilgrims annually repair.

LADRONE.S, la-dronz', or MARIANNE

(ma-ri-an') ISLANDS, a group of 16 islands in the north Pacific Ocean, north of the Caro¬

line Islands and 1,500 miles east of the Philip¬

pines. The northern group is volcanic and un¬

inhabited. Guahan is the southernmost and lar¬

gest of these islands; and next in importance is

Saipan, the seat of administration. The islands have a total area of 250 square miles. The in¬

habitants, who are mainly indigenous, are tall, robust and active, and naturally acute, lively and ingenious. Their huts are constructed of palm-

trees, and divided by mats into different apart¬

ments. Rice, sugar, maize, indigo, coffee and tobacco are the main products, with the bread¬

fruit tree, first discovered here. The islands were discovered by Magellan in 1521, and were settled by the Spaniards. Magellan called them Islas de Ladrones (Thieves' Islands), because the Pacific pirates had a rendezvous here. To¬

ward the end of the 1 7th century they received the name of Mariana or Marianne Islands, from the queen of Spain, Marianne of Austria, the mother of _ Charles II, at whose expense the Jesuit missionaries were sent over who settled here in 1667. The chief inhabitants are settlers from Mexico and the Philippines. .Guahan (Guam) was ceded to the United States in 1898, and the rest sold by Spain to Germany in 1899, becoming part of the German New Guinea Protectorate. In the early days of the Great European War they were captured by the Japanese as one of the allied nations, and are now (1917) in their possession. Pop. estimated at over 15,000.

LADY OF THE AROOSTOOK, a'roos'-

tuk, title of a novel by William Dean Howells appearing first in the Atlantic (1878-79), then in book form (Boston 1879).

LADY-BIRDS, beetles of the family Coc-

cinellidce. This is a very large family of small beetles of rounded, convex form, usually shin¬

ing and hairless. The head is retracted beneath the pronotum, the legs are short and hidden and the elytra are usually brightly colored and marked with

dark spots. These colors vary much in the same species, especially in the Eng¬

lish Coccinella septenipunctata, — the pet of chil¬

dren. The most widely known American spe¬

cies is the black one with two red spots (C.

bipunctata) , common all over the United States.

These beetles live upon plants, shrubs and trees, depositing their eggs in little bunches on the lower sides of the leaves. The worm-like mag¬

gots are active, searching the leaves for plant-

lice, which are eagerly devoured, each kind of beetle choosing a special kind of aphid for its food. In this habit the lady-birds, which are sometimes extremely numerous, perform a val¬

uable service, since their minute prey is highly injurious to the plants. See Scale-Insect.

LADY BOUNTIFUL, a character in

Farquhar's (The Beaux StrategenP (1705).

Widow and beneficiary of Sir Charles Bounti¬

ful and his will, she dispenses her wealth cur¬

ing the Lichfield inhabitants of their maladies.

LADY CHAPEL, a chapel dedicated to

the Virgin Mary, and when attached to cathe¬

drals, generally placed eastward from the altar.

The lady chapel of Westminster Cathedral is that _ usually known as Henry VIPs. Saint Patrick's Cathedral in New York possesses a most ornate lady chapel.

LADY CRAB, a common name for the

Plcityonichus ocellatus, an American species of edible crabs beautifully covered with rings of red and purple. It is one of the group Cal-

linectes hastata. There are, however, other crabs which are so termed because they all bear what is considered as an outline of the head and shoulders of a woman.

LADY-DAY, one of the quarter-days in

England and Ireland, on which rent is made payable. It falls on 25 March in each year. In the Roman Catholic Church it is held as a great festival under the title of the Feast of the" An¬

nunciation. In the English Church it is ob¬

served as a feast. In France the day is termed Notre Dame de Mars.

LADY FERN, vulgar name for Asplenium

fHix-fcemina. It has ovate-oblong or broadly lanceolate, twice pinnate fronds, and is found in moist woods of Europe and North America.

It is claimed by some to have the properties of a vermifuge. The British place this fern in the genus Athyrium. Scott refers to it in the words :

"Where the copse-wood is the greenest, Where the fountain glistens sheenest.

Where the mountain dew lies longest,

Where the lady fern is strongest."

Edwin Lees calls it ((the sweet lady fern® and Howitt says: <(Do not pluck the strawberry flower nor break the lady fern.®

LADY OF THE LAKE, The. Scott's

(Lady of the Lake/ published 1810, was the third of his metrical romances, following the (Lay of the Last Minstrel* and ‘Marmion.* It was in part the result of a trip which Scott had made, on legal business, into the Highland coun¬

try, where he had been impressed by the romantic character of the scenery and its appro¬

priateness to the poetic treatment of historic as¬

sociations. ((This poem/ he said, ((the action of which lay among scenes so beautiful and so deeply imprinted on my recollections, was a labor of love, and it was no less so to recall the manners and incidents introduced. The frequent custom of James IV, and particularly of James V, to walk through their kingdom in disguise, afforded me the hint of an incident which never fails to be interesting,® — that is, the participation, on the part of royalty in dis¬

guise, in a romance among humbler folk. The poem may be said to reach the high-water mark of Scott’s success in blending the interest of scenery, action and simple human feeling, so far as his metrical works are concerned, though it contains nothing so fine of its kind as the ac¬

count of the battle of Flodden in

nothing of him.® He also related, to illustrate*

his care for accuracy of detail, that he himself rode into Perthshire ((to see whether King James could actually have ridden from the banks of Loch Vennachar to Stirling Castle within the time supposed in the poem.® (The Lady of the Lake/ like the earlier romances, met with instant success, and has proved last¬

ingly popular. Incidentally, its epilogue is one of Scott’s few distinguished achievements in purely lyric poetry. In the Edinburgh Review the work was discussed by Jeffrey, Scott’s good friend but frank critic, and his summing up of its qualities remains

one of the best accounts of Scott's poetic style : ((A medley of bright images and flowing words, set carelessly and loosely together, — a diction tinged successively with the careless richness of Shakespeare, the harshness and antique simplicity of the old romances, the homeliness of vulgar ballads and anecdotes, and the sentimental glitter of the most modern poetry; passing from the borders of the ludicrous to those of the sublime, alter¬

nately minute and energetic, sometimes artificial, and frequently negligent, but always full of spirit and vivacity, abounding in images that are striking, at first sight, to minds of every contexture, and never expressing a sentiment which it can cost the most ordinary reader any exertion to comprehend.®

Raymond M. Alden.

LADY OF LYONS, The, a play, by Bul-

wer-Lytton, originally called (The Adventurer/

It was first produced in 1838.

LADY OF MERCY, Order of Our, a

Spanish order dating from 1218. It was founded by James I of Aragon, in compliance with a vow made during his captivity in France.

Pope Gregory IX approved the order in 1230.

It was instituted to redeem Christian captives from the Moors. The order was extended to women in 1261. A branch order instituted in France was suppressed at the time of the Revolution. It is now a missionary order, mainly in South America and South Africa.

LADY OF SHALOTT, The, a maid who

died for love of Sir Lancelot of the Lake. It is the title of one of Tennyson's poems (1832).

LADY OR THE TIGER, The, title of a

story by Francis Richard Stockton (New York 1884). It received exceptional popularity heightened by the fact that the sequel or deci¬

sion is left to the reader, thereby creating a considerable fund of conjecture and discus¬

sion. The title has become a pet phrase to express a dilemma.

LADY WINDERMERE'S FAN. Oscar

Wilde had made himself notorious in affecting to write only to the few. In Wady Winder¬

mere's Fan* he throws his dart directly at popularity with the many. Nothing in Wilde's career is more perverse and more character¬

istic than the extraordinary success of his series of comedies beginning in 1892 with Wady Windermere's Fan/ This success is secured by an impudent practice of all the codes he had preached in his early career. And now his affronts to the public bring him fortune as well as fame. In the 80's Wilde had been t1 e enfant terrible of the British Isles; he had shocked the prudes ; he had pained the apostles'

of beauty for man's sake with his impious con¬

tempt for the British middle-class man. He had got himself lampooned and made the cen¬

tral figure of a Gilbert and Sullivan opera, but still he was poor. Now at the age of 38 he turns respectable as to morals and conventional as to artistic manners. Nothing could be more lofty, more smug, more British middle-class than the morals of Wady Windermere's Fan* ; nothing could be more au fait according to the current English imitations of French seri¬

ous drama than the innocent-guilty intrigue that it propounds. The men are long-winded prat¬

ers, wise and witty and sophisticated as to words,

impeccable as to their private lives.

The women are dowagers and faithful wives.

If any has sinned it was very long ago. The young girls are silent. In all these respects Wilde was giving the respectable English audi¬

ence what it wanted. He knew that the audi¬

ence would accept any amount of banality in the theatre if only it were given a dash of piquant French sauce. Above all it must not be called upon to think ; it must not be brought up short with an arresting observation of real life. It would enjoy risque allusions but only as verbal badinage. It resented bitterly any at¬

tempt on the part of the dramatist to be honest. Wilde was never more witty and in¬

genious than he was in Wady Windermere's Fan) and the succeeding plays. Never, save in (The Importance of Being Earnest/ which is a true farce, was he less honest. In his earlier work, with all his absurdities, he had been a corrective for characteristic British faults. In his society plays he pampers and coddles these faults and prospers upon them. Wilde's wit and paradox and epigram have become famous.

The verbal brilliancy of his plays is what gives them continuing life. The stories are second-

rate; the characters are not differentiated. All 648

are artificial creations in a fictitious code. But the author's own quips of observation, his turn of phrase and observation, the heartless polish of his contemptuous comedy, make the play memorable among the few examples of English comedy of manners. (Lady Windermere's Fan1

was produced by George Alexander at the Saint James'

Theatre, 22 Feb. 1892; it was revived at the same theatre 19 Nov. 1904 and 14 Oct.

1911. Its first production in America was at the Columbia Theatre, Boston, 1893. It has been one of the most popular stock plays for revivals in this country, in England and on the Continent. Consult Ransome, A., (The Life of Oscar Wilde, a Critical Study) (1912) ; Sherard, R. H., (Oscar Wilde-* (1906) ; (The Real Oscar Wilde> .(1915); Wilde, O., (The Truth of Masks, in Intentions > (1891).

Thomas IT. Dickinson.

LADYFISH, BANANA-FISH, or BONE-

FISH, the name of several different marine fishes conspicuous for elegance of outline and handsome coloring. They are found mainly in the tropical regions.

LADY'S FAN, The. See Giants Cause¬

way.

LADY'S, or FAIRY'S, FINGERS,

GLOVE, THIMBLE, etc., are some among

many gardener's names for the purple foxglove (Digitalis purpurea), in regard to which much provincial folklore might be cited. See Digi¬

talis ; Fox-glove.

LADY'S MANTLE, popular name for the

Alchemilla pratensis (Schmidt) of the

Rosacece family. The Alchemilla vulgaris L.

is also so called. This term is derived from the fact that there is supposed to be a similarity to a mantle in the shape of its leaf. It is a perennial with orbicular-reniform leaves, 5-9

lobed, more or less pubescent, serrate. Flowers are

two inches broad. It grows in grassy places near the Nova Scotia, Cape Breton and eastern Massachusetts coast, but was naturalized from Europe. The Alchemilla alpina L. is found on Miquelon Island and on the White and Green mountains and is distinguished by its beautiful five oblong silky entire leaflets. The Aphanes arvensis L., or parsley-piert, is also called field lady's mantle. This is found in dry fields of Nova Scotia, Georgia, Tennessee, etc., and has claims to astringent and diuretic properties.

LADY'S SLIPPER, or MOCCASIN

FLOWER, an orchid of the genus Cyprip'e -

dium, several species of which grow both wild and cultivated in the United States. See Orchids.

LADY'S SMOCK. See Cuckoo-flower.

LADYSMITH, British Columbia, city

situated on Oyster Harbor, Vancouver Island, in the Nanaimo district, 17 miles southeast of Nanaimo, on the Esquimalt and Nanaimo Rail¬

way. It is a shipping point for the collieries which are located about 12 miles inland. The Canadian Pacific Railroad Company operates a train ferry from Vancouver to this point and the freight for Vancouver Island is transferred here. The city was founded during the Boer War and the streets are named after the gen¬

erals who took part in that conflict. It was incorporated in 1904 and owns its own electric light and sewerage systems. The Canadian Bank of Commerce and the Royal Bank of Canada have branches here. There are four churches, two public schools and a high school.

There are smelters and stove works, shingle mills, aerated waterworks, boat-building yards, etc. Oyster cultivation is carried on in the harbor and there is a large farming district tributary to the city. Pop.

3,295.

LADYSMITH, South Africa, town of

northern Natal, near the Klip River, 119 miles by rail north by west of Pietermaritzburg, and 322 southeast of Pretoria. It is situated in a hilly region about 30 miles east of the Drakens¬

berg Mountains. During the South African War of 1899-1901 Ladysmith was besieged by a strong force of Boers. The complete invest¬

ment began on 2 Nov. 1899 and the relief was not effected till 28 February of the following year, or 118 days after the Boers succeeded in isolating the town. The town was held by a garrison of about 10,000 men under Sir George White, and during the siege much damage was done by the shells of the Boer artillery. Dis¬

ease also carried off many of the garrison and the inhabitants. The relief was effected by General Buffer after a hotly contested march by way of Pieters and Nelthorpe, to the east of the railway. Three previous attempts by the same general to relieve the town had to be abandoned owing to the strength of the Boer positions and to their superiority in long-

range guns. The population numbers about 4,000.

LAEKEN, la'ken, Belgium, a suburb of

Brussels on the Brussels-Ostende and the Brus-

sels-Humbeek railways. It has a royal palace, built 1782 but restored 1890 after the fire; with handsome park. On a neighboring hill is the colossal monument of Leopold I with its statue by W. Geefs. Pop. 35,024.

LAELIUS, le'li-us, (1) Gaius, Roman gen¬

eral and statesman: d. after 170 b.c. He was a friend of Scipio Africanus the elder, and fought

under the latter in most of his campaigns. In 190 b.c. he was made consul in consequence of his successes in the Spanish campaign (210-206

B.c.) and in Sicily and Africa. He defeated Syphax in 203. In 170 he was ambassador to Transalpine Gaul. (2) Gains, surnamed

Sapiens (the Wise), son of the preceding Ro¬

man statesman and student: b. about 186 b.c.; d. 115 b.c. He was an intimate friend of Scipio Africanus the Younger which comes out clearly in Cicero's treatise (Laelius sive de AmicitiaP In 151 he was tribune of the plebs, in 145 praetor, and in 140 was consul. His love of literature and philosophy is noted as well as his friendship and social intercourse with tal¬

ented contemporaries as the philosopher Panae-

tius, the -historian Polybius, the poets Terence and Lucilius. His early life was devoted to the study of philosophy and law. Besides figuring in (De AmicitiaP as interlocutor, he is a speaker in (De Senectute) and in (De Repub¬

lican He had some talent for military work as proved by his campaign against the Lusita-

man Viriathus. He imbibed the doctrine of the Stoics from Diogenes of Babylon and Pande-

tius. Early in his political successes he at¬

tempted to procure a division of the public land among the people but wisdom caused him to drop the measure as inopportune; later he be¬

came an adherent of the aristocratic party.

How highly his course or life was honored is clearly

shown in one of Seneca's injunctions to his friend Lucilius ((to live like Laelius.^

LAEMMER, lem'mer, Hugo, German the¬

ologian : b. Allenstein, East Prussia, 25 Jan.

1835. He studied at Konigsberg, Leipzig and Berlin, obtained the degree of D.Ph. (1854) at Leipzig, became (1857) private teacher at Berlin, then made a visit to Italy. He entered the Catholic Church (1858) and was ordained a priest (1859) and made doctor of theology at Breslau. He was made prelate-prothonotary in 1882. He wrote (Misericordias DominP

(1861) in justification of his entering the Catho¬

lic Church; (dementis Alexandrini de logo Doctrina) (1855);

chengeschichte des 16ten und I7ten Jahrhun-

derts> (1863; 2d ed., 1892) ; (De Caesaris Bar-

onii literarum commercio Diatriba) (1903).

LAENNEC, Rene Theophile Hyacinthe,

re-na ta-6-fel e-a-sant len-nek, French physi¬

cian: b. Quimper, France, 17 Feb. 1781; d. near Douarnenez, France, 13 Aug. 1826. He took his degree of doctor of medicine in 1814 and his professional reputation was already so high that in the same year he was appointed principal editor of the Journal de Medecine. In 1816

he was appointed chief physician to the Ho-

pital Necker, and soon after made the notable discovery of mediate auscultation, that is, of the use of the stethoscope. The original dis¬

covery, however, is claimed for Auenbrugger (q.v.). In 1819 he published his

l'auscultation mediate,) having read a memoir on

the subject to the Academy of Sciences in the previous year. The remainder of his life was devoted to the perfecting of this new sys¬

tem of diagnosis, and so far as diagnosis is concerned his treatise has produced an effect not attained by any other work. The special study of Laennec was diseases of the chest, and by means of auscultation, either by the di¬

rect application of the ear, or of the stethoscope as an auxiliary, he elucidated the pathology of these diseases, which were previously involved in the greatest obscurity. His (Life} by Saint-

ignon was published in 1904.

LAERTES, king of Ithaca and father of Ulysses. He had been one of the heroes en¬

gaged in the chase of the Calydonian boar, and in the expedition of the Argonauts. The ab¬

sence of his son in the Trojan War plunged him into melancholy; but the return of Ulysses re¬

stored his energies, and he took part in the fight with the suitors of Penelope.

L2ESA MAJESTAS, Latin term meaning

injured majesty. It is a phrase taken .from the Roman law and entering modern civil law to designate an offense against the person or dignity of the king; therefore high treason.

Consult Glanvil, lib. 5, c. 2 ; Blackstone s < Com¬

mentaries, y 75.

L2ETARE (l?-ta re) SUNDAY, called also Mid-lent, the fourth Sunday in Lent. The in-

troit for the day in the Roman Catholic Church begins with the words, ^Laetare, Jerusalem, from Isaiah lxvi, 10; hence the name.

LAFARGE, Marie Cappelle, French

victim of circumstantial evidence: b Villers-

Helon, 1816; d. Ussat, 7 Nov. 1852 Of distin¬

guished family and highly educated, she mar¬

ried (1839) an iron-master of Correze and was accused of poisoning him when he died (1840) from eating poisoned sweetmeats. She had purchased arsenic from a pharmacy and could not clearly account for its use; her neighbors testified against her, and she had been accused of the theft of diamonds from a lady friend (1839) which were then, in part, discovered in her residence and was sentenced to two years'

imprisonment for the theft. The evidence of witnesses as to the poison was contradictory and her lawyer, the celebrated Paillet of Paris, made a good defense. But the animosity of the judge prevailed and she was adjudged guilty and sentenced to hard labor for life, and later evidence in her favor did not stay the punish¬

ment. Friends gained her release after 12

years in prison, but she soon died from the experience she had gone through. While in prison she wrote

LAFAYETTE, la-fa-et, or LA FAY¬

ETTE, Marie Jean Paul Roch Yves Gilbert Motier, Marquis de, French soldier and states¬

man : b. Chavagnac, near Brioude, Auvergne (in the present department of Loire), 6 Sept.

1757; d. Paris, 20 May 1834. He belonged to an eminent family of France. He was edu¬

cated in ithe College of Louis le Grand in Paris, in 1774 entered the army as an officer of the Guards, and on hearing of the Declaration of Independence by

the American colonists deter¬

mined to lend them his assistance. In 1777 he left France for America with 11 companions, among whom was Baron De Kalb, set sail from Pasages, Spain, in a yacht equipped by himself, and arrived at Georgetown, S. C, 14 April. He proceeded to Philadelphia, and to the Congress there in session volunteered his services without pay. On 31 July he was commissioned major-

general, and not long after became a member of Washington's staff. He was severely wounded at Brandywine (11 September), while rallying the American forces from a retreat; was appointed to the command of an expedition for the proposed invasion of Canada, never executed owing to lack of means, and in April 1778 was ordered to join Washington at Valley Forge. On 19 May he was surprised by General Grant with 5,000 troops at Barren Hill (12

miles from Valley Forge), where he had taken posit with 2,100 troops and five cannon. Though nearly surrounded by a superior force, he suc¬

ceeded in extricating himself, recrossing the Schuylkill and reaching Valley Forge in safety.

He received the thanks of Congress for his conduct at Monmouth (28 June), where he fought brilliantly under Lee. War between France and England having broken out, La¬

fayette returned (January 1779) to place him¬

self at the disposal of the French government; obtained for the American cause financial as¬

sistance and the reinforcement of a fleet and 6,000 troops under Rochambeau, and 11 May 1780 rejoined the American army. He was shortly afterward stationed at Tappan with a light infantry corps of observation, and was a member of the court of general officers by which Major Andre was tried and condemned to death (29 September). On 20 Feb. 1781 he was sent by Washington with 1,200 New Eng-

land and New Jersey troops to aid in the de-

U'nse ot Virginia. Reinforced, he pursued Cornwallis from near Charlottesville to York-

town, thus contributing to (the decisive opera¬

tions by which the war was virtually concluded He sailed from the United States in December 1781, hut revisited America in 1784, when he was enthusiastically received. Lafayette was called to the Assembly of the Notables in 1787

and was elected a member of the States-General'

which took the name of National Assembly (1789) Two days after the attack on the Bastile he was appointed (15 July) commander-

in-chief of the National Guard' of Paris, and gave them the tricolor cockade. It was through his means that the lives of the king and queen were saved from the mob that had taken pos¬

session of the palace at Versailles (5-6 Octo-

T Aher- the ad°Ption Of the Constitution of 1/90 he resigned all command and retired to his estate of La Grange. He had previously re¬

signed his title, the abolition of titles havin°*

been decreed by the National Assembly. The first coalition against France (1/92) soon called him from his retirement. Being appointed one of the three major-generals in the command of the French armies, he established discipline aiJ. . cfeated the Austrians and Prussians at Philippeville, Maubeuge and Florennes, when his career of success was interrupted by the factions of his country.

During the Reign of Terror commissioners were sent

to arrest him, but he escaped to Flanders. Having been captured by an Aus-

tt?anc>*)atr^ August), he was delivered to the Prussians, by whom he was again trans-

f ei red to Austria. He was carried with great secrecy to Olmiitz, where he was subjected to much privation and suffering, and whence he was not released until 25 Aug. 1797. He returned to his estate at La Grange, and taking no further part in public affairs devoted himself to agricultural pursuits. He sat in the French Second Chamber from 1818-24 and from 1825-

30 was leader of the opposition. In August 1824 he landed at New York on a visit to' the United States, upon the invitation of the Presi¬

dent at. the request of Congress, and was re¬

ceived in every part of the country with the warmest expression of delight and enthusiasm Congress voted him $200,000 and a township of land, his own fortune having been mostly lost by confiscation during the Terror. During the Revolution of July 1830 he was appointed gerr-

eral-m-chief of the National Guard of Paris, and though not personally engaged in the event, was, through his activity and name, of thffe greatest service. When the National Guard was established throughout France, after the ter¬

mination of the struggle, he was appointed their commander-in-chief. Of Lafayette Ed¬

ward Everett said : «Who, I would ask, of all the prominent names in history, has run through such a career, with so little reproach justly or unjustly bestowed.** At the celebration of the centennary of the surrender at Yorktown a rep¬

resentative of his family was present as the gaiest of. the nation. Early in 1917 the historic chateau in which Lafayette was born was pur¬

chased by the. French Heroes Fund, an Ameri¬

can organization, to be restored and perpetu¬

ated as a memorial and museum of American and French patriotic emblems. Consult

moires et Manuscrits de La Fayette* (8 vols..

Paris 1837-40) ; Sarrans, (General Lafayette and the French Revolution of 1830* (2 vols., London 1832) ; Tower, (The Marquis de La Fayette in the American Revolution* (2 vols., Philadelphia 1895) ; Tuckerman, Wife of La¬

fayette* (New York 1889) ; Whitman, (Lafay-

ette in Brooklyn* (New York 1905),

LAFAYETTE, Ala., town and county-

seat of Chambers County, on the Central Rail¬

road of Georgia, 85 miles northeast of Mont¬

gomery. Here is the seat of Lafayette College (q.v.), founded in 1885. There is a large trade in cotton and other products, the town being a distributing point for a large section of coun¬

try. Pop. (1920) 1,91 L

LAFAYETTE, Ind., city and countv-seat

of Tippecanoe County, on the Wabash River, and the Cleveland, Cincinnati, Chicago and Saint Louis, Chicago, Indianapolis and Louis¬

ville (Monon), the Lake Erie and Western and the Wabash railroads, 64 miles north¬

west of Indianapolis and 120 miles south¬

east of Chicago. The Terre Haute. Indian¬

apolis and Northwestern, the Fort Wayne Northern Indiana and the Battle Ground traction lines also

connect the city with outside points. LaFayette derives its chief business from agriculture, being the farming and manu¬

facturing centre for the surrounding country.

Other industries are carpet mills, soap factories, flour mills, wire and iron works, foundries and machine shops, electric accessories, automobile factories, agricultural implements, lumber and carriage works. There are five national, two State banks and one savings bank and two loan and trust companies having a combined capital¬

ization °f $965'000 and deposits, of about $13,-

000,000. There are also two building and loan associations. There are 31 church edifices. La¬

Fayette is the seat of Purdue University, em¬

bracing 'the State Agricultural College, contains a hfgh school, supplemented by an excellent public school system, a public library confain-

mg over 20,000 volumes and the Indiana State Soldiers' Home. Here also is the Wabash Val-

ley Sanitarium. The city stands six miles above the site of the old French fort, built in 1720

and called Post Oniatanon. In 1760 the fort was surrendered 'to the British, but later in the same year was captured by the Indians La¬

Fayette was first chartered as a city in 1853

It is governed under the General Indiana Char¬

ter which went into effect in April 1905, by a board of public works composed of three mem¬

bers and a city council composed of 10 mem¬

bers elected for four years. The city owns and operates the waterworks, has electric lights eleetrie-. street railway and a well-equipped fire

department. - The- foreign element in the popu¬

lation is- small.— Pop. 22,486; including West LaFayette about 30,000.

LAFAYETTE, La., parish-seat of Lafay¬

ette Parish, division terminal Southern Pacific Railroad, with shops and roundhouse, 144 miles west of New Orleans. Elevation, 41 feet.

Forty miles from Gulf, in the heart of a fertile, undulating prairie. Is the commercial centre of a region noted for its cane, cotton, corn and rice, and is three miles from the Anse-La-Butte oi . elds. Here is located the South western Louisiana Institute, established in 1900, a State coeducational institution of academic and tech-

nica .. learning,. withv .agriculture, domestic

science and commerce, and teacher-training for each of these, and Mount Carmel Academy established in 1835. Has two large brick public schools, six church buildings, three banks, flour hotels, $50,000 theatre, two wholesale houses, cotton oil mill, two ice plants, two cotton gins and one of the largest sugar refineries in the State ; three newspapers and modern post-office building; commission form of government and municipal light and water plant. Many miles of paved sidewalks and graveled streets and 22

passenger trains daily. Lafayette lies in the re¬

gion of the two bayous, the Vermilion and the Teche, which is called the Attakapas country, after the Indian tribe that once inhabited it.

The region was settled in 1755 by the descend¬

ants of the French colonists who were ex¬

pelled from Nova Scotia by the English. A large element, other than French, has come within the last 30 years through the develop¬

ment of the railroads. Pop. (1920) 7,855.

LAFAYETTE, a fish. See Goody.

LAFAYETTE AT BARREN HILL.

The first independent command of the Conti¬

nentals entrusted by Washington to Lafayette as a major-general was with 2,100 of his best troops (out of 11,800 effectives 'trained by Steu¬

ben), with five pieces of artillery, to take a position on Barren Hill, 10 miles from Philadel¬

phia. The object was to cut off British foraging parties and make reconnaissance to see if Howe was about 'to evacuate the city. The British got wind of the projected movement and a ship was kept waiting in the Delaware River for 10

days, the commander hoping to take Lafayette as a prisoner to England. On 8 May, a day of joy, news of the French Alliance was read in camp. On the 18th. Lafayette sallied out and secured a strong position on Barren Hill. On the 19th, 5,000 British and Hessians marched by three roads to envelop the young Frenchman and his force, one detachment west of the Schuylkill expecting to cut off his retreat at Matson’s Ford. The plan, skilfully conceived, seemed certain of success, when Lafayette, de¬

tecting the red uniforms, quickly occupied the strongest positions and sent out false heads of columns, which delayed the British advance un¬

til reinforced and able to deploy. The race was now for Matson’s Ford. The enemy rallied by two roads to

cut off the Americans, but the retreat was so skilfully conducted, Lafayette bringing up the rear, -that, despite the heavy cannonade from the British batteries of field artillery and the swift charges of the Hessians, the young Frenchman, by his wisdom, coolness and promptness, saved the day. One incident illustrates this. A British, round shot, hitting the axle, disabled one of the five cannon of the Continentals. To abandon a gun would mean grief both to Lafayette and to Washing¬

ton. Ordering the artillerists to leap from their caissons and horses into the farm yard of John Harby, a farmer, Lafayette commandeered his wagon and had the gun quickly lashed by the breech to the hind axle. Then, whipping up the horses, the cannon was dragged seven miles over the rough road to Matson's Ford. In the skirmish at the river side the American rear¬

guard lost nine men. That of the British was reported as three, but the retreat was perfected and all the guns saved, together with the troops, to the joy of Washington and the confirming of his trust. A few days later the army started in pursuit of Howe. Consult Carrington, (Battles of the American Revolution } (1888).

William Elliot Griffis.

LAFAYETTE COLLEGE, a Presby¬

terian college at Easton, Pa., founded in 1832.

It averages 55 professors and instructors, 725

students, 45,000 volumes in the library, $643,000

in productive funds, grounds and buildings valued at over $1,500,000, income $126,000, num¬

ber of graduates 3,500. It was originally char¬

tered in 1826, but owing to the failure of the legislature to make any appropriation, the col¬

lege was not opened until 1832. Since the Civil War the college has had a notable growth. The college curricula offers courses leading to the degree of bachelor of arts, bachelor of philoso¬

phy, bachelor of science, bachelor of science in chemistry, bachelor of science in civil engi¬

neering, chemical engineering, electrical engi¬

neering, mechanical engineering and mining engineering. There are now 42 buildings, in¬

cluding Pardee Hall, a memorial library, a memorial chapel, the Gayley Laboratory of Chemistry and Metallurgy and the Mechanical Engineering building.

LAFFAN, laf'an, William Mackay, Amer¬

ican newspaper publisher and art connoisseur: b. Dublin, Ireland, 22 Jan. 1848; d. New York, 1909. He was educated at Trinity College, Dub¬

lin, and emigrated to America (1868) where he worked on the San Francisco Chronicle as re¬

porter, and becoming city editor, then managing editor of the Bulletin. In 1870 he went over to the Baltimore Daily Bulletin, becoming owner and editor, in which capacity he made vigorous war on the political clique that was injuring the city. He became a member of the staff (1877) of the New York Sun, then (1881) art editor for Harper and Brothers, but was publisher of the New York Sun in 1884, establishing the Evening Sun in 1887. In 1900 he purchased the Charles A. Dana estate’s interests in the Sun, and became president of the Sun Printing and Publishing Co. To overcome difficulties with the news-gathering associations he established the Laffan News Agency. He was a prominent connoisseur and collector of Chinese porcelains and wrote the introduction to the Catalogue of Porcelains of the Morgan Collection then at the Metropolitan Museum of Art (New York 1904).

LAFFITTE, Jacques, zhak la-fet, French

banker: h. Bayonne, 24 Oct. 1767; d. Paris, 26

May 1844. He entered the banking house of the senator Perregaux, and in 1809 became the head of the firm, which he made one of the first houses in France. In the same year he was appointed director of the Bank of France, and in 1814 governor of the same establishment.

When the credit of France, in 1815, was at a very dangerous crisis, Laffitte advanced 2,000,000

francs in ready money, by which means a neces¬

sary article in the capitulation of Paris was settled. He was elected to the Chamber of Deputies in 1816. In 1819 he was deprived of the presidency of the bank, which was bestowed on the Duke of Gaeta, yet he was in 1822

unanimously re-elected to the office of regent de la banque (director). Laffitte was again elected to the Chamber of Deputies in 1827, and took an active part in the Revolution of July 1830, being one of the deputies who signed 650

the protest, and declared themselves deputies of France, in spite of Polignac's order to annul the election. He founded a new credit bank in 1837, and was president of the Chamber of Deputies in 1843. He became bankrupt in his latter days, and was obliged to sell all his property to pay his debts, but his Paris hotel was preserved to him by a national subscrip¬

tion.

LAFITAU, Joseph Francois, zho-zeg-

fraii-swa la-fe-to, French missionary and writer: b. Bordeaux, 1 Jan. 1681; d. there, 3

July 1746. He belonged to the Society of Jesus, and was for some years (1711-17) attached to their missions in Canada, and was afterward procurator of the Canadian missions. On his return to France he published (Memoire con-

cernant la preeieuse plante ging-sang de Tar-

tarie* (1718), the plant here noticed, which was highly valued by the Chinese, having been found bv Lafitau in the Canadian forests ; (Moeurs des sanvao-es Americains comparees aux mceurs des premiers temps) (1723); (Histoire des Decouvertes et des conquetes des Portugais dans le nouveau monde) (1733).

LAFITTE, la-fet', Jean, American pirate and smuggler: b. France, 1780; d. Silan, Yuca¬

tan, 1826 (according to some authorities, at sea 1817). He was at one time a privateer in the employ of Cartagena for the destruction of British and Spanish commerce. Soon he turned to piracy, and by 1812 was leader of a band of desperadoes who maintained headquarters on the island of Grande Terre in Barataria Bay, and thence plundered traders in the Gulf. Dur¬

ing the War of 1812, Commodore Percy, com¬

manding the British naval force in the Gulf waters, unsuccessfully endeavored to obtain Lafitte's co-operation in the expedition against New Orleans. Lafitte later offered his services to the governor of Louisiana and General Jack-

son, on condition of full pardon for himself and followers. He assisted in the construction of the defenses of Barataria Bay, and in com¬

mand of a detachment of his band participated most creditably in the battle of New Orleans (8 Jan. 1815). President Madison by procla¬

mation confirmed the amnesty granted to the outlaws. Lafitte was a bold smuggler, and brought to

Louisiana cargoes of negro slaves.

He was associated with a brother, Pierre, with whom he is often confounded. He is the hero of J. H. Ingraham's story, (Lafitte. >

. LAFLAMME, la-fiame', Toussaint An¬

toine Rodolphe, Canadian jurist: b. Mont¬

real, 15 May 1827 ; d. 1893. He was educated at Saint Sulpice College, in 1849 was admitted to the bar, became an editor of L'Avenir, and was a member of the ^Rouge" or liberal re¬

form element in Quebec province. At the same time he continued his legal practice, and was appointed professor of the law of real property in McGill University. In 1872-78 he sat in Parliament for Jacques Cartier County, in 1876

was Minister of Inland Revenue in the Mac¬

kenzie administration, and in 1877-78 Minister of Justice.

LAFONTAINE, la'fon-tan', August

Heinrich Julius, German novelist: b. Bruns¬

wick, 5 Oct. 1758; d. Halle, 20 April 1831. He studied theology (1777-80) at Helmstedt, be¬

came private instructor in several locations till 1789. He joined the Prussian army (1792) as field-chaplain and settled (1800) in Halle. He was made canon of Magdeburg Cathedral as reward for dedicating a work to Friedrich Wilhelm III and Queen Louise. He was a prolific but popular writer, being author of over 150 volumes. Sentiment and domestic life are his themes served up in the narrow lines of the period. Writing under the pseudonyms Gustav Freier, Miltenberg or Selchow, his best tales are (Gemalde des menschlichen Herzen) (1792, and later, 15 vols.); (Familiengeschich-

ten> (12 vols., 1797-1804) ; (Der Sondcrling) (1793); (Der Natur mensch) (1791). Consult Gruber, (August Lafontaines Leben und

Wirken> (Halle 1833).

LAFONTAINE, Henri, Belgian jurist:

b. Brussels, 22 April 1854. He was appointed (1878) secretary of the Gesellschaft fur Ford-

erung der Madchenarbeiter Schulen, and (1889) secretary of the Belgian Peace Society. In 1893 he became professor of international law, and was made (1895) senator, also director of the International Bibliographical Institute, and in 1907 was appointed secretary of the Union of International Associations. He was awarded (1913) the Nobel prize for his work in the advancement of international peace. He wrote (Les droits et des obligations des entrepreneurs de travaux publics) (1885) ; (Traite de la con-

trefagon) (1888) ; (Pasicrisie internationale) (1902) ; (Bibliographic de la Paix et de 1' Arbitrage* (1904).

LAFUENTE Y ZAMALLOA; la'fwan'ta

e tha-mal-yo'a, Modesto, Spanish historian: b. Ravanal de los Caballeros, 1 May 1806; d.

25 Oct. 1866. After receiving his education in philosophy and theology he was appointed pro¬

fessor of philosophy at the University of Astorga (1832), and two years later succeeded to the chair of theology there. Abandoning this some years afterward, he went to Madrid where he began writing political and theatrical criticisms for the newspapers, under the pen names of Fray Gerundio and Pelegrin Tira-

beque. These essays were collected as (Capil-

ladas) (1837-40) and as (Teatro social del siglo

XIX* (1846). But his chief title to fame rests on his ^Historia general de Espana* (30 vols., 1850-67), a monumental work, later edited and revised by Juan Valera (25 vols., 1887-90).

Other historical works by Lafuente include Wiaje aerostatico de Fray gerundio y Tira-

beque) (1847), and (Revista europea > (1848-

49).

LAGARDE, la'gard', Paul Anton, German

Orientalist: b. Berlin, 2 Nov. 1827; d. Gottin¬

gen, 22 Dec. 1891. He studied theology and Oriental languages at Berlin and became"(1851) adjunct instructor of the Halle University, but continued (1852-53) his studies at London and Pans, returning to Halle to lecture. He taught at several schools of science, from 1866,' at Berlin and Schlepsingen and was made (1869) professor of Oriental languages at, Gottingen University. The most important of his aston¬

ishingly numerous and many-sided philological works are (Gesammelte Abhandlungen* (Leip¬

zig 1866); (Mitteilungen> (Gottingen 1884-91); . Uebersicht fiber die im Aramaischen, Arab-

lschen und Hebraischen fibliche Bildung der Nomina' (ib. 1889) ; 'Semitics' (Gottingen 1878-79) ; 'Onentalia' (ib. 1879-80) •

mtcta' (ib. 1877-80) ; 'Petri Hispani de lingua

Arabica libri5 (Gottingen 1883) ; '2Egyptiaca5

(ib. 1875) ; 'Bibliothecae Syriacae) (ib. 1892) ; 'Armenische Studien) (ib. 1877) ; 'Persische Studien) (ib. 1884). He also wrote several poems

which were published by Anna de La-

garde (Gottingen 1897). His great learning and gifts were curiously mixed with dogma¬

tism and distrust in the activities of others.

His 'Deutsche Schriften) (4th ed., Gottingen 1903) deals with the position of the German state to theology, the Church and religion. His library now belongs to the New York Univer¬

sity. Consult Lagarde, Anna de, (Paul de La-

garde, Errinnerungen aus seinem Leben) (Got¬

tingen 1894).

LAGARTO. The Spanish word for "liz¬

ard.55 It was applied by the early Spanish ex¬

plorers of Central America to the alligator, and their use of the word clung to the literature of the natural history of the New World for many years.

LAGERLOF, la'ger-lef, (Ottilia Lovisa)

Selma, Swedish author: b. Marbacka, Verm-

land, 20 Nov. 1858. Her father was a Swedish army officer; her mother came of a family of artists and clergymen. She was educated at the Royal Women's Superior Training College, Stockholm. She became a teacher at the Girls'

High School at Landskrona (1885-95), and dur¬

ing this time prepared her first book, 'Gosta Berling's Saga5 (2 vols., 1891 ; Eng. trans., Bos¬

ton 1898). Its refreshing breath of romance was a pleasant change from the pessimistic realism which had been the vogue and brought the author prompt and large success. A year's travel in Egypt, Palestine and Greece provided her with material for the second volume of her 'Jerusalem5 (2 vols., 1901-02; Eng.

trans., New York 1903), and also for portions of 'Christ Legends5 (1904; Eng. trans., New York 1908).

Out of travel and a study of conditions in Italy and especially in Sicily came the 'Miracles of Anti-Christ5 (1897; Eng. trans., Boston 1899).

Commissioned in 1902 by the National Teach¬

ers' Association of Sweden to write a school textbook which should present in story form the folklore, geographical peculiarities and flora and fauna of the various provinces of the coun¬

try, Miss Lagerlof accomplished her task with a success that added a children's classic to Swedish literature — 'Nils Holgersson's Won¬

derful Journey through Sweden5 (2 vols., 1906-

07), the English translation of which is en¬

titled 'The Wonderful Adventures of Nils5

(New York 1907). Honors followed Miss La-

gerlof's successes; in 1904 the Swedish Acad¬

emy awarded her its great gold medal ; in 1907

she received the degree of doctor of letters from Upsala University; in 1909 she was awarded the Nobel prize for literature, the only woman to have received this honor; and in 1914

the Swedish Academy elected her to member¬

ship — the first woman so honored. Her vogue in America is in part due to Mrs. Velma Swan-

ton Howard, who early believed in her appeal to Americans and carefully translated many of her books. Her work includes also 'Invisible Links5 (1894) ; 'From a Swedish Homestead5

(1899; Eng. trans., New York 1901); 'The Girl from the Marsh5 (1908; Eng. trans., Bos¬

ton 1910) ; 'Further Adventures of Nils5

(1911); 'Liljecrona's Home5 (1911); 'The Legend of the Sacred Image) (1913; Eng.

trans., New York 1914) ; 'Matilda Wrede5

(1913; Eng. trans., New York 1914); 'Dunun-

gen,5 a comedy based on her work, 'Invisible Links5 (1914) ; 'The Emperor of Portugalia5

1916; Eng. trans., New York 1916). See TORY OF Costa BeRLING, THE.

LAGO MAGGIORE, la'go mad-jore, or

LAKE OF LOCARNO (anciently Verbanus),

a large lake in northern Italy and Switzerland, extending from Sesto to Locarno, about 37

miles long and from \1/2 to 3 miles broad. It is 636 feet above the level of the sea, and at the northern end in some places as deep as 1,220 feet. On the upper end it is enclosed by lofty and finely wooded mountains, and the east bank slopes gradually to the Lombard plain.

There are several islands, two of which, Isola Bella and Isola Madre, called Borromean Is¬

lands, are laid out in gardens and pleasure grounds.

LAGONEGRO, la-go na'gro, a small town

38 miles south of Potenza, Italy, noted as having been the scene of a great French vic¬

tory in 1806.

LAGOON (from the Latin lacuna, a gap

or hollow), shallow lakes or creeks connected with the sea, which are found along low-lying coasts. It is also applied to the expanse of water in the interior of those coral reefs which present to view

above the surface of the water nothing but an external fringe. See Coral.

LAGOS, la'gos, town, at present the tem¬

porary capital of the British colony and protec¬

torate of Nigeria. It is the most important seaport in upper Guinea, situated on an island of the same name. A bridge, 2,500 feet long, connects with Iddo Island. There is also direct rail connection with Kano, 717 miles distant.

Its exports are rubber, cocoa, ground nuts, hides and skins, kerosene oil and mahogany.

Pop. 60,000, of which about 500 are Europeans.

Lagos, with its hinterland, were acquired from the native king in 1861, and have been suc¬

cessfully administered as an independent pro¬

tectorate, part of the Gold Coast Colony, part of southern Nigeria, and are now incorporated in the colony and protectorate of Nigeria. See Nigeria.

LAGOS, la'gos, Mexico, city in the north¬

east of the state of Jalisco, on the Mexican Central Railroad. It lies 6,000 feet above the sea; was founded in 1563 by Francisco Martel, and after the war of independence was named Lagos de Moreno after its defender, Pedro Moreno, who died here in battle against the Spaniards in 1817. Pop. 12,243.

LAGOS, la'gush, Portugal, a fortified city in the district Faro, province Algarve, beauti¬

fully located on the western shore of a bay on the Atlantic Ocean. It has several churches, an aqueduct, a great stone bridge spanning an arm of the sea. The harbor is sandy. Its industries consist of wine-growing, southern fruit culture, fisheries of tunny fish and sardines. This is the old Roman site of Lacobriga. Pop. 8,268.

LAGRANGE, Joseph Louis, zhd-zef loo-e

la-granzh, Comte, French mathematician: b.

Turin, 25 Jan. 1736; d. Paris, 10 April 1813.

His great-grandfather was a cavalry officer in the French army, who afterward passed into the service of Sardinia. When scarcely 19 La-

grange was made mathematical professor in the artillery school at Turin. In 1764 he ob¬

tained the prize of the Academy of Sciences in Paris for a treatise on the libration of the moon, and in 1776 for another on the theory of the satellites of Jupiter. About this time he made a visit to Paris, where he became per¬

sonally acquainted with D'Alembert, Clairaut, Condorcet and other savants. Soon after his return he received an invitation from Frederick the Great to go to Berlin, with the title of Director of the Academy. Here he lived for 20 years, and wrote his great work (La Mec-

anique analytique.) After Frederick's death (1786) the persuasion of Mirabeau and the offer of a pension induced him to settle in Paris. He was the first professor of geometry in the Polytechnic School, and the first inscribed member of the Institute. He took no active part in the Revolution, and the law for the banishment of foreigners was not put in force against him. In 1794 he was appointed pro¬

fessor in the newly-established Normal School (Lcole Normale Superieure) at Paris (1794), as well as in the Lcole Polytechnique. Napo¬

leon bestowed upon him distinguished tokens of his favor, and he became member of the Senate, grand

officer of the Legion of Honor and count of the empire. The most important of his works, are his 'Mecanique analytique }

(1788) ; (Theorie des fonctions analytiques) (1797); Resolution des equations numeriques*

(1798); (Legons sur le Calcul des fonctions* ; and (Essai d'arithmetique politique. 5

LAGUERRE, la'gar, Edmond Nicolas,

French mathematician: b. Bar-le-Duc, 9 April 1834; d. there, 14 Aug. 1886. His abilities had been already acknowledged by the Lyceum when his article solving the mathematical prob¬

lem of angular solution was published (1853) in Nouvelles Annales de Mathematiques, he entering the Lcole Polytechnique the same year.

In 1885 he was elected member of the Academy of Sciences to succeed Serret in the geometry section, and shortly afterward he was appointed to the chair of physical mathematics at the College of France. His algebraic system ap¬

plied to curves and spherical measurements were a great advance in science. Most of his writings found publication in Nouvelles An¬

nales, Comptes Rendns and Bulletin de la S octet e Philomatiques. Among those works published by him are (Note-sur la resolution des equations numeriques* (Paris 1880) ; (The-

orie des equations numeriques* (Paris 1884) ; Recherches sur la geometrie de direction) (Paris 1885). Posthumous honors were ac¬

corded him in rewarding him with the Prix Petit d'Ormoy in 1887. Consult Poincare, (Notice sur Laguerre) (Paris 1887).

LAGUNA, la-goo'na, N. Mex., pueblo

town on the Atchison, Topeka and Santa Fe Railroad, 60 miles from Albuquerque. The population, some 1,100, is composed largely of various branches of the Pueblo Indians of Keresan stock, who are industrious and self-

supporting. The government granted them 17,-

000 acres, of which only 215 acres can be used for farming purposes, and they depend mainly on a fertile strip along the San Jose River.

Some wool is raised. There is an old adobe Roman Catholic church here over 200 years old.

Pop. 1,583.

LAGUNA, Philippines, a province of the island of Luzon, situated in the southern part of the island, on the south and east shores of the Bay Lagoon (q.v.) ; area, including depend¬

ent islands, 752 square miles. The province is mountainous in the centre and north, and in the southwest is Mount Maquiling, 3,666 feet high ; there are a number of rivers; the soil is very fertile; the climate moist and variable. All varieties of tropical plants and trees found in the Philippines grow here; the staple products are sugar, rice, corn, cotton,, tobacco, indigo, cocoanut, betel nut and fruit and vegetables.

There are a number of industries, including mills for the extraction of cocoanut oil, furni¬

ture manufacture, the manufacture of cheese and stock raising; there is considerable export trade, products being sent to all parts of the archipelago. Civil government was established in the province in July 1902. The inhabitants are mostly Tagalogs. A railway runs' along the south shore of the bay from Santa Cruz (the capital, q.v.) to Manila. Pop. 148,000.

LAHARPE, la arp/ Jean Frangois de,

French critic and author: b. Paris, 20 Nov.

1739; d. there, 11 Feb. 1803. He first brought out several voumes of (Hero'ides but first gained note by his tragedy (Warwick (1763), though his other tragedies met with no success.*

But his Rloges on Henry IV, Fenelon, Racine, etc., show refinement and added to his fame, but his conceit and harsh criticisms made numerous bitter enemies, nearly losing him the election (20 June 1776) to the Academy. He gave lectures, as professor of literature at the newly founded Lycee (1786-98) with great suc¬*

cess. His articles as critic for the Mercure de France brought applause, also those under the title (Lycee ou Cours de litterature (Paris 1799-1805). His participation in the Revolution brought him five months in jail in 1794, but he became an enemy of revolution later and an earnest worker for religion and monarchy.*

He supervised a selection of his works in six volumes (Paris 1778), and his (CEuvres choisies et posthumes) appeared in four volumes. Con¬

sult Sainte-Beuve,

not, Recherches sur La Harpe > (Dijon 1820).

LAHEE, Henry Charles, American writer

on musical topics: b. London, England, 2 July 1856. He was educated at Saint Michael's Col¬

lege, Tenbury, Worcestershire, where he was chorister (1865-69), and was in the English mer¬

cantile marine (1871-79). Coming to the United States he was secretary of the New England Conservatory of Music at Boston (1891—99) , and since the last-named date has conducted a musical agency in Boston. He has published (Fa¬

*mous Singers of Yesterday and To-Day >(1898) ; **

Famous Violinists of Yesterday and To-day*’

(1899); (Famous Pianists* (1900);

.LAHN, lan, Germany, a tributary of the Rhine haying its source in the Rothaargebirge, Westphalia. Its length is 135 miles and is navigable from the mouth up to Giessen by the aid of locks. The valley, sometimes quite nar-

row, is rich in natural beauties and much vis¬

ited by sight-seers. Ems is the principal town on the river’s banks.

LAHORE, la-hor', India, second city and capital of the Punjab, on the left bank of the Ravi, 298 miles northwest of Delhi by rail. The native city covers an area of 640 acres, surrounded by a brick wall 30 feet high, flanked by bastions, and approached by 13 gates. The streets are extremely narrow, and the houses have in general a mean and gloomy appear¬

ance ; but these only appear by contrast with the magnificent structures by which they are dominated. (

leum of Ranjit Singh, with its rounded roof and projecting balconies, and the desecrated facade of the Mogul palace, stand side by side in front of an open grassy plain, exhibit¬

ing a grand coup d’ceil .)} The citadel or fort stands on a slight but commanding eminence.

The European quarter and the Mean Meer cantonment (three miles distant) lie to the south and east. Among modern buildings are the Punjab University, the Oriental College, Aichison Chief’s College, Mayo Hospital, Vic¬

toria Jubilee Hall, school of art, Anglican

cathedral, etc. It was at one time a great cen¬

tre of the decorative arts — gold and silver ware, glass and enamel work — but most of these have gradually declined or vanished, and was famous for its superb cloths made of Bokhara thread. The North-West Railway

workshops employ 5,000 men ; the other indus¬

tries include soap, acids, printing, leather, cot¬

ton and woolens, furniture, bricks and tiles: and the city is the centre of a rich agricultural district. A municipality was organized in 1867, a water supply was introduced in 1881 and a drainage system in 1883.

In 1524 Lahore became the seat of the Mogul Empire, under which it reached its greatest splendor. Before passing into the hands of the British it was the capital of the Sikhs. Pop. about 228,687 (60 per cent Mo¬

hammedan). Lahore division (commissioner-

ship) has an area of 17,154 square miles, and a population of 4,656,629. The Lahore dis¬

trict has an area of 3,704 square miles; pop.

about 1,250,000.

LAHR, lar, Germany, town in the district of Offenburg, Baden, on the Schutter River, junction of the Dinglingen-Lahr State Railway and street railways. It has three Evangelical and one Catholic church, a monument to Bis¬

marck and another to the poet Eichrodt.

Among its other public buildings are a gymna¬

sium high school, trade school, Imperial orphan asylum and several government edifices.

Among its manufactures are ovens, pottery, snuff and

cigars, roof-paper, toys, frames, chic¬

ory, leather, artificial flowers, also book-bind¬

ing and lithographic work and wine culture are done on a large scale. The town has been in existence since 1278 and was the principal town under the Geroldseck government, later belonging to Nassau, and (1497) coming under the rule of Baden. Pop. 15,191.

LAIBACH, li'bah, Slovenian Ljubljana,

capital of the division of Carniola, Jugo-Slavia, located on the Laibach River, which is spanned here by seven bridges, and on the southern branch of the Vienna-Trieste and the Laibach-

Oberlaibach, and other railways. It is embel¬

lished with large squares, and the monument to Radetzki von Fernkorn, and beautiful prom¬

enades. Among its more important edifices are the Saint Nicholas Cathedral (18th cen¬

tury) with its high cupola and frescoes; the Saint Jacob's, the Ursuline and Evangelical churches, the latter in Byzantine style ; the government building, palace of justice, agri¬

cultural building, town-hall, bishop's palace, casino, etc. A monument was erected (1886) to Anastasius Grim. The industrial establish¬

ments include a cotton-goods factory, bell foundry, iron foundry, machine works, candy and chicory factories and manufactures of wire, paper, twine, stone and earthenware, leather, beer-brewery, electrical works, etc. Among her educational institutions are two Obergymnasia, a high school, teachers' institutes, a theological institute, trade school, commercial institute, students' library, museum and theatre. The museum contains interesting relics of a lacus¬

trine village discovered in the Laibach fens.

The Schlossberg towers high over the town and has a castle dating 1416-1520, partially de¬

stroyed (1813) by the French. The town is generally acknowledged to be the seat of the ancient Emona. In 1270 Ottokar of Bohemia captured the place, and it received municipal rights in 1416. After capitulation (1809) to the French it was occupied till 1813 as seat of the governor-general of the Illyrian prov¬

inces. The Congress of Monarchs met here to debate the situation of Italy which later brought about the overthrow of the liberal con¬

stitution of Naples, England being dissident.

Consult Milliner, A., (in Klun's (Archiv fur Geschichte KrainsC parts 2 and 3).

LAIDLER, Harry Wellington, American

socialist author: b. Brooklyn, N. Y., 18 Feb.

1884. Pie was educated at Wesleyan Univer¬

sity A.B. (1907) and received the degree of LL.B. at Brooklyn Law School (1910), and of Ph.D., Columbia (1914). He was member of the reportorial staff of the Brooklyn Eagle (1907-10), a founder of the Intercollegiate So¬

cialist Society (1905) and its secretary from 1910, an association on similar lines as the English Fabian Society. He was editor of the Intercollegiate Socialist from 1913. He studied the labor question and social movements in Europe and here and has delivered numerous lectures on these subjects. He wrote boy¬

cotts and the Labor Struggle* (1914), and a pamphlet entitled

LAING, lang, Alexander Gordon, British

African explorer : b. Edinburgh, Scotland, 27

Dec. 1793 ; d. near Timbuctoo, Africa, 26 Sept.

1826. After serving for several years in the English army, he entered on his career as an African traveler in 1822. In that year he vis¬

ited Falaba, the capital of the Sulima country, got to within three days' journey of the sup¬

posed source of the Niger, but had perforce to return. An opportunity having presented itself of proceeding on the discovery of the course of the Niger, it was arranged that he should accompany the caravan from Tripoli to Timbuctoo. He left Tripoli in July 1825 in com-

pany with the Sheik Babani, and after a tedious journey of nearly 1,000 miles arrived at Gha-

dames ; and on 3 December reached Ensala.

He quitted Ensala on 10 Jan. 1826 and on the 26th entered on the sandy desert of Tenezaroff.

After some fighting with the Tuaregs he ar¬

rived at Timbuctoo on 18 August, the first Eu¬

ropean who had ever reached that city. After a short stay he set out on his return, but was assassinated on 26 Sept. 1826. The murder was committed by the order of the son of the Prime Minister of Tripoli, whose agent, Babani was.

v Laing's journals, which he had prepared for the press, were published in 1825 under the title, 'Travels in the Timmannee, Kooranko and Soolima, Countries of Western Africa. 5

LAING, Gordon Jennings, American

classical scholar : b. London, Ontario, 16 Oct.

1869. He was graduated (1891) at the Uni¬

versity of Toronto, took the degree Ph.D. at Johns Hopkins (1896), then studied for a year at the American School of Classical Studies, at Rome. He was instructor of classics at Whetham College, Vancouver, British Colum¬

bia (1892-93) ; lectured on Greek and Latin (1893) at Toronto University, and on Latin literature (1897-99) at Bryn Mawr College.

He was made professor at the University of Chicago (1913) and was appointed managing editor of the Classical Journal (1905-08), as¬

sociate editor Classical Philology , from 1905; general editor of the University of Chicago Press since 1908. He was vice-president of the Archaeological Institute of America from 1913.

He edited (Masterpieces of Latin Literature5

(1903) ; Selections' from Ovid5 (1905).; 'Phormio of Terence) (1908).

LAING, Malcolm, Scottish historian: b.

near Kirkwall, Orkney, 1762; d. there, 6 Nov.

1818. He was a lawyer by profession and later a member of Parliament, but devoted himself principally to historical investigation.

He completed the last volume of Henry's his¬

tory of Great Britain) (1785) and was the au¬

thor of a 'History of Scotland) (1800), which may be regarded as supplementary to Robert¬

son's history and is a monument of painstaking research. In the preliminary dissertation he

presents an elaborate argument to prove Queen Mary's participation in the murder of Darn-

ley. He published in 1805 an edition of Ossian.

LAING, Samuel, Scottish author: b. Kirk¬

wall, Orkney, 4 Oct. 1780; d. Edinburgh, 23 April 1868. Entering the army in 1805 he served in the Peninsular War and in 1834 traveled in the Scandinavian countries. He published 'Jour¬

nal of a Residence in Norway 1834-36 5 (1836) ; and 'A Tour in Sweden) (1839) ; 'Notes of a Travelled (1842) ; but is best known by his important translation of the 'Heimskringla or Icelandic Chronicle of the Kings of Norway, with a Preliminary Dissertation (1844).

LAING, Samuel, English railway admin¬

istrator, politician and author : b. Edinburgh, 12 Dec. 1812; d. Sydenham Hills, Kent, 6 Aug.

1897. He is the son of Samuel Laing (1780—1868). He was prominently identified with railway legislation in England, the inception of "parliamentary55 passenger trains with a fare of one penny a mile being due to his sugges¬

tion, and he was chairman of the Brighton and South Coast Railway. He was for many years prominent in Parliament and from 1860 to 1863 held the office of Finance Minister in In¬

dia. In his old age he took to writing books, mainly philosophical. Of his works, 'Modern Science and Modern Thought5 (1885), and 'A Modern Zoroastrian5 (1887), have occasioned some discussion. His other publications of a miscellaneous character include 'India and China5 (1863); 'A Sporting Quixote; or the Life and Adventures of the Hon. Augustus Fitzmuddle5 (1886) ; 'The Antiquity of Man5

(1890); 'Human Origins5 (1892).

LAIRD, lard, David, Canadian politician: b. New Glasgow, Prince Edward's Island, 1833; d. Ottawa, 12 Jan. 1914. He was educated at Truro, Nova Scotia, and subsequently estab¬

lished and edited the Patriot in Charlottetown.

In 1871 he became a member of the assembly of Prince Edward Island and after the admis¬

sion of the province to the Dominion was a member of the House of Commons and Min¬

ister of the Interior, 1873-76. He was lieuten¬

ant-governor of the Northwest Territory, 1876-81. In 1877 and 1899 he was a commis¬

sioner in the arranging of treaties which ex¬

tinguished by purchase the Indian title to great tracts in the Qu'Appelle and Peace River dis¬

tricts.

LAIRD, John, English shipbuilder : b.

Greenock, Scotland, 14 June 1805; d. Birken¬

head, Cheshire, England, 29 Oct. 1874. His shipyards were at Birkenhead, on the other side of the Mersey from Liverpool, and he was for a long time the head of the firm of John Laird and Sons. He was the first builder of iron steamships and built the John Randolph, the Nemesis and the Alabama. The first was the earliest iron vessel that was ever seen in America and was sent out to Savannah in pieces; the second, the first armed vessel of iron. The history of the Alabama is well known. He entered Parliament for Birkenhead in 1861 when he retired from active business.

LAIRESSE, la'res', Gerard de, Dutch

painter and etcher: b. Liege, Belgium, 1640; d.

Amsterdam, 11 June 1711. He was early a pu¬

pil of his father, Regnier Lairesse, and of Fle-

malles, and left them for Utrecht, and after¬

ward Amsterdam, where he labored hard for perfection in his art. He first of all confined himself to models of the antique and the classi¬

cal ideals of Poussin. His work was thus dis¬

tinguished by somewhat wearisome manner¬

ism and his pictures very frequently seem painted in an unnatural silvery, metallic tone.

His masterpieces are to be seen in Amsterdam, Schleissheim, Cassel and in the Louvre, Paris.

His ideas on art, as dictated to his pupils and associates, together with his etchings, were pub¬

lished after his death in two volumes, under the title 'Het Groot Schilderboek5 (1712). The work has been translated into German, French and English and has had a great influence in the art education of the 18th century.

LAIS, la'is, the name of two Greek

hetaerae, celebrated for their remarkable beauty.

The first lived at Corinth at the time of the Peloponnesian War; the most eminent and wealthy men of the time, including Aristippus, the Cyrenaic philosopher, and Diogenes, the cynic, fell under her spell. The younger Lais was the daughter of Timandra and was born LAISSEZ-FAIRE

at Hyccara, Sicily, 422 b.c. She came to Cor¬

inth in her seventh year, and was educated in her profession by the painter Apelles. Later in life she followed a certain Hippostratus to Thessaly, where she was stoned to death by women in the temple of Aphrodite. But it is impossible to sift the really

historic from mere anecdotal tradition in the accounts of these women which have come down to us. Consult Jacobs, (Lais, die altere und die jiingere) (1830) ; Wieland,

LAISSEZ-FAIRE, la'sa far'. A slogan of great potency in the political and economic dis¬

cussions of the 18th century, particularly in France. It made a strong appeal to the jurists and to the philosophers of an age engrossed with the idea of a "natural law," which was higher than the edicts of kings and parlia¬

ments and was the only right rule of human conduct. The French lawyers from the earli¬

est times showed a predilection for the droit naturel in their theoretical disquisitions ; but in practice, strangely enough, they strenuously ad¬

hered to the medley of provincial contumes, Roman jurisprudence and royal proscriptions, which constituted the laws of their country.

It was the Marquis d'Arguesau who first in¬

jected the natural law into the domain of legis¬

lative polemics and made the phrase "laissez-

faire" a postulate for political argument.

"Laissez-faire," he declared, as early as 1735, should be the fundamental rule of government and should be adopted as its watchword by every public authority. "To govern better,"

he said, "it is necessary to govern less," a pro¬

nouncement which was to become the palla¬

dium of liberty with the Jeffersonian school of politics in America, and with individualists everywhere for a century and a half to come.

But d'Arguesau, probably, got his catchword from

Colbert, who records the fact that in 1680

a merchant, Legendre by name, on being asked what was required for the advancement of commerce and industry, replied : "Laissez-

faire" — leave them alone. What was meant was that the production and exchange of com¬

modities should be relieved of the restrictive regulations and taxes with which they were burdened. Not only was international com¬

merce hampered by export and import duties, of which few persons of those times would have thought to make complaint, but domestic trade was impeded by equally great, if not greater, obstacles. Every road was barred by gates at which toll had to be paid to the king or provincial seigneur and every commune ex¬

acted octroi and other charges on everything that was brought in from other communes or the surrounding country. License fees, were exacted from every calling and many indus¬

tries were monopolized for the revenue they yielded to the state. .

These were the conditions against which the "Physiocrats" — the elder Mirabeau, Mer-

cier de la Riviere, Turgot and, above all, Fran-

gois Quesnay launched their protest. Quesnay, a philosopher and surgeon of note, and physi¬

cian to Madame Pompadour, made the phrase "laissez-faire" the groundwork of his system of economics. He contributed a number of ar¬

ticles to the

The free exercise of his faculties, he declared, is every man's natural right as long as in the exercise of this right the similar rights of all other men

are respected by him. Starting with this as a postulate, Quesnay deduced as a cor¬

ollary, the right of every man to the undis¬

turbed enjoyment of the fruits of his handi¬

work or intellectual activity. The free enjoy¬

ment thereof included the right to freely dis¬

pose of or exchange the commodities and other things of value thus produced. Any tax or other regulation imposed by public authority, which hinder such production, enjoyment or exchange, are invasions of natural right. The proper functions of government are, the pro¬

tection of life and property and the administra¬

tion of justice, and the assumption of greater or other powers is supererogation. "Laissez faire, laissez passer," let men make things and let the products pass. This is natural law in an economic dress. As a by-product of his theorizing Quesnay evolved the impot unique , or single tax. Agriculture, he declared, stands apart from other industries in that it alone yields a net. All other industries involve merely a change of materials in form and posi¬

tion; he, therefore, calls them "barren." But agriculture produces a "surplus value." The productiveness of agricultural land varies ; but the rental value automatically fixes the rela¬

tive capacity of any given piece of land to yield a net or surplus. Let taxation, therefore, be limited to ground rent. Incidentally this would prevent the friction which is caused by the shifting of taxation; a tax in the form of rent could not be shifted. The impot unique, of course, implied the abolition of customs du¬

ties, transit dues and all other taxes on indus¬

try and commerce. Adam Smith made the law of supply and demand, operating without re¬

striction in a free market, the basis of his economic system. Jeremy Bentham adopted the reasoning of Quesnay with respect to the functions of the state, saying that political economy requires nothing from the latter but the security of industry from governmental interference. In other respects Bentham was not in sympathy with the theory of "natural law." Indeed his pronouncements, that the state is the source of all law and that legis¬

lation should have regard for "the greatest good of the greatest number," are, in the main, negations of the doctrine of "laissez-faire."

The phrase, however, obtained currency in England, and more (one-sided) honor there than in the land of its origin. "Laissez-faire"

became the shibboleth of the free traders of the Manchester school, and of the orthodox political economy everywhere. Carlyle launched his invectives against the "dismal science" in vain. "Supply and demand and the devil take the hindmost" was his energetic translation of the phrase into English. But the policy of "hands-off" or "laissez-faire" remained a fixed principle in English legislation until quite re¬

cent times, particularly with respect to the taxation of the rental value of, or potential surplus product from, land. Public opinion, and scientific opinion as well, has undergone a complete change. The extreme individualism, which supplied most of the axioms of politics and law down to the last quarter of the 19th century, and a long way into that period in some countries, has given way nearly everywhere.

Aidful, protective and regulative intervention in industrial affairs is being more and more completely recognized as a legitimate

governmental function. The greatest good to the greatest number, rather than ^natural right®

and the greatest possible liberty of the individ¬

ual, has become the active principle of modern legislation, and ((laissez-faire® has been swept into the political dustbin.

Stephen Pfeil.

LAITY (Gr. 7a<5c, the people). Those

members of the church who are not included in the clergy. In the Roman Catholic Church the clergy are divided into eight orders : bishop, priest, deacon, sub-deacon, acolyte, exorcist, ostiarius, lector. By some authorities the epis¬

copate and the priesthood are considered dif¬

ferent degrees of the same order, and the lowest of the eight orders is said to belong to all who aspire to the priesthood, postulants or candi¬

dates, who &re styled clerics. The Protestant Episcopal Church holds, as the prayer-book says, ftthat from the Apostles' time there have been three orders of ministers in Christ's Church, Bishops, Priests and Deacons.® This does not deny the historic existence of other orders, and may be thought simply to interpret the sentence with which the pastoral letter of the first council of Jerusalem opens (Acts xv, 23) : ((The Apostles and Presbyters and breth¬

ren send greeting,® the brethren being the laity.

In secular life, the term is also used to distin¬

guish outsiders from the members of the learned professions. See Clergy.

LAJARD, la'zhar, Jean Baptiste Felix,

French archaeologist: b. Lyons, 30 March 1783; d. Tours, Sept. 1858. He was attached to the Persion mission as secretaiy under General Gardan, and there collected the valuable series of ancient Babylonian cylinders which are a part of the cabinet in the Bibliotheque na-

tionale. His researches led him to the view of the close connection of the Greek civilization with the Orient and thereby explained numer¬

ous facts concerning the origin of the Hellenic religions. After serving successfully in vari¬

ous capacities in diplomacy in Greece, Russia and Denmark this work ended with the fall of the empire. Under the Restoration he was made receiver of finances. In 1830 he was elected member of the Academie des Inscrip¬

tions et Belles-Lettres. Among his numerous works must be mentioned (Recherches sur le Culte, les symboles, les attributs et les monu¬

ments, figures de Venus en Orient et en Occident (1837— 47) ; (Recherches sur le Culte public et les Mysteres de Mithra en Orient et en Occident (Paris 1847-48), a work which was crowned by the Academie des Inscriptions et Belles-Lettres. His treatises on archaeological subjects are very numerous, and he edited the works of Saint Martin and of Abel Remusat.

LAKANAL, la/ka/nal', Joseph, French

statesman: b. Serres, 14 July 1762; d. Paris, 14

Feb. 1845. . He was educated by the Doc¬

trinaires, joined their congregation and became a teacher, then professor in philosophy at Moulins. In 1791 his uncle Font made him vicar-general at Ariege, and he was sent to the National Convention (1792) as deputy for his department. There he voted

for the uncondi¬

tional death of Louis XVI. He soon rose to the presidency of the committee of public in¬

struction; he had the Jardin du Roi reorgan¬

ized and called the Museum of Natural His¬

tory. He took a prominent part in the creation of the Lcole Normale, Institute, central schools, primary schools and in adopting serial telegra¬

phy. He was appointed commissary by the Directory (1795) to assist in several newly-

annexed French departments. In the same year he presented a plan for the establishment and organization of central schools, and he also entered the Council of 500, but on the 18

Brumaire, he resigned all positions except the chair of the Central School. In 1816 he was banished as a regicide and his name was erased from the list of the Institute he had founded.

Emigrating to the United States he became president of University of Louisiana and then Alabama planter. On the re-establishment of the Academie des Sciences Morales et Politiques 0832) he returned to France to claim his orig¬

inal post, which was given to him in 1834. Con¬

sult Saint-Hilaire, G., (Lakanal, sa vie et ses (? 880U)X> (1849) ' Lavigne' B'' (J°sePh LakanaP

LAKE (Lat. lacus), a standing body of water surrounded by land. Lakes are of two kinds — fresh-water and saline — and have been formed in various ways. Taking first the fresh-water lakes, these may be grouped as follows: (1) Obstruction Lakes.— Some of these are more or less, temporary sheets of water, such as the lake-like expansions of cer¬

tain rivers, and the deserted loops of river-

channels. . Other temporary lakes are due to the operations of the beaver ; to the choking of the narrower passages, of a river-channel by drifted vegetable debris or river-ice; to the advance of a glacier across the mouth of a lateral valley, to the damming of valleys by lava flows or to obstructions by landslides.

(2) Crater Lakes. — These occupy the craters of extinct or quiescent volcanoes. (3) Sink Lakes. — These lie in hollows caused by sub¬

sidence of the surface consequent upon the re¬

moval of underlying soluble rocks, such as rock-salt and calcareous and gypseous rocks.

(4) Earth-movement Lakes — Unequal move¬

ments or warping of the earth's crust have occasionally originated hollows by direct sub¬

sidence. . It is possible also that local elevation by affecting the lower ends of valleys may some¬

times have obstructed the flow of rivers and thus given rise to lakes. (5) Glacial Lakes.—These consist of (a) hollows of erosion or rock-basins, which have been excavated by glacier-ice, and (b) hollows caused by the un¬

equal distribution or accumulation of glacial detritus during the glacial period. (6) Subter¬

ranean Lakes. — These are found chiefly in cal¬

careous regions, where they occupy the under¬

ground channels which have been excavated by the chemical and mechanical action of water.

Fresh-water lakes are very unequally distributed.

They are most numerous in those regions which were overflowed by land-ice during the glacial period, as in the British Islands, Scandinavia, Finland, Canada

and the United States. Lakes occur at all heights above the sea; the most elevated being Lake Tsana in Abyssinia (7,500 feet). Lake Titicaca in the Bolivian Andes (12,500 feet) and Askal Chin in Tibet (16,600 feet). The largest lake in the world is LAKE

Lake Superior, which covers an area of 31,200

square miles, and has a mean depth of about 475 feet. Lake Baikal, in central Asia, is the largest and deepest mountain lake, its area being 11,580 square miles, and in places reaches a depth of 5,400 feet. Some of the mountain lakes of Europe also attain great depths ; thus, Lake Geneva is 1,000 feet, Lago Maggiore 1,158

feet and Como 1,358 feet.

Salt Lakes. — Two kinds are recognized: (a) portions of the sea cut off from the general oceanic area by epigene or hypogene agencies; (b) lakes, originally fresh-water, which have been rendered saline by evaporation and con¬

centration. Those of the first group range in size from mere pools and lagoons up to inland seas, such as those of the great Aralo-Caspian depression. The Dead Sea and the Great Salt Lake of Utah are good examples of the second group of saline lakes, which might be defined shortly as lakes which have no outlet to the ocean. The Caspian Sea is 97 feet below the level of the Black Sea, has an area of about 170,000 square miles and is from 2,500 to 3,000

feet deep in the deepest parts. A still more de¬

pressed area is that of the Dead Sea, the sur¬

face of which is 1,292 feet below the level of the Mediterranean Sea.

In Scotland the term loch is applied to lakes or

lake-like extensions of the sea completely shut in by land.

LAKE. Pigments consisting of coloring

matter combined with a metallic oxide are called lakes. They are obtained by mixing with the solution of the coloring matter a solution of alum or of a salt of tin, tungsten, zinc or other metal and then adding an alkali or alkaline car¬

bonate. The precipitate which forms consists of the color combined with the oxide. Among the pigments prepared in this way may be men¬

tioned blue lake, consisting of cobalt blue, indigo or ultramarine and alumina; madder lake, of madder and alumina; orange lake, of turmeric and alumina ; carmine lake, of cochineal and alumina, which is the finest and most important of "11; purple lake, of logwood and alumina, and so on. The exact tint depends on the pro¬

portions of the ingredients and the mode of preparation, as the lakes do not appear to be definite compounds. Lake pigments are largely used not only in painting, but also< in calico-

printing, but in the latter the metallic oxide is put upon the cloth and the color is afterward applied.

LAKE AGASSIZ, ag'a-si, name given by

N. H. Winchell to a large body of water which in the Glacial Epoch covered the Red River Valley in Manitoba, Saskatchewan, northeastern North Dakota and western Minnesota. Its shrunken remnants are lakes Winnipeg, Mani¬

toba, Winnipegosis, Rainy Lake, Lake of the Woods and Red Lake. Its area was about 110,000 square miles, its length nearly 700 miles its width 250 miles and its greatest depth 700

feet more than the depth of its remnants. Its

existence was due to the ice sheet of the Glacial Epoch which at one stage of recession dammed the northern outlet through Nelson River ; at the time the outlet of the lake was to the south by a transient stream called river Warren. The sheet of silt that accumulated in the bed of this lake now constitutes the soil of a great level plain noted for its luxuriant crops • vol. 16 — 42

of hard wheat. For description consult Warren Upham, Monograph 25, United States Geolog¬

ical Survey.

LAKE BONNEVILLE, bon'vil. See

Great Salt Lake.

LAKE BOUNDARIES. See Bound¬

aries of the United States.

LAKE CARP, a fish, Carpiodes Thomp-

soni, one of the carp-suckers (q.v.), inhabiting the Great Lakes.

LAKE CHARLES, La., city, seat of Cal¬

casieu Parish, situated on the shores of Lake Charles and Calcasieu River, on the main Southern Pacific line, 219 miles from New Orleans and 160 miles from Houston, Tex.; terminus Saint Louis, Iron Mountain and Southern Railway and Kansas City Southern Railway ; on Ocean to Ocean Highway, deep water through Intercoastal Canal via Port Arthur west, and New Orleans on the west.

One of the most picturesque cities of the State.

Its principal buildings are the courthouse, city hall, four graded schools, high school, four colored schools, 17 churches, Carnegie library, Federal building and courthouse, sanitarium, orphanage and convent. Its industrial estab¬

lishments comprise light and power plant, ice factory, gas plant, oil refinery, shipbuilding plant, chemical plant, rice mills, saw mills, etc.

Its agricultural interests comprise rice, corn, cotton, oranges, grape fruit, strawberries, pecans and all garden truck with 300 farming days to the year. In the heart of the Calcasieu long leaf yellow pine timber district and chief centre of the lumber manufacturing interests of the State, it lies 10 miles east of the greatest sulphur producing mines in the world and 15

miles east of the Vinton and Edgerly oil fields.

From this centre of Calcasieu Parish radiates a 200-mile ($2,000,000) system of hard surfaced highways; the Calcasieu River bridge, concrete and steel, 1,782 feet in length, was completed in 1918. The city was settled 1852, incorporated 1857, chartered 1886 and adopted commission form of government 1913. Pop. (1920) 13,088.

LAKE CITY, Fla., town and county-seat

of Columbia County, on the Seaboard Air Line and other railroads, 60 miles west of Jackson¬

ville. Here until 1905 was located the State Agricultural College. There is an agricultural experiment station. In 1901 *the State legis¬

lature granted the town a new charter greatly enlarging its limits. It is the seat of Columbia College (Baptist) and is located in a thriving cotton region. Cattle-raising and truck farm¬

ing are also important industries. The town has an important trade in cotton, lumber, tur¬

pentine, fruit, etc. The waterworks and electric-

lighting plants are municipally owned. Pop.

3,422.

LAKE CITY, Minn., city in Wabasha

County, on the expansion of the Mississippi River known as Lake Pepin, and on the Chi¬

cago, Milwaukee and Saint Paul Railroad, 57

miles southeast of Saint Paul. It has a public library and high school .and numerous manu¬

factures, including grain elevators, flour mills, cut-glass works, pearl-button, boat, wagon and carriage factories, foundries, machine shops and an extensive nursery covering 1,400 acres.

The city is a popular summer resort. The city has adopted the commission form of govern-

ment, and owns the waterworks and electric-

light plant. Pop. 3,142.

LAKE DWELLINGS, dwelling-houses of

men built on piles in the water near the shore of a lake. They may be considered in two categories: (1) The prehistoric structures of Switzerland and the neighboring region; and (2) more modern structures elsewhere.

Swiss Lake Dwellings. — Villages con¬

structed by men of the Neolithic and subsequent ages of culture (see Stone Age) in the water of the lakes of northwestern Switzerland, and in adjoining parts of France and Italy. They do not represent an epoch in itself, but only incidents of situation with reference to the social conditions of their time. The region was one of difficult mountains, and doubtless these were infested by roaming bands of savage or lawless men, putting in constant danger the lives and property of any settler desiring peace

and comfort. It may well be supposed that the desire for safety was the ruling motive in constructing homes surrounded by water, where by the lifting or destruction of a bridge or causeway, or the withdrawal of boats, a village might rest in security against bandits who would not have the means of immediately at¬

tacking by water, and could not, or would not, wait to carry on a prolonged siege. Some dwellings of the same kind, however, were placed on the shore, and these would probably be abandoned at the coming of raiders. On the whole it may be concluded that these water-

guarded communities represent the most ad¬

vanced effort of the time to obtain a settled social state and foster industry. Nothing more is known of these villages than may be gathered from a study of their remains. They are found in all the larger lakes as well as in some small ones — perhaps 300 sites in Switzerland and many others in Italy. The first discovery was in Lake Zurich in 1854, when a season of ex¬

tremely low water disclosed groups of stumps of piles at a little distance from the shore; and dredging recovered hundreds of implements of stone, bone and deer-horn, that had been lying in the mud for thousands of years. Subse¬

quent exploration of the submerged margins of other Swiss lakes showed many more town sites, and exhumed a vast quantity of relics, in some cases only those of the Stone Age, in others metallic implements denoting occupation in the age of bronze, while a very few sites showed an intermediate condition of culture.

The custom of making these lacustrine villages continued, therefore, from the time of the Neolithic people — probably from their first advent — on through the Bronze Age and into the more modern time when iron had come into use. It is surprising that

it should not have been found in existence by the Greek and Roman pioneers to this region, but no written record or even tradition indicates survival to historic times. The occupation of these vil¬

lages, however, was far from continuous. At Robenhausen, on the ancient Lake Pfaffikon, now a dry marsh, three Neolithic occupations appear, one on top of the other, and each was destroyed before the next began. The tops of each set of piles are from three to five feet higher than the earlier set. The number of houses in the first occupation has never been estimated ; that of the second has been esti¬

mated at 30, and the third and last at 50 houses.

The settlement covered nearly three acres and contained about 100,000 piles. At Morges, on Lake Geneva, again, three different stations close together evidently belong to different times. One has yielded no metal ; the second a mixture of stone and the straight, flat, bronze hatchets characteristic of the beginning of the bronze period ; the third only the finest of advanced bronze-work. <(Here,® as T. W.

Wilson remarks, <(there could have been no contemporaneity — no mixture. Each must have been destroyed before the other began.®

It is probable that these successive occupations represent as many catastrophes, most likely overwhelming conquests in which the places were sacked and swept away by fire. Evidence of conflagration is frequently noticed. In such a case decay and ice would gradually dispose of the piles near the surface of the water, but where it was deep, or the timbers were sunk in mud, they would be preserved. A complete dugout canoe has been found in one place.

Burned towns might frequently have been re¬

built, but finally all were abandoned, and new towns

arose near by in subsequent centuries, built by new folks. Some of the more recent villages were of comparatively great size. That at Morges was 1,200 feet long by 150 broad, and is estimated to have housed 1,200 inhabitants.

Much study has been given to the plan and construction of these lacustrine habitations.

Although in some of the little lakes foundations of bundles of withes, or of heaps of stones, were made, as in building crannogs, most villages rested on thousands of piles. The labor in¬

volved must have been prodigious, especially in the Stone Age, when trees had to be felled and cleared of limbs, and piles sharpened, with only stone hatchets and fire for tools. The neces¬

sary number of piles having been driven into the lake-bottom, their tops were cut to a general level and then floored over with planking or slabs, on which the buildings were erected. A narrow bridge, perhaps with a draw, connected the platform with the shore. What the houses and other superstructures were like is a matter of doubt. They must have been fairly substan¬

tial and tight to withstand the winter cold and mountain gales; and no doubt contained fire¬

places of stones and clay for warmth and cook¬

ing purposes. It is probable that they were usually formed of reeds or slender poles cover¬

ing the frame, and coated with clay, forming Svattle-and-daub® huts, as fragments of such clay walls, hardened by fire, have been found in abundance.

Other Lake-Dwellers. — Antiquarians and

travelers have described similar dwellings, and even villages still in use in various parts of the world. Herodotus, who visited Thrace early in the 5th

century, b.c., saw the natives about Lake Prasias living in a lacustrine village precisely like those of ancient Switzerland; modern Rumelian fishermen around Lake Prasias still build and inhabit similar dwellings. The same custom is followed by tribes dwelling on marshes, lake-borders or river-courses in cen¬

tral Africa, the East Indies and Malaya, Australasia and in tropical America. The motives nowadays are not always, if ever, fear of enemies, but rather convenience, since such folks are usually dependent on boats for travel, or are engaged in fisheries of some sort, or find it needful to sleep above the wet jungle-soil LAKE FOREST — LAKE GEORGE

659

and out of the way of dangerous animals and annoying vermin. One of the most prominent examples is that which led European explorers to give the name Venezuela ((

Around Lake Maracaibo the Indians dwelt in the rainy season in flimsy shelters perched on piles driven in the water, the shorter ones carrying the sills and floor, and the longer ones the roof-poles. They made platforms for stor¬

ing property, and little islands as refuges for their meagre livestock. But there is a well-

known example nearer home. The Irish, and to a less extent the Scotch and English of old times, had lake dwellings that were made in the following way and were styled crannogs.

Crannogs. — Great quantities of small

stems, sticks and the like are collected and sunk by means of stones in the lake, so as to form an island. Very often advantage is taken of the existence of an island just level with the sur¬

face of the water, which can be raised a foot or two above the surface with comparatively little labor.

Sometimes a few upright piles are driven in on the top after the chief part of the island has been made in the manner described. When the island is thus raised to a sufficient height it is frequently strengthened by an enclosure of stakes driven into the bottom of the lake per¬

pendicularly. A platform of thin stems of trees, either round or split into boards, is then made on top of the island, and this supports the structures that are built on them. The cran¬

nogs of Ireland appear to have been

rather used as strongholds than as dwellings.

Consult Keller, (Lake Dwellings of Swit¬

zerland and Other Parts of Europe) (1878) ; Wood, Martin, (Lake Dwellings of Ireland) (1886); Munro, R., (Ancient Scottish Lake Dwellings> (1882); (Lake Dwellings of

Europe (1890), and general works on archaeol¬*

ogy-

Ernest Ingersoll.

LAKE FOREST, Ill., city in Lake County, on Lake Michigan, and on the Chicago and Northwestern Railroad, 28 miles north of Chicago. It is a suburban and residential town without industries or manufactories. There is here a seminary for girls, a public library, an academy for boys and Lake Forest University (q.v.). It was settled in 1859, and is governed by a mayor and council elected every two years. Pop. 3,657.

LAKE FOREST UNIVERSITY, at Lake

Forest, Ill., is an educational corporation, operating four institutions: Lake Forest Col¬

lege, opened in 1876, offering courses in liberal arts and sciences for both men and women; Lake

Forest Academy, a boys' preparatory school, opened in 1858; Ferry Hall, opened in 1869, a girls' preparatory school and junior col¬

lege,' named for the Rev. W. W. Ferry, who left a bequest of $35,000 for such a school, and the Lake Forest School of Music opening in 1916, incorporating and extending the courses in music hitherto given in other departments.

A summer school of landscape architecture was instituted in 1916. The charter was pro¬

cured in 1857 by a group of prominent citi¬

zens of Chicago under the leadership of the Rev W. W. Patterson, D.D., who formed the Lake Forest Association in 1856 and purchased 1.300 acres of land on the high wooded shore of Lake Michigan, 28 miles north of Chicago.

Here the town of Lake Forest was plotted in 1857, every alternate lot being assigned to the university, 62 acres being set aside as a campus. The original title of the institution was Lind University, but this was changed in 1865 to Lake Forest University. The college, the academy and Ferry Hall have separate grounds and buildings and independent facul¬

ties. They are all provided with a complete equipment of dormitories and commons, as well as a modern educational plant. The faculties number 55 and there are 490 students enrolled.

The libraries contain 43,000 volumes. The total value of the grounds and buildings is $1,040,000; the endowment amounts to $1,200,-

000, including the special Bross Fund of $40,000, the income of which is used for lectures similar to the Bampton and Gifford Lectures, and for a decennial prize in the field of Christian apologetics.

LAKE OF THE FOUR FOREST CAN¬

TONS, Switzerland, a common name for the Lake of Lucerne. The city of Lucerne and the towns of Kiisnacht, Brunnen and Fliielen are on its shores.

LAKE GENEVA, je-ne va, Wis., city in

Walworth County, on the Chicago and North¬

western Railroad, 70 miles northwest of Chicago. Situated on Lake Geneva, the city has developed into a popular summer resort.

The lake is nine miles long and from one to three miles in width, and is fed entirely by springs. The Yerkes Observatory, belonging to the University of Chicago, is located here.

There are numerous large hotels, churches, schools^ a public library, the Oakwood and Lakeside sanitariums and other buildings.

It has a condensed milk factory, cement-

stone and brick works, and a creamery.

The city was incorporated in 1893 and is governed by a mayor and council elected annually. The waterworks are the property of the city. Pop. 3,079.

LAKE GEORGE, in the eastern part of

the State of New York, is one of the most beautiful, noted and picturesque lakes in the world. It is fed mostly by ice cold springs, there being less than-half a dozen living streams flowing into it. Its outlet is Lake Champlain in the Saint Lawrence River Basin. It is the head¬

waters of one of the most noted of the Saint Lawrence valleys. It narrows at its outlet and the waters enter Lake Champlain by a short creek, which has a descent of about 230 feet in a mile with a series of cascades and an abrupt fall of 30 feet at Ticonderoga. Its length is about 36 miles, and it is 346 feet above the sea, and at its headwaters it is 247 feet above Lake Champlain.

In 1609 Champlain sailed up the lake which bears his name, and Indians told him of the beautiful water called Andiatarocti (Place Where the Lake Contracts) but there is no rec¬

ord that he ever saw Lake George. Father Jogues, a Jesuit missionary, first saw the lake while a captive in Mohawk hands on 9 Aug.

1642; but it was not till he saw it a second time' on 29 May 1646, that he called it Lac du Saint Sacrament, or Lake of the Blessed Sacrament, owing to his having seen it on the eve of Corpus Christi, a name which it retained 660

until it was changed by Gen. William Johnson, 28 Aug. 1755, and given that of Lake George, after George II. The name <(Horicon® given it by Cooper, is an historical fraud, the creation of the novelist's brain.

This lake is on the direct route of travel which was used in the early days of exploration and colonization in journeying to and from Canada and New York. It was on the Great War Trail of the Nations, and was in turn un¬

der the control of the French, the English and the Colonists, while our country was in its formative stage. During the French and Indian War, forts were built at Carillon (Ticonder-

oga) by the French, and at the head of Lake George (Fort William Henry, Fort George and Fort Gage) by the English. It has been the scene of numerous bloody contests, between the whites and the Indians, the French of Canada and the English of the colonies. The encounter known as the (

quins under Baron Dieskau, and the English and Iroquois under Sir William Johnson, with an Indian chief, King Hendrick, in charge of the Indians. A monument commemorative of this battle was unveiled at Lake George 8 Sept.

1903. It consists of heroic figures of Sir Wil¬

liam Johnson and Chief Hendrick, designed by Albert Weinert. The State of New York has purchased here a large tract of land, containing the battlegrounds and Fort George, the reser¬

vation being known as "Battle Park.® A few miles to the south King Hendrick fell, while a monument marks the spot where Col. Ephraim Williams, founder of Williams College, met his death.

Among the more important events associated with Lake George were the siege by Montcalm, capture and massacre at Fort William Henry 9 Aug. 1757; the gathering of Lord Aber¬

crombie's great army, its defeat and death of Lord Howe at Ticonderoga, 5-8 July 1758; the building of Fort George, advance down the lake and capture of Fort Ticonderoga by Lord Amherst, July 1759; capture of Fort Ticonder¬

oga by Ethan Allen, May 1775; removal of guns and stores over the lake, winter of 1775—76 to Boston by Col. Henry Knox; and oc¬

cupancy by American forces, spring 1776, fol¬

lowed by devastating smallpox epidemic ; seizure by General Burgoyne, summer 1777; un¬

successful attack on Diamond Island by Ameri¬

cans under Colonel Brown on English forces, 22 Sept. 1777; capture of Fort George by Maj.

Christopher Carlton (English) October 1780; visit of General Washington and staff, July 1783. *

The State has bountifully stocked its waters with fish.. Deer, black bear, rabbits, partridges, foxes, minks and rattlesnakes are to be found among its mountains, and ducks, eagles, gulls and all kinds of wild birds fly above its waters.

The lake is surrounded by mountains, the most striking of which are Prospect (1,800 feet), Buck (2,000 feet), Tongue, with its succession of mounts, Erebus, Shelving Rock, Black (2,315

feet), Anthony's Nose,, named after Anthony Wayne, and Rogers' Slide, after the fabled ex¬

ploit of Rogers the Ranger, in 1757-58.

Lake George has more than 200 islands, among the largest of which are Long and Big Burnt islands ; Dome Island is the highest, Green Island is the most beautiful, and Dia¬

mond the most celebrated historically and senti¬

mentally; Tea' — so-called from "a tea house®

erected there in 1828; Recluse and Floating Bat¬

tery, occupied by Abercrombie 1758; Fourteen Mile, used by Burgoyne's forces for camping purposes; Harbor Islands, scene of a bloody conflict (25 July 1757) between French and Indians and English; and Prisoners', at foot of lake, used by the French as a place of confine¬

ment for captives. "The Narrows,® half way down, are narrow passages in the lake, clustered wdtih large and small islands, known generally as the "Hundred Islands.®

There are many indentations in the lake line, some forming large bays. The best known are Dunham's, Kattskill, Bolton, Northwest, in it¬

self a considerable lake. Fourteen Mile and Paradise, the most beautiful bay in the world.

The lake is well served by three fine steamers run in connection with the Delaware and Hud¬

son Railroad and Champlain Transportation Line. The principal villages on the lake are — Lake George, at the head, located in the town of Caldwell, Bolton

Landing and Hague, near which are the Dixon graphite mines, the largest of their kind in existence. The ruins of Fort Ticonderoga (q.v.) are not far from the foot of the lake. Geologically, Lake George is thought to be a formation of the Glacial Age.

To the mineralogical expert specimens of value are readily accessible in the surrounding moun¬

tains. Garnets, resinites, cocolite, pyroxene, sphene, graphite and tourmaline are found at Rogers' Slide ; feldspar, hermatite at or near Anthony's Nose; while the beach sands con¬

tain powdered garnet, amethyst, crystal quartz, magnetic sand and epidote; on Diamond Island are found quartz crystals; gold in non-paying quantities has also been discovered.

Consult Reid, (Lake George and Lake

Champlain) (New York 1910) ; Seelye, (Lake George in History > (Lake George 1897).

James A. Holden.

LAKE HERRING, or LAKE WHIT¬

ING, a local name for certain whitefish of the Great Lakes, especially the cisco (q.v.).

LAKE LAHONTAN. The name of the

early French explorer Lahontan was given by Clarence King to a large body of water which in the Pleistocene Epoch occupied 8,422 square miles of the Great Basin province of northern Nevada. It was caused by a cycle of increased precipitation during-the Glacial times. With increasing aridity of climate the water dried up until at present there remains only a few scat¬

tered saline lakes or ponds; of these Pyramid, Winnemucca, Carbon, Walker and Honey

lakes are the most notable. At its maximum, when the

lake was about 500 feet deep, and also at an intermediate stage, terraces were de¬

veloped. These are conspicuous on the present desert slopes especially where deltas were formed by streams emptying their load of gravel and sand into the lake. As dessication pro¬

gressed the waters of the lake became increas¬

ingly saline and deposited tufa or impure cal¬

cium carbonate especially of the variety thino-

lite; this occurs in columns, terraces and other forms in various parts of the area. For de¬

tailed description consult I. C. Russell, Mono¬

graph 11, United States Geological Survey.

LAKE SCHOOL, or LAKISTS, a name

given by the Edinburgh Review to certain LAKE-TO-SEA COMMISSION — LAKE TROUT

British poets who came forward conspicuously at the beginning of the 19th century, and en¬

deavored to substitute a natural and simple taste for the classicism of which Addison and Pope furnish leading examples. They received their name from the picturesque lakes of Cum¬

berland and Westmoreland, where Wordsworth, Coleridge and Southey had fixed their residence.

LAKE-TO-SEA COMMISSION, or In¬

ternational Waterways Commission. In June 1902 President Roosevelt approved an act of Congress (Rivers and Hafibors Act) providing for the appointment of an international com¬

mission of six members, three representing the

interests of the United States and three from Canada, to investigate and report upon the con¬

ditions and uses of the waters adjacent to the boundary line between the United States and Canada. A corresponding act was passed by the Dominion government. At the meetings of the commission held in 1905 it became apparent that the United States government placed a much narrower construction upon the acts au¬

thorizing the appointment of the commission than that applied to it by the Canadian govern¬

ment, which held that the scope of the com¬

mission's powers included all waters adjacent to the boundaries of the two countries. The United States government, on the other hand, interpreted the inquiries of the commission as being limited to the waters of the Great Lakes.

The point was yielded by the Canadian gov¬

ernment. Among the questions discussed at subsequent meetings are the uses of the waters at Sault Sainte Marie and of the Niagara River, and an equitable division thereof ; the protection of Niagara Falls as a scenic spectacle; pro¬

posed uniformity in marine signal lights be¬

tween the two countries; the advisability of building controlling works at the outlet of Lake Erie; the diversion southward of certain waters in Minnesota that now flqw north into the Rainy River and the Lake of the Woods; the effect of the Chicago Drainage Canal on the levels of the Great Lakes and . the Saint Lawrence; suppression of illegal fishing on the Great Lakes ; common channels, navigation regulation in narrow channels, shore protection and the transmission of electric energy gen¬

erated in Canada, to the United States, and vice-versa. . „ „ ,

On 11 April 1908, the United States and Great Britain concluded a treaty respecting the demarcation of the international boundary be¬

tween the United States and Canada, which for that purpose is divided into eight sections.

A new commission with enlarged powers for dealing with all international water rights on the frontier between the United States and Canada was created under treaty of January 1909, under which the International Joint Com¬

mission was created in 1911. This commission is vested with authority to deal not merely with boundary waters, but also with -(all questions which are now pending between the United States and the Dominion of Canada, involving the rights, obligations or interests of either in relation to the other, or to the inhabitants of the other, along their common frontier, and to make provision for the adjustment and settle¬

ment of all such questions as may hereafter arise. » It is composed of six members, three from each country, and holds sessions at Wash¬

ington in April and at Ottawa in October in each year. This body has row sunerseded the old Lake-to-Sea or International Waterways Commission, save as respects the determination of the boundary through the Great Lakes, with which duty it was specially charged by the treaty of 11 April 1908, already referred to.

LAKE SILVERSIDES. See Silver-

sides.

LAKE STATE, The, a popular name given to Michigan. Its- shores are watered by lakes Superior, Michigan, Huron and Erie. The In¬

dian word Michigan signifies <(great water?

LAKE STURGEON, the sturgeon (A cl -

penser rubicundus) of the Mississippi Valley and Great Lake region. It is also called Ohio, Black, Stone and Rock Sturgeon, and is the most common of the North American fresh¬

water sturgeons, weighing 50 to 100 pounds.

See Sturgeon.

LAKE TROUT, two salmonoid fishes of

the genus Cristwomer inhabiting lakes in the northern United States and southern Canada, (1) the Great Lake trout (C. namaycush) ; and (2) the siscowet (C . siscowet). The former, and more important, occurs in most of the larger lakes and ponds from New Brunswick to Idaho and Vancouver Island, and throughout northern Canada and Alaska. The Canadians call it namaycush and by other Indian names ; in Maine and Vermont it is known as "togue®

and Honge® respectively; and on the upper Great Lakes as Mackinaw trout. It is the largest of the trout family, sometimes exceed¬

ing 100 pounds in weight, but the average speci¬

men weighs from 15 to 20 pounds; the biggest fish are found in the largest and deepest lakes.

It is trout-like in form, thin-skinned, with little or no underlying fatty tissue, and dark gray spotted with round paler spots sometimes of a slightly reddish tinge. It is fierce and voracious, seizing and feeding upon ((all fishes with soft fins^ and anything else edible that falls in its way; and when mature it can hold its own against any other depredator, so that it may be regarded as ruler of the lakes. It spawns on the reefs in the late autumn, but otherwise dwells in the deeper waters; Jordan says that the usual number of eggs deposited at one spawning is only 5,000 or 6,000. As a game-

fish it seems variable, in some waters affording good sport by trolling with a spoon-bait or live minnow, and in others having small repute among

anglers. All agree, however, as to the excellence of its flesh on the table; and it fur¬

nishes a commercial fishery on the Great Lakes only excelled in importance by that for white-

fish. These trout are usually caught by vast gill-nets operated by steam vessels, . and three or four tons are sometimes taken in a single haul. About 1885 the supply in the Great Lakes was diminished to an alarming extent; but arti¬

ficial propagation by the State and national governments soon restored the quantity, so that at the beginning of the present century more could be taken by fishermen than could profit¬

ably be sold. It* is outranked in market-price and demand, however, by the whitefish.

The siscowet is very similar, but has a deeper bodv, thicker skin, beneath which is an excessive development of fatty tissue and naler coloration. It is rarely seen outside of Lake Superior, where it is numerous in deep water.

(See Salmon; Trout), and consult works there G62

cited. Consult also Goode, (American Fishes5

(1888) ; Jordan and Evermann, (American Food and Game Fishes) (1902) ; Sage and Cheney, (Salmon Trout5 (1902).

LAKE OF THE WOODS, a boundary

lake, partly in the province of Ontario, Can¬

ada, and partly within the State of Minnesota and with a small part in Manitoba, 190 miles west-northwest of Lake Superior and 377 feet above its level. It is broken by one long prom¬

ontory and several smaller ones into distinct

portions, of which only the southern, contain¬

ing Big Island, is properly designated the Lake of the Woods, while the eastern bears the name of White Fish Bay, the northern, which is studded with islands, being called Clear Water Lake, and the northwestern, Shoal Lake. The whole expanse of water forms a single lake of very irregular shape about 65 miles in length and from 10 to 60 in breadth, the water area being about 1,851 square miles. It is navigable for vessels, drawing not more than nine feet of water, from Kenosa to the mouth of Rainy River, and there is steamer service between Rat Portage, Norman and Keewatin. Rainy River, the principal feeder of the lake, enters it at its southeastern extremity, just below Fort Louise ; its discharge is at the north by the Winnipeg. It abounds with sturgeon. The boundary between Canada and the United States follows the Rainy River to its mouth in the lake, and then proceeds across the lake in such a way as to leave Big Island to Canada, whilst giving most of the Lake of the Woods proper to Minnesota. A little west of the me¬

ridian of 95° the boundary strikes due south to meet the parallel of 49°, which is then fol¬

lowed, the result being that the United States owns an isolated portion of the land on the northwest shore. There are gold mines in the neighborhood. Lake of the Woods was dis¬

covered by Jacques de Noyon in 1688, and on one of its islands Jean La Verendrye was mur¬

dered by the Sioux in 1736. See Boundaries of the United States.

LAKEWOOD, N. J., township and village

of the same name in Ocean County. The town is a famous health and winter resort, surrounded by an extensive pine forest, in which are nu¬

merous lakes. Here are numbers of large hotels and many cottages owned by residents of New York and

Philadelphia. Known for more than a score of years to a few, discovered and orig¬

inally promoted by men who found here the conditions which were a necessity of long life, and developed and made successful by the presence of manifold advantages, Lakewood is known on both sides of the ocean, among the most critical and intelligent travelers from Can¬

ada to the Gulf and from the Atlantic to the Golden Gate, in Europe and on the Continent as the most popular resort in America's Middle East. Lakewood has grown steadily in its nor¬

mal population, as well as its taxable inventory.

Its streets and avenues, carefully laid out and well built of stone, are kept in perfect repair during the season and afford one of the chief charms of the place in an almost endless variety of drives. The lakes of the place, among its great charms, are protected carefully from contamination and at once furnish an adequate water supply for fire purposes, are points of much attraction at the infrequent times when skating is available, and throughout the season a picturesque viewpoint, admired by thousands.

Pop. (1920) 6,110.

LAKME, lak'ma, a beautiful tragic opera in an Indian setting, composed by Leo Delibes, libretto by Gille and Goudinet. First pro¬

duced in Paris on 14 April 1883. Lakme, a Hindu maiden, falls in love with Gerald, an English officer, whom she found trespassing on sacred ground near the temple of her father, Nilakantha, a fanatical Brahmin priest, who hates the English and resolves to kill Gerald.

Disguised as a beggar and armed with a dag¬

ger, the father sets out for the city accom¬

panied by his daughter, disguised as a street singer, to find the Englishman. The latter, as expected, recognizes the girl's voice and betrays himself. He is stabbed by Nilakantha, but the girl with the help of a slave conveys Gerald to a hut in the forest and nurses him back to health. A brother officer appears and recalls Gerald to his sense of duty. The bugle calls and be must away. Reading his resolve in his face that he means to leave her, Lakme eats a poisonous flower and dies in his arms.

LAKSHMI, laksh'me (Prosperity), in

Hindu mythology the wife of Vishnu and the goddess of fortune. She is the female or pro¬

ductive energy of Vishnu, and hence is in many cases regarded as an expression of the attri¬

butes of Vishnu. She is said to have been produced from the ocean of milk when churned by the gods to obtain the beverage of immor¬

tality. She was thus born in the full flush of beauty, adorned with a diadem and with gems on her neck and arms, bearing in her hand a lotus. As soon as she was born she betook herself to the bosom of Vishnu, to whom she was ever faithful. According to a later view, that of the worshippers of Vishnu, this god produced three goddesses, Brahmi, Lakshmi and Chandika, the first his creative, the second his preserving and the third his destroying energy. See Sri.

LALANDE, Joseph Jerome le Frangais de, zho-zef zha-rom le fran-sa de la-land, French astronomer: b. Bourg-en-Bresse, Ain, 11 July 1732; d. Paris, 4 April 1807. He devoted him¬

self to mathematics and astronomy and was sent by the Academy in 1751 to Berlin to determine the parallax of the moon, while Lacaille went with the same object to the Cape of Good Hope. After having finished his operations at Berlin, he was chosen member of the Academy of Sciences in Paris in the

year 1753. Thence¬

forward no volume of their (Transactions 5 ap¬

peared which did not contain some important communication from him. In 1762 he was ap¬

pointed professor of astronomy in the College de France, where he lectured with great suc¬

cess to the end of his life, and in 1795 was appointed director of the Paris observatory.

His chief works are his (Treatise on Astron-

omy) (1764) ; /History, Theory, and Practice of Navigation5 ; and (Astronomical Bibliog¬

raphy. J He wrote all the astronomical articles for the great Encyclopedic5 and rewrote them for the Encyclopedic Methodique,' and con¬

tributed to various scientific periodicals, besides editing the (Connaissance des Temps5 from 1760 to 1775 and from 1794 till his death.

LALANDE'S DOG. See Cape Fox

LALEMENT, lal-man, Gabriel, French

Jesuit missionary: b. Paris, 10 Oct. 1610; d. in the Huron country, 17 March 1649. He be¬

came a Jesuit in 1630, arrived in Canada in 1646 and in 1648 was sent to the Huron mis¬

sions under de Brebeuf. He was there about a month when the Iroquois attacked the settlement of Saint Ignatius and later attacked the Saint Louis mission, where they captured de Brebeuf and Lalement. They led the two priests to Saint Ignatius, there tied them to stakes and after horrible torture put them to death. Con¬

sult Martin, (Hurons et IroquoisP

LALEMENT, Jerome, French Jesuit mis¬

sionary in America: b. Paris, 27 April 1593 ; d. Quebec, 26 Jan. 1673. In 1610 he entered the Jesuit order, then taught in educational institutions of the order, and in 1638-45 was superior of Huron Jesuit mission in New France. In 1645-50 he was superior of all the missions in New France. After a sojourn in France (1650-59), he returned to America to resume his post. Letters and reports by him on the missions for 1639-43, 1646-48 and 1660-64

appear in the great compilation of the (Jesuit Relations > (1896-1901). Consult also Parkman, (The Jesuits in North America) (new ed., 1898).

LALITA-VISTARA, la-li-ta-vis'ta-ra, one

of the most celebrated works of Buddhistic literature, of unknown origin and antiquity, ex¬

isting only in a Sanskrit version. It contains a narrative of the life and doctrine of the Buddah Sakyamuni, and is considered by the Buddhists as one of their chief works treating of religious law.

LALLA ROOKH, lal'a rook. This col¬

lection of narrative poems on Oriental themes (published 1817) brought Moore £3,000 before Longman, the publisher, ever saw the manu¬

script, and in popularity justified that price.

Its permanent reputation, however, is almost solely that of a curiosity. Moore attempted an Oriental subject upon Byron’s suggestion, and following Byron centred the interest of his narrative in love and freedom, but had, like Southey, to rely upon books, referred to in learned-looking notes, for his Eastern color.

His framework story of an Indian princess traveling to meet the prince, her bethrothed, and entertained

along the way by the prince himself in disguise telling stories,. has charm, but the stories themselves are strained in feel¬

ing, over-decorated, diffuse. The best of them, (The Veiled Prophet, > approaches Byron's picturesqueness; (Paradise and the PerP has the lyric sweetness of Moore's own (Melodies. , The references to the cause of Irish freedom are unconvincing and irrelevant. Of romantic love-sentimentality, with due observance of propriety, (Lalla Rookh) contained an abun¬

dance sufficient to win the favor of a generation that liked the sentimentality in Scott and Byron; of real passion it contained about as much as a wedding-cake. One is now chiefly interested in the raillery of the prose passages making fun of contemporary critics. The best judges of Moore s own day did not overrate the merit of his performance, and Hazlitt. who said that the author had. mistaken the art of poetry for that of cosmetics, assessed its faults justly if with characteristic emphasis.

William Haller.

LALLY-TOLLENDAL, la-le-to-lon-dal,

Thomas Arthur, Comte de : b. Romans, pau-

phine, 1702; d. 9 May 1766. He was of Irish parentage, his father having followed the for¬

tunes of James II. Trained to arms, he was made brigadier on the field of Fontenoy for distinguished bravery. He accompanied the Pretender to Scotland in 1745, and in 1756 was selected to restore the French influence in India, for which purpose he was made governor of Pondicherry. He failed in this, surrendered Pondicherry in 1761 and was brought prisoner to England. The following month he was al¬

lowed to return to France, where, after a long imprisonment, he was condemned and executed (1766) for treachery, etc. His son (Trophime Gerard, 1751-1830), supported by Voltaire ob¬

tained in 1778 a complete authoritative vindica¬

tion of his father's conduct. Consult Malleson, (Count Lally) (1865).

LALIN, la-len, Spain, town in the province of Pontevedra, located in a mountainous region, 37 miles northeast of Pontevedra. Its indus¬

trial life depends largely on the agriculture of the highlands, and it has 'tanneries and paper mills. Pop. 16,300.

LALLEMAND, lal'man', Charles Fransois

Antoine, Baron, French general: b. Metz, 23

June 1774; d. Paris, 9 March 1839. A volunteer of 1792, he became an aide-de-camp of Junot and gained the grade of colonel by his conduct at Jena. In Spain he was advanced (1811) to brigadier-general and took an important part under Davout (1813-14) at the defense of Hamburg. Given command (1815) by Louis XVIII of the department of the Aisne, he attempted, unsuccessfully, to create a rising in favor of Napoleon, who named him general of a division and peer of France. With Napo¬

leon's surrender and deportation to Saint Helena, he desired to accompany the emperor but was forbidden. After several months in¬

ternment at Malta, he was released, and after traveling to the East and to Egypt without finding employment, 'he sailed (1816) for Amer¬

ica at the head of a number of other refugees who had been condemned to death by the ordi¬

nance of the 24th July. Meeting his brother here they started to found a colony in the name of Champ d'Asile in Texas but encoun¬

tered trouble with the Spaniards and he aban¬

doned his plans. He had plans for releasing

Napoleon, who left him 100,000 francs in his will (1821), but he is next heard of in Spam offering his services to the Constitutional party ; he next went to Brussels and to Paris (in spite of the death sentence) and finally to New York, where he directed an educational establishment.

Re-entering France after the revolution, of Tuly he was reinvested (1831) with his titles and made a peer of France (1832), command¬

ing successively the 17th and the 10th military divisions.

LALO, la-lo, Edouard Victor Antoine,

French composer: b. Lille, 27 Jan. 1823; d.

Paris, 22 April 1892. He was a pupil, under Baumann, at the Lille branch of the Paris Conservatory, becoming first known at Paris as the violinist in Armingaud s chamber-music soirees, soon issuing his own chamber-music pieces. His opera (Fiesco> (1867) was never presented but the ball-music was played in con¬

certs (1872). His first full success arrived with

his grand opera play, (Le roi d'Ys) (1876), his third opera, (La Jacquerie,* was not finished till (1896) brought to completion by Coquard.

His grand ballet, (Namouna,) was included in the grand opera (1882), then in concerts, and his pantomime,

As composer of instrumental pieces he was more fortunate, showing warmth and talent.

He wrote three violin-concertos : the first dedi¬

cated to Sarasate, the second, (Symphonie es-

pagnole,* and the third, ^Concerto russe) ; also a cello-concerto, piano-concerto, a (Rhapsodie norvegienne* for the orchestra, a symphony, etc.

LAMA, genus Camelidce including all the South American camel family represented by the species vicuna, guanaco, llama and alpaca.

The two former are wild and the others do¬

mesticated races. O. Thomas decided the re¬

lationship of the domestic to the wild races as being derived from the wild guanaco. They are all smaller in size and build than the camels and have no hump on their backs. Their pointed ears are relatively longer -than the camels, their tails a mere stump, toes separated each with its pad. There is a tooth less than the camels on each side of the upper jaw. They live in western and southern regions of South Amer¬

ica in temperate climate, as the higher ranges of the Andes and Cordilleras, in Patagonia, Tierra-del-Fuego, etc. See Llama; Alpaca; Vicuna.

LAMAISM, la'ma-iz'm, the name usually

given in the Occident to the form of Buddhism which is the prevailing religion in Tibet and in parts of central Asia. The word is derived from the Tibetan Lama, <(Superior One,® a term properly applied to the higher clergy, though often given by courtesy to all fully or¬

dained monks. Buddhism was first introduced into Tibet in the 7th century a.d., during the reign of King Srong-tsan Gam-po, who mar¬

ried two Buddhist princesses, the one from Nepal and the other from China; but the re¬

ligion made little headway until King Thi-srong De-tsan about 750 a.d. caused it to be preached throughout his dominions by an Indian teacher named Padmasambhava. This remarkable man, who. is famous

in Tibet for his supposed magical powers, succeeded in converting most of the people from their former religion, an animistic belief known as ((Bon,® but only by incorporating much -of its demonolatry into the already corrupt form of Buddhism that he taught. At this time the order of monks, or Lamas, was established, monasteries were built, and the translation of the sacred books from Sanskrit into Tibetan was actively carried on.

After an ineffectual persecution by King Lang Darma in the 9th century, which led to the ruin of the reigning dynasty, Buddhism soon re¬

gained its sway and the authority of the mo¬

nastic order increased. In the 11th century Atisha, a monk from India, tried to reform some of the abuses then prevalent and to spread a purer theology, an effort which gave rise to the sectarian divisions of Lamaism.

The Sa-kya sect was especially favored by Kublai Khan, the Mongol emperor of China in the 13th century, who recognized its Grand Lama's spiritual and temporal supremacy over Tibet. Another reformer arose in the person of Tsong-kha-pa (1355-1417), who revived the strict monastic discipline and founded the Ge-

lug-pa or ((Virtuous Method® sect, often known as the (< Yellow-hat® sect, from the color of its headdress, that of the other sects being red.

Its third Grand Lama converted the inhabitants of Mongolia, and received from one of their chieftains the title of Dalai (((ocean-wide® or ((all-embracing®) Lama, by which his successors have generally been known to Europeans. The fifth Grand Lama of the Ge-lug-pa, named Ngag-wang Lo-zang Gya-ts'o, gained the tem¬

poral power over Tibet with Mongol aid about 1640, and began the building of the great palace-

monastery of Potala near Lhasa, the capital.

In the following century the Chinese govern¬

ment asserted its suzerainty over Tibet, and it has since then kept the Dalai Lamas subject to its political control, without, however, dimin¬

ishing their ecclesiastical prestige in Tibet and Mongolia. At the present day Lamaists are also found in Manchuria, among the Buriat tribes in Siberia, the Kirghiz, and the Kalmuks on the Volga. In the south the inhabitants of the Himalayan districts of Ladakh and Bhutan and, in part, of Sikkim and Nepal belong to one or another of the Lamaist sects. The total number of the adherents of the religion is per¬

haps 10,000,000.

Beliefs. — The Buddhism which Padmasam¬

bhava brought to Tibet was that of the Maha-

yana. school (see Mahayana), to which the mystical rites and theories of the Tantra (q.v.) had already been added. The doctrinal peculiar¬

ities of Lamaism are to be found mainly in its luxuriant mythology and demonology, derived partly from Hindu and partly from Tibetan sources. Beside and indeed outranking the his¬

toric Gautama or Sakyamuni are the figures of the divine ((meditative® Buddhas (usually five) with their active celestial emanations, called Bodhisattvas, and their appearances on earth as human Buddhas in the present world cycle, Gautama himself being the most recent of these.

A ((primordial Buddha,® or first cause, is also recognized. Especial reverence is accorded to the Bodhisattva Avalokitesvara, <(the all-seeing, merciful Lord,® who is the offspring of Amitabha Buddha and the heavenly counter¬

part of Gautama, to Manjnsrl, the god of wisdom, and to the fierce Vajrapani. There are corresponding

female Bodhisattvas or god¬

desses, of whom Tara in her various forms is most worshipped. The foregoing deities, to¬

gether with others, mostly of fiendish aspect, serve as "tutelaries,® and both the various sects and each individual Lama have their respective patrons. Another highly revered class of demons is that of the ((Defenders of the Faith,®

and there are many inferior spirits, friendly or malignant. Famous religious teachers, both In¬

dian and Tibetan, have been canonized and are worshipped as incarnations of the deities.

Hierarchy . — The monastic order, which, though an essential part of Buddhism, was loosely organized in earlier times, has become in Lamaism a highly, developed system con¬

trolling the entire religious life of the com¬

munity. The monks or Lamas are very numer¬

ous, and usually live together in monasteries, although some are hermits and others are found in the villages of the laity. The rule of celibacy is strictly observed only by the Yellow-

hat sect. Communities of nuns also exist, but they are few and less highly regarded. The LAMAMIAO — LAMAR

order has four regular grades, probationer, novice, fully ordained monk and abbot; but above these stand the ^reincarnate® Lamas, who are supposed to be the earthly manifestations of deities or of deceased saints. The Dalai Lama himself is regarded as the incarnation of Avalo-

kitesvara, his scarcely less reverenced colleague, the head of the monastery of Tashi-lhunpo, known as

the Pan-ch'en Lama, as that of Amitabha, and the other chief Lamas of Tibet, Mongolia and elsewhere, over a hundred in number, claim similar origins. The mode of succession to these dignities, as practised for the last 500 years, is a peculiar one. The spirit of the deceased Lama is supposed to become re¬

incarnate after a few weeks or sometimes a longer interval in an infant of marvelous birth and character. Search is made for children possessing such qualifications, and after pre¬

liminary tests the names are drawn by lot, under the supervision of other chief Lamas, 'and the new Lama is thus- found. Sometimes, espe¬

cially in Mongolia, the succession is restricted to members of particular tribes or even families.

Ritual. — The Lamaist system is highly sacerdotal, and the ceremonies of worship are carried on by the monks, who have in their monasteries temples richly adorned and contain¬

ing many images. The analogy between the rites of Lamaism and those of the Roman Catholic Church has often been noticed, but Christian influence, though possible, has not been defi¬

nitely proved, since Lamaist ritual may well be a natural development from the tenets of Mahayana Buddhism. Public worship consists usually of prayers, hymns and the presentation of cakes, rice, water and other offerings to the Buddhas and the other gods. Sacred sentences, the best known of which is the om mani padme Junn , or « Jewel-lotus® formula, are repeated in private devotion with the aid of a rosary or, when printed on paper together with mystic diagrams, are inserted in the well-known pray¬

ing wheels or used as flags. Sorcery and magic are in high repute, even among the mem¬

bers of the reformed Yellow-hat sect, who possess an

official oracle, and astrologers . are often consulted. There are many religious festivals, the greatest being the feast of the conception of Gautama Buddha in. the first month (February), the commemoration of his death in the fourth month, the water festival in the autumn and the festival of Saint Tsong-

kha-pa in the 10th month. A great mystery-

play is enacted toward the close of the year..

General Influence. — While Lamaism in its distinctive features and as it is found in ordi¬

nary practice presents itself to the Occidental mind as a form of polytheistic superstition in which the propitiation of fiendish powers is a chief element, the ethical side of early Bud¬

dhism and its teachings have an ameliorating influence upon the more enlightened among the people, especially the clergy.

Literature. — The sacred books of Lamaism are the Canon proper, called the

mentaries, the (Tan-gyur) or (Tanjur, 5 con¬

taining 225 volumes. The former consists mainly of translations from the Sanskrit of the scriptures of the Mahayana school, and of works on the Tantra system, together with a few translations from the Pali and the Chinese; the latter form a huge collection of theological, exegetical and scientific works partly of Indian and partly of Tibetan origin. Consult analysis of •

the (Kanjur) made by Csoma Korosi, as trans¬

lated and augmented by L. Feer in Annales du Musee Guimet (Vol. II, pp. 131-573, 1881).

For modern accounts of Lamaism, consult Griinwedel, A., (Mythologie des Buddhismus in Tibet und der Mongolei5 (1900); Koppen, C. F., (Die lamaische

Hierarchie und Kirche) (1859) ; Schlagintweit, E., (Buddhism in Tibet) (1863) ; Schulemanr.. G., (Die Geschichte der Dalailamas5 (1911) ; Waddell, L. A., (The Bud¬

dhism of Tibet5 (1895).

Charles J. Ogden.

LAMAMIAO, China, a town in southeast

Mongolia known to natives as Dolonnor. It is in the jurisdiction of the province Tchili and is located on the western slopes of the Chingan Range at an altitude of about 4,000 feet. It has an earthen wall, narrow, unclean streets and two large monasteries. Its inhabitants num¬

ber about 30,000 and it is a large commercial emporium trading with eastern Mongolia, Chinese bartering tobacco, saddles, tents, jewelry and arms against cattle, horses and sheep. It is noted for its skilled workers in clocks, bronze and cast iron idols, bells and vases, known all over China.

LAMANSKY, Vladimir Ivanovitch, Rus¬

sian philologist and historian : b. Saint Peters¬

burg, 1833. He was professor of Slavic lan¬

guages at the Saint Petersburg University from 1865 to 1890, and belongs to the most enthusias¬

tic and, at the same time, most learned represen¬

tatives of the Slavophile movement in Russia.

He wrote (The Slavs in Asia Minor, Africa and Spain* (1859) ; (Serbia and the Southern Slav Provinces of Austria) (1864) ; (Historical Study of the Greco-Slavic World5 (Saint Petersburg 1871), in which he advances his theory of the contrast between the Greco-Slavic and the Romano-Germanic world.. He wrote works also on the language and literature of the Bulgarians (1869) ; the literary monuments of

the ancient Czechs (1879). In 1884 and later he issued (Secrets d'Ltat de Venice,5 con¬

cerning 15th and 16th century documents in the archives of Venice, and (1892) the work (The Three Worlds of the Asiatic-European Con¬

tinent.5 He has been, since 1890, editor of the ethnographic periodical Zivaja Starina.

LAMAR, la-mar', or LAMAR Y CORTE-

ZAR, la-mar' e kor-ta-thar', Jose, Spanish-

America'n general: b. Cuenca, Ecuador, 1778; d.

San Jose, Costa Rica, 11 Oct. 1830. He went to Spain in his youth, and entering the army there fought against the French at Saragossa. He was ordered to Peru in 1815, and was governor of Callao Castle at the time of its surrender, 21

Sept. 1821. He then joined the revolutionists and in 1824 became marshal. He was elected President of Peru in 1827; caused the deposition of Sucre, President of Bolivia; provoked a war with Colombia, in which he was defeated, and on 29 June 1829 was deposed by his own officers and exiled.

LAMAR, la'mar, Lucius Quintus Cincin-

natus, American jurist: b. Eatonton, Putnam County, Ga., 1 Sept. 1825 ; d. Macon, Ga., 23

Jan. 1893. He was graduated from Emory Col-

lege (Oxford, Ga.), studied law at Macon, was admitted to the bar in 1847, removed in 1849 to Oxford, Miss., was there professor of mathe¬

matics in the University of Mississippi (1850—52), in 1852-55 practised at Covington, Ga., was elected to the Georgia legislature in 1853, and having

returned in 1855 to Mississippi, was there elected representative in Congress in 1857

and 1859. In 1860 he resigned his seat in Con¬

gress; drafted Mississippi's ordinance of seces¬

sion; and was a member of the State conven¬

tion that passed it (9 Jan. 1861). Chosen lieu¬

tenant-colonel of the first Confederate regi¬

ment organized in Mississippi, serving with his regiment at Yorktown and Williamsburg, he resigned from military service in October 1862, and in 1863-64 was in Europe, whither he had gone as commissioner to Russia, though 'he did not proceed to his post. From December 1864, until the close of the war, he was judge-advo¬

cate of the military court of the 3d Army Corps with the rank of colonel. After the war he held the chairs of ethics and metaphysics 0866-67) and of law (1867-70) in the Univer¬

sity of Mississippi; he resigned when the Re¬

publicans secured control of the university upon the readmission of the State into the Union.

He was a representative in Congress (1873-77) and a United States senator (1877-85) ; and Secretary of the Interior in President Cleve¬

land's Cabinet (1885-88). From 1888 he was an associate justice of the United States Su¬

preme Court. He bent his efforts to bring about a reconciliation and a better understand¬

ing between the South and the North. On 27

April 1874 he pronounced before the House a eulogy on Charles Sumner, highly praised for its eloquence and generally for its liberal tone, but so displeasing in that respect to many of his

constituency that they endeavored to defeat his re-election. His strong opposition to the debasement or inflation of the national currency caused the Mississippi legislature formally to direct him to renounce either his views or his seat in the Senate, both of which he declined to do. He was re-elected to the Senate by an in¬

creased majority. His oration at the dedication of the monument to John C. Calhoun at Charleston, S. C. (1887), was one of the best of his public addresses. Consult the study by Mayes, including Lamar's speeches (Nashville Tenn., 1896).

LAMAR, Mirabeau Buonaparte, American

politician, second President of the republic of Texas: b. Louisville, Ga., 16 Aug. 1798; d. Rich¬

mond, Tex., 19 Dec. 1859. After being em¬

ployed a number of years in mercantile business and farming, he established in 1828 the Colum¬

bus Inquirer, a journal devoted to the defense of State rights, and was actively engaged in politics until his removal in 1835 to Texas. Ar¬

riving there at the outbreak of the revolution, he at once sided with the party in favor of in¬

dependence, and participated in the battle of San Jacinto, to the successful issue of which the charge of the cavalry under his command greatly contributed. He was soon after called into the Cabinet as Attorney-General, a position which he subsequently exchanged for that of Secretary of War. In 1836 he was elected the first Vice-President of Texas, having for some months previous held the rank of maior-general in the army. In 1838 he was elected President, in which office he remained until 1841. During his term of office Texas was formally rec¬

ognized as an independent republic by the prin¬

cipal powers of Europe. He founded the edu¬

cational system, advocating the grant of three leagues of land to each county for the mainte¬

nance of an academy and 50 leagues for two universities. Upon the breaking out of war be¬

tween Mexico and the United States in 1846, he joined General Taylor at Matamoras, and fought at the battle of Monterey. He subse¬

quently stationed himself with an armed force at Laredo, where for two years he was engaged in constant conflicts with the Comanches, whose depredations on the frontier he greatly curtailed.

He was appointed United States Minister to Argentina in 1857, but did not go to his post.

The last public position which he held was that of United States Minister to Nicaragua and Costa Rica, from which he had but lately re¬

turned when he died. He published (Verse Memorials) (1857).

LAMAR, Mo., city and county-seat of Bar¬

ton County, on the Spring River and the Mis¬

souri Pacific and the Frisco Lines railroad sys¬

tems, 39 miles north of Joplin. Lamar College is located here. There is a public-school library and courthouse. The city has extensive coal mining and lumbering interests and is the cen¬

tre of a large agricultural district. It has a large flour trade. The city owns the water¬

works and electric-lighting plants. The popula¬

tion is about 2,316.

LAMARCK, la'mark', Jean Baptiste

Pierre Antoine de Monet, Chevalier de, French scientist, a pre-Darwinian evolutionist •

b. Bazentin, Picardy, 1 Aug. 1744; d. Paris, 18

Dec. 1829. He was of noble family, entered the army in 1760, but was compelled on account of an accident to abandon active military service, after which he devoted his attention to study!

first to medicine; afterward, after hearing Jussieu's illustrations of botanv, he turned to the study of that science. Jussieu had inti¬

mated that the old method of classification in botany was defective and Lamarck determined to remedy the deficiency. He labored with great diligence on a treatise in which he showed the defects of the old classification, and pro¬

posed a new one which met with general ap¬

proval. He then applied his new system to the plants of France, and delivered to the Academy his Flore FranQaise,> which brought him celeb¬

rity and secured his admission to the Academy of Sciences. This work was printed on the recommendation of the Academy, at the ex¬

pense of the government, for the benefit of the author (1780).

Lamarck now turned bis whole attention to lotamcal research, and made several excursions to Auvergne, and into Germany, in the last of which he was accompanied by the son of Buffon.

On his return to Paris he undertook the botani¬

cal department of the encyclopaedia which Panckoucke was publishing, and applied himself to this task with such assiduity that, in 1783

he produced the first half of the first volume!

with an introduction containing a sketch of the history of the science. He published the second volume in 1788. But a dispute between him and the

publisher brought the undertaking to a stand, and ended Lamarck's botani-cal career. At the breaking out of the Revolution L. Q. C. LAMAR

Late Justice of the United States Supreme Court
LAMARCKISM

667

he was the second professor of the royal Jardin des Plantes, but in consequence of new arrange¬

ments he received a chair in the department of zoology, in which he was soon as much dis¬

tinguished as he had been in botany. In his writings he shows himself a real forerunner of Darwin. Lamarck's comprehensive mind was also directed toward physics, on which he pub¬

lished several works. He published also a re¬

port annually on meteorology and weather pre¬

dictions. His

Lamarck is the founder of invertebrate palae¬

ontology. The most permanently important work of his is (Philosophie Zoologique* (1809), although at the time it was published it ex¬

cited little attention. He was doubtless fa¬

miliar with Erasmus Darwin's (Loves of the Plants,* which in spite of its many absurdities contained some premonitions of the great dis¬

coveries to be made by the author s greater grandson, Charles Darwin. The essence of La¬

marck's theory may be stated in the following propositions: (1) Every considerable and sus¬

tained change in the conditions of life produces a real change in the needs of the animals involved; (2) change of needs involves new habits; (3) altered

function evokes -change of structure, for parts formerly less used become with increased exercise more highly developed other organs in default of use deteriorate and finally disappear, while new parts gradually arise in the organism by its own efforts from within (efforts de son sentiment interieur) ; (4) gains or losses due to use or disuse are transmitted from parents to offspring. The main point is of course contained in the last proposition, which is controverted by Darwin and Weismann and their adherents in England and Germany.

There is, however, a Lamarckian school of con¬

siderable influence in Paris, and the Neo-La-

marckians of the United States, including Cope, Hyatt and Packard, have much to support their Haws of growth® as involving the inherited effects of use, disuse and new environments.

See Darwin; Evolution; Heredity.

Consult Butler, < Evolution, New and Old (1879) ; Claus, (Lamarck als Begrunder der Descendenztheorie) (1888) ; Cox, (The Founder of the Evolution Theory* (in 'New York Academy of Science Annals,* Vol. XIX, 191U) , Haeckel, (Die Naturanschauung von Darwin, Goethe und Lamarck* (1882) ; Martins, Un Naturaliste philosophe* (Paris 1873).

LAMARCKISM, la-mar'kizm. The theory

of organic evolution which, in brief, accounts for the origin of life-forms by change of envi¬

ronment, the exercise or use, and the disuse of organs, and the transmission of characteristics acquired during the lifetime of the individual.

It differs from Darwinism in lacking the prin¬

ciple of natural selection.

History of the Rise of the Theory. —

Lamarck, in 1801, after 25 years' experience as a botanist, and when as a systematic zoologist he had devoted 10 years of labor in classifying the invertebrate animals of the Paris Museum, then the most extensive zoological collection in the world, published a lecture, delivered in 1800, in which he claimed that time without limit and favorable conditions of life are e two principal means or factors in the production of plants and animals. Under the head o favorable conditions he enumerates variations in climate, temperature, change of habits, varia¬

tion in means of living, of preservation of life, of means of defense, and varying modes of reproduction. As the result of the action of these different agencies or factors, the faculties of animals, developed and strengthened by use, become diversified by the new habits so that by slow degrees the new structures and organs thus arising become preserved and transmitted by heredity. Although Lamarck did not dis¬

cover the principle of natural selection, he recognized the fact of competition, of a struggle for existence, but did not dwell on them to the extent that Darwin and later observers did.

In 1802, 1803 and 1806 he reiterated and some¬

what extended these views, which were pub¬

lished in final form in 1809, in his (Philosophic Zoologique, and again, in 1815, in the introduc¬*

tion to his (Animaux sans Vertebres. By this time Lamarck had become the greatest zoologist of the period between Linne and Cuvier. He was expert in detecting the limits between species, and has given us the best definition extant of a species.*

Lamarck's Factors of Organic Evolution.

— These in their essential form are contained in his famous two laws:

First Law. — In every animal which has not exceeded the term of its development, the more frequent and sustained use of any organ grad¬

ually strengthens this organ, develops and en¬

larges it, and gives it a strength proportioned to the length of time of such use; while the constant lack of use of such an organ imper¬

ceptibly weakens it, causes it to become re¬

duced, progressively diminishes its faculties and ends in its disappearance.

Second Law. — Everything which nature has caused individuals to acquire or lose by the influence of the circumstances to which their race may be for a long time exposed, and con¬

sequently by the influence of the predominant use of such an organ, or by that of the constant lack of use of such part, it preserves by heredity (generation) and passes on to the new indi¬

viduals which descend from it, provided that the changes thus acquired are common to both sexes, or to those which have given origin to these new individuals.

Lamarck also insisted that animals are modi¬

fied in accordance with the diversity of their surroundings ; that local causes, such as dif¬

ferences in soil, climate, etc., give rise to varia¬

tions and that the whole surface of the earth affords a diversity in localities and habits, one region differing from another, that though the environment remains the same for a long time and species remain constant for that period, yet there is a slow gradual change, and species are modified in adaptation to such changes. More¬

over such changes induce alterations in the wants or

needs of animals : this, necessitates other movements or actions to satisfy the new needs, and hence they give origin to new habits, and this leads to the use or exercise of some organ or organs in a new direction, with the result that different parts or organs are. modified in adaptation to the new surroundings and necessities of existence. All this is perfectly true We now know that by geographical changes or from lack of food animals are com¬

pelled to migrate into new regions, and are there dbliged to adopt new habits and become transformed into new species or types. Thus

whales have descended from terrestrial forms; the baleen whale has in its embryo stage rudi¬

mentary teeth showing that it is a descendant of toothed whales. Lamarck refers to Geof¬

frey's discovery in embryo birds of the groove where teeth should be situated, and subse¬

quently fossil birds with teeth were unearthed.

The mole with its functionless eyes, due to underground life, the blind Proteus of Aus¬

trian caves, the headless and eyeless bivalve mollusks, these parts lost by disuse; the evolu¬

tion by atrophy of the limbs of the snake, due to their lack of use in passing through narrow places; wingless insects whose wings have been lost by disuse ; the webs between the toes of ducks, geese, as well as those in the feet of the frogs, sea turtles, otter and beaver, are mentioned by Lamarck as examples of the effect of use and exercise. Other examples of use results are the origin of horns in ruminants; the long neck of the giraffe, which by the absence of herbage was obliged to browse on the foliage of trees (

ores, of the kangaroo and of the sloth which are

accounted for by the necessity of their adopting new habits, and, by exercise in new directions, 'becoming adapted to the new condi¬

tions of life. Although Lamarck gave few illustrations, it may be doubted whether any one has since his day more satisfactorily ex¬

plained the origin of such forms or modifica¬

tions. Lamarck also accounts for the origin of man, suggesting in a tentative way his rise from an arboreal or ape-like creature, with a de¬

tailed hypothesis of the gradual process of his transformation, into a being with an upright posture, an enlarged brain, powers of reason and other human qualities. But besides these special cases Lamarck was 'broad and compre¬

hensive in his views of nature and creation.

He was the first to show that the animal series was not a continuous chain of being, but rather should be compared to a tree, with its branches.

In fact he was the first to construct a gene¬

alogical tree, the first attempt at a phylogeny of the animal world. He demanded unlimited time for the process of evolution. He antici¬

pated the uniformitarian views of Lyell. He pointed out that where, as in Egypt, the cli¬

matic conditions have remained the same for many centuries, species have remained constant, but that under a varying environment they become modified. He writes of the struggle for existence; shows that the stronger devour the weaker; he refers to the principle of com¬

petition in the case of the sloth. He repeat¬

edly insists on the fact that vestigial structures are the remains of organs which were actively used

by the ancestors of existing forms. He shows, what is much insisted on at the present day, that change of functions in organs leads to their transformation or recreation, and that the assumption of new habits precede the origin of new, or the modification of organs already formed. A great deal is now said of the ef¬

fects of migration and consequent geographical isolation in the origination of new species; Lamarck invoked this factor in the case of man, and he also pointed out the swamping effects of intercrossing. Lamarck's theory of use-

inheritance is denied by some, but by others is regarded as an important factor in evolu¬

tion. He does not, however, refer to the in¬

heritance of mutilations, etc.

All these views lie at the foundation of the theory of organic evolution ; yet Lamarck's opinions were set aside, misunderstood and ridiculed. Some crude and ungrounded hy¬

potheses were mingled with them. In his time the sciences of palaeontology, embryology and bionomics were undeveloped. Lamarck col¬

lected but few facts, and he lacked the experi¬

mental skill of Darwin ; so that it was re¬

served for the latter naturalist, half a century later, to convert the world to a belief in evolu¬

tion. At present, however, it is acknowledged that Lamarckism affords the fundamental prin¬

ciples on which rests the theory of organic evolution, and many of the most eminent natu¬

ralists have worked and are working along Lamarckian lines.

Bibliography.— Packard, (Lamarck, the

Founder of Evolution: His Life and Work, with Translations of his Writings on Organic Evolution > (New York 1901) ; H. Elliot's trans¬

lation of the (Philosophie Zoologique) (New York 1914) ; Spencer, H., (Factors of Organic Evolution> (New York 1895) ; Cope,

mary Factors of Organic Evolution* (Chicago 1896); Hutton, (Darwinism and Lamarckism: Old and New* (London 1909).

Alpheus S. Packard,

Late Professor of Zoology, Brown University.

LAMARTINE, la'mar'ten, Alphonse Marie

Louis de Prat de, French poet and statesman: b. Macon, Burgundy, 21 Oct. 1790; d. 28 Feb.

1869. He came of well-to-do parents of royal¬

ist sympathies. His father was imprisoned during the Terror. He was educated first by his mother, then, after a brief period at Lyons, by the Peres de la Foi at Berry (1805-09). He then passed two years at home, reading poetry and romance, and was in Italy from 1811 to 1813. At the Restoration he entered the Gardes du Corps. The Hundred Days oi Napoleon's return he passed in Switzerland and Aix-en-

Savoie. Here a love affair with a girl who died soon after opened a copious poetic vein. After Waterloo he returned to France, revisited Switzerland, Savoy and Italy in 1818-19, and in 1820 published his first book, the much ad¬

mired < Meditations. > Soon after he left the army for the diplomatic service, was made secretary of the embassy at Naples and mar¬

ried a congenial, wealthy and beautiful English lady, Marianne Birch. (Nouvelles Meditations*

followed in 1824, with a transfer to Florence and the Cross of the Legion of Honor from Charles X in return for a laudatory poem. In 1829 came (

*tine, of which he told in (Voyage en Orient**

(1835), was chosen deputy in his absence, and soon gained repute as a ready speaker and effective orator, becoming steadily more demo¬

*cratic in his political sympathies. (Jocelyn**

(1836), (La Chute d'un Ange) (1838), two frag¬

ments of a would-be epic of the human soul, and (Recueillements (1839) contain his last signifi¬*

*cant poetry. The (Histoire des Girondins**

(1847) was less a history than a vaguely LAMB

669

declamatory invitation to the revolution of February 1848, in which Lamartine had a promi¬

nent part, being Minister of Foreign Affairs in the provisional government, a member of the Constituent Assembly 'by concurrent election in 10 departments, and one of its executive com¬

mittee. His own inexperience and impatience of routine, joined to the futility of his col¬

leagues and the unreason of the mob, led to the conspicuous failure of his efforts to govern by speeches and reconcile the middle class to democracy. In June he yielded to Cavaignac and got but few votes when nominated for the presidency in 1849. His political day was over.

He was not even elected to the Assembly.

Grown poor in the public service he tried to redeem his fortunes by much writing: (Con¬

fidences J (1849), (Raphael) (1849), both auto¬

biographical, 'Nouvelles Confidences> (1851), histories of the French Revolution and the Restoration, biographical sketches of Columbus, Jeanne d'Arc, Oliver Cromwell and others, and stories in prose, of which (Graziella> and 'The Stone Mason of Saint Point* are best known.

He edited his own complete works in 41 vol¬

umes, 1858-63. A pension, tardy recognition oi his sacrifices and his deeds was accorded him in 1867. Amiable, vain, fond of pose, pictur¬

esquely sentimental, fatally fluent alike with tongue and pen, with <(a habit of inaccuracy®

and rhetorical embellishment, without well-

grounded political convictions, Lamartine's best titles to remembrance are the poems of his early years. (See Meditations). Consult Brunetiere, (Evolution de la Poesie lyrique) (Vol. I, 107

ff.) ; Sainte-Beuve, Portraits contemporajns*

(Vol. I, 190 ff.) ; Deschanel,

lumbus,* (Jeanne d'Arc* and 'Cromwell* and of excerpts from the Rrench Revolution.) Benjamin W. Wells,

Author of ' Modern French Literature .*

LAMB, Charles, English poet, critic and essayist: b. The Temple, London, 10 Feb. 1775; d. Edmonton, England, 27 Dec. 1834. Lamb was the youngest of three surviving children, among seven, of John Lamb, a clerk in the Inner Temple, and Elizabeth [Field] Lamb.

Both parents were of humble and rural origin.

Charles passed the first seven years of his life in the Temple, where he received some instruc¬

tion, and in 1782 went to Christ's Hospital, where

he remained the next seven years. Here he met his life-long friend and counsellor, S. T.

Coleridge (q.v.). Lamb was known as a gentle and amiable boy, whose natural shyness and sensitiveness were increased by a trick of stam¬

mering, of which he never succeeded in com¬

pletely ' ridding himself. Aside from these traits, there is to be noted the strain of mania in Lamb's family which in the boy expresses itself as excitability and nervousness. Other important determinants in Lamb's career were the influence of Coleridge, which tended to de¬

velop thoughtfulness and a love of poetry, his own liking for early English authors, particu¬

larly the Elizabethans, and his genuine and un¬

failing delight in the life of the city. Though a fair scholar at school, Lamb was really more of a reader, and his reading had a great effect on his literary career and the quality of his work.

Shortlv after leaving Christ's Hospital, Lamb entered the South Sea House. In 1791

he got a clerkship in the East India Company at £70 and there remained, with gradual in¬

crease in salary, until he was retired in 1825, on a pension of £441. From the time he en¬

tered business to his death, his life was singu¬

larly uneventful. The critical year, 1795-96, was marked by his father's falling into imbe-

cility, his own solitary attack of mania, and (September 1796) his sister's stabbing of their mother in a fit of insanity. The nature of the hereditary complaint and his sister's need of a guardian determined his mode of life. He turned his back on an inchoate love affair, put aside all

thought of marriage and devoted him¬

self to his sister, as she to him in her sane mo¬

ments. In 1797, on the death of their father, the two began their long life in London, un¬

broken except for one short trip to Paris. In the period their local home was changed but six times.

Lamb began his literary career in 1797 by the addition of three sonnets to a volume of Coleridge's. His poetical production was small ; altogether during the course of his life his known poems number about 110, of which the best known are 'The Old Familiar Faces,*

'Hester* and Gn an Infant Dying as Soon as Born.* In 1798 he wrote Rosamond Gray and Old Blind Margaret,* a prose tale of sen¬

timent. Though praised by Shelley and others for a charm that it undoubtedly possesses, the story, as a composition, is very incoherent and shows the writer's lack of technical skill.

Structural defects equally great, because of lack of adequate motive in characterization, abound in Lamb's next attempt, 'John Wood-

vil,> a very undramatic drama, which was re¬

fused by Kemble in 1799 and published by Lamb in 1802. Nor was Lamb's third attempt at imaginative literature more successful : the farce, (Mr. H.,* ran one night in 1806 and is probably one of the least dramatic pieces ever put on any stage. The truth of the matter is that Lamb had very little constructive ability in narrative and dramatic forms, that his attempts in them were due to the influence of the early dramatists, of whose work he was very fond and whose vogue he did much, later, to restore.

His liking for them rested on their poetry rather than their dramatic ability.

In the next kind of work that he took up, Lamb had much better success. These were stories retold and they stand in three chief volumes, (Mrs. Leicester's School,) (Tales from Shakspeare> (both of 1807), and 'The Adventures of Ulysses (1808), in many of which his sister was his coworker. Lamb had here his material made for him and, therefore, his own quality was less trammeled. The 'Tales from Shakspeare,* of which Charles wrote the tragedies and Mary the comedies, 670*

quickly went into a second edition and has since become an English classic of a minor order.

The stories are retold with much simplicity and with a very happy emphasis on the characters and the moral of the main situation ; less is proportionately given to the under-plots. Next to the (Essays of Elia) the (Tales) are Lamb's best-known work.

In 1808 Lamb entered the field of criticism, and for the next decade his published writings indicate that his interests were, broadly, of a critical nature. His chief motive for this change seems to have been his desire to express in the form of comment the admiration for the early writers which he had expressed, by imita¬

tion, in his own dramas, and, by transcript, in such works as the ^ales.- In 1808 appeared his specimens of English Dramatic Poets Contemporary with ShakspeareP with his valu¬*

able notes thereon. Other important essays are (On the Tragedies of Shakspeare) and (On the Genius and Character of Hogarth, > both of which appeared in Leigh Hunt's Reflector in 1811, an essay on Wordsworth's

lected works of Lamb, issued in 1818. There are also a few minor pieces of criticism, but the amount of Lamb's critical work is exceed¬

ingly small in view of its high reputation, and its form is fragmentary. Its place is probably due to the fact that Lamb did very much to restore to their rightful heritage those old writ¬

ers from whom he drew much of his own in¬

spiration and to the fact that, in an age of critical dogmatism, Lamb insists constantly, though not always with an eye to logic or his¬

torical fact, on broad appreciation.

Lamb's fame rests chiefly on the next im¬

portant work, or rather kind of work, which he attempted. Having practically failed in crea¬

tive narrative and drama and having achieved only a moderate contemporaneous success in fields of retold stories and criticism and poetry, he turned his attention to the literary essay and found it a proper vehicle for his peculiar gen¬

ius. Lamb had from time to time during his earlier life as well as his later written miscel¬

laneous essays of a quaintly humorous quality, like

(1814), but the idea of regularly using the es¬

say form did not occur to him until the famous (Essays of EliaP These were published as books in two series, in 1823 and in 1833, but they originally appeared in the London Magazine.

For the first two or three years, from August 1820 to December 1822, they were published almost every month; after that they came out at very irregular intervals until 1833. Of the 51 essays and 16 (Popular Fallacies) in the two series only about 14 are really well known; of these Hmperfect Sympathies) and (A Dis¬

sertation on Roast Pig) are probably the most famous, though such essays as (The South Sea Housed (Mrs. Battle's Opinions on Whist, >

(Dream Children> and (My Relations) are scarcely less well known and in no wise infe¬

rior. The essays have, in the main, come to be regarded as the best examples of the per¬

sonal essay that English literature possesses.

Certainly no English essays more completely reveal the personality of the author or reveal it in more winning terms. They are renowned for their quaintness, their wit, their sympathy, their humor, their serenity and their rever¬

ence.

Between Lamb's retirement in 1825 and his death, his work in literature was of rather a miscellaneous character. A few essays of the Elia type and some miscellaneous pieces of criticism, and a wholly undramatic and unsuc¬

cessful drama, (The Wife's Trial, or, The In¬

truding Widow, } are about all that he produced after he ((came home forever.® See Essays of Elia.

Bibliography. — The best edition of Lamb's works is that by Canon Alfred Ainger, in six volumes. This does not include the (Speci¬

mens^ which are most conveniently to be had in the Bohn Library. A full bibliography of Lamb's writing is to be found in B. E. Martin's (In the Footprints of Charles Lamb) (New York 1890). Canon Ainger's

cellent bibliography of the contemporary writ¬

ers from whom we gain our knowledge of the author. To his list of titles may be added De Quincey's (Recollections of Charles LambP

Of the many essays on the subject, that of Pater, in (Appreciations,* is probably the near¬

est to finality.

William T. Brewster,

Professor of English, Columbia University.

LAMB, Charles Rollinson, American

architect and artist: b. New York. He estab¬

lished a high reputation for talented ecclesias¬

tical architecture and decoration in his partner¬

ship with his brother Frederick as proprietors of the J. & R. Lamb Corporation. He de¬

signed the Dewey Arch erected at Madison Square (1899) for the triumphal procession after the Spanish War, and the Court of Honor erected for the Hudson-Fulton Celebration (1909) was from his designs. He was presi¬

dent of the Art Students'. League and of the

Municipal Art Society and is trustee for nu¬

merous art associations*.

LAMB, Daniel Smith, American physician : b. Philadelphia, 20 May 1843. He took his M.D. at Georgetown University in 1867. He volunteered in the United States army in 1861

and was on duty in military hospitals through¬

out the war. He was acting assistant surgeon at the Army Medical Museum in 1868-92 and since 1892 has been pathologist there. He has been professor of materia medica and then anatomy at Howard University since 1873; and was professor of general pathology at the Uni¬

ted States College of Veterinary Surgeons in 1894-1900. He conducted the autopsy on Presi¬

dent Garfield. He edited the Washington Med¬

ical Annals, has . written numerous monographs on medical, sanitary and anthropological sub¬

jects and is author of (History of the Medical Department, Howard University, Washington (1900).

LAMB, Horace, English mathematician and physicist: b. Stockport, England, 27 Nov. 1849.

He was educated at Owens College, Manchester, and at Trinity College, Cambridge, where he was Fellow and assistant tutor in 1872-75. He was professor of mathematics at the University of Adelaide, Australia, in 1875-85 ; and since 1885 has been professor of mathematics Owens College and the University of Man-

chestcr. He was elected a Fellow of the Royal Society in 1884, was royal medalist in 1902 and in

1909-10 he served as vice-president of the society. Besides many papers on mathematical physics he is the author of (Motion of Fluids) (1878);

1906) ; Hnfinitesimal Calculus) (1897; 3d ed., 1907) ; (Dynamic Theory of Sound) (1910) ;

LAMB, John, American soldier: b. New

York, 1 Jan. 1735 ; d. there, 31 May 1800. He at first worked in New York with the elder Lamb in the trade of optician and mathemati¬

cal instrument maker, but in 1760 entered the liquor trade. He was one of the (

erty® (q.v.) and active in all the early Revo¬

lutionary scenes in New York. He supported the resistance of the colonies to the (

sion. Commissioned captain of artillery in 1775, he was authorized by Congress to remove the cannon from the Battery in New York on 23

August of that year ; he subsequently took part in Montgomery's expedition against Quebec, where he was wounded and made prisoner.

Later he rose to be colonel and at the time of Benedict Arnold's treason commanded at West Point. After the Revolution he was elected to the State legislature of New York, and for some years previous to his death held the post of customs collector of New York port. Con¬

sult the biography by Leake (Albany 1857).

LAMB, Martha Joan Reade Nash, Ameri¬

can historian : b. Plainfield, Mass., 13 Aug.

1820; d. New York, 2 Jan. 1893. She was mar¬

ried to Charles A. Lamb in 1852 and removed with him to Chicago, Ill., where in 1863 she was secretary to the United States Sanitary Com¬

mission Fair. She made her home in New York from 1866 and was editor of the Maga¬

zine of American History from 1883 till her death. Her publications include a scholarly (History of the City of New7 York) (1877-81) ; (The Homes of America) (1879) ; (Wall Street in History* (1883) ; (The Christmas OwP

(1881) ; (Snow and Sunshine) (1882).

LAMB, Mary Ann, a sister of Charles

Lamb (q.v.).

LAMB IN ART. In the ancient Christian art of the Catacombs we find the lamb figuring as emblem of the Redeemer as early as the 3d century, though rarely, later' to become quite commonly used to represent Christ, and re¬

ferring to the mention by Saint John the Evan¬

gelist and the Jewish Paschal lamb. Some early depictions have an accompanying shep¬

herd's staff, later the- Good Shepherd appears.

Early in the 4th century we find the symbols of the cross and nimbus, to be followed later by the cross and banner of the Agnus Dei that has continued to this day. Another early rep¬

resentation met with is that of Christ, in the form of a lamb, standing on a mount, from which four streams flow, typifying the four Evangelists. Other pictures give the Savior in human form with a lamb by His side and sur¬

rounded by 12 other lambs, symbols of the 12

Apostles. But the primitive Christians used the lamb or sheep as symbol of other Old and New Testament personages; as instances are those where it represents Moses, Saint John the Baptist, the Apostles. In fact the Apostles are found represented

by a lamb constantly in the Catacomb frescoes, ancient sarcophagi and ancient mosaics in Roman basilicas. Again, lambs have been used as symbolic of the 12

tribes of Israel. It is generally conceded in ecclesiastical art that when more than 12 lambs are presented they refer to the faithful. En¬

tire Biblical scenes have been depicted in which the sacred personages performing take on the form of lambs. Illustrations which depict the lamb of the Apocalypse represent the symbol, with seven horns and seven eyes, breaking the seven seals of the mysterious book. It is often seen surrounded by crosses and with the four Evangelists depicted at the extremities ; several sepulchral brasses display this combination.

Ancient pictures portray the lamb performing numerous acts, such as raising Lazarus from the dead, multiplying the loaves in the wilder¬

ness, crossing the Red Sea. It is also found being baptized in the Jordan, standing at the foot of the cross, lying slain upon an altar, shedding blood from its breast into a chalice, blood pouring in four streams from its feet.

In such cases the lamb is depicted always as carrying a cross. Early mosaics and frescoes show the lamb lying on a throne surmounted by a cross. The lamb pictured on chasubles and altar frontals is often lying, as if dead, upon the Book with the seven seals, also as holding, while standing, the banner of the Res¬

urrection with the fore foot or the rear foot.

In this action it has been accepted as the her¬

aldic insignia of several towns, noble families and societies. Artists in depicting the Agnus Dei have generally accepted the following rules : The lamb's body is white ; the head is surrounded with a nimbus of gold containing a red cross; the banner,

depending from the traverse of a reclining cross, has a white field, red at the base point and a red cross in centre.

The whole is usually enclosed either in a cir¬

cle or quatrefoil with field azure (blue) or gules (red). As an attribute in ecclesiastical art the lamb is found accompanying Saint Ag¬

nes, Saint Genevieve, Saint Catherine and Saint Regina. Saint John is frequently depicted car¬

rying a lamb or accompanied by the Paschal lamb, and buildings dedicated to this saint often show the lamb as decorative motif. In some pictures and statuary the lamb appears as sym¬

bol of the virtues the person represented was noted for, such as Innocence, Meekness, Patience, Purity.

Clement W. Coumbe.

LAMBALLE, lan'bal', Marie Therfcse

Louise de Savoie-Carignano, Princesse de, French-Italian princess, friend of Marie An¬

toinette: b. Turin, 8 Sept. 1749; d. Paris, 3

Sept. 1792. She was the fourth daughter of Prince Louis Victor of Carignano and in 1767 was married to Prince de Lam-

balle who died in the following year. Upon the marriage of Marie Antoinette the prin¬

cess returned to court and was accorded the favor of the royal lady, to whom her gentleness and submissiveness greatly ap¬

pealed. They became close friends and upon Louis XVI's accession to the throne the queen made her superintendent of the royal house¬

hold. The Comtesse de Polignac superseded her in 1776-85, when the queen sought a rec-

onciliation and resumed their former intimacy.

The salon of the princess was used by the queen as a sort of headquarters for her various intrigues, and as* this became known the pop¬

ulace believed the queen’s innocent dupe to be the responsible party and hated her accordingly.

When, after the Revolution, the royal family, in 1791, attempted to escape the princess made her way to England to appeal for aid for her royal friends. She returned to the Tuileries in November of that year and was permitted to share the queen’s imprisonment in the Tem¬

ple from 10 August until 19 August, when she was removed to La Force. On 3 September she was brought before the tribunal and com¬

manded to take an oath against the king. Upon her refusal she was turned over to the mob, which tore her in pieces and bore her head on a pike before the windows of the .queen in the Temple. Selections from her letters were pub¬

lished in Volume XXXIX, (La Revolution frangais5 (Paris 1900). Consult Bertin, Sir George, (Madame de Lamballe5 (Paris 1888) ; Lescure, Comte de, (La Princesse de Lamballe5

(1864) ; Hardy, B. C., (The Princesse de Lam-

balle> 1908).

LAMBAYEQUE, lam-ba-ya'ka, Peru, capi¬

tal of the maritime department of the same name, which was created in 1874. It is situ¬

ated on the Lambayeque River, about six miles from the Pacific Ocean, the outlets for its trade being

the ports of Eten and Pimentel, with which it has railway connection. Cotton and woolen fabrics are manufactured on a small scale. Its inhabitants, mainly of mixed blood, is estimated at 8,000. The department of Lam¬

bayeque, lying between the Pacific and the de¬

partments of Piura, Cajamarca and Liberdad, has an area of only 4,614 square miles, is only settled along the river valleys where irrigation is possible, but contains some fertile lands which produce good crops of cotton, rice, to¬

bacco and sugar-cane, and there is good pas¬

turage in the uplands. The total population of the department is estimated to be 127,000. Cap¬

ital, Chiclayo.

LAMBEAUX, lan'bo, Jef (Joseph Marie

Thomas), Belgian sculptor: b. Antwerp, 1852; d. 6 June 1908. He studied at the Antwerp Acad¬

emy of Fine Arts and under Jean Geefs. His first production, (War,5 was exhibited in 1871, but owing to financial difficulties his work for some years was confined to profitable humor¬

ous subjects. He then went to Paris to study, and in 1881 executed his masterpiece, (The Kiss,5 which is in the Antwerp Museum. He later studied in Italy where the work of Jean Boulogne greatly impressed him, although his style undoubtedly was formed by the Flemish masters. His fountain at Antwerp (1886) is a fine example of his work, and among other famous pieces are (Robbing the Eagle's Eyrie) (1890) ; (The Bitten Faun5 (1905), and a colossal marble bas-relief, (The Human Pas¬

sions.5

LAMBECK, lam'bek, or LAMBECCIUS,

Peter, German scholar : b. Hamburg, 13 April 1628; d. Vienna, 7 April 1680. He studied at Hamburg, Amsterdam, Paris and Rome, was teacher of history in the gymnasium at Ham¬

burg from about 1650 to 1662 when he became rector. In 1662 he was converted to the Ro¬

man Catholic faith and went to Vienna, where in 1665 he was installed as librarian of the Imperial Library. His most valuable works are (Commentarii de Bibliotheca Caesarea Vindo-

bonensi5 (8 vols., Vienna 1665-69), and the (Prodromus5 of the unfinished (Historia Literaria5 (1710).

LAMBERT, Alexander, American pianist :

b. Warsaw, Poland, 1 Nov. 1862. He studied in early life with his father, and on the advice of Rubinstein was sent to the conservatory at Vienna, where he graduated in 1880. In 1881

he gave a series of concerts in New York, which he repeated the next season through Germany and Russia. After studying for a while under Liszt he returned (1884) to the United States, and from 1888 to 1906 was di¬

rector of the New York College of Music when he resigned in order to devote his entire time to private teaching. He is author of many compositions, but is best known as a successful teacher. He has written Systematic Course of Studies5 (6 vols., 1892), and (Piano Method for Beginners5 (1907), which is in use in every part of the United States.

LAMBERT, Daniel, English citizen famed

for his unusual corpulence : b. Leicester, 13

March 1770; d. 21 July 1809. Up to his 19th year he gave no indications of the remarkable stoutness which he afterward attained, being an enthusiastic lover of field sports and athletic exercises. He

succeeded his father as keeper of the Leicester prison, exchanged an active for a sedentary life, and from this time rapidly increased in size till he became an object of public curiosity and attracted visitors from all parts of the country. He now resolved to turn his obesity to account, and in 1806 commenced an exhibition of himself in Piccadilly, London.

He afterward exhibited himself in the principal towns of England. At the period of his death he was 5 feet 11 inches in height, weighed 739

pounds and measured 9 feet 4 inches round the body and 3 feet 1 inch round the leg. In diet he was remarkably abstemious, drank water only and never slept more than eight hours.

LAMBERT, Eugene Louis, French

painter : b. Paris, 24 Sept. 1825 ; d. 1900. He studied under Delacroix and Delaroche and made his debut at the Salon in 1847. He is famous chiefly as a painter of cats, the re¬

markable success of his (Chat et Perroquet5

(1857) largely influencing his choice of sub¬

jects in later years. He became a member of the Legion of Honor in 1874 and was awarded third medal at the Exposition Universelle in 1878. His work is familiar throughout the United States, and his (Cat and Kittens5

(1870) hangs in the Metropolitan Museum, New York. His (Family of Cats5 (1887) is in the Luxembourg. The charming illustrations for Cherville's (Chiens et chats5 (Paris 1889) are his work.

LAMBERT, Johann Heinrich, yo'han

hin'rih lam'bert, German mathematician and philosopher : b. Miilhausen, in Alsace, 26 Aug.

1728; d. Berlin, 25 Sept. 1777. His father was a

tailor in humble circumstances, and he was obliged to follow his father's employment. In this situation he spent the greatest part of the night in study and soon acquired a knowledge of mathematics, philosophy and the Oriental lan¬

guages. At the early age of 19 he discovered LAMBERT — LAMBERTON

the so-called <(Lambert's theorem.® He became tutor to the sons of Salis, President of the Swiss Confederation, accompanying his pupils (1756-59) on a continental tour.. In 1759 he was released from his duties, and in 1764 Fred¬

erick the Great appointed him to the head of the Architectural Council and made him a mem¬

ber of the Academy of Sciences. He enriched the transactions of various societies with his papers and treatises, all of which bear the stamp of eminent and original genius. Most of his mathematical pieces were collected in three volumes by himself. Philosophy, and especially analytic logic, are greatly indebted to him for his (Neues Organon, or Thoughts on the Ex¬

amination and Relations of Truth) (1764), and his (Architektonik, or Theory of the First Simple Principles in Philosophical and Mathe¬

matical Knowledge* (1771).

LAMBERT, John, English soldier: b.

Kirkby Malhamdale, Yorkshire, 7 Nov. 1619; d. 1683. He entered the army and had at¬

tained the rank of colonel in 1644, when he fought against the king at the battle of Mar-

ston Moor. He assisted Ireton in drawing up the ((Heads of the Proposals,® in 1647; was a brave, chivalrous and able soldier and the idol of the

army, holding a place second only to Cromwell, was generous in his treatment of Royalist prisoners and took no part in the measures leading up to the execution of the king. He accompanied Cromwell into Scot¬

land in 1650, specially distinguished himself at Dunbar and Worcester, and took the lead in the council of officers who gave the Protectorate to Cromwell. He subsequently opposed the Protector and was deprived by Cromwell of all his commissions, though a pension of £2,000

was allowed him for past services. When Richard attempted to assume the Protectorate Lambert came forward and became the head of the Fifth Monarchy Men, or extreme Re¬

publicans. In August 1659 he suppressed a dangerous Royalist rising at Chester, in the same year was member of Parliament for Pontefract, dismissed the "Rump® Parliament, governing with the aid of Council of Public Safety. In order to detach him from the Com¬

monwealth suggestions were made by Royal¬

ists for a marriage between Prince. Charles or his brother the Duke of York and his daughter.

In 1660 he set out for the north to encounter Monk, but was deserted by his troops, seized and committed to the Tower, whence he soon escaped, again attempted to gather troops and was again arrested. At the Restoration he was excepted from the act of indemnity, brought to trial and condemned in 1662, but his sentence was commuted to banishment to Guernsey, from whence he was removed to Drake's Island, Plymouth Sound.

LAMBERT, John, English

about 1775; d. unknown. He visited North America in 1806-09 under the auspices of the Board of Trade, with the object of introducing hemp-raising in Canada in order to render Eng¬

land independent of the hemp of northern Europe, with which supply Napoleon was inter¬

fering. This project was unsuccessful, but Lambert remained in America exploring "those parts made glorious by Wolfe and Washing¬

ton® and studying "the effect of the new gov¬

ernment.® He published the results of his ln-

vestigations a year after his return to Eng¬

land, (Travels through Lower Canada and the United States of North America, 1806-08 1 (3

vols., London 1810). The work is written from a liberal standpoint and ran through three edi¬

tions. He also edited and wrote a preface for the (Essays) of Washington Irving (2 vols., London 1811), after which time nothing is known of him.

LAMBERT, Louis A., American Roman

Catholic clergyman : b. Charleroi, Pa., 13 April 1835 ; d. 1910. He was educated at Saint Vin¬

cent's College, and the archdiocesan sem¬

inary, Saint Louis, and was ordained to the priesthood in 1859. He was chaplain in an Illi¬

nois regiment during: the Civil War, was pastor at Cairo. Ill., 1863-69, and subsequently at Seneca Falls and Waterloo, N. Y. ; was pro¬

fessor of normal theology and philosophy at the Paulist Novitiate. He founded the Catholic Times in 1874, and was its editor till 1880, and after 1894 was editor-in-chief of the New York Freeman's Journal. He was involved in a con¬

troversy with Robert G. Ingersoll, and his side of the controversy was published in a volume.

The bishop of Rochester, Dr. McQuaid, refused to assign Dr. Lambert to a parish in his diocese, but was overruled by the Pope. There¬

upon Dr. Lambert was made rector at Scotts-

ville, N. Y., where he remained until his death.

He published (Thesaurus Biblicus* ; (Notes on IngersolP ; (The Christian Father) ; (Tactics of Infidels,) etc.

LAMBERT VON HERSFELD, German

historian : b. probably Thuringia ; d. Benedictine monastery at Hersfeld, 1088. He was finely educated, ordained a priest at Aschaffenburg, and is sometimes spoken of as Lambert of Aschaffenburg or 'Shafnaburg. He. entered the Benedictine monastery at Hersfeld in 1058, and made a pilgrimage to the Holy Land, visiting many monasteries of his order. His fame rests upon his < Annals, > a history of the world from its beginning until 1077. Lambert followed the work of other historians until 1040, when he emerged as an independent historian treating familiar contemporaneous history. The work is written in a beautiful Latin and the style is excellent. The writer is definitely antagonistic to Henry IV, whose visit to Canossa is bril¬

liantly described, as is the battle of Hohen-

burg; and the work, naturally, is strongly in favor of the papacy. Until recently the fair¬

ness and accuracy of the (Annals* have been unquestioned. The "Annals* were first pub¬

lished in 1525, in the III and V Hanover and Ber¬

lin 1826 fob), and translated into German by Hesse (Leipzig; 2d ed., 1893). He is credited with the authorship of some of the monastery records, and with (Carmen de Bello Saxonico,*

edited by Pannenborg (Gottingen 1892) and by

Holderegger (Hanover 1894). Consult Del¬

ft ruck H.,

LAMBERTON, Benjamin Peffer, Amer¬

ican rear-admiral: b. Cumberland County, Pa., 25 Feb. 1844; d. 9 June 1912. He was graduated at the United States Naval Academy in 1864

and was assigned to the United States, steamer America for service during the remainder of 674

the Civil War. He was regularly promoted and at the outbreak of the Spanish-American War was chief of staff for Admiral Dewey. After the battle of Manila Bay he was advanced in rank seven numbers for (Ceminent and con¬

spicuous conduct.** He commanded Admiral Dewey's flagship, United States steamer Olym¬

pia, in 1898-99, served on the naval retiring board in 1900, and on the lighthouse board in 1900-03. He was in command of the South Atlantic squadron in 1903-04 and served at the Naval War College in 1904. He was chairman of the lighthouse board in 1905-06 and was re¬

tired 25 Feb. 1906.

LAMBERTON/ John Porter, American

editor and author : b. Philadelphia, 22 Oct.

1839; d. 26 July 1917. He was graduated from the University of Pennsylvania in 1858 and re¬

ceived degree of A.M. in 1861. He was teacher of classics in several academies (1859-80), but was obliged to retire from this field on account of the impairment of his hearing. Entering upon literary work he was associate editor of the (American Supplement to the Encyclopaedia Britannica (9th

ed.), and assisted in pre¬

paring the index to that edition of the Britan¬

nica. He was for five years (1891-96) in the editorial department of the J. B. Lippincott Company and revised (Worcester's Dictionary*

and other works of reference published by it.

He was managing editor and chief writer of (Historic Characters and Famous Events) (12 vols., 1896-98) and literature of All Ages) (10 vols., 1898-99). To the series (Six Thou¬

sand Years of the World's History* he con¬

tributed (Literature of the 19th Century1* (1900).

He prepared an educational work on (English Literature* (1903) ; revised and enlarged (The Drama* of Alfred Bates (1905-07). In 1902 he became an assistant in the library of the Uni¬

versity of Pennsylvania.

LAMBERTVILLE, N. J., city in Hun¬

terdon County, on the Delaware River, the Del¬

aware and Raritan Canal and the Pennsylvania Railroad, 16 miles northwest of Trenton.

Water power is here furnished for extensive paper mills, rubber works, spoke factories, stone-quarries, flour mills, manufactories of pottery, hairpins, wire novelties and foundry and machine shops. The city was first incorpo¬

rated in 1849, and under a charter of 1904 is governed by a mayor and council elected every two years. The city is located on the site of a ferry on the old route from New York to Philadelphia and was long known as Coryell's Ferry and later as Georgetown. The popula¬

tion is about 4,657.

LAMBERVILLE, Jean de, zhon de lan-

bar-vel, French missionary; d. Paris, 6 Feb. 1714.

In 1671, as a member of the Jesuit order and under their direction, he settled in the Iroquois village of Onondaga. He had previously spent three years in Canada, and he now became active in cementing the alliance between the Indians and the French. Meanwhile Governor Dongan of New York was straining every nerve to win over the Iroquois League to the Eng¬

lish, but without success. Lamberville, who was chaplain of the French garrison at Forts Frontenac (Kingston) and Niagara, was

obliged to abandon his post by the risk he ran when the Iroquois delegates were treacherously seized at Fort Frontenac to which they had repaired on receiving pledges of a peaceful con¬

ference (1687). In 1691 he was at Sault Saint Louis. He returned to France in 1692 and for the next 20 years was procuror for the Canadian mission.

LAMBESSA (anc. LAMBiESA), Alge¬

ria, a village in the department of Constantine, seven miles southeast of Batna and 17 miles west of Timgad. The town owed its ancient importance to a Roman military camp founded there under Hadrian 123-129 a.d. The modern village has an agricultural colony founded in 1848 and a large convict establishment built about 1850. The village is interesting chiefly because of its historical remains. While vandal¬

ism has destroyed many of these, those still existing are cared for by the Service des Monu¬

ments Historiques. There are triumphal arches erected to Septianus Severus and Commodus ; the capitol or temple dedicated to Jupiter, Juno and Minerva, which has a portico of eight columns ; a splendid building in the old Roman camp dating from

268 a.d. ; cemeteries to the north and east with the stones still standing, although those to the west of the village have had their stones removed for building purposes. There are, besides, remains of an amphitheatre, arsenal, baths, residences, an aqueduct, a single standing column of the temple to ^Esculapius and some fine statues and mosaics. The ruins of the town have yielded many inscriptions, of which Renier edited 1,500 and 4,185 are in the (Corpus In-

scriptionum Latinarum.* More than 2,500 of the inscriptions relate to the Roman camp.

Consult Renier, L., (Inscriptions romains de l'Algerie* (Paris 1855) ; Graham, A., 'Roman Africa* (London 1902) ; Boissier, (Ro-

man Africa* (New York 1899) ; Gsell, S., (Les Monuments antiques de l'Algerie* (Paris 1901).

LAMBETH, a municipal and parliamentary

borough of London, on the right bank of the Thames, opposite Westminster. Area, 4,080

acres. Lambeth has been famous for its pot¬

teries for over 200 years; soap and chemicals are the other chief manufactures. Lambeth Palace has been the official residence of the archbishops of Canterbury since the end of the 12th century. The oldest part remaining is the Early English Chapel. The so-called Lollard's Tower dates from 1440. The palace contains a fine series of portraits of the archbishops and possesses a magnificent library containing a valuable manuscript collection. Lambeth sus¬

pension bridge crosses the river below the palace. Astley's Circus and Vauxhall Gardens, at one time famous resorts, were located here.

The borough for parliamentary purposes is di¬

vided into four constituencies, each returning one

member. Pop. 298,058. Consult Allen, (History of Lambeth* (1826); Hill, Electoral History of the Borough of Lambeth* (1879); Honey, (Origin and Duties of Overseers of Lambeth for 300 Years* (1900); Tanswell, (History of Lambeth* (1858).

LAMBETH ARTICLES, in English ec¬

clesiastics, a name given to a statement of cer¬

tain doctrines of predestination, justification and free-will, drawn up at Lambeth Palace in 1595 by William Whitaker, master of Saint LAMBETH CONFERENCE — LAMENNAIS

John's College, Cambridge, and other Calvin¬

ists. They were approved by Archbishop Whit-

gift, but disapproved by Queen Elizabeth.

Consult Curtis, (History of Creeds and Con-

fessions) (Edinburgh 1911).

LAMBETH CONFERENCE, the name

given to periodical assemblages of Anglican bishops at Lambeth Palace, near London, Eng¬

land. The idea of a pan-Anglican conference was first mooted by Bishop Hopkins of Ver¬

mont in 1851, and was revived by Bishop Lewis of Ontario during what was called the Colenso schism in 1866. The first conference was sum¬

moned by Archbishop Longley in 1867, at which 76 bishops were present. The second confer¬

ence held in 1878 was attended by 100 bishops.

In 1888 there were 145 present, in 1897, 194, and 241 in 1908. The conference does not legislate or formulate Church doctrines, but finds profit in

discussing serious ecclesiastical problems.

The most important practical outcome of the conference has been the publication of what is called the Lambeth Quadrilateral as a basis for Christian unity, embracing the scriptures, the Nicene and Apostles' Creed, the two sacraments and the historic episcopate. The conference will continue every 10 years. Consult Davidson, 'The Lambeth Conferences of 1867, 1878, and 1888> (London 1889) ; Conference of the Bishops of the Anglican Communion (London 1897, 1908).*

LAMBINUS, Dionysius (Denys Lam-

bin), French scholar: b. Montreuil-sur-Mer, Picardy, 1516; d. Paris, September 1572. He was educated at Amiens and in Italy, and from 1561 was professor of Latin and Greek at the College Royal, Paris. His lectures were often interfered with by illness but his fame was secured through his editing of classical authors. His work was characterized by con¬

*servatism and profound scholarship and is still in use. His principal editions are ' Horace **

(1561);

(1570) ;

LAMBKILL, or CALF-KILL. See

Mountain Laurel.

LAMBROS, lam'bros, Spyridion, Greek

historian: b. Corfu, 21 April 1851. He studied at Athens, Berlin and Leipzig, and in 1882-85

he was inspector of public schools under the Hellenic Ministry of Education. He was appointed professor of ancient history in the University of Athens in 1887 and was rector there in 1903-04. He has made numerous translations of English and German works into Greek; became general secretary of the

Com¬

mittee on Olympic Games in 1903 ; and edited a Greek periodical, E ^Xr/vnfiv^fujv dealing with Greek literature as recorded in the Orient. Llis publications include Collection de romans grecs en langue vulgaire et en vers) (1880) ; 'History of Greece) (6 vols., 1886-1908) ; Catalogue of the Greek Manuscripts on Mount Athos* (1895-1901): < ’Apyvporrofyeia > (1909).

LAMBRUSCHINI, lam'broo-ske'ne, Luigi,

Italian cardinal and politician: b. Genoa, 16

May 1776; d. Rome, 12 May 1854. At an early-

age he entered the order of Barnabites ; be¬

came archbishop of Genoa in 1819; and from 1827 until the revolution in 1830 he was nuncio at Paris. He was created a cardinal 30 Sept.

1831, and in 1836 succeeded Bernetti as Secre¬

tary of State under Pope Gregory XVI. It was a trying period and Lambruschini, although an able man, did little to improve matters. He bitterly opposed modern changes, even to rail¬

ways and illuminating gas, and was credited with a too liberal use of spies and prisons. He fought valiantly for temporal control ; and in the quarrel between the bishop of Cologne and Prussia he wrote the famous allocutions.

He was made bishop of Sabina in 1842 and of Porto in 1847. The Roman Revolution of 1848

forced him to flee and eventually he joined Pius IX at Gaeta, returning to Rome with him in 1850. He wrote (Opere Spiritual f1838) ; (Sull’ immacolato concezione) (1843), etc.

LAMB’S CLUB, The, a club founded in

New York, Christmas, 1875, "for the purpose of social recreation and the cultivation of mu¬

sical, literary and artistic talent.® The club was incorporated 10 May 1877 and is organized on the order of the Lamb's Club of London.

It strictly limits its non-professional member¬

ship, and while its professional members include musicians, artists and authors it succeeds in maintaining its theatrical traditions. .The Lambs' Gambol, an entertainment comprising the notable features of the season's plays pre¬

sented by the principals, tours the larger cities each spring and is an event of prime importance in the theatrical world. The Gambol's financial receipts paid for the comfortable building which houses the club at 128 West 44th street, New York.

LAMB'S LETTUCE. See Corn-salad.

LAMB'S-QUARTERS, a roadside "pig¬

weed** (Cheno podium album). See Goosefoot.

LAMECH, name of two scriptural person¬

ages mentioned in the book of Genesis. (1) Descendant of Cain. (2) Son of Methusaleh, and father of Noah, lived 777, and died five years before the Flood.

LAMENNAIS, lam'na', Hugues Felicite

Robert de, French religious and political au¬

thor: b. Saint Malo, 19 June 1782; d. Paris, 17 Feb. 1854. His father was ennobled in 1788 for public services. His mother died when the boy was five years old, and he was sent to live with his uncle at Dinan. There he found ample opportunity for study in the splendid library of his uncle, where he became steeped in the philosophy of the century. With his elder brother Jean-Marie, he published in 1808

'Reflexions sur l'etat de l'Eglise en France pendant le XVIIIeme siecle et sur sa situation actuelle,* which caused wide dis¬

cussion and was suppressed by the police. In 1809 he entered the priesthood, but it was not until 1816 that he finally accepted ordination at Vannes. In the intervening years, he had written an effective treatise on 'La tradition de l'institution des eveques en France) in which he advocated the creation of bishops without papal sanction. During the Hundred Days he escaped to England, fearing the Im¬

perial police, and there became familiar with the policies and thought of that country. After his ordination, Lamcnnais devoted himself with great energy and zeal to the service of the Catholic Church. In 1817 he began the pub-

lication of his monumental work (Essai sur l'indifference en matiere de religion) (4

vols., 1817-24; English trans. by Stanley, London 1898). With the fervor of intellectual conviction he advocated a strict restoration of the original Catholic doctrine. He denounced the spirit of individual inquiry which Des¬

cartes, Rousseau and Luther had stimulated to the detriment of the church and the state.

Politically he favored the submission of tem¬

poral to spiritual authority and advocated a form of democracy deriving its power from a theocracy. Pope Leo XII at first approved of his religious philosophy, and invited Lamennais to visit Rome where he was graciously received and offered a place in the Sacred College. He preferred, however, to return to France, where he already had a large following, especially among the younger clergy, and

with Chateau¬

briand he soon became known as a political power. His essays appeared in the Conserva-

teur for a time, but the monarchical tendencies of de Villele, one of the chief owners of the paper, soon alienated his sympathies, and he began to publish two independent jour¬

nals, Le Drapeau blanc and La Memorial Catholique. From 1825-26 he was also occu¬

pied with the publication of (De la religion consideree dans ses rapports avec l'ordre civil et politique. 5

At La Chenaie, Lamennais with a brilliant following, including among its ranks Lacor-

daire, Gerbet, Rohrbacker, Salmis, de Carne, and later de Guerin, worked enthusiastically for his great reforms. The organ of this group was the journal L' Avenir, which took as its motto, <(Dieu et Liberte55 ; and the body of active sympathizers and workers for the cause of theocratic democracy was known as the (

ingly, he suspended publication, and with Lacordaire set out for the Holy City in 1831

to meet Gregory XVI. They were, to their surprise, coolly received by the Pope, who asked them to drop the matter. All obeyed promptly except Lamennais who still hoped for a favor¬

able reception ; but when further letters of the Pope indicated clearly his concessions to tem¬

poral authority, Lamennais abandoned hope.

Shortly after his departure, the encyclical <(Mirari vos'5 was sent out by Rome in which Gregory formally denounced the theories set forth in L'Avenir and propagated by the (

clical ((Singulari nos” (1834).

It was not long before Lamennais rallied his force and his followers and began to direct his energy toward the championship of the rights of the people alone. In support of ((la liberte et la humanite55 he wrote (1836) ; (Le Livre du peuple) (1837) ; and (Le Pays et le gouvernement5

(1840), for which he was imprisoned for a year at Sainte-Pelagie, where he wrote (Une Voix de prison.) This was followed in 1843

by (Amschaspands et Darvands,5 (Le Deuil de la Pologne5 (1846), and numerous other pamphlets and treatises. In 1840 he collected the articles which had appeared in L’Avenir and published also a remarkable work in three volumes, (Esquisse de philosophies The third volume entitled (De l’Art et du beau) still remains one of the finest of discussions on aesthetics. He was recognized as one of the leaders of the Liberal Democratic party, and in defense and support of the Revolution of 1848

published Le penple cpnstituant, which, like a later publication, La Revolution democratique et sociale, was forced to an early death through lack of financial means. He was chosen a member of the Constituent Assembly where he sat with the Extreme Left. His last years were occupied with the translation of Dante’s (Divina Commedia.5 He refused to accept a church burial, and was interred without any religious ceremony.

Several volumes of posthumous works and letters have been published by Forgues (1858) ; H. de Courcy (1862); A. Blaize (1866); by A. du Bois de la Villerabel (1866) ; and M. A.

Rousel (1892). Incomplete collections of his works have been made, one in 10 volumes (Paris 1836-37) ; and another in 10 volumes (Paris 1844). Consult also Blaize, A., (Essai biographique sur M. de Lamennais5 (1858) ; Brunetiere, F., (Nouveaux essais sur la li¬

terature contemporaine5 (1893) ; Janet. Paul, (La philosophic de Lamennais5 (1890) ; Renan, E., (Essais de morale et de critique5 (1857) ; and Sainte-Beuve, (Portraits Contemporains5

(1832) and (Nouveaux Lundis.5

LAMENTATION FOR THE DEAD.

See Funeral Rites.

LAMENTATIONS, Book of. See Jere¬

miah, Lamentations of.

LAMETH, la 'met', Charles Malo Fran¬

cois, Count de, French general and politician: b. Paris, 5 Oct. 1757; d. Poutoise, 28 Dec. 1832.

He served in the French expeditionary force which aided the American Revolutionists, was aide to Rochambeau and at the battle of Yorktown received serious wounds. He was deputy to the States-General in 1789; and in 1791 he was elected to the National Assembly by the nobility. His opposition to Mirabeau resulted in his arrest and he fled to Hamburg where he remained until 1800. He returned to France under the consulate, fought under Na¬

poleon and was made governor of Wurzburg.

In 1814 he joined the Bourbons, and in 1829

succeeded his brother, Alexandre, as deputy.

LAMIA, a mythical queen of Libya, who, on being robbed of her own children by Hera, devoted her life to strangling and eating chil¬

dren. In later story Lamia was a vampire who seduced and then sucked the life-blood of young men. As a vampire she appears in Goethe’s (Die Braut von Korinth5 and Keats’

(Lamia.5

LAMIA, (Turkish Zeituni or Zituni), city of Greece, capital of the provinces Phthiotis and Phosis, 'near the head of the Gulf of Lamia, 28 miles southeast of Pharsalos. It is situated upon the side of a hill crowned by a mediaeval fortress, and has remains of the ancient city from which the Lamian War (323 R.c.) takes its name. On the south of the gulf is the Pass of Thermopylae. The modern city has a

bazaar, gardens and a mosque. Its principal industry is the raising of camels. The city re¬

sumed its ancient name after Turkish rule was thrown off. In its more recent history is fa¬

mous the nearby bridge of Alamanna, whqre, in 1821, 700 Greeks commanded by Diakos and the bishop of Salona withstood the progress of a Turkish army. Pop. estimated 8,000.

LAMIA. This narrative poem in couplets was written by Keats in 1819 and published, to¬

gether with (Isabella) and (The Eve of Saint Agnes* in 1820. Keats founded his poem on an incident given by Burton in the (Anatomy of Melancholy* from Philistratus, concerning the marriage of a Corinthian youth to a serpent-

woman or Lamia. At their wedding her real nature is detected by the philosopher Apollo¬

nius, and on being denounced she vanished. The story belongs to a familiar type of folklore in¬

cident, commonly known as the (

gestiveness of his material, but is interested rather in its picturesque and emotional values.

He prefaces the meeting of Lamia and Lycius by a brilliant description of the serpent and an account of her transformation by Hermes into a woman. Lycius

is enthralled by Love and the enchantment endures until the fatal desire comes upon him to marry the maiden in the presence of his friends. The close of the poem is made to illustrate Keats' favorite idea of the antagonism between the life of feeling and ab¬

stract reflection. Apollonius, who comes un¬

invited to the feast, represents the chilling phi¬

losophy which destroys the illusions of poetry and romance. The poet's sympathies are all with the enamored lovers. In style and versi¬

fication (Lamia) shows traces of the influence of Dryden. The rich sensuousness of (The Eve of Saint Agnes) here takes on an almost metallic brilliancy, but the poem is little in¬

ferior as a work of art. For references see article Ode on a Grecian Urn.

James H. Hanford.

LAMINiE. See Bed.

LAMINARIA, an important genus of

brown seaweed of the family Laminariacecu, prolific in the colder coast waters of the tem¬

perate zones. The species has no definite leaves, the thalius forming a ribless expansion, flat and ribbon-like, either simple or cleft. A few species are edible, while others are em¬

ployed as fertilizers and in making kelp.

Among them L. bulbosa and L. digitata, which attain immense length, were formerly important in the production of carbonate of soda, but the discovery of common salt as a more accessible and prolific source of supply has largely super¬

seded the-ir use. L. potatorum is a native of the

Australian coasts and furnishes the natives with food and material for domestic utensils and implements. L. bucinalis, a native of Cape of Good Hope, yields iodine, while several Jap¬

anese varieties are edible.

LAMINATION (from Lat. lamina, thin

plate), the division or divisibility < of rock into thin layers or sheets. Lamination occurs chiefly in rocks composed of fine-grained .ma-

terials and evidently is produced by deposition in water and variation in the nature of material deposited. The term usually is limited to strat¬

ified rock, although some geologists apply it to the tabular structure of igneous crystalline rocks.

LAMMAS DAY (M.E. hlammsesse, "loaf-

mass®) in the calendar, the 1st day of August, so called perhaps from the custom which for¬

merly prevailed among the tenants who held lands of the cathedral church in York, Eng¬

land, of bringing offerings of the first fruits of the harvest in the form of wheat loaves on that day.

LAMMASCH, lam'ash, Heinrich, Aus¬

trian jurist: b. Seitenstetten, 1853. He studied at the University of Vienna and was appointed law lecturer there in 1878. In 1885-89 he was professor at the University of Innsbruck, and in 1889 he became professor of law at Vienna.

He entered the Austrian Upper House in 1899

and became leader of the Conservatives. He represented Austria at the first Hague Peace Conference and in 1911 was president of The Hague Tribunal. He was an arbitrator on the Venezuela case, 1903-04; and presided over the boards deciding

the Muscat case, 1905, and the Newfoundland fisheries controversy in 1910.

He has published < Moment objektiver Gefarh-

lichkeit im Begriffe des Verbrechensversuche*

(1879) ; (Diesbstahl und Beleidigung* (1893) ; (Rechtskraft internationaler Schiedsspriiche*

(published by the Nobel Institute, 1913) ; (Schiedsgerichtsbarkeit* (1914), etc.

LAMMENS, la'mans', Henri, Belgian

Orientalist: b. Ghent, 1862. He entered the Society of Jesus, was later appointed professor of Arabic literature in the Instituto Biblico, Rome, and has specialized in the study of Ori¬

ental history, Syrian geography and Moham¬

medanism. His works include (Fatima et les filles de Mahomed) (Rome 1912) ; and (Le ber-

ceau d l'lslam; l'Arabic occidentale a la veille de l'higir > (Vol. I, Rome 1914).

LAMMERGEIER, lam-mer'gi-er, the lar¬

gest of European eagles (Gypaetus barbatus), often called griffon-vulture because it fre¬

quently feeds on carrion, especially bones aban¬

doned by other animals, which it has. power to break, or carries to a great height in the air and then lets fall; it does the same with tor-

tises, which form an important part of its fare in some countries. The lammergeier is a bird of the mountains and deserts of southern Eu¬

rope (where it has now been nearly extermi¬

nated), northern Africa and southern Asia; it.

builds a great rude nest on some mountain ledge and lays a single brown-blotched egg.

LAMON, la-mon, Ward Hill, American

biographer: b. 1828; d. Martinsburg, W. Va., 7

May 1893. He was the law partner of Abra¬

ham Lincoln at Springfield, Ill., and after the latter's election as President became his pri¬

vate secretary and was appointed by him mar¬

shal of the District of Columbia. He published

LAMON, la mon', Bay of, a landlocked bay on the eastern (Pacific) coast of Luzon, Philippines, dividing the southeastern peninsula from the main part of the island. The island of Alabat and smaller islands make an inner bay on the south. The bay is bounded by the prov

inces of Infanta, Laguna and Tayabas on the south and west, and by the provinces of Taya¬

bas and Ambos Camarines (Norte) on the south and east. On the northwest coast of the bay is the port of Lampon, Infanta, which was important in the latter part of the 16th century and the 1 7 th century as the harbor of the Span¬

ish galleons between Manila and New Spain, it being thought a safer way of communication than the straits of San Bernardino.

LAMONT, la-mont, Daniel Scott, Amer¬

ican politician : b. Cortlandville, N. Y., 9 Feb.

1851 ; d. Millbrook, N. Y., 23 July 1905. He was educated at Union College, Schenectady, en¬

tered journalism at Albany, became a political correspondent, in 1883-89 was private secretary to Grover Cleveland, was later in business, and in 1892-96 was Secretary of War in Cleveland's second administration. In 1897 he was elected vice-president of the Northern Pacific Railway Company.

LAMONT, la-mont', Johan von, Scottish-

German astronomer and magnetician : b.

Braeiner, Aberdeenshire, 13 Dec. 1805 ; d.

Munich, 6 Aug. 1879. At an early age he. was sent to the Scottish monastery in Regensburg to be educated and so far as is known he never returned to his native country. He be¬

came assistant at the observatory of Bogen-

hausen near Munich in 1828 and was its director from 1835 until his death. From 1852 he was also professor of astronomy at the University of Munich. His most notable contributions to astronomy consist of 11 zone catalogues of 34,674 stars; his measurements of nebulae and clusters; and his observations of the satellites of Uranus resulting in the determination of its mass. He was instrumental in the establish¬

ment of magnetic observatory at Bogenhausen in 1840; made extensive magnetic surveys of Germany, France, Spain and Denmark; an¬

nounced in 1850 the magnetic decennial period, and in 1862 made his discovery of earth cur¬

rents. Most important among his writings is the standard work, (Handbuch des Ermag-

netismus5 (Berlin 1849).

LAMORICXERE, la'mo're'syar', Chris-

tophe Leon Louis Juchault de, French gen¬

eral: b: Nantes, 5 Feb. 1806; d. Prouzel, 11

Sept. 1865. He entered the engineers in 1828, served in the Algerian campaigns from 1830, and in 1843 became a general of division. He rendered important service at the battle of Isly, 14 Aug. 1844; acted temporarily as gov¬

ernor-general of Algeria, and in 1847 secured the surrender of Abd-el-Kader, thereby termi¬

nating the war. Upon his return to France he was elected to the Chamber of Deputies and served as Minister of War under General Cavaignac. A bitter opponent of Louis

Napoleon, he refused to give allegiance after the coup d'etat of 2 Dec. 1851 and was exiled.

He became commander of the papal army in the Italian campaign of 1860, but was defeated and forced to surrender his army at the battle of Castelfidardo, 18 Sept. 1860. The remaining years of his life were spent in retirement in France.

LAMOUREUX, Charles, French violin¬

ist and orchestra leader: b. Bordeaux, 20 Sept.

1834; d. Paris, 21 Dec. 1899. He entered the conservatory at Paris in 1850 and in 1853 be¬

came first violin at the opera. He founded the (Societe de l'Harmonie Sacree,} and gave the first performance in Paris of Handel's (Mes¬

siahs in 1873. In 1876 he became leader of the orchestra at the Opera Comique and in 1881 he inaugurated a series of Wagnerian con¬

certs. He was twice leader of the orchestra at the Paris Opera and his visits to London were the occasion of many successful concerts at Queen's Hall. He was notably successful in his efforts to popularize the music of Wagner.

The Concerts Lamoureux were continued in Paris after his death by his son-in-law, Chevil-

lard.

LAMP, any contrivance which through the formation of its parts affords a means of pro¬

ducing light,. and sometimes heat, by the com¬

bustion of oils, fats or inflammable fluids, with the aid of a wick, which, by capillary attraction, conveys the substance burned to the flame point.

By modern adaptation of the word many ap¬

pliances for producing light by gas or electricity are designated as lamps, and the illustrations of lamp standards that accompany this article show the high pitch of artistic excellence to which they have been brought. The history of the lamp, however, is interesting, especially as the development of the modern oil lamp and of general illumination can be said to date only from about 1840. Man ignorant of fire is unknown; therefore, the use of the burning brand as a torch may be regarded as coeval with the race, and the torch as the progenitor of the succeeding lamp. Considered archaically the primitive lamp was a very simple device.

An unworked stone, having a natural concavity, a sea shell, or the skull of an animal, constituted the earliest forms. A bit of moss or a twist of vegetable fibre served as a wick. Fat, grease or fish oil furnished the illuminant. The intro¬

duction of the lamp marked the first stage of man’s advancement toward civilization, and may, therefore, be appropriately considered as a figure or symbol on the dial of time pointing to the dawn of his intellectual awakening.

When, or where, or by what people the first lamps were made cannot now be determined.

Recent archaeological discoveries in the ruins of

the long-juried cities of the Mesopotamian plain, Assyria, have revealed many terra-cotta lamps of. a variety of forms, and of good workman¬

ship, that were in common use 7,000 or 8,000

years b.c. It would be an unwarranted assump¬

tion to assert that these well-developed crea¬

tions denote the beginning of the lamp. Stone lamps have been found that are undoubtedly of great antiquity, but this fact alone does not necessarily class them as palieolithic ; they are simply prehistoric, and of an age that cannot be definitely determined. The so-called Stone Age determines so little that is of real chronological value that classifications in archaeology can¬

not always be wisely made upon data thus fur¬

nished. French archaeologists have within a few years recovered from the lakes of Swit¬

zerland bronze lamps that were in use by the lake-dwellers at a period late in the Lacustrian Age. These are without doubt the most an¬

cient metal lamps yet discovered.

Early Examples. — Whether the first emi¬

grants from Asia into ancient Greece found the Pelasgic races using lamps, or whether the in¬

vaders brought the art of lamp making with them, neither legend nor tradition has left even a mythical answer. In our researches in lamp LAMPS

8,":

B'n-139 LAMPS OF C ARCTIC6 NORTH AMERICA; 11 Eskimo Soapstone Lamp, North Greenland. 12 Eskimo Clay Lamp, Yukon Valley 13 ^MPS^T^'nnBeUy 1632. 15 Iron Betty, 1620. 16 Fat Lamp, Brass 14-22 EARLY AMERICAN COLONIAL LAMPb , 14 I in aetty, ^ 19 Tin « Petticoat

” Lamp, Whale-

oilSbu1rnenr.T832ht’ ^“lin WhXoi!°li'm”Pi812. 21 Tin Upright, Franklin burner, Whale-oil, 1750. 22 Guest Lamp Tin, Whaie-oil, used in old-time inns, 1820

LAMPS

1 10 EARLY ENGLISH AND AMERICAN COLONIAL LAMPS; 1 Horologic Lamp, Pewter, 1600. 2 Old Diitch Lamp, Copper, 1640. 3 Iron Slot Lamp Pottery Upright, Penn. Dutch, 1745. 4 Old English Pewter Lamp, ft**™. 5 Tm Newburyport (Mass.) Betty, 1724. 6 Tin Lard-oil Lamp, with reflector, 1830. 7 Portsmouth (N. H.) Betty, Tin, 1760. 8 Old English Bulls Eye Lamp, Pewter, 1770. 9 Tin Lard-oil Lamp, 1840. 10 Old Enghsh Pewter Lamp, 1720

11-L5 AMERICAN GLASS LAMPS; 11 Glass Camphene Lamp, 1845. 12. Glass Camphene Lamp, 1850. 13 Glass Whale-oil Lamp, 1830. 14 Glass Camphene Lamp, 1848 15 Glass Whale-oil Lamp, 1760

LAMP STANDARDS

k'&j-

Courtesy of Gorham Company, N. Y. C,

1, 2 Lamp standards at entrances to New York State Educational Building, Albany, N. Y.

3 Flag pole bases and lamp standards, Central Library Saint Louis, Mo.

4 Lamp standard, Peoples Savings Bank, Providence, R. I.

archaeology we can at the best but work our way backward, from the known to the un¬

known, from the ascertained facts to that dim, mysterious darkness of remote antiquity where all

traces of chronology are lost, and where our conclusions must be largely sustained by de¬

ductions drawn from analogical reasoning. The poems ascribed to Homer, 950 b.c., contain all that we know of the manners and customs of early Greek society. He speaks of the "Festival of Lamps,® and makes frequent mention of the torch. The Greek and Roman torch was often simply a terra-cotta, or bronze, lamp-shaped de¬

vice secured to a staff. The so-called "grease-

pot-lamp® of Egypt is without doubt more an¬

cient than the oldest lamp of Greece, and the terra-cotta lamps of Babylonia are also thou¬

sands of years older. Egypt as a nation was on the decline when the history of Greece began.

Assyrian records found on clay tablets proclaim a nation with a remoteness of antiquity as yet undetermined. Among the many ancient relics discovered in the ruins of the Babylonian cities have been terra-cotta lamps that closely re¬

sembled those of early Greece. This similarity of configuration between the earliest examples discovered and those of Greek make of a period that was perhaps midway between the first Olympiad, 776 b.c., and the beginning of the Christian era is remarkable. Only the simplest essentials are represented. A shallow, saucer¬

shaped oil or fat reservoir being the most primi¬

tive of terra-cotta lamps. Then comes the oval in shape, with a slight prolongation of the rim into a short, narrow rostrum, or wick support, and the formation of a rudimental handle. Then the oval-shape with the reservoir enclosed, and one or two wick supports. These constitute the types that were essentially common to all East¬

ern lands. The later Greek and Roman lamps, both

terra-cotta and bronze, are remarkable rich in ornamentation, and artistically graceful in form. These constitute a division that sepa¬

rates the crude primitive from the finished prod¬

uct. The earliest terra-cotta lamps were made in one piece, and baked without glazing. Later Greek and Roman terra-cotta lamps were made in two principal parts, the "crater? or oil reser¬

voir, and the "discus? or covering for the reservoir. Each of these parts were joined to¬

gether after being molded, and then baked.

The ornamentations were generally confined to the "discus? and were called the "limbus?

The "nasus? or wick support, as well as the "ansa? or handle, were most frequently made separately and carefully attached to the body of the lamp before baking. The " discus ® had a small circular opening near the centre through which the lamp could be filled. Many of the better lamps had the maker's name, and often his private mark, stamped on the bottom. Large terra-cotta lamps were frequently made with two, three and sometimes six or even 12

"nasi? The lamp with (< nasus ® for one wick was called a "monomyxos? and that for two wicks a "dimyxos? and so on. The Greek and Roman bronze lamps were made in an almost endless variety of forms, and were often beau¬

tiful and artistic to a marked degree. Plain iron lamps were used by the common people at a later period. They were either cast or forged in a single piece, and were mostly ectypes of the more artistic and costly terra-cotta and bronze lamps, but were without decorations.

The study of the ancient lamp maker was de¬

voted alone to the external form of his wares.

Grace, beauty and elegance, as expressed in out-'

lines and decorations, were his chief concern.

No attempt was made to improve the light. The pale, smoky, flickering flame continued to shed its uncertain light from the massive and costly silver candelabrum of the wealthy just as it had for untold ages from the simple stone and terra¬

cotta lamps of their ancestors. Etruscan terra¬

cotta and bronze lamps so closely resembled those of early Greek make that a separate de¬

scription is not required in this article. The chief characteristic, however, that distinguished the true Etruscan pottery from that of Greece is the strong coloring that was applied to the former. What was true of the art of lamp making in Greece was also true of the rest of the civilized world, for it was more than 17 cen¬

turies after the Christian era before any real improvement was introduced in lamp construc¬

tion.

The Inventive Age. — Prior to 1783 many lamps and illuminating appliances had been in¬

troduced, but there was little if any improve¬

ment in the light afforded, or marked advance¬

ment in the construction or mechanical arrange¬

ment of the parts designed to increase the brilliancy of the flame. The first real improve¬

ment was the introduction of the flat, woven, ribbon-like wick, and the securing the wick in a close-fitting support. This arrangement permitted only a small surface of the wick to be exposed to the flame, and the wick being narrow the flame came in contact with the centre as readily as the outward

parts and thus most of the free carbon was consumed, con¬

sequently there was less smoke than in the old style of loose wick. M. Legers of Paris in¬

troduced this improvement in 1783. To this was attached for the first time a spur-wheel, which by rotating adjusted the wick, thus regu¬

lating the flame. The same year M. Argand, the Swiss chemist, introduced his improvement in burners, which consisted of a tubular wick attached to a tube which extended through the oil reservoir and opened into the base of the lamp, thus affording a means of centre draught, which supplied an abundance of oxygen to the flame and created sufficient heat to consume all of the carbon and so prevented the escaping of smoke. This was truly the beginning of a new era in lamp making, for the art now en¬

tered upon what may be designated as <(the inventive age of the lamp.® Science and inven¬

tion now came to the aid of the artisan. Prin¬

ciples involving an understanding of the laws of combustion and the science of light were ap¬

plied to the construction of illuminating devices.

The result was more light and better light. Ar-

gand's epoch-making invention related wholly to his improved burner. His first lamps were simply huge oil reservoirs with his new burner attached to the top. He used sheet iron chim¬

neys formed with a hood opening over the flame. The use of glass chimneys with the Argand burner came about purely by accident.

A workman in attempting to heat a bottle over the flame cracked off the bottom, and'

because the glass had become too hot for him to hold

he momentarily placed it over the burner. The result was suprising; the bril¬

liancy of the flame was not only increased but the light became steady and in every way 680

superior to that produced with a sheet iron chimney. The brilliancy of the light on the top • of the huge reservoir made a wide shadow.

To overcome this was a problem that was finally solved by a German lamp-maker, who produced a model in which the burner was secured to the end of a long neck or rostrum, very much like the present so-called German student lamp. The removing of the light away from the great reservoir not only reduced the shadow but afforded a more ready means of supplying the oil to the wick uniformly. In 1800 Carcel introduced his ingenious ' lamp which was provided wih a clock-work device, which operated a small pump, raising the oii from the base of the lamp to the wick-holder, thus keeping the wick uniformly submerged in the oil. This contrivance was too costly to come into general use, and was confined mostly to lamps used in halls and large rooms. Many lamps were offered by makers that were de¬

signed to burn crude, heavy whale oil, and others in which lard oil was consumed. Lard oil lamps were inconvenient in cold weather, for the oil would become solid. To overcome this several devices were invented. Perhaps the most successful was the lamp with a copper tube, the upper end of which was between two wick tubes, while the lower end passed through the oil to the bottom of the lamp. Copper being a good conductor of heat, the oil was thus kept in a liquid state while the lamp was burning. For many years lard oil was the only lllummant used in the great lamps of the lighthouses of the world. It was not until after 1880 that burners for lighthouse lamps had been constructed that would satisfactorily consume kerosene oil. Up to about

1800 but few small, portable lamps had been made.

Nearly all the appliances so far introduced for domestic illumination were large, so-called, table lamps, and mural lamps. English manu¬

facturers first made small hand lamps of tin, brass and pewter. These were mostly lard or whale oil burners, with a single wick tube. In the whale oil lamps the wick tube was round, in the lard oil lamps the flat, woven ribbon-

wick was used, the wick being moved up and down in the lard oil lamps by a spur-wheel.

In the whale oil lamps a small aperture in the upper part of the wick tube was provided, thiough which ((a prick^ could be inserted by which the wick was pricked up or down. In the large and important field of research and experiment in domestic illumination, American genius and skill very early took a prominent part.

Lamps in America. — Before proceeding

to the introduction of a description of early American inventions relating to lamps and light¬

ing appliances, it will be interesting to briefly notice what may be truly designated as the original American lamp. There has never been found among the remains of the mysterious mound-builders of the Western Continent any nSil t^iat cou^ t>e r'ghtly regarded as a lamp.

The North American Indians, who were found inhabiting the country on the arrival of the first Europeans, did not possess a lamp. The pine torch was their only means of artificial illuminating. The one lamp that can claim the distinction of being really. American is the stone lamp of the Eskimo. This is usually a shallow vessel of stone, most frequently of soap-stone, sometimes bone, clay, wood and the skull of an animal is used. The oil of the seal, walrus and whale is burned in these rude lamps, dry moss serving as a wick. These lamps also

serve as stoves, for they are used for cooking and warming. Without these simple lamps human life could not be maintained in the inhospitable regions these strange people inhabit.

The first lamps used in the Plymouth Colony were of Dutch make, and were called by the English emigrants Betty lamps (German, Bes-

*ser-better). The few lamps that the Pilgrim fathers brought with them in the Mayflower on her memorable voyage were of this class. They are of iron, either forged from a single piece or were cast of gray, coarse iron. The earliest of these were known as the open Betty, or ((Slot lamp.** Then followed the Betty with a top, one part of. which was formed as a hinged lid. The wick support was an angular, half round iron secured to the inside bottom of the lamp. There was an upright handle at the back, to which was attached, 'by a link, a pointed hook, the point of which extended beyond the crook. This was used to sus¬*

pend the lamp from the high back of the rush-bottom chair, or the point was thrust into the crevice between the great stones of the side of the open fire-place. The Betty was pear-shaped, flat on the top and bot¬

tom. Ihis form was sometimes made in brass but rarely was any attempt made at ornamenta¬

tion. Ihese lamps were in use in some parts of the New England colonies as late as 1790.

Prior to 1680 all lamps used in the American colonies were imported, mostly from England In 1680 a tinsmith of Newbury, Mass., began the manufacture of tin Betty lamps. These after Newburyport was separated from New¬

bury, became known as Newburyport Bettys.

Later these lamps were made in Rivermouth (Portsmouth, N. H.) and were called Ports¬

mouth Bettys. In 1720 a few pewter and brass lamps had been made by small manufacturers at Salem, Mass., and Providence, R. I. These were heavy and extremely inconvenient to be carried about. Among the earliest makers of pewter lamps and candlesticks in the New Eng¬

land colonies was Richard Graves, a pewterer who came from England, where he had learned the trade or, as it was then called, the art.

He came first to Boston, but moved to Salem Mass where he long worked at his business'

and brought out many fine goods in his line!

Henry Shnmpton of Boston was also a maker of fine pewter lamps, and his beautiful lamps and candlesticks graced many of the grand old colonial homes. Among the earliest American experimenters in lamp construction and in¬

ventors. of improved burners was that mar¬

velous investigator, philosopher, statesman and inventor Benjamin Franklin (q.v.). Not con-

tent wnh perfecting an improved stove, known as the Frank in heater, he very early turned his ? Ption the improvement of domestic lamps When we recall the fact that Franklin's first manual labor was cutting wicks in his father's chandler shop, it is not surprising that we find his versatile mind turning to the subject of \^?o°Ve ji1 un^ating appliances. Prior to i/42 candles were in general use in American colonies. The iron Betty lamps were used in a comparatively few families. The shallow saucer-shaped clay cruise introduced from Scot-

land was still used for lighting among the poorer classes, but candles were the chief illu¬

minators. Franklin's first invention consisted in devising two round wick tubes so arranged that, according to his directions given to the workmen who constructed the burner, the dis¬

tance between the tubes should equal the diameter of one of them. His theory was that the proximity of the two flames created an up¬

ward draught that so increased the heat that the liberated carbon was consumed, thus adding to the light and preventing smoke. He observed that the introduction of the third burner, while it consumed a third more oil, and added a third more flame, did not give a corresponding in¬

crease in light. Franklin also suggested the improved cotton wick, loosely braided, which afforded a better medium for supplying oil to the flame by capillary attraction. Franklin did not secure patents on his inventions, but al¬

lowed manufacturers to freely introduce them, which they did on quite an extensive scale, and small portable lamps of tin and brass with Franklin burners soon became very common.

Another American of note, Benjamin

Thompson, better known as Count Rumford (q.v.), in 1789 wrote an exhaustive essay on <(The Management of Light in Illumination.5'

He constructed over 100 different lamps in his extended experiments. He invented the photom¬

eter to measure the relative intensity of light emitted by different illuminants. He found that the purest white light could be obtained by means of lamps properly constructed, using clarified vegetable or animal oil, at less than one-eighth of the cost for the same degree of light produced by wax candles, and for about half the cost of tallow candles. He invented but one burner. In this he constructed a cen¬

tre, flat wick tube, with two similarly shaped tubes placed at acute angles on either side of the wick tube, his design being to supply oxygen through the angular tubes impinging on the wick tube. This burner did not satisfy him, and its introduction did not become general.

In his further experiments he confined himself to the Argand burner, and devoted his attention to the better construction of the lamp proper.

His aim was to produce a lamp in which the shadow should be eliminated as much as pos¬

sible. He invented what was known as the ((Astral lamp,® which consisted of constructing the oil reservoir in the form of a flat, circular tube with radiating arms attached to the pedes¬

tal of the lamp, and securing the burner within the circle. He also introduced what he called the "Balloon Illuminator.55 This was for use in halls, ballrooms and salons. He also made what he called a "Dining-room Illuminator,55

and also a table or reading illuminator. All of Count Rumford's investigations and his ex¬

tended experiments relating to lights and lamps, were carried on while he was in the public service of the Elector of Bavaria, who created him a count as a reward for his valuable ser¬

vices and as a recognition of his great learning and the importance of his researches and inventions.

Hundreds of patents have been granted to American inventors for lamps and lamp burn¬

ers. One of the earliest patents on record in the United States Patent Office was for a de¬

vice in which an adaptation was made of Frank¬

lin's two-wick tubes by securing them to a per¬

forated disc through which the tubes passed.

Beneath the disc was a cork through which the tubes also passed, the cork being cemented to the under side of the disc. This could then be fitted into the top of the lamp the same as a cork fits the neck of a bottle. This was mostly applied to glass lamps, which were first intro¬

duced in America in 1810. In 1812 one J. Neal secured a patent for a lamp provided with a telescopic sliding cylinder, the wick tubes were secured to the top of the cylinder, being screwed into a collar which formed the upper part of the tube. When the lamp was filled with oil, a float on the bottom of the tube extended the cylinder to its full length. The wicks were long, reaching to the bottom of the cylinder.

As the oil was consumed the cylinder was cor¬

respondingly lowered, thus keeping the wicks uniformly submerged in the oil as long as any remained in the lamp. These lamps were made in tin, brass and pewter and became quite popu¬

lar. In 1839 one J. Price of Nashville, Tenn., obtained a patent on an arrangement for burn¬

ing pine knots. According to the directions the knots were to be cut up into small pieces and inserted into a tube, which had a diameter of about an inch and a half and a base not unlike an ordinary brass candlestick. A spring inside the upright tube was compressed as the pieces of pine knots were forced in. When the tube had been filled an oval cap or cover with a large opening was placed over the top and secured by a bayonet clutch. The spring forced up the wood to be burned through the opening in the cap ; as it was burned away the ash fell into a circular receptacle secured on the up¬

right pedestal. A sheet iron chimney with a broad hood partly surrounding the flame was provided as the specification says Ho convey the ascending smoke

away from the face of the person using the lamp.55 P. S. Moorhouse ob¬

tained a patent in 1830 for a lighting device in which balls of cotton or tow saturated with grease or fat were burned while held by an up¬

right supporting claw secured to a pan base, in which the ash was collected. Between 1843 and 1845 S. Rust secured eight patents on lamps and five on burners. These patents did not in¬

troduce any new features, and consisted mostly of the introduction of novelties relating to forms and supposed ornamentation. . His inven¬

tions in the line of burners did not involve, any new features and possessed but little real utility.

The 'so-called "Solar Lamps,55 patented in 1843 by the Philadelphia firm of Cornelius &

Company, were a great improvement over any table lamp so far introduced. They were con¬

structed to burn lard oil. The burner proper was a modification of Argand's. The wick tube, over which the circular wick closely fitted, ex¬

tended through the bottom of the oil reservoir, where it was provided with openings for the admission of air. The heat conveyed through the lard oil by the wick tube served to keep the oil in a liquid state in cold weather. The burner was so constructed that the flame was diffused more generally than in other lamps, while the bulb-shaped glass chimney created a hot-air chamber in which all free carbon was consumed.

The light was profuse, white and clear. This firm manufactured a large variety of elegant lamps, which were used extensively in the homes of the wealthy. Benkler's lamp,, intro¬

duced in 1840, had a tube through which air 682

was admitted to the flame, the angle of the tube being such that an upward movement of air was produced when the oxygen came in con¬

tact with the heat, and thus a forced draught was secured which made the light constant and aided greatly in the consumption of smoke.

Through the means thus adopted cheap heavy oils could be burned without the offensive smell and excessive smoke produced by cheaper lamps when these low-grade oils were consumed.

Coal Oil and Kerosene Lamps. — About

1845 was introduced in the United States a compound that was known as burning fluid, or, from its inventor's name, Potter's fluid. This was a highly explosive illuminating fluid, com¬

posed of a mixture of about three parts of wood alcohol to one of purified oil of turpen¬

tine. This was burned in lamps provided with long, slender, tapering brass tubes, secured to a disc that screwed into a collar fitted to the upper part of the lamp. The wick was round, firmly woven cotton, which closely fitted the wick tubes. This was to prevent the escape of the vapor from the fluid. Little thimble-shaped caps, secured by small chains, were provided to cover the end of the wick tubes when the lamp was not in use. This was to prevent the evaporation of the highly volatile burning fluid.

Camphene was the trade name of a burning fluid composed of oil of turpentine, purified by being distilled over quick-lime. This fluid was burned in lamps provided with the same class of burners as that described for burning fluid.

The highly explosive nature of these dangerous compounds rendered them unpopular for do¬

mestic use, and they were soon displaced by the safer and cheaper kerosene oil, which came into general use about 1860. This was first called coal-oil, and in some localities mineral oil, while in others it was known as petroleum oil. Many hundreds of lamps and burners have been in¬

vented to use this cheap illuminant. In all suc¬

cessful kerosene burners a glass chimney is necessary. Many attempts have been made to produce a kerosene burner that would afford a clear, brilliant, steady, smokeless flame, without a chimney, but so far no good, practical lamp has been put on the market that successfully accomplishes this much-desired result. A lamp was made and introduced in 1869 that burned a vapor of naphtha without a chimney. While the flame from this device was white and bril¬

liant, the. light was flickering, and when moved about emitted annoying smoke. The highly ex¬

plosive nature of the fluid burned made its common use unsafe, so that the vapor lamp never became popular. What is known as the German student lamp, supplied with an im¬

proved Argand burner, and the so-called Rochester lamp, employing another modifica¬

tion of the Argand burner, are the best and most successful kerosene lamps so far intro¬

duced. There are hundreds, if not thousands, of different kerosene oil burners attached to an almost endless variety of lamps now on the market. These embrace hand lamps, table lamps, piano lamps and a Variety of library and parlor lamps that are remarkably rich in orna¬

mentation and graceful in form and shape, but in the construction designed to assist the com¬

bustion of the oil in producing the illumination the 9ame general principles are involved, and with the

exception of the smaller hand lamps the original Argand burner principle is adhered to, with slight modifications and improvements.

In the small hand lamps a perforated hood¬

shaped cap surrounds the wick making a dome¬

like chamber through which the air drawn from the outside is deflected into the flame, thus sup¬

plying the needed oxygen. The flat ribbon wick is used in most of the smaller lamps, the wick being moved up and down by a spur-wheel as before described.

Safety Lamps are lamps so constructed

that the danger from the foul explosive air of mines, especially deep 'coal mines, may be les¬

sened or prevented, by so protecting the flame of the miner's lamp that it will not come in direct contact with the mixed carburetted hydro¬

gen and atmospheric air, which is often present in such quantities as to create an element of great danger. The first safety lamps were called <(Sted Mills,® and were devices in which small steel wheels, with roughened edges, were rapidly revolved against a flint, securely held by a pow¬

erful spring. The sparks thus produced af¬

forded an intermittent light which was sufficient to illuminate the more dangerous parts of the deep mines. But as this lamp necessitated the employment of a boy to revolve the wheel while the miner was engaged in his work, it proved too expensive for economic use. In 1813 Dr.

Canny in England introduced the first true safety miner's, lamp. In his invention he pro¬

duced a lamp in which the external air was ad¬

mitted to the burner through a chamber con¬

taining water, while the flame was protected by a glass bulb, the product of combustion escaped through perforations in a flat support on which the glass bulb rested. This con¬

trivance was so cumbersome, and so liable to breakage, that it never came into general use.

In 1815 George Stephenson and Sir Humphry Davy contrived a safety lamp that, with slight modifications, has continued in use up to the present time. The air to support combustion was admitted to the flame through small open¬

ings in the bottom of the lamp, while the flame was protected by a glass, upright cylinder, the top of which was covered with a wire gauze cap. Several forms introducing slight changes from the original Davy lamp have been made.

The lamp in which the flame is protected by a wire gauze cylinder in the place of a glass one was a later invention of Sir Humphry Davy.

Mackworth's safety lamp was an improvement over the Canny lamp, and introduced features common to that and the Davy lamp. A water chamber was provided through which the ex¬

ternal air passed before reaching the flame.

Immediately surrounding the flame was a thick, glass cylinder, and above that a fine wire gauze cylinder, making. a continuous protection about the flame. Outside of this was an additional wire gauze cylinder added as a means of pro¬

tection against breakage. Lamps for jewelers, chemists and laboratory use are in reality minia¬

ture furnaces, and are generally provided with wide wick supports in which are large cotton wicks. Alcohol is the most common fluid used for generating heat in these lamps. Painter's lamps are

contrivances in which naphtha is burned under pressure, the resulting heat being employed in. the removing of old paint from surfaces which it is desired to repaint. Hand lanterns are simply lamps of various forms, surrounded by glass globes or cylinders to protect the flame from the wind. Ancient lan-

terns were provided with transparent protectors made of horn scraped thin to permit the light to be reflected through. The word lantern is a combination of lant-horn, and was employed to express a light which was protected with a transparent horn. Another form of early lantern, now designated by collectors as the <(Guy Fawkes lantern,® was of tin, perforated with small punctures through which the light shone. Early hall, or as they were called entry, lanterns were often massive and elegant ground glass globes, ornate and beautiful to a marked degree. Either candles or oil were used as illuminant. They were suspended by chains from the ceiling and a glass smoke pro¬

tector was provided in those of more elaborate make. (See Electric Lighting; Gas Illumina¬

tion). Consult Bolton, H. C., (Legends of Sepulchral and Perpetual Lamps5 (London 1879) ; Hough, W., (Lamps of the Esquimo5

(Washington 1896) ; Norton, C. A. Q., (Light and Lamps of Early New England, 5 (in Con¬

necticut Magazine Hartford 1903-04) ; Walters, H. B., (Greek and Roman Lamps in the British Museum5 (London 1914).

C. A. Quincy Norton, M.D.

LAMP, Electric. See Electric Lighting.

LAMPADEDROMY, or LAMPADE-

PHORIA, an ancient Greek torch race on foot or horseback, held in honor of Prometheus, Athena, Hephaestus, Demeter, Pan, Artemis and other divinities. The races undoubtedly origi¬

nated in honor of Prometheus. The aim of the contestants was to be first to reach the goal with the torch still burning. The races were held at night, and in some of them the contest¬

ants were mounted. The foot races were run either singly, each contestant, running the entire course, or in relays, in which case the torch was passed from one runner to another and the winner was the team whose torch first arrived. Extinguishment of the torch pro¬

hibited a bearer from continuing in the race.

The races were regarded as very important, requiring rigorous physical tests and long training.

LAMPASAS, lam-pas'sas, Tex., town and

county-seat of Lampasas County, on a branch of the Lampasas River, and the Gulf, Colorado and Santa Fe and the Houston and Texas Central railroads, 80 miles northwest of Austin.

There is a large trade here in agricultural produce, live stock, cotton, grain, wool, and the town has cotton gins, wagon and carriage fac¬

tories, flour-mills and other industries. Sulphur springs in the locality have attracted many in¬

valids here. The town owns the water supply system and has a public library and two public parks. Pop. 2,119.

LAMPBLACK, finely divided carbon or

soot, produced on a commercial scale by the imperfect combustion of organic materials that are rich in carbon, such as tar, resins, pitch and petroleum. The combustion is usually car¬

ried out in brick furnaces, or in cast-iron ves¬

sels, to which a smaller supply of air is ad¬

mitted than would be required for complete oxidation. The dense smoke that results is led through a series of settling chambers, in which the lampblack is deposited, the finest grade be¬

ing precipitated in the last chamber. Lamp¬

black so prepared contains about 80 per cent of carbon, the remaining portion consisting of oily and resinous matters, together with moisture and certain inorganic substances, such as am¬

monium sulphate. The resinous and other organic constituents can be removed by heating to redness in a closed crucible, after which the soot is digested with hydrochloric or sulphuric acid, and finally washed to remove the inorganic constituents. Lampblack is used chiefly in the manufacture of paints and printers' inks and for these purposes the crude product is sufficiently pure. For the manufacture of Chinese ink ((

In the German method the soot is deposited on woolen cloths hung in the chambers, from which the pigment is detached by beating. See also Blacks; Carbon.

LAMPER-EEL, or LAMPERN, a lam¬

prey (q.v.).

LAMPERS, or LAMPAS, an inflammation

and swelling of the mucous membrane of the hard palate in the roof of a horse's mouth.

The swelling is back of the incisor teeth and is due to physiological causes ; it usually occurs in young horses and at the time of shedding the teeth. No treatment is necessary although an astringent wash may be used.

LAMPERTI, lam-per'te, Francesco, Italian teacher of

vocal music: b. Savona, 11 March 1813 ; d. Como, 1 May, 1892. He studied at the conservatory at Milan and for many years was director of the theatre at Lodi, where he also engaged in vocal training. From 1850-75 he was professor of vocal music at the Milan Con¬

servatory, after which time he engaged in pri¬

vate instruction. His reputation was world¬

wide and he numbered among his pupils Sem-

brich, Campanini, Galli, Albani and many other famous singers. He published several treatises on the training of the voice, an English trans¬

lation by J. C. Griffith, (A Treatise on the Art of Singing) (1876), covering the essentials of his methods.

LAMPMAN, Archibald, Canadian poet : b.

Morpeth, Kent County, Ontario, 17 Nov. 1861; d. Ottawa, Ontario, 10 Feb. 1899. Of United Empire Loyalist descent, he was graduated from Trinity College, Ontario (1882), and after 1883

held an appointment in the Post Office Depart¬

ment at Ottawa. He published two collections of poems, (Among the Millet) (1888), and (Lyrics of Earth) (1895). His (Complete Poems5 with Memoir5 by D. C. Scott appeared in 1900.

LAMPRECHT, lam'prekt, Karl, German

historian: b. Jessen, near Wittenberg, 25 Feb.

1856; d. 11 May 1915. He was educated at Gottingen, Leipzig and Munich and in 1885 be¬

came professor of history at Bonn, in 1890 at Marburg and in 1891 was appointed to a similar office at Leipzig, which was admirably equipped for his work. As a teacher he was original in his

methods, and to him history meant as much the revelation of sociology as of political events.

In 1905 he represented Germany at the Com gress of Science held at Saint Louis. He founded in 1882 the (Westdeutshe Zeitschrift fiir Geschichte und Kunst.5 He was -the chief exponent of the Knlturgeschichte and believed intensely in the superiority of German kultur.

Shortly before his death he repudiated, with some indignation, the conception of Germany's part in the Great War as having been dictated 684

by the <(War Lords,® and avowed that in re¬

gard to it that Germany was a unit. His writ¬

ings include (Beitrage zur Geschichte des f ranzosischen Wirtschaftslebens im elten Jahr-

hundert5 (1878) ; (Die romische Frage von Konig Pippin bis auf Kaiser Ludwig den From-

men) (1889); (Deutsche Geschichte5 (13 vols., 1891-1908) ; cZur jungsten deutschen Ver-

gangenheit5 (1901) ; (What is History5 (1905) ; Americana5 (1906).

LAMPRECHT THE PRIEST, a middle

high German epic poet of the 12th century : date and place of birth and death unknown.

Practically all that is known of his life is that he was called (

gon, celebrating the life of Alexander the Great.

It has been published in several different edi¬

tions, among them being Vienna (1849), Frank¬

fort (1850), Halle (1884, 1898).

LAMPREY, an eel-like creature of the

group Cyclostomi and family Petromyzonidce.

The anatomical characters are described under Cyclostomi. The lampreys feed principally on fishes, to which they attach themselves by their suctorial mouths, and then scrape away the flesh with their rasp-like teeth. There are about 7 genera and 15 species, living mostly in the north temperate zone. Lampreys inhabit both salt and fresh waters, but those of the sea ascend rivers and brooks to deposit their spawn on pebbly shallows, and great numbers die there.

Most of them are plainly dark colored, but some of the fluviatile species are bluish or silvery, as the common one (Ichthyomyzon concolor), in the Upper Mississippi Valley and Great Lakes, which is about a foot long.

LAMPSACUS, ancient Greek city of Mysia, Asia Minor, on the Hellespont and opposite Gallipoli. The modern village of Lapsaki is built on its site. The city was colonized by Ionian Greeks, possessed a fine harbor and was celebrated for its wine. It came under Persian rule during the Ionian revolt, but after the battle of Mycale, in 479 b.c., it joined the Athe¬

nians. After its defense against Antiochus the Great of Syria in 196 b.c. it became an ally of Rome. Lampsacus was the seat of worship of the nature-god Priapus.

LAMPTON, William James, American

journalist: b. Lawrence County, Ohio; d. May 1917. He was educated in public and private schools and at the Ohio Wesleyan University and Marietta College; edited a newspaper at Ashland,. Ky. (1887—88) ; was reporter for the Cincinnati Times , writer for the Steuben¬

ville Herald and the Louisville Courier- Journal, editor of the Merchant Traveler, Cincinnati, and was

on the staff of the Critic and the Evening Star, Washington, and of the Detroit Free Press. He was also, after 1898, a special writer for the New York Sun and the New York Herald. In March 1910 he was appointed colonel on the staff of Governor Willson of Kentucky. He published (Yawps and Other Things) ; (Mrs. Brown's Opinions> (1886) ; Confessions of a Married Man5 ; (Tame Ani¬

mals I Have Known5 (1912), and (The Trolley and the Lady5 (1908). He was a member of the Poetry Society of America and the Author's League of America,"

LAMSDORFF, lams'dorf, or LAMBS-

DORF, Vladimir Nikolaevitch, Count, Rus¬

sian statesman: b. Petrograd, 25 Dec. 1844 (old style) ; d. 20 March 1907. He entered the For¬

eign Office in 1866 and was continuously in service until his resignation in 1906. He be¬

came Assistant Foreign Minister in 1897 and Foreign Minister in 1900. He was likewise Privy Councillor from 1901 ; and in 1902 he was Secretary of State to the emperor. He was one of the framers of the Pekin Treaty of 1900 which determined the future commercial relations of the two countries and stipulated that China should defray the costs involved in the suppression of the Boxer; and in his offi¬

cial capacity worked earnestly in 1903 to avert the Russo-Japanese War. He was successful in securing an amicable settlement with Great Bri¬

tain when the Russian fleet by mistake fired on a British fishing fleet off Dogger Bank 25 Oct.

1904. He possessed all the Orders of Russia from 1898.

LAMSON-SCRIBNER, Frank, American

botanist: b. Cambridgeport, Mass., 19 April 1851.

He was graduated at the Maine State College of Agriculture in 1873 ; served two years as clerk to the secretary of the Maine State Board of Agriculture; and was an officer of Girard College (1876-84). In 1887 he was made chief of the section of vegetable pathology in the United States Department of Agriculture, and from 1888 to 1894 was professor of botany in the University of Tennessee, and director of the agricultural experiment station there 1890-

94; chief of Division of Agrostology, United States Department of Agriculture, 1894-1901, and chief of the Insular Bureau of Agriculture, Philippine Islands, 1901-04. In 1889 he received from the French Minister of Agriculture the cross of the Chevalier du Merite Agricole.

He was in charge of exhibits of the United States Department of Agriculture at various expositions since 1904, including those at Saint Louis (1904), Portland, Ore. (1905), James¬

town (1907), Seattle (1909), Buenos Aires (1910),. Turin, Italy (1911), the Dry Farming expositions at Lethbridge, Can. (1912), Tulsa, Okla. (1913), Wichita, Kan. (1914), Denver, Colo. (1915) ; appointed expert on exhibits by the Secretary of Agriculture (1913) ; and mem¬

ber of the Government Exhibit Board by the President for the Panama-Pacific International Exposition. Among his writings published in the proceedings of various bodies, encyclopaedias and in government reports, are (Weeds of Maine5 (1869); ^Ornamental and Useful

Plants of Maine5 (1874) ; Agricultural Grasses of Central Montana5 (1883) ; (Revision of the North American Melicae5 (1885) ; (Grasses of Mountain Meadows and Deer Parks5 (1889) ; Philippine Agriculture5 ; ^Diseases of Plants5

(1885-87) ; and papers on (Grasses as Sand and Soil Binders,5 and on (Grasses and Foliage Plants,5

including descriptions of many new species (1894—1900). He has also pul3lished (The True Grasses,5 translated from Pie naturlichen Pflanzenfamilien5 (1890).

LAMY, la'me, Bernard, French philosopher and author: b. Le Mans, 1640; d. Rouen, 29

Jan. 1715. He studied at the oratory at Le Mans and in 1658 entered that at Paris. From 1671-75 he was professor of philosophy at Sau-

mur, and later taught at Grenoble and at Paris, LAMY — LANCASTER

68-5

He was removed from Saumur because of his advocacy of the Cartesian philosophy; and he later had trouble over the publication of one of his books without requisite permission. He thereupon, in 1690, retired to Rouen, where he pursued his literary labors. His works include (Nouvelle5 Reflexions sur l'art poetique) (Paris 1668 ; 2d ed., 1678); (L'art de parler> (Paris 1670; 8th ed., 1757) ; (Entretiens sur les sci-

ences) (Grenoble 1683) ; (De Tabernaculo foe¬

deris, de sancta civitate Jerusalem et de Templo ejusP a work of 30 years (Paris 1720), etc.

LAMY, Etienne Marie Victor, French

author: b. Cize, Jura, 2 June 1843. He took his degree in law at the University of Stanislas in 1869, and from 1871-81 he served in the House of Deputies. He was elected to the Academy in 1905 and in 1913 became its per¬

petual secretary. His works include (Le Tiers Parti, l'Assemblee nationale et la Dissolution (1872) ; (Temoins de jours passes) (1909, 1913) ; (Au service des idees et des lettres) (1909) ; (Ouelques oeuvres et quelques oeuvriers) (1910, 1913), etc.

LANARK, Scotland, a parliamentary, royal and municipal burgh and the county town of Lanarkshire, 32 miles southeast of Glasgow.

It is finely situated in romantic scenery; the Falls of Clyde are near by. The principal in¬

dustries are weaving and shoemaking. Lanark was the scene of some of Wallace's exploits, and it has interesting Roman and feudal re¬

mains. The race course is the scene of a fa¬

mous Scottish meeting. New Lanark, about a mile off, was for 28 years (1800-28) the scene of the noteworthy social experiments of Robert Owen (q.v.). Pop. of municipal burgh, 5,900.

LANARKSHIRE, an inland county in the

southwest of Scotland, bounded on the north by Dumbarton and Stirling shires, east by Lin¬

lithgow, Midlothian and Peeblesshire, south by Dumfriesshire and west by Ayrshire and Ren¬

frewshire. Area, 897 square miles. Holding tenth place in area of the Scottish counties, it contains one-fourth of the population of the country. It is almost entirely drained by the river Clyde and its affluents, and shows a re¬

markable diversity of aspect, bleak uplands, smiling orchards, busy coal fields and manufac¬

turing districts. The surface rises toward the south, where the Leadhills reach an altitude of 2,403 feet. The Upper (or southern) Ward is chiefly composed of hill or moorland; the Middle Ward is famous for its orchards and the Lower Ward has rich alluvial lands. Dairy farming is one of the principal agricultural industries. Lead-mining . is carried on. It is the principal seat of the iron and coal trade of Scotland, with its numerous dependent indus¬

tries, about 50 per cent of the coal mined in Scotland is raised in Lanarkshire. For Parlia¬

mentary purposes the county contains six divi¬

sions. The county town is Lanark (q.v.). Pop., including Glasgow, 1,486,081 ; exclusive of Glas¬

gow, 662,575.

Lanarkshire, which has many interesting Celtic and Roman remains,. .was in ancient times inhabited by the Damnonii, a Celtic tribe. It formed part of the Saxon kingdom of Strath¬

clyde, which in the 7th century was subdued by the Northumbrian Saxons, when great num¬

bers of the Celts migrated to Wales. The county has stirring associations with the struggle for Scottish independence; at Langside the fate of Mary, Queen of Scots, was settled by the de¬

feat of her forces by the Regent Moray (1568) ; the Covenanters defeated Claverhouse at Dum-

clog in 1679, and were in turn defeated by the Duke of Monmouth at Bothwell Brig in the same year.

LANCASHIRE, lan'ka-sher, county pala¬

tine in England, bounded on the north by Cum¬

berland and Westmoreland, on the east by Yorkshire, on the south by Derbyshire and Cheshire and on the west by the Irish Sea.

Area, 1,880 square miles. It is somewhat flat toward the shoreline, but elevated in the north and east. Geologically, carboniferous limestone prevails in the north, old red sandstone on the coast. Wheat, oats and potatoes form the prin¬

cipal crops; and among its minerals the prin¬

cipal are coal, 'slate, paving stone, stoneware and fireclay. The great coal field occupies 400

square miles between the chief rivers, the Rib-

ble — the dividing line between the northern and southern parts of the county — and the Mersey. Iron is abundant in the Furness dis¬

trict, also famed for its ship-building. Its minerals, and especially its great cotton indus¬

try, have given it world-wide fame; and its other manufactures include worsted, wool, silk, machinery, glass and soap. Liverpool and Manchester are the principal cities. The capi¬

tal is Lancaster. For Parliamentary purposes the county has 23 divisions. After the Norman Conquest, Lancaster became first an earldom and then a duchy, and since the reign of Ed¬

ward IV it has been a Crown duchy and pala¬

tinate. Pop. 4,767,832, of which 4,000,000 are in South Lancashire.

LANCASTER, lang'kas-ter, Sir James,

English navigator: b. about 1550; d. London, May 1618. He served under Drake against the Armada in the Edward Bonaventure. He com¬

manded the same ship in the first English ex¬

pedition to the East Indies (1591—94). The record of this voyage is one of perilous adven¬

ture, in which some Portuguese ships were captured, and a mutiny broke out in his own crew. Of the 200 who had doubled the Cape with him, but 25 returned to England. This voyage led to the founding of the East India Company, of which he was an original director.

He captured Pernambuco in Brazil in 1594, and commanded the first fleet of the East India Company (1600-03). On his return home he was knighted. He did much to promote the voy¬

ages of Weymouth, Hudson and Baffin, in search of the Northwest Passage to India.

The strait leading west from the north of Baffin Bay was in 1616 named Lancaster Sound by Baffin. He was the first of the navigators to use lemon juice as a remedy for. scurvy, the virtue of which was afterward entirely forgot¬

ten for nearly 200 years. Consult his (Vovages,>

edited by Markham for the Hakluyt Society (London 1877).

LANCASTER, Joseph, English educator,

the founder of the educational system bearing his name: b. London, 25 Nov. 1778; d. New York, 24 Oct. 1838. Early awakened to reli¬

gious impressions, he served as a naval volun¬

teer and afterward joined the Society of Friends, and became deeply imbued with the educational needs of the poorer classes. In 1798

he opened a school for children in Southwark, 680

which he conducted on the Madras system, previously made known by Dr. Bell. (See Bell, Andrew). The principal features of the sys¬

tem were the teaching of the younger pupils by the more advanced students, called monitors, and an elaborate system of mechanical drilL

by means of which these young teachers taught large numbers at the same time. Although his schools were opposed by the Established Church as subversive of its monopoly, he soon found powerful support, and in 1805 was teaching 1,000 children. The number of his patrons and the amount of subscriptions continuing to in¬

crease, he founded a normal school for training teachers in his system. He made extensive tours through Great Britain and Ireland, and in 1811 had founded 95 schools, attended by 30,000 children. He was somewhat unbusiness¬

like and improvident in his -habits ; became bankrupt, and emigrated to America in 1818, where schools were founded on his model at New York, Philadelphia, Boston and Baltimore, and afterward attemped to set up one in Montreal. He ultimately fell into poverty.

His family subsequently removed to Mexico, where his system was very popular, and where his grandchildren, bearing the name Lancaster-

Jones, became prominent politically.

LANCASTER, William Joseph Cosens,

"Harry Colling wood,® English civil engineer and author: b._ Weymouth, 23 May 1851. He entered the British navy as a midshipman, but on account of defective eyesight resigned, and became a civil engineer, in that capacity visit¬

ing different parts of the world. Under the pseudonym "Harry Collingwood,® he is known to juvenile readers in England and America as the author of the popular nautical romances, (The Secret of the Sands> (1878) ; (Under the Meteor Flag) (1884) ; (The Pirate Island) (1884) ; (The Congo Rovers* (1885) ; (The Missing Merchantman (1888) ; (The Cruise of the Esmeralda > (1894) ;

(1898) ; (The Castaways) (1899) ; (A Pirate of the Caribbees) (1900) ; (Across the Spanish Main (1906);

(1908); (Overdue* (1910).

LANCASTER, England, municipal bor¬

ough, seaport and county town of Lancashire, on the south bank of the Lune where it be¬

comes tidal 12 miles from the sea, and 21 miles north of Preston. The silting up of the estu¬

ary with sand has made the port inaccessible for large vessels, but a dock has been built at Glasson, five miles distant, where ships trans¬

fer their cargoes to lighters. The principal manufactures are cabinetmaking, oilcloth and linoleum, cotton and silk goods, and machinery.

Lancaster was a Roman station; its earliest charter is dated 1193; but except for the castle keep, built by the Normans, and Saint Mary's Church, no building antedates the 17th century. The town owns the gas, water and electric undertakings, as well as slaughter¬

houses, baths, markets and cemeteries. A mag¬

nificent town-hall, built in the classic style and the gift of Lord Ashton, was opened in 1909.

There are technical and art schools, a fine aqueduct and a fine public park, the Williamson Park. Pop. 41,410.

LANCASTER, Mass., town, and several

villages combined, in Worcester County, on the Nashua River, and the Boston and Maine Rail¬

road, 18 miles north of Worcester. Here is the State Industrial School for Girls, a public library, four churches, the Thayer Museum of North American Birds, high school, and manu¬

factures of brick, cotton yarn, brushes, etc. ; printing office and book-bindery ; also large poultry and other farming interests. The Sev¬

enth Day Adventists maintain a large academy at South Lancaster. The town was first set¬

tled in 1651 by John Prescott. Irf 1676 the Indians laid the place in ruins and killed 40

of the inhabitants. It is the birthplace of Mrs.

Caroline Lee (Whiting) Hentz, author of cThe Planter's Northern Bride* and other once popu¬

lar novels; James C. Carter, the noted lawyer, and Luther Burbank. The town owns the waterworks. Pop. 2,585.

LANCASTER, N. H., town and county-

seat of Coos County, on the Israel River, 126

miles north of Concord, on Western Boule¬

vard route of the State system of highways, with direct routes and good roads to all moun¬

tain resorts. There are excellent schools. The town is on the Boston and Maine and the Maine Central railroads and is a popular sum¬

mer resort and residential section for New York and Boston people, being situated in an attractive part of the White Mountain region.

It has manufactories of drugs, chemicals, lum¬

ber, wood-work and machinery. The town was settled in 1764. The town owns and controls the waterworks. Pop. 3,054.

LANCASTER, N. Y., village in Erie

County, on the New York Central and Hudson River, the Lehigh Valley, the Delaware and Lackawanna and

Erie railroads, 10 miles east of Buffalo. An important manufacturing cen¬

tre containing iron-works, brass foundries, ma¬

chine shops, glass-works, flouring-mills, brick¬

yards, knife-works and other industries. The waterworks plant is owned by the village. Pop.

(1920) 6,059.

LANCASTER, Ohio, city and county-seat

of Fairfield County, on the Hocking River and Canal, and the Pennsylvania and other rail¬

roads, 32 miles south of Columbus. It is the farming centre for the county; is in the nat¬

ural-gas belt and is engaged in the manufac¬

ture of agricultural implements, stoves, paper, automobile tires, wood-pulp machines, lenses, carbon pyrometers, foundry products, flour, glass, shoes, and has railroad shops and car¬

bon works. It is the seat of the State Indus¬

trial School for Boys, > Crawfis Institute and the Columbia Commercial School ; contains a fine courthouse, high school, four banks and many churches; and has electric light and street railroad plants; a good water supply; daily, weekly and monthly periodicals; and an assessed property valuation of over $2,000,000.

The city does an annual business amounting to $750,000. It was first settled in 1800 by Eben-

ezer Zane and is governed by a mayor and a city council of seven members elected every two years. The city owns the waterworks and gas plants. Senator John Sherman and Gen.

W. T. Sherman were born here. Pop. 14,840.

LANCASTER, Pa., city and county-seat of Lancaster County, the richest agricultural county in the United States (census 1910), on the main line of the Pennsylvania and the Phil¬

adelphia and Reading railroads, 68 miles west

of Philadelphia and 37 miles east of Harris¬

burg. It is the manufacturing trade centre for the county; it is an important tobacco market and is engaged in tobacco growing, cigar-mak¬

ing, cattle raising and the manufacture of cot¬

ton goods, locks, watches, umbrellas, silk, lino¬

leum, cork, iron and steel goods. It is the seat of Franklin and Marshall College and the Thaddeus Stevens Industrial School of Penn¬

sylvania; contains the General, Saint Joseph's and the County hospitals, Children's Home, a public library, a Y. M. C. A. and Y. W. C. A. ; has gas and electric light plants, 162 miles of electric railroad in the city and county, 13 na¬

tional and State banks having a combined capi¬

tal of $2,904,000, about 50 churches and an as¬

sessed property valuation of over $29,000,000.

The city was founded in 1718 by Mennonites (q.v.) and was called Hickory Town until 1730.

In 1777 Congress sat here for a few days and from 1799 to 1812 it was the capital of the State. It became a borough in 1742 and a city in March 1818. It is governed by a mayor, elected every two years, and by a select coun¬

cil of nine members and a common council of 27 members elected annually. Here is the birthplace of

Gen. John Fulton Reynolds, home of President James Buchanan, 15th President of United States, and the tomb of Thaddeus Stevens, the great statesman. The municipality spends upward of $250,000 yearly in maintain¬

ing the public service. Pop. 55,000.

LANCASTER, S. G, town and county-seat

of Lancaster County, located on the Southern and Lancaster and Chester railroads, 72 miles north of Columbia and 40 miles south of Charlotte. This is the shipping and trade cen¬

tre of a large and fertile district devoted to the growing of cotton, tobacco, alfalfa and grain, and to the live-stock industry. The lar¬

gest cotton-mill under one roof in the South, 137,778 spindles and 3,006 looms, is located here; machine shops, cotton-oil mill and other industries; the second largest department store in the State ; splendid graded schools ; paved streets and all modern city conveniences; 100

business houses; three strong banks; one semi¬

weekly newspaper; magnificent churches; a salubrious climate and a most hospitable citizen¬

ship. Pop., city, 3,500; city and mill district, 7,000.

LANCASTER, House of, a name given in

English history to designate the line of kings — Henry IV, V and VI, immediately descended from John of Gaunt, fourth son of Edward III.

Edmund, second son of Henry III, was created Earl of Lancaster and Leicester. His son Thomas added Derby and Lincoln to his titles, became leader of the baronial opposition to Edward II and was beheaded for treason. His grandson was advanced to the dignity of a duke and, dying without male issue, the

in¬

heritance fell to his daughter Blanche, heiress of Lancaster, who became the wife of John of Gaunt, who in 1362 was created Duke of Lan¬

caster. His elder brother Lionel was created Duke of Clarence, and thus originated the rival houses of Lancaster and York. Henry IV, son of John of Gaunt, deposed Richard II, son of Lionel, and usurped the crown, being suc¬

ceeded by his son Henry V, and both sover¬

eigns obtained Parliamentary and Church sanction for their rule. The long minority of Henry VI and his feeble rule ended in the Wars of the Roses (q.v.), the contest being concluded by the union of the two houses in the marriage of Henry VII, the Lancastrian heir, with Elizabeth, eldest daughter and heir¬

ess of Edward IV, of the House of York. See also England.

LANCASTER SOUND, an outlet of Baffin

Bay, in lat. 74° 20' N., connecting it with Bar-

row Strait. This opening into the Arctic Ocean was discovered by Baffin in 1616 and was named in honor of Sir James Lancaster (q.v.), but it was first navigated by Parry in 1819. Only part of it is navigable each sea¬

son.

LANCASTERIAN SCHOOLS. Democ¬

racy had not yet obtained such a strong hold upon the people of America at the beginning of the 19th century as to lead them to provide free public schools for all the children. Then, too, the financial conditions of the country were such that the people were unable to meet the expense which would be incurred in the maintenance of such schools. Private schools which received pay pupils,

church and charity schools and home instruction were the educa¬

tional facilities afforded in these early times.

Probably not more than one-fourth of the children of the country were afforded the op¬

portunity of attending a school. Men of vi¬

sion recognized the menace to a republican form of government in a large body of illit¬

erate citizens and the need, therefore, of reme¬

dying the situation which existed. It was known that in London a type of schools had been established which afforded instruction for a large number of pupils at very small cost.

These schools were known as Lancasterian schools.

The founder of these schools was Joseph Lancaster, a native of London. His parents were very poor and he received only the rudi¬

ments of an education. He possessed a philan¬

thropic, benevolent spirit and showed marked interest and sympathy in the poor. At the age of 20 he opened in Southwark, London, in 1798, a school for the poor. His personality, his genius for organization and the great neces¬

sity for a school of this type made the enter¬

prise a success and he soon enrolled 1,000 pu¬

pils in the school. A small tuition was charged those who could pay it but no pupil was refused admission who was unable to pay tuition. The receipts from tuition did not permit the em¬

ployment of sufficient teachers to give instruc¬

tion. Lancaster was familiar with the type of school maintained by Dr. Andrew Bell under a monitorial

system. He modified and im¬

proved the Bell system and adapted it to meet the needs of his school.

In 1805, the legislature of New York incor¬

porated an organization known as <(a society for establishing a free school in the city of New York for the education of such poor chil¬

dren as do not belong to or are not provided for by any religious society.® One of the prime movers in the organization of this school was DeWitt Clinton. The first school opened by this society was in 1806 and the Lancasterian system was put in operation in that school.

The dominant influence in this society was that of the Friends and as Lancaster's school in London was non-sectarian and had been sup-

ported by the Friends it was natural that this society should adopt the Lancaster type of school. The name of the society was later changed to Public School Society and con¬

tinued its operations for nearly 50 years or un¬

til 1853 when it was merged into the public school system of the city under the control of the board of education. More than 60 schools had been established and in each of these dur¬

ing their entire history the Lancasterian system was in operation. While the Lancasterian schools will always be associated with the Pub¬

lic School Society of New York City, such schools were very generally organized in the northern and eastern parts of the United States. He attempted the organization of an institution in Baltimore under

his own direc¬

tion known as Lancasterian Institute. Little is known of this institution except that it was a failure. He also organized a model Lancas¬

terian school in Philadelphia. Outside of New York city these schools were not a factor in public education for a longer period than 20

years and gradually disappeared after 1830. A fine school building administered under the Lancasterian plan was erected at Albany in 1812

and still stands on Eagle street one block south of State street and is owned and occupied by the Albany Medical College.

The most distinguishing feature of the Lan¬

casterian schools was the employment of moni¬

tors. One teacher with the assistance of moni¬

tors would give instruction to 500 and often to 1,000 pupils. The monitors were chosen from the pupils in the school. The pupils who were regarded by the master as the best students in the advanced classes were selected. They were generally allowed their tuition for the services rendered and sometimes were paid a shilling or two per week. A monitor was charged usually with the instruction of 10 younger pupils. He sat on a high stool or raised seat at the end of a bench on which his pupils were seated.

These monitors were very often divided into two classes — general monitors and subordinate monitors. They were called monitor-general of reading, monitor-general of writing, moni¬

tor-general of arithmetic. The subordinate monitors were called assistant monitors or simply monitors of reading, monitors of arith¬

metic, monitors of writing, etc. Each monitor wore a

badge or ticket usually made of leather and on this was printed the title of the monitor and his rank.

The curriculum in these schools consisted almost wholly of instruction in reading, writ¬

ing, arithmetic and morals or religion. In¬

struction in science and in English grammar was added to the course of study in the schools of New York City during the later years of their existence. The teaching was wholly me¬

chanical. The sole effort of instruction was aimed at imparting information and developing the memory. There was an absolute lack of effort to arouse the child's powers of observa¬

tion, to stimulate the exercise of his own men¬

tal attainments and to develop him into a rea¬

soning, thinking being. Much of the instruc¬

tion was given by dictation and by the use of formal questions. This was necessary under the monitorial system because the monitors did not possess sufficient education to give inde¬

pendent instruction. Sand tables were used for the children in the younger classes. Boards containing the letters of the alphabet — small and large — were posted in the schoolroom.

The alphabet wheel was also largely used. This was arranged so that a wheel adjusted to a standard might be turned in such a way as to show consecutively the letters of the alphabet.

When a letter was exhibited the child from dic¬

tation traced the letter in the sand or on a slate.

Children who had not received instruction were placed beside those who had received instruc¬

tion, so that the latter might aid the former.

This process of teaching the alphabet was te¬

dious and required from one to two years to enable the child to <(learn his letters.® This process was termed a ((very intellectual method of teaching the alphabet.® Writing was of course taught in connection with the reading.

When a pupil had learned his alphabet he was promoted to the class in monosyllables and was taught b-a spells ba. Arithmetic was taught un¬

der the same general plan. The subject in¬

cluded the four fundamental processes. The pupils were first taught to copy figures from the blackboard. The monitor would write a column of figures on the blackboard and the first pupil would read aloud as, (<3 and 4 are seven and 5 are 12 and 7 are nineteen and 6 are twenty-five, put down 5 and carry 2 to the next.® If the first pupil made an error in this addition the pupil who discovered it took rank over the one who made the error. As pupils became proficient in arithmetic they were pro¬

moted in that subject independently of their proficiency in other subjects. They were pro¬

moted in each subject on the same basis. Here was the idea of the modern departmental sys¬

tem of school organization. Teachers of to¬

day and even the layman in education will un¬

derstand the general defects of the Lancasterian system of instruction.

The principles upon which Lancaster

founded his schools were sounder than his plan of organization or his systems of instruction.

He declared that all children were entitled to an education and that the good of society required that they should be educated. He accordingly held that it

was the obligation of a nation to provide school facilities for all children who would not otherwise be accorded such privi¬

leges. He also opposed the action of any church in attempting to compel children not members of such church to attend its schools.

He regarded such action as the infraction of a most sacred personal right. These fundamental principles of public education were sound and conform to the general principle now accepted wherever public schools are maintained that <(education is the function of the state.®

Lancaster made extended use of mottoes which were posted conspicuously in the school¬

room, on cards or boards, and which were also made the subject of classroom instruction.

Some of these were as follows : ((A place for everything and everything in its place.® <(Let every child at every moment have something to do and a motive for doing it.®

One of the first agencies in the country for the training of teachers was the Lancasterian schools. The annual report of 1814 of the so¬

ciety for establishing a free school in New York, states that from its beginning (1806) one of its great objects of interest has been to train teachers. In 1818 Charles Picton, a trained disciple of the Lancasterian system, was LANCE — LANCELOT OF THE LAKE

brought from London to take charge of a pub¬

lic school in New York City. The training of teachers which had already received attention was given prominence and the trustees an¬

nounced that they would gratuitously train teachers

for this system in six or eight weeks.

Lancaster did not approve this limited training and referred to it as preparing ((mush-room teachers? The plan of training teachers in New York City was later improved and the course extended to include more advanced in¬

struction. The work of these schools in train¬

ing teachers was no more effective than the in¬

struction which the schools provided for the children.

Lancaster was opposed to the rod as a dis¬

ciplinary agency. His ideas on this subject are represented in the following statement: <(The guillotine in France, during the Reign of Ter¬

ror, and the rod in the hands of the advocates of ignorance, are alike.® DeWitt Clinton stated in relation to the discipline of these schools, ((The punishments are varied with cir¬

cumstances, and a judicious system of rewards, calculated to engage the infant mind in the dis¬

charge of its duty, forms the keystone which binds together the whole edifice® Rewards were offered for meritorious conduct and fines were imposed for breaches of discipline. These were arranged on an elaborate scale through the issuance of tickets ; some of the common modes of punishment were as follows: placing a wooden log weighing from three to eight pounds around the pupil's neck ; putting wooden shackles on the legs of a pupil and compelling him to walk around the room, putting the hands behind the back and tying them with wooden shackles, tying the legs together de¬

tention after school hours, placing a label on the pupil which specified his offense, compel¬

ling a pupil to wear a tin or paper cap or a fool's

coat, giving an indolent boy a cart or a pillow. It is suggested in the manual that boys should be rocked in a cradle.

In the year 1818, Lancaster came to the city of New York. He was received as a distin¬

guished guest of honor. He was welcomed on behalf of the city bv the recorder and the mayor and on behalf of the State by Governor Clin¬

ton. The governor invited him to Albany and there introduced him to the leading men of the State. He then visited the city of Philadel¬

phia and was there received with unusual honor and distinction. From Philadelphia he went to Washington where the House of Representa¬

tives passed the following resolution: (

Clinton gave the Lancasterian system his un¬

qualified approval and through his great in¬

fluence the system was readily adopted in every city in the State of New York. Clinton said of him, ((I recognize in Lancaster the benefac¬

tor of the human race. I consider his system as creating a new era in education, as a blessing sent down from heaven to redeem the poor and distressed of this world from the power and dominion of ignorance.® One of the governor’s last official acts was to recommend the enact¬

ment of law authorizing the supervisors # of each county to raise $2,000 for the establish¬

ment of a monitorial high school in each county of the State.

This system did not provide a sound sys¬

tem of public education. It became established in

certain parts of the country, notably in New York City, and delayed the establishment of a sound, practicable, efficient system of education in such places for several years. Its adoption not only throughout the United States but in England, Holland and Germany was due largely to the claim of its friends that ((one teacher could instruct one thousand pupils.® Its trial throughout the world for a period of 25 to 50

years shows the lack of appreciation of a sound, scientific system of education which existed not only in America but abroad in the formative period of our national government.

Thomas E. Finegan,

Deputy Commissioner of Education and Assist¬

ant Commissioner in charge of Elementary Education, State of New York

LANCE, George, English painter: b. Dun-

mow, Essex, 24 March 1802; d. Birkenhead, 18

June 1864. When less than 14 years old he entered the studio of Haydon in London and remained a pupil there for seven years, also studying at the Royal Academy. He began to exhibit in 1824 and is best known as a painter of flowers, fruits and game, but occasionally produced historical and genre work. He ex¬

hibited 135 pictures at the British Institution, 48 at the Society of British Artists and 38 at the Royal Academy. His work may be seen in the National Gallery, the South Kensington Museum and the Tate Gallery. Among his pupils were Sir John Gilbert and William Duf-

field.

LANCE, a weapon consisting of a long

shaft, with a sharp point, much used before the

invention of firearms and still in use. It was common among the Greeks and Romans. Fred¬

erick the Great formed an entire regiment of lancers. The Austrians followed and soon established three regiments. After the partition of Poland, many Poles entered the French serv¬

ice and a body of Polish lancers was estab¬

lished. The war with Russia, in which the efficiency of the lance in the hands of the Cos¬

sacks, particularly in 1812, was strikingly mani¬

fested, brought this weapon into still more repute, and the Prussians formed three regi¬

ments. The French lancers were formed in 1813 to cope with the Cossacks. Almost all the armies of Europe have regiments of lancers: the Cossacks of the Ural, the German LIhlans, the independent cavalry of the French dragoons, the first regiment of each division of iurkish cavalry and the Bengal native cavalry are armed with the lance, as are four Belgian and six British cavalry regiments. This arm is not in use in the United States cavalry. The weapon is from 8 to 11 feet long and is made of oak, bamboo or (in the case of the Uhlans) of tubular steel. It has long been a subject of debate whether the lance or sword is the more effective cavalry weapon ; its execution is most deadly in the pursuit of a fleeing enemy.

LANCELET. See Amphtoxus.

LANCELOT OF THE LAKE, a name

celebrated in the traditions relating to King Arthur or the Round Table. # Lancelot was the son of Ban, king of Brucic, and after his father’s death was educated by Viviana (the Lady of the Lake). She took him to the couit 690

of King Arthur, to make him one of his knights, and to admit him to the heroes of the Round Table. Arthur with his sword (Escalibor) dubbed him knight, and Lancelot subsequently distinguished himself by his great heroism. His love for Guinevere, the wife of Arthur, and his disregard of Morgana, a fairy, and the sister of Arthur, placed the knight in the most dan¬

gerous situations, from which, however, he al¬

ways extricated himself. He finally succeeded to the throne, after having defeated King Claudas, the murderer of his father, but was slain by Mordred, the murderer of Arthur, whom Lancelot wished to punish. In his last moments Viviana appeared and kissed the last breath from the lips of the dying hero, the sole survivor of the Round Table. His remains were deposited near those of Guinevere.

LANCER, a soldier of the European light cavalry, carrying the lance as a weapon. The use of the lance is of mediaeval origin although in later European warfare the Cossacks orig¬

inally used the lance ; it was not introduced into regular army regiments until Napoleon made use of it. Lancer regiments have since been incorporated in most European armies. The Prussian regiments so armed are designated Uhlans, while the Cossacks retain their original name with the weapon. There are no lancer regiments in the United States army. The lancer regiments were used effectively in the early stages of the European War, but trench warfare interrupted their usefulness, together with that of other cavalry divisions. The lancer regiments are most useful when the enemy infantry is in retreat, the effect usually being demoralizing.

LANCET-FISH. See Surgeon-fish.

LANCET WINDOW, a high and narrow

window with an arch acutely pointed, re¬

sembling a lancet in form. This form of win¬

dow structure was characteristic of the first half of the 13th century and remained in use in England and Scotland long after the French had perfected the geometric forms. They were often built double or triple and in some in¬

stances more than three windows are used to¬

gether, as in the case of the Five Sisters at York Minster. The groups at Ely and Salis¬

bury are excellent examples of the double and triple types. In the lancet groups the central arch may be higher although this is not invariable.

LANCEWOOD, the wood of a West In¬

dian tree (Bocagea virgata), of small or mod¬

erate size, but of great usefulness and value, possessing in a high degree the qualities of toughness and elasticity. It is well adapted for the shafts and poles of light carriages, and for all uses where light, strong, elastic timber is required. Both in strength and elasticity it is considered superior to the best ash. The name is also applied to the trees themselves, as well as to several other trees and their wood.

LANCHOW, lan'chou, China, capital of

the province Kansu, on the right bank of the Hoang-ho and near the Great Wall of China.

It is one of the most important cities of in¬

terior China, due in part to its situation at the junction of the trade routes to Turkestan, Tibet and Mongolia. The streets of the city are paved with stone, although the buildings are chiefly of wood. The important manufactories are those of woolen and camels' hair goods and ammuni¬

tion, while a large trade is carried on in silks, silver and jade ornaments, fur, wood-carvings, tin and copper wares, grain, vegetables, fruit and tea.

The population is variously estimated at from 100,000 to 500,000.

LANCIANI, lan-chia'ne, Rodolfo Amedeo,

Italian archaeologist: b. Rome, 1 Jan. 1847.

He received his education at the Collegio Romano and the University of Rome, and in 1878 was made professor of Roman topog¬

raphy in the latter. He attained celebrity by his investigations among the ruins of Rome, is the author of upward of 400 archaeological or historical publications, and is a member of many learned societies and a senator of the kingdom of Italy. In 1887 he gave a course of lectures at Harvard University, afterward pub¬

lished with the title (Ancient Rome in the Light of Recent Discoveries) (1888). Other works of his are (LTtinerario di Einsiedeln e l'Ordine di Beneletto Canonico) (1891) ; (Pagan and Christian Rome) (1893) ; (The Ruins and Ex¬

cavations of Ancient Rome) (1897) ; (Forma Urbis Romae) (1893-1901), a map of Ancient Rome in 46 sheets on a scale of 1 :1000, show¬

ing all the excavations; (New Tales of Old Rome^ (1901); (Golden Days of the Renais¬

sance in

LANCIANO, lan-chia'no (ancient Aux-

anum) , Italy, city and episcopal see in the prov¬

ince Chieti, eight miles from the Adriatic and 12 miles southeast of Chieti. The city is built upon three hills, two of which are connected by a Roman bridge, and is 984 feet above sea-

level. It has an imposing cathedral, with a clock-tower built in 1619. There is a Gothic church erected 1227, and there is a fine rose window, 1362,

in the church of the Annunziata.

It is the seat of an archbishop, whose palace is built upon the remains of an old Roman theatre. The ancient city was a judicial and civic headquarters under Roman occupation.

The modern city has schools, a hospital, gym¬

nasium, library and other progressive institu¬

tions. The trade of the city is concerned largely with the products of the surrounding country, silk, wine, oil, fruits and grain, and there are linen and hemp factories. Pop. (commune) 19,917.

LANCRET, lan'kra, Nicolas, French

painter: b. Paris, 22 Jan. 1660; d. there, 14

Sept. 1743. He studied under D'Ulin and later under Gillot who had taught Watteau. Lan-

cret's style was largely influenced by Watteau, for whom he had a great admiration, and while his productions never equalled those of his model, he did excellent work in the portrayal of the gay scenes of the court under the Re¬

gency. More than 80 of his paintings have been engraved and the total of his work is immense. He was admitted to the Academy in 1719 and in 1735 he became a councillor. The National Gallery, London, has four of his paintings, ; the Brit¬

ish Museum has an excellent series of draw¬

ings done in red chalk ; there are 28 of his paintings in the royal palaces at Berlin and Potsdam, these being purchased by Frederick the Great ; there are six in Petrograd, and numerous others in collections, public and pri¬

vate. Consult d'Argenville, (Vies des peintres,)

and Ballot de Sovet, (Lloge de M. Lancret) (1843; new ed., 1874).

LAND, in Political Economy. In eco¬

nomic theory as in social fact, land holds a pe¬

culiar position, by which the laws normal to other industrial objects are deflected. Fore¬

most is the fact that, it being an indispensable locus for all industry or even social existence, its price or rental in a community where all the land is taken up is non-competitive, a monopoly which is also a sine qua non, as would be that of air or water, and consequently is always higher than its productive value justifies, or what is the same thing, men are content to receive a less return on their capital invested in it than in any other object. This is of course aggravated in countries where, as in England before 1832, all political privileges are annexed to it, the richest manufacturer having no vote unless he bought land and became a freeholder; less so, but still heavily, in England at present, where it and its tenantry confer great social and political prestige ; but most of all in socie¬

ties like the south of Ireland where there is practically no industry but agriculture, and a footing on the soil at some terms is the one refuge from starvation. Farms there in former days were bid for on occasion at 10 or a dozen times the gross annual produce, because there are no degrees in impossibility, and they could not in any event be deprived of a bare coarse subsistence. But the only countries in which it is on an economic level with other objects are those like America, where there has been an inexhaustible abundance of land to be had at about the cost of surveying and registering title ; and here it has been the economic regulator of other prices and wages, which cannot fall below the profit of free agriculture.

The economic discussion over land in Eng¬

land, where freeholds are very difficult to ac¬

quire, naturally took the form of an investiga¬

tion of the phenomena of Rent (q.v.) ; and an important part of the first economic philoso¬

phies was based on a theory of the origin and mutations of the rent charge. According to them it could only exist where there were different grades of soils, and represented the difference in profit of farming better ones over that of farming those just sufficient to make their utilization worth while. In fact, however, even if all soils were alike, rent would still be paid for their hire if the labor and capital could produce more than the rental. Another principle early formulated, differentiating the working of land from other industries, was that of diminishing returns : it was said that labor and capital in any other field produce in exact proportion to their volume, whatever that be, —10 times the investment producing 10 times the return, — whereas upon the land it is manifestly not so; extra labor produces but a small and rapidly dwindling accretion to the product, till it soon ceases to produce any. Here again there was imperfect observation: two plowings or hoeings would not produce double the crop of one, but double the outlay invested in manures or other fertilizers, loads of loam, etc., often produce very much more than a propor¬

tionate extra returp. The real difference is, that in other industries the extra outlay can be applied in exactly the same channels, in land it must seek different ones.

Land in this sense refers purely to land used for raising food; where it has other uses, it is subject to the general laws of industry. Land, for instance, on which is located a water-power for manufacturing, or mineral land, if for sale, follows the usual mercantile conditions.

The subject of land belongs under Land Laws; of the single tax, under Taxation; of land nationalization, under Socialism, it being a branch of the question how far it would profit the country to place the entire social machinery under elected instead of self-determined man¬

agers ; of agrarian difficulties, under the special branches of history concerned — the Roman agrarian contests, for example, shed little light on and are little illumined by the system of peasant distribution in France or the Irish land laws, with its changes from feudal to dual and finally to occupying ownership. For the methods followed in the United States, see Public Lands.

LAND BANKS, Massachusetts. Early

in the 18th century Massachusetts paper cur¬

rency had driven abroad nearly all her coin, broken her credit and demoralized her business, and the failure of the Quebec expedition in 1711 carried the embarrassment to a climax.

Encouraged by the success of the South Sea scheme in England, some Boston merchants in¬

duced the General Court to make the bills of credit of the province legal tender for debts of seven years previous and three years subse¬

quent. Besides this, a number of notable men, including Peter Faneuil, devised the scheme of a bank whose resources should rest on real estate mortgages, to make loans of its own notes ; to encourage subscriptions it was pro¬

posed that Harvard College should have $1,000

a year out of the proceeds. Governor Dudley opposed it strongly; his son, the Attorney-Gen¬

eral, memorialized the General Court against it, and the latter forbade them even to print their scheme till they had laid it before the court, which then

refused to incorporate it. To ward it off and produce the same result, at Dudley's suggestion a public bank was founded, with a capital of $250,000 provided by the Gen¬

eral Court, to lend bills of credit for five years at 5 per cent, one-fifth to be repaid each year, the whole secured on real estate mortgages.

In 1739, with the bad state of the finances in¬

creased by the still worse state created by the paper money of Rhode Island, and silver rated at 27 to 1, the project of a land bank was again brought forward. Several hundred persons were to form it; notes were to be issued up to $750,000, the security being a mortgage on each partner's real estate in proportion to his hold¬

ing, or sureties also possessed of sufficient estate, and each partner paying 3 per cent on the loans made him, in bills or in kind, at a rate fixed by the directors. The House of Representatives was largely favorable, but Gov¬

ernor Belcher denounced it as tending to fraud, disturbance of order and confusion of business, and he set aside the election of the speaker and nearly half the council for connection with the bank, besides displacing many office holders.

Despite this, the company began operations, ex¬

pecting that the notes would circulate readily.

They were mistaken: not over $300,000 were issued. But in 1741 Parliament not only ex¬

tended to the colonies an act. forbidding the issue of bills not payable in coin at the end of the term, but made the directors liable to the 692

holders of the bills for their face with in¬

terest. As a large part of them had been issued at a discount, the partners (though many had little to lose) were threatened with ruin, and Parliament had to permit relief measures. One of these partners, who lost all his property, was the father of Samuel Adams.

LAND OF BEULAH (Isaiah lxii, 4),

the name of Israel when it shall be married.

In (Pilgrim's Progress5 Bunyan uses the term to designate a resting place ((where the sun shineth night and day55 and where the Pilgrims remain until they cross the river Death to the Celestial City.

LAND BOUNTY. See Bounties.

LAND-BRIDGES ACROSS THE

OCEANS. One of the most attractive studies in geology is that of the change in form of the continents, and in the relative spaces of ocean, especially since the continents assumed their present general shape, and especially since the beginning of the Age of Mammals, or Tertiary Period, — ithat geological period which closed with the Glacial Epoch.

It is plain that during this period millions of years long, many changes occurred in the level of the lands of the globe. Sometimes one or the other of the great masses was lifted, until a much larger expanse of land was out of water than before; then again it would sink until the. sea overrran broad areas. Geologists know this from the fact that they find rocks which were evidently formed under salt water.

By their characteristic fossils, and by other marks, they know where these rocks belong in the scale of geological succession, or time; and by plotting them on a map they can show ap¬

proximately the shape any continent had at some long-past time. Of course this may not be done for

any stage you may ask for, but it can for some of them. Thus in the early part of the Tertiary, while both Americas were in much their present condition, only broader in Canada, Europe was an archipelago of large islands, separated from Asia by a broad sea, and the Mediterranean extended over the Saharan deserts, leaving central and southern Africa as an island. All Persia, Syria and Arabia were then under water, so that the cold Arctic Sea flowed through into the Indian Ocean, which must have made the climate of India and East Africa very much cooler than now.

The most interesting feature of these

changes, however, is that by which, now and again, the Old World was connected with the New by necks or spaces of land, known as "land-bridges55 ; especially as these permitted an interchange of plants and animals, giving to us many new ones from the other side of the ocean, including, finally, man himself.

No more fascinating department of natural history exists than the study of the distribution on the earth of living beings, past and present.

A striking result of this study is the knowledge that, while the continents and great islands of the southern hemisphere differ from each other, and from the northern hemisphere, in their plants and animals, the several parts of the northern hemisphere are closely similar in this respect. The same families of trees — pines, spruces, cedars, oaks, maples, chestnuts, birches and so on ; and the same sorts of animals —quadrupeds, birds, fishes and insects — are found in Europe and northern Asia as in North America. In fact, many of the living species are virtually identical in all three regions. It is hard to separate the Canadian marten from the Russian sable, our big-horn from the Hima¬

layan argali, our moose and caribou from the elk and reindeer of Norway; and some, like the polar bear, fox and wolf, the raven, golden plover, crossbill,

bank-swallow and others, are quite alike in both the Old and the New Worlds.

This has been so, judging by the fossils in the various Tertiary strata, ever since the Age of Reptiles.

What is the explanation? None of these animals, save possibly certain birds or fishes, could get across an ocean. They must have been able to travel upon land, and it is from their presence that it seems certain that land-

bridges have existed, at various times in the past, between the northern parts of America, and Europe and Asia.

Let us pause here a moment to note what North and South America have to show on this point. South America possesses a fauna which is peculiar to itself. Several large groups there are not represented in any other part of the world, and nearly all its animals in every class, are different from those elsewhere. The fossils show that the same was true in the far past; so that it looks as if that continent has been isolated ever since its life began: only Australia is more self-supplied.

But if South America has always been cut off from the rest of the world (except from North America, at times), where did it get its marsupials? These were numerous there in Tertiary times, and big and little opossums still remain. The only answer is a supposition that at a period when mammals and birds were just beginning to take distinctive form in a world mainly reptilian, both the Australasian islands and. South America were attached to an Ant¬

arctic continent then far broader than now. An elevation of 10,000 feet above the present level would expose dry land far beyond the Antarctic Circle and include Australia, New Zealand and Patagonia in a South-polar continent; and there is other evidence that such an "Antarctica55 ex¬

isted in Cretaceous and Paleocene times, and that its borders, at least, had a temperate climate.

It is supposed, also, that at the same time, and somewhat later, Brazil and Africa were connected by a ridge, or a chain of islands, since it is hard to account otherwise for the presence of monkeys in South America, which first appeared there in Miocene time, or for certain rodents like those of South Africa.

Furthermore, . the Atlantic is comparatively shallow and island-studded even now in that narrow part.

Let us return now to North America and its oceanic bridges. These appear, from the data given in the works of Professors Osborn and Scott, to have been repeatedly established and destroyed by alternating elevations and depres¬

sions of the 'land and the sea-bottom, both before and during the Age of Mammals.

At the beginning of the Tertiary Period, continuous land encircled th'e North Pole. That this would require no very startling change from the present level may be seen by looking at a "hqrt of the northern oceans. This shows LAND-BRIDGES ACROSS THE OCEANS

that a broad space extends from Scotland to Greenland, where the water is nowhere more than 1,000 fathoms deep; and that the central part of this is a wide, winding plateau, named Wyville Thomson Ridge, which at the present time comes within 300 or 400 fathoms of the surface. Therefore an uplift of the bottom of the north Atlantic of less than 2,000 feet would extend our coast beyond Greenland and the Banks of Newfoundland, include the British Isles within Europe, drain the Baltic and North seas and connect the two continents, by. a neck of dry land about 300 miles wide in its nar¬

rowest part. There also would appear, prob¬

ably, a second line of dry land about on the 80th parallel. Both of these, in the warm cli¬

mate of the early Tertiary Period, would speedily have become covered with vegetation and attract and sustain wandering animals.

On the Pacific side, such a rise would drain nearly the whole of Bering Sea and join Alaska to Siberia by a stretch of mountainous land a thousand miles in breadth. Even . 500

feet of uplift would now close Bering Strait.

A moment's thought will show one that a decided, if slow, alteration in the climate of all northern lands must have followed the ele¬

vation of these "bridges.® The Arctic Sea would then be confined to its own basin, and unable to pour its icy currents into either the Atlantic or the Pacific Ocean. Hence the warm Gulf Stream and its Oriental counterpart, the Japan Current, would, and must, follow a solid coast right around to Europe and western America, respectively, without interference by any cold currents from the north, as at pres¬

ent ; and so the whole ocean must have been warmer than now. Hence, we find in the north¬

ern coast-rocks of that period remains of. trop¬

ical sea-animals which could not exist in waters as cold as those of the present day.

At the same time solid land extended much farther toward the North Pole than at present, warding off Arctic influences to some extent.

All these circumstances, with others, pro¬

duced a warm climate in the earlier half of the Tertiary, so that, as the fossil plants of that time show us, tropical conditions prevailed in the United States, and even southern Green¬

land must have had weather in summer like that of Maryland, for it was clothed with simi¬

lar plants and hardwood trees.

One may ask: What is the evidence that enables geologists to speak so confidently of the existence of "these "land-bridges,® since noth¬

ing is left of them? It is this:

In the older layers of North American Eocene rocks, all the fossils are of animals peculiar to this continent — families and species which had developed here alone. In the next later layers, however, races of animals sud¬

denly appear, for which no American ancestors can be found, but which are identical with those of the Old World of that time. None of these is much like any present creatures, of course, but the similarity of fossils on both sides of the oceans is so great that it is evident that these animals must then have been able to pass from one continent and colonize the other.

The road lay far to the north, but the genial climate kept it open to all sorts of migratory c re 3. tu res.

There was at this period, . also, a broad isthmus between the two Americas, permitting migration north and south as well as east and west, and it is from that time that we date the arrival of many ancient South American animals, one of which still remains — the opossum. Such a condition for world-wide .

distribution of plants and animals seems never to have arisen again, although lesser migra¬

tions have occurred, for "bridges® were sub¬

merged and re-established more than once in the subsequent periods.

Finally the advancing world arrived at that

comparatively recent stage, just preceding the Glacial Epoch, which is known as the Pleisto¬

cene. All land-connections between Europe and Greenland had then sunk under the waves, leaving only Iceland, the Faroes and the Shet-

lands as monuments to its former situation ; but now the basin of Bering Sea was once more drained and an isthmus of dry land, a thousand miles wide, united Siberia with Alaska, and this remained until the disappearance of the continental ice-cap.

It was by this broad path that America be¬

came peopled by a large number of the many kinds of animals which formed the truly grand fauna of our country in the Pleistocene Epoch.

Only those who have studied the matter realize how rich and varied this fauna was (as compared with the present paucity) in the genial time just preceding the general glacia¬

tion. A large proportion of the animals were immigrants; and, as no bridge had existed across the Atlantic for a long time previous, they must have come over from Asia by way of Alaska.

In this way we obtained most of our north¬

ern animals — the bighorn and the mountain goat, the bison, such deer as the moose, caribou and wapiti, the bears, the badgers, otters and other fur-bearers, foxes, wolves and a long list of lesser mammals, birds, etc. None of these have American ancestors. In return, America gave to the Old World the horses and camels, which, originating here, passed over into Asia and on beyond, where they survived, in more favorable circumstances, the extinction that overtook their races here. These two also passed into South America, where all the horses died out, but representatives of the camel family remain in the guanacos, vicunas and their domesticated races; and there came north the cumbersome ground-sloths and other strange early

beasts, and, later, such modern ones as the puma, the porcupine and a few others.

But the strangest incident of this nature is that of the elephants which, from the Miocene onward, wandered over North America and finally penetrated to Patagonia. They devel¬

oped as species and grew in size until at last they resulted in the huge imperial elephant, the mastodon and the mammoth, the last two of which were killed off here, as in Europe, by primitive men. All of these were, as races, immigrants; but from where? It is only within half a dozen years that this question could be answered. "Appearing,® says Dr. Scott, "sud¬

denly in the Miocene of Europe and North America, in which regions nothing was known that could, with any plausibility, be regarded as ancestral to them, they might as well have dropped from the moon for all that could be told concerning their history. The exploration of the Eocene and Oligocene beds of Egypt 694

has dispelled the mystery, and has shown that Africa was the original home of the group, whence they gradually spread to every conti¬

nent except Australia.® See Elephant.

Such is the world-wide evidence of the ex¬

istence of ((land-bridges)) and their lasting effects upon the plant and animal history of the earth.

Ernest Ingersoll.

LAND CRABS. Almost all shore-crabs

will withstand exposure to the air for some hours without suffering injury, and many of them are

regularly so exposed at ebb tide. It is not surprising, then, that some of them have wandered far from the seashore into the fresh¬

water streams and the moist woods and moun¬

tain forests, or even largely forsaken the vicin¬

ity of water and established themselves on dry hillsides. The land crabs, par excellence, belong to the family Gecarcinidce, in which the carapace is thick and hard, strongly arched above, rounded, bent downward and truncate in front, and vaulted in the branchial region. The branchial chamber is spacious and lined by a spongy membrane which retains moisture for a long time and thus keeps the gills damp. Six or seven genera and several species inhabit the warmer regions of both hemispheres. One species (Gecarcinns ruricola) is common on many of the West Indian islands, is excessively abundant on some of the Bahamas and occurs in southern Florida. They abound at the east¬

ern end of Cuba, and were a source of immense annoyance to the inexperienced soldiers of the United States army in the campaign of 1898

against Santiago de Cuba. On Jamaica and the other larger islands they inhabit a zone in the hills from one to three or four miles from the shore, where they live in burrows beneath stones or under the roots of trees, from which they emerge at night to seek their chiefly vege¬

table food. They are large, robust creatures with extremely powerful claws, which a pug¬

nacious disposition leads them to use freely.

Mating takes place in the spring, and during the rainy season in May a common impulse causes them to migrate in vast armies to the sea, where they bathe and deposit their eggs, which are washed up and buried in the sand by the waves. By resident naturalists and travel¬

ers who have observed it, this animal's march to the sea is described as a most impressive sight. Most of the males form an advance guard which is followed in two or three days by the females and remaining males. They are said to proceed in a direct line and to climb over, instead of passing around, every obstacle, even houses. After discharging the eggs, bath¬

ing and resting, the crabs return to the hills and in midsummer close their burrows with leaves, grass, etc., and retire to their inmost re¬

cesses to moult. At this time, while in the soft-

shelled state, they are in high favor for the table, and are dug out of their burrows in large numbers for market. The crabs of this familv possess well-developed gills, but in addition the gill-chambers are modified for air-breathing, the lining being thick and well supplied with blood-vessels, and divided by a fold of mem¬

brane so as to leave a sort of pocket in the upper part. The Brazilian mangrove-crab shows this especially well.

On Christmas Island, in the Indian Ocean, the soil of the high lands is in some places honeycombed with the burrows of a land-crab (Geocarcoidea calandi) that feeds on leaves which are dragged into the burrows. <(From their enormous numbers,® says a student of them, ftthey must play a great part in the de¬

struction of decaying vegetable matter, and its incorporation into the soil.® Once a year, in the rainy season, they migrate to the sea for breeding purposes.

Another family of crabs, the land-hermit crabs (Ccenobitidce) , are found on all tropical coasts, and spend most of their lives inland, often climbing bushes and trees. To this fam¬

ily belong the large cocoanut, or robber, crabs of

tropical islands.

Even more perfectly adapted to terrestrial life are the many species of land isopods called wood-lice (q.v.) ; and many of the river-crabs (Thelphusidce) , and of the crayfish, are more terrestrial than aquatic in habit. A well-known species of Thelphusa in Japan is sometimes met with on mountains at an elevation of 2,000

feet or more above the sea-shore. Consult Kingsley, Standard Natural History> (Vol.

II) ; Proceedings of the United States National Museum (1899); Cailman, (Life of Crusitacea>

(New York 1911).

LAND CREDIT AND LAND CREDIT

INSTITUTIONS. Credit accorded on real

estate security is short term if the period is nine years or under, and long term if it is 10

years or over. In the United States, however, long term is understood to begin after five years. Usually the principle of short-term loans is payable in lump at the end of the period, but the principal of long-term loans is reducible to final extinction by partial payments at stated intervals during the period. There are two methods for determining the amount of each of such payments, and also two ways of using them for the reduction and extinction of the debt. The amount may be determined by divid¬

ing the principal into equal parts by the num¬

ber of years, or by splitting it into unequal parts and leaving the larger ones to the latter years so that the partial payments, with interest included, may be as nearly even as possible.

Each payment is represented by a promissory note drawing interest from date of the loan.

This is not an infrequent practice for 10-year loans, and is known as payment by instalments.

But the common method of computation is to divide the principal by the present value, at interest compounded at the given rate, of a payment of one dollar at the end of each year for the period of the loan. To illustrate, the present value of a 20-year series of such one-

dollar payments at 5 per cent compound in¬

terest is $12.46221 — a figure that divides 1,000, for instance, into 80.24 equal parts. Hence, this would be about the annual sum that a bor¬

rower^ would have to pay at the end of each year, in order to extinguish a $1,000 loan at 5 per cent interest within 20 years. If the per¬

iod is 10 years, he must, by similar reasoning, pay $129.50, while if it is 50 years he must pay $54.77 annually. That is to say, the longer the period the smaller becomes the borrower's annual, payment, so that if the period is 81

years it is $50.97, or only a few cents more than the interest alone on the original principal.

The borrower's payments determined by this LAND CREDIT AND LAND CREDIT INSTITUTIONS

695

method are called annuities, and the process of paying off a loan by such annuities is called amortization.

A variation of this method and process is to require the annuities to be paid at the begin¬

ning instead of at the end of each year, and to calculate them accordingly. On a 20-year $1,000 loan at 5 per cent interest the annuity would then be $77.94. But inasmuch as the first annuity is deducted from the face of the loan, the borrower

would actually get only $922.06. So if he wished the full $1,000 he would have to borrow $1,084.53 and pay a correspondingly larger annuity. When pay¬

ments are semi-annual, the interest dates are counted instead of the full years, and only one-half of the annual rate is taken; and so also with quarterly payments. Tables pub¬

lished in various languages give the rates by which the annuity can be computed for amor¬

tizing a loan of any amount, interest or period up to 100 years. Tables also show annuities in integral figures, as $25, $50 or $75, but inas¬

much as they let the period take care of it¬

self, they are objectionable because of the odd number of years and the fractional payments at the end.

The amortization of loans by annuities sup¬

poses that out of each annuity there is taken the necessary part to cover interest on the loan and that the remainder is immediately applied to the reduction of the unpaid principal. The effect is the same as that of the instalment plan; and this is one way to use the borrower's payments for the gradual extinction of his debt. The other way is to reckon the principal as remaining at its original amount throughout the period and. to place the payments, less in¬

terest, into a sinking fund to be credited with interest at a given rate. If this rate is the same in every particular as that of the loan, there will of course be no difference between these two ways in actual results. But the bor¬

rower would be at a disadvantage if the sink¬

ing fund's yield were lower than that of the loan ; and such is often the case in Austrian savings banks, where this sinking-fund plan is much used and

the borrower's payments are kept as a deposit account. Loans,, whatever be the manner of payment, attain their land-credit character by the mortgage given by the bor¬

rower to secure the performance of his con¬

tract. The value of the mortgaged property must at least equal the amount of the loan, and the borrower's title to it should preferably be free and unencumbered. The value and title are determined to the lender's satisfaction.

Titles may be guaranteed by companies formed for such purpose. In the United States 19

States have enacted laws, embodying features of the Torrens system, for determining the title expeditiously; but in a number of the Western States the foreclosure laws, by reason of the borrower's homestead and other exemp¬

tions and redemption rights, do not permit a speedy collection of the debt in the event of default.

Long-term reducible loans are manifestly not suitable for the individual investor. They are p racticable only for institutional investors that can issue their own credit instruments against them and thereby effect the immediate recovery of their funds, despite the length of the loan period. These instruments may be either bonds, like a promissory note, or debentures in the nature of a certificate of indebtedness with or without a date set for payment. Both may be subject to recall at the maker's will and be secured by mortgages held in trust. Deben¬

tures, however, usually have no fixed maturity or specific security, but are retired periodically by lot, while the holder's protection is the prior lien of the debentures on all the institution's assets. The length of a loan depends, from the borrower's standpoint, upon the size of the annuity he wishes to pay; from the lender's standpoint, it depends

upon the terms and con¬

ditions upon which money may be obtained.

The institutions for according land credit are either public, semi-public or private. Pure pub¬

lic institutions are those in which government supplies the working funds. or the permanent fund, if any, and appoints the executive officers.

In form public institutions are bureaus, commissons or departments of government supported by regular or occasional appropria¬

tions, or incorporated bodies with capital or a foundation supplied by government, and with its guaranty, expressed or implied, on any credit instrument they may issue. They are not intended for the average landowner, and they never extend credit without imposing condi¬

tions in regard to the person, the rule being that wherever the cash or credit of . govern¬

ment is used, the borrower must be in actual need of such help and must swear to apply the loan to the specified object for which it was granted. They were established for breaking up the feudal system, for dividing and alloting large estates, for enabling peasants or workmen to acquire small farms or homes, for promoting interior colonization or settling the public do¬

main, for financing land reclamation, for reliev¬

ing distress due to war or natural causes, or for meeting problems arising from compulsory mili¬

tary service, absenteeism of landlords, congested population or political emergencies. Govern¬

ment has sometimes subsidized private institu¬

tions having such objects. Institutions in which private individuals may hold stock, or partici¬

pating in profit and loss, and join government in electing the directors and officers are semi¬

public. Like pure public institutions, they have various forms, and the older ones were author¬

ized by special laws.

The German landschaften are a notable type of semi-public institution. There are 23 of these in Germany, and some very loose adapta¬

tions of them in Sweden, Denmark, Austria-

Hungary and Russia. Formed under special laws enacted at widely different times, they vary greatly in organization and operation. But an outline of the Silesian landschaft (created in 1769 and so the oldest, of all land-credit insti¬

tutions) will give a fair idea of the others.. A landschaft is a district managed by an adminis¬

tration whose chief officers are appointed bv government upon nomination of resident land-

owners enrolled as members. The district in¬

cludes only lands lying outside the towns and cities and is divided into lesser areas, each with a local administration subordinated to the one just above it. The central organization con¬

sists of a president, two vice-presidents, . a secretary and a treasurer. The local adminis¬

trations have a similar organization, except the lowest subdivisions where the sole execu¬

tive officer is a superintendent.

The organization is associational without capital stock or shares. The voting strength of each member

is determined by the number and amount of his mortgages. The voting is done in circles, as the lowest subdivisions are called. Members elect the superintendents and also delegates to sit in convention for selecting the nominees for the other offices. Beyond this members have no voice in the management.

They cannot dissolve the landschaft nor alter its structure or purpose since it is not formed under articles of agreement, but was established by legislative act. Acceptance of office is obligatory upon election. Members are bound when duly called upon to perform such duties as caretakers, cultivators or receivers of mort¬

gaged farms taken over upon default of loans.

Compensation may or may not be allowed them.

All members are borrowers, since nobody joins except applicants for loans, and membership ceases upon repayment of the loan. Any qualified landowner is entitled to admission.

If his application be refused by the local offi¬

cers, he may appeal to the central administra¬

tion, which in all cases must make the final decision.

The loans of the landschaft must be secured by first mortgage on land worth 50 or 40 per cent more than the loan and stocked with enough equipment and domestic animals to assure a production at least equal to annual dues and taxes. The loans are without any other restriction as to amount, use or purpose.

They are always long term and repayable by amortization on the sinking-fund plan. A feature, however, that distinguishes the land¬

schaft from other land-credit institutions is that the loans are made, not in cash, but by an exchange

of the borrower's note and mortgage for the landschaft's own debentures. The law prescribes $1,000 to $20 as the denominations, and 5 to 3 per cent per annum as the interest rate of these debentures, and gives the bor¬

rower the right to select the kind he wants.

The annuity consists of the interest on the de¬

bentures he selects, plus one-half of 1 per cent of their face; and so the loan and the debentures exactly correspond in amount and interest rate. The borrower undertakes to pay the annuity until his debt is completely extin¬

guished. To this may be added a small charge for expenses during the first 10 or 15 years.

Besides the obligatory annuities, the borrower may make voluntary payments as often as he pleases, and tender debentures at par in lieu of cash for all his dues. Defaults are never al¬

lowed for longer than six months, since the only money the landschaft has for meeting its obligations on the debentures comes from the loan they represent.

The annuities and other payments by bor¬

rowers are placed in the sinking fund as soon as they are received. When the borrower's ac¬

count therein, after entries of his proportional share of any profit or loss have been made, equals the . original amount of his loan, his mortgage is canceled and his membership ceases. This may happen sooner or later than expected. So the period of the loan is some¬

what indefinite. No debentures are issued ex¬

cept upon the making of a loan. But the landschaft maintains a bureau for selling them for the borrowers. The sale may be below or above par, and

so the interest the borrower actually pays depends upon the market quota¬

tion. With the view of protecting investors, the interest date of the loan is set a few months ahead of the interest date of the debentures, while the membership agreement gives the landschaft a right to instant possession of the mortgaged property in the event of default, or even if it deems its olaims in jeopardy. Every six months the landschaft must by lot retire debentures up to the amount of cash on hand in the sinking fund, so as to preserve an exact balance between the outstanding amounts of the loans and debentures. For this reason the debentures are made without any fixed matu¬

rity, but are recallable at par at the lanschaft's will.

This semi-annual retirement and payment of its own debentures and interest coupons, or the acquisition of the same by purchase in open market or through borrowers tending them for their dues, are the only lawful uses that a landschaft may make of its sinking fund. This fund cannot be reinvested in mort¬

gages. If it should become impaired, the landschaft may levy assessments on all bor¬

rowers in proportion to the unpaid principal of their loans, in order to make good the de¬

ficiency. Hence, since the borrowers are thus collectively liable on the debentures, they are mutually responsible by one another's defaults; and this continues for two years after mem¬

bership ceases. In most of the landschafts the liability is unlimited, but in a few others it is limited to some percentage or multiple of the mortgage.. The landschafts are not profit¬

making. Their sole object is to exchange their debentures for the less salable note of the borrower, and so enable him to obtain a loan at a

lower rate and on easier terms than he could get through his own unaided credit.

Operating in this way, the landschafts have need of no other money than what they re¬

ceive from the borrowers for paying running expenses and interest and for redeeming the debentures. Consequently their only funds are the sinking fund and perhaps a small reserve to guard against contingencies.

Private institutions are those that are owned, financed and managed entirely by indi¬

viduals without any assistance or intervention of. government, except official supervision.

With a few exceptions, they are authorized under general laws and not by special acts.

There are three kinds : Companies for insur¬

ing or guaranteeing titles or mortgages, bond and mortgage companies, and building and loan associations. The first kind, when they confine their business to their distinctive ob¬

ject,. serve rather to expedite than to extend credit. When they extend credit, they follow the methods of other private institutions, and so will not be treated separately. Bond and mortgage companies have fixed capital stocks divided into shares, usually paid in.

The . various laws of bond and mortgage companies differ widely in detail and at im¬

portant points, but their first model was the French legislation of 1852, which contains two master clauses. These are capital stock and surplus must be maintained at a safe ratio to bonds or debentures; and bonds or debentures in circulation must represent first liens on real estate of. adequate value and never exceed outstanding loans in either

amount or interest rate. The ratio is never more than $1 to $20. A part of the capital stock or all of an obligatory reserve is set aside as a guaranty fund and kept in liquid investments. The reserve is created out of a portion of the annual earnings. With this ex¬

ception, a company may invest all its assets, regardless of source, in mortgages and dis¬

tribute all its profits among shareholders.

There is no limit for dividends since the aim is profit. A maximum is sometimes pre¬

scribed for capital stock, so as to prevent monopoly, but inasmuch as the capital stock serves not only as a working-fund, but also as a guaranty-fund and must be maintained at the statutory ratio to bonds or debentures, its amount may be increased upon approval or order of the supervising authority.

Generally the companies may extend credit to any class of landowners or on any kind of land designated by the charter or by-laws.

The loans may be made for long term payable by annuities, or for short term payable, by instalments or in lump, but rarely on the sink¬

ing-fund plan. The longest term in France is 75 years. The mortgaged property must have a value 40 or 50 per cent greater than the sum lent upon it and be capable of yielding a dur¬

able and certain revenue, which, in the case of long-term loans, must at least equal the bor¬

rower's annual dues. If there be a maximum for amount of the loan, it is usually one-tenth of the capital stock. The interest rate must not exceed that borne by the latest issue of bonds or debentures, plus an addition usually limited to one per cent more for costs and profits. Payments on

loans are made annually or semi-annually. Perishable parts of the mortgaged property must be insured. The bonds or debentures are issued in series, with dates fixed for payment of principal and in¬

terest, but with a provision under which they may be recalled before maturity at a premium ; in France prizes are lawful at their redemp¬

tion. That country also has provided for licensed land-credit companies a special pro¬

cedure for examining titles.

A building and loan association is an in¬

corporated body with a variable capital ; that is to say, a capital which may be increased or decreased by the issuing or canceling of shares, or by payments or withdrawal of payments on such shares. There may be any number of members above the minimum fixed for incor¬

poration. According to the original design, the area of an association was delimited by a radius of a few miles from headquarters, so as to make all operations local. Its powers are to receive members' savings to lend to members for building or acquiring homes.

These features stimulate thrift, and for this reason tax exemptions are accorded. The ad¬

ministration consists entirely of members elected by members, the funds all come from members and the facilities are available for members only. The association is, therefore, co-operative.

Shares may be held only by duly admitted members and each entitles the holder to one vote. These are of various kinds. The most common are instalment shares, on which the subscriber makes payments at stated intervals, and investment shares, for which payment may be made in whole or in part at subscription.

A permanent association may issue shares at any time. A serial one may issue shares only in series, and no new shares may be issued in a series after a dividend has been declared, except to subscribers who pay the book value of such shares. Instalment shares are used for loan transactions. A borrower is required to subscribe to instalment shares in an amount equal to his loan. Consequently he becomes liable to twice the amount of his loan for any losses of the association. A first mortgage is given on the house and lot for which the loan was made, and the shares are pledged as an ad¬

ditional security. Non-borrowing members may subscribe for as few or as many shares of any kind as they please. Payments made by members serve to mature the shares. Each share is credited with its proper portion of the profits. At maturity the shares are can¬

celed. If a member is not indebted to the as¬

sociation, he is given their face value in cash.

If he is a borrower, this value offsets his debt and his loan becomes paid and his mortgage is canceled, along with his pledged shares.

Pledged shares may not be withdrawn until the loan has been fully paid. But the credits on other shares ordinarily may be withdrawn on 60 days' notice.

By reason of this method the loans of a building and loan association are repayable in instalments on the sinking-fund plan, and may run for 10 or even to 18 years. The funds that an association may have for investment are auctioned off to the highest bidder at a regular meeting or at some meeting specially called for the purpose. The sum which the successful bidder pays in addition to the inter¬

est rate is called the premium. The law pre¬

scribes no limit for this, while entrance fees and fines for withdrawals or defaults may be charged. Hence, the borrower may be re¬

quired to pay what would be usury in the case of any other institution or lender. In the United States, there are at least 68 premium plans, 25 plans for distributing profits, 12

withdrawal plans and 7 kinds of shares. So many changes have been made in their original scope that the building and loan associations, under the laws in a number of the States, are no longer true to type. This has been brought about by removing restrictions as to area, making shareholding a mere nominal require¬

ment for borrowers and depositors, and per¬

mitting the associations to borrow money, issue bonds, incur liabilities with persons not members, and to finance themselves with funds coming from outside sources.

Bibliography. — Brunneck, W. von, (Die

Pfandbriefsysteme der preussischen Land-

schaften> (Berlin 1910) ; Casasus, Joaquin D., (Les institutions de credit; etude sur leurs fonctions et leur organization* (Brussels 1900) ; Franz, Robert, (Die Landschaftleihen Kredit-

institute in Preussen> (Berlin 1902) ; Gortz, Dr. V., (Die Verfassung und Verwaltung der Schlesischen Landschaft* (Breslau 1907) ; Herrick and Ingalls, (Rural Credits) (New York 1914), and (How to Finance the Farmer) (Ohio 1915) ; Josseau, T. B., (Traite du Credit Fonder* (Paris 1873) ; Nicholson, Sir F. A., (Report on Land and Agricultural Credit' to the Madras Presidency* (2 vols., Madras 1895) ; (Oppenried, R. M. von, (Die Hypothekaranstalten in Deutschland und

Osterreich-Ungarn) (Vienna 1911); Spitzer, S., (Tabellen fiir die Zinses-Zinsen und Ren-

ten-Rechnung mit Anwendung derselben auf Berechnung von Anlehen, Konstrucktion von Amortisationsplanen, etc.) (Vienna 1911) ; In¬

ternational Institute of Agriculture, Mono¬

graphs^ also (Monthly Bulletin of Economic and Social Intelligence) (Rome 1910, et seq.).

Myron T. Herrick,

R. Ingalls.

LAND GRANT. See Public Lands.

LAND GRANT COLLEGES. See Edu¬

cation, Agricultural.

LAND HOLDING. See Corporations,

Legal.

LAND LEAGUE, an Irish organization

founded under the presidency of Charles S.

Parnell, but of which the inspirational force was Michael Davitt, which came into being at a meeting held in Dublin, 21 Oct. 1879. The failure of the Irish crops in 1878-79 was fol¬

lowed by distress among the Irish tenant farmers and peasantry; they were unable to meet their obligations, and the numerous evictions which took place were accompanied by outrages. The principal tenets of the as¬

sociation formed to meet this situation were the ((three F's® — fixity of tenure, fair rent and free sale (of the tenant's interest) ; but many speakers at Land League meetings, held in different parts of the country, went so far as to demand that the soil should belong to the cultivator. Opposition by direct violence was deprecated, and recourse was had to boy¬

cotting. (See Boycott). This state of things continued till the end of 1880, and was greatly aggravated by the rejection by the House of Lords of the Compensation for Disturbance Bill of that year, when 14 members of the Land League, of whom the most important were Parnell, Dillon, Biggar, T. D. Sullivan and T. Sexton, were indicted. The chief counts were <(conspiring to prevent payment of rents, to defeat the legal process for the enforcement of payment of rents, and to pre¬

vent the letting of evicted farms.® The trial, which took place early in 1881, was a fiasco, but it drew from Justice Fitzgerald the declaration that the Land League was an illegal body. The agitation increased, a coer¬

cion act was passed and habeas corpus sus¬

pended, and the (

They issued a manifesto calling on the Irish tenants to pay no rent during their imprison¬

ment. The government replied by declaring the Land League an illegal body, . and sup¬

pressed its branches throughout the country.

All that the Land League had contended for was finally conceded when Wyndham's great land purchase scheme of 1903 was passed into law, and the dual ownership which has sub¬

sisted from 1870 was changed into an occupy¬

ing ownership. Consult Flatley, (Ireland and the Land League } (Boston 1881) ; Davitt, (The Fall of Feudalism in Ireland; or the Story of the Land League Revolution (Lon¬

don 1904). See Ireland.

LAND-LOCKED .SALMON, a salmon

which inhabits an inland body of water and can never

go and come to the sea. The term applies in America only to salmon inhabiting certain lakes in eastern Canada and northern New England; and whether these salmon

should be regarded as distinct species or merely as representatives of the Atlantic sal¬

mon modified to suit their local conditions is a question upon which ichthyologists are not agreed. It is most convenient to follow the distinctions made by sportsmen and regard the land-locked salmon as two species, the Sebago salmon and the ouananiche.

LAND OF NOD (Gen. iv), an unknown

land on the east of Eden wherein Cain took refuge. In colloquial and nursery allusion the state of sleep, a land of drowsiness or nodding.

LAND OFFICE OF THE UNITED

STATES, a government department charged with the management and disposal of the pub¬

lic lands. On 25 April 1812 it was organized as a bureau of the Treasury Department, but on the creation of the Department of the In¬

terior, it was transferred to the latter on 3

March 1849.

(

The bureau is at present organized in 15

divisions and employs about 1,500 officials. The purchase, location and entry of land is made through local offices, of which there are 100

in continental United States and three in Alaska. As the lands in a district are sold the local office for that district is closed. The office employs a field force for the protection of public lands, to

investigate timber trespass, un¬

lawful enclosure, fraudulent entry, etc., or, in general, any infringement of the land laws.

The cash receipts of the Land Office during the fiscal year ending 30 June 1917 amounted to $6,149,630.54, consisting of $3,632,021 from dis¬

posal of public lands, $2,445,429 from sales of Indian lands, $4,996 from leases of power per¬

mits etc., $38,639 from fines for depredations on the public lands, $25,395 for copies of rec¬

ords and plots, and $3,147 from sales of gov¬

ernment property. The area of public and In¬

dian lands originally entered during the year amounted to 16,201,794 acres and lands patented to 11,313,362 acres. See Public Lands, and consult Donaldson, Thomas,

LAND REGISTRATION. See Regis¬

tration of Property Titles; Torrens Land System.

LAND-SNAIL, an air-breathing terrestrial gasteropod mollusk, or snail of the family Helicidce or some nearly related pulmonale.

These mollusks possess a well-developed, usu¬

ally globose and more or less spiral, horny and brightly colored shell (except in slugs, q.y.), into which the whole animal may be withdrawn, and which has, usually, a lunate aperture, not LAND OF STEADY HABITS- LAND TAX

closed by an operculum. Four retractile ten¬

tacles exist, the upper pair being the larger and possessing eyes at their tips. A distinctly de¬

veloped so-called ^foot® is present. The aper¬

ture by means of which air is admitted to the lung-chamber for the purpose of breathing ex¬

ists on the right side, under the edge of the shell. The mouth possesses an upper mandible of horny consistence and toothed structure, and, as in other gasteropods, there is a tongue or lingual ribbon bearing many teeth. The food is generally of a vegetable nature, and snails are capable of doing great mischief in gardens, but none in the United States is noticeably harm¬

ful. The sexes are united in the same individ¬

ual ; but the copulation of two such hermaphro¬

dite individuals is necessary for impregnation, which becomes mutual. The eggs are globular or oval, have coriaceous shells, and are laid singly in damp places, as under leaves, stones, etc.; Bulimus (q.v.) is noted for the compara¬

tively large size of its eggs. These eggs and the snails themselves are eaten by birds, turtles and other enemies, especially in the tropics, where land-snails are more varied, numerous and conspicuous than in temperate regions.

Some species, however, live in very cold cli¬

mates, far to the north or high on mountain ranges. Those of cold climates hibernate in winter, creeping into sheltered places, and clos¬

ing the aperture with one or more air-tight drum-head-like curtains of hardened mucus.

In hot and dry places they protect themselves in midsummer against undue loss of moisture in the same manner.

The land-mollusks offer very interesting problems in geographical distribution, as they are easily disseminated and hence widely scat¬

tered; and are easily affected by the environ¬

ment, so that species have developed in very limited areas, as on certain islands and in val¬

leys close to one another yet very distinct in their molluscan faunas.

The family Helicidce, which embraces not only the terrestrial genus Helix, but the bush¬

climbing, long-spired Bulimus (q.v.), and sev¬

eral smaller genera, includes thousands of species. Specimens are always most numerous in moist woods and in a limestone region than elsewhere. Many small terrestrial mollusks, properly called land-snails, belong to families other than Helicidce, as the Orthalicidce, Buli-

mulidce and Pupidce, the last containing many minute American species, not larger than a pin¬

head, shaped like a grain of rice, and beauti¬

fully chased; Stenogyridce, in which are found the great agate-shells (Achatina) and sundry others of the tropics ; Succineadce, represented by many small, glassy expanded forms of great beauty; and others, some of which contain shell-less and slug-like forms.

Utility of Snails. — Snails have been made of use medicinally in the past, and curative virtues are still attributed to them among European peasants. Among the Romans snails were held in high esteem as articles of food and even of luxury; and special parks or es¬

tablishments named ^cochlearia" were con¬

structed for the purpose of fattening these mollusks. The practice of eating snails has never been very common in England, but Howard, the prison philanthropist, tried to en¬

courage it ; Howard cultivated the H. varronis, the largest of European species. In modern Europe, as in many parts of France, and in Vienna, especially during Lent, snails are largely consumed, especially among the lower orders. The proletariats of Naples are exceed¬

ingly fond of a soup made from H. nemoralis.

The most valued species among modern epi¬

cures is the H. vermic-ulata or little hermit snail, found at Montpelier ; and H. aspersa, the garden-snail of the English, is also regarded as very delicate when properly cooked. H.

pomatia has a wider range as an edible snail, especially in France, where this species is ex¬

tensively cultivated for market in appropriate enclosures called escargotieres ; thousands are also gathered from the vineyards and sold in the larger towns of southern France and Italy.

The taste for these mollusks has been brought to the United States by immigrants, and in the Italian quarters of New York and other large cities great quantities of living snails are ex¬

posed for sale, among other mollusks, in the food-shops. They are also extensively imported in pickle. Consult Lovell, (British Edible Mollusks) ; Cooke,

bridge Natural History, 1895) ; Binney and Bland, (Land and Fresh-water Shells of North America.*

LAND OF STEADY HABITS, a phrase

applied to the State of Connecticut.

LAND SURVEYING. See Surveying.

LAND TAX, formerly the chief source of levying an income for government uses, but in modern times constituting generally an incon¬

siderable part of national incomes. Both the Greeks and Romans taxed upon the estimated yield of land in their earliest taxation, but later developments of wealth gave broader sources of income and the land taxes ceased to occupy the place of prime importance in providing a government income, except where agriculture instead of commerce and industry forms the chief occupation of a country.

Rome returned to the land tax as a source of revenue after the decay of the empire destroyed her commerce ; and northern Euro¬

pean countries depended upon land taxes al¬

most exclusively in their earlier days. The development of wealth in other forms in¬

variably diverts taxation from the land except where it is required, as in many modern in¬

stances, for purposes of social or political development.

The French physiocrats and the American single-taxers maintain that the entire source of revenue for government uses should be vested in the taxation of land. While these theories have many adherents the present consensus of opinion among economists is that their applica¬

tion would involve many serious injustices.

More recently special taxation of land for the purpose of preventing large tracts being held in idleness for speculative purposes, and large estates held in unproductiveness, have held the attention of legislators.

In New Zealand, Australia and western

Canada taxation of land for the purpose of regulating its use is prevalent.

In the United States the laws of the in¬

dividual States vary, but the general procedure is the assessment at a uniform rate of all property, including land. There is no Federal 700

taxation of land, direct taxation being left in the hands of the States. As a rule changes in land taxation in the States are at present em¬

ployed as a means of preventing the land from being held in idleness, thereby retarding the development of the community as a whole.

LAND TORTOISE, a terrestrial turtle of the family Testudinidce, order Cryptodira (see Chelonia), a family characterized primarily by the possession of a strong box-like shell, com¬

pletely ossified when young and covered with horny shields, into which the whole body may be withdrawn and in some forms wholly en¬

closed. The family also contains aquatic and amphibious forms (see Mud-turtles; Ter¬

rapin), but these need not now be considered.

American representatives are found in the box-

turtles (properly so-called) of the genus Cis-

tudo, in which the plastron is connected with the carapace by ligaments and is divided into two movable lobes, the transverse hinge being so perfect that the box can be completely closed after head, legs and tail have been withdrawn.

The carapace is high and arched. The common box-tortoise of the United States (C. Carolina) has become completely terrestrial, and has undergone some interesting structural modifica¬

tions in consequence, among others a loss of webbing between the toes. It reaches about six inches in length, is highly variable in the arrangement of the

blackish and reddish tints of its coloration, and each dorsal shield is nicely sculptured in concentric rings, but these become worn nearly smooth in old age. They wander about the woods, walking with the shell well lifted from the ground, and searching for food most diligently in the evening and earlv morn¬

ing and in moderate and moist weather. Their food consists chiefly of snails, slugs, earth¬

worms, crayfish, grubs and the like, together with fungi and a little green stuff. In winter they hibernate, buried in soil or garden rubbish.

They are fond of staying in one limited district, are easily tamed and exhibit some intelligence, but individuals differ much in these respects.

The typical land-tortoises, however, are those of the genus Testudo, in which the plastron has no hinged, folding part, and the feet are short and webless. The 40 or more species are scat¬

tered throughout the warmer parts of the world, excepting in Australasia. The small, convex, highly sculptured ^Greek® tortoises of Europe and North Africa, so often kept as garden pets, are familiar representatives. They feed almost wholly upon green grass, leaves and vegetables.

The captive made famous in Gilbert White's (Natural History of Selborne> was one of these (T . ibera), and its shell is now preserved in the British National Museum. The gopher tor¬

toise (q.v.) of Florida is a North American species; and a similar widely spread South American species (T. tabulata), which lives mainly on forest fruits, is often two feet long.

Gigantic Land Tortoises. — Certain ter¬

restrial tortoises of very large size survived until the Historic Age, and in some cases still exist, on islands in the Indian and Pacific oceans.

They are relics of a bygone period, when even larger ones prevailed. Fossil bones in Miocene and Pliocene strata of India, western North America and other parts of the world indicate tortoises of that period whose heads alone must in life have been nearly a foot in length, and beside those giants even the largest of the modern species so-called would look small. The presence of such turtles gave their name to the Galapagos (q.v.) group of islands off the coast of Ecuador, where each of the large islands of the archipelago supported a separate species, but all resembled one another in the relative small size of the head and great length of the neck. ((The most peculiar looking are or were T. ephippium and T. abingdoni, the shell of which is extremely thin, with large lacunae in the osseous plates. The profile of the shell is saddle-shaped, with the horny shields partly concave and turned upward at the sides. The general color of these and other Galapagos tor¬

toises is black.® Toward the close of the 19th century all that remained of these tortoises were caught and distributed alive to various parks and zoological collections in North America and Europe, where they will be cared for and will probably continue their race. They eat grass and leaves of succulent plants, as lettuce ; their food in the Galapagos having been mainly cactus and a lichen (Usnea).

Other giant tortoises inhabited the islands of the Indian Ocean until within the historic period, and a few remain in captivity. In 1898

there was still living in England a specimen of T. sumeiri, once existing in thousands on the Seychelles, whose history was known since 1766, when it was already of large size. Other spe¬

cies inhabited Madagascar, where they became extinct, prehistorically, Bourbon, Mauritius and Rodriguez. They were utilized as food by the voyagers of the 17th and 18th centuries; were wastefully slaughtered by the European colon¬

ists, and carried in shiploads from island to island, until at last none remain but a few captive specimens. Consult Gunther, (Gigantic Land Tortoises) (1877); Gadow, (Amphibia and Reptiles > (1901) ; Baur, American Natural¬

ist (Vol. XXIII, December 1889).

LAND TRANSFER, Reform in, modern

methods of land registration which have re¬

placed the oldtime conveyancing by feoffment, livery of seisin and other primitive methods which were effective in early times. The mod¬

ern deed gives an accurate description by actual survey of the land, and is legally signed, sealed and recorded ; the records being open to the public in the United States. If there are encumbrances or burdens of any sort against the land, these also are recorded. The Tor¬

rens system of land registration is in effect in Australia and adaptations of it have come into use in England, the Philippines, Hawaii, Cali¬

fornia, Colorado, Illinois, Massachusetts, Min¬

nesota and Oregon. Insurance of title is largely used in the United States, this taking the form of the payment of a premium for a private investigation and guarantee of title.

LANDER, Richard Lemon, English Afri¬

can explorer: b. Truro, 8 Feb. 1804; d. Fer¬

nando Po, 6 Feb. 1834. He became a domestic servant ; in that capacity accompanied Capt.

Hugh Clapperton as his servant on his second expedition into the interior of Africa (1825).

After Clapperton’s death in 1827 he returned to the coast and in 1830 published (Reoords of Captain

Clapperton's Last Expedition to Africa. 5 In the spring of 1830 he set out with his brother John to explore the course and ter¬

mination of the Niger, under the auspices of LANDER

the English government, and from Badagry, near Cape Coast Castle, they proceeded to Boossa on the Niger, and after ascending the river for about 100 miles traced its course downward to the sea and proved that it entered the Bight of Benin by several mouths. They were the first also to discover that it was fed by the Benue. Their journal was published in 1832, entitled (Journal of an Expedition to Ex¬

plore the Course and Termination of the Niger, >

and was translated into several languages.

While on a trading expedition in the delta of the Niger, he was wounded by the natives and died soon after. The story of his last journey is told in (Narrative of an Expedition into the Interior of Afriea) (London 1835).

LANDER FEMALE COLLEGE, a

Methodist institution of higher education at Greenwood, S. C., founded in 1872. Its faculty numbers 23 ; the average annual attendance of students is 272. The tuition fees are $50 to $60; living expenses, $140 to $150; the productive funds amount to $10,500; the income, including tuition and incidental charges, is $38,550. The library contains over 3,100 volumes. The num¬

ber of graduates since organization is 388.

LANDES, land (Landes de Gascogne),

a tract of sandy marsh land in southern France, on the Bay of Biscay, and covering some 5,400

square miles in the provinces of Landes, Gi¬

ronde and Lot-et-Garonne. The land is a plateau with sterile soil composed of fine sand on a subsoil impermeable by water. Parallel with the coast are numerous dunes, from 100

to 300 feet high, which, however, have been kept from extending by building a palisade which the sand cannot cross. The land was formerly inundated three-fourths of the year, forming an unhealthy swamp, but in the 18th century the engineer Frangois Chambrelent succeeding in perfecting a system of draining and planting to remedy this condition. One thousand six hundred miles of ditches were dug and 1,600,000 acres were planted with pine and oak. The dunes also have been planted with maritime pines and cork trees, a scheme devised by Nicolas Thomas Bremontier toward the end of the 18th century, which, together with the protecting palisade, prevents the ad¬

vance of the sand toward the east, and thereby obviates the former steady encroachment upon tillable fields.

LANDES, maritime department of southern France, bounded on the west by the Bay of Biscay. Its area, 3,615 square miles, makes it the second largest department in France, but owing to the fact that three-fourths of its ter¬

ritory is occupied by the Landes (q.v.) marsh and pine lands, it is one of the most sparsely-

settled districts in the country. The remaining land is highly fertile, however, and the popula¬

tion draws a considerable part of its income from the cork and pine trees of the marsh lands, which yield timber, resinous products, charcoal and cork. There are also saw-mills, salt works, iron works, stone quarries, brick and tile works and potteries. Mont de Marsan is the capital of the department. Pop. 288,902.

LANDESMANN, lan'des-man, Heinrich

(pseud. Hieronymus Lorm), Austrian poet and author: b. Nikolsburg, Moravia, 9 Aug. 1821; d. Briinn, 3 Dec. 1902. Owing to physical deli¬

cacy he was privately educated. He became deaf and partially blind in his fifteenth year, and afterward wholly blind. He nevertheless pursued a literary career with marked success.

His lyrics are considered the most important of his works, but they are marked by a gloomy spirit. He went to Berlin in his early twenties and there is said to have gained the enmity of Metternich through some political criticism. He was later critic for Kiihne's periodical, Europa.

His writings include (AbduP (1843); (Ein Zogling des Jahres 1848} (1855; later published as (Gabriel SolmaD); (Der ehrliche Name) (1880); (Das Leben kein Traum) (1888); ^eheimratiiP (1891) ; (Nachsommer, neue Gedichte) (last ed., 1901), etc.

LANDGRAVE (German Landgraf), a

title assumed by certain territorial counts of the German empire to distinguish them from the in¬

ferior counts. There were originally three land¬

graves, those of Thuringia and of Upper and Lower Alsace, who were princes of the empire.

The title was assumed by Louis III of Thurin¬

gia about 1130.

LANDING FORCE, or LANDING

PARTY, a permanently organized force com¬

posed of infantry and artillery, attached to each ship of a squadron. The service required of a landing force varies from that of police duty in cases where anarchy or revolution may exist, and

where there are no other forces at hand, to the hardest kind of offensive war¬

fare on shore. The force is usuafly com¬

prised of marines, although they may be sup¬

ported by blue jackets; the landing of marines is a recognized procedure in the way of maintaining order where necessary without bringing up a question of war or invasion such as would arise from sending an army force into a country.

The men are landed in ship's boats and the flotilla is commanded by an officer acting as beach master, who has a sufficient number of armed men to protect the boats in the absence of the landing party, although the boats may return to the ships if they are near at hand.

The warships furnish a base of supplies and communication for the landing force and the warships must always be kept open.

A section of a landing force is a unit con¬

sisting of one officer, three petty officers and 24 men. Two such sections form a company and two or more companies (not exceeding six) form a battalion. Two or more battalions form a regiment, and two or more regiments form a brigade. In the boats the men are seated in squads, ready to deploy the instant the beach is reached. There are six. special details of a landing force, consisting, of pioneers, signalmen, messmen, ammunition and ordnance party, guncotton party and ambulance party. The officers are armed with pistols, the men with rifles, and each battalion has two machine guns and one three-inch field piece. Each battleship carries a guard of marines consisting of two officers and about 70 men. In case a larger landing force is required a body of 5,000 marines can be started at 24 hours' notice. They would be carried on their own transports or upon war¬

ships.

LANDIS, Kenesaw Mountain, American

justice: b. Millville, Ohio, 20 Nov. 1866. He

was graduated at the Union College of Law, Chicago, in 1891, admitted to the bar in that year and engaged in the practice of law in Chicago. He served as private secretary to United States Secretary of State Gresham, and since 28 March 1905 has been United States district justice of the northern dis¬

trict of Illinois. He came into national prominence when presiding at the trial of the Standard Oil Rebate cases in 1907, imposing a fine of $29,240,000. While the decision was set aside by the higher courts it did much to establish a reputation for Justice Landis.

LANDIT, or LENDIT, lan'de, (The Fair

of), a famous fair held in France in mediaeval times. The fair found its origin in the desire of the bishop of Paris to arrange a public display of a reputed fragment of the true cross received by the cathedral of Paris in 1109.

The second Wednesday in June was designated as the time when the fragment might be viewed by the people in the open space be¬

tween Saint Ouen, Saint Denis and Paris.

Owing to the gathering of great crowds of people for this purpose a fair was held under the direction of the monks of Saint Denis, and for many years was largely attended. In 1556 the fair was removed to Saint Denis, after which time its importance steadily di¬

minished, and in the 18th century the fair was abandoned. A sheep market was afterward established in its place.

LANDLORD AND TENANT, the rela¬

tion of renter to rentee; not necessarily of land, except as all dwellings or industries must have land for a locus, but of any of its ma¬

terial encumbrances. The landlord need not be the owner; he may himself be a lessee or tenant granting occupancy or use to a sub¬

tenant. It is sufficient that his title is superior to that of the one who holds through him.

The difference between the latter's interest and that of the landlord is known as the re¬

version of the latter; but there is obviously no reversionary interest unless the grant is specifically limited to a less volume than the grantor's, and none unless it is inferior in kind. Historically, the relation originated in the practice of infeudation in the Middle Ages, when all holdings were a chain of vassalships, when even kings did homage for portions of their possessions, and no property was held by any but kings, except as vassal to some over-

lord. The feudal incidents were abolished by the English statute of Quia Emptores in 1290.

The modern mercantile relation of lessors and lessees is the creation of statute, judicial de¬

cisions and the specific agreements of written contracts.

The mutual obligations of the contracting parties in law are natural consequences of the relation. The landlord on his part must pro¬

tect the tenant from any other claim of oc¬

cupancy; must not evict him or suffer him to be evicted and if he does either is liable in damages. He is not, however, under any obligation to protect him against violence, trespass, nuisances or other

unlawful acts of outsiders; nor to furnish habitable buildings, usable implements or anything whatever of specific quality unless specially agreed on.

The doctrine of caveat emptor is also extended to caveat lessor; he must form his own con¬

clusions and run his own risks. The tenant cannot question or interfere with the land¬

lord's title, even if the latter be worthless: his own is derived from it, and must stand or fall with it. Nor does any length of oc¬

cupancy enable him to plead the latter in bar of the landlord's right, by the statute of limi¬

tations, under common law ; but he very gen¬

erally can by statute after a certain period, though never till the period of his tenancy has expired. Of old the feudal tenant could do at once much more and much less than this : he could not under any circumstances get the landlord's property into his own hands, but by a legal fiction of which the law sanctioned the use (feoffment or common recovery), he could grant to a third party what he did not himself own, so that the third party could retain it; the wrongful grantor, however, forfeited his own estate to the landlord. Statutes long since abolished these fraudulent conveyances.

The tenant must keep the premises in re¬

pair; if he lets them go to ruin or deteriorate from non-use he is liable in damages. By common law he must rebuild premises destroyed by fire; most States of the United States abro¬

gate this right, however. The tenant must not commit waste ; but he may cut wood for fire, repairs or fencing, and if he is a tenant at will or for life he has a right to the crops.

Obligations by agreement may of course be almost anything. Stipulation of rent usually forms a part;

permission to make improve¬

ments not to be removed is most usual, some¬

times obligation to make them of certain sorts ; and an agreement not to assign the lease with¬

out the landlord's permission. The landlord may agree to renew the lease or to pay for improvements, or permit removal of fixtures, etc. An agreement to pay a reasonable rent has been held to be implied without being speci¬

fied in the lease. All such rights and' duties extend to the successors to the parties, includ¬

ing assignees.

LANDMARKS CLUB, The, an associa¬

tion incorporated in California, in 1895, and having for object the preservation of the monu¬

ments and historic landmarks of that State.

It raises funds through private subscription and in the course of its existence has carried on a State-wide campaign of education for the preservation of the Indian and early Spanish remains in California. Many of the old missions were crumbling until the club in¬

stituted the necessary repairs to preserve these interesting relics for posterity. The club has reroofed nearly an acre and a half of mis¬

sion buildings, repaired and safeguarded full half a mile of mission walls. It has so pre¬

served the most important parts of three of the noblest monuments of California history and romance that they will stand for a century.

These are the missions of San Juan Capistrano, San Fernando and Pala. In recent years the work of the club has been greatly extended by the founding of

Local Cloisters, each of which concentrates its efforts in its immediate local¬

ity. Membership dues are $1 per year and life membership with diploma cost $25.

LANDOIS, lan-dwa, Hermann, German

zoologist: b. Munster, Germany, 19 April 1835; d. 1905. He entered the priesthood, but in 1859

turned his attention to science, and in 1873 was LANDOIS

appointed professor of zoology at the Academy of Munster and head of the zoological museum. He is the author of (Sound and Voice Apparatus of Insects) (1867) ; 'Text-

Book of Zoology> (1870); 'Text-Book of Botany> (1872) ; (Voices of Animals> (1875) ; 'Text-Book of Instruction in the Description of Nature,) and other popular works of a like character.

LANDOIS, Leonard Christian Clemens,.

German physiologist: b. Munster, Germany, 1

Dec. 1837 ; d. 1902. He is a brother of H.

Landois (q.v.), and was educated at the Uni¬

versity of Griefswald and had been professor of physiology there from 1872. He was widely known as an original investigator and the discoverer of blood pulse transfusion, and has published (Le Diagnostique des Malades d o Yeux) (1877) ; (Manuel d'Ophthalmoscopie) (1878); 'Traite complet d'Ophthalmologie) (1886) ; (Lehrbuch der Physiologie) (12th ed., 1909), etc.

LAND ON, Letitia Elizabeth, English

poet, better known by her initial signature <(L.

E. L.)) : b. Chelsea, England, 14 Aug. 1802: d.

Cape Coast Castle, Africa, 15 Oct. 1838. She wrote much for the then fashionable annuals, and was long popular both as poet and prose writer. In June 1838 she was married to a Mr. George MacLean, and sailed with him to Cape Coast Castle in western Africa, where he was governor. She died there mysteriously soon after her arrival, from prussic acid. Her chief works are (The Improvisatrice and Other Poems) (1824) ; (The Golden Violet) (1827) ; (The Venetian Bracelet) (1829) ; 'Ethel Churchill,) a novel (1837), and 'Traits and Trials of Early Life) (1836), supposed to be autobiographical. Consult her 'Life and Remains,) edited by Blanchard (London

1841).

LANDON, Melville de Lancey ("Eli

Perkins))), American author: b. Eaton, N. Y., 7 Sept. 1839. He was graduated at Union College in 1861, and soon after joined the Union army, from which he retired in 1864, having reached the rank of major. He became a cotton-planter in Arkansas and Louisiana, traveled in Europe, and was for a time secre¬

tary of the United States legation at Saint Petersburg. His writings have made him known chiefly as a humorist, but have dealt with serious as well as lighter subjects. He has published 'Saratoga in 1901 } (1870) ; 'History of the Franco-Prussian War) (1871) ; 'Wit, Humor and Pathos) (1875) ; 'Wit and Humor of the Age) (1880); 'Kings of Plat¬

form and Pulpit) (1887) ; 'Thirty Years of Wit) (1890); 'Eli Perkins on Money — Gold, Silver or Bimetallism) (1895), and other works.

LANDOR, A. Henry Savage, English

traveler and painter: b. Florence, 1865. He is a grandson of Walter Savage Landor (q.v;).

He was educated at Florence and in Paris.

He has spent many years in travel, visiting in Korea, China, Japan, India, Nepal, Tibet, South Mongolia, Persia, Beluchistan, the Philippine, Azore and Sulu islands, and in Australia, America and northern Africa. He was the first white man to reach the sources of the Brahmaputra River and established their exact position (Tibet 1897) ; and was also the first white man to explore Central Mindanao Island, there discovering the Mansakas ("white

tribe))). He was with the allied troops on their march to Peking in 1900, and was the first Anglo-Saxon to enter Llasa, the Forbidden City. He holds the world's record in .moun¬

taineering. Mr. Landor declared the River of Doubt, which Theodore Roosevelt claimed to have discovered in South America, to have no existence. He served as a disptach rider during the European War. Among his writings are 'Alone with the Hairy AimP ; 'Corea, or the Land of the Morning Calm) ; 'A Journey to the Sacred Mountains of Siao-on-tai-shan) ; 'China and the Allies) (1901) ; 'In the Forbidden Land) (1898); 'Across Coveted Lands) (1902) ; 'The Gems of the East) (1904) ; 'Tibet and NepaP (1905); 'Across Widest Africa) (1908); 'The Americans in Panama) (1910); 'An Ex¬

plorer's Adventures in Tibet) (1910) ; 'Myster¬

ious South America) (1914).

LANDOR, Walter Savage, English poet

and author of prose dialogues : b. Warwick, England, 30 Jan. 1775; d. Florence, Italy, 17

Sept. 1864. The literary life of Landor is among the longest in the history of letters; his first book, 'The Poems of Walter Savage Lan¬

dor,) appeared in 1795; his last work, 'Heroic Idyls,) came out in 1863. He was the eldest son of Dr. Landor and his second wife, Eliza¬

beth Savage, both of ancient families. As a boy Landor showed great love of reading, was fond of trees and flowers and was known for his physical strength and fiery temper. At school near home and at Rugby, which he en¬

tered at 10, he was an excellent Latin scholar, and his rebellion against the somewhat arbitrary dictum of his tutor regarding a Latin quantity was the cause of his rustication in his sixteenth year. Two years later he entered Trinity Col¬

lege, Oxford, where he was known for his sympathies with republican government and whence he was expelled the following year for a boyish freak. This led to a quarrel with his father, and in 1794 he left home. For the next 10 years he lived a somewhat nomadic life, fluctuating between London and Tenby, Wales, with short periods of residence in Bath and other intervening cities, and trying his hand at journalism and poetry. In the former field he wrote rather intemperate articles for the Courier against the Tory government then in power; in the latter he did some of his best work. Besides 'The Poems of Walter Savage Landor) already mentioned, there appeared in 1798 his long and vague, but often musical, poem, 'Cebir,) and four years later 'Poetry by the Author of Cebir.) The literary influ¬

ence to which he was at this time most subject was Milton.

On the death of his father in 1805, Landor succeeded to a goodly property, and began to look about for a country place. Finally in 1809

he bought a large estate at Llanthony in Wales, which he conducted in so high-spirited and un¬

practical a way that in five years he sunk £70,-

000 in it and was obliged to give it over to trustees, who made it yield a sufficient income to support him elsewhere. Meanwhile, in 1808, he had with characteristic enthusiasm enlisted with a

company of volunteers in the war for Spanish liberty, but after a few months in Spain returned disgusted with the pusillani-

mousness of the leaders. With equal impetu¬

osity he had, in 1809, married Miss Julia Thullier, a young girl 18 years his junior, whom he met at a dance in Bath. Owing to his un¬

evenness of temper and to the commonplaceness of her. mind, the marriage proved, in many ways, to be an unhappy one. In a fit of anger, he went to France without her, in 1814, though they had planned the journey together. During this period he published several books, of which the most important is imonidea a volume of elegiac verses (1806), some of his Latin poems, Hdyllia Heroica) (1810), and the tragedy (Count Julian } (1812).

Settling first in Tours, Landor was there joined the following year by his wife, and the two then went to Italy. For three years they lived at Como and later in various Italian cities, until, in 1821, the Landors made Florence their home. Here they were for eight years, and here Landor, who had done comparatively little literary work except for the finishing of Hdyllia Heroica} (1820), wrote the books most inti¬

mately associated with his name, the (Imaginary Conversations. > The first of these appeared in two volumes in 1824; this was followed by a third in 1828 and by the fourth and fifth in 1829. Altogether the number of conversations was about 80, which was about doubled during the rest of Landor’s life. Though not in any sense popular, they were welcomed by the men of letters of the time. In general they express Landor’s reflections and feelings on subjects of high importance. Colvin, in his life of

Landor, divides them into two classes, the dra¬

matic, represented by the excellent (Leofric and GodivaP and the reflective to which type the majority conform, but in a strict sense none are dramatic, for the reason that Landor rarely ex¬

presses more than his own emotion, and though this feeling is often high and noble, it is not to any notable degree historically accurate. The reflective dialogues express Landor's fine thoughts on a great variety of subjects, the character of which is represented by the gal¬

axy of famous men who serve as his mouth¬

piece. All in all, the (Conversations) are among the best examples of restrained, polished, classic style that we possess.

In 1829, Landor removed to Fiesole and here, among other works, he wrote (The Cita¬

*tion and Examination of William Shakespeare^*

published in 1834. The book is one of his longer pieces but is not so successful as the Conversations > because of its rather labored humor. Nor it is so good as the two succeeding pieces, which Landor planned or wrote in Italy and published after his return to England in 1835. (Pericles and Aspasia (1836), his longest single work, is commonly regarded as his most finished production, in regard to beautv of thought and finish of expression. Scarcely, if at all, inferior, however, is the Centameron^*

the record of a five-days' visit of Petrarch with Boccaccio, a book which contains some of Landor's most mature criticism, as well as the most charming of his descriptive passages, the narrative of Ser Francisco's visit to church.

It is on these perhaps as much as on the more miscellaneous

Landor's work after 1837 is comparatively unimportant, and except for some articles to Leigh Hunt's Monthly Repository, a satire, and some "Hellenic,® supplies little new in type.

The most conspicuous volumes were (Last Fruit of an

Old Tree) (1853), containing con¬

versations and miscellaneous work, (Dry Sticks, Fagoted by W. S. Landor } (1858), and (Heroic Idylls > (1863).

Criticism is in substantial agreement that Landor occupies a high but not a pre-eminent place in 19th century letters. The excessively cultivated nature of his subjects, the com¬

parative scantiness and restraint of his pro¬

duction, and the fact that his style is conspic¬

uous for rhetorical graces rather than for nat¬

ural warmth or broad sympathy, keep him from attaining the highest position either as a poet or as a prose writer, but as the master of pol¬

ished prose and the writer of isolated passages he has few superiors. See Imaginary Conver¬

sations ; Pericles and Aspasia.

Bibliography. — The standard life is that by John Forster (2 vols., 1869), now forming the first volume of the standard edition of the works (8 vols., 1876). Colvin's life in the (English Men of Letters) is good; it supplies a good list of authorities on Landor. Leslie Stephen's essay ((Hours inaLibraryP Vol. II), and Vernon Lee's ^he Rhetoric of Landor) (Contemporary Review, Vol. LXXXIV, p. 856, 1903), should be consulted.

William T. Brewster,

Professor of English, Columbia University.

LANDOUZY, lan'doo'ze, Louis Joseph

Theophile, French physician: b. Rheims, 27

March 1845. He was educated at Rheims and at the Medical School in Paris, and was gradu¬

ated there in 1876. In 1880 he was appointed to the faculty of the Medical School and since 1880 he has been professor of therapeutics and materia medica there. He became a member of the French Academy of Medicine in 1893. He has made many contributions to medical litera¬

ture. Among his works are (Sur la Tuber-

culose Infantile* (1875-78) ; (Sur la myopathie atrophique progressive,* with Dejerine (1886) ; 'Sur les Paralysies dans les maladies aigues*

(1880) ; (Recherches sur les causes de l'ataxie locomotrice progressive) (1882) ; (Glossaire medical* (1902) ; (Medicine Allemand et medicine Frangais, in les Allemands et la Science) (1916), etc.

LANDRAIL. See Corncrake.

LANDRETH, Burnet, American agricul¬

turist: b. Philadelphia, 30 Dec. 1842. He was educated at the Polytechnic College, Philadel¬

phia, vyas captain of infantry during the Civil War, serving in the Army of the Potomac, and since the war period has devoted himself to the promotion of higher agricultural and allied in¬

terests in many important fields of service* He was chief of the Bureau of Agriculture at the Centennial Exhibition, director-in-chief of the American Exhibition in London and is a mem¬

ber of many American scientific societies; also holds honorary membership in similar bodies in European countries, in India and in Japan; and is Chevalier and Officer du Merite Agricole de France. He founded and is president of the Association of Centenary Firms of the United States and is head of the seed-house of D.

Landreth & Sons, established in 1784 in Phila-

delphia. He has published several works on agricultural subjects.

LANDRETH, David, American agricul¬

turist : b. Philadelphia, 1802 ; d. Bristol, Pa., 22

Feb. 1880. He was privately educated and joined his father in the seed and nursery busi¬

ness, devoting himself to matters of public in¬

terest in agricultural and horticultural lines after he became head of the firm. He was one of the founders of the Pennsylvania Horti¬

cultural Society in 1827 and acted as its cor¬

responding secretary in 1828-36. He was presi¬

dent of the Philadelphia Society for the Pro¬

motion of Agriculture and established the Il¬

lustrated Floral Magazine in 1832. He wrote numerous articles on agricultural and horti¬

cultural subjects and edited with additions Johnson's dictionary of Modern Gardening) (Philadelphia 1847).

LANDRY, Auguste Charles Philippe

Robert, Canadian author and statesman : b.

Quebec, 15 Jan. 1846. He was graduated from Laval University in 1866; then took a course in agricultural science at the College of Sainte Anne and devoted himself to farming He served for several years in the militia, rising to the rank of lieutenant-colonel. In politics he is allied with the Conservatives; he was a mem¬

ber of the Quebec assembly (1875-76) ; was elected to the Canadian House of Commons in 1878, where he served till 1887, when he was defeated at the general election; in 1892 he was called to the Senate. He became president of the Quebec Exhibition Company in 1894, is a member of several agricultural societies and was elected president of the Council of Agriculture in 1896. He has written (Traite populaire d' Agriculture theorique et pratique) (1878); (L'Eglise et l'Etat> (1883) ; and numerous papers on political and scientific subjects.

LANDS, Public. See Public Lands.

LAND'S END, England, a headland in

Cornwall, about 60 feet in height, consisting of granite cliffs bristling _ with sharp fangs of rocks somewhat resembling the back of an alligator, which forms the southwestern ex¬

tremity of England. There is a lighthouse on the rocks, called Lonerships, about a mile to the west. Here is the entrance to the English Channel from the Atlantic Ocean.

LANDSBERG, Max, American rabbi: b.

Berlin, 26 Feb. 1845. He was educated at the universities of Gottingen, Breslau and Halle and at the Jewish Theological Seminary at Breslau, becoming a rabbi in 1870. From 1871-1914, when he retired, he was in charge of the Berith Kodesh congregation at Roches¬

ter, N. Y. He was governor of the Hebrew Union College at Cincinnati, Ohio, and in 1911

he was president of the 12th New York State Conference of Charities and Correction. He published (A Ritual for Jewish Worship*

(1884; 3d ed„ 1910).

LANDSBERG - AN - DER - WARTHE,

lants'-berk-an-der-var'te, Germany, city in the province of Brandenburg on the river Warthe, 80 miles northeast of Berlin. The town has important iron foundries, engine and boiler factories. It manufactures tobacco, cloth, leather, spirits, furniture, bricks and other commodities, as well as carrying on a trade in the produce of the neighboring country. The

town obtained civic privileges in 1257. Pop.

39,339.

LANDSCAPE, in painting: a picture pre¬

senting a view of natural scenery as it appears within the range of vision from a single point of observation, with or without figures of men or animals. The landscape is essentially modern in its evolution, the Greeks ignoring it in their absorption with the human figure; the Roman and Pompeian wall-paintings are the nearest approach to landscape painting afforded by classic art. The Odyssey landscapes, now in the Vatican Library, and the pictures of a garden painted upon the walls of an apart¬

ment in the villa of Livia at Prima Porto near Rome, are the best of the remaining examples of the art as practised by the Romans.

In Christian art the landscape makes a late appearance, but Giotto (1267-1337) under the influence of Saint Francis of Assisi makes use of natural scenic effects as backgrounds.

It was not until the beginning of the 15th cen¬

tury, however, that the modern landscape made its appearance in the Flemish and Italian schools of art, and even then the landscape was subordinate to the figure interest. Fra Angelico makes use of actual copying from nature, preceding efforts being largely com¬

prised in certain typical objects such as rocks,

clouds, trees or buildings. Leonardo makes use of landscape backgrounds and Raphael is amazing in the diversity and harmony of his adaptations of natural scenery in his back¬

grounds. Michelangelo, on the other hand, ignored the landscape in art and held it and its admirers in contempt. Andrea Mantegua fol¬

lows Raphael but his work is far from possess¬

ing the grace which characterizes that of his successor, Correggio. In the Venetian school the beauties of nature received more enthusias¬

tic representation, and the Bellini, Giorgione and Titian, particularly the latter, are con¬

sidered the founders of the modern landscape.

The pupils and followers of Titian accorded the landscape ample consideration in their compositions, among them being Tintoretto and Veronese. Canal and Guardi follow and are considered the last of the Venetian schools.

In the southern Alps, Salvator Rosa showed considerable power in reproducing the wilder aspects of nature and had a considerable in¬

fluence in the development of the art.

In the northern countries of Europe, as in Italy, painting was a later development ot art, following sculpture and architecture. The miniatures were the precursors of landscape in Flemish art and the first great impetus to the use of nature in painting was given by the van Eycks (1380-1440). Roger van der Wey¬

den, H. Memling and Gheerardt David com-

lete this period of Flemish art, reaching per-

aps the greatest attainments in landscape painting in the 15th century. Later Flemish painters were

attracted by the glamour of the Italian Renaissance and the distinctiveness of the old Flemish school was temporarily sub¬

merged. The work of Bernard van Orley, however, showed originality and genius ; and the influence of the true Flemish art was ap¬

parent, likewise, in the productions of Herri de Bles and Patenier. Brueghel follows with excellent work and one of his sons was notable, as were Paul and Matthew Bril. Rubens did 706

not paint landscapes until late in life and then was largely influenced by Titian; but in Ru¬

ben's work appears the notable innovation of portraying the changes in the sky. Later in the development of Flemish art were Brouwer, a pupil of Frans Hals, Jacques d'Arthois, Cornelis Huysmans and Jan Siberechts.

The landscape in German art originated at Cologne in the work of Stephen Lochner and reached its greatest heights in the productions of Albert Differ of Nuremberg. Diirer showed originality and power as an interpreter of nature and stands alone in German art. It is nearly a century later that Adam Elsheimer comes into prominence, after which interval, strife appears to have suppressed art for a con¬

siderable period.

In the early days of French landscape painting it is difficult to distinguish between the miniaturists and the painters. Jean Fouquet of Touraine practised both arts. The work of French artists was also considerably in¬

fluenced by the presence in France of both Flemish and Italian art colonies, and the at¬

traction Italy held for French painters had a

powerful influence over the development of early French painters. Among the greatest of the early painters was Poussin, although his success came in Italy, and after him came Claude Lorraine whose work presents much of the grander aspects in nature with wonderful effects of space and atmosphere.

The earliest of the Dutch landscape painters were Mabuse and his pupil Jan van Schoreel through whom Utrecht became a centre of art.

They were followed by Abraham Bloemaert and Cornelis van Polenburgh, the latter of whom founded the style known as the

Arcadian landscapes. Like that of other coun¬

tries the Dutch school was largely influenced by Italy where numerous Dutch painters studied and often remained. Among those settling in Italy but really belonging to Hol¬

land were the brothers Andries and Jan Both.

Jan Asselyn and Nicolas Berchem also lived and worked in Italy although of Dutch origin.

Karel du Jardin, Vermeer, Pieter de Hooch and Michiel Carre were among the pupils of Berchem. Pieter Molyn, Esaias van de Velde and Jan van Goyen also became great names in the Dutch school where political changes and a Protestant religion were largely instrumental in forcing the painters into the field of landscape painting as affording a patronage lacking in other lines. Salomon Ruysdael and Allart van Everdingen were really the

originators of the Dutch school of art ' which chose its own peculiar but very adaptable country for portrayal with lasting effects in the world of landscape painting. Hobbema follows with the Cuyps, Paul Potter, Adrian van de Velde, Phillips Wouwerman, Emanuel de Witte and Jacob Ruysdael, the latter of whom in some of his landscape compositions rivals and even surpasses Rembrandt. The Dutch school found its culmination in Rem¬

brandt who raised to its highest art the pres¬

entation of a simple stretch of landscape, al¬

though Rembrandt showed his originality in landscape painting later than in other work.

The Dutch school was decadent after Rem¬

brandt.

The Spanish school of art rose with the decline of Spain's greatness among the nations.

Zurbaram is the first among Spain’s landscape painters, followed by Velasquez and his con¬

temporary, Francisco Collantes, and then Murillo.

The 18th century saw the development of landscape painting in England with Richard Wilson, a Welshman, as its first great ex¬

ponent. Gainsborough’s work foreshadowed greater developments although with him the landscape is subsidiary to the portrait. Thomas Barker, known as (

Constable, while influenced by the Dutch, was sound in principle and was the originator of innovations in light effects, furnishing inspira¬

tion later to the Barbizon school and so in¬

fluencing much of the later art of Scotland and Holland. J. M. W. Turner possessed a range in the field of nature perhaps wider than any of the landscape artists, and while perhaps some of his work may be criticized for effects which were the outgrowth of a peculiar tem¬

perament he left a mass of exceptional crea¬

tions covering an extraordinary variety of sub¬

jects, many of them among the finest extant.

In the more modern French school, Wat¬

teau, Oudry, Boucher, the three generations of the Vernet family, Hubert, Robert and Honore Fragonard produced a type of decorative landscapes not hitherto attempted, and this romantic group was succeeded by the Barbizon school upon which the sound principles of Con¬

stable had so material an influence. In this later group the effects of nature were combined with a poetic idealism. The list of later French painters is lengthy and distinguished, including Georges Michel, Louis David, D.

Ingres, Delacroix, Richard Parkes Bonning-

ton, Paul Huet, Alexandre Decamps, Camille Flers and Corot; as well as Eugene Isabey, Rousseau, Charles Jacque, Millet, Diaz, Jules Dupre, Louis Cabat, Prosper Marilhat and Francois Couchet.

. French influence has been of powerful effect in recent landscape painting, originating the Barbizon and the Impressionist methods. The Glasgow school and the Cornish school of Newlyn, in Great Britain, have also exercised wide influence.

In America landscape painting has come under a considerable amount of criticism as being of European origin and coming under European influence. Considering, however, the European origin of American civilization, and the interchange of ideas and influences to be traced among the exponents of the art of landscape painting in Europe the criticism be¬

comes captious rather than otherwise. It was not until the 19th century that landscape paint-

gained any real foothold in America al¬

though the landscape background for portraits was occasionally employed. The Hudson River school of landscape painting was the earliest effort in this direction, the pioneer being Thomas Doughty. Others

were Thomas Cole, Asher B. Durand, J. F. Kensett, William and James MacDougal Hart. These and others specialized on scenery of the romantic character of the Hudson and its environs and brought much criticism through their too great atten¬

tion to detail and the panoramic character of their canvases. Of a later group F. E. Church

painted subjects ranging from Labrador to South America, and Thomas Moran and Albert Bierstadt felt the lure of the Rockies. Suc¬

ceeding this earlier group came George Inness, Alexander H. Wyant, Homer Martin and

Henry W. Ranger whose art is of unexcep¬

tional quality even though admittedly some¬

what under the influence of the French school.

Later are Ralph S. Blakelock, Albert P. Ryder, Horatio Waller, Winslow Homer, Paul

Dougherty, Allan B. Talcott, Alexander Har¬

rison, F. W. Benson, J. Alden Wier, W. L.

Lathrop, Colin Campbell Cooper, Willard L.

Metcalf, Albert L. Groll, Leonard Ochtman, Dwight W. Tryon, Frederick Ballard Williams and others who are doing earnest work. Of those influenced by the Impressionist school, Childe Hassam and John W. Twachtman are notable as producing work of strength and originality. Winslow Homer, while a marine rather than strictly a landscape painter, is con¬

sidered typically original in his work; and while Whistler, Sargent and Alexander use landscape effects only in subordination to their portraits the character and distinctiveness of their work is

unquestioned.

Bibliography. — Michel, Emile, (Great Mas¬

ters of Landscape Painting,* translated from the French (Philadelphia 1909) ; Hamerton, Philip Gilbert, (Lon¬

don 1911) ; Ruskin, John, (Lectures on Land-

scape) (1897) ; Woermann, (Die Landschaft in der Kunst der alten Volker) (Munich 1876) ; Montabert, Paillot de, (Traite complet de la peinture) (9 vols., Paris 1829-50) ; Crowe and Cavalcaselle, (History of Painting in Italy* (2d ed., London 1902) ; Janitschek, (Geschichte der deutschen Maleri* (Berlin 1900) ; Weale, (Hubert and John van Eyck*

(London 1907) ; Crowe and Cavalcaselle, (The Early Flemish Painters* (2d ed., London 1872) ; Havard, (The Dutch School of Paint¬

ing* (London 1885) ; Dilke, Lady, (French Painters of the Eighteenth Century* (London 1899) ; Thomson, D. C., (The Barbizon School* ; Muther, Richard, (The History of Modern Painting* (2d ed., London 1907) ; Salter, E. G., (Nature in Italian Art* (London 1912) ; Kundall, landscape and Pastoral Painters of Holland* (London 1891) ;

de Jongh. (Het Hollandsche Landschap*

(The Hague 1903) ; Bode,

ters of Dutch and Flemish Painting*

(London 1909) ; Lanoe et Brice, (His-

toire de l'Ecole frangaise du Paysage*

(Paris 1901) ; Holme, (Masters of English Landscape Painting* (New York 1903) ; Scott, (Our British Landscape Painters* (London) ; Caffin, Charles H., (Story of American Paint¬

ing* (New York 1907) ; Harrison, Birge, landscape

Painting* (New York 1909) ;

Isham, Samuel, (The History of American Painting* (New York 1905) ; Bryant,. Lorinda Munson, (American Pictures and their Paint¬

ers* (New York 1917) ; Dunlap, William, (History of the Arts of Design in the United States* (Boston 1918).

LANDSCAPE ARCHITECTURE. "Land¬

scape architecture is primarily a fine art, and as such its most important function is to create and preserve beauty, in the surroundings of human habitations and in the broader natu¬

ral scenery of the country; but it is also con¬

cerned with promoting the comfort, conveni¬

ence and health of urban populations, which have scanty access to rural scenery, and urgently need to have their hurrying, worka¬

day lives refreshed and calmed by the beau¬

tiful and reposeful sights and sounds which nature, aided by the landscape art, can abun¬

dantly provide.** (C. W. Eliot).

Very early in his history man shaped the economic changes which he made in -the earth's surface so that they gave him also an aesthetic satisfaction. This satisfaction was due in great measure to the fact that the changes were obviously man-made ; they bore witness that he had impressed his ideas on the stub¬

born natural material. Much later in his de¬

velopment — almost, it might be said, in mod¬

ern times — came the period when man, in¬

stead of being isolated and overpowered in the midst

of wild nature, found himself cramped and oppressed by the works of his own hands, and sought relief in the aesthetic pleasure to be derived from landscape which expresses not man's will but the operation of natural forces. The province of landscape architecture is so to guide man's modification of the landscape that he may get the greatest possible aesthetic satisfaction of one or both of these two quite different kinds. The re¬

sulting beauty might be, at one end of the scale, that of the formal surroundings of a palace — architecture in natural materials to show man's magnificence — or, at the other extreme, that of a woodland solitude — appar¬

ently an age-long natural growth — a place of rest from all the works of man. Within comparatively recent years, there has come a general recognition of the value to the public of designed and organized cities, and of parks, reservations and other out-of-door spaces, and a greatly increased interest in private pleasure-

grounds of various kinds. There is now an effective demand for designing skill using as materials ground forms and vegetation, and for designing skill in the arrangement of land¬

scape and architectural forms — streets, parks, buildings — in larger unities, for public use.

This demand has been met by the rise of a separate profession, because the materials and technique of this new field are not those of the older allied professions of architecture and engineering, and are quite as difficult to master within an ordinary lifetime.

Like architecture, its sister profession in the fine arts, landscape architecture requires of its practitioner diverse abilities not often found in the same person : the aesthetic appreciation and creative power of the artist, together with the executive skill of the business man. The landscape

architect should know the materials of his art ; ground forms, vegetation and structures in their relation to landscape. He should know on the one hand what results are physically possible of accomplishment with these materials, and on the other hand w'hat kinds of beauty were better attained in the materials of some other art. Since, for the most part, the landscape architect cannot pro¬

duce at will in his design all the forms which he might desire, but must choose from among the forms offered by nature those which will suit his purpose, he cannot be confident that 708

his design is possible of execution unless he possesses an accurate first-hand knowledge of the plant materials and of the ground forms from which he must choose the elements of his composition. Since the beauty of vegeta¬

tion is that of intricacy, of multiplicity, of growth and change, the landscape architect's experience and power in design will come to be quite different from that of the architect, who deals with definite, rigid forms and bal¬

anced masses. In his formal designs in close conjunction with buildings the type of beauty which he seeks will not be widely different from that sought by the architect. But since the fundamental organization of his natural¬

istic designs, of his preservation and enhance¬

ment of natural scenery, will be the real or apparent manifestation of the untrammeled forces of nature, the landscape architect who would attempt such design must have humbly studied the forces which carve the valleys, and which direct the flow of the streams, and he must be keenly sensitive to the aesthetic unity of a mountain or the perfect growth of a ground-covering fern, which may dominate

or decorate his nature-inspired work.

Historic Styles of Landscape Design. —

In studying existing works of landscape archi¬

tecture we find that we may consider in groups works which produce a similar effect on the beholder on account of a fundamental similar¬

ity in their organization ; and this similarity of organization comes in the case of each group from a similarity of conditions under which the examples in the group were brought forth, — conditions, namely, of their physical environment and material, of the people who made them, and of the purposes for which they were produced. We find that the various historic styles of landscape design which have been differentiated have taken their names usu¬

ally from the peoples which originated them and the countries in which they arose, occa-

' sionally from an individual whose name was associated with certain definite pieces of work which were the first examples of the style, and, rarely, from the total aesthetic effect produced by the style; for instance, Italian style, style of LeNotre, Romantic style. From the point of view of the fundamental ideal ex¬

pressed by the designer, styles of landscape design fall into two classes, those which ex¬

press the dominance and the will of man and those which express the designer's apprecia¬

tion of the power and beauty of nature. We may call the styles in the first of these cate¬

gories humanized and those in the second, naturalistic. . Since giving an object geomet¬

rical form is a common and obvious way of making it express man's will, the term formal has often been used in the sense of man-made or man-dominated, but

the two terms are not synonymous, for there are many informal de¬

signs which nevertheless are definitely and ob¬

viously humanized. The hand of the designer and his artistic achievement may be recog¬

nized as fully in this design as in man's formally-arranged compositions. The follow¬

ing review may serve to suggest how the most clearly characterized historic styles have taken form, each under its own circumstances.

The Egyptians have left us records of their gardens, which in their early form were inner courts with fruit and ornamental plants, but later were extended outside to larger rectan¬

gular areas, formally planted. The Babylonian gardens are known to have been terraced, commanding extensive views, as in the case of the famous ((hanging gardens" of Babylon, and cooled and decorated by water features.

In ancient Persia, again, water was a leading element in the enclosed gardens, which were made pleasant and grateful to the dwellers in the hot and dry climate by shade and fruit, and were usually adjacent to an extensive thickly-planted wilderness or park. The '(groves" and orchards of the Greeks reflect the immediate influence of Persia on the treat¬

ment of outdoor areas after the Persian wars.

Classic pleasure-grounds, however, find their highest development in the Roman villas, for instance, Pliny's Laurentine and Tusculan villas, and Hadrian's at Tivoli, — carried out as splendid architectural schemes, and with regard to the advantages of cool breezes, view, shade and the decorative beauty of water and statu¬

ary. In the Middle Ages we find in the mon¬

asteries gardens primarily utilitarian, of which Saint Gall, with its four areas of fruit, vege¬

tables, herbs and flowers, is perhaps the most famous example; and correspondingly for the pleasure of the inhabitants of the castles, as feudal life became less war-like, the terrace walks along the castle walls grew into enclosed separate gardens furnished for outdoor enjoy¬

ment. Meanwhile in the Far East landscape de¬

sign had been developing to a high degree of definiteness and finish. Chinese gardens, said to date from earlier than 2000 b.c., took the form of miniature landscapes, carefully de¬

signed and enclosed; and with the spread of Chinese culture the Japanese took suggestion from these landscape gardens of China and ultimately produced styles of garden design which expressed their reverence for nature,"

wrought out, conventionalized and symbolized by successive generations of artists, in forms of great intrinsic beauty. The Moorish gar¬

dens in Spain had for their direct prototype the gardens of Persia and Syria. They were patios surrounded by buildings, shady, cool, full of the scent of flowers, and the splash and sparkle of running water. The gardens were necessarily a part of the architectural scheme, both being in a clearly marked style which molded the culture of Spain, and through the Spaniards influenced the style of the buildings and gardens of Mexico and Cali¬

fornia. The villas of the proud, powerful, ostentatious, artistic nobles of the Italian Re¬

naissance were based on the design of the gardens of the old Roman patricians and served a mode of life not very different. They were usually the unified work of one designer, often a well-known architect or sculptor, and the style of the garden designs reflects the rise and development of the style of

the Re¬

naissance in the other arts. The villas were set on steep-sided hills facing the open view and the cool 'breeze. In earlier times the de¬

sign was simple,— the main building and its terrace being the centre of a scheme of gar¬

dens with still pools, and statues and foun¬

tains, often of great sculptural excellence. In later times the villas became more conscious architectural schemes of axial relation, of dec¬

oration less for intrinsic merit than for general effect. Throughout the three centuries of their

development there was shown in the villas a feeling for the beauty of water, displayed in increasingly ingenious ways, for the relief of shade and its contrast in design with open sunlit spaces, for the inspiration of the open distant view, and a feeling, never as yet else¬

where equalled, for effective formal design in materials of architecture and vegetation. In France, England and Holland the Renaissance called forth an expression of architectural de¬

sign in outdoor areas, stimulated by Italian influence, which flowered in different periods.

The Dutch had their small, trim, topiary gar¬

dens; the English their Tudor and Elizabethan country estates with pleasant flower gardens, stretches of turf, and homely kitchen gardens, enclosed one next to the other; and the French had their great open parterres and large gar¬

dens, consisting of different treatments of rectangular units more or less intervisible, —

precursors of the work of Le Notre. Coin¬

cident with the later Renaissance, but spring¬

ing from Persian influence through the Mo¬

gul dynasty, a style of garden design was produced in India, which, as in other hot cli¬

mates, utilizing shade and flowers and fruit, and water in long pools and splashing foun¬

tains or waterfalls, covered areas so great that the designs rival in magnificence those of the Grand Style in France. Le Notre's work at Versailles expressed the power of France and the magnificence of Louis XIV. Built on flat ground, the gardens produced the effect of great extent with recognizable unity and variety of open and wooded areas by the use of allees, here for the first time employed at so great a scale, _ separating one bosquet from another, connecting various points of in¬

terest, forming vistas large and small centred upon the architectural and sculptural decora¬

tion of the scheme. Next the garden fagade of the main buildings, a great terrace deco¬

rated with water basins or carpet-bedding, served as a foreground to the architectural design. This formal design in the ((grand manner® extending its influence all over Eu¬

rope, even into Russia, and often carried to extremes by incompetent designers, invited a reaction toward the inspiration of Nature.

The Landscape Style, originating in England where it was expressed in the work of Kent and Brown, was influenced deeply by the work of such landscape painters as Claude Lorraine and also somewhat by ideas introduced from China. It spread to France and to other parts of the Continent with the Romantic movement and fell later into extremes as unfortunate

as any of those of formal design. It sub¬

stituted the formless for the formal, and the Romantic symbol for aesthetic unity, before it settled to the more rational landscape style of Repton in England and of Puckler-Muskau in Germany. The work of Repton and his followers inspired the park-like estates in America with which Downing was familiar and the tradition of which he followed in his designs, laying, however, increasing emphasis on the use of native vegetation. At the time of his death in 1852, the industrial growth of the United States had begun to cause conges¬

tion in towns, and Downing was a leader in the movement to ameliorate the life of town-

dwellers by the provision of public parks.

It was reserved for Calvert Vaux and Fred¬

erick Law Olmsted to develop to meet this need a style of naturalistic landscape design which has had the most profound influence on the work of the last 50 years, — compositions of open meadows enclosed and diversified by woods, in which the public may find a sense of seclusion and of relief from the insistence of urban sur¬

roundings. In Central and Prospect parks in New York and Franklin Park in Boston we have this style at its best. The work of H. W.

S. Cleveland extended the park movement in the West, and at the same time through his writings he pointed out the necessity for the application of the principles of landscape archi¬

tecture to the planning of new towns. Charles Eliot, a disciple of Olmsted and later his part¬

ner, continued the naturalistic tradition, and is especially known for his activities culminating in the park system of Boston, which has in¬

fluenced extensively the park development of

America. The private place design of the United States in the last half century has also deeply felt this same influence. Large estates have been treated like parks; very small estates have in some of the best examples approached a style not unlike the Japanese, though less small in scale. Simple informal plantings have been the accepted treatment in many commu¬

nities, and have naturally enough often degen¬

erated in unskilful hands into meaningless curvilinear beds and needlessly indirect paths.

In America there has also been a tradition of garden design dating from the colonial period, — gardens of trim hedges and fragrant flower borders, often overhung by fruit trees, usually near the houses and closely adapted to the uses of their owners, and often pleasantly naive in expression. With our present increasing ap¬

preciation of colonial art there has been a re¬

vival of outdoor design inspired by this period.

As the number of country estates of wealthy owners has increased in America, we have fol¬

lowed also the examples of English gardens and Italian gardens, originally designed for re¬

quirements somewhat similar to ours. And also, both in America and in England, has arisen a comparatively new style, — the wild garden, the rock garden, the pond garden and so on,— an attempt to produce at small scale, and usually with a certain amount of symbolism almost Japanese, some striking type of wild nature. Quite different in spirit is the work of the last 25 years in Germany, which, ex¬

pressing in formal terms the needs of the Ger¬

man family for outdoor living, is consciously differentiated from all previous styles of land¬

scape design. When handled by a designer with some inborn sensitiveness to beauty of form, this modern German work has great in¬

terest, but in many cases even some of the Germans themselves would admit that unhappy aesthetic results have arisen from their conscious seeking for an independent style peculiar to German Hcultur.® The modern landscape archi¬

tect has in the examples of the styles of the past a treasury of inspiration and information to aid him in his present work; but he should study these styles not as an archaeologist, not as a copyist, but as a workman providing him¬

self with tools for future original use. He should endeavor to see how in each case the designer met a particular and individual prob¬

lem ; he should feel a brotherly and human interest in the way his predecessor has adapted 710

means to ends, and he should thus get from an example in any style some inspiration for his own work however different its circumstances might be.

The Professional Practice of Landscape

Architecture in America. — Not until recently has there been in this country sufficient demand for the services of the trained landscape archi¬

tect to make it possible for any considerable body of men to carry on the practice of this profession. The American Society of Land¬

scape Architects was founded in 1899, the first degree for the accomplishment of a designated collegiate course in landscape architecture , was granted in 1901. But at present professional degrees are offered by at least six institutions in the United States, and the field and scope of the profession and the technical knowledge which its

practitioners should possess are being differentiated with considerable clearness from the tangent fields of other professions like architecture and engineering. The general prin¬

ciples of the proper professional conduct of a landscape architect are in effect the same as those governing the action of the architect, and are not essentially different from those relating to the work of the engineer, because they are fundamentally the principles of common hon¬

esty applied to the relations of a man who sells skilled advice to a client, who directs for the client the carrying out of this advice, and who serves as arbiter as to the meaning of these directions between the client and the person who does the construction. According to the con¬

stitution of the American Society of Landscape Architects, (

ranging land and landscape for use and enjoy¬

ment, whose compensation is received directly from his client and not directly or indirectly from labor, plants or other material used in fitting land for use, or from persons supplying the same.® The broadest field of professional activity in which the landscape architect finds himself most frequently in co-operation with practitioners from other professioxis is the field of city planning, where the landscape architect works in collaboration with engineer, architect, sociologist, economist or lawyer. Unlike the case of co-operation of architect and landscape architect in the design of a building and its grounds, the delimitation of field in city plan¬

ning cannot be territorial, but must be according to the subjects in which the various collabo¬

rators are severally skilled. It is, therefore, doubly important that each collaborator should appreciate the point of view of the others, and that

all should have at least a sound funda¬

mental conception of the subject of city plan¬

ning as a whole. This necessity of collabora¬

tion and mutual comprehension and the funda¬

mental value of the contribution of the land¬

scape architect in such a collaboration have been made especially plain in the case of gov¬

ernment industrial housing projects for war workers during the European War, where the determination of the physical arrangements of the communities was arrived at usually by such a co-operation of professional skill.

Typical Problems of the Landscape Archi¬

tect. — The landscape architect tries to meet the demands of each problem with a design which, though almost necessarily sacrificing some factors which are theoretically desirable, combines on the whole the maximum of aesthetic and economic excellence possible for him to create under the particular circumstances.

These circumstances are the local conditions of topography, soil, climate and so on, the finan¬

cial means available, the preferences of those whom the landscape architect serves as to the appearance and expression of the design and the economic uses to which the design is to be put, with their resultant fixing of the sizes and shapes of many parts of the composition.

Beauty of appearance may be sought in many different ways, and where one kind of beauty proves to be impossible with the sizes and shapes necessary to be used in the design, an¬

other kind may be attained, perhaps at a dif¬

ferent scale and with a different aesthetic ex¬

pression. No two problems are ever exactly alike, but each typical well-defined use of the land has its more or less characteristic effect on the composition, no matter what the other circumstances may be. The ordinary work of the landscape architect falls, therefore, into classes most readily according to use. Some of the types of landscape designs which nat¬

urally occur in the practice of landscape archi¬

tects in our time and in our condition of society are the garden, the private estate, the <(land subdivision® or development of land for residential use, the country club and country hotel grounds, the grounds of colleges and in¬

stitutions, hospitals and other public or semi¬

public building groups, the grounds of public buildings, exposition grounds, amusement parks, zoological parks and botanical gardens, ceme¬

teries, playgrounds, the smaller intown parks, the larger country parks on the outskirts of our cities and the great landscape reservations, State and national, scattered throughout the country which are now being recognized as having a peculiar worth.

As man has more and more greatly utilized natural resources, the amount of actually wild landscape has decreased, and in our time it is decreasing at an enormously accelerated rate, so that the unhampered expressions of nature's forces remain only in inaccessible and inhos¬

pitable places, and even there they are rapidly passing away before the blind destructive power of man's enterprise. A possession of inesti¬

mable value to mankind is thus becoming in our country so rare that we are beginning to appreciate its preciousness, and the responsi¬

bility rests largely upon the landscape archi¬

tects of this generation to see to it that the best of the scattered remnants of natural character and natural beauty, which we still have left to us, are preserved for the recreation and inspira¬

tion of the future generations. Almost within the memory of living men has come the effec¬

tive conception of the city as a complete organ¬

ism which must provide for its inhabitants such things as they cannot provide for themselves for complete and efficient living; and with this conception has come the realization of the im¬

portance to the individual, and so to the com¬

munity, of beauty, and especially of outdoor beauty, and the duty which the community has to provide it. This duty has been put before the community very definitely in these times, not only in the housing for war workers in this country, but especially in the reconstruction of cities and countrysides destroyed in the war.

We are now coming to see that this same con¬

ception of a complete functional organism ap¬

plies as well to the State and to the nation ; that the lands of the nation should be studied as to their various fitness to all the purposes which land may serve, and then so regulated that each may best serve that purpose, eco¬

nomic or aesthetic, to which in the general nation-wide scheme it is best fitted.

Bibliography. — Some of the most import¬

ant general books on landscape architecture which

have influenced the development of the art are Whately, T., Observations on Modern Gardening) (1770) ; Hirschfeld, C. C. L., (Theorie der Gartenkunst) (1775-80) ; Rep-

ton, H., (Sketches and Hints on Landscape Gardening and Observations on the Theory and Practice of Landscape Gardening>

(1794 and 1803) ; Loudon, J. C., ^An Encyclopaedia of Gardening) (1822) ; Prince von Piickler-Muskau's (Andeutungen fiber LandschaftsgartnereL (1834; now available in a recent English translation) ; Down¬

ing, A. J., (Treatise on the Theory and Prac¬

tice of Landscape Gardening) (1841) ; Andre, E., (L'Art des Jardins1 (1879); Van Rensselaer, Mrs. Schuyler, (ArJ: out-of-doors 1 (1893) ; and the biography by his father of (Charles Eliot, Landscape Architect (1902). Of recent general works should be mentioned Meyer and Ries, (Die Gartenkunst in Wort und Bild) (enlarged 1914) ; Parsons, S., (Art of Landscape Archi-

tecture) (1915), and Hubbard, H. V., and Kim¬

ball, T., (An Introduction to the Study of Landscape Design) (1917). In this last book will be found a selected list of references on landscape architecture, which gives fuller biblio¬

graphical information for all the titles here mentioned and many others, arranged by subject for professional usefulness. The Boston Pub¬

lic Library Catalogue of the Codman Collection of Books on Landscape Gardening (1899) con¬

tains a large number of titles of the older works. . ...

Among the books treating the history of landscape architecture Gothein, M. L., (Ge-

schichte der GartenkunsG (1914) stands out most

conspicuously both in comprehensiveness of scope and wealth of source-material con¬

sulted. In English, Triggs, H. I., (Garden Craft in Europe1 (1913), and the compilation (Gardens Ancient and Modern1 (1885), also published as (The Praise of Gardens,1 ed. by A F. Sieveking (1899), together with Miss Rose Nichols' (English Pleasure Gardens) (1902), include an historical survey of European gardens to show their influence in England, and Mrs. Van Rensselaer's series of historical articles in Garden and Forest (1889-90), will be found useful. Noteworthy treatises on his¬

toric styles of landscape design in special coun¬

tries are for England, the garden histories by the Hon. Alicia Amherst and George W. John¬

son ; for France, the works of MM. Fouquier and' Stein; for the Netherlands, Van Sype-

steyn, (Oud-Nederlandsche Tuinkunst1 ; for Japan, Josiah Conder's work; for India, Mrs.

Villiers Stuart, (Gardens . of the . Great Mughals1 ; and for the American colonial gar¬

dens, Grace Tabor, dld-Fashioned Garden¬

ing.1

On the theory of landscape design and ap¬

preciation, Abel, L., (Aesthetik) ; Hamerton, P. G., Sandscape1 ; Marcus, H., (Die orna-

mentale Schonheit der Landschaft1 ; Migge, L., dartenkultur1 ; Schneider, C. K., 'Landschaft-

liche Gartengestaltung) ; Marquis de Girardin,

pay study; and also Hubbard and Kimballs (Landscape Design) mentioned above.

The books on the design of estates and gardens are legion, and similarly abundant are descriptions of

famous parks and gardens in various parts of the world. The titles of some of these works by such writers as Alphand, Blomfield, Jekyll, Kemp, Mawson, Muthesius, Robinson, Schultze-Naumburg, Sed.ding, Triggs and others are to be found in the bibliographies already mentioned. Current professional litera¬

ture is noted in the quarterly Landscape Archi¬

tecture (official organ of the American. Society of Landscape Architects), which contains arti¬

cles by eminent practitioners, as did the earlier periodical Garden and Forest (1888-97). »

Henry V. Hubbard,

Assistant Professor of Landscape Architecture, Harvard University.

LANDSCAPE GARDENING. See

Landscape Architecture; Horticulture.

LANDSEER, Sir Edwin Henry, English

animal painter: b. London, 7 March 1802; d.

1 Oct. 1873. Hampstead Heath was the scene of some of his early studies, and on one of his early productions now at Kensington his. father has written ((at the age of five." Following the advice of Haydon he studied the Elgin Marbles and the wild beasts at Exeter Change and dis¬

sected every animal whose carcass was obtain¬

able. His life is the record of his works and successes. In the Academy's exhibition for 1815 he exhibited the 'Portrait of a Mule) and the (Heads of a Pointer-Bitch and Puppy.1 In 1818 he contributed several studies of animals to the Academy and the British Institution. In that year a picture exhibited at the exhibition of the Oil and Water Color Society in Spring Gardens, lighting Dogs

Getting Wind,1 at¬

tracted great attention and set a seal upon his work. In 1820 he painted his (Dogs of St.

Gothard.1 In 1821 he exhibited 'Ratcatchers,'

a (Prowling Lion1 and other works of great spirit. In 1822 he received the premium of £150 from the British Institution for the (Larder Invaded.1 The (Cat's Paw1 appeared at the Academy in 1824 and was-sold for £100.

In 1826 he was elected A.R.A., and in 1831

became R.A. In 1827 he exhibited (The Re¬

turn from Deer-Stalking) ; a 'Fire-s.ide Party, >

1829; 'High Life) and 'Low Life,1 1831; < Spaniels of King Charles' Breed,) (A Jack in Office, > 1833; 'Bolton Abbey in the Olden Time,1 1834; (The Drover's Departure,1 1837; (The Return from Hawking1 and the Shep¬

herd's Chief Mourner,1 1837; a distinguished Member of the Humane Society1 and (There's Life in the Old Dog Yet,1 1838; in 1840, Say¬

ing Down the Law1 ; in 1844, (Commg Events Cast Their Shadows Before, > and in 1846, (The Stag at Bay1 ; in 1849, (The Forester's Family1 ; in 1850, (A Dialogue at Waterloo1 ; in 1851, (A Scene from the Midsummer Night's Dream1 ; in 1853, 'Night and Morning) and 'The Chil¬

dren of the Mist.1 His later works include Saved, > (Deer-Stalking,> 'A Flood in the Highlands, > (A Random Shot1 (the most 712

pathetic of all his works), (Wild Cattle at Chillingham,) and his celebrated work of sculp¬

ture, the Lions in Trafalga Square. Landseer's

pencil was productive, and besides many works not here named he produced portraits of celeb¬

rities of the time, that of Sir Walter Scott be¬

ing in the National Gallery. In 1850 he was knighted; in 1855 he received the gold medal of the Paris exhibition. He declined the presi¬

dency of the Royal Academy offered him on the death of Sir Charles Eastlake (1865).

Landseer, notwithstanding his notable work in portraiture, was essentially an animal painter, his success being in fur rather than in flesh.

Down to about 1823 he was content to repro¬

duce the natural expression and characteristics of animals, but after that date, at the sacrifice of genuine artistic qualities, his animal pieces are treated with more or less pictorial effects, with the idea of enforcing the analogy between the character of men and dogs. Dogs and deer are hU favorite subjects. His draughtsmanship is facile and elegant, and he was exceedingly rapid in execution. He held a distinguished place in the society of his time, but his abnor¬

mal sensibility made him in his later years acutely liable to fits of mental depression due to imagined slights by social superiors. Consult Graves, A., (Catalogue of the Works of Sir Edwin Landseer) (London) ; Mawson, J. A., (LandseeU in (Makers of British Art) (Lon¬

don 1902) ; Monkhouse, Cosmo, (Studies of Sir Edwin Landseer > (London) ; Stephens, F.

G., (Sir Edwin Landseer* (ib. 1880) ; Sweetser, M. F., Landseer,* in (Artist Biographies) (Vol. Ill, Boston 1878).

LANDSHUT, lants'hoot, Germany, capital

city of lower Bavaria, on the right bank of the

river Isar, and 40 miles by rail northeast of Munich. From 1255-1503 the town was capital of the duchy Bayern-Landshut, and in 1800-26

it was the seat of a university. There is a fine Italian Rennaissance palace built in the 16th century, and near the town is the ancient castle of Trausnitz, once a seat of the dukes of lower Bavaria. There are 11 churches, one of which, a Gothic brick edifice, dates from 1392 and has a tower 435 feet high. The Cistercian nunnery of Seligenthal, founded in 1232, is near the city, and has a church built in 1729-38. The city is important for its manufactures and markets. Pop. 25,137.

LANDSKRONA, lans-kroo'na, Sweden, a

fortified seaport town on the east side of the Sound, 15 miles northeast of Copenhagen. It has a castle which was completed in 1543 and is now used as a prison, and opposite the town on the island of Hven is the famous subter¬

ranean observatory of Uranienborg, built by Tycho Brahe in the 16th century. The modern town ranks 12th in the manufacturing industry of Sweden, leather and sugar products being of chief importance. There are coal mines in the neighborhood and the town possesses an excellent harbor 35 feet in depth. The har¬

bor was the. scene 24 July 1677 of a great naval battle in which the Swedes were victorious over the Danes. Pop. 16,130.

LANDSLIDE, or LANDSLIP, the slip¬

ping or sliding of land, through the failure of supporting strata, from its original position.

They are due to a variety of causes. Water, particularly in its changing forms through frost and thaw, is the chief agent in their production.

The wearing away of supports by water, the cracking of underlying materials by summer droughts and the

rending of existing crevices by the thawing of water frozen in them are some of the commonest modes by which they are brought about. Sometimes a mass of land resting on an inclined bed slides for a consider¬

able distance before it is arrested by a level surface; thus, in 1772, the Solway Moss, loosened by excessive rains, rolled over 400

acres of cultivated land, reaching in some parts to the roofs of the houses. The fall of the Rossberg in Switzerland and the slip at Char-

mouth, near Lyme Regis, are other familiar in¬

stances. In 1902 in British Columbia a remark¬

able landslide occurred destroying an entire mountain village and causing the death of nearly 100 persons.

^Landslide** is a term employed in United States political phraseology to denote the crush¬

ing defeat of a political party in an election, and especially of the overwhelming defeat of the party in power, as for example, the Demo¬

cratic landslide of 1890 and the Republican land¬

slide of 1896.

LANDSMAN, in the United States navy

an enlisted man who is not in the seaman branch of the service, but takes the rating of third class seaman. Persons possessing a me¬

chanical trade may be enlisted up to the age of 30 years instead of 25 years as in other branches of the service, and a landsman enlisted for a special position must have the fact recorded on his service card. Originally the term embraced the lowest rating in all branches of the enlisted force of the naval service, but latterly the term has been confined to

men enlisted in the artificer or special branches, while in the seaman branch the lowest rating is that of apprentice seaman.

The pay in peace times is $17.50 a month; in wartime and for six months thereafter, $32.50

a month.

LANDSTAD, land'stad, Magnus Brostrup,

Norwegian bishop, folklorist and poet: b. near North 'Cape on the island of Maaso, 7 Oct.

1802; d. Christiania, 8 Oct. 1880. He was edu¬

cated for the ministry and became minister at Seljord, where he lived until his retirement in 1876, after which time he resided in Christiania.

His literary activities were confined chiefly to versification of folklore and to the composition of hymns. His (Norske folkeviser* (1851-53) comprised about 130 poetic versions of folk¬

lore, set to music by Lindeman. He, together with Andreas Faye, was a pioneer in the classi¬

fication of Norse folklore. Landstad made a translation of the hvmns of Luther (1855) and he also compiled a book of hymns, (Kirkesalme-

bog,* which in 1869 was adopted for use in the Norwegian churches and which contained some 60 hymns of his own composition. He also published

LANDSTURM, lant'stoorm (land storm,

land uprising), in Germany, a local militia, con¬

sisting of two levies or bans, the first em¬

bracing all males liable to service but as yet untrained of. age from 17 to 39, and the second all men, trained or untrained, from 39 to 45.

See Landwehr.

LANDWEHR, lant'var (((national de-

fenseC), in the German Empire, a term applied LANE

713

to that part of the military force of the state which is not kept constantly tinder arms, but during peace follows ordinary trades, and is only summoned into active service on the break¬

ing out of war or some internal emergency.

It was first organized by Prussia in 1813, and was extended to all states .of the German Em¬

pire in 1871. On leaving the reserve of the regular army the soldier spends 12 years in the Landwehr, after which he is transferred to the Landsturm (q.v.). In Austria and Hungary the Landwehr, which form cadres alongside the regular army, was reorganized in 1889. In Switzerland the years from 32 to 40 are spent in this force, after which discharged men are drafted to the Landsturm, in which they re¬

main for eight years, thus terminating their military service.

LANE, Alfred Church, American geolo¬

gist: b. Boston, 29 Jan. 1863. He was graduated at Harvard in 1883 and studied at the Univer¬

sity of Heidelberg in 1885-87. He was in¬

structor in mathematics at Harvard in 1883-85; petrographer of the Michigan Geological Survey and instructor in the Michigan College of Mines in 1889-92 ; and assistant, then State, geologist of Michigan in 1892-1909. Since 1909 . he has been Pearson professor of geology and min¬

eralogy at Tufts College. He was a delegate to the International Geologic Congress in 1913.

Besides numerous articles he is editor and part author of various reports on geologic surveys in Michigan and Canada as well as those of the United States Geologic Survey.

LANE, Edward William, English Orien¬

talist: b. Hereford, 17 Sept. 1801; d. Worthing, Sussex, 10 Aug. 1876. Owing to a breakdown in health he went to Egypt in 1825, lived the life of its people and adopted the dress of the country. In 1836 he published (Manners and Customs of the Modern Egyptians,' a book which bears on every page the stamp of au¬

thenticity. His next work was the first accu¬

rate version and one of the most famous translations of the (Arabian Nights' (1838—40). This work was the first _ translation of consequence into English, which was made directly from the Arabic, all previous trans¬

lations having been made through the French.

It contained valuable illustrations and numer¬

ous scholarly and indispensable notes. The translations of Burton and Payne were subse¬

quent to it. The world is indebted to him for many valuable works on Egypt and especially for his (Arabic-English Lexicon' (1863-74), which cost him 30 years of unremitting labor, the expense of production being generously under¬

taken by his friend, the 4th Duke of Northum¬

berland. The succeeding parts came out from 1877 to 1892 under the editorship of S. Lane-

Poole, the whole forming a dictionary indis¬

pensable to the students of Arabic. (3ee Arab¬

ian Nights). Consult his (Life' by S. Lane-

Poole (London 1877).

LANE, Franklin Knight, American Cabi¬

net officer: b. Prince Edward Island. Canada, 15 July 1864; d. Rochester, Minn., 18 May 1921.

He removed to California in early childhood and was graduated at the University of California in 1886. He engaged in newspaper work and in 1889 was admitted to the bar of California.

He practised law in San Francisco, where in 1897-1902 he was city counsel. He was active politically and in 1905-13 served on the Inter¬

state Commerce Commission, receiving his ap¬

pointment from President Roosevelt. In 1913

he was appointed Secretary of the Interior in the Cabinet of President Wilson.

LANE, George Martin, American educa¬

tor : b. Charlestown, Mass., 24 Dec. 1823 ; d.

Cambridge, Mass., 30 June 1897. He was graduated from Harvard in 1846 and after four years at the universities of Berlin and Gottingen returned to America and became professor of Latin at Harvard in 1851. He held this chair until 1894 when he became professor emeritus. He published (Latin Pro¬

nunciation' (1871) in which he contended for the continental pronunciation of the language as against the (

finished a Latin grammar, completed by Mor¬

gan (1898). The famous ballad of (The Lone Fishball' was written by Professor Lane.

LANE, Harry, American legislator : b.

Corvallis, Ore., 1855. He was graduated at the Williamette University in 1876 and en¬

gaged in the practice of medicine at Portland, Ore. He was superintendent of the Oregon State Insane Asylum in 1887-91, and was mayor of Portland in 1905-09. He was elected to the full term in the United States Senate in 1913. He is an advocate of government ownership of telegraphs and telephones. In the debates on the Armed Neutrality Bill, Sen¬

ator Lane greatly incensed his constituents by taking part in the filibuster of 5 March 1917

against the bill.

LANE, Henry Smith, American politician : b. in Montgomery County, Ky., 24 Feb. 1811; d. 1881. He studied law, and was admitted to the bar; removed to Indiana in 1832, and while engaged in his profession became prominent in Whig politics. After serving as State sen¬

ator (1837), he was twice elected to Congress (1838 and 1840), and in the Mexican War lieutenant-colonel of an Indiana regiment. The dissolution of the Whig party was followed by a preliminary organization which led to the formation of the Republican party, and in this movement Lane, was conspicuous, acting with other leaders who planned the first Republican national convention, held in Philadelphia in 1856, and of which he was permanent chair¬

man. A coalition of Republicans with members of the disappearing American party in 1859

elected him to the United States Senate, but after a contest he was unseated in favor of his Democratic competitor. He was elected gov¬

ernor of Indiana in 1860, and in the same year became United States senator, serving one term.

LANE, James Henry, American politician

and soldier: b. Lawrenceburg, Ind., 22 Jirne 1814; d. Leavenworth, Kan., 11 July 1866. He was admitted to the bar in 1840, enlisted as nrivate in an Indiana regiment in 1846, served in the Mexican War,

became colonel and at Buena Vista commanded a brigade. Returning from the war. he was elected lieutenant-

governor of Indiana; from 1853 to 1855 was a Democratic representative in Congress ; in the latter year removed to Kansas, joined the Free-

State party, acted as president of the Topeka and Leavenworth constitutional conventions and became major-general of the Free-State forces. In 1856 the Free-State legislature 714

elected him to the United States Senate, but he was not allowed to sit. He was a prominent actor in turbulent scenes, and was twice in¬

dicted, once for treason and again for murder: on the second charge he was tried and acquit¬

ted. In 1861 Kansas was admitted to the Union and Lane was elected United States senator, but entered the Federal army and in the same year was appointed brigadier-general of volunteers, serving with ability until March 1862, when his commission was canceled. The "Great Southern Expedition® from Kansas (1861-62) and other military schemes of the period were conceived by Lane, but came to nothing. As commander for recruiting in the Department of Kansas (1862) he came into collision with the State authorities and was charged with attempted usurpation. In 1865 he was again elected to the United States Sen¬

ate, suffered from paralysis in the following year and died by his own hand.

LANE, Jonathan Homer, American mathe¬

matician : b. Geneseo, N. Y., 9 Aug. 1819 ; d.

Washington, D. C., 3 May 1880. He was grad¬

uated at Yale in 1846 and entered the United States

Coast Survey in 1847. He was appointed assistant examiner of the United States Patent Office in 1848 and was principal examiner in 1851-57. In 1869-80 he was connected with the Bureau of Weights and Measures in Wash¬

ington. He was a member of the Coast Survey's expedition to Des Moines, Iowa, to observe the total solar eclipse in 1869, and to Catania, Spain, in 1870. He invented a machine for finding the real roots of the higher equations ; a visual telegraph; an improved basin for mer¬

curial horizon; a mechanism for holding the Drummond light and reflector on shipboard, etc. He published (On the Law of Electric Induction in Metals) (1846) ; (Report of the Solar Eclipse of 7 Aug. 1869> (1869) ; 'Theo¬

retical Temperature of the Sun) (1870) ; 'Co¬

efficients of Expansion of the British Stand¬

ard Yard Bar) (1877), etc.

LANE, Joseph, American soldier and poli¬

tician : b. Buncombe County, .N. C., 14 Dec.

1801 ; d. Oregon, 19 April 1881. In 1816 he went from Henderson County, Ivy., to War¬

wick County, Ind., where he was for some time clerk in a mercantile establishment, and in 1822-46 served in both houses of the State legislature. He resigned from the senate in 1846 to enlist as a private in the 2d Indiana Volunteers, was soon commissioned colonel of the regiment, and in the same year was pro¬

moted brigadier-general. He was wounded at Buena Vista, defeated Santa Anna at Hua-

mantla and was brevetted major-general, U. S. A., for this service. After the Mexican War he was appointed governor of Oregon Territory, was

Democratic delegate from Ore¬

gon to Congress in 1851-57, defeated the Rogue Indians at Table Rock in 1853 and in 1859-61

was a LTnited States senator. He was nomi¬

nated for the Vice-Presidencv in 1860 on the unsuccessful Breckenridge ticket. He then re¬

tired from public life and lived at his ranch in Oregon for the rest of his life.

LANE, Sir Ralph, English administrator

in America: b. Northamptonshire, England, about 1530; d. in Ireland, 1603. His earjy life was spent in maritime adventure; in 1583-84 he held a command in Ireland, in 1585 took the di¬

rection of the colony that Raleigh was estab¬

lishing in Virginia, sailed in that year in the fleet commanded by Sir Richard Grenville and was left with 107 colonists at Roanoke Island, while the fleet returned to England (25 August).

He was thus the first governor of Virginia.

The location proved unsuitable, provisions ran low and there was trouble with hostile Indians.

On 19 June 1586 the colon}' sailed for England in the fleet of Sir Francis Drake. In 1589 Lane was a colonel in Drake's expedition against Portugal, and in 1591 helped to quell a rebellion in Ireland. It is regarded as not unlikely that he and his companions first brought tobacco and potatoes to England. Letters by him may be read in Hawks' 'History of North Carolina) (1857); and in Hale (editor), ' Archaeologia Americana) (Vol. IV 1860). Consult also his 'Account of the Particularities of the Imploy-

ments of the Englishmen left in Virginia,) printed by H. S. Burrage in 'Early English and French

Voyages) (New York 1906).

LANE, Ralph Norman Angell (Norman

Angell), Anglo-American author: b. England, 26 Dec. 1874. He was educated at the Lycee de Saint Omer, France, and at Geneva, Swit¬

zerland. He came to the United States in 1890

and engaged in ranching, prospecting and news¬

paper work. In 1898 he returned to Europe as Paris correspondent of several American news¬

papers, serving in this capacity until 1900, when he became editor of the Daily Messenger in Paris. In 1905-15 he was general manager of the Paris Daily Mail. He is famous as the au¬

thor of 'The Great Illusion J (1910) which has appeared in England, America, France, Ger¬

many, Holland, Denmark, Sweden, Spain, Italy, Russia, Japan and China, and in Hindu, Ben¬

gali, Urdu, Marathi and Tamil. The Garton Foundation was established in London in 1913

for the dissemination of Angell's ideas of a modern world state. Among his other writings are 'Patriotism Under Three Flags) (1903) ; 'Europe's Optical Illusion) (1909); 'War and the Essential Realities) (1913); 'The World's Highway) (1915); 'The Dangers of Half-Pre¬

paredness) (1916), etc.

LANE, William Coolidge, American libra¬

rian : b. Newton, Mass., 29 July 1859. He was graduated at Harvard in 1881 and was assist¬

ant librarian there from 1887 to 1893, when he became librarian of the Boston Athenaeum, continuing in that position until 1898, since when he has been the librarian of Harvard University. From 1886 to

1900 he served as secretary and treasurer of the publishing board of ^ the American Library Association, in 1898-99 was president of the association and since 1899 chairman of the publishing board.

From 1904 to 1909 he was president of the Bib¬

liographical Society of America.

LANE-POOLE, Stanley, English archae¬

ologist and historian: b. London, 18 Dec. 1854.

He is a nephew of E. W. Lane, the Orientalist (q.v.). He was educated at Corpus Christi, Ox¬

ford; in 1874-92 was employed in the coin de¬

partment of the British Museum; was sent by the British government on archaeological mis¬

sions to Egypt (1883) and Russia (1886); was employed by the Egyptian government in ar¬

chaeological research at Cairo (1895—97) ; and

from 1898-1904 was professor of Arabic in Trinity College, Dublin. He has published in all over 70 volumes, among them being (Social Life in Egypt* (1883) ; (The Moors in Spain) (1887) ; (Saracenic Egypt* (1900) ; (Mediaeval India) (1902) ; and (The Story of Cairo) (1902). He also edited many volumes and pre¬

pared the extensive catalogue of the Oriental and Indian coins in the British Museum (1875—92) ; (North and by North) (1903) ; (The Thousand and One Nights) (3 vols., 1906).

LANE THEOLOGICAL SEMINARY,

a divinity school founded at Cincinnati, Ohio, 1829. It was opened for students three years after its

foundation and its endowment amounts to about $500,000 ; it income $20,000 ; it has 8 instructors and 57 students. Although it is under the control of the Presbyterian Church it receives students from other reformed bod¬

ies. . No tuition fees are charged, board is low and there are 40 scholarships, each of the value of $2,000. The college stands on a lot of 60

acres donated by Elnathan Kemper in 1829 ; there are five professors' houses and a library containing over 23,000 volumes. Two clubs are maintained, the General Society of Alumni and the Lane Club.

LANESSAN, Jean Antoine de, zhon an-

twan de lan-e-san, French naturalist and pub¬

licist: b. Saint Andre-de-Cubzac, Gironde, 13

July 1843. He entered the health corps of the French marine service, after studying medicine at Bordeaux, and was engaged as surgeon on the coast of Africa and China until the Franco-

Prussian War. He was elected to the National Assembly in 1881 and came into notice as a Re¬

publican journalist. Being interested in colo¬

nial matters he was appointed governor-gen¬

eral of Indo-China in 1891-94; and his writ¬

ings have done much to promote French colo¬

nization. He was Minister of Marine in the Waldeck-Rousseau Cabinet, 1899-1902. ^ His principal works are (De Protoplasme vegetal*

(1876);

vants* (1879) ; (L'Expansion Coloniale de la France* (1888); (Principes de Colonisation (1897); (L'Indo-Chine franchise* (1899); (1905) ;

(1910) ; (Nos Forces Navales* (1911) ; (Nos Forces Militaires) (1913).

LANETT, la-net', Ala., village in Cham¬

bers County, two miles southwest of West Point, Ga., on the Chattahoochee Railroad and on the Chattahoochee River. The population of the town is growing owing to the cotton mills, bleaching and dyeing works which levy for materials upon the cotton lands surround¬

ing the town. The mills have abundant water power. Pop. (1920) 4,976.

LANFRANC, lan'frank (Fr. lan-fran),

Anglo-Norman ecclesiastic, the first arch¬

bishop of Canterbury after the Norman Con¬

quest: b. Pavia, Italy, about 1005; d. Canter¬

bury, Kent, 24 May 1089. After studying law in his native city he left Italy about 1039 and founded a school of law at ^Avranches, which soon became famous in 1045, but entered the Benedictine monastery of Bee and in 1046 was chosen its prior. Lie opened a school in the monastery which presently became the most popular in Europe. He took a prominent part in the controversy with Berengar on transub-

stantiation. About 1053 he came into close re¬

lations with William of Normandy, and though he at first condemned William's marriage with his cousin, he afterward (1059) went to Rome to procure the papal dispensation for it. Wil¬

liam accordingly made him prior of his new foundation, the abbey of Saint Stephen at Caen (1066), and in 1070 made him archbishop of Canterbury in place of Stigand. Lanfranc was William's most valued counsellor, acted as re¬

gent in the king’s absence and continued in the reign of William Rufus to exercise a great and moderating influence on the government of England. He rebuilt Canterbury Cathedral in the Norman style after the fire of 1067. Con¬

sult his

The first complete edition of his works was edited by D’Achery (Paris 1648).

LANFRANCO, lan-fran'ko, Giovanni,

Italian historical painter: b. Parma, 1580 or 1581 ; d. Rome, 1647. He was a page in the service of the Marquis of Montalo, who placed him in the studio of Agostino Carracci at Parma. Later he studied in Rome under An¬

nibale Carracci, assisting him in painting the frescoes in the Farnese Palace. His most not¬

able work was done in fresco painting, al¬

though there is a considerable number of his oil paintings in the various Italian collections.

He was also an engraver, his most famous work in that line being the plates for Ra¬

phael’s biblical subjects in the Vatican. Among the most famous of his frescoes are his An¬

gels in Glory,* painted for his old patron, the Marquis of Montalo, in the cupola of Maria in Piazzo at Piacenza ; the completion of the cu¬

pola frescoes of San Andrea della Valle; the cupola of the church of Gesu Nuovo at Naples; and he painted other frescoes in various north¬

ern Italian cities. He painted (Saint Peter walk¬

ing upon the Sea’* for Saint Peter’s Church in Rome and likewise executed a Passion series for the chapel of the Crucifix there. His serv¬

ices to ecclesiastical art were recognized by Pope Urban VIII who knighted him.

LANFREY, Pierre, pe-ar lan-fra, French

historian and publicist : b. Chambery, 26 Oct.

1828; d. Pau, France, 15 Nov. 1877. He was educated in the Jesuit college of his native town and in Paris and became well known by the publication of works in support of political and religious liberalism. These include (L'Eglise et les philosophes au XVIII siecle* (1855) ; (Essai sur la revolution franqaise* (1858); (Histoire politique des papes* (1860) ; (Lettres d'Everard) (I860), a social novel in epistolary form; (Le retablissement de la Pologne) ; and (Etudes et portraits politiques) (1863). His most important work is a (History of Napoleon P (1867-75), which is strongly hostile to Na¬

poleon. It was incomplete at his death. In 1871 he was elected to the National Assembly by the department of Bouches-du-Rhone, and took his seat with the Republican Left. He _was Ambassador at Berne (1871-73), and in 1875 he was elected a life senator.

t _

LANG, Andrew, English author: b. Sel¬

kirk, 31 March 1844; d. 20 July 1912. He was educated at Saint Andrews and at Balliol Col-

lege, Oxford; was elected Fellow of Merton, Oxford, in 1868. He was probably the most versatile writer of his time, and was recognized as an authority on many subjects, including Greek, French and English literature, anthro¬

pology and folklore, Scottish history (especially

the Jacobite period), telepathy and physical research. His wide learning appears in his prose rendering of the (Odyssey5 (1879; with Butcher), and the (Iliad) (1882; with Myers and Leaf), and (Homer and the Epic) (1893), a defense of the unity of the poems ; in his works on comparative mythology and religion, (Custom and Myth5 (1884), (Myth, Ritual, and Religion) (1887; new ed., 1899) ; (The Making of Religion) (1898), and (Magic and Religion5

(1901) ; and in his studies of Scottish history, such as (A History of Scotland from the Roman Occupation5 ; (The Mystery of Mary Stuart5 and (Prince Charles Edward.5 Some of the most interesting of his work is to be found in (Letters to Dead Authors5 (1886) ; (Letters on Literature5 (1889) ; (Angling Sketches5 (1891) ; (Essays in Little5 (1891) ; (Adventures Among Books5 (1904). He pub¬

lished also volumes of verse, (Ballades in Blue China5 (1880); (Rhymes a la Mode5 (1884); (Grass of Parnassus5 (1888) ; (Ballads of Books5 (1888); (Ban et Arriere Ban5 (1894).

Mention should also be made of (Cock-Lane and Common Sense5 (1894), a discussion of the spiritualistic question; Uohn Knox and the Reformation5 (1905) ; (A Defence of Sir Walter Scott and the Border Minstrelsy5

(1910) ; and the biographies of Lockhart (1896) and Tennyson (1901). See Letters to Dead Authors.

LANG, Arnold, Swiss zoologist and anat¬

omist: b. Oftringen, 1855. He was educated at the universities of Geneva and Jena, and in 1876 became privatdocent in zoology at Bern.

He was assistant at the zoological station at Naples in 1878-85, and was Ritter professor of phylogeny at Jena in 1886-89. In 1889 he became profeesor of zoology and comparative anatomy at the University of Zurich, where in 1898-99 he was rector. He wrote

(Die Poly-

claden (Seeplanarien) des Golfes von Neapel5

(1884) ; (Ueber den Einfluss der festsitzenden Lebensweis.e auf die thiezre5 (1888) ; and his (Lehrbuch der vergleichenden Anatomie5 was translated into the English (Text-book of Com¬

parative Anatomy5 (Part I, 1891 ; part II, 1896).

LANG, Benjamin Johnson, American

musician : b. Salem, Mass., 28 Dec. 1837 ; d. 1909.

He studied music under his father, an organist and pianoforte teacher, and at 15 began work as teacher and organist. In 1855 he went to Germany for further study, which for three years he pursued under the instruction of Liszt, Albert Jaell and others. Returning to Boston he at once attained prominence as organist, pianist, teacher and conductor ; became organist of the Handel and Haydn Society in 1859 and conductor of the same in 1895; conductor of the Apollo Club in 1868, and of the Cecilia Society in 1874. In 1869 he made a second visit to Europe, and gave concerts in Berlin and other cities. As a member of the concert committee of the Harvard Musical Association he did much in the interest of musical culture, and through this and other organizations secured the production of many new works. The intro¬

duction of Wagner to the American public was in no small part due to his presentation of that master. He also introduced in America Men¬

delssohn's (Walpurgis Night5 and Berlioz'

(Damnation of Faust.5 While he accomplished much work as a composer, few of his com¬

positions have been published.

LANG, Cosmo Gordon, English arch¬

bishop: b. 31 Oct. 1864; the son of the Rev.

John Marshall Lang D.D., C.V.O. As an un¬

dergraduate he had a brilliant career at Glas¬

gow University, at Balliol College, Oxford; and was a student of the Inner Temple, London, 1883-89. He became a Fellow of All Souls'

College, Oxford, in 1888, and attained the de¬

grees of D.D., D.C.L., LL.D., and D.Litt. He was curate at Leeds 1890-93; Fellow and Dean of Divinity, Magdalen College, Oxford, 1893—96; vicar of Saint Mary's, — the university church, — Oxford, 1894—96; vicar of Portsea, 1896-1901; bishop of Stepney, 1901-08; Canon of Saint Paul's, 1901-08; and honorary chaplain to the late Queen Victoria. He was created archbishop of York in 1908 and at the con¬

firmation held in the Church House 20 Jan.

1909 objections were raised on behalf of the Protestant Truth Society on the ground that while bishop of Stepney he had allowed infrac¬

tions of the law as to church ritual. The objec¬

tions were dismissed by the commissioners in chambers presided over by the archbishop of Canterbury, on the technical grounds ((that they could not "be lawfully received.55 He visited the United States in 1918.

LANG, Heinrich, German-Swiss theolo¬

gian and reform leader: b. Frommern, Wurtem-

burg, 14 Nov. 1826; d. Zurich, 13 Jan. 1876. He was educated in theology at the University of Tubingen and took part in the uprising of 1848, for which he was banished. He became pastor of Wartau, Switzerland, and won wide recogni¬

tion for his advocacy of the Reformed Church.

He later became pastor of the church at Meilen.

He established a paper called Die Zeitstimmen ans der reformirten Kirche der Schweitz which he later combined with Bitzius' Berner IVochem-

bldtter under the new name Reform. He op¬

posed the old doctrines of the orthodox church, and was untiring in his efforts to promote broader views. He wrote (Versuch einer christ-

lichen Dogmatik5 (1858; 2d ed., 1868) ; (Ein gang durch die christliche welt5 (1859; 2d ed., 1870), and (Religiose Reden5 (2 vols., 1873-74; 2d ed., 1896).

LANG, John Marshall, Scottish Presby¬

terian clergyman and educationist : b. Glasford, Lanarkshire, 14 May 1834; d. Aberdeen, 2 May 1909. After completing his education at Glas¬

gow University he filled successively several im¬

portant charges, and was minister of the Barony parish in Glasgow from 1873-1900. He was moderator of the Church of Scotland in 1893. He was the author of several devotional and other religious works. His third _ son, Cosmo Gordon Lang (q.v.), was appointed archbishop of York (1909). In 1900 he was appointed vice-chancellor and principal of Aber¬

deen University.

LANG, Karl Heinrich Ritter von, Ger¬

man historian: b. Balgheim, near Nordlingen, 7 July 1764; d. Ausbach, 26 March 1835. He was educated at the universities of Altdorf and Gottingen, specializing in history and jurispru-

dence. In 1789 he was private secretary to Baron von Biihler, Wurtemburg's envoy at Vienna; he traveled and studied extensively, and from 1793-1801 he was private secretary and archivist to the Prussian leader Harden-

berg. In 1797 he was secretary .of the legation at the Congress of Rastadt. He was ennobled in 1808 and in 1810-17 was archivist in Munich, retiring in 1817. His dependability as a his¬

torian is lessened by his tendency to satire and his giving rein to personal prejudices. Among his many works are (Memorien) (Brunswick 1842; 2d ed., 1881) ; (Beitrage zur Kenntnis der natiirlichen und politischen Verfassung des oettingischen Vaterlandes) (1786) ; (Neuere Geschichte des Fiirstentums Bayreuth' (1798-

1811) ; (Bayerns Gauen) (1830).

LANGBAINE, lang'ban, Gerard (Lang-

baine the younger), English dramatic biogra¬

pher and critic: b. Oxford, 15 July 1656; d.

there, 23 June 1692. He was the son of Gerard Langbaine, provost of Queen's College, Oxford, and was educated at University College, Ox¬

ford. For years he trifled with literary pur¬

suits and in November 1687 a work appeared under Langbaine's name entitled (M*omus Tri-

umphans, or the Plagiaries of the English Stage Exposed in a Catalogue of Comedies, Trage¬

dies, etc.' A month later the work reappeared as (A New Catalogue of English Plays, > the advertisement disclaiming responsibility for the title of the first edition and for an uncorrected preface. Langbaine attributed the unauthorized edition with its derisive title to the malice of Dryden. At this time Langbaine had collected 980 English dramatic

works. He later wrote (An Account of the English Dramatic Poets, etc.' (Oxford 1691), which is his best-known and most valuable compilation. He was elected yeoman bedel of arts at Oxford in 1690 and esquire bedel of law and architypographus in 1691.

LANGBEIN, lang'bin, August Friedrich

Ernst, German humorist : b. Radeburg near Dresden, 6 Sept. 1757; d. Berlin, 2 Jan. 1835.

He was educated for the law at Leipzig and engaged in practice in Dresden until 1800 when he went to Berlin to enter upon a literary career. Both his verse and prose are of a rollicking humorous cast and were widely popu¬

lar. He wrote (1792; 2d ed., 1888) ; (Thomas Kellerwurm' (1806) ; (Sammt-

liche Schriften> (1835-37); (Humoristische Gedichte,' edited by Tittmann (1872);

istische Erzahlungen) (1891). Many of his poems enjoyed a lasting popularity as songs.

LANGDALE, Marmaduke, Baron, Eng¬

lish soldier: b. near Beverley, about 1 598 ; d.

Holme, 5 Aug. 1661. He came into public notice in 1639 when he opposed the ship-money levy on Yorkshire, but when the Civil War began he espoused the cause of King Charles I, and in 1643 he raised a regiment to fight for him. He afterward became a commander of cavalry, de¬

feated .the invading Scottish army at Corbridge, Northumberland, 19 Feb. 1644, and later fought at Marston Moor. He was victorious at Mel¬

ton Mowbray 25 Feb. 1645; and succeeded in raising the siege of Pontefract on 1 March 1645, a piece of work regarded as perhaps the most brilliant of his career. He was defeated at Naseby, at Rowton Heath and at Sherburn , and the battle of Carlisle

completely shattered the remnant of his 1,500 horsemen so that he was compelled to flee to the Isle of Man, whence he escaped to France in May 1646. In the second Civil War he returned to Scotland with a commission from Charles II, and on 28

April 1648 he surprised Berwick and quickly raised a body of Royalists. He was defeated by Cromwell's army at Preston, 17 Aug. 1648, and was taken prisoner 25 August. He was one of seven persons debarred from pardon by Parliament, but he succeeded in escaping from prison. He entered the Venetian service and was prominent in the defense of Candia against the Turks in 1652. After the Restoration Charles II created him a peer. His estates had been confiscated by Parliament, his losses in the service of the king amounting to £160,000, and he excused himself from the coronation ceremonies in 1661 on the ground of poverty.

LANGDELL, Christopher Columbus,

American lawyer: b. New Boston, Hillsborough County, N. H., 22 May 1826; d. Cambridge, Mass., 6 July 1906. He studied at Harvard, was graduated from its law school in 1853, in 1853-70 practised in New York, in 1870 be¬

came professor of jurisprudence in the Harvard Law School, and in 1871 dean of the law school faculty. In 1895 he retired. He was an orig¬

inator of the so-called ((case» system of legal study, and was otherwise prominently identi¬

fied with the progress of professional educa¬

tion in this country. His publications include Selection of Cases on the Law of Contracts) (1870; enlarged ed., 1877); (Cases on Sales) (1872) ; (Summary of Equity Pleading' (1877; 2d ed., 1883), and (Cases in Equity Pleading'

(1878); (Brief Survey of Equity Jurispru¬

dence' (1904).

LANGDON, John, American statesman:

b. Portsmouth, N. H., 25 June 1739; d. there, 18

Sept. 1819. At the outbreak of the Revolution¬

ary War he embarked in the patriotic cause, and in 1775 he was a delegate to the Con¬

tinental Congress, but resigned officejn June 1776, on becoming navy agent. In 1 777, while speaker of the New Hampshire assembly, he pledged a large portion of his property for the purpose of equipping the brigade with which Stark defeated the Hessians at Bennington.

He took part in the battle of Stillwater and commanded a company at Saratoga and in Rhode Island. Subsequently he was a member and speaker of the State legislature, a mem¬

ber of the Continental Congress, a delegate to the convention which framed the Constitution of the United States, and president of New Hampshire. He was one of the first United States senators from New Hampshire, which office he held until 1801, serving for a time as president of the Senate. In politics he acted with Jefferson, who upon assuming office in 1801 offered him the post of Secretary of the Navy, which he declined. From 1805 to 1812, with the exception of about two years, he was governor of New Hampshire; and in 1812 he was offered by the Republican congressional caucus the nomination for the office of Vice-

President of the United States, which, on the score of age and infirmities, he declined. The remainder of his life was passed in retirement.

LANGDON, Samuel, Congregational cler¬

gyman and educator : b. Boston, Mass., 1723 ; 718

d. Hampton Falls, N. H., 1797. He was gradu¬

ated from Harvard in 1740 and was pastor at Portsmouth, N. FI., 1747-74. In 1774 he became president of Harvard, resigning in 1780. In the New Hampshire Convention he ardently advo¬

cated the ratification of the Federal Constitu¬

tion. He received the degree of D.D. from Aberdeen in 1762. Langdon was the author of several works on religion and philosophy.

LANGE, lang'e, Ernst Philipp Karl

(Philipp Galen), German novelist: b. Potsdam, 21 Dec. 1813; d. there, 20 Feb. 1899. He took his degree in medicine at Berlin, became a surgeon in the Prussian army in 1840, saw service in the Schleswig-Holstein campaign of 1849 and afterward settled at Bielefeld, where he practised medicine and began his literary career. He retired with the rank of surgeon-

general in 1878. He wrote (Der Inselkonig) (1852; 3d ed., 1858); (Der Irre von Saint James* (1854; 9th ed., 1891); ^Walter Lund) (1855) ; (Die Tochter des Diplomaten) (1865) ;

LANGE, Friedrich Albert, German soci¬

ologist and economist : b. Wald near Solingen, 28 Sept. 1828; d. Marburg, 23 Nov. 1875. He was educated at Dinsberg, Zurich and Bonn, and became privatdocent in philosophy at Bonn in 1855. In 1858 he became schoolmaster at Duisberg, but resigned upon the government forbidding schoolmasters to partake in political activities, and entered journalism in the cause of political and social reform. He was a bitter opponent of Bismarck’s ministry. In 1866 he removed to Winterthur near Zurich, where he was connected with the Winterthurer Land-

bote. He became privatdocent at Zurich in 1869 and professor of inductive philosophy in 1870. His

strong sympathy with the French in the Franco-Prussian War influenced his resig¬

nation from Zurich but he afterward abandoned politics. In 1872 he became professor at Mar¬

burg. He wrote (John Stuart Mills Ausichten fiber die sociale Frage) (1866) ;

LANGE, Henry, German cartographer : b.

Stettin, 13 April 1821 ; d. Berlin, 20 Aug. 1893.

He was for three years engaged upon John¬

son's Physical Atlas in Edinburgh and in 1855—60 he was head of the geographical department of Brockhaus in Leipzig. He was appointed in¬

spector in the Berlin Statistical Bureau in 1868. Among his publications are (Atlas vom Nordamerika) (1854) ; (Brockhaus Reise-atlas*

(1858-73); (Sfidbrasilian, mit Rficksicht auf die deutsche Kolonization* (1885), etc.

LANGE, Johann Peter, German theolo¬

gian : b. Sonneform near Elberfeld, 10 April 1802; d. Bonn, 9 July 1884. He studied at Bonn, held several pastorates and in 1854 be¬

came professor of theology at Bonn. He was one of the editors of the (Theologische-

homiletisches Bibelwerk,* which was. trans¬

lated, edited and enlarged under the direction of Dr. Philip Schaff as (A Commentary on the Holy Scriptures, Critical, Doctrinal and Homi-

leticaP (25 vols., New York 1865-80). He wrote (Christliche Dogmatik) (3 vols., 1849-52; new ed., 1870) ; (Grundriss der theologischen Encyclopedic* (1887); (Grundriss der christ-

lichen Ethik* (1878); (Grundriss der Bibel-

kunde) (1881), etc.

LANGE, lang'e, Julius Henrik, Danish

art critic: b. . Vordingborg, 19 June 1838; d.

Copenhagen, 20 Aug. 1896. After leaving the University of Copenhagen he traveled in Italy, and thereafter devoted himself to study of the history of art, becoming in 1888 professor in that subject at Copenhagen University.

Among his works are (On Art Values) (1876) ; (Danish and Foreign Art) (1879) ; (Gods and Men in Homer * (1881) ; (Art and Politics*

(1885) ; (Bastien Lepage and Other Painters) (1889); (Thorwaldsen's Representation of the Human Figure) (1893). In his (Billed-

kunstens Fremstilling at Menneskeskikkel sen> (3 vols., 1892-99) he elaborates his dis¬

covery of the ((Law of Frontality.** Consult Brandes, G., (Julius H. Lange* (Copenhagen 1898).

LANGE, Thomas, Danish novelist: b. Co¬

penhagen, 1829 ; d. Lyngby, 1887. He studied theology but abandoned it for a literary career.

His work ranks nearly equal to that of his contemporary countryman, Goldschmidt. His first successful novel was (Eventyrets Land*

(1865). Later writings include (Aaen og lhavet* (1870) ; (Romantiske skildringer*

(1872) ; (De lyse Noetter* (1875) ; (Nyt Liv*

(1879), etc.

LANGE, Thor Naeve, Danish author and

translator: b. Copenhagen, 1851; d. 1915. He studied at the University of Copenhagen and took his Ph.D. there in 1894. He became a professor at Moscow in

1877 and in 1887 he was Danish consul there. His work includes some excellent poetry and prose work besides translations of verse from the French, Italian, Greek, Russian and English. His (Skildringer fra den russiske Literatur* (1886) ranks as a notable production. He wrote (En Maaned i Orienten) (1887) ; (Skizzer og Phantasier*

(1890) ; (Gennem farvet Glas* (1894) ; U

danske Farver) (1907), etc.

LANGELIER, lanzh'lya', Sir Frangois

Charles Stanislas, Canadian jurist and states¬

man: b. Saint Rosalie, Quebec, 24 Dec. 1838: d. 8 Feb. 1915. He was educated at Saint Hyacinthe College, Laval University and the Law Faculty of Paris, and was professor of Roman law and afterward of civil law and economics at Laval University. He served in the Canadian House of Commons in 1884-98; was Minister of Crown Lands, Quebec, 1878-79; mayor of Quebec in 1882-90; and puisne justice of the Superior Court in 1898-1907.

He was acting chief justice of the Superior Court of the province of Quebec division in 1906-11; and from 1911 he was lieutenant-

governor of the province of Quebec. He was knighted in 1907. He published (De La Preuve en Matiere Civile et Commerciale) ; (Commentaire du Code Civil de la Province Quebec.)

LANGEN, Joseph, German theologian : b.

Cologne, 3 June 1837; d. Bonn, 13 July 1901.

He studied at the University of Bonn and was ordained a priest in 1859. He became assistant professor in 1864 and in 1867 professor of the exegesis of the New Testament at Bonn, a LANGENBECK

position he held for the remainder of his life.

In 1870 he supported Dollinger in his con¬

troversy with the Vatican and was excommuni¬

cated. He left the Old Catholic Church in 1878 because of the permission to marry which was given priests, but he was never reunited with the Roman Catholic Church. His writ¬

ings, which made him well known, include (Introduction to the New Testament (1868; 2d ed., 1873) ; cAn Examination of the Vatican Dogma in the Light of Patristic Exegesis of the New Testament ; (History of the Church of Rome to the Pontificate of Innocent IIP (4 vols., 1881-93), etc. He also con¬

tributed to the International theologische Zeit-

schrift.

LANGENBECK, lang'en-bek, Bernhard

Rudolph Konrad von, German surgeon : b.

Pardingbiittel, 8 Nov. 1810; d. Wiesbaden, 29

Sept. 1887. He took his degree at Gottingen in 1835. He traveled in France and England, returned to Gottingen as privatdocent and in 1842 became professor of surgery at Kiel.

He succeeded Dieffenbach as director of the Clinical Institute for Surgery and Ophthalmol¬

ogy at Berlin, serving there in 1848^82, when he retired. He was a daring and skilful sur¬

geon and made a reputation in facial surgery, as well as in resection, an operation on the bone which frequently obviates amputation of a limb ; and in the treatment of gunshot wounds he was an authority. He was general field surgeon of the army in the war with Den¬

mark in 1848, served in 1864-1866 and in the Franco-Prussian War of 1870— 71. He was ennobled for his services in the Danish War.

He published (Chirurgische Beobachtungen aus dem Kriege) (1874).

LANGENBECK, Karl, American cer¬

amic chemist: b. Cincinnati, Ohio, 7 Oct. 1861.

He studied under Victor Meyer in Zurich and under Carl Liebermann in Berlin. He was superintendent of the Rockwood Pottery in Cincinnati in 1885-90, and is the originator of the Rockwood faience and adventurine pottery glazes. In 1888-90 he was professor of chem¬

istry at Miami Medical College. He is well known as a consulting chemist and since 1908

has been associate editor of the Journal of Industrial and Engineering Chemistry. He wrote (Chemistry of Pottery) (1895).

LANGENBECK, Konrad Johann Mar¬

tin, German surgeon: b. Horneburg, 5 Dec.

1776; d. 24 Jan. 1851. He studied at Jena, Vienna and Wurzburg and took his degree at Gottingen in 1802. He was appointed professor at Gottingen in 1804. He was eminently suc¬

cessful both as a surgeon and as a teacher.

He founded and edited the Bibliothek filr Chirurgie und Ophthalmologic (1806-28). He was the father of Maximilian Adolph Lan-

genbeck (1818-77), also famous as a surgeon and uncle of Bernhard Rudolph Konrad von LANGENBECK (q.V.).

LANGENDIJK, lang'en-dik, Pieter, Dutch

poet and dramatist: b. . Haarlem, 1683; d. 1756.

He was by trade a designer of textile patterns, but turned to literature, in which he achieved considerable success. His work includes a number of dramas, chiefly comedies, some of which are still produced, and he was the author of numerous poems. His works include (Don QuichoP (1696); (De ZwetseU (1712); (Het wederzyds huwelyksbedrog) (1714) ; (Kreis-

Louwen) (1715) ; (Quincapoix of de wind-

haudelaars) (1720) ;

Hampen, (Histoire des lettres Neerlandaises>

(1821-26) ; Meijer, (Pieter Langendijk) (1891).

LANGENSALZA, lang'en-zal'tsa, Prus¬

sia, city in the province of Saxony, on the Salza, 19 miles northwest of Erfurt. It became a town in 1211, was subsequently part of the electorate of Saxony, and in 1815 came into Prussian possession. Near it are the remains of the Benedictine monastery of Hohenburg, where Henry IV was victorious over the Sax¬

ons in 1075. It was the field of three other famous battles ; the defeat of the imperial army by the Prussians and English, 15 Feb.

1761 ; the victory of the Prussians over the Bavarians 17 April 1813, and the defeat of the Prussians by the Hanoverians 27 June 1866, the results of this battle being reversed by the arrival of Prussian reinforcements 29 June.

The modern town is chiefly engaged in the textile industries. There are sulphur springs in the vicinity. Pop. 12,663.

LANGENSCHEIDT, lang'en-schit, Gus¬

tav, German philologist and publisher: b. Ber¬

lin, 21 Oct. 1832; d. there, 11 Nov. 1895. He was an

extensive traveler and the originator with Charles Toussaint of the Toussaint-

Langenscheidt method of self-instruction in languages. The first textbook of the series, Franzosische Unterrichtsbriefe zum _ Selbst-

studiunP (1856) reached its 62d edition in 1902. He was assisted by Karl von Dalen and Henry Lloyd in the preparation of (Eng-

lisch Unterrichtsbriefe.) He published also •the Sachs- Villatte Franzosisc'hdeutsches Wor-

terbuch) (1868-94) ; the Muret-Sanders (En-

cyclopadie Worterbuch der Englisch und

deutsche Sprache) (1891-1901), etc. The sys¬

tem was founded on the Hamilton-Jacotot method and has been widely adopted for use in different languages.

LANGEVIN, lanzh-van, Sir Hector Louis,

Canadian statesman : b. Quebec, 26 Aug. 1826 ; d. 1906. He was called to the bar in 1850.

He entered Parliament during the Union period, and on Confederation was appointed Secretary of State ; was subsequently Minister of Public Works (1869-73) ; Postmaster-General (1878) ; and again Minister of Public Works (1879-91). He retired from public life in 1891.

LANGEVIN, Jean Francois Pierre La

Force, zhoii fran-swa pe-ar la fors, French-

Canadian Roman Catholic bishop : b. Quebec, 22 Sept. 1821 ; d. 26 Jan. 1892. He was edu¬

cated at the Quebec Seminary, was ordained priest in 1844 and consecrated bishop of Rimouski in 1867. In 1870 he founded the Col¬

lege of Rimouski. Among his publications were (Histoire clu Canada en Tableaux>

(1860) ; (Cours de Pedagogie) (1865).

LANGEVIN, Louis Philip Adelard, Ca¬

nadian Roman Catholic prelate : b. Saint Isi¬

dore, La Prairie County, Quebec province, 23

Aug. 1855; d. Montreal, 15 June 1915. He was educated in theology at the Sulpician College, Grand Seminary, and Saint Mary's College, 720

Montreal ; was ordained in 1882 ; was appointed professor of theology in the University of Ottawa 1885 ; and in 1893 became rector of Saint Mary's Church, Winnipeg. He was con¬

secrated archbishop of Saint Boniface, 19

March 1895. He played a conspicuous part in the separate schools controversy in Manitoba.

LANGHAM, Simon de, English arch¬

bishop and cardinal: b. Langham, about 1310; d. Avignon, 22 July 1376. He became a monk, then prior and later abbot in the abbey of Saint Peter at Westminster. He was ap¬

pointed treasurer of England in 1360 and in 1361 'became bishoo of Ely. He was chancellor of England in 1363, and in 1366 was elected archbishop of Canterbury. He expelled the secular clergy, headed by John de Wiclif, from their college at Canterbury Hall, Oxford, and as chancellor of England took part in the anti-

papal measures of 1365-66. He was neverthe¬

less made a cardinal by Urban V in 1368, but his acceptance cost him the favor of Edward III and he was compelled to resign his arch¬

bishopric. He retired to Avignon, soon held other offices of the Church and in 1374 was again offered the archbishopric of Canterbury, but declined it. He left his estate to West¬

minster Abbey, where his tomb is the oldest monument to an ecclesiastic.

LANGHORNE, John, English poet and

translator of Plutarch : b. Kirkby Stephen, West¬

moreland, March 1735; d. Blagdon, 1 April 1779. He entered Clare Hall, Cambridge, in 1760, and having taken orders became a curate at Dagenham in Essex in 1761, and rector of Blagdon, Somerset, in 1766. In 1777 he was installed a prebendary of Wells Cathedral.

He wrote verses and stories once popular, but he is remembered now only by the translation of Plutarch's Lives which he made with his brother William (1721-72). This work, orig¬

inally published in six volumes in 1770, has passed through many editions.

LANGLADE, lan'glad', Charles Michel

de, French-Canadian soldier and pioneer, known as ((the founder and father of Wisconsin :)} b.

Mackinaw, Mich., May 1729; d. Green Bay, Wis., January 1800. His mother was the daughter of an Ottawas chief, and as head of the Ottawas he carried out the ambuscade which resulted in the defeat of General Brad-

dock in 1755. He was in the service of the French at Fort Duquesne; and in 1757 he joined Montcalm with a band of Ottawas, rendering services at Fort George for which he was made second in command at the mili¬

tary post at Mackinaw. He was with Mont¬

calm at the siege of Quebec, was in the battle of the Plains of Abraham, and in 1760 fought under Chevalier de Levis. At the outbreak of the American Revolution he joined the British at the head of a large body of Indians. When the Indians deserted General Burgoyne after the severe reprimand which followed the murder of Jane McCrea, Langlade was forced to accompany them ; but while Burgoyne bit¬

terly blamed him the British government did not. confirm the charges. He was appointed Indian agent in 1780 and later became Indian superintendent and commander-in-chief of the Canadian militia. He held these offices until his death, and received a life annuity of $800

from the British government. He was a man of unquestioned integrity, and inspired senti¬

ments of warm regard of which traditions still linger in Wisconsin.

LANGLANDE, lang'land, LANGE-

LANDE, or LONGLAND, William, Eng¬

lish poet: b. Cleobury Mortimer, about 1332; d. about 1400. Little is known of him except from tradition, according to which he was edu¬

cated at Oxford, and became a monk of Mal¬

vern. The familiarity of the author with the Scriptures and the Church fathers indicates that he was an ecclesiastic; several local allu¬

sions in the poem, and the fact that its scene is the ((Malverne Hilles,^ prove that it was composed on the borders of Wales; and inter¬

nal evidence fixes its date at about 1362. It narrates the dreams of Piers Ploughman, who, weary of the world, falls asleep beside a stream in a vale among the Malvern hills; and while satirizing in vigorous allegorical descriptions the corruptions in church and state, and the vices incident to the various professions of life, and painting the obstacles which resist the amelioration of mankind, presents the simple plowman as the embodiment of virtue and truth, and the representative of the Saviour.

Its ancient popularity appears from the large number of MS. copies still extant, most of them belonging to the latter part of the 14th century. It was a favorite of religious and po¬

litical reformers, and several imitations of it appeared, the most important of which was (Piers Ploughman’s CredeP written about 1393

by some Wycliffite, assailing the clergy, and es¬

pecially the monks. In 1550 the ‘Vision of Piers Ploughman* was printed by the reformers, and so favorably received that three editions were sold within a year. This poem is a re¬

markable example of a system of verse, derived from the Anglo-Saxons, and marked by a regu¬

lar alliteration instead of rhyme. There are two classes of manuscripts, which give the text with considerable variations. The best edition both of the 'Vision* and the 'Crede* is that of Wright (1856; new ed., 1897); and of the 'Vision.* that of Skeat (1886). Consult Jus-

serand, 'Piers Plowman: a Contribution to the History of English Mysticism * (1893) ; Stubbs, C. W., (The Christ of English Poetry) (New York 1906).^

LANGLES, Louis Mathieu, French Ori¬

entalist: b. Perrenes, 23 Aug. 1763; d. 28 Jan.

1824. He was educated at Paris, specializing in Oriental languages. He translated the 'In-

stituts politiques et litteraires de Tamerlan) from the Persian in 1787; and edited the Alphabet tartare-mandchou* of Father Amyot in 1789-90. He was instrumental in the es¬

tablishment of the School of Oriental Lan¬

guages in Paris in 1795; and was its first ad¬

ministrator, as well as professor of Persian.

He was author of many studies of Oriental literature, and the founder of the Paris Geographical Society.

LANGLEY, John Newport, English

physiologist: b. Newbury, 1852. He was educated at Saint John's College, Cambridge.

He received a fellowship at Trinity College, Cambridge, where he was lecturer in 1884-1903, also serving as university lecturer; and later became professor of phvsiology at Cambridge.

He is a member and officer of many English, American and Continental scientific societies; SAMUEL PIERPONT LANGLEY

was Royal Medalist of the Royal Society in 1892, and was awarded the Baly medal of the Royal College of Physicians in 1903. He has contributed extensively to scientific journals, and is the editor of the Journal of Physiology.

LANGLEY, Samuel Pierpont, American

astronomer, physicist and pioneer designer of airplanes: b. Roxbury, Boston, 22 Aug. 1834; d. Aiken, S. C., 27 Feb. 1906. He was gradu¬

ated from a high school, studied architecture and civil engineering and after a two years'

trip abroad became an assistant in the Harvard Observatory in 1865, and later assistant pro¬

fessor of mathematics in the United States Naval Academy, and in 1867 was appointed director of Allegheny Observatory. In 1887

he became secretary of the Smithsonian Insti¬

tution. He organized in 1881 an expedition to Mount Whitney, Cal., where he was successful in re-establishing the color constant and in extending the invisible solar spectrum. He also devised the bolometer, or thermic balance, a contrivance for detecting minute differences of radiant heat and measuring accurately to less than one ten thousandth of a degree Fahrenheit. He established the Astrophysical Observatory and the National Zoological Park at Washington and in 1887 was president of the American Association for the Advancement of Science. His name became generally known through his experiments in connection with the problem of mechanical flight. In 1896 a motor-

driven airplane designed by him accomplished the first sustained flight. Further experiments were not so successful, but his design of ap¬

paratus has been shown to be correct ; in fact, in 1914, Glen Curtiss installed a more power¬

ful engine in Langley's machine of 1903 and made a successful flight with it at Hammond-

sport, N. Y. Congress voted Langley $5,000 to carry out his ideas. Criticism and lack of support, led him to abandon his experiments, which, if persevered in, would have been suc¬

cessfully eventually, as aeronautical engineers now recognize the correctness of Langley's reasoning and the value of his contributions in this field of science. Among his writings are (The New Astronomy) ; Experiments in Aero-

Dynamics, J and (Internal Work of the WindP

LANGLEY, Walter, English painter: b.

Birmingham, 1852. After attending the

National School, Birmingham, he qualified as a lithographer, meanwhile studying in the local school of art. He there gained the National scholarship and studied at South Kensington two years; settled in Newlyn, Cornwall, 1882.

Among his watercolor paintings are (Among the Missing'; departure of the Fleet'; (Disaster' ; (After the Storm.' His oil paint¬

ings include (Never Mor.ning Wore to Even¬

ing but Some Heart Did Break) ; (Mother-

less) ; (Bread-winners,' etc.

LANGLOIS, lan'glwa', Hippolyte, French

soldier and military writer: b. Besangon, 1839; d. 12 Feb. 1912. He was educated at the Lcole

Polytechnique at Paris and entered the artillery as sub-lieutenant in 1858, rising to the rank of captain in 1866. He was with the army of Metz in the Franco-Prussian War. He be¬

came professor of artillery at the Lcole de Guerre in 1887 and in 1898-1900 he was com¬

mandant of that institution. He received rank as general of division in 1898 and in 1901 was vol. 16 — 46

designated commander of the 20th Army

corps at Nancy. In 1902 he was a member of the superior council of war, and upon reach¬

ing the age limit in 1904 he was retired. He served in the French Senate in 1906, was elected to the French Academy in 1907, and was a grand officer of the Legion of Honor.

He was deeply interested in the improvement of the artillery and was influential in the pro¬

duction of the famous 75 mm. quick-firing gun.

He founded in 1907 the Revue Militaire Gen¬

erate, a publication dealing with military art and history. He wrote (L'Artillerie de cam-

pagne en liason avec les autres armes) (1891—92) ; (Manoeuvre d'un detachement de toutes armes avec fuex reels' (1887) ; (Guerre turco-

russe et anglo-boer' (1903), etc. His military writings gained worldwide recognition.

LANGOBARDI, lan-go-bar'dl. See Lom¬

bards.

LANGREO, lan'gr', Spain, city in the

province of Oviedo on the river Nalon, 18

miles from the coast and 10 miles southeast of Oviedo on a branch railway from Oviedo to Labiana. Its chief industries are the mining of coal and iron ore and the manufacture of iron products. The surrounding country pro¬

duces fruit, wheat and hemp. Pop. 25,444.

LANGRE.S, France, capital of an arron-

dissement in the department of Haute-Marne, 21 miles southeast of Chaumont on the eastern railway to Belfort. It is situated on the (

tary history as a commanding strategic point.

The town in ancient times was known as Andematunum, capital of ancient Lingones; under Roman rule it was practically autono¬

mous until the revolt of Sabinus reduced it in rank to a colony in 71 a.d. The cathedral of Saint Mammes was built in the 12th century, and the church of Saint Martin in the 13th, 1 5th and 18th centuries. There is a Gallo-

Roman gate, a museum of Gallo-Roman an¬

tiquities, a picture gallery and library. The town is the seat of a bishop, has a higher ecclesiastical seminary and communal colleges for both sexes. The industries of the town include a famous line of cutlery and textile manufactures, together with a trade in grain and oil. Pop. 6,335.

LANGSHAN, a breed of small, active

((Asiatic" fowls, long held in esteem by poultry-raisers; cocks weigh 10 pounds. Two varieties are approved — the pure white and the glossy black. See Poultry.

LANGSIDE, Scotland, a village forming

a suburb two miles south of Glasgow. It is famous as the scene of the battle in which the Regent Murray

on 13 May 1568 defeated the forces of Mary, Queen of Scots and forced her flight to England where she was made prisoner and held until her execution. The battle lasted only three-quarters of an hour.

LANGSON, French Indo-China, capital

of the province of Langson in Tongking, 82

miles northeast of Hanoi, on the railway be¬

tween there and Lungchow in the Chinese province Kwangtung. The town has a citadel and was the scene of two battles in which the French were first defeated by and in turn de¬

feated the Chinese in 1885, since when it has belonged to the French.

LANGSTON, John Mercer, American

educator: b. in Louisa County. Va., 14 Dec.

1829; d. Washington, D. C., 15 Nov. 1897. He was born a slave, but when six years old was emancipated, and in 1849 was graduated at Oberlin College, where he was also (1853) a graduate in theology. Admitted to the bar in Ohio (1854), he practised law in that State for 13 years, and in 1869 was appointed professor of law at Howard University, Washington, D. C. ; 'became dean of the law department, and in 1873 vice-president of the university. In 1871 he was appointed a member of the board of health of the District of Columbia, and was afterward elected secretary of the District.

From 1877 to 1885 he was United States Minister and consul-general in Haiti, and when he returned to this country he was made president of the Virginia Normal and Col¬

legiate Institute at Petersburg. He was elected to Congress in 1888. He published (Freedom and Citizenship, > a collection of addresses (1883).

LANGTON, Stephen, English cardinal:

b. about 1150; d. Slindon, Sussex, 9 July 1228.

He was educated at Paris, and while on a visit to Rome in 1206 Innocent III created him a cardinal and nominated him to the see of Canterbury, consecrating him archbishop next year. King John refused to allow Langton to take possession of his see, and it was not till England had been placed under an interdict, John excommunicated and threatened with de¬

position, that the king yielded. Langton was acknowledged in 1213, and in August joined the insurgent barons, and acted with them in compelling John to sign Magna Charta. He crowned Henry III, and in 1223 demanded of him the full execution of the charter. He was the author of some theological treatises, and the division of the Bible into chapters has usually been attributed to him. Consult Plook, (Archbishops of Canterbury > (1862).

LANGTRY, Lily, English actress : b.

island of Jersey, 1852. She was the daughter of the Rev. W. C. Le Breton, dean of Jersey, and as the ((Jersey Lily® (a name given by Millais to the portrait of her which he had painted) was famous for her singular beauty and social graces. She was married to Edward Langtry in 1874. In 1881 she made her first appearance on the stage at the Haymarket Theatre in (She Stoops to Conquer. > She has paid several professional visits to the United States, and in 1903 she starred in (The Cross-

ways, > a play written by herself in collaboration with J. Hartley Manners. In 1899 she was married to Sir Hugo de Bathe, Bart.

LANGUAGE. See Etymology; Lan¬

guage, Science of ; Speech ; Writing.

LANGUAGE, Science of. Language in

its broadest sense is any means of expressing thought. The cries of the lower animals are language in so far as they give expression to their state of mind, there is a language of flowers and so on. The present article deals with only one form of language, i.e., human speech. The Science of Language in this nar¬

rower sense (also called Linguistics) comprises three branches: (1) General Linguistics; (2) Comparative Philology; (3) Special Grammar.

The object of the General Linguistic is to ascer¬

tain the fundamental laws and characteristics of the language processes by the examination and comparison of all the languages available for this purpose. This branch interprets the phe¬

nomena observed in the light of the known laws of psychology, phvsiology and physics. It lays the foundations for all the branches of lan¬

guage study. Comparative Philology has a 'nar¬

rower field, being limited to the comparison of languages of kindred origin. Its purpose is to determine the genetic relationships between such languages. Examples are Indo-European Comparative Philology, Comparative Philology of the Bantu languages, of the Semitic lan¬

guages, etc. Special Grammar is of two types, historical and systematic. The latter offers a systematic classification and description of the forms and usages of any given language or dialect at some definite period of its life, e.g., the grammar of Modern English, of Chaucer’s English, of Hellenistic Greek. Historical gram¬

mar aims to explain the development of a given language from generation to generation.

A. General Linguistics.

Description of the Language Processes. —It is customary to define language as articulate sounds expressive of ideas. While such a definition may satisfy the popular curiosity, it is extremely inadequate. As a matter of fact, language is a complex series or group of nerv¬

ous, muscular and physical processes. It is a well-known fact that the nervous system is made up of a great many groups of nerve cells.

Each group performs some special function. For example, one part of the brain receives the impressions from the eye, another from the ear and so on. In particular from one area on each side of the brain run fibres which reach either directly or indirectly (by relays) all the muscles of the body. When we wish to give utterance to an idea, we set up (in some way not fully understood) a nervous activitv in that portion of this <(motor area® which controls the muscles that must be moved in order to produce the required sounds. Physiologists assume that this activity consists of chemical activity in the nerve cells. Reaching the muscle this nervous activity sets up what we will designate as (1) the first stage of the speech process, i.e., a chemical activity in the muscle cells and the consequent movement (shortening and thicken¬

ing) of the muscle. The moving muscle drags with it the bones and other tissues attached to it. Practically all the muscles of the body from the hips upward to the level of the ears are employed in speech. Those of the abdomen and chest control the stream of breath; those of the larynx control the production of musical tones ; those of the head and neck control the move¬

ments of the jaws, tongue, lips, etc., necessary to the modification of musical tones and the production of consonantal noises.

These movements initiate (2) the second stage, i.e., they set the air particles of the breath into rapid oscillation. These air vibrations, the physical

stage of the speech process, are propa¬

gated in accordance with the laws of physics in all directions and thus impinge upon the ear drums of the listener. Propagated thence to the inner ear they there act upon appropriate sense organs and through them stimulate the tips of the auditory nerves. The nervous process thus LANGUAGE

set up is propagated along the nerve, like fire along a fuse, till it reaches the brain, where it initiates (3) the third stage, i.e., sensations of sound, which awaken in the mind of the listener ideas and emotions similar to but never identical with the ideas and emotions which started this train of processes in the mind of the speaker.

This series of psycho-physical processes may be figuratively called the main trunk line of speech, but the following accessory processes are equally essential. The muscular movements not only produce air vibrations, but also stimu¬

late by pressure of friction sensory nerves lo¬

cated in or upon the muscle fibres, in the syno¬

vial membranes of the joints and in the sur¬

faces of the tongue, palate, gums, lips, etc. This stimulation results in (4) kinesthetic sensations (of strain, deep pressure and touch) which re¬

port to us the location, nature and extent of the movements executed. Aided bv the audi¬

tory sensations they provide a means by which we control our movements; through them we learned to repeat desired movements in infancy; through them we become aware of errors of movement (mispronunciations) in later years; without them tradition in language would be impossible.

Not less vital are (5) the many associational

processes. The parts of the brain active during thinking are connected (directly or through sub¬

centres) with the motor areas, and it is a law of mental life that all thought tends to pass over at once into action. There is likewise asso¬

ciation between the sounds of the words and their meaning, between the sounds and the kinesthetic sensations, between the kinesthetic sensations and the ideas, between the visual sensations (that is, the appearance of the written or printed words) and the meaning, etc. The effect of these associations is to bind the whole into a co-ordinated and harmonious system, in which each process takes place with a degree of accuracy and order of sequence adequate to the accomplishment of the purposes for which speech is employed.

All the above processes both in man and animals have been developing since primaeval times by a natural process of evolution in accordance with the laws of physical and mental growth. On the other hand alpha¬

betic signs or letters are arbitrarily de¬

signed or selected by individuals to represent certain sounds. They yield (6) visual sensations.

Although originating as symbols of sounds, the letters when grouped into words quickly be¬

come associated with the meanings and are primarily symbolic of them.

Thus we see that speech is a combination of three different kinds of symbols: (a) the primary symbols, muscular movements, (b) the secondary symbols, speech sounds, and (c) the tertiary symbols, written or printed words.

The average man thinks usually of the last two forms, but he who would understand the nature of language and fathom the laws of its devel¬

opment should rather direct his attention chiefly to

the muscular movements and regard language study as applied Psychology of Movement.

The above described processes beginning with thought in the mind of the speaker and ending with the awakening of thought in the mind of the listener do not, however, complete the cycle of speech. It must not be forgotten that speech is a social activity. Man cannot live without the co-operation of his fellow-men.

The chief purpose of speech is to secure this co-operation and thus achieve some form of self-realization, of accomplishing our desires.

The communicative process is completed only when the speaker gets a response by word, look, gesture or even silence (for silence is some¬

times eloquent), which will enable him to judge the attitude of the listener and hence the degree of his own success or failure.

The probkms of General Linguistics fall into two classes : first, those which have to do with the processes of expression and, second, the problems of understanding. Under the first fall the following: the relation of thought to lan¬

guage, the relation of physical to spiritual mat¬

ters, the origin of language, the degree of accu¬

racy and completeness with which language ex¬

presses thought, the extent to which the forms of thought are controlled by language and vice-

versa, the effect of environment on speech, the problems of anatomy and physiology of nerve and muscle and of the localization of brain functions, the problems of muscular control.

The problems of interpretation include those of understanding and those of sensation. Here fall the questions as to the degree of accuracy with which

sensations correspond to stimuli, or, conversely put, how far the state of mind determines the character of the sensation (mis-

hearings, misreadings and misunderstandings), how sensations awaken thought. All these problems may be grouped under two heads : Phonetics and Semantics.

Phonetics. — Phonetics is the general science of speech sounds; phonology is the study of the system of sounds of any given language, as, e.g., English phonology. The organs of speech in the narrower sense are the mouth and nose cavities and especially the tongue and larynx; also the trachea and lungs with their controlling muscles. In a broader sense they include those muscles of the abdomen which aid in the control of breathing. The lungs force through the trachea a stream of air, the rate of flow and compression of which are varied from moment to moment to meet the needs of speech. The larynx, which rests on the top ring of the wind pipe, is a small box having a cartilaginous framework overlaid with muscles, connective tissue and mucous membrane. Its most essential parts are the so-called <(vocal cords.® These are not, strictly speaking, cords at all, but are overhanging, ledge-like projections, one arising from each side of the inner wall of the larynx.

The core of each is formed by a small muscle, the front ends are immovably attached to the inner front angle of the thyroid cartilage (Adam's apple) in contact with each other.

Each muscle is attached at its posterior end to one of the arytenoid cartilages, which can be moved by means of appropriate muscles up¬

ward, downward, forward or sidewise. Thus by the approximation of the arytenoid cartilages the <(cords® can be brought into contact along their entire length, completely closing the glottis, as the opening between them is called; or the rear ends of the cords may be separated, yield¬

ing a V-shaped glottis. When brought into contact, or nearly so, and tensed by proper muscular action, they are made to vibrate by the current of air forced through the trachea.

The vibrations can be easily felt if the finerer be placed upon the Adam's apple during speech.

The sound produced is musical tone, consisting physically of a series of like vibrations, and technically called voice. The rate per second of the vibration determines the key or musical note on which a sound is pronounced or sung.

The shorter the cords and the higher the tension the higher the rate and the higher the note.

The loudness is determined by the amplitude of the vibrations of the cords. The air waves produced by the cords are very feeble; but they are reinforced by the resonating effect of the mouth and nose cavity. It is estimated that the voice as heard is some 300 times as loud as it would be if not thus reinforced. The cords, like a violin string, vibrate not only as a whole but also in segments, the segmental vibra¬

tions yielding overtones. For example, if the cord as a whole vibrates 100 times per second, the half cord will vibrate 200 times, the third 300 times, the fourth 400 times, the eighth 800

times, the twelfth 1,200 times and so on. The commingling of these overtones of varying loudness is what gives the main characteristic distinction to the voices of different persons.

The vowels are <(voice® with little or no audible commingling of other sounds. After much study it now seems to be established, that the difference between the various vowels is caused by the presence of certain characteristic tones. Some of these have

been recently cal¬

culated as follows :

oo in moon ca.

o in mow, roam. "

aw in maw "

a in ma "

The following vowels have two character¬

istics :

ee in meet ca. 310 and ca. 3100

a in mate " 490 " " 2460

e in met " 690 " " 1950

a in mat " 800 * " 1840

A in ma has also been found with two characteristics, 950 and 1,240. According to the above definition we must regard the liquids and nasals l, m, n and r as vowels (even though they lack the clear, open quality of a, e, i, o, u) , particularly in such words as apple, serum, oven (often pronounced ov'm) and over, in which the e and u are usually silent, the l, m, n and r being the loudest sounds in their syllables.

In addition to musical tones the speech organs produce sounds which consist either of irregular vibrations or of regular vibrations, that do not produce on the ear the effect of musical tones.

Such sounds are called noises. There are two classes of these noises: (1) Explosive noises, (2) frictional noises.

The former are made by the complete stop¬

page of the air (effected by a closure at some point in the throat, mouth or larynx), and the subsequent

compression of the air behind the closure, followed by the sudden opening of the closure by muscular action and the air pressure. The resulting consonantal sound is called a <(stop® or ^explosive.® The closure yielding p is made by bringing the lips into contact, / by pressing the tongue against the teeth (French and German dental t) or the gums (alveolar t, as commonly made in England and America, though . dental and alveolo-dental t is often found among us) or against the top of the mouth (cerebral or pre¬

palatal t, as found in Sanscrit), k by pressing the rear part of the tongue against the back part of the hard palate (palatal k, as in kick) or against the velum (velar k, as in koal or coal) or against the back part of the throat below the velum (gutteral k, as in Arabic).

In all of these sounds except Arabic k and the two now to be mentioned, the velum is also drawn upward, closing the nose passage. A k may also be made by pressing the epiglottis against the back of the throat and a glottal stop is produced by an explosion at the vocal cords (Greek trough breathing1*) . A velar-

nasal stop is made by closing the lips and velum and snapping open the latter, b, d, g are the same explosive noises accompanied by voice.

Trilled r is produced by a succession of such stops made 'by the rapid vibration of the tongue or the uvula against the adjacent parts of the mouth. Frictional noises (spirant consonants or fricatives) are produced when the air pas¬

sage is reduced by near closure to a very small channel and the air forced swiftly through it.

Thus are produced voiceless s in see, sh in shall and th in think. To these correspond voiced z in zest, z in azure and th in these.

All these are hisses. If the channel is larger and

the breath driven more gently, the noise is a murmur as in / and American northern r (voiced or voiceless). Glottal spirants are English h (sometimes voiced) and the

((whisper.®

If immediately following an explosion the passage remains narrow for an instant the explosion is followed by a hiss. These sounds are called affricates: ch in change, j in jump.

Y as in yet is a swiftly pronounced <(long® e; w in we is an evanescent oo as in boot.

In the production of most of the above sounds the velum may remain open, i.e., drawn forward and downward, adding the resonance cavity of the nose to that of the mouth. This greatly increases the quality (by reinforcing the higher overtones) and volume of the sound.

Hence singers are especially trained to use nose resonance to the greatest possible extent.

If the velum is closed, fully half the resonance effect is lost. By using more breath and over¬

straining the muscles of the larynx one can partly make up the loudness, but the quality is irretrievably lost. A full, clear resonance -can be secured only when the mouth opening is fairly wide. If it is completely stopped (as in pronouncing n), or made very small, we get a muffled nasal twang characteristic of certain French vowels and of ((Yankee® pronunciation.

The lips may be more or less puckered or <(rounded® in the pronunciation of all the vowels and most of the consonants. This gives a peculiar resonance effect. English o in note and u in tune are rounded. German u and French u are rounded long e (as in meet or mere).

Accent is of two kinds. Stress accent is a variation in the energy of utterance (ampli¬

tude of vibration) of successive (a) words, (b) syllables, (c) sounds or (d) parts of the same sound; (a) constitutes sentence accent, (b) is word accent, (c) and (d) syllable accent. Pitch accent is a variation of musical tone (rate of vibration) similarly affecting sounds, syllables and words. In most, if not all, languages both types occur. In English stress predominates.

225 vibrations per second

460

1050

LANGUAGE

725

Comparatively few speech movements and

sounds are here described. Those actually produced are innumerable; they run into the millions or even billions. Each nation has a group of some three score "main® sounds and countless minor variations. Each individual has his own way of speaking; we easily recog¬

nize his voice ; but even he varies his pronuncia¬

tion from day to day, nay, even from minute to minute. Here, as everywhere else in animal and even vegetable life, nothing is fixed. As the old Greek philosopher said, pantd rlici, Everything is in a flux.® Movement and change are life; rigidity is death.

Sound Changes. — As already stated, Pho¬

netics is applied psychology of movement. The muscles used in speech, though highly trained, act as other muscles act. You cannot close the eyes and draw with a sharp pointed pencil 10 lines exactly one inch long. A ball plaver cannot throw the ball twice through exactly the same point over the plate. If he does it is an accident. The best marksman

rarely hits the exact centre of the bull's eye. So in speech no one can repeat at will exactly the same move¬

ment, much less a group of movements neces¬

sary to the production of a given sound. There will always be variations in range, direction, duration and co-ordination. The variations are slight, as are those of an expert marksman, and the consequent variations in sound are either unnoticeable to the "naked® ear or, if noticeable, are really unnoticed, since our at¬

tention is wholly absorbed in what a person is saying and we give only the slightest heed to the details of sound. It is only occasionally that variations occur large enough to thrust themselves on our attention. Then we call them mispronunciations.

But the variations, though small and un¬

noticed, will in a given community under favorable conditions accumulate in a given di¬

rection. Thus there will be a slow but steady shift in a given direction, which in time will result in entirely different movements, that is, in entirely different sounds. For example, the word stone in Early English was written stane and pronounced with the sound of a as in father; in Chaucer's time the same vowel had the sound of on in bought and the spelling was reformed to stone. Since then it has shifted to the present pronunciation. The following types of changes occur: (1) Cessa¬

tion of movement. Sounds become silent, as most e's, at the end of English words, gh in high, b in lamb, etc. This change may be facilitated by a stress accent on the preceding syllable. (2) Increase or decrease in the duration of the movement. Example: The Indo-European extra long diphthongs at, ex, oi, etc., became the ordinary length diphthongs di, ex, oi, eft:., in Latin. (3) Variation in ex¬

tent of movement. This variation affects, for example, the shape of the mouth cavity and the tension of the vocal cords, giving rise to varia¬

tion in vowel quality, as in stone, cited above, and characterizing such shifts as that of Indo-European palatal k to fricatives in San¬

scrit and Slavic. (4) Anticipation or delay of individual movements composing a group.

Such are the voicing of previously voiceless consonants and vice-versa; assimilation both progressive and regressive; and w Umlaut. (5) Change in the order of movements. This is a fertile source of mispronunciation, but ap¬

pears to have caused few historical changes.

The causes of these changes are partly physiological and partly psychological, being due to changing chemical conditions in the muscle or to changes in state of mind. Wide¬

spread regularity observed in these changes has given rise to the belief that, like other natural phenomena, they follow regular laws; but the conditions determining the changes are extremely complex and difficult to control.

Such laws are Grimm's law of consonant change, with its modifications by Verner and Burgmann.

Semantics, or Semasiology; the Science

of Meaning. — The simplest word has six "personalities,® so to speak; it is an intricate Dr. Jekyl and Mr. Hyde. It has three material forms : the moving muscle, the vibrating air and the written or printed signs. To each of these corresponds a purely mental side : the word picture, as seen ((in the mind's eye® ; the memory image of the sound and the kines¬

thetic or "motor® image; that is, the feeling of touch, strain, etc., in the muscles. These are

mental states, mental "contents.® The pic¬

ture of a word is the same sort of thing as the picture of a house. Both are made up of ideas of color, shape and direction. We saw above that these are linked to one another by associa¬

tions, that they are also linked up with the motor areas. We now add that they are linked up with all other mental contents that con¬

stitute thought, so that when these last are in consciousness the word images also appear.

It is a law of psychology that any mental con¬

tent may thus be linked up with, that is, sug¬

gest, recall or represent any other mental con¬

tent.' But all ideas are mental contents and all word images are ideas or mental contents.

Meaning is simply one mental content which some other mental content by association calls up, that is, represents. When we hear or see words, their mental images simply through asso¬

ciation call into consciousness other mental con¬

tents, which are their meaning. Meaning is representation.

Two kinds of mental content enter into all thought : sensation and feeling. The first is the mental state resulting immediately from the stimulus of one of the sense organs. Examples are: red, bitterness, cold, hardness, fragrance, pain, etc. We locate them (except headache) outside of the brain. Combinations of these sensations constitute ideas. No idea ever enters consciousness without awakening a personal re¬

sponse, such as that of pleasure, displeasure, relaxation, strain (as in anxiety), stimulation or inhibition. This reaction is called feeling.

Combinations of these feelings constitute emo¬

tions and passions. The will is one form of them. On the basis of ideas and feelings ab¬

stract ideas develop.

In ideas, as in muscular movement, there is continual variation. The details of form, di¬

rection, color, intensity, are continually chang¬

ing. We never obtain a wholly new idea; it is always a variation or modification of the old. The variations are greatest in childhood; in manhood the ideas become more stable; in old age they approach a condition of rigidity as we draw near to death. Changes in ideas consist in the loss of former elements from them and the addition of new ones.

Of the elements of an idea some are rela¬

tively permanent, recurring time after time with the recurring idea, as, for example, the general shape of a horse. Others a temporary, as the color, actions or temper of the horse. A detail may 'be present once and then disappear for¬

ever. Permanency is often, as in the case just mentioned, based on qualities of objects in nature, but often it is not. Again, not all the elements are equally prominent in our conscious¬

ness. Some come out clearly, others fade into the background. Now it is the color of the bird on which we fix attention, now his song, now he is for us merely a symbol of the coming of spring.

In the meanings of words, as in muscular movement, the small variations accumulate with time so that a word may eventually have totally changed its meaning. We are not usu¬

ally aware of these changes any more than we are aware of the sound changes, because our attention is wholly occupied with the present idea and we seldom recall its older form for comparison. But when we read old books, these changes force themselves upon the at¬

tention. Comparing old and new meanings, we find that concrete words have become abstract and vice-versa, comprehend meant at once time <(seize,® and we now use catch, take, get, tumble in the sense of ^understand,® that words have suffered restriction or expansion of meaning (a minister was originally any servant, now it is a servant of God, or of the state; gain orig¬

inally had the narrower meaning ^harvest®), that they have shifted to a higher or to a lower moral value (German selig <(blessed® is English silly; Latin mens means ((mind,® but mentiri means <(to lie,® i.e., falsify). There have also been distinguished (a) changes of non-domi¬

nating^ elements, (b) of dominating elements, (c) of permanent elements, (d) of transitory elements, (e) from ideational content to emo¬

tional content and the reverse, (f) in degree of emotional value, (g) ideas corresponding to one sense organ to those corresponding to another, as when we say ((a sharp knife, a sharp tone, a sharp taste, a sharp man® (the last usage being abstract).

Grammatical Categories. — An especially

important branch of semantics is that dealing with the parts of speech and other grammatical categories, the case relationships, mood, tense, voice, number, degree, etc., all of which are the product of the analyzing and classifying proc¬

esses of the mind. The normal mind quickly develops the power of distinguishing various qualities, such as sex, and their degrees, and of observing relationships of time (present, past, future,

before, after, simultaneous), place (in, on, about), cause, effect and so on. Other categories reflect the attitude of mind: pur¬

pose, will, desire, probability, doubt, neces¬

sity. They run into the thousands. Finnish has 18 cases. One language has over 60.

Some of these occur very frequently and are very important dominating elements of thought. Their frequent occurrence, import¬

ance and the degree of readiness and closeness with which they fuse with other concepts, are such that the sounds or words representing them act both phonetically and semasiologically in peculiar ways. They find expression in the following forms: (1) juxtaposition, e.g., apple tree, tree toad. Juxtaposition is but the first stage of composition, as seen in therefore, Johnson; (2) Relative rapidity of utterance of different sounds or groups of sound, including pauses. (3) Stress of voice, signifying, for example, relative importance; (4) Pitch of voice, indicating interrogation, irony, etc. ; (5) order, e.g., apple-pie, pie-apple; (6) adverbs; (7) prepositions; (8) conjunc¬

tions (including (9) pronouns); (10) auxiliary verbs; (11) inflectional forms: suffixes, pre¬

fixes, infixes and various modifications of sound, such as umlaut (mutation) and vowel gradation; (12) often no special formal sign is needed, as when the relationship in which objects stand to each other in nature is so im¬

pressed upon us that the mere mention of the objects suggests it. Dickens' character Jingle depended much upon this fact. (13) Lastly the general circumstances and conditions of a conversation and the known purpose of the speaker are valuable keys to the meaning.

The associative processes and sound changes combine to give origin to inflectional endings.

Some are known to have originated in com¬

position; in other cases sounds developing in accordance with purely phonetic laws inde¬

pendent of meaning have later taken on the significance of inflectional elements. Adverbs and conjunctions are commonly developed out of inflectional forms of other parts of speech, especially nouns, adjectives and pronouns, but also, the less commonly, from verbs. The prep¬

osition is. only an adverb <(in disguise.®

Classification of Languages. — There are a number of principles on which languages may be classified. That most widely known was elaborated by von Humboldt. He distinguished between the outer and inner sides of lan¬

guages, between the movements and the con¬

ceptual forms. He conceived that the latter, being inherent in the human mind, are the same for all nations, but that different peoples expressed them with different degrees of per¬

fection. He considered the most primitive type to be the ^isolating® languages, in which the words are all simple roots with nothing resembling inflectional forms. Higher were the ((agglutinating» languages which show a partial fusion of roots into loosely united word ele¬

ments, and highest the inflected type. This principle cannot be applied practically to the classification of the languages of the earth, be¬

cause few, if any, of them belong exclusivelv to any one class. As a matter of fact, both the analytic tendency (toward isolation) and the synthetic (toward inflection) are present in alj languages at all times. Now one may pre¬

vail, now the other, as in Old English' there were elaborate inflections, while at present English

belongs rather to the isolating type, as does the Chinese. In fact languages show such complexity and variety that it maf be doubted whether any principle of classification can be consistently applied to them. The best that can at present be done is to put into groups by themselves certain languages which have con¬

spicuous resemblances in vocabulary and ex¬

ternal form. Such clearly defined groups are: The Malavo-Polynesian Group (agglutinative), including Malayan, Melanesian and Polynesian; Bantu or Kafir; Dravidian Group in southern India and Ceylon ; Finno-Ugric, comprising Finnic (six languages), . Permian, Volga Fin¬

nic and Ugrian, the chief language of which LANGUAGE

is Magyar; Chinese, an isolating language, as are also the unrelated Anamese, Siamese, Burmese and Tibetan; Turko-Tataric.

There are about 30 groups of languages recognized on the American continent but their relationships are not all perfectly under¬

stood. The Semitic branch includes, among others, the Assyrian (with Babylonian), He¬

brew, the language of the Old Testament, Phoenician and Arabic (classical and modern).

To the Hamitic branch belong Ancient Egyp¬

tian, Coptic, Berber and several languages in Abyssinia and adjacent territory. The Indo-

European family will be discussed in detail in the next section of this article.

B. Comparative Philology.

In this article only Indo-European Com¬

parative Philology is treated. The Indo-

European family of languages contains the fol¬

lowing branches :

1. Aryan or Indo-Iranian group. This com¬

prises (a) the Indian languages, that is, literary Sanscrit (both Vedic and Classical) with a very rich religious and secular literature; Pracrit, the ancient vernaculars, from which many of the spoken languages of modern India are descended; Pali, the language in which the Buddhistic writings are largely preserved.

Modern Gipsy also belongs here. (b) The Persian group, that is, Avestan (the language of the Zend Avesta) ; Old Persian (the lan¬

guage of the cuneiform inscriptions) ; Middle Persian or Pehlevi (till about 700 a.d.) ; Mod¬

ern Persian, Kurdic, Ossetian and Baluchi; Parsi, the language of the Fire Worshippers.

2. Armenian, old and modern.

3. Greek, with its many dialects and marvel¬

ous literature. The chief ancient dialects were Attic-Ionic, Doric and ^Eolic; the main his¬

torical periods are Homeric, Classical Attic, Hellenistic, Byzantine, Modern.

4. The Illyrian group, represented by the Albanian.

5. Italic group, comprising Latin and the Oscan-Umbrian dialects. From spoken Latin disseminated throughout the Roman Empire the Romance languages have developed.

6. Celtic, including the language of the an¬

cient Gauls, and modern Welsh, . Cornish, Scotch and Irish, the last with an important literature. . , ,

7. Germanic or Teutonic, represented . by (a) old Gothic; (b) Scandinavian (Danish.

Swedish, Norwegian and Icelandic); (c) West Germanic with its various older dialects from which modern German, Dutch, Flemish and English are sprung.

8. Balto-Slavic includes (a) Lithuanian, Lettish and Old Prussian (now extinct) ; (b) East-Southern Slavic (Russian, Bulgarian, Serbian, Croatian, Slovenian) ; Western Slavic (Czechish Bohemian, Wendish, Polish and Polabian) . „ „ , , , , .

It is known that all of these had their origin in dialects of one common language, the home of which on linguistic and archaeological evi¬

dence is generally conjectured to have been be¬

tween the Baltic and the Caspian seas. . Thence they spread by migrations to their later habitats By the separation thus brought about and in some cases at least by race mixture the differences between the dialects increased until they became distinct languages, which m then-

turn spread over larger areas, and broke up again into dialects. These later dialects de¬

veloped into still other languages, and so on indefinitely. This process is still going on, though more slowly, because of the closer com¬

munications existing between nations. It is possible, perhaps even likely, that the Celtic and Italic groups arose from one common dia¬

lect, just as did Baltic and Slavic or Indian and Iranian; in which case we should have to speak of an Italo-Celtic group instead of two separate groups. Each of these Indo-European groups developed separately, no one of them springing from another. Thus English is just as closely related by origin to Hindi or Bengali or Russian or Czechish as it is to Irish or French, although the extensive borrowing of French words in modern times gives the Eng¬

lish vocabulary a closer resemblance to the French.

The reconstruction of the primitive dialects is accomplished (only, of course, to a very slight degree) by discovering through com¬

parison of the related languages what were the original sounds, words, forms and meanings.. It must be understood, however, that it is im¬

possible to reconstruct combinations of words.

For, while we may reconstruct two different words, we cannot be certain that both were used in the given form in a given dialect at the same time. Furthermore all reconstruc¬

tions are only approximate. But philologists are not distressed on this account, since they are interested not in discovering the starting points of modern forms (which, after all, were only end points as compared with the innumer¬

able forms that for ages preceded them), but in discovering the nature of the changes that took place and the laws by which they were governed.

We know that the early dialects possessed roughly the same group of sounds as is de¬

scribed in the earlier part of this article. It doubtless possessed at one time a strong stress accent which appears to have brought about such variations in vowel sound as are seen in Greek tithemi, thetos, tethmos, which show the vowel e as long, short and vanished. It also seems that at least in the eastern area this accent was combined with a marked musical or pitch accent. Compound words were freely formed. There was extensive use made of suf¬

fixes and prefixes in derivation. There was very elaborate inflection: three genders (not referring, however, mainly to sex) ; three numbers (singular, plural and dual) ; eight case forms were differentiated in the singu¬

lar, six in the plural and four in the dual ; the verb had forms distinguishing actions as beginning, ending, progressing, completed, or momentary, but gave less accurate expression to the time; it had also desideratives, intensives, causatives and iteratives; the verb had also three persons, three numbers, five moods, two voices, active and middle, but apparently, no special passive form; there were also various verbal nouns and verbal adjectives. The noun and verb show some striking resemblances m form, which suggest that at a much earlier pe¬

riod they, like the English noun and verb (cf. the word stone used both as a noun and a \ erb) , were only slightly differentiated or not at alL

For the Origin of Language, see Speech, Genesis of.

C. History of Language Study in Europe.

The scientific study of language in Europe began with the Greeks, who, however, were not interested in language for its own sake so much as for the light its study threw on other fields of knowledge. Plato investigated etymology because he hoped thereby to learn something of the nature of material things.

Aristotle, who studied language as an acces¬

sory to logic and dialectics, investigated es¬

pecially the relations between thought and the forms of words. His main contribution was the definition of some of the parts of speech and some of the categories of the noun and the verb. He is justly regarded as the founder of systematic grammar. The Stoic philosophers extended and supplemented his definitions till they covered practically the whole field of grammar. Unfortunately the domination of their thought by logical theory led them into some errors. The work of the Greeks was summed up in two

grammars (that of

Dionysius Thrax in the 1st century b.c. dealing with sounds and inflections, and that of Apollonius Dyscolus in the 2d century a.d.

dealing with syntax), which have served as models, for the thousands of systematic gram¬

mars since composed in Europe. The Roman grammarians added practically nothing to the achievements of the Greeks, contenting them¬

selves with translating their words into Latin and adapting them to the Latin language. (See Donatus; Priogian). The Scholastic philos¬

ophers (from the 12th century on) did positive harm by completely subjecting grammar to logical theory. Grammar became practically <(applied logic" (see Nonius). The last rep¬

resentative of this school was the German Gottfried Hermann (1772-1848), who, however, endeavored to combine the older ideas with the Kantian categories. Some slight influence was exerted in Europe by Arabic grammarians by way of Spain. In addition the Hebraist Reuchlin (1455-1522) introduced the idea of ((roots,55 that 'has played so important a part during the last 150 years.

A new era in language study begins with the development of the ((historical-philosophi-

cal55 school in the earlier part of the last cen¬

tury. The change was determined chiefly by the growth of Romanticism and the (

covery55 of Sanscrit. Language study was more completely liberated from the domination of logic and speech came to be thought of rather as an historical development than as a static structure. The wonderful enthusiasm for language study then prevalent was stimulated by such works as Schlegel's (Sprache und Weisheit der Inder) and von Humboldt's

(Kawi Sprache.5 Franz Bopp (1791–1867), starting out to investigate the nature of verbal endings, published a series of works which laid the foundations of Comparative Philology.

Sir Wm. Jones had recognized Greek, Latin, Sanscrit and possibly Gothic and Celtic as re¬

lated languages. Bopp added Zend (in 1816), Lithuanian and Old Bulgarian (1833–35) and Albanian (1855). He laid the foundations for the later work of Pott (in etymology), Fick (lexicography), Schleicher (critical phonology) and Schrader (prehistoric antiquities of the Aryan people). The books of Max Muller, professor in England, and William D. Whitney, American, have popularized the whole subject, which is summarized in Brugmann and Del–

briick's Principles of Comparative Philology of the Indo-European Languages) (7 vols., in German). Grimm's (German Grammar) (Vol.

I, 1819) is the first great embodiment of the historical point of view. He directed his at¬

tention mainly to the changes continually oc¬

curring in the living spoken dialects of Ger¬

many (instead of studying older literary re¬

mains) and on the basis of a previously un¬

paralleled collection of data, he deduced the famous statement of Indo-European con¬

sonant changes known as Grimm's law. This and the similar work of other later scholars combined with the invention of instruments for the exact measurement of muscular move¬

ments and air waves has led to the develop¬

ment of the important field of Experimental Phonetics. Most important of all, however, is the

fact that in language study the laws of psychology have replaced the laws of logic as the basis of the methods employed in all in¬

vestigations. As a result of this, language study has taken its place beside jurisprudence, history, economics, etc., as one of the Human¬

istic or Psychological Sciences.

Bibliography.— On the whole field; Bloom¬

field, L., 'Introduction to the Study of Lan-

guage) (New York 1914) ; Jespersen, O., (Growth and Structure of the English Lan-

guage) (Leipzig 1905) ; Oertel, H., (Lectures on the Study of Language5 (New York 1902) ; Paul, H. (translated), 'Introduction to the Study of the History of Language5 (London 1891) ; Tuttle, T. G., (Introduction to the Natural History of Language5 (London 1908) ; Whitney, W. D., (Language and the Study of Language5 (New York 1867) ; id., (The Life and Growth of Language5 (New York 1875) ; Wundt, W., 'Volkerpsychologie5 (Vols. I and II Die Sprache, 3d ed., Leipzig 1911). Consult also handbooks of psychology as James, An-

gell, Pills'bury, etc. Phonetics : Rousselot, J., 'Principes de phonetique experimental > (2

vols., Paris 1897-1908) ; Scripture, E. W., (The Elements of Experimental Phonetics5 (New York 1902) ; Sievers, E., (Grundziige der Phonetic5 (5th ed., Leipzig 1901) ; Sweet, H., Primer of Phonetics5 (3d ed., Oxford 1906).

Semantics: Breal, M., Semantics5 translated by Cust (London 1900) ; Ginneken, J. van, Principes de linguistic psychologique5 (Paris 1907). Comparative Philology: Brugmann-

Delbruck, (Grundriss der Vergleichenden

Grammatik der Indo-Germanischen Sprachen5

(Strassburg 1893-1911, first two parts in 2d ed.) ; epitome of same (ib. 1904) ; Giles, P., (A Short Manual of Comparative Philology for Classical Students5 (2d ed., New York 1901) ; Hirt, H. A., Pie Indogermanen5

(Strassburg 1905-07), gives an admirable criticism and summary; Schrader, O. (trans¬

lated from 2d ed.) ; Prehistoric Antiquities of the Indo-European Peoples5 (London 1890, 3d ed., in German, Jena 1907) ; Skeat, W. W., (The Science of Etymology5 (Oxford 1912) ; Neillet, A., 'Introduction a l'etude comparative des langues Indo-Europeennes5 (3d ed., Paris 1913).

Clarence L. Meader,

Professor of Latin, Sanscrit and General Lin -

guistics, University of Michigan ,

LANGUAGE MAP OF EUROPE, (a)

ihe Romance Languages.— Portugal is about the only country in Europe that has no lan¬

guage question, because only one language, Portuguese, is spoken in it. "In the 12th cen¬

tury the Galician (Gallego) dialect of Spanish, to which it is closely related, and which is still spoken in the northwest of Spain, was used by Spanish and Portuguese poets alike. Outside of Portugal, Portuguese is spoken in the Azores, the islands of Madeira and Saint Thomas, in the Portuguese colonies of India and Africa, and is the official language of Brazil. Spain is less fortunate. Although the greater part of the people speak dialects more or less closely related to the Castilian of the centre, which is the official language, namely Aragonese in the northeast,

Asturian in the north, Leonese and Andalusian in the south, yet the Galician is more nearly Portuguese, and t'he Catalonian of Catalonia and the Balearic Islands must be considered, and is so claimed by the natives, a distinct language, which is more closely related to the Provencal of the south of France. Besides, the Basque of the provinces of Guipuscoa and Biscay, and of a part of Navarre and Alava, is not even an Indo-European language, but a remainder of the ancient Iberian tongue of the peninsula.

Outside of Spain, Spanish is spoken in South and Central America, in Mexico and some Southern States of t'he United States, in the Philippines, the Canaries, the Carolines, while Catalan is spoken in the southwest of France, to the east of Perpignan, in Cuba and in the Argentine Republic.

Except for a spur of the Basque in the Basses Pyrenees, the Catalan at Perpignan, the Celtic Breton sporadically still spoken at Finistere, Cotes-du-Nord, and the Morbihan, and a Flemish border in the northeast, the rest of France is divided up between the French and the Provencal dialects of the Romance family. The Romance line in the north runs from Gravelines through Merville, Steen werck and Nieppe, then follows the Lys and passes into Belgium. The linguistic line in Belgium runs approximately along the West Flanders and Hainaut 'borders, enters Brabant and runs to Longuey, where the line turns to the east and follows the Luxemburg frontier.

It takes in Metz, Sarrebourg in Lorraine and a part of Alsace, and from Munster follows the border up to Switzerland, where it cuts the cantons of Soleure and Berne, goes to Lake Brienne, follows Lake Morat, goes through canton Freiburg and over Mount la Berra, then runs through the southern part of Berne and the Col du Valais, follows the Italian frontier up to Savoy, runs along the Piedmont, and goes as far as Menton.

In the departments of Haute-Garonne,

Ariege, Gironde, the Gascon is spoken, which is now generally considered to be a separate language, rather than a dialect, that stands in the same relation to the Provencal that Portu¬

guese occupies in regard to Spanish. The rest of the French territory consists of the Langue d'oeil, which contains the official French, and the Langue d'oc, to which the Provencal dialects belong. It is not possible to run a well-defined line between the two, but ap¬

proximately an irregular line, which runs east of Angouleme, south of Montlugon and Lyons, and north of Geneva, almost to Bern, is the southern limit of the French dialects. Besides, the southeastern dialects, which include those spoken in Switzerland, in Savoy and in a part of the Franche-Comte, are mixed, and gen¬

erally go under the name of Gallo-Roman.

The official language of France is the one which evolved out of the dialect of the Isle-de-

France. With the growth of the French colonies it also spread in America to Canada, where some 3,000,000 speak a peculiar patois, in Louisiana, in the western part of San Domingo, at Dominique, in some of the An¬

tilles and in French Guinea. In Africa it is spoken in Algiers, Madagascar and, besides, in the smaller French colonies, both in Africa and in Asia.

Although the official language of Italy is the one which evolved out of the Tuscan dia¬

lect, the country represents even more varieties of Romance than does France. The Gallo-

Roman dialects are found in Liguria, Pied¬

mont, Lombardy and in Sardinia. Then there are the distinct Venetian, Corsican, Neapolitan, Umbrian, Abruzzan and Sicilian, which differ widely from the

official language. In the northeast a line running west of Triest and east of Udine is the eastern border of the Friulan, which is sometimes considered to be a separate language, closely related to the Ladin of the Alps. This Ladin is in the west found in the Grison region of Switzerland, in the centre in the western Tridentino, also in Switzerland, and in the eastern Tridentino and the Alto Beluno, where it also enters Italian territory. In addition to this we have Pro¬

vencal spurs in the northwest, the German Tredici and Sette Communi in the north, and a few Greek spots south of Brindisi, while about Brindisi and in a long strip to the north of it, as well as sporadically in Calabria and in Sicily, there are Albanian settlements. Out¬

side of Italy, Italian is spoken extensively in the Argentine Republic and in the United States. We still have a Romance group in the East, whither it was transplanted during the Roman domination. As Daco-Rumanian it is spoken in Rumania proper, and the linguistic line runs far into Hungarian and Austrian territory, along an irregular line, east of Weisskirchen near the Danube, Temesvar, Gross-Wardein, to the Theiss River. Here it turns due east, past Sziget and south of Czernowitz, after which the line runs very irregularly to the Dniester in Russia, and down the Dniester to the Black Sea. To the east of the Dniester there are a large number of Rumanian settlements, of considerable size, almost up to the Dnieper. To the west of the Dniester there are considerable Russian bases to the north of Kishinev, and the whole Black Sea littoral up to the mouth of the Danube is settled by Bulgarians. In the Dobrudja the Rumanians are almost cut off from the sea by a large Tatar region, but the whole of the Danube in the Dobrudja is Rumanian. From there to the west there are but few Rumanian settlements to the south of the Danube, ex¬

cept for a large oasis to the northwest of Vidin, in Serbian territory. Within the com¬

pact Rumanian region there is a solid Hun¬

garian block from Marom Vasarhely in the west to beyond Beretsk in the east, and from near Brasov in the south to the river Maros 730

in the north, and a large number of minor Hungarian settlements throughout the region north of Rumania proper. There are also very many German colonies throughout that region and solid German blocks around Brasov, south of Naszod, and in the Banat, which has Croa¬

tian territory to the south and west, Hungarian territory to the north and Rumanian territory in the north and east.

The Macedo-Rumanians are found in a

long oasis running north and south about Samarina, Avdela, Perivoli, Mezovon, Syraku, Kraina, in Macedonia and in scattered settle¬

ments in Albania, almost as far as Bitolia. Of the Istro-Rumanians there are but a few isolated settlements south of Monte Maggiore, but they are rapidly adopting the Slavic lan¬

guage of their surroundings.

(b) The Germanic Languages. — We have

already discussed the western limit of the Germanic languages on the Continent. In the south the line runs from Monte Rosa over the heights of the southern Alps, over the Saint Gothard, to the south of Samnaun, over Laurein, Salurn Altrei, south of Brixen, In-

nichen, Pontafel, Villach, Klagenfurt, Mahren-

berg, Mureck, Radkersberg, but from Pontafel to Radkersburg there are numerous German colonies to the south, in Slovenian territory, the largest being

the one around Gottschee, while a large Slovenian settlement is found in Austrian territory. At Radkersberg the Ger¬

man linguistic line runs north inside Hun¬

garian territory (through Eberau, Rechnitz, Oedenberg, around Wieselberg and Pressburg, from where it runs along the Hungarian border as far as Hohenau. Here it gradually turns in a westerly direction through Moravian and Bohemian territory, leaving Znaim, Rieger-

schlag, Krumau, Neumark on the Germanic side. Here it turns to the northeast, just grazing past Pilsen, Leitmeritz and Reichen-

berg. Then it turns southeastward in a very irregular line as far as Olmiitz and reaches Troppau in Silesia. But there are numerous German colonies in Hungary on both sides of the Danube, from Neustadt to Neusatz, and large settlements in Bohemia and Moravia about Budweis, Ig'lau, Landskron, Briinn, and in the Slovak country, about Kremnitz, Kas-

mark, Gollnitz.

From Troppau, northward to the sea, the linguistic line is very broken, there being hundreds and thousands of German colonies through Galicia, Poland and Russia, as far as the Volga. But running a straight line north¬

ward through Oppeln to Kempen, thence to the northwest through Lissa to Bentschen and Schwerin, thence to the northeast through Bromberg, Allenstein, Goldapp, thence in a semi-circle through Eydtkuhnen to Polanzen on the sea, most of the territory to the left is German. But there is very mixed Polish strip from Bromberg to Danzig, and for a distance of some 40 miles to the west of the Vistula. Besides, to the northwest of Danzig there is a solid settlement of Kashubs, speaking a language closelv related to Polish, and around

Kottbus and Bauzen there are two large oases of people speaking a language in¬

termediate between Polish and Bohemian, known as Wendish or Serbo-Lusatian. If a line be drawn from Karge in the east to Cologne and Aix-la-Chapelle in the west, the territory to the south represents the High German, from which the official language is derived, while the northern part represents the Low German dialects. According to the Pan-

German atlas of 1900 the whole world is more or less German. Thus the United States are 4.6 per cent German, forming 32 per cent of the foreign-born population. Milwaukee is given there as 66 per cent German, Hoboken as 57 per cent, etc. Rio Grande do Sul in Brazil is 28 per cent German. Canada is 7 per cent, South Africa 5 per cent German, and so forth. This map explains much of the World War.

A line running from Eupen, to the south¬

west of Aix-la-Chapelle, past Cleve, Emerich, Bentheim, Neuhaus to Emden, separates the Low German group in the east from the Dutch in the west and Frisian in the north. But a strip of territory along the western part of Jutland, as far as Tondern, including the Sylt and other islands, is also Frisian. A line run¬

ning west and east, from below Tondern to above Flensberg, separates German from Dan¬

ish, so that a considerable part of German Schleswig is linguistically Danish.

Denmark and Norway are linguistically al¬

most identical, and Sweden differs from them only by a different official language. Norway and Sweden have Lap inlets, and Swedish is spoken outside of Sweden in the provinces of Esterbothnia and Nyland in Finland, and in the Aland Islands. In addition, we have the related Icelandic in Iceland.

The remaining Germanic language, Eng¬

lish, is spoken in Great Britain, but in the northwestern, western and southern counties of Ireland Gaelic is spoken to some extent, even as Scottish Gaelic is preserved in the extreme northwest of Scotland, and Welsh through a considerable part of Wales. The Pan-German map mentioned above accredits 25.8 per cent of the population of the earth as speaking English.

(c) The Slavic Languages. — The western boundary of the Slavic nations was determined as the southern and eastern boundary of Aus¬

tria and Germany. We can now establish the various subdivisions within this group. The Slovenian language is spoken in southern Ca-

rinthia and Styria, in Carniola and part of Istria. The western line runs from Neuen-

mark, to the west of Triest, to Gorz, passes through Italian territory and follows the polit¬

ical borderline as far as Pontafel. From here it turns due east to Villach, having German settlements within the line, however, and runs somewhat north of the Drau, and strikes the Mur at Mureck. From here it runs into Hun¬

garian territory as far as S. Gotthard, to the north, abruptly turns south to Warasdin on the Drau, then to the southwest, taking in Agram and Nesselthal, and not quite reach¬

ing Fiume, through northern Istria, to a point south of Triest, leaving the littoral chiefly to an Italian populace. The Serbo-Croatian lan¬

guage is spoken to the southeast of it. The line runs from Mureck along the Mur until its union with the Drau, thence along the Drau up to its union with the Danube, then down the Danube to Weisskirchen, where Rumanian territory is reached; but from Esseg on there are numerous Serbian settlements to the north of the river, as far north as Segedin. Going

UP the Morava to Leskovac all the territory to the west is Serbian, but the triangle be¬

tween the Morava, Danube and a line running from Leskovac past Nish to Negotin, is chiefly Serbian at the periphery, but Rumanian at the core. From Leskovac the line runs to Vranya, from there westward to Skopye, thence in a semi-circle to Scutari. But there are numerous Serbian colonies in northern Albania. Thus all of Dalmatia, Slavonia, Sirmia, Bosnia, Herze¬

govina, Montenegro and the greater part of Serbia are Serbo-Croatian, while a spur from Nish to Pirot in Serbia is Bulgarian. The Serbo-Croatian'? and Slovenians form together the Yugo-Slav division of the Slavs.

All the territory south of the Danube, from Vidin to Kustendji, and to the east of the Serbian line, which, however, has to be ex¬

tended from Skopye to Kostur, thence to Sa-

loniki, then straight to Seres and all along the littoral almost up to Constantinople, is chiefly Bulgarian. But there are within this territory innumerable Albanian settlements in the west, Greek colonies along the ^Egean, the Sea of Marmora and the Black Sea, and Turkish colonies in the interior. Besides, there are sev¬

eral Bulgarian spurs into Albania and a con¬

siderable number of colonies in southern Alba¬

nia and in northern Greece. On the other hand, much of the Bulgarian territory in Mace¬

donia is claimed by the Serbians to be Ser¬

bian, because in reality the Bulgarian and Serbian dialects pass here into each other.

If a line be drawn from Kostur to the Adriatic opposite the island of Corfu, all the territory to the north not yet accounted for is held by a non-Slavic race, the Albanians, who have also many colonies in Greece, especially in Attica. If a line is continued from Kostur to Saloniki. most of the territory to the south, including the islands in the Ionic and Hfgean seas, is Greek.

The Czech and Slovak linguistic line was defined by the German circular line from Pressburg, around Pilsen, to Tropau. A line running up the Morava, above Pressburg, to Skalica, thence along the Carpathians up to Babia Gora, _ forms the southern border of Czech. Continuing the line in a semi-circle to Neumarkt, thence in a very irregular line to Kaschau, and from there almost in a straight line westward to Pressburg, it includes the Slovak subdivision of the Czecho-Slovak terri¬

tory. There are, however, numerous Slovak colonies as far down as south of Budapest.

If a line be drawn from Kaschau to Siget, thence to Czernowitz, and from Kaschau a semi-circle be drawn to the west, as far as some distance south of Przemysl, then past Yaroslav to Lezaisk, we get the western limit of Ruthenian, which belongs to the same group as Little Russian or Ukrainian. The rest of Galicia, north of the Slovak territory, is Polish.

If a straight line be drawn north from Le¬

zaisk to Suvalki, all the territory to the west, up to the German border, is Polish, except for Ruthenian indentations; as far as the river Narev, and White Russian indentations to the north. A semi-circle from Suvalki to Vilno, thence an irregular line to Dvinsk, and from there a. fairly straight line past Busk to the sea north of Memel up to the German border in the west and with deep spurs into German territory, include the non-Slavic Lithuanians.

Proceeding from Dvinsk up the Dvina as far as Druya, then drawing a line northward to near Izborsk, thence northwestward to the sea, we get the Letts to the north of the Lithua¬

nians. But the Lithuanian territory is dotted with Polish and Russian settlements, while the Lettish territory is similarly filled with German colonies, and, in the east, with Great Russian oases.

To the north of the Letts live the Esthon¬

ians, who almost reach to lakes Pskov and Peipus, then down the Narova to the sea. The islands of Dago and Osel are also Esthonian.

The Esthonians are not Indo-Europeans, but belong to the same group as the Finns. Vari¬

ous Finnish races, in small groups, occupy the littoral from the Narova almost to Petrograd.

North of Petrograd, between the Bay of Fin¬

land and Lake Ladoga, as far up as Rautus, the population is mixed Russian and Finnish.

The southern littoral of Lake Ladoga, up to the mouth of the Swir River, is Russian. If a straight line be drawn from here to Perm and the Urals, most of the territory to the south would be chiefly Russian. To the north of this line they live only along the rivers, the largest block being on the Kama, north of Perm, as far as Cherdyn.- The southern line of the Russians runs along the Black Sea to Gagri in the Caucasus. Thence a line to Alek-

sandriskaya on the Caspian Sea forms the southernmost border of the Russians. Within this region, we distinguish 'between the Little Russians or Ukrainians, related to the Ruthen-

ians of Galicia, in the governments of Cher¬

nigov, Poltava, Kharkov, Voronezh, Podolsk and parts of Kherson, Ekaterinoslav and the Crimea. Eastward

they have been settling in the government of Stavropol and as far as the Volga. The White Russians occupy the greater part of the governments of Grodno, Vilno, Vitebsk and Smolensk, and all of Mogilev, and a small part of Chernigov. The rest of the Russian territory belongs to the Great Russian dialects. But it must be borne in mind that there is no strict division of these groups, as dialects pass into each other at the points of meeting. The vast territory of Russia has, besides, a large number of other than Indo-

European linguistic blocks.

Finland, except for the littoral in the bays of Bothnia and Finland, which is Swedish, and the extreme north Uleaborg, which is in¬

habited by the Lapps, is Finnish. Related tribes are Carelians, between lakes Ladoga and Onega, and as far north as Lake Pavozero, and also in many settlements in the government of Tver; the Esthonians, already mentioned; the Mordovinians, in many settlements in the governments of Nizhegorod, Penza, Simbirsk, Saratov, Samara; Cheremisses to the north of the Volga and to the west of Kazan; Votyaks between the rivers Vyatka and Kama ; Syryans along the rivers Vychegda, Mezen and Pechora.

Of Turkish people the most numerous are the Bashkirs between the rivers Ural and Kama; the Tatars in the government of Kazan and along the Kama, also in the Crimea ; the Chu¬

vashes on the Volga, near the Kama; the Tatars and Nogays south of the Volga, along the Caspian Sea; the Kirgizes to the north of the Caspian Sea, east of the Volga. Of Mongols we have the Calmucks, on the upper Ural, between the Kirgizes and the Bashkirs.

The races of the Caucasus baffle any brief

description and must be treated separately.

To the same linguistic group as the Finns belong the Magyars or Hungarians, who oc¬

cupy all the territory of Hungary not other¬

wise described as occupied by Slavic people.

In addition to the Tatar settlements of the Dobrudja there are the related Turks in the littoral of the 2Ege an and in small scattered colonies in Macedonia. In about the same re¬

gions are also found scattered colonies of Armenians who belong to the Indo-European group. There are also Armenian colonies . in Galicia, who, however, are rapidly becoming Polonized. We have also one Semitic language in Europe, namely, Maltese, a curious mixture of Arabic and Romance, which is spoken at Malta and Pitayusa, islands of the Mediterra¬

nean.

Leo Wiener.

LANGUE D'OC, lang-dok', the Provencal

tongue of the south of France. See Provencal Language; Provencal Literature; Felibrige.

LANGUEDOC, lang'gwe-dok (Fr. lan-ge-

dok), France, a former province, varying very considerably in extent, its unity being entirely a political creation, but including the present departments of Aude, Tarn, Herault, Lozere, Ardeche and Gard, as well as the arrondisse-

ments of Toulouse and Villefranche, in the department of Haute-Garonne ; and the arron-

dissements of Puy and Yssingeaux, in the de¬

partment of Haute-Loire. Toulouse wTas its capital.

LANGUR, lan-goor', a monkey of the genus Semnopithecus, containing large leaf -eating species of the Himalaya Mountains, India, southward into Ceylon, southwestern China and the Malayan region eastward as far as Java.

The genus represents an interesting transition-

group between the gibbons and the catarrhine monkeys, and includes a large assemblage of species with a long, thin body, tall hind-legs, long, slender tail and no cheek-pouches, such as the entellus, or sacred monkey of the Hin¬

dus, the wanderoos of Ceylon and several locally conspicuous kinds. These monkeys dwell chiefly in forests and go in troops of considerable size. They feed on leaves and fruit, often doing much damage in native plantations. They rarely descend to the ground, and when disturbed there seek to escape by prodigious bounds; but ordinarily they remain in the tree-tops, and progress by swinging from branch to branch, one arm after the other, often at surprising speed. Twenty-nine species are described by H. O. Forbes in his mono¬

graph in Allen's 'Naturalists' Library) (Lon¬

don 1894).

LANIARD, or LANYARD, a small rope,

usually a four-stranded hemp rope, used on a ship. It is employed in setting up rigging, being rove through dead eyes, and in making fast heavier ropes or other objects. The. arti¬

cle to which the rope is attached gives it the names bucket-laniard, lock-laniard (for firing the percussion hook of a cannon), etc. A knife-

laniard is the broad white tape for carrying a knife around a sailor's neck and is a part of the regulation uniform in the United States navy.

LANIER, la'nyer, or LANIERE, Nicholas,

English musician: b. London, 1588; d. there, February 1665 or 1666. He came of a family of French musicians who had served for gen¬

erations in the English royal household. He became a musician in the royal household about 1604 and subsequently was master of the king's music under both Charles I and James L

He followed the royal family into exile and after the Restoration resumed his former post of master of music. He composed the music for Ben Jonson's masques 'Lovers Made Men>

and 'The Vision of Delight, > introducing the Italian "stylo recitativo® into England. He was also a painter and a connoisseur of art, and was in Italy in 1625-28 buying pictures and statues for the collection of Charles I. Por¬

traits of Lanier painted by Van Dyck, Jan Livens, Isaac Oliver and Lanier himself are in existence. Of his music much remains in manuscript, but a large portion of it is pub¬

lished in 'Select Musicall Ayres and Dialogues*

(1653, 1659); 'The Musical Companion

(1667) ; 'The Treasury of Music> (1669), and 'Choice Ayres and Songs* (1685). The

Lanier family continued to inherit its talent for music, the American branch being repre¬

sented by Sidney Lanier (q.v.).

LANIER, Sidney, American poet: b.

Macon, Ga., 3 Feb. 1842; d. Lynn, N. C., 7

Sept. 1881. His father, Robert Lanier, a law¬

yer of Macon, came from a family noted for a love of music and art. An ancestor, Jerome Lanier, a Huguenot refugee, was well known at the court of

Queen Elizabeth as a musical composer; another forebear, Nicholas Lanier, was director of music at the court of James I and Charles I, and first marshal of the Society of Musicians incorporated at the Restoration.

Sidney Lanier's mother, Mary Anderson, be¬

longed to a prominent Virginia family also noted for decided talent for music and poetry.

The poet's artistic temperament was therefore a direct inheritance. As a child Lanier was passionately fond of music and without anv instruction learned to play on the guitar, piano, flute and violin. A critic said of him in later years : "In his hands the flute was transformed into a voice that set heavenlv harmonies into vibration.® This passion for music also showed itself in his keen sensitiveness to rhythmic effect. At 14 he entered the sophomore class of Oglethorpe College, Georgia, and after three years graduated with distinction. He was tutor in the college until the outbreak of the Civil War, when he joined the Confederate army as a private soldier. He fought in sev¬

eral important battles, was transferred to the signal service and finally became signal officer of a blockade runner. In the autumn of 1864

he was captured and confined in Point Look Prison. He had taken advantage of every leisure moment to pursue his studies in litera¬

ture, modern languages and music, and during his long idle hours in prison he gained a com¬

plete mastery of the technique of the flute. He was released in February 1865 and made his way on foot to Macon, but the fatigue of the journey added to the previous hardships of camp and prison caused a severe illness which did irreparable damage to his lungs. The years that followed were years of hand-to-hand fight for a subsistence. For two years he

clerk in a hotel in Montgomery, and there wrote his novel (Tiger Lilies, J a book of power and promise, but hastily written and poorly sustained; he taught at Prattville, Ala., and studied and practised law with his father for five years in Macon. In December 1867 he married Miss Mary Day of Macon, and her be¬

lief in his genius, her willingness to endure with him privation and hardship made possible the valiant struggle and the achievement of the next 14 years. In the autumn of 1873, after an unsuccessful attempt to re-establish his health by a winter in Texas, he determined to move to Baltimore, where he could find greater oppor¬

tunities for culture. He played the flute in the Peabody orchestra ; in the intervals of hemor¬

rhage he wrote articles for magazines ; he gave lectures on literature in private schools; and thus, with the generous aid of his father, he sup¬

plied tjie necessities of his family. His study of languages, of Anglo-Saxon and early Eng¬

lish texts, of English and of foreign literature, was incessant and systematic. In February 1879 he was appointed lecturer on English lit¬

erature at the Johns Hopkins University, and this position he held until his death. His two principal courses of lectures at the university are embodied in his (Science of English Verse*

(1879), a thorough and suggestive treatise on English metre, declaring that English verse de¬

pends on stress, not accent, and that it is based on certain easily recognized musical rhythms, and (The English Novel, > a masterly treatment of the

development of the idea of personality and its place in the modernnovel. Again and again Lanier was driven by illness to Texas, to Florida, to North Carolina, but he was never idle ; he studied much, he thought largely on all vital subjects, on love, life, art, economics, re¬

ligion, and now and then he gave to the world poems of exquisite truth and beauty. In the spring of 1881 it became evident that the un¬

equal fight was nearing its end, and as a last resort he tried tent life in the mountains of North Carolina. The last illness came at Lynn, in Polk County, and on a morning of early September he passed away.

Lanier's most important prose works besides those already mentioned are (The Boy's Frois-

sart> (1878); (The Boy's King Arthur* (1880) ; (The Boy's Mabinogion> (1881); (The Boy's Percy* (1882); (Shakespeare and his Forerun-

ners) (1902). His best-known poems are (Hymus of the Marshes) ; ; (The Crystal > ; Corn* ; (The Symphony* and (The Centennial Medita¬

tion.* The distinctive characteristics of his poetry are a wholesome outlook upon life, a constant recognition of the highest in character and in thought and a varied fresh and melodi¬

ous rhythm. His passion for good and love, his robustness, his high conception of the mean¬

ing and power of the love of man and woman, proclaim his close kinship to Browning. In questions of social economics Lanier was abreast of his time ; he believed in the rights of the individual, he hated the iron hand of unjust trade, but he realized that these problems must be solved in the "patient modern way.**

He knew that the great poet must be an artist in sound and color, as well as a thinker, and that no

labor was too arduous for perfecting verse forms; to attain perfection in his art the poet must make the mechanical verse fulfil its vast possibilities, he must gain the mastery over imagination, so that imagination may be¬

come his servant. But for Lanier there was no art for art's sake ; art was consecrated to man and to God. Like all true poets he lived near to nature, and he has described our Southern scenery with loving faithfulness warmed by vivid imagination. He has given new meaning to "our forests of live-oak beauti¬

*fully braided and woven with intricate shades of the vine ; to our broad fronded fern and keen-leaved canes.** The luxuriance of the Southern forests, the wealth of undergrowth, the warmth, the color, the singing birds live in his poetry, but there is no undue heat, no trop¬*

ical languor. Whittier has not been more faithful to the rocky coasts, to the snowstorms of New England, than has Lanier to the South.

*His letters and complete poems were edited by his widow with a memoir by William Hayes Ward (New York 1881, 1884, 1906), with bibliography. Consult also (The Lanier Book**

(New York 1904), and Nims,

(Boston 1905). See (Song of the Marshes.5

Emilie W. McVea,

President of Sweet Briar College, Sweet Briar, Va.

LANJUINAIS, lan'zhwe'na', Jean Denis,

Count de, French statesman: b. Rennes, 12

March 1753; d. Paris, 13 Jan. 1827. He took his degree as doctor of laws at 19 years of age and was qualified for the bar at that time. He was appointed counsel for the Breton estates and was a successful

legal practitioner when he became professor of ecclesiastical law at the University of Rennes in 1775. He was a dep¬

uty in the States-General in 1789 and demanded the abolition of titles of nobility, working val¬

iantly for a constitutional monarchy mean¬

while. At the Convention of September 1792

he was charged with reactionary views; but while opposing the extremes of the Mountain and its following, Lanjuinais remained faithful to Republican principles. He denied the right of the Convention to condemn to death Louis XVI, but voted for banishment in the hope of saving the monarch's life. He came under ar¬

rest with the Girondins but escaped to Rennes and concealed himself until after the downfall of Robespierre. He returned to the Conven¬

tion on 8 March 1795 and was president of the Upper House during the Hundred Days. He opposed Napoleon and upon the restoration of the Bourbons he was created a peer. As a member of the tribunal which tried Marshal Ney he voted for exile. He wrote Constitu¬

tions de la nation franqaise* (1819) ; appre¬

ciation du project de loi relatif aux trois con-

cordants* (1806 ; 6th ed., 1827); (£tudes bi-

ographiques et litteraires sur Antoine Arnauld, P. Nicole et Jacques Necker* (1823), etc. His collected works were published in four volumes in Paris (1832).

LANKESTER, .Edwin, English scientist :

b. Melton, 23 April 1814; d. 30 Oct. 1874. His early medical studies were attended with diffi¬

culty, he had a short course at the University of London, and took his M.D. at Heidelberg in 1839. In 1840 he settled in London as a lec¬

turer and writer, and in 1850 he became pro¬

fessor of natural history at New College, Lon¬

don. He was appointed lecturer on anatomy and physiology at the Grosvenor Place School 734

in 1853, and in 1853-71 was joint editor of the Quarterly Journal of Microscopic Science. His microscopic examination of the water from the "Broad Street Pump^ undertaken with Dr.

Snow, identified the outbreak of the cholera epidemic of 1854 with the famous pump. He was an indefatigable and popular worker on matters concerning sanitation and public health, many of his articles and lectures being pre¬

pared for the layman. His work was taken up by the National Health Society. In 1855 he edited for the prince consort William Macgil-

livray's 'Natural History of the Dee Side and Braemer' (privately printed). He contributed the article

(1868) ; (Lives of Naturalists) (1842) ; (An Account of Askern and its Mineral Springs) (1842); (Half-hours with the Microscope) (1859), etc.

LANKESTER, Sir Edwin Ray, English

zoologist: b. London, 15 May 1847. Educated at Downing College, Cambridge, and Christ Church, Oxford, he was elected a Fellow and lecturer of Exeter College, Oxford, in 1872; 1874-90 he was professor of zoology and com¬

parative anatomy in University College, Lon¬

don, and from 1891 till 1898 Linacre professor of comparative anatomy at Oxford. From 1898-1907 he was director of the natural his¬

tory department of the British Museum. In 1884 was prominent in founding the Marine Biological Association, now located at Ply¬

mouth, and in 1869 became chief editor of the Quarterly Journal of Microscopical Science.

Lankester's works include the following: (A Monograph of the Fossil Pishes of the Old Red Sandstone* (Part I, 1870) ; Comparative Lon¬

gevity in Man and the Lower Animals) (1870) ; developmental History of the Mollusca)

(1875) ; 'Studies in Apus, Limulus, and Scor¬

pio' (1881); (On Food> (1882); 'The Ad¬

vancement of Science' (1890) ; (Extinct Ani¬

mals' (1905) ; (The Kingdom of Man' (1907) ; (From an Easy Chair' (1908) ; (Science from an Easy Chair' (1910-12) ; diversions of a Naturalist' (1915).

LANMAN, Charles, American author : b.

Monroe, Mich., 14 June 1819; d. Washington, D. C., 4 March 1895. He was educated at the Academy of Norwich, Conn., and went to New York, where he was in business from 1835 to 1845. He then returned to Monroe as editor of the Gazette. He afterward joined the staff of the National Intelligencer at Washington, D. C. He was private secretary of Daniel Web¬

ster in 1850 and secretary to the Japanese le¬

gation in Washington in 1871-82. He was at various times librarian of the War Department, librarian of copyrights, of the Interior Depart¬

ment and of the House of Representatives. He prepared the first Congressional biographical directory. He was among the first to explore the mountains in North Carolina. He painted many landscapes and made many sketching trips. He published in all about 32 volumes, in¬

cluding (A Tour to the River Saguenay'

(1848); (Private Life of Daniel Webster'

(1852); dictionary of Congress' (1858); 'The Japanese in America' (1872); 'Leading Men of Japan' (1883) ; (Biographical Annals of the Civil Government of the United States'

(1876); (Haphazard Personalities' (1886), etc.

LANMAN, Charles Rockwell, American

Orientalist: b. Norwich, Conn., 8 July 1850. He was graduated at Yale in 1871 ; studied Greek and Sanskrit there and from 1873 to 1876 pur¬

sued studies in Orientalism at Berlin, Tubingen and Leipzig, returning in the latter year to ac¬

cept a fellowship at Johns Hopkins University.

Since 1880 he has been professor of Sanskrit at Harvard. He has lectured at many institutions on Oriental subjects; has traveled in India, and from 1879 to 1884 was secretary of the Ameri¬

can Philological Association, edited its trans¬

actions' (Vols. X-XIV), and in 1890 became its president. He was corresponding secretary of the American Oriental Society from 1884 to 1894 and in 1896, and served it as vice-presi¬

dent from 1897 to 1907, when he became its president. His published works include * Noun-

Inflection in the Veda' (1880); a (Sanskrit Reader, with Vocabulary and Notes' (1884-88) ; 'The

Beginnings of^ Hindu Pantheism' (1890); 'Raja-Qekhara's Karpura-manjari,'1 a trans¬

lation of a Hindu drama of 900 a.d. (1900) ; and numerous contributions to Oriental and other journals. He projected the 'Harvard Oriental Series' (1891), to which he has made several contributions. He received the degree of LL.D. from Yale in 1902, and from Aberdeen University in 1906. In 1909 appeared his "Pali Book-Titles and their Brief Designations," in 'Proceedings' of the American Academy of Arts and Sciences (Vol. XLIV, pp. 661-707, Boston) .

LANNER, Joseph Franz Karl, Austrian

musical composer : b. Vienna, 12 April 1801 ; d. there, 14 April 1843. He early showed an aptitude for music, playing the violin and com¬

posing music before he had any instruction.

He established a quartet with the elder Strauss as viola, which proved the nucleus of a great orchestra. Lanner's genius ran to dance music and he developed the modern waltz from the old Viennese national dance landlcr. He com¬

posed 208 marches and dances, and is generally acknowledged the father of modern dance music.

LANNER, the name of a small "noble" fal¬

con formerly in high repute among European falconers of mediaeval times, the identity of which, however, is not quite clear. It was prob¬

ably the handsome reddish-gray Falco feldeggi of the Mediterranean region, still highly valued among Bedouin falconers for its docility and graces. The name is extended to other African and Asiatic hawks of similar appearance and qualities.

LANNES, Ian', Jean, Duke of Montebello, marshal of France: b. Lectoure, 11 April 1769; d. Vienna, 31 May 1809. He had a scanty edu¬

cation but his physical prowess caused him to be made sergeant in the battalion of volun¬

teers which he joined in 1792 for service in the war with Spain. He had attained rank as colonel when in 1795 army reforms caused his loss of rank. He re-entered the army as a volunteer and went with Napoleon to Italy, and in 1797 rose to the rank of brigadier-gen¬

eral. He had by this time demonstrated to Napoleon his extraordinary ability for hard ad¬

vanced guard fighting against any odds and LANOE — LANSING

the great Corsican thereafter used him re¬

peatedly to prepare the way for his own crush¬

ing attacks. He commanded a brigade in the Egyptian campaign; he accompanied Na¬

poleon to France and distinguished himself at the 18th Brumaire. He was again in command of the advance guard in crossing the Alps in 1800, and at the battle of Montebello so aided Napoleon that he was created a duke, taking his title from the name of the battle. At Marengo he successfully conducted the hardest fighting. He was Ambassador to Portugal in 1801 and in 1804 he became a marshal of France. At Austerlitz he commanded the ad¬

vanced guard, and in the campaigns of 1806-

07 he rendered signal services. His method at Saalfeld is still studied as a model in the French Staff College. He won further laurels at Jena and at Friedland, then went with Na¬

poleon to Spain as commander-in-chief of a separate armv with which he won the battle of Tudela, 22 Nov. 1808. He then engaged in the siege of Saragossa, of which he took posses¬

sion 21 Feb. 1809. Later in 1809 he was again engaged in an Austrian campaign, leading the army across the Danube. Forced to retreat in the battle of Aspern-Essling, 22 May 1809, he exposed himself recklessly, as was his wont, and was wounded, dying at Vienna, 31 May.

Napoleon entertained for him a deep affection and was bitterly grieved at his loss. He was one of the ablest of the marshals of France, possessing signal ability for high command, and remarkable daring and strength as a leader.

Consult Perin, R., (Vie Militaire de Jean Lannes* (Paris 1809) ; Thoumas, (Le Marechal Lannes* (1891).

LANOE, Falconer. See Hawker, Mary

Elizabeth.

LANOLIN, a fatty substance obtained

from the grease of sheep’s wool, and consisting chiefly of cholesterin. The wool-grease is saponified by means of caustic soda, and the resulting emulsion is diluted with water. The lanolin then separates in fine particles, which, by the aid of a centrifugal separator, may be obtained in a creamy mass. The lanolin of commerce contains about 30 per cent of water.

Lanolin is very generally used as a basis in the preparation of salves and. ointments, since it does not grow rancid, and is itself antiseptic to a certain extent. It absorbs water and pene¬

trates the tissues of the body much more freely than lard or vaseline.

LANSDALE, lanz'dal, Pa., borough of

Montgomery County, 22 miles north of Phila¬

delphia, on the Philadelphia and Reading and the Stony Creek railroads. The principal in¬

dustries include the manufacturing of agricul¬

tural machines, silks, shirts, heating apparatus and iron and brass products. Pop. 3,551.

LANSDOWNE, George Granville (or

Grenville), Lord, English poet and dramatist: b. 1667; d. London, 30 Jan. 1735. He was edu¬

cated in France and at Trinity College, Cam¬

bridge. He came of a family devoted to the cause of the Stuarts and at the age of 12

recited to the Duchess of York some verses he had written in honor of her visit to Cam¬

bridge. During the reign of William III he lived quietly, devoting himself to dramatic writing and the society of the great poets of his day: Pope, Dryden, Allison and Wycherley.

He entered public life upon the accession of Queen Anne in 1702, being elected to Parlia¬

ment, and in 1710 he became Secretary of War.

In 1711 he was created a peer and in 1712 he was appointed Comptroller of the Household and a privy councillor. Upon the accession of George I he lost the favor of the court and was removed from office in 1714. He was later suspected of complicity in a plot to aid the Pretender and was confined in the Tower from 26 Sept. 1715 until 8 Feb. 1717. Upon his re¬

lease from prison he went to Paris, where he lived for 10 years, later returning to England but refraining from further participation in public affairs. His poetry was of less value than his dramas, but he was a distinguished patron of the poets of his day. His dramatic works include (The British Enchanters)

(1706) ; (Heroick Love) (1698) ; (Once a Lover and

Always a Lover) (1696). His col¬

lected works were published (The Genuine Works in Prose and Verse of G. G. Lord Lansdowne* (2 vols., London 1732; another ed., 3 vols., 1736).

LANSDOWNE, Henry Charles Keith

Fitzmaurice, 5th Marquis of, British states¬

man: b. 14 Jan. 1845. He was educated at Eton and Oxford, and entered politics as a member of the Liberal party. He was one of the lords of the Treasury (1869-72) ; under-secretary for War (1872-74) ; under-secretary for India, 1880; and from 1883-88 governor-general of Canada. From 1888-93 he was viceroy, of India; in 1895 joined Lord Salisbury's Cabinet as Secretary for War; and from 1900-05 was Secretary of State for Foreign Affairs. His tenure of office in the last-named post was marked by the further cementing of the alliance with Japan and the growth of the entente with France. The rejection by the House of Lords under his leadership of Mr. Lloyd-George's budget of 1909 was followed by the defeat of the Unionist party at a general election in the early part of 1910 and by the passing of the Parliament Act, which curtails the powers of rejection formerly possessed by the Upper House. In 1915 Lord Lansdowne joined the Asquith coalition government as a minister without portfolio.

LANSDOWNE, Pa., borough in Delaware

county, five miles southwest of Philadelphia, on the Philadelphia, Baltimore and Washington Railway. It is chiefly important as a growing suburb of Philadelphia with the public improve¬

ments following a residential development. It has steel manufactures. Pop. (1920) 4,797.

LANSFORD, Pa., borough in Carbon

County, on the Lehigh and New England Railway, 40 miles north of Reading. It is the centre of the

anthracite coal fields, has exten¬

sive coal mining interests and manufactories of shirts, knit goods and garage, supplies. In the neighborhood is situated an immense electric-

power plant. It was settled in 1845 and was incorporated in 1876. The government is ad¬

ministered by a burgess elected every four years and a borough council which controls the local administrative offices. Pop. about 10,000.

LANSING, John, American jurist: b. Al¬

bany, N. Y„ 30 Jan. 1754; d. 12 Dec. 1829. He studied law in Albany and New York; was en¬

gaged in practice at the beginning of the Revo¬

lution, during a period of which he served as 736

militaty secretary to General Schuyler. In 1784

he was elected to Congress, and while a member of that body was elected to the lower house of the New York legislature, where he was chosen speaker in 1786, in which year he also became mayor of Albany. For a short time he repre¬

sented New York in the Constitutional Conven¬

tion (1787), which he left because he held that he had been sent to participate in an amendment of the Articles of Confederation and not in the forming of a new constitution. In 1788, at the New York convention, his opposition to the ratification of the Constitution was stoutly maintained. He served on the New York-

Vermont boundary commission- in 1790 was appointed a judge of the New York Supreme Court and became chief justice in 1798. From 1801 to 1814 he was chancellor of the State.

He declined the Anti-Federalist nomination for governor of New York in 1804. He disappeared mysteriously in New York City on 12 Dec.

1829, after having quitted his hotel to post a letter on a wharf nearby.

LANSING, Robert, American statesman :

b. Watertown, N. Y., 17 Oct. 1864. After grad¬

uating from Amherst College he was admitted to the New York bar and began to practise law in his native town. On various important occa¬

sions he was engaged by the United States government on international questions, among them the Bering Sea Fur-Seal Arbitration (Paris 1892-93), in which he served as counsel and technical delegate; the Bering Sea Claims Commission (1896-97), Alaskan Boundary Tri¬

bunal (1903), North Atlantic Coast Fisheries Arbitration (1909-10) and the American and British Claims Arbitration (1912-14). Mr.

Lansing was appointed counsellor for the De¬

partment of State in March 1914. On the unexpected resignation of Mr. William Jen¬

nings Bryan (q.v.) from the office of Secretary of State on 8 June 1915, President Wilson on the following day authorized Mr. Lansing to perform the duties of that office <(for a period not to exceed thirty days, until a Secretary shall have been appointed and have qualified.®

The subsequent definite appointment of Mr.

Lansing as Secretary of State proved a for¬

tunate choice. In the delicate negotiations with foreign powers which Mr. Lansing conducted during 1915, 1916 and 1917, he displayed a statesmanlike breadth of view and a judicial grasp of essential

points. The unrestricted submarine policy of the German government, involving diplomatic duels with ambassadors and Foreign Offices, and the intricate problems arising under international law from the British and French attitude with regard to the rights of search and blockade, in addition to many other thorny questions concerning the diffi¬

culties of neutrality, were alike handled by Mr.

Lansing with diplomatic skill and tact. Mr.

Lansing was a member of the American dele¬

gation to the Paris Peace Conference. Differ¬

ences regarding foreign policy led to an estrange¬

ment with President Wilson, who, in February 1920, asked for Mr. Lansing's resignation.

LANSING, Mich., city, capital of the State and county-seat of Ingham County, at the junc¬

tion of the Grand and Cedar rivers, and on the Chicago and Grand Trunk, the Lake Shore and Michigan Southern and several other railroads, 85 miles northwest of Detroit. It occupies an elevated site on a plateau rising from the water level and is well laid out. Its streets are well shaded. There is an abundance of water power derived from both rivers, the Grand River hav¬

ing here a fall of 18 feet. It is a trade centre and is engaged in the manufacture of agri¬

cultural implements, flour, stoves, machinery, beet sugar, canned goods, automobiles, gaso¬

line engines, carriages, wagons, trunks, wheel¬

barrows, building materials, malleable castings, furniture, fixtures, electric supplies, cut glass, candy, ice cream, cigars, automobile accessories, artificial stone and knit goods. There are over 200 manufacturing concerns, employing about 11,000

persons, and an annual product valued at about $30,000,000. It contains the State Capitol, built at a cost of $1,500,000; State Hospital; State Library, containing 105,000 volumes ; United States government buildings; State School for the Blind; and the State Industrial School ; State Agricultural College, with a farm of 675 acres; and has electric-light and street-

railroad plants; water power from the river, which is spanned by several bridges ; national and State banks; about 20 churches; daily, weekly and monthly periodicals ; and an as¬

sessed property valuation of over $6,000,000.

Under a charter of 1897 the city is governed by a mayor and council elected every two years.

The waterworks and electric-light plants are owned and operated by the municipality. The city was settled in 1837, laid out for the State capital in 1847, when a single 'family occupied the site, and incorporated in 1869. Pop. 57,327.

LANSING MAN, a term applied to a col¬

lection of human bones, found near Lansing, Kan., 20 feet below the surface of the earth, under a stratum of carboniferous limestone.

The skull which was well preserved measured : Maximum length, 188 mm. ; breadth, 138 mm. ; cranial index, 73.4. From the date of this dis¬

covery in 1902, men of science have been di¬

vided in their opinion as to the antiquity of the remains. It is now generally agreed that the skull does not represent an ancient type of man.

The skull is preserved in the United States National Museum. Consult Ales Hrdlicka, <(Skeleton Remains Suggesting or Attributed to Early Man in North America,® in Bulletin No.

33, Bureau of American Ethnology (Wash¬

ington 1907).

LANSINGBURG, N. Y., village in Rens¬

selaer County, north of the city of Troy, of which it became a part, 1 Jan. 1901. It was a manufacturing town with a population of 12,-

595 when absorbed.

LANSON, Gustav, French literary critic: b. Orleans, 5 Aug. 1857. He was educated at the Lycee d'Orleans, the Lycee Charlemagne and the Lcole Normal Superieure, receiving the degree of doctor of letters. He engaged in the teaching of rhetoric and later became professor of French literature at the Univer¬

sity of Paris, _ and at one time he was engaged in teaching in the United States where his methods have been adopted by several uni¬

versities. He is a member and officer of several French literary societies and an officer of the Grand Legion of Honor. His works in¬

clude (Nivelle de la chaussee et la comedie larmoyante) (1887) ; (Histoire nationale de la litterature franqaise) (1894; 11th ed., 1909);

(Manuel bibliographique de la litterature fran¬

chise, 1 500-1 900) (4 vols., 1910-12), etc. He edited (Les lettres philosophiques of Voltaire>

(1908).

LANTERN, formerly LANTHORN (1)

an open-work carrier or structure with trans¬

parent sides, used for carrying a lamp or candle, as

a portable light, or for protecting it from the wind. Lanterns were used by the ancients in augury. They were also carried before troops on the march by night, being then borne on the top of pikes, and so constructed as to throw the light backward. Dark lanterns are provided with only a single opening, which can be closed up when the light is required to be hidden, or opened when there is occasion for its assistance to discover some object.

See Lamp.

(2) In architecture, a small structure on the top of a dome, or in other similar situations, for the purpose of admitting light, promoting ventilation, or for ornament, of which that on the top of the capitol at Washington may be re¬

ferred to as an example. In Gothic architecture the term is sometimes applied to louvres on the roofs of halls, etc., but it usually signifies a tower which has the whole height, or a con¬

siderable portion of the interior, open to view from the ground, and is lighted by an upper tier of windows. Notable examples are the Cimborio of Burgos Cathedral, the celebrated example of Coutances Cathedral, Normandy, and the equally famous octagon of Ely Cathedral.

(3) The elaborate lighting fixture, with its prisms, in a lighthouse (q.v.).

LANTERN OF DEMOSTHENES. See

Lysicrates, Monument of.

LANTERN-FISH, a general term for the

luminous fishes of the depths of the sea, most of which belong to a single group (Inio?ni).

See Deep Sea Exploration; Deep Sea Life; Fish ; Ichthyology.

LANTERN-FLIES, homopterous bugs

with membranous forewings concealing the folded hinder wings when the insects are at rest, and the head greatly prolonged and said to be light-giving in some tropical species.

They feed upon plants and deposit their eggs in slits cut in the bark. The best-known species is the candle-fly (Fulgora laternaria) of tropical America, but the luminosity alleged of it is an old story not recently verified.

Many other popular beliefs are attached to the insect. It is said in Brazil, for instance, to be so poisonous that anything against which it strikes its long beak will fall dead. Several small and non-luminous species of this family occur in the United States. Consult Brunner, (Am. Naturalist,* (Vol. XXIII, p. 835, 1885).

LANTERN SLIDES, Method of Making.

Lantern slides are so universally used in edu¬

cational work and are so easily made that teachers should know the process. Besides, lanterns, which can be attached to any electric light socket, have become so cheap and so efficient that illustrated descriptions of travels and outings may be enjoyed in the home. As far as the method of making them is con¬

cerned, there are three classes of lantern slides: (1) lantern slides by contact, .(2) by reducing or enlarging, and (3) by copying illustrations or photographs.

1. Lantern Slides by Contact — Put the lantern slide plate on the negative in a print¬

ing frame and print just as if the plate were a piece of printing-out paper. The time of ex¬

posure will be rather short. With a gas man¬

tle lamp or an ordinary electric-light bulb, try two seconds at a distance of three feet. If the negative is weak, increase the distance, underexpose and develop thoroughly; if the negative is dense, lengthen the exposure. If the negative is uneven, increase the distance so that 8 or 10 seconds, or even longer will be required for the exposure. This will give an opportunity for shading the weaker parts, just as in printing on paper. With most kodak films and with other negatives up to 314X4/4

inches, this is the best method. Even with larger negatives, a desirable portion may be covered by the plate and a print made of that particular feature.

2. Reducing and Enlarging. — If a lantern slide is to be made from a negative either smaller or larger than the lantern slide plate, a camera is necessary. Place the negative in a perfectly vertical position so that a good light, but not direct sunlight, may shine through it, as in making an ordinary picture.

*Remember that the lantern slide plate is very slow, so that the exposure will be 10 to 15 times that required for ^instantaneous** plates or for kodak films. Lantern slides made by reduc¬*

tion from larger negatives are likely to be the best; enlargements from negatives smaller than the lantern slide are not so satisfactory.

3. Copying Illustrations or Photographs.

In making lantern slides from photographs, maps or pictures in books, it is necessary to make a negative and then make a lantern slide from the negative. Preferably, this negative should be of the same size as the lantern slide plate. The lantern slide may then be printed by contact. Lantern slide plates may be used in making such negatives. If an average 5X7

photograph is to be copied in good diffuse day¬

light, with an F 16 stop, and a lantern slide plate, try an exposure of 15 seconds. In copying maps and

line drawings, where dead blacks and pure whites are desired, expose fully and overdevelop. Formulae for de-

velepors are furnished with every box of plates. Consult Chamberlain, Charles J., Meth¬

ods in Plant Histology* (1901) ; (The Photo-

miniature,* (Lantern Slides, Vol. I, No. 9, 1899).

Charles J. Chamberlain.

LANTERNS, Feast of, a religious cere¬

mony held in China on the 15th day of the first month of the year. It derives its name from the vast number of lanterns which are hung out of the houses and in the streets. The lanterns used are often of great value, being richly ornamented with gilding, painting, japanning and sculpture, and some of them are of great size, reaching nearly 30 feet in diameter, and are so constructed as to resemble halls or cham¬

bers.

LANTHANUM, a rare metallic element

resembling cerium in its general properties, dis¬

covered by Mosander, in 1839, in the Swedish mineral cerite. It has the chemical symbol La, and an atomic weight (for 0 = 16) of 138. Its melting point is between that of anti¬

mony (840° F.) and silver (1740° F.). It has 738

a specific gravity of 6.16, and a specific heat of 0.0448. It is a white metal, moderately ductile and malleable. It oxidizes rapidly upon expo¬

sure to the air, and decomposes water slowly when cold, and rapidly when hot. It dissolves readily in acids, with the formation of corre¬

sponding salts, which are mostly colorless, with an astringent taste. The metal is prepared by the reduction of its chloride by metallic potas¬

sium, and the subsequent removal of the potas¬

sium chloride that is formed, by washing with alcohol. Neither lanthanum nor its salts are of any industrial importance. The name is from a Greek word meaning ^concealed,® in allusion to the fact that lanthana, the oxide, was for a time confused with the oxides of other rare metals belonging to the cerium group.

Lanthanum occurs, as a silicate, in the minerals cerite, gadolinite, orthite and allanite; as a car¬

bonate in lanthanite occurring in Lehigh County, Pa., and Essex County, N. Y.

LANZA, lan'tsa, Gaetano, American mathe¬

matician and engineer : b. Boston, 26 Sept.

1848. He was educated at the University of Virginia, and for two years was an instructor there ; was an instructor and assistant professor at the Massachusetts Institute of Technology (1872-75); professor of theoretical and applied mechanics (1875-1911), in charge of the depart¬

ment of mechanical engineering (1883-1911), and since 1911 professor emeritus. He has served at various times as consulting engineer and in 1906-11 was president of the Mathematical and Physical Club. He is a Fellow of the American Academy of Arts and Sciences, a member of the British Association for the Ad¬

vancement of Science, and of other scientific bodies here and in Europe. He has published (Applied Mechanics) (1885; 9th ed., 1905), and (Dynamics of Machinery) (1911), and his writings include many papers presented to scientific societies.

LANZAROTE, lan-tha-rd'ta, one of the

Canary Isles, the most easterly of the group, about 90 miles from the African coast; area, 235 square miles ; greatest length, 31 miles ; breadth, 5 to 10 miles. Its coast is in general very bold, and presents ranges of basaltic cliffs rising in some parts to 1,500 feet; its interior is rough in surface, and contains several moun¬

tains, the loftiest of which has a height of 2,000 feet. The only port of any consequence is Arrecife. Pop. 19,261.

LANZI, lan'tse, Luigi, Italian antiquary and art critic : b. Monte dell' Olmo, near Macerata, 1732; d. Florence, 30 March 1810.

He was educated for the priesthood, entering the order of the Jesuits. He became keeper of the galleries of Florence in 1773 and through study and research became an author¬

ity on Italian painting and Etruscan language and antiquities. He was buried beside Michel¬

angelo in the church of Santa Croce at Florence. His writings include (Storia Pit-

torica della Italia) (1792, 1796); (Saggio de lingua Etrusca) (1789); (Saggio delle lingua Italia antiche) (1806) ; (Dei vasi antichi dipinti volgarmente chiamati Etruschi) (1806), etc.

He also wrote verse, edited and annotated Hesiod, (Works and Days,) and he wrote a number of treatises on spiritual subjects.

LAO-TSE, laa-tsa, or LAO-TSEU, Chi¬

nese philosopher : b. Kiuh-jin about 604 b.c. The date of his death is unknown, but some early writers think he attained the age of 160. His primal name was Li Uhr, but as he became distinguished he was called Lao-tse, or ven¬

erable philosopher. He was the founder or re¬

former of one of the most ancient and import¬

ant religious sects of China, known as the Tao or sect of reason. He was a historiographer and librarian to a king of the Chow dynasty; traveled to the borders of India, where he may have become acquainted with Buddism ; met Confucius and reproached him for his pride, vanity and ostentation ; was persuaded to re¬

cord his doctrines in a book, which he did in the (Tao-ti-king) or (The Path to Virtue) ; and on completing this task is reputed to have disap¬

peared into the wilderness, and there ascended to heaven. According to him silence and the void produced the Tao, the source of all action and being. Man is composed of two principles, the one material and perishable, the other spir¬

itual and imperishable, from which he emanated, and to which he will return on the subjugation of all the material passions and the pleasures of the senses. Lab-tse's moral code is pure, incul¬

cating charity, benevolence, virtue and the free¬

will, moral agency and responsibility of man.

Since the 2d century of our era the sect has continued to extend over China, Japan, Cochin-

China, Tonquin and the Indo-Chinese nations.

See Taoism.

LAOAG, la-wag', Philippines, capital of the province of Ilocos Norte, Luzon, on the Grand de Laoag River, four miles from its mouth. It is picturesquely situated in a fertile plain and is well built ; it is open to the coastwise trade and is the centre of shipment for the agricultural products of the region.

Rice, indigo, tobacco and sugar are the prin¬

cipal products. The name signifies (

LAOCOON, la-ok'6-on, a priest of Apollo at Troy. As he was sacrificing a bull to Poseidon on the shore, two serpents swimming from the island of Tenedos advanced to the altar. The people fled, but Laocoon and his sons fell victims to the monsters. The sons were first attacked, and then the father. Wind¬

ing themselves round him, the serpents raised their heads high above him, while in his agony he vainly endeavored to extricate himself from their folds. They then retired to the temple of Pallas Athene, where they took shelter under her shield. The people saw in this omen Lao-

coon's punishment for his impiety in piercing with his spear the wooden horse consecrated to Athene. The story has frequently furnished a subject to the poets, but it is chiefly interesting to us as having given occasion to a fine work of sculpture — the Laocoon group, now in the Vatican. It was discovered in 1506 on the site of the baths of Titus. Pope Julius II bought it and placed it in the Vatican. Its preserva¬

tion was perfect, except that the right arm of Laocoon was wanting : this was restored by a pupil of Michelangelo. This group is of the dramatic Rhodian school, and by no means belongs to the best style of Greek sculpture.

Yet it has been much treated of in literature, especially by Goethe, Heine, Lessing, Winckel-

mann and Herder. It represents three persons in agon}r, but in different attitudes of struggle

or fear, according to their ages. Pliny declares it was made of one stone by the sculptors Age-

sander, Polydorus and Athenodorus, all natives of Rhodes, and the two latter probably sons of the former.

Lessing makes it probable that those three artists lived under the first emperors. It may be fairly doubted whether the statue mentioned by Pliny is the same as that we now have ; acute observers have found that the group does not consist of one block, though the junctions are carefully concealed. To this it may be an¬

swered that they were not perhaps perceptible in the time oi Pliny. Several copies have been made; one in bronze, from a model by Giacopo Tati or Sansovino, which was carried to ^France. Bacio Bandinelli made a copy which is in the Medici Gallery at Florence.

LAODAMIA. Wordsworth's (Laodamia,5

published in 1815, is a narrative poem in stanzas dealing with the classical story of Protesilaus, a Greek hero who sacrificed him¬

self in fulfilment of the oracle which declared that victory should be the lot of that party from which should fall the first victim in the Trojan War. According to the legend, as narrated by Wordsworth, Laodamia, the wife of Protesilaus, prays to the gods that her hus¬

band may return to her from Hades. He does so and relates the story of his death at the hands of Hector, rebuking the excessive passion of his wife, who cannot bring herself to consent to his return to the shades of death.

Summoned by Hermes the spectre departs, leav¬

ing Laodamia a lifeless corpse upon the palace floor. The poem closes with a description of the trees which grew from the tomb of each and withered at the top when they had attained such a height that they commanded a view of the walls of Troy. The underlying idea of the poem is the weakness of the soul exemplified in Laodamia, whose uncontrolled

love makes her incapable of lifting her heart to a <(higher object® and accepting her husband's sacrifice and fate. Both the motive of the piece and its classical amosphere reflect the change in point of view which Wordsworth experienced in his maturer years. (See Ode to Duty). Its beauty of style and calm nobility of tone make it one of Wordworth's unquestionable master¬

pieces. The poem bears traces of the influence of Virgil, whom the poet was rereading at the time. In an earlier version Laodamia is more pitied than condemned. Later the ethics of the poem seemed to require her punishment.

The present ending, adopted in 1845, is a kind of compromise. Consult notes in Dowden's (Poems by Wordsworth5 (Athenaeum Press

Series).

James H. Hanford.

LAODICEA, la-od-i-se'a, the ancient name of eight places in Asia Minor including (1) Laodicea, now called by the Turks Eski Hissar (Old Castle), an ancient ruined city, once the capital of Greater Phrygia, 120 miles east of Smyrna, the site of one of the seven primitive Christian churches of Asia. Nothing but very extensive ruins of inferior architectural merit remain to point out the locality of this interest¬

ing city. (2) Now Ladik, a city of Lyconia, north of Iconium. (3) An ancient city of Syria, founded by Seleucus Nicator, which stood to the northeast of Baalbec, in a plain watered by the Marsyas.

LAODICEA, Council or Synod of, coun¬

cil held at Laodicea ad Lyceum in Phrygia in the 4th century. The exact time of the coun¬

cil is disputed, Hefele placing, it between 343

and 381, while Baronius maintains 314 as the correct

date, and other years as late as 399

are considered by different authorities. The council was composed of 32 bishops from the provinces of Asia and the results of its rulings are produced in 60 canons which were pro¬

nounced as binding upon the Christian creeds throughout the world by the Council of Chal-

cedon in 451. The canons are disciplinary in the main and make a privileged class of the clergy, but regulate strictly ritual, precedents, heresy, baptism, fasts, angel-worship and other matters of form and faith. From the list of canonical books notable omissions are those of the Apocrypha and the Revelation. The canons are published in Hardouin, (Con-

ciliorum Collectivio5 (Vol. I, 1875).

LAOKOON. To the scholarly world out¬

side of Germany (Laokoon5 (1766) is probably better known than any other of Lessing's works — an interesting poem by Matthew Arnold testifies to its fame. It represents the culmina¬

tion of a wave of critical inquiry which swept over the whole of western Europe ; with re¬

gard to contemporary poetic practice it was a polemic of irresistible timeliness; and in every respect it is a characteristic work of its clear¬

headed and sure-handed author.

(Laokoon5 has to do with the boundaries of painting and poetry. It delimits the re¬

spective fields of sister arts which have indeed much in common, but properly possess each a special sphere. Mutual accommodation may be expected of the sisters, and is provided for; nevertheless, either can only at her peril in¬

vade the peculiar domain of the other. So much had been recognized in Europe since the time of the Renaissance. Italians, Frenchmen and Englishmen — all of the more important of them known to Lessing — had for genera¬

tions meditated and written on the problems that he treated, and some had endeavored to distinguish what belonged to one sister from what belonged to the other. But the pre¬

vailing tendency had been to assimilate, to evaluate and to compare, whereas he con¬

trasted. Before Lessing two texts from an¬

tiquity had been thought to warrant emphasis upon likeness: Horace's phrase in the (Art of Poetry5 Ut pictura poesis (((as a picture is, so is poetry55) and the saying attributed to Simonides of Ceos, ((A picture is mute poetry; poetry is a speaking picture.55 There were recognized, howrever, the facts that speaking takes time, and sight may be momentary; that a mute object is an object in space, whereas words — the medium of poetry — neither are objects nor have any existence in space: in short, that both the matter and the manner of poetry and painting are, as Plutarch had de¬

clared, different one from the other.

Differences in manner or medium of artis¬

tic creation are manifest: forms and colors are in no sense like words or language. That the matter suitable to the two arts is also dif¬

ferent was demonstrated by Diderot, when he invited attention to the treatment of one and the same subject in the two media, and showed how absurd would be the appearance on canvas of a man submerged, up to his head, in spite

of the effective handling of such a scene in the

poetry of Virgil.

This hint, and a similar one from Winckel-

mann and Moses Mendelssohn with reference to the statue of Laocoon, and Virgil's narra¬

tive in the second book of the (ZEneid,) gave Lessing the starting point for his discussion; — for his discussion, not for the development of his ideas; these he had derived from con¬

sideration of the practice of Homer, a practice vividly brought to Lessing's attention by a passage in Burke's essay (On the Sublime and Beautiful. > Upon the basis of first principles discovered in Homer, Lessing built up his theory of the fundamental difference between poetry and painting. But the first 15 chapters of

ecessors : Winckelmann, Joseph Spence and Count Caylus. Then, in chapter 16, he formu¬

lated his results in dogmatic, deductive fashion, essentially as follows : The symbols, or means of expression, in painting are lines and colors; the symbols, or means of expression, in poetry are articulate words. Lines and colors are properties of bodies, the parts of which coexist in space ; articulate words have no existence in space, but succeed one another in time. If, therefore, as is evident, there should be a suit¬

able relation between the subject of artistic treatment and the means employed, the proper subject for painting is something, the constituent parts of which coexist in space, i.e., bodies; and the proper subject for poetry is some¬

thing, the constituent parts of which succeed one another in time, i.e., movements or, in general, actions. Painting can represent ac¬

tion only suggestively, by means of bodies; poetry can represent bodies only suggestively, by means of action. Painting can represent only a single moment,

but can suggest other moments ; poetry can present a body to view, but will give it the aspect which it bears at a definite moment, the moment of mention. The painter will choose a pregnant moment, i.e., one which gives the imagination free play with cause and effect; and the poet will choose a significant aspect, i.e., one which gives the imagination a vivid picture of present reality.

But the painter will suggest, he cannot tell, a story, and the poet will present, he cannot exhaustively describe, a body — instead, he will translate a work into the terms of an operation, and will transform beauty into grace. Grace is beauty in motion. Space is the realm of the painter; the realm of the poet is time.

Lessing's treatise was a protest against two abuses that ran riot in his day: excessive alle¬

gorizing in painting, excessive detailed descrip¬

tion in poetry. Painting subordinated beauty to ^poetic® substance and ran the risk of unin¬

telligibility; ((pictorial® poetry dissipated its energy in the vain endeavor to assemble the parts of extensive objects which defied imagina¬

tive unification. Lessing was more concerned with poetry than with painting; he was a poor visualizer, but quick to respond to sensory-

motor appeal. Further, he cared more for ideas than for things, more for action than for being. His rationalistic mind dealt chiefly with the objective aspect of arts which must, in the last analysis, justify their methods by their subjective effect upon the whole man, the sensuous even before the rational. But he made a theoretical distinction which is unas¬

sailable, however much it may be subject to modification when applied to specific cases.

Lessing himself was ready and willing to re¬

lax the rigidity of his demarcations. The

We need not regret that it remained a frag¬

ment. What the treatise gained in complete¬

ness it might have lost in incisiveness. The first part, that we have, is a masterpiece of composition, a work of art, in which discus¬

sion of abstract principles is made marvelously concrete and stimulating. Translated by Ellen Frothingham (Boston 1874), and by Sir

Robert Phillimore (London 1874). Edited by W. G. Howard (New York 1910). Cf. Irving Babbitt, (The New Laokoon) (Boston 1910).

William G. Howard,

Assistant Professor of German, Harvard Uni¬

versity.

LAOMEDON, Greek mythological char¬

acter, son of Ilus, king of Troy and father of Priam (Podarces). By command of Zeus

Laomedon was served by Apollo and Poseidon, Apollo tending his flocks and Poseidon build¬

ing the walls of Troy which Laomedon

founded. Laomedon refusing the compensation agreed upon the country was visited by a pestilence sent by Apollo and a sea monster sent by Poseidon. The oracle declared that relief could be obtained only by the sacrifice to the sea monster of one of Laomedon’s daughters. Lots were cast and Hesione was chosen and chained to a rock to await the sea monster’s . coming. Here Hercules found her and promised to free her in exchange for the magic horses given to Tros, the father of Ganymede, to comfort him after the loss of his son. Laomedon again broke his word' and Plercules returned,

destroyed Troy, killed Laomedon and all his sons except Priam who had opposed his father's methods. Hercules carried away Hesione and placed Priam upon the throne. It was said that so long as the grave of Laomedon remained inviolate by the Scsean gate the walls of Troy would remain impregnable.

LAON, lan, France, capital city of the department of Aisne, 87 miles northeast of Paris.. It has been, from earliest times a forti¬

fied city, owing to its situation upon command¬

ing ground. It was the ancient Ladunum and was fortified by the Romans in the 5th century.

The invasions of the Franks, Vandals, Huns and others were checked here in early times ; in the Hundred Years War Laon changed hands several times, being held successively by the Burgundians, English and French. Napo¬

leon here was defeated by Blucher in 1814, and in the Franco-Prussian War Laon fell into the hands of the Germans. In the European War Laon again fell before the Germans in the autumn of 1914 and remained within the famous <(Von Hindenburg line® until the closing cam¬

paign of 1918. The cathedral of Laon was built in the 12th and 13th centuries and is considered one of the most important Gothic structures in France. There is an old episcopal palace, now in use as a courthouse; the 13th century LAOS — LAPHAM

gates of Ardon, Chenizelles and Soissons; the ancient abbey of Saint Vincent and the church of Saint Martin, built in the 12th century.

Laon was the seat of a bishopric until the Revolution. Its modern fortifications consist of an inner line of defense works and two groups of forts to the southeast and southwest.

It has sugar and metal-manufacturing indus¬

tries and is famous for its artichokes, aspar¬

agus and fruits. The town possesses an excel¬

lent museum, a lycee for boys, a girls' college and agricultural and normal schools. Pop 15,228. y

LAOS, la oz, or LAOTIANS, division of the Thai or Shan race of Indo-China, occupying the territory in northern India from Tongking to Cambodia in the Malay Peninsula. The people prefer to be called Thai rather than Lao, which is a political name, indicating the Thai peoples governed by Siam. Shan also is a political name, probably from the Chinese, and means the Thai peoples under Burmese rule.

They are at present chiefly under French and Siamese rule although a species of independence is accorded a few tribes. The Laos came from the mountain districts of Yunnan. Szechuan and Kueichow, driving the wild tribes of the Kwa peoples away. Their civilization was of a comfortable order, with small states having few and easy laws and low taxes, and embodied for the greater part the adoption of Buddhism.

The Laos are of a friendly, pleasant disposi¬

tion, too easy-going to compete successfully in commerce; their chief occupations are along agricultural lines in connection with rice, silk and herds. The cutting of teak timber is done mostly by the wilder tribes in the mountains.

There are two distinct divisions of the Laos, the Lao Pong Dam, or North Laos, and the Lao Pong Kao, or Eastern Laos. They possess a written language, the Lao Pong Dam

deriving theirs from the Burmese, while the Lao Pong Kao language is similar

to the Siamese. The physical character¬

istics of the race are low stature, yellow complexion, high cheek bones, small, flat nose, oblique eyes, black hair and scanty beard.

While polygamy is practised it is rare and the women of the race enjoy considerable freedom and are kindly treated. They have a distinct taste for music, their instrument being the Hchen,® a mouth organ of rather sweet tone; and they have a considerable development of folklore. From 1828 the Laos were governed by Siam, the most powerful Laotian state, Vien-Tiane being destroyed at that time. The government was thereafter conducted in part by native hereditary princes and partly by man¬

darins sent from Bangkok. The government is now divided between France and Siam. As a whole the Laos are lazy but peace-loving; they are superstitious, crediting disease to evil spirits and believing in wer-wolves. Men, women and children are alike addicted to tobacco smoking.

Consult Granier, M. J. F., (Voyage d'explo-

ration en Indo-Chine5 (1873) ; Mouhout, A. H., (Travels in the Central Parts of Indo-China, Cambodia and Laos) (1864) ; Hallett, H. S., (A Thousand Miles on the Elephant in the Shan States) (1890) ; Gosselin, C., (Le Laos et le protectorat franqais) (1900); Reinach, L. de, (Le Laos> (1902) and (Notes sur le Laos) (1906).

LAOS, a territory in the French Indo-

China Peninsula, surrounded by the British Shan states, Anam, Tongking and the Chinese province of Yuan-nan. Its boundaries and po¬

litical status have been the subject of four international agreements, the last concluded in 1907, when the Luang-Prabang territory on the west side of the Mekong was partially restored to Siam. Its extent and the number of its inhabitants are unknown, but they have been estimated at one and a half million. The country is intersected by mountain

ranges and traversed by the Mekong or Cambodia River, the alluvial valley of which produces abundant sugar, rice, tobacco, etc. Laos exports to the neighboring states a considerable quantity of ivory, gold, silver, precious stones, silk, etc.

The inhabitants are reported to be connected with the Burmese in their racial, social and religious peculiarities. The capital is Ching-

Mai.

LAOSAURUS, la-6-sa/rus, a genus of un¬

armored, herbivorous dinosaurs (q.v.) of the suborder Ornithopoda, whose remains are found fossil in the Jurassic rocks of western North America.

. LAPAROTOMY, surgical operation con¬

sisting of the opening of the abdomen by mak¬

ing an excision in the loin in order to reach the abdominal cavity or pelvic viscera.

LAPEER, la-per', Mich., city and county-

seat of Lapeer County, on the Michigan Cen¬

tral and the Grand Trunk railroads, 60 mHes north of Detroit, 45 miles west of Port Huron and 41 miles south of Bay City. It was first settled in 1836 by A. N. Hart and was incor¬

porated as a city in 1868. The municipal gov¬

ernment is administered by a mayor and city council of eight members, elected every two years. It is located in a fertile agricultural region and is an important trading centre for poultry and farm produce. The waterworks are the property of and are operated by the mu¬

nicipality. The city has four banks, and its industries include numerous large factories, stone works, planing mills, flouring mills, stove works, _

a tannery, machine works and iron foundries. The Michigan Home for the Feeble-

Minded is located here; also the Lapeer Busi¬

ness College, High School and various church buildings. Pop. (1920) 4,723.

LAPHAM, lap'am, Increase Allen, Ameri¬

can naturalist: b. Palmyra, Wayne County, N. Y., 7 March 1811; d. Oconomowoc, Wis., 14 Sept. 1875. From 1825 to 1832 he assisted in the survey of the Erie Canal, the Ohio Canal and the Welland and Miami canals. In 1833

he removed to Columbus, Ohio, as secretary of the State Board of Canal Commissioners, and also turned his attention to botany, meteorology and geology. He removed to Milwaukee in 1836 where he dealt in real estate and also made a thorough study of the Wisconsin cli¬

mate, topography, geology, fauna and flora, its resources and its commerce. He was chief geologist of Wisconsin in 1873-75. He was a member of most of the scientific and historical associations of the United States. His pub¬

lications, including maps, number more than 100 and represent an immense amount of re¬

search; the best known are Geographical and Topographical Description of Wisconsin) 742

(1844); (Antiquities of Wisconsin (1855); (Geological Map of Wisconsin* (1855). The first-named work was the chief authority on the subject for many years and had much in¬

fluence in directing emigration toward

Wisconsin.

LAPIDARY WORK. The lapidary is the

skilled cutter, polisher and engraver of precious and semi-precious stones. This work was known to the ancient Greeks and Romans, who excelled in it, as the ^glyptic® art, which term is used to this day to express the work done on intaglios and cameos. In the case of pre¬

cious stones intended for jewelry or adorn¬

ment the ancients at first had to satisfy them¬

selves with rounding off the edges and irregu¬

larities of the crude stone and then polishing their surface. These rounded or pebble forms are known as <(en cabochon® and are still usual in our carbuncles. The method of facetting to bring about a greater brilliance from light re¬

flections on the many-faced surface required too great an amount of grinding until better abrasives were discovered, and the hardest gem¬

stones, as the ruby and diamond, had to wait till the great cutting power of diamond dust was learned. See Gems.

The invention of lapidary work dates back far behind the days of civilization, in fact to the time when the mind of the savage found that hard stones would cut softer ones. And hence we have our earliest extant engraved stone work on steatite, serpentine, limestone, lapis, etc., all of which are easily cut with splinters of flint or other hard stones available to the savage. Many specimens of real art engraving on stone are extant from such early states of civilization, as those of Babylonia, Egypt, the PEgean Islands, etc. These early engravings were done in the production, of seals ; those of the Babylonians, early Egyptians and Assyrians assumed the form of a stone cylinder, the incised characters on which were impressed on soft clay by the simple process of rolling, the engraved devices appearing in relief on the clay. Later we find the Egyptians

reduced the proportions of their stone seals to what we would now call signet size, soon to receive a bored hole threaded with leather, wire or other material so as to be hung por-

tably on the person. Later again the religiously venerated scarab beetle was carved on the obverse side of the signet by the lapidary.

Soon the loop was reduced and used for the circlet of a finger ring — the embryo of the finger ring was therefore a signet.

As to the lapidary's technique in early days we know a little but not much, though the amount of deductive conjecture written by ex¬

perts would cover many pages. The close examination of the surfaces of extant ancient examples affords fair evidence that sharp splinters of stone or chisels of metal were the tools used. The point rendered by a splinter of corundum set in some kind of handle could furnish the work we find done on the earliest pieces; in fact there are proofs that just be¬

fore Roman times this tool was in use. Be¬

sides incising, however, we come across, work impossible by such method. Here the drill was used to obtain the depth of cutting, the fre¬

quent use of holes is evidenced under a magni¬

fying glass, the lines showing the drill per¬

foration deeper than the chipped-out depths done between to bring the connected holes into a line. This work was, no doubt, done with the very ancient bow-drill, the bit or drilling piece being pointed with a quartz or corundum end moistened with corundum powder and oil to create a cutting edge. Ancient specimens found on the island of Crete show us they used tubu¬

lar drills, thus permitting, at a single process,

the cutting of a ring or circle. It may be here stated that the Chinese, even the Maoris, of New Zealand, still use the tube drill ; the ancient Aztecs also used it. A great advance in lapi¬

dary work was brought about by the later dis¬

covery of the disc tool. By the 5th century b.c.

the Greeks created marvelous stone engraving through the use of the revolving disc as an adjunct with the drill. The cutting power of a rapidly revolving disc edge is comparatively speedy and produces lines of. mathematical accuracy and cleanness of incision. The pot¬

ter's lathe dates back to very early civilization, with its motion produced by foot power on a large wheel or disc near the ground. Such a machine was, no doubt, used by the Greeks.

So far we have discussed only the produc¬

tion of incising devices in negative below the surface, the design being brought about in relief by impressing on soft surfaces (seals); such work is termed <(intaglio.® It was prob¬

ably about the 5th century b.c. when the creation of positive engraving on stone, known as ((Cameo® (see Cameos), was started. By this method a design in relief is brought about directly by cutting away the background and carving the subject in different depths as. is done by the sculptor. The lapidaries producing intaglio work were known as cavatores or signarii by the Latins, and the workers in cameo were termed coelatores or scalptores. Recent discoveries in the production of metals for cut¬

ting tools and inventions in lathes and other machines for lapidary work have aided our artisans to quicker production, but their output will not compare in quality and perfection of art with the marvelous intaglios and cameos of the ancients, done with great patience and paucity of tools. Consult Pannier, L., (Les Lapidaires frangais du Moyen Age*

(Paris 1882) ; Claremont, L., (The Gem Cutters'

Craft* (London 1906) ; Natter, L., (Traite de la Methode antique de graver en Pierres fines, compare avec la Methode moderne) (London 1754).

Clement W. Coumbe.

LAPILLI. See Pyroclastic.

LAPIS-LAZULI, the sapphire of the am

dents, is a highly-prized ornamental stone. It was long supposed to be a simple mineral, but now has been shown to be a variable mixture of lazurite, haiiynite, diopside, amphibole, mus¬

covite, calcite, pyrite and other minerals. The most important mineral in the stone is lazurite, which is itself a highly complex compound, essentially Na*(Na S3. Al) Al2Si30i2, but con¬

taining also in molecular combination varying amounts of haiiynite and sodalite. Lazurite is usually massive, has a hardness of 5 to 5.5, a specific gravity of 2.45, and rich azure-blue color. Its most important localities are in Siberia, Persia, China and Chile.

LAPITHAE, a mythical race of Thessaly, whose struggles under the leadership of their king, Pirithoiis, against the Centaurs are a fre-

quent subject in art and literature. The final contest was due to the unsuccessful attempt of the Centaurs to carry off Hippodamia, the bride of Pirithoiis, at their marriage-feast.

LAPLACE, Pierre Simon, pe-ar se-mon

la-plas, Marquis de, French mathematician and astronomer: b. Beaumont-en-Auge (Calvados), 28 March

1749; d. Paris, 5 March 1827. He studied the higher mathematics at the academy of Beaumont; in 1767 went to Paris and there by the influence of D'Alembert became pro¬

fessor of mathematics in the Ecole Militaire.

By his brilljant memoirs on the theory of probability he attracted wide notice and in recognition was elected membre-ad joint (1773) and titular member (1785) of the Academy of Sciences. He was appointed examiner in the royal artillery corps (1784) and professor of analysis at the Normal College (1794) ; and in 1816, for the elegance of his style in the Ex¬

position du Systeme du Monde) (1796), was ad¬

mitted to the Academie Frangaise, of which in 1817 he became president. Appointed by Na¬

poleon Minister of the Interior (1799), he was shortly dismissed, being, according to the em¬

peror, ((below mediocrity as a minister,® and aiming to (

ciples of the infinitesimal calculus.® He was, however, given a seat in the Senate, became its vice-president and in 1803 chancellor. He also held the post of president of the Bureau of Longitudes and was a member of the com¬

mission for the establishment of the metric system. On the creation of the empire he was made a count; but he acquiesced in the down¬

fall of Napoleon, and was the recipient of a marquisate at the hands of the monarchy in 1817.

Nichol called him the "titanic geometer,®

and he has been styled also "the Newton of France.® Among the more important of his remarkable investigations are the discovery of the inequality in the movements of Jupiter and Saturn; his

researches in probabilities (con¬

tained in the

bility 1812, and the (Essai philosophique sin¬

ks probability 1814) ; his improvements in the lunar theory, and his theory of the tides.

*His chief work is the great (Mecanique celeste**

(1799–1825), a compendious solution of the problems of physical astronomy, and one of the greatest contributions ever made to science. It was translated into English by Nathaniel Bowditch (q.v.) (1829–39). A collection of Laplace's works in 13 volumes was made by the French government (1878 et seq.). Consult the life by Kaufman (Paris 1841), and Arago, (Biographies of Scientific Men5 (in Eng. trans., Boston 1859).

LAPLACIAN HYPOTHESIS. See Cos¬

mogony, Geology and Laplace.

LAPLAND, an extensive territory in the north of Europe, between lat. 64° and 66° N., and from the shores of Norway east to those of the White Sea; area, about 150,000 square miles, of which more than a half belongs to Russia; and the remainder is shared in nearly equal pronortions between Sweden and Nor¬

way. Both from its geographical position and its physical conformation Lapland, or the country of the Lapps, is one of the most for¬

bidding regions of the globe, consisting either of rugged mountains, some of them covered with perpetual snow, and many of them only for a short period free from it, or of vast monotonous tracts of moorland wastes. This extensive territory appears to have been at one time wholly occupied by the people to whom it owes its name ; but its southern and better portions have been gradually encroached upon by Norwegians, Swedes and Finlanders.

The Lapps call themselves Sabme or Sab-

meladsjak (the Norwegians call them Finns), belong to the Ural-Altaic stock, and are con¬

sequently closely related to the Finns (Suomi).

As a race they are the shortest people in Europe (four or five feet in height). They are spare of body, with dark, bristly hair and scanty beard, and short, often bandy legs.

Though not very muscular, they are capable of great exertion and fatigue, and frequently live to a great age. The mouth is large, the lips thick and 'the eyes small and piercing.

The Lapps are usually distinguished as Mountain, Sea, Forest and River Lapps. The Mountain Lapps, the backbone of the race, are nomads; they move constantly from place to place in order to find sustenance for their reindeer herds, their only source of wealth.

In summer they go down to the fiords and coasts, but spend the rest of the year in the mountains and on the plains of the interior.

The Sea Lapps, mostly impoverished Mountain Lapps, or their descendants, dwell in scattered hamlets along the coast, and live by fishing.

The Forest and River Lapps are nomads who have taken to a settled mode of life; they not only keep domesticated reindeer, but hunt and fish. The nomad Lapps live all the year round in tents. The reindeer supplies nearly all their wants, except coffee, tobacco and sugar. They live on its flesh and milk; they clothe them¬

selves in its skin, and use it as a beast of burden. It is computed that there are 400,000

reindeer in Lapland, for the most part semi¬

wild. In his personal habits and in his clothing the

Lapp is the reverse of cleanly : he gets his last bath when two years old. He is rather prone to self-indulgence, is good natured, but sad-featured and melancholy, miserly and selfish; he is passionately attached to his country. He is opposed to everything that has an appearance of frivolity or pleasure, especially dancing; although the nation is rich in folklore, hymns are preferred to the weird old national songs. The Lapps # all pro¬

fess Christianity; but there still lingers among them vestiges of- the old pagan super¬

stitions. Their imagination is easily excited, and they are readily susceptible to religious impressions of a sensational type; a notable ((epidemic® of this kind occurred at Kouto-

keino in Norwegian Lapland in 1848-51. Cli¬

matic conditions make their attendance at church infrequent; but the Lapp goes at least once a year, when the burials, christenings, marriages and communions follow each other in succession. It is regarded as a degradation for a Lapp to marry a non-Lapp.

Valuable beds of iron ore have been found within recent years in the southern part of Swedish Lapland, at Gillivari and Kiruna, re-

spectivelv 44 and 100 miles north of the Arctic circle, and these are being developed by the Swedes with rapidity and thoroughness. At Kiruna in 1886 there was not a single house; in 1914 there was a population of 10,000, with 744

^movie55 shows, a Salvation Army .band and a trolley car system (the most northerly in the world) and other marks of an advanced civil¬

ization. On the opposite side of Luossajaryi there is a great mountain of iron ore (7 per cent pure metal), the largest deposit in the world, yielding

over 3,000,000 tons a year. The Lapps themselves will not work in mines,'

regarding it as devil's work, and in conse¬

quence the mines are operated by a motley crowd of cosmopolitans.

The Lapps of Norway and Sweden belong to the Lutheran Church, those of Russia to the Greek Church. The Norsemen treated the Lapps as a subject race as early as the 9th century, but had to reconquer them in the 14th ; the Russians followed in the 11th, and the Swedes in the 16th. From the 13th to the 17th century the Lapps were kept in a state little better than slavery by Swedish adventurers known as Birkarlians. But at the present day both the Scandinavian governments bestow on them every consideration ; they pay no taxes of any kind ; they have an organized system of local government ; stationary and ambulatory schools are maintained for the benefit of their children; and they are exempt from military service. The number of Laplanders is not supposed to exceed 30,000 of all descriptions, of whom Norway has nearly 15,000, Sweden about 7,000, the rest belonging to Russia. Prob¬

ably one-third of them are nomadic. Consult Acerbi, G., (Travels through Sweden, Fin¬

land, and Lapland ... in 1798 and 1 799 }

(2 vols., 1882) : Du Chaillu, P. B.,

(ib. 1912) ; Rae, Ed., (The Land of the North Wind5 (London 1875) ; and (The White Sea Peninsula) (ib. 1882) ; Tromholt, S., (Under the Rays of the Aurora Borealis) (2 vols., Lon¬

don 1885) ; Walter, L. E., (Norse and Lapp5

(New York 1913) ; and (Lapland, Sweden's America,5 in (The American-Scandinavian

Review5 (Vol. II, 1914).

LAPLAND LONGSPUR. See Long-

spur.

LAPORTE, la-port', Ind., city and county-

seat of Laporte County, on the Lake Shore and Michigan Southern, the Pere Marquette, Lake Erie and Western and several other railroads, 59 miles east of Chicago. It is the farming trade centre for the county; and is also en¬

gaged in the manufacture of woolen goods, ag¬

ricultural implements, saw mills, cooperages, braiding mills, foundry and machine shops, sash and door factories, a brewery, manu¬

factories of furniture, carriages, woolen goods, ladiators, pianos, blankets, bicycles, flour, wheels, hubs, etc. It is an attractive summer; resort, having several beautiful lakes in its vicinity; contains a handsome courthouse, city ball, Saint Rose's Academy, the Ruth C.

Sabin Home, the Association House for

women and girls, a hospital, Fox Memorial Park and public library; and has an electric-

light plant, waterworks supplied from one of the lakes ; several churches, national and State banks, daily, weekly and monthly periodicals, and an assessed property valuation of about $4,000,000. In the winter large quantities of ice arc cut at the lakes here and shipped to Chicago. The city is governed by a mayor and council, elected for a term of four years.

The waterworks are the property of the city.

Laporte was incorporated in 1832 and re¬

ceived its charter as a city in 1852. Pop.

15,158. Consult Packard and Daniel, *History of

Laporte County5 (Laporte 1876).

LAPPARENT, la'pa'raii', Albert Auguste

Cachon de, French engineer and geologist: b.

Bourges, 30 Dec. 1839; d. Paris, 5 May 1908.

He was educated at the Lcole Polytechnique and at the Lcole des mines. In 1858-60 he was an engineer in the mining corps engaged in making a geological map of France; and in 1874 he became secretary of the Channel Sub¬

marine Tunnel Committee, and with A. Potier made the geologic surveys in connection with the Channel Tunnel project. He received the appointment of professor of geology and mineralogy at the Catholic Institute, Paris, in 1875; and was also professor of miner¬

alogy, geology and physical geography of the ficole Libre des Haute Ltudes. He was president of the French Geological Society in 1880, and was elected to the Academie des Sciences in 1897. He published (Traite de Geologie5 (1 vol., 1881; 5th ed., 3 vols., 1905) ; (Cours de mineralogie5 (1884; 3d ed., 1899); (Les Tremblements de terre5 (1887) ; (La Philosophic minerale5 (5th ed., 1910), etc.

LAPPENBERG, Johann Martin, German

historian: b. Hamburg, 30 July 1794; d. there, 28 Nov. 1865. He was educated at the Uni¬

versity of Edinburgh, later studying in London, Berlin and Gottingen. In 1820 he was elected by the Hamburg Senate as Resident Minister at the Prussian court. In 1823 he became keener of the Hamburg archives, and he there laid the foundations of his fame as a historian through his exhaustive researches, continuing in the office until J863. He served as Hamburg’s repre¬

sentative in the German Parliament at Frank¬

fort in 1850. His publications include (Ge-

schichte von England5 (2 vols., 1834-37); fUeber den ehemaligen Umfang und die Ge-

chichte Helgolands5 (1831); (Hamburgisches Urkendenbuch5 (1842); (Urkundliche Ge-

schichte des Hansischen Stahlhofes zu Lon¬

don5 (1851), etc. He was also an editor of the (Monumenta Germanise historical

LAPRADE, la'prad', Pierre Martin Vic¬

tor Richard de (Victor de Laprade), French poet and critic: b. Montbrisen, 13 Jan. 1812; d. Lyons, 13 Dec. 1883. He was educated for the law at Lyons but turned to literature for a career. He produced four volumes of verse in the years 1839-44. and in 1845 traveled in Italy engaged in literary research. He re¬

ceived the professorship of literature at Lyons in 1847 and in 1858 he was elected to the French Academy. The publication of his political satire

bly in 1871. His patriotic poetry ranks high¬

est among his work. His verse includes (Les Parfums de Madeleine5 (1839) ; (La Colere de Jesus5 (1840);

(1878), etc. In prose he was author of (Des habitudes intellectuelles de l'avocat5 6 1 840 J ; Questions d'art et de morale5 (1861); (Edu-

cation Liberale) (1873). etc. Consult Bire, E., Aictor de LapradeP

LAPRADELLE, la'pra'del', Geouffre de,

French international lawyer: b. Paris, 1871. He was professor of international law at the universities

of Paris and Grenoble, and in 1914 was exchange professor at Columbia Uni¬

versity, where he received an honorary LL.D. ; with Professor Politis he established in 1905

the Recneils des arbitrages internationaux.

His writings cover discussions of international rights over territorial waters, disarmament and similar matters. Author of Hmperialism and Monroeism* ; (Theories et practiques des fondations) (1894) ; (La questione du Maroc) (1904); (La Guerre et le droit des gens) (1908).

LAPRAIRIE, la'pra're, Canada, capital,

village of Laprairie County, Quebec province, on the south shore of the Saint Lawrence River and eight miles southwest of Montreal on the Grand Trunk Railway. It is a summer resort and is growing in industrial importance.

It was the starting point of the first railway built in British North America, in 1832. It possesses an old fort which in June 1700 was attacked by Col. Peter Schuyler and his New England troops in the ((Battle of Laprairie.®

Pop. 2,388. Laprairie, also a district of 319

square miles in Quebec province.

LAPSE, legal term with several defini¬

tions. In the law of wills lapse is where a beneficiary under the will dies before the tes¬

tator and the legacy is lost, or fallen and auto¬

matically becomes a part of the residuum of the testator’s estate, unless provision is made in the will to prevent such lapse. In several States the law provides against total lapses in certain cases, as in the instance of children or grandchildren surviving the legatee, in which case the bequest

would go to the heirs by direct descent. There is a distinction between <(void®

and (

In ecclesiastical law a benefice is adjudged to have lapsed when the patron fails within six months after the avoidance of the benefice to exercise his right of presentment. In such case the rights of patronage devolve upon the bishop as ordinary patron, the metropolitan as superior patron, and the sovereign as patron paramount of all the benefices in the realm.

In English criminal procedure ((lapse® is used in the sense of <(abate,® to indicate that the death of one of the parties involved brought the proceedings to a conclusion.

LAPSED, term applied in the early days of Christianity to those converts who fell away from faith in times of persecution, returning to heathen practices such as idol worship, burning incense or sacrificing to the heathen gods. Excommunication was the punishment accorded such as denied the faith or reverted to heathen practices, and there was vigorous opposition to their being restored to the Church. However, on profession of penitence they were permitted to hope for reinstatement in the Church, but were compelled to pass a long probation and perform special penances, and most often were admitted to communion only at the time of death.

LAPUTA, island described in Swift’s

(Gulliver’s Travels* as floating in the air guided by a loadstone under the control of the inhabitants. It was peopled by a race of philosophers devoted to mathematics and music, and who let their land run to waste and their people live in penury while they de¬

voted themselves to visionary schemes such as softening marble <(for pillows and pin¬

cushions,® extracting ((sunbeams from cucum¬

bers® for use in raw weather, and similar absurdities, directed as satire against Sir Isaac Newton and the Royal Society. The philosophers were attended by ((flappers® whose duty it was to awaken them from their deep introspection when addressed. Laputa in many respects resembles the ((lantern-land® in Rabelais' ((Pantagruel,® Swift being generally believed to have imitated that work.

LAPWING, a plover (Vanellus vanellus or cristatus), found throughout temperate Europe and Asia, across the whole breadth of which it breeds. It has a hind toe and in this respect departs from the true plovers. In the summer a few are found as far north as Norway, Ice¬

land and Greenland, and in winter they migrate for the most part to Africa and India. In its habits the lapwing much resembles the Ameri¬

can killdeer ; and, like that bird, it is hated by gunners on account of its alarm-cries. This pursuit and the market demand for its flesh, and more especially for its eggs, greatly re¬

duced its numbers, especially in Great Britain, where it is again on the increase due to its recent protection by law. The lapwing is note¬

worthy for the long flowing crest on the head, the contrasting white and deep iridescent green of its plumage, and for its peculiar jerking, yet rapid flight. In the breeding season it is always seen in pairs, but in the winter months great flocks are visible on the seashore and on the borders of marshes. Consult Newton, dictionary of Birds) (London 1896), and (The Lapwing, Green Plover, or Peewit* (in ^Agriculture and Fisheries Board of Great Britain, Leaflet No. 44* 9th ed., ib. 1905).

LAPWORTH, Charles, English scientist :

b. Farringdon, Berkshire, 1842. He was trained as a schoolmaster at Culham College, ham University, holding the chair until 1913.

81. The whole of his leisure was devoted to geology, and in 1881 he was appointed profes¬

sor of geology and physiography at Birming¬

ham University, holding the chair until 1913.

He has done notable work in his geological in¬

vestigations, especially in the Durness-Eriboll district of Scotland, which he began in 1882, and during the course of which he established his theory of ((rock-fold® and interpreted the complicated strata which had baffled previous observers. Among his works are (The Geolog¬

ical Distribution of the Rhabdophora) (1880) ; Untermediate Text-Book of Geology) (1899) ; (British Grapholites> (1900-08), etc.

LARAMIE, lar'a-me, Wyo., city and

county-seat of Albany County, on the Laramie River and the Union Pacific Railroad, 58 mile?

west of Cheyenne, the State capital. It is a popular summer resort, being situated on the plains in close proximity to the mountains. L

is the shipping and trade centre for a largr stock-raising and mining section; and is als-

engaged in manufacturing; has large deposits of gold, silver, lead, graphite, antimony, cinna¬

bar and other minerals ; and rolling mills, plaster mills, planing mills, a tannery, a pack¬

ing plant, limestone quarries, plaster mills and railroad and machine shops. It is the seat of the University of Wyoming, the State fish hatchery, Agricultural Experiment Station, and the State penitentiary; contains public and col¬

lege libraries, Elks Home, State Museum and Saint Joseph's Hospital; and has electric-light plants, waterworks, daily and weekly news¬

papers, and an assessed property valuation of over $1,500,000. Laramie was first settled in 1867 by employees of the Union Pacific Rail¬

road, incorporated in 1869 and chartered as a city in 1884. The municipal government is vested in a mayor and a council of six members elected biennially. The waterworks are owned by the municipality. Fifty per cent of the population are American born, 20 per cent Scandinavian and 10 per cent German. Pop.

(1920) 6,301.

LARAMIE MOUNTAINS, a Rocky

Mountain range which extends through Wyo-

mining and Colorado, and bounds the Laramie Plains on the east. The highest point is Laramie Peak, 10,000 feet high. Coal is the principal mineral, and is found in the foothills of the range.

LARAMIE PLAINS, a plateau in south¬

eastern Wyoming, about 7,500 feet above sea-

level. It is situated between the Laramie and Medicine Bow Mountains, in the counties of Albany and Carbon. In spite of its high alti¬

tude the region has become a highly developed and very prosperous agricultural centre.

LARAMIE RIVER, an important stream

rising in northern Colorado and flowing into the North Platte at Fort Laramie in Wyoming.

Its length is about 200 miles.

LARAMIE STAGE, geological formation

of western North America from about the 26th to the 56th parallel and, in certain dis¬

tricts, from the 103d to the 115th meridian.

There has been considerable controversy as to the true geological age of the strata, and it is now assumed that it represents the time-hiatus between the Cretaceous and Tertiary series.

It varies from a depth of about 4,000 feet in Colorado to much greater depth in Montana and Canada and to only a few hundred feet in other regions. The formation is remarkably uniform and appears everywhere to have been the result of continuous sedimentation from base to top. Its strata is composed mostly of sandy material; shaly strata also occur, and the formation is coal-bearing in its entire ex¬

tent. Molluscan fauna of both fresh and brackish waters, many species of reptiles and land plants characterize the fossils of the entire formation. Consult 'United States Geological Survey Bulletin No. 82) (Washington 1911).

LARASH, la-rash, or EL-ARAISH,

Spanish Morocco, seaport and capital city of Azgar province on the Atlantic Coast, 43 miles by sea southwest of Tangier. It was originally a favorite port for wintering vessels, its waters being fairly deep inside the bar, but the alluvial soil brought down by the Wad Lekkus n°w prohibits its admitting any but small ves¬

sels. It has an ancient wall in fair condition and 10 antiquated forts. The Spanish occupa¬

tion of 1610-89 is evidenced by towers of Saint Stephen, Saint James and the castle of Our Lady in Europe, the latter now the kasbah or citadel. The town has a fine market place and its streets are generally paved. It ex¬

ports wool, sheep skins, goat hair and goat skins,

fullers' earth, grains and fruits. The trade of the town is about $2,5U0,000 annually.

There is a tradition which connects Larash with the Garden of the Hesperides. Pop. about 6,000.

LARBOARD, left side of a ship looking toward the bow, a term probably derived from its usually being the lading-side. The word is now obsolete, its similarity to its opposite "star¬

board® having caused it to be superseded by the word "port.® In the United States navy since 1913 steering orders have been changed to "right rudder® and ((left rudder.®

LARCENY, the fraudulent appropriation

of the personal property of another person without that person's consent. To constitute this crime the removal of the goods to any distance is not necessary, but it requires to be shown that the article has completely passed, for however short a time, into possession of the criminal. Concerning the kinds of things the appropriation of which is larceny, the com¬

mon law restricted them to personal property as distinguished from real estate, but this dis¬

tinction has been largely abolished by recent statutes. At one time in Great Britain the punishment for grand larceny was death ; later it was restricted to transportation ; now the punishment for larceny is imprisonment, the same as in the United States, and depends on the previous character of the prisoner. The common-law rules on larceny have been greatly modified by statute and the conversion of goods to one's own use with felonious intent, as in the embezzlement of funds which has been confided to one, is now defined and punished as larceny. It is necessary to consult the legis¬

lation in each State jurisdiction. Consult Bishop, (Commentaries on the Law of Statu¬

tory Crimes* (Chicago 1901), and Clark and Marshall, (The Law of Crimes* (2d ed., Saint Paul 1905). See also Theft.

LARCH, a genus (Larix) of coniferous trees characterized by a pyramidal habit of growth ; small linear leaves arranged in clusters upon the older branches, singly and spirally upon the young twigs, often conspicuous pis¬

tillate flowers which develop small, erect, glo¬

bose or oblong cones, the attenuate scales of which are not deciduous at maturity. The species,, of which there are about a dozen, are natives of the colder parts of the northern hemisphere. The best-known one in the

United States is the American larch, hack¬

matack or tamarack (L, laricina) , which grows generally in wet, peaty soils and shallow swamps, or occasionally upon drier upland soils, from Hudson Bay to Pennsylvania, and west¬

ward to Manitoba and Illinois. It attains a height of 60 or more feet, and has nearly horizontal branches. Its wood is hard and very durable, but light in proportion to its size.

Being very straight and slowly tapering, the trunks are much used for telegraph poles, scaf¬

fold-supports, fence-posts, railway-ties and in ship-building. It is less planted for ornamental

purposes than the following species because its branches are less pendulous and less leafy.

The European larch (L. decidua) grows usually upon dry uplands and a wide range of soils, but rarely in moist ground. Its range is from the mountains of southern Europe to the far north, where it is among

the few hardy trees; in Asia it has a similar distribution.

In height it exceeds the tamarack, often reach¬

ing 100 feet, and since it is of rapid growth, and is used for an even larger number of pur¬

poses than the preceding, it is often planted for commercial purposes, windbreaks and for ornament. The timber which is rich in resin and is practically exempt from insect attacks is valuable for wet situations. It is little used for planks because it warps badly. Since it does not ignite readily and does not splinter it was largely used in wooden battle-ships.

Its bark, which contains tannin, is somewhat used in preparing leather; its stem yields Oren-

burgh gum resembling gum arabic ; and its leaves • in warm climates exclude Brangon manna, a sweetish, turpentine-flavored manna (q.v.).

The other species more or less resemble the foregoing in habit and uses. The most beauti¬

ful and ornamental is probably L. leptolepis, a native of Japan. It attains height of 70 and 80 feet and is remarkable for the brilliant au¬

tumn colors of its foliage. All the species except the Himalayan larch (L. griMthii), which seldom exceeds 40 feet in height, are hardy throughout the United States. The tim-

ful and ornamental is probably L. leptolepis, a native of the Pacific Coast region from Oregon northward, is considered the best yielded by coniferous 'trees. The tree is the largest of the genus, often reaching a height of 150 feet.

The only insect seriously harmful to the larch is a sawfly (Nematus erichsonii) , whose young hatch in early summer from eggs previ¬

ously inserted into the young shoots, and im¬

mediately begin feeding upon the leaves. This pest is occasionally sufficiently numerous to de¬

foliate large tracts of forest.

LARCH SAWFLY, insect pest (nema¬

tus erichsonii hartig), whose larvae feed upon the foliage of larch trees. The pest exists in Canada, United States and England and is very destructive, entire forests being defoliated. The eggs, which are laid in the new growth of wood, hatch in June or July and the larvae usually feed until August.

LARCHEY, Etienne Loredan, French

author and antiquarian: b. Metz, 1831; d. Paris, 1902. He was educated at the College Saint Louis and the Lcole des Chartes. He received an appointment at the Mazarin Library in 1852

and later became its librarian, leaving there in 1873 to become adjunct curator at the library of the arsenal where he was curator from 1880.

He was noted for historical and linguistic research, and did much editing and miscellane¬

ous writing. Author of (Un Mois a Constan-

tinople) (1855); (Eccentricites du langage'

(1860); (Origines de rartillerie frangaise'

(1862) ; (Maitres bombardiers de Metz >(1860) ; (Petits documents pour servir a l'histoire de nos mceurs) (1869) ; (Memorial illustre des deux sieges' (1871), etc.

LARCPIMONT, or LARCHMONT

MANOR, N. Y., village in Westchester

County, on Long Island Sound, and 21 miles northeast of Grand Central Station on the New York, New Haven

and Hartford Rail¬

road. It is a growing suburb of New York; and is also a summer resort, with advantages in bathing and fishing. It was at one time the home of J. Fenimore Cooper. Pop. 2,468.

LARCOM, Lucy, American poet: b.

Beverly, Mass., 1826; d. Boston, 17 April 1893.

In her youth she was a factory girl in Lowell, Mass., and to the Lowell Offering, a magazine conducted by the operatives in the cotton-mills, made contributions which attracted the favor¬

able notice of Whittier, with whom she after¬

ward compiled (Child-Life) and (Songs of Three Centuries.' For three years she studied at Monticello Seminary (Godfrey, Ill.), for six years taught in Wheaton Seminary (Nor¬

ton, Mass.). She was editor-in-chief of Our Young Folks, a Boston magazine, later merged with Saint Nicholas, in 1865-74. She passed her later years at Beverly Farms, Mass. She edited several collections of verse, and pub¬

lished (Ships in the Mist, and Other Stories'

(1859); (Poems' (1868); (An Idyl of Work, a Story in Verse> (1875) ; 'Childhood Songs'

(1877) ; and (Wild Roses of Cape Ann, and Other Poems' (1880); (A New England Girl¬

hood Outlined from Memory, ' an autobiog¬

raphy (1899). Her collected poetical works ap¬

peared in 1884. Her poems of New England life were especially effective, perhaps the best known being 'Hannah, Binding Shoes.' Con¬

sult Addison, (Life, Letters and Diary of Lucy Larcom> (Boston 1894).

LARD, the melted and strained fat of

swine, which differs in its situation from that of almost every other quadruped, as it forms a thick, distinct and continuous layer betwixt the flesh and the skin, somewhat like the blubber in whales. The greater part of the finer sorts of the lard of commerce is procured from the ab¬

dominal part of the animal. Lard is rather soft, white and readily fusible at 100° F. It consists of stearin, which is a solid, and olein, which is a liquid fat; but it usually contains small quantities of impurities, and it is to them probably that it owes its becoming occasionally rancid. Lard is much used for culinary pur¬

poses such as pastry making, for shortening and for frying, and as a base for various ointments. Stearin is used for candle-making, and olein is much used as a lubricant for machinery. Leaf lard is taken only from the fat surrounding the kidneys. Formerly lard was much adulterated but recent legislation has stopped this almost completely. Great quanti¬

ties are exported annually. There are now in the market several substitutes for commercial lard. See Fats ; Meats and Meat Production.

LARDNER, Dionysius, Irish physicist; b.

Dublin, 3 April 1793; d. Naples, 29 April 1859.

He. was graduated from Dublin University in 1817 and was made professor of astronomy and physics in the University of London in 1828.

From 1840 to 1845 he lived in the United States, where he gave popular scientific lectures in many towns. He wrote several notable mathematical treatises; and edited, himself be¬

coming one of the chief contributors, a (Cabinet Cyclopaedia' (134 vols., 1829-49). Among his other writings are (Manual of Electricity,'

etc. (1841); 'Treatise on Heat' (1844); 'The

Steam Engine* (1852) ; (Natural Philosophy and Astronomy * (1851-52).

LARDY, Charles (Edouard), Swiss law¬

yer and diplomat: b. Neuchatel, 1847. He took his LL.D. at Heidelberg in 1867. He was ap¬

pointed first secretary of the Swiss legation at Paris in 1869 and in 1883 he became Minis¬

ter there. He was the first Swiss member of the Permanent Arbitration Court at The Hague; was president of the Institut de Droit International in 1902 ; and has served as a delegate to various international conferences.

He has written many legal articles and reports on trials and congresses, and translated into French Bluntschli's ^Codified International Law* (1870; 4th ed., 1886).

LAREDO, la ra'do, Tex., city, port of entry and county-seat of Webb County, on the Rio Grande opposite Nuevo Laredo, and on the Mexican National, the International and Great Northern, and the Rio Grande and Eagle Pass railroads, about 150 miles west of San Antonio. It is situated in an agricultural and stock-raising region and in the Rio Grande coal belt, with valuable iron ore deposits in the vicinity. Laredo was settled by the Spaniards in 1767 and was incorporated in 1848. The Spaniards found here Indians who tilled the soil and built houses. The early missionaries established here a mission some years before a permanent settlement was made. The chief manufacturing establishments are extensive concentrating and sampling works, brick-yards, furniture factories, foundry and machine-shop products, sheet-metal works, broom and mat¬

tress factories, car and machine shops, brick¬

works, wagon, pickle and cracker factories, a hide establishment, stock-yards, grain elevators and large coal yards. It is the trade centre for a large section of the southwestern part of Texas and has a large international trade. Its imports amount to over $2,500,000 annually and its exports to $14,000,000. It is connected with Nuevo Laredo, on the Mexican side of the Rio Grande, by bridges. Some of the prominent buildings are the courthouse, the jail, the Mexi¬

can National Hospital, the Mercy Hospital and the Ursuline Convent. It is the seat of the Laredo Seminary, established in 1882, under the auspices of the Methodist Episcopal South Church, and the Ursuline Academy. The park of 65 acres is an attractive feature of the city.

Pop. (1920) 22,710.

LARES, Amador de, the contador or royal treasurer of the island of Cuba at the time when Velazquez was governor, that is, in the first quarter of the 16th century. He had, as he proudly boasts, previously spent 22 years in the wars of Italy. He is remembered for the aid he gave Hernan Cortes in securing and re¬

taining the command of the expedition fitted out for the conquest of Mexico in 1518-19.

He exerted his strong influence with the gov¬

ernor to secure the appointment of captain-

general of the armada for Cortes. In this favor to Cortes, Lares was seconded by his own private secretary, Andres de Duro, and it was the latter who warned Cortes, when Velasquez, suddenly changing his mind, was about to de¬

prive the latter of the command of the ex¬

pedition even before he had his vessels com¬

pletely fitted out or had sailed from the island of

Cuba. This warning permitted Cortes to sail suddenly before the notice of demotion from Velasquez could reach him. After the future conqueror had sailed away on his bril¬

liant venture Lares remained his friend and helped to furnish him information that was in¬

valuable to him. His name is, therefore, in¬

separably connected with that of Cortes and the conquest of the domains of the Aztecs.

LARES, plural of the Latin word lar,

tutelary divinities of the Romans, originally either the spirits of ancestors who watched over the family of a descendant or, according to a perhaps more probable view, gods of the lands on which the man’s house stood, and only later household gods. See Lars.

LARGESS, or LARGESSE, term used

in mediaeval times by the minstrels, who as a reward for their services at the feasts of their lords used to cry wLargess !** The term was also used to designate fees paid to heralds for services on high occasions. While more or less archaic the word has still vocabulary place in the sense of a large gift, bounty, donation or present.

LARGILLIERE, lar'jil'yar'. Nicolas,

French portrait painter: b. Paris, 20 Oct. 1656; d. there, 20 March 1746. He studied at Ant¬

werp under Goubeau and at 18 went to Eng¬

land where for four years he worked under Lely. His work attracted the favor of Charles II, but the hatred engendered against Roman Catholics by the Rye House Plot and culminat¬

ing in ordinances for their expulsion caused him to withdraw to Paris in 1678. There he made the

acquaintance of Mme. Le Brun and of Van der Neulen, and he speedily gained recognition as a portrait painter. There re¬

mains some doubt as to the place where Lar-

gilliere's portraits of James II, the queen and the Prince of Wales were painted, for while the painter was recalled to London after the accession of James II, his stay was brief and the birth of the prince was a later event, so that the portraits were probably painted in Paris. He became a member of the Academy in 1685, his diploma picture being the portrait of Le Brun now in the Louvre. He was made chancellor of the Academy in 1743. Among his sitters were the greatest celebrities of his day, Huet, bishop of Avrauches, Cardinal de Noailles, President Lambert and his wife and daughter being among them. While he occa¬

sionally treated other subjects his fame rests upon his portraits of which he is said to have produced about 1,500, including those of both single sitters and large portrait groups. His work is well represented in the leading Euro¬

pean portrait galleries and was widely circu¬

lated through engravings executed by Van Schuppen, Desplaces, Pitou and others.

LARGO, lar'go, musical term from the

Italian designating a slow tempo, largely used to indicate a slow, broad, solemn style. Handel often employs it, as in the (Messiah* and (Behold the Lamb of GodP Haydn used it in the introduction, the first chorus and in the introduction to the third part of the (Creation.*

Beethoven used it to convey only grandeur and deepest feeling. Style, not pace, is its dom¬

inating characteristic. The term ((largamentoy'

indicates breadth of style without change of tempo.

1 Wood-lark, Sky-lark and Crested Lark 2 Alanda calandra

3 Alanda yeltoniensis; A. sibirica; A. brachydactyla 4 Desert Larks

5 Horned Lark

LARGS, largz, Scotland, seaside resort in Ayreshire County, on the Firth of Clyde, 43

miles southwest of Glasgow on the Glasgow and Southwestern Railroad. It has a superior beach, dry climate and excellent yaching facili¬

ties. Its historical remains constitute Skel-

morlie Aisle, a relic of the old parish church of Saint Columba, converted into a mausoleum in 1636 and a mound supposed to cover the remains of the Norwegians killed in the battle between Haakon of Norway and Alexander III in 1263. Pop. 3,724.

LARI, la're, Italy, market town in the province of Pisa, 14 miles by rail southeast of Pisa and 14 miles northeast of Leghorn. It has hot springs and is situated in an agricul¬

tural district producing fruit, grain, wine and oil. Pop. about 2,000. Pop. of commune 12,268.

LARI, suborder of birds including the

gulls and their allies. They are of large or medium size, with aquatic habits, and possess long and, as a general thing, pointed wings in which there are 11 primaries, the last of which is extremely short. The three front toes are webbed, and the hind toe, not always present, is not united with the others. The nostrils are slit-like and the birds have a split

palate. Of the suborder the gulls, terns and skimmers have bills without a cere and the claws only slightly curved. The skuas or jaegers have a bill with a cere almost half its length, and strong, curved, sharp claws. As a rule they make no nest or but a suggestion of one, and lay from one to four eggs. The young are covered with down when hatched, and while of somewhat inde¬

pendent habit are kept near the nest and fed by the parents. The plumage of the fully de¬

veloped birds is thick and soft and of neutral tints. They are scattered over the world and include some 125 varieties.

LARIAT. See Lasso.

LARID^E, the family of sea-going birds which includes the skuas (Stercorarina) , gulls (Larina), skimmers (Rhynchopina) and terns (Sternince) , but some naturalists regard the skuas and skimmers as each of family rank.

They are practically cosmopolitan, although the great majority are restricted to sea-coasts.

LARIOSAURUS, lar-i-o -sa'rus, a genus

of fossil reptiles, of the family Nothosaurida, allied to the plesiosaurs, which were lizard-like in shape, rarely a yard long and had heads of moderate size with numerous prehensile teeth.

Nearly complete skeletons of L. balsami are obtained from the black Triassic shales near Lake Como and from the German Muschelkalk.

LARISSA, la-res'a, Greece, city and capi¬

tal of a nomarchy or province in Thessaly, on the Salamvria River, 35 miles northwest of the port of Volo, with which it is connected by railway. Situated in a rich agricultural district, it is now the largest, richest and most populous city in Thessaly, is the seat of a Greek archbishopric, and

has tobacco, cotton, leather and silk industries. For centuries under the rule of the Turk, it was ceded to Greece in 1881, since which time the large Mohammedan population then residing there has greatly de¬

clined. It was the headquarters of the Greek army mobilization in the Balkan War of 1913.

Pop. about 18,000.

LARIVEY, la're'va', Pierre de, French

dramatist: b. Troyes about 1550; d. 1612. He came from a famous Italian family of printers, and is said to have cast horoscopes and been clerk at the church of Saint Etienne where he afterward became a canon. While not the pioneer of French comedy he was the first to make use of ordinary natural dialogue on the stage. His dramas were chiefly adaptations from the Italian, and of the 12 he wrote nine were printed as (Comedies facetieuses) (Vol.

I, 1579; Vol. II, 1711). While prose comedy was never popular until Moliere's time it is generally admitted that both Moliere and Reg-

nard were signally influenced by the work of Larivey. He was also a translator of catholic taste, his subjects ranging from Straparola's (Facetieuses nuits) (1573) to Aretino's (Hu-

manite de Jesus-ChrisL (1604). His plays were reprinted in Jannets' (L'Ancien Theatre f rangais) (Vols. V-VII, 1879).

LARK, a bird of the family Alaudida.

Larks are small, ground-keeping birds, with small awl-like beaks, the long tarsi scutellated posteriorly, and the claw of the hind toe usually greatly lengthened; the wings vary much in length, but are usually short, as also is the tail.

The normal coloration is light brown with darker longitudinal streaks, the under parts be¬

ing whitish and the breast usually spotted.

There is frequently a crest or decided blackish marks about the head, while the desert forms are, as usual, pale and ornamented. Larks dwell in open grassy places, making their nests on the ground or among rocks, sometimes elaborately, and laying spotted eggs ; they are sociable, but hardly gregarious. Some fre¬

quently perch on trees, and most of them soar while singing, as is well known of the sky¬

lark (q.v.), and the song of many resembles that of this renowned musician. It is a physio¬

logical peculiarity of the family that larks molt only once a year. The food consists of insects and their larvae, worms, small seeds, buds, ber¬

ries, etc. The flesh of all is considered a dainty, and great numbers are caught annually on both sides of the Mediterranean to be sold in the markets. The family includes about 100

species, divided among about a dozen genera, of which only one, Otocorys, with probably but a single species (the horned lark, q.v.) is found in America, and only a single species occurs in Australia. The remainder of the family belongs to Europe, Asia and Africa, where familiar types are the sky-lark and wood-lark (qq.v.).

The name is also given to many more or less similar birds of other families, as to sev¬

eral of the pipits and Old World warblers, while the meadow-lark (q.v.) of the United States is a starling.

LARK-BUNTING, a fringilline bird of

the western plains of the United States, the male of which in summer is solid black, except a conspicuous white patch on the wings and the female brown-streaked. The habits of the pair are terrestrial,

and the male soars in singing after the manner of the sky-lark and with some similarity in notes. A very different bird, one of the smaller plains sparrows (Chondestis grammaca), is known as the lark-finch.

LARK FINCH, or LARK SPARROW

(Chondestes grammacus), small grayish-brown 750 LARKIN

sparrow of the Mississippi Valley region, called lark finch because of its thick, finch-like bill.

Its head is marked with black and white streaks and has a chestnut patch. It nests in bushes or trees and feeds on grasshoppers, locusts and weevils and the seeds of weeds and grass.

The song is long and varied, with a purring phrase and is very pleasant.

LARKIN, James, Irish labor leader. He

organized the Irish Transport and General Workers' Union, with the purpose of uniting under central leadership all Irish labor. He was prominent in several strikes, most notably in that of the Irish Transport Workers' Union beginning 26 Aug. 1913. The strike was at¬

tended by sabotage and violence and engen¬

dered severe suffering among the strikers be¬

cause of inadequate funds and its continuation into the winter. Larkin was tried and sen¬

tenced to seven months' imprisonment for sedition, but was released on bail and found his popularity increased by the experience. He edited the Irish Worker, qnd in 1912 was elected to the Dublin corporation. He came to the United States and was there imprisoned for violation of the Espionage Act.

LARKSPURS, a genus (Delphinium) of

annual and perennial herbs of the family Ranunculacece, characterized by palmately lobed or divided leaves and showy racemes or panicles of large irregular flowers. Many of the species, of which there are about 60 in the north tem¬

perate zone, are cultivated for ornament, and have developed numerous improved varieties, some of which are double-flowered. The most popular annual species is D. ajacis, which at¬

tains a height of about 18 inches and bears showy blue, pink or violet, sometimes white, flowers throughout the summer. Of the per¬

ennial species. D. formosum, D. grandiflorum and D. hybridum are most popular in America, and have yielded the largest number of horti¬

cultural varieties. They are all natives of Asia, become two to four feet tall, blossom during midsummer and are noted for their beautiful tints of blue, their hardiness and ease of culti¬

vation. If cut down immediately after flower¬

ing they often blossom a second time before frost. Among the best-known American species are D. menziesii, D. scopulorum and D. nudi-

caule, which range from the Pacific Coast to the plains region; and D. exciltatum, D. tri¬

corne and D. carolinianum , found most com¬

monly east of the Mississippi. The larkspurs thrive best in rich, deep, sandy loam well ex¬

posed to the sun. The annuals are propagated from seed, as are many of the perennials, which are also increased by cuttings taken in early spring or from second growth in summer.

Established clumps may be divided in fall or spring. Since the seeds are very slow in germinating they are usually sown in autumn out of doors or in early

winter in a green¬

house.

LARKSVILLE, Pa., borough in Luzerne

County, three miles northwest of Wilkesbarre, on the Susquehanna River. It has a growing population and its chief industry is coal mining.

Pop. 9,288.

LARMINIE, William, Irish poet: b.

County Mayo, 1849; d. Bray, 19 Jan. 1900. He spent most of his life in the civil service, ill-

health compelling his retirement a few years LARNED

before his death. He was identified with the Irish Literary Revival and was strongly in¬

fluenced by the Gaelic legends. His dramatic poem

He published a collection of (West Irish Folk Tales) (1893) and was author of cGlaulua and Other Poems) (1889) ; (Fand and Other Poems > (1892). A selection of his verse is given in Brooke and Rolleston's (Treasury of Irish Versed accompanied by an appreciation by George Russell (<(A. E.®) .

LARMOR, Sir Joseph, British physicist:

b. Magherall, County Antrim, Ireland, 11 July 1857. He was educated at Queen's College, Belfast, and Saint John's College, Cambridge.

He was professor of natural philosophy at Queen's College, Galway, and at the Queen's University in Ireland in 1880-85; examiner in mathematics and natural philosophy in the Uni¬

versity of London, and lecturer in mathematics at Cambridge University in 1885-1903. He was knighted in 1909 and since 1911 has served as member of Parliament from Cambridge Uni¬

versity. He is a member and officer of many scientific societies, and in 1915 received the Royal Society's Royal Medal. He has pub¬

lished numerous articles on mathematics and physics, and is author of (yEther and Matter) (1900).

LARNACA, or LARNAKA, or LAR-

INCA, Cyprus, city at the head of a bay on the south coast, 23 miles southeast from Nico¬

sia. It is the chief seaport of the island and is built on the site of the ancient Citium. It has Phoenician inscriptions, Mycenean tombs and other antiquities, but the ancient citadel was leveled in 1879. It has an iron pier 450

feet long and the harbor affords anchorage waters from 16 to 70 feet deep. Exports, grain, fruit, raisins and gypsum. Pop. 8,681.

LARNAUDIAN EPOCH, period at the

close of the Bronze Age in European prehis¬

toric archaeology. It was named from the Larnaud station situated in the Jura Moun¬

tains.

LARNE, Ireland, seaport city of County Antrim, on Lough Lome, an inlet of the North Channel, 18 miles north of Belfast, on the Bel¬

fast and Northern Counties Railroad. Larne's situation, 39 miles from the Scottish coast, makes it a base of the shortest passage from Ireland to Great Britain, and there is a daily mail service. It is a market town and seaside resort, ships iron ore and there are a bleach¬

ing establishment, flour mills and a weaving factory. Pop. 8,036.

LARNED, Josephus Nelson, American

author and librarian : b. Chatham, Ontario, Can¬

ada, 11 May 1836; d. 1913. He was a member of the editorial staff of the Buffalo Express 1859-69, and editor, 1869-72; he was then super¬

intendent of public education in Buffalo for a year, and in 1877 became librarian of the Buf¬

falo Library, a position which he held for 20

years. He was president of the American Li¬

brary Association in 1893-94. He edited and published (1902) (The Literature of American History, > a bibliography, in which the (

cated in short annotations by historical students.

His other works include (Talks about Labor) (1877); (History for Ready Reference) (7

vols 1895-1910; rev. ed., 1913);

(1901), and (P rimer of Right and Wrong'

(1902); (History of the United States for .Secondary Schools' (1903); (Seventy Cen¬

turies: A Survey' (1905) ; (Books, Culture and Character' (1906);

LARNED, Kan., city and county-seat of

Pawnee County, at the junction of the Arkan- •

sas and Pawnee rivers, 240 miles southwest of Topeka. It is on the Missouri Pacific and the Atchison, Topeka and Santa Fe railroads, and is the shipping centre of a large farming and stock-raising country. It has flour mills, found¬

ries, an ice factory, grain elevators, machine shops

and other industries and has electric light and waterworks. The State hospital for the insane is located here. It contains also the Larned Sanitarium, a hospital, city library and old Fort Larned Military Reservation and fort. The city is governed by a mayor and council elected every two years. Pop. 3,139.

LAROMIGUIERE, la'ro'me'gyar', Pierre,

French . philosopher : b. Livignac, 3 Nov. 1756; d. Paris, 12 Aug. 1837. He studied under Condillac, and became professor of philosophy at Toulouse, but being censured by Parliament for his publication of a treatise on taxation he went to Paris, where he was favorably received. He was appointed professor of logic in the Fcole Normale and lecturer at the Pry-

tanee, and in 1811 professor of the faculty of letters in the University of Paris. He was a member of the Tribunate in 1799. In 1833

he was elected a member of the Academy of Moral and Political Sciences. His theories as a philosopher led him to distinguish clearly between the psychologic phenomena which may be traced to physical causes and the action of the soul itself, and he developed the theory of attention beyond even his master, Condillac, and others who influenced his views, Destutt de Tracy and Cabanis among them. He main¬

tained that the soul is free in its choice and therefore immortal. While not distinctively an originator, but rather a developer of philo¬

sophic theory, he possessed a faculty for clear and accurate statement so that his work crys-

talizes not only the results of his own ob¬

servations but those of others who influenced his thought. Author of (Projet d'elements de metaphysique' (1793) ; (Les Paradoxes de Con¬

dillac' (1805) ; (Legons de philosophic'

(1815-18).

LAROUSSE, Pierre, pe-ar la-roos,

French lexicographer and encyclopaedist: b.

Toucy, Youne, 23 Oct. 1817; d. Paris, 3 Jan.

1875. He was the son of village blacksmith.

For several years he compiled educational text¬

books. In 1865 appeared the first volume of his great library of information, anti-clerical *

in tone, (Grande Dictionnaire Universel du XIX Siecle.' It was in 15 volumes, and was completed in 1875 ; and was followed by an (Encyclopedic du XVIII Siecle.' He published also small condensed editions of the large works and admirable supplementary publica¬

tions are regularly issued. Larousse's aim was ft) be entertaining and bright in his articles rather than scholarly, critical and exact, and the fruits of his enormous labors have been a very present help in time of need to succes¬

sive generations of journalists. His native town raised a statue to him in 1894.

LARRA, Luis Mariano de, Spanish writer, son of Mariano Jose de Larra (q.v.) : b. Mad¬

rid, 17 Dec. 1830. On graduating in arts he entered journalism and became editor, finally, pf the Gaceta de Madrid (1856-66). He filled many public offices and was decorated by several of the governments of Europe for brilliant literary work and advocacy of govern¬

mental and other reforms. He was for a num¬

ber of years director of the Boletin Oficial of the Department of Formento. He was the author of a vast

quantity of poetry, short stories and critical articles which appeared in almost every newspaper of note in Spain.

Among his formal published works are (Tres Noches de amor y celos,'

(La ultima sourisa' (novels) ; (E1 Amor de la moda,' (Juicios de Dios,' (La flor del valle,'

(Batalla de reinas,' (E1 amor y le interes,'

(E1 rey del mundo,' (La oracion de la tarde,'

(Flores y perlas,' (Oros, copas, espadas y bastos,' (Las corazones de oro,' (Un buen hombre,' (La viuda de Lopez,' and (Julia'

(dramas) ;

(Suenos de oro,' (Lan vuelta al mundo,'

(Chorizos y polacos,' (Las campanas de Car¬

rion,' (La guerra santa,' (Los hijos de Mad¬

rid,' (Boccaccio,' (E1 Guerrillero,'

diante' (Zarzuelas). The work of Larra is generally interesting, and brilliant in spots; but he wrote too rapidly to produce much of the highest order. His dramas and zarzuelas have been long very popular in Spain and in the Latin-American countries where they have been presented by the best companies. Among the noted musicians who have furnished the music for his zarzuelas are Gaztambide, Arrieta, Ro-

gel, Marques, Caballero and Barbieri.

LARRA, Mariano Jose de, Spanish au¬

thor: b. Madrid, 24 March 1809; d. 13 Feb.

1837. Educated partially in French and par¬

tially in Spanish, he early displayed a tendency to compose in both languages and an inordinate love of

study. At the age of 13 he had trans¬

lated from French into Spanish the whole of Homer's Uliad' and had written a grammar of the Spanish language. After this he con¬

tinued his education in Madrid where he studied literature, mathematics, ancient and modern languages and medicine. Dropping the latter in his third year, he began the study of law at the University of Valladolid which he also abandoned. He finally drifted into journalism and literature and became very active in polit¬

ics. He wrote under a number of noms de plume, one of which, ((Figaro," he soon made famous. His first popularity was won in a weekly publication entitled Pobrecito Hablador, in which he burlesqued very cleverly the so-

called bad habits and customs of the Madrid of his day. On the arrival of a more liberal policy toward the press on the death of Ferdi¬

nand VII (20 Sept. 1833), he began to take a very active part in politics in which he soon became a noted journalistic contender, satir¬

izing with great cleverness the follies and ab¬

surdities of his time. Witty in the extreme, he

never descended to the bitterness of the polit¬

ical, party and personal vituperation of the writers of his day. All the world laughed with him and appreciated the truth of the pictures he painted and the humor of the situations, characters and incidents he depicted, in the best, most fluent and most happy of language which was in general devoid of partisanship and inspired with a spirit of fairness. This fairness of mind and broadness of view in¬

creased his popularity and extended the field of his readers. He also acquired a reputation as literary and dramatic critic inferior to that of no other contemporary writer in Spain. At the height of his fame he visited England, France and Portugal and everywhere he was received as a personage of the highest dis¬

tinction (1835). The following year he visited Belgium and Germany, during which he was elected, in his absence, diputado to the Cortes.

Larra's family relations were unhappy, prob¬

ably on account of his own lack of domestic qualities; and these were intensified by his relations for several vears with a married woman with whom he appears to have been infatuated. Jealousy made his life miserable both at home and in his irregular marital rela¬

tions, the latter of which becoming unbear¬

able to the woman in the case, she turned her back on the poet ; and Larra, in despera¬

tion, took his own life. So great was his popularity that ((all Madrid turned out to h'S

funeral.® Among Larra's published works are (E1 dogma de los hombres libres) (transla¬

tion) ; the following dramas, translated or adapted, (Julia) ; (Una imprudencia) ; (Don Juan of Austria) ; Felipe5 ; (Roberto Dillon) ;

etta) ; (E1 retrato de Shakespeare.) His orig¬

inal drama, (E1 conde de Fernan Gonzalez, >

met with some success. A complete edition of Larra's works was published by Montaner and Simon, Barcelona.

LARRABEE, lar'ra-be, William Clark,

American Methodist Episcopal clergyman and educator : b. Cape Elizabeth, Me., 1802 ; d. 1859.

He was principal of Methodist academies at Cazenovia, N. Y. (1831-35), and Kent's Hill, Me., and in 1837 was a member of the Maine Geological Survey. In 1840 he was appointed professor of mathematics and natural science in Indiana Asbury (now De Pauw) Univer¬

sity, and in 1852-54 and 1856 was superintend¬

ent of public instruction in Indiana. He worked efficiently toward the improvement of educational methods in his denomination.

Among the works published by him are (Scien¬

tific Evidences of Natural and Revealed Reli-

gion) (1850) ; (Wesley and his Co-laborers) (1851); (Asbury and his Co-laborers) (1853); and (Rosabower) (1854), a collection of arti¬

cles written for the Ladies' Repository.

LARRAMENDI, lar'ra-men'de, Manuel

de, Spanish Jesuit scholar: b. Audoain, about 1690; d. Loyola, about 1750. He was educated at Bilbao and was professor of theology at Valen¬

cia, Valladolid and Salamanca. After serving for some years at court as father confessor to the queen dowager, Maria Anna, he, in 1733=

retired and devoted himself to study and writ¬

ing. Author of (De la antiguedad v univer-

salidad del vascuence en Espana) (1728) ; (E1

impossible vencido ; arte de la lengua vascou-

gada> (1729); (Discurso historico sobre la antiqua y hermosa cantabria* (1736); (Dic-

cionario trilingue, Castellano, vascuence y la¬

tino > (1745).

LARREY, lar' ra, Dominique Jean, Baron.

French military surgeon : b. Baudean, near Bagneres-de-Bigorre, July 1766; d. Lyons, 1842.

He studied medicine at the hospitals Hotel Dieu and Hotel des Invalides, and visited America before entering the French army in 1793 as surgeon in the German and Spanish campaigns. He was with Napoleon in Italy and again in Egypt, was created a baron and pensioned in 1810. He continued in service and in 1842 was inspector of military hospitals in Algeria. Larrey originated the ambulance volante and was noted for his humanity as well as possessing a high scientific reputation.

He became known as <(la Providence du Sol-

dat.® Author of (Memoires chirurgie militaire et campagnes) (4 vols., 1812-17) ; ^Relation des voyages et des campagnes de 1815 a 1840) (1840) ; (Chinique chirurgicale) (5 vols., 1830-

36) ; (Recueil de memoires de chirurgie) (1821), etc. He was also author of many im¬

portant scientific papers.

LARS, larz, Roman tutelary deities.

Lars is an Anglicized plural, derived from the Latin, Lar, singular of Lares (pron. la-raz).

Lares occurs on old Italian monuments beside Lars, an older form of the same word. At¬

tempts have been made to identify Lares or its singular Lar with an Etruscan word, Lar, Larth, Larthi or Larthia, common on sepul¬

chral inscriptions, equivalent to the English <(lord® or (

sibly akin to another Tyrrhenian word Laran, name of the Etruscan god of war. But this attempt has .not met with general favor. In Dollinger's opinion the Lars were deified an¬

cestors, or souls of men, personifying the vital powers, and so assure the duration of a family, over whom their protection was supposed to extend. Wissowa, on the contrary, holds the Lars to have been originally protecting spirits of lots of arable land, above which rose shrines at those spots (conipita) where the paths bounding such lands met those of another's holding. Wissowa rejects therefore the older idea of deified progenitors. Holding, as he does, that the Lars were originally gods of the cultivated fields, thence he derived them, claim¬

ing that from such agrarian status they later appeared within the Roman home.

Some, looking upon the Lars as earthly beings, discern a distinction thus between them and 'the Manes on one hand, and between them and the Penates on another. Such as perceive this distinction regard the Manes as infernal spirits ; and say the Romans regarded the Pen¬

ates as heavenly. Yet all authorities agree that Manes, Penates and Lars were regarded as guardian spirits by those who worshipped them.

From very early times a distinction existed between private and public Lars. The Lars domestici (private Lares of the home) were worshipped by the Roman household, and by the family alone. One of those household gods, the Lars familiaris, who accompanied the fam¬

ily whenever the residence was changed, was conceived of as the very centre of the house¬

hold cultus. One view regards the Lares do-

mestici as souls of virtuous ancestors, who (ac¬

cording to the Roman idea) were set free from the realm of shadows by Acherontic rites; exalted into deities ; which thereupon became protectors over their progeny, as household gods.

The Lars publici (public lars), enjoyed a wider sphere worship, and received particular names from the place over which their influ¬

ence was supposed by the Romans to extend.

Among these may be mentioned (1) Lares compitales, originally two in number, the mythic sons of Mercurius and Lara (or Larunda), guardian spirits of the cross-roads, where their shrines were erected, and in whose honor an annual festival, the Compitalia or the Laralia was held, the celebration itself falling in the month of December, a short time after the observance of the Saturnalia. It was not alone the cross-roads, but also the whole neighboring district, town and country, which felt and ac¬

knowledged the divinity and the power of the Lares compitales of their respective local¬

ities. (2) Lares Urbani, presided over cities.

(3) Lares praesti'tes originally tutelaries of the public common ; finally guardians of the state.

On the Via Sacra near the Palatine Hill, they had a temple and an altar. On coins they ap¬

pear as the figure of a young man, wearing a chlamys, holding a spear, seated with a dog, symbol of vigilance. (4) Lares viales, of the roads, protecting genii of travelers. (5) Lares permarini, of the sea. (6) Lares rustici, of the country. (7) Lares hostilii, who guarded the state from enemies. The Lares grundules, too, should not be omitted. Their worship was connected with that of the white

Sow of Alba Longa and its 30 young. Opposed 'to the Lares, who were peaceful, happy spirits of the dead, were the Larvae, bearing a name which betrays its connection with the Latin word Lar just as the parallel word form ((arvum}) or (

The Lars were worshipped daily in the Roman home, particular honors being paid them on the Kalends, the Nones and the Ides, of the Roman month. Originally each house¬

hold had only a single Lar; and the shrine, a small domestic chapel, sheltering an image of the good spirit, was kept in each home, — the Roman gave this shrine the name of HLdicula or Lararium. The image of the god was some¬

times of stone, of wood, of metal, in the last case, sometimes even of silver.

In early times the Lar stood in the Atrium; but later, when the family hearth was removed, it was placed elsewhere in the Roman home.

At home a Roman felt himself surrounded by invisible friends and guardians, and these sentiments found expression in festive gather¬

ings, at which the Lararium was thrown wide open, and the exposed Lar garlanded about with flowers. Every morning a prayer was made to the idol, and at each meal offerings of food and of drink were set before him. Then a part of the offering was placed on the hearth and finally taken up and shaken into the flames.

Whenever a son of the family assumed the toga virilis; whenever the birthday of the head of the family recurred; whenever a new bride vol. 16 — 48

entered into the family circle; or whenever the festival of the Caristia in memory of the de¬

ceased was celebrated, on these and on the occasion of every other event of importance to a Roman family, special offering and sacri¬

fice were made to the Lar. He (for, as the Romans conceived this idol, he was an ani¬

mated being) was on such occasions crowned with wreaths of flowers ; cakes and honey, wine and incense, and swine, — all were laid before him. The worship of the Lares persisted throughout the Roman pagan period, changing its character considerably as time went on; and its hold upon the Roman soul appears to have been such, that long after the inception of Christianity we hear of a Roman emperor, Alexander Severus, who numbered among his household gods, besides images of Alexander of Macedon, and Abraham, a figure, even the Lar of Jesus Christ. The Lar was represented variously. Sometimes as a youth, his head covered by a hat, with a traveler's stave in one hand, and accompanied by a dog. Again, we find the Lar figured as a youth : in short, high-

girt tunic (symbolic of readiness to serve) ; he holds a rhyton (drinking horn) in one hand and carries a patera (cup) in the other.

Witness to domestic happiness or misfortune, the Lar hallowed every domestic occurrence ; his presence rendering every Roman home, as it were, a sacred temple. ((No other nation,'

remarks one student of comparative religion, ((except the Chinese, have carried the religion of the home so far® as have the Romans in their worship of the Lares.

LARSSON, lar'son, Carl Olaf, Swedish

painter : b. Stockholm, 28 May 1853. He studied in Stockholm and in Paris. After some ambitious early attempts he engaged in illus¬

trating, gaining for himself the title of the (

ing spirited and vigorous and full of gaiety and charm. While he is credited with a French vivacity, the Scandinavian point of view is clearly expressed. He excels in outdoor sub¬

jects and in pictures of home life. He has also distinguished himself as a mural painter as well as in the field of water-color and oil painting. He is an earnest advocate of main¬

taining the national type of dress and coloring, pleading for the so-called ((gaudy peasant colors that are needed contrasts to the ice and snow®

of his native land. He executed the illustra¬

tions for Rydberg's (Singoalla) and the mural paintings in the Fiirstenberg Gallery and the National Museum, Stockholm.

LARVA, the young of an animal, when it differs from its parents in form and manner of life. In most invertebrates and in some of the lower vertebrates, the animal hatched from the egg is so different from the adult that in many cases the relationship was long unsuspected by naturalists, and the little creatures were given names as separate beings, — zoea, nauplius , etc., now applied to the forms of larvae they repre¬

sent. These larvae may grow by imperceptible degrees into the stature and likeness of the adult; or they may pass by comparatively sud¬

den changes through a series of more or less

different forms, until finally the adult form is reached and retained. In the latter case the development is said to be by metamorphosis (q.v.), most completely and familiarly mani¬

fested by insects. Whatever the method, the course of larval growth in its successive stages recalls the phylogeny of its race — that is, the course of its evolution in history. Thus each of the various phases of the larval life of any of Fig. 1. — A trochophore: a, anus; m, mouth.

the lower animals, like the foetal life of em¬

bryos of the higher ranks, indicates probable ancestral forms. Some of the most remark¬

able larvae may be mentioned. Among the marine annelids a larva known as the trocho¬

phore or trochosphere (Fig. 1) is common. It has a short compact body, traversed bv the alimentary canal, and has one or more bands of cilia around the body and a sensory patch at the top of the head. By feeding, this larva grows, the increase being chiefly in length, and with this increase, the joining or metamerism of the body, so noticeable in the adult, appears.

Other worms have different types of larvae, among them the pilidium of the nemertines (Fig. 2), shaped somewhat like a chapeau with enormous ear lappets. Between these is the mouth which leads to a large blind sac, the stomach of the worm. The worm itself de¬

velops inside the pilidium and later escapes from it to continue its existence, leaving the rest to die.

Among the mollusks larvae like the trocho¬

phore occur, and it is the existence of these larvae which leads naturalists to think that annelids and mollusks, so different in the adult, had a common ancestry. Later, with the appearance of molluscan characters, a larva known as the veliger may appear. This is characterized by a large disk on the top of the head, which serves for a time as a swimming organ and is later lost.

All of the lower and some of the higher Crustacea pass through a so-called nanplius stage (Fig. 3). The adult crustacean consists of several segments, but the nauplius is without joints, has a single eye, a straight alimentary canal, the mouth being overhung by an enor¬

mous upper lip, and three pairs of appendages, which later became changed into the 'two pairs of antennae and the mandibles of the adult.

The first pair of the nauplian appendages are Fig. 3. — Nauplius of Sacculina.

simple and apparently are only sensory, while the two remaining pairs are two-branched, and serve as swimming organs, the basal portions being also used as jaws to force food into the mouth which lies between them. In the higher Crustacea two other and better developed larvae known as the zoea and megalops may appear.

Possibly the most remarkable larvae occur among the echinoderms. These forms, exem¬

plified by the starfish and sea-urchin, are no¬

ticeable for their radial symmetry, but in the larvae, of which there are several distinct types, not a trace of a radial arrangement of parts can be found. They are rather markedly bi¬

laterally symmetrical, with well-marked dorsal and ventral surfaces, which, however, do not correspond with the upper and lower surfaces of the adult. Some of these larvae are more or less barrel-shaped, but in others, as in the pluteus (Fig. 4) and bipinnaria (Fig. 5), the body is drawn out into a number of processes, soft and flexible in the latter, but stiffened in the pluteus by internal calcareous rods.

The starfish or sea-urchin later arises on one larvz;

side of this larva, the processes are absorbed and the radial arrangement is superimposed upon the bilateral features in the adult, without, however, completely obliterating them.

The larval forms of insects vary greatly both in their form and in the completeness of their metamorphosis. They may be divided into two classes,

the cruciform and the campodea-

form. The former include those which are worm-like, such as the caterpillars (q.v.) of moths and butterflies, the grubs of beetles, the maggots of flies and the like. They are the most numerous and conspicuous forms, and are active and voracious, and do nearly all the damage to be attributed to injurious insects.

The campodeaform larvae are those which nearly resemble the parents, such as the nymphs of the dragon-fly and related groups. The sec¬

ond stage of larval life among insects is a very different existence, usually stationary and qui¬

escent, and is called the pupa stage (see Pupa).

Some larvae among insects and elsewhere may breed, — a phase of reproduction called paedo-

genesis see Parthenogenesis.

The value of the different forms and habits of life assumed by animals in passing through the larval stage or stages is that it tends to prevent the extinction of the species, since if at any moment all the adults were swept out of existence, the young living in a different station would continue to represent and revive the species. (

On the other hand, the larval forms of fixed marine animals serve as food for fishes, espe¬

cially young fishes and numerous invertebrates, which, without this resource, would starve ; and larvae of insects are the principal resource for food of birds in the breeding season, when all the small, inland birds must feed their nest¬

lings on caterpillars and grubs, for the most part, even when they are seed-eaters as adults.

Certain larvae enter extensively into the food-

supply of many mammals, and are even eaten, or become otherwise useful to man. Some are artificially cultivated for his service, the silk-worms, for an example.

Among vertebrates larvae are rare, and ap¬

pear only in the lower forms, those of the lamprey (Ammoccetes) , of eels (Leptocephali) , of certain salamanders (axolotls) , and of frogs (tadpoles), being the most noticeable.

LARVAE, also LEMURE, in Roman my¬

thology ghosts conceived as the souls of the dead revisiting earth at night with harmful in¬

tent. They were exorcised by the head of the 'household in a ceremonial ritual held at mid¬

night 9, 11 and 13 May, which comprised a festival called ^lemuralia® or ^lemuria,® and at which games were played with other suitable observations. Later the term came to mean supernatural monsters or goblins and some¬

times the souls of criminals.

LARYNGISMUS (lar-in-jis'mus) STRID¬

ULUS. Laryngismus is spasm of the glottis, causing contraction or closure of the opening; laryngismus stridulus (also called Kopp's asthma, Millar's asthma, etc.), is spasm of the glottis usually associated with some disease, especially with the common ailment of children known as rickets.

LARYNGITIS, lar-in-jl'tis. See Nose

and Throat, Diseases of.

LARYNGOSCOPE, la-rlng'go-skop, an

instrument used for examining the larynx. It consists of a little plane mirror attached to a stem, about four inches long, at an angle of 120

degrees or more. This mirror is introduced into the mouth of the person to be examined, and held near the back of the throat, while a strong light is thrown upon it from a reflector worn upon the forehead, or held between the teeth of the examiner. In the strong light of the sun, or of an argand burner, the light thrown from the reflector is concentrated upon the laryngeal mirror, which lights up the parts to be exam¬

ined, while it at the same time reflects the images of these parts into the eye of the ex¬

aminer. In this way the mechanism of the human voice may be studied, and what is of considerable importance, disease if present can be readily detected, and the fitting remedy ap¬

plied. The chief merit of introducing this in¬

strument in a very complete form into medical practice must be assigned to Drs. Turck of Vienna and Czermak of Prague, although Garcia, Liston, Babington, Avery and others used a reflecting mirror to explore the recesses of the throat. It was not until the two Ger¬

man physiologists took up the subject in 1857

that the benefits arising from^ its use were fully recognized. A somewhat similar arrange¬

ment is used in examining the posterior nasal cavities, a smaller mirror is used with its face turned upward.

LARYNGOTOMY, lar-mg-got'6-mi. See

Bronchotomy.

LARYNX, the collection of structures by which the voice is partially produced, situated at the upper part of the trachea or windpipe.

It is formed mainly by two pieces of cartilage, the thyroid above and the cricoid, which is situated

below. The thyroid is formed of two extended wings like plates meeting at -the 756

middle line in front and making a prominence known as Adam's apple; above and from the sides two horns project upward, and are con¬

nected by bands to the hyoid bone, from which the larynx is suspended. The thyroid cartilage rests and is movable upon the cricoid, moving backward or forward, but not from side to side. The cricoid cartilage is shaped like a signet-ring (Greek krikos, a ring), the narrow part of the ring being in front. The cricoid carries, perched on its upper edge behind, the arytenoid cartilages, which are of. great im¬

portance in the production of the voice. These various cartilages form a framework upon which muscles and mucous membranes are dis¬

posed. The mucous membrane which lines the larynx is thrown into various folds. These folds about 15 mm. long in man and 11 mm. in woman are called the true vocal cords, and by their movements the voice is produced. Pro¬

jecting toward the middle they form a chink, Fig. 1. Fig. 2.

Larynx internally. Larynx externally.

which is called the glottis. By the contraction of various muscles this chink can be so. brought together that the air forced through it throw the edges of the membrane into vibration and so produce sounds. Variations in the form of the chink will effect changes in the sound.

Thus the production of voice is the same as in musical instruments, the arrangement of the many complicated muscles in the larynx being such as to produce (1) the vibratory sounds, (2) to regulate the sound, (3) to . vary the pitch, and (4) to

determine the quality of the sound. While the voice is produced in the larynx, it is modified by the rest of the respira¬

tory passages. (See Voice). In the act of swallowing, the glottis is covered by a cartilag¬

inous plate called the epiglottis. In the accom¬

panying cut, Fig. 1, shows c, the larynx inter¬

nally, b being the epiglottis situated above the glottis or entrance to the larynx, A a the trachea, and d the oesophagus or gullet. In Fig. 2, j is the trachea, b the hyoid bone, n n the thyreo-hyoid membrane, o the thyreo-hyoid ligament, G the thyroid cartilage, R the cricoid cartilage, p the crico-thyroid ligament. See Nose and Thboat.

LAS CASAS. See Casas, Bartolome de

I. AS.

LAS CASES, Emmanuel Augustin Dieu-

donne Marin Joseph, Marquis, em-man-oo-el 6-gus-tan de-e-don-na ma-rari zho-zef las kas, French historian, one of the companions of Napoleon at Saint Helena: b. Chateau Las Cases, near Revel, 1766; d. Passy-sur-Seine, 15

May 1842. He was educated at the school of the Oratorians in Vendome, and at the military and naval schools of Paris, and when the Revo¬

lution broke out took part with the Royalists.

After the defeat of the Prussians in Champagne he fled to London, where he lived as a teacher.

While here he executed his (Atlas historique et geographique) (1802), which he published under the name of Le Sage. When the

emigres were recalled by Napoleon, Las Cases returned to Paris. Having entered the army of

Bernadotte (1809) he gained the favor of Napoleon, who in 1810 made him chamberlain and count of the empire. After the disasters of Leipzig and Moscow, Las Cases commanded the 10th legion of the National Guard. In 1814

he refused to assent to the request for Napo¬

leon's abdication, and went to England, whence he subsequently sent in his adhesion to the Bourbons. After the return from Elba he went back to France, and after the final defeat of the emperor at Waterloo followed him to Saint Helena. Here with his son he devoted himself to the care of Napoleon, and passed his evenings in recording the emperor's re¬

marks, which were subsequently published in his (Memorial de Sainte Helene* (1822-23).

Having written a letter to Lucien Bonaparte commenting freely on the treatment to which Napoleon was subjected, he was arrested, 25

Nov. 1816, sent to the Cape of Good Hope, presently taken to England, thence conveyed to the Continent and to Frankfort-on-the-Main, where he at last received his libertv after 13

months' captivity. He was not allowed to re¬

turn to France until the death of Napoleon.

In the reign of Louis Philippe he was elected in 1831 and 1839 to the Chamber of Deputies, taking his seat at the extreme left, or with the ultra-opposition. He wrote, in addition to the works above mentioned, his own life, (Memoires d'E. A. D., Comte de Las Cases*

(1818).

LAS CRUCES, las kroo'ses, N. Mex.,

village and county-seat of Dona Ana County, near the Rio Grande, 43 miles northwest of El Paso, Tex., on the Atchison, Topeka and Santa Fe Railroad. It is

situated in a fruit-growing and agricultural region and has 'important min¬

ing industries in silver, copper, lead and zinc.

The State College of Agriculture and Me¬

chanics' Art is located here, and the town owns its waterworks. Pop. 3,386.

LAS PALMAS, lfis pal'mas, Canarias, the chief town of Grand Canary Island and capital of the archipelago, the third port of Spain and first in point of tonnage, is situated in the northeast of the island, 52 miles from Teneriffe and 262 from Madeira. It is an attractive place, beautifully situated in a fertile valley and contains a fine town-hall and a museum richer in aboriginal remains than any other in the world. Besides the cathedral of Saint Cristobal it has a number of quaint churches ; in the church of San Antonio Abad, but in an earlier building, Columbus attended Mass before setting out for the discovery of America in 1492. The city has been the seat of a bishopric since 1485. The principal industries are fishing and-shipbuilding and the manufac¬

ture of woolen goods, hats, leather and glass.

Potatoes, bananas and tomatoes, almonds and sugar are among the exports. Steamer serv¬

ices are maintained with the principal Euro¬

pean ports, and with the West Coast of Africa, the Cape, Australia and New Zealand and America. Pop. 62,886.

LAS VEGAS, las va'giis, N. Mex., city and county-seat of San Miguel County, on the Gallinas River, a branch of the Pecos, and on the Atchison, Topeka and Santa Fe Railroad, 83 miles east of Santa Fe. There

are here practically two towns, the old Mexican settle¬

ment, which is the county-seat, and the mod¬

ern city lying to the east, first known as East Las Vegas, but incorporated in 1888 and char¬

tered in 1896 as the city of Las Vegas. The New Mexico Normal University and the New Mexico Insane Asylum are located here, and there is a public library, sanitarium, flour-mills, carriage and wagon shops, railroad machine shops, planing-mills, foundries and machine shop, tie-preserving work, lumber and brick yards, candy and cigar factories, a brew¬

ery, etc. The surrounding county is de¬

voted to agriculture and stock raising and Las Vegas is an important wool market.

The health resort known as Las Vegas Hot Springs is located six miles distant, at an elevation of 6,767 feet above the sea. It is noted for its fine scenery and equable climate and for its numerous medicinal springs, with temperatures ranging from 75° to 160° F. Pop.

(1920) 4,304.

LASAULX, la' zo, Ernst von, German

archaeologist : b. Coblenz, 16 March 1805; d.

Munich, 9 May 1861. He studied at Bonn and Munich, traveled through Austria, Italy, Greece and Palestine, and took his degree at Kiel in 1835. He was appointed professor of philology and aesthetics at Munich in 1844, but his in¬

fluence having caused the downfall of the Minister Abel, he was dismissed from the uni¬

versity by King Louis 28 Feb. 1847. He was elected to the National Assembly at Frankfort in 1848, and

on 15 March 1849 he was re¬

instated at Munich by King Maximilian II.

He served in the Bavarian House of Deputies from 1849 until his death. He was magnetic as a teacher and of a mystical temperament. His writings deal largely with parallels between the Christian religion and the Hellenic philosophy.

He wrote (Geschichte und Philosophic der ehe bei den GriecheiP (1852) ; (Der Untergang des Hellenismus* (1854) ; (Des Sokrates Leben) (1857), etc.

LASCARIS, la'ska'riz, Constantine, Greek scholar and grammarian : b. Constantinople, about 1434; _d. Messina, about 1500. He came of a Bithynian noble family, which had among its members three emperors of Nicaea in the 13th century. The fall of Constantinople in 1453 forced him to flee to Corfu. He later went to Italy where he was appointed Greek tutor to Hippolita, daughter of the Duke of Milan. He taught in Rome where he gained the friendship of Cardinal Bessarion ; went to Naples at the request of Ferdinand II and there delivered a course of lectures op Greece ; he also taught in Spain, and for the last 35 years of his life he taught Greek at Messina. Among his pupils there was the future Cardinal Bembo.

He collected and copied many manuscripts, which he willed to the Senate of Messina, and which were taken to Spain in 1712 and placed in the National Library in Madrid. His (Grammatica Gneca, sive Compendium octo Orationes PartiunP (1476) was the first work printed in the Greek language. Consult Ville-

main, A., (Lascaris on les Grecs en XVeme Steele > (1825).

LASCARIS, Theodore I, emperor of

Nicaea; d. 1222. He came of a noble Byzantine family, was son-in-law of Alexander III and was distinguished by his exploits in defeating the Latin

invasion of Constantinople in 1203-04.

After the fall of the city he went to Nicaea and there founded a new Byzantine state which became a rallying point for his countrymen and of which he became emperor in 1206. He main¬

tained his empire against the aggressions of the Latin Emperor Henry and Alexius Com-

nenus of Trebizond, carried successful war into the enemy's territory and in 1210 he captured Alexius and wrested considerable territory from the Turks. His daughter, Irene Lascarius, married his successor, John Vatatzes, and be¬

came the mother of Theodore II, who reigned from 1254-58, and recovered Thrace from the Bulgarians in 1255-56.

LASK, F'oland, city in the government

of Piotrkow, 82 miles southwest of Warsaw and 12 miles southwest of Lodz, on the Newolka River and on the Warsaw-Kalisz Railroad. It has important textile manufac¬

tories. It lay within the district overrun by the Central Empires in the European War and was the scene of much sanguinary fighting. Pop.

over 4,000.

LASKER, las'ker, Eduard, German poli¬

tician : b. Jarotschin, Posen, 14 Oct. 1829; d.

New York, 5 Jan. 1884. He was of Jewish descent, and after being educated at the univer¬

sities of Breslau and Berlin obtained a post in the Municipal Court (1851). He spent three years in England in the study of political con¬

ditions there. On his return he entered the gov¬

ernment service and was elected in 1865 to the Lower

House. He sat subsequently in the Con¬

stituent North German Diet, and up to the time of his death in the North German and German Diet for the district of Saxe-Meinin-

gen. He was associated with the <(Fortschritts-

parteD or Progressives, and in 1866 assisted in forming the National Liberal party, from which he later withdrew in opposition to Bismarck's economic policy. He took an active part in the civil consolidation of the German Empire. On his death in New York the House of Repre¬

sentatives passed a vote of condolence and transmitted it for presentation through the au¬

thorized channels to the German Reichstag, but the message was peremptorily returned by Bis¬

marck through the German Embassy at Wash¬

ington. Among his writings is (Zur Verfas-

sungsgeschichte Preussens) (1874). Consult Bamberger, (Eduard Lasker* (Leipzig 1884).

LASKER, Emmanuel, German chess

champion : b. Berlinchen, 24 Dec. 1868. He chose mathematics as a profession, but eventu¬

ally turned his attention to chess, playing with such success that since 1892 he has triumphed over all competitors both in tournaments and duel matches. He has outplayed, without losing a single game, Blackburn, Bird and F. Mieses of Leipzig. In 1892 he won the first prize in the London tournament, and in the Interna¬

tional tournament at New York in 1894 beat all the best players, including Steinitz, champion of the world. A decisive match was arranged between him and Steinitz at Moscow and came 758

off December 1896 and January 1897. Lasker won by 10 games to 2, 5 being drawn. In 1902

he was appointed assistant lecturer on mathe¬

matics at Victoria University, Manchester. He had arranged a match with the celebrated Rus¬

sian player, Rubenstein, for August 1914, which was canceled on the outbreak of war. He founded (Lasker’s Chess Magazine) in 1904, and is the author of ^Common Sense in Chess.) LASO DE LA VEGA, la'so da la va'ga,

Garci, or GARCILASO DE LA VEGA,

Spanish poet and soldier: b. Toledo, 6 Feb.

1504; d. Nice, 14 Oct. 1536. He entered the army, served under Emperor Charles V against the French and the Turks and received his death wound at the assault upon a castle near Frejus when but 32 years of age. His reputa¬

tion as a poet, however, was already estab¬

lished. He was an intimate friend of the poet Boscan, with whom he adapted the Italian verse forms to Spanish.- Comparatively little of his poetry remains. There are a few early villancicos in the native Spanish manner ; three eglogas, two elegias, five canciones, and epistola in blank verse and 37 or 38 sonnets. His work bears no trace of the camp-life and military scenes among which his life was passed, but is marked by a tender melancholy. There are traces of the influence of the Italian poets in his manner and some of his grace is doubtless due to Horace. His poetry was printed (Works) (1544) with Boscan’s poetry • reprinted (New York 1903). Consult Fitzmaurice-Kelly, J., (Bibliographic de l'Histoire de la Littera-

ture Espagnole) (Paris 1913).

LASSA, las'sa. See Lhasa.

LASSALLE, la-sal', Ferdinand, German

Socialist: b. Breslau, 11 April 1825; d. Geneva, 28 Aug. 1864. He studied at the universities of Breslau and Berlin, and while there gained the friendship of such men as Bockh and Humboldt.

Toward the end of 1844 he met at Berlin the Countess H'atzfeldt, who had contracted an un¬

fortunate marriage, conducted her suit for sepa¬

ration and brought it to a successful issue. He first made himself known as a leader during the democratic troubles of 1848, and was im¬

prisoned for a year for alleged inciting to re¬

volt. In 1858 he produced a work on the phi¬

losophy of Heraclitus and in 1861 published his System of Acquired Rights. } Thereafter he proceeded to organize the working classes, which caused the government to accuse him of sedition, and he was imprisoned for four months. He was at first allied with the party of the Progressists, but in 1862 he broke with them; in 1863 he issued his famous (Offenes AntwortschreibenP a brochure in which he sets forth his working-class program, and later in the same year founded a Labor Union (All-

gemeiner dcutscher Arbeiterverein) , and began the Socialist propaganda in Germany. In 1864

he published an attack on the Manchester school of economists under the title (Herr Bastiat-

Schultze von Delitzsch der okonomische

Julian, oder Kapital und ArbeitP In the sum¬

mer of the same year he was killed in a duel occasioned by a love affair. One of the chief points in his economic theory was that the ((iron law of

wages" tended always to reduce wages to the mere cost of living; to remedy this he proposed associations of the working classes in productive enterprises with capital furnished by the state. He left no such elabo¬

rate statement of his views of the nature of capital and capitalistic society as did Marx; nor did he influence the labor movement so much through his theoretical teachings as through his power and success as an organizer. Consult Bernstein, and Dawson, (German Socialism and LassalleP

LAS.SBERG, las'berk, Joseph Maria

Christoph von, Baron (Meister Sepp von Eppishusen), German antiquary: b. Don-

aueschingen, 10 April 1770; d. 15 March 1855.

He studied at Strassburg and at Freiberg, specializing in law, economics and forestry. He entered the service of Prince von Fiirsten-

berg in 1789, became chief warden of the forests in 1804, and under the regency of Princess Elizabeth for her son Karl Egon he was Privy Chancellor in 1806-17. He retired at the close of the regency and for the re¬

mainder of his life studied old German litera¬

ture. He collected a library of 12,000 volumes and 273 rare manuscripts, one of which was the Hohenems manuscript of the codex of the

mutig Gedicht, der LittoweU (1826) ; (Eggen-

lied) (1832) ; ^iedersaaP (4 vols., 1820-25), etc. Consult Pfeiffer, F., (Brief wechsel zwischen Lassberg und uhland) (Vienna

1870).

LA.SSELL, la-sel', William, English as¬

tronomer: b. Lancashire, 18 June 1799; d. 5

Oct. 1880. His early education was scanty, and while serving a mercantile apprenticeship at Liverpool he made telescopes for himself, and in a private observatory which he built near that city he began his astronomical work, about 1820, and continued it until 1861. There he built and mounted reflecting telescopes equa-

torially, the first of the kind in use, and also invented a method of polishing the specula.

With his own telescope he discovered the satel¬

lite of Neptune in 1847, observed the eighth satellite of Saturn in 1848, and in 1851 discov¬

ered two new satellites of Uranus. In 1861, at Valetta, on the island of Malta, he mounted equatorially a reflecting telescope, and at that place until 1865 he made observations, also de¬

scribing new nebulae and correcting many of his former results. In 1865 he returned to England, built an observatory near Maidenhead and there spent the remainder of his life.

LASSEN, las'sen, Christian, Norwegian

philologist and linguist: b. Bergen, Norway, 22

Oot. 1800; d. Bonn, Prussia, 8 May 1876. He studied at Christiania, Heidelberg and Bonn, at which latter university he became in 1830 ex¬

traordinary and in 1849 ordinary professor.

With Eugene Burnouf he deciphered many Pali MSS., and the result of their labors was pub¬

lished by the -Asiatic Society in an (Essay on the Pali or Sacred Language from the Penin¬

sula beyond the Ganges. > He published with Schlegel the

and was for many years editor of the Zeit-

schrift fur die Kunde des Morgcnlandcs. His works, which are numerous and valuable, relate to a variety of Oriental languages and ancient history, embracing, among other subjects, trans¬

lations from the Hindu philosophy, the history

of Bactriana, Cabool and India, and cuneiform inscriptions.

LASSEN, Eduard, Danish composer: b.

Copenhagen, 13 April 1830; d. Weimar, 15 Jan.

1904. He began his education at Brussels and 1851 won the (

enlob5 (I860);

LASSEN PEAK, Cal., volcanic peak of

the Sierra Nevadas, on the boundaries between Plumas, Shasta, Lassen and Tehama counties, about 135 miles north of Sacramento, in lati¬

tude 40° 28' north. It was supposed to be extinct, but on 30 May 1914 clouds of steam and ash issued from the summit, and on 8 June and 18 July 1914 a column of steam rose to a height of 10,000 feet above the crest. The activity was credited to the great earthquake preceding it in Alaska and California. Its ancient lava beds are of vast extent and there are boiling springs and hot mud lakes at the base of the mountain. Altitude, 10,577 feet.

LAS.SERRE, la'sar, Paul Joseph Henri

de Monzie, French religious writer: b. Carlux, 25 Feb. 1828; d. 1900. He studied law at Paris and in 1851 created a sensation by the publi¬

cation on 2 December of (L'Opinion et le coup d'etat, 5 written in favor of the coup d'etat. He was active in behalf of Poland, gaining the Pope's condemnation of the massa¬

cres of Warsaw; gained wide attention by his strictness on Renan's (Vie de Jesus5 ; and was later noted for his writings on the Lourdes pilgrimage, where he stated that he had re¬

ceived benefit, and over which he had a bitter controversy with Zola. Author of (L'Esprit et la Chair5 (1859) ; (La Pologne et la Catho-

licite5 (1861); (L'Evangile selon Renan5

(1862); (Notre-Dame de Lourdes5 (1869); (Episodes Miraculeux de Lourdes5 (1883), etc.

LASSO, a long strong thong of buffalo-

hide, rope or leather, with a running noose at one end, used by ranchmen and hunters. It is thrown in such a way as to fall over the horns or head of the animal, the hunter coiling one end round a high pommel on his saddle. When he makes a successful cast the hunter spurs his horse to its fullest speed, and the horse or other animal is almost strangled or borne to the ground and becomes an easy prey. Instead of a noose a leaden ball may be attached to the end of the thong, which is thrown so as to entangle the legs, neck or horns of the ammal to be captured. The lasso has been used in the South American wars: it was employed against the French sentinels by some of the semi-barbarous tribes whom Russia had pressed into her armies during the Crimean War.

LASSO-CELLS, or STINGING CELLS,

names applied to the cnidocysts of coelenterates.

See Nematocyst.

LASSON, la'son, Adolf, German scholar:

b. Strelitz, Mecklenburg-Strelitz, 12 March 1832. He was educated at the University of Berlin, where he became privat-docent of phi¬

losophy in 1877 and honorary professor in 1897. He was greatly influenced by the phi¬

losophy of Hegel. Author of (Baco von Verulams wissenschaftliche Principien5 (1860) ; (Das Kulturideal und der Krieg5 (1863) ; (Meister Eckhart der Mystiker5 (1868) ; (Giordano Bruno5 (1872) ; (Das Gedachtnis5

(1894) ; (Der Leib5 (1898) ; (Aristotelische nikomachische Ethik5 (1909), etc.

LASSUS, la 'sus', Jean Baptiste Antoine, French architect : b. Paris, 19 March 1807 ; d.

Vichy, 15 July 1857. He studied at the ficole des Beaux-Arts and under Lebas and Labrouste.

From Labrouste he imbibed the influences which started him toward the pre-eminence he attained in the 19th century Gothic revival in France. He was engaged with Duban and Viollet-le-Duc in the restoration of Sainte Chapelle in 1840-56, and in 1842 he began with Viollet-le-Duc the restoration of Notre-Dame.

He was also engaged in the restoration of Saint-Germain-l'Auxerrois, the cathedral of Moulins and built the church of Saint Nicolas de Nantes as well as other churches and con¬

vents throughout the provinces of France. He was a contributor to Annales archeologiques and author of (Monographic de la cathedrale de Chartres5 in collaboration with Didron and Amaury Duval (1843) ; (Reaction de l'Acad-

emie des beaux-arts contre l'art gothique5

(1846) ; annotated (Album de Villard de Hon-

necourt5 (1858).

LASSUS, Orlandus, or LASSO, las'sd,

Orlando (originally Roland DelattreL Ger¬

man composer: b. Mons, in Hainaut, 1520 or 1530; d. Munich, June 1594. As a composer he was excelled only by Palestrina among mu¬

sicians of the 16th century. About 1556 he went to Munich as chapel-master to Albert, Duke of Bavaria, and in 1562 became chapel-

master, an office which he held till his death.

Among his more than 2,000 works are some 60 masses, many madrigals and songs, and the celebrated music for the Seven Penitential Psalms. In the royal library at Munich is the richest collection of his works. His sons pub¬

lished a collection of his motets entitled Mag¬

num Opus Musicum5 (1604. 17 vols., folio).

An edition of his collected works appeared at Leipzig 1893, et seq.

LAST DAYS OF POMPEII, The. Bul-

wer-Lytton s (The Last Days of Pompeii,5 pub¬

lished in 1834, has as its subject the destruction of Pompeii by fire, water, ashes and lava in the terrible eruption of Mount Vesuvius in the year 79 of the Christian era. The novel was mainly written at Naples near the scene of the ancient calamity in order that all incidents per¬

taining to it might be completely visualized, Bulwer climbed Mount Vesuvius, studied the excavations of the ruined city and was gener¬

ally well prepared for the task by his knowl¬

edge of the classical literatures. It was his aim to restore the decadent life of Pompeii just before the destruction of the city. He reani¬

mated, as it were, the skeletons found in houses, baths, temples and forum, all of which places he minutely described. These old skele¬

tons, clothed in flesh and blood, became the dramatis personae of his plot. Most of them were buried in the ruins; but the hero and heroine, Glaucus and lone, escape by the aid of 760

Nydia, the Thessalian blind girl, and, being Greeks, retire to Athens. Nydia, hopelessly in love with Glaucus, drowns herself in the sea.

Among others who survived is Olinthus, the Christian, who converts Glaucus and lone to the new religion in which they are supremely happy.

Bulwer's novel annoys the reader of the present day by its stilted style, its melodrama and its sentimentalism ; but these and other grave faults cannot blind the critic to the fact that

The catastrophe which Bulwer chose for his theme at once interests and appalls ; and the last chapters, descriptive of the awful fate that overcame the inhabitants of Pompeii, reach a high level of vivid narration, quite sufficient to keep the novel alive.

Wilbur L. Cross.

LAST JUDGMENT, The, subject of re¬

ligious paintings based upon Matt, xxv, 31, et seq., when Christ shall return to judge the world. It was a subject much favored by me¬

diaeval artists, some of the greatest religious paintings and frescoes being founded upon the idea. Among them are that by Fra Angelico at the Florence Academy; one by Fra Bartol¬

ommeo painted in 1498-99 on the wall of the cloister of Santa Maria Nuova at Florence; Jean Coussin at the Louvre; a fresco by Giotto at Santa Maria dell'

Arena, Padua; the fresco by Michelangelo in the Sistine Chapel at the Vatican; by Rubens in the Munich Gallery; by Tintoretto at Santa Maria dell Orto, Ven¬

ice ; the fresco by Peter von Cornelius at Lud-

wigkirche, Munich.

LAST LETTERS OF JACOB ORTIS,

(Ultime lettere di Jacopo Ortis) (1802), the most significant prose work of the Italian poet', Ugo Foscolo, is an autobiographical novel in epistolary form. Begun in 1798 when the au¬

thor was a mere boy of 20 the history of this book is a romance in itself. Published in un¬

finished form in 1799, continued for an im¬

patient editor by the unscrupulous Angelo Sas-

soli whose unauthorized edition was repudiated by Foscolo when he brought out his true text in 1802, the (Ultime lettere > shows the influence of Rousseau's (Nouvelle Heloise* and still more of Goethe's (Werther.) Like its German predecessor which antedated it by a quarter of a century, Foscolo's narrative reflects the pes¬

simism, the unhealthy sentimentalism and the excessive morbidness of that period of social and political upheaval. The suicide in 1796 of Girolamo Ortis, a fellow student at the Uni¬

versity of Pavia, Foscolo's unhappy love af¬

fairs, the Treaty of Campo Formio (17 Oct.

1797) by which Austria acquired Venice and which caused the poet's departure from his adopted state, became the genesis of these let¬

ters which so deeply stirred the patriotic ardor of the Italian youth of the succeeding genera¬

tion. An exile from Venice, Ortis (Foscolo), in a series of letters to his friend Lorenzo (G. B. Niccolini), laments his country's servi¬

tude and gradually lays bare his hapless pas¬

sion for the lovely Teresa, the affianced and later the bride of another. This correspondence runs from October 1797 until March 1799, when the wretched youth stabs himself to death after writing an affecting farewell to Teresa. Such scenes as the meeting between Ortis and the aged poet Parini, the incident of the kiss, the final parting with Teresa and some splendid de¬

scriptions of nature, are full of feeling. The language, while not exempt from affectations, is a robust, eloquent and animated poetic prose.

Although the intermingling of the patriotic mo¬

tive with the love idyll weakens the unity of the work, the loss in artistic effectiveness is compensated by the intense passion for liberty that animates Ortis. It is the first modern Italian novel of incontestable merit and the harbinger of the romantic movement in Italy.

Consult Martinetti and Antona-Traversi for a critical edition of the text (Saluzzo 1887) ; Al-

bertazzi, A., (I1 Romanzo) (Milan 1902) ; Maz-

zoni, G., (L'Ottocento) (Milan 1913) ; Marinoni, E., (Prose . . . di Ugo Foscolo) (Milan 1913).

Alfred G. Panaroni.

LAST OF THE MOHICANS, The.

(The Last of the Mohicans) was the second of the Leather-Stocking series which Fenimore Cooper wrote, and it stands second in the order in which these novels present the deeds and emotions of the greatest character American fiction has furnished to the wrorld of the imagi¬

nation. Perhaps less realistic than (The Pio¬

*neers, * and less poetical than (The Prairie,**

(The Last of the Mohicans) is still the most representative not only of the series, but of Cooper's romances in general. In this tale Leather-Stocking first reaches his true pro¬

*portions. (The Pioneers, * in which he had first appeared, had shown him some¬*

what hardened by age ; only at the end of that book, when Natty, in search of simplicity and perfect freedom, withdraws from the settle¬

ments and plunges into the deeper woods, does he make his full appeal. In (The Last of the Mohicans, which presents Hawkeye, as he is now called, in the prime of his strength and valor, he has grown nobler as he has grown more remote, more the poet and hero as the world in which he moves has become more wholly his own. Chingachgook has undergone an even greater change. He had been known in (The Pioneers* as Indian John, a drunken old vagabond who was dignified only by his death. (The Last of the Mohicans) restores to him his cunning and pride. The purest ro¬*

mance of the story lies in Uncas, the son of Chingachgook, gallant, swift, courteous, a lover for whom there is no hope, the last of his mighty line. Cooper was perfectly willing to admit that Uncas was idealized, like other epic and romantic heroes. It is clear also that Uncas possesses many of the virtues which Rousseau had said are to be found in the state of nature. Romantic idealization, however, and romantic sentiment cannot deprive Uncas of the perennial appeal which youth makes when cut off in the flower. Nor is a book which has added three such personages to fiction to be too lightly dismissed as without power of charac¬

terization.

*The action and setting of (The Last of the Mohicans**

are on the same high plane as the characters. The forest, in which all the events take place, surrounds them with a changeless majesty which deepens, by contrast, the rest¬

less sense of danger. Flight and pursuit, LAST ROSE OF SUMMER — LATENT FAULT

Cooper's favorite plot-device, fill almost the en¬

tire book; two white girls, being escorted from Fort Edward, on the Hudson, to Fort William Henry, on Lake George, are pursued by the hos¬

tile savages who infested that region during the French and Indian War; they are captured and, after another desperate pursuit, rescued. The thrilling contest is carried on with even* subtle trick known to Magua, the villain, and to Hawkeye and the Mohicans, who are the real heroes of the piece, though there is a conven¬

tional lover for one of the conventional girls.

Among the most moving moments in fiction is that in which Uncas reveals himself to the Delawares; of all Cooper’s climaxes it is the one built up with the greatest skill. The coin¬

cidences are occasionally strained and the style is careless, but the narrative force of the book, no matter what its defects, is too compelling for it to be called less than a masterpiece.

Carl Van Do rex.

LAST ROSE OF SUMMER, The, a fa¬

mous song by Thomas Moore, published in his Urish MelodiesP The air was derived from an old melody, (The Groves of Blarney. >

LASTMAN, last'man, Pieter, Dutch

painter and engraver: b. Amsterdam, 1580; d.

Haarlem, about 1649. He was a pupil of Gerrit Pieterz. and later studied in Rome under Els-

heimer. Returning to Amsterdam he estab¬

lished a studio and in 1622 Rembrandt became one of his pupils. He made his reputation as a historical painter. His work is well repre¬

sented in European galleries. Among them are Repose in Egypt (1608), Rotterdam Mu¬*

seum; (Ulysses and N'ausicaa (1609), Bruns¬*

*wick Museum; * Apollo and the Muses,* Cas-*

sel Gallery;

tion, Copenhagen; (Adoration of the Shep-

herds) (1629), Haarlem Museum; (Raising of Lazarus (1632), Hague Museum, etc.*

LASUS, Greek poet: b. Hermione, Argolis.

He flourished in the early part of the 6th cen¬

tury and lived in Athens in the reign of Hip¬

parchus. He was of the literary and artistic circle Peisistratidae, a rival of Simonides, and teacher of music and poetry to Pindar. He was considered the inventor of the dithyrambus and did much to perfect it and increase its popu¬

larity. He was the author of the first treatise on the theory of music.

LASZLO DE LOMBOS, las'lo de lom'-

boz, or VON LANLOS, Philip Alexius,

Hungarian painter: b. Budapest, 1869. He studied at the Industrial Art School and Na¬

tional Drawing School at Budapest, under Lie-

zenmavei at Munich and under Lefebre and Benjamin Constant at Paris. He received gold medals from the Paris Salon in 1899, 1900; and also from Munich, Diisseldorf, Saint Louis and Venice; and the golden placque from the Na¬

tional Salon of Art in Budapest in 1912. He was ennobled by the emperor of Austria in 1912. In 1907 he took up his residence in Eng¬

land. His reputation rests upon his portraits.

Among his sitters are Prince Hohenlohe. Pope Leo XIII. King Edward VII, Queen Alexan¬

dra, Kaiser Wilhelm II. Theodore Roosevelt, King Alfonso XIII, Queen Victoria of Spain, Lord Roberts and other notables. He has done excellent work in portraying children and his portrait of himself is in the Lifizi, Florence.

LATACUNGA, la-ta-koon'ga, Ecuador,

capital of the province of Leon, 56 miles south of Quito, and one of the oldest towns in the republic and on the railway from Guayaquil and Quito. Owing to its situation on a plain more than 9,120 feet above sea-level, it has an even and temperate climate, and the surround¬

ing country is well adapted to agriculture and cattle-raising; but it is only 25 miles distant from the great volcano, Cotopaxi, and has re¬

peatedly been destroyed by earthquakes. There are manufactures of woolens and cottons, pot¬

teries, etc., and pumice stone and saltpetre are wrorked. A palace of the Incas is still in existence in the vicinity. Latacunga was dis¬

covered by the Spaniards in 1534. Pop. esti¬

mated at 12,000.

LATAKIA, la'ta-ke'a, Syria, seaport town in the vilayet of Beirut, opposite the island of Cyprus and 75 miles north of the town of Tripoli. It was the ancient Laodicea ad Mare, named by Seleucus Nicator in honor of his mother ; and in the Roman period it was known as Julia. It was the seat of an ancient bishopric, and at the time of the Crusades was a wealthy city. It came under the rule of Tancred in 1102, but was recaptured by Saladin in 1118.

It had a Christian colony which was permitted to build fortifications for its protection but the Christians were banished and their defenses leveled by Sultan Kala'un. In the 16th century Laodicea was almost non-existent but the establishment of the tobacco trade in the 17th century gave new life to the town, and tobacco raising is still its chief industry, although it also exports silk, oil, sponges and eggs. Pop.

(estimated) 25,000.

LATEAU, la'to, Louise, Belgian vision¬

ary: b. Bois d'Haine, 30 Tan. 1850; d. 25 Aug.

1883. She entered the Third Order of Saint Francis of Assisi and after a vision of Christ which appeared to her in 1868 she was said to be stigmatized with wounds which bled on Fridays, although Belgian medical authorities pronounced the case stigmatic neuropathy.

Bishop Dumont of Tournav believed the young woman's case a miracle. When he was later deposed Lateau left the Roman Catholic com¬

munion. Consult Rohling, A., (Louise Lateau, die Stigmatifirte von Bois d'Haine> (1874).

LATENT FAULT or DEFECT, legal

term used in the law of sales and in personal injury law. In the law of sales a purchaser is guarded against a blemish or defect not ap¬

parent or fraudulently concealed at the time of purchase. The seller does not impliedly warrant against latent defects in goods not of his own manufacture, but is bound to disclose latent defects known to him. In the law of injury a lender may be held responsible for damages for an injury incurred by; the bor¬

rower in the use of a borrowed article whose defects were not made known. However, an employee or third party is not bound to take notice of defects in the article or appliance loaned. If an appliance is hired to another it carries with it an implied guarantee against latent defects: and in case of a carrier every test dictated by the utmost possible care must be made. In English law there is a provision in a bill of lading exempting an owner 'from liability for damages incurred through latent

or undiscovered defects, such as leakage through a defective rivet in a water-tank, or a defective rivet in the hull, unknown to the owner at time of sailing.

LATERAL MORAINE. See Moraine.

LATERAN, palace and church at Rome.

The name is derived from Plautius Lateranus, head of a rich patrician family whose estates were confiscated by Nero, while he himself was put to death for complicity in the con¬

spiracy of Piso. The palace afterward be¬

came an imperial residence, but was given to Pope Melchiades in 312 by Constantine the Great, and thereafter was the residence of the popes for a thousand years. Only fragments of the palace of Constantine remain. Above is a chapel so sacred that none but a pope may officiate at its altar, and none but priests wor¬

ship within its walls, and containing a portrait of our Lord known as the

or portrait not made with hands, traditionally begun by Saint Luke and finished bv an angel.

At one end of the dining hall called the Triclinium, in a building attached to the con¬

vent of the Passionist fathers, is the Scala Santa, or Holy Stair, reported to be that of Pilate's house, made holy by the feet of our Lord as he passed to judgment. The rest is more recent, the palace having been rebuilt from designs of Fontana by Sixtus V. The palace also contains notable museums of Christian and pagan antiquities.

LATERAN COUNCILS, five ecumenical

councils of the Roman Catholic Church, held in the church of Saint John Lateran, Rome, under the presidency of the Pope. The first Lateran Council, attended by 300 bishops, took place in 1123, under Calixtus II. The Con¬

cordat of Worms (the agreement between the emperor and the Pope) was confirmed; the indulgences granted to the Crusaders by Urban II were renewed; the consecrations performed by Burdin, the anti-pope, were annulled; the decrees against simony, marriage of the clergy, etc., were repeated. The second (1139), under Innocent II, attended by 1 000 bishops, laid the interdict upon King Roger of Sicily, ex¬

communicated the Petrobrusians, and ordered Arnold of Brescia to keep silent. The third (1179), under Alexander III, decreed that a vote of two-thirds of the total conclave should be required legitimately to elect a pope. The fourth, convened by Innocent III in 1215, is the most important of all the Lateran Councils.

Besides representatives of many princes, two Oriental patriarchs were present, 412 bishops and 800 abbots and priors. Seventy decrees were issued.

The first, directed against the Cathari and Waldensians, contains a confession of faith, in which the term transsubstantiation occurs for the first time. The second decides the Trinitarian controversy between Petrus Lombardus and Joachim of Floris (in favor of the former). The 13th forbids the foundation of new monastical orders. The 21st decrees that all the faithful shall confess at least once a year to his sacerdos proprius (Mansi xxii 953-1086). The fifth (1512-17), which was convened by Julius II and continued in 1517

under Leo X, and was not recognized by the Gallican Church, abrogated, on the command of Julius II, the Pragmatic Sanction issued by the Council of Pisa, and approved the con¬

cordat between Francis I of France and the Pope by which the ^liberties® of the Gallican Church were abrogated. Consult Valentini, (Basilica Lateranense descritta ed illustrata) (1839); Buddeus, (De Conciliis Lateranensi-

bus,> Jena (1725) ; von Kefele, (Concilien-

geschichte) (9 vols., Freiburg 1855-90).

LATERITE, a highly ferruginous, argil¬

laceous rock or soil, found in India. The laterite of the highlands results from the weathering of the underlying volcanic rocks in situ. (

rock of the extensive low lands near the western coast; is formed from the debris of volcanic rocks of the region and of highland rocks. True laterite is a mixture of ferric hydroxide and aluminum hydroxide, with a small amount of free silica. It differs from true clay, in that the aluminum is present as a hydroxide, instead of as the silicate, kaolinite.

Laterite is sometimes rich enough in iron to constitute an ore of that metal.

LATEX. The name, Latex, was first ap¬

plied to certain plant juices which have a white, milky appearance. The white juice of the common milkweeds (Asclepias) is a familiar and typical example. The applica¬

tion of the name was then extended to cover similar juices which lack the whitish appear¬

ance, like the colorless, slimy juice of the Spider Lily {Trades cantia) .

The latex is contained in cells which are often remarkable for their length and com¬

plexity. In many families of plants, like the Asclepiadacece (Milkweeds) and Eupliorbiacece (Spurges), the latex cells are differentiated early in the development of the embryo and continue to grow as the embryo develops into the seedling and into the mature plant, and may finally reach a length of many yards. Conse¬

quently, they are the longest cells in the plant kingdom. They may branch profusely, but no transverse partitions are formed and, therefore, Fig. 1.

they are regarded as unicellular vessels. A portion of a single latex cell is shown in Fig. 1.

The wa^s tatex cells are generally

smooth and thin and more or less elastic.

During growth, they weave in and out among LATHAM

the other cells but do not penetrate them. A small portion of a latex cell surrounded by other cells is shown in Fig. 2.

Fig. 2.

Not all of the latex carrying structures are formed in the way just described, for the partitions in rows of cells may become dis¬

solved, so that long vessels are formed, the process being like that involved in the forma¬

tion of the woody vessels which carry ordinary sap. Whether formed from a single cell or from rows of cells by the breaking down of partitions, long continuous tubes are developed.

If there were any transverse partitions, they would interfere with the free flowing of the latex.

The contents of t*he latex tube or vessels are as varied as the plants which contain them.

There is a rather thin layer of protoplasm lin¬

ing the wall and containing manv nuclei and various inclusions, while the hollow part of the vessel contains most of the latex. The consistency of the latex varies, but it is usually a milky sap which flows easily. It contains mixtures of gums and resins, rubber, fat and wax in emulsion. Sometimes there are tan¬

nins, salts, ferments and poisonous alkaloids.

In the Euphorbiaccce there are also starch grains. Rubber is such an important form of latex that it is treated under its own heading.

The great Euphorbia trees of South Africa, when cut into with an ax, exude great quanti¬

ties of a sticky, milky latex which might be of commercial importance.

When a plant containing latex is injured, the latex flows out and quickly coagulates as it is exposed to the air. The latex of Euphorbia splendens, a plant very common in the cactus rooms of greenhouses, will pull out into threads as fine as cobwebs, within a minute from the time the cut is made; but in such a small plant the elastic material is not in sufficient quantity to be of any commercial value. In some plants, especially in the flower clusters, the latex tubes are very close to the surface and

the tissue covering them is very thin and delicate, so that creeping insects break through LATHROP 763

and are held by the rapidly coagulating latex and thus prevented from reaching the nectar, which is reserved for flying insects which can effect cross-pollination. Consult Molisch, H., (Studien fiber den Milchsaft und Schleimsaft der Pflanzen) (1901). Various textbooks on botany have paragraphs on latex.

Charles J. Chamberlain.

LATHAM, la'tham, John, English orni¬

thologist : b. Eltham, 27 June 1740 ; d. Winches¬

ter, 23 Aug. 1837. He studied anatomy under Hunter, engaged in the practice of medicine at Dartford, and in 1796, upon inheriting a fortune, retired in order to devote his time to nature study. He was elected to the Royal Society in 1775, and was active in the estab¬

lishment of Linnean Society in 1788. He was closely associated with the leading scientific men of his day, and made a notable collection of birds. His last work, the (General History of Birds, J was written in his ninth decade, and the illustrations were designed, etched and colored by the author. It is his most im¬

portant work and is referred to by ornithol¬

ogists as an authority for the assigned names of species. Although Latham has acknowl¬

edged faults as a compiler the work is a re¬

markable achievement. Author of (A General Synopsis of Birds) (3 vols., 1781-85) ; (Index Ornithologicus sive Systema Ornithologiae) (2

vols., 1790; ed. Johanneau, Paris, 1809) ; Gen¬

eral History of Birds* (11 vols., 1821-28), etc.

LATHAM, Robert Gordon, English eth¬

nologist and philologist : b. Billingborough, Lincolnshire, 24 March 1812; d. Putney, Surrey, 9 March 1888. He was educated at Eton and Cambridge and became professor of English literature in University College, London. He published numerous works on the English tongue, among them (The English Language*

(1841; frequently republished); (History and Etymology of the English Language* (1849) ; 'Handbook of the English Language) (1851) ; (Elements of Comparative Philology) (1862), and a revised edition of Johnson's Dictionary (1870). His principal works on ethnology are (Natural History of the Varieties of Man*

(1850); 'Man and his Migrations1* (1851); 'Ethnology of the British Islands) (1852); 'Ethnology of Europe* (1852) ; 'Descriptive Ethnology* (1859) ; (Russian and Turk*

(1878).

LATHROP, la'throp, Francis, American

decorative artist and portrait painter : b. at sea near the Hawaiian Islands, 22 June 1849: d. Woodcliff, N. J., 18 Oct. 1909. He studied under T. C. Farrar in New York, at the Royal Academy, Dresden, in 1868, and in 1870-73 under Madox Brown in London, and assisted William Morris, Spencer Stanhope and Edward Burne-Jones in the execution of vari¬

ous works. He returned to New York in 1873

and' engaged in decorative painting, portraiture and stained glass work. His chief decorative works are in the Metropolitan Opera House, New York; Trinity church and the Bijou Theatre, Boston ; and in the chapel at Bowdoin College, Brunswick, Me. His work also ap¬

pears in many private residences in New York, Albany

and Baltimore. Of his stained glasses notable examples are those of the Marquand Memorial in Princeton College

chapel, and in Bethseda church, Saratoga.

He was one of the founders of the Society of American Artists and an associate of the National Academy of Design.

LATHROP, George Parsons, American

author: b. Oahu, Sandwich Islands, 25 Aug.

1851 ; d. New York, 19 April 1898. He was educated in New York and in Dresden, study¬

ing in the latter city from 1867 to 1870, when he returned to New York and for a short time studied law. He went to England and there, in 1871, married Rose, second daughter of Nathaniel Hawthorne. (See Lathrop, Rose Hawthorne). From 1875 to 1877 he was as¬

sistant editor of the Atlantic Monthly, editor of the Boston Courier till 1879; resided after¬

ward at Concord, Mass., and in New York.

Among his writings in prose and verse the fol¬

lowing are best known: (Rose and Roof-Tree, >

poems (1875); (Study of Hawthorne) (1876); < Afterglow, > a novel (1876) ; (A Masque of Poets) (1877) ; (An Echo of Passion) (1882) ; (In the Distance) (1882) ; (Spanish Vistas) (1883); (History of the Union League in Philadelphia* (1883) ; 'Newport* (1884) ; Gettysburg, a Battle Ode) (1888) ; (Dreams and Days,* verses (1892) ; Gold of Pleasure) (1892). With his wife he published (Annals of Georgetown Convent* and (A Story of Courage* (1894), and he brought out an edi¬

tion of Hawthorne's works, with a biography (1883). The American Copyright League was founded (1883) by Lathrop.

LATHROP, John (also LATHROPP,

LAYTHROP), American clergyman : b.

Yorkshire, England; d. 1653. He was edu¬

cated at Oxford ; took holy orders ; was rector at Egerton in Kent; and about the year 1624, in London, became minister (succeeding Henry Jacob) of the first Independent and Congrega¬

tional church organized in England. He and his congregation underwent annoyance and persecution at the hands of churchmen, and for a time (1632-34) Lathrop was imprisoned.

During his confinement he was bereft by the death of his wife and by a division in his flock over a question of baptism, and in 1634

sailed to Massachusetts, where he settled as minister at Scituate, removing in 1639 to Barnstable. The records of these towns kept in ((an original register** written by him are re¬

ferred to as authority by Prince in his (Annals of New England.*

LATHROP, John Hiram, American edu¬

cator: b. Sherburne, N. Y., 22 Jan. 1799; d.

Columbia, Mo., 2 Aug. 1866. He was gradu¬

ated at Yale in 1819; from 1822 to 1826 was tutor there ; adopted the profession of law, which he followed for six years, then aban¬

doned it for that of teaching. He taught at Norwich, Vt., and at Gardiner, Me. Between 1829 and 1840 held professorships of mathe¬

matics, natural philosophy, law, history and

economics at Hamilton College; was president of the University of Missouri 1840-49; after¬

ward became chancellor of the University of Wisconsin (1849-59); president of Indiana University (1859-60) ; professor of English literature at the University of Missouri (1860-

62). He was again president of the University of Missouri in 1865, and until the time of his death.

LATHROP, Julia Clifford, American so¬

cial worker: b. Rockford, Ill., 1858. She was

graduated from Vassar College in 1880 and since 1889 has spent much of her time as a voluntary resident at Hull House, Chicago.

She has specialized in the study of the care of the insane, the education of children and in the development of juvenile courts, and has made several tours abroad for the study of methods obtaining in other countries. She served on the Illinois State Board of Charities, was president of the Illinois Society for Men¬

tal Hygiene, vice-president of the Chicago School of Civics and Philanthropy, and was appointed the first chief of the new Children's Bureau in the Department of Labor at Wash¬

ington. She is author of reports and articles on care of the insane, civil service, and of 'The Children's Bureau) (1912).

LATHROP, Rose Hawthorne, American

author: b. Lenox, Mass., 20 May 1851. She was educated in the public schools, having lived during the years 1853-60 in England, where her father, Nathaniel Hawthorne (q.v.), was United States consul at Liverpool (1853-

57), and in Portugal; studied art in Dresden and

London; and in 1871 married George Par¬

sons Lathrop, with whom, until his death, she was associated in literary labors. She has been especially interested in the improvement of conditions for suffering and needy people, and in 1891 established Saint Rose's Free Home for Cancer, and Rosary Hill Home, in New York, where she afterward became head of a Dominican community of the Third Order and directress of a charitable home, her title being Mother Mary Alphonsa. Besides many sketches and stories, her writings include (Along the Shore, * poems (1888), and ' Memories of Hawthorne, * with her husband (1897), with whom she also collaborated in other works.

LATHROP, William Langson, American

painter: b. Warren, Ill., 29 March 1859. He was self-taught in art and has devoted himself to landscape painting. He was awarded the gold medal of the Philadelphia Art Club, won the Webb and W. T. Evans prizes, and was also awarded prizes from the Carnegie Institute and Worcester, Mass. His work is represented in the permanent collections of the Metropolitan Museum of Art, New York; the Carnegie In¬

stitute, Pittsburgh; the Albright Gallery, Buf¬

falo; the National Museum of Art, Washing¬

ton; and the Minneapolis Art Museum. He was elected to the National Academy in 1907.

LATHYRUS, lath'e-rus, a genus of plants of the family Leguminosce, the vetchlings or everlasting peas, which resemble Vicia but have usually fewer leaflets (often two), broader petals, an obliquely truncate staminal tube, and a style longitudinally flattened and bearded on the inner face. The species are numerous and grow in sandy and waste places, or in meadows.

L. pratcnsis, the meadow vetchling, a climbing plant, two or three feet long, with yellow flowers,

is a familiar example in many parts of the northern hemisphere. Another species (L.

maritimus) the beach-pea, is equally wide¬

spread. The roots of L. tuherosus are eatable.

L. sativus and other species are used as green fodder for cattle in India, but are harmful to pigs ; and several species contain a poisonous principal injurious to the human systetm. L.

latifolius and L. sylvestris, of southern Europe iTIMER — LATIN

765

and England, respectively, are botlrennials and known as the everlasting pea. doratus, a native of the East, is a common fl‘ garden plant, with fragrant flowers. L. syiris wag-

neri is grown as a fodder plant iermany, France and the United States. It ds abun¬

dant green forage and when well std is very resistant to drought. Nearly 60 ses of the genus are cultivated for their hande flowers — yellow, red, scarlet, purple an

LATIMER, Hugh, English elate, re¬

former and martyr : b. Thurcast Leicester¬

shire, about 1490; d. Oxford, Oct. 1555.

He was educated at Cambridgtook holy

orders, and by and by began toeach Prot¬

estant doctrine, which led to vrous oppo¬

sition. As one of the represenves of the University of Cambridge, he s lifted Henry VTTT’q Hrmhtc r>n rrali/Jitrr m

university ot uamDridge, ne sufiea ucui; VIII’s

doubts on the validity ots marriage with Catharine of Aragon; was ide chaplain to the king in 1530, and bishop- Worcester in 1535. In 1539 he resigned hLshopric, not being able to accept the Six Anes, and was put in prison, but on the access of Edward VI he was released and becameghly popular at court. This continued until ary ascended the throne, when Latimer was ed to appear, with Cranmer and Ridley, befc a council at Oxford, and condemned. Af much delay

and a second trial Latimer a Ridley were burned at the stake. His dig words are famous: ((Be of good cheer, M;er Ridley, and play the man ; we shall this

R. M. Carlyle (1899).

LATIMER, James Elijah, American clergy¬

man and educator : b. Hartfci, Conn., 7 Oct.

1826; d. Auburndale, Mass., 2 Nov. 1884. He was graduated at Wesleyan liiversity in 1848

and engaged in teaching uni 1861 when he became pastor of the Metbdist Episcopal church at Elmira, having entred the ministry in 1858. He traveled in Euroe in 1868 and in 1870 he was selected as proessor of historic theology in the Boston Uniersity School of Theology. In 1874 he was appointed dean and professor of systematic tleiiogy there, which positions he retained the renainder of his life.

He was a contributor to m; gizines and religious periodicals.

LATIN, The Mech nism of. Under this

heading it is proposed to give a brief descrip¬

tion of the morphology of Latin with a feW

preliminary remarks on the Latin alphabet.

1. The Alphabet. — Originally and even up until

Cicero's time, the Latin language had only 21 characters to represent its sounds.

Toward the end of the republic or the begin¬

ning of the empire the letters Y and Z were introduced from the Greek alphabet in Greek loanwords, so that at this time there were *.3

characters in Latin (6 vowels and 17 con¬

sonants), as follows: „ __ _ _

ABC DEF GHI KLM N OP

QRS T U (V) X Y Z

The 9th and 20th characters, however, had consonantal as well as vocalic values. Unlike the Greek, the Latin alphabet was not borrowed directly from the Phoenician, but through the medium of the Greek alphabet of the Doric-

Chalcidian colony of lower Italy.

2. The Parts of Speech.— In Latin there are the following parts of speech: noun (which includes substantives and adjectives), pronoun, verb, adverb, preposition, interjection and con¬

junction. Numerals are considered as adjec¬

tives or adverbs accordingly as they are cardinals or ordinals. Participles partake o the nature and functions of both the adjective and the verb. Words which undergo a change in form to indicate a change in meaning are said to be inflected. The last .four parts of speech mentioned above are uninflected. Ine inflection of nouns and pronouns is called de¬

clension ; that of verbs, conjugation. .

3. Gender, Number and Case. — In Latin one and the same nominal form indicates simul¬

taneously gender, number and case without any of these categories having a distinctive mark.

A. Gender. — There are three genders in Latin: masculine, feminine and neuter. It is difficult, however, to foretell a priori what would be the gender of a given word. In gen¬

eral masculine and feminine mark a difference of sex, and neuter denotes inanimate objects, but there is also a grammatical gender which must not be confused with the natural gender.

B. Number. — Latin distinguishes two num¬

bers : singular and plural. The dual, which in Indo-European served to designate two objects, has completely disappeared, although there are traces of some dual forms, such as duo ana ambo, which however are treated as plurals.

C Case — Latin possesses six cases : nomina¬

tive, genitive, dative, accusative, vocative and ablative. The ablative was formerly, a local case and with it is confused a case primitively distinct, the instrumental or case of accompani¬

ment and of means. There are also some traces of a locative case, now lost. The use of prep¬

ositions with some of the cases supplies some deficiencies of the mere cases in expressing word relationship. The functions of the cases are as follows: ,

nominative . case of subject or of

predicate attribute

genitive . case of complement

& of noun, whether

subjective or objec¬

tive

dative . case of person or

thing interested

accusative . case of direct com-

plement of verb, ot

extent of space and

duration of time ; of

limit of motion

vocative . case of direct address

ablative . case of point of.de-

parture or origin

instrumental ablative., case of means, instru¬

ment, manner and

accompaniment

locative ablative (in . , . ,

nnrt) . case of place in which

Inrative . case of time at which

l0CatlVC . or place in which

LATIN

It is characteristic of Latin that from the very beginning there is a tendency to reduce the number of cases. In the singular the instru¬

mental has disappeared, the locative has only a precarious existence and the vocative and nom¬

inative tend to be confused. In the plural Latin never had but one form for the dative, ablative, instrumental and locative, not to mention the single form for the nominative and vocative, whose identity goes back to the Indo-Euro¬

pean.

4. The Noun. — Variation of accent plays no part in the declension of Latin nouns, for since prehistoric times Latin had an accent at Singular.

The declension of neuter nouns differs a little from the paradigm below in the nominative, vocative and accusative cases, which in the plural always end in -a.

5. Pronouns. — Pronouns in Latin fall into five chief classes: personal (including posses-

sives), demonstrative, relative, interrogative and indefinite. Although in many respects pro¬

nouns do not differ to a great extent from nouns in declension, they have essential char¬

acteristics which show clearly that they have their own declension. This is particularly true of personal pronouns whose declension is therefore given here:

Plural.

1

2

3

1

2

3

nominative

ego

tu

(demonstrative)

nos

VOS

(demonstrative)

genitive

mei

tui

sui

nostrum, nostri

vestrum, vestri

sui

dative

mih!

tibjf

sib?

nobis

vobis

sib!

accusative

me

te

se, sese

nos

VOS

se, sese

ablative

me

te

se, sese

nobis

vobis

se, sese

a fixed place, and the displacements of the Indo-European movable accent, of which some traces are found in Greek, have entirely disap¬

peared in Latin. Moreover, the Indo-European variation of the quality or quantity of stem-

vowels, a phenomenon called ablaut or vowel gradation, which is not preserved intact in any one language, leaves but few traces in Latin.

The Indo-European noun was composed of a stem, to which was added an ending which, concurrently with the vocalic variations of the stem, marked at once the number, gender and case. Since the vocalic variation of stem was almost entirely eliminated in Latin, Latin declension is to be recognized by the endings.

The Latin grammarians laid down five types of declension according to the relation between the nominative and genitive :

1

2

3

4

5

nom.

gen.

rosa

rosae

dominus

domini

dux

ducis

mens

mentis

classis

classis

manus

manus

dies

diei

This distinction is very artificial, although it is always taught. The following paradigm shows the case-endings of the five declensions : 6. The Verb. — The conjugation of the Latin verb depends entirely upon the contra¬

distinction of two stems, that of the present and that of the perfect. Related to the latter is the stem of the verbal adjective in to, which serves notably to form the perfect of the passive and of deponents. The contradis¬

tinction did not, at least originally, imply an entirely temporal idea, but merely an action viewed as uncompleted or completed respec¬

tively. Moreover, the two stems were at first independent of one another, but, as the lan¬

guage developed, they were gradually linked to¬

gether (conjnngere) as parts of the same sys¬

tem and parallel temporal forms based upon each of the two stems appeared.

In the conjugation of the verb there are two voices : active and passive. The active indi¬

cates a fact, an action, a state pure and simple.

The passive has a double meaning: 1, imper¬

sonal, with the meaning of the indefinite sec¬

ond or third person; and 2, a middle-passive, expressing, as in Greek, that the subject is in¬

terested in the action expressed by the verb, often with a reflexive sense. A certain number of verbs of middle or active meaning have only passive endings; these are called deponents.

As regard forms, the conjugation of the verb 1

2

3

4

5

nominative

rosa

dominus

dux

mens

classis

manus

dies

genitive

rosae

domini

ducis

mentis

classis

manus

diei

dative

rosae

domino

duel

menti

classi

manui

diei

accusative

rosam

dominum

ducem

mentem

classem

manum

diem

vocative

rosa

domine

dux

mens

classis

manus

dies

ablative

rosa

domino

duce

mente

classe

manu

die

Plural.

1

2

3

4

5

nominative & vocative

genitive

dative & ablative

accusative

rosae

rosarum

rosis

rosas

domini

dominSrum

dominis

dominos

duces

ducum

ducibus

duces

mentes

mentium

mentibus

mentes

classes

classium

classibus

classes

manus

manuum

manibus

manus

dies

dierum

diebus

dies

distinguishes personal and non-personal forms.

I he f ormer, which are the more important, comprise the tenses and moods provided with personal endings; the latter, declinable or in¬

declinable forms which by their origin and their morphology are attached to the substantive.

Personal forms comprise three moods: in¬

dicative, or mood of reality or affirmation ; im¬

perative, which serves to give orders; and sub¬

junctive, or mood of subordination, which marks will and anticipation and in Latin also wish, possibility and condition. Each of the stems has three tenses in the indicative : present, imperfect or past, and future; the imperative has no past and the subjunctive no future or future perfect. Each of these tenses has two numbers: singular and plural; there is no dual.

Each of these numbers has three persons: first, second and third (except the imperative which has not the first).

Non-personal forms comprise: a, verbal

substantives: infinitive (present and perfect in the two voices), gerund and supine, which form a sort of declension of the active infinitive; and b, verbal adjectives: participles (present and future active, perfect and future passive).

Latin has not merely one conjugation, but it is difficult to find a satisfying classification.

The distinction into four conjugations, imagined by the Latin grammarians and still in use in the teaching of Latin, takes into account only the present and even here unites two different formations. In the perfect it is even altogether improper. But the division into thematic and non-thematic or athematic verbs is equally un¬

satisfactory. The four conjugations now gen¬

erally adopted in teaching are those whose stem ends in -a (first conjugation), -e (second con¬

jugation) and -l (fourth conjugation), together with the third conjugation which includes, among others, all those verbs whose stem ends in a consonant and requires a thematic vowel to join it to the personal or tense endings.

There are quite a few verbs which do not fit into these artificial categories, such as sum (((I am®), volo («I wish®), fero («I bear®), etc.

The personal endings of all the tenses (in¬

dicative and subjunctive) in the active voice except the perfect indicative are :

Person.

Singular.

Plural.

-d or -m

-mus

2

-s

-tis

3

-t

-nt

The personal endings of all the tenses findica-

tive and subjunctive) of the

present stem in

the passive and

in deponents

are :

Person.

Singular.

Plural.

1

-r

-mur

2

-ris or -re

-mini

3

-tur

- ntur

The personal endings of the perfect indicative tense in the active are :

Person.

Singular.

Plural.

1

-i

-imus

2

-istx

-is tis

3

-it

-erunt, -ere

The personal endings of the tenses (indicative and . subjunctive) of the perfect stem in the passive and in deponents are formed by the participle and the auxiliary verb.

Bibliography.— Bennett, Charles E.,

(Strassburg 1902) ; Hale, W. G., and Buck, C. D., (A Latin Grammar> (Boston 1903) ; Kuhner, Raphael, (Ausfuhrliche Grammatik der lateinischen Sprache) (2d ed., Vol. I, Han¬

over 1912) ; Lindsay, W. M.,

gua ge> (Oxford 1894); Roby, (Latin Gram-

mar>; Sommer, F., (Lateinische Laut- und

Formenlehre* (Heidelberg 1902).

Herbert F. Wright,

sometime of the Department of Latin , The Catholic University of America.

I

hit/ a

■

. .. ■! .1.) ot »\ <(T .ivy) • . ' , '' 1 '

.0 J

: ■ r . ' '

,

'

. .nil i rz I , • a!

mm* *'a- o

'.Vs-.

tit-

V

:>ilj Ik io i '

ni moi

.'fi-a I'i AnliA

tvs A- t"

vt- *10 *m- . S

tuV.s- i

f)vilin:L>a: JDyhvq lo a o i. i :-;l .

*a-. l«\ •

*•

'it';-

t/ianinri) ■ r: •!•')' ' :'fT '/■ ■'

aril ni u . !

f.. \i vji i- . . *

9ftr> ,4 »h o ,i

, • ■ n '• 1 ; 1

' v iat'S '0 ' 1 '

: ./■ .

; '[f)!?. i) ' t • • '

• - i . in 0 s-

• u] ,i v ,.b?i i)<

I I ' . ■ 1 :

) mi v- ! ir;' . : 1 1

.1/ .

. .

r0tVv! .-.'..'..A . . 1

.a at Jiuk \o Vtk t » /ns .

.

.

-rtf 7 , DKkf.'hob /V /!•>/ a fUStto a n <

i

< ' : ' ' I a: • - ; !

io on

owl

. : *>'•• J ; i / Tmfmfflfll

r‘ , : • ’ *f • ■ ■ nuX

ni losl'i btn im- rq

■

; o ' ‘ ; : '

Jri08fnq) -im.q : : iw vql'fi >v

nilt ,» It: -ii. ’■ i 'A' vri

s . - ■ - -fer t

In : ii •• ni '>«|«VN|tnJ

r.marll-tKWI

•

•i* < no^|fllM|

. -. ':■<.! >iIk> yntitA

3, r .?> ' 7 - . •

Vol. 17, LATIN AM TO LYTTON

Americana

m

12

■ v

-fV

COPYRIGHT DEPOSIT.

Copyright w:

£

■‘V-.

- oww

• Vv»

.

mem?

I

I

i

$

i

I

i

\

i

I

1

d

THE

ENCYCLOPEDIA

AMERICANA

JT

IJg,nM(y

Uriveesal

MˆOWLEDGEj

In Thirty Volumes

> > ’ 3 J

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK. CHICAGO

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 1 8 1922

45ˆ4654317

I

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XVII

ALDEN, RAYMOND M., Ph.D., Litt.D.

Professor of English, Leland Stanford Junior Uni- * versity

LETTERS IN LITERATURE LITERARY FORMS LYRIC POETRY

AUSTIN, OSCAR P., M.A.

Statistician of the National City Bank of New York and Secretary of the National Geographic Society

LATIN AMERICA — INDUSTRIAL DE¬ VELOPMENT AND COMMERCIAL PRODUCTS

AYRES, SAMUEL G., B.D.

Garrett Biblical Institute

LECTURESHIPS

BEER, WILLIAM

Librarian, Howard Memorial Library, New Orleans

LOUISIANA

BOUCKE, EWALD A., Ph.D.

Professor of German and Scandinavian, University of Michigan

LITERATURE, COMPARATIVE

BRANDON, EDGAR EWING, A.B., A.M.

Dean of Miami University

LATIN AMERICA — EDUCATION IN LATIN AMERICA

BREWSTER, WILLIAM T., A.M.

Provost of Barnard College, Professor of English, Columbia University.

LORNA DOONE LUSIADS, THE

BROOKE, TUCKER, M.A., Litt.B.

Professor of English, Yale University

LOVE'S LABOUR'S LOST

BUCHANAN, MILTON A., Ph.D.

Professor of Italian and Spanish, University of Toronto

LIFE IS A DREAM

CANFIELD, ARTHUR G., Ph.D.

Professor of Romance Languages, University of Michigan

LE ROUGE ET LE NOIR LEARNED LADIES, THE

CLEMENTS, FREDERIC E., B.Sc., Ph.D.

Head of the Department of Botany, University of Minnesota

LICHENS

CORNYN, JOHN HUBERT, B.A., LL.B.

Editorial Staff of The Americana

LATIN AMERICA — LATIN AMERICAN LITERATURE

LEON, FRAY LUIS PONCE DE LYCEUM

COUMBE, CLEMENT W.

Technical Art Expert

LAUREL IN ART AND SYMBOLISM LION IN ART

CUSHMAN, ROBERT EUGENE, A.B.

Associate in Political Science, University of Illinois

LAW MERCHANT, THE LEGISLATION, DIRECT LEGISLATIVE REFORM

CUTLER, FRANCES W., M.A.

Instructor in English, Vassar College

LIGHT OF ASIA, THE

DANA, JOHN COTTON, A.B.

Librarian, Public Library, Newark, N. J.

LIBRARIES, SPECIAL

DEWEY, MELVIL, LL.D.

Author of “ Decimal Classification and Relativ Index,” etc.

LIBRARY ADMINISTRATION

DOLE, NATHAN HASKELL, A.B.

Author, Editor and Translator

LIZA

DOW, CHARLES M.

Director of Letchworth Park and Arboretum

LETCHWORTH PARK AND ARBO¬ RETUM

DRUM, WALTER, S.J.

Professor of Scripture, Woodstock College, Wood- stock, Md.

LOYOLA

DUNN, WALDO H., M.A., Litt.D.

Professor of English, College of Wooster, Wooster, Ohio

LIVES OF THE POETS

EGAN, MAURICE FRANCIS, Ph.D., LL.D.

Former Envoy Extraordinary and Minister Pleni¬ potentiary to Denmark.

LEO XIII

EGGERT, CARL E., B.Ph., Ph.D.

Assistant Professor of German, University of Michigan

LUCIAN

EISELEN, FREDERICK CARL, Ph.D., D.D.

Professor of Old Testament Interpretation, Garrett Biblical Institute

LEVITICUS, BOOK OF

EISERHARDT, EWALD, Ph.D.

Professor of German, University of Rochester

LIED VON DER GLOCKE, DAS

ESTES, DAVID FOSTER, D.D.

Professor of New Testament Interpretation, Colgate University

LUKE

LUKE, GOSPEL ACCORDING TO

FAIRLIE, JOHN A., Ph.D.

Professor of Political Science, University of Illinois

LOCAL GOVERNMENT LOCAL OPTION

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

LATIN AMERICA — THE MINERAL INDUSTRY

LATIN AMERICA — THE RUBBER IN¬ DUSTRY

FIRMIN, GEORGE

General Manager, Little Rock Board of Commerce

LITTLE ROCK, ARK.

FISH, DANIEL

Judge, District Court, Minneapolis; author of “Lincoln Bibliography,” etc.

LINCOLN, ABRAHAM

FUERBRINGER, LUDWIG E., D.D.

Professor of Theology, Concordia Theological Sem¬ inary, Saint Louis, Mo.

•LUTHERAN CHURCH IN AMERICA

GARNER, JAMES WILFORD, Ph.D.

Professor of Political Science, University of Illinois

LAW, CONSTITUTIONAL LAWS OF WAR, THE LEGISLATION LEGISLATURE

GAUSS, CHRISTIAN, Litt.D.

Professor of Modern Languages, Princeton Uni¬ versity

LION OF FLANDERS, THE

GOMME, G. L., F.S.A.

Clerk to the London County Council.

LONDON, ENGLAND

(Revised by D. S. Douglas, Toronto)

GRAHAM, W. B.

Trade Expert, Latin American Division, Washington D. C.

LATIN AMERICA — CATTLE AND MEAT INDUSTRY LATIN AMERICA — HIDES AND LEATHER

LATIN AMERICA — RICE PRODUC¬ TION

LATIN AMERICA — THE TOBACCO INDUSTRY

LATIN AMERICA — WOOL INDUSTRY

GRAVES, REV. CHARLES

Hartford, Conn.

LIBERTY, RELIGIOUS LIBERTY OF THE PRESS

GUITERMAN, ARTHUR, B.A.

Author and Critic

LIGHT THAT FAILED, THE LITTLE MINISTER, THE

HALLER, WILLIAM, Ph.D.

Instructor in English, Columbia University

LAYS OF ANCIENT ROME

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

LAVENGRO

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor, Department of German Lan¬ guage and Literature, College of the City of New York

LENAU, NIKOLAUS LUDWIG, OTTO

HASTINGS, CHARLES S., Ph.B., Ph.D.

Sheffield Scientific School, Yale University

LIGHT

HEMELT, FRANCIS J.

Associate Professor of English Language and Liter¬ ature, Catholic University of America

LOISY, ALFRED FIRMIN

HIBBEN, JOHN GRIER, Ph.D., LL.D., L.H.D.

President of Princeton University

LOGIC

HOLLAND, W. J., Ph.D., Sc.D., LL.D.

Director of Carnegie Museum, Pittsburgh, Pa.

LEPIDOPTERA

HOLMAN, C. VEY, LL.M.

Lecturer on Mining Law, University of Maine

LAW, AMERICAN SCHOOLS OF

HOWARD, WILLIAM G., A.M.

Assistant Professor of German, Harvard University

LOST PARADISE, THE

Contributors to Volume XVII — Continued

HOWE, WILLARD C.,

Editorial Director of “ Lumber ”

• LUMBER INDUSTRY IN THE UNITED STATES

HUNTINGTON, EDWARD V., Ph.D.

Associate Professor of Mathematics, Harvard Uni¬ versity.

LADD-FRANKLIN, CHRISTINE

Lecturer at Columbia University

LOGIC, SYMBOLIC

INGERSOLL, ERNEST

Zoologist and Author

LEAVES

LIZARD

LUMINOSITY OF ANIMALS ISAACS, ABRAM S., Ph.D.

Professor of Semitic Language, New York Uni¬ versity

LAZARUS, EMMA

LITERATURE, ART AND MUSIC, IN¬ FLUENCE OF THE WORLD WAR ON

ISAACS, EDITH J. R.

LICHTENSTEIN

JACOBY, HAROLD, Ph.D.

Rutherford Professor of Astronomy, Columbia Uni¬ versity

LEAST SQUARES, METHOD OF

JELLIFFE, SMITH ELY, M.D., Ph.D.

Adjunct Professor of Diseases of Mind and Nervous System, Post Graduate Hospital and Medical School; Professor of Psychiatry, Fordham Uni¬ versity, New York

LAVAGE

LUNGS

KLEIN, HENRI F.

Editorial Staff of The Americana

LICHNOWSKY, PRINCE KARL MAX LICHNOWSKY MEMORANDUM

LENNOX, PATRICK J., Litt.D.

Professor of English Literature, Catholic University of America

LOGACEDIC VERSE

LOISEAUX, L. A., B.S.

Associate Professor of Romance Languages and Literatures, Columbia University

LES CHATIMENTS

LUCKIESH, M.

Nela Research Laboratory, National Lamp Works, General Electric Company

LIGHT AND SHADE

mcdaniel, walton brooks, Ph.D.

Professor of Latin, University of Pennsylvania

LATIN WRITERS

McGILLICUDDY, DANIEL J., A.B.

Lewiston, Me.

LEWISTON, MAINE

MEADER, JOHN R.

Labor and Service Department, Brighton Mills, Passaic, N. J.

LIFE EXTENSION

MEEHAN, Very Rev. ANDREW B.

Saint Bernard's Seminary, Rochester, N. Y.

LAW, CANON, THE NEW CODE OF

MORRIS, EDWARD PARMELEE, L.H.D., Litt.D.

Professor of Latin, Yale University

LATIN LANGUAGE, THE LATIN LITERATURE, THE

MUNROE, CHARLES E., S.B., Ph.D.

Professor of Chemistry, George Washington Uni¬ versity, Washington, D. C.

‘ • •

LYDDITE

NASCHER, I. L., M.D.

Author of Geriatrics; Diseases of Old Age and Their Treatment

LONGEVITY

PANARONI, ALFRED G., B.S.

Instructor in Romance Languages, College of the City of New York

LITTLE OLD WORLD, THE

PFEIL, STEPHEN*

Formerly of the Philadelphia ” Press ”

LAW

LAW, MILITARY LEGITIMACY

RAUSCH, FREDERICK

Of Sackett and Wilhelms Corporation, New York

LITHOGRAPHY

RINES, GEORGE EDWIN

Editor of “ The Americana ”

LUTHER, MARTIN

RIX, GEORGE E.

Secretary of Lawrence Chamber of Commerce

LAWRENCE, KANSAS

SAVAGE, ELMER S., B.S., M.S., Ph.D.

Professor of Animal Husbandry. Cornell University

LIVE STOCK SHAW, GEORGE T.

Master and Librarian, The Athenaeum, Liverpool

LIVERPOOL, ENGLAND

- Deceased.

Contributors to Volume XVII — Concluded

SHERMAN, L. A., Ph.D., LL.D.

Of the University of Nebraska

LOWELL, JAMES RUSSELL

STARR, FREDERICK, Ph.D., Sc.D.

University of Chicago

LIBERIA

TAYLOR, A.E., Ph.D.

Professor of Moral Philosophy, Saint Andrew's University, Scotland

LEIBNITZ

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Uni- versity

LONGFELLOW, HENRY WADSWORTH LYCIDAS

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

LETTERS TO DEAD AUTHORS LOCKSLEY HALL

. § »

UNDERHILL, JOHN GARRETT, Ph.D.

Author of Spanish Literature in the " England of the Tudors "

LAZARILLO DE TORMES LOS INTERESES CREADOS LOS SUENOS

VALETTE, MARC DE

Chief, Economics de la Banque de France, Paris

LEGION OF HONOR

VEAZIE, WALTER B., Ph.D.

Department of Philosophy, Columbia University

LEVIATHAN, THE

VERNER, WILLIAM F.f B.S.

Assistant Professor of Mechanical Engineering, University of Michigan

LOCOMOTIVE, THE

WALTER, FRANK K., B.A., M.A.

Vice- Director, New York State Library School

LIBRARY TRAINING

WATKINS, JAMES L.

‘ Statistician, New York City

LATIN AMERICA — THE COTTON INDUSTRY IN LATIN AMERICA
LATIN AMERICA — SUGAR INDUSTRY IN LATIN AMERICA

WEEKS, RAYMOND, Ph.D.

Professor of Romance Languages, Columbia Uni¬ versity

LE CRIME DE SYLVESTRE BONNARD

LE PECHEUR DTSLANDE

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature,” etc.

LE DIABLE BOITEUX

LE GENDRE DE MONSIEUR POIRIER

LES LETTRES PERSANES

LETTERS, THE

LIFE OF JESUS, THE

WIENER, LEO

Professor of Slavic Languages and Literatures, Harvard University

LEAR OF THE STEPPES, A

WILCOX, MARRION, A.B., LL.B.

Co-Editor of Encyclopedia of Latin America

LATIN AMERICA — GENERAL DES- CRIPTON AND
CHARACTERISTICS LATIN AMERICA — LATIN AMERICA AND THE
WORLD WAR LATIN AMERICA — FRUIT TRADE OF LATIN AMERICA

WILEY, EDWIN, Ph.D.

Librarian, United States Naval War Service

LIBRARIES

LIBRARIES, MEDIAEVAL AND RENAISSANCE LIBRARIES, MODERN LIBRARY ARCHITECTURE AND CONSTRUCTION LIBRARY DATA

LIBRARY LAWS AND LEGISLATION IN THE UNITED STATES

WILSON, OTTO

Chief of Latin-American Division, Bureau of Foreign and Domestic Commerce, Washington, D. C.

LATIN AMERICA — TRANSPORTA¬ TION AND COMMUNICATION IN

WRIGHT, HERBERT F., Ph.D.

Sometime of the Department of Latin, The Catholic University of America

LATIN LITERATURE OF THE MIDDLE AGES

LIVES, PARALLEL

YANES, FRANCISCO J., Ph.D.

Assistant Director, Pan-American Union

LATIN AMERICA — CIVILIZATION OF LATIN AMERICA

KEY TO PRONUNCIATION.

••

a

far, father

n

Span, h, as in canon pihon (pen’yon)

(can’yon),

a

fate, hate

ng

mingle, singing

a or

a

at, fat

nk

bank, ink

a

air, care

•

a

ado, sofa

6

no, open

A

a

all, fall

o or 6

not, on

ch

choose, church

6

corn, nor

e

eel, we

6

atom, symbol

e or

e

bed, end

o

book, look

e

her, over: also Fr. e, as in de; eu, as in neuf; and oeu, as in

oi

oil, soil ; also Ger. eu,

as in beutel

boeuf, coeur; Ger. d (or oe), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

oft’, trough

sh

show, sure

g

gas, get

th

thick, thin

‘

gw

•

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

h or

H

Ger. ch, as in nicht , wacht

u or u

but, us

hw

what

u

pull, put

l

file, ice

ii

between u and e, as

in Fr. sur.

Ger. Muller

i or

1

him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

V

of, very

A

1

y

(consonantal) yes, young

•

J

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

n

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents,

to indicate

point, Jean, temps

syllabic stress

; . ‘ (•1-

q j‘i;t ■{ i

Jtjq . Ifiq

,tib-bt -I : ■ i ,

.

.

LATIN AMERICA, a general term given to the countries in South and Central America ; especially those whose in¬ habitants come of Latin linguistic stock. These include inhabitants of Mexico and certain islands of the West Indies. The term Hispanic America has also come into use, embracing both the Portuguese- American inhabitants of Brazil and the Spanish- American inhabitants of other countries of Central and South America, as descendants of natives of the Iberian Peninsula, which under Roman domination was called, as a whole, Hispania. From this point of view the Hispanic Society of America, New York City, the periodicals Hispania and Hispanic American Historical Review, all three deal with matters both Portuguese- and Spanish-Amer- ican. Special information will be found in this section under the following heads :

1. General Characteristics.

2. Civilization of Latin

America.

3. Education in Latin

America.

4. Latin American Litera¬

ture.

5. Latin America and the

World War.

6. Transportation and Com¬

munication in Latin America.

7. Industrial Development

and Commercial Prod¬ ucts of Latin America.

8. Mineral Industry in

Latin America.

9. Cotton Industry in Latin

America.

10. Cattle and Meat In¬

dustry in Latin America.

11. Hides and Leather in

Latin America.

12. Coffee Industry in Latin

America.

13. Fruit Trade of Latin

America.

14. Rice Production in Latin

America.

15. Rubber Production in

Latin America.

16. Sugar Industry in Latin

America.

17. Tobacco Industry in

Latin America.

18. Wool Industry in Latin

America.

1. GENERAL CHARACTERISTICS.

Latin America distinguishes as a group 20 American republics, Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Pan¬ ama, Paraguay, Peru, Salvador, Uruguay and Venezuela. In a still larger sense, but less accurately, as a general term it designates all of the central and southern portions of the New World, continental and insular as well, between the United States and Cape Horn. The total area of the 20 Latin American re¬ publics is about 8,150,000 to 8,200,000 square miles and the aggregate population of the same countries not less than 75,000,000. In each the language of the ruling class is Spanish, except in Brazil, where it is Portuguese, and in Haiti, where it is French or a patois called “creole® But in the central regions of the Western Hem¬ isphere are about 205,000 or 206,000 square miles

with 3,190,000 to 3,200,000 inhabitants not in¬ cluded in any of the Latin American republics. They are held as dependencies by Great Britain, Holland, France or the United States; and to denominate these dependencies “Latin Ameri¬ can® would be misleading.

A few facts may serve to supplement de¬ scriptions in the articles devoted to South America, Central America, Panama, Mexico and the West Indies; to each of the above- mentioned republics, and to their

political sub¬ divisions.

Climate. — Readings of the thermometer, as set down in notes of travel in Latin America, are: At Montevideo, Uruguay, 18 June, 54° F. at 11 a.m. ; Buenos Aires, Argentina, 4 July, 52° F. at 3 p.m. But the average of these two, namely, 53° F., was recorded on the west coast of South America as the lowest figure the mer¬ cury reached during the cold season at Lima — which lies so much nearer than do Buenos Aires and Montevideo to the equator that its range . of temperatures would be decidedly higher were it not for the influence of the cold Humboldt current. In the article Chile ref¬ erence at greater length is made to this cur¬ rent, which is a truly beneficent river of the ocean, constantly tempering and stabilizing the climate along the Pacific coast, flowing north¬ ward and then northwestward along that coast until headlands below the equatorial line throw it straight out to sea, to cool one side of the Galapagos Islands. That is one of the big facts about the climate among others in the same field.

At the confluence of the Paraguay and Alto Parana rivers, 25 July, the thermometer showed 80° F. in the shade at 10 a.m., and about noon of the same day on the Paraguay River, 92° F, in the shade; at Asuncion, Paraguay, 27 July, 84° F. in the shade; in the same city, 28 July, 78° F. at 9 a.m. The circumstance that Asun¬ cion is built on a hill counts for much. Com¬ paring these observations, made in regions re¬ mote from the ocean, with observations at moderate altitudes above the Atlantic coast, a striking difference is noticed immediately. Thus, on the road from the Brazilian port of Santos to Sao Paulo, 14 August, the thermom¬ eter showed only 62° F. at 2 p.m., and in the city of Sao Paulo, 15 August, 61° F. as the average of the forenoon. At Rio de Janeiro (nearly at sea-level), 19 August, we find 72° F. in the afternoon, but only 67° F. at 7-8 a.m., 20 August; and, as the record for the

warmest day of that ˆwinter® season in Rio, 84° F. at 3-4 p.m. A short distance away, at Petropolis among the mountains, we note 63° F. at 7 a.m.; and at an elevation of 1,500 feet above Rio, in the tropical forest clothing the flanks of Corcovado, 29 August, 60° F. at 7 a.m. The fact thus illustrated is, simply, that regions sufficiently elevated to receive quite di¬ rectly the cool and saturated ocean breezes have, even in these latitudes near the Tropic of Capricorn, a climate not given to extremes but favorable to man and vegetation alike. Again, near the

Atlantic coast in lat. 1° 52′ S., long. 38° 45′ W. we read 84° F. at 11 a.m.; in lat. 1° 13′ N., long. 43° 51′ W., 86° F. at 12, noon, to 1 p.m. ; in lat. 8° N., long. 53° 48′ W, 85° F. at 2 p.m. The highest temperatures (in the shade) observed at the equator near the Pacific or Atlantic coasts, either at sea or where the ocean influence controls — 85° or scarcely more than 86° F. — must be called quite moderate. (See comment on this subject in the article Brazil). In the corresponding re-g:ons north of the equator, near the Tropic of Cancer, we appreciate, or resent, most promptly the development of intolerable degrees of heat in regions that are enclosed and far from the sea. For example, we notice en route Oaxaca, Mexico, to Puebla, 14 March, 100° F. in the otherwise comfortable cars of a train running through a valley. It is necessary to remember that the Antillean regions (see Central Amer¬ ica) look out, on one side at least, upon a com¬ paratively restricted and nearly bisected Amer¬ ican Mediterranean, not upon the ocean which plays the part we have mentioned all along the South American east coast; that the trade winds and the Gulf stream visit some portions of this interpolated continental area assidu¬ ously, but are as constantly deflected from other portions; and, partly for this reason, each subdivision of the vast, varied and most interesting Antillean region is the subject of a special study. (See the separate titles). Pan¬ ama, occupying the narrow space between two oceanic elbows, has, as shown by observations in a sheltered building near the centre of the capital during the year, an equatorially limited range of temperatures — from 76° F. to 88° F. But places shut in, even parts of the city of Panama itself, because they lie nearly at sea- level, may have 100° F. thrust upon them when the air-currents from ocean to ocean are inter¬ rupted temporarily.

Climatic Values of Altitude. — Here again in Panama (and this is not less true of the Central American states) we find that even a moderate elevation mitigates the tropically op¬ pressive conditions that are notorious in the lowlands. The importance of this consider¬ ation becomes apparent when we reflect that in much more than one-half of the entire land- area in the New World between the Tropics of Cancer and Capricorn nature assigns the con¬ trol of temperatures to mere altitude or to the almost equally permanent influence of oceanic and aerial currents. But in the vast highlands of Latin America one learns by experience, if be has not learned through previous study, that the pure and rarefied air is bad for any weakness of the heart, and, even when there is no such weakness, produces what is commonly known as soroche (anoxaemia or mountain-

sickness). It is worth while to note quite care¬ fully the effects of the change from sea-level to these great altitudes, since the experience

bears directly upon the question of the value of these uplands as regions where civilized men can live and work successfully. We ob¬ serve, as first effects, that the skin becomes rather dry and the digestive processes are de¬ ranged — with consequent pains and penalties. We must add the following symptoms: lassi¬ tude, loss of appetite, aversion to all forms of physical effort and drowsiness. The heart finds its steady job a bit harder than usual, and one gets out of breath too quickly, the air seem¬ ing to supply the lungs with innutritious food. After a long voyage a traveler in vigorous health suffers to this extent — that is, slightly and for a few days at least — on making a rapid and radical change. But in a week or so these symptoms disappear, the traveler gets acclimated and should find no trouble in mak¬ ing any physical effort that the situation calls for. Quite the contrary, in fact. We enjoyed mountain-climbing, long walks, long and hard riding, at altitudes of about 12,000 feet for sev¬ eral weeks and ranging from 10,000 to 16,000 feet during two months. The impression we receive in regard to the people living in Andean towns (for example) situated at altitudes of 7,000 to 14,000 feet is that they, as a rule, with some exceptions of irregular lives, are not in¬ jured by the climate.

Naturally healthful regions are the follow¬ ing: 1. The extensive region south of a line drawn from ocean to ocean through the cities of Paysandu and Valparaiso, including all of southern Argentina and Chile. 2. The uplands of southeastern Brazil. 3. The Andean habit¬ able districts, including many valleys and cuencas, at altitudes ranging from 6,000 to 12,000 feet. 4. In Venezuela, Central America and Mexico, the districts, often fertile and ex¬ tensive, at altitudes ranging from 2,500 or 3,000 to 7,000 feet, more or less. 5. Portions of the West Indies receiving the full benefit of the trade winds and ocean currents. Unfortu¬ nately it is necessary to note the prevalence of such diseases as typhoid fever in cities and towns whose favorable situation in temperate uplands does not safeguard them against the consequences of neglecting sanitary regulations. The tropical conditions in the low-lying parts of Central America and the northwest coast of South America (to and including the Gulf of Guayaquil) are unfavorable to health chiefly be¬ cause enormous deposits of alluvion and exces¬ sive rainfall offer ideal conditions for the prop¬ agation of disease-bearing insects. Yellow fever and malarial fevers have therefore long been regarded as endemic. Similar conditions are found in the great Amazon Valley and on the tropical Brazilian coast between the Atlantic and the highlands of the interior. Successful efforts to combat and control these fevers have been made at focal points — at Santos and Rio de Janeiro, at Panama, etc. — but much

still re¬ mains to be done. Annual rainfall is most ex¬ cessive in amount at Pernambuco and Iquitos in Brazil, at Greytown in Central America, and in the territory of Magellan, in southern Chile ; it is least on the Peruvian littoral and in north¬ ern Chile (q.v.) ; it is as a rule moderate in the interior of Argentina. Dense fogs, called

gariias, supply the place of rain (but only to a slight extent) in the arid west coast regions just mentioned. Ever since the discovery of the New World the fact has been observed that the most vigorous races gained their de¬ velopment in the extreme south (region number 1) and in the temperate or relatively cold up¬ lands (regions 3 and 4). It is not less interest¬ ing to observe that the most progressive and vigorous element of which we have any record in the early history of Brazil had its home in region number 2. For the exceptionally fine and temperate climate of Uruguay, see the article devoted to that country.

Fauna and Flora. — The highlands of the northern and central portions of Mexico are included in the Nearctic Region and their fauna is classed with that of all temperate and Arctic North America; but naturalists, grouping to¬ gether all other parts of Latin America, in the wider sense of that term, distinguish the group (thus composed of Central America and Panama, the Mexican lowlands, the West Indies and South America) as the Neotropical Region. A valuable study entitled (A Zoolog¬ ical Expedition to South America,) by W. E. Agar (in Royal Philosophical Society of Glas¬ gow Proceedings, Vol. XL, pp. 53-65, 1909), contains an expression of its author’s opinion to the effect that the Neotropical is, of all those regions into which zoologists divided the world in accordance with their fauna, by far the most interesting. And this is true although only four families of the ungulates are represented: the pigs by the peccary, the cervidae by a few species of deer, the camels by the llama, and finally there is the tapir; while the beasts which we may call characteristic of the country are such forms as the opossum, armadillo, ant- eater and sloth, all very lowly organized ani¬ mals.

Our interest in this fauna is deepened when, at the suggestion of the same writer, we ex¬ amine its history in past geological ages. <(The past history of the mammals [in general, i.e., in all regions] shows us that, broadly speaking, most new forms arose in the North Polar regions (which we know were much warmer then than now) and spread thence southwards, exterminating to a large extent the more

primi¬ tive earlier forms, and being sometimes ousted in their turn by new forms migrating south¬ wards. Now, the primitive mammals which

arose in the Northern Hemisphere seem to have reached South America, not across the Isthmus of Panama — for we known that the whole south portion of North America was sub¬ merged at this period — but probably by means of a land connection across the Atlantic with Africa. Whatever may have been the exact

nature of this connection between South Amer¬ ica and the other land-masses of the globe

toward the end of the secondary geological epoch, it is certain that it was soon broken through and that South America was com¬

pletely isolated during the whole of that period in which the most active evolution of mammalia was taking place in other parts of the world. The few low mammals which had reached South America before it became isolated evolved a very peculiar mammalian fauna, including such forms as the giant sloth or Megatherium, and Glyptodonts like gigantic armadillos, which,

however, never reached a very high grade of development, such as the mammals in the more desperate struggle for existence that was going on in other parts of the world were attaining.® But finally a new path of approach to this com¬ pletely isolated continent was constructed. Dur¬ ing the end of the Miocene period the emer¬ gence of the Isthmus of Darien or Panama allowed the influx of more highly specialized forms from the Northern Hemisphere; and accordingly we find that fossiliferous beds dating from this period hold the remains of lions, the sabre-toothed tiger, dogs, bears, llama, deer, horses, tapirs and peccaries — animals that had been abundant in other parts of the globe for ages before, but had been unable to reach South America for the reason mentioned. These invaders ˆestablished themselves to a great extent at the expense of the old typical South American fauna. Remains 6f this original fauna, however, still survive in the opossum, armadillo, ant-eater and sloths, while the new forms, which are now far more abun¬ dant, both in numbers and species, include such forms as the deer, tapir, peccary, puma, jaguar, wildcats, dogs, etc.® Ex-President Roosevelt invites our attention particularly to the fact that South America has the most extensive and most varied avifauna of all the continents. The rhea, or American ostrich, and the fur seal were studied with true interest by Dr. John Augustine Zahm in Uruguay. For the dis¬ tinctive fauna and flora of an important part of the west

coast, see Chile. On the other hand the countries of Central America, forming borderlands between the greater North and South, naturally show some results of the nrox- imity of the former; nevertheless the influence of the latter has been in these respects so much the more potent that Central America is with good reason assigned to the Neotropical Region, as we have said above.

Near the heart of South America, the region called the Chaco is interpolated between the region of great forests and the sabanas and pampas — the last being poor in vegetation while the first is in the same respect almost beyond belief richly endowed: since in that vast Amazonian valley the vegetable kingdom long ago fairly conquered the animal kingdom by expelling or subordinating the most important terrestrial mammals. (Consult Putnam's Maga¬ zine, Vol. VII, pp. 194 —199, New York, Oct. 1909-April 1910). Of course it is still impos¬ sible to say what addition will be made to rec¬ ognized lists of plants by these equatorial South American forests : they have never been more than partially explored; a civilizing reconquest of the fertile areas they usurp has never been attempted systematically. Taken all together they make the Great Forest of the world, shar¬ ing primacy in the list of this world's natural features with the Andes, the greatest of moun¬ tain masses, and with the Amazon's wholly in¬ comparable torrents. We mention here only a few of the best-known natives of widely sepa¬ rated parts of Latin America: Cinchona, mate (Ilex Paraguay ensis) , coca, various rubber-pro¬ ducing forest growths, victoria regia, maize and Agave americana (both presumably Mexican), tobacco (a product of the islands of the West Indies), and potato, claimed as a native by both Chile and Peru. A very early association ex-

isted with the flora of the Eastern Hemisphere; a much more recent connection was established with the North American flora. (See above). Botanic geography will, we think, establish the facts that Latin America's most distinctive and distinguishing possession is its flora and that in this respect, even more — or much more — than in respect to its fauna, its claims will re¬ ward our attention ; and although this is ((by far the most interesting region® to the botanist as well as to the zoologist, we shall find both botanists and zoologists as one in asserting that the primitive geologic union of the South American continent with Africa and Australia explains many phenomena which could not be understood otherwise. Briefly, then, Latin American flora

and fauna, both of surpassing interest, have indeed enjoyed independent de¬ velopment, yet in most ancient times they un¬ doubtedly influenced and in turn were influ¬ enced by the flora and fauna of equatorial, tropical and sub-tropical regions of the East¬ ern Hemisphere.

Languages. — Interesting variations are ob¬ served in the Spanish, spoken and written, which, as we have said, is the language of the ruling classes in 18 of the republics. Thus, in Mexico its characteristics are those of the tongue of southern Spain, but in Costa Rica those of northern regions in the mother coun¬ try; in distant Chile the Castilian linguistic standards are flouted (the substitution of j in place of g being a single example of literary and popular revolt), while Cuba has held fast to the good old Spanish linguistic traditions through all the years of political insurrections and armed rebellion. Ecuador, Colombia and Peru deserve their fame as, in this respect, con¬ servative centres of an inherited culture, where the best usages are appreciated by writers and speakers. The literature of that great country, Brazil, in which Portuguese is spoken, seems to all loyal Brazilians a priceless treasure, even as the manuscript of the ˆusiad* seemed to Camoes : they cherish their language in cor¬ responding degree — somewhat too exclusively.

Governments of Latin America. — The Latin American countries are constitutionally either federal states, resembling most nearly in this respect the United States of America, or are unitary and centralized. The United States of Brazil, the United States of Mexico and the United States of Venezuela more obviously stand in the class first mentioned; Argentina's governmental plan embraces some of the features characterizing each class; the other countries (Republic of Bolivia, Republic of Colombia, etc.) in the main illustrate by their organization the growing Unitarian or centraliz¬ ing tendency: ((Republic of Colombia® was formerly ((United States of Colombia® ; the variations are, however, so complex that we convey only an approximately correct idea of them when we say that the federal form of government in Latin America resembles that of the United States and the centralized that of France. The readers who wish to study this subject closely will find paragraphs on govern¬ ment and constitution in the articles devoted to these countries separately, with careful bibliographic reference to such special works as are available. Frequent constitutional changes are there recorded; but these must not

be regarded as indications of weak vacillation. It is only fair to say that they are to a some¬ what greater extent than we commonly realize paralleled in our own experience, particularly in the matter of State governments (consult Holcombe, A. N., (State Government in the United States,* pp. 119-120, New York 1916) ; that by the middle of the 19th century ((the constitutions of most of the States of the United States had been revised or were in process of revision® ; and that, ˆbeginning in 1870, the constitutions of most of the leading States in the north outside of New England [and in the South after the overthrow of negro domination] were revised, the culmination of the movement being reached in New York in 1894.® Some of the most interesting constitu¬ tional changes in South America (for example, in Paraguay) were designed simply — and wisely — to prevent the recurrence of dictator¬ ships and so to safeguard orderlv development in the future. The dangers in that quarter have often been bravely met and will surely be over¬ come; their magnitude, and the importance of these phenomena in every study of this branch of our subject must be admitted.

But the people who possess the splendid central and southern regions in the New World have determined that whatever im¬ pedes true progress or conflicts with the stabil¬ ity of republican institutions shall have no place in the third great period of national develop¬ ment, which is at hand.

Marrion Wilcox.

2. CIVILIZATION OF LATIN AMER¬ ICA. Latin- American civilization from an Anglo-Saxon point of view may be found wanting in many respects, but the life and happiness of nations, the ideals and hopes of their peoples, their legislation and institutions, are not to be found ready made, but have to be worked out to meet peculiar wants, and in accordance with the racial, mental, moral, climatic and material resources and necessities of each.

Latin America must be dealt with as a whole if one wishes to cast a rapid glance at its civilization. Some of the 20 free and independ¬ ent states which in their aggregate make up Latin America have developed more than others, and a few to a remarkable degree, but whether north or south of the Panama Canal, east or west, on the Atlantic or the Pacific, on the Caribbean or the Gulf of Mexico, the countries of Latin America sprang from the same race — the brave, hardy, adventurous, ro¬ mantic and warlike Spanish and Portuguese conquerors, who fought their way through un¬ known territories,

whether in quest of <(E1 Dorado® or in warfare against whole nations of Indians, as in the case of Mexico and Peru, where the native Indians had a wonderful civilization of their own.

On the other hand, the men who founded the United States, the Pilgrims who first set foot on this new land of promise, and those who followed in the wake of the first settlers, came to the country already prepared, through years of training, to govern themselves. They came to the friendly shores of the New World in quest of freedom. They wanted a home in a new land not yet contaminated with the spirit of the Old World. They brought with them

their creed, their habits of order and discipline, their experience in self-government, their love of. freedom, their respect for the established principles of law. Hence from its inception Anglo-American civilization was built upon solid ground. Its subsequent development — the mar¬ vel of the last half of the 19th and of this 20th century — is due to the solidity of their institutions, their steadfastness of purpose, their practical view of life, and a territorial expanse where all the soils, all the wealth, all the climatic conditions of the cold, the temperate and the tropical zone can be found.

The discussion of Latin- American civiliza¬ tion is of vast importance, since it deals with the history and development of 20 republics lying beyond the Mexican border, and covering an aggregate area of about 8,200,000 square miles, with a total population of nearly 80.000,-000, of whom 54,000,000 speak the Spanish language, 24,000,000 Portuguese in Brazil, and 2,000,000 French in Haiti. This general divi¬ sion brings us at once to deal, under the same classification, with peoples and civilizations springing from different sources, — Spanish, Portuguese and French. Even among the Spanish-speaking countries there are conditions, — depending on the province of origin of the first Spanish colonizers and settlers, who came mainly from Biscay, Andalusia, Castile, Aragon and Estremadura — which tend to establish slight differences and peculiarities just as the various States of the United States show dis¬ similarity due to the sources of their popu¬ lation.

Geographically, Latin America begins beyond the Rio Grande, with Mexico, at the southern boundary of which extends what is called Cen¬ tral America, consisting of Guatemala, Hon¬ duras, Salvador,

Nicaragua and Costa Rica, the historic five Central American states; Panama, the gateway to the Pacific on the west and to, the Caribbean and the Atlantic on the east; South America proper, embracing Venezuela on the Caribbean, Colombia on the sea and partly on the Pacific ; Ecuador, Peru and Chile, bordering on the Pacific; Bolivia and Paraguay, inland states in the heart of South America; Argentina, Uruguay and Brazil on the Atlantic; and, lastly, Cuba, Haiti and the Dominican Republic, islands in the Caribbean Sea. Thus Latin America extends from the north tem¬ perate zone to Cape Horn, near the Antarctic Ocean, which means that all climatic conditions are found in that enormous area from the cool regions of northern Mexico to the tropical heat of the torrid zone and again to the cold lands of Patagonia. This is indeed a world of wealth where all the products of the globe can be successfully cultivated, where all races of man¬ kind can live and thrive, because the Mexican and Central American cordilleras, and farther south the mighty Andean range, offer an un¬ broken chain of lofty peaks, wide yalleys and extensive tablelands, affording all climates and zones, all kinds of soils and minerals, the only limitation to the development of these lands being human endurance. The water supply is plentiful in most parts of Mexico and the Central American republics, and there is noth¬ ing which can be compared to the hydro¬ graphic areas of northern and central South America, consisting of the Orinoco Basin with its 400 affluents, offering a total navigable

length of about 4,000 miles; the mighty Amazon, having three times the volume of the Missis¬ sippi and navigable for over 2,000 miles, and the network of great rivers emptying into it; the Parana and the river Plata, with twice the volume of the Mississippi, and a thousand other streams too numerous to mention in detail, but which can be found on any fairly good map, showing a feasible water route from the mouth of the Orinoco in Venezuela to the Amazon and the very heart of South America, and thence to the Parana and finally down to the river Plata.

It is well known how Columbus discovered this New World which to-day bears the name of America (although the application of that name is quite restricted in this country to the United States) — what hardships that un¬ daunted sailor and his followers had to endure, their sufferings, their hopes and their faith in some supernatural fate, a trait which is due in part to the influence of Moorish ancestors in Spain through the mingling of both races dur¬ ing the occupation wars which lasted over eight centuries. The discovery of America has a tinge of romance, such as inspires the soul of the adventurer and the buccaneer. It was a romance that began at the Rabida, grew in the

presence and with the help of good Queen Isabella, developed into a mad desire for ad¬ venture at Palos, and ended with the planting of the Spanish standard on the shores of Guanahani, now called Watling's Island. From here Columbus went to what is to-day called Cuba, thence to Hispaniola — now divided into Haiti and Dominican Republic — and in this latter island founded the first white settlement in the New World. It is not necessary to follow Columbus' voyages or his adventures step by step, but the discovery of America is an epic worthy of the mettle of the great explorer and his men.

And so the civilization of what is called Latin America began with the first Spanish settlement, the first Indian blood shed by the greed of the white conqueror and the first attempt to Christianize the inhabitants of the new-found land. The inevitable features of conquest — war, treachery, destruction, fire, sword, deeds of valor but little known and endurance almost superhuman — marked along the trail of the discoverers the birth and first steps of the nations of the New World. And in the midst of this turmoil, bravely battling against unknown odds, the Spanish missionary fathers worked unceasingly, founding hamlets and towns, thus planting in the wilderness the seeds of many a large city to-day, building their temples of worship, going from place to place struggling with disease and hunger, teach¬ ing the Indians the Spanish language and with it their religious faith, and laying the founda¬ tion of what is known to-day as Latin America.

The second stage of Latin-American civil¬ ization began when the Crown of Spain finally took an active interest in its new possessions and men of a better class than the soldiery which landed with the discoverers and con¬ querors began to come to the New World, bringing their wives and daughters, and sur¬ rounding themselves with whatever comforts could be had in their new home. They were in many cases scions of noble families, who came either as viceroys, governors or in some

other administrative capacity, or as ˆoidores,® or judges, and men of letters in general. There came also learned monks, and among these, philosophers, poets, musicians, painters and skilled artisans. Hence some of the oldest descriptions and chronicles of Latin America are in verse or in choice prose, either in Span¬ ish or in Latin, and we find in some of the oldest cities in Spanish America wonderful ex¬ amples of wood carving, either in churches or in old houses, beautiful specimens

of the gold and silversmith's art, some fine paintings, and unexcelled samples of the art of illuminating books, particularly missals.

The scholars, either members of the reli¬ gious orders or laymen, began to gather books imported from Europe, and so our libraries were started, mainly in the convents. With this feature of civilization the necessity of educating the children of the Spaniards and the Indians became more pressing, and private schools and seminaries were established, as a first step toward the foundation of universities. Both in Mexico and in Peru schools were founded by order of the Crown of Spain for the education of the Indians, where they learned not only reading and writing, but the manual arts as well.

Latin Americans point with natural pride to the fact that the first university founded in the New World was that of Santo Tomas de Aquino at Santo Domingo, in 1538. This uni¬ versity is no longer in existence, but there still exists that of San Marcos at Lima, Peru, founded in 1551; the University of Mexico, established in 1553 and refounded in 1910; the University of Cordoba, in Argentina, dating from 1613; that of Sucre in Bolivia, founded in 1623, or 13 years before Harvard, which dates from 1636, and that of Cuzco, in Peru, established in 1693, or eight years earlier than Yale, which was founded in 1701. The Uni¬ versity of Caracas, in Venezuela, dates from 1721, and that of Habana, Cuba, from 1728, the other universities founded before the 19th century being that of Santiago, Chile, in 1743, and the University of Quito, Ecuador, in

1787.

The great agent of civilization and progress, the printing press, has been known in Latin America since 1536, when the first printing outfit was introduced into Mexico and the first book printed in the New World, a plea of Father Las Casas for a better life. Cartagena, Colombia, is said to have been the second city of America to have a printing press, in 1560 or 1562, but Peru seems to hold the record for the first book printed in South America, about 1584, and La Paz, Bolivia, had a printing establishment about 1610. There were also a press and other printing paraphernalia at the Jesuit missions of Paraguay, about the first decade of the 17th century. The first work in Bogota was printed about 1739; Ecuador printed its first book in 1760 and Venezuela in 1764, while the earliest production of the Chilean press bears the date of 1776; and there was a printing outfit in Cordoba, Argen¬ tine, in 1767. With the foundation of univer¬ sities and schools and more frequent com¬ munication with Spain and other European countries of Latin origin, and the printing of books and

newspapers in the New World, the

“desire for learning was developed and a new field was opened to intellectual culture.

The dissatisfaction of the colonies with the exactions and abuses of the viceroys, caplains- general and other officials representing the Crown of Spain, jealousies between the ˆcreoles,® or children of Spanish parents born in America, and the peninsulars, or native Spaniards, commercial preference and social distinctions and other petty annoyances born of the arrogance of the Spaniards on the one hand, and the proud nature of the creoles on the other, were the smouldering embers which, fanned by the success of the American Revo¬ lution and the storm of the French Revolu¬ tion, set on fire the Spaniard colonies at the end of the 18th and the beginning of the 19th century. The majority of the Spanish-Ameri- can countries attained their independence be¬ tween 1804 and 1825, and their struggles for freedom, while encouraged by the example of the United States, were inspired by French ideals. The heroes of the bloody but romantic French Revolution, their fiery speeches and fearlessness, their proclamation of the repub¬ lic and the rights of man; the echoes of the Boston Tea Party, the exploits of the spirit of 76, the commanding and serene figure of Washington, the adoption of the American Constitution, the utterances of the grave think¬ ers and inspired orators of the Revolutionary period — all these dazzling examples of patriot¬ ism appealed to the Spanish-American colo¬ nists, and one by one the colonies began their fight for independence. The executions and ignominy which were the lot of the first patriots who forfeited their lives for the cause of independence, instead of discouraging the leaders, made them more aggressive, and they resolved to gain the day at all hazards.

On the most brilliant pages of the history of Latin America are written, among the names of other heroes, those of Miranda of Ven¬ ezuela, the precursor of South American inde¬ pendence ; Bolivar, who has been called the Washington of South America, a born leader, the liberator and father of Venezuela, his na¬ tive country, and of Colombia, Ecuador, Peru and Bolivia; Sucre, also a Venezuelan, more like Washington than was Bolivar; San Mar¬ tin, the great general of Argentina, the brave and heroic liberator of the southern half of South America; Artigas of Uruguay, a man of sterling qualities; O’Higgins, the great Chilean hero; Tiradentes, the forerunner of Brazilian independence; Morelos and Hidalgo in Mex¬ ico, both Catholic priests, and both martyrs to the cause of independence; and scores of others from each country whose names would be meaningless except

to those well acquainted with the history of South America.

Once free from colonial bondage, the new republics, whose political constitutions in the main are based on that of the United States, had to deal with fresh problems arising from changed conditions. The new political entities commenced their independent life heavily handicapped, on the one hand by their eco¬ nomic condition after a period of protracted wars, and on the other hand by a scarcity of population. The unbounded productiveness of Latin America, coupled with the' modest wants of the masses, has been the main cause of the

slow development of most of these countries as manufacturing centres, their chief means of support being agricultural and allied industries and mining. The evolution out of all this chaos has been more rapid in some countries than in others, due to special conditions, among which the principal ones are geographic and topographic position and predominance of the white man.

The leading classes, owners of -black slaves and landlords to the Indian tenantry, lived for the most part in relative ease after the war of independence. Those who did not seek in the army a field for their activities or inclinations devoted themselves to intellectual and scientific pursuits, either in civil life or in the service of the Church. Some went abroad, to' France or Spain preferably, to acquire a general educa¬ tion or to perfect that received at home and to see the world, and on their return bringing new ideas which were eventually adopted and modified as necessity demanded. With the progress of the 19th century Latin America also advanced.

Intellectually, there is no difference between the Latin- Americans and the Anglo-Americans. The literature of Latin America (q.v.) is as rich and valuable as that of any country, yet it is hardly known — not to say entirely un¬ known — in the United States except by a handful of men who have devoted their time to the study of the Spanish language. It is only during the last few. years that a desire to learn Spanish has made itself felt in the United States, and it is most gratifying to note the number of persons now able to read and understand the language and their growing familiarity with things Latin- American. On the other hand, the study of modern languages is compulsory in all of the universities and colleges of Latin America, and absolutely neces¬ sary to obtain certain academic degrees. French

was for a long time the language chosen by the majority of the students, hence the influence of French literature and French thought in Latin America. German was taken up by many, more as a commercial tongue than otherwise. English was preferred by others, rather as an accomplishment than as a lan¬ guage of immediate practical use, but now it has taken, in many cases, the place of Ger¬ man. These two languages have followed the trend of trade, but English is becoming more useful every day in view of the increased re¬ lations of Latin America with the United States, in all spheres of human activity.

The problem of education has always com¬ manded the earnest attention of all the Latin- American governments, to the extent of having made primary education not only free but compulsory. So far as higher education is concerned — that is, all grades above primaiy — there are institutions, either public or pri¬ vate, or both, for secondary and superior edu¬ cation, normal schools, schools of mines, agri¬ cultural and manual training, technological in¬ stitutes, colleges, universities, conservatories of music, academies of painting and sculpture, national or public libraries., museums, etc. — in short, all kinds of institutions devoted to the moral and intellectual uplift of the people.

In each of the Latin-American countries there is a system of scholarships which serves as a practical means of promoting interest in

education. This system provides for support¬ ing abroad for a certain length of time such students and graduates as have won honors, who are sent to Europe and in some cases to the United States, to perfect their education and bring home the latest and most approved methods. Since the present war began students come to the United States who formerly would have gone to Europe to take a post-graduate course in some science or profession. Others are in this country studying and investigating school methods and appliances. At present there are over 1,300 such students -in the United States.

With better means of communication and a desire to expand their trade with Latin America, United States merchants and travelers are visiting intelligently the Latin-American countries, and men of science and learning have, during the last few years, turned their eyes toward that continent, bringing to light the wopders of past ages buried by the sands of Time, and doing justice to a civilization then little known, and only by a few. No better proof of the fact that Latin-American civilization is worthy of note could be had than the desire to exchange

professors and students between certain universities of the United States and those of the leading South Ameri¬ can countries, as well as the acquisition, gen¬ erally by purchase, of important private li¬ braries of Latin America, containing invaluable works dealing with the history, progress and higher development of those countries.

Latin Americans have done much toward the progress of the world both intellectually and materially. Civilization may be divided into two great branches from which others spring: development of the intellectual forces of mankind and development of the material resources for the benefit of society. Under the first head — as has been shown in the pre¬ ceding paragraphs — there are found educa¬ tional institutions to train and perfect the mind, . which have existed in Latin America for centuries, and the result of this training has been great jurists, historians, orators, physicians, painters, sculptors, poets, musi¬ cians, playwrights and others too numerous to mention when dealing with 20 countries, but whose works might fill a great library. A passing mention has already been made of the standing of Latin-American writers. There are painters and sculptors of renown, whose works have been admired, rewarded and commended in the leading art centres of the world. In all these countries there are art schools from which the students go preferably to Italy or France, most frequently pensioned by the gov¬ ernment, to perfect themselves. There are musicians wedded to their art and a credit to their country and themselves; and composers* singers and players educated in their own con¬ servatories or schools. There are theatres and opera-houses not surpassed by any others in the United States or Europe, and the govern¬ ments of many, if not all, of the Latin-Ameri¬ can countries contribute to the musical educa¬ tion of the people by subsidizing opera troupes every season or so, paying large sums to ob¬ tain the best singers. Many a celebrity who has come to New York has commenced his career in Latin America.

There is another phase of Latin-American

civilization showing in an unquestionable man¬ ner a natural tendency toward the establish¬ ment of higher ideals — those ideals that are to-day being proclaimed by men of good will of all nations. I refer to arbitration, recourse to which is the highest form of culture among peoples. Arbitration is not new with the Latin- American peoples. It is one of the basic prin¬ ciples of their social structure,

since it rests on the civil law of Rome, which provides for arbitration as one of the ordinary and usual means of settling differences between man and man. The principle of world arbitration was first proclaimed by Gen. Simon Bolivar, who was the originator of the idea of holding the first Congress of Nations of America at Panama in 1826, for the purpose, among others, of adopting arbitration as a principle of Amer¬ ican — that is to say, Pan-American — policy.

In recent years Latin America has had re¬ course to arbitration and direct negotiations partaking often of the nature of arbitration, more frequently than all the rest of the world. Latin-American wars have been civil wars for a political principle, and these mainly in coun¬ tries where the military element predominates. They have never engaged in wars of conquest. In their international difficulties arbitration has always been the keynote of negotiations. It is a remarkable fact that in the history of the Latin-American republics, since they became independent from the mother country over 100 years ago, they have had among themselves only two international wars, and these could indeed be classed as national, since they were fought among members of their own family of nations. But these wars were not fought for territorial expansion, nor in the spirit of conquest, although territory may have been gained as an indemnity. These are the Para¬ guayan war against Brazil, Uruguay and Argentina, 1865-70, and the war of Chile against Bolivia and Peru, 1879-84. On the other hand, who, looking at the map of Europe before this war, would recognize it as the same Europe of half a century ago? With one or two exceptions — the Iberian and Scandinavian peninsulas and the British Isles — there is not a single country that has not been remade at the cost of numberless lives.

All boundary disputes — and they have been many — ‘have been or are being settled by arbitration. ‘Could any better proof be offered of the advancement of peoples who, while springing directly from a race of warriors, are not afraid to work toward the ends of peace?

Another proof of this spirit of progress is the maintenance in the city of Washington, by all the countries of the American hemisphere, of a unique organization called the Pan-Ameri¬ can Union, the living embodiment of the idea which created the International Union of American Republics as a result of the first Pan American Conference held in Washington in 1889-90 at the invitation of that great Ameri¬ can statesman, James G. Blaine. The Pan- American Union represents the spirit of prog¬ ress, the desire for a better understanding, the necessity for stronger ties of friendship, felt among the republics of the three Americas, by making them known to one another, by bring¬ ing

to the attention of the people of the United States the opportunities offered by the Latin-American countries, their civilization,

their onward march toward prosperity, united in a single purpose of material and moral ad¬ vancement.

There is another aspect of the civilization of the Latin-American republics which deserves more than passing attention. It is their polit¬ ical life as members of the Pan-American fraternity of independent nations. Their first step toward higher ideals was their declaration of independence and their assumption of the duties and exercises of the rights of sovereign states. The transition from colonial depend¬ encies to self-governing nations was fraught with difficulties unknown to the citizens of the original 13 states of the North American Union, resulting from different conditions, due in the mam to the spirit that inspired their complete emancipation. The original 13 States separated from England principally for prac¬ tical reasons, while the Spanish-American countries had to contend with an economic as well as a political problem.

After a period of evolution — or of succes¬ sive revolutions, as some would say — during which the several antagonistic interests were undergoing a process of amalgamation, or bet-, ter still, clarification, there now exist, in the majority of Latin-American countries, stable governments whose sole aim is to maintain above reproach the moral as well as the eco¬ nomic credit of their respective nations, so as to attract foreign capital and energy, which will stimulate the development of home indus¬ tries, and ensure pea'ce, prosperity and hap¬ piness to its citizens. Some Latin-American republics have been less fortunate, but every disturbance, all civil strife, should be construed, in fairness, as a misdirected effort toward the attainment of a goal dreamed of and desired by all. Public education, foreign commerce, improved means of communication, greater de¬ velopment of the natural wealth of these coun¬ tries, are factors which have contributed and are constantly contributing to the establish¬ ment of a peaceful era -which will eventually become normal and stable.

As to the material phase of Latin-American civilization, communication with the other countries of the world at the beginning of the World War was represented by over 50 steam¬ ship lines plying between European ports and those of Latin America, and about 25 lines running from the United States to the Atlantic, Caribbean and west coast ports of Latin America. The combined railway mileage from Mexico down to Chile and Argentina, including the island countries of Cuba, Haiti and the Dominican Republic, is estimated at over 68,000

miles, Argentina leading with over 22,000 miles ; next comes Mexico with over 15,000 miles; Brazil follows with about 14,600 miles; Chile, nearly. 6,000 ; Cuba, nearly 2,500, and the other republics in lesser proportion. There is not one single country, however, that is not in¬ cluded in this total mileage. It may seem strange that in an area of about 8,200,000 square miles there should be only 68,000 miles of railway, but if one stops a moment to con¬ sider the enormous barrier extending along the west coast of South America, formed by the mighty range of the . Andes Mountains, which made direct communication between the cities of the Atlantic and Pacific coasts very difficult, and the scarcity of population which creates

demands and makes traffic profitable, one will understand why the railways of Latin America have not advanced faster. But even under these circumstances, not a day passes but some work is done toward the extension of that railway mileage.

Another phase of civilization and progress is the foreign commerce of a country. The progress made by Latin America in its com¬ mercial relations with the world at large and the United States, especially, shows that there is a great consumption of all such articles as are considered necessary to civilization. Latin America is not a manufacturing continent; it mainly produces for export agricultural prod¬ ucts such as sugar, coffee, rubber, tobacco, cacao or cocoa, cotton, etc., hides and other raw materials, mining products sudh as silver, gold, tin, copper, iron, bismuth, saltpeter, etc., and a few gems. Its main imports are ma¬ chinery of all kinds, hardware, cotton and other fabrics, foodstuffs, carriages and automobiles, railway material, electrical appliances and other similar products of industry necessary to the cultivation of the land, the improvement of roads and cities, and the comfort of the in¬ habitants.

There is not a city of any importance in Latin America where either artificial illuminat¬ ing gas or electric light is unknown. Tele¬ graph and telephone wires stretch all over Latin America, uniting cities and towns, over the wilds and across the mountains, bridging mighty rivers, connecting neighboring countries and linking their shores with the rest of the civilized world. Not an event of any import¬ ance takes place in Europe, Asia, Africa or the United States which the submarine cable does not bring to the Latin- American press, to be made public either in the form of bulletins or in ˆextras,® according to the

importance of the event, while nearly every Latin-American country has its wireless telegraph system. Electric cars are fast replacing the older and slower methods of transportation within the cities and extending their usefulness to carry¬ ing passengers to suburban villas, small towns or country places of amusement, and Buenos Aires, the largest Latin-American capital, has a subway in operation.

A charge frequently made against Latin- Americans is that they are a race of dreamers. There is some truth in this. Latin- Americans have inherited from their forefathers the love of the beautiful and the grand; the facility for expression and 'the vivid imagination of the Latin race; the sonorous, majestic Span¬ ish, the flexible, musical Portuguese, and French, the language of art; and a responsive chord to all that thrills, be it color, harmony or mental imagery. They have also inherited from those ancestors their varying moods, their noble traits and their shortcomings, both of which have been preserved, and in certain cases improved, under the influence of environ¬ ment, the majestic mountains, primaeval forests, ever blooming tropical flowers, birds of sweet¬ est songs and wonderful plumage; under magnificent skies and the inspiration drawn from other poets and writers, foreign and native.

Much more might be said to show the con¬ stant endeavor of Latin America to co-operate with its best efforts to the civilization of the

world. It has contributed readily according to its Latin standards,, and from the day of its independence and the establishment of republi¬ can institutions Latin America has recognized the rights of man, abolished slavery, fostered education, developed its commerce and in¬ creased traveling facilities and means of com¬ munication with the outer world. It has con¬ tributed to the best of its ability to the sum total of human betterment, and the day cannot be far off when full justice will be done to the efforts of the countries south of the United States, where live a people intelligent, progres¬ sive, proud of their history and their own efforts, and ready to extend a friendly hand and a sincere welcome to those who are will¬ ing to understand them, and aid them on their road to progress.

Francisco J. Yanes,

Assistant Director, Pan-American Union.

3. EDUCATION IN LATIN AMERICA. General and Historical. — Education in Latin America is dominated by two forces. One is historical and concerns higher and pro¬ fessional studies. The Spanish

colonists estab¬ lished universities soon after their occupation of the country. Santo Domingo, 1538; Lima, 1551; Mexico, 1553; Bogota, 1572; Cordoba in Argentina, 1613; Chuquisaca (now Sucre) in Bolivia, 1623. Six others were founded by the end of the colonial period. They had charters from the king of Spain and from the Pope, and enjoyed the monopoly of granting degrees. Preparation was obtained only in church schools and by private tutoring. The univer¬ sities themselves were conducted by the re¬ ligious orders. They were organized and con¬ ducted solely in the interest of the colonial aristocracy. To-day they are national and theo¬ retically open to all classes with small tuition fees and very generally include engineering schools. However, their traditional character¬ istics persist. They overemphasize theory, culture, dialectics, and make their appeal to the leisure class. They exercise little or no di¬ rect influence on elementary instruction. On the other hand, they dominate the secondary schools, which too often are but feeders to the universities, imitating their methods, reflecting their traditional spirit, and are likewise limited in patronage almost exclusively to the wealthy classes.

The other force in Latin-American educa¬ tion, the movement for elementary education, is recent and comes from abroad. Before 1860 no state had any well-defined system of elementary instruction. During the presidency of Sarmiento (1868-74) Argentina inaugurated a determined movement for universal elemen¬ tary instruction. Sarmiento was influenced by the example of the United States. About the same time Chile undertook seriously the national organization of elementary schools. France has been rightly called the intellectual mother of Latin America, and when the French republic from 1870 on strove to banish illiter¬ acy from France, its influence was not without great effect in Spanish America. All the states soon put* upon their statute books laws for compulsory primary education. The reform has not progressed uniformly. Argentina, Chile and Uruguay in South America and Costa Rica in Central America have made the

greatest progress. Whereas in these states 50 years ago illiteracy was perhaps more than 90 per cent, it is now less than 50 and rapidly de¬ creasing. In some of the other states it is still 90 per cent. Cuba has made commendable progress in elementary education since its inde¬ pendence. The least progress has been made in those countries where the Indian and Mestizo population is the largest, or where strong clerical influence hampers the national and secular school

organization. In such coun¬ tries school statistics are often misleading. Many schools exist only on paper, in others the terms are short, average attendance is low and the law of compulsory attendance is not enforced.

Primary Education. — The standard period

of the elementary school is six years, but even in a country like Argentina the full length is observed only in cities and larger towns. The villages and countryside maintain curricula of but two, three or sometimes four years. The school year appioximates nine months. The subjects of instruction are reading, writing, arithmetic, drawing, geography and national his¬ tory. As far as the mere ability to read is concerned, the short period of elementary schooling ‘ which obtains in so many localities is in part compensated for by the phonetic spelling of Spanish, and as concerns simple cal¬ culation by the use of the metric system. Gen¬ uine intellectual development, however, suffers severely from the short term of schooling for the average child. Elementary teachers are as a rule underpaid, and are seldom from the upper classes. The sharp class distinctions which so generally prevail in Latin America, especially in countries with a large mestizo pop¬ ulation, are nowhere more noticeable than in the schools. Except in Argentina, and in a lesser degree in Uruguay and Costa Rica, chil¬ dren of the upper classes of society seldom at¬ tend the elementary public schools. They re¬ ceive their primary education either through private tutoring or in private select schools, or in primary grades attached to the state sec¬ ondary schools. This practice tends to foster and accentuate class distinction and makes of the public elementary instruction purely folk schools — a condition of affairs much to be re¬ gretted in a democracy.

In a few countries there is a surprisingly strong tendency toward coeducation in the ele¬ mentary schools, but in general the policy is segregation of the sexes. In cities and larger towns segregation is practised in all grades. In smaller communities boys and girls are taught together in the first two or three grades and segregated in the higher grades. In rural and small village schools where the range of instruction is limited (from two to four grades) the classes are usually open to both sexes.

Except in the federated republics (Argen¬ tina, Brazil, Mexico and Venezuela) the primary school system is thoroughly central¬ ized and directed even in the smallest details from the national capital. The funds are ap¬ propriated from the national treasury* the ad¬ ministration is vested in the council of ele¬ mentary education under

the Minister of Pub¬ lic Instruction. This council fixes the cur¬ riculum and methods, provides the building and

equipment, establishes qualifications of teach¬ ers, assigns teachers to their posts and fixes their salaries. Frequently there is a local board of education chosen by the municipality or named by the governor of the province. Its authority is, however, carefully limited. Its principal functions are to care for the material equipment (building, etc.), to recommend suit¬ able teachers, and when the teacher has been appointed, to see that he performs his assigned duties and maintains a proper scholastic, moral and civic attitude. Sometimes the local board is expected to provide from local funds 'the building and equipment. Great numbers of primary schools are conducted in rented build¬ ings.

In the federated republics the state systems are a copy of the national system of the cen¬ tralized republics. The tendency, therefore, is toward centralization over a larger or smaller extent of territory and close uniformity. Such a system has undoubed advantages and was the only one that could cope with the difficulties that confronted popular education in Latin America. In Argentina 'the national govern¬ ment has recently asserted the right to estab¬ lish, maintain and control national elementary schools in 'those states where the local author¬ ities do not provide an adequate system. In some countries, especially in Mexico, the municipalities establish and maintain elemen¬ tary schools irrespective of the state system. These schools are usually better equipped and conducted than the state schools since the very fact of their establishment is an indication that state-wide interest in popular education is de¬ ficient or non-existent.

Normal Schools. — Those countries which have done most for primary education lay great stress on their normal high schools, which have come to be the secondary schools of the com¬ mon people, as well as training schools for primary teachers. These schools were origin¬ ally an importation and came with the impetus for universal and obligatory primary instruc¬ tion. Many of the first masters were brought from Europe and the United States, and the schools were organized on the model of the French primary normal school and the original independent normal school of the United States. The requirement for entrance is completion of the elementary school course (six years) or its equivalent. The curriculum covers four, five and six years. The studies embrace what is usually found in grades 7 to 12 of American junior and regular high schools with the addi¬ tion of pedagogy, observation of teaching and practice teaching in the annexed model school. Many normals are boarding schools. Whether boarding or day schools the usual practice is for the state to maintain

the scholars, lodging, feeding and clothing them in the boarding schools, or paying them a commutation in the day schools. In return the scholars enlist in the teaching service of the state for a certain number of years. In case they do not serve out their enlistment, they agree to reimburse the govenment. A bond is given to ensure the observance of the contract. Unfortunately, in many countries this contract is not always ob¬ served. The normal school students come from the lower middle class, if indeed one can speak of a middle class in the average Latin-Ameri-

can society, and their advancement into the higher grades of instruction, even with indus¬ try and ability, is difficult and rare. Their limited education is a handicap, and the line of demarcation between the normal and ele¬ mentary schools on one hand and the secondary and university education on the other is so sharply drawn that it is next to impossible to pass from the one to the other. Chile and Argentina maintain higher normal schools of college rank for the training of primary nor¬ mal school instructors, and, to a limited ex¬ tent, for the training of regular high school teachers, but the latter are more usually re¬ cruited from the universities and lack distinct pedagogical preparation. The boarding normal schools very naturally are for one sex or the other, but in the day schools coeducation is surprisingly common. A model school is always attached to a normal school, and much stress is laid upon practice teaching, although much more time is devoted to observation than to actual practice.

Secondary Education. — The standard

period of the regular secondary schools (Liceos) is six years, but in some countries it is less. These schools are usually good of their type even in countries where primary education has been neglected. Their clientele is largely from the upper classes. Church and private schools of this grade are numerous, but the state retains (as in France) the right of examination and power to grant the degree (bachelor of humanities) at the end of the course. The curriculum is, as a rule, uniform and comprises the Spanish language and litera¬ ture, general and national history, mathematics, physics, chemistry and biology (usually without individual laboratory practice), French, Eng¬ lish, elementary philosophy and economics. Latin is seldom included. The uniform curric¬ ulum in the secondary schools is due to their close administrative relation with the univer¬ sities. They are still regarded

as mere pre¬ paratory schools. When commercial and indus¬ trial education was introduced, it seemed more politic to divorce it wholly from the traditional secondary schools, as had been done with the primary normal training. Hence almost every¬ where commercial and industrial schools are separate institutions although state supported. When they are combined with the regular high school, it is for economic, not pedagogical or administrative reasons. Notwithstanding the relative excellence of the regular high school, it suffers from the lack of trained and pro¬ fessional teachers. Much of the instruction is given by university graduates who divide their time between a number of schools or who carry on a profession (law, medicine, pharmacy, jour¬ nalism, etc.) at the same time. Their teaching is necessarily often a secondary consideration and their attendance irregular. They fre¬ quently lack ability really to teach. The recita¬ tion is apt to become a lecture as in the uni¬ versity.

Commercial Education — The commercial school in many Latin-American countries oc¬ cupies a position of high favor, receives liberal state support and opens an avenue to young people who could not hope to profit materially by the regular high school course. _ It is usu¬ ally a combination of upper primary and junior high school. The curriculum comprises

the traditional subjects of the fourth, fifth and sixth grades of the elementary school with a commercial orientation of arithmetic, geography and composition, while introducing the specific commercial branches, typewriting, stenography and accounting. Much stress is laid upon modern foreign languages, especially English and French. These schools often receive im¬ portant gifts and even regular subsidies from public-spirited citizens and commercial organ¬ izations. Evening as well as day classes are the rule in these institutions, and some have evening classes only. Unfortunately relatively few pupils complete the entire curriculum. They leave the school after acquiring the mere rudiments of a commercial education to accept modest employment in business.

Higher and Professional Education. — The universities are professional schools almost exclusively. A very few have faculties of letters and pure science. The standard uni¬ versity contains faculties of law, medicine, engi¬ neering, commerce and agriculture ; but many have only two or three faculties. Medical de¬ partments include schools of pharmacy, den¬ tistry and midwifery. The average course of study in law covers six years ; in medicine, six ; in engineering and agriculture, four ; in commerce, four; in pharmacy and dentistry, three.

The enrolment in Latin-American univer¬ sities is surprisingly large. Buenos Aires has approximately 6,000 (exclusive of the attached preparatory high school) ; Santiago 2,000, Lima 1,100, Montevideo 900 exclusive of the agri¬ cultural college, a separate institution, and others in proportion to population and degree of general culture. The explanation is found in the fact that although the institutions are merely groups of professional schools, they also fill the place occupied by the liberal arts college in the United States, and many students attend" with no expectation of following the profession they are studying. They take a uni¬ versity course for general culture or for the sake of the doctor's degree which is conferred upon graduation. Not nearly half the gradu¬ ates in law and not more than half in medicine practise the profession. The law course espe¬ cially is regarded as a liberal education, being less technical than in an American law school and including at least the rudiments of all the social sciences, psychology, economics, sociology, constitutional history, as well as the philosophy and history of law, and international law. It is in fact a study of jurisprudence in the wide sense, and leads to the degree of doctor of jurisprudence. The medical college with its adjunct departments usually has the largest en¬ rolment. The curriculum is long and full. Not as much stress is laid upon chemistry and the other basic sciences of medicine as there should be, but the clinical instruction and practice is excellent. Agriculture, the last of the faculties to be introduced, is much en¬ couraged by the governments and receives generous support. The enrolment, however, is limited. All the states have one or more schools of agriculture either as part of a uni- versity or existing as a separate institution.

Organization of Universities. — Practi¬ cally all institutions of higher and professional instruction in Latin America are state sup¬ ported and state controlled. In a few centres

there are church colleges of law, engineering, etc., but never of medicine. These colleges do not confer the degree of the profession. That privilege is reserved for the state uni¬ versity. Most state universities are autono¬ mous; i.e., they are governed directly by the faculty, which is a self-perpetuating corpora¬ tion. However, the election to a vacant chair must be confirmed by the President of the re¬ public through the Minister of Public Instruc¬ tion. The common practice is for the faculty to nominate three candidates for a vacancy of whom the minister selects one. The state ex¬ ercises in this way a

control over the personnel, but usually the faculty indicates its choice of the candidates, and the minister rarely rejects the nomination. The universities have thus acquired almost everywhere complete independ¬ ence. Their revenue, of course, depends largely on the will of the national (or provincial) legislature. University professors, like those of the secondary schools in Latin America, are rarely teachers by profession. The law is taught by practicing lawyers and judges in office; medicine, by practicing physicians. This custom has the same disadvantages though not so marked as in the Liceos. A professor usu¬ ally teaches but one course which consists of three lectures or recitations per week. If a course runs through two years, one man will teach the first year, another the second. This custom accounts for the large number of pro¬ fessors in an institution in proportion to the students, the ratio being often in the smaller universities as high as one to five. The differ¬ ent colleges of a university are usually scat¬ tered, the college of law being located in one part of the city, the college of medicine in another, etc. Each has its own library and laboratories. This necessitates a duplication of material and often a duplication of instruction since matriculation in the university is directlv from the high school, and certain basic subjects are taught in two or more colleges. Especially is this true of the basic sciences of medicine, engineering and agriculture. The universities are very generally open to both sexes, and women are enrolled in considerable numbers in the colleges of medicine, pharmacy, dentistry, education and architecture.

So-called practical schools of agriculture and industrial arts are very common and are supported or subsidized by the state. They are of lower rank than the university profes¬ sional schools and are for the training of over¬ seers, foremen, artisans and farmers. The agricultural states have featured the practical agricultural school in recent years. Argentina has a score of them of different grade. Some are designed to emphasize the type of agricul¬ ture in the region where they are located, fruit growing, cattle raising, sugar industry, etc. ; others have a general curriculum. They admit boys with the mere fundamentals of in¬ struction from the third or fourth grade, and continue their common school instruction, add¬ ing the professional branches. The curriculum extends over three or four years. Many of these institutions are boarding schools. The system is very similar in other states. Chile maintains them in the agricultural region; Cuba has one in each of the six provinces. In Brazil and Mexico it is the concern of the individual states, the national government con¬

cerning itself only with the higher professional schools.

Industrial Education. — The practical in¬ dustrial schools (Escuelas de artes y officios) have the same status and occupy a correspond¬ ing position in the industrial field. They are supposed to reduce theory to the minimum and bend their energies to the practical. This is especially difficult, however, in Latin America since the tradition in education there for cen¬ turies has been in favor of theory, and the racial mind is forcibly bent in that direction. In the most enterprising countries there are trade schools for girls as well as for boys. Chile, for example, has a great number for girls, one or more in almost every important town. The introduction of industrial and agri¬ cultural education into the regular primary schools is uncommon. The tendency is to make them separate departments of instruction. Both at Buenos Aires and at Santiago, Chile, there is a school of industrial arts which occupies a middle ground between the ordinary elemen¬ tary trades school and the engineering college. They are well equipped and train a high type of artisan and practical engineer. Many ele¬ mentary trade schools are conducted by various orders of the Roman Catholic Church. The Salesian Brothers make a specialty of this type of education. Some of these schools combine elementary agricultural training with schooling in the industrial arts. They usually receive a subsidy from the local, provincial or national treasury. The pupils come from very poor families or are orphans.

Theological Education. — Preparation for the Roman Catholic priesthood is given in church schools which are wholly removed from governmental supervision. At least one such school is maintained in each diocese from whence the more gifted boys are sent to the arch-diocesan school in the capital for ad¬ vanced instruction and training. The lesser priesthood may be recruited directly from the diocesan school. These institutions necessarily have a different curriculum from that of the state and state-supervised elementary and sec¬ ondary schools, not only in the emphasis laid upon strictly religious instruction, but also in the inclusion of Latin which is seldom found in the Spanish-American curriculum ; in fact, in many states the study of Latin in the state and state-inspected schools is forbidden by law.

Education in Brazil.— In Brazil little was done for popular education before the advent of the republic (1889). It is delegated wholly to the individual states. Some, notably Sao Paulo and other southern states, have made commendable progress; others have done very little. The type of instruction is much the same as in Spanish America. The same is true of secondary education. Brazil has two national schools of law (Sao Paulo and Recife) and two of medicine (Rio de Janeiro and Sao Salvador) but since 1911 their gradu¬ ates have no rights not enjoyed by graduates of other standard institutions. The tendency now is to

establish universities; i.e., groups of professional schools, in all the state capitals.

Conclusion. — Popular education is re¬ tarded in Latin America by various causes of which some are operative in some countries, others in others, and some in all. They may be summarized as follows: (1) Apathy of Indian

and Mestizo population; (2) lack of trained teachers; (3) opposition of church to secular schools; (4) greater relative importance and appropriations given to university and second¬ ary instruction; (5) want of proper buildings, textbooks and equipment ; (6) sharply accen¬ tuated class distinctions; (7) traditional cur¬ ricula and inefficient methods of instruction.

Notwithstanding all the discouraging cir¬ cumstances, there is everywhere a universal ambition to overcome illiteracy, a realization that an educated citizenry is necessary for political, economic and social progress, a will¬ ingness to learn modern educational methods, and an ever-increasing adaptability of instruc¬ tion to local and racial needs.

Edgar Ewing Brandon, Vice-President and Dean of Miami University.

4. LATIN AMERICAN LITERATURE,

the literature of the various nations and peoples on the American continents speaking the Latin languages. In this wide sense the term em¬ braces the Spanish, French and Portuguese countries and, therefore, includes the literary productions of French Canada and other French colonial possessions in America, past and pres¬ ent. In the restricted sense in which the term is employed in this article, however, it deals only with the literatures of the Spanish and Portuguese countries of the New World which have achieved national existence and which have, consequently, been for years facing each the problems of its national life and producing a national literature. In a general sense the literatures of all the Latin-American countries are very much alike, just as the literatures of all English-speaking countries have a marked resemblance. The heritage of language, cus¬ toms, laws, government, social usages and liter¬ ature have made this necessarily so. Yet the differences are, in most cases, as marked as the resemblances. In a general way the literature of the Spanish- American

countries holds the same relation to that of Spain that American literature does to that of England. It repre¬ sents the multiple and varying interests of the great Spanish colonial land in the New World. It has ever clung to the literary traditions of the mother country, and Spain's influence upon Spanish-American literature has been, in a sense, paramount. But just as Spanish colonial America has ever been different from British colonial America, so this difference is reflected in the literatures of the two countries. Eng¬ land never had a very strong hold upon her colonial possessions in America ; and she con¬ sequently never entered very fully into their lives.

But the conditions under which the .Spanish- American colonies grew up were quite different from those of the English- American colonies. From the early days of her contact with the New World Spain not only identified herself with her colonies but she kept such a firm hand upon their government that the colonies them¬ selves were never anything but an echo of the mother-country. The vast Indian population of the Spanish-American colonies made their government a very serious problem, which for the first century following the conquest made the interests of Spaniards in America identical with those of Spain. During the three centu¬ ries of Spanish rule in the New World, Mexico

and Peru gave birth to by far the greater part of the Spanish-American literature. The lit¬ erary productions of these countries, while ex¬ hibiting a certain amount of individuality, is during this period essentially Spanish ; and the greater part of it is the work of Spaniards or of sons of Spaniards born in America. This Latin-American literature, whether it treat of things American or Spanish, is markedly a re¬ echo of the literary life and ideals of Spain. Nevertheless it is interesting and of very con¬ siderable importance because of the fact that, while it invariably followed Spanish literary models, it necessarily very frequently treats of things American in a way that reveals the life of the colonies and the relation of the Spanish adventurers and of the Spanish government to the natives of the New World. An important part of it also deals with the history, customs, habits, religion, traditions and superstitions of the American races preceding and immediately following the discovery of the New World and the contact of Europe with America.

The Colonial Period. — The two favorite colonies of Spain in America were Mexico and Peru, the former, because it was the first great territory conquered; and the latter, because of its wealth in the precious metals which gave it material importance over all the other Spanish- American colonies. The early prominence of these two

colonies attracted to them great num¬ bers of Spaniards of all classes, among them many of high title, family connection and ex¬ cellent education. To these, to priests and friars and to native Indian writers we owe a great part of the early colonial literature. Mexico's part in this colonial literature is fully discussed in the article on Mexican Literature (q.v.). In general this early literature con¬ sists of letters and similar documents relating to the conquest, settlement and administration of the colonies, to the customs and habits of the Indians and to their pre-conquest history. The literature contributed by the priests and monks consists of works largely relating to the Chris¬ tianizing of the natives and it includes invalu¬ able texts of a religious nature written in the numerous native tongues of the aborigines. Some of these works are of a much more ex¬ tensive, ambitious and valuable nature than others. Among these are the (Historia de las Indias) of Fray Bratolome de Las Casas (q.v.) ; the (Historia General de las Cosas de Nueva Espana) of Padre Bernardino de Sahagun and other works on the antiquities of Mexico by the same author; (Historia natural y moral de las Indias,* by Padre de Acosta (1580); the (Monarchia India) of Padre Torquemada (1615) (q.v.); the (Storia Antica del Mes sico) by the Abbe Clavigero (1780), all of Mexico; the (Inca Ceremonial and Religion* of Cristobal de Molina of Cuzco (between 1570 and 1584) ; the (Extirpacion de la Idola- tria del Peru* of Pablo Jose de Arriaga; and the (Relacion de las costumbres antiguas de los naturales del Peru,* by an anonymous Jesuit priest. These, however, are but a few of the numerous and valuable works of this kind, to which are due much of our knowledge of pre- Columbian civilization in America and of the events immediately succeeding the conquest and the relationship of the .Spaniards to the natives. But this early period of Spanish-American colo-

nial history produced laymen who have left as valuable and as vivid accounts of the same period as have the representatives of the Church. Among these are Fernando de San- tillan, (Relacion, etc.5 (1550) ; Juan Jose de Betanzos, (Account of the Incas5 (1551); Pedro de Cieza de Leon, historian of the con¬ quest of Peru (about 1554) ; Juan de Matienzo, (Gobierno de El Peru5 ; Polo de Ondegardo, two (Relaciones5 giving an account of the laws and system of administration of the Incas of Peru (between 1561 and 1571) ; Bernal Diaz del Castillo, (Historia Verdadera de la Con- quista de Nueva Espana5 (toward the end of the 16th century) ; F. de Alva Ixtlilxochitl,

In addition to these serious historical works the first period following the conquest saw many writers of personal narratives, heroic, narrative and semi-lyrical poems, a considerable number of which were based on personal ad¬ ventures or reputed to be so. These chronicles are interesting for the light they give on the obscure history, customs, quarrels and habits of the period. Among these are the rhymed chronicles, (La Araucana5 of Alonso Ercilla y Zuniga of Chile (1533-94); also (Arauco Do- mado) (1596), (E1 Vasauro) (1633) and (E1 Ig¬ nacio deLoyola) of Pedro deOna, also of Chile; (Puren Indomito5 of Hernando Alvarez of To¬ ledo; the (Compendio historico de Cbile) of Melchor Xufre del Aguila (1568-1637) ; the (Conquista del Nuevo Mundo) of Gaspar de Villagra (1610) ; the (Elegias de Varones ilus- tres de Indias5 of Juan de Castellanos; the (Peregrino Indiano5 of Anton'io Saavedra Guz¬ man (1599), of Mexico; Mexico Conquistada) of Juan de Escoiquiz ; the (Cortes Valeroso) of Gabriel Lasso de la Vega (1594); and the (Hernandia> of Francisco Ruiz. (See an account of these under Mexican Liter¬ ature). Ambitious <(epic poems55 of a very similar nature appeared in the Argentine, Peru and Brazil. The various branches of this ex¬ tensive literature acted and reacted upon one

another, throughout the Spanish and Portuguese colonies in America and in Spain and Portugal; for in this the colonies were following in the footsteps of the mother countries ; though some of the American poems were superior to a very considerable body of the European end of the literature. Many of these rhymed chronicles were little more than prose, and their authors would often have probably done better if they had used prose as their vehicle of communica¬ tion instead of poetry. Yet, to-day, they are looked upon as valuable owing to the side¬ lights they throw upon the age in which they were written. But their popularity prevented the production of prose works of a similar char¬ acter to any great extent. However there were a few prose productions which had considerable influence upon colonial literature owing to their general popularity and the extent to which they were read throughout Latin America. Among these were the (Cautiverio feliz) of Francisco Nunez de Pineda, written in the latter half of the 17th century; and the (Restauracion de la Imperial y conversion de almas infieles> of Fray Juan Barrenechea (1693). The religious literature depicting the lives of the saints and other sacred characters during the first two centuries of Spanish rule in America, though plentiful, is of no great interest, except in so far as it shows the efforts the priests and monks made to present religious dogma in a pleasing form for the enlightenment of the Europeans in America and in a still simpler and more realistic form for the instruction of the Indian and

mes¬ tizo population (See account of the religious drama in the. article on Mexican Literature). Of the most interesting and ambitious religious epics of this period' are (La Cristiada5 of Fray Diego de Ojeda of Lima (1611) ; and the (Santa Rosa de Lima) of Luis Antonio de Ovedo (Peru 1711). The most interesting chronicler (and a fairly good poet) of the first century of the Spanish occupation of America was Bernardo de Balbuena (for whom, see Mexican Literature).

The period under consideration produced a great amount of verse, apart from the rhymed chronicles. Much of this has been lost and such of it as has been preserved is, on the whole, not of a very high class (iSee Mexican Litera¬ ture for an account of literature of this nature in New Spain). Among the few poetical works of the period that are still of interest are the

The body of Spanish-American literature of the colonial period, on the whole, faithfully rep¬ resents the life in Spanish America, with its adventures, its strongly religious element and its close relation to the mother country. A part of it, too, shows the Indian side of the ques-

tion. This latter is strongly brought out in such works as <011anta,) a Peruvian drama written in the Quichua language; (Cautiverio feliz > (already mentioned) of Francisco Nunez de Pineda; and the drama cSiripo) of Manuel Jose Labarden, an Argentino (1789).

Throughout the colonial period of Latin American literature, Mexico, Colombia, Peru and Chile acted and reacted upon one another in some manner ; but their literary resemblance to one another is more due to their common famil¬ iarity with and imitation of Spanish writers. For this reason they have all been reviewed under one head. But the Revolutionary period and the years following have seen a very con¬ siderable divergency in literary aspirations and achievements throughout all the republics which had their origin in the Spanish-American colo¬ nial possessions. Therefore it has been found convenient to treat the literature of each one of these nations separately, connecting them only when it is necessary to show the influence that one national literature has had upon the others.

Revolutionary Period. — The general char¬ acteristic of the literature of the Revolutionary period throughout' Latin America is that of a strong resentment against Spain, an intense, somewhat idealized

desire for liberty, and a general breaking away from the old order of things. It signified also the rise to power of the native population of the various colonies as distinguished from the Spanish-born rulers. It was inspired by the Napoleonic conflict in Europe, the troubles in which the Spanish gov¬ ernment found itself, and by the ideals of the American and the French revolutions. (For the restrictions placed upon native Indians and Spanish creoles, see Mexican Literature). Naturally, possessing the ideas on government that they did, and the antipathy to Spanish rule that they had shown for some years, the Amer¬ ican revolutionists inclined strongly toward re¬ publican institutions. Once each country se¬ cured its independence the people proceeded to set up a republic in name at least. This feeling toward Spain and Spanish government and this love for republicanism and for the institutions of the United States and France are strongly reflected in the Latin- American literature of the Revolutionary period ; and the more revolu¬ tionary the writers and the more they showed their hatred for the past the more they were likely to be popular with their fellow country¬ men. Yet for all this there is, at the beginning of republican institutions in 'Spanish- America, very little literary breaking away from Spain, whose literary bondage had become so firm and lasting that it may still be said to remain com¬ paratively firm. The revolutionary writers who sprang into prominence in the Spanish-Amer- ican colonies used the Spanish language in all its varied literary forms as their most powerful weapon against the mother-country, at the same time fanning the native hatred against every¬ thing Spanish. The whole land was sharply divided into two parties, those who were pr.o- Spanish and those who were anti-Spanish. The latter identified themselves with the cause of the Indian and the mestizo. The slumbering hatred of the oppressors who had so cruelly treated, for three centuries, the descendants of the native races, and had kept them in bondage, burst forth with terrible intensity and Spaniards were everywhere treated with the same cruelty

that they had meted out to the vanquished na¬ tives. All this is reflected in the Spanish- American literature of the revolutionary period. Though it falls short of correct literary form, this literature never lacks intensity and direct¬ ness of aim. Much of it is very bitter; and the greater part of it still more markedly local in its point of view. But it has in it a sense of indi¬ viduality and the breath of national freedom which had never before been known in Spanish America. This revolutionary feeling is strongly exhibited in the (Marcha patriotica) of the Ar¬ gentina, Lopez y Planes, which, though it was long the national anthem of the Argentine, is intensely anti-Spanish. Most of

the literature of this period is controversial and political and shows all the ear-marks of having been written for revolutionary ends. Little of it is of very great value from a literary point of view. Its worth, however, consists in the fact that it served as a training field for the writers who were to follow in all the countries of Latin America and to produce, in each case, a national literature.

Argentina. — The early literature of the Argentine Republic is filled with the revolution¬ ary spirit that gave birth to the nation. Of the early Argentine poets one of the best is Juan Cruz Varela (1794-1839). His work ex¬ presses well the spirit of his age in its intense¬ ness and intolerance. Two of his dramas, (Dido} (1823), and and (E1 PoetaJ Two other political exiles and writers of in¬ fluence were Claudio Mamerto Cuenca (181 2— 52), and Jose Rivera Indarte (1814ˆ45). The fofiper left two dramas.

a follower of the doctrine of Echeverria that American poetry should be distinctly American. His works include (Los Amores del Payador) (1838) ; (America Poetica) (a collection of shorter poems, 1846) ; and (Estudios Biog- raficosP Other poets of talent of this same period are Vicente Fidel Lopez (1815-1903) ; Juan Bautista Alberdi (1810-84) ; Luis Domin¬ guez (1819-98) and Bartolome Mitre (1821- 1906). The latter, who became President of the republic and who proved himself a very successful soldier and leader of men, wias a poet of considerable merit, a noted journalist and one of the best historians and biographers of his country. Another journalist, Domingo Faustino Sarmiento (1811-88), played a very prominent literary and political part in the history of the Argentine, becoming a powerful journalistic factor, a leader in politics, Presi¬ dent of the republic, a reformer in education and a university professor of ‘note. His book (1872), and (La Vuelta de Martin Fierro) offer some of the best pictures of gaucho life in the Argentine presented in any work to date. Estanislau del Campo, a year younger than Fernandez, also helped to make the gaucho famous. His (Fausto,* a poem written in the gaucho dialect, is full of the spirit of the wild presented in a very artistic and spirited manner. Olegario Victor Andrade (1838-83), who was 42 years of age before he was any way well

known in literary circles, became suddenly famous not only in his own country but out¬ side it and acquired the reputation of being one of the two or three best poets of the country ; and by many critics he is

held to be the best. The most characteristic and worthy of his poems is (PrometeoP To this period be¬ longs Ricardo Gutierrez (1836-96), poet and novelist, who is credited with being the best of all the interpreters of criollo life in the Argen¬ tine. His work shows a powerful imagination, great sympathy and striking ability to depict the life, feelings and passions of the lower classes on the great plains of Argentina. Carlos Encina (1839-82), in his two works (Canto al arte> and (La lucha por la idea) made him¬ self the leader of what may be called the aes¬ thetic school in Argentine literature, a school which was destined to widely influence Latin- American literature and to have its effect on that of Spain through the Modernistas. Martin Coronado, a contemporary of Encina, was a narrative poet of considerable power and the possessor of a large fund of humor. Among his most popular works are (Los Hijos de la Pampa,* (Angela,* and several dramas, the best of which are (La Rosa Blanca) (1877), and (Luz de Luna y Luz de Incendio) (1878). One of the best Argentine interpreters of nature is Rafael Obligado, a follower of the school of Echeverria. His poetry is romantic in form, tender in sentiment and free in movement. Gervasio Mendez (1849-98), the poet of melan¬ choly, bed-bound most of his life, set the fashion for a sort of melancholy poetry \vhich was in great favor in the Argentine during the latter quarter of the 19th century. Eugenio Cambaceres, a contemporary of Mendez, was his direct opposite. His naturalism was so marked that he had difficulty in gaining the attention of the public. His first two works, (Sibidos de un vago) (1882) ; (Musica senti- mentaP (1883) and (Sin rumbo* (1885), gradu¬ ally overcame the antipathy of the public and his (En la sangre) (1887) made his reputation as a painter of the national life, especially of the mixed population of Buenos Aires. Martin Garcia Merou, born in 1862, is one of the most voluminous of modern Argentine writers, hav¬ ing already published some 16 volumes covering literary criticism, descriptive studies of foreign countries, tales and poems, novels and history. The list of younger Argentine writers is long and includes, among others, Domingo Martinto, Luis S. Ocampo, Alberto Navarro Viola, Adolfo Mitre, Julio E. Mitre, Enrique E. Rivarola, Ruben Dario (q.v.), Juan Mas, Emilio Berisso, Manuel Galvez, Eugenio Diaz Romero, Ricardo Rojas, Alvaro M. Lafinur, Albero Giraldo, An¬ tonio Argerich, Paul Groussac, Lucio Vicente Lopez and Enrique Rodriguez Larreta. Some of the later Argentine novelists are worthy of special' attention. Among these are two who have won attention in Europe. Carlos Maria Ocantos has an audience throughout Spain and Latin America. He has written many novels, the best of which are (Leon Saldivar, * (Don Perfecto,* (E1 Peligro.* Emma de la Barra, who writes under the pen name of ((Cesar Duayen,** is the best of the woman novelists of the

Argentine. Her most popular story, (Stella,* depicts, in a vivid manner, fashionable society in the capital. In this field she disputes sover-

eignty with Martin Aldeo whose novel (La Novela de Torquato Mendez5 is in itself a vivid picture of the life of Buenos Aires.

Chile. — From the earliest days of the con¬ quest Chile has been a land of historians and chroniclers, to some of which reference has been made in the earlier section of this article. Many of the historical works of Chile are excellent ; and she has shown considerable talent for essays and writings of a like nature. But it is in the novel, in more recent times at least, that Chilean literature has given the greatest promise. One of the earliest and most voluminous of Chilean novelists was Liborio Brieba, whose plots are set in the revolutionary period of native history. They are often spoiled by crude presentation of crime and fan¬ tastic plots. The work of Martin Palma (1821— 84) is in every way better than that of Brieba. He was journalist, controversialist, free-thinker and tractarian. Among his novels are (Los Secretos del Pueblo5 (1869) ; (La Felicidad del Matrimonio5 (1870) ; (Los Misterios del Con- fesionario5 (1874, translated into English). The success of his novels brought forth, numer¬ ous imitators. Miguel Luis Amunategui (1828- 88) who worked with his younger brother Gregorio, was the first trustworthy critic of Latin-American poetry and poets. Their works include, among much published matter, (Juicios criticos de algunos poetas luspano-americanos5 ; (La Alborada poetica en Chile5 and (Primeras representaciones dramaticas en Chile.5 The most copious biographer of Chile and probably of Latin America is Benjamin Vicuna Mackenna (1831-86), who has written more than 150 vol¬ umes on biographical-historical subjects. Diego Barros Arana (1830-1908)., one of the most learned men and deepest thinkers of Chile, has left the best history of his native land, (Historia General de Chile,5 among numerous other his¬ torical works. Alberto Blest Gana, whose liter¬ ary activity began in 1858, with a volume of striking stories dealing with contemporary society, is one of the best story writers and foremost novelists of Chile. Among his novels are (Pago de las Deudas5 (1860) ; (Martin Rivas5 (1862) and numerous shorter stories, all of which move along swiftly displaying one vividly painted scene or characterization after another. Ramon Vial (1833-96), a dramatist and comedy writer of considerable talent, pos¬ sessed of an inexhaustible fund of humor and resources in dramatic comedy.

Among his numerous works some of the best are (Mujer- hombre5 ; (Los extremos se tocan5 and (Grati- tud y amor.5 Three writers all bearing the same family name, Daniel Barros Grez (born 1839), Vicente Grez (born 1843) and Borja Orijuela Grez, have all made names for them¬ selves in Chilean literature. The former is the best of the Chilean writers of historical fiction. Among his novels are (E1 huerfano,5 (Primeras aventuras del maravilloso perro Cuatro Remos en Santiago5 and (Pipiolos y Pelucones5 (Liberals and Conservatives), all of which are written with keen wit, satire and humor. He was also successful as a writer for the stage, his best dramatic production being

joven5 (1884) ; (Marianita5 (1885) ; (E1 ideal de una esposa5 (1887) ; and a volume of poems (Rafagas5 (1882). Borja Orihuela Grez is also a novelist and her (E1 cura civil5 is an excellent picture of certain phases of country life in the interior of Chile. Ramon Pacheco, who has been active as a novelist since the beginning of the last quarter of the 19th cen¬ tury, has found his field in episodes of native history. His best-known work, (E1 subterraneo de los Jesuitas5 (1878), has gone through several editions. Enrique del Solar (1844-), son of a famous mother, Mercedes Marin del Solar, is the author of a number of popular novels con¬ siderably above the average of their class, among them being (Dos Hermanos5 ; and (Una aventura en Ercilla.5 Luis Montt (1848-1909), poet, bibliographer, critic and editor, has done much to encourage the study of the history and literature of his native land. Jose Toribio Medina (1852-) is the greatest authority on the history of printing throughout Spanish America ; and he has written the best and most appreciative history of the early literature of Chile. Valentin Mutillo (1840-) has written numerous novels, short stories and other literary productions stretching over a third of a century. The best known of these is a novel (Una vic- tima del honor5 (1871). Alejandro Silva de la Fuente is the author of several novels of promise ; but they are hopelessly tragic. Among these are (Ventura5 (1885) ; and (Penas que matan5 (1887), which are the most character¬ istic of his earlier work. Alberto del Solar (I860-), traveler, diplomat, novelist and de¬ scriptive writer, has done some creditable work. Among his publications are uincahual5 ; (Rastaquoere5 ; and two novels, (Contra la marea5 and (E1 faro.5 One of the best short story writers of Chile is Luis Orrego Luco (1866-). He is also a successful novelist. Among his works which have attracted much attention are(Un idilio nuevo5 (1900); (Un voluntario de la patria vieja5 (1905) ; and (Casa grande5 (1908). Among the long list of other writers of Chile not mentioned are Pedro N. Cruz, story novelist ; Rene Brickies ; Emilio Rodriquez Mendoza, novelist; J. V. Lastarria ; Baldomero Lillo ; A. C. Espejo; F. Santibanez ; R. Maluenda ; G. L. Hubertson ; all short story writers. J. J. Vallejo and Daniel Riquelme are both humorous writers popular in Chile.

Andres Bello (1781-1865), as both poet and prose writer of varied talents and accomplish¬ ments, properly forms the connecting link be¬ tween the prose and the poetical writers. Born in Venezuela he became the moving spirit in educational matters in Chile where he was soon recognized as the leader of the classical school of literature in his adopted country. Bello distinguished himself as a poet, journalist, literary leader, educator and writer of school and other books. _ Grammar, philosophy, mathematics, education, juris¬ prudence and international law were all handled by Bello in works of singular clearness _ and notable pedagogic construction. His position as president of the University of Chile increased his influence. Jose Joaquin de Mora (1784— 1863), a naturalized Spaniard and a literary man of some ability, was the opponent of Bello in most of his educational and literary work. His

fluence upon the development of literature in Chile. The most notable woman writer of this period was Mercedes Marin de Solar (1804- 66), a writer of occasional verses which have in them the imagery, imagination and vision that make true poetry. Salvador Sanfuentes (1817- 60), jurist, educator, statesman and literary man, was Bello's most noted pupil. Among his poetical works are (E1 Campananario,* Juana de Napoles> (a drama), (E1 Bandido,' dnamij uentemagu (Ricardo y Lucia> and and (Lecciones de politica postiva.* The two sons of Andres Bello, Juan (1825-60) and Carlos (1815-54), both wrote and trans¬ lated dramas and generally helped on the liter¬ ary movement in Chile. Carlos Bello's drama, (Los Amores del Poeta) was very successful as were several of the dramatic adaptations of his brother. One of the stoutest liberals among the Chilean literary men of the middle of the 19th century was Francisco Bilbao (1823-65). Sociologist, historian, journalist and poet, he showed talent in every field. His best prose work is (Sociabilidad Chilena.? A friend and supporter of the literary and political ideas of Bilbao was Eusebio Lillo (1826-1910). Editor, poet and soldier, he wrote fervid patriotic po¬ etry, some of which is still popular in Chile, among these being the (Himno nacionaP and the (Himno de la igualdadP Another active literary and political figure of this period was Isidoro Errazuriz (1835-). He distinguished himself in the field of history, which deals alto¬ gether with Chilean affairs. Guillermo Blest Gana (1829-1904) is a very subjective poet with decidedly romantic leanings. He has been called the poet of the home. Guillermo Mata is the most representative Chilian poet of the middle of the 19th century. He fitted his muse to

political and national ends and he had ad¬ mirers throughout Latin America. Among his extensive poetical publications are (La mujer misteriosaP (Un cuento. endemoniado,* (Cuen- tos en verso, } and much heroic and historical poetry. Martin Jose Lira (1833-67), one of the best nature poets of Chile, has made numerous translations from English into Spanish, among them Longfellow's (Psalm of Life.* Luis Rodriguez Velasco, J. A. Soffia, Eduardo de la Barra, the brothers D. A. and J. A. Alemparte and a score of other writers contributed more or less to Chilean poetry.

Uruguay. — The peculiar formation of the great flat country along the Rio de la Plata and the close political and social relationship long existing between Uruguay and the Argentine have made it inevitable that their literatures should act and react upon one another. The constant revolutions in both countries have caused the exodus of literary men from one to the other and from the neighboring republics. The capitals of both republics have formed the hot-beds of revolutionary propaganda and the

refuge of political exiles, many of whom were fired with the enthusiasm for political and social reforms each in his respective country. These conditions and circumstances have had an all-powerful influence upon the literature of both countries and in fact upon that of several other Latin-American republics, though probably upon none to such an extent as upon Argentina and Uruguay, many of the literary men of whom have had, at one time or another, to take refuge abroad from evils at home. To this latter class belonged Francisco Acuna de Figueroa (1790-1862). He was a strong partisan of Spanish interests in America and when the colonists rose up in rebellion during the Napoleonic troubles in Europe, he fought the battles of Spain right vigorously, using reason, appeals to patriotism, invective and satire. Naturally, on the success of the cause of the colonists, he had to leave the country, going to Brazil. After a while, he was per¬ mitted to return and became most active, as a literary figure. His influence which was nation wide exerted its greatest power in Repub¬ lican circles. Notwithstanding many public duties Acuna de Figueroa was a voluminous writer, his published works comprising 12 sub¬ stantial volumes. In (La Malambrunada,* one of the best-constructed and worked-out satires in the .Spanish language, he ridicules the exag¬ gerations and pretensions of the new school. In (La Madre Africana* Acuna de Figueroa pleads for the abolishment of the African slave trade ; and in others of his poems he displays a constant and intelligent interest in the great public questions of his day. Melchor Pacheco y Obes (1810-57) was, in a sense, a precursor of the Romantic school of literature. Pedro P. Bermudez (1816-60), a poet of

some power, is noted for his lyrical drama (E1 Charrua,* which met with signal success on account of the sen¬ timents it expresses, its sympathy with the na¬ tive races and America as opposed to Spain. Adolfo Berro (1819-41), a still more determined follower of the Romantic school, selects for his poems, for the most part, native subjects and incidents and he evolves his story with consid¬ erable skill and marked interest. Juan Carlos Gomez, a lyrical, romantic poet with strong sub¬ jective and personal tendencies, made his power felt in journalism and politics. He is intensely patriotic and he displays a fierce hatred of Bra¬ zilian domination over his country. On this subject he devotes a long poem of six cantos, ˆigueredo.* Alejandro Magarinos Cervantes (1825-93), diplomat, poet, dramatist and novel¬ ist, is the most universal literary genius that Uruguay has produced. He early acquired lit¬ erary fame not only at home but throughout Latin America and Spain. He published, dur¬ ing his student days in Madrid, a novel of con¬ siderable force and great promise, (La estrella del sur* and two dramas, Amor y patria) and (Percances matrimoniales,* which increased his reputation. When, at the age of 27, he pub¬ lished his poem ˆCeliar,* a striking legend of epic qualities, his name was already well known throughout Spain. Crowned with European laurels he returned to his native country at the age of 30. There during the rest of his life he retained the enthusiastic admiration of his countrymen who heaped favors upon him, among them being the position of rector of the

national university and senator. Among his more notable works are (Brisas del Plata) (1864), and (Palmas y Ombues* (1884), two volumes of poems of various kinds, all of which are marked by a choice of native sub¬ jects, an intense love of his native land and the power of painting the life about him superior to that of any of his contemporaries or of his countrymen up to his day. Of his various novels, (Caramuru* is the best from the point of view of construction and general develop¬ ment. Francisco de Acha (1828-88), journal¬ ist, poet, humorist and dramatist, wrote very good comedies, several of which were very suc¬ cessful on the stage. He also edited a comic satirical paper, El Molinillo, which had a very wide circulation. Among his successful dramas, some in prose and others in verse, were Aro¬ mas caseras,* (Como impieza acaba,* (La fusion* and (Una victima de Rosas.* Heraclio Farjado (1833-70), poet and dramatist, was one of the most popular literary men in Uruguay in his day. He possessed considerable dramatic talent and wrote excellent shorter

poems and odes. (Arenas del Uruguay* contains most of his shorter poems; and his most noted longer poetical composition is (La cruz de Azabache.* For his ode on (America y Colon* he won a gold medal in 1858. His best-known drama. (Camilia O'Gorman* (1836), was received with great enthusiasm, perhaps more on account of its political references than because of the evident dramatic talent which it shows. Victor- iano E. Montes (1848—) belonged to the group of poets who delighted in depicting the life of the interior of the country after the manner of the gaucho poets. His best productions, which possess a very considerable warmth of feeling and action, are (E1 Tambor de San Martin* and (Tejedora de nanduti.* To this period be¬ long two dramatists who were quite popular, Estenilaso Perez Nieto and Orosman Morato- rio. The chief work of the former, (Aparien- cias y realidades,* has its scenes laid during the revolutionary period. Moratorio, in his dramas, successfully exploited the gaucho character, sur¬ roundings and associations, working over popu¬ lar legends and stories. His dramas are still occasionally presented. Washington P. Bermu¬ dez (1847-) came by his dramatic talent

through family inheritance, his father being Pedro P. Bermudez, already mentioned. He contributed fugitive verse to the periodicals; and became known as a writer of witty, satir¬ ical and political poems, many of which were contributed to El Negro Timoteo, a noted polit¬ ical journal. He wrote many plays, the most successful of which was

est poem of its kind in Uruguayan literature. This, when published, bore the title of (Ta- bare,* the name of the hero of the story. The poem, which consists of six cantos, sings, in beautiful lyrical verse, the love story of Tabare, half-breed Charru Indian, for Blanca, the sister of Don Gonzalo, the Spanish commander. The plot ends in a tragedy, which was in reality the only solution for the complications the author had created. Among the other works of San Martin are his famous (La Leyenda Patria,* (La epopeya de Artigas* and (Resonancias del Camino.* Luis Pineyro del Campo (1858-) marks the passing of the Romantic movement into quasi-realism. He has written a great deal that is pleasing and often poetic, but little that is really lyrical or approaching poetical great¬ ness. His (E1 ultimo gaugho,* one of his long¬ est poems, gives a pleasing picture of the past and its customs. Santiago Marciel (1867-), at the age of 17, published a volume of poems which gave great promise of future achievement ((Auras primaverales*). His best-known long poem, (Flor del trebol,* a tale of love, war and adventure, displays considerable poetic feeling and an appreciation of the beauties of nature. Among the other poets of Uruguay worthy of notice are Bernardo Prudencia Berro (1803-68),

Enrique de Arrascaeta, Joaquin de Salterain, Antonio Lussich, Luis M. Lafinur, Jose del Busto, Victor Arreguine, Rafael Fragueiro and Carlos Roxlo. The latter, who is a poet of con¬ siderable versatility, has written what is by far the best literary history of his country, (Historia critica de la literatura uraguaya* (1912). The same subject has been treated, but in a much less efficient and extensive manner, by Francisco Bauza, in his (Estudios literarios*

(1885).

Eduardo Acevedo Diaz (1851-), journal¬ ist, soldier, reformer, critic and novelist, stands easily at the head of the story writers of Uru¬ guay. He passed a stormy life. Frequently in opposition against the government and often in arms and exile, his varied experiences are em¬ bodied in a series of novels of startling reality and dramatic force. Undoubtedly Acevedo Diaz was largely influenced in his earlier days by his companion in exile, Carlos Maria Rami¬ rez, author of (Amores de Marta,* a popular romantic story, and other tales. Among Ace¬ vedo Diaz' popular stories are (Brenda,* his first novel; Usmael,* (Nativa,* (E1 Grito de Gloria,* a trio of semi-historical novels, pur¬ porting to relate the adventures of a family during the wars of the revolution, which pre¬ sent a bewildering array of excellently drawn characters. Carlos Reyles (1862 —) is credited at home with being the leader of the natural¬ istic movement among the novelists of Uruguay. He had unexceptional facilities for depicting the life of the interior of the republic, for he was the owner of an extensive cattle ranch on which were employed scores of cattlemen and other ranch help. These he studied carefully and in detail ; and he has reproduced them with startling exactness. Among his best and most realistic stories are (Beba* (1894) ; (La raza de Cain* ; and a volume of excellent short stories. Manuel Bermudez (1867 —) also has written very good stories after the style of Reyles.

Uruguay has also produced good dramatists

in Samuel Blixen (1869-1909) and Victor Perez Petit (1871 —). The former has developed, in a series of plays of the seasons, (Primavera,) (Otono) and Unvierno,* some very fine char¬ acterization. Perez Petit has written, in addi¬ tion to drama, literary criticism, stories and tales. His literary criticisms and studies in¬ clude (Los Modernistas) and (Zola,) and his dramas

Peru and Bolivia. — Away back in semi- historical times Peru and Bolivia were con¬ nected politically and their interests have been, in many respects, very closely related since then. Bolivia, owing to the disturbed condi¬ tion of the country following the expulsion of the Spaniards, did not begin to produce litera¬ ture until about the middle of the 19th cen¬ tury; and since then, her writers have, for the most part, been but rather faint echoes of those of Peru and the other surrounding countries, and of Spain. Therefore the literary efforts of Peru and Bolivia have been grouped together in this article.

Peru. — In Peru the unsettled condition of the country following the achievement of inde¬ pendence retarded literary development ; but still the ancient land of the Incas recovered more quickly than her one-time province, Upper Peru (Bolivia). Manuel A. Segura (1805-71) is the brightest literary star on the horizon of Peruvian Republican literature. His first comedies began to appear in 1839. His pub¬ lished comedies numbering a dozen are witty, full of intrigue, have considerable movement and present very good characterization. Hence they were very popular in their day. Among the best of his comedies are (La moza mala) ; (Saya y manto) ; (Lances de AmancaesP (Na Catita> ; and (E1 Sargento CanutoP Felipe Pardo Aliaga (1806-68) was, like Segura, a depictor of the humorous situations of life and a wielder of satire. Thev are very good pictures of certain phases and conditions of the life of the country and of the society of the day. Among Pardo's best-known comedies are (Frutos de la educacionP (Don Leocadio) and (Una Huerfana en ChorillosP Manuel Castillo (1814-70), leader of the mountain school of Arequipa, is a poet with a great love of nature and a power of depicting her moods. To this period belongs Juana Manuela Gorriti de Belzu (1819-74), the greatest woman writer of Peru and her most clever novelist. Her husband, Manuel Bezu President of Peru from 1848 to 1855 and again in 1865, died in the latter year at the hand of an assassin. Juana Manuela Gor- rita had published her first novel, (La QuenaP in 1845 and had followed it up with many tales of a like nature, all having a historical or legendary basis in the national life of Peru and her pre-Spanish civilization. A collection of her stories was published under the general title of *Suenos y realidades) in 1865; and

since then various other editions have appeared. Juana Manuela Gorrita also edited a periodical, El Correo del Peril , which exercised very considerable influence in literary circles. Jose Arnaldo Marquez (1830-1904) wrote in a fatal¬ istic and hopeless vein which gained him a con¬ siderable following. He struggled all his life with poverty and inability to make a decent liv¬ ing and his struggle is vividly

reflected in his contains a collection of his love poems. Ricardo Palma, critic, historian, philol¬ ogist and poet, made a very respectable body of literature out of the traditions, customs and humors of Peru and Peruvian life. No other Latin-American writer has handled so many characters, incidents and plots as Palma has in his (Tradiciones Peruanas) which were pub¬ lished in various series and numerous volumes. Clemente Althaus (1835-81) has attempted al¬ most every class of literature, passing from Romanticism in his younger days to Classicism in his more mature years. He wrote much and passably well. Luis Benjamin Cisneros (1837-1904), diplomat and poet, rises above the level of the poetic achievements of Althaus. Among his poems which are recited in schools and colleges and at private gatherings and public assemblies in Peru, are (A1 Peru* (I860) ;

(Aurora Amor) (1885) ; and numbers of his songs and his patriotic odes. Manuel Nicholas Corpancho (1839-63) who died in the burning of a ship at sea was one of the most promising of Peruvian poets. Owing to his poetic success he had already been appointed Peruvian Minis¬ ter to Mexico at the age of 21. He was both dramatist and lyrical poet. His first drama, (E1 poeta cruzado,* published at the age of 17 is a surprisingly good production. Among his other works are ˆagallanes,* an epic poem founded upon the life of Magellan. A collec¬ tion of his poems with an introduction by Jose Marmol appeared under the title (Ensayos poeticos.* Pedro Paz Soldan y Unanue (((Juan de Arona,** 1839-95), a poet of much originality and power, occupies a high place in the estima¬ tion of his countrymen. In his periodical, El Cliispazo, he poured out all his satire, sarcasm and bitterness, which, natural with him, was imitated by the younger poets of his following. Paz Soldan made extensive translations from Virgil, Lucretius and Ovid ; and this helped to increase the beauty and effectiveness of his style and the strength of his imagery. At once the most characteristic and the best of his published works is (Cuadros y episodios peru- anos) (1867). In these pictures, for such they really are, Peruvian scenery and life, especially in the country, seem to live and breathe. Ricardo Rossel (1841-1909), a poet of high ideals and Romantic tendencies, forms the link between the Romanticists and the Modernistas. Rossel has attempted successfully, in addition to Romantic poetry, the historical legend, songs, letrillas and humorous verse. Two poems which show the extremes of his composition and treatment are (Hima Sumach a poetical historical legend, and (Meditacion en el cemen- terioP Manuel Gonzalez Prada (1844-), professor of literature, possessed of a mastery

of Spanish composition, has run through all the. gamut of extremes, pessimism, atheism, anti-religious fanaticism, anarchism, and yet preserved his beauty of style and perspecuity of thought and arrangement. His most char¬ acteristic work is (Paginas fibres.' Carlos G. Amezaga (1846-1906), dramatist and poet, in his (Leyenda del Cauc'ho' has shown consider¬ able epic ability and his (Mas alia de los cielos) has the true lyrical ring. Clorinda Matto de Turner (1854—), the Peruvian wife of an

English doctor, is noted for her patriotic poems. She has written two series of good (

Bolivia. — Among Bolivian writers who have made respectable places for themselves on the literary roll of their country is Nestor Galindo (1830-65), a somewhat melancholy poet of Ro¬ mantic tendencies. Undoubtedly he stands higher in the eyes and in the hearts of his

countrymen, because he was exiled from his native land several times, and finally shot. His chief work is (Lagrimas.' Daniel Calvo (1832- 80), a contemporary of Galindo, seems to have been under the same influence as the latter ; and his attitude toward life is seen in his first volume of poems, (Melancolias. ' In fact he was an ardent admirer of Galindo and ad¬ dressed. some poems to him which fully dis¬ play this admiration. His (Rimas' are better and more varied than his other work ; and some of the romantic legends contained therein have been popular in Bolivia. Rosendo Vil¬ lalobos (1860-) has spent more time out of

his native country than in it; and while he is claimed by Bolivia as one of her clever literary men, he more properly belongs to the city of Lima where most of his literary work has been produced. There he published several volumes of poems, light in quality, but pos¬ sessing a sympathetic touch and a swing which make them pleasant reading. They have, therefore, been quite popular in both Peru and Bolivia. Numbers of other Bolivian writ¬ ers are scattered throughout Latin America be¬ cause of the want of encouragement at home. One of these, Ricardo Jaimes Freyre, a profes¬ sor of literature in Tucuman, Argentina, has made for himself an international reputation as a follower of the Modernista movement. He is a disciple of Ruben Dario, with whom he was at one time associated. Benjamin Lens (1836-78) was a follower of the Romantic poetry whose influence had already extended to all Latin America in his day. He, Galindo and Calvo are usually associated together in any review of Bolivian literature. Lens,

how¬ ever, is free from the excessive lachrymose tendencies of his two literary companions. He is, therefore, more pleasant reading, though he has not the poetic touch of Galindo nor the facility for successful imitation of Calvo. The modern poets of Bolivia are all under the influence of Ruben Dario, Santos Chocano or some one or all of the prime actors in the Modernista movement. Of late years, how¬ ever, Chocano has come to have more influ¬ ence in Peru than Dario or any other modern or ancient poet. The Pan-American note of Chocano finds an echoing voice and a sympa¬ thetic ear in Bolivia. This Chocano influence is having a good tendency on the younger genera¬ tion of Bolivian writers who promise to make themselves heard in the near future in the cause of the extension of the feeling of com¬ mon interests and brotherhood throughout the American continents.

Colombia. — For its population and the ex¬ tent of its educated class Colombia has pro¬ duced more literary men, in its short national life, than perhaps any other of the Latin-Amer¬ ican republics. Among the early writers of republican Colombia are Jose Joaquin Ortiz (1814-92) and Jose Eusebio Caro (1817-53), both poets, magazine writers and editors who worked together earnestly and intelligently for the advancement of Colombian literature. The latter is very strongly subjective and sensi¬ tive, vehement in his likes and dislikes, lyrical and oratorical, and he moves ever on a high plane of morality and duty. Ortiz, too, be¬ longs to the Romantic school, and his poetry shows power of description, choice of words, finish of form and a lyrical ring which, at its

best, is very good. His patriotism and his literary culture ring true and enabled him to do much, during his long and active life, for the cause of letters in his native country. A contemporary poet of great talent was Julio Arboleda (1817-62), statesman, soldier and pa¬ triot. Born to considerable wealth, his life was one long series of adventures and political changes, which finally ended in his assassina¬ tion. His geatest work, (Gonzalo de Oyon,* a long poem founded on a native legend, is written in excellent Spanish, and displays many attrac¬ tive poetical gifts. Its influence has been very considerable on subsequent Colombian literature and his work is still read throughout Latin America. One of the most voluminous writers of Colombia was Manuel Maria Madiedo (1817-1900). His varied writings cover sci¬ ence, law, government, logic, poetry and reli¬ gion ; and there is a strong patriotic ring to them enforced by an enthusiastic love of na¬ ture. He

was also a journalist and dramatist. One of the poets of this period who strongly reflected the Romantic movement was Gregorio Gutierrez Gonzalez (1826-72), ˆAntioco.® There is a tone of melancholy and discouragement running through his poems which appealed strongly to his audience and made him one of the most popular poets of Colombia. Felipe Perez (1834-) and his brother Santiago (1837-) both wrote dramas, some of which were acted with success and others of which were simply published as literary productions. Felipe found the plots for his novels and tales in the early history of Spanish America, while his brother sought his in English history. Jose Maria Samper (1828-98), diplomat, dramatist, novelist and biographer, is one of the foremost figures in Colombian literature. He was a pro¬ lific dramatist, averaging over three plays a year for some time, all of which were staged, some of them with notable success. Turning from the stage he wrote novel after novel, interlarding his work with sketches of his contemporaries and of other native literary men. Among his best dramas are (Dos Priinos a la Moderna > and (Un Alcalde a la antiguaP His (Historia de una almaP largely autobiograph¬ ical, is a book of deep interest. One of the most interesting characters in Colombian litera¬ ture is Rafael Nunez (1825-94). At the age of 36 he was President of Colombia, and for a score of years he dictated the policy and gov¬ ernment of his country. Beginning as a con¬ firmed skeptic, he gradually came around to protect the Church and he rose from a dictator to an advocate of something as near like con¬ stitutional government as Colombia was fitted for at the time. In addition to poems he has written a very interesting work, (La Reforma politica en Colombia. > Jose Maria Vergara (1831-72), poet, literary critic and editor, did much for the advancement of Colombian litera¬ ture; and his (Historia de la literatura en Nueva Granada) (1867) is the best authority on the subject. Jose Manuel Marroquin, statesman, philologist, political writer and his¬ torian, was successively Vice-President (1898- 1900) and President (1900-04). His works in¬ terestingly reflect the life of his times. Miguel Antonio Caro (1843-1909), another Colombian President, was a classical poet; encouraged literature and edited, among other works. Ar- boleda's ooems. Diegc Fallon (1834-1905), a

poet of breadth and imagination and depth of feeling, stands high in Colombia as a writer of rhythmic poetry that is, in some ways, sug¬ gestive of Poe. His religious sentiments and love of nature are ever strongly in evidence in all his work. Rafael Pombo (1833-1912), dip¬ lomat, educator and poet, is still one of the most popular of Colombian writers. Flis poetry is versatile, imaginative, rhythmic technically excellent; and it often expresses great depth of feeling.

Among his many popu¬ lar poems are (Mi AmorP (Angelina, •* (Cuen- tos morales) and (,Cuentos pintados. y

Colombia has produced many novelists, the best of whom are Jorge Isaacs (q.v., 1837- 95) and Jose Maria Samper already mentioned. Isaacs' (Maria* is the best novel written in Latin America. It has been translated into most of the languages of Eurooe and has been warmly received in Spain. The book con¬ stantly reveals an intensity of passion that is truly Latin-American. Isaacs also published a volume of poems of some merit but inferior to his novel. He has had many imitators in his own country, the best of whom is Lo¬ renzo Marroquin, who has written some clever stories which have attracted attention at home and abroad. Of these the best known and most discussed is

Among the more recent Colombian noets who have influenced Latin-American literature through originality in meter and form is Jose Asuncion Silva (1860-96).

Ecuador. — Gabriel Garcia Moreno (1821— 75), twice President of the republic (1861-65 and 1869-75) was the leader of the ultra-Catholic party in Ecuador and his administration was very much of a dictatorship. He possessed a curious combination of talents. He was ar¬ dently attached to the mysticism of the Middle Ages, and his writings, especially his journal¬ istic work and his (Defensa de los Jesuitas,* are of great interest as reflecting the condition of Ecuador during its period of development toward more democratic ideas. The most in¬ teresting literary character of Ecuador is Juan Leon Mera (1832—99) , poet, novelist, critic, his¬ torian, scholar and antiquarian. But it is as a poet that he is best remembered. One of the best of his longer poems is (La virgen del sol> (1861). Odes, romances, Indian legends, love poems and songs give a great deal of variety and life to his whole 'body of poems. Mera's (Historia Critica) of the literature of Ecuador is one of the best works of its kind; and his editions of the works of various Latin-Amer¬ ican poets give strong evidence of his critical ability. Mera also won fame as a novelist, his best work in this department of literature being (CumandaP (1879). This story displays a great love for and familiarity with nature. In it the poet shows that the forest is his domain and his great love. Numa Pompilio Llona (1832- 1907), educator, poet and philosopher, who re¬ ceived an excellent, cosmopolitan education in Colombia, Peru and Ecuador, and spent some years in the diplomatic service of his country in Europe, wrote, long, semi-philosophical poems and sonnets which were popular in his day ; but they are too discursive and subjective to suit the popular taste of to-day. Some of his poems, however, like (Noche

de dolor en las montanas,* (Los Caballeros del Apocalipsis* and (La Odisea del Alma5 are still popular in

Ecuador. Juan Montalvo (1835-89) is one of the most unique of Ecuadorian literary men. Profoundly religious, he was a strong hater of everything that gave evidence of sham in soci¬ ety, government and religion. This hatred burned fiercely against the friars and the igno¬ rant clergy of his country who prostituted their office. His mind was brilliant and original and his forms of poetical expression distinc¬ tively his own. Among his works are (E1 Buscapie) (partially finished) ; (Siete tratados,5 (Cervantes,5 and considerable excellent literary criticism, much of which appeared in his quar¬ terly, El Espectador. Like most Latin-American countries, Ecuador possesses a very consider¬ able number of aspirants for noetical honors, the greater number of which, however, sing in a minor key. Among these are Luis Cordero, Dolores Veintemilla de Galindo, Julio Zalum- bide, Horacio Vasquez, Francisco Campos, Ale¬ jandro Andrade Coello, Carlos R. Tobar, Emilio Gallegos del Campo, Dolores Sucre and Emilio Gallegos Naranjo.

Venezuela. — On the breaking out of the revolution which finally led to the separation of the country from Spain, the Venezuelan revolutionary leaders had only one use for the press, and that was to employ.it to fight Spain. This end was purely political. Hence the vol¬ ume of political literature which marks the be¬ ginning of the life of the young republic. But even at this early date some enthusiastic spirits began the cultivation of literature for its own sake. These literary devotees were encouraged by the establishment of the first printing press in Venezuela dn 1806; through revolutionary activity; the smuggling into the country of books forbidden by Spain and the general in¬ tellectual activity which proclaimed the coming of the revolutionary storm. Among these early literary advocates and lovers were Jose Luis Ramos, Jose Sanz, Luis Javier Ustariz and Francisco Javier Ustariz who are now remem¬ bered more for the encouragement they gave to literature and the example they set than for the excellence of their literary remains. Andres Bello (q.v.), the greatest name in the literary life of Venezuela in the early days of the re¬ public, became more intimately connected with Chile (q.v.) very early in his career. Roman¬ ticism early made its appearance in Venezuela, as it did in all the Latin-American republics. Its first standard bearer was Jose Antonio Martin (1804-74). True to the

inspiration of poetry in Venezuela he sang the beauty of the rich tropical land about him. To him nature was altogether lovely. He also wrote pleasing narrative poems and political effusions which were not so happy because they were not the natural expression of the author who couched them in characteristic Gongoristic language. One of his best poems is (Canto funebre5; and one of his most characteristic and curi¬ ous narrative tales is (E1 Mascara. 5 Fer- min Toro (1807-65), diplomat, educational¬ ist, statesman and poet, has the peculiar distinc¬ tion of being both a classical writer and a romanticist. He was one of the best diploma¬ tists which his country has produced and he negotiated important treaties between Vene¬ zuela and Spain, France, Italy and Great Britain and was instrumental in obtaining general official recognition in Europe of the independ¬

ence of Venezuela from Spain. Though he was successful in classical poetry he was the first to recognize the fact that in his own country was a wide and interesting field for poetic efforts ; and he himself lead the way in his elegies

ments ‘perhaps better than any other Vene¬ zuelan. There is a depth of sweetness and tenderness, a wealth of imagery and an un¬ dertone of sadness in his poetical efforts that have endeared him to his countrymen. Fran¬ cisco G. Pardo (1829-82), one of the most per¬ sistent prize winners of the Venezuelan Acad¬ emy, has been called the Longfellow of Vene¬ zuela. Among his popular poems are (Las IndianasP (E1 porvenir de la America) and (La gloria del libertadorP Cecilio Acosta (1831— 81), jurist, orator, journalist and poet, had the power of poetical repetition so noticeable in the songs, poems and oratory of the aboriginal races of America. Some of his poems read like an echo of (Hiawatha) or of some of the songs or hero tales of the Iroquois or Algon- quins. He was one of the cleverest masters of word painting in the history of Latin- American literature. A very characteristic example of his style and his limitations is cLa casita blancaP Being a noted orator, Acosta was naturally a master of prose composition. In fact his prose has often all the characteristics of his poetry. It is rhythmic, imaginative and forceful. (La gota de rocioP one of his best poems, pos¬ sesses much of the mannerism of his best prose efforts and effects. Nicanor Bolet Peraza, journalist, political agitator, reformer and dramatist, was at one time well known in the United States, where he spent most of his life in political exile. He was witty, satirical and yet withal possessed of a strong fund of com¬ mon

sense and the ability to size up the situa¬ tion in all cases. He strove sedulously to in¬ duce the different republics of Latin America to follow the example of the United States in the adoption of democratic principles and prac¬ tices. His writings have always been popular in Venezuela with a large percentage of the people, and his play (Luchas de honor } re¬ ceived an ovation in the capital of that re¬ public. Julio Calcano (1840 —), philologist and novelist, was tireless in his efforts in the field of literature and in his endeavors to inspire his countrymen with a desire to improve and broaden that field. His historical novel, (Blanca de TorrestellaP which has run through several editions, and which has been translated into English and French, was popular in Europe and America. No other Venezuelan writer has painted such vivid pictures in prose of his country as has Julio Calcano. This is because he knew Venezuela as few Venezuelan writers have succeeded in knowing it. His great work (E1 Castellano en Venezuela* has become a classic for those who are interested in the study of the Spanish language in Latin America and its relation to the tongue of the mother- country. Juan Antonio Perez Bonalde (1846-92) made popular in Venezuela the poetry of Becquer who received his inspiration from Heine. Perez Bonalde has often more of the ring of the German than has Becquer himself ; but generally his poetry falls considerably below that of either Heine or his adapter. Perez Bonalde's importance consists in the fact that he introduced his countrymen to Becquer and put them in line with a wave of literary effort which was destined to spread over all the re¬ publics of Latin America and to leave deep and lasting effects, one of which was that it, in part at least, was the cause for the appearance of

the Modernista movement on the American continents. Perez Bonalde's German influence is due to the fact that he was a very close student of the German language and literature and especially of the poems of Heine of whom he was an ardent admirer. His

tracted attention throughout Latin America and in Spain, (Nieve y lodo) and the most learned and extensive work of its kind on the subject in Spanish. Jose Gil Fortoul (1860 —), historian, short-story writer, essayist, critic and novelist, began his literary life as an out and out adherent of the French psychological writers and more especially of Paul Bour- get. But he outgrew his youthful tend¬ ency and influence and became the most in¬ teresting and soundest historian of his coun¬ try. His first story to attract attention, (Julian,

> is said to be largely autobiographical, and his French influence stood him in fairly good stead as it enabled him to analyze the conditions under which his hero is supposed to have lived, and incidentally to reveal his own thoughts and the influences at work in his own life. A succeeding story,

circulation in Europe in both Spanish and French. Among his poems is a volume bearing the title cPequena opera lirica> (1904). He has also published numerous volumes of sketches and travels, among them (Mas alia de los horizontes) (1904) and (La Lampara de Aladino) (1915). A close friend of Ruben Dario (q.v.), Blanco Fombona became one of the most active of the Modernista poets and the foremost representative of that school in Venezuela. His (E1 hombre de hierro,* a satire on conditions in Venezuela during the dictator¬ ship of Cipriano Castro, is a novel of very con¬ siderable force and power of description and of depicting conditions and characters. It grew out of the author's personal experience while governor of the Amazonas territory (1905). While in prison in Venezuela Blanco Fombona wrote (Cantos de la prision y del destierro) (1911) which have become popular with the Venezuelan revolutionary element. He has also written a great deal of sane criticism about Latin America and other literature; but his weak point is his antipathy to the United States. Miguel Eduardo Pardo (1868-1905) has cari¬ catured the Modernista movement and the whole school of writers who have written so fervidly about Venezuela, in his (Todo un pueblo,* which has been also printed in Europe and translated into French. Manuel Diaz Rodriguez has taken delight in satirizing conditions in his native land and in many respects he has outdone Pardo in his novel (Idolos ratos,* in which he lashes absolutism in Latin-American politics and government. He is inclined to follow the sociological school, as exemplified in French literature of the latter quarter of the 19th cen¬ tury, in his other novels and more especially in (Sangre patricia.) As an art and literary critic Diaz Rodriguez has no superior to-day in Venezuela, and few equals in Latin America. His criticism is marked by the same rhythmic, forceful and clear, prose that makes his novels and other literary productions delightful read¬ ing. Among the other Venezuelan minor writers worthy of mention are Francisco de Sales Perez ((Ratos perdidos,* 1880); Nunez de Caceres; Jacinto Gutierrez Col, Andres Mata; Victor Racamonde, Samuel Dario Mal¬ donado; Francisco Lazo Marti ((Silva cri- olla>) ; Eduardo Blanco ((Zarate}); Jose Maria Manrique; Tomas Michelena ((De- boraˆ 1884; (La Hebrea,* 1890) ; Arevalo Gonzalez, and Rafael Cabrera Malo. For the literature of other Latin-American countries see Mexican Literature; West Indian, Cen¬ tral American, and Brazilian Literature.

Bibliography. — Amunategui, Miguel Luis, (La via de D. Andres Bello) (Santiago 1882) ; (Las Primeras representaciones dramaticas en Chile> (Santiago 1888) ; (Ensayos biograficos* (Santiago 1893-96) ; Barreda, E., (Nuestro Parnaso, coleccion de poesias argentinas) (4 vols., Buenos Aires 1914) ; Blanco-Fombona, Rufino, (Cartas de Bolivar > (Paris 1893) ; (Autores Americanos) (Paris 1912) ; Canete, Manuel, (Escritores hispano-americanos) (Ma¬ drid 1884) ; Figueroa, P. P., (Antologia chilena) (Santiago 1908) ; Garcia Calderon, Francisco, (Latin America) (London 1913) ; Garcia Velloso, Enrique, (Historia de la litera- tura argentina) (Buenos Aires 1914) ; Gutierrez, Juan Maria, (Poetas anteriores al siglo XIX*

(Buenos Aires 1865) ; Isaza, E., (Antologia colombiana) (Paris 1895) ; Laverde Amaya, I.,

(Apuntes sobre biografia colombiana) (Bogota 1889) ; Medina, Jose Toribio, (Historia de la literatura colonial de Chile) (Santiago 1882) ; Menendez y Pelayo, Marcelino, (Historia de la poesia hispano-americana> (Madrid 1913) ; Mera, Juan Leon, (Ojeada historico-critica sobre la poesia ecuatoriana* (Quito 1868) ; Oyuela, Calixto, (Apuntes de literatura Argen- tina) (Buenosˆ Aires 1889); Pena, N.,

(Cartas americanas) (Madrid 1889-90) ; Ver¬ gara y Vergara, J. M., (Historia de la litera¬ tura en Nueva Granada) (Bogota 1867) ; Cal- cano, Julio, (Parnaso venezolano) (12 vols., Caracas 1892; Picon Febres, Gonzalo, (La literatura venezolana en el siglo XIX > (Caracas 1916) ; Bauza, Francisco, (Estudios literarioˆ (Montevideo 1912) ; Roxlo, Carlos, (Historia critica de la literatura uruguaya> (Montevideo 1912) ; Molina, P., and Finot, E., *Poetas bolivianos. J

John Hubert Cornyn, Birmingham Southern College.

5. LATIN AMERICA AND THE WORLD WAR, 1914-19. The attitude of the Latin-American countries as a whole toward the conflict in Europe can be fully appreciated only when we examine separately the record of each country in this great class during the years of the war. It will, therefore, be our en¬ deavor to present briefly in this article the facts disclosed by studies of action and of tendency, so far as these can be ascertained to-day, . in every one of the 20 Latin-American republics. We shall endeavor also to give prominence to things essential and of permanent value, and to show in a true perspective things accidental

or transitory. The American republics making common cause with the United States and her allies will be mentioned first. Then those main¬ taining neutrality — either strict neutrality or a friendly neutrality toward the United States — will be considered in their turn.

Cuba and Panama followed immediately the lead of the United States in her declaration that a state of war existed between the United States and Germany. Thus, on the day after that declaration, the Cuban Congress resolved that there existed also a state of war between Cuba and Germany. President Menocal, in his message to the Cuban Congress, reviewed the causes which brought about hostilities between the United States and Germany. He dwelt upon Germany's continuous violations of in¬ ternational law and of the rights of neutrals, and said : ((The Republic of Cuba must not be indifferent to this violation of the rights of peoples nor ignore the noble attitude of the United States. We are bound to that nation by sacred ties of gratitude and confraternity, and by a political treaty explicit and implied which creates between the two nations an understand¬ ing practically amounting to an alliance. This would require Cuba's co-operation at any ordi¬ nary time, and all the more so now that the United States is defending principles of human liberty, of international justice, of honor and the safety of those free and independent na¬

tions which are threatened in their most vital rights and interests.® On 16 Dec. 1917 Cuba declared war on Austria-Hungary. In like manner Panama's acknowledgment of the close political and friendly ties which bind it to the United States was both swift and spontaneous. It has been well said that, to all intents and purposes, Panama has been in a state of war with Germany since 7 April 1917. The Presi¬ dent of that republic in his proclamation of 9 April 1917 said: ((Panama will lend its full and decided co-operation to the United States of America against any enemies that carry out or intend to carry out any hostile act against the territory of Panama or the Panama Canal or that should in any way affect or intend to affect the common interest of the two coun¬ tries.® This official document was supple¬ mented by a cablegram addressed to the Presi¬ dent of the United States by the President of Panama, in which the latter said : <(The Re¬ public of Panama, whose future is so intimately identified with that of the Great American Democracy, will take upon itself, in this trial, the obligation concurrent with its conception of solidarity, and fully assumes on this occasion the responsibilities due to its obligations to¬ ward the United States.® On 10 Dec. 1917 Pan¬ ama declared war on Austria-Hungary.

Bolivia practically reached a decision early in February 1917. The

Bolivian Foreign Of¬ fice, having been advised of the establishment of the submarine ((blockade® by Germany, re¬ plied that the character of a maritime -warfare involving offensive action of submarines against neutral vessels and persons, as well as the pro¬ hibition of all neutral traffic within the zone described, constituted an absolute denial of the inherent right of neutral powers to trade and navigate; that in view of this abnormal and il¬ legal situation the government of Bolivia had advised the United States that it was fully in accord with the stand taken by President Wil¬ son, and made common cause with the United States. On 13 April 1917 the German Minister was given his passports. The Bolivian Foreign Office stated that, inasmuch as Germany had carried out to all intents and purposes its threat against vessels and persons of neutral states, and in view of the fact that the steamer Tu hantia had been torpedoed in neutral Dutch waters, the Bolivian Minister to Berlin being on board, diplomatic relations between Bolivia and the German Empire were no longer possi¬ ble. On 6 Aug. 1917 the Bolivian President, in his message to the Bolivian Congress, fully en¬ dorsed the course adopted by the government of the United States in defense of the principles of humanity and justice.

Brazil's first public statement in connec¬ tion with her attitude in the European War was almost synchronous with Bolivia's reply, men¬ tioned above; for on 7 Feb. 1917, answering likewise Germany's notification in regard to submarine warfare, the Brazilian government, through its Foreign Office, expressed the de¬ sire to maintain its position of unswerving neu¬ trality, reserving, however, the right to present in due time such claims as might arise in con¬ crete cases affecting Brazilian interests. It was also stated that a deep impression had been caused by the German avowal of an intention to sacrifice lives unjustly, and unjustlv to de-

stroy property and disorganize commerce. The Foreign Office pointed out, moreover, that Bra¬ zil could not accept the "blockade® as effective ; and that the Brazilian government, in harmony with international usages, conventions and agree¬ ments, was bound to protest against such a block¬ ade, placing on the German government the re¬ sponsibility for any acts affecting Brazilian citi¬ zens, ships and merchandise. On 11 April 1917 the Brazilian government broke off diplomatic re¬ lations with Germany, as the result of the sink¬ ing of the steamship Parana by a German sub¬ marine, without warning and with loss of lives, on the night of 3 April 1917 off Point Barfleur.

On 1 June 1917 the Brazilian government re¬ voked the decree of neutrality (of 25 April 1917) in the war between the United States and Germany. Next, measures were taken to make use of the German merchant vessels an¬ chored in Brazilian ports. The plans formed at that time included the protection of Brazil¬ ian shipping abroad and co-operation with friendly nations in measures designed to se¬ cure the freedom of Brazil's foreign trade. On 4 June 1917 the Brazilian Ambassador at Washington, in his note to the Secretary of State of the United States, said: (

Costa Rica evinced the true Pan-American spirit promptly, offering the use of its ports to the warships of the United States, arresting on 16 Sept. 1917 three of the resident Germans who were charged with conspiracy, and intern¬ ing all Germans who resided in Costa Rican ports. A special session of Congress was called and on 21 Sept. 1917 the government severed diplomatic relations with Germany. The diplo¬ matic and consular representatives of Germany received their passports, and the Costa Rican

legation and consuls in Germany were recalled. Costa Rica declared war on the government of the German Empire 23 May 1918.

The Dominican Republic declared its .neu¬ trality in 1916, but in June 1917 withdrew the exequatur of the German consular service and thus, in response to the general sentiment of its citizens, severed diplomatic relations with the German Empire.

Ecuador did not reach a clear and explicit decision in this matter until toward the end of 1917, but the government expressed to the Min¬ ister of the United States at Quito, in a note dated 11 Feb. 1917, the following views: "The efforts of neutral powers to soften the rigors of the present disastrous war are very com¬ mendable and worthy of applause, as are . . . the principles declared by the Government of the United States in its note of 18 April 1916, addressed to the German Foreign Office, through American Ambassador Gerard, con¬ cerning the inalienable rights of neutrals, the immunity of non-combatants, and those sacred rights of humanity which have universally and of old been accepted by civilized nations.® The President of Ecuador, in his message of 10 Aug. 1917 to the Ecuadorean Congress, ad¬ vanced the thought of Pan-American solidarity in the following terms : ((We continue to up¬ hold a policy of neutrality and our efforts to secure a more open and frank understanding among all nations of the American continents. We have said on every occasion, when justice so demanded, that we are in sympathy with and have faith in the great democratic principles, the fundamental basis of those nations. Amer¬

ica, therefore [in the wider sense, as suggested above], will always find us with it.® On 5 Oct. 1917, when Peru broke off diplomatic relations with Germany, it was stated that the German Minister at Lima intended to go to Ecuador, to which country he was accredited as well as to Peru. The Ecuadorean government announced, however, through its' Minister of Foreign Af¬ fairs, on 7 Oct. 1917, that the German Minister would not be received officially in Ecuador in case he desired to present his credentials there ; and two months later (7 Dec. 1917) the sever¬ ance of diplomatic relations with Germany was made definite and complete.

Guatemala, in a formal statement dated 7 March 1917, protested against Germany's sub¬ marine blockade, of which it had received noti¬ fication on 9 February. The whole policy adopted by the German Admiralty constituted, according to the characterization of it in that document, a violation of the rights of nations. This protest elicited no response whatever from the German government or its diplomatic rep¬ resentative in Guatemala, and the Guatemala government proceeded to sever diplomatic re¬ lations with Germany on 27 April 1917. It also offered its ports, territorial waters and railway facilities to the United States ; and by a decree of the National Legislative Assembly, 21 April 1918, Guatemala's attitude of belliger¬ ency toward the German Empire was declared to be the same as that of the United States.

Haiti's National Assembly protested on 11 May 1917 against the establishment of the sub¬ marine blockade, asserting that Germany must be held to account in every sense for resultant injuries sustained by Haitian subjects travel¬ ing on the high seas ; that a benevolent policy

was adopted toward the United States, and that diplomatic relations with Germany would, if necessity for such action arise, be broken off. Accordingly when the Karnak and the Mon¬ treal were sunk, several Haitians losing their lives, the government of Haiti demanded sat¬ isfaction and indemnity. The German gov¬ ernment emphasized its unwillingness to con¬ sider the matter by delivering his passports to the Haitian charge-d'affaires at Berlin. The rupture was completed by the dismissal, on 16 June 1917, of the German representative at Port-au-Prince, and by a declaration of war, 12 July 1918.

Honduras, on 17 May 1917, severed diplo¬ matic relations with Germany, as a protest against the submarine campaign. In the de¬ cree of that date we find the declarations that the republic at Honduras makes common cause with the United States, approving fully the principles that the latter's government defends ; and that ((it is incumbent upon Honduras to de¬ clare its attitude in the conflict between the United States and Germany on account of the submarine warfare, in violation of the princi¬ ples of international law, the rights of neutral property, and commerce on the high seas.® The government of Honduras offered to the United States its resolute co-operation in all possible ways and declared war on Germany, 19 July 1918.

Nicaragua, on 18 May 1917, broke off diplo¬ matic relations with Germany. In the note of the Minister of Foreign Affairs to the resi¬ dent American Minister full sympathy with the policy of the United States was expressed <(by instruction of the President of the Republic,® and Nicaragua was truthfully represented as being in accord with the attitude the United States had taken for the safety of all the Latin- American continent and its measure of defense of the high ideals and principles of civiliza¬ tion. The use of the Nicaraguan ports, ter¬ ritorial waters and means of communication was offered to the government of the United States. Nicaragua's declaration of war on Germany was dated 8 May 1918.

Peru sent a strong note of protest to the German government upon the sinking of a Peruvian vessel, the bark Lorton, 5 Feb. 1917. Later she refused to submit the case to German prize court and sent a second note, demanding a reply to the first — but without avail. On 28 July 1917 the President of Peru in his mes¬ sage to the Congress expressed agreement with President Wilson's war-message. <(The sufferings of humanity,® said President Pardo, tyvill not have been in vain if, through these efforts there is raised the new edifice of in¬ ternational society upon the immutable foun¬ dation of justice.® On 7 Sept. 1917 Peru's House of Representatives, by resolution unani¬ mously adopted, declared its adhesion to the es¬ tablished principles of justice and international ethics as proclaimed by President Wilson; and on the following day the Senate declared : C(The international policy of Peru must be in¬ spired by the principles of the solidarity of the nations of the American continents with the LTnited States, in harmony with ideals of inter¬ national justice proclaimed by President Wil¬ son and with the declaration formulated . . . in the House of Representatives.® The Peru¬ vian Congress, by a vote of 105 to 6, passed a

resolution severing diplomatic relations with Germany on 5 Oct. 1917,

and on the same day passports were handed to Dr. Perl. (See above, Ecuador). On 4 June 1918 the Peruvian gov¬ ernment took possession of eight German ves¬ sels interned at Callao. This was not, how¬ ever, regarded as an act of war.

Uruguay manifested cordial approbation of the cause defended by the American govern¬ ment. In a note dated 14 April 1917 and ad¬ dressed to the American Minister in Monte¬ video the Uruguayan Minister of Foreign Af¬ fairs stated that his government, while still maintaining neutrality, recognized the justice of the position taken by the United States of America. Thus, the offer of (

Summarizing our observations up to this point, we may say that nearly two-thirds of all Latin-American republics made known, by vig¬ orous governmental action, their adhesion to the cause of the United States and her Allies before the end of the year 1917 and were found standing firmly for the right when the vear 1918 had half run its course. We owe to John Barrett, Director-General of the Pan-American Union (see Bibliography) , the observation (in 1917) that <(the sober public sentiment of [the people of] practically all the twenty Latin American Republics is overwhelmingly pro- United States and pro-Ally in this struggle of democracy against autocracy. It would seem, in consequence, to be only a question of time when all the Latin American countries must follow the dictates and demands of this pub¬ lic sentiment and align themselves with the United States and the Allies.® Let us now turn our attention to the remaining seven — to those whose governments maintained interesting vari¬ ants of neutrality. ((Argentina, Chile, Colom¬ bia, Mexico, Paraguay and Venezuela,® accord¬ ing to a special memorandum issued in 1919, ˆeither by the statements of their Executives or by resolutions passed by their Congresses, or again by the pro-Ally tone of their most repre¬ sentative statesmen also expressed themselves in favor of Pan American solidarity.® As for Salvador, her declaration of benevolent neu¬ trality toward the United States (

Argentina, on 7 Feb. 1917, made answrer to

Germany’s notification concerning the subma¬ rine blockade : <(The Argentine Government regrets that His Imperial Majesty has thought necessary to adopt such extreme measures and declares that it will adjust its conduct, as al¬ ways, to the fundamental rules and

principles of international law.® In accordance with that declaration, the Argentine Foreign Office en¬ tered a strong protest when information was secured in regard to the sinking of the Monte Protegido, 4 April 1917 ; and in its note of 4 July 1917 demanded satisfaction for the sink¬ ing of the sailing vessel Oriana on 6 June and the steamer Toro on 22 June, both without loss of life. More specifically, it required in¬ demnity, together with assurances that no more Argentine vessels would be attacked. In the Monte Protegido case Germany accepted the suggestion in regard to indemnity. On the other hand an effort was made to justify the sinking of the Toro. Argentina reiterated her demand 4 Aug. 1917. Next, into the heated controversy a new element was projected. On 8 Sept. 1917 the Department of State of the United States published several cablegrams, dated 19 May and 3 and 9 July of the same year, sent by the German charge-d'affaires at Buenos Aires through Baron Lowen, Sweden's Minister at the same capital, to the Secretary of Foreign Affairs in Stockholm, to be delivered to the Minister for Foreign Affairs in Berlin. These dispatches contained an insolent refer¬ ence to Argentina's Minister of Foreign Af¬ fairs and recommended the sinking of Argen¬ tine vessels without leaving a trace. On 12 Sept. 1917 riots occurred in Buenos Aires, in the course of which the people expressed their resentment by wrecking the German Club, the offices of the German newspaper, La Union , and important German business houses. The offending charge-d'affaires, Count Luxburg, and the German legation were protected by the police. The Argentine government immediately asked Germany to disapprove Luxburg's con¬ duct and to apologize for his discourteous lan¬ guage; and on 19 Sept. 1917 the Argentine Sen¬ ate voted almost unanimously (23 to 1) m favor of breaking off diplomatic relations with Ger¬ many. This resolution was sent to the Cham¬ ber of Deputies for approval. On 23 Sept. 1917 the Argentine government received a note of apology from Berlin, expressing disapproval of Luxburg's utterances; but the Chamber held this to be inadequate, and on 25 Sept. 1917 by a vote of 53 to 18 upheld the Senate's course^ On the next day 100,000 persons paraded through the streets of Buenos Aires; and this was but a part of a great popular demonstration in favor of war. Nevertheless the executive, it was said, did not consider it advisable to 'ter¬ minate diplomatic relations with Germany after the promise of discrimination in favor of Ar¬ gentine ships and the apology for the Luxburg incident. This seems to have been a clear case of unrepresentative inaction : the determination of the Argentine people not finding utterance through the executive.

Chile, at the beginning of the war, declared its neutrality. Its

President, on 1 June 1917, in a message to the Chilean Congress, referred to the common enemy's declared intention to es¬ tablish a submarine blockade and then said: (

fect well-established maritime routes utilized as of old by countries foreign to the present armed conflict, we have found ourselves obliged to re¬ serve the right to take measures against acts Which we cannot tolerate.® But at the same time he expressed unwillingness to deviate from the line of strict neutrality. It is cer¬ tainly more important to note that on 29 June 1917 the government of Chile endorsed Uru¬ guay's declaration of 18 June that (

Colombia at an early period declared its neutrality, and its government consistently maintained that original position. Neverthe¬ less the Colombian Senate, in October 1917, passed a resolution of protest against the bar¬ barous submarine warfare conducted by the common enemy.

Mexico's attitude was defined by President Carranza in his message to the Congress on 15 April 1917 as follows: ((Having in view com¬ pliance with the high duty of preserving and defending the national interests, and inspired always by the most altruistic and humanitarian motives, I shall guide the conduct of the Gov¬ ernment under my charge by all possible and dignified means in the direction of a most strict and rigorous neutrality.® At the beginning of a Congressional session, 1 Sept. 1917, President Carranza reviewed certain efforts that had been made by the Mexican government, the object of which was to render prosecution of the war extremely difficult. In this connection he men¬ tioned a note in which the Mexican govern¬ ment had proposed that all neutrals should cease shipping supplies to the belligerents. But according to his own admission the efforts of his government to bring about a premature peace had not called forth, in other Latin-Amer- ican countries, such full approval as he de¬ sired. And it is a pleasure to add that when the new Belgian Minister was presented the Mexican chief executive, in his address of wel¬ come, himself emphasized the duty of resisting the common enemy to the uttermost, saying: (

tiano Carranza, on 19 Oct. 1915, was brought about in an exceptional manner, namely, through co-operative action of the American countries which, after careful investigation of Mexican conditions,

granted together the offi¬ cial recognition to the de facto Carranza gov¬ ernment.

Paraguay, geographically so remote from all scenes of the great war, gave evidence, nev¬ ertheless, of the feeling of her people when, on 11 July 1917, an important meeting held at Asun¬ cion was attended by the most prominent citi¬ zens, by the leaders of thought and representa¬ tives of the masses. The meeting offered am¬ ple tribute of admiration to the United States for her entrance into the conflict in defense of the principles of humanity and democracy, ac¬ claiming her as the champion of human rights, and particularly of those of the New World. The suggestion was brought forward that Para¬ guay's duty was to intervene in the conflict against the common enemy, but the government has continued to profess neutrality.

Salvador's Foreign Office, in its note of 4 Dec. 1914, observed : <(The use of neutrality proclamations seems to have been customary before international law clearly defined the principles which should govern the rights and obligations between belligerents and neutrals during a state of war. Later, these proclama¬ tions have been used in cases where neutrals maintain an active commerce with belligerents ; have adjoining frontiers across which they might supply each other with armament ; or when a neutral nation has a commercial fleet that might be affected in its traffic with bellig¬ erents. Our country in the present war is not affected by any of the above-mentioned con¬ tingencies ; and as a state of neutrality and the regulations established for the same are juridic conditions emanating from the war itself and from the international principles which govern it, Salvador as a neutral is obliged to observe strictly the principles of war-neutrality. These principles must not necessarily be promulgated by this country in the form of a proclamation, as they are amply set forth in the fourteen diplomatic instruments subscribed to at the Sec¬ ond Conference of the Hague in 1907 and in the Declaration of London dated 26 Feb. 1909.)) The Minister of Foreign Affairs also stated that notice had been given to the military com¬ manders under his control to see to it that bel¬ ligerent vessels should observe strict neutrality in the employment of their wireless apparatus. The government of El Salvador declined to take. sides openly against the common enemy, but in a note, dated 3 Oct. 1917 the Minister of Foreign Affairs stated that ((E1 Salvador, as an American nation, could not fail to recognize, in the conflict between the United States and Germany the. solidarity which binds it to the great Republic of the North, in view of the spirit of Pan-Americanism which should pre¬ vail.®

Venezuela, non-committal from the begin¬ ning of the war,

announced its policy on 3 May 1917 through the message of the Provisional President, who stated that there had been no act of German submarines by which Venezuela had been directly affected, and, therefore, Vene¬ zuela had not been involved in the complica¬ tions which had drawn the United States into

war with the common enemy: (

Contributions to the Cause of the Allies were indeed extended, but with attendant dif¬ ficulties, mainly economic, even in those coun¬ tries of Latin America in which the natural demonstration of approval was not entirely pre¬ vented by active German propaganda. Brazil, for example, rendered valuable services — to which reference was made, in 1919, by the Bra¬ zilian Ambassador to France, who was also the leading member of the Brazilian peace delega¬ tion at Paris. In support of his assertion that Brazil had accomplished much in the Allied cause since she entered the war, the Ambassa¬ dor said : <(We seized 43 first-class German vessels and one German cruiser. Thirty of these vessels we turned over to France for her own use. We mobilized our entire army, of 60,000 officers and men, and all our navy. At the same time we placed our merchant fleet at the command of the Allies. We sent our best aviators to France, together with more than 100 army officers. We organized and maintained a complete hospital unit in France, with 300 beds. We kept more than 50 steamships plying be¬ tween Brazilian ports and the United States and Europe, supplying our allies with coffee, cocoa, oils, nuts, cotton and sugar. We stamped out German propaganda in Brazil, put a stop to enemy espionage and interned many dangerous enemy aliens. A large part of our navy was sent to European waters, where, un¬ der command of a United States admiral, it co¬ operated with the Allied fleets in protecting the coasts and shipping and troop-transports from enemy submarines. Eight of our best merchant vessels were sunk by torpedoes while in the service of the Allies. Many of our sea¬ men were lost with these vessels. Some of our seamen were picked up and interned in Ger¬ many. We feel our position is quite modest, but hope for the complete approval by the con¬ ference of what we did.® (Consult New York Herald, 3 Feb. 1919).

Large sums of money were raised in Latin America for the loans of all the Allies (con¬ sult (Selling War Bonds in South America,* in The South American, New York, October 1918, p. 5).

Special mention should be made here of Cuba's highly creditable part in the war. When speaking in a general way about the participa¬ tion of Cuba, the Secretary of War of that re¬ public mentioned a few

interesting details in July 1918, saying, among other things: ((We have established training camps in Cuba, both military and naval, and through the courtesy of the United States we have placed officers at Key West and Pensacola for instruction.

I' ranee has detailed two Cuban aviators, who have achieved brilliant records in France with the Lafayette Escadrille, to act as instructors in our aviation school. We have purchased ad¬ ditional equipment and materials necessary to make this arm of our service effective. . . .

If our forces are needed on the western front, they will go there. It should be distinctly un¬ derstood that the Cuban government will with¬ hold nothing that it possesses that can be used to advantage by our allies in the fight against Prussian militarism.® On 19 Oct. 1918 an¬ nouncement was made in Havana that Cuba's total subscriptions to the Fourth Liberty Loan amounted to $10,000,000, or $4,000,000 more than the quota allotted to her. The President of Cuba, in an authorized statement, said: (

Bibliography. — Barrett, John, (The War and the New America — the New Pan-Amer- ica} ; Address before the Southern Commercial Congress; World Court (New York, Novem¬ ber 1917) ; Blakeslee, George H., /True Pan- Americanism ; a policy of co-operation with the other American Republics) ; Journal of Race Development (Worcester, January 1917) ; Bul¬ letin of the Pan-American Union, (The Grow¬ ing Spirit of Pan-Americanism* (Washington, October 1917) ; Calderon, I., (The Consecra¬ tion of the Western Hemisphere to Democ¬ racy, } World Court (New York, November 1917) ; (Circular de la Cancilleria Ecuatoriana a las Cancillerias del Norte, Centro y Sud America, sobre Union y Solidaridad de los paises de todo el continente,* Boletin del Min- istro de Relaciones Exteriores (Quito 1917) ; Downs, W. C., (Pan-Americanism and the War,* South American (New York, November 1917) ; Naon, R., (The European Conflict and the Pan American RepublicsP The Commoner (Lincoln, December 1914) ; Rendueles, M. R.,

1918, p. 146) ; (Tribute to Brazilian Help in the War,* Pan American Magazine (New York, February 1919).

Marrioist Wilcox.

6. TRANSPORTATION AND COM¬ MUNICATION IN LATIN

AMERICA.

Railways. — Although several countries lay claim to having the oldest railway in South America it appears that the first road to be actually opened for service was a line five miles long, finished in British Guiana in 1848. In the next year a line was completed between Caldera and Copiapo, Chile, and in 1857 the first road began operations in Argentina, Brazil following a year later. Since that time con¬ struction has been practically continuous, and now every country in South America has its railway system. Naturally expansion . of rail¬ way transportation has been most rapid in the level plains of Argentina, . where rails have been laid at comparatively little expense, and it has made least progress in the west and north, where mountain construction often runs the cost up to more than $100,000 a mile. The railway mileage of South American countries (not in¬ cluding minor private and other lines) was (1917) as follows:

country Mileage

Argentina Bolivia . . , Brazil. . . Chile …. Colombia . Ecuador . . Guiana : British . Dutch. . French . Paraguay . Peru

Uruguay.

Venezuela

21,325

850

16,146

5,015

698

427

100

109

231

1,900

1,639

In each country this mileage serves national needs almost entirely, and tourists will find that communication between countries is still largely by coast or ocean vessels.

Travel to South America as a rule follows a welLbeaten path. The tourist who wishes to visit the chief centres usually travels on one of two routes — down the east coast to Buenos Aires, across the continent to Valparaiso, up the west coast to Panama, and thence to Colom¬ bia and Venezuela, or the reverse of this jour¬ ney, making ‘ the north-coast countries from Barbados or Trinidad. If he elects the for¬ mer route his first stop will probably be at Pernambuco, where most ocean liners serving Brazil call. Coast steamers will carry him to Para, Natal and points between, but the tourist whose time is limited can continue by ocean steamer to Bahia and to Rio de Janeiro. From Rio a favorite trip is that by rail to Sao Paulo, thence by rail to Santos, where the steamer can again be caught for Rio Grande do Sul, Montevideo and Buenos Aires. From Buenos Aires various side trips can conveniently be made, including a visit to Asuncion, capital of Paraguay. The only transcontinental line in South America affords rail accommodations between Buenos Aires and Valparaiso, Chile, where the traveler usually takes a boat for the trip along the west coast. If he wishes to visit Bolivia he stops at Antofagasta, reaching La Paz from that port by rail in about 45 hours. Siroche or ˆmountain sickness,® how-

ever, caused by a too rapid change from the coast to an altitude of over 12,000 feet, may make a more gradual ascent advisable. From La Paz two other railways reach the coast, that leading to Mollendo, Peru, having hereto¬ fore had the most passenger traffic. At Mol¬ lendo the sea voyage is continued to Callao- Lima, thence to the northern ports of Peru and to Guayaquil, Ecuador, from which the capital, Quito, can be reached in a two-days’ journey. Steamships carry the traveler from Guayaquil to Panama and through the canal to Colon, where connection can be made for Cartagena, Colombia. After possible trips to the interior cities of Bogota and Medellin, connections are made at Cartagena or Puerto Colombia for Venezuelan ports, the most important of which are Puerto Cabello and La Guaira, from both of which the capital, Caracas, can be reached by rail. As convenient the traveler can then either go to Trinidad or Barbados and catch a north-bound boat, or return to Colon.

It will be seen that on a South American tour of this kind a great part of the travel is by boat, and railways are as a rule of only local convenience. If he desired to do so, how¬ ever, the traveler could land at Victoria, Brazil, and continue on the route mentioned entirely by rail to Mollendo, Peru.

Most of the railways of South America have been built by European capital, largely Eng¬ lish. The equipment is therefore for the most part European. Government ownership and operation are most prominent in Chile, but exist also in Brazil, Argentina and other coun¬ tries. There are a multitude of gauges, ranging from the broad 5 feet 6 inches of various Argentine lines to 2 feet 6 inches of the Anto¬ fagasta (Chile) and Bolivia line in Chile, and even narrower private lines. Accommodations for passengers on many roads, notably those of the larger Argentine and Brazilian systems, are the equal of those in the United States, luxurious parlor-car, sleeping-car and dining- car service being provided. Fares are variable but for the most part are not excessive. Rates for excess baggage, however, are usually high.

Before reviewing briefly the transportation systems of the various countries, the much- discussed project of the Pan-American Rail¬ way should be mentioned. This project is the proposed linking-up of existing lines to afford railway service through North and South America, from New York all the way to Bue¬ nos Aires. Existing lines could be utilized to the southern border of the United States, and the National Railways of Mexico line would carry the train to the Guatemalan border. Railways now in operation, being built or pro¬ jected would afford passage through Central America to Panama, where construction to the Colombian border would involve the conquering of the tropical forest. At the other end of the line there is through trackage from Buenos Aires to Cuzco, Peru, except for a stretch of about 66 miles, now under construction between La Quiaca and Tupiza, Bolivia, and there ar.e various mountain lines in Colombia, Ecuador and Peru which would form links in the com¬ pleted chain. Much of the construction yet to be affected, however, is in difficult country and it will be many years before the great dream is a reality.

South America.

Argentina. — The great level plains of Ar¬ gentina, with their wealth of agricultural and pastoral products, have made the river Plata region the centre of railway expansion in South America. From Buenos Aires a great network of lines stretches out to the north, west and south, connecting practically every important town or city of Argentina with

the capital and bringing the country to a rank of ninth in point of railway mileage among the nations of the world. The following distances by rail from Buenos Aires to other cities of Argen¬ tina will illustrate the extent of railway de¬ velopment: To Bahia Blanca, 446 miles; Tu- cuman, 720 miles ; Mendoza, 647 miles ; San Juan, 745 miles; Santa Fe, 299 miles; Rosario, 186 miles; Cordoba, 433 miles; Salta, 996 miles; Santiago, 628 miles; Jujuy, 1 006 miles; San Luis, 485 miles; Catamarca, 771 miles; Mar del Plata, 248 miles. Up to the outbreak of the European War the mileage was being steadily extended, but that event practically suspended construction through the curtailment of the supplies of foreign capital necessary for exten¬ sive building.

The systems of Argentine railways, with their mileage (excluding private and other minor lines) are as follows : Buenos Aires and Pacific, 3,535 miles; Buenos Aires Great Southern, 3,792 miles; Buenos Aires Western, 1,870 miles; Central Argentine, 3,305 miles; Cordoba Central, 1,205 miles; Entre Rios, 831 miles; Buenos Aires Midland, 322 miles; Ar¬ gentine North Eastern, 752 miles; Province Santa Fe, 1,192 miles; Rosario-Puerto Belgrano, 493 miles ; General Buenos Aires, 790 miles ; Central Northern, 1,790 miles; Argentine del Norte, 1,196 miles; Buenos Aires Central, 252 miles. Most of these systems are owned wholly or in part by English shareholders (English capi¬ tal having been invested in Argentine railways to the extent of almost a billion dollars), and the securities of the more important roads are quoted regularly on the London Stock Exchange. Of the total mileage the govern¬ ment owns some 4,000 miles, the longest roads being the Central Northern Railway, running from Santa Fe northwest to the Argentine boundary at La Quiaca, and the Argentine Northern, running from Santa Fe west to San Juan, both roads having several branches. The government is interested in building and operating railroads chiefly in order to open up new territory, and the roads in many cases are run at a loss.

Argentine railways have three different gauges. The broad gauge of 5 feet 6 inches, said to have been introduced when the first railway builders purchased rolling stock of this gauge which had been used in the Crimean War, prevails on several of the larger roads, including the Buenos Aires and Pacific, the Buenos Aires and Great Southern, the Buenos Aires Western and the Central Argentine. The middle gauge, 4 feet 8ˆ4 inches, is used by the Entre Rios Railway, the Argentine North Eastern and the Buenos Aires Cen¬ tral. The government lines mentioned, the Transandine Railway, the Cordoba Central, the Buenos Aires Midland and the Province of Santa Fe are of metre (3.28 feet) gauge. Freight carried on these roads naturally con-

sist very largely of grain, livestock and animal products such as wool and hides, but consider¬ able quantities of wine and grapes are carried from the vineyards of Mendoza and other western provinces.

The passenger service of these lines is quite up-to-date, and all the comforts appertaining to modern railway travel are provided. The line of the Central Argentine between Buenos Aires and Rosario has been double-tracked, and the running time between these cities, a distance of 186 miles, has been reduced to four and a half hours. The fare is not ex¬ cessive. One of the minor drawbacks to rail¬ way travel in many parts of Argentina is the monotony of landscape, some lines running for hundreds of miles over level plains with prac¬ tically no trees or hills to be seen in any direction. The railway system in general is such that every city of consequence in Argen¬ tina can be conveniently reached from Buenos Aires, and tourists and commercial travelers find it a good plan to make the capital their headquarters, taking side trips to other centres as may be desirable. The fact that a great part of the import and export business of the country flows through Buenos Aires makes it unnecessary for foreign salesmen to visit many of the outlying cities. Tourists, however, will find it interesting to visit Tucuman, where Argentine independence was declared; Men¬ doza, the centre of the wine industry; Rosario, second to Buenos Aires as a shipping centre; La Plata, where there are a large observatory and large meat-packing plants ; and Mar del Plata, the great seaside resort.

Uruguay. — The fact that Uruguay, smallest of South American republics, has some 1,600 miles of railway is an illustration of the pro¬ gressiveness of the country, as well as the facility in construction afforded by the level or gently rolling character of the land. The chief system is the Central Uruguay Railway, which operates approximately 1,000 miles of track. Its main line and an extension connect Montevideo with the Brazilian frontier and join the Rio Grande system at Sant' Anna. Nearly all lines are controlled by British capital, and as a rule return a good profit. They are for the most part operated under a government guarantee.

In the third of the river Plata countries, Paraguay, there is as yet but a single line, the Paraguay Central, running from Asuncion, the capital, to Villa Encarnacion, where it makes connection with the Argentine North Eastern. A branch from Villa Rica to the Brazilian frontier is

being constructed, to con¬ nect with the Sao Paulo-Rio Grande Railway and give through connection with the Atlantic Coast. At present Asuncion is reached in about 50 hours from Buenos Aires over the road mentioned, or by river boat, the trip upstream taking five days and the return trip four days. An extension of the Santa Fe Railway of Argentina is being constructed which has for its objective a point in Argentina op¬ posite Asuncion, the complete line to be en¬ tirely in Argentine territory but giving Asun¬ cion another outlet to the sea. _

Chile. — From Buenos A>res the broad- gauge tracks of the Buenos Aires and Pacific lead away 647 miles to Mendoza, joining there with the meter-gauge Argentine Transandine vol. 17 — 3

Railway. This continues 111 miles to the Transandine Tunnel, two miles long. The Chile-Argentine boundary line is reached about halfway through the tunnel, and across the line the journey is over the track of the Chilean Transandine Railway to Los Andes, 47 miles. From there to Valparaiso (83 miles) runs the line of the Chilean National Railway. The whole distance from Buenos Aires to Val¬ paraiso is 888 miles. This Transandine route has made unnecessary the long voyage around the Horn when traveling between Valparaiso and Buenos Aires, the railway trip now being made in two days. The line does not carry a great amount of freight but has a good passenger traffic. During the winter months it is often blocked by snows and the service is consequently very uncertain from June to August.

The character of the railway development of the west coast has been determined by the peculiar contour of the land. Along practically the whole length of the South American conti¬ nent the high ridges of the Andes lie only a comparatively short distance back from the coast. For the most part, therefore, the rail¬ ways of Chile, Peru and Ecuador consist of short lines crossing the narrow strip of coast lands between sea and mountains, here and there climbing over the high passes into the interior plateau.

The chief exception to this is the Longi¬ tudinal Railway of Chile, running from Puerto Montt in the south to a point near Iquioue (eventually to be extended to Arica). Be¬ cause of the proximity of the mountains to the sea and their height, railway construction has been exceedingly costly and difficult and has required the solution of more engineering problems than construction in any other part of the world. The highest railway in the world is to be found in Peru, a branch of the Central of Peru Railway reaching to the height of 15,865 feet, while farther south, in Bolivia, a branch of' the Antofagasta

(Chile) and Bolivia Railway running to Potosi attains 15,814 feet. So far the rail connection between Buenos Aires and Valparaiso is the only one affording transcontinental service, but, as men¬ tioned above, the completion of 66 miles of track between La Quiaca and Tupiza will open another through route. Work on this connec¬ tion has been carried on intermittently for sev¬ eral years. A third route will be opened when Bolivia's railway system is extended to meet the track of the North Western of Brazil Railway, practically completed to the border town of Corumba. Another transcontinental line, to run from Bahia Blanca, Argentina, to Talcahuana, Chile, has been discussed, but no active work is being done on it. There is already a road from Bahia Blanca to Neuquen, in Argentina.

Of the 5,000 miles of railway open in Chile about 3,000 miles are owned by the government, Chile being the only country in South America that has an extensive government-owned sys¬ tem. These roads are for the most part oper¬ ated at a loss. The private lines are mostly ˆnitrate® railways, owned and operated by the companies exploiting the nitrate fields in North Chile.

Bolivia. — The country of Bolivia, entirely cut off from the sea, has three rail connections

with the coast, two of these being through Chile and one through Peru. The lines through Chile run from Antofagasta and Arica to La Paz, and that through Peru to Mollendo. The southernmost line is that of Antofagasta (Chile) and Bolivia Railway, from Antofagasta to Oruro, Bolivia, a distance of 575 miles. From Oruro the Bolivia Railway, leased by the Antofagasta Railway, leads to Viacha, 125 miles, and the rest of the distance to La Paz, 19 miles, is covered by a line constructed by the Antofagasta Railway, as well as by two others. The whole distance of about 720 miles is covered in 45 hours. The second line to the coast is the Arica-La Paz line of 248 miles, of which 28 miles is rack road. The time required for the trip to La Paz from the coast is about 25 hours and for the journey in the other direction 15 hours, the first-class fare being about 6ˆ2 cents a mile. The third line to the sea is through Peru to Mollendo, the total dis¬ tance being 534 miles and the running time about 29 hours to the coast, part of the journey being made by steamer on Lake Titicaca. This road is the Southern Railway of Peru, which also operates a branch from Juliaca to the ancient Inca capital, Cuzco, 210 miles, a favorite objective of tourists. While most of the traffic to and from Bolivia has been by way of the first and third of these routes, the second is considerably the shortest and there is, more¬ over, one of the best harbors along the Pacific Coast at Arica. The line was opened in 1912 and is expected to build up a volume of busi¬ ness between La Paz and the coast that will equal that of its older competitors.

Peru. — Besides the Southern Railway, Peru has one other line that climbs the Andes from the coast. This is the famous Central Railway of Peru, one of the most wonderful railways in the world because of the number and Character of the engineering difficulties overcome. It was surveyed and partially completed by Henry Meiggs, an American engineer, at an enormous cost. It runs from the port of Callao to Oroya, 138 miles, with an extension to Huancayo, a further 70 miles to the south. The main line passes through 57 tunnels and reaches a height of 15,665 feet, a branch to Morococha going 200 feet higher. This branch, as noted above, is the highest railway in the world. At Oroya the Cerro de Pasco Railway leads to the town of that name, the site of an important Ameri¬ can copper mining enterprise. Besides these railways there are various shorter lines, chiefly connecting the agricultural valleys of the coastal regions with Pacific ports.

A large part of the mileage of Peruvian railways is controlled by the

Peruvian Corpora¬ tion, a company formed in 1890 by European holders of Peruvian securities, the ‘payment of interest on which was in default. The agree¬ ment between the government and the corpora¬ tion is such that the latter dominates the rail¬ way situation in Peru. The company is in¬ terested in new construction, and has surveyed for the government a line to run from Tiripata, on the Southern Railway, to the Madre de Dios River, which will open up a through rail- and-water route to the Atlantic. Other trans- Andean lines are projected in the northern and central sections of Peru.

Ecuador.— The only railway of importance in Ecuador is the Guayaquil and Quito line,

built, owned and operated by Americans. This line is another example of daring mountain construction. It has a total length of 287 miles and the journey to Quito takes two days. There are also railways inland from the ports of Bahia de Caracas, Manta and Bolivar, and lines are projected from Quito to the coast and from Ambato, on the Guayaquil and Quito Railway, to Curaray in the interior, which will open up the rich tropical sections of the Amazon Valley in Ecuador. Work on the latter line is proceeding slowly.

Colombia. — In the north-coast countries of Colombia and Venezuela railroad building has made little progress, partly because of the mountainous character of the country and partly because of the fact that each country is but sparsely inhabited. In Colombia the main arteries of travel are still the rivers, particularly the Magdalena, and nearly all railways lead off from this river or from the seacoasts. The foreign traveler usually lands either at Carta¬ gena (thence reaching the river by rail at Cala- mar, 62 miles away), or at Puerto Colombia, going thence to Barranquilla, a rail distance of 17 miles. A river boat carries him to La Dorado, where the Dorado Extension Railway leads around a series of rapids to Puerto Bel¬ tran, the river voyage being then continued to Girardot. The rest of the journey to Bogota, the capital, is by railways of two different gauges, a distance of 109 miles. From Bogota two short lines lead out north and southeast, besides the line running to the Magdalena River. The Antioquia Railway, nearly completed, con¬ nects Medellin with the Magdalena, and a short line leads out from the river port of Puerto Wilches, to be eventually continued to Bucara- manga. Isolated lines serving local needs in¬ clude the Cucuta Railway (44 miles) in the east, the Santa Marta Railway (92 miles) in the north, and the Cauca Railway (103 miles) in the west. A short line running from the Magdalena at Girardot to Espinal completes the list. The railway construction program of Colombia includes the completion of the lines from the Magdalena to

Bucaramanga and to Medellin, the continuation of the Cauca Rail¬ way to Popayan, the connecting of the Cucuta Railway with the Magdalena, the building of a line from Medellin to the Gulf of Darien, and the construction of a line from Girardot to Cali, thus giving Bogota access to the Pacific.

Venezuela. — The 530 miles of railway in Venezuela are all of three and one-half feet gauge or less, and serve the regions along the coast. The chief line is the Great Railway of Venezuela, a German road of 111 miles running from Caracas to Valencia. It was a costly road to build1, having 86 tunnels and 212 bridges. Both the terminal cities of this road are con¬ nected with the coast, Valencia by an English-owned railway of 34 miles running to Puerto Cabella and Caracas by the La Guaira and Caracas line, also English, which in its 23 miles passes over 10 bridges and through nine, tunnels, and climbs 5,000 feet. The Bolivar Railway (109 miles) connects the interior city of Barquisimeto with the coast at Tucacas, and is important as a carrier of copper ore from the. mines at Aroa, about 50 miles from Tucacas. This road is also English-owned as is the Cen¬ tral Railway (46 miles) running southeast from Caracas. Most of the other railways,

penetrating short distances into the interior iiom the coast and from lake Maracaibo, are financed by Venezuelan capita), three being government-owned. Several projects for new railways have been talked of, but extensive construction will have to await the development of the country.

Guiana. In British Guiana there are about 100 miles of railway, the chief line being that from Georgetown to New Amsterdam, 60 miles long. Dutch Guiana has a single road of about 109 miles.

Brazil. — Brazil, a country whose great ex¬ panses have as yet not even been fully ex¬ plored, holds great promise for future railway construction. There are now some 16,000 miles of railroad in the country, and lines pro¬ jected and under construction when the European War broke out would have added 8,000 or 10,000 miles more. Existing lines, with one notable exception, have naturally been laid where the country is most thickly settled, that is, in the coastal regions and the immediate hinterland, and the great interior plains and forests are penetrated by only one line that has connections with the coast. Construction has been most in evidence in the more productive section, comprising the agricultural and mining states of

the south. Almost one-half of the total mileage of the country is owned by the federal government, although most of this is leased. The gauges of Brazilian railways range from two feet to five feet three inches, but about 90 per cent of the mileage is metre gauge.

The chief economic value of these railways heretofore has been to bring the products of each general section to the coast, and communi¬ cation between northern, southern and western states is still largely by ocean or river steamer. The traveler visiting the several coast cities has little use for the railways until he reaches Rio de Janeiro. From Rio the usual journey (re¬ quiring all of one day), is by rail to Sao Paulo, one of the most thriving commercial cities of South America, and then to the coast again at Santos, where steamer connection is made for southern Brazil and the river Plata. However, the traveler, if he wishes to do so, can reach both Uruguay and Argentina by rail from Rio de Janeiro. Sleeping and dining-car service is provided, but the rates are high.

The line that connects the capital with many of the important cities of southern Brazil and the oldest line in the country is the Central of Brazil Railway, wrhose broad and metre gauge tracks lead to Sao Paulo in the southwest and to Bello Morizonte and other important centres in the north. It is government-owned, and returns a large annual deficit. The coun¬ try's best-paying line is the Sao Paulo Railway, running from Santos to Jundiahy via Sao Paulo, which carries a tremendous freight of coffee annually. There are two tracks over the 50 miles between Sao Paulo and Santos, and grades of 8 per cent are surmounted by means of endless-cable systems. Other import¬ ant lines of this region that should be men¬ tioned are the Mogyana, Sorocabana, Pmilista, South Minas, West of Mines and Brazil Rail¬ way systems. The last named is the compre¬ hensive system controlled by a company known as the Farquhar Syndicate, incorporated in Maine, which carried forward ambitious de¬ velopment plans that involved railway construc¬

tion or control in Brazil, Uruguay, Paraguay and Argentina. This development, however, was largely suspended by financial difficulties on the outbreak of the European War, and the company passed into the hands of a receiver. The southernmost states of Brazil are served by this line and by the Great Southern, the region to the north of Rio de Janeiro by the Leopoldina Railway, the region around Pernam¬ buco by the Great Western, the state of Ceara by the Brazil North Eastern, and Bahia by the state of Bahia Southwestern. There is at present no through rail connection between north and south, but it is planned to have the Central of. Brazil extended eventually to Para,

thus affording railway communication for all the states on the Atlantic seaboard. Construc¬ tion is also reaching out toward the western plains, and a transcontinental line through Bolivia will eventually be built.

Far removed from all other lines is the Madeira-Mamore Railway, 1,800 miles into the interior, which spans a series of rapids in the Madeira, Mamore and Beni rivers. These rapids are the only obstruction to river traffic from the interior of Bolivia to the Atlantic, and the road of 225 miles was constructed (with great difficulty and only after repeated failures) to afford an outlet for the products of eastern Bolivia.

Mexico and Central America.

Mexico. — Before the revolution broke out in 1910 Mexico had witnessed a steady expan¬ sion of its railways, which formed a network that afforded an outlet for the products of almost all parts of this potentially wealthy coun¬ try. In the years that followed the overthrow of Diaz not only has new construction been materially diminished (though not entirely sus¬ pended) but millions of dollars' worth of track and rolling stock have been destroyed. In normal times the country is well served by its railways. It has albout 16,000 miles of rail¬ way, mostly standard gauge (four feet eight and one-half inches) of which about 7,300 miles are owned or controlled (but not operated) by one system, the National Railways of Mexico. The government organized this system by combining the National Railroad of Mexico and the Mexi¬ can Central, in 1908, and later adding the Mexican International, the Vera Cruz and Isthmus and the Pan-American. The govern¬ ment owns 50.3 per cent of the ordinary stock and thus has full control. The principal line of the system runs from Nuevo Laredo, on the northern border, through the states of Nuevo Leon and San Luis Potosi on down to Mexico City, with several branches east and west.

Other important lines of Mexico include the Southern Pacific of Mexico, running from the northern border through the western states of Sonora and Sinaloa to Tepic, whence it will be continued to join the National Railways of Mexico at Guadalajara; the Mexico North Western Railway, one of the two lines joining El Paso and Chihuahua ; the Mexican Rail¬ way, running from Vera Cruz to Mexico City, with several branches ; the Kansas City, Mexico and Orient Railway, which when completed will join Kansas City with the port _ of Topolo-bampo on the Gulf of California; and the Tehuantepec National Railway, running from

coast to coast between Salma Cruz and Puerto Mexico. The only isolated system is the United Railroads of Yucatan, and a line is pro¬ jected which will join this with the other rail¬ ways of the country.

Mexico has a carefully worked out body of railway law, and the Minister of Communica¬ tions is assisted by a standing advisory Railway Commission of nine members.

Central America. — In Central America through connections from ocean to ocean are afforded in three countries, Panama, Costa Rica and Guatemala (considering Panama a part of Central America). On these and other Central American lines the traveler will find some of the finest scenery attending railway travel anywhere in North and South America. Both freight and passenger rates are high, but the service in general is good. The oldest and best-known line, the Panama Railway, has been carrying immense amounts of traffic across the isthmus since it was opened in 1855, and its earnings have been very large. It is 47 miles long, and the trip between the Atlantic and Pacific terminals is made in about one and one- quarter hours. From Port Limon, in Costa Rica, the three and one-half foot gauge Costa Rica Railway (leased by the Northern Rail¬ way of Costa Rica) carries the tourist through wild and beautiful country to the capital, San Jose, in some five or six hours, a daily service being maintained in both directions. The fare is $3.90 gold. Over another line the traveler may also reach the Pacific Coast at Puntarenas, 69 miles from San Jose, in about the same time. The freight traffic of these Costa Rican railways is very largely made up of bananas and coffee shipped by the United Fruit Company. A sys¬ tem that promises much for the future develop¬ ment of Central America is that of the Inter¬ national Railways of Central America. This now includes the lines joined to make the ocean-to-ocean route from Puerto Barrios, on the Atlantic, to San Jose on the Pacific, together with a branch at Santa Maria and a line run¬ ning westward from La Union, Salvador. When projected roads are completed the Inter¬ national Railways will have continuous track from the Mexican border to Panama, which will complete the North American part of the Pan- American Railway.

The railway mileage of the countries of Central America is as follows : Panama, 202 miles; Costa Rica, 450 miles; Nicaragua, 200 miles; Salvador, 184 miles; Honduras, 300 miles; Guatemala, 500 miles.*

Ocean Transportation. — The fact that a large part of the foreign trade

of South Amer¬ ica has been with Europe has caused a great development of ocean transportation service be¬ tween the two continents. Until a few years before the World War the only regular com¬ munication of any importance between South America and the outside world was over the lines of ships that ran to European ports. It was customary for passengers bound for South America from the United States to go by way of Liverpool or Hamburg, and a great deal of freight was also routed via these ports. While this has decidedly changed and the United

♦These figures, which are approximate only, are taken from * Railway Expansion in Latin America ' by Frederic M. Halsey.

States enjoys reasonably good freight service with South America, it is nevertheless true that in normal times transportation facilities to and from Europe are immensely better than to and from the United States. This is due in large part to the nature of the resources and com¬ merce of Europe, South America and the United States. South America is distinctly a continent of raw materials, while Europe is a producer of manufactured articles and has been, moreover, an investor of immense amounts of capital. A heavy volume of oversea traffic and a consequent growth of shipping was, there¬ fore, very logical. The United States, on the other hand, has until recent years supplied it¬ self with most of its foodstuffs and other raw materials and has also not actively sought for¬ eign markets for its factory products. Direct transportation facilities to South America, therefore, have been in demand only in a com¬ paratively few years and the freight and pas¬ senger traffic, even after direct service was well established, has been carried almost wholly in foreign bottoms. Before the beginning of the European War a triangular trade *route had been evolved by which vessels carried manufac¬ tured goods from Europe to South America, coffee, hides and a few other staples from South America to the United States and various American exports to Europe. The radical changes resulting from the war, together with the steadily increasing interest of the United States in South American trade, will undoubt¬ edly cause the establishment of more amnle direct facilities between North and South America, which in time will rival the facilities heretofore enjoyed by European countries.

After the outbreak of the World War in 1914 shipping service to South America was of course anything but normal. The price of charters advanced as much as 1,000 per cent, and ships were often not to be had at any price that would justify the dispatch of cargo. Any description of shipping conditions during the war would give little indication of the ordinary state of ocean transportation. The following

account will, therefore, be confined to a review of the service offered immediately before the beginning of the war, although most of the lines mentioned have maintained a more or less in¬ terrupted service during its continuance.

European shipping, carrying mostly food¬ stuffs, hides and skins, and similar commodities to Europe, has been much more in evidence in the ports of Brazil and the river Plata than on the west and north coasts and scores of vessels, some of them registering as high as 20,000 tons, have come and gone at all seasons of the year. The port of Buenos Aires saw its business grow so rapidly that elaborate con¬ struction of docks was hardly sufficient by the time it was completed to take care of the grow¬ ing traffic. In 1913 a total of 700 passenger¬ carrying vessels entered the port from over¬ seas, bringing 316,000 passengers. Many of the large liners that reached Buenos Aires put in also at Rio de Janeiro and Montevideo, and these also were busy ports. Liners flying the flags of European countries, together with the ships of one Brazilian line, afforded most of the regular communication between the east coast and New York, and the American flag, carried only by an occasional sailing vessel or

tank steamer or the monthly vessels of one American line to Brazil, was counted a rarity along the east coast.

England has enjoyed the bulk of South American trade and English lines have been more numerous than any other. The Royal Mail Steam Packet Company was perhaps the most prominent of these. It maintained a weekly service, its modern steamers of 15,000 tons and more making the voyage from Liver¬ pool to Buenos Aires in 18 days regularly, and on occasion covering the distance from Cadiz, Spain, to Rio de Janeiro in 11 days. The Lam¬ port and Holt Line had passenger and freight steamers running to the river Plata both from New York and from English ports, and steam¬ ers of the Booth Line plied regularly between England and North Brazil and Amazon ports, and between New York and these ports. Other lines offering service between the east coast of South America and England were the Harri¬ son Line, the Houston Line, the London and Northern Steamship Company, Ltd., the Blue Star Line, the British and Argentine Steam Navigation Company, Ltd., the Nautilus Steam Shipping Company, Ltd., the Nelson Line, the Prince Line and a line operated by the New Zealand Shipping Company, Ltd., and Shaw, Savill and Albim Company, Ltd. All these sent their ships to the river Plata, and the

Royal Mail, in addition, had regular boats to Venezuela and to Panama, offering service, through transshipment, to the west coast. Direct service to the west coast was maintained by the Pacific Steam Navigation Company, a subsidiary of the Royal Mail. The fastest of the river Plata steamers made Lisbon in about 14 days and Southampton in 17 days from Buenos Aires, and the first-class fare ranged from $110 to $160.

Next to the English the ships of the Ital¬ ian lines were most numerous in traffic to the east coast. This was due to the large move¬ ment of Italian immigrants into Argentina and Brazil, many of them going over for the har¬ vests and returning to Italy to soend the rest of the year at home. Those who settled per¬ manently brought their tastes with them and the demand for Italian articles built up a trade of considerable proportions. The following lines maintained a service consisting mostly of monthly sailings each way between Italian ports, usually Genoa and Naples, and the river Plata: Italia Line, La Veloce, Italian Lloyd, Lloyd del Pacifico, Lloyd Sabaudo, Navigazione Generale Italiana, Ligure Braziliana and Sicula- Americana. The German flag was carried by the large vessels of the Hamburg-South Amer¬ ican and the North German Lloyd to Brazilian and Argentine ports, and by the Roland Line to west coast ports. The first-named line maintained a weekly service to European ports, including Lisbon, Vigo, Southampton, Bou¬ logne and Hamburg, calling at Rio de Janeiro on the way and covering the distance between the river Plata and Lisbon in about 16 days. The first-class passenger fare to Europe was about $160. Regular liners were also to be seen in the river Plata in weekly, fortnightly or monthly service from France, Denmark, Hol¬ land, Spain, Belgium and Sweden, and even the interior countries of Russia and Austria- Hungary found it desirable to maintain a regu¬ lar service through their own national lines.

Besides the regular boats there were a large number of tramp steamers and sailers and spe¬ cially chartered boats plying between Europe and the river Plata, for the most part carrying grain and livestock products from Buenos Aires, Rosario, San Lorenzo (near Rosario) and Bahia Blanca, and bringing back coal and miscellaneous cargo.

Betvveen the United States and the river Plata six steamship lines, all British, offered freight service and one or two of these also carried passengers. These were the Lamport and Holt (the only important passenger-carry¬ ing line), Barber, Norton, Houston, Prince and American-Rio Plata lines. They maintained a fortnightly or monthly service from New York, stopping at Brazilian ports in one or both directions. The United States and Brazil Line, flying the American flag,

was established primarily to carry the products of the United States Steel Products Company to Brazil and bring back manganese for steel manufacture, but it also offered general cargo service. The Booth Line had sailings from New York to Para, Manaos and Iquitos, and also on occa¬ sion to ports on the north coast of Brazil, and the Brazilian line, the Lloyd Brazileiro, oper¬ ated between New York and all the important Brazilian ports.

The west coast enjoyed adequate ocean transportation facilities, both to oversea coun¬ tries and between the various coast ports. The regular European lines included the Kosmos and Roland lines, flying the German flag, the three English companies, the Pacific Steam Navigation Company, Gulf Line and Lamport and Holt, and the Johnson Line, maintaining service to Denmark and Norway. To the United States ships of three lines sailed regu¬ larly from west coast ports — the Merchants, West Coast and New York and South Amer¬ ica lines, each with sailings varying from one to two months apart. These lines made the trip around the Horn until the opening of the canal, but now go by way of Panama. Be¬ tween Japan and the Pacific Coast the large ships of one line, the Toyo Kisen Ivaisha, pro¬ vided regular and adequate service. In the coasting trade between the ports of Chile, Peru and Ecuador three companies maintained reg¬ ular schedules, the Pacific Steam Navigation Company, the Compania Sud Americana de Vapores (Chilean) and the Compania Peruana de Vapores y Dique del Callao (Peruvian Steamship and Drydock Company of Callao). Ships of the Kosmos Line and others sailing to transoceanic ports also made stops at the im¬ portant ports of the west coast and carried more or less coasting traffic. Besides these regular sailings there were a large number of tramp steamers and sailing vessels taking ni¬ trate from Chile to Europe and the United States or bringing coal from Australia and Wales.

The flags of more than half-a-dozen coun¬ tries were carried on the ships of the regular lines that served the ports of the north coast. Spain was represented by the Compagnia Transatlantica de Barcelona, Italy by La Ve¬ loce, France by the Compagnie Generale Trans-atlantique, Holland by the Royal Dutch West India Mail, Germany by the Hamburg Amer¬ ican, England by the Harrison and Leyland lines, the Royal Mail Steam Packet Company

and the United Fruit Company (British ves¬ sels sailing from United States ports), and the United States by the <(Red Dw Line. The ships

of most of these lines touched at ports of both Venezuela and Colombia, usually, how¬ ever, going in one direction, New Orleans or New York being visited either before or after the Caribbean ports on the round trip from Europe. The United Fruit Company had sail¬ ings only to Colombia, and the Red D Line and the Royal Dutch West India Mail visited only Venezuela.

In Venezuela, La Guaira and Puerto Ca- bello were the chief ports of call, the cargo to and from Maracaibo, the important coffee dis¬ trict, being transshipped at Curacao, and a good part of the trade of Ciudad Bolivar and the Orinoco being handled through Trinidad. In Colombia either Cartagena or Puerto Colom¬ bia, the port for Barranquilla, was visited by the liners serving the country, and in addition the port of Santa Marta became prominent be¬ cause of heavy shipments of bananas. Barran¬ quilla, the most important commercial city of the Colombian Republic, is shut off from the ocean by a great bar at the mouth of the Mag¬ dalena, which permits the entry of boats of lighter draft only. Various projects have been discussed and contracts have even been let for dredging and maintaining a channel through this bar, but this has not been accomplished so far and cargo must come and go through Puerto Colombia.

The various lines carrying the commerce of the United States with South America may be said to have furnished a fairly adequate serv¬ ice, and in the main their ships were ready to carry all the cargo that offered. There has been considerable agitation in recent years for the establishment of American steamship lines to carry freight and passenger traffic between the United States and Latin America, but this has arisen from a desire for many advantages de¬ rived from a national service rather than from a conspicuous inadequacy of cargo space. Nev¬ ertheless there is little question that American- owned vessels would do much to assist in the upbuilding of United States trade with Latin America. American lines could expand their service with the increasing demands from American shippers, and could adopt policies that would directly encourage a steady trade in¬ crease. A faster schedule with more frequent sailings of passenger vessels to Brazil and the river Plata would help to bring shipping com¬ munications from New York to a par with those from Liverpool, Hamburg and Genoa. A constant community of interest between Amer¬ ican industries and the companies which trans¬ ported their products to Latin America would work for as great an expansion of both trade and shipping as could reasonably be expected under normal conditions of competition. It is probable that with the growth of interest in foreign trade in the United States the estab¬ lishment of American-owned lines to all parts of Latin America will be a question

of only a short time.

The time now required for the voyage from New York to Buenos Aires is 24 or 25 days, to Rio de Janeiro 17 days, to Colon 7 days, to Cartagena 8 or 9 days, to La Guaira 8 to 10 days., to Guayaquil, Ecuador, 12 to 14 days, to

Callao, Peru, about 15 days and to Valparaiso, Chile, about 22 days. The West Coast and the Merchants lines offer through service to the west coast, and the United Fruit Company and the Panama Railroad and Steamship lines con¬ nect with the boats of the Peruvian and Chilean lines and the Pacific Steam Navigation Com¬ pany. Vessels plying to east coast ports from New York make no stops in the West Indies, as a rule, except at Barbados, and occasionally Trinidad, and travelers in Venezuela or Colom¬ bia who wish to visit Brazil and Argentina often find it more desirable to return to New York than to wait for connections. Pernam¬ buco is the first port of call for the regular liners on the way down the east coast, except those of the Lloyd Brazileiro, and Para and neighboring ports are reached from Pernam¬ buco by coasting vessels.

River Transportation. — Transportation by river in South America has had the importance which it always has in a new and unexplored continent, and it will continue to be perhaps the chief factor in the development of the in¬ terior regions, particularly the Amazon Valley, for an indefinite time to come. Where rail¬ ways are built they form of course the prin¬ cipal means of carrying traffic, and a steady ex¬ pansion in railway construction is to be ex¬ pected. But such construction is attended with great difficulties in the vast tropical regions of the northern and central sections as well as in the mountainous regions of the west coast, and the cost is very heavy. The rivers will, there¬ fore, remain the recognized outlets for these tropical regions until the growth of population makes it feasible and desirable to provide what is now dense forest land with networks of rail¬ ways.

There are four great river systems in South America on which vessels ranging in size from the small canoe of the Indian to the great ocean liners carry manufactured goods to the interior and bring out rubber, hides and a dozen other tropical products. These are the systems of the Amazon, the river Plata, the Orinoco and the Magdalena. So extensive are these systems that with a comparatively few miles portage one can go by boat except for rapids from Buenos Aires to the mouth of the Orinoco. The great Amazon, of course, leads in the extent of navigable waterways and ocean liners go regularly as far as

Manaos and even Iquitos, almost to the boundary of Ecua¬ dor. The Parana and its tributaries, the Para¬ guay and the Pilcomayo, stretch far into the heart of the continent and afford an outlet for the interior plains of Bolivia, Brazil, Paraguay and Argentina. In the north the Orinoco is as yet little utilized because the country it serves is but thinly settled, but the grassy plains through which it flows will support millions more cattle than they do, and until railways are built to the coast their onlv outlet will be by way of the river. In Colombia the Magdalena forms the only highway by which freight and passengers move from the interior of the coun¬ try to the Atlantic Coast and vice-versa.

Navigation on the Amazon, in many respects the most remarkable river highway in the world, is carried on by ocean liners, particularly the boats of the Booth Line and the Lloyd Brazil- ciro, by a number of river companies and by a

host of larger or smaller vessels not grouped into companies. The principal river company is the Companhia Navegagao do Amazonas, a Brazilian company, which owns some 50 or 60 vessels. The principal port is that of Manaos, about 1,000 miles from Para, on the Rio Negro near the place where it empties into the Ama¬ zon. On the Madeira there is continuous navi¬ gation to the beginning of the rapids- at Santo Antonio, and beyond these series of rapids, which are spanned by the Madeira-Mamore Railway, boats of light draft can run almost to the foot of the mountains. On the Amazon itself the line of navigable water for large- draft boats passes the frontier of Peru and continues on to Iquitos, and much farther for those of smaller size. Another highly import¬ ant river in Brazilian transportation is the Sao Francisco, which rises in the state of Minas Geraes and flows north for more than a thou¬ sand miles before turning east and south to the Atlantic. Rapids and falls prohibit through navigation, but there is a stretch of about 800 miles between Pirapora and Sobradinho over which boats of considerable size can operate.

The Uruguay River does not offer much in the way of transportation facilities, as rapids at. Salto stop the boats going up from Buenos Aires. The Paraguay, however, is open as far as the draft of vessels will permit them to go, and steamers of the Lloyd Brazileiro call regu¬ larly at Corumba on the Bolivia-Brazil fron¬ tier. These boats and also those of the Mihano- vitch Line (Argentine Navigation Company, Ltd.) offer a river service to Asuncion, Paraguay, the trip up the river from

Buenos Aires taking about five days and that down¬ river about four. This company, which has a fleet of some 300 vessels, does an extensive coasting business to Argentine ports and main¬ tains a daily express service between Monte¬ video and Buenos Aires.

On the Orinoco, as noted, traffic is light be¬ cause of the fact that the plains through which the river flows are as yet but sparsely inhab¬ ited. There is considerable difference in the level of the river in the rainy and the dry sea¬ sons and when the floods come it overflows its banks and its width increases to several miles. The principal city, Ciudad Bolivar, is reached by vessels engaged in ocean trade, and the river is navigable for large boats during high water as far as San Antonio. In western Venezuela the large expanse of lake Mara¬ caibo affords a highway over which the im¬ portant coffee production of the interior reaches the outside world, but a bar at the en¬ trance keeps out all but light-draft boats.

The Magdalena River, in Colombia, may be said to be the life-line of the country's com¬ merce. Practically all imports destined for the interior are carried over it. Although it is silted up at the mouth so that ocean liners can¬ not pass through, cargo is discharged at Carta¬ gena and Puerto Colombia and is taken thence by rail to the river ports of Calamar and Bar- ranquilla. It is then loaded on river boats (which also carry passengers) and carried up the Magdalena to the various river ports, from which it is taken inland by muleback or rail. If destined for the capital, Bogota, it must be transferred to railway trains at Honda or La Dorado and then reloaded on river boats at Bel¬ tran, after having encompassed a series of rap¬

ids in the river. It then goes by river to Girar- dot, 93 miles, and finally arrives at Bogota after another journey by rail, during which it must be transshipped from a medium-gauge to a narrow-gauge railway. From the time it ar¬ rives in port, therefore, until it reaches Bo¬ gota the cargo is transshipped six times. The whole trip up-river to Bogota takes 8 to 10 days, but the down trip can be made in less time during periods of high water. The Cauca River,, the principal tributary of the Magda¬ lena, is navigable over part of its length, but rapids and falls prevent the river boats from running through to the Magdalena. Railway construction may in time provide a quicker and more convenient outlet for the country's prod¬ ucts, but this is not likely to be accomplished for many years.

Mexico and Central America.

Central America has owed much of its ocean-transportation service to

the development of its banana industry, as this has brought about the establishment of the steamship lines of the United Fruit Company. The vessels of this company have provided the east coast of Central America with a service to United States ports more frequent and regular than is enjoyed by any other section of Latin America. Large ships carrying as a rule both passengers and freight sail regularly between the United States and Central America, as well as Colom¬ bia and Cuba, giving direct connections between these countries and five United States ports. From New York there are two sailings each week for Panama (one of these boats also mak¬ ing Port Limon, Costa Rica), and one sailing every two weeks for British Honduras, Guate¬ mala and Spanish Honduras. From Boston there is a weekly boat to Port Limon, stopping at Havana, Cuba, on the way. From New Orleans there is a boat each week to British and Spanish Honduras and Guatemala and an¬ other to Panama and Costa Rica, while a third sails for Panama by way of Havana. Service is also offered from Galveston and Mobile, though no passengers are carried, as they are on all the other routes. These boats, carrying millions of bunches of bananas from Central American ports every year, as well as cacao and other produce, afford an adequate and valued service of immense importance to the prosper¬ ity of Central American countries, all of which are reached directly except Salvador and Nicaragua.

Besides the United Fruit Company lines serving the east coast from the United States are the Bluefields Fruit and Steamship Company, operating between Bluefields and New Orleans, affording the only regular steamship commu¬ nication of eastern Nicaragua with the outside world ; the Orr-Laubenheimer Line, the vessels of which operate between Mobile and ports of British Honduras and Guatemala ; the Hub- bard-Zemurray Line running fruit steamers from Mobile to Puerto Cortes, Ceiba and Tela. Honduras ; and the Independent Steamship Line, with sailings twice a week for Ceiba, Honduras.

Before the war the Hamburg American Line (Atlas Service) had weekly sailings be¬ tween New York and Port Limon, and also a semi-monthly service from Port Limon to Hamburg. The Elders and Fyffes Line formerly

carried bananas from Costa Rica to Bristol, England, but the vessels were taken over by the United Fruit Company, which continued the sailings via Colon and Jamaica. The French Compagnie Generale Transatlantique maintained a semi-monthly service between Colon

and Port Limon and Havre before the war, but sailings under war conditions have been uncertain. Besides this line connections between Panama and Europe are normally afforded by the Levland and Harrison Line and the Royal Mail Steam Packet Company to England, La Veloce (Italian) to Genoa, and the Compania Transatlantica de Barcelona to Spanish ports.

On the Pacific coast Central America is served by five regularly operating lines, the Pacific Mail, the line of W. R. Grace and Com¬ pany, the Salvador Railway and Steamshin Com¬ pany, the Jebson Line and the California South Sea Navigation Company. The first-named line operates between Balboa and San Fran¬ cisco, touching at intermediate ports of im¬ portance, the second between Seattle and Bal¬ boa and the third between Salina Cruz, Mex¬ ico, the terminus of the Tehuantepec Railway, and Balboa. The Jebson Line and the Cali¬ fornia South Sea Navigation Company operate out of San Francisco, the former with steamers every three weeks and the latter every 10 days for ports to the south. Before the war the vessels of the Kosmos and Hamburg Amer¬ ican lines called at Central American ports on their way to Europe. All the above lines serve Mexican west-coast ports as well as those of Central America, and in addition the Pacific Coast Steamship Company has sailings from San Francisco to Mexican ports.

To Mexican east-coast ports four or five lines offer direct regular service from New York, and others take cargo for transshipment. The New York and Cuba Mail has a weekly service to Vera Cruz, Progreso and Puerto Mexico, and the American and Cuban Steam¬ ship Line and the Atlantic Fruit Company serve Vera Cruz, Tampico and Frontera with frequent sailings. From New Orleans and Mobde three or four lines have weekly sailings to the chief east-coast ports of Mexico, and there are also a large number of tramp steamers plying between Mexican and United States Gulf ports. Several oil companies also onerate tank steamers out of Tampico to United States and European ports. In normal times Dutch, British, German and other steamers afford a frequent service to Europe.

Lake and river transportation has not been extensively developed in Mexico or Central America, as there are no interior waterways of great importance. In Guatemala a certain amount of traffic is carrried on . over Lake Izabal, and in Nicaragua Lake Nicaragua, Lake Managua and the San Juan River form a water highway that is considerably used. In Mexico the Panuco River, leading back from Tampico, is navigable for many miles.

Interior Transportation. — A casual study of the map will disclose that South America, although discovered by white men over 400 years ago, is as yet in large part only fringed with settlements, and the heart of the continent remains as it was before Columbus sailed. All along the coasts are scores of towns and cities,

mostly commmunicating with each ‘other and the outside world by water, which serve as inlet and outlet for the commerce of a com¬ paratively narrow hinterland. In some cases the towns and villages of this hinterland are reached by railways, in others by river boats ; but very often the only communicating road from the coast is a rough trail, where even wheeled • vehicles will find no thoroughfare. Even where rail or river transportation is well developed the terminal towns serve as distributing centres for settlements still farther in the interior, which must be reached by primitive means. These interior towns are not heavy consumers of manufactured goods from abroad, or at least the variety of such goods in demand is not wide. But such lines as cotton goods, boots and shoes, farm implements, house furnishings and hardware of various kinds, particularly cutlery, move constantly to the interior when they can be obtained from abroad. It is also a mistake to consider that these out¬ lying villages offer no special market for lux¬ uries or for articles usually associated with urban life. An American company has placed sewing machines in the houses of poor Indian laborers, and one instance is known where an American soda fountain was imported, al¬ though the drums of carbonated water to be used in it had to be carried regularly 100 miles or so by muleback. As a rule the American manufacturer exports his wares to South America in the same way as the German, Briffsh or other European manufacturer, that is through an export commission house, which attends to transportation details. Even where he shins direct his goods in most cases go to a native importing house in some large port, and this house, long established in the field, has its own connections with merchants of the interior. It will nevertheless be worth his while to make such study as he can of the ultimate consumer in South America, and, if oppor¬ tunity offers, to trace his goods by personal visit to their final destination in mountain or forest home. The necessity for complying closely with requirements as to trifling details in color or construction, for packing in con¬ tainers of a certain weight and quality and for being liberal in granting credit terms to importers will undoubtedly be more clear to him after such visit.

The distributing centres for foreign goods in South America are in most cases coast cities at which the ocean liners discharge the cargo destined for the general region which they serve. Along the coast of Brazil there are six or eight of these centres, including Para, Pernam¬

buco, Bahia, Rio de Janeiro and Santos, and to a lesser extent Rio Grande do Sul, Porto Alegre, Florianopolis, Victoria, Maceio, Forta¬ leza, Paranagua and others, while Manaos, over 900 miles up the Amazon, is for all prac¬ tical purposes to be considered an ocean port. From these cities goods are distributed bv coast vessels ranging in size from those of several hundred tons to the small sailing vessels or motor boats, which make the numerous small ports in between the larger centres, and from these the goods work their wav back into the inland villages. In Uruguay all lines radiate from Montevideo and in Argentina Buenos Aires is the great open door to the whole in-

terior. Goods destined for Patagonia may be routed by way of Bahia Blanca or Punta Are¬ nas, but the greater part of imports for this section also will probably be found to pass through Buenos Aires. Along the Chilean coast are many nitrate towns and cities, each of which lives an independent existence, ob¬ taining all its supplies from visiting ships. Besides three railway lines running to the Pacific, Bolivia is reached by two or three routes running up from the river Plata. This is the historic road over which a great amount of traffic passed in the Spanish colonial days, and it is still a convenient pathway for supplies going to eastern Bolivia. The route lies through either Buenos Aires or Rosario, then by rail to the border at La Quiaca, then by cart or animal to Tupiza, 57 miles, or to Tarija, 82 miles, and then by such conveyance as offers to the final destination. Goods often reach the cities of Sucre or Potosi in this manner. Throughout all the region known as the ((mon- tanaˆ district, embracing eastern Bolivia, Peru, Ecuador and western Brazil, the method of moving produce is the same — that is, by rail, ocean steamer or river boat as far as these conveyances can take it, then by muleback, llama back or man power to the village in the mountain or forest. This is true also of Colom¬ bia and Venezuela and the Guianas, to the north, where the general absence of rail trans¬ portation makes the mule a necessitv in com¬ municating with most districts off the coast.

In all South America there are hardly any extensive highways built and maintained with substantial paving materials, such as are com¬ mon in the United States and Europe. Wheeled vehicles are mostly carts, which are used in many places to bring the country produce to market and to do heavy hauling in the towns and cities. This lack of roads is due in part to the expense of constructing them, in part to the general disposition of South Americans to allow foreign enterprise to

develop their re¬ sources. There is, however, a very widespread interest in the subject of good roads, and several governments have included substantial sums in their budgets to be devoted to build¬ ing them. It is likely that the continent is on the eve of an era of extensive highway con¬ struction, one of the things now most needed to open up the resources of the various po¬ tentially wealthy countries. The coming of the automobile is to be credited with much of the interest now being displayed in good roads.

Of the beasts of burden used to transport freight into the mountainous districts of the Andean highlands the llama is most distinct¬ ive but the mule is most useful. The llama is not a strong animal and can carry onlv about 100 pounds. It is very tractable and finds its own forage by the wayside. It knows its load, however, and will usually refuse to go on if a few pounds extra weight are added to its burden. The mule carries as much as 250 pounds at a load, but as the pack is arranged so as to distribute the load evenly on each side it adds greatly to the convenience of the im¬ porter to have the goods in cases of 120 or 125 pounds each. Packages should not be over three feet long, or 14 inches in other dimen¬ sions. Indians carry heavy loads on their

backs and go long distances with little to eat, although a pouch of cocoa leaves on which to chew is considered practically a necessitv.

Conditions in Central America are prac¬ tically the same as in South America so far as interior transportation goes, although in one case at least an excellent automobile road has been built. This is the highway called (

Otto Wilson,

Chief of Latin-American Division, Bureau of Foreign and Domestic Commerce, Washing¬ ton, D. C.

7. INDUSTRIAL DEVELOPMENT AND COMMERCIAL PRODUCTS OF LATIN AMERICA. Latin America is the most promising of the undeveloped sections of the world. The North Temperate Zone has been peopled and developed. Europe with 3,875,000 square miles has 465,000,000 people, or 120 per square mile. Asia with 17,000,000 square miles has 870,000,000 people, or 50 per square miles. North America with 8,600,000 square miles has 140,000,000, or 16 per square mile. Africa with 11,600,000 square miles has 150,000,000, or 12 persons per square mile; South America with 7,600,000 square miles of area has but 56,000,000 people, or 7 persons per square mile.

Add to South America, Mexico, Central America, Cuba and the island of Haiti, and we find that Latin America has 8,660,000 square miles, 82,000,000 people and 8 persons per square mile. North America has 315,000 miles of railway, Europe 227,000, Asia 62,000, South America but 49,000, and Latin America as a whole, 70,000. .Europe has a commerce of $25,000,000,000 per annum in nor¬ mal years; North America, $6,250,000,000; Asia, $4,200,000,000, South America $2,250,000,000 in her best year, 1913, and all Latin America

$2,900,000,000.

The three great requirements of man are food, clothing and manufactures. The North Temperate Zone has been pretty well de¬ veloped as to its producing powers and is look¬ ing to the South Temperate Zone and Tropical America for food and manufacturing materials. The food demands of the Temperate Zone peo¬ ple are chiefly bread and meat, and the Tropics at present do not produce enough of these for their own use. And there are only three places in the South Temperate Zone to which to look for products of this character, namely, South America, Australia and New Zealand. All of Argentina, all of Uruguay, two-thirds of Chile and the southern parts of Brazil and Paraguay are temperate. They grow wheat, corn and maintain enormous herds of cattle and sheep, and Argentina is now beginning to develop the swine industry. In addition to this the great elevated region of the interior of Peru, Bolivia, Ecuador and Colombia is capable of producing Temperate Zone products, the extreme eleva-

tion giving it a temperate climate even under the Equator. Argentina, Uruguay, Chile and Mexico ‘together produce about 225,000,000 bushels of wheat a year, while Australia and New Zealand, the other South Temperate Zone wheat producers, seldom turn out more than 100,000,000 bushels a year. Of corn, Argen¬ tina is next to the United States in rank in the quantity of corn produced, and actually exports more corn than we do, and Mexico 75,000,000 bushels, while Australia and New Zealand pro¬ duce but very small quantities. Of meats Argentina alone exceeds Australia and New Zealand in combination, her supply of cattle being about 30,000,000 against 13,000,000 in Australia and New Zealand. Mexico and Cen¬ tral America have normally about 10,000,000. Of sheep Argentina has 83,000,000, Australia 82,000,000 and New Zealand 25,000,000, though the number of sheep slaughtered for food is small, most of

them being retained for wool production. Of swine Argentina has about 3,000,000 while Australia and New Zealand have about 1,000,000. Brazil has as many cattle as Argentina, 30,000,000; Uruguay 10,000,000, other countries of South America about 20,000,000, and Mexico and Central America 10,000,000, making for all Latin America about 80,000,000 against 20,000,000 in Australia, New Zealand and South Africa. The total number of cattle in all the world is but about 500,000,000. About 125,000,000 of these are in India which does not utilize them for food, so that Latin America has now over one-fourth of the world's supply of cattle usable for food. And when we re¬ member that Latin America has at the present time but an average of 8 persons per square mile against 20 persons per square mile in the United States and 120 per square mile in Europe, it will be seen that her possibilities of a large increase in the future are very great, both in the matter of meat supply for the out¬ side world and that of grain, for Argentina in 1913 held fourth rank as an exporter of wheat, and was also the world's largest exporter of corn. Of sugar Cuba is the world's largest producer, her exports in 1918 in sugar alone amounting to about $246,000,000.

In one other important article of food sup¬ ply South America outranks all other parts of the world combined. This article is coffee. Brazil alone produces not merely more coffee than any other country, but actually more than all the rest of the world put together. In fact Brazil's output of coffee amounts to about three-fourths of the world's supply, while sev¬ eral other of the Latin-American countries pro¬ duce considerable quantities of this important world crop. The total world output of coffee averages about 2,500,000,000 pounds per annum, and of this Brazil produces three-fourths and Latin America as a whole produces four-fifths. And when we remember that the coffee crop of the world amounts to about $350,000,000 per annum in value in the countries of production we begin to realize the value of Latin America's production of this article of commerce. The cacao crop of the world amounts in value to about $100,000,000 per annum, and Latin America produces about one-half of this, di¬ vided between Ecuador, Brazil and the West Indian Islands, the Ecuador crop amounting to about 100,000,000 pounds a year, and that of

Brazil about 75,000,000. Of flaxseed, or lin¬ seed, as it is usually termed in commerce, Argentina produces about one-third of the world's supply, the total world crop usually amounting to about 130,000,000 bushels, while Argentina alone produced 44,000,000 bushels in 1913, though the crop% of 1916 was very small owing to the extreme 'droughts which adversely affected many of the agricultural products of that country.

Wool, hides, rubber, tin and copper are Latin America's chief contribution to the manu¬ facturing requirements of the world at the present time, and the output of copper on the western coast of continental Latin America has greatly increased in very recent years. The relative rank of the Argentine and Uruguay in the world's supply of wool and hides is in¬ dicated by the figures above quoted of sheep and cattle in the same countries compared with those of other parts of the world, as above presented. In copper production Chile holds second rank as a world producer, and rapidly increasing its output through the great mines owned by American capital, though her out¬ put is small as compared with the United States, which still supplies over one-half of the copper of the world. Chile has also the world's chief supply of nitrate. Mexico and Peru are considerable producers of gold and silver.

Bolivia supplies about one-fifth of the world's tin, and has very large supplies yet undeveloped. In India rubber, Brazil formerly held first rank in world production prior to the recent wonderful development in the production of plantation rubber, but her output of forest rubber is declining by reason of the enormous supplies of plantation rubber now entering the world markets. Of cotton considerable quan¬ tities are grown in Brazil, Peru, Chile, Mexico, Colombia and the northern part of Argentina. Tobacco is grown in great quantities, that of Cuba alone amounting to about $25,000,000 a year.

Latin America has a more promising future than any of the other great undeveloped areas of the world. It is, as already shown, a large producer of many classes of foodstuffs and manufacturing material for which the world is clamoring, its fertile area is larger in propor¬ tion to its entire extent than that of any other of the undeveloped continents, and the present population per square mile is smaller than that of any other of the continents except Aus¬ tralia which has a much larger percentage of desert than has Latin America. The greatest lack in natural supplies is in coal, of which she has but small quantities, found chiefly in Chile, but the recent developments in fuel oil production in Mexico and the mountain re¬ gions of the west coast of South America, coupled with 'the increasing use of the splendid water powers for the production of electricity, promise to minimize the disadvantage due to this lack of fuel supplies.

Latin America's greatest requirement at the present time is capital for transportation facili¬ ties and for the development of the great agri¬ cultural and mineral resources which will be¬ come available with facilities to transport the natural products to the navigable streams of which South America has the world's greatest supply and thence to

the ocean where steam-

ships are available to transport them to the waiting markets of the world. The lessons of the war have shown that the horseless vehicle and flying machine can now be successfully used over areas in which no modern roads exist, and the development of the motor for farm pur¬ poses has shown how agriculture can now be conducted in the tropics without the aid of the horse. These things point to' a great develop¬ ment in the producing power of Latin America in the near future.

O. P. Austin,

Statistician of the National City Bank of New

York and Secretary of the National Geo¬ graphic Society.

8. MINERAL INDUSTRY IN LATIN AMERICA. The known mineral riches of Latin America exceed those of any other part of the globe so far explored. The entire sup¬ ply of the world's bismuth comes from Bolivia; by far the largest supply of thorium is fur¬ nished by the monazite sands of Brazil; the unparalleled nitrate deposits of Chile supply practically all of the world's consumption of nitric acid, and quite all of its consumption of iodine; Colombia is the only considerable source of platinum outside of Russia; the tin production of Bolivia stands second on the world's tally sheets; Colombia supplies the world's demand for fine emeralds; Brazil is second only to South Africa in the production of diamonds, and for many years was first; the asphalt lakes of Trinidad and Bermudez supply the world.

In striking contrast to the prodigious wealth awaiting development in Latin America is the notably disproportionate enterprise with which it has been attacked. The most serious hin¬ drance is the lack of transportation, and, com¬ parable with this, the scarcity of water and dearth of fuel. The preliminaries of new un¬ dertakings in the mineral country require the investment of very substantial sums, and ex¬ plains why the active mines in the whole region are those which have been in operation for centuries, and why the vast mineral treasure^ of the less accessible places is left to the exploita¬ tion of the individual native miner.

The mineral belt of Latin America is cen¬ tred upon the great

continental backbone which in the United States and Canada bears the general name of <(The Rockies.® In Mexico it is a broad zone traversing the entire country from northwest to southeast. Through Cen¬ tral America it is lower in altitude and with apparently fewer treasure spots. In South America it appears again as the Andes, follow¬ ing along the entire western coast. Other smaller areas add their tribute, notably the coastal uplift of southeastern Brazil, known as the great Brazilian plateau. Glaciers and other erosive agencies have scattered far and wide their grindings from the mother lodes, so that the territory available for profitable ex¬ ploration and development is, broadly speaking, boundless; and somewhere within the region may be found every mineral having commercial value.

The disturbed conditions in Mexico and the influences of the European War upon the min¬ eral output of South America from 1914 to 1918 make it impossible to present an accurate

survey of Latin America's potential production of any of the metals. The most that can be done is to show what the actual production was under these great disadvantages.

Gold. — In Mexico and Central America almost all the mining of gold is from the lode. In South America much the greater output is from the placers which for centuries have been accumulating fragments from lodes of un¬ rivaled richness high up on the slopes of the Andes, and as yet undiscovered. The stores of gold and golden objects carried away from the Inca and Aztec chiefs by Pizarro and Cortes were doubtless the accumulations of many years, and in all probability were the prod¬ uct of the placers. Under the viceroys a very large amount of gold and silver was obtained under a system of forced labor at no expense to the taskmasters. In Bolivia alone the great placer deposits have been worked since the middle of the 16th century and are estimated to have produced $2,500,000,000. About the middle of the 18th century the leading gold producing country of the world was the south¬ eastern highland of Brazil in the present state of Minas Geraes. The workings were mainly placer, but there were some lode mines. Some of the more remarkable yields of mining under modern methods are: Butters (Salvador), $4,138,050, on a capitalization $729,000; Dos Estrellas (Mexico), $10,335,000, on a capitaliza¬ tion of $150,000; Mexico Mines of El Oro, $4,458,745, on a capitalization of $875,000; Penoles (Mexico), $6,361,687, on a capitaliza¬ tion of $180,000; San Rafael (Mexico), $1,442,- 380, on a capitalization of $60,000; Sorpresa, $3,979,240, on a capitalization of $384,000.

Figures which give a fair comparison of the relative annual gold

production of the countries of Latin America follow:

Argentine .

Bolivia .

Brazil .

British Guiana

Chile .

Colombia .

Costa Rica Cuba .....

Dutch Guiana. Ecuador .....

Fench Guiana.

Honduras .

Mexico .

Nicaragua. . . .

Peru .

Salvador .

Uruguay .

Venezuela .

$107,300

175,000

3,570,000

879,000

731,000

2,971,700

1,021,629

28,000

571,100

406 . 500 3,050,000 1,000,000

20,500,000

1,100,000

492,000

1,245,000

111,000

623.500

Upon the breaking out of the European War in 1914, the demand for metals other than silver and gold lessened considerably, so that large numbers of men found their way to the fields yielding the precious metals. The effect was most marked in the yields of Colombia and British Guiana, the former increasing to $4,678,000 (nearly 60 per cent), and the latter increasing to $1,126,515 (28 per cent).

As to the immediate outlook it may be said there are enormous gold-bearing deposits on the summits and slopes of the Peruvian and Bolivian Andes, and this section is probably richer than the most productive area now being worked anywhere in the Western Hemisphere. Glacial moraines miles in extent show gold in paying quantities, and great alluvial ((pampas® are equally rich. In addition, gold may be

picked out of every stream flowing down to the lowlands. In the Nechi and Condoto rivers in Colombia dredges are at work, the yield ranging from 20 to 50 cents a cubic yard, though not yet in the richest section. Drills show that an average of 70 cents per yard pre¬ vails throughout a mass of 7,000,000 yards. In 19la gold to the value of $1,720,000 was taken by two dredges from the Nechi River. The mines of Chiquiaguillo are noted for the un¬ usual size of the nuggets secured, the largest weighting 5 2l/2 ounces, of which 47 ounces were solid gold. In the form of lodes gold is found both on the eastern and

western slopes of the Andes, the veins often crossing the water courses, and showing an outcrop hun¬ dreds to thousands of feet above the base of the ravines. They are traceable for miles, from three to eight feet in width and showing from one to five ounces of gold per ton. The whole country, and this is true also of Mexico and Honduras, is dotted with signs of ancient workings. In Honduras many of these diggings are being worked to-day with the most primitive appliances and yielding sur¬ prising returns. In the Brazilian plateau the ore is showing richer quality as the mines are sunk deeper. The Saint John del Rey mine is now the deepest in the world having reached the depth of nearly 5,000 feet. This mine and the Ouro Preto combined have a steady output of about $233,000 a month. Formerly the gold output was mostly placer, and abandoned placer mines are very numerous in Minas Geraes. In French Guiana and Dutch Guiana some of the placer territory has apparently run out, though it is still considered profitable for dredges. With all its potential richness, how¬ ever, the whole of Latin America is at present yielding only about one-fifth as much gold as is South Africa.

Silver. — Large as has been the total of gold produced by Latin America, the amount of silver has been many times larger. The records do not go back of about 1545, when Europeans found many silver mines yielding enormous quantities, and millions of dollars in silver ornaments, images and objects of art. At the beginning of the 19th century the yearly silver output of Mexico was about $27,000,000; it is now about $45,000,000. The state of Zacatecas alone has produced nearly or quite $1,000,000,000 in silver. The most famous sil¬ ver mine in South America is at Potosi, Bolivia, discovered in 1545. Fully $3,000,000,000 has been taken from this ((silver mountain,® and its yearly output is about $2,450,000. Another noted mine is, or was, that at Cerro de Pasco, now equally famous for its enormous copper pro¬ duction, the silver it now yields being what is found in with the copper. Another none of fabulous richness is that at Valenciana, Mexico, which from 1760 to 1810 produced over $300,-000,000. In Colombia several discoveries have been made of ore carrying from 500 to 750 ounces of silver to the ton. In Chile and Argentina silver has been found on both sides of the great eruptive masses of the mountain country, but as yet is little worked. The silver output of those countries is largely that recovered from argentiferous copper ores.

The latest authoritative figures for the silver

production of Latin America are those for 1914, as follows :

Argentina .

Bolivia .

Chile… .

Colombia .

Ecuador .

Peru .

Mexico .

Central America

$19,500 2,200,000 39,600 194,300 12,500 4,618,400 39,099,200 1 ,330,600

The total of $47,520,000 is about 41 per cent of the entire silver output of the world ($116,- 719,000) for that year. With the increase of copper mining in Peru, the silver output of that country has risen to about $6,000,000 annually; a part of this, however, comes from the argen¬ tiferous lead of the mine at Ancachs.

Copper. — For many years Mexico and Chile have been among the leading contributors to the world's supply of copper, Chile, indeed, having been at one period the largest copper producer in the world. Recently Peru has taken third place in Latin America's copper produc¬ tion, the mines at Cerro de Pasco, long famous for their great output of silver, now being . claimed to include one of the largest known deposits of copper ore. From Venezuela mines $15,000,000 worth of copper have been taken in 15 years. In Bolivia also copper mining has developed in many localities, usually in con¬ nection with silver mines of long standing. In Brazil some large copper smelters are in con¬ tinuous operation, and the increased price due to the European war has occasioned the pump¬ ing out of the old Cobre copper mine near Santiago, Cuba, which has stood full of water for a century or more. In Guatemala and Costa Rica many copper deposits are found, but few are worked, and these but feebly. Mexico's copper output, which in normal times is about 175,000,000 pounds annually, in 1915 had dwindled to 68,255,676 pounds. In Chile, however, the greatest development has taken place. Fully 2,000 copper mines are in more or less active operation, many of them by indi¬ vidual native miners in localities far removed from transportation facilities, only the richest findings reaching civilization in bags on the backs of mules or llamas.

Recent explorations in the region of Chuquicamata have revealed the largest known body of copper ore in the world, estimated to contain at least 700,000,000 tons of ore averaging 38 pounds of copper to the ton. And these figures are completely over¬ shadowed by those of Peru, where the Cerro de Pasco mines are yielding 140 pounds to the ton, besides 11 ounces of silver and nearly one- tenth of an ounce of gold. For 1916 the ex¬ ports of copper from Chile amounted to 146,-605,900 pounds, and from Peru 91,766,475 pounds. Under the stimulus of the war de¬ mand and the war prices, vigorous exploration is in progress throughout the whole of western South America, and a very large increase in output may be expected within the next two or three years.

Tin, Platinum and Bismuth. — In the

world's production of tin Bolivia holds second place, following the Malay states; the output for 1915 being 21,794 tons — about half that of Malaya, and over four times that of the long famous mines of Cornwall. In several in¬ stances former silver mines are now yielding tin ores, the silver having disappeared. Many

rich lodes of tin ores have been located at high elevations in the Bolivian Andes, at places remote from transportation lines, and the claim is confidently made that this region holds the largest and most valuable tin deposits in the world. Formerly a large proportion of the tin output of Bolivia was won from placers, and while these are by no means exhausted, lode mining has been found more profitable. The tin exports of Bolivia now exceed a value of $15,000,000 annually. Within the past three or four years tin mining has been developed in Catamarca province, Argentina, and small ship¬ ments are reaching the market from that local¬ ity. As a matter of fact, tin is found in nearly all parts of Latin America where silver occurs, but the individual outputs are small and do not appear in the records.

Next to Russia, Colombia is the most im¬ portant source of platinum in the world. Its output in 1915 was about 19,000 ounces, and, as the Russian production had diminished one- half on account of the war, the Colombia pro¬ duction amounted to one-seventh of the world's output. From a value of $44 per ounce in 1914 platinum has risen to $100 per ounce in 1917, stimulating the mining of this metal to the fullest extent. The workings are generally in gold-bearing gravels, and

some of these de¬ posits have been found in Ecuador and are be¬ ing developed. Platinum in small quantities has also been found in the gold placers of Brazil. The crude platinum mineral, as it comes from Colombia, has a very large admixture of either iridium or osmiridium, amounting sometimes to 30 or even 50 per cent.

Very nearly the whole of the world's supply of bismuth comes from the Bolivian mines at Tasna and the Chorolque mountain. At the former locality the deposits constitute the larg¬ est known occurrence of bismuth ores. The metal is associated with tin and silver and is nearly all sulphide. At Huayni-Potosi a con¬ siderable part of the large yield is native metal. Another locality which has been worked suc¬ cessfully, though in a small way, for bismuth is that of San Gregorio, Peru, and it is known that bismuth is plentiful in other Peruvian territory. For 1915 the Bolivian product was 568 tons, valued at about $1,071,000; the Peru¬ vian output was about 25 tons.

Coal and Petroleum. — The retardation which the mineral industries of Latin America suffer through lack of cheap fuel has already been noticed. The condition is not due to the barrenness of the territory in this primal necessity, but to indifferent development of a natural supply actually abundant. All through the Andes region coal exists in large quanti¬ ties, and in many localities wide seams are ex¬ posed to view for long distances along the slopes and in the sides of ravines, millions upon millions of tons being in sight. Some of these coal veins come down almost to tide water — as at Paracas and near Trujillo, Peru. Good coal is found also along the coast of Ecuador, but it is as yet undeveloped. It is difficult to understand this situation in the face of the fact that in Bolivia coal imported from England brings $40 per ton, and delivered at the Potosi mines, $70 per ton. Although Peru has almost unlimited deposits of bofh anthra¬ cite and bituminous coal, as well as lignite, the only considerable mining done in that country

is by the industrial companies which consume it. About 700 tons a day is thus mined, most of it being turned into coke. In Chile, new deposits have been discovered recently in the Aconcagua region near Rio Blanco. In South¬ ern Chile, coal is mined extensively at Lota and Coronel, at the former place the mines running out under the sea for more than half a mile. The yearly output of the three principal mines aggregates more than a million tons. As fuel, the Chilean coal is not of the highest grade, having about 80 per cent of the heating value of the imported British coal. The Lota mines have been worked since 1852. In Colombia, coal is found in many widely separated localities; good bituminous coking coal in the interior, and lignite beds near the coast. No attempt at commercial development has been made. There is more

or less coal of fair quality in Vene¬ zuela, worked only for local purposes. In Mexico, coal is very plentiful, and the deposits in some cases are of great extent. At one lo¬ cality in Coahuila a visible supply of 300,000,000 tons has been found. Perhaps the most seri¬ ous result of the delay in coal development is that under this condition no great iron indus¬ try can be brought into being, and without this, the whole country must be at a disadvantage as compared with other sections. The coal production averages annually about 1,350,000 tons for Chile, 980,000 tons for Mexico, 300,000 tons for Peru and 16,500 tons for Brazil.

The petroleum beds of Mexico and Peru are important sources of fuel oil, the Mexican fields occupying fourth place in the records of the world output. The Mexican field at Tam¬ pico contains one of the most productive wells ever opened, yielding 105,000 barrels per day. The total capacity of the wells now producing in Mexico is not far from 600,000 barrels per day. The 1915 output is given authoritatively at 35,000,000 barrels. The only considerable active oil production in South America is in the Lobitos fields of Peru; their yearly output is about 3,500,000 barrels. In Bolivia, however, there is an immense oil belt 150 miles long and this continues over the national boundary into Argentina to Comodoro Rivadavia where the Government is pushing development. In Co¬ lombia, petroleum has been found in the upper Magdalena district, and at Santander an oil area 100 miles in length and 60 miles in width has been located. It contains many sponta¬ neous oil springs. Another large field has been located in Venezuela near the city of Mara¬ caibo, and in the River Limon district in sev¬ eral places near the asphalt lake oil oozes from the ground. There is also a small refinery in active operation at Santa Elena in Ecuador. On the island of Trinidad the development has reached an output of 700,000 barrels annually. The Guatemala oil fields are controlled rigidly by the Government, and the output is small at present. With exceptional prospects for a great oil industry all Latin America, with the single exception of Mexico, cannot be said to have seen even the first stages of its possible develoomen.

Other Metals and Minerals. — Foremost

among the lesser mineral products of Ladn America stands nitrate of soda, or (

Chile, an interior dry valley between the Coast ranges and the Andes. Associated with the nitrate (29 per cent) is sodium chloride (43 per cent), sodium sulphate (5 per cent), and calcium sulphate (4 per cent). A small pro¬ portion (1/10 of 1 per cent) of sodium iodate supplies the world with iodine — about 450 tons, valued at about $2,000,000 annually. These nitrate deposits supply not only the larg¬ est part of the world's nitric acid for indus¬ trial purposes, but also the bulk of the nitro¬ genous fertilizers for the world's agriculture. With the outbreak of the European war a great demand sprang up for Chile nitrate as a source of the ingredients of explosives, and previous exports were trebled to meet this demand. In 1916 the output of the nitrate fields was about 3,000,000 tons.

Iron, which has been well called the foun¬ dation of all modern civilization, exists in enormous quantities and of unrivaled quality throughout all Latin America, awaiting devel¬ opment. In the Brazilian plateau are billions of tons of ore carrying up to 50 per cent of the metal, but coal and transportation are lacking for its successful utilization. Great iron de¬ posits are found also in Chile, and some ore is exported. At Tofo the explorers' drills have blocked out a mass of Bessemer-grade ore calculated to contain 100,000,000 tons. Here, too, a lack of coking coal is holding back development. In the province of Atacama deposits of iron ore aggregating 500,000,000 tons contain gold in the proportion of one ounce up to 16 ounces per ton. In Venezuela a start has been made, and a million tons of 67 per cent ore are being shipped annually. In the southeastern part of Cuba has been located an immense body of iron ore estimated at 300,- 000,000 tons, carrying 1 per cent of nickel. In 1915 Cuba shipped 830,000 tons of iron ore, and 200,000 tons of manganiferous iron ore. Other important deposits have been found in northern Mexico, Guatemala, Honduras, Colombia and Peru.

After the outbreak of the European War and the consequent advance in the price of antimony from 6 cents to 40 cents a pound, many antimony mines throughout Latin Amer¬ ica, unprofitable at the old prices, went into active operation. The effects were most marked in the increase of Bolivia's exports of ore (50 per cent) from 205 tons in 1914 to 19,786 tons in 1915. The antimony ores are found in the same localities as the tin ores, but in different veins. Mexico also has rich anti¬ mony deposits, and in normal times exported upwards of 4,500 tons of metallic antimony annually. Since 1911 the production has been greatly reduced.

About half the world's supply of borax is produced by Chile. The western range of the Andes, known as the Cordillera Occidental,

traverses Peru, Bolivia, Chile and extends into Argentina. Many of the peaks of this range were volcanoes, and at their bases, at eleva¬ tions of 12,000 feet above the sea, are a suc¬ cession of lakes whose waters are saturated with borax, which thickly encrusts their shores and forms a thick pellicle on the surface. Lake Ascotan in Chile is capable alone of sup¬ plying the whole world's demand for borax for many years to come. Bolivia and Peru

have similar lakes, and in Peru are dry beds of lakes which formerly existed there, now a mass of borax and other salts.

Four-fifths of the world's supply of vana¬ dium is produced by a single mine in Peru, which yields about 3,000 tons annually. The mine has much greater possibilities if there were a larger market for its product.

About one-tenth of the total production of tungsten is supplied by Latin America ; Mexico, Bolivia, Argentina and Brazil joining to make up their yearly output of 1,200 tons of 60 per cent ore.

In precious stones, Colombia leads the world with the finest of emeralds of such per¬ fection that they are valued at three times the price of perfect diamonds of equal weight. The mines at Muzo hold the record of having produced the largest emerald known, a stone weighing within two pennyweights of nine ounces. The diamond mines of Brazil have yielded some of the most famous of the world's jewels, notably the <(Estrella do Sul® (Star of the South), which weighed after cutting 125 carats, and was sold to the Rajah of Baroda for a figure said to have been close to $15,- 000,000. Brazil holds the record for black dia¬ monds with a stone weighing 3,150 carats. The diamond fields of Brazil promise profitable returns for years to come, and recent prospect¬ ing has revealed new possibilities in a ledge of diamonds in the matrix. Brazil is also rich in aquamarines, topazes and amethysts. A large pearl fishery is in operation in the waters about Margarita Island, employing 1,000 boats and upwards of 3,000 persons.

The largest known supply of thorium exists in the monazite sands of the Brazilian coast, and to this must be added a recently discovered bed of gravel in the interior, estimated to con¬ tain not less than 60,000 tons of this scarce and valuable metal.

The great sulphur mine at Tinguirirca, Chile, holds another world's record as the rich¬ est sulphur mine known, much of its output being pure native sulphur. For years the Mex¬ ican mines at Aguascalientes

and Ollague have been producing important quantities of sulphur.

The very important asphalt lakes of Trini¬ dad and Bermudez, each covering an area of more than 1,000 acres, and together yielding a very large proportion of the world's total pro¬ duction of asphalt, is only one more testimony to the marvelous richness in mineral wealth possessed by Latin America. The manganese and zircon of Brazil, the lead and graphite of Mexico, the zinc of Guatemala, the molybde¬ num and mercury of Peru, the talc of Uruguay, may only be mentioned as of those for which space lacks for detailed discussion. Enough has been told to show that the story of the mineral wealth of Latin America has scarcely begun to unfold, and with so much already known, a mighty development must be looked for in the nearer future. Consult Ugarte, M., (E1 Porvenir de la America Latina) (Valencia 1911) ; Pan-American Union, ˆGeneral De¬ scriptive Data) in 20 separate pamphlets, one devoted to each of 'the Latin-American repub¬ lics (Washington 1915-17) ;

Editorial Staff of The Americana.

9. COTTON INDUSTRY IN LATIN AMERICA. Cotton production in the Latin- American republics has reached important pro¬ portions, the average crop now being 385,000,- 000 pounds in those countries. Brazil leads with an annual crop of 207,000,000 pounds. The Mexican crop averages 100,000,000 pounds, the Peruvian 62,000,000 pounds, and that of the West Indies 6,500,000 pounds. Venezuela, Haiti and Argentina produce 3,522,000, 3,122,000 and 1,230,000 pounds, respectively. Among the smaller producers are Colombia with 790,000 pounds, the Dominican Republic with 368,000 pounds, Nicaragua 257,000 pounds, Ecuador 250,000 pounds and Paraguay 51,000 pounds.

Reliable information concerning the cotton industry in the southern countries is as fol¬ lows :

Mexico. — Among the countries of Central and South America Mexico ranks second in the production of cotton. The staple is cultivated on a small scale in many sections of the repub¬ lic, but the principal cotton lands are found in the states of Tamaulipas and Vera Cruz on the Gulf Coast ; Oaxaca, Guerrero, Sinaloa, Sonora and Lower California on the Pacific Coast ; and Durango, Coahuila and Chihuahua in the north

central section. But at least 80 or 90 per cent of the crop is grown in the central states of Durango and Coahuila, in what is known as the Laguna section. The Laguna lands are said to be of even greater fertility than those of the famous Nile Valley. No fertilizers are needed as there is plenty of nitrogen in the soil, and the Nazas River which irrigates the lands brings down the required phosphates and pot¬ ash. The fertility of the soil is so great that one irrigation in August or September assures a large crop the next year.

There are no reliable statistics relating to cotton production in Mexico, but the normal crop is estimated at about 200,000 bales of 500 pounds. The unsettled condition of the coun¬ try, however, has so greatly interfered with cotton cultivation that in 1914-15 the output was only about 145,000 bales. Mexico exports very little raw cotton in ordinary times, but the closing of the mills in Torreon, Durango and other interior towns has forced the cotton planters in the past few years to send a con¬ siderable amount of their staple to the United States. Besides these exports from 20,000 to 25,000 bales raised in the Imperial Valley are ginned in the United States from the seed cotton sent across the border.

According to late official figures there are in Mexico 139 cotton mills, containing 762,149 spindles and 27,019 looms. These mills in nor¬ mal times consume about 162,000 bales of cot¬ ton, and employ 34,500 operatives, and -the out¬ put was approximately 17,605,000 pieces of cloth and 5,002,000 pounds of yarn, valued at $26,548,000 (gold). Most of the mills are fitted for only the coarser grades of goods which find their best customer in the peon. The govern¬ ment levies a direct tax of 5 per cent on all mill sales. Most of the mills are small, the average containing 5,225 spindles and 182 looms. There are only 13 mills with over 10,000 spin¬ dles, the largest single mill containing 44,184 spindles and 1,675 looms. The largest group of mills are located in the states of Puebla and Vera Cruz, and in the Federal District. The

most important of the mill towns are Puebla, Atlizco, Orizaba and Mexico City.

Before the condition of the country became so unsettled the imports of cotton goods into Mexico showed a steady increase, the require¬ ments of the people growing proportionately faster than the capacity of the local mills for supplying them. In 1908 the total output of the mills was valued at $27,357,000, while the imports were valued at $8,846,000, so that Mex¬ ico imported nearly one-fourth of its require¬ ments of cotton goods. The Mexican tariff on cotton goods is

among the highest in the world, being exceeded by those of Peru, Russia and Brazil. On some classes of cloth the duty amounts to three times its value abroad, espe¬ cially on the coarser grades ; the imports are, therefore, mostly of the finer grades of cloth, and such specialties as are not made in Mexico. In 1913 the imports of cotton goods from the United States increased to the value of $1,065,- 000; in 1914, to $1,201,000; in 1915, to $2,261,- 000; and in 1916, to $4,892,000, and in the eight years from 1908 to 1916, $4,072,000 or 368J/2 per cent.

Guatemala. — No cotton is produced in Guatemala, but (1917) it contains the only cot¬ ton mill in Central America. This mill is owned and operated by an American and is located near Quezaltenango. It operates 6,000 spindles and 150 looms, and manufactures coarse colored cottons and unbleached sheet¬ ing, called ˆmanta.® The cotton used in the mill is mainly American, but it also uses some Mexican and occasionally a little Peruvian.

Guatemala is the largest importer of cotton goods in Central America, and cotton manu¬ factures make up the largest single import of the country, amounting to about 24 per cent of all imports and in some years to nearly a third. Of this trade previous to the European War England's share was about 53 per cent, that of the United States 24 per cent, that of Germany 18 per cent and all other countries the remain¬ ing 5 per cent.

Of the total of $1,735,000 worth of cotton manufactures imported in 1913, the last normal year before the war, Great Britain supplied $778,000, the United States $504,000, Germany $337,000, and other countries $116,000. In 1914 Great Britain supplied $597,000, the United States $311,000, Germany $286,000, and other countries $95,000, of 'the total of $1,289,000 worth of cotton manufactures. The statistics of the United States Department of Commerce for 1917 showed exports of cotton goods to Guatemala valued at $471,635. The demand is mainly for goods that are staple articles in the United States.

Honduras. — Cotton is not cultivated in Honduras, though the cotton - tree, which is indigenous throughout Central America, is found in all parts of the country. But the ex¬ treme height of the tree, reaching 20 to 30 feet, makes it impracticable to gather the fibre which is so very short that it is practically worthless for spinning. However, experiments have shown that both the soil and climate of Honduras are highly favorable to the success¬ ful cultivation of upland and sea-island varie¬ ties of cotton. There are no cotton mills in this republic.

The United States almost monopolizes the

trade of Honduras, both imports and exports, and just prior to the European War supplied the country with about 65 per cent of its total imports of cotton goods. The main imports in this class are prints, gray goods, colored and white goods. The United States has the bulk of the trade in gray goods and more than half of that in colored and dyed goods. England supplies most of the white goods, such as bleached muslins, fancy cottons, ginghams and drills. In 1908 our share in the cotton goods import trade was less than 66J/4 per cent, in 1911 it increased to about 72 per cent and in 1914 to nearly 80 per cent. In 1916 the total value of our trade in cotton goods amounted to $523,688.

Nicaragua. — -There is a limited area of Nicaragua that is suitable for growing cotton, and the cotton produced (from imported Mis¬ sissippi seed) is said to compare favorably with American upland. The greater portion of the country, however, is too mountainous to raise cotton, and the area suitable for cotton, said to be not much greater than 50,000 acres, is confined mainly to the western coast in the province of Chinandega, north of the port of Corinto. In 1908 a crop of 192,026 pounds was produced, in 1912 it increased to 256,344 pounds, but in 1914 the yield was only 12,562 pounds.

Cotton cloth (hand-made) is produced in Nicaragua only in small quantities, the amount imported practically representing all that is used. The cheaper qualities of cotton cloth, such as gray and bleached sheetings, prints, ginghams and drills, make up the greater share of the textile imports. In 1908 the total value of imported cotton goods amounted to $909,000, and in 1913 to $1,022,846. In the latter year England supplied 55 per cent of the cotton cloth imported; the United States, 29 per cent; France, 7 per cent; and Italy, Germany and Spain smaller amounts. In 1914 the imports of cotton goods dropped in value to $828,000, and in 1915 to less than $600,000. In the latter year there were no imports from Germany, and the decrease in the imports of cloth from England amounted approximately to 80 per cent. The value of our exports in 1915 was $259,528, and in 1916 $518,651. In 1917 cotton exports from Nicaragua were valued at $18,859.

Salvador. — No raw cotton is produced in Salvador, nor are there any

establishments for the manufacture of cotton. The imports of cotton goods into Salvador are listed as cotton yarn and thread, and as cotton cloth and other manufactures of cotton, and while there are no details as to the kinds of goods imported, the manufactures of cotton form by far the largest importations, being from 33 to 35 per cent of the total. This trade is practically monopo¬ lized by Great Britain and the United States. These countries on an average furnish 60 and 30 per cent, respectively, of the total and all other countries 10 per cent. In 1907 the total value of cotton goods imported amounted to $1,153,000, of which Great Britain supplied $653,736, the United States $331,721, and all other countries $167,673, and in 1914 to $1,- 532,000, showing an increase of about 33 per cent. Of the 1914 total Great Britain supplied $847,724, the United States $ˆ62,491, Italy $105,- 231, and other countries $117,017. In 1916 the imports from ‘the United States increased in value to $735,144.

Costa Rica. — Cotton is not cultivated in Costa Rica, and there are no establishments for its manufacture, and as there is practically no hand-manufacture in the country all cotton wares consumed are imported. Of the piece goods imported, the United States monopolizes the trade in gray goods to almost as great an extent as England does in the sale of white goods. The English also have the largest share of the colored goods trade, while the United States has the largest proportion in the sale of prints. In 1913 cotton goods to the value of $828,948 were imported, of which $355,042 worth came from Great Britain, $243,- 802 from the United States, $124,699 from Ger¬ many and $105,405 from other countries. The cotton imports in 1915 totaled $ˆ66,699, and of this $129,848 came from Great Britain, $266,333 from the United States and $70,518 from other countries. The imports of cotton goods from the United States in 1916 were valued at $623,- 699, an increase over 1915 of about 135 per cent.

Panama. — No cotton is produced or manu¬ factured in Panama, and there is no hand-loom work except possibly on a small scale among the southern Indian tribes. The share of the United States in the trade of Panama has steadily increased since the foundation of the republic until now it buys nearly all that Pan¬ ama has ‘to sell, and supplies about 73 per cent of her requirements from other countries. Notwithstanding the favorable position held by the United States in the general trade of the republic, for some time prior to 1914 England controlled more than half of the cotton goods trade, the share of the United States being about one-third, the remainder falling mainly to Germany. But a comparison of the imports in 1914 and 1915 shows that the United States gained at the expense of European countries, on account of the war then raging, in nearly all classes of goods

imported, Spain being the only European country that increased its ex¬ ports in 1915. In 1915 the imports from the United States amounted in value to $913,391, and in 1916 there was an increase to $1,396,880, or 53 per cent. The main imports from the United States consist of bleached, unbleached and colored cloths, knit goods, clothing and other wearing apparel, other miscellaneous wares and a small quantity of yarn.

Cuba. — Cuba's imports of cotton goods in the order of value are cloth, knit goods, lace, ready-made clothing and thread. Of the cloths imported the largest takings are white goods, prints, colored goods and gray goods. Prior to the World War, Great Britain supplied more than half the cloths classed as close-woven, followed by Spain, the United States, France and Switzerland. Of loose-woven cloths Great Britain also supplied over half, followed by the United States, Spain and France. The bulk of the knit goods came from France, Ger¬ many and Spain, with only a small amount from the United States, laces from Great Britain, with smaller amounts from Germany, France and Spain. Of the wearing apparel im¬ ported the United States furnished nearly half, with lesser amounts from France, Austria and Germany. Cotton velvets were imported from Spain and Great Britain, tulle from the latter country and France, pique from Great Britain,

and passementerie from Germany, the United States and France.

Prior to 1900 the exports of cotton goods from the United States to Cuba were a very small proportion of that country's require¬ ments, being a little less than 7 per cent of the total, but beginning with the independence of the. island the proportionate share of the United States increased materially, and in 1915 reached 37]/2 per cent of the total. The cotton- goods trade of Cuba ever since 1900 has been undergoing a marked change. The value of cotton goods sent to Cuba from the United States increased from $4,325,000 in 1915 to $7,742,000 in 1916, being a gain of $3,417,000, or 79 per cent in a single year, mainly due to the war.

Haiti — A yery superior quality of cotton is grown in Haiti, but the crop is small and the quantity uncertain, owing to continuous revo¬ lutions and the unsettled condition of labor. In 1914 the exports of raw cotton amounted to 3,121,839 pounds, and in 1917 to 8,381,786 pounds, nearly all of which was shipped to Liverpool. There are no

cotton manufactures, all the cotton wares used being imported. There are no statistics relating to the cotton goods imported from the various countries, but as the United States is now controlling about 90 per cent of the import trade, it may be assumed that most of the cotton goods used are obtained from this country.

In spite of revolutions the cotton-goods trade with Haiti shows a gratifying increase in recent years, the total value of such goods ex¬ ported to that republic in 1916 being $2,275,749, compared with $770,452 in 1915; $1,706,208, in 1914; and $742,978, in 1908.

Dominican Republic. — The cotton-growing district of this republic is in the northern half of the island, principallv the provinces of Monte Christi, Santiago and Puerto Plata, and some little planting in the provinces of Espaillat and La Vega. The province of Pacificador also contains much good cotton land. The cotton grown is of the sea-island variety and com¬ mands a high price. The cultivation of cotton for export was begun in 1908, and for a time enjoyed considerable prosperity though the production was small. The largest yield was in 1912, but since then the crops have gradually lessened, and in 1914 only 368,439 pounds were exported, and 297,471 pounds in 1915. The cotton wares used in the republic are all im¬ ported, as there are no hand-looms or mills for making such goods. The total -value of cotton goods imported in 1913 amounted to $1,880,211; in 1914, to $1 232,725; and in 1915, to $1,869,849. The values of the cotton goods imported from each country in 1915 were as follows: United States, $1,377,222; Great Britain, $390,192; Porto Rico, $62,716; Germany, $19,875; Spain, $15,517; France, $4,327. It will thus be seen that the United States controls the bulk of the cotton trade, its share being nearly 74 per. cent of the total, while that of Great Britain is 20 per cent, the remaining 6 per cent being divided between Porto Rico, Germany, Spain and France. Cotton exports of 1917 were valued at

$32,164.

Virgin Islands, U. S. — In 1913 the island

of Saint Croix produced 778.000 pounds of sea-island cotton, but the following year the crop was almost a failure, amounting to only vol. 17 — 4

62,000 pounds. The value of cotton textiles im¬ ported in 1914 amounted to $70,006, of which Great Britain contributed $49,838, the United States, $J3,798 and Germany, $4,614. The value of imports in

1916, from this country amounted to onlv $39,398.

Colombia. — A small amount of cotton is grown in Colombia, which is confined to the departments of Bolivar, Atlantico and Magda¬ lena. Most of the cultivated cotton fields lie along the banks of the Magdalena River, be¬ tween Barranquilla and Colomar. There is also a small amount of cotton gathered from the native wild cotton trees. The staple of the cultivated cotton is one and one-half to one and three-eighths inches, grown from Missis¬ sippi seed imported every second year. It re¬ sembles sea-island cotton, but the fibre, which is long and silky, is sa;d to 'be too fine for use in the local mills. This has resulted in the exportation of the Colombian cotton, and the importation of American cotton for domestic manufacture. In 1914 the Colombian cotton sold in the Liverpool market as high as 24 cents a pound. In 1907 the raw cotton exported amounted to 564,242 pounds, and in 1914 to 789,390 pounds. In 1915, owing to the Euro¬ pean War, there were no exports, the small crop being consumed by local mills.

According, to government stat'stics (1915- lb) there are in Colombia 21 establishments de¬ voted to the manufacture of ˆtextiles and threads,® with a combined capital of $3,530,400. How many of. these are engaged in cotton manufactures is not shown, but there are at least four cotton mills of importance, one each at Cartagena, Medellin, Samaca and Bogota. They operate some 20,000 spindles and 200 looms, and make narrow gray sheeting, drills and thread. Besides these there are four under¬ shirt mills — one at Cartagena, another at Bar¬ ranquilla, and two at Medellin. There are also hosiery machines at Cartagena and Buga.

Textiles form the largest single item of im¬ ports into Colombia, and of these cotton goods are by far greater than all others. In 1908 the total value of cotton goods imported amounted to $6616,602, the value of the goods received from each country and the percentage share of each being as follows : Great Britain, $3,929,- 674, per cent 59 5; United States, $1,477,082, per cent 22 ; Germany, $425,540, per cent 6.5 ; France, $312,135, per cent 5; Spain. $135,084, per cent 2 ; all other countries, $337,087, per cent 5. In 1913 the value of cotton goods re¬ ceived from the United States was almost the same as in 1908, amounting to $1,453,774, in 1915 it dropped to. $846,793, but in 1916 it was more than three times as much, reaching $2,- 607,192. Of course this great increase was the result of the disturbance of trade caused by the European War. Colored cloths are the chief item of imports, followed by bleached and unbleached cloths.

Venezuela. — Cotton is grown to a limited extent in Venezuela, most of which is raised near Valencia and consumed by local mills. The staple is strong and silky, and about one and five-sixteenths inches in length. Besides the cotton of domestic growth consumed in the mills, a small quantity was exported prior to the European War, the total in 1908 being 396.- 885 pounds, which was mostlv taken bv France, some going to Germany, the Netherlands and

the United States. But that the crops of very recent years have been too small to meet local requirements is evidenced from the fact that within the past year the surtax of 25 per cent of the duty on imported cotton has been removed, and now the import tax is only 3.43 cents per pound. There are four cotton factories in Venezuela, operating about 19,000 spindles and 500 looms. They employ 1,800 hands and con¬ sume about 6,250 bales of cotton annually. The mills are located in Caracas, Valencia, Maracaibo and Cumana. These mills make gray goods, coarse wearing cloths, plain sheet¬ ing and hosiery.

The cotton-goods trade is the most import¬ ant in Venezuela, and one in which the United States appears to the worst advantage. Of the total value of this trade in 1908, amounting to $4,191,270, Great Britain furnished such goods to the value of $2,545,536; Germany, $681,530; and the United States, $307,973, the latter's share being only a fraction over 7 per cent. Our share in this trade in 1910 was 7.7 per cent; 1911, 8 per cent; 1912, 10.3 per cent; 1913, 22.6 per cent; 1914, 12.5 per cent; and the first six months of 1915, 20.9 per cent. The items of most importance constituting this trade are in the order named, prints, drills, madapol- lam, undershirts, checks and plaids, gray shirt¬ ing, white shirting, hosiery, etc. The imports of cotton goods has been considerably affected by the European War, the value having fallen from $3,907,726 in 1913, to $2,460,525 in 1914, and since 1914 still less than this as indicated by the imports of the first six months of 1915. The exports of cotton goods from the United States to Venezuela in 1915 were valued at $413,203, and in 1916 at $1,114,606, an increase of $701,403, or 170 per cent.

.Ecuador. — Cotton is raised in Ecuador south of Guayaquil and also around Ibarra, north of Quito, but to what extent there is no available information. Most of the cotton produced is used in domestic manufacture, and occasionally some little is exported. In 1908 7,317 pounds were shipped to the United States, and in 1914 120,000

pounds to Great Britain. The mills depend upon home grown cotton for their limited supplies, the duty on raw cotton being so high (4.42 per pound) as to prohibit any imports.

Of the imports cotton goods are the most important, forming 24.5 per cent of total in 1908, the value of which was $2,453,900. Of this amount Great Britain contributed $1,573,- 243, or 64 per cent ; Germany, $395,724, or 16 per cent; Italy, $147,020, or 6 per cent; the United States, $106,770, or 4.5 per cent; Spain, $103,268, or 4.5 per cent; and all other coun¬ tries, $127,875, or 5 per cent, of which Bel¬ gium contributed $76,357; France, $34,820; and all other countries $16,698. The principal articles _ of import are white shirting, prints, gray shirting, knit underwear, cotton trousering, handkerchiefs and hosiery. Cotton goods in general are dutiable at 5.06 cents per pound gross weight, but a few pay special rates. In 1915 the value of cotton goods imported from the United States was $146,854, and in 1916 $498,321, an increase of $351,467, or 240 per cent.

Peru. — Cotton has been one of the chief products of Peru since the time of the Incas, but only within the past 15 years has there been

any attempt to increase the acreage and im¬ prove the methods of cultivation. Nearly all of the crop is grown on the west coast near the sea and within the valleys formed at intervals between the mountains and the sea by small rivers. The alluvial deposits in these valleys are rich in nitrogen and potash and are very productive. Cotton growing as a rule is very profitable, and hence the area is being increased, and with greater irrigation upon which all of the crops depend and the gradual development of intensive farming the crop is steadily in¬ creasing, or was increasing until the European War. The very high freight rates and the limited demand in European countries has been very discouraging to planters, and the crops the past few years have fallen off considerably. The cotton plantations vary in size from 500 to 5,000 acres, are owned principally by Peru¬ vians, and the laborers are native Indians whose average wage is about 60 cents a day. Peru¬ vian cotton may be divided roughly into five staple classifications : The so-called Mull rough® cotton, coming mostly from the planta¬ tions in the Piura Valley; the <(modern rough,® from the districts of Palpa and Uazca; sea- island, largely from Supa; mitififa, grown at several localities along the coast; and ((Peru soft,® locally known as Egypto. The rough Peruvian is the indigenous cotton of the tree-cotton variety, and has a strong, rough, wooly, crinkly staple, about one and three-eighths to one and one-half inches long, and its price is largely governed by the price of wool as it is used to mix with wool in the manufacture of <(all-wool® underwear, hosiery and cloth. The

crop of long-stapled sea-island and mitififa, grown from imported sea-island and Egyptian seed, is small as the staple and quality are found to deteriorate with a consequent lower¬ ing of price, which to some extent is governed by the price of Egyptian cotton, a variety it closely resembles. The <(Peru soft® or Egypto (a misnomer for it is grown from American upland seed) is much more extensively culti¬ vated than even the native cotton. In the United States it is an annual, in Peru it is cultivated as a biannual, though the second year's crop is about 20 per cent less than that of the first. Its staples run from one and one- eighth to one and one-quarter inches, and its market value is governed by the price of Amer¬ ican upland.

In 1902 the cotton crop of Peru was 106,914 bales; in 1905, 139,609 bales; in 1909, 315 640 bales; in 1913, the largest crop ever made 364,706 bales ; in 1914, 346,422 bales ; and in 1915, 318,071 bales. The average bale weighs about 170 pounds. The United States con¬ sumes annually about 5,654,500 pounds of Peruvian cotton. In 1915—16 the imports amounted to 5,454,000 pounds, but the bulk of the cotton exported from Peru goes to Liver¬ pool. In 1913 the United States exported to Peru cotton goods to the value of $198,331, and in 1916 to the value of $675,686, an increase of $477,355, or 242 per cent. There are seven cotton mills in Peru, five of which are located at Lima, operating 67,900 spindles and 2,293 looms, the capital invested being $2,057,000. These mills manufacture mostly gray sheetings and shirting, gray ducks, ticks and drills and gray and colored checks and striped cloths; also blue drill, khaki drills and trousering,

ordinary grades of white flannel, and white drills and towels. Outside of the domestic consumption one of the best markets for these goods is Bolivia, and a small quantity is also taken by Chile. The mills consumed 41,177 bales (Peruvian weights) in 1913, 32,353 bales in 1914 and 44,118 bales in 1915.

Bolivia. — Cotton is not grown in Bolivia, nor are there any manufactures of cotton. The imports of cotton goods average in value about $1,000,000 a year, and are largely con¬ fined to a few standard lines. The greatest demand seems to be for gray sheetings, white shirtings, printed flannelets and cotton trouser¬ ings or cassinettes. In most South American countries Great Britain has controlled about half the cotton goods trade, but prior to 1914 Germany had obtained nearly half the Bolivian trade, Great Britain only about a fourth, the

remainder /being divided between the United States and Peru, with a small amount going to Italy and France. Most of the gray sheeting used is from the United States and Peru, with a small amount from England. This is the only line in which the United States is prominent in this market, the imports consisting almost wholly of Massachusetts shirtings. Besides these about the only American cotton goods used are small amounts of drills, duck and ticking. The trade in white shirtings is monopolized by Great Britain, and that in printed flannelets was done mainly with Ger¬ many, some of the finer grades coming from Great Britain. The cheap cotton trouserings or cassinettes were furnished almost entirely by Germany, as were corduroys, used not only for riding trousers but by the poorer white popula¬ tion for suits, on account of their stout wear¬ ing quality.

No detailed statistics of the cotton trade of this republic are obtainable, and hence the proportionate share of the United States is unknown. However, our exports of this class of goods for the fiscal year 1915-16 showed an appreciable gain over the previous year, particularly in bleached and unbleached goods. In bleached cloths the increase was from 1 10,- 806 yards to 1,200,944 yards and in unbleached cloths from 1,934,264 yards to 3,069,619 yards, while the value of all cotton wares increased from $146,597 to $366,254.

Chile. — No cotton is grown in Chile, but there are three cotton factories of some im¬ portance, operating about 5,000 spindles and 400 looms, besides there are seven or eight knitting mills. These mills make shirts, underwear and hosiery, and a small quantity of miscellaneous wares. Among the South American countries Chile ranks third as a buyer of cotton goods, its annual imports for some years prior to the European War averaging over $11,000,000 in value. Cotton goods form the largest single item of the imports, the value of which amounted to $11 ,442,939 in 1905, to $13,262,180 in 1907, to $12,214,864 in 1909, to $9 025,176 in 1913 and, due to the war, to only $6,324,368 in 1914. ■ There are no very recent statistics show¬ ing the share of each country in the imports.

Among the principal imports, in the order of value, are colored and dyed goods in general, white shirting, knit goods, prints, drills, yarn, gray sheeting, osnaburgs, sewing thread, flan¬ nel, passementerie, lace, oxfords, bed-covers, handkerchiefs, ticking, cotton waste and cotton

blankets. The trade of the United States, at the period named, consisted mainly of osna¬ burgs for making flour sacks, flannel, gray sheeting, sail duck, white goods and yarn. The value of the cotton

goods exported from the United States to Chile in 1914-15 was $639,031 and $1,638,043 in 1915-16, an increase of $999,012, or 156 per cent. This increase was mainly confined to bleached, unbleached and colored cloths, the exports in 1914—15 being 6,780,257 yards, as compared with 12,211,220 yards in 1915-16.

Argentina. — Cotton cultivation has been undertaken on a small scale in Argentina for some years. There are large tracts of land in the northern and northwestern section of the country that are well adapted for cotton, but for lack of experience, capital and sufficient labor, the crop has made little progress. The provincial governments and various agricul¬ tural societies have tried to encourage cotton growing by offering prizes at agricultural fairs, and in 1913 the province of Corrientes granted partial exemption from taxation, and a bounty for picking cotton. Most of the cot¬ ton grown in Argentina comes from the ter¬ ritory of Chaco, where European farmers are doing most of the planting, employing native Indians and peons from Paraguay and the province to pick the cotton. There are also small areas devoted to cotton in Cordoba, Santa Fe, Corrientes and several other prov¬ inces. In 1907 the exports of raw cotton amounted to 116,767 pounds; in 1912 to 1,230,- 000 pounds; in 1913, to 750,000 pounds, and 1914, to 609,500 pounds.

There is (1917) one cotton-spinning mill in Argentina with 9,000 spindles, and five cotton¬ weaving mills with a total of 1,200 looms. The spinning mill has a capital of $850,000, and consumes from 650,000 to 750,000 pounds of raw cotton annually, most of which is im¬ ported from the United States, and small quan¬ tities from Brazil and Peru. The capacity of this mill is about 1,100,000 pounds of yarn. The five weaving mills have a capital of $730,- 000 and employ 1,415 operatives. The produc¬ tion of the mills is figured at 8,000,000 to 10,- 000,000 yards annually, comprised mainly of duck, canvas, gray sheeting and shirting, and a small amount of colored goods. There are also 43 knitting mills with 650 machines, with a yearly production of about 4,000,000 pounds.

The most important single item imported into Argentina is cotton goods. Of this trade prior to 1914 Great Britain controlled about half, the remaining half being competed for by Italy, Germany, France, Belgium, the United States, Spain and other countries. As indi¬ cating the share of each country in this trade the imports of a typical year is a fair illustra¬ tion. The total value of the cotton goods im¬ ported amounted to $27,119,134, and of this .Great Britain furnished $13,428,662, or 49.5 per cent; Italy, $5,403,737, or 20 per cent; Germany, $3,731,172, or 14 per cent; France, $1,623,565, or 6 per

cent ; Belgium, $916,788, or 3 per cent ; the United States, $685,207, or 2.5 per cent ; Spain, $663,266, or 2.5 per cent ; aqd all other countries, $666,737, or 2.5 per cent.

Piece goods form the bulk of the cotton manufactures imported, and most cwf these are classed as colored goods, which include both goods made with dyed yarn, usually known as

colored goods and piece-dyed goods. Other piece-good imports, in the order of their value, are printed, bleached, and gray goods, espe¬ cially of cotton and wool mixed cloths for trousering, women's skirts, etc. In addition to piece goods the other chief imports of cotton manufactures are cotton yarn, hosiery, lace handkerchiefs, bed covers, blankets, cotton flour bags, haberdashery, duck and canvas, ready-made clothing, ribbons and tapes, and towels. Heretofore the trade of the United States was confined chiefly to cotton flour bags, yarn, duck and canvas, with a small amount of ready-made clothes, gray drills, madapollams and candle wicks. But since the beginning of the European War this country has made extraordinary gains, especially in the exports of bleached, unbleached and colored cloths, knit goods and yarns. The increase in the value of each of this class of goods in 1915— 16 as compared with 1914-15 is as follows: bleached cloths from $11,612 to $225,716; un¬ bleached cloths, $178,179 to $578,663; colored cloths, $14,344 to $796,786; knit goods, $169,572 to $1,686,512; yarns, $475,528 to $2,183,809, while the total of all cotton goods increased from $1,064,265 in 1914-15 to $6,495,724 in 1915-16. This shows a gain in one year of $5,431,459, or 510 per cent.

Paraguay. — There is considerable land in Paraguay very productive and well adapted to cotton raising, but the lack of labor, the lack of a home market, high freight rates abroad and the fact that other crops pay better have tended to restrict cotton production. What little cotton there is made is grown partly from the indigenous tree cotton, which bears for sev¬ eral years without replanting and yields a strong fibre about one and one-fourth inches in length, and partly from imported Ameri¬ can seed which gives a fibre one and three- sixteenths inches long and is whiter in color than the indigenous cotton. Prior to 1870 about 43,000 acres were cultivated in cot¬ ton. Since that date, as a result of the war in which the country had been engaged, cotton culture has been neglected. In 1905, 18,893 pounds were exported; in

1906, 13,018 pounds, and in 1907, 19,092. The total crop during these years averaged about 51,000 pounds. Ex¬ periments during 1915 were carried on with American seed and under the direction of an experienced American planter, the results being very satisfactory. There are no cotton manu¬ factures in Paraguay and prior to 1914 the cotton goods trade was divided between Great Britain, Germany, Italy, Spain and France, the rank of each being in the order named.

Uruguay. — Cotton is not grown in Uruguay, and there are only two or three small cotton¬ weaving mills with some 300 looms. There is also a small but increasing number of knitting machines for making hosiery. The products, of the weaving mills consist of plaid flannelets,

known as tartan, a good grade of khaki, Turk¬ ish towels, common strips and checks and a small amount of fancy goods. There are no available statistics of the imports of cotton goods or the origin of the same, but a recent report of the United States Department of Commerce shows that the imports of cotton goods for the first six months of 1916 were valued at $967,933. The value of cotton goods

exported to Uruguay in 1914—15 from the United States amounted to $126,054, and in 1915-16 to $870,613, an increase in value of $744,559, or 590 per cent. The value of bleached, unbleached and colored goods in¬ creased from $20,279 to $145,307 ; knit goods from $25,609 to $377,810; and yarns from $14,- 444 to $133,067.

Brazil. — It has been estimated that there are sufficient and available lands in Brazil to pro¬ duce 40,000,000 bales of cotton ; and yet, com¬ pared with such possibilities, it contributes a very small share to the cotton commerce of the world. The crops fluctuate from year to year, but in spite of the increasing demand for home consumption, and high protection, production shows little tendency to increase. The tariff on imported raw cotton, 7.27 cents a pound, is the highest in the world, the next highest being Russia with 7.22 cents a pound, Peru with 2.65 cents and Mexico with 1.74 cents.

The unprogressive state of cotton culture is said to be due to the fact that cotton is grown in small patches by small farmers, who till the lands by the most primitive methods, and who have neither the money nor the knowledge to adopt more advanced systems; also, to the lack of transportation facilities. Again, another drawback is the uncertain and irregular rain¬ fall, which is often excessive at the fruiting period and at other times fails entirely, result¬ ing in prolonged drought. Cotton can be raised practically in all parts of the country, but the states producing the largest crops (in the northeastern

section) are, in the order of their importance, about as follows: Pernam¬ buco, Parahyba, Rio Grande do Norte, Ceara, Alagoas, Maranhao, Sergipe, Sao Paulo, Minas Geraes and Bahia. The Pernambuco cottons are in general of long staple, and the arboreous Peruvian varieties predominate. The varieties most cultivated are known locally as quebra- dinho, creoulo, caiana and governo, especially the first two, both of which are tree-cotton. The crop of this state ranges from 150,000 to 250,000 bales. The states of Parahyba and Rio Grande do Norte are ranked after Pernambuco in cotton production. The tree cotton of these states gives the largest yield and will bear six to eight years. Sea-island cotton also gives good results. The Maranhao cotton ranks second only to the famous sea-island. The varieties most cultivated are the Peruvian and some varieties of herbaceous ; the creoulo, que- bradinho and the governo being mostly es¬ teemed. The highlands produce cotton trees that bear for 8 or 10 years, and are often 20 feet or more in height. The sandy lands of the state of Ceara produce an excellent cotton, the fibre of which is strong, flexible and silky; the salt marshes produce the acclimated sea-island, and also tree cottons that bear regularly for periods up to 10 years. The herbaceous varie¬ ties produce cotton in three to four months. The small state of Alagoas in proportion to its size produces more cotton than most of the other states. In the state of Sergipe the her¬ baceous cottons predominate, but there are also some of the longer-staples grown. The herba¬ ceous cottons take six months and the tree cot¬ tons nine months to bear.

The statistics of cotton production in Brazil are very unsatisfactory and not always reliable,

but as nearly as can be ascertained the crop from 1910 to 1915, inclusive, in Brazilian bales (of 176 pounds each) averaged 966,000 bales, the maximum being reached in 1913 with 1,165,000 bales, and the minimum in 1915 with 781,000 bales. On account of the increased do¬ mestic consumption, the exports of raw cotton from Brazil have declined considerably in re¬ cent years. Back in 1872 as much as 173,115,- 500 pounds were exported. Nothing like this amount has since been sent out of the country, as the home consumption has continually in¬ creased. The exports in 1912 reached 36,980,- 000 pounds, in 1913, 82,504,000 pounds, and fell to 1,960,000 pounds in 1915.

The spinning and weaving of cotton in Brazil has developed to such an extent in the past 20 years that it is now the most important industry in the country. And it is not only a valuable asset in the prosperity of Brazil, but also a growing factor in its economic develop¬ ment as is evident from the following data very recently compiled by Senor Cunha Vasco, showing the comparative status of the industry in 1905 and 1916:

Number of mills working regu¬ larly . .. . .

Number of spindles working

regularly . . .

Number of looms working regu¬ larly . . .

Number of hands working regu¬ larly . . • • • . .

Annual production in yards . . .

Capital .

Value of output .

1905 1916

110 250

734,928 1,464,218

26,420 49,648

39,159 72,943

264,749,000 261,520,700

$48,427,000 $78,756,000

30,260,750 59,783,750

The annual consumption of cotton per spin¬ dle is estimated at 88.18 pounds, from which it is deduced by Centro Industrial, a commercial association of Rio de Janeiro of high standing, that not less than 129,121,900 pounds of cotton are consumed annually. The leading states in the manufacture of cotton, in the order of importance : Minas Geraes, Sao Paulo, Rio de Janeiro, Federal District, Bahia and Maranhao. There are from one to a half dozen mills in 10 other states. The goods made in the Brazilian mills are chiefly of the coarse and medium grades. The largest output is of col¬ ored goods, followed by gray, printed, dyed and bleached, in the order named. Some of the larger mills are manufacturing the finer grades, part of which compare favorably with the imported goods in both weave and finish. The value of the exports of cotton from the United States to Brazil in 1913 amounted to $386,368, and in 1916 to $782,755, a gain of $396,387, or 103 per cent.

General Trade with United States. — The total value of our cotton trade in 1907-08 with all Latin America, and including the West Indies, amounted to $7,366,526, and in 1912-13, the year before the outbreak of war in Europe, to $15,506,377. This was a gain in the five years of $8,139,851, or 110 ˆ4 per cent. But just two years following, 1915-16, the total exports reached the value of $38,381,074, a gain of $22,- 874,697, or a little more than 147 per cent. The statistics contained in the following table give the value of our trade with each country for the fiscal years 1907-08, 1912-13 and 1915-16. It is certainly a gratifying exhibit, every coun¬ try showing a substantial gain, except Hon¬

duras, where there was a loss of 25 per cent. The most conspicuous gains (1913-14 — 1915- lb) are shown in the value of the exports to Mexico, Costa Rica, Cuba, the British West Indies, Venezuela, Peru, Chile, Argentina and Uruguay. Of course this was largely due to the total suspension of exports from Germany, and the interruption of the maritime trade of other belligerent European nations. But the American .exporter ought henceforth to be pre¬ pared to meet any competition, and not part with legitimate trade he has acquired.

Value of Cotton Goods Exported from the United States to Latin America and West Indies.

COUNTRY

1907-08

1912-13

1914-15

Per

cent

increase

1912-13

1914-15

Mexico .

$782,966

$1 ,064,895

$4,891,956

359

Guatemala .

329,067

427,445

578,579

35

Honduras .

333,921

699,506

523,688

British Honduras

26,479

131,448

188,017

43.5

Salvador .

329,161

407,730

735,144

80

Nicaragua .

246,222

349,401

518,651

49

Costa Rica .

257,567

293,262

623,699

113

Panama .

201,957

1,122,185

1,396,880

24.5

Total .

$2,507,340

$4,495,872

$9,456,614

110.3

Increase, dol-

lars .

$1,988,532

$4,960,742

Increase, per

cent .

79

110

Haiti .

$742,978

$1,465,710

$2,276,749

55

San Domingo . . .

34,570

986,076

1,347,919

37

British West

Indies .

40,711

960,041

1,973,542

105.5

Dutch West

Indies .

2,563

104,531

109,556

5

Danish West

Indies .

3,648

28,302

34,062

21

French West

Indies .

655

14,550

93,024

520

Cuba .

1,245,822

2,903,372

7,741,671

132

Total .

$2,070,947

$6,462,582

$13,576,523

110

Increase, dol-

lars .

$4,391,635

$7,113,941

Increase, per

rent. .

212

110

Colombia .

$624,587

$1,453,774

$2,607,192

79

Venezuela .

307,973

376,314

1,114,606

197

Ecuador .

106,770

218,232

498,321

133

Bolivia .

9,378

295,645

366,254

24

Peru .

132,409

188,004

675,686

260

Chile .

445,960

808,674

1 ,638,043

102

Argentina .

685 , 207

538,421

6,495,724

1,107

Uruguay .

97,084

146,344

870,613

503

Paraguay .

222

3,261

16,360

401

Brazil .

373,545

431,368

782,755

82

Guiana .

5,104

87,886

282,383

221

Total .

$2,788,239

$4,547,923

115,347,937

237.5

Increase, dol-

lars

$1,759,684

$10,800,014

Increase, per

rent. .

6′

237.5

Grand total .

$7,366,526

$15,506,377

$38,381,074

147.5

Increase, dol-

lars .

$8,139,851

$22,874,697

Increase, per

rpnt – –

110.5

147.5

James L. Watkins, Statistician, New York City.

10. CATTLE AND MEAT INDUSTRY IN LATIN AMERICA. The world demand for meat, and particularly beef, has directed at¬ tention to Latin America as the most promising field for its production. Locally, there are but few places in either the northern or southern group where cattle have not been raised with success since the Spanish settlement. Due, however, to the lack of transportation facilities and extensive meat-preserving plants, until re¬ cently their great value in export trade was almost entirely in their hides. In consequence, the native stock deteriorated through inter¬ breeding and acclimatization to the tropical and semi-tropical conditions, the result being a non-fat producing animal of small size whose beef was unsuited to the tastes of foreign buy¬ ers. But with a foreign demand, and the in¬ stallation of packing, refrigerating and trans¬ portation facilities, cattlemen of the pampas of Argentina early recognized the need of scien¬ tific methods. Foreign pedigreed stock has been introduced for cross-breeding, fat-produc¬ ing feedstuffs have been cultivated, sanitary regulations have been decreed and enforced, inland transportation has ‘been facilitated and markets have been established. The result is that under the stress of war requirements for foodstuffs, Argentina became prepared, along with her sister republic, Uruguay, while the beginning of a powerfully potential export meat trade unfolded itself throughout the southern part of the continent, including both Brazil and Paraguay, with the southern prov¬ inces of Chile. The present development has shown that, wherever intelligent, encouragement has been given to the cattle industry it has prospered. Cheap grazing land, cheap labor, salubrious climate, luxuriant vegetation, im¬ proved methods of refrigeration and transpor¬ tation, await only the scientific correlation of these elements in the more intensive applica¬ tion of the principles of animal industry to make Mexico, Central America, the West In¬ dies and South America a constant producer of cattle, beef and other meat-producing animals for ages to come.

Argentina. — The Argentine Republic is the greatest livestock country of Latin America. Situated between 22° and 55° of south lati¬ tude, it has every degree of climate that the United States has, including a diversity of rain¬ fall. Certain parts, particularly in Patagonia, are semi-arid, and deducting these, along with the foot-hills of the Andes, and 90,000 square miles under cultivation, from the whole area leaves an estimated 484,162 square miles avail¬ able for livestock, an area

approximately twice the size of the State of Texas. The number of cattle, officially estimated 1 Jan. 1915, was 30,- 000,000 — 3.8 per capita — valued at $955,350,000, in addition to 80,000,000 sheep, valued at $203,- 808,000, 4,564,000 goats, valued at $3,875,748, and 3,200,000 swine, valued at $33,968,000. Of a total of exports amounting to $558,280,643 in 1915, animals and animal products aggregated 218,780,416 gold pesos ($0,965), or $211,516,181.44.

From the days of the earliest settlers the raising of cattle has been the important in¬ dustry of the country, the immense ˆpampas,** or prairies, and the salubrious climate being particularly adapted for livestock. But com¬ mercially, as far as exports were concerned, cattle were raised chiefly for their hides, the

meat being consumed .at home, with the ex¬ ception of a small export trade in dried beef, or ˆtasajo,® the only form of preservation gen¬ erally known, and a limited number of stock on the hoof sent to neighboring countries. The result locally was that the inhabitants of Ar¬ gentina became the greatest consumers of beef in the world, a reputation they still maintain, the per capita consumption being 275 pounds in the cities, and about 300 pounds in the country, as against 112 pounds for Great Britain, 102 pounds for Germany, 80.3 pounds for the United States and 77 pounds for France. The first shipment of refrigerated beef was ex¬ ported from Buenos Aires to Havre in 1877 — 80 tons. While it was hailed as a success, it was not until the period beginning 1885 that it became of commercial importance. The amount shipped in that year was small — a valuation of only $1,680 — but sufficient to show its commercial practicability, and from that time it has grown to immense proportions, being to-day the greatest staple of the country, and a product that will not attain to its poten¬ tialities for years to come. It is sufficiently large at the present time to control the world quotations of meat, and has been resoonsible for the introduction of hundreds of millions of dollars not only into the exploitation of Ar¬ gentine industry but that of the entire Rio Plata territory and the whole semi-tropic South America southward.

During the past generation the leading ranchmen, supported by the government in the realization of the need for better beef stock, have imported the best examples obtainable of well-known European breeds, which they have either crossed with the native cattle or kept pure. This movement has taken place largely during the past decade. Considered from all points of view, the Shorthorn has been accepted as the animal best adapted to Argentina's needs, figures from the Argentine Herd Book for the year (1917) showing 15,127 bulls and 27,422 cows of this breed. Other breeds are in the following order:

Hereford, 2,294 bulls and 4,280 cows; Aberdeen Angus, 1,638 bulls and 2,654 cows ; Flemish, respectively 62 and 185 ; Red Polled, 56 and 71; Jersey, 34 and 41; Red Shorthorn, 17 and 30; and Devon, 4 and 16. This does not represent all the cattle of pedigreed stock, but those registered only. The number, of various breeds, registered in the Herd Book from 1908 to 1917* is 60,107 bulls and 66,091 cows, of which approximately 54,000 are alive to-day. From 1901 to 1914 there were brought into the republic 12,761 pedigreed animals, chiefly from Great Britain, valued at $8,000,000, or an average of $637 each. The interest in livestock improvement is so keen that animals of real promise command the high¬ est prices. At the show sale of 1913 at Buenos Aires, the Shorthorn bull, Americus, sold for $33,968, the world's record price, other high figures being Durham Shorthorn (in 1915), $25,476, and the Shorthorn reserve champion (1916) , $23,353. The average price brought for 200 bulls auctioned in 1915 was $2,420.

The great majority of stock for breeding purposes is brought from Great Britain, the government regulations being extremely strin¬ gent as. to the country of origin, the purpose of which is to prevent the entry of stock afflicted with the foot-and-mouth disease and other

plagues. The regulations were in fact so strict that it has been, until quite recently, impos¬ sible to introduce any livestock whatever from the United States, _ the fact of the foot-and- mouth disease existing in any part of the country operating as a bar to cattle from anv other part, even across the continent where the plague might be unknown. However, at the solicitation of the American Shorthorn Breeders' Association the regulations were modified by decree of 6 Oct. 1915, in the sense that, while importation is prohibited from any. country while the foot-and-mouth disease ((exists or has existed in an epizootic or gen¬ eral form ; or from departments, provinces, countries, or states where the disease exists or has existed within three months previous to shipment, the three months counts from the date of the official declaration of the extinc- . tion of the disease, provided that such declara¬ tion has not been made until 15 days have elapsed from the last case.® The government feels that it is able now to successfully cope with the cattle plague.

Under the patronage of the government, the Sociedad Rural Argentina — the national or¬ ganization interested in livestock — holds annual

international livestock exhibitions at Buenos Aires, at which prizes for excellence are awarded by a jury sent to Argentina by the Royal Agricultural Society of London, thus maintaining breed standards, the while keeping alive the interest between Argentina and her greatest meat customer. Further encourage¬ ment is given to the meat industry by the gov¬ ernment agricultural schools, and also by the sending abroad of students, or ((becados,® to study veterinary science in leading institutions of France, Germany, Great Britain and the United States. These young men, fresh from the latest and most advanced instruction abroad, return to take up their work on the great ranches or with the department of the govern¬ ment concerned with livestock where they are a strong factor in the promotion of animal industry.

With the exception of those parts of Argen¬ tina devoted to agriculture in whole or part, cattle run on immense ranges similar to those of a generation ago in the western United States. Under ordinary conditions but little care is required, the pasturage and climate being favorable. There is, however, the danger every few years of droughts diminishing the supply of water and grass, causing poorly con¬ ditioned stock to be rushed to market. The results are commercially bad for the industry, in that the country is depleted of its stock of calves and breeding cows, as is shown by the varying gains and losses indicated in the national census. Of late, however, since the success of the refrigerating packing-houses has been dem¬ onstrated commercially, a great acreage has been regularly devoted to the raising of feedstuffs for cattie, the principal ones being corn, 1,250,-000 bushels, 1915—16, and alfalfa, known locally as (

continuance and growth of Argentine cattle raising and meat packing.

The packing-houses of Buenos Aires, La Plata and other Argentine cattle markets rank with the best in the world, and in connection with their output a fleet of vessels fitted for the carrying of frozen and chilled meats plies between the Rio Plata and Euro¬ pean ports, with lesser facilities for meeting the requirements, just beginning, of North America. It is estimated that of the* British investments of approximately $2,500,000,000, more than one-half is devoted in one way or another to the cattle or packing industries. Likewise, Argentina has been a favorite field for American investments, particularly in ex¬ tensive packing establishments. Due to the European War demands they have been operated at their capacity. Southern Patagonia, formerly considered a bleak, waste territory, has be¬ come an important producer of meat, prin¬ cipally mutton, the packing-houses for which are located at Punta Arenas, Chile.

The exports of ((pastoral products,® compris¬ ing frozen and chilled beef, frozen mutton, sundry frozen meats, preserved meats, extract of beef, powder of meat, preserved tongues, livestock — cattle and sheep — condensed soup, and jerked beef — <(tasajo,® according to the figures of the Direccion General de Comercio y Industria, at five-year periods from 1885 to

1913, are as follows : 1885, $6,684,945 ; 1890,

$9,971,249; 1895, $14,768,972; 1900, $13,894,206; 1905, $33,170,104; 1910, $43,440,235; 1911,

$53,167,086; 1912, $56,502,816; and 1913, $53,- 486,761. Under the general heading ((pastoral products,® the United States consul at Buenos Aires states the exports for 1914 as $146,389,- 581 ; for 1915, $211,057,640. These last two years doubtless include hides, an important item of exports, the total of cattle hides, in pounds, for the year 1914 being 122,552,518 (of which 102,541,570 to the United States) ; and 1915, 182,848,061 (of which 142,564,077 to the United States). Of the beef exported, che United States bought, in pounds, in 1914, 115,784,599; United Kingdom, 604,866,777 ; 1915, United States, 84,077,633 ; United Kingdom, 637,903,108; the other large purchaser being France, 1915, 46,626,817 pounds.

Bolivia. — Bolivia is concerned chiefly with the mining and rubber industries. While stocl^ raising might be successfully carried on in many portions of the country, it has, despite the encouragem nt of the government, been neglected except for local needs. While there are sufficient cattle for domestic purposes, and many thousands running wild, the export of meat will probably be delayed many years,, as the grazing lands are located far in the interior of the continent and the means of transporta¬ tion to the sea coast are difficult and costly. In that part of the Andes occupied by Bolivia and Peru are found the llama, alpaca, vicuna and the domestic sheep, all producing meat for local demands, besides a very fine qualitv of wool for export. In 1913, 465 metric tons (2,205 pounds) of cattle hides were exported; in

1914, 374; and in 1915, 613. In addition, 6,558 head of cattle on hoof were exported to Brazil and Argentina. In view of this threatened de¬ pletion of the herds, the government is at pres¬ ent considering the prohibition of shipments of

livestock, at the same time having already authorized the free importation of cattle, with a view of introducing: the better breeds.

Brazil. — Brazil has devoted her greatest attention to the coffee and rubber industries, her exports in 1915 of these products being respectively 60 per cent and 13*/} per cent of all products sent abroad. (See articles Coffee; Rubber). The attention paid to this, source of wealth has, consequently, resulted in the neglect of other industries, except such as have been required for home needs. Stock raising has only recently been attempted with a view to export. It is true that Brazil has long been a great source of cattle hides, but their number has been measured by the domestic consumption of meats. It is since the outbreak of the European War that serious attention has been paid to a diversification of industries, par¬ ticularly meat. The increasing home demand for coffee, due to the increase of population — threatening a curtailment of exports — and the competition of cultivated Oriental rubber plantations, has aroused the government officials and economists, and late in 1916 the pre¬ liminary session of the Sociedade Nacional de Agricultura (National Agricultural Society) was held at Rio de Janeiro, called for the pur¬ pose of studying the Brazilian livestock situa¬ tion, particularly as regards cattle. Among other phases considered were: domestic breeds, their degeneration and means for their im¬ provement; relative productive capacity; world supply and demand ; possible federal, state and municipal assistance. Plans were formulated for special courses in all subjects related to the cattle and meat industries, and the formation of an efficient corps of veterinarians and bac¬ teriological experts to uniformly control cattle rearing and meat sanitation, with the establish¬ ment of zootechnic stations and model farms. In addition consideration was given in detail to the transportation of stock, packing and re¬ frigeration, domestic and oversea freights and the question of direct government supervision over same. As a result of this meeting, a cattle exposition was held at Rio de Janeiro, 13-28 Mav 1917, cash prizes and diplomas being provided by the society, and Chicago packing firms contributing handsome cups.

The number of cattle in Brazil at the present time is conservatively estimated at 30,705,400 — 1,222 per capita, and 9.03 per square mile — the greater number being found in the southern and western parts of the country. Of the States, Sao Paulo has 1,312,000, Piauhy, 1,163,000, Ceara, 1,162,000, Rio Grande do Sul. 7,249,000, Minas Geraes, 6,861,000, Bahia, 2,683,000, Matto Grosso, 2,050,000, and Goyas, 1,873,000. In addition, the estimate of sheep is 11,000,000; goats, 10,- 000,000 ; and swine, 20,000,000. With the ex¬ ception of the southern part of Parana, frosts are unknown, and the native

pasturage, known as (

Besides the newly-organized Sociedade Nacional de Agricultura, many of the individual states have their local cattle fostering organizations, under whose auspices fairs and expositions are held annually, In Rio Grande do Sul a state union — the Uniao dos Criadores — was organ¬ ized in 1915 with the purpose of inducing the government to promote rural development, in¬ cluding improved transportation facilities, co¬ operation in the purchase of necessities re¬ quired in the cattle industry, particularly cattle for breeding, barbed wire, salt, wind-mills, etc. In two years the Union enrolled 1,600 members, and attained a flourishing condition. From its headquarters at Porto Alegre a monthly, maga¬ zine is issued, for the use of its members, the public and for exchange purposes with like organizations throughout the world. The presi¬ dent of the commonwealth of Minas Geraes, the fifth state in size in the country, in his last annual message (1916) called particular at¬ tention to the lack of transportation facilities, a general need throughout the republic, and pro¬ posed a concerted effort to increase the frozen meat industry in that particular state. He mentioned in particular the shipments of this product from Santos, beginning in September 1914, with 3,100 kilos, valued at $270, and in¬ creasing during the calendar year 1915 to nearly $1,500,000, and during the first four months of 1916 to $1,177,000, the bulk of this being raised in Minas Geraes. Government aid has been given in this commonwealth with good results, cattle fairs having been established at Tres Coraqoes, Sitio, Bemfica, Lavras and Campo Bello, at which 192,336 head were sold in 1913.

The native livestock of Brazil — of Portu¬ guese origin — is well suited to the climate and pasturage of the country, and has recently been successfully crossed with foreign breeds. While small, the domestic animal, known as the ((gado criouli® (creole), is not unsuited to beef purposes, and by selective breeding has at¬ tained an excellence that fits it for exhibition purposes in competition with foreign breeds, or with the “mestico,® the native crossed with imported sire. Of the domestic strain, the most desirable are of the four types known as “caracu,® “curraleiro,® “cortaleiro® and “mocha.® Of the foreign breeds introduced, the Polled Angus is considered the best, the Here¬ ford and Shorthorn being second and third choice. Some attempt has been made to cross the zebu, from India, with domestic stock, as being adapted in certain parts of the country to withstand the intense tropic heat and insect pests.

As regards meat production, Brazil has long supplied her domestic needs, in addition to ex¬ porting quantities of dried beef, known as

“xarque,® “charquai,® “tasajo® and “biltong.® In the city of Rio de Janeiro alone 31,150,020 pounds were consumed in 1916, and 9,912,056 pounds re-exported, principally to the Amazon ports. Of these amounts, the states of Rio Grande do Sul supplied 2 843,302 pounds, Matto Grosso, 5,044.930, and Minas Geraes and Sao Paulo, 22,806,366 pounds, figures that indicate the extent of local production. The dried beef industry continues as an important branch of Brazilian commerce as well as that of other South American states — the product is cheap, wholesome, may be produced without expensive

equipment, requiring no coal or ice, both ex¬ tremely expensive, and is easily transported. However, coincident with the European em-broglio, the country awoke to the fact that a handsome profit was in store for foodstuffs, particularly meat, with the warring nations, and during the period following 1914 rapid strides were made in the installation of frozen and chilled beef packing plants.

The exportation of refrigerated meat, in consideration of the short time that it has been a subject of Brazilian trade, has been import¬ ant. The first shipment was made from Santos, consigned to New York, in July 1915, amount¬ ing to 205,350 pounds, the whole amount ex¬ ported from that port during the same year amounting to 17,452,839 pounds; from Rio de Janeiro, 1,239,992 pounds; and from Para, 7,902 pounds, a total for the six months of 18,730,733 pounds, valued at $1,530,399. Of this quantity, the United States received 4,393,28 7 pounds; France, 222,910 pounds; United Kingdom, 9,592,626 pounds; and Italy, 4,521,910 pounds. During the first 11 months of 1915, 14,686,386 pounds were exported, and in a like period of 1916 the number was 70,268,566 pounds, an in¬ crease of approximately 400 per cent, a ratio that is maintained in the shipments during the early months of 1917, with Rio de Janeiro, however, leading Santos in the quantity shipped.

Shipping facilities had to be created to handle the export meat trade, the regular steamship lines calling at Brazilian ports adapt¬ ing themselves to the new requirements. The steamship Rio de Janeiro of the Lloyd- Brasileiro Line — owned by the Brazilian gov¬ ernment — made its first trip with refrigerating installation leaving Santos for New York 4 July 1915, with 205,350 pounds of beef. Other boats of the same line, the Minas Geraes, the Acre and the Sdo Paulo , have

since been fitted with cold storage holds for the same trade. In addition, the English and French lines making Brazil have every facility for handling meats. On 15 Sept. 1916, the Highland Harris (Eng¬ lish) carried a cargo of 6,398,000 pounds from the packing-house at Vera Cruz (Rio de Janeiro) ; and on 19 Nov. 1916, the Cravonshire (English) carried 8,132,500 pounds, in addi¬ tion to 1,100 cases of canned meats from the packing plants at Barretos and Osasco. Thus far, the greater quantity of refrigerated meats has gone to Europe. While a large quantity has been cleared for the United States, the Summary of Commerce makes no mention of imports from Brazil, the quantity shipped here doubtless having been transshipped.

On the by-products of the meat industry, hides have been the most important. In 1913, the total exports were 35,075 metric tons (2,204.6 pounds), of which the United States received 1,122, Germany, 9,823, France, 9,892 and Great Britain, 1,585; for 1914, the total was 31,434 metric tons, of which the United States received 5,617, Germany, 8,964, France 5,432 and Great Britain, 1,845; for 1915, the total was 37,080 metric tons, of which the United States received 19,796, Germany, none, France, 2,701 and Great Britain, 3,386 — the exports of the United States approximating 54 per cent of the total. In addition, the exports of sheep and goat skins for the years 1913-14-15 amounted to 3,232, 2,487 and 4,573 metric tons respectively, the United States buying from

75 per cent of the total in 1913 to 98 per cent in 1915.

Chile. — Chile, with her mineral and chem¬ ical industries and shortage of grazing lands, has been unable to produce sufficient beef for her own consumption. In 1914, animal products to the amount of $4,500,000 were imported. The number of horned cattle in the country in 1915, according to the official estimate, was 2,083,997. Besides, there are about 4,600,000 sheep and 221,000 hogs in the country. With the opening up for settlement of the six south¬ erly states of Chile for agriculture and stock raising, there is a probability of the country excelling in the packing and export of meats, particularly mutton and sheep products. The great centre for livestock production extends southward from Llanquihue to Cape Horn, the commercial centre being Punta Arenas, on the continent side of the Strait of Magellan. A city of 17,000 inhabitants, it has grown up dur¬ ing the past decade as the packing centre of Chile and Argentine Patagonia. In 1914, the shipment of animal products, chiefly to Europe, amounted to $5,405, 120 ; in 1915, $6,853,229. Although Punta Arenas is in Chilian territory, there is no indication in the statistics of the country as to what part of these exports is to be

credited to the nation, and in fact a great proportion should be credited to Argentina. The cattle and sheep and packing interests in and around the city of Punta Arenas represent a capitalization of approximately $8,000,000.

Colombia. — Columbia has thousands of acres of fine grazing lands open the year around, principally in the Magdalena and Sinu valleys, on the Pacific highlands and the Carib¬ bean coast. The number of cattle is estimated at 5,000,000 — 1 per capita. Locally, the cattle industry is of importance for the domestic sup¬ ply of meat afforded, and for the quantity of hides exported. Some few cattle are sold abroad. In 1914, 400 head of beef steers were shipped to Panama ; in 1915 the number was 850, increasing in 1916 to an estimated 1,000 per month. During the same year (1915) 41,- 255 head of cattle were shipped to the United States, which fact vouches for their sanitary excellence, in striking contrast to former con- dictions that kept Colombian livestock off the United States and Cuban markets. Lately the government has taken strong measures to as¬ sist the cattle industry, one being the law of 1915 providing for the establishment of pack¬ ing plants on the Atlantic Coast, the products of which may only be exported, under govern¬ ment inspection and supervision. In March 1917, announcement was made of the govern¬ ment contract with Evaristo Rivas Groot for the erection of a plant on the Gulf of Morros- quillo. The shipment of hides is an important source of income, those sent abroad in 1912 amounting to $2,661,721.50 ; 1913, $3,180,781 .68, of which the United States received $1,024,955 (1912) and $966,759 (1913). The exports of hides to the United States in 1914 were $1,042,- 174; in 1915, $1,904,558; and in 1917, $1,639,167.

Costa Rica. — Costa Rica had, in 1905, 304,- 662 head of cattle, and 79,7,30 hogs; 1910, 333,- 417 head of cattle, and 69,712 head of hogs; and 1915, 347,475 head of cattle, and 76,198 head of hogs — .845 head of cattle per capita, and 18.54 per square mile. According to the report of the United States consul, Costa Rica offers rich

possibilities for the cattle industry, there being large tracts of suitable grazing land procurable in fee at from $0.50 to $1 per acre, or on lease for about one-tenth of these sums. In addition, cattle are easily moved, no great dis¬ tances having to be traveled, and the climate being favorable, no shelter is required. The most available cattle lands

are situated in the provinces of Alajuela, Cartago and Guanacaste. The present stock of cattle consists of the native breeds crossed with the Holstein, Guernsey and Durham. There is no refrigerating packing¬ house in the country, but a considerable number of cattle on the hoof are shipped to the Canal Zone. The number of cattle slaughtered in 1905 was 34,081; 1910, 48,371; and 1915, 50,111. From these, hides were expored in 1905 to the value of $108,810; 1910, $125,419; and 1915, $160,124. Exports of cattle and calf hides to the United States amounted in 1911 to $63,853;

1912, $39,392; 1913, $49,906; 1914, $50,634; 1915,

$87,749, and 1917, $308,275.

Cuba. — In Cuba, according to the registra¬ tions of the Department of Agriculture the number of cattle (1914, 3,395,000 — official! (1916) is 4,000,000 — 87 per square mile and 1.62 per capita. (Commerce Reports, 20 Sept. 1916, p. 1079). The republic, due to the diver¬ sity of its particular tropical productions, tobacco and sugar, and the high price of land, has not paid uniform attention to the cattle in¬ dustry. At the conclusion of the War for Inde¬ pendence there were few cattle left on the island, and importations were made from Porto Rico, the United States, Mexico and South America in 1899 of range cattle to be fattened on the domestic pastures. At the same time, and since, breeding animals have been im¬ ported, principally from the United States, with the result that in the provinces of Camagiiey, Oriente and Santa Clara many fine ranches are found. In these provinces land is reason¬ ably cfteap, grazing is good and water is plenti¬ ful. Most of the grazing land is fenced, and from two to three acres of native grass — either Guiena or Parana — is sufficient for each animal the year around, with necessity for extra feeding during the frequent droughts. The favorable natural conditions resulted in a rapid increase in the number of cattle, and in 1905 the island was considered as being over¬ stocked, from the fact that the supply was too limited to warrant important refrigerating plants and shipping facilities for dressed meats, and, being grass fed, the cattle could not be exported on the hoof successfully. Since 1905, the number of cattle has increased with the population, while a steady improvement has been shown in their breed and weight, and a marked improvement in their sanitary condition.

Within the past 10 years cattlemen have recognized the advantage of proper facilities on their ranches, and numerous extensive improve¬ ments have been made in the matter of con¬ veniences, such as wind mills, tanks, ponds and silos, and in some rare cases efforts have been

made to utilize the by-products of the sugar in¬ dustry in the fattening of cattle. Alfalfa has, likewise, been introduced, and, when the soil is inoculated with the alfalfa bacteria, it has proven of great utility in supplementing the native feedstuffs. At present there are no packing-houses in Cuba. There is, however, at ITabana a refrigerating establishment of limited

capacity for supplying the local hotels and steamship companies with frozen meat. Due to this fact, the general method of meat preservation is that of dried beef, large quanti¬ ties of which are consumed in the republic, the domestic supply being at present insuf¬ ficient.

The exports of live cattle in 1914 amounted to $14,925; 1915, $7,715; hides and skins, 1914, $2,365,498; 1915, $3,038,429; other animal prod¬ ucts, 1914, $148,901 ; 1915, $76,653. With the exception of a small part, all these exports were made to the United States. During the same years- there were imported, 1914, 22,808,- 429 pounds of salt, fresh, canned and jerked beef, valued at $2,746,485 ; in 1915, the amount was 15,498,600 pounds, valued at $2,137,642, nearlv all (jerked beef) coming from Argen¬ tina; 1914, 6,829,067 pounds; 1915 , 3 744,766 pounds; and Uruguay, 1914, 14,426,820 pounds; and 1915, 11,617,423 pounds.

Ecuador. — Ecuador is mountainous over much of its area, and is industrially concerned with the production of cocoa and other tropical products, to the neglect of the cattle industry. There is, however, much available land suited to livestock, particularly on the Esmeraldas and Santiago rivers and on the table-lands to the east of the Andes. The entire stock of cattle, nearly all of native breed is consumed at home, the hides alone being exported. These latter amounted in 1909 to $220,600; in 1910, $257,252; in 1911, $210,428; and in 1912, $294,898. Many attempts have been made by large landholders and corporations doing business in the country to encourage the industry of cattle raising, and annual fares are held at Quito. Hides to the amount of 2,217,529 pounds.

Guatemala. — Guatemala has, according to official estimates (1915), 655,386 head of cattle — 13.57 head per square mile, and .309 per capita. The ‘great majority are of the native strain, weighing on an average 850 pounds. Im¬ ported breeding stock has lately been intro¬ duced, among which were 400 bulls from the United States, in 1915. For crossing purposes the Hereford and Little Holstein are the favorites, the animal produced by the crossing weighing from 1,100 to 1,200 pounds.

All sections of the republic are suitable for cattle, but the favorite portion for fattening purposes is the Pacific Coast slope, where on an acre and a half of Guinea or pampas grass per animal they are prepared for market. The advantages of this particular section have at¬ tracted cattle from the other parts of Guate¬ mala, as well as Honduras. The drive from the latter country is estimated at 40,000 head annually. Meat being abundant and cheap its consumption is very high. The late ruling price of beef cattle on hoof at the principal market, Guatemala City, is $0.04 per pound. In 1914 the prices for 122,000 head of cattle slaughtered ranged from $0.0075 to $0 03 per pound. In 1915, under a special concession, three shipments of cattle — amounting to 2,198 head — were made to the United States through the port of New Orleans. They were sold to the packing-houses at Chicago and Saint Louis for $0,065 per pound. As evidence of tick in¬ fection was found, further shipments were prohibited by the United States Bureau of Animal Industry. A recent concession for a packing plant near Quiriga, Guatemala, on

which construction has commenced, promises to give an increased impetus to the cattle in¬ dustry in both republics. Arrangements have been made for the shipment of the prepared beef direct to the United States. The exports of cattle and calf hides to the United States amounted in 1911 to $11,852; 1914, $6,871; 1915, $210,805; and 1916, $197,107.

Honduras. — Honduras has, according to conservative estimates, 489,000 (1914) head of cattle — 10.57 per square mile and 1.78 per capita — with a present annual increase of from 12 per cent to 15 per cent. It was recently the subject of a special investigation of the United States Department of Agriculture with regard to its livestock prospects, and a favorable report was made. The greater number of cattle is found in the deoartments of Olancho Choluteca, with numerous herds in the de¬ partments of Cortes, Colon, Atlantida and Yoro. Water and shade are abundant, and the Guinea and Para grass is at times so rank that it hides the cattle that graze in it. Formerly many cattle were shipped annually to Cuba, and at present large numbers are being sent to Guate¬ mala, Salvador and British Honduras. A beef¬ packing plant near the town of Quiriga, Guate¬ mala, on the Honduras side of the boundary, has a capacity of 50 head per day. The con¬ cession controls 100,000 acres of land in Hon¬ duras alone, well stocked. The exports of hides to the United States in 1911 amounted

to

$35,563; 1914, $82,332; 1915, $137,773; 1916,

$325,460, and 1917 to $291,472.

Mexico. — Due to the recent disturbances in Mexico, it is difficult to estimate the extent of the cattle industry to-day. In 1902 the num¬ ber of cattle was reckoned at 5,142,457 head, a low estimate. At present, the supply of cattle for the meat demands of the country is inade¬ quate, so much so that in October 1916 a par¬ tial embargo was placed upon their export, which embargo was in May 1917 made com¬ plete. The statement of Consul Philip C. Hanna at Monterey, made to Washington (Consular Reports, 9 Aug. 1916), is generally true for the whole republic : <(Large areas . . . over which large herds of cattle

roamed, are to-day empty pastures. A large sum in export duties was collected, but the meat supply . . . has been greatly reduced.

. . . The declared export value of hides and

bones from this consular district for the year, as compared with 1914, reveals the fact that there was a falling off of 10 per cent in dry cattle hides, 72 per cent in green (or butcher) cattle hides, 54 per cent in goat skins, 80 per cent in pig skins, and 36 per cent in crude bones. One of the many serious problems con¬ fronting the nation at present is the replenish¬ ing of its meat supply and at prices within the purchasing power of the poor.® Supplement¬ ing this, Consul Frederick Simpich, of No¬ gales, reported (1916): ((Heavy exports of cattle have greatly depleted the herds, but own¬ ers were compelled to sell, in many cases, in order to protect themselves. The wholesale stripping of the ranches, wherein cows, heifers, and all were sold, has discounted the future for several seasons ahead.® In 1915, the ex¬ ports from Mexico of cattle amounted to 13,907 head, valued at $332,699; 1916, 24,919 head, val¬ ued at $556,540. Of cattle and calf hides ex¬ ported to the United States the number of

pounds was: 1911, 22,871,509, valued at $2,796,652; 1912, 28,264,745, valued at $3,583,851 ; 1913, 29,559,779, valued at $4,230,382; 1914, 37,- 750,732, valued at $6,367,721 ; 1915, 50,808,523, valued at $8,357,078; and 1916, 44,101,773, val¬ ued at $7,661,104. The exports of fresh beef and veal to the United States in 1914 amounted to 212,865 pounds, valued at $14,114; 1915, 3,- 941,131 pounds, valued at $384,497 ; and 1916, 1,316,698 pounds,

valued at $127,800.

Nicaragua. — Nicaragua has about 500,000 (estimated) head of cattle — 10.1 per square mile, and .833 per capita. Cattle raising has been up to the present one of the greatest in¬ dustries in the republic, there being produced sufficient for domestic demands and a surplus available for shipment to Costa Rica, Salvador, Honduras and Nicaragua. The number ex¬ ported annually is on an average 50,000 head. The departments of Chonales, Leon and Sego¬ via in the western part of the country are ad¬ mirably adapted to the industry, and recently (1916) the United States consul at Bluefields in a report to Washington recommended very highly the territory in his district for cattle raising, mentioning it as the only industry within the country wherein the producer was independent of the middleman, the demand for beef being so great that buyers were constantly scouring the country for livestock. The prin¬ cipal cattle market is Tipitapa, department of Managua. Good grazing land is obtainable at from $0.75 to $1 per acre. The exports of cattle and calf hides to the United States in 1911 amounted to $142,589; 1912, $124,403; 1913, $205,817; 1914, $173,281; 1915, $358,642; and 1916, $454,648 and 1917, $460,738.

Panama. — Panama has, according to the Bulletin of the Pan-American Union, 166,937 head of cattle — 5.15 per square mile, and .49 per capita — with estimated facilities for caring for 5,000,000. One-third of the cattle in the country are in the province of Chiriqui, the other cattle-producing provinces being Code, Veraguas, Los Santos and Panama. The ex¬ ports of hides to the United States in 1911 amounted to $102,502; 1912, $112,480; 1913,

$118,380; 1914, $172,443; 1915, $264,244; 1916,

$301,633 and 1917, $332,512.

Paraguay. — Paraguay ranks her cattle in¬ dustry as her chief resource. In 1877 there were 200,525 head of cattle in the republic; in 1886, 729,796; in 1899, 2,283,039; in 1902, 2,460,- 960; and in 1915, 5,249,043, the rapid increase being due to the lack of market, in addition to the large number brought in from Argentina and Brazil to occupy the cheap grazing lands. The natural increase, above those slaughtered, is reckoned at 6 per cent annually. The num¬ ber per capita is 5.249, second only to Uruguay with 6.518 per capita, and 8.8 times that of the United States with .59 per capita. Due to its importance as a national asset, the government has been very liberal in the matter of granting concessions for stock raising and in the

elabo¬ ration of meat and its allied industries. As a result, at the present time most of the avail¬ able grazing land is taken up by settlers or large cattle companies, even in the Chaco, the extensive prairie territory lying west of the Paraguay River. The existence of cheap land has attracted many stockmen from Argentina, excellent pasturage being purchasable at from less than $1 up to $4 per acre. Land values

are reckoned according to their access to trans¬ portation, rather than according to their avail¬ ability for stock raising. A thoroughly regu¬ lated Department of Animal Industry is main¬ tained by the government, and sanitary regula¬ tions are enforced against the introduction or spread of the foot-and-mouth disease or other plagues. The experts and veterinarians in charge are chiefly men that have been educated at government expense in the technical schools of the United States and Europe. In addition, the Sociedad Ganadera del Paraguay (Live Stock Association of Paraguay), an organiza¬ tion of stockmen and business men, under the patronage of the banks of the country, has been an important factor.

The native, or “criollo® (creole), breed is a small animal, weighing from 850 to 1,000 pounds, incapable of putting on much fat. When crossed with European stock it is known as <(mestico/ and compares favorably with ordinary unpedigreed stock, and thrives and fattens on the luxuriant pasturage afforded the year around. Efforts have been successfully made to cross the ˆcriollo® with Zebu stock from India, and in addition at the present time many bulls of the Shorthorn, Hereford, Hol¬ stein and Polled Angus breeds are being intro¬ duced. Of all the stock in the country, it is estimated that 80 per cent is native and 20 per cent mixed with European breeds.

The abundance of pasturage, supporting from 25 to 40 animals per 100 acres, with fat¬ tening herbs indigenous to the upkeep of a cattle ranch very low as compared with neigh¬ boring countries, and with the introduction of more adequate transportation facilities, along with refrigerating plants, Paraguay promises to be the great livestock region of South America. At present no fresh meat is ex¬ ported. In dried beef, or ˆtasajo,® however, the trade has always been considerable, the amount exported in 1913 being 3,771,625 pounds; 1914, 1,638,232 pounds; and 1915, 2,363,905 pounds. The first shipment of this product made to the United States — 4,500 pounds

— was made in April 1917. It is ex¬ pected that within a year regular shipments of refrigerated beef will be made, one packing plant, or <(f rigorifico,® at Trinidad being just completed, and the materials for the erection of another at Asuncion being now on the ground. In 1917, 241,344 hides were exported.

An increasing number of fat steers is ex¬ ported annually, most of them being purchased by the Buenos Aires packers. The number for 1910 was 11; 1911, 137; 1912, 4,661; 1913, 36,- 564; 1914, 24,385; and 1915, 29,509. During the same period the number of cattle slaughtered for local consumption, representing also the number of hides produced — of which 90 per cent were exported — was: 1910, 343,447;

1911, 302.375; 1912, 238,042; 1913, 362,484;

1914, 318,397 ; and 1915, 340,692. The market price for steers for local slaughter during 1915 averaged $20 per head; for export, $25; and cows, $14.

Peru. — Peru is not a cattle country, other than for local needs. The mountainous nature of the country and the profits arising from cer¬ tain minerals and special products of the coun¬ try have relegated the livestock industry to a minor position. The llama, alpaca and vicuna, all native to the region, furnish wool and meat

in small quantities, domestic sheep raising being in addition an industry of some importance. As concerns beef and cattle products, a con¬ siderable quantity is imported, the figures for 1912 being $206,706; for 1913, $118,864; and for 1915, $113,193. In addition, in 1913, there were imported from Chile cattle to the value of $46,834, and from the United States $7,991, the former being chiefly for slaughter, and the latter for breeding. Of exports, live cattle valued at $9,811 were sold in 1912, the amount in 1913 being $177,832. Hides of all kinds of livestock exported in 1912 amounted to $617,- 410; in 1913, $930,629. Of this last, cattle hides comprised $641,624, the same item amounting in 1914 to $521,947.

Salvador. — Salvador is essentially an agri¬ cultural country, coffee, sugar and rice being the great staples. The result is that the cattle industry, other than for dairying and domestic consumption, has been neglected, despite the efforts of the government to foster it. The number of cattle in 1906 was 284,000, later estimates indicating a small increase. So small is it in comparison with the size of the country and the population that during the year 1914 the total exports

of hides amounted, according to the figures of the Salvador gov¬ ernment, to only $48,669, of which $31,313 went to Germany, and $14,906 to the United States. Evidently on a different basis of valuation, the United States figures regarding imports of hides from Salvador are as follows: 1911,

$32,248; 1912, $45,393; 1913, $69,960; 1914, $78,-

650; 1915, $135,799; and 1916, $149,577.

Uruguay. — Uruguay partakes of the ad¬ vantages afforded to the cattle industry by its geographical location, being of that group com¬ prising southwestern Brazil, Argentina and Paraguay, the natural pasture of livestock. The number of cattle in the country (1916) was 8,192,602 — 6.518 per capita, the highest in South America, and approximately 17 head per square mile. This branch of industry has been the main resource of the country, formerly in the shipment of cattle on the hoof, the export of dried beef, or ˆtasajo,® hides, beef extracts, and in addition, its sheep products, its sale of wool alone for 1909 being $18,682,112; 1910, $15,036,977 ; 1911, $19,491,761; and the first six months of 1913, $18,740,037. Meat and meat • extracts (including mutton) were exported in 1909 to the amount of $6,190,979; 1910, $7,571,- 611; 1911, $7,017,944; and in the first six months of 1913, $1,083,900; during this last period slaughter-house products and frozen and chilled beef were classified separately, the former amounting to $8,404,900, and the latter to $3,868,995, a total of $13,358, 795 for the half year, the quantity exported since that time being greater per annum, as is indicated by the imports into the United States of fresh beef and veal — 1914, 38,712,846 pounds, valued at $3,313,618; 1915, 13,802,565 pounds, valued at $1,175,293; and 1916, 116,549 pounds, valued at $10,486. The sharp decrease for 1916 is ex¬ plained by the great European demand, a de¬ mand that also called for the re-export of 18,000,000 pounds of the quantity imported in 1914. Animal products exported in 1917 were valued at $93,456,574.

Realizing the importance of the meat in¬ dustry, the government of Uruguay has de¬ voted the greatest attention to measures for

its encouragement, promoting exhibitions of livestock and establishing experiment stations, decreeing sanitary regulations with regard to the

cattle plague, quarantines, abattoirs, certifi¬ cation of meat, etc. In October 1916, the Pres¬ ident recommended to the General Assembly the creation of a Department of Live Stock to operate under the Ministry of Industries, at the same time outlining the need for a central or¬ ganization to direct the industry, to combine in one department the various offices in charge of inspection, animal diseases, marks and brands, and import and export requirements.

Venezuela. — Venezuela, formerly the home of great herds, has to-day about 3,500,000 head of cattle, although estimates have given as high as 9,000,000. About 500,000 are slaughtered annually, the great majority for domestic con¬ sumption. It is estimated that there are more than 100,000 square miles available for stock raising. On 12 March 1917 a presidential de¬ cree was issued establishing an experiment sta¬ tion near Caracas, to take up the problems of intensifying the industries of the republic, in¬ cluding Livestock. In the valley of the Orinoco, and particularly along the Colombian boundary in the state of Tachira, are splendid pastures, well watered and of uniform climate, where the cattle industry flourishes. The exports of' hides (principally to the United States) in 1913 amounted in round numbers to $1,492,000; in 1914, $1,390,000; and the first six months of 1915, $845,000. Of cattle exported in 1913, the valuation was $625,000; in 1914, $285,000; and the first six months of .1915, $138,000. In addition, a small quantity of dried, salted and frozen meat was exported. B. Graham,

Trade Expert , Latin- American Division, War Trade Board, Washington, D. C.

11. HIDES AND LEATHER IN LATIN AMERICA. During war conditions, the price of hides and leather became unprecedented. But aside from war, the natural world demand is increasing faster than the production. During the decade, 1890-99, inclusive, the average price of hemlock tanned sole leather was $0.1939 per pound. At the beginning of 1916 it sold for $0?3250, an advance of 67 per cent. Oak tanned sole leather in the same period advanced 57.6 per cent; calf-skin, 58.8 per cent, and oak tanned harness, 49.9 per cent. During 1916 and 1917 a more than appreciable advance was made, and leather manufacturers protested their inability to secure the raw stock of hides. This upward movement was reflected strongly in the great cattle states of Latin America and in some it was the temporary financial salvation during the early commercial depression follow¬ ing the outbreak of the European War — as be¬ ing a staple of immediate and cash demand.

Despite increasing production, little attempt has been made to use hides industrially in their respective countries. The great bulk is ex¬ ported in its raw state, despite the fact of the vast quantities of tanning materials available throughout Latin America — quebracho, man¬ grove, divi divi and innumerable others. > These tanning materials are, in their turn, particularly during the past decade, an important export item, many shipments abroad being carried by the same bottoms that transport the hides for which they are intended.

As the greatest cattle country of South America, Argentina is the greatest producer

of hides. Exports in 1885 amounted to $12.-

040,113; 1890, $10,931,216; 1885, $15,273,154; 1900, $13,436,361; 1905, $19,076,544; 1910, $30,- 711,408; 1911, $34,440,015; 1912, $42,129,576;

1913, $38,532,700; 1914, 124,552,518 pounds, and 1915, 182,879,061 pounds. Of this number 46.5 per cent was wet and 53.5 per cent dry. In this connection it may be stated that all pack¬ ing-houses and most of the metropolitan butchers' hides are wet, while the hides of beeves killed for individual consumption are usually dry, the former commanding a uni¬ formly higher price, as their texture is devoid of the unevenness caused by unequal drying, as is frequently the case with the dry hides, these latter also frequently showing the marks of the unpracticed skinner's knife. Exports to the United States during the fiscal year ending 30 June 1912, amounted to $15,220,904, and 1916, $32,7 54,929, in addition to goat, sheep and other skins. The United States is the greatest buyer.

Bolivia has many cattle, the greater number on ranches, but many running wild. The ex¬ ports of hides in 1913 amounted to 465 metric tons (2 204.6 pounds), valued at $143,916; 1914, 374 metric tons, valued at $104,666, and 1915, 613 metric tons, value not stated. Only a small part was consigned to the United States.

Brazil, according to the report of the United States consul at Rio de Janeiro (Commerce Reports, 26 May 1917), concerning the market for shoes, states that local industry in the man¬ ufacture of this article is increasing. Other re¬ ports also indicate that leather is being pre¬ pared from domestic hides in increasing quan¬ tities, due to the availability of so many excel¬ lent tanning materials, not, however, on an ex¬ port scale. Cattle hides to the amount of 35,075 metric tons (2,204.6 pounds), were ex¬ ported in 1913; 1914, 31,434 metric tons,

and

1915, 37,080 metric tons (see Latin America, Cattle and Meat Industry of). During the fiscal year ending 30 June 1916 the exports of cattle hides to the United States amounted to 59,729,930 pounds, valued at $12,282,472.

Chile, in 1913, exported hides to the value of $1,537,850; 1914, $918,260, and 1915, $1,670,- 750; the export of leather during these last two years being $225,627 and $261,342, respectively. No exports of consequence have been made to the United States until recently, the amount in 1915 (fiscal year ending 30 June) being 802,585 pounds, valued at $122,152, and 1916, 6,887,970 pounds, valued at $1,091,343. Leather to the value of $49 was exported to the United States in 1915 (fiscal year), and $2,555 in 1916.

Ecuador exported hides in 1912 to the value of $29,839; 1913, $5,604; 1914, $120,730; 1915, $66,459; 1916, $148,864. In a statement from the United States consul at Guayaquil (Com – merce Reports, 13 Jan. 1917), it is said that the total for the year 1916 was shipped to the United States. Evidently on a different valu¬ ation, the reports of the United States Bureau of Foreign and Domestic Commerce give the amounts purchased from Ecuador as follows:

1916, 2.059.616 pounds, valued at $409,047 and

1917, 2,217,529 pounds, valued at $613,417.

Paraguay, during its entire history, has rec¬ ognized the raising of cattle for their hides as one of its most important resources, and at the present time there is a marked increase in the production and export of this staple. The num¬ ber exported, in 1910, was 343,447 ; 1911, 302,-

375; 1912, 238,042; 1913, 362,484; 1914, 318,397,

and 1915, 340,692. In 1915 the greatest num¬ ber sent to any one country was 75,175 hides, to the United States, the other large purchasers being Holland, Great Britain, Argentina and Uruguay. Evidently a part was credited to some of the transshipping countries, as the statistics of the United States Department of Commerce credit Paraguay with hides as fol¬ lows: 1915 (fiscal year ending 30 June),

129 pieces (8,531 pounds), valued at $933, and 1916, 141 pieces (8,632 pounds), valued at $1,733. These are the only exports to the United States noted within recent years.

Peru exported hides, in 1912, to the value of $617,410; 1913, $930,629; 1914, $641,624, and

1915, $521,947. United States government statistics specify imports of hides from Peru, in the fiscal year 1915, at 1,003,134 pounds, valued at $174,375, and 1916, 3,263,109 pounds, valued at $584,542.

Uruguay, during the year 1909, exported hides to the value of $11,165,155; 1910, $11,- 147,242; 1911, $9,976,291, and in 1914, 2,079,514 pounds, valued at $8,015,476. Exports to the United States during the fiscal year ending 30 June 1915 amounted to 21,875,639 pounds, valued at $4,117,359; 1916, 44,254,341 pounds, valued at $9,275,658, and 1917, 47,314,408 pounds, valued at $9,879,167.

Venezuela exported hides, in 1913, to the value of $1,492,000; 1914, $1,390,000, and the first half of 1915, $845,000. Her principal market is the United States. On an apparently different valuation, the statistics of the Depart¬ ment of Commerce state the imports of hides from Venezuela, during the fiscal year ending 30 June 1915, as 7,033,382 pounds, valued at $1,639,456, and 1916, 7,530,524 pounds, valued at $1,901,421.

Regarding the northern group of Latin- American states, comprising Costa Rica, Cuba, Dominican Republic, Guatemala, Haiti, Hon¬ duras, Mexico, Nicaragua, Panama and Sal¬ vador, reference is made elsewhere in this work (see Latin America, Cattle and Meat Indus¬ try of). Of exports to the United States in

1916, Central America contributed $1,523,209

worth of hides, with the greatest proportion coming from Nicaragua, Panama and Hon¬ duras. During the same year Mexico exported to the United States hides to the value of $7,661,104; and the West Indies, including for¬ eign possessions, $3,433,804, of which Cuba con¬ tributed $2, 922,298. W. B. Graham,

Trade Expert, Latin- American Division , War

Trade Board, Washington, D. C.

12. COFFEE INDUSTRY IN LATIN AMERICA. The coffee crop of the world, ac¬ cording to the New York Coffee Exchange, amounts to

about 2,403,324,000 pounds, or 18,- 207,000 bags of 132 pounds each annually. The crop of 1915-16 was above the average and is estimated at 2,487,792,000 pounds, or 19,756,000 bags. Of the total world's crop marketed in 1915-16 (19,192,317 bags) the United States took 47 per cent and Europe 53 per cent. And of the total taken by the United States (9,099,- 276 bags) 8,973,863 bags, or 98.6 per cent, were the growth of Latin-American countries, while we received only 125,413 bags, or 1.4 per cent, from all other countries.

The following will show the amount of coffee in bags of 132 pounds imported into the

United States from Latin America and all other countries during the past five years :

Total	From	From	Per cent
all	Latin	other	Latin
year	kinds	America	countries	America
1915-16 .	9,099,276	8,973,86 3	125,413	98.6
1914-15 .	8,474,928	8,328,331	146,597	98.3
1913-14 .	7,587,336	7,415,975	171,361	97.7
1912-13 .	6,538,869	6,366,861	172,008	97.4
1911-12 .	6,706,070	6,249,218	456,852	93.2

Brazil. — Coffee is by far the most import¬ ant product of Brazil, and constitutes fully 60 per cent of the total value of all exports Not only is coffee the leading product, but Brazil leads the world in the production of this staple, its average crop the past five years being 72 per cent of the world's crop for the same period.

• The states producing the bulk of the coffee crop are Sao Paulo, Rio de Janeiro, Minas Geraes and Bahia. Of the total crop the Sao Paulo district produces about 80 per cent, the Rio de Janiero district 15p2 per cent and the Bahia and Victoria districts 4p2 per cent. Thus, in 1915 it is estimated that the crop of the Sao Paulo district amounted to 14,000,000 bags (132 pounds each), that of the Rio de Janeiro dis¬ trict to 2,750,000 bags and that of the Bahia and Victoria districts to 750,000 bags.

The largest crop ever produced in Brazil was that of 1906-07 amounting to 19,654,000 bags, or 2,594,328,000 pounds, but in later

years the crops averaged much less than this, the average production for five years (1910-15) being about 13,125,000 bags, or 1,732,500,000 pounds.

The importance of the coffee crop as a source of wealth to Brazil may be illustrated by the following tabular statement showing the value of coffee exported as compared with that of other exports:

Coffee's

per-

Value of Value of centage

YEAR coffee exports other exports to total

1910 . $127,212,875 $182,793,563 41.0

1912 . 225,992,915 136,253,036 62.4

1913 . 197,936,296 115,691,782 63.1

1914 . 129,713,673 91,825.356 58.5

The following table shows the exports of coffee (in bags of 132 pounds each) from Brazil to the various countries named during the years ended 31 July 1914 and 31 July 1915. It is interesting to note changes in the markets brought about by the European War:

COUNTRY EXPORTED TO

United States .

France .

Egypt .

Uruguay .

Algeria .

Chile .

Gibraltar .....

Turkey in Asia . . .

Rumania .

Turkey in Europe

Russia .

Germany .

Austria .

Belgium .

All others .

1914 bags

1915 bags

5,817,628

5,880,619

1 ,902,647

1,808,815

245,851

1 ,346,839

240,844

688,252

272,493

479,701

36,375

306,669

45,413

279,865

240,932

261,457

123,690

183,457

7,500

117,800

106,475

111,843

51 ,820

85,310

35 , 654

52,763

72,758

49 , 425

26 , 684

39,692

12,200

14,100

64‘, 682

2,550

11 ,813

2,220

70,122

2,000

18,913

800

1,876,138

1 ,033,173

522,195

53,352

56,170

Sweden .

Italy ……. .

Great Britain .

Norway .

Denmark .

Argentina .

British South Africa

Greece .

Spain .

Total

14,533,581 13,401,515

LATIN AMERICA- COFFEE INDUSTRY (12)

63

A comparison of the exports for 1915 with those of 1914, the year immediately preceding the World War, shows a decrease of only 1,132,066 bags, or 7.7 per cent. The increase of 1,605,334 bags exported to Scandinavian countries may be accounted for by the cessation of any direct exports in 1914 to Germany and Austria. The United States continues to be the largest purchaser of Brazilian coffee, the average imports from that country in the five years, 1910-15, amounting to 5,646,000 bags, or nearly 45 per cent of the entire crop. The total value of all the coffee exported from Brazil to the United States in 1917 was $110,052,616.

Colombia. — Of all the Latin-American republics, Colombia ranks next to Brazil both in the production and exportation of coffee. Of the average value of all exports from 1911 to 1914, inclusive, amounting to $24,309,000, the average value of coffee for the same period was $12,144,000, or 50 per cent of the whole. The coffee crop of the republic averages about 126,- 450,000 pounds, or 958,000 bags (132 pounds each) annually. About 25,000 bags are re¬ tained for home consumption, the remainder being shipped to the United States and to Euro¬ pean countries. The United States is Colom¬ bia's best customer for its coffee crop, its im¬ ports from that country averaging more than 70 per cent of the annual production. The im¬ ports in 1915-16 amounted to 109,363,456 pounds and in 1916-17 to 118,410,000 pounds.

The principal coffee producing districts are the department of Cundinamarca, which pro¬ duces the renowned Bogota brand ; the Ocana, Cucuta and Bucaramanga districts, in the de¬ partment of Santander, and in the Tolima and smaller valleys of the Cordilleras. It is esti¬ mated that there are 125,000,000 coffee plants in these districts, and as they are valued at 30 cents each, they represent an investment of

$37,500,000.

Guatemala. — Coffee is the principal crop of Guatemala. The districts best suited to its culture are Antigua, Barbereno, Costa Chuva, Alta Verapaz, Costa Cuca, Costa Grande, Pochuta and Tumbador. In some of the dis¬ tricts coffee of very fine quality is grown at an altitude of 5,000 feet, but the yield of the trees is comparatively light. The total area under cultivation is about 98,800 acres. Germans own and control between 50 and 60 per cent of the plantations. The best coffee is grown in the department of Alta Verapaz.

The total production of coffee in Guate¬ mala in 1913 amounted to 104,623,600 pounds, and in 1914 to 91,852,200 pounds. Prior to the World War about three-fourths of the crop was marketed in Europe, Germany taking the largest share. The following statement shows the exports to the various countries just prior to the war, 1913:

exported to Pounds Bags

Germany .

United States . . . Great Britain Austria-Hungary South America . .

Netherlands .

France . . .’ .

53,765,128 407,311

21,400,385 162,124

10,773,165 81,615

4,247,353 32,177

1,824,060 13,819

412,484 3,125

143,723 1,089

Total . 92,566,298 701,260

- p – ’

During the past two years special efforts have been made to create a greater demand for

Guatemala coffee in the United States, which have met with marked encouragement. In 1915 the United States imported from that country 60,363,716 pounds of coffee, which was an in¬ crease of 15,758,677 pounds, or 35 per cent over the previous year, and was 66 per cent of the entire crop. It has been estimated that in 1916 the United States took from 75 to 80 per cent of the coffee produced that year.

Costa Rica. — Coffee planting has been carried on in Costa Rica for many years, and until banana culture assumed its present pro¬ portions was the leading industry. At one time as much as 45,000,000 pounds were produced, but the crops now average much less, due to the enormous crops of other Latin-American countries and the consequent fall in value. But Costa Rican coffee is still highly prized in Europe, especially in England, where, on ac¬ count of its exceptional quality and flavor, it commands a good price. According to a recent official publication the total exports from all Costa Rica from August 1915 to April 1916 amounted to 37,134,182 pounds. The exports for the years 1911-12 to 1915-16, inclusive, were as follows:

YEAR

Pounds

Bags (132 lbs.)

1911-12 .

. 26,979,893

204 , 393

1912-13 .

. 28,702,108

217,440

1913-14 .

. 39,058,444

295,897

1914-15 .

. 26,910,407

203,867

1915-16 .

. 37,134,182

281,320

Of the amount exported in 1915-16 Great Britain took 50 per cent, the United States 42 per cent, the remainder going to France, Soain, Italy, Panama and Chile. Prior to the World War Germany, in 1913, was the second best market for Costa Rican coffee; but the United States has now taken this rank, its imports in 1915-16 having reached 13,292,365 pounds, which is 6,521,400 pounds, or 92 per cent, greater than the imports in 1914—15, and 9,269,000 pounds, or 230 per cent in excess of the imports in 1913-14. Coffee to the aggregate value of $3,779,747 was exported from Costa Rica in 1917.

Nicaragua. — The value of coffee production in Nicaragua, as compared with other products, is indicated by the export statistics for five years (1910-15), which show that of the total average value of all exports coffee represented 55 per cent. The following tabular statement gives the quantity and value of coffee ex¬ ported to different countries in 1913 and 1915, and indicates the changes that resulted from the World War :

COUNTRY

France (1913) .

France (1915) .

Germany (1913) .

Germany (1915) .

Great Britain (1913) . . .

Great Britain (1915) .. .

United States (1913) .

United States (1915) . . .

Italy (1913) .

Italy (1915) . .

Other countries (1913)..

Other countries (1915) . .

Bags

Pounds i

(132 lbs.)

Value

10,293,437

77,981

$1,715, 186

4,382,319

33,199

607 , 737

7,653,182

57,979

1,844,262

3,321 ,692

25,164

595,613

4,068,766

30,824

409,171

3,715,012

28,144

615,644

6,303,693

47,755

668 , 393

621,667

4,711

97,445

3,045,698

23,074

258.166

662,028

5,015

122,845

626,626

4,747

64,317

Total (1913) . 26,267,018 198,994 $4,990,995

Total (1915) . 18,427,102 139,599 2,007,784

Nicaragua's coffee trade with the United States increased immensely within the five years

(1910-15), the imports rising from 1,144,182 pounds in 1911-12 to 9,074,757 in 1915-16, or 693 per cent in the five years. The exports of coffee in 1917 reached the amount of $3,000,000.

Venezuela. — Great efforts have been made since 1910 to increase the coffee bearing area of Venezuela. The crop of 1910 amounted to about 440,920 bags. Of this about 160,000 bags were expected to be received at the ports of La Guaira, Puerto Cabello, Guantu and Sucre and the balance from Maracaibo, Vel de Coro, etc. The exports from Maracaibo in 1911 were 54,716,265 pounds, of which 37,062,068 pounds were sent to the United States. In 1912 the exports were 71,457,942 pounds, of which the United States took 50,273,888 pounds. The average exports for the preceding 10 years, 1902-11, was 53,130,326 pounds. The imports of coffee from Venezuela from 1911-12 into the United States were as follows, in bags of 132 pounds each: 1911-12, 356,890; 1912-13, 376,-

296; 1913-14, 378,435; 1914-15, 548,963; 1915-

16, 556,101 bags, the increase in the five years amounting to 199,211 bags, or nearly 56 per cent.

Ecuador. — While the quantity of coffee produced in Ecuador does not compare with that of most other South American countries, it is still one of the most valuable agricultural products of the republic. Considerably more than half of the crop is sent to Chile. The following shows the distribution of the crop to various countries in 1914 and 1915 :

COUNTRY 1914 1915

Chile . 2,768,317 lbs. 2,528,834 lbs.

France . 1,323,725 lbs. 599,938 lbs.

United States . 808,815 lbs. 175,143 lbs.

Spain . 767,298 lbs. 558,956 lbs.

Great Britain . 466,979 lbs .

Panama . 193,536 lbs. 478,077 lbs.

Germany . 146,260 lbs .

Italy . 287,833 lbs.

Peru . 16,437 lbs.

Total . 6,474,930 lbs. 4,645,218 lbs.

Mexico. — The coffee crop of Mexico, which may be produced in the highland regions throughout the republic, varies from 77,000,000 to 110,000,000 pounds annually, about 40,000,000 pounds, or 43 per cent, being exported, and the remainder held for home consumption. Of course the amount of the latter is largely con¬ trolled by the market price of the product, Mexican coffee of the best brands being highly esteemed. The imports of coffee from Mexico into the United States from 1911-12 were as follows in bags of 132 pounds each: 1911-12,

258,758; 1912-13, 197,890; 1913-14, 374,133;

1914-15, 399,289; 1915-16, 377,521 bags.. This shows an increase in the five-year period of 118,763 bags, or about 46 per cent.

Salvador. — The coffee crop of Salvador, as represented by its exports, in 1910-11 amounted to 74,000,000 pounds, of which 64,000,000 were exported and 10,000,000 retained for home con¬ sumption. The crop of 1911-12 is estimated at approximately 70,000,000, of which 60,000,000 were exported and 10,000,000 held for home consumption. According to government statis¬ tics the average exportation of coffee for the past 10 years is 60,553,377 pounds, and the average production 70,533,377 pounds, or 534,- 344 bags of 132 pounds each. The imports of coffee into the United States from Salvador since 1911 in bags of 132 pounds are as follows:

1911-12, 86,466; 1912-13, 66,335; 1913-14, 66,353; 1914-15, 119,874; 1915-16, 88,298.

Haiti. — The coffee industry of Haiti was seriously affected by the continuous political upheavals of recent years. In 1906 nearly 60,- 000,000 pounds of coffee were exported to the United States, whereas we received from that republic in 1916 only 3,320,000 pounds, and an average of only 3,585,000 pounds from 1910 to

1915.

Other Countries of Latin America. — The

coffee crops of the other and lesser producing countries may be illustrated by the exports from each to the United States during the three years (1913-16) as follows (in bags of 132 pounds each) :

COUNTRY

1915-16

1914-15

1913-14

Dominican Republic .

. 26,785

27,048

8,130

Panama .

. 4,959

7,659

2,337

Honduras .

. 3,974

5,045

5,037

Cuba .

. 82

2,151

108

Chile .

. 190

1,921

1

Peru .

. 2

537

1

Argentina .

. Ill

650

Marrion Wilcox.

13. FRUIT TRADE OF LATIN AMER¬ ICA. The most impressive fact in the history of the cultivation of valuable fruits in the Latin American

tropics is not that so much has been accomplished but that so much still remains to be achieved. The past success amply justifies a confident outlook for the future in this great industry. The true propor¬ tions of the opportunity presented are brought out more clearly by reversing the ordinary arrangement of statistics, and beginning with the smaller items. Thus, a study of imports into the United States during the fiscal year ending 30 June 1916 shows:

Value of oranges imported from Costa Rica $4,343; from Honduras $1,495; f rom Panama $914; from Jamaica $43,843; from Cuba $9,826. Value of lemons imported from Mexico $239; from Cuba $1,800; from Brazil $33. Value of pineapples imported from Cuba $960,832; and of preserved pineapples from Cuba $35,867 ; from Haiti $300; from Guatemala $1,901. Value of all other fruits (with the exception of bananas) imported from tropical or sub¬ tropical America: Costa Rica $810, dutiable; Guatemala $240, free; Honduras $5,142, free, and $48, dutiable; Mexico $3,113, free, and $16 532, dutiable; Jamaica $1,301, free, and $29,272, dutiable; Cuba $63,614, free, and $404,- 701, dutiable; Dominican Republic $127, free; Haiti, $644, free, and $280, dutiable; Brazil $272, dutiable; Colombia $4,122, free; Vene¬ zuela $75, free.

The quantities and values of the bananas imported during the same period of 12 months into the United States from the new world's tropics were given as follows by the Depart¬ ment of Commerce of the government of the United States: From Costa Rica 4 058,000 bunches, valued at $2,268,844; from Guatemala 3,81 1 750 bunches, valued at $958,189: from Honduras 9,702,791 bunches, valued at $1,964,- 822; from Nicaragua 1,548,500 bunches, valued at $250,883; from Panama 4 516,307 bunches, valued at $2,113,855; from Mexico 1,527,025 bunches, valued at $424,631 ; from Jamaica 4,926,944 bunches, valued at $1,445,392; from Cuba 2,859,021 bunches, valued at $1,072 035; from the Dominican Republic 289,091 bunches,

valued at $140,264; from Colombia 2,710,047 bunches, valued at $1,264,992. And in the short month of February 1917, imports of bananas into the United States were: 1,527,620 bunches, valued at $519,489, from the Central American states and British Honduras; 48,017 bunches, valued, at $18,026, from Cuba; and from South America 226,000 bunches, valued at $113,000.

In Porto Rico (which we include in the present survey, although that island can no longer be called strictly ((Latin American”) the successful cultivation of grapefruit, oranges and pineapples attracts attention. In the year 1916 shipments from Porto Rico to the United States included 296,613 boxes of grapefruit, valued at $836,932, and 404,367 boxes of oranges, valued at $790,667 ; pineapples valued at $1,176,- 319 and canned pineapples $122,858, etc. Porto Rico’s experience demonstrates the possibility of expanding the fruit industry by diversifying the products ; there is no practical limit to the varieties of valuable fruits that the Latin American tropics can produce ; and <(In the Caribbean fruit trade the United States’ mar¬ ket is, with a trifling exception, the only prof¬ itable one.” (Consult Jones, C. L., (Caribbean Interests of the United States, } New York

1916.)

The records of achievement recorded in the first paragraph as justifying a confident out¬ look” relate principally to a single species, the Musa sapientium or banana the fruit of which was not produced on a large scale in the Latin American tropics until citizens of the United States had established the banana trade, in 1866, — at first importing from Colon only — and then had developed the industry during years and decades of unremitting effort. Many groups of citizens of the same country have been actively engaged in this work of development and share the credit accorded to all for the successful application of northern initiative, enterprise and capital to the prob¬ lems of tropical agriculture. It is especially important to remember and register the circum¬ stance that such efforts have been in a wide sense constructive or well nigh creative; that northern commercial methods have supplied new transportation and communication facili¬ ties, and (taking in their stride obstacles that for centuries had been regarded as insur¬ mountable) have expelled tropical fevers from their strongholds. As Mr. F. U. Adams writes in his (Conquest of the Tropics> (New York 1914) : <(In 1871 there was not a mile of rail¬ road in all of Central America [the Republics of Guatemala, Salvador, Honduras, Nicaragua and Costa Rica] with the exception of a short line having its terminal at Puerto Cortez, Hon¬ duras. There were no dependable foot or wagon roads from its capitals. . . . There

was no steamship service from the United States or from any part of the world.

There probably was no inhabited spot on earth more isolated. These republics were cut off not only by the sea but also by barriers of pestilential lands, which the natives dreaded to cross and which the

outside world could not enter. To-day these former wildernesses con¬ stitute one of the most productive agricultural sections of the globe. To-day the ships from all the world enter the beautiful harbors of Central America and land their passengers in ports which are as sanitary as those of Massa- vol. 1 7 — 5

chusetts. To-day most republics of Central America are served with well-managed and modernly equipped railway lines. . . . Who performed these miracles?" His answer is that they were wrought by citizens of the United States <(who had the imagination, the courage and the ability to attack and conquer" the prob¬ lems of tropical wildernesses; and he adds that when actual results had demonstrated to the world that the industrial and qommercial con¬ quest of the tropics was possible, this should have proved to the United States that it was the bounden duty of its people, its press and its government to encourage and foster the speedy development of those regions, not for the mere purpose of obtaining money rewards, but with the larger, broader and truly states¬ manlike object of (

The last-mentioned achievement — the mas¬ tery of problems of tropical sanitation for the safeguarding of the health of all who labor on the fruit plantations — deserves our special consideration at this moment. The head of the Tulane School of Tropical Medicine of New Orleans observes: <(The vast improve¬ ments there [in the Latin American tropics] do the genius of American medical men a credit that only future ages will appreciate. Every one knows what great sanitary work the American Government has accomplished in the Canal Zone, but few realize that a similar im¬ provement has been worked in the rich fruit centres." The facts adduced in support or con¬ firmation of this statement are substantially the following: In 1900, about three years be¬ fore the United States took over the Panama Canal and began the work of sanitation in the Canal Zone, more than 15,000 men were at work for a fruit company on Caribbean tracts of coastal lands which had been regarded al¬ ways with fear and aversion, as though they had been necessarily and permanently disease¬ breeding areas. But the rate of mortality among laborers and officials was not high, for the simple reason that the basic principles of that system which afterward made possible the completion of the Panama Canal (q.v.) without terrible sacrifices of human life had already been studied, tested, accepted, and the

LATIN AMERICA — RICE PRODUCTION IN LATIN AMERICA (14)

fc>t>

appropriate remedies had been already applied. “In the selection of sites for new towns and settlements careful attention was given to the requirements of drainage. All adjacent swamps were cleared, and the grass and underbrush kept cut about the houses. The laborers were verbally instructed how to take precautions against the known dangers of these districts, and the medical employees of the company made regular inspections of their places of living,® to enforce compliance with such in¬ structions. “Hospitals were erected and prompt measures taken to isolate any victim of con¬ tagious diseases.® With the co-operation of the various governments, strict quarantine was en¬ forced against certain foreign ports whenever such action became advisable. The medical officers of the banana companies very promptly turned to good account the discovery (confirmed practically in 1898) of the causes of yellow fever and malarial fevers, and employed the most effective methods for the extermination of the disease-bearing insects; indeed, there seems to be no good reason for withholding endorsement of the assertion that sanitary work and experi¬ ments conducted by the pioneer banana com¬ panies in Costa Rica and elsewhere in the years between 1873 and 1899 were of value to those medical scientists who finally were “able to announce to the world that the mysteries of yellow fever and malaria had been solved.® After 1899 all houses occupied by employees not immune to such fevers were screened — sometimes doubly screened — to exclude per¬ nicious mosquitoes. Petroleum was used freely in stagnant pools and slow-running streams. All expedients for eliminating the tropical menaces to health were tested and, if approved, installed on a liberal scale. For example, we may mention the adoption of the following sanitary measures at Puerto Barrios, Guate¬ mala : All low-lying places near that town were filled in or flushed with salt water and danger-spots above high tide were drained. The camps out on the neighboring plantations were located on high, well-drained ground, and all grass and other vegetation kept low for 150 yards around these camps; tanks holding the water supply were thoroughly screened ; all surface water was oiled at stated periods. The results are satisfactory; for no case of any quarantinable disease has aopeared during several recent years at this port or at others to which similar preventive measures and methods have been applied.

The banana lands owned by a single north¬ ern company are 150,000 acres in extent, and those owned by its competitors and by inde¬ pendent growers who sell to the various im¬ porting houses, about 370,000 acres. Even now, the total area devoted to this agricultural in¬ dustry approximates 520,000 acres. We have mentioned already the development of railroad transportation facilities in the Central

American republics that stood most in need of them. Not less noteworthy is another outgrowth of this international dealing in the fruits of the Latin American tropics — the establishment of new steamship transportation facilities. One of the fruit companies operates 90 vessels (248,- 607 tons in all), with accommodations for 3 000 passengers and carrying about 360,000 tons annually of general freight for the public — thus opening not only new markets to manu¬

facturers in the United States but also open¬ ing the markets and the opportunities of the great world to the people of Central America who had been shut off from both during long and sometimes depressing, though never, to the people there who inherit traits of the Indomi¬ table Iberian, wholly discouraging ages. — Pro¬ fessor C. L. Jones, of the University of Wis¬ consin, writes : “One company chiefly engaged in the exploitation of the banana trade claims, with its allied interests, to have expended $200,- 000,000 in the [Latin] American tropics. It reports its resources devoted to Caribbean de¬ velopment as $88,867,408.27.® Again, on pages 296-297 of (Caribbean Interests of the United States, > he says that the fruit trade has under¬ gone a development similar to that of the asphalt industry. Production to some extent may be left in the hands of small planters and a minor part of the total amount marketed is still thus grown; but the work even in this stage of the industry is more efficiently per¬ formed by aggregations of capital which can assure a steady supply and transportation facili¬ ties that can be depended upon. The small planter must ordinarily market his fruit by sending it to tidewater or to the railroad on muleback. The large company can build branch railroads at a fractional part of the cost of animal transportation; and in this manner it can exploit regions which otherwise lie too far distant to permit their profitable cultivation. If a steamship cannot berth at his dock, the small producer is at a disadvantage because he can neither buy a lighter nor build the necessary landing pier. Moreover, in many of the Caribbean banana regions the public author¬ ities neglect to supplv him with these facilities. Shipments of fruits to foreign countries, he adds, cannot take place in the ordinary cargo vessels. Specially constructed steamships with refrigerating appliances are required, to keep the fruits from ripening too rapidly. <(As a result of these conditions the export of fruit in the Caribbean has come to be almost entirely controlled by a few large concerns, the pioneer companies.® Particularly interesting are the same writer’s comments on Cuba and Honduras. In his opinion the fruit trade of Cuba, still in its infancy, shows promise of healthy de¬ velopment. Bananas for home consumption are grown over the entire island, but are ex¬ ported only from the north coast at the ex¬ treme eastern end

where soil and climate are especially favorable. The Cuban citrus fruit (especially grape fruit) industry is increasing in importance. His studies of Central Ameri¬ can countries lead him to say that the pros¬ perity of the foreign trade of Honduras “de¬ pends, even more than in Costa Rica, upon the banana industry. ... In the production of fruit the country has great possibilities. As yet, this development is confined chiefly to the north-east coast, near the ports of Tela, Ceiba and Trujillo.® Hhe heterogeneous population of the Trujillo region is almost entirely dependent upon the banana trade, which in Honduras has apparently unlimited possibilities of develop¬ ment.

Marrion Wilcox.

14. RICE PRODUCTION IN LATIN AMERICA. The use of rice as an article of food is more uniformly widespread in Latin America than in the United States. It is the

mainstay of the laboring classes, and, by itself or incorporated with other foods, is found, as well, on the tables of the wealthy. From the universal demand for this cereal, it is found to a greater or less extent in all of the Latin American states, with the greatest acreage in Brazil, where its cultivation is mentioned as early as the middle of the 15th century. From the days of its earliest production it has been a subject of government control and encourage¬ ment. At the present time it is being fostered by the Ministry of Industry and Agriculture, whose efforts are directed to an increased pro¬ duction to reduce the cost of living — a real service in view of the fact that the greater part of wheat and other breadstuffs is imported. Under the auspices of this ministry there was published in 1914 a comprehensive work on the subject by Dr. L. Granato, entitled (0 Arroz,* and in connection with the conclusion of ar¬ rangements for a direct shipping line between Brazil and Japan, plans were perfected for the introduction of several thousand laborers <(to be employed in accordance with the regulations of the national authorities in the cultivation of rice, etc.® With experienced labor and the nat¬ ural facilities offered by the Brazilian climate, lands and natural streams adaptable for irri¬ gation uses, the future of the country as a rice producer is promising.

Brazil. — The chief rice-raising state of Brazil is Sao Paulo. In 1912 its crop amounted to 222,992,643 pounds, 1913, 178,013,- 824 pounds, and 1915, 192,000,000 pounds. Of the other states, Minas Geraes,

producing about half as much as Sao Paulo, Rio de Janeiro, Rio Grande do Sul, Ceara, Parahyba, Santa Catharina, Maranhao, Para and Espirito Santo follow in the order named. The total production of the whole of Brazil was estimated in 1911 at 15,82 3,372 bushels, a figure that is exceeded at the present time. Due to the domestic demand, only a negligible quantity of rice is exported, but a large amount is imported each year, the quantity for 1913 being 17,110,195 pounds, and for 1914, 14,377,073 pounds, of which about 70 per cent was purchased in India, the remainder coming principally from Germany, the United Kingdom and The Netherlands. Of purchases from the United States the quantity in 1912 was 191 pounds, valued at $8; 1913, 13,530 pounds, valued at $636; 1914, 190 pounds, valued at $9; 1915, 274,104 pounds, valued at 811,789; 1916, 700,574 pounds, valued at $26,904; and 1917, 126,429 pounds, valued at $4,973. Due to the high customs duties and surtax, amount¬ ing to about 3j/2 cents per pound, the cost of the low and medium grades of foreign rice when offered on the domestic market is too high to be able to compete with the local cereal of the same quality and the greater part of all the imports consists of the fancy high-priced grain, the favorite grades being those known as the Patna and Siam.

Argentina. — In accordance with the policy of the government in its scheme for the en¬ couragement of national industry, to make the country self supporting, the Ministry, of Agri¬ culture of Argentina has lent its assistance to the rice-growing industry, which has. long passed its experimental stage. Due to climatic fitness, the northern part of the republic has seen the greatest development. In a special re¬

port by the United States consul at Rosario (15 June 1915) to Washington, it was stated that approximately 12,000 acres were under rice cultivation at that time, a decrease from the 19,664 acres shown by the government statistics of 1908. Of this latter the number of acres de¬ voted to rice in the various provinces and ter¬ ritories was divided as follows: Santa Fe, 5,421 ; Tucuman, 4,823 ; Buenos Aires, 2,469 ; Cordoba, 1,997; Entre Rios, 1,838; Misiones, 1,530; Salta, 598; Jujuy, 526; Pampa, 334; San Juan, 54; Corrientes, 54; La Rioja, 10 and Santiago del Estero, 10. In a supplemental re¬ port (2 June 1916), certain changes are indi¬ cated in the localities of production, Tucuman, Salta and Jujuy being mentioned as the prin¬ cipal producers, with cultivation on a smaller scale in San Juan, Mendoza, La Rioja, Cata- marca, Corrientes, the Chaco and Misiones.

Experiments have been made with the prin¬ cipal varieties of Chinese, Japanese, Italian and Spanish rice, and those known as vialon.ne,

kinsku and Valencian are mentioned as being best adapted for the localities under experiment. To place the industry upon a stable basis, ex¬ perts from Japan were called to study and re¬ port upon rice-growing possibilities. The climate, soil and irrigation of the northwestern provinces of Salta, Jujuy and Santiago del Estero have been reported suitable for rice culture on a large scale, with particular recom¬ mendation for the departments of Campo Santo and Santa Ana in Salta and La Banda in Santiago del Estero. Later reports will be made regarding possibilities in Catamarca and La Rioja, where conditions are already known to be favorable.

The national production of rice doubled after the breaking out of the European War, due to the general increase in the prices of cereals of all kinds resulting from the general world demand, and, particularly as concerns Argentina, the excessive oversea freight rates on imports. In the three provinces alone of Tucuman, Salta and Jujuy, the acreage, de¬ voted to rice growing in 1916 was five times that of 1915, and with the exception of certain localities — notably Corrientes — where drought was experienced, the yield per acre was the maximum. As indicating the increase, the province of Tucuman may be taken as an ex¬ ample, the yield being, in 1913, 4,190,000 pounds; 1914, 7,120,000 pounds; 1915, 15,430,000 pounds; and in 1916, between 15,000,000 and 16,000,000 pounds (estimated).

On the occasion of a competitive exhibition of native rice (1917) held at Buenos Aires, un¬ der the auspices of the Argentine Rural Soci¬ ety, it was pointed out that with an acreage of from 60,000 to 75,000 acres devoted to this cereal, the country would no longer be depend¬ ent on imports. The amount bought abroad amounted, in 1913, to 97,721,190 pounds; 1914, 123,417,935 pounds, of which the greater part came from Italy and the British possessions. The United States (supplying none in 1911 and 1912) sold Argentine, in 1913 (fiscal year end¬ ing 30 June), 7,619,152 pounds; 1914, 3,000 pounds; 1915, 3,923,611 pounds; 1916, 3,442,042 pounds; and 1917, 36,88 7,737 pounds.

In accordance with the policy of encourage¬ ment given to the industry, the National and Provincial governments have perfected agree-

merits, the former through the Banco de la Nacion, providing for the

milling and grading of rice at actual cost to the grower. In addi¬ tion, plans have been made for giving expert instruction as to its culture; for furnishing suitable seed and other inducements ; and sea¬ sonable markets.

Peru. — Peru is one of the Latin American countries whose production of rice corresponds closely to domestic requirements. In mention of the industry (Bulletin of the Pan American Union, February 1917), rice culture is stated as having been a national industry for several centuries, the importance of which has only recently come to be realized. In the same arti¬ cle the annual production is estimated for the past several years as being from 70,000,000 to 100,000,000 pounds. While obsolete methods of growing and handling the cereal are still in vogue in parts of the country, there has been a noticeable advance generally in the utilization of modern appliances, due to the encourage¬ ment of the government through the Ministry of Public Industry. Rice mills are being in¬ stalled, for which there is a growing demand for equipment from the United States (Com¬ merce Reports, 3 Feb. 1916).

The quality of the Peruvian rice is stated by the United States consul at Lima (Report of 10 June 1916) as being superior and better than that imported from China, a fact that ac¬ counts for both imports and exports appearing in the annual trade reports of the country, as the former are intended to supply the cheaper grades of consumption, releasing for foreign de¬ mand the higher priced domestic product. Recent¬ ly, however, in order to conserve domestic food¬ stuffs, an embargo has been placed on its expor¬ tation, a measure that has been the subject of criticism. The exports of rice amounted in 1912 to $289,411; 1913, $380,690; 1914, $305,484; and 1915, $788,061. During the same period the im¬ ports were, 1912, $598,399; 1913, $546,313; 1914, $404,592; and 1915, $603,700. Of the imports since

1911, those from the United States were as fol¬ lows: 1911 (fiscal year ending 30 Tune), none;

1912, 30,000 pounds, valued at $1,200; 1913 and 1914, none; 1915, 541,662 pounds, valued at $24,255; 1916, 57,890 pounds, valued at $2,410; and 1917, 493,912 pounds, valued at $21,395.

Costa Rica. — The annual per capita con¬ sumption of rice in Costa Rica is. at least 100 pounds, it being eaten at least twice a day by every inhabitant of the republic. The total consumption exceeds 30,000,000 pounds per year, from 4,000,000 to 6,000,000 pounds being imported annually, notwithstanding the heavy domestic

production, largely on the mountain and hill slopes of the interior of the country. Of late there has been a movement toward the utilization of the swamp lands in the neighbor¬ hood of Port Limon, it being practicable to flood these during certain months of the year. The imports of rice — formerly 60 per cent from Germany, 22 per cent from the United States, 10 per cent from England, and the remainder from China and other countries — have lately been as follows: 1913, $143,391; 1914, $160,- 311; and 1915, $108,649. The amount imported from the United States since 1912 is as follows: Fiscal year ending 30 June 1912, 1,034 pounds, valued at $38; 1913, 4,558 pounds, valued at $152; 1914, 10,236 pounds, valued at $421; 1915, 876,014 pounds, valued at $34,944; 1916, 541,547

pounds, valued at $21,031 ; and 1917, 195,357 pounds valued at $8,043.

On 28 April 1917, the United States consul at San Jose reported that the available supply of rice in the country amounted to 1,721,800 pounds, and that the present year's crop, ac¬ cording to government estimates, would be 5,131,600 pounds.

Paraguay. — As regards natural facilities — climate and irrigation — for the production of rice, the conditions in Paraguay are ideal. The production, however, has never been equal to the demand and it is only recently that the gov¬ ernment, through the Banco Agricola, has taken the matter seriously in hand. The area de¬ voted to rice growing in 1915, amounting to 2,480 acres, was more than double that of 1914, and in 1916 the acreage was still greater. The production for 1915 was estimated at 40,000 bushels. The numerous river bottom lands, convenient to the larger population centres, are being investigated and plans are being formu¬ lated for the study of the problem of efficient rice culture by Japanese experts. The price of refined rice, 26 May 1915, was $0.14*4 per pound, and the domestic production, unrefined, averaged about $0.04 per pound. Early in 1916 the Banco Agricola instructed its agents that the Committee of Agriculture and Industry, to protect the producers of agricultural products, had authorized the purchase of Paraguayan grown rice in the husk, at $0.2*4 per pound de¬ livered to the agencies of the bank. This mh'ii- mum price was intended merely to maintain values and did not prevent others from pur¬ chasing the product at the same or a higher figure. This activity is within the scheme of the same institution for several years, in pur¬ chasing rice in the open market and furnish¬ ing it to the poorer classes at cost. Due to the fact that rice appears in the government statis¬ tics under the heading of foodstuffs, the quan¬ tity imported cannot be estimated. Before the

war the greater part came from Germany. Much is purchased through Buenos Aires com¬ mission houses. Imports from the United States began with 1915, 37,212 pounds, valued at $2,323 ; 1916, 44,440 pounds, valued at $2,250.

Ecuador. — Rice is the principal article of diet of all Ecuadorians and is raised locally to a considerable extent. The production varies from 7,500 to 10,000 tons annually, being sub¬ ject at long intervals to serious droughts. In 1916, due to prolonged lack of rainfall, the crop was reported by the United States consul (23 March 1916) as almost a total failure. The average imports of rice, 1909 to 1913, amounted annually to 4,600 tons, the valuation being, 1909 and 1910, per ton, $44; 1911, $49; 1912, $47; and 1913, $52. In 1916, the price had advanced to between $70 and $75 per ton. The most pop¬ ular rice consumed is that imported from Peru, the next being the domestic grain, while that from India ranks third. The production is largely in the hands of small farmers and the crop is usually sold or bartered in its raw state to the local merchants, who send it to mill, receiving back 100 pounds of the hulled product for every 160 pounds of the unhulled. There are 19 rice hulling machines in the country. Imports from the United States amounted, in 1911 (fiscal year ending 30 June), to 5,625 pounds, valued at $132; 1912 and 1913, none; 1914, 6,771 pounds, valued at $283; 1915, 127,-

092 pounds, valued at $5,106; 1916, 50,000 pounds, valued at $1,955; and 1917, 709,379 pounds, valued at $37,774.

Remaining States of Latin America- Special industries and special products of many of the remaining Latin American states are such that the local production of rice is of comparatively small importance, and, while carried on to a greater or less extent, it is in¬ cluded in the statistics of “agricultural prod¬ ucts.10 As an industry, for example, in Bolivia, the United States consul (Supplement to Com¬ merce Reports, 18 April 1917) states that it has “remained undeveloped because of the lack of adequate means of transportation.” The im- orts of rice for the year 1915 amounted to 209,963, of which the United States contrib¬ uted $13,530.

Chile raises very little rice, although a great deal is consumed in the country. The United States consul at Valparaiso (Commerce Re¬ ports, 4 Aug. 1915) states that the annual im¬ ports, taken on the

basis of the statistics and tables of 1913, total 40,350,340 pounds, valued at $935,281, the United States supplying 99,427 pounds, valued at $2,305 ; United Kingdom, 484,240 pounds, valued at $11,224; Germany, 15,684,406 pounds, valued at $363,546; Italy, 9,217,532 pounds, valued at $213,649; India, 8,356,536 pounds, valued at $193,695; Java, 80,688 pounds, valued at $1,870; Peru, 5,247,499 pounds, valued at $121,631 ; all other, 1,180,012 pounds, valued at $27,361. In 1914, the im¬ ports amounted to $668,357, and in 1915, $1,106,- 187. No imports were made from the United States in 1911, 1912 or 1913. In the fiscal year ending 30 June 1914, however, 19,315 pounds, valued at $270, were purchased from the United States; 1915, 1,829,700 pounds, valued at $74,- 346; 1916, 7,295,271 pounds, valued at $312,387 : and 1917, 9,407,693 pounds, valued at $449,940 — a remarkable gain, bespeaking the Chilean appreciation of the United States product.

Colombia consumes vast quantities of rice. As to its domestic production, the United States consul at Barranquilla (Supplement to Commerce Reports, 30 June 1915) says: “Rice, an important article of consumption, is culti¬ vated by small farmers in a primitive way, the chief implements being a few hides, wooden poles, and a winnowing fan of palm leaves.” In view of the favorable climate, the unlimited facilities for irrigation, and, above all, the ex¬ pressed intention of the government to foster agrarian pursuits, along with the present, in¬ creasing price of foodstuffs, the time seems opportune for making rice culture of com¬ mercial importance. Prior to the European War, the quantities imported amounted to ap¬ proximately $800,000 annually, 86 per cent being furnished by Germany. At the present time Great Britain and the United States are supply¬ ing the market. During the fiscal year ending 30 June 1912, the United States supplied 73,353 pounds, valued at $2,741 ; 1913, 45,740 pounds, valued at $2,113; 1914, 17.680 pounds, valued at $629; 1915, 2,584,076 pounds, valued at $98,013;

1916, 8,934,829 pounds, valued at $343,105; and

1917, 3,383,644 pounds, valued at $142,775.

Uruguay is essentially a pastoral country,

and, with the exception of wheat, has, until re¬ cently, given but little attention to the raising of cereals. As to her imports of rice, the fig¬ ures are included among other “food products.”

No imports were made from the United States in 1911, 1912, 1913 or

1914. Those made in 1915 amounted to 93,175 pounds, valued at $4,635; 1916, 48,660 pounds, valued at $2,513; and 1917, 1,758,226 pounds, valued at $88,329.

Venezuela raises a comparatively small amount of rice. According to the United States consul at La Guaira (Supplement to Commerce Reports, 17 April 1916), “rice is grown, but in far from sufficient quantity, and it is one of the principal articles of import.” Imports in 1913 amounted to $288,607, of which The Netherlands supplied $150,986; Germany, $106,088; the United States, $16,281; Great Britain, $9,635; and France, $14,104. In 1914, the imports amounted to $396,906, of which The Netherlands supplied $196,052; Germany, $86,922; the United States, $63,630; Great Bri¬ tain, $5,837; others not reported. In 1915, the amount was $619,952, of which the United States supplied $424,518; Great Britain, $91,- 415; Trinidad, $23,866; Spain, $24,029; and France, $656 {Supplement to Commerce Re¬ ports, 17 April and 29 Dec. 1916). According to the reports of the United States Department of Commerce (1915, 1916), the exports from the United States to Venezuela for the year ending 30 June 1912, amounted to 46 388 pounds, valued at $1,490; 1913, 42,650 pounds, valued at $1,589; 1914, 25,018 pounds, valued at $800; 1915, 4,253,399 pounds, valued at $175,408; 1916, 6,559,777 pounds, valued at $262,448; and 1917, 9,411,231 pounds, valued at $424,389.

Guatemala in 1913 raised 3,501,000 pounds of rice; 1914, 22,753,200 pounds; and 1915, 24,015,000 pounds, indicating an increased in¬ terest in the development of this industry, a condition resulting from general world condi¬ tions and the appreciation of the possibilities, in an agricultural way, of the country. In 1916 the production, due to labor demands for other industries, fell to 13,554,700 pounds, estimated {Commerce Reports, 5 April 1917). Rice, being the principal article of diet, large quantities are also imported, the quantitv from the United States being, in 1911 (fiscal year ending 30 June), 164,675 pounds, valued at $4,164; 1912, 130,330 pounds, valued at $3,513; 1913, 68,200 pounds, valued at $2,524; 1914, 81,295 pounds, valued at $3,422; 1915, 671,299 pounds, valued at $27,172; 1916, 235,814 pounds, valued at $9,658; and 1917, 181,546 pounds, valued at

$7,515.

Honduras, according to the report of the American Consul at Tegucigalpa {Supplement to Commerce Reports, 7 July 1915), is pecu¬ liarly adapted to the raising of rice, but never “on a large scale until highways are built and transportation facilities afforded the people.” In a later report, his successor at the same place said

{Supplement to Commerce Reports, 3 May 1916) : “Honduras at present imports a vast quantity of rice; yet Honduran rice is considered the best on the market, and avail¬ able rice lands in the Puerto Cortes district’ cover a large area.” The production in 1915 amounted to 3,252,000 pounds. The imports,

1913- 14 (fiscal year ending 1 August), amounted to $82,124, of which the United States supplied $72,218, and Germany, $9,310;

1914- 15, total, $112,627, of which the United States supplied $110,194, and Germany, $1,421 {Supplement to Commerce Reports, 18 Dec. 1916). Evidently on a different basis of valua-

tion, the United States Department of Com¬ merce gives the exports of rice to Honduras as follows: 1912, 1,101,230 pounds, valued at $33,-267; 1913, 1,083,045 pounds, valued at $44,599: 1914, 1,501,472 pounds, valued at $65,101 ; 1915, 2,119,055 pounds, valued at $83,748; 1916 2,264.- 256 pounds, valued at $90,650; and 1917, 2,601,727 pounds, valued at $115,157.

In Nicaragua <(some rice is grown, but not enough for local requirements® (Supplement to Commerce Reports, 1 Dec. 1915). The imports of this cereal amounted in 1913 to $172,645 ; 1914, $134,882; and 1915, $145,550. Imports from the United States have been as follows : 1911, 330,393 pounds, valued at $10,242; 1912, 583,476 pounds, valued at $17,328; 1913, 812,911 pounds, valued at $32,448 ; 1914, 697,612 pounds, valued at $29,719; 1915, 807,672 pounds, valued at $32,601 ; 1916, 1,164,645 pounds, valued at $46,232; and 1917, 1,529,180 pounds, valued at

$62,519.

Panama, although adaptable to agriculture, is in a backward state, due to lack of trans¬ portation facilities, the principal industry being that of utilizing the natural products of the country, balata, bananas, etc. While suited to rice culture, very little is raised. The imports of this cereal in 1914 amounted to $351,000. Imports of rice from the United States amounted in 1912, 170 323 pounds, valued at $4,864; 1913, 170,111 pounds, valued at $7,614; 1914, 281,516 pounds, valued at $11,839; 1915, 4,861,604 pounds, valued at $195,031 ; 1916, 2,300,577 pounds, valued at $90,573 ; and 1917, 1,959,561 pounds, valued at $93,223. In a report by the United States Consul General (

Com¬ merce Reports, 14 Aug. 1915), it was stated that the preference in imports was for the grains known as Siam No. 1 and Saigon No. 1, formerly procurable from Hamburg, but pur¬ chased at present in San Francisco. Some do¬ mestic United States rice has been purchased at New Orleans.

Salvador is one of the Latin American countries raising sufficient rice for its own needs and a surplus for ‘export. In 1914 the area under cultivation was 27,000 acres, pro¬ ducing 12,344,000 pounds. During the same year, the exports amounted to $10,983, of which the United States received $4,032 ; Guatemala, $2,050; Nicaragua, $3,632; Honduras, $366; Panama, $197 ; Costa Rica, $702 ; and France, $4.

Mexico produces a large quantity of rice, but, due to the large domestic consumption, quantities have to be imported every year, par¬ ticularly at present on account of recent politi¬ cal and industrial troubles. The area under cultivation in 1914 was 41,000 acres, producing 33,921,000 pounds. Figures regarding importa¬ tion as a whole, for recent years, are not avail¬ able, but the imports from the United States amounted in 1912, 21,621 pounds, valued at $9,- 381; 1913, 439,937 pounds, valued at $22,711; 1914, 1,292,466 pounds, valued at $55,573; 1915, 1,742,531 pounds, valued at $76,716; 1916, 6,099,- 932 pounds, valued at $229,196; and 1917, 7,616,- 038 pounds, valued at $346,452. In 1914, Mexico exported to Cuba rice to the amount of 1,451,- 692 pounds, valued at $44,734.

Cuba raises sugar and tobacco, lands are dear and labor is in great demand, a combina¬ tion of elements that militates against the com¬ mercial exploitation of rice in competition with

the fields of the Orient. While some rice is raised, its quantity is negligible and as a result the great demand of the island is met by im¬ portation. The imports in 1913 amounted to 279,952,741 pounds, valued at $7,772,634 ; and in 1914, 250,641,198 pounds, valued at $6,529,735. In 1913, Germany supplied, in round numbers, 106,000,000 pounds and British India, 61,000,000 pounds; the respective quantities in 1914 being 44,000,000 and 48,000,000 pounds. Imports from the United States amounted in 1912, 9,140,407 pounds, valued at $246,214; 1913. 669,179 pounds, valued at $28,793; 1914, 11,378,020 pounds, val¬ ued at $414,768; 1915, 25,340,501 pounds, valued at $999,810; 1916, 49,127,404 pounds, valued at $1,897,354; and 1917, 21,906,928 pounds, valued at $891,181 — Cuba being the best customer of the United States in this product.

Special Agent Garrard Harris in a report to Washington (Commerce Reports, 27 Jan. 1916), calls particular attention to the high quality of the rice demanded for Cuban con¬ sumption. The varieties in universal demand are the Rangoon, or <(Semilla,® as it is gener¬ ally termed ; the Calcutta, otherwise known as (<01d Hard Patna,® or (

The Dominican Republic is concerned with the tobacco, coffee and cacao industries and very few cereals are raised, rice being grown to only a small extent. The imports of this cereal in 1913 amounted to $736,751 ; 1914, $485,776; 1915, $908,876; and 1916, $1,080,068. The United States supplied, in 1911 (fiscal year ending 30 June), 35,000 pounds, valued at $1,007; 1912, 43,703 pounds, valued at $1,498; 1913, 54,290 pounds, valued at $2,367 ; 1914, 48,750 pounds, valued at $1,418; 1915, 6,706,158 pounds, valued at $289,874; and 1916, 9,301,967 pounds, valued at $369,770.

Haiti, as regards industrial conditions, is closely allied with the Dominican Republic. The production of rice is exceedingly small. Imports from the United States in 1912 (fiscal year ending 30 June) amounted to 71,660 pounds, valued at $2,725; 1913, 109,055 pounds, valued at $4,357 ; 1914, 33,659 pounds, valued at $1,253; 1915, 6,706,158 pounds, valued at $289,- 874; 1916, 9,301,967 pounds, valued at $369,770; and 1917, 15,476,048 pounds, valued at $681,837.

W. B. Graham,

Trade Expert, Latin- American Division, War Trade Board, Washington, D. C.

15. RUBBER INDUSTRY IN LATIN AMERICA. Latin America holds the cradle of the rubber industries of the world, in the southwestern section of the great basin of the Amazon, where the ((black hevea® is at its best, and Brazil, Peru, Bolivia and Ecuador share in providing its most favored habitat. It was from this region that the first specimens of rub¬ ber were sent to Paris by a scientific expedi¬ tion in 1736. It should be remembered, how¬ ever, that historical mention of the use of rub¬ ber among the native Indians of that country had been made 200 years before, but without attracting serious attention. Although the rub¬ ber production of the Amazon basin has been for the last few years overshadowed by the

yield of the great rubber plantations of the East, the seeds, plants and stumps with which those plantations were established came from the Amazon and to-day the Amazonian hevea (Hevca Brasiliensis) occupies 1,500,000 acres in Ceylon, Sumatra, Java, the Malay Peninsula, southern India, Borneo and Burma. Notwith¬ standing even these widespread enterprises in cultivated rubber, the fact remains that the most remarkable rubber producing region of the world lies in the valley of the Amazon. It extends from the Atlantic Ocean on the east to the southern boundary of Colombia on the west, a distance of 3,000 miles. This valley, perhaps 200 miles across at the Atlantic end, broadens toward the south until it is 1,500 miles across, comprising a total area of about 2,400,000 square miles. By far the greater part of this territory lies in Brazil, but parts of Bolivia, Peru, Ecuador and Colombia are in¬ cluded. Practically the whole region is cov¬ ered with forests, and it is estimated that hardly more than 5 per cent of this vast area has been exploited by the rubber gatherers.

In the larger survey, however, Latin Amer¬ ica contributes to the markets of the world six different kinds of rubber from as many differ¬ ent species of plants. Their market names and sources are as follows:

Para rubber — obtained from several varieties of Hevea, chiefly H. Brasiliensis, though usually a mixture, sometimes containing rubber from Sapium Taburu, and, separately, that from Micrandia siphonioides; produced in the states of Para and Amazonas, the government province of Acre, and the states of Maranhao and the northern parts of Matto- Grosso and Goyaz, of Brazil; and in Peru, Ecuador, Bolivia and southeastern Colombia.

Ceara, or Manigoba rubber, also Ceara scrap — obtained from several species of Manihot, mainly M. Glaziovii and M. dichotoma; produced in northeastern Brazil, chiefly in the state of Ceara. .

Colombia Virgen, or Cartagena scrap — obtained from several species of Sapium, mainly 5. Tolimense and S. verum;

firoduced in Peru, Colombia, Venezuela, British Guiana, and ocalities in Central America.

Mangabeira, or Bahia rubber, and Matto-Grosso. sheets — obtained from Hancornia speciosa; widely distributed throughout Brazil, but collected chiefly in the states of Bahia, Pernambuco and Matto-Grosso,

and to some extent in Minas Geraes, Goyaz and Sao Paulo.

Caucho rubber, Mexican strips, Centrals, etc. — from species of Caslilloa, principally C. Ulei in Peru and Ecuador, and C. elastica in southern Mexico, Costa Rica, Nicaragua, Honduras, Salvador and Guatemala, and in Trinidad and

Tobago. .

Guayule rubber — obtained from the shrub Parthenium argenlatum; produced in northern Mexico.

In the Amazonian Basin, where Para rubber originates, there are three districts in which rubber gathering is active, all lying south of the river and along its southern tributaries: (1) The island section, including the numerous islands forming the Amazonian delta and yield¬ ing what is commonly termed (

which are not duplicated in any of the sections where the same varieties of rubber-producing trees are cultivated in plantations. Whatever the true reason, the industrial fact is that man¬ ufacturers hold that the wild Para rubber of the Amazon is absolutely dependable as to quality, while ((plantation Para® needs a cer¬ tain amount of manipulation before it can be worked through the processes commonly em¬ ployed with unvarying success for wild Para.

The production of Para rubber is largest in the island district, extending from the mouth of the Amazon about 500 miles up the river, and comprising a multitude of low, tide-flooded islands and the low alluvial shores of the main stream and its affluents from the south. Here the principal rubber-yielding tree is the <(white hevea,® a variation of Hevea Brasiliensis, re¬ garded by botanists as having ˆmigrated® down the river from its original habitat in the up¬ land region near the headwaters toward the southwest. Its white color is attributed to the peculiar whitish lichens which grow upon its trunk in the down-river country. On the higher lands the lichens are dark gray or black,' giving rise to the title <(black hevea.® This explanation, however, does not account for the decided difference in the cortex of the two trees even when found growing close together, nor for the <(red hevea® growing in both dis¬ tricts. The trees are scattered through the forest, generally from 200 to 300 feet apart, although occasionally in groups of two to six. A trail is laid out to cover from 130 to 150 trees, a distance of about six miles. The hevea sap flows very slowly, and requires from 100 to 150 tappings a season. In some sections a new tapping is made every day, in others every other day.

At the camps the rubber is separated from the sap by drying out the moisture over a smoky fire made in such a way that the smoke contains a considerable proportion of acetic acid and creosote — a slow process. A great saving of time in this coagu¬ lation process has been accomplished by the introduction of a new treatment of the raw sap with a mixture of benzine and wood alcohol.

The output of Amazonian rubber is con¬ trolled primarily by the cost of getting the rubber to navigable water, and also to a large degree by the reluctance of laborers to go far into the forests. The population which is de¬ pended upon for laborers is apathetic, . due to an anaemic condition of health, this in turn being the result chiefly of climatic conditions. The rainy season begins in November, and from March to May the entire river, country is subject to flooding, in some localities the waters rising as much as 50 feet. Owing to the low gradient the water is very . slow , in running off. The impossibility of maintaining roads under such conditions operates oporess- ively against development of the industry. Whatever rubber collecting is done must begin not earlier than May and be completed by the end of October. On the higher lands toward the western and southwestern part of the basin the rainfall is less and the floods run off more rapidly and the rubber season is longer. Com¬ plaint" is made that the average laborer works but 100 days in the season, and that in a large part of the rubber-producing region the work could be and should be carried on for 200 days,

adding from 50 to .60 per cent to the annual output.

The . figures for the 1916 output of wild rubber in the Amazonian region are only par¬ tially complete. They show that in that year 17,747 tons were shipped from Manaos to New York and European ports, and that 38,682 tons were shipped from Para to the same destina¬ tions, a total from these two principal ports of 56,329 tons. Of the whole, 20,334 tons went to Europe (26,792 tons in 1915) and 35,995 tons to New York (33,597 tons in 1915). The world's yield of plantation (cultivated) rubber for 1916 is officially estimated at 160,000 tons. The latest available complete figures are those for the fiscal year ended 30 June 1913: they are quoted here for purposes of comparison. The output of the Amazon valley in that year was 43,362 tons. Of this 31,362 tons were pro¬ duced in the upper rivers section, including parts of the Bolivia and Peru rubber districts, and 12,000

tons in the lower Amazon country. As classified, this output consisted of 16,971 tons (39.12 per cent) of (

The territory which produces Ceara rubber includes the Brazilian states of Ceara, Piauhy and Bahia. The Manihot trees from which this kind of rubber is collected thrives on compara¬ tively poor soil, on desert plains and dry hill¬ sides up to an elevation of 3,500 feet above the sea. It withstands the long drought from May to November, and is indifferent to occasional hoar frosts. There are some plantations of the Manihot in Brazil, and tapping is begun as early as the second year. The yield of this district is about 4,000 tons annually.

North of the Amazon the Hevea Brasil- iensis does not grow in commercial quantity, but the Hevea Benthamiana is plentiful and yields an excellent rubber. As a rubber dis¬ trict, however, this territory has not been seri¬ ously exploited, except in the Rio Araguaya district near the Atlantic coast. H. Benthami¬ ana is plentiful also along the river Tocantins, south of the mouth of the Amazon.

In Colombia there are three rubber-produc¬ ing districts : in the southern and southeastern section, along the valleys of the Japura and lea rivers and the Rio Negro; in the north, along the valleys of the river Magdalena and its tributaries ; and in the northwest ip the basin of the river Atrato. The production is chiefly <(caucho,® although a considerable quan¬ tity of fine Para is collected from the <(black hevea® of that section. Heretofore the system of collecting the ((caucho® sap has included cutting down the trees, so that the productive area has been constantly diminished. This prac¬ tice is being regulated by law, and eventually will be abolished. The exports of all rubber from Colombia in 1915 amounted to a value of

$91,953.

In Peru the rubber district embraces the departments of Loreto and San Martin and

parts of Junin, Huanaco and Cuzco, including the valleys of the rivers Huallaga, Maranon, Ucayali and Putumayo. This region yields some of the finest Para and a much larger quantity of the best caucho. In this country there is a dependable supply of laborers — na¬ tive Indians — to be had at no other locality in the Amazonian basin.

Bolivia's rubber-yielding territory covers the northern part of that country, including the valleys of the Rio Beni, Rio Mamore, Rio Madre

de Dios and other headwater affluents of the Rio Madeira.

The eastern part of Ecuador lies in the most favored section of the Amazonian basin and produces both fine Para and caucho. On the Pacific coast near Guayaquil some plantations have been started.

In Venezuela the rubber country lies along the southern border and along the basin of the Orinoco. The available sources are Hevea Benthamiana and Hevea Guyanensis. Large plantations have been made in Trinidad and Tobago, but with indifferent results. Other varieties will be tried.

In Panama rubber-gathering is one of the native occupations. The source is a variety of Castilloa. In 1915 the exports amounted to 70,604 pounds, valued at $18,874.

In Central America various species of Cas¬ tilloa flourish on both sides of the mountain chain, and small plantations have been estab¬ lished in most of the countries. For some years the collecting of wild rubber was the chief industry of eastern Nicaragua, but the increasing supply of East Indian plantation rubber in the market has so lowered the price that the pursuit has become unprofitable. The same conditions exist in Honduras, the dealers being unable to pay living wages to the laborers. As a consequence, rubber-gathering has nearly ceased.

In British Honduras the rubber industry is carried on along the banks of the Mullins River and in the valleys of its tributaries, along the Sittee River and the Rio Grande in the south and the Sibun River and the upper Belize River in the west. There are also several plantations in the country.

In Mexico, south of the parallel of 22° north latitude, there are no less than nine species of rubber-yielding Castilloas, C. lacti- flua being the most productive. Some of these (Tastilloas flourish on the Pacific coast, some in the semi-arid regions and others on the humid Atlantic coast lands. The rubber area includes the states of Vera Cruz, Oaxaca, Chiapas, Tabasco and Campeche and the terri¬ tory of Tepic. In recent years large plantations of Castilloas have been set out in the Soconusco and Palenque districts in the state of Chiapas. The ((guayule® rubber country lies in the northern part of Mexico in what is known as the Chihuahua Desert on the great central plateau. It covers an area of about 125,000 square miles, though actually occupying only about one-tenth of the acreage. In gen¬ eral its habitat may be delimited as the Texas boundary on the north, the northern boundary of the Mexican state of Durango on the south, the meridian

of Santa Barbara, Chihuahua on the west and the meridian of San Luis Potosi on the east. The plant grows most freely

along the lower portions of the slopes and on low ridges, but not on the alluvial bottom lands. As to elevation, it is found on levels from 2,000 feet to 10,000 feet above the sea, but is most plentiful at 6,000 to 6,500 feet, and where the rainfall is from 7 to 10 inches annually. The average stand is about one plant to each square yard. The full-grown plant is 30 to 36 inches high and 40 inches in diameter and weighs from 8 to 10 pounds. The yield of rubber is from 7 to 8 per cent of the weight of the plant. It is estimated that the guayule growth amounts to 500,000 tons, with the total possible yield of 35,000 to 40,000 tons of rubber. The annual output is about 5,000 tons. Formerly, and in some sections to-day, the guayule plants were torn up bodily with the roots. This had the effect of extirpating the plant in those locali¬ ties. The conservative practice is to cut the plant above the root-stock which sends up new branches, and is ready to be cut again in three or four years. The guayule rubber is of supe¬ rior quality when a part of its large content (30 per cent) of resin is removed.

The rubber industry of Latin America has had to meet the momentous industrial fact of the rapid increase in recent years of cultivated rubber raised on plantations where labor is plentiful and cheap. This supply has doubled the market offerings since 1908, during which the cost of collecting wild rubber has been continually increasing. To meet the new con¬ ditions which still larger yields of plantation rubber will bring into the market situation a reorganization of the labor system and a great improvement in transportation facilities seem imperative, if the wild-rubber industry is to continue prosperous.

Richard Ferris,

Editorial Staff of The Americana.

16. SUGAR INDUSTRY IN LATIN AMERICA. The cane sugar production of the world for the past few years has averaged ap¬ proximately 10,280,000 tons or 22,670,400,000 pounds. Of this quantity the countries of Latin America — not including any foreign posses¬ sions in America — produce about 4,138,000 tons or 9,124,290,000 pounds, which is equivalent to more than 40 per cent

of the worlds total crop of cane sugar. The following tabular statement fairly represents the cane crops of the countries named (in tons) :

Cuba . 3 , 000 , 000 Mexico . . 89 , 000

Argentina . 336 , 000 Central America. . 35 , 000

peru . 263,000 Venezuela . 20,000

Brazil [image] . 240 , 000 Paraguay . 2,821

Dominican Repub- Colombia . 1,667

lie . 150,000

The United States, the largest consumer of sugar per capita of all other countries, in 1915- lb imported from all sources 2,455,366 tons or 5 414,081,941 pounds of cane sugar, and of this quantity 2,451,329 tons or .5,405,180,430 pounds were imported from Latin Ameiica, leaving only 4,037 tons or 8,901,585 pounds brought in from all other countries. Our imports from Latin America increased from 1,963,485 tons in 1912-13 to 2,451,329 tons in 1915-16, or 25 per cent.

Cuba.— The republic of Cuba is n

two countries together furnish approximately one-half of the world's supply of cane sugar, each producing from two to more than three million tons.

Climatic conditions and the soil of Cuba are so well adapted to the growing of sugar cane that nearly one-half of the tillable area of the island is devoted to this crop. The cane ma¬ tures in from 12 to 18 months, but the crop is so planted that it is harvested more or less throughout the year, though the principal har¬ vest season is from December to June. The lands in the western provinces have been planted in cane so many years and have be¬ come so impoverished that not more than four to seven crops can be harvested without re¬ planting. In the newer and richer lands of the eastern provinces 10 or 12 crops and some¬ times twice as many may be harvested without replanting. Recent statistics show that the yield of sugar per acre was 4,900 pounds har¬ vested from 1,384,812 acres. The Cuban sugar factories have been greatly improved within the past few years. Keen competition has forced Cuba to adopt more economical methods in the manufacture of sugar, and this has re¬ sulted in an almost constant decline in the number of factories, but an increase in their size and capacity. Some years ago there were 473 factories, but now

there are only 190 to 200. The plantations are equipped with pri¬ vate railway lines to transport the cane from the fields to the factories. There are approx¬ imately 3,000 miles of these railways.

Recent statistics show that of the total area under cane about 56 per cent was either culti¬ vated or controlled by the factory owners, while 44 per cent was cultivated by independent farmers who sold their cane to the factories. As an incentive to produce high grade cane it is paid for according to the sugar content and not the gross weight. During the 10 years ending with 1912-13 there was an average of 175 factories in operation, which ground an average of 15,925,000 tons of cane annually and produced 1,687,000 tons of sugar, or 3,778,880,- 000 pounds annually. The production since 1912-13 in tons is as follows: 1916-17, 3,000,000 tons; 1915-16, 3,007,915 tons; 1914-15, 2,592,667 tons; 1913-14, 2,59 7,732 tons. The greater por¬ tion of the Cuban crop of sugar, is exported, the average the past 20 years being about 95 per cent, of which the United States has taken about 90 per cent. In 1913 the United States took 2, 129,748 tons, valued at $107,975,360, and 2,164,621 tons valued at $116,479,869 in 1914. Great Britain took 240,870 tons, valued at $12,- 598,817, in 1913, and 231,541 tons, valued at $10,910,416, in 1914. The total exports in those years were 2,411,188 tons, valued at $122,388,062, in 1913, and 2,454,334 tons, valued at $130,413,- 769, in 1914. In 1915 the United States im¬ ported 2,136,110 long tons of sugar from Cuba, and 2,299,488 long tons in 1916. The following values of the sugar crops since 1910 will serve to indicate the remarkable growth of this in¬ dustry, as well as how prosperity has come to Cuba in recent years :

191.1-12 . $121,468,000 1914-15 . $205,000,000

1912— 13 . 115,395.000 1915-16 . 250.000.000

1913- 14 . 130.424,000 1916-17… – 246,000,000

Dominican Republic. — The sugar planta¬ tions of the republic are located on the south-

ern coast. In the adjoining hinterland are many of the most important sugar centres of the island, namely, Angelina, Consuelo, Porvenir, Cristobal, Colon, Santa Fe and Quisqueya, and the value of the sugar exported through the chief sugar port, San Pedro de Macoris, in 1915 amounted to over $3,000,000.

The sugar land extends along the coast, and going westward in the vicinity of the city of Santo Domingo are to be found the centrals Italia, San Isidro and San Louis, and toward the western border of the republic in the Azua and Barahona district Azana, Ocoa and An- sonia estates. Nearly all of these sugar estates have prospered greatly in recent years. The sugar acreage is increasing annually and new centrals are in process of construction.

The soil is well adapted for sugar cultiva¬ tion and produces on an average 25 years of ratoon crops with an output of 70 tons of cane per acre from virgin land during the first year. The sugar season extends from December to June or July. The local labor supply is lim¬ ited, and in normal times is increased by im¬ portations from the nearby British West Indies.

The estimates in tons of the sugar crops of the three seasons, 1914 to 1917, are as follows:

DISTRICT

1914-15

1915-16

1916-17

Macoris .

75,970

91,738

112,273

Santo Domingo .

20,205

21 ,925

33,906

Azua .

3,472

5,071

5,812

Total .

99,647

118,734

151,991

The imports of raw sugar into the United States from the Dominican Republic were 1,927 tons in 1914, 34,012 tons in 1915 and 47,992 tons in 1916.

Peru. — The area suitable for growing sugar cane on the west coast of Peru is limited only by the available supply of water for irrigation. There is also a small area east of the Andes planted in cane, but at least 9 7j4 per cent of the crop is grown in the rich valleys along the coast. The crop is planted and harvested throughout the year, but the principal harvest season is from October to February. The cane in the coast region requires 18 to 20 months to mature and from 8 to 12 crops may be harvested from one planting. The area of cane under cultivation is about 101,000 acres. The number of laborers employed in the industry is estimated at 21,881. The average produc¬ tion per hectare of 2.471 acres is a little over 10 metric tons (equal to about 4} 4 short tons per acre). In the Chicama Valley where there are a number of fine modern mills the produc¬ tion runs as high as 13ˆ4 metric tons per hectare (equal to a little more than six short tons per acre).

The growth of the sugar industry of Peru may be seen from the following, showing the yield in metric tons for the years specified of white and granulated, muscovado and Chancaca sugar. The exports for the same years are given as an indication of the growth of this branch of the industry:

Production, Exports, year tons tons

1912 . 192,754 147,410

1913 . 183,954 142,901

1914 . 228,054 176,670

1915 . 262.840 220.257

The disposition of the crop of 1915 to the various countries was in the following propor¬ tions: Chile, 39.93 per cent; United States, 21.69 per cent; Great Britain, 17.80 per cent; Spain, 4.17 per cent; Bolivia, 1.68 per cent; consumed locally or stored, 18.73 per cent.

From 1911-16 the United States imported the following amounts of raw sugar from Peru, the imports in the last two years being remarkable as compared with former years: 1911-12, 5,917 tons; 1912-13, 6,201 tons; 1913-14, 3,126 tons; 1914-15, 32,252 tons; 1915-16, 37,549 tons.

Mexico. — Almost the whole of the lowland region of Mexico is adapted to growth of sugar cane, and it is grown in 18 of the 28 states, but approximately one-half of the crop is pro¬ duced in the two states — Morelos and Vera Cruz. The two other states of most import¬ ance are Puebla and Sinaloa. In the lowlands along the coast as many as 10 crops may be harvested from one planting. In this region very little cultivation is needed, and the yield has been as high as 35 tons to the acre. Owing to the disturbed condition of the country the sugar industry has not made the progress that may be noted in other Latin-American coun¬ tries and very little modern machinery is in use, the old open-kettle process being still mostly in use, which extracts only about 6 per cent of sugar per weight of cane.

Notwithstanding the continuous revolutions of recent years the quantity of sugar produced in Mexico increased considerably, until the past two seasons. The crop of 1903-04 decreased from 112,930 to 102,931 in 1905-06, increased to 178,134 in 1910—1 1, decreased to 167,258 in 1911-12, to 143,000 in 1913-14, and to 121,000 in 1914-15. But the crops of the last two seasons are estimated at only 65,000 tons for

1914— 15, and 50,000 tons for 1916-17. The quan¬ tity of sugar, in tons imported into the United States from Mexico in recent years, is as fol¬ lows: 1913-14, 922 tons; 1914-15, 34,371 tons;

1915- 16, 6,636 tons.

Brazil. — The cultivation of sugar cane, one of the oldest industries of Brazil, owing to in¬ creased demand for sugar, has again been re¬ vived and promises to assume much greater importance. It is now grown in more than half the states, from the mouth of the Amazon down to the Laguna Mirim. The most flour¬ ishing centres of sugar production are in the state of Rio de Janeiro, where Campos is the focus of sugar deliveries, and Pernambuco, a thousand miles farther

north ; Sao Paulo has also an increasing sugar industry as may be seen from the following list of large sugar mills in each state : Alagoas, 9 ; Bahia, 7 ; Ma- ranhao, 3; Minas Geraes, 7; Parahvba, 2; Per¬ nambuco, 46; Rio de Janeiro, 31; Santa Catha- rina, 2; Sao Paulo, 20; Sergipe, 15; Piauhy, 1; Rio Grande do Norte, 3; total, 139.

The cane is planted at the beginning of the rainy season and is harvested from 12 to 18 months later in the southern states and from 11 to 14 months in the northern states. From 4 to 6 crops are cut from one planting. The yield of cane per acre varies from 15}4 to 16*4 tons, depending upon the character of the soil and season. The sugar extraction is low compared with other cane-growing countries and ranges from 4 to 9 per cent of the weight

of the cane. The low yield is due mainly to continuous planting in the same soil for many years. The sugar production in recent years is as follows: 1912-13, 343,000 tons; 1913-14, 203,394 tons; 1914-15, 240,000 tons; 1915-10, 194,000 tons.

The principal markets for Brazilian sugars are Great Britain, the United States, Uruguay, Bolivia, Chile, Peru, Cape Verde and France. The exports to the United States increased from 312 tons in 1910-11 to 14,937 tons in 1914- 15 and to 9,095 tons in 1915-16.

Colombia. — Sugar cane grows in the rich valleys of Colombia year alter year without replanting, and it is said that there are fields in the valley of Cauca that have been har¬ vested every year for nearly a century without renewal, although in Cuba the cane yields only from 5 to 10 crops, and in many sugar-pro¬ ducing countries it must be set out every year. The yield of each hectare (2.47 acres) is also very high, being 800 to 1,000 quintals (112 pounds), in comparison with 600 to 800 in Cuba and 900 to 950 in Hawaii ; and with irri¬ gation, which is available without much diffi¬ culty on account of the nature of the land, the yield would be still higher.

There are no statistics available, other than the exports to the United States, that would indicate the production of sugar in Colombia, though it is well known that the industry has shown a rapid development in recent years. The imports into ‘the United States in 1910-11 amounted to 2,447,314 pounds, but for some un¬ accountable reason there appears to have been no receipts from that

country either in 191 1— 12, 1912-13 or 1913-14. In 1914-15 the imports reached 3,675,812 pounds, and in 1915-16, 3,376,- 700 pounds.

Guatemala. — Next to coffee, sugar is the most important crop of Guatemala. While the cane flourishes in almost every region from the level of the sea to an altitude of 5,000 feet, the chief sugar districts are in the provinces of Escuintla, Mazatenango and Solola, all on the Pacific coast. The principal variety cultivated, known as "Jamaiquina,® was brought into the republic from Jamaica. The area devoted to sugar in 1916 was 76,352 acres. The average production is about 4,200 pounds per acre. In the Pacific coast region there are 20 sugar mills. The grades of sugar manufactured are 86 to 89 brown sugar and from 96 to 99 white sugar. The quality is said to be excellent and there is a large local demand for the product. The sugar exported is principally the raw prod¬ uct known as "moscabado.® The following are the estimates of the production of sugar in tons for the years named: 1913, 10,884 tons; 1914, 11,338 tons; 1915, 13,605 tons. In 1915 10,918,800 pounds, equal to 4,952 tons, were ex¬ ported, all of which was. sent to the United States and Central American countries. The exports to the United States for the years named are as follows: 1913-14, 1,258,202

pounds; 1914-15, 3,193,297 pounds; 1915-16, 3,459,144 pounds.

Costa Rica. — The cane sugar lands of Costa Rica are located in the central and Pacific coast regions. About two-thirds of the cane area is in San Jose and Alajuela, and one- third on the Pacific coast. The area. devoted to cane increased from 25,590 acres in 1905 to 27,636 in 1907-08, to 32,331 in 1910, but de¬

creased to 29,474 in 1914. The high prices and great demand for sugar has, however, undoubt¬ edly resulted in a considerable addition to the area since 1914. This is plainly evident from the fact that Costa Rica exported to the United States 1,598,737 pounds of raw sugar in 1915 and 4,947,289 pounds in 1916, whereas previous to these dates the crops did not meet the local demand and sugar had to be imported every year. The cane grown along the coast ripens in about 18 months, while that grown in the more elevated regions of the interior requires 24 months to ripen.

Venezuela. — The high prices and great de¬ mand for sugar have resulted in plans being consummated for its manufacture on a large scale in Venezuela. The progress already made is evidenced from the large increase in the ex¬ ports of raw sugar the past two years. The

sugar plantations in the vicinity of Caracas are all under irrigation, and the same is true in lesser degree of the plantations in the states of Aragua and Carabobo. The most remarkable cane in the republic grows around and especially at the south end of Lake Maracaibo, where four big centrals are in operation. It is said that the cane at the south end of this lake produces readily for 25 years.

The exports of cane sugar from Venezuela to the United States in 1910-11 amounted to 653,077 pounds and in 1911-12 to 269,530 pounds. There were no exports worth men¬ tioning in either 1912-13, or 1913-14. In 1914- 15 there was a revival of this trade and 330,- 789 pounds were sent to the United States and the year following 8,293,531 pounds.

Argentina. — The cane sugar lands of Ar¬ gentina are located in the northern part of the republic, chiefly in the, province of Tucuman, which comprises about 80 per cent of the total area planted. In 1912-13 this province con¬ tained 72 per cent of the sugar mills, and pro¬ duced 84 per cent of the cane and 83 per cent of the sugar. The principal harvest season is from 1 June to 31 October. The yield per acre is estimated at from 10 to 20 tons. The pro¬ duction of sugar increased from 157,513 tons in 1903-04 to 304,389 tons in 1913-14. The do¬ mestic supply of sugar in Argentina is approx¬ imately equal to the demand. Some years the production exceeds the home demand and the surplus is exported. At other times the short crops necessitate the importation of a consid¬ erable quantity, as was the case in 1913 when 83,289 tons were imported, and again in 1916 when 75,000 tons were imported. But mean¬ while (1914) 71,308 tons were, exported. The government, to encourage the industry, pays a bounty on all sugar exported. A maximum

price has been fixed by law which is equal to the import duty; when the price of domestic sugar exceeds the. price fixed by law, sugar is imported to equalize prices.

The production of cane sugar the past five years is estimated as follows: 1912-13, 221,- 004 tons; 1913-14, 280.319 tons; 1914-15, 335,- 833 tons; 1915-16, 152,301 tons.

There are 37 mills in the republic, with an estimated capital of $31,594,882. The annual sales of these mills is put at $19,841,855, and the raw material employed is valued at

$7,820,907.

Other Latin-American Countries. — There are no available data or statistics for other

Latin-American countries producing cane sugar, but in addition to the countries already reviewed (and excluding European colonies) considerable quantities of sugar are produced in Salvador, Nicaragua, Panama, Haiti, Hon¬ duras and smaller quantities in Bolivia, Ecua¬ dor, Paraguay and Chile. The imports from these countries into the United States are given in the introductory table, which will in some degree indicate the production of those coun¬ tries.

James L. Watkins, Statistician , New York City.

17. TOBACCO INDUSTRY IN LATIN AMERICA. Argentina. — The domestic pro¬ duction of tobacco in the Argentine Republic is used exclusively in the domestic cigar and cigarette factories. Due to its medium and inferior quality it is used for the cheaper grades of consumption, either by itself or mixed in proportions of 50 per cent or 55 per cent with the imported leaf. In 1895 the num¬ ber of acres under tobacco cultivation was 39,- 030, and in 1912, 23,860, a decrease attributed to the high internal revenue taxes and the low import duties for the imported product. In view of this phase of the Argentine tobacco situation, the Section of Tobacco of the Argen¬ tine Department of Agriculture in July 1916 issued a report on the subject, in which it was stated that, despite the inferior quality of the product, it was of domestic importance, and recommendations were made to increase both the acreage and quality, the latter by the intro¬ duction of the approved scientific methods of cultivation and handling, as otherwise the do¬ mestic leaf will continue selling in the market for a third of the price of the imported leaf. The production for the decade, 1903-13, in pounds, was 149,995,150.8, the individual years being as follows: 1903, 8,382,675.4; 1904, 17,-

749,214.4; 1905, 18,417,847.8 ; 1906, 8,312,191.8; 1907, 10,051,960.6; 1908, 13,750,024.2; 1909, 21,- 829,029.2; 1910, 15,146,760.2; 1911, 12,825,696.4;

1912, 12,241,435.8; and 1913, 11, 238, 315, showing a wide variation in the amount raised, the greater part of which is cultivated in the prov¬ inces of Corrientes, Salta and Tucuman, all situated in the northern part of the republic.

The principal tobacco consumption of the country is of cigarettes, most of which are of domestic manufacture, and retail, per box of 14, for from Ax/\ to 17 cents, the demand for foreign cigarettes being supplied chiefly by the foreign element. Of cigars, the ˆToscano,® an Italian imported cigar, is the most popular, re¬ tailing for four and one-fourth cents, and an Argentine imitation known as the ˆAvanti,® retailing at two and one-twelfth cents. The well-to-do Argentinian smokes Habanas exclu¬ sively; in addition there are various Brazilian, Dutch and German brands that have a consid¬ erable sale. Very little tobacco is chewed. The imports during the five-year period. 1908—12, were as follows: Habana leaf. 1,587,344 pounds ; Paraguayan, 2,554,665 pounds ; others, 10,604,643 pounds, of which about 70 per cent came from Brazil and 18 per cent from the United States. Of manufactured tobacco dur¬ ing the same period, 74,097 pounds from Uru¬ guay, United Kingdom. Cuba, Italy, France, Spain, Egypt, etc. ; Habana. cigars in boxes, 87,989 pounds; other cigars in boxes, 2,044,902

pounds — three-fourths from Italy and the re¬ mainder largely from Switzerland and The Netherlands; other, cigars, not in boxes, 55,193 pounds — Switzerland and Italy; cut tobacco Upicadura”), Paraguay, 7,738 pounds, and other, chiefly United Kingdom, 4,969 pounds; and snuff, 6,534 pounds, Italy and France.

Brazil. — Brazil, of the Latin-American countries, is the greatest producer of tobacco, an industry that has been carried on since the days of the colonial governments. In 1796 the exportation of tobacco to Portugal amounted to more than 18,000,000 pounds, an amount that has steadily increased since that time until the formation of the republic, since which time, due to labor conditions, the production has changed but little, being conservatively esti¬ mated at 77,640,000 pounds annually. In 1912 the exports amounted to 54,449,820 pounds ; in

1913, 64,771,152 pounds. Ninety-five per cent of the exports are made from Bahia, the chief port of the tobacco district, and the greatest amount is sent to Europe. Taken in its en¬ tirety tobacco is the sixth in size of all Bra¬ zilian exports, the republic, besides supplying her own domestic needs, supplying the greater part of the requirements of her neighboring countries. Besides the state of Bahia, the entire east coast is interested in tobacco cultivation, particularly the state of Maranhao, and lately it has become an industry of future promise in the states of Rio Grande do Sul, Santa Catha- rina, Minas Geraes and Pernambuco. The average exports from Bahia to the other non¬ producing parts of Brazil is about 6,600,000 pounds annually, in

addition to about $500,000 worth of cigars, cigarettes and other elaborated tobaccos. In 1915 these last amounted to 37,- 000,000 cigars and 17,000,000 cigarettes.

Prior to the outbreak of the European War 40 per cent of the exports went to Hamburg, 40 per cent to Bremen and 17 per cent to Ar¬ gentina, with practically none to the United States, the figures being as follows: 1913, total, 29,388 metric tons (2,204.6 pounds), of which to the United States, 6; Germany, 24,- 473; Argentina, 4,359; Uruguay, 343; 1914, total 26,980, of which to the United States, 192; Germany, 22,133; Argentina, 2,873; Uruguay, 664; 1915, total 27,096, of which to the United States, 1,953; Germany, 1; Argentina, 7,302; Uruguay, 866; the Netherlands, 3,980; and France, 6,581. The shipments made to the United States were largely for re-export and for temporary storage to avoid the tobacco worm prevalent in Brazil. Imports of tobacco leaf, for blending with the domestic leaf, were,

1914, total, $386,069, of which the United States supplied $100,136; Holland, $60,805; Turkey in Europe, $30,818; China, $40,202; and Cuba,

$16,012.

Cuba.— While Cuba is not as great a pro¬ ducer of tobacco as certain other countries, the reputation that its raw and manufactured product has achieved has made the* name Habana synonymous for excellence of tobacco, a reputation that the island has held since its first discovery. Next to sugar, it is Cuba's most important crop.. The manufactures of this staple amounted in 1913 to $29,014,114, of which 387.376.230 cigars were valued at $22,- 055,008; 289.334 064 packages of 16 cigarettes valued at $6,516,344; 918,590 pounds of cut

tobacco, valued at $442,762. In 1914 the total was $23,564,686, of which 312,767,343 cigars were valued at $17,626,391 ; cigarettes, 247,872,- 578 packages of 16, valued at $5,574,887; 770,- 829 pounds of cut tobacco, valued at $363,408, a general decrease in every class. In addition there remained leaf to the amount of $18,093,- 754 unmanufactured. Of the cigars manufac¬ tured in 1914, 188,816,225 were consumed in Cuba, and 123,951,118 exported. The exports for the year 1914 amounted to $26,353,170, divided as follows: Leaf, $16,584,078; cigars, $9,129,661; cigarettes, $429,147;

and cut tobacco, $210,284. Of the leaf tobacco the number of bales exported in 1913 was 322,121 ; in 1914, 314,732. Of these amounts the greatest buyer was the United States, 1913, 259,758; 1914, 239,-922; followed by Germany, 1913, 20,572; 1914, 18 838; Canada, 1913, 16,880; 1914, 7,861; Spain, 1913, 4,518; 1914, 25,802; and Argentina, 1913, 12,102; 1914, 10,281. Of cigars exported in 1913, the number was 183,226,330, the nine countries buying more than 1,000,000 each being: England, 66,842,801; United States, 53,577,563 ; Germany, 14,028,326; Canada, 13,- 319,147; France, 9,362,492; Australia, 6,316,505; Spain, 5,428,515; Argentina, 3,928,061; and Chile, 3,488,234. Of the 123,951,118 cigars ex¬ ported in 1914, the nine countries buying more than 1,000,000 were: England, 43,951,994; United States, 37,732,728; Spain, 8,274,730; Can¬ ada, 8,229,412; France, 7,230,825; Germany, 5,187,946; Australia, 5,121,363; Chile, 1,730,502; and Argentina, 1,146,432. In 1917 the total ex¬ ports of leaf and manufactured tobacco amounted to $22,617,648, a decrease of about $2,500,000 in leaf and $1,800,000 in manufactured tobacco, caused in part by the European War and in part by the deflection of the ordinary transport service. This resulted in a depression among tobacco growers and a disorganization among labor, the result being that many of the plantations were temporarily planted with sugar cane, due to the great demand for this com¬ modity.

In Cuba the greatest attention has been paid to the scientific raising of tobacco, so that the product of each locality has its spe¬ cial characteristic, it being said that the poorest tobacco grown on the island is equal to the best grown elsewhere. The highest prized, as being the choicest cigar leaf in the world, is the (

wrappers, ((Bejucal,® and its three ordinary classes, (

For the purpose of protecting the reputa¬ tion of tobaccos and cigars produced in Cuba, a law was passed on 16 July 1912, providing for a national collective trade mark on the containers of all tobaccos and tobacco products intended for export, under heavy penalties, and in consequence the Bureau of Agriculture, Com¬ merce and Labor registered a distinctive mark for each, <(tobaccos and cut tobacco® and ((cigars manufactured in Cuba.®

Paraguay. — The most widely cultivated, al¬ though not the most important, crop in Para¬ guay is tobacco. Its production was formerly carried on on an extensive scale, and a ready market was found in Europe, particularly in Germany, but due to internal troubles its acre¬ age decreased and until recently it was prac¬ tically unknown beyond

the Paraguayan bor¬ ders. It is now under the special patronage of the Banco Agricola, the government institu¬ tion concerned with betterment of agricultural matters. Soils have been analyzed, seeds from Cuba introduced and scientific instruction given as to the cultivation and handling to meet the demands of export buyers. In 1910 a regula¬ tion was passed providing for the classification under the Tobacco Revision Office (Oficina Revisadora de Tobacos) as follows: <(Pito,® <(Media,® ((Regular,® ((Buena,® ((Doble,® <(Para la,® <(Para 2a,® and <(Fuerte,® the (

The exports in 1900 amounted in pounds to 6,590,644; 1901, 5,103,265; 1902, 6,200,014;

1903, 7,012,870; 1904, 9,997,724; 1905, 7,980,119; 1906, 5,076,104; 1907, 3,391,762; 1908, 10,977,164; 1909, 10,580,998; 1910, 11,259,230; 1911, 14,219,- 781; 1912, 8,842,216; 1913, 11,897.609; 1914,

9,908,921; and 1917, 13,479,000. The great bulk of the lighter grades is exported to Europe, more than half going to Amsterdam and Bremen, being in large part destined for the Spanish trade. Of the heavier grades Argentina is the greatest buyer.

Chile. — In the year 1913 there were under cultivation in Chile 3,430 acres of tobacco, producing 8,523,645 pounds. For 1914, with a slightly smaller acreage, the production was 6,282,228 pounds. All of this was consumed in the republic. In addition there were imported, in 1913, 411,031 pounds of tobacco, valued at

$456,384, of which 115.181 pounds were ciga¬ rettes, valued at $229,032 ; 67,623 pounds cigars, valued at $111,943; 156,762 pounds, leaf to¬ bacco, valued at $77,913; and 71,465 pounds cut tobacco, valued at $41,406. The cigarettes were imported from 16 countries, of which France supplied 27,119 pounds, Belgium, 25,- 097 pounds, Cuba, 24,286 pounds, Great Britain, 19,923 pounds, Germany, 9,217 pounds, the re¬ minder from other countries, the United States being credited with 888 pounds. Of the cigars, Cuba supplied 36,854 pounds ; Italy, 7,553 pounds; Germany, 8,305 pounds; France, 3,640 pounds; Panama, 3,494 pounds; Great Britain, 3,225 pounds; and Belgium, 3,045 pounds, the remainder being distributed among seven other countries, the United States supplying

547 pounds. Of the leaf tobacco, Cuba supplied 131,548 pounds; Germany, 11,224 pounds; the United States standing third with 3,741 pounds; the remainder being distributed among eight other countries. Of the cut tobacco, Cuba sup¬ plied 22,297 pounds; France, 14 850 pounds; Belgium, 11,173 pounds; Great Britain, 11,164 pounds; the United States standing fifth with 6,292 pounds, the remainder being distributed among six other countries. According, to the United States Commerce Reports, the imports in 1914 of leaf tobacco amounted to $66,135, cut tobacco $40,369, cigars $78,876 and ciga¬ rettes $157,106, a total of $342,486; and in 1915, the imports of leaf and cut tobacco amounted to $129,377.

In 1913 there were 192 tobacco factories in Chile, of which 59 were located in Valparaiso and 61 in Santiago, 129 being of Chilean owner¬ ship and 63 belonging to foreigners. The num¬ ber of persons employed was 1,960, and the value of their production, from foreign and domestic leaf, was $3,338,807. The greater part of the manufactures was of cigars, with a small portion of cigarettes, and a still smaller one of smoking tobacco. The favorite form of tobacco is the cigarette, the domestic being the cheapest. Of the foreign brands, nearly all the well- known English cigarettes are sold, as well as the French, Italian, Cuban, Turkish and Egyp¬ tian, the black Cuban type being a favorite by a large percentage. Of cigars, the Cuban and Mexican are most popular. Due to the war many of the lighter brands of European cigars and cigarettes have been unobtainable, a deficiency that is beginning to be supplied by the United States.

Colombia. — With proper encouragement, Colombia promises to be one of the important tobacco producing countries of America, as the plant thrives, in almost every portion of the country. It is even claimed that certain small sections produce a quality rivaling the Cuban tobacco. Due, however, to the failure to adopt approved scientific methods of raising, handling and grading, the qualities of the better grades are not uniform from year to year, and for export purposes the whole crop is considered under one standard — a leaf of average quality, largely used as filler. The country produces more than sufficient for domestic consumption, quantities being raised near the coast and in the department of Santander, while the leaf of the best quality comes from the district of Ambalema, where also the greatest quantity of tobacco is found.

The exports of tobacco (mostly leaf) in

1913 amounted to 13,811,000 pounds (esti mated) ; and in 1914, to 5,806,737 pounds, valued at $393,096; 1915, 4,562,122 pounds,

valued at $334,642. Of the total amount, 5,089,342 pounds, exported in 1914, from the port of Barranquilla, 5,089,893 pounds were consigned to Europe, and 15,449 pounds to the United States. Of the amounts shipped from the port of Carta¬ gena in 1914 and 1915, the respective figures are as follows: France, $378 and $52,476; Ger¬ many (1914 only), $149,371; Great Britain (1915 only), $29,583; United States, $3,051 and $31,810; other countries, $26,100 and $25,404. During the fiscal year ending 30 June 1916 the amount exported to the United States was $35,325, of which $1,013 was cigar wrappers and $34,325 leaf.

The decline of exports following 1913 is indicative also of the reduction of the quantity raised, the reduced demand by Germany — the greatest customer — being discounted by the utilization of much of the former tobacco acreage for other purposes. Notwithstanding this, the immediate result of the European War was the sharp breaking in prices, in June 1915, being as low as $0.06 per pound, a fact that has been discouraging to the industry. Some relief is afforded, however, to the native indus¬ try by the increase (1915) of duties on im¬ ported tobaccos, leaf and manufactured, from 80 cents to $1 per kilo (2.2046 pounds), in con¬ nection with the high internal revenue taxes. There is necessarily a demand for foreign tobaccos for blending purposes, in addition to special demands for the manufactured product. Of manufactured and leaf tobacco imported in 1915, amounting to $148,433, the United States furnished a large percentage.

Costa Rica.— The importance of the ba¬ nana and coffee industries in Costa Rica has made of tobacco growing a lesser industry serv¬ ing at present for domestic demands. This notwithstanding the fact that its production is a success, the climate and soil being favorable. In 1914 the number of acres under tobacco cultivation was 2,734. Partly as a means of revenue,, and partly to protect the domestic tobacco, interests, the government has levied a very high duty on the imported product — about $0.85 per pound, plus a surtax of 5 per cent on imports for consumption at Port Limon. The result has been that, due to the high prices necessarily demanded for imported tobaccos and cigars, local factories have been lately es¬ tablished throughout the republic, a very large one being located at San Jose. This local de¬ mand has encouraged the growing of the native leaf, with a result that imports have decreased by half, the imports being largely of foreign cigars and cigarettes for which there is a special demand. The quantity of tobaccos exported is negligible. The imports through Port Limon in 1914 amounted to $124,000 of which the United States supplied $52 000; Germany, $15, 000; Great Britain, $18,000, and France, etc.,

$39,000. For 1915, the imports at the same port amounted to $37,100, of which the United States supplied $31,200; Great Britain, $10,000, and France, etc., $5,900.

Dominican Republic.— Of all the Latin- American countries, the Dominican Republic at present ranks third in the raising of tobacco, the production for 1913 being 28,000.000 pounds, and the normal yield annually being 17,250,000

to 23,000,000 pounds. Due, however, to internal troubles, the production decreased somewhat in 1914 and 1915, the yield for the latter year be¬ ing- between 6,900,000 and 8,050 000 pounds, – which was increased in 1916 to (estimated) be¬ tween 23,000,000 and 25,000,000 pounds.

The exports of tobacco leaf from the coun¬ try in 1913 amounted to 21,539,876 pounds, valued at $1,121,775, of which Germany re¬ ceived 20,099,803; the United States, 285 412; France, 355,400, and other countries, 788.260. In 1914 the amount exported was 8,152,208 pounds, valued at $394,224, of which Germany received 7,286,382; the United States, 128,953; France, 78,492, and other countries, 653,981. In 1915, 13,717,900 pounds, valued at $972 896, of which the United States received 7,624,839; France, 1,944 872, and other countries, 4,146,188. In 1916, 17,438,332 pounds, valued at $1,433,323, of which the United States received 6,825,584; France, 1,278,746, and other countries (unspeci¬ fied). 9,334,002.

Ecuador. — Ecuador produces some excel¬ lent qualities of tobacco, it being claimed that for delicacy of flavor they are the equal of the best Cuban. The acreage is scarcely more than enough for domestic requirements, and the methods of raising and handling are not such as bring out its best qualities. The greatest quantity is raised in the Guayas fluvial region and in the province of Esmeraldas. In 1914, 107,616 pounds of leaf tobacco, valued at $19,- 922, were exported, the amount for 1915 being 596,445 pounds (to Peru), valued at $89,825, an increase that is due to the encouragement of the government.

In October 1915, a law was passed, effective 1 Jan. 1917, for the government control of the tobacco industry, . raising, manufacturing and selling, on the basis of concessions to producers and selling

agencies. By its provisions, the production and manufacture are exempt from all fiscal taxes ; written notice to the competent authority is required of all persons desiring to raise tobacco, and license is given without charge. Subject to confiscation, tobaccos and products may not be transported from one place to another, even in the same town, with¬ out a permit. Taxes were provided for all tobaccos on hand on 1 Jan. 1917, and in the future the privilege of selling tobaccos is to be auctioned annually, for the various districts or provinces, or for the whole republic, fiscal taxes being likewise imposed upon the conces¬ sions, varying from $87.60 to $4,672.

Guatemala. — In quality, Guatemalan to¬ bacco ranks high. Due, however, to antiquated methods of handling it, it has not acquired the commercial value that its qualities merit. It is raised throughout the republic, but the favorite leaf is produced in the vicinity of Zacapa, at Barberina and vicinity, and also at Chiqumulilla on the west coast. The quantity raised in 1903 was 1,065,000 pounds. The total annual production has recently been estimated (1916) at from 250,000 to 300,000 pounds, when, judging by the quantity manufactured, it should be five times this. Due to the high duties on imported tobacco and its products, the domestic leaf is largely used in the local factories, al¬ though a very large ouantity is imported from Honduras, which is incorporated with the native leaf in the manufacture of cigars and cigarettes for export. Rapid progress has been made

during recent years in the manufacturing of tobacco, both as to the quantity worked and the methods employed. While the small factory predominates, there being hundreds of shops producing hundreds of thousands of fine and ordinary cigarettes, there are also four ma¬ chine-made factories in the country, produc¬ ing an aggregate of 640,000 cigarettes per day. To protect the small shop, the government on 23 Nov. 1916 issued a notice requiring the pay¬ ment of a tax of one centavo on each box of machine-made cigarettes. All domestic cigars are made by hand, the industry being an im¬ portant one. Guatemala and Honduras tobacco are generally used, with a Sumatra wrapper bought in the United States. Most of the ordinary cigars are made by Indian women and children, whose labor is cheap, some of the cigars selling as low as $2 per thousand ; those of better quality sell for from $0.02^2 to $0.05 each. The cheapest machine-made cigarettes sell for about $1 per thousand. The domestic con¬ sumption of both cigars and cigarettes is large.

In 1915 Guatemala imported leaf tobacco to the value of $2,575 ; manufactured, $10,398. Of the leaf tobacco, $2,205 worth came from the United States, the remainder from Holland. Of the tobacco

manufactures, the United States supplied $4,265 ; Cuba, $3,262 ; Germany, $950 ; Mexico, $760; England, $827; Jamaica, $163, and the remainder from Holland, France, Japan and China. As showing the consumption of cigarettes in the country, the imports of cigarette paper for 1915 amounted to $29,666, of which Spain supplied $26,311 worth; the United States, $1,637; the remainder coming from Ger¬ many, England and Denmark. During the same year exports amounting to $18,954 were made to the United States, Colombia, Honduras and British Honduras. Of this, $13,054 was manu¬ factures, and $5,900 leaf tobacco.

Honduras. — Statistics regarding the pro¬ duction of and trade in tobacco in Honduras are lacking, but from the reports of the United States consular agents in that country and Guatemala, it is apparent that tobacco of a commercially fine quality grows in the country, but that through poor methods of curing it has not generally become an article of world ex¬ port, but is sufficient for domestic needs. A large quantity is shipped to Guatemala, where it is manufactured, some of it being returned and some re-exported, and Peru. In 1913-14 there were imported tobacco and tobacco manufac¬ tures to the value of $17,146, of which the United States contributed $10,386; 1914-15, $20,520, of which the United States contributed

$13,436. <

Mexico. — The revenues derived from the profits of the tobacco monopoly in Mexico amounted, in 1783, to $777,651 ; and in 1801-02, to $4,000,000 silver, the monopoly of the tobacco industry having been a prerogative of the Crown from the time of the Spanish conquest. With independence, the industry languished until 1868, from which time it has gradually in¬ creased. In 1889, Mexican tobacco obtained the gold, silver and bronze medals at the Paris Ex¬ position, being adjudged superior to the best Cuban leaf. Later, the French government gave official notice through ((la Regie,® the special department concerned with the monop¬ oly, that Mexican tobacco was acceptable for its uses.

In Mexico the use of tobacco is universal, and its consumption large, with the result that large quantities are raised of which no esti¬ mates are given. Being of universal use, it is grown everywhere. Experts credit the district of San Andres Tuxla, in the state of Vera Cruz, with

the leaf of the choicest quality. The soil here is similar to that of the Vuelta Abajo in Cuba. In the Tuxla section, how¬ ever, the same care has not been shown in the cultivation and handling of the leaf, for which reason it has failed of general commercial demand. Despite the fact of cheap and un¬ scientific labor and methods, Mexican tobacco for years has been an article of export in the markets of the United States and Europe. Until the war in Europe and domestic politi¬ cal dissensions, the chief European markets were Hamburg and Havre, with a growing de¬ mand in England. At Hamburg, the Valle Nacional leaf, selected, grown by government convict labor, sold for $0.18 per pound, at which figure it was in great demand.

Recent figures as to the yield and export are not obtainable. In 1906, the estimated crop of the chief tobacco districts amounted to 26,180,-000 pounds, divided' among the following dis¬ tricts : San Andres Tuxla, 3,300,000 pounds; Acayucan Talixpam, 759,000 pounds: Cordoba, 7,700,000 pounds ; Tlapacoyan, 3,795,000 pounds ; Tepee, 3,795,000 pounds; Ojitlan, Valle Nacional, 3,530,000 pounds; Playa Vicente, 3,- 530,000 pounds ; other districts of Oaxaca and Chiapas, 1,265,000 pounds, and districts of San Luis Potosi, 506,000 pounds. The foregoing was but a small part of the crop for the year, as figures are not given for the remainder of the republic. Luring the fiscal year ending 1911, the exports of tobacco (leaf and manu¬ factured) to the United States amounted to

$14,011; 1912, $31,039; 1913, $43,331; 1914, $58,-

941; 1915, $77,003, and 1916, $142,383.

Peru. — The tobacco industry in Peru is a government monopoly, the special department having charge of same being known as the Estanco del Tobaco, founded in 1904. Since 1909 it has been administered by the Compania Recaudadora de Impuestos (National Tax Col¬ lecting Company) under contract for a term of years. The territory devoted to the cultivation of tobacco is designated by law, and the importation, manufacture and sale of all forms of tobacco are in the hands of this company. In addition to this control, the government is otherwise encouraging the tobacco industry. In the latter part of 1916, the government is¬ sued an order through the Department of Fomento (National Industry) commissioning two Peruvian graduate students to spend a year in Cuba to study the practical cultivation and handling of tobacco, to the end of intro¬ ducing the approved scientific methods of carry¬ ing on industry in Peru.

The prices for tobaccos of all kinds are fixed by the government. The

greatest and best quality of leaf is grown in the provinces of Huancavelica and Tumbes, the former supply¬ ing the government in 1915 with 619,490 pounds, and the latter with 421,600 pounds. In addi¬ tion there was imported from Ecuador 596,445 pounds and 82,895 pounds from Honduras. In 1914, the quantity of domestic leaf used was 798,659 pounds, there being imported in addi¬ tion 65,714 pounds from Ecuador and 101,707

pounds from Honduras. Of cigarettes, the domestic manufacture in 1914 amounted to 404,429,700; cigars, 175,400. In 1915 the re¬ spective numbers were 369,299,052 and 152,100. .The average cost of the domestic cigarettes was $0.74 per thousand. During 1914, there were imported 38,825 ,232 cigarettes; 1915 (esti¬ mated), 8,800,000; cigars, 1914, 245,814; 1915, 31,099, the great bulk of each coming from Cuba, most of the remainder from England.

Venezuela. — The production of tobacco for domestic consumption is carried on throughout Venezuela, in addition to which an export of more than 200,000 pounds is made annually, the greater part, until the European War, to Ger- many.. The tobacco of Capadare, a special dis¬ trict, is noted for its strength and aroma, and by some is preferred to Habana tobacco. Besides Capadare, tobaccos of excellent quality are raised in the districts of Yaritagua, Merida, Cumanacoa, Guanape, Maturin, Upata, Aragua, Carabobo,. Barinas, Rio Negro, Caripe and the Federal district. The greater part used in the country is of domestic manufacture, Cuban and Virginia leaf being imported for blending. The imports of leaf and manufactured tobacco in 1914 amounted to $10,912; 1915, $3,643.

W. B. Graham,

Trade Expert, Latin- American Division, War Trade Board, Washington , D. C.

18. WOOL INDUSTRY IN LATIN AMERICA. The wool industry is subject to climatic influences, it being found that, while sheep thrive in the tropic and semi-tropic zones, nature, by its law of compensation, relieves them of the necessity of clothing themselves to withstand the cold and their wool loses those qualities that the requirements of commerce have standardized. Applying this to Latin America, we find that the most successful ex¬ ploitation of the wool industry is in the ex¬ treme southern countries of South America, or on the high table lands free from tropic in¬ fluence.

Argentina. — Next to Australia, and on a par with the United. States,

Argentina occupies a pre-eminent position in the wool industry. Unlike the cattle and meat industry, wool grow¬ ing has been of long standing. In 1885 the ex¬ ports of this commodity amounted to $35,950,-

111; 1890, $35,521,681; 1900, $31,029,522; 1905,

$27,991,561; 1910, $58,847,699. The best year during this period was 1899, during which the total amounted to $71,283,619. Throughout the entire statistics of the country, a fact generally true elsewhere, a close relation is noted be¬ tween the production of wool and the price of mutton. When the latter is in demand at a good price, entire flocks of sheep are slaugh¬ tered, with a resulting diminution of the wool clip for the following few years.

On 1 Jan. 1915, the estimated number of sheep in the republic was 80,000,000, and the es¬ timated clip amounted to upward of 300,000,000 pounds per annum (Commerce Reports, 1 Dec. 1916). Sheep are pastured throughout the re¬ public, particularly in the central and southern part. Requiring cheap lands, they have been pushed further south each year, with the re¬ sult that parts of Patagonia and of Tierra del Fuego, considered a generation ago as unin¬ habitable for civilized man, have been found to be peculiarly adapted to the industry. The

rapid development of this territory to its new capabilities, in connection with a similar devel¬ opment in the corresponding latitude of Chile, lias made a distinct sheep-raising section of the southernmost part of the continent, tributary to a great extent to Punta Arenas, Chile, which until recently was a free port.

Vice-Consul J. W. White, at Buenos Aires, on 17 Oct. 1916 made an extended report on the wool industry to Washington, calling attention to the conditions permitting Argentina to de¬ mand unheard-of prices for her wool. The ac¬ tion of the British government in placing an embargo on the sale of the previous year's clip of the United Kingdom had operated to the di¬ rect advantage of the republic, enabling her to supply the wants of neutral countries in addi¬ tion to filing orders from the Entente Allies for such varieties as the British colonies do not produce.

Seventy-five per cent of the wool comes from the white-faced, long-

wool sheep of the Lin¬ coln and Leicester breeds, the quantity and the quality being such that in the markets of the world it is known as Argentine crossbreed. Its grades, when sorted into coarse and medium crossbred, correspond to the domestic commons and domestic one-fourth bloods in the United States. The fine Argentine crossbred is the equivalent of the United States tliree-eighths blood. Of the yearly total, merino fleeces con¬ stitute 20 per cent, the equivalent of the do¬ mestic fine in the United States, and the re¬ maining 5 per cent is from the black-faced and domestic sheep. The average clip per animal is 5.3 pounds.

Prior to the European War, the principal buyers of Argentine wool were France and Germany. Exports to France in 1911 amounted to 51,501 tons; 1912, 51,138 tons; 1913, 31,342 tons; and 1914, 23,794 tons, a total for the four years of 157,775 tons. During the same period, Germany bought in 1911, 31,693 tons;

1912, 47,839 tons; 1913, 41,362 tons; and 1914, 30,386 tons, total, 151,280 tons. During the same years the purchases of the United Kingdom amounted to 93,225 tons ; Belgium, 55,731 tons ; United States, 42,521 tons ; Italy, 14,849 tons ; and other countries, 18,989 tons. From these figures t'he total exports of wool for these four years totaled 534,370 tons, being divided as follows: 1911, 132,056 tons; 1912, 164,964 tons;

1913, 120,080 tons; and 1914, 117,270 tons. Re¬ cent economic changes have made the United States the principal purchaser of Argentine wool. Of the total export, 298,939 bales (925.9 pounds each) for the fiscal year ending 30 Sept. 1916, 152,330 bales went to the United States, as compared with the 102,429 bales purchased of the export of 303,402 bales in 1915, and 34,000 bales out of 304,268 bales in 1914. The strong demand from the United States contributed largely to the increase of prices, the average sales in 1912 being, per pound, $0,165; 1913, $0,175; 1914, $0,175; and 1915, $0,201. During the August-September market season of 1916, the foreign demand plus speculation forced the price from $0,327 to $0,404 ner pound, quotation that covered all classes, including lambs' wool, shorts, belly wool and sweepings, the spirit of speculation being so stronglv instilled into the market that to-day no settled price is recog¬ nized.

Chile. — In Chile the raising of sheep for their wool to be used in the domestic textile industry has been carried on since the first settlement of the country. It is within the present generation that the industry has as¬ sumed export proportions, a result of the development of the

southern portion of the republic, including the extensive territory of Magellanes. The number of sheep in the coun¬ try, according to the estimate of the govern¬ ment (Commerce Reports, 16 March 1916), is 5,000,000, of which 2,000,000 are in the terri¬ tory tributary to Punta Arenas.

Formerly the centre of the government penal colony, founded in 1840, Punta Arenas, on the Strait of Magellan, in time became an im¬ portant coaling station for steamers. Later, Scotch shepherds from the Falkland Islands, noting the excellence of the pastures in the vicinity, brought their flocks and started the industry that promises to become one of the most important in the country. The result has been that the Chilean government has recog¬ nized the possibilities of this part of the re¬ public, and has thrown open the territories of Llanquihue, .Chiloe and Magellanes to settle¬ ment, and thousands of acres of land have been occupied, the greater part devoted to sheep farming. There are many settlers from the British Isles, and English is everywhere spoken. Punta Arenas, population 17,000, was a free port until 1912, one cause of its rapid growth and importance. The territory, all devoted to the same industry, of which it is the chief city, includes not only Chilean pastures, but those of southern Argentina. The estimated clip for 1916 (Commerce Reports, 21 Oct. 1916), was 25,000,000 pounds. Argentine wool also to the amount of 1,347 metric tons (2,204.6 pounds) passed through this port in 1914.

In 1913 and 1914 Chile exported the follow¬ ing amounts (metric tons) : To Great Britain, 9,400 and 8,115; France, 1,938 and 1,264; Bel¬ gium, 583 and 39; Germany, 742 and 2,185; and the United States, 7 and 358. Due to the demand caused by the war, exports increased greatly to the United States, those for 1915 (fiscal year ending 30 June) amounting to 2,369,359 pounds, valued at $599,650, and 1916, 9,611,489 pounds valued at $2,562,792.

Chilean wool is divided into two general classes — merino, which is fine, soft, curly -and comparatively short, and English, which is long, straight and glossy. Between these two grades there are various crossbreeds, the quantity of these increasing each year. After 1914, the price of merino wool fell, while the crossbred rose appreciably. Export wool is unwashed (Commerce Reports, 16 March 1916), weighing twice as much as that prepared for spinning. The lack of facilities for washing had the effect of causing difficulty in the dyeing of wools for native industry. Of this latter there are two factories in the country, at Santiago and at Tome, the annual consumption being about 550 metric tons of wool, and their output 435,000 yards of fabric, which is used in part for army, navy and police uniforms. In addition, the

manufacture includes cash¬ meres, broadcloths, blankets and shawls.

Uruguay. — Uruguay, as regards the pro¬ duction of wool, is subject to the general con¬ ditions that affect Argentina. The country is

essentially pastoral, and the greatest interest has been taken by the government in the intro¬ duction and propagation of fine stock. The ex¬ ports of wool in 1913 amounted to 63,571 metric tons. Since 1914, the greatest trade in this commodity has been with the United States, the exports in 1914 (fiscal year ending 30 June) amounting to 7,965,817 pounds, valued at $1,- 854.065 ; 1915, 14,612,703 pounds, valued at $3,956,216; and 1916, 8,941,506 pounds, valued at $3,206,191.

Brazil. — Brazil, due to the tropical nature of the greater part of its surface, is not destined to become one of the great wool producing countries. However, in the southern part of the republic — notably in the state of Rio Grande do Sul — the climate is adapted for sheep raising, and a considerable quantity of wool is produced. The principal market of the country for wool is at the port of Rio Grande. Success is also reported in sheep

raising for wool in the states of Parana and Minas Geraes. Exports for the country in 1911 amounted to 2,147,970 pounds, valued at $311,386; 1912, 4,198,630 pounds, valued at

$571,276; 1913, 2,838,804 pounds, valued at

$394,155; 1914, 2,448,193 pounds, valued at

$251,544; and 1915, 997,639 pounds, valued at $193,065. Exports to the United States during the fiscal year ending 30 June 1915 amounted to 115,147 pounds, valued at $29,389; and 1916, 87,864 pounds, valued at $15,590. Native in¬ dustry consumes a large amount, the quantity increasing rapidly.

Other Countries of Latin America. — Of

the Latin-American countries, there are none that do not produce some wool, many in large quantities, and some a product of a special

quality, this latter being particularly true of Peru, Bolivia and Chile, where, in the Andes region, the alpaca, vicuna and llama thrive. In the supplement to Commerce Reports of 18 April 1917, the United States Minister at La Paz says : “Throughout the arid region that lies between the two Cordilleras a species of bunch grass grows winch is capable of resisting the rigors of winter and which provides abundant pasture for sheep and other wool-bearing animals. Experiments conducted under gov¬ ernment supervision seem to indicate that the alpaca is better suited to live in the highlands than is the sheep or any other wool-bearing animal. The government of Bolivia is making a special effort to stimulate the industry, and the production of alpaca wool is attaining con¬ siderable importance in the country.® (Samples of alpaca and llama wool, raw and woven into native fabrics, may be seen at the Bolivian Con¬ sulate-General at New York).

Four animals closely related to the camel of Africa and As:a inhabit the Andean high¬ lands. Of these the vicuna and guanaco are wild and hold no important position as a source of wealth. The skin of these animals is covered with a coat of soft hair and has value as a fur. Efforts to prevent their ex¬ termination, however, are of little effect in a country so sparsely settled and so difficult to police, and the fear is that they may eventually disappear altogether. The aloaca and the llama are domest:cated . . The alpaca, al¬ though closely related to the llama, with which it interbreeds freely, differs ... in the char¬

acter of its wool. The wool of the alpaca is generally black or white; occasionally, however, brown or spotted ones are found. It is cus¬ tomary to shear the alpaca every second year, but it has been found that the wool continues to grow for a longer period and that it would be profitable to shear them only every third year. The present yield averages about 10 to 15 pounds every second year . . . Among the wools alpaca is’ superior because of its re¬ markable strength, its flexibility, and the fine¬ ness of its texture . . . The production is lim¬ ited entirely to the Andean highlands of Peru and Bolivia.

Peru, in addition to her production of alpaca and llama wool, has large domestic sheep interests. The exports of alpaca wool in 1913 amounted to $1,573,670; 1914, $1,538,427; and 1916, $1,696,213. Of llama wool, the exports in 1913 amounted to $141,493; 1914, $90,477 ; and 1915, $144,152. Domestic wool, $797,868; 1914, $841,165; and 1915, $1,066,844. Exports to the United States in 1915 (fiscal year ending 30 June) amounted to 819,347 pounds, valued at $192,284; and 1916, 2,426,279 pounds, valued at

$669,174.

Colombia, although using a considerable quantity of wool in domestic manufacture, also produces some for export. The quantity sent to the United States in 1915 amounted to 915 pounds, valued at $218. No shipments were made in 1916. Paraguay also produces wool for export, the quantity sold abroad in 1914 being 93,634 pounds; and 1915, 129,127 pounds. Of this latter, 24,651 pounds were shipped to the United States, the remainder to Argentina, Uruguay, Italy and France. As to Venezuela, no figures regarding wool production are avail¬ able. Of the northern group of Latin-American states, Mexico is the greatest grower of wool. In normal times it is an important industry. Even during the recent troubled perod, her ex¬ ports to the United States amounted in 1914 (fiscal year ending 30 June) to 849,991 pounds, valued at $108,004; 1915, 1,154,626 pounds, value at $134,863; and 1916, 1,321,213 pounds, valued at $170,518. Of the remainder of the group, the only states exporting to the United States during 1916 (fiscal year ending 30 June) were Costa Rica, 19,574 pounds, valued at $8,935 ; Guatemala, 572 pounds, valued at $257 ; and Panama, 200 pounds, valued at $50.

W. B. Graham,

Trade Expert, Latin-American Division, War

Trade Board, Washington, D. C.

LATIN CHURCH. See Catholic

Church, Roman.

LATIN CROSS (crux immisa or capita), cross with the upright considerably longer than the transverse beam which crosses it near the top. It is generally regarded as the type used in the crucifixion of Christ and therefore be¬ comes a symbol of the Christian faith.

LATIN EMPIRE. See Byzantine Empire.

LATIN HYMNS. See Hymns, Latin.

LATIN KINGDOM OF JERUSALEM,

kingdom established and maintained by the Crusaders in Jerusalem in 1099-1187, and after¬ ward re-established around Saint- Jean d'Acre and maintained until 1291. The kingdom was the common property of Christendom and dur¬ ing its two centuries of existence its character

LATIN LANGUAGE

was international. The French, however, were strongest among the ruling officials, while the Italians attained a considerable economic in¬ fluence. The kingdom reached its greatest di¬ mensions toward the middle of the 12th cen¬ tury when it extended on the Syrian coast from Beirut to Raphia, from the Lebanon district on the northeast to beyond the Dead Sea on the southeast, extending along the Jordan to the Arabian Desert and including the port of A'ila on the Red Sea. The kingdom was organized on the feudal system and the sovereignty was vested in the body of feudatories who composed the high court rather than in the king whose authority was chiefly military. The court's au¬ thority governed the succession to the throne, made the laws and constituted the high tribunal from whose decisions there was no appeal. The <(Assizes of Jerusalem® was compiled by the court. Later in the 12th century a court of burgesses was organized, this having power over the burgesses, sentence of either exile or death being vested in it, a power withheld from the king and at first non-existent in the kingdom. The great feudal chiefs, however, really maintained inedpendent kingdoms within the limits of the greater kingdom, and on occasion even waged war without consent of the king. However, the royal authority had ample financial resources, derived from customs, caravan taxes and the monopoly of special industries. The right to coin money was vested within the king's authority, and with the consent of the high court he could levy additional taxes in case of threatened invasion. On the occasion of Saladin's arming against the kingdom in 1182 a tax of 2 per cent was levied on all revenues, even those of the Church. The vassals owed military service but received payment for it. Godfrey de Bouillon was elected Lord of Jerusalem, 22 July 1099, but did not assume the crown. He was succeeded by his brother, Baldwin of Odessa, who was crowned king of Jerusalem, 25 Dec. 1100. Baldwin I (q.v.) reigned until 1118 and was the real founder of the kingdom, greatly extending its territory and effectively organizing its power. He was succeeded by his son Baldwin II, 1118-31, who was followed by his son-in-law, Fulk, Count de Anjou. He also succeeded in increasing the importance of the kingdom, reigning in 1131-41, and succeeded by his son, Baldwin III, 1143-J32, under whom the kingdom reached its zenith, although the principality of Edessa was wrested from it in 1144. He was succeeded by his brother Amaury I, 1162-74, who aroused Saladin by his attempted subjugation of Egypt. His son Baldwin IV, 1174-85, ruled through a regent, owing to his illness from leprosy, and was succeeded by a nephew, Baldwin V, a child who was supposed to have been poisoned a year later. Dissensions among the

barons had by this time weakened the royal power and Jerusalem fell to Saladin in 1187 under the reign of Guy de Lusignan and his wife, Sibylla, mother of Baldwin V. The siege of. Saint- lean d'Acre was then begun and upon its sur¬ render, 13 July 1191, the kingdom of Jerusalem was re-established there. It continued in exist¬ ence until 1291, Jerusalem itself being within its jurisdiction in 1229-44.

LATIN LANGUAGE, The. One of the

Indo-European family of languages, spoken in

Latium and especially in Rome, and extended with the Roman rule over the ancient world ; the source from which the Romance languages (Italian, French, Spanish, Portuguese) are de¬ rived.

As one of the Indo-European languages Latin shows a relationship in vocabulary, in inflected forms and in syntactical structure to other branches, Greek, Sanskrit, Germanic, Slavic, but according to the theory now gener¬ ally accepted this indicates linguistic relation¬ ship only and does not necessarily imply an ethnological connection between the races speaking these languages. It was long held that the resemblance between the Greek and the Latin was so close as to warrant the belief that the two languages (and races) were de¬ rived from a common stock, but this theory (of a Graeco-Italian unity) is now generally abandoned. Probably the closest connection of Latin is with the Celtic languages.

Latin was one of a group of dialects spoken in central Italy. The other best known and most closely related Italic dialects are the Faliscan (which is scarcely more than a local variety of Latin) and the Osco-Umbrian. The latter was an extensive family of dialects spoken in the mountain districts of central Italy, especially in Samnium, and in early times was more widely distributed than the Latin and of at least equal advancement. The Oscan is represented by a number of inscriptions, of which the Tabula Bautina is the longest, and the Umbrian by the Iguvinian Tables, of some 4,000 words in length.

The Latin language was reduced to writing at an early period by the use of an alphabet derived from the Greek alphabet of the town of Cumae. Of this earliest period we have scanty records in inscriptions from about 500 b.c. down (the Fibula of Palestrina, the Duenos inscription) and in the rituals of the Salii and the Arval Brethren. These were not wholly intelligible to the Romans of the classical times and are still in part obscure ; but enough is clear to show that the language was at that period a raw dialect of limited vocabulary, in¬

capable as 3ret of expressing the thoughts or emotions of a highly civilized people.

The change from a rustic dialect to a lit¬ erary language took place in the 3d and 2d centuries b.c. It was brought about by two causes. In the first place, through the exten¬ sion of Roman power over the whole of Italy, Latin became the language of trade and of offi¬ cial intercourse throughout the peninsula ; in this process of expansion the language reflected the expanding interests and necessities of the people who spoke it, becoming by use richer in vocabulary, more varied and at the same time more regular in structure, and gaining by its contact with the Oscan and Umbrian. This process was aided also by the constant practice of oratory, which the workings of a free con¬ stitution called forth. In the second place, the contact with the Greeks of southern Italy gave an immense and lasting stimulus to literary production. At first this took the form of the drama and the epic, and the necessities of verse, particularly of the Greek hexameter, re¬ quired a conventional distinction between long syllables and short, such as the native rhythms, which were mainly accentual, had not required. The quantitive character thus given to the lan-

guage and the imaginative enrichment which came from its employment in poetry affected chiefly the language of literature. On the other hand, in t'he spoken Latin, the giving up of the Indo-European accentuation and the adoption of a new accent-law, by which the main accent was restricted to the penult and ante-penult, resulted in the frequent shorten¬ ing of the unaccented final syllable, especially in iambic words, and in the occasional dropping of final consonants. Acting in different di¬ rections, as a conservative force in the literary Latin, as a cause of rapid change in the spoken language, these influences produced the begin¬ ning of that separation between the language of books and the speech of the common people, which, though it occurs to some degree in all languages, is a most marked peculiarity in the development of the Latin language.

For about a century and a half before the beginning of our era and for an equal time after that date the Latin of books remained almost unchanged in sounds and forms ; its his¬ tory during this time deals with its growth and change as an instrument of literature. The Classical Period (the Ciceronian and Augustan) saw the culmination of Latin style, first in prose and then in poetry. Cicero was an

extraordinary master of style and in his hands the language lost its archaic stiffness of struc¬ ture and became a flexible and a complex means of expression. Better than any other Latin writer he used the periodic form of sentence, not as a mere rhetorical device, but as a suit¬ able expression for a complete thought, with all its subordinations and interdependence, in a unified and harmonious structure. Caesar also represents the simplest narrative prose, free from archaisms and absolutely unaffected and unadorned. In verse Virgil and Horace are types of the artistic use of imaginative speech, in which by a careful felicity of selec¬ tion and combination language is made to con¬ vey poetic suggestion, without either the affec¬ tation of the Alexandrian school or the heavi¬ ness of Ennius or Lucretius,

The change from the Classical Period to the <(Silver):) Latin of the early empire is likewise chiefly stylistic and from this point of view it must be regarded as a change for the worse. To a considerable extent pleasure in the mere arts and tricks of expression took the place in Ovid and Martial of true poetic force and poetry became contaminated by rhetoric. In prose, however, the rhetorical and individualistic tendencies were less injurious; Tacitus, though he abandoned the periodic structure of Cicero and introduced into prose many words from the vocabulary of poetry, nevertheless used a style suited to his tempera¬ ment and subject.

It is not worth while to follow in detail the later history of the literary-Latin. It was in the main rhetorical and imitative and it lacked that vigor of thought which alone can main¬ tain a vigorous linguistic life. To this general statement there are two exceptions. The Latin of the jurists kept up the tradition of accuracy and clearness, employing a technical vocabulary without rhetorical artifice, and the Christian writers, possessed by the supreme desire to convey a serious message to unlettered readers, continued the spirit, if not the form, of the better Latinity. With these exceptions, how¬

ever, the Latin of literature is, after the 2d or 3d century, no longer in the fullest sense a living language.

Meanwhile the Latin of daily life, the lan¬ guage spoken by the common people of Rome, by slaves and provincials and soldiers, had con¬ tinued to exist under the level of the literary language, from which it was separated about 250 b.c. The evidence for the spoken Latin during the later republic and the early empire is somewhat scanty, consisting of occasional inscriptions like the wall-writings of Pompeii or passaged in authors like Petronius, in which the colloquial Latin is intentionally imitated. But the effect of the accent in the

shortening of final syllables is to be seen even in Horace and Virgil and this tendency leads in some in¬ scriptions to the loss of final consonants. After the 3d century of our era we have increasing evidence of change in sounds and forms. The vowel e and the diphthongs ce, ce were no longer clearly distinguished in sound, and were there¬ fore confused in writing; cm became o; b and v were interchanged; the softening of c, t and g before e and i began ; initial h was lost or was misplaced (this had begun in the time of Catullus). Still more marked was the loss of the distinction, probably never made with great precision in the ordinary speech, between long and short vowels, and the consequent re¬ appearance of accentual verse. The disappear¬ ance of final consonants, especially m and s, destroyed the distinctive marks of gender and even of case, so that cases, being no longer distinct in form, were not clearly differentiated in usage. In syntax the older paratactic con¬ structions, which are found in Plautus and oc¬ casionally throughout Latin literature, again appear and analytic idioms (habere as an auxiliary verb) began to displace the inflec¬ tional verb-forms; the use of prepositions weakened the force of the cases; conjunctions lost their original meaning quod , for example, driving out other conjunctions. All these are steps toward the passage from Latin to the Romance languages. They went on at differ¬ ent rates in different parts of the empire and under different conditions, but the beginning of many can be traced back to early Latin and they are not to be thought of as accidents by which the Latin language was destroyed, but as entirely normal and natural changes which mark the progress of the language from the inflected stage to the comparatively uninflected condition of the Romance languages. From this point of view the Latin of literature is to be regarded as a deviation, in some sense artificial, from the normal life of the language. See Alphabet.

Bibliography. — There is a good sketch of the history of the Latin language in the (His- torische Grammatik der latinische Sprache) (I, 1) by Stolz, and a longer history and dis¬ cussion by Weise, (Charakteristik der latin¬ ische SpracheP

Edward Parmelee Morris, Professor of Latin, Yale University.

LATIN LITERATURE. Within the brief limits of the following sketch it will not be possible to describe fully the characteristics of single writers (for these special articles must be consulted) ; only_ a general history of Latin literature will be given, with a summary esti¬ mate of its value.

LATIN LITERATURE

A division into periods will be found con¬ venient, though such divisions in a continuous development must not be understood to imply abrupt changes.

L The Prehistoric Period down to 240 B.C.- — No complete writings from this period survive in their original form, but from frag¬ ments and chance allusions it is known to have been a period of native beginnings, as yet un¬ touched by foreign influences. In poetry, which from its nature takes literary form before prose, we possess partly modernized fragments of religious ritual in verse, the forerunners of a kind of lyric. A few allusions seem to indi¬ cate the existence of the custom of chanting lays in honor of national or family 'heroes, which might under favoring conditions have flowed together into an epic, and many refer¬ ences and some later fragments show that vil¬ lage festivals, in Italy as in Greece, were cele¬ brated with songs and dances of a mimetic and humorous character, out of which a subor¬ dinate kind of drama actually arose, even after the introduction of Greek comedy. Semi- ritualistic charms and farmers' maxims, of which Cato gives us> specimens, might easily have been collected into a didactic poem on agriculture. In prose the legal codifications were already well advanced, and the many forms of official record furnished the material for history and, indeed, dictated its earliest annalistic form. Oratory, as might be expected, was in constant use in the Senate, in popular assemblies, and for purposes of eulogy, and a speech of Appius Claudius Caecus, delivered in the Senate in 280 b.c., was still extant in the time of Cicero. Thus in several directions the germs of a native literature had appeared be¬ fore the Greek influence was felt.

2. The Period of Greek Influence, Begin¬ ning with 240 B.C. and Lasting for about a Century. — 'Through the conquest of the Greek cities of southern Italy the Romans first be¬ came fully aware of the treasures of Greek literature, by that time practically complete. Its introduction into Roman life was due to a Greek slave, Livius Andronicus, who translated plays of the Greek ((New Comedy® (Meander and others) for presentation at the Roman festivals and put the 'Odyssey* into Saturnian verse to be used as a reading-book in schools. He thus gave a new impulse and direction both to dramatic and to epic poetry and he was fol¬ lowed in the drama by native Italians, Naevius, Plautus and Ennius, and in the epic by Naevius, who wrote a history of the First Punic War in the native accentual verse-form. Ennius, the most influential writer of the period, continued the epic still further by writing in hexameters a history of the Roman race,

which remained the national epic until the appearance of the

treatise on farming which, in a partially modernized form, is still extant. The writing of history had already begun, in the Roman annalistic form, though in the Greek language, but Cato wrote a history of Italian towns in Latin. There was also considerable activity in legal writing, though systems of juris¬ prudence came somewhat later. This last was purely Roman and in general the Greek in¬ fluence was less felt in prose, and the impulse to stylistic finish was less active than in poetry.

The period was thus one of beginnings in many lines. The stimulus of the Greek litera¬ ture was almost a tyranny as to the form, espe¬ cially in poetry, but in the writers of more original mind the Italian spirit and something of the Italian form, like the music and dances of comedy, still maintained itself. In the period of transition to Cicero's time (about 1 50—84 b.c.) the further growth of oratory, history and jurisprudence in prose, and the writing of plays on Italian subjects and in native form, showed that the Latin spirit was recovering from the first dominance of the Greek artistic form. In particular, it was during this time that the purely national satire received its permanent form and direction at the hands of Lucilius.

3. The Ciceronian Age, 83-43 B.C. — In this period, which is defined by the beginning and the end of Cicero's literary activity, Latin prose reached its culminating point, combining at last into a harmonious whole the earnestness of the Roman and something of Greek artistic skill. The practical national tendencies were still exemplified by Varro, who gave a long life to investigation and published works in many fields, in law, history, philosophy, gram¬ mar and agriculture, with an almost exclusive attention to the matter rather than to the style. In history Sallust may be called the first of Roman historians, in the true sense of the word as distinguished from the annalists and antiqua¬ rians, but his style is intentionally archaic and not wholly natural. The period was especially rich also in political writings, in the form of biographies and memoirs, among which must be included the commentaries of Caesar, historical in form, but written for a political purpose, and models of perfectly simple narrative in the pur¬ est diction. But the chief figure in the litera¬ ture of the period was Cicero. He was a man of wide knowledge both of the earlier Roman oratory and of Greek rhetoric; he was equally interested in the theory and in the practice of public speaking, and his warmth of tempera¬ ment and purity of taste in composition made him an eminent master of style. His writings have remained since his time the models and standard of Latin prose. Aside from his speeches, of which some 50

are extant, he left valuable works on rhetoric, some well-written treatises on philosophy and a large and ex¬ tremely interesting collection of letters, gathered and published after his death by his secretary.

In poetry also this period was second only to the Augustan Age. Lucretius, continuing the tradition of didactic poetry, wrote in hexam¬ eters an exposition of the atomic theory of Epicurus. The subject was in itself unsuited to poetry, but Lucretius has so infused into it his own moral earnestness and so interspersed and adorned the doctrines with passages of

lofty beauty that the work is intensely Roman and is undoubtedly the greatest didactic poem in existence. In lyric poetry Catullus left be¬ hind him at his early death a few score of poems, almost all quite short and some of them overwrought with imagery and allusion in the Alexandrian manner, but of the purest lyric strain and in this one respect superior to the

4. The Augustan Age, 43 B.C. to 14 A.D.

This period was, in contrast to the preceding, mainly an age of poetry. The loss of political freedom affected unfavorably both the public oratory and the political and historical prose. Scarcely an orator of the period has left more than an empty name and public speaking sank into declamation and rhetorical display. In his¬ tory there is the one great name of Livy, but even he, though a friend of Augustus, found in the history of the past a kind of refuge from the political hopelessness of his own time. His style, in the narrower sense, was an adaptation of the periodic sentence structure of Cicero to the purpose of narrative, to which it is not en¬ tirely suited, but his descriptions — his (

But the conditions which were unfavorable to the highest kinds of prose composition fos¬ tered production in the unemotional and imper¬ sonal fields of technical writing. To this per¬ iod belong the work of Vitruvius on archi¬ tecture, the extremely learned work of Verrius Flaccus on lexicography and grammar, now unfortunately lost, and some important writers on law. It was, however, in poetry of high quality that the age was especially productive. Virgil, after some imitations of Theocritus and a very perfectly finished poem on farming, left behind him at his death the

Taken all together, this roll of names, though no one of them is quite of the very highest rank, entitles the Augustan Age to a place among the great periods of literary production.

The Ciceronian and Augustan periods are sometimes put together and called the Classical Period, or, in contrast with that which follows, l he Golden Age of Latin Literature.

5. The Silver Latin, 14-117 A.D. — Two

characteristics mark the literature of the early empire. On the one hand, technical skill in the craft of writing was never greater nor more generally exercised. Verse-composition was common and the versification was accurate and finished. But, on the other hand, the in¬ creasing tyrannies of Tiberius, Caligula, Nero and Domitian suppressed independence of ut¬ terance and even of thought and the decrease in race-vigor weakened the nobler impulses to expression. Technical skill was therefore put to frivolous or ignoble uses and was directed by petty vanities into mere affectation, instead of being controlled by a reserved taste and a sober purpose. Poetry borrowed the rhetorical devices of prose and prose used the vocabulary of poetry.

But while this description is fairly appli¬ cable to most of the writers of this and the succeeding period, there were not a few writers who, though they were inevitably affected by the character of their times, were yet raised by interest in their subject or by refinement of taste almost to the level of the Classical Period. This was true in a measure of many of the writers on technical subjects, grammar, agricul¬ ture, medicine, law ; such, for example, was the elder Pliny, who collected a sort of compendium of knowledge in his (Naturalis HistoriaP The philosopher and poet Seneca has been at times highly esteemed, but it is difficult to acquit him of insincerity and his closet-dramas betray his tendency to bombast. Quintilian, however, was a great teacher of rhetoric in the best sense and a writer of learning and taste, who would have been distinguished in any age. With him may be ranked, though on different grounds, the younger Pliny; the collection of his letters was made by himself and the letters were doubtless written for publication, so that they lack (ex¬ cept the correspondence with the Emperor Tra¬ jan) the interest of Cicero’s letters, but Pliny was a man of excellent taste and of creditable aspirations and his character as revealed in his correspondence is distinctly attractive. The greatest prose writer of the period was Tacitus, the historian. He had endured and been em¬ bittered by enduring the dreadful oppressions of Domitian’s rule and under the liberal reign of Nerva and Trajan he

used his opportunity to write truthful and independent histories of the empire. His style is individual and difficult from its condensation, but better suited to his subject than the Ciceronian periods would -have been, and his treatment of his theme, though not free from prejudice, is extremely powerful. Herodotus and Thucydides in Greek and Livy and Tacitus in Latin are the four great histo¬ rians of the ancient world.

On the side of poetry, though there were many writers of some merit, only a few deserve mention here. Martial composed epigrams, Lucian wrote an epic of the civil war between Caesar and Pomney, and Persius and Juvenal were satirists. The latter is, in spite of rhetor¬ ical blemishes and a repellant savageness of tone, one of the greatest writers in Latin litera¬ ture and his satire has been the model for much writing of the same kind in English literature.

6. The Later Empire. — Of writers after the end of the first century of our era few are of importance from the strictly literary point of view and there is a certain justice in closing

the history of Latin literature with Tacitus. But in the long list of writers of the next four or five centuries there are many whose works have, apart from their form, an intrinsic in¬ terest, in some cases a very great interest. From them may be selected the following names : In history, Suetonius, Ammianus and the (Scriptores Historiae Augustse) ; in literary commentary and criticism, Gellius, Donatus Servius and Macrobius; in grammar, Marius Victorinus and Priscian. The most original and perhaps in a true sense literary work: of these centuries is to be found in the legal writings, from Gains to the (Code of Justinian, > and in the Church Fathers, Lactantius, Ambrosius, Jerome, Augustine and many others; in writers of both of these classes interest in the subject checked the prevalent inclination to regard the art of writing as an end in itself rather than as a means.

This chronological review of Roman litera¬ ture may be supplemented by a brief summary and estimate of Latin writers by classes accord¬ ing to their form or subject matter. In the comparative simplicity of the ancient literatures the connection between writers in the same class was more direct and therefore more note- worth}” than it is in modern times.

The Roman drama, having been early checked in its possible growth by the introduc¬ tion of Greek models, took almost entirely a Grjeco-Roman form. Of the tragedies nothing has been preserved except the book-plays of Seneca, and the writing of tragedy for the stage had come to an end before the time of Cicero. The form of drama which took its subjects from Roman legend appears to have been only slightly successful and it is evident that the serious drama had little hold upon Roman life. The comedies, even those of Greek form like the extant plays of Plautus and Terence, expressed more of the Italian spirit and retained their hold upon the stage, and the farces, the mimes and the Atellan plays were even more popular. The Italian interest, then as now, was more in the acting and impersonation than in the dramatic form or story.

In epic poetry the glory of the Homeric poems was so great as to determine, somewhat to its disadvantage, the form of the Roman na¬ tional epic. It is not unlikely that Ennius was in this respect more truly national than Virgil. The poet of the (Hiineid) was in truth hampered by the Homeric machinery of gods and heroes and by the supposed necessity of imitating in one part of his poem the wanderings of Odys¬ seus, in another the battles of the Iliad. These things were not real to him ; they were epic conventionalities which he felt obliged to adopt, as he adopted at times the phrases and the similes of the Homeric style. In all these re¬ spects, in which the ˆTEneid* is most fre¬ quently and quite properlv compared with the Greek epic, Virgil is plainly the inferior and they are sufficient to exclude him from the small company of the world's greatest poets. But in the occasional passages where he is in¬ spired by the opportunity of expressing his real theme — the greatness of the Roman state — he writes with a proud dignity and a conscious understanding of the meaning of history, to which there is no parallel in the Homeric poems. Ffis verse also is suited to the dignity

of his thought ; his hexameters are composed as wholes, while the Homeric hexameter ap¬ pears to retain the traces of its composition out of two short half-verses. The Virgilian verse is less suited to the simplicity of nar¬ rative, but is unequalled in elevation.

Didactic writing in prose and verse was es¬ pecially natural and attractive to the Roman mind and the series of didactic works extends from the earliest times down to the end. The most notable in verse are the great poem of Lucretius (De Rerum Natura) and the of Virgil. Both depend largely — Lucretius wholly — on Greek authorities for their subject matter, but two more thoroughly Roman poems could not be named. In form the work of Lucretius is incomplete; the (Georgics) is

one of the most perfectly finished poems in Latin literature.

Lyric poetry in Latin has an especial inter¬ est from the fact that the Greek lyrics of the best period are preserved only in fragments and our conception of this important form of poetry in ancient literature must be derived chiefly from Catullus and Horace. Apparently the best qualities of Alcaeus and Sappho are better re¬ produced by the free spontaneity of Catullus than by the careful workmanship and mature intelligence of Horace. We are fortunate in the possession of both. Lucretius, Catullus, Virgil and Horace are the four cornerstones of Latin poetry.

The elegy is closely allied to the lyric, from which it differs chiefly in the use of the elegiac couplet, hexameter and pentameter. The ex¬ amples that we have in Tibullus, Propertius and Ovid do not conform to the rule of ancient grammarians that elegy should deal with melan¬ choly themes. But the somewhat despondent temperament of Tibullus and the simplicity of his treatment are well suited to elegy. Proper¬ tius is more virile, but is over-much given to the display of Alexandrian learning. In the amatory elegiacs of Ovid his extraordinary cleverness has a congenial field and his lack of essential manliness is less detrimental than elsewhere.

Epigram and satire were also natural forms of expression for the Italian, and many epi¬ grams are extant in inscriptions or are pre¬ served anonymously in the Anthology. Martial is the only writer whose collected epigrams have come down to us. They are often neat, often amusing, but this form of art is of course not very high. In satire the Romans claimed complete originality and apparently with justice. The satirical spirit may express itself in comedy or epigram or in semi-lyrical iambics like the (Epodes) of Horace, but the grammarians meant that in Latin the satire had been given a distinct conventional form — a short poem in hexameters — in which was expressed a distinct tone of critical comment on persons or on social life. In this sense satire can be clearly traced from Lucilius through Horace to Persius and Juvenal. Of the four Horace is incomparably the most humorous and in reality the most penetrating; Lucilius is preserved only in fragments, Per¬ sius is obscure, and both the objects of Juve¬ nal's satire and the indignation with which he attacks them are too real to give pleasure.

In the prose literature of Rome, oratory and history hold the first place. In both the art

took substantial form before the national tend¬ ency was overwhelmed bv the finished Greek productions. Oratory is represented in the ex¬ tant literature only by some late Panegyrics and the speeches of Cicero, a small amount in comparison with the volumes of the Attic ora¬ tors. It is peculiarly unfortunate that we have none of the political speeches which played so large a part in the history of the republic ; they would undoubtedly illustrate the prevail¬ ingly practical character of Roman oratory and would show how steadily it grew to the height of Cicero's (Second Philippic.* Up to this point, while it was increasingly stimulated by the best Greek models, it was able to resist the influence of Greek rhetoric. After Cicero's time the teaching of rhetoric, which had be¬ come common in Rome, brought about an un¬ due attention' to form and a consequent loss of power.

The writing of history also long served a practical end. It began as a mere expansion of the official annual records, including the names of magistrates, the important public events and the recognized prodigies. This kind of history continued to be written after Naevius and En¬ nius had composed more elaborate histories in verse, and, even when Roman history was writ¬ ten in the Greek language, it was but little in¬ fluenced by the great Greek models. It is with Sallust and Nepos that the writing of history really began and its importance in Latin litera¬ ture is attested by the long line of minor historians.

Roman philosophy can make no claim to originality.. It is found, in prose, in Cicero and Seneca. The former gave free renderings of the best Greek works on ethical philosophy with special reference to its value in the training of the orator ; the latter wrote without much sys¬ tem brief essays on ethics.

Of epistolary literature, either letters act¬ ually sent to the persons addressed or essays in epistolary form, a considerable amount is known through allusions and the two collections by Cicero and Pliny have been mentioned. They are a unique feature of Roman literature, since it happens, perhaps from the concentration of Greek life in single cities, that no such collec¬ tions are extant in Greek.

Of the technical writings enough has been said. They belong to all periods of the litera¬ ture and cover almost all fields of study, agri¬ culture, grammar, literary criticism, architec¬ ture, medicine, rhetoric, military strategy, engi¬ neering, astronomy, law ; the first and the last subjects in this list being by far the most abun¬ dant and important.

In comparison with the Greek literature the Latin is inferior in imagination and in form — two important characteristics; it is superior in the directness of its human appeal and in its practical worth to the modern world. It is sometimes said to be an imitative literature, but it is rather a continuation of Greek literature in new surroundings. The influence of Greek lit¬ erature upon Roman is not different in kind from the influence which modern literatures exert upon each other.

A comparison with modern literature is less easy, because the differences are greater. The ancient literatures follow more strictly defined lines of tradition, especially in poetry. The Roman circle of readers was more limited than

the modern and literature was therefore less broadly based and less representative of a wide variety of interests. And the comparative ab¬ sence of the romance or novel and the slight use of the motive of romantic love makes a very obvious difference. See articles on the in¬ dividual authors mentioned, for further bio¬ graphical and critical material. See also Latin Writers ; Classical Literature.

Bibliography. — Schanz, M., (Geschichte der romischen Literatur) (in Muller, (Handbuch der klassischen Altertumswissenschaft,* 3d ed., Munich 1905-14) ; Teuffel, W. S., and Schwabe, L., (Geschichte der romischen Literatur* (Eng. trans. by C. C. Warr, London 1891-92) ; Mackail, J. W., (History of Latin Literature> (New York 1895); Sellar, W. Y., Toman Poets of the Republic and Roman Poets of the Augustan Age* (Oxford 1892) ; Tyrrell, R. Y., (Lectures on Latin Poetry* (Boston 1893) ; Moulton, (The Ancient Classical Drama) (2d ed., Oxford 1898) ; Fowler, Toman Lit¬ erature J (New York 1903) ; Mayor, John E. B., bibliographical Clue to Latin Literature* (based on the work of Dr. E. Hiibner, Lon¬ don and Cambridge 1875) ; Duff, J. D.,_ (A Literary History of Rome from the Origins to the Close of the Golden Age* (London 1909) ; Howe, George, (Recent Criticism of Latin Literature) (Baltimore 1913) ; Peignot, Charles, (Bibliotheque choisie des classiques latins) (Paris 1813) ; Plessis, (La poesie latine) (Paris 1909).

Edward Parmelee Morris, Professor of Latin, Yale University.

LATIN LITERATURE OF THE MID¬ DLE AGES. The very greatness of the Roman Empire gives the reason for its dis¬ solution, even apart from the barbaric invasions, and the vicissitudes attending this dissolution were reflected in the cultivated and the popular language alike. There was this exception, how¬ ever; the latter preserved its

vitality upon the tongues of the people, while the former tended to become a sort of official lingua franca with the monks and notaries, and even with the learned was modified by the influence of the colloquial dialects and new forms of thought, until it lost nearly every vestige of its former elegance and grace and became the barbarous Latin which, after serving as vehicle for the thought of western Europe for seven centuries, contributed to the later revival of that tongue in its classic purity that was so important a feature of the Renaissance.

The Latin language during the centuries of the literary decadence could not of course be maintained in this classic purity. On the one hand, the prevalence of vulgar idioms and the accumulation of foreign elements through the granting of citizenship to all the subjects of the empire, and, on the other hand, the rapid transformation of thought which, to give ex¬ pression to new ideas, constrained the words to new meanings often far removed from their origin — these were the elements which con¬ tributed to the rapid corruption of the literary language. Meanwhile, in the individual prov¬ inces, the mixture of the official language with the dialectal elements and the natural differ¬ entiation due to a variety of causes had brought about the birth of different forms of the lan¬ guage from the 3d century on ; so that the Gallic Latin, for example, had its own charac-

teristics which distinguished it from the Afri¬ can Latin with its bombastic sonority. These were the first germs of new languages which were to spring from the root of Latinity. Nevertheless, although it is probably impossible to determine just when Latin ceased to exist as a spoken language among the common peo¬ ple, it continued throughout the Middle Ages to be the language of the Church, of the law courts and of both religious and secular edu¬ cation and in this way became the medium of no inconsiderable number of real literary pro¬ ductions.

It is generally conceded that the Middle Ages began with the fall of the Empire of the West in 476, for it was then that the civil¬ ization and culture of the ancient Romans suc¬ cumbed to the barbarians. It is from this point, then, that we begin the history of the Latin literature of the Middle Ages, continuing from that date to the fall of Constantinople in 1453. For purposes of discussion, it will be convenient to make roughly a division into pe¬ riods, although this does not necessarily con¬ note abrupt changes. From 476 to the 8th

cen¬ tury Latin literature is found in a condition of deepest decline, from which it recovers by progressive steps through the ecclesiastical re¬ naissance (from the 8th to the 10th centuries) and the period of scholasticism (from the 11th to the 14th centuries) to the world Renaissance (from the 14th century on). Without making these arbitrary limits too hard and fast, we shall proceed to enumerate briefly the chief authors in the various fields of literature.

1. Pre-Carolingian Period. — With the tri¬ umphant spread of Christianity, the things of the world had lost their appeal and the think¬ ing man begins to look within; after the con¬ version of Spain and France, the only worthy objects of human endeavor are the restoration of God's kindom on earth and the struggle against earthly enticements to sin. There arose a natural antagonism to pagan literature and consequently to pagan literary forms and ideals, many Christian writers professing to despise exactness in writing, <(since I think it utterly unworthy,® as Pope Gregory said, (

Latin literature then became identical with the record of Christian writers and the purely Roman element, or one might say the purely literary element, was bound to suffer in conse¬ quence. The apologetics and polemics of the early patristic literature disappeared with the spread of religion and Christian literature tended to go in new directions, chiefly toward mysticism and away from dogma, which was no longer of prime importance because of its universal acceptance. This tendency was mani¬ fested, for instance, in the abandonment of the purely textual criticism of the Holy Scriptures for interpretative criticism and also in hagiog¬ raphy, that fertile field of holy romance so im< portant throughout the Middle Ages. More¬ over, the influence of the Christian hymns

caused accentual rhythm and rhyme to be firmly established in literary Latin upon the same footing as classic metre.

Although all literary life gradually became extinguished with the transfer of the seat of the empire to Byzantium and the supremacy of the barbarians in all the Western provinces, some remnants remained, especially in Africa and Gaul, and in Italy too during the reign of Theodoric, which was a time of peace. Poetry was cultivated by the African school under the dominion of the Vandals likewise. Among the African poets were Dracontius, Luxorius and Corippus, and of the non-African poets men¬ tion should be made of Alcimus Ecdicius Avitus, M'agnus Felix Ennodius, Maximianus and Venantius Fortunatus, the latter being famous as a hymn-writer.

This period of barbarity also saw a few truly great examples of prose-writers. First of all, Anicius Manlius Torquatus Severinus Boethius (480-524), the celebrated Roman sen¬ ator who was imprisoned by Theodoric and condemned to death. While in prison he com¬ posed his most famous work, (De consolatione philosophic,* a mixture of prose and verse after the manner of Martianus Capella in which the author imagines that Philosophy appeared to him in prison and consoled him for his sufferings. Boethius composed many other works on philosophy and mathematics as well as on Christian doctrine.

Next to Boethius in importance is Magnus Aurelius Cassiodorus Senator (c. 480-575), the secretary of Theodoric, outliving him as well as the fall of the Goths and the coming of the Lombards. The last years of his life were passed in the retirement of a cloister founded by himself, and it was he who introduced the rule of copying manuscripts which has pre¬ served for us the treasures of the ancient classics. His activity as a writer embraces two periods, that of his political life and that of his cloistered life. To the first period belong panegyric orations in praise of the Gothic kings; (Chronica) ; (History of the Goths,* of which we have only the epitome made by the Goth Jordanis, and a collection in 12 books of everything written in connection with his office. To the second period belong Hnstitutiones divi- narum et ssecularium litterarum* and several other works.

The chief historian of the period is Gregory of Tours (538-593), author among other works of miraculous legends of the saints, but more especially of 10 books of (Historia Francorum,* which won for him the appellation, (Herodotus of the Franks.* Only improperly does one number among the historians the Briton Gildas, called the Wise.

Among the theological writers should be mentioned Benedict of Nursia (c. 480-543), the founder of Monte Cassino, who wrote a (Regula* which was extremely important in later monastic development. But ahead of all stands Pope Gregory I, surnamed the Great (c. 540-604), from whom, besides biblical. com¬ mentaries, homilies and a book on the duties of the sacred ministry, we have many (800) let¬ ters, important for the history of the time, and eight or nine hymns. Excluding these and Eugippus (511), the author of the incomparable biography of Saint Severinus, the theological writers of the period belong to the provinces

of North Africa (Verecundus and others) and Spain (Leander of Seville and Martin of Bracara).

Grammar and erudition also in this period found some valiant cultivators. Besides Fa- bius Planciades Fulgentius, there was at the time of the Emperor Anastasius (491-518), the grammarian, Priscian of Caesarea, who wrote at Constantinople, but in Latin, 18 books (Insti- tutionum grammaticarumP in which he has handed down to us the most complete work on the Latin language, especially important for the many remnants of ancient literature which are there preserved. From a pupil of Priscian, Eutyches, we have an (Ars de Verbp) in two books. Although living in the East, these were the last grammarians of any value ; in the West studies were entirely decadent, as may be seen, for example, from the grammatical writings of Virgilius Maro, a Gaul of the 6th or 7th cen¬ tury, full of ridiculous questions and whimsical speculation.

In the midst of such great agitations of peoples and changes in government as were at¬ tendant upon the incursions of the barbarians, it is natural that there was felt the need for establishing a standard of law by combining the dispositions of the Roman laws with the new barbarian constitutions. In the West attempts to satisfy the new needs are found in the (Edictum Theoderici Regis) (500), the (Lex Romana VisigothorunP or (Breviarium AlaricP (506) and the (Lex Romana BurgundionunP (516). But the most important was the (Corpus Iuris) prepared in the East by Justinian (5 27- 565), consisting in two principal parts, the law of the jurisconsults (Hus vetus®) and the im¬ perial law (((ius principale®). The latter was codified in the (Codex Justinianus) (528 and 534), the former was divided into 50 books called

By the 7th century all literature had ceased in Italy and in France. Only in the Visigothic kingdom in Spain did some remnants of the ancient culture remain. There we find the bishops Eugenius and Julian of Toledo, but the most prominent figure of this time is Isidore (c. 570-636), bishop of Seville, the author of many historical, grammatical and theological writings. The most important is the work en¬ titled (Etvmologiarum Libri XX, J containing the exposition of the seven liberal arts, of med¬ icine, of jurisprudence, of religious history and finally the treatise (books 9-20) on questions of language. For the knowledge assembled there, it has considerable importance, notwithstanding the lack of critical discrimination.

The deterioration of classical culture be¬ comes very marked in this century. Quite bar¬ baric is the Latin of the Frank Fredegar and his

continuators, who wrote an extremely valu¬ able chronicle of the times. An echo of classic

culture, however, resounds in England with Aldhelm (c. 650-709), the writer on prosody, with the Venerable Bede (674-735) of North¬ umberland, whose erudition arose above the standard of his time, with Tatwine (d. 734), archbishop of Canterbury, grammarian and poet, and with Boniface (683-755), the author of a grammatical manual, who later became the “Apostle of the Germans.® Bede was a prolific writer in nearly every field of literature. Be¬ sides lives of the saints in metrical form and other poems, he wrote grammatical, mathemat¬ ical and theological treatises, sermons, and espe¬ cially the (Historia ecclesiastica gentis An- glorum) and the

To this century also belong the Irish poet, Columbanus (543-615), the founder of the monastery of Bobbio which later became famous as the home of learning in northern Italy, and his fellow-countryman, Adamnan (c. 624-704), the author of a biography of Saint Columba, “the most complete piece of biography that all Europe can boast of through¬ out the Middle Ages.®

2. Carolingian Period. — The Carolingian

Age marks a comparatively sharp division in the literary history of Latin. It brought learn¬ ing into good repute again and furnished ma¬ terial for writers. Besides a theological litera¬ ture of imposing proportions, this period pro¬ duced a vast body of poetry, epistles and his¬ torical writings, all based more or less con¬ sciously on classical models. The leader of this, revival was Alcuin (c. 735-804), although his importance as a teacher surpasses that as a writer. After teaching 15 years at York he went over to France and presided over the court school of Charlemagne. Besides several treatises on grammar and rhetoric in dialogue form, he also composed scriptural commen¬ taries, works upon astronomy and metrics and poems.

The teacher of Greek at Charlemagne’s court school was Paul Warnefrid, better known as Paulus Diaconus (c. 725-797), the first import¬ ant historian of the Middle Ages after Gregory of Tours. He was also prominent on account of the extent of his classical culture and lit¬ erary skill, which were singularly displayed in the six books of his Hlistoria Langobardorum,) written at Monte Cassino, and in his sum¬ mary of the abridgment of Varrius Flaccus by Pompeius Festus. In the latter half of the 8th century the Irish monk, Dicuil, composed a summary of geography.

Linking the 8th to the 9th century the tradition of learning which Alcuin had brought from York to Tours was transmitted through Rabanus Maurus (c. 776-856) to Fulda. Apart from extensive commentaries on the Old and New Testaments, he wrote several educational treatises and a sort of encyclopedia entitled *De universoP Among the pupils of Rabanus was the future abbot of Reichenau, Walafrid Strabo (c. 809-849), who studied Christian and pagan poets and wrote on sacred as well as secular themes. His (HortulusP a description of plants in the monastery garden, was widely read during the years following, while his (Visio WettinP is justly regarded as a proto¬ type of Dante's (Divine Comedy. * Four biog-

raphies of saints, two in prose and two in verse, are also attributed to him.

In the middle of the 9th century flourished Sedulius Scotus, the author of a commentary on Porphyry and a guide for princes entitled (De rectoribus Christianis,* and Joannes Scotus Eriugena, the author of a commentary on the Gospel of Saint John and glosses on Martianus Capella and Boethius, besides his philosophical work, (De divisione naturae.) In the latter half of this century appeared the monk of Saint Gall, Notker Balbulus, who wrote legends and anecdotes,

Besides the writers mentioned above, each of whom wrote in several departments of lit¬ erature, there were several authors during the first part of the Carolingian period who at¬ tained prominence in some one particular field. In philology and grammar, mention might be made of Servatus Lupus, abbot of Ferrieres, and Eric and Remi of Auxerre, authors of glosses and commentaries on the Bible, Pris- cian, Boethius, Martianus Capella and Aristotle. In poetry stands forth the name of Theodulf (c. 760-821), who occupies the first place among the Carolingian poets, and in history, the names of Anastasius Bibliothecarius (c. 810-879), the compiler of an historical work, (Chronographia tripartita, > and other historical works, Willi¬ bald, the author of a life of Saint Benedict, and Einhard (c. 770-840), a layman, educated at Fulda. The latter composed in admirable Latin a (Life of Charlemagne, > modeled after the (Life of Augustus) of Suetonius, and sev¬ eral other works of an historical character.

In the 10th century the monastery of Gan- dersheim was famous as the retreat of the nun-poetess, Hroswitha (c. 930-c. 1002). With a view to

providing the age with a purer litera¬ ture than that of Latin comedy, she composed six moral and religious plays, in which she imitates Boethius as well as Terence. Two biblical poems, six legends and two epics are ample evidence of her industry and an excep¬ tional number of recent editions of her plays attests her enduring popularity. In the mid¬ dle of this century also appeared an epic which in some ways indicates the high-water mark of pure literature in mediaeval Latin. This is the

The 11th century saw the rise of the Goliard songs popular with itinerant clerical students. These were lyrical in form, but they were often far from lyrical in substance and feeling, so that the Goliards were finally suppressed. These songs seem to have been the precursors of modern college songs of the type of the (Gaudeamus igitur.)

3. Scholastic Period. — Although during the

two centuries following the reign of Charle¬ magne letters suffered a partial eclipse due to the last great invasion from the North, in the monasteries the classic authors were still read

and studied and copied — in fact it is to the tireless work of the monks that we owe the preservation of the classical texts — and in this manner the way was paved for the great scholastic movement which followed. The rise of the universities and the elaboration of scholastic philosophy after the Crusades brought about another linguistic creative pe¬ riod. Scholasticism, however, in the broad sense of the word, began much earlier than the mediaeval schools. There is no absolute break between the patristic and' the scholastic literature. The Church Fathers who flourished before the fall of Rome were followed by the writers of compendia of universal knowledge, such as Cassiodorus, Isidore and Bede, through whom the slow demarcation of the field of philosophy was brought about and philosophical problems gradually assumed their proper place, but until the 12th century there was a lack of systematization. The last great representative of scholastic philosophy cast in the non-svstem-atic form is Saint Anselm (c. 1033-1109), a native of Lombardy who later became arch¬ bishop of Canterbury.

Scholasticism, in the more restricted sense, begins with the 12th century. On the ground that truth cannot contradict truth, it seeks to harmonize the teachings of the Christian re¬ ligion with the results of philosophical investi¬ gation. This is not the proper place, however, for a history of scholasticism, except in so far as it produced works of literary merit. It will be sufficient for our purpose to mention merely

its chief exponents. After Roscelin and Wil¬ liam of Champeaux comes Peter Abelard (1079-1142), famed as a teacher and of great influence in the next century. His most im¬ portant contribution to philosophy and theology was his (Sic et non,* although he composed other works on a variety of subjects. Adelard of Bath was one of the first mediaeval scho¬ lastics to seek knowledge by traveling in Greece and Asia. Other writers of -prominence in scholasticism of the 12th century were Hugo and Richard of Saint Victor, Alain de l'lsle and Peter Lombard (c. 1100-c. 1160). The latter was the author of four books of (Sen¬ tences,) which became the object of innumer¬ able commentaries in the years that followed.

Strictly literary productions, however, were comparatively rare in the 12th century. John of Salisbury (c. 1115-80) has left us lives of Saints Anselm and Thomas of Canterbury and several other historical and philosophical works, and Bernard of Clairvaux (1090-1153) has left us, among other works, his (De con¬ sideration ad EugeniunV the chief idea of which is that the reformation of the Church should begin with the sanctity of its head. In the field of poetry the writers are more numer¬ ous. Among these are the prolific hymn-writer, Adam of Saint Victor, <(the foremost among the sacred Latin poets of the Middle Ages" (Trench) ; Bernard of Cluny, author of the hymn (Jerusalem the Golden,* besides a satiric poem (De contemptu mundi* ; Joseph of Exeter with his epic on the Trojan War; Hildebert, author of lives of Queen Radegundis, etc., be¬ sides hymns and other poems, and Walter of Chatillon, in whose (Alexandreid* occurs the well-known hexameter Uncidit in Scyllam qui vult vitare Charybdim* (He falls into Scylla's jaws who would escape Charybdis).

The greatest representatives of scholastic¬ ism come in the 13th century, after the works of Aristotle had become thoroughly known. The first of these, in the point of time, is Alexander of Hales (d. 1245), a Franciscan. Then in rapid succession come the Dominicans, Albertus Magnus (c. 1206-80), an indefati¬ gable writer upon a multiplicity of subjects be¬ sides philosophy and theology, and his famous pupil, Thomas Aquinas (1225 or 1227-74), with his (Summa theologica) and (Summa contra gentileS, > besides commentaries upon Aristotle and Peter Lombard. Other commen¬ taries on the

The 13th century also witnessed the produc¬ tion of such famous hymns as (Dies Irae,* Range Lingua) and (Stabat Mater, > and it was

in this century that Jacobus de Voragine wrote his (Legenda AureaP and-Matthew of Paris, the last and perhaps the greatest of monastic annalists, lived. In the early part of this century a striking contrast to Ekkehard's

During the last three or four centuries of the Middle Ages canon and Roman law were making rapid progress. Gratian (1160) com¬ menced the codification of the former, and his work was continued by Innocent III, Gregory IX, Raymond of Penafort and Boniface VIII, until a (Corpus Iuris CanonicP was ready to take its place by the side of the (Corpus Iuris CivilisP Some of the chief commentators on canon law in the various stages of its codifica¬ tion were Ivo of Chartres, Henry of Segusic (Hostiensis), Joannes Andreae, Guido da Baisio and Agostino Trionfi. Many of these commentaries appeared in the form of a (SummaP arranged logically or alphabetically. With regard to Roman law some of the chief commentators were Irnerius, Azo, Accursius, Cino da Pistoja and Bartolus. During the 13th century the Institutes of Justinian were used as a model by Bracton in his collection of English laws and customs.

This brings to a close the Latin literature of the Middle Ages,, for Petrarch, Boccaccio and Poggio, though living before the fall of Con¬ stantinople, logically belong with the Renais¬ sance and are generally so considered. A retro¬ spect over the period covered by this article leads to the conclusion that the Middle Ages were not so <(Dark® as they have been pic¬ tured; that Latin literature did not die with

the fall of the Western Empire, although it inevitably felt the adverse influence of barbar¬ ism, but on the contrary created or developed several literary forms of no mean value, such as hymns, romances and history, the latter rep¬ resenting every variety of style from the dryest of annals and mere records through real his¬ tories and biographies to historical romances ; and that it was due to this preservation of the Latin language and literature and its spirit in the monasteries side by side with the vernacular that contributed in large measure to the re¬ vival of learning in the 1 5th century.

Bibliography. — Chevalier, Ulysse, Reper¬ toire des sources historiques du moyen age : bio-bibliographie) (Paris 1907) ; Clark, Victor S., (Studies in the Latin of the Middle Ages* (Lancaster, Pa., 1900) ; Ebert, A., (Allgemeine Geschichte der Literatur des Mittelalters im Abendlande* (Leipzig 1889) ; Grober, Gustav, (Grundriss der romanischen Philologie* (Vol. II, part 1, Strassburg 1893) ; Manitius, Max, (Geschichte der lateinischen Literatur des Mittelalters) (Vol. I, Munich 1911); Sandys, J. E., (A History of Classical ScholarshitP

(Cambridge 1908) ; Teuffel, W. S., (Geschichte der romischen Literatur* (many editions and English translation) ; de Wulf, M.,

Herbert F. Wright,

Sometime of the Department of Latin, The Catholic University of America.

LATIN QUARTER (Quartier Latin, kart'yVla'tan') , celebrated student district of Paris, in which are located the College de France, the Sorbonne, the Institut, the Luxem¬ bourg, Pantheon and other schools. The term is connected with youthful Bohemianism and the extremely radical views always current among certain elements of a student body. See Paris.

LATIN UNION, The. The institution of the Latin Union marks an important epoch in the history of bimetallism, for, while it was the gold discoveries of California and Australia which were the direct cause of the organization of this monetary convention, it was the down¬ ward tendency in the price of silver that re¬ sulted in the practical suspension of that coin-, age by the parties to the treaty.

In 1853, when the subsidiary silver of the United States had begun to be seriously affected by the cheapened price of gold, the Treasury Department found it 'necessary to reduce the quantity of silver in its small coins in order that they might still remain below the value of gold. A few years passed and Switzerland also found herself face to face with the same financial problem, but she, instead of following the example of the United States, solved her difficulty by lowering the fineness of standard for her small coins to 800 thousandths fine.

This method of equalizing the coinage nat¬ urally had a tendency to act disadvantageously for those countries, like France and Italy, where the standard remained much higher than that of Switzerland, for, as the coins of one nation circulated commonly in all the countries that had adopted, the franc system, it was soon re¬ alized that, in accordance with Gresham's law,

the cheaper Swiss coins would eventually super¬ sede the dearer coins. It was unreasonable to suppose that the coins of France or Italy, con¬ taining as they did so much more pure silver, could hope to compete with the cheap coins of Switzerland, so long as the latter

passed cur¬ rent at the same ‘nominal value.

Such was the fear, and it was not long be¬ fore these predictions began to be fulfilled. The Swiss coins, being only 800 thousandths fine, soon crossed the French frontier, where they were exchanged for French coins of the same nominal value. The latter were then exported to Switzerland, where, after having been melted and recoined, they netted a considerable profit for the speculator. By April 1864 the situation had become so thoroughly unsatisfactory that the French government was compelled to issue a decree prohibiting the receipt of the Swiss coins at the customs-house and other public offices.

In response to overtures from Belgium a conference of delegates representing four of the interested states — France, Italy, Switzerland and Belgium — met in Paris 20 Nov. 1865 and agreed to establish a uniform coinage, the new system to be based upon the principles adopted by the United States in 1853. Thus, the silver coins — the 2 franc, 1 franc, 50 centimes and 20 centimes pieces — were reduced from a standard of 900 thousandths fine to a uniform fineness of 835 thousandths, a policy which low¬ ered the small coins of the several countries to the position of a subsidiary currency.

In adopting this policy the members of the Latin Union had not discarded the principles of bimetallism. Gold coins of the value of 100, 50, 20, 10 and 5 francs, and a 5-franc silver piece, were all to be coined at the old standard of 900 thousandths fine and free coinage, at a ratio of I5j4 to 1, was granted to any holder of gold or silver bullion who desired to obtain any of the gold coins or 5-franc silver pieces. The subsidiary currency was formally declared legal tender in all business transactions between individuals of the states that coined them for an amount not in excess of 50 francs.

The treaty under which the Latin Union was formed was ratified by each government and went into effect 1 Aug. 1866. In 1868 Greece also became a party to the convention, which, by its own terms, was to exist until 1 Jan. 1880, but the downward tendency shown by silver during 1873 compelled the delegates to call an¬ other conference. On this occasion the fear most generally entertained was that the German mints would flood the several countries with their demonetized silver. A meeting was held at Paris, therefore, 30 Jan. 1874, at which the full power of free coinage of silver was with¬ drawn from individuals and the amount of sil¬ ver 5-franc pieces to be coined by the several treaty states was greatly reduced.

The last convention of the Latin Union was held 29 Oct. 1897 and the

monetary agreement accepted at that time is tacitly continued from year to year, although practically in abeyance, and it may be denounced at any time by any of the contracting states. According to its terms, the five contracting states have adopted a gold and silver coinage of the same fineness, weight, diameter and current value, and the allowance for wear and tear in each case is the same. The coinage of 5-franc pieces, of gold as well as

of silver, is temporarily suspended and the issue of subsidiary silver is, with certain exceptions for special reasons, limited to 7 francs per head of the population of each state. The most im¬ portant exception to this section of the con¬ vention is in the case of Greece, where the issue is limited to 6 francs per head.

It is further agreed between the contracting countries that each government, in all its pub¬ lic offices, shall accept payment in the silver 5-franc pieces of each of the other states, anl in the subsidiary silver to an amount not in excess of 100 francs. Moreover, each state engages to' exchange the excess of its issues over its receipts of subsidiary silver for gold or 5-franc silver pieces, and each binds itself that, at the termination of the convention, it will resume also its 5-franc silver pieces, pay¬ ing in gold a sum equal to the nominal value of the coin resumed. The only exception to this section of the treaty is made in the case of Italy, in which the government is freed from this obligation to take back its fractional coins upon the dissolution of the convention, it being stipulated instead that it will forbid the exportation of such coins while the Union continues and will not change its present sys¬ tem of subsidiary coinage for five years follow¬ ing its separation from the Union.

Other countries which have adopted this monetary system without joining the union are Finland, Rumania, Serbia, Russia and Spain, while the following American countries have as¬ similated their coinage to that of the union — Chile, Colombia, Ecuador, Guatemala, Peru, Uruguay and Venezuela. Consult Arnaune, (La monnaie, le credit et le change) (2d ed., Paris 1902) ; Palgrave, R. H. I., dictionary of Political Economy0 (New York 1900) ; and Willis, H. P., (History of the Latin Monetary Union) (Vol. II, New York 1900).

LATIN VERSIONS OF THE SCRIP¬ TURES. See Bible, Versions of.

LATIN WRITERS. The following list of writers presents the more famous names which the general student of literature is likely to meet in his reading. The authors are ar¬ ranged according to the year of their birth so far as it can be determined. For further mate¬ rial on

each author, see the separate articles on each. See also Latin Literature.

Lucius Livius Andronicus. c. 284 — 204 b.c.

With his translations of Greek tragedy and comedy Latin literature is said to begin, 240 b.c. He also translated Homer's 'Odyssey.' We have a few frag¬ ments.

Gnaeus Naevius. c. 269 or 264 — c. 199 b.c.

Reckoned the first native Roman poet. He was the first to compose a Latin play. His greatest achievement was an epiq on the Punic War. Only fragments survive. Titus Maccius Plautus, c. 254 — 184 b.c.

Roman comic poet. Twenty of his comedies are still extant.

Quintus Ennius. 239 — 169 b.c.

The "Father of Roman Literature." Wrote tragedies and comedies, and other poetry. His chief work is an epic poem, 'The Annals,' covering the whole history of Rome.

Marcus Porcius Cato. 234 — 149 b.c.

Author of the first Roman historical work in Latin prose. He published orations and didactic treatises. His work on 'Agriculture' is the oldest volume of Latin prose extant.

Marcus Pacuvius. c. 220 — c. 132 b.c.

Roman tragic poet. His writings are now preserved only in fragments.

Publius Terentius Afer. c. 184 — 159 b.c.

Extant works, six comedies.

Gaius Lucilius. 180 — 103 B.C.

First Latin satiric poet. We have only fragments.

LATIN WRITERS

Lucius Accius. 170 — b.c. . .

Author of adaptations of Greek tragedies; original Latin tragedies, and various prose works. Fragments extant.

Marcus Terentius Varro. 116 — 27 b.c.

Most learned of ancient Roman scholars. The major portion of his prose and poetry is lost, but we have con¬ siderable remains of his works on ‘The Latin Language’ and on ‘Agriculture.’

Marcus Tullius Cicero. 106 — 43 b.c.

Of his numerous writings, we have over 50 orations, many rhetorical and philosophical treatises and about 800 letters.

Gaius Julius Caesar. 100 — 44 b.c.

His memoirs, ‘The Commentaries,’ alone remain.

Cornelius Nepos. c. 99 — c. 24 b.c.

Author of biographies of many eminent men.

Titus Lucretius Carus. 96 (probably) — 55 b.c.

Famous for his didactic poem ‘On the Nature of Things,’ which we still have.

Gaius Valerius Catullus. 87 or 84 — c. 54 b.c.

First important and perhaps the greatest Latin lyric poet. We have a collection of over a hundred of his poems.

Gaius Sallustius Crispus. 86 — 34 b.c.

Best known by his monographs on Catiline’s conspiracy and the Jugurthine war.

Publius Virgilius Maro. 70 — 19 b.c.

Most representative Latin poet. His greatest works are the ‘Eclogues,’ the ‘Georgies,’ and the ‘iEneid,’ but we also have some of his minor poems.

Quintus Horatius Flaccus. 65 — 8 b.c.

Left satires, epodes, odes, and epistles, but is most distinguished for the perfection of his odes.

Titus Livius. 59 b.c. — 17 a.d.

Wrote a history of Rome in 142 books, of which we have

35.

Albius Tibullus, c. 54 — c. 19 b.c.

An elegiac writer, from whose pen we have about two dozen poems.

Lucius Annaeus Seneca, c. 54 b.c. — c. 39 a.d.

Of his rhetorical works we have about six books.

Sextus Propertius, c. 49 — c. 15 b.c.

Elegiac poet, from whom we have four books of verse.

Publius Ovidius Naso. 43 b.c. — 17 or 18 a.d.

His important extant poems are the ‘Art of Making Love,’ ‘Remedies for Love,’ the ‘Metamorphoses,’

‘ Epistulae ex Ponlo,’ Tristia, Fasti, Heroides. A famous tragedy, the ‘Medea,’ has not survived.

Gaius Velleius Paterculus, c. 19 b.c. — 30 + a.d.

Author of a compendium of Roman history which is still extant.

Valerius Maximus.

We have his collection of anecdotes in nine books.

Lucius Annaeus Seneca, c. 4 b.c. — 65 a.d.

From him have come a satire on Claudius, moral essays, philosophical epistles, physical treatises, and a few tragedies.

Aulus Cornelius Celsus. c. 2 a.d. — ?

Author of an encyclopedic work, of which we have only the eight books on medicine.

Phaedrus.

Author of an extant collection of fables.

Pomponius Mela.

His geographical work in three books is the earliest work of the sort that we possess.

Lucius Junius Moderatus Columella.

Author of an important work in prose and verse on agriculture, in 12 books.

Quintus Curtius Rufus.

‘History of Alexander the Great,’ in 10 books, all of which, except two, have survived.

Gaius Plinius Secundus. 23 — 79 a.d.

Author of the ‘Historia Naturalis,’ an encyclopedic work in 37 books, still extant.

Silius Italicus. c. 25 — c. 101 a.d.

Composed an extant epic poem on the Second Punic War, in 17 books.

Aulus Persius Flaccus. 34 — 62 a.d.

Writer of six satires, still extant.

Marcus Annaeus Lucanus. 39 — 65 a.d.

Of numerous works in prose and verse we have only his epic, the ‘Pharsalia.’

Petronius Arbiter. ? — 66 a.d.

Author of a satirical romance in at least 20 books, of which we have considerable fragments.

Titus Calpurnius Siculus.

Left us seven eclogues and a poetical panegyric.

Gaius Valerius Flaccus Setinus Balbus. — c. 90 a.d.

Composer of an extant poem on the Argonautic expedition, in eight books.

Marcus Fabius Quintilianus. Between 35 and 40 — c. 95 A.D.

Known chiefly by his treatise in 12 books upon the training of an orator.

Publius Papinius Statius, c. 40 — 96? a.d.

There have survived of his works five books of occasional poems (the ‘Silvae’), and two epics, a Thebaid and an Achilleid.

Marcus Valerius Martialis. c. 40 — c. 102 to 104 a.d.

The world's greatest writer of epigram, from whom we have 1,575.

Publius Cornelius Tacitus, c. 55— c. 120 a.d.

One of the chief ancient historians. His surviving works are a treatise on oratory, a biography of Argicola, a monograph on Germany, his 'Annales' and 'Historiae.'

Decimus Junius Juvenalis, c. 60 — c. 140 a.d.

Composed 16 poetical satires, which we have.

Gaius Plinius Caecilius Secundus. 62 — c. 113 a.d.

Of his published speeches only the panegyric of Trajan has reached us, but his nine books of letters in semi-essay form, and a tenth containing his correspondence with Trajan, have survived.

Gaius Suetonius Tranquillus. 75? — 160 ? a.d.

Latin biographer, best known by his extant 'Lives of the Caesars.' although we have fragments of other biographies.

Lucius (?) Annaeus Florus.

Composed an extant epitome of Roman history in two books.

Marcus Cornelius Fronto. c. 100 — c. 175 a.d.

Besides less important works in incomplete form, we have most of his correspondence with Marcus Aurelius.

Gaius. c. 110 — c. 180 a.d.

The famous jurist, large amounts of whose writings have come down to us.

Marcus Aurelius Antoninus. 121 — 180 a.d.

Besides his letters in Latin, we have the well-known 'Meditations,' written in Greek, in 12 books.

Lucius Apuleius. c. 125 — ? a.d.

Composed works on a great variety of subjects, of which few have

reached us. Most important is the novel ‘The Golden Ass.’

Aulus Gellius. c. 130 — ? a.d.

His miscellanies, the ‘Attic Nights,’ in 20 books, have reached us almost intact.

Marcus Minucius Felix.

Author of a dialogue, the ‘Octavius,’ which is our earliest extant work in Latin Christian literature.

Quintus Septimius Florens Tertullianus. c. 150 — c. 230 a.d.

The great Christian apologist. We have numerous theological treatises from his pen.

Thascius Caecilius Cyprianus. c. 200 — c. 255 a.d.

Author of numerous theological works, many extant.

Marcus Aurelius Olympius Nemesianus.

We have a portion of his didactic poem on the chase.

Arnobius. ? — 326 ? A.D.

Author of a Christian apology in seven books, which have come down to us.

Lactantius’Firmianus. — after 315 a.d.

Known as the Christian Cicero. We have his chief theological works in prose and verse. Most important is his ‘Institutiones Divinae.’

Eutropius. 4th century.

A historian whose epitome of the entire history of Rome, in 10 books, is still valued.

Hilarius (Bishop of Poitiers). — 367 A.D.

A Christian controversialist and commentator on the Bible, of whose numerous works we still have remains.

(Pope) Damasus. 305 — 384 a.d.

One of the first Christian poets. Epitaphs and poetical eulogies of

departed Christians have come down to us.

Decimus Magnus Ausonius. c. 310 — c. 395 a.d.

A Roman poet from whom we have many works in various departments of literature, epigrams, elegiacs, epistles, etc.

Ammianus Marcellinus. c. 330 — c. 400 a.d.

Composed a continuation of 'Tactius,' of which we have only 18 books of Contemporary history.

Hieronymus. 331 — 420 a.d.

Famous for his translation of the Bible and his com¬ mentaries. A Latin version of Eusebius' Chronological Tables, many letters and Christian biographies require mention.

Ambrosius. c. 340 — 397 a.d.

One of the Church Fathers. His writings include letters, orations, hymns and didactic works, of which we have large amounts.

Quintus Aurelius Symmachus. c. 345 — c. 405 a.d.

Besides fragments of his orations, we have official reports, and 10 books of letters which are of great historical value.

Aurelius Prudentius Clemens. 348 — c. 410 a.d.

The greatest poet of his century. We have hymns and other Christian poetry.

Claudius Claudianus. ? — c. 408 a.d.

Last important non-Christian poet. Extant are his¬ torical and mythological poems and many shorter pieces. Most famous is his epic, 'The Rape of Proserpina.'

Meropius Pontius Anicius Paulinus. 353 — 431 a.d.

A Christian writer from whom we have letters and poems.

Aurelius Augustinus. 354 — 430 a.d.

Widely known by his 'Confessions,' he has also left us letters, sermons, theological treatises, and his famous work, in 22 books, on 'The

Kingdom of God.’

Macrobius Theodosius. 4th, 15th century a.d.

A commentary on Cicero’s ‘Dream of Scipio’ and a book instructive to the student of Roman literature and antiquities, which he called ‘Saturnalia,’ have been preserved.

Martianus Capella. 4th, 15th century a.d.

We have his encyclopedic work, in nine books, on the ‘Seven Liberal Arts,’ which was of great importance in mediaeval education.

Leo (the First, surnamed “the Great”), c. 395 — 461 a.d.

Sermons and letters of his composition are extant.

Gaius Sollius Apollinaris Sidonius. c. 430 — c. 480 a.d.

A collection of his poems and nine books of letters are instructive for the life of his time in Gaul.

Blossius ALmilius Dracontius. 5th century a.d.

We have from him poems that are very creditable for this age, on mythological and Christian subjects, as well as two epithalamia.

Magnus Felix Ennodius. 473 — 521 a.d.

A prolific writer in several fields, whom we know through his letters, speeches, a panegyric and numerous poems.

Anicius Manlius Torquatus Severinus Boethius, c. 480 — 524 a.d.

Translator of many Greek philosophical and math¬ ematical books. His famous ‘Consolations of Philosophy’ is often accounted “the last work of Roman literature.” Flavius Magnus Aurelius Cassiodorus Senator, c. 480 — c. 575 a.d.

Historical, theological and encyclopedic works, a con¬ siderable portion of which has survived.

Priscianus. 6th century a.d.

Besides some unimportant works, we have his eight books on the Latin language, the most influential gram¬ matical work in that tongue.

Venantius Honorius Clementianus Fortunatus. c. 535 — c. 600 a.d.

Best known through his epic poem on Saint Martin of Tours, although others have come down to us, together with lives of the Saints in prose.

Gregorius of Tours. 538 — 593 a.d.

Author of theological books, including lives of the Saints. Most important to us is his 'History of the Franks' in 10 books.

(Pope) Gregorius (the First), c. 540 — 604 a.d.

We have theological works composed by him, and over 800 letters of high value to the historian.

Isidorus (Bishop of Seville), c. 570 — c. 636.

A theological, historical and grammatical writer of great influence upon the Middle Ages. Chief among the works which we have from him is his 'Origines,' in 20 books.

Walton Brooks McDaniel, Professor of Latin, University of Pennsylvania.

LATINI, la-te'ne, Brunetto, Italian phi¬ losopher and scholar: b. Florence, about 1220; d. about 1294. He was a notary by profession and in 1250 participated in the revolution which established a Guelph democratic government. He was sent as Ambassador to Alfonso X, of Spain, in 1260, to obtain aid in the stabilizing of the new government, but in his absence the Guelphs were overthrown and he took refuge in Paris where he remained in 1261-68. He returned to Tuscany in 1269 and for the next 20 years occupied various government offices of importance. He was an eloquent speaker and held an honored place in. the councils of the government. His friendship for the poet Dante is dwelt upon in (Inferno,* canto xv. He wrote the earliest Italian didactic poetry, his poem 'Tesoretto,* written in rhymed couplets of heptasyllabic metre, which was translated from French into Italian by Bono Giamboni under the title 'Tesoro.* Consult Chabaille, (Li Livres don Tresor par Brunetto Latini* (Paris 1863).

LATINS (Latini), the ancient inhabitants of Latium, in Italy. Janus, Saturn, Picus and Faunus, who were deified by their subjects, are

represented to have been the most ancient Latin

kings. These ancient Latins formed a league of 30 cities, of which the town of Alba Longa became the head. Although Rome was a colony from Alba she became powerful enough in the reign of her third king to seize upon that city and raze it to the ground. Under Servius Tul¬ lius, Rome entered the Latin confederacy and in the reign of his successor, Tarquinius Super¬ bus, was acknowledged as head of the league. On the fall of the Tarquins the Latins regained their independence and struggled long against the republic to maintain it ; it was finally lost, however, by the decisive victory of the Romans near Mount Vesuvius (340 b.c.).

LATINUS, la'tm-uz, Roman legendary king of the Laurentians in Latium and eponymic ancestor of the Latin race of ancient Italy. In Hesiod he is king of the Tyrsenians, son of Ulysses and Circe. In Virgil's (Tineid* (VII- XII) he is the son of Faunus and the nymph Marcia and reigns over Latium. He welcomes .Eneas upon his landing at the mouth of the Tiber and Tineas subsequently marries La- tinus' daughter Lavmia and succeeds to the throne. There are other legendary accounts of Latinus but his importance in mythology lies in the effort to make him a connecting link be¬ tween Rome and Troy.

LATITUDE. The astronomical latitude of a place is the altitude of the celestial pole on the declination of the zenith. From the me¬ chanical point of view it may be defined as the angle between the plane of the earth's equator and the observer's plumb-line or vertical. Neither of these definitions makes an assump¬ tion as to the form of the earth and this astro¬ nomical latitude is seldom identical with the geocentric, nor even with the geodetic latitude of a place. It is, however, the only kind of lati¬ tude which can be directly determined from astronomical observations. There are six methods of determining latitude.

1. By Circumpolars. — This most obvious method is to observe, with the meridian circle or some analogous instrument, the altitude of a circumpolar star at its upper culmination, and again, 12 hours later, at its lower. Each of the observations must be corrected for refraction and the mean of the two corrected altitudes will be the latitude. This method has the advantage of being an independent one and does not re¬ quire any data (such as the declination of the stars used) to be accepted on the authority of previous observers. But to obtain much ac¬ curacy it requires considerable time and a large fixed instrument. In low latitudes the refrac¬ tion is also very troublesome.

2. By the Meridian Altitude or Zenith Dis¬ tance of a Body of Known Declination. — If we use the meridian circle, we can always se¬ lect stars that pass near the zenith where the refraction will be .small ; moreover, we can se¬ lect them in such a way that some will be as much north of the zenith as others are south and thus eliminate the refraction errors. But we must take our star declinations out of cata¬ logues made by previous observers and so the method is not an independent one. At sea the latitude is usually obtained by observing with the sextant the sun's maximum altitude, which of course occurs at noon. Since at sea it is sel¬ dom that one knows beforehand precisely the moment of local noon, the observer takes care

to begin to observe the sun's altitude some 10 or 15 minutes earlier, repeating his observa¬ tions every minute or two. At first the alti¬ tude will keep increasing, but immediately after noon it will begin to decrease. The observer uses, therefore, the maximum altitude obtained, which, corrected for refraction, parallax, semi¬ diameter and dip of the horizon will give him the true latitude of his ship. On account of the sun's motion in declination and the northward or southward motion of the ship itself, the sun's maximum altitude is usually attained not precisely on the meridian, but a few seconds earlier or later. This requires a slight correc¬ tion to the deduced latitude, explained in books on navigation or practical astronomy.

3. By Circum-meridian Altitudes. — If the observer knows his time with reasonable ac¬ curacy, he can obtain his latitude from ob¬ servations made when the body is near the meridian, with practically the same precision as at the moment of meridian passage. The great advantage of this method is that the observer is not restricted to a single observation at each meridian-passage of the sun or of the selected star, but can utilize the half-hours preceding and following that moment. The meridian-cir¬ cle cannot be used, as the instrument must be such as to make extra-meridian observations possible. Usually the sextant or universal in¬ strument is employed.

4. The Zenith Telescope Method. — This

method is generally known as the American, because first practically introduced by Captain Talcott of the United States engineers, in a boundary survey in 1845. Its essential charac¬ teristic of the micromctric measurement of the difference between the nearly equal

zenith dis¬ tances of two stars which culminate within a few minutes of each other, one north and the other south of the zenith and not very far from it; such pairs of stars' can always be found. When the method was first introduced, a special instrument, known as the zenith tele¬ scope, was generally employed, but at present a simple transit instrument, with declination micrometer and a delicate lever attached to the telescope tube, is ordinarily used. The telescope is set at the proper altitude for the star which first comes to the meridian and the ˆlatitude level,® as it is called, is set horizontal ; as the star passes through the field of view its dis¬ tance north or south of the central wire is measured by the micrometer. The instrument is then reversed and so set by turning the tele¬ scope up or down, then the level is again hori¬ zontal. After this reversal and adjustment, the telescope tube is then evidently elevated at ex¬ actly the same angle as before, but on the op¬ posite side of the zenith. As the second star passes through the field, we measure with the micrometer its distance north or south of the centre of the field; the comparison of the two micrometer measures gives the difference of the two zenith distances. The great advantage of the method consists in its dispensing with a graduated circle, and in avoiding almost wholly the errors due to refraction it virtually utilizes the circles of the fixed observatories by which the star declinations have been measured, without requiring them to be brought into the field. Years ago it was not always easy to find accurate determinations of the declinations of

the stars employed, but at present the star cata¬ logues have been so extended and improved that the difficulty has practically disappeared, so that this method of determining the latitude is now not only the most convenient and rapid, but is quite as precise as any, if the level is sufficiently sensitive.

5. By the Prime Vertical Instrument. —

Here we observe simply the moment when a known star passes the prime vertical on the eastern side, and again upon the western side. Half the interval will give the hour-angle of the star when on the prime vertical. The dis¬ tance of the star from the pole is the comple¬ ment of the star's declination. The observa¬ tions are not so convenient and easy as in the case of the zenith telescope and the number of stars available is less ; but the method presents the great advantage of requiring nothing but an ordinary transit instrument, without any special outfit of micrometer and latitude level. It also evades the difficulties caused by refrac¬ tion.

6. By the Gnomon. — The ancients had few or no instruments and of

course could not use the preceding methods of finding latitude. They were, however, able to make a very re¬ spectable approximation by means of the sim¬ plest of all astronomical instruments, the gno¬ mon. This is merely a vertical shaft or column of known height erected on a perfectly hori¬ zontal plane ; and the observation consists in noting the length of the shadow cast at 'noon at certain times of the year. It is easy to com¬ plete the sun's zenith distances when farthest north and south ; and, since the sun travels equal distances north and south of the celestial equator, the mean of the two results will give the angular distance between the equator and the zenith ; i.e., the declination of the zenith, which is the latitude of the place. This method is an independent one, like that by the observation of circumpolar stars, requiring no data except those which the observer determines for himself. Evidently, however, it does not admit of much accuracy, since the penumbra at the end of the shadow makes it impossible to measure its length precisely. The ancients in¬ stead of designating the position of a place by means of its latitude, used its climate instead — the climate being the slope of the plane of the celestial equator, which is the complement of the latitude. Many of the Egyptian obelisks were erected primarily for use as gnomons and were used for that purpose.

Since the moon and the principal planets keep within the Zodiac, the ecliptic is a most convenient circle of reference and was used as such by the ancients. Consequently great care must be taken to avoid confusion of celestial latitude and longitude with right ascension and declination or with terrestrial trial latitude and longitude. The terms right ascension and decli¬ nation are of comparatively recent introduction, celestial latitude and longitude being much older. See Longitude.

LATITUDINARIAN, a term applied to a school of religious thought which flourished in England in the 17th century. It was character¬ ized by a tolerant spirit toward dissenters and an insistence on adhesion to the fundamentals of Christianity rather than to any professed ec¬ clesiastical system as the basis of church mem-

bership. Its principal leaders were Hales, Chil- lingworth and Taylor. The Cambridge Plato- nists (q.v.) and later the Broad Church party are the heirs of the Latitudinarians.

LATIUM, la'shi-um, a name given to the country inhabited in ancient times by the Latins, between the Apennines and the sea. The prin¬ cipal part of this country was the Campagna di Roma (q.v.). After the conquest of the neighboring tribes, the Volsci, the Hernici and the Aurunci by the Romans, the name Latium was used to denote all the country between the Tiber and the Garigliano (formerly Liris). The chief early cities were Ardea, Lavinium, Tus- culum, Laurentum and Alba Longa. Rome kept pushing toward the coast, absorbing all those who opposed her and eventually con¬ quered the communities of Latium which had banded together in the Latin League. In 340 b.c. these cities revolted, but were unable to prevail against Rome and so lost their political unity. They were finally and completely con¬ quered in the Social War 89 b.c., when the in¬ habitants of Latium became full Roman citi¬ zens.

LATONA, la-to'na, was the mother of Apollo and Artemis. During her pregnancy she was persecuted by Hera, by whose command the dragon Python threatened her with death and the earth was not permitted to allow her a place for her delivery. After long wanderings she found rest on the floating island of Delos which granted her refuge on the strength of Leto's promise that the island should become the seat of the deity to whom Latona would give birth there. Latona is represented as a mild, benevolent goddess, in a sea-green dress. With Artemis she cured the wounded 2Eneas and crowned him with glory. When Artemis fled to Olympus from the anger of Hera, La¬ tona carried to her her quiver and arrows, which she had left behind. She was worshipped chiefly in Lycia, Delos, Athens and other cities of Greece. In Crete a festival was celebrated in honor of her, called Ecdysia.

LATOUR D'AUVERGNE-CORRET, Theophile Malo de, ta'6-fel ma'lo de la-toor dd-varn-ye-kor-ra, French soldier: b. Carhaix, Brittany, France, 23 Nov.- 1743; d. Oberhausen, Bavaria, 27 June 1800. He early decided to be¬ come a soldier and when the French Revolu¬ tion broke out was among the first _ to rally round its standard and distinguished himself in the army of the Pyrenees. Higher appoint¬ ments were offered him but he declined, de¬ claring that he was only fit to command a com¬ pany of grenadiers and was consequently named by Napoleon <(First Grenadier of France.® His corps generally made the van¬ guard and was called ((the infernal column.® In 1799 he fought under Massena in Switzer¬ land and fell while attached to the army of the Rhine. His heart was embalmed and carried in a silver box by one of the company in which he had served; his name was alwavs called, the oldest sergeant answering — (

LATREILLE, la’tra’y’, Pierre Andre,

French naturalist: b. Brives-la-Gaillarde, Cor- reze, 20 Nov. 1762; d. Paris. 6 Feb. 1833. He entered the College Lemoine at Paris in 1778 and was ordained a priest in 1786, afterward re¬ tiring to Brives, where in addition to his duties he made a study of entomology and zoology. He returned to Paris in 1788 and was elected to the Society of Natural History; the Revolu¬ tion, however, interrupted his career and he was for a time imprisoned at Bordeaux as a sym¬ pathizer of the royal cause. He was elected corresponding member of the Institute in 1798 and was given charge of the arrangement of the ‘entomological collection at the Museum of Nat¬ ural History, Paris. He became a member of the Academy of Sciences in 1814, and in 1821 a chevalier of the Legion of Honor. He was appointed professor of zoology of crustaceans, arachnids and insects at the Museum in 1830. His fame rests chiefly upon his reforms in en¬ tomological classification. Author of (Memoire sur les mutilles decouvertes en France’ ; Pre¬ cis des caracteres generiques des insects, dis¬ poses dans un ordre naturel’ (1796) ; (Histoire naturelle des singes’ (2 vols., 1801) ; (Histoire naturelle generale et particuliere des crustaces et insectes’ (14 vols., 1802-05) ; (Genera crus- taceorum et insectorum, secundum ordinem naturalem in familias disposita’ (4 vols., 1806- 07) ; (Familles naturelles du regne animal’ (1825); (Cours d’entomologie’ (1 vol. com¬ pleted, 1831), etc.

LATROBE, la-trob’, Benjamin Henry,

American architect : b. Yorkshire, England. 1 May 1764; d. New Orleans, 3 Sept. 1820. He studied at the University of Leipzig, served in the Prussian army as cornet of hussars, became an architect in England, achieved dis¬ tinction as an engineer in London and came to Norfolk, Va., in 1796. He built the James River-Appomattox Canal and the Rich¬ mond penitentiary ; removed to Philadelphia and there designed the Bank of the United States, the Bank of Pennsylvania, the old Art Academy and other structures ; and supplied the city with Schuylkill water in 1800.ˆ The Roman Catholic Cathedral at Baltimore is also his work. In 1803 he was appointed surveyor of public buildings in Washington and later was chosen architect of the capitol. After the burning of the capitol by the British in 1814, he was appointed to rebuild it, but in 1817 re¬ signed. His journal ; Notes and Sketches of an Architect, Naturalist and Traveler’ was published in 1905.

LATROBE, John Hazlehurst Bonval,

American lawyer : b. Philadelphia, 4 May 1803 ; d. Baltimore, 11 Sept. 1891. He was the son of Beniamin H. Latrobe (q.v.). He studied at the United States Military Academy, was called to the bar in 1825, from 1828 until his death was counsel for the Baltimore and Ohio Rail¬ way Company. He was the founder of the Maryland Institute. He also invented a stove commonly known as the <(Baltimore heater." Latrobe was long identified with the American Colonization Society and succeeded Henry Clay in its presidency in 1853. He also became presi¬ dent of the Maryland Historical Society and published a (Bioqraphy of Charles Carroll of Carrollton' (182-0 ; a (History of Mason and Dixon's Line' (1854) ; (Personal Recollections

of the Baltimore & Ohio Railroad* (1858) and other works.

LATROBE, Pa., town and borough in Westmoreland County, on the Loyalhanna Creek and on the main line of the Pennsylvania Railroad and the terminus of the Ligonier Val¬ ley Railroad, is situated 40 miles east of Pitts¬ burgh and 40 miles west of Johnstown at the foot of the Chestnut Ridge and the opening of the rich Ligonier Valley. It is the centre of a large agricultural district ; valuable deposits of coal and iron ore are worked and coke manu¬ facturing is carried on to a considerable extent. Latrobe has a large number of factories, includ¬ ing large steel mills, woolen mills, paper mills, flour mills, mattress factory, sand works, brick works. Its public institutions include eight ele¬ mentary schools and high school, 12 churches, a girls' academy and men's college, both within three miles, also hospital and city building. Pop. (1920)' 9,484.

LATROBITE, a mineral named after C. I. Latrobe. It is found massive and crystal¬ lized in forms belonging to the triclinic system ; but the crystals are not well defined ; color, pale pink; scratches glass; specific gravity, 2.8; opaque; lustre vitreous. It is composed of silica, alumina and lime, being a rare variety of anorthite (q.v.) or lime feldspar., See Feldspars.

LATRODECTUS, a genus of spiders of the loose-web building family Theridide, which contains certain large American species pop¬ ularly considered poisonous, especially one (L. mactans) known in the tropics as the katipo. This spider, according to Emerton, is sometimes

half an inch long, with a round abdomen and the whole body black except a bright red spot on the under side and one or more red spots over the spinnerets and along the middle of the back; the small and few males have in addition red vertical stripes on each side. This spider makes a large funnel-shaped nest among loose stones, which may spread out two or three feet. It is found all over the country from Canada to Argentina and Chile, and is every¬ where feared, but there is no good reason for considering it any more poisonous than other spiders.

LATTEN, a compound or mixed metal re¬ sembling brass used in the Middle Ages for metal work. Mines of latten are mentioned as existing in the time of Henry VIII, and the compound is often alluded to in ancient public records, without students of antiquity being able to determine what composition is meant. Three varieties were distinguished, the black, the shaven and the roll. That used by English workmen used to be imported from Germany and the Netherlands, the finest kind being known as Cologne plate. Latteners formed one of the recognized crafts of London. In some localities the term is still applied to plate-tin.

LATTER DAY SAINTS, Church of Jesus

Christ of. See Mormons.

LATTER DAY SAINTS, Reorganized Church of Jesus Christ of. See Reorganized Church of Latter Day Saints of Jesus Christ.

LATTICED DRAINAGE. See Trel-

lised Drainage.

LATTICELEAF, lat'is-lef, or LATTICE-

PLANT (also called laceleaf and water-yam), a remarkable aquatic plant (Aponogeton fenes- tralis) of Madagascar, noteworthy for the structure of its leaves. The blade resembles latticework or open needlework, the longitudinal ribs being crossed by tendrils, and the interstices between them being open. The root, which is fleshy, and resembles that of the yam, is farina¬ ceous and edible.

LATTIMORE, Samuel Allan, American educator and chemist : b. Union County, Ind., 31 May 1828; d. 17 Feb. 1913. He was gradu¬ ated at Indiana Asbury (now De Pauw) Uni¬ versity in 1850, acted as classical tutor there in 1850-52, and after taking his M.A. in 1853 he was appointed to the chair of Greek. He was professor of chemistry in

Genesee College in 1860-67, and in 1867-1908 professor of chemistry at the University of Rochester. He retired in 1908. He was chemist to the New York State Board of Health in 1881-1908, and to the New York State Department of Agri¬ culture in 1886-1908; also serving as chemist to the Rochester beard of water commis¬ sioners. He was an earnest worker for the exposure of adulteration in food products and did much to popularize, and stimulate interest in, his branch of science. He was active in the establishment of the Western New York Institution for Deaf-Mutes; was a Fellow, and in 1880 vice-president, of the American Asso¬ ciation for the Advancement of Science, and was the recipient of several honorary degrees from American universities.

LATTMANN, lat'man, Julius, German educator: b. Goslar, 4 March 1818; d. Gottin¬ gen, 20 Aug. 1898. He was educated at the University of Gottingen, taught in the gym¬ nasium at Gottingen in 1847-60, and in 1870- 90 he was director of the gymnasium at Claus-thal. He was deeply interested in theories of linguistic teaching and reforms therein, and wrote a large number of textbooks.

LATVIA, a republic situated along the southern part of the Baltic littoral. It is bounded north by the Gulf of Riga, Esthonia and Russia, east by Russia, south by Lithuania pnd west by the Baltic Sea. Its area is about 24.-440 square miles with a population (15 Tune 1920 T of 1,503,193. The chief city is Riga (Pop. 569,100). The republic is inhabited chiefly by Letts, the maioritv of whom are Protestants. There is a university at Riga. An independent republic was proclaimed 18 Nov. 1918, Latvia being previously included in the Russian prov¬ inces of Courland, part of Livonia, and part of Vitebsk. Agriculture is the chief industry of the inhabitants. Flax and timber are the chief exports. Riga and Libau are its principal ports. See Letts ; Lettish Language and Literature.

LAUBAN, city of Silesia, on tˆe Oueis, 38 miles southwest of Liegnitz. Pop. 15,467.

LAUBE, lou'be, Heinrich, German novel¬ ist and dramatisi : b. Sprottau, Silesia, 18 Sept. 1806; d. Vienna, 1 Aug. 1884. He studied theology at Halle and Breslau, and settled in Leipzig in 1832. He engaged in literary work and an active participation in the movement known as ((Das junge Deutschland.® His political essays and a series of novels which scored the existing government got him into

difficulties, and he was subjected to police sur¬ veillance, while his writings were confiscated. He was expelled from Saxony in 1834 and served a nine months' prison sentence in Ber¬ lin. Shortly after his marriage he was again imprisoned for a year because of his political sympathies, and in 1839 he returned to Leip¬ zig and entered upon his career as a dramatist and theatre director. He served in the Frank¬ fort National Assembly in 184S-49, resigning in order to accept an appointment as artistic director in the Hofburg Theatre in Vienna. He was director of the Leipzig Stadtheatre in 1869-70, and in 1872 returned to Vienna as head of the nevv Stadtheatre there, a position he held until his retirement in 1880. He was a master of stage-craft and his work in this field won him higher rank than either his dramas or novels. His dramas are notable particularly for their adaptability for stage reproduction. He wrote several novels and his memoirs after his retirement from public life. Author of the political essays (Das neue Jahr- hundert) (1833) ; (Politische Briefe> (1833); a three-volume novel, (Das junge Europa) (1833-37); the dramas (Monaldeschi) (1845); (Gottsched und Gellert5 (1847) ; (Vol. Ill, 6th ed.. 1901).

LAUD, lad, William, English prelate : b. Reading, Berkshire, 7 Oct. 1573; d. London, 10 Jan. 1645. He was educated at Saint John's College, Oxford ; took priest's orders in 1601 ; became vicar of Stanford, Northamptonshire, 1607, and rector of West Tilbury, Essex, 1609 ; was made archdeacon of Huntingdon in 1615 and dean of Gloucester 1616, and as king's chaplain in 1617 accompanied James I to Scot¬ land, where he attempted to enforce Episcopacy with no success. In January 1621 he became a canon of Westminster and in the following June, bishop of Saint David's. After the acces¬ sion of Charles I, Laud was translated in 1626 to the see of Bath and Wells, and in 1628 to that of London. In 1629 he was elected chan¬ cellor of the University of Oxford, which he enriched with a valuable collection of manu¬ scripts, establishing also a professorship of Arabic. In 1633 he was promoted to the see of Canterbury. In 1634 he instituted rigorous proceedings against all who would not conform to the Church of England, and sought to ex¬ tinguish all forms of dissent by means of fines, imprisonment and exile. When the Long Par¬ liament met (1640) the archbishop was im¬ peached for high treason at the bar of the House of Lords by Denzil Holies and com¬ mitted to the Tower. After three vears he was brought to trial, but the Lords deferred giving judgment. The House of Commons, however, passed a bill of attainder (January 1644), de¬ claring him guilty of high treason, and con¬

demned him to death. He met his end on the scaffold at Tower Hill

with great firmness. He was opposed to Rome on the one hand and to Puritanism on the other, laid stress on sacra¬ mental grace and apostolic succession and or¬ der in public worship, favored a national ob¬ servance of Sunday, had a high repute for learning, but was tactless in his handling of his opponents. Consult Gardiner, S. R., (The Personal Government of Charles D (1871) and (The Fall of the Monarchy of Charles P (1881); and (Lives> by Benson (1887); Hut¬ ton (1885); Mackintosh (1907); Simpkinson (1894), and Waterman (1912).

LAUDANUM, la'da-num. See Opium.

LAUDER, Harry (real name MacLen- nan), Scottish singer: b. Portobello, 4 Aug. 1870. He was employed in a flax-spinning mill when a boy and later worked in the coal mines. His natural talent for music and gift for entertaining soon won him considerable reputation as an amateur entertainer and he chose the stage as a profession. His first tours were of Scotland and Ireland, but he appeared in London in the early nineties and speedily be¬ came a great favorite. His first tour of the United States was made in 1907 and was phenomenally successful. He toured the coun¬ try repeatedl}r afterward, always enthusiastic¬ ally welcome. He toured Australia and New Zealand in 1914 and returning to England threw himself whole-heartedly into the recruit¬ ing service. He organized and personally paid the expenses of a band of Scottish pipers which became famous and himself toured Eng¬ land in the work of recruiting. Later, after many difficulties, he secured government per¬ mission to sing on the actual firing line and in the front line trenches in France. While generally regarded as a comedian, his songs and characterizations range from those of rollicking humor to the tenderest tributes to home, love, and country. After the death of his only child, Capt. John Lauder, at the front in France 28 Dec. 1916, Lauder for a time re¬ fused to return to the stage, but the call was so insistent that he obeyed it. After his first visit to the front he organized the ((Harry Lauder Million Pound Fund for Maimed Men, Scottish Soldiers and Sailors.® Lord Rosebery is honorary president of the fund and Lord Balfour is its secretary. The pur¬ pose of the fund is to present the maimed soldiers and sailors of Scotland with a suf¬ ficient amount to establish them in business or in a suitable calling, not as a charity, but as an acknowledgment of their country's debt. Both words and music of Lauder's songs are his own composition and include many that are widely popular. Among them are (Roamin' in the Gloamin' 5 ; (Wee Hoose Amang the Heather5 ; (She's the Lass for Me5 ; (The Laddies Who Fought and Won, 5 etc. He is author of a Scottish comedy and (Harry Lauder at Home and on Tour5 (1906); (Harry Lauder's Logic> (1917) ; (A Minstrel in France5

(1918).

LAUDER, Sir Thomas Dick, 7th Baronet of Fountainhall, Haddingtonshire, Scottish author: b. Edinburgh. 1784; d. 29 May 1848. He served in the 79th Regiment (Cameron Highlanders) and succeeded to the baronetcy in 1820. He began his literary career in 1815

with contributions to the Annals of Philosophy, published at Glasgow, and in 1817 his story- entitled (Simon Roy Gardener at DumphaiP was published in Blackwood's Magazine with the editorial announcement that it was ((3 vols., 1837) ; (Legends and Tales of the Highlands) (3 vols., 1841), etc.

LAUDER, William, Scottish literary for¬ ger: b. latter part of 17th century; d. Bar- badoes, 1771. He was educated at Edinburgh University, where he afterward engaged in tutoring. He was an excellent classical scholar and in 1739 published (Poetarum Scotorum Musae Sacrae) (3 vols.), a collection of poems by various authors, chiefly paraphrased from the Bible, and accompanied by an over-laudatory preface concerning one of the authors, Arthur Johnston. He was unsuccess¬ ful in his efforts to secure an appointment at Edinburgh and in 1742 settled in London. In 1747 the first of a series of articles endeavor¬ ing to prove Milton a plagiarist appeared in Blackzvood's Magazine, so cleverly written that men like Dr. Samuel Johnson were for a time inclined to support Lauder in his allegations. He attempted to prove that 'Paradise Lost) was largely composed of plagiarisms from dif¬ ferent authors, whom he increased to about a hundred, presenting inaccurate quotations and going so far as to make use of a Latin trans¬ lation of (Paradise LosU His venture suc¬ ceeded for a time, but was thoroughly exposed by. scholars conversant with the sources from which Lauder supposedly drew his informa¬ tion ; and he was finally induced to make a con¬ fession, Dr. Johnson taking a leading part in the proceedings. The forgeries are included in (Essays on Milton's Use and Imitations of the Moderns in his ((Paradise Lost®* (1750), and 'The Grand Imposter: or Charles I Vindicated from the Charge of Plagiarism Brought against Him by Milton, and Milton Himself Convicted of Forgery* (1754). Practically forced into exile he went to Barbadoes, where he died.

LAUDERDALE, James Maitland, 8th

Earl of, Scottish statesman : b. Ratho, Mid¬ lothian, 26 Jan. 1759; d. Thirlestane Castle, Berwickshire, 13 Sept. 1839. He < studied at the University of Edinburgh, Trinity College, Oxford and Glasgow University, read law at Lincoln's Inn and in 1780 became a member of the faculty of advocates. • He was elected to the House of Commons in 1780 and in 1781 he was an advocate of Fox's demand for a com¬ mittee on the state of the American War,

maintaining that the authors of the war were "no less inimical to the liberties of Great Britain than America.® He supported Fox's East India Bill in 1783, and in 1787 was one of the managers of Hasting's impeachment. In 1789 he succeeded to the peerage and was elected a Scottish representative peer. He was in Paris at the time of the attack upon the Tuileries; and later strongly opposed the French War, but without appreciable support from his associates. His continued opposition to the ministry prevented his re-election in 1796 and in 1802, but with the return of the Whigs to power he was in 1806 created a peer of Great Britain and Ireland with the title Baron Lauderdale of Thirlestane, Berwick. He declined the appointment as governor-general of India, but accepted the office of Lord High Keeper of the Great Seal of Scotland and was sworn a member of the Privy Council, 21 July 1806. Upon Lord Grenville's downfall in 1807 he resigned and became an active mem¬ ber of the opposition in the House of Lords. He was leader of the Whig party in Scotland, and received the Order of the Thistle in 1821. He afterward became affiliated with the Tory party and exerted a considerable influence with its leaders. With the Duke of Bedford he at¬ tacked the pensioning of Burke, calling forth Burke's famous 'Letter to a Noble Lord) (1796). There are 86 of his protests in jour¬ nals of the House of Lords,* for which consult Rogers, (Protests of the House of Lords) (Vols. II and III). He wrote a large number of political pamphlets, and his Unquiry into the Nature and Origin of Public Wealth) (1804; enlarged ed., 1819) was translated into Italian and French. Of his political writings the best known is (Letters to the Peers of Scotland) (1794).

LAUDERDALE, John Maitland, Duke of, Scottish politician : b. Lethington, 24 May 1616; d. 20 or 24 Aug. 1682. He was the eldest surviving son of John, 1st Earl of Lauderdale, and made his entrance into public life as a staunch supporter of the Presbyterian cause. Fie embraced the Covenant and in 1643 vvas sent to England as one of the commis¬ sioners for the Solemn League and Covenant, later carrying it before the two houses at Westminster. In 1644 he was instrumental in securing the surrender of Charles I, but he afterward espoused the royal cause, and suc¬ ceeded in obtaining a supreme

influence over Charles II. He accompanied Charles II from Holland to Scotland but was taken prisoner at Worcester in 1651 and kept in prison until 1660 when he returned to Charles at Breda and despite opposition was appointed Secretary of State. He triumphed over all his opponents in Scotland, became practical administrator of that kingdom and soon turned against the Covenanters, whom he persecuted mercilessly. Able and unscrupulous, his position as the favorite of Charles enabled him to employ methods which were reminiscent of the scan¬ dals and abuses of the Stuart administration before the civil war. He was created Duke of Lauderdale and earl of March in 1672 ; and in 1674, earl of Guilford and Baron Petersham in the peerage of England, and was made a Privy Councillor of England. His hold upon the king withstood repeated demands of the House

of Commons for his removal, and he remained in favor with the monarch until he voted for the execution of Lord Stafford, 29 Nov. 1680. He was then stripped of all his pensions and public offices except that of the life appoint- ment of extraordinary lord of session. His health had already failed and he died in retire¬ ment. He left no male issue and his English titles became extinct.

LAUDIAN MANUSCRIPT (Codex Lau- dianus), manuscript of the Acts of the Apostles presented to the University of Oxford in 1636 by Archbishop Laud and now No. 35 in the Bodleian Library. It is a manuscript of great value and has 226 leaves of from 23 to 26 lines, nine by seven and a half inches in size. The quality of the vellum is poor and the ink is faded. It is written in parallel columns and uncial letters. The Latin words are invariably opposite those of the Greek text and are a closely literal version, not a transcript of either Jerome or the Vulgate. The leaves covering xxvi, 29 — xxvii, 26, are missing. Its origin is fixed at about the 6th century and it was probably written in western Europe. Readings from it were taken by Fell (1675), and Mill (1707). The Hearne edition (1715) is very rare. Later editions are by Hansell (1864), and Tischendorf (1870). Consult Davidson, (Biblical Criticism > (Vol. II, p. 293) ; Gregory, (Canon and Text of the New Testament* (1907).

LAUDON, lou'don, or LOUDON, Gid¬ eon Ernst, Baron von, Austrian general : b. Tootzen, Livonia, 2 Feb. 1717; d. 14 July 1790. He was of Scottish descent and served in the Russian army in 1732-39. He settled in Austria in 1742, became a colonel at the outbreak of the

Seven Years War and in the following year was promoted major-general. He fought at Rossbach and Hochkirch, and with the aid of the Russian General Soltikoff defeated the forces of Frederick the Great at Kunersdorf in 1759. He won further victories at Glatz and Landshut, was ennobled in 1758 and became field-marshal in 1778 after service in Bohemia. He fought in the Turkish War of 1788-89, capturing Belgrade, and in 1790 he became generalissimo. Consult Janko, (Das Leben des Feldmarshalls von Laudon) (1869).

LAUDONNIERE, Rene de, re-na de 15- do-ne-ar, French navigator. Nothing is known of the date of his birth or death. His first appearance is in 1562, when he shared in Ribault's attempt to establish a Huguenot colony at Port Royal in South Carolina. He built a fort and founded a colonv in 1564 at a point 12 miles up the Saint John's River, Florida. But his colonists were more men of adventure than of industry and were much molested by the Indians. They eventually compelled him to sanction an expedition against the Spaniards in Cuba. But the colony fell subsequently into such straits that 3 Aug. 1565, when Capt. John Hawkins reached Fort Caro¬ lina, as they had named their settlement, he found them without supplies or ships. . On 29 August, Ribault arrived with seven ships and 300 men, and superseded Laudonniere, who was ordered home to defend himself against charges of treason and tyranny. In Ribault's. absence the Spaniards attacked Fort Carolina and massacred the colonists. Laudonniere escaped,

took refuge in England and did not return to France till 1566.

LAUENBURG, lou'en-poork, Prussia, town in the province of Pomerania, 38 miles north¬ west of Danzig and 68 miles northeast of Koslin on the right bank of the Leba River. It has textile and leather manufactories, and also produces matches, stoves, machinery and cement bricks. There is a considerable trade in lumber, wines and dive stock. Pop. 13,916.

LAUENBURG, Prussia, administrative cir¬ cle in the province of Schleswig-Holstein, bordering Hamburg, Lubec, Mechlinburg-Schwerin and Hanover, and bounded on the south by the Elbe River. It has an area of 455 square miles, is well wooded, with a fertile soil, and is principally occupied with agricul¬ ture and stock-raising. Its chief towns are Lauenburg and Ratzeburg. Its ancient in¬ habitants were Polabs and later it formed a part of the duchy of Saxony. It was ruled in succession by the dukes of Saxe-Lauenburg, house of Hanover and the kings of Denmark. It became Prussian in 1866, and in 1890 Bis¬ marck received the title of the Duke of Lauen¬ burg, his largest

estate, Friedrichsruh, being located there. Pop. 54,571.

LAUENBURG, Prussia, town in the cir¬ cle of Lauenburg, Schleswig-Holstein, 26 miles southeast of Hamburg on the Elbe River and Trave Canal. It has a castle built in 1181 by Duke Bernhard of Saxony. The modern town has shipbuilding and manufacturing industries. Pop. 5,178.

LAUFER, lou'fer, Berthold, American an¬ thropologist and Orientalist : b. Cologne, Ger¬ many, 11 Oct. 1874. He was educated at the universities of Berlin and Leipzig, and the Seminary for Oriental Languages, Berlin. He came to United States in 1898, and in 1898- 99 he was a member of the Jesup North Pacific expedition to Saghalin Island and the Amur region of eastern Siberia for an ethnological survey. He accompanied the Jacob H. Schiff expedition to China in 1901— 04, and the Mrs. T. B. Blackstone expedition to Tibet and China in 1908-10. He was as¬ sistant in ethnology at the American Museum of Natural History, New York, in 1904-06; lecturer on anthropology and East Asiatic languages at Columbia University, in 1905 and 1906-07 ; became assistant curator of Asiatic ethnology at the .Field Museum of Natural History, Chicago, in 1911, and curator in 1915. He is a member of the leading scientific socie¬ ties of America, Europe and Asia. Author of more than 100 scientific papers; and descrip¬ tive Account of the Collections of Chinese, Tibetan, Mongol and Japanese Books in the Newberry Library* (1913).

LAUFF, Joseph von, German poet, novel¬ ist and dramatist: b. Cologne, 16 Nov. 1855. He was educated at Munster, Westphalia, en¬ tered the army as lieutenant of artillery in 1877 and reached the rank of major in 1898, at the same time being summoned to Wiesbaden by William II and ordered to devote his dra¬ matic gifts to the Royal Theatre. . His earliest literary work took the form of epic poems, of which the first was published in 1886. He later wrote several novels which enjoyed a consider¬ able success, but he found his greatest rewards

in the writing of dramas. He was ennobled in 1913. Author of the epic poems (Jan Van Calker, ein Malerlied vom Niederrheim) (1887; 3d ed., 1892); (Der Helfensteiner, ein Sang aus dem Bauernkriege) (1889; 3d ed., 1896); (Die Overstolzin) (1891; 5th ed., 1900) ; (Herodias) (1897; 2d ed., 1898) ; (Geis- lerin> (1900; 4th ed., 1902) ; the novels

(Die Hexe5 (1892; 6th ed., 1900); Regina coeli > (1894 ; 7th ed., 1904); (Die Hauptmannsfrau5 (1895; 8th ed., 1913); (Marie Verwahnen) (1903) ; the dramas Hgnez de Castro) (1894) ; a Hohenzollern tetralogy, (Der Burggraf) (1897); (Der Eisenzahn) (1900); (Der Grosse Kiirfurst) (1900) ; (Friedrich der Grosse,

Vorwarts5 (1900); Riischhaus5 (1900);

LAUGEE, lo'zha, Desire Frangois, French painter: b. Maromme, 25 Jan. 1823; d. Paris, 24 Jan. 1896. He studied under Picot and at the Lcole des Beaux-Arts, and first exhibited in the Salon in 1845. His work covers portraits, historical, genre and religious paintings. Among his paintings are (Van Dyck a Savelthem et la Mort de Zurbaran5 (1850) ; Reseur chez les chartruex) (1855) ; (Sainte Elisabeth de France lavant les pieds des pauvres) (1865) ; mural paintings in the church of Saint Clotilde, Paris (1870); a decorative painting, (Le Triomphe de Flore) in the Hotel Continental (1879) ; < Victor Hugo stir son lit de mort) (1880) ; Res Approches de l'automne > (1892) ; (Le Fil de la Vierge5 (1893), etc. Examples of his work may be found in the museums of Amiens, Lille and Luxembourg.

LAUGEE, Georges, French painter: b. Montvilliers, 19 Dec. 1853. He studied under his father, Desire Franqois Laugee (q.v.), and under Pils and Lehman, and made his first exhibition in the Salon in 1877. His work is chiefly of the genre type. His paintings include Re Repas des Moissoneurs) (1877) ; (Arra- cheuses de betteraves en Picardie) (1879) ; (En Octobre) (1881) ; (Soliel Couchant5 (1886); (Au printemps de lavie) (1891); (Au pays normand et les Lapins) (1894), etc.

LAUGHING GAS, a name given to ni¬ trous oxide after its remarkable physiological effects were discovered by Sir Plumphry Davy in his Researches,5 published in 1800. The effects are generally of a pleasurable kind and the person under the influence of the gas is more or less excited, dancing, singing, laughing or indulging in other violent motions. This by prolonged inhalation ceases and stupor and anaesthesia, or insensibility to pain, supervene. Hence the use of this gas in dental and surgical operations. See Anesthetics ; Nitrous Oxide.

LAUGHING GULL, black-hooded gull of the North American coasts (larus atricilla), which migrates to the Amazon in winter. It is between 15 and 17 inches in length, has a mantle of slate-gray with white beneath, and in breed¬ ing season the hood, or capistrum, is nearly black. Its popular name comes from its pe¬ culiar cry which resembles boisterous laughter. It nests on sandy inlets from Florida to Maine, building a carefully-constructed nest of sea¬ weed and grasses on the

ground.. The Euro¬ pean species (larus ridibundus) is similar in character except that it is smaller in size. Both species are very numerous.

LAUGHING PHILOSOPHER, a char¬ acterization of Democritus of Miletus (q.v.). He laughed at the follies of man and is dis¬ tinguished by this epithet from the “weeping philosopher, 55 Heraclitus, who mourned for human depravity and infatuation.

LAUGHLIN, laf’lin, James Laurence,

American political economist and educator : b. Deerfield, Ohio, 2 April 1850. He was gradu¬ ated from Harvard in 1873. In 1878 was ap¬ pointed instructor of political economy there and was assistant professor 1883-87. From 1887 to 1890 he was president of the Manu¬ facturers’ Mutual Insurance Company of Phila¬ delphia; in 1890-92 professor of political econ¬ omy at Cornell ; and in 1892 became head professor of the same department in Chicago University. In later years he has given special attention to the study of financial questions ; in 1894-95 he prepared a scheme of monetary reform for the San Domingo government which was later adopted; and he has been a member of the monetary commission created by the Indianapolis Monetary Conference in 1897. He is a member of the International Institute of Statistics and of the Political Economy Club, of which he was one of the founders. He has written (Anglo-Saxon Legal Procedure in Anglo-Saxon Laws5 (1876); (Study of Polit¬ ical Economy5 (1885): (History of Bimetellism5 (1886), a comprehensive treatment of the sub¬ ject; Rlements of Political Economy5 (1887); (Gold Prices since 1873 5 (1887) ; (Facts about Money5 (1895) ; (Report of Monetary Com¬ mission5 (1898); Principles of Money5 (1902); Reciprocity5 (1903); Undustrial America5 (1906); (Aus dem Amerikanischen Wirtschaftsleben5 (1907) ; Ratter-Dav Prob¬ lems5 (1909) ; and has prepared an abridged edition of Mill’s Principles of Political Econ¬ omy5 (1884) with a short biography and a sketch of the history of political economy. He was editor of the Journal of Political Economy, and was one of the founders of the Quarterly Journal of Economics, to which he has con¬ tributed frequently.

LAUGHTER, in physiological-psychology, an expression of emotion, consisting chiefly in certain convulsive and partly involuntary activ¬ ities of the muscles of respiration by means of which after an inspiration the explosion of air from the lungs in a series of interruptions pro¬ duces a succession of short abrupt movements of the muscles of the face and often of other parts of the body, along with an emission of chuckling sounds from the throat. It is usually

accompanied by a peculiar expression of the eyes, indicating merriment, keen amusement, satisfaction or derision; and even sometimes by tears. A gentle and inaudible form of laughter is called a smile. It is expressed merely in the movement of the lips and eyes. Dr. Boris Sidis discovered in the course of his investigations of the causes of laughter the primary law that “all unrestrained activities of normal functions give rise to the emotion of joy with its expres¬ sions of smiles and laughter55 ; and with this as the initial point of his discussion, he begins with a consideration of the “play-instinct55 in all young animals. Upon this hypothesis Dr. Sidis builds up a tolerably convincing theory that very nearly all human activity is based upon the “play-instinct.55 Widely differing human ac-

tivities church ceremonies, theatricals, out¬ door games contends Dr. Sidis, are at bottom things which subserve the same function. All satisfy the play-instinct, daughter, smiling, grinning, are all external manifestations of the play instinct® (Dr. Sidis). In all he perceives expressions either of satisfaction, derision, con¬ tentment or inner emotion of joy — and they all accompany the play-instinct. Thus church services and a football game become inwardly connected. From the coarse roar of an amused mob enjoying to the full the laughter induced by suffering (!), we reach, after gradation upon gradation, the inner glow of the human soul, a glow which comes to all reverent worshippers of the divine; and the ultimate, supreme manifestation of joy expressed outwardly only by a rapt expression of the countenance or by the gleam in the eye, it is yet none the less of the very essence of laughter. Laughing is the privilege of man. It is the outburst of senti¬ ment. Yet it is limited to the domain of rational mentality.

Homer tells us that the followers of Ulysses died with laughter at the sight of Irus writhing in anguish on the ground after Ulysses had broken his skull. Sir Thomas Urquhart is said to have died in a paroxysm of laughter, on hearing of the restoration of Charles II ; a statement which is rendered sufficiently prob¬ able by the record of similar cases and by the eccentric character of the individuals said so to have died. Aretseus, an ancient physician, specifies unextinguishable laughter as one of the causes of death. And other ancient writers have mentioned the names of different persons who died of excessive joy. According to the common account, even Sophocles was among this number.

John Kendrick Bangs has pointed out that the conclusion that laughter is necessarily sar¬ donic would be a half-truth only. ‘ Yet he admits that he who endeavored to trace the causes of laughter, induced by a Broadway librettist, would find himself inevitably en¬ meshed in a miasmatic ooze emanating from the emotional morasses of an unspiritual bed¬ lam. The only common element in both the mirth described by Homer and in the case just mentioned seems to him a sort of unwitting cruelty. ((The highest point reached by laugh¬ ter,® says Dr. Sidis on the other hand, <(is inti¬ mately related to the highest intellectual, es¬ thetic and moral development of man.® These words recall the statement of Addison, that it annoyed him to see the talents of humor and ridicule in the hands of an ill-natured man. The better of our professional humorists re¬ member this. They know that ridicule and social decadence are capable of mutual under¬ standing, and therefore keep them apart. Pro¬ fessional humor never forgets that to laugh with and not at people is the mission of him who would work great ends through the laughter of sympathy. They never stoop will¬ ingly to the caustic ridicule which leaves be¬ hind it the sting of resentment and the scar of injury and injustice. (J. K. Bangs).

They teach us to laugh aright. They dis¬ cover for us relationships where they are least expected, and the reaction is laughter. Or they show us how relationships. appearing to exist are preposterous, which being done sud¬ denly we laugh. The expression of laughter is

not always indicative of a physical apprecia¬ tion of enjoyment, for it is well known that idiots are prone to laughter which is often with¬ out any such significance. Many idiots con¬ stantly show a laughing countenance, the smile being more or less stereotyped; or they may grin, giggle or chuckle at the slightest stimulus, whether of food, color, music or personal con¬ tact. It is probable that in such cases laughter is purely an expression of physical content¬ ment, rarely associated with higher or more complex ideas.

In children, laughter is more sensible, but the expressions of joy usually contain an ele¬ ment of uncontrolled exuberance. Thus they clap their hands, stamp their feet and jump around in pure excess of vital spirits. In adults the subject of laughter is extremely com¬ plex. As a rule, during laughter, the mouth is more or less open, the corners being drawn backward and usually somewhat upward. The upper lip is commonly raised. The drawing- back movement is seen best in the broad smile or in moderate laughter; in out-and-out mirth the teeth are usually exposed by the raising of the upper lip. The cheeks are ordinarily drawn upward at the same time and wrinkles are formed under the eyes. This movement in old persons makes a very

characteristic feature, and the wrinkles so frequently found in their faces largely assist to interpret the sense of content¬ ment indicated. Associated with laughter, there is often a change in the character of the eye. The bright and sparkling eye described by Darwin and others who have devoted much time to this subject is the eye of laughter. Often tears suffuse the eyes and destroy this appearance of brightness, but this is usually due to excessive laughter.

Numerous signs are produced during these expressions of joy. During laughter, the move¬ ments of the chest and larynx are almost ex¬ actly opposite to those that accompany the screams and cries of distress. In these latter the expirations are prolonged and continuous, and the inspirations short and interrupted; whereas in joy the expirations are usually short and the inspirations long.

((In all races of men,® says Darwin, ((the ex¬ pression of good spirits seems to be the same, and it is easily recognized® ; and he adds, that (

which is laughter pulled up abruptly, followed by a sudden facial seriousness or a change which affects only a part of the features, while the rest are unmoved. Consult Bergson, Henri, < Laughter > (New York 1912) ; Darwin, Ex¬ pression of the Emotions in Man and Animals) (latest ed., New York 1910) ; Hughes, (Die Mimik des Menschen5 (1900); and Sidis, B., the Psychology of Laughter) (New York 1913) ; Sully, James,

LAUGHTON, la'ton, Sir John Knox,

British naval officer and historian : b. Liverpool, 23 April 1830; d. 14 Sept. 1915. He served in the Baltic during the Russian War, 1854, and in China from 1856—59. He was mathematical and naval instructor in the Royal Naval Col¬ lege, Portsmouth, 1866-73 (afterward holding the same post at Greenwich) ; and was lecturer on naval history, 1876-89. In 1885 he was ap¬ pointed professor of modern history in King's College, London. He was the author of Phys¬ ical Geography in its Relation to Prevailing Winds and Currents) (1870) ; (Treatise on Nautical Surveying) (1872) ; Ptudies in Naval History* (1887) ; (Nelson and his Com¬ panions in Arms* (1896), etc. He was the founder of the Navy Records Society, for which he edited some important publications, and he contributed largely to the (Dictionary

of National Biography.*

LAUGIER, lo'zhya, Paul Auguste Ernest,

French astronomer: b. Paris, 1812; d. 1872. He studied at the Polytechnique and at the Paris Observatory under Arago. In 1843 he was elected to the Academy of Sciences, and was afterward attached to the Bureau of Longi¬ tudes. He was favorably known for his work on the subjects of solar equator and sun-spots.

LAUMONTITE, la'mon-tit, one of the zeolite family of minerals. It usually occurs in masses made up of white, vitreous to pearly, monoclinic prisms. It is a hydrous silicate of aluminum and calcium, HiCaAkShOu + 2H20. Upon exposure the normally colorless and transparent crystals quickly lose part of their water of crystallization and become white, opaque, brittle and much below the normal hardness of 3.5 to 4. Laumontite is rarer than most of the zeolites with which it is associated in many localities. Especially fine specimens are found at Nagyag, Transylvania, in Nova Scotia, New Jersey, Lake Superior, etc.

LAUNCESTON, lans'ton, England, a bor¬ ough and market town in the county of Corn¬ wall, 24 miles north by west of Plymouth, and on the river Kensey near its confluence with the Attery and Tamar. It is situated on the side of a hill, is generally well built, and has a fine church, built of granite in the 16th cen¬ tury in a debased perpendicular style and oc¬ cupying the site of an older building of which a detached tower remains of date 1380; a guildhall in castellated style; a town-hall (1887), and a grammar school founded in the reign of Edward VI. There are the ruins of the old castle, the seat of the earls of Corn¬ wall, in which George Fox the Quaker was imprisoned in 1656 for distributing tracts, and of a fine priory. A fine Norman doorway is to be seen in the White Hart Hotel. Agricul¬ ture, tanning and iron-founding are the chief emplovments. This town * was until 1838 the

capital of Cornwall; but Bodmin is now the assize town. It gives name to one of the six parliamentary divisions of the county. Pop.

4,117.

LAUNCESTON, Tasmania, the second city in the island, in the county of Cornwall, 133 miles, by rail, north of Hobart, at the con¬ fluence of the North and South Esk rivers, the united stream taking after this the name of the Tamar, which is navigable up to the town from the sea, a

distance of 40 miles. With the floating dock access is readily ob¬ tained by vessels of large tonnage. The streets are regularly laid out and lighted by electricity. The principal buildings are the town-hall ; the Albert Hall ; the mechanics' institute, with library; technical schools and school of mines; and art gallery. Wheat, oats, peas and pota¬ toes are the chief crops grown in the neighbor¬ hood, but fruit culture is steadily extending, and gold, oil, hardwood and bark are also ex¬ ported. Launceston is the seat of a United States consular agent. Pop., with suburbs,

23,726.

LAUNCH, in shipbuilding, a term com¬ prehending the apparatus for removing a ves¬ sel from the land to the water. The keel of a ship is laid upon a series of blocks, placed six or seven feet apart, the tops of which lie in a line which slopes downward to the water at an angle of about five-eighths of an inch to the foot. Timber shores on either side support the vessel in an upright position upon the keel blocks. When ready for launching <(ways** of planking are laid parallel to the keel under the bilges of the ship and extending into the water a considerable distance. A cradle is now built under the ship, with its bottom resting on the ways. Just betore launching the keel blocks are lowered away or otherwise removed, trans¬ ferring the weight of the ship to the cradle and ways. Dogshores are put in place to prevent the ship from sliding down until the right moment. When the time arrives the dogshores are removed and the vessel begins to slide, at first slowly, downward, the cradle slipping along the ways and breaking into pieces as soon as the water takes the weight of the vessel from it. Some vessels are built in dry dock and are floated out when ready. Hydraulic machinery of a special type is used to insure the cradfe starting on the ways.

LAUNCH, the largest boat belonging to a ship of war. It is only used for service which cannot be performed by the smaller boats. There are steam, motor and sailing launches. In large men-of-war launches 40 to 60 feet long are carried. They are used as picket boats to guard against surprise by torpedo or other craft, and some are capable of steaming 18 or 19 knots. Two types of sailing launch are supplied to vessels of the United States navy — one propelled by oars or sails and the other by gasoline or heavy-oil engines. The latter is from 32 to 45 feet long, has a speed of five to eight knots and is much used in carrying men and stores to and from ships. The corresponding boat of merchant vessels is called the long boat.

LAUNDER, in mining, a water-gutter, conduit, pipe or trough, usually

of wood, for conveying water to a stamp-mill or other hydraulic apparatus for comminuting or sort-

ing ore. Also a trough or box to receive the slimes from the stamps.

LAUNDRY MACHINERY. Laundry machinery as it is understood from the com¬ mercial standpoint includes a class of mechani¬ cal devices developed during a comparatively recent period, to supplant the primitive proc¬ esses of laundering that have existed during all time. While the use of laundry machinery in crude forms dates back for a considerable period, the past three or four decades mark the era of the development and manufacture of power machinery for ‘laundering purposes, in a sufficient degree to warrant recognition as an independent branch of industry. This is due to the fact that the steam laundry is a modern institution ; and the development and extent of manufacture of laundry machinery has gone hand in hand with the growth of the laundry interest. The steam laundry of to-day per¬ forms on a large scale, and by improved mechanical devices, the processes of cleansing, that for centuries had been confined to hand work in connection with the running stream, or the wash tub of later years. The growth of the laundry as an organized business has been so rapid during the past quarter of a century that its changing needs have made, and still keep, the invention and production of laundry machinery in a state of constant development of new ideas and forms. So that while the laundry machinery business has passed the em-bryotic stage, it may fairly be said in the open¬ ing years of the 20th century to be in an era of great advance, holding and to hold a much more important position as an independent and recognized branch of mechanical industry. The city of Troy, N. Y. (the birthplace of the collar, cuff and shirt industry, as set forth in an article under that head) was practically the home, and for many years was the centre, of the steam laundry interests of the country; an interest which has now extended to every city or place of any importance in the land. So general is the recognition of this fact, that the name (

The introduction, use and development of laundry machinery has been much more rapid and general in the United States than in Europe. American manufacturers are com¬ peting actively for the trade of all foreign markets. The greatest limitation to the de¬ velopment of the trade abroad is the conserv¬ atism of foreign nations in adopting the more advanced methods of laundering calling for the

modern types of American machinery. WhUe there are very many forms of laundry machinery in use, the most prominent examples of the art are included in those that perform the three most important functions of launder¬ ing, namely, washing, drying and ironing.

Washing Machines. — The first process, washing, is performed by two types of rotary machines, the dash wheel and the reverse wheel. The dash wheel consists of a large cylinder divided into pockets by baffles and revolving in one direction inside of an outer case. This machine is used principally in new work laundries. The more generally used washer is the reverse wheel. In this the goods are placed in an inside cylinder having perforations to admit the free passage of water, steam and soap among the goods. This cylinder runs in an outside shell or case, the water and steam being let in by pipes, and by automatic re¬ versing devices the inside cylinder revolves several times in one direction, then an equal number in the opposite one. This action loosens up the goods and subjects them freely to the action of water and soap, and so re¬ moves the dirt from the garments. The inside cylinders are made of wood and brass and the outside cases of wood, galvanized iron or brass. Another form of the interior cylinder has its sides of copper rods with sufficient space be¬ tween to allow the free entrance of the hot soapy liquid in the outer case. An improved and very efficient type of this machine has the inner cylinder pivoted off the centre, with the result that the cleansing liquid is scooped up by the revolving eccentric and surges through the <(wash® as it falls back to the bot¬ tom of the case. These washing machines are made in several sizes, graded to the economical performance of the work they are expected to do. They may be had either for the ordinary laundry work at low pressure, or with steam- tight covers and connections to support the high steam pressures used particularly for sterilizing or disinfecting. A different type of washer is used in washing flannels and other woolens, for which the temperatures must be much lower, the revolving motion slower, and the baffles and paddles arranged to produce a kneading effect. The operations of rinsing and blueing are carried out in the same machines in which the washing is done.

Drying Machinery. — The next process is that of drying. The goods are first taken from the washer and placed in what is known as a centrifugal extractor. This machine consists

of a perforated copper basket, revolving rapidly inside an iron or steel curl or case, and making from 800 to 1,400 revolutions per minute. The water is thrown out through the perforations in the basket by centrifugal force, and in about 20 minutes the goods are partially dried and ready to be taken out. The drying process is completed by

the use of a dry-room. The

improved types include the cabinet room, made up of a series of racks or trucks arranged with bars or hooks to hold the collars, cuffs, shirts or other garments, and running on tracks into a cabinet made of wood or metal. The heat is supplied by a series of steam coils arranged horizontally or longitudinally in the room, and often heated by the waste wash water. Fans are used to circulate the heat among the goods and accelerate the drying process. The most recent development is the automatic dry-room. In this the goods are hung on hooks attached to an endless chain or wire cable, which enters into and passes through the room in a series of loops, and out at the other end of the room. The goods are dried in one journev and are re¬ moved from the hooks by an automatic device so that they fall into baskets on the outside of the room.

Ironing Machinery. — The third general division of laundry work is the ironing, for which many forms and styles of machines are used. For collars and cuffs, it is done on machines consisting of a combination of re¬ volving covered drums coming in contact with revolving heated rolls, the goods being ironed as they pass through. The covered drum is wound with layers of felt, cotton flannel and

muslin, forming a padding much the. nature of that which covered the old-fashioned family ironing board. The heated rolls are highly polished and are heated by gas or steam. Formerly all these machines required the goods to be passed through several times for a per¬ fect finish. The more modern types of ironers are known as <(one pass machines? These have a series of heated rolls and drums so that the collar is put in at the front of the machine and comes out at the back perfectly ironed. Some of these ironing machines of modern production have a capacity of from 250 to 300 dozen collars or cuffs per hour. The length of the ironing surface of the heated rolls of collar and cuff ironing machines of different sizes varies from 12 to 48 inches. For the ironing of flat pieces such as sheets, table linen and towels, a machine known as the mangle is used, by which the goods are dried on revolving cylinders heated by steam. In the recent, types of mangles great capacity is attained ; in some the length of ironing sur¬ face reaches 10 feet and requires several operators to feed the

machine. For shirts, a separate class of ironers is required. These are the bosom, body, sleeve and band ironers. The general principle and operation are, how¬

ever, the same as in the collar and cuff ironers, previously described. The most recent de¬ velopment of shirt ironing machinery is a series of machines steam heated, and on which the finish is produced by pressing instead of iron¬ ing. Flannels are pressed on a hollow table having a perforated surface through which steam comes up in sufficient amount to dampen the goods. Special padded forms of various shapes are employed in the pressing of ladies shirtwaists and fancy skirts.

Other important machines not described above and which are used in laundering are starchers, shapers and dampeners. There are many other forms of laundry machinery made to cover parts of processes, and new forms and types are constantly being invented and put on the market. The special census of manufac¬ tures taken in the United States in the year 1914 reported a total of 6,097 power laundries of factory grade, operating machines aggregating 174,881 horse power. These establishments em¬ ployed 130,641 wage-earners who received an¬ nually a total of $59,483,000 in wages. The capital invested amounted to $98,055,000, and the amount received for the work done was $142,503,000. Consult Rothery, G. C., and Edmonds, IT. O., (The Modern Laundry* (London 1909).

John T. Birge,

Vice-President and Treasurer, Adams Laundry Machinery Company.

LAUNE, Ion, or LAULNE, Etienne de, or DELAUNE, French engraver: b. Paris or Orleans, 1518; d. Strassburg, 1595. He was by trade a goldsmith and medallist, but is said to have had lessons from Benvenuto Cellini, and from 1561 appears to have devoted himself to engraving. Political affairs caused him to leave France, and the later part of his life was spent at Augsburg and Strassburg. His finest work is shown in his small prints, some of which may be seen at the Louvre. The}' are for the most part designs for coins, and for goldsmith's and armorer's work. His larger prints are not important.

LAUNFAL, Sir, knight of the Round Table and. steward to King Arthur. He is celebrated in James Russell Lowell's (Vision of Sir LaunfaP and his story more fully told by Thomas Chestre in (Sir Launfal.* Tryamour, the sweetheart of Sir Launfal, supplied him with a never-failing purse and promised to ap¬ pear to him when he was alone. His

loyalty to her incensed Queen Guinevere, daughter of the king of Ireland, whom Sir Launfal declared to be unworthy to kiss Tryamour's feet. Im¬ prisoned by King Arthur and threatened with death unless he could prove his assertion, Sir Launfal is rescued and freed by the appear¬ ance of Tryamour. The two then journeyed to the isle of Oleron and were seen no more.

LAUNITZ, lou'mts, Robert Eberhard,

Russian- American sculptor : b. Riga, Russia, 1806; d. New. York, 1870. He studied under Thorwaldsen in Rome; emigrated to America in 1828, and in 1833 became a member of the National Academy. Among lfis works are the Pulaski monument at Savannah, Ga., and the battle monument at Frankfort, Ky.

LAUNITZ, Vladimir von per, Russian soldier and government official : d. Saint Peters¬ burg, 3 Jan. 1907, He served in the Turkish

War of 1887-88, was governor of Tamboy for three years, and in 1906 was appointed prefect of police at Saint Petersburg. He was partic¬ ularly severe in his suppression of revolutionary tendencies, and after the assassination of Gen Count Alexis Ignatieff, 22 Dec. 1906, and the attempt to kill Vice-Admiral Dubassoff he redoubled his efforts. His published report showed the arrest in Saint Petersburg of 588 persons, accused of revolutionary agitation, in the three days 25-27 Dec. 1906. He was shot and killed at the Institute of Experimental Medicine, Saint Petersburg, 3 Jan. 1907, the assassin himself being immediately afterward shot by an officer who was present.

LAUPEN, low-pen, town in canton of Bern, Switzerland, situated at the junction of the Sense and Saane, 10 miles west-southwest of Bern. It was the scene of a victory of Bern over Fribourg and allies in 1339. Pop. about

1,000.

LAURA, the French lady celebrated by Petrarch as the object of his lifelong passion: b. Eaumont, Provence, 1308; d. Avignon, 6 April 1348. Petrarch (q.v.) has told us that he saw her for the first time in the church of Santa Chiara at Avignon, on Good Friday, 6 April 1327 ; that she was the mother of several chil¬ dren and died on Good Friday at the hour in which he had first seen her, and was the same evening

laid to rest in the Franciscan church. It would appear that Laura was the daughter of Audibert de Noyes and was married io Hugo de Sade and bore him 11 children. There is no ground for supposing that Laura was a mere creature of the poet's fancy. Consult Minich, (Sulla Persona della Celebre Laura, > in (Atti dell Instituto Veneto) (Vol. IV, series 5, 1877-78) ; D'Ovidio, (Madonna Laura) (in the (Nuova Antologia,> 15 July and 1 Aug.

1888).

LAURA, a small monastic community, such as was common in Egypt, Palestine and Syria. It formed a mean between the solitude of the hermitage and the community life of the mediaeval monastery. There was a superior, but no very definite rules. The cells were sepa¬ rately clustered like an encampment round the chapel. The brethren only met together twice a week and subsisted on bread and water. Three monks occupied one cell, under Pacho- mius. A famous laura was founded by Chari¬ ton, a hermit, at Pharan near Jerusalem, one by Saint Euthymius several leagues from Jerusalem, and others in the 5th century by Sabas, a celebrated 'hermit. The Empress Eudocia, wife of Theodosius II, also insti¬ tuted a laura. Consult Genier, R., (Vie de Saint Euthyme le Grand, 377—473 J and (Le moines et l'eglise en Palestine au Ve siecle) (Paris 1909).

LAURACE/E. See Laurel.

LAURANA, lou-ra'na, Luciano da, Ital¬ ian architect: b. Dalmatia, 1 5th century. He is supposed to have been a pupil of Brunel¬ leschi, and among his own pupils was Bramante (q.v.). He designed the ducal palaces, at Urbino and Gubbio for Federigo of Urbino, between the years 1468-82. His work is char¬ acterized by strength and simplicity of line and splendid proportions, and he is considered with¬ out a rival in his period.

LAUREL, la'rel, Miss., city and county- seat of Jones County, on the Gulf and Ship Island, the Mobile, Jackson and Kansas City and the Queen and Crescent railroads. 110 miles northwest of Mobile. In 1890 this was a village of 100 people, while in 1910 it had 8,465 population. The town owes its beginning to the sawmills of East¬ man, Gardiner & Company, and of the Kings¬ ton Lumber Company. These sawmills have timber sufficient to last them at least 25 years. Laurel has the following important industries in addition to its sawmills: Laurel Cotton Mill, having 10,000 spindles and 640 looms,

and employing 400 hands; Laurel Oil & Fertilizer Company, using 40 tons of cotton seed daily; Lindsey Wagon Company; Brick & Tile Com¬ pany, having a capacity of 30,000 bricks per day, and Mississippi Knitting Mills, with a capacity of 125 pairs of hose per day. It also has many smaller factories, as a machine shop, railroad repair shops, foundry, cotton compress, ice factory and electric-light and power plant. The town has two national banks. It contains a fine city hall building and the State Agri¬ cultural Farm. The waterworks are operated and owned by the municipality. Laurel has adopted the commission form of government. Pop. (1920) 13,037.

LAUREL, a tree or shrub of the family Lauracea ?, having alternate, simple, often ever¬ green, exstipulate leaves ; panicles or umbels of perfect flowers and one-seeded drupes or berries. The species, of which there are more than 1,000, mostly tropical, are divided into about 40 genera and are most largely repre¬ sented in Brazil and southwestern Asia. Among the best-known North American members are the red bay (Persea borbonia), sassafras (Sas¬ safras sassafras), pond spice (Litsea genicula- ta), and wild allspice (Benzoin benzoin), all of which are found east of the Mis¬ sissippi. The tropical species are, however, more important. Among them are avocado or alligator pear (Persea gratissima), cinnamon, camphor-tree and cassia (Cinnamomnm) , and greenheart (Nectandra rodice). The name is usually restricted, however, to the two trees of the tvpe genus Lauriis, which are natives of the Mediterranean region, and are char¬ acterized by dark, evergreen leaves, small, dioecious or perfect inconspicuous flowers in little axillary umbels and small, suc¬ culent, purple, cherry-like berries. They sometimes attain heights exceeding 50 feet, but are usually scarcely more than a third of this height. The more popular species is the poet's or wreath laurel (L. nobilis), called in America sweet-bay. See Bay.

Among the numerous other shrubs known as laurels are the mountain-laurel (q.v.) and other species of Kalmia, the Portugal laurel {Primus lusitanica), the cherry-laurel (Primus laurocerasus and P. caroliniana) , and the ground-laurel (Epigcea repens), better known as ˆtrailing arbutus.®

LAUREL IN ART AND SYMBOLISM.

The laurel was dedicated by the ancients to Apollo. The very earliest belief of the mys¬ terious virtues of the laurel was that it had purifying qualities. Ancient writers say that Apollo purified ffimself with laurel after slaying Python, the snake monster who was making

Parnassus (near Delphi), home of the oracle, inaccessible. And every eighth year Delphi commemorated this purification of the god by a festival ; hence laurel is said to have been used by the ancients for purification from evil consequences that might follow through the slaying of a living animal. The laurel tree was supposed to be inhabited by spirits — this belief and that of purifying influences may have arisen from the fable that Diana (Artemis), the virgin goddess, guarded the purity of her nymphs with great jealousy, and when Daphne offended she was turned into a laurel tree. Hence the ancient terming of the laurel plant Daphne. In depictions Apollo frequently fig¬ ures in purification ceremonies and the laurel accompanies the rite. An ancient writer says that during a pestilence at Miletus, Branchis, the founder of the oracle there, sprinkled the people with laurel leaves and purified them. Of a certain priestess (Gaia) we read that in delivering Apollo's oracles she (

thence it was but a short step to the brow of the conqueror in battle and the Roman em¬ peror. And the pupils of PEsculapius, who had been prescribing laurel medicinally as cure for ((fever, convulsions, the afflictions of lethargy, headache and coughs,® naturally assumed the emblem. Young doctors were decorated with laurel branches (having berries on them) — whence is said to be derived the term ((bac- calaureatus.® The person crowned with laurel was called (III (13th century), but Chaucer, on his return from abroad, assumed the title of poet-laureate, and obtained an annual allowance of wine from 1389. Edmund Spenser (died 1599) is generally considered as the first of the officially appointed line of poet-laureates, which have been continued down to our present day. As a decorative art motif the laurel was used by the ancient Greeks and Romans. In copying the classic arts the French styles Louis XIV and Empire, of course, used the laurel liberally as one of their favorite decora¬ tive elements. In wreaths, borders and other uses, the laurel is retained in art of recent times.

Clement W. Coumbe.

LAUREL HILL, Pa., long range of the Alleghany Mountains, forming a boundary be¬ tween Somerset County on the east and Fayette and Westmoreland counties on the west, and extending from Cambria and Indiana counties into West Virginia, where it is named Chest¬ nut Ridge. Its altitude is above 2,000 feet. The ridge has rich deposits of coal.

LAUREL-MAGNOLIA, the sweet-bay. See Bay.

LAUREL WATER, or CHERRY-LAU¬ REL WATER, liquid distilled from the leaves of the cherry-laurel and water. It standardizes to 1 per cent of hydrocyanic acid and consti¬ tutes a powerful poison. It is used as a flavor¬ ing for medicines, and as a sedative and nar¬ cotic. It has been used ignorantly as a flavor¬ ing in cooking with fatal results.

LAUREMBERG, lou'rem'berk, Johann, German satirist: b. Rostock, 26 Feb. 1590; d. Soroe, Denmark, 28 Feb. 1658. He studied medicine at Paris and Rheims, traveled exten¬ sively in England and on the Continent, and in 1618 was appointed professor of poetry at Rostock. He became professor of mathematics at the Ritterakademie at Soroe in 1623 and re¬ mained there until his death. His use of the Low German dialect mirrored wittily the pecu¬ liarities of the people and scenes he portrayed. He wrote a Latin play (Pompeius Magnus* (1610), and a Greek epithalium. His most notable work, however, is his (Veer olde

beromde SchertzgechichteP Consult Classen, J., (Ueber das Leben und die Schriften des Dichters J. Lauremberg* (1841).

LAURENCE, Richard, Anglican arch¬ bishop, younger brother of French Laurence: b. Bath, 1760; d. Dublin, 28 Dec. 1838. He was educated at Corpus Christi College, Oxford, and was ordained in the Church of England. He held the vicarage at Coleshill in 1787 and later was vicar of Great Cheverall and

rector of Rollstone, Wiltshire. He became deputy regius professor of civil law under his brother at Oxford in 1796; and in 1804 deliv¬ ered the Brampton lectures, «An attempt to illustrate those articles of the Church of Eng¬ land which the Calvinists improperly consider Calvinistical,® later published (1805; 3d ed., 1838) . He was appointed rector of Mersham, Kent, in 1805, and of Stone, near Dartford, in 1811. A well-versed student of theology, canon law and Oriental languages, he was in 1814 ap¬ pointed regius professor of Hebrew and a canon of Christ Church, Oxford. In 1822 he became archbishop of Cashel, Ireland. He was instrumental in having the study of Oriental languages given a more important place in English universities, was a zealous defender of the Church of England against the Calvinists and Unitarians, and succeeded in recovering from the Ethiopic manuscripts several sup¬ posedly lost apocryphal works, among them (The Ascension of the Prophet Isaiah) (1819), and (The Book of Enoch the Prophet* (1821). Author of numerous sermons and essays, and dissertations on the Logos of Saint John) (1808) ; (On the Existence of the Soul After Death* (1834); (Poetical Remains) (1872; 25 copies, privately printed), etc.

LAURENCE, la'rens, Saint, Roman Chris¬ tian martyr : d. Rome, 10 Aug. 258. He was of Spanish race, and when in the Valerian perse¬ cution Pope Sixtus II was carried to martyr¬ dom, Laurence as deacon and treasurer of the Church refused to give up the keys of the treasury, and according to tradition was put to death by being laid over a fire on bars of iron. The Escurial was built by Philip II in fulfil¬ ment of a vow made on Saint Laurence's day, 10 August, to the honor of that saint, the ground plan being after the pattern of a grid¬ iron.

LAURENCE, Samuel, English painter: b. Guilford, Surrey, 1812; d. London, 28 Feb. 1884. He was one of the most successful portrait painters of his day, and had as sitters many of his most eminent

contemporaries, including Whewell, Browning, Carlyle, Dickens, Froude, F. D. Maurice, Thackeray and Tennyson. . While on a visit to Longfellow in 1854 he painted a portrait of John Russell Lowell which has been engraved.

LAURENS, la'rens, Henry, American pa¬ triot and statesman: b. Charleston, S. C., 1724; d. there, 8 Dec. 1792. He was a mercantile clerk in London and Charleston and in the latter place established a successful business. An opponent of royal, aggression, he was in¬ volved in numerous disputes with the Crown judges regarding their decisions. in marine law and the admiralty courts. Having withdrawn from active business, in 1771 he went to Eng¬ land and was there one of the 38 Americans who in 1774 signed a petition to advise Parlia¬ ment against passing the Boston port-bill. In 1775 he became a member of the first South Carolina provincial congress, in 1776 vice-presi¬ dent of the Council of Safety in that colony and from 1 Nov. 1777 to 10 Dec. 1778 was presi¬ dent of the Continental Congress in succession to Hancock. He sailed in 1779 as Minister to Holland for the negotiation of a treaty with that country, but his packet, the Mercury, was

captured by the British, he was examined by the Privy Council and from 6 Oct. 1780 was imprisoned for about 15 months in the Tower on suspicion of high treason. Having been exchanged for Cornwallis, he was sent to Paris, where, with Adams, Franklin and Jay, he signed the preliminary treaty of peace with Great Britain 30 Nov. 1782. The collections of. the South Carolina Historical Society con¬ tain many of his papers. Consult ((Henry Laurens: Narrative of his Capture and Con¬ finement in the Tower of London,® in cCollec- tions) of the South Carolina Historical Society (Vol. I, Charleston 1857) ; Moore, Frank, (Cor¬ respondence of Henry Laurens of South Caro¬ lina,) in (Materials for History) (New York 1861) ; Dawson, H. B. (ed.), (Laurens Petition and Letters> (Morrisania, N. Y., 1866-67).

LAURENS, Jean Paul, zhon pol lo-ron, French artist: b. Fourquevaux, Haute-Garonne, 1838; d. Paris, 24 March 1921. He studied in the Bcole des Beaux-Arts at Toulouse, and became a pupil of Cogniet and Bida in Paris. Llis work is distinguished for boldness and vigor, and the tragic elements of his subjects are heightened by the dramatic realism of the artist. In point of moderation, in treatment and of taste in coloring, his compositions have received some adverse criticism, but his powerful effects are not called in question. In 1886 he became a professor at the Bcole des Beaux-Arts, in 1891 he was elected a member of the Institut and president of the Societe des Artistes Franqais and in 19C0 commander of the Legion of Honor. Among his

pieces are (Death of Tiberius) (1864) ; (A Voice in the Desert* (1868) ; Exe¬ cution of the Due d'Enghien) (1872) ; (The Pool of Bethesda) (1873) ; (The Interdict (1875) ; (The Austrian General Staff Around the Deathbed of General Marceau* (1877) ; Eaooleon and Pius VII at FontainebleaiP (1894), and the Proclamation of the Republic in 1848) (1902). He is also distinguished for his decorative work; notable frescoes from his brush adorn the Pantheon and the Paris Hotel de Ville. Consult Van Dyke, C. J., (Modern French Painters.*

LAURENS, John, American soldier: b. South Carolina, 1753; d. there, 27 Aug. 1782. He was the son of Henry Laurens (q.v.). He was educated in England, and in 1777 became an aide to Washington, whose secretary he also frequently was. From the battle of Brandy¬ wine (11 Sept. 1777) he participated, it is said, in all actions in which Washington commanded. He was severely wounded at Germantown, commanded the light infantry when the united American and French troops under Lincoln and D'Estaing attempted the capture of Savan¬ nah, and aided in the defense of Charleston when besieged by Clinton. In the spring of 1781 he was sent to France to obtain money and supplies. Contrary to diplomatic precedent, he requested and obtained an audience with the king, and secured the necessary assistance. He captured one of two redoubts at Yorktown and received Cornwallis' sword. He was killed in a skirmish on the Combahee River, S. C. What Washington called his (

LAURENS, formerly LAURENSVILLE,

S. C, village and county-seat of Laurens County, 38 miles southwest of Spartansburg and 75 miles northwest of Columbia, on the Charleston and Western Carolina and the Columbia, Newberry and Laurens railroads. It is situated in an agricultural district, has cotton mills and a glass factory. Pop. (1920) 4,629.

LAURENT, Auguste, o-giist lo-ron, French chemist: b. La Folie, Haute-Saone, 14 Nov. 1807; d. Paris, 15 April 1853. In 1838 he became professor to the Academy of Sciences of Bordeaux, which post he held for eight years. In 1848 he was made assayer to the mint and chemical adviser of the Minister of War. His researches were very numerous, em¬ bracing all departments of the science, organic and inorganic,

and opening up new fields and new views. He was one of the champions of the unitary system against the dualistic held by most of the chemists of the time. He was op¬ posed also to the electro-chemical theory, which his investigations into the derivatives of naphthaline did so much to shake, and main¬ tained the doctrine of types — forms of consti¬ tution of bodies which admitted of parts being substituted by other elemental or compound substances without the type of the original body being altered. His views on general chemical theory appeared in a posthumous work entitled (Methode de chimieP translated into English by Odling, and published by the Caven¬ dish Society, 1855.

LAURENTIAN (la-ren'shi-an) MOUN¬ TAINS, the crescent-shaped plateau-like height of land in British North America, ex¬ tending for over 3,000 miles from Labrador to the Arctic Ocean, surrounding Hudson Bay, forming the watershed between Hudson Bay, the Saint Lawrence and the Great Lakes, and dividing the same bay from the sources of the Mackenzie River. The average elevation of this range is about 1,500 feet, while some of the peaks attain a height of 3,000 feet. The system is remarkable for its number of lakes and sheets of water. The rock formation be¬ longs to the sedimentary deposits known as the Laurentian system.

LAURENTIAN SYSTEM. The term Laurentian has been applied by certain Cana¬ dian geologists to a great series of rocks, partly of sedimentary and partly of igneous origin, that is typically developed on the Laurentian Hills north of the Saint Lawrence River. Sim¬ ilar rocks occur elsewhere along the Height of Land, from Labrador to the western end of Lake Superior. The rocks are of very ancient date, but the exact significance of the term Laurentian as a time division or as a lithologic name is in dispute. The typical Laurentian in¬ cludes a series of gneisses, mica, schists, quartzites and crystalline limestones with in¬ trusive granites and green stones of the Archaean group, including also the Huronian. The total thickness may be 30,000 feet. By the United States Geological Survey, Laurentian is made an epoch of the Archaean period. Dur¬ ing this epoch the Laurentian series of granite batholiths (q.v.) were intruded into the Keewatin (q.v.) series of o-reenstone schists (q.v.). The proper application of the term is in much dispute.

LAURIA, lou're-g (LURIA or LORIAj Ruggiero di, Spanish-Italian admiral : b. Castle of Lauria, Lauria, Basilicata, 13th century; d. Valencia, 2 Jan. 1305. Of his early life little is known. His father was an adherent of King Manfred of Sicily, and his mother, Bella of Lauria, accompanied Constanza, the daughter of Manfred, to Spain where she

was married to Peter, son of James, conqueror of Aragon. Lauria was reared in the court ot Aragon, and received estates in Valencia after the subjection of that kingdom, but little is known of his life until 1282, when he accompanied Peter III on his expedition to Sicily. The Sicilian revolt, known as the <(Sicilian Vespers, w had broken out against the ruler established by Charles of Anjou after the death of Manfred. Peter III claimed the kingdom by right of his wife as daughter and heiress of Manfred, and with the support of the Sicilian nobles. The expedition against the Anjou forces was successful and in 1283 Peter III was crowned king by the Sicilians. Lauria was thereupon made com¬ mander of the fleet, but while this first docu¬ ment concerning him refers to him in the high¬ est terms it gives no clue to the nature of his services. As commander of the Aragon fleets, Lauria in the succeeding 20 years proved him¬ self one of the greatest naval commanders in history, his career recording continuous vic¬ tories. He fought in both the south Italian waters and off the coast of Catalonia, his first recorded victory being that over the naval force of Charles of Anjou off Malta in 1283. His fleets were maintained in a high degree of efficiency, and his methods included the use of the ram and of powerful crossbows instead of depending, as did the French, upon boarding and hand-to-hand fighting. He won a decisive victory over the Angevin fleet in the Bay of Naples, 1284, capturing Charles of Salerno, heir to the kingdom, who continued for years a prisoner in Sicily and Spain. His most brilliant exploit was the defeat of the French fleet off Catalonia in 1285, which still ranks as a su¬ preme achievement in naval history. The French king, Philline le Hardi invaded Cata¬ lonia with the purpose of aiding his cousin, Charles of Anjou, in his effort to regain Sicily. The invading army was supported by the French fleet off the coast, from which it drew reserves and supplies. Peter III summoned Lauria from the Sicilian coast, the commander reaching Barcelona 24 August. The nature of the French campaign necessitated the French fleet's being extended along the entire coast of the invaded territory, and while Lauria's fleet was greatly inferior in numbers his naval strategy was fully equal to the emergency. On 9 September at night he struck at the French centre near the Hormigas in full force and gained a com¬ plete victory. He then sailed for Rosas, in¬ duced the enemy fleet to come out by raising the French colors and visited upon it a defeat as crushing as the first blow upon the centre. The capture of the town followed, together with the stores massed there for the invading army. The retreat of King Phillipe soon fol¬ lowed, nearly his entire army being lost through hunger and the attacks of the mountaineers. The French naval power was so broken that it did not recover for many years, and Lauria re¬ turned to Sicily to resume command of King Peter's forces

against those of Anjou.

LAURIA

LAURIER

111

The death of King Peter in 1286 materially changed the situation. He was succeeded on the throne of Aragon by his son James and in Sicily by Alphonso. Upon Alphonso's death James inherited the throne of Sicily and placed his younger brother Frederick there as vice¬ roy. James made peace with the Angevin line, but the Sicilians offered the crown to Fred¬ erick who successfully withstood both his elder brother and the forces of Anjou. Lauria re¬ mained for a time with Frederick, but his dom¬ inating allegiance appears to have been to the house of Aragon and he returned to the sup¬ port of James. Frederick thereupon confiscated Lauria's estates in Sicily and put his nephew to death, a retaliation which was afterward repaid in full in two crushing defeats of the Sicilians at sea. However, although badly beaten at sea, Frederick's land operations were more successful and the Peace of Calatabellota ended the war in 1302. Lauria retired to his vast estates in Valencia in 1303, where he died two years later. Lauria undoubtedly was merci¬ less as a conqueror, a characteristic of his age, but his brilliancy as a commander was not rivaled for many generations. Consult Amari, M., (Guerra del Vespro) (2 vols., 8th ed., 1876) ; Ramon de Muntaner, (Chronicle, J edited bv Karl Lanz (1844) ; Charles de la Ronciere, (Histoire de la marine frangaise) (Vol. I, pp.

189-217, 1899).

LAURIA, Italy, city of Basilicata in the province of Potenza, near the borders of Cala¬ bria, seven miles south of the nearest railway station at Lagonegro, and 121 miles south of Naples. It is built upon the side of a steeply sloping hill, 1,821 feet above sea-level, and is in two parts, a walled portion above and the remainder on a plain below. It has a castle which was the birthplace of Ruggiero di Lauria (q.v.) in the 13th century. The French, under Massena, destroyed the town in 1806. It is situated in section producing fruit, wine, pota¬ toes and grain, and it manufactures rope, woolen goods and leather. Pop. 9,769.

LAURIC ACID, or DODECOIC ACID,

a fatty acid occurring (as glyceryl ether) in the berries of the bay-tree (Laurus nobiAs), in pichurim beans, in cocoanut oil and. elsevyhere.

It may be prepared from the oils in which it occurs by saponification, followed by the frac¬ tional precipitation of the acids by means of barium acetate. Laurie acid has the formula G2H:*02, and is insoluble in cold, and slightly soluble in hot, water, but very soluble in both alcohol and ether. From its solution in alco¬ hol it crystallizes in the form of silky needles, melting at 110° F. With the metals it forms a series of salts called laurates, which, with the exception of barium laurate and the lau¬ rates of the alkali metals, are mostly insoluble in water. The laurates of the alkali metals and of barium are soluble in water, and much more soluble in salt water than the alkali metal salts of the other fatty acids. Hence <(marine soap® is made from cocoanut oil. The glyceryl ether (also known as trilaurin, or laurostearin), has the formula CsHrTCˆHˆCDs, melts at 113° F. and may be obtained from bay-berries by extraction with alcohol.

LAURIE, Arthur PTlans, Scotch chem¬ ist and educator: b. 6 Nov. 1861. He was a son of Simon Somerville Laurie (q.v.) and

was educated at the universities of Edinburgh and Cambridge. He was a Fellow of King's College at Cambridge and in 1891 became Cantor lecturer. He was a member of the Home Office Committee on Pottery Manufac¬ ture in 1893, and lecturer in physics and chem¬ istry at Saint Mary's Hospital Medical School in 1895, serving also as Gilchrist lecturer. He was examiner in chemistry to the Royal Col¬ lege of Physicians in 1898, and likewise exam¬ iner in oils and colors to the City and Guild's Institute. He was professor of chemistry to the Royal Academy of Arts in 1912, and is principal of the Heriot-Watt College, Edin¬ burgh. In 1915 he was appointed to the Muni¬ tions Inventions Department of the Ministry of Munitions as a member oPthe panel of scien¬ tific experts. He edited (The Teachers' Ency¬ clopaedia (7 vols., 1911-12), and is author of Scientific Investigations in Phvsico-Chemis-try} ; (The Food of Plants) (1893); Proc¬ esses, Pigments and Vehicles — a Manual for Art Students) (1895) ; (Greek and Roman Methods of Painting) (1910); (The Pigments and Mediums of the Old Masters) (1914), etc.

LAURIE, John Wimburn, British Cana¬ dian soldier and legislator: b. London, 1 Oct. 1835 ; d. 20 May 1912. He was educated at Sandhurst and at the Staff College, and entered the 2d Queen's Royals as ensign in 1853. He volunteered for service in Crimea in 1854-56, where he saw service at Sebastopol and in both attacks on Redan. He was a staff-officer in the Indian Mutiny 1858-59, and was inspect¬ ing field-officer of militia in Canada in 1861— 81. He joined the expedition to the Transvaal in 1881, and took an active part in the sup¬ pression of the half-breed rebellion in north¬ western Canada in 1885. He was

Red Cross commissioner in the Serbian-Bulgarian War in 1885, and was promoted lieutenant-general in 1887. In 1874-80 he was president of the Board of Agriculture in Nova Scotia, and in 1887-91 he served in the Canadian House of Commons as member from Shelburne. He was mayor of Paddington in 1907-08, and served in the English Parliament as member from Pembroke Boroughs in 1895-96. He received numerous medals in his military service and was likewise decorated in several foreign coun¬ tries. He was a lecturer on agriculture, Scotch regiments in the army and on Imperial Fed¬ eration.

LAURIE, low'rT, Simon Somerville, Scot¬ tish educator: b. Edinburgh, 13 Nov. 1829; d. there, 2 March 1909. He was educated at the University of Edinburgh ; for five years was a teacher on the Continent; and returning to Scotland held important positions in connec¬ tion with education. In 1876 he was appointed to the professorship of education in the Uni¬ versity of Edinburgh. He published many works, among which are Philosophy of Ethics > (1866) ; Panguage and Linguistic Method in the School > (1892) ; and historical Survey of Pre-Christian Education) (1895); (Synthetica)

(1906).

LAURIER, lo'ri-a, Sir Wilfrid, Canadian

statesman: b. Saint Lin, Quebec, 20 Nov. 1841; d. Ottawa, 17 Feb. 1919, the only son of Carolus Laurier, whose ancestors came from France in the latter half of the 17th century, and of Marcille Martineau. He received his early

education at L'Assomption College, and studied law at McGill University (Montreal); in 1865 and 1866 was a vice-president of the Institut Canadien (Montreal), which formed the nu¬ cleus of a movement toward intellectual liberal¬ ism on the part of the younger French and was strongly opposed by the clergy ; and in 1866 opened a law office at Arthabaskaville. In 1868 he married Miss Zoe Lafontaine of Montreal. In 1871 he was elected to the Que¬ bec legislature, and in 1874 he was chosen as Liberal member of the Dominion House of Commons for Drummond and Arthabaska. He was soon recognized as one of the most elo¬ quent speakers in the Canadian Parliament. At the outset he was regarded as the leader of the Liberals in Quebec

province ; a speech of his in defense of Catholic liberalism, delivered in Quebec June 1877, was received with en¬ thusiasm throughout the country; a few months later he was selected for the portfolio of inland revenue in the Mackenzie administration. On 7 June 1887 he succeeded Blake as chief of the Liberal opposition, though he himself ad¬ vised the choice of an English-speaking Prot¬ estant ; and in 1896, on the return of the Lib¬ erals to power, he became Prime Minister of Canada. That position he filled with remark¬ able distinction until the return of the Con¬ servatives in 1911. Measures associated with his premiership were the framing of a British preferential tariff and a consequent tariff war with Germany; a compromise settlement of the Manitoba schools question; the organization of two new provinces, Saskatchewan and Alberta ; extensive railwa}r developments ; and the fram¬ ing of the Taft-Fielding reciprocity agreement, on which his party was defeated at the polls.

Of all the representatives of the colonies in England on the occasion of Queen Victoria's Diamond Jubilee, he was the most remarked for the refinement of his manners and the elegance of his diction, and was recognized in Paris as in London as one of the most eloquent speakers of his time either in French or Eng¬ lish. While a great admirer of England's polit¬ ical institutions, and a Liberal of the English rather than of the Continental school he was an ardent Canadian and a thorough believer in Canada's destiny. He opposed the imperialistic policy of Chamberlain and contributed more than any other man to prevent him from draw¬ ing the colonies into the <(vortex of warlike imperialism, }) to use his expression. He had to pass through all kinds of political and religious difficulties, and gave evidence of qualities and talents which would have made him distinguished as a speaker and a states¬ man in any country of the world. Not the least of his services to Canada has been the splendid contribution he made, through¬ out a long life, to the furtherance of good relations and mutual helpfulness between the two great races of which the population is mainly composed.

As leader of the opposition he approved of Canada's participation in the European War, and he addressed a number of meetings in the province of Quebec with the obiect of stimulating recruiting among French-Canadians for service in the forces being sent overseas. Consult his (Speeches, } edited by Barthe (1890) ; Willison, (Sir Wilfrid Laurier and

the Liberal Party> (1903); Daniel, laurier and His Time* ; and Skelton, (The Day of Sir Wilfrid LaurieU (1916).

LAURION, or LAURIUM, also ER- GASTERIA, Greece, mountain range and mining town in southern Attica. The silver mines through which the town and district be¬ came famous apparently were known from very early times; but their historic importance dates from the time of the Athenians, for whom they produced a large revenue and whom they materially aided in maintaining commercial as¬ cendency. Themistocles seized the opportunity after the battle of Marathon to secure the devotion of the mining revenues for the build¬ ing of a navy and the adoption of his plan resulted in the Athenian naval power and the victory at the battle of Salamis. The mines were let out to individuals, the state receiving a fixed rental in addition to a percentage of the profits, and they were worked by slaves. Toward the end of the 5th century the im¬ portance of the mines declined and while they were worked up to the opening of the Christian era the output steadily diminished until it came chiefly from the working over of tailings. The ancient workings are still in a good state of preservation. French and Greek companies took over the rights to the mines in the mid¬ dle of the 19th century and they are now worked for lead, manganese and cadmium. The mining district is connected by rail with the port of the same name. Pop. about 10,000.

LAURISTON, lo're'ston, Jacques Alex¬ andre Bernard Law, Marquis de, French general and diplomat : b. Pondicherry, India, 1 Feb. 1768; d. Paris, 12 June 1828. He re¬ ceived a militarv education at Paris and Brienne, and as a cadet was on friendly terms with Napoleon. He was commissioned in 1786, served in the earlier Revolutionary campaigns in the Netherlands and on the Rhine, and in 1795 was promoted brigadier-general of artil¬ lery. In 1800 he was appointed aide-de-camp to Napoleon. He was director of Le Fere Artillery School, special envoy to Denmark, and in 1802 was sent to England to present the ratification of the Peace of Amiens. He became general of division in 1805, fought in the war against Austria, and in 1806 occupied Venice and Ragusa. He was appointed gover¬ nor-general of Venice in 1807. was present at the Erfurt negotiations of 1808, and later par¬ ticipated in the Spanish and Italian campaigns. He commanded the artillery at the battle of Wagram in 1809 and by his furious onslaught at the Austrian centre won a decisive vic¬ tory. He served as Ambassador to Russia in 1811, and in 1812 he rendered important serv¬ ice in covering the retreat from Moscow. He was in command of different army corps at Liitzen, Bautzen and in the autumn campaign, and was taken prisoner in the retreat from Leipzig in 1813. He was released upon the fall of the empire and joined Louis XVIII. He was given a seat in the House of Peers, a command in the royal guard, was created a marquis in 1817 and marshal . of France in 1823. In the

invasion of Spain in 1823 he com¬ manded the siege and capture of Pamplona.

LAURIUM, la’ri-um, Mich., village in Houghton County, on the Copper Range and Mineral Range railroads. It adjoins Calumet,

and is seven miles from Lake Superior and 12 miles north by east from Houghton. It is situ¬ ated in the Keweenaw Peninsula, in the northern part of the State, in one of the richest copper regions of the United States. There is con¬ siderable local trade. Cooper mining is the chief occupation. Pop. (1920) 6,696.

t aˆt4V7?VIK’ lour’vek, or LARVIK, or LAURVIG, Norway, seaport and watering re¬ sort, on the Larvikf jord, at the mouth of the Laagen River, four miles south of Fredriks- vaern and 98 miles southwest of Christiania, on the Skein Railway. The port has a depth of from 18 to 24 feet. The city has a con- S’derable industrial activity and exports tim¬ ber, ice, woodpulp and granite. There are sulohur and mineral springs, and the mud baths are famous. Pop. 10,105.

LAUSANNE, lo’zan, Switzerland, canital of the canton of Vaud; situated on the Jorat Mountain Range, on the river Flon, one m:le noith of Lake Geneva at a junction cf rail¬ ways from Geneva, Bricg and the S’mplon, Freiberg and Bern, and from Vallorbe for Paris. There is a funicular railway between the town proper and Ouchy, its port on Lake Geneva. The older portion of the town was built upon five hillocks, to which was due much of its picturesque beauty. The improve¬ ment project of filling the valleys and hollows between the hills was begun in 1836 and com¬ pleted in the early part of the 20th century with considerable impairment of the natural beauty of the city, although some fine squares have been built on the filled-in portions. The Flon Valley is spanned by the Grand Pont, a two-story viaduct built in 1839-44, and the bridge of Chanderon was constructed in 1905. The railroads have given the modern Lau¬ sanne a considerable commercial importance as it is now on the international route from Paris to Milan, and the town is growing, extending its limits chiefly on the south and west.

The cathedral of Notre Dame was conse¬ crated by Pope Gregory X in 1275 and is con¬ sidered the finest structure of its sort in Swit¬ zerland. It was sacked after the Bernese con¬ quest, when the

cathedral became Protestant. It is Gothic in tyne and was restored under the direction of Viollet-le-Duc in 1875-1906. Sharing with the cathedral the highest ground in Lausanne is the castle, dating from early in the 15th century, built by the bishops, but now used as an administration building by the canton of Vaud. Near these on the Place de. la Ri- ponne is the Palais de Rumine, opened in 1936, wherein are lodged the libraries of the canton and the university, the collection of the Musee Arlaud and the canton's collections of nat¬ ural history, archaeology and industrial art. The university was founded as an academy in 1537 and was raised to its present rank in 1890. Lausanne has besides a Protestant theological school in connection with the cathedral, a 'num¬ ber of boarding schools and many scientific and literary societies. It is a recognized literary centre, is much frequented by foreigners and has a large resident foreign, ponulation. It was the birthplace of Beniamin Constant and the historian Gibbons lived there many years. The population is in the main French-speaking and Protestant.

The ancient town was on the shore of the lake southwest of the present site and was de¬ stroyed by the Alamanni in the 4th century. The inhabitants re-established their homes in the hills and in 590 the new town was chosen by Bishop .Marius as his see city. There was a Burgundian settlement across the Flon and another settlement around the church of Saint Laurent, both of which eventually became part of Lausanne. The bishops became princes of the empire in. 1125, but from 1368 their powers over the municipality were gradually decreased. After the Bernese occupation, 1536-1798, Lau¬ sanne became capital of the canton Leman and upon the creation of the canton of Vaud in 1803 it was made its capital. Pop. 63,923.

LAUS. SEDAT, Aime, ama los'da, French geodesist and astronomer: b. Moulins, 19 Feb. 1819; d. Paris, 18 March 1907. He was edu¬ cated at the Lcole Polytechnique, where, after some 3'ears in the engineers, engaged princi¬ pally in the fortifications of Paris and the Spanish frontier, he returned in 1856 to take the chair of geodesy and astronomy. In 1871 he became professor of applied geometry at the Conservatoire des'Arts et Metiers and in 1881 he was appointed director there. The unifica¬ tion cf French time to that of Paris became a law through his efforts 14 March 1891. He invented and improved many instruments in use in geodetic photography and astronomical ebservations and was keenly interested in the development of aerial transportation, serving as president cf a commission appointed in its in¬ terests. Author of (Leqons sur l'art de lever les plans) (1860) ; (Recherches sur les instru¬ ments, les methodes et le dessin topograph- iques) (2 vols., 1898-1903), etc.

LAUT, Agnes C., Canadian author : b.

Stanley, Ontario, 11 Feb. 1871. In childhood she was taken to Winnipeg. She attended Manitoba University, afterward spending her summers in the Rocky and Selkirk mountains. In 1895-97 she was an editorial writer for the Manitoba Free Press, Winnipeg. She has written (Lords of the North) (1900); her¬ alds of Emnire) (1902); (Pathfinders of the West* (1904); (Vikings of the Pacific)

(1906) ; (The Conquest of the Great North- West* (1908) ; (Freebooters of the Wilder- ness) (1910) ; (Pioneers of the Pacific Coast*

(1915).

LAUTERBRUNNEN, lou'ter-brun'en, Switzerland, village in the canton of Bern, in a valley of the same name traversed by the White Liitschine River, seven miles southeast of Interlaken and 33 miles southeast of Bern on the Bernese Oberland Railroad. The val¬ ley has some of the most magnificent scenery in Switzerland and the town is built at the foot of the Jungfrau, while the Schwarz Mouch and Breithorne combine so to shadow it that the sun does not touch it before seven in the summer nor until noon in the winter. The view of the Jungfrau is superb and the valley, which takes its name from its numerous springs, has some splendid cascades, among which is the Staubbach, 980 feet in height. Others are the Triimmelbach and Schmadri- bach. The altitude of the town is 2,580-2,645 feet. Tourists come here in great numbers. Pop. 3,318.

LAUTREC, lo'trek', Odet de Foix, Vi-

comte de. French general: b. 1485; d. Naples, 15 Aug. 1528. He was brother to Franqoise de Chateaubrant, mistress of Francis I, through whose influence he gained high offices. He served in the campaign of Marignano in 1515 and in 1516 became governor of Milan where he enacted measures of the utmost severity. He was successful in defending the duchy in 1521, but he met disastrous defeat at the bat¬ tle of the Biocca in 1522. He was created mar¬ shal of France *in 1527, and in command of the armv of Italy he succeeded in again occu¬ pying Milan ; he then undertook the siege of Nanles, but died of the plague without accom¬ plishing his mission. Authorities differ con¬ cerning him and his rank as a general. He is by some considered

brilliant and able although unfortunate, while others maintain that such assertions are without grounds.

LAUZON, Jean de, zhon de lo-zon, French colonial admmistrator : b. 1582; d. 1666. Fie was a member of the Hundred Associates, who organized to promote the settlement of New France. He seems to have directed most of his energies toward acquiring landed prop¬ erty in Canada for himself and his family and gained for his son the sole right of fishing on 60 leagues of the Saint Lawrence, with a title to the adjacent lands. His own title to the island cf Montreal he sold to the Jesuits in 16-iO. He was for five years governor of New France (1651-56), but his policy was feeble and short-sighted. He returned to France before his second term was over.

LAUZON, or SAINT JOSEPH, Canada,

village in Levis County, in the province of Quebec, on the south bank of the Saint Law¬ rence River, five miles east of the city of Que¬ bec, on the Intercolonial and the Quebec Cen¬ tral railroads. It has a ferry to Quebec and is connected with Levis, two miles distant, by an electric railway. Its industries include ship¬ building and it sells aerated waters. Pop.

3,978.

LAVA AND LAVA FLOWS. The fluid

rock poured out by a volcanic vent is known as lava. If this is very viscous it may accumulate near the vent and form a cone. If it is very fluid it may flow out into a thin sheet spread¬ ing far over the surrounding country. The rate of flow is rarely over a mile an hour. As the lava advances it destroys all life in its path, burning and scorching the vegetation. . As the mass begins to cool its surface may solidify and break open many times, becoming exceedingly rugged, or scoriaceous as it is called. Very rough cindery surfaces are called Aa (q.v.) and smooth surfaces Pahoehoe, from the Ha¬ waiian. Lava surfaces are often highly vesicu¬ lar or amygdaloidal (q.v.). In some regions lava flows have accumulated one above another to great depths, as in the Columbia Plateau, where as many as 40 distinctive flows can ■be seen along the side of a canyon wall, sepa¬ rated by thin layers of soil. See Volcanoes, and section on V oleanism in article on Geology.

LAVAGE. The washing of any cavity of the body, by means of a flow of water by gravity through a rubber tube, and the with¬ drawing of

the water and whatever comes with it through the same. tube. Thus the bowels and the bladder may be irrigated, as it, is then called..

Specifically lavage is a term generally used of the removal of the contents of the stomach for various purposes. A rubber tube about five feet long is used. The patient, in a sitting position, with head thrown back, inserts the tube into his mouth, and it is then forced gently downward for about 22 inches, with the help of swallowing movements. To the other end of the tube a vessel, such as a funnel is attached and into this is placed a pint to a quart of warm sterilized water or weak alkiline solution. The funnel is then raised to a height above the patient's head sufficient to allow the water to flow gently into the stomach. When it has disappeared from the funnel, the funnel is lowered and the water, with the contents of the stomach, flows out into it. This process is used either in the analysis of test meals, to discover conditions of acidity, secretion of mucus, the rate of digestion, etc., or for the purpose of treating such disorders as catarrh of the stomach. The patient can easily learn to carry out the whole process himself. With a still greater amount of skill a special form of tube can be passed through the stomach, the pylorus and into the duodenum, and thus that part also can be lavaged. For the lavage of children's stomachs a smaller tube and quantity of water is used.

Smith Ely Jelliffe.

LAVAL, la'val', France, capital city of the department of Mayenne, on the Mayenne River, 46 miles east of Rennes and 188 miles by rail southwest of Paris. The town is built upon both sides of the river, the ancient portion occupying the hills to one side while the mod¬ ern town stretches over the plains on the op¬ posite banks. The river is 124 feet wide at this point and is spanned by a railway viaduct ; the stone bridge, Pont Neuf, and the Pont Vieux with its three pointed arches, which dates from the 16th century. The town is considered one of the most beautiful in France. In the ancient portion with its narrow, twisting streets are the cathedral, built in the 16th century; the castle of the counts with a donjon built in the 12th century; the 14th— 15th century church of Notre Dame; the 12th century church of Notre Dame d'Aventires and the 15th century church of Saint Venerand. It has many houses of the 15th and 16th centuries. There are also an art museum, a museum of natural history and archaeology, a library and a linen hall. The modern town has fine promenades and modern educational institutions. The town existed in the 9th century. It was taken by Talbot in 1428, and suffered considerably in the Vendean war, the Vendeans under Rochejacquelin here defeating the Republicans 24-25 Oct. 1793. Its ch'ef and oldest industry is the

manufacture of cotton and linen cloth, introduced from Flan¬ ders in the 14th century. There are other manu¬ facturing interests, including foundries, flour¬ mills, shoe factories, tanning and dyeing. There is a trade in marble and in grain. The bishopric was created in 1855. Pop. 25,540.

LAVAL-MONTMORENCY, Francois Xavier de, fran-swa ksav-e-a de la-val-mon- mo-ron-se, French Roman Catholic prelate: b. Laval, France, 30 April 1623; d. Quebec, 6 May 1708. He became a priest in 1645 and in 1651 was appointed missionary bishop of Cochin- China, a post which he declined to become arch-

deacon of Evreux. In 1659 he came to Canada as apostolic vicar, with the dignity of bishop of Petra in partibus. There he established (1665) the Quebec Seminary. In 1674-83 he was titular bishop of Quebec. He was an active and in¬ fluential figure in governmental affairs. He op¬ posed the sale of intoxicating liquors to In¬ dians. He is regarded with great veneration by the French Canadians. Laval University is named in his honor.

LAVAL UNIVERSITY (now University of Montreal), until 1919 a branch of the uni¬ versity founded at Quebec, in 1852 and named for Mgr. Frangois de Montmorency- Laval first bishop of Quebec. The directors of this institution obtained then from Her Majesty Queen Victoria a charter which in confirming the rights and privileges they had enjoyed up to that time also conferred upon them university rights and privileges, for the instruction of youth in secondary and profes¬ sional studies.

In 1876, following a request from Mgr. Bourget, bishop of Montreal, to secure a Cath¬ olic university in his episcopal city, the Sacred Congregation of the Propaganda enjoined Laval University to establish a section at Montreal, to give therein the same instruction as at Que¬ bec. This curriculum was inaugurated in 1878, in the faculties of theology and law, in 1879 in the faculty of medicine and in 1887 in the faculty of arts. By virtue of an apostolic constitution of 1919, the section became independent of the establishment at Quebec and assumed the title of University of Montreal. It now possesses its own government and a complete local administration. It comprises four faculties, those of theology, law, medicine and of arts (sciences and letters), seven aggregated schools, the Polytechnic, the School of

Comparative Medicine and Veter¬ inary Science of Montreal, that of Dental Sur¬ gery, that of Pharmacy, Notre Dame Ladies' College, the Agricultural College at Oka and the School of Higher Commercial Studies. The French language is used in all sections ex¬ cept .that of theology, where Latin prevails. The professors of the faculty of theol¬ ogy are appointed by the Grand Seminary of Montreal, directed by the priests of Saint Sulpice. The ordinary course is three years and three months. Some pupils prolong their stay six months to prepare themselves for doc- torship. A greater number, after completing their course at Montreal, go to take their de¬ grees in Rome, where the Seminary of Saint Sulpice of Montreal has opened a college for Canadian students.

The faculties of law and medicines are in¬ stalled in an edifice on Saint Denis street, where they have large classrooms, sectional libraries, playrooms, a gymnasium, etc. The faculty of medicine has a lecture-room, a dis¬ secting-room and four laboratories, for chem¬ istry, histology, bacteriology and medical elec¬ tricity. The" present faculty of medicine con¬ tinues the School of Medicine and Surgery of Montreal, founded in 1845 and affiliated to the Victoria University of Coburg (Ontario), from which it received its degrees until the year 1890. At this period the school had its charter modified by the Quebec government and allied itself to the Montreal section of the faculty of medicine of Laval University, with which to¬

day it forms one body. It receives its degrees from Laval University, but has maintained its charter and autonomy.

As the scientific and literary course which is usually followed by this faculty in the Eng¬ lish universities is given, in this province, to Catholic youths by the colleges and seminary schools affiliated to Laval University, where the pupils obtain the degrees of bachelor of letters, of sciences^ or arts, a complete instruction of this kind is not imposed on the university. Seven courses, relevant to this faculty, are actually given there, that of French literature, founded in 1898, by the late Abbe Colin, supe¬ rior of the Seminary of Saint Sulpice of Montreal. Up to that time this course had been given by a Fellow of the Paris University. The second course has for its object ecclesi¬ astical public law, and comprises 20 lessons. The five other courses are those of history of fine arts, economics, Gregorian plain-chant, pedagogy and French-Canadian history. The other professors, ecclesiastic or lay, of the faculty of arts give a regular course in the colleges affiliated to the university, or are occa¬ sionally called to give public conferences at the university. To this faculty have been an¬ nexed a college for the higher education of young girls, which is under

the immediate su¬ pervision of the congregation of Notre Dame, and a college of modern literary teaching for members of religious communities and laymen also. This year the faculty gave a summer school for masters of secondary and primary instruction.

The Polytechnic School of Montreal, founded in 1874 and aggregated to Laval Uni¬ versity in 1887, is largely supported by the gov¬ ernment of the province of Quebec. It corre¬ sponds, by the nature of its curriculum, to the faculty of applied science in other universities. It prepares for the different branches of civil and industrial engineering, such as public works, railways, engines, mines, bridges and steel construction, etc. A branch of decorative and industrial arts has been connected with it recently. Previously the school also was pro¬ vided with a prosperous School of Architecture.

The School of Comparative Medicine and Veterinary Science of Montreal exists since 1886. Aggregated to the university, it is under the control and submissive to the inspection of the Minister of Agriculture of the government of Quebec, from which it receives a grant. Its system requires a four years' course and the final degree is that of doctor of veterinary medicine. The school, which occupies very fine premises at 387 De Montigny Street East, has a very interesting pathological museum at the university. The number of pupils, nearly all from this province, is not great, but it tends to increase as the farmers are beginning to recognize the value of the services which can be rendered them by veterinary doctors, who are well up in their profession. The School of Dental Surgery of Montreal, located at 380 Saint Hubert Street, spaciously and richly, is the continuation of the French section of the College of Dentistry of the Province of Que¬ bec founded in 1894. It was affiliated to Laval University in February 1904, and obtained legal existence by an act of the legislature of Quebec, in the month of May of the same year. This school, intended for the French Canadian youth

of this country and the need for which arose from the rapid progress dental surgery has made within the past few years, is now launched, left to its own resources and depend¬ ing solely on the devotedness of its protessors. The course covers a period of four years and the final degree is that of doctor of dental surgery. The infirmary is open every day from 1 October to 1 April, from 9 a.m. until noon, and the poor receive, under the direction of competent professors, gratuitous

attention or at a slight outlay to cover the cost of material. The School of Pharmacy, affiliated in May 1906, with 124 students actually; the Agricul¬ tural College at Oka, affiliated in March 1908, and which numbers nearly 200 pupiis, mostly graduates of the secondary colleges ; finally, the School for Higher Commercial Education, founded by the government itself and affiliated in April 1915, form three of the most interest¬ ing departments of this prosperous institution. The latter constitutes one of the most im¬ pressive buildings of the city, facing the old and famous Viger square and the actual Viger station. In the very present, an understanding is working to the effect of soon connecting with the university a school of music, both vocal and instrumental.

An ecclesiastical vice-rector, chosen by the bishops of the province of Montreal, is ap¬ pointed by the University Council. He repre¬ sents, for discipline and general administra¬ tion, the university, the corporation of ad¬ ministrators and the bureau of governors ; an executive committee of five members, dele¬ gated by the bureau, assists him in the manage¬ ment of current affairs and in the execution of the decisions of the corporation and bureau.

The archbishop of Montreal, by rank of vice-chancellor, controls the nomination and dismissal of the professors, and exercises a strict surveillance over doctrine and discipline. He is by right the president of the corporation of administrators, which owns the university and manages its finances. The suffragan bishops of the ecclesiastical province of Montreal, the delegates of all the affiliated colleges and sem¬ inar es of the same province, the delegates of faculties and former graduates also sit in this corporation, which generally operates through a bureau of governors, composed of eminent personages in finance and the liberal pro¬ fessions.

Emile Ch artier, Registrar of the University .

LAVAL UNIVERSITY; Quebec, Canada. The first establishment of higher education in Lower Canada was founded in 1852. The di¬ rectors of the Seminary of Quebec, the pioneer institute in the educational held, secured from her majesty, Queen Victoria, a charter, which conferred on the seminary the privileges of a university. A petition signed by the arch¬ bishop and bishops of the ecclesiastical province of Upper and Lower Canada was nresented at Rome, requesting that the Seminary of Quebec be accorded the customary rights of a Catholic university, and in particular that of conferring dinlomas in theology and canon law. Pius IX did not at once grant what was asked. At that time Great Britain refused to recognize the

ecclesiastical titles given by the Holy See; she also denied legal existence to the Catholic

University of Dublin, and it was feared in Rome that the foundation of a Catholic uni¬ versity in Quebec would prove an impossibility. For this reason Rome wished to be assured of the grant of a royal charter before it extended canonical privileges. As soon as the official document was received from London, which was toward the end of December 1852, an au¬ thentic copy was forwarded to Rome and on 6 March 1853 the Holy Father sent a brief which granted to the archbishop of Quebec the right to confer theological degrees upon those who completed their ecclesiastical studies at the Quebec University.

In the Royal Charter, the Roman Catholic archbishop of Quebec, by virtue of his office, is named the visitor of the university, which shows the broad-mindedness of the English government which permitted the French- Canadian Catholics to organize their university teaching without any control save that of an archbishop of their own nationality and faith. The state renounced all interference in ques¬ tions of program or inspection. The visitor received the most extensive powers, he was given the right to veto on all regulations and nominations, and on presentation of the coun¬ cil, he could appoint the professors of the faculty of theology. As to the office of rector, the highest in the university, it de¬ volves, by right, by the terms of the charter upon the superior of the Seminary of Quebec. This office is, therefore, essentially temporary, since the superior of the seminary, elected for three years and re-eligible after the first trien¬ nial, cannot occupy the post entrusted to him longer than six consecutive years, unless a special authorization be accorded by ecclesias¬ tical authority.

The charter also provides for the establish¬ ment of a council which conjointly with the rector administers the affairs of the university. This council is composed of all the directors of the seminary and of the three oldest titulary professors of each faculty. It has the power to make the statutes and regulations which it may judge suitable, with one condition, that these statutes and regulations contain nothing contrary to the laws of the United Kingdom or of Canada.

This council held its first session on 21 Feb. 1853, when it resolved that Laval University should include four faculties: those of the¬ ology, law, medicine and arts. Each faculty is provided with a special council which dis¬ cusses and submits to the university council alL questions which may directly interest one or the other of these

faculties.

The faculty of theology was not immedi¬ ately created at Quebec. The number of aspi¬ rants to the priesthood was limited and the needs of the parochial ministry so urgent and so multitudinous that the seminarians could not be allowed the time to devote themselves freely to the study of the higher ecclesiastical sciences. It was only in the year 1866 that the basis of a faculty of theology was laid. The faculty of medicine, on the contrary, was organized and put in motion in the year 1853. A School of Medicine already existed in Ouebec. The di¬ rectors of the university found therein a certain number of professors who were prepared to give medical instruction. The School of Medi¬ cine was willing to efface itself and make way

for the budding faculty of Laval, and six of its professors resigned and accepted professor¬ ships at the university. The course in medi¬ cine was fixed at four years. As there were two large hospitals in Quebec, those of the Hotel-Dieu and the Navy, -the students of the faculty were enabled to follow numerous and various clinics.

It was not such an easy task to organize a faculty of law, and in the year 1854 the first steps toward this end were taken. However, of all the branches of the university, teaching of law was the one for which the greatest need existed, as there was no school of law in Que¬ bec. There were many distinguished lawyers who could have filled professorships but they lacked the enthusiasm to devote themselves to teaching and were not willing to sacrifice, however little, without sufficient compensation, a numerous clientele. There was great diffi¬ culty in realizing the plan first conceived. After various proceedings, two professors were found, one being a judge of the Superior Court, who was named dean. In 1855 the university council w'as able to add four other representa¬ tives to the faculty of law. Unfortunately the greatest number of these professors were pre¬ vented, by reason of their external occupations, from preparing and giving their courses so much so that during several years the teaching of the faculty of laws was limited to the courses of civil and Roman law. In 1857, it was necessary to call a professor from France to give lectures on Roman law.

The faculty of arts was at first the least favored of all the faculties. The students who had received at the colleges and seminaries the basis of

a literary or scientific education were not inclined to further pursue these studies. Being obliged to earn a livelihood by entering one or the other of the liberal pro¬ fessions they commenced their studies in the¬ ology, law or medicine immediately upon ter¬ minating their classical course. They had neither time nor money to devote to the study of the higher branches of letters and sciences. For this reason Laval University did not deem it opportune to establish, in the first years of its existence, professorships of advanced in¬ struction in the faculty of arts. In 1855 a faculty of arts was outlined.

Laval University had by virtue of its charter the power to confer diplomas of bachelor, licen¬ tiate or master, and of doctor in the faculties of law, medicine and arts. It could not con¬ fer degrees in theology. The papal brief ac¬ corded by Pius IX granted this privilege to the archb'shop of Quebec. The university did not receive all the rights of a canonical uni¬ versity until the year 1876.

In 1870 the faculty of medicine of Laval had the favor and honor of being affiliated to the Royal College of Surgeons of London. This granted the university and the students of the faculty of medicine the following privi¬ leges: (1) The enrolment examination of

Laval University is recognized as equivalent to the preliminary examination of the Royal College of Surgeons of London; (2) the cer¬ tificates of assiduity gained by enrolled stu¬ dents of the medical course are recognized by the Royal College; (3) doctors in medicine of Laval University are admitted to the examina¬

tion for diploma as member of the Royal Col¬ lege of Surgeons of London.

In 1865 the rector asked and obtained from Rome an indult which gave the archbishop of Quebec the power to confer degrees in theology upon all students of the grand seminaries of the Canadian province. In 1866 Laval Univer¬ sity organized its faculty of theology.

The library of the Quebec Seminary in¬ cluded at the time of the foundation of the university over 15,000 volumes; 1,000 volumes for the faculty of law, and 2,000 volumes for the faculty of medicine, were then added. In 1876 this library contained about 55,000 vol¬ umes. At the present time it contains over 140,000. The seminary cabinet of physics is one of the most complete in America.

In 1897-98 a bacteriological laboratory was installed and in the following year a labora¬ tory in experimental chemistry for analytical

work was placed at the disposal of the stu¬ dents. The university has a number of splen¬ did museums as. follows: (1) Invertebrate Museum, comprising of several distinct collec¬ tions. The entomological collection numbers over 14,000 specimens of insects from all parts of the world. The conchological collection contains nearly 1,000 species of Canadian and foreign mollusks. (2) Museum of Ethnology, in three divisions: (a) the Indian collection; (b) the Chinese and Japanese collection; (c) the general collection. (3) Religious Museum, containing religious souvenirs, etc., and particu¬ larly the lead tomb with remains of the wooden coffin in which reposed for nearly two cen¬ turies the remains of Francis de Laval, first Catholic bishop of Canada and founder of Quebec Seminary. (4) Museum of Paintings, containing many old and valuable paintings by the old masters. (5) Mineralogical and Geo¬ logical Museum, containing over 5,000 speci¬ mens. (6) Botanical Museum. (7) Zoological Museum. (8) Numismatic Museum containing over 3,000 coins and medals.

The faculty of theology numbers 650 and there are 380 students in the other faculties. The faculty of theology has 35 pro¬ fessors and 25 auxiliary professors, and the other faculties have 21 professors and 18 auxil¬ iary professors.

LAVATER, la'va-ter, Johann Kaspar,

Swiss physiognomist: b. Zurich, 15 Nov. 1741; d. 2 Jan. 1801. As a youth he was not distin¬ guished for studious methods, but early mani¬ fested a fervent piety and remarkable powers of persuasion in public discourse. He de¬ veloped a distinct poetic gift, and was first known through his verses in 1767. Two years later he. took orders, became pastor of a Zurich church in 1764, and served in that calling with different churches in his native city until his death. He also enjoyed a contemporary popu¬ larity through his mystical writings, now almost forgotten. He is best remembered as the origi¬ nator of a system of physiognomy, which, al¬ though of little practical account to-dav, is often referred to by students and writers. The book in which he set forth his system is entitled (Physiognomische Fragmente zur Beforderung der Menschenkenntniss und Menschenliebe) (Physiognomical Fragments for the Promotion of a Knowledge of Man and of Love of Man,* 1775-78). It was ornately published, with a

profusion of striking illustrations, including portraits of distinguished

persons, features to which its fame is considered to have been largely due. Yet Lavater's observations display a penetration and insight into human nature and its varying traits which entitle him to some consideration as scientist and philosopher, and there is a residue of his teachings which the inquiring world still appreciates. He enjoyed an intimate acquaintance with Goethe, who con¬ tributed to the (Fragments * a chapter on the skulls of animals, and strikingly portrayed Lavater in (Wahrheit und Dichtung.) Goethe afterward became estranged from him, accusing him, not without some grounds, of hypocrisv and superstition, but orobably in fact repelled by Lavater's intellectual bigotry. Still Lavater was a man of large and open heart, personally and socially as hospitable as he was mentally intolerant, and with characteristics of true saintliness. During the French occuprrion of Switzerland he gave proof of his patriotism, and his death resulted from a wound inflicted by a French soldier at the capture of Zurich in 1799. There are several English translations of the fragments. * Consult Lives by Gessner (1802), Heisch (English 1842), Muncker (1883), and monograohs bv Steck (1884) and Von der Hellen (1888). See Physiognomy.

LAVEDAN, Henri, on-re la-ve-dan, French journalist, critic, novelist and play¬ wright: b. Orleans, 1859. He began life as a journalist and novelist, but his best work has been as a dramatist. He was elected to the Academy in 1898. He contributed under the pseudonym of <(Manchecourt** a series of bril¬ liant articles to Vie Parisienne , Gil Bias, etc., and in fiction has published (Mam'zelle Virtue1* (1885) ; (Queen Janvier* (1886) ; (Lydie* (1887) ; (Inconsolable* (1888) ; (High Life* (1891); (A New Game* (1892); (Teur beau physique* (1894); (Leurs soeurs* (1895); (C'est servi* (1904); (Baignoire 9* (1905). Among his plays the most notable are (A Fam¬ ily* (1890), awarded a prize of 4,000 francs by the French Academv, and (Prince d'Aurec* (acted in 1892) ; (Le vieux marcheur* (1895) ; (Les deux noblesses* (1897) ; (Le marquis de Priola* (1902) ; (Viveurs* and (Varennes,* with G. Lenotre (1904) ; (Le duel* (1905), pro¬ duced in New York in 1906; (Le bon temps* (1906) ; (Sire* (1910), produced in New York in 1911; (Servir* (1913).

LAVELEYE, Emile Louis Victor de,- a-mel loo-e vek-tor de lav-la, Belgian political economist: b. Bruges, 5 April 1822; d. Doyon, near Liege, 3 Jan. 1892. He was educated at the College Stanislas, Paris, and at the Uni¬ versity of Ghent,- where he studied law, and in 1864 became professor of political economy in the University of Liege. Among his numer¬ ous writings are (History of the Provencal Language and Literature* (1846) ; (The Ques¬ tion of Gold* (1860) ; (Property and its Primi¬ tive Form* (1874), his best-known work;

(The Religious Conflict in Europe* (1875) ; (Con¬ temporary Socialism* (1881) ; (Elements of Political Economy* (1882); (Money and In¬ ternational Bimetallism* (1891); Govern¬ ment in Democracies* (1891).

LAVELLE, la-vel, Michael J., American Roman Catholic prelate: b. New York city,

3 May 1856. He was graduated at Manhattan

College in 1873 and at Saint Joseph's Seminary, Troy, in 1874. He was ordained in the priest¬ hood 7 June 1879, and was appointed assistant rector at Saint Patrick's Cathedral in that year. Since 1886 he has been rector there. He was appointed vicar-general of New York in 1902 and domestic prelate to Pope Pius X in

1903.

LAVENDER, a genus (Lavandula) of perennial herbs, sub-shrubs and shrubs of the order Labiatce, consisting of about 20 species, native to the Mediterranean region and south¬ western Asia. The best known are true laven¬ der (L. vera) and spike lavender (L. spica), which like other members of the genus have narrow leaves crowded near the ground, and blue or violet two-lipped flowers in whorls which form more or less interrupted spikes. All the lavenders contain similar volatile oils (oil of lavender, oil of spike, etc.), for which the plants are cultivated and which are ob¬ tained from the flowers by distillation with water. The principal use of these oils is in perfumery, but they have been used in medi¬ cine as stimulants, tonics and stomachics. The dried flowers are placed with clothing laid away in bureaus and chests, partly because their aroma repels moths, but chiefly for the sake of the pleasant odor imparted to the garments. The perfume called lavender water is a solu¬ tion of oil of lavender in spirit, along with attar of roses, bergamot, musk, cloves, rose¬ mary and other ingredients, which after stand¬ ing for some time is strained and mixed with a certain proportion of distilled water. Laven¬ der plants do not thrive as well in America as in English gardens, but succeed best in light, dry, friable soil, well exposed to the sun. They are best propagated by means of cuttings of one year's growth ; seeds are unreliable, since they are slow to germinate and usually produce plants of inferior quality. Arabian lavender (L. stoechas) yields an oil used in varnish. In California and a few other places in the United States lavender is grown but not on a com¬ mercial scale.

LAVENGRO. George Borrow's (Laven- gro,* published in 1851, and its

sequel, (The Romany Rye* (1857), constitute virtually a single work dealing with the author's experi¬ ences as a wanderer in England and particularˆ with his adventures among the gypsies. Within the scope of the picturesque and whimsical narrative is contained a strange medley of novel incidents and curious lore — conversa¬ tions with apple-women and post-boys and wayfaring priests, much talk of prize-fights and prize-fighters, and many remarkable de¬ tails of gypsy life and manners. The inimi¬ table personalities of the gypsies, Mr. and Mrs. Petulengro, with whom the author is on terms of intimacy, recur at intervals, and their in¬ teresting domestic arrangements, their na'ive ideas of morality and their strange dialect afford an abundance of humor. The name Lavengro, word-master, is applied by them to the author because of his knowledge of lan¬ guages and his interest in the curiosities of philology.

Beginning in (Lavengro* and running half through (The Romany Rye* is the delightful episode of the author's encounter with Isopel Berners. Isopel, an Amazon in strength, ca-

pable of defending herself against all comers, but dignified, beautifully simple and as pure in spirit as the stars under which she sleeps alone, is a uniquely interesting heroine, and the brief romance between her and the author is handled with a delicacy and charm which ally Borrow with the great masters of English fiction. (Lavengro) and (The Romany Rye) are not as widely, read as they deserve to tie. Of all books which embody the romance of the open road they are the most delightful. Con¬ sult editions of (Lavengro,> with introductions, by W. I. Knapp (1900) and by F. Hindes Groome (1901) ; Seccombe, Thomas, Hsopel Berners, > selected from ; Walker, Hugh,

James H. Hanford.

LAVERAN, la've-ran, Charles Louis,

French military physician: b. Dunkirk, 30 May 1812; d. Paris, 7 Aug. 1879. He was educated at Lille, was appointed assistant at the hospital at Algiers in 1840, and in 1841-50 he was pro¬ fessor at the hospital at Metz. He returned to Algiers in 1850 as professor of epidemiology, director and resident physician of the Lcole Val de Grace. He served in the Franco-Prussian War as sanitary inspector for the Army of the North, and was for a time in charge of the military school at

Montpellier, but in 1872 ac¬ cepted a call to return to Algiers as chief di¬ rector of the Lcole Val de Grace. He was author of many valuable scientific papers, con¬ tributed to the (Dictionnaire encyclopedique des sciences medicales) and wrote (Traite des maladies et des epidemies des armees) (8 vols.,

1875).

LAVERAN, Charles Louis Alphonse,

sharl loo-e al-fons la-ve-ran, French physician: b. Paris, 1845. He was graduated at the School of Military Medicine of Strassburg in 1867. Tn 1873 he was made a member of the faculty of Val de Grace and after traveling in Algeria to investigate the subject of malarial fever was appointed professor of military hygiene and clinical medicine in that institution in 1883. In 1894 he was appointed director of the 11th corps in the Army Medical Service and subse¬ quently physician-in-chief of the Lille Hos¬ pital and member of the French Academy of Medicine. He is an authority on malaria, dis¬ covering the plasmodium. His works include (Traite des Fievres palustres) (1884) ; /Ele¬ ments de pathologie medicale) (with Tiessier, 1894) ; and (Traite de Hygiene militaire> (1896). In 1907 the Nobel prize in medicine was awarded him.

LAVERDIERE, la-var-de-ar', Claude Honore, Canadian author and teacher : b. province of Quebec, 1826; d. 1873. He was educated for the priesthood, which he entered 1851, and was appointed professor in Quebec Seminary and assistant librarian in Laval Uni¬ versity. His claim to recognition rests on the efforts he made to unearth and publish to the world the heroic achievements of early French-Canadian settlers and explorers. His . works are of extreme value and interest and include the completion of Ferland's 'History of Can¬ adaˆ the editing of the 'Jesuit Relations) and of the (Voyages > of Champlain, with notes and a life of the explorer.

LAVERY, lav'er-i, John, British painter: b. Belfast, 1857. He studied art in Glasgow, London and Paris. His first exhibition of note was his 'Game of Tennis) at the Academy in 1886 and in 1888 he received a commission for a painting, 'The State Visit of Queen Vic¬ toria to the Glasgow Exhibition of 1888) which hangs in the Glasgow Art Gallery. He was elected associate of the Royal Scottish Academy in 1892, of the Royal Academy in 1896, and is also a member of the Royal Hi¬ bernian Academy. He is famous chiefly for his portraits and figure-work, although he has ac¬ complished excellent work in landscape and his¬ torical paintings. His work is characterized by a free and

vigorous line, brilliant execution and exceptional mastery of color harmony. He is especially famous for his portraits of women and a portrait of himself hangs in the Uffizi Gallery, Florence. An exhibition of his work was held in New York in 1915. His work is especially well represented in public galleries, among them the Pinakothek, Munich, the na¬ tional galleries of Rome, Berlin, Dublin, Brus¬ sels and Toronto, Canada, the Philadelphia Gallery, Luxembourg Gallery, the modern gal¬ leries at Leipzig, Mannheim and Venice, the New South Wales Gallery, the corporation galleries of Glasgow, _ Manchester and Brad¬ ford and at the galleries in Santiago de Chile and Buenos Aires.

LAVES, la ‘ves, Kurt, American astrono¬ mer: b. Lyck, Germany, 24 Aug. 1866. He studied at the universities of Konigsberg and Berlin and in 1892-93 he was assistant at the Royal Observatory in Berlin. He has been a member of the faculty of the University of Chicago since 1893, and since 1908 has been associate professor of astronomy there. He is a member of various American and foreign scientific societies and has devoted much time to research.

LAVEZARIS, la’va-tha’res, or LABA- ZARES, Guido, de, Spanish adventurer: b. Bilboa, 1510; d. Manila, 1580. He sailed on the expedition to Spice Islands under Ruy Lopez de Villabos in 1542 and was prevented from leaving there until 1549 when he went to the city of Mexico. In 1558 he was com¬ missioned by the viceroy, Luis de Velasco, to explore the coasts of Florida preparatory to the dispatching of an expedition for the ex¬ ploration and conquest of the interior of that country. His principal objective was the searching out of a suitable landing place, and he discovered a bay which he named Filipina, which undoubtedly is Mobile Bay. He accom¬ panied the exploring expedition to Florida under Luna de Arellano in 1559. Uoon his return to the city of Mexico he joined the expedition for the conquest of the Philippines, serving as treasurer, and sailed i’n 1564. He later succeeded to the command of the islands; added to Spanish control the provinces of Pangasinan and Ilocos ; and routed the Chinese pirates, compelling them to surrender Manila, which he afterward fortified. Upon the arrival of a regularly appointed governor- general in 1575 his administration was officially approved, and he was granted the honorary title of lieutenant-governor, with salary, which he enjoyed until his death. His narratives of his experiences in Florida and in the Philippines

were published by the Spanish government (Madrid 1578).

LAVIGERIE, la-vezh-re, Charles Mar¬ tial Allemand, French missionary: b. Bayonne, 31 Oct. 1825; d. Algiers, 26 Nov. 1892. After passing through the Seminary of Saint Sulpice at Paris he was appointed professor of eccle¬ siastical history to the Sorbonne in 1853. In 1863 he was made bishop of Nancy, and four years later archbishop of Algiers. His life work began by the establishment of his Central- African mission. On being made ecclesi¬ astical administrator at Tunis he began fight¬ ing the slave-hunting and slave-barter which desolated the Dark Continent. For this purpose he agitated in the chief capitals of Europe, and secured pledges from England ami Ger¬ many to enforce rigidly the anti-slavery article of the Kongo Conference. In 1890 he urged in France the Church's acceptance of the republic, in which counsel it was considered that he was not without the concurrence of Leo XIII. He was made cardinal in 1882. His published works include (CEuvres choisis) (Paris 1884).

LAVIGNAC, la'ven'yak', Albert, French teacher and critic of music: b. Paris, 1846. He was educated at Paris and in 1882 was appointed professor of solfeggio at the Conservatory, where he later became professor of harmony. Author of (Cours complet theorique et prac- tique de dictee musicale) (1882); (La musique et les musiciens) (1895;ˆ English ed., 1899); (Le voyage artistique a Bayreuth) (1897), translated into English as (The Music-Dramas of Richard Wagner> (1898) ; (Les gaites du Conservatoire) (1900) ; (Notions scolaires de musique) (1905). He completed in 1913 the first volume of an ambitious undertaking (Encyclopedic de la musique/ of which he is editor-in-chief.

LAVISSE, la -ves, Ernest, French histo¬ rian: b. Nouvion-en-Thierache, France, 17 Dec. 1842. In 1888 he was appointed to the chair of modern history in the Paris Faculty of Letters and in 1892 was elected to the French Academy. His historical researches have had chiefly to do with Germany, with which country he en¬ deavored to promote more friendly relations; and they are marked by a ripe scholarship which enhances their authoritativeness. Among im¬ portant works by him are (The Mark of Brandenburg under the Ascanian Dynasty > (1875) ; (Studies of the Plistory of Prussia* (1879) ; Frederick the Great Before his Accession* (1893) ; (The Three Emperors of Germany: William I, Frederick III, Wiljiam IP (1888); (Political History of Europe* (1890) ; (The Youth of Frederick the Great* (1893-1901) ; a (Histoire generate* (with Ram- band) ; a monumental (History of France* (9 vols., 1900-11) ; and a volume of (Souvenirs* in

1912.

LAVOISIER, Antoine Laurent, an-twan lo-ron la-vwa-ze-a, French chemist: b. Paris, 26 Aug. 1743; d. there, 8 May 1794. He was the son of a wealthy tradesman; was educated at the College Mazarin ; studied mathematics and astronomy under Lacaille, chemistry in the laboratory of Rouelle and botany under Jus¬ sieu. In 1766 he received a prize offered by the Academy of Sciences (of which in 1768

he became an associate), for an essay on light¬ ing the streets of Paris. Soon after this he traveled through France collecting material from which he constructed the first geological chart produced in that country, during the same period publishing a number of scientific treat¬ ises. In 1769 he was appointed one of the farmers-general of the revenue. By means of his wealth and influence he secured special ad¬ vantages for extending his investigations, which were also stimulated bv the new dis¬ coveries of Priestley, Cavendish and Black. In 1776 he was director of the government powder-works ; sat on the commission of weights and measures in 1790; and in 1791 be¬ came commissary to the treasury. In May 1794 he was accused before the Convention as an ex-farmer-general, condemned by the Rev¬ olutionary tribunal and guillotined.

To Lavoisier modern chemistry looks as its chief founder; he organized its methods, re¬ formed the old nomenclature and virtually established for this science a new terminology. By his work mainly the old phlogistic chem¬ istry was displaced, and he shares with Joseph Priestley (q.v.) the distinction due to the dis¬ covery and analysis of oxygen, to which he gave its name, Priestley having already called it “dephlogisticated air.** “Lavoisier,** says Huxley, “first showed, oy the most conclusive experiments, what was really the composition of atmospheric air® (1777). His chief works, as containing h’S most important discoveries, are his (Traite elementaire de Chimie) (1789) ; and his posthumous (Memoires de Physique et de Chimie*. (1805). Among his others are (Sur la combustion en general* (1777) ; (Reflexions sur le phlogistique) (1777) ; Considerations sur la nature des acides) (1778) ; (Methode de nomenclature chimique) (with Guyton de Morveau, Berthollet and Fourcroy, 1787). His complete works were published by the French government under the title of (CEuvres de Lavoisier publiees par les Soins de son Excel¬ lence, le Ministre de l’lnstruction Publique) (6 vols.; 1864—93). There are many accounts of his life and work. Consult Grimaux, (La- voisier d’apres sa correspondance, ses Manu- scrits, ses papiers de famille et d’autres docu¬ ments inedits > (Paris 1888) ; and Schultze, (La¬ voisier, der Begriinder der Chemie* (Hamburg 1894) ; Thorpe, (Essavs

in Historical Chem- istry) (New York 1911).

LAVROV, lav-rof', Peter Lavrovitch

(Mirtov), Russian revolutionist, scientist and scholar: b. province of Pskov, 2/14 June 1823; d. Paris, 6 Feb. 1900. He received a military education at Saint Petersburg and became colonel of artillery and instructor in mathe¬ matics at the Academy of Artillery, re¬ maining there for 22 years. It was not until 1862 that he joined the Land and Liberty party, thereby identifying himself with the revolutionists. He was arrested for his political activities in 1866 and in 1868 was sentenced to banishment in the Ural Mountains. He succeeded in making his escape to France and settled in Paris. He was elected a member of the Society of An¬ thropology in Paris in 1870, and in 1871 he was in England and Belgium as a representative of the Paris Commune. He founded and edited, 1873-77. a Socialist periodical, Forward, in

which he gave particular consideration to Rus¬ sian politics. Before leaving Russia he had contributed extensively to the literature of the revolutionary movement, and he now continued anonymously to contribute to various publica¬ tions in its interest. He was well grounded in history, science, philosophy and psychology and spent the greater part of his time after leaving Russia in writing. His political pam¬ phlets are voluminous in number and made him widely popular in Russia, because of their clarity, sanity and belief in the power of the people through education to bring about the reforms he so earnestly advocated. Author of (The Hegelian Philosophy) (1858-59) ; (An Attempt at a History of Modern Thought) (2 vols., 1859) ; (Outline of the Physico- Mathematical Sciences1 (1866) ; historical Letters1 (1879), etc.

LAW, Andrew Bonar, British statesman : b. New Brunswick, Canada, 16 Sept. 1858. Educated in Canada and Glasgow, he engaged in the iron business in the latter place and acted as chairman of the Scottish Iron Trade Association. He entered Parliament as Union¬ ist (Conservative) member for the Blackfriars division of Glasgow in 1900. He was defeated in the January 1906 election, but found a seat a few month later for Dulwich. In 1910 he contested Northwestern Manchester on a straight Tariff Reform issue, but lost. In 1911 he was returned for the Bootle division of Lancashire, which he has since

represented. Between 1902 and 1905 he was parliamentary secretary to the Board of Trade. Since the resignation of the Balfour Cabinet in December 1905 the Unionists have been in opposition ; owing to the war no election was held in 1915, but in that year a coalition ministry was formed and Mr. Law became Colonial Secre¬ tary. He had succeeded Mr. Balfour in the leadership of the Unionist party in 1911. In 1916 he succeeded Mr. Lloyd George as Chan¬ cellor of the Exchequer, the latter becoming Premier in the place of Mr. Asquith.

LAW, Edmund, Anglican bishop : b. Cart- mel, Lancashire, 6 Tune 1703; d. Rose Castle, Carlisle, 17 Aug. 1787. He was educated at Saint John's College, Cambridge, and was later elected a Fellow of Christ's College. He be¬ came rector of Graystoke, Cumberland, in 1737, and was made archdeacon of the diocese of Carlisle in 1743, which office he resigned upon his becoming master of Peterhouse in 1756. He was appointed proto-bibliothecarius at the University of Cambridge in 1760, and in 1764 he was made Knightbridge professor of moral philosophy. In 1768 he became bishop of Car¬ lisle. His writings are characterized by a broad religious toleration, and he regarded his ap¬ pointment to a bishopric as a proof that free¬ dom of religious inquiry was not rebuked. Be¬ sides translations and numerous religious papers he wrote 'An Enquiry into the Ideas of Space and Time1 (1834) ; 'Considerations on the State of the World with Regard to the Theory of Religion1 (1745), etc.

LAW, John, of Lauriston, Scottish specu¬ lator: b. Edinburgh, 21 April 1671; d. Venice, 21 March 1729. His father was a goldsmith in Edinburgh. He was educated at Edinburgh Universitv, where he was remarkable for profi¬

ciency in arithmetic and algebra. He early migrated to London deep in debt, and while in that city killed a man in a duel, but managed to escape to the Continent. He returned to Scotland in 1700, and the following year pro¬ posed to the Scottish Parliament the establish¬ ment of a bank with paper issues to the amount of the value of all the land in the kingdom and the abolishment of the farming of the rev¬ enues; but his scheme was rejected. The years from 1708 to 1715 were spent on the Conti¬ nent, and his success as a gambler caused him to be banished from Venice and Genoa as a designing adventurer. He accumulated a large fortune by gambling, and at length secured the patronage of the Duke of Orleans, regent of France, and in company with his brother, Wil¬ liam, established his bank in 1716 by royal au¬ thority. It was at first composed of 1 200 shares of 3,000 livres each, which soon bore a premium. This bank became the office for all public receipts, and there was annexed to it a Mississippi company, which

had grants of land in Louisiana, and the exclusive right of trade in that territory for 25 years, and of receiving and exporting the beaver skins of Canada, and it was expected to realize im¬ mense sums by planting and commerce. In 1718 it was declared a royal bank, and shares rose to 20 times their original value. A vast quantity of paper money was issued, the credit of which was unquestioned, whilst the national bonds remained at a price far below their nominal value. In 1720 Law became a Roman Catholic and was made a councillor of state and comptroller-general of the finances; but the shares sank in value as rapidly as they had risen. He was obliged to resign his post, after five months, and for personal safety to quit the kingdom. (See Mississippi Bub¬ ble). He lived afterward in great obscurity, finally settling in Venice, and died still occupied in vast schemes, and fully convinced of the solidity of his system, the failure of which he attributed entirely to enmity and panic. Vari¬ ous opinions have been entertained of the merit of his project, and by some it has been thought to have possessed feasibility, had it been carried more moderately into practice. A volume entitled 'Giuvres de J. Law1 was pub¬ lished (1790). Consult Wood, 'Memoirs of the Life of John Law1 (1824) ; Mackay, 'Memoirs of Extraordinary Popular Delusions1 (1850) ; Thiers, 'Histoire de Law1 (1858) ; Weston- Glynn, 'The Financier Law: his Scheme and Times1 (1907).

LAW, John, American lawyer: b. New London, Conn., 1796; d. Indiana, 1873. He was graduated at Yale and admitted to the bar in 1817, but soon after emigrated to Indiana, where he settled at Vincennes. He was quickly brought to the front as a lawyer; became suc¬ cessively prosecuting attorney, judge for eight terms and in 1838 receiver of public moneys. In 1855 he was appointed judge of the Court of Land Claims. He afterward served in the 37th and 38th Congresses on committees of li¬ brary, agriculture and Revolutionary pensions. He was descended from a long line of lawvers, which included the chief justice of the Connec¬ ticut Supreme Court, Jonathan Law, and was president of the Indiana State Historical So¬ ciety.

LAW, William, English clergyman and writer: b. King's Cliffe, Northamptonshire, 1686; d. there, 9 April 1761. He was graduated at Emmanuel College, Cambridge, in 1712, hav¬ ing been ordained and elected a Fellow of his college in 1711. He afterward lived at Cam¬ bridge, tutoring and occasionally acting in his capacity as a

clergyman. His loyalty to the Stuarts prevented his taking the oath of alle¬ giance to George I, and he was deprived of his fellowship. He is thought afterward to have become a curate in London, but from 1727 he was a member of the household of Edward Gibbon, grandfather of the historian, as tutor and spiritual adviser. His influence extended over a widening circle of friends, among them Charles and John Wesley, and Archibald Hutcheson, M.P. from Hastings. His writings extended his influence over a wider sphere, Dr. Samuel Johnson, Lord Lyt¬ telton, Bishop Horne and others attesting the worth of his teachings. In 1740 the Gibbon household was broken up and Law returned to his house at King's Cliffe. There he was subsequently joined by the wealthy widow of his old friend, Archibald Hutcheson, who had counselled her to place herself under Law's spiritual guidance and by Miss Hester Gibbon, sister of his former pupil, who also possessed considerable means. The three formed a household devoted to the following of Law's famous book, 'The Serious Call to a Devout and Holy Life,* spending most of their in¬ come in charity, and their time in religious study and devotion ; an arrangement which con¬ tinued until Law's death, 21 years later.

As a writer Law had among his contempo¬ raries no rival except Ridiard Bently in the field of controversy, always supporting the High Church party; while in matters of practical divinity his influence was indispu¬ table. The Wesleys, however, broke with Law after his teachings and writings be¬ gan to evince a tinge of mysticism. This tendency appears to have been the out¬ growth of his admiration for the Teuton theosophist, Jacob Boehme, although Law was by no means a disciple of that writer. Author of (Three Letters to the Bishop of Bangor * (1717); 'Remarks on Mandeville's Fable of the Bees* (1723) ; (Treatise on Christian Re¬ flection (1726) ; (Serious Call to a Devout and Holy Life> (1728) ; 'Case of Reason'* (1732) ; 'An Appeal to all that Doubt and Dis¬ believe the Truths of the Revelation (1740); (The Way to Divine Ivnowledge) (1752) ; 'Dialogue Between a Methodist and a Church¬ man (1760), etc. Consult Overton, J. II., 'Law, Non-Juror and Mystic* (1881) ; Walton, C., 'Notes and Materials for a Complete Biography of W. Law* (1848).

LAW (M.E., lawd ; A.S., lagu). The An¬ glo-Saxon form is of rare occurrence, except in compounds; but from these, and from the cognate Icelandic log, pi. lag — i.e., "things ly¬ ing in due place,® like strata of slate, for in¬ stance — the original meaning of lagu as, "that which lies in order,® is inferable. The transi¬ tion of the idea to sheets of parchment or other material, upon which an order is in¬ scribed, and, ultimately, to that which had been written, ordered or ordained, could not have been difficult. The derivation of the English

word “law® from the French loi (Norm. Fr. lay) or from the Latin lex , lego, is incorrect. But the Latin and Teutonic words evidently come from the same Aryan root (lagh , to lie). The oldest meaning of lex was “a bill® — prob¬ ably so called because it was laid before the people in comitia for approval (cf. Ger. vor- lage, a bill). When a lex, or bill, had been agreed to it was still called a lex, just as we speak of a “McKinley Bill® or a “Hepburn Bill,® even when it has become an act of Con¬ gress and been a law for many years. This word-history shows that the term “law® is used in its original and proper sense only when it is used as the generic name for that which has been ordered and made applicable to the conduct of human beings. In mediaeval times animals were regularly tried and condemned for their defaults and we still speak of trivial and defective evidence as “insufficient to hang a dog.® This practice of trying and passing judgment on dumb creatures, however, was an aberration. When ancient law declared for¬ feited an animal or inanimate object, which had caused the death of a person, it was a liability of the human owner of the offending thing that was enforced. When a well was filled up because a child had been drowned therein, this was a penalty enforced upon the owner of the well ; when an ox was made to furnish forth funeral baked meats for the rela¬ tives of the man whom the animal had gored, it was at the cost of the owner of the ox — the owner, not the thing that had caused a mis¬ chief, was responsible to the law. In admiralty practice ships are made defendants in actions for debt and are libelled in suits for damages, just as if they were persons, but the liability enforced in every case is that of the master or owner of the vessel. A law, therefore, is a rule of human conduct. This being so the in- appropriateness of the term, “laws of na¬ ture,® in its modern sense, becomes apparent- Records of natural phenomena and their se¬ quences, though set down with mathematical preciseness and logical perfection, are not rules of conduct at all ; they are descriptions. The statement that “an apple falls to the ground from a height of 15 feet in one second,® is not a “law® of gravitation, but a fact — just as if one should say “he stole,® one would merely be describing an act. The commandment, “thou shalt not steal,® however, is a law. The distinction is obvious. Mathematical laws are rules of quantity, not of conduct. In the do¬ main of aesthetics such terms as the “law of beauty® or the “law of harmony® are familiar expressions ; but these, like all the others men¬ tioned, are “laws® merely in figure of speech. Terms like “Grimm’s law,® the “laws of pho¬ netics,® or the “laws of metre,® are justified, because they are rules of human conduct in the use of language, having their origin in cus¬ tom. The commandment “thou shalt not covet® is a rule of ethics, a moral precept and also a law ; but the science of ethics is

concerned with resolutions and operations of the human will, or with states of mind, which have not found expression in action. The rules of this science, therefore, are not, properly speaking, laws. Covetousness is a sin and invites no leeal penalty until it has manifested itself by the infraction of some legal right. Law is a rule

of conduct governing external human acts. Speaking and writing are actions, but thinking is not an external act and a mere inclination to do is not an act at all.

Rules of. human conduct are most varied in their origins and degrees of sanctity. The (

West® the rule was “Shoot first, then palaver.® At the stage of social development here spoken of law would be definable as a rule of con¬ duct governing external human actions, sanc¬ tioned by public opinion and enforced by indi¬ viduals with the acquiescence of the commu¬ nity. The idea of a law as a rule promulgated and imposed by legislative act, and enforceable only by the public authorities, was a later con¬ ception — meaning later in the stage of social growth, not later in historic time. Some com¬ munities had laws in the strict sense of the word thousands of years before others.

Early Codes. — The earliest known sys¬ tem of secular law is contained in the legisla¬ tion (circa 2350 b.c.) of Hammurabi, king of Babylonia, who was a contemporary of Abra¬ ham and of Chedorlaomer the Edomite. This legislation took the form of a code of 282 paragraphs, regularly arranged under heads and subheads, dealing with the rights of per¬ sons, property, the family, contracts, torts and procedure in a very adequate manner. It for¬ bade widows to remarry, without first making provision, under the direction of a judge, for the care of her deceased husband’s household and children; it penalized surgeons for injuries done by them in unsuccessful operations, and various other tradesmen for damages caused by their neglect. It demanded retribution, “an eye for an eye, a tooth for a tooth,® in the very w7ords of the Levitical law made over a thousand years later. It was a civil code throughout, containing no religious ordinances ; in fact, it transferred the judicial function from the priests to the elders. The idea of the Single Taxers that land held out of use should be burdened as heavily as land under cultiva¬ tion was anticipated by 4,000 years. The as¬ sumption would be unwarranted

that a code, which reflects an advanced social order and rather complex economic conditions, was evolved out of the innermost consciousness of a lawgiver. On the contrary, it is a reasonable supposition that the Babylonian codifiers did little more than restate, in orderly form, an existing body of customs. The transition from unwritten customs to written code marks a stage in the history of almost every juristic system. As human societies developed and hu¬ man relations increased in complexity so did the rules for the government of human conduct ; a few simple customs, with which everybody was familiar, no longer sufficed. Knowledge of ihe law became the privilege of a class — of a priesthood or a military and political aristoc¬ racy. Various motives impelled these privi¬ leged repositories of legal knowledge to part with a monopoly so advantageous to themselves. The religious oligarchies of Asia embodied their legal learning in codes either for their own guidance, to relieve their memories, or to instruct their disciples. The opportunitv inci¬ dentally afforded them to magnify and con¬ solidate their influence was too tempting to be resisted and their monopoly of knowledge en¬ abled them to pass off on the public collections, not of rules actually observed, but of rules which the priestly order thought proper to be observed. Such a collection is that known as the Laws of Manu. The claims to the highest antiquity made for this Hindu code are not well founded — and, while it is evidently of

Brahmanical origin and enshrines many genu¬ ine observances, it does not embody a set of rules that were , followed, as a whole, any¬ where in Inuia. It gave general sanction to localized cruel practices, like the suttee, and it hardened the law of status into the abhorrent social institution of caste. Another reason for codification may be found in territorial expan¬ sion through conquest. This probably was the motive for the compilation of the early Baby¬ lonian code. Hammurabi had forced his sov¬ ereignty on Assyria and would, naturally, de¬ sire all his subjects to obey one law. The writing down of the laws of Minos, additional fragments of which have recently been found in the Gortyna inscriptions, was probably sim¬ ilarly influenced — Minoan sovereignty having been extended over practically all the city- states of Crete. Lycurgus of Sparta took from these laws the institution of the syssitia — public tables at which all citizens dined in common — and also their general policy, which was to train and control, not only the young but mature citizens as well, in

all the habits and relations of life from the cradle to the grave. This policy comported with the pur¬ pose of Lycurgus to create an invincible mili¬ tary machine. The laws of Sparta cultivated the soldierly virtues at the cost of nearly every¬ thing else. A wrarrior who returned from bat¬ tle without his shield suffered disgrace, inef¬ faceable during life, and scarcely effaced by subsequent death in the performance of a dis¬ tinguished heroic action. A Spartan boy, on the other hand, was encouraged to practice dis¬ simulation and to appropriate whatever he de¬ sired and was disgraced for lying and stealing only when caught at it. Aristotle damns the Minoan law with faint praise and, if its moral level was no higher than that of the Spartan institutions, the high respect accorded to the former by the ancient Greeks seems hardly deserved. But the 180 or more codes of the Greek cities and their colonies in Asia, Africa, Italy and Sicily were not, generally speaking, inspired by the desire to confirm and perpetu¬ ate the power of a ruling class. On the con¬ trary, they were usually the outcome of suc¬ cessful assaults by the plebeian or popular elements of the community on the aristocratic repositories of legal lore and on the latter's monopoly of RlIlHll£d£e! '"The rules of con¬ duct wrere graven on stone or written on scrolls, so that they might be known to all whom they concerned and who wTere expected to observe them. The communities in which they were promulgated were fairly advanced in their institutional development and familiar with rules of conduct imposed, by public au¬ thority and enforced by a public magistracy. This ideal was fullv realized by the promulga¬ tion of a written law.

The Civil Law. — The Roman Law of the Twelve Tables, more clearly than some other of the codes mentioned, was the fruit of a pop- ular revolt against the legislative monopoly of a class. The institution of the tribunate had subjected the pronouncements of the patrician Senate to the veto of a popular representative ; the Publican Law had given the plebeians the right to make laws in their own assemblies; finally the Decemvirate was established for the express purpose of ordering and declaring

a law which should be applicable to all citizens of Rome, and known to all through its pub¬ lication. When its task was completed, the Decemvirate was dissolved. One should not expect these early collections to be codes in the modern sense. Solon's Constitution of Athens had but little order and usually these compilations mingled religious and civil ordi¬ nances and moral precepts without regard for their essential differences in character. The Roman code is a mere enunciation of customs existing at a time when Roman society had barely emerged from the intellectual condition in which religious

duties and civic obligations are invariably confounded. Its provisions re¬ specting contracts, and many other things, might have more properly found place in a book of rites than in a book of laws ; and it embalmed cruel and superstitious practices. The body of a bankrupt might be cut up and divided among his creditors. The inflexibility of a code would not at first be regarded, as an evil comparable with the evil of living- under a law held in guardianship by the privileged few and altered by these at will to suit their pur¬ poses. Their strict adherence to the letter, moreover, enabled the Romans to preserve their legal institutions intact amid great social changes and to avoid the dangers of a too rapid development — such as reduced some of the Greek codes to formlessness and made the law as administered by Athenian juries, for instance, very little better than the rule of the mob. When the Roman jurists had to adapt their code to new circumstances they did so with great caution and, at the outset, by legal fictions. These fictiones, as they were called, while concealing, or affecting to conceal, any change in the letter of the law, permitted a change in its operation or direction. For in¬ stance, the jus civilis (literally the law per¬ taining to citizens) gave strangers no standing in court. But justice could not be denied to the great number of aliens who had flocked to the city; so a rule of pleading was made that a plaintiff might aver his citizenship and that this averment could not be traversed, even though it might be untrue. The form of mar¬ riage known as Hsus required continuous co¬ habitation for one year to establish the rela¬ tion with all its legal consequences ; a woman thus married (and usus became the prevalent form of marriage) could, by absenting her¬ self from the marital domicile for one day in each twelvemonth, defeat the law which gave the husband absolute power over the person and property of his wife. The legal fictions were many. In their responsa prudentum, learned jurists applied the law in a sense other than literal. But a more effective solvent of the harshness of the code was equitas. This was an outgrowth of the jus gentium. The Prater annuallv published an edict (it after¬ ward became perpetual) containing a statement of the law which he proposed to apply in the cases of foreigners seeking justice in the courts of Rome. The praetorian edict was a collation of alien laws on various tonics which seemed likelv to be brought into judicial consideration. In the beginning the edict was a contemptuous concession to the gentiles; but the uniformity of the legal rules on given subjects, though drawn from many and quite unrelated sources,

could not fail to become impressive. It seemed reasonable that rules, which served the ends of justice between Syrians, Egyptians, Gauls and Greeks, would produce equitable results also when applied to Romans. If strangers could transfer all kinds of property by simple deliv¬ ery, or could make contracts by simple memo¬ randum, by letter or by word of mouth, why should a Roman be obliged to go through an elaborate ceremonial, which had “become mean¬ ingless and superfluous, in order to achieve the same purpose? While the rules of equity, which were published by the Praetor from time to time and added to the perpetual edict, could not supersede the rules of law, they could, and did, make the latter inoperative. A Roman woman and her property might still be left (by the law) in lifelong wardship of her male rela¬ tives; but a rule of equity would enable her to snap her fingers at her guardians by recog¬ nizing her right to use and dispose of that which was hers as she wished. Wills originally could be made only in the presence, and wfith the consent, of the comitia calata; they might be regarded, therefore, as special acts of legis¬ lation. The obiect of a will was to enable a father to direct who should be his heir and thus to defeat the law of inheritance which made an emancipated son incapable of taking his heritage by regular legal succession. The Praetor, however, actively intervened to pre¬ vent the abuse of testamentary power. An “undutious will® could be set aside and any disposition of the patrimony contrary to the equitable rights of a wife or children would be disregarded. There was comparatively little legislation affecting private Roman law until the time of the later emperors. But the fic¬ tional and equitable exceptions ultimately be¬ came the rules and the moral speculations of the Greek philosophers exerted a profound in¬ fluence. Aristotle mentions a distinction be¬ tween written law and (

sum,® and the distinction between citizens and gentiles ceased to exist. Its general provisions, regulative of the rights of property and of per- sonsTn their private relations to one another, hatie since been bettered in only few respects and have deteriorated in some. The original barbarity of the patria potestas had been re¬ fined, so that the power of the father over the uersons of his children had been reduced to a conditional veto of their marriage, while his power over the property of unemancipated sons was modified through the general practice of emancipating them when they had attained the age of discretion. Children, irrespective of sex, shared equally in the patrimony, though the estate might be held in trust by the gen¬ eral heir appointed by will. Marriage, rest¬ ing on the consent of the married, it was con¬ sidered “immoral® to hold the parties in the bonds of matrimony when consensus no longer was present. Milton

postulated his theory of divorce on the same premise and the doctrine is really not more shocking coming from a heathen Roman lawyer than from an English Puritan pamphleteer. The jus civilis gave more freedom to women, married or unmar¬ ried. than most modern laws do ; but it recog¬ nized chattel slavery.

The Feudal System. — The barbarian erup¬ tion broke the continuity of the develop¬ ment of the law on a Roman foundation. The customary laws of the Teutonic in¬ vaders wrere modified here and there through contact with the Roman system. Theo- doric the Goth had received his education at the imperial court at Constantinople ; but the Ostrogothic kingdom of Italy was too short lived to permit the growth of a Romanized system of Teutonic law. The Forum Judicum is the onlv extant code in which a fusion of the two systems was made with a measurable degree of success. This code wras Hamed (6-19-652 a.d.) during the reigns of Chintasvintus and Recesvintus, two Visigothic kings in Spain, and is a combination of the Visigothic laws, re¬ duced to writing in the second half of the 5th century by Euric at Arles, and of the Brevia- rum Alaricum, compiled from the Roman codes at the beginning of the 6th century. The Visi¬ gothic kingdom was overthrown in 711, but its code was adopted by Ferdinand III of Ara¬ gon about 1350. The Christian Church intro¬ duced and administered the Roman law of in¬ heritance and of marriage and the family — – modified by Christian concepts and the Leviti- cal canon — and influenced the embodiment of the principle of the widow's dower into the cus¬ tomary law of all western Europe. In almost all other respects, however, the rupture with the past became complete when the feudal sys¬ tem had become firmly established. The ex¬ clusive right of the first-born to the succession and the rules for the entailment of estates were originally promulgated in the "house laws® of the great feudatory chiefs, who com¬ pelled weak sovereigns to incorporate them in their land grants ; but these regulations did not have long to wait for their embodiment into the customary law. On top of the institution of chattel slavery, or serfdom, feudalism im¬ posed the institution of villeinage, with the right of the lord to heriots and unpaid forced labor. While the right of unmarried women to

hold property, as recognized by the Roman law, was continued, the property of a married woman passed absolutely under the dominion and ownership of her husband. As a legal per¬ son a woman ceased to exist when she became a wife. When European society worked its way

out of these conditions, after centuries of struggle, it was with little help from the Ro¬ man law. There was no central source of au¬ thority. The empire of the Franks fell to pieces after the death of Charlemagne and the mediaeval empire of the Germans, sometimes called <(Holy® and ˆRoman,® was a mere thing of parchment and ink. It was not recognized in France after the 10th century. Germany from the beginning was a loosely-knit aggre¬ gation of duchies, whose chiefs were as often at war with the Kaiser as in his allegiance. The grand seigneurs of France were more pow¬ erful than the king. Conditions were not pro¬ pitious for the development of a common law and became less so as political and class divi¬ sions grew smaller and more numerous. The organization of secret courts (Ger. Vehm-gerichte) whose judgments, made in the dark, were executed in the dark by the daggers of oath-bound brotherhoods, was only one of many indications of the general lawlessness. What law developed was of limited application with respect to the territory, or the social classes, affected. Every province in France had a dif¬ ferent legal system, every German principality had its (

The revival of the study of the corpus juris civilis at the University of Bologna and other seats of learning toward the end of the Middle Ages produced a flow of knowledge in many streams. But human societies were becoming nationalistic and patriotic; the universities were cosmopolitan and scholastic, with little sympa¬ thy for the new spirit that was actuating the nations of western Europe. It is not sur¬ prising, therefore, that the product of the new learning was a groundwork of ideas rather than a body of laws ; academical theorizing that led to nothing practical. Neither is it sur¬ prising that the finest fruits of the legalistic renaissance were works on international, rather than civil, law. Grotius' treatise (

part of the peasants for liberation from feudal serfdom. The struggle was bootless. The corpus juris, indeed, became authoritative, when it was not in conflict with local law, but German peasants remained serfs for three more centuries. France, notwithstanding the consolidation of the monarchy, remained un¬ der the curse of an anomalous and discord¬ ant jurisprudence. The south continued to be the Pays du Droit Ecrit; the north, the Pays du Droit Coutumier; but province differed from province. One influence might have been ex¬ erted for betterment. The French lawyers had attained a political and social position beside the feudal nobility; they were organized in great chartered corporations with large powers and larger claims ; they excelled their compeers throughout Europe in the qualities of the ad¬ vocate, legislator and judge; their generaliza¬ tions displayed an elegance of diction and a* refinement of logic, unexampled since the

pass¬ ing of the jurisconsults of ancient Rome. But not one venerable or lucrative quiddity would they sacrifice in the interest of legal harmony and clarity. For the (

English Legislation. — In England the evo¬ lution of a homogeneous legal system was favored by the concentration of the law¬ making power. As early as the 13th cen¬ tury jhe common law was centralized in the King's Court ; and it was the law spoken by the king's judges. There was no other school ; and there was no other masters from whom it could be learned. The systematic study of the Roman civil law was discouraged, and, finally, its citation as precedent was interdicted. The courts, making law by working on material presented for their consideration, demanded skilful pleaders — and in the course of a few generations a learned profession arose and became established in the societies of the inns of court. The processes whereby the English law was adapted to the changing needs of society were much the same as those which had been employed in Rome a thousand years before. By the legal fiction of levying a fine and suing for a common re¬ covery the strictest entail could be broken ; by the transformation of a tenure in fee into an equitable use, an inalienable feudal benefice be¬ came property, which could be conveyed by deed or devised by will ; by the substitution of money for personal labor in the payment of rent, and the recognition of leases as freeholds, the tenants became freeholders and, conse¬ quently, free men. The law did not permit married women to own personal property ; but equity enabled them to hold any kind of prop¬ erty in trust for their own benefit, and to dis¬ pose of the same at pleasure. The private law remained mostly unwritten until modern times. All the statutes enacted between the

time of the Conquest and the time of the Com- monwealth, embracing topics of the private law, would scarcely cover 30 printed pages of an ordinary law book. The Statute of Merton (1233) declared it to be the English law that children born out of wedlock could not be legitimized by the subsequent marriage of their parents. The Statute of Merchants (1285) au¬ thorized the imprisonment of insolvent debtors, but it also provided that the goods of travelers who died while passing through England could not be seized and withheld from their heirs • — in which respect English law was centuries in advance of that of the Continent. The guilds, generally speaking, were treated with consider¬ ation, though there were several statutes pro¬ hibiting and penalizing

restraints of trade and combinations to unreasonably enhance prices. Artificers, however, received much unfriendly attention from the law-makers. In 1304 a com¬ bination to bring about, by lawful means, an injury to a third person was declared con¬ spiracy ; in 1360 all <(alliances and covins® be¬ tween masons, carpenters, etc., were declared void; the act of 1452, empowering the Chan¬ cellor to issue writs of proclamation against disturbers of the peace, and to punish disobe¬ dience by outlawry, is believed to have orig¬ inated the suppression of strikes by injunctive order. The Statute of Victuallers (1548), while it gave freedom of employment to skilled me¬ chanics in any town, forbade artificers to form oath-bound confederacies not to work, or to make agreements among themselves as to hours of labor. In 1349, and persistently for 100 years thereafter, efforts were made to fix wages by law; and they were abandoned only when masters complained that they could get no servants unless they paid more than the statutory wage. Worst of all fared the agri¬ cultural laborers or villeins. They were com¬ mitted without bail by any justice of the peace for refusing to work. Wat Tyler's rebellion (1383) was a plebeian revolt, and among the demands of the rebels was one that labor in husbandry be commuted to a money rent. In part the demands were allowed. Villeins were thereafter paid wages, but the act of 1585 re¬ stricted them to labor in their hundreds and required them to follow the calling of their fathers. Villeinage was formally abolished in 1425, but as late as 1574 commissioners were appointed by Queen Elizabeth to manumit bond- men and bondwomen. The Statute of Labor, passed (1562) in the reign of Elizaoeth, re¬ quired unmarried artisans with incomes of less than 40 s. to serve at their handicrafts. Per¬ sons under 30 having no trade could be com¬ pelled to labor at the request of any person having an art or mystery; all persons between 12 and 60, not otherwise employed, might be compelled to labor at husbandry. Employment was for a year and masters could not dismiss, nor servants leave, without good cause. Un¬ skilled and agricultural laborers could not de¬ part from the parish without the certificate of a constable and two good citizens. The wages of artisans were fixed by justices of the peace. The statute against the monopolies by royal patent was passed in 1623, after 50 years of shilly-shallying by Elizabeth and James Feudal tenures were abolished by a statute ot Charles I.

Era of Rationalism.— Philosophy m the

18th century had become a rationalistic ideal¬ ism. Every philosopher, moreover, was dupli¬ cated as a publicist, seeking new principles on which to base a reconstituted social order. Man, in a state of nature, was imagined to have lived under conditions of almost

absolute liberty. Society was assumed by Rousseau to have been established through a ((social con¬ tract,® whereby each individual surrendered only so much of his complete freedom as was necessary to the enjoyment of the equal right of every other individual to perfect liberty of action. To ensure this equality was con¬ sidered the only function of government. This was the theory; what were the facts? The political condition of France was that of a feudal aristocracy, succeeded, when the Revo¬ lution had been accomplished, by an imperial despotism with a limited elective franchise. The population was largely agricultural; the burgesses were mostly engaged in petty indus¬ try. Land was burdened with feudal charges and movable property practically non-existent. Legal relations between persons were few and well-defined, and were wholly individualistic. Unrestricted private ownership was considered the basic principle of private law. The prop¬ ertyless workingmen were disunited and ignored. <(Egalite® was understood to mean political equality. During the whole revolutionary pe¬ riod legislation was regarded the only right source of law. Legislators, however, were not expected to weigh the morality of each indi¬ vidual action; if the law secured a maximum of liberty to each, that was sufficient. Every¬ body favored a code — the economist-philoso¬ phers because it tended toward a desired har¬ mony and universality of legal principles, not because they believed a perfect system could be created at one stroke. They were rather partial to the coutumes, which they deemed to reflect present social needs more nearly than the jus civilis. But when the radicals had ob¬ tained supremacy in the convention all previous legislation was pronounced barbarous and un¬ civilized. Cambaceres and a legislative commis¬ sion were directed, in 1793, to prepare a brief code. The first draft was rejected as too com¬ plicated. The second effort of Cambaceres, (

private affairs, to act in his own interest and not the interests of the public — remained the ideal. The absolute right of private ownership and freedom of contract were the cornerstones of the edifice. In England the first effect of the French Revolution was reactionary and quiescent. The Combination Act of 1800 out¬ lawed workingmen's associations, transitory or permanent, which had for their object the in¬ crease of wages or other regulations of the terms of employment. Any person offering to assist in the maintenance of a strike might be proceeded against summarily before a peace officer. The Health and Morals Act of 1802, though an emergency law called forth by an

epidemic, may be regarded as the beginning of factory legislation. The slave trade was pro¬ hibited in 1806; the whipping of women at the pillory for misdemeanors was abolished in 1820, and in 1822 the first law for the preven¬ tion of cruelty to animals was passed. The era of individualistic and utilitarian law reform (1825-70) was ushered in by the writings of Jeremy Bentham and was dominated by his ideas. According to Bentham, legislation is a science; its aim is to carry out the principle of utility, hence the proper end of every law is the greatest happiness to the greatest number. Every person is, in the main, the best judge of his own happiness ; hence, all restrictions on free individual action, which are not necessary to the security of like freedom to other per¬ sons, should be removed. Maine's aphorism that, ((modern law substitutes contract for status,® embodies the fundamental conception of the Benthamite Liberals, who regarded the unrestricted exercise of the right of contract as the most satisfactory way of disposing of the whole body of antiquated legal institutions. The British utilitarians, like the French ration¬ alists, fell short of the conception that posses¬ sion and ownership might impose legal duties as well as give legal rights, and that it may be a function of the law to protect individuals — even mature normal men — from their own weakness, as well as to ensure to the strong- freedom in the exercise of their legal powers.

Modern Development. — American legisla¬ tion did not become fecund until 50 years after the adoption of the Constitution, receiving its impetus from the great moral movements — anti-slavery, woman's rights and prohibition. The legal right of married women to own and disnose of property separately from their hus¬ bands was generally recognized by statutes en¬ acted before the 19th century had passed its meridian. After the Civil War came other moral and social movements, resulting in laws for the benefit of labor and for the suppres¬ sion of trusts. Peaceful strikes have ceased to be criminal conspiracies. The principals underlying the anti-trust laws are as old as the early English statutes against combinations in restraint of trade and price-fixing agree¬ ments. The law restricting woman and child labor and the minimum wage laws however, are limitations upon the liberty of contract, and they are among the few in which the right of the state to restrict this freedom is recog¬ nized. The compensation laws transfer the burden of insuring against industrial accidents from the workingmen themselves to the indus¬ tries in which they are employed The regu¬ lation of injunctions in labor disputes gives

expression to the thought somewhere enter¬ tained that judge-made law is more ˆaristo¬ cratic® than that made by democratic legislators. The provisions of the constitutions of North Carolina, Missouri and

Oklahoma, that men have (

Bibliography— Ames, Jas. B., Pectures on Legal History* (Cambridge, Mass., 1913) ; Austin, John, jurisprudence or the Philosophy of Positive Law* (5th ed., London 1885) ; Bentham, Jeremy, Principles of Morals and Legislation* (Clarenden Press 1879) ; Dicey, A. V., (Law and Public Opinion) (London 1905) ; Gams. (tr. by H.

Goudy, Oxford 1904) ; same, Struggle for Law) (tr. by J. W. Lalor, Chicago 1879) ; Lee, Guy Carleton, (Historical Jurisprudence) (New York 1900) ; Maine, Henry Sumner,

(Ancient Law)(New York 1888; London 1906) ; Montesquieu, Charles Louis de, < Spirit of the Law> (1st ed., Paris 1748); Pollok and Mait¬ land, (History of Law in England) (2d ed., Boston 1899) ; Savigny, Fr. Carl v., (Jural Relations) (2d ed., book of the (System of Modern Roman Law,> tr. by W. H. Rattigan, London 1884) ; Stimson, .Fred. J., (Popular Law Making* (New York 1910) ; Continental Legal History Series, published under auspices of Association of American Law Schools (11 vols., Boston 1912-18; Vol. I, General Survey; Vol. II, Progress in the 19th Century).

Stephen Pfeil.

LAW, in science and in philosophy, a gen¬ eral formula expressing either a de facto uni¬ formity of nature as we actually find it or a necessary property of all conceivable worlds. The first type is exemplified by the law of gravi¬ tation, which asserts that two particles attract one another with a force varying directly as the product of their masses and inversely as the square of the distance separating them. It is quite conceivable from the purely logical standpoint that there might be a world where the attractive force might vary as the sum of the masses of the particles concerned ; observa¬ tion, however, teaches us that our world is not of this sort. On the other hand, the law of contradiction, which says that no proposition can at once be true and false, is or necessity valid in any universe whatever. The distinc¬ tion between the two types of laws has been minimized into one of degree by those who hold the consistency theory of truth, for these writers claim that even such laws as that of gravitation follow from the nature of any possible universe, and that their denial involves an inconsistency, or at any rate a

greater degree of inconsistency than their assertion. How¬ ever, from the standpoint of those who main¬ tain the correspondence theory of truth believ¬ ing that the truth of a statement depends on whether it correctly portrays a certain con¬ tingent real state of affairs, the distinction be¬ tween necessary and de facto or empirical laws may well be absolute, and usually is absolute. Both necessary and empirical laws differ funda¬ mentally from laws of right and wrong or the laws established by states.. Ethical and polit¬ ical laws are either descriptions of things as they ought to be or schemes of procedure in¬ tended to create some desired state of affairs. Ethical and political laws may be violated without falsifying them ; the violation of an ethical law is a sin; of a political law, often a crime; and many political laws contain clauses contemplating their own violation. On the other hand, to precisely the extent to which a scientific law is violated, it is not a law at all. The laws of ethics speak in the imperative; those of a natural science in the indicative. Notwithstanding the fact that, strictly speaking, a law of science is rendered invalid by a single exception, all empirical laws are either marred by exceptions or by the possibility of exceptions. Owing to the general uniformity of nature, and especially to the particular uni¬ formities which ages of observation have dis-

closed to us in certain fields, when a certain conjunction of circumstances have occurred time and again, while a certain component part of that conjunction has never or but rarely been known to occur in isolation, we are able to formulate the law that the component part is an index of the presence of its associates, and to expect that whatever exceptions this law may have will be rare in proportion to the number of times it is satisfied. Further than this we can never go ; the law of gravita¬ tion itself, that image of all a law of nature should be, has recently been suspected of small variations from the facts. Of small variations be it noted ; the fact that we can make the quantitative errors of the laws of nature re¬ cede further and further is what renders a mathematical physics,' and in general a precise science of any sort, at once pos¬ sible and valuable. In the case of such laws as that of recapitulation in biology and of many psychological generalizations, the enormous quantitative error is concealed by a loose termi¬ nology, which is able to assume just such slight changes as to cover the facts throughout all the changes of the observations. Laws such as these are sometimes called empirical laws or generalization in a sense narrower than that in which this term has been employed in the present discussion. The justification for the larger sense of the phrase which has been employed here is that the distinction between the rawest generalization of a new science and the

law of universal gravitation is simply one of degree : of the clearness of the terms employed, the measure of interrelation of the facts em¬ braced with the other facts of the science, the amount of observation and research that has been made, and the rarity of observations con¬ tradicting the law. The law of gravitation is not equally fallible to the law of recapitulation in biology, but it is similarly fallible. For a discussion of the methods by which scientific laws are established (see Induction) ; the dis¬ cussion of induction under Logic.

Norbert Wiener.

LAW, American Schools of. Among the notable features of educational progress in the United States during the 19th century, there was, possibly, none more remarkable in scope or destined to exert weightier influence upon the future of the nation than the marvelous in¬ crease in number and growth in importance of our American schools of law. That this statement is conservative rather than extrav¬ agant is demonstrated by the fact that while at the opening of that century there existed in our nation but a single professional law school — and that a private enterprise which never conferred a degree — at its close, more than 100 publicly chartered academic institutions were given official recognition as such by the national commissioner of education.

And the American school of law is to-day an institution peculiar to itself, for the reason that there existed in the mother country from which our common law and so large a propor¬ tion of our earlier statute law, as well as the formal machinery of our administration of justice, were derived, no similar scholastic or¬ ganizations which could serve as models, in the development of a system of instruction in jurisprudence.

Among the Continental nations of Europe, of course, and particularly among races of Latin derivation, schools of law had been firmly established from a period of remote antiquity and were held in exalted importance.

Thus, great schools of jurisprudence flour¬ ished, long prior, even to the time of Justinian, at Berytus, Rome and Constantinople, and be¬ came especial objects of the sedulous watch, care and protection of that great emperor to whose enlightened supervision the Roman law

owed its systematization and codification at the hands of Tribonian and his colleagues. Al¬ though, in the earlier period of Roman history and under the republic, the youthful student who aspired to master the principles of juris¬ prudence usually attached himself to some law¬ yer of prominence from whose discourse and practice he might acquire the desired knowl¬ edge, this custom became obsolete to the degree that, under the emperors, nowhere in Rome's vast domain, outside of these three schools, of which the Sidonian was pre-eminently the most famous and successful, was professional in¬ struction in law permitted to be given.

The impetus given by these law schools of antiquity, not alone to the study of legal principles but to the cause of learning in all branches, was incalculable. And, similarly, the renaissance of modern education has been justly held to date from the successful effort of Irnerius, at the dawn of the 12th century, to revive scholastic interest in the juridical learning of the civilians. This notable scholar and teacher, himself an alumnus of Constanti¬ nople, by the establishment, under the auspices of Frederick I of Germany and at the sugges¬ tion of Hildebrand's friend, the Countess Ma¬ tilda, of his wonderfully successful lectureship on the Corpus Juris Civilis, provided the actual nucleus around which was eventually assembled the great university of Bologna, forerunner of all modern institutions of the kind.

But such was the history of the growth of the English common-law that slight parallelism existed between the methods by which instruc¬ tion in its principles and practice could be gained by the neophyte and those open to stu¬ dents of legal science in Continental countries and especially among peoples whose jurispru¬ dence was derived from or dominated by the elementary fundamentals of the Roman civil law. Thus, while elaborate and erudite courses in the history and principles of jurisprudence, ancient and modern, including both the canon and the civil law, have for centuries figured prominently in the curricula of the two great English universities, neither the highest profi¬ ciency in their scholarship nor any degree in law conferred by Oxford or Cambridge ever led to the bar in England. On the contrary, the wardship of the door to the practice of the leeal profession in our mother country has ever been in the keeping of the Inns of Court, curi¬ ous bodies politic which, while neither hostelries nor seminaries, partook in some respects of the nature of both and have remained the peculiar custodians of instruction in the arcana of com¬ mon-law practice and Heading.

Whether or no acceptance be accorded to the view of that eminent American jurist and legal educator, Judge Simeon E. Baldwin, that the

unsystematic texture of the common law was less friendly to its pursuit as a scholastic

exercise, acquiescence must be full and unre¬ served in his conclusion that the absence of English law schools in modern times left Amer¬ ica no guide in this direction ; and that, great as seems the present measure of her success, whatever our country has done she has done for herself, slowly, painfully, with hesitating and uncertain step.

To Tapping Reeve, lawyer, judge and legal writer of eminent distinction, belongs the honor of establishing the first American law school, at Litchfield, Conn., in 1784. Judge Reeve, a graduate of Princeton in the class of 1763. had settled in the practice of law at Litchfield as early as 1772, and had married a sister of Aaron Burr, who was an early student of law under him and an inmate of his household. Under the able guidance of its founder, who remained its sole instructor until his elevation to the judgeship of the Superior Court of Connecticut, in 1798, the Litchfield Law School speedily gained a widespread and favorable reputation. Upon his assumption of the duties of the bench, Judge Reeve associated with himself in the con¬ duct of the school, James Gould, the well-known legal author and jurist. The Litchfield school, though, as has been said, never conferring a degree, maintained a successful career for a round half century, and during its existence numbered more than 1,000 students upon its rolls. Of its thousand alumni, some 40 rose to be justices of courts of last resort in the States of their various residences, while others reached positions of eminence as legislators in both houses of Congress. To the experience of its founder and his colleague in this pioneer school, American students and practitioners of law unquestionably owe the production of two valuable and important textbooks, each of which for more than half a century remained a stand¬ ard of authority in its line. These were Judge Reeve's treatise on the (Law of Baron and Feme; Parent and Child; Guardian and Ward5 (1816), familiarly known as (

Coming now to the question of the estab¬ lishment of regular academic courses of instruc¬ tion in law in publicly chartered institutions, while a professorship in English law had been established, largely through the efforts of Thomas Jefferson, in the ancient College of William and Mary in Virginia in 1782, the earliest course of collegiate law lectures ever given in America was that delivered in 1790 by Justice James Wilson of the Supreme Court of the United States, as incumbent of the chair of law in the College of Philadelphia, the institu¬ tion founded by Benjamin Franklin, and merged in 1792 in the University of Pennsylvania. Auspicious circumstances attended

this opening of American collegiate instruction in law, the lecturer being not only one of the best read and most deeply learned lawyers of his time, but, by reason of his distinguished record as a signer of the Declaration of Independence, and

a member of the Constitutional Convention of 1787, a van-leader of public thought and action. In deference, we may suppose, to his high dig¬ nity as a member of the Federal judiciary, his introductory lecture on 15 Dec. 1790, was at¬ tended by a brilliant concourse of public officials, including the President of the United States and his Cabinet, as well as the governor of Pennsylvania, members of Congress and of the State legislature;. But the course, or rather series, for Judge Wilson delivered three courses of lectures during that academic year, ended with its close; and no further instruction in the subject was attempted in the University of Pennsylvania until 1817, when law lectures were once more given during the period of a single year; following which came another interval of total inactivity in that institution lasting until

1850.

In New York, the history of academic legal instruction began with the appointment of James Kent, in 1793, to a professorship of law in Columbia College, his first course of lectures being delivered to a small class, during the following year, and succeeding courses in 1795 and 1797. Owing to the slight attendance, how¬ ever, he resigned the chair in 1798, upon his accession to the bench of the Supreme Court of New York, of which he became chief justice in 1804. In 1823, at the age of 60, having served in the previous year as a member of the convention to revise the State constitution, and having been chancellor of New York since 1814, he retired from the bench and was re¬ elected to his former chair at Columbia. The incalculably valuable service which he had ren¬ dered to the cause of American jurisprudence and especially to the administration, develop¬ ment and extension of equitable jurisdiction, he now supplemented by elaborating his learned and lucid lectures into those incomparable com¬ mentaries on American law in four volumes (1826-30), which for more than three-quarters of a century have remained for the lawyers of our country as solid and standard an authority of • reference as were the works of Coke and Blackstone to English practitioners. Attend¬ ance upon the chancellor's lectures appears,

however, to have been perfectly vountary with the student body, no regular law course being prescribed, no examinations on the subject being held and no degrees in law conferred. In point of fact, no department of law appears to have been regularly organized at Columbia until 1858; and it seems that prior thereto no law school existed in New York city.

Eldest of existing American law schools organized as such is the Harvard Law School, which was established in 1817. While it is true that as early as 1779 Isaac Royall, a Massachu¬ setts citizen, then resident in London, had be¬ queathed property to Harvard College for the establishment of a chair of law, the fund did not become available until 1815, and the duties of the incumbent, up to the time of the ap¬ pointment of Hon. Asahel Stearns as university professor of law in 1817, consisted merely in the delivery of 15 lectures annually to the senior class in the college. Professor Stearns re¬ mained 12 years at the head of the law school, and it may justly be said with every desire to render due credit to this distinguished and faithful instructor that they were years of small beginnings and of little advancement for

the institution. The Litchfield school enjoyed such a high repute that it easily attracted a far larger and more enthusiastic attendance, while even the Northampton school was a dangerous rival. In 1829, however, a new phase was placed upon the condition and prospects of the Harvard Law School by Hon. Nathan Dane's generous donation of $10,000 for the endowment of a new professorship of law, coupled with his request that Mr. Justice Story of the United States Supreme Court, Marshall's great co¬ adjutor and the only one of his associates who fairly divides with him the fame of the early administration of that mighty bench, be ap¬ pointed the first Dane professor.

Simultaneously, John Hooker Ashmun, then head preceptor of the Northampton school, was tendered the chair of the Royall professor¬ ship. The average of attendance at the Cam¬ bridge school had then sunk to fhat of a single student, but upon the acceptance of its head¬ ship by Judge Story a revival of interest was manifested and the close of his first year's administration saw in the neighborhood of 30 pupils enrolled. The Northampton school im¬ mediately ceased to exist and the Litchfield school was abandoned four years later. Pro¬ fessor Ashmun's death in 1833 was followed by the election, as Judge Story's colleague, of Simon Greenleaf, an advocate of eminence, the first official reporter of the decisions of the Supreme Judicial Court of the State of Maine, and the distinguished author of that treatise on the law of evidence, which at once became, as it has since remained, a standard of au¬ thority in all countries ruled by English law.

The Yale Law School is second in age only to that of Harvard, and, while ordinarily spoken of as established in 1824, practically dates from the appointment in 1826 of Hon. David Daggett, a judge of the Superior Court of Connecticut, to the professorship of law in the college — a chair which had been established, indeed, as early as 1801, under the presidency of Rev. Dr. Timothy Dwight, and had been previously ad¬ ministered by the Hon. Elizur Goodrich, but merely as a lectureship on the leading principles of legal science with no view to qualifying students for the bar. Professor Daggett, how¬ ever, had been, up to the time of his appoint¬ ment, associated with a leading advocate, Sam¬ uel J. Hitchcock, in the conduct of a private law school in New Haven, and, under his su¬ pervision, the Yale department of law speedily took shape as a practical law school.

In 1833, graduates of the Litchfield school established a law schoql at Cincinnati, and similar schools were founded at Louisville, Ky., in 1846 and at Lebanon, Tenn., in 1847. The number of American law schools prior to 1850 was thus extremely limited and the aggregate attendance upon their courses was correspond¬ ingly small.

Twenty years later, in 1870, the number of law schools had increased to 28, with an aggre¬ gate attendance of 1,653 students. In 1880 there were 48 schools, serving 3,134 students; in 1890, 54 schools with 4,518 attendants, and in 1901 the number of schools had reached 100, with more than 13,000 pupils enrolled. The report of the United States Commissioner of Educa¬ tion for 1910 gives statistics of attendance at 114 law schools of a total student body num¬ bering 19,567, of whom 205 were women. The

distribution of these schools among the various States was as follows : One each in Alabama, Arkansas, Connecticut, Idaho, Maine, New Jer¬ sey, North Dakota, Oklahoma, South Dakota, Texas, Utah, Washington and West Virginia; two each in Colorado, Florida, Iowa, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Oregon and Wisconsin ; three each in Georgia, Maryland, Massachusetts, Nebraska and Vir¬ ginia ; four each in California, Pennsylvania and North Carolina; five each in Kentucky and Tennessee ; six each in the District of Columbia, Indiana and Missouri ; seven in Ohio and nine each in Illinois and New York. The signifi¬ cance of this vast and rapid growth may per¬ haps be more readily grasped when one remem¬ bers that from 1875 to 1899 the number of students enrolled in professional schools in the

United States increased as follows : In theol¬ ogy, 58 per c£nt ; in medicine, 177 per cent ; in law, 343 per cent.

In 1910 there were 184 American schools of theology, with an attendance of 11,012 students, an increase of 3,000 students over the number of students in 1900, while the number of stu¬ dents in the 114 law schools rose from 12,516 in 1900 to 19,567 in 1910.

At 55 law schools the course essential io graduation covers three years ; at 38 a two- years' course leads to a bachelor's degree, while five institutions in the Southern States have only a one-year course. Under the influence of the section on legal education of the American Bar Association, a constant and gratifying ad¬ vance in the standard of instruction and in the lengthening of the course for the bachelor's de¬ gree in American law schools is to be noted. In 1890, only eight schools required three years' attendance for the bachelor's degree, while eight years later progress in this direction had been so great that no less an authority than Joseph H. Choate, in the annual address delivered be¬ fore the American Bar Association, did not hesitate to declare, ((The standard of legal edu¬ cation has never before been advanced to its present height. The young men who come annually from the law schools to recruit our ranks, are better equipped and qualified — far more so, than we ever were • — to enter upon the arduous and responsible duties that await them.®

The marked elevation in the requirements for admission to American schools of law is shown by the fact that while, prior to 1877, no entrance examinations were prescribed in any of them, and so late as 1890 there was but a single institution demanding a demonstration of precedent educational attainments equivalent to the requirements for college matriculation, nearly one-half of the recognized law schools of this country now deny admission to appli¬ cants except upon terms that would practically secure their entrance to the average college of liberal arts. The highest standard of admission is that prescribed by Harvard, which for some years past has refused to admit, as candidates for degrees of law, students not holding the degree of bachelor of arts, conferred by some college of recognized standing. In this position the Cambridge authorities have been followed, not without great hesitation and well-founded reluctance, by Columbia. The strongest objec¬ tion to such a requirement may be summed up in the statement that, there being no necessary

correlation between the courses of study pur¬ sued by various students in different institu¬ tions leading up to the academic degree, its possession is not strong evidence of any special equipment for the

pursuit of legal studies ; and that the object aimed at might be better and more directly attained by the establishment of entrance examinations at the various schools of law sufficiently comprehensive in scope and exhaustive in character to establish the appli¬ cant's fitness to enter intelligently upon the study of the principles of law. Ninety-seven schools, with an enrolment of 8,464 students, constituting the Association of American Law Schools, have united in the uniform requirement that each school belonging to the association shall maintain an entrance examination equiv¬ alent to that required for graduation from a high school.

It is a matter of singular interest that with the steadily advancing standard of entrance re¬ quirements, there has followed an almost equiv¬ alent decline in the importance of a diploma of graduation from a law school as a factor in securing admission to the bar. Formerly, in many jurisdictions, such a diploma was by statute an immediate passport to the practice of the profession, but with the stiffening of the educational requirements demanded of the law student there has most fortunately concurred a quickening of the conscience of the courts as to their duties and responsibilities in the prem¬ ises ; with the result that the sound judgment of lawyers and legal educators has been gradu¬ ally led to endorse the proposition that it is neither logical nor desirable for schools of law in no way subject to the supervision of the courts to possess the unrestricted power to create officers thereof. The influence of the American Bar Association and its junior organ¬ ization, the Association of American Law Schools, has for some years been steadily and wisely directed to securing the abolition of the exercise by law schools of this power, which should properly be exercisable only by the courts. While there can be no doubt of • the eventual establishment of this reform univer¬ sally, a law school diploma still admits to the bar in the States of Alabama, Georgia, Kansas, Louisiana, Michigan, Mississippi, Missouri, Pennsylvania, South Carolina, Tennessee, Texas, West Virginia and Wisconsin.

In many of the States this matter has now been wisely regulated by placing the matter of admission to the practice of law exclusively within the jurisdiction of State boards of law examiners, the members of such boards being usually appointed in rotation for fixed terms by the justices of the highest appellate courts of the respective States.

As the American school of law was prac¬ tically compelled to construct its own road to success, it is not unnatural that there should have arisen considerable divergence of opinion and of practice in the matter of methods of instruction. Roughly, it may be said that three

systems have prevailed ; a system of instruction by lectures and dictation ; a system of instruc¬ tion by the study of and recitation from pre¬ scribed textbooks of authority; and a system of instruction confined largely to the reading and expounding of selected cases of leading import¬ ance, indicated by the instructor, through which the student is encouraged to delve for a mas-

tery of the principles involved. The latter method, first generally introduced on a scientific basis by Prof. C. C. Langdell, Dane professor of law at Harvard, and since greatly elaborated bv his colleagues, Profs. James Barr Ames, Joseph H. Beale, Jr., and Samuel R. Williston, as well as by Prof. W. A. Keener, of Columbia, and Prof. Ernest Huffcut, of Cornell, may be justly considered the prevailing system in our law schools of to-day, although justice requires the statement that none of these methods is or ever has been exclusive of the others, but rather that the curriculum of every well- directed law school in the present, as in the past, has ever included a greater or less pro¬ portion of attention to each of these systems.

No review of the history of American law schools would be just or complete which failed to note the remarkable debt under which the practice and the administration of law in this country has been placed by the contributions to legal literature made by members of their vari¬ ous faculties in the form of standard textbooks, usually, if not universally, the outgrowth Gould on (Pleading > and Kent's Commen¬ taries on American Law) have already been instanced. Story's treatises on the ˆElements of Constitutional Law* and on (Equity Juris- prudence) ; Greenleaf's exhaustive summariza¬ tion of the law of evidence and Parsons' great work on the Caw of Contracts* constitute three monuments of this sort which alone would re¬ flect imperishable renown on the Harvard Law School could it point to no other ground of claim to its present distinction. And an inter¬ esting parallelism subsists between the facts that, as it was the donation to Oxford by Viner of the profits of his compendious abridgment of English law which furnished the foundation of the Vinerian professorship, the first and greatest fruit of which was the elaboration by Sir William Blackstone of his course of lec¬ tures into the imperishable Commentaries on the Law of England,* so it was the donation to Harvard by Dane of the profits of his later abridgment of law which directly stimulated the production of Joseph Story's masterly work on (Equity Jurisprudence. >

Other notable instances of legal authorship in point are the great work on Constitutional Limitations,* by Judge Cooley of the law school of the University of Michigan, the elaborate and finished analysis of private international law by Prof. Raleigh C. Mino-r of the University of Virginia, and the learned exposition of the Caw of Estoppel > by Melville M. Bigelow, of the Caw of Wills and Administration,') by James Schouler, and of the Caw of Wills/ by George Enos Gardner, of Boston University.

C. Vey Holman, LL.M., Lecturer on Mining Law, University of Maine.

LAW, Canon. See Canon Law for history previous to the new Code.

LAW, Canon, The New Code of. That

the Catholic Church, as a perfect society, en¬ joys the right of directing her members by positive laws in the attainment of her end, the sanctification and salvation of souls, no one will deny. Early Christians, strong in their belief and diligent in the observance of di¬

vine precepts, were guided chiefly by apostolic men and by the Sacred Scriptures. Increasing in number, spreading over the world and grow¬ ing less fervent in religious practices, Chris¬ tians were of necessity subjected more and more to positive regulations. Various laws to meet various conditions of time and place were enacted, for while the Church is immu¬ table in her doctrine, her discipline is neces¬ sarily subject to change. Indeed of the many ecclesiastical laws promulgated throughout the centuries, not a few had been abrogated by the supreme authority of the Church, some had become obsolete, while others, owing to changed conditions, were found to be difficult of execution or less useful and expedient for the common good. Because too of their number and the fact that they were not easily acces¬ sible, Pius X, soon after his eleotion as Pope, 4 Aug. 1903, realizing how helpful it would be for the stable restoration of ecclesiastical dis¬ cipline to put an end to these inconveniences resolved to arrange in a clear and orderly col¬ lection all the laws of the Church that had appeared adown the ages, abolishing those that had become obsolete, adapting others to present needs, and enacting new ones as neces¬ sity or expediency might suggest. The first steps were taken in March 1904, a commission, as it is called, of cardinals being put in charge of the project under the leadership of Cardinal Gasparri, while canonists of note from various countries were asked to aid by their counsel and labors. The work when nearing completion was submitted to the bishops of the world, whose suggestions had been sought in the beginning, as well as to the superiors of re¬ ligious orders, for a final

expression of opinion on the prepared canons. Meanwhile Pius X had been succeeded in the chair of Peter by Pope Benedict XV, to whom it fell to give to the world on Pentecost, 27 May 1917, the com¬ pleted code, over 13 years after the inception of the task. The prescriptions of the new code, however, did not become effective till the fol¬ lowing Pentecost, 19 May 1918. The bull of promulgation, which is styled, as is the custom, from the first words Providentissima Mater Ecclesia — Most Provident Mother Church, is addressed: To our venerable brethren and

beloved sons, the patriarchs, primates, arch¬ bishops, bishops and other ordinaries, and also to professors and students of Catholic uni¬ versities and seminaries. The code, as might be expected, is in Latin, the language of the Church. To translate it into another tongue or to reprint the original Latin text permission of the Holy See is required.

Introduction. — A lengthy preface to the code, written by Cardinal Gasparri, enters ex¬ tensively into the history of canon or ecclesi¬ astical law and its compilations, giving especially the particulars of the present codification. Then come the constitution providentissima and a decree (15 Sept. 1917) of Benedict XV, by which a commission of cardinals and counsellors is instituted to interpret the new code. This constitution moreover reminds the Roman con¬ gregations that their office is to enforce the law and forbids them to issue new regulations of general character, except the need be apparent. Such new legislation, if. contrary to the code, must have the approval of the Pope. The commission will see also that insertions or

additions to the code are put in the proper place and all discrepancies removed. Thus it is hoped to keep the code ever complete and consonant with actual circumstances or needs. These con¬ stitutions are followed by a profession of faith, in the usual form, which is obligatory at certain specified times for certain clerics, as for example in synods or on promotion to a parish. This formula then will be at hand when required.

Contents and Divisions. — The code, com¬ prising 2,414 canons, is divided into five books. The first book contains certain preliminaries and general notions concerning laws, customs, re¬ scripts, privileges, dispensations and the method of computing periods of time as applicable in canon law. The other books treat respectively of persons,

things, processes, crimes and punishments. We note the following: Future laws, emanating from the Holy See, will not bind, unless otherwise stated, until three months after their promulgation in the official period¬ ical, Acta Apostolicce Sedis. Laws, however, that are merely confirmatory of natural or positive divine law are of immediate obligation. Bishops or other legislators inferior to the Holy See are free to adopt any adequate method of making known their laws, and may insist on immediate observance of them. Laws are assumed to be territorial, not personal, unless there is evidence to the contrary. Dis¬ ciplinary laws, not found in the code, are abrogated; liturgical norms on the contrary remain in force. Merely prohibitive laws must be clearly distinguished from those that render an act null. Subjection to local laws, with certain exceptions, is determined by domicile, namely, by dwelling in a place with the inten¬ tion of remaining there. A domicile is usually parochial, though a person may possess a domicile in a diocese and not in a particular parish. One who is unbaptized, or, if baptized, has not attained the use of reason or is men¬ tally irresponsible, is not subject to ecclesiastical laws. Those who are under 21 years of age are minors, beyond that majors; an idea that has its bearing in the application of certain laws. Dioceses are divided territorially into parishes, while in countries where dioceses do not exist, but vicariates and prefectures apostolic, these divisions are styled missions or quais-parishes. The priest who is in charge of a parish is a pastor, while a rector administers a mission. Parishes are determined by territorial lines, not by languages or nationalities, though where these latter exist they are to remain.

By virtue of the constitution sapiente con- silio the Roman congregations, tribunals and offices were remodeled under Pius X. Some further changes are noted in the code. The Holy Office assumes the work of the congrega¬ tion of the index ; a separate congregation for Oriental affairs is established while the congre¬ gation of seminaries and universities appears with its new title. The privileges of cardinals are mentioned in detail. Bishops for the most part are selected directly by the Holy See, must be at least 30 years of age and possess the qualities demanded by the office. A diocesan bishop is obliged to pay an official or canonical visit to the various parishes and institutions of his territory at least every five years, while all are required at prescribed times, varying from 3 to 10 years according

to the distance from Rome, to report personally to the Holy See. The bishops of America are called on also for a written report every five years. A diocesan bishop is assisted by a vicar-general, who has jurisdiction throughout the diocese, and various others who constitute the episcopal curia or official family of the bishop. An official, distinct

from the vicar- general if the volume of work involved require it, has charge of juridical matters. Deans or vicars forane enjoy minor delegated powers, each within his own section of the diocese. A bishop has his advisory board. In some coun¬ tries the cathedral chapter fills this office, but in America the diocesan counsellors are priests, usually six in number, selected by the bishop for a term of three years from the clergy of the episcopal city or vicinity. All matters re¬ lating to them are determined in the code. Appointments to ecclesiastical offices should be in writing.

Pastors. — It is the mind of the Church that a pastor's tenure of office, as far as the good of religion will permit, should be per¬ manent. In the United States some are per¬ manent, others not. Bishops, however, may with the advice of the cathedral chapter or council, grant permanent pastors to all parishes. Parishes that may be erected in the future will have permanent pastors, unless the bishop in consultation with his advisory board decide otherwise. A concursus or competitive ex¬ amination, where formerly prescribed for pro¬ motion to a pastorate, still remains in force. A non-competitive examination is required for appointment in other cases. All pastors, even though they belong to the permanent class, may be removed, transferred or demoted for rea¬ sons assigned in law. Unbecoming conduct, physical or mental unfitness, the peculiar quali¬ ties of the pastor which the bishop wishes to employ elsewhere, and other causes are found among the legal reasons for removal. In all cases where the authorities proceed without the consent of the pastor in question certain formalities must be observed, and when a criminal charge is alleged as the reason for action, formal judicial proceedings are required.

Pastoral duties and rights remain prac¬ tically as they were in previous legislation, though our former rectors are now pastors with parochial rights, obligations and privileges by reason of their office. They may now grant absolution from sin in the sacrament of pen¬ ance under the usual conditions, to the mem¬ bers of their parish, not merely within the limits of their diocese, but anywhere through¬ out the world. They have the obligation, bind¬ ing in strict justice, of applying the Holy Sacrifice of the Mass for their parishioners on all Sundays, and some other specified days during the year. The administration of the sacraments of baptism and extreme unction, and assisting at the marriage and burial of parishioners, are parochial rights, reserved to pastors ordinarily. The chief duties incum¬ bent on pastors are to reside in the parish, preach, instruct, visit the sick and to administer in every way to the spiritual welfare of their people. The administration of the temporal goods of the parish is a most important duty in some countries. The number, appointment and removal of

associate pastors or assistant priests belongs to the bishop of the diocese.

is embraced in the reception of tonsure. Every cleric must be attached to a diocese or to a religious community. A bishop may promote to the priesthood or other orders his own sub¬ jects only. In this respect one becomes sub¬ ject to a bishop either by reason of his birth and domicile in the diocese, or by acquiring a domicile in the diocese. For legitimate reasons a cleric, if he desire, may be transferred from one diocese to another with the approval of both bishops. The transfer, with a few ex¬ ceptions, must be made in writing.

A novitiate or period of probation of at least one year is necessary for admission to the religious state. Then follow vows of poverty, chastity and obedience for three years, after which perpetual vows may be made, if agree¬ able to superiors. Some religious are likewise clerics. The profession of perpetual vows in a religious society releases a cleric from his diocese. Should he later for any reason what¬ ever be dispensed from his vows or become secularized, he must find a bishop who is will¬ ing to accept him. A cleric who has not made perpetual vows in religion reverts, on leaving his community, to the diocese to which he was canonically attached.

The Sacraments. — As far as possible the sacraments are to be conferred in a church, not in private houses. The ordinary minister of the sacraments of confirmation and orders is a bishop ; of the other sacraments, a priest. As baptism is necessary for salvation, infants receive this sacrament. At least one sponsor, if possible, is required in baptism, while more than two, one of each sex, are not allowed. A sponsor, as a rule, should have reached the age of 14. To act in this capacity clerics in major orders require their bishop's permission, while religious are excluded except in case of necessity, and then too permission of the proper superior is necessary. Only the spiritual relationship which is contracted in baptism con¬ stitutes at present a nullifying matrimonial im¬ pediment, and merely between the one baptized and the sponsors ; a modification of previous discipline. Confirmation is not to be ad¬ ministered ordinarily to children under seven years of age. A sponsor is required and one only is permitted. The same sponsor acts for one or at most for two, though the prelate confirming may for sufficient reason determine otherwise. As a rule the same sponsor should not act for the same person both in baptism and confirmation.

Not every priest, merely by reason of his ordination, is qualified to hear sacramental con¬ fessions. To pronounce sentence in the tribunal of penance he needs jurisdiction. This a bishop grants for his own diocese. A special authorization is required to hear the confes¬ sions of religious or novices in their own houses.

Any priest not inhibited may offer the Holy Sacrifice of the Mass once each day, twice in case of necessity on Sundays or other days on which the faithful are obliged to hear Mass, three times on Christmas and All Souls Day (2 Nov- . ember). Mass and the distribution of Holy Communion are allowed from one hour before the aurora till one hour after midday. An exception to this regulation permits. Mass at midnight on Christmas eve with certain restric¬

tions. No matter how late the hour the cele¬ brant must be fasting from midnight. On Good Friday the Mass of the presanctified, without consecration, is offered and the Blessed Eucharist is not distributed to the people.. The sick at times, under well-defined conditions, are permitted to receive Holy Com¬ munion when not fasting. All who have at¬ tained the use of reason are obliged to receive Holy Communion at Easter time. In some countries only two weeks, from the Sunday before till the Sunday after Easter, are allowed for fulfilling this precept. Bishops may, how¬ ever, extend the period from the fourth Sun¬ day of Lent — and in the United States from the

first Sunday of Lent — to Trinity Sunday. Frequent, even daily, communion is recom¬ mended.

In Extreme Unction, t*he anointing of the feet may be omitted for any reasonable cause. The anointing of one sense, preferably of the forehead, with a briefer verbal form too than usual, will suffice, when death appears im¬ minent. The usual prayers and unctions are supplied later, should death be delayed. This sacrament is administered conditionally, when it is doubtful whether the person is actually sick unto death, or is still alive, or has at¬ tained the use of reason.

At least the theological course of candi¬ dates for the priesthood should be spent in a seminary. The age prescribed for the various orders remains as before, except that tonsure may not be given before the candidate has commenced the study of theology, subdeacon- ship not earlier than toward the end of the third year of theology, deaconship at the be¬ ginning and priesthood after the middle of the fourth. The space that should intervene be¬ tween the orders is practically left to the judg¬ ment of the bishop. Nevertheless the reception of tonsure and a minor order, or all four minor orders, or the last minor order and subdeacon- ship, or two major orders on the same day is forbidden. While the Saturdays of the ember weeks, the Saturday before Passion Sunday and the Saturday of Holy Week are the usual ordination days, tonsure may be given on any day, minor orders on Sundays and feast days that are doubles (a liturgical term), major orders on Sundays and holydays. All privi¬ leges contrary to these prescriptions have been withdrawn. Irregularities, which are certain canonical hindrances either to the reception or to the exercise of orders, have undergone some modifications. The law is precise in demand¬ ing testimonial letters, examinations and spiritual exercises in preparation for orders. Announcement too is made in one's parish that he is about to receive a major order.

Espousals, to have any effect, must be in writing and properly witnessed. The marriage of a Catholic is not recognized unless it take place in the presence of a pastor or ordinary (bishop, vicar-general or administrator) within his own territory or before a priest duly dele¬ gated by one of these, and two witnesses. Some exceptions are made to the general rule when one of the contracting parties is in dan¬ ger of death, and in other cases when it is foreseen that a duly authorized nriest cannot be approached within a month. The age of law¬ ful consent for marriage is 16 for the male, 14 for the female. A Catholic contracts mar-

riage invalidly with an unbaptized person, illicitly with a baptized non-Catholic, without proper dispensation. Until the code became effective a marriage between a baptized and un¬ baptized person was always null. At present disparity of worship, as this impediment is called, nullifies a marriage only when one of the parties has been baptized in the Catholic Church or has been received into the Church. Affinity, which arises from a valid matrimonial contract, constitutes a diriment impediment, indefinitely in the direct line, inclusive of the second degree in the indirect. Public decency or fitness, an impediment which has its origin in an invalid marriage or in public or notorious concubinage, does not extend beyond the sec¬ ond degree and then in the direct line only. The impediment of consanguinity, which formerly embraced the fourth degree in the collateral line, now ceases at the third; thus second cousins are within the prohibited de¬ gree : in the direct line marriage is never tolerated. The reception of subdeaconship, as well as a solemn religious profession, begets a diriment impediment. The forcible retention, as well as abduction, of a woman with a view to marriage, renders her incapable of a lawful matrimonial consent, while still in duress. Fear or force may be sufficient to invalidate matrimonial consent. The Church may for sufficient reasons dispense in matrimonial im¬ pediments which she herself originated, not in those which are founded on the natural or divine law.

Holydays and Fasting. — Catholics on

holydays are bound to abstain from servile work and to assist at Mass. The feasts of Christmas, Circumcision, Epiphany, Ascension, Corpus Christi, Immaculate Conception, As¬ sumption, Saint Joseph, Saints Peter and Paul and All Saints are holydays, except where, with permission of the Holy See, they have been abrogated. Thus in the United States the feasts of Epiphany, Corpus Christi, Saint. Joseph and Saints Peter and Paul are not ob¬ served as holydays.

The law of abstinence forbids the eating of flesh meat, while the law of fasting allows only one full meal a day with a small amount morning and evening. The prohibition of par¬ taking of meat and fish at the same meal on certain days no longer obtains. The law both of abstinence and fasting ceases on Sundays or holydays, except on holydays during Lent. Abstinence alone is obligatory on all Fridays. The law of abstinence together with fasting is binding on Ash-

Wednesday, the Fridays and Saturdays of Lent, Ember Days, and on the vigils of Pentecost, Assumption, All Saints and Christmas. On all other days of Lent fasting alone is incumbent on Catholics. Both laws cease at noon on Holy Saturday. All who have reached the age of seven years are subject to the laws of abstinence, while the regulations concerning fasting affect those who are between 21 and 60, unless they are excused through infirmity, hard labor or other legiti¬ mate reason.

Records and Examinations. — The Church is solicitous concerning her records of bap¬ tisms, confirmations, marriages, orders, funerals and interments, financial matters and admin¬ istration of property, spiritual status of pa¬

rishioners, etc. Many minute details in regard to all these matters are now prescribed.

An examination is the usual method pre¬ scribed for determining one's fitness for re¬ ceiving orders, preaching, hearing sacramental confessions, accepting a pastorate. An annual examination for at least three years after pro¬ motion to the priesthood is prescribed for the diocesan clergy, as well as conferences, essays, papers and the like at stated times on theolog¬ ical subjects.

Delicts, Processes and Punishments. —

Crimes against faith, religion, ecclesiastical au¬ thority, violations of the rights of others, maladministration of ecclesiastical goods, abuse of authority, neglect of one's duties, these and similar matters have their place in the code, with the process, judicial or extrajudicial, as the case may require, to be observed in estab¬ lishing guilt and inflicting punishment. Pre¬ scriptions regarding the personnel of courts and other matters are many and varied. The penalty to be inflicted in punishment of delicts or violation of law is often stated specifically in the code, sometimes it is left, within certain restrictions, to the presiding judge. Ecclesias¬ tical penalties for the most part are spiritual, the most severe of all being excommunication, suspension and interdict, which are included under the general term of censure. Admoni¬ tions, corrections, penances, loss of emoluments, pecuniary fines, denial of promotion are among the less rigorous canonical punishments. Proc¬ esses that are not of a criminal character are likewise noted in the code, such as civil suits, processes to determine the invalidity of a matrimonial contract, of orders received, or of a religious profession, as well as various others that are extrajudicial.

Conclusion. — Some constitutions that are not new, and which relate to the Holy See while vacant, the regulations governing the conclave in which the new Pope is elected1 and other matters during the interregnum, are given in the code. A most satisfactory alphabetical index of its contents completes the volume.

Very Rev. Andrew B. Meehan, Saint Bernard's Seminary, Rochester, N. Y.

LAW, Civil. See Civil Law.

LAW, Commercial. See Commercial Law.

LAW, Common. See Common Law.

LAW, Constitutional, that part of public law which regulates the political organization of a State and so named because usually em¬ bodied in a written instrument called a con¬ stitution. It is sometimes spoken of as the organic or fundamental law of the State be¬ cause it is the basis of all other municipal law. It differs from international law in being wholly municipal in character and from admin¬ istrative law in that it regulates only in a gen¬ eral way the organization of the government, leaving the details to be regulated by the rules of administrative law. It differs from ordinary statute law both as to its source and method of enactment and as to its content. While statute law is enacted, modified! and repealed by the legislature, constitutional law is usually enacted by a constituent convention especially chosen for the purpose while its validity is, in America at least, usually made to depend upon the ap-

proval of the electorate, to whom it is sub¬ mitted by way of referendum. Hence it is commonly said that constitutional law is enacted by the people, whereas statute law is the work of their representatives. This distinction as to method of enactment, however, is not universal. In some States the same bodies which enact ordinary statute law also ordain and alter the bodv of constitutional law.

This is true in Great Britain, where the Parliament may alter the constitution in the same manner in which it may enact or repeal an ordinary statute. Likewise in France and in Germany the Parliaments may make amend¬ ments to the constitution subject only to the limitation that the French Chambers are re¬ quired to observe certain

formalities which they do not observe in passing ordinary statutes, and in Germany an extraordinary majority is required. In Switzerland the peo¬ ple participate directly in the enactment of their constitutional law, not only through the refer¬ endum (q.v.) but also through the so-called initiative by which they are empowered to draw up proposed constitutional amendments and submit them directly to the electorate for ap¬ proval. For the different types of constitutions see the article Constitution.

The distinction between the content of con¬ stitutional law and that of ordinary statutory legislation is largely one of degree and in the States of the American Union this distinction is fast disappearing. Among the proper sub¬ jects of constitutional law are (1) the struc¬ ture and powers of the government including a distribution of its legislative, executive and judicial functions, among separate and distinct organs; (2) a definition of the class empowered to participate in the choice of elective officers and the method by which that choice is to be exercised; (3) the determination of the qualifi¬ cations, duties and privileges of those em¬ powered to hold government offices and man¬ dates; (4) the creation of a 'phere of indi¬ vidual liberty — usually embodied in a bill of rights — upon which the government is for¬ bidden to encroach, and (5) provision for a legal and orderly method of making changes in the constitution so as to avoid the risks and dangers of revolution. In addition to these subjects which may be denominated the essen¬ tials of a constitution scientifically drawn, it is common to incorporate therein various pro¬ visions relating to education, patents, copy¬ rights, the army and the navy, the militia, cor¬ porations, public debts, rules of judicial pro¬ cedure, regulations concerning official salaries, taxation and administration, etc., which accord¬ ing to strictly juristic tests are more properly subjects for statutory regulation. The effect of this practice has been to introduce into the domain of constitutional law a considerable amount of private law, thus derogating from the principle that the constitution should be ex¬ clusively an instrument of public law. On the other hand the usual difficulty of amending the constitution so as to adapt it to new conditions and exigencies has made it necessary to deal with certain subjects by statutory legislation, although they are properly matters that should come within the province of constitutional law. Notable instances are statutes for the govern¬ ment of dependencies. Thus the ordinance of the old Confederate Congress of the United

States, passed in 1787, for the government of the Northwest Territory, the various statutes for the organization of the other Territories of the United States, the acts for the government of the Philippine Islands and Porto Rico were of the nature of constitutions of government for

the dependencies to which they applied They were mainly instruments of constitutional public law, although cast in the form of statutes.

A final distinction between constitutional law and statute law is the element of para- mountcy which belongs to the former. In all countries where constitutional law is a separate and distinct body of jurisprudence its prescrip¬ tions take precedence over all statutory enact¬ ments in case of a conflict between the two. In such cases the conflicting statute is said to be ˆunconstitutional® and is treated as invalid. The power of determining the fact of irrecon¬ cilability has been assumed by the judicial branch of the government in the United States and has been so long acquiesced in that the power will probably never be questioned, al¬ though it is not expressly conferred by the Constitution. In none of the continental European countries have the judiciaries as¬ sumed such power, and in England the ((consti- tutionality® of an act of Parliament can scarcely arise, since that body is legally omnip¬ otent. The rules for the construction of the prescriptions of constitutional law are essen¬ tially the same as those for the construction of statutes except that constitutions are more strictly interpreted and constitutional com¬ mands are more often construed as mandatory where similar provisions in statutes would be treated as directory only.

In the United States, and in fact in all coun¬ tries having the federal form of government, there are two bodies of constitutional law, namely, that which is national in scope and that which is local, the former being paramount to the latter in case of conflict. In the United States that part which is federal or na¬ tional consists of the Constitution <(estab- lished and ordained by the people® in 1788, including the subsequent amendments thereto, together with the interpretations of the Federal judiciary and the usages and customs which have grown up in connection with the ad¬ ministration of the government. Among the important principles, which have been developed as a result of judicial interpretation may be mentioned the right of the government to ac¬ quire and administer foreign territory, the immunity of the national government, its in¬ strumentalities and agencies from taxation by the States, the right of the government to issue legal tender paper currency both in time of war and in time of peace, the exclusive power of Congress over foreign and interstate com¬ merce, the exclusive power of the States over all matters relating to the suffrage subject to the limitations of the 14th and 1 5th amend¬ ments, the right of the national government to undertake internal improvements, the right of the courts to declare laws unconstitutional, the right of Congress to . abrogate a treaty, etc. Among the usages which have become for all practical purposes a part

of Federal constitu¬ tional law may be mentioned : the ineligibility of the President for a third term, the obliga¬ tion of presidential electors to vote for the

party nominees, the power of the President to remove his appointees without the consent of the Senate, the method of legislation by the committee system, the requirement that repre¬ sentatives in Congress shall reside in the dis¬ tricts from which they are chosen, etc.

Likewise the constitutional law of the in¬ dividual States is embodied in written constitu¬ tions, in most cases prepared by constituent as¬ semblies and approved by the electorate upon referendum, together with the amendments thereto and the interpretations of the State judiciaries. Several of the early State consti¬ tutions were prepared and put into effect by the legislatures or by irregular revolutionary as¬ semblies without popular ratification.

With one exception (Delaware), no altera¬ tion can be made in any of the existing consti¬ tutions without the approval of the people at the polls, and but three of the constitutions now in force were put into effect without rati¬ fication by the electorate. The earlier consti¬ tutions were brief instruments containing but little more than the law for the organization of the government and the necessary safe¬ guards for the protection of individual liberty, but the later ones are bulky documents con¬ taining a vast amount of private law relating to matters which are properly subjects of statutory regulation. This increasing tendency to amplification has resulted from the popular distrust of the State legislatures and the conse¬ quent desire to place the regulation of many matters beyond the power of the legislature to alter or repeal it. The effect has been to destroy in a large degree the scientific distinc¬ tion between constitutional law and statutory law, to retard the constitutional development of the commonwealth, and to add confusion to the task of the student and the practical con¬ stitutional lawyer. .

In Great Britain the existing body of con¬ stitutional law differs in several respects from that of the United States. In the first place it is not so much the result of revolution nor is it so nearly the finished product of a constit¬ uent assembly. It is more the product of

evolution and growth and is more largely un¬ written than that of the United States. More¬ over, what is written is scattered through dif¬ ferent acts instead of being contained in a single compact instrument. Finally, the Parlia¬ ment being the chief source of constitutional as well as of statutory law there are no juristic tests upon which a distinction may be founded — a fact which has led Mr. A. V. Dicey, one of the most learned English commentators, to declare that the constitutional law of England is a “sort of maze in which the wanderer is perplexed bv unreality.® He questions whether English constitutional law is really law, and expresses the opinion that it is only a cross between history and custom, undeserving of the name of law. As the term is used in Eng¬ land, he says, it includes all rules which define the members of the sovereign power and regu¬ late their relations to each other, which de¬ termine the mode in which the sovereign power is exercised, which prescribe the order of suc¬ cession to the throne, which regulate the prerogatives of the chief magistrate, determine the form of the legislature, define the territory of the state, etc. Such of these rules as are enforced by the courts he calls collectively the

<(law of the constitution.® The others which consist of understandings, habits or practices, and which are not enforced by the courts, he calls the “conventions of the constitution,® or constitutional morality. To the former class belong the rule as to the irresponsibility of the king and the responsibility of his ministers ; to the latter belong the rules relating to the executive veto, the initiation of revenue bills and the resignation of ministers. Monsieur Boutmy, a learned French commentator on the British Constitution, points out that the prin¬ cipal sources of the constitutional law of Eng¬ land are: (1) Treaties or quasi-treaties, such as the Acts of Union; (2) the common law; (3) solemn agreements, for example, the Bill of Rights; (4) statutes. Of the other European countries the constitutional law (Staatsrecht) of Germany is most nearly like that of the United States as to its source, content and dual character. The constitutional law of the French Republic may be dismissed within a sentence. It is embodied in a brief instrument of a few hundred words, contains a bare outline of the organization of the government, does not con¬ tain a solitary provision in behalf of individual liberty, and any part or the whole may be altered by the legislature at will.

Bibliography. — Anson, Paw and Custom of the Constitution ; Burgess, (Political Science and Constitutional Law) ; Boutmy, (Studies in Constitutional Law} ; Cooley, Prin¬ ciples of Constitutional Law) ; Dicey, (The Law of the Constitution } ; Story, Com¬ mentaries on the Constitution ; Lebon, Pas Staatsrecht der franzosischen Republic> ;

Laband, Pas Staatsrecht des deutschen Reiches > ; Willoughby, (On the Constitution. >

James Wilford Garner, Professor of Political Science, University of Illinois.

LAW, Criminal. See Criminal Law.

LAW, Customary. See Customary Law.

LAW, International. See International Law.

LAW, Maritime. See Maritime Law.

LAW, Military, a term, which, in its more restricted sense, describes the legal system that regulates the organization and government of the military establishment of a state and the discipline of its armed forces. It applies to the conduct of civilians in a very limited num¬ ber of cases. Even military persons are, ordinarily and in time of peace, amenable to military law for military offenses only — for instance, desertion, mutiny, insubordination, neglect of duty, unbecoming conduct, frauds upon the government, etc. Though officers and men may be further disciplined in ac¬ cordance with military law (by degradation, dismissal from service and'other like penalties) for infractions of the law of the land, they are answerable in time of peace for such infrac¬ tions, in the first instance, to the civil authori¬ ties and triable in the ordinary courts of law. An interesting controversy on this subject arose while the Pershing expedition was in Mexico on its hunt for the bandit Villa. Several men were accused of violations of the local law, and the question was whether they should be delivered to the civil authorities for trial in the Mexican courts, or whether they

should be judged by their own proper military tribunals. The United States were not at war with the Mexican government and, out of re¬ spect for Mexican punctilio, the authorities at Washington had disavowed any interpretation of its- intervention as purposing an occupa¬ tion. The conditions under which military penalties are usually applied to civil offenses, therefore, did not exist. It was finally de¬ cided that when an armed force enters foreign territory to carry out orders of its own sovereign superior, it cannot be assumed to submit itself to the civil jurisdiction of the country thus entered; that a condition simulat¬ ing war exists and that martial law prevails in the

zone of operations and so far as the mem¬ bers of the expedition are concerned. The obscurities on this point have since been re¬ moved by the amended Articles of War, adopted by Congress in 1916.

The greatest part of the military law of the United States is statutory and its most important provisions are contained in the Articles of War. These statutes, like other enactments of Congress, are subject to interpre¬ tation by the higher civil courts, and judicial decisions interpreting the law in cases as they arise are of equal authority with the statutes themselves. Among other forms of written military law may be mentioned the decisions of the President and Secretary of War; the opinions of the Attorney-General and Judge Advocate-General ; the Army Regulations and the General Orders of the War Department. The latter include the famous ((General Order No. 100 (of 1863) for the Conduct of Ameri¬ can Armies in the Field. ® There is also a body of well-established usages, known among military men as the (

and the common law of war (which is inter¬ national), provide penalties for wrongs done to the inhabitants of occupied territory. For in¬ stance, it is declared in the Articles of War that, an officer or soldier who does violence to a person bringing provisions to a camp in foreign parts may, and one who forces a safe¬ guard shall, suffer death.

With respect to civilians the ordinary civil and criminal laws are not, ipso-facto, suspended when a nation is at war, though in a zone of actual operations military rule may be estab¬ lished and martial law enforced. But in hostile territory occupied by an invading army the functions of civil government cease, or continue only with the sanction and, if deemed necessary, the participation of the occupier. The latter may, and will, continue in force the territorial law, to be administered as between the civilian population and, as far as prac¬ ticable, by the local magistracy, when to do so is not in conflict with provisions for the security, maintenance and efficiency of the occupying army or the success of its operations. But the government of occupied territory is of neces¬ sity military and any violation of the law of war by a civilian comes under the jurisdiction of the military tribunals of the occupier. Re¬ lieving the enemy with money, food or am¬ munition; harboring or protecting an enemy; aiding war prisoners to escape, or destroying railroads, bridges, telegraphs, etc., are war crimes. Any secret or unauthorized communi¬ cation with the enemy is considered treasonable by the law of war. Foreign residents in oc¬ cupied territory, or foreign visitors in the same, can claim no immunity from this law. They may communicate with foreign parts so

far as the military commander permits and no further. A war crime is always severely punished. The penalty for war treason is death, when the offense consists in the betrayal to the enemy of anything concerning the condition, safety, operations or plans of the troops holding or occupying the place or district. The law of war, like the criminal law, takes no account of sex, concerning the spy, the war traitor or the war rebel. (General Order No. 100, Art. 102). Most of the offenses indicated above as crimes under the common law of war are also defined as crimes in the statutory law of the United States. They are punishable in accord¬ ance with the latter law. whether or not com¬ mitted within zones of operation or in hostile occupied territory. Martial law at home is a mere euphemism for military government as a domestic fact. It is an extension of military power over persons and things not ordinarily subject to it, and such power may be exercised in time of war, insurrection or rebellion in parts of the country retaining allegiance. Whenever feasible, martial law is carried out in cases of individual offenders by military tribunals. (General Order No. 100, Art. 12).

Courts-martial are tribunals created by the order of a proper convening authority and are empowered to try accusations, reach findings of guilt or innocence and to impose appro¬ priate sentences. Their sentences, however, have no legal validity of themselves, being in the nature of recommendations merely until they have received the approval of a military commander, designated by law for this purpose, who is called the reviewing authority. Only

with such approval or confirmation do the sentences of these tribunals become operative and acquire the same sanction as the sentences of civil courts having criminal jurisdiction. Courts-martial diiler trom civil tribunals not only m the nature and extent of their jurisdic¬ tion but also in the manner of their creation. Civil courts are created by statutes which define their composition and endow them with appropriate powers, and which make them permanent institutions of the State. Courts- martial, on the other hand, though authorized by statute, are created in every instance by military orders issued by the commander-in chief or other officers empowered by the Articles of War to call them into being. When the case, or cases, referred to a court-martial for trial have been disposed of, the tribunal is dissolved by the authority that created it and ceases to exist.

Courts-martial may be composed only of commissioned officers and are of three grades — general courts-martial, special and summary courts-martial. Special and summary courts- martial are tribunals of limited powers, ap¬ pointed by the commandants of garrisons, forts, camps or other places where troops are on duty, for the enforcement of discipline among the rank and file of their commands. They have no jurisdiction over commissioned officers nor over the more serious military offenses. Special or summary courts-martial can impose no penalties more severe than imprisonment and loss of pay for six or three months, re¬ spectively. Non-commissioned officers cannot be tried by a summary court, if they object, without authority of a superior officer who would be competent in law to bring them to trial before a general court. Neither may a summary court try a soldier holding the privileges of a certificate of eligibility to pro¬ motion to commissioned rank. Special courts- martial are composed of three officers of the regiment, corps or other detachment, or of the camp or garrison, for which they are ap¬ pointed. A summary court for a detachment or post in which there is but one commissioned officer may consist of that officer alone; but its judgments, in that event, cannot be carried out without the special approval of a superior au¬ thority if they involve penalties greater than one* month's imprisonment and forfeiture of pay. As its name implies, the procedure of this court is summary. The officer constituting the court is not sworn, but performs his duty under sanction of his oath of office. When the accused party in arrainged, if his plea be guilty, he is given an opportunity to make a statement and to introduce testimony in respect to char¬ acter. If the plea be not guilty, the trial pro¬ ceeds in the usual manner, but the evidence is not recorded. The commanding officers who are empowered by law to approve the sentences of inferior courts-martial have power, also, to remit or mitigate the same.

General courts-martial may be appointed by the President, the commanding officer of any territorial division or military department, the commanding officer of an army, a field army, an army corps, a division or a separate brigade. Also, whenever necessary, and when empowered by the President, by the commanding officer of any district or of any force or body of Jroops. When any commander is the accuser

or prosecutor the court shall be appointed by a superior competent authority. No officer shall be eligible to sit as a member of such court when he is the accuser or a witness for the prosecution. General courts-martial have the most extensive jurisdiction of all military tribunals, both in respect to persons and cases. They are empowered

to try any military per¬ son, whatever his rank, for any act made pun¬ ishable by the Articles of War; also any other person, civilian or military, who, by the statutes of the United States or the common law of war, is subject to trial by a military tribunal. General courts-martial have the power to im¬ pose the death penalty, which special and summary courts have not. General courts- martial may consist of any number of officers from 5 to 13. They shall consist of the larger number when that many officers can be convened without manifest injury to the serv¬ ice. But the judicial functions of general courts-martial may be exercised only by prop¬ erly constituted tribunals of at least five mem¬ bers. A less number is without power to enter upon the trial of a case, to proceed with a trial already begun or to perform any act of a judicial character. The number of officers who shall compose a particular court is determined in conformity with the statute by the conven¬ ing authority, and his conclusion in that re¬ gard is final. No officer or soldier put in arrest shall be continued in confinement more than eight days or until such time as a court-martial can be assembled. The procedure of court s-rmartial is substantially the same as that of civil courts having criminal jurisdiction. The accused may challenge any member of the court for cause, but peremptory challenges are not allowed. The court and judge-advocate are sworn and witnesses are put to their oath. The allegations against the accused are embodied in charges and specifications which correspond with the indictment and counts in ordinary criminal actions. When arraigned, the ac¬ cused may plead to the jurisdiction, in bar of the trial, or in abatement of the action. When these pleas are exhausted, or if none of them is resorted to and a plea to the general issue is made, the case goes to trial on its merits. The rules of evidence are those which regulate the admission of testimony in criminal cases in the courts of the Unite I States. See Habeas Corpus ; High Treason ; Military Courts Martial; and consult Regulations of the Army of the United States) (Washington, Government Printing Office, 1916, containing the revised Articles of War) ; Rules of Land Warfare) (issued by the War Department — Office of the Chief of Staff, Washington 1914).

Stephen Pfeil.

LAW, Moral. See Moses.

LAW, Municipal. See Government; Mu¬ nicipal Government.

LAW, Natural. Many laws have been

found necessary to regulate the conduct of man in his various

relations to society which are more or less arbitrary according to the re¬ quirements of localized conditions, but underly¬ ing them all are the laws of nature.

If a man kill an animal and eats of its flesh he has no reason to conceal the act ; he goes his way with a full stomach and a clear con¬ science, and no one charges him with the com-

mission of crime. He has simply conformed to the law of nature and answered the instinct of self-preservation. But if a man kill another man, his whole deportment, and even the ex¬ pression of his features, indicate the conscious¬ ness of guilt and fear. Natural law might be said to be the law dictated by conscience, not law deduced from man's education and experi¬ ence in the world — law regulating his own general rights and duties in relation to the moral government of God, or Nature, and his own moral capacity and accountability.

So natural law covers a man's duty to God, or Nature — the duties of man toward himself, such as self-preservation, temperance, etc.; the duties of man toward other men or duties which arise from his relations to others near or dear to him ; and finally the duties of man, generally and politically, to universal society, especially to the community in which he lives.

At different periods of the world's history men have had various conceptions of justice. Self-preservation was the basis of law among the Sophists of Greece and the Epicureans; the Stoics believed that natural law was founded upon reason and used the term ((rational law-® Aristotle conceived natural justice to be partly legal (made by man) and partly natural (dic¬ tated by God).

Natural law, or jus naturale , as defined by Roman philosophers and jurists, is that law which is naturally discerned by right reason, as opposed to the law found necessary and made by man for the safe conduct of the state under localized conditions or by agreement for the preservation of international rights. Later, however, they distinguished jus naturale from jus gentium, the former being known by Ulpian's definition, <(Natural law is that which nature has taught all living things,® and the latter in¬ cluding the laws of expressed or implied agree¬ ment between men, or humanistic laws. Aris¬ totle interpreted natural law simply as the law of nations; the Stoic

conception was that natural law makes all men free, but that the law of nations permits slavery. The Epicureans thought that commercial trade or profit-making came under natural law. In the administration of Roman justice, natural law was often re¬ ferred to in justification of an act of judgment, but the validity of a Roman law was never questioned because opposed to natural law.

During the Middle Ages natural law seems to have been considered mostly in its humanistic aspect, that is, in its acquired or necessary application to particular conditions. Owing to the dominant religious trend of the period, natural law came to be identified with the law of God. And in the development of English and Continental law there seems to exist a stronger inclination to consult the flexible laws of human reason rather than the immutable rules of natural law.

During the 1 7th and 18th centuries the the¬ ories and doctrines of natural law formed an important part of the discussions m relation to international law, general jurisprudence, politics and political economy. This was par¬ ticularly true in relation to the rehabilitation of the laws relating to liberty, personal rights, property-holding, etc. But in the end utili¬ tarianism played a more important part in the period of legal reconstruction and reform.

When jurisdiction passed from ecclesiastical

authorities to the people at large, the popular theory that conscience is the true interpreter of law (consult the writings of Marsiglio of Padua, c. 1270-c. 1343) developed a strongly anarchistic trend, in that it made each man an arbiter of right and wrong, from whom no appeal could be taken to a higher authority. This view, of course, could not be carried to its logical extreme in practice. However, in England the populace gained the privilege of participating in the constitution of government mainly through the forced recognition of the natural-rights theories which they had long asserted against the Crown. The natural rights to which claim was chiefly made in the period of the enlightenment were those to life, liberty, the pursuit of happiness and property. As will be seen, the American Declaration of Inde¬ pendence is an expression of the natural law theory. These same views were previously- expressed in the writings of Locke and Rous¬ seau (qq.v.), and played an important part in the French Revolution.

The theory of natural law has ever had its adherents and its enemies. One reaction against it was notably set forth by Hobbes (q.v.). It can be variously construed, according to the philosophical, reasoning of the definer. Some one reasons that polygamy is against natural law,

another claims that marriage should never exist at all ; this one claims that it is natural for man to worship a Supreme Being, that one says that all religion is superstition and human weakness, and is not a natural desire. Unless, indeed, we assume that fundamentally all men's consciences are the 'same, the interpretation of natural law is dependent upon the moral sensi¬ bilities of the individual. However, owing to the great measure of uniformity which actually exists in human nature, there is a certain high¬ est common factor of the many diverse con¬ sciences of mankind, and this common factor is recognized in the formulation of all legal issues. This common element does not owe its exist¬ ence to anything a priori in the nature of mor¬ ality, but to the de facto homogeneity of the human race. It can be seen that a community less in extent than the human race will possess more homogeneity, and accordingly it will pos¬ sess a natural law more developed in details. (See Law; Civil Law; International Law). Consult Abbot, E. B., (Justice and the Modern Law) (New York 1913) ; Ahrens,

LAW, Parliamentary. See Parliament¬ ary Law.

LAW, Patent. See Patents, the Laws of,

LAW, Physical. See Physics.

LAW, Public. See Public Law.

LAW OF FAMILY, The. See Family Law.

LAW OF HUSBAND AND WIFE, The.

See Hltsrand and Wife.

LAW OF MARRIAGE. See Marriage, Law of.

LAW MERCHANT, The. The law mer¬ chant was a system of law which grew up in Europe during the Middle Ages for the regula¬ tion of the dealings of mariners and merchants in all the commercial countries of the world. It comprised much of what is found in the modern codes of maritime and commercial law.

Four features of the law merchant may be noted : First, it was customary law, unwritten in form, and not emanating from any

legisla¬ tive body. It developed to meet the needs and usages of commerce. Second, its procedure and operation were summary in character. The justice dispensed was prompt, speedy and sure. Thus it was designed to meet the needs of the merchant class who wanted their disputes set¬ tled quickly. Third, it was permeated by the principles of equity, justice and good faith. It was eminently practical and disregarded tech¬ nicalities. Fourth, it was international "in char¬ acter. It has often been defined as the ((private international law of the Middle Ages.® It orig¬ inated, not in any one country, but in the com¬ mercial countries of the civilized world. It ap¬ plied to alien and citizen alike provided he was a merchant or mariner.

The law merchant has now become more or less definitely incorporated into the formal legal systems of the nations of the world, although in some cases, as in Germany and France, it is still administered by separate courts.

The evolution of the law merchant in Eng¬ land has been an important chapter in legal his¬ tory inasmuch as England has been a great law- giving nation as well as a nation dependent to an unusual degree upon trade and commerce.

In the Middle Ages the law merchant in England comprised both maritime and com¬ mercial law and was administered in special local courts created for that purpose in the im¬ portant commercial cities of England. These courts were sometimes the courts created to dispense justice at the commercial fairs. In the larger cities special courts grew up for the express purpose of administering the law mer¬ chant. Their jurisdiction was recognized by the English statutes.

In the reign of Edward III separate ad¬ miralty courts were created for the trial of maritime and piracy cases, thereby limiting to commercial actions alone the jurisdiction of the courts of the law merchant. The common law courts as they developed became jealous of competing tribunals and by the end of the 16th century had succeeded in transferring from the jurisdiction of the law merchant to that of the common law all cases arising in internal trade. By the end of another century these special mercantile courts had disappeared entirely and the ordinary courts of common law and equity had assumed jurisdiction in commercial mat¬ ters. The principles of the law merchant were not, however, lost. Litigants could still have their cases decided in accordance with them by ˆproving® such principles as foreign law is now proved, in other words, by convincing the com¬ mon-law courts that such principles were rec¬ ognized by the customary law of commercial intercourse. When thus ˆproved® the

principle of the law merchant became' part of the law of the land. It thus became amalgamated into the general system of the English law.

Consult Carter, (A History of English Legal Institutions) (4th ed., Chap. 27, 1910) ; Holds- worth, (A History of English Law* (1903, Vol. I, Chap. 7) ; Mitchell, (The Law Merchant) (1904) ; (Select Essays in Anglo-American Legal History,* by various authors (1907).

Robert Eugene Cushman, Associate in Political Science, University of Illinois

LAW OF NATIONS. See Interna¬ tional Law.

LAW SCHOOLS. See Law, American Schools of; Education, Professional.

LAW TERMS, space of time prescribed by law in which a court may be in session with adjournments from day to day, or time to time, until its adjournment sine die. In the United States a ((regular® term is one begun at a time fixed by law and adjourned at the discretion of the court in consistency with the law. A <(special term® is held by a single justice pre¬ siding over motions and causes of equitable nature, as opposed to the <(general term® with three justices, held for the consideration of appeals. The original conception of the term, dividing the year into law terms, was abolished in the United States at the time of the Revolu¬ tion and in England has been superseded by an arrangement by which the Supreme Court of Judicature has four sittings each year: Michaelmas, 2 November to 21 December, but by order of council commencing 24 October; Hilary, 11 January to the Wednesday preceding Easter; Easter, Tuesday after Easter week to Friday before Whitsunday, and Trinity, Tues¬ day after Whitsun-week, to 8 August, but end¬ ing by order of council on 12 August.

LAWES, laz, Henry, English composer: b. Dinton, Warwickshire, 1596; d. London, 21 Oct. 1652. He was a brother of William Lawes (q.v.) and was educated as a classical musician. He became famous as a composer for masques and songs, and he is eulogized by Milton in several poems. He set to music the poet's (Masque of Comus) and supervised its produc¬ tion at Ludlow Castle in 1634. He published (Avres and Dialogues, for One, Two and Three Voices* (1653).

LAWES, Sir John Bennett, English chem¬ ist: b. Rothamsted, Hertfordshire, 28 Dec. 1814; d. there, 31 Aug. 1900. He was edu¬ cated at Eton and at Oxford, whence he went to London, and there remained for a while en¬ gaged in the practical study of chemistry. .

Reaching his majority, he came into possession of his estate, where he undertook experiments in agricultural chemistry in the interest of a more scientific method of agriculture. In 1843 he employed Dr. (afterward Sir) J. H. Gil¬ bert as superintendent of laboratory work at the Rothamsted farm, and uniting his own labors with those of his colleague, by a course of investigations, indoors and out, developed scientific processes whereby superphosphate of lime came to be used as a fertilizer. For over 50 years they carried on these labors together, and important practical results for improved agriculture are recorded to their credit. In 1899 Lawes transferred his laboratories and ex¬ perimental fields, with an endowment amount¬ ing to about £100,000, to a board of trustees, in order to secure their permanent usefulness. He was created a baronet in 1882. Consult Hall,

A. D., (The Book of the Rothamsted Experi- ments) (1905).

LAWES, William, English composer: d. Chester, England, 1645. He was an elder brother of Henry Lawes (q.v.), with whom he was associated in various musical matters, and not only wrote music for many of the songs of the time, but the music for Shirley's masque, 'The Triumph of Peace) (1636), and for Sandvs' version of the Psalms, published in

1648.

LAWES, William George, English Con-

gregationalist clergyman : b. Aldermaston, Berkshire, 1 July 1839; d. 1915. He was or¬ dained in the Congregationalist ministry in 1860 and was appointed to the South Sea Mis¬ sion by the London Missionary Society, serving there in 1861-71. After a furlough in England he was, in 1874, sent to New Guinea where he was the first European resident and pioneer missionary in British New Guinea. He took part in the proclamation of the British protectorate in 1884 and in the annexation to the British Empire in 1888. He founded a college for na¬ tives at Vatorata, New Guinea, in 1896 and was its president until 1906, when he retired to Sydney, New South Wales. He translated parts of the Bible into Motu and was author of (Grammar of Motu, New Guinea Language) (1895; 3d ed., 1896).

LAWES-WITTEWRONGE, laz'wit'rong, Sir Charles, English sculptor: b. Teign- mouth, 3 Oct. 1843; d. 6 Oct. 1911. He was educated at Trinity

College, Cambridge, suc¬ ceeded his father as baronet in 1900, and in 1902 assumed by royal license the additional name of Wittewronge. His work as a sculptor is characterized by strength and vigor of line and usually is full of action. He was an ardent sportsman and was keenly interested in agri¬ culture. He was president of the incorporated Society of British Sculptors and chairman of the Lawes Agricultural Trust. Among his well- known works are the bronze group 'They Bound Me On) (1888) and the high relief of 10 female figures called 'United States of America) (1890).

LAWLESS, Emily, Irish novelist, daugh¬ ter of the third Baron Cloncurry : b. 1845 ; d. 21 Oct. 1913. She has published several popular romances of Irish life, full of pathos and pic¬ turesqueness, among which are (Hurrish: a Study } (1886); (Grania,> her most powerful work (1892). and 'Maelcho,) a story of the rebellion of Sir James Fitzmaurice in the 16th century (1894). She is also the author of 'Ireland,) in the 'Story of the Nations) series (1890); 'A Garden Diary) (1901); 'With the Wild Geese,) poems (1902); 'Maria Edge-worth,) a biography (1904), and 'The Book of Gilly) (1906).

LAWLEY, Alethea Jane Wiel, English historical writer: 2d daughter of the 2d Baron Wenlock. She was married to the Cavaliere Tatteo Wiel in 1890 and lives in Italy. She has published 'Vittoria Colonna,) a study (1888) ; 'Venice,) 'Story of the Nations) series (1894) ; 'The Romance of the House of Savoy) (1898) ; 'Verona,) in 'Mediaeval Towns) series (1902) ; 'The Navy of Venice) (1910), etc.

LAWLEY, George, American yacht builder: b. London, England, 1823; d. 27 Feb.

1915. He emigrated to the United States in 1851 where he engaged in shipbuilding. His firm, Lawley & Son, Boston, built the America's cup defenders. the Puritan (1885) and the May¬ flower (1886). The Volunteer defender was a joint product of the Lawley yards and of build¬ ers at Wilmington, Del. The Vanitie , which in 1914 failed to qualify for the America's cup race, was also built under Lawley's super¬ vision.

LAWN, finely woven white goods, cotton or linen, of an open texture, plain or printed. The white 'sleeves, which form a part of the dress of a bishop in the English Church, are made of 'lawn.

LAWN-TENNIS, a modern game, played on grass, gravel, cinder or asphalt courts, with balls and rackets. The face of the racket is now invariably plane, and consists of a net formed of tightly-strung gut.

The balls are of rubber covered with white flannel, about two and one-half inches in diameter and two ounces in weight. For a game between two players (a single-handed game) the court is 78 feet -long by 27 wide. It is divided across the middle by a net, the ends of which are attached to two posts, which stand three feet outside the court on each side. The height ‘of the net is three and one half feet at the posts and three feet at the centre. At each end of the court, parallel to the net and 39 feet from it, are drawn the base¬ lines, the extremities of which are connected by the sidelines. Half-way between the side-lines, and parallel to them, is drawn the half-court line, dividing «the space on either side of the net into two equal parts called the right and left courts. On either side of the net, at a dis¬ tance of 21 feet from it, and parallel to it, are drawn the service-lines. The players .take up their positions on opposite sides of the net and one of them, decided by tossing, called the server, standing with one foot behind and one foot on the base-line, ‘serves the ball from his right court into the diagonally opposite court. The ball is served by being struck with the face of the racket while it is in the air, and the stroke is counted a fault if the service be from the wrong court, or if the server do not stand as directed, or if the ball do not strike, the ground in the diagonally opposite court within the service-line. After a fault the server must serve again from the same court, unless the stroke was a fault because served from the wrong court. The next .service comes from the left court, and thereafter the courts are taken alternately. The non-server is called the striker- out, and it is his business to return the ball by striking it with the face of his racket. The server wins a stroke if the striker-out “volley the service,)) that is, strike the ball before it touches the ground, or fail to return the service or the ball in-play, or return the. service or the ball in-play so that it drop outside any of the lines which bound his opponent’s court, or otherwise lose a stroke in accordance with the recognized 4aws of the game. The striker-out wins a stroke if the server serve two consecu¬ tive faults, or fail to return the ball in-play, or return the ball in-play so that it drop outside any of the lines which bound his opponent’s court, or otherwise lose a stroke. On either player winning his first stroke the score . is called 15 for that player; on either player win-

uing his second stroke the score is called 30 for him ; on either winning his third stroke his score is called 40, and the fourth stroke won by either player is scored game for that player. However, if both players have won three strokes, nhe score is called deuce, and the next

stroke won by either player is scored advantage for that player. If the same player win the fol¬ lowing stroke, he wins the game ; but if he lose the next stroke, the score is again called deuce, and so on until one player win two strokes immediately following the score at deuce. The player who first wins six games wins a set, but with both at five a method of scoring similar to advantage is often introduced. Sides are changed >at the end of every set. Three-handed and four-handed lawn-tennis differ in no essen¬ tials from the game as above described. The game of lawn-tennis as now known was intro¬ duced about 1875.

Bibliography. — Dewhurst, E. B., (Science of Lawn Tennis) (Philadelphia 1910) ; Do¬ herty, R. F. and H. L., (On Lawn Tennis) (New York 1903) ; Heathcote, J. M., (Tennis, Lawn Tennis and Racquets5 (new ed., London 1903) ; Lambert-Chambers, D. K. D., (Lawn Tennis for Ladies) (New York 1910) ; Little, R. D., (Tennis Tactics5 (ib. 1913) ; Myers, A. W., fawn Tennis at Home and Abroad5 (ib.

1903) ; id., (Complete Lawn Tennis Player> (Philadelphia 1908) ; Paret, J. H., (Lawn Ten¬ nis : Its Past, Present and Future5 (New York

1904) ; Walsh, G. E., (Making a Tennis Court5 (ib. 1912) ; Wright and Ditson, (Official Lawn Tennis Guide) (Boston, annually) ; Spalding's Athletic Library, (Lawn Tennis) (New York, annually) ; (Lawn Tennis Handbook (London, annually) .

LAWNS: Their Preparation and Care, a

closely-mown turf maintained for ornament in parks and private grounds. It may or may not be dotted with trees, shrubs or other specimen plants, or even with flower beds. These are, however, mere incidents, and since they usually detract from the natural beauties of an open sward, should usually be confined to the borders in irregular, rather than formal, order. The lawn thus becomes the canvas and the side¬ planting the frame for a natural picture in which the dwelling or other prominent feature is placed.

Whether the contour of the surface be level, convex or concave, it should always be graded so as to avoid even slight irregularities, and where the land is rolling all three contours should be harmoniously blended so as to avoid breaks such as terraces, and so as to ensure the repose that comes from such blending. Except on sand and clay, lawns do well on practically all soils if properly prepared and maintained. After the grading the 'land should be plowed, dug, or forked, as

deeply as the soil will permit, even to the depth of two feet, then harrowed thoroughly, removing all stones and burning all rubbish, weeds, etc. A liberal dressing of complete fertilizer containing potash, phos¬ phoric acid and nitrogen in readily available forms should be given, and where possible a covering of an inch or more of rich soil is often of decided advantage. Except for their con¬ taining seeds of weeds, animal manures are especially valuable, that of sheep and cattle be¬ ing usually better than ordinary stable-manure ;

when the latter is applied it should always be after thorough composting and rotting to de¬ stroy weed-seeds. The surface being very smooth, the fertilizer well harrowed in and the wind asleep, seeding may be performed, prefer¬ ably just before rain. The seed should be the purest that can be obtained, and may or may not be raked in, but the land should always be heavily rolled. In the Northern States the pop¬ ular grasses for lawns are Kentucky bluegrass, which is especially valuable for soils rich in lime, red-top and Rhode Island bent grass. (See Grasses). Mixtures of several grasses are valuable because the grasses that start first choke out weeds and are later themselves choked out by the slower-growing blue-grass.

Whew the grass is three inches tall it should be cut with a scythe, and afterward with a lawn-mower as occasion may require. In the autumn a dressing of well-composted manure should be given, and in the spring the strawy useless parts should be raked off before growth starts. After the frost is out of the ground the lawn should be rolled to compact the turf, which usually heaves more or less during the winter. It is further essential that weeding be performed every year, but especially during the first, second and third. If desired, a sprinkling of white clover (Trifolium repens) may be given by sowing the seed after or before the grass seed; being of different weights, they cannot be sown together. White clover may also be sown upon heavy and poor soils, where it will often make a good stand and a good pre¬ cursor for grass. In the South the grasses mentioned -usually fail, and should be replaced by species that can withstand the climatic con¬ ditions. The most satisfactory and popular are Bermuda grass, joint grass and Saint Augustine grass. The first is usually propagated by pass¬ ing the roots, freed from soil, through a feed cutter, sowing and harrowing the pieces.

Small lawns are frequently made by trans¬ planting sod from old pastures, in which cases the turf is cut in long strips about 15 inches wide, rolled up and laid down like carpet, and then pounded or heavily rolled to press the roots firmly against the soil. The subsequent management should be that given seed-sown lawns. Owing to the

dryness of the summers in many parts of the United States lawns are often considered failures. Too frequently, how¬ ever, these results follow imperfect preparation and improper management. As a rule lawns should not be watered while they are young or in the early part of the season, because this tends to keep the roots near the surface and to make the grasses less able to withstand dry weather. Water should therefore be withheld until the plants seem to be in dire need, and then it should be applied in what may seem ex¬ cessive quantities. Consult Barron, Leonard, fawns and How to Make Them) (New York 1906) ; Corbett, L. C., (The Lawn5 (in farm¬ ers' Bulletin No. 2485 Washington 1906) ; Doogue, L. J., < Making a Lawn5 (New York 1912) ; Kelligan, C. P., (Starting a Lawn5 (in * Circular No. 20, 5 of the Michigan Experiment Station Lansing 1913) ; Schreiner and Skinner, fawn Soils5 (in farmers' Bulletin No. 4945 Washington 1912).

LAWRANCE, John, American lawyer, soldier and legislator: b. Cornwall, England,

1750; d. New York city, November 1810. He emigrated to America in 1767, settling in New York, where he was admitted to the bar in 1772. He early attained a considerable success as a lawyer, and at the outbreak of the Revo¬ lution warmly espoused its cause. He received an officer's commission in the First New York regiment, serving under his father-in-law, Gen. Alexander MacDougall. He was. ap¬ pointed aide-de-camp to Washington in 1777, and in October of that year presided over the trial of Major Andre. He returned to the prac¬ tice of law after the war, and in 1785-87 was a delegate to the Continental Congress. He was an ardent supporter of the constitution proposed by the Federalists, and lost his seat to an anti-Federalist in 1788. He served in the New York State senate in 1789 and was elected the first representative of New York city in the first United States Congress, 1789-91, succeed¬ ing himself in the second Congress, 1791-93. In 1794 he was the first justice appointed to the United States District Court of New York, re¬ signing upon his election to the United States Senate in 1796. He served as president pro- tempore of the Senate in 1798-99. Lawrance was a personal friend of both Washington and Hamilton.

LAWRENCE, Abbott, American manu¬ facturer and diplomatist : b. Groton, Mass., 16 Dec. 1792; d. Boston, 18 Aug. 1855. In 1814 he became one of the firm of A. and A. Law¬ rence, which for many

years conducted a pros¬ perous business in the sale of foreign cotton and woolen goods on commission, and later established a cotton industry in Lowell, Mass., with his brother Amos (q.v.). He was a mem¬ ber of the 24th Congress and again 1839ˆ40. He was a commissioner in 1842 to settle the Northeastern Boundary question and arranged a basis for settlement with Lord Ashburton which was satisfactory to both the United States and England, and was Minister to Great Britain in 1849-52. He founded the Lawrence Scientific School of Harvard University, to which he gave $100,000; and was a liberal, phi¬ lanthropist. Consult Hill, A. H., (Memoir of Abbott Lawrence) (2d ed., Boston 1884).

LAWRENCE, Amos, American merchant: b. Groton, Mass., 1786; d. Boston, 31 Dec. 1852. He was educated in his birthplace at an acad¬ emy founded by his father. He worked for many years as a clerk and in 1807 started at Boston a dry-goods business of his own, formed a partnership with his brother (1814) and be¬ gan a large wholesale business. . Lawrence and Lowell became the centres of this firm's manu¬ facturing activity which soon placed them, at the head of the cotton-spinning and weaving trade. Amos Lawrence retired from active bus¬ iness in 1831 through ill health and spent much of his later years in promoting works of philan¬ thropy and patriotism. The academy at Groton, of which he \)vas a liberal benefactor, was named Lawrence Academy in his honor (1843) ; he contributed liberally to the raising of the Bunker Hill monument and made large con¬ tributions to Williams College. Consult (Ex- tracts from the Diary and Correspondence of Amos Lawrence with a Brief Account of Some Incidents in His Life> (1855).

LAWRENCE, Amos Adams, American philanthropist: b. Boston, Mass., 31 July 1814;

d. Nahant, Mass., 22 Aug. 1886. He was grad¬ uated at Harvard University in 1835, invested extensively in cotton manufactories and later became interested in various industrial corpora¬ tions and banking firms. He served as an officer in various charitable institutions and was principal manager of the Emigrant Aid Asso¬ ciation organized to aid in the colonization and maintenance of Kansas as a free State, in which connection he was associated with Eli Thayer and others in 1853-54. The town of Lawrence in Kansas was named in his honor. In the Civil War he was active in recruiting the 2d Massachusetts Cavalry regiment. He was one of the founders of Lawrence College, Appleton, Wis., and he . built Lawrence Hall, the

Epis¬ copal Theological Seminary, at Cambridge.

LAWRENCE, Frederick William Peth- ick, English social reformer and barrister-at- law : b. 28 Dec. 1871. He was educated at Trinity College, Cambridge, and in 1897 was elected a Fellow there. He made a tour around the world investigating social conditions, and in 1899-1901 lived at the Mansfield Settlement House, Canning Town. He made an effort to enter Parliament but his opposition to the South African War defeated him. He purchased a controlling interest in the Echo in 1901 and edited it until its demise in 1905, when he per¬ sonally settled its obligations. He was asso¬ ciated with Mrs. Pankhurst in the militant demonstrations of the Woman's Suffrage Party and was joint editor of Votes for Women in 1907-14. He was sentenced to nine months' imprisonment for connection with a destructive raid of the militant suffragists in 1912 and was ordered to pay the costs of the prosecution. Upon his refusal*he was declared bankrupt, the bankruptcy being annulled after the court had deducted the costs of the trial from the estate. In 1916 he became honorary treasurer of the Urban District Council. Author of various papers on mathematics, economics, free trade and woman suffrage, and (Local Variations in Wages> ; 'Woman's Fight for the Vote) ; (The Man's Share) ; Reformer's Year Book,

1 904-08. >

LAWRENCE, George Alfred, English novelist : b. Braxted, Essex, 25 March 1827 ; d. Edinburgh, Scotland, 23 Sept. 1876. He was educated at Oxford, studied law, but soon turned his attention to fiction and became sud¬ denly famous by his novel, cGuy Livingstone, or Thorough > (1857). He was much read in America as well as in* his own country, and (Sword and Gown) (1859) ; (Breaking a But¬ terfly) (1869) and other works gave him an evanescent popularity. His (Border and Bas- tile) (1863) has an autobiographical interest, in which he records his adventures in the United States, undertaken with a view to joining the Confederate army. He was taken prisoner by Federal troops before his purpose could be accomplished, and was only released on con¬ dition that he return to England.

LAWRENCE, George Newbold, Amer¬ ican ornithologist: b. New York, 20 Oct. 1806; d. 1895. He was privately educated, was for some years in the drug business, but in 1867 retired, and thereafter devoted himself to orni¬ thology. From 1846 he contributed to the litera¬ ture of ornithology; and he also made an ex¬ tensive and valuable collection of birds, includ-

ing 8,000 specimens, representing almost every variety found in the United States, and an excellent series of the birds of Mexico, Central America, the West Indies and South America. This collection he sold to the American Museum of Natural History. He assisted Spencer F. Baird and John Cassin in the preparation of (The Birds of North America > (1860). He was a member of many scientific societies.

LAWRENCE, James, American naval of¬ ficer: b. Burlington, N. J., 1 Oct. 1781; d. 5 June 1813. He entered the navy as a midship¬ man 4 Sept. 1798; in 1800 was made acting lieutenant and in April, 1802, lieutenant, and served during the war with Tripoli; he was first lieutenant of the schooner Enterprise and one of the party which boarded and destroyed the frigate Philadelphia in the harbor of Tripoli on the night of 15 Feb. 1804. Shortly before peace was concluded he was given command of a gunboat, and on his return to the United States, served as first lieutenant of the Chesapeake and subsequently commanded the Vixen, the Wasp and the Argus. In November 1810 he was pro¬ moted to the rank of master commandant and given command of the Hornet. In 1812 he cruised in the Hornet with Commodore Bain- bridge's squadron along -the South American coast, and at the mouth of the Memerara River he met the British brig Peacock, which after a severe action of about 15 minutes he forced to surrender. When she surrendered, the Peacock was badly damaged and sinking, and Lawrence transferred the crew to his own ship. (See Hornet). On 14 March 1813 he was promoted to the rank of captain and appointed to the frigate Chesapeake, then lying in Boston; the Hornet was also placed under his orders and it was intended that the two ships should sail against the Greenland whale fishery. On 1 June 1813, when the Chesapeake was ready for sea, Lawrence sailed out of the harbor to meet the British ship Shannon; after a severe battle he was forced to surrender, and his ship was taken as a prize into Halifax. (See Chesa¬ peake and Shannon, Battle of). Lawrence was fatally wounded and died four days after the battle ; throughout the action he showed the greatest coolness and courage, and his last words as he was carried from the deck were, ((Hartford 1821) ; Roosevelt, (Naval War of 1812) (2 vols., New York 1904).

LAWRENCE, John Laird Mair, 1st

Baron Lawrence, English viceroy and gov¬ ernor-general of India: b. Richmond, York¬ shire, 24 March 1811; d. London, 26 June 1879. He

was a younger brother of Sir Henry Mont¬ gomery Lawrence and of Sir George Saint Patrick Lawrence, both of whom attained dis¬ tinction in India. He was educated at Foyle College, Londonderry, at Wraxall Hall, Clifton, Haileyberry College and the College of Fort William, Calcutta. He mastered Urdu and Per¬ sian, and in 1830 he was appointed assistant to the collector at Delhi. With brief intermissions he was for 20 years magistrate and land rev¬ enue collector in that district, gaining a thorough understanding of the natives and so adminis¬ tering affairs for their comfort and prosperity that he gained a wide influence with them. He

was responsible for beneficent land reforms and was also largely instrumental in preventing oppression of the people by their own chiefs. At khe outbreak of the first Sikh war he was able to raise and forward supplies and muni¬ tions of war which resulted in the victory at Sobraon. He then administered the territory of the defeated Sikhs with such success that in the second Sikh war he was able again to come to the rescue, with the result that the Punjab was annexed and Lawrence appointed commis¬ sioner and then lieutenant-governor. In the seven years before the outbreak of the Indian Mutiny he so pacified the territory as to be able to send troops to the relief of Delhi and other hard-pressed points, and earned for himself the title <(the savior of India.® He was knighted in 1858 and upon his return to India received the thanks of Parliament and a pension of £2,000 annually in addition to his regular pension of £1,000. He became privy councillor, acting as secretary of the state's council for India, and in 1864 became viceroy and governor-general of India. His administration was uneventful but marked by the prudent care and wisdom upon which he had built his power in Indian affairs. Upon his return to England in 1869, after 40 years of service in Indian affairs, he was created a baron. For the last 10 years of his life he was chairman of the London School Board and of the Church Missionary Society. He was buried in Westminster Abbey. Consult Smith, B., (Life of Lord Lawrence* (1885) ; Atchison, Sir C., (Lord Lawrence) (in (Rulers of India Series* 1892) ; Trotter, L. J., (Lord Lawrence 5 (1880) ; Gibbon, F. P., (The Lawrences of the Punjab) (1908).

LAWRENCE, Saint, the Deacon, Chris¬ tian martyr: d. about 258. He was deacon of Pope Sixtus II and in the persecution of Valerian he was summoned before the judge to produce the treasures of the Church. He brought with him the poor and needy of the Church as the treasures in his keeping and upon refusal to retreat from his position was sentenced to be burned on a gridiron. His martyrdom followed by three days that of Pope Sixtus. While the legend and the details as related by Saint Ambrose are doubtless some¬ what enhanced by the

narrator, there is no question of the occurrence of the martyrdom. He is supposed to have mocked his judge and executioners while under torment. His name appears in the canon of the Mass of the Roman Catholic Church and his calendar day is 10 August. There have been enumerated 228 churches named for him in England, and the Escurial was built in his honor by Philip II of Spain in celebration of the victory of Saint Quentin, which was won on his feast day in

1557.

LAWRENCE, Stringer, English soldier: b. Hereford, 6 March 1697; d. London, 10 Jan. 1775. He entered the army in 1727, served at Gibraltar, in Flanders and at the battle of Cul- loden, and in 1748 he went out to India to take command of the East India Company's troops. He defeated the French attempt to capture Cuddalore soon after his arrival, but was later captured by the French cavalry patrol at Arian- copang and was held prisoner until the peace of Aix-la-Chapelle. He was in command of the capture of Devicota in 1749, at which time

Chie served under him, a lifelong friendship ensuing. He returned to England in 1750, but in 1752 he took command of the forces intended for the relief of Trichinopoly and succeeded in forcing the surrender of the French besieging army. Later he defeated the French at Bahur, and in 1753 he once again relieved Trichinopoly and defended it for the 17 months preceding an armistice and conditional treaty. The ar¬ rival of regular forces of the Crown deprived him of the chief command in 1754, but he served under the new commander, Col. John Adlercron, in the operations around Wandi- wash in 1757. He was in command of Fort George in 1758-59 during the siege by the French, and after two years in England re¬ turned to India as major-general and com¬ mander-in-chief at his old post. He presided over the reorganization of the Madras army in 1765 and retired in 1766. The monument to his memory in Westminster Abbey was erected by the East India Company.

LAWRENCE, Sir Thomas, English por¬ trait painter: b. Bristol, 4 May 1769; d. Lon¬ don, 7 Jan. 1830. His father was an inn¬ keeper, who in 1772 removed to Devizes, where the artist gave early proof of his ability by drawing portraits of his father's guests or, standing on a chair, would recite passages from Pope or Milton. At the age of six he

was sent to school, where he remained two years, and this, with the exception of a few lessons subsequently in Latin and French, con¬ stituted his whole education. The family re¬ moved to Bath in 1779, where he had access to the galleries of some of the neighboring gentry, where he employed himself in copying historical and other pieces. From this time he was the sole support of his family, and by the age of 12 his studio was the resort of the beauty and fashion of Bath, his works being mainly half-size ovals in crayon. In his 17th year he began to paint in oils. In 1787 the family removed to London, and Lawrence was admitted a student at the Royal Academy; his subsequent career was successful and bril¬ liant. He was elected in 1791 a supplemental associate by the desire of the king, being under the age (24) fixed by the laws of the institu¬ tion. No other case of the kind has occurred. On the death of Sir J. Reynolds the next year he was made painter to the king. His reputation grew steadily, and he was soon considered the first portrait-painter of the age in England. His scene from the (Tempest) was a successful attempt at historical painting. In 1794 he was made a Royal Academician and was elected president in 1820. In 1815 he was knighted by the Prince Regent, who also em¬ ployed him to take the likenesses of the allied sovereigns and the most distinguished persons of their suite. During their visit to England he finished the portrait of the king of Prussia, and went to Aix-la-Chapelle several years afterward to paint the Emperor Alexander; thence he went to Vienna, where he completed the portraits of the emperor, the archdukes, Metternich, etc., and in Rome painted Pius VII and Cardinal Gonsalvi. These portraits are now in the Waterloo Gallery at Windsor and are of great historical value. Lawrence's portraits are striking likenesses and display a bold and free pencil ; but they are, particularly

his later ones, chargeable with mannerism ; his coloring, brilliant and effective as it is, is hard and glassy, and shows little insight into character. The pleasing artificiality of his work, however gratifying to his sitters, has lowered his artistic reputation with succeeding generations. It was said of him that he never lost a sitter by an unflattering likeness. Pol¬ ished and courtierlike in his manners, he was an inveterate and in main a harmless flirt, his successive proposals of marriage to the two daughters of Mrs. Siddons and subsequent withdrawals from these engagements being the only discreditable episodes in an otherwise honorable career. His income for the last 20 years of his life was very large, but he died poor, owing to the lavishness with which he spent money in acquiring the first-rate produc¬ tions of his art, in assisting less fortunate artists and in other ways. His valuable and unrivaled collection of drawings by the old

masters was unfortunately dispersed after his death.

LAWRENCE, Sir William, an eminent

surgeon and anatomist: b. Cirencester, 16 July 1783; d. 5 July 1867. In 1799 was apprenticed to the celebrated Abernethy, and was an in¬ mate of his house for five years. In the third year of his apprenticeship he had given such proofs of his zeal and capacity that Abernethy appointed him demonstrator in anatomy at Saint Bartholomew's, and for 12 years he dis¬ charged the duties of his office with signal ability. From 1824-65 he became principal sur¬ geon to Saint Bartholomew's Hospital. In 1816 he published an (Introduction to Com¬ parative Anatomy and Physiology, > and in 1819 (Lectures on the Physiology, Zoology and Natural History of Man,* which provoked the hostile criticism of theologians. In 1829 he succeeded Abernethy as lecturer on surgery to Saint Bartholomew's, and altogether he was connected with this hospital 65 years. Shortly before his death he was made a baronet. Few men of his time did more than he for the ad¬ vancement of surgery. His treatise on her¬ nia* was a standard work, and that on dis¬ eases of the Eye) (1833) marks an epoch in ophthalmic surgery. His lectures on surgery were published in 1863. He was twice presi¬ dent of the Royal College of Surgeonsˆ and on two occasions he delivered the Hunterian ora¬ tion.

LAWRENCE, William, American politi¬ cian: b. Mount Pleasant, Ohio, 29 June 1819; d. 8 May 1899. He was graduated from Frank¬ lin College (1838) and at the Cincinnati Law School (1840). He early became prominent in politics, and from 1845 to 1847 owned and con¬ ducted the Logan County Gazette, and was afterward editor of the Western Law Journal. He served in the lower house of the State legislature and for five years as State senator, and from 1857 to 1864 was judge of the Court of Common Pleas and of the District Court. After seeing some military service (1862), he was elected to Congress in 1865 and in 1880 appointed first Comptroller of the United States Treasury, from which office he retired in 1885. He has published several books on law, notably (The Law of Claims against the Government (1875), and (The Treaty Ques¬ tion > (1871) ; (Decisions of the First Comp-

t roller in the Department of the Treasury of the United States5 (1881-85).

LAWRENCE, William, American Prot¬ estant Episcopal bishop : b. Boston, 30 May 1850. He was graduated at Harvard in 1871, and at the Episcopal Theological School, Cam¬ bridge, Mass., in 1875; was rector of Grace Church, Lawrence, Mass., 1876-84; professor of homiletics and pastoral theology at the the¬ ological school above named, 1884-93 ; dean of the school, 1888-93. He was university preacher at Harvard, 1888-91. In October 1893 he was elected bishop of Massachusetts to succeed Bishop Brooks, and was consecrated to that office, which he continued to hold, in the following year. He has published a (Life of Amos A. Lawrence,5 his father (1889) ;

(Visions and Service) (1896) ; (Life of Roger Wolcott5 (1902) ; (Study of Phillips Brooks5 (1903), and other works.

LAWRENCE, William Beach, American jurist: b. New York, 23 Oct. 1800; d. there, 26 March 1881. He was graduated at Colum¬ bia College in 1818, and after his admission to the bar in 1823 he practised in New York, where he attained eminence. He removed to Newport, R. I., in 1850; was elected lieutenant- governor of Rhode Island in 1851 and soon after became acting governor. He became widely known by reason of his connection with the ˆCircassian case® in 1873, before the Ameri¬ can and British International Court in Wash¬ ington, D. C., his arguments securing the case for his clients and leading to the only reversal of a decision by the United States Supreme Court that had ever occurred. He published (History of the Negotiations in Reference to the Eastern and Northeastern Boundaries of the United States5 (1841) ; (Belligerent and Sovereign Rights as Regards Neutrals During the War of Secession5 (1873) ; c Disabilities of American Women Married Abroad5 (1871) ; Administration of Equity Jurisprudence5 (1874) ; (Etudes sur la jurisdiction consulaire et sur l'extradition5 (1880).

LAWRENCE, Kan., city and county-seat of Douglas County, on both sides of the Kan¬ sas River, and on the Atchison, Topeka and Santa Fe and the Union Pacific railroads, 40 miles west of Kansas City. It is the farming trade centre for Douglas and parts of two other counties, and is principally engaged in manufacturing, which is greatly promoted by the excellent water power furnished by the river. It is the seat of the Kansas State Uni¬ versity, Haskell Institute and Government In¬ dian Industrial School ; contains a hospital, pub¬ lic library, fine school buildings and several public parks, and has flour and paper mills, barbed-wire, ice, brick and tile, shirt, sash and door factories and foundry and machine shops. There are electric-light plants, waterworks, several national and State banks, daily, weekly and monthly periodicals and an assessed prop¬ erty valuation of over

$1,000,000. The city was settled by an anti-slavery colony from the East in 1854 and was named in honor of Amos A. Lawrence. It was the first of the Kansas Free-State towns founded by the Emigrant Aid Society, soon after the passage of the Kansas-Nebraska bill (q.v.). In 1856 a band of Missouri border ruffians sacked the town, which was defended by old John Brown

(q.v.) and his sons. In 1863, the Confederate raider Quantrell attacked the town and killed 125 citizens. The commission plan of city gov¬ ernment has been in operation since 1914. Pop. (1920) 12,456.

LAWRENCE, Mass., city, and one of the county-seats of Essex County, on both sides of the Merrimac River, and on the Boston and Maine Railroad, 26 miles northwest of Bos¬ ton. It is one of the notable and leading manu¬ facturing cities in the valley of the Merrimac River. Built at the lowermost available rapid on the river, the city has the concentrated power of all the tributaries of that stream and receives benefit from the entire watershed feed¬ ing the main current — an area of 4,450 square miles. The water power developed at this point, amounting to about 15,000 horse power, is remarkably uniform and reliable.

Water Power Plant. — In 1845-48 the (

Manufacturing and Business. — Lawrence

may well be known to Americans as ((The Worsted City,55 for the United States census returns show that in the production of worsted and woolen dress goods Lawrence leads the United States and is second in the world ; Birmingham, England, being the only city which excels her in this respect. Lawrence leads the entire country in the amount of capital in¬ vested in any one locality in the worsted and

woolen dress goods industry, and in the value of that class of goods produced, the sum in¬ vested in this distinct business in 1917 being $120,263,298 and the value of product $135- 618,681. Among wool-growers and dealers of the world, the city is known as a leading con¬ sumer of that staple. Among the great manu¬ facturing companies that lead in importance are the Pacific Mills, having over 10,000 em¬ ployees; the American Woolen Company, em¬ ploying 17,000 operatives; the Arlington” Mills, with 8,500 operatives; the Everett Mills, employing 5,500. The total investment in the textile industry in

Lawrence in 1917 was $175,534,916 and the total value of textile prod¬ ucts was $174,495,698. Lawrence is also famous for its manufacture of calendered book paper. In the manufacture of wooden wheels Law¬ rence also leads the country, the Archibald Wheel Company manufacturing government artillery wheels, wheels for fire engines and automobile wheels.

The first steam fire-engine in America was manufactured in Lawrence. Paper-mill ma¬ chinery is also extensively manufactured, as are also shoes, foundry products, carriages and steam fire apparatus, engines, boilers and mill fittings and findings of all description.

The industrial unrest which has been gen¬ erally attributed to La'wrence is now the sub¬ ject of systematic study by a commission of citizens employing a high-grade publicity ex¬ pert, and seeking by co-operation with the heads of the industries to establish a new in¬ dustrial consciousness and relationship be¬ tween the workers and the employers. The means employed are to be along the lines of those advocated in the Rockefeller Industrial Plan of Shop Committees, Co-operative Man¬ agement, ultimate partnership and ownership by such employees as fit themselves for- it ; an increase in home and property ownership as a stabilizer of labor and a means of reducing labor turnover ; a development of parks, play¬ grounds and recreational centres ; the increase in interest in education, Americanization and naturalization, and a broad comprehensive plan of housing and city planning.

Site and Environment. — The site was pe¬ culiarly adapted to the building of an import¬ ant industrial centre. The small Spicket River here enters the Merrimac from the north and the Shawsheen stream enters from the south. The location is healthful. The rapid Merrimac River divides the city into nearly equal sec¬ tions, the northern half now having the lar¬ gest population and most important industrial establishments. The city was laid out in 1845- 46 by the founders and promoters, and has been built largely in accordance with original plans.

Public Works and Buildings. — The water¬ works, established in 1874-75, were so ample that extensions have not made it necessary to reconstruct the pumping plant or the storage reservoirs. The source of water supply is the Merrimac River. The filtration beds that cleanse the current before it is distributed for use were designed and constructed in 1892 under the care and approval of the Massachu¬ setts State Board of Health. The experimental station of the Massachusetts State Board of Health is established here. Illuminating

and heating gas and electric lighting and power are

supplied by a single chartered company. The courthouse was erected in 1903, at a cost of $250,000, and the post office was erected at about the same time at a cost of $150,000. The school buildings are large and commodious. The old city hall, the original ((Town House, } > served for a quarter century almost every con¬ ceivable public use and is still a noticeable structure. Other notable features are the Essex County Training School, Children's Home, Cottage and Lawrence hospitals. A noteworthy experiment is now being tried by the American Woolen Company at its Wash¬ ington Mill, where an immense modern build¬ ing has been erected, part of which is being devoted to the use of a day nursery where the mothers employed in the mill can bring their children mornings and leave them in charge of trained nurses.

Parks and Pleasure Grounds. — The found¬ ers of the city wisely reserved a common of 17 acres at the very centre of the business and residence section as a public pleasure ground. No buildings are allowed upon this central park and no public reserve in the common¬ wealth is more nobly wooded or more truly the people's ground. About this central park the largest public buildings, the leading Prot¬ estant churches and many of the best residences are grouped. Four large outlying parks in a nearly wild condition but of much natural beauty and several smaller squares are well cared for by an established park commission of five members. A playstead of several acres exclusively for games and athletic exhibitions is conveniently located.

Banks and Savings Institutions. — Lawrence has one national, three trusts, three savings, three co-operative and one Morris Plan bank, the total savings bank deposits being over $30,00,000, and the total bank deposits, savings and commercial, being over $56, 0(X), 000.

Churches and Charities. — There are over 40 organized churches in the community, the Roman Catholics having much greater numbers and larger value in property than any other denomination. There is an organized city mis¬ sion. A General Emergency Hospital and Chil¬ dren's Home are maintained by the Ladies' Union Charitable Society, a protectory or asylum for orphans or destitute children, an endowed Home for Aged People, and every nationality in the community has its own relief, benefit or social societies.

Government, Schools, Free Libraries and Lectures. — Municipal control is vested in a commission of five, consisting of a mayor and

four aldermen, each in charge of a department, namely, finance, public safety, public property and parks, engineering and public health and charities. The annual budget of expenditures for municipal maintenance and operation ap¬ proaches $2,000,000. There are 32 public schools, one industrial school, H parochial schools and one training school which is main¬ tained by the county. There is a high school and a recently constructed central grammar school of 36 rooms with the most modern equipment, including baths of all kinds, gym¬ nasium, lunchrooms, lecture halls, meeting- rooms for parents and having trained nurse and doctor constantly in. attendance. The evening schools are maintained as a part of the public school system and give courses in

classical and English studies, also special in¬ structions in penmanship, mechanical and free¬ hand drawing, bookkeeping and typewriting and the natural sciences. A special feature in which Lawrence is very active is the course in Americanization and naturalization, which is being discussed and studied by educators throughout the country. A free course of lec¬ tures especially for industrial classes, upon sci¬ entific and miscellaneous subjects, has for many years been sustained by endowment. The free public library of over 50,000 volumes is patronized by all classes. The main library building was the gift of a generous citizen.

History. — Previous to 1845 the territory now included within city limits (about seven square miles lying in form nearly a square) was an unimportant section of two old, his¬ toric towns — Andover and Methuen. The in¬ habitants of the site numbered only about 350 and were nearly all the families of quiet farm¬ ers or river men ; there was not a church build¬ ing, warehouse for trade or manufacturing establishment of any importance then standing in the entire district. In 1845ˆ16 an associated company of manufacturers, financiers and mer¬ chants, the leading pioneer manufacturers and progressive business men of prominence in Massachusetts, after critical examination, asso¬ ciated themselves together and procured an act of incorporation under the name of the Essex Company, chartered for the purpose of de¬ veloping and controlling the water power and establishing factories and workshops at or near the site they selected. This company pur¬ chased lands covering nearly half the area of the contemplated town and secured land or flowage rights for several miles above the site chosen for the projected city. It was decided to

locate at the lowermost of three successive Merrimac River rapids below Lowell, at the confluence of the Merrimac, Spicket and Shawsheen rivers. Promoted as the Lawrence build¬ ing and manufacturing enterprise was at the outset by responsible and powerful sponsors, the <(New City,® as it was at first called, rap¬ idly developed and became almost at the be¬ ginning important as an industrial centre. In less than two years from the commencement of operations in 1845, the settlement was organ¬ ized as a separate town, taking the name of Lawrence in honor of the eminent merchant manufacturers of that name who were so deeply interested in establishing the town and city. The city has had its calamities. Its industrial enterprises survived the financial reverses of 1857, 1858 and 1859, only because of powerful support given by loyal defenders and business leaders. This time of trial was succeeded by the gloom attendant upon the ((Fall of Pember¬ ton Mill,® 10 Jan. 1860, an occurrence that en¬ listed the interest and sympathy of the entire country. In the War of the Rebellion the city's volunteers were among the first to re¬ spond to the call for troops and were among the first to engage in conflict. A citizen, Sum¬ ner H. Needham, was the first martyr to fall in the ranks of the patriot soldiery in April 1861. Lawrence was incorporated as a city 10 May 1853.

Population. — The cosmopolitan character of the population is particularly noticeable. Forty-six nationalities are represented among the population. Formerly the greatest immigra¬

tion was from France, the British Isles, Canada and Germany, but of recent years the flow has been from Italy, Greece, Poland, the Balkan States and Russia. Pop. (1920) 94,270.

George E. Rix,

Secretary of Lawrence Chamber of Commerce.

LAWRENCE UNIVERSITY, Appleton, Wis., a Methodist Episcopal institution founded in 1847 and named in honor of its principal donor, Amos A. Lawrence, of Boston. In 1916 it had 47 professors and instructors, 721 stu¬ dents, 34,129 volumes in the library, and pro¬ ductive funds, $905,876; grounds and buildings valued at $531,000; benefactions during 1915, $23,000; income, $112,280.

LAWRENCEBURG, la'rens-berg, Ind., city and county-seat of Dearborn County, on the Ohio River, and on the Baltimore and Ohio and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, 22 miles west of Cin¬ cinnati, Ohio. It was settled in 1817 and was first

incorporated in 1847. The government is administered by a mayor, elected every four years, and by a city council, elected every two years. It has manufactures of flour, edge- tools, burial caskets, tube-well supplies, wagons, barrels, etc. Pop. (1920) 3,464.

LAWRENCEVILLE, Ill., town and county-seat of Lawrence County, 141 miles east of Saint Louis, on the Baltimore and Ohio Southwestern and on the Cleveland, Cincin¬ nati, Chicago and Saint Louis railroads. The surrounding country is rich in oil deposits and agriculture is likewise important. The town has modern improvements and industrially is chiefly occupied in refining crude oil. Pop.

(1920) 5,080.

LAWRENCEVILLE SCHOOL, The, an

American college preparatory school at Law- renceville, N. J., originally founded in 1810, but refounded in 1882 as an endowed school known as the ((Lawrenceville School on the John C. Green Foundation,® at which time the English (

LAWS, Direct Enactment of. See Initia¬ tive; Legislation, Direct; Referendum.

LAWS, Execution of. See Executive.

LAWS OF NATURE IN MYTHS. See

Mythology.

LAWS AND USAGES OF WAR, a

branch of public, international law covering the body of rules and principles instituted and observed by civilized nations in the conduct of a public war. The code covers the relations of neutrals and belligerents, blockades, captures, prizes, truces, armistices, capitulation, prisoners,

declarations of war and peace, and all matters iii any way connected with the prosecution of war Custom and the demands of advancing civilization fotm the basis of many of the statutes, while others have been formulated and agreed to by international Conventions, Con¬

sult (Rules of Land Warfare) (Washington, Government Printing Office, 1914).

LAWS OF WAR, The. A comparison of the laws of war as they exist to-day with those which governed the conduct of belligerents 100 years ago will reveal one striking difference, namely, whereas, the law to-day is in large part written, a century ago it was for the most part unwritten. Aside from occasional stipula¬ tions in treaties dealing with such matters as the treatment of enemy subjects at the out¬ break of war, the exercise of the right of search and capture, what goods should be treated as contraband and the like, the law of war consisted mainly of custom and usage, the evidence of which was found in the treatises of text writers and in the decisions of prize courts. Naturally, the text writers and jurists were not always in agreement as to what cus¬ tom and usage permitted and what it forbade and even where there was agreement the recog¬ nized rules were not always known to military or naval commanders.

During the past 50 years out of this mass of custom and tradition a large body of written law has developed, the greater part of which is now embodied in the texts of international conventions and declarations which have re¬ ceived the formal assent of the great body of states, and in official manuals or ordinances issued by states for the information and guid¬ ance of their military and naval commanders. What may be regarded as the starting point in the process by which the law of war has thus far been reduced to written form was the promulgation by Presiden Lincoln in 1863 of General Orders No. 100 entitled, “Instruc- tions for the Government of the Armies of the United States in the Field.® In the main, these “instructions® were prepared by Dr. Francis Lieber, a distinguished publicist of German origin, who in early life emigrated to the United States and was for many years a professor in South Carolina College. The code prepared by him consisted of 157 articles which defined the limits of military authority and presented in more or less detail the rights and duties of military commanders in time of war. The effect was to limit the arbitrary powers of commanders and to remove the ex¬ cuse for violations of the law of nations on account of their ignorance as to what custom and usage required or uncertainty as to its meaning. The promulgation of these “instruc¬ tions® represented the first attempt ever made by a government to define and embody in a written code the laws of land warfare. < They received high praise from the. great jurists of the time, they formed the basis of the regula¬ tions adopted by the Brussels Conference in 1874 and they unquestionably exerted great in¬ fluence upon the subsequent development of the laws of war. They remained in force until 1914

when they were superseded by a new manual entitled the (Rules of Land. War¬ fare, > which are largely a revision of Lieber s code. What was vital and important in Lie-

ber's code was retained, what was obsolete was omitted and the provisions of the new manual were brought into harmony with the great in¬ ternational conventions adopted at Geneva and The Hague.

A few other governments followed the ex¬ ample of the United States, and in 1899 the first Hague Conference impressed by the de¬ sirability of each state having a code of this kind inserted in its convention respecting the laws and customs of war on land an article making it. the duty of the contracting parties to issue instructions to their armed forces, which instructions should be in conformity with the regulations annexed to the Convention. The British government had already as early as 1884 issued a manual of military law and this manual was now reissued and brought into harmony with the rules of the Hague Conven¬ tion. The governments of most other coun¬ tries have done likewise. In 1902 the German government issued a manual of the laws of war entitled, (Kriegsbrauch im Landkriege) prepared by the Great General Staff. This manual has been much criticized not only be¬ cause of the extreme views set forth by its authors in regard to the rights of belligerents, military, necessity, the means that may be em¬ ployed in the conduct of war, etc., but because it ignores many important provisions of the Hague Convention, to which such manuals are required to conform, repudiates outright some of them and dismisses others still with the statement that they are good enough in theory but that they will never be observed in practice by belligerents. In this respect it forms a striking contrast to those of the United States, Great Britain and France, the provisions of which conform in every essential particular to the regulations annexed to the Hague Con¬ vention.

Although the Hague Convention did not make it the duty of the contracting parties to issue manuals for the guidance and informa¬ tion of their naval commanders in the conduct of maritime warfare a number of govern¬ ments have in fact done so. Thus Great Bri¬ tain has her manual of Naval Prize Law, Germany her prize code (promulgated 3 Aug. 1914), which it may be added is not open to the criticism which has been so frequently directed against the German manual of land warfare, and France her "instructions® to the commanders of the naval forces, first issued 19 Dec. 1912, and reissued in revised form 30 Jan. 1916. In 1900 a naval code prepared by Admiral Stockton was promulgated by the Navy Department of the United States but it was withdrawn by President Roosevelt in 1905

and has not been reissued or replaced by an¬ other.

The practice of governments of issuing manuals for the information and guidance of their military and naval commanders marked an important step in the development of the laws of war. The effect was to define and reduce to written form many of the customs and usages governing the conduct of war on sea and land and thereby remove or reduce the possibility of harm which might result from ignorance or uncertainty on the part of com¬ manders as to what was permissible and what was forbidden by them.

The capital defect of these manuals, how-

ever, lay in the fact that being unilateral acts they were binding only upon the commanders and troops of the government which issued them and might be altered or revoked at any time. In short, they had no international bind¬ ing effect. What was needed to complete the process of development of which they were the starting point was an international code con¬ taining an authoritative definition and state¬ ment of the laws of war formulated and adopted by the whole body of states, which therefore would be binding upon all of them and which could not be altered at the will of any single state.

So far as the law of land warfare is con¬ cerned this need has now been met in a large degree and to a less extent it may also be said of the law of maritime warfare. This change has been brought about by the adoption of a number of international conventions and declarations, through the agency of conferences representing in some cases practically the whole body of states. These acts are the Declarations of Paris of 1856 and of Saint Petersburg of 1868, the Geneva Conventions of 1864 and 1906 and the Declarations and Conventions of the two Hague Conferences of 1899 and 1907.

The Declaration of Paris of 1856 represented the first attempt to embody in an international act certain rules regarding maritime warfare. It declared privateering to be abolished, estab¬ lished the immunity of private property, except contraband, from capture at sea, when found under a neutral flag and proclaimed that a blockade to be legal must be effective, that is, it must be maintained by a sufficient number of vessels to make the violation of the blockade hazardous to any ship which should undertake to pass the blockading cordon.

The declaration was framed by representa¬ tives of Austria, France, Great Britain, Prussia, Russia, Sardinia and Turkey. At the outbreak of the War of 1914 the only maritime powers which had not formally ratified or adhered to the declaration were the United States, Spain, Mexico, Venezuela, Bolivia and Uruguay. In practice the United States and Spain acted in accord with its rules during the Spanish- American War of 1898 and at the second Hague Conference in 1907 the delegations of Mexico and Spain declared that their govern¬ ments accepted the declaration in entirety. Its rules may therefore be now regarded as a part of the body of international law govern¬ ing the conduct of maritime warfare.

Eight years after the adoption of the Dec¬ laration of Paris, that is, 1864, a conference representing 16 states met at Geneva and framed the first Red. Cross Convention, the general purpose of which was to create certain immunities for the persons who are charged with the care of sick and wounded soldiers in war and for the hospitals, ambulances and material employed in such service. Within a period of four years nearly all the governments of Europe and America had become parties to the convention. In 1906 it was revised and improved by a second conference which also met at Geneva.

In the meantime, 1868, the Declaration of Saint Petersburg was framed by a conference representing most of the governments of Eu¬ rope. The parties te the declaration engaged

to refrain from using a certain type of bullet which by reason of character inflicted super¬ fluous injury upon those against whom it was employed. The declaration also affirmed the humanitarian principle that there are limits at which war ought to yield to the requirements of humanity, asserted that the only legitimate object which states should endeavor to accom¬ plish during war is to weaken the military forces of the enemy and declared that this object would be exceeded by the employment of arms which needlessly aggravate the suffer¬ ings of disabled men or render their death inevitable. The principle thus laid down, al¬ though criticized by some militarists like von Moltke, has been affirmed by the military manuals of many countries, and was incorpo¬ rated by reference in article 23 of the Hague Convention respecting the laws and customs of war.

The success of these efforts to reach an agreement as to certain rules and principles governing the objects and methods of war paved the way for further international legis¬ lation. In 1874 a conference representing most of the European powers met at Brussels and framed

a body of rules governing the conduct of .war on land but unfortunately it was not ratified by the powers and therefore remained without international force. Nevertheless its rules exerted a strong moral influence upon the conduct of the wars which followed, and many of them found their way into the military manuals issued by various governments for the guidance of commanders and troops in the field. Moreover it became the basis of the Hague Convention of 1899 respecting the laws and customs of war on land.

The high water mark in the movement to define and codify the laws and customs of war was reached in the work of .the two Hague Conferences of 1899 and 1907. ‘J’he first con¬ ference formulated and adopted «Aree conven¬ tions and three declarations, five of which deal with the conduct of war, the most im¬ portant of them being the convention respecting the laws and customs of war on land. The latter convention was ratified by the govern¬ ments of all the states represented at the con¬ ference and was later adhered to by the gov¬ ernments of 19 other states not represented at the conference. The conference of 1907 went much further and adopted 13 conven¬ tions and one declaration, 10 of which relate directly or indirectly to the conduct of war. (See Hague Conventions). The most import¬ ant of them was the convention respecting the laws and customs of war on land, which was mainly a revision of the corresponding con¬ vention of 1899.

In consequence of a clause which declared that the convention should be applicable only between the contracting parties, and then only if all the belligerents were parties, this con¬ vention as well as most of the. others of 1907 was not legally binding during the recent European War, because several of the bellig¬ erents have never ratified it. Nevertheless, the Convention of 1899 respecting the laws of war on land is binding upon all because all the belligerents were parties to it. Moreover, it is well to remember that many of the provisions of the conventions of 1907 were not new rules

but were merely declaratory of the existing cus¬ tomary law and as such they were binding inde¬ pendently of the status of the conventions in which they are incorporated — as much so as any other well-established customary rule of the law of nations. In some cases belligerent governments during the recent war took ad¬ vantage of the circumstances that the conven¬ tions of 1907 were not

technically binding, in order to avoid the obligations which the conventions created, but for the most part they proceeded on the theory that they were in fact binding and the governments of several of them announced at the outbreak of the war that they would observe their provisions pro¬ vided their adversaries would do likewise.

The Hague Conventions, so far as they relate to the conduct of war, deal mainly with war on land ; nevertheless several conventions were adopted relating to maritime war. Thus there was a convention relative to the conver¬ sion of merchant vessels into warships, a con¬ vention relative to the laying of submarine mines, a convention governing naval bombard¬ ments and a convention relative to certain restrictions upon the right of capture in naval warfare. The questions of blockade, contra¬ band, visit and search, transfers of flag, de¬ struction of prizes and others, however, were not dealt with by the Hague conventions. It thus happened, therefore, that a large part of the law of maritime warfare remained unwrit¬ ten and in the form of custom. As there were wide divergencies of opinion and practice in regard to some of these matters it was of the highest importance that a general agreement should be reached in these points and the results embodied in an international conven¬ tion. In consequence of the action of the Sec¬ ond Hague Conference in providing for the creation of an international prize court which should apply thd (

that in upholding its own rights it would rely upon the existing law of nations rather than upon the declaration.

In July 1916 the British and French govern¬ ments, partly in consequence of Germany's methods of submarine warfare and partly in consequence of changed conditions, revoked the earlier proclamations by which they had put the declaration into force with certain modifi¬ cations and promulgated a series of new rules which they would apply in respect to contra¬ band, continuous voyage, etc. While the dec¬ laration as such was thus thrown overboard, it may be said of it what has been said above of the Hague conventions, of 1907, namely, that many of its rules were not new but were merely declaratory of the existing customary laws and as such were binding upon the bellig¬ erents as much so as if the declaration had been formally ratified.

At the present time, therefore, only a com¬ paratively small part of the law of maritime warfare is to be found in the texts of inter¬ national conventions ; like the law of land war¬ fare a century ago, it still consists largely of custom and of judicial precedent. Owing to the

fact, however, that it has been the object of interpretation by prize courts for more than a century, it is now fairly well defined although as stated above there are still divergencies of opinion and of practice in regard to some im¬ portant questions. While the larger part of the law of land warfare is now written and may be found in the texts of the great inter¬ national conventions, there are still many ques¬ tions, reprisals, for example, that are unregu¬ lated, except by custom and usage. Both of the Hague conferences admitted that it had not been possible to agree upon regulations concerning all cases which might arise in prac¬ tice and they took the precaution to declare expressly in the preamble to the convention respecting the laws and customs of war on land that the high contracting parties did not intend that unforeseen cases should, in the ab¬ sence of a written undertaking, be left to the arbitrary judgment of military commanders and in <(cases not included in the regulations adopted by them, the inhabitants and the belligerents remain under the protection and the rule of the principles of the law of nations as they result from the usages established among civilized peoples, from the laws of humanity and the dictates of the public conscience.®

The European War has shown that some of the established rules of war law, those re¬ lating to blockade and contraband, for example, are not in harmony with present day conditions and will need to be revised; others are obsolete and many new rules will be necessary in con¬ sequence of the invention of new instrumental¬ ities for carrying on war. As to the exact changes that will be made in the new rules adopted it would, of course, be idle to speculate. See International Law.

Bibliography. — Bentwich, (The Declara¬ tion of London U Holland, T. E., (Laws of War on Land) (Introductory chapter) ; Speight, (War Rights on Land* (Chap. I) ; Renault, (War and the Law of Nations) (American Journal of International Law Vnl. IX, p. 1); (Rules of Land Warfare> (Washington, Gov¬ ernment Printing Office, 1914) ; (British Man-

ual of Military Law> ; Morgan, J. H., ‘The War Book of the German General Staff) (New York and London 1915).

James W. Garner,

Professor of Political Science, University of Illinois.

LAWSON, Andrew Cowper, American

geologist: b. Ansruther, Scotland, 25 July 1861. He was graduated at the University of Toronto in 1883, took his A.M. there in 1885 and his Ph.D. at Johns Hopkins in 1888. He served on the Geological Survey of Canada in 1882- 90, afterward becoming professor of mineralogy and geology at the University of California, where he is now dean of the College of Min¬ ing. He was a delegate to the Geological con¬ gresses at London 1888, Saint Petersburg 1897 and Toronto 1913; and served as chairman of the California Earthquake Investigation Com¬ mittee in 1906. He is a member of various scientific societies and in 1909-10 he was presi¬ dent of the Seismological Society of America. Author of numerous papers on geology.

LAWSON, Cecil Gordon, English painter: b. Wellington, Shropshire, 3 Dec. 1851 ; d. Lon¬ don, 10 June 1882. He exhibited at the Acad¬ emy in 1870, but many of his pictures were rejected by the hanging committee till 1878, when his 'Minister's Garden) and a 'PastoraP at the Grosvenor made him famous. He was highly esteemed by the poet-painter, Rossetti, and his works are now much valued. Consult Gosse, 'Cecil Lawson: A Memoir.)

LAWSON, Ernest, American landscape painter: b. Halifax, Nova Scotia, 1873. He studied art at the Art Students' League in New York under Twachtman and James Alden Weir and spent 1903-04 in study in France. He is of the Impressionist school in its best development and is especially happy in his rendering of both urban and rural scenes, con¬ fining his work chiefly to American subjects until 1916 when he spent a season painting in Spain. He was awarded the silver medal at the Saint Louis Exposition in 1904, the Ses- nan medal of the Pennsylvania Academy in 1907, the first Halgarten prize in 1908, the Altman prize in 1916, the gold medal at the San Francisco Exposition in 1915, the Corcoran silver medal in 1916 and the Inness gold medal in 1917. He was elected an associate of the National Academy in 1908. Among his paint¬ ings are 'Near High Bridge) ; 'The Abandoned Farm) (National Gallery, Washington) ; 'Road Down the Palisades) (1911) ; 'Hillside at In¬ wood) (1912) ; 'Evening, Palisades) (1913).

LAWSON, Henry Archibald, Australian poet, novelist and short story writer : b. Gren¬ fell, New South Wales, 1867. He worked on his father's farm, with the exception of some time spent in Sydney learning carriage-paint¬ ing, until he was 20 years of age, when he went to Melbourne and two years later to Albany, Western Australia.

There he worked as a house painter. While in Sydney he began contributing poems and stories to the Bulletin and this he continued long after he had left the city. So successful were these efforts that be secured a position on the literary staff of The Boomerang, Brisbane (1890-91). For the next five years he wandered about Australia, sometimes working at this trade, at others doing any kind of work that came to hand.

In 1897 he was a government teacher in New Zealand. Three years later he was in London. After three years' residence in England he re¬ turned to Sydney in 1902. There he continued at his trade and began working up more of his experiences into poems, sketches and short stories, which have about them a freedom, naturalness, boldness and sureness of touch that often suggests Kipling. Among his pub¬ lished works which are all provincial, and for that reason the more interesting, are 'Short Stories in Prose and Verse) (1895); 'In the Days When the World was Wide) (1896) ; 'While the Billy Boils) (1896) ; 'Verses Popu¬ lar and Humorous) (1900) ; 'The Country I Came from) (1901); 'Joe Wilson and his Mates) (1901) ; 'Children of the Bush) (1902) ; 'On the Track and over the Sliprails) (1905) ; 'When I was King and Other Stories) ; 'Star of Australia.)

LAWSON, John, American colonial sur¬ veyor-general : d. 1712. He was of Scotch birth ; began his surveys in 1700, and was an intelligent observer, enterprising and circum¬ spect, but fell a victim to the jealousy of the natives, who confounded the surveyor of their territory with those who despoiled them of it. He was captured by them during one of his explorations when in company with De Graffen- ried, a Swiss baron who contemplated coloniza¬ tion. The latter was permitted to buy himself free, but Lawson failed to propitiate their hos¬ tility and perished by the fire torture. He left one of the most valuable of the early histories of the Carolinas, of their feeble condition, their resources and aspects and their principal abo¬ riginal tribes. It is entitled 'A New Voyage to Carolina, containing the Exact Description and Natural History of that Country, together with the Present State thereof; and a Journal of a Thousand Miles Traveled through Several Na¬ tions of Indians, giving a Particular Account of their Customs, Manners, etc.) (1709). The volume is a quarto of 258 pages, well illus¬ trated with one of the best maps of the time, and with various other engravings, chiefly in natural history. It is now rare.

LAWSON, Thomas William, American

banker and author: b. Charlestown, Mass., 26 Feb. 1857. He was

educated in the public schools and in 1870 established himself as a banker and broker in Boston. He operated extensively in copper properties and was known as a particularly daring speculator. He became senior member of the firm Lawson, Arnold and Company, president of the Bay State Gas Company of Delaware, The Thomas W. Law- son Company,. the Trinity Copper Company and the First National Copper Company. He is a prominent yachtsman and in 1904-05 he at¬ tracted wide attention by his contribution to Everybody's Magazine of a series of articles, 'Frenzied Finance,) supposed to be an expose of the evils of speculation in copper, oil and stocks generally. Lawson's high financial standing and his reputation for daring on the exchanges enhanced the sensational qualities of the. attacks. Author of 'The KranlU (1887) ; 'History of the Republican Party) (1888) ; 'Secrets of Success) (1888); 'Collection of Poems and Short Stories from Magazines) (1888); 'Lawson's History of the American Cup) (for private distribution, 1902) ; 'Fren-

zied Finance) (1905); (Friday the Thirteenth) (1907) ; (The High Cost of Living) (1913).

LAWSON, Victor Fremont, American newspaper publisher: b. Chicago, 9 Sept. 1850. He was educated at Phillips Academy, An¬ dover, Mass. He inherited from his father an interest in a printing establishment, and in 1876 bought the Chicago Daily News, which, with his partner, Melyille E. Stone, he developed successfully, starting a morning edition in 1881 under the name of the Record. In 1888 he bought out his partner and became sole pro¬ prietor; in 1901 the Record was merged with the Times-Herald under the name of the Record-Herald and with the Inter-0 cean under the name of the Chicago Herald in 1914. He has been president of the Associated Press; has also been active in philanthropic work, and was active in support of the movement for a United States Postal Savings Bank, and started the Daily News Fresh Air Fund, which supports a sanitarium for sick children of the poor.

LAWSON, Sir Wilfrid, English states¬ man : b. Cumberland, England, 4 Sept. 1829 ; d. London, 1 July 1906. He early came into notice as a temperance advocate. In 1859 he was elected to Parliament for Carlisle, in which, with brief intervals, he sat for 47 years. In 1863 he introduced his first permissive or local option resolution for the regulation of the liquor traffic, and in 1864 brought in a bill on

similar lines. From 1868-85 he again repre¬ sented Carlisle; from 1886-1900 the Cocker- mouth Division of Cumberland, and from 1903 till 1906 the Camborne division of Cornwall, and was again returned for his old constitu¬ ency in 1906. He may be said to have devoted his life to the temperance cause, and was presi¬ dent of the United Kingdom Alliance. His local option resolution was an annual event in the House of Commons, and passed in 1880, 1881 and 1883. A strong Radical in politics, a devout churchman and a keen sportsman, — he was master of the Cumberland hunt — he was a brilliant platform speaker, whose humor was only the mask of a consuming earnestness of purpose. He was exceedingly popular in the House, and used to while away the tedium of. the lobbies by snatches of impromptu verse. Three volumes of his speeches have been pub¬ lished and he is joint author with Sir F. C. Gould of (Cartoons in Rhyme and Line) (Lon¬ don 1905).

LAWSON'S CYPRESS. See Cypress.

LAWTON, Henry Ware, American sol¬ dier: b. Manhattan, Ohio, 17 March 1843; d. San Mateo, Luzon, 19 Dec. 1899. He entered the military service as a private 16 April 1861 ; became captain 17 May 1862. He was mus¬ tered out 25 Nov. 1865, but entered the regular army as second lieutenant the next year; was transferred to the Fourth cavalry in 1871 ; and promoted to captain 20 March 1879. In 1876 he was conspicuous in the expedition against the hostile Sioux, took part against the Ute Indians in Colorado, in October 1879, and in the spring of 1886 was selected by General Miles to lead a picked body of troops into Mexico in pursuit of Geronimo. At the end of three months Geronimo and his band were captured. At the beginning of the Spanish- American War Lawton was a lieutenant-

colonel, and was made a major-general of vol¬ unteers 8 July 1898. He was in command of the Second Division of the Fifth army corps before Santiago, and at the close of the war was transferred to the Philippines where he began active operations against the insurgents and after capturing Santa Cruz, a Filipino stronghold, 10 April 1899, and San Isidro, 15 May, was placed in command of Manila, 1 June. In the autumn he began an offensive campaign looking toward the capture of Aguinaldo, and was killed in the battle of San Mateo.

LAWTON, William Cranston, American educator and author: b. New Bedford, Mass., 22 May 1853. He was graduated from Harvard in 1873 and later studied at the University of Berlin. He was a member of the Assos ex¬ pedition in 1881 ; in 1895-1907 he was professor of Greek language and literature at Adelphi College, Brooklyn, and he

was afterward pro¬ fessor of literature at Hobart College, Geneva, N. Y. He was secretary of the Archaeological Institute of America in 1890-94. He has con¬ tributed extensively to magazines and was classical editor and contributor to (Warner's Library of the World's Best Literature) ; au¬ thor of (Three Dramas of Euripides) (1889) ;

(Folia Dispersa) (verse) ; (Art and Humanity in Homer) (1896); (New England Poets) (1898) ; Successors of Homer) (1898) ; Tope's Hamer) (1900); (Histories of Greek and Latin Literature) (1903) ; (Ideals in Greek Literature) (1905), etc.

LAWTON, Okla., city and county-seat of Comanche County, one of the three counties formed from the Comanche reservation and added to Oklahoma Territory 6 Aug. 1901. It is situated on the Chicago, Rock Island and Pacific and the Saint Louis and San Francisco railroads, about 90 miles southwest of Okla¬ homa City. Its principal industries are agricul¬ tural (especially cotton-growing) and the manu¬ facture of cottonseed-oil. The local water sup¬ ply is owned by the city; an extensive irriga¬ tion system in the neighborhood has been in¬ stituted by the government. Among the inter¬ esting features are Fort Sill, United States military post, the Wichita National Forest and Game Preserve, <(Medicine Park® and the Fort Sill Indian School. The city was named in honor of Gen. Henry W. Lawton (q.v.), a very able American officer who lost his life in the war in the Philippines. Pop. (1920) 8,930.

LAWYER. See Attorney ; Counsellor at Law.

LAWYER, common name given locally to certain fishes of different parts of the United States. They are the burbot, sometimes called also Hake lawyer® ; the mudfish or bowfin ; the stilt sandpiper and the mangrove snapper.

LAWYER, Rights and Duties of. See

Counsellor at Law.

LAXATIVE, a term applied to medicines and articles of food which without causing irritation evacuate the contents of the intestines. The terms aperients, lenitives and eccoproctics are also employed to cover the same meaning. Laxative articles of food, the use of which causes daily intestinal evacuations, contain con¬ siderable quantities of indigestible matter; some of them salts and acids which act in much the same way as the saline laxatives, and

others, notably fruits and vegetables containing quantities of cellulose, which is indigestible in the main, by increasing the bulk of the faeces distends the intestines and induces easy evacu¬ ation. Among the laxative fruits are prunes, figs, pears, apples, oranges, peaches and berries. The laxative foods consist of the unboiled meal of cereal grains, such as graham or whole wheat flour, cracked wheat, oatmeal and Indian meal and pure bran. Honey, molasses and brown sugar are likewise usually effective in promoting a daily intestinal evacuation, and in some cases a glass or two of cool water taken immediately after arising will produce the same result. Laxative foods generally increase the appetite, due to the incomplete digestion of considerable nutritive matter caused by its mixture with cellulose or woody fibre. As a rule, the articles of food most easily assimilable result in constipation unless mixed with the bulky foods which are never wholly digested. Laxative medicines are called into use when a laxative diet has failed to produce the desired result, or when its use is inadvisable and when other hygienic measures are ineffective or can¬ not be employed. They include manna, tama- rindus, magnesia, salts, sulphur, castor-oil, rhubarb, senna, cascara sagrada, phenolphtha- lein and the preparations of liquid paraffine. The use of liquid paraffine, promoted by Sir Arbuthnot Lane, has the effect of softening and rendering more bulky the contents of the in¬ testines, thereby producing gentle evacuation without the paraffine's exerting other medicinal effect. The liquid paraffine is variously known as liquid ˆ albolene, liquid vaseline, Russian mineral oil, and there are many variations of the product under proprietary control.

LAXENBURG, Lower Austria, village nine miles south of Vienna, on the Schwechat River. Its palace is one of the summer homes of the Austrian imperial family. The Imperial Park, which is open to the public, consists of 1,000 acres, covers 17 islands in the Schwechat River and was laid out in 1782-98, following the English style. The Altes Schloss is used as a hunting lodge and was rebuilt in 1693 after its destruction by the Turks. The Neues Schloss dates from 1752 in the reign of Maria Theresa and Joseph II. The Franzenburg dates from 1799 and is noted for its art collections. Pop. about 1,000.

LAY, Benjamin, British-American philan¬ thropist : b. Colchester, England, 1677 ; d. Ald¬ ington, Pa., 3 Feb. 1759. His parents were Quakers, . and he illustrated in his life the hu¬ mane principles which the Society of Friends has so long conspicuously represented. At 18 he adopted a sailor's life, and for some years followed the sea. In 1710 he was married and lived again for a while at Colchester; after¬ ward went to Barbadoes, where he became a merchant ; but having aroused hostility by his denunciation of slavery, removed from the island (1718) to Philadelphia, where his anti¬ slavery agitation was continued. Of numer¬ ous tracts which he wrote on slavery one was published by Franklin, entitled (A11 Slave Keepers, that Keep the Innocent in Bondage, Apostates) (1737). He was influential in bringing the Friends in this country to take a more decided stand against slave-holding, and just before his death a resolution was passed

condemning those who still held slaves. He did not, however, confine his reforming endeavors to one direction, but labored for a more humane treatment of criminals, and discouraged the use of animal products whether for food or clothing, the use of tea and tobacco, and on one occasion tried to fast for 40 days in imitation of Christ. He is described as a singular figure, dwarfish and hunchbacked, and presenting an appear¬ ance of poverty. He was buried in the Friends' burying-ground at Abington.

LAY, Henry Champlin, American Prot¬ estant Episcopal bishop: b. Richmond, Va., 6 Dec. 1823 ; d. Easton, Md., 17 Sept. 1885. He was graduated at the University of Virginia, ordained deacon (1846) and priest (1848). He was consecrated missionary bishop of the Southwest (1859) and translated to the diocese of Easton (1869). During the Civil War the episcopal charge of Kansas was as¬ signed to him, that State being then erected into a diocese. The revision of the lectionary was largely due to Bishop Lay; while he was engaged on the Standard Prayer Book up to his death. He was the author of (Studies in the

Church > (1872) and (The Church and the Nation > (1885).

LAY, John Louis, American inventor : b. Buffalo, N. Y., 14 Jan. 1832; d. New York, April 1899. In July 1862 he was appointed sec¬ ond assistant engineer in the United States navy, and in 1864 invented a new torpedo. By means of this apparatus Cushing destroyed the Albemarle, a Confederate ram. When Admiral Porter advanced up the James River after the evacuation of Richmond, Lay was employed to clear away the submarine obstructions. He was engaged by the Peruvian government to mine the harbor of Callao, in view of a Spanish at¬ tack, but his main work as an engineer and in¬ ventor was the construction of the dirigible torpedo, which bears his name, and was pur¬ chased by the United States government.

LAY DAYS, maritime law term designat¬ ing the stipulated number of days granted to the charterer of a vessel for shipping or un¬ loading cargo, during which time no charge may be made for wharfage. The sum charged for days ini excess of the number allowed in the charter is called demurrage and its amount is usually fixed in the charter. The period of lay days begins at the arrival of the vessel in port, and, in the absence of custom or agree¬ ment . to the contrary, includes Sundays. In maritime insurance lay days also designate a period, commonly limited to 30 days, for which rebate of insurance may be demanded while a ship has remained idle and without fires at a dock.

LAY READER, a lay man authorized by the bishop in Anglican and Episcopal churches to read certain portions of the service, certain approved sermons and to conduct funeral serv¬ ices. Lay readers were first appointed under Edward VI in 1560, and the order continued in England until the 18th century. It was revived in the United States because the limited num¬ bers of the clergy made it impossible to com¬ pass the expansion of the missions, and in many places services were for years conducted solely by lay readers. These are appointed by the

bishop and receive a license for one year, their powers being very particularly defined by the canons. In England the office was revived in 1866, and in 1905 the regulations concerning its scope were revised. Consult Hotchkin, S. F., (Importance and Usefulness of Lay Reading5 (1892); Restarich, H. B., (Lay Readers)

(1894).

. LAYA, la’y4 > Jean Louis, French dram¬ atist : b. Paris, 4 Dec. 1761; d. there, 25 Aug. 1833. He had written several comedies and tragedies before the production in 1793 of his (L Ami des lois5 at the Theatre Francois. The play embodied a highly courageous protest against mob rule, daring to characterize Robes- pierre and Murat with scarcely a pretense of disguiseˆ only 19 days before the execution of Louis XVI. Prohibited by the Commune, but demanded by the populace, the play was pro¬ duced after an appeal to the Convention, 30,000 Parisians guarding the theatre. Laya escaped from Paris and remained away until the end of the Terror, but a number of persons convicted of having copies of the play in their possession were guillotined. He was appointed to the Paris chair of literary history and French poetry in 1813, and in 1817 was elected to the Academy. His work is notable chiefly for its unusual influence at the time of its production. Author of (Essai de deux amis) (1786) ; (Vol¬ taire aux Frangais5 (1789); (Les Dangers de 1’ opinion > (1790) ;

LAYAMON, la’yˆ-mon, or LAWEMAN,

la’man, British chronicler. He lived early in the 13th century, and was a priest ministering at Radstone, now known as Areley Regis, on the Severn, in Worcestershire. He is the au¬ thor of a metrical romance, (The Brut,5 which is mainly an amplified version of the French (Roman de Brut) (q.v.), the latter being itself a compilation with additions from Geoffrey of Monmouth’s (Historia Britonum.5 As history or literature its value is slight, but it is of high philological importance, and exhibits the Eng¬ lish language in its period of transition and be¬ fore it had become Gallicized, as in the Can¬ terbury Tales) of Chaucer. In fact, there are not more than 90 words derived from the French in the whole poem of 56,000 lines. Con¬ sult the London Society of Antiquaries edition of (Brut,5 edited by Sir Frederick Madden (1847) ; Ten Brink, (Early English Literature5 (Vol. I, trans. New York 1883).

LAYARD, la’ard, Sir Austen Henry, Engj lish traveler and archaeologist: b. Paris, 5 March 1817; d. London, 5 July 1894. He was of a family originally French; was partly edu¬ cated in Italy; began to study law, but gave up this work and entered upon a course of travels in the East. Before he was 23 he had traveled in most of the larger European countries; in 1840 he was on the banks of the Tigris, and.be- fore the end of his career had “won distinc¬ tion as a traveler, archaeologist, politician, diplo¬ matist and student of the fine arts.® In 1845 he began the excavations in Assyria (q.v.) for which he first

became celebrated. . The results of his discoveries on the site of Nineveh (q.v.) were published in 1849-53. In 1849 he was ap¬ pointed attache to the British embassy at Con¬

stantinople. At first he paid his own expenses in his researches, but afterward received gen¬ erous assistance from Lord Stratford de Red-cliffe, then English Ambassador in Constanti¬ nople, and still later £3,000 voted by the House of Commons was used by the trustees of the British Museum for continuing Layard's ex¬ cavations. In 1852 he entered Parliament as a Liberal, and became Under-Secretary of State for Foreign Affairs 1860-66. He was lord rec¬ tor of the University of Aberdeen, 1855-56. In

1868 he was appointed chief commissioner of works and privy councillor; went to Spain in

1869 as British Ambassador, and 1877-80 was Ambassador to the Ottoman Porte. In 1878 he was created K.C.B., and was made a foreign member of the Institute of France in 1890. He wrote much on the history of painting, was a leading spirit in the Arundel Society and a trustee of the National Gallery. His writings include (Nineveh and Its Remains5 (1849) ; (Nineveh and Babylon5 (1853) ; (Monuments of Nineveh5 (1849-53) ; (Inscriptions in the Cuneiform Character from the Assyrian Monu¬ ments5 (1851) ; (Early Adventures in Persia, Susiana and Babylonia5 (1887, 1894). Consult his Autobiography5 (1902).

LAYCOCK, la'kok, Thomas, English phys¬ iologist: b. Wetherby, Yorkshire, England, 10 Aug. 1812; d. Edinburgh, Scotland, 21 Sept. 1876. He was the earliest to put forth the theory of the reflex action of the brain. This was in 1844, and in 1855 he became professor of the practice of physic and of clinical medicine at Edinburgh University. He published (Mind and Brain5 (1860) ; (Methods of Medical Ob¬ servation5 (1856), etc., and wrote many pro¬ fessional papers on sanitary science, insanity, etc.

LAYERING, in horticulture, is a mode of propagating plants by bending down a young branch and covering part of it with earth, thus causing it to shoot forth roots before it is sepa¬ rated from the parent stalk. The portion cov¬ ered with soil has often a notch cut in it below, or a tight ligature is applied. The free return of the sap is thus prevented, and the formation of roots from buds is promoted. The time which must elapse between the cutting or bind¬ ing of the shoot and its separation from the parent plant varies greatly, a few months suffic¬ ing in some cases, while two years are requisite in others. This

mode of propagation is em¬ ployed for pinks, hortensias, heaths, gooseber¬ ries, etc.

LAYMAN'S MISSIONARY MOVE¬ MENT, a movement which grew out of a mis¬ sionary prayer meeting held in the chapel of the Fifth Avenue Presbyterian Church in New York 15 Nov. 1906, planned to commemorate the centennial of the famous Haystack Prayer¬ meeting held at Williamstown, Mass., from which the modern missionary movement re¬ ceived its impetus. The movement is not a society for missionary work, but is an inter¬ denominational movement designed to aid the denominational boards already in existence. The object is two-fold: the education of the people so that there shall be a general under¬ standing of missionary methods, plans and needs, and second, the examination of the for¬ eign mission work in the field by commissions

of laymen who pay their own traveling ex¬ penses. The movement has been recognized by most of the churches. In the first stages of its work banquets and get-together meetings were held in all the large cities of the United States and Canada. Later great coruventions of lay¬ men have been held within denominational lines, notably by the Presbyterian Church, the Methodist Episcopal Church and the Methodist Episcopal Church, South. The proceedings of most of these conventions have been published in full. These conventions have discussed more than the missionary movement. They have in¬ cluded in their programs many things per¬ taining to a general forward movement of the Church. The movement spread to England and Scotland in 1907. By invitation six American laymen represented the movement to the people of Great Britain. Within 30 days Eng¬ land and Scotland each had an organization at work. The movement employs a general secre¬ tary with headquarters at 1 Madison Square, New York. There is no membership and no organization- apart ;from a series of com¬ mittees. There is a general committee of ap¬ proximately 100 laymen, which meets annually, giving general direction to the movement. An executive committee of 25 members meets each month in New York city, giving closer supervision to the work. Division committees are developed in different sections of the United States to give immediate, direction to the work in their own territory. In each separate city, community or county where work is un¬ dertaken a co-operating committee of the move¬ ment is organized to give it direction and assistance. Detailed suggestions are

printed for the guidance and help of such committees.

The chief features of a standard missionary church, as emphasized by the Laymen's Mis¬ sionary Movement, are the following: 1. A missionary pastor. 2. A missionary committee. 3. A missionary Sunday school. 4. System¬ atic missionary education, including : a. Regu¬ lar missionary meetings, b. The use of mis¬ sionary literature, c. Organized mission study classes. 5. A program of prayer for missions. 6. An annual every-member canvass for mis¬ sions. 7. The weekly offering for missions.

By the use of these methods whole cities have already more than doubled their entire previous missionary offerings. It is the purpose and hope of the movement to assist in enlisting the men of all churches in the steady support of a missionary policy adequate to the presenta¬ tion of the gospel of Christ to every creature.

When the Laymen's Movement began its work very few churches had discovered the value of the missionary committee. The rea¬ sons for having such a committee in every con¬ gregation may be summarized as follows:

The missionary committee 1. Divides and locates responsibility. 2. Enlists lay activity. 3. Reinforces the pastor's efforts. 4. Chal¬ lenges to the study of missions. 5. Provides a great opportunity for Christian service. 6. Reaches the membership individually. 7. Stimulates the spiritual life of its members. 8. Greatly increases intelligence, intercession and offerings.

Many thousands of these committees have been appointed as the result of the agitation conducted by the Lavmen's Movement. It is estimated that some hundreds of thousands of

laymen are now serving as members of such committees.

Missionary offerings have increased largely as a result of the movement. In 1905, the year before the movement was organized, the churches of the United States and Canada were giving $8,120,725 for foreign missions. In 1915 they gave $18,793,000, a cumulative gain of a million dollars a year. In other words, the churches were now giving $10,000,000 a year more than they gave in 1906.

From its inception in 1906 to 1916 the Movement organized fully 3,000 conferences and conventions, attended by at least a million men. Two national campaigns have been con¬ ducted in which there was a paid registration of 175,000 delegates. The first national cam

paign, in 1909-10, closed with a congress in Chicago, the second, in 1915-16, culminated in a similar national congress in Washington, D. C.

The periodical of the movement, Men and Missions, has been published regularly since 1909, millions of pieces of printed matter have been distributed and a vast amount of publicity has been given the missionary enterprise in the press and in connection with the conventions of the Movement.

LAYNEZ, li'nath, or LAINEZ, Diego,

de-a'go, second general of the Jesuits: b. Al- mancario, near Siguenza, Castile, 1512; d. Rome, 19 Jan. 1565. He studied in Alcala and Paris, in which latter town he joined with Ig¬ natius Loyola in founding the order of Jesuits. His especial work was to travel over Europe to gather new members and spread the influence of the order, when its constitution had been confirmed and approved by Pope Paul III (1540). He was very successful in extending the Society of Jesus. He was a man of marked ability and as a consulting theologian took a conspicuous part in the Council of Trent. He had succeeded Loyola as general of the Jesuits in 1556. On the death of Paul IV he avoided the chance of election to the tiara, and refused a cardinal's hat. Consult Boero, (Vie du P. Jacques Lainez) (1894).

LAYS OF ANCIENT ROME. Macau¬ lay's purpose in the (Lays of Ancient Rome' (published 1817) was to recreate some of the old folk poems which he suspected to have been the sources of some of the most striking inci¬ dents recorded by the historians of early Rome. For models he took Homer and the English popular ballads. The Lays sound neither like Homer nor any ballad, but like Macaulay. He adapted the ballad stanza almost out of all recognition to fit his own ringing rhetorical style, and he used his classical learning to sup¬ ply abundant concrete details for that vivid description of men and places and for that vigorous narrative for which he was famous. This is particularly true of ˆoratius,* where the subject, with its contrasted personalities and stirring action, was especially congenial. It is almost as true of (The Battle of Lake RegillusP though the incident there is neither so striking nor coherent. It is not so true of

Up to 1875 a hundred thousand copies had been sold. They are not

great poetry, but Macaulay himself, who used to recite

William Haller.

LAZARETTO, a name given in Italy and other parts of southern Europe and also in Hawaii and in California to isolated hospitals for such as are afflicted with contagious dis¬ orders. The name is derived from Saint Laz¬ arus, who (from the unauthorized idea that he was a leper) is the patron saint of lepers; and during the Middle Ages, when leprosy was common in Italy and other parts, the hospitals in which the lepers were confined received that name, and the lepers themselves were called lazzari. Howard wrote (An Account of the Principal Lazarettos in Europe5 (1789). Those buildings and enclosures attaching to seaport towns chiefly on the Mediterranean, where the crews and passengers of ships from places where contagious disease is known to prevail, are also called lazarettos. These laz¬ arettos consist generally of various detached buildings, with courts between, the whole being surrounded by a wall and placed in an airy situation outside the town or sometimes on a small island near the coast. See also Quarantine.

LAZARILLO DE TORMES, la'tha-re'- lyo da tor'mas, the first of the picaresque or rogue novels and the most complete early ex¬ ample of modern realistic fiction, takes im¬ portant rank in the history of literature as a satiric picture of Spanish life during the Re¬ naissance, of vividness, directness and power. The story, although a sequence of episodes or adventures presented from the point of view of below stairs, possesses exceptional unity of characterization in which the satire is wholly fused, the progress of the action developing through the pursuit of various forms of false pretense as the anti-hero, or picaro, passes through the service of masters unprincipled as himself, who are differentiated from him by superior experience and social position, and by the hypocrisy which the support of ttieir position entails. In style the book is simple and vigorous, with the bluntness of common speech, antedating the affectations of the Golden Age, surpassing in force and restraint the later productions of the picaresque school, all of the characteristics of which are to be found clearly marked in its pages. The prototypes of La- zarillo must be sought among the fabliaux and later kindred Spanish developments at the hands of the archpriest of Hita and others; to these the (Celestina5 and the precept of classical writers, Apuleius and Petronius, may be added. A number of traditional mediaeval tales are also incorporated. The influence of the story was continuously active during the 17th and 18th centuries, especially in the novel of Field¬ ing and Smollett, while the (Gil Bias5 of Le Sage is a direct descendant. Of the seven

episodes, or treatises, of the original work, the first, in which the boy Lazarillo enters the service of the blind beggar, is the most mordant and real, the apparent fruit of direct observa¬ tion.

The earliest known editions are those of Alcala and Burgos, 1554, based probably upon an original issued during the preceding year. Both were published anonymously, but in 1607 the authorship was attributed to the poet di¬ plomatist, Diego Hurtado de Mendoza, whose claim has since been rejected by competent scholars. Previous to publication, (Lazarillo5 circulated in manuscript, to which fact variants in the versions current may be ascribed. An anonymous continuation appeared at Antwerp in 1555, but the most familiar of the second parts is that by Juan de Luna, a Spaniard resident at Paris (1620). All these second parts are fantastic and in large measure alle¬ gorical, missing both the spirit and force of the original. (Lazarillo5 was nrohibited in the Index Expurga to rius of 1559, since which date it has circulated in Spain chiefly in mod¬ ified form as the (Lazarillo Castigado.5 David Rowland completed an English translation (London 1576), probably through the French. Subsequent renderings are by Thomas Roscoe, (1832), and Louis How (New York 1917) ; upon scholarly and literary grounds, How's version is the most satisfactory. For history and bibliography of (Lazarillo,5 consult Chand¬ ler, F. W., (Romances of Roguery5 (New York 1899) ; Fonger de Haan, (A.n Outline of the History of the Novela Picaresca in Spain5 (The Hague and New York 1903); Menendez y Pelayo, M., (Origenes de la Novela Espanola5 (Madrid, in the (Nueva Biblioteca de Autores Espanoles5); also C. P. Wagner's introduction to How's translation.

John Garrett Underhill.

LAZARI.STS, or FATHERS OF SAINT LAZARUS, a congregation of the Roman Catholic Church, originally known as ((Priests of the Mission,55 founded at Paris by Saint Vincent de Paul in 1625 for the purpose of supporting missions and ministering to the spiritual wants of the poor at home, and in foreign parts, especially Barbary. The founda¬ tion was confirmed by letters patent of Louis XIII, May 1627, and the missionaries were erected into a congregation by Pope Urban VIII in 1631. At the time of the Revolution they included 1,195 members and 63 houses. In 1817 they established themselves in the United States. See Orders, Religious.

LAZARUS (abridged form of the He¬ brew name Eleazar, ((God has helped55), name of two persons in the New Testament. 1. Lazarus of Bethany, brother of Martha and Mary, and a friend of Jesus. John xi, xii, narrates the miracle of Jesus raising Lazarus from the dead after

he had lain four days in the tomb. Beyond the mention of Lazarus' presence at the banquet which Simon the Leper gave Jesus (Matthew xxvi, 6-16; Mark xiv, 3-11; Luke x, 40; John xii, 1-11) there is no further reference to him or the miracle of his raising from the dead. The miracle is stated in John xii, 1-11, to have produced a great effect upon the Jews, converting many to a belief in Jesus and thereby caused the high priests to seek the death of Lazarus as well as of Jesus. There has been a wide controversy concerning the authenticity of the miracle, grounded in part upon the failure of the other Synoptists to mention it despite its significance. Supporters of the actuality of the miracle are

inclined to consider doubts cast upon it as evi¬ dences of enmity to Christianity. (2) The beg¬ gar in the parable "Lazarus and Dives® (Luke vi, 20), this constituting the only occurrence of a proper name in a parable, and used prob¬ ably merely as characterization, and not with any thought of connecting the beggar with Lazarus of Bethany. The description of the beggar at the gate of the wealthy Dives, covered with sores and longing vainly for the crumbs from the table, doubtless gave rise to the assumption that he was a leper, an un¬ founded belief which nevertheless became widespread and the name passed into many languages as identified with leprosy. The story appears only in the gospel of Luke.

LAZARUS, Emma, American poet; b. New York, 22 July 1849; d. there, 19 Nov. 1887. Trained at home under the personal direction of her father, Moses Lazarus, a New York mer¬ chant of prominence in the social and busi¬ ness world, she early displayed intellectual promise. From her childhood books were her most precious possession and her mind was turned to poetry for its utterance — the Civil War inspiring her first lyric outbursts. Her earliest productions, (Poems and Translations) 0867), were marked by a seriousness if not sombreness, incomprehensible in one so young, whose life, too, was full of happy anticipations. In her second volume, four years later, there was more artistic completeness, and a certain consciousness of power gave more strength to her verse. Her (Admetus and Other Poems> (1871) was favorably received, and its classic atmosphere showed distinct talent, while, side by side with its imaginings in (Admetus) and

and appeared about the time of the Russian Jewish persecution of 1882, although it was written without any reference to those out¬

breaks. In the American movement to aid the refugees, she took a helpful part. She wrote for The Century (May 1882) an impassioned article, (Russian Christianity versus Modern Judaism, > wherein she championed her brethren and refuted their critics and assailants. In prose and verse she further strove to vindicate her ancestral creed and inspire its followers to brotherhood and useful activity. In The Century for February 1883 she pleaded for “a restored and independent nationality and re¬ patriation in Palestine.® After her father’s death in March 1885 her own health failed slowly and the end came in November 1887, just at the time when her powers were ripest and her opportunities seemed at their greatest. In addition to the volumes already named she published (Poems of Heinrich Heine) (1881) ; (Songs of a Semite) ; (The Dance to Death, and Other Poems* (1882). Her collected poems were issued in two volumes in 1889.

Abram S. Isaacs,

Professor of Semitic Language, New York U niversity.

LAZARUS, la’tsa-rus, Moritz, German philosopher: b. Filehne, Posen, 15 Sept. 1824; d. Meran, Tyrol, 13 April 1903. He was the son of a Jewish scholar, was educated in Hebrew literature and history, and studied law and philosophy at the University of Ber¬ lin. He was professor in the University of Berne in 1860-66, professor of philosophy at the Military Academy at Berlin in 1868-73, and in 1873 was appointed professor at the University of Berlin. His philosophy was a development of the Herbartian theory and he became a leader in that school. With H. Steinthal he founded the Zeitschrift fur V olkerpsychologie und Sprachwissenschaft in 1859, and made numerous contributions to it. He was president of the first and second Jew¬ ish Synods at Leipzig, 1869, and Augsburg, 1871. He received the title Geheimrath on his 70th birthday. Author of (Das Leben der seele) (1855-57; 3d ed., 1883); (Ueber den Ersprung der Sitten* (1860; 2d ed., 1867); (Ueber die Ideen in der Geschichte> (1865; 2d ed., 1872) ; (Zur Lehre von den Sinne- tauschungen* (1867) ; (Ideale Fragen* (1875 ; 2d ed., 1885); (Erziehung und Geschichte* (1881); (Unser Standpunkt* (1881); (Ueber die Reize des Spiels) (1883) ; (Der Prophet Jeremias> (1894) ; (Die Ethik des Judentums) (1898; new ed., 1911) ; (Die Erneuerung des Juden- tums* (1909).

LAZETCHNIKOV, la-zecUnye-ko-f, or LAZHECHNIKOV, or LAZJETJNIKOV, Ivan Ivanovitch, Russian novelist and dram¬ atist b. 1794; d. 1869. He was engaged in teaching after his retirement from the army in 1819 and gained considerable success as a writer of historical romances and of dramas. Author of (Poslednii Novik*

(1833); (Ledi- anyi Dom) (1835) ; ˆasurman* (1838). His collected works were published at Petrograd (1858; new ed., 1884).

LAZULI FINCH, a small brilliantly blue finch (Cyanospiza amoena) of the Western States, frequently kept as a cage-bird. It is

much like its relative, the eastern indigo-bird

(q.v.).

LAZULITE, a mineral, which is not to be confused with lapis lazuli (q.v.), is found in Austria, Switzerland, Sweden, Brazil and in North Carolina and Georgia. It occurs mas¬ sive and also well crystallized in monoclinic crystals of steep-pyramidal habit. It has a fine blue color and vitreous lustre and is semi- translucent. It is moderately hard, but brittle ; specific gravity, 3.1. It is a hydrated phosphate of aluminum, iron and magnesium, but it also contains lime, and sometimes silica.

LAZZARONI, lad'zq-ro'ne, Italian name lor the poorest class in Naples, people who are homeless and live chiefly by begging, although intermittently they may fish and perform odd jobs. There was a rising among them in French Revolutionary times and during the Napoleonic era, their sympathies being with the Bourbons. At that time they attacked and pil¬ laged people of wealth and of the nobility whom they suspected of sympathy with the new era.

LE BAS, Philippe, fe-lep le-ba, French his¬ torian and archaeologist: b. Paris, 17 June 1794; d. there, 1861. At 16 he entered the navy, which he left three years later for the army and he shared in the campaigns of 1813-14. In 1820 he was chosen by Queen Hortense to act as tutor to Prince Louis Napoleon, later Napo¬ leon III, with whom he remained until Octo¬ ber 1827. After holding professorships at Paris successively of history and of the Greek language and literature, he was commissioned in 1842 by the French government to under¬ take a tour of archaeological investigation in Greece and Asia Minor, during which he made many valuable discoveries. He published books on very varied subjects, embracing essays on classical inscriptions, editions of ancient au¬ thors, travels, ancient and mediaeval history, politics, instruction in German and translations from German and English. His best-known works are his Explication des inscriptions grecques et latines recueillees en Grece) (1835-37) and { Voyage archeologique en Grece et en Asie Mineure) (1847 et seq.).

LE BLANT, le blah', Edmond Frederic,

French archaeologist: b. Paris, 12 Aug. 1818; d. there, 3 July 1897. He began his archaeo¬ logical investigations while on a journey to Rome in 1847 and thereafter made the study his lifework, specializing in Christian epig¬ raphy and the history of early Christian in¬ stitutions in France. His investigations in these fields are of acknowledged importance. He was elected to the Academy of Inscriptions in 1867, and in 1883-89 he was director of the Rcole Franqais at Rome. Besides numerous scientific papers he was author of (Inscriptions chretiennes de la Gaule anterieures au Viii erne siecle> (1856-65) ; (Manuel d'epigraphie

chretienne) (1869) ; (Les sarcophages chre- tiens de la Gaule> (1886); EEpigraphie chretienne en Gaule et dans l'Afrique romaine) (1888) ; (Les persecuteurs et les martyrs aux premiers siecles de notre ere) (1893), etc. He collaborated with Jacquemart in the preparation of (Histoire artistique de la Porcelain*

(1861-62).

VOL 17—U

LE BLOND, le'blond', Elizabeth Alice Frances (Mrs. Aubrey), British author and Alpinist: b. Wicklow County, Ireland, about 1860. She was the only child of Sir St. Vincent Bentinck Hawkins- Whitshed, Bart., and succeeded to the title of a Hanover baron¬ ess. She was married to Col. Frederick Burnaby in 1879, widowed in 1885 ; married to John Frederick Main in 1886 and widowed in 1892 ; and in 1900 she was married to Aubrey Le Blond. She is famous as a mountain climber making the most difficult ascents in the Swiss and Dauphine Alps and in Arctic Norway. She was elected first president of the Ladies' Alpine Club in 1907. She has been an extensive con¬ tributor to periodicals, makes the photographs used to illustrate her travel books and has lectured on mountain climbing, using her own slides as illustrations. Author of (The High Alps in Winter> (1883) ; (High Life and Towers of Silence) (1886) ; (Adventures on the Roof of the World) (1904); Mountain¬ eering in the Land of the Midnight Sun) (1908) ; (A Guide to Old Gardens in Italy) (1912);

LE BOEUF, le'bef', Randall James, Amer¬ ican lawyer : b. Cohoes, N. Y., 10 March 1870. He received his education at Cornell Univer¬ sity and was admitted to the bar in 1893. After practising in New York city he returned to Albany and became a member of the firm of Burlingame and Le Boeuf. Since 1898 he has practised alone. From

1897-1901 Le Boeuf was corporation counsel of the city of Rens¬ selaer, and in 1909 was appointed justice of the Supreme Court of New York, retiring in 1911. He was a member of the New York State Banking Commission which revised the banking laws in 1913. Judge Le Boeuf has traveled extensively in Alaska, West Indies and on the Continent.

LE BON, le bon', Gustave, French physi¬ cian, ethnologist and psychologist: b. Nogent- le-rotrou, 1841. He received his M.D. in 1876 but abandoned the practice of medicine for ethnological and psychological research. He was appointed chief of the government expedi¬ tion to India for the study of the architecture of the Buddhist monuments in 1884. Author of (L'Homme et les societes* (2 vols., 1877) ; (Les monuments de L'Inde) (1894) ; (Lois pyschologiques de revolution des peuples* (1895; English translation, (The Psychologies of the Peoples,* 1898; 2d ed., 1912) ; (L'Evolu- tion des forces* (1899; English translation, 1908); (Psychologie ded'education* (1904; 13th ed., 1909); (L'Evolution de la matiere* (1905; English translation, 1907) ; (La revolution fran- caise et la psychologie des revolutions* (1912; English translation, (The Psychology of Revo¬ lution^ 1913), etc.

LE BON, Joseph, French politician: b. Arras, 29 Sept. 1765; d. Amiens, 10 Oct. 1795. He entered the priesthood, was professor of rhetoric at Beaune and later joined the revo¬ lutionists. He served as mayor of Arras and administrator of Pas-de-Calais; and in 1793 took his seat in the Convention. Under a commission by the Convention he succeeded in preventing Cambrai from being taken by the

Austrians, displaying marked courage and ability. Later, however, the severity of his dealings with the opponents of the Revolution in the departments of the Somme and Pas-de- Calais, coupled with the enmity of his political adversary, Armand Cuffroy, caused his trial before the tribunal of the Somme and his sub¬ sequent condemnation and execution. Consult Emile le Bon, (Histoire de Joseph le Bon et des tribunaux revolutionnaires d'Arras et de Cambrai5 (2d ed., 2 vols., 1864).

LE BOULENGE, le boo'lan'zha, or LE- BOULANGE, Paul Emil, Belgian soldier: b. Mesnil-Eglise, 11 March 1832; d. Ostend, 30 May 1901. He early entered the artillery ser¬ vice and reached the rank of

lieutenant-general upon his retirement in 1897. He was an expert in ballistics and invented the Le Boulenge chromograph. Author of (Etudes de balistique experimentale5 (1868) ; description et emploi du chronographe Le Boulenge) (1869; 2d ed., 1877) ; (Telemetre de fusiP (1875) ; deter¬ mination des vitesses velocipediques, Volo- graphes) (1894), etc.

LE BRAZ, le bras', Anatole, French novel¬ ist : b. Duault, 2 April 1859. He was educated in Paris and engaged in teaching, becoming professor of French literature at the University of Rennes in 1905. In his literary work he has specialized in the legends and customs of old Brittany and he has lectured extensively on the subject. He made several lecture tours of the United States under the auspices of the French Alliance. Besides numerous contributions to magazines he is author of (Tryphina Keran- glas) (1892) ; da chauson de Bretagne> (1892); (Au pays des Pardons5 (1895; Eng¬ lish translation, 1906) ; (Paques d'lslande5 and (Vieilles histoires du pays breton5 (1897) ; da terre du passe5 (1902); des coutes du soleil et de la brume5 (1905) ; (Au pays d'exit de Chateaubriand5 (1909) ; (Arnes d'occident5 (1912), etc.

LE BRUN, le brim', Napoleon Eugene Charles Henry, American architect : b. of French parents, Philadelphia, 2 Jan. 1821 ; d. New York, 9 July 1901. He was a pupil of Thomas Lb Walter, the architect, and from 1842 to 1861 practised his profession in Philadelphia where his most notable work is the Roman Catholic cathedral in Logan Square. He re¬ moved to New York in 1861 and among struc¬ tures there which were designed by him with his son are the Foundling Asylum and the Metropolitan Life Insurance building in Madi¬ son Square.

LE CARON, le ka'ron', Henri (real name

Thomas Miller Beach), British secret service agent: b. Colchester, 26 Sept. 1841; d. London, 1 April 1894. He assumed the name Le Caron when he came to America in 1861 to join the Union forces in the Civil War. He served through the war, rising to the rank of major. In 1865 he learned of the Fenian plot against Canada and communicated with the authorities in England. He was thereupon engaged by the British government as a military spy and until 1889 was in closest communication with the Fenian organization. His reports enabled the British government to defeat the Canadian invasion of 1870 and led to the surrender of Riel in 1871. He lived for 25 years in America, chicuy in Detroit, gathering information for

his government and making occasional trips to Europe. In 1889 he was summoned by the London Times to give his testimony before the Parnell Commission, a proceeding which auto¬ matically ended his career as a secret service agent. Author of (Twenty-five Years in the Secret Service5 (6th ed., 1892).

LE CARON, Joseph, French missionary: d. 1632. He was a Franciscan, belonging to the congregation of Recollets. His work in Canada (he landed at Tadoussac, 25 May 1615) was chiefly among the Huron tribe, and he was the first European to explore the lake of that name. His indefatigable labors among the In¬ dians met with scant success, though he left some valuable information concerning their lan¬ guage, which was of great value to his suc¬ cessors. The name of Le Caron is of special interest in connection with the origin of the Christian religion in Canada : the first mass in what is now the province of Quebec was cele¬ brated by him (and Father Jamay) on the Riviere des Prairies, near the western extremity of the island of Montreal, 24 June 1615; on 12 August of the same year the first mass in Ontario was sung by him near Thunder Bay; and in 1617 at Quebec he officiated at the first marriage in Canada. After Kirke's capture of Quebec (1629) he was deported to England with others of the French population and never returned to the monastery which he had built in that city.

LE CHAPELIER, le sha'p'lya', Isaac Rene Guy, French revolutionist: b. Rennes, 12 June 1754; d. Paris, 22 April 1794. He was a lawyer by profession and in 1789 he was elected to the States-General. He was one of the founders of the Breton Club and on 3 Aug. 1789 he was chosen president of the Con¬ stituent Assembly. He was one of the prin¬ cipals on the committee which drafted the new constitution and he opposed Robespierre's pro¬ posal that members of the Constituent Assem¬ bly should be barred from election to the new assembly. The extreme measures adopted by the revolutionists gradually moderated Le Chapelier's opinions and on 29 Sept. 1792 he introduced a measure for the restriction of the clubs. A visit to England on professional busi¬ ness made a pretext for the extremists to charge him with conspiring with foreign na¬ tions and he was brought before the Revolu¬ tionary Tribunal, condemned and executed.

LE CHATELIER, le sha'te'lya', Henri Louis, French chemist: b. Paris, 8 Oct. 1850. He studied at the College Rollin, the Lcole Polytechnique and the Lcole des Mines. He was appointed professor of chemistry at the Ecole des Mines in 1877, and in 1882 became professor of mineralogical chemistry there. He was called to the chair of mineralogical chem¬ istry at the College de France in 1898. He has

made extensive researches, and is the inventor of appliances for use in experiments in chem¬ istry and physics. He is a chevalier in the Legion of Honor, was president of the Societe Mineralogie in 1898 and of the Societe de Physique in 1907. He is an extensive con¬ tributor to scientific journals and is author of (Cours de chimie industrielle5 (1896; 2d ed.. 1902) ; (High Temperature Measurements5 translated by G. K. Burgess (1901) ; (Recherches experimental sur la constitution

des mortiers hydrauliques) (1904; English translation 1905) ; < Introduction a l'etude de la metallurgie> (1912); (La silice et les silicates> (1914); (Les explosifs> (1915), etc.

LE CLEAR, le kler, Thomas, American painter : b. Owego, N. Y., 1818 ; d. New York, 1882. He painted portraits in London, Canada, before he had received any instruction in art, and left that place about 1832 for New York, where he made his principal residence. He was elected a National Academician, in 1863. Besides his portraits, wfhich are clever in char¬ acterization and full of life and expression, he has painted many genres, such as (Marble Players) ; (The Itinerant (1862) and (Young America. } Among his portraits are those of (William Page) in the Corcoran Gallery at Washington; and (George Bancroft in the Century Club, New York.

LE CLERC, le-klar, John, or Johannes Cler' icus, Swdss theologian : b. Geneva, Swit¬ zerland, 19 March 1657; d. Amsterdam, Nether¬ lands, 8 Jan. 1736. He began to study theology and philosophy in his native town, and con¬ tinued his studies at Grenoble, Saumur, Paris and London. He gradually adopted the view-s of the Remonstrants, as the adherents of Arminius (q.v.) were then called. In 1684 he was appointed to the faculty of the Remon¬ strant College at Amsterdam. In 1728 a stroke of apoplexy deprived him of his powyer of speech, which he never recovered. His in¬ fluence has been most widely felt through his writings, which are voluminous. He edited the (Apostolic Fathers of Cotelerius) (1698), and the views he held about Mosaic authorship, inspiration and kindred topics seemed to anticipate some recent deductions .from the Higher Criticism. Besides a Bible commentary he published (Bibliotheque universelle et his- torique* (25 vols., 1686-93) ; (Bibliotheque choisie) (28 vols., 1703-13) ; and (Bibliotheque ancienne et moderne) (29 vols., 1714—26).

LE CLERC, Sebastien, French designer and engraver : b. Metz, Lorraine, 26 Sept. 1637; d. Paris, 25 Oct. 1714. He acquired the elements of design from his father, a gold¬ smith, and by the advice of Le Brun devoted himself to engraving, in which he became so distinguished that at the suggestion of Colbert he was appointed engraver in ordinary to Louis XIV. Pope Clement XI also conferred upon him the honor of knighthood. He formed his style on that of Le Brun, improving it, how¬ ever, by a careful study of Raphael; and in his published works, which number between 3,000 and 4,000, and embrace every variety of sub¬ ject he has exhibited a singularly correct and elegant execution. He also published treatises on geometry, architecture and perspective. Consult De Vallemont, Elogue historique de Sebastien Le Clerc) (Paris 1715) ; Jombert, Catalogue de l'oeuvre de S. Le Clerc) (Paris

1774).

LE CLERQ, Chretien, kra-te-on le klar, French missionary: b. Artois, France, about 1630; d. Lens, France, about 1695. He labored as a Recollet missionary in the peninsula of Gaspe, Canada, with intervals, from 1675-87, and invented a system of hieroglyphics which he taught the Micmacs. His works are inter¬ esting as throwing a side light upon early Canadian history, but are tinged with ecclesias¬

tical partiality for Frontenac, who favored the Recollets at the expense of the Jesuits. These works are (Nouvelle relation de la Gaspesie) (1691), and Establishment of the Faith in New France) (English translation by John G. Shea 1881).

LE CONTE, le kont, John, American physicist: b. Liberty County, Ga., 4 Dec. 1818; d. Berkeley, Cal., 29 April 1891. He wˆas a son of L6wis Le Conte. He was gradu¬ ated from Franklin College in 1838, from the College of Physicians and Surgeons, New York, in 1841 ; in 1846-55 w7as professor of natural philosophy and chemistry in Franklin College; in 1856-459 was professor of natural and mechanical philosophy in South Carolina College; in 1869 became professor of physics and industrial mechanics in the University of California; wˆas president of the university in 1876-81 ; and in 1881 again assumed his profes¬ sional duties. Among his publications w'ere (The Philosophy of Medicine) (1849), and (The Study of the Physical Sciences) (1858).

LE CONTE, John Eaton, American nat¬ uralist: b. near Shrewsbury, N. Y., 22 Feb. 1784; d. Philadelphia, 21 Nov. 1860. He was a brother of Lewis Le Conte. In 1813 he entered the army as a topographical engi¬ neer, and in 1831 was retired with the grade of major. He published (

Monographs of North American Species of Utricularia, Gratiola and RuelliaP and other studies in natural history.

LE CONTE, John Lawrence, American entomologist: b. New York, 13 May 1825; d. Philadelphia, 15 Nov. 1883. He was a nephew of Lewis Le Conte. He was graduated from Mount Saint Mary's College (Emmits- burg, Md.) in 1842, from the College of Physi¬ cians and Surgeons in 1846, became a surgeon of volunteers in the Federal army in 1862 and was later made medical inspector United States army, with rank of lieutenant-colonel. In 1873 he wras chosen to the presidency of the American Association for the Advancement of Science. He was generally recognized as an important authority on entomology; and pub¬ lished on that subject Classification of the Coleoptera of North America) (1862-73) ; Cist of the Coleoptera of North America) (1866) ; and (New Species of North Ameri¬ can Coleoptera) (1866-73).

LE CONTE, Joseph, American geologist : b. Liberty County, Ga., 26 Feb. 1823; d. Yo- semite Valley, Cal., 6 July 1901. He was a son of Lewis Le Conte. He wras graduated from Franklin College, Georgia, in 1841, from the College of Physicians and Surgeons, New York, in 1845; practised medicine at Macon, Ga. ; in 1850 became a pupil of Louis Agassiz, whom he accompanied on an expedition to Florida; and later was professor of natural science in Oglethorpe University, Georgia, and of natural history in Franklin College. In 1856-69 he was professor of chemistry and geology in the University of South Carolina, and from 1869 until his death held the chair of geology in the University of California. During the Civil War he wˆas chemist in the Confederate- medicine laboratory and later in the nitre and mining bureau at Columbia, S. C. He was president of the American Association for the Advancement of Science in 1892. His

contributions to geology include the determina¬ tion of the character and age of the Cascade Range; the description of the ancient glaciers of the Sierra Nevada; the development of what is called the (

LE CREUSOT, France. See Creusot, Le.

LE CRIME DE SYLVESTRE BON¬ NARD. In general, modern French writers of fiction are models of conciseness and direct¬ ness : they follow the tale to its conclusion without turning from the road to

wander in meadows, however tempting. The ability to say ((No® to their fancy is not the least of their merits. It was inevitable that there should be writers who attained their purpose by the opposite method — that of digressions and detours, of an apparent neglect of continuity and sequence. These authors rely on the effects of surprise of whimsical fancy. Among them is Anatole France. Thousands of readers, who had grown tired of the logical severity and directness of the ordinary French novel, found themselves under the spell of his wandering fancy.

None of France's stories is more delightful in this regard than (The Crime of Sylvestre Bonnard. y Here is a book to charm sensitive and generous souls who are weary of the more sordid and vulgar aspects of life. It is the love story of an aged academician and bibliophile — but without a dull page. It mentions, to be sure, books, tomes and parchment, but it also mentions cats, a tyrannical and devoted old family maid, an extravagant voyage to Sicily, an irresistible Russian princess, children, youth, bonbons and violets. The portraits of Sylvestre Bonnard, Mme. De Gabry, Jeanne are thor¬ oughly and exquisitely French. The style is that for which the author is celebrated — sub¬ tle,. suggestive, polished to the last degree of delicacy and grace.

Raymond Weeks.

LE DENTU, le daiVtu, Jean Frangois Auguste, French surgeon and writer: b. Basse- Terre, Guadeloupe, 21 June 1841. He took his M.D. at Paris in 1867, became a member of the faculty in 1869, professor of pathological surgery there in 1888, and of clinical surgery in 1891. He acted as surgeon at the Hotel Dieu from 1872, and in 1889 he was elected to the Academy of Medicine. He collaborated with Pierre Delbet in the preparation of (Traite de chirurgie clinique et operatoire> (1895-1901), and (Nouveau traite de chirurgie) (1908-09). Author of (Maladies de la pros¬ trate et de la vessie) (1881) ; (Traite des affections chirurgicales des reins,- des ureteres et des capsules surrenales) (1889); *Le cancer du sein) (1902); (Visions d'Egypte) (1911), etc.

LE DIABLE BOITEUX, le d'yabl' bwii'te, (

Benjamin W. Wells.

LE FANU, le-fa'nii or lef'a-nu, Joseph Sheridan, Irish journalist and novelist: b. Dublin, 28 Aug. 1814; d. there, 7 Feb. 1873. Having graduated from Trinity College, Dub¬ lin, he joined (1837) the staff of

the Dublin University Magazine, at first as contributor, and afterward as editor and proprietor. Among modern Irish novelists he stands next in popularity to Charles Lever. (The House by the Churchyard) appeared in 1863, and was succeeded by (Uncle Silas) (1864), his most powerful work; (Guy DeverelP (1865); (The Tenants of Malory) (1867) ; (The Wyvern Mystery > (1869); In a Glass Darkly) (1872), etc.

LE FLO, le flo, Adolphe Charles Emman¬ uel, French general and diplomatist: b. Lesnevin, 2 Nov. 1804; d. Nechoat, 16 Nov. 1887. He studied at the ficole Militaire de Saint Cyr in 1823-25, entered the army and served in the African campaigns of 183*1 and 1848, rising to the rank of brigadier-general. He was appointed Ambassador to Russia, 23 Aug. 1848, but in the following year he re¬ turned to take his seat in the National Assem¬ bly. His opposition to the plans of Louis Napoleon caused his exile from France, 9 Jan. 1852, and it was not until 1857 that he was permitted to return. He took no further prt in politics during the reign of Napoleon xif, but served as Minister of War for a time during the Franco-Prussian War and at the

end of the war was reappointed to that office. He was again Ambassador to Russia in 1871- 79. He published (1887) the documents rela- tiye to the Franco-German crisis of 1875, which, with the aid of Alexander II, he guided to a peaceful termination.

LE GALLIENNE, le gal'li-en, Richard, English author: b. Liverpool, England, 20 Jan. 1866. He was educated at Liverpool College and after several years spent in business served as literary critic for the Star and settled in London. Since 1902 he has lived in New York. Among his numerous published works are (My Ladies' Sonnets) (1887) ; (Volumes in Folio) (1888); (George Meredith5 (1890); (The Book-Bills of Narcissus) (1891); Eng¬ lish Poems) (1892); (The Religion of a Literary Man5 (1893) ; (Prose Fancies) (1894-96) ; (Robert Louis Stevenson and Other Poems) (1895) ; Retrospective Re¬ views5 (1896) ; (The Quest of the Golden GirP (1896); (If I were God > (1897); (The Ro¬ mance of Zion Chapel,5 a novel (1898) ; (Travels in England* (1900) ; (Odes from the Divan of Hafiz) (1903) ; (Painted Shadows) (1907) ; (Little Dinners with the Sphinx) (1909); (Vanishing Roads and other Essays)

(1915).

LE GENDRE DE MONSIEUR POI¬ RIER, le zhandr' de me'zyer pwa'ryer ((Mr. Poirier's Son-in-law)) , is regarded as a model of the modern French comedy of manners and by some as supreme in this class since (The Marriage of Figaro.5 Jules Sandeau (1811-82) furnished the general scheme for it; Emile Augier (1820-89), as is clear from comparison with his other dramas, — it was the 12th of 28 — gave to its social satire the distinctive touch of genius. It appeared in 1854, two years after the French had made Napoleon III emperor by popular election. The play's subject is the conflict in ideals and ethics between the new plutocracy, half-deceived by its own demo¬ cratic catch-words, and the old aristocracy, proud of its aloofness from the spirit of the times. The immediate mark of satire is the new aristocracy of wealth, which had first gained social recognition in the reign of the "bourgeois king,® Louis Philippe (1830 — 48) . The millionaire Poirier, a retired cloth mer¬ chant, is an aspirant to the peerage. To aid his political and social ambitions he has mar¬ ried his daughter Antoinette to Gaston, a noble, whose debts he has paid and whose idleness he would like to reform. The finer aristocratic qualities are represented in Gaston's friend, Hector, the sturdy virtues of the capitalist class in Verdelet. There is no hero in the play and no villain. Each of the five characters has a winning side. The play develops into a contest in magnanimity, each acting after, his kind. Antoinette wins Gaston to active life and to her love. Hector and Verdelet find ground for mutual respect and esteem. The weakness of Poirier's confidence in the power of money to work a change of heart or mind is ex¬ hibited with lambent irony, yet he never for¬ feits a sympathetic interest. Each actor in the domestic drama has gained by contact with every other, has helped and grown in the help¬ ing. That is the social moral. The plot is developed with great rapidity and dramatic

skill, but the great distinction of the comedy is in its unfolding of character. There are four editions of this drama with English introduc¬ tions and notes, and a translation by B. H. Clark in (Four Plays by E. Augier5 (New York 1915).

Benjamin W. Wells.

LE GOFFIC, le gof'fek, Charles Henri,

French poet, novelist and literary critic: b. Lannion, 1863. He made an especial study of the traditions and customs of Brittany, around which most of his work is written. He is a Chevalier of the Legion of Honor and was several times a laureate of the French Academy. He collaborated with Gabriel Vicaire in the writing of the drama (Le Sortilege5 (1896) ; and .with E. Thieulin he published the critical

writings (Nouveau traite de versification fran- Qaise5 (1890; 5th ed., 1910). His first volume of verse was (Armour breton) (1889) ; (Le pardon de la reine Anne) (1898) ; and the first of his collected verse appeared Roesies com- pletas5 (1913). He contributed extensively to the literature of the European War. Besides the works already mentioned he is author of (Le crucefie de Keralis) (1892) ; (Sur la cote1* (1897) ; R'Erreur de Florence5 (1904) ; (L'Ame Bretonne) (1902-08) ; (La double con¬ fession5 (1909) ; Retes et coutumes popu¬ lates5 (1911); (Dixmude; the Epic of the French Marines5 (Eng. trans., Simmonds, F., 1916) ; Rourguinottes- et pompoms rouges5 (1916) ; (Sans Nouvelles,5 drama (produced 1916; pub. 1917) ; Rteenstraete5 (1917) ; Gen¬ eral Foch at the Marne5 (1918), etc.

LE JEUNE, le zhen', Paul, French Jesuit missionary: b. in the diocese of Chalons, 1592; d. Paris, 7 Aug. 1664. He joined the Jesuits in 1614, taught for a time in various colleges and in 1632 was sent to Canada by Richelieu where he became superior of the missions. He founded the Christian Indian village, Sillery, four miles above Quebec, in 1637. He ceased to be superior of the Canadian missions in 1639, returned to France in 1649 and was ap¬ pointed procurator of foreign missions. He was chosen in 1658 by Anne of Austria for the post of bishop of Canada, but the Jesuits' rules did not permit acceptance of the dignity. Au¬ thor of (Brieve relation du voyage de la Nou- velle France5 (1632), the first of a series of Relations5 edited yearly by Le Jeune until 1640 and continued by the Jesuits until 1672; he also wrote many devotional books.

LE LOUTRE, lootr, Louis Joseph, French missionary: b. about 1692; d. about 1775. He was vicar-general of Acadia, and from about 1740, when he was sent to Nova Scotia, he labored for years among the Micmac Indians of that region with great success, obtaining practical control of all their affairs, spiritual and otherwise. He led them against the Eng¬ lish. and when the country fell into the hands of Great Britain succeeded in compelling the Acadians to show their allegiance to King Louis, although for years they had been sub¬ jects of King George. The consequence was terrible suffering for the simple people, whose miseries became historic through their deporta¬ tion in 1755. Le Loutre fled to Quebec, sailed for France, was taken by the English and kept prisoner in the Isle of jersey for eight years.

Being released, he returned to France, where he died.

LE MENTEUR, le mdn'ter ((The Liar,* 1642), by Pierre Corneille, is the first good French comedy, the first to emancipate this form of drama from mediaeval or misunder¬ stood classical tradition. The liberation came, with the comedy itself, from Spain. This is in part translated from (La Verdad Sospe- chosa,* by Juan de 1' Alarcon, though some¬ times attributed to Lope de Vega. In part, and especially in the conclusion, it is adapted from it, altered to suit the more refined taste of the France of the aging Richelieu. The hardly less amusing and clever sequel, (La Suite du Menteur) (1643), is taken similarly from Lope. (The Liar) inaugurates in French comedy a class of plays of which Moliere's (Misanthrope* is the most notable member, in which interest is centred on the exhibition of some particular social type. The action passes at Paris, opening in the Tuileries and soon passing to the Place Royale, where it closes. The time is contemporary. Dorante, the Liar, having played with the study of law at Poic- tiers, has just returned to Paris, ((abandoning the gown for the sword,® and relying on his tongue and ready fancy to make himself king of hearts. Cliton, his valet, with no greater scruples, has the alert shrewdness and caution of his experience and station and is a worthy predecessor of Moliere's Scapin, as Sabine is of the whole tribe of soubrettes. Geronte, the Liar's father, is his easy dupe. Clarice, whom he would have liked to beguile, as well as her friend, Lucrece, with lying tales of adventures, extravagances and devotion, but whose heart is already given to Alcippe, so turns the tables upon him that he finds himself at last, after a series of scenes hilarious for the auditors, con¬ strained to accept the betrothal with Lucrece which his father has arranged, as he supposes, at his son's behest. (La Suite du Menteur) tells how Dorante <(leaves the lady and takes the money,® but ((exchanging fetters of the law for those of marriage® finds his mate and match in Melisse, while Lucrece is united, briefly, with the rich and moribund Geronte. (Le Menteur* is edited with English notes by J. B. Segall (New York 1902).

Benjamin W. Wells.

LE MOINE, le moin', Sir James Mac- Pherson, Canadian historian : b. Quebec, 24 Jan. 1825; d. Quebec, 5 Feb. 1912. He was educated in his native city and in 1850 was called to the bar. He was inspector of the in¬ land revenue district of Quebec 1869-99. He was knighted in 1897. Among his works are (L'Ornithologie du Canada* (1860) ; (Etude sur les Navigateurs Arctiques Franklin, Mc¬ Clure, Kane, McClintock* (1862) ; (The Tour¬ ist's Note-Book) (1870); (Quebec: Past and Present* (1876); (The Scot in New France* (1880) ; (Picturesque Quebec* (1882) ; (The Land We Live In* (1891) ; (Legends of the Saint Lawrence* (1898) ; (Annals of the Port of

Quebec* (1900) ; (The Avi-Fauna of the Province of Quebec* (1902).

LE MOYNE, Antoine, an-twan le-mwan, Sieur de Chateauguay, French soldier and colonist in America; b. Montreal, 17 July 1683; d. Rochefort, France, 21 March 1747. He was a son of Charles Le Moyne (1626-85) (q.v.).

He entered the French army and in 1704 came to Louisiana with a company of settlers. In 1705-06 he fought under D'Iberville against the English, in 1717 was appointed commandant of the French forces in Louisiana and in 1718 king's lieutenant of that colony. With the aid of Indians he captured Pensacola from the Spanish 14 May 1719; but he surrendered it 7 August. Having been held as a prisoner of war until July 1720, he took command at Mo¬ bile upon the conclusion of the peace of that year, but returned to France in 1726. He was governor of Martinique in 1727-44, and in 1745 was appointed governor of lie Royale (Cape Breton), but illness prevented him from taking up office.

LE MOYNE, Charles, Sieur de Lon- gueuil, French settler, soldier and proprietor in America: b. Dieppe, France, 1626; d. Ville- marie, Canada, 1685. He came to Canada in 1641, settled at Villemarie and was interpreter between the Hurons and the colonists. In 1651 he successfully defended the fort from an attack by the Iroquois, whom he routed with great slaughter ; and in 1653 he concluded a peace with the Five Nations. These Indians, however, in 1655 again made an attack upon the colony, which was saved from destruction largely by Le Moyne's exertions. In 1657 Le Moyne received from Frangois de Lauzon, who held 60 leagues of land under royal grant, full seignorial rights ; and in 1664 his possessions were largely increased by the cession of Isle Saint Helene and other tracts. He partici¬ pated in the expedition led by Tracy and Courcelles in 1666-67, and in several cam¬ paigns against the Iroquois; and for many years was captain of Montreal. He was made Sieur de Longueuil in 1668 and to this title that of Chateauguay was later added.

LE MOYNE, Charles, 1st Baron de Lon¬ gueuil, French soldier in America : b. Ville¬ marie, Canada, 10 Dec. 1656; d. 8 June 1729. He was a son of Charles Le Moyne (q.v.). He entered the French army, with which he served in Flanders, but returned in 1683 to Canada. He promoted colonization in Canada and built a stone fort on his estates at Lon¬ gueuil. In the campaign of 1687 against the Iroquois he was commander of a division of militia ; and in 1690 he was wounded at the repulse of Phipps' attack on Quebec. He was made baron 1700 for services to the colony; commanded the Canadian forces at Chambly,

when the English made an unsuccessful at¬ tempt to take Montreal; and in 1711 became commander-in-chief of the colonial troops. He was governor of Three Rivers 1720-24 and governor of Montreal 1724-29. In 1726 he rebuilt Fort Niagara.

LE MOYNE, Jacques, Sieur de Sainte Helene, French soldier in America: b. Ville¬ marie, Canada, 16 April 1659; d. Quebec, Oc¬ tober 1690. He was a son of Charles Le Moyne (q.v.). In March 1686 he accompanied the expedition led by the Chevalier de Troyes against the English on Hudson Bay, and in the capture of Forts Rupert, Monsipi and Quit- chitchonen, and the seizure of the English governor, took a prominent part. He was second in command of the expedition that captured, plundered and burned Fort Corlear (now Schenectady), 9 Feb. 1690. In October

Phipps laid siege to Quebec and Le Moyne was selected to direct the defense. He was mortally wounded while leading about 200 troops in the repulse of 1,300 British at the passage of the Saint Charles.

LE MOYNE, Jean Baptiste, Sieur de Bienville, French administrator in America: b. Villemarie, Canada, 23 Feb. 1680; d. Paris, 1768. He was a son of Charles Le Moyne (q.v.). In 1729, upon the death of his brother, Charles, Baron de Longueuil (q.v.), he suc¬ ceeded to the title ; but he was known as De Bienville. In 1697 he served in the expedi¬ tion of the Chevalier de Troyes against the English settlers in Hudson Bay. He after¬ ward went with his brother, D'Iberville (see Ibervlle), to France, and 24 Oct. 1698, sailed from Brest in the expedition led by D'Iberville to take possession of the mouth of the Mis¬ sissippi. Bienville was appointed lieutenant of the king, explored the surrounding region, and in 1700 became commander of a fort on the river 44 miles above its mouth. He succeeded Sauvolle in the direction of the colony and assumed command of the camp of Biloxi, 22 Aug. 1701. In December he transferred the settlement to Mobile, which prospered through the arrival of recruits from France with sup¬ plies (1703-04) and of 50 Canadians (1706). In February 1708 he was ordered to France as a prisoner, but he was later reinstated in his position. The attempt to cultivate the soil by Indian labor having been unsuccessful, he sug¬ gested to the king in 1708 the importation of negroes from the Antilles, to be exchanged for Indians at the rate of three Indians for two negroes. In 1713 Cadillac arrived as governor, and Bienville was commissioned lieutenant- governor. Bienville led an

expedition to the territory of the Natchez Indians in 1716, built a fort and concluded a treaty. In 1718 he be¬ came governor of Louisiana, in the same year founded New Orleans, which was made the seat of government in 1723; in 1724 he went to France to answer charges preferred against him, but in 1733 returned as governor and holding the rank of lieutenant-colonel After unsuccessful campaigns against the Chickasaws in 1736, 1739 and 1740 he sailed for France in

1743.

LE MOYNE, Joseph, Sieur de Serigny,

French soldier in America : b. Villemarie, Canada, 22 July 1668; d. Rochefort, France, 1734. He was a son of Charles Le Moyne (q.v.). He entered the French navy and in 1694 and 1697 commanded the flotilla which co-operated with his brother D'Iberville (see Iberville) in the expedition to seize Hudson Bay. Later he received command of a squad¬ ron, took to Louisiana Canadian settlers and surveyed (1718-19) the coast of that colony. He drove the Spaniards from their fortifica¬ tions at Pensacola (15 June 1719), and re¬ pulsed them at Dauphin Island, near Mobile (19 August) ; became a captain in 1720 and in 1723 rear-admiral. From 1723 he was governor of Rochefort.

LE MOYNE, Paul, Sieur de Maricourt, French soldier in America: b. Villemarie, Can¬ ada, 15 Dec. 1663; d. there, 21 March 1704. He was a son of Charles Le Moyne (q.v.). He participated in Troyes' expedition against the English at Hudson Bay, was wounded in the

attack on Fort Monsipi (20 June 1686) and remained with his brother D'Iberville (see Iberville) in command of the captured district until 1690. In 1690 he distinguished himself in the defense of Quebec against Phipps, later took part in Frontenac's expedition against the Iroquois and in 1701 concluded peace with them.

LE MOYNE, Paul Joseph, Chevalier de Longueuil, French soldier in America: b. Canada, 17 Sept. 1701; d. France, 12 May 1778. He was the son of Charles Le Moyne (q.v.). He entered the French army in 1718. He com¬ manded at Fort Frontenac, and also served as governor of Detroit and Three Rivers. He fought with distinction in various campaigns, and in 1747 marched 180 miles in the depth of a severe northern winter to reinforce Vau- dreuil at the siege of Fort George.

LE MOYNE, Pierre. See Iberville, Pierre Le Moyne Sieur d'.

LE MOYNE, Simon, Jesuit missionary: b. Beauvais, 1604; d. Cap de la

Madeleine, Canada, 1665. In 1622 he entered the Society of Jesus and was sent to Canada in 1638. He was on the Huron mission with Bressani, Chaumonot and the future martyrs. He was a perfect master of the Huron-Iroquois language and was unequalled in his knowledge of Indian customs and traditions. This ability was recog¬ nized and he was employed on delicate and arduous embassies. He was the first European to go among the Onondagas and his eloquence and knowledge of their traditions won their admiration. He next was sent to the Mohawks and was well received by them, visited New Amsterdam and pacified the Mohawks during several critical periods. At these times he was often in danger of death. In 1661 he returned to the Mohawks for the fifth time, was tor¬ tured and condemned to death, but was saved by the chief, Garakontie. He died on the way to return to the Onondagas. Consult Campbell, (Pioneeer Priests of North America) (New York 1908).

LE NOTRE, or LE NOSTRE, le no'tr'. Andre, French landscape gardener: b. Paris, 1613; d. there, 1700. He was the son of the superintendent of the gardens at the Tuileries. He studied painting under Simon Vouet and frequented the studio of Le Brun, later studied architecture and eventually adopted landscape gardening as a profession. The position of his father enabled him to put into effect in the Tuileries gardens some of his ideas and he was later commissioned to plan the gardens of the Chateau de Vaux. He was the originator of the formal French garden with its stately co-ordination of grounds and buildings. He was commissioned director of the royal gardens by Louis XIV in 1657. The park of Versailles is regarded as his masterpiece and he also laid out the gardens of Saint-Cloud, Fontainebleau, Chantilly and many others in France. He was ennobled by Louis XIV in 1675. His influence was felt in many countries and he planned many gardens and parks in both England and Italy. The gardens of the Vatican are his work as is Saint James' Park in London.

LE PECHEUR DTSLANDE, le pa'sher diz'land', (The Iceland Fisherman,) is the most admired novel of Pierre Loti. The author passed most of his life on the ocean,

becoming finally and remaining to the close of his active career a commandant in the French navy. He thus came to know the sea in all its aspects and moods. His books describe life on the ocean and in distant coun¬ tries. The 'Pecheur d'Islande) alone would suffice to

prove that Loti knows not only the ocean, but the human heart as well. The views of Breton life are pictured by the hand of a master with just enough local color to create an “atmosphere** and to explain the characters as far as they are the product of environment. Even if we have never known those who go down to the sea in ships, we come rapidly to know and respect them as we read these pages of beautiful yet solemn description and narrative. We feel the dumb anguish of the bereaved widows and the astonished grief of the orphans. Few love stories of greater delicacy have ever been told than that of Gaud, the heorine, and Yann, her sweetheart. After six days of marriage, he has to go away to the fishing grounds of Iceland, and never returns.

Raymond Weeks.

LE PLAY, le pla, Pierre Guillaume

Frederic, French engineer and economist: b. La Riviere Saint-Sauveur (Calvados), 11 April 1806 ; d. Paris, 5 April 1882. He was educated at the Ecole Polytechnique and was later ap¬ pointed to a position in the State Department of Mines. He became head of the permanent committee of mining statistics in 1834, and engineer-in-chief and professor of metallurgy at the Ecole des Mines in 1840, receiving the appointment as inspector in 1848. He was designated as organizer of the exhibition of

1855 by Napoleon III, and was later counsellor of state and commissioner-general of the Ex¬ hibition of 1867. He was also a senator of the empire. He received the Montyon prize of the Academy of Sciences and was elected grand officer of the Legion of Honor. He was deeply interested in living conditions among the work¬ ing classes and for many years devoted his vacations to travel in European countries for the purpose of making observations on the sub¬ ject. He founded the Societe internationale des etudes pratiques d’Lconomie sociale in

1856 and edited its journal, La Re forme Sociale , which he founded in 1881. Author of ‘Les Ouvriers europeens* (1855) ; ‘La Reforme sociale) (2 vols., 1864 ; 7th ed., 3 vols., 1887); (L’Organisation de la familie) (1871) ; ‘La Constitution de l’Angleterre) (in collaboration with Delaire, 1875).

LE PLONGEON, le plon’zhon’, Augustus,

French archaeologist: b. Jersey, Channel Islands, 1826; d. 13 Dec. 1908. He was a descendant of De Tocqueville, was educated in France

and engaged in the practice of medicine in Central America, where he became interested in the history of the Peruvians and conducted in¬ vestigations which are of recognized value. Author of ‘Sacred Mysteries among the Mavas and the Quiches, 11,500 Years Ago* (1886) ; (Queen Moo and the Egyptian Sphinx* (1896).

LE QUEUX, le ku, William, English novelist: b. London, England, 2 July 1864. He studied art in Paris. In 1888 was a Parlia¬ mentary reporter for the London Globe, and its sub-editor 1891-93. In 1900 he was appointed English consul to San Marino. He has trav¬ eled widely in Europe and the Near East, and

is recognized as an authority on the spy systems of Continental Europe. Among his numerous fictions are (Guilty Bonds) (1890) ; ‘Sinned Against* (1891) ; ‘The Great War in England) (1892) ; ‘Stolen Souls> (1894) ; (Whoso Find- eth a Wife* (1897) ; ‘The Day of Tempta- tion> (1897); ‘Scribes and Pharisees) (1898); ‘Wiles of the Wicked) (1900); (In White Raiment* (1900) ; ‘The Tickencote Treasure* (1902) ; ‘The Invasion) (1908) ; ‘The Hand of Allah* (1914) ; ‘German Spies in England* (1915) ; ‘Britain’s Deadly PeriP ; ‘The Way to Win* and ‘The Zeppelin Destroyed (1916).

LE RO.SSIGNOL, le ros’i-nyol, James Edward, American educator : b. Quebec, Can¬ ada, 24 Oct. 1866. He was graduated at McGill University, Montreal, in 1888 and also studied at Leipzig, where he obtained the degree of D.Ph. in 1892. He was professor of psy¬ chology and ethics at Ohio University 1892-94, and professor of economics at Denver 1894- 1911. In 1908-09, while on leave of absence from Denver, he was professor of economics at the University of Nebraska. In 1911 he was appointed head of the department of economics at the latter institution, and became director of the School of Commerce there in 1913. He was special lecturer at McGill University in 1900 and at the University of Wisconsin in 1903. From August to December 1906 he was in New Zealand investigating economic conditions there. He is a member of the American Academy of Political and Social Science and other societies and has published ‘The Ethical Philosophy of Samuel Clarke* (1892) ; ‘Monopolies Past and Present* (1901) ; ‘Taxation in Colorado* (1902) ; ‘History of Higher Education in Colo- rado) (1903); ‘Orthodox SocialisnP (1907); ‘Little Stories of Quebec) (1907) ; ‘State Socialism in New Zealand* (1910) ; ‘Jean Baptiste, A Story of French Canada* (1915) and numerous articles on economic subjects.

LE ROUGE ET LE NOIR, le roog’ a le nwar (‘Red and Black*) is, with the ‘Char¬ treuse de Parme,* written at the same time (1830) but

published eight years later, the chief title to fame of that original French gentleman of letters, Henri Beyle, who pre¬ ferred to call himself Stendhal and pass for an Italian. The somewhat enigmatical title of the novel symbolizes the contrasted careers of the army and the Church, between which the coolly and selfishly calculating ambition of the hero chooses. This hero, Julien Sorel, was an early superman, wholly unmoral, recognizing no other measure of the value of conduct than its success in attaining its immediate ends. He appealed strongly to the thoughts and imagina¬ tions of a later generation, and we discover expressions of admiration for him in Nitzsche and frequent traces of resemblance to him in the novel. In a romantic age, passionately in love with the color and costume and wonder of far lands and unfamiliar periods of history, Stendhal in 'Le Rouge et le Noir* focussed the attention of the novel upon life under present conditions. The novelist, he said, should hold a mirror up to life as it passes on the street. In his attitude and his method he thus anticipated the realism that was to dominate the novel, and 'Le Rouge et le Noir) is a kind of landmark in the history of the novel in France. Consult English translations by E. P. Robins

(London 1896) ; and H. B. Samuel (London 1914).' A useful source of information is Adolphe Paupe, (Histoire des oeuvres de Stend- haP (Paris 1903).

Arthur G. Canfield.

LE SUEUR, Jean Frangois, le swer, zhon fran-swa, French composer: b. Drucat-Ples- siel, near Abbeville, 15 Jan. 1760; d. Paris, 6 Oct. 1837. At six he was placed at the musical school of the cathedral of Amiens and after completing his studies was made director of music in the cathedrals at Seez, Dijon, etc., and in 1784 in the church of the Innocents, Paris. In 1786 he became ' master in the church of Notre Dame. He was afterward induced to compose for the theatre, ˆelemachus,* his first opera, being given with great success in the Theatre Feydeau. From 1788 he devoted his time altogether to theatrical music. His opera cLa Caverne) was produced in 1793; (Paul et Virginie* in 1794; (Telemaque* in 1796; (Les bardes) in 1804, and (La Mort d'Adam* in 1809. He was made professor of music in the National Institute. In 1813 he became a member of the fourth class of the Institute; in 1814 composer to the king; and in 1817 professor of composition to the Conserva¬ toire. His sacred music consists of 33

masses, and of oratorios and motets. He also wrote several works on musical subjects.

LEA, le, Henry Charles, American author; b. Philadelphia, 19 Sept. 1825; d. 1909. He was a son of Isaac Lea, grandson of Mathew Carey, and was named for his uncle, Henry Charles Carey. He entered his father's pub¬ lishing house in 1843 ; became its head in 1865 ; and retired from business in 1880. He was actively engaged in public undertakings for civil and social advancement, and during the Civil War rendered conspicuous services in support of the -Federal government. Between 1840 and 1860 he wrote many papers on chemis¬ try and conchology, and after 1857 devoted his attention to European mediaeval history. He had taken up this study as an avocation, but in later years he devoted himself increasingly to the mastery of mediaeval church history. He employed copyists to duplicate for him docu¬ ments dealing with the Inquisition. He be¬ queathed his books and manuscripts to the University of Pennsylvania. He was a mem¬ ber of the American Academy of Arts and Letters and a Fellow of the British Academy. He received honorary degrees from Harvard, Princeton, Pennsylvania and Giessen. His chief works are (Superstition and Force) (1866) ; (An Historical Sketch of Sacerdotal Celibacy in the Christian ChurclP (1867; 3d ed., 2 vols., 1907) ; (A History of the Inquisi¬ tion of the Middle Ages) (1888; new ed., 3 vols., 1906; French trans. by Solomon Reinach, 1899; German trans., 1905-06) ; (Chapters from the Religious History of Spaing (1890) ; (Formulary of the Papal Penitentiary in the Thirteenth Century* (1892) ; (A History of Auricular Confession and Indulgences in the Latin ChurclP (1896) ; (The Moriscos of Spain: Their Conversion and Expulsion* (1901) ; (Historv of the Inquisition of Spain* (4 vols., 1906-07) ; (The Inquisition in the Spanish Dependencies) (1908). Consult Baumgarten, P. M., (Henry Charles Lea's His¬ torical Writings1* (New York 1909) ; Cheyney,

E. P., ((On the Life and Works of Henry Charles Lea,® in (Proceedings* of the Ameri¬ can Philosophical Society (Philadelphia 1911).

LEA, Homer, American soldier and author: b. Denver, 17 Nov. 1876; d. Los Angeles, 1 Nov. 1912. He came of a Virginian colonial family and was educated at the University of the Pacific and at the Leland Stanford, Jr., University. He became interested in Chinese military affairs and in 1900-01 he attempted the relief of the Chinese emperor Kwang Hsu. He raised and commanded the second army division in China in 1904, receiving rank as lieutenant-general. He was associated with the Chinese reformer, K'ang Yu-wei; and with Dr. Sun Yatsen in

the Chinese revolution, 1911 > -12. He caused wide comment by the publication of his book (The Valor of Igno¬ rance* (2 vols., 1909) in which he set forth the possibilities of a Japanese invasion of the United States. He was also author of a novel (The Vermilion PenciP (1908) ; a drama (Crimson Spider* (1909), and (The Day of the Saxon* (1912), the latter second of a trilogy of which (The Valor of Ignorance* was the first volume, and embodying a warning of supposed dangers besetting the British Empire. Lea was also engaged in the preparation of a (History of the Political Development of the Chinese* at the time of his death.

. LEA, Isaac, American -naturalist : b. Wil¬ mington, Del., 4 March 1792; d. Philadelphia, 7 Dec. 1886. In early life he engaged in com¬ mercial pursuits, and from 1821 to 1851 was partner in a large publishing business; but from boyhood he was devoted to the study of natural history, and his various collections of minerals and fossils, and especially of shells, were valu¬ able contributions to science. He was a mem¬ ber of the Academy of Natural Sciences of Philadelphia, and of the Philosophical Society of the same city, in whose transactions* many of his observations were published ; he was also elected to membership in learned so¬ cieties abroad. His work in the study of fresh-water and land mollusks brought him special distinction. His principal publications are Observations on the Genus Unio* (1827—33) ; (Synopsis of the Family of Naiads*

(1852-70). In the National Museum at Wash¬ ington his vast collection of Unionida? and his gem collections are deposited. Consult Scud- der, (Bulletin U. S. National Museum, No. 23* (Washington 1885). An account of Lea's work in conchology was published at Philadelphia in 1861 by G. W. Tryon, Jr.

LEA, Luke, American journalist and legis¬ lator: b. Nashville, Tenn., 12 April 1879. He was graduated from the University of the South in 1899 and from Columbia University in 1903. He established himself in the practice of law at Nashville in 1903, and later became publisher and editor of the Nashville Tennesseean. He served in the United States Senate in 1911-17.

LEA, Matthew Carey, American chemist : b. Philadelphia, 1823; d. there, 15 March 1897. His work in developing the chemistry of photography has served important purposes. Besides many articles treating of the chemical action of light, his publications include an authoritative (Manual of Photography* (2d ed., 1871). He was the eldest son of Isaac Lea (q.v.).

LEACH, leech, Arthur Francis, English historian and educator: b. London, 1851; d. 28 Sept. 1915. He was educated at New Col¬ lege, Oxford, and was a Fellow of All Souls College in 1874-81. He became a barrister at Middle Temple in 1874 and assistant charity commissioner in the Endowed Schools De¬ partment in 1884. He was commissioner from 1906 until his death. He was appointed ad¬ ministrative examiner of the Board of Educa¬ tion in 1901 and became assistant secretary of the board in 1903. He was an authority on the history of education in England. He con¬ tributed the articles on the history of educa¬ tion and English public schools to the Amer¬ ican Cyclopaedia of Education5 (1912-13). Author of English Schools at the Reforma¬ tion (1546-48) 5 (1896); (History of Winches¬ ter College5 (1899) ; (Early Yorkshire Schools5 (1899-1903) ; (Schools of Mediaeval England5 (1914), etc.

LEACH, William Elford, English natural¬ ist: b. Plymouth, 1790; d. Palazzo, Saint Sebas- tiano, near Tortona, 25 Aug. 1836. He studied medicine at Saint Bartholomew's Hospital, Lon¬ don, and took his M.D. at Edinburgh Univer¬ sity in 1812. His interest in natural history induced him to abandon medicine and in 1813 he was appointed assistant librarian at the British Museum. He introduced and developed there the natural system of arrangement in conchology and entomology devised by Latrielle and Cuvier, and when his arrangement was superseded by that of the French naturalist, Henri Milne-Edwards, Leach was acknowl¬ edged as an investigator to whom science owed great obligations. In the field of Crustacea he was considered the greatest naturalist of his time. Ill health compelled his retirement in 1821 after his becoming assistant keeper of the natural history department in the British Museum. He was elected a Fellow of the Royal Society in 1817. Besides numerous con¬ tributions to scientific journals and to the Encyclopaedia Britannica5 and Edinburgh Encyclopaedia5 he was author of (Zoological Miscellany5 (3 vols., 1814-17) ; Systematic Catalogue of the Specimens of the Indigenous Mammalia and Birds that are preserved in the British Museum5 (1816) ; Synopsis of the Mollusca of Great Britain,5 published post¬ humously (1852).

LEACOCK, le'kok, Hamble James, Amer¬ ican missionary : b. Cluff's Bay, Barbados, 14 Feb. 1795; d. Sierra Leone, Africa, 20 Aug. 1856. He was educated at Codrington College, Barbados, took deacon's orders in 1826, and became assistant priest of Saint John's parish,

where he aroused great opposition by freeing his own slaves and offering to all slaves within the parish the privileges of the church. Subse¬ quently he was stationed at Saint Vincent, and was pastor of Saint George's, Charlestown, and at Nevis. He removed in 1835 to Lexing¬ ton, Ky. From 1836 he held various pastorates, in 1848-55 was again in Barbados, and in 1855 went to Africa as the first volunteer of the West Indian Church Association for the furtherance of the Gospel in West Africa. He developed a large mission field at Rio Pongas, Sierra Leone. Consult the biography by Cas- wall (1857).

LEACOCK, Stephen Butler, Canadian author and educator: b. Swanmoor, Hants, England, 30 Dec. 1869. He came to Canada in 1876, was educated at Upper Canada College and the University of Toronto, where he was graduated in 1891. After spending several years in school teaching he took a graduate course in political economy at the University of Chicago and was appointed to the staff of Mc¬ Gill University in 1901. Under an appoint¬ ment by the Rhodes Trust (1907-08) Professor Leacock made a lecture tour round the British Empire. In 1900 he married Beatrix, daughter of Col. R. B. Hamilton of Toronto, and has one son, Stephen Lushington Leacock, b. 19 Aug. 1915. Professor Leacock is the author of Elements of Political Science5 (1906) ; Essays and Literal Studies,5 and of several works of a lighter character, such as Eon- sense Novels5 (1911) ; (Sunshine Sketches of a Little Town5 (1912); ˆBehind the Beyond5 (1913) ; Adventures with the Idle Rich5 (1914); Eurther Foolishness5 (1916); (The Hohenzollerns in America5 (1919).

LEAD, led, or LEADE, Mrs. Jane (Ward), English mystic: b. County of Nor¬ folk, 1623; d. Stepney, 19 Aug. 1704. She came of an excellent family and at 16 is said to have heard a miraculous voice during the Christ¬ mas festivities in her father's house, after which time she devoted herself seriously to religion. She was married in 1654, widowed in 1670, and thereafter lived in seclusion in Lon¬ don with her only daughter. Her inclination toward mysticism was accentuated by her study of the works of Jacob Boehme, and in April 1670 she began her spiritual diary in which she recorded her frequent prophetic visions. The diary was published in two volumes, (The Heavenly Cloud5 (1681) and (The Revelation of Revelations5 (1683). In 1693 one of the books was translated into Dutch and German by Fischer of Rotterdam and attracted con¬ siderable attention. Francis Lee, a young Oxonian traveling in Holland, was induced upon his return to England to make Mrs. Lead's acquaintance and urge her to further writing. Lee was deeply influenced by her sincere piety, became her secretary and after being adopted as her son married her daughter. Lee wrote many of Mrs. Lead's works at her dictation, and was

instrumental in the organiza¬ tion of a society of theosophists called the <(Philadelphians,55 of whom Mrs. Lead was the head, and whose membership included many followers throughout England, Holland and Germany. Mrs. Lead's closing years were clouded by poverty and jealousies among her followers, one of whom, however, granted her a small annuity. She died in one of the alms¬ houses of Lady Mico at Stepney. Lee, who remained faithful to her, wrote a descrip¬ tion of her death, (The Last Hours of Jane Leadp which was translated into German. During Mrs. Lead's lifetime her voluminous writings enjoyed a wide vogue but they are now rare. She wrote also Enochian Walks with God5 (1694) ; (The Laws of Paradise5 (1695); A Fountain of Gardens5 (4 vols., 1696-1701) ; A Living Funeral Testimony5 (1702), etc.

LEAD, led, S. D., city in Lawrence County; on the Chicago and Northwestern and the

Chicago, Burlington and Quincy railroads, about 18 miles from the western boundary of the State. It was settled in 1876 and incorpo¬ rated in 1877. It is situated in the Black Hills in a gold mining region. The chief in¬ dustries are connected with mining, the manu¬ facturing of mining tools and the outfits for mining camps. Modern methods of mining have made the Black Hills one of the largest gold producing regions in the world, and Lead receives its share of the industrial plants con¬ nected with preparing the ore for market. The educational institutions are the public and par¬ ish schools, Black Hills Business College, the Hearst Free Kindergarten, and the Hearst Free Library. The Lead Coliseum and several churches are among the prominent buildings. The value of the business transacted annually is about $17,000,000. The government is now managed on the commission plan. Pop. 5,013.

LEAD, one of the most useful metallic elements, well known in chemistry and in the arts. From early times references to it are found in literature. It is mentioned in Exodus xv, 10; Numbers xxxi, 22; Job xix, 24; and Ezekiel xxvii, 12, and is supposed to have been imported into Palestine from Tyre, although it should be remembered that there are lead mines in Sinai and the Lebanon, as well as in Egypt. Articles made of lead by the ancient Romans, such as water-pipes, water-tanks, weights, rings and small ornamental cylinders, are still preserved. Examples in the grounds of old churches show that the Roman method

of mak¬ ing pipes from sheet-lead continued in use till late in the Middle Ages. Small lead-weights of curious forms have been found among Vi¬ king remains dating as early as the 10th cen¬ tury. Many of the European countries are known to have produced lead as early as from the 10th to the 14th century.

Physical Properties. — Lead (chemical sym¬ bol Pb, from the Latin name of the element, plumbum, atomic weight about 207), is a soft metal of a bluish-white color, tending to gray, with a bright metallic lustre when newly cut or melted. It is tasteless but has a distinctive odor when rubbed. It soon tarnishes when ex¬ posed to the air, taking on a thin film sup¬ posed to be suboxide. But lead suffers less than most metals either from atmospheric agencies, or damp soils. It can be scratched with the nail, and easily cut and makes a mark upon paper. Its specific gravity varies from 11.352 in the ingot to 11.365 when rolled into sheets. It begins to melt at 619° F., and is completely liquid at 638°. Its boiling point is about 2 700°. In cooling from a molten condition lead crystallizes into regular octa¬ hedrons from which the still liquid lead may be poured away. It may also be obtained in a crystalline tree-like formation known as arborescent lead by decomposing a solution of lead acetate by the electric current. Its hard¬ ness is increased by repeated meltings. It is highly malleable and in a less degree ductile, but its tenacity is small — a wire 1 – 12th of an inch being unable to carry a load of 20 pounds. Lead is not a good conductor of heat or electricity. It can be welded at ordi¬ nary temperatures by pressing two freshlv cut surfaces together; and when gently heated it can be forced by pressure through perforations and pipes. Water containing carbonic acid has

a slight action on lead, carbonate being formed and dissolved, but this action is apparently hindered by the presence of some salts and accelerated by others. When lead is heated to redness in air it is oxidized, litharge (PbO) being formed. Lead is attacked by nitric acid and by hot strong sulphuric acid, but dilute sulphuric or hydrochloric acids have but little action. It is, therefore, largely used for the construction of sulphuric acid chambers and for chemical works plants. It alloys readily with many metals.

Lead Ores. — Native lead occurs sparsely in some localities in Mexico, India and Wales. Its ores are found extensively, more or less pure or associated with other ores, in various parts of the United States, in Great Britain, Germany, Spain and other European countries. The most common form is the sulphite (PbS), known as galena. It occurs usually in veins, and is often associated with zinc and fre¬ quently with silver. Ores of lead are found most plentifully in rocks belonging

to the Silurian Age, chiefly in the mountain lime¬ stones. Some occurrences are true veins, others beds or pockets. In the United States the most common occurrence is as a ˆsjieet® filling a vertical crevice, and is in such cases generally a very pure galena. The lead-silver ores of the Cceur d'Alene district in Idaho are in the form of veins, while those of the Leadville district in Colorado occur largely as irregular replacement deposits of great size in lime¬ stones. In both the above districts, the ores are believed by some authorities to have been introduced by heated waters connected with igneous activity. Others argue that the ab¬ sence of other hot water sedimentary sub¬ stances make this theory untenable. In the Flat River district of southeastern Missouri, the ores carry little silver, and occur as irregular disseminations in Cambrian dolomites. They are believed to have been introduced by cold waters which leached the ores from adjacent rocks where they occurred in minute quan¬ tities. In the Joplin district of Missouri and in southwestern Wisconsin, considerable lead is associated with the zinc ores (q.v.). Cerus- site, the lead carbonate, is common in the upper parts of certain lead deposits, where it is supposed to have resulted from the weather¬ ing of the galena of the original ore.

In the United States the richest ores are found chiefly in the Western States, the car¬ boniferous limestone bearing both hard and soft ores, which contain silver chloride and cerussite. The output of smelting works in Colorado, Idaho, Missouri, Montana, Utah, etc., figures largely in the industrial statistics of the country. (See Lead Industry, American). At the present time the main supply of lead is obtained from the Rocky Mountain regions, where the ores are argentiferous — as to some extent all galena is — and the lead-silver mines in some of the States mentioned have produced much wealth for their owners. Conde lead is imported into the United States from British Columbia and Mexico. Other minerals associ¬ ated with galena are anglesite or sulphate of lead, lanarkite, which is a basic sulphate, pyro- morphite, or phosphato-chloride of lead, and bournonite, consisting of the sulphides of lead, copper and antimony. Galena is very heavy and usually can be easily separated from most of

the lighter minerals with which it is associated. The heavier minerals, such as barytes, pyrites and blende, are not so easily or completely sepa¬ rated. In Great Britain the ore is crushed to pass through about a half-inch sieve and is dressed to contain over 76 per cent of lead. In

other countries the concentration is not so high and sometimes no dressing is resorted to. This is specially the case in districts where the blast furnace is used for smelting, since finely divided material is unsuited for the blast-furnace.

Metallurgy. — Galena is the principal lead ore employed for the purposes which metallurgy (q.v.) now so widely subserves. The next im¬ portant ores, 'the sulphate and the carbonate, are seldom treated except in combination with oth¬ ers. The three main processes are the air-re¬ duction, the roasting and carbon reduction and the iron or precipitation reduction processes. Galena when taken from the mine is broken up into small pieces or reduced to powder, and the impurities, in so far as these can be removed mechanically, separated by machines. If the dressed galena is nearly pure, as it often is, the smelting operation is simple. The processes of lead-smelting — galena being the ore — which have grown up in various parts of the world, are strikingly similar in principle, though differing much in detail. Since 1913 flotation has been extensively resorted to for the con¬ centration of lead ores. It is estimated that in 1915 its process recovered not less than 50,000 tons of metal formerly lost in fines and slimes. In the United States lead is smelted in rever¬ beratory furnaces made of brick, or in water- jacketed blast-furnaces. The blast-furnace is always preferable to the reverberatorv where it can be used, and has now become almost uni¬ versal for lead-smelting.

Production. — The latest complete figures available for the world's production of lead are those of 1913; the outbreak of the Euro¬ pean War in 1914 demoralized the mining in¬ dustries of all European countries. The world's total of lead produced in 1913 was 1,270,458 tons. Of this, the United States produced 411,878 tons — 32.4 per cent of the whole. The output of the other lead-mining countries was as follows : Spain, 223,767 tons ; Germany, 199,627 tons ; Australia, 127,867 tons ; Mexico, 68,343 tons; Belgium, 55,997 tons; Great Britain, 33,620 tons; France, 30,864 tons; Austria-Hungary, 26,565 tons ; Italy, 23,920 tons ; Greece, 20,282 tons; Canada, 18,849 tons; Tur¬ key in Asia, 15,322 tons.

The output of lead in the United States for 1915 was 550,055 short tons, valued at $51,705,- 000. Of the whole, Missouri produced 195,634 tons; Idaho, 160,680 tons; Utah, 106,105 tons; Colorado, 32.352 tons; Nevada, 7,664 tons; Arizona, 6,953 tons; California, 5,606 tons;

Montana, 4,853 tons ; Oklahoma, 4,346 tons ; Wisconsin, 2,632 tons; and Kansas, 1,320 tons. The lead produced by Missouri, Montana,

Oklahoma, Wisconsin and Kansas is non-argen- tiferous, or what is known as <(soft lead."

In 1915 the United States imported 76,757

tons of lead of which 47,123 tons came from Mexico, 2,710 tons from South America and

I, 150 tons from Canada. In the same year the

lead exports of the United States included

26,547 tons to Canada; 13,445 tons to Japan;

II. 549 tons to Russia; and 10,603 tons to Great Britain. The output of lead in the United

States in 1916 is placed at 552,228 short tons; in 1917, 640,000 short tons.

Lead Oxides. — Five oxides of lead are known, namely, the suboxide (Pb20), the monoxide (PbO), the sesquioxide (Pb203), the red oxide (PbaCh), and the peroxide or dioxide (Pb02). Of these, however, only three — the monoxide, the red oxide and the dioxide — are of any importance. Lead monoxide (PbO), lith¬ arge, or massicot, is largely used in the arts, and is made by heating molten lead in a shal¬ low reverberatory furnace with free access of air, the litharge as it forms being pushed to one side so as to expose a fresh surface of the metal. The mass thus obtained is ground and separated from intermixed lead. It is then the buff-colored powder known as ground litharge or massicot. When the oxidation takes place above the melting point of the oxide, as in cupellation, the litharge on solidification breaks up into orange-colored scales and is then known as <(flake litharge." Litharge melts at about 600° C. to a clear liquid, and at higher tem¬ peratures volatilizes. Lead oxide is a powerful base and dissolves in acids forming salts. At high temperatures it combines readily with silica, forming fusible silicates, and therefore has a very corrosive action on crucibles or firebricks which contain silica. An electrolytic process of making red lead and litharge from galena is used at Niagara Falls. When lith¬ arge is heated to dull redness with free access of air, oxygen is taken up and the red oxide (PbaCh) red lead is formed. It is manufac¬ tured by roasting ground litharge with free access of air for about 24 hours ; the opera¬ tion being carried on till the required tint is obtained on cooling. It is used as a pigment and in the manufacture of flint glass and enamels.

Compounds of Lead. — One of the most im¬ portant lead compounds is plumbic carbonate (carbonate of lead, white lead), PbCOs — the cerussite of mineralogists, and now largely mined in the United States as an ore of lead. White lead is manufactured on a large scale, and is extensively used in the arts as a white pigment and as a body for other colors in paints. (See Paints). Another leading com¬ pound is plumbic chloride (chloride of lead), PbCh. The minerals matlockite and mendipite are both oxychlorides of lead. A basic chloride of lead is made for use as a white pigment, which is, however, not so serviceable as ordi¬ nary white lead. Lead acetate (sugar of lead), Pb(C2H302)2, 3H20, is prepared by dissolving massicot in dilute acetic acid. It can be ob¬ tained in transparent crystals or in scales by evaporating the solution. It is soluble in one and one-half parts of cold water, and in eight parts of alcohol. Like litharge, it is used in the manu¬ facture of oil-varnishes. Minium or red lead is much used in the manufacture of flint- glass, as a cement and as a pigment. For glass¬ making it requires to be made of very pure lead as a slight trace of copper would impart a color to the glass. Minium is prepared by heating massicot or monoxide of lead to a temperature of 600° F. in iron trays, in an oven, carefully avoiding fusion. More oxygen is thus gradually absorbed ; and a bright-red compound is formed which is the red lead of commerce. Orange lead, made from white lead instead of from massicot, is a very pure

kind of red lead. Yellow lead, so called some¬ times by manufacturers, is a mixture of the oxides of lead and antimony, which is to some extent used to give a yellow color to earthen¬ ware, and as a pigment. The so-called black lead (see Graphite), of which pencils, etc., are made, contains no lead.

Lead in Medicine. — Most of the lead com¬ pounds used in medical practice are made into external applications for disorders of the sys¬ tem which manifest themselves upon the skin, although some are employed as sedatives, as¬ tringents, etc. Lead acetate is an approved internal remedy in typhoid fever, diarrhoea and other diseases. Of plasters, ointments and the like, lead carbonate, lead iodide and lead oleate are familiar constituents.

Lead Poisoning. — Under the influence of moist air, or of water in which air is held in suspension, the hydroxide of lead is formed, and this is soluble in water. To this condition is to be attributed many

cases of poisoning by drinking water which has been standing for some time in lead pipes or vessels. The use of soluble salts of lead in the arts is a frequent cause of painful and sometimes fatal poisoning, from the metal finding its way into the system. The effects often are not immedi¬ ate as minute doses are apparently harmless, but these being oft repeated have a cumula¬ tive effect and the seizure is sudden. The glazing of culinary vessels with lead; the color¬ ing of confectionery with the chromate, chlo¬ ride or carbonate of lead ; the sweetening of sour wine by litharge or oxide of lead; the drinking of water which has passed through new lead-pipes ; and living much in rooms newly painted with lead-colors, all these things may cause exposure to this peril, and often produce lead or saturnine poisoning. But the most frequent and virulent cases occur among painters and persons engaged in white-lead fac¬ tories. In lead-poisoning the countenance as¬ sumes a sallow, earthy hue, the skin becomes dry and harsh, the digestion is deranged and ihe bowels constipated, and a sweetish metallic laste is felt in the mouth. A specially import¬ ant sign is the appearance of a blue or violet line along the margin of the gums and teeth, due to the formation of sulphide of lead. There is sometimes kidney derangement, mus¬ cular palsy, severe disturbance of the brain, and even epilepsy and some form of insanity. The most commonly occurring result of lead-poison¬ ing is lead-colic, or painters' colic. See Electro- Chemical Industries; Ore Deposits.

LEAD, Refining of. See Electrochemical Industries.

LEAD PENCILS. The earliest mention of what are known to-day as lead pencils ap¬ pears in records dating back to 1565 — not long after the discovery of the noted graphite mine at Borrowdale, England, in 1554. This mine furnished the material for the first lead pencils. The graphite was sawed into strips and fas¬ tened into wooden casings. In 1795 the Frenchman Conte improved the process by grinding the graphite and mixing it with clay, in order to produce grades of hardness and blackness, and this is the method of manu¬ facture at the present day. Not all graphite is available in making pencils. The variety known as (< flake graphite® is quite useless, the

flaky texture allowing the pencil to slip over the paper without leaving a mark. The variety which is used is a form in fine scales ap¬ proaching the amorphous form and is found in localities in Siberia, Bohemia and Bavaria in Europe, and in Mexico.

The graphite as i't comes from the mine is ground in a mill together with a special kind of clay mined in Germany. This grinding is continued until the mass is perfectly homo¬ geneous. The proportion

of clay added is determined by the degree of hardness required in the finished pencil, ithe very hard (marked HHHHHH) having the most clay and the very soft (BBBBBB) having hardly any. The soft leads have to be made larger in diameter to stand the strain put upon them when in use. After the grinding, the putty-like mass is put into the cylinder of a hydraulic press which has a pierced plate for the bottom and a movable plunger is driven down upon the mass, forcing it through the perforations in the plate. This operation is repeated as many times as it appears necessary to get the paste into a perfectly smooth condition. It is then put into another similar press which has only one per¬ foration in the plate. This may be square, round or oval, depending upon the shape of the lead required. As the ˆstring® of lead comes slowly through the plate an operator guides it into a groove cut in a tray and nips it off into lengths of seven inches. When filled, the trays of leads are covered with carbon dust and placed in an oven where they are baked at a temperature ranging from 2,200° to 2,300° F., to secure just the right degree of hardness.

The wood in which the lead is encased is red cedar from the Southern forests — pref¬ erably in Florida, Georgia and Alabama, where the cedar grows with a smooth cheesy texture. This material is milled until it is in <(slats® seven inches long, two inches wide and one-fourth inch thick, sufficient for the lower halves of six pencils. In these slats are cut six grooves deep enough to hold a string of lead. The slats are given a coat of glue and the leads are put in place, and a cover slat, slightly thinner, is glued on. The ((blocks,® as they are now called, are placed in clamps where they remain until thoroughly dry and hard. Then they go into a shaping machine which mills them into six perfectly shaped pencils, round, hexagonal, oval or any other form for which the knives are set and leaving them per¬ fectly smooth. Then they are fed into a ma¬ chine which gives them one or two coats of varnish of such a color as desired. The ends are then trimmed, a strip of gold leaf laid on one end which receives the title from another press, the tin tips and rubbers are put on in an automatic machine and the pencils are ready for boxing and labeling for the market.

The supply of cedar has been so rapidly dis¬ appearing that an attempt has been made to grow it under cultivation. In 1906 the number of lead pencils made in the United States was about 320,000,000, requiring 110,000 tons of cedar, which was then selling at $20 per ton. Since then cedar buyers in the South have bought up old cabins built of cedar logs, and even replaced old rail fences with wire, in order to get the coveted wood, no other sub-

stance having been proved a satisfactory sub¬ stitute.

The pencils with colored leads go through the same process, except that ((China clay® is used as the binder, and colored pigments take the place of the graphite. For these, with their larger Heads,® it has been found feasible to construct a casing of paper wound spirally around ithe centre. This is glued at one point on each turn, and the pencils are sharpened by unwinding as many turns as are necessary. The glued spots hold the strip from unrolling all the way down. Copying pencils are made with a coal-tar dye mixed with a gum soluble in water. Carpenters' and markers' pencils have a proportion of wax or tallow incorpo- rated with the graphite.

LEAD SOUNDINGS. See Soundings.

LEADER, Benjamin Williams, English landscape painter: b. Worcester, 12 March 1831. He studied art at the Worcester School of De¬ sign and at the Royal Academy of Arts, Lon¬ don. He early gained recognition as an able follower of the great English landscape paint¬ ers and has specialized in

LEADER, the player who takes the prin¬ cipal part in a musical organization, as the first violin in an orchestra, the first cornetist in a brass band and the first soprano in a chorus. Formerly the leader in bands and orchestras was also the conductor, but the duties are now separated in large organizations. In an orches¬ tra the leader is stationed at the conductor's right, directs the uniform bowing of the violins, and upon him in a large measure rests the animation and precision of <(attack.® He also plays' all solo violin passages except in concertos. Except in orchestras that are or¬ ganized institutions lie usually makes the en¬ gagements with the different members.

LEADHILLITE, a lead ore consisting of sulphate and carbonate with probable formula, 4PbO SO3. 2CO3H2O. Found in small amounts in Pinal County, Ariz., and Tintic district, Utah.

LEADING STAR. See Lodestar.

LEADING TONE OR NOTE, in musi¬ cal compositions the note immediately below the keynote, separated from it by a semitone, the shortest interval in the system. It takes its name from the fact that it leads up to the most important note in the scale, but has no status of its own and is incapable of standing as a root note. In the Greek scales and in the ecclesiastical scales derived from them the note

immediately below the keynote was separated by a full tone and was in no sense a leading note. A growing sense of harmony among musicians demanded the use of the leading

note, but ecclesiastics were disinclined to per¬ mit any change in the scales and Pope John XXII passed an edict against it in 1322. How¬ ever, musicians usually sang it, and as it was not written the ecclesiastical authorities ignored it. By the time of Bach and Handel lines of difference between the antique and modern scales had become fused and the leading note has since had its recognized place.

LEADING OF VOICES, musical term covering the correct progression of individual voices or parts in a musical composition. See Harmony, Counterpoint.

LEADVILLE, led'vil, Colo., a city and the county-seat of Lake County, 80 miles b> rail southwest of Denver, the State capital, on •the Colorado Midland, Colorado and Southern and the Denver and Rio Grande railroads. It is situated 10,200 feet above the sea amid pic¬ turesque scenery, near the headwaters of the Arkansas River in central Colorado, between the Mosquito and Sawatch ranges of the Rocky Mountains. Leadville was first settled in I8601 by miners and prospectors, but after a period of comparative prosperity as a gold-mining centre declined with the exhaustion of the first discovered deposits. It revived with the dis¬ covery in 1877 of rich lead and silver deposits, followed by the discovery of other gold, zinc, copper, bismuth and manganese deposits, and the mineral output during the period 1879- 1905 amounted to $328,487,146. It is the mining, farming and grazing trade centre of an ex¬ tensive region, has fine buildings, including a Carnegie library, opera house, theatre, court¬ house, jail, hospital and almshouse, has a pa¬ rochial school, a high school and four grade schools and several churches. The city is lighted by gas and electricity, has an excel¬ lent water supply and well-organized fire and police departments. Besides its large sampling, refining and reduction works, smelting fur¬ naces, etc., it has also iron foundries, manu¬ factures of machinery, ice, jewelry and novel¬ ties and a government fish-hatchery. The city is administered by a mayor and common coun¬ cil of six members elected biennially. Pop.

(1920) 4,959.

LEAF, Walter, English classical scholar and financier: b. Norwood, 1852. He was educated at Trinity College, Cambridge, where he was a Fellow in 1875. He entered the banking firm of Leaf, Sons and Company in 1877 and was its chairman after its reorganiza¬ tion as

Leaf and Company, Ltd., in 1888-92. He was one of the founders of the London Chamber of Commerce, serving successively as its vice-president, deputy chairman and in 1887 chairman. He was president of the Hellenic Society in 1914, and his researches in classical literature gained for him additional degrees from Cambridge and the D. Litt. from Oxford. He was chairman of the London County and Westminster Bank in 1914 and was appointed to the committee of finance for the European War. Author of numerous contributions to periodical literature of the classics and of (The Story of Achilles5 (1880) with J. H. Pratt; (The Iliad, Edited with Introduction and Notes> (2 vols., 1886-88; 2d ed., 1900-02);

(Companion to the Iliad5 (1902); (Troy: a Study in Homeric Geography5 (1912) ; (Homer

and History > (1915). He also translated from the Russian (A Modern Priestess of Isis) (1894), and published (Versions from Hafiz: An Essay in Persian Metre) (1898).

LEAF. See Leaves.

LEAF-BEETLE, a popular name for

many members of the family ChrysomelidcB' (q v.), which embraces about 18,000 widely dis¬ tributed species, about 600 of which are found in North America. The larvae, which feed upon the succulent parts, either fully exposed, in protective cases, beneath the epidermis as leaf-miners or stalk-borers, are all soft-bodied six-footed creatures with great appetites. Some larvae feed on roots, some are aquatic and many cover themselves with excrement as a protec¬ tion against their enemies. The adults of sev¬ eral tropical species are of such brilliant colors as to be used fdr jewelry when mounted in gold settings. The family includes many species considered serious pests of cultivated plants. Some of the most noted of these are the flea- beetles, tortoise-beetles, potato and asparagus beetles, elm:leaf beetle and the diabroticas, rep¬ resented by the striped and the spotted cucum¬ ber-beetle. These are treated under their food- plant titles.

LEAF-BUG, or PLANT-BUG, bugs of the family Capsidce, which suck the juices of plants. Two hundred and fifty of the thousand or more species described occur in the United States, and all except the predaceous species are vegetable feeders, a few being considered

pests. They are generally oval or elongated, yellowish or greenish, sometimes with lines or dots of red or black. All have a decidedly ˆbuggy® odor. Among the best-known species are the red-bug or cotton-stainer (Dysdercus suturellus) , so called because its excrement stains the cotton in the opening boll, thus re¬ ducing the grade. It is less troublesome than formerly because the piles of cottonseed in which it used to breed are now used for oil instead of being thrown in heaps to decay. The insect also attacks oranges in Florida. Cotton¬ seed will attract them away from the trees. Another species troublesome on currants, goose¬ berries, dahlias, etc., is the four-lined leaf-bug (Pcecilocapsus lineatus). Its eggs are laid in the young twigs which may be cut in autumn or winter and burned. The insects may also be jarred off the plants into receptacles while sluggish in the early morning.

LEAF-CUTTER BEE, one of the large

bees of the genus Megachile, of which- a com¬ mon species in the United States is M. cetun- cularis. It is a Hhick-bodied bee with a large square head, stout scissors-like jaws and with a thick mass of dense hairs on the under side of the tail for the purpose of carrying pollen. }) These bees make their nests in the hollow stems of elder-bushes, or, nowadays, often in crevices about buildings, and form their cells of round pieces which they cut out of tender leaves of many sorts of trees and bushes, especially the rose. Many cells are made, each containing an egg and store of pollen, and the whole economy of the group is very interesting. There are many species in various parts of the world.

LEAF-CUTTING ANTS. See Ants.

LEAF-FROG, a small American frog of the family Cystignalhidce and the genus Hy-

lodes, common in the tropics. They are similar to the tree-toad, are usually prettily colored and in size are rarely quite two inches long. The fingers as well as the toes have effective sucking discs enabling them to climb trees and perch securely upon their branches. The vocal sac of the male is similar to that of the tree- toads. The most common species is the Hy- lodes martiniensis, the coqui of the West Indies, noteworthy because of its being the first established instance of the complete metamor¬ phosis of the young frog before leaving the

egg.

LEAF-HOPPER, any member of the family Jassidce, which includes a

very large number of small bugs greatly varying in form and often grotesque. They are especially nu¬ merous in grass and grain, which they are be¬ lieved to injure to a greater extent than is usually supposed. Among the best-known species is the grape-vine leaf-hopper (Erythroneura vitis), which is often so abundant in vineyards that the leaves may turn brown from the insects' punctures. They have been effectively caught by tapping the vines to make the insects jump against a screen smeared with tar or a fan similarly covered and kept in constant motion close to the vines. This species is sometimes erroneously called Hhrips® (q.v.). Among the best known of the grass-feeding host of species is the destructive leaf-hopper (Cicadnla or Li-motettix exitosa). This is sometimes caught in wide pans covered with tar and dragged across the field.

LEAF-INSECT, or WALKING LEAF,

tropical species of the family Phasmidae , which is represented in temperate climates by the walking-stick (q.v.). They are so called be¬ cause of the remarkable resemblance of their wings to leaves, not only in color but also in the arrangement of the veins, etc., so that the natives believe that the insects are really leaves which have acquired organs of locomotion, di¬ gestion, etc. Their legs also look more or less like twigs, and their eggs, which are dropped upon the ground from the foliage where the insects feed, look very much like seeds. When leaf food fails these insects eat one another's wings. This likeness is of use as a protection from enemies. See Mimicry in Animals.

LEAF-MINER, any insect of the super¬ family Tineoidea, which comprises several fam¬ ilies of very small moths, most of whose larvae feed upon the soft tissues (parenchyma) of leaves and green stems beneath the epidermis, sometimes eating away rounded passages and sometimes long serpentine paths. More than 4,000 species have been described, of which fully 1,000 are American. The adults are often remarkably beautiful, exhibiting under the mi¬ croscope a covering of lustrous scales. Among the plants that these insects attack injuriously are oaks, pines, maples and palmettos. Some of the leaf-feeding species have developed the habit of feeding during their later larval days upon the outside of the leaf, either fully ex¬ posed or in a protective case. Others have as¬ sumed root- and seed-feeding habits; still others have become twig-borers and gall-form¬ ers. Some of the related species live upon ani¬ mal skins, fur, wool, etc. (See Clothes- Moth). A few flies of the families An- thomyiidce and Oscinidce are leaf-miners, as

are also some leaf-beetles of the family His- pini and some sawflies of the family Ten- thredinidce. Consult Comstock, J. H. and A. B., (Manual for the Study of Insects) (8th ed., Ithaca, N. Y., 1909) ; Sharp, (Cambridge Nat¬ ural History) (Vol. VI, London 1901).

LEAF-MONKEY, an Anglo-Indian name

for a langur (q.v.).

LEAF-NOSED BATS, a general term

for such bats as have on the snout upright leaf¬ like growths of highly sensitive membrane which is presumably of great assistance to them in making their way about in darkness and in finding and taking their insect-prey. (See Bat). These folds of skin are, naturally enough, called the nose-leaf, and may be com¬ paratively small and simple, or so large as to form a grotesque mask, such as gives so ex¬ traordinary appearance to the horse-shoe and other leaf-nosed bats of the family Rhino- lophidce, and to the <(false vampires® of the family Nycteridce. North American bats show very little of this peculiarity. These compli¬ cated membranes are always fringed with long fine hairs, which serve the purpose of the tactile whiskers of cats, and the bats possessing this feature are more thoroughly nocturnal than those in which it is lacking or little developed.

LEAF-ROLLER, LEAF-TYER, or LE AF-SE WER, a small moth, in most cases one of the family Tortricidce, whose caterpillar rolls a leaf or a part of a leaf into a case, ty¬ ing it into a cylindrical case with silken bands and lining this case with silk, so as to form a sort of cocoon in which it may transform safely into the pupa stage. In some cases the nest is formed by fastening together several leaves. ((In most cases,® says Comstock, ((the building of the nest is the work of a single larva, but in very many instances several larvae work to build a common nest.® Each species makes its nest of a particular form, and infests some special kind of plant or tree, and many do considerable injury, especially among greenhouse plants and orchard trees.

LEAF-TYER. See Leaf-roller.

LEAGU,E> leg, a measure of length vary¬ ing in different countries. The word is sup¬ posed to be of Celtic origin, but it has been in¬ troduced into the modern languages of Latin origin through the Latin

Icuca. The Romans derived it from the Gauls. It was brought to England by the Normans and at that time (1066) equalled 2.9 modern English miles. The Roman league was equal to 1,500 paces, each of 5 feet, or 1.376 modern English miles. The English land league is 3 statute miles and the nautical league 3 equatorial miles, or 3.457875 statute miles. The Italian league is reckoned as equal to 4 miles, each of 5,000 feet. The Spanish league varies very much according to the locality. On the modern Spanish roads the league is estimated at 8,000 varas, or 7,416 English yards. The Portuguese league was equal to 3.84 English miles. In the old French measures the length of the league was different in every district, but the three principal leagues were the legal or posting league, equal to rather less than 2*4 English miles, the marine league somewhat more than 3*4 English miles and the astronomical league equal to about 2j£ English miles. The metric

league is reckoned as equal to 4 kilometres (2.49 miles). At present the league is a nautical measure equal to the 20th part of a degree, that is, 3 geographical miles, or 3.657 statute miles.

LEAGUE, political connections which •have been called alliances since the French lan¬ guage has become the diplomatic language of Europe. Among these are the League of Cam- brai, formed in 1508 between Louis XII, king of France, the German Emperor Maximilian and Ferdinand of Spain, for the purpose of humbling the republic of Venice, and which was joined in 1509 by Pope Julius II. Th s league was dissolved in 1510, as many simila ones have been, in consequence of mutual dis¬ trust, and was succeeded in 1511 by the liga santa, or holy league, between the Pope, Maxi rnilian, Ferdinand and Venice. The object of this was to compel Louis XII, whose allies had now become his enemies, to renounce his con quests in Italy; which object was gained. Thirty years afterward a holy league was formed in Germany. When the principal Prot¬ estant princes in Germany united in 1530, and again in greater numbers in 1536, to form the union of Schmalkalden, in order to protect their common faith and withstand the Emperor Charles V, the Roman Catholic princes assem¬ bled at Nuremberg, in 1538, to take measures for the support of their own faith and to op¬ pose the designs of the Protestant princes; and as their league had the protection of the Roman Catholic Church for its object, they termed it the holy league. A fourth league was headed by Henry, Duke of Guise, in 1576, against Henry III of France. Its ostensible object was the sup¬ port of the Roman Catholic religion, whence it was called the Catholic League. There was a fifth league in Germany in the 1 7 th century known as the Holy League.

LEAGUE AND COVENANT. See

Covenanters.

LEAGUE OF NATIONS. See War,

LEAGUE OF THE PRINCES, a league formed under the leadership of Frederick the Great, 12 July 1785, between Prussia, Han¬ over and the electorate of Saxony against Emperor Joseph II of Austria, for the purpose of defeating Austria's project of annexing Ba¬ varia, giving in exchange Belgium. The league was afterward joined by Brunswick, Mainz. Hesse-Cassel, Baden, Mecklenburg, Anhalt and the Thuringian Lands. It accomplished its purpose and continued its existence until the death of Frederick the Great, when it was dis¬ solved as no longer necessary.

LEAGUE OF THE PUBLIC WEAL, a

union of powerful French nobles under the leadership of Charles the Bold, Duke of Bur¬ gundy, against Louis XI for the purpose of re¬ gaining their old feudal rights which had been largely usurped by the king. The league's vic¬ tory at Montlhery, 16 July 1465, resulted in the signing of the Treaty of Conflans, in which Louis was forced to concede the demands of the nobles. Subsequently, however, Louis suc¬ ceeded in dealing individually with the mem¬ bers of the league with the result of re-estab¬ lishing the power of the throne over that of the feudal chiefs.

LEAHY, le'hi, William Augustine, Amer¬ ican author: b. Boston, 18 July 1867. He was graduated from Harvard in 1888, was literary editor of the Boston Traveller in 1893-94, then entered general literary work and contributed verse and short stories to magazines. From 1902 he was secretary to the music department of the city of Boston, until 1910, when he be¬ came secretary to the mayor of Boston 1910-12. His works are 'The Siege of Syracuse) (1889); 'The Incendiary' (1896), which obtained a prize offered by the Chicago Record; and a (Historv of the Catholic Church in New Eng¬ land' (1899).

LEAKE, Sir John, English admiral : b. Rotherhithe, 1656; d. Greenwich, 21 Aug. 1720. He entered the navy and in 1673 was serving under his father on board the Royal Prince. He became commander of the Firedrake in 1688 and served under Admiral Herbert in the action off Bantry Bay, 1 May 1689. His achievement of setting fire to the French ship Diamant in that action secured his pro¬

motion to the command of the Dartmouth with 40 guns. He convoyed supply ships to London¬ derry with the Dartmouth and succeeded in raising the siege. He commanded the 70-gun Eagle in the battle of Balfour, 19 May 1692, and in 1701 he was appointed governor and commander-in-chief at Newfoundland. He achieved the purpose for which he was sent out, the destruction of the French fishing fleets and settlements on that coast, and upon his return to England was promoted rear-ad¬ miral of the fleet. In 1702 he was knighted and promoted vice-admiral. He relieved Gibraltar in 1704 and again in 1705. He was made vice-admiral of the white in 1704. In

1706 he risked disobedience to orders and suc¬ ceeded in relieving Barcelona, but the wisdom of his action was so clear that he received no reprimand. Later in the year he secured the surrender of Cartagena, Alicante, Majorca and Iviza and upon his return to Portsmouth he was presented by the queen with a present of £1,000. He became admiral of the white and commander-in-chief of the Mediterranean in

1707 and captured a large fleet of the enemy's victualers with which he averted the famine which threatened Barcelona as a result of the French victory at Almanza. He later partici¬ pated in the reduction of Sardinia and Minorca and in 1709 he became rear-admiral of Great Britain. He was appointed one of the lords of the admiralty in 1709, acting as chairman of the board. He was member of Parliament from Rochester in 1708-14. Upon the death of Queen Anne his appointments and patents expired and he was retired on a pension of £600. Consult Leake, S. M., 'Life of Sir John Leake' (1750); Campbell, (Lives of the Ad¬ mirals' (Vol. III).

LEAKE, lek, William Martin, English archaeologist and topographer: b. London, 14 Jan. 1777; d. Brighton, 6 Jan. 1860. An officer in the West Indian service (1794-98) and ar¬ tillery instructor at Constantinople in early life, he later traveled in the East and was engaged in surveys and diplomatic business for the British government in Greece (1805-09). Among his publications are Researches in Greece' (1814); 'Topographv of Athens' (1821), a learned and still valuable work; vol. 17 — 12

'Historical Outline of the Greek Revolution' (1826) ; 'Travels in .Northern Greece' (1835) ; (Peloponnesia' (1846). Consult Marsden, 'Brief Memoir of the Life and Writings of W. M. Leake' (1864).

LEAMINGTON, Canada, village in Essex County, Ontario, on Lake Erie and on the Michigan Central and Pere Marquette rail¬ roads, 30 miles southeast of Windsor. The vil¬ lage has connection with Windsor by

electric railroad and there is steamship connection with Pelee Island. It has trade in country produce, lumber and tobacco and its industries include canning, sash and blinds and tobacco factories. Pop. 2,652.

LEAMINGTON, or LEAMINGTON PRIORS, England, fashionable health resort in Warwickshire, on the river Learn near its junction with the Avon, 98 miles northwest of London, on the Great Western and London and Northwestern railroads. The town owes its importance to its springs of mineral waters, saline, sulphurous and chalybeate. There are baths and a fine building houses the pump- rooms. The town is modern, dating its growth from the erection of the baths about 1786. Its population in 1811 was only 543 and it was not incorporated until 1875. In 1838 it received a royal license to call itself Royal Leamington Spa, but the name never became popular. There are several important schools, a college, a handsome town-hall which houses an art gal¬ lery and public library, the South Warwick¬ shire Hospital and Midland Counties Home for Incurables and extensive public gardens and parks. Leamington and Warwick, two miles distant, have from 1885 formed a con¬ stituency sending one member to Parliament. Aside from its business as a health resort the town has iron foundries and brickworks. Pop.

26,713.

LEANDER, Saint, bishop of Seville: b. Cartagena, 534 or 550; d. Seville, 13 March 600 or 601. He early entered a Benedictine monastery and afterward founded a school which became famous. He converted Prince Hermenegild, eldest son of the Gothic King Leovigild, to Catholicism and was exiled. He spent the years 579-82 in Byzantine where he gained the friendship of the future Pope Gregory the Great, with whom he afterward maintained a correspondence. He returned to Seville and about 584 was created bishop. He converted Reccared, second son and successor of Leovigild, and succeeded in securing Visi- gothic's Spain's rejection of Arianism for the Roman Catholic faith. Pope Gregory dedicated to him his 'Moralia in Jobum' and in 599 sent him the pallium.

LEANDER CLARK COLLEGE, before 1906 known as Western College, is located at Toledo, Iowa. It was founded by the Iowa Conference of the United Brethren in Christ ; was incorporated in 1856; and was opened to students in 1857. It was first located at West¬ ern, Linn County, but was moved to Toledo in 1881. In 1889 the main building was destroyed by fire, but was immediately rebuilt. The board of trustees consists of representatives of the alumni and of five conferences of the United Brethren and three membersrat-large. The

college is open to men and women on equal terms. Two regular college courses are

offered, the classical and the scientific, and the degrees of A.B. and B.S. are conferred. Both courses are almost entirely elective in the last two years, the list of electives differing in the two courses. In addition to the collegiate de¬ partment, there are the Academic or Prepara¬ tory School, the Conservatory of Music, the College of Commerce, the School of Elocu¬ tion and Oratory and the Department of Art. Graduates from the collegiate courses are ad¬ mitted to the senior year of Yale, Chicago and Smith without examination. The buildings in¬ clude the main building, the Bright Conserva¬ tory of Music, Mary Beatly Hall (the dormi¬ tory for young women), Drury Hall (the young men's dormitory) and the College Church. The faculty number 16 instructors ; the average annual attendance of students is 240; tuition fees amount to $65; living ex¬ penses, board, etc., $162 ; productive funds are $203,000; income, including tuition and inci¬ dental charges, $21,663 ; the graduates since or¬ ganization number 617. The library contains 7,500 volumes.

LEANDER AND HERO. See Hero.

LEANDER McCORMICK OBSERVA¬ TORY. The Leander McCormick Observa¬ tory of the University of Virginia owes its origin to the generosity of the late Leander J. McCormick of Chicago. The chief instrument is the 26-inch refractor, both lens and mount¬ ing the work of Alvan Clark and Sons. The lens when finished was the largest in the world and it was regarded by Alvan G. Clark to be his masterpiece. While testing it, before its erection at the University of Virgina, the star T Cygni was discovered to be a double. The observatory was opened in 1882. The first di¬ rector was Ormond Stone. The work under his direction was entirely visual and investiga¬ tions were carried out along the following lines : A study of the Orion nebula, a search for southern nebulae, micrometer measures of double stars, satellites and comets, photometric work by means of a wedge and observations of long period variables by the Argelander method. S. A. Mitchell succeeded Professor Stone in 1913. A double-slide plate holder was attached to the eye end of the telescope and photographic work was undertaken, using a color filter and isochromatic plates. The chief work at present is the determination of the parallaxes of the fixed stars by means of pho¬ tography. The parallaxes of 125 stars

were found as the result of two and a half years' work. Photographic work is also done by placing a wire grating in front of the objec¬ tive. This work is for the purpose of deter¬ mining the photovisual magnitudes of the Har¬ vard standard regions and is being carried on in co-operation with Harvard College Observa¬ tory. The McCormick Observatory is the head¬ quarters of the American Meteor Society. In 1916 more than 10,000 observations on meteors or shooting stars were made in the United States and Canada, and largely by amateur as¬ tronomers. These observations are sent to the McCormick Observatory and are discussed by Dr. Chari es P. Olivier and the results pub¬ lished. The work on long period variables has been continued. On account of the large aper¬ ture (26-inch) stars are visible near their min¬ ima and when they are invisible to the tele¬

scope at Harvard and to the smaller telescopes used by the American Association of Variable Star Observers. Micrometer work on doubles, etc., has likewise been continued. There are three fellowships available for graduate stu¬ dents who wish to continue work for the de¬ gree of doctor of philosophy. The income of the observatory is derived from appropriations by the University of Virginia, by gifts from the Leander McCormick estate and from Mr. Edward D. Adams of New York and by small grants from the National Academy of Sci¬ ences for meteor research.

LEANDRE, la'an'dr', Charles Lucien,

French caricaturist and painter: b. Champse- cret, Orne, 1862. He studied under Bin and Cabanel and made his first exhibition at the Salon in 1887. He specialized in portraits and genre painting and was also a teacher of draw¬ ing until 1894 when he began the publication in La Rire of the drawings and caricatures which made him famous. He was also con¬ nected with Le Figaro and other journals. His portraits in pastels constitute a considerable success in another branch of art and his litho¬ graphic work is ranked as exceptional. He il¬ lustrated Rostand's (Cyrano de Bergerac) (1900) ; and Murger's '•Vie de Bolierneˆ (1903). Among his posters may be mentioned 'Yvette GuilberD ; (Les nouveaux maries) ; 'Joseph Prudhomme) ; 'Les Lutteurs) ; and 'La Femme au chien.5 He published a series of albums;

1907.

LEANING TOWER. See Pisa.

LEAP YEAR, the name given in Great Britain to every year of 366 days. The length of the year is a little less than 365j4 days. Ju¬ lius

Caesar, in reforming the calendar, ar¬ ranged that in every fourth year February should have 29 days instead of 28, and that two days should be called by the same name. The day whose name was repeated was, according to the Roman method of reckoning, the sixth before the calends of March, that is, the 24th February, and the year in which this name was given to two successive days was named bissex¬ tile (bis. twice; sextus , sixth). The name leap year is perhaps due to the notion that the cal¬ endar takes a leap of one day every fourth year to make up for its ordinary year being one-fourth day too short. Every year is a leap year which is divisible by four without re¬ mainder, except the concluding years of cen¬ turies, every fourth only of which is a leap year; thus the years 1800 and 1900 are not leap years, but 2000 and 2400 are.

LEAR, ler, Edward, English author and artist: b. London, 12 May 1812; d. San Remo, 29 Jan. 1888. In 1831 he became draftsman to the London Zoological Society. His illustra¬ tions of the 'Family of the Psittacidse) (1832) was followed by many other illustrations for zoological works by Gould, Bell, Swainson, Jar- dine and Gray. In 1837 he visited Italy and the East and in those parts spent most of his remaining days, chiefly occupied with land¬ scape painting. He exhibited 'Dead Birds) in 1836 and in 1850 was represented at the Royal Academy exhibition by 'Claude Lorraine's

House on the Tiber. > As an author he is best known by his (Book of Nonsense J (1846) ; (Nonsense Songs and Stories) (1871) ; (More Nonsense Songs, > etc. (1872) ; and laugh¬ able Lyrics) (1877). He also wrote (Views in Rome and its Environs* (1841); Hllustrated Excursions in Italy * (1846) ; (Journal of a Landscape Painter in Greece and Albania) (1851) ; (Journal of a Landscape Painter in Southern Calabria) (1852) ; (Views in the

Seven Ionian Islands) (1863) ; and journal of a Landscape Painter in Corsica) (1870). Tennyson's verses (To E. L. on his Travels in Greece) were addressed to Lear.

LEAR, Tobias, American diplomatist: b. Portsmouth, N. H., 1762 ; d. Washington,

D. C., 11 Oct. 1816. He was graduated at Har¬ vard in 1783 and in 1785 became private sec¬ retary to General Washington, to whose

domes¬ tic affairs he attended for several years, and by whom, in his will, Lear was most liberally re¬ membered. In 1802 he was consul-general at San Domingo and afterward consul-general at Algiers' and commissioner to conclude a peace with Tripoli. He discharged this last duty in 1805 in a manner which gave offense in certain quarters, but his conduct was approved by the Federal government. He returned shortly after to the United States.

LEAR OF THE STEPPES, A ((Stepnoy Korol' LirU. A number of Turgenev's friends, in 1870, were giving reminiscences of Shake¬ spearean characters whom they had met in life. Turgenev gave his story of the Russian King Lear, in which he meant to depict the elemental passions, as found in the rude Russian sur¬ roundings. Tall, awkward, harsh Kharlov, a landed proprietor, who in reality possesses the soul of a simple-minded child, has two daugh¬ ters, who slavishly execute his will, but are waiting for his death. Having had an ominous dream about death, he makes his property over to his daughters. Immediately they turn him out of his home, and when a street urchin taunts him with his homelessness, he is seized with the passion for revenge. He ascends the roof of his house, and with his gigantic strength pulls it to pieces, until he falls dead among the ruins. The younger daughter is seized with remorse and joins the dissenters, among whom, through her imperious manner, she assumes a leading position. The elder sister grows pros¬ perous as a landlady. Where, then, is the po¬ etic justice? Has she deserved her good luck? To this question Turgenev gives the significant answer that everything in the world, both the good and the bad, takes place according to a logical law, which man cannot comprehend, but which he (Turgenev) seems dimly to grasp.

Leo Wiener.

LEARNED, lar'ned, Marion Dexter,

American educator: b. near Dover, Del., 10 July 1857; d. 1 Aug. 1917. Graduated from Dickin¬ son College, 1880, he studied in Germany in 1885 and received his Ph.D. at Johns Hopkins Uni¬ versity in 1887. He was instructor in lan¬ guages at Dickinson Seminary in 1880-84 and in 1886-95 he was first instructor, then associ¬ ate professor and professor of German at Johns Hopkins. In 1895 he became pro¬ fessor of German in the University of Penn¬ sylvania. He edited Americana Germania, later German American Annals, from 1897 and

was organizer and director of the American Ethnographic Survey. Besides numerous con¬ tributions to periodicals he wrote (The

Pennsylvania German Dialect* (1889) ; Ger¬ man Diaries of the American Revolution , (1902-05) ; (The Family of Abraham Lincoln) (1909) ; (Guide to the MS. Sources of Amer¬ ican History in the German State Archives *

(1912).

LEARNED LADIES, The ((Les Femmes Savantes*), one of the most readable, vivacious and often acted comedies of Moliere, was first produced 11 March 1672 and published in 1673. The theme is related to that of (Les Pre- cieuses Ridicules,* but is not the same. The at¬ tack there was on literary pretense in a pass¬ ing vagary of fashionable speech; here it deals with perennial springs of affectation and ped¬ antry. The play has a close modern counter¬ part in Pailleron's (Le monde ou Ton s'ennuie.* Its lively raillery at abiding social foibles, ebullient good humor and savory common- sense gave it lasting hold on the stage. It owed immediate success, however, in part to its hardly disguised portraiture of Abbe Cotin, a dilettant literateur, in the character of Trisso- tin, <(Thrice-fool,** as a contemporary inter¬ prets the name, which Moliere had altered from the too-recognizable Tri-cotin. Whether Vadius, the pretentious pedant of the play, is meant for Boileau's aversion Menage is dis¬ puted. Menage had at least the wit to recog¬ nize no resemblance. Around Trissotin the whole action revolves. Indeed, Madame de Sevigne called the play by his name. The question is whether he shall receive the hand of the very engaging Henriette or whether it shall go with her heart to Clitandre, a fine young fellow with less affectation to learning. But, throughout, the interest is almost wholly in portrayal of character and in the satire of the literary pedantry and affectation which are developed in that contest. Henriette knows her own mind and heart, she lacks neither tact nor resource, but she is a dutiful daughter of her time, country and station. For Trissotin is her mother, Philaminte, masterful in the home and bent on forming a circle of arbiters of taste so that <(none shall have wit but our¬ selves and our friends.® With her is Henri- ette's aunt Belise, a sentimental pedant bor¬ rowed with little change from Desmaret's (Visionnaires,* and her elder sister Armande, an acidulated pedant with a personal grudge against Clitandre. On the other side is her father, Chrysale, acted by Moliere, an exceed¬ ingly acute study of a man of good sense, good nature but weak character, starting with right impulses, but soon thinking to compromise, and discovering that he has surrendered. Ariste supports Chrysale's better judgment with commonsense, and Martine, the cook, with de¬ licious peasant shrewdness and wit. Legend says the part was studied from Moliere's own cook who acted herself in it. Trissotin is at last tricked into revealing that he cares more for Henriette's dowry

than for herself, and Clitandre wins the prize. The best remem¬ bered scenes of the play are concerned with a sonnet (To the Princess Urania on her Fever) and an epigram, both taken bodily from Abbe Cotin's (CEuvres galantes,* published in 1663. Cotin had fatuously called himself Father of

the French Enigma and had described his monogram, two C's facing one another, as <(forming a circle that, in a sense hardly mys¬ tic, indicates the circumference of the world to be filled by my works.}) These two pieces, at least, have come near to fulfilling the proph¬ ecy. Abbe Cotin is remembered for them alone. (Les Femmes Savantes) is best edited with pertinent comment by Mesnard in Vol. IX, and by Moland in Vol. XI of their editions of Moliere. There are editions with English notes by Alcee Fortier (Boston 1902) and others, and translations by H. Van Laun (Ed¬ inburgh 1875) and C. H. Page (New York

1908).

Benjamin W. Wells.

LEARNING IN ANIMALS. See Ani¬ mal Psychology ; Eyesight in the Lower Animals.

LEARY, Richard Phillips, American na¬ val officer: b. Baltimore, 3 Nov. 1842; d. Bos¬ ton, 27 Dec. 1901. He was graduated at the United States Naval Academy in 1860; served during the blockade of Charleston 1863-65 ; promoted commander in 1882. During the Samoan revolution in 1888 he was the senior naval officer present at the critical moment. He was promoted captain in April 1897 ; com¬ manded the cruiser San Francisco in 1897-98; and when the New Orleans was purchased from Brazil convoyed that vessel to the United States. At the close of the Spanish-American War he was appointed the first American gov¬ ernor of Guam and served there till relieved, on his own request, in April 1900.

LEASE, a species of contract granting the possession of lands, tenements, or incorporeal hereditaments, for life or a limited term of years, or during the pleasure of the contracting parties. The grantor is called the lessor and the grantee the lessee. A lease may be in writ¬ ing or by parol, but the former is more satis¬ factory, as it usually sets out in regular form and binding terms the respective rights of the

contracting parties. In many of the states of the Union the statutes require that leases for more than one year be in writing. A lease contract establishes the relation of landlord and tenant between the lessor and lessee, unless its terms limit the relation of the parties. A lessor who holds an estate for years only may under-lease in such a manner as to establish a technical re¬ lation of landlord and tenant between the owner of the fee and the lessee. One of the essential requisites of a lease is that its dura¬ tion must be for a shorter period than the duration of the interest of the lessor in the property leased; for if the holder of an interest less than that of a fee leases his interest for the full term of its continuance it would be in effect an assignment or sale of his interest and in no sense a lease. In a lease proper, the lessor reserves to himself a reversionary inter¬ est in the property included in the lease. The beginning and termination of which are to be determined by the agreement of the parties. This agreement must also include a designation of the premises, estate or interest intended to pass to the lessee. A term, however, is per¬ fected only by the entry of the lessee. Even after the making of a lease the estate remains in the lessor up to such time as the lessee actu¬ ally enters into possession, and the only right

the lessee has in the estate is that of making an entry, which must be exercised to give him the additional rights provided for in the lease. All persons possessed of lands or tenements, or interest therein, competent to do business and under no legal disability, as of unsound mind, immature age or the like, may enter into a lease contract. (See Estate; Landlord and Tenant; Real Property) ; and consult the au¬ thorities referred to under those heads.

LEASE AND RELEASE, a form of con¬ veyance used in England for the transfer of ownership of a freehold and reversion. It is said to have been devised by Sergeant Moore after the enactment of the statute of uses. The instrument is of a compound nature, consisting of a lease, covering the bargain and sale, and providing for a release enacted in separate deeds. The lease provides for the use of the property in question for one year upon pay¬ ment of a pecuniary consideration by the ten¬ ant ; at the end of the year the tenant, being in possession, is capable of receiving a release of the freehold and its reversion, which release may be made the following day. This method of conveyance was in use in various parts of the United States until after the Revolution, when it was superseded by conveyance by bar¬ gain and sale, and it has since been replaced by similar conveyances in England.

LEASEHOLD. A leasehold is an estate

held under or by virtue of a lease. An estate for years usually commences by means of a written lease. It is important to distinguish between a lease and an agreement to lease, the former being a completed contract and the latter only a stipulation for the formation of a contract at some future time. It is often diffi¬ cult to determine to which of the two classes an instrument belongs, without resorting to an interpretation based upon the intentions of the contracting parties. If a lessee fails or re¬ fuses to enter into possession under and in ac¬ cordance with the terms of a lease, the pos¬ session remains undisturbed in the lessor, and the remedy of the latter would be by an action for not entering into possession and for conse¬ quent damages, rather than for a breach of the conditions of the terms of the lease, the rela¬ tion of landlord and tenant not having been established before an entry under the lease. A person can convey by lease no greater interest than he possesses in an estate. If the lessor has only a life estate it terminates with his death, although he may have executed a lease for a term of years not completed at the time of his death. The ordinary powers, duties and obligations of the contracting parties may be increased, diminished or modified by special provisions in a lease. Many lease contracts provide for all of the contingencies which can ordinarily happen. It is not infrequent that a clause in the instrument provides that the lessee may build upon land leased to him, and that he shall have the right to remove his build¬ ings at the expiration of his term, or purchase the fee. Any provision not illegal or incon¬ sistent with public policy may be an incident of a leasehold.

LEAST ACTION, Principle of, the prin¬ ciple, due to Maupertuis and first definitely enunciated by. Lagrange, that the sum for all the particles in a given dynamical system of

the space-integrals of the momenta of these particles as they move from a position Px to a position P2 is in general smaller hy the actual route which the particles traverse than by any slightly different route. The sum of the in¬ tegrals, or 2 Smvds is called the action of the system, and is represented by the letter A. Even when A is not less than any of its neigh¬ boring values, what is known as its first varia¬ tion is 0. See Calculus of Variations; Me¬ chanics.

LEAST .SQUARES, Method of. A

mathematical process for treating the results of scientific observation

so as to free them as far as possible from the effect of error.

The familiar idea of measurements either regards them all as perfectly exact when made, or at least sufficiently near perfect exactness. For instance, a carpenter wishing to know the width of a room simply measures with his two- foot rule, and notes the size just as it came from the measurement. But in scientific work, where the highest degree of accuracy is neces- sary, we must do much more than this. The carpenter's measurement will doubtless be cor¬ rect within an inch, and if he is a particularly careful workman, it will be correct within a fraction of an inch. But if it were necessary to know the width of that room within a hun¬ dredth of an inch very different processes of measurement and very much more accurate tools would be essential. If it were required to attain a degree of exactness within one thousandth of an inch, it might perhaps happen that no tools or method of measurement could be devised which would accomplish the desired result.

It is obvious on reflection that since human measurements must always depend ultimately upon fallible human senses, so there must al¬ ways exist a limit of precision beyond which it is not possible to go. It happens almost always that the degree of precision required in scientific measurements is somewhere near this unattainable limit; so that it is especially in scientific work that we have to resort to some method adapted to diminish as far as possible the harmful effects of those small errors which thus always result from the fallibility of human senses. The Method of Least Squares was perfected for this purpose.

It is clear from the above that this method is pre-eminently a practical process ; it can per¬ haps be understood best by approaching it from the point of view of a concrete practical exam¬ ple. For instance, it is well known that a bar of iron changes its length with every change of temperature. If the bar is heated it becomes longer; when cooled it becomes shorter. Now suppose an experimenter in a physical labora¬ tory desires to determine the effect of tempera¬ ture changes upon the length of such an iron bar. What he does is extremely simple. Ap¬ paratus is provided for varying the temperature of the bar by alternate heating and cooling, and additional apparatus for measuring its length very accurately at various temperatures. At the same time some form of thermometer is used to make certain that we know the exact temperature of fhe bar at the various stages of the experiment.

Let us introduce the following notation :

/<,= length of the bar at some assumed tem¬ perature to,

l — length of the bar at some other tempera¬ ture t.

Now if we are willing to assume that the .length varies uniformly with changes of tem¬ perature we may write,

a”= increase in length of bar per degree of heating.

We shall then have the equation,

(1) l~loP(t- — to) x.

The quantities appearing in this equation are of three kinds with respect to our knowl¬ edge of their numerical values :

1. Unknown quantities; viz.: x and lo.

2. A quantity known from observation, and therefore subject to errors brought about by the fallible human senses ; viz. : /.

3. A coefficient which we may safely assume to be known, with practically complete accuracy from the thermometer readings; viz.: t — to.

Let us now rewrite equation (1) in a slightly different form, and repeat it several times with subscript numbers, so as to distinguish equa¬ tions depending on the successive observations at various temperatures. We have:

/«+ (ti — to) x — lx— 0,

(2) /0+U2 — 1 0)x — U—0,

/n+ (1 3 – t„) X – l3 = 0,

etc. etc.

It is at once evident that as we have only two unknown quantities (/0 and x) we can com¬ pute their numerical values from any two equa¬ tions of the group (2) by the ordinary processes of elimination given in elementary algebras. But which two equations shall we select for this purpose? We might use the first two, for instance, or the last two, or the first equation and the last. If we try the actual process numerically upon a real example we generally find that the values of the unknowns come out different from the various combinations of equations. It was not until the Method of Least Squares was

introduced that scientific men had a better way of computing their ob¬ servations than the crude one of solving a great many different combinations and taking the average of the results so obtained.

The reason for the differences thus arising from different combinations of equations is easy to find. We have seen that the quantities l in equations (1) and (2) are known from observa¬ tion, and therefore subject to the usual small unavoidable observational errors. If the Vs were absolutely correct, all combinations of equations would give precisely the same results for the three unknowns. But the Vs are not thus absolutely correct ; and, in a very strict sense, the several equations numbered (2) are therefore inconsistent amongst themselves. Ad¬ mitting fallible numerical values of the Vs as actually observed, all equations of the form (2) cannot be exactly true simultaneously: indeed, it follows from the very nature of observational errors such as affect the Vs that in all probabil¬ ity no one of the equations (2) is really ab¬ solutely correct and true.

The right-hand members of equations (2), then, should not really be zeros. It will be more correct to represent them by a series of small quantities v, and to write equations (2) thus:

/0 + (tx — to) X~Ph~ V\,

/ox /,) + (h — to) X + k— Vi,

ˆ /o + (U – to) x + h = Vs,

etc. etc.

Formation of Normal Equations. — It will

be convenient at this point to introduce a change of notation, so as to secure greater generality, and at the same time avoid our somewhat cumbersome form, which has been employed simply to visualize our conceptions by fixing attention upon an example derived from actual practice. We shall now increase the number of unknown quantities from two to three, and designate them by the lettetrs x, y, z; and the known coefficients of x, y, z we shall designate by the letters a, b, c. The quantities l, observa- tionally known, will now be designated by n's. This will bring our notation into conformity with the usual practice of writers on Least Squares. Our general equation intended

for solution thus become, from (3) :

(4)

(hx + biy + Ciz + «i — Vi, a-ix + b2y + CiZ-- m2 = Vi, (hx + bzy + c*z + n3— v z, ciiX 4- biy + CiZ~- M4 = Vi,

etc., etc.

The v's are here simply the errors of the equations, if we may be permitted the use of such an expression. More accurately, they are the amounts by which the equations fail of sat¬ isfaction when we substitute in them any as¬ sumed system of numerical values for the un¬ knowns x, y, z. If, by any process whatever, we obtain a system of numerical values for x, y, z, and substitute those values in the left-hand members of equations (4), we shall ob¬ tain a series of residual errors represented by the v's. The name ((residual® has therefore been given to the v's, for brevity.

It is evident that if we consider two differ¬ ent systems of numerical values for the un¬ knowns x, y, z, and substitute both systems in equations (4), we shall get two different sets of values for the residuals v. In fact, and in general, for every different system of values belonging to x, y, z there will be a different set of v's: it is the province of the Method of Least Squares to determine which system of x, y, z, and corresponding v's is preferable. To do this, we make use of the following prin¬ ciple, due to Legendre :

Of all possible systems of values for the unknowns x, y, z, that one possesses the highest probability of being correct which makes the sum of the squares of the residuals v a mini¬ mum.

This principle probably does not admit of rigorous demonstration, but. it is so highly plausible that we are justified in adopting it without hesitation. This plausibility becomes evident when we consider that the best system of values for x, y, z must certainly make all the individual residuals small. Yet it would not do to adopt as our principle that the sum or mean of the residuals should be a minimum. For some being positive, and some negative, it might happen that the sum or mean would be made very small, while the individual v's re¬ mained in part very large. But the squares are not subject to this criticism, since they are all positive, and are at the same time the simplest functions that are thus positive.

Adopting, then, Legendre's principle of Least Squares, it remains to show how we can use it to solve equations (4). Again following the

notation usual with writers on this subject,

we shall employ square brackets as a symbol of summation, so that, for instance, the quantity

\w]

will designate the sum of the squares of all the v's. Then, according to Legendre's principle, we must have :

(5) [vv]—a minimum.

But, according to equations (4), [vv] is a function of x, y, z; and as these latter quanti¬ ties are independent, the principles of maxima and minima in the calculus tell 11s that we can satisfy the condition (5) by equating separately to zero the first partial differential coefficients of [w] with respect to x, y, z. In other words, we have :

(6)

6 M _ n

(5* '

Now since:

4 M _ n 6 M _n

4y — U' Jz

[yv] = V\Vi f ViVi (VzVz + ViVi { etc. equations (6) become:

Vx

4z > i

6x

Vi

A'2

1 ^3 . . n

j vz — 1 — f etc. — 0, ox

(7) n-jj + #» + *•-% + etc ■ ~ °-

dvi . rk/3 . , n

V\ r “f” V2 **7 — “T” ^3 “j — “T” CtC** – 0.

Oz oz oz

Now, differentiating equations (4), we have:

4z;i

4l > !

6x

di,

4y

= bi,

4s

= Ci,

4%

4y2

4%

- Ci,

6x

d2,

6y

— bi,

4s

dvz

4y3

= bz,

4z > 3

6x

dz,

6y

4s

— Cz\

etc.,

etc.,

etc.

so that (7) become:

aivi j diVi 4~ dzVz j etc. = 0, (8) b\V\ f biVz f bzVz j 6/c. = 0,

C1V1 4“ C2V2 f CzVz j ˆ/c. = 0.

It will be noticed that the number of equa¬ tions of the form (8) is the same as the number of unknown quantities x, y, z, no matter how large may have been the number of original equations of the form (4). We shall therefore simply substitute in equations (8) values of the v’s from equations (4), remembering that, ac¬ cording to our notation :

\dd\ = didi } didi j dzdz | etc.,

[db] = dibi dibi j dzbz ff- etc.,

\clc\ = = <2iCi 4~ dzCi 4~ dzCz 4~ etc., etc., etc.

and thus obtain the following equations :

[aa]# -L [ab\y 4* [ac)z 4~ [an] — 0,

(9) [ab]x 4″ [bb\y + [bc]z j [bn] = 0,

[ac]x 4~ [bc]y + [cc]z 4- [cn] = 0.

Equations (9) are called ((Normal Equa¬ tions.® As we have just seen, their number is always equal to the number of unknown quan¬ tities, and their solution by elimination offers no ambiguity. Furthermore, owing to the method by which they have been deduced, it is clear that

they will furnish for the unknowns x, y, z a system of numerical values, which, when substituted in the original equations, (4), will make the sum of the squares of the re¬ sidual errors less than would be the case with any other possible system of numerical values

for the unknowns, no matter how much other system might have been obtained.

If we now compare the above normal equa¬ tions (9) with the original equations (4), which are usually called ˆobservation equations,® we see at once the law of formation of (9) from (4). It is evident that to form the normal equations we may use the following simple rule, first writing zeros instead of ifs for the right- hand members of equations (4).

Rule for Normal Equations.— To form the first normal equation, multiply each obser¬ vation equation throughout by the coefficient of its x, and then add the resulting equations. To form the next normal, use in the same way the coefficients of y; and for the third nor¬ mal, use the coefficients of z.

The normal equations once formed, they can be solved by any method of algebraic elimi¬ nation ; but it is generally most convenient to use the following special form of computation, due to Gauss.

From the first equation (9) we have:

[ab] [ac] _ [an]

[aa] 7 [aa] M*

If we substitute this value of x in the other two normal equations (9) we shall eliminate x. This substitution can be systematized by the introduction of auxiliary quantities [bb. 1], [be. 1], etc., defined by the following equations:

[66. 1] = [66]— |ˆ|[a6],

[6c. 1[= [6c] — [2| Mi

(10) [6 n. 1] = [bn] – jˆj [an],

[cc. 1] = [cc] – lˆ-jlocl,

[cn. 1] = [cm] — jˆj[aM],

Using these auxiliaries, the substitution of the above value of x gives :

[bb. 1]y + [be. 1]z + [bn. 1] =0,

(11) [be. 1 }y + [cc. 1]z + [cn. 1] =0.

These equations, while precisely similar in form to the original normal equations (9), now involve one less unknown quantity, and their number has been reduced from three to two. A second application of the same method of elimination gives the following ((second® auxil¬ iaries :

[cc. 2] = [cc. 1] — |ˆ-j| [6c. 1],

(12)

[cm. 2] = [CM.] – [6m. 1],

and the equation :

(13) [cc. 2]z+[cn. 2]~0.

From this equation (13), we have for the

value of

(14)

[cn. 2]

[cc. 2\

We now find the value of y by substituting this value of z in either of the equations (11) ; and ;r by substituting the values of y and z in any one of the normal equations (9).

Case of a Single Unknown — It is of spe¬ cial interest to consider the application of the Method of Least Squares when there is only a

single unknown quantity, directly observed. An example of this, for instance, would be our measurement of a room, where the only un¬ known is the width of the room, and several independent direct observations have been made.

Denoting the single unknown quantity by x, the observation equations

of the form (4) will be :

(15)

X + Hi = Vi,

x + n2 ~ Vi,

X + M3 ~ Vs, X + «4 = Vi,

etc. ;

and if we suppose there are in all m such ob¬ servation equations, the ((rule for normal equa¬ tions® gives a single normal equation of the form :

(16) mx 4* [w] = 0,

and this will be the only normal equation. The solution is :

(17)

n

m

or, in other words, the most probable value of x is the arithmetical mean of the several ob¬ served values represented by the n's. This is a further strong addition to the evidence of plau¬ sibility attaching to Legendre's theorem of Least Squares. Possibly no other simple admissible theorem as to the residuals would give this re¬ sult for a single unknown, observed directly; yet this result is the only one consistent with common sense.

Actual, Mean and <(Probable® Errors. —

The values obtained for the unknowns by the Method of Least Squares are not the true values, but only the most probable values ob¬ tainable under the circumstances. They are subject to error; and we shall here consider three different quantities technically known as <(errors.®

1. The actual error, defined as the diver¬ gence from the truth, and designated by the symbol A.

2. The mean error, defined as an error of such magnitude that its square is the mean of the squares of all the actual errors A belong¬ ing

to the several observations. It is desig¬ nated by the symbol e. If there are m A's,

(18)

ee

[AA]

m

3. The probable error, whose magnitude is such that it is an even chance whether any random actual error A belonging to any ob¬ servation is bigger or smaller than the prob¬ able error. It is designated by r.

To determine the value of e for the case of a single unknown x, observed m times, we pro¬ ceed as follows. Let:

xo — the arithmetical mean of the observed values of the unknown x, equation (17).

Xo + q the unknown and unknowable true value of x.

Then, as we have seen, Xo is the most prob¬ able value of x, according to the Method of Least Squares, and [w] will be a minimum if we substitute that value of x in equations (15). This substitution gives :

Xo T- Wi = i/i,

Xo "k W2 = Vi,

Xo 4" ns = vs, etc.

But if, instead of Xo, we substituted the true quantity x0 + q, we should get a series of true errors A, instead of the residuals v. This would give :

Xo+q+rh = Ai,

Xa--q~\~n2 — A2,

Xo~^q--n» — A3, etc.

A subtraction between these last two sets of equations gives :

Ai — V--q,

(19) A2 = v2+q,

Aa = v*+q,

and there will be m such equations. Squaring and adding them gives :

[A A] — [vv]+mq2-\~2[v]q.

But, from the principle of the arithmetical mean,

M=o,

so that :

(20) [AA]==[w]+mq2.

From the equation of definition (18) :

so that,

(21)

[A A] =m ee ;

[w] . ££ = – — -f m

Now, the value of q2 can never be known; but we can get an approximation to it easily enough. It can be shown by the theory of probabilities that if we continue observing any quantity, the mean error of the arithmetical mean of the observed values will decrease in proportion to the square root of the number of observations.

To demonstrate this principle, let us con¬ sider :

Two observed quantities, Hi, n2, affected with actual errors, Ai, A2, and mean errors, £1 £2.

Now let N be the sum of m and w2 or:

N — ih + n2,

and designate by A' and e' the actual and mean errors of N. We shall have:

A Ai T A2 ;

and squaring this equation :

A A Ai Ai T A2 A2 T 2 Ai A2.

If k observations have been made to deter¬ mine Hi and n2 the above becomes by summa¬ tion :

[A A] = = [Ai Ai] T* [A2 A2] “T 2 [Ai A2].

In this equation, the last term, 2 [Ai As] may be considered zero, because it will dis¬ appear, or nearly disappear, in the general average, on account of positive and negative errors being equally probable, a priori. But the squared terms remain, being always posi¬ tive, and we have :

[A A] ■ [Ai Ai] d- [A2 A2].

Consequently, by our equation of definition (18), this becomes:

s’ e’= e, e, -f e2 e2.

This equation brings out the important prin¬ ciple that the square of the mean error of the sum of two quantities is equal to the sum of

the squares of their respective mean errors. The principle can of course be extended so as to include three, or any greater number, say m, of observed quantities.

Now let us suppose the ris to have been ob¬ served with equal accuracy, so that £1 and £2 will be equal, and we have :

e’ e ‘= 2 £1 £1,

or for m n’s :

£’ e’= m £i £1,

or _

e’— V m £1

This last equation shows that the mean error £•’ of the sum of m equally precise quantities is

\/m times the mean error of one quantity. But the arithmetical mean

of m observations is ‘/m times their sum, and its mean error there¬ fore £’/w, or, according to the above:

Mean error of arithmetical mean =

£ 1

V m

which establishes the principle enunciated above, that the mean error of the arithmetical mean decreases in proportion as the square root of the number of observations increases.

In accordance with this principle, Xo will be more accurate than any individual average x

in the proportion of Vw to 1. Consequently, since q is the error of xo and £ a sort of aver¬ age value for the error of any x, we may take as a good approximation for q2 :

Substituting this value of q2 in equation

(21), we get:

im — 1) ££ = [vv], or:

(22)

£ =

1

and equation (22) will enable us to calculate approximately the mean error £ from the known residuals v.

It would carry us too far afield in the theory of probabilities to demonstrate the relations existing between the mean error £ and the probable error r. But we may remark in pass¬ ing that it is shown in works on the theory of errors, that, approximately:

r = 2Ae,

or :

Furthermore, remembering that £ and r have reference to the precision attainable from a single observation, we can get the correspond¬ ing errors belonging to the arithmetical mean from m

observations by the aid of the principle already used, viz. : that the diminution of error is proportional to the square root of the num¬ ber of observations. Denoting the mean and probable errors of the arithmetical mean from m observations by £0 and r0 equations (22) and (23) give: _

(24)

(25)

4

4

[vv]

m (m — 1)

[w]

m (m — 1)

LEAST SQUARES

185

Mean and Probable Error for Several Un¬ knowns. — Equation (22), so far as we have yet considered it, applies only to the case of a single unknown * observed directly m times. But a similar expression can also be found for the case of observation equations of the form (4), when solved by means of normal equa¬ tions of the form (9). Having found values of the unknowns x, y, z, from the solution of normal equations, we substitute these values in the original observation equations, and thus obtain numerical values of the residuals v, by which amounts the original observation equa¬ tions fail of being exactly satisfied. With these values of the vs we compute [vv]. If we then let :

u = the number of unknown x, y, etc., ap¬ pearing in the original observation equations, it may be shown that we shall have for the mean and probable errors :

(26)

1 [w]

\m — u

(27)

r_ 2.

1 [w]

3 ˆ

\m — u

For the complete demonstration of these equations we must refer to works on the Method of Least Squares. The equations fur¬ nish average approximate values for the mean and probable errors of any average obseryed quantity n, as it appears in any observation equation of the form (4). The unknowns x, y, z, are of course determined from the whole group of equations with much greater precision, and therefore with smaller mean and probable errors. In the case of z, for instance, it is shown in works on Least Squares that its mean and probable errors are smaller than those given by (26) and (27) in the proportion of :

ˆ [cc. 2] to 1,

where [cc. 2] is the final coefficient of z ap¬ pearing in the last reduced equation (13) re¬ sulting from the Gaussian elimination of the normal equations (9). Consequently, denoting by cz and rz the mean and probable errors of z, we have : _ _

(28) Ez= \j [cc. 2] (m — u)’

<”> — H.,a’ 71-3-

The corresponding mean and probable er¬ rors of x and y can be found by rearranging the observation equations in such a way that each unknown in turn will come out last in the Gaussian elimination.

Weights.— It happens sometimes that the quantities n, appearing in the observation equa¬ tions (4), have been determined by the ob¬ servers with unequal precision. For instance, a certain n may have been observed twice, while all the others depend upon a single observation only. In such a case, that particular n is said to have ((double weight,® or the weight 2, while all others have the weight 1 only. Obviously, we can treat this case in our reductions by simply writing the doubly weighted equation twice, with all its coefficients and unknowns,

among the observation equations, and then proceeding as usual. There is, however, a bet¬ ter way of dealing with this matter of varying weights; and we can derive- it from a consid¬ eration of the rule for the formation of normal equations from observation equations. We may use the following:

Rule for Weighting Observation Equa¬ tions. — Multiply each observation equation throughout by the square root of its weight and then form normal equations by the usual rule.

It may be seen readily, in the simple case of one equation only having double weight, that this rule will produce precisely the same effect on the normal equations as would result from merely writing that particular observation equa¬ tion twice among the other observation equa¬ tions, in the manner just explained. But it is also shown in works on Least Squares that the above rule for weights holds good when all the observation equations have different weights, and even when these weights are fractional.

To illustrate the foregoing, we shall give the complete solution of a set of observation equa¬ tions resulting from a precise determination of clock error made with the transit instrument of Columbia University Observatory in New York. The observation equations were as fol¬ lows, the numerical terms n being expressed in seconds of time.

- + 0.04y + 1.29 2— 0.2 7 = 0,
- + 0.08y + 1.26ˆ — 0.02 = 0, x + 1.36y 4* 2.84 z — 6.52 — 0, x — 0.23y + 1.54 z — 1.32 — 0,

(2’) x + 0.03y + 1.30,sr + 0.06 = 0,

- — 0.07y — 1.302 — 0.02 = 0,
- + 0.14y — 1.21 2 + 0.84 = 0,
- + 0.03y — 1.302 + 0.48 = 0, x — O.Oly — 1.33 2 + 0.31 = 0, x — 1.28y — 2.752 — 4.68 = 0.

Each of these equations depends on the observation of a different star; the unknown x is the clock error, and the other two unknowns y and 2 relate to certain errors of adjustment in the transit instrument.

The solution now proceeds as follows :

Applying the <(Rule for Normal Equations® gives :

+ 0.34* — 0.63y + 29.432 — 9S.78 = 0,

(9’) — 2.63* + 3.59y — 0.632 + 15.30 = 0,

+ 10.00* — 2.63y + 0.342 — 11.22 = 0.

The method of equations (10) and (11) transforms these into the following:

(IF) + 2.90y — 0.542 + 12s. 35 = = 0,

— 0.54y + 29.422 — 9.40 = 0.

A further application of (12) gives:

(13’) + 29.322 — 7S.10 = 0.

From this we obtain:

(14’) 2 = + 0S.24.

If we now substitute this value of z in either of equations (11’) we obtain:

y — — 4s. 25.

These values of y and z can now be substi¬ tuted in either of equations (9’), and we get:

- = — 0s. 005.

We now substitute the numerical values

thus obtained for x, y and z in equations (2’), and obtain the following residuals, v:

V VV

0.125

0.015625

.055

.003025

.075

.005625

.025

.006250

.125

.015625

.005

.000025

.045

.002025

.045

.002025

.025

.000625

.125

.015625

[vv] .060850

Applying equation (27), remembering that m is the number of residuals, in this case 10, we have :

(27’)

_ 2 I 0s. 060850 . 3\ 10 — 3

+ Os.061.

This is the <(probable error® of a single ob¬ servation. To obtain the corresponding quan¬ tity for the value of z given by equation (14') we must use equation (29). We have from

(13’):

[cc. 2] =29.32.

Consequently, from (29) :

(29’) r*

2

3

0.060850

29.32 (10 — 3)

= + OMUl.

This result signifies that it is an even chance whether the actual error of our numerical value of z is greater or less than 0S.011, so that the probable error becomes a sort of test of the precision of our result.

To obtain the probable error of another un¬ known, as x, we rearrange the equations (2’) so as to make x the’ last unknown, instead of z. Written in this way, the equations are:

(2″) + 0.04y + 1 .29 + * — 0.27 = 0,

etc., etc.

The normal equations are:

+ 3.59y — 0.63s — 2.63* + 15s 30=0,

(9 ‘) — 0.63y + 29.43s + 0.34* — 9 78 = 0,

— 2.63y + 0.34s + 10.00* — 1 1 22 = 0.

The method of equations (10) and (11) gives :

+ 29.32s — 0 12* — 7e.10 = 0,

(11”) — 0. 12s + 8.07* — 0.01 = 0.

The application of (12) :

(13”) 4* 8.07* — 0S.01 = 0.

And, consequently:

(14”) * = + 0S.00.

This is practically the same as the value al¬ ready obtained, and thus affords incidentally a very complete check on arithmetical accuracy. Values of y and s can of course be obtained as before by substitution.

Applying equations (29) again, we have the probable error of * :

(29”)

0.060850

8.07 (10 — 3)

= 4- 0s. 022.

Equation (14”) shows that the clock was exactly right; and (29”) that the precision of this clock-error determination is very high.

Bibliography. — Wright and Hayford, (Ad¬ justment of Observations y ; Chauvenet, ‘Spher¬ ical and Practical Astronomy } (Vol. 11, Appen¬ dix) ; Jordan, (Vermessungskunde) (Vol. I).

Harold Jacoby,

Rutherford Professor of Astronomy, Columbia University.

LEATHER, Artificial. See Leather Sub¬ stitutes.

LEATHER, Chamois. What is known in the market as chamois skin is really an oil- tanned sheep or lamb skin lining. The supply of skins from the chamois animal is very limited ; enough could not be obtained in a year to supply the United States for more than a single day. In Switzerland about 5,000 to 6,000 skins would be a fair average yearly crop. This skin is heavier than the skin of the sheep or lamb, also much coarser. For strength and durability this skin is preferable, but for ordinary use and appearance the oil- tanned sheep-skin lining would, in most in¬ stances, be preferred.

To manufacture sheep or lamb skins into chamois leather the first step necessary is to remove the wool, which is accomplished either by painting the skin on the inside with a solution of sodium sulphide or by immersion in milk of lime. By the former method the wool is loosened in a few hours; by the latter method it will require several days. When the wool is loose it is pulled off either by hand or scraped

off with a dull instrument. The skin is now again immersed in milk of lime, to swell it. It is then cleaned (beamed, as the trade calls it), to remove all fleshy particles that may adhere to it. It is now ready for splitting. The chamois skin is really only the half of a skin. The outside, that is, that part of the skin next to the wool, known as the grain side, is not suitable for chamois leather, and is used for other purposes, mostly for hat linings, book covers, etc. In former times, when skins were prepared for oil tannage, this part of the skin was cut away with a suitable knife and thus lost. In our days the skin is cut through the centre (split), thus producing two skins from one — the outside, called grain or skiver, and the inside, called lining or flesher. The split¬ ting is accomplished on machines specially con¬ structed for this purpose. It consists of an endless knife, the edge of which is constantly grinding to keep it sharp, the skin being passed through rollers against the sharp edge of the knife. These machines require very delicate adjustment to produce good results.

The lining or flesher is now ready for tan¬ ning. This is accomplished by sprinkling it with oil, codfish oil of good quality. It is im¬ portant that this oil should be thoroughly in¬ corporated ihto the skin. For this purpose a quantity of the skins are placed into what arc known as fulling stocks, which twist and turn the skins in every direction and distribute the oil evenly. After sufficient milling the skins are partly dried and the process of sprinkling and drying is repeated again and again until they are full of oil and all the moisture is dried out. They are now allowed to hang sufficiently long to thoroughly tan them at a temperature of about 100°. The process after this is very simple. The oil is removed by pressure and the balance washed out by saponf-

fication; after this they are dried and they are then ready for finishing. The oil, by the way, is recovered, by decomposing the soap solution with an acid and separating. It is sold to manufacturers of other leathers, it being useful to make them pliable, etc. The finishing is done mostly by pressing the skin against re¬ volving wheels, covered with emery or flint to remove all adhering substances and to present a finished surface. We now have the finished chamois leather ready for the trimming and sorting room, where it is cut into suitable sizes and packed for the market. Of late years a trimmed skin, that is, skins of even sizes, are preferred by the trade. For this reason most manufacturers, at least most American manu¬ facturers, cut their skins over patterns so as to produce uniform sizes. In former years,

when England and France supplied the United States market, the skins in the same package would vary in size and shape, thus lacking uniform¬ ity. See also Hides and Leather.

LEATHER, Manufacture and Uses of.

Of all the ancient industries that of the manu¬ facture of leather is one of the most interesting on account of the convertibility of an easily de¬ composed substance into one which resists pu¬ trefaction. The manufacture of leather is as old as history itself. In China the manufacture and use of leather was known before the Christian era, and in Egypt leather has been found in mausoleums of the ancients, showing us that nations in the remote ages of the past were practised in the art and left slight traces of their high civilization to be admired to-day. The Persians and Babylonians passed the art over to the Greeks and Romans and so down through the different mediaeval nations to us. The American Indians were also well versed in the art of making leather, although their method of tanning was entirely different to that of the ancient races, yet the fact remains that they also discovered a way of treating the skins of animals in such a way as to prevent the putre¬ faction of animal tissues.

Composition of Hides and Skins. — The skin of an animal consists of three layers — the outerskin, middle and underskin. The outer- skin which cannot be tanned is removed with the hair, leaving the middle skin or grain and the underskin or flesh. The upper part of the skin in which the coat of hair, wool or fur is rooted is a thin layer termed the epidermis or cuticle. Next beneath this is the much thicker corium or true skin, and next to this the under skin.

The epidermis does not combine with tannin or other substances to produce leather. It is therefore useless to the tanner and is removed at the same time as the hair. The portion of the skin thereby exposed is technically termed the ˆgrain® side. The corium or true skin is the actual leather skin and is made up of inter¬ laced bundles of gelatinous fibres. It is more or less filled with fluid matter that serves to renew the cuticle and maintain the skin in a pliant and moist condition. In the tanning process these matters are removed, reducing the weight of the skin considerably, and there remains nothing but the fibrous portion to be acted on by the tanning materials. The quality of leather which can be produced from a skin depends upon the thickness, flexibility and

strength of the corium, which exceeds the com¬ bined thickness of all the other layers of the skin. The under skin consists of a loose con¬

nective tissue, in which the sweat and fat glands, the blood vessels and the muscular fibres are embedded. The side upon which the con¬ nective tissue of the under side is located is technically designated as the ˆfleslU side. The under skin or flesh is composed of interlaced fibres which give the strength to the tanned stock and is therefore a most important factor for the tanner while the middle skin gives the fine smooth appearance to the finished product. The skin, being organic, is composed of carbon, oxygen, hydrogen, nitrogen and sulphur, which go to make up the middle and under skin.

Source and Uses of Hides and Skins. — Most of the leather in common use is made from the hides and skins of domestic animals, those of cattle being by far the most important, followed by goatskins, sheepskins, horsehides, pigskins and in a small measure dogskins. Many skins of wild animals, principally those of the kangaroo, deer, peccary, alligator, seal, wal¬ rus and buffalo are in fairly general use. Cattle hides are used chiefly for shoe upper and sole leathers, harness, belting, upholstery, bag and case leathers, and to some degree in bookbind¬ ing. Goatskins are used for shoes, gloves, bookbinding and fancy leathers. Sheepskins are used for shoe linings, gloves and the greater part of the fancy leathers. Horsehides are used for shoes and utility gloves. Pigskins are used for the inner parts of shoes, utility gloves, bookbinding, fancy leathers and saddle seats. Dogskins find limited application in glove leathers. Kangaroo is used for fine shoe leathers. Deerskins, known as buckskins, are used for both shoes and gloves, peccary for utility gloves, alligator for bag and fancy leathers, seal for bags, bookbinding and fancy leathers, walrus for jewelers' polishing wheels and buffalo for heavy soles.

Preliminary Processes — The skin, as re¬ ceived by the tanner, is either green, green salted, dry and dry salted, and in whatever state received, the first process is to trim the hides to remove all useless pieces and adhering fat, but the dry salted skins are first softened. When thoroughly trimmed, so as to pass inspec¬ tion of the foreman, the skins are placed in the soaks. The soaks are large tanks filled with as pure cold water as can be obtained to which salt has been added in order to open the pores of the skin, and the skins are allowed to remain there for 24 to 48 hours, with periodic agita¬ tion or stirring, due care being taken not to heat the stock. The object of the soak is to soften the skin and to remove all foreign matter such as dirt, salt and blood. Great care must be used to remove all blood and salt, as these materials, if left on the skin, will cause stains which will show dark spots in the finished leather if colored into tan, and -dull if made into blacks. Another object of the soak is to add water to the skin to bring it back again as near to the condition in which it was when taken off

the animal. The water of the soak must be cold, not above 65° F., so as to prevent all bacterial action and thereby prevent the loss of what tanners call hide substance. The soak¬ ing is controlled by the chemist, whose duty it is to examine the water for dissolved ((hide

substance,® that is, to analyze the water of the soak for ammonia. As mentioned, the hide contains nitrogen. This organic nitrogen is converted either by bacteriological or chemical action into ammonia, due to over warm water or too long in the soaks or both. The skins are then taken from the soaks and placed in a re¬ volving drum and washed thoroughly with clean cold water in order to remove all adhering foreign matter. They then go to the fleshing machine, a machine which consists of spiral blunt knives, set into a revolving cylinder, to remove all superfluous fat on the flesh side of the skin. From the fleshing machine they go to the lime vats for loosening the hair, plump¬ ing the stock and spreading the fibres apart.

Depilation. — In the more modern process of liming, the skins are treated with a mixture of lime and sodium sulphide, a chemical ob¬ tained in the manufacture of washing soda or by other processes. If it is not desired to save the hair, which is valuable, the skins may be dehaired by the use of sulphide of soda alone. Hair can also be loosened by “sweating,® that is, to hang the stock in chambers where the tem¬ perature and humidity can be controlled. This process is simply a partial putrefaction which affects the base of the hair roots, so as to allow them to be easily removed. The sweating process is used, now very seldom, in the manu¬ facture of sole leather, and formerly to remove the wool from sheep skins. The depilation now in use is accomplished by lime or the above former mentioned combination of lime and sul¬ phide. The lime vats are similar to the soaks. The skins are placed in a saturated solution of slacked lime, in which there is always an excess of lime, so that the calcium hydrate, which is slacked lime, is absorbed by the skin, the lime liquor remains at the same strength by the water dissolving some of the excess of lime always present. Lime is used on account of its being a weak alkali and only acts upon the softer parts of the skin, such as the hair bulbs, etc., while it hardly acts upon the harder parts of the skin ; yet, by leaving the skin too long in contact with lime, the harder parts are also affected. Bacterial action of the limes must also be taken into consideration for depilating, as new limes are very slow in removing the hair, and the action of the lime is increased as it grows older. The

liming takes from two to three days, and sometimes longer, according to the raw material placed in the vat and the kind of stock required. Here the chemist is called again to control the time and the action, so that the skins do not become too soft or lose too much substance, thereby making the skins flabby and loose. From the lime vat the skins are either dehaired by hand or machine. Although machine dehairing is quite satisfactory, the skins must be worked by hand in order to re¬ move the fine hairs which were left by the machine. The skins are then placed upon the beam, a semi-circular board placed on end, simi¬ lar to a barrel cut in half in length with the convex side up, with the flesh side of the skin toward the workman, who cuts off the remain¬ ing flesh, fat and tissue. From this operation the skins are washed thoroughly in clean, cold water to remove all adhering lime and as much of the dissolved lime as possible. In order to get all the absorbed lime out of the skins, they are again placed in a vat of water in which fer¬

mented hen manure, dog dung or pigeon manure is dissolved, and allowed to remain in this solu¬ tion until by chemical reaction all alkali is shown to be removed. The lime is sometimes removed by chemical means in the use of lactic acid, the acid of sour milk, and in the newest processes the material used is an extract made from the various organs of the animal such as the spleen, pancreas, etc. This process is known as bating. The fermented animal excrements used produce lactic acid by bacterial action, but also has the advantage of containing bac¬ teria which are very essential in this process of bating. The idea of bating is first to render soluble the insoluble salts of lime, which the skins take up, and then to bring the skin, which swells in the alkaline lime liquor, back to the state desired by the tanner to produce leather according to his needs. The skins are again washed and are ready for the tan, if vegetable leather is required, or for pickling in case chrome tanned stock is to be made.

Tanning Materials. — In vegetable tanned stock the skins are hung on sticks and placed in vats and treated with a dilute water extract of bark, hemlock, oak, quebracho, a South American wood, sumac, myrobalans, mimosa or Australian willow, valonia or oak acorns from Greece and Turkey, and many other materials too numerous to mention or com¬ bination of the different vegetable tannins. The liquor in the vats is strengthened daily with the extracts until the skin is thoroughly tanned or as the tanner would say “struck through.® The vegetable tannages are limited only by the number of plants, barks and other vegetable substances which yield _ tannins in sufficient quantities for commercial use. In practice only a few tannins offering the advan¬ tages of cheapness, large supply and greater

suitability are used. Hemlock and oak bark liquors and extracts separately or in combina¬ tion are used more than any other vegetable tannins. Most sole and belting leather, prac¬ tically all upholstery, harness, bag, strap and case leathers and some shoe and bookbinding leathers are tanned with hemlock or oak or both. Sumac is the principal tanning material for bookbinding leathers, on account of its giving a light-colored leather that is resistant to light and decay. Gall-nuts, myrobalans, divi-divi and oakwood are also used in book¬ binding leathers. Valonia and chestnut oak extract are used for sole leather in connection with oak and hemlock. Quebracho is used in various leathers, often with hemlock and oak. Gambier and palmetto are used in many of the softer leathers for shoes, gloves, etc. Some leathers are tanned with a mixture of three or four different vegetable materials as may be necessary to give the color, firmness and other properties desired. A distinct tan¬ nage of limited use is the oil tannage used for making some glove leathers, particularly chamois and buckskin. Cod oil is the oil com- monlv used. Its oxidation tans the leather. The leather is then washed, oiled or placed in a revolving drum with a combination of oils and greases which is called “Fat Liquoring® and hung up to dry. The skins are now ready for coloring and finishing which, will be ex¬ plained further on under chrome or chemical tanning.

Chrome or Chemical Tanning. — The vcge-

rr

c

X

o

2

£

u

O

U-t

C/5

C/5

C/5

a

X

o

c

Cm

•G

6

o

JS

o

c

s

3

*4-

o

.3

4-4

TJ

0)

u.

■O

s

3

J5

i

>

01

3

O

M

3

Ui

>

4-4

3

O

JS

o>

3

o

>>

3

O

u

0)

JS

4-4

3

V

■Si

0 >

0)

.3

Ui

o

•5

JS

b®

Ui

0 >

3

s

0)

8

’JS

o

3

£ S

O ui

ig

c/5 “

5 -a*

30

M 3

1.1

o2

-»■* o n g

is

“q1 o> iC J3.-3

■44

Q,

it3 3

° 44

M 0_, 3 -O 73

-3 4-4 0)

> 3 (J£

3 0) 3

■ G

w<; m

LEATHER MANUFACTURE

Copyright, Underwood & Underwood, N. Y.

1 Softening raw hides with rolling machines, in a big American tannery

2 Trimming untanned hides — • sulphide, lining, and washing paddles at the left

table method of tanning light leathers is being replaced by chemical tanning or combination of vegetable and chrome now considered chemi¬ cal or chrome tanning. In order to prepare the stock for chrome tannage, it is first pickled after being washed out of the bate; that is, placed in a vat, fitted with a revolving paddle similar to a water wheel, in which is dissolved salt and sulphuric acid mixed in different proportions, according to the ideas of the fore¬ man. W hen the skins have absorbed enough of the chemicals, they are taken out of the paddle, allowed to drain and then pressed in an hydraulic press to squeeze out the water. They are then split on a machine, which con¬ sists of a fast running horizontal belt knife or drawn over a stationary knife being pressed on to the edge of the knife by a roll placed above the knife. The thickness of the skin is regu¬ lated by the distance between the belt knife or stationary knife and the roll. Light stock such as calf, kip, goat or sheep are not split but shaved on the flesh. The chemicals used in the manufacture of chrome leather are mostly im¬ ported and before we enter the realm of modern chemistry as applied to tanning it will be of interest to know where the raw materials are obtained and what they are. The raw materials are sulphuric acids, glucose, sodium thiosulphate, soda ash and chrome salts. Sul¬ phuric acid or oil of vitriol as generally known is obtained by burning sulphur or brimstone. Glucose or grape sugar is obtained from corn starch. Sodium thiosulphate, commonly known as <(Hypo,® a salt with which every photographer is familiar, is also obtained from sulphur or brimstone by heating it with caustic soda,, known as soda lye. As a by-product sodium sulphide is also obtained, which as already said is used in the dehairing process. Soda ash or calcined soda is obtained from salt. The chromium salts used in the tanning are made from chrome iron ore, a very hard mineral composed of the oxides of chromium and iron and mined mostly in New Caledonia, although some is mined in Canada, Turkey in Asia and California, but the quantity is so small as to be no factor in the manufacture. The chrome iron ore is mixed with lime and soda or potash, placed in a furnace with free access to the air and roasted at a bigh temperature. When finished, the mass is treated with water to extract the sodium or potassium rhromate formed. Sulphuric acid is then added and the liquor evaporated and allowed to crystalize, and the resulting crystals are sodium or potassium bichromate, the mother

substance for the manufacture of the compounds used in the tan¬ nery. This bichromate is used in the tannery, as such, for the so-called two-bath tannage or converted into its salts, to be used in the one-bath process. The one-bath and two-bath processes are chemically similar. The two-bath produces the chrome salt desired in the skin, while the one-bath process consists of forming the chrome salt desired and when so made to mill or drum it into the skin.

It is interesting to note that the first prac¬ tical chemical or chrome tanning was invented in the LJnited States by an American, August Schultz, in 1884. Since that time great advance¬ ment has been made in chrome tanning in America and Europe but the theory has re¬ mained the same, yet the fact remains that it

was discovered in the United States and due to the research of an American. Schultz's patent was for a two-bath, while Professor Knapp of Germany published in 1858 a process for the one-bath process, though he did not recognize its value. In 1893, Martin Dennis, of Newark, N. J., recognized its value and was granted patents on this process. For the two-bath process, the pickled stock is taken and placed in a revolving drum with water in which com¬ mon salt is dissolved, the drum closed and set in motion. Then bichromate, i.e., either sodium bichromate or potassium bichromate, is dis¬ solved in water, a certain amount of sulphuric acid added for the purpose of changing the bichromate into another chrome salt which will be absorbed by the skin. Bichromate without the use of an acid (and sulphuric is used in preference) will not penetrate the skin, and this mixture is put gradually in the drum. When all bichromate has been added and the skins are ((struck through,® that is, the yellow color of the bichromate has thoroughly pene¬ trated the skin to its fullest extent, a solution of thiosulphate of soda, ((Hypo,® is added. These materials, when in contact with the yellow colored stock, will turn them blue by precipitating an insoluble chrome compound between the fibres of the skin and chrome- tanned leather, is the result of this stage. A solution of soda ash or calcined soda is now added to the stock in the revolving drum to neutralize the acid present and also to convert any soluble chrome compound present to an insoluble. The stock is now thoroughly washed, pressed and sent to the machines to be split down to the required thickness and to be shaved smoothly on the flesh. The next process of tanning is probably the most im¬ portant to the tanner of to-day, namely, the one-bath process. The one-bath process, in which the liquor used is 'blue, is the same with the exception, as above explained, the liquor is already made and simply milled into the skin. The tanner tests his stock from time to time in order to know when it is thoroughly tanned. This test is simply

taking a piece of the heaviest part of the skin and boiling in water for five minutes. If the stock remains soft and does not curl after the expiration of the time, the stock is considered tanned. After tanning is finished, the stock is again washed and pressed, and is readv for the fat liquoring, coloring, drying, resoftening, tacking on boards to dry, staking and finishing. The fat-liquoring process is to mill oils, soaps and greases into the stock in order to keep them soft and pliable and at the same time render them semi-water proof. Staking is stretching the skins by machine in order to get a smooth surface. The coloring of the skins is done by the ap¬ plication of wood dyes or coal tar colors. The coloring of the stock is of great import¬ ance. In order to prevent the dye-stuffs from going on unevenly, great care must be exercised. Blacks are made either by the use of logwood or aniline colors.

Finishing Processes. — Those leathers which are not shined and which always have a dull appearance such as used in work shoes may be sponged with oils, measured and sorted into grades to be sold. A good many leathers are boarded in order to give them a distinc¬ tive pattern. The grain side is folded on itself

and rolled under pressure with a cork surface board attached to the arm. This makes a square pattern on the surface when done up and down and from side to side of the skin. Leather for dress shoes on which a bright or semi-bright lustre is desired must be seasoned and glazed. Seasoning consists in sponging the surface of the leather with a liauid dress¬ ing consisting of albumen or some similar preparation which will coagulate with the heat of friction. After seasoning and drying leather is glazed. The glazing process brings up the polish in about the same way that a brush does on shoes. The skins are glazed or rubbed over with a glass cylinder under great pressure. This glass cylinder is placed horizon¬ tally in a pocket at the end of a long wooden arm, which is brought down over the skin by a connecting rod from the fly-wheel of the machine. The skin is laid over a slanting board and held there by the operator who shifts its position so that all parts of the skin come beneath the glazing cylinder which moves up and down in a straight line, continually bear¬ ing on the skin with a heavy pressure. Some skins on which a dull polish is wanted are brushed over the surface with a revolving roller brush. Leathers on which a high polish is desired are sponged with finish, dried and glazed several times in succession. If an es¬ pecially smooth surface is desired the leather is embossed after the first glazing. This is done by

placing the skin beneath the hot steel plates of a heavy hydraulic press. The last operation is sponging a light coating of oil over the skin.

Shoe upper leather is sold by the square foot and is measured by power driven measuring machines. Each skin is passed through the machine and a dial on the machine indicates the measurement to one-fourth of a square foot. Patent leather is chrome tanned, dried, fat-liquored and dyed black as oreviously described up to the finishing process. Some of the grease given in fat-liquoring and some of the oil applied to the grain are not combined with the fibres, and unless removed will cause the varnish to slip over the leather so that finish¬ ing becomes impossible. Degreasing is best done by soaking the leather in naphtha, and then pressing out the naphtha and drying the leather. When ready for finishing the skin is spread out and tacked on a frame, and the varnish, which is mainly oxidized linseed oil, is applied with a brush similar to a paint brush. The skins on these frames are then placed in ovens so that the varnish may be baked on. Generally several coats of varnish are baked on the skin.

Bibliography. — (Bibliograph Modern Amer¬ ican Tanning) (2 vols., Chicago) ; Allen, Fred¬ erick J., (The Shoe Industry } (Boston, Mass.) ; Burt, E. W., (Shoe Craft — Its Organization (Boston) ; Fleming, Louis A., Practical Tan- ning) (Hillsdale, Mich.) ; Hill, Herbert and Yeoman, Henry, (Manual of Boot and Shoe Manufactured (London, Eng.) ; Pfister and Vogel, (Leather Specimen Book) (Milwaukee, Wis.) ; Pratt Institute of Tanning, (Lecture Courses* (Brooklyn, N. Y.) ; and files of the Boot and Shoe Recorder (Boston, Mass.).

LEATHER-BACK, or LEATHER- JACKET. See Leather-turtle

LEATHER-BEETLE, one of the der-

mestid beetles (see Dermestes), which in the grub state damages leather in storehouses and after it is made up into articles, such as shoes, harness, etc. The species is Dermestes vul- pinus; and it is also a pest in silk manufacture, eating the cocoons. Infested places should be thoroughly fumigated with bisulphide of car¬ bon, or some other powerful gas.

LEATHER-FISH. See File-fishes. LEATHER-HEAD, an Australian bird, the friar-bird (q.v.).

LEATHER AND SHOE TRADE TECH NICAL TERMS. The following is a list of the more important terms used in the shoe and leather trade :

Acid Tanned. — Tanned by the use of a mineral acid, instead of the usual vegetable tanning substances, derived from the bark or wood of certain trees and plants. (See Tanning.)

Adjustment. — A general term applied to the fastening of a shoe, whether button, buckle or lace, etc., by means of which the shoe is adjusted to the foot, or more definitely used in referring to the amount of play of such fastening available in conforming the shoe to the foot. The lace is the easiest of all adjustments, as it is flexible and self-conforming. The strap and buckle has less adaptability. Buttons are adjustable by re-setting, effective machines having been devised for that purpose.

Alaska. — An overshoe, having a cloth upper and rubber vulcanized sole, usually with high front and back.

Aloft. — (Said of sole stitching.) A sole "stitched aloft" is stitched without a channel on the under side, the thread showing on the bottom of the shoe.

Alum Tanned. — Subjected to a dry tannage or tawing with salt and powdered alum. (See Taw.)

Ankle Brace. — A steel brace built into the top of a shoe to support a weak ankle or other defect. Also may be made of sole leather, molded to conform to the shape of the foot, usually built into children's shoes for the protection of weak ankles.

Arch. — The bony framework of the foot, extending from the heel forward to the toes, which is sustained by the muscles and ligaments in the form of an irregular arch. (There is a secondary transverse arch of the foot also at the ball, the bones being slightly arched crosswise.) This part of the foot is subject to various ailments, due prin¬ cipally to relaxation of the muscles, ligaments and tendons, which permit the turning of the main arch inward, the "broken arch" or "flat foot," so called, being more an eversion than anything else, although its action does flatten the foot. The term "arch" is applied also to the under portion of the shoe, curving from the heel forward toward the ball, and to the corresponding portion of a last. Arctic. — A high, thick cloth and rubber overshoe fastened with one or more buckles.

Backstay. — A strip of leather covering and strengthening the back seam of a shoe; "California" or "accordeon back¬ stay," a term sometimes applied to piping, caught in the back seam of a shoe; "English backstay," or "jockey backstay," a broad backstay extending

forward and meet¬ ing the quarter on each side.

Bal. — (An abbreviation of the word “Balmoral,” from the original English name of the shoe.) A front-laced shoe of medium height, as distinguished from shoes that are adjusted by buttons, buckles, etc., also as distinguished in pattern from the “Blucher.”

Ball. — The fleshy part of the foot back of the toes, or the corresponding part of a last or shoe. The girth here is an important point in the measurement of shoes and lasts. Ballet Slipper. — A specially constructed slipper for pro¬ fessional women dancers, with reinforced soles and no heels, made of leather, usually light kid.

Barefoot Sandal. — A name given to heelless low-cut shoes for children, having deeply slashed vamp and quarter and fastened by means of straps and buckles.

Baseball Shoe. — A shoe built of canvas or leather for the sport indicated, having triangular shaped plates on both ball and heel to prevent slipping. Usually made on modi¬ fied gypsy or scout pattern — laced well to the toe.

Basil. — A heavy bark tanned sheepskin, used for lining or insoles.

Bathing Shoe. — A heelless canvas shoe, usually fastened with laces or thongs about the ankle, and used at the shore in outdoor bathing.

Bath Slipper. — A light, loose slipper, usually heelless and often made of cloth, fibre or even paper, and used about the house or bath.

Beaded. — Having edges of upper leather skived thin and folded in, instead of being left raw. Another meaning is, trimmed with beads, as the vamps of women’s slippers.

Beaver-top. — A name applied to warm cloth shoes.

Bedroom Slipper. A soft, comfortable slipper, made of wool felt, soft cotton fabric, or soft leather, with flexible sole — — either of sole leatner, or light chrome stock with very low heels, or spring heels; sometimes knitted or cro¬ cheted and attached to a lamb’s wool sole.

Bellows Tongue. — A broad, folding tongue, stitched at each side to

the top of a Blucher shoe or boot, for the pur¬ pose of making it water-tight. Used in work shoes, also hunting boots, etc.

Belting. The best portion of a bark-tanned cowhide, used for the making of leather belts for machinery.

Bench-made. — Applied to shoes which are made at “the bench i. e., the cobblers’ bench. Shoes made entirely by hand are rare in these days, although some fine lines of factory shoes are claimed to be “hand-welted”; that is, to have the welt, upper and insole sewed together by band, thus promoting flexibility.

Bend. — The best and strongest part of a side of leather.

Bicycle Bal. — A shoe originally designed for bicycle riders, but later adopted for use in other outdoor sports. It is usually laced well down towards the toe and has a protect¬ ing toe cap.

Blacking. — A general name for paste shoe dressing.

Blind Eyelet. — An eyelet which is concealed on the inner side of the lace stay, the lace hole being left raw-edged on the outer side.

Bloom. — A slight appearance of mildew or mold which some¬ times appears on shoes in stock. (See Spewing.) It may be wiped off readily.

Blucher.— -A shoe or mid-leg boot, named for its inventor, General Blucher of the Prussian Army of the time of the first Napoleon. A distinguishing feature of the Blucher is the extension forward of the quarters to the throat of the circular vamp, the quarter being loose at the inner edge, and made to lace across the tongue which was originally a bellows tongue. After its adoption in the Prussian Army in form somewhat similar to the present hunting or sporting boot, it became very popular. The feature of the extended quarter was later adopted in shoes of ordinary height and with the ordinary type of tongue, as well as in Oxfords, and this form of cut is still much used in all classes of shoes, men’s, women’s and children’s. It is a curious fact that all three of the great generals engaged at the battle of Waterloo invented a form of military footwear.

Blucher Bal. — A pattern combining both the features of the Balmoral and the Blucher, having a whole quarter vamp and top, as in the Bal with an over-lapping front as in the Blucher.

Boarded. — Finished with a lined surface faintly indented or stamped into the leather.

Boot. — This term is used in England only to designate high- cut shoes for men, women or children as distinguished from slipper, pump or Oxford (which last only is called a “shoe”). It is largely, although not universally, so used in this country, although the term “shoe” is often used here to designate a high-cut; the term “boot” is sometimes restricted to tne men’s solid leg boot, or laced hunting boot.

Bootee. — A boot with short leg, sometimes made with rubber goring over the ankle, and sometimes made with lace front extending from the throat of the vamp over the instep to the anklfe. Thus made, for men, it imitates in wearing the appearance of an ordinary boot or Bal. The term also refers to a half-leg length boot, usually knitted for infants.

Boot Jack. — A V-shaped board or frame, in which to catch the heel of a leg boot to pull it from the foot. Re¬ turning to use because of military and riding boot wearing.

Bottom Finish. — Tne final polishing, painting, buffing, or, other process applied to the bottom of a completed shoe. The simplest form is the plain “grain finish,” in which the outer sole is left almost untouched, as in cheap shoes. The “acid finish” consists of light buffing off of the grain and treatment with an acid polish, which gives the bottom a hard, waxy surface. Different colors are produced by stains applied immediately after buffing. “Velvet Bot¬ tom,” a bottom buffed, then chalked and buffed again producing a velvety nap. “Painted Bottom,” a stained bottom with wax coating. Fancy designs, or trade marks and names, are sometimes stamped on bottoms. “Black bottoms,” are painted with edge blacking, rubbed down and polished. Viscolized soles have a gray color of their own. Another gray sole is produced by applying blacking and then buffing.

Box Calf. — A proprietary name for calf leather finished with the grain side boarded or stamped with irregular rec¬ tangularly crossed lines.

Boxing. — A stiffening of leather or other material used in the toes of shoes to preserve their shape. This is often made of canvas stiffened with glue or similar material, sometimes of thin metal, in cheap shoes.

Bracelet Tie. — An Oxford pattern with an extended back cut from same piece of material, including at its top, ankle high, a strap around the leg — total height of shoe five or six inches.

Break. — To crack through or crack the surface finish as in patent

leather. “Break of the shoe,” the creasing and fine cracks which form over the ball, in wear.

Breast of Heel. — The forward face of a heel, under the shank, which is not usually finished otherwise than by trimming smooth; in French or other wooden covered heels the breast is built to extend forward sloping into the shank, and covered by leather cemented to it.

Brogan. — A heavy pegged or nailed work shoe of ankle height.

Brogue. — A name originally applied to rough, heavy shoes, originally made of untanned calfskin with the hair left on; the word is sometimes used incorrectly for “brogan.”

Brogued Vamp. — A vamp overlaid with long, extension wing tip.

Bronze Kid or Calfskin. — Leather finished with a form of cochineal dye. This dye (made from the bodies of small insects), which stains cloth a vivid red, when applied to leather gives it a peculiar bronze-colored, metallic semi¬ iridescence. This method of finishing leather has long been known and the leather for many years has been used in women’s fancy slippers, principally in kid, with an occa¬ sional period of favor as a material for street wear, such as that of a few years ago. The delicate character of the finish, and the tendency of the cochineal dye to rub off when wet, has led to the development of aniline dyes.

Buck or Buckskin. — Strictly speaking, tanned or tawed deerskin. This term is loosely used, and a great deal of so-called buckskin is suede-finished calfskin or side leather or suede kid. Buckskin is nearly always used white or in a light shade of cnampagne, but is used also in black. By recent common usage, the term “buck” has come to be fully understood to mean the suede-finished cowhide.

Buckram. — A stiff, strong canvas, stiffened with glue and used as a foundation for the tips of shoes or as a cemented backing for fabrics used in shoemaking, etc.

Buff. — A split side leather, coarser than “glove grain,” but otherwise similar, used for medium or cheap grades of shoes, principally men’s. (See Split.) As a verb, the terms mean to scour off the outer or “grain” side of leather.

Buffalo Sole. — The hide comes from the true buffalo of Asia and the East Indies. Hemlock tannage. Coarser and more porous than cowhide. Used for heavy nailed shoes.

Burnish. — To polish, as the edge of the sole.

Buskin. — A woman's low cut house shoe of either cloth or leather, Having small, triangular-shaped goring on top of front at instep.

Button-fly. — The lapped over and strengthened strip of leather in the front of a button shoe in which are the buttonholes.

Cabaretta. — This trade term is applied to a leather the origin of which is often disputed. It has appearance of being either a superior sheepskin or a rather inferior goat¬ skin. The Cabaretta is a cross between a sheep and a goat and its leather partakes of the character of both. It comes from South America chiefly. Very common in a dull or "mat" finish for tops of patent leather and other shoes.

Cack. — An infants' smallest hard-soled shoe with no heel, sizes 1 to 5.

Calfskin. — For trade convenience, skins of neat cattle of all kinds are classified as follows: Weighing up to 15 pounds, green, "calfskins"; 15 to 25 pounds, "kips"; all above 25 pounds, "hides." This is, of course, merely an arbitrary distinction for trade convenience, and the quali¬ ties of the extremes in each grade merge into those of the next grade. There is also a great deal of variation in the qualities of skins of the same weight, which is true of all kinds of skins, and is a fact which makes leather grading a difficult task, requiring long experience, and which also complicates the practical work of the shoe manufacturer. No two skins are precisely alike, and different parts of the same skin vary.

Calking Machine. — An appliance to depress or shape the inner sole of a shoe, to make it conform to the snape of the bottom of the foot.

Callous. — A spot of thickened and toughened skin on the palm of the hand or sole of the foot. The latter under continued pressure develops into a corn.

Carriage Boot. — A loosely made boot for women, usually of fabric, often fur-trimmed, and intended to be worn in winter, being slipped over the ordinary shoes or slippers. Commonly used over dancing slippers.

Carton. — The pasteboard box in which each pair of fine shoes is usually packed. The carton is a comparatively late development in the trade. The first approach was to wrap each pair in ordinary paper. Pairs were formerly kept together by a string knotted through holes in

the heel, as “bargain shoes” are sometimes handled now. The National Shoe Retailers’ Association, 14 Jan., 1914, endorsed standard sizes of cartons and the following meas¬ urements in inches.

Length Width Depth

Men’s . 12 2-4 4£

Misses’ . 101 4| 3j

Women’s . Ill 5i 3j

Boys’ . Hi 6 3i

Youths’ . 101 5i 31

Children’s . 8i 4^ 2J –

“Stock cartons” are special cartons which are kept on the

shelves permanently, instead of being used to deliver shoes to the customer. Sometimes these are made of double length, for double depth shelving.

Case. — • The variable-sized box in which shoes are packed for shipment; men’s usually 12 pairs in a case, women’s 24 to 36 pairs, etc. Cases for foreign shipments are often much larger. (See Show Case.)

Castor. — Suede-finished kid, for gloves, usually in lighter weight than is used in the making of shoes.

Cement. — A general term applied to adhesive materials. Various kinds of cement are used in the manufacture of shoes as between the heel lifts, between soles, fastening beaded edges, etc. “Rubber cement” is a solution of India rubber which is useful in shoe repairing as well as in manufacturing.

Chamois.— The alum-tanned skin of a variety of deer. The leather is very pliable and may be washed. It is used more often for gloves than for footwear, being very soft and pliable. Much imitation chamois is on the market, this being alum-tanned sheepskin.

Channel. — A slanting cut made around the edge of a sole or insole where stitching is to be done. Such a cut is made on the outside of welt and McKay shoes, the lip of the channeling being cemented down after the stitching is done, so as to present a smooth bottom and to keep the bight of the stitch from being exposed to immediate wear. (See illustration under Welt.)

Children's Sizes. — A series of sizes running in two divisions from 5 to 8 and from to 11. Children's shoes form a larger proportion of the total than is usually realized. Tables of population show that one-third of all the inhabitants of the United States are below the ages of 15 years. (See Sizes.)

Chrome Sole. — In sole leather the full thickness of cattle hides is used. Chrome-tanned sole is the strongest and lightest sole leather. It is slippery and porous and has a rough edge. Sometimes stuffed with grease to make waterproof. Used chiefly in outing and athletic shoes.

Chrome-tanned. — Tanned with bichromate of potash and dilute muriatic acid. (See Tanning.)

Circlet. — A proprietary name given to a small horseshoe¬ shaped tubelet of steel, to be driven into the heels of shoes for the purpose of preventing undue wear.

Circular Vamp. — A vamp so cut as to join the quarter in a seam on each side of the shoe running down to the shank, instead of being continued straight back to the heel on one side as in a three-quarter vamp shoe, or on both sides as in a whole vamp shoe. (See Vamp.)

Clog. — A heavy soled, very low cut shoe, sometimes with wooden soles.

Cobbler's Seam. — A seam made by stitching through and through, the pieces being laid so that the edges are even instead of being lapped.

Collar. — A narrow stitched-on strip of leather, around the outside of the top of the shoe, usually for ornamental effect.

College Boot. — A boot for girls, cut lower than the "Polish," to about ankle height.

Colonial. — A low shoe made principally (although not exclusively in the past) for women's wear, having a flaring tongue outside with a large ornamental buckle across over the waist. The buckle and tongue

are distinctive features, whether the shoe fastens with tie or strap. This shoe is supposed to date from Colonial days in this country, although examination of old-time prints will show that a shoe oftener worn (at least by men) had only a broad silver buckle without the flaring tongue. In the strict “Colonial” the flaring tongue extends above the instep, instead of lying flat to the foot, below the instep, as in the case of most of the “tongue pumps,” which seem to be a sort of variation of the Colonial, evolved by the addition of a tongue to the pump.

Coltskin. — This term is applied to split leather made from horsehide, as well as that made from what would be strictly considered a colt. Colts are used for food in certain parts of Russia, just as veal calves are used in this country, and the hides are a staple article in Russian com¬ merce. The leather is of firm, solid texture, and has been much used in recent years for patent leather.

Combination Last. — A last some part of which varies from the usual standard measurement; for example, being wider or narrower at the ball or heel than the regular standard. (See Last.)

Comfort Shoes. — Soft, flexible shoes with low heels, made for invalids or elderly people.

Congress Gaiter. — An ankle-high shoe with leather or cloth top, adjusted to the ankle by a gusset of rubber goring in the sides instead of by laces, buttons, etc.

Copper Toe. — A copper boxing or lip, used to protect the toe, in children’s shoes.

Cordovan. — The adjective is derived from the name of the Spanish city, Cordova, wnich had an ancient repute for the mak’ng of fine leather, either from goatskin or horse- hide, the Spaniards having been for some centuries the world’s best tanners. Cordovan leather from horse butt (rear part of horsehide) tanned with gambier and other vegetable tannings. Colored in black, tan, etc., and fin¬ ished on the flesh side. A very close waterproof leather

because of the impermeable shell in this part of the horse¬ hide. Used in high grade men’s shoes. It is expensive and is imitated in calf and sides.

Corduroy. — A ribbed velvet-like fabric. One objection to it as a shoe material is that it is thicker than some fabrics in common use, tending to give toes and ankles a clumsy appearance.

Cothurne. — An ancient type of Roman low shoe, laced about the ankle, recently revived by French shoemakers.

Counter. — A piece of stiffening material which passes around the heel of the shoe to support the outer leather and prevent the shoes from running over. Counters are made of sole leather, split leather, pasted (thin splits and skiv- ings) canvas backs, cemented (two thin leather pieces with leather board between) fibre board and leather board. Counters are shaved thin at the edges and shaped by machinery. In women's pumps the counter is sometimes extended forward in the inner side, almost to the ball of the foot. In heavy shoes for miners, furnace men and iron workers, metal counters are sometimes used on the outside of the shoe.

Court Tie. — A men's low, straight-topped Oxford usually in patent leather, with black silk tie, and of a type which is prescribed by court ceremonial dress requirements in England and other countries, whence the name. Also applied to women's two or three eyelet ties usually on Blucher pattern. It is often used as a dancing shoe by men who find pumps uncomfortable or lacking in adjustment.

Cowboy Boots. — A peculiar type of leg boot with high, fancy tops, with very high heels, of approximately Cuban contour. These boots were and are worn by Western cowboys, who are seldom on foot. One purpose of the high heel is to prevent the foot slipping forward in the stirrup, in riding horseback.

Cowhide. — Used to refer to cattle hides weighing from 25 pounds upward, green salted, also the leather made from such hides. (See Hides, also Calfskin.)

Creaser. — An implement for making parallel creases or straight wrinkles in the vamp of the shoe across the ball, causing the shoe to break evenly.

Creedmore. — A cheap, heavy shoe for men, Blucher cut, with bellows tongue.

Creole. — A heavy workshoe of the "Congress" type; that is, having rubber goring in the sides.

Crimp. — To shape to the front of the foot the one-piece vamp and leg of a highside-seam boot, or riding boot.

Crimped Vamp. — A vamp which runs in one piece to the ankle or higher, as in the "nullifier," or in side-seam leg boots for farm use, etc.

Cuff. — A strip of leather, wider than a “collar,” sewed around the top of a shoe. Both “collar” and “cuff” are used principally for ornamental effect.

Cupped Sole. — Applied to the depressions in a sole caused by the ball of the foot in wearing. Shoes the soles of which are much “cupped” sometimes present a difficult problem in half-soling, in order to avoid changing too much the general shape to which the foot had adjusted itself.

Cushion Sole. — A padded innersole.

Custom Made. — Made by hand to the customer’s special order and measurement. The term is also used to apply to factory-made shoes which are designed upon conservative models which have been in common use in custom shoemaking.

Custom Toe. — This designation was intended to refer to a toe of standard and unchangeable type, but in late years the type itself has been modified. The modem “recede” toe is of similar design.

Cut-off Vamp. — A vamp which is cut off at the tip and stitched to the tip, instead of continuing forward under the tip and being lasted in with it. It is claimed by makers of medium and cheap grade shoes that this offers an economy in leather which does not detract from the general cost-balance of the cheap shoe.

Dom Pedro. — A heavy one -buckle shoe with bellows tongue. This name was originally proprietary. The shoe was intro¬ duced at the time of the visit to this country of Emperor Dom Pedro, of Brazil, and was made in high grades. The lack of adjustment was against it, and it eventually took its place among styles of working shoes.

Dongola. — Heavy plump goatskin, tanned with a combina¬ tion of vegetable and mineral acids, and having a semi- bright finish. The terms “Dongola,” “kid” and “Mor¬ occo” are sometimes loosely used interchangeably. The terms “Dongola” and “’Morocco” are geographical and indicate the origin of the leathers thus named. (See also Cordovan.) The name was used a number of years ago as a proprietary name applied to antelope leather.

Dress Shoes. — Shoes appropriate for use with formal attire, and for social occasions. The requirements of fashion are more exact there than in any other class of shoes, and the salesman should have dependable knowledge of what is deemed correct style. Men are perhaps in more need of guidance in this matter than are women.

Dull Calf or Kid. — Leather having a smooth but dull and unglazed finish.

Eclipse Tie. — Proprietary name of a one-eyelet tie for women, stitched close at the throat and having a small, pointed tongue.

Edge Setting. — Finishing the edges of the soles with polish, applied under heavy pressure or by rubbing.

Edge Trim. — This term refers to the method of finishing the edge of the sole. “Beveled edge,” “round edge,” “square edge,” etc., are self-explanatory; “fudge edge,” having the welt seam hidden, close to the upper; “extension edge,” an extra wide edge. Fancy edge include a great variety of stamping and knurling. “Square-edged turns” are sometimes called “English welts” or “mock welts.” “Feather edge,” the thin edge often seen in “turned” soles.

Elkskin. — A term applied usually to soft tanned calfskin, used in sporting and outing shoes.

Embossed Leather. — Leather stamped or carved with various figures, geometrical and ornamental. A recent method of producing consists of cutting away a background, leaving the pattern in relief.

Enamel. — Leather with a shiny finish on the grain side as distinguished from “patent” leather, which is usually finished on the flesh side, or the surface of a split leather. (See Patent.)

English Last. — A term applied to a last the principal char¬ acteristics of which are an extra long recede toe and low heel.

English Welt. — A Mock Welt.

Everett. — A type of men’s slipper low ‘in the back, but coming up over the waist in front to the instep.

Extension. — The addition of a size or sizes to the standard measurement of a last, to allow for the forward curve of the toe, or the addition of a fraction of a size for each

j additional width above the sample width, in grading lasts. (See Last.) Also applied to extra width in edges of sole, or to the edge itself.

Eyelet. — An annular ring of metal, etc., inserted through and clinched in the lace holes of shoes; “blind eyelet,” top invisible and bottom clinched; “worked eyelet,” a lace hole finished with stitching like a buttonhole.

FabricSi — A general term designating woven or knit cloths of any kind, made from animal or vegetable fibres, such as wool, silk, flax, cotton, etc. Fabrics of various kinds have been used in shoes for many years.

Fair Stitching. — Stitching applied around the sole, showing on the upper side; usually applied to a “McKay” shoe to imitate a “welt.”

Fancy Slippers. — A general term applied to light slippers made for women’s indoor evening dress wear, and made of silk, satin or the finer leathers, usually with French heel or Spanish heel, and variously ornamented, with beading, embroidery, plain or jeweled buckles, etc.

Faust Slipper. — A high cut house shoe similar to a “Romeo” with V-shaped cuts at the sides, instead of U-shaped and no goring.

Felt. — A sheet made of fibres of wool, hair, fur, etc., matted together and rolled flat, usually with sizing to give it con¬ sistency. It differs from a fabric, inasmuch as the fibres are not spun into threads and then cross-woven, but are merely allowed to drift into a loose layer in a current of air, then flattened into a sheet under pressure.

Filler. — A light form of wood or other material placed in a shoe used as a sample, for display or in stock, to distend it to the appearance it would have when worn. A New York store introduced a plan of placing fillers in each shoe as it was put in stock, these being sold to the customer at a cheap rate to use as shoe trees. Light, hollow wood fillers are made by last makers, following the exact conformation of the different lasts they produce and therefore filling and fitting perfectly the shoes which are made from such lasts. – . .

Findings. — A general term applied to articles which are incidental or accessory to the manufacture, the trimming or the care of shoes. The list includes practically every¬ thing in shoes except leather. As applied to the shoe store, it includes such articles as laces, polishes and dressings, shoe trees, foot powders, rubber heels, arch supports, heel plates, shoe horns, shoe brushes, insoles, fancy buckles and numerous other incidental articles.

Finger Foxed. — Having a pieced Blucher quarter so cut that the heel foxing extends forward to the throat in a narrow strip below the upper

part of the quarter, the lower piece looking a little like a hand with the fore finger extended. . ,

Finger Stitching. — Stitching which reinforces the lapped quarter of a Blucher shoe.

Finish. — The final methods and processes of preparing the leather for use, or of polishing, buffing or otherwise treating the soles of shoes upon completion. (See Bottom Finish and Leather.)

Fitting. — The selection and adjustment of ready-made shoes, with reference to their adaptation to the foot of the intended wearer.

Full information is given under the subject Lasts as to the scale of measurements, especially with reference to the additional extensions.

Fitting Stool. — A low, slanting-topped stool upon which the shoe salesman sits when trying on a shoe, it having a ledge on which to rest the foot of the customer while adjust¬ ing the shoe thereto.

Fixture. — Any stand, bracket, hook, support or other device for displaying samples of the merchant's shoe stock, in window or other parts of the store.

Flange Heel. — A heel made with a flare toward the "top lift," or bottom of the heel as the shoe stands when worn.

Flat Foot. — A term applied to "broken arch."

Flat Last. — A last with comparatively little arch or toe spring.

Folded Edge. — An edge skived thin and cemented down in fold, as distinguished from an edge which is left as it is cut. Applied to the parts of an upper.

Foot Form. — A proprietary name for last or shoe made in close conformity to the natural outline of the foot.

Foothold. — A low rubber overshoe, having no heel, but adjusted by a light heel-strap; sometimes called "Sunny South" rubbers or "sandals."

Foot Muff. — A fur or woolen bag in which to place the foot for warmth while riding or driving.

Foot Powder. — One of various preparations, some proprie¬ tary,

dusted on the foot for sanitary or strengthening purposes.

Foxing. — A piece of leather forming (or covering) the lower part of the quarter of a shoe. In earlier days, when shoe patterns were very simple, this term was loosely used as applying to the vamp also, and this use has not altogether disappeared. For example, “slipper foxed” (or “whole foxed”) is a term applied to whole vamp shoes for women. “Three-quarter foxed,” having a three-quarter vamp.

Freak Shoes. — Term most often applied to a wide, almost straight across toe, same width as at ball of foot, usually used in conjunction with term “freak last.” Also shoes of style that might be classed as “insane novelties”; shoes of style marked by bizarre, startling, unusual features, outside the limits of good taste.

French Calf. — Genuine French Calf was formerly imported to this country in considerable quantity. It was a wax finished calf leather of firm quality and high grade.

French Chalk. — A soft steatitic chalk orˆ talcum used to dust in shoes to facilitate their slipping on the foot.

French Foot. — Made with a single seam in the center of the sole; applied to hosiery.

French Sizes. — The French sizes for shoes run on a scale of measurements, as well as numbering, entirely different from those used in this country. (This refers to the explicit meaning! of this term, not to what is known as “French Size Marking,” which see.) The size is about one-fourth of an inch.

English French

French and English Sizes actual measurement in inches

French Size Marking. — This term applies to a system (which probably did not originate in France) of marking American or English size and widths. It is applied, in fact, to a variety of systems, the principal feature being that it is a cipher or secret method, which does not reveal to the customer the actual size of the shoe. A great variety are in use — too many, in fact, as it makes trouble for the

manufacturer. In marking the widths, instead of using the ordinary lettering, arbitrary numbers are used. For example, if you put down the number 10 to indicate AA widths, then 11 would represent A, 12 would represent B, etc. Your key sheet for widths would stand thus: —

Widths . AA A B C D E EE

Your width markings . 10 11 12 13 14 15 16

In marking the sizes, start in the same way with some arbitrary number. For example, use 20 for size 1, 20- for sizes 1 j, etc. Your key to size marks would stand thus:

Sizes . 1 lj 2 2\ 3 Z\ 4 4 5 etc.

Your marks . 20 20- 21 21- 22 22- 23 23- etc.

In using such a system, the width number would be set down first, with the size number following. For example, the mark for a 4B shoe would be simply the figures 1223. The “12,” as shown above, would stand for B width and “23” for 4 in size.

Stock being once marked in this way, all that would be necessary for the sales force would be to keep in mind the key and translate backward. For example, a shoe is marked 152 1- ; the “5” of the 15 indicates the fifth letter of the alphabet or E, which gives the width; add one to the “1,” which gives you size 2, the dash indicating the half size; the shoe is therefore a No. 2\ , E width. The second and fourth figures are the principal ones. This is only an example of many such keys. The principal pur¬ pose of all such markings is to avoid all controversy with customers over sizes. Many strong firms, howevef, have discarded them and have educated their customers to depend upon the store’s expert knowledge of fitting, with¬ out regard to the marked size. (See Size.)

Fudge Edge. — An edge stitched very close to the upper and trimmed close.

Full Double Sole. — Having two thicknesses of outsole through to the heel.

Full Serge. — A fabric shoe made with a one-piece upper laced to the toe.

Full Vamp. — A vamp that extends forward full size and is lasted under, instead of being cut off and sewed to the tip, on the under side.

Gaiter. — A separate ankle covering, or “over-gaiter.” An over-covering for the foot, of cloth, adjusted with buttons and attached with a buckle and strap, or a band beneath the shank of the shoe. “Gaiter boot,” one designed in imitation of a boot with over-gaiter. Gaiter — a term also applied to a Congress shoe. (See Spat.)

Glazed Kid. — – The principal form in which tanned goatskin (kid) is finished for use as shoe leather, either black or tan colored. The skins are tanned usually by the chromic acid process (see Tanning), from which they come out almost white. Blacking (or other color) is then brushed on thickly, and the skins are put through a machine which practically pounds the coloring matter into the texture of the skin, at the same time smoothing and polishing it.

Glazed kid lends itself to dyeing in a great variety of delicate and beautiful colors for ladies’ shoes. The white are tanned with alum in-addition as alum is necessary to give a white leather. Goatskins for glazed kid are imported from all over the world.

Glove Grain. — A light, soft-finished “split” leather, gener¬ ally used for women’s or children’s shoes. (See Split.)

Glucose. — A variety of sugar chemically produced from starch. Certain grades of it have been used in tanning sole leather, in connection with extracts, and an abuse developed in leaving too much of it in the leather, thus adding to the weight by the introduction of a cheap mater¬ ial, which added nothing to the strength or value of the leather, but was charged for by tne pound at leather prices.

Goatskin. — See Kid.

Golf Disks. — Small rubber inserts placed in the bottom of golf shoes to prevent slipping.

Golf Hose.— Heavy woolen stockings in fancy colors and plaids used in golf and other outdoor sports.

Golf Shoe.-; — Calf or cloth shoe, with or without hob nails, usually with ball straps — a specialty for outdoor sports and golf.

Goring. — A strong knit fabric in which strands of India rubber are used, rendering it elastic to a large degree. This material is used in “Congress” shoes, also in other patterns. Congress shoes are often used by railroad track men, as the foot may be instantly pulled out in case of catching fast in frogs or tracks, with cars or engines approaching.

Grain. — The outer side of a hide or skin, as distinguished from the "flesh" side. The term is also applied to leather made from or finished on the grain side of the skin. (See Leather.)

Gun Metal. — A proprietary name for a fine grade, well finished calfskin leather, chrome tanned with dull or semi- bright surface.

Gussett. — A side piece or insert of rubber webbing in the side of a Congress shoe. Sometimes applied to a full Blucher or bellows tongue.

Gypsy Seam. — A seam running from the throat straight down the front of a shoe to the toe, making a "split vamp."

Half Double Sole. — An outsole composed of one full sole to heel, with a slip sole above it.

Half Sole. — A tap sole; an extra outsole extending only to the shank of the shoe; to apply. such a sole in repairing a partly worn shoe.

Harness Leather. — Leather similar to belting, and made from hides of cattle, bark-tanned and oil finished.

Heel. — The principal varieties of heels are named for their style or shape. The height of the heel is a leading con¬ sideration, and is usually expressed in eighths of an inch. "Cuban," a high, rather straight heel, without the curve of the "French" or "Louis XV" heel, which usually meas¬ ures an inch and a half or more in height, and is pitched well forward under the foot with a graceful curved outline; the French heel is most often made of wood, covered with leather, with a thickness of sole leather or "top lift" at the bottom, sometimes made entirely of sole leather; "mili¬ tary" heel, a heel straighter than the "Cuban" and not so high; "Spanish" heel, a covered "Cuban" heel; "common sense" heel, a low heel — which may or may not Indicate real common sense in the wearer or fitter. The foregoing are all used in women's shoes. The "military" heel is often used in men's shoes. In children's shoes, the "spring" heel is a low heel formed by extending the outsole of the shoe back to the heel with a "slip" inserted between outsole and heel seat; "wedge" heel, one somewhat similar to a "spring" heel, but with a wedge-shaped "lift" nailed on the outside, instead of a "slip" on the inside of the out¬ sole. In the use of fabrics for women's shoes,- heels are often covered with the same material that the upper is made from. "Anatomic" heel, a heel made principally in men's shoes, with the inner side extended forward to the extent of a half or three-quarters of an inch, the idea being to better support the arch of the foot. Aluminum heels are being experimented with, these

being made of sheets of aluminum, lacquered black to correspond with patent leather. “Breast” of the heel, the forward face of it. The height of a heel is measured vertically, at the side, just back of the breast, and is taken “overall.” That is, meas¬ uring from the top lift to the upper edge of the sole “Pitch” of a heel, its inclination forward under the foot.

Heel Brace. — A metal brace or frame attached to the out¬ side of a shoe to keep the heel straight.

Heel Pad. — A pad of felt, leather, etc., placed in the heel of the shoe inside, and covering the insole at the point where the heel of the foot rests.

Heel Plate. — A plate of metal attached to the bottom of heels to resist wear.

Heel Seat. — The rounded top of the heel of a shoe, including the “rand.”

Heel-stay. — A pasted lining of rough surfaced leather, such as suede, placed in the heels of Oxfords or other low-cut, shoes, to prevent the shoe slipping at the heel.

Hemlock Sole. — Tanned with hemlock bark liquor. A firmer leather than oak or union. Used for medium price men’s shoes and work shoes, chiefly nailed work. Used also by repairers, especially for heel top lifts. Cheaper than oak or union. See also Tanning.

Hides. — In its trade significance, this term is distinguished in meaning from the word “skins,” which applies to the skin of goats, calves, sheep and other small animals, the term “hides” referring only to those skins which are above 25 pounds in weight, from cattle, horses, etc.; “packer hides,” those taken off in the large slaughter houses, which usually bring nigher prices because greater care is used in taking them off.*

Hip Boots. — Extra high rubber boots used in fishing or other outside work.

Hobnail. — A heavy, large headed nail, used in the soles of shoes to resist wear, or a shoe thus made.

Horn. — The “shoe horn,” used especially to facilitate slip¬ ping on low-cut shoes, was originally made from a thin strip of cow’s horn, scraped smooth.

Horn Fibre. — A proprietary name for a strong, resilient, waterproof composition used in making counters.

Hunting Boot. — – A laced boot, usually made with “bellows tongue” and Blucher-cut, with waterproof sole, and used for hunting and other rough outdoor use.

Inlay. — A contrasting piece of leather inserted under an opening in a shoe top and stitched fast thereto, for orna¬ mental effect.

Inseam. — The seam which in a welt shoe fastens together the welt, the upper and the insole. (See Welt.)

Insole. — The inner sole of a “welt” or “McKay” sewed shoe, to which the “upper” is stitched and the “outsole” is either stitched, nailed or pegged. This is an important part of the shoe, and requires good material.

Iron.— A measure indicating the thickness of soles. It is one forty-eighth of an inch; a “twelve iron” sole is therefore one fourth of an inch thick, etc.

Ironing Out. — A finishing process for tops of shoes, by placing the shoes on trees and using a smooth, curved usually electric-heated iron.

Jack Boot. — A heavy, all-leather fishing boot with crimped front.

Jockey Boot. — A high, straight top boot for children, usually with cuff or collar of different leather, and a tassel.

Juliet. — A negligee or house slipper for women, loose fitting and with high front and back, having rubber goring at the sides.

Kangaroo. — A fine, tough, close-fibered leather, made from imported kangaroo skins. “Kangaroo calf,” calfskin fin-

ˆ ished in imitation of genuine kangaroo.

Kangaroo Sides.— Cowhide tanned with hemlock and other

vegetable tannings. Part of the grain has been “buffed” off or removed by hand with a special sharp blade. Hand boarded. Used for work shoes.

Kin. — Shoe leather made from the skins of mature goats. The skin of the young goat or “kid” is made into the thin, flexible leather used in the making of kid gloves, being too delicate for use in shoes. The goats from which come the supply of kid leather are either wild goats or allied species partially domesticated, and are found in the hill regions of India, the mountains of Europe, portions of South Amer¬ ica, etc.

Kid is rightly regarded as the shoe material par excellence for women’s and children’s wear, as well as for light wear in men’s shoes.

Kip. — A bovine hide or skin, weighing from 15 to 25 pounds (see Calfskin), or the leather made from such a skin.

Knurl. — To decorate by use of a wheel or tool, as the edge of soles, etc.

Knurled Bottom. — Having the bottom of the sole finished with ornamental wheeling or tooling, running round the edge and parallel with it.

Lace. — Laces are made of leather or fabrics, and of various lengths, according to the use intended. The standard lengths run by quarter yards, although there are some pop¬ ular intermediate lengths, such as thirty-inch, forty-inch, etc. ˆ Some ribbon laces, especially for women’s or chil¬ dren’s shoes, are sometimes furnished in continuous rolls or bolts, to be cut off by the dealer in desired lengths.

Lace Hook. — A metal hook used principally in men’s and children’s boots, above the instep, as a convenience in lacing, taking the place of eyelets.

Lace Stay. — A strip of leather applied up the front of a lace shoe to strengthen and reinforce the eyelets or eyelet holes.

Lapstone. — An iron plate which the cobbler holds in his lap and upon which he beats soles in order to give them a rounded shape or to solidify them, or on which he pounds down seams or folded edges with his flat-faced hammer.

Larrigan. — A knee-high leg moccasin, or boot made with moccasin sole, sometimes having a wedge-heeled sole on the outside, and used by lumbermen in the snow of our northern forests and Canada, where the name originated. The moccasin foot is the distinguishing feature.

Last. — The wooden or metal form or mold over which a leather or rubber shoe is constructed and which gives the shoe its shape. Lasts

are turned to very exact measure¬ ments and proportions by the use of machinery. In the process of manufacturing welt shoes the insole is lightly tacked to the bottom of the last, then the upper is placed over the top of the last, pulled down firmly and tacked, the tacks being driven only part way in, the counter and toe boxing first being placed. This operation of pulling over and tacking is now usually done by ingenious machin¬ ery. Then follow the various processes of “welt inseam- ing,” “beating out,” etc., which prepare the shoe for the applying of the outsole, prior to which all the loosely driven tacks are carefully pulled out.

Lasts are made from seasoned maple wood, are graded in an exact scale of standard sizes, each size, half size and width requiring its proper scale of measurements. The standard scale of last measurements for ball, waist and instep, as adopted in this country, is as shown in the sub¬ joined table.

American Standard

Lasting Tacks. — Tacks which are used in the lasting of shoes. As the upper is pulled over the insole, tacks are driven about half-way in to hold the upper in place until it sets and molds itself to the shape of the last. These tacks are to be taken out before the out-sole is put on.

Leather. — An outer animal integument, tanned, tawed or otherwise chemically preserved, shrunk and toughened. Any skin or hide of beast, bird, fish or reptile may be made into leather. (See Tanning and special article on Leather.)

Leather Board. — An imitation sole leather made from scraps of leather pasted and pressed together into sheets.

Ledge. — A shelf projecting out about a foot from the rest of the shelving, some three and a half feet from the floor, and used as a convenient place to lay a shoe or carton while selecting shoes for a customer. Some modem stores have discarded this feature.

Leg Boot. — -As distinguished from what is termed a “shoe” in America, a boot which extends some distance above the ankle without lacing.

Legging. — A strapped or laced covering for the leg, extend¬ ing from the ankle to the knee. A “Puttee” legging is formed from a spirally wrapped strip of cloth.

Levant. — A general term indicating certain processes of tanning.

Lift. — One of the separate pieces of sole leather used in making a leather heel. “Top lift,” the last piece applied in making the shoe.

Linings. — Are cut and fitted with the top of the shoe and are made from drilling cajother fabric, sheepskin, calf or kid. Leather lined shoe? are by many considered too warm for indoor use. The lining is sometimes found to be a weak point in shoes, and, as with other portions of the shoes, good quality is necessary in order to withstand wear.

Louis Heel. — The French heel; a covered wooden heel which pitches well forward under the foot with a gracefully curved outline, usually built with a leather top lift.

Low-cut. — The principal varieties of low-cut shoes are slip¬ per, pump, tie, Oxford, sandal and Colonial. The pump is essentially a slipper, there being no fastening. Other varieties of slipper are mules, opera slippers, house slippers, Everetts, etc. Oxfords may be adjusted with lace or button, and may be Blucher cut or straight lace, etc. Shoes with three eyelets and upward are usually classed as “Oxfords”; two eyelets, as “sailor ties”; one eyelet, as “court ties,” “Eclipse ties,” etc., the latter a proprietary name for a style of low-cut shoes. In these, as with all other forms of footwear, varieties once quite distinct have been merged into each other by modem shoe designers.

Lumbermen’s Overs. — A combination piece of footwear consisting of a felt boot over which is worn a heavy rubber Arctic; used by lumbermen and farmers in winter.

Mat. — Dull finished, with an unglazed surface.

Mat Kid. — A thin calfskin used for shoe uppers, having a dull mat surface and used principally in contrast with bright-finished calfskin, or with patent leather.

McKay Sewed (or simply “McKay”). — A method of shoe¬ making named for the inventor. The upper is lasted over an innersole, the last is then removed, and the outsole is sewed on by a thread which goes straight through from the outside, catching the upper and innersole, with the seam showing on the inside. The outsole, is usually channeled

Last Measurements.

Sizes

1

11

2

Ball .

. . . . 6|

61

61

A

Waist .

. . . . 6f

61

61

Instep .

. . . . 7

71

n

Ball .

. . . . 61

61

7

B

Waist .

. . . . 6f

61

61

Instep .

. . . . 7|

71

71

Ball .

. . . . 7

71

71

c

Waist .

. . . . 61

7

71

1

Instep .

. . . . 7|

7 1

71

Ball .

72

71

71

D –

Waist .

71

71

73

1

Instep .

. . . . 7|

71

8

Ball .

. . . . 71

7-

76 ‘ 8

B i

Waist .

72

71

7 2

sl

\

Instep .

... 8

81

21

3

31

4

41

5

51

6

61

61

7

71

71

71

71

71

7®

71

6|

61

7

71

71

71

71

71

71

71

71

71

71

71

8

81

81

81

71

71

7f

71

71

71

76

‘ B

71

8

81

7

71

7ˆ

‘ 8

71

71

71

71

8

75-

‘ 8

71

71

8

81

81

81

81

81

71

71

75 7

74 ‘ ‘8

76

» 8

71

8

81

81

81

71

71

71

71

71

8

81

81

71

8

81

81

81

81

81

81

81

71

76

‘S

71

8

81

81

81

81

81

n

71

71

71

8

81

81

81

81

81

81

81

8|

81

81

81

9

91

71

8

81

81

8|

81

81

8|

81

71

71

8

81

81

81

81

81

81

8f

8!

81

81

81

9

91

91

91

Graded in Women’s and Men’s Sizes.

7

71

8

81

9

91

10

101

II

8

81

81

81

81

81

8f

81

9

71

8

81

81

81

81

81

81

81

81

81

81

81

9

91

91

91

91

81

81

81

81

81

81

9

91

91

81

81

81

81

81

8|

81

9

91

81

81

9

91

91

91

91

91

9|

81

81

8|

81

9

91

91

91

91

81

81

81

81

81

9

91

91

9f

9

91

91

91

91

91

91

91

10

81

81

9

91

91

9|

91

91

91

91

81

81

81

9

91

91

91

91

91

91

91

91

.91

91

10

101

101

9

91

91

9f

91

91

9|

91

10

81

9

91

91

91

91

91

91

01

io|

91

91

91

91

10

101

101

101

It will be noted that no meaurements are given regarding the toes of lasts. It has been said that “all the fitting is done back of the ball of the foot; you can do what you please with the toe of a last.” It is true that a great many modifications of toe shapes are made, while retaining the standard measurements of the other parts of the last.

as with a welt sole, and pasted back over the seam. A sock lining is put in the shoe to cover the inside seam.

Comparison with the welt method will show that this is a simpler plan, but it has the disadvantage of being less easy to repair. The McKay machine was one of the first sole-stitching machines used. Its introduction cheapened

b

the making of medium-priced shoes and it is still used to a considerable extent. The welt process has been much improved and facilitated within the past few years, some¬ what to the disadvantage of McKays. (See Turn, also Welt.)

Cross Section of a McKay Sewed Shoe.

Measurement. — The measuring of the foot for special cus¬ tom orders is an art which requires practical experience. Fine custom shoemaking is almost a negligible quantity in this country, except in large cities. A considerably greater proportion of custom-made shoes is to be found in both France and England. The principal points of measure¬ ments are the ball, waist, instep, ankle, and total length.

Size sticks are constructed which give these details. (See illustration under Last.) In some cases special single¬ pair shoes can be secured from the factory which will meet the needs of a difficult customer.

Mining Shoes. — Heavy, hobnailed, oil-grain working shoes for miners.

Moccasin. — A heelless shoe made with a single piece of soft leather turned up at the edges as the sole, this being stitched directly to a low upper with a saddle seam. In some there is no upper, the sole being drawn over the foot with thongs. A recent innovation is the use of a low wedge heel in connection with the moccasin sole. This shoe was invented by the North American Indians, the name being from the Algonquin language. It is the char¬ acteristic Indian shoe. Modified forms, with tops ankle high, or higher, are used in the snows of winter by Northern lumbermen. The “shoe pack” and “larrigan” are modifications.

Mock Welt. — A name applied to a square-edged, close trimmed turned sole.

Molded Counter. — A counter made from composition leather board, etc.

Morocco. — Originally a sumac-tanned goatskin leather, made in Morocco and stained red. It is still made there and elsewhere by that process, and used in book binding. This was the original significance of the term, but it is now applied to leather made in imitation of morocco, also applied in general to heavy goatskin of any vegetable tannage used for shoes, as well as to goatskin tanned by the chrome process.

Mouquet Slipper. — A cheap slipper made of webbing or other coarse fabric, for house or rough use.

Mule. — A slipper for women’s house use having a high heel but no counter or quarter. They are of French origin, and are usually made of satin, fine kid, etc., and ornamented with rosettes and the like.

ˆNapoleon Boot. — A leg boot designed by Napoleon, orig¬ inally used for soldiers, having a high wave top. The Napoleon top was quite common in women’s boots a few years ago.

Napoleon Tap Sole. — • An extra sole so beveled in from the edge as to be invisible from above. This is sometimes used for crippled feet in connection with a built-up heel the purpose being to sustain a crippled

or shortened leg in such a manner as to reveal as little as possible the existence of a physical defect.

Neat Leather. — A term applied to bark-tanned cowhide, oil finished.

Neat's Foot Oil. — A light oil obtained from hoofs and bones of cattle and highly esteemed as a leather dressing, especially for the side leathers. It is very commonly used by farmers in winter as a dressing for boots.

Nippers. — Long-necked pliers, used to cut nails or pegs, lasting tacks, etc., from the inside of shoes.

Nubuck. — A proprietary name for a white or cream colored buck leather.

Nullifier. — A shoe with high vamp and quarter, dropping low at the side and having a "U"-shaped rubber goring inserted. These are made loose fitting and are generally used for house wear.

Oak Sole. — Tanned with liquor or extract of oak bark. This is the best bark-tanned sole leather. Used for men's fine shoes and more used by repairers than any other sole leather. Can be sewed or nailed.

Oak Tanned. — Tanned with oak bark, the most common of vegetable tannings. This kind of tannage requires much more time than the newer methods which use mineral astringents, but the leather produced is superior for most purposes. ,

Oil Grain. — A heavy, bark-tanned side leather, finished in oil, with pebbled surface on the grain side of the skin. A split is taken off the flesh side in order to reduce the leather to a thickness suitable for use in shoes. It was originally made, and is used still, for men's heavy working shoes.

Ooze Calf. — A proprietary name given to velvet or suede- finished calfskin. The name has been one of those which became almost too popular, inasmuch as it is commonly appropriated and applied to everybody's velvet finished calfskin. As ordinarily used in the trade, the terms "ooze'" and "suede" have much the same meaning. Some pro¬ cesses produce a leather in which the grain is buffed off and the velvet finish put on the grain side. Suede strictly is a

[velvet or nap finish of the flesh side of the skin, the grain being left on the other side, and thereby adding to the strength of the leather.

Opera Slipper. — The term is applied to any dress slipper for women and to a particular cut of house slipper for men. The former use is the more common. An opera slipper usually has a French heel, may have a whole or circular vamp, and is usually made of satin or other fine fabric, or of high-grade kid, calfskin or patent leather, often orna¬ mented with beading, embroidery, etc.

Orthopedic. — This term signifies “of correct foot form.” It is used as a proprietary name for shoes which make a special point of conforming to the natural outlines of the foot.

Outsole. — The outer or bottom sole of the shoe. So far as the public is concerned, it is usually “the” sole, as they know but little of interior construction.

Over-gaiter. — A cloth anklet extending down over the shoe to the vamp, usually buttoned at the side and fastened with a strap extending under the shank of the shoe. Its original use was with pumps or other evening dress shoes for winter wear. It has been at times used by men for day dress, especially abroad.

Oxford. — A low-cut shoe, coming to the instep or lower, either lace, strap or button. It may be of Blucher or straight lace cut, and may have any form of vamp, etc., as well as fancy inlays, saddle welting, collars and other orna¬ mentation. It is made in men’s, women’s and children’s sizes. The term is usually applied to lace shoes which have three or more eyelets, the “one-eyelet tie” and “two- eyelet tie” being so distinguished.

It is said that the shoe was first used in Oxford, Eng., more than three hundred years ago, in straight lace. The Blucher cut and the use of buttons were much later develop¬ ments. This form of shoe is one of the most popular and extensively used of all patterns for summer wear. It is low enough for a reasonable degree of coolness and at the same time is high enough to have a complete adjustment to the foot. Other lower forms become at times very popular for women, but the Oxford has never been wholly displaced at any time within recent years. “Plugged Oxford,” one with whole vamp and a separate lace stay.

Pack. — A name given to a lumberman’s shoe, made moccasin fashion, but with the upper extending to the ankle or above.

Packer Hides. — Hides of cattle taken off in the large slaughter houses of cities. They bring a slightly higher price becaus- of the greater care

and skill exercised in taking them off. Hides taken off by country butchers or by farmers are often nicked up by the skinning knives, and any cut in the hide damages the leather produced.

Pancake. — An artificial imitation leather, made from leather scraps which are skived thin and cemented together under heavy pressure. This material is often used in heels, with a sole leather top lift.

Pasted Counter. — A counter made of more than one piece of leather cemented together. Sometimes a center of leather board or hard cardboard is used with a thin layer of leather on each side. These are, of course, inferior to solid sole leather counters, and are used only in cheaper and medium grades of shoes.

Patent Leather. — (Patent kid, patent calf, etc.). Leather finished with japan or varnish. Any firm, dry-tanned leather can be used as the basis of this well-known finish, such as kid, calfskin, coltskin, side leather, etc. After tanning and drying, the leather is shaved to uniform thickness, and successive coats of black varnish are applied to the flesh side, the first coats being dried and rubbed down so as to work the varnish thoroughly into the fibre of the leather and also furnish a smooth coating for the last application. The last coat is applied with a brush, and the leather is allowed to dry in direct sunlight. The direct rays of the sun have a chemical effect, the

nature of which is not wnolly understood, but which seems to be necessary for the produciug of a firm, glossy coat. Various vegetable gums and oils are used in the making of the varnish.

Patten.— A wooden sole shoe or clog, used in Oriental countries, elevated upon wooden supports at each end.

Patterns. — Metal or cardboard sheets from the outlines of which are cut the various pieces of tne upper of a shoe, or the upper itself, as modified by differences in these outlines and shapes.

Pebbled Goat. — – Tanned goatskin, finished on the grain side with a pebbled surface produced by passing it between rollers under pressure.

Peg Cutter. — An implement for planing down and smooth¬ ing the inside of a wooden-pegged shoe or boot. This was formerly a leading

item of equipment in all shoe stores.

Pegged Boot. — A boot the sole of which is attached by means of wooden pegs. This method was largely used some years ago in the production of leg boots for men, as well as heavy cheap shoes for men, women and children. The perfection of sewing machinery by the McKay, welt and turn processes practically eliminated the peg, except in specialties.

Cross Section of a Pegged Shoe.

Perforation. — The principal use of perforation is for orna¬ mental purposes in the upper of a shoe, usually along the line of seams, but occasionally extending wholly or partly across the quarter. It is usually done by means of dies, and within a few years much variation in pattern has been made. Recently, perforations for ventilation have been used, with good results.

Pieced Counter.— A counter formed of two or more pieces of leather pasted or cemented together.

Pipe. — To pull loose from the surface, forming a hollow undemeatn, or to ripple up the surface; applied to. the loosening of the surface of patent leather, which sometimes occurs. When the varnish coat pulls loose, it usually cracks through soon afterward. The same effect is pro¬ duced sometimes without actually pulling loose from the leather.

Pipe Clay. — A clay of steatitic talc used for polishing leather or for cleaning white leather. Material of this kind has come into general use in connection with white shoes.

Piping. — A thin, narrow fold of leather or other material, caught with a seam between larger pieces, or at the edge of an upper.

Pitch. — Inclination from the vertical; applied to the set of heels, more rarely to the inclination of the top of boots.

Plow Boots. — A men's solid leg boot, with top of eight inches or higher, made with side seams.

Plugged Oxford. — An Oxford cut with whole vamp, with a separate piece inserted in front and forming the lace stay and forward part of the quarter.

Polish. — The making of shoe polishes has greatly extended within the present generation. The old-style shoes made of leather with the split

side out required heavy, black pastes to coat the rough surface of split leather. For this purpose many pastes containing lampblack, molasses, vitriol, etc., were sold. With the introduction of chrome- tanned dry leathers, with the smooth or hair side out, an entire change of formula was necessary.

Pastes and liquids are in varying demand as the influence of habit, the enterprise of manufacturers or convenience may dominate. The pastes are easily applied, not liable to the accidents that affect liquids and are much in favor as a safe and convenient form of polish. The liquids have

the advantage of restoring faded colors, covering the dust in the seams and giving an appearance of newness that pastes cannot equal. A combination of a liquid for cleans¬ ing, restoring the color, etc., and a paste for a burnished wax finish is superior to either alone and is in steady demand wherever fine shoes are worn.

Polish (i. e., “derived from Poland”). — A term applied to women’s or misses’ front lace boots of the ordinary height of five or more inches, measuring from the heel seat to the top. This pattern of boot is said to have originated in Poland. At any rate, it received that name very early in its progress of perfection, and the name has been generally used ever since, here as well as abroad. It is distinguished from the bal as being of more than ankle height and from the Blucher in having the quarters meet at the throat of the vamp, instead of being stayed at either side and left loose at the inner points.

Prick-Stitched. — ‘Having the stitches which attach the sole to the welt separately pinked out and indented on the upper side.

Prince Albert. — A men’s house slipper made somewhat like a Nullifier, except that it has a low quarter and is cut with a split vamp, the seam running down the front.

Prunella. — A peculiarly woven serge cloth, formerly much used for shoe topping.

Pull Strap. — A small strap of tape or leather at the top of a men’s bal or leg boot, used in pulling it on the foot.

Pumice Stone. — A vitreous volcanic froth, sharply abrasive, used to produce nap on suede and similar leather, or to clean them.

Pump. — • The lowest cut of all ordinary shoes, originally and usually consisting of simply a whole vamp, sole and heel. It was originally

designed for a dancing shoe, and made principally for men. Within recent years it has come into very general use for women, in a form which is practically the same in cut as an opera slipper, except that the modern pump for women is used for street wear as well as house wear and is made in white as well as turns, and that it has a Cuban heel. Beginning in about 1906, its use for this purpose became very prominent.

Pump Sole. — A light single sole usually with beveled edge, used in men's or women's shoes. The term was originally applied to fight turn soles, but later has come to be applied to McKays.

Puttee. — A legging used by soldiers, riders, sportsmen, etc., which is wound spirally around the leg, from the ankle up to the knee. Of later years all leg coverings detached from the shoe have been termed "puttees."

Quarter. — The back portion of the upper of a shoe, covering the heel and attached to the vamp. Quarters may be whole or pieced, may be finished with collar or cuff at top, and may have a foxing of the same or different leather. In a lace shoe, a lace stay is added for additional strength; in a button shoe, the inner and outer quarters are cut dif¬ ferently to allow for the lap over of the button-fly, which usually attaches by a seam down the front, although the inner quarter is sometimes run clear over without a seam. "Quartered over," having the quarter stitched on outside of the vamp. This is seen in the so-called "gaiter boots" for women.

Rand. — A piece of leather curved in the shape of a horseshoe and fitting around the top of the heel. The inner edges are shaved thin and this hollowing helps to form a rounded heel seat.

Raw Eyelets. — Eyelets which are merely holes through the lace stay, without the ordinary annular metal ring. Strictly speaking, "raw eyelets" are not eyelets at all. (See Blind Eyelets.)

Recede. — Used as an adjective in the shoe trade, this term applies to toes of shoes or lasts which are drawn down sharply towards the toe, so that the top of the toe "recedes," and is comparatively narrow and pointed rather than blunt in outline.

Reserve. — Shoes which duplicate those on the shelves stored conveniently and drawn upon from day to day, as the "forward stock" (goods on the shelves) is sold.

Retanned Sides. — A side leather in combination of chrome and

vegetable tannages to give it strength, softness and resistance to barnyard acids. Boarded and brush colored on the grain. Stuffed with greases. For use in heavy work and farm shoes.

River-driving Shoes. — ‘Shoes for lumbermen, with sharp spiked soles, used in those lumber regions where rafting is a common method of getting out logs. All lumbermen’s boots are spiked; and river-driving spikes are extra long and extra sharp.

Rolling Ladder. — A ladder fastened upon rollers with floor track and upper frame, used to get at stock in stores where high shelving is used.

Roman Sandal. — A shoe or boot for women or children with the front composed entirely of straps from the throat of the vamp to the top, each strap and space being about equal in width.

Romeo. — A man’s slipper often of felt with high-backed quarter and high front and slashed low at the side.

Rope Stitched. — Having a heavy corded stitching, as in the edges of soles or elsewhere, chiefly for ornamental effect.

Rubber Cement. — A quick-drying solution of rubber which forms a very useful and powerful cement often used in the manufacture of leather shoes.

Rubber Heels. — These are made for use in either men’s or women’s shoes, being supplied to stores and attached there.

Rubber Shoes. — There is a considerable variety of pattern in rubber footwear, from the low “footholds” to the fisher¬ man’s hip length boot. The most common use is as an overshoe or boot, to be worn over either leather or felt footwear.

Besides regular and ordinary low cut rubber overshoes, there are a number of varieties, among which are the following: “Storm slipper” or “Romeo,” with extra high front and heel; “Alaska,” a cloth top rubber storm cut; “self-acting overs,” so cut as to slip on without the use of the hand and with a rubber projection at the heel by which each shoe can be pushed off by using the other foot; “clog,” an extra low cut rubber; “footholds,” or “Sunny South” rubbers, rubbers for women which cover the forepart of the shoe only with a strap

extending from the shank up over the heel; “Arctic,” a heavy cloth-topped, ankle-high rubber over, fastened with one or more buckles; “snow excluders,” extra high rubbers of the Arctic type; “lumber¬ man’s overs,” extra heavy, buckled overshoes, intended for use over felt boots.

Among rubber boots, besides the regular height, there is the half-high boot, the leather soled boot, the thigh boot and the hip boot, the latter being tne longest and coming up over the hip with a strap to attach it to the belt, and used for fishing, hunting, etc.

“Felt combinations” are rubber overshoes of the Arctic type in combination with felt boots. Tennis and gym¬ nasium shoes are also made with rubber soles, usually with cloth or canvas tops.

Running Shoes. — Low, soft leather shoes with spiked soles used in foot racing.

Russet. — Means “tan color,” and nothing else, although it is often used when the word “Russia” is intended. Bark- tanned leather comes out a yellowish brown; that is the origin of the word “tan” as applied to shade; and the word “ russet ” was orignally used to refer to leather which was not blackened or otherwise colored, but was left in its natural tan color.

Russia. — A calfskin leather finished by a process which originated in Russia whence the name was taken. Birch oil or tar forms a component part of the dressing which gives the leather a peculiar fragrance. It was originally bark-tanned, although the name is now applied also to chrome-tanned calfskin. The Russian “Russia” was usu¬ ally dyed a deep red, and in this color is still often used for the binding of fine books. The grades which are made for use in shoe manufacturing are heavier and less expensively finished. They are usually finished in tan or brown, although black Russia has been more used of late years.

Russian Boot. — A peculiar cut of high button boot with patent leather top or cuff, also a tassel in front, popular in recent years for children.

Sabot. — A wooden shoe carved in one piece from a block of bass-wood or other light wood. It is quite common in Western Continental Europe, especially in Germany, France, Belgium and Holland.

Saddle Seam. — A seam made by stitching through and through, the pieces being laid so that the edges are even, instead of being lapped.

Saddle Welting. — A strip of leather stitched across the front of a shoe running from the shank around over the throat of the vamp to the other side.

Sailor Tie. — A name commonly applied to a two eyelet, low-cut shoe, tied with ribbon lace.

Sandal. — Originally an ancient piece of footwear which con¬ sisted of simply a sole of leather fastened to the foot by thongs or straps. As used now, it refers either to women's or children's button and strap shoe or boot, or to a low- cut shoe for children, which is made with vamp deeply slashed and perforated for ventilation. (See Roman Sandal.)

Satin. — A silk fabric of peculiar weave and glossy finish, much used in women's slippers. It is sometimes made with cotton backing. This material, like most other fabrics, requires to be backed by a strong canvas-like fabric to which it is cemented.

Satin Calf. — A grain-leather split, dressed with oil and smooth finished. It is made from the skin of a mature animal, not of a calf.

Scoot Shop. — A shop whose policy is to get out pro¬ duction under simplest construction — once common in New England where small gangs of men raced to finish shoes quickly.

Scotch Edge. — A wide extension edge, either welt or imitation. "Scotch outside" and "Scotch inside" are terms which indicate wide extension on one side only, with closer trim on the other side.

Screw Fastened. — Having the sole attached to the upper with screw nails, as in heavy work shoes.

Scuffer. — A light slipper; "Skuffer," a proprietary name for a specialty shoe.

Seal Grain. — A split leather which has an artificial grain stamped upon it by passing it through steel rollers under

pressure. Tue strict application of the term is to side leather made to imitate the natural grain of. a tanned sealskin.

Serge. — A twilled woolen cloth of firm texture occasionally used for shoe topping. Special weaves are always re¬ quired to supply the needed firmness and elasticity.

Shank. — A strip of metal used to stiffen the sole of a shoe between the heel and the ball. The name also applies to that part of the sole of the shoe.

Sheepskin.— Sheepskin is used largely for shoe linings. The skins of most varieties of domestic sheep are not strong enough to use for the outer part of the shoe. There are varieties, however, including some Asiatics, which make fairly tough leather which is sometimes used for the cheaper grades of women's or children's shoes. It is in¬ ferior to kid in firmness of texture, and tends to scuff and tear.

Shoe. — Generally speaking, a garment for the human foot having a somewhat stiff sole and a top of lighter material, usually leather, though many other materials are used. It differs from the boots as that term is ordinarily used in this country, in not extending very far above the ankle and in being provided with some form of fastening, such as lace, button, strap and button, strap and buckle, or goring. It is distinguished from the slipper as well as from the boot. As used in America, it includes the Oxford. The English use of the term differs, in that it applies to Oxfords or low cuts, while those varieties of high shoes known as Blucher, Bal, Polish, etc., are there referred to as "boots." This use of the term "boot" is becoming more common in America.

Shoe Horn. — A curved metal device to aid in slipping the heel of the foot past the counter in putting on a shoe.

Show Case. — A glass- fronted or glass-enclosed case or box for the display of shoes or other goods.

Shrewsbury Calf. — A proprietary name for a fine quality of oil-finished upper leather.

Side. — One-half of a tanned cowhide of any tannage or finish, the hide being cut down the back.

Side Laced Boot. — A boot laced down over the ankle on either the inner or outer side, instead of in front. This is not esteemed as a very practical method of making shoes, but is usually to be found among novelty boots for women's wear. One form of the side-laced boot which is of practical usefulness is a specialty boot for extra¬ stout women, laced on the inner side.

Side Leather. — Cowhide, split to thickness adapting it for use for uppers of shoes or for other purposes. There is a great variety of finish possible, and considerable variety in quality. The usual method of

finishing tanned cowhides includes cutting the hide in two down the back making two “sides” of it. The trade refers to “a side of sole leather,” meaning half a cowhide finished whole, for soles or other use; the term “ side leather” refers to the cowhides as split, and includes the leathers more specially referred to as the various kinds of “grains” and “splits.” Among these varieties are so-called “satin calf,” “seal grain,” “box calf,” “buff,” “glove grain,” etc. (See Split.)

Size. — The length measure of a last or shoe, taken on a certain standard width and varying slightly as the shoe is made wider or narrower. The American and English series of size vary * of an inch. That is, size 8 is 3 of an inch longer than size 7, etc. The series of numbers begin with the smallest infants’ shoe, size 0, and run up to 13* then back to 1 and up to 12, men’s size.

In tabular form the sizes on shoes run as follows:

Sizes Inches

little gents’ 10 to 13*

women’s 2 to 8

Size-stick. — A rule for foot measurement having a fixed upright standard at one end and a sliding standard, the foot of which marks the sizes which are indicated on the

INFANTS 0 to 5

children s 5 to 8

children’s (2d run) 8* to 11

youths’ and misses’

11* to 2*

boys’, 2* to 5*

men’s, 6 to 12

ˆ3

4§

4

5* 5 1

5

6

6t

63

7H n (

9*

.10 . 101-

. io§

.11 .11* .11! 12 12*

face of the rule. In use, the customer's foot is placed. Hat on the stick and the sliding standard slid forward to adjust. Ordinarily from 2 to 3 sizes above the stick meas¬ urement is allowed as being the proper size of shoe to fit the foot.

Skins. — The leather trade use of this term applies to the skins of small animals, such as goats, sheep, calves, etc., as distinguished from the term "hides," this referring only to those skins from cattle, horses, etc., which are above 25 pounds in weight, green salted.

Skivers. — A term applied to thin slip soles placed in the bottom of a shoe as fillers. The word "skive" as used in the manufacturing trade means to shave or pare thin, as for example, the edges of upper leather where it is the intention to fold them under before stitching.

Slide. — A shoe ornament which may be described as " a buckle minus the tongue." This class of ornament has been in very common use for a number of years in women's shoes for street wear although it was always used to some extent in fancy slippers.

Slip Sole or Slip Tap. — A half sole running from toe to shank, between the regular outsole and the welt or insole. The term "slip sole" is applied also to a thin insole, which is slipped into the shoe

either to add warmth or to adjust it in fitting it to the customer's foot.

Slipper. — This term applies generally to any footwear other than rubbers, which has no method of fastening, being merely slipped on the foot and remaining there by tension of its upper part. General varieties include bath slippers, the Everett, the Faust, the Juliet, the Romeo, nullifiers, opera slippers, all varieties of pumps, etc. The term applies also to strapped footwear for women or children, as "one-strap slipper" or "two-strap slipper," etc.

Slipper-foxed. — Made with whole vamp.

Smoked Elk Sides. — A soft chrome tanned cow or steer hide for work or athletic shoes. Very strong and tough and stays soft. Hung in a smoke-house to give it a color, imitating the Indian tannage. Called "Elk" because sup¬ posed to resemble Elkskin in appearance. Made in black and colors.

Sneakers. — Rubber-soled canvas shoes used for outing, tennis, etc.

Snuff. — To take a very thin shaving from the grain side of side leather.

Snuffed Chrome Kip. — Kips are coarser skins than veals, due to an older or poorer fed animal (grass fed). The grain if scratched or defective is snuffed off by holding grain side against an abrasive wheel. Sponged over with black dye and finished dull. Makes a durable shoe leather. Snuffed calf and sides are also common.

Sock Lining. — The strip of smooth leather cemented inside McKay sewed shoes, the purpose being to cover the stitches, which in a McKay come directly through both outsole and insole.

Soft Sole. — Infants' shoes made moccasin fashion with soles of soft kid.

Soft Toe. — A toe made without stiffening or boxing; sometimes called the globe toe. This is used in comfort shoes as well as in regular lines on men's and women's kid shoes for tender feet.

Sole Leather. — Heavy leather, dry finished, for soles of shoes. It is tanned and finished with a view to produc¬ ing firm, solid texture rather than extremely pliability. Hides of cattle are used, horsehides being usually too thin. Sole leathers made from green hides are best.

Soles. — The bottom pieces of any variety of footwear. When the

word is used without qualification, “outsole” is usually meant.

Southern Tie. — A two eyelet ribbon tie.

Spanish Heel. — A covered wooden heel, shaped like the Cuban.

Sparable. — A heavy, chilled iron nail, spike-shaped, with a rough head, commonly used around the heels of heavy work shoes.

Spats. — Short for “Spatterdashes,” an English term for cloth gaiters, buttoned or buckled around the ankle and fastened under the instep.

Spewing. — A term applied to the formation of a substance on the surface of leather, which is called bloom and which resembles mold or mildew. It is supposed to be caused by the exuding of some of the materials used in tanning or finishing of leather, and it does no damage to the shoes in the process of becoming thoroughly seasoned while in stock. It is readily wiped off.

Spliced Heel. — A heel of double thickness; applied to hosiery. •

Split. — To shave leather into two or more thicknesses or the leather itself thus treated. This is done to reduce heavy leather to a thickness suitable for use in the uppers of shoes, upholstery, etc. The work necessitates the use of the splitting machine.

Sporting Shoes. — ■ Shoes made for use in various games, hunting, etc.

Spring. — The amount of variation from a straight or hori¬ zontal line at the toe of a shoe or in the arch. The “toe¬ spring” of a shoe may be measured by setting it on a flat surface and measuring from the surface to the under

side of the sole at the toe. Shoes with but little toe spring are said to have “a flat forepart.”

Standard Screwed Shoes. — In making this type of shoe the tacks used in lasting are driven way in and clinched against the steel bottom of tne last. The heavy outsole is tacked in place and fastened by means of screws. The metal which forms this fastening is in the form of wire with continuous screw thread. The machine, immedi¬ ately the screw reaches the inside of the shoe, automat¬ ically cuts it off and feeds it to the next fastening. It makes a strong but stiff shoe.

Cross Section of a Standard Screwed Shoe.

Staple. — A general term applied to shoes embodying such features of style and make-up as render them subject to repeated demand from customers, as distinguished from the “ novelty,” the “freak,” or the “ specialty ” (which see); shoe which with minor variations in style or orna¬ mentation may be expected to sell in future seasons.

Stitched Down. — A simple form of shoe in which the upper is turned outward on the sole and stitched straight through. It was often used by soldiers in the Civil War.

Stogie. — A heavy-pegged work shoe of the brogan type. It may be Blucher or straight lace.

Storm Boot. — An extra high cut shoe, for women, coming well above the ankle, made of heavy leather and intended to meet bad weather conditions.

Storm Rubber. — A rubber overshoe having an extra high front and back.

Straight Last. — ■ A last with comparatively little swing and of simple outlines.

Street Shoes. — Boots or low-cuts of solid construction, suitable for street use, especially in women’s wear, as distinguished from more delicate varieties of boot, or from most slippers.

Style. — The material, cut, or model, or combination of all, which is deemed to be in accord with favored stand¬ ards, or in fashion.

Suede. — A method of finishing leather; or the leather itself. The word is French for “Swedish;” the velvet finish is supposed to have originated in Sweden, and it was applied originally to kid and not to calfskin. The process of making it involves buffing (which is a process of scour¬ ing or grinding) on an emery wheel the flesh side of the leather, so as to produce a sort of nap or velvety surface. Some makers of leather adopt a different process, buffing or scouring off the grain side of the leather to produce the nap.

Suede Calk. — Skin of a very young calf finished on the flesh side by holding this side against an abrasive wheel to raise a fine nap. Worn flesh side out for ladies’ shoes. Sheepskin is also treated this way. Calf makes the best suede leather for fineness and durability.

Swing. — The curvature of the outer edge of the sole of a shoe.

Tan. — A yellowish brown color, the name of which indicates the origin. The color of unfinished oak-tanned leather is a tawny, yellowish brown or “tan color,” which is shortened into simply “tan ” in ordinary use.

Tanning. — Converting skins or hides into leather by an astringent acid derived either from vegetable sources, such as the bark of the oak, hemlock, willow, chestnut, sumac, etc., or with a-astringent mineral substances, of which Alum may be taken as a characteristic type. In general, any acid which has what would be called a “puckery” effect will act upon a skin to convert it into leather. It toughens the skin, condenses it and coagulates all the albuminous matter so that it is no longer putrescible. That is to say, it preserves it from rotting.

It is only within comparatively recent years that mineral tannages have been in use. German chemists were the beginners, but the finishing development of chrome tan¬ nage took place in this country, and Robert Foerderer, late of Philadelphia, was well known as the originator of a successful process as applied to kid skins. His chosen trade name, “Vici,” has become almost a generic name for all chrome-tanned kid, although the name was simply his own proprietary trade mark.

Tap. — A partial sole; a half sole. Sometimes applied to the lifts of a heel.

Taw. — To convert into leather by a species of dry tannage, such as packing of skins in dry salt and powdered alum. This is used when it is desired to tan skins without re¬ moving the fur, hair, or wool for use as furs or floor mats.

Tennis Shoe. — A sporting shoe, usually with canvas upper, rubber sole and low heel.

Thong. — A strip or cord made of leather or rawhide.

Throat. — As applied to the vamp of a shoe, the central part of the opening, where the top joins it in front. The term is applied to the corresponding part of lasts.

Tie. — A name for a low laced Oxford, with not over three eyelets. They are usually classified according to the num¬ ber of eyelets, as

one eyelet ties, two eyelet ties, etc., and ribbon laces are generally used.

Tip. — An extra piece covering the toe of the shoe, separate from the vamp, and lasted under with it; “stock tip,” a tip of the same material as the vamp; “patent tip,’ a patent leather tip; “wing tip,” one having a point in the center and extending in curved lines backward at either side of the shoe; “straight tip,” one stitched straight across in distinction from the wing tip; “shield tip,” a tip resem¬ bling the wing tip but not extending so far back; “diamond tip,” one ending in a sharp point at the back toward the throat of the vamp; “imitation tip,” stitching across a plain vamp to imitate a tip.

Tongue. — A strip of leather the end of which is attached inside the throat of a laced shoe, coming up to the top of the shoe under the lacing. “Bellows tongue,” a broad folding tongue stitched to the quarter at each side.

Tongue Pad. — A small pad fitted to the inner side of the tongue or button fly, to fit a shoe to a foot having an extra low instep.

Top. — A general term applied to all parts of the upper of a shoe usually referring principally to the parts above the vamp.

Top Facing. — A binding or lining which is sewed around the inner part of the upper of a shoe at the top. Leather, silk and other materials are used, and the name of the maker or dealer is often stamped, woven or printed thereon.

Top Lift. — The outer piece of leather in a heel.

Tread. — The floor surface of the sole of a shoe.

Tree. — A last-shaped block or filler, usually adjustable, and placed in shoes to preserve their shape. They have come into general use by wearers of shoes.

Turned Shoe. — A woman’s shoe having the upper stitched directly to the sole wrong side out, the shoe being then “turned ” right side out, the process giving it the name. This method is applied only to the making of lignt dress boots or slippers, with thin, flexible soles.

Two-piece Counter. — A counter made of two pieces of leather pasted or cemented together. The same method is sometimes used in insoles.

Union Sole. — Tanned with a combination of hemlock and oak bark

liquors or extracts. Not quite as firm as oak sole. Used for women's shoes and the better grades for men's shoes. Sews well. Varies in color according to propor¬ tions of oak and hemlock used.

Upper. — A term applied collectively to the upper parts of a shoe, including vamp, quarter, lace stay or button fly, top facing, back stay, collar, etc., as stitched together and assembled.

Vamp. — The lower part of the upper of a shoe, which is stitched or otherwise attached to the sole.

Velours. — A French word meaning velvet. It is used as a proprietary name for a soft finished calfskin, chrome tanned.

Velvet. — A fabric of silk consisting of a woven backing with a fine, closely clipped pile or nap. Cheaper varieties are made with foundation of cotton or linen. As used in the making of shoes velvet is backed with a firm, thin cloth or buckram, which is cemented to it, to add to its strength.

Velvet Finished. — Finished with a nap, as suede leather, produced by grinding or buffing.

Velveteen.' — A cotton velvet, or one mixed silk and cotton.

Ventilated Shoe. — A shoe with cut spaces or perfora¬ tions for ventilation. The barefoot sandal is a type, as used in children's shoes. Various patented devices are also used. One of the simplest forms consists of con¬ cealed perforations in the vamp near the shank of the shoe, others continuing through the perforations in a per¬ forated tip. The popular increase of hygienic tendencies will eventually make some such method essential in the building of summer shoes.

Vesting. — A fine silk-figured cloth, originally intended, as indicated by the name, for the making of fancy vests.

When used for the making of shoes it is backed with a cemented layer of buckram to strengthen it.

Vici. — A proprietary trade name for a brand of chrome- tanned glazed kid. The name has come to be generally but incorrectly used for all makes of chrome kid.

Vienna Cut. — As applied to a shoe upper, seamless except for a half circular seam down the outside of the foot.

Viscolize. — To render waterproof, as sole leather, by the use of emulsified oils or glycerine. Viscolized soles are frequently used in hunting or sporting boots.

Waist. — The smallest part of that portion of the foot which lies between the instep and the ball, or the corresponding part of a last. In the standard scale of last measurements, the waist girth is five-eighths of an inch smaller than the instep and one-eighth of an inch smaller than the ball. See Last.

Walking Boot. — Any substantially built boot, for outdoor dress use.

Wave Top. — A double curved cut of shoe top, highest in front.

Wax Calf. — A heavy calfskin leather with a wax finish. This is among the earliest and best methods of finishing calfskin leather.

Wellington Boot. — A high leg boot, originally designed by the Duke of Wellington for use by his cavalry soldiers. The high front comes to the knee, or above.

Welt. — A narrow strip of leather stitched to a shoe; a strip of leather stitched across the upper; as most definitely and commonly used, the strip of leather which in welt shoes is stitched fast to both the upper of the shoe and the insole at one operation, called inseaming, the edge of the strip then being stitched through and through, fastening to the outsole, the seam running around the outer edge of the sole, concealed on the under side by a channel or lip, which is cut in the sole and cemented down after

Cross Section of a Goodyear Welt Shoe.

finishing the shoe. The term “welt” applies also to the shoe thus made. It is considered the best method of making shoes, except where extreme lightness is desired, when the single “turned” sole is used. The welt method is used in men’s, women’s and children’s medium to high-grade shoes, and is the old hand-work method. The process of making the welt shoe involves a number of incidental machines, but the principal ones are the inseamer and the outseamer. The machines principally used are those of the “Goodyear ” patent, and the term “Goodyear welt” applies to the product. “Hand welt,” a welt shoe stitched by hand. “Mock welt,” a square-edged turn.

Wheeling. — A finish applied to the edge of a shoe by means of a corrugated wheel; sometimes used on a McKay to imitate stitching.

Width. — This term as applied to shoes means more strictly “girth.” (See Last, for table of width measurements in inches for each size.) The variations in measurements are given in fractions of an inch, as measured with a tape-line laid round the foot or last.

Willow Calf. — A proprietary name for a grained calf¬ skin. (Willow bark is sometimes used in tanning.) Wooden-pegged. — Having the sole attached by wooden pegs extending through the outsole, upper and insole, as in coarse boots and work shoes.

Work Shoes. — Coarse, heavy shoes, especially those for men, as the brogan, Creedmore, Creole, Dom Pedro, etc.

LEATHER SUBSTITUTES. Owing to the increasing demand for leather in the manu¬ facture of shoes, belting and harness, the sup¬ ply of thin sections of hides suitable for

upholstery, bookbinding, travel goods, etc., has steadily decreased and its cost increased. The result has been the introduction of various leather substitutes. These are of two chief classes: (1) those which imitate the appearance of leather, and (2) those which also duplicate its general characteristics and durability. In the first class there are embossed papers, papier mache, oilcloth and light weight cloths thinly . coated with rubber, linseed oil compounds and soluble cotton. In the second class there are strong, thick fabrics heavily coated and em¬ bossed with rubber or linseed oil, or soluble cotton compounds. _ The latter successfully

duplicate the coloring, feeling and embossed graining of the best hide leather. While none has at this writing been made quite the equal of real grain leather, the best grades of leather substitutes are generally more durable than what is known in the trade as ((split leather, » which is composed of the weaker fleshy por¬ tions of the thick hide, split away from the grain or hair side to produce thin upholstery leather.

Split leather, coated with soluble cotton, and embossed in various grains, is really a variety of leather substitute, its base of tanned fleshy substance being about half as strong as the better grades of leather substitutes having heavy fabric bases. Split leather, commonly sold as <(genuine leather, M is the chief cause of disappointments in leather upholstery as it does not compare in wearing qualities with grain

leather. The fabric substitutes most used are coated with a jelly consisting chiefly of soluble cotton in solution which carries the pigment required to produce the desired color. The jelly in a fluid condition is spread on the cloth while the latter is moving over rollers. It is scraped to a thin coating by a knife set in the machine. Each coating is quite thin, suc¬ cessive coatings being applied to build up the desired body. The solvent evaporates during the coating process, leaving the jelly in the form of a tough, flexible film of pyroxylin firmly anchored to the cloth. The plain coated cloth is then embossed by hot rolls or plates bearing the desired grain, which is the last stage of the process. Two-color effects such as Spanish or Moorish finish are obtained as in the real leather process by flooding the grained surface with a darker coating and wiping it off in spots to give a shaded or toned effect and to show a darker color in the ((val- leys® than on the ˆhills.® Leather substitutes are now extensively used for upholstering au¬ tomobiles, furniture, carriages, etc., and in various industries formerly dependent on leather.

LEATHER-TURTLE, or TRUNK- BACK, a rare marine turtle of the tropical seas (Sphargis coriacea) , which has a leathery case instead of a shell. It is the largest of existing Chelonia, known specimens having a case four feet in length, and a live-weight of not less than 1,000 pounds. When young its case is thin, soft and flexible, but as age ad¬ vances the jacket becomes stiffened by the formation within it of great numbers of little adjoining bony plates and the exterior shows strong longitudinal ridges. These turtles are powerful swimmers and wander throughout the oceans, feeding upon jellyfishes, crusta¬

ceans, cuttlefishes and other animal food. Late in the summer it seeks some sandy shore or islet, where the female buries her eggs after the manner of other sea-turtles. These eggs are good to eat, but the flesh of the animal is not of good taste, and is said to be unwhole¬ some. Much interesting discourse upon the curious structure, relationships and ancestry of this declining race may be found in Gadow's (Amphibia and Reptiles) (London 1901).

LEATHERJACKET, common name for the trigger-fish of the family balls tides. They include the Batistes carolinensis of warm At¬ lantic waters, including the Mediterranean, the Monacanthns of Australian waters and the Oligolites saurus. They are used as food in certain sections but are detested by fishermen as clever bait stealers.

LEATHERSTOCKING TALES , a name

given a series of Indian and pioneer romances by James Fenimore

Cooper (q.v.). The name Leatherstocking was given to Natty Bumppo, one of Cooper's heroes.

LEATHERWOOD. See Cyrilla.

LEATHES, lethz, Stanley, English clergy¬ man and Oriental scholar : b. Ellesborough, Buckingham, 21 March 1830; d. May 1900. He was graduated at Jesus College, Cambridge, in 1852 and was ordained in 1857. He was ap¬ pointed professor of Hebrew at King's Col¬ lege, London, in 1863, and in 1868-80 he was lecturer there. He was one of the Old Testa¬ ment Revision Committee in 1870-85. He was elected prebendary at Saint Paul's Cathedral in 1876, was rector of Cliff-at-Hoo, near Gravesend, in 1880-89 and at Much Hadham, Hertfordshire, from 1889 until his death. He received an honorary D.D. from Edinburgh in 1878, and Cambridge made him an honorary Fellow in 1885. In 1873 he was a delegate to the Evangelical Alliance in New York. Be¬ sides publishing many sermons and lectures he was author of (A Short Practical Hebrew Grammar > (1869) ; (Studies in Genesis)

(1880) ; (The Foundations of Morality)

(1882).

LEAVE AND LICENSE, in English law

the defense to an action in trespass, maintain¬ ing that the consent of the plaintiff had been given to the trespass complained of, thereby rendering the action void.

LEAVEN, lev'en, a substance producing fermentation, especially in the making of bread, consisting of a portion reserved from dough already in a state of fermentation and used to cause fermentation in freshly mixed dough, resulting in a light, porous bread. The use of leaven is of great antiquity and has given rise to many figurative meanings of the term. Leaven is largely supplanted by its more con¬ venient relative, yeast, in modern bread mak¬ ing.

LEAVENWORTH, lev'en-werth, Elias Warner, American lawyer: b. Canaan, N. Y., 1803; d. Syracuse, N. Y., 1887. He*was gradu¬ ated at Yale in 1824; studied law with William Cullen Bryant at Great Barrington, Mass., and in the Law School at Litchfield, Conn. ; was admitted to the bar in 1827. and began practice the same year at Syracuse, N. Y. He was twice mayor of Syracuse 1849, 1859; secretarv of state of New York, 1854-55; president Board

of Quarantine Commissioners, 1860; 1875 to 1877 he was a member of Congress. He was a member of the State Constitutional Conven¬ tion of 1872. President Lincoln in 1861 ap¬ pointed him commissioner under the convention with New Granada. He published (Genealogy of Leavenworth Family) (1873).

LEAVENWORTH, Kan., the county-seat of Leavenworth County and one of the most important cities in the State, 26 miles north¬ west of Kansas City, on the west bank of the Missouri River, here spanned by two fine iron bridges, accommodating railway and ordinary traffic. The Missouri Pacific, Union Pacific, Atchison, Topeka and Santa Fe, the Chicago, Burlington and Quincy, the Chicago, Rock Island and Pacific, and the Chicago Great Western railroads enter the city. It is the eastern terminus of the Leavenworth and To¬ peka Railroad and is on the line of the Kansas City Northwestern Railroad. Leavenworth was founded by the ((Sons of the South® in 1854, and the following year received a city charter. It derives its name from Fort Leav¬ enworth north of the city, the oldest and most important military post on the Missouri River, built in 1827. Prior to the Civil War it was an important trading point and it was at Leaven¬ worth that most of the wagon trains across the prairies were outfitted. The city is the trade centre for a farming and coal-mining region, an inexhaustible coal deposit underlying the city at a depth of 700 feet, giving employment to over 1,000 miners, and yielding 60,000 bushels of coal daily. Besides its coal mines, the manufacturing industries are correspondingly extensive and include flour mills, iron foun¬ dries, refrigerating plants, manufactures of mill machinery, mine machinery, stoves, steam engines, furniture, brooms, wagons, light and heavy trailers, farming implements, road machinery, bridge and structural iron and steel, washing machines, soap and chemicals, paper bags and containers, ice, candy and cereal foods.

The city, which is protected from inunda¬ tion by a limestone stratum, is well laid out, electrically lighted, has an excellent water supply, and a complete system of electric street railroads, connecting with Fort Leavenworth on the north, and the National Soldiers' Home and Lansing Prison on the south. There are 32 churches of all denominations, two hospi¬ tals, Cushing and Saint Johns, three theatres, three national banks and three savings and State banks. Mount Saint Mary's Academy for Girls is located three miles south of the city and the school system of Leavenworth is one of the best in

Kansas. It is the seat of a Roman Catholic bishop and has a fine cathe¬ dral.

The western branch of the National Home for Disabled Volunteer Soldiers is located three miles south of Leavenworth. It com¬ prises 640 acres of beautifully kept grounds, equipped with the most modern housing, amusement and welfare conditions, for accom¬ modation and entertainment of its 3,000 in¬ mates. The Army Service Schools of the United States army are located at Fort Leaven¬ worth in a magnificent building with a separate library building. The permanent capacity of Fort Leavenwoth is approximately 5,000 offi¬

cers and men and temporary cantonments were erected during the Great War to accommodate approximately 3,000 more. The Disciplinary Barracks or Military Prison is located at Fort Leavenworth and in 1918 had approximately 4,000 inmates with the capacit}ˆ of nearly twice that number. The Farm Colony of the Disci¬ plinary Barracks maintains a herd of pure-bred . Holstein Friesian cattle which is one of the best herds in the West. It also has a chicken ranch which in 1918 produced approximately 30,000 pure-bred chickens. A pure-bred Duroc. Jersey swine herd is maintained by the Farm Colony on the large farm which is operated by them. The Colony also has several large greenhouses and the prisoners engage in both diversified and intensive farming and while learning these useful agricultural trades are earning the right to reinstatement in the army and honorable discharge therefrom. The Farm Colony established in 1918 an experimental de¬ partment operated in co-operation with the Kansas State Agricultural College and the Leavenworth County Farm Bureau for the pur¬ pose of experimenting in new crops. This is probably the largest development of the Farm Colony idea for prisoners in the United States. The Federal Prison occupies a corner of the Reservation and is the largest Federal Prison maintained in the United States and in 1918 had approximately 2,500 inmates engaged in general mechanical work. This prison has the most modern equipment and has night schools with extension courses from the Kansas Uni¬ versity and the Kansas State Agricultural Col¬ lege. A very large bronze statue of Gen. U. S. Grant is located just north of the city on the military reservation and is said to be one of the best statues of Grant in existence.

During the Great War a Community House for the entertainment of soldiers was opened in the city of Leavenworth and successfully maintained during the period of the war. This afforded clean and wholesome amusement for the soldiers stationed at Fort Leavenworth and gave them an opportunity to meet the better element of citizens.

In November 1917 the city voted bonds for the erection of a perma¬ nent Community House to be used as a civic centre and school. The management of this building was placed under the Board of Edu¬ cation and the general purpose of it is to pro¬ vide a place for the holding of all sorts of civic and public activities and the discussion of civic problems and the development of civic projects.

The city government of Leavenworth is ad¬ ministered on the commission plan since 1909, Leavenworth being one of the first cities in the State of Kansas to adopt that form of govern¬ ment. Pop. (1910) 19,363; (1920) 16,912.

Consult Burke and Rock, (History of Leaven- worth) (Leavenworth 1880).

LEAVES, in the ordinary sense of the word, are the structures on which devolves the duty of nourishing the plant. They invariably arise as lateral protuberances from the grow¬ ing-points or terminal vegetative cones of the shoots, that is, from a part of the plant which is still in an embryonic condition. In cases where a leaf seems to arise from an older part of a plant, as from the trunk of a tree, close inspection shows that it – is really developed

from a shoot perhaps not readily visible. Its growth is first at the apex, but this soon ceases, and is followed by continuous enlargement throughout the tissues, by which the upper part or blade of the leaf is soon distinguished from the basal part, and the stalk or petiole (where present) is subsequently formed between them. The development may result in a variety of structures, some of which are far different from typical foliage-leaves, yet are strictly homologous ; such are scale-leaves, bracts and the parts of a blossom (floral leaves). The higher the rank of the plant in the scale of development the more these diversities are manifested; and the observations here to be made apply mainly to the phanerogams from the ferns (q.v.) upward.

Leaves collect from the atmosphere the great essential of plant-food, carbon, and con¬ duct the processes of its assimilation, or, in other words, apply it by chemical conversion to the vitality and growth of the plant. In order to understand how they perform this function it will be necessary to investigate their struc¬ ture and properties. Each leaf is composed of three parts, an outside layer on each surface of

compact, flattened, and usually colorless cells, forming a skin or epidermis; an inner part (mesophyll) consisting of irregular cellu¬ lar tissue and intercellular spaces. These cells of the mesophyll contain minute bodies (chloroplasts) of green coloring matter called chlorophyll, which also abounds in the bark of the stems of herbs and all other green parts of plants, and is the working element in their composition. Through the spongy mesophyll extends the network of veins which form the skeleton of the leaf, and are at once its sup¬ port and its channels of communication with the other parts of the plant; these form the third part of the leaf. One other important feature must be mentioned — the breathing- pores, or stomata. These are excessively minute openings in the epidermis, which occur wherever chlorophyll lies underneath, but are most numerous on the under or earthward side of the leaves, where, on the average, about 60,000 may be counted per square inch of sur¬ face, although in some leaves they are six or eight times as numerous. Each of these pores lies between the “guard-cells® which form an automatic valve, opening or closing the pore, by their swelling or shrinking, according to varying conditions and the requirements of plant-health, especially in respect to evapora¬ tion. The chlorophyll grains (chloroplasts) also change their positions in the cells so as to take all possible advantages of a weak illumination, or to guard against a bad effect from excessive light.

Of the 10 essential elements of plant-food nine are drawn from the soil by means of the roots, but the tenth, which is the most import¬ ant and the largest in amount of all, is ob¬ tained by all green plants solely from the carbonic acid of the atmosphere and is taken up by the green leaves alone ; also a little of the oxygen required. The air enters the stomata, is seized, as it were, by the chlorophyll, and within it is so decomposed (in a manner not yet explained) that the carbon is chemically ex¬ tracted and is transformed into plant-food and plant-substance, tha-t is, is assimilated; and botanists restrict their use of the term ˆassimi¬

lationˆ to this physiological absorption of car¬ bon alone. In order to be able to do this work, however, the leaves require the aid of sunlight, without which the chlorophyll becomes inactive, and in total darkness a green plant will speedily die of starvation, however rich may be the soil in which it is rooted. The “rest® of plants at night is thus accounted for ; and also the greater rapidity of growth in northern plants where in summer they enjoy more hours of sunlight each day than southern plants get.

But the service of leaves in the nutrition of the plant does not cease

here. They perform a most important function in the transpiration of water. Plants must always draw from the soil a quantity of water far in excess of their needs, or of their capacity to hold, in order to get a sufficient supply of the mineral food dis¬ solved in it, but in exceedingly small quantities ; and after that sustenance has been extracted the extra useless, surplus of water must be got rid of. This is accomplished through the stomata of the leaves, out of which water is always passing in gaseous evaporation or some¬ times even in globules. A secondary but most important accompaniment of this is the suction thus formed, by which the constant up-flow from the root-ends is maintained.

A third essential office of leaves is as the lungs of the plant, which must breathe in essen¬ tially the same manner and for the same pur¬ poses as does an animal ; that is, they must take up oxygen and give off carbonic acid. This independent process (the converse of the simul¬ taneous assimilation) is carried on steadily by all plants, night and day; but in those having leaves it is mainly performed by these organs, because they spread the greatest surface.

In addition to these foremost and general services, leaves are adapted in particular cases, almost as numerous as the plant species, to such special purposes as a depository of food for the young plant in the cotyledons or seed-leaves ; as ■bulb-scales in plants like the hyacinth and lily, where part of the nourishment in the foliage of one year is stored up in the scales or subterra¬ nean thickened leaves, for the early growth and flowering of the next year; as bud-scales, form¬ ing the protective coverings of buds, as tendrils, pitchers, fly-traps, etc.

These complicated requirements and duties, under varied conditions and circumstances, have produced the extraordinary modifications of form and texture which leaves present, and which must now be briefly considered.

Forms and Arrangement of Leaves. — The typical and ordinary foliage leaf is a thin, flat structure composed of stalk (petiole) and blade (lamina) of symmetrical form, and growing in the plane of the horizon, so that one side (the dorsal) is presented upward to the sky and sun¬ shine, and the other (ventral) is downward and in shadow ; and these sides usually present ap¬ propriate differences in texture, the upper sur¬ face being usually more smooth and compact than the lower. A great variety of textures, from smooth, polished or waxy, to rough, downy or spiny, are distinguished by botanists and used in the description of plants ; these variations of surface are largely defensive in their character. Some leaves have no stalk and are said to be sessile,

in which case the base of the leaf may partly clasp or completely sur¬ round the stem, or be otherwise modified;

similarly the stalk takes many forms, sometimes with two lesser subsidiary leaves (stipules) at the base. The rigid woody centre of the stalk may continue straight on through the middle of the leaf to its apex, forming a midrib which throws out branches alternately on each side toward the margin of the blade, each again branching repeatedly and connecting with its neighbor, and so forming a network or skeleton of woody fibres which strengthen and support the leaf. These ribs are called veins or nerves, and the whole is the ˆvenation® of the leaf. Such a simple leaf (for example of the beech) is called reticulate or net-veined. In a large class of cases, however, the branches of the midrib do not spring at approximately equal intervals along its length, but all diverge from a point near its base, making a palmately veined arrangement, as in the maple. This reticulate veining is characteristic of dicotyledons. In another very distinct type of venation, char¬ acteristic of monocotyledons, there is no mid¬ rib, but the stalk divides at the base of the blade into many equal veins which extend in a more or less curving line through the length of the leaf, converging at the apex ; such a leaf is said to be parallel-veined, as in grasses. Upon the plan of the skeleton depends mainly the form of the leaf, of which a great number of variations are named in botanical manuals and used in descriptions of species, depending mainly on the character and extent of the in¬ dentation or incisions.

The arrangement of leaves upon the plant is an important matter. That it follows certain regular plans is apparent in buds, which when cut across exhibit their young leaves packed together in one or another of certain definite ways ; and their relative position on the stem of an herb or the twig of a tree follows as a result of the law of growth in that group. The theo¬ retical perfection of arrangement, however, is often greatly disturbed by the interference of older leaves with the development of the younger, and by other causes affecting the un-symmetrical growth of the whole plant. The arrangement of leaves upon the stem, called phyllotaxis, is in most cases one of alternation, thus securing the uninterrupted exposure of the upper surface of the leaf to the sun. It is to obtain this exposure that plants struggle to become tall and bear their leaves m.ost pro¬ fusely at the summit ; and that the branches of trees reach outward as far as possible; and the lower early leaves of many soon die off because shaded by the

later, higher growth. The arrangement is carried out in two prin¬ cipal ways : the leaves are either alternate, one after another, only a single leaf arising from each node or joint of the stem; or opposite, when there is a pair of leaves on each joint of the stem ; but sometimes the leaves are whorled or verticillate, there being three or more in a circle on one joint of the stem. The result of this arrangement in an alternate-leaved stem is to cause the leaves to follow one another up the stem in a spiral manner ; while any two successive leaves on the same species will also be separated from each other by just and equal portion of the circumference of the stem. The same principle governs the parts of the flower in which the sepals of the calyx typically alternate with the petals of the corolla, the petals with the stamens and the stamens with

the pistils, but it is often disguised in a very puzzling way, especially by the absence of one or more series of organs. See Flower.

Modifications of Leaves. — Leaves exist in other forms than the typical ones of foliage. Scales, such as those which envelop and protect •buds in winter, and the seeds in cones, are leaves of simple structure which have no assim¬ ilative powers or functions; they most fre¬ quently originate from an enlarged leaf-base upon which a proper leaf never develops. Bracteal leaves, or bracts, are of similar char¬ acter and grow beneath and about the flowers, of which, when they are colored, they often form the most conspicuous part; but fre¬ quently they are green and are connected with true leaves by intermediate forms. Both scales and bracts have been forced, under experi¬ mental conditions, to develop into true leaves.

The modified leaves which form the flowers of phanerogams are termed <(floral leaves,® and, as has been said, typically succeed one another in whorls from below upward, as sepals, petals, stamens and carpels. The sepals are usually green and much like foliage-leaves ; the sepals often retain a likeness, but the interior whorls usually bear no resemblance to leaves, yet occa¬ sionally, in ill-health, revert to a shape which betrays their origin and genetic history.

Periodicity of Leaf Growth. — Leaves are a temporary part of the plant, arising and dis¬ appearing at more or less regular intervals, usually once a year. This is especially notice¬ able in the higher plants, some of which (an¬ nuals) die in autumn completely, surviving as species only in their seeds ; others die down to the roots in the fall and put forth entirely new stems as well as leaves the following spring; while others, as shrubs and tree, die only so far as their leaves are concerned, put¬ ting forth new foliage after the stated period of

rest. This period is due to the arrival of annually recurring unfavorable conditions of temperature or moisture or both, when the activity of life in the plant is suspended and it ceases to feed or grow. In such a state leaves having no function are needless — in fact often harmful — and in many cases die and fall off in so sudden and conspicuous a manner that we say such trees are deciduous ; while others, which we call evergreen, retain most of their leaves in a green condition until gradually replaced by new ones, so that the foliage seems to be perpetual. The brilliant colors of the dying leaves of many trees and herbs in autumn are due partly to chemical changes in the decaying chlorophyll and partly to the ex¬ posure of pigment cells previously concealed by the abundance of chorophyll and other features of vital activity. The leaf drops because it no longer receives nourishment from the stem or twig. The cells at its base close up, transmit¬ ting no more sap, and in so doing separate from those in the base of the leaf, which is thus cut off and thrown away.

Bibliography. — The morphology, genesis and functions of leaves have been studied most deeply by German students, as Haeckel, Fritz Muller, Gobel, Schwender, Marchlewski, Fisher and others. These and other authorities have been well summarized in the English translation by Porter of Strasburger's (Textbook of Botany* (1903). For the fo rms and nomen¬ clature of leaves, consult the botanical manuals

tiiid textbooks of Gray, Wood and other Amer¬ ican authors. Consult also Atkinson, < Ele¬ mentary Botany* (New York 1898) ; Coulter, (Plant Structures > (ib. 1900); id., (Elementary Studios in Botany > (ib. 1913) ; Ganong,

Ernest Ingersoll.

LEAVES OF GRASS, a collection of poems by Walt Whitman (q.v.), published in

1855.

LEAVITT, Erasmus Darwin, American mechanical engineer: b. Lowell, Mass., 27 Oct. 1836; d. Cambridge, Mass., 11 March 1916. He was self-educated, receiving an honorary D. Eng. from Stevens Institute in 1884. He worked his way up through various machine shops and in 1860-61 was chief draughtsman for Thurs¬ ton, Gardner and

Company, Providence. He was assistant engineer in the United States navy in 1861-67, but resigned and resumed his practice, specializing in pumping and mining machinery. He was consulting engineer for the Calumet and Hecla Mining Company in 1874-1904, when he retired. He acted as con¬ sulting engineer at various times for the cities of Boston and Louisville, and for private con¬ cerns. . He was a member of various engineering societies, and in 1883 was president of the American Society of Mechanical Engineers.

LEAVITT, lev'it, Joshua, American editor: b. Heath, Mass., 8 Sept. 1794; d. Brooklyn, N. Y., 16 Jan. 1873. He was graduated at Yale College in 1814 and was admitted to the bar in 1819. In 1825 he graduated at Yale Divinity School and in 1831 became editor of the New York Evangelist. He was an active member of American Anti-Slavery Society in 1833, and from 1837 to 1840 was editor of the society's journal, The Emancipator. He was an active promoter of the ˆLiberty® and (

LEAVITT, Mary Greenleaf Clement,

American temperance advocate : b. Hopkinton, N. H., 22 Sept. 1830; d. 5 Feb. 1912. She was graduated at the West Newton State Normal School in 1851, and in 1857 was married to Thomas H. Leavitt. She taught in various district and grammar schools and in 1867-81 conducted a private school for young ladies and children. She was one of the organizers of the Boston Women's Christian Temperance Union, was a member of the state board of executives and later was national lecturer. In 1883-91 she was secretary of the world's W. C. T. U. and traveled in Europe, Australia, Asia, Africa, South America and many islands, es¬ tablishing branches of that organization. She became honorary life president of the world's W. C. T. U. in 1891. She was a contributor of temperance and purity articles, stories and verse to the periodical press.

LEBAND, le'band, John, English Non-con¬ formist divine: b. Wigan, Lancashire, 18 Oct. 1691 ; d. Dublin, 16 Jan. 1766. He was ap¬ pointed assistant of the Presbyterian congre¬ gation in New Row, Dublin, in 1716 and later became pastor, remaining there all his life. He is famous for his writings in connection with

the deistic movement of the 18th century, which, while by many considered common¬ place, are of unquestioned importance in the literature of that era. Author of (A Defence of Christianity* (1733), a reply to Matthew Tindall's Christianity as Old as Creation) ; (Divine Authority of the Old and New Testa¬ ments Asserted * (1738), in

reply to Thomas Morgan's (The Moral Philosopher ; (Remarks on [H. Dodwell's] Christianity not founded on Argument (2 vols., 1741) ; his most important work is (View of the Principal Deistical Writers that have appeared in England) (1754 — 56) ; discourses on various Subjects, * with a (Life) prefixed (4 vols., 1768-439).

LEBANON, leb'a-non, Ind., city and county-seat of Boone County, on the Central Indiana Railway and the Cleveland, Chicago, Cincinnati and Saint Louis railroads, about 30 miles northwest of Indianapolis. The first permanent settlement was made in 1824, and the city was chartered in 1875. Its chief in¬ dustrial establishments are grain elevators, a furniture factory, cabinet factory, separator factory, wheel works, mitten factory, condensed milk plant and canning plant. The govern¬ ment is vested in a mayor, whose term of office is four years, and a council. The waterworks are owned and operated by the city. Pop.

(1920) 6,257.

LEBANON, Ky., city, county-seat of Marion County, on the Louisville and Nash¬ ville Railroad, about 52 miles southwest of Lexington, the capital of the State, and 70 miles south of Louisville. It is situated in an agricultural region, and is the trade centre for an extensive section. The chief manufactures are flour, meal, furniture, wagons and car¬ riages, wheels and hardwood flooring. There are also several tobacco warehouses. A large amount of livestock is shipped from Lebanon. It is the seat of Saint Augustine's Academy, under the auspices of the Roman Catholic Church, and of a public and parish high school and good graded schools. Several churches and the city and* county buildings are among the prominent buildings. The city owns and operates the waterworks. Pop. (1920) 3,239.

LEBANON, Mo., city, county-seat of Leclede County, on the Saint Louis and San Francisco Railroad, about 55 miles northeast of Springfield. It is situated in an agricul¬ tural, fruit growing, dairying and stock raising region and is the trade centre for a large ex¬ tent of country. Its chief manufactures are flour, machine-shop products, ice, barrels, lum¬ ber, bricks and dairy products. Its trade is principally in the manufactured products, live¬ stock, fruit, hay and vegetables. The city, though small, is a well-known health resort because of its mineral springs. The water¬ works and, electric-light plant are the property of the municipality. Pop. (1920) 2,848.

LEBANON, N. H., town, one of the county- seats of Grafton County, on the Mascoma River, a few miles from its junction with the Connecticut

River, and on the Boston and Maine Railroad. It is about 68 miles north¬ west of Concord, the capital of the State. It was settled about 1762, by people from the vicinity of Lebanon, Conn., who named their

new home after the Connecticut town. It is situated in an agricultural region, but the ex¬ tensive water power supplied by the Mascoma River has made it an important manufacturing town. The chief manufactures are woolen goods, machinery, agricultural implements, wooden ware, men's clothing, sash, doors and blinds, snow-shovels, flour, dairy products and lumber. It has large brickyards. Over 1,500 persons are employed in the manufac¬ tories. The annual town meeting is still the governing power. Pop. (1920) 6,162.

LEBANON, Ohio, village, county-seat of Warren County, on the Dayton, Lebanon and Cincinnati and the Cincinnati, Lebanon and Northern railroads, about 73 miles southwest of Columbus, 30 miles northeast of Cincinnati and 22 miles south of Dayton. It was laid out as a village in 1802. It is situated in an agri¬ cultural region and its industries are connected with farm products. It is the seat of the Lebanon University. It has a Carnegie public library containing about 10,000 volumes. There is one orphan asylum; also many beautiful residences. The village owns and operates the electric-light plant, the gas plant and the waterworks. Pop. (1920) 3,396.

LEBANON, Pa., city, county-seat of Lebanon County, on the Cornwall and Leba¬ non and the Philadelphia and Reading rail¬ roads, about 66 miles northwest of Philadelphia and 23 miles northeast of Harrisburg. Lebanon was settled as early as 1700 by Ger¬ man emigrants. The borough of Lebanon was laid out by George Steitz, in 1750, and was first called Steitztown. It was incorporated in 1820 and chartered as a city in 1885. It is situated in the Lebanon Valley, noted for the fertility of its soil ; but the largest part of the wealth of the city comes from the quarries and mines of the vicinity. The Cornwall iron mines, about five miles distant from the city, the limestone and brownstone at the base of the mountains, the brick-clay, the iron ore, all contribute to the industrial wealth of Lebanon. Its chief industrial establishments are furnaces and foundries, rolling-mills, steel plants, machine shops, a very large nut and bolt works, chain works, silk factory, cigars and organs. The educational institutions are the public and parish schools, the Lebanon Business Col¬ lege, the School of Telegraphy, and four libra¬ ries. It has a large number of churches.

Some of the prominent public buildings are the court¬ house, county-house and post-office. Pop.

(1920) 24,643.

LEBANON, Tenn., city, county-seat of Wilson County, on the Nashville, Chattanooga and Saint Louis and the Tennessee Central railroads, about 35 miles east of Nashville. It is situated in an agricultural region, and its trade and industries are connected with farm¬ ing products. Its chief manufacture is that of cedar pencils. It ships large quantities of hay, butter and poultry. It is the seat of Castle Heights Training School, of Lebanon College for Young Women and of Cumberland University, founded in 1842 by the Cumberland Presbyterians. The city has adopted the com¬ mission form of .government and owns the waterworks and electric-light plants. Pop.

(1920) 4,084.

LEBANON, Cedars of. See Cedar.

LEBANON, Mountains of, Syria, two nearly parallel mountain ranges which, com¬ mencing at about lat. 34° 25′ N., stretch south-southwest toward Palestine, enclosing between them a valley about 70 miles long by 15 miles wide, now simply distinguished by the name of El-Bukaa, (

LEBANON SPRINGS, N. Y., village, in

the township of New Lebanon, Columbia County, on the Rutland Railroad, about 25 miles southeast of Albany. It is in a fertile agricultural region, and is a favorite health resort because of its mineral springs. A com¬ munity of Shakers (q.v.) who live in the vil¬ lage and vicinity make brooms and baskets

r.nd cultivate extensive gardens. They sell considerable garden seed. See New Lebanon.

LEBANON VALLEY COLLEGE, a co¬ educational institution, founded, in 1867, at Annville, Pa., 20 miles from Harrisburg. It is under the auspices of the United Brethren. The college has five courses which lead to the degree of bachelor of arts; and normal, art, music, oratory and preparatorv departments. In 1916 there were connected with the

school 25 professors and instructors, and 360 students. The college consists of seven buildings, a campus and an athletic field. There are up¬ ward of 10,000 volumes in the college library. The plant and grounds are valued at $293,000, the endowment $75,000, and the gross income is about $52,000.

LEBEL, le'bel, Nicolas, French soldier and inventor : b. Angers, 18 Aug. 1835 ; d. Vitre, Ile-et-Vilaine, 6 June 1891. He entered the Military School of Saint Cyr in 1855, served as captain in the northern army dur¬ ing the campaign of 1870, and (became director of the Musketry School at Tours, and in 1883 at Chalons. The same year he was appointed member of the commission on securing an im¬ proved rifle for the infantry. The commis¬ sion decided in favor of the small-bore rifle offered by Lebel, and known as the ((fusil Lebel, 55 which was introduced into the French army in 1886. He was present as colonel at the battle of Sedan, but sickness cut short his military career, and in 1890 he was placed on the retired list.

LEBENSOHN, la'ben-son, Abraham Bar

(pseud. Adam), Russian Hebrew poet and grammarian: b. Vilna,, Russia, about 1789; d. there, 19 Nov. 1878. He was educated as a Talmudist, became interested in Hebrew gram¬ mar at 11, and at 13, in accordance with the prevailing custom, he was married. He lived with his wife's people the ensuing eight years, engaged in teaching and pursuing his studies. He conducted a brokerage business for about 15 years, and spent the remainder of his life in teaching. In 1848-64 he was on the teach¬ ing staff of the Vilna Rabbinical School. He early established a reputation as a Hebrew poet and his first volume of verse (Shire Sefat Kodesh5 (1842) was received with enthusiasm as marking an epoch in Neo-Hebrew literature. His was the first work of the new literature to rank with similar literature in western Europe and he achieved a high reputation in the centres of Hebrew learning. He was a rabbinical scholar of note and through his liberal tendencies became known as a leader of the new Judaism. He prepared an article on the condition of the Jews in Russia for presentation to Sir Moses Montefiore on his visit to Russia in 1846 in which he charged the Jews with responsibility for their own troubles, blaming their general ignorance, their lack of skill as artisans, juvenile marriages, the ignorance of the rabbis and teachers, and ex¬ travagance for their condition. His remedy was that of governmental intervention. He collaborated with Benjacob in the preparation of a 17-volume edition of the Bible with a translation into German (1848-53). A second volume of his poems was published in 1856 and the third in 1869. He was author of a com¬ mentary on Benshew's (Hebrew Grammar5

(1874); an allegorical drama (Truth and Faith* (1867) ; (Poems in the Sacred Tongue,5 a complete edition of his verse (3 vols., 1895).

LEBENSOHN, Micah Joseph, Russian Hebrew poet, son of Abraham Bar Lebensohn (q.v.) ; b. Vilna, Russia, 22 Feb. 1828; d. there, 17 Feb. 1852. He received a modern education, supplemented by his father's teachings and a course in philosophy under Schelling at Berlin. He made translations of Hebrew songs when very young and engaged in the writing of original verse at 16. His life and work were shadowed by the contraction of tuberculosis, which caused his death at 24. He produced verse which ranks above that of his father in beauty and pathos and in felicity and strength of composition, and is generally re¬ garded as one of the most notable Hebrew poets. Among his translations is that of Schiller's version of (The Destruction of Tnay5 from the

LEBERT, la'bert, Hermann, German phy¬ sician : h. Breslau, 9 June 1813; d. Bex, Canton Waadt, Switzerland, 1 Aug. 1878. He studied medicine at the universities of Berlin, Zurich and Paris, and in 1836 engaged in practice at Bex. He spent the winters of 1842- 45 in Paris, studying comparative anatomy, lived in Berlin the winter of 1845ˆ16 and settled in Paris in 1846. He was professor of medi¬ cine at Zurich in 1853-59 and at Breslau in 1859-74. He specialized in microscopic anat¬ omy, adding appreciably to the knowledge of pathology and biology. He conducted a series of special investigations in the progress of cancer, tuberculosis and scrofula. Author of (Physiologie Pathologique5 (1845) ; (Traite Practique des Maladies Scrofuleuses et Tuber- culeuses5 (1849) ; (Traite Practique des Maladies Cancereuses5 (1851) ; (Handbuch der Allegemeinen Pathologie und Therapie5 (1865) ; (Die Krankheiten des Magens5 (1878), etc.

LEBERT, Siegmund, German music teacher: b. Ludwigsburg, Wiirttemberg, 12 Dec. 1822; d. Stuttgart, 8 Dec. 1884. He was educated in music at Prague and became a pianist and teacher of music in Munich. In 1856 he, together with Faiszt, Bachmann, Laiblin, Stark and Speidel, founded the Stutt¬ gart Conservatory. While his methods have been superseded as unnecessarily laborious, he numbered many distinguished musicians among his pupils. He received an honorary Ph.D. from the University of Tubingen and the title of professor from the king of Wiirttemberg. Together with his colleagues of the conserva¬ tory he published an edition of pianoforte classics; and with Stark he was author of (Grosse Klavierschule5 which went through many editions and was translated into English, French, Italian and Russian. He was also co¬ editor with Stark of dementi's (Gradus ad Parnassum.5

LEBLANC, le'blan, Maurice, French novel¬ ist: b. 1864. He is a brother of Georgette Leblanc (Mrs. Maurice Maeterlinck). He be-

gan his career as a writer of novels and scored his first great success in 1906 when he began writing detective stories. His principal char¬ acter, Arsene Lupin, enjoys a fame equaled only by that of Conan Do} de's Sherlock Holmes in the field of detective stories, and his work has attained an even greater success than that of Emile Gaboriau, his predecessor in this field. His skill in handling his material has caused him to be compared with Flaubert and de Maupassant. He is a chevalier of the Legion of Honor. All of his later works have been translated into English and have enjoyed a wide vogue on both sides of the Atlantic. Author of (Une Femme) (1893) ; (L'CEuvre de la mort) (1896) ; (Arnelle et Claude1* (1897) ; (Gueule-rouge-80 chevaux) (1904) ;

(Arsene Lupin) (1907); (Arsene Lupin contre Sherlock Holmes) (1908) ; (Nouvelles aven- tures Arsene Lupin) (1910); (Le bouchon de cristaP (1912) ; (La Confession d'Arsene Lupin1* (1913) ; (Teeth of the Tiger1* (1914) ;

(Woman of Mystery* (1916) ; (Golden Tri- angle) (1917), etc.

LEBLANC, Nicolas, French chemist : b. Issoudun, department of Indre, 1742; d. Saint Denis, 16 Jan. 1806. He studied medicine, was appointed surgeon to the Duke of Orleans and, after the Revolution, administrator of the de¬ partment of the Seine. His name is associated with the process of converting common salt into carbonate of soda, a matter to which he turned his attention in 1786, after the Academy had offered a prize of 2,500 livres for the dis¬ covery. His first endeavors did not yield a decisive result, but led to an accidental dis¬ covery by Dize, an assistant of Jean Darcet (q.v.) at the College of France, through which success was attained. Prior to this time soda was obtained from natural deposits and the ashes of marine plants, the supply of which had become insufficient. With the Duke of Orleans and another, Leblanc and Dize formed a part¬ nership and began to make soda. The Revolu¬ tion wrecked their enterprise. Despite his pat¬ ent for 15 years, secured in 1791, Leblanc was compelled by the committee of public safety to disclose the secret of the process, and

the manufacture became open to all. After years of poverty and fruitless efforts for redress, he committed suicide. The discovery of the essen¬ tial features of the process was assigned to him in 1855 by a commission of the Academy, although the claim of Dize was stronglv ad¬ vocated. As to the value of the process itself there is no doubt. It has made soda cheap, thereby facilitating the manufacture of soap, the cleansing and bleaching of cloth, etc. ; has promoted the manufacture of sulphuric acid, and thereby the utilization of metallic sul¬ phides ; and has originated the manufacture of chlorine and of bleaching-powder. The Leblanc soda-process is still in extensive use, but is now dependent more on its by-products than on its output of soda One-half of the world's soda is now made by the ammonia-soda or Solvay process. See Soda.

LEBON, lebon', Felix Frederic Georges,

French general and tactician: b. Paris, 1845; d. 1907. He was educated at the Lcole Poly* technique and the Lcole d' Application de l'Ar-tdlerie et du Genie, and was a lieutenant in the Franco-Prussian War. He was promoted

regularly, receiving rank as general of division in 1902, and was generally recognized as an authority on artillery tactics. He became a member of the superior council of war in 1907. He was a Commander of the Legion of Honor and was the recipient of many foreign decora¬ tions. Besides writing numerous articles on artillery tactics and the use of explosives, he collaborated on the Revue d'artillerie.

LEBRET, 1 e-bra', Georges, French poli¬ tician : b. Etampes, 1853. He received his LL.D. at Paris and in 1879 was commissioned by the Minister of Public Instruction to inves¬ tigate and make a report on leases and on agricultural laws and customs in England and Scotland. He was professor of civil and crim¬ inal law at the University of Caen in 1885-91, and was then appointed professor of financial legislation there. He served in the House of Deputies in 1893-1902, and in 1898-99 he was Minister of Justice. In 1902 he returned to Caen as professor of civil law. He edited the Revue critique de legislation et de jurispru¬ dence and was a recognized authority in its field. Author of (Etude sur la propriete fon- ciere en Angleterre1* (1882)

LEBRIJA, la-bre'ha, Spain, city in the province of Seville, 44 miles southwest of Seville, on the left bank of the Guadalquivir and the eastern border of marshes called Las Marismas, and on the Seville-Cadiz Railway. It has a ruined Moorish castle and a church which was originally a mosque, and which ex¬ hibits a combination of Moorish,

Gothic and Roman architecture. There are deposits of clay which supply manufactures of bricks, tiles and earthenware, and the city has a trade in stock and country produce. Lebrija was set¬ tled by the Greeks and is the Roman Nabrissa or Nebrissa. It was a flourishing town under the Moorish domination and was captured by Saint Ferdinand in 1249, but was lost. It re¬ mained Christian under the Castilian crown from the time of its capture by Andrew the Wise in 1264. It was the birthplace of Elio Antonio de Lebrija or Nebrija (1444-1522), known also as Nebrissensis, tutor of Queen Isabella and a leader of the revival of learning in Spain, who assisted Cardinal Ximenes in compiling the (Complutensian Polyglot Bible. * Pop. 11,506.

LEBRUN, le-brun, Charles, French painter : b. Paris, 24 Feb. 1619; d. there, 12 Feb. 1690. He was the son of a sculptor, but early turned his attention to painting and became the pupil of P. Perrier and S. Vouet. He was especially attracted by the Italian masters, examples of which he copied in the gallery at Fontainebleau so that in his 15th year his works won the patronage of Cardinal Richelieu. Chancellor Seguier provided means for him to visit Rome, and during his residence there (1642-46) he studied under Poussin, at the same time paying much attention to the antique and the paint¬ ings of the early masters. In 1646 he returned to France and assisted in founding the Royal Academy of Arts and Sciences, in which he was successively professor, chancellor and in 1683 director. He was also director of the Gobelin tapestry manufactory. In 1662 Louis XIV appointed him court painter, ennobled him and made him curator of his art collections. He was meanwhile engaged in decorating the

Apollo Gallery in the Louvre. In 1668 the king appointed him superintendent of works in the building of Saint Germain. He also decorated with paintings the royal chateau at Sceaux and designed the statues and fountains for the park, etc. In 1679 he undertook his greatest work, the interior decoration of the palace at Versailles, and in the Great Gallery portrayed the achievements of Louis XIV. Very many paintings of his are still to be seen in the Louvre. His works are characterized by abun¬ dant invention and facility of execution; they reflect the spirit of the contemporary Italian school, but are marred by excessive straining after effect, flatness of design and falsity of color tone. His vast canvas, (Portrait of the Banker Jabech of Cologne and Family, > is in the Berlin Museum. He exercised a despotic influence

over the French art of his time. He wrote (Traite sur la physiognomie) and (Methode pour apprendre a dessiner les pas¬ sions. J Consult Generay, (Le Style Louis XIV) (1885), and Jovin, (Charles Lebrun, et les arts sous Louis XI V) (1890).

LEBRUN, Charles Frangois, Due de Pia¬ cenza, French administrator: b. Saint Sauveur- Landelin, 19 March 1739; d. near Dourdan, 16 June 1824. He was appointed inspector of Crown-lands, later entered the States-General and the Constituent Assembly, was appointed governor of Seine-et-Oise in 1791, sat in the Council of Five Hundred, of which he was chosen president, and was made third consul by Bonaparte for services on the 18th Brumaire. In 1807 he reorganized the administration of the exchequer, and after a long retirement re¬ entered public life as governor of Holland in 1810. He translated the (Iliad,* the and the Jerusalem Delivered.) Consult his

LEBRUN, Marie Louise Elisabeth, French painter: b. Paris, 16 April 1755; d. there, 30 March 1842. She was trained under Doyen, Joseph Vernet and Greutze, and chose portrait painting as her specialty. She left a great num¬ ber of portraits in oil and pastel. About 600 are identified as her works of which the most important are her portrait of herself with her little daughter (in the Louvre) ; her portrait of herself in the Uffizi Gallery at Florence; Marie Antoinette with her three children (in the museum at Versailles). In 1783 she was elected a member of the Academy. During the French Revolution she took refuge in the va¬ rious European capitals, where she painted por¬ traits of the reigning princes and members of their families, as well as of the most famous people of the time. Few works of hers are to be met with except in private collections. She published (Souvenirs de ma vie* (Paris 1837).

LEBRUN, Ponce Denis Ecouchard, called LEBRUN-PINDAR, French poet: b. Paris, 11 Aug. 1729; d. there, 1807. His title “Pindar** is due to the form and the mythological allu¬ sions of his odes, not to any great poetical merit, either in them or the lyrics, and as a satirist he alternately groveled before and libeled the same men. His best odes are addressed to Buffon. He excelled in the composition of madrigals and epigrams; the latter relate for the most part to his quarrels with other authors.

LECCE, let’cha, ancient Lycia, or Lupia, southern Italy. The town is situated in the

province of Lecce, on a plain between the Adriatic on the north, the Gulf of Taranto on the west and the Ionian Sea on the south. It has many interesting edifices, especially churches and convents, some of which contain admirable works of art. At the gate of Saint Biagio is a triumphal arch erected in commemoration of the entrance of Charles V. There is a public library and there are well-established day and evening schools and numerous charitable in¬ stitutions. It is the centre of a productive agri¬ cultural district, and has potteries, wool and soap and important tobacco industry. Lecce was very flourishing during the Roman period, escaped the barbarians and in 1000 a.d. was governed by its own counts. Pop. 36,200.

LECCO, lek'kd, Italy, capital city of the province of Como, at the exit of the Adda from the Lake of Lecco, the southeastern arm of Lake Como, 16 miles northeast of Como and 32 miles by rail north of Milan. The city is reached by steamer from Como and is 673 feet above sea-level. There is a mediaeval stone bridge over the Adda at this point, built orig¬ inally in 1335 and renewed in 1609. While an ancient town, Lecco is modern in its buildings. It is noted for its excellent schools, and pos¬ sesses a modern hospital, public library and similar institutions. It has been described in Alessandro Manzoni's (Promessi Sposi,* and a statue has been erected to the author by the city. There are manufactures of silk and cot¬ ton stuffs, wax-candles, iron and copper works, brass foundries, olive-oil mills and wood-carv¬ ing. The town was presented to the bishops of Como in the 11th century, came into the pos¬ session of the archbishops of Milan. in the 12th century and in the 13th century it was de¬ stroyed by the Visconti. In the 14th century it was fortified and the .famous bridge across the Adda was built to unite it with Milanese terri- torv. It was made a countship in 1647. Pop.

12,146.

LECCO, Lake of (It. Lago di Lecco), the name given to the southeastern arm of Lake Como in Italy. Some of the large streams of the northern part of Italy flow into Lake Lecco. The town of Lecco and many pretty villages are on its shores.

LECH,.leh, a river which has its rise in the Alps, in Vorarlberg, Switzerland, at an (altitude of over 6,000 feet, flows east and north until it enters Bavaria, after which its course is almost directly north to Donauworth where it unites with the Danube. Its length is 180 miles. It is not a navigable stream, but it has extensive water power. On this river, near Rain, about five miles below Donauworth, Tilly was defeated and killed, 5 April 1632, by a Swedish force under

Gustavus Adolphus.

LECHE, le-che, in zoology, the Onotragus lechc, from South Africa. It is a water ante¬ lope, frequenting damp, marshy places and. tak¬ ing to impassable swamps. It goes in consider¬ able herds, and may be . known by the peculiar way in which it allows its horns to recline, al¬ most touching the withers.

LECHEVALIER, le-she-val'ya', Jean Baptiste, French classical archaeologist : b. Trelly, Normandy, 1 July 1752; d. Paris, 2 July 1836. He was educated for the priesthood, but in 1784 he became secretary to the Comte

de Choiseul-Gouffier whom he assisted in archaeological researches in the plains of Troy in 1784-86. During the Revolution he traveled in England, Germany, Denmark, Holland, Sweden and Russia, and after his return to France he was, in 1808, appointed director of the Library of Saint Genevieve. He believed that the site of Troy was on the hills above Bunarbashi, and he also maintained that the (Iliad) and the 'Odyssey5 were written by Ulysses. Author of (Voyage de la Troade) (1800; Eng. trans. by Da'lzel, description of the Plains of Troy5); 'Ulysse-Homere ou du veritable auteur de l'lliade et de l'Odyssee5 (1829), etc.

LECHFELD, lek'felt, Bavaria, extensive stony plain south of Augsburg on the west bank of the river Lech. It was the scene of a de¬ cisive victory by the forces of Otto II over those of the Hungarians, 10 Aug. 955, resulting in the cessation of the Hungarian forays into Bavarian territory.

LECHFORD, Thomas, American colonial

lawyer : d. about 1645. He came to the Massa¬ chusetts Bay Colony in 1638 and was the earliest lawyer in Boston. He was regarded with great suspicion by the colonial authorities on account of his profession and the nature of his religious opinions, and he found extreme difficulty in making a living. He, therefore, in 1641, returned to England, where his book, 'Plain Dealing, or News from New England,5 Was printed in 1642. It is a valuable source of information respecting details of early colonial life, and in 1644 was reprinted with the new title, 'New England's Advice to Old England. > A modern edition, annotated by J. H. Trum¬ bull (q.v.), appeared in 1867.

LECITHIN, le-ci-thin, in chemistry, a name applied to several phosphoretted fat tyr bodies, of very similar chemical and physical properties, derived from brain substance, nerves, blood, gall, the yelk of eggs, etc., and also from some vegetable substances (maize, etc.), and which appear as constant constituents of the cell substance of organized bodies. They are viscous bodies, insoluble in water, slightly soluble in cold alcohol, but very soluble in boil¬ ing alcohol and in ether. From their saturated ‘ solution in alcohol they crystallize in radially- grouped needles, which dry up in vacuo to a white powder. They may also be crystallized from glacial acetic acid. Every lecithin is a fat containing only two fatty acid radicals, the third hydroxyl group being replaced by neurine in combination with phosphoric acid. The structural formula is

O – CJL

/ \

0 = P— OH (CH,)* = N

\ /

o— ch2 ho

I ,

CHOR

!

CH2OR’

where R and R’ are acyl radicals.

LECKY, lek’i, William Edward Hart- pole, English historian: b. Newton Park, near Dublin, 26 March 1838; d. London, 23 Oct. 1903.

He was educated at Cheltenham College and at Trinity College, Dublin, whence he was graduated in 1859, and in 1860 published anony¬ mously his first work, (The Religious Ten¬ dencies of the Age5 (I860), followed in 1861 by (Leaders of Public Opinion in Ireland,5 dealing with Swift, Flood, Grattan and O’Con¬ nell, which appeared under his name in a new edition in 1871. An important ‘History of the Rise and Influence of the Spirit of Rationalism in Europe) followed in 1861-65 and ensured him wide reputation as scholar and thinker. His (History of European Morals from Au¬ gustus

to Charlemagne5 (1869) displayed a profound knowledge though its conclusions were not always sound. His most elaborate and valuable work is a ‘History of England in the Eighteenth Century5 (Vols. I— II, 1878; III-IV, 1882; V-VI, 1887; VII-VIII, 1890), in which he treats very fully of Irish affairs to the time of the Addington Ministry. In a new edition of this history, published in 12 volumes in 1893, the chapters on Ireland were removed from their original context and arranged in a continuous narrative occupying the last five vol¬ umes. This work is in reality a history of civilization for the period covered; treating of the forces contributing to the making of the 19th century England, whether of native or of foreign origin. Lecky’s other works are ‘Poems5 (1891) ; ‘Democracy and Liberty5 (1896), in which he arraigns modern British political life, and makes some comments upon Gladstone which once aroused considerable dis¬ cussion; and ‘The Map of Life: Conduct and Character5 (1899) ; ‘The French Revolution5 (1904) ; ‘Historical and Political Essays5 (1908). In 1895 he was elected to the House of Commons as member for the University of Dublin, and in 1897 was sworn of the Privy Council. In politics he was at first a Liberal and from 1886 a Liberal-Unionist with an un¬ disguised aversion to democratic government. He became corresponding member of the In¬ stitute of France in 1894, and an honorary mem¬ ber of the Royal English Academy upon its organization. A biographical memoir was pub¬ lished by his wife (London 1909). Consult also Rhodes, J. F., ‘William Edward Hartpole Lecky5 (in ‘Historical Essays,5 New York

1909).

LECLAIRE, Edme-Jean, ed-ma-zhon le- klar, French social scientist: b. Aisy-sur- Armangon, 14 May 1801 ; d. Herblay, 10 Aug. 1872. At first a farm-worker, then apprentice to a mason, he afterward apprenticed himself to a house-painter in Paris, and in 1827 began the painting business on his own account. He proved remarkably successful, and soon took a leading position in his trade. In 1835 the prin¬ ciple of profit-sharing (q.v.) was proposed to him and in 1842 he began to put it in practice in his own establishment, dividing the amount available in sums proportioned to yearly wages. A mutual-aid society which he formed in 1838 and reorganized in 1853 sustained itself from the latter year on the profits which were shared among the members. In 1864 the right to a division of the funds of the society was super¬ seded by a system of retiring pensions. Le- claire was elected maire of Herblay in 1865. In the company which he founded his plan of

distribution is still adhered to with continued success.

LECLERC, le-klar, Charles Victor Em¬ manuel,ˆ French general: b. Pontoise, 17 March 1772; d. San Domingo, 2 Nov. 1802. He entered the cavalry service in 1791 and was aide-de-camp to General Lapoype. At the siege of Toulon he won the interest of Napoleon, who thereafter held him in high regard. Leclerc accompanied Napoleon as his adjutant in the Italian campaign of 1796, and in 1797 he was married to Napoleon's sister Pauline. He served in the Egyptian campaign, receiving rank as general of division, and he afterward was engaged at Fleurus and Hohenlinden. He was placed in command of the expedition against Toussaint l'Ouverture in 1801 and suc¬ ceeded in securing the surrender of the negro governor and his forces, but himself fell a victim to yellow fever and died in San Domingo.

LECOCQ, le-kok, Alexander Charles,

French composer: b. Paris, 3 June 1832; d. 1 March 1911. He received his musical education in the Conservatory of the capital, under Bazin and Halevy, and the earliest of his operas to appear was (Le docteur miracle, > which had won the first Offenbach prize. His operetta (Fleur de The) gained him the widest recogni¬ tion. In this as in his later productions he fol¬ lowed the advice he had received from Offen¬ bach, that the operetta should be elevated into a work of art. His principal operettas are (Les jumeaux de Bergame) (1868) ;

LECOINTE, le-kwant', Georges, Belgian naval officer and scientist : b. Antwerp, 1869. He was captain of the Belgica in the Belgian Antarctic expedition of 1897-99, ranking as second in command, and later published valua¬ ble reports of the undertaking. He was in¬ strumental in the organization of the Interna¬ tional Polar Commission which met at Brussels in 1908, and from 1900 he was scientific director of Belgian Royal Observatory. Author of (La creation d'une marine nationale belge) (1897); (La navigation astronomique et la navigation estimee) (1897) ; (Au pays des Manchots) (1904) ; (Mesures Pendulaires) (1907), etc.

LECOMPTON, le-komp'ton, Kan., city in Douglas County, on the Kansas River, and on the Atchison, Topeka and Santa Fe Rail¬ road, about 15 miles east of Topeka. It was settled in 1854 by sympathizers with the slaver}' side of the question which was then before the people, in relation to the admission of new States. Lecompton was the headquarters of the pro-slavery men, and it was here that the Le¬

compton Constitution (q.v.) was framed, in the fall of 1857. Until 1903 it was the seat of Lane University, founded here in 1865. The place was named in honor of Judge S. D. Le- comte, one of the early workers in Kansas. The electric-light plant is the property of the municipality. Pop. (1920) 310.

LECOMPTON CONSTITUTION, in

Kansas history a form of territorial govern¬ ment, adopted by a convention held at Lecomp¬ ton, Kan., in 1857, the legality of which in both form and action became a matter of dispute and caused national discussion and Congres¬ sional action. For several years prior to 1857 the slave question had agitated the territory, and numerous bloody quarrels between the Free State settlers and the Missourians who came across the border into Kansas added fuel to the strife. In June 1857 the territorial legis¬ lature, composed entirely of pro-slavery men, chosen at an election at which the Free-State men had declined to participate on the ground of its illegality, met at Lecompton, and among other acts passed one providing for the election of a convention to frame a State constitution for Kansas. Meanwhile Congress had passed a bill declaring void all the enactments of the Kansas legislature on the ground that they were cruel and oppressive. The election for dele¬ gates to the constitutional convention was held 15 June, but the Free-State men took no part in it. Only 2,000 votes were cast, while the legal voters in the Territory numbered 10,000. The constitutional convention met at Lecompton in November and adopted a constitution, four sections of which related to slavery, declaring the rights of owners to their slaves to be in¬ violable and prohibiting the legislature from passing acts of emancipation. This provision alone was to be submitted to the people at an election to be held 21 December. The ballots cast were to be endorsed : ˆConstitution with slavery,® or ˆConstitution with no slavery,® thus securing in any event the adoption of a constitution, several clauses of which, besides those submitted, were highly objectionable to a majority of the people. A provision was in¬ serted preventing any amendment to the con¬ stitution previous to 1864. The promulgation of this constitution caused great excitement in Kansas.

At the election 21 December the vote re¬ turned was 6,143, more than one-half of which was from the counties along the Missouri border, whose total number of voters by the census did not exceed 1,000. Against the slavery clause there were but 569 votes, the Free-State men generally abstaining from voting. The constitution being thus nominally adopted, an election for officers under it was to be

held 4 January. At a special session the legislature passed an act submitting the Le¬ compton constitution to the direct vote of the people on the same day with the State election, and the result was 10,226 votes against it. Con¬ gress after a long discussion referred the matter to the people of Kansas at an election on 3 Aug. 1858, when the Lecompton constitution was again rejected by 10,000 majority. Mean¬ while the territorial legislature had called an¬ other convention to meet in April to frame a new constitution, which was submitted to the people and ratified by a large majority, though by a small total vote. The territorial legislature met in January 1859 and passed an act submitting to the people the question of calling, still an¬ other constitutional convention. Delegates were elected, and at a convention which met from 5 July to 27 July a constitution was finally adopted which prohibited slavery. This was

ratified by a majority of 4,000 at the election 4 October, and the slavery question was at last settled and Kansas was admitted to the Union as a State, 29 Jan. 1861. See also Kansas; Slavery.

LECOMTE, Paul Henri, French botanist: lb. Saint Nabord, Vosges, 8 Jan. 1856. He engaged in teaching botany and in 1906 be¬ came professor at the Museum of Natural His¬ tory. In 1897 he founded the Revue dcs Cul¬ tures Coloniales, and for some time served as its editor. He was author of several elemen¬ tary textbooks and (Les textiles vegetaux des colonies) (1895); (1904) ; (Ana- cardiares de l'Afrique occidental' (1905) ; (Flore generale. de l'lndo-China,' etc.

LECONTE DE LISLE, Charles Marie Rene, sharl ma-re re-na le kont de lei, French poet: b. Saint Paul, He de Bourbon (now Re¬ union), 23 Oct. 1818; d. Louveciennes, 17 July 1894. When a young man he went to France, studied law at Rennes and after a course of travel settled in Paris. His progress was slow, but gradually he gathered a group of young writers, and expanded his own work, whereby he won recognition as leader of the modern Parnassian school of poetry. It was some years before he found a publisher for (Poemes an- tiques) (1852), his first volume of real signifi¬ cance, but with (Poemes barbares' (1862) he gained an academic prize of 10,000 francs. In 1884 he published (Poemes tragiques,' and in 1895 appeared (Derniers poemes,' a posthumous volume containing also critiques on his pre¬ cursors in lyric poetry. His hand gave its im¬ press to (Le Parnasse contemporain,' a series of volumes published in 1866, 1869

and 1876, which is representative of his school, and in these some of his own most notable work was first seen. He also rendered valuable service to French literature by his superior transla¬ tions of the (Iliad' (1867); Hesiod' (1869), the (Orphic Hymns' (1869); the ˆdvssevb (1870); (Ho race' (1873); ˆSophocles' (1877) and (Euripides' (1885). In imitation of the Greek he wrote the dramas (Les Erinnˆes' (1872) and (L'Apollonide,' based on the (Ion' of Euripides. His poetry embodies a philosophy of human life in which he sought to combine art with scientific principles and to weave in one poetic fabric the mythical past with ideal visions yet to he realized by the race. In 1887 he was elected a member of the Academy.

LECOT, le-ko, Victor Lucien Sulpice,

Cardinal, French Roman Catholic clergyman : b. Montescourt, 8 Jan. 1831 ; d. Chambery, 19 Dec. 1908. He was educated at the Petit Seminaire at Compiegne and at the Grand Seminaire at Beauvais. He served as chap¬ lain in the French army in the Franco-Prus- sian War and in 1886 was consecrated bishop of Dijon. He became archbishop of Bor¬ deaux in 1890 and cardinal priest of Santa Pudenziana in 1893. He protested against the Church Separation Law of 1901, but endeav¬ ored to persuade the Pope to sanction a com¬ promise.

LECOUVREUR, le-koov-rer, Adrienne, French actress: b. Damery, Champagne, 5 April 1692; d. Paris, 20 March 1730. Arriving at Paris _ in her 10th year she made her first theatrical venture three years later, and was

immediately engaged for the theatre at Lille. For the following 10 years she was <(on the road" as member of various traveling com¬ panies, but in 1717 was called to the Comedie Frangaise, and made her debut as Electra in Crebillon's tragedy. Her simple and natural impersonation made a deep impression on the most fastidious of audiences, and from that time she played the role of most of the heroines in Corneille and Racine with such success that she was welcomed into the most aristocratic circles of the city and was drawn into corre¬ spondence with some of the most intellectual men and women of the day, among whom was Voltaire. During the last 10 years of her life she counted among her admirers Maurice of Saxony, Voltaire and Lord Peterborough. She perished by poison administered by the Du- chesse de Bouillon, a jealous rival. This de¬ nouement is the subject of the play (Adrienne Lecouvreur,' by Scribe and Legouve. Consult Mouval, (Lettres d'Adrienne Lecouvreur'

(1892).

LECTERN, or LETTERN, the reading-

desk or stand on which the larger books used in the services of a church are placed. The most ancient lecterns were made of wood, and elaborately carved. Modern ones have been

Brass Lectern, Cathedral of Saint John the Divine, New York City.

made of marble or brass, very ornamental in design and of excellent execution. They are sometimes made in the form of an eagle, the outspread wings of which form the support for the volume.

LECTIONARY (Lat. lectionarium) , orig¬ inally a service-book of the church of the Middle Ages, so termed as it contained the les¬ sons (lectiones) or passages of Scriptures, read in the church service. The Roman Catholic Lectionary contained the epistles and gospels of the Roman missals, sometimes also all the les¬ sons of the various services in the Church, in which case it was termed the Plenarium. The

most ancient known, the Gallican Lectionary, is believed to represent the rite of the ancient Gallican Church. It was published from a manuscript of the monastery of Luxeuil in 1685, by Mabillon (q.v.), who attributed it to the 7th century. It was written in Merovingian characters, it names the festival of Saint Gene¬ vieve, and assigns three lessons to each mass, in accordance with the ancient Gallican liturgy.

In the Greek Church the lectionaries consist of lessons from the Gospels, from the Acts and Epistles. The Greek lectionary is called Syn- axarion (avvaˆdpto), and the oldest synaxarion extant is that prefixed to the Codex Cyprius (K), a manuscript of the New Testament which belongs to the 8th century.

The lectionary or calendar of the English Book of Common Prayer was first published in 1559, and contained two lessons, one from the Old Testament and one from the New for daily morning and evening prayer, and special lessons for Sundays and holidays. This lection¬ ary was adopted by the Protestant Episcopal Church of the United States in 1789, but in 1883 the General Convention changed it by re¬ vision into the form which it now bears. In accordance with this assignment the Old Testa¬ ment is appointed to be read through in the course of public worship once a year; the New Testament being read three times

in the same period.

LECTISTERNIUM, among the ancient Romans, a sacrifice of the nature of a feast offered to the gods, an evident survival of the idea common in early stages of religious development that divinities actually partook of the offerings presented to them. On occasions of extraordinary solemnity, or in times of public calamity, the Greeks and Romans placed tables with food before images of the gods reclining on couches. According to Livy the first Roman lectisternium took place 354 b.c., when a terrible plague affected the cattle. These sacrificial feasts were of two kinds — ordinary, occurring almost daily, and extraor¬ dinary, occurring at intervals, and lasting from three to eight days, or longer. Consult Fowler, W. W., Toman Festivals> (London 1899).

LECTOR (reader), a minister of the church who reads the Bible, and other writings of a religious character, to the people. The order of lectors is the second of the minor orders in the Roman Catholic,. the first in the Greek Church. The office is now merely looked upon as one of the steps to the priest¬ hood, and only in the office for Good Friday does the missal recognize the functions of the lector. Lectors were consecrated by prayers and sometimes by laying on of the hands for this office; the candidate must have completed the seventh year of his age. They are men¬ tioned by Justin Martyr in the 2d century, and appear to have been proper officers of the Church in the 3d century. The orders in the Roman Catholic Church are bishop, priest, deacon, subdeacon, acolyte, exorcist, reader, ostiarius or doorkeeper See Orders, Holy.

LECTURESHIPS, Endowed. The lec¬ ture platform has provided many opportunities for extended influence and instruction. Recog¬ nizing their value, many lectureships are en¬ dowed, mainly, in connection with various edu¬ cational institutions. The income from the in¬

vested funds is sufficient to pay the lecturer for his work and his expenses. Nearly all the educational institutions of England and Amer¬ ica have one or more such lectureships. There is another group of lectureships endowed with sufficient funds wherewith to publish the lec¬ tures, and thus, make them of permanent value. We confine this article to this smaller group. The majority of these lectureships are theo¬ logical.

I. English Lectures. — The oldest series of lectures was founded as the result of the bequest of Robert Boyle. Dr. Richard Bent¬ ley was the first lecturer in the long series which was begun in 1691. The Boyle

Lectures are in defense of natural and revealed religion. They are delivered in the Chapel Royal at Whitehall. The power of appointment to the lectureship lies with the bishop of London.

The Bampton Lectures founded by the be¬ quest of John Bampton, canon of Salisbury, were given annually at Saint Mary's, Oxford University, for many years beginning in 1781. They are now given in alternate years, due to the depreciation of the income. The incum¬ bent must be an M.A. from either Oxford or Cambridge University and cannot fill the lec¬ tureship twice. The lecturers are chosen by the heads of the colleges of Oxford Univer¬ sity. The subjects allowed cover almost the entire range of theology.

The Hulsean Lectures founded by John Hulse have been delivered annually at Cam¬ bridge University since 1820. They are con¬ fined to a discussion of Christian evidences or biblical difficulties. John Hulse also gave the endowment for a prize essay.

The Congregational Union Lectures were founded in 1831 and began in 1833. They appear at irregular intervals. They are not confined to particular subjects, but are allowed a wide range in the field of theology.

The Cunningham Lectures were founded by Dr. W. Binney Webster to perpetuate the memory of Rev. William Cunningham, prin¬ cipal of Free Church College, Edinburgh. The lecturer is usually selected from the Free Church of Scotland, but not necessarily. They are delivered in Edinburgh and deal with biblical and theological subjects. The first lec¬ ture was delivered in 1864 by Robert A. Cand- lish.

The Fernley Lectures were founded by John Fernley to explain and defend the theological doctrines and polity of the Wesleyan Metho¬ dist Connexion. The first lecture was given in 1870. The lectures are given annually before the conference of ministers of the Wesleyan Methodist Connexion.

The Baird Lectures were founded in 1873. The lecturers are selected by the trustees of the endowment fund which amounts to £500,000 ($2,500,000). The lecturers are chosen only from ministers of the Church of Scotland, and ministers of any other Scotch Presbyterian Church. The lectures have largely dealt with biblical and theological subjects and the church history of Scotland.

The Croall Lectures are named after their founder, Mr. John Croall, and are designed to defend and maintain the doctrines of the Chris¬

tian religion, ((and to increase the religious literature of Scotland.® The lecturer is pref¬ erably chosen from the ministry of the Pres-

byterian churches of Scotland. The lectures are delivered at Edinburgh and were begun in

1875.

The Hibbert Lectures were founded for the purpose of furthering the study of comparative religion. They are delivered at Oxford and London. The lecturers are not drawn exclu¬ sively from England. The first lecture was delivered by Max Muller in 1878.

Lord Gifford founded the lectures which bear his name. They are delivered at the uni¬ versities of Edinburgh, Glasgow, Aberdeen and Saint Andrews. The first lectures were deliv¬ ered in 1888. See Gifford Lectures.

The Schweich Lectures dealing with Old Testament subjects have been given at the British Academy, London, since 1910.

The Drew Lectures on Immortality were delivered at Oxford University in 1912 by R. H. Charles.

The Christian Evidence Society maintained a course of lectures for several years.

II. American Lectures. — The Ely Lectures were founded in 1865 by Mr. Zebulon Stiles Ely of New York, and are delivered at inter¬ vals under the auspices of Union Theological Seminary in New York. The subjects are all within the range of apologetics.

The Yale Lectures on preaching on the Lyman Beecher foundation were inaugurated in 1872 when Henry Ward Beecher gave the first course before the Yale Divinity School.

The Stone Lectures of Princeton Theolog¬ ical Seminary were founded by Mr. Levi P. Stone of Orange, N. J., in 1871. The first lecture was delivered in 1883 by Mark Hopkins. The subjects are theological.

The bequest of John Bohlen of Philadel¬ phia in 1874 established the John Bohlen Lec¬ tureship in connection with Holy Trinity Church,

Philadelphia. The lecturers are to confine themselves to the subjects discussed by the Bampton lecturers.

The Lowell Lectures are given from time to time under the auspices of the Lowell Insti¬ tute of Boston, Mass. A course was given by Francis Bowen as far back as the winter of 1848-49. The foundation dates from the be¬ quest of John Lowell in 1836. The subjects in¬ clude psychology, anthropology, natural theol¬ ogy and apologetics.

The Mendenhall Lectures are given at De Pauw University, Greencastle, Ind., and deal with some phase of the <(Divine origin, inspira¬ tion and authority of the Bible.® They were founded by the bequest of Marmaduke H. Mendenhall, D.D., and were inaugurated in

1915.

The Louis Clark Vanuxem Foundation of Princeton University was named after its donor after the receipt of his bequest in 1879. The lectures are to be on subjects of current scientific interest.

The Bishop Paddock Lectureship was founded in 1880 by Mr. George A. Jarvis of Brooklyn, N. Y., in loving memory of his former pastor and friend, Rt. Rev. Benjamin Henry Paddock, bishop of Massachusetts. They are delivered at the General Theological Seminary in New York city. Their aim is, (

Frederick Merrick, for 51 years a member of the faculty of Ohio Wesleyan University, founded the Merrick Lectureship in that insti¬ tution in 1889. The lectures cover the ((gen- eral field of experimental and practical reli¬ gion.®

In 1892 a committee of representatives of several of the leading universities organized (The American Lectureship on the History of Religions) for <(the purpose of encouraging the intelligent study of religion.® The first lecture was delivered in 1895.

The Ingersoll Lectureship, on the immor¬ tality of man, was founded at Harvard Uni¬ versity in 1893 by the bequest of Mrs. Caroline Haskell of Keene, N. H.

The Barrows Lectures on Christianity are given under the auspices of the University of Chicago and delivered in the Far East. They were founded by Mrs. Caroline Haskell in 1894 as the result of the World Parliament of Religions held in Chicago in 1893. The first course was given in 1 895—96 by John Henry Barrows, after whom they are named. In the year 1894 Mrs. Haskell also gave the Univer¬ sity of Chicago the Haskell Lectureship on Comparative Religion.

Mr. William Belden Noble of Washington, D. C., founded the William Belden Noble Lec¬ tures at Harvard University in 1898. The sub¬ jects are to be within the (

The Cole Lectures were founded by Col. E. W. Cole and wife of Nashville, Tenn. They are delivered in connection with the Biblical department of Vanderbilt University, and are restricted to (

Lake Forest College, Lake Forest, Ill., re¬ ceived from the late lieutenant-governor of Illinois, William Bross (1866-70), fund's for the endowment of the Bross Foundation in honor of his son, Nathaniel Bross, who died in 1856. The funds had accumulated so that the first

course of lectures was possible in 1903. The subjects are within the range of Christian evidences. The same fund also provides for a prize to be given to the writer of the most important book in a given period, in the same field.

The Hale Lectures were founded in 1900 in connection with Western Theological Seminary of Chicago, Ill., by the bequest of Rt. Rev. Charles Reuben Hale, bishop coadjutor of Springfield. The subjects specified are: <(litur- gies and liturgies; church hymns and church music; the history of the Eastern churches; the history of the national churches ; contem¬ poraneous church history.®

The Nathaniel William Taylor Lectures are given annually before the Divinity School of Yale University and had their beginning in 1903. They deal with the evidences of the Christian religion.

The Norman W. Harris Lectures were founded by the late Norman Waite Harris, a banker of Chicago, Ill. They are delivered at Northwestern University, Evanston, Ill. They were founded ((to stimulate scientific re¬ search of the highest type.® The first lectures

were given by Prof. Borden P. Bowne of Bos¬ ton University in 1907.

In 1905 Mrs. Caroline E. Haskell of Chi¬ cago, Ill., established a lectureship at Oberlin College on <(Oriental literature and its relation to the Bible and Christian teaching.® The first lecture was given in 1907.

The George Shepherd Lectures on Preach¬ ing are delivered under the auspices of Bangor Theological Seminary, Bangor, Me. The first lectures were delivered in 1904.

There are other courses of endowed lec¬ tures in connection with various institutions and societies which do not publish their lec¬ tures. All the foundations represented above have published most of the lectures given on the foundation. There are also lectures covering one or more years which we have not in¬ cluded, like the Saint Giles Lectures on Com¬ parative Religion, the Saint Margaret's Lec¬ tures and the Ingham Lectures.

Samuel G. Ayres, Garrett Biblical Institute.

LEDA, le'da, in Greek mythology, the wife of the Spartan king, Tyndareus. In order to enjoy her, Zeus changed himself into a swan, in which form he is represented with her in a picture from Herculaneum. By him she had Pollux and Helen, and by Tyndareus, Castor and Clytemnestra.

LEDA, genus of bivalve mollusk with a small elongated shell concentrically striated, hinged with two rows of small saw-like teeth and an external ligament. It exists in the Silurian time and is still represented by various living species. It is of the Lamellibranchiata family and is sometimes classified as of the family Ledice. See Pelecypoda.

LEDESMA BUITRAGO, la-des'ma bwe- tra'go, Alonso de, Spanish poet : b. Segovia, 2 Fe'b. 1562; d. there, 15 June 1632.. His work was romantic and highly imaginative, charac¬ terized by fanciful exaggerations, and was the foundation of a school of verse-writers known as ((conceptistas ,® named from the first of the poet's books. The works of Quevedo and Lope de Vega are supposed to have been influenced by him. Author of (Conceptos espirituales> (1600) ; (Juegos de nochebuena) (1611) ; (Ro- mancero y monstruo imaginado) (1615) ; Epi¬ grams y hieroglificos a la vida de Cristo) (1625). Specimens of his verse are published in Rivadeneira's (Biblioteca de autores espa- noles> (Vol. XXXV, 1872).

LEDOCHOWSKI, Miecislas Halka, me- a-kes'las hal'ka led-6-hov'ske, Polish Roman Catholic ecclesiastic: b. Galicia, 29 Oct. 1822; d. Switzerland, 22 July 1894. He studied the¬ ology and subsequently entered the papal dip¬ lomatic service and became papal auditor suc¬ cessively at Madrid, Lisbon, Rio de Janeiro and Santiago de Chile. In 1861 he was ap¬ pointed archbishop of Thebes, while his ap¬ pointment to the archbishopric of Gnesen and Posen in 1866 constituted him primate ex officio of Poland. He actively opposed the Prussian May laws by which Bismarck sought to sub¬ ject the Roman Catholic Church in Germany to state control. In consequence of his oppo¬ sition, his property was confiscated and himself imprisoned in 1873 for two years. He was created cardinal in 1875 and in 1892 general prefect of the propaganda.

LEDOCHOWSKI, Wlodimir or Vladi¬ mir, Russian-Polish priest : b. Loosdorf, Gali¬ cia, 7 Oct. 1866. He came of a family distin¬ guished in Russia and in Austria, and was educated at the Vienna Gymnasium, the Semi¬ nary, Tarnow, Austria, and at the Germanicum, Rome. He entered the order of the Jesuits in 1889 and was ordained in 1894. He became vice-provincial, then provincial for Poland ; in 1906 he was

elected assistant-general and in 1915 general of the Society of Jesus in cen¬ tral Europe. He was actively connected with various undertakings looking toward a peace¬ able settlement of the European War

LEDOUX, le-doo, Albert Reid, American mining engineer: b. Newport, Kv., 2 Nov. 1852. He was educated at the Columbia School of Mines and the universities of Berlin and Got¬ tingen. He was State chemist and a member of the State Board of Health of North Caro¬ lina in 1876-80, thereafter acting professionally as consulting engineer, metallurgist, assayer and chemist and as an expert in chemistry and engineering cases. He served for two years as expert on the New York Electric Subway Commission. He was president of the American Institute of Mining Engineers in 1903 and is a member of the leading scientific societies.

LEDOUX, Louis Vernon, American poet: b. New York, 6 June 1880. He was graduated at Columbia University in 1902 and became associated with his father's firm, Ledoux and Company, mining engineers and metallurgists, of which he is vice-president. He has devoted considerable time to writing verse and has achieved a considerable success in that line. Author of (Songs from the Silent Land> (1905) ; (The Soul's Progress and Other Poems) (1907) ; (Yzdra) (1909) ; (The Shad¬ ow of Etna) (1914); a lyrical drama, (Story of Eleusis) (1916) ; (George Edward Wood- berrv, a Study of His Poetry* (1917).

LEDRAIN, le-dran', Eugene, French

archeologist: b. Sainte-Suzanne, Mayenne, 1844; d. Paris, 1910. He was educated for the priesthood but devoted himself to researches in Oriental archaeology. He was for many years a curator in the department of Oriental antiquities at the Louvre and also served as a professor in the Ecole du Louvre. He was author of (Un grand seigneur feodal dans la moyenne Egypte* (1876) ; (Les momies greco-egyptiennes ornees de portraits peints sur pen- neaux) (1877) ; (Histoire d'lsraeP (2 vols., 1879-82) ; (Les monuments egyptiens de la bibliotheque nationale) (2 vols., 1880-81) ; (Dictionnaire des noms propres palmyreniens* (1886) ; (Traduction de la bible> (6 vols., 1886- 90) ; (Catalogue des monuments arameens et himyarites du Musee du Louvre) (1888) ; (Dic- tionnaire de la langue de l'ancienne Chaldee*

(1897).

LEDRU-ROLLIN, le-dru-r5l-lan, Alex¬ andre Auguste, French political

agitator: b. near Paris, France, 2 Feb. 1807; d. Fontenay- aux-Roses, France, 31 Dec. 1874. Admitted to the bar in 1830, he became prominent in the defense of Republican journalists and men of similar views in the reign of Louis Philippe, and later as a democratic agitator and leader of the workingmen's party. On the outbreak of the Revolution of 1848 he became a member of

the provisional government as Minister of the Interior, and in May was one of the five in whose hands the Constituent Assembly placed the interim government. But he offended everyone by his arbitrary conduct, and resigned. He was a candidate for the Presidency against Louis Napoleon in the following December, but was ignominiously beaten. An unsuccess¬ ful attempt to provoke an insurrection against his rival put an end to his influence, and for the next 20 years he lived alternately in Lon¬ don and Brussels, being amnestied only in 1870. After his return to France he was elected to the Assembly in 1871, and again in 1874.

LEDUM OIL. See Labrador Tea.

LEDYARD, John, American traveler : b. Groton, Conn., 1751 ; d. Cairo, Egypt, 17 Jan. 1789. He entered Dartmouth College in 1772, with a view of fitting himself for missionary duty among the Indians. The restraints of this mode of life proving irksome, he absented himself at one time from college for several months, during which he visited the Indians of the Six Nations; and, finally abandoning the idea of becoming a missionary, he embarked on the Connecticut River in a canoe of his own fashioning and floated down to Hartford. After a brief experience as a theological stu¬ dent, he shipped at New London as a common sailor in a vessel bound for the Mediterranean, and at Gibraltar enlisted in a British regiment, but was discharged at the request of his cap¬ tain. He accompanied Captain Cook on his third voyage around the world, 1776-80, and of this voyage he kept a private journal, which in accordance with a general order of the government was taken from him on the return of the expedition to England. Subsequently he wrote out from recollection, assisted by a brief sketch issued under the sanction of the Admiralty, an account of the expedition, pub¬ lished in 1783. During the two years suc¬ ceeding his return to England he remained in the British naval service, but steadily refused to take arms against his native country. In December 1782, he found means to escape. He intended to journey

through northern Europe and Asia and after surmounting many obstacles arrived at Irkutsk, where on 24 Feb. 1788 he was arrested by order of the Empress Cath¬ erine, conducted with all speed to the frontiers of Poland, and there dismissed, with an intima¬ tion that he would be hanged if he re-entered Russia. Ledyard found his way back to Lon¬ don in the spring, and was cordially received by Sir Joseph Banks and others who had be¬ friended him. Undaunted by previous adver¬ sities, he eagerly accepted an offer to under¬ take an expedition into the interior of Africa; and when asked how soon he would be ready to set out, replied: <(To-morrow morning.® He departed from England in the latter part of June, intending to cross the African continent in a westerly direction from Sennaar, and had proceeded as far as Cairo, when he died. For capacity of endurance, resolution and physical vigor, he was one of the most remarkable of modern travelers. Many extracts from his journals and his private correspondence with Jefferson and others are given in Sparks' mem¬ oir of him.

LEDYARD, Lewis Cass, American law¬ yer and financier: b. Michigan, 4 April 1851.

He took his A.B. at Harvard in 1872, and his LL.B. at the Harvard Law School in 1875, afterward engaging in law practice in Boston. He became associated with various corpora¬ tions, railroads and telegraph companies as a director, was president of the Franklin Build¬ ing Company and a trustee of the United States Trust Company. He was trustee and vice-president of the New York Public Li¬ brary, president of the Lying In Hospital and a trustee of the Metropolitan Museum of Art.

LEDYARD, William, American soldier: b. Groton, Conn., about 1750; d. Fort Griswold, Conn., 7 Sept. 1781. He held the commission of colonel in the militia of Connecticut, and during the marauding expedition of Arnold in September 1781 was in command of Forts Trumbull and Griswold, which protected New London. He refused a demand for the surren¬ der of Fort Griswold, and resisted for nearly an hour the attack of a British force numbering 800 men. The command of the attacking force devolved upon Major Bromfield, a Tory, who effected an entrance into the fort after nearly 200 of his men had been disabled, including 48 killed, the Americans having lost about a dozen killed. To Bromfield's inquiry: (

LEE, Agnes, American writer, formerly of Boston, now Mrs. Otto Freer, of Chicago, has written many poems for the leading maga¬ zines. Several years ago she published a book of poems for children. She has

translated into English the poems of Theophile Gautier, Flau¬ bert's (St. JulienP Gregh's (Maison de l'En- fance,* etc. In 1910 appeared her volume of poems, (The Border of the Lakeˆ and in 1914 (The Sharing, } a book of her later poems. She has written several poetical plays.

LEE, Albert, American author and editor : b. New Orleans, 11 May 1868. He prepared for college at Exeter where he was one of the founders of the Phillips Exeter Literary Maga¬ zine, which still exists. He was graduated from Yale in 1891, having during his senior year edited the Yale Literary Magazine. In 1891—94 he was on the editorial staff of the New York Sun ; in 1895 became editor of Harper's Round Table; and in 1899 was for a short time associate editor of McClure's Magazine, becoming managing editor of Har¬ per's Weekly in the same year. In 1901-03 he was associate editor of Collier's Weekly, tak¬ ing the position of managing editor in January 1903. In 1911 he went abroad for a period of travel, and in June 1913 associated himself with Mr. Conde Nast in the starting of the magazine Vanity Fair, of which he is now managing editor. He has written Tommy Toddles > (1896) ; (Track Athletics in Detail > (1897) ; (The Knave of Hearts1* (1897) ; (Four for a Fortune1* (1898) ; (He, She and They) (1899) ; (The Pie and the Pirate) (1910), (Miss Phoenix) (1912), which he later dramatized

and produced at the Harris Theatre, New York, in October 1913.

LEE, Alfred, American Protestant Episco¬ pal bishop: b. Cambridge, Mass., 9 Sept. 1807; d. Wilmington, Del., 12 April 1887. He was graduated at Harvard in 1827, and after study¬ ing law practised for three years in New Lon¬ don, Conn. Feeling, however, that his vocation was elsewhere he was admitted to the General Theological Seminary, where he was graduated in 1837. He was elected rector of Calvary Church, Rockdale, Pa. (1838), but on being consecrated first bishop of Delaware in 1841, took charge of Saint Andrew's, Wilmington, the following year. He was a member of the American Committee for Revision of the Neiv Testament (1881) and presiding bishop (1884— 87). He is the author of (Life of Saint Peter5 (1852); (Life of Saint John5 (1854); (A Treatise on_ Baptism5 (1854) ; (Harbinger of Christ5 (1857) ; (Co-operative Revision of the New Testament5 (1881).

LEE, Algernon, American journalist: b. Dubuque, Iowa, 15 Sept. 1873.

He was edu¬ cated at the University of Minnesota, and from 1895 was identified with the Socialist move¬ ment. He edited the Tocsin at Minneapolis in 1898-99, the Worker in New York in 1899- 1908, and th'e Daily Call in 1908-09, when he became a department editor on the Metropoli¬ tan Magazine. He was appointed educational director of the Rand School of Social Science in 1909, and in 1904, 1906, 1916 and 1917 was a delegate to the International Socialist con¬ ventions. He opposed the sale of War Savings Stamps and invited considerable censure by his hostile attitude toward the conduct of the European War.

LEE, Ann, foundress of the Society of Shakers in America. See Shakers.

LEE, Arthur, American diplomatist : b. Stratford, Westmoreland County, Va., 21 Dec. 1740; d. Urbana, Middlesex County, Va., 12 Dec. 1792. He was educated at the University of Edinburgh ; entered the practice of medicine at Williamsburg, Va. ; studied law in the Tem¬ ple, London (1766-70) ; practised in England in 1770-76; closely observed colonial questions; was a member of the society known as ((The Supporters of the Bill of Rights,55 by which ministerial measures were discussed, and in 1770 was appointed associate of Franklin as London agent of Massachusetts colony. When Congress appointed Franklin, Jay and Dickin¬ son a committee to correspond with friends of the colonies in other parts of the world, Lee became secret agent in London of the commit¬ tee; and in 1776 he was chosen by Congress joint commissioner with Franklin and Deane to obtain a treaty of alliance with France. In 1777 he dispatched special missions to the gov¬ ernments of Spain and Prussia; in 1778 became commissioner to Spain; but in 1779 was recalled owing to his disagreements with Franklin and Deane. He was a representative in the Vir¬ ginia general assembly in 1781 ; a delegate to the Continental Congress in 1781-84, and a member of the board of treasury in 1784-ˆ89. He opposed the adoption of a Federal constitu¬ tion. Consult Lee, R. H., (Life of Arthur Lee5 (1829).

LEE, Blair, American legislator and law¬ yer : b. Silver Springs, Md., 9 Aug. 1857. He

was graduated from Princeton University in 1880 and from the Columbian (now George Washington) University in 1882, and was ad¬ mitted to the bar in Maryland and in the Dis¬ trict of Columbia. He was elected to the Maryland State senate in 1905 and in 1909, and on 4 Nov. 1913 he was elected to the United States Senate to fill the term of Senator Jack- son, expiring 3 March 1917.

LEE, Charles, American soldier: b. Dern- hall, Cheshire, England, 1731 ; d. Philadelphia, 2 Oct. 1782. In 1751 he entered the English army as lieutenant of the 44th, which he ac¬ companied to America in 1754, and with which he was present at Braddock's defeat on the Monongahela (9 July 1755). H»e was wounded in Abercrombie's attack on Ticonderoga (1 July 1758), took part in the capture of Montreal in 1760 and was promoted major in 1761. He served in Burgoyne's division in Portugal in 1762, and was for a time busy with a scheme for establishing in America two colonies, one on the Ohio, the other on the Illinois, to be recruited from Switzerland and Germany as well as New England. In 1764 he went to Poland, there was appointed to the staff of King Stanislaus Augustus, in 1766 accompanied the Polish embassy to Turkey, in 1769 as a major-general in the Polish army fought in a campaign against the Turks, and having called his superior officers fools, left the service and returned to England. _ He was made lieutenant- colonel on half-pay in 1772, but was further unrecognized by the British government, and in disappointment came to America 10 Nov. 1773, and by skilful display of what military knowledge he possessed attracted the attention of the Continental Congress, then eager to ob¬ tain competent leaders for the Revolutionary army. His career thenceforth was perhaps the strangest in the annals of the Revolution. He wished to become commander-in-chief of the American forces, but accepted the appointment as second of the major-generals, Artemas Ward (q.v.) being the first. To inspire public con¬ fidence he purchased for £5,000 Virginia cur¬ rency (about £3,000 sterling), an estate in Berkeley County, Va. ; but he did not assume his rank until guaranteed by Congress pecuniary indemnity for possible losses incurred in so doing. He undeservedly received popular credit for Moultrie's successful defense of Charles¬ ton, S. C. (28 June 1776), and was called the <(Hero of Charleston.55 In 1776 he became first major-general upon the resignation of Ward. He failed to obey when ordered by Washington to cross the Hudson from Westchester County with his 7,000 troops and join the latter in New Jersey; but when Washington was com¬ pelled to fall back on Princeton (2 Dec. 1776) crossed the river to Morristown and encamped there with 4,000 troops. Gates marched from Ticonderoga with seven regiments for Wash¬ ington's aid, but Lee diverted three of the regi¬ ments to Morristown. Washington crossed the Delaware into Pennsylvania, and Lee diligently spread reports of the commander-in-chief's in¬ capacity and planned a flank movement upon the British army whose success he intended should secure his own appointment to replace Washington. He was, however, captured at Baskingridge (13 Dec. 1776), and imprisoned at New York, where he deserted the American cause, and designed a plan for the subjugation

of the American colonies, the original draft of which was found among the private papers of the Howes in 1857. He was exchanged in 1778, and re-entered the American service for reasons not fully known ; hut his insubordination at Monmouth (28 June 1778) nearly lost the day, and he was suspended from command for one year. A subsequent disrespectful letter to Con¬ gress caused his dismissal from the army. His treasonable correspondence with the British au¬ thorities was not discovered till many years after. He wrote (Strictures on a Friendly Ad¬ dress to all Reasonable Americans) (1774) in reply to Dr. Myles Cooper (q.v.) ; and made a foolish claim to be the author of the ((Junius):> letters. Consult the (Memoirs,) edited from his papers by Langworthy (1792), and Moore, (The Treason of Charles Lee5 (1858).

LEE, Charles, American Cabinet officer : b. Leesylvania, Va., 1758; d. Fauquier County, Va., 24 June 1815. He was a brother of Henry Lee, soldier (q.v.). He was graduated from the College of New Jersey in 1775; studied law in the office of Jared Ingersoll at Philadelphia; practised in Westmoreland County, Va., and sat in the Virginia assembly. On 10 Dec. 1795 he was appointed by Washington Attorney- General of the United States, and this office he filled until the last month of Adams' adminis¬ tration (1801). He declined an appointment by Jefferson as chief justice of the United States Circuit Court for the fourth circuit.

LEE, Eliza Buckminster, American prose writer: b. Portsmouth, N. H., 1794; d. Brook¬ line, Mass., 22 June 1864. She was married to Thomas Lee of Boston, Mass., where the greater part of her life was spent. She was a popular author in her day and among her books are (Sketches of New England Life5 (1837) ; delusion5 (1839) ; a translation from the Ger¬ man of the (Life of Jean Paul Richter5 (1842) ; (Naomi; or, Boston Two Hundred Years Ago5 (1848); (Parthenia; or, The Last Days of Paganism5 (1858), and a translation of Ber- thold Auerbach's (Barefoot Maiden5 (1860).

LEE, Fitzhugh, American soldier and di¬ plomatist: b. Clermont, Fairfax County, Va., 19 Nov. 1835; d. Washington, D. C., 28 April 1905. He was the nephew of Robert E. Lee (q.v.). Appointed as cadet at large to West Point by President Fillmore, he entered the academy at 16, and was graduated in 1856, re¬ ceiving an appointment to the famous Second cavalry of which A. S. Johnston was colonel and R. E. Lee was lieutenant-colonel. After serving for a year at Carlisle

Barracks as cavalry instructor of recruits, he reported to his regiment on the frontier of Texas and was greatly distinguished in several fights with the Indians, being mentioned in the official reports for skill and gallantry. In a fight with .the Comanches, 13 May 1859, he was severely wounded, but recovered and joined his com¬ mand. He led a part of his company in Janu¬ ary 1860, in a very notable and successful fight with the Indians, in which he greatly distin¬ guished himself in a single combat with an Indian chief. In November 1860 he was ordered to West Point as instructor of cavalry tactics. When Virginia seceded from the Union he promptly resigned his commission and ten¬ dered his services to his native State. He served for a time on the staff of Gen. R. S.

Ewell, and in September 1861 he became lieu¬ tenant-colonel, and in April 1862 colonel of the First Virginia cavalry. Henceforth he was in¬ timately connected with Stuart's cavalry and won constant reputation for dash, daring and intelligent execution of duty. After the battles around Richmond he was made brigadier-gen¬ eral, his brigade consisting of the 1st, 3d, 4th, 5th and 9th Virginia cavalry and a battery of horse artillery. In the campaign against Pope and the Maryland campaign the cavalry ren¬ dered most important service, and General Lee did his full duty in these operations. When Gen. Robert Lee withdrew from Sharpsburg, Fitzhugh Lee's brigade relieved the pickets and held the lines till the army had crossed the Potomac. On 17 March 1863 Averell's division of 3,000 cavalry crossed the river at Beverly's Ford, and attacked him; though he could only put 800 troopers in the saddle, he successfully resisted Averell, and after one of the most hotly contested cavalry battles of the war drove him back across the river. In the Chancellors- ville movement he protected Jackson's flank, and made a very important reconnoissance by which he located the flank and rear of the enemy, and enabled Jackson to attack it to the best advantage. In the autumn of 1863 he was made major-general and given command of a division of cavalry. In the campaign of 1864 he rendered important service, holding in check the advance of Grant's army until Gen. R. E. Lee's infantry could occupy Spottsylvania, re¬ pelling Sherman's raid on Richmond, defeating Sheridan at Trevillians and Samaria Church, routing Wilson at Reams Station and operating with Early in the Valley, being severely wounded at the battle of Winchester. When Hampton was sent south Lee was given the command of the entire cavalry corps of the Army of Northern Virginia, conducting the re¬ treat to Appomattox, was one of the council of war whom Robert Lee consulted, and one of the leaders in the last charge of the Army of Northern Virginia. He ((accepted the situa¬ tion55 after the surrender, and went to work on his farm at

Richland. From 1886 to 1890 he was governor of Virginia. In 1896 he was appointed consul-general to Cuba, in which position he kept the State Department thor¬ oughly informed of the Spanish policy during the rebellion, and vigorously upheld the rights and interests of the United States; after the destruction of the Maine he did much to pre¬ vent the premature outbreak of war with Spain, but when war was inevitable he was recalled. In May 1898 he was appointed major-general of United States volunteers, and assigned to the command of the 7th army corps. At the close of the war he was made military governor of the province of Havana, and later was given the command of the Department of the Mis¬ souri. He published (Robert E. Lee5 (1894, in (Great Commanders' Series), and (Cuba's Struggle against Spain5 (1899).

J. W. Jones, D.D.

LEE, Francis Bazley, American lawyer and historical writer: b. Philadelphia, 3 Jan. 1869; d. Trenton, N. J., 2 May 1914. He was educated at the State Model School in Trenton, N. J., and was. graduated from the Wharton School of Political Economv in the University of Pennsylvania in 1890. He was admitted to

the New Jersey bar in 1893 and thereafter prac¬ tised his profession in Trenton. In addition to , various historical monographs relating to New Jersey, he is the author and editor-in-chief of /New Jersey as a Colony and a State/

LEE, Francis Lightfoot, American patriot :

b. Stratford, Westmoreland County, Va., 14 Oct. 1734; d. Richmond County, Va., 3 April 1797. He was elected to the Virginia house of burgesses for Loudoun County in 1765, and later represented Richmond County in that assembly. He signed the Westmoreland decla¬ ration against the Stamp Act (1765), and on 15 Aug. 1775 became a member of the Con¬ tinental Congress, where he served until the spring of 1779. On 4 July 1776 he was one of the 56 signers of the Declaration of Independ¬ ence. He also was a member of the committee that prepared the Articles of Confederation, and was prominent in debate, particularly on the questions of the Newfoundland fisheries and the navigation of the Mississippi. After his retirement from Congress he served for a brief term in the Virginia

legislature. Consult San¬ derson, (Lives of the Signers) (Vol. IX, 1827).

LEE, Frederic Schiller, American physi¬ ologist: b. Canton, N. Y., 16 June 1859. He studied at Saint Lawrence University, at Johns Hopkins and at Leipzig, and in 1886-87 he was instructor in biology at Saint Lawrence Univer¬ sity. He was instructor and associate professor of physiology and histology at Bryn Mawr Col¬ lege in 1887-91. In 1891 he was appointed demonstrator of physiology at Columbia Uni¬ versity and he was subsequently adjunct pro¬ fessor and Dalton professor there, becoming Jessup lecturer in 1911. He was appointed to the United States Public Health Service in 1917. He edited the American Journal of Physiology in 1898-1914, and since 1900 has edited the Columbia University Quarterly. He has translated and edited a number of medical treatises, has contributed to the leading scien¬ tific journals and is author of Scientific Features in Modern Medicine) (1911).

LEE, Gerald Stanley, American author and lecturer : b. Brockton, Mass., 4 Oct. 1862. He was graduated from Middlebury College, Vermont, in 1885, and from Yale Divinity School ‘in 1888. He was a Congregational minister for the ensuing nine years at Princeton, Minn., Sharon, Conn., and West Springfield, Mass. He was lecturer in the English department, Smith College, 1897, and has lectured on liter¬ ature and the arts since 1898. He is editor of Mount Tom , an All-Outdoors Magazine, and author of numerous magazine articles and the following ‘books: (About an Old New England Church* (1893) ; (The Shadow Christ* (1896) ; (The Lost Art of Reading* (1902) ; (The Child and the Book* (1902) ;

LEE, Guy Carleton, American publicist: b. 1862. He ‘was graduated at Rutherford Col¬ lege, North Carolina, in 1889 and was admitted to the bar of North Carolina in 1894, Pennsyl¬ vania in 1895 and Maryland in 1897. In 1895 he was professor of English history and common

law at Dickinson College ; in 1896-98 he was scholar, honorary scholar and Fellow, and in 1898-1905 instructor in history at Johns Hop¬ kins University. He lectured on comparative politics at George Washington University 1900- 02, was literary editor of the Baltimore Sun 1901-08, and since 1900 has been editor-in-chief of the International Literary Syndicate. He has published (Hincmar — An Introduction to the Study of the Church in t?he Ninth Cen¬ tury* (1898) ; (Public Speaking* (1899) ; (His- torical Jurisprudence* (1900) ; (Source Book of English History* (1900) ; (True History of the War Between the States* (1903) ; (Robert E. Lee: A Biography*

(1905); (The Heart of a Child* (1910) ; (The Soul of a Woman* (1910) ; (The Mind of Man* (1911) ; and was editor-in-chief of cThe World's Orators* (10 vols., 1900) ; (The History of Woman* (10 vols., 1902-03) ; (The History of North Amer¬ ica* (20 vols., 1903-05). He has also con¬ tributed to reviews and journals on legal, his¬ torical, political and social subjects.

LEE, Harriet, sister of Sophia Lee (q.v.) : b. London, 1756; d. Clifton, 1 Aug. 1851. In 1786 she published the (Errors of Innocence,* a novel succeeded by several others now for¬ gotten. In 1797-1805 appeared her ˆCanter¬ bury Tales,* 8 of the 10 tales of which were her own, the others being by her sister Sophia. They enjoyed a great popularity in the early part of the 19th century, and a new edition was published in New York in 1856-57. One of the most remarkable is the German tale, (Kruitzner,* from which Lord Byron borrowed not merely the plot and the machinery down to the most trivial incidents, but in some instances the language, of- his (Werner.* She also wrote two dramas, the (New Peerage* and the (Three Strangers.*

LEE, Henry, American soldier : b. Leesyl- vania, Westmoreland County, Va., 29 Jan. 1756; d. Cumberland Island, Ga., 25 March 1818. He was graduated from* the College of New Jersey in 1774; in 1775 became a captain in Col. Theo- doric Bland's legion of Virginia cavalry, and in September 1777 joined Washington's army in Pennsylvania. Promoted major for services in battle (January 1778), he was given command of a partisan corps consisting of two troops of horse, and latter increased by a third troop and an infantry company. This corps, which was employed in the. annoyance of the British march and camp, was known as (

abandon Camden (10 May 1781). He took Augusta, Ga. (5 June 1781), and having re¬ joined Greene, fought with distinction at Eutaw Springs (8 Sept. 1781), and captured some of Rawdon's rear-guard in the British retreat. After having been present at Yorktown, he short/ly resigned his commission. In 1785-88 he was a Virginia delegate to the Continental Con¬ gress; in 1788 was a member of the Virginia convention for the ratification of the Federal Constitution; in 1789-91 sat in the general as¬ sembly of the State and in 1792-95 was gov¬ ernor. In 1794 he was appointed by Washing¬ ton to command the 15,000 troops sent to sup¬ press the (

LEE, Hildegarde Langsdorf (Mrs. Guy Carleton Lee), American physician: b. Cen¬ terville, Pa., 26 March 1868. She was graduated at Dickinson College in 1888, and at the Woman's Medical College, Philadelphia, 1891. In 1912 she married Guy Carleton Lee (q.v.). She has practised her profession at Carlisle, Pa., since 1892 ; was on staffs of Harrisburg Insane Hospital, Norristown Insane Hospital, Tewksbury Almshouse. She is also assistant editor Pennsylvania Medical Journal, and sec¬ retary-treasurer National Society for Broader Education and many other societies ; is espe¬ cially interested in plans for financing charitable organizations, and is known as a lecturer on social and economic subjects and contributor of articles on sanitation, hygiene, etc.

LEE, James Prince, English bishop : b. London, 28 July 1804; d. Manchester, 24 Dec. 1869. He was graduated at Trinity College, Cambridge, 1828, ordained in 1830 and in 1830- 38 he served as a master at Rugby under Dr. Thomas Arnold. He was elected head-master of King Edward's School at Birmingham in 1838 and numbered among his pupils E. W. Benson, archbishop of Canterbury, J. B. Light-foot and B. F. Wescott, bishops o.f Durham. He became first bishop of the newly-created see of Manchester in 1848, and was especially notable for his work in church extension, con¬ secrating 130 churches in the 21 years he served as bishop. He was active in the establishment of the Manchester Free Library, and bequeathed his own library to Owens College, Manchester.

LEE, Jennette Barbour Perry, American novelist: b. Bristol, Conn., 10 Nov. 1860. She was graduated from Smith College, Massachusetts, in 1886, was professor of English at Vassar 1890- 93, and in the College for Women at Western Reserve University 1893-96, and in the year last

named was married to Rev. G. S. Lee (q.v.). In 1901-04 she was instructor in English and in 1904-13 professor of English language and literature at Smith College. She has published (Kate WetherelP (1900); (1916) ; (The Green Jacket* (1917), and nu¬ merous sketches and stories.

LEE, Jesse, American Methodist clergy¬ man: b. Prince Edward County, Va., 1758; d. September 1816. He was admitted to the Conference as a preacher among the Methodists in 1783, and was chosen as a friend and travel¬ ing companion by Francis Asbury. His writ¬ ings have been the basis of much of the his¬ tory of early Methodism in America. In 1789 he traveled over New England and preached Methodism from Connecticut to Maine. He formed the first

Methodist congregation in New England at Stratfield, Conn., 26 Sept. 1787. In 1792 he preached in Massachusetts, and gathered the first class at Boston 13 July 1792. He was chaplain to Congress during six suc¬ cessive terms. He is known in New England as ((The Apostle of Methodism.® He wrote (A History of Methodism in America) (1807). Consult Lee, L. M., (Life and Times of Jesse Lee> (1848).

LEE, John Doyle, Mormon official : b.

Kaskaskia, Ill., 1812; d. 23 March 1877. He became a Mormon in 1837, and after doing some missionary work began his official career. He was captain of militia, probate judge of Iron County and member of the Territorial legislature. In the Mountain Meadow Mas¬ sacre he was indicted as one of the chief instigators and was condemned to death. Con¬ sult (The Mormon Menace; being the Confes¬ sion of John Doyle Lee, Danite, an Official Assertion of the Mormon Church under the Late Brigham Young) (with an introduction by Alfred Henry Lewis, New York 1905). See Mountain Meadows Massacre.

LEE, Luther, American Methodist clergy¬ man : b. Schoharie, N. Y., 30 Nov. 1800; d. Flint, Mich., 13 Dec. 1889. He entered the Genesee Conference in 1827, became an itiner¬ ant preacher and a temperance and anti-slavery lecturer, and was several times mobbed on ac¬ count of his abolitionist sentiments. From 1843 to 1867 he was a member of the Wesleyan body, having as a Wesleyan clergyman been presi¬ dent in 1853 of Michigan Union College at Leoni and pastor of churches at Syracuse and elsewhere, but in 1867 returned to the Methodist Episcopal denomination. He was the author of (Universalism Examined and Exposed) (1836) ; (The Immortality of the SouP (1850) ;

(Slavery Examined in the Light of the Bible> (1855) ; (Elements of Theology* (1856) ;

(Natural Theology* (1866). His (Autobiog¬ raphy J was published in New York (1882).

LEE, Nathaniel, English dramatic poet: b.

Hatfield, about 1653 ; d. London, 1692. He was educated at Cambridge, turned his attention to the drama and in 1675 produced his tragedy of

ˆNeroP and from that time to 1681 produced a tragedy yearly. From 1684 to 1688 he was insane and confined in Bethlehem Hospital, and after his discharge two more tragedies of his were produced. He is the author of 11 plays, all of which were favorably received; but his natural fire and pathos were buried in a torrent of words and clouded by a tendency to ((furious fustian and turgid rant.® In his play, (The Rival Queens) (1677), occurs the of t-quoted line :

“ When Greeks joined Greeks then was the tug of War ”

LEE, Richard Henry, American patriot : b. .Stratford, Westmoreland County, Va., 20 Jan. 1732; d. ‘Chantilly, Va., 19 June 1794. He was educated in England, but returned in 1752 to Virginia, where he soon became prominent in public affairs and was elected to the house of burgesses. In 1773 he became a member of the committee of correspondence to communicate with the other colonies, and in 1774 was a dele¬ gate from Virginia to the first Continental Con¬ gress. There he attracted attention by his eloquence and drafted the petition to the king. In the second Congress he prepared the address to the people of Great Britain. Both of these documents are remarkable state -papers. On 7 June 1776 he moved ((that these united colonies are and of right ought to be free and inde¬ pendent states; that they are absolved from all allegiance to the British Crown; and that all connection between them and the states of Great Britain is and ought to be totally dissolved.® He was in the Virginia legislature m 1780-84, was elected president of Congress in 1784, in 1786 was again a member of the State legis¬ lature and in 1787 also sat in Congress. _ Upon the adoption of the Federal Constitution, to which he was opposed, he was elected one of the first two senators from Virginia and there remained, at first as an Anti-Federalist, until his resignation in 1792. He was one of the ■notable orators of his time. Consult Lee, R. H., (his grandson), (Li’fe and Correspondence of R. H. Lee) (1825). His (Letters> have been edited by J. C. Ballagh (Vols. I, II, New York

1910, 1914).

LEE, Robert, Scottish clergyman : b. Tweedmouth, England, 11 Nov. 1804; d. Tor¬ quay, 14 March 1868. He was educated at Saint Andrew’s University and in 1833 was elected minister of the Presbyterian chapel at Arbroath, Forfarshire. He was in charge of the parish of Campsie, Stirlingshire, in 1836-43, and from 1843 until his death was minister of the old Grayfriar’s Church, Edinburgh. He also served as professor of biblical criticism and dean of the Chapel Royal at the University of Edin¬ burgh from 1847. He was an earnest advocate of more graceful forms of worship within the Church of

Scotland, working for the adorn¬ ment of church edifices, written prayers, the sanction of suitable postures and the introduc¬ tion of instrumental music. He was respon¬ sible for the installation of the first organ used in the national church, that at Grayfriars, in April 1864. In 1859 he was charged before the Presbytery of Edinburgh with unlawful innova¬ tions, but he ably vindicated his action and defeated his accusers. Other actions followed and the case of his distribution of printed prayer books among his congregation was in progress at the time of his death. Author of

cThe Holy Bible. With the Marginal Refer¬ ences revised and improved) (1854; 2d ed., 1855) ; ˆPrayers for Public Worship, with Ex¬ tracts from the Psalter and other parts of Scripture* (1857) ; (The Reform of the Church in Worship, Government and Doctrine) (Part I, 1864), etc. Consult Story, (Life of Robert Lee> (2 vols., 1870).

LEE, Robert Edward, American soldier :

b. Stratford, Westmoreland County, Va., 19 Jan. 1807; d. Lexington, Va., 12 Oct. 1870. His father, Gen. Henry Lee (q.v.), popularly known in the War for Independence as (

Observant, respectful and dignified, the youth was reaching out for manhood over a route that might ‘be used as a model for those who followed him. He obtained his early educa¬ tion in good private schools in Alexandria, Va., and being sedate and studious, stood high in the estimation of his teachers and was be¬ loved by all his comrades. At 18 the inherited instincts of his nature became aroused and he resolved to be a soldier. A cadetship at the United States Military Academy at West Point was obtained for him by Gen. Andrew Jackson, and the natural bent of his mind was confirmed. To all duties he gave his closest attention; to all studies his profound thought; to all military drills, evolutions, tactics, strat¬ egy and commands, his perfect obedience. He became an officer in the cadet battalion at the proper time and was the adjutant of his class, when a first classman — a post of honor in a cadet’s aspiration. After many who first en¬ tered the academy in his class had fallen by the wayside in the various examinations, semi¬ annually held, 46 still remained to receive graduating diplomas. In 1829 Lee graduated second in his class without having received a single demerit during his whole course of study, because he conscientiously discharged all the duties confided to him ; convinced then as he said many years afterward, that <(duty was the most sublime word in the English lan¬ guage.® He was at once commissioned brevet second lieutenant and was assigned to the engi¬ neers corps, the ((Scientific Corps of the Army® as it was called,

and won high reputation in that important branch of the service. On 30 June 1831, two years after leaving West Point, he married Mary Randolph Custis, daughter of G. W. P. Custis, who was a grandson of Mrs. George Washington, and thus became proprietor of Arlington on the Potomac and other estates. Five years after, in 1836, he was promoted to first lieutenant and two year^ later, in 1838, was made captain. In 1834 he became assistant to the chief engineer of the

army in Washington and in 1837 took dharge of erecting works to protect Saint Louis from the erosion of the Mississippi. From 1841 to the outbreak of the Mexican War he was at Fort Hamilton in charge of the defenses of New York. During the Mexican War, the op¬ portunity was presented for the first time to show the military mettle of the engineer officer, and Winfield Scott, when placed in command of the army to invade Mexico, constantly consulted with Lee, acted largely on his advice and mentioned him repeatedly in his official reports. Lee was responsible for the arrange¬ ment of the batteries used to reduce Vera Cruz. In that campaign he made a reputation superior to all officers of his grade. He sur¬ passed them in personal daring, scientific coun¬ sels — a coup d'ocil of the battle-field — and for felicitous execution of orders. In the re¬ connaissances before the victory of Contreras he especially distinguished himself, as was also the case at Chapultepec, where he was wounded. He was brevetted major at Cerro Gordo, 18 April 1847, lieutenant-colonel at Contreras and Churubusco and colonel at Chapultepec. His veteran commander said that his ((success was largely due to the skill, valor and undaunted courage of Robert E. Lee,® and that <(if oppor¬ tunity offered, he would show, himself the foremost captain of his time.®

At the close of the Mexican War his serv¬ ices as an engineer were again demanded by the government and fie was made a member of the board of engineers of the United States army, being employed at Baltimore from 1849 to 1852 in the construction of forts for harbor defense; 1 Sept. 1852 he was made superin¬ tendent of the academy at West Point — a complimentary detail — and the school derived such benefit from his great ability and sagacious administration of its affairs that there was a general desire to retain him. Three years af¬ terward, in 1855, the boundary lines of the United States having been extended, making it difficult to protect American citizens on the frontier, two new cavalry regiments were added to the three then in service and Lee was of¬ fered the position of lieutenant-colonel of the

2d cavalry by Jefferson Davis, the Secretary of War, and accepted, serving with his regi¬ ment at various posts in western Texas and giving very efficient service in protecting the settlers from the depredations of the Coman- ches and other Indians. Lee was at Arling¬ ton on a furlough to settle up the estate of his wife's father, Mr. Custis, when on 16 Oct. ˆ859 John Brown with a small force marched into Harper's Ferry to liberate slaves and in¬ augurate war between the whites and the blacks. No one then knew the limit of the aggressive action of Brown, but the War De¬ partment knew that an officer of balanced judgment, combined with experience and cour¬ age, should represent the government at that point. Lee was selected and he promptly re¬ sponded to the summons to go to Harper's Ferry. His judicious plans to capture Brown were successful, and the latter's trial, convic¬ tion and execution followed. Lee then re¬ turned to Washington and in a short time was again on his way to resume his duties in Texas, 'having charge of the department of Texas until February 1861.

Though absorbed by the conscientious dis¬

charge of his duties, Lee's letters show that he had noticed the increasing chasm between the northern and southern sections of the republic, and that the citizens thereof were ranging themselves upon their respective sides. Hon¬ ing to the last that the diverging view's could be brought together, Lee was at last face to face with the ˆirrepressible conflict® and could only consider on what side his sword, already famous, should be drawn. <(We are between a state of anarchy and civil war. May God avert us from both. I must be patient and wait the end, for I can do nothing to hasten or retard it,® he said. (

Arlington, Washington City, P. O., April 20, 1861.

Honorable Simon Cameron ,

Secretary of War.

Sir: — I have the honor to tender the resignation of my commission as colonel of the first regiment of cavalry.

Very respectfully your obedient servant,

R. E. Lee,

Colonel First Cavalry.

Having once decided the question he never faltered in his allegiance or doubted the cor¬ rectness of his decision. He said to Gen. Wade Hampton in 1869, as they were discuss¬ ing the war and its results : ((I could have taken no other course without dishonor, and if it were all to be gone over again, I should act in precisely the same manner.® Going to Rich¬ mond at the request of the Virginia Conven¬ tion, he was made major-general and com¬ mander-in-chief of the Virginia forces (23 April) and when Virginia joined the Con¬ federacy he was commissioned in the Con¬ federate service and made one of the five full generals. In July 1861 he endeavored from a distance to direct the Confederate attempts to hold what is now West Virginia and in August took personal charge of the difficult campaign, but the campaign failed through the fault of others and he was severely criticised by the newspapers. He was then put in charge of the sea-coast defenses in South Carolina, Georgia and Florida, and here his knowledge and practical experience in engineering came into play, for there is little douht but that the heroic defense which that department after¬ ward made was only possible through his skill and energy in placing it in proper condition. In March 1862 he was made military adviser to President Davis and occupied that position till the wounding of Gen. J. E. Johnston at Seven Pines. He quickly demonstrated his power of

Photograph by Geo. S. Cook, Richmond

GEN. ROBERT E. LEE

organization. Everything had to be created — armies organized and the various necessary departments constructed, and on 1 June he was placed in command of the Army of Northern Virginia. He at once determined to drive Mc¬ Clellan from the siege of Richmond. He sum¬ moned "Stonewall® Jackson to his aid, col¬ lected all the reinforcements he could and, after, sending J. E. B. Stuart on a scouting circuit of the Union army, on 26 June opened the "Seven Days Battles,® attacking McClellan's lines on the Chickahominy. Several battles were fought (Oak Grove, Mechanicsville, Gaines' Mill, Peach Orchard, Savage Station and Glendale, qq.v.), and, while repulsed in a bloody battle at Malvern Hill (1 July) where McClellan had made a last stand to save his army, Lee had prepared for a combined attack the next morning, but found that McClellan had retreated during the night under cover of his gunboats at Harrison's Landing, 30 miles below Richmond. He captured 52 pieces of artillery and quantities of stores of all kinds and left McClellan's army in a demoralized condition, and though he had not annihilated it, as he had designed and

might have so done but for the failure of some of his subordinates, he had driven it away from Richmond, raised the siege and by a series of manoeuvres brought it to pass that McClellan and Pope, who had taken command of the Army of Virginia, united forces near Washington. Here Lee completely routed Pope, the campaign culminating in the battles on the old field of Manassas on 28, 29 and 30 August and finally drove him to the fortifications in front of Washington (see Bull Run, Second Battle of). Then fol¬ lowed the Maryland campaign, in which Jack- son captured Harper's Ferry with 11,000 prisoners and large quantities of arms and stores. On 14 Sept. 1862 a part of Lee's army under D. H. Hill was worsted in a battle at South Mountain (q.v.) or Boonsboro because McClellan had come into possession of . Lee's orders. Accordingly Lee abandoned his in¬ tention of invading Pennsylvania, ordering an immediate retreat into Virginia on the 15th and deciding to fight McClellan on the heights and banks of the Antietam near Sharpsburg. At Sharpsburg (Antietam), 17 Sept. 1862, Lee re¬ pulsed every attack made by McClellan's well- equipped troops and advanced his own lines, only retreating across the Potomac when he learned that the Union army had received large reinforcements (see Antietam, Battle of). On 7 November Burnside superseded McClellan in command of the Union forces and crossing the Rappahannock at Fredericks¬ burg, tried to take the Confederate army by surprise (13 December). Lee, . however, had divined his purpose and, occupying a naturally strong position,, not only repulsed his attack, but administered a crushing defeat, compelling him to recross the river, where his strong works and heavy artillery rendered him safe from a counter attack by Lee. (See Fredericksburg, Battle of). In February 1863 Hooker succeeded Burnside and was de¬ feated by Lee at Ohancellorsville (q.v.). In the Gettysburg campaign of 1863, Winchester was captured by Ewell, and at Gettysburg (q.v.) 1-3 July, Lee faced Meade, gained a de¬ cided victory the first day, gained some ground the second day, but was repulsed with heavy

loss on the third day. He remained in line of battle all day the 4th of July and for several days at Hagerstown, but Meade did not attack him, and he later retreated into Virginia, in November and December 1863 compelling Meade to withdraw after the Mine Run cam¬ paign (q.v.), though the latter had 70,000 men to Lee's 50,000. In March 1864 Grant was made commander-in-ohief of the Union army, "which was to crush Lee and capture Rich¬ mond.® He had 120,000 well-equipped and provisioned troops, while Lee had not more than 62,000 men, badly armed, wretchedly equipped and poorly supplied with rations, clothing, ordnance stores and transportation. And yet he outgeneraled and defeated Grant in every battle in that campaign from the Wilderness to Petersburg, from the Rapidan to the lines in front of Richmond, compelling him to camp before Petersburg

and remain practically idle for several months, or until March 1865. (See Wilderness; Todd's Tavern; Po River; Spottsylvania Court House; North Anna; Hawes' Shop; Pa- munkey and Totopotomoy; Drewry's Bluff; Petersburg; Trevilian Station; Saint Mary's Church ; Weldon and South Side Railroads; Jerusalem Plank Road; Deep Bottom; Globe Tavern; Ream's Station; Fort Harrison ; Poplar Spring Church ; Hatcher's Run; Fair Oaks). These great oontests against enormous odds are a monu¬ ment of the strategic and tactical ability of Lee as well as to the courage of his troops. His defense of Richmond and Petersburg alone was a marvelous example of defensive warfare. Now the supply of money was ex¬ hausted and the question of feeding the soldiers was daily becoming more troublesome. A discontinuance in the supply of arms and ammunition was imminent. His gallant army had been exposed in a violent campaign to overwhelming numbers and he no longer had "Stonewall® Jackson and J. E. B. Stuart by his side. During the remainder of the war Lee had to guard 40 miles of breastwork with a bare skirmish line and yet meet every move of the enemy, to supply his army, to recruit his thinned ranks from a country already stripped of its men, and to witness the starving out of his army — yet he met and overcame all these dbstacles with a resourcefulness which was born of the highest order of military genius. (See Hatcher's Run; Fort Stedman). Hav¬ ing been made commander-in-chief of all the Confederate armies in February 1865, he deter¬ mined to unite with Johnston and attack Sher¬ man before Grant could reinforce him, but, on account of the poor condition of the roads and the lack of transportation facilities, Grant fore¬ stalled him with his 101,000 infantry, 14,700 cavalry, 9,000 field artillery, and 369 guns at¬ tacked Lee's army (46,000 infantry, 6,000 cavalry, 5,000 field artillery and 190 guns) at Dinwiddie Court House and White Oak Road (qq.v.) 30-31 March, and at Five Forks (q.v.) 1-2 April, inflicting a crushing defeat and caus¬ ing him to retreat. Upon reaching Amelia Court House he found that his provisions had been sent in error to the capital, and so being unable to retreat or give battle with any degree of success, on 9 April, at Appomattox Court House, the Army of Northern Virginia surren¬ dered. (See Farmville and Highbridge).

The number of men surrendered was about 27,000, but when the troops marched out to stack their arms hardly 8,000 were able to present themselves with muskets in their hands. When the time arrived for him to yield to the inevitable and surrender his splendid army, with whose courage and heroism the whole world was familiar, he was greater if possible than ever 'before. ((When you return to your homes, ®> he said to his troops at Appomattox, <(y°u will take with you the satisfaction that proceeds

from the consciousness of duty faith¬ fully performed, and I earnestly pray that our merciful God extend to you his blessing and protection.®

Lee was now a private citizen for the first time in 40 years. He refused lucrative offers from all sides and sections. The legislature of Virginia, desiring to testify its appreciation of his services and character, directed the treasurer of the State to subscribe 100 shares of stock at a par value of $200 in a company organized for the improvement of the navigation of the James River and vest the same in Lee. He would receive the gift only on condition that he would be permitted to use it for the "educa- tion of the poor, particularly the children of such as had fallen in defense of the country,® and he gave his stock 'to Liberty Hall Acad¬ emy, in Rockbridge County, Va., afterward known as Washington College and now called Washington and Lee University (q.v.). Lee was offered the presidency of the college and at first declined, saying he was <(an object of censure to a portion of the country and might draw upon the college a feeling of hostility.® <(I think it is the duty of every citizen,® he further added, ((in the present condition of the country, to do all in his power to aid in the restoration of peace and harmony and in no way to oppose the policy of the State or general government directed to that object.® He finally accepted, however, saying that after what he had written if the board still thought his ser¬ vices would be advantageous to the college and country he would yield to their judgment, and in October 1865 was installed. He con¬ tinued to refuse highly remunerative positions because he preferred to continue the educa¬ tional work he had undertaken. At last, how¬ ever, the labor and exposure of his campaigns and responsibilities attendant to his position as president of the college brought bodily distress. In the spring of 1870 he was persuaded to go south for his health, but the steady progress of the disease could not be checked and his life work rapidly drew to a close. On the evening of 28 Sept. 1870 he was stricken with apoplexy from which he never recovered; he lingered on for a fortnight, breathing his last on the morning of 12 Oct. 1870. Early in the war Lee's home at Arlington, Va., had been seized by Federal troops and in January 1864 was purchased bv the national government at a tax sale for $26,800, the Arlington National Cemetery being established there later in the same year. In 1868 G. W. C. Lee, one of the heirs under the Custis will, brought suit to test the validity of the sale to the government, and though the suit was barred in the Supreme Court, Congress in 1883 appropriated $150,000 to acquire an undisputed title.

Lee had for 63 years lived and moved among a people who will cherish his memory

through succeeding generations, as long as the sun, moon and stars endure. He was a most remarkable man whether soldier or citi¬ zen. From his

earliest infancy to the hour of his death he was beloved by all classes — by all people, and the people of his native State of Virginia selected him as one of her two repre¬ sentatives whose statues should be placed in the rotunda of the capitol at Washington. Benjamin Hill, of Georgia, summed up Lee's character in splendid form when he said: (

Bibliography. — Allan, W. M., 'The Army of Northern Virginia in 1862) (Boston 1892) ; 'The Correspondence of Gen. Robert E. Lee, Chancellorsville to Gettysburg> (in (Southern Historical Society Papers,5 Vol. XXVIII, pp. 148-155, Richmond 1900) ; Adams, C. F., 'Lee at Appomattox and Other Papers5 (Boston 1902) ; Bradford, Gamaliel, 'Lee the American) (Boston 1912) ; Barnard, J. G., 'The Penin¬ sular Campaign) (New York 1864) ; Bruce, P. A., 'Robert E. Lee) (Philadelphia 1907) ; (Battles and Leaders of the Civil War5 (New York 1884-88) ; Cooke, J. E., (Life of General Robert E. Lee) (New York 1871) ; Deering, J. R., 'Lee and His Cause) (New York 1907) ; Evans, C. A., (ed.), Confederate Military History5 (Atlanta, Ga., 1899) ; Freeman, D. S. (ed.), 'Lee's Dispatches > (New York 1915) ; Lee, R. E., Jr., 'Recollections and Letters of General Robert E. Lee) (New York 1909) ; Gilman, Bradley, (Robert E. Lee) (New York 1915) ; Hill, F. T., (On the Trail of Grant and Lee) (New York 1911) ; Jones, J. W., 'Life and Letters of Robert E. Lee5 (New York 1906), and (Personal Reminiscences, Anecdotes and Letters of Gen. Robert E. Lee5 (New York 1876) ; Lee, Fitzhugh, 'General Lee5 (New York 1894) ; Longstreet, H. D., 'Lee and Longstreet at High Tide5 (Gainesville, Ga., 1904) ; Long, A. L., (Memoirs of Robert E. Lee5 (New York 1887) ; Page, T. N., ' Robert E. Lee, Man and Soldier5 (New York 1911), and (Robert E. Lee, the Southerner5 (New York 1908) ; Pollard, E. A., 'The Early Life, Campaigns and Public Services of Robert E. Lee5 (New York 1871); Shepherd, H. E., 'Life of Robert Edward Lee5 (New York 1906) ; Stiles, R., 'Four Years under Marse Robert5 (New York 1904) ; Taylor, W. H., 'General Lee, His Campaigns in Virginia, 1861—65 5 (Norfolk 1906) ; Trent, W. P., 'Robert E. Lee5 (Boston 1899) ; White, H. A., 'Robert E. Lee and the Southern Confederacy5 (New York 1898) ; Webb, A. S., 'The Peninsula5 (New York 1881). . Fitzhugh Lee,

Revised by Irving E. Rines.

LEE, Samuel, English clergyman and Orientalist : b. Longnor, Shropshire, 14 May

1783 ; d. Barley, Hertfordshire, 16 Dec. 1852. He acquired Greek, Hebrew

and a knowledge of Chaldee, Syriac, Samaritan, Persian and Hindu¬ stani without instruction and was graduated from Queen's College, Cambridge, in 1818. He was appointed professor of Arabic at Cam¬ bridge in 1819, held several parishes, was regius professor of Hebrew at Cambridge in 1831ˆ48 and in 1838ˆ52 he was rector of Barley. He was a linguist of rare attainments and was re¬ puted to have mastered 18 languages. Author of (Novum Testamentum Syriace) (1816) ; (Vetus Testamentum Syriace) (1823) ; Tram- mar of the Hebrew Language (1830; 6th ed., 1844) : (Hebrew, Chaldee and English Lexicon) (1840), and numerous scholarly translations.*

LEE, Samuel Philips, American naval of¬ ficer: b. Sully, Fairfax County, Va., 13 Feb. 1812; d. Silver Springs, near Washington, D. C., 5 June 1897. He entered the navy as midshipman in 1825 and was promoted passed midshipman in 1831. He reached the rank of commander in 1855, and served on the board of examiners in 1858-60. He was assigned to blockade duty off the coast of South Carolina on the outbreak of the Civil War. He was appointed acting rear-admiral in 1862 and placed in command of the North Atlantic blockading squadron and perfected a blockad¬ ing system by which the Confederacy was com¬ pletely isolated. In 1864 he received command of the Mississippi squadron and moved up the Cumberland to the support of Hooker, keeping communications open and gaining a vote of thanks from Congress. He was promoted commodore in 1866 and rear-admiral in 1870, receiving at that time command of the North Atlantic squadron. He was retired 13 Feb. 1873. Author of (The Cruise of the Dolphin) (Reports of the United States Navy Depart¬ ment, 1854).

LEE, Sir Sidney (formerly Solomon Laz¬ arus), English author and editor: b. London, 5 Dec. 1859. He was educated at the city of London School and at Balliol College, Oxford, from which he was graduated in 1882. In 1883 he became assistant editor of the (Dictionary of National Biography, in 1890 joint editor with Sir Leslie Stephen, and on the retirement of the latter in 1891 was appointed editor-in- chief Under his editorship appeared the last 37 volumes (Vols. XXVII-LXIII, 1891-1901), together with two supplements (6 vols.) and the Undex and Epitome. * To this work he contributed 820 articles. His < Memoir on King Edward VII, * contributed to the (Second Supplement, > provoked a storm of controversy, his portrayal of that monarch not 'being re¬ garded by many critics as sufficiently eulogistic. He was Clark lecturer in English literature at Trinity College, Cambridge, in 1901-02, Lowell Institute lecturer at Boston in 1903, and lecturer for the Common University Fund at Oxford in 1909. He was knighted in 1911, and in 1913 was appointed professor of English language and literature in the University of London. He has published < Stratford-on- Avon from the Earliest Times to the Death of*

Shakespeare (1885; new ed., 1906); (Lord Herbert of Cherbury's Autobiography, with a Continuation of his Life) (1886; new ed., 1906) • (A Life of William Shakespeare) (1898; popular ed., 1900, 1007; rev. and re-*

written, 1915) ; (A Life of Queen Victoria) (1902; new ed., 1904) ; (Shakespeare's First Folio Facsimile, with Introduction, and Cen¬ sus of Extant Copies) (1902) ; (Elizabethan Sonnets> (1904) ; (Great Englishmen of the 16th Century> (1904) ; (Shakespeare's Poems and Pericles) (1905) ; (Shakesp.eare and the Modern Stage) (1906) ; (America and Eliza¬ bethan England, in Scribner's Magazine (1907); (The French Renaissance in Eng- land) (1910); Principles of Biography,) Cambridge Lecture (1911); (Shakespeare and the Italian Renaissance,) British Academy Shakespeare Lecture (1915) ; (The Life of William Shakespeare) (1916).*

LEE, Sophia, English author: b. London, May 1750; d. Clifton, near Bristol, 13 March 1824. She was the eldest daughter of John Lee, an actor. She was the author of a comedy en¬ titled (The Chapter of Accidents,) brought out at Haymarket Theatre in 1780 with great suc¬ cess. The next year her father died and she removed with her sisters to Bath, where she de¬ voted the profits of her play to the establish¬ ment of a young ladies' seminary over which she and her sister Harriett (q.v.) long pre¬ sided. She wrote two or three novels and contributed (The Young Lady's Tale) and (The Clergyman's Tale) to the (lCanterfbury Tales, published by herself and her sister.*

LEE, Stephen Dill, American soldier: b. Charleston, S. C., 22 Sept. 1833; d. Vicksburg, Miss., 28 May 1908. He was graduated from West Point in 1854; served on the frontiers of Texas, Kansas and Nebraska; was promoted to the rank of first lieutenant in 1856 and served in Florida in 1857. On the secession of South Carolina he resigned from the United States army and was made captain of South Carolina volunteers, and gradually rose from this rank to that of lieutenant-general. He was at Seven Pines, at the Seven Days' Battles around Rich¬ mond, in the campaign against Pope and at the second battle of Bull Run. He was placed in command of the forces at Vicksburg, but was succeeded by General Pemberton before the capture of the city by the Federals. After the war he settled at Columbus, Miss. He was elected to the State senate in 1870 and was a prominent member of the Constitutional Con¬ vention in 1890. In 1880 he was made president of the State Agricultural and Mechanical Col¬ lege at Starkeville, holding this position till 1899, when he became commissioner of the Vickslburg National Park. He was president of the

United Confederate Veteran Associa¬ tion after 1904.

LEE, Thomas George, American profes¬ sor of anatomy: b. Jacksonville, N. Y., 27 Nov. 1860. He was educated at the universities of Pennsylvania, Wurzburg, Harvard and Munich, and in 1884-86 he was assistant professor of histology and embryology at the University of Pennsylvania. He was lecturer and director of the laboratory at Yale in 1886-91 and as¬ sistant professor of histology at Radcliffe in 1891-92. In 1892 he went to the University of Minnesota as professor of embryology and histology, became professor of anatomy and director of the Institute of Anatomy in 1909, and since 1913 he has been professor of com¬ parative anatomy there. He is associate editor

of the Anatomical Record and has written several monographs on the embryology of vertebrates.

LEE, Vernon, the nom-de-plume of the English writer, Violet Paget (q.v.).

LEE, William, English clergyman and in¬ ventor: b. probably at Calverton, Nottingham¬ shire; d. Paris, about 1610. He was educated at Cambridge University and while either cu¬ rate or incumbent at Calverton he, in 1589, invented the stocking-frame. Failing to secure royal patents in England, owing to the aversion to supplant hand-labor by machinery, he re¬ moved to France upon the invitation of Henry IV, who promised the patronage withheld by Queen Elizabeth. He established his frames at Rouen and was highly successful in his un¬ dertaking until the assassination of Henry IV, and subsequent unsettled conditions caused the withdrawal of royal patronage. He died, dis¬ appointed and unremunerated, and his work¬ men returned to England where the foundation of the manufacture of hosiery by machinery was then laid.

LEE, William, American diplomatic repre¬ sentative : b. Stratford, Va., 1737; d. near Wil¬ liamsburg, Va., 27 June 1795. He was a brother of Arthur Lee (q.v.), Francis Lightfoot Lee (q.v.) and Richard Henry Lee (q.v.). Prior to the. Revolution he was active as a merchant in London ; and there he was for a time agent of Virginia colony. In 1777 he became asso¬ ciated with Thomas Morris (q.v.) as superin¬ tendent of the commercial affairs of the United States at Nantes, France, and in 1778 was ap¬ pointed commissioner to Prussia and Austria, but accomplished nothing. A treaty drawn up by him with Neufville, a merchant of Amster¬ dam, in the year 1778, and approved by the burgomaster of that city,

became the avowed cause of the war declared by Great Britain against Holland. Consult Wharton, Revo¬ lutionary Diplomatic Correspondence of the United States > (1889).

LEE, William Little, American lawyer: b. Sandy Hill, N. Y, 25 Feb. 1821 ; d. Honolulu, 28 June 1857. He was educated at Norwich University, Vermont, and at the Harvard Law School, and engaged in the practice of law at Troy, N. Y. Threatened with tuberculosis, he in 1846 decided to remove to Oregon, making the journey by sea; but repairs on the vessel detained him at Honolulu and he undertook some important" legal commissions from the Hawaiian government. He afterward accepted the appointment of chief justice and chancellor and remained in those offices until his death. He framed a new constitution with civil and criminal codes ; was president of the commis¬ sion governing the distribution of lands to the common people, a proceeding due to his good offices; and in 1855 he negotiated a reciprocity treaty with the United States. His death was due to a recurrence of his old trouble follow¬ ing overwork in the Hawaiian small-pox epi¬ demic of 1853.

LEE, Mass., town, in Berkshire County, on the Housatonic River and on the New York, New Haven and Hartford Railroad, about 33 miles northwest of Holyoke and 10 miles south of Pittsfield. The town includes the villages of South and East Lee. Lee is situated in an agricultural region ; but the country is traversed

by the southern spurs of the Green Mountains, known as the (

LEE, nautical term designating the side of a ship sheltered from the wind. The word comes from the Anglo-Saxon hleo and it is likewise found in other languages, the Icelandic hie, the Dutch lij, the Danish Ice. A <(lee shore® is one unprotected from the wind, as the wind blows straight upon it. To (

LEE-BOARD. See Centre-board.

LEE FAMILY, The, a family of Virginia,

some of whose members have been conspicuous in public affairs at almost every stage of Ameri¬ can history. Among all the eminent names of the South there is none that outranks this in the number or prominence of those who repre¬ sent it in the records of the nation. Sprung from a cavalier line of old and distinguished English stock, the Virginia Lees have continued in the New World that order of Old-World aristocracy — an aristocracy of character and culture, of honor and of public service — which has legitimated itself under the broadening con¬ ditions of democratic

development, and to which, as well as to the plainer but not less masterful middle-class English element that elsewhere entered into the making of the re¬ public, democracy in the American Common¬ wealth owes its most essential traits. That Richard Lee who, during the reign of Charles 1, brought his large household to Virginia and himself became the first of this illustrious line in America, brought also to the Northern Neck in Northumberland County, where he settled, an English yeoman's sturdiness, raised and enlightened and nowise debilitated by the re¬ finements of gentility. A stout partisan of the Stuart cause, he supported Sir William Berke¬ ley (q.v.) in his resistance to Cromwell's policy, and through this attitude the colonists, threat¬ ened by the Protector's fleet, forced its com¬ mander into a treaty styling the colony an independent dominion. Lee is said to "have joined successfully with Berkeley in having Charles II proclaimed king in Virginia nearlv two years earlier than his final coronation in London. Richard Lee's son, Richard, and the second Richard's third son, Thomas, were leaders in the colony, Thomas dying just as his governor's commission was made out. By

his wife, Hannah Ludwell, he had five sons, who 'became distinguished for public and patri¬ otic acts. Of these, Richard Henry Lee (q.v.), by reason of the diversity and singular effi¬ ciency of his services, rendered for many years before the Revolution, during that struggle and for 10 years afterward, to Virginia and all the colonies and later States, stands among the pre-eminent figures of his day. The steps pre¬ liminary to the Declaration of Independence can never be recalled without remembrance of him as mover of the resolutions which led to its adoption in the Continental Congress. The address to the people of Great Britain, which he wrote, is perhaps surpassed in weight and loftiness of spirit by no American state paper. His brother, Francis Lightfoot Lee (q.v.), not only was one of the signers of the Declaration, but also made liberal sacrifices for the patriot cause, all the more to be remembered to his honor when it is considered that by temper and education he was fitted rather for the occupa¬ tions of a student, and for social elegancies, than for the turmoil of politics and the trage¬ dies of war. Arthur Lee (q.v.), youngest son of Thomas, was educated in two professions, medicine and law, and distinguished himself by public services both at home and abroad. As representative of the colonies in Europe dur¬ ing the Revolution, he displayed abilities as a man of learning, versatility and political saga¬ city, which he applied in ways highly useful to his country in critical times. William Lee (q.v.), another of the sons of Thomas, also repre¬ sented the United States in Europe at that period, with less distinction than others of this family attained, but not

without some exhibition of their unusual qualities. The fame of Henry Lee (q.v.), the (

LEE-HAMILTON, Eugene, English poet: b. London, 6 Jan. 1845; d. 9 Sept. 1907. He was educated at Oxford and entered the diplomatic service in 1869, resigning in 1875. He was for many years an invalid,, obliged to maintain a recumbent posture continually and turning to 'his art for solace. In 1896 he re¬ covered his health, and in the following year visited the United States and Canada. Among his published works are (Poems and Tran¬ scripts5 (1878); (The New Medusa5 (1882); Hmaginary Sonnets5 (1888); (The Fountain of Youth5 (1891); 'Sonnets of the Wingless Hours5 (1894); (Forest Notes5 (1898); 'The

Lord of the Dark Red Star5 (1900) ; and 'The Romance of the Fountain5 (1905). He is a half-brother of Violet Paget (q.v.), "Vernon Lee,55 and married in 1898 the novelist, Annie E. Holdsworth (q.v.).

LEE-METFORD RIFLE, a military

weapon formerly manufactured for the use of the United States navy and now displaced by the Springfield rifle. It was a gun discharging a steel-jacketed bullet with smokeless powder. The velocity of the bullet was 2,460 feet per second and the penetration at the regulation range of 15 feet was 62 pine boards each seven- eighths of an inch in thickness. The pressure on the gun when fired was 60,000 pounds to the square inch. The rifle could kill at over a mile.

LEECH, John, English illustrator : b. Lon¬ don, 29 Aug. 1817 ; d. there, 29 Oct. 1864. He studied at the Charterhouse School nine years, where Thackeray was his school-fellow ; began the study of medicine at Saint Bartholomew's Hospital ; but soon he gave up his medical studies and began making drawings. The first of his important works were the illustrations to the 'Ingoldsby Legends.5 He joined the staff of Punch in 1841. In that field he worked with pre-eminent success, supplying weekly pic¬ tures of all sections of English life — scenes of field and forest, of the busy streets, of the rustic cottage and alehouse, and the elegant city dwelling and club ; the huntsman, the swell, the injured paterfamilias; the fast young lady and her grave, portly mother; the housemaid and her follower, etc. — all thrown off with remarkable precision and showing a steady growth in artistic power. He was buried be¬ side Thackeray in Kensal Green Cemetery. His designs for Punch have nearly all been published separately as (Pictures of Life and Character5 and as 'Pencilings from Punch,5 He also executed the illustrations for 'The Comic History of England,5 'The Comic His¬ tory of Rome5 and various other books. Con¬ sult Brown, 'John Leech5 (1882) ; Everitt,

(English Caricaturists5 (1886) ; 'Life,5 by Frith (1891).

LEECH LAKE, a body of water in Cass County, Minn., the largest of the lakes which constitute the headwaters of the Mississippi River. It is about 1,300 feet above the level of the sea; 24 miles long and 15 miles wide. The short stream, which is the direct outlet o.f the lake and flows into the Mississippi, is called Leech Lake River. The United States has built a dam at its outlet, which drains into the Mis¬ sissippi. On the south and east shores is the Leech Lake Indian Reservation. The country round is well wooded and fish and game are plentiful.

LEECHBURG, Pa., borough in Arm¬ strong County, 34 miles northeast of Pittsburgh, on the Pennsylvania Railroad. The first use of natural gas in iron making in western Pennsylvania was made here in 1874. There are cement, steel and iron works and rich coal mines. Pop. (1920) 3,991.

LEECHEE. See Litchi.

LEECHES, highly specialized Annelida constituting the order Hirudinea or Discophora. They are distinguished from most other anne¬ lids by the nearly complete obliteration of the coelom or body-cavity, owing to the develop-

ment of parenchymatous connective tissue, muscles, etc., the presence of an anterior or oral sucker and a posterior or subanal sucker, and by the absence of setse, except in Acan- thobdella. In all leeches which have been care¬ fully studied there are exactly 34 segments or somites, each represented by a ganglion in the central nervous system, and being of smaller size and simpler structure toward the ends than in the middle of the body, where each is divided into from 2 to 12 rings, one of which, sometimes regarded as the first, sometimes as the middle ring, bears metameric, eye-like sense organs. Most leeches are temporary parasites, a few nearly permanent parasites; the rest are predatory hunters or scavengers, or they may change from one mode of life to another. They are marine, fresh- water or terrestrial. The first class is most abundant, both in indi¬ viduals and species, in cold seas, the second is both temperate and tropical and the third is confined to warm regions. Four families are distinguished : the Ichthyobdellidce or fish- leeches, the Glossiphonidce or tortoise and snail leeches, the Herpobdellidce or worm-leeches and the Hirudinidce or jawed leeches. The first two families possess a long protrusible pro¬ boscis and are much more closely allied than the

Herpobdellidce and Hirudinidce , which have no proboscis. The Ichthyobdellidce are chiefly parasitic on fishes and, except a few-fresh¬ water forms, are marine. Some of them, as Branchellion, are branchiate. The Glossi- phonidee are richly represented in the 'fresh¬ water lakes and streams of North America by a great variety of species, most of which attach themselves to tortoises, whose blood they suck, or else they devour water-snails and small worms. A few are parasitic on fishes. In all of them the oral sucker is small and the eyes in one to four pairs placed near the median line. The Herpobdellidce contains slender, six or eight-eyed, predaceous leeches, which are extremely abundant in fresh-water ponds and feed on small leeches and worms. They have no toothed jaws and the digestive tract is simple and straight. The Hirudinidce have 10 eyes, generally three-toothed jaws and a spacious sacculated digestive tract. Here belong the true blood-sucking leeches, the medicinal leech of Europe and our native Macrobdclla decora, also formerly largely employed in this country for blood-letting. The only terrestrial leech of the United States belongs to this family. It inhabits garden soil, feeds on earthworms and is one of the largest leeches known. Consult Beddard, F. E., (Earthworms and Leeches) (in ˆCambridge Natural History, > Vol. II, Cambridge 1901) ; id., (Earthworms and their Allies) (New York 1912) ; Leuckart and Brandes, XXI, Washington 1899) ; Verrill, A. E., Unvertebrate Animals of Vineyard Sound } (ib. 1874) ; Whitman, Quar¬ terly Journal Microscopical Science (1886); Moore, (Bulletin Illinois State Laboratory of Natural History) (1901).

LEEDS, England, a municipal, parliamen¬ tary and county borough and large manufactur¬ ing city, in the West Riding of Yorkshire, on the river Aire, 185ˆ4 miles north of London.

The river, which in passing through the city is spanned by eight bridges, is navigable from its mouth in the Humber, and connects with the Leeds and Liverpool Canal (127 miles long) which gives communication with the west. The town extends for about seven and one-half miles from east to west and about seven from north to south. From the extent of the manu¬ factures the town is naturally smoky, and on the whole its appearance is not prepossessing, although much modern improvement has been effected. The most conspicuous building is the Roman-Corinthian town-hall, considered one of the finest municipal buildings in the kingdom. The greater portion of one wing is allotted to the Free Public Library, to which has been added the Fine Art Gallery. Other notable buildings are Leeds Infirmary, in the Gothic style; the new general post office, in the Renaissance style; the school-board offices, the Royal Exchange, the stock exchange, Leeds University (q.v.), the Leeds Institute of Science, Art and Literature; the Grand Theatre, the new Empire Theatre, the gram¬ mar school, the Coliseum (a public hall), etc. Among the places of worship are

the parish church of Saint Peter's ; Saint George's, with a tower and spire 160 feet high; Holy Trinity, a fine building in the Early English style; some of the Dissenting places of worship, and the Roman Catholic church of Saint Ann's. Other institutions are the Leeds Medical School (1894), Young Men's Christian Institution, a large training college for students for the Wesleyan ministry and a literary and philo¬ sophical society. There is an admirable central library with 24 branches. The grammar school dates from 1552. The charitable institutions of Leeds are numerous. Parks have been laid out by the corporation and recreation grounds, the chief being Roundhay Park (two miles from Leeds), 300 acres in extent and contain¬ ing a lake of 33 acres. The fine ruins of Kirkstall Abbey (q.v.) (three miles from Leeds), a Cistercian foundation dating from 1152 with the adjacent grounds, presented to the town by Colonel North in 1889, form an attractive re¬ sort. Adal Church, nearby, dates from 1140. There are interesting Roman remains in the vicinity. The waterworks supply Leeds with water from the Washburn, a tributary of the Wharfe. The street car system, which is rail¬ less overhead trolley, is owned and operated by the municipality, as is electricity supply. An extension of the city boundaries took place in 1912, which brought in the Roundhay, Shadswell and Seacroft districts.

Leeds is and has been for generations the chief seat of the woolen manufacture of York¬ shire and has become the seat of other im¬ portant industries. Chief of these is the whole¬ sale clothing trade, in which several thousand hands are employed, many being also employed in the steel works, iron foundries, rolling-mills, tool and machine factories ; in the boot and shoe factories and the leather trade, and in the cloth-cap trade, which is also becoming a great branch of industry. There are also locomotive works, tobacco manufactories, color-printing works, extensive chemical and glass works, important works for the making of' drainage pipes, firebricks, ornamental terra-cotta and pottery ware, etc. One of the great sources of

the wealth of Leeds is its abundant supplies of coal and iron. Nearly 100 collieries are worked in the district.

The history of Leeds extends over more than 1,200 years, the town being mentioned under the name of Loid or Loidis by the Venerable Bede as the capital of a small British kingdom about 616. Its first charter was obtained

in 1208, and it was incorporated by Charles I in 1626. It was made a city in 1893, and its mayor was raised to the dignity of lord-mayor in 1897. The vicinity is crowded with villages, most of the inhabitants of which are employed in manufacturing for the Leeds market. Pop. about 453,170. Consult the publications of the Thoresby Society; Jack- son's (Guide to Leeds,) and A. Tait's volume on Tome of the Public Institutions of Leeds (London 1903).*

LEEDS, University of. The Leeds School of Medicine, founded in 1831, and the Yorkshire College, established as a college of science in 1874, were united in 1884; from 1887-1903 the college formed part of Victoria University, Manchester, and from the latter year until it received its charter as the Uni¬ versity of Leeds (25 April 1904) it was asso¬ ciated with Owens College of Victoria Uni¬ versity. It has four faculties — arts, medicine, science and technology. There is an observatory, and the museums and laboratories are excel¬ lently equipped. The university owns a farm and dairy school at Garforth, and a new build¬ ing has recently been opened for the agricul¬ tural department at the university. The uni¬ versity is supported by grants from the city of Leeds and the Yorkshire County councils, and. it also receives liberal financial aid from the Clothworkers' Company of London which has in all contributed not less than £160,000, for buildings and technical equipment, and from the Skinners' Company of the same city. The students in 1913-14 numbered 1,262.

LEEDS MUSICAL FESTIVAL, a three- day, triennial musical event in England inaugurated in 1858 as part of the ceremonies connected with the opening of the town-hall by Queen Victoria. Sterndale Bennett was the first conductor. While the festival was a suc¬ cess, giving £2,000 of its profits to the Leeds medical charities, it was not until 1874 that it was organized on a permanent basis. It pro¬ duces new compositions, both choral and orchestral by native and foreign composers, and reached a high state of development under the direction of Sir Arthur Sullivan, who was its conductor in 1880-98, inclusive. Sir Michael Costa conducted the festival in 1874-77, and since 1901 Sir C. V. Standford has been con¬ ductor. Consult Bennett, J., and Spark, F. R.,

(1892).

LEEK, England, market town in Stafford¬ shire, 26 miles southeast of Manchester and 157 miles northeast of London, on the Churnet Val¬ ley branch of the North Staffordshire Rail¬ way. The church of Saint Edward the Con¬ fessor was built in 1180 but has been greatly changed through different restorations. There are ruins of the Cistercian Abbey, De la Croix,, dating from 1214, and there are also remains of the Roman invasion. The

town received its grant for a Wednesday market

from King John. It has at the height of sum¬ mer a double sunset, caused by the sun's sink¬ ing behind one hill to reappear and sink be¬ yond another. The town has broad, regular streets, modern educational and municipal insti¬ tutions and important manufactures of silks and of agricultural implements. Pop. 15,487.

LEEK, a mild onion-like plant (Allium por- rum), native to the Mediterranean region and much cultivated for culinary purposes. For table use its stems are usually blanched by mounding earth about them as in blanching celery several weeks before they are needed for use. Leeks are used in soups and other¬ wise. They are the more tender and succulent the richer the soil. The flower stem is about two feet tall, and the flowers are disposed in large compact balls, supported on purple peduncles. The leek was well known to the ancient Egyptians, Greeks and Romans, and is a Welsh national emblem. Several species of the genus grow wild in the United States, fur¬ nishing the wild leeks, wild onion, field garlic, etc., of the country folk. When cows eat these plants their milk and butter is tainted in con¬ sequence. See Garlic.

LEEMPOELS, lam'pools, Jef (Joseph),

Belgian painter: b. Brussels, 15 May 1867. He studied at the Brussels Academy of Art under Portaels and Stallaert and specialized as a por¬ trait and figure painter. He received the great state medal at Vienna in 1895 and was awarded gold medals at Saint Louis (1904), Antwerp, Paris and Buenos Aires. He is a chevalier of the Legion of Honor and of the Order of Leo¬ pold. His portraits include those of Belgian royalty and nobility, and he also spent a sea¬ son in New York engaged in portrait work. His figure paintings are on the symbolic order and he is noted for his strong technique, fine coloring and careful finish. His (Hymn to a Family) is a portrait group of himself and family, and his portrait of King Leopold hangs in the Senate House, Brussels. His figure paintings include

LEER, lar, Prussia, city and riverport in the province of Hanover, 58 miles east of Groningen, on the river Leda near its con¬ fluence with the Ems, and at a junction of railways to Bremen, Emden and Munster. The town is very old but its municipal privileges date only from 1823. The heathen place of sacrifice is near here. Leer furnishes steam¬ boat connections with the North Sea health resorts, Borkum and Norderney, holds markets for livestock and has an extensive trade in foodstuffs, paper, hardware and Westphalian coal. Manufactures include textile industries, iron foundries, shipbuilding yards, and soap, cigar, vinegar and earthenware factories. Leer has broad, well-paved streets, a harbor im¬ proved in 1903, fine

churches, a town-hall with a tower 165 feet high, and schools for the study of navigation and the classics. Pop. 12,690.

LEES, Charles Herbert, English physicist: b. Glodwick, Oldham, 28 July 1864. He was educated at Owens College, Manchester, and at Strassburg University. He was appointed assistant lecturer and demonstrator in physics at Owens College in 1891 ; became lecturer in physics at the University of Manchester in

1900, and was afterward professor of physics at the University of London. He has col¬ laborated in the production of textbooks on practical physics and is author of papers on conduction of heat and electricity, and kindred subjects, published in the Philosophical Maga¬ zine, the Philosophical Transactions of the Royal Society and similar publications.

LEE'S MILL, Engagement at. Lee's Mill is a point on the Warwick River, in Vir¬ ginia, near which occurred the first consider¬ able collision of the Peninsula campaign. The Confederate forces under General Magruder occupied the line of the Warwick, and between Lee's Mill and Wynn's Mill Cobb's brigade threw up intrenchments and constructed re¬ doubts for artillery. On 16 April 1862 Gen. W. F. Smith, with his division of Keyes' corps, was ordered by General McClellan to recon¬ noitre Cobb's position, stop his work and, if deemed judicious, drive Cobb from it. Brooks' Vermont brigade was thrown forward, and after an artillery fire of more than six hours, part of the time from 18 guns, four companies of the 3d Vermont crossed the stream below a dam and seized the rifle-pits of the 15th North Carolina, but were driven back with severe loss. The effort was renewed later in the day, when, under cover of a heavy artillery fire, which was sharply replied to, detachments of the 4th, 5th and 6th Vermont endeavored to cross the Warwick, but were driven back. The Union loss during the day was 156 killed and wounded, and 9 missing. The Confederate loss did not exceed 75 killed and wounded. The result confirmed McClellan in his convic¬ tion that the line of the Warwick could not be carried by direct assault, and he directed all his efforts to the siege of Yorktown (q.v.). Consult (Official Records) (Vol. XI) ; Webb, A. S., (The Peninsula) (New York 1881-1908) ; McClellan, J. B., (McClellan's Own Story (New York 1887) ; Allan, W., and Hotchkiss, J., (The Battlefields of Virginia) (New York*

1867).

LEESER, Isaac, American rabbi and journalist: b. Neuenkirchen, Prussia, 12 Dec. 1806; d. Philadelphia, 1 Feb. 1868. In his 18th year he removed to Richmond, Va., where he at first engaged in business. In 1829 he became Hazan or minister of Congregation Mikveh Israel of Philadelphia. His first work, (The Jews and the Mosaic Law, appeared in 1833, followed in 1837 by his sermons in two vol¬ umes. He edited in 1841 (Grace Aguilar's*

Spirit of Judaism, and began in 1843 his monthly magazine, The Occident, which he conducted until near the end of its 25th vol¬ ume. In 1845 he published his Pentateuch in Hebrew and English, and in 1848 his edition of the (Daily Prayers,* according to the German ritual. Retiring from the ministry in 1850, he issued an English translation of Schwarz's clas¬ sic (Geography of Palestine,* and an edition of the Hebrew Bible, with Jaquett. He began now an English translation of the Old Testa¬ ment, completed in later years. In 1857 he was elected minister of the Beth El Emeth Syna¬ gogue, but continued his literary labors, editing (Dias Letters1* (1859) ; (The Inquisition and Judaism * (1860) ; (Mrs. Hester Rothschild's*

Meditations and Prayers (1864) ; Grace Agui¬ lar's (Jewish Faith and Spirit of Judaism**

(1864). In addition to his work as editor, translator, author and lecturer, he gave the im¬ petus to nearly every Jewish charity in the city, while he suggested institutions that have since been established, so far-sighted was his vision. He was for decades the leader of the conservative party in American Israel and was aggressive and fearless in his opposition to the reform movement, whose progress, however, he could not check.

LEETE, Frederick De Land, American Methodist Episcopal bishop : b. Avon Springs, N. Y., 1 Oct. 1866. He was graduated at Syracuse University in 1889, and was ordained in the ministry in 1888. He held various pastorates, was general secretary of the Young Men's Christian Association at Utica in 1891— 94, and in May 1912 he was elected bishop in charge of Georgia, South Carolina, Florida and Alabama. He is well known as a public speaker, and is author of (Everyday Evangel¬ ism (1909); (Christian Brotherhoods* (1912); (The Church in the City* (1915).*

LEETE, William, English colonial gov¬ ernor of Connecticut : b. Dodington, Hunting¬ donshire, England, 1613; d. New Haven, Conn., 16 April 1683. He was destined for the pro¬ fession of law, and after being called to the bar practised in the Bishop's Court at Cam¬ bridge, but joined the Puritans

who were emi¬ grating in great numbers to America, and reached the western continent in 1637. He made his home in the New Haven colony in 1639 and became a religious leader in Guilford, which he had helped to found. From 1658 to 1661 he was deputy governor of New Haven. From 1661 to 1665 he was governor, at which latter date the colony was united with Con¬ necticut by royal charter. He was deputy gov¬ ernor of the colony of Connecticut from 1669 to 1676, when he was appointed governor, a position he held till his death.

LEETONIA, Ohio, village in Columbiana County, 58 miles north of Wheeling, W. Va., on the Youngstown and Ohio River, Pennsylvania and Erie railroads. It is situated in a coal¬ mining district and there is a supply of natural gas. There are manufactures of machinery and tools. Pop. (1920) 2,688.

LEEUWARDEN, la'war-den, the Nether¬ lands, Holland, capital city of the province of Friesland, 31 miles west of Groningen, on the canal between Harlingen and Groningen. The town grew around the courts of the Friesian stadtholders and is comparable to The Hague for its general attractiveness; possesses many handsome buildings and is one of the most important cities of second rank in the country. It was originally a walled city, but the old gates have been demolished, and the walls more or less obliterated. There is a town-hall built in 1715; a royal palace built for the Friesian stadtholders; the Kanselarji, dating from 1502; the unfinished church tower, Old-' hove, built in 1529. Notable is the Friesian Museum, containing relics of several strata of civilizations from the stone to the modern age, gathered from the terpen, or artificial mounds, once very numerous in the province, richly illustrating the evolution of the race, and especially of the Teutonic migrations. ' The city has an extensive trade in grain, cattle,

foodstuffs, wines and brandies, flax, chicory and woolens; and manufactures sewing-ma¬ chines, musical instruments, gold and silver wares, cardboard and tobacco. There are shipbuilding yards and copper, iron and lead works. Its history dates back to 1149 and in 1190 it received its rating as a town. It had free access to the sea until about 1300 when the estuary on which it was built was silted up. It was important in the military history of the 15th and 16th centuries, and be¬ came a bishopric in 1559, hut came under the Reformation in 1580. During our Revolu¬ tionary War, this city was the centre of inter¬ est in the American cause. On 26 Feb. 1782, after the pro-American excitement at Franeker (q.v.), the first vote to recognize the independence of the United States of America was

taken in the legislature ; the example of Friesland being quickly followed by the other six states of the Dutch Republic and then by the national body, the States-General, John Adams being received soon after as persona grata by the stadtholder, 19 April 1782. The Burgher's Club of Leeuwarden <(in grateful recognition of the Acts of the Assemblies,® had a silver medal struck showing a man in ancient ((Free Friesian® costume, between two female figures, holding back Great Britain and welcoming the United States, while a cherub from the skies confers upon the latter the hat of freedom. The States-General medal, com¬ memorating recognition of the American by the Dutch Republic, represents the Dutch maiden, grasping over an altar the hand of the American <(libera soror® ; the reverse showing a steed free from all trammels, rushing to the mountains of freedom, with Latin mottoes meaning <(Tyrants repulsed by valor,® and <(under French auspices.® Another medal, rich in emblems, dates and Latin mottoes, struck 7 Oct. 1782, commemorates the Treaty of Com¬ merce and Navigation made on that date, be¬ tween the two republics, Dutch and American. On 15 July 1909, in the presence of the queen's representative and an audience of notables, a bronze tablet "Memorial of Gratitude® erected by the De Witt Historical Society of Tomp¬ kins County, N. Y., was unveiled. Consult Griffis, (The American in Holland > (1899).

Pop. 37,897.

LEEUWENHOECK, la'wen-huk, or LEU- WENHOEK, Antonius van, Dutch anatomist and microscopist : b. Delft, 24 Oct. 1632; d. there, 26 Aug. 1723. He early gained a reputa¬ tion for the high quality of the lenses he manufactured for the use of microscopists, demonstrating the superiority of single lenses of short focus to the double lenses hitherto in use. While not possessed of a scientific edu¬ cation his natural talent for investigation in¬ duced Leeuwenhoeck to make personal observa¬ tions and his discoveries caused him to be termed the "father of scientific microscopy.® He was introduced to the Royal Society of London by De Graef in 1673 ; and in 1680 was elected a Fellow of the French Academy of Sciences, becoming corresponding member in 1697. His reputation for lenses, which he con¬ tinued to manufacture during his life, was not surpassed in Europe, and a collection of 26 of the lenses bequeathed to the Royal Society, but subsequently lost, are stated to have been of

double convex construction ranging from 40 to 160 diameters in magnifying power. His most important discovery was that of the capillary circulation of the blood, announced in 1690, and completing the theory of Harvey. His investigations definitely overthrew the theory of "spontaneous generation® supposed by even the learned at that time to be the origin of many insects and animals. His discovery of the spermatic animalcules,

while made a few months later than that of Ludwig Hamm of Leyden, was nevertheless an independent investigation. He was the first to discover the mischievous effect of the aphides upon plant life, and he made careful observations on the structure of plants. Among his other discov¬ eries were those of the red corpuscles of the blood, the fibrous structure of the crystalline lens, the nature of the brain, nerves, hair and epidermis. While his physiological specula¬ tions were at times wide of the truth they were not more so than those of the best physi¬ ologists of the dav, and in the main display remarkable powers of observation coupled with sagacious deductions which anticipated many modern physiological discoveries. His method of scientific research set a high standard among biologists. Of his papers concerning his dis¬ coveries 112 were first published in the Philo¬ sophical Transactions of the Royal Society, and 26 appeared in the Memoirs of the Acad¬ emy of Science. His collected works were pub¬ lished (Send'brieven, outledingen en outdekkin- gen oudervindigen en beschouwingen) (7 vols., 1685-1718) ; a Latin edition, (Opera Omnia, sive Arcana Naturae Ope Exactissimorum Mi- croscopiorum Selecta> (7 vols., 1715-22; an abridged English edition translated by S. Hoole, 2 vols, 1798-1801).

LEEUWIN, la'vin or le'wm, Cape, the name of the point of land which is the south¬ western extremity of Australia. It was named after the vessel Lecnwin, in which were the Dutch navigators who discovered in 1622 this part of the continent. The light from the light¬ house can be seen 20 miles away. The place is subject to severe storms.

LEEWARD ISLANDS. See French Establishments in Oceania.

LEEWAY, the deviation of a ship from her course caused1 by her lateral drift to lee¬ ward. Likewise, the angle caused by the line of a ship's course and that of her keel. When a strong wind is blowing the steersman makes a proportionate allowance between the headway and the drift to leeward. When steering in a smooth sea little or no leeway is made.

LEFˆ BURE -W & L Y, le-fa'bur-va'le, Louis James Alfred, French musician: b. Paris, 13 Nov. 1817; d. there, 21 Dec. 1869. In 1832, at the age of 15, he succeeded his father as organist of Saint-Roch, and in that year entered the Conservatoire. He was awarded second prizes in piano and organ in 1834 and first prizes in both in 1835. He after¬ ward studied composition privately with Adolphe Adam, and the organ with Sejan. He retained his position as organist of Saint-Roch and engaged in teaching and composition. In 1847-58 he was organist at the Madeleine, and he succeeded Sejan at Saint Sulpice in 1863.

LEFEBVRE- LEFˆBVRE-DESNOUETTES

He was noted for his improvisations, which, together with his compositions, were remark¬ able for their brilliant harmonies. He was elected to the Legion of Honor in 1850. He was especially famous as an organist and for his compositions for the organ. He was au¬ thor of 50 etudes; three symphonies; three masses; an opera-comique, (Les . recruteurs) (1861) ; a cantata, (Apres la victoire) (1863), etc.

LEFEBVRE, le-favr, Charles, French composer: b. Paris, 19 June 1843. He studied at the Conservatoire under Ambroise Thomas and in 1870 won the first prize with his can¬ tata, (Le jugement de Dieu.} He was after¬ ward a professor at the Conservatoire and engaged in composition. He was author of several symphonies, sonatas, much instrumental music and (Judith J (1879); (Melka) (1883); (1889); (La messe du fantome (1899) ; (Toggemburg> (1906), etc.*

LEFEBVRE, Jules, French painter: b. Tournan, Seine-et-Marne, 10 March 1836; d. Paris, 24 Feb. 1912. He was apprenticed to the trade of his father who was a baker, but through his mother's interest he was sent to Paris and became the pupil of Leon Coignet. His (Death of Priam,) exhibited in the Salon (1851), won for him the Grand Prix de Rome, since which he gained many medals and honors. His (Femme Couchee) in the Salon of 1868, a nude of singular freshness and1 power, established his reputation as an artist of the first rank, and the votes of the judges were divided equally between this picture and a painting of Corot's for the medal of honor, which was, however, bestowed on Brion. Among his best-known canvases are (Grass- hopped (1872) in the Saint Louis Museum; ignon5 and in the Salon of 1870 attracted wide attention, and in recognition of its merits the painter was decorated with the cross of the Legion of Honor.

Lefebvre was one of the first of French painters, and his influence was great in the Julien School where he was one of the in¬ structors. Among the romanticists, classicists, realists and impressionists, he stood in the same class as Hector Leroux, Baudry, Bou- gereau and Puvis de Chavannes, as an advanced idealist. Yet in opposition to such artists as Courbet, Manet and Bonnat, he was immensely popular, being in his love of ideal beauty and his refined technique <(French of the French.®

LEFEBVRE, or LE FEVRE, Nicolas or

Nicasius, chemist, probably a native of France: b. about 1620; d. London, 1669. He was edu¬

cated at the Protestant Academy at Sedan, acquired a knowledge of chemistry and became his majesty's apothecary and distiller. In 1660

appeared his (Traite de la Chemie Theorique et Pratique, > which went through several edi¬ tions, and was translated into German. In 1660 he was invited to London by Charles II to take the post of royal professor and apothe¬ cary in ordinary to the household. He was also elected to the Royal Society, which had just been founded. In 1664 appeared a trans¬ lation into English of his

LEFEBVRE, Pierre Frangois Joseph,

Duke of Danzig, marshal of France : b. Rouf- fach, Alsace, 20 Oct. 1755; d. Paris, 14 Sept. 1820. At the outbreak of the Revolution he was a sergeant in the Guards. He espoused the cause of the revolutionists, rose to the rank of officer and was noted for his courage and humanity in the street fighting in Paris. He was promoted general of division in 1793. He served at Fleurs, Altenkirchen and in other actions of the Revolutionary campaigns, and in 1799 he was wounded at Stokach. He returned to^ France and aided Napoleon in the coup d'etat of 18 Brumaire, and became one of the first marshals of the First Empire. He was at Jena, received his ducal title for his services at the siege of Danzig in 1806-07, served in Spain in 1808-09, and commanded the Bavarian forces at Abensberg, Rohr and Eckmiihl. He was in command of the Imperial Guard in the Russian campaign, and fought through Napo¬ leon's last campaign against the Allies. He gave allegiance to Louis XVIII and was made a peer, but joined Napoleon in the Hundred Days and was not permitted to return to his seat in the Upper Chamber until 1819. He was one of the ablest of Napoleon's subordinate commanders, fearless, unassuming, trustworthy and loyal. His wife, nicknamed by the court, <(Madame Sans Gene® (q.v.), was, like himself, a child of the people and suffered much criti¬ cism, but retained his unquestioning loyalty.

LEFEBVRE-DESNOUETTES, le-fev'r'-

da -noo et , Charles, Count, French cavalry general: b. Paris, 14 Sept. 1773; d. at sea, 22 April 1822. He volunteered in the Revolution¬ ary army in 1792 and in 1798 had risen to the rank of captain, and was appointed aide-de- camp to Napoleon. He won promotion at both Marengo and Austerlitz, served in the Prussian campaign of 1806-07, and in 1808 became gen¬ eral of division and was created a count. He participated in the Spanish campaign and was taken prisoner by the English late in 1808. He escaped after two years and joined Napoleon's invasion of Russia. He took part in the Aus¬ trian and Prussian campaigns, served again under Napoleon in the Hundred Days and was wounded at Waterloo. He was condemned to death for his allegiance to Napoleon but made his escape to the United States. Eventually he obtained permission to return to France, but was lost at sea off the coast of Ireland when the Albion went down with

all on board.

LEFEVRE, FAVRE, fa'vr', or FABER, fa'bar, Pierre, Jesuit priest: b. Villaret (now Villard), Savoy, 13 April 1506; d. Barcelona, 1 Aug. 1546. He studied at the College of Sainte-Barbe, Paris, and became the tutor of Ignatius Loyola. He was ordained in 1534 and °.n 15 August of that year he was one of the six original associates of Loyola in the founda¬ tion of the Order of the Jesuits. In 1537 he was professor of theology in the Collegio di Sapienza in Rome, and in 1538 he was sent to Parma and Piacenza where he labored for a revival of Christian piety. He was sent to Germany in 1540 to uphold Catholicism at the Diet of Worms, and he was called to that of Ratisbon in 1541. He then worked for a time in Spain, but returned to Germany in 1543 and established the Jesuit College at Cologne. In 1544 he was again sent to Spain where he founded Jesuit colleges at Coinbra, Madrid, Valencia and Valladolid He was selected to attend the Council of Trent in 1546, but died on the way. He was revered next to Loyola in the original order of the Jesuits. He was beatified 5 Sept. 1872 and his feast day is 8 August.

LEFFERTS, Marshall, American engineer: b. Bedford, Long Island, 1821 ; d. 1876. After receiving a common school education he took up various occupations, finally settling down in the profession of electrical engineer, which he pursued from 1849 to 1860. He patented an automatic system of telegraphic transmission. During that time he was in the employ of the American Telegraph Company, and consult¬ ing engineer to the Atlantic Cable Company. He made many improvements in inventions in the department of electrical transmission while in the service of these companies. During the war he commanded the 7th regiment. In 1867 he became connected with the news department of the Western Union Telegraph Company; two years later, president of the Gold and Stock Telegraph Company, and 1871 he took control of the commercial news department, which had been purchased by that company.

LEFFMANN, Henry, American chemist : b. Philadelphia, 9 Sept. 1847. He was gradu¬ ated from Jefferson Medical College in 1869 and from the Pennsylvania College of Dental Surgery in 1884. He was elected assistant professor of chemistry at the Philadelphia Cen¬ tral High School and served from 1876 to 1880. He was port physician 1884-87, and 1891-92, and in 1888 was appointed but not confirmed, coiner United States Mint, political reasons interfering. After 1888 he was professor of chemistry at the Women's Medical College of Pennsylvania and professor of chemistry

at the Wagner Free Institute of Science. Among his works are (First Steps in Chemical Prin- ciples) ; (Compend of Organic Chemistry ; (Compend of Chemistry> ; (Analysis of Milk and Water Products) ; (Sanitary Relations of Coal Tar Products) (from the German); ˆStructural Formulae for the Use of Students* ;*

(Analysis of Water ; (Select Methods in Food Analysis) (2d ed., 1905) ; (About Dickens**

(1908); (States-Rights Fetish) (1913). He edited Reese's (Medical Jurisprudence and Toxicology (4th and 5th eds.), and (Allen's Commercial Organic Analysis) (Vols. I and II, 3d ed.).*

LEFORT, le-for', Frangois Jacques, Rus¬ sian admiral and statesman : b. Geneva, 1653 or 1656; d. Moscow, 2/12 March 1699. He was of Scottish descent, was educated at Geneva, and after service with the French and Dutch navies he joined the Russian army in 1675. He served in the wars against the Turks and Tatars and afterward became a sort of mili¬ tary monitor to the future Peter the Great. He was a close supporter and adviser of Peter in the struggle against his sister, Sophie, for the rulership in 1677-79 and gained the undying gratitude of the monarch. He reorganized the army with the assistance of Patrick Gor¬ don, materially aided the realization of Peter's project of creating a navy, and was largely instrumental in introducing Western ideals in the court of Russia. He became grand admiral and generalissimo in 1694, and shared in the naval triumph in which Peter wrested Azof from the Turks in 1695-96. He was chief of the embassy in the expedition in which Peter the Great traveled incognito through Europe in 1697-98. Consult Bassville, (Precis histoire la vie de Frangois Lefort (1784) ; Posselt, (Der General und Admiral F. Lefort* (2 vols.,*

1866).

LEFRANC, le-fran', Abel Jules Maurice,

French historian: b. Elincourt-Sainte-Marguer- ite, Oise, 27 July 1863. He was educated at Paris and at the universities of Leipzig and Berlin. He was secretary, and later professor, of the College of France, was exchange pro¬ fessor at the University of Chicago in 1913 and was thrice a laureate of the French Acad¬ emy. He was a collaborator on the (Grande Encyclopedic and attained general recognition as an authority on the literature of the 16th century. Author of (Histoire de la ville de Mo>on et de ses institutions jusqu' a la fin du Xllle siecle* (1887) ; (Histoire du College de France depuis ses origines jusqu' a la fin du premier Empire) (1893) ; (Legons sur Moliere et sur le roman frangais au XVIIe siecle* (1904—09);*

(Defensede Pascal: Pascal est-il un faussaire? (1906); (Etudes sur*

Maurice Guerin et sur ses oeuvres inedites (1908) ; Wes oeuvres de Frangois Rabelais* (1912-13); (Grands ecrivains frangais de la renaissance) (1914) ; (CEuvres inedits de An¬ dre Chenier* (1914), etc.*

LEFUEL, le-fwel', Hector Martin, French architect: b. Versailles, 14 Nov. 1810; d. Paris, 1 Jan. 1881. He studied under his father and Huyot, and at the Ecole des Beaux-Arts, and in 1839 won the Prix de Rome. He designed in 1848 a mantel for the Palais de Florence which won great admiration, and in 1854 he succeeded Visconti in the direction of the work at the Louvre and at the Tuileries. He built the temporary palace for the Exposition des Beaux-Arts in 1855, and the fagades of the Grand Galerie and the Rue de Rivoli were his work. He remodeled the pavilions Marsan and Deflore, and built the national porcelain works at Sevres. He was a professor at the Ecole des Beaux-Arts, and in 1855 he was elected to the Institute.

*LEG (a word of Scandinavian origin, Icelandic leggr, Danish lag, Swedish lag; the Anglo-Saxon word was scanca or sceanca, from which is derived the English word <(shank**), one of the two lower limbs of man, and any*

one of the limbs of an animal, used in sup¬ porting and moving the body, in standing, walking, running, climbing or swimming. The sense of the word is occasionally restricted to the designation of .that portion of the body between the knee and the ankle, but more gen¬ erally it is used in describing the entire lower limb.

LEGACY, a gift of a chattel, money, or other personal property made through the will of a person deceased. Such bequests are either specific or general ; a specific legacy as the name indicates is confined to the gift of a specific article, as a piece of plate, a painting, etc. ; a general legacy is one which is paid out of the general assets of the estate. If the subject of the specific legacy fail, that is, if it goes out of the possession of the testator, the legacy becomes null, whereas a general legacy, which of its very nature is not to be paid out of any particular property or possession, does not lapse provided the general assets of the estate are sufficient to cover it. When the assets are insufficient, debts being first paid off, specific legacies take precedence over general, the latter being then reduced pro rata. A demonstrative legacy is a term given to a bequest which to some extent partakes of the character of the two preceding forms of bequest. It is one in

which the testator orders to be given the lega¬ tee out of specific property or funds. Such is a bequest of a number of shares of stock out of a large number. In the case where the legatee dies before the testator the legacy lapses and is included in the share of the residuary legatee, or in case such a legatee is not named, passes to the testator's next of kin. Legacies may be satisfied by the testator previous to his death, in which case they are said to lapse by ademption. Legacies to a married woman are subject to the law governing the property of this class of persons, and legacies to a minor are payable to the guardian who holds such in trust for his ward. The testator's powers are in some States limited by statute. For these and for rules as to the interpretation- of clauses giving bequests, the provisions in regard to illegitimate children, etc. (see Will). Con¬ sult the references there appended.

LEGAL EDUCATION. Instruction in

law schools is given by lectures, by recitations from textbooks and by discussion and explana¬ tion of selected cases. Each of these systems has its advocates. In a majority of the schools instruction is given mainly by lectures. Next in popularity comes the method of recitations on lessons previously assigned. There are only a few schools that depend mainly on the dis¬ cussion and explanation of selected cases. See Counsellor at Law, Education, Professional.

LEGAL HUNDRED, The, the govern¬ ing conference of the Wesleyan Methodist Church established by John Wesley in 1784 in order to give to his Church organization a legal standing before the civil authorities. The pow¬ ers of the body are defined in a paper called (

once a year, its sessions never less than five days, nor longer, than three weeks, and con¬ trols all Church procedure whether of denom¬ inational or business nature.

LEGAL PROCEEDINGS, all proceedings, whether civil or criminal, provided for by law and brought or instituted in a court of law, or legal tribunal, for the purpose of establish¬ ing or acquiring a right, or enforcing justice or a remedy. The term covers all the processes of a suit from its initiation to the filing of records. A secondary meaning of the term makes it distinguish between cases tried in common-law courts and those of ecclesiastical courts or courts of admiralty, chancery or equity.

LEGAL REPRESENTATIVE, or PERSONAL REPRESENTATIVE, one

who personally represents another and suc¬ ceeds to his rights and place, as the executors or administrators of a will or estate of a de¬ ceased

person ; the heirs of a deceased person either through relationship or bequest, and, in the case of a living person, a representative in cases of bankruptcy or insolvency, as an assignee or receiver ; or a guardian, partner, an assignee of a mortgage or a grantee of land. The term originally designated only the ex¬ ecutors or administrators of the estate of a decedent. The approval of the court is neces¬ sary to the confirmation of any such appoint¬ ment.

LEGAL TENDER, in its widest sense, an offer to perform a contract according to speci¬ fied conditions. It also designates the coin and paper money which a creditor may be com¬ pelled to accept in payment of debts. Gen¬ erally speaking, all kinds of United States money are legal tenders in ordinary transac¬ tions, either with or without limit as to amount. Specifically, gold coins are a legal tender for any amount; gold and silver certificates are not legal tenders; silver dollars, United States notes and the few United States treasury notes of 1890 still outstanding are unlimited tenders unless otherwise contracted; subsidiary silver coin are legal tenders for all dues to the amount of $10, and minor coin for all dues to the amount of 25 cents. National bank notes are not really legal tenders, but in ordinary busi¬ ness they pass as such. They are receivable at par in payment of dues to the United States, except duties on imports and for payments by the United States, except interest on the public debt or redemption of the national currency. Certificates of deposit payable to order are issued to national banks for United States notes ; they bear no interest, and are chiefly used in the settlement of clearing-house bal¬ ances and in the reserves of the banks. State banks are governed by varying local laws, and their circulation is almost wholly within the several States. Consult Breckenridge, S. P., 'Legal Tender) (Chicago 1903) ; Hepburn, A. B., 'History of Coinage and Currency in the United States> (New York 1903) ; Hunt, A. R., 'Treatise on the Law of Tender1 (Saint Paul, Minn., 1903) ; Laughlin, J. L., 'Economic Ef¬ fects of Legal Tender, 5 in Yale Review (Vol. X, New Haven 1902) ; Smith, J. C., 'Legal Tender: Essays* (London 1910), and United States Revised Statutes, §§ 3584-3590, as amended.*

LEGAL-TENDER CASES, in American

finance, a series of cases before the United States Supreme Court, involving the question whether certain acts of Congress declaring United States notes a legal tender in payment of all debts, public and private, were constitu¬ tional. The cases were first argued in Decem¬ ber 1867 and decided in

November 1869, by a divided court. Five members of the court de¬ cided in the affirmative and three dissented. In 1871 after a reorganization of the Supreme Court, the cases were again brought up for argument. Again the court divided, five judges upholding the constitutionality of the act and four dissenting. All the judges agreed that Congress had full power to direct issues of paper money. In 1878 Congress decreed that legal tender notes which had been redeemed or received in the Treasury from any source should be reissued and kept in circulation. This latter act was assailed in the courts and the Supreme Court decided, with but one dis¬ senting voice, that Congress had full power to make United States notes a legal tender in the payment of private debts in times of peace as well as in times of war. This decision closed all judicial action upon the subject. Consult Thayer, (Legal Tender J in Harvard Law Re¬ view (1887) ; Legal Tender Cases (110 U. S. 421, 1884) ; Bancroft, George, (A Plea for the Constitution (New York 1886) ; Miller, lec¬ tures on the Constitution of the United States) (ib. 1891).

LEGAL TERMS. The following is a list

of the most important legal terms commonly employed in the United States and Canada. As it would be impossible to give anything like a complete list of such terms within any reason¬ ably brief space — there being, in number, sev¬ eral thousand of them, — care has been taken to select only those which are most frequently used, and, in each case, as far as possible, to specify in what particular branch of law they are applied — whether in civil law, criminal law, pleadings or elsewhere:

Abalienation. — In civil law, the act of transferring a title in real or personal property from one person to another.

Abandonment. — (a) The act of voluntarily leaving a per¬ son to whom one is bound by ties of obligation, as hus¬ band, wife, etc.; (b) the relinquishment of one's rights in a possession or claim.

Abator. — (a) One who, without legal right, enters a free¬ hold upon the death of its possessor, and before the heir or devisee; (b) a person who removes a nuisance. Abetment. — In criminal law, the act of encouraging, coun¬ selling or inciting a felony.

Abeyance. — A state of uncertainty or of expectation. Abjudication. — In civil law, the act of divesting a debtor of his real estate for the benefit of his creditors by means of judicial decree.

Abjuration. — The negative part of the oath of allegiance by the taking of which foreigners desiring to become citizens of the United States solemnly

abjure their alle¬ giance to the former sovereign.

Able. — In civil law, having the necessary qualifications; fit. Abolition. — A suppression of proceedings, or permission to stay further prosecution.

Abrogation. — A term denoting the annulment of a law by the act of legislature or by. usage.

Absentee. — One who is not within the jurisdiction of a particular court. _ ,

Absolute Estate. — An estate the right in which has been determined so unconditionally that the owner is deemed qualified to take immediate and unlimited possession. Absolution. — In civil law, a formal sentence or decree declaring a person to be innocent of the crime with which he has been charged.

Absque hoc. — A term used in law in the denial of some matter of fact that has been alleged and is repeated. Absque tali causa. — A term used in law to denote "with¬ out such cause."

Abs. re. — An abbreviation of the Latin phase "absente reo," used in law to indicate the absence of the defendant.

Abuse of Distress. — Such use of an animal or chattel distrained that the distrainer lays himself liable to prose¬ cution for misappropriation.

Abuse of Powers. — Used (a) in civil law to denote the act of resorting to intentional' irregularity in order to gain a legal advantage over one's opponent; (b) in criminal law to denote a use of legal processes for illegal purposes, as when a criminal complaint is made merely for the purpose of coercing the payment of a debt, or when valuable property is sold on execution to satisfy a very small debt.

Acceptilation.— In civil law, a release made by a creditor to a debtor without consideration and when the debt has not been paid.

Accomplice. — In criminal law, any participator in an offense, either before or after its commission.

Accrue. — In civil and criminal law, to become an enforce¬ able right, as the statute of limitation, which accrues by lapse of time.

Accumulative Judgment. — A second judgment, which does not begin to exercise its effect until after the first judgment has expired.

Acquiescence. — (a) Used in Canadian law as a synonym for "free

consent"; (b) a term used to denote any neglect to take legal proceedings that might naturally imply con¬ sent to the matter in hand.

Act in pais. — A term denoting an official act that has been performed out of court and has not been recorded.

Acts of Court. — See Law, Legal Acts.

Acuerdo. — A formal decision or decree of a qualified court.

Ac etiam. — A term used to denote the introduction to the statement of the real cause of action in a case where it was necessary to allege a fictitious cause of action.

Address. — • In equity pleading, the technical introduction in a bill of the court in which a remedy has been sought.

Ademption. — The annulment of a grant or the lapse of a legacy by the testator, either by satisfying it or by mani¬ festing an intention to revoke it.

Adjudication. — (a) The formal judgment of a court; (b) a decree in which the court declares an ascertained fact to be such, as in cases of bankruptcy.

Adjudication, Former. — A prior decision in a case be¬ tween the same parties employed to bar any subsequent litigation covering the same or similar points in dispute.

Adjunction. — The act of affixing one person's property to that of another, as when one erects a building upon another's land, etc.

Admeasurement. — A term used to denote the act of ascer¬ taining and laying off the portion due, as in cases of the settlement of an estate, the adjustment of damages, or of dower right. Sometimes known as admensuration.

Adminicle. — Synonymous for corroboratory evidence.

Admittance. — In civil law, the act of giving possession of a copyhold estate.

Adpromissor. — Synonymous for security, or bail.

Ad quod damnum. — (a) A term used to designate a writ issued commanding an inquiry as to the damage liable to result from the opening of a highway, or the institution of other public improvement; (b) the order under which the compensation for damage is paid when private property has been seized for public uses.

Advowson. — The right of presentation to a vacant benefice (q. v.).

Affeerment. — A term used to denote the assessment of a pecuniary penalty according to the circumstances of the case.

Affiliation. — Used to denote the act of determining the paternity of a child, that the obligation for its proper maintenance may be judicially fixed.

Affirmance. — The confirmation by a higher court of the findings of a lower court.

Affirmative. — A term used in judicial proceedings to designate the side upon which the burden of proof must fall.

Aiding and Abetting. — In criminal law, a term used to denote the act of a person who, while not directly respon¬ sible for the commission of a felony, has supported, sus¬ tained and rendered aid to its perpetrators.

Aleatory Contract. — A term used in civil law to denote that this document, is a contract, the fulfilment of the conditions of which depends upon a contingent event.

Allowance. — A term used in law to denote an extra sum awarded in addition to regular costs.

Ambidexterity. — A term applied to the act of a juror who takes money from both parties to a suit and who promises to render his verdict in favor of each of them.

Ambulatory, — A term used in civil law to denote that a thing is capable of being altered; thus, the return of a sheriff is ambulatory until it has become a matter of record.

Amercement. — Synonymous with affeerment.

Amicable Action. — A term used in law to denote that the action at issue has been commenced and is being prose¬ cuted by mutual consent of both parties to the proceed¬ ings, in order that they may obtain the decision of the court on the matter as a question of law.

Amortization. — The conveyance of property to a corpora¬ tion.

Ancestor. — In law, one who has preceded another in the possession of an inheritance, whether he be a progenitor or a collateral relative.

Ancillary Letters of Administration. — In law, the term "ancillary" denotes that the administration is a local and subordinate one, covering such part of the assets of a decedent as are not only without his domicile but which the law requires should be collected and applied to the satisfaction of the claims of creditors, the surplus being remitted to the principal administrator.

Annulment. — A judicial act making void retrospectively as well as prospectively, as in the annulment of a marriage.

Antecessor. — Synonymous for an ancestor.

Appellant. — The person appealing, or removing a cause from the lower to the higher court.

Appendant. — Any right or privilege that may pass with an inheritance.

Application. — In civil law, the appropriation of a debtor's assets among several creditors when the payment is in¬ sufficient to meet all obligations in full.

Appointment. — ■ The designation, by a person having the right to do so, of a beneficiary to take the use of an estate created under a previous will or deed.

Approver. — In criminal law, one who turns state's evidence by confessing his part in a felony and giving evidence against all his accomplices in the commission of the crime.

Arm. — • In law an arm is any object that a man may take in hand while in anger with the intention of assaulting another.

Array. — (a) The act of empanelling a jury; (b) the jury itself.

Asportation. — Used in criminal law to denote the felonious removal of goods from one place to another.

Assay. — The examination of weights and measures by the legal standard.

Attempt. — An "attempt," to be a crime in law, must be an act done in part execution of the design to commit the felony; the mere preparation, without an effort at commission, not being a criminal offense.

Attendant. — In civil law, a person who owes a service to another.

Attentate. — (a) A question improperly attempted by an inferior judge; (b) something done after an extra-judicial appeal.

Attorn. — In civil law, to acknowledge tenancy under a person who was not the original landlord but who has since claimed to have become such.

Authentic. — Designating an action which has been executed with all respect to the formalities of law, performed by the proper persons and attested before the proper au¬ thorities. An "authentic act" in civil law is a deed that has been properly performed and attested before a proper magistrate.

Aver. — (a) To allege as a fact; (b) to offer in evidence.

Avoidance, Plea in. — A plea in which the defendant, without denying the plaintiff's allegation, introduces some new facts in the hope of evading its effect.

Bequest. — Personal property left to a person by will.

Bill in Equity. — The pleading in an equity suit in which the plaintiff explains the circumstances upon which he bases his prayer for relief.

Bill of Exceptions. — In common-law practice, a doc¬ ument drawn after a trial by the unsuccessful party in which he presents all the rulings complained of as errors at the time of trial, and all the exceptions taken thereto, in order that they may be considered by the court to which he has appealed. See Bill.

Bill of Parti culars. — A document in which the par¬ ticulars of the matter at issue are set forth in detail.

Bona Fide. — In law, designating an act done without fraudulent intent. Thus, a "bona-fide purchaser" is a person who has purchased something for the price asked and without notice of an adverse claim; a " bona-fide possessor" is one who possesses something without the knowledge that there are others who have a better right in its title.

Brief. — (a) A systematically arranged and concisely ex¬ pressed, but formal, memorandum of the points of law or of fact that are to be brought out in argument or developed in the examination of witnesses at the trial; (b) a writ summoning the person upon whom it is served to answer to the action.

Burden of Proof. — A term used to denote the obligation which rests upon one of the parties to a legal action to produce sufficient evidence to

establish the fact that he has alleged in his complaint under penalty of having judgment entered against him, and this burden is not shifted until the party upon whom it has first rested has submitted sufficient evidence to turn the presump¬ tion in his favor.

Capias. — In civil law, a writ directing that the person of the defendant be taken into custody. The most common kind of writs of capias are (1) the "capias ad respon¬ dendum," under which the body is taken to answer before judgment has been declared; and (2) the "capias ad satis¬ faciendum," which designates that the body execution was taken after judgment had been entered.

Caption. — A document or part of a document setting forth the time and place that an action at law has been taken, with the court of authority before which it was performed, and such other particulars as might be required to render it valid, all of which information must have been written upon or attached to the paper to which it relates.

Carriage. — A term used in equity practice to designate the party to whom the right of going forward with the proceedings has been entrusted.

Case. — The term applied to any suit, or action in court.

Cause. — A legal proceeding calling for judicial decision.

Cause of Action. — The condition of facts which entitles one party to bring action against another.

Cause to Show. — A term usually applied to denote an order from the court commanding a person to present a reason for some action, as why he should not be punished for contempt of court, etc.

Cesser. — (1) A term denoting that a person has neglected to perform the service or make the payment ordered by the court for two years; (2) a cessation, as of liability.

Cession. — The voluntary surrender of a debtor's assets to satisfy his creditors. Also termed "cessio bonorum."

Charge. — An address delivered by a judge at the conclusion of a trial in which he instructs the jury in relation to the points of law, the weight of evidence, etc.

Charging Part. — In a bill of equity, that part in which the plaintiff alleges other and anticipatory evidence, or introduces matter to which he wishes the defendant's answer.

Cheat. — A fraud committed by imposition. Such an act is punishable by law: (1) when it deprives another of his property, even when it is not great enough to amount to a felony; and (2) when it is accomplished by some method other than that of mere words, as in the use of false weights or measures or in the substitution of worthless articles for those of real value.

Claimant. — (a) One who brings suit to obtain something which he demands as his right; (b) in admiralty proceedings, this term is applied to the person who is permitted to defend an action "in rem" brought against certain goods in which he claims property right.

Claim Notice. — A term used in mining law to denote that a miner has posted a notification of his intended occupancy upon a piece of public land.

Clause. — (a) A term used to denote a collocation of words which might be removed from the instrument without affecting its intelligibility; (b) used to specify a distinct proviso, as a clause in a contract. The term "assumption clause" denotes a stipulation frequently inserted in a deed to property upon which there is a mortgage or other incumbrance, that, under its operation, the payme'ot of said debt may be assumed by the grantee to the exonera¬ tion of the original debtor. The "Enacting Clause" is the leading declaration of a statute, which usually begins "Be it enacted," etc. An "Interpretation Clause" defines the meaning and limitations of words used in an act, while the "Saying Clause" is that which exempts something which might otherwise be included in the operation of the instrument or statute. »

Codicil. — An instrument containing anything which a testator might wish to add, revoke or explain in relation to his will. Although supplementary to the will itself it is actually a part of it. See Will.

Cognizance. — (a) A plea admitting the facts as alleged in the declaration; (b) in actions for replevin, a plea that the defendant holds the goods in question contrary to his right; (c) the action of a court in taking authoritative notice of a cause.

Collateral Ancestors. — A term used in civil law to denote relatives, or antecessors who are not progenitors.

Collateral Facts. — Facts considered foreign to the matter at issue.

Collateral Issue. — Something outside of the main ques¬ tion at issue.

Collateral Proceedings. — Proceedings brought, not for the direct purpose of impeaching the prior proceedings, but as a fresh action, as opposed to a "direct" action.

Collateral Security. — Additional security.

Collateral Testimony. — Confirmatory testimony.

Collation.— A term used in civil law to indicate that former advancements of a decedent's property have been returned in order that the estate may be equitably divided among all the heirs.

Collocation. — The allotment among creditors of the proceeds of a judicial sale that has been made to satisfy their claims.

Collusion — A term used in law to denote a private, or secret, understanding by which two or more parties agree to act as though at variance with one another in order that they may prejudice those who are not a party to their secret and so obtain a remedy to which they are not legally entitled.

Comity of Nations. — A term used in international law to define that spirit of courtesy which causes one nation to recognize the laws and institutions of another in such a manner as to permit them to take effect within its own territory.

Commercial Law. — The term by which the laws relating to commerce are known. These include all laws regarding

shipping, bills of exchange, insurance, brokerage and general commercial affairs. See Commercial Law.

Comminatory. — Designating an act of imposing such a heavy forfeiture in a business transaction that it cannot be enforced in a court of justice.

Common Law. — A term used to define that body of law that has been derived from such sources as the reports of adjudged cases, from the opinions of legal authorities, and from popular usage and custom, rather than from any statutory enactments. See Law, Common.

Community Property. — A term used in civil law, and in the statutes of several States, to designate the property of husband and wife, exclusive of the antenuptial property of either, and of the property secured by either through the avenue of bequest or gift.

Compensation. — Used in civil law to denote the annulment of a debt by a

counterclaim which the debtor holds against his creditor. See Mandate.

Compensatory Damage. — A term used in civil law to define such damage as may have been estimated as a fair equivalent for the injury received.

Competence. — (a) Legal right and authority to act; (b) also used in regard to evidence to denote its legal fitness to be heard.

Complainant. — The plaintiff in, or one who commences, a legal action against another, or in whose behalf a criminal prosecution is instituted. The claim for relief upon which such an action is brought is commonly known as the complaint.

Conclusion. — (a) The decision or finding in a case; (b) the end of a pleading; (c) an estoppel or bar by which one is held to the position which he has taken. 4- "conclusion of fact" is a decision on the part of a judge or referee as to the actual facts in the matter at issue; a "conclusion of law" is a similar decision in which the legal rights and obligations of the parties to the action resulting from the conclusion of fact are clearly specified.

Conclusive Evidence. — A term applied to testimony that possesses such weight as to preclude any contradiction of the fact in question.

Concurso.— A term in civil law usually applied to the litigation, or opportunity for litigation, which exists when several creditors, acting adversely to one another, claim the right to share in an estate, the object being to make one accounting cover all the claims against the fund.

Concussion. — Used in civil law as a synonym for extortion.

Condonation. — Used to denote an act of remission by which a husband or wife pardons a matrimonial offense which one knows that the other has committed by per¬ mitting the guilty party to return to all conjugal privileges. It is by such an act that the innocent party loses all right to seek a remedy for the offense in question.

Confirmation. — Used in civil law to denote the perfection of tne title in an estate or possession.

Conflict. — Used legally to indicate the opposition existing between the laws of various jurisdictions when an effort is made to apply them in reference to each other.

Confusion. — A term used in civil law to denote the extinc¬ tion of an obligation owing to the fact that the two persons necessary to its continuance have become one person, as when one has become the heir of

the other, etc.

Conjoint. — Used in civil law to indicate a person who has a mutual interest with another in an enterprise or obligation.

Connivance. — The act of having a secret understanding with another; usually employed in relation to a wrongful act.

Consideration. — A term used in law to denote the remu¬ neration that a contracting party accepts in exchange for something else or in return for a service rendered. A "concurrent consideration" is a consideration received at the time of the making of the agreement; an "executed consideration" is one previously received; an "executory consideration," one to be received at a date subsequent to the agreement. The term "good consideration" is used to define that natural love and affection which is usually considered an adequate motive for the transfer of property without a valuable equivalent, except as against creditors. A "valuable consideration" is an equivalent that must be admitted to be of pecuniary value. "Want of consider¬ ation" is the lack of any equivalent whatever, and "failure of consideration" denotes that an apparently good equiva¬ lent has afterward become worthless. See Mandate.

Consolidation. — Used in civil law to denote the merging of the profit of land with the property. _

Construction. — (a) Used to denote an intelligent reading with such explanations as may be necessary to define the meaning of the text; (b) when uncertainty exists as to the actual intent of an instrument; any altered reading of the text designed to show its proper application is also termed a "construction."

Contempt. — A term usually applied to define the disobe¬ dience to, or open disrespect for, a court or legislative assemblage that has come to be known as "contempt of court," an offense that may be committed either in or outside of the courtroom, and which is punishable by commitment to prison or by the imposition of a fine. The term "constructive contempt" is applied when the offense, while not committed in the presence of the court, is of

such a character that the law is obliged to take cognizance of it, whether it was performed intentionally or not. Any wilful or aggressive disobedience or disorder is termed "criminal contempt," while an act committed in the presence of the court is known as a "direct contempt." A person who has been committed for this act against the dignity of the judiciary, and who has not purged himself therefrom, is said to be "in contempt."

Contraband. — The term applied to goods that are pro¬ hibited from importation or exportation by the laws of the country. Such goods, when handled illegally, subject one to the charge of smuggling.

Contract. — Used in the civil law to denote a document in which the rights and agreements of the two or more parties concerned in the obligation are specifically defined that they may become enforceable by law. Among the many terms used in relation to the making or execution of contracts, the following are among those which are most commonly employed: Accessory contract, one made to secure the performance of a previous contract; aleatory contract (q.v.); bare contract, an unconditional surrender or agreement; commutative contract, one in which each party gives and receives an equivalent; contract of record, one that had been entered before a judicial tribunal, as a judgment, etc.; executed contract, one in which the thing agreed upon has been done; executory contract, one in which the thing agreed upon has yet to be done; express contract, one in whicn the agreement is expressly stipulated in writing; gambling contract, one in which the parties agree to make good all differences that may be occasioned by chance within a specified time, but such contracts cannot be enforced at law; implied contract, one that may be imputed by construction, as when by some valuable exchange or service rendered justice demands that the contract be carried out as implied; indeterminate contract, one in which the terms cannot be fixed until other motives act; joint contract, one in which the parties are bound to perform all the obligaitons of the agreement, or are entitled to receive tne benefit of them; mutual contract, one in which the obligation assumed by each party is in view of the obligation assumed by the other party; oral contract, one depending upon word of mouth alone; simple contract, a contract not under seal; special contract, one in which the thing to be done is specified in detail under seal; verbal contract, same as oral contract; voidable contract, one liable to be made void but which is binding until such notice is given; void contract, one that is not legally binding upon either party. See Contract.

Contribution. — In civil law, the amount levied upon each of several persons having mutual interests in the same enterprise to equalize the loss suffered or the payments made. A " suit for contribution " is an action brought to compel the payment of such proportionate shares.

Conversion. — (a) An unauthorized attempt to exercise the rights of ownership over personal property belonging to another; (b) an assumption in equity that real property has been converted into personal property or vice versa when the owner has shown in a proper manner that such was his intention.

Corpus Juris Civilis. — Body of the Civil Law.

Cost. — The sum fixed by law as the amount to be charged as the expense for bringing suit. In actions at law such costs are usually aggregated that they may be paid by the losing party when final judgment is entered.

Courts-Martial.— See Law, Military.

Covenant. — In civil law, any agreement under seal.

Covert. — A term used to denote that a person is under protection; usually applied to a woman, and especially to one who is married.

Covin. — An agreement in which two or more parties have entered into collusion to the detriment of another party.

Credible Witness. — One who is qualified to testify and who cannot be impeached as unworthy of credit.

Creditor's Action. — (a) The term applied to a bill in equity, in which one or more creditors, acting for all other creditors, seek to reach assets that could not legally be sold on execution that they may obtain an accounting and due settlement by law; (b) the same term is applied to the bill that may be brought by creditors seeking to set aside a transfer of assets as a fraudulent transaction.

Criminal Law. — That body of law which relates to crimes and their punishment. See Law, Criminal.

Cross-action. — A suit brought by the defendant in a previous action against the plaintiff therein.

Cumulation. — A combination of Causes for action, or defenses, so joined that all must be tried together.

Curia Advisari Vult. — A term denoting a postponement after argument to give the court time for deliberation.

Dative. — Designating something that may be disposed of at pleasure.

De Bene Esse. — A legal term denoting that a thing is taken for what it is worth, as in the case of testimony that may be suppressed after more full examination.

Declaration. — The pleading in which a plaintiff explains his claim for relief in a civil action.

Dedicate. — To surrender voluntarily (private property) that it may be applied to public uses.

&3S

LEGAL TERMS

Dedit. — In Canadian law, the sum stipulated to be paid as a penalty in case of breach of contract.

De Domo Reparando. — (a) The term applied to a common law writ issued to a houseowner against a neighbor whose building is in danger of falling with damage to the plaintiff's property; (b) a writ issued against a cotenant to compel him to show caiifce why he should not share in the expense of repairing property held in common.

Deed. — A document, under seal, made for the purpose of conveying real estate. See Deed.

Deforcement. — In civil law, the withholding of property to which another person holds the rights but of which he cannot gain possession.

Degree. — The term applied to the distinctions made in the culpability of various persons who have violated the criminal law; thus, the active perpetrator is charged with crime in the "first " degree; those who aided or abetted him, in the " second " degree.

De Jure. — A term implying right according to law.

Delegation. — A term applied in civil law to denote that a debtor has freed himself from the responsibility for his debts by offering another person who binds himself to assure their payment.

Delivery. — In civil law, the act of placing a person in legal possession of any property.

Demise. — In civil law, a term used to denote a lease for a number of years.

Depart. — To deviate in one pleading from the defence made in a prior pleading.

De plano. — Used in law to denote that a thing is so mani¬ festly right as to require no argument.

Determinable. — A term used in civil law to denote that a thing is liable to termination by uncertain contingencies.

Detinet. — A common law action of debt in which it is alleged that the defendant held back money that should have been paid to the plaintiff.

Devest. — A term used as a synonym for deprivation of title.

Dictum. — An opinion of a judge, but not the deliberate determination of the court.

Diminution. — Used to denote that an omission has been made in the records of a case sent from a lower to a higher court for review.

Disclaimer. — (a) A refusal to accept a position, as trustee of an estate or executor under a will ; (b) a plea by which the defendant abandons all claim upon or interest in the subject at issue; (c) an instrument by which a patentee abandons a part of his claim of invention.

Discontinuance. — A term used to imply that a suit has been terminated through the action of the plaintiff.

Discretion. — A judicial power that is exercised purely upon personal judgment in view of existing circumstances and not upon application of any rules of law.

Dismission. — Rejection of a suit by the court on the ground that it is unworthy of maintenance.

Distrain. — To seize and hold another's goods in order to apply them to the satisfaction of the distrainor's claim, or to maintain possession of them until such a claim is settled.

Disturbance. — In common law, the wrongful obstruction of any party in the enjoyment of his personal rights.

Divestiture. — In civil law, the act of abandoning one's effects.

Doli cap ax. — A term used in common law to denote that a child is of sufficient age to be able to distinguish the difference between right and wrong.

Dominus. — In civil law, the person who maintains possession of something by right.

Donation. — In civil law, the transference of something from one person to another without consideration.

Dower. — The portion of, a husband's estate which reverts to the wife upon his death.

Duplicity. — Used to define the act of pleading two or more distinct matters together as if they constituted only one.

Duress. — Used to denote the exercise of such restraint as to practically amount to coercion. "Duress of goods' 'i s the forcible seizure of goods without authority to force the claimant into settlement; "duress of imprisonment" implies actual personal restraint; "duress per minas', denotes coercion effected by threats of personal injury to life or limb. In law, no promise or agreement is held to be binding if made under duress.

Elegit. — (a) A judicial writ of execution; (b) a title to land held under such writ.

Elimination. — A term frequently used as a synonym for ejectment. •

Encumbrance. — The amount for unpaid services or public charges that rest upon a property to diminish its value even through changes of ownership.

Enjoin. — The act of restraining a person by means of a judicial injunction.

Entireties, Tenancy by. — A tenure created when an estate is divided or conveyed to a man and his wife during coverture.

Escrow.— A writing that has been fully executed but which has then been placed in the hands of a third party, to be held by him until such time as the specified conditions under which the instrument was prepared have been fulfilled.

Esplees. — A term used to denote the products of the land, whether in produce, rents, or otherwise.

Evocation. — In law, the act of taking an action from one court for the purpose of carrying it to a higher court.

Exaction. — An offence committed by officials in authority who exact or take a fee when the law requires that none be paid.

Exception. — (a) A term most frequently used to denote the action in common law practice by which all objections made to the rulings of a court are noted in writing that they may be submitted to a higher court as an explicit reason why an appeal should be granted; (b) a clause in a con¬ veyance exempting some portion of the estate from the sale; (c) a writing employed in a case in equity to indicate the particular portions of an adversary's pleadings to which objection has been taken.

Exchange. — In civil law, a reciprocal transfer of property in which no financial consideration is offered or required.

Executor de son tort. — One who attempts to settle the affairs of a deceased person without authority.

Ex facie. — A term used to denote what may be assumed from the face of a writing.

Expatriation. — The act of renouncing the country of one's birth to become a citizen of another country.

Expromissor. — In civil law, one who binds himself to pay the debts of another person.

Extend. — In civil law, to seize lands in satisfaction of a debt.

Extortion. — (a) A gross overcharge which could not be upheld in law; (b) the act of obtaining money from another person when none, or a smaller amount, is due.

Extradotal.— In civil law, that portion of a woman's property that is exempt from consideration under dower right.

Pactum. — The term used to denote the statement of a case to the court.

Fee. — An estate held in trust. When it is vested in the owner and his heirs and assigns forever, it is commonly known as a "fee simple."

Feigned Issue. — A term used to denote that the issue has been prepared for court by agreement, or by judicial order, rather than by the ordinary procedure.

Fiduciary Capacity. — A term often used to denote that the position occupied by the party referred to was one of trust and confidence, the idea being that violations of such confidence are not covered either by discharge in bankruptcy or by the laws and rulings regarding imprison¬ ment for debt.

Fieri facias. — A civil law writ that may be issued after judgment, empowering the sheriff to levy upon goods or iands to secure the amount due.

Forbearance. — • In civil law, the act of restraining the enforcement of one's legal rights.

Force and Arms. — A term used to denote that the act complained of was

done with violence.

Forcible Entry. — The act of taking possession of property by means of threats, or by arms, etc.

Foreign Attachment. — The process of seizing the local property of an absent debtor in order that he must either put in an appearance or allow the claims of the creditor to be satisfied.

Foreign Matter. — ■ Actions that must of necessity be tried in some other county.

Forfeiture. — The act of having one's property transferred to another as the result of one's negligence or by reason of the misdeed of another person.

Furniture. — -In civil law, personal chattels in use by a

ˆ family, and, ordinarily, exempt from legal process.

Gage. — A term used to denote the personal property that has been placed in a creditor's hands by a debtor as security for the payment of his indebtedness.

Gager del ley. — Used synonymously with a "wager of law."

Garnishee. — The person who takes possession of the money or property of another with the avowed intent to keep it to answer the claim of the creditor, or until the defendant is otherwise discharged.

Gift.— In civil law, a conveyance that is made without consideration, either in blood or money.

Giving Time. — In civil law, an agreement by which all the creditors agree to give a debtor time to pay his debts instead of forcing him to abide by the terms of the first agreement.

Go Without Day. — A term used to denote that a case has been dismissed from court.

Grant. — (a) A generic term applied in civil law to all transfers of real estate; (b) the instrument by which the transfer is made, or the property which is so transferred.

Gross Negligence. — A term used to indicate that the ordinary care which even a thoughtless man might take of his own person or property has in this instance been omitted.

Habeas corpus. — A term used to denote a writ issued to parties suspected of detaining another, and commanding them to produce the body of that person at a certain time and place, there to submit to such judgment as the court may see fit to make in the matter. This habeas corpus action is one of the most famous in law, it havingjjeen

used so often to protect human rights that it has come to be known as the "Great writ of Liberty." See Habeas Corpus.

Habitation. — In civil law, the right of an individual to live in a house owned by another person without prejudice to the property.

Habitual Criminals. — Persons who are so well known as malefactors by reason of their criminal past history and associations as to be punishable by penalties of more severity than are ordinarily imposed upon persons who have no such record against them.

Hearsay Evidence. — The term applied to testimony that cannot derive its value in credibility from the witness himself, but must depend largely upon the veracity of another person.

Heritage. — In civil law, every kind of immovable property, whether acquired by purchase, descent, or otherwise.

High Seas. — – A term often used in the settlement of ques¬ tions of jurisdiction, etc. It denotes the uninclosed water of the ocean and all those of the sea-board that may be beyond the boundaries of the low-water mark.

Hold. — Used technically in civil law as a part of the term "To have and to hold," the clause known as the "tenendum," by which the grantee's tenure to the land in question is expressed.

Homologation. — A term used in civil law to denote the approbation of the award and order necessary before execution may take place.

Hypothecation. — A term used in civil law to denote a creditor's right over a debtor's property: the power to cause it to be disposed of by sale that he may secure his payment from the proceeds. There are various forms of hypothecation recognized by law: Conventional hypothe¬ cation, or those effected by the agreement of parties; general hypothecation, as when a debtor hypothecates his entire estate for the benefit of his creditors; legal

hypothe¬ cation, those that are not dependent upon a contract or agreement; special hypothecation, or the hypothecation of a special estate; and tacit hypothecation, as when ordered by the court to secure a debtor's creditors.

Immaterial Averment. — In pleading, a statement of unnecessary particulars sometimes included in connection with, or as description of, what is actually material to the case.

Immoral Consideration. — A term used to define a contract based upon something which is contrary to good morals; such contracts usually being void.

Immovables. — A term used in civil law to denote that kind of property which from its own nature or by its situation cannot move itself or be removed without great difficulty.

Imparlance. — A term denoting the continuance of a cause for a few days to give one of the parties to the issue time to answer the pleadings of his opponent.

Impediments. — In civil law, the legal hindrances in the making of contracts, as minority, lack of reason, coverture, etc.

Imperium. — A term used to define a power that vests only in the executive: The right to call upon the military forces of the State to enforce its statutes.

Impertinent. — A term used to denote that certain matters that have been introduced into a bill, answer, or other proceedings in equity, are not properly before the court.

Improvement. — A term used in civil law to denote the betterment in the condition of a property due to the expenditure of labor and money.

In fraudem legis. — A term used to imply that a thing is "contrary to the law."j

In Full Life. — A term used to indicate that a person is neither physically nor civilly dead.

In loco parentis. — Literally, in place of a parent.

In pari causa. — A term employed to denote that two parties are in equal right according to law, in which case, according to usage, the party having possession is regarded as of best right.

In pari delicto. — A term indicating that both parties to an issue are equally at fault, a case in which no relief can be obtained.

In propria persona. — Literally, in his own person. _

In solidum in solido. — A term used in the making of a contract, and meaning, "For a whole as a whole."

In statu quo. — Literally, in the same condition as before.

In toto. — Used legally to imply "in the whole."

Inalienable. — Designating properties that cannot be trans¬ ferred from one to another, as the public highways, parks, etc.

Incompatibility. — A term denoting the incapability of two persons to exercise the rights and privileges when together, as in the case of landlord and tenant, husband and wife, etc.

Indirect Evidence. — A term used to denote that kind of evidence that, while it does not establish the fact in ques¬ tion, furnishes a presumptive proof in its favor.

Inducement. — Employed in civil law to denote the con¬ sideration, or benefit which was used to induce the promisor to make the contract in question.

Induciae. — Used in civil law to indicate the declaration of a truce in judicial hostilities.

Injuria absque damno. — A term used to imply that the wrong incurred was without damage or loss, in which the action at law cannot be maintained.

Jeopardy. — The condition of a prisoner when a trial jury has been impanelled and sworn to try his case. If he escapes this jeopardy he cannot again be subjected to the same danger, the United States Constitution clearly defin¬ ing that point that "No person shall be subject for the same offenes to be twice put in jeopardy of life or limb."

Joinder.— (a) In civil law, the merging of several causes of action in a single declaration; (b) in criminal law, the act of joining several cases of the same nature in one indict¬ ment; (c) acceptance by both parties to an action of an issue tendered.

Joint Action. — A term used when two or more persons are alike parties to

a suit, as two or more plaintiffs against two or more defendants.

Jus abutendi. — A term meaning, literally, the right to abuse, but generally employed to denote that the party in question has every possible right over his property.

Justifying Bail. — A term used to denote that the parties who have been produced as bail have been able to justify themselves in spite of any exceptions taken by the opposition.

Labor a Jury. — A term used to denote that an effort has been made to reach the jury for the purpose of tampering with it, or affecting its decisions.

Laches. — Neglect to perform a certain duty or to protect a claim at the proper time.

Law of Equity. — • See Law.

Law of Merchants. — See Law.

Law of Nations. — See Law.

Lese Majesty. — Apparent disrespect for a monarch. In some countries such an offense is treated as treason.

Letters Testamentary. — An instrument in writing, granted by a judge or other official having authorty and jurisdiction over the probate of wills, making it known that the will in question has been proved in proper form and that the estate is in order to be administered.

Levitical Degree. — A term used in law to denote the degrees of kindred that are prohibited in the 18th chapter of Leviticus.

Lex loci. — A term used to denote the local law, or, literally, the law of the place.

Liquidated Damages. — Damages, the amount of which have been decided upon by an anticipatory agreement between the parties concerned.

Made Known. — A term used to denote that a writ of scire facias has been duly served upon the defendant.

Mainour. — A term which literally means "found in hand," and which is used in criminal law to denote that the goods stolen were found with the person who stole them. "To be taken in the mainour," therefore, is synonymous with being caught in the act.

Maintenance. — A term used in law to denote any officious interference with the course of justice.

Malfeasance. — A term used to denote the unlawful or wrongful conduct of a public official in office.

Malpractice. — A term denoting bad medical practice, whether due to ignorance, carelessness, or criminal intent.

Malum in se. — A term denoting that an act is evil in itself, in counterdistinction to the offenses that, while not naturally evil, have become so because of the fact that they have been specifically prohibited.

Manbote. — The compensation paid to the relatives of a murdered man by the murderer, or on behalf of the latter.

Mandamus. — A writ issued by a superior court by which an inferior court, a corporation, or other body is directed to perform some act therein specified on the ground that it is a part of their office and duty. A writ of mandamus which couples this command with an alternative to the effect that if this act be not done the party commanded to perform it must show cause why this order has not been obeyed, is termed an "alternative mandamus"; a writ in which the command of the superior court is absolute, is termed a "peremptory mandamus."

Manu forti. — A term used in pleading to denote that the entry was the most forcible that could be made.

Matter in Deed. — A matter that may be proved by deed.

Matter of Fact. — A matter that may be referred to a jury, as its truth is a question that may be determined by the senses, or decided upon evidence.

Matter of Law. — A matter the truth or falsity of which must be decided by established rules of law.

Matter of Record. — Matter that may be proved by the production of an authentic record.

Mercantile Law. — That branch of law in which the rights and duties arising out of mercantile relations are defined.

Metes and Bounds. — A term used to define the boundary lines of lands.

Misfeasance. — The performance of official or legal duty in an improper manner by a public official.

Misjoinder. — A term used in. pleading to denote the improper union of causes of action or of persons in a single suit at law.

Moral Certainty. — A term which denotes the degree of certainty by which a jury is justified in determining its verdict.

More or Less. — A term used to convey the impression that the quantity of the matter at issue is uncertain and that neither party shall find cause for complaint in its deficiency or excess.

Mulct. — The fine imposed upon the conviction of an offender for the commission of an offense.

Municipal Law. — See Law.

Mystic Testament. — A term used to define a will under seal.

Natural Law. — See Law, Natural.

Ne baila par. — A plea in detinue, in the making of which the defendant denies that the thing sued for was ever delivered to him.

Never Indebted. — A plea in which the defendant asserts that he is not indebted to the plaintiff for the amount sued for.

New Promise. — A new contract made after the original agreement has become invalid and by the terms of which the signers agree to fulfil the stipulations of the prior contract.

Newly Discovered Evidence. — A term used to denote that the proof of new facts that have been obtained since a verdict was rendered are of sufficient importance to affect the decision of the court.

Nihil dicit. — Literally, he says nothing. A term used to denote that judgment may be taken by default.

Nihil habet. — Literally, he has nothing. A term used in the return made by the sheriff who has been unable to discover the property required under a writ of scire facias, etc.

Nominal Damage. — ■ A term used when a trifling sum has been awarded in a case where a breach of duty, or an infraction of the plaintiff's rights, has been shown, but by which no serious injury or loss had been sustained.

Nonfeasance. — Refusal or failure by a public official to perform a legal or official duty.

Nul tort. — A plea to a real action in which the defendant enters a denial of any wrong.

Nulla bona. — A term used in a return to a writ of fieri facias denoting that there are no goods upon which a levy may be made.

Optional Writ. — A writ which contains the alternative providing that if a thing is not done cause must be shown as to why it was not done.

Organic Law of the State. — See Law, Constitutional.

Oyer and Terminer.— Although this name was originally applied only to an English court for the trial of indict¬ ments, it has since been adopted in some portions of the United States as the title of the higher courts of criminal jurisdiction. See Court.

Parti ceps Criminis. — A term used to denote that a party is a partner in the crime alleged.

Pendente Lite. — A term used to denote that a matter is in statu quo pending the action of the court.

Peremptory Challenge. — A privilege permitted in crim¬ inal cases when the prisoner's counsel is granted the right to make a specified number of challenges of jurors with¬ out giving his cause.

Perpetuating Testimony. — A term applied to testimony that has been reduced to writing and duly attested ac¬ cording to law that it may be

preserved to be read in evidence at some action not yet instituted.

Plaintiff and Defendant. — See Law.

Positive Fraud. — A term used when the deception in question was not only successful but was so clearly in¬ tentional as to be beyond the possibility of doubt.

Precarious Right. — A right that the owner has trans¬ ferred to another person that the latter may enjoy it until it shall please him to revoke it.

ProcIss Verbal. — In French Canadian law, an act or proc¬ ess of apportioning the expenses f

Quiet Enjoyment. — • A term employed in covenants or leases by which it is agreed that the vendee or lessee shall be permitted to peaceably enjoy the premises.

Quo Warranto. — A term derived from the name of a writ issued to compel a person or a number of persons to show by what warrant they have assumed the duties of a public office, trust, or franchise. It is, accordingly, the remedy which must be resorted to to oust usurpers from office.

Rate. — In Great Britain, an amount levied upon property in the nature of a tax for legal purposes.

Real Covenant. — A term applied to the signed and sealed agreement by which two or more persons bind them¬ selves to pass a real thing.

Rebutting Evidence. — The testimony in a trial in which the defendant makes answer to the plaintiff's surre¬ joinder.

Recoupment. — The term applied to the right accorded the defendant to claim damage, in the same action, from the plaintiff because of his failure to comply with some cross¬ obligation or his violation of some duty imposed upon him by the terms of the contract.

Rejoinder. — The term applied to the fourth stage in the pleadings in an action at common law, in which the defend¬ ant makes answer to the plaintiff's replication. A sur¬ rejoinder is the next pleading of the plaintiff.

Replevin. — A term applied to a personal action brought to recover possession of goods that have been wrongfully taken or detained, security being given by the com¬ plainant to try the right to their ownership by means of a regular suit at law, and to return the goods, replevined if

such action should be determined in favor of the defend¬ ant. A "replevin in the cepit " is an action in which it is claimed that the defendant wrongfully took the goods, while a "replevin in the detinet" is an action claiming that he wrongfully detained them.

Salvage. — See Law, Maritime; Salvage.

Separate Maintenance. — An allowance made by a hus¬ band for the support of his wife from whom he has separated.

Specification. — A detailed statement or description, as of a patent.

Stoppage in Transitu. — The resumption by the seller of either the actual or constructive possession of goods that have not been paid for while on their way to the vendee but before the latter has acquired actual possession of a prop¬ erty right in such articles.

Subornation of Perjury.— The term applied to the act by which another person is persuaded to commit the crime of perjury. See Perjury.

Tender. — A term denoting an offer to deliver something in satisfaction of a debt, or to give to the other party the specific thing required by the contract in 'question. Transfer. — (a) The act of conveying property, right, or title from one person to another; (b) the removal, as of a cause, from one jurisdiction to another.

True Bill. — When an indictment is found against a party accused of a felony before the grand jury the finding is termed a "true bill." See Law, Criminal.

Ultimatum. — In international law, a final statement, as of one power to another, before breaking off friendly nego¬ tiations.

Under and Subject. — A term used in instruments for the conveyance of land, indicating that the party taking it accepts the transfer subject to the mortgage upon it. Vadium Mortuum. — Literally, a dead pledge. A term used to denote the security given in the form of a mortgage by which the lender agrees that if the money borrowed is not repaid at the time specified the estate shall pass to the lender.

Vadium vivum. — Literally, a live pledge. A term used to denote a pledge given in the form of a mortgage under which the lender agrees to take the sum borrowed out of the profits of the land.

Without Prejudice. — A term used in cases of overtures and communications between parties to an action at law by which it is specified

that should the negotiations fail to result in the adjustment of the controversy nothing that has transpired at such meetings will be taken advan¬ tage of at subsequent hearings before the court, but all will be regarded as "without prejudice" to the matter at issue.

Yielding and Paying. — A term used in the writing of a lease that it may constitute a covenant on the part of the lessee to pay the rent stipulated.

LEGARDEUR DE SAINT-PIERRE, Jacques. See Saint-Pierre, Jacques Lagar- deur DE.

LEGARE, la-gre, Hugh Swinton, Amer¬ ican statesman: b. Charleston, S. C., 2 Jan. 1797; d. Boston, Mass., 16 June 1843. He was graduated at the College of South Carolina in 1814, and subsequently studied at Edinburgh University. After a tour of Europe he re¬ turned home in 1820, and two years later en¬ tered upon the practice of law. In 1821 he represented his native city in the State legis¬ lature, and in 1830 was elected attorney-general. In the same year he established the Southern Review, a quarterly, with Stephen Elliott. In 1832 he was appointed charge-d'affaires at Brus¬ sels. In 1836 he was elected to the lower House of Congress. In 1840 he was appointed by President Tyler Attorney-General of the United States. He was a brilliant orator and debater, and his contributions to the New York Review on (DemosthenesP the ˆOrigin of Roman LawP etc., were marked by much literary ability.

LEGATE, an ambassador sent by the Pope and armed with his authority to represent him at the court pf a foreign prince or state.

LEGATION, a diplomatic mission; also, the building in which the minister resides and the area immediately surrounding it. A lega¬ tion is usually deemed immune from the juris-

diction of the country in which it is situated, and to be subject only to the laws of the country which the Minister represents. It may therefore serve as a place of refuge for polit¬ ical offenders. All persons attached to a for¬ eign legation are protected by the act of 30 April 1790, from violence, arrest or molestation (Fed. Cas. No. 2,278).

LEGAZPE, Miguel Lopez de, me-gel lo'path da la-gath'pa, Spanish soldier : b. Zu- marraga, Guipuzcoa, about 1510; d. Manila, Luzon, 20 Aug. 1572. He was for several years chief secretary of the government of the City of Mexico, and in 1564 was made commander of the Spanish forces sent to

the Philippine Islands. He sailed from La Navidad, Mexico, in November 1564 and reached the islands in the following February. He took possession of several of the islands and founded San Miguel in Cebu, in May 1565; began ihe subjugation of Luzon in 1570, and founded the city of Manila in May of the next year.

LEGEND, originally a term applied to col¬ lections of biographies of saints and martyrs or of remarkable stories relating to them. In the Middle Ages a collection of the lives of the saints was known by the name of Legenda Sanctorum, or Historia Lombardica. There is a celebrated collection, called the Golden Legend (Aurea Legenda), by Jacobus de Voragine, archbishop of Genoa, who died in the year 1298. It was translated into English by Caxton, and printed by him at the command of William, Earl of Arundel, in 1483. Many of the mediaeval legends were of an uncritical char¬ acter, and along with true history often mingled much fable. In the course of time the legend came to mean only the fictitious parts of the story and became distinct from authentic his¬ tory. It has now come to mean any unauthen- tic or improbable story handed down from ancient times. Legend is also used for the motto or words engraved in a circular manner round the head or other figure upon a medal or coin. The meaning of this term is similar to that of inscription ; but the latter refers chiefly to the writing placed in the middle of the coin, while the legend surrounds it.

LEGEND OF GOOD WOMEN, an un¬ finished poem of Chaucer, planned to embrace the lives of 19 women of antiquity celebrated through their devotion to Cupid, but of which he completed eight and a part of the ninth, supposed to have been written about 1685. While nearly all the stories used are in Boc- cacio's (Declaris Mulieribus) there is doubt that Chaucer had ever seen that work. He followed the original authors, Ovid, Livy and others, and 'there are indications of influences from Virgil, Dante and Guido da Colonna. The prologue and (Cleopatra) are considered among Chaucer's best work.

LEGEND OF SLEEPY HOLLOW, The,

one of the stories in Washington Irving's (Sketch Book) (7 parts, 1819-20). It deals with the tradition of the Headless Horseman, used to interrupt Ichabod Crane's courtship of Katrina van Tassel, and is one of the most popular tales in the book.

LlSGENDE DES SIECLES, la'zhand' da ze-a'kl, La (The Legend of the Centur.tes), a collection of lyrical epic verse by Victor vol. 17 — 16

Hugo, published in 1859-77-83, and considered his finest work in this field.

LEGENDRE, Adrien Marie, a-dre-on ma¬ re le-zhondr, French mathematician: b. Paris, 18 Sept. 1752; d. Auteuil, France, 9 Jan. 1833. He was professor of mathematics in the mili¬ tary school at Paris and in 1783 became a mem¬ ber of the Academy. He was in 1787 employed by the French government, with Cassini and Mechain, to measure a degree of latitude be¬ tween Dunkirk and Boulogne, while English mathematicians did the same on the other side of the Channel, in order to determine the pre¬ cise location of the observatories of Greenwich and Paris. In 1808 Legendre was appointed by the imperial government councillor, for life to the university. He particularly distinguished himself by profound investigations as to the at¬ traction of elliptical spheroids, and his method of calculating the course of the comets at¬ tracted great attention. His best-known work is Elements de geometrie (1794; new ed., with additions and modifications by Blanchet 1845), which has been translated into English with notes by Sir David Brewster. He wrote also (Essai sur la theorie des nombres) (1798) ; (Nouvelle methode pour determiner l'orbite des cometes> (1805) ; (Exercises du calcul integral, sur divers ordres de transcendantes et sur les quadratures) (1811—19) ; (Traite des fonctions elliptiques et integrates Euleriennes> (1827-32), etc.*

LEGENDRE, Louis, French revolutionist: b. Versailles, 22 May 1752; d. Paris, 13 Dec. 1797. He was a butcher, and at the outbreak of the Revolution he speedily became a leader through his untutored eloquence and personal magnetism. He was prominent in the taking of the Bastille, in the massacre of the Champs des Mars and in the attack on the Tuileries. He was a member of the Convention and voted for the execution of Louis XVI. He repre¬ sented the Convention on missions to Lyons and Seine-Inferieure in 1793, was a member of the Comite de Surete Generate, and was instru¬ mental in securing the fall of the Girondists. He deserted Danton after his arrest,, and after the fall of Robespierre he was active among the reactionaries, opposed the Jacobin Club, which he had helped to found, and as presi¬ dent of the Convention was prominent in the impeachment of J. B. Carrier. He afterward was elected a member of the Council of An¬ cients.

LEGENDRE, Napoleon, Canadian poet and essayist: b. Nicolet, Quebec, 13 Feb. 1841; d. 1907. He was educated at Saint Mary's Jesuit College, Montreal, was admitted to the bar of Lower Canada in 1865, edited Le journal de l' instruction publique in 1871-76, and in 1876 was appointed clerk of the French jour¬ nals of the legislative council of Quebec. He was an original member of the Royal Society of Canada. Author of (Sabre et scalpeP (1872) ; (£chos de Quebec (2 vols., 1877) ; (Les perce-Neige,* poems (1886) ; (La langue frangaise au Canada) (1892), etc.*

LEGER, la-zha, Louis Paul Marie, French scholar and author: b. Toulouse,

13 Jan. 1843. In 1885 he was appointed professor of the Slav languages at the College d.e France, and has done much to awaken an interest in

the history and philology of the Slav peoples by such works as (Slav Studies* (1875) ; his¬ tory of Austria-Hungary* (1878), translated into English; (Slav Tales) (1882); (The Save, Danube and Balkan* (1884) ; (Bulgaria*

(1885) ; Russians and Slavs) (1890) ; Rus¬ sian Literature) (1892) ; (Le Monde Slav) (2d ed., 1897-1902) ; (1902) ;

(Souvenirs d'un slavophile> (1905) ; (Moscow) (1904) ; Prague* (1907) ; (Serbs, Croats and Bulgarians* (1913). He was elected a mem¬ ber of the Institute in 1900.

LEGER (lej'er) LINES, in music the short

lines drawn above and below the staff for those notes which exceed its compass; the corre- snonding spaces being called Heger. spaces.® The term dates from about 1700 and its origin is disputed.

LEGERDEMAIN, lej-er-de-man', the art of deceptive juggling; variously styled pres¬ tidigitation, thaumaturgy or sleight of hand; or less correctly, magic. Properly, . magic (q.v.) is the name for necromancy, divination, sorcery or unusual and apparently tsupernat- ural things accomplished by the aid of occult powers or discarnate spirits. The term magic has been popularly used by self-styled ((magi- cians® who are really jugglers or sleight-of- hand performers, depending on their ability to trick or mislead spectators at a public perform¬ ance, as in a theatre. The typical stage per¬ former has a stock of tricks, depending largely upon the use of apparatus calculated to de¬ ceive or mislead, as boxes and pitchers with double bottoms or concealed compartments. There is much substitution of like objects, as coin, eggs, handkerchiefs, etc. The expert pres¬ tidigitator has a skilful knack of directing the attention of the public at the instant he substi¬ tutes one thing for another. It is this substitu¬ tion that has suggested the terms — legerde¬ main (fine hand) and sleight-of-hand. He di¬ rects the attention to one thing when he wishes it removed from another. When the spectator is advised to watch slowly the movement of his hands, it is likely that the important thing is done with his foot, or by an attendant, etc. The simple juggler amazes one by the celerity with which he handles half a dozen balls, plates, etc., but the legerdemain artist goes farther and is satisfied only by imitating the impossible in the work of the

true magician or spiritual medium. The successful thaumaturgist may carry with him considerable machinery for the performance of his deceptions. Some of these have become widely known and advertised, as the human head resting on a plate on a small table with no apparent body. In this trick, mirrors between the legs of the table hide the person who sits under with his head through a <(faked® plate. These mirrors reflect dra¬ pery of the same color as that at the rear and the spectators appear to see right through and under the table. Another popular trick is that of locking a man in a trunk and then tying the trunk with many ropes, after which a curtain is dropped. Within a few seconds the man ap¬ parently walks out, carrying the opened trunk in his hand. The obvious explanation is that there are two similar trunks and two men — twins being hired for the performance. Rob¬ ert Houdini was the first to bring real scientific methods to the aid of modern con¬

juring, and more recently the Herrmanns have been famous in this art. There is a well- known popular vaudeville deception carried on by the scientific use of liquid air. Here the performer appears to fry eggs on a cake of ice, whereas he simply freezes them.

Snake-charming is largely hypnotic, and it is believed that some of the East Indian per¬ formers in the open air simply hypnotize the beholders into the conviction that they see what does not really take place. Other tricks are undoubtedly magic, performed through oc¬ cult knowledge not generally recognized, as telepathy, clairvoyance, materialization, etc. The true scientific conjurer makes one of op¬ tical delusions, as in the famous ghost trick; of reflections of sound ; of expert and highly elaborate systems of signaling with a confed¬ erate ; trap-doors, curtains, invisible wires, electrical contrivances, etc. For several hun¬ dred years there have been exhibitions of a person — usually a ((beautiful lady® — sus¬ pended in mid-air, without apparent means of support. This trick undoubtedly has been ac¬ complished in more ways than one. The method in case of ((Astarte® was a supporting iron bar of the color of the back curtains that escaped detection. Another method, in which the elbow of the subject is allowed to touch a cornice, consists in using steel armor worn under the clothing and bolted to the cornice. Consult Smithsonian Annual Report (Psychol¬ ogy of Prestidigitation) for 1894; Hoffman, (1903) ; Cochrane, (The Machinery of Amusement' (in (Modern Industrial Prog¬ ressˆ 1905) ; Houdini, (Unmasking of Robert HoudinP (1908) ; Elbiquet, (Text-Book of Magic (1913). See Magic.*

LEGGE, leg, James, British Chinese scholar: b. Huntly, Aberdeenshire, 1815; d. Oxford, 29 Nov. 1897. He was educated at King's College, Aberdeen, and at the High¬ bury Theological School, London ; was or¬ dained and in 1839 went as a missionary to the Chinese. He was stationed

at Malacca at the head of the Anglo-Chinese College until 1842 when the college was removed to Hongkong, where he remained for 30 years. He was an earnest missionary and realized the necessity for an understanding of the language and cul¬ ture of China among his coworkers. He there¬ fore began in 1841 a translation of the Chinese classics (8 vols., Hongkong 1861-73). In 1875 a chair of Chinese language and literature was founded at Oxford University for occupation by Dr. Legge and he remained there until his death. In addition to his numerous transla¬ tions and works on Chinese religion he was author of (The Life and Teaching of Confu¬ cius (1867) ; (The Life and Teaching of Mencius) (1875); (The Religions of China)*

(1880).

LEGGETT, leg'et, Mortimer Dormer,

American soldier: b. Ithaca, N. Y., 19 April 1821 ; d. Cleveland, Ohio, 7 Jan. 1896. After graduating in medicine at Willoughby, Ohio, he studied law and was admitted to the bar in 1845. In the following year he was instru¬ mental in organizing the first union free school system in Ohio. He was professor of plead¬ ings and practices in Ohio Law College 1855—58, superintendent of the Zanesville (Ohio)

public schools in 1858-62, and from 1862-65 served in the Federal army and was promoted to be major-general of volunteers in July 1864 and was commissioned major-general a year later. From 1871-81 he was United States Commissioner of Patents. From 1881 till his death he practised in Cleveland, Ohio.

LEGGETT, William, American journalist: b. New Y ork, 1802; d. New Rochelle, N. Y.. 29 May 1839. He was educated at the college in Georgetown, D. C., and in 1822 entered the navy as midshipman, but resigned in 1826. He had in the previous year published a volume of poems, (Leisure Hours at Sea, by a Midship¬ man of the U. S. Navy, 5 and in 1828 became editor of the Critic , a weekly literary journal, soon united with the New York Mirror, to which he contributed (Tales by a Country Schoolmaster' and (Sketches at Sea.* In 1829 he became one of the editors of the New York Evening Post, to which journal he was at¬ tached until 1836. He then commenced a weekly journal called the Plaindealer, which attained a large circulation, but was soon dis¬ continued through the failure of its publisher. In May 1839 he was*

appointed by President Van Buren diplomatic agent to Guatemala, but died suddenly while preparing for his depar¬ ture. His (Political Writings, with memoir by Theodore Sedgwick, appeared in 1840. Leg¬ gett was remarkable among the journalists of his day as an unflinching advocate of freedom of opinion for his political opponents as well as for the men of his own party. Among his staunch friends was William Cullen Bryant. Consult Wilson, J. G., (Bryant and his Friends* (New York 1886).*

LEGGETT'S, or BALD HILL, Battle of,

an engagement of the Civil War, near Atlanta, Ga. The battle of Peachtree Creek (q.v.), 20 July 1864, was a Confederate defeat. On the 21st General Sherman advanced strong skir¬ mish-lines to within about two miles of the works surrounding Atlanta. In the morning Leggett's division was ordered to carry a high, bare hill, situated about half a mile south of the Decatur Railroad. Supported on the right by Giles A. Smith's division, Leggett advanced under cover of the hill itself, dashed forward when reaching its base, drove Cleburne's Con¬ federates from it and began to entrench. The Confederates made several vain efforts to re¬ take it. From its summit Atlanta was in full view. Discovering at daybreak of the 22d that the advanced Confederate works had been abandoned, Sherman ordered a general ad¬ vance along his line to occupy the city, and the movement began accordingly. During the night, however, the Confederate General Hood had abandoned his advanced lines on the left and ordered Hardee's corps of four divisions to march entirely past Sherman's left and at¬ tack his left and rear. Giles A. Smith's divi¬ sion of Blair's 17th corps held Sherman's left and Dodge's 16th corps was some distance in rear of the centre of Blair's corps and per¬ pendicular to it. Blair fronted west, Dodge south.

About midnight Hardee moved out of At¬ lanta by the McDonough road, and about day¬ break, when the troops had made a night march of 15 miles, and passed beyond Sher¬ man's left, he halted, formed line and gave his

men needed rest. In half an hour the order was given to advance and his corps went for¬ ward until Bates and Walther's divisions came to open ground, where they received a most deadly fire from Dodge's two Union divisions, which held them in check. Every effort to ad¬ vance was repulsed with great loss and Gen¬ eral Walther was killed. On the Federal side Gen. J. B. McPherson (q.v.), commanding the Army of the Tennessee, hastened troops to fill an interval between Dodge and Blair, rode to Dodge and then toward Blair's line, and had gone but a short distance when he fell mor¬ tally wounded, being succeeded in command by Gen. John A. Logan. Meanwhile the left of Hardee's line had enveloped Giles A. Smith's

division, attacking it in front, flank and rear, Smith gradually yielding ground and refusing to connect his left with Dodge's right, the Con¬ federates gradually advancing to the foot of Leggett's Hill. When Hardee's attack on Sherman's left and rear was being delivered, Hood ordered Cheatham's corps to attack in front, and the attack fell upon Leggett's Hill and the 15th corps on the right of it, just as Leggett had repulsed an attack in his rear. Leggett, by desperate fighting, held his ground. The Confederates made repeated at¬ tacks until nightfall, when Hardee withdrew his right wing, leaving his left connected with the entrenched line in front of Atlanta. On the right of Logan's corps the Army of the Ohio was attacked by Smith's Georgia militia, which was readily repulsed. On Hardee's right Wheeler's cavalry attacked Sprague's brigade in Decatur and for a time pressed it vigor¬ ously, but Reilly's brigade of the Army of the Ohio coming to its assistance, Wheeler was re¬ pulsed. The battle of Leggett's or Bald Hill was one of the greatest of Sherman's Atlanta campaign and involved four corps of his army and two of Hood's. The loss of the Army of the Tennessee was 430 killed, 1,559 wounded and 1,733 missing, with 10 guns; the entire Union loss during the day was about 4,000. The Confederate loss is not known ; it has been variously estimated at from 6,000 to 10,000 ; it was probably between 5,000 and 6,000. Con¬ sult (Official Records (Vol. XXXVIII) ; Cox, J. D., (Atlanta* (New York 1882) ; Sherman, W. T., (Personal Memoirs* (New York 1875) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. IV, New York 1887-88).*

E. A. Carman.

LEGHORN, leg'horn or leg-horn' (It. Livorno, le-vor'no-), Italy, a walled city and the third commercial port of Italy, in Tuscany, on the Mediterranean. It is the capital of the province of Leghorn, which has an area of 133 square miles and a pooulation of about 135,- 765. It is about 200 miles northwest of Rome and 60 miles west of Florence. It is a well-built and clean city; the north part called Ve¬ nezia Nuova, is intersected by canals along which are warehouses and stores, and a ship canal connects with the Arno. Leghorn has an inner and outer harbor and a good roadstead; the approach to the new dock has been deep¬ ened to 28 feet to admit of the entrance of large vessels. In the outer harbor is a light¬ house, built in 1303. Some of the manufac¬ tures are straw hats (originally the famous

Leghorn hats), leather, woolen caps, glass, paper, soap, coral ornaments,

etc. Shipbuilding is one of its important industries, vessels for the Italian navy being constructed here. The chief exports are olive oil, borax, wine, marble, pumice stone, quicksilver, candied fruit, hemp, hides, soap, raw silk, etc. The chief imports are sugar, cotton, coal, tobacco, grain, spirits and petroleum. In the middle of the 16th cen¬ tury Leghorn had less than 800 inhabitants ; but about this time it became a free port, the first one on the Mediterranean. After the de¬ cay of Porto Pisano, a neighboring city, Leg¬ horn grew into importance. It has few build¬ ing of the Renaissance period; a 17th century cathedral, a synagogue dating from 1581 and the royal castle are the principal public build¬ ings. Some of the educational institutions are the Royal Commercial Marine Institute, the Royal Marine Academy, a library with over 72,000 volumes, a number of academies and seminaries. There are many charitable insti¬ tutions. It is the seat of a bishopric and a United States consul. Leghorn is a popular summer resort and its connection by electric lines with the bathing places and with beautiful villages in the vicinity make it a most desirable place of residence at any season of the year. Pop. 105,315.

LEGHORN, a breed of domestic fowls. See Poultry.

LEGHORN HATS, hats made in Tuscany from straw-plait obtained from bearded wheat cut green and bleached. They are so called because imported from Leghorn.

LEGION, in ancient Roman armies, a body of infantry consisting of different numbers of men at different periods, Horn 3,000 to above 6,000, often with a complement of cavalry. Each legion was divided into 10 cohorts, each cohort into three maniples and each maniple into two centuries. Every legion had 60 cen¬ turions and the same number of optiones or lieutenants and standard-bearers. The stand¬ ard of the legion was an eagle.

LEGION, Theban, a Roman legion sup¬ posed to have been composed entirely of Chris¬ tians, which upon refusal to participate in the persecution of their fellow Christians was by the orders of the Emperor Maximianus (285— 305) twice decimated and finally exterminated. The legion was composed of 6,600 men re¬ cruited from the East and under command of Mauritius who later became the patron saint of Agaunum, Switzerland, the name of the town of their martyrdom being changed to Saint Maurice in his honor. The legend ap¬ pears to have originated with Eucherius, bishop of Lyons, and while there are many later versions they supply details rather than change its outline. There has been much controversy concerning the authenticity of the story. It is alleged that nearly a century and a half elapsed between its supposed date and the first written record of it. Further arguments against it are that Christian soldiers

were rarely executed but given their choice of sacrificing to the gods or being discharged, and that an entire legion would scarcely have been put to death at a time when Maximianus sorely needed troops. Consult (Acta sanctorum, edited by J. Bolland and others (Sept, vi, 308-49, 895—*

26), and Minge, J. P., (Patrologiae cursus com- pletus series graeca (Vol. CLXXI, 1625-30).*

LEGION, The Thundering, a Roman

legion of the time of Marcus Aurelius. The substance of their story is that after driving the Marcomanni and Quadi from Hungary (174 a.d.), Marcus Aurelius and a portion of his army found themselves in a valley enclosed by high mountains and were in danger of perishing from thirst. The prayers of the Christian soldiers in the army brought the needed water in the form of a thunderstorm, which not only saved the army but put the barbarians to rout through terror and the swift attack of the Romans. The legend states that the legion was thereafter called the Thundering Legion in honor of the achieve¬ ment. Of the actual occurrence of the thunderstorm and its assistance to Marcus Aurelius there is no doubt ; but the name Thundering Legion (Legio Fulminata) had ex¬ isted from the time of Augustus, and probably originated in the representation of lightning as the device on its shields. A marble pillar at Rome represents the deliverance of the army by means of the storm, but is not considered a memorial to the supposed prayers of the Chris¬ tians. Dio Cassius in (Excerpta Ziphilin) (I, lxxi, 8) states that the miracle was due to an Egyptian sorcerer. The letter of Marcus Aurelius, giving credit to the prayers of the Christians, printed in the first (Apology of Justin Martyr, J is spurious. Capitolinus at' tributes the miracle to the prayers of Marcus Aurelius himself, while Tertullian supports the Christian legend.

LEGION OF HONOR, French Order

of the (L'Ordre de la Legion d'Honneur), an order created by Bonaparte, First Consul, on 19 May 1802 (29 Floreal, Year X), to reward distinguished services rendered in military and civil life. The emblem of the Legion d'Honneur is a star with five twofold-rays, the centre of the star being surrounded by an oak and laurel crown, one side representing the French Re¬ public (substituted for the emperor's head), with the inscription "Republique Frangaise 1870,)) the other side being adorned with two tricolor flags (substituted for the imperial eagle), and bearing the inscription, which has not been changed : ((Honneur et Patrie.® The star, white enameled, is made of silver for the Chevaliers , and of gold for the other grades. The diameter is of 40, 60 or 70 millimeters (1.57, 2.36 or 2.75 inches), according to the grades. The badge is attached to a red-

watered ribbon and worn on the left side of the chest.

The badge of the Legion of Honor, when worn by civilians or military and haval officers in civilian clothes, is a red-watered ribbon fixed to the left side buttonhole of the coat. The ribbon takes the form of a <

The number of members of the order, orig¬ inally provided by the law, was not to exceed 6,000, but this amount was very rapidly ex¬ ceeded, and Napoleon himself, up to 1814, had granted the membership of the Legion of Honor to 36,825 individuals.

The first decorations were distributed with great solemnity to the "legionnaires® in Paris, Place des Invalides, on 14 July 1804 by Napo¬ leon who, by that time, had become emperor :

the decorations were therefore distributed in his own name so that the new dignitaries had to swear fidelity to him ; for that reason some distinguished individuals refused the crosses which had been offered to them, their personal convictions and principles not allowing them to recognize the establishment of the new regime. Among these distinguished objectors were Lafayette and Rochambeau.

Civil Medal.

Among the members of the first promotion I may mention the following names which are now well known in the world of sciences, art, literature, politics and, of course, in the mili¬ tary and naval history of France: Monge, Berthollet, Lagrange, Laplace, Prony, Parmen- tier, de Jussieu, Cuvier, Montgolfier, Colin d'Harleville, Chenier, Fontanes, Le Brun, Da- cier, Sylvestre de Sacy, David, Le Sueur, Mehul, Monsigny, Cambaceres, Sieyes, Talleyrand, Fouche, Volney, d'Aguesseau, Portalis, Brillat- Savarin ; all the Marechaux de France , the Generals and Admirals; it may be mentioned here that Marshal Augereau refused to answer when his name was called.

A second distribution of a still more solemn character was made by the emperor, at Boulogne-sur-Mer, on 17 April 1805, in pres¬ ence of 70,000 troops. Presently the Cross of the Legion of Honor was to smell powder for the first time at the famous battle of Auster- litz (2 Dec. 1805). According to the latest statistics there are 49,236 legionnaires, distrib¬ uted among the five degrees as follows: Chevaliers, 41,108; officiers, 6,713; commandeurs, 1,142; grands officiers, 229; grands-croix, 44 — total,

49,236.

The President of the Republic is the ((souverain chef et grand maitre de VOrdre » (sovereign head and grand master of :he order) .

These statistics, however, were compiled be¬ fore the war; none of a more recent date arc available, although more than 30,000 crosses have been allowed since the beginning of the war; a decree. of 13 Aug. 1914 authorizes the distribution of as many crosses as circumstances will require ; but a special law passed by both Houses of Parliament will be necessary to give a legal and definite ratification to all the nom¬ inations. Of course the bill will be passed without the slightest opposition. During peace¬ time, in order to be admitted to the member¬ ship of the Legion of Honor it is necessary to have discharged, with some distinction, civil or military functions during at least 20 years and sometimes 25 years. This rule, however, does not apply to the persons who have rendered extraordinary services in their civil or military functions, or in the arts and sciences. But, in any case, in order. to be admitted to a superior grade it is necessary to have been : (1) For the grade of officier, four years a chevalier; (2) for the grade of commandeur, two years an officier; (3) for the grade of grand officier, three years a commandeur ; (4) for the grade of grand-croix, five years a grand officier.

The nominations and promotions from a lower to a superior grade are made twice a year, on the 1st of January and the 14th of July. There are of course exceptions to that rule when the latter are justified by extraordi¬ nary services and circumstances, as for in¬ stance in time of war, but the Legion of Honor is the highest distinction of that kind which can be obtained in France; it is not granted easily, and there is no legionnaire who is not very proud to wear the badge of an order which has been famous ever since it was created by Bonaparte.

All officers, non-commissioned officers and privates in the army and the navy who are members of the Legion of Honor receive the following annual pensions according to their grade: Chevaliers, 250 francs ($50); officiers, 500 francs ($100) ; commandeurs, 1,000 francs; grands-offciers, 2,000 francs ; grands-croix, 3,000 francs.

No pension whatever is paid to the legion¬ naires who have been admitted to the member¬ ship of the order for civil services.

When admitted or promoted, the legion¬ naires have to pay to the Grande Chancellerie the following fees according to their grade:

For the copy For the price of the patent of the badge

The Chevaliers . 25.00 francs 12.00 francs

“ Officiers . 50.00 “ 67.50 “

“ Commandeurs . 80.00 “ 149.00 “

“ Grands Officiers . 120.00 “ 58.00 “

“ Grands Croix . 200.00 “ 240.00 “

The administration is entrusted to a Grand Chancellor who holds the seal of the Order, works up the annual budget, reports to the President of the republic all propositions con¬ cerning the Legion of Honor, etc. A Secre¬ tary-General, appointed by the President of the republic, represents the Grand Chancellor when the latter is absent for any reason whatever.

The Grand Chancellor is assisted by a Council of the Order which assembles every month for general purposes > (management, budget, control of the regulations, vacancies arising from the death of members every six months), distribution of the available crosses among the different ministerial departments,

discipline, etc. The Council consists of the Grand-Chancellor, president ; the Secretary- General, vice-president, and 12 members of the Order appointed by the President of the re¬ public.

Membership in the Legion is forfeited when¬ ever the legionnaire loses temporarily or per¬ manently his rights of French citizenship. The President of the republic is also empowered to suspend or suppress the use of the rights and prerogatives attached to membership of the Order, after a penal sentence of a civil or military court, and whenever it has been ascer¬ tained that the legionnaire has acted in a dis¬ honorable manner in certain cases where the

law provides no penalty.

Of course, distinguished foreigners are ad¬ mitted to the Order, but their admission is at the same time more easy and more difficult than is the case for Frenchmen; more easy because there are no restrictions as regards the length of time during which the}’- have to make themselves serviceable, and more difficult be¬ cause the cross is allowed only on account of rather high distinction. A law provides that foreigners are aadmis et non regus ®

(admitted, not received), and form a contingent quite dis¬ tinct from the French cadres. The foreign members of the Order have the same rights as the French members to a funeral with military honors.

Among the Americans who are or have been members of the Legion of Honor may be men¬ tioned the following:

Grands Croix.

Horace Porter (soldier and diplomat)

Robert S. McCormick (diplomat)

Grands Officiers.

David R. Francis, ex-Sec- retary of the Interior Francis B. Loomis (dip¬ lomat)

Rear-Admiral Peary Ferdinand W. Peck Charlemagne Tower (dip¬ lomat)

Major-G e n e r a 1 Leonard Wood

COMMANDEURS. Rear-Admiral Ammen Brigadier-General Baird Wharton Barker (University of Pennsylvania) Major-General John R. Brooke

Nicholas Murray Butler (president Columbia Uni¬ versity)

Andrew Carnegie (steel magnate and philanthro¬ pist)

Rear-Admiral Higginson Major-General Howard Mgr. John Ireland (late arch¬ bishop of Saint Paul) Perry Belmont (diplomat) Dr. Arthur W. de Roaldes (surgeon)

Major-General Schofield Major-General Sickles

Officiers.

Charles F. Beach (a distin¬ guished American lawyer practising in Paris) •

Paul W ayland Bartlett (sculptor)

A. Barton Hepburn (ex¬ president New York Chamber of Commerce)

Patrick Collins (late mayor of Boston)

Deering Jones (Chicago)

Charles W. Eliot (president emeritus, Harvard Univer¬ sity)

James Howard Gore (pro¬ fessor of Columbia Uni¬ versity)

William R. Harper (late president of the University of Chicago)

William Jacob Holland (director of the Carnegie Institute, Pittsburgh)

James H. Hyde (formerly vice-presidentof the Equitable Insurance Co.)

Harry Pratt Judson (presi¬ dent of the University of Chicago)

A. Lawrence Lowell (presi¬ dent of Harvard Uni¬ versity)

C. W. McCormick (presi¬ dent of the McCormick Harvesting Co.)

John W. Mackay (president of the Commercial Cable Co.)

Ridgway Knight (artist)

Robert J. Thompson (dip¬ lomat)

Edward Tuck (banker)

John Wanamaker (formerly Postmaster- General)

Two weeks after the famous battle of Aus- tcrlitz a decree signed by Napoleon, at Schoen- brunn, on 15 Dec. 1805, ordered the creation of three schools for the education of the

daughters of the members of the Legion of Honor. The first of these schools was estab¬ lished in the Chateau d'Ecouen, near Versailles, in 1806; the second one, at Saint-Denis, near Paris, in 1808, the third one, at La Maison des Loges, in the forest of Saint Germain, in 1811.

The daughters of the legionnaires who have no fortune are admitted free of charge to these educational establishments ; the granddaughters, sisters or nieces of the legionnaires are also admitted to the same establishments, but they have to pay 1,000 francs a year at the Saint- Denis school and 700 francs at the Ecouen and des Loges schools. The total number of pupils admitted free of charge in the three schools amounts to 1,200, whilst the number of paying pupils is limited to 155 altogether. The Grand-Chancellier has the general control of the three establishments to which the pupils are admitted on his own recommendation to the President of the republic.

The annual expenses of the Order are about 17,000,000 francs

($3,400,000), the two principal items being the pensions of the members, about 10,000,000 francs ($2,000,000), and the pensions of the Medailles Militaires, about 6,000,000 francs ($1,200,000), (see Medaille Militaire below), other minor items of ex¬ pense being the salary of the staff at the Grande Chancellerie about 250,000 francs ($50,000), the three educational establishments for young ladies about 300,000 francs ($60,000). The receipts are provided by an annual interest of 4,150,000 francs ($830,000) on Rentes frangaiscs (French Consolidated Fund), which are owned by the Order. The Domaine d'Ecouen together with the fees paid by some of the pupils give an annual income of about 110,000 francs ($22,000). The Ministry of Justice, to which the Order of the Legion of Honor is financially connected, provides every year all the funds required to balance the accounts. It may be mentioned here that in 1916 a rich American gentleman, formerly a president of the National City Bank, New York, contributed generously 1,000,000 francs ($200,000) to the Order, the interests of which are to be distributed among the children of the legionnaires who have been killed during the war.

The Palais de la Legion d'Honneur which is situated on the Quai d'Orsay and Rue de Lille, is the private property of the Order. It was burnt down during the Commune in 1871, and part of the records were destroyed. On the initiative of General Vinoy, who was then the Grand-Chancellier, a public subscription for the reconstruction of the building was opened on 7 June 1871. The list was headed by Monsieur Thiers with 2,000 francs; on 2 Octo¬ ber the subscription lists were closed. A total amount of 1,625,599 francs 19 centimes ($325,- 119.83) was provided, mostly by the legion¬ naires. The Palais was completely recon¬ structed in 1878.

The Legion of Honor may be granted to privates and non-commissioned officers, but in very exceptional circumstances only. The Medaille Militaire (which carries the privilege of an annuity amounting to 100 francs ($20)), was therefore created in 1852 in order to recog¬ nize the services of <(non-commissioned officers, corporals, privates or marines.® especially in time of war. The Medaille Militaire may also

be granted to field-marshals and admirals and to general officers who have been commanders- in-chief. In such cases, that distinction is con¬ sidered as being second to none. The Medaille

Military Medal.

Militaire for instance was granted to Marshal J off re after the battle of the Marne.

The medailles are granted partly on the recommendation of the Minister of War and the Minister of the Navy, and partly on the recommendation of the Grand-Chancellier de la Legion d'Honneur ; but all nominations are to be approved by the Conseil de I'Ordre. As al¬ ready. stated, the pensions of the Medailles Militaires absorb about 6,000,000 francs of the financial resources of the Legion of Honor.

Marc de Valette.

LEGISLATION. The term ˆlegislation® in its most restricted sense has reference to the enactments of a legislative body (see Legislature). In a larger sense, legislation embraces the totality of general rules of law binding upon the community, whether they emanate from a legislative body, from the people acting by way of the referendum, from a constituent assembly (in the United States a ˆconstitutional convention®), the chief of state (president, king or emperor), or a subsidiary law-making body, such as a municipal or county council. In a special sense it may also be applied to the body of so-called judge-made law built up by the courts as a result of their power to interpret the meaning of the constitu¬ tion and laws. Legislation through the agency of bodies of specially chosen representatives is of modern origin. (See Legislature). Among the ancients custom was the chief source of law, and in Rome positive written law had to conform to custom in order to be valid. This theory of the supremacy of customary law over written law persisted throughout most of the mediaeval period. (See Law). After the

close of the Middle Ages, however, legislation vvas exalted above custom, the idea that legisla¬ tion proceeded from the state took root and it was denied by the jurists that customary law might override the prescriptions of positive law.

In the United States the great body of legis¬ lation consists of the enactments of Congress, the State legislatures and the various sub¬ sidiary law-making bodies, particularly the municipal councils. The constitutions also con¬ tain a large body of legislation, and not all of this is organic or fundamental in character, for in recent years there has been a marked tend¬ ency to insert in them many rules of private law and even rules of parliamentary pro¬ cedure. (See Constitution). Formerly much of this legislation was embodied in the statutes, but the growing distrust of the legislatures has had the effect of transforming more and more the constitutional convention into an ordinary law-making body . as well as a constituent assembly.

The evidence of this tendency is found in the great length of some of the more recent constitutions, such as those of Louisiana, Okla¬ homa and Virginia, all of which contain a mul¬ titude of provisions which logically should be reserved to the statutes. The body of legisla¬ tion found in the constitutions and the statutes is supplemented by a mass of judge-made law consisting of the interpretative decisions of the courts. Not strictly legislation in form, it is such in effect, and a study of the text of a con¬ stitution or statute apart from the constructions which have been read into it by the judiciary often, gives an imperfect knowledge of its meaning and effect. Where there is doubt as to the meaning of the statute the courts not only claim the right to discover its meaning, but also to give effect to the intention of the law-maker so far as that intent can be ascer¬ tained. (

the customs service, the internal revenue serv¬ ice and various other branches of the adminis¬ trative service. Many of these regulations lay down rules of conduct not only for public officials and employees, but are binding upon private individuals as well and for violation of which they are subject to the penalties of the criminal law. See Executive.

In Europe this source of legislation is even more important, for there the ordinance power of the executive is much larger. In England what are known as the ˆstatutory rules and orders in council® constitute a very extensive and important body of subsidiary legislation ; they are published with the acts of Parliament and not infrequently constitute the larger bulk of legislation found within the covers of the volume of law enacted annually for the gov¬ ernment of the English people. They consist of orders issued by the Crown in Council either in pursuance of the royal prerogative — a more or less undefined realm of .power which the Crown inherited from early times and of which it has never been deprived by Parlia¬ ment — or in pursuance of authority, expressly delegated to the Crown or the ministers by act of Parliament. Some of these orders are issued for the purpose of supplementing the statutes, which in England are usually brief and embody in outline only the general will of Parliament ; others regulate matters with which Parliament has not dealt at all, but the regu¬ lation of which has been delegated to the Crown or the minister.

On the continent of Europe legislation of this character is even more extensive. There the power of the executive to issue ordinances (reglements , Verordnungen) and regulations (arretes) is very large. There even more than in England acts of the legislature rarely descend into details in laying down rules of conduct or in prescribing the mode of executing the law.

Usually the will of the legislature is declared only in general terms and a large discretionary power is left to the officer charged with the execution of the law. The power to elaborate the statute and supply the details so as to make it enforceable is then left to the executive through the exercise of the pouvoir reglemen- taire. There also much more than in the United States a large independent power of legislation in respect to matters not dealt with by the legislature is delegated by Parliament to the executive. Thus in France the power to legislate for the colonial possessions in so far as the Parliament itself has not legislated on colonial matters is exercised by the President of the republic.

Regarding the procedure and methods of legislation by legislative bodies a few obser¬ vations may be made.

It is a general though not an absolutely universal constitutional rule that revenue bills may originate only in the more popular of the two chambers. The rule originated at a time when upper chambers were generally appointed or were largely hereditary bodies and it was, therefore, considered improper to permit them, being irresponsible as they were to the people, to initiate measures for laying taxes. Although in many countries the upper chamber is now a popularly elected body, the old restriction on its power to initiate money bills still survives in spite of the fact that it no longer has any

raison d'etre. In a number of countries, nota¬ bly France and the United States, the exact meaning of the restriction has often been a source of controversy between the two cham¬ bers. In countries like the United States, where the so-called presidential system of gov¬ ernment prevails, legislative measures may be initiated only by members of one or the other chamber; on the contrary, in those countries where the cabinet or parliamentary system is found, it is the right of the ministry as well as of any member to introduce bills and in practice most important measures are pre¬ pared and introduced by the ministry. They are, therefore, known as ˆgovernment® bills in contradistinction to <(private® bills, or those introduced by members who do not belong to the ministry. Their passage is advocated by the ministry and the refusal of the legislature to pass them may and generally does cause the ministry to resign. (See Cabinet Govern¬ ment). Indeed, in England, Parliament has to a large degree abdicated its legislative power in favor of the Cabinet. In practice it chooses from its members a small body of leaders to whom it accords the power to frame legislative measures, reserving to itself only the right of control.

In the United States and England a distinc¬ tion is made between bills and resolutions. A bill embodies the will of the legislature on matters of a more permanent and funda¬ mental character, while a resolution embodies the

legislative will on matters of a temporary or subsidiary character. In Congress and some of the State legislatures a distinction is also made between joint and concurrent resolutions, the latter of which expressing the views of the legislature only do not require the approval of the executive. In Congress and in many of the State legislatures joint resolutions like bills must be submitted to the executive for his approval or disapproval.

In. England and the United States an import¬ ant distinction is that between public and pri¬ vate or local bills. A private bill, unlike a public bill, instead of dealing with matters of public interest and affecting generally all per¬ sons within the State or all persons within a particular class as defined according to some essential characteristic, affects only a particular person or locality. Such are bills for the in¬ corporation of a city or a public service com¬ pany, for changing the name of an individual, for legitimizing an illegitimate child, for the settlement of a private claim and the like. It is characteristic of such bills that they are generally designed to confer a benefit, a privi¬ lege or an exemption upon some person, com¬ pany or place. In the English Parliament a special procedure has been provided for deal¬ ing with such bills. They may be brought be¬ fore. Parliament only by petition and only after public notice has been given by advertisement in the community to be affected by the bill if it becomes a law. Fees are also required of the parties promoting or opposing such bills. After being reported on by two examiners of petitions they are considered by a special com¬ mittee on private bills which after hearing evidence for and against them makes a recom¬ mendation to the House. In the United States generally the procedure in respect to private bills does not differ in essential particulars

from that in regard to public bills. In a few States, however, there is a different procedure. Thus in Massachusetts private or local bills may be proposed only by petition and due notice must be given to all the parties concerned. In some States prior notice of an intention to apply for a special act must be published in the community where the person or thing affected is found. In New York local and private bills providing for an appropriation of money require a vote of two-thirds of the members of the legislature for their enactment while bills affecting a single city must after passage by the legislature be submitted to the mayor thereof for his approval. Legislative bodies usually have the power to provide for their own organization and to frame their own rules of procedure. By the Constitution of the United States, however, the Vice-President is made the presiding officer of the Senate and by most of the State constitutions the lieutenant- governor is

made the presiding officer of the State senate. The State constitutions likewise impose certain restrictions on the legislature in respect to its procedure. Thus both houses are required to keep and publish a journal of their daily proceedings; generally it is provided that no law shall be passed except by bill ; that no bill shall embrace more than one subject which shall be clearly expressed in the title ; that every bill shall be read at least three times before being passed ; that no law shall be amended by mere reference to its title, but the amended portion must be set out in full ; that the yeas and nays of members voting shall be recorded upon the demand of a certain number of mem¬ bers ; that every bill shall be referred to a com¬ mittee for examination and report; and that all bills shall be printed and placed on the desks of members, etc. Subject to these and some¬ times other similar constitutional requirements the legislature is free to adopt such rules of procedure as it may choose. See also Cabinet Government; Constitution; Executive; Law; Legislature.*

Bibliography. — Alexander, 'The Proce¬ dure of the House of Representatives) (New York 1916) ; Bryce, 'The American Common-wealth> (New York 1910) ; Clifford, (History of Private Bill Legislation (London 1885) ; Cushing, 'Law and Practice of Legislative As- semblies) (New York 1907) ; Jones, 'Statute Law Making) (Boston 1912) ; Ilbert, legis¬ lative Methods and Forms) (Oxford 1901) ; Reinsch, Paul, 'American Legislatures and Legislative Methods) (New York 1903).

James W. Garner,

Professor of Political Science , University of Illinois.

LEGISLATION, Direct. As its name implies direct legislation is a system of law- making in which the people themselves legislate instead of delegating that duty to a group of elected representatives known as a legislature. It has come to be synonymous with the initia¬ tive and referendum although it may properly be regarded as a more general and inclusive term. See Initiative and Referendum.

History. — While direct legislation seems first to have made its appearance in Switzer¬ land in the 16th century it is in the United States that its evolution and operation may best be studied. The germ of the modern sys¬

tem of direct legislation may be found in the colonial custom of authorizing the constituency of a member of the legislature to "instruct® him formally as to their wishes in relation to any problem of legislative policy. This "in¬ struction® did not legally bind the legislator but merely imposed a possible moral obliga¬ tion upon him. A second step in the direction of direct legislation was the establishment in Massachusetts in 1778 of the precedent

of referring a new State constitution to the people for ratification. The spread of this system has been rapid and consistent and it may now be regarded as settled that American State con¬ stitutions may be neither adopted nor amended without the approval of the electorate of the State. In the third place, some of the earlier State constitutions required that upon certain specific questions any action taken by the legis¬ lature must receive -popular ratification at the polls. The subjects upon which such referenda were necessary were not numerous and the favorites seem to have been the State banking laws, bond issues and the location of State capitols. Finally, the principle of direct legis¬ lation was applied to local problems. Where absolute uniformity of legislative policy throughout the entire State seemed undesirable "local option® was introduced whereby separate localities could adopt or reject a certain policy as their needs and desires might direct. This system of "local option® was frequently em¬ ployed to solve the vexed problem of the regu¬ lation of the liquor traffic but it has also been applied to local financial problems, boundary changes and in more recent times under the name, "municipal home rule,® to the very struc¬ ture of municipal government.*

In 1898 South Dakota adopted a constitu¬ tional amendment creating a system of State¬ wide initiative and referendum. This was the first State to place the powrer to enact and to veto laws directly in the hands of the people. In 1902 Oregon followed suit wdth a system of direct legislation which has attracted wide at¬ tention and has served as a model for several of the American States. The spread of the system since that time has been fairly rapid, especially in the States west of the Missis¬ sippi River. By January 1919 21 States have the initiative or referendum or both, the State of Massachusetts adopting the system of direct legislation in November 1918. For the names of these States together with the dates of the adoption of the svstem, see under Initiative and Referendum.

Public Opinion Bills. — It is well estab¬ lished that the legislature cannot delegate its law-making power to the electorate without being specifically authorized to do so by the State constitution. In other words any system of direct legislation must be provided for in the organic law of the State. Several of thr State constitutions, however, definitely author¬ ize the legislature to consult the wishes of the people upon legislative measures whenever they desire to do so and with the understanding that this expression of popular opinion is merely advisory. In Illinois this system has been still further developed in the Public Opinion Act of 1901 which permits 10 per cent of the voters of the State by petition to secure the reference of any proposition to a vote of the people for an expression of opinion.

The vote thus taken does not bind the legis¬ lature but gives them an accurate knowledge of what the people desire.

Voters' Interest in Direct Legislation. —

Election statistics show that in general people are less interested in voting upon constitutional amendments and statutes than upon candidates for office. The percentage of interest thus shown varies from year to year, from State to State, and from measure to measure.

Roughly speaking, the number of people who will vote in a direct legislation election seems to range from 60 to 80 per cent of those who will vote for State officers. Some questions like prohibition and woman suffrage always called' forth a heavy vote while other less striking measures sometimes come very near escaping the voter's eye altogether. Some States try to guarantee that only measures which are of general and State-wide interest be submitted to the people by requiring not only that a certain per cent of the voters must petition for their submission but also that that per cent must be obtained in two-fifths, or half as the case may be, of the counties of the State. Thus measures of purely local concern are automatically excluded from the ballot.

Advantages. — The arguments in favor of direct legislation may be summarized as fol¬ lows : First, it embodies the central principle of democracy for it places in the hands of the people the means of securing without in¬ terference or delay the enactment of their will into law. Second, the realization that it is futile to oppose the wishes of an electorate possessing the power of direct legislation will make the legislature more sensitive to the popular will and render the frequent use of the initiative and referendum unnecessary. Third, the educational value of direct legislation can¬ not be over-emphasized. From his share in it the voter acquires interest and information re¬ garding public affairs which increase his value as a citizen. Finally, tne system has proved successful in practice. The States which have it show no disposition to abandon it, the laws which the people have enacted have been well drawn and salutary, and civic interest has been augmented.

Disadvantages.— The opponents of direct legislation advance the following arguments : First, it destroys representative government by weakening not only the power of the repre¬ sentative legislature but also its sense of re¬ sponsibility. Second, it tends to break down the fundamental distinction between the con¬ stitution of the State and ordinary statutes by making it possible for them both to originate and be changed in substantially the

same way. Thus respect for the constitution is diminished. Third, it imposes upon the voter the burden of expressing an opinion upon questions re¬ garding which he has little or no information or understanding. Fourth, in like manner it burdens the voter with the decision of problems in which, as proved by the actual votes cast in many instances, he has little or no interest. Fifth, it < turns the technical and difficult task of drafting laws over to amateurs with the result that much of this legislation is carelessly drawn and defective. Sixth, it has accom¬ plished nothing where it is in use which has not been done with less expense and trouble

elsewhere. Finally, it opens up vast opportu¬ nities for demagogues and radical minorities to persist in the presentation of their fads and programs until by virtue of the sheer weari¬ ness and indifference of the electorate they may secure their enactment into law.

Recall. — While the recall of officers is hardly an integral part of a system of direct legislation it is very frequently a companion of the initiative and referendum. It embodies the principle of direct political action by the people. It permits a stipulated percentage of the voters by petition to compel an officer to stand again for re-election before the expira¬ tion of his term. If he does not receive a majority of the votes cast in this election he is thereby ousted from office and the opposing candidate assumes the duties of the office. The recall is regarded as a more radical sys¬ tem than the initiative and referendum, is in force in fewer States and is less frequently used where it is in force. See Recall.

For literature on direct legislation see Initiative and Referendum.

Robert Eugene Cushman, Associate in Political Science, University of Illinois.

LEGISLATIVE REFORM. Growth of Popular Distrust of Legislatures. — No one

can say that American State legislatures have been denied the opportunity to prove themselves worthy of the confidence and respect of the American people. At the close of the Revolu¬ tionary War a reaction in political opinion set in which reduced the formerly powerful State governor to the position of a figurehead and enormously expanded the importance and au¬ thority of the legislatures. The use made by the State legislature of these wide powers, especially during the ante-bellum decades when corporate charters, franchises and other spe¬ cial privileges were being granted, forms one of the black chapters in our political history. While corruption and disregard of the public interest were not universal they were so nearly so that American public opinion came to re¬ gard the State legislature with

a distrust which recent efforts at reform have not succeeded in removing. This popular distrust of State legis¬ latures has been evidenced in the constitu¬ tional provisions, which began to appear about the time of the Civil War, placing restrictions upon legislative powers. Some of these related in minute detail to legislative procedure but mostly they comprised long lists of subjects upon which the legislature might not act at all or might act only under rigorous constitu¬ tional restraints. This distrust was also shown in the very general policy of providing that legislatures should meet only every other year and that the length of the session should be restricted, provisions reflecting clearly the point of view that a legislature is a necessary evil and its term of activity should accordingly be reduced to the minimum. The recent spread of the system of direct legislation, whereby the people acquire the power themselves to enact or veto laws, is a further indication of popular lack of confidence in our representa¬ tive legislatures.

Present Need for Legislative Reform. —

The more striking criticisms which at the present time may legitimately be urged against State legislatures may be summarized as fol-

-ows : First, the quality of the men who com¬ pose them is frequently exceedingly poor. Without losing sight of the fact that many, probably most, of the legislators are honest and some of them are competent, it remains true that too frequently they prove to be venal and wholly unfit by training or education to per¬ form the functions of their office. Second, lobbying continues to prevail at most State capitols. Corporations and organizations de¬ sirous of securing special privileges at the hands of the legislature send paid representa¬ tives to exert influence upon the members. While this influence may be exerted by legit¬ imate means, such as arguments before legis¬ lative committees, it is far more likely to take the form of open bribery or other forms of corruption. Third, the demand for special and local legislation, what may be called private legislation, leads to most serious abuses. The time of the legislature is occupied with mat¬ ters trivial in importance while the demands of various localities and interests for legislative consideration are met bv the convenient method of ˆlog-rolling,® or ˆpork-barrel® legislation, whereby each legislator in order to secure the granting of his own demand supports those of every one else. Local and individual inter¬ ests are thus furthered; the interests of the State at large are ignored. Fourth, legislative procedure is complicated and beset by technical requirements which too often result merely in confusion and delay without securing the de¬ liberation and caution which they were de¬

signed to provide. The result is hasty and ill- considered legislation turned out in enormous quantities. Fifth, there is no centralized re¬ sponsibility for legislation passed by a State legislature. Such responsibility is lost in a maze of committees and party caucuses as well as between the two houses of the legislature. No men or group of men can be held really accountable for objectionable legislation. Fi¬ nally, the laws themselves, drawn by men from every walk of life, most of whom are without training or experience, are frequently poorly drawn. No effort is made to relate them to the already existing law of the State, while they frequently do not accomplish their obvious purposes because of ambiguous or conflicting provisions.

Proposals for Legislative Reform. — The

need for reform in our State legislatures has long been recognized and a variety of remedies have been suggested and in some cases adopted. These proposals may be considered briefly as follows: (1) The first is a sweeping change in the structure, composition and organization of the legislature. The bicameral or two-house system is to be abolished and the size of the single house much reduced. This, it is claimed, would minimize confusion and encourage effi¬ ciency. This single house is to be elected by a system of proportional representation so that the various political and economic interests may have adequate representation therein. Finally greater harmony is to be established between the legislature and the executive of the State by allowing the governor and heads of the administrative departments to have seats in the legislature. This program was devised by reformers in the State of Oregon but has never been adopted in any State. (2) A sec¬ ond and less revolutionary measure of reform is directed against the abuse of lobbying. T wo

schemes have been devised for this purpose: One of them, embodied in a New York statute, requires the registration in the office of the secretary of state of all lobbyists together with the names of the persons or interests they rep¬ resent and an account of any money spent in influencing legislation. The other plan is in force in Wisconsin and forbids entirely all efforts to influence members of the legislature privately. Lobbyists must confine themselves to appearance before legislative committees and the presentation of printed literature to in¬ dividual legislators. Both of these laws have produced salutary results. (3) A third remedy for legislative abuses is the introduction of a budget plan for the control of State finances. By placing in the hands of a responsible State officer the duty of presenting a financial pro¬ gram which shall comprise the estimates both of income and expenditures and by taking from the legislature the power to increase the ap¬ propriations thus proposed the serious evils of the (

Bibliography. — Beard, (American Govern¬ ment and Politics) (revised

1914) ; Dealey, (The Growth of American Slate Constitutions > (1915) ; Dodd, Procedure in State Legisla- tures) (Annals of the American Academy of Political and Social Science, 1918) ; Holcombe, (State Government in the United States> (1916) ; Reinsch, (American Legislatures and Legislative Methods' (1907) ; Reinsch, head¬ ings on American State Government ' (1911) ; Young, (The New American Government and Its Work' (1915).

Robert Eugene Cushman, Associate in Political Science, University of Illinois.

LEGISLATURE. In the most general

sense of the term a legislature is any law-mak¬ ing body, whether Congress, Parliament, Land¬ tag or other assembly of representatives charged with the enactment of general rules of conduct binding upon the inhabitants of the state. In a narrower sense the term is descrip¬ tive only of the law-making bodies of the States composing the American republic, al¬ though several of these bodies are officially des¬ ignated by other names. Thus in several States the legislature is officially known as the general assembly or the legislative assembly, and in two, Massachusetts and New Hampshire, the Colonial name (

Legislatures are of modern origin. Among the ancient Greeks legislation was enacted by popular assemblies rather than by select bodies of representatives. Among the ancient Ro¬ mans legislation was enacted by the comitia, likewise a popular assembly embracing all the citizens of Rome. Under the empire the em¬ peror became the chief source of legislation and his edicts and rescripts were supplemented by a large body of judge-made law emanating from the praetors and jurists. Representative law¬ making bodies in the modern sense never ex¬ isted among the Romans. Montesquieu was right when he said that the ancients had no notion of a legislative body composed of rep¬ resentatives of the people ((Esprit des lois, Bk. xi, ch. 8). The English historian Free¬ man remarks that <(the ancient world trampled on the very verge of representative govern¬ ment without actually crossing the boundary® ((History of Federal Government,* ch. 2). Throughout the Middle Ages the chief source of legislation was the king or the feudal lord. The beginnings of the modern representative sys¬ tem are found in the Witenaqernot of early English history, out of which the English Par¬ liament, the first representative legislature known to history, was destined ultimately to evolve. Not*

popularly elected at first, its mem¬ bers came eventually to be chosen by the free¬ holders. In the 13th century, thanks to Simon de Montfort, representatives of the boroughs were added. From early times the clergy also had their representatives, so that in the end the Parliament, as it came to be called, was in¬ deed an assembly of the three estates of the realm : nobility, commons and clergy.

On the continent of Europe the develop¬ ment of legislative bodies was slower of growth. The rise of cities gave an impetus to the development of the representative principle through the demand which it created for repre¬ sentation of these agglomerations in the law¬ making bodies. In France the beginnings of legislative representation are found in the meeting of the representatives of the three es¬ tates in a general parliament in 1302. Called together to consult with the king, they soon ac¬ quired the right to give or withhold supplies from the Crown. Meetings of the estates took place at regular intervals until 1614 when they ceased to be convoked by the king until the outbreak of the Revolution. From that time on France has had a Parliament, although it has not always been a truly representative body, during the period of 1800—14.

It was characteristic of the representative system of Europe until the 18th century that its legislative bodies did not represent the

whole people but special classes such as the clergy, the nobility, the towns and the like. The deputies of each class were separately sum¬ moned and often sat apart and voted sepa¬ rately. Thus the Parliament of Sweden until comparatively recent times was composed of four chambers. Deputies usually also bore in¬ structions from their constituencies and were obliged to vote in conformity with the man¬ dates thus given. They were, therefore, not representatives in the modern sense, with power to declare the will of the people, but only delegates commissioned to consult for the common good and to report back to their con¬ stituencies.

Ultimately nearly all the legislative bodies of Europe came to consist of two chambers. In England this transformation was completed early in the 14th century, the representatives of the nobility and clergy constituting one cham¬ ber; the representatives of the towns, bor¬ oughs a'nd counties, the other. It was due wholly to the existence of this class system in England rather than to any considerations of policy or expediency that the organization of the British Parliament came to be bicameral in structure. Inasmuch as the distinction between clergy, nobility and commons was never intro¬ duced into America the reason which gave rise to the bicameral system in England never ex¬ isted here. Nevertheless, all of the original State legislatures, except those of Georgia, Pennsylvania and Vermont, were constructed on the bicameral principle. Benjamin Franklin

stood almost alone among the founders of the republic in advocating the unicameral system of legislative organization, and it was mainly due to his influence that the legislature of Pennsylvania at first consisted of a single chamber. The three States which started with single-chambered legislatures, however, soon abandoned the system for the bicameral idea and it has prevailed in all the States then ex¬ isting and in those subsequently admitted to the Union. Likewise Spain, Portugal, Mexico, Bolivia, Ecuador, Peru and other states which once had unicameral legislative bodies have all abandoned the single chamber principle for the bicameral system. <(The bicameral system,® says Francis Lieber, <(accompanies the Angli¬ can race like the common law and everywhere it succeeds.® <(Of all forms of government that are possible among mankind,® said the his¬ torian Lecky, <(I do not know any which is likely to be worse than government of a single omnipotent democratic chamber.®

The superiority of the double-chambered legislature is defended on several grounds. In the first place, the existence of a second house serves as a check on hasty and ill-considered legislation. In the second place, the bicameral system affords protection to the people against the despotic tendencies of a single chamber — <(it doubles the security of the people,® said Judge Story, <(by requiring the concurrence of two distinct bodies in any scheme of usurpa¬ tion or perfidy where otherwise the ambition of a single body, would be sufficient.® The Americans restrain, their legislatures, says James Bryce, by dividing them just as the Ro¬ mans restrained their executives by substituting two consuls for one king. On the other hand, there has been a growing disposition in recent years to question some of the advantages

claimed for the bicameral system, and in a number of States, notably Oregon, Nebraska and California, there have been well-organized movements looking toward the establishment of legislatures composed of a single house. In Oregon the question of abolishing the senate was submitted to a vote of the people in 1912 and again in 1914, and although the pro¬ posal was defeated a large vote was cast in favor of it. In Nebraska a joint com¬ mittee of the legislature after making a careful study of the merits and demerits of the bicameral system made a report advocating the establishment of a small legislative body composed of a single chamber. Likewise in California, recently a majority of both houses of the legislature voted in favor of a proposed amendment to the constitution providing for the creation of a single-chambered legislative assembly. The arguments against the bicameral system are in brief the following: It greatly increases

the cost of legislation by reason of the larger number of members and employees ; it conduces to deadlocks, dissension and intrigue ; and it retards the dispatch of legislative busi¬ ness. Moreover the checking function, which is the chief raison d'etre for a second cham¬ ber, works both ways ; that is, it often serves to hinder the enactment of good legislation as well as to prevent bad legislation. Again, since both houses are now elected by constitu¬ encies composed of the same persons, each house is little more than a duplicate of the other; neither is more radical or more con¬ servative than the other and hence neither is by its constitution and nature disposed to re¬ strain the other. Advocates of the single-chambered system also argue that the execu¬ tive veto, the referendum and the power of the courts to declare acts of the legislature uncon¬ stitutional now afford adequate checks against unwise and unconstitutional legislation. Fi¬ nally, it may be remarked that there are al¬ ready more than 60 single-chambered legisla¬ tures in the world to-day, including those of Greece, Bulgaria, Serbia, the South African Union, all the provinces of Canada except Que¬ bec and Nova Scotia and many of the German states. As is well known the legislative bodies of many large cities are also unicameral in structure. The unicameral principle, therefore, is not a theory but it is in practical operation in many countries.

In many of the European states the upper houses of the legislature are not organized on the principle of popular representation. In some of them there is a hereditary element, in others certain public officials are members of right and in many there is an appointive ele¬ ment. (See Great Britain — Parliament). In the United States since the adoption of the 17th amendment the upper house of Con¬ gress has been chosen by the same method as the lower house so that both rest on the same principle although senators are chosen for longer terms, they represent larger con¬ stituencies and higher qualifications are re¬ quired of them. Both houses of the State leg¬ islatures are composed of representatives with only slightly different qualifications, and terms, and they are chosen by constituencies made up of the same class of electors. Members of both houses are apportioned either on the .basis of the total population or the number of voters.

Equality of representation is everywhere pro¬ claimed as a principle, but the principle is seri¬ ously deviated from in certain New England States where in consquence of the town svs- tem of representation small communities with populations of less than 1,000 inhabitants not infrequently choose as many representatives as populous cities like Providence, New Haven and Hartford. The common rule that each county, however small its population, shall have at least one representative or that each county shall have one senator often plays havoc with the principle of equality of representa¬ tion. In several States constitutional limita¬ tions have been imposed on the representation of the large cities. Thus in New

York, no county may have more than one-third of all the representatives — a provision designed to limit the representation of New York citv; and somewhat similar provisions are found in the constitutions of Pennsylvania and Rhode Island.

Illinois alone among the States has a sys¬ tem of minority representation in the lower house of the legislature. Under this system, in¬ troduced in 1870, it has nearly always been possible for the principal minority party in each legislative district to choose one of the three members to which the district is entitled in the lower house, and it has often enabled secondary parties such as the Prohibitionists, Progressives and Socialists to elect a few mem¬ bers. (See Proportional Representation). It has the disadvantage, however, of fre¬ quently resulting in the election of a house in which no party has a working majority, thus making difficult the enactment of imoortant constructive legislation. Moreover, it fre¬ quently results in the election of a legislature, a majority of the members of which belong to a political party different from that to which the governor who is chosen at the same elec¬ tion belongs, thus dividing the legislative power between two politically antagonistic depart¬ ments and thereby paralyzing it to a degree.

In all the States the upper house of the leg¬ islature is officially designated as the senate. In size the State senates vary from 19 members in Arizona to 63 in Minnesota, 40 or 50 being a common number. In about two-thirds of the States the terms of senators are four years ; in most of the others it is two years; in New Jer¬ sey it is three years; and in Massachusetts and Rhode Island it is one year. In a number of States the senators are divided into classes, the terms of one-half or one-third of them expir¬ ing at the same time, thus making the senate to some extent a permanent and continuous body. In all the States the senate has certain special functions such as the approval of ex¬ ecutive appointments and the trial of impeach¬ ment cases.

In most of the States the lower branch of the legislature is known as the <(house of rep¬ resentatives, in a few it is styled the <(assem- bly,® and in three the (

In all the States members of the legislature receive some pecuniary compensation for their services. It is in the form either of a salary or a per diem allowance. The largest salaries are those paid the members of the legislatures of Illinois and New York ($3,500 per term and $1,500 per year, respectively) ; the smallest are those of South Carolina and New

Hamp¬ shire ($200 per year). In about 30 States the per diem method prevails, the amount varying from $3 per day in Kansas and Oregon to $10 per day in California, Iowa and Kentucky, the most general amount being $4 or $5 per day. Mileage, ranging from 10 cents ner mile to 25 cents, is usually allowed and fre¬ quently there is a small allowance for station¬ ery and newspapers. In some States the amount of compensation is fixed by the con¬ stitution ; in some the maximum amount is spec¬ ified, in others the determination of the amount is left entirely to the legislature, usu¬ ally subject, however, to the limitation that no increase may take effect during the term for which the legislature making it is elected. In the majority of States the legislature holds regular sessions every two years, but in Mas¬ sachusetts, New York, New Jersey, Georgia and South Carolina annual sessions are held. Alabama alone of all the States is content with quadrennial sessions. In all the States the gov¬ ernor is empowered to call extraordinary ses¬ sions, but usually the legislature is restricted at such sessions to the considerations of only such matters as are specified in the governor's proclamation. In many States the length of the legislative session is limited by the constitution to a certain- number of days — 40, 60 or 90, with a view to preventing long-drawn- out sessions. In other States the same end is accomplished by constitutional enactments pro¬ viding that at the expiration of a certain num¬ ber of days the pay of the legislature shall cease.

The powers of the State legislature, unlike those of Congress, are not specifically enu¬ merated by the constitution. In this respect they are more like those of the English Parlia¬ ment. A' State legislature, therefore, may usually exercise any legislative powers which have not 'been delegated to Congress or pro¬ hibited to the legislature by the Federal or State Constitutions. Their powers are conse¬ quently very wide and as President Woodrow Wilson has well said in his book on (The State, 5 the attempt to enumerate them would involve cataloguing all the business and social relationships of life — obviously an impossible task. Among their powers may be mentioned the enactment of the civil and criminal law, the law of judicial procedure, the law of busi¬ ness, of contracts, partnerships, agency and the like, the regulation of trade, industry and the professions, local government, public health, the public safety, education, charity, marriage and divorce, railways, elections and hundreds of other matters. As a result of the action of the courts in declaring important acts of the legislature unconstitutional for excess of power there has been a disposition in recent years to enumerate in the constitution certain matters upon which the legislature is author¬ ized to enact laws, the purpose being to remove doubt as to the power of the legislature in respect to such matters.

In consequence of the popular distrust of the legislatures, there has been a tendency in recent years to impose constitutional limita¬ tions on their

powers, particularly in respect to the incurring of debts, the levying of taxes and the appropriation of money. Many consti¬ tutions forbid the enactment of local or special laws where a general law would be applicable or the)'- allow it only tinder certain restrictions. These restrictions have had the effect of reduc¬ ing t'he output of legislation in many States and of removing well-known evils that are in¬ separable from private and local legislation. See also Congress ; Legislation ; Referendum ; Parliament; Senate.

Bibliography. — Burgess, (Political Science and Constitutional Law) (Vol. II, New York 1890) ; Bryce, (The American Commonwealth ; (Vol. X, Ch. 40, New York 1910) ; Dealey, (Growth of American State Constitutions) (Chs. XV-XVII, New York 1915) ; Garner, (Introduction to Political Science) (Ch. XIV. New York 1910) ; Harley and Others, (Second Chambers in Practice) (London 1911) ; Lea¬ cock, (Elements of Political Science5 (Pt. II, Ch. II, Boston 1906) ; Marriott, (Second Chambers5 (Oxford 1910) ; Reinsch, (American Legislatures and Legislative Methods5 (New York 1907) ; Sidgwick, cThe Elements of Politics) (Ch. XX, New York and London 1897) ; Wilson, Constitutional Government in the United States5 (Chs. IV-V, New York

1908).

James W. Garner,

Professor of Political Science , University of Illinois.

LEGITIM, (1) in Scots law, the share of the movable property which descends to chil¬ dren on the death of the father, amounting to one-third when the widow survives and one- third to her as her jus relictae (q.v.). The father can dispose of the remaining third, which was called "dead's part,55 as he desires by will. If no widow survived, one-half was legitim and one-half dead's part. (2) In civil law, that part of a man's personal property which descends to his children at his death. It amounteˆ to one-fourth in Roman law. It is embodied in the law of Louisiana. The word is also spelled legitime.

LEGITIMACY. As a law term legiti¬ macy55 is employed mainly to describe the status of children born in lawful wedlock. The mean¬ ing of the term will be best understood by contrasting the condition of illegitimate with that of legitimate children. A child born out of wedlock is nutlus filius ; it has no legal parents. Neither its mother nor its putative father have any parental obligations toward it, and, when the public authorities intervene to compel a parent to support his or her illegiti¬ mate offspring, the action is taken in the pub¬ lic interest, to prevent the child from be¬ coming a public

charge, and not because of any inherent legal right of the bastard. Primarily the authorities look to the mother to provide for the child, but where the mater¬ nal parent lacks ability to support it the puta¬ tive father may be proceded against. In some countries the law will not inquire into the paternity of a bastard, however. An illegiti¬ mate child is incapable of inheriting either from its mother or putative father or, from

the collateral relations of either; in the eye of the law a bastard has neither ancestors nor next of kin. Another child born to its parents, whether in or out of wedlock, stands in no legal relation toward it with respect to prop¬ erty. Nor do its own parents inherit any¬ thing from an illegitimate child which dies in¬ testate. Only the legitimate descendants of persons born out of wedlock inherit from them by law ; if they have no descendants their prop¬ erty escheats to the State. In other respects the civic status of a person is not affected hy illegitimacy. He can hold and acquire prop¬ erty by gift or by will and dispose of the same like any natural person; and, though titles and estates of inheritance do not descend to him by law, he can become the founder of a family and become the possessor of a name in his own right. The bar sinister, which heraldry re¬ quired illegitimate sons to blazon on their escutcheons, was often borne by great men, conscious of their own worth, without a sense of disgrace; and to be <(his own ancestor® was the pride of more than one of the heroes of history.

A child born in wedlock is presumably legitimate, though evidence that husband and wife had not lived together for a period so long as to preclude the possibility of the former having been the father would rebut the pre¬ sumption. Under the common law the pre¬ sumption of legitimacy was conclusive unless the father was shown to have been "beyond the four seas® for more than nine months prior to the birth of the child; if, during that time he was within the kingdom, the presump¬ tion of his fatherhood could not be combated even by proof that he was continuously absent from his domicile. This hard and fast rule has now been relaxed, and in England, as every¬ where, fatherhood may be disproven by any competent evidence. Children of marriages which are found to have been nullities because of legal impediments are illegitimate, just as are children resulting from illicit intercourse. The harshness of this rule has been ameliorated to some degree by the doctrine of <(putative marriage.® One party to an annulled mar¬ riage having been unaware of the disqualifying impediment, that party and the children of the marriage are entitled to all the rights that would have been theirs if the marriage had been valid. The children of the union are to be regarded as legitimate. This canon has become a rule of equity. In England legitimacy may be established by proceedings in court under the statute (21 and 22 Victoria chap. •93) passed in 1858. It was under this law that an ignorant butcher from the antipodes tried to prove his title to the Tichborne estate; and he found many believers in his claim, includ¬ ing the mother of the real heir.

Proposals were frequently made by the mediaeval church to the lay authorities that children born out of wedlock be legitimized by the subsequent marriage of their parents. In 1235 the English bishops, in their capacity of lords spiritual, endeavored to make the pro¬ posal a law. In the

record of the Statute of Merton (20 Henry III, chap. 9) the repudiation of the principle by the lords temporal is set forth as follows : The bishops having "in- stanted the lords that they would consent that all such as were born afore matrimony should

be legitimate as well as they that be born within matrimony, as to succession of in¬ heritance, forasmuch as the church accepteth such as legitimate ... all the earls and barons answered with one voice that they would not change the laws of the realm which had hitherto been used and approved.® The law of England remains unchanged in this re¬ spect, and the rule was also followed in the United States as part of the common law. By statute in most of the States a child born out of wedlock is now legitimized bv the mar¬ riage of its parents. This is, and has long been, the rule in practically all countries in¬ habited by people of European race. In politi¬ cal history legitimacy has reference to sovereign successions by "divine right.® Legitimists re¬ gard all breaks in the right line of descent as usurpations of sovereignty, particularly when the breaks have been caused by parliamentary depositions of kings and bv popular revolution. According to the legitimist's Almanach,) published up to recent times, the Comte de Chambord was Louis XIX, king of France, Don Carlos was king of Spain; Sicily, Naples, Modena, Parma and other parts of Italy were still under their former Bourbon kinglets, while Maria Theresa, Duchess of Este and late con¬ sort of former King Ludwig III of Bavaria, was known as the "White Rose Queen® and regarded by the Jacobites as the legitimate sov¬ ereign of Great Britain, Ireland and the do¬ minions beyond the seas, she being a descend¬ ant of the elder and deposed branch oj the Stuarts.

Stephen Pfeil.

LEGITIMATION, the act of conferring legitimacy (q.v.) on a person born out of wed¬ lock. It is effected by act of the legislature, by adoption or by the subsequent marriage of the father and mother of the bastard. The latter means, however, can only be had provided the father and mother were free to marry at the time of the birth, and that there was no diri¬ ment impediment to such marriage. In Eng¬ land, Ireland and in a few of the United States legitimation by subsequent marriage does not obtain, the maxim there being, "once a bastard, always a bastard.® In most States, however, such a marriage legitimizes previous offspring. Complications arise where after the child's birth, one of the parents marries a third per¬ son, has children, and after the dissolution of this marriage, marry. The general rule in such cases is to confer a status of legitimacy on the bastard child, but not to displace the legitimately-born children by the latter. See Bastard; Illegitimacy; Legitimacy; and con¬ sult legitimation by Subsequent Marriage (in Journal of Society of Comparative Legisla¬ tion, Vol. VI, new series, London 1906).*

LEGITIME, Frangois Denys, fran-swa de-ne la-zhe-tem, Haitian general: b. 1842. During the administration of President Salo¬ mon, he was accused of aspiring to the Presi¬ dency, and accordingly went to Kingston, Jamaica, remaining three years, then returned to Haiti at the invitation of his followers, and on 7 Oct. 1888 was elected President of the provisional government. General T'helemaque denounced the election as a job, and attempted to make himself President, but he was killed in the battle which ensued. Legitime was elected

President of Haiti 17 Dec. 1888, but resigned in 1889, owing to the opposition of General Hip- polyte, and again retired to Jamaica. In 1896 President Sam granted a general amnesty, and he returned to Haiti.

LEGITIMISTS, The, in French history the supporters of the claims of the elder Bour¬ bon line, descended from Louis XIV, against those of his younger brother, Philippe, Due d'Orleans. The party existed from the over¬ throw, in 1830, of Charles X, who was of the elder Bourbon line and was succeeded by Louis Philippe, an Orleanist. The Bourbons became extinct with the death of the Comte de Cham- bord in 1883, and the claims of both lines were united in the Comte de Paris, grandson of Louis Philippe. In Spanish history the term is used to designate an adherent of the pre¬ tender, Don Carlos de Bourbon (1788-1855), second son of Charles IV of Spain, and his descendants, in claims to the throne of Spain. The word legitimiste was not admitted by the French Academy until 1878, but it had already been accepted in both French and English usage, meaning a supporter of hereditary right to govern as against parliamentary rule.

LEGLER, Henry Eduard, American li¬ brarian: b. Palermo, Italy, 22 June 1861; d. 13 Sept. 1917. He was educated in Switzerland and in the United States. He was a member of the Wisconsin assembly in 1889, secretary of the Milwaukee school board in 1890-1904, secre¬ tary of the Wisconsin Library Committee in 1904-4)9, and from 1909 was librarian of the Chicago Public Library. In 1912-13 he was president of the American Library Association. Author of ˆChevalier Henry de Tonty (1896) ; heading Events of Wisconsin History) (1897) ; (The Genesis of Poe's Raven) (1907) ; (Of Much Love and Some Knowledge of Books * (1912*), etc.*

LEGNAGO, la-nya'go, Italy, city in the province of Verona, on the river Adige, 33 miles by rail southeast of Verona. It is one of the series of towns fortified by the Austrians in 1815, known as the Quadrilateral, its original

fortifications having been destroyed by Napoleon in 1801. The surrounding country is low and marshy but highly productive ; sugar, rice and other cereals are grown and the town has a thriving trade in agricultural produce. Pop. town, 2,731 ; commune, 17,000.

LEGNANO, Italy, city in the province of Milan, on the river Olono, 16 miles northwest of Milan. It has a ruined castle of the Visconti and its church of San Magno, dating from 1529, has an altarpiece by Bernardino Luini which is considered among his fin¬ est work. Near here the Lombard League was victorious over the forces of Frederich of Barbarossa in 1176. There are important silk and cotton factories and other textile industries, as well as machine-shops and boiler works. Pop. commune, 24,364.

LEGOUIS, le-goo'e, Emile, French literary critic: b. Honfleur, Calvados, 1861. He studied at the universities of Caen and Paris, was appointed lecturer and professor at the Uni¬ versity of Lyons in 1885 and in 1904 became professor of English language and literature at the Sorbonne. He was exchange professor at Harvard in 1912-13. Author of (Thomas

Gray; Choix de poesies (1887) ; (Le general Beaupuy> with Bussiere, G. (1891) ; (La Jeun- esse de William Wordsworth* (1896; Eng. trans., 1897) ; (Quelques poemes de Wordsworth * (1896) ; (Morceaux choisis de litterature an- glaise> (1905) ; defense de la poesie fran- gaise a l'usage des lecteurs anglais* (1912); (William Wordsworth) in Cambridge History of English Literature> (Vol. XII, 1914), etc.*

LEGOUVlS, le-goo-va, Gabriel Ernest Wilfrid, French dramatist and miscellaneous writer: b. Paris, 15 Feb. 1807; d. 14 March 1903. In 1827 he won a prize of the Academy with a poem on the art of printing, (Decouverte de l'imprimerie. While instructor in the College de France 1847, he lectured on the history of woman's development ; and later published (Moral History of Women* (7th ed., 1882), and (Woman in France in the 19th Century* (1864). These works were received with great favor, and were followed by (Science of the Family* (1867), and (Messieurs the Young Folk) (1868). Meanwhile Legouve was winning high distinction as a playwright with < Louise de Lignerolles* ; (Adrienne Lecouvreur* with Scribe (1849) ;*

1882 he published (Recollections of Sixty Years, and in 1890 (Winter Flower, Winter Fruits: Story of my Household.* In 1885 he became a member of the French Academy.*

LEGOUVlS, Gabriel Marie Jean Baptiste,

French poet and dramatist: b. Paris, 23 June 1764; d. Montmartre, 1812.

He was father of Gabriel Jean Baptiste Ernest Wilfrid Legouve (q.v.). His verse was extremely popular and of his plays (La mort de Henri IV (1806) was most successful. He was elected to the Academy in 1798. The death of his wife in 1810 caused the loss of his reason and he died in a sanatorium. Author of the dramas (La mort d'Abel* (1792) ; ˆpicharis* (1793) ; (Quintus Fabius* (1795) ;*

LEGRAIN, le-gran, Georges Albert,

French archaeologist : b. Paris, 4 Oct. 1865. He was educated at the College de France. He was appointed a member of the Institut Fran- gais d'Archaeologie Orientale at Cairo in 1892, and in 1894 was made inspecteur-dessinateur of the museum there. In 1895 he was given direction of the reconstruction of the great temple of Ammon at Karnak, where in 1904 the excavations made in the progress of the work disclosed an enormous collection of buried statuary, comprising 800 stone statues and 17,000 of bronze. No find of similar magnitude had been made since Mariette's at Serapeum and it was rated as of vast historical import¬ ance. He was also engaged in the reconstruc¬ tion of the temples of Rameses III, Osiris and Ptah. Author of (Catalogue du Musee de Cairo ; (Le statuette funeraire de Pathmos* (1904) ; (Comment doit-on etablir une genealo- gie egyptienne* (1906);*

LEGRAND, le-gran', Louis Desire, French lawyer and diplomatist: b. Valenciennes, 30

March 1842. He was educated at Paris, served in the Franco-Prussian War, was elected a member of the House of Deputies in 1876 and in 1882-95 he was Minister Plenipotentiary at The Hague. He is a chevalier of the Legion of Honor and was named corresponding member of the Academy of Sciences in 1890. Author of (Du Divorce et de la separation de corps5 (1865) ; 'Senac de Meilhan> (1868) ; 'Le Mariage et les moeurs en France 5 (1879) ;

'Compte rendu de la legislature au nom de la gauche republicaine) (1881); 'L'Organisation des Indes neerlandaises5 (1887) ; 'L'ldee de patrie) (1897) ; 'Precis de procedure civile usuelle et pratique) (1897; new ed., 1904), etc.

LEGRAND DU SAULLE, le-gran'dii sol, Henri, French physician and alienist: b. Dijon, 16 April 1830; d. Paris, 6 May 1886. He studied medicine at Dijon, served as interne at various hospitals and in 1862 took

his M.D. at Paris. He was one of the editors of the Gazette des Hospitanx in 1854-62, engaged in the practice of medicine and in 1868 became connected with the prefecture of police, Paris, where he shared the labors of Lasegne. He was appointed physician at the Salpetriere in 1879. He was one of the founders in 1868 of the Societe de Medicine Legale and was for many years connected with Annates medico- psychologiqnes. Author of 'La folie devant les tribunaux) (1864) ; (La folie hereditaire5 (1873) ; 'Traite de medecine legale5 (1874) ; (Etude medico-legale sur les epileptiques5 (1877) ; 'Etude medico-legale sur l'interdiction des alienes5 (1880), etc.

LEGRENZI, Giovanni, Italian Composer: b. Clusone, near Bergamo, 1625; d. Venice, 26 July 1690. He studied under Pallavicino and was appointed organist at the church of Saint Maria Maggiore at Bergamo. He later became maestro di capella of the church of the Spirito Santo at Ferrara and about 1664 he was ap¬ pointed director of the Conservatorio dei benedicanti at Venice. In 1681 he became v ice- maestro and in 1685 maestro di capella at Saint Mark's, Venice, where he remained until his death. His most famous pupils were Lotti and Gasparini. His compositions have a wide range but he is most famous for his operas, of which he wrote 17 and which surpassed anything then written in the instrumentation as well as pos¬ sessing other merits. Among them are 'Achille in Sciro5 (1664) ; 'La Divisione del Mondo5 (1675); (I due Cesari5 (1683); 'Pertinace5 (1684), etc.

LEGROS, le-gro', Alphonse, Anglo-French artist: b. Dijon, France, 8 May 1837 ; d. London, 8 Dec. 1911. In 1857 he exhibited for the first time in the Salon, but finding small encourage¬ ment in France, removed to London in 1863, became a naturalized Englishman and was ap¬ pointed in 1870 Slade professor in University College. His work, alike in painting, etching and modeling, is strongly mannered, and as a colorist his range is limited. He presents the rural scenes and peasantry of France with, an austere dignity of style and force of expression, which though they did not make him popular won generous recognition from his brother artists. His more important works are the 'Anglers,5 the 'Pilgrimage,5 the 'Spanish Cloister,5 the 'Benediction of the Sea,5 the 'Baptism,5 the 'Coppersmith,5 the 'Dead

Christ,5 'Woman Praying,5 'Public Penance,' and 'On the Edge of the Woods,5 which last is in the Metropolitan Museum, New York. His versatility was extraordinary — pen and pencil drawings, medal work, portraiture, etch¬ ings and sculpture having each the marks of his pronounced individuality. But his fame is per¬ haps greatest in his etched portrait work and this gave him a distinctive place in contempo¬ rary art.

Among his subjects were Watts, Poynter, Leighton, Carlyle and Manning. Note¬ worthy etchings are 'Death and the Woodman,5 and 'Le Repas des Pauvres,5 both marked by a fine breadth in conception and handling. His monumental fountain at Welbeck Abbey is perhaps his best piece of sculpture.

LEGUIA, la -goo'ya, Augusto B., Peruvian financier and statesman : b. Lambayeque, 19 Feb. 1864. He studied at Valparaiso, Chile, served in the Chilean-Peruvian War and after¬ ward became prominent in financial circles. He became Minister of Finance in 1904 and was elected President in 1908. A revolutionary up¬ rising by the followers of Pierola endeavored to gain control of the government in 1909, and on 29 May succeeded in taking President Leguia prisoner. Loyal government forces came to his rescue within an hour, however, and order was promptly restored. His ad¬ ministration saw the boundary dispute with Bolivia settled in favor of Peru and also the resumption of friendly relations with Chile, with whom there had 'been ill-feeling over boundary decisions. Upon the expiration of his term as President he took up his residence in London.

LEGUME, leg'um, the fruit or seed of plants of the Leguminosce or pulse family. The seed vessel, or pod, has one cell and two valves ; is generally dehiscent, opening down both sides, the seeds being borne on the ventral suture. Peas and beans form the most familiar mem¬ bers of the group. Indehiscent legumes, which at maturity break into one-seeded parts, are known as loments.

LEGUMIN, or vegetable casein, a protein substance analogous to the casein of milk, ob¬ tained from beans, pease, lentils, vetches and other leguminous seeds ; the principle of the Leguminosce.

LEGUMINOSiE, a group of plants for¬ merly considered a family, but now generally divided into three families. The term, however, is a convenient one and is retained for the group as a whole. The plants are herbs, shrubs and trees widely distributed in all cli¬ mates but most numerous in tropical and sub¬ tropical regions ; growing upon all kinds of soil ; exhibiting a great range of habit from creeping annual to climbing shrub; useful for a great variety of purposes — ornament, food, timber, fodder and in the arts; and constituting one of the largest groups of plants, about 7,000 species distributed among about 450 genera. The species are characterized by alternate, stipulate, usually compound leaves; papiliona¬ ceous or sometimes regular flowers commonly arranged in racemes ; monadelphous, diadel- phous or occasionally distinct stamens, typically 10, surrounding a single simple pistil which generally becomes a pod or legume containing one to many seeds.

The species naturally fall into three fami¬ lies: (1) Fabacecc, with flowers resembling a butterfly; (2) Ccesalpiniacecu, with imperfectly or not at all papilionaceous corollas, which may sometimes be nearly regular; (3) Mimosaccce, with small, regular flowers. The first group contains more than two-thirds of the species. Its members are adapted for insect fertilization, especially by bees, which alight upon the lower petals, brush against the pistil which is thrust out by the insect's weight, then come in contact with the stamens and finally carry the pollen, which has been discharged, to other flowers. Thus the pistils receive pollen from stamens not in the same flower with them. In some in¬ stances they may also obtain pollen from these stamens, thus having a double chance to be fertilized. See Flowers and Insects.

Perhaps the most interesting trait found in the group is the power possessed by the species cf obtaining free nitrogen from the air by means of the tubercles or wart-like excrescences upon their roots. These tubercles are the homes of bacteria which have gained entrance to the plant's tissue through the root-hairs and are thus the result of irritation. The plants, it is believed, furnish the bacteria with carbohydrate food in return for the nitrogenous material pre¬ pared by them, thus exhibiting excellent ex¬ amples of symbiosis (q.v.). Largely owing to this reciprocal action, the legumes are valued as green manures, a fact long acted upon but un¬ explained until the last quarter of the 19th century, when Hellriegel and other investigators proved it, and even went further to show that soils poor in the bacteria could be inoculated profitably. See Clover; Nitrogen; Root-Tu- bercles; Green Manuring; Vetch; Cowpea; Bean; Lupine; Acacia; Licorice; Indigo; Sweet Pea; Medic; .Laburnum; Tamarind; Mimosa.

LEHAR, la'har, Franz, Austrian com¬ poser : b. Komron, Hungary, 30 April 1870. He was educated at the Academy of Music at Prague and was successively concert master at the Elberfeld Opera, a regimental bandmaster in the Austrian army 1890-1902 and conductor at the Vienna Theatre. His light opera, (Die lustige Witwe> ((The Merry WidowO* pro¬ duced at Vienna, 30 Dec. 1905, brought him worldwide fame and a great fortune. He is also author of (Wiener Frauen> (1902) ; (Die JuxheiraD (1904) ; (Mitislav der Moderne> (1906) ; (Der Graf von Luxemburg) (1909) ; (Le roi des Montagues) -(1914), etc.

LEHI, le'hi, Utah, city in Utah County, 31 miles south of Salt Lake City, on the north shore of Utah Lake, and on the Denver and Rio Grande and San Pedro, Los Angeles and Salt Lake railroads. It is situated in an irri¬ gated

farming district chiefly interested in rais¬ ing sugar beets and fruit. There is a canning factory and a sugar refinery. F'op. (1920) 3,078.

LEHIGH, le'hi, a river of Pennsylvania which has its rise east of Wilkesbarre, in Lu¬ zerne County, and flows nearly south to a point about 12 miles below Mauch Chunk, where it breaks through the Blue Ridge. From here its course is southeast to Allentown, then northeast to Easton, where it enters the Delaware River, after a course of about 120 miles. In its upper course it is a rapid and picturesque mountain stream, broken by several falls. It passes

through a rich coal and iron-ore region, and serves as an outlet for the products of the mines. It was made navigable by a series of extensive improvements to Whitehaven, 84 miles from its mouth. The Lehigh Valley Railroad follows the course of the river for nearly its entire length.

LEHIGH UNIVERSITY, an institution

at South Bethlehem, Pa., founded by Asa Paoker (q.v.) in 1866. His endowment of the university, including an appropriation of land, totaled about $3,000,000, said to be the largest donation by one American to the cause of education up to that time. The original object of Judge Packer was to (

LEHIGH VALLEY RAILROAD COM¬ PANY, The, was incorporated by an act of the legislature of Pennsylvania, 21 April 1846, as the Delaware, Lehigh, Schuylkill and Susque¬ hanna Railroad Company; its name was changed to Lehigh Valley Railroad Company 7 Jan.

1853.

The Lehigh Valley Railroad system is to¬ day a double-track trunk line extending through the States of New Jersey, Pennsyl¬ vania and New York, from the Atlantic Sea¬ board to the Great Lakes. The main line runs from New York to Buffalo, N. Y., a distance of 448 miles. The entire mileage of the system in 1916 was 1,443.69 miles, of which 596.47 miles was double track. The company possesses ter¬ minals on the Hudson River front opposite

New York city, at Perth Amboy, N. J., and on Lake Lrie at Buffalo, N. Y.

The company also controls the Lehigh Valley Coal Company and the Morris Canal, 106.48 miles in length. At the eastern end of the line in New York har¬ bor the company owns a fleet of 286 boats.

The rolling equipment of the road 30 June 1916 consisted of 971 locomotives (passenger, freight and switching), 631 passenger-car equip¬ ment, 43,579 freight-car equipment (of which 18,322 are coal cars). The total earnings of the system for the year ended 30 June 1916 were $47,382,569; expenses of operation for the same period, $33,092,978; net earnings from operations, $14,289,591 ; percentage, operating expenses to gross earnings, 69.82 per cent. The amount of merchandise freight moved for the year ending 30 June 1916, exclusive of com¬ pany's material, was 19,752,591 tons. For the same period the coal tonnage, not including supply coal, amounted to 13,959,754 tons; the coal tonnage amounted to 70.67 per cent of the total tonnage hauled during the year.

LEHIGHTON, Pa., borough in Carbon County, on the Lehigh River, and on the Cen¬ tral of New Jersey and the Lehigh Valley rail¬ roads, about 75 miles northeast of Harrisburg, the capital of the State, and 70 miles, in direct line, northwest of Philadelphia. It is a trade centre for a mining section of the county. Its chief manufactures are silk and lace, meat¬ packing, shirts, stoneworks, car-springs, flour, leather, stoves, furniture, brick and mining tools. The borough owns the electric-light plant, but leases it to a private corporation who operates it. The fair grounds of the County Industrial Society are located here. Pop. 6,102.

LEHMANN, la'man, Alfred Georg Lud¬ vig, Danish psychologist and psychophysicist : b. Copenhagen, 1858. He was graduated at the University of Copenhagen, and later studied at the University of Leipzig under W. Wundt, who greatly influenced his later career. He was in 1890 appointed docent, and in 1910 professor, at the University of Copenhagen, where he founded a psychophysical laboratory. The Society of Sciences awarded him a gold medal for his (Hovedlovene for det menneske- lige Folelsesliv) (1892). He is also author of (Overtro og TroldonV (4 vols., 1893-96; trans¬ lated into German) ; (De sjselelige Tilstandes legemlige YtringeU (3 vols., 1898; German trans. 1899-1905) ; (Psychologische Methodik) (1905) ; (Grundzuge der Psychophysiologie> (1912) ; (Paedagogisk PsykologP (1913).

LEHMANN (Charles Ernest Rodolphe), Henri, French painter: b. Kiel, Schleswig, 14 April 1812; d. 31 March 1882. He studied under his father, Leo Lehmann, and under Ingres in Paris, visited Munich and Italy, and in 1847 settled at Paris where he became naturalized. He as first painted scriptural sub¬ jects but eventually confined himself chiefly to portrait work, in which field he made a con¬ siderable reputation. He also executed

mural decorations, among them the chapel of the church of Saint Merry, and the Throne Hall, Luxemburg Palace. He became a chevalier of the Legion of Honor in 1853, a member of the superior council of the Beaux Arts in 1875, and professor at the ficole des Beaux Arts. His works include (Tobias and the AngeP (1835);

miah (1842), Angers Museum; (Leonidas J (1848), Nantes Museum; (Adoration of the Magi and Shepherds) (1855), Rheims Mu¬ seum; (Rest) (1864), Luxemburg Museum;*

LEHMANN, Frederick William, American lawyer: b. Prussia, 28 Feb. 1853. He was graduated at Tabor College, Iowa, in 1873 and was admitted to the bar in that year. He en¬ gaged in practice at Nebraska City in 1873-76, Des Moines, Iowa, in 1876-90, and since then has practised at Saint Louis. He was solicitor- general of the United States in 1910-12. He was a government delegate and chairman of the committee on plan and scope at the Univer¬ sal Congress of Lawyers and Jurists in 1904; and United States delegate to the A. B. C. mediation confer nee at Niagara Falls in 1914. He was president of the American Bar Asso¬ ciation in 1908-09, and second vice-president of the American Academy of Jurisprudence in 1914.

LEHMANN, Johannes Edvard L., Danish theologian and historian : b. Copenhagen, 19 Aug. 1862. He studied in Lund, Germany, Holland, England and Paris, and took his Ph.D. at the University of Copenhagen in 1896. He became docent in the history of religion at Copenhagen in 1900, professor of that subject at Leyden in 1909 and at the University of Berlin in 1910. Author of (Zarathustra> (2 vols., 1899-1902) ; (Mystik i Hedenskab og Kristendom (1904; German trans. 1907) ; (Buddha) (1907) ; (Textbuch zur Religions- geschichte* (1912) ; (Barnelaerdom og Yug- lingsliv* (1913), etc. He also edited and revised De la Saussaye's (Lehrbuch der Religions- geschichte) (4th ed., 1912).*

LEHMANN, Karl Bernhard, German physician : b. Zurich, 27 Sept. 1858. He studied at the University of Zurich and in 1881 was appointed assistant in the physiological institute there. He was physiological assistant at Munich from 1883 until he became assistant professor of hygiene at Wurzburg in 1887, where he was appointed professor in 1894. Author of (Methode praktischer Hygiene) (2d ed., 1901 ; Eng. trans., Crookes, 1893) ; with Neumann, R. O., (Atlas und Grundriss der Bakteriologie) (1897; 5th ed., 1911); (Der Bedeutung der chromate fur die Geshundheit der Arbeiter (1914), etc.*

LEHMANN, Lilli, German operatic singer: b. Wurzburg, 1848. Her mother, who was harp-player and prima donna under Spohr at Cassel, gave her the

first musical instruction and under her training Fraulein Lehmann de¬ veloped a remarkable soprano voice. She made her debut in Berlin (1870) and subsequently produced so good an impression that she was appointed imperial chamber singer in 1876. She became famous from the parts she took in the Nibelungen trilogy at Baireuth, and sang in Wagner's operas in London (1884), and as principal soprano in the same operas at the Metropolitan Opera House, New York, her principal roles being Briinhilde and Isolde. From 1885-90 she was mainly at the Metro¬ politan Opera House, New York, and in 1899 appeared at Covent Garden, London, in a round of parts. On her return to Germany

she found herself debarred from appearing on the operatic stage through having outstayed the leave given her by the Berlin Opera, but through the personal intervention of the emperor, the prohibition was removed. In 1888 she was married to Paul Kalisch.

LEHMANN, Liza, English singer and composer: b. London, about 1862; daughter of Rudolf Lehmann (q.v.). She studied vocal music at London and Rome, and composition under Freudenberg and Hamish MacCunn. On 23 Nov. 1885 she made her debut in London; her success was assured, and she was received well throughout Great Britain and Germany. In 1894 she retired from public singing on her marriage with Mr. Herbert Bedford, a well- known composer. She devoted herself hence¬ forth to composition and produced works of freshness and originality, many of them tinged with a refined feeling wThich recalls the modern German romantic or emotional school. Her most successful works are the (Persian Garden y ; and (The Daisy Chain) (1901).

LEHMANN, Peter Martin Orla, Danish statesman: b. Copenhagen, 19 May 1810; d. there, 13 Sept. 1870. He was educated in law at the University of Copenhagen and while of German descent early affiliated himself with the Danish national party. He was a contrib¬ utor to Kjdbenhavnsposten in his student days and in 1839-42 was one of the editors of the Fadrelandet, which he founded with C. N. David. He was active in the affairs of 1848, was foremost in the party which insisted upon the Eider as the Danish boundary and main¬ tained that Schleswig was an integral part of Denmark. He was a member of the cabinet formed by Count A. W. Moltke in 1848 and was sent to London 'and Berlin on missions concerning Schleswig-Holstein affairs. He was a member of the Folketing in 1851-53; of the Landting in 1854-70; and of the Reichrat in 1856-66. He was Minister of the Interior under Hall in 1861-63. He had a wide follow¬ ing,

was liberal in his policies and a firm believer in the maintenance of Danish rights against German aggression. Author of (Om Aarsagerne til Danmarks U!ykke) (1864), which ran through eight editions and was translated into English. His collected works were published (4 vcls., 1872-74).

LEHMANN, Rudolf, Anglo-German painter and writer : b. near Hamburg, 19 Aug. 1819 ; d. Bushey, Herts, 27 Oct. 1905. He was educated at the Johanneum, Hamburg, and proceeding to Paris studied painting under his brother, Henry Lehmann ; he was afterward the pupil of Cornelius and Kaulbach (q.v.) at Munich. He went to Rome in 1839 and remained there 16 years. His largest picture is (The Blessing of the Pontine Marshes by Sixtus V, which was bought by the French government after be¬ ing exhibited in France 1846. He also executed for the French government a (Madonna and Child.) In 1866 he settled in London and be¬ came a successful portrait painter, his work being distinguished by a reposeful dignity. He published (An Artist's Reminiscences) (1894) ; (Men and Women of the Century) (1896).*

LEHMANN, Rudolph Chambers, English journalist, lawyer and politician : b. near Shef¬ field, England, 3 Jan. 1856. He was educated

at Cambridge and became a barrister of the Inner Temple in 1880. He has been a member of the staff of Punch from 1890 and was editor of the London Daily News in 1901. He coached the Harvard crew in 1896 and 1897. He is a keen politician and represented the Harborough division of Leicestershire in the Liberal interest from 1906-11. He has pub¬ lished among other works (1893); Usthmian Library: Rowing) (1897); (Anni Fugaces, verse (1901); (Adventures of Picklock Holes) (1901) ; (Crumbs of Pity) (1903); (The Complete Oarsman) (1908); (Memories of Half a Century* (1908); (Light and Shade> (1909) ; Charles Dickens as Editor) (1912); (A Spark Divine} (1913).*

LEHMKUHL, lem'kool, Augustinus, Ger¬ man Catholic theologian: b. Hagen, Westphalia, 23 Sept. 1834. He was educated at Essen- Ruhr and at various scholasticates of the Jesuit order which he entered in 1853. He was or¬ dained to the priesthood in 1862 and became successively professor of Sacred Scripture, dogmatic theology and moral theology at the scholasticates of Maria-Laach (1862-72) and Ditton Hall, England (1873-80). Since 1880 he has resided mostly in Holland and devoted himself to literary pursuits. He published (Herz Jesu Monat (1861; 11th ed., 1912) ; (Theologia moralis) (2 vols., 1883; 11th ed.,*

1910) ; Compendium theologiae moralis) (1886; 5th ed., 1907) ; (Arbeitsvertrag und Strike) (4th ed., 1904) ; (Die soziale Not und der kirchliche Einfluss (4th ed., 1905) ; (Die soziale Frage und die staatliche*

Gewalt (3d ed., 1896) ; (Internationale Regelang der so- zialen Frage) (3d ed., 1896) ; (Der christliche Arbeiter* (3d ed., 1902) ; (Das biürgerliche Gesetzbuch des deutsdien Reic'hs* (7th ed.,*

1911) ; (Das Herz des gottlichen Menschen- freundes (2d ed., 1906) ; Casus ConscientiaP (2 vols., 4th ed., 1900) ; (Probabilismus vin- dicatus* (1906) ; (Das Gattesbrot* (2d ed.,*

1912) . He collaborated in Herder's (Kirchen- lexikon and Conversationslexikon,* etc., and edited many compendia and manuals. Dr. Lehmkuhl is known far beyond his own country due to the fact that his theological works and the Casus Conscientiae* are the textbooks in nearly all the Catholic seminaries of the world.*

LEHR, lar, Julius, German economist : b. Schotten, Hesse, 18 Oct. 1845; d. Munich, 10 Oct. 1894. He was educated at Giessen, became privatdocent in economics at Munich in 1868, professor at Karlsruhe in 1874, and from 1885 until his death was professor at Munich. Au¬ thor of (Schutzzoll und FreihandeP (1877) ; (Politische Oekonomie in gedrangter Fassung) (4th ed., 1905) ; (Produktion und Konsumtion in der Volkswirtschaft (1895; ed. by Franken¬ stein), etc.*

LEHR, Paul Ernest, French jurist, author and educator: b. Saint-Die, Vosges, 13 May 1835. He was educated at Strassburg and was admitted to the bar there. He was engaged in the defense of Strassburg as a captain in the National Guard in 1870, and after the fall of the city he retired to Lausanne, Switzerland. In 1875 he was appointed professor of com¬ parative jurisprudence at the Academy of Lausanne, and in 1877 he was appointed to a

post in the French embassy in Switzerland. His contributions to the knowledge of foreign law were important. Author of Elements de droit civil germanique> (1875); < Elements de droit civil russe> (2 vols., 1877-90) ; < Elements de droit civil espagnoP (2 vols., 1880-90) ; (Elements de droit civil anglais (1885) ; (Le nouveau code penal portugais) (1888), etc.*

LEHRS, lars, Karl, German classical scholar: b. Konigsberg, 2 June 1802; d. there, 9 June 1878. He was of Jewish descent, but be¬ came a Christian in 1822. He was educated at the University of Konigsberg, and from 1845 until his death he was professor of ancient Greek philology there. He was the originator of a new system for the study of Homer, ex¬ plaining from

the text itself, the method being embodied in his important work (De Aristarchi Studiis Homericis) (1833; 2d ed., 1882). He was also author of (Quaestiones Epicae (1837) ; (De Asclepiade myrleano) (1845) ; (Horatius Flaccus) (1869) ;*

LEIB, lib, Michael, American politician: b. Philadelphia, 1759; d. 1822. He was sent to the State legislature, and to Congress in 1798, where his pronounced political opinions made him conspicuous. Re-elected in 1800 and again in 1802, he opposed the administration of Jeffer¬ son, whom he had at first supported, and was politically associated with William Duane (q.v.), who published the Aurora. Returned to Congress in 1804, he there vigorously opposed Gallatin, and entering the Senate in 1808 was there especially hostile to both Madison and Gallatin. He left the Senate in 1814 to become postmaster of Philadelphia.

LEIBL, li'b'l, Wilhelm, German genre and portrait painter: b. Cologne, 23 Oct. 1844; d. Wurzburg, 4 Dec. 1900. He was a pupil of Piloty and of Ramberg at Munich, and in 1869- 70 he was in Paris studying the methods of the French realists by whom his later work was largely influenced, although he was likewise an earnest student of Holbein's manner. He worked into his final representative manner — strength of line accompanied by delicacy of finish and fine coloring — through his early pe¬ riod of devotion to realism, and the second of painstaking particularity in detail. His work ranks among the best of his period in Ger¬ many, and he had a large following. He re¬ ceived the gold medal at the Paris Salon of 1870, the Prussian large gold medal and similar honors. He was a member of the Berlin Acad¬ emy. His portraits ranked high and include

one of his father (Wallraf-Ricartz Museum, Cologne) ; the painter, Paulsen (Berlin Gal¬ lery) ; Frau Gedon (gold medal, Paris Salon) ; the painter, Sperl (Budapest Gallery). His genre pictures dealt mainly with sturdy peasant types. Among them are (Cocotte) ; (The Bachauer Peasant Womeifi (National Gallery, Berlin) ; (Three Women in Church) (Hamburg Gallery) ; (Two Poachers) (Berlin Gallery) ; (A ProvinciaP (Pinakothek, Munich) ; (In the Kitchen) (Stuttgart Museum), etc. He col¬ laborated with Sperl, the landscape painter, in several canvasses, and also executed a number of fine etchings.

LEIBNITZ, lib'mtz, Gottfried Wilhelm von, the most universal scientific genius of

modern times: b. Leipzig, 21 June 1646; d. Hanover, 14 Nov. 1716. He early lost his father, a professor of moral philosophy in the local university, and depended for his childish education mainly upon undirected omnivorous private reading. Having passed through the University of

Leipzig, he graduated doctor of laws from Altdorf, near Nuremberg, in 1666, and passed almost at once into the service of the archbishop elector of Mainz, arch-chan¬ cellor of the empire, in whose interests he be¬ gan the series of attempts to find a basis for the reunion of Western Christendom which oc¬ cupied him at intervals through a great part of his life. In 1672 Leibnitz was dispatched to Paris in the hope that he might be able to pro¬ mote the interests of the German states by diverting the ambitions of Louis XIV toward the. conquest of Egypt. The mission failed of its intended effect, but the residence of Leibnitz in Paris, between 1672 and 1676, which was only broken by a brief visit to London in 1673, was of the utmost importance for the develop¬ ment of his thought, as it brought him into con¬ tact with the chief living exponents of Car- tesianism, Arnauld and Malebranche, as well as with Huygens and other leading mathematicians. From this period date Leibnitz's critical study of Cartesianism and his introduction to higher mathematics, of which the first result was his discovery of the fundamental notions' of the infinitesimal calculus. This discovery, made in 1675, was announced in 1676 to Newton, who promptly replied that he had for years been in possession of methods (the ((method of flux¬ ions®) leading to the same results as those of his correspondent. The nature of these methods was however disguised in a couple of anagrams. Leibnitz did not actually publish his discovery until 1684; Newton's method was only given to the world in 1693. Leibnitz's later years were unfortunately much disturbed by a bitter controversy, which reflects little credit on either party, with the friends of Newton, who accused him of having stolen the idea of the calculus from papers of Newton's seen during his visit to England. It is now generally ad¬ mitted that this charge, which was never made by Newton himself, was quite baseless, and that though Newton had elaborated his methods for private use as early as 1665, the discovery of Leibnitz was entirely independent, while his notation was so much more convenient that it has completely replaced that of his great rival, even in England.

On the termination of his residence in Paris Leibnitz spent several weeks in Holland in close communication with Spinoza, then living at The Hague, where he died in the following spring (1677). It appears that the two thinkers had repeated philosophical discussions, and that Leibnitz was even allowed to see the jealously guarded manuscript of Spinoza's (Ethics. His subsequent misrepresentation of the extent of this intercourse with the greatest thinker of the previous generation, which has only been ex¬ posed within recent years, is perhaps the great¬ est blot on Leibnitz's character. Leibnitz had already been deprived of his diplomatic position by the death of the Elector of Mainz in 1673. He now (1676) accepted from Johann Fried¬ rich, Duke of Brunswick, the post of court- librarian at Hanover, which he filled for the*

rest of his life. Much of his time was hence¬ forward taken up with public affairs and with preparation for a history of the House of Brunswick, in connection with which he spent two years (1687-89) in research in the archives of Austria and Italy. He negotiated long, but to no result, with Bossuet and Spinoza for the reunion of the Roman and Reformed churches, did much to promote the mining industry of the Harz district, and in especial labored to advance the organization of scientific research by the foundation of academies. The sole di¬ rect result of these last exertions was the cre¬ ation in 1702 of the Berlin Academy with Lieb- nitz as its first president. Plans for similar in¬ stitutions in Dresden, Vienna and Saint Peters¬ burg proved abortive.

During the lives of Johann Friedrich and his successor, Ernst August, Leibnitz remained in high favor and enjoyed in particular the friend¬ ship of the ((two Electresses/ Sophia, wife of Ernst August and daughter of Descartes' cor¬ respondent, Elizabeth of the Palatinate, and her daughter, Sophia Charlotte, queen of Prus¬ sia. With the accession of the former's son, George Louis, afterward George I of England, to the dukedom he seems to have fallen into some disfavor, which, combined with the at¬ tacks of Newton's partisans, did much to em¬ bitter his last years.

Works. — In addition to his diplomatic and historical compositions, Leibnitz conducted an enormous scientific and philosophical corre¬ spondence, but his busy life left little time for the production of philosophical works on a large scale. He preferred to make his ideas known piecemeal in correspondence and occa¬ sional short essays on particular points. The one extended philosophical treatise published in his lifetime, the famous ˆheodicy,* a de¬ fense of natural theology against the sceptical attack of Bayle, is by general consent his poor¬ est performance. (The far more important

logic recreated nearly 200 years later by Boole. Similarly the feasibility of the apparently chi¬ merical project of a universal "characteristic/ or philosophical symbolism independent of spoken language, to which so much of Leibnitz's thought was devoted, has only been shown in the last few years by its approximate realization in the mathematical logics of Peano, Freje and others.

Philosophical System. — Leibnitz makes his first appearance as a philosopher with a settled system of his own in 1685 at the age of 39, in the (Discourse on Metaphysics* composed for Arnauld. He had previously

passed succes¬ sively under several different influences. In youth he had been familiar with the traditional doctrines of the great schoolmen, particularly with the nominalist system of Duns Scotus, and had afterward been powerfully influenced by the new materialist and mechanical philosophy of nature as expounded by Hobbes and Gas¬ sendi. During his stay in Paris he had been a profound student and acute critic of Cartesianism, and had subsequently, as we have seen, come into relations with Spinoza, who, however, failed from the first to satisfy him. At some time between 1675 and 1685 he had evidently further made a special study of Plato and Aristotle. The system of ideas at which he finally arrived bears traces of all these prepara¬ tory studies. In its general character it is cor¬ rectly described by the common statement that it represents a reaction against the exclusively mechanical interpretation of nature and mind and a return to the spiritualistic and teleological conceptions of the Platonic-Aristotelian philoso¬ phy. Against the purely mechanical conception of extra-human nature assumed by Cartesian- ism Leibnitz maintains that the explanation of mechanical routine itself has always in the last resort to be found in final casuality, in pur¬ posive activity; against the Spinozistic concep¬ tion of the illusoriness of all finite individual¬ ity, which he sincerely regarded as fatal to re¬ ligion, he insists upon the ultimate and absolute reality of individual finite existence. At the same time, Leibnitz's system is one of pure and consistent rationalism ; he aims at ruining the mechanical philosophy by showing that it col¬ lapses of itself when the attempt is made to think it out with rigorous consistency. Phys¬ ical science is absolutely justified in demanding a mechanical explanation of all events without exception, but the very nature of mechanical explanation is such that it cannot be finally satisfactory, but demands a further metaphys¬ ical explanation in terms of individual purposive activity to make it intelligible.

In his most generally known works Leibnitz contents himself with expounding the conse¬ quences of this train of thought without clearly indicating the ultimate logical premises upon which it is based. What these premises are may best be learned from some of the papers recently printed by M. Couturat. In particular the little tract headed (Primse Veritates) (ulti¬ mate truths), contains a deduction of all the leading doctrines of the Leibnitian system, with one exception, from one or two ultimate logical theories. This sketch will be closely followed in the next few paragraphs.

The fundamental assumption from which Leibnitz, starts is the doctrine (1) that all true propositions are analytical, i.e., the predicate of

every true proposition is part of the meaning of its subject term. This is, in fact, the very meaning of the word truth. All ultimate truths are therefore identical and can be reduced to one of the two forms, A is A (Law of Iden¬ tity), A is not non- A (Law of Contradiction, which Leibnitz wrongly regards as a mere ver¬ bal transformation of the Law of Identity). What we call an a priori or deductive proof is merely the reduction of a derivative proposition to a form in whidh this identity between sub¬ ject and predicate is made explicit by means of logical analysis. So-called synthetic proposi¬ tions, in which the predicate appears to involve a new determination of the subject, are merely propositions for which we have not succeeded in performing this analysis. It is this denial that any true proposition can be really synthetic which constitutes the fundamental difference between Leibnitz and Kant.

It is now further assumed (2) that every proposition is one which affirms or denies an attribute of a substance or subject, and (3) that there is an ultimate plurality of such logical subjects or substances. Of these assumptions (2), which is, in fact, logically a mere trans¬ formation of (1), is the source of Leibnitz's worst logical difficulties, as it forces him to hold that no proposition asserting a relation between two substances can be an ultimate truth. Any statement of the form, <(A has the relation x to B,® must be decomposable into a pair of statements of the form ((A has an at¬ tribute xi® (

Leibnitz goes on to observe that the whole difference between the necessary truths of science and the contingent truths of every-day experience is explained by the distinction be¬ tween explicitly and implicitly analytical propo¬ sitions. When writing for others, Leibnitz habitually spoke of this difference. between truths of reason and truths of fact as if it were an ultimate difference in kind. Truths of rea¬ son, he usually says, depend upon the Law of Contradiction, and are therefore demonstrable; truths of fact depend on the Principle of Suffi¬ cient Reason, and are, with the one exception of the existence of God, contingent and in¬ demonstrable. From the (Primse Veritates) it is clear that his real meaning was merely that truths of fact (propositions involving the. as¬ sertion of existence) would require an infinitely prolonged analysis before they could be re¬ solved into identities. Leibnitz's Law of Suffi¬ cient Reason, in fact, turns out to mean simply the doctrine that every truth is analytical and therefore capable of a priori proof, though the production of the proof, may demand an in¬ finitely prolonged analysis and thus be prac¬ tically impossible for us. It now follows (1) that no two things can be exactly alike ; nu¬ merical diversity always implies difference in attributes, since there must be a reason why the things are counted as two and not as one, and this reason

must, on the principles just laid down, lie in some difference in their attributes.

(Principle of the Identity of Indiscernibles) . Hence Leibnitz denies that space is a reality, for if it were, there would be infinitely numer¬ ous real things (the points of space), which are all exactly alike. (2) There are no ˆexternal® relations between things, i.e., no relations which do not arise out of the attributes of the terms related, since every truth, reduced to its simplest terms, consists in the ascription of an attribute to a subject, and no proposition asserting re¬ lation between two things can therefore be an ultimate truth. Hence, since geometry and me¬ chanics consist precisely in the study of such ˆexternal® relations, the whole world of ex¬ tended and moving objects must be merely ap¬ parent or phenomenal, not real. (3) The true concept of any individual substance logically involves the whole series of its past, present and future states. Everything that can happen to such a substance is logically a consequence of the character of that substance, each substance is causa sui, the reason for the succession of its own states. Hence God, being omniscient, can deduce the whole history, e.g., of Saint Peter or Alexander the Great, from contemplation of the concept of Peter or Alexander. (4) Every individual substance involves in its concept the whole structure of the universe, so that from complete knowledge of any one substance we could deduce a priori, if our power of analysis were infinite, the whole history of the universe. This follows from the consideration that every substance stands in some relation to every other, while, according to the logic of Leibnitz, every relation presupposes as its foundation a corre¬ sponding attribute in each of its terms. Hence all the substances are different expressions of the same fundamental system. They <(mirror® or <(represent® the same structure but with vary¬ ing degrees of clearness, like perspective draw¬ ings, taken from different points, of the same fort or city. The connection between different substances is thus ideal or metaphysical, not real or causal. Strictly speaking, no finite substance exercises a real influence on another, since every substance is the sufficient reason for the suc¬ cession of its own states, and the 'passing over of a state or predicate from one thing into another is unintelligible. Thus what we com¬ monly call external causes are, in truth, merely occasions or conditions of the occurrence of a change of which the real cause is always the nature of the substance in which the change takes place. But, since all substances <(mirror® the same system, the result is that there ap¬ pears to be causal interconnection between the states of all the things in the universe. Each thing develops from within, entirely unaffected

by any other, and yet the result is the same as it would be if everything were casually affected at every moment by all the rest. This is Leib¬ nitz's most famous theory, the doctrine of the Pre-established Harmony between all sub¬ stances. A particular case of it is the psycho¬ physical correspondence between the soul and the body. The soul develops independently ac¬ cording to the law of its own nature, and the same is true of each of the substances which, as an aggregate, compose the body, yet the cor¬ respondence between the. psychical and the bodily series of changes is as complete as it would be if each series were, at every step con¬ ditioned by the other, nor is there, any need, after the fashion of the Occasionalists, to in-

voke the supernatural interference of God to effect the correspondence. The point is well illustrated by the analogy of a hand of musi¬ cians who keep perfect time and tune simply because each of them is playing correctly from his own score without waiting for his cue from any of the others.

Further consequences are (5) that empty space does not exist, since it would have to con¬ sist of points which are all different, and yet all exactly alike. For the same reason, bodies do not consist, as Descartes held, of mere ex¬ tension, since extension, if real, would be merely the infinite repetition of elements which are ex¬ actly alike. (6) Matter is not only infinitely divisible but infinitely divided. There are no atoms, or indivisible parts of matter. If an atom were a true substance or ultimate unit it would be theoretically possible to deduce the whole constitution of the universe from ade¬ quate knowledge of the motion of one atom, whereas in fact many different theories of the universe may agree in yielding the same series of positions for a given atom. All matter is therefore, as we read in the (Monadology,) composite, and thus even the smallest particle is a fully organized world; every part of the (

Finally (7) since substances are simple units, no substance can begin or cease to exist bit by bit, by gradual development. The simple sub¬ stance or monad, to adopt the technical term borrowed by Leibnitz from the younger Van Helmont, has no parts, and is a kind of spirit¬ ual or metaphysical (

The only important doctrine of Leibnitz which does not figure in the

foregoing sketch, taken from the tract. on ultimate truths, is also the one doctrine which is most manifestly an excrescence on the system, the theorem of the existence of God. This is, according to Leib¬ nitz, the only ((truth of fact® which can be proved by a finite process of logical analysis. Leibnitz attempts to prove it both from a con¬ sideration of the ((eternal truths® or ((truths of reason,® the universals of pure science, and from the (

truth is wider than that of actual existence. Besides the existing system of Laws of Nature, other systems are equally conceivable or logic¬ ally possible, and the truths which hold for all possible constitutions of the universe form the body of ((eternal truths.® But Leibnitz holds that all possibilities must be founded on some¬ thing actual, otherwise there would be no means of distinguishing the possible from the impos¬ sible, a doctrine which is also fundamental in the philosophy of Lotze. The requisite founda¬ tion in actuality is provided by the existence of God. The (

ment that Leibnitz spoke of God as the ((monad of monads® seems to originate with Hegel and to have no foundation.

In the (

The system of monads now falls into a hierarchy of three grades, according to the degree of the monad's clearness of perception. The perception and appetition of the monad are not necessarily conscious. The condition of the monads which compose the so-called in¬ animate world is similar to that of the soul in profound sleep or swoon; their perceptions are, as we now say, permanently "below the threshold® of distinct consciousness. Leibnitz is thus the author of the doctrine since so fateful in Psychology, of indefinitely minute "unconscious® mental modifications. In ani¬ mals, when fully developed, the formation of sense-organs, which are essentially an apparatus for the collection of stimuli, renders possible the summation of such ((minute perceptions® to form a single intensified and therefore con¬ scious perception, and thus provides a basis for memory and association. Those "domi- nant monads® which have thus been furnished with heightened perceptions form the second stage in the hierarchy, that of animal souls. In accord with the biological ideas of his time, Leibnitz regards the process of conception and birth essentially as one of development in size; not

only is there no generation of life from lifeless matter, but each living germ, even before conception, already contains, on a microscopic scale, the whole organization of the future animal. Death is the converse proc¬ ess of reduction, by which the organism re¬ turns to a microscopic condition; hence, strictlv speaking, not only all souls, or dominant monads of organisms, but all organisms them¬

selves, are indestructible. Rational minds form the third and highest grade in the system of monads. Their distinguishing characteristic is that, in addition to memory and the power of forming associations of ideas, they possess the power of discerning rational connections be¬ tween truths, and thus of rising to reflective consciousness of the self as a simple substance and of God, the infinite substance. Since the perceptions of every monad are internal states of itself, Leibnitz necessarily agrees with Des¬ cartes in regarding the fundamental notions of rational science as innate, but is more careful than Descartes to give prominence to the neces¬ sity for analysis and reflection before these in¬ nate ideas can be brought to light. Before the reflective process has disengaged them the fun¬ damental categories of rational thought are present in the mind as veins, which have not yet been laid bare, are present in the unshaped block of marble. In virtue of their capacity for rational thought, spirits may be said to be living mirrors not only of the universe, like all other monads, but of God, its cause. God is related to them not merely as to all created things, after the fashion of an inventor to his machine, but as a prince to his subjects or a father to his children. Thus they form, within the uni¬ verse, a more special society or <(city of God® over which God presides not merely in accord¬ ance with natural but also in accordance with moral law. The universe thus presents, within the Pre-established Harmony itself, a second harmony between the physical and moral orders in consequence of which the mechanical se¬ quence of physical causes and effects tends of itself, without any need for special divine in¬ terposition, to an ultimate adjustment of the happiness of each spirit to its moral deserts. Leibnitz's mathematical optimism thus culmi¬ nates in ethical optimism at the cost of a rather hazardous identification of goodness in the metaphysical sense of quantity of existence with goodness in a specifically moral sense.

Two points still call for some further re¬ mark: (1) Leibnitz's conception of matter; (2) his ethical theory.

Matter. — Leibnitz's theory of matter is con¬ ditioned by his discovery of the fundamental defect of Cartesian Mechanics. Descartes had assumed that "quantity of motion,® or mo¬ mentum,

is independent of the direction of motion, and had consequently been led to base his Mechanics on the assertion that the quan¬ tity of motion in a dynamical system remains constant. Against this view Leibnitz contended that the capacity of a moving body for doing work, its vis viva or "living force,® as measured by its effects in moving another body through a greater or a less distance, is proportional not to its momentum, but to its momentum multi¬ plied by its velocity. Hence the correct meas¬ ure of force is not mv (momentum) but mv2 (vis viva, the double of what we call the Ki¬ netic energy of the body). It is this which is really conserved in dynamical transactions be¬ tween bodies. (The controversies as to the true ((measure of force® to which these ob¬ servations gave rise have long been admitted to be largely verbal. If we measure a con¬ stant force by the momentum it generates in a given time, Descartes' formula is, of course, correct; if we measure it by the distance through which it propels a body, that of Leib-

nitz has to be adopted. Similarly, both the Conservation of Momentum and the Conser¬ vation of Vis Viva, if properly formulated, are truths). The importance of the point in Leibnitz's philosophy is due to the fact that it led him to regard force as a real entity, different from actual motion, and thus to hold, as against the Cartesians, that the phenomenal physical world cannot be analyzed into exten¬ sion and motion alone. For Leibnitz's own theory of phenomenal matter it is further im¬ portant to distinguish primary from secondary matter. Primary matter itself is something more than mere extension or occupation of space. It is extension plus resistance (a con¬ ception which seems to combine in one inertia and impenetrability). But for this quality of resistance any one state of the physical world would be indistinguishable from any other. Primary matter is however purely passive, and is never to be found existing alone. All physi¬ cal existents contain in addition force, in the sense of spontaneous tendency to change of state. It is the secondary matter thus consti¬ tuted by extension plus resistance plus force which is studied by the physicist, and held by Leibnitz to be infinitely divided and organized. Secondary matter thus stands, so to say, half¬ way between the monads and the pure abstrac¬ tion of primary matter, and is the matter of which Leibnitz speaks as a ((truthful phenome¬ non. w There is really no very close connection between these dynamical theories and the meta¬ physical system of Leibnitz, though the two are made to look more intimately related

than they actually are by a confusion between force in the dynamical sense of rate of change of mo¬ mentum and force in the metaphysical sense of the inherent tendency of the monad to change of state.

Ethical Views. — There is nothing very in¬ dividual in the ethics of Leibnitz (which may be generally described as a doctrine of rational¬ istic utilitarianism of a type common enough in the 17th and early 18th centuries), except his treatment of the problem of moral freedom. As we have seen, the original source of all change is appetition in the monad. Conscious appetition is desire, and desire is always di¬ rected toward the apparent best. There is thus no such things as unmotived willing; a volition only seems unmotived when the motive im¬ pulse is (

plus intelligence. We are free in proportion as we have intelligence to discern the real best, a doctrine which is only nominally distinct from Spinoza's. Leibnitz further agrees with Spi¬ noza in his general conception of the moral good. Pleasure is assumed to accompany in¬ crease of activity, i.e., clear perception, and good and evil correspond to acts motived re¬ spectively by clear and by confused perception. Hence Leibnitz ought to have regarded vice as equivalent to honest and unavoidable error. He tries to escape by his distinction between meta¬ physical and moral evil. The former is simply the element of passivity or confused percep¬ tion in the monads, and is not inconsistent with God's goodness, since a world which includes this element may contain a greater number of <(compossibles,55 and so be on the whole better, than one which does not. Moral evil, or vice, and physical evil, or suffering, are inconsist¬ ently regarded at once as being logical conse¬ quences of this metaphysical evil, and yet as contingent and non-necessary. The ethical sys¬ tem based on such ideas is naturally in the main one of enlighted egoism in which intelligence is exalted at the cost of ignorant good inten¬ tions. But since, in virtue of the harmony between monads, my own good and that of others are inextricably bound up together, Leib¬ nitz holds that doing good to others naturally gives us pleasure, and hence he agrees with Shaftesbury in recognizing the existence of dis¬ interested affection. To make the coincidence of my own good with the good of others com¬ plete he has further to assume, as we have seen that he does, immortality and the final proportionment of happiness to desert.

Other works by Leibnitz are (Nouveau sys- temeˆ de la nature) (1695) ; (Essais de the- odicee5 (1710); (Principes de la nature et de la grace5 (1714) ; (Nouveaux essais sur l'en- tendement humain>

(1765). His philosophical works in French and Latin have appeared in several editions. The principal are those of Erdmann (Berlin 1840), of Jaret (Paris 1866; 1900) ; and of Gerhardt (Berlin 1875-90). Pertz undertook the publication of a complete edition — four volumes of history (Hanover 1843 — 47) , seven volumes of mathematics (Ber¬ lin and Halle 1849-63) and one volume of philosophy have appeared. Some of the im¬ portant philosophical works have been trans¬ lated by G. M. Duncan (New Haven 1890) ; the (Nouveaux essais > bv A. G. Langley (Lon¬ don 1894) ; (The Monadology) by R. Latta (Oxford 1898).

Bibliography. — Cassirer, Ernst, 'Leibnizs System in seinen wissenschaftliehen Grund- lagen> (Marburg 1902) ; Couturat, Louis,

1876) ; Merz, J. T., (Leibnitz' (London 1884) ; Nourrisson, J. F., (La philosophie de Leibniz' (Paris 1860) ; Pfieiderer, Edmund, (G. W. Leibniz als Patriot, Staatsmann und Bildung- strager' (Leipzig 1870) ; Russell, B. A. W., (Critical Exposition of the Philosophy of Leib¬ nitz' (London 1900) ; Zimmermann, Robert, (Leibnizs Monadologie' (Vienna 1847).

A. E. Taylor,

Professor of Moral Philosophy, Saint Andrews University, Scotland,

LEICESTER, Robert Dudley, Earl of. See Dudley, Robert, Earl of Leicester.

LEICESTER, les'ter, England, county- town of Leicestershire, on the river Soar, a southern tributary of the Trent, 99 miles north¬ west of London, on the Midland Railway and on branches of the Great Northern and London and Northwestern railways and on the Leices¬ ter Canal. It was the Roman Ratce and the ancient British and Roman Ratce Coritanorum and has interesting Roman remains, including the Jewry wall and several pavements, while the bricks in the early Norman church of Saint Nicholas are of Roman origin. There are several fine churches with Norman and early English remains and the ruins of an ab¬ bey of the Black Canons, founded in 1143. The castle has parts of the original Norman hall, two gateways and an artificial mount upon which the donjon or keep stood. It was one of the ((Five Boroughs" of the Danes in the 9th century. It was a

municipality in 129-121 a.d., was the seat of a bishopric in 680-874 and in the 13th century it instituted a government by a mayor and 24 jurats. It was taken by storm by Charles I in May 1645 and retaken by Fairfax in the following month. It was granted its first charter by Robert of Meulan in 1103 or 1118 and later received charters by Henry VII in 1505, by Elizabeth in 1599, by James I in 1605 and 1610, by Charles I in 1630 and by James II in 1684. It has been repre¬ sented by two members in Parliament since 1295. It has a prescriptive market dating from the 13th century, held on Wednesdays and Saturdays ; a fair dating from 1228, and an¬ other dating from 1473. There are several other fairs of more recent origin. There are excellent modern libraries, schools, hospitals, benevolent institutions, art museum, gymna¬ siums, churches and parks. It became a county borough in 1892 and was extended to consti¬ tute a civil parish in 1892. The manufacture of hosiery on knitting frames was established about 1680 and still constitutes an important industry. The manufacture of boots was in¬ troduced in the 19th century and the brewing and woolen industries were established In the 13th century. Other industries include the manufacture of cotton, lace, elastic webbing, iron-works and brick-works. Pop. about 227,242. Consult Bateson, (Records of the Borough of Leicester' (1899); Johnstone, 'History of Leicester' (1892).

LEICESTER, Mass., village in Worcester County, six miles southwest of Worcester, at the sources of the Quinebaug River and on the Boston and Albany Railroad. It is situated in a fertile, well-wooded farming district and manufactures cards, clothing and woolen goods. Pop. (1920) 3,635.

LEICESTER, or THE FATAL DE¬ CEPTION, a tragedy written by William Dunlap (q.v.) in 1794 and credited with being the first tragedy of American authorship to be produced on the stage.

LEICESTER SQUARE (formerly Leices¬ ter Fields), London, England, a square in the west end of the city; frequented by foreigners of the middle class, especially French and a refuge for the French Huguenot emigres after the Edict of Nantes in 1685. It was unin¬ closed country until the time of Charles II. It was once the site of Savile House; and Lei¬ cester House, built for Robert Sidney, Earl of Leicester, formerly stood on the north side of the square. Here Queen Elizabeth of Bohe¬ mia, (

LEICESTERSHIRE, England, north mid¬ land county, bounded by Derby on the north¬ west, Nottingham on the north, Lincoln and

Rutland on the east, Northhampton on the southeast and Warwick on the southwest, where it likewise touches Staffordshire. The area of the county is 819 square miles. The surface is undulating, the hills of the Charn- wood Forest in the northwest forming the high¬ est ground, Barden Hill having 912 feet eleva¬ tion. The county drains chiefly to the Trent through the Soar, Anker, Devon and Mease ; but the south of the county drains to the Avon. The climate is mild and rainfall moderate ; the soil of a loamy quality, of which nine-tenths is under cultivation. Dairying is an important industry and the famous Stilton cheese is manufactured near Melton Mowbray. It is a famous fox-hunting county, Leicester and Mel¬ ton Mowbray being the principal centres, while the noted kennels of the Quorn Hunt are at Quorndon, near Mount Sorrel. Coal mining is carried on extensively and there are quar¬ ries of limestone, freestone, blue slate and granite. The Leicester sheep are famous for their fine fleeces, the wool being largely used in local manufactories of wool hosiery. The district was penetrated by the Anglians in the 6th century and Leicester fell to them about 556. It formed the kingdom of the Middle Angles in the kingdom of Mercia in 679, and in the 9th century was conquered by the Danes. The earliest inhabitants were the Celtic Cori- tani, who were conquered in turn by the Ro¬ mans, Anglians, Danes and Normans. The Domesday Survey of 1086 reveals the land¬ holders of the district to be chiefly Norman. Leicester was a Lancastrian stronghold dur¬ ing the Wars of the Roses and was the scene of the battle of Bosworth in 1485. In the Civil War of the 1 7th century Leicesteshire favored Parliament in the main. Lady Jane Grey was born at Bradgate, near Leicester. The woolen industry was important as early as Norman times and Leicestershire wool commanded a higher price than any in England in 1343. The manufacture of hosiery was inaugurated in the 17th century and continues of prime import¬ ance. Pop. 432,019.

LEICHHARDT, lik'hart, Friedrich Wil¬ helm Ludwig, German explorer: b. Trebatsch, Brandenburg, Prussia, 23 Oct. 1813; disap-

peared in Australia, 1848. He was educated at the universities of Gottingen and Berlin, spe¬ cializing in philology and natural history, and in 1841 went to Australia where he was en¬ gaged in making a geological survey, the re¬ ports of which were published after his death. His second visit to Australia was at the head of an exploring expedition in which he tra¬ versed Queensland and Arnhem Land in

1844- 45 and traveled some 2,000 miles. In 1848 he started from Moreton Bay in an attempt to traverse the continent and was lost, the last communication received from him being de¬ spatched from Macpherson's Station on Co- goon River, 3 April 1848. Five relief expedi¬ tions were organized and sent in search of him in 1851-65 but no trace of him was found. A town and county were named in his honor in New South Wales as well as a district in Queensland. Author of (Journal of an Over¬ land Expedition in Australia, from Moreton Bay to Port Essington' (1847); Contribu¬ tions to the Geology of Australia) (1855).

LEIDENFROST, li'den-frost, Johann Gottlob, German scientist and professor of medicine: b. Rosperwenda, 24 Nov. 1715; d. Duisburg, 2 Dec. 1794. He studied at Giessen, Leipzig and Halle and from 1743 until his death he was professor of medicine at the Uni¬ versity of Duisburg. He was the originator of an experiment proving the spheroid shape of a drop of water by dropping it upon a hot plate and demonstrated the presence of a layer of va-por between the plate and the water. Au¬ thor of (De Aquae Communis Nonnullis Qual-itatibus) (1796); (Opscula Physico-Chemica et Medica) (1797).

LEIDY, li'di, Joseph, American naturalist: b. Philadelphia, 9 Sept. 1823 ; d. there, 30 April 1891. He was graduated M.D. at the Univer¬ sity of Pennsylvania in 1844 and in 1853 was elected to the chair of anatomy in that institu¬ tion, a post which he long filled, as well as that of professor of natural history in Swarthmore College, 'Pa., to which he was appointed in 1871. In 1881 he became president of the Academy of Natural Sciences at Philadelphia and in 1885 president of the Wagner Free Institute of Sci¬ ence in that city. He was the author of many valuable memoirs, chiefly published in the Pro¬ ceedings of the Academy of Natural Sciences, the Transactions of the American Philosophi¬ cal Society and the (Smithsonian Contributions to Knowledge.' Among them may be cited (Ancient Fauna of Nebraska) (1853) ; Creta¬ ceous Reptiles of the United States' (1865); (Fresh Water Rhizopods of North America) (1879) ; (Treatise on Human Anatomy) (1861— 89). Consult the Memoir by Chapman, H. C., in the Proceedings of the Academy of Natural Sciences (1891).

LEIGH, le, England, market town and municipal borougfi in Lancashire, 11 miles northwest of Manchester, on the London and Northwestern Railroad. The town has a church dating from 1279 which, with the ex¬ ception of the tower, was restored in 1873. There is an amply endowed grammar school of unknown age, but which received its heaviest endowments in 1655, 1662 and 1681.

The town was founded in the 12th century, but not incor¬ porated until 1899. Its officers consist of a mayor, 18 aldermen and 24 councilors. The

municipal equipment in gas, water, sewage dis¬ posal, hospital and fire departments is modern. The town is situated in a coal-mining region, manufactures silk and cotton goods and has extensive collieries; it has also breweries, flour mills, glass works and foundries. Pop.

44,103.

LEIGHTON, la'ton, Alexander, English

physician and clergyman: b. Scotland, 1568; d. London, 1649. He was educated at Saint An¬ drew's University, became a Presbyterian cler¬ gyman and settled in London where he en¬ gaged in the practice of medicine in addition to his work as a preacher. He became in¬ volved in difficulties through his publication in 1624 of (Speculum Belli Sacri, or the Look¬ ing-Glass of the Holy War' and his petition to Parliament against episcopacy which he af¬ terward enlarged and published in Holland, (An Appeal to the Parliament, or Zion's Plea against the Prelacie> (1628). These writings were violent in their abuse of the bishops, the king and particularly of the queen. He was seized by the authorities 17 Feb. 1630, sen¬ tenced to be degraded from holy orders, pay a fine of £10,000 and to life imprisonment after being whipped, pilloried, branded and muti¬ lated. He succeeded in making his escape but was recaptured and part of the sentence of mutilation was executed with the utmost barbarity, although for some reason the second half of the punishment was remitted. He was then imprisoned until 1640 when the Long Parliament remitted his fine and voted him £6,000 for his losses and inju¬ ries. In 1642 he was made keeper of the state prison, Lambeth House, where in shattered health he spent the remainder of his life. Archbishop Laud is credited as chiefly responsi¬ ble for the inhuman persecution of Leighton.

LEIGHTON, Frederick, Baron, English painter: b. Scarborough, 3 Dec. 1830; d. Lon¬ don, 25 Jan. 1896. He received some lessons in art at Paris as early as 1839, and then fol¬ lowed further instruction at Rome. At 14 he entered the Royal Academy of Berlin and subsequent art studies were made by him at Frankfort, Brussels and Paris (1850). From Rome he sent to the Royal Academy exhibition of 1855 his picture of (Cimabue's Madonna Carried Through Florence) — a work which called forth general admiration and was pur¬

chased by the queen. He resided mostly in Paris for the next four years, studying and painting, and to this period belong, among other works, (The Triumph of Music ‘ (based on the story of Orpheus and Eurydice) ; (The Fisherman and the Siren ‘ and (Romeo and Juliet.,’ Having finally settled in London, he was elected in 1863 an associate of the Roval Academy, and in 1869 a full academician. In 1878 he succeeded Sir Francis Grant as presi¬ dent of the Royal Academy, was knighted and was also named an officer of the Legion of Honor. In 1886 he was created a baronet and in 1896 was raised to the peerage. From among his numerous works may be singled for special mention (Paolo and Francesca’ (1861) ; (Jezebel and Ahab) (1863) ; (Orpheus and Eurydice) (1864) ; (Hercules Wrestling’ with Death’ (1871); (Elijah in the Wilderness’ (1879) ; (Hero Watching for Leander’ (1887) ; (Captive Andromache’ (1888) ; (Greek Girls

Playing at BalP (1889) ; ‘The Bath of Psyche> (1890); (Lachrymal now in the Metropolitan Museum, New York; as also the two large frescoes at the South Kensington Museum, representing respectively the (Arts of War) and the (Arts of Peace.) He achieved a high place as a sculptor by his ‘Athlete Strangling a Python > (1876) and his ‘Sluggard (1886). The special merit of his work lies in the per¬ fection of his draftsmanship and design; his coloring, though possessing the unfailing charm of harmonious arrangement, is only thoroughly satisfactory from the decorative point of view. A fine poetic quality conjoined with elegance in drawing and great refinement in execution mark his whole work. His Ad¬ dresses to the Students of the Royal Acad- emy) appeared in 1896. Consult ‘Lives* by Mrs. Lang (1885); Rhys (1895); Monkhouse, ‘British Contemporary Artists* (1899).*

LEIGHTON, Robert, Anglican archbishop, son of Alexander Leighton (q.v.) : b. prob¬ ably London, possibly Ulishaven, Forfarshire, 1611; d. London, 25 June 1684. He took his A.M. at the University of Edinburgh in 1631 and afterward traveled in France, acquiring the language, and through his association with relatives of Roman Catholic faith, a broad re¬ ligious tolerance which remained a dominating characteristic all his life. He apparently re¬ turned to England after his father’s pardon in 1640, and in 1641 he was ordained a Presby¬ terian clergyman at Newbattle, Midlothian. He resigned his charge in the following year, find¬ ing himself unable to co-operate with the fiery zeal of his associates. In 1653 he became

prin¬ cipal of the University of Edinburgh and pri- marius professor of divinity, where he re¬ mained seven or eight years. His addresses and prelections of that period evidence an ex¬ ceptionally cultivated mind and a high spiritual elevation. When, after the Restoration, Charles II determined to bring Scotland again within the fold of Episcopacy, he selected Leighton as one of his bishops. While long severed from his connection with the Presbyte¬ rians, Leighton was averse to accepting the ap¬ pointment, but was persuaded in the belief that the Episcopacy contemplated was of the liberal order advocated by Archbishop Ussher and which he was sure the more liberal non-con¬ formist leaders would accept. He chose the diocese of Dunblane and administered its af¬ fairs with exemplary mildness. His associ¬ ates, however, were if anything more intoler¬ ant than those he had left in the Presbyterian ministry and the persecutions inflicted upon the Covenanters induced him to go to London in 1665 with the purpose of resigning his bishop¬ ric. Receiving from Charles II the promise of milder methods Leighton returned to his charge, but finding no results from the prom¬ ises made he returned to London in 1669 again to plead for milder methods of spreading the religion he consistently believed to be the best but which was being injured by the usages in force. Promises were again forthcoming and in the following year there appeared a slight effort to carry them out, so that Leighton, unon being promised co-operation in the conciliatory measures he deemed advisable, accepted the archbishopric of Glasgow. He occupied this post in 1670-74, when, despairing of inducing

his colleagues to depart from their immoderate courses, and finding himself with both the Episcopalians and Presbyterians as antagonists, he resigned. He lived thereafter with his sis¬ ter at Broadhurst in Horsted Keyes, Sussex. His writings were collected and published after his death, but have suffered from over-editing. The best edition is considered that of Rev. W. West (7 vols., 1869-73), which includes a bi¬ ography of Leighton. Consult also Burnet, 'History of His Own Times> (1723-24) ; Lang, Andrew, 'History of Scotland) (1902).

LEINSTER, len'ster, Ireland, one of the four provinces of Ireland, occupying the mid¬ dle and southeastern portion of the island, ex¬ tending to the river Shannon and bounded on the east by Saint George's Channel and the Irish Sea. Its boundaries include counties Carlow, Dublin, Kildare, Kilkenny, King's, Longford, Louth, Meath, Queen's, West Meath, Wexford and Wicklow. The southern part formed the ancient kingdom of Leinster (Laighen) , while the northern region was the kingdom of Meath. The area is 7,622 square

miles and the population, which declined from 1841, is now increasing. Pop,, 1,162,044.

LEIPA, or BOMISCH-LEIPA, be'mish ll'pa, Czecho-Slovakia, city of Bohemia, 23 miles southwest of Reichenberg and 42 miles north¬ east of Prague, on the river Polz. Its population is chiefly of German origin and it is important in¬ dustrially. It has woolen spinning-mills, sugar refineries, breweries and railroad machine- shops ; and manufactures velvet, cotton cloth and pianos. Pop. 13,493.

LEIPZIG, lip'tsig, or LEIPSIC, lip'sik,

Germany, the largest town of Saxony and the third largest in the German Empire, situated in a broad, fertile plain at the confluence of the rivers Elster, Pleisse and Parthe. The city comprises the inner town, the inner and outer suburbs (Vorstadte), the more outlying sub¬ urbs (Vororte), incorporated with the city in 1889-92, and more recent extensions since 1910, all traversed and connected by electric street railroads. The former fortifications surround¬ ing the inner city have been replaced by fine streets and promenades. The old city still re¬ tains much of its ancient appearance, but the modern suburbs are characterized by broad streets and imposing buildings. Among the squares of the city are the Marktplatz, with a Siegesdenkmal ; the Augustusplatz, one of the largest in Germany, with a splendid fountain ; the Konigsplatz, the Johannisplatz, with a Ref¬ ormation monument (Luther and Melanch- thon) ; and the Rossplatz ; and among the other monuments worthy of mention are those of Gellert and Fechner in the Rosenthal, an ex¬ tensive park in the northwest, between the El¬ ster and the Pleisse ; of Hahnemann, Leibnitz, Grassi, Mendelssohn and Bismarck; together with the more recent memorial of the Volker- schlacht. Besides the parks and open spaces just mentioned, Leipzig includes, among many others, the Johannapark, the Grassipark; the Konig Albert Park, the scene of the 1897 ex¬ hibition; the Johannisthal, with an observa¬ tory; the botancal garden; the zoological gar¬ den, recently much extended ; the palm garden, opened in 1899. The most noteworthy churches of the city are the Thomaskirche (13th cen¬ tury), rebuilt 1885-89, in which Bach was or-

ganist; the Nikolaikirche (11th century), re¬ cently restored ; the University or Pauliner- kirche (1240), restored 1896-99; the

Matthai- kirche, restored 1879; the Johanniskirche (14th century), rebuilt and reconsecrated in 1897, and containing the remains of Sebastian Bach and Gellert ; the Peterskirche ; the Lutherkirche ; the Andreaskirche ; two modern Roman Cath¬ olic churches ; an Anglo-American church ; a synagogue; and churches of other denomina¬ tions. Of non-ecclesiastical buildings the most notable are those of the university, which was founded in 1409, is now the third largest uni¬ versity in the German Empire and has over 5,000 students. The 500th aniversary was fit¬ tingly celebrated in 1909. These buildings are mostly modern, especially the Albertinum, erected in 1890-96 in accordance with the plans of A. Rossbach for completing and renewing the whole group. The university library (the Albertina) contains 600,000 volumes and over 6,000 manuscripts. Other buildings and insti¬ tutions are the old Rathaus (16th century); the new Rathaus, in course of construction on the site of the Schloss Pleissenburg, a 13th cen¬ tury building, once the citadel of the town and famous as the 'scene of Luther's disputation with Eck in 1519; the old exchange (1678), now the meeting-place of the town council ; the new exchange in Renaissance style ; the Ko- nigshaus (17th century), the residence till 1829 of the Saxon princes ; the old Gewandhaus, where the celebrated Gewandhaus concerts were long held ; the new concert hall ; the Im¬ perial Bank building, in German Renaissance style; the municipal library (1899), containing 130,000 volumes and many manuscripts; the municipal museum, in Italian Renaissance style ; the chief post-office ; the new book exchange, the headquarters of the German book trade, in German Renaissance style ; the Buchgewerbe- haus (1897), with a Gutenberg hall; the pano¬ rama building; the Grassi Museum (1896), now including the collections of the former mu¬ seums of industrial art and ethnology; the building of the Land und Amtsgericht, en¬ larged in 1895-96; the Imperial-Supreme Court ; the new conservatory of music ; the old and the new theatre ; the Krystallpalast, including concert halls, etc. ; the market hall ; the large Johannis hospital; a deaf and dumb and a blind institution; the hospital of Saint Jakob; the Triersches Institut, for women; three gym¬ nasia, namely, the Thomasschule (1221), the Nikolaischule (1511) and the Royal Gymna¬ sium, a Real Gymnasium ; several Realschulen and many other schools ; a Handelshochschule, or High Commercial School (1898), the first in Germany ; the new normal college for women (1912); a school of industrial art; a Royal Academy of Arts ; and the new infantry bar¬ racks at Mockern. Chief among literary asso¬ ciations is the famous Auerbach's Cellar, in¬ troduced in Goethe's (Faust.) Leipzig has railway communication with all the chief towns of Germany and its situation makes it of great importance as a trading centre. The new

rail¬ way station covers the largest area of any in Europe. It has three large annual fairs, which have been held ever since the 12th century. It is the headquarters of the book trade in Ger¬ many, having no fewer than 100 book-selling and publishing firms, and takes a foremost place among European towns in the many in¬

dustries associated with the publication and printing of books. Its other industries include iron-founding, cotton-spinning, wool-combing, the weaving of jute and linen, brewing, sugar¬ refining, distilling and the manufacture of ma¬ chinery, electrical plant, agricultural imple¬ ments, ethereal oils, dyes, essences, soaps, per¬ fumes, wax-cloth, chocolate, tobacco, paper, leather, tapestry, cement, musical and other in¬ struments, etc. Leipzig is also a world market for furs and all similar goods.

The municipality, governed by an over¬ burgomaster, burgomaster, police director, magistrates and councilors, is most progressive, gas, waterworks and electricity being in its hands, and there is a municipal bakery. The name Leipzig, from the Slavonic lip a, a lime-tree, is found applied to a Slavonic fishing vil¬ lage near the present site of Leipzig about 1017. The history of the town during many centuries is one of gradually extending importance. It suffered much during the Thirty Years' War at the hands of both combatants. Its position of pre-eminence in the book trade dates from the latter half of the 1 7th century. During the earlier years of the 18th century the town be¬ came the centre of a literary movement under Gottsched. Leipzig and its neighborhood suf¬ fered greatly during the Napoleonic wars and on 16-19 Oct. 1813 a series of severe battles fought around the town resulted in a crushing defeat of Napoleon and the retreat of the French from Germany. This victory was com¬ memorated by the unveiling, on the centenary of the battle in 1913, of a colossal monument 300 feet high, designed by Professor Bruno Schmidt and costing $1,500,000. During the war of 1866 Leipzig was occupied by Prussian troops for 18 months. In 1879 the Supreme Court of Justice for the empire was established in the city. Since 1880, when the population, in which Protestants overwhelmingly preponder¬ ate, was 149,081, the population has remarkably expanded, being 357,122 in 1890, 456,124 in 1900, 589,850 in 1910 and (with recent suburban ex¬ tensions) was estimated in 1914 at 626,267.

LEIPZIG, Battles of, three important battles, two of whi h were in the Thirty Years' War, and one in the Napoleonic Wars. (1) The first battle of Leipzig is also known as the battle of Breitenfeld from the plain about a mile from the city, upon which it was fought. It was

fought 17 Sept. 1631 between the Swedes under Gustavus Adolphus and the Im¬ perialists under Tilly. The forces of the Im¬ perial army were estimated at 44,000 men ; while the Swedes, with whom were allied the Protestant Saxons under Elector John George I, had altogether about 20,000 men. The Im¬ perialists were defeated with losses variously reckoned as from 7,000 to 10,000 men, while the allied Swedish and Protestant Saxon troops lost 2,700. The battle is important from the military point of view in its exemplification of the prime necessity for mobility; and from the historical viewpoint as constituting the first signal advance of Protestant forces against the hitherto impregnable forces of Catholicism. (2) The second battle of Leipzig was fought 2 Nov. 1642, and is also called the second battle of Breitenfeld. The Imperialists of Aus¬ tria, under Leopold of Austria and Piccolo- mini, were defeated by the Swedes under Tor-

stenson. (3) The most important battle of Leipzig is the victory gained by the allied armies of Prussians, Russians, Austrians and Swedes under the command of Prince Schwar- zenberg against the French forces under Napo¬ leon. The battle was fought 16-19 Oct. 1813 and practically secured the liberty of Germany, where it is called ˆVolkerschlacht® ((

At the outset of the battle the allied army numbered about 200,000, which was later in¬ creased to 300,000. Napoleon had, all told, about 180,000. Napoleon personally directed the battle, which at first went in his favor, and was lost only through the inability of Marshal Ney to furnish him with reinforcements; Napo¬ leon failed to make use of an opportunity to effect a retreat by way of Lindenau on 17 October, a Sunday, and in falling back on the two succeeding days was subjected to heavy losses. Of his forces 40,000 were killed or wounded and 30,000 taken prisoner. The allied losses were about 54,000. The battle, aside from its constituting a decisive victory is im¬ portant as marking the point from which the downfall of Napoleon became assured. Con¬ sult Gerlach, L., (Die Schlacht bei Leipzig) (1892) ; Maude, F. N., (The Leipzig Campaign, 1813) (1908) ; Jomini, H., (Life of NapoleoiP (Vol. IV, 1864).

LEIPZIG, Colloquy of, conference held in Leipzig by the German Lutherans and Calvin¬ ists 3-23 March 1631 for the (purpose of secur¬ ing harmony between the two churches, and a resultant union to resist the execution of the Edict of Restitution. The Landgrave,

William of Hesse, the Elector Christian William of Brandenburg and the Elector John George met at Leipzig accompanied by their leading the¬ ologians Johannes Bergius, Theophilus Neu- berger and Johannes Crocius of the Reformed faith, and Matthias Hoe, Polycarp Leyser and Heinrich Hopffner of the Saxon Lutherans. The Reformed party proposed the Confession of Augsburg as a basis of discussion, announc¬ ing their willingness to sign it as it stood in the Saxon form published by Elector John George of Saxony (1628). The articles of the Confession were taken up separately and unanimity of opinion was found to exist on articles v-vii and xii-xviii, and their differ¬ ences on i-ii were declared immaterial. The third article, on Christology, found a wide difference of opinion, and they compromised on a definite statement of their separate be¬ liefs. The Lutherans maintained that the human and divine natures of Christ were iden¬ tical in possessing omniscience and omnipo¬ tence, while the Reformed party denied that Christ as a man possessed these attributes. They agreed on the fourth article, the Re¬ formed theologians confirming the Lutherans in their belief that Christ did not come to save all men ; and on the ninth article, con¬ cerning baptism, they also agreed after making some additions. Upon the tenth, however, an agreement was found impossible and it was treated in the same manner as the third. The Reformed party maintained that participation of the blood and body of Christ in the Eu¬ charist is by faith while, the Lutherans held to the belief of actual physical participation. The

remaining articles were agreed to, and as the conference was private, only four copies of the protocol were made, one for the faculty of Leipzig and one for each of the princes pat¬ ronizing the meeting. Later, however, reports of the conference were published in England, France, Switzerland, Holland and Sweden. While the meetings were conducted in an amicable spirit and many close points of agree¬ ment found, the conference had no lasting re¬ sults in the way of closer understanding or union.

LEIPZIG, University of, third largest and second oldest university in Germany, founded in 1409 by 400 students and 40 teach¬ ers, who seceded from the University of Prague as an outcome of the Hussite agita¬ tion, and the decree which transferred the power of the university from the Germans to the Bohemians. The statutes and constitution closely follow those of Prague, and the univer¬ sity was founded under the patronage of Fred¬ erick the Quarrelsome of Meissen and his brother William. It flourished until 1559 when its standards were lowered, and failed to make much progress until 1830 when a reorganiza¬ tion was effected. The university

thereafter became one of the most important in the world, and for a time it enrolled the largest student body in Germany, although those of Berlin and Munich have now exceeded it in that respect. It is fortunate in possessing large revenues from house property in Leipzig and great estates throughout Saxony in addition to substantial assistance from the state. Its pro¬ fessorial chairs are handsomely endowed. The buildings are in the main modern a series of building operations in 1890-96 co-ordinating and renewing the entire group. Especially notable among them are the library with nearly 600,000 volumes and more than 6,000 manu¬ scripts, the legal and the philosophical faculty buildings. A change was made in the govern¬ ing organization of the university in 1893, the new body being called the ((syndicate.® Before the outbreak of the European War in 1914 it enrolled a student body of more than 5,000 in medicine, law, theology and philosophy.*

LEIPZIGER, Henry Marcus, American educator : b. Manchester, Eng., 29 Dec. 1853 ; d. New York, 1 Dec. 1917. Coming to New York in 1865, he was educated in the City College and Columbia (Ph.D. 1878), taught in the public schools (1873-81), was assistant su¬ perintendent of schools (1891—96) , superintend¬ ent of lectures for board of education (1890- 96), and from 1896 to his death supervisor of public lectures. He was identified for some years with the Aguilar Free Library, Hebrew Technical Institute and the Y. M. H. A.

LEISHMAN, John G. A., American dip¬ lomat and iron manufacturer: b. Pittsburgh, Pa., 28 March 1857. He was orphaned at an early age and entered the steel industry at Pittsburgh, learning the business in all its intricacies. He succeeded in accumulating a considerable fortune, was senior member of the steel-brokerage firm Leishman and Snyder in 1881-86, and vice-president of Carnegie Brothers and Company from 1887 until 1897, when he became president of the firm in its reorganized form as the Carnegie Steel Com-

pany. He shortly afterward retired from busi¬ ness. He accepted the appointment as Minis¬ ter to Switzerland from President McKinley in 1897, where he remained until his transfer to Turkey in 1900. He particularly distin¬ guished himself for diplomatic tact and dex¬ terity in his negotiations with Turkey for full rights for American

citizens and schools in that country, and in his pressing with equal suc¬ cess his insistence that the American Minister should have access to the Sultan. His office was elevated to the rank of Extraordinary Ambassador and Plenipotentiary in 1906 and he continued service in Turkey until President Taft appointed him to the Embassy in Italy in 1909. From 12 Aug. 1911 to 4 Oct. 1913 he was Ambassador to Germany.

LEISLER, li's'ler, Jacob, American colo¬ nial political leader: b. Frankfort-on-the-Main, Germany; d. New York, 16 May 1691. He came to America as a private soldier in the service of the Dutch West India Company, and was for a time engaged in trade at Albany, and later settling in New York, was appointed in 1683 one of the ˆcommissioners® (judges) of the Court of the Admiralty. In 1689 he was the leader of the insurrection against Gov¬ ernor Nicholson, supported mostly by the militia and the lower classes; the fort and the public funds were seized on the 31st of May, and Leisler a few days later declared for William and Mary, asserting his acts to be necessary for the ˆpreservation of the Prot¬ estant religion.® A committee of safety was formed, who on 8 June commissioned Leisler as <(captain of the fort.® In this capacity he at once begatt to repair the fort, and strength¬ ened it with a ((battery® of six guns beyond its walls, which was the origin of the public park still known as the Battery. Nicholson and the council of the province, with the au¬ thorities of the city, attempted by pacific means to prevent the uprising, but without effect. Becoming finally alarmed for their own safety, the lieutenant-governor sailed for England, and the mayor with the other officials retired to Albany. On 16 August the committee of safety appointed Leisler (

ernor, and demanded possession of the fort, which Leisler refused. On Sloughter's own demand immediately upon his arrival in March 1691, he likewise refused to surrender it, until convinced of Sloughter's identity, and the lat¬ ter had sworn in his council. Leisler was im¬ mediately imprisoned, charged with treason and murder, and shortly after tried and condemned to death. His son-in-law and secretary Mil- borne was also condemned on the same charges. These trials were manifestly unjust; the judges were the personal and political enemies of the prisoners, and Sloughter for some time hesi¬ tated to sign the death warrants. Leisler's son secured from the English Parliament the re¬ versal of the bill of attainder in 1695; and the confiscated estates were also returned to the heirs. Consult Hoffman, (The Administration of Jacob Leisler (in Jared Sparks, (Library of American Biography, > Vol. XIII, Boston 1844) ; Brodhead, (History of New York) (New York 1853-71) ;

documentary History of New York) (Albany 1842-51), and E. S. Brooks, (In Leisler's Times) (a historical story) .

LEIST, list, Burkard Wilhelm, German

jurist: b. Westen, Hanover, 12 July 1819; d. Jena, 31 Dec. 1901. He studied at Gottingen, Heidelberg and Berlin. He was appointed pro¬ fessor of civil law at Basel in 1846, at Rostock in 1847, and from 1853 he filled that chair at the University of Jena. He was a pupil of Savigny. His especial field of research was in the hypothetical field of Indo-Germanic law. Author of (Die Bonorum Possessio5 (1844-48); Mancipation und Eigentumstradition) (1865) ; (Der Romische Erbrechtsbesitz) (1871) ; (A1- tarisches Jus Gentium) (1889) ; (Altarisches Jus Civile5 (1892~96), etc.

LEITER, liter, Joseph, American finan¬ cier: b. Chicago, 4 Dec. 1868. He was grad¬ uated from Harvard in 1891, and was agent for his father, Levi Zeigler Leiter (q.v.), in 1892- 98. In the autumn of 1897 he began buying wheat on the Chicago Board of Trade in an attempt to corner the market. Wheat prices soared to double their normal height and at the opening of the year 1898 Leiter held the largest private ownership of wheat in the history of grain trade. Concerted action on the part of his competitors broke the corner and Leiter is reputed to have suffered losses to the amount of $10,000,000. He is president of the Zeigler Coal Company, Chicago, and of the Chicago, Zeigler and Gulf Railway Company; and a director of the American Security and Trust Company.

LEITER, Levi Zeigler, American finan¬ cier: b. Leitersburg, Md., 1834; d. 1904. He worked his way up in the retail drygoods from a clerkship in a country store to a partnership in the Chicago firm Coolidge, Wadsworth and Company. In 1865, together with Marshall Field, he sold his interest in that concern and they purchased a controlling interest in the drygoods establishment of Potter Palmer, the firm name then becoming Field, Palmer and Leiter. Upon Palmer's withdrawal it became Field, Leiter and Company until 1 Jan. 1881, when Leiter retired from the company and de¬ voted himself to the management of his large real estate holdings and corporation interests.

One of his daughters was Mary Victoria, Lady Curzon of Kedleston.

LEITH, ieth, Charles Kenneth, American geologist: b. Trempealeau, Wis., 20 Jan. 1875. He was graduated from the University of Wis¬ consin in 1897. In 1900-05 he was assistant geologist in the United States Geological Sur¬ vey. He was appointed assistant professor of geology at the University of Wisconsin in 1902, and since 1903 has been professor there. He has also served as professional lecturer in structural and metamorphic geology at the University of Chicago since 1905. He is author of a number of scientific papers and (A Summer and Winter on Hudson Bay (1912); 'Structural Geology) (1913) ; (Metamorphic*

Geology (1915).*

LEITH, Scotland, a seaport and parlia¬ mentary burgh in the county of Midlothian, encircled on three sides by Edinburgh, on the south shore of the Firth of Forth, on the Water of Leith. It is connected with Edin¬ burgh by Leith Walk — originally a line of earthworks built during the Cromwellian occu¬ pation, and by branch lines of the railways centering in Edinburgh. It is the principal sea¬ port in the east of Scotland. Among the prin¬ cipal public buildings are the stately old parish church of Saint Mary's, custom-house, Trinity House, corn exchange, the new and well-equipped Leith Academy, including the Leith Technical College, and there are fine parks and public golf links. The chief manufactures are ropes, sail cloth, oil cake, paints, colors, artificial manures, and there are shipbuilding yards, iron foundries, engine works, flour mills, oil mills and refineries, steam saw mills, large makings, an ice factory, etc. The foreign trade is chiefly with the Baltic and the principal French and German ports, and there is a trade in grain, flour, etc., with the United States and Canada. There are extensive wet docks and a fine road¬ stead, and several public graving docks, cap¬ able of receiving the largest vessels. It is the first of the fishery districts of Scotland. The quaint fishing village of Newhaven, on the west, is part of the burgh. The municipality is one of the most progressive in the kingdom ; the water and gas undertakings are conjoined with Edinburgh, and it owns and operates its own electric plant and cable car systems.

Leith is a very ancient town its earliest charter dating from 1128.

It was besieged by the Lords of the Congre¬ gation during the Reformation period, and of the landing of Mary Queen of Scots on 1 Sept. 1561. Little of the old town remains, the narrow streets and alleys having been swept away by a great municipal improvement scheme. Leith, Portobello and Musselburgh, known as the Leith Burghs, return one member to the House of Commons. Pop% over

80,000. Con¬ sult Stevenson, (Annals of Edinburgh and Leith> (1839) ; Irons, J. C., (Leith and Its Antiquities) (1898).

LEITHA, li'ta, a river formed by the junction of two small streams near Neu- stadt, in Lower Austria, and flowing north¬ east on its course of 90 miles, a . small part being along the frontier of Austria and Hungary, until it joins the Raab, a tributary of the Danube, at Altenburg. The Leitha Moun- vol. 17 — 18

tains rise between it and Lake Neusiedl, and it has a factitious importance in its application to Hungary as Trans-leithania and Austria as Cis- leithania.

LEITMERITZ, llt'mer-its, Czecho-Slovakia, town and episcopal see of Bohemia, at the head of navigation on the right bank of the Elbe, 45 miles by rail northwest of Prague. It possesses a fine cathedral founded in 1057, and built in 1671, in which are some rare paintings. The episcopal palace was built in 1694-1701 and in its library are maps of Bohemia made- by Nicolaus Claudianus of Jung-Bunzlau in 1518. The church of All Saints was built in the 13th century ; and the town-hall, which is noted for its bell tower, was erected in the 15th century. Mention is made of the town as early as 993 and originally it was the site of the castle of a royal count. Its town charter dates from 1248 and it reached its greatest prosperity under Charles IV. It suffered severely in the Hussite wars and in the Thirty Years' War. The bishopric was founded in 1655. The town is situated in a rich agricultural region which is known as the <(Bohemian Paradise.® Corn, fruit, hops, beer and wine are produced in abundance and the city has glass, leather, cement, chalk and brick industries. The river is spanned here by an iron bridge 1,700 feet long. Pop. 15,421.

LEITMOTIV, lit'mo-tef, in music , the leading theme, the characteristic phrase, which occurs over and over again in the same com¬ position, in reference to the same person, phrase of feeling or scenic complication of in¬ tense passion or action. The phrase strikes the note of these several crises or conjunctures and recurs whenever they are repeated. While many operatic composers, such as Mozart and Weber, have employed the expedient of the leading theme, Wagner does so more than any other modern musician. In his Leitfaden, or analyses of his operas, in which he lays bare some of the secrets of his artistic workman¬ ship, he shows that he has consciously indi¬ vidualized every one of his characters, every change in the scenery or action of the drama, or in the emotions and moods of the dramatis persona, by the introduction of a specific

musi¬ cal theme, which he employs throughout the opera to suggest the same thing. This theme is worked upon and varied with the masterly skill which Wagner possesses in fugue and part writing. Thus in his Parsifal,* Kling- sor, Kundry, Parsifal, Amfortas and the Flower maidens are all ushered in with a special lead¬ ing theme for each. There is a special theme for the Eucharist, for the spear (Speermotiv) , for the Holy Grail (Gralmotiv). The chil¬ dren's voices raise a strain (Faith is still alive) to the notes of the Glaubensthema, or faith- motive. There is a Leidensmotiv, to express the grief of Amfortas ; there is the Doormotiv, expressing the promise of help ; the Zauber- motiv, suggesting the devlish power of witch¬ craft, while the mother's sorrow is suggested by the Motiv des Herzleids, the heart-grief's theme. The Bell-theme, with its pealing sound, the Ride-theme, suggesting the clatter of horsehoofs, the Good Friday theme, with its characteristic chords, each in its way, are powerfully suggestive, and when once rec¬ ognized, their recurrence has a powerful effect.

LEITNER, lit'ner, Gottlieb Wilhelm,

Anglo-Hungarian Orientalist : b. Budapest, 14 Oct. 1840; d. Bonn, 22 March 1899. He .was the son of a physician who went to Turkey in 1849, and, already well instructed in the classics, he quickly acquired Turkish, Arabic and modern Greek; he studied English, French and Ger¬ man at the British College at Malta. At the age of 15 he acted as interpreter in the Crimean War. He entered King's College, London, in 1858, was naturalized as a British subject and in 1861 received the appointment to the chair of Arabic and Mohammedan Law at King's College. In 1864 he went to Lahore as prin¬ cipal of the government college there and was instrumental in the establishment of various schools and libraries throughout India. He made extensive researches in the origins of Indian art and in Graeco-Buddist art, and also engaged in exploration of Tibet and other northern Himalayan countries. He edited the Asiatic Quarterly Review for some years, and is reputed to have acquired 25 languages. Author of (The Languages and Races of Dar- distan> (2 vols., 1867-71; 2d ed., 1877) ; his¬ tory of Dardistan, Songs and Legends) (1881) ; (History of Indigenous Education in the Pun¬ jab since Annexation (1883). Consult Stoc- queler, J. H., (Life and Labours of Dr. Leit- ner> (1875).

LEITRIM, le'trim, Ireland, county in the province of Connaught, bounded on the north¬ west by Donegal Bay, northeast by Fermauagh, east by Cavan, southeast by Longford, south¬ west by Roscommon and west by Sligo. The principal river is the Shannon and the scenery is beautiful ; but the land for the greater share is poor, the tilled land amounting to one-third and pastureland two-thirds. Potatoes are grown, and oats, the only grain crop, give a small yield. Cattle, swine and poultry are raised; the county has minor coal mining in¬ terests, and there are manufactures of coarse linens and pottery. Leitrim was the ancient Hy Bruin-Brenny, forming the western part of Brenny, and was also called Brenny O'Rourke when in the possession of the de¬ scendants of Roderick, king of Ireland. It became County Leitrim in 1583. The popula¬ tion is 90 per cent Roman Catholic and deple¬ tion by emigration is more serious than in any other county in Ireland. Pop. 63,557.

LEIXNER-GRUNBERG, liks'ner griin'- berg, Otto von, German poet and critic : b. Saar in Moravia, 24 April 1847 ; d. 1907. Among his poetical works are a volume of (Poems) (1868) ; the drama (Resurrection of Germany0 (1870) ; ; (Memento Vi-

vere) ; (Princess Sunshine) (1882). Still other works are (Marginal Notes by a HermiD ;

Young Matron > (1890) ; (Lay Sermons)

(1894). His (History of German Literature) (1879-82; 7th ed., 1906) is a notable work.

LEJEAN, le-zhan', Guillaume, French ex¬ plorer : b. Plouegat-Guerand, Finistere, 1828 ; d. there, 1 Feb. 1874. He specialized in the study of Breton history and of geography, and traveled in the Balkans in 1857-58 and 1867-70 in charge of an official mission for the study of geography. He made explorations in Egypt

and Northern Africa in 1860-61 ; and in 1862 he was named French consul in Abyssinia, but with other Europeans was driven out in Sep¬ tember 1863. He traveled in Kassala and the country of the Bogos in 1864, and in Asia Minor, Mesopotamia, along the Persian Gulf and the basin of the Indus in 1865. Author of (La Bretagne, son histoire et ses historiens) (1850) ; (Ethnographic der europaischen

TiirkeP (in Petermann's (Mittelungen) 1861) ; (Voyage aux deux Nils) (1865); (Theodore II, le nouvel empire d'Abyssinie et les interets frangais) (1865). He also published maps of European

Turkey and the Nile regions. Con¬ sult Cortambert, (G. Lejean et ses voyages (Paris 1872).*

LELAND, Charles Godfrey, American

author: b. Philadelphia, 15 Aug. 1824; d. Florence, Italy, 20 March 1903. He showed poetic talent in youthful contributions to news¬ papers and a growing genius, marked by un¬ usual versatility, during his college days at Princeton, where he was graduated in 1846. He studied afterward at Heidelberg, Munich and Paris, giving special attention to modern languages, philosophy and aesthetics. In 1848 he took part in the revolutionary uprising in Paris ; the same year returned to Philadelphia and studied law ; was admitted to the bar in 1851, but gave up the legal profession and de¬ voted himself to literary pursuits, becoming prominent in various fields of journalism and authorship. For a time he was editor of the New York Illustrated News; in 1861 estab¬ lished the Continental Magazine in Boston, and two years later returned to Philadelphia, where for several years he edited the Press. During the Civil War he published (The Book of Copperheads,) a political satire. From 1869 to 1880 he resided chiefly in London. In Eng¬ land and on the Continent he studied gypsies and gypsy lore, in which he became one of the leading authorities of his time. His career as poet, ethnologist and traveler, with its mingling of literary avocations, was invested with an element of romance, and his more serious work was lightened by the interchange of humor. At the same time his achievements show the practical talents of a man of business. When in 1880 he once more returned to Philadelphia he was instrumental in establishing industrial teaching in the public schools, in furtherance of which he wrote a number of manuals and gave his supervision to the work. From 1886 he lived in Europe, mainly in Florence. He wrote and translated a larg'e number of works, remarkable for variety as well as for literary value, the best known and most popular of which are (Hans Breitmann's Ballads (1867— 70, 1895), written in ˆPennsylvania Dutch,® his translations from Heine, including (Pictures of TraveP (1856) and (Heine's Book of Songs> (1862), (English Gypsies and Their Language* (1873), ˆEnglish Gypsy Songs) (in collabora¬ tion, 1875), (The Gypsies) (1882) and (Gypsy Sorcery and Fortune-Telling) (1892). Among his other writings are (The Poetry and Mys¬ tery of Dreams> (1855) ;*

Priests in the Fifth Century) (1875) ; 'Johnny- kin and the Goblins> (1876); 'Pidgin-English Singsong) (1876); 'Abraham Lincoln)

(1879) • 'The Minor Arts) (1880) ; 'Algonquin Legends of New England) (1884); 'Etruscan-Roman Re¬ mains in Popular Tradition) (1892) ; 'Autobi¬ ographical Memoirs) (1893); 'Songs of the Sea and Lays of the Land) (1895) ; 'Mending and Repairing) (1896); 'One Hundred Profit¬ able Acts) (1897); 'The Unpublished Legends of Virgil) (1899); and (his last work) 'Ku- loskap the Master, and Other Algonkin Poems) (1903), a volume of Indian folklore in verse, written in collaboration with John Dinely Prince Consult Pennell, E. R., 'Charles God¬ frey Leland: A Biography) (2 vols., New York 1906).

LELAND, or LEYLAND, John, English antiquary: b. London, about 1506; d. there, 18 April 1552. He was educated at Cambridge, Oxford and Paris. Returning home he took holy orders and Henry VIII made him his chaplain and librarian. In 1530 he became rec¬ tor of Pepeling, near Calais; in 1542 he received the rectory of Haseley, Oxfordshire, and he was a prebend of Salisbury Cathedral. In 1533 he received the title of royal antiquary and was empowered by a commission under the great seal to search for objects of antiquity in the archives and libraries of all cathedrals, abbeys, priories, etc., in consequence of which he spent six years in traveling and collecting materials for the illustration of the history and archaeology of England and Wales, but died without having completed his undertaking. The great bulk of his collections was placed in the Bodleian Library. The first part to be pub¬ lished was the 'Commentarii de Scriptoribus Britannicis,) issued in 1709 by Anthony Hall. In 1710 Hearne published the 'Itinerary) in nine volumes and five years later the 'Collec¬ tanea) was issued by him in six volumes. Leland wrote Latin poetry with considerable elegance, and a collection of his miscellaneous Latin verse and epigrams was published in 1589. Some of his autographic manuscripts are preserved in the Bodleian Library, Oxford, others in the British Museum. Consult Bur¬ ton, 'Life of lohn Leland) (London 1896).

LELAND STANFORD JUNIOR UNI¬ VERSITY, a coeducational institution at Palo Alto, California, about 30 miles southeast of San Francisco, in the Santa Clara Valley. The university campus comprises 9,000 acres of land, partly in the level of the valley and partly rising into the foothills of the Santa Moreno Mountains, which separate it from the Pacific Ocean, 33 miles beyond. The Bay of San Francisco lies in front at a distance of three miles and across it are fihe mountains of the Diabolo range.

The university was founded by Leland Stan¬ ford (q.v.) and his wife, Jane Lathrop Stan¬ ford (q.v.), as a memorial to their only son who

died in his 15th year. The founders de¬ sired that the university should give a training primarily fitted to the needs of young men. Both sexes are admitted to equal advantages in the institution, but the number of young women who may attend at any given time is limited to 500. Beginning with the academic year 1916-17 the number of first-year men students will be limited to 500 annually. The

object of the university, as stated by its found¬ ers, is "to qualify students for personal suc¬ cess and direct usefulness in life)) and to "promote the public welfare by exercising an influence in behalf of humanity and civilization, teaching the blessings of liberty regulated by law, and inculcating love and reverence for the great principles of government as derived from the inalienable rights of man to life, liberty and the pursuit of happiness.))

The endowment grant establishing the uni¬ versity was made in November 1885, under an act of legislature passed for this purpose; the cornerstone of the institution was laid in May 1887 ; and the university was formally opened to students on 1 Oct. 1891. The attendance for the first year numbered 559 and included all college classes with a number of graduate stu¬ dents, the university graduating its first class of 38 in May 1892. The original faculty numbered 35 professors and instructors, under the leader¬ ship of David Starr Jordan as president. In 1913 John Casper Branner became "president, the office of chancellor being created for Dr. Jordan. On 1 Jan. 1916 Dr. Branner retired and was succeeded by Ray Lyman Wilbur, a graduate of the university.

The architecture of the university buildings is patterned after the old Spanish missions of California and Mexico. The buildings are of buff sandstone with red tile roofs. They form two quadrangles, one within another, with de¬ tached buildings grouped about them. The inner quadrangle consists of 12 one-story build¬ ings, connected by an open arcade, facing a paved court of three and one-quarter acres in extent. Connected with this quadrangle at various points by corridors, and completely sur¬ rounding it, is the outer quadrangle of 12 buildings, for the most part two stories in height above the basement. This outer quad¬ rangle is again surrounded by a continuous open arcade. In the inner quadrangle are the departments of law, of the different languages and mathematics, and the administrative offices. In the outer quadrangle are the scientific, engi¬ neering and geological departments, those of history, economics and English, and the library and assembly hall. In the rear of the quad¬ rangles are the laboratories and shops of the

engineering departments. The dormitories, one for young men and another for young women, with their gymnasia and athletic grounds about them, are located to the east and west. In front to the right of the main drive are the building of the department of chemistry and the art museum. A new and permanent library building, to replace one destroyed by the earth¬ quake of 1906, will soon be begun.

Most striking among the architectural fea¬ tures of the university buildings were the Me¬ morial Arch and the Memorial Church. The former was 100 feet in height, 90 feet in width and 34 feet deep, with an archway of 44 feet spanning the main entrance. This arch was destroyed by the earthquake and has not yet been restored. A sculptured frieze 12 feet in height, designed by Saint Gaudens, and repre¬ senting the progress of civilization, surrounded it. The Memorial Church opens from the inner court and is opposite the main entrance. It is of Moorish-Romanesque architecture. The church, erected by Mrs. Stanford in mem¬ ory of her husband, is adorned within and

without with costly mosaics, representing, as do the beautiful stained windows, Biblical scenes and characters. It has a splendid organ of 46 stops and 3,000 pipes and a chime of sweet- toned bells. The church is non-sectarian in character and method. Religious services are held each Sunday morning and afternoon. There is a week-day vesper service and the organ is played each day at the close of reci¬ tations. The church was greatly damaged by the earthquake, but has been practically restored.

The students live in the dormitories, in club houses on the grounds or in private boarding¬ houses in the village, which is situated a mile distant from the university buildings. The professors live in homes provided on the grounds or in the village. Twenty Greek-letter societies for young men and 10 for young women occupy chapter homes on the campus.

In the government of the students, ((the largest liberty consistent with good work and good ordˆr is allowed. They are expected to show both within and without the university such respect for order, morality, personal honor and the rights of others as is demanded of good citizens. Students failing in these respects or unable or unwilling to do serious work toward some definite aim are not

welcomed and are quickly dismissed.®

The university council consists of the presi¬ dent, professors and associate and assistant professors of the university faculty. To it is entrusted the determination of requirements for admission, graduation and other matters relat¬ ing to the educational polioies of the institution. It acts as an advisory body on questions sub¬ mitted to it by the president or trustees. The routine work, of the faculty is divided among various standing committees with power to act and responsible primarily, some to the council and some to the president. Departmental affairs are in the hands of subordinate councils consisting of the instructing body in the de¬ partment, a member of which is designated by the president as presiding officer.

The general control of the university's affairs was by special provision in its charter reserved to the founders or either of them during their lifetime, they to act in the capacity of a board of trustees, the trustees themselves having only a nominal connection. This pro¬ vision remained in force until July 1903, when under a special act of legislature passed for the purpose, Mrs. Stanford finally turned over to the board of trustees full authority and con¬ trol over the university. The board of trustees numbers 15, members being elected for a term of 10 years. In educational matters the presi¬ dent of the university has the initiative, his acts being subject to the confirmation of the trustees. The board through a treasurer and business manager, one of their own number, administers directly the financial affairs of the institution.

The endowment of the university comprises 90,000 acres of land, including the Palo Alto, Vina and Gridley estates, and interest-bearing securities, the whole amounting to about $30,- 000,000, two-thirds of which is productive of income.

In its entrance requirements the university recognizes 29 entrance subjects of different values according to the time devoted to them in

the secondary schools. The unit of value is a full year of high school work in the particular subject, and any 15 units, with certain limita¬ tions, chosen from this list constitute 'prepara¬ tion for full entrance standing. The university has no list of accredited schools, but considers on its merits the work of all reputable schools. The student chooses a major subject, the pro¬ fessor in which becomes his adviser and to which he is required to devote one-fourth of his time. His remaining time is filled up by courses chosen by the student? under the advice and direction of his major professor. Fifteen hours ' of

recitations per week constitute the regular course throughout a period of four years. Stu¬ dents are graduated when they have completed 120 hours of work and the requirements of their major subject. Degrees are conferred in May, September and January.

The university grants the undergraduate degree of A.B. in all courses; the degrees of A.M. and Ph.D. for one and three years' work, respectively, beyond the undergraduate require¬ ments ; the J.D. and LL.B. degrees in law, M.D. in medicine, and that of Engineer for gradu¬ ate work in engineering. The university grants no honorary degrees.

The work of the university is grouped under the following departmental heads :

Greek, Latin, Germanic languages, Romanic languages, English, philosophy, psychology, edu¬ cation, history, economics, law, mathematics, physics, chemistry, botany, physiology, zoology, entomology, anatomy, bacteriology, geology and mining, civil engineering, mechanical engineer¬ ing, electrical engineering, medicine.

The university library contains 265,000 vol¬ umes. The attendance for the year 1915-16 was 2,197, of which 500 were women. The faculty numbers 214. Tuition is free, but all undergraduate students pay an incidental fee of $15 per semester, also the customary labora¬ tory and class fees. A tuition of $100 a year in law and $150 in medicine are charged in the professional courses of these departments.

In recent years the most important develop¬ ment in the university has been the establish¬ ment and growth of the medical school in San Francisco, based on the Cooper Medical Col¬ lege foundation, Which was taken over in 1908. The laboratories of anatomy, bacteriology, phy¬ siology, chemistry, etc., are located on the campus at Palo Alto. The professional courses are conducted in the city. The buildings of the school consist of a clinical and laboratory building, Lane Hospital, with a capacity of 180 beds, a nurses' home, and the Lane Medical Library budding, containing 40,000 volumes.- The university is about to erect a new hospital building at a cost of half a million dollars.

LELEGES, lel-e 'gez', in ancient history a people supposed to have lived on the coasts of Greece, Asia Minor and the Higean Islands. Homer mentions them as allies of the Trojans, but does not catalogue

them in the (Iliad, > nor is their dwelling-place given. Later writers confused them with the Carians. Pherecydes (5th century b.c.) describes them as inhabiting the coast of Caria from Ephesus to Phocaea, the Carians themselves occupying the land to the south; but Philippus of Thean- gela (4th century) refers to them as slaves of the Carians, as does Plutarch. The Hesiodic

catalogue has a reference to the Leleges as a primitive tribe living in Locris in central Greece. After the 4th century b.c. various writers placed them west of the zEgean ; and they are often confused with the Carians, later writers assuming that they were partners with them in raids upon the coasts of Greece. They were reported from the 4th century to have been discovered as having lived in various parts of Greece and certain writers believed them to be aboriginal. Place names connected with their tribes are scattered through Greece and Caria and seem to substantiate the theory of migration ; although some authorities be¬ lieve the Lelegian legends to have originated from the names of these places, such as Pedasus, Physcus, Larymna and Abae, rather than that they were founded by immigrant Leleges. The Greek accounts are considered better than the modern elaborations of them.

‘ LELEWEL, lel’ev-el, Joachim, Polish his¬ torian, geographer and numismatist: b. War¬ saw, 22 March 1786; d. Paris, 29 May 1861. His family was of Prussian origin, but his father was naturalized as a Polish citizen. He was educated at Vilna, taught at Krzemieniec, Volkynia, and in 1814 became lecturer in his¬ tory at Vilna. In 1818-21 he was lecturer and librarian at the University of Warsaw, re¬ turning then to his old position at Vilna. He was highly popular among the students and so gained the disfavor of the Russian governor, Novosiltsev, who in 1824 deprived him of his professorship. He removed to Warsaw, was elected to the Diet in 1829 and was connected with the revolutionary movement there, his activities making him so obnoxious to the government that he was forced to disguise himself to make his escape. He arrived in Paris in 1831, but was suspected by the Russian Ambassador of complicity in Polish plots and the French government, upon request, ban¬ ished him in 1833. He then went to Brussels where he engaged in literary work, returning to Paris a few days before his death. His work

evidences wide learning and careful re¬ search ; and his maps, which he personally en¬ graved in order to assure the preservation, of' their remarkable accuracy, are also of im¬ portance. Author of (Bibliograficznych Ksiag dwoge,) A Couple of Books on Bibliography (2 vols., 1823-26) ; (La Numismatique du moyen age> (2 vols., 1835) ; (Etudes Numisma- tiques> (1840) ; (with an atlas of 50 plates; 5 vols., 1852-57); (La Pologne au moyen age> (3 vols., 1846—5 1) ; (Polskaˆ an historical survey of Polish affairs (20 vols., 1853-76), etc.

LELONG, le-lon', Jacques, French bibli¬ ographer: b. Paris, 19 April 1665; d. there, 13 Aug. 1721. He was educated at Malta and at Paris, was ordained a priest in 1689 and be¬ came librarian at the Oratory of Saint Honore, Paris, in 1689, remaining in seclusion there until his death. His work was not completed at his death; but was carried on by Fevret de Fontette who revised and extended the (Bibliotheque Historique) (3 vols., 1768-72), and it was completed by Barbaud de la Bruyere (2 vols., 1775-78). Lelong was author of (Bibliotheca sacra, > a catalogue of all the edi¬ tions of the Bible (1709) ; and containing 17,487 items and many valuable notes (1719).

LELY, le'li, Sir Peter, Dutch painter : b. Soest, Westphalia, 1618; d. London, 30 Nov. 1680. His real name was Pieter van der Faes, but he assumed as his artistic title a nickname, Lely, or rather Le lys, which had been borne by his father. He was the pupil of Peter Greb- ber in his early manhood, but went to England in his 23d year and began his career as a por¬ trait painter. His pictures were much admired and Charles I appointed him court painter. He painted the portrait of that sovereign and also of Cromwell, but he reached his greatest emi¬ nence after the Restoration. He was an imita¬ tor of Van Dyck, whom he almost equaled in the excellence of some of his earlier work. But as he fell in with the artificiality of Charles IPs licentious court his manner lost much of its dignity and originality, and with a fatal facility he assumed that mannerism which detracts so much from the artistic worth of his portraits. His coloring as well as his drawing became weak and conventional. He was, how¬ ever, a great favorite with the king and his famous (Beauties of Hampton Court was painted at the request of his royal master, these ˆbeauties** being the loveliest women of the court, including the Duchess of Cleveland. His series of 12 (Admirals, > painted for the Duke of York, is also well known. He is best represented at Hampton Court, National Por¬ trait Gallery, London, at Greenwich and Wind¬ sor, and there are also two interesting por¬ traits by him, one of Sir William Temple and one of Nell Gwynne at the Metropolitan*

Museum. Consult Baker, C. H. C., (Lely and the Stuart Painters (2 vols., London 1912). Lely founded the school of English portrait, and up to the time of Reynolds and Lawrence was. its ablest representative. His method of handling, as well as his conception of the por¬ trait, were long imitated, and even to-day have their influence.*

LEMAIRE DE BELGES, le-mar' de belzh, Jean, French poet and historiographer: b. Bavai, Hainault, 1473; d. about 1525. He was a nephew of Jean Molinet, of whom he called himself a disciple, but whose influences he outgrew. He studied at Paris and at Lyons, and about 1503 he became librarian to Margaret, Duchess of Savoy and subsequent regent of the Netherlands. He served the duchess on several missions to Rome, became canon of Valen¬ ciennes and afterward entered the service of Anne of Brittany. His work is largely free from the affectations of his immediate prede¬ cessors and is marked by a fine sense of rhythm. He had a marked influence over the succeeding poets of his country, Etienne Pas- quier, Ronsard and Du Bellay being among his followers. Author of

LEMAfTRE, le-ma'tr', Frangois Elie Jules, French author, poet and critic: b. Ven- necy, 27 April 1853; d. Paris, 6 Aug. 1914. On finishing his education he became a school¬ master, but in 1884 decided to devote himself to literature. He became editor of the Revue Bleue, in which some of his articles attracted considerable attention. But his wide reputation is based almost entirely on his dramatic criticism. He was appointed dramatic critic on the Journal des Debats in 1886, and for

many years he wrote weekly articles on the drama of a type that revolutionized the methods of criticism. His literary studies were collected under the title of (Les Contem- poraines) (1886-89), in which the studies of Flaubert, Zola, Victor Hugo and Ohnet created a great impression. His dramatic criticisms are collected in volumes entitled Hmpressions du Theatre, } of which some 20 have been pub¬ lished. He also published two volumes of poetry and was the author of several plays. His first was

(L'Age Difficile) ; (La Massiere) ; (Bertrade) and (Le Pardon. > He

was one of the supreme masters of lucid, witty and intellectual French.

LEMAN (la-man) LAKE, a name some¬ times given to the Lake of Geneva. See Geneva, Lake of.

LEMARE, le-mar, Edwin Henry, English organist and composer: b. Ventor, Isle of Wight, 1866. He studied at the Royal Acad¬ emy of Music, was organist and director of music at Sheffield Parish Church in 1886-92, later filling those offices at Holy Trinity, Sloane street, and at Saint Margaret's, Westminster. He was organist in charge of the music at Carnegie Hall, Pittsburgh, in 1902-05 ; afterward twice gave recital tours in Australia and New Zealand ; and was organist at the Panama Ex¬ position in 1915. He has written numerous articles for musical periodicals on the subject of organ music and is author of more than 100 organ and choral works, and about 200 organ transcriptions from the great classical composers.

LEMAY, le-ma', Leon Pamphill, Canadian poet and novelist : b. Lotbiniere, province of Quebec, 5 Jan. 1837. He was educated at the University of Ottawa and became an advocate in 1865, but never engaged in practice. He was appointed librarian to the Quebec legisla¬ ture in 1867, from which office he was retired on a pension in 1892. He was awarded an honorary Litt.D. at Laval University in 1888, where he also won two gold medals for poetry. He translated Longfellow's (Evangeline) into French (1870). Author of (Essais Poetiques) (1865) ; (Le pelerine de Sainte Anne) (1877) ; (Picounoc le maudiD ; (Poemes Couronnes) (1870); (Les Vengeances) (1875; dramatized 1876); (Petits Poemes) (1883); (Rouge et bleu) (1891) ; (Les goutellettes) (1904).

LEMBCKE, lemb'ke, Christian Ludvig Edvard, Danish poet: b. Copenhagen, 15 June 1815 ; d. there, 20 March 1897. He was edu¬ cated in theology, and in 1850 became rector of a Latin school at Haderslev. In 1864, after the Prussian invasion, he removed to Copen¬ hagen, establishing a similar school there. He was well known as a translator from the Eng¬ lish poets, his work including Shakespeare (18 vols., 1861-70; 3d ed., 1897-1900) ; Byron (2 vols., 1873-76) ; Thomas Moore's (Lalla Rookh) (1878), etc. His original verse in¬ cludes (Digte og sang) (1870) ; Wort moder- smaal er dejligt,) Our Mother Tongue (1859).

LEMBERG, lem'berg, Poland, the capital of the province of Galicia, and the third city of Poland, on the Peltew, 470 miles by rail northeast of Vienna. Founded in the 13th century and formerly

surrounded by walls, the

city notwithstanding has a modern appearance, the walls having been replaced by boulevards and promenades. It is the seat of the crown- land government, and of the important courts and public offices connected with it, also of three metropolitan sees, Greek, Armenian and Roman Catholic. The Greek church of Saint Nicholas dates from 1292, and the cathedral is a basilica (1740-79) ; the Armenian cathedral, in the Armenian-Byzantine style, dates from 1437 ; the Roman Catholic church of Saint Mary from 1363, and the cathedral is a Gothic structure of date 1480. The Dominican church contains a fine monument by Thorwaldsen. The university founded in 1784 and reorganized in 1817 is attended by over 5,000 students, and has a library of over 230,000 volumes. Since 1871 the language of instruction has been Polish ; prior to that it was German. There is a botanical garden and a school of forestry. National Institute founded in 1817 by Ossolinsk has a library of over 180,000 volumes and 3,000 MSS. chiefly of Polish literature, and there is a museum of antiquities. The manu¬ factures are extensive and varied, and there is a large trade, mostly in the hands of Jews. There is an electric street railway. The fair of the Three Kings is held here each January. The heterogeneous population consisting of Jews (57,587), Poles, Ruthenians and Germans numbered approximately 206,113. Over 85 per cent of the population speak the Polish lan¬ guage. Lemberg was from 1432-1772 the capital of the Polish province of Reussen. It was captured by the Turks in 1672, and by the Swedes in 1704, and fell to Austria in the first partition of Poland. At the outbreak of the European War in August 1914, a move¬ ment was made by the Russians to overrun eastern Galicia, and Lemberg was captured by them on 3 September ; but was retaken by the Austro-German forces on 22 June of the fol¬ lowing year. See War, European.

LEMBERG, University of, Poland, situ¬ ated in the city of the same name, founded by Joseph II in 1784, and the third largest univer¬ sity in the country. It originated from a Jesuit school whose charter dated from 1661 but which did not receive papal sanction until 1758, 26 years before it was transformed into a state institution. It became a lycee in 1803, but was restored to its former status and re¬ organized in 1817, its marked growth dating from 1850. Until 1824 the language of instruc¬ tion was Latin, German then succeeding it until 1871, since when Polish has been used. It has faculties of law, philosophy (including pharmacy), medicine and theology. There are more than 100 lecturers, about 5,000 students, and the annual budget amounts to about $275,- 000. The library contains about

230,000 vol¬ umes, 900 manuscripts and nearly 12,000 coins and medals.

LEMERY, lam're,' Nicolas, French chem¬ ist: b. Rouen, 17 Nov. 1645; d. Paris, 19 Tune 1715. At an early age he displayed a taste for chemistry, went to Paris in 1666, and attached himself to Glaser. He soon left -Glaser and took up his abode at Montpelier, where he had the free use of a laboratory, and began to give lectures which excited great interest and were attended by many of the influential inhabitants of the place. In 1672 he returned to Paris and

gave courses of lectures on various parts of chemistry, the success of which seems to have been very great. His ap¬ peared in 1675. This book went through numerous editions — 31, it has been calculated — and was translated into the chief European languages. 1 he book is plainly modeled upon the prior treatises of Lefebvre and Glaser, the opening chapters being identical in manner and treatment, but shows proof of the author hav¬ ing profited by the work of his predecessors. In 1681 the religious troubles began to harass him; he was required to demit his office by a given time, and had ultimately, in 1683, to take shelter in England, where he was well re¬ ceived by Charles II, to whom he dedicated an edition of his book. He returned later to France, graduated as doctor of medicine at Caen, went to Paris, where he soon had a very large practice; but in 1685 the revocation of the Edict of Nantes forbade him, as a Prot¬ estant, the exercise of this profession. Against this he struggled for a little, but in 1686 joined the Roman Catholic Church. In 1699 he be¬ came an associate of the Academy of Sciences. Besides the (Cours de ChimieP Lemery wrote and published other works and papers, among which may be mentioned (Pharmacopee univer¬ sale (1697) ; (Traite universelle des Drogues simples) (1698) ; (Traite l'Antimoine* (1707). It deserves to be remembered that he was one of the first to attempt the elucidation of natural terrestrial phenomena by referring them to chemical action, and to exhibit these on an experimental scale, as when he made what is still known as Lemery's volcano, by placing a mixture of sulphur and iron in a hollow, heap¬ ing up the earth over the mixture, moistening and leaving it to itself. By-and-by combina¬ tion between the iron and sulphur begins, heat is evolved, the earth heaves and swells, steam escapes, and the resemblance of*

the miniature eruption to the larger original is very striking. He left two sons, both of whom were after¬ ward distinguished as chemists.

LEMIEUX, le-mye', Rodolphe, Canadian lawyer and statesman: b. Montreal, 1 Nov. 1866. He was educated at Laval University and became a barrister in 1891. He was elected to the Canadian Parliament in 1896, serving successive terms, was Solicitor-General of Canada in 1904-06, Postmaster-General in 1906- 11 and Minister of Marine in 1911. He served as special envoy to Japan in connection with the immigration trouble in 1907, and in 1910 he was Canadian delegate to the inauguration of the South African Union. He was ap¬ pointed professor of the history of law at Laval University in 1907, and became a Fellow of the Canadian Royal Society in 1908. Author of (De la contrainte par corps (1896) ; (Les origines du droit Franco-Canadien) (1900).*

LEMIRE, le-mer', Jules Auguste, French priest and social reformer: b. Vieux-Berquin, Nord, 23 April 1853. He studied at the Col¬ lege of Saint Francis of Assisi, Hazebrouck, and was professor of philosophy and rhetoric there from 1878-93. He was elected to the Chamber of Deputies in 1893 and was returned in 1898, 1902 and 1906. He organized the so¬ ciety La Ligue du coin de terre et du foyer, whose purpose was to secure a freehold for every French family wishing to own one. He

was a conservative Republican and Christian Socialist in politics, and in 1893 vigorously op¬ posed the closing of the Bourse du Travail, considering it an infringement of the rights of workers. He was appointed honorary canon of Aix in 1897, and of Bourges in 1900. In 1893 he was seriously injured in the Chamber of Deputies by the throwing of a bomb by the anarchist Vaillant. Author of (Le Cardinal Manning et son action sociale) (1889) ; (D'Ire- lande en Australie (1892); (Que feront les religieuse?) (1903).*

LEMLY, Henry Rowan, American soldier: b. North Carolina, 12 Jan. 1851. He was grad¬ uated from West Point in 1872, and was ap¬ pointed second lieutenant of the Third Cavalry. In March 1898 he was promoted captain, and during the Spanish- American War commanded Battery C of the Seventh United States Artil¬ lery in the Porto Rico campaign. He took part in Indian combats on Tongue River, Rose¬ bud, Slim Buttes and Belle Fourche. He was retired at his own request 20 April 1899. For many years he was director of the National Military School at Bogota, Colombia, and was commander-general for Colombia at World's Columbian Exposition 1893. He has published (What Was El Dorado? ; (Among the*

Arapa- hoes) ; (West Point Romance) ; (Padre An- selmo) ; (A Queen's Thoughts) ; also Spanish translation of Upton's Unfantry Regulations, and of an English translation of a French (Manual of Strategy> (1887) ; (Ejercicios Gimnasticos* (1889); (E1 Hellografo; Tactica de Infanteria> (1901), etc.*

LEMMENS, lem'ens, Nicholas Jacques,

Belgian organist and composer : b. Zoerle- Parwys, province of Antwerp, 3 Jan. 1823; d. near Mechlin, 30 Jan. 1881. He studied at the Conservatoire at Brussels and in 1846 re¬ ceived a government pension for the purpose of studying at Breslau under Adolf Hesse. He was appointed professor of the organ at the Conservatoire at Brussels in 1849, and for some years after 1857 resided much in Eng¬ land. He established a college for training Catholic organists and choirmasters at Mechlin in 1879. He married Miss Sherring¬ ton, a noted English soprano, in 1857. His work as a teacher is considered of exceptional importance in the improvement of methods which it influenced throughout the country. He composed more than 60 compositions for the organ, a Te Deum, two symphonies for orchestra and many pianoforte pieces. His (f£cole d'orgue is used in the conservatoires of Paris, Brussels and other European cities.*

LEMMING, a short-tailed, rat-like animal, related to the European voles and American meadow-mice, which inhabits the high moun¬ tains of Scandinavia. Its technical name is Myodes lemmus, and closely related species are found in northern Siberia and in Arctic Amer¬ ica. In general appearance these animals are more like miniature short-eared, yellowish rab¬ bits or pikas than like mice; they subsist wholly upon vegetable food, dwell in nests made of bark, grass, etc., in some sheltered nook, and do not hibernate but force their way about un¬ derneath the snow in search of moss, lichens, sprouting woody plants and other edible things. They are very prolific, rearing two broods of four to six young annually, and hence every few

years they become so numerous that the moun¬ tains can no longer support the hordes. At such times, occurring at irregular intervals of sev¬ eral years according to circumstances, an exodus takes place and great numbers of lem¬ mings descend from the mountains and spread over the lowlands. There the easier climate, more abundant food and absence of enemies, permit a s,t i 1 1 further multiplication, so that by the following season the little animals have in¬ creased into a plague. They wander more and more widely, overrun and damage, or some¬ times wholly devour crops, gardens and mead¬ ows, and make themselves a destructive nui¬ sance. Such an invasion is felt more severely in .the narrow and fertile valleys of Norway than in the broader and more forested spaces of Sweden. At such a time concerted measures are devised to kill them off, carnivorous mam¬ mals and birds flock to the feast and epidemic diseases often break out among them. Spread¬ ing with a restless energy for travel, the lem¬ mings overcome or attempt to overcome all obstacles and heedlessly plunge into lakes too large or rivers too swift to be crossed. When the remnants of the host reach the sea many of them boldly swim out in their ignorance of its magnitude and are drowned. Such overrun- ing of the country by lemmings is not known in Arctic Asia or America, where different con¬ ditions exist.

LEMMING-MICE, certain small, mice-like animals closely related to the lemmings and having similar traits, inhabit the region about Hudson Bay and the southern part of Green¬ land, of which the most prominent is Cuniculus torquatus, chiefly remarkable for its turning white in winter. Other species belong to the genera Synaptomys, Lemmus, etc.

LEMMON, John Gill, American botanist : b. Lima, Mich., 2 Jan. 1832. He studied at the LTniversity of Michigan, but left to enter the Federal army in June 1862, and was a prisoner at Andersonville, Ga., from August 1864 till the end of the Civil War. He has lived in Cali¬ fornia from 1866, where he was for four years botanist of the State Board of Forestry. He has published (Recollections of Rebel Prisons> (1874); (Ferns of the Pacific Slope> (1884); 'Handbook of North American Cone Bearers) (1895); 'Botanizing in Apache Land5 (1901); (How to Tell the Trees5 (1902), etc.

LEMNIAN EARTH, a reddish earth found in the island of Lemnos, celebrated as a rem¬ edy for snake-bites and various diseases, and

collected by the ancients in accordance with special religious observances on only one day in the year. Analysis shows it to be composed of silica, 67 per cent ; alumina, 14 per cent; water, 8 per cent ; iron oxide, 5 or 6 per cent ; soda, about 3 per cent and traces of lime and mag¬ nesia. Its classical name <(terra sigillata55 (sealed earth) is due to the fact that it was compressed and marked with the head of the Lemnian Diana. The earth is a fair substitute for soap, but has no medicinal properties.

LEMNISCATE, a curve formed by a point moving so that the product of its distance from two given points shall be the square of half the distance between the points. It is a par¬ ticular case of the Cassinian oval. If the two fixed points be (la, 0), the equation of the curve will be (.r24- y2)2— o2(.r2 — y2), which be¬

comes in polar co-ordinates p2= ˆ cos 2 0. The lemniscate can be produced by a section of a torus or anchor-ring the external radius of which is three times the internal radius by a plane tangent to the torus internally and par¬ allel to its axis. It may also be generated as the locus of the foot of the perpendicular from the centre of an equilateral hyperbola to its tangent. The curve is shaped like a figure 8 and has the centre for a double point of inflec¬ tion. The tangents at this point bisect the angles formed by the two perpendicular axes of symmetry of the figure. Curves formed from other curves after the manner by which the lemniscate is derived from the equilateral hyperbola sometimes receive the generic name of lemniscates. The one derived from the ellipse is especially interesting. The ordinary lemniscate was first discussed by Jacob Ber- bouilli in the Acta Eruditorum for 1694. The further development of the theory of the curve is due to Fagnano and Euler. Consult Bro- card, (Notes de bibliographic des courbes geometriques5 (Bar-le-Duc 1897).

LEMNIUS, lem'ni-us, Simon (real name Simon Lemm Margadant; sometimes called Emporicus or Mercatorius), German classical scholar and poet: b. Miinsterthal, about 1510; d. Chur, 24 Nov. 1550. He is supposed to have studied at Munich and Ingoldstadt, and was under the direction of Melanchthon at Witten¬ berg. He early engaged in attacks upon the followers of Luther, written in Latin verse, and supporting Luther's enemies and the Elector Albrecht. The controversy grew so bitter that he was forced to leave Wittenberg. From 1540 until his death he was a teacher in the newly-established Mikolaischule at Chur. Author of (Epigrammaton Libri Duo5 (1538) ; (Apologia contra decretum, quod imperio et tyrannide M. Lutheri et Justi Jonae Viteber- gensis Universitas evolgavit5 (Cologne 1538) ; 'Latii Pisaei Juvenalis Monachopornomachia,5 in which he surpasses

himself in bitter invec¬ tive; (BucOlicorum Eclogae Quinque5 and (Amorum Libri Quatuor5 (1542) ; (Homeri Odyssea Heroico Versu Facta, Accedit Ba- trachomyomachia5 (1549) ; a Latin translation of Dionysius' (Periegesis5 (1543), and a 'Rhaete'is5 which remained in manuscript until

1874.

LEMNOS, the classical name for Stali- mene, the northernmost island of the Grecian Archipelago, between the Hellespont and Mount Athos. It anciently contained a volcano, Mosy- chlus, which was regarded as the workshop of Hephaistos (Vulcan), and was worshipped by the Greeks as sacred. The island belongs to Turkey and consists of two peninsulas almost separated by the harbors of Paradiso and San Antonio. It has an area of 160 square miles and abounds in vineyards, wheatfields, olive and fruit groves. The chief town is Limno or Kas- tro, with 3,000 inhabitants, a fortified place on the west coast. Pop., chiefly Greeks, about

27,000.

LEMOINE, le-mwan', Emile Michel Hya- cinthe, French mathematician: b. Quimper, Finistere, 22 Nov. 1840; d. 1912. He studied at the ficole Polytechnique, and for some time was engaged in teaching. He was later for many years connected with the municipal gas department of Paris, and was distinguished for

his ability in both mathematics and music. In geometry he was notable for his contributions to the development of the theory of the tri¬ angle. He was a founder of the Societe Mathe- matique de France in 1871, and in 1894 he founded the scientific periodical L' intermediate des M atheniaticiens.

LEMON, Mark, English humorist and playwright: b. London, 30 Nov. 1809; d. Craw¬ ley, Sussex, 23 May 1870. He made his first essays in the lighter drama, and the modern London stage was supplied by his facile pen with more than 60 pieces, farces, melodramas and comedies, among which were

1871).

LEMON, a small tree or spreading shrub (Citrus limonia) of the

family Rutacece. It is a native of India, but has been introduced into tropical and subtropical countries through¬ out the world, especially those of the Mediter¬ ranean region, whence it was imported into Florida and California. In Florida the cold wave of 1894-95 destroyed most of the orchards, leaving only those in the southernmost coun¬ ties, the soil of which is poorly adapted to the trees and must be carefully mulched, fertilized and managed to yield profitable returns. In California the lemon was introduced about 1850, but did not become commercially import¬ ant until the closing quarter of the 19th cen¬ tury, during the last 10 years of which the annual shipments to Eastern markets averaged about 1,200 carloads, although half of the 400,000 trees had not yet reached bearing age. The climate is perfect, but the water supply is deficient, so that the orchards must be irrigated. The fruit is one of the most important grown in the United States, since, in addition to its value in food and drink, the citric acid of its juice is used upon a commercial scale by calico- printers, who by its aid remove iron from pat¬ terns stamped with certain dyes, and the oil or extract distilled from the rind is serviceable in perfumery, for flavoring, etc.

Owing to its spreading habit the tree must be carefully pruned, else it will make the neces¬ sary cultivation impossible, and will result in bearing fruit at or near the ends of long willowy branches. The trees are usually set about 20 feet apart each way, given clean culti¬ vation and fertilization like the orange (q.v.). The fruit, which ripens during the winter, is cut, not pulled, green as soon as it is two and one-quarter inches in diameter, the picker carry¬ ing a gauge. These details have been found necessary since lemons ripened on the tree are of inferior quality and will not keep well, and since the market demands lemons in the sum¬ mer. The fruit is spread in shallow trays and stored in a well-ventilated curing-house where by careful management it develops the charac¬ teristic yellow skin, which also becomes tougher,

thinner, more pliable and silky and less liable to injury in handling. When properly man¬ aged, lemons are profitable, and because of the constant demand are more reliable than any other of the citrus fruits.

LEMON GRASS (Andropogon nardus, a. schoenanthus and a. citratus) , any of several varieties of perennial tufted grasses native to southern Asia. It is of abundant growth, both wild and cultivated. It is of no value for grazing purposes except when very young, but it has a commercial value for the distillation of essential oils used in perfumery. The variet}' known as andropogon schoenanthus yields

the lemon-grass oil of commerce, which is often passed as verbena oil. Other varieties yield citronella oil, also used in perfumery.

LEMON JUICE, the juice of lemons, a liquid usually opaque and turgid and exceed¬ ingly sour because of the presence of citric and malic acids. It is much used in the preparation of cooling drinks, usually combined with sugar and water, or with potassium bicarbon¬ ate. It is of value in the treatment of scurvy.

LEMON OIL, a volatile oil obtained, by pressure, from lemon peel. It consists chiefly of a terpene, CioHw, known as limonene, which boils at 349° F., and closely resembles citrene, though differing from it in certain essential par¬ ticulars. Lemon oil has an agreeable odor, and is used chiefly as a flavor and perfume. It is reputed to change spontaneously into turpentine upon keeping, but this belief probably has no foundation in fact. Lemon oil mixes in all proportions with glacial acetic acid and with absolute alcohol.

LEMON VINE. See Barbados Goose¬ berry.

LEMONNIER, le-mdn'nya', Pierre Charles,

French astronomer: b. Paris, 23 Nov. 1715; d. Heril, near Bayeux, 31 May 1799. He was ad¬ mitted to the Academie of Sciences when but 20 years of age, having prepared an elaborate lunar map ; and in the same year was chosen to accompany Maupertis and Clairaut on a geodetic expedition to Lapland. He was largely instrumental in securing the introduction of English methods and instruments in French astronomical circles, and in 1741 introduced the use of the transit instrument at the Paris Observatory. He visited England and Scotland in 1748 for the purpose of observing the annular eclipse of 25 July. He made a careful observa¬ tion of the disturbances of Jupiter and Saturn which later investigations confirmed; an import¬ ant series of lunar observations covering a period of 50 years; investigations of terrestrial mag¬ netism and atmospheric electricity, and suc¬ ceeded in determining the places of a large number of stars. He was a lecturer at the Col¬ lege de France during a large portion of his. career, was admitted to the Royal Society in 1739, and upon the founding of the Institute was one of the 144 original members. Author of ˆHistoire Celeste1 (1741) ; (Theorie des cometes,* a translation with annotations of Halley's Synopsis1* (1743) ; (Nouveau zodi- aque) (1755) ; (Observations de la lune, du soleil, et des etoiles fixes* (1751-75) ; (Lois du magnetisme* (1776-78), etc.*

LEMPA, lem'pa, San Salvador, a river, the largest of Central America, which rises in. Lake,

Guija on the boundary of Guatemala and El Salvador, flows eastward through a broad and fertile valley for a distance of nearly 150 miles and then turning abruptly to the south breaks through the volcanic coast range of mountains and finishes its course of over 200 miles in the Pacific in lat. 13° 12′ N., long. 88° 41′ W., 35 miles southeast of the city of San Salvador. It has numerous large tributaries and is sub¬ ject to sudden floods. The mouth of the river is obstructed by a bar, but the river is reached by a natural channel connected with the Jalte- peque estuary, and is navigable by small steam¬ ers for 100 miles.

LEMPRIˆRE, John, English classical scholar: b. Island of Jersey about 1765; d. Lon¬ don, 1 Feb. 1824. He was graduated at Oxford University in 1790, was ordained and began life as a schoolmaster. He afterward was ap¬ pointed to the livings of Meeth (1811), and Newton-Petrock (1821). He is the author of the well-known classical dictionary (1788), which was founded on Sabatier's (Diction- naire des Auteurs Classiques.5 He also pub¬ lished (Sermons5 (1791) ; translation of Herodotus,5 first volume only (1792), and dictionary of Universal Biography5 (1808) ; enlarged and reprinted by Lord (New York

1824).

LEMURES, lem'u-rez, among the ancient Romans, a term applied to departed spirits, es¬ pecially those of ancestors who hovered about during the night. Probably the word was derived from the festival Lemuria held 9, 11 and 13 May, when at midnight the father of the family, with special ceremonies, nine times threw black beans over his head, thus banishing the spirits from the household for another year. Consult Fowler, W. W., (Roman Festi¬ val (London 1899) and Wissowa, George, (Religion und Kultur der Romer) (2d ed., Munich 1912).

LEMURIA, a name given by Haeckel to a vast area assumed to exist in past ages over the area of the present Africa, Indian Ocean and Malayan Archipelago, on the hypothesis that the existence of such a continent was nec¬ essary to explain the peculiar present distribu¬

tion of the lemurs and other phenomena of geographical distribution. The discovery of the remains of lemurs in America and Europe rendered such hypothesis futile, and the idea was soon abandoned. Consult Wallace, A. R., Geographical Distribution of Animals5 (Lon¬ don and New York 1876) ; Scott, (The Lost Lemuria5 (New York 1904) ; Steiner, R., Submerged Continents of AtLntis and Le¬ muria: Their History and Civilization5 (Chi¬ cago 1911).

LEMURS, le'merz, the curious monkey¬ like animals, or (

ners, and quite harmless, gentle and tamable. They are usally mouse-gray or yellowish, not marked in ornamental ways, the hair is long and often woolly, and the tail usually long, bushy and never prehensile. The hind-legs are longer than the fore-legs in the true le-mures, which move about on all fours, not using their hands as do monkeys, although the thumbs are opposable; the second toe always has a sharp claw, while the other digits bear nails. In the internal anatomy many features are different from the rule of structure else¬ where in the order. The simplicity of the brain, the fact that certain arteries form retia mirabilia, and especially the non-deciduate con¬ dition of the placenta, are prominent among these lemuroid peculiarities. In general, how¬ ever, the lemurs show much resemblance to the Anthropoidea.

The Lemuridcu, or lemurs proper, are divis¬ ible into four groups or sub-families. The first group (Indrisincu) is limited to Madagascar, and includes several genera distinguished prom¬ inently by the great size of the hind-legs, as compared with the fore-limbs; and when upon the ground these lemurs walk erect, balancing themselves by holding their short arms above their heads. The largest is the indri (q.v.), which has no visible tail, while the smallest are the avahis (genus Avahis) which are the size of gray squirrels, but have very long tails. A third important genus is Propithecus, con¬ taining several large brightly colored species, called sifakas, which are mainly vegetarian, go about in large bands like the indris and seek food in the daytime, whereas the avahis are nocturnal; and are often tamed and taught to hunt like dogs.

The most typical Lemurs are in the sub¬ family Lemurincu, which contains several gen¬ era, some of which inhabit the Comoro Islands as well as Madagascar. Their limbs are of nearly equal length, and they have a fuller dentition (36 teeth). Among the best known are the so-called ((gentle55 lemurs ; the noctur¬ nal grass-eating bokomboulis (Haplemur) ; and the handsome and highly arboreal species of the type-genus Lemur, which vary greatly in habits, food

and appearance. One of these is familiar as the "Madagascar cat55 or ring¬ tailed lemur (L. catta), since, unlike the rest, it remains upon the ground, especially about rocks, is easily caught and readily tamed. It is remarkable for the fact that the sexes differ in color, the male being black, while the female is reddish brown with white whiskers and ear- tufts, and the tail alternately ringed with brown and white. The ruffed lemur (L. var- ius) is still- more strikingly diversified in black and white, and has a ruff of long hair about the neck. All these lemurs survive captivity well and furnish interesting specimens for all zoological gardens.

The third sub-family is that of the Gah- gincu, represented in the continent of Africa and in Madagascar. The galagos (q.v.) have long hind-legs, causing them to hop like kan¬ garoos, when on the ground (but the most of their life is passed in trees), large, semi-naked ears and long tails. Important genera are Galago (q.v.) ; the mouse-lemurs or chirogales (q.v.) ; and the diminutive, squirrel-like dwarf-lemurs (Microcebus) . – –

LEMURS

1 Ruffed Lemur

2 Ring-tailed Lemur

3 Slender Loris

4 Ayeaye

5 Great Galago

6 Common Loris

The sub-family Lorisince contains a group of small lemurs, distributed widely in Africa, India and Malaysia. «In external appear¬ ance, w remarks Beddard, ((all the three genera of this sub-family agree in their small size, their short or entirely deficient tail, large star¬ ing eyes, and the rudimentary character, or absence, of the index finger, which is never provided with a nail; in all of them the thumb diverges widely from the other fingers, and the great toe is so divergent as to be directed backward.® The ears are small and rounded; and the eyes are very large, and situated close together on

the front of the head. They feed on small birds and insects, and are chiefly nocturnal in habits. They inhabit India, Cey¬ lon and the Eastern Archipelago. The genus Nycticcbus contains the remarkable ((sloth mon¬ key® or sloth lemur (N . tardigradus) , which is nocturnal, howls dismally at times and is the object of many fears and superstitions among the Malays and southern Chinese. The genus Perodictus contains the queer African pottos and angwantibos. The most typical species of the group is the slender loris (Loris gracilis), a pretty little arboreal animal of the Malayan countries. It is described as Smaller than a squirrel, of exceeding change- ness and grace, with beautiful eyes.®

The geographical and geological distribution of the lemurs is very interesting. Their re¬ mains are found in the rocks as far back as the transition period (Puerco beds) between the Cretaceous and Tertiary, the oldest occurring in the western United States. These are small lemuroids, and similar forms are found in the early Tertiary rocks of Europe, Asia and Africa. Many genera are known. The most recent, which may have survived in Mad¬ agascar until the discovery of that island by Europeans, was Megaladapis, which must have been three or four times bigger than any mod¬ ern species. The circumstance that existing lemurs and certain other animals occurs only in south-central Africa, Madagascar and the Ori¬ ental region, and nowhere between, was so extraordinary a fact in zoogeography that early attempts to account for it resulted in the hypothesis of an ancient continental land-area, called Lemuria (q.v.) which was supposed to connect Africa and southern _ Asia. This theory had little other foundation, and the subsequent discovery of remains of extinct lemurs in Europe, western Asia and the two Americas showed that it was needless. It is evident that the existing lemurs are the sur¬ vivors of a once world-wide race which has died out except in certain islands and favor¬ able corners of the world where they are not exposed to cold climates nor to too many enemies. The almost complete absence of pred¬ atory animals in Madagascar doubtless ex¬ plains the comparatively great number of lemurs characteristic of that isolated country.

Consult Beddard, 'Mammalia (1902) ; For¬ bes, (Allen's Naturalists' Library* (1894) ; Lydekker, (Royal Natural History, * Vol. I, (1893); Mivart and Murie, (Anatomy of the Lemuroidea,* (in Trans. -Zool. Soc. of London, Vol. VII 1872) ; Ingersoll, 'Life of Mammals> (New York 1909).*

LENA, la-na' or le'na, Siberia, one of the largest rivers in the world, draining about

1,000,000 square miles, rising on the north¬ western side of the mountains which skirt the western shore of Lake Baikal, about 180 miles east-northeast of Irkutsk. It flows in a wind¬ ing but mainly semi-circular course, north- northeast and northwest, receiving the Vitim, the Aldan, the Viliui and other tributaries. Then a mighty stream it flows generally north. About 800 miles from the ocean it is over five miles in width. Near its mouth it separates into branches, forms a great number of del¬ taic islands and discharges itself into the Arc¬ tic Ocean by several mouths in lat. 73° N. and long, about 128° E., having thus passed over 21 degrees of latitude and 22 degrees of longi¬ tude. Its direct course, through a generally barren country interspersed with a few dense forests, but in some parts with valuable min¬ erals, is about 1,480 miles; its actual course, windings included, about 2,850 miles. It is navigable through the greater part of its upper course, is rich in fish, is frozen from October to May and disastrous floods are often caused by the melting of ice in its upper parts.

LENAPE (len'a-pa) STONE, in archae¬ ology, a name given by H. C. Mercer to an in¬ scribed gorget found in Bucks County, Pa., in 1872, upon which was incised a spirited com¬ bat between men and a mastodon ; lightning intervening and aiding the men in the destruc¬ tion of the beast. The stone told pictorially the legend recorded by Jefferson in his (Notes on Virginia. Since its discovery the stone has been condemned by most archaeologists, and not always on the same grounds, and it is prob¬ able that it will not be accepted generally as genuine until abundant corroborative evidence has been obtained. If genuine, the stone estab¬ lishes two interesting facts concerning the In¬ dians of the Atlantic seaboard; that the mas¬ todon or mammoth was living when these peo¬ ple were at the climax of their cultural devel¬ opment, or, if not a feature of practically our present fauna, then that the advanced Indian lived at a much more remote period than is generally supposed. The evidence now had concerning the mastodon is that it was living about 2,500 years ago, and this antedates the Indian as so advanced an occupant of this re¬ gion. That man has been an occupant of our seaboard region since the Glacial Epoch is demonstrable and his contemporaneity with so recently extinct an animal as the mastodon is certain. The principal objection that can be brought against its genuineness is that it is so far in advance of all other known specimens of Indian pictographic art. Consult Mercer, H. C., 'The Lenape Stone* (Philadelphia*

1885).

LENARD, le-nart', Philipp, Hungarian physicist: b. Pressburg, 7 June

1862. He stud¬ ied at the universities of Budapest, Vienna, Berlin and Heidelberg. He became privat- docent at Bonn in 1891, taught at Breslau in 1894, at Aachen in 1895, was appointed pro¬ fessor at Heidelberg in 1896 and at Kiel in 1898, returning to Heidelberg in 1907. In 1909 he was appointed head of the new radiological institute at Heidelberg. He received the Nobel prize for physics in 1905. Author of (Ueben Kathodenstrahlen) (1906) ; (Ueber Aether und Materi-e (1910).*

LENAU, la-nou, Nikolaus (pseudonym for Nikolaus Franz Edler von Niembsch von Strehlenau), Austrian poet: b. Csatad, near Temesvar, Hungary, 13 Aug. 1802; d. in the insane asylum at Oberdobling, Austria, 22 Aug. 1850. His father, Franz, was an official of the Hungarian Treasury (d. 1807) ; his mother, who later (1811) married the Budapest physi¬ cian Karl Vogel, d. 1829. Lenau is perhaps the most melancholy and pessimistic poet in German literature; in fact he is frequently set up as a type of the denial of life, as opposed to Nietzsche, who is taken as an affirmation of life. His early education was irregular and evidently guided by the tendency to encyclope¬ dic knowledge which is rather common among Germans and which makes German writers fre¬ quently feel their kinship with Faust. He at¬ tended the Piaristengymnasium at Budapest (1812-15), studied philosophy at the University of Vienna (1819-20), then at Pressburg (1821) ; he then turned to law, at Vienna (1822-26), in¬ terpolating one semester of agriculture, at the Hungarian University of Altenburg; he later even pursued medical courses at Vienna. In the autumn of 1831 he was attacked, at Heidel¬ berg, by profound melancholy, from which he felt there would be no deliverance except through a trip to America, which he under¬ took in 1832 ; Bis experiences, owing to his sen¬ sitive and over-delicate nature, must have been very unpleasant, for he returned to Europe in 1833, settling down in many places in Bavaria and Austria. Ferdinand Kiirnberger's novel, (Der AmerikamiideP ds a free rendering of Le- nau's American disillusionment, and a number of poems by Freiligrath, Heine and Herwegh were suggested by the same situation. Lenau became insane in October 1844 and spent the rest of his life in confinement. He is, as a ly¬ ricist, close to Goethe in importance, full of color and temperament ; Austria's greatest poet, presenting a powerful infusion of Slavic melancholy, together with ingratiating volup¬ tuousness and passionate fire. Many of his poems and ballads have become popular. His epic

attempts are rather lyric and fragmentary in quality; (Faust > (1836) ; (Savonarola)

(1838) ; (Die AlbigenseU (1843); (Don Juan} (posthumous).

Jacob Wittmer Hartmann.

LENBACH, Franz von, frants fon len'bah, German painter : b. Schrobenhausen, Upper Bavaria, 13 Dec. 1836; d. Munich, 6 May 1904. His father was a stone mason and in boyhood he followed his father's trade. As a youth he painted portraits at a gulder (40 cents) each. At the suggestion of Hofner, the animal painter, he turned to the study of art and be¬ came a pupil of Geyer in Augsburg. He subse¬ quently attended the Munich Academy for a short time and then for two years studied the technique of painting under Grafle. From 1855 to 1857 he lived as one of the artistic co¬ terie of Schrobenhausen and painted portraits, landscapes and animals. He then attached him¬ self to Piloty and as the pupil of that artist ac¬ companied him to Rome. Here he applied himself to the study of the old masters and painted his picture (The Roman Forum,) whose vivid coloring and grandeur of design made his reputation. After his return to Germany he painted several portraits, which were dis¬

tinguished by a power of coloring rivaling that of the Venetian school, and a vivid character¬ ization and chiaroscuro which recalled Rem¬ brandt. He was for a few years teacher in the Weimar school of art, but eventually returned to Munich and attracted the attention- of Baron von Schack, who engaged him to visit Italy and Spain for the purpose of making copies of the principal paintings of Giorgione, Velasquez, Titian, Rubens and others. The copies executed by the painter have all the in¬ dividual tone and color of each original and he developed immensely his own power and style by their production. This appears most plainly from an examination of his portraits which, original and fresh as they are, show plainly that the master had trained himself in the school of Titian, Rembrandt and Velas¬ quez. Though his drawing is sometimes weak and incorrect, his paintings nevertheless are characterized by powerful modeling, life-like expression, and as a portrait painter while he disregarded contour, his remarkable sense of character enabled him to see to the soul of his sitter with genial and sympathetic intuition. It is from his series of portraits of the makers of modern Germany that these men will be known to posterity — the force and vividness of which reflect their personalities. He painted the Emperor William I in the last year of that monarch's life; he executed several portraits of Von Moltke and 100 portraits or

sketches of Bismarck, their features becom¬ ing familiar to the world largely from the numerous reproductions of these inimitable pictures, now looked upon as classic examples of German art. Bismarck especially appears in these canvases in every attitude and cos¬ tume, civil and military, which he assumed. Many of these portraits are in the picture galleries of Berlin. He painted in his time every living man of eminence in Europe from Gladstone to Leo XIII. He was less success¬ ful with feminine types. He also executed many pastel portraits as well as single ideal figures (ˆakuntalaB

LENCAN, or LENCAS, a group of na¬ tive tribes in southern Honduras and northern Nicaragua, possessing a language distinct from that of neighboring tribes, but divided into several dialects. They are semi-civilized and of peaceful habits, although they fight on occa¬ sion. There is hut scanty history concerning them available and their relation to the whites is largely unknown. They are among the tribes at one time designated as ftChontal,® a name covering several undistinguished groups in Central America, but which for the greater share are now known and named individually.

LENCLOS, lon-klo, Anne, French cour¬ tesan, better known as Ninon de Lenclos : b. Paris, 15 May 1615; d. there, 17 Oct. 1705. She was famed for her beauty and notwithstanding her reputation some, of the most respectful ladies of the time cultivated her friendship, and in her old age her house was the rendezvous of the most distinguished personages of the city

and court. Scarron consulted her on his ro¬ mances, St. Evremond on his poems, Mo- liere on his comedies, Fontenelle on his dia¬ logues and La Rochefoucauld on his maxims. Richelieu is said toˆ have been her first lover, and Coligny, Conde, Sevigne, etc., were her lovers and friends. She retained the charms of her manners and conversation, and to some extent of her person, to extreme old age. She is the prototype of Mademoiselle de Scudery's (Clelie) (Paris 1556-60).

LEND A HAND CLUBS, organizations of young persons established in the United States in 1871, for religious, philanthropical and social purposes. The name is derived from a story by Edward Everett Hale, entitled (Ten Times One is Ten, > published in 1870. Each club creates its own constitution, but follows a common motto :

" Look up and not down,

Look forward and not back,

Look out and not in.

Lend a hand."

The badge of the club is a Maltese cross, with the inscription ((In His Name? A cen¬ tral federation called the Look Up Legion was formed at Chautauqua, N. Y., in 1874, and the Lend a Hand was founded, a journal of the societies.

LENEPVEU, la-na-ve, Charles Ferdi¬ nand, French composer: b. Rouen, 1840. A pupil of Savard, Ambroise Thomas and Chau- vet, he obtained the Prix de Rome in 1865, and was appointed professor of harmony at the Conservatory in 1881 and of composition in 1894. He became a chevalier of the Legion of Honor in 1887 and a member of the Institute in 1897. His works, which are lacking some¬ what in inspiration, include the sacred drama (Jeanne d'ArcP first given in the cathedral of Rouen in 1886, several operas, a requiem Mass, (Meditation) for orchestra, and various choral and solo compositions.

LENEPVEU, Jules Eugene, zhiil e-zhan, French painter: b. Angers, 1819; d. 1898. He was a pupil of Picot and at the Beaux-Arts, won the Prix de Rome in 1847, painted several canvases ((Les Martyrs aux Catacombes) ; (Pius IX in the Sistine ChapeP ; (Venetian Night } ; (Hylas,) and others), and executed many frescoes in public buildings at Paris, Angers and elsewhere.

L'ENFANT, lon-fan, Pierre Charles, French- American engineer: b. France, 1755; d. Prince George's County, Md., 4 June 1825. A lieutenant in the provisional service of France, in whose best military institutions he had been trained, he came to America with Lafayette in April 1777; built Fort Mifflin (on the Dela¬ ware), which successfully resisted one of the most vigorous attacks of the Revolutionary War, and by his skill as a designer of fortifica¬ tions attracted the attention of Washington, who made him chief of engineers, with brevet of major of engineers. He remodeled and re¬ fitted the City Hall in New York for the use of the first Congress, and later also the Federal House in Philadelphia. Washington and Jeffer¬ son selected him to draw the plan for the ((new federal town,® and during the spring and sum¬ mer of 1791 he was employed in the elabora¬ tion of his plans. Jefferson wished the design to be that of a chess-board regularity of

squares, but L'Enfant broke the monotony of this arrangement by inserting numerous ave¬ nues running at acute angles. His plan was ap¬ proved by Washington, and he was retained to direct the execution of it. The commissioners in general charge of the work advertised a sale of lots for October 1791 and requested L'Enfant to furnish his plan to- be engraved and pub¬ lished. This he refused to do, asserting that speculators would purchase the best locations in the ((vistas and architectural squares® and "permanently disfigure the city® by "huddles of shanties.® For this insubordination Washington ordered his dismissal, 1 March 1792. For plan¬ ning the "federal city® and devoting his time for months to the survey and other preliminary operations L'Enfant received only $2,500 and a lot near the executive mansion, a compensation quite in accord with the general economy with which the work was prosecuted. He requested the commissioners to recall the order for the money and "not take any further trouble about the lot.® Later, Madison appointed him pro¬ fessor of engineering at West Point, but he declined the post. He designed several public works at Philadelphia and was appointed to construct the present Fort Washington (on the Potomac). He partly executed the work, but disagreed with his superiors and was dismissed. He lived latterly at Chellum Castle, the resi¬ dence of Dudley Digges, near Bladensburg, Md., and frequented the halls of Congress seek¬ ing in vain for a reward for past services. The execution of his plan for Washington was con¬ tinued by his assistant, Andrew Ellicott, later professor of mathematics at West Point. L'Enfant's design may be viewed in the Library of Congress. To L'Enfant is chiefly due the fact that to-day Washington is one of the most picturesque cities of the world. See Washing¬ ton.

LENHER, len'er, Victor, American chem¬ ist: b. Belmond, Iowa, 13 July 1873. He was educated at Dickinson College and at the Uni¬ versity of Pennsylvania and engaged in teach¬ ing. He was assistant professor of chemistry at the University of Wisconsin in 1900-04, and associate professor there in 1904-07, since when he has been professor. Author of numerous papers on research in organic chemistry pub¬ lished in scientific journals; a translation of Moissan's (Electric Furnace) (1904), and laboratory Experiments) (1902; 4th ed., 1906).

LENINE, Nikolai (also known under his real name Nikolai Ilyitch Ulyanov, and un¬ der another pseudonym, Vladimir Ilyin), Russian socialist : b. 1870, of a noble origin. Like a brother, who was hanged when Lenine was 17 years old, for plotting to kill the Tsar, Lenine

began his revolutionary activity when he was still quite young. Most of Lenine's life has been spent in exile, chiefly in Switzerland, where many of his economic and political writ¬ ings were produced. This exile was imposed upon him by the necessity of avoiding imprison¬ ment in Russia for the propagation of anti- Tsarist and Socialistic views. Even before the opening of the European War in 1914, Lenine had long been occupied with the problems of the international Socialist movement; his works (printed in the Russian language in various parts of Europe) dealt with the problems of imperialism and opportunism and revealed a

profound understanding of the function of finance and industry in forcing imperialistic wars, as well as a hatred of the political lead¬ ers who supported wars of this type. Among his works published in Russian were (What Next? Burning Questions of Our Movement' (Stuttgart 1902) ; (Two Tactics of the Social- Democratic Party in the Democratic Revolu¬ tion' (Geneva 1905) ; (On Rural Poverty' (Geneva 1905) ; (The Dispersal of the Duma and the Tasks of the Proletariat' (Moscow 1906) ; (Martov and Cherevanin in the Bour¬ geois Press' (Saint Petersburg 1906), and a Russian translation of Karl Marx's (Civil War in France' with Engels' Preface (Odessa 1905). His hatred of opportunism expressed itself in a pamphlet attacking Karl Kautsky (Saint Petersburg 1906), as well as in numer¬ ous subsequent attacks on that leader of the Centre faction of the German Social-Demo¬ cratic party. Such also is the content of the periodicals edited by Lenine in Switzerland (Kommunist , 1915; Sbornik, 1916). After the outbreak of the Revolution in Russia, March 1917, while Leon Trotzky (q.v.) was attempt¬ ing to reach home from New York, Lenine suc¬ ceeded in passing into Russia through Ger¬ many. Immediately on his arrival in Petrograd he began to oppose the opportunist and coali¬ tion policy of the Menshevik faction of the Social-Democratic party in Russia (Lenine him¬ self was a member of the Bolshevist, or ((Max- imalist" faction, after the split that had oc¬ curred at the party convention in 1903), which was aided by the right wing of the Social-Revolutionaries. Kerensky, who had joined the latter party after the success of the March Rev¬ olution, was for a continuation of the war with Germany, which was opposed by the tortured and wearied Russian population. After the July (1917) offensive, which threw

thousands of ill-equipped troops into the slaughter, Keren¬ sky and the Menshevik faction became un¬ popular, and this unpopularity grew until the Bolsheviki, under the guidance of Lenine and Trotzky, overthrew the Kerensky government and established a ˆdictatorship of the prole¬ tariat" (6 Nov. 1917, N.S.). Lenine, in a ses¬ sion of the Workers' and Soldiers' Council (Soviet), introduced his famous proposals on land and peace, which were both passed with a great majority on 7 November. Within a few days came the publication of the "Secret treaties" (reprinted January 1918 by the New York Post), the apportionment of land to the peasants and the opening of preliminary peace discussions with the German delegates at Brest-Litovsk. Lenine himself in numerous articles defended the signing of a separate peace with Germany (consult the Class Struggle, New York 1918, and The Revolutionary Age, Bos¬ ton 1918). In February 1918 the German troops advanced further into Russia, contrary to the stipulations of the treaty, and imposed still more humiliating conditions upon that country. Consult Nuorteva, Santeri, (An Open Letter to American Liberals' (New York 1918) ; Reed, John, (The Sisson Documents' (New York 1918), also numerous articles in The Liberator, New York 1918-19. Consult also, in English, Lenine's (Political Parties in Russia' (New York 1917) ; (The Soviets at Work' (New York 1918) ; (A Letter to American Working¬ men' (New York 1918) ; (The State and the

Revolution' (New York 1919) ; (The Lessons of the Revolution' (New York 1919).

LENNEP, len' nep, Jacob van, Dutch dramatist, novelist and poet : b. Amsterdam, 24 March 1802; d. Oosterbeek, near Arnheim, 25 Aug. 1868. He took his degree in law at Ley¬ den and became a successful advocate at Am¬ sterdam. His first published work consisted of translations from Byron, and his first volume of original verse appeared in 1826. He began the publication of novels in 1828 and steadily gained in popularity, his position in Dutch literature being similar to that of Sir Walter Scott in English. He was further distin¬ guished for the production of several widely popular patriotic songs and plays at the time of the Belgian revolt. He wrote a Dutch his¬ tory for juveniles in a pleasing style and was a versatile journalist and critic. He served in a judicial capacity for several years and was a member of the Second Chamber in 1853-56. Several of his novels have been translated into French, German and English. Author of : Verse, (Academische Legenden' (1826) ; (Nederlandsche Legenden' (2 vols., 1828) ; the patriotic comedies, cHet Dorp aan de Grenzen' (1830), and (Het Dorp over de Grenzen' (1831) ; the historical romances, (De Pleegzoon' (1833) ; (De Roos van Dekarna' (2 vols.,

1836) ; (Onze Voorouders' (5 vols., 1838) ; (De Lot- gevallen van Ferdinand Huyck' (2 vols., 1840) ; (Elisabeth Musch' (3 vols., 1850) ; (De Lot- gevallen van Klaasje Zevenster' (5 vols., 1865) ; the juvenile history (Geschiedenissen van Noord-Nederland aan mijne Kindern verhaald' (4 vols., 1845). He was also author of several dramas.

LENNGREN, len'gran, Anna Maria

(Mrs.), Swedish poet: b. probably at Upsala, 18 June 1755; d. Stockholm, 8 March 1871. She was the daughter of Magnus Malmstedt, a pro¬ fessor at the University of Upsala, and received an excellent education. Her verse was success¬ ful from its first publication, when she was 18, and she also engaged in making translations of French and Latin plays for production at the court. She continued writing after her mar¬ riage to Karl Peter Lenngren, an editor of the Stockliolmpostem, in 1780, and her verse ap¬ peared anonymously in that publication for some years. She wrote in a facile, natural style with a simplicity and truthfulness that made her widely popular among her country¬ men. Her works were published in collected forrn, (Skaldefors6k' (1819; with a (Life' by Carlen, 1856; with a (Life' by Warburg, 14th ed., 1907).

LENNI LENAPE, len'i len' a-pe, an im¬ portant Algonquin tribe. See Delaware In¬ dians.

LENNO LENAPES, len'nd len'a-pez, the native name for the Delaware Indians (q.v.).

LENNON, John Brown, American union labor leader: b. Lafayette County, Wis., 12 Oct. 1849. He received a public school educa¬ tion and in 1886-1910 he was general secretary of the Journeymen Tailors' LTnion of America, editing in those years The Tailor. From 1889 he was treasurer of the American Federation of Labor. He is a member of the Commission on Industrial Relations appointed by President Taft in 1912 and reappointed by President Wil-

son ; is vice-president of the Illinois Anti- Salcon League, and has lectured on social problems.

LENNOX, Charlotte Ramsay, Anglo- American miscellaneous writer: b. New York, 1720; d. London, England, 4 Jan. 1804. She was the

daughter of the lieutenant-governor of New York and was educated in England. She mar¬ ried and being left a widow in narrow circum¬ stances took up literature for support. Her best work is (Shakespeare Illustrated5 (1753— 54). She also wrote (Memoirs of Harriot Stuart5 (1750) ; 'The Female Quixote,5 popular in its day and somewhat injudiciously praised by Fielding and Johnson (1752); 'Sophia,5 a novel (1763) ; 'The Sisters, 5 a comedy (1769), etc. She was the friend of Dr. Johnson and Samuel Richardson, from the former of whom she received much encouragement.

LENNOX, Patrick Joseph, American uni¬ versity professor: b. Nurney, County Kildare, Ireland, 12 Aug. 1862. He was educated at Rockwell College, Saint Patrick's College, Car- low, and University College, Dublin. In 1886 he became lecturer at University College, Dub¬ lin, and professor of classics and English at the Dominican Women's College of the same city. Subsequently he became senior lecturer in the intermediate department of Blackrock College and chief professor of the evening courses at University College, Dublin. Since 1907 he has been professor of the English language and literature at the Catholic University of Wash¬ ington, D. C. He has made particular studies of economic and sociological questions and in 1910 was sent to London by the Department of State to attend the International Congress of Chambers of Commerce. In the same year he investigated trade conditions in Europe as special agent of the United States Department of Commerce and Labor. In 1911 he was sent by President Taft to represent the United States at the International Congress on Alcohol¬ ism. His works include (The Victorian Era in Ireland) (1887) ; (Mythology of the Ancients) (1888); (Early Printing in Ireland) (1909); 'Women Writers of English in the Fifteenth Century) (1910); (The National University of Ireland) (1911) ; 'Addison and the Modern Essay) (1912). He is a contributor to 'The Catholic Encyclopedia,5 the 'Encyclopedia Americana,5 the North American Review, the Catholic World , the Catholic Educational Re¬ view, etc., and editorial writer on the Wash¬ ington Post.

LENNOXVILLE, Canada, village in Sherbrooke County, province of Quebec, 105 miles southwest of the city of Quebec, at the confluence of the Massawippi and Saint Francis rivers, and on the Grand Trunk and Canadian Pacific railroads. Bishop's College and Bishop's School are located here. Pop.

1,211.

LENOIR, le'nwar', Alexander Albert,

French architect: b. Paris, 21 Oct. 1801; d. there, 17 Feb. 1891. He was educated at the College Bourbon and under Debret at the ficole des Beaux-Arts. Through the publica¬ tion of 'Projet d'un musee historique) (1883), he secured the adoption of his plan to unite the Palais des Thermes and the Hotel de Cluny as the Musee de Cluny and received the appointment as an architect to execute the

work. He became life-secretary of the Lcole des Beaux-Arts in 1862 and a member of the Academie des Beaux-Arts in 1869. His work in the reproduction of mediaeval buildings was particularly notable. Author of 'Instruction sur l'architecture monastique au moyen age5 (2 vols., 1852-56) ; 'Statistique monumentale de Paris5 (1861-67), etc.

LENOIR, le nor, N. C., town and county seat of Caldwell County, 70 miles northwest of Charlotte, on the Carolina and Northwestern Railroad. The Davenport Female College is located here and Blowing Rock, whose eleva¬ tion is 4,500 feet, is near. There are gold and mica mines and the surrounding country is in¬ terested in agriculture and fruit-raising. The town has tanneries and planing-mills and manu¬ factures of furniture and cotton stuffs. Pop.

(1920) 3,718.

LENOIR CITY, Tenn., city of Loudon County, 23 miles southwest of Knoxville, at the confluence of the Tennessee and Little Tennessee rivers and on the Southern Rail¬ road. It has abundant water power and oper¬ ates carworks, lumber yards, a flour mill and cot¬ ton spinning and knitting factories. Pop. 4,210,

LENOIR ENGINE. See Internal Com¬ bustion Engine.

LENORE, la-no re, ballad by Burger (1773), named from its heroine and based on the old Slavic legend that the tears of a maiden shed over the death of her betrothed may cause him to return from the grave in the guise of a vampire, carry her away to the graveyard and destroy her, unless she should be rescued in some miraculous fashion. The name is also used in two poems by E. A. Poe, 'The Raven) and 'A Paean5 (1831), afterward rechristened 'Lenore.5

LENORMANT, le-nor-man, Charles, French archaeologist and art historian: b. Paris, 1 June 1802; d. Athens, Greece, 24 Nov. 1859. He became inspector of fine arts in 1825, pro¬ fessor at the Sorbonne in 1835 and was pro¬ fessor of Egyptian archaeology in the College de France from 1848 till his death. Among his writings

are 'Des artistes contemporains) (2 vols., 1833) ; 'Questions historiques) (2 vols., 1845) ; 'Musee des antiquites egyptiennes5 (1842) ; 'Le tresor de numismatique et de glyptique) (5 vols., 1836-50) ; 'Elite des monu¬ ments ceramographiques5 (1844-57, with de Witte).

LENORMANT, Francois, French his¬ torian and archaeologist, son of Charles Le- normant (q.v.) : b. Paris, 17 Jan. 1837; d. there, 10 Dec. 1883. He was one of the foremost of French Assyriologists and from 1874 was pro¬ fessor of archaeology at the Bibliotheque. Among his very numerous works are 'Re- cherches archeologiques a Eleusis5 (1862) ; 'Essai sur l'organisation politique et econ- omique de la monnaie dans l'antiquite5 (1863) ; 'Manuel d'histoire ancienne de l'Orient5 (1868) ; 'Chefs-d'oeuvre de l'art antique> (1867-68) ; 'Les Tableaux du musee de Naples5 (1868); 'Histoire du peuple j uif 5 (1869);

'Les sciences occultes en Asie5 (1874-75) ; 'Les origines de l'histoire d'apres la Bible et les traditions des peuples orientaux5 (1880-82) ; 'Monnaies et medailles5 (1883) ; 'La Grande- Grece5 (1881-83).

LENOX, James, American philanthropist : b. New York, 19 Aug. 1800; d. there, 17 Feb. 1880. He was educated at Columbia, and in 1839, on the death of his father, a wealthy Scot¬ tish merchant of New York, he inherited a fortune of several millions and 30 acres of land between Fourth and Fifth avenues. After his father's death he retired from business and de¬ voted his time to study and the collection of fine books, statuary and painting. After some years he became the possessor of the most extensive private collection of books and paint¬ ings in the United States. In 1870 he erected a large and costly building on Fifth avenue, be¬ tween 70th and 71st streets, to contain his col¬ lection. On 23 May 1895 the Lenox Library was consolidated with the Astor Library and the Tilden Trust to form the New York Public Library. He founded the Presbyterian Hos¬ pital, his gifts to it amounting to $600,000. He also made important gifts to Princeton Col¬ lege and Seminary, and gave liberally to numer¬ ous churches and charities connected with the Presbyterian Church.

LENOX, Mass., town in Berkshire County, on the New York, New Haven and Hartford Railroad, about six miles south of Pittsfield and

the same distance from the boundary line between New York and Massachusetts. It was settled in 1750 and named in honor of Charles Lenox, Duke of Richmond. The town includes the villages of Lenoxdale and New Lenox. It is noted for its beautiful scenery and healthy climate. Within the town limits are Laurel and Mahkeenac lakes and spurs of the mountains called the Ledge, Perry Peak, Bald Head and Mattoon Hill. This locality is largely resi¬ dential ; the industries which contribute to the wealth of Lenox are located mainly in the large cities. Many noted people have been resi¬ dents of Lenox, among others Nathaniel Haw¬ thorne, Henry Ward Beecher and Fanny Kem¬ ble. The government is administered by town meetings. Pop. 3,060.

LENS, lonz, France, city in the depart¬ ment of Pas-dejCalais, nine miles northeast of Arras on the Defile and on the Lens Canal. It is an important coal-mining centre, has iron, steel and engineering works and manufactures sugar, steel cables and soap. It is an ancient town and was at one time fortified. It was the scene of a victory by the French under Conde over the Spaniards under Archduke Leopold William, 2 Aug. 1648. It was occupied by the Germans during the European War beginning August 1914, and was the scene of severe fight¬ ing at both the beginning and end of the strug¬ gle, being retaken by the Allies 3 Oct. 1918. Pop. 31,746.

LENS, a transparent body, generally glass, which refracts the rays of light convergently or divergently. Converging lenses, properly speak¬ ing, are called positive (trade designation plus, +), because they bring rays of light to an actual focusj thus forming a real image. Con¬ verging lenses give, under suitable conditions, a magnified image of an object, and one or both of their bounding polished surfaces are convex. The fact of their being thicker in the middle than at the edges distinguishes them from diverging lenses. Diverging lenses are called negative (trade designation, minus, ■ —) because they tend to cause the rays of light to

diverge and form, under all conditions, a virtual, reduced image of an object. One or both of their surfaces are concave and they can be dis¬ tinguished from converging lenses by their be¬ ing thinner in the middle than at the edges. These two classes of lenses are each divided into three leading types. Those of the positive

/ a m nr 7 7F

Fig. 1.

or convex class are (I) double or bi-convex; (II) plano-convex; (III) convex-meniscus (trade term, periscopic-convex). Those of the negative or concave class are (IV) double or bi-concave; (V) plano-concave; (VI) concave- meniscus (trade term, periscopic-concave). (See Fig. 1). 'Convex lenses converge parallel rays, as shown in Fig. 2, to a point (c) called

the principal focus or focal point, and the dis¬ tance from a certain point (b), called a prin¬ cipal point, which is usually within the lens, to the focal point (c) is the equivalent focal length. The straight line (d b c) which passes through the middle of the lens, joining the centres of the curvature of the two surfaces, is called the principal axis.

For brevity, the word ˆfocus® is often used instead of focal length. In a concave lens, the action on parallel rays is opposite to that of a convex lens ; instead of converging the light, it diverges the rays away from the axis, as shown in Fig. 3. The imaginary extension of the di¬ verging rays should meet at c, and when, as in

the case of the convex lens, the incident rays are parallel, the distance from the virtual focus c to the principal point b is the equivalent focal length. It will be noticed from the diagrams that the rays of light entering the substance of the lens are always bent toward the thickest part of the lens. Generally speaking, the real

or virtual focus increases with the increase of radius of curvature of the polished surfaces. The power of any lens is the quotient obtained by dividing unity by the equivalent focal length. A lens is said to be neutralized when combined with one of equal and opposite power, giving the effect of a plane glass. The distinctness of the image formed by a simple lens depends mostly on the extent to which the spherical aberration and the chromatic aberration are present, the aberrations being greater as the ratio of diameter to focal length increases in a lens of any given type. Spherical aberration of a lens is caused by the rays meeting at different intervals along the axis instead of combining at one point. In Fig. 4, ol is the spherical aberra¬ tion. Chromatic aberration is due to the sepa¬ ration of the light into its different colors, thus causing, in the case of a convex

lens, the violet rays to meet at a point v nearer the lens than do the red rays at point r. In Fig. 5 vr is the chromatic aberration. Both of these defects are corrected in achromatic lenses. The process by which this is accomplished is the combining of two or more lens forms of different kinds of glass which have differing angles of re¬ fraction. These are accurately fitted together and cemented into one piece. A very common combination is a convex crown glass with a

Fig. 5.

concave flint glass. A still better combination is a central disc of flint glass with a crown disc on each side of it — all being optically ground so as to correct both chromatic and spherical aberration.

Up to the present we have only considered lenses in which the curved surfaces are spherical, and for this reason are called spherical lenses. There are, however, other forms of lenses used, especially for the correction of defects in vision, principally astigmatism, of which the most important has one, sometimes both, of the curved surfaces cylindrical. These are

VOL. 17—19

called cylindrical lenses, or cylinders. In these lenses a line drawn along the summit of curva¬ ture, parallel to the axis of the imaginary cylin¬

der, is called the axis, and must be distinguished from the principal axis of a spherical lens. (Fig. 6). When the lens has two cylindrical sur¬ faces, with the axes at right angles, it is called a ((crossed cylinder® ; if one of the surfaces is spherical and the other cylindrical, the lens is called a ˆsphero-cylinder.® Another form of lens which has come into use in recent years is the toric (toroidal) lens on which one surface is toroidal, the meridians of the surface are at right angles to each other and have radii of

different curvature. Its form is. illustrated by a section of a bicycle tire. (Fig. 7). These lenses are much in use for lighthouses, being

usually built up by a series of concentric rings of almost prismatic form.

Type lenses are combined for economic use generally in four ways: (1) to produce an en¬ larged image, as in the reading-glass and mi¬ croscope ; (2) to produce a smaller image, as in the photographic camera; (3) to gather and project rays of light in a cylindrical beam, as in the lens of a lighthouse, or the condenser of a stereopticon ; (4) to condense and project to a focal point, as in the burning glass. The lenses for telescopes, microscopes, cameras and stereopticons require to 'be ground and polished with the most exquisite accuracy. In a some¬ what less degree accuracy of form and finish is required in spectacle lenses. The following list comprises the usual forms of lenses in commercial use :

Achromatic Lens. — In its simplest form is a combination of a converging crown glass lens and a diverging flint glass lens so proportioned that the chromatic aberration is corrected for two colors. These lenses are generally com¬ bined by a thin transparent cement which makes them together appear and operate as one lens. (See Fig. 8). They are also made up of three, four or five lenses cemented together.

Aplanatic Lens. — A lens or a lens system which is free from spherical aberration.

Apochromatic Lens. — An achromatic lens in which the chromatic aberration is corrected for three colors and the spherical aberration is also very perfectly corrected.

Bi-focal Lens. — A double focus spectacle lens first introduced by Benjamin Franklin, and now commonly made by adding to or inserting a segment in the lower half of the lens.

Bull's-eye Lens. — A piano convex lens of relatively short focus used for illuminating pur¬ poses, generally in a hand lantern.

Cataract Lens. — A short focus convex lens to aid vision after the removal of the crystalline of the eye for cataract.

Coddington Lens. — Originally the central portion of a glass sphere but is now generally made a single lens of considerable thickness with convex surfaces, with a circular groove to cut out the marginal rays.

Collective Lens. — In a microscope or tele¬ scope eyepiece the large lens nearest the objective.

Compound Lens (a trade term). — A lens in which combinations of

piano, spherical, cylin¬ drical or toric surfaces are made, sometimes to the extent of obtaining a prismatic effect.

Condensing Lens. — A convex lens or a sys¬ tem of lenses for concentrating light to a point or on a surface.

Coquille Lens (trade term). — A piece of colored glass of uniform thickness and having concentric spherical surfaces.

Crossed Lens. — Either a double convex or double concave lens with the radii of curvature in the proportion of 1 to 6, and giving the mini¬ mum amount of spherical aberration.

Crystalline Lens. — The natural double convex fluid lens in the eye situated behind the iris and aiding to form the image on the retina.

Demonstration Lenses. — A series of lenses of pronounced curvatures to illustrate the various types of lenses.

Doublet Lens. — A combination of two separate single lenses. These lenses may be either simple or compound.

Eye-lens. — The lens nearest the eye in eye-pieces (oculars) used for microscopes and telescopes.

Eyeglass Lens. — A spectacle lens used to aid vision. As a single lens it is held in position by muscular contraction. The eyeglass with lenses for both eyes is generally accepted to mean the form which is held in position by clamping upon the nose (French, pince-nez) , or it may be attached to a handle.

Finder Lens. — A lens or a combination of lenses attached to a camera to locate the bound¬ aries of the field of view.

Fluid Lens. — A lens produced by filling the space formed by two transparent surfaces with a suitable liquid.

Fresnel Lens. — A lens formed of a cen¬ tral piano convex or toric convex lens bounded by ring-shaped prisms and lenticular prisms, used to project the rays from a lamp, as in a lighthouse or railway signal light.

Immersion Lens. — A microscope objective of high power, the front lens of which is con¬ nected by fluid to the cover glass of an object, thus giving increased angular aperture.

Kryptok Lens. — A spectacle lens com¬ pounded by countersinking the ordinary lens and filling the aperture with glass of a different angle of refraction and fusing the two into one in the electric furnace.

Magnifying Leps (Magnifier). — A lens or a series of two or three lenses used to increase the apparent size of an object, mounted so that one, two or three may be used separately or superposed one upon the others, and in con¬ venient form for the pocket.

Pebble Lens (trade term). — A spectacle lens made of rock crystal which is harder than glass and has a different angle of refraction.

Photographic Lens (also photographic ob¬ jective). — A lens or a combination of lenses designed for photographic purposes. It is made in a great variety of types, the simplest being the single achromatic convex meniscus lens. The form in most common use is composed of two separated achromatic menisci, with their concave surfaces toward one another, known commercially as symmetrical, rectilinear or aplanat. The portrait lens, another type, gen¬ erally of large diameter, having great light¬ gathering power, is composed of two separated achromatic lenses, one cemented and the other uncemented (Petzval type). The most modern photographic lens is the anastigmat, invented by P. Rudolph, which is free from astigmatism, a fault present in all earlier types. The new varieties of optical glass made in Jena were first successfully employed in these lenses, by means of which greater perfection in other di¬ rections was also attained.

Punktai Lens. — A spectacle lens corrected for astigmatism over a field of 80 degrees. See Spectacles.

Spectacle Lens. — A lens used to correct

vision and when two are combined by a bridge which rests on the nose and provided with bows which clasp the temples is now generally termed spectacles.

History. — The early history of lenses is quite vague. While the magnifying property of glass globes filled with water and presum¬ ably of glass beads was known, there is no authentic information that lenses were made and used. There is in the British Museum a

piece of rock-crystal about the size of a modern spectacle lens, cut to a piano convex form which was found by Layard during the excavations at Nimroud. Instead of having a spherical sur¬ face, it is made up of a series of facets and the crystal is permeated by cloudy striae. Alhazen, who died about 1052, first described the magnifying effect of simple lenses. Spec¬ tacle lenses were well known in the 13th cen¬ tury, and their invention is credited to Salvino, d'Armato degli Arma'ti, about 1255. The com¬ bination of two single lenses, thus forming a compound microscope, for the purpose of magnifying objects, is believed to be due to Hans and Zacharias Janssen of Middleburg, Holland, about 1590. The discovery of the telescope, which is credited to Galileo, about the year 1610, was in its original form a com¬ bination of convex lens of long focus with a concave lens of short focus, and this form is still retained in the ordinary opera glass, which is designated as a Galilean telescope. The achromatic lens was the next important inven¬ tion and was made by Dolland in England in 1758. The making of lenses was revolutionized in 1886 by the announcement of 19 new kinds of glass by the Jena Glass Works of Jena, Germany. In 1888, 24 other kinds were placed on the market; and eight more in 1892. Not all of these were suitable for making lenses, but some of them proved superior and new com¬ binations with former glasses were possible, resulting in some of the most remarkable in¬ strumental lenses theretofore produced. In July 1914 a practical glass maker was added to the force of the Bureau of Standards of the United States, and this bureau has since made some of the finest optical glass ever produced. See Glass; Jena Glass; Lighthouse; Micro¬ scope; Optics; Photography; Stereopticon ; Telescope. Consult Bolas, T., and Brown, G. E., (The Lens> (New York 1902) ; Fraprie, F. R., (How to Choose and Use a Lens) (Boston 1915) ; Hovestadt, H., (Jena Glass, and Its Scien¬ tific and Industrial Applications) (London 1902) ; Prentice, C. F., 'Ophthalmic Lenses and Prisms) (Chicago 1917) ; Thorington, J., Re¬ fraction and How To Refract (Philadelphia 1914) ; United States Bureau of Standards Re¬ print 122, 'The Resolving Power of Objectives1* (Washington 1909) ; Wood, R. W., (Physical Optics* (New York 1911).*

LENS, in geology. See Bed.

LENSTROM, lan'strem, Carl Julius, Swedish clergyman, poet and critic : b. Gefle, 9 May 1811; d. Vester-Lofsta, 6 April 1893. He was educated at the University of Upsala and took orders in 1834. He was instructor in the history of literature at Upsala in 1836-43, and lecturer in philosophy at the Gymnasium at Gefle in 1843ˆ15. From 1845 he was rector at Vester-Lofsta. His literary productions in¬

cluded history, fiction, poetry, philosophy and theology. Author of (Bidrag till den svenska aesthetikens historia) (1840) ; a Swedish church history, 'Larobok i allmanna och svenska Kyrkohistorien> (1843); in verse 'Cromwell (1860); and 'Gustaf II Adolf> (1860);*

LENT (from Anglo-Saxon Lend, spring), the spring or vernal fast of the Christian Church as observed, in preparation for Easter,

by members of the Greek, Roman and Anglican churches. The original fast of spring which preceded Easter was of 40 hours' duration, this being the number of hours that intervened between the death and resurrection of Christ. Additional days were added, their number vary¬ ing in different churches. Cassian (420 a.d.) says six or seven weeks was the period in the several churches, but none exceeded 36 fasting days. He affirms that the observance of Lent is not primitive. The historian Sozomen (440 a.d.) writes of the fast "The Quadragesimal fast before Easter some observe six weeks, as the Illyrians and Western churches; others make it seven weeks, as the Constantinopolitans and 'neighboring churches.® In the first three or four centuries much latitude was allowed in the observance of Lent; Chrysostom recom¬ mends, but does not enforce it, insisting on the prior necessity of good works and alms-giving. Distinction of foods was not made in primitive times, when the greatest ascetics ate meat in Lent, though they abstained from eating until the evening. In its present form it dates from the 9th century. See Fasting; Ash Wednes¬ day ; Holy Week.

LENTHALL, William, English parlia¬ mentarian: b. Henley-on-Thames, June 1591; d. Besselsleigh, 9 Nov. 1681. He was educated at Oxford, was called to the bar at Lincoln's Inn in 1616 and became a bencher in 1633. He was member of Parliament for Woodstock in the Short Parliament, April 1640, and was selected by Charles I to be speaker of the Long Parliament, beginning 3 Nov. 1640. He was a man of much pliancy of nature and was bitterly criticized as a time-server in the troubles of his day; but ort the occasion of the appearance of Charles I in the House of Commons, 4 Jan. 1642, for the purpose of arresting five members, he won the gratitude of Parliament by his dig¬ nified refusal to disclose their whereabouts. He was shortly afterward granted the sum of £6,000 for expenses connected with <(strict and long attendance® in the House. He was ap¬ pointed master of the rolls 22 Nov. 1643 and was a commissioner of the great seal in 1646- 48, having sided with Parliament at the out¬ break of the rebellion, although he was prob¬ ably at heart a royalist. He put the question for the king's trial from the chair, in the belief, he afterward maintained, that the majority

were in favor of clearing him. While he con¬ fessed that much of his conduct was based upon personal cowardice he nevertheless had the courage to use his casting vote to save the lives of the Earl of Norwich, 8 March 1649, and Sir W. D'Avenant, 3 July 1650, both royal¬ ists. He was speaker of the first Parliament under Cromwell in 1654 and was member from Oxfordshire in 1656, and was again speaker of the Long Parliament 1659. He aided the resto¬ ration of the Stuarts, but was not returned to the House of Commons and was deprived, of his office of master of the rolls by the king. He was permitted to appear at court after tes¬ tifying against the regicide, Thomas Scott.

LENTICEL, in botany, a mass of round¬ ish cells characterized by having a greater or less likeness in shape to a double-convex lens. It is exemplified in the inner bark of trees and woody plants of mature age, where a lenticel underlies each of the many openings through

the bark, usually denoted externally by wart¬ like excrescences, by which the air enters to furnish oxygen and other gases to the interior of the wood, where connected openings between the cells carry the gases to all parts of the plant — a provision very necessary to its health. These openings at the lenticels are partly closed in winter by a growth of corky, cortical cells, but reopen in spring and resume their supply of air to the reviving life of the plant.

The same name is given, in physiology, to one of the follicles at the base of the tongue that secrete and supply to the tongue the moisture (mucus) that it requires in order to exercise the sense of taste, and to perform its function generally.

LENTIL, a European leguminous plant (Ervum lens), closely allied to the tares and vetches. Lentils are cultivated in southern Europe in two varieties — the large garden len¬ til and the common field lentil, for the sake of their seeds contained in small pods. The straw of lentils is good food for cattle and sheep, and when mixed with vetches, and sowed as food, is excellent fodder. As food for man lentils are very nutritious, and in Egypt, Syria, Mexico, etc., are an important article of diet. They are used in soups, etc., in England and the United States, but not to a great extent. –

LENTIL, in geology. See Bed.

LENTINI, len -te'ne, or LEONTINI (anc. Leontium) , Sicily, city in the province of Syra¬ cuse, 18 miles southwest of Catania by rail, six miles from the coast, and on Lake Lentini, the largest body of water in Sicily. The town was founded by Chalcidians, from Naxos, 729 b.c. It was captured by Hippocrates of Gela in 498 b.c., appears to have been unimportant in Roman times, was destroyed by the Saracens, 848 A.n., and was practically leveled by the earthquake of 1698. It was the birthplace of Euclid. The modern town manufactures earthenware and is a market for grain, oil, wines, flax, fish and game, and cattle. The neighborhood is highly malarial. Pop. 22,904.

LENTULU.S, len'tu-lus, the name of a patrician family of Rome of the Cornelian gens. Several of its members distinguished them¬ selves by their virtues and services, while others were less honorably conspicuous. Pub¬ lius Lentulus Sura was quaestor under Sulla (81 b.c.) , praetor (75 b.c.) and consul (71 b.c.). He was expelled from the senatorial order by the censors, but became praetor again in 63 b.c., while Cicero was consul. As one of the ac¬ complices of Catiline, Lentulus was indicted in the conspiracy and put to death in prison. Lentulus Spinther, one of the most luxurious and ostentatious men of his age, was curule aedile (63 b.c.), praetor (60 b.c.) and consul in 57, when he was instrumental in procuring Cicero's recall. He was governor of Cilicia and Cyprus from 56-53 b.c. Later he became a partisan of Pompey, but was pardoned by Caesar and joined Brutus and Cassius when they took the field after the assassination of Caesar. L. Cornelius Lentules Crus, who was the chief accuser of Publius Clodius for violating the mysteries of the Bona Dea. He became praetor in 58 b.c. ; consul in 50 b.c., and in this capacity bent all his efforts toward encouraging an armed resistance to Caesar. Upon Caesar's victory, he fled to Greece; and when Pompey's

defeat at Pharsalus made it impossible for Lentulus to return, he embarked for Rhodes. After wandering through Cyprus, he went eventually to Egypt where he was put to death by Ptolemy.

LENZ, Oskar, German explorer and geog¬ rapher : b. Leipzig, 18 April 1848. He studied at the University of Leipzig, was appointed to the Austrian Geological Institute and was en¬ gaged in expeditions to Croatia, Hungary and Bohemia. He was in West Africa on a scien¬ tific expedition for the German African Com¬ pany in 1874-77 ; and in 1880 he succeeded in crossing the western part of Sahara and reach¬ ing Timbuktu. The Mahdi revolt having cut off Junker, Casati and Lupton, he in 1886 organized and headed the relief expedition.

He was ap¬ pointed professor of geography at the German University of Prague in 1887, was rector there in 1902-03 and retired in 1909. He collaborated with Hochstetter in the preparation of (Die zweite deutsche NordpolfahrG (1874). Author of (Skizzen aus Westafrica' (1878); Tim¬ buktu : Reise durch Marokko, die Sahara und den Sudan > (2 vols., 1884) ; 'Wanderungen in Afrika) (1895); (Ueber Geld bei Naturvol- kern> (1895); (Marokko, Geschichte, Land,

und Leute) (1907), etc.

LEO, the name of 13 popes, as follows:

LEO I, Saint (surnamed the Great), Pope from 440-461: b. Rome or Tuscany; d. Rome, 10 Nov. 461. Of the Roman popes only Leo I and Gregory I received the designation (III to adjust the dispute between the general Aetius and the chief magistrate Albinus, when Pope Sixtus III died, 19 August. While still absent Leo was elected Pope and upon his re¬ turn was consecrated, 29 Sept. 440. He set about securing unity in the Church and in 443 began measures for the suppression of the Manichaeans and other heretics, succeeding in returning many to the Church and in banishing others. He greatly strengthened the central authority of the Church and a signed evidence of his success exists in the edict of the Emperor Justinian III which directed that the authority of the bishop of Rome was necessary for any innovations, and that ((the decree of the apostolic see should thenceforth be law.® Leo's correspondence with Turibius of Astorga in 447 culminated in the denouncement of Prescil- lianism by the Church in Spain ; in 449 he held a council in Rome against the Eutyches, whose council held earlier in the year Leo denounced as the "Robber Synod® ; and in 451 he addressed to the General Council at Chalcedon, over which he presided by legates, his famous "dog- matic letter® to Flavian, defining the doctrine of the Incarnation. His letters are of great importance in Church history and 143 of them are in existence, together with 30 written to him. When Attila threatened to invade Italy, after the fall of Aquileia, Valentinian sent Leo

to dissuade the invader from his purpose and the persuasive powers of the Pope made the mission successful. Leo also saved Rome from being burned by Genseric in 455 and secured the pledge of the vandal to refrain from murder and to spare the three oldest basilicas

in his pillage of the city. His achievements in the direction of establishing the authority of the successors of Saint Peter on a monarchial basis, and the strength of his administration of Church proceedings in Africa, Gaul and Spain, no less than in Rome, marked his rule as of exceptional importance. He was famous also for his sermons, which were brief but excellent, and upon which many of the lessons in the Roman breviary are based. His name day is 11 April. His sermons and letters were edited by Ballerini (Venice 1753-57). Consult Arendt, (Leo der Grosse und seine Zeit) (1835) ; Gore, (Leo the Great) (1880).

LEO II, Saint, Pope (August 682 to June 683) : b. Sicily; d. Rome, 28 June 683. He was elected Pope a few days after the death of Pope Agatho, 10 Jan. 681, but was not con¬ secrated until 17 Aug. 682. He confirmed the decrees of the Sixth CEcumenical Council, held in Constantinople in 680-81 under the presi¬ dency of the legates of Pope Agatho, and which condemned Pope Honorius I for not summarily suppressing heresy. Leo wrote several letters on the subject, explaining the decree and ab¬ juring his bishops to subscribe it; making it clear, however, that his anathematizing of Honorius was not an accusation of his teaching heresy, but of his showing too great leniency in dealing with it. The letters are particularly important in their bearing upon the infallibility of the Pope. He succeeded in settling the diffi¬ culties existing between the sees of Rome and Ravenna, the archbishops of Ravenna wishing to be independent of the direct jurisdiction of the Pope. Leo abolished the tax formerly im¬ posed upon the archbishops when they received the pallium ; but, while insisting that they come to Rome for consecration, limited their exacted visit to eight days and permitted their yearly homage to the Pope to be presented through a delegate. His name is connected with the improvement of the Gregorian Chant and he was instrumental m raising the grade of church music. His day is 28 June.

LEO III, Saint, Pope (December 795- May 816) : b. Rome; d. there, 25 May 816. He succeeded Adrian I, 26 Dec. 795 and was con¬ secrated the next day. Upon his election he sent to Charles the Great (Charlemagne) the keys of Saint Peter's and the standard of the city of Rome in acknowledgment of the suzerainty of the king. He received in leturn letters of congratulation and a rich share ot the treasure captured by the king from Avars, and was thereby enabled to deal generously with the churches and charitable institutions of Rome. A conspiracy formed by two nephews of Adrian I, to deprive Leo of the papacy by destroying his eyes and tongue, thus rendering him unable to fill the office, was brutally at¬ tempted during a papal

procession in 799, but Leo succeeded in escaping with minor injuries and afterward made his way to Charles at Paderborn. He was received with respect and later escorted in state to Rome where he was highly acclaimed. The conspirators against

him were banished. In 800 Charles returned to Rome and was crowned by the Pope em¬ peror of the Romans. While the subordinate position of Leo became thus clearly defined the result was to ensure the protection of the em¬ peror for the Roman Church and Christendom against the heathen, and the arrangement con¬ tinued satisfactorily during Charles' lifetime. Upon the accession of Louis conspiracies were again formed against him, but Leo was warned in time and the conspirators were seized and punished. However, the question of sovereign jurisdiction in Rome was again revived and Leo died before a decision was reached. He was known as a benefactor of the poor and a patron of art. Among the mosaics made under his direction is one in the Lateran, Rome, showing Saint Peter giving the pallium to Leo III and the standard to Charles.

LEO IV, Saint, Pope (April 847-July 855) : b. Rome; d. there, 7 July 855. He suc¬ ceeded Sergius II, and was consecrated 10 April 847 without waiting for the consent of the em¬ peror because of an impending attack of the Saracens upon Rome. He thoroughly repaired the walls of the city, entirely rebuilding 15 of the great towers, and enclosed Vatican Hill by a wall, a precaution not previously taken. The fortified portion of the city was named Civitas Leonina in his honor. He rebuilt Portus for the benent of Corsican exiles driven from their homes by the Saracens, and fortified other Roman towns. He repaired the damage done to Saint Peter's and other Roman churches in the Saracen raids of 846. He held three synods, at one of which Louis II was crowned emperor. His alleged miracle of extinguishing a fire by prayer is pictured in Raphael's work in the Sala dell' Incendio at the Vatican.

LEO V, Pope : d. probably 6 Dec. 903. He was a Benedictine monk who, in 903, succeeded Benedict IV, but was imprisoned by his chaplain Christopher, and died soon after.

LEO VI, Pope : d. probably 3 Feb. 929. He succeeded John X, 6 July 928, and is said to have been put to death by Marozia.

LEO VII, Pope: d. 13 July 939. He suc¬ ceeded John XI, son of Marozia. He success¬ fully negotiated a peace between Hugo, king of Italy, and Alberic, Duke of Rome, the son of the celebrated Marozia, and is reported to have been an irreproachable man and zealous

ecclesiastic. His successor was Stephen IX. Consult Gregorovius, F., (History of the City of Rome in the Middle Ages) (Vol. Ill, London

1895).

LEO VIII, Pope (July 964-Feb.-April, 965) : d. 965. He was intruded in the pontifi¬ cate on the pretended deposition of John XII, in 963, under the patronage of Otho I, but on Otho's withdrawal John re-entered Rome, and drove away Leo. John's death occurring soon after, Benedict V was chosen Pope. The Em¬ peror Otho subsequently took Rome, and after the banishment of Benedict again intruded Leo, who shortly after died. He is regarded as the true Pope from the abdication of Benedict V in July 964 until his death between February and April of 965. Documents purporting to vest in the emperor the nomination of popes and bishops, supposed to have been given by Leo, are generally considered forgeries.

LEO IX, Saint (Bruno), Pope (1049— 54) : b. Egisheim, near Colmar, on the borders of Alsace, 21 June 1002; d. Rome, 19 April 1054. He came of a noble family and through his father was second cousin to Emperor Con¬ rad II. He was educated at Toul, became canon there and in 1026 bishop. He rendered valuable political services to his cousin Con¬ rad II, and to Henry III, and became famous for his wide learning and 'his zeal in correcting abuses. Upon the death of Pope Damascus II, in 1048, Bruno was elected Pope and was consecrated as Leo IX, 12 Feb. 1049. He put down an effort of ex-Pope Benedict IX to seize the papal chair, and immediately set about a reorganization of financial affairs. At the Easter synod of 1049 he initiated his warfare on two notorious evils, simony and clerical in¬ continence, continuing his efforts at later synods held in Rome and in the course of various progresses he made through Italy, Germany and France. In 1053 he moved against the Nor¬ mans in Italy with an army composed of Italian and German volunteers, but was defeated at Astagnum near Civitella 18 June 1053 and was taken prisoner by the Norman leader, Robert Guiscard. He was confined at Benevento for 10 months, but treated with the utmost respect, and upon falling ill he was permitted to re¬ turn to Rome where he died shortly afterward. His life was distinguished by his purity and strength, of purpose. His name day is 19 April. Consult Hunkier, (Leo der Neunte und seine Zeit) (1851) ; Milman, (History of Latin Christianity) (Vol. Ill, 1903) ; Mann, (Lives of the Popes in

the Early Middle Ages) (Vols. IV, VI, 1910).

LEO X (Giovanni de' Medici), Pope (151 3— 21) : b. Florence, 11 Dec. 1475; d. Rome, 1 Dec. 1521. He was the second son of Lorenzo the Magnificent, and his father had him made a cardinal by Innocent VIII at the age of 13. When the Medici were expelled from Florence, in 1494, he spent some years in travel in Ger¬ many, France and Flanders, and made ac¬ quaintance with many eminent men, returning to Rome in 1503 and devoting 'himself to science and the fine arts. He was appointed by Julius II legate with the papal army, and in 1512 was taken prisoner by the French at the battle of Ravenna, regaining his liberty only after the evacuation of Milan bv the French. In 1513 on the death of Julius II, he was elected Pope, and made his entry into Rome on 11 April, the anniversary of his capture at Ra¬ venna. His pontificate of nine years is one of the most eventful of modern history, when viewed in relation to great political changes, to the revival of literature and, above all, to the Reformation. He succeeded in putting an end to the dispute between Louis XII and the court of Rome; he continued and brought to a close the Council of the Lateran ; and, at a confer¬ ence held at Bologna, concluded a concordat with Francis I of France. In 1517 he created the unexampled number of 31 cardinals, among whom were Cajetan, Campeggio, Trivulzio ana other learned and eminent men. He planned a great war against the Turks, and resolved about the same time to complete the church of Saint Peter at Rome, and in order to raise funds for these schemes he granted to all the faithful, who should contribute by their alms,

certain indulgences, the preaching of which in Saxony was one of the forces which resulted in the Reformation. Leo published his first bull against Luther in June 1520, and Luther ap¬ pealed to a general council and publicly burned the bull at Wittenberg. A second bull appeared against Luther in January 1521, and the papal anathema was echoed by the doctors of the Sorbonne. At the same period war was re¬ sumed between the Emperor Charles V and Francis I, the Pope allying himself first with Francis and soon after with Charles. As an intelligent patron of literature and the fine arts, he was surrounded with many of the most dis¬ tinguished men of his time. He stimulated the study of Greek and the collection of ancient manuscripts ; restored the Roman University and the great Laurentian Library of Florence. His worldliness was regarded with extreme dis¬ favor by the Church, although in matters of be¬ lief and personal moral conduct no criticism was brought against him. But he refused to recognize the serious nature of the dangers threatening the papacy, ignored the urgent need for reforms and, on*

the whole, was ever the prince rather than the Pope. His good quali¬ ties and many achievements were of a secular instead of a religious nature, and his pontifi¬ cate was regarded as unfortunate for the Church. Consult Roscoe, (Life and Pontificate of Leo X> (1805) ; Creighton, (History of the Papacy During the Period of the Reforma- tion) (Vols. III-V, 1882-94) ; Niti, (Leone X e la sua politica) (1892) ; Conforti, (Leo X ed il suo secolo) (1896).

LEO XI (Allessandro Ottaviano de' Me¬ dici), Pope (I- 27 April 1605) : b. Florence 1535; d. 27 April 1605. He was consecrated bishop of Pistoria 1573, became archbishop of Florence in 1574 and entered the college of cardinals. He was appointed legate to France by Clement VIII in 1596 and there aided in suppressing the Hugenot influence at the court of Henry IV. On 1 April 1605 he became Pope. He survived only 26 days after his elec¬ tion.

LEO XII (Annibale della Genga), Pope (1823-29) : b. near Spoleto, 1760; d. 10 Feb. 1829. He entered the priesthood in 1783, was made titular archbishop of Tyre 10 years later and became a cardinal in 1816. He was bishop of Sinigaglia until 1820, when he was appointed cardinal vicar at Rome. In 1823 he succeeded Pius VII. He was a strong opponent of secret societies, such as the Free-masons and the Carbonari. Consult Artand de Montor, (His- toire du Pape Leon XII > (1843).

LEO XIII (Joachim Vincent Raphael Lodovico Pecci), Pope (1878-1903) : b. Carpinto, 2 March 1810; d. Rome, 20 July 1903. His father was Count Domenico Lodovico Pecci, and his mother Anna Prosperi-Buzi. The palace in which Joachim was born was the coun¬ try house of the family. Count Lodovico Pecci confided his sons, Joseph and Joachim (or Vincent) to the Jesuits of Viterbo, who very recently had been restored by Pius VII to the privileges of which Clement XIV had deprived them. In 1818, Joachim Pecci began his educa¬ tion in the Jesuit college of Viterbo. That de¬ votion to the Greek and Latin classics which later gave him fame as a poet, showed itself early. At the age of 12 he was skilled in

writing Latin verse. There still exists an epigram for the provincial of the Jesuits,—

“Oh, utinam possem Pecceius ipse sequi.”

In 1824, Leo XII carried further the plans of Pius VII and reopened the Roman College of the Society o.f Jesus. This college is like¬ wise known as the Gregorian University. Young Pecci entered and applied himself to his studies with so much earnestness that his health gave way, and, in 1830, though he received the highest honor — that of being chosen for a pub¬ lic disputation in philosophy on theses taken from the whole course, — the Prefect of Studies was obliged reluctantly to excuse him. Still he strove for that perfect health which was denied him. He was a mighty hunter and his gun, — very old-fashioned, with a barrel decorated in the Arabian manner, — is still pre¬ served, and he walked great distances.

In 1832, Joachim Pecci took the degree of doctor, with all possible honors, chiefly recorded in the annals of the Sapienza University. In the College of Noble Ecclesiastics he studied canon and civil law. In 1837, Gregory XVI named him domestic prelate, and he became known as Monsignor Pecci. On the last day of the year 1837, he was ordained priest by Cardinal Odescalchi, the vicar-general of Gregory XVI. One of the most important epochs in the history of Monsignor Pecci is his administration of the duchy of Benevento. It was the haunt of smugglers and brigands, licensed by public opinion and supported by noble families. It had given Gregory XVI, who was a lover of justice and order, pro¬ found anxiety. At the age of 28 Monsignor Pecci was made delegate and sent to do what the Neapolitan neighbors of Benevento sneer- ingly said was ˆimpossible.® Monsignor de Z’Saeclaes well says that his government of Benevento is (XVI died shortly after his arrival in Rome. Pius VIII, the predecessor of Gregory, was followed by another Pius, — Cardinal Mastai Ferretti — who appreciated the value of Pecci so greatly that he felt that as arch¬ bishop of Perugia the late Nuncio to Brussels

could be of more service in healing internal discord than in placating foreign kings and cabinets. He was preconized, — solemnly pro¬ claimed in conclave, — the archbishop of Peru¬ gia, on 19 Jan. 1846, and on 26 July he made his solemn entry into the capital of the country of Saint Francis d’Assisi. From 1846 to 1878 he ruled in Perugia. In the Consistory of 18 Dec. 1853, he was created cardinal. During his long episcopate, he found the world in miniature in Perugia. The growing antagonism against the Church haunted him. He was all for the things of the spirit, — the things of the ’mind, postulating the truth of the divinity of Christ and the reality of his birth, death and resurrection. In this line, he refutes the claims of

Renan, in his (Life of Jesus, > as eagerly as he refutes false Socialism later, in a Papal Let¬ ter.

On 7 Feb. 1878 Pius IX died. On Monday, 18 February, the cardinals met in conclave. Pecci, as Cardinal Camerlengo, walked last in the procession. On Wednesday, 20 February, by a vote of 45 out of 61, Cardinal Pecci be¬ came Pope. From 20 Feb. 1878 to 20 July 1903, Leo XIII was constantly active. He restored the Catholic hierarchy to Scotland, early in 1878, and issued his first Encyclical, Inscru- tabile, against the forces at work for the disin¬ tegration of society — putting strong accent on the disregard of the sacramental character of marriage. In 1878ˆ79 Leo XIII was in a most difficult position with the government of Ger¬ many. This later year marks the beginning of the decay of the Kulturkampf which strength¬ ened the Centre party in Germany and which made the name of Bismarck detested by Ger¬ man Catholics at home and abroad. In 1879 came the Encyclical, Quot Apostolici, followed by the Aiterni Patris — all encyclicals taking their names from the opening words. The first was aimed at that Socialism <(which at¬ tacks all that has been wisely decreed by human and divine laws for the protection and orna¬ ment of life® ; the second is an exposition of the claims of Saint Thomas Aquinas as a philosopher.

Another important encyclical, — it is not pos¬ sible to name them all, — appeared on 12 Feb. 1880. It was the Arcanum , on Christian mar¬ riage. Another, 29 June 1881, was the encycli¬ cal Diuturnum in favor of rightful authority. <(The Church,® he said, <(was everywhere the friend of honest liberty; she detested tyranny.® In 1882 he strove to keep the Irish movement within legal bounds. The encyclical Etsi Nos, of February 1882, gave rise to the rumor that he would leave Rome, so ˆintolerable® had the situation become. In 1890, the world gradually learned that for six years every historical docu¬ ment in the Vatican had been at the service of scholars. He omitted nothing that could add to the progress of historical science. The. en¬ cyclical, Humanus Genus, was aimed at Free¬ masonry, which assumes an atheistical and anti- religious aspect in Latin countries.

Leo XIII was aroused to intense enthusiasm for the work of Cardinal Lavigerie in breaking down the slave-trade in Africa, and his encyc¬ lical, In Plurimis, 5 May 1888, is evidence of his detestation of slavery. It is addressed to the bishops of Brazil. The prudence with which Leo XIII handled the question of the Knights of Labor was due to the tact he pos-

sessed of discovering the best advisers. There were forces at work urging the condemnation of this society; but, owing to the sanity and energy of Cardinal Gibbons, Cardinal Manning and Monsignor O'Connell, rector of the Catho¬ lic University, a disaster by which suspicion and dislike to the Church might have been excited was avoided.

The relations between the late Pope and the United States of America were very close. He established the Catholic University at Washing¬ ton, and constantly expressed interest in it. His solicitude for the Church in America was profoundly shown in the Apostolical letter, Testem Be.ncvolenticu, on (< Americanism," in which he paternally determines and settles a point for some time in controversy among American Catholics. In the beginning of the year 1893, Monsignor Satolli, afterward Car¬ dinal, became the first Apostolic Delegate to the United States. This is not a diplomatic but a purely ecclesiastical office. Cardinal Satolli was succeeded by Monsignor, later Car¬ dinal, Martinelli, and (1903) by Monsignor, later Cardinal, Falconio.

The' efforts of Leo XIII to direct attention to the study of the Scriptures are historic. Perhaps of all his letters which have a diplo¬ matic character, that written to the French in 1892 caused the greatest discussion. It was received by French Royalists with ill-concealed disgust. There is no question that the pontifi¬ cate of Leo XIII was of vital value in the history of the last quarter of the century.

As a poet, Leo XIII wrote exquisite Latin verse, a translation of which has been made by the Jesuit fathers at Woodstock, Md., and a later and fuller one by Dr. Hugh Henry, of Overbrook Seminary, in Pennsylvania. Con¬ sult biographies by Bonghi (Citta di Castello 1884) ; Wienand (2d ed., Cologne 1892) ; Furey (New York 1904) ; and also Goetz, (Leo XIII > (Gotha 1899). His encyclicals have been published in Latin and German (Freiburg 1878-1904) ; and in English (New York 1902).

Maurice Francis Egan, Former Envoy Extraordinary and Minister Plenipotentiary to Denmark.

LEO, le'b», the name of six rulers of the Byzantine empire, as follows

:

LEO I (surnamed Thrax, Magnus and Makelles), Byzantine emperor: b. Thrace, about 400; d. 474. He was a military tribune at the death of Marcian in 457, was raised to the throne through the influence of Aspar, com¬ mander of the military forces, and was recog¬ nized as emperor by both Senate and clergy. Aspar, despite his great power, could not be¬ come emperor because of his being an Arian, but thought to rule through Leo. Leo, how¬ ever, refused to be dominated. He steadily followed the leading of his predecessor in an effort to decrease the powers of the great nobles ; defied Aspar, changing his bodyguard from the Germanic one formed to uphold Aspar's power to Isaurian; confirmed the de¬ crees of the Council of Chalcedon and sternly suppressed the Eutychian heresy in Egypt. He repelled the Hun invasions of Dacia in 466 and 468, and in 467 had one of his generals, Authemius, elected emperor of. the West. To¬ gether they equipped an expedition to conquer the pirate Vandals of Africa, sending 1,100

ships and 100,000 men ; but the fleet was sur¬ prised by the Vandal king, Genseric, and nearly half of it destroyed. Leo seized upon the defeat as an excuse for having Aspar put to death as a traitor, the Vandals also being of Arian stock. The Goths, to revenge the fate of Aspar, laid waste the country as far as the walls of Constantinople. He was sometimes called Leo the Elder to distinguish him from his infant grandson, who succeeded him ; and his surname Magnus was given him by the Orthodox, while the Arians called him Makelles (butcher). Consult Gibbon, (The Decline and Fall of the Roman Empire) ; Cambridge Mediaeval History' (Vol. I, 1911).

LEO II called the Younger, grandson of Leo I, Byzantine emperor. He succeeded his grandfather under the guardianship of his father, who caused himself to be proclaimed emperor a few months afterward. He is said to have been put to death by his own father after reigning from January to November

474.

LEO III (surnamed the Isaurian), By¬ zantine emperor: b. probably in Isauria, but by some authorities in Germanicia, in the Syrian province of Commagene, about 680; d. 18 June 741. He entered the army of Justinian II, rose to distinction and under Anastasius II became supreme commander of the army in Asia. In 716 he marched against Theodosius III, who had been proclaimed emperor on the deposition of Anastasius II, and himself seized the crown in 717. His

accession was immediately followed by 'the siege of Constantinople by the Saracens under the caliph Solyman, and his stubborn resistance not only compelled the enemy to withdraw after a siege variously estimated at from one to two years, but removed from eastern Europe the danger of a Saracen in¬ vasion. He then proceeded to consolidate his empire, strengthening his frontiers by the en¬ couragement of settlers in the war-ravaged dis¬ tricts, and so thoroughly reorganized his armies that he was able to visit heavy defeats upon the Saracens when in 726 and 739 they again attempted invasion. He instituted civil reforms in taxation, marital and maritime laws and raised the serfs into a class of free tenants. An uprising against Leo, headed by the deposed Anastasius II, soon after the siege of Con¬ stantinople, resulted in the capture and execu¬ tion of Anastasius. One of the most notable acts of Leo's reign was the order, in 726, that all image-worship in the churches must cease. (See Iconoclasts). He was supported by the aristocracy and a portion of the clergy, but op¬ posed by most of the theologians and the monks. The edict caused a general revolution throughout the empire, and resulted in the loss of Ravenna, Rome and other portions of south¬ ern Italy and the separation of the Greek from the Latin Church. While partially unsuccessful in his attempt at religious reform the reign of Leo is on the whole noteworthy for its solid achievements. He is credited with so stabilizing the empire as to have been the means of its survival for the succeeding 500 years. Con¬ sult Gibbon, (Decline and Fall of the Roman Empire) ; Bury, (The Later Roman Empire' (1889) ; Hodgkin, F., (Italy and Her Invaders'

(1892).

LEO IV — LEO

297

LEO IV (surnamed Chozar, or Chazarus), Byzantine emperor: b. 25 Jan. 750; d. 8 Sept. 780. In his time the controversy raged fiercely between the Iconoclasts, or image breakers, and their adversaries, both of whom he protected by turns. He repulsed the Saracens in Asia. He was succeeded by his infant son Constantine VI, who had been crowned the year after Leo's succession, under the guardianship of Leo's wife, Irene (q.v.). See Iconoclasts.

LEO V, Byzantine emperor, called the Armenian, from the country of which he was a native: d. 25 Dec. 820. He rose to the rank of general by his valor, but was accused of treason, disgraced and imprisoned. Michael Rhangabus, on ascending the throne in 811, re¬ stored him

to his rank, but Leo, profiting by the misfortunes of his master, headed a mili¬ tary revolt and was elected emperor by the troops in 813. While the chief instigator of the disaffection among the soldiers which led to his elevation Leo justified himself in so far as to meet and crushingly defeat the Bulgarians who were planning a siege of Constantinople. So thoroughly did he break their armies that a peace of 74 years ensued. He was one of the most violent of the Iconoclastic princes and was severely criticized although he was ac¬ knowledged a useful emperor. A plot devised for the benefit of Michael I caused the former emperor to be condemned to death in a fiery furnace, but his friends rescued him by as¬ sassinating Leo V before the altar on Christmas Day, and reseated him on the throne. Consult Bury, J. B., (History of the Eastern Roman Empire) (New York 1912).

LEO VI (the Philosopher), Byzantine emperor: b. 865; d. 911. He was the son of Basilius, the Macedonian, and in 886 succeeded to the throne jointly with his younger brother, Alexander, who, however,. took no share in gov¬ erning. His reign was marked by various wars with barbarian states, including the Hungarians, Bulgarians and Saracens. Thessalonica was sacked and practically destroyed and Sicily and lower Italy were overrun. Leo VI appears to have possessed small claim to his surnames, the ((Wise® and the ˆPhilosopher.® He banished his early tutor, Photius, patriarch of Constanti¬ nople, upon his succession to the throne; and upon his own excommunication from the Greek Church, following his fourth marriage — an act forbidden by the Church — he deposed Nicho¬ las, the patriarch who had pronounced the ban upon him. His authorship of the literary pro¬ ductions credited to him has been questioned. Among the works bearing his . name are 'Oracula, a poem ; ˆrationes-* ; 'Basilica,* the completion of a digest of laws begun by his father; and an important treatise on military tactics, believed by some authorities to be the work of Leo III (Leyden 1612). Consult Gib¬ bon, (Decline and Fall of the Roman Empire*; Bury, (Later Roman Empire) (1887); Oman, (Byzantine Empire* (1892).*

LEO, Friedrich, German classical philolo¬ gist: b. Regenwalde, 10 July 1851; d. 1914.. He was educated at the universities of Gottingen and Bonn, and was afterward professor at the universities of Kiel, Rostock, Strassburg, Bonn and Gottingen. For many years he edited the philological journal Hermes. He also edited 'Senecae Tragaediae (1878-79) ;*

tunati Opera Poetica) (1881), and was author of 'Plautinische Forschungen) (1895) ; (Die griechisch-romische Biographie nach

ihrer lit- erarischen Form) (1901) ; (Saturnische Vers (1905); 'Geschichte der Romischen Literatur: Erste Band, Die Archaische Literatur* (1913), etc.*

V

LEO, Heinrich, German historian : b. Rudolstadt, 19 March 1799; d. Halle, 24 April 1878. He was educated at the Rudolstadt Gym¬ nasium and at the universities of Breslau, Jena and Gottingen, and in his student days was con¬ nected with the radicals of the German Bursch- enshaft or ((Black Band,® but was early alien¬ ated from them because of their extreme meas¬ ures and became a conservative. He became privat-docent at Erlangen in 1820, and in 1823 made a journey devoted to historical investiga¬ tion in Italy. He was docent at Berlin in 1822- 27, and for 40 years after 1828 he taught at Halle, gaining a remarkable reputation for his ability as a teacher through his powers of ex¬ position and his unusual memory. During the closing years of his life his mind was affected. He was a collaborator on the Jahrbucher fur Wissenscliaftliche Kritik during its existence, 1827ˆ16. Author of (Lehrbuch der Geschichte des Mittelalters) (1830) ; (Geschichte der

italienische Staaten (5 vols., 1829-32) ; (Zwolf Bucher niederlandischer Geschichten* (2 vols., 1832-35) ; 'Die Hegelingen* (1838) ; 'Lehrbuch der Universalgeschichte* (6 vols., 1835-ˆ44) ; 'Vorlesungen fiber die Geschichte des deutschen Volks und Reichs) (1854-66) ; 'Meine Jugen- zeit) (1880), etc.*

LEO, Leonardo, or, correctly, LIO- NARDO ORONZO SALVATORE DE LEO, Italian musical composer: b. San Vito degli Schiavi, now San Vito dei Normanni, near Brindisi, 5 Aug. 1694; d. Naples, 31 Oct. 1744. He was educated at the Conservatorio della Pieta dei Turchini, Naples, studying un¬ der Provenzale and Nicola Faga. While re¬ puted to have studied under Scarlatti and Pi'toni it is considered improbable, although his work obviously was influenced by them. He was maestro at the cathedral at Naples and at Santa Maria della Solitaria, became court organist and taught at 'the Conservatorio Saint Onofrio, Naples. He first attracted attention through his compositions for the stage, writing both comic and serious operas, but achieving his greatest success with his comic operas. His reputation as a composer, however, rests upon his sacred compositions, among which his (Miserere) and (Dixit Dominus best illustrate his masterly style and the magnificent effects he obtained with comparatively simple means. He was the first of the Neapolitan school to gain a complete mastery over modern harmonic*

counterpoint. The most famous of his pupils were Pucini and Jommelli. He wrote about 60 operas of which the best known was the comic opera Amor Vuol sofferenze, also known as*

LEO ("the lion®), in astronomy, the name given to one of 12 zodiacal constellations and denoted by the symbol O. It contains about 100 stars visible to the naked eye, the chief star being Regulus, also called Cor Leonis, or the Lion's Heart. The sun enters the sign Leo about

21 July. Leo Minor, the Lesser Lion, is a constellation found by Hevelius about 1691. None of its stars reach the fourth magnitude. Leonides are meteors radiating from the vicinity of Leo, usually seen about 14 Novem¬ ber.

LEO AFRICANUS (known variously as Johannes Leo; Juan Leo; Giovanni Leo, or Leone; Eliberitanus ; and, among the Moors, as Al Hassan ibn Mahommed Al Wezaz Al Fasi), Moorish traveler and geographer: b. probably Granada, about 1485 or 1494; d. Tunis, about 1552. He came of a noble Moorish fam¬ ily, was educated at Fez, and as early as 1512 he traveled in Morocco, Tunis, Bugia and Con¬ stantine. He traveled in the Sudan and Sahara regions in 1513 —15 ; later visited Constantinople, passing through Egypt, and afterward visited the three Arabias, Armenia and Tartary (probably Tabriz). He also ascended the Nile from Cairo to Assuan. In 1517 or 1520, on his return journey by sea from Egypt, he was cap¬ tured by pirates and eventually presented as a slave to Pope Leo X. The pontiff soon learned of his captive's wide explorations, bestowed a pension upon him, converted him to Christianity and stood sponsor at his baptism, giving him his own name. The captive, known as Leo Africanus, acquired Latin and Greek, and in turn taught Arabic, Cardinal Egidio Antonio being numbered among his pupils. At the sug¬ gestion of the Pope he wrote his description of Africa.) The work is stated originally to have been written in Arabic, but that manu¬ script is lost. However, the author himself wrote an Italian version (1526) which still ex¬ ists. It was printed by G. B. Ramusio (1550), and for long was regarded as the best author¬ ity on Africa. He returned to Tunis some time after the death of the Pope. Of his other writ¬ ings, his poems, a Spanish Arabic glossary and a collection of Arabic epitaphs are lost. There remains his (De viris quibusdam illustribus apud Arabes (consult Fabricius, ^Bibliotheca*

GraecaP Vol.. XIII, 259-298, Hamburg 1726). The descrizione dell' Affrioa) was published in French by Jean Temporal (Lyons 1556) ; in German by Lorsbach (1805) ; in English by Francis Moore in (Travels into the Inland Parts of Africa) (1738). Several Latin editions and English translations thereof are highly in¬ accurate.

LEO DIACONU.S, la'o di'ak-o'nuz (Leo

the Deacon), Byzantine historian and court priest: b. Caloe, Ionia, about 950; d. about 1000. He settled in Constantinople and witnessed the era of national recovery under the emperors Romanus II, Nicephorus Phocas and John Limisces, saw Crete reconquered, the invasion of Syria and the expulsion of the Russians from Bulgaria. His history covers the period 959-75, and while not well written it is regarded as trustworthy. It constitutes a valuable sup¬ plement to Byzantine history. It was printed in ˆCorpus Historiae Byzantinische) (Bonn

1828).

LEOBEN, la'o'ben, Austria, town in Styria, 44 miles by rail northwest of Graz, on the Mur. It was at one time a walled town and parts of the wall and towers remain. The old parish church has stained glass of the 14th century. It has technical schools and a widely-known academy of mining. The lignite

deposits of upper Styria and the iron mines and furnaces of Vordernberg and Eisenerz give it an important trade in iron, and it has ex¬ tensive iron- works. Here, 18 April 1797, Na¬ poleon signed the secret provisional peace treaty which gave Austria the greater portion of the mainland of Venice in return for the Nether¬ lands, which was succeeded by the Campio- Fornio Treaty. Pop. 11,504.

LEOBSCHUTZ, la'op'shuts, Germany, town in the province of Silesia, Prussia, 20 miles by rail northwest of Ratibor, on the Zinna River. The town dates from the 10th century and was the capital of the principality of Jagerndorf in 1524-1623. It has an extensive trade in flax, grain and wool and is engaged in glass-making, malting, wool-spinning and textile industries, and the manufacture of machinery, bricks and large bells. Pop. 13,081.

LEOCHARES, le-ok'a-rez, Greek sculp¬ tor of the 4th century b.c. He was a pupil of Scopas, and Pliny ascribes to him the sculptures on the west side of the Mausoleum at Hali¬ carnassus. He was one of the artists privileged to make portraits of Alexander the Great. Three

statues of Zeus are known to have been executed by him, and his cGanymede carried off by an Eagle) was famed throughout the ancient world. With Lysippus he produced a colossal bronze group representing Alexander at a lion-hunt. The works of Leochares are all lost, but there are numerous copies of the Ganymede, the best being that of the Museo- Pio Clementino, Rome, and another larger copy in the library of Saint Mark, Venice, and a bust of Alexander may be a copy of one of his.

LEOMINSTER, lem'ster, England, mar¬ ket town and municipal borough in Hereford¬ shire, 157 miles northwest of London, on the Lug and on the Great Western and London and Northwestern railways. It is situated in a rich agricultural district and has some fine old tim¬ ber houses. There is a parish church with a Norman nave and some of the finest examples of window tracery in England, restoration at different periods, however, making it an edifice of mixed architecture. The district produces wool, 'hops and fruit, and brewing and the manufacture of agricultural implements form the principal industries. The town received its first charter in 1554, but dates from before the Conquest, when it was the seat of a religious house. Pop. 5,737.

LEOMINSTER, lem'm-ster, Mass., a town of Worcester County, 40 miles west- northwest of Boston, on the Nashua River, and on the New York, New Haven and Hartford and the Boston and Maine railroads. The town is well laid out, has handsome residential sec¬ tions, six churches, 20 schools, a public library and over 18,000 volumes and a fine park. Leom¬ inster is well lighted with gas and electricity and has a good water supply and abundance of water power, the waterworks being municipal¬ ized. It is a busy industrial centre, the home of the comb-manufacture of the State, of piano cases and piano-fortes, has large cabinet works, paper mills, tanneries and extensive manufac¬ tures of cement, bricks, yarn, jewelry, toys, but¬ tons, paper boxes, chemicals and hairpins. The town is surrounded by some of the most fertile farm land in the county, and horticulture and

floriculture are growing industries. Leominster, settled in 1725, was part of Lancaster until 1740 when it received a charter of incorporation. A disastrous fire occurred in 1873. Pop. 19,789. Consult Emerson, (Leominster, Massachusetts) (Gardner, Mass.,

1888).

LEpN, la-on', Antonio, Mexican soldier: b. Huajuapam, Oaxaca, 1794; d. 1847. Having abandoned the side of the royalists for that of , the insurgents under Ituibide, he distinguished himself in 1821 by the capture of Tehuantepec, for which he was made lieutenant-colonel. When, however, Iturbide proclaimed himself emperor, the support of Leon was given to Gen¬ eral Bravo, the Republican leader. In 1824, as deputy from Oajaca, he served in the Constitu¬ ent Congress, and later lie aided in quelling in¬ surrection, against the authority of the republic. He was killed at the battle of Molina del Rey in the war with the United States.

LEON, Fray Luis Ponce de, Spanish mystic poet : b. Belmonte de Cuenca, 1527 ; d. Madrigal, 23 Aug. 1591. On graduating from the University of Salamanca he entered the Augustinian order, where his talents soon brought him prominently to the front. In 1561 he was appointed to the chair of Thomistic philosophy, and 10 years later he was also ap¬ pointed professor of sacred literature. But his keen, investigating intellect got him into trouble the following year, when he was charged with expressing doubt as to the validity of the Vul¬ gate, and also with having published unauthor¬ ized versions of the Bible or parts thereof. The story is that he had rendered into Spanish the (Song of Songs } (of Solomon) for a friend, and that this was published without his knowl¬ edge or consent. However, the affair cost him over four years' imprisonment. During this period much of his best literary work was done. On his release from prison in 1576, with a warning to be more careful in the future, his chair in the university was restored to him and he was assigned the subject of Biblical exegesis. But, owing to his brilliancy, his reputation as a poet, mystic and theologieian, he had numerous enemies who watched him closely and some of them made other charges against him in 1582. These, however, were not sustained, thanks probably to his growing power in the order to which he rose to be vicar-general shortly after¬ ward. This seems to have silenced his enemies, and he was raised to the high dignity of pro¬ vincial of Castile; but he lived only 10 days afterward. Among his prose works are (Los Nombres de Cristo,> consisting of three books, the result of his literary activity during his four years' imprisonment; (La Perfecta Casada) ; (Exposicion del Libro de Job) ; (Song of Solo¬ mon and Commentary. 5 These were long popu¬ lar. His mystical treatment of the various names given to Christ in the scriptures appealed strongly to the mystical-loving age in which he lived. 'In fact to all of his works belongs that mysticism that distinguished 'his poetical efforts. But popular though h'is prose was in his own day, it was as a mystic

and lyrical poet that he distinguished himself above the writers of his age. His poetry is sympathetic and pleasing, scholarly and marked with a lyrical ring unsur¬ passed by any Spanish poetry of his century. He was widely read in the classics and his poetical works include translations from many

of the Latin poets, among them Horace and Virgil. He also made translations from the Greek poets. In nearly all of these transla¬ tions he has caught the spirit of the original. He successfully imitated Petrarch. Leon's countrymen are accustomed to divide his orig¬ inal poetry into four distinct classes and to accord him a very high place in each of these classes which are religious, moral, phil¬ osophical and patriotic. The moral and phil¬ osophical however are often classed under one head. So highly was his work ad¬ mired that he has been proclaimed, by his admirers, the greatest poetical genius of Spain. Leon himself rather underestimated his own rare poetical gifts, and he used them, as he himself has explained, for the greater glory of God, and not to feed his own personal vanity. There is a fervor and sincerity about his religious poetry that bear out his confession. No Spanish author has approached him in the purity of thought and language of his sacred poems. Many of them read like the inspirations that he himself seems to have believed them to be. There is a sweetness about them united with a wondrous beauty of expression and brilliant, ever-pleasing imagery, that makes their simplic¬ ity stand for the breathing of the breath of life. His subjective mysticism is more engag¬ ing, more beautifully expressed and more truly poetical than that of any other Spanish writer in an age of mysticism. As was quite natural, he exercised a strong and far-reaching influence on the development of Spanish language in liter¬ ature. He confirmed the love of the Classics and the ancient literature in Spain, and he has, therefore, been rightly looked upon as the greatest of 'the Spanish Classical poets. Leon's poems, which were not published during his lifetime, were issued by Quevedo in 1631, 40 years after 'his death. Merino published his collected works in six volumes in Madrid in 1816. This is still the best edition.

Bibliography. — Ford, J. D. M., (Luis de Leon, the Spanish Poet, Humanist and Mystic) (Vol. XIX, No. 2, publications of the Modern Language Association of America) ; Gonzalez de Tejada, J., (Vida de Fray Luis de Leon) (Madrid 1863) ; Gutierrez, M., (Fray Luis de Leon y la filosofia espanola) (Madrid 1885) ; Menendez, de Pelayo, M., (Estudios de critica literaria (Madrid 1893) ; Merino, (Obras de Luis de Leon* (Madrid 1804-16) ; Reusch, (Luis de Leon und die Spanische Inquisition (Bonn 1873) ; Wallace, E., translation into English of the Perfecta Casada) (Chicago 1903) ; Wilkins, C., (Fray Luis de Leon) (Halle*

1866).

John Hubert Cornyn, Editorial Staff of The Americana.

LEON, Juan Vasquez de, Spanish con¬ quistador and companion of Cortes during his first venture in the land of the Aztecs. He wlas one of the half a dozen or more com¬ panions of the conqueror who were of noble blood; and Leon, who was a near relative of the governor of Cuba, Velasquez, was probably the most highly connected of all the party, having a legal right to use the title "hidalgo.® He aided Amador de Lares (q.v.) in enabling Cortes to make his preparations to leave Cuba; and he was among the small band of cavalry with which Cortes invaded the uplands of Mex-

ico. He was somewhat proud, valiant, re¬ sourceful and an excellent, leader, and for this reason was trusted by Cortes who gave him high command in his forces and invariably de¬ pended upon him when something dangerous and difficult had to be done. When Cortes marched from the City of Mexico in 1519 to Vera Cruz, Leon, who did not approve of his action, tried to raise trouble ; and he and his companions were promptly arrested by Cortes and confined aboard ship. Leon soon repented of his action and was admitted once more into the confidence of his leader. From that time on he was ever among the most faithful fol¬ lowers of Cortes, who considered him the most level-headed of his officers. He was fre¬ quently found making a protest against bigotry in an age when practically every Spaniard was a bigot; and he strongly objected to the useless massacres of the natives of Mexico. He was one of the guard of five men selected by Cortes to effect the arrest of Montezuma II, emperor

of the Aztecs, and it was by his pre¬ cipitate action that the arr-est was made good at that time. He was also the commander of the body of troops that maintained the guard of the royal prisoner from the vantage point of the ante-chamber of his old palace where he was under arrest. He was a good com¬ panion and had the courtly manner of the Spanish court, and for this reason Montezuma took a great liking to him. Leon seems to have had more respect for the Aztec emperor than had any of his companions, and he did his best to entertain him during his captivity. Leon was sent by Cortes to plant a colony on the Coatza- colcos River on the Isthmus of Tehuantepec, but the latter was forced to recall him before he had time to finish his commission, owing to trouble in his own affairs ; and Leon, obey¬ ing the call, joined him at Cholula and was with Cortes in his famous capture, at Vera- Cruz, of the forces of Narvaez, who had been sent from Cuba by Velasquez, the governor, to replace him. At this eventful time Leon was sent by Cortes, with an armed force, to secure the province of Panuco. On his return to Mex¬ ico City he modified the anger of Cortes against the imprisoned Aztec emperor Montezuma, who was not able to force his people to supply the Spaniards with provisions. Shortly after this the Spaniards were forced to leave the capital of the Aztecs, and they attempted to do it secretly at the dead of a moonless night. But they were discovered, and a desperate battle ensued which resulted disastrously for the Spaniards, the greater part of whom were killed or severely wounded in this retreat, which is known in Spanish history as the (

and lived to be one of the important figures in the colony of New Spain as Mexico was called, while Leon lost his life on the ((Dismal Night.® It is said that Cortes wept when he heard of his death.

LEON, le'on, Iowa, town and county-seat of Decatur County, 87 miles by rail' south of Des Moines, on the Chicago, Burlington and Quincy Railroad. It is situated in an agricul¬ tural region devoted to dairying, stock and poultry raising. Pop. (1920) 2,193.

LEON, or LE6N DE LOS ALDAMAS,

Mexico, state of Guanajuato, the first city in population and second in commercial import¬ ance in the state. The distance from Leon to the United States border at El Paso, Tex., is 996 miles, to Guanajuato, 34 miles and to Mex¬ ico City 258 miles by the Mexican Central Rail¬ way. The altitude of the city is 5,864 feet above sea-level. The situation, in the midst of a fertile and highly cultivated agricultural dis¬ trict, is most favorable to the industries to which the city is devoted. It was founded in 1576 and has always

maintained a condition of even and locally satisfactory prosperity. While there are no great manufactories in the place, it is emphatically one of the most important manufacturing cities in the republic, a consid¬ erable proportion of its simple homes being given over to the making of rebosos, zerapes, leather clothing embroidered in gold and silver, saddles, harness, bridles and numerous other articles of necessity, in which labor practically all the members of the family take part. There are also numerous other and more pretentious industrial establishments, including cotton and woolen mills, but the greater part of the manu¬ facturing is in the modest homes of the work¬ ing people. Here are located the headquarters of the northern military zone of the republic. A cathedral, a public library containing over 2,000 volumes, a church library with 9,000 vol¬ umes, a number of imposing church edifices, numerous creditable business blocks, well- paved streets and several attractive parks add to the advantages of the community as a place of residence. The banking facilities are pro¬ vided by branches of the National Bank and the Bank of San Luis Potosi and an agency of the Bank of Zacatecas. Pop. 57,722.

LE6N, la-6n', Nicaragua, city situated in a large and fertile plain 13 miles from the Pa¬ cific coast. It is laid out on a regular plan, in spacious streets, with intervening squares. The public buildings are considered among the finest in Central America and include a large and massive cathedral, crowned by a lofty central dome and flanked by two towers. It is also the seat of a university. Other buildings are the old episcopal palace (built 1678), sur¬ rounded by fine gardens ; the new episcopal pal¬ ace (1873), the churches of La Merced, Reco-leccion and Calvario, remarkable for their size and fine facades, and various other churches; the Tridente College of Saint Ramon, once a flourishing establishment, with professorships of law and medicine and numerous students, but now possessed only of a nominal existence ; the government house, Cuartel General or head barracks and the hospital, occupying the old convent of San Juan de Dios. The manufac¬ tures of Leon are confined chiefly to articles in

dressed leather and cutlery; and the trade, ow¬ ing to its inland situation, does little more than supply its local wants, but the railway between Leon and Corinto on the coast has somewhat improved it. The markets display fruits and vegetables in great variety and almost bound¬ less profusion. Leon was founded in 1523

by Francisco Hernandez on the shore of Lake Managua and was removed to its present site in 1610. It was at one time the capital of the republic and is still the largest city. Pop. about

60,000.

LEON, laon', Philippine Islands, pueblo of Iloilo province, Panay, about 14 miles north¬ west of Iloilo. Pop. about 10,000.

LEON, Spain, city, capital of the province, as formerly of the ancient kingdom of the same name, 82 miles by rail northwest of Val¬ ladolid. Its trade is chiefly domestic; its im¬ portance is historical, dating from a strong military station under the Romans, part of whose fortified walls are still standing. Situ¬ ated on an open plain below the neighboring mountains, Leon has two great monuments, both of deep significance in the history of Spanish civilization. Attached to the collegiate church of San Indor el Real is the Panteon de los Reyes which preserves unharmed in their original state the burial places of the an¬ cient kings, queen and princes. The cathedral of Leon, dedicated to Santa Maria de la Regia, is one of the three great Gothic churches com¬ menced during the reign of Saint Ferdinando III and is noted for its beautiful 13th century French blazoned glass and sculpture. The 12th century convent of San Marcos restored in 1514 is also noted for its fine architecture and ornamental fagade. Pop. 18,000.

le6n, Spain, a northwestern province, area 5,936 square miles; population 400,000; density 66.6 to the square mile; capital Leon (q.v.). It is part of the former kingdom of Leon (area 21,038 square miles; population 1,478,000) which was divided into the modern provinces of Leon, Palencia, Zamora, Valla¬ dolid and Salamanca. See Spain — History.

LE6N, Isla de (known also as the Isla Gaditana ; the Greek Gades and Roman Ga- deria), an island off the southwest coast of Spain, in the Atlantic Ocean, separated from the mainland by the Channel of San Pedro. It is about 10 miles long by 2 miles broad, has a flat, marshy surface and many sand dunes. On it dre the cites of Cadiz and San Fernando, and there is connection with the mainland by means of two bridges, one of them a railroad bridge. The island was the seat of the remotest west¬ ern colony of the Phoenicians, founded 1100 b.c. Pop. 60,873.

le(5n pinelo, Antonio de, Spanish writer: b. Peru, between 1585 and 1590; d. about 1660. He held various offices of import¬ ance under

the Council of the Indies and the Spanish government. As he was born of Spanish parents, in the American colony of Peru and educated, at least in part, in Spain, where his parents were highly connected, he seems to have always enjoyed the confidence of the Spanish authorities. At an early age he gave much attention to collecting documents and information bearing on the history of the

New World and especially of Spain's connec¬ tion with it. Not satisfied with the result of his investigations in Peru and Mexico, both of which countries then contained notable archives, he returned to Spain to search there the rec¬ ords and other documents relating to the Americas. It was due to these labors that he became historian to the Council of the Indies. This position he filled so well that he became known as the best chronicler of the affairs of the New World up to his time. He wrote nu¬ merous works, some of which were published during his lifetime and others of which long lay in manuscript. Among these works are (Epitome de la Biblioteca Oriental y Occiden¬ tal, Nautica y Geografica) (Madrid 1629) ; (Tratado de confirmaciones reales de encomi- endas, oficios y casos en que se requieren para las Indias occidentales) (Madrid 1630) ; (Re- copilacion de las leyes de Indias } (Madrid 1628 and 1680) ; (Aparato politico de las Indias occidentales) (1653) ; (E1 paraiso en el Nuevo Mundo) (1656); (Consejo Real y Supremo de las Indias, su origen y Jurisdiccion, y los presi- dentes, consejeros, fiscales y secretarios que desde su fundacion ha tenido) (Madrid 1658) ; (Relacion de las fiestas de la Congregacion de Lima y la limpia Concepcion de Nuestra Senora) (Lima) ; (Historia natural de las In¬ dias occidentales> (Madrid) ; (Fundacion y grandezas historicas y politicas de la Ciudad de los Reyes Lima> (Madrid) ; (Historia de la Villa Imperial del PotosP ; (Poema de la Con¬ cepcion Purisima de Nuestra Senora) ; (Velos antiguos y modernos en los rostros de las mujeres, sus conveniencias y danos, ilustracion de la Real Pregmatica des las Tapadas) (Madrid) ; (Question moral si el chocolate quebranta el ayuno eclesiastico : tratase de otras bedidas y confecciones que se usan en varias provincias> (Madrid) ; (Oracion pane- girica a la presentation de Nuestra Senora) (Madrid) ; (Por la pintura y esencion de pagar alcavalas5 (Madrid) ; (Vida del ilus- trisimo y reberentisimo D. Toribio Alfonso de Modrouejo arzobispo de la Ciudad de los Reyes Lima) (Madrid 1653) ; (Discurso sobre la importancia, forma y disposition de la Reco- pilacion de las leyes de Indias) ; (Acuerdos del Consejo de Indias) (Madrid 1658) ; (Gobierno espiritual eclesiastico de las Indias) ; (Anales 6 historia de Madrid desde el nacimiento de Christo hasta 1658. } A very considerably larger list of titles of works by Leon Pinelo is pre¬

served by the (Biblioteca Nova de Nicolas Antonio. 5 Consult any good history of Spanish literature.

LEONARD, len'erd, Abiel, American Protestant Episcopal bishop : b. Fayette, Mo., 26 June 1848. He was graduated at Dartmouth College in 1870 and at the General Theological Seminary, New York city, in 1873. Entering the ministry of the Protestant Episcopal Church, he served in Missouri and Kansas until 1888, when he was consecrated bishop of Salt Lake. That bishopric he continues to retain.

LEONARD, Adna Wright, American clergyman : b. Cincinnati, Ohio, 2 Nov. 1874. He is the son of the late Rev. Adna B. Leonard, who was for many years secretary of the Board of Foreign Missions of the Methodist Episcopal Church. He was graduated from New York University in 1899 and from Drew

Theological Seminary in 1901. He was a stu¬ dent in the American School of Archaeology in Rome, 1901-02. He entered the ministry of the Methodist Episcopal Church, joining the New¬ ark (N. J.) Conference. After a pastorate in Porto Rico and the pastorate of the American Methodist Episcopal Church in Rome he be¬ came pastor of important churches in Ohio, and finally in 1910 pastor of First Church, Seat¬ tle, Wash. The General Conference of 1916, of which he was a member, elected him bishop of the Methodist Episcopal Church. He is the author of (The Roman Catholic Church at the Fountain Head} (1910) ; and (The Shepherd King) (1911).

LEONARD, Daniel, American jurist: b. Norton, Mass., 29 May 1740; d. London, Eng¬ land, 27 June 1829. He was graduated from Harvard in 1760 and after studying law be¬ came a Whig member of the General Court. Disapproving of the extreme measures of the Whigs, his sympathies were with the Loyalists and his papers, signed <(Massachusettensis)) and published in a Boston newspaper in 1774-75, were replied to by John Adams over the signa¬ ture <(Novanglus.)) Leonard's articles ably de¬ fended the position of the English government and they constituted the strongest statement of that position put forth in the colonies. In 1776 he went with the English army to Halifax, N. S., and was among those named in the Ban¬ ishment Act of 1778, while his property was confiscated by the act of 1779. He went to England from Halifax and was subsequently for many years chief justice of the Supreme Court of Bermuda. In

1819 John Adams pub¬ lished the (Novanglus and Massachusettensis) with a preface. Consult Tyler, (Literary His¬ tory of the American Revolution.)

LEONARD, H. Ward, American in¬ ventor and electrical engineer : b. Cincinnati, Ohio, 8 Feb. 1861 ; d. New York, 18 Feb. 1915. He was graduated from the Massachusetts In¬ stitute of Technology in 1883, and in the fol¬ lowing year became associated with Thomas A. Edison's staff of engineers. In 1887 he be¬ came general superintendent of the Chicago Western Electric Light Company, and in 1888 he organized the firm Leonard and Izard, en¬ gaging in the installation of central stations and electric railways. The firm was bought out by the Edison Company in 1889 and Leon¬ ard was appointed manager for the company's combined interests in United States and Can¬ ada. He later founded the H. Ward Leonard Manufacturing Company at Bronxville. He patented more than 100 inventions connected with electrically-driven machinery and vehicles, among them an automatic electric-lighting sys¬ tem- for railway trains and motor cars, and a system of motor control, which was adopted by the United States navy. His system of mo¬ tor control was also used at the Paris Exposi¬ tion in 1900 in operating the moving sidewalk and was one of the features of the exposition. He was awarded gold medals at the Paris (1900) and Saint Louis (1904) expositions, and also received in 1903 the John Scott Leg¬ acy medal of the Franklin Institute. He was a contributor to electrical engineering periodicals.

LEONARD, James Francis, American telegrapher : b. Kentucky, 1804 ; d. 1862. He was practically the earliest telegrapher to read

messages by sound and for his time was the swiftest telegraph operator in the world. In the summer of 1848 he began to receive mes¬ sages by sound and soon afterward received and wrote out 55 words a minute for Pro¬ fessor Morse, as a test of the invention. He is buried in Frankfort, Ky., where his grave is marked by a monument erected by telegraphers.

LEONARD, William Andrew, American Protestant Episcopal bishop : b. Southport, Conn., 15 July 1848. He was educated at Phil¬ lips Academy, Andover, Mass., and at Saint Stephen's College, Annandale, N. Y. ; was graduated at the Berkeley Divinity School, Middletown, Conn. He was ordained deacon in May 1871, and priest in July 1873; became assistant at Holy Trinity Church, Brooklyn, N. Y., 1871 ; rector of the church of the Re¬ deemer, Brooklyn, 1873; then rector of Saint John's parish, Washington, D. C., 1880; was

chaplain of the 23d Regiment, N. Y. N. G. (1876-80) and is now chaplain of the Ohio Society of New York, and of the Sons of Colonial Wars, Ohio. He was consecrated bishop of Ohio, 12 Oct. 1889 ; is president of the Fifth Province of the American Church, and of the trustees of Kenyon College, Gam- bier, Ohio. His writings include (Via Sacra, or Footprints of Christ) (1875) ; (Brief His¬ tory of the Christian Church) (1878) ; (New York Church Club Lectures) (1893) ; faithful Life) (1888) ; (Life of Stephen Banks Leonard of Owego, N. Y.) (1909) ; (Witness of the American Church to Christianity) (Bedell Lec¬ tures, 1894).

LEONARDO DA VINCI, la-6-nar'dd da

ven'che. See Vinci.

LEONCAVALLO, Ruggiero, rud-ja'rd

la-on-ka-val'lo, Italian composer: b. Naples, Italy, 8 March 1858; d. Rome, Italy, 9 Aug. 1919. He was educated at the Naples Con¬ servatory of Music and for many years resided as a teacher in Paris. Under the influence and encouragement of Wagner he wrote his trilogy (Crepusculum,) a drama of Italian history, of which (Medici) is the first part. He is best known by his operas (I Pag- liacci) (1892);

LEONFORTE, la'on-for'ta, Sicily, city in the province of Catania, 2,133 feet above sea level, about 40 miles west of Catania. It is situated in an agricultural district, producing cereals, fruit and wine, and there are exports of sulphur and salt. Pop. 19,751.

LEONHARDT, la'on-hart, Gerard Adolf Wilhelm, German jurist: b. Hanover, 6 June 1815 ; d. there, 7 May 1880. He was edu¬ cated at Gottingen and Berlin, became an ad¬ vocate and in 1837 was appointed to the Han¬ overian government service. He was appointed Minister of Justice in Hanover in 1865, served as chief justice of the High Court of Appeals after Hanover was annexed to Prussia, and in 1867 received a seat in the Prussian Upper House and was appointed Minister of Justice in Prussia. He was an authority on criminal law and was instrumental in introducing many reforms in Germany's criminal code. He re-

tired in 1879. Author of (Kommentar liber das Kriminalgesetzbuch

fur das Konigreich Hanover } (1846-51) ; (Die Justizgesetzebung

des Konigreic'hs Hanover > (1859-60) ; (Zur Re¬ form des Zivilprozesses in Deutschland) (1865).

LEONI, la-6'ne, Leone (sometimes called II Cavaliere Aretino) , Italian sculptor and medallist : b. near Arezzo, or at Menaggio, about 1509; d. Milan, 22 July 1590. He first appears in Venice where he was associated with Titian and Pietro Aretino, and he met Benvenuto Cellini at Padua in competition for the medal of Bembo. He was an engraver in the mint under Pope Paul III in 1538-40, and was afterward similarly employed at Milan under Alfonso d' Avalos. Through the influence of Ferrante Gonzaga he was appointed medal¬ list and sculptor in the household of Charles V. He executed many busts, statues and bas-re¬ liefs of the royalties and members of the court, a notable example of his art being (Charles V Repressing Violence, now in the Musee de Prado, where many other specimens of his work are exhibited. He is represented also in the museums at Madrid, Vienna and Windsor Castle. He possessed a valuable art collection, and his house in Milan, still in existence, was famous for its sculptural decorations. He was assisted in his work by his son, Pompeo Leoni (q.v.).*

LEONI, Pompeo, Italian sculptor, son of the preceding : b. probably Milan ; d. Madrid, 1610. He worked with his father, who greatly influenced his style. Together they executed the famous bronze groups of Charles V and. Philip II and# their families in the Escorial. Most of his life was spent in Spain, and he continued in the favor of the court after the accession of Philip III. Among his other work is the monument to Don Fernando de Valdes, at Salas, Asturias ; and the mausoleum of the Marquis Poza at Valencia; together with many busts and statues of the royal family and of the nobility.

LEONIDAS (le-on'i-das) I, king of Sparta : b. 480 b.c. He was a son of King Anaxandrides, and ascended the throne about 489 b.c. When Xerxes invaded Greece, the Greek Congress assigned to Leonidas the de¬ fense of the pass of Thermopylae. His force, according to Herodotus, amounted to over 6,000 men, of whom 300 were Spartans. After the Persians had made several vain attempts to force the pass, a Greek named Ephialtes betrayed to them a mountain path, by which Hydarnes led a body of Persians to attack Leonidas in the rear. Before this manoeuvre could be completed, Leonidas, dismissing most of his allies, undertook to hold the pass with a forlorn hope of 300 Spartans, 700 Thespians and 400 Thebans. Here they resisted the main body of Xerxes' army, being attacked both in

front and rear. No quarter was given or taken and it was not until the entire Spartan and Thespian corps were wiped out, that the remaining small body of Thebans surrendered. Leonidas fell early in the action, and a desper¬ ate struggle afterward took place over his body, which was rescued by the Greeks, but after the surrender Xerxes ordered the head cut off and the remains crucified. The details of the gallant resistance are lost in a maze of myths, but numerous writers have paid their

tribute to Leonidas and the brave band be¬ trayed at Thermopylae. Consult Herodotus, V, 39~41; Cicero, (Tusc. Disput., v. I, 42-49; Grundy, (The Great Persian War* (1901).*

LEONIDES, or LEONIDS. See Leo.

LEONINE VERSE, a form of Latin verse, originating during the Middle Ages, con¬ sisting of hexameters and pentameters of which the final and middle syllables rhyme. They are so called from Leonius, a poet of the 12th century. An instance of Leonine verse is found in the lines by Tennyson;

" The long light shakes across the lakes,

And the wild cataract leaps in glory."

LEONNATUS, la'dn-na'tuz, Macedonian general of Pella : d. Thessaly, 322 b.c. He was considered one of the ablest commanders under Alexander the Great, and accompanied him in his invasion of Persia in 334 b.c. He was kept in positions close to the emperor's person and at Malli he and Peucestas saved the life of Alexander. He received the satrapy of the Hellespontine Phrygia after the death of Alex¬ ander, but soon afterward was killed in battle against the Athenians and their allies, who were besieging Antipater at Lamia.

. LEONTIUS OF BYZANTIUM, le-on'-

shi-uz ov bi-zan'shi-um (called also Scholas- ticus and Hierosolymitanus), Byzantine ecclesiastic; flourished in the 6th century. Lit¬ tle is known of his life. He mentions having in early years belonged to a Nestorian com¬ munity, and he is reputed to have introduced Aristotelian definitions into theology. There is much confusion concerning the authorship of various manuscripts bearing the name (; (Contra Monophysitas ; (Contra SeverunP ; and (De Seeds.* His collected works are published in J. P. Migne's (Patro-logk Graeca* (Vol. LXXXVI).*

LEONTODON. See Hawkbit.

LEONZIO PILATO, la-6n'tse-o pe-la'to, or LEO PILATUS, Greek or Calabrian pseudo-scholar: d. at sea, on the Adriatic, about 1366. It is supposed that he met Petrarch in Padua and Boccaccio at Milan, and upon the invitation of Boccaccio to become his guest he went to Florence where the influ¬ ence of his patron secured him the chair of Greek in the university. His knowledge of Greek was in no way scholarly and he was practically a barbarian. He made the first mod¬ ern translation of Homer into Latin under the immediate care of Boccaccio and with more distant counsel from Petrarch. The ignorance of the Calabrian, cloaked in an assumption of knowledge and defended by a surly indifference, led Boccaccio into many errors in his own work. Pilatus appeared to have accompanied Boc¬ caccio on his visit to Petrarch at Venice in 1363, and later went to Constantinople. On his return journey to Italy he was killed by lightning at sea. Consult Hodius, (De Graecis illustribus) ; Petrarch, (Epistolae) (Vols. V, VI); Hutton,

LEOPARD, or PANTHER, one of the

great cats widely distributed over Africa and Asia, and prehistorically prevalent in southern

Europe. The general color is yellowish fawn, which becomes white on the under aspect of the body, marked with black spots of various sizes, irregularly dispersed; these spots are often rosette-like, but do not enclose a central spot as is the case with its American analogue, the jaguar (q.v.). Black examples often occur. In general appearance and conformation the leopard is tiger-like, but is considerably the inferior of the tiger in size and weight, meas¬ uring on the average about 3 feet and 10 inches from the nose to the root of the tail, which is almost as long as the body. This beautiful cat is, however, the peer of the tiger, making up in agility, quickness and wit for his lack of weight and power. Its prey con¬ sists of any animal it is able to pounce upon or overcome, and among the native villages and herdsmen of both India and Africa it is dreaded as a destroyer of cattle and sheep, since, like the American puma, when it invades a cattle- pen or sheepfold it kills many times more animals than it can

eat or carry away. Never¬ theless, leopards have always been among the partly tamed and trained animals of shows, and they thrive well and breed in captivity.

The leopard — which is more commonly called panther® in India — frequents mainly wooded and rocky regions, where it can take, refuge in trees, or seek among their limbs the birds, monkeys and other arboreal creatures that form a fair share of its food. It does not hesitate to attack large prey, but can rarely overcome a buffalo or one of the larger Afri¬ can antelopes unless the animal is taken at a great disadvantage. Not more than one pair is usually found in a given district; and they make their lair in some rocky jungle, where once a year two to four kittens are born to them, which remain with their mother until they are well grown. One hears less of man- eating leopards than of .lions and tigers with the habit of attacking human beings; but the leopard is more widespread, numerous and sub¬ tle than either of the others and doubtless is the real perpetrator of many homicides attribu¬ ted to the larger cats. At any rate the leopard is regarded by those familiar with him as quite as formidable a beast to encounter, and sports¬ men adopt the same methods and use the same precautions as when they are pursuing the tiger. A most excellent summary of leopard-hunting experiences ma} be read in Porter's (Wild Beasts) (New York 1894). For the leopard in India consult Sanderson, 'Thirteen Years among Wild Beasts in India* (1893) ; Forsyth,

LEOPARD, The. See Chesapeake and

Leopard Affair.

LEOPARD-CAT, a highly variable,

tawny, much-spotted cat about two feet long in body, and with a long tail, which dwells in

northern India but is not well known. It is called Felis bengalensis *by Elliot and also by Mivart, but its identity is doubtful. Consult Lydekker, ˆGame Animals of India) (1907).

LEOPARD-FLOWER. See Blackberry Lily.

LEOPARD-FROG. See Frog.

LEOPARD-MOTH, a large European

tussock-moth (Zeazera pyrina), white spotted with black, whose caterpillars bore into the limbs of forest and shade trees, and so weaken them that they die or are easily broken by the wind. This moth has been introduced to America in the neighborhood of New York where it is one of the pests in the parks.

LEOPARD (lep'ard) SEAL (Sea Leop¬ ard), a spotted Patagonian seal, Ogmorhinus or Hydrurga leptonyx of the family Phocidce. It is

widely distributed in southern, temperate and Antarctic seas. The males sometimes at¬ tain a length of 12 feet. The fur is short and lustrous, spotted yellowish white and dark gray on the hack, and yellowish beneath. The fur of the females is somewhat darker than that of the males.

LEOPARD-SHARK, a handsomely varie¬ gated small shark (Triakis semif as datum) , of¬ ten seen along the coast of southern California.

LEOPARDI, la'd-par'de, Alessandro,

Italian sculptor: b. Venice, last half of 1 5th century; d. there, about 1512. His earliest known work is the magnificent mausoleum of the Doge Andrea Vendramini in the church of San Giovanni e Paolo at Venice. Some of the figures are missing, two of which authorities agree are in the museum at Berlin. He was charged with forgery and banished from Ven¬ ice in 1487, but the necessity for finishing the statue of Bartolomeo Colleoni, begun by Ver¬ rocchio, caused the Senate to recall Leopardi in 1490. The pedestal of this work is his own creation and he cast the bronze statue. The bronze sockets for the three standards in the square of Saint Mark's were designed and cast by him, and he worked on the tomb of Car¬ dinal Zeno at Saint Mark's in 1503-05, the tomb being finished by Pietro Lombardo. Among the works believed to be his but not fully verified are 'Elijah in the Fiery Chariot in the Morgan collection, New York, a bronze relief ; and the three bronze reliefs of the Assumption of the Virgin* in the Museo- Archeologico, Venice.*

LEOPARDI, Giacomo, Count, Italian scholar and poet : b. Recanati, in the marshes of Ancona, 29 June 1798; d. Naples, 15 June 1837. He devoted himself from an early age to study in the fine library of his father, and when he reached his 15th year was master of Latin and Greek, and had soon read most of the literary masterpieces of antiquity. In 1815. his translation of Porphyry's 'Life of Plotinus 5 was followed iby his (Saggio sopra gli Errori degli Anti'chi. He was of profound poetic genius and mourned over the degraded political condition of his native land, a feeling which found utterance in his magnificent (Ode to Italy, * a poem which proclaimed him the first of modern Italian singers. In 1822 he went to Rome and attracted the attention of Niebuhr by his criticism of a new edition of the 'Chronicon of Eusebius*; and the. great historian at-*

1 The Leopard or Panther

2 Snow Leopard or Ounce

3 Hunting Leopard or Cheetah

tempted in vain to settle him as professor in the University of Berlin. Leopardi was broken in health, as well as in spirit, and his unhappi¬ ness was intensified by an unhappy love affair. Bunsen offered him such a professorship, and it was declined. He left Rome to travel in Italy, his tour embracing many of the great northern cities, and ending with Naples. He developed the most absolute skepticism, and the unhappiness of his lot made him a pessimist. His sight failed, and he was forbidden to take up a book, and though he was a linguist of rare accomplishments, wrote in Greek and Latin with equal ease, had mastered French, Spanish and English, he could apply his attainments to no practical end. His classic training had, how¬ ever, given him a power and precision in the use of his native tongue, which was unprece¬ dented in his day. His early lyrics were written between 1816 and 1824, and are distinguished for lucidity, genuine feeling and brilliant com¬ mand of metre and rhyme. His most famous poem, however, is (La Ginestra) (1836), in which he gives full expression to his hopeless creed; and of his poetic productions some 39 remain to this day the finest and most imperish¬ able utterances of the Italian lyre. His other works include translations and critical treatises, and after his death were published his prose works, a miscellany of peculiar interest. His 'Epis'tolario, a collection of his letters, records in the most intimate manner his personal life. Consult Autard, (Essay sur les Idees philoso- phiques et l'inspiration poetique de Giacomo Leopardi > (1877) ; Ranieri, (Sette anni di so- dalizio con Giacomo LeopardF (1880); Cap- pelletti, (Bibliographia Leopardiana) (1882) ; Ceaseo, (Nuove ricerche su Giacomo LeopardF (1893), and cLa Vita di Giacomo LeopardF (1905) ; Seiban, (Leopardi sentimental y (1913). See Dialogues ; Odes.*

LEOPOLD (le'6-pold) I (George Chris¬ tian Frederick), king of the Belgians: b. Co¬ burg, 16 Dec. 1790; d. 10 Dec. 1865. He was the fourth son of Francis, Duke of Saxe- Coburg, and after receiving a careful literary and scientific education and spending some years in foreign travel, he entered the Russian service, in which he rose to the

rank of a general and commanded corps at the battles of Liitzen, Bantzen and Leipzig. On the return of Napoleon from Elba he joined the army of the Rhine and with it entered Paris. While in England after the peace of 1815 he married (2 May 1816) Princess Charlotte, daughter of the Prince Regent and heiress to the throne, and was naturalized by act of Parliament and created Duke of Kendal. The princess died in childbed on 5 Nov. 1817. In February 1830 he was offered the crown of the new kingdom of Greece; was proclaimed; but as conditions he had specified regarding a rectification of frontier and his entire acceptability to the Greek people were not fulfilled, he renounced the sovereignty. On 4 June 1831 he was elected by a national congress king of the Belgians. Difficulties were encountered for the first eight years of his reign with the king of Holland, out of whose territory Belgium had been carved, and these were settled by the Treaty of Twenty-four Articles in 1839. In August 1832 he married Louise, eldest daughter of Louis Philippe of France (d. 1850). During

the revolutionary troubles of 1848 he offered to abdicate if his rule was unacceptable to his sub¬ jects; but all classes rallied round the king. He ruled with great prudence, was one of the wisest monarchs of his time, was frequently called on to arbitrate on international disputes and was called the Nestor of Europe. His daughter, Carlotta, was the wife of Maximilian, emperor of Mexico. He was succeeded by his son, Leopold II. Consult Juste, (Les Fonda- teurs de la Monarchic beige, Leopold, Ier Roi des Beiges (1868), an English translation of which appeared, entitled (Memoirs of Leopold P (1868) ; Taillandier, (Le roi Leopold et la reine Victoria) (1878).*

LEOPOLD II (Louis Philippe Marie VicItor), king of the Belgians: b. Brussels, 9 April 1835; d. Brussels, 17 Dec. 1909. He was the eldest son of Leopold I, and married in 1853 Maria Henrietta, Archduchess of Austria (d. 1902), daughter of Archduke Joseph of Austria. > He early manifested great interest in the opening up of central Africa, and in 1876 organized at Brussels the African International Association, the purpose of which was to utilize African discoveries for commercial purposes. He aided, and to a large extent financed, Stan¬ ley's explorations on the Kongo in 1879-82. By the Berlin Congress of 1885 the Kongo Free State was farmed, its territory neutralized and its sovereignty conferred on King Leopold. In 1889 the king willed this domain to the Belgian people. Certain grave scandals in connection with its administration and the commercial ex¬ ploitation of the natives — in the profits of which the king

shared — were brought to light in 1903 and action taken by the British Parlia¬ ment to have an inquiry into the abuses com¬ plained of. The result was that reforms were effected, and in 1908 the Kongo Free State be¬ came a Belgian colony. King Leopold was a man of notoriously immoral life. But he was an able monarch, who governed as well as reigned, and initiated many schemes for the commercial advancement of his country. Dur¬ ing his reign its foreign commerce increased sixfold and its merchant fleet fivefold, and it began to take its place as a colonial power. His only son, Leopold, died in 1869; his second daughter, Stephanie, was married to Prince Rudolf of Austria who. died mysteriously in 1889. He was succeeded by his nephew, Albert I (q.v.). Consult MacDonnell, J. de C., (King Leopold IP (London 1905) ; Rappoport, A. S., (Leopold, King of the Belgians) (New York

1910).

LEOPOLD I, Holy Romap emperor: b. Vienna, 9 June 1640; d. there, 5 May 1705. He was second son of the Emperor Ferdinand III of the house of Hapsburg and of Maria Anna of Spain, and was educated for the Church, when the death of his brothers made him heir to the throne of his father. Previous to the death of the latter in 1657, Leopold had (1655) been crowned king of Hungary, still mainly in Turkish hands ; in 1656 he was elected king of Bohemia, and in 1658, in spite of the opposition of Cardinal Mazarin, emperor. The war with the Turks having been renewed in 1660, Monte- cuculi won the battle of Saint Gothard on the Raab (1 Aug. 1664), which was followed, how¬ ever, by a peace which the Hungarian partisans of the emperor regarded as ignominious. In

1678 occurred the great insurrection under Tokoly, due to the emperor's persecution of the Hungarian Protestants, who in 1683 obtained the help of the Turks by their invasion of Aus¬ tria under Kara Mustapha. Leopold fled from Vienna, but John Sobieski's great victory saved his capital and thrones. Buda was retaken after a memorable siege in 1686, and the victories at Zalankemen (1691) and Zenta (1697), won by the military genius of Prince Eugene, led to the peace of Carlovitz (1699), which also se¬ cured the possession of Transylvania. But neither the wholesale executions of Hungarian patriots at Eperies, nor the acquiescence of the Diet of Presburg in the proposition to make the male line of the Hapsburgs hereditary in

Hun¬ gary (1687), could make peace permanent in that long-distracted country. Leopold also had to wage three protracted wars against Louis XIV ; the last, the War of the Spanish Succes¬ sion, which he did not live to see concluded. In the German Empire the long reign of Leo¬ pold witnessed the growing power of the house of Brandenburg, under Frederick William, the great elector, whose son assumed the royal title under the name of Frederick I in 1701.

LEOPOLD II, Holy Roman emperor: b.

Vienna, 5 May 1747 ; d. there, 1 March 1792. He was the 3d son of the Emperor Francis I, and succeeded him in 1765 on the throne of Tuscany, where he effected reforms in the land laws and confined ecclesiastical jurisdiction to purely ecclesiastical matters. The death of his brother Joseph II in 1790 called him to the greater cares of the vast Austrian dominions and soon after of the German Empire. He hastened to make terms with Frederick William II at Reichenbach (27 July 1790), was unani¬ mously elected German emperor, pacified Hun¬ gary by taking the royal oath to observe strictly the constitution and by various concessions, proclaimed a full amnesty and restored all their ancient privileges to the Belgians, gave Tus¬ cany to his son Ferdinand, concluded a peace with Turkey at Sistova (4 Aug. 1791), con¬ certed with Frederick William, Frederick Augustus of Saxony and others, at Rilnitz, pre¬ liminary measures for meeting the aggressions of the French Revolution, and finally made a formal defensive and offensive alliance with Prussia (February 1792). Francis, his oldest son, succeeded him on the throne.

LEOPOLD, Karl Gustaf af, Swedish poet: b. Stockholm, 3 April 1756; d. there, 9 Nov. 1829. He attained distinction in Swedish letters, his first work to attract wide attention being his (Ode on the Birth of the Prince- Royal Gustavus Adolphus (1778). He was appointed secretary to Gustavus III in 1778 and stood high in the regard of that monarch. His odes on the martial achievements of the Swedes were among his most popular produc¬ tions, and his tragedies (Odin) (1790) and (Virginia* (1802) were highly successful. In 1818 he was appointed Secretary of State. His III, 1800-02; Vols. IV-VI, 1831-33).*

LEOPOLD, Order of, name of two orders,

one of Austria-Hungary and one of Belgium. (1) The Austrian Order of Leopold was founded by the Emperor Francis I, 7 Jan. 1808, in honor of his father, Emperor Leopold II. It

*is bestowed for <(personal merit.® There are three classes : Grand Cross ; Commanders and Chevaliers. The two first carry the title of baron and the third receive hereditary nobility. The Grand Mastership is vested in the Crown and the officers of the order are the prelate, chan¬ cellor, treasurer, registrar and herald. The decorations comprise a badge, collar and star, and the habit is of the national colors. The motto is <(Integritate et Merito.® (2) The Bel¬ gian Order of Leopold is a civil and military order, founded 11 July 1832 by Leopold I. It is divided into five classes : Knights Grand Cordons; Grand Officers ; Commanders; Officers and Chevaliers. The Grand Mastership is vested in the Crown and the three inferior grades carry pensions. The decorations con¬ sist of a badge, a collar and a star. The motto is <(L'union fait la force.® Consult Laurence-Archer, J. H., (The Orders of Chivalry**

(1887).

LEOPOLD II, Lake, a lake in the admin¬ istrative district of that name in the Belgian Kongo, West Africa. It is 90 miles long from north to south and varies in width from 2 to 30 miles. Its banks are low and subject to inundation. It empties into the Mfini, an afflu¬ ent of the Kwa or Kassai, which flows into the Kongo. It was discovered by Stanley in 1881.

LEOPOLDVILLE, Belgian Kongo, West Africa, a station on the left bank of the Kongo near the Stanley Pool, 235 miles in a direct line northeast of the mouth of the Kongo, connected by rail with Matadi. It is the western terminus of navigation on the upper Kongo. It was founded by Stanley, February 1882, and the native population largely preponderates over that of the whites. There is a pipe line for the conveyance of crude oil from Matadi and there is a wireless station. Pop. about 15,000.

LEPANTO, Battle of, a famous naval en¬ gagement fought near the town of Lepanto in Greece, on the Gulf of Corinth, 7 Oct. 1571, between the Ottoman and the combined Medi¬ terranean fleets of the Christian allies, princi¬ pally Venetian and Spanish craft. Under the command of Don John of Austria they ob¬ tained an overwhelming victory. Cervantes (q.v.), the author of (Don Quixote, 5 distin¬ guished himself in this battle, receiving three wounds. This was the concluding battle of the Crusades, destroying the Turkish fleet and ending their supremacy in the Mediterranean. Considering the primitive bow-gun weapons then in use, the loss of life was remarkable, being estimated as 20,000 for the Ottomans and 8,000 Christians. The allies brought into the fight 200 galleys and 8

galeasses (large three- masters, carrying cannon), while the Turkish fleet numbered 273, but of smaller size on the average and fewer cannon. The Turks em¬ ployed Christian prisoners as galley-slaves and 10,000 or more were liberated by the Christian victory. Consult Maxwell, (Don John of Austria) (1883) ; Prescott, (Reign of Philip ID (1902).

LEPANTO-BONTOC, la-pan'to-bon-tok,

Philippines, a province of Luzon formed by the union of the three subprovinces of Lepanto, Bontoc and Amburayan, occupying the western central part of northern Luzon; area 1,232 square miles. The province mostly is rugged

and mountainous; it is thinly settled and there are no roads, communication being by trails. The only industry of importance is copper min¬ ing. 'Civil government was established in May 1902. Pop. 60,000, mostly Iggorotes and Ifugaos.

LEPCHAS, lep'chaz, a Tibetan stock of Sikkim, India. They are a peaceful people who have suffered considerably from the incursions of more warlike neighboring tribes, and both their ancient customs and their language are falling into disuse. Their language is of Indo-Chinese origin and through the efforts of Colonel Mainwaring and others who appre¬ ciated its beauty, the knowledge of it has been preserved. The literature of the Lepchas, how¬ ever, has been practically destroyed, resulting in the loss of many of their traditions. Their language possesses an extensive nomenclature in zoology and botany, and the people are well versed in beast and bird lore. They are mostly Buddhists in religion. They were once pros¬ perous and independent but are now poor and largely of the coolie class. Consult Mainwar¬ ing, (Grammar of the Rong (Lepcha) Lan¬ guage in the Darjiling and Sikkim Hills y (Cal¬ cutta 1876) ; Von Schlagintweit, ˆResults of a Scientific Mission to India and High Asia (London 1863) ; Donaldson, F., (In Lepcha Land* (1900).*

LEPELETIER DE SAINT-FAR- GEAU, le'pefltya de san far'gyo-', Louis Michel, French politician: b. Paris, 29 May 1760; d. there, 20 Jan. 1793. He came of a prominent family and inherited great wealth. Originally a conservative he was chosen presi¬ dent of the Parliament of Paris in 1789 and was a deputy for the nobility in the

States- General. His opinions gradually changed, however, and he became an adherent of the Revolution. On 13 July 1789 he moved to demand of the king the reinstatement of Necker. He was elected president of the Con¬ stituent Assembly 21 June 1790, and at the Con¬ vention he was a deputy from Yonne, voting for the execution of the king. The Royalists had understood him as pledged to defend the king, and a member of the king's bodyguard assassinated him the evening before the king's death. He was given a splendid funeral by the Convention and his death was commemorated in a painting by David, which, however, his daughter destroyed. Lepeletier had been deeply interested in public education and many ideas from his notes were incorporated in later plans. Consult (CEuvres de Michel Lapeletier Saint- Fargeau, with a biographical sketch by his brother Felix (Brussels 1826).*

LEPER. See Leprosy.

LEPERDITA, le'par-ditysa, a genus of fossil ostracode crustaceans of the family Leperditiidcu, extending from the lower Silu¬ rian to the Carboniferous Age. The shells have oblong unequal valves with a straight dorsal edge, the right valve having an overlapping ventral edge ; there is a small eye tubercle and a subcentral interior muscular imprint. The ex¬ terior is smooth and rounded. They occur in abundance in eastern United States and in Europe.

LEPIDIUM, le-ped'yum, a genus of plants of the family Cruciferco and the tribe Sinapeae. They are usually known as pepper-

wort, peppergrass and cress and number about 65 species scattered throughout the warm re¬ gions of the earth. There are about 25 species in North America, some of them of European origin, but naturalized. They are characterized by white flowers and have dehiscent pods which are almost invariably two-seeded.

LEPIDODENDRON, a fossil plant oc¬ curring in rocks of the Carboniferous Age, sup¬ posed in some cases to have been important in the constitution of coal. They are usually identified by fossil-botanists with the living club mosses, although the fossil forms are of far greater size, attaining at times a growth of 75 to 100 feet in height. They are widely dis¬ tributed over the world and are abundant in the middle and lower divisions of the productive coal measures.

LEPIDOLITE, or LITHIA MICA, an

important member of the mica group of min¬ erals, as it is now one of the chief sources of the lithia salts so valuable in medicine. The specific gravity is 2.8 to 2.9, the hardness 2ˆ4 to 4 and the optic axial angle 50° to 70°. Its name, derived from the Greek, lepis, a scale, alludes to its usual occurrence in fine, scaly- granular masses. It rarely occurs in distinct, monoclfnic crystals. It has a pearly lustre and a gray, lilac or peach-blossom pink color. It occurs in small quantities in many parts of Eu¬ rope and Asia, but by far the most important locality is in San Diego County, Cal., where it is now extensively mined. It is also found in Maine and Massachusetts and has been mined near Haddam, Conn. It is very frequently as¬ sociated with pink and green gem tourmalines.

LEPIDOMELANE, a species of iron pot¬ ash mica. In appearance it is black and either opaque or clear, scaly and adamantine. It crys¬ tallizes in the monoclinic system. It occurs in eastern United States and northern Europe.

LEPIDOPHYTA. See Paleobotany.

LEPIDOPTERA (Gr. rif, scale; Trrepdv, wing) : An order of the class Insecta, compris¬ ing the butterflies and moths. The name was given to the order because the wings are covered with little scales, or flattened hairs. The Lepi- doptera undergo in their development a com¬ plete metamorphosis, passing through the stages of the egg, larva and pupa, before appearing as the perfect insect, or imago.

Eggs. — The eggs of the Lepidoptera are minute objects, though generally large enough to be seen with the naked eye. When examined under the microscope they are found to vary greatly in form according to the species. They may be spherical, hemispherical, oval, conic, cylindrical, spindle-shaped or flattened. The eggs of the Cochlidiidce, or slug-moths, are cir¬ cular, or elliptical, and greatly flattened, resem¬ bling microscopic pancakes. The egg of the common cabbage-butterfly is spindle-shaped. The eggs of both butterflies and moths are generally beautifully fluted with raised lines, or ornamented with a net-work of sculpturings arranged in geometrical patterns. They are always provided with a minute opening in the shell known as the micropyle, permitting them to be fertilized. This is located at the apex in most forms, but in the case of those eggs which are flattened the micropyle is located on the side. The female deposits the eggs upon the plant on

which the caterpillars feed, or in close prox¬ imity to the food which is to nourish them, in the case of those few species which do not subsist in the larval stage upon vegetable matter.

Larvae, — When the eggs hatch the insects appear as larvae, or caterpillars. These undergo successive molts as they increase in size, shed¬ ding their skins from time to time until they have attained the development at which -the next transformation, known as pupation, occurs. The bodies of larvae consist normally of 13 segments, or somites, of which the first is the head. The forms of the larvae are very various, though in the main they are vermiform and cylindrical. The larvae of butterflies are for the most part smooth, though in some genera they are curi¬ ously ornamented with lateral or dorsal projec¬ tions, which may be spinous, club-shaped or filamentous. The larvae of moths are often hairy, or spinose, and in some genera of the Lasio camp idee , the Cochlidiidce and the Satur- niidee, these spines possess stinging, or poison¬ ous, properties. Lepidopterous larvae possess three pairs of true feet located upon the three segments immediately following the head, and corresponding to the six thoracic feet which are found in the winged form of the insects. In addition to these true feet the bodies of these larvae are supported by from two to eight pairs of abdominal prolegs, or false feet, which are fleshy and do not recur in the imago. The head is always more or less conspicuous in the larval stage, and is provided with eyes and mouth parts adapted to cutting and deglutition.

One of the most remarkable portions of the anatomy of lepidopterous larvae are the two long glands located in the dorsal region, which secrete a milky fluid, which is vented through a nipple-shaped organ upon the lower lip known as the spinneret, and which upon exposure to the atmosphere is transformed into the sub¬ stance known as silk.

Pupae. — When the larva has attained ma¬ turity it is transformed into a pupa. Pupae may be naked, or they may be enclosed in a structure of silk known as a cocoon. The pupae of butter¬ flies are usually attached by their anal extrem¬ ities to twigs, the under side of rails or stones. The attachment is effected by means of a button of silk into which the hook-like cremaster is thrust. In some families chrysalids are in addi¬ tion held in place by a girdle of silk. The larvae of many moths undergo pupation in a cocoon which may be densely woven or very loosely constructed of a few strands of silk mingled with hairs from the body of the caterpillar, or loose particles of adherent earth or fragments of leaves. Many of the hawk-moths

and almost all of the owlet-moths undergo transformation in underground cells which the caterpillars mold for themselves in the soil before changing into pupae. The duration of the pupal stage varies in length according to the species, or the season. Many species in temperate climates pass the winter in the pupal form. Where there are two or more generations in a season the pupal period is short for the summer broods, and the fall brood hibernates in the pupal state. The pupae of butterflies are often ornamented with silvery or golden spots, hence the name chrysalis has been applied to them, the word being derived from the Greek (xc,pvoo gold). The pupae of moths are generally some shade

of brown or black. The pupa contains the imago and in almost all cases an examination will show in the pupa the location of the vari¬ ous organs of the perfect insect in a rudimen¬ tary form.

The Imago. — When the period of pupation is ended the butterfly or moth breaks through the pupal shell and emerges a four-winged, six¬ footed insect, known as the imago. The females of some species of moths are apterous, or pro¬ vided with wings so poorly developed that they cannot be used in flight.

Classification. — The classification of the Lepidoptera has afforded opportunity for much divergence of opinion among naturalists, but the division into two great suborders, the Rhopalo- cera, or butterflies, and the Heterocera, or moths, is well established in usage.

The Rhopalocera contains six families:

I. Nymphalidce ((

II. Erycinidce (ˆMetal-marks®). — The fe¬ male has the first pair of legs weakly, though perfectly developed. The coxa- of the foreleg of the males is spined, and the tarsi are unjointed and without claws. There are over 60 genera and fully 1,000 species in this group. The but¬ terflies composing it are generally small, but gaily and curiously colored. The metropolis of the family is found in the hot lands of the New World, though it is also represented in the Eastern Hemisphere.

III. Lyccenidce (((Blues,® ((Coppers® and <(Hair-streaks®) . — The fore legs of the male are aborted, the tarsus having but a single joint terminated by a single claw. There are over 2,000 species known. The butterflies are gen¬ erally small. The upper sides of the wings are prevalently some shade of blue, bronzy green or copper,

though there are some species, especially in Africa, yellow, red or white.

IV. Pieridce (((Whites,® <(Sulphurs® and <(Orange-tips®). — The six legs are well devel¬ oped in both sexes and the feet have two hooks or claws at the end. There are about 1,200 species known to science. The ((cabbage butter¬ fly® and the ((common sulphur® of the clover fields are fair representatives.

V. Papilionidce (((Swallow- tailed Butter¬ flies®). — The six legs are well developed. The claws are simple. About 1,000 species belong to this family, among them some of the largest and most splendid tropical insects.

VI. Hesperiidce ("Skippers®) . — The six legs are perfect. The claws are short and thick. The bodies are relatively robust. In flight the insects are very quick and powerful, hence the common name. The butterflies are generally small, though there are some quite large species.

There are about 13,000 species of butterflies which have been named and described. It is probable that when we shall have explored the entire earth the total number of existing species may be found to be 18,000.

The Heterocera, or moths, may be divided into about 60 families, of which 43 are repre¬ sented in North America. The families which have the largest number of species in North America are the Noctuidce , or "owlet-moths," the Geometric!#, or "measuring-worm moths," the Saturniidce, or "wild silk-moths," the Arc- tiidce, or "tiger-moths," the Spliingidce, or "hawk-moths," the Tortricidce, or "leaf-rollers," and the Pyralidce. More than 7,000 species of' moths are known to occur in the United States and Canada, and probably more than 100,000 species at present exist upon the globe.

The most important of all the Lepidoptera from a commercial standpoint is the silk-moth (Bornbyx mori), which was introduced into Europe from China by way of India, and at an early, date was brought to the New World.

Bibliography. — Beutenmiiller, (Monograph of Sesiidse of North America) (Memoirs American Museum of Natural History) ; Dick¬

inson, (Moths and Butterflies) (Boston 1905); Dyar, (A List of North American Lepidoptera) (Bulletin, United States Natural Museum, No. 52) ; Edwards, (The Butterflies of North Amer- ica) ; Felt, E. P., (Gypsy and Brown Tail Moth> (Bulletin, New York State Museum, No. 103, Albany 1906) ; Hampson, Catalogue of the Lepidoptera Phalaenae in the Collection of the British Museum ; Holland, (The Butterfly Book) (1898 ; 2d ed., 1904); id., (The Moth Book* (1905) ; Packard, (Monograph of Geo- metridse* (Hayden's Survey, Vol. X) ; id., ˆMonograph of Notodontidae* (Memoirs Na¬ tional Academy of Science, Vol. VII) ; Roths¬ child and Jordan, (A Revision of the Lepidop- terous Family Sphingidae* ; Scudder, (Butterflies of New England* (1889) ; Smith, "Catalogue of the Noctuidae* (Bulletin, United States Natural Museum, No. 44) ; Transactions of the Amer¬ ican Entomological Society (published quarterly since 1867) ; Entomological News (published monthly since 1890) ; Psyche (published bi¬ monthly since 1877).*

W. J. Holland,

Director of Carnegie Museum, Pittsburgh, Pa.

LEPIDOSIREN, the American genus of Dipnoi (q.v.), or lung-fishes, closely resembling the African genus Protopterus, but having a more eel-like form, smaller scales and the paired limbs reduced to mere filaments of no use in locomotion. The single species Lepido- siren paradoxa was discovered by the Austrian naturalist Natterer in the tributaries of the up¬ per Amazon in 1837. For 50 years the species was known from only two or three museum specimens, but in 1887 was rediscovered in abundance in Paraguay by an Italian zoologist and since then has been the object of several expeditions which have made it well known. Jt lives in the sluggish, vegetation-choked "streams and lakes of that region, the natives of which spear it in large numbers for food. Its large eggs, more than a quarter of an inch in diameter, are deposited in underground nests where they are guarded by the males, whose ventral fins become densely villous and serve as accessory respiratory organs at this time. On the approach of the dry season the muscles of the tail undergo fatty degeneration and the fish retires to a mucus-lined "cocoon" in the mud at the bottom of a burrow sealed at inter¬ vals of three or four inches by plates of mud

perforated by two or three small openings. In these retreats the "lolachs," as they are called by the Indians, remain until the rains again convert the baked earth into mud. The lepido- siren feeds on large aquatic snails, confervas and roots.

LEPIDOSTEUS. See Gar.

LEPIDOSTROBUS (Gr. "whirling scale"), a fossil cone from the coal measures, usu¬ ally found in seams or nodules of clay- ironstone, and often compressed. They con¬ sist of a central axis surrounded by imbri¬ cated scales or bracts, each containing a spo¬ rangium (spore-case). They have been found united to the tip of the branches of Lepidoden- dron, and this shows that they were the fruit of that genus.

LEPIDOTUS, a genus of fossil ganoid fishes of the family Semionotidce, occurring in abundance from the Keuper to the lower Creta¬ ceous in Europe, Siberia, India and Brazil.

LEPIDUS, Marcus .TEmilius, Roman triumvir : d. Circeii, 13 b.c. He became praetor 49 b.c., consul with Julius Caesar in 46, and in 44 was appointed by Caesar to the government of Narbonese Gaul and Nearer Spain. He came of a distinguished patrician family, and possessed great wealth and influence, but seems to have held little power, and to have been a poor commander. He was in Rome at the time of Caesar's death, and joined Mark An¬ tony. In 43 he united with Antony and Octa- vianus to form the triumvirate, obtaining Spain and Narbonese Gaul in the division of the empire. After the battle of Philippi (42) a redivision took place, in which Lepidus received Africa, where he remained till 36, when he was summoned by Augustus to assist him against Sextus Pompey. He then tried to seize Sicily, but was overcome by Augustus, who deprived him of his triumvirate, and banished him to Circeii, where he lived under strict surveillance.

LEPORIDJE, a family of rodents com¬ prising the rabbits and hares. With the Lago- myidce it constitutes the suborder Dupliciden- tata, distinguished from all other rodents by having two pairs of upper incisors, of which the second is much reduced in size and placed immediately behind the first and larger pair. The hind-legs are much longer than the fore¬ legs and are well adapted by their structure for the leaping mode of locomotion affected by these animals ; the tibia and fibula are com¬ pletely ankylosed and articulate with the cal- caneum by a pulley-like surface, thus combin¬ ing great strength with great freedom of move¬ ment in one plane. The family is now cos¬ mopolitan, some 75 species and. sub-species be¬ ing recognized in North America. The genus Lepus is practically coextensive with the family. See Hare.

LEPRA, in botany, a plant disease char¬ acterized by the exudation

upon the surface of the leaves of a white mealy or scaly sub¬ stance. In pathology : (1) Same as leprosy

(q.v.). (2) Formerly applied as descriptive of

a scaly affection of the skin now classified as psoriasis, and also known as lephra alphos and lephra Grcecorum.

LEPRECHAUN, lep’re’han, LEPRE¬ CAWN, LUPRACHAUN, or CLURI- CAUNE, in Irish folklore a pygmy sprite sup¬ posed to make shoes, grind meal and assist in other ways humans who are kind to him. He is supposed to reach to a man’s knee in height and when not engaged in other helpful deeds is believed to be making shoes, the sound of his hammering being one of the principal means’ of discovering him. He is reputed to possess the secret of wealth and to be power¬ less to conceal it under the steady gaze of the human eye, but if the gaze be relaxed even momentarily he escapes. In some versions he possesses a purse which (

LEPROHON, le-pron’, Rosanna Eleanor Mullins, Canadian poet and novelist : b. Mont¬ real, 1832 ; d. there, 20 Sept. 1879. She was educated at the Convent of Notre Dame, Mont¬ real, and began her literary career at 14 with contributions to the Montreal Literary Garland. She married Jean Lukin Leprohon, a Canadian physician, in 1851. From 1860 she was con¬ nected with the Montreal Family Herald and she also wrote for the Boston Pilot. Many of her novels were serialized and several were translated into French. Most of her novels deal with social happenings about the time of the English occupation. Her novels include (Eveleen O’Donnell > (1859); Antoinette de MirecourP (1864) ; (Armand Durand) (1868). Her collected poems were published after her death (Montreal 1881).

LEPROSY, a term very vaguely used by medical and other writers to denote a disease, Lepra tuberculosa , which appears to have pre¬ vailed from the earliest time down to the present. The bacillus leprce was discovered by Hansen in 1868. The most prominent symp¬ toms of the disease are as follows : a constant but intermittent fever, dusky red or livid tubercles of various sizes on the face, ears and extremities; thickened state of the skin with diminution of its sensibility; falling off of the hair, except that of the scalp ; hoarse, nasal or lost voice; ozsena; ulcerations of the surface, a periodical

exaggeration of perspiration, con¬ nected with nervous disturbances, and a feeling of anxiety with sense of impending disaster and extreme fetor. The tubercles vary in size from that of a pea to an olive. Hands, feet and face are generally first affected.

In modern times three main forms of leprosy are recognized. In the first the whole body becomes white and scaly, without much interference with the general health. This is the type of the Biblical leprosy, and it is rare nowadays. The second variety causes a loss of feeling in the hands and feet in its earlier stages, and later on in the arms and legs. It is known as anaesthetic leprosy. It is a form of neuritis (q.v.). The sufferer from this form of the disease is much troubled with dysentery, and when the disease is advanced his hands and feet are liable to slough off. The third variety of leprosy is known as the tubercular form. It is distinguished by horrible swellings of loose skin, which becomes dis¬

colored. This is the commonest modern variety of the disease and the one most repulsive.

Leprosy was recognized 1500 b.c. in India and in the Orient and in Palestine and the countries immediately east of it leprosy existed until the dispersion of the Jews in the 1st cen¬ tury of the Christian Era. As the power of the Roman Empire declined in the west of Europe a strong tide of emigration from the Levant set in. The plague of leprosy spread with the teaching of Christianity until no coun¬ try in Europe was free from it. It is also said that the returning Crusaders spread the disease all over Europe in the 11th and 12th centuries. Between the 6th and the 15th centuries leprosy was by far the most dangerous and infectious disease of which any account has come down to us.

To be a leper was to be an outcast beyond hope of any solace but the grave. All the larger towns in Europe had a place specially set apart for its lepers. This reservation was shunned as if it were the mouth of a burning hell. A boundary line was made, beyond which no leper could venture, except at the risk of in¬ stant death. If a healthy stranger unwittingly wandered too near the leper's camp he was re¬ morselessly thrust into it and made to share the lot of those previously afflicted. Food was furnished to these leper camps by the town au¬ thorities. The provisions intended for the use of the lepers were left on some exposed hill, selected for that purpose, during the daytime, and removed by the inmates of the camp at night. No office, no matter how exalted, served to keep a sufferer from leprosy from universal ostracism.

In the sparsely settled country districts, solitary lepers abounded. Each one wandered about by himself in the unfrequented woods and uninhabited waste places. The rigorous compulsion of the villagers compelled him to wrap himself in a sheet so that only his eyes were exposed. He must carry a bell in his hand and ring it in order to warn wayfarers of his approach. Whenever the dismal tinkling of the leper's bell was heard, the inhabitants fled in terror of their lives. The unfortunate victim supported life as best he might by roots and berries, and by the occasional offerings of char¬ itable persons left where he could find them.

At an early period in the history of the Christian Church efforts were made to alleviate the sufferings of lepers. An order of Saint Lazarus was formed as early as 72 a.d., taking its name from Lazarus, the beggar who ate the crumbs which fell from the rich man's table. Later on, in the 12th century, a military order of Lazarus was founded by the Knights Hos¬ pitallers. When these knights were driven out of Palestine they made France and afterward Sicily their headquarters. Numerous lazarettos were established by them in the principal cities of Europe. For many years the grand master of this order was required to be a leper. In civil law the leper was treated as one dead. His property passed to his heirs, his wife was free to marry again, and on his departure for the lazaretto prayers for the dead were repeated over him, and a shovelful of earth was thrown after him to make the ceremony complete.

With the progress of civilization leprosy gradually disappeared from every part of Europe except Norway. Lazarettos gradually

fell into disuse, and only the name of leper re¬ mained as a by-word to express social and moral contamination. Great Britain was one of the last countries to cut clean of leprosy. As late as the 15th century, 250 leper hospitals were in existence there. The government, as well as other European governments, has practically banished the disease, by careful surveillance. In British America the disease still lingers in New Brunswick. In the hospi¬ tal for lepers at Tracadie there have been a score of cases regularly for many years.

In the United States leprosy has existed since the Revolution and probably will continue to exist. Leprosy hospitals in secluded spots are maintained in San Francisco, New Orleans, Boston and New

York, and cases are always found here in numbers from two or three to a score. In the Philippines at the time of the American occupation there were 15,000 cases in the islands, but by the census of 1902 only about 5,000 cases were reported. The disease was brought to Manila originally from Japan about 200 years ago. The number of lepers in the world is estimated to be about 3,000,000, two-thirds of which are in China.

The most celebrated leper colony or settle¬ ment in the world is that on the island of Molokai in Hawaii ; but the conditions there have been much exaggerated. Molokai lies about 25 miles from the island of Oahu, and about 56 miles from Honolulu. The leper set¬ tlement on the elevated, grassy plain of Kalau- papa has an area of 8,000 acres.

The whole number of lepers at the Molokai settlement in 1902 was officially reported at 1,191, viz., 741 males and 450 females. There would be, therefore, nearly seven acres of pro¬ ductive soil for every member of the settle¬ ment. There are hospitals, dispensaries, churches and comfortable cottages for the ac¬ commodation of families ; these cottages are well ventilated, abundantly supplied with fresh water and kept in good condition. Cottage residents requiring medical treatment are at¬ tended at their own homes by the resident phy¬ sician. Every man, woman and child may draw 21 pounds of fresh beef every week, a liberal supply of taro, flour or bread, rice, tea, sugar, salt, tobacco and matches, and as much good clothing as required. A sum of money is paid to those who do not draw the full ration, which enables them to purchase articles not included in the regular supply.

It is reasonably certain that leprosy can be cured by competent skin and nerve specialists. See ((Neuritis® in Jelliffe and White, dis¬ eases of the Nervous System) (1917).

LEPSIUS, lep'se-oos, Karl Richard, Ger¬ man Egyptologist: b. Naumburg, 23 Dec. 1810; d. Berlin, 10 July 1884. After studying philol¬ ogy at Leipzig, Gottingen and Berlin, he pub¬ lished his first work, (Le Tabulis Eugubinis1 (1833) and therupon removed to Paris. In 1835 he visited Italy and took up his residence at Rome. He subsequently went to London and pro¬ jected with Bunsen a large work on ancient Egypt. He started in 1842 and spent three years exploring in Egypt from the Sudan north of Khartum to the coast of Syria, obtaining an enormous amount of data. His life henceforth was that of an ardent Egyptologist, and honors were showered upon him. He was professor in the Berlin University, director of the*

Egyptian

section of the Royal Museum, director of the Royal Institute, head of the Royal Library, etc. In 1866 another trip to Egypt resulted in his famed discovery of the Decree of Tawis, or Table of Canopus. He was author of a large number of important works on Egyptian antiquities, one being the (Nubische Grammatik' which is perhaps the least contribution to modern knowledge of the Nubian language. His ˆhronologie der AgypteU is also a stand¬ ard authority.

LEPTOCARDII. See Ichthyology.

LEPUS (<(the hare®), in astronomy, one of the 48 constellations south of Orion, contain¬ ing several bright stars, among them Alpha and Beta Leporis.

LERAY, le-ra', Francis Xavier, American Roman Catholic bishop : b. Chateaugiron, France, 1825; d. France, 1887. He was edu¬ cated at Rennes, but in 1843 crossed the Atlantic and settled at Baltimore. He went through the ordinary theological course under the direction of the Sulpicians and was admitted to the priesthood 1852. He was a chaplain in the Confederate service during the war and after¬ ward returned to Vicksburg, and while the plague of 1867 raged was always at hand to comfort and assist the sufferers. In 1873 he was consecrated to the see of Natchitoches, La., and 10 years later promoted to the archbishop's chair of New Orleans.

LERDO DE TEJADA, Sebastian, sa-

bas'te-an lar'do da ta-ha'da, Mexican states¬ man: b. Jalapa, Mexico, 25 April 1825; d. New York, 21 April 1889. He was educated at the College of San Ildefonso, Mexico, was admitted to the bar in 1851 and was appointed a judge of the Supreme Court in June 1857. He was Minister of Foreign Affairs in 1857 ; member of Congress in 1861-62 and in 1862-63 ; and ac¬ companied President Juarez in 1863-67, during which time he was successively Minister of Justice and Minister of Foreign Affairs. He was elected chief justice of the Su¬ preme Court in December 1867, and on the death of Juarez, 18 July 1872, succeeded to the Presidency, and in the following Novem¬ ber was elected to that post. In 1876 he was again candidate to succeed himself, and after a doubtful election was declared re-elected by Congress. This action resulted in a revolution headed by Diaz, and Lerdo's adherents were signally defeated at Tecoac, 16 Nov. 1876, while Lerdo was forced to leave the country. He lived in retirement in New York City till his death.

LERIDA, la’re-da, Spain, city, capital of the province of the same name on the river Segre, an affluent of the Ebro, 82 miles by rail northwest of Barcelona. It consists of an upper and a lower town, distinctive features of which are the two cathedrals. The 13th century cathedral exhibiting Byzantine, Moorish and Gothic architecture, perched on the hill, is sur¬ rounded by fortifications and serves as a mili¬ tary storehouse. It is a beautiful church, full of fine ornamental sculpture and the ((Porta dels Fillols® is an excellent example of a re¬ markable Catalan type. In the new cathedral of Corinthian style in the lower town there is a magnificent cope of 13th century Moorish silk. There are also noteworthy Romanesque houses, old convents, a former palace of the

kings of Aragon, the episcopal palace, schools and educational institutions. The streets are narrow and gloomy. Cotton, woolen, silk, leather and glass goods are manufactured. As Ilerda, an aboriginal settlement, it is noted for its resistance to the Roman invaders. Its episcopal see dates from the Visigoth occupa¬ tion, and in 546 a council assembled here. Pop. 24,500.

LERIDA, Spain, a northeastern province of ancient Catalonia; area, 4,690 square miles; pop. 291,850; density. 60.4 to the square mile. Capital Lerida (q.v.).

LERMONTOF, Mikhail Yuryevitch, Rus¬ sian poet and novelist: b. Moscow, 1814; d. 15 July 1841. He was descendant of a Scotch¬ man, named Learmont, who emigrated to Rus¬ sia. The Lermontof family were small land- owners in the government of Tula. His mother died at the early age of 21 when he was only two-and-a-half years old and his father, of whom nothing is known beyond the fact that he was an army officer, confided the child to the care of his grandmother, an aristocratic lady who owned the village of Tarkhanui not far from the town of Penza. She did every¬ thing in her power for his education so that he might take a high position in the world of fashion.

When he was in his 13th year he was put into a boarding school for boys of noble birth, in Moscow, to prepare for the university and there spent five years, recognized even then for his brilliant mind and attractive qualities. He was admitted into the university but was soon involved apparently without direct fault in a trivial escapade which

the stern discipline then in vogue punished by expulsion. As this cut him off from his chosen career, he went to Saint Petersburg and in March 1832 enrolled himself in the Yunker School where he re¬ mained two years. During this time he de¬ voted himself assiduously to poetical composi¬ tion and produced his (Mongo) (in which he described himself under the name of ˆMyoshka®) , and (Peterhofsky Prazdnik ((A Festival at PeterhoP) as well as several Cau¬ casus poems, such as IzmaiPBey and Hadji- Abrek. In these he showed a tendency to be cynical and was openly an imitator of Byron, who exercised a great influence over the young writers of Russia. In 1834, shortly after he had left the Yunker School, he wrote his drama*

the Russian people. No longer is there any trace of the cynical romanticism of the Byronic epoch. In its way, though not so extended a work, it was a considerable improvement on his clumsily constructed but nevertheless beauti¬ ful epic, (Demon, > with which his name is more familiar to foreign readers, perhaps partly be¬ cause portions of it were set to music by Rubinstein.

Nathan Haskell Dole. LERNZEA. See Fish-lice.

LEROUX, le-roo, Frederic Etienne,

French sculptor: b. Eccouche (Orne), 3 Aug. 1836; d. 1906. He studied with Jouffroy and at the Beaux-Arts, became an exhibitor at the Salon in 1863, obtained a medal of the second class at the Paris Exposition of 1878, and a silver medal at that of 1889. Among his best- known works are (Demosthenes on the Shore ; (Joan of Arc* ; (Marchand de Violettes) ; (Bouquetiere.**

LEROUX, Hector, French painter: b. Ver¬ dun, 27 Dec. 1829 ; d. 1900. He was a pupil of the Beaux-Arts and of Picot, in 1857 obtained by his

the Caesars> (1864); (1874) in the Corcoran Gal¬ lery, Washington; (The Burial of Themistocles> (1876); lThe Fall of Herculaneum (1881); (News from Outside) (1891) ; (Hagar and Ishmael* (1892) ; (Joan of Arc at Domremy)*

(1900).

LEROUX, Louis Eugene, French painter: b. Paris, 28 Sept. 1833. He studied with Picot, became known for his genre-scenes derived from

Breton life, and painted, among his more important works, (Le Nouveau-Ne (in the Luxembourg Gallery) ; (Avant l'Ensevellisement) ; (La Priere*; and (Avant la Confession.)*

LEROUX, Robert Henri (called Hugues), French journalist and author: b. Havre, 1860. He became a journalist at Paris where he wrote for the Temps, Matin, Figaro, Journal and other newspapers, and published two works on Russia, (La Russie Souterraine) (1885) and (L'Attentat Sloughine, a story of the Nihilists. He has visited the United States as lecturer before the Cercle Frangais de l'Harvard. His further works include (L'Autre France) (1900), a drama, with Decourcelle; the works of fiction, (Un de Nous) (1886) ; (Le Maitre de l'Heure> (1897);*

LEROY, le-roi', William Edgar, American naval officer: b. New York, 24 March 1818; d. there, 10 Dec. 1888. In 1832 he entered the navy as midshipman and served as a lieutenant on the Princeton during the Mexican War. He served in the United States navy during the Civil War also, doing good service, especially at Charleston in 1863 and Mobile Bay in 1864, became a commodore in 1870 and a rear-admiral in 1874. He commanded the South Atlantic squadron 1876-79 and retired from active service in 1884. On account of his courtly manners and general fastidiousness he was often styled ((the Chesterfield of the Navy.®

LERO Y-BEAULIEU, le-rwa bo-le-e, Henri Jean Baptiste Anatole, French historical writer: 'b. Lisieux, Calvados, 1842 ; d. 16 June 1912. He was a brother of Pierre Paul Leroy- Beaulieu (q.v.). In 1881 he was appointed to the chair of modern history in the Ecole Libre des Sciences Politiques, and in 1887 was elected to the Academy of Moral and Political Sciences. He became director of the former institution in 1906. He contributed extensively to the Revue des Deux Mondes and published in 1882 the important work, (iL'Empire des Tsars et les Russes, a study of Russian history, poli¬ tics and civilization. Others of his publications are (La France, la Russie, et l'Europe* (1888) ;*

LERO Y-BEAULIEU, Pierre Paul, French

economist : b. Saumur, Maine-et-Loire, 9 Dec. 1843; d. Paris, 10 Dec. 1916. He was edu¬ cated at the Lycee Bonaparte and the Ecole de Droit of Paris and the universities of Bonn and Berlin; became a journalist at Paris; wrote his fL'Influence d'Etat Moral ct Intellectuel des

Populations Ouvrieres* (1868), crowned by the Academy ot Moral and Political Sciences ; as¬ sisted in founding the Ecole Libre des Sciences Politiques and was appointed professor of finance there in 1872. In 1880 he became pro¬ fessor of political economy in the College de France. He established in 1873 L'Economiste Frangais, which he continued to edit. In 1878 he was elected to the Academy of Moral and Political Sciences. He came into promi¬ nence in 1912 by an arresting appeal to the French people, in which he pointed out the grave dangers of the depopulation and dena¬ tionalization of France owing to the declining birthrate. Among his further writings are (La Colonisation chez les Peuples Modernes) (1873); Precis d'Lconomie Politique* (1888); (Traite Theorique et Practique d'Lconomie Politique* (1895) ; (La Renovation de l'Aise, Siberie, Chine, Japon* (Eng. trans. 1900) ; (La Sahara, le Sudan et les chemins-de-fer transsahariens) (1904) ; (The United States in the Twentieth Century) (1906) ; (Le Question de Population (1913).

LERY, Jean de, zhori de la-re, French Cal¬ vinist preacher: .b. La Margelle, France, 1534; d. 1601. In 1556 he was sent from Geneva to preach at Rio Janeiro, Brazil, where French colonies had been established by the Huguenots, and was the first Protestant minister to preach on the American continent. He and the preach¬ ers who accompanied him were obliged to re¬ turn to France owing to a bitter misunder¬ standing regarding their salaries. Lery has left an account of his travels in the west under the title (Histoire d'un Voyage fait en la Terre du Bresil* (1578).

LES CHATIMENTS, la shat'e-maii'. III, that a final edition could be publicly issued in France. (Les Chatiments* is a collection of poems protesting against the political crime of Louis Napoleon Bonaparte, in which lyrical satire assumes the most varied forms, from sublime eloquence to abusive, al¬ most coarse, personalities. This protestation of right against might, of justice against violence, gives to the author full opportunity, to display the qualities which characterize his poetical works : power of imagination, suggestion and association, combined in this case with a per¬ sonal feeling of indignation against what he considers as a public calamity and a step back¬ ward in the road of social and. political prog¬ ress. Although the book is divided into seven parts, there is no real sequence nor order in this collection of satirical poems, but this defect is more than balanced by the admirable com¬ bination of poetical forms, the variety of tones, rhythms and metres, the richness of the vo¬ cabulary, the harmony of words well suited to the

expression of the thought or to the char¬ acter of the subject. Hugo's fondness for antithesis in words as in composition is seen throughout the work and some of the poems consist of two symmetrically balanced parts. Probably the best known of them is (L'Expi-

ation/ in which occur the epic descriptions of Napoleon I's retreat from Russia and of the battle of Waterloo. Consult Swinburne, / Essay on Victor Hugo (London 1886) ; Rigal, (Vic- tor Hugo, poete epique* (Paris 1900).*

L. A. Loiseaux.

LES LETTRES PERSANES. The Per¬ sian Letters (1721) of Montesquieu was a lively political satire, spiced with rather warm imaginings of life in an Oriental seraglio. Behind the transparent veil of a setting for¬ eign to French ways, the Letters offer a keen and trenchant criticism of the whole social and political structure of France, scourging the insatiable cupidity of the courtiers, the privi¬ leged idleness of the nobility, the impudence in business of parvenu financiers. In exposing the meaner side of the decaying years of Louis XIV, Montesquieu is as pitiless as Saint-Simon. But he is constructive also. Much of the future <(Spirit of the Laws® is here in embryo, and in the myth of the troglodytes he touches the origin and bases of all society. This myth tells how a people by surrender to their natural instincts brought about their own destruction and how two families, escaping the general ruin, founded a stable society on the domestic and military virtues and the sanctions of an official religion. In this aspect the Letters range themselves with such tales of Voltaire as

Benjamin W. Wells.

LESAGE, le-sazh, Alain Rene, French

novelist and playwright : b. Sarzeau, near Vannes, 8 May 1668; d. Boulogne-sur-mer, 17 Nov. 1747. He studied law in Paris and be¬ came an advocate, but soon afterward turned all his attention to literature. He made many fruitless efforts after recognition and success, principally by translating from the Greek and Spanish. At length two plays of his, (Crispin Rival de Son Maitre (1707), adapted from a Spanish piece of Mendoza's, and*

this novel was a bare-faced plagiarism from a Spanish original. In (Gil Bias the wit of the author is triumphant and the surprises and ad¬ ventures of human life, with all the ups and downs of fortune, are made to rouse our sense of humor as well as our keenest interest, and to dazzle our fancy by the swiftness and variety of their changes. The work is, of course, desti¬ tute of high ideal and all moral aim, but it has been compared with those of Rabelais and La Fontaine, and its hero was certainly the pre¬ cursor of Figaro. The most memorable of Lesage's other romances are (Les aventures de Guzman d'Alfarache* (1732), an imitation of a Spanish romance of Mateo Aleman; (Este- vanille Gonzales* (1734) ; (Les aventures du chevalier de Beauchesne* (1732), founded on contemporary memoirs; and (Le Bachelier de Salamanque) (1736), the latter the production of his declining years, and highly valued by him. But his most numerous works were vaudeville and comic operas (101 in all). Lesage was the forerunner of the realistic school and while not a creator he was a keen observer, painting life as he found it with a keen understanding of its foibles. The Acad¬ emy revenged itself on him for the graceless levity and irreverence toward the learned pro¬ fessions which he exhibited in his works, by refusing to elect him to their number. But they failed to check the growth of his fame. His influence was first spread in England through Smollett and in France through Balzac. Although popular in his lifetime he was little appreciated, but his place in French literature now appears more secure than ever. A full edition of his works was published in Paris in 1828. Consult Claretie, (Le Roman en France an debut du XVIII. Siecle, Lesage Romancier> (1890) ; Barbaret, (Lesage et le Theatre de la Foire) (Dijon 1887) ; Brunetiere, F., (Critiques* (Vol. Ill, Paris 1880) ; Faguet, E., (Dix huitieme siecle* (i'b. 1885) ; Lintilhac, Eugene, (Grands ecrivains frangais* (ib. 1893) ; Saintsbury, G. E., (Essays on French Novelists* (London 1891). See Gil Blas ; Lame Devil, The.*

LESBOS, lez'bos. See Mitylene.

LESCHETIZKY, lesh-e-tits'ki, Theodor, Austrian pianist : b. Lancut, near Lemberg, Austria, 22 June 1830; d. 15 Nov. 1915. He received his first instruction from his father, a prominent teacher in Vienna, and after a successful concert tour in 1864 was made professor of the pianoforte at the conservatory of Saint Petersburg, where he turned out many illustrious pupils. In 1878 he returned to Vienna with an ever-increasing reputation. As a pianist he was remarkable for delicacy of touch and a magic power of expression. As a composer he published some very elaborate pieces for the piano, some songs and an opera, (Die erste Falte) (1867). Among his more

famous pupils are Helen Hopekirk, Mark Hambourg and Paderewski. Consult Annette Hullah, (Theodor Leschetizky (Lon¬ don 1906).*

LESGHIANS, les'gi-anz, a group of semi¬ savage tribes of the eastern Caucasus, inhabit¬ ing the region of Daghestan. They have been called Lehi by the Persians, Kists by their neighbors, the Georgians, while their own gen-

eral name . is Naktchuoi. They include the Avars, Lakions, Dargis and Chechezians. Their origin is prehistoric and their relationship to each other is not clear, but probably chiefly re¬ ligious, they being mainly followers of Murad (q.v.), a Mohammedan prophet. They came under Russian dominion in 1859, when their chief Shamyl was defeated. Their men are large and powerful, though not as handsome as the Circassians, having prominent noses and a Mongolian cast. Some of the tribes are fair, however, showing Circassian mixture. They are very independent and fought 30 years against Russian supremacy. They raise goats and cattle on the slopes of the hills, operate primitive forges and manufacture coarse cloth¬ ing. Consult De Morgan, (Recherches sur les Origines des Peoples du Caucase) (1889); Hutchinson, (Living Races of Mankind' (1901).

LESLEY, les'li, J. Peter, American geolo¬ gist: b. Philadelphia, 17 Sept. 1819; d. Milton, Mass., June 1903. He was graduated at the University of Pennsylvania in 1838, for the next three years was engaged as assistant in the first geological survey of Pennsylvania. In 1844 he was graduated at the Princeton Theo¬ logical Seminary and licensed as a minister. Visiting Europe, he made foot-journeys through several countries and for a while studied at the University of Halle. From 1845 to 1848 he labored for the American Tract Society among people in the mountain districts of Pennsylvania and then served two years as minister of a Congregational church at Milton, Mass., re¬ signing on account of a change in his religious views. Returning to Philadelphia, he resumed his geological researches, extending his inves¬ tigations throughout the coal, oil and iron re¬ gions of this country and Canada. In 1855 he became secretary of the American Iron Asso¬ ciation ; in 1858 secretary and librarian of the American Philosophical Society ; and State geologist of Pennsylvania in 1874. He was also professor of geology at the University of Penn¬ sylvania 1872-78 and there in 1886 was ap¬ pointed emeritus professor. In 1863 he went to Europe to examine

the Bessemer iron works for the Pennsylvania Railroad Company, and in 1867 was appointed by the United States Senate a commissioner to the Paris Exposition. He was president of the American Association for the Advancement of Science in 1884. He edited many works, published numerous scien¬ tific papers in various journals and reports, and also wrote (1876); and (Paul Dreifuss, His Holi¬ day Abroad) (1882). Consult Ames, M. L., (2 vols., New York 1909).

LESLEY, John, Scottish prelate and histo¬ rian : b. Scotland, 29 Sept. 1527 ; d. near Brus¬ sels, Belgium, 31 May 1596. He was educated at King's College, Aberdeen, and in 1554 be¬ came professor of canon law there. He strongly opposed Knox and everything pertain¬ ing to the Protestant movement in Scotland. A firm friend of Mary, Queen of Scots, and by her appointed bishop of Ross, he was concerned in the scheme for her marriage to the Duke of

Norfolk, and in the consequent rebellion in the north of England, with the plan for Spanish intervention, and was imprisoned in the Tower. While there he wrote (Piae Consolationes. Finally he was led to confess and as a conse¬ quence the Duke of Norfolk was executed. When released in 1573 he crossed to the Con¬ tinent and in 1593, as a reward for his efforts in encouraging the populace to resist a siege in the Civil War, was created bishop of Cou- tances in Normandy. His chief production is a history of Scotland (1578), in 10 books, seven in Latin and the last three Scottish dia¬ lect. He was also the most active in the group of commissioners who revised the laws of Scotland and oversaw the printing of (Actis and Constitutionis of the Realm of Scotland)*

(1566).

LESLIE, Charles Robert, American genre painter: b. London, England, 19 Oct. 1794; d. there, 5 May 1859. His parents were Ameri¬ cans, the father being a watchmaker of Phila¬ delphia, and to that city they returned with the boy in 1800. There he completed his educa¬ tion at the University of Pennsylvania and was afterward apprenticed to a bookseller. A por¬ trait drawn from memory of G. F. Cooke, the actor, caused a mild sensation among certain business men in Philadelphia, and by means of a subscription, headed by his employer, he was sent in 1811 to England and studied under Allston, West and others; became the intimate friend of Coleridge, Washington Irving and Constable, the artist ; began to exhibit in 1813 ; was elected associate of the Royal Academy in 1821 and in

1826 to full membership. He first adopted a style in large historical subjects, but his genius led him into historical genre of a humorous character, in which he excelled alike in conception and execution, and in which his gentle humor was as pervasive as his finished manner. He was first brought into wide notice by his (Sir Roger de Coverley Going to Church) (1819). To this period be¬ long his portrait of Washington Irving and the illustrations which he designed for that au¬ thor's (Sketch-Book* and his Knickerbocker's History of New York.* Leslie's election as an associate of the Academy was secured by Pay¬ day Revels in the Time of Queen Elizabeth.* In 1824 he visited Sir Walter Scott at Abbots¬ ford and painted his portrait. He was elected.*

professor of drawing at the United States Mili¬ tary Academy, West Point, in 1833, accepted the position, but in a few months gave it up and returned to England. In 1838, at Windsor, he painted (The Queen Receiving the Sacrament after the Coronation. From 1848 to 1852 he was professor of painting at the Royal Acad¬ emy. His principal pictures illustrate scenes from the works of great authors. His draughts¬ manship and composition are both good; but he. was lacking in the gift of color — indeed in this respect his later work declined. His great¬ est qualities are his delicate perception of char¬ acter, intense feeling for the domesticities, his humor which iis always in good taste and the beauty and grace of his delineations of woman¬ hood. Hi's best-known paintings include (Sancho Panza in the Apartment of the Duchess* (1824) ; (Uncle Toby and the Widow Wadman* (1831); (The Dinner at Mr. Page's House* (1831) ; and (The Taming of the*

Shrew) (1832). He published a volume of lectures as a Hlandbook for Young Painters) (1855) ; (The Memoirs of Constable5 (1845) ; an unfinished (Life of Reynolds) (1865) ; and (Autobiographical Recollections 5 (1860).

LESLIE, Eliza, American author : b. Phila¬ delphia, 18 Nov. 1787; d. Gloucester, N. J., 1858. Her girlhood was spent partly in London, Eng¬ land, where her brother, Charles Leslie (q.v.), afterward became distinguished as an English artist. She returned to the United States in 1799 and the rest of her life was nearly all passed in her native city. She first became famous by her (Seventy-five Receipts for Pas¬ try, etc.5 (1827), followed by (The Domestic Cookery

Book) (1837), 40,000 copies of which were sold; (The Home Book) (1840); and (The Ladies' Receipt Book> (1846). She had, however, soon after the success of her first work, begun to write juvenile and other works, and for a generation was one of the most popu¬ lar of American prose writers. Her books are mainly, though not invariably, written to en¬ force moral instruction, and among them are (The American Girls Book5 (1831) ; (Stories for Helen5 ; (Kitty's Relations5 ; (Leonilla Lynmore5 ; (The Maid of Canal Street5 ; (The Dennings and their Beaux5 (1851) ; (Mrs. Washington Potts5 ; and (The Behavior Book5 (1853). She edited for many years The Gift, a popular annual for young women.

LESLIE, Frank (assumed name of Henry Carter), American publisher and journalist: b. Ipswich, England, 1821 ; d. New York, 10 Jan. 1880. He was educated at Ipswich ; entered a mercantile house at 17 ; developed artistic abil¬ ities, and under the name of Frank Leslie con¬ tributed sketches to the Illustrated London News. The success of these led to his giving up commercial pursuits to become superin¬ tendent of engraving for that paper. In this position he produced valuable inventions, and made himself master of technicalities. Coming to the United States in 1848, he followed his profession here, and in 1854 founded the Gazette of Fashion and the New York Jour¬ nal. In 1855 he began the publication of Frank Leslie's Illustrated Newspaper (now Leslie's Weekly), following these with the Chimney Corner, the Boys' and Girls' Weekly, the Budget of Fun and others. In 1867 he was appointed commissioner to the Paris Exposition, where he received a prize for his services to art. He married Miriam Florence Folline, of Louisiana, and she, having taken at his death, by legislative act, the name of Frank Leslie, successfully continued the business, from which she finally withdrew in 1902.

LESPINASSE, Julie Jeanne Eleonore de,

zhti-le zhan el-a-6-ndr la-pi-nas, French letter writer: b. Lyons, November 1732; d. Paris, 22 May 1776. She was an illegitimate daughter of Madame D'Albon, and on the death of her mother she went to live with the Marquise De Vichy, the legitimate daughter of Madame D'Albon, and in 1754 became the companion of Madame Du Deffand (who had already become blind), at the urgent request of the latter. This position she occupied for about 10 years; but the jealousy and selfishness of Madame Du Deffand rendered her situation very uncom¬ fortable. She gained the friendship of all the elite of Madame Du Deffand's society, such as

Marmontel, D'Alembert and Turgot; and when the separation

between the two ladies at last occurred her friends all adhered to her. Her earliest letters are addressed to a Spanish marquis, Gonsalvo de More, and the later ones to Count de Guibert, a mediocre poet and essayist. They are infused with passionate de¬ votion and were published by the widow of Guibert in 1800, and appeared in English in Boston in 1903. Mrs. Humphrey' Ward has made her character more famous by reproduc¬ ing her career in (Lady Rose's Daughter5 (1903). Consult Asse, (Mlle. de Lespinasse et Mme. du Deffand5 (1877).*

LESQUEREUX, la-ke-re, Leo, Swiss- American palaeontologist: b. Fleurier, Neu¬ chatel, Switzerland, 18 Nov. 1806; d. Columbus, Ohio, 25 Oct. 1889. He was educated at the Academy of Neuchatel, at Weimar and at the University of Berlin ; was principal of the Col¬ lege of Chaux-de-Fonds (Switzerland) in 1829-34; made a special study of peat; and was appointed by the Neuchatel authorities to ex¬ amine the peat bogs of that canton. In 1844 he received from the Neuchatel government a gold medal for his treatise, directions for the Exploration of Peat Bogs.5 In 1848 he came to the United States; was for a short time as¬ sistant to Louis Agassiz at Cambridge; and later became assistant to W. S. Sullivant in the study of American bryology, at Colum¬ bus, Ohio, where he resided until his death. He made particular investigation of the coal formations of the United States, more especially of the Pennsylvania coal flora, and he became the chief American authority on fossil botany. He published with Sullivant: (Musci Americani Exsiccati5 (1856; 2d ed., 1865), and (leones Muscarum5 (1864) ; and with T. P. James (Manual of the Mosses of North America) (1884). He also contributed (1880-84) three volumes on the coal flora to the Pennsylvania Geological Survey, which has been considered one of the chief American works on carboniferous plants; and three re¬ ports to the volumes published bv the Hayden survey. He wrote more than 50 memoirs on scientific subjects. In 1864 he became a mem¬ ber of the National Academy of Sciences, and in 1888 of the Geological Society of London.

LESSEPS, leseps (Fr. le-seps), Ferdinand, Vicomte de, French diplomat: b. Versailles, 19 Nov. 1805; d. 7 Dec. 1894. He entered the diplomatic service in 1828, and after being con¬ sul at various places was Ambassador to Mad¬ rid in 1848-49. In 1854 he went to Egypt at the invitation of the viceroy, Said Pasha. This gave opportunity for the development of a plan that had been developing in his mind for 20 years. He there sketched a plan for canalizing the Isthmus of Suez, obtained a concession from the viceroy for building the same and in 1856 published a report on the subject. He

encountered all sorts of opposition, chiefly from the English, who feared that the new waterway would be under antagonistic control. Prom¬ inent engineers questioned its feasibility, and the Turks, under English influence, refused permission to utilize Turkish territory. The work was at last begun in 1859, and carried to completion tinder De Lesseps' supervision in 1869. (See Suez Canal). He also planned the unfortunate Panama Canal (q.v.), and after the

company was dissolved in 1889, judicial proceed¬ ings were taken against De Lesseps and other directors for maladministration of funds and bribery, and he was condemned to imprisonment. As he was then much advanced in years, it is probable that the errors of this enterprise, were mainly chargeable to others, and that his reputa¬ tion was borrowed for this work after he had passed his active usefulness. The plans were changed from time to time, much money was wasted, until it became evident that the work could not be completed with available funds, and the crash came in 1888, when De Lesseps was 83 years old. (See Panama Canal). He was elected to the Academy of Sciences in 1875, and to the Academie Frangaise in 1884. Among his writings are (Memoire a l'Academie des Sciences sur le Nile Blanc et la Soudan) ; (Principaux Faits de l'Histoire d'Abyssinie) ; (Letters, Journal et Documents relatifs a l'His- toire du Canal de Suez) (1875-81), crowned by the Academy;

LESSING, Gotthold Ephraim, German dramatist and critic : b. Kamenz, Upper Lusatia, Saxony, 22 Jan. 1729; d. Brunswick, 15 Feb. 1781. In 1741 he was sent to the School of Saint Afra at Meissen. He was a diligent student, who, according to his tutor, was a horse that needed double fodder. He went to Leipzig ostensibly for a theological training; but he gave his chief attention to gen¬ eral literature, and contributed some inter¬ esting articles to literary journals. His academic studies having been concluded at Wittenberg, he went to Berlin, where he was active as journalist and critic, was employed by Voltaire, but soon quarreled with him, and whither he returned (1758) after a two-years' sojourn at Leipzig. He brought out (Vademecum fur Herrn Samuel Gothhold Lange, } in 1754, a criticism of a translation of Horace by Lange which had appeared some time before. The year following saw the is¬ suing of a six-volume edition of his critical and dramatic works, including the first bourgeois trailers piel in German, (Miss Sara Sampson. > On his return in 1758 to the capital, he instituted the famous series of

(1767), the first national drama of

Germany, and (1766), the best work of German criticism. (Minna von BarnhelnP was an artistic presentation of contemporaneous life, and liberated the German drama from the slavish imitation of the French so exclusively preached by Gottsched. In it Lessing wished to rebuke not only the disposition toward aping the French, but also the indifference of the rulers to the soldiers that had won the Seven Years' War; and to eliminate the provincial hate which then so often existed in Germany, especially that between Prussia and Saxony. In

testify against himself.® His battle against error in all domains had notable effect in Ger¬ many, and has not yet failed of an even wider stimulative interest. There are very many collected editions of Lessing's works but the best is probably that begun by Lachmann in 1838 (3d ed., by Muncker, 22 vols., Stuttgart and Leipzig 1886-1910). Good translations are Bell's (Dramatic Works of Lessing) (2 vols., 1878) and Beasley and Zimmern's Faokoon, Dramatic Notes, and the Representation of Death by the Ancients) (1879).

Bibliography. — Bliimner, H., Fessings Laokoon) (Berlin 1879) ; Braun, T. W., Mes¬ sing in Urteile seiner Zeitgenossen (ib. 1884-97) ; Consensus, Ernst, Fessing und die Vos- sische Zeitung) (Leipzig 1900) ; Duntzer, J. H. J., (Lessings Leben) (ib. 1882) ; id., Frlanter-ungen zu Lessings Werken) (ib. 1882) ; Dan- zel and Guhrauer, (Lessing, sein Leben und seine Werke) (ib. 1850-54; 2d ed., 1880) ;*

Fisher, E. K. B., (G. E. Lessing, als Ref- ormator der deutschen Literatur (Stuttgart 1881) ; Goedeke, Karl, (Grundriss zur Geschichte der deutschen Dichtung) (3d ed., Dresden 1913) ; Meyer, R. M., (G. E. Lessing* (Leipzig 1908) ; Pabst, C. R., (Vorlesungen iiber Nathan der Weise* (Berlin 1881) ;*

Rolleston, T. W., Fife of G. E. Lessing) (Lon¬ don 1889) ; Sime, James, (Life of Lessing) (New York 1877) ; Schmidt, Erich, Fessing Geschichte seines Lebens und seiner Schriften> (3d ed., 2 vols., Berlin 1910). *See German Literature; Minna von Barnhelm ; Laokoon ; Nathan the Wise.*

LESSING, Karl Friedrich, karl fred'nh,

German painter, grand-nephew of G. E. Lessing (q.v.) : b. Wartenberg, Silesia, 15 Feb. 1808; d. Karlsruhe, Baden, 5 June 1880. He was sent about 1822 to the architectural school of Ber¬ lin, to fit himself for an architect. After a severe struggle between duty and inclination, he yielded to his artistic inclinations and by the production of his (Churchyard with Grave¬ stones and Ruins) (1825) fixed his profession irrevocably. This picture produced a strong impression, and for a year or two the artist de¬ voted himself to landscape; but coming under the influence of Sdhadow, established himself in Diisseldorf, and studied historical painting with enthusiasm and success. (The Court Yard of the Convent — a Snow Scene, * is perhaps the most striking of all his landscapes. (The Tyrant Ezzelin in Captivity refusing the Exhortations of the Monks) (1838), was his first important historical picture in the new

style. It was followed by *Huss before the Council of Constance) (1842), the 'Seizure of Pope Pascal II, > the (Martyrdom of Huss) (1850), now in New York, and many others, under the influence of which the school of Diisseldorf divested itself of the strictly cath¬ olic spirit by which it was previously character¬ ized, and adopted a bolder and more dramatic manner, and a greater freedom in the choice of subjects. Lessing, however, is distinguished from his associates by depth of thought, energy of expression, and vivid dramatic conception, at the same time that his pictures exhibit the hard¬ ness of outline and defective coloring peculiar to the Diisseldorf school. Consult Jordan, 'Ausstellung der Werke Karl Friedrich Les- sings) (1880).

LESSON. See Lectionary.

LESTER, Charles Edwards, American author: b. Griswold, Conn., 15 July 1815; d. De¬ troit, Mich., 29 Jan. 1890. He studied law in Mississippi, and was admitted to the bar, but afterward spent two years at the Auburn Theo¬ logical Seminary, and was dulv ordained. The pulpit, however, proved not more congenial to his tastes than the bar, and 'he employed his time chiefly with the pen. He was appointed United States consul at Genoa, 1842-47, and was after¬ ward prominent as a journalist and political speaker. He published 'Glory and Shame of England) (1841) ; (Condition and Fate of Eng- land> (1842) ; 'The Artist, Merchant and Statesman) (1846) ; Fife and Voyages of Americus Vespucius) (1846) ; 'Artists of America) (1846) ; (My Consulship) (1851) ; 'Our First Hundred Years1* (1874-75) ; and translations of Alfieri's

LESTOCQ, les-tok, Jean Hermann, French physician and adventurer

: b. Celle, Hanover, 29 April 1692; d. Livonia, 23 June 1767. He was the son of a French Protestant surgeon who had left his native country on the revoca¬ tion of the edict of Nantes, and when 21 went to Russia to seek his fortune. He was first employed by Peter the Great, but on account of his dissolute morals, was exiled to Kasan in 1718. Catharine I, on 'her accession in 1725, re¬ called him, and appointed him physician in the household of her second daughter, Elizabeth. He soon gained an influence over the mind of this princess, and when the imperial title de¬ volved upon Ivan VI, he persuaded her that the only way of saving her own life was to seize upon the crown. She yielded to his sugges¬ tions, made the young tsar prisoner and seated herself on his throne. Lestocq was then ap¬ pointed privy councillor, which gave him the rank of general, physician in ordinary to her majesty, and president of the medical college. His prosperity lasted but a few years. Charged with treasonable projects, he was arrested, tor¬ tured and exiled to Siberia. Peter III, on his accession, gave orders for his recall, and Catharine II gave him an estate in Livonia.

LESTODON, a genus of fossil animals of Patagonia, allied to Mylodon, and distinguished by the possession of canine teeth. See Ground- sloth.

LESTRANGE, les-tranj, Sir Roger, Eng¬ lish journalist and pamphleteer : b. Hunstanton, Norfolk, 17 Dec. 1616; d. London, 11 Dec. 1704. He was probably educated at Cambridge. In 1629 he accompanied Charles I in his expedi¬ tion against Scotland. In 1644 he formed a plan for surprising Lynn Regis, but was seized and condemned as a spy. He was, however, respited from time to time until he had been in prison four years, when he escaped to the Con¬ tinent. In 1653 he returned to England, was licenser of the press from the Restoration until the close of the reign of James II, and edited the Public Intelligencer in 1663, the London

Gazette in 1665, and the Observator in 1681, the latter existing till 1687. In 1685 he was knighted, and given a seat in Parliament. He fell into disfavor in 1688, and his license was revoked, while he languished for a time in jail. He was author of a great number of coarse and virulent political pamphlets and translated Josephus, Cicero's 'Offices, Seneca's 'Morals, > Quevedo's*

LESUEUR, Eustache, es-tash le -sii-er, French painter: b. Paris, 19 Nov. 1617; d. there, 30 April 1655. He was taught drawing by his father, a sculptor, and was afterward placed at the school of Vouet, where the Italian masters became his models. His masterpiece is the series of paintings executed for the Carthusian monastery in Paris in 1645-48. These pictures are now in the Louvre, and in 22 panels depict the principal scenes in the life of Saint Bruno. In 1650 he painted for the corporation of goldsmiths the (Preaching of the Apostle Paul at Ephesus, which was presented to the chapter of Notre-Dame, but has been now removed to the Louvre. He did much in decorating the old parish churches of Paris and among his later productions are some mytho¬ logical scenes in the Hotel Lambert. His works are distinguished by purity of line-, careful execution and are conceived in a mood of pro¬ found feeling.*

LETCHER, John, American politician: b. Lexington, Va., 29 March 1813; d. there, 26 Jan. 1884. By his own efforts Letcher edu¬ cated himself at Washington College and at Randolph-Macon. He then (1839) began the practice of law and at the same time entered politics as editor of the Lexington Valley Star. In all campaigns he took an active part on the Democratic side. In 1850 he was a member of the Virginia Constitutional Convention and from 1851 to 1859 Letcher was a member of Congress where his devotion to the public in¬ terest won him the title <(Honest John Letcher.® From 1860 to 1864 he was governor of Virginia. He opposed secession but after the war began he organized the resources of Virginia for strong resistance and turned the State forces and equipment over to the Confederates. He was imprisoned for several months after the war and then returned to his profession. In 1876-77 he was a member of the State legisla¬ ture.

LETCHWORTH PARK AND ARBO¬ RETUM. Letchworth park comprises a tract of land of 1,000 acres in extent, lying on either side of the Genesee River in Livingston and Wyoming counties, New York. The property was acquired in 1907, by gift from William Pryor Letchworth to the State of New York, and placed by the deed of gift by the donor in the permanent custody of the American Scenic and Historic Preservation Society. The park is a place of rare beauty and grandeur har¬ moniously blended, through which the Genesee River cuts its way. Within its boundaries are the three falls long known as the Upper Falls of the Genesee, or sometimes as the Portage Falls.

The custodian society, recognizing the need in America of a practical demonstration in the growing of forest trees, and with the purpose of increasing the timber resources of America,

formulated plans for a forest arboretum soon after the property came into its hands. Re¬ specting the function of the arboretum, the director stated, "The principle upon which the Letchworth Park Arboretum is established is that it shall consist of a permanent collec¬ tion of the various species of the world's tim¬ ber trees, likely to thrive in this northern climate, planted scientifically to test their value and illustrate the processes of development, so supplying not only knowledge for knowledge's sake but also knowledge for practical use.® The possibilities of the arboretum for extend¬ ing exact knowledge of tree growth will be fully developed. The growth of the trees is measured periodically, their liability to disease is noted and their capacity for seed bearing; their behavior in pure stands and in mixture, their influence upon the forest floor, and other practical considerations bearing upon their value for commercial tree-planting is carefully observed and recorded. By this means the Letchworth park arboretum will aid materially in laying an exact scientific basis for the suc¬ cessful extension of practical forestry in the United States. Every step is taken, not only to ensure results of the highest scientific value from forest work at Letchworth park, but also to develop its usefulness as an object lesson to all park visitors.

In 1912 the custodian society planted the first tree in the arboretum. The nursery where the seeds are sown is an interesting educational feature of the arboretum work, for here the early stages in the development of timber trees may be observed — from the germination of the seed to the removal of the plants to the field plantations. Something over 500,000 plants have been transferred from the nursery rows to the fields, where they are grouped in blocks of an acre or more each, with a view, so far as possible, of showing color effects. All the important native and foreign trees that may thrive in that locality have been or will be planted, and will be made conveniently acces¬ sible by walks and drives through this living tree museum for means of study and observa¬ tion of visitors to Letchworth park. In all 297 different species have been planted in the arboretum. It is expected by the custodian society that this living tree museum will be to the tree planter what the laboratory is to the student, a tangible, available demonstration of processes and results.

Charles M. Dow,

Director of Letchworth Park and Arboretum.

LETHARGY. See Consciousness, Dis¬ orders of.

LETHBRIDGE, Canada, a city in Alberta, capital of the Medicine Hat District, 700 miles west of Winnipeg and 145 miles southwest of Calgary. It is in lat. 49° 42′ N. and long. 112° 51′ W., and is 2,990 feet above sea-level. It lies on the Old Man (Belly) River, the valley of which, 320 feet deep and a mile and a half wide, is there crossed by a trestle bridge 307 feet high and 1 mile 47 feet long. Situated in the centre of the part of the province lying south of the main line of the Canadian Pacific, it is the chief distributing point for that dis¬ trict. The original settlement, ((Coal Banks,® sprang from the discovery by Sir A. T. Galt in 1882 of coal along the river banks and the

opening of the Galt mines in 1883. The effort to market the coal by barges failed and in 1885 the ((Turkey Trail® (narrow gauge) railway to Dunmore was constructed. The name Leth¬ bridge, after the president of the company operating the mines and railway, was then adopted. The town, incorporated 1890, re¬ mained for 15 years or more a small coal min¬ ing and cattle ranching centre. The great influx of immigration then brought farmers who demonstrated that the land, despite assertion of the ranchers that it was too dry, was excel¬ lent for wheat growing and other agricultural activities. The extensive introduction of irri¬ gation has greatly stimulated farming. Since 1900 its development has been chiefly as a wholesale and distributing centre to the sur¬ rounding farming country. Over 30,000,000 bushels of the 1915 grain crop passed through the Lethbridge Railway yards. But coal mining remains an important factor, the output of the immediate district being 3,000 tons daily. In 1906 Lethbridge was incorporated as a city. In 1913 it secured a unique charter from the pro¬ vincial government, establishing the commission form of government. The city is governed by three commissioners, the mayor who is com¬ missioner of finance and public safety, and the commissioner of public works and the com¬ missioner of public utilities. An election for one of these (by proportional representation) is held every year, and each retains

office for three years. The charter also provides for a system of initiative, referendum and recall whereby, upon a petition of a fixed percentage of the electors, an election is held to decide upon a new by-law or the recall of any of the commissioners. The city is supplied by a private company with gas from Bow Island, but the waterworks system, the electric-light and power systems and the street railway are owned and operated by the municipality. The city also owns and operates its own coal mine from which it draws all fuel required at its power plant and for heating municipal buildings. The water is taken from the river and a mechanical filtration plant has been installed. The sewage, first purified in a sewage disposal plant, is emp¬ tied into the river lower down. The streets are wide and have been well planted with trees. The buildings in the business section, which overlook Galt park, are of reinforced con¬ crete and brick. The private residences are mostly of wood construction. There are three parks, one of which has an artificial lake of 91 acres. Pop. 9,436.

LETHE, le'the (Greek, Lethe, forgetful¬ ness), the mythological River of Oblivion in the lower regions. The water had the power of making those who drank it forget their former existence. Souls before passing into the Elysian Fields drank that they might have no recollection of their earthly sorrows; those who were destined to return to the upper world in new bodies drank that they might forget the pleasures enjoyed in Elysium. _ The name is also given to a daughter of Eris, as the personification of Oblivion.

LETTER OF CREDIT. See Credit, Letter of.

LETTER OF MARQUE. See Marque, Letter of.

LETTERN. See Lectern.

LETTERS. See Letters in Literature.

LETTERS, The, of Marie de Rabutin- Chantal, Marquise de Sevigne (1626ˆ-96), pre¬ sent a correspondence of rare historical, social and personal interest in a style seldom ap¬ proached in vivacity, limpidity and deftness. Some letters from others are included and the collection is extended beyond Madame de Se- vigne's life, but of her own there are more than 1,100, extending from 1644 to within a few days of her death. Far the greater part of the letters are addressed to her daughter, Frangoise Marguerite, Comtesse de Grignan (1646ˆ-1705), who handed down the collection to her own daughter, Madame de Simiane. Meantime many of the letters had appeared in

connection with the correspondence of Madame de Sevigne's cousin, Bussy-Rabutin, in 1696 and 1697. Seven unauthorized and partial editions appeared between 1725 and 1728. Madame de Simiane, destroying her mother's letters, which she feared savored of Jansenism, committed her grandmother's to Chevalier de Perrin, who issued six volumes of them between 1734 and 1737, a seventh in 1751 and a second edition in eight volumes in 1754. He is thought to have used more editorial zeal than restraint. Most of the original letters were destroyed. The few that remain are now printed as they were written. The interest of the correspond¬ ence centres in the letters to Frangoise, who married the Comte de Grignan in 1669. He was made lieutenant-general of Provence in 1670. Frangoise followed him there in 1671. Mother and daughter visited one another in Paris and at Grignan from time to time, sometimes for long periods. Madame de Sevigne died and was buried at Grignan. When separated from Frangoise she wrote copiously and often, in a hand that suggests an easy writer. Most of the letters are long, and 15 a month is in the early years nothing extraordinary. Love for this daughter was the absorbing passion of her life. But she was, as M. de Grignan said after her death, <(a delightful companion® and her letters are companionable still. She had been carefully educated. Chapelain and Menage were among her tutors. She had meditated Tacitus and had Italian and Spanish poets at command for apt citation. She was wealthy. She had and appreciated shrewd business coun¬ sel and had no illusions whitlher the extrava¬ gances of Versailles and the courtier nobles were leading the Old Regime. She was fond of society and moved easily in its highest circles, with La Rochefoucauld, Fouquet, the Cardinal de Retz and Madame de La Fayette among her intimates. She was exceptionally well informed of all that was going on before and behind political and military scenes. Her letters are thus of great value to the student of French character, for the attitude toward monarchy and the Church in the early years of Louis XIV and for the economic origins of the French Revolution. Wishing to tell all she thought, felt, heard and saw, she brought to the pleasant task a unique gift of style in which art blends subtly with nature. Writ¬ ten from Paris, from her uncle's abbey at Livry, from the baths of Vichy or her country house, Les Rochers, near Vitre in Brittany, the letters show sides of life and manners, of

court and people, that elude the formal histo¬ rian. 1 hey are also wonderfully entertaining, full of anecdote, witty sayings, sprightly

gossip and genial fancies. They had become noted before her death and, long before official pub¬ lication, had been held up as epistolatory models in a Latin poem (Ratio conscribendae epistolse.) They are best edited by Monmerque, Regnier, Mesnard and Sommer (14 vols., and an album of portraits, pictures of houses and facsimiles of letters, Paris 1862-68) ; more conven¬ iently by Silvestre de Sacy (11 vols., Paris 1861-63). Among many partial editions a vol¬ ume of translations by Mrs. Ritchie (Phila¬ delphia, n. d.), Masson's Selections) (Oxford, n.d.) and (Lettres Choisies) (New York 1905), may be mentioned. Edward Fitzgerald's post¬ humous dictionary of Madame de Sevigne) (2 vols., London 1914) is very helpful. Good brief appreciations are given in biographies by Gaston Boissier (Paris 1888) and Miss Thackeray (Edinburgh 1881). The fullest memoir is by Walckemaer (5 vols., Paris 1845-52), the best is by Mesnard (in Vol. I of Monmerque's edition, pp. 1-316). Consult also Puliga, (Madame de Sevigne, her Correspond¬ ents and Contemporaries) (2 vols., London 1873) and Aldis, J., (Madame de Sevigne, Queen of Letter Writers) (New York 1907).*

Benjamin W. Wells.

LETTERS, Proportionate Use of. Among printers experience has taught the frequency of use of letters, so that the following tables have been compiled :

E. .

. 1,000

M .

. 272

T. .

. 770

F .

. 236

A. .

. 728

W .

. 190

T

. 704

Y .

. 184

S. .

. 680

P .

. 168

O. .

. 672

G .

. 168

N..

. 670

V .

. 158

H

. 540

B .

. 120

R..

. 528

K .

. 88

D..

. 392

J .

. 55

L .

. 360

Q .

. 50

U..

. 296

X .

. 46

C. .

. 280

Z .

. 22

use

The following table : of initial letters:

shows the frequency of

s. .

. 1,194

R .

. 291

c. .

. 937

w .

. 288

.

. 804

c .

. 266

A. .

. 574

u .

. 228

T. .

. 571

0 .

. 206

D. .

. 505

V .

. 172

B. .

. 463

N .

. 153

M. .

. 430

J .

. 69

F. .

. 388

o .

. 58

I...

. 377

K .

. 47

E. .

. 340

Y .

. 23

H. .

. 308

Z .

. 18

L. .

. 298

X .

. 4

LETTERS TO DEAD AUTHORS. Of

all the volumes of literary criticism in Eng¬ lish published within the past generation per¬ haps none is saner in content and more cap¬ tivating in style than Andrew Lang's (Letters to Dead Authors.) Written, as the author states, at the request of the editor of the Saint James ' Gazette, and published in 1886, this little book originally included 22 ˆletters,® to which were added four others in the American edition of 1891. ((For some reason,)) says the brief preface to the latter edition, <(the kind¬ ness of readers has favored a volume which is not the author's favorite.)) But the reason is plain. Lang has in the main addressed his own favorite authors, and hence writes con

VOL. 17 — 21

amove; yet personal as is his criticism, it yet expresses the attitude of the majority of read¬ ers ; and while his estimates, both literary and personal, are in the main ˆappreciative,® they are discriminating and sane. This excellent matter is couched in a style that varies with the subject but is always apt for its purpose — now grave, now gay, now lively, now severe ; that ranges from rollicking humor, quiet mirth, sharp satire, to tenderness and pathos, and at times, attains a really noble eloquence. In all this is sheer literary craftsmanship of a high order ; and here is sufficient reason why <(the kindness of readers has favored the volume.® But the abiding charm of the book lies in the fact that one actually feels identified with the writer of it as he talks with many old favorites — Herodotus and Horace, Rabelais and Moliere, Scott and Dumas, Byron, Shelley and Poe, tersely sums up the fundamental qualities of their work and adequately expresses our grati¬ tude for their contribution to the world's store of pleasure, beauty and truth. The warm, human, captivating <(literary criticism® in these brief familiar studies is in itself literature of permanent interest and value.

Marion Tucker.

LETTERS OF JUNIUS. See Junius, Letters of.

LETTERS IN LITERATURE. The let¬ ter, primarily a personal and utilitarian com¬ position, passes over into the field of literary interest by processes often gradual and difficult to define ; so that, although we commonly dis¬ tinguish separate types, such as informal letters intended only for the eyes of those directly addressed and formal epistles composed with a view to ultimate publication, the

distinction cannot be made with clearness in the actual his¬ tory of the subject. Out of the private art of personal correspondence there must have arisen, at a very early period, the more public art of the literary letter. It was formerly supposed that the earliest extant collection of formal letters was the series (about 150 in number) of Greek epistles professing to have been written by the tyrant Phalaris, of the 6th century b.c. Around these, near the close of the 17th century, there developed a consider¬ able controversy, connected with the so-called "Quarrel of the Ancients and Moderns® ; and Richard Bentley, the philologist, in his famous (Dissertation on the Letters of Phalaris) (1699), demonstrated — as is now universally admitted — that they are of comparatively late origin, perhaps of the 2d century a.d. Among the early genuine letters of the Greek period are those of the rhetorician Isocrates (d. 338 B.c.) , nine in number; these are distinctively public rather than personal in character, being addressed to public persons and dealing largely with political themes. In like manner the philos¬ opher Epicurus (d. 270 b.c.) made use of the epistle for the summary exposition of his doc¬ trines. In the literature of the Romans the letter holds a large place, largely owing to the charm of the numerous letters of Cicero (d. 43 b.c.) and Pliny the Younger (d. 113 a.d.). In both these cases the letters were in the first place genuinely personal in character, but were in part written with a view to publication, — Pliny actually editing nine books of his. Of Cicero's one series is made up of letters ad-

dressed to his friend Atticus, another to his brother Quintus, another ad familiares — to various personal friends. These epistles intro¬ duce us to the social and political life of the great Roman period with an intimacy afforded by no other records of the age, and their form and style set the standard for letter-writing for many centuries. Pliny's letters are perhaps even more attractive than Cicero's because of the greater simplicity of his character; two of them, describing the eruption of Vesuvius in the year 79, are especially famous. Mean¬ time the philosopher Seneca (d. 65 a.d.) had made use of the epistolary form for composi¬ tions of the nature of moral essays, in his 124 letters to Lucilius. Not to pursue the story of Roman letter-writing in detail, we may note that Quintus Aurelius Symmachus, near the close of the 4th century, wrote well-known letters in the manner of Pliny, of which 10 books were published by his son ; that Apol- linaris Sidonius, prefect and Christian bishop in Gaul in the 5th century, left a large and interesting correspondence descriptive of

the provincial life of the empire; and that Cassio- dorus, churchman and statesman under Theo- doric in the 6th century, left 12 books avari- arum epistolarum? which are perhaps the best source of modern knowledge of the Ostro- Gothic dynasty. The Church fathers, too, both in the East and the West, made large use of the letter, whether personal or pastoral ; and there were preserved and circulated epistles (to mention only a few names) of Basil and Chrysostom in the Eastern Church, and of Ambrose, Jerome, Augustine and Popes Leo I and Gregory I in the Western. In the mediae¬ val period the traditions of both sacred and secular epistles were maintained, with em¬ phasis on the former until we approach the time of the Renaissance, when there was a marked revival and cult of the latter. Doubt¬ less for their human interest the letters of Abelard and Heloise in the 12th century, com¬ memorating their ill-fated love, excel all other epistolary compositions of the age. These, of course, were purely personal ; but already, as has been hinted, there was growing up an art of rhetorical letter-writing, commonly called ars dictaminis, due in part to the revival of the Ciceronian tradition and in part to the new humanism. The composition, especially, of public letters written by state officers and sec¬ retaries became the subject of treatises and of study in schools. One of the leaders in this art was Alberich (or Alberico) of the monas¬ tery of Monte Cassino (d. 1088), who wrote a Breviarium de Dictamine , followed, early in the following century, by the model letters (called Rationes Dictandi) of Hugo of Bologna. The rules governing epistolary composition, as formulated by these authorities, were elaborate and severe ; thus Alberich taught that every epistle must have five chief divisions, — the salutatio or greeting, the benevolentice captatio or introduction designed to produce a favor¬ able impression, the narratio, the petitio, and the conclusio. Later works also classified the types of letters to be studied, as Didactic, Deliberative, Demonstrative, Judicial, or Famil¬ iar, with many sub-types after the manner of rhetorical pedantry. It is obvious that the epis¬ tolary art would be among those sedulously cultivated in Italy, from the 13th to the 16th

centuries ; and in fact the collections and treatises representing it during that era are countless. Especially precious are the letters of Dante (such as those addressed to the em¬ peror, Henry VII, to the Italian cardinals, etc.) and of Petrarch; the latter collected his, and prepared them for publication, classifying them as ((Familiar Correspondence,® <(Correspond- ence in Old Age,® ((Letters without a Title,® etc., with a curious appendix called ((Epistle to Posterity.® Somewhat later, the letters of Bembo (d. 1547) and

Aretino (d. 1556) were especially valued for their elegance, and were widely collected and republished. At the same period in Spain, Antonio de Guevara distin¬ guished himself as an epistolarian, and his Epistolas Familiares (1539), which came to be called the ((Golden Epistles,® were even more largely circulated and imitated than any of the Italian school ; they were published in English in both the 16th and 17th centuries. Another Spanish collection of note was that of the let¬ ters of Antonio Perez (d. 1611). Of the early Reformers the chief epistolarian was Erasmus, who recorded the fact that his enormous cor¬ respondence sometimes required him to write 40 letters a day. Though his letter-writing was often informal enough, he also studied the art of the rhetoricians, and himself wrote a manual De Conscribendis Epistolis. The let¬ ters of Melanchthon and of Luther have also, of course, a high place in the personal litera¬ ture of the Reformation; and Ulrich von Hut- ten, with collaborating friends, turned the epis¬ tolary art to the uses of satire in his famous (Letters of Humble Men) (Epistoloz Obscu- rorum Virorum) , published 1515-17.

In France the impulse of the Renaissance had effects similar, though less notable, to those in Italy. Among the chief early models of French letter-writing are the collections of the letter, ˆof Voiture (d. 1648) and Jean Balzac (d. 1654). Those of Balzac in particular were often reprinted. Pascal soon made use of the form for serious philosophic purposes in the famous Lettres Provinciates (1656-57). It was in the 18th century, however, that French letter-writing became distinguished as one of the forms most representative of the spirit of the age ; notable examples are the correspond¬ ence of Voltaire (d. 1778), of Rousseau (d. 1778), of Marianna Alcoforado (d. 1723), of the Marquis du Deffand (d. 1780) and of Madame de Stael (d. 1817). Pursuing the sub¬ ject hastily into the 19th century, we may note such attractive epistolarians as Sainte-Beuve, Prosper Merimee, George Sand, and the broth¬ ers Edmond and Jules de Goncourt. The Ger¬ mans have never distinguished themselves strikingly in letter-writing viewed as an art, though from the days of Luther to those of Wagner they have furnished examples of let¬ ters important for their substance. Especially notable for literature is the correspondence of Lessing and Moses Mendelssohn, in the 18th century, and that of Goethe and Schiller. Other interesting epistolarians are Herder, the brothers Schlegel and the brothers Grimm.

Few examples of the letter-writing of Eng¬ land survive from the pre-Elizabethan period, aside from official correspondence in state papers and the like. The outstanding excep¬ tion is the collection of Paston Letters, written by various members of a Norfolk family, be-

tween 1424 and 1509, and first published (in part) in the late 18th century (not fully until 1875) ; their value is historical, not literary. With the Renaissance the conception of letter¬ writing as a literary art naturally entered Eng¬ land, being marked, for example, by the pub¬ lication of such collections as the Letters of Guevara, translated into English by Edward Hellowes in 1574 and Sir Geoffrey Fenton in 1575 (Fenton added (Letters of other Authors, Latin, French and Italian5). Still earlier, in 1568, had appeared William Fullwood's (Enimie of Idlenesse: Teaching the maner and stile how to endite, compose and write all sorts of Epistles and Letters, 5 a work which became exceedingly popular and was often reprinted; it included translations of letters by Latin and Italian writers. Of a humbler and more utili¬ tarian character were collections of the <(com- plete letter-writer® order, such as a work of 1618, probably compiled by Gervase Markham, called (Conceited Letters, newly laid open: or a most excellent bundle of new wit, wherein is knit up together all the perfections or art of Episteling.5 Far more value, of course, attaches to the personal correspondence of cer¬ tain of the great personalities of the period. Thus we have a considerable body of Bacon's letters, first published in 1702 and in subse¬ quent collections, and another of Sir Philip Sidney's ; of special interest is the Latin cor¬ respondence of Sidney and Hubert Languet, translated into English in 1845. A minor Elizabethan writer, of no little interest to stu¬ dents of the period, was Gabriel Harvey, who was fond of preserving and publishing his letters ; and it is to him we owe the publica¬ tion of some of Spenser's, in a collection called (Letters to and from Edmund Spencer5 (1 579— 80). John Donne's fascinating (Letters to Sev¬ eral Persons of Honor,5 written between 1600 and 1630, were published bv his son in 1651.

The chief developer of the English letter as a literary form was James Howell, a trav¬ eler, diplomatist and pamphleteer, who in 1645 published the first series of his (Epistolae Ho- elianae : Familiar Letters, Domestic and Foreign, Divided into Sundry Sections, partly Historical, Political, Philosophical.5 These letters were represented as having been addressed to various persons, but appear to have been really of the nature of essays in epistolary form, and they have a place of some significance in the de¬ velopment of the essay in the 17th century. Three later volumes followed, and many re¬ prints. Of the same period are the private letters exchanged by Sir William Temple and his betrothed, Dorothy Osborne; Mistress Os¬ borne's

letters represent a delightful blend of propriety and spirited informality. Those of Sir Henry Wotton, diplomatist and man of letters (d. 1639), were published with his other manuscripts in the interesting collection called (Reliquiae Wottonianae5 (1651). Other collec¬ tions of the same period . were (Loveday's Letters, Domestic and Foreign,5 published by the writer's son in 1659, and Sir Richard Bul- strode's (Original Letters written to the Earl of Arlington5 (1674). The versatile Duchess of Newcastle published in 1664 a fictitious or ideal series called (Two Hundred and Eleven Sociable Letters.5 Milton's (Letters of State,5 translated from the Latin, were published by his nephew, Phillips, in 1694; while in 1743

appeared an additional volume, called (Original Letters and Papers of State . . . found among the Political Collections of Mr. John Milton.5

In the 18th century the field of English letters becomes still more rich and varied, though the tendency is by this time toward more and more informality. Most intimate of all the collections are the letters of Swift to Esther Johnson, commonly called the

with her (Diary in 1842-G6. With reference to this period it must also be recalled that it was the demand c f a publisher for a collection of model letters for the use of young persons of moderate attainments which led Samuel Richardson to embark on his epochal career as epistolary novelist with*

Bibliography. — Roberts, W., (History of Letter-Writing from the Earliest Period to the Fifth Century> (London 1843) ; Ellis, Henry, (Original Letters of Eminent Literary Men of the 16th, 17th, and 18th Centuries> (Camden Society Publications, 1843) ; Holcombe, J. P., (Literature in Letters> (New York 1866) ; Scoones, W. B., (Four Centuries of English Letters) (London 1880) ; Williams, H., English Letter-Writers of the 18th Century) (London 1886) ; Mason, E. T., (British Letters Illustra¬ tive of Character and Social Life) (New York 1888) ; Rannie, D. W., (Letter-Writing as a Form of Literature) (pamphlet, Oxford 1895) ; Johnson, R. B., Eighteenth Century Letters) (London 1898) ; (The Gentlest Art5 and (The Second Post,) collections, edited by E. V. Lucas (New York 1907 and 1910) ; Dawson, W. J. and C. W., (Great English Letter-Writers) (New York 1909). See also a bibliography in a dissertation of the

University of Pennsylvania by M. B. Hansche, (The Formative Period of English Familiar Letter-Writers) (1902).

Raymond M. Alden,

Professor of English, Leland Stanford Junior

U niversity.

LETTERS PATENT. See Patents.

LETTIC LANGUAGE AND LITERA¬ TURE, the speech and literary production of the Letts, who inhabit Courland, Livonia, Kovno, Pskov and Vitebsk, also in EastPrus- sia, Brazil and in the Lettish colonies in the United States. The language is spoken by 1,750,000 people. It forms with Lithuanian and the now extinct Old Prussian, the Baltic sub¬ division of the Indo-Germanic linguistic family.

Lettic is distinguished from Lithuanian by a pho¬ nology further removed from the Indo-Euro¬ pean standard, and by its accent, which always falls on the first syllable. In a few points it is more archaic than Lithuanian. For instance, it retains the Indo-Germanic s and z which in the sister language has been modified to sz and z, and the original brief vowels, which in many cases have become long vowels in Lithuanian. It is divided into numerous dialects, the chief of which are the following : East Lettic, the Mitan dialect, which is the standard literary form, the North Lettic, spoken in north and northwestern Courland and in the Riga districts of Livonia. Lettic has only two genders and two numbers, although there remain traces of the dual number. It also retains seven of the eight cases of the Indo-Germanic family, has only the three tenses of the verb (past, present and future) and the indicative, conditional and imperative moods. A reflexive form is added to the verb by the addition of s. Periphrastic forms are numerous. The vocabulary contains a great number of German, Russian, Esthonian, Finnish and Scandinavian words, and the in¬ fluence of these languages is discernible in much of the native vocabulary.

Until the last century the language was greatly neglected and a few German scholars were the first to describe and investigate it. Within recent decades the Letts themselves have given more attention to their language and the movement has resulted in an increased and greatly improved literary output. The earliest literary works in Lettish were transla¬ tions of Luther's ˆCatechism) (Ronigsberg 1586). Undeutsche Psalmen) and (Gesange) (1587), a translation of

the Bible (Riga 1685— 89) and other works almost exclusively of a religious or didactic character, and translations from the German. G. F. Stender (d. 1796) wrote a grammar and a compendious diction¬ ary of Lettish, which gave a new impetus to the study of the language. He wrote also (Augustas gudribas grahmata) (1776), a work containing the elements of astronomy, geogra¬ phy, history, etc., and also stories and tales which helped to popularize the language and at once arrested its decline. The first Lettish comedy was written by his son, Alexander Stender. The close of the 18th and the open¬ ing decades of the 19th century saw a great literary revival among the Letts, who began to take pride in cultivating their language as a literary medium. Periodicals were founded, in¬ cluding the Latweeschu Awise (1822 —) and Magasin (Mitau 1827 —), and a vigorous effort was made to develop a national literature free of German and Russian influences. The classics of the western European tongues were translated and exerted a marked influence on the literary development of Lettish. Lettish poems, novels and romances issued from the press in increasing numbers, and works on eco¬ nomics and sociology ushered in a new era in national culture. Among the literary figures of the 19th century stand forth pre-eminently Jur Allunan, the Kaudoit brothers, Neikens, Pum- purs, Kronwald, Lautenbach, Rosenberg- Aspasia, Blanman, Rainis-Pleekschan, Janson, Zeifert.and Lap. By the year 1900 there existed in Lettish about 2,500 works and 10 periodicals. The folksongs of the Letts are numerous and some are very beautiful. The best are con-

tained in the first numbers of (Latweeschu tantas dfeesmas) (Leipzig 1874 et seq.). Schleicher published a collection of tales and proverbs (Weimar 1857).

Bibliography.— Andreianov, 'Lettische Volks- lieder und Mythen) (Halle 1896) ; Bezzen- berger, 'Lettische Dialekt-Studien5 (Gottin¬ gen 1885) ; id., 'Ueber die Sprache dfer preussischen Letten> (ib. 1888) ; Bielenstein, August, 'Die lettische Sprache) (Berlin 1864) ; id., 'Lettische Grammatik) (Matau 1863) ; id., (Die Elemente der lettischen Sprache) (ib. 1866) ; id., 'Tausend lettische Rathsel, iibersetzt und erklart) (Mitau 1881) ; id., (Grenzen des lettischen Volkstammes und der lettischen Sprache) (Saint Petersburg 1892) ; Brentano, 'Lehrbuch der lettischen Sprache) (Vienna 1906) ; Kalning, (Kurzer Lettischer Sprach- fiihrer) (Riga 1910) ;

Klaushush, (Latweeschu vakstrieezibas wehsture> (Riga 1907) ; Leh- golnis, (Latweeschu literaturas wehsture) (Riga 1908) ; Ulmann and Brasche, 'Lettische Wor- terbuch) (Riga 1872-80) ; Thomsen, 'Bero- ringer melem de Finske og de Baltiske Sprog) (Copenhagen 1890).

LETTRES DE CACHET, let-r-de-ka-sha, in France, a name given to the warrants of imprisonment issued by the kings before the Revolution. All royal letters (lettres royaux) were either lettres patentes or lettres de cachet. The former were open, signed by the king, and countersigned by a minister, and had the great seal of state appended. Of this kind were all ordinances, grants of privilege, etc. But these Checks on arbitrary power did not exist with regard to lettres de cachet, also called lettres closes, or sealed letters, which were folded up and sealed with the king's little seal {cachet), and by which the royal pleasure was made known to individuals or to corporations and the administration of justice was often interfered with. It was not always for political reasons that lettres de cachet were obtained; sometimes private persons got troublesome members of their families brought to reason in this way. The lieutenant-general of the police kept forms of lettres de cachet ready, in which it was only necessary to insert the name of the individual to be arrested.

LETTS, lets, a Slavonic people closely akin to the Lithuanians, inhabiting a portion of Russia. Their language, along with the Lithu¬ anian and Old Prussian (extinct), forms the Lettic or Lithuanian branch of the Indo- European family of tongues. The Letts num¬ ber about 1,000,000.

LETTSOMITE, or CYANOTRICHITE,

a mineral consisting of hydrous copper alu¬ minum sulphate, 4 CuO. AI2O3SO3. 8 H2O. . A minor ore of copper in the Tintic district, Utah.

LETTUCE, let'is, a genus (Lactuca) of hardy annual and perennial herbs of the order Compositae. _ Less than 10 of the 100 recognized species, which are distributed mainly in the northern hemisphere, are in cultivation, and some botanists consider these to be merely forms of three or perhaps two species. They are characterized by opposite leaves of various forms, and white, yellow or blue flowers in heads which are arranged in small panicles. The only species used in America, the common garden lettuce (L. sativa), is an annual whose

natural prototype is unknown, but is supposed to be L. scariola, an Asiatic species.

Lettuce is one of the oldest food-plants, having been used, it is said, by Persian royalty more than 2,000 years ago. To-day it is un¬ questionably the most widely used of all our materials for salads, and has developed an in¬ numerable host of varieties of great diversity of form. They are somewhat roughly divided into two general groups : heading, in which the leaves form a cabbage-like head; and cutting, in which the leaves are more loosely arranged. In each of these groups are forcing and out¬ door varieties. A third group, the cos or romaine varieties, which may be considered a subdivision of the cabbage group, consists of long, narrow-headed kinds, whose outer leaves must be tied above the head to properly blanch the inner ones. They are specially valued as summer lettuces, because of the ability to pro¬ duce leaves of good flavor in spite of consider¬ able heat.

Lettuce grows best in cool weather. It re¬ quires a rich open soil and clean cultivation ; plenty of sunlight in the cool seasons and par¬ tial shade in the warm. The seed may be sowed in a hotbed, where the plants may be either allowed to develop, or from which they may be transplanted to the garden, 8 to 12 inches be¬ ing allowed between them. Immense quantities of lettuce are forced in greenhouses during the winter, and from the trucking regions of the South, where the plants are grown with only sun heat in canvas-covered beds, the markets are supplied during the winter with thousands of carloads.

When grown under glass lettuce is some¬ times attacked by so-called plant diseases — leaf-spot, rust, mildew and drop or rot. These may be very largely if not wholly controlled by good management, especially with respect to ventilation, the temperature being kept lower than that which is favorable to the growth of the fungi. Sterilizing the soil with live steam for an hour or more is practised and believed by many large growers to destroy the spores. The operation is performed a day or so before planting.

LEUCADIA, lef-ka-de'a, or LEUKAS.

See Santa Maura and Cape Ducato.

LEUCAEMIA, an incurable but rarely oc¬ curring disease of unknown origin, character¬ ized by enlargement of the spleen and lym¬ phatic glands, and the changes in the blood con¬ sisting in a decrease of the number of the red cells, diminution of the amount of

hsema- globin in each cell, and great increase in the number of the leucocytes or lymphocytes. The disease may come on rapidly, with anaemia and loss of flesh and strength ; usually the onset is insidious, the deterioration of the general health or the swelling of the spleen or glands being first noticed. The least uncommon form of the disease shows peculiar changes in the bone-marrow; next in frequency is the form in which only the spleen and marrow are changed, and rarest of all is the form in which the glands are changed (the lympatic). Besides the increase in the number of the leucocytes, a form of the cell found onlv in the bone-marrow appears in the blood. The symptoms, which almost invariably include a fever of about 102°, difficulty in breathing, occasional hemorrhages,

etc., are due to the loss of nutrition of the tissues, to the anaemia, to the pressure of the enlarged spleen on the vital structures in the abdomens and to the pressure of the enlarged glands. The glands most commonly enlarged are the chains along the neck, those in the axilla, the abdominal glands, the glands of the groin and those of the thorax. They may be barely large enough to be felt or may form bunches in these parts that are plainly visible. The disease progresses for months or years with intervals of considerable improvement sometimes obtained from arsenic in large doses.

LEUCIN (Greek, (

LEUCIPPUS, lu-sip'us, Greek philosopher, flourished between the 4th and 5th centuries b.c. To him is attributed the first idea .of the atomic system afterward perfected by his dis¬ ciple Democritus. Kepler and Descartes were much indebted to the doctrines of these mas¬ ters for the explanation of the planetary vortices.

LEUCITE, a native silicate of aluminum and potassium, having the formula KAI2, and crystallizing in forms that are isometric at 900° F., but pseudo-isometric at ordi¬

nary temperatures. Its anomalous double re¬ fraction has been the subject of much study and discussion. The mineral is white or gray in color, and has a hardness of from 5.5 to 6, and a specific gravity of 2.50. It occurs more particularly in recent volcanic rocks, and Vesu¬ vius is the best-known locality for it. It is also found in considerable quantity in the Green River Basin, Wyoming. Leucite may be con¬

verted into the mineral analcite by the action of a soda solution, and the inverse transformation of analcite into leucite is also possible.

LEUCOCYTES. See Blood.

LEUCOMAINES (Gk. fa vKUfia , white of egg), certain nitrogenous organic basis found as products of metabolism in living organic tis¬ sues. They may be extracted from fresh beef by warm water and oxalic acid, together with a little oxygen. The solution is boiled, filtered, evaporated and extracted with alcohol several times. The alcoholic solution is precipitated with ether several times, and its several com¬ ponents are isolated by various means. The bases thus obtained are xanthocreatinine, C5H10N4O ; chrusocreatinine, C5H8N4O ; amphi- creatine, C9H19N7O4; pseudocreatine, C4H5NB0 ; C11H24N10O5, and C12H25N11O5. Some of the leucomaines are toxic. They correspond to the alkaloids (q.v.) in plants. See Metabolism.

LEUKOPLAST.S. See Chromatophores.

LEUTHEN, loi'ten, or LISSA, Poland, a village nine miles west of Breslau, Lower Silesia, which gives its name to the battle gained here by Frederick the Great, 5 Dec. 1757, over Prince Charles of Lorraine. The Aus¬ trians numbered about 90,000 and the Prussians 34,000. The Austrians lost 10,000 in killed and wounded, 12,000 were taken prisoners, besides considerable war munitions, and Silesia was re¬ gained. Pop. 800. See Seven Years' War.

LEUTZE, loit'se, Emanuel, American ar¬ tist: b. Gmiind, Wiirtemberg, 24 May 1816; d. Washington, D. C., 18 July 1868. He was brought to the United States in infancy and early displayed a talent for portrait painting. He studied at Diisseldorf under Lessing and lived abroad for many years after 1841. Among his works, which are largely historical, are ˆColumbus before the Council of Salamanca) ;

(Columbus in Chains > ; (Columbus before the Queen ; landing of the Norsemen in Amer- ica) ; (Washington Crossing the Delaware, >*

*perhaps his best-known work; (Washington at Princeton * ; Lafayette in Prison at Olmiitz Visited by his Relatives.) In 1860 he was em¬ ployed by the United States government to make a large mural painting entitled (West- ward the Star of Empire takes its Way* on one of the stairway walls in the national Capitol. His detail*

has been criticized and some of his work pronounced crude, but it is always strik¬ ing and effective. His principal figures always suggest power.

LEVANT, le-vant' (<(sunrise,® (

Geographically the word is a name applied to designate the coast of the Mediterranean immediately east of Italy, including the islands of the TEgean, Egypt, Asia Minor and Syria.

LEVANT, The. See Constitution, The.

LEVANT MOROCCO, a superior quality of Morocco leather, originally imported from the Levant, being made from the skin of Angora goats, See Leather,

LEVASSEUR — LEVER

327

LEVASSEUR, le-va-ser, Pierre Emile,

french political economist and geographer: b. Paris, 8 Dec. 1828; d. July 1911. He was educated at the College Bourbon and the Ecole Normale Superieure, and after holding several important educational posts became in 1876 professor of geography at the Ecole Libre des Sciences in Paris. He was especially prominent in regard to geographical study in French school and in addition to a series of geogra¬ phies was author of (Public Moneys among the Romans > (1854); 'The Gold Question (1858); 'The French Population (1889-91); (Agriculture of the United States (1894); (The American Workman (1900); (Summary of Political Economy* (1905) ; 'History of the Commerce of France) (1911-12). He was a member of the Academy of Moral and Political Sciences and a commander of the Legion of Honor. He visited the United States in 1893 in connection with the Columbian Exposition.*

LEVEE, le-ve' or lev'e (from the French word lever, to rise, and the time of rising). (1) In social usage, levee is a word used in high life or court language for the ceremonial visits which great personages receive in the morning, as it were at their rising. The levee is distinguished from the drawing-room, inasmuch as at the levee of a gentleman, gentlemen only appear, and at the levee of a lady, only ladies, while at the drawing-room, ladies and gentle¬ men both are admitted. The meaning is now more extended and the term is applied chiefly to the stated occasions on which the king or queen of Great

Britain publicly receives those subjects whom their rank entitles to the honor. On the first presentation of daughters of dukes, marquises and earls, it is customary for the queen to kiss them on the cheek. The term is little used in the United States. (2) In hy¬ draulic engineering, an embankment raised on the margin of a river to prevent inundation. That part of Louisiana which lies on the lower Mississippi was formerly subject to the annual overflow of the river, by which immense dam¬ age was done to the land. To guard against these inundations, levees of earth have been thrown up for more than a thousand miles along the river banks to a height sometimes of 15 feet, with a breadth of 30 feet at the base. This construction began about 1720 in New Orleans and was carried on locally and irregu¬ larly until 1882, when the Mississippi River Commisision began its work under the United States government. In front of New Orleans the levee is very broad and serves as a wharf, steamboats and other vessels being moored to it. Breaches sometimes occur in the levees, when the water rushes through and does great mischief ; these breaches are called crevasses. Consult Humphreys, (Floods and Levees of the Mississippi River (1914). See Mississippi Levee System; Natural Levee.*

LEVEL. (1) In mining, a horizontal gal¬ lery or passage. The workings at different depths are said to be at the different levels — the 50 or 60 fathoms level, and so on.. A level which opens to the surface at the. side of a valley is called a day level, and. being graded affords a means of natural drainage without pumping. A drowned or blind level is a drain¬ age gallery which has the form of . an inverted siphon. A dip-head level is one which proceeds

from the foot of the engine-shaft right and left, and from which the rooms diverge. (2) In surveying and engineering, an instrument for indicating a horizontal line or determining the position as to horizontality of an object or surface to which it is applied, and then de¬ termining the true level, or the difference of rise or fall between two or more places. There are numerous levels, vailing in form, size, arrangement or construction, according to the purpose for which each is intended; as, for in¬ stance, the carpenter's, mason's, gunner's or surveyor's levels, the mercurial, water and spirit levels, etc. All may be divided into three classes: (a) The simplest, such as the mason's or carpenter's level, in which the vertical line is determined by a plumb line and the horizon¬ tal by a line perpendicular to it. (b) Those in which the horizontal line is determined by the surface of a fluid at rest ; as in the water and mercurial levels, (c) Those in which the hori¬ zontal line is determined by a bubble of air floating in a fluid contained in a glass

tube, as a spirit level.

LEVELERS, the name of an ultra-reform party in Great Britain, which arose in the army of the Long Parliament about the year 1647 and was put down by Fairfax. The movement was partly political and partly religious ; they aimed at the establishment of an equality in titles and estates throughout the kingdom. While they condemned all religious strife and differences, they mutinied on various occasions and a number were killed before the party was suppressed.

LEVELING. See Surveying.

LEVEN, Loch, loh le'vn or lev'n, Scot¬ land, a lake in the county of Kinross, of oval shape, four miles long, two miles broad; great¬ est depth, 90 feet. It contains several islands, on one of which are the remains of the historic castle of Loch Leven, in which Mary Queen of Scots was confined after her separation from Bothwell and where she escaped shortly before the battle of Langside. The trout fishing of the lake is famous.

LEVER, le'ver, Charles James, Irish nov¬ elist: b. Dublin, 31 Aug. 1806; d. Trieste, Austria, 1 June 1872. He was educated at Trinity College, Dublin, and after studying medicine, partly at Gottingen, he obtained the degree of bachelor of medicine from Trinity College in 1831. During the prevalence of cholera in 1832 he gained considerable reputa¬ tion for his skill and devotion in the treatment of that disease. In March 1834 he contributed his first paper to the new Dublin University Magazine, of which he was editor 1842-45. The first chapter of 'Harry Lorrequer, a desig¬ nation which he afterward made famous as his nom de-plume, appeared in the February number for 1837. He removed to Florence in 1847, where he held a diplomatic position, was English consul at Spezzia in 1858 and at Trieste 1867-72. He published (Harry Lorrequer* (1837); 'Charles 0'Malley> (1840); 'Tom Buiike of Ours* (1844) ; 'Jack Hinton* ; 'Arthur 0'Leary) (1844) ; 'Roland CasheP (1850) ; 'The Bramleights of Bishops Folly) (1868); 'Lord Kilgobbin* (1872), etc. The rollicking character of the earlier of these was*

intensely national, but his later novels were more thoughtful and artistic.

LEVER, lev'er or le'ver, a mechanical de¬ vice for the transmission

and transformation of power. It is essentially a rigid structure, in which case it acts as a straight bar, no matter what its conformation, pivoting upon a fixed point called the <(fulcrum.® By means of the lever a great force operating over a short dis¬ tance is obtained at the expense of a small force operating over a long distance. The crowbar is the commonest simple example in practice. With it a stone weighing 500 pounds may be raised two inches by moving the handle end of the bar downward 20 inches, the ful¬ crum being so placed that the distance from the hand to the fulcrum is 10 times as long as from the fulcrum to the stone. It will be noted that the fulcrum has to carry the sum of the weights at the two ends of the lever • — in the example quoted, 550 pounds. The lever is operated under three different conditions : (1) Where the fulcrum is between the power and the resistance, as in lifting the stone with a crowbar; (2) where the resistance is between the power and the fulcrum, as in a nutcracker; (3) where the power is between the resistance and the fulcrum, as in a. sugar-tongs or a sheep-shears. In the last instance the power has to be larger than the resistance, as it oper¬ ates on the small section of the lever to pro¬ duce a less power over a longer distance at the resistance end. The equation of the lever is : The power multiplied by its end of the lever equals the resistance multiplied by its end.

LEVERETT, lev'er-et, Frank, by family

tradition descendant of John Leverett, Ameri¬ can colonial governor (q.v.), American geol¬ ogist : b. Denmark, Iowa, 10 March 1859. He was educated at Denmark Academy and the Iowa Agricultural College. In 1886 he entered the United States Geological Survey; was as¬ sistant geologist 1890-1900, and since 1901 has been geologist ; also since 1909 lecturer on geol¬ ogy, University of Michigan. His special lines of investigation are glacial geology and water resources. He is a member of many scientific societies, both national and international. His publications include (Water Resources of Illi¬ nois > (1896) ; (Water Resources of Indiana and Ohio (1897) ; (The Illinois Glacial Lobe* (1899) ; (Glacial Deposits of the Erie and Ohio Basins1* (1901) ; (Flowing Wells and Municipal Water Supplies of the Southern Peninsula of Michigan* (1906) ; Comparison of North American and European Glacial Formations) (1910); (Surface Geology of Michigan>*

(Northern Peninsula 1911; Southern Peninsula 1912) ; (Surface Geology of Minnesota>

(northwest quarter 1915) ; . (Pleistocene of Indiana and Michigan

*and History of the Great Lakes, * with Frank B. Taylor (1915) ; and various shorter reports and papers.*

LEVERETT, Sir John, American colonial

governor: b. England, 1616 ; d. Boston, Mass., 16 March 1679. At 17 he emigrated to America with his father and settled in Boston. He re¬ turned to England in 1644 to take part in the struggle between the Parliament and the king, and as commander of a company of foot sol¬ diers gained military distinction and the friend¬ ship of Cromwell. He subsequently resided some years at the court of the Protector as

agent of Massachusetts. On his return to America he held successively some of the most important civil and military offices in the gift of the colony, and finally in 1673. was elected governor. His administration is important in colonial history as the era of the war with King Philip, which his skill and energy were instru¬ mental in conducting to a fortunate issue. Two years previous to his death he was knighted by Charles II in acknowledgment of his serv¬ ices to the New England colonies during this contest.

LEVERETT, John, grandson of Sir John Leverett (q.v.): b. Boston, 25 Aug. 1662; d. Cambridge, 3 May 1724. He was an eminent lawyer and judge, speaker of the colonial legis¬ lature and president of Harvard College from January 1707 until his death. He was a man of unusual attainments and received the. honor, then rarely bestowed upon colonial subjects, of membership in the Royal Society.

LEVERRIER, le-va-re-a, Urbain Jean Joseph, French astronomer: b. Saint-Lo, 11 March 1811; d. Paris, 23 Sept. 1877. He was educated at the College Louis Le Grand and the Ecole Polytechnique, and devoting himself to astronomy, made observations which pro¬ cured him admission to the Academy of Sci¬ ences in 1846. About this time he began inves¬ tigating the perturbations of Uranus. He made calculations with the view of determining the mass and orbital elements of an unknown planet supposed to cause the disturbances and was able to assign within one degree the re¬ gion where it might be looked for. John Couch Adams (q.v.), then a student at Cam¬ bridge, had been making investigations in the same track, and the honor of discovering Nep¬ tune (q.v.) is regarded as belonging equally to both. He received the grand cross of the Le¬ gion of Honor and other recognitions of his achievement. In 1854 Leverrier succeeded Arago as director of the Observatory of Paris, in which post, except an interval from 1870 to 1873, he remained until the

end of his life. Here he distinguished himself by his thorough¬ ness. and system, reforming the management, getting rid of political barnacles and making it the equal of any observatory of its time. He was the originator of the planetary and solar tables that became standard in the Nautical Al¬ manac. He spent many years elaborating La¬ place's theories and in his (Mechanique Celeste presented to the astronomical world the best summary then extant on the planetary motions.*

LEVI, le'vl, one of the 12 patriarchs, a son of Jacob and Leah. The prince of the Shechemites having wronged his sister Dinah, he, with his brother Simeon, attacked their city and murdered all the males. Jacob reproaches them on his death-bed for this act of cruelty and foretells the dispersion of their descend¬ ants : ®I will divide them in Jacob, and scatter them in Israel® (Gen. xlix, 7). Three sons went down with Levi to Egypt — Gershon, Ko- hath and Merari (Gen. xlvi, 2). Moses and Aaron were of this tribe. See Levites.

LEVI, la-ve, Sylvain, French Oriental philologist: b. Paris, 28 March 1863. Professor in the College of France, director of the sec¬ tion of philology, history and religions, viewed from the scientific point of view. He was in

charge of the course in Sanskrit in the samp in¬ stitution from 1889 to 1894 ; and he was sent on a special scientific mission to Indian and laoan (1897—98) . He has written extensively for scientific publications and among his published works are (Le Teatre Indien> (1890); (1898); (Le Nepal> (1906-07).

LEVIATHAN (Hebrew) is compounded of two words meaning a great fish and fas¬ tened; hence it probably means a huge fish cov¬ ered with close scales. The Septuagint renders it dr a k on (a dragon), and ketos (a whale). From the description of it given in the book of Job (xli) it is usually, and probably correctly, considered to mean the crocodile, though in some places it has been interpreted the whale. See Tristram's (Natural History of the BibleF LEVIATHAN, The. Hobbes' levia¬ than appeared in 1651 at the end of the civil war which left Cromwell in power. In many ways it was the child of these rebellious times, though it was not, as is sometimes charged, a defense of the Stuart monarchy. Far from be¬ ing a mere political tract the (Leviathan) stands as the first original treatise on politics*

and ethics since Aristotle.

Hobbes undertook the task of deducing a naturalistic theory of the state as an integral part of his naturalistic philosophy, an under¬ taking which marks him as the only English philosopher, with the execution of Spencer, who produced a system of philosophy.

The first part, ((On Man,® may be said to lay the foundation of modern psychology. It proceeds from a discussion of elementary sen¬ sation to an analysis of the ˆinterior beginnings of voluntary motions commonly called the pas¬ sions,® whereby we may conceive the natural condition of mankind from which the state has been generated through the (

The fourth and last division of the book is a spirited attack on the Roman Catholic Church under the pleasing caption (Of the Kingdom of Darkness and brought the author into disfa¬ vor with the Royalists.*

Hobbes considered himself the founder of social science and certainly the

There are no special treatises on the levia¬ than of any outstanding merit. The best gen¬ eral account of his philosophy in English is to be found in Sir Leslie Stephen's volume on (Hobbes* in the English Men of Letters Series.*

Walter B. Veazie.

LEVIEN, la-ven', Ilse, German authoress : b. Hamburg, 1852; d. 1908. After studying in her native city, she taught school for a number of years, until 1884. In that year she went to Stuttgart, where she studied aesthetics. There she became an intimate of Vischer, and after his death wrote (Vischer — Erinnerungen) (1889). From Stuttgart she proceeded to Munich, at¬ tracted by the literary circle of which Paul Heyse was the leading figure. In her later years she was afflicted by an incurable illness which so depressed her that she agreed to be shot by her intimate friend, Emma Mandel- baum, who then killed herself. Miss Levien was married to an Armenian named Okunian. Of her novels those deserving mention are (Hamburger Novellen> (1886); Zwischen Elbe und Alster (1890); (Bittersiiss) (1891); (Querkopfe) (1897); (Erich Hetebrink* (1907). Other works are (Gedichte,* a volume of poems (1890) ; (Phibje Ohrtens Gluck* (1902), a com¬ edy; (Die Retter der Morale a drama (1905).*

LEVIN, Lewis Charles, American politi¬ cian: b. Charleston, S. C., 10 Nov. 1808; d. Phil¬ adelphia, 14 March 1860. Removing to Wrood- ville, Miss., he became a school teacher and subsequently followed tlhe practice of law in various States, settling permanently in Philadel¬ phia in 1838. The temperance cause attracted him and he edited a temperance organ. Becom¬ ing known as speaker and writer, he formed the Native-American party in 1843 and pub¬ lished The Sun, a daily paper, in its interests. As a representative of the party he was sent to Congress and served three terms (1845-51).

LEVIRATE MARRIAGE, among the Jews, the custom of a man's marrying the widow of a brother who died without issue. The same custom or law prevails in some parts of India. Consult Benziger, (Hebraiche Arch- aologie) (1907).

LˆVIS, Frango is Gaston, fran-swa gas- ton la-ve, Due de, French soldier in America: b. Chateau d'Anjac, Languedoc, 23 Aug. 1720; d. Languedoc, 1787. He served in the French army in various campaigns and in 1756 was or¬ dered to Canada, where he became second in command to General Montcalm. For his serv¬ ices at the defense of Carillon in 1758 he was promoted major-general; and at Montmorenci in 1759 he repulsed the English under Wolfe. After Montcalm's death on the Plains of Abra¬ ham, Levis took command of the French army, and during the winter of 1759-60 he maintained a vigorous struggle against great odds. He was victor at Sainte Foye in 1760 and might have gained Quebec if the French vessels had ar¬ rived at the opening of navigation in that spring. Levis returned to France, where he continued in the service ; he was made a mar¬ shal in 1783 and given a dukedom in 1784.

LEVIS, la've or lev'is, LEVIS TOWN or PORT LEVI, le'vi, Canada, the capital of Levis County, Quebec, on the Saint Lawrence River, opposite Quebec city, with which it has ferry communication. It is an important port with government docks ; is the landing place for transatlantic travelers; and has a large export trade. Most of the square timber brought down the Saint Lawrence in rafts is here loaded into sailing ships for Europe. It is on the Inter¬ colonial railway and a terminus of the Quebec

Central and of branches of the Grand Trunk railways. It is fortified, has a convent, ship¬ yard, factories, stores and lumber-mills. Pop.

7,452.

LEVITES, le'vlts, those of the tribe of Levi who were not priests. They were the min¬ isters specially singled out for the service of the sanctuary, and, with tlhe priests, formed the sacerdotal tribe. After the idolatry of the golden calf, the Levites were the first to rally round Moses, and then the idea of a special consecration of <(an Israel within an Israel® de¬ veloped itself and the Levites thenceforth occu¬ pied a distinct position. They became guardians of the tabernacle and no others approached it under penalty of death. They appear to have been in part only descendants of Levi, others being taken into the tribe at convenience. From the first the Kohathites, as nearest of kin to the priests, had the highest offices assigned them. They bore the vessels of the sanctuary and the ark itself. A permanent arrangement was made for their maintenance. They were to receive the tithes of the produce of the land, and in their turn to offer a tithe to the priests. When the tabernacle should have a permanent place, the whole tribe was to be assigned 48 cities, six of which were to be cities of refuge. The Le¬ vites were moreover to preserve, transcribe and interpret the law and to read it every seventh year at the Feast of Tabernacles. They were not included in the general census of the peo¬ ple, but in a separate census (1 Chron. xxiii, 3) ; their number is given at 38,000. The vessels of the temple and sanctuaries were placed in their charge and they prepared animals for the sac¬ rifices. Keeping watch and menial duties of cleaning the places of worship alsj fell to their share. They were the assistants and servants of the Aaronite priests, and at some periods seem to have closely approached the priests in dignity and position, and at others to be de¬ graded and treated as menials. Their position was much changed by the revolt of the 10 tribes, and after the captivity, in the movement under Ezra, not more than 38 could be brought together. The purity of their blood was strin¬ gently guarded both by Ezra and Nehemiah. After the destruction of the temple in the dis¬ persion, they disappeared from history, being merged in the crowd of captives scattered over the Roman world. See Leviticus.

LEVITICUS, Book of. Leviticus is the third book in the Old Testament. Its Hebrew name is Wayyikra, ((And he called,® after the opening word of the book. The designation Leviticus, which means <(Levitical,® that is, ((the Levitical System® — the Levitical system is found chiefly in this book — originated with the early Greek translation of the Old Testament known as the Septuagint and is meant to be de¬ scriptive of the contents. The Talmud suggests an even more appropriate title, namely, ((Law of the Priests.®

Contents. — Leviticus contains few passages cast in narrative form ; and in these few cases the narrative is introduced not so much for the purpose of describing the past as for the pur¬ pose of enforcing some provision for the fu¬ ture. The book is almost entirely, a collection of laws, chiefly priestly or ceremonial in nature, that is, laws dealing with the functions and privileges of the priests and Levites ; hence, the

name Leviticus. The first group of laws (i, 1-vii, 38) deals with sacrifices and offerings — burnt offerings, meal offerings, peace offerings, sin of¬ ferings and guilt offerings — and writh the priestly functions in connection with these sac¬ rifices. These laws are followed by accounts of the consecration of Aaron and his sons as priests and of the sin of Nadab and Abilhu, and by further regulations concerning priestly du¬ ties and portions (viii, 1-x, 20). Five chap¬ ters (xi-xv) are devoted to laws dealing with matters of cleanness and uncleanness. The day of the atonement is the subject of chapter xvi ; chapters xvii-xxvi contain the so-called Law of Holiness (see further, section 4). Chapter xxvii is in the nature of an appendix, contain¬ ing laws concerning vows, things devoted and tithes.

Composition. — Other books of the Penta¬ teuch contain material taken from at least three originally separate sources, commonly desig¬ nated by the letters J, E and P ; in Deuteronomy appears a fourth source known as D. (For de¬ tails see article Pentateuch). The whole of Leviticus is derived from P; but chapters xvii- xxvi, with the exception of some later inter¬ polations found chiefly in chapters xxiii and xxv, formed originally a separate code of laws, which is designated ((Law of Holiness® bv mod¬ ern scholars. (For a characterization of P see article Pentateuch, and the relevant sections in Eiseleri, F. C., (The Books of the Penta¬ teuch > ; a better understanding of the relation of Leviticus to the other P sections in the Pen¬ tateuch may be secured from a consecutive reading of the whole P document, as reproduced in an English translation in Kent, C. F., (The Student's Old Testament — for the material embodied in Leviticus consult especially the vol¬ ume entitled (Israel's Laws and Legal Preced¬ ents' — or in Brightman, E. S., (The Sources of the Hexateuch) ; compare also Carpenter and Battersby,

The Law of Holiness. — Chapters xvii- xxvi constitute perhaps tlhe most significant sec¬ tion of the book of Leviticus. Peculiarities of form, contents and expression have convinced modern scholars that these chapters existed at one time as an independent code. (It is not

impossible that originally the code was more extensive than it is now. Some of its laws may have been omitted by the redactor who made it a part of P ; others may have been trans¬ ferred to other parts of tlhe Pentateuch, for example, the food laws in Lev. xi and the law concerning fringes in Num. xv, 37-41). The designation <(Lawr of Holiness® (H, the first letter of Holiness, as also of the corresponding German word (

As in the case of the Book of the Cove¬ nant (see article Exonus), attemnts have been made to subdivide the Law of Holiness into a series of decalogues (consult L. B. Paton, Journal of Biblical Literature, 1897, pp. 31-37), but such a theory necessitates a more or less radical rearrangement of the contents, which

would find its only justification in the demands oi the theory. The code deals with a variety of topics ; it is worthy of note, however, that it lays much less stress upon civil and criminal than upon moral and ceremonial requirements. The more important subjects covered are the slaughter of animals and sacrifice (17) ; un¬ chastity and Moloch worship (18) ; the religious and moral behavior of the Israelites (19) ; penalties for Moloch worship, unlawful mar¬ riage < and other offenses (20) ; regulations touching priests and offerings (21, 22) ; sacred seasons (23) ; the lights of the sanctuary, the showbread, the blasphemer and his punishment

(24) ; the Sabbatic year and the year of Jubilee

(25) . The code closes with a hortatory ad¬ dress, emphasizing the fundamental duty of loyalty to Yah well (26).

The individual laws did not originate with the compiler of the code. Internal evidence makes it probable that the author of the code had access to earlier collections, which may have been made at different times and places and in different priestly circles, embodying laws handed down in oral or written form for gen¬ erations and centuries. No doubt he may have formulated and inserted new laws, but, on the whole, his work was that of adapting older laws to present conditions, of bringing them into harmony with his own point of view, and of re-enforcing them by supplying suitable motives. Kent is undoubtedly right when, in speaking of these laws, he says, ((Their roots are probably to be traced to the Mosaic and nomadic periods of

Israelitish history.®

In language, thought and general aim the Law of Holiness resembles Ezekiel. For in¬ stance, the principle underlying the more formal teaching of Ezekiel is the same kind of holiness as is insisted upon in the Law of Holiness. The similarities are, indeed, so striking that some scholars have considered Ezekiel the author, or at least the redactor, of the code. However, there are also such obvious differences that it is practically impossible to believe that they came from one and the same author.

Are, then, the resemblances a matter of coincidence? Or, was Ezekiel influenced by the Law of Holiness? Or, was the compiler of the code influenced by the thought and language of Ezekiel ? The evidence is so slight that there exists wide difference of opinion on these questions among scholars. On the whole, it seems most satisfactory to ex¬ plain the resemblances by assuming that the Law of Holiness and the Book of Ezekiel originated in the same priestly circles and under the inspiration of the same religious concep¬ tions and ideals. In the words of Kent, ((It is probable, therefore, that the original draft of this code was made between the first and final captivity (b.c 597-586), a period in which the more enlightened leaders, like Jeremiah and Ezekiel, saw clearly that the state was doomed and that Israel's laws and institutions, if they were to be preserved, must be put into written form.® This code served as a nucleus around which a later writer or compiler arranged legal material taken from various sources; the com¬ pilation which resulted is now known as P, or, the Priestly Code.

Bibliography. — In addition to the discus¬ sions named in the body of the article, atten¬ tion may be called to the following books in

English : Chapman, A. T., Hntroduction to the Pentateuch5 (Cambridge 1911); and, in co¬ operation with A. W. Streane, ((Sacred Books of the Old Testa¬ ment^ New York 1898) ; Gray, G. B., Hntro- duction) (New York 1913) ; Harper, W. R., 'The Priestly Element in the Old Testament (Chicago 1902) ; Kennedy, A. R. S., (Leviticus and Numbers5 ('New Century Bible,) Edin¬ burgh 1911) ; McFadyen, J. E., Hntroduction 5 (New York 1905). Also articles on (

Frederick Carl Eiselen, Professor of Old Testament Interpretation, Garrett Biblical Institute.

LEVULOSE, a sugar (CeHuOe) isomeric with a grade of glucose, but

of left polariza¬ tion ; it always occurs with glucose in honey, in many fruits and in other sacchariferous vegetable tissues. It is popularly known as fruit sugar, is thick, sweet and will not readily crystallize. See Sugar.

LEVY, Auguste Michel, French mineralo¬ gist: b. Paris, 1844; d. 1911. He was promi¬ nently connected with the geographical survey of France in 1876, and he was for many years a very active member of the Academy of Sci¬ enceˆ Among his publications which are all of a scientific nature are Structure des roches eruptives etudees au microscope) (1876) ; 'Syn- these des mineraux et des roches 5 (1888) ;

Structures et classification des roches erup- tives) (1889) ; (Tableaux des mineraux des roches) (1888), with A. Lacroix as collabo¬ rator; and E'Explication de la carte geologique de la France,5 in collaboration with F. Fouque.

LEVY, Emile, a-mel la-ve, French painter: b. Paris, 20 Aug. 1826; d. Paris, 4 April 1900. He won the Grand Prix de Rome in 1854. In 1878 he was awarded a first class medal for a picture he exhibited in the Salon. He had re¬ ceived the cross of the Legion of Honor in 1867. He was much valued as a portrait painter, and also was successful in pastel. Among his works are (The Death of Orpheus> (1866), now in the Luxembourg; (Supper of the Martyrs5 (1859) ; 'The Elements5 in the Louvre; Eresentation of the Virgin5 in the church de la Trinite, and (The Judgment of Midas.5

LEVY, le 'vee, Louis Edward, American photo-chemist and inventor : b. at Stenowitz, Bohemia, 12 Oct. 1846; d. 17 Feb. 1919. Coming to the United States in childhood he received his education at the Detroit public schools. He gave special attention to mathematics and astronomy at the University of Michigan (1866) and to practical optics in Detroit (1861-70). He was connected with the United States Lake Sur¬ vey (1866), made researches in microscopic photography (1867-70) and invented a process in photo-chemical engraving (1874) called the <(Levytype.® He received (1896), with his brother Max, a medal for invention of "Levy line screen® and (1900) a gold medal for Levy "acid blast,® both from Franklin Institute,

Philadelphia, and a medal and diploma from the World's Columbian Exposition (1893) tor original discoveries. He published and edited in Philadelphia, The Evening Herald (1887— 90) ; The Mercury (1887-91) ; author of (The Jewish Year* (1895) ; (The Russian Jewish Refugees in America) (1895) ; busi¬ ness, Money and Credit) (1896), and, with Hugo Bilgram, (The Cause of Business Depressions) (1914). He was elected vice-presi¬ dent of Inventors' Association at Paris in Sep¬ tember 1900, member of Committee on Sci¬ ence and the Arts, Franklin Institute; elected vice-president of institute, 1916.

LEVY, Uriah Phillips, American naval of¬ ficer : b. Philadelphia, 22 April 1792; d. New York, 22 March 1862. Sailing as a cabin boy before his 11th year, he was apprenticed as a sailor in 1804, and before he was 20 had passed through every grade and became master. On 23 Oct. 1812, he was commissioned sailing- master in the navy, serving until June 1813 on the ship Alert and then on the brig Argus. He was placed in command of one of the prizes which the Argus secured, but it was subse¬ quently recaptured and he, with his crew, was imprisoned in England for 16 months. In March 1817, he was appointed lieutenant. Per¬ sonal antagonism, in which religious prejudice played an important part, subjected him to nearly 40 years' struggle, in the course of which he fought a duel, killed his opponent, was court-martialed six times and finally dropped from the list as captain. He was finally re¬ stored to that rank in 1855, and later became commodore.

LEVY, lev'!, (1) a term used in Europe for the compulsory raising of a body of troops from any specified class in the community for purposes of general defense or offense when the existing military forces are insufficient to meet the necessities of the case. When a coun¬ try is in danger of instant invasion a levee en masse is sometimes made — that is, every man capable of bearing arms is required to con¬ tribute in person toward the common defense. On less urgent occasions the levy may be re¬ stricted to a class, as to men between 18 and 40 years of age. (2) In law, the seizure of prop¬ erty under a writ or other process ; usually the taking by a sheriff or marshal of the property of a judgment debtor under an execution. It is not a valid levy unless the marshal or other official takes actual possession of the property. In the case of real property, he enters and takes charge, as by taking the key, or putting on new locks. In tile case of chattels, he may either move them to another place or if they are cumbersome place a deputy to watch them. The judgment debtor

is not always ejected from his premises, as they are taken subject to sale for the amount of the judgment, and any excess above judgment and costs belongs to the original owner. See Attachment; Execution.

LEWES, lues, George Henry, English philosophical writer: b. London, 18 April 1817; d. there, 30 Nov. 1878. He was in turn clerk, medical student and student of philosophy in Germany, whence he returned to England in 1840 to devote himself to general literature. His first important work was his biograph¬ ical History of Philosophy (1846), of which a*

second edition appeared, much extended and altered. This work, written largely from a Positivist point of view, sufficiently proved his ability as a thinker and writer. He was literary editor of the Leader (1850-54). He published his (Life of Robespierre) (1849) and a compendium of Comte's (Philosophy of the Science (1853). His*

LEWES, lu'is, Del., town, in Sussex County, on Delaware Bay and on the Asso- woman Canal and the Pennsylvania Railroad, about 40 miles southeast of Dover. The excel¬ lent harbor has been improved by an artificial breakwater. It is the shipping point for much of the farm and garden products of the southern part of Delaware. Large quantities of fruit, fish oils'and vegetables are among the products shipped to Northern markets. Lewes is the headquarters of the Delaware Bay pilots. It contains a shirt factory, tomato canneries and tin-box factories. Cape Henlopen lighthouse, built in 1800, is nearby. The waterworks are municipally owned. Pop. (1920) 2,074.

LEWIS, lu'is, Agnes Smith, English

scholar and palseographist. She was educated at the Irvine Academy, Ayrshire, in her child¬ hood and subsequently became an accomplished linguist, especially in modern Greek, Arabic and Syriac. She was married to Rev. S. S. Lewis (1836-91). Her remarkable services to palaeographical science have been recognized by the bestowal upon her of honorary degrees from Halle, Saint Andrews, Heidelberg and Dublin. In company with her sister, Mrs. Margaret Dunlop Gibson (q.v.), she visited Sinai four times, and in 1892 discovered and photographed the Syro-Antiochene, or Sinaitic Palimpsest, the most ancient one of the four Gospels known. In 1896 they brought back the first half of the Hebrew Ec.clesiasticus. Both

sisters were awarded the gold medal of the Royal Asiatic Society in 1915. She has writ¬ ten also introduction to the Four Gospels from the Sinaitic Palimpsest5 ; (Some Pages of the Sinaitic Palimpsest Retranscribed) ; (A Translation of the Syriac Gospels) ; (The' Pal¬ estinian Syriac Lectionary of the Gospels5 ; and other learned works on Scripture antiquities. –

. LEWIS, Alfred Henry, American journal¬ ist and author: b. Cleveland, 1858; d. 23 Dec. 1914. He was a lawyer by profession and at the age of 21 was elected city attorney of Cleveland. Later, he went West and in New Mexico and Arizona procured material for his Wolfville stories. He practised law in Kansas City for six years, entering journalism in 1890, and with William Nelson, editor of the Star, outlined the plans for the boulevard of the park in Kansas City. In 1891, Lewis went to Wash¬ ington as a staff correspondent of the

Kansas City Times, subsequently becoming Washing¬ ton representative of the Chicago Times and later of the Hearst papers. He first gained prominence through his ((Wolfville® tales of Western frontier towns. In 1898 he established in New York The Verdict, a humorous weekly. He has written (Wolfville) ; (Episodes of Cow¬ boy Life) ; (Sandburrs) (1900) ; (Wolfville

Days5 (1902) ; (Wolfville Nights5 (1902) ; (Bfack Lion Inn5 (1903) ; (Peggy O'Neal5 (1903); (The Sunset Trail5 (1905); Confes¬ sions of a Detective5 (1906) ; (Story of Paul Jones5 (1906) ; (The Throwback5 (1906) ; (When Men Grew Tall5 (1907) ; (An Ameri¬ can Patrician — Aaron Burr5 (1908); (Wolf- ville Folks5 (1908) ; (The Apaches of New York5 (1912) ; Caro Nell and her Friends5 (1913); Cation — Famous New York Mur¬ ders5 (1914).

LEWIS, Andrew, American soldier: b. Donegal, Ireland, about 1720; d. Bedford County, Va., 26 Sept. 1781. He resided in Augusta County, Va., where he was prom¬ inent in border conflicts; and in 1754 entered as a volunteer the expedition for taking possession of the Ohio region. Later he became a major in Washington's regiment of Virginians, and was at the surrender of Fort Necessity. In 1756 he was in command of the Sandy Hook expedition; in 1758 participated in that of Major Grant to Fort Duquesne, on which oc¬ casion he was taken prisoner and carried to Montreal. He was a commissioner of Virginia in 1768 to arrange a treaty with the Iroquois, _ in 1774 was appointed a brigadier-general during hostilities with the Indians on the western Vir¬ ginia border, and 10 Oct. 1774 gained an im¬ portant victory over the Shawnee confederacy at the battle of Point Pleasant (at the mouth of the Great Kanawha). He was a brigadier-general in the Continental army from 1 March 1776 to 15 April 1777, and then entered the Virginia civil service. He drove Lord Dun-more from Gwynn's Island, 9 July 1776. For several years he sat in the Virginia house of burgesses, and in the Virginia conventions of May and June 1775 was a delegate from Bote¬ tourt. As a soldier he was highly regarded by Washington. See Colonial Wars in America.

LEWIS, Charles Bertrand («M. Quad55), American journalist: b. Liverpool, Qhio, 15 Feb. 1842. He was educated at the Michigan Agricultural College, and served in the Union

army during the Civil War. His journalistic work began on the staff of the Detroit Free Press, and he soon became known as a descrip¬ tive and humorous writer under the name of <(M. Quad.55 In addition to his work in this field, in connection with various publications, he has also written (Field, Fort and Fleet: A Sketch-

Book of the Civil War5;

LEWIS, Charlton Thomas, American law¬ yer and author: b. West Chester, Pa., 25 Feb. 1834; d. Morristown, N. J., 26 May 1904. He was graduated at Yale in 1853, and after study¬ ing with a view to entering the ministry, served as professor at the State Normal University at Bloomington, Ill., 1856—57, and from 1858 to 1861 was professor in Troy University. In 1863-64 he was a United States deputy com¬ missioner of internal revenue. He entered upon the practice of law in New York city in 1865 ; was associated with William Cullen Bryant in editing the Evening Post; and re¬ turned to law practice in 1871. At Harvard, Columbia and Cornell universities, during 1898- 99, he was a lecturer on insurance. He was also president of the Prison Association of New York and of the State Charities Aid As¬ sociation of New Jersey. Among his published works are (Gnomon of the New Testament,5 translated from the German of Bengel (1861) ; (History of Germany5 (1870) ; (Harper's Latin Dictionary,5 in collaboration with Charles Short (1879) ; (Latin Dictionary for Schools5 (1889) ; (Elementary Latin Dictionary5 (1890), etc.

LEWIS, Dio, American physician and au¬ thor : b. Auburn, N. Y., 3 March 1823 ; d. Yonkers, N. Y., 21 May 1886. He studied at the Harvard Medical School, and practised for a time at Port Byron and at Buffalo, N. Y., pub¬ lishing at Buffalo a monthly periodical with hygienic aims. He became widely known by his writing in advocacy of a system of higher gymnastics, and finally established a school in Boston in which teachers were trained in his new exercises ; and a school for young ladies was also founded at Lexington, Mass., which was destroyed by fire in 1868. About 1883 he removed to New York. He wrote many arti¬ cles for magazines, and his more extended works include (The New Gymnastics5 (1862) ; (Weak Lungs and How to Make them Strong5 (1863); (Talks About People's Stomachs5 (1870); (Our Girls5 (1871); (Chats with Young Women5 (1871); (Chastity5 (1872); (Gypsies5 (1881), and (In a Nutshell5 (1883).

LEWIS, Edmonia, American sculptor: b.

New York, 4 July 1845. She is of negro and Indian parentage. With slight instruction in sculpture she developed a talent for that art, and came into notice in 1865 through the ex¬ hibition of her first known work, a bust of Col. Robert Gould Shaw, in Boston. That year she went to Rome to study, and there she soon afterward established permanent residence. Her works include (The Freedwoman5 ;

Death of Cleopatra) (1876), exhibited at the Philadelphia Exposition; (The Marriage of Hiawatha) ; (The Old Arrow-Maker and his Daughter) ; (Asleep) ; (Madonna with the In¬ fant Christ,* and many portrait busts, among them those of Lincoln, Longfellow, Sumner and John Brown. Most of her work is in Europe.

LEWIS, Estelle Anna Blanche (Robin¬ son), American dramatist: b. near Baltimore, Md., April 1824; d. London, 24 Nov. 1880. While a schoolgirl she made a verse-rendering of the <2Eneid) into English; wrote (1852) ;

LEWIS, Francis, American patriot: b. Llandaff, Wales, March 1713; d. New York, 30 Dec. 1802. He entered commerce in London, but later came to America, and established a mercantile business in New York and Phila¬ delphia. He made numerous successful busi¬ ness voyages to Europe, and in 1752 obtained the contract for clothing the British army in America. In the same year he was aide-de- camp to Gen. Hugh Mercer at Oswego, N. Y., when Montcalm advanced against it. After the capitulation, he was sent to France, and subse¬ quently exchanged. For his services the gov¬ ernment presented to him 5,000 acres of land. From 1765 he took part in public affairs. He was one of the New York committee in the First Colonial Congress (1765), in 1775 was elected to the First Continental Congress, in 1776 signed the Declaration of Independence, in 1777 was again elected to Congress and in 1779 became commissioner of the Board of Admiralty. He expended his wealth most freely in the patriot cause, to which his com¬ mercial knowledge also was very useful.

LEWIS, Sir George Henry, English law¬ yer: b. 1833; d. 7 Dec. 1911. He was educated at University College, London, and was called to the bar in 1856. He laid the foundations of his subsequent great reputation in the prosecu¬ tion of the directors of Overend and Gurney's Bank, and from that time he was employed in most of the great sensational trials, including the Colin Campbell divorce suit, the Tranby Croft baccarat scandal and the Piggott forgeries. So deeply was he cognizant of the unsavory secrets of the ((upper ten® that it was said of him that he could have placed one- half of London society in jail; but in order that there might be no leakage of informa¬ tion, he kept no diaries in his professional work. He assisted the movement for the founding of the Court of Criminal Appeal, was knighted in 1893 and created a baronet in 1902.

LEWIS, Henry Carvill, American geolo¬ gist: b. Philadelphia, 16 Nov. 1853; d. Man¬ chester, England, 21 July 1888. He was grad¬ uated from the University of Pennsylvania in 1873, served as a volunteer in the State Geolog¬ ical Survey of Pennsylvania in 1879-84, was

professor of mineralogy in the Academy of Natural Sciences of Philadelphia in 1880-88, and of geology at Haverford College in 1883-88. In 1886-87 he studied at Heidelberg, and in 1887-88 made special investigations regarding the origin of the diamond. He prepared a chart of the various ancient ice-sheets and glaciers of England, Ireland and Wales, for some time edited the mineralogical department of the American Naturalist, and wrote ex¬ tensively on geological subjects, including (The Antiquity of Man in Eastern America, Geolog¬ ically Considered (1880) ; (The Geology of Philadelphia) (1883) ; Comparative Studies upon the Glaciation of North America* (1886), and (The Terminal Moraines of the Great Glaciers of England* (1887).*

LEWIS, James, American actor: b. Troy, N. Y., about 1840; d. West Hampton, Long Island, N. Y., 10 Sept. 1896. Lie first appeared in 1858 at the Troy Museum as Farmer Gam¬ mon in (The Writing on the Wall, played second comedy parts for a time at the Green Street Theatre of Albany, was later with a traveling company on the Georgia circuit, and was at Birmingham, Ala., when the Confederacy was proclaimed. Having escaped to the North, he afterward (1866) appeared at the Olympic, New York, as low comedian in (Your Life's in Danger, * presented by Mrs. John Wood's company. He was afterward successful as Dick Swiveller, and from 1869 until his death he was leading comedian in Augustin Daly's company. He took numerous parts with ex¬ cellent versatility.*

LEWIS, James Hamilton, American legis¬ lator: b. Danville, Va., 18 May 1866. He re¬ moved to Augusta, Ga., was educated at Hough¬ ton College and at the University of Virginia. He studied law at Savannah and was admitted to the bar in 1884. In 1886 he removed to Seattle, Wash., and there established a law practice. He was elected to the Territorial senate and in 1890 declined the nomination for Congress. He was candidate for governor in 1892, but was defeated. He was unsuccessful as candidate for the United States Senate in 1894. At the Democratic National Convention of 1896 he was the Washington State candidate for the vice-presidential nomination. He was elected to the 55th Congress (1897-99) as congressman-at-large. He was the author of a resolution for the recognition by the United States of the independence of Cuba. In

1900 he was again a candidate for the Vice-Presi¬ dency at the Democratic National Convention at Kansas City, being endorsed by the Pacific Coast States. _ He served on the staff of Gen. F. D. Grant in the Spanish- American War, in Cuba in 1898. In 1903 he was credited to the Joint High Commission on Canadian and Alaskan Boundaries at London and also served as United States commissioner to regulate the customs laws between the Dominion of Canada and northwestern United States. In 1903 he removed to Chicago and in 1905-07 was cor¬ poration counsel of that city. In 1908 he was Democratic candidate for governor of Illinois, but was defeated by Dineen. He was elected to the Senate of the United States in 1912 for the terrn 1913-19. He served as United States commissioner representing the United States Senate at London to execute treaty laws for

safety at sea. He was chosen Democratic "whip® of the Senate and as such rendered efficient support to the Wilson administration. He has written (Handbook on Election Laws,> with A. H. Putney (1912) ; Constitutions, Statutes and their Construction } ; (Two Great Republics: Rome and the United States) (1913) ; (History of International LawP

LEWIS, Matthew Gregory, called "Monk® Lewis, English author: b. London, 9 July 1775; d. at sea on the way from Jamaica to England, 14 May 1818. He was educated at Oxford, in

1794 became a member of the British embassy at The Hague, and in 1795 published Am¬ brosia, or the Monk) (whence his sobriquet), which had a great success at the time. From 1796-1802 he represented Hindon, Wiltshire, in the Commons. Of his various dramatic works the best known is (The Castle Spectre, > first presented in 1798, and abounding in ghosts, storms and other melodramatic features. He visited, in 1815-16 and 1817-18, his property in the West Indies, to provide for the suitable treatment of his negro slaves; and published the (Journal of a West Indian Proprietor, which is interesting as a description of the con¬ dition of the negro in Jamaica of that time. His writings had considerable influence on the early poetry of Walter Scott, for whose translation of (Gotz von Berlichingen) he ob¬ tained the publication in 1799.*

LEWIS, Meriwether, American explorer: b. near Charlottesville, Va.,

18 Aug. 1774; d. near Nashville, Tenn., 8 Oct. 1809. He en¬ listed in the troops called out for suppression of the "Whisky Rebellion® in western Pennsyl¬ vania in 1794, entered the regular service in

1795 as lieutenant of the line, in 1797 was pro¬ moted captain, in 1801-03 was private secretary to Jefferson, and in the latter year was ap¬ pointed commander of an expedition to cross the continent, with Capt. William Clark (q.v.) as second in command. On 5 July 1803 he left Washington for Pittsburgh, Pa., where the ex¬ pedition was equipped ; but he did not begin to ascend the Missouri until the ice had broken in the spring of 1804. Then he proceeded up the river to its sources, crossed to the Rocky Mountains, reached the headwaters of the Columbia River, floated down that river to the Pacific, and explored a large part of the Ore¬ gon region. He had covered in all more than 4 000 miles from the junction of the Missouri with the Mississippi. Having wintered in an entrenched camp on the south bank of the Columbia, he started eastward 23 March 1806, and arrived at Washington 14 Feb. 1807. He received a grant of land and was appointed governor of Louisiana, where he found much confusion, and where he was successful in re¬ storing order. He was a bold explorer, and familiar with Indian matters. He died by his own hand near Nashville, Tenn. Consult memoir by Biddle and Allen (new ed., 1843), and Liehton, (Lewis and Clark) (1901; River¬ side biography series). See also Lewis and Clark Expedition.

LEWIS, Morgan, American soldier and statesman: b. New York, 16 Oct. 1754; d. there, 7 April 1844. He was graduated from the Col¬ lege of New Jersey in 1773, studied law, in 1774 entered the Continental army, was com¬ missioned major in the 2d New York, later

became chief of staff to Gates with colonel's rank, and quartermaster-general of the north¬ ern army. He commanded at Crown Point ; and after the war entered legal practice in New York. Elected to the assembly, he also became judge of the Court of Common Pleas, attorney- general of New York, succeeding Aaron Burr (1791), judge of the Supreme Court (1792), chief justice of the court (1793) and governor (1804-07). In 1805 and 1806 he was governor of the State of New York, winning from Burr by a large majority. In 1810 he was elected to the State senate, in 1812, after declining the portfolio of Secretary of War, became quarter¬ master-general of the armies of the United States, in 1813 was promoted major-general, and was in command at Sackett's Harbor and French Creek. He was president of the New York Historical Society, and

president-general of the Cincinnati. In 1831 he was Grand Mas¬ ter of the Freemasons.

LEWIS, Tayler, American author and edu¬ cator: b. Northumberland, N. Y., 27 March 1802; d. Schenectady, N. Y., 11 May 1877. He was graduated at Union College in 1820; studied law in Albany and practised at Fort Miller, but soon gave nearly all his time to the study of classical literature. In 1838 he was appointed professor of Greek at the University of New York, and in 1849 accepted the same professor¬ ship at Union College. He attained distinction as a philologist and in Christian apologetics. Besides contributing largely to periodicals, he published the following works : (The Nature and Ground of Punishment* (1844) ; ˆlato contra Atheos) (1845); (The Six Days of Creation) (1855) ; (The Bible and Science) (1856) ; (The Divine Human in the Scriptures) (1860) ; (State Rights, a Photograph from the Ruins of Ancient Greece) (1864) ; and (The People of Africa, Their Character, Condition and Future Prospects,* with E. W. Blyden and Timothy Dwight (1871). He was a member of the Bible Revision Committee.

LEWIS, or LEWIS-WITH-H ARRIS,

Scotland, the largest and most northerly of the Outer Hebrides, separated from the mainland by the Minch, a sea 30 to 35 miles wide. The northern larger portion, Lewis, is in Ross-shire, and is separated by a narrow neck from the southern portion, Harris, which belongs to Inverness-shire. The island occupies 770 square miles, is 60 miles long, varies in breadth from 5 to 30 miles and has a diversified surface which attains an elevation of over 2,700 feet. It is almost totally devoid of trees, contains a good deal of peat bog, less than 4 per cent of the soil being under cultivation. There are inter¬ esting monumental remains, including what is regarded as the finest example of a Druidic stone circle in Scotland. Capital, Stornoway. Pop. of island about 34,319.

LEWIS AND CLARK EXPEDITION, The, in American history, a celebrated expedi¬ tion t,o the northwestern part of the United States in 1803, under the command of Capt. Meriwether Lewis of Virginia and Capt. Wil¬ liam Clark, the results of which gave a more definite idea of our natural resources in this hitherto unexplored region than had ever been known. Recognizing the importance of a thor¬ ough and accurate knowledge of the vast extent of the country acquired by the United States

with their independence, Thomas Jefferson, while Minister to France, suggested to the traveler, Ledyard, an exploration of western America. Nothing came of it, however. In 1792 he made a similar proposition to the Amer¬ ican Philosophical Society (q.v.), and Michaux, the celebrated traveler and botanist, proceeded as far as Kentucky, when he was recalled by the French Minister. In January 1803, in a con¬ fidential .message to the Congress, President Jefferson recommended an appropriation for this purpose. It was granted, and he appointed Lewis, who had been his private secretary nearly two years, to the command of the expedition along with Clark. Lewis, while nominally in command of the expedition, always regarded Clark as his official equal, and during the three years of trying experience the two men worked hand in hand toward their great object with increased friendship and respect for each other. Lewis left Washington on 5 July 1803 and was joined by Clark at the Ohio. The expedition was delayed at Pittsburgh till 31 August, then proceeded on its way toward the Mississippi, Lewis choosing volunteers from the military posts along the way. The intention had been to winter at La Charette, a French settlement on the Missouri, but owing to the advanced season the first winter camp was pitched at River Dubois, on the Mississippi, about opposite the mouth of the Missouri. On 9 March 1804 Lewis was one of the witnesses to the transfer of Upper Louisiana at Saint Louis ; on 14 May 1804 he set out from River Dubois on the Jong journey up the Missouri. The party comprised in addition to Lewis and Clark three sergeants, twenty-three soldiers, three interpreters and Clark's negro slave, York. Toward the end of October they reached the Mandan country and put up for winter quarters near the site of the present city of Bismarck, N. D., after a trouble¬ some journey of 1,600 miles, battling against the swift current, the snags of the river and its falling banks. Much of this distance Lewis traveled on foot, hunting, collecting specimens and making notes upon the country. The jour¬ ney was resumed 7 April 1805, and on the twenty-sixth the party reached the mouth of the Yellowstone, one or the other of the captains, usually Lewis, pushing ahead with hunters on foot to provide game for the camps and to examine the country. On 3 June they passed and named Maria's River, and on the thirteenth came to Great Falls. Nearly a month was spent in making the portage, and on 25 July the party came to the triple fork of the Missouri. Nam¬ ing the three branches Jefferson, Madison and Gallatin, they proceeded up the Jefferson River, and on 12 August reached the head of naviga¬ tion. Then marching across the Nez Perce trail, along the

Bitter Root Mountains, came to the headwaters of the Clearwater branch of the Columbia. On 7 October they launched their canoes for the descent of this great river to the Pacific, which they reached 15 November. A fortified camp, called by the explorers Fort Clatsop, was pitched on the shore of Young's Bay, and here with much hardship the winter was spent. The return journey was begun 23 March 1806, and on 8 May the headwaters of the Clearwater were reached. On the return journey the party divided and explored a large part of the present State of Montana, uniting again below the mouth of the Yellowstone.

Rapidly descending the Missouri they arrived at Saint Louis, 23 Sept. 1806. Both Lewis and Clark kept elaborate and valuable journals. Unfortunately they were never to edit them. A paraphrase by Nicholas Biddle, a friend of Jefferson, appeared in 1814 and has run through many editions. Not until 1903 were these price¬ less papers published in their complete form, presenting the first authentic record of this ex¬ traordinary expedition.

LEWIS OVERTHRUST, a large over¬ thrust fault (q.v.) in the front ranges of the Rocky Mountains along the Canadian boundary. The break in the rocks is nearly horizontal, and old rocks of pre-Cambrian (q.v.) Age have been thrust horizontally out over younger rocks of Cretaceous Age for a distance of over five miles. The fault is well exposed in Glacier National park and vicinity, particularly on Chief Mountain, from which it is sometimes called the Chief Mountain Overthrust.

LEWISBURG, lu'is-berg, Pa., borough, county-seat of Union County, on the Susque¬ hanna River and on the Philadelphia and Read¬ ing and the Pennsylvania railroads, about 50 miles north of Harrisburg. It is on the border of the great anthracite coal fields and in a fertile agricultural valley. Its chief manufac¬ tures are flour, lumber, furniture, shirts, woolen goods, machirre-shop products and acetylene gas. Its trade is chiefly in its manufactured products and in grain and vegetables. It is the seat of Bucknell University, opened in 1846 under the auspices of the Baptists. Pop. (1920) 3,204.

LEWISBURG, Battle of. On 21 May

1862 General Heth, with a Confederate force of three regiments of infantry, a battalion of dismounted men, a regiment of cavalry and three batteries, aggregating about 2,200 men, marched from Salt Sulphur Springs, Va., on Lewisburg, 24 miles distant, to surprise Col. George Crook who was encamped at that place with about 1,500

men. Heth marched through Union, crossed Greenbrier River, driving in Crook's pickets, and at 5 a.m. of the 23d formed line on a hill east of the town, Crook's camp being on the west side. Crook threw out a well-supported skirmish line, which soon en¬ gaged Heth's advance; Heth at first had some success, but was gradually forced back; Crook charged his main line ; a panic seized Heth's troops and they fled from the field in disorder, retreating across the Greenbrier and burning the bridge behind them. Heth left on the field 38 dead and 66 wounded, 4 guns and over 200 stand of small arms. Over 100 of his un¬ wounded men were captured. Crook's loss was 13 killed, 53 wounded and 7 missing. Consult (Official Records5 (Vol. XII) ; The Century Company's (Battles and Leaders of the Civil War5 (Vol. II).

LEWISHAM, England, a metropolitan and parliamentary borough of London, four miles southeast of Saint Paul's. Area, 7,014 acres. It is a favorite residential district and contains the great open common of Blackheath, which is replete with historical interest. There are large nurseries in the borough. The Horninian Mu¬ seum is located on Forest Hill, and Morden's College, a 1 7th century foundation, on the south of Blackheath. The borough returns one member to Parliament. Pop. 160,834. Consult

*Hasted, (History of Kent and the Hundred of Blackheath.**

LEWISOHN, Adolph, American philan¬ thropist: b. Hamburg, Germany, 27 May 1849. Coming to New York in 1865, where his elder brother, Leonard, merchant and philanthropist (b. Hamburg, 10 Oct. 1847; d. London, 5 March 1902), had preceded him a few years, the firm of Lewisohn Brothers was formed in 1866. In 1868 they specialized in metals, particularly copper, in which line they became leaders in the markets of the world. After his brother's death, Adolph Lewisohn headed prominent organizations in finance and metal industry and rapidly became identified with vital movements in philanthropy and social betterments, his character and services being recognized by his appointment on important national and local commissions. He gave $300,000 for the School of Mines building at Columbia University; also a German library and a stadium to the College of the City of New York; as president of the Hebrew Sheltering Guardian Society Las been lavish in his gifts, and is a generous donor to all worthy causes.

LEWISTON, Me., the second city in size in the State, 35 miles north of Portland, on the east bank of the Androscoggin River, and on the line of the Maine Central and Grand Trunk railways; incorporated a town 18 Feb. 1795, with a population of 600; incorporated as a city 15 March 1861, with a population of 7,500, and organized 16 March 1863. This city is located in the heart of the Androscoggin Val¬ ley, a fertile and prosperous agricultural dis¬ trict. The city of Auburn, with a population of about 15,000, is located immediately opposite on the westerly bank of the river and the four cities are connected by four beautiful and com¬ modious iron bridges, making them practically one community with a combined population of 41,311. The railroad connections and facilities are of the best. Three great lines of steam railways converge here, — the Maine Central, Grand Trunk and the Portland and Rumford Falls. The Maine Central runs west of Port¬ land and the seaboard, there connecting by water routes with Boston, New York and all Southern ports, and by rail over the Boston and Maine with Boston, New York and all points south and west, and running east to Bangor, Saint John and the Maritime Provinces. The same road has local branches extending to Franklin and Somerset counties on the north, Augusta, the capital of the State, and the Ken¬ nebec Valley on the east, and again connecting with the seaboard on the south at Bath and Rockland. The Grand Trunk also extends from here westerly to Portland and northerly to Montreal, thence to Chicago and the far West. The Portland and Rumford Falls runs north¬ erly through the beautiful Oxford region to Rumford Falls, thence into the heart of the celebrated Rangeley Lakes district, one of the finest fishing and game preserves in the coun¬ try. Lewiston is the electric railroad centre of the State of Maine. The Lewiston, Augusta and Waterville Street Railway, one of the lar¬ gest electric road systems in the State, radiates from this centre, extending southerly to the seacoast at Bath and easterly to Augusta and Waterville. The Portland-Lewiston Interurban Electric Railway runs from Lewiston to Port-

land and is generally recognized as one of the best equipped electric railroads in the country.

Manufactures. — Although located in a fer¬ tile agricultural district, Lewiston is distinctly a manufacturing city. The Androscoggin River here has a fall of 50 feet and furnishes one of the most extensive water powers in the coun¬ try. This power is utilized by means of an immense system of distributing dams and canals. The amount of power at the falls is 13,000 horse power. About two and one-half

miles up river an immense dam has been con¬ structed which adds 10,000 horse power, making in all 23,000 horse power available for use ; the latter 10,000 horse power is made available for use by electricity and is so distributed. The city's largest single industry is the manufacture of cotton cloth. Some of the largest manufactur¬ ing plants in the country are located here, and their various products are found in nearly all the markets of the world. Among them are the Bates Manufacturing Company, capital $1,200,- 000, operating 2,250 looms and 82,376 spindles ; the Hill Manufacturing Company, capital $750,000, operating 1,912 looms and 80,016 spindles; the Androscoggin Mills, capital $1,- 000,000, operating 80,000 spindles and 2,206 looms ; the Continental Mills, with 2,619 looms and 94,688 spindles ; the Avon Mill with 126 looms and 6,160 spindles; the Libby and Ding- ley Company, capital $300,000, with 18,000 spindles. Their products are ginghams, bed spreads, fine dress goods, seersuckers, fancy shirtings and colored cottons, sheetings, twills, jeans, grain bags, drills, momie cloths, fine and coarse yarns, quilts, linen and cotton towelings, scarfs and table covers. There are three woolen mills located here — the Columbia Mills, oper¬ ating 8 sets of machinery, 94 looms and a dye house; the Cowan Woolen Company, 8 sets of machinery, 46 looms and does it own dyeing; the Cumberland Mill, with 7 sets of machinery and 76 looms. The products of the woolen mills are blanket wrappers, cheviots, cassimeres, repellants and meltonettes. One of the largest and most noted bleacheries and dye works in the United States, the Lewiston Bleachery and Dye Works, is located here. . Its capital _ is $300,000; its business, bleaching and dyeing cotton cloth.

In addition to the textile manufacturing in¬ dustries there are other small industries, the products of which are machinery and mill sup¬ plies for cotton and woolen mills, engines, boilers, brick, lumber, carriages, clothing, foundry products and agricultural implements.

Banks. — There are two national banks, two savings banks and one trust and safe deposit company. The capital stock of the two na¬ tional banks and the trust company is $675,000, surplus $286,830.46. The deposits in the sav¬ ings banks and the trust .company are $4,805,805.

Government and Finances. — The govern¬ ment is vested by charter in a mayor, board of aldermen and common council. The mayor is elected by the entire vote of the city, while one alderman and three councilmen are elected from each of the seven wards into which the city is divided. All are elected annually on the first Monday of March and hold their offices for the term of one year. The administrative

offices are partly appointed by the mayor subject to confirmation by the board of aldermen and partly elected by the city council, the latter body

being composed of the board of aldermen and common councilmen. The schools are under the jurisdiction of a superintending school committee of 14 members, — two elected by the voters of each ward and holding their offices for the term of two years. The public water¬ works are under a board of water commis¬ sioners consisting of seven members, one elected annually in March by the city council under authority of a State law, and holding office for a term of six years. The mayor is ex officio a member of the board. The fire department is under the control of a board of commissioners consisting of five members, the mayor being a member ex officio. The board is created by a State law and one member is elected annually in March by the city council and holds office for a term of four years. The highways, bridges and sewers are under the control of a board of public works created bv State law and consisting of seven members, of which the mayor is a member ex officio. One member is elected by the city council annually in February and the term of office is six years. The city owns its own waterworks. The supply is abundant, unusually pure and healthful and is taken from Lake Auburn, a beautiful and picturesque pond fed by springs and located in the city of Auburn, about four and one-half miles from Lewiston. This city was the first in the United States to own and operate its own street lighting plant. The undertaking has proved a great success and many other cities in the country have since adopted the plan. The total assessed valuation of real and personal property in 1915 was $18,907,701 ; rate of taxa¬ tion $19.20 on each $1,000 of valuation; total municipal bonded debt $990,500; floating debt

$221,396.

Churches and Charitable Institutions. —

There are 12 churches in the city, some of which are imposing edifices. Four are Roman Catholic, one Episcopal, one Baptist, one Friends, one Congregational, two Free Baptist, two Methodist and one Universalist. There is also a Jewish synagogue. Two of the Catho¬ lic churches, Saint Joseph's and Saint Patrick's, are supported principally by Irish- American Catholics, while the third,

Saint Peter's, is com¬ posed in membership of French-Canadian citi¬ zens who number about 13,000 people in this city. In connection with the Catholic churches are maintained four large Catholic parochial schools, with a total membership of 2,239 scholars. These schools are under the superin¬ tendence of the parish priests and are taught by the Sisters of Charity. Of the charitable institutions the more notable are the Sisters' Orphanage, the Healy Asylum, the Young Women's Home, the Home for Aged Women. There are two hospitals in the city, — the Central Maine < General Hospital and the hos¬ pital of the Sisters of Charity. Both receive substantial aid from the State. The Central Maine General Hospital is located in the heart of the city at the corner of Main and Ham¬ mond streets. The hospital of the Sisters of Charity is. on Sabattus street, just at the edge of the thickly, settled part of the city. Both hospitals are in elegant locations, and occupy imposing brick . structures, commodious, well lighted and. ventilated, with all modern appoint¬ ments and improvements and high grade medi¬

cal staff. The Sisters' hospital is in charge of the Sisters of Charity, but is absolutely non¬ sectarian, its doors being open to all alike.

Education. — The public school system of the city is of the best and a source of pride to its citizens. The city gives an absolutely free education to its pupils from the kindergarten to the completion of the high school course. Its school buildings are numerous, conveniently located, with all the usual modern appoint¬ ments, some of the more recently constructed being among the best in the State. A new high school building was recently erected at a cost of $75,000. The total value of the school property owned by the city is over $300,000. The corps of teachers is selected with great care and a high standard of efficiency is re¬ quired by the superintending school board. The results are highly satisfactory. In addi¬ tion to the public schools are the Catholic parochial schools, where a high standard of thoroughness in instruction is maintained. Bates College is also located here. It is a co¬ educational institution and was the first col¬ lege in New England to open its doors to women. The college is in a flourishing condi¬ tion. It has 15 excellent buildings, a faculty of 19 full professors, one assistant professor, five graduate instructors, two directors of phy¬ sical training and a dean for the women of the college with the standing of. a professor and a student body of 472.

Miscellaneous. — The city has five excellent hotels, commodious, comfortable and well ap¬ pointed; four fine theatres, a splendid public library, a beautiful city hall, a new United States post office building and a handsome pub¬ lic park, two live and ably conducted

daily newspapers and one weekly, a progressive board of trade, and a population of thrifty, industrious, law-abiding and order-loving peo¬ ple. Pop. (1920) 31,791.

D. J. McGillicuddy.

LEWISTON, N. Y., village, in Niagara County, on the Niagara River, and on the New York Central and Hudson River Railroad, seven miles north of Niagara Falls, and about 25 miles north of Buffalo. It has communica¬ tion by steamer with a large number of lake ports, and is the terminus of a line connecting with Toronto. The famous Gorge Route from Niagara Falls, traversed by an electric trolley line, connects at Lewiston by a suspension bridge with Queenstown. Canada, and other points of interest in the vicinity are the Devil's Hole and Bloody Run, Rumsay park, and the Tuscarora Indian Reservation. The place where Lewiston now stands was the site of an Indian village. In 1720 the French took pos¬ session of the place, and built a blockhouse, but abandoned it in a few years, when it was again occupied by the Indians. Joseph Brant's home was in this vicinity. On 14 Sept. 1763 occurred the Indian massacre at Bloody Run, a place near Lewiston. The first white settlement was made about 1800, and in 1818 the town was incorporated, and in 1843 the village. On 19 Dec. 1813, Lewiston was one of the towns burned by the English and Indians, in retalia¬ tion for the burning of Newark (now Niagara), Canada West, by the Irish-Ameri- can General McClure; numbers of innocent per¬ sons perished on both sides. The place is now

a favorite summer resort. There is a public library. Pop. about 713. Consult Pool, land¬ marks of Niagara County> (Syracuse 1897).

LEWISTOWN, Ill., city, county-seat of Ful¬ ton County, on the Chicago, Burlington and Quincy and the Fulton County Narrow Gauge railroads, about 50 miles southwest of Peoria, and 60 miles north-northwest of Springfield, the State capital. It is situated in an agricultural region and is the trade centre of a large part of the county. Its chief manufactures are car¬ riages and wagons, flour, lumber, brick, tile, furniture, bee traps, cigars, concrete blocks and dairy products. Livestock and farm products are shipped from

Lewistown to the large markets. It contains a Carnegie library and owns the waterworks. Pop. (1920) 2,279.

LEWISTOWN, Mont., city and county- seat of Fergus County, 120 miles southeast of Great Falls, on the Chicago, Milwaukee and Saint Paul and the Great Northern railroads, and on Spring Creek. It is a manufacturing, mining, farming and stock-raising centre. It has flour mills, brick yards and creameries, a Carnegie library, Catholic hospital, four banks, city hall, courthouse, seven schools and a high school. Gold and coal are the prin¬ cipal objects of the mining interests. The waterworks are owned by the municipality. Because of its central location in the Great Judith Basin it is an important trade centre. The assessed valuation of its property is $3- 283,000, while the estimated real valuation is $15,000,000. Pop. (1920) 9,000.

LEWISTOWN, Pa., borough, county-seat of Mifflin County, on the Juniata River, and on the Pennsylvania Railroad and on the Pennsyl¬ vania Canal, about 60 miles northwest of Har¬ risburg, the State capital. There is a hos¬ pital and a public library. It is situated in a fertile agricultural region in which are valu¬ able mineral deposits, especially of iron and glass sand. Lewiston is a trade centre for an extensive farming section ; but it is also a manufacturing borough. The chief manufac¬ tures are steel, iron, flour, leather, lumber, foundry and machine-shop products, silk, edge- tools, hosiery, hydrants and pumps. Lewis¬ town and vicinity are now favorite summer resorts. Pop. 9,849.

LEXICOGRAPHY. See Dictionary.

LEXINGTON, Ky., city and county-seat of Fayette County, metropolis of the famous Blue Grass section, is on the Southern, the Chesapeake and Ohio, the Queen and Crescent and the Louisville and Nashville railroads, with 42 passenger trains daily, and is connected with five Blue Grass county seats by interurban railways with hourly service; is located at intersection of four national highways — Dixie, Jackson, Boone Way and Midland Trail; about 82 miles south of Cincinnati, Ohio, and about 22 miles southeast of Frankfort, the capital of the State; has a shopping population of 500,000 people within a radius of 50 miles; is the largest wholesale distributing centre in central and eastern Kentucky; is the gateway to the rich mining section of Kentucky. The first settlement was claimed by a party of hunters, who, in 1775, camped at this place and named it Lexington in honor of the battle of Lexing¬

ton. They built a log cabin on the site so as to leave a proof of their

ownership. Four years later Robert Patterson, one of the hunt¬ ing party, made here a permanent settlement. Three years afterward the town was incorpo¬ rated by the legislature of Virginia, as this section was then a part of Virginia. In 1792, when Kentucky became independent of Vir¬ ginia, Lexington was made the capital of Ken¬ tucky, and the first Kentucky legislature met in this city. The city was granted a charter in 1832. Lexington is located in a fertile agri¬ cultural section ; has the largest loose leaf tobacco market in the world, which is one of its largest assets, the sales amounting to about $5,000,000 annually; is surrounded by the finest and most celebrated stock farms in the world ; has the fastest trotting track in the world; has more than $250,000 annual income from the training stables of the trotting and running tracks. Its chief manufactures are Bourbon whisky, harnesses, saddlery, flour, canned goods, lumber, carriages and wagons. Some of the important institutions are Uni¬ versity of Kentucky, Sayre College, Hamilton College, Saint Catherine's Academy, State Agri¬ cultural and Mechanical College, Kentucky Re¬ form School, Chandler Normal School (negro) ; 12 public schools. It has the Eastern State Hospital for the Insane, Saint Joseph's Hos¬ pital, Good Samaritan Hospital and Colored Industrial Home. It has an excellent public library. Henry Clay made this city his home from 1797 until his death. Pop. 41,500.

LEXINGTON, Mass., town, in Middlesex County, on the Boston and Maine Railroad, about 12 miles northwest of Boston. The town contains the villages of Lexington, East Lex¬ ington and North Lexington. Lexington was settled in 1642, was long known as ((Cambridge Farms,® and was incorporated as a town in 1713. It was the scene of the first conflict between the colonists and the British troops in the Revolutionary War, on 19 April 1775. Lex¬ ington is situated in an agricultural region, and its industries are connected chiefly with the products of the farms and the trade neces¬ sary for supplying local wants, but is chiefly a residential town. It contains many points of interest, some of which are the first battle¬ ground of the Revolutionary War ; the monu¬ ment commemorative of this battle; the Mon¬ roe Tavern, built in 1695, which was Earl Percy's headquarters; the old Belfry, here was hung the bell giving the alarm that the British were coming, and the Hancock-Clarke house (1698), where Samuel Adams and Hancock lodged the night before the battle. The last- mentioned building is now used as a museum for Revolutionary and early settlement relics. The town has recently acquired and added to the battlefield, or ˆCommon,® the Buckman tavern and three acres of land. This tavern was used as the Minutemen's headquarters 19 April 1775. A number

of monuments in honor of the men and events which made Lexington famous adorn the city, also the first normal school built in America. It contains the Cary Library with nearly 25,000 volumes ; a fine high school, the Hancock and Adams grammar schools, a town hall and a number of fine churches and elegant residences. The old bury¬ ing ground, visited annually by hundreds of

people, is mute witness of the noble people who have lived in this town. Pop. (1920) 6,340.

LEXINGTON, Mo., city, county-seat of Lafayette County, on the Missouri River, and on the Missouri Pacific and the Atchison, Topeka and Santa Fe railroads, about 63 miles southeast of Saint Joseph and 39 miles east of Kansas City. The first permanent settlement was in 1825, and it was incorporated in 1830. Lexington was the scene of a siege in 1861, when a Confederate force of 18,000 under Gen. Sterling Price attacked the city, which was defended by a Federal force of 3,000 men under Col. James Mulligan. The Federals sur¬ rendered on 20 Sept. 1861, but Price left the place a few days later, and put on guard a small force. On 16 October, a Federal force of 230 men under Maj. J. White entered the city, released the Union prisoners and took the Confederates captive. The city is in the midst of a fertile agricultural region, and is the largest single coal mining point in Mis¬ souri. Lexington is the seat of the Central College for Women, the Lexington College for Young Women and the Wentworth Military Academy. Pop. (1920) 4,695.

LEXINGTON, Va., town, county-seat of Rockbridge County, on the north fork of the James River, and on the Baltimore and Ohio and the Chesapeake and Ohio railroads, about 110 miles west by north from Richmond, and 44 miles northwest of Lynchburg. It is in a rich farming valley west of the Blue Ridge. Valuable deposits of sulphur ore are in the vicinity. The chief manufactures are dairy products, agricultural implements, flour and lumber. The city owns and operates the water¬ works. The water is brought some distance from springs in the mountains. Lexington is the seat of the Virginia Military Institute, opened in 1839, and the Washington and Lee University (q.v.). Generals Jackson and Lee are buried here, and statues have been erec¬ ted in their memory. The Jackson Memo¬ rial Hospital and Lee Memorial Church are also noteworthy. The mineral springs in the vicinity are becoming popular resorts ; the

Natural Bridge (q.v.), one of the natural curi¬ osities of America, is about 15 miles south, separated from Lexington by low mountains or hills. Pop. (1920) 2,870. '

LEXINGTON, Siege of. After the battle of Wilson's Creek (q.v.), Mo., 10 Aug. 1861, Gen. Sterling Price, abandoned by McCulloch and his troops, appealed to the secessionists of Missouri to fill his depleted ranks ; and about the middle of August he moved northward toward the Missouri River, skirmished with a force under Gen. J. H. Lane, 7 September, at Dry Wood Creek, drove Lane out of the State, and followed as far as Fort Scott, which had been abandoned. On the 10th he was at Rose Hill, from where he marched for War- rensburg, which was reached on the 11th, Pea¬ body's 13th Missouri at that place retreating to Lexington. When Fremont, at Saint Louis, heard of Price's northward movement, he or¬ dered to Lexington a force which, when Price arrived at Warrensburg, numbered 2,800 men, with seven 6-pounder guns, under command of Col. James Mulligan, 23d Illinois. Mulligan took position and threw up entrenchments on College Hill, a bluff 200 feet above low-water

mark, northeast of the city, overlooking it and the Missouri, and on which was a substantial brick building erected for a college. Imme¬ diately in front of the college was the first line of works, outside of which was a broad ditch, and beyond were <(confusion55 pits. On the morning of the 11th Price marched from Warrensburg toward Lexington, and that night, after a march of 30 miles, halted three miles from the city, where he rested, until dawn, when he drove in Mulligan's pickets, and from four different points opened a can¬ nonade upon the hastily constructed works around the college. After several sharp en¬ counters the Confederates captured some out¬ works and drove Mulligan's men behind the main line. At the end of the day Price with¬ drew to the fair ground, two miles away, to await reinforcements and ammunition. Mul¬ ligan, looking for reinforcements, strengthened his position and prepared for a siege. Price was anxious because he knew of the approach of Union troops to relieve Lexington ; but being reinforced to 25,000 men, and his ammunition coming up, he again moved on the city on the 18th, took possession, closed in unon Mulligan and began a siege. Rains' and Parsons' divi¬ sions occupied strong positions on the east, northeast and southwest of the works; Rives' division, supported by McBride's command and a part of Harris', moved along the river bank to a point immediately beneath Mulligan's works; fire was opened upon the Confederates from a dwelling on the bluff, 125 yards from the works; upon which the Confederates charged and took the house, and also the bluff immediately north of it. A gallant counter¬ charge by

Captain Gleason, with 80 men of the 23d Illinois, retook the house, but it was soon regained, and the adjoining heights fortified. Firing continued all day of the 19th ; water gave out, but Mulligan encouraged his men to hold on until help arrived. On the morning of the 20th Price caused to be taken to the river heights a number of hemp-bales, with which movable breastworks were constructed. These were rolled forward; under cover of them the Confederates moved to within 10 rods of the works; and at 2 p.m., after over two days' continuous fighting, Mulligan's men being without water or rations and short of ammuni¬ tion, a white flag was displayed, and Price ordered a cessation of firing. Mulligan had lost 42 killed and 108 wounded, and surren¬ dered 1,624 men, 7 guns, manv horses and a large amount of stores. Price reported a loss of 25 killed and 72 wounded. Price remained at Lexington until 30 September, when, pressed by the Union advance from Jefferson City, he abandoned the place and retreated toward Arkansas, leaving a guard of 500 men with the prisoners taken. On 16 October a squadron of cavalry under Maj. F. J. White surprised the party, captured 70 and released the prison¬ ers. Consult (Official Records5 (Vol. Ill) ; The Century Company's (Battles and Leaders of the Civil War5 (Vol. I).

E. A. Carman.

LEXINGTON AND CONCORD, Battles

of, in the American Revolution. Learning that the colonists had collected a quantity of mili¬ tary stores at Concord, Mass., Gen. Thomas Gage (q.v.), commander of the British troops

LEXOW

LEYDEN

341

at Boston, sent 800 troops under Lieut.-Col Francis Smith and Maj. John Pitcairn (q.v.) to seize these stores. The colonists were warned of the expedition by William Dawes and Paul Revere (q.v.) and on their arrival at Lexington early on the morning of 19 April 1775 the British found about /0 minute-men under Capt. John Parker assembled to dispute their progress. Pitcairn ordered the provin¬ cials to disperse and, on their refusal, fired into them, then ordering the troops to open fire. The colonists returned the fire and re¬ treated, leaving eight dead on the field. The British next proceeded to Concord, destroyed several pieces of cannon and some stores and

prepared to retire to Boston. A body of col¬ onists under Maj. John Buttrick offered re¬ sistance and firing was begun, resulting in a few casualties on both sides. The country having been aroused, armed men rushed to the scene so that the British were assailed from all sides.

Meanwhile, having been informed of the skirmish at Lexington and fearing disaster to his troops, Gage rushed 900 infantry under Lord Percy to Smith's aid. Being reinforced and provided with artillery the British were able to check the colonists, since the latter •could not approach close, owing to the can¬ non fire. Nevertheless they continued to fol¬ low and harass the British until they had reached a point too close to the city for their own safety and accordingly abandoned the pursuit. Shortly after sunset the British reached Bunker Hill in a state of utter ex¬ haustion. Though estimates of the colonists engaged vary from 250 to 20,000, probably not more than 400 or 500 were actually en¬ gaged at any one time. The British loss was 73 killed, 174 wounded and 26 prisoners; 49 Americans were killed, 39 were wounded and 5 were reported as missing. On hearing of the battles, thousands of colonists hastened toward Boston and soon that city was in a state of siege, culminating in the battle of Bunker Hill (q.v.), the regular investment of Boston, the occupation of Dorchester Heights (q.v.) and the subsequent evacuation of the city by the British. Consult Frothingham, Richard, (The Siege of Boston) ; Force, Peter, (American Archives- (4th series, Vol. II) ; Lossing, B. J., (Field-Book of the Revolu¬ tion (Vol. I, p. 523 et seq.) ; Fleath, William, (Memoirs) ; Thacher, James, (Military Jour¬ nal 5 ; Fisher, Sidney G., (Struggle for Amer¬ ican Independence) (Vol. I, pp. 300-308) ; Gage's Circumstantial Account* (in Mass. Hist. Coll., 2d series, Vol. II) ; accounts of the actions by Isaiah Thomas, Elias Phinney, Ezra Ripley and Lemuel Shattuck ; and biog¬ raphies of those engaged.*

LEXOW, lek 'sow, Clarence, American lawyer and politician : b. Brooklyn, N. Y., 16 Sept. 1852; d. 1910. He studied abroad and at the Columbia Law School, where he was grad¬ uated in 1872. He was admitted to the bar and established practice in New York city, receiv¬ ing a large German-American patronage and engaging in many important litigations. In 1882 he became a resident of Nyack and was active in the Republican party there. In 1890 he was an unsuccessful nominee for Congress, but lowered the usual Democratic majority. In

1893 he was elected to the State senate where he served till 1898. Here he at once became a leader, was chairman of the committee on

in¬ ternal affairs and introduced the bi-partisan po¬ lice bill calling for an investigation of the New York city police. This led to the appointment of the so-called <(Lexow Committee,)} of which he was head; the investigations of this commit¬ tee brought to light the system of protection of vice by the police in New York and were the direct cause of the reform campaign and the election of Mayor Strong. Lexow was also the introducer of the bill creating the city of Greater New York, was chairman of the joint legislative committee for the investigation of trusts and unlawful combinations, of the com¬ mittee on primary elections reform and of the judiciary committee. In 1896 he was chairman of the committee on resolutions at the Republi¬ can State convention and introduced the gold standard plank in the platform ; in 1900 he was a presidential elector. He is author of reports on (Municipal Government (5 vols., 1895) and on (Trusts and Unlawful Combinations>

(1895).

LEYDEN, li'den, or LEIDEN, Nether¬ lands, an important town in the province of South Holland, 22 miles by rail southwest of Amsterdam, on both sides of the Old Rhine, which flows through the town by several branches. The neighborhood is marked by wind-mills, country-seats, pleasure-grounds, gardens and fertile meadows, and street rail¬ roads connect with the bathing resort of Kat- wyk, five miles to the northwest on the North Sea. The streets are straight, broad and clean; Broad street (Breedc-straat) being esteemed one of the finest in Europe. In it is situated the town-hall (Stadhuis) , originally founded toward the end of the 16th century, a pictur¬ esque building, with 30 windows in a line in front, a tall spire and three highly-ornamented projecting gables. In the council-chamber are the painting of the (Last Judgment,* by Lucas van Leyden, and several good historical por¬ traits ; in part of the lower floor is situated the meat market. None of the churches are re¬ markable ; the Reformed church of Saint Peter contains monuments to Boerhaave, Span- heim, Scaliger, etc. The most important educa¬ tional institution is the university founded in 1575, formerly one of the most famed in Eu¬ rope, especially for law, and still in excellent repute. It is attended by 1,500 students. Con¬ nected with the university are a well-laid-out botanic garden, an observatory, a library of 400,000 volumes, with over 3,000 maps and nearly 7,000 MSS., many of priceless value, an anatomical theatre and museum of compara¬ tive anatomy, one of the richest collections of natural history in existence, cabinet of coins, museum of antiquities and a rich Japanese mu¬ seum. Leyden was noted for its cloth manu¬ factures, which after 1670 declined, but have revived in recent

years. There are also various other branches of manufacture and the former great trade in books, carried on in the latter part of the 17th and during the greater part of the 18th century and rendered world-renowned by the Elzevirs, is represented by several print¬ ing offices. There is an extensive trade in agri¬ cultural produce, especially cheese and butter. Pop. 59,207, The most memorable event in

the history of Leyden is the successful siege it maintained against the Spaniards in 1573-74 until relieved by the action of the Prince of Orange in breaking down the dikes. Leyden is the birthplace of John of Leyden, the founder of the Anabaptists; Camper, Muschen-broeck, the brothers Gerard and Isaac Vossius, Gronovius, Rembrandt, Luke of Leyden, the brothers Van der Velde, Gerard Douw, etc. It is of interest to Americans as the asylum from 1609 to 1620 of the persecuted English non¬ conformists, the Pilgrim Fathers, founders of the New England States.

LEYDEN JAR. See Electricity.

LEYS, Henri Jean Auguste, on-re zhon 6-gust lis, or la, Baron, Belgian painter : b. Antwerp, 18 Feb. 1815; d. there, 25 Aug. 1869. He worked from 1829 to 1832 in the studio of his brother-in-law, Ferdinand de Braekeleer, and in 1833 exhibited in Brussels (Fight Be¬ tween a French Grenadier and a Cossack. J He attracted still further attention by his picture (Fight of Burgundian and Flemish Soldiers. His style changed after his visit to Paris (1835) ; during which he confined himself to a study of the French Romantic school. Yet while the modern manner is discernible in his works, he shows himself also under the influence of Van Dyck and Rembrandt in such pictures as (Flemish Wedding) ; (A Painter's Studio* ; (A Family Party in Brittany) ; (Burgomaster Six at Rubens' Housed etc. In 1839 he still fur¬ ther modified his manner after traveling in Holland and familiarizing himself with the Dutch genre painters. It was certainly under their inspiration that he painted such pictures as (A Family Party* (1845) ; (Divine Services in Holland> (1850), etc. After completing his travels in Holland he still further changed his style and painted in the bizarre style of Quen¬ tin Matsys, whose naivete and uncouthness he also reproduced. In 1863 he received a com¬ mission to decorate with frescoes the town-hall of Antwerp, and this he fulfilled by producing a fine series of scenes from the history of the city. He was also an etcher, lithographer and wood engraver of*

acknowledged skill. A statue to his memory was placed on the Boule¬ vard Leys.

LEYTE, la'ta, Philippines, a province con¬ sisting of the island of Leyte and 40 dependent islands, discovered by Magellan in 1521 ; area of Leyte 3,872 square miles ; area dependent islands 342 square miles ; total 4,214 square miles. Leyte lies southeast of Luzon, south¬ west of Samar, from which it is separated by the narrow strait of San Juanico, and north¬ west of Mindanao ; it is roughly rectangular in outline; its extreme length from northwest to southeast is 121 miles. The two most import¬ ant dependent islands are Biliran, area 144 square miles ; and Panaon, area 76 square miles. They are both mountainous ; Biliran is noted for its sulnhur springs ; Panaon is well populated and has some gold deposits. The in¬ terior of the island of Leyte is mountainous (highest peak, Mount Sacripante, 3,930 feet), there being a number of extinct volcanoes and the island is crossed by a number of large riv¬ ers ; the coast line is irregular, indented by a number of bays, some of which afford excellent harbors, among the best in the Philippines.

*There are numerous roads on the east coast and the west coast is also paralleled by roads and trails for almost its entire length ; the riv¬ ers furnish good inland transportation. The climate is temperate and healthy; the province is one of the best cultivated in the archipelago; the most important product is hemp and many of the plantations being under cultivation for almost 50 years require little work, the crop being abundant and of excellent quality ; other products are rice for home use, cotton, choco¬ late, sugar, coffee and corn. The mineral prod¬ ucts include sulphur, gold, iron, lead and silver ; of these the most important is sulphur, which supplied the gunpowder works at Manila under Spanish rule. There are also valuable forests ; the yield of dammar, the brea or pitch of the Spaniards, is the most important in the Philip¬ pines. The largest industries are the manufac¬ ture of abaca and the cabonegro or black boat cables from the hemp and the extracting of cocoanut oil. There are also ship-building yards at Tacloban, the capital, at which good-sized schooners are often built, and weaving of fine fabrics by the women. Civil government was established in April 1901 ; the people have proved generally favorably inclined to the new regime although there were sporadic troubles in 1905 and 1906; there has been renewed ac- * tivity in every line of industry; and protection is now in the hands of a native police. The school attendances number over 44,000. Pop. 357,641, mostly Visayan.*

LHASA, lha'sa, or LASSA, las'sa, Tibet, the capital of the country

and the ˆRome® or "Mecca® of Buddhism, its name signifying the "Place of God,® is picturesquely situated in a valley plain surrounded by mountains rising from the K-chu, a left affluent of the Sanpo or Upper Brahmaputra, about 280 miles in a direct line northeast of Darjiling. Access being exclu¬ sively forbidden to Europeans, three only hav¬ ing visited it during the 19th century, the place had a mysterious celebrity, until the British ex¬ pedition under Col. G. J. Younghusband (q.v.) reached the city in 1904. The accounts since published corroborate the information previ¬ ously obtained from Asiatic pilgrims and ex¬ plorers. Broad roads lined by luxurious gar¬ dens lead past the well-built houses of the sub¬ urbs to the closely guarded gates of the walled city, which is dominated by the imposing Potala hill-palace and other hill-top edifices. The prin¬ cipal streets of the city are wide, regular and clean, lined with well-stocked stores and houses of two and three stories; but the side streets and lower parts of the town are very dirty and daily crowded by importunate beggars. The houses are generally two or three stories high, built of stone, brick or earth, terraced at the summit and uniformly whitened externally, the windows and door-frames being painted with the sacred or lamanesque colors, red and yel¬ low. Internally, however, they are exceedingly dirty and comfortless and have no chimneys. A yak stable occupies the ground floor. There is no heavy traffic on the streets, yak and horse being the only means of conveyance. In the heart of the city is the convent of Moru, with a large printing establishment, from which numerous religious works are issued; and on the outskirts, toward the cardinal points, are four other large monasteries — Praebung an

the west, Sera on the north, Khaldan on the east and Sarnie on the south or southeast side. All these have several thousand inmates being greatly resorted to from China, Turkestan, Nepal, etc., as schools of philosophy and Bud¬ dhism. About \l/2 miles, northwest from the city and connected with it by two avenues of trees is the Potala, Bottala or Buddha-la, the residence of the Dalai or Tale (Grand) Lama, the ecclesiastical sovereign of Tibet and su- pi erne pontiff of the vast regions forming cen¬ tral, eastern and southeastern Asia. A triple- peaked hill here rises abruptly out of the plain to the height of 367 feet; it is covered with convents and cells of monks and in the centre is the palace of the Dalai Lama, a fine edifice 1,000 feet long, four stories in height, with over 490 rooms and a large dome, wkich, like the columns of the peristyle

surrounding the structure, is covered with gilding. The inte¬ rior is full of idols, treasure and works of art. The chief public edifices are the Buddhist mon¬ asteries, some of them among the noblest speci¬ mens of architecture in Asia. The buildings were begun 1,200 years ago, the most recent parts being 200 years old. Seven miles to the west is the largest monastery of Tibet, the sum¬ mer residence of the Dalai Lama. About 7,500 monks inhabit it, and it has room enough to ac¬ commodate the largest of American universities. Lhasa is the principal emporium of Tibet and a rendezvous of people from all parts of Asia; silk stuffs, tea and other articles being here ex¬ changed for Tibetan, Indian and European goods. British troops under Colonel Young- husband occupied Lhasa in 1904, and after great difficulties concluded a treaty with the authorities in behalf of British interests. Pop. of city estimated at 10,000, exclusive of the great number of Buddhist lamas or priests and students in the monasteries (computed at 15,000). Associated with the Dalai Lama are two ambans, appointed every four years, who direct political administration, and the regent, who is the most learned lama in the country. Lhasa is the scene of a great annual religious gathering, attended by 80,000 lamas. The trade is entirely in the hands of women. As a great centre of pilgrimage, it is visited by great throngs from Tibet and Mongolia. (See Tibet). Consult Candler, (The Unveiling of Lhasa) (London 1905) ; Chaan (a member of the Chi¬ nese mission of 1906-07), (The Most Extraordi¬ nary City in the World) (in the National Geo¬ graphic Magazine for October 1912) ; Holdich, T. H., (Tibet the Mysterious) (New York 1906) ; Hac, (Travels in Tartary, Tibet, etcP (2 vols., London 1852) ; Landor, A. H. S., (The Opening of Tibet* (ib. 1905) ; Millington, (To Lhasa at Last) (ib. 1905) ; Waddell, L. A.,*

L'HOPITAL, Guillaume Frangois Antoine,

ge-yom frari-swa an-twTan lo-pe-tal, Marquis de Saint Mesme, French mathematician : b. Paris, 1661 ; d. 2 Feb. 1704. He devoted him¬ self exclusively to the study of mathematics, having received some instructions from Jean Bernouilli in differential and integral calculus, and at the age of 32 distinguished himself by solving problems proposed to the lovers of mathematics by Jacques Bernouilli; and 1693 was admitted an honorary member of the Acad¬

emy of Sciences at Paris. From that period he published, in the French and foreign journals, solutions of difficult questions, and other mathe¬ matical communications. Such was his reputa¬ tion that Huygens, profound as was his ac¬ quaintance with science,

applied to L'Hopital for information relative to the nature of the differential calculus. This led to the publica¬ tion of his (Analyse des Infiniment Petits) (1696), the first French work on the subject of which a new edition was published by Le- fevre (1781). Besides the work mentioned he was the author of (Les Sections Coniques, les Lieux Geometriques, la Construction des Equa- tiones (1707), and (Une Theorie des Courbes MecaniquesP*

L'HOPITAL, Michel de, me-shel de, French statesman: b. Aigueperse, Puy de Dome, France, about 1504; d. Chateau Bellebat, near Etampes, France, 15 March 1573. He studied law in Italy, and returning to France was pres¬ ident of the Court of Accounts in 1554, and chancellor of France in 1560. To his moderate policy were due the Edict of Romorantin, 1560, which prevented the introduction of the Inquisi¬ tion in France; the Edict of Pacifiction, 1562, authorizing the free exercise of Protestant wor¬ ship; and the Ordinance of Moulines, 1566, which aimed at reform in the administration of justice. Distinguished for his integrity and moral courage, L'Hopital stood far in advance of his time in his support of toleration and civil liberty. He gave up his office in 1568.

LI, le, a Chinese unit, the inV, th part of a liang or ounce, and the equivalent of "cash,® a copper coin of China, with a square hole in the middle, and an inscription on one side. The value of a li in American money is about one- eighth of one cent. Ii is also a Chinese measure of length, the equivalent of one-one hundredth of a day's walk, very slightly exceeding one- third of an English mile on the level; but in a hilly country the li is a distance requiring the same effort to cover on foot as the li on the level, and in such a case it might be as little as an eighth of a mile.

LI HUNG CHANG, le hoong chang, Chinese statesman and diplomatist : b. Lu-chow, province of Ngan-hwei, 16 Feb. 1823 (or per¬ haps 1819) ; d. Peking, 7 Nov. 1901. He re¬ ceived a thorough education, passing through the successive grades of scholarship, with the severe examinations which in China must be undergone before admission to the literary caste, ((ahead of 15,000 competitors.® In 1847 he received the third degree, and entered the Hanlin College in 1849. In 1850, when the Tai-ping rebels invaded Ngan-hwei, he joined Tseng Kuo Fan's army as secretary. He was appointed judge of Che-kiang province, and in 1861 governor of Kiang-su. In 1863, in conjunction with Col. (afterward Gen.) Charles George Gordon (q.v.), known as ((Chinese Gordon,® he retook Su-chow and drove the rebels entirely out of Kiang-su. Gordon's force, the <(Ever-victorious Army,® had previously been commanded by Frederick T.

Ward, an American soldier of fortune, and was largely composed of foreigners. From them Li Hung Chang derived much informa¬ tion concerning Europeans, and also acquired

increased military knowledge and ideas of Western political ethics.

For his services in suppressing the Tai-ping rebellion Li was made commander of the Im¬ perial forces, head of the navy, a hereditary noble and received the highest decorations in the gift of the emperor. In 1864 he was ap¬ pointed governor of the Kiang provinces. During the Nien-fei rebellion (1868) he was degraded for apathy in the face of the enemy, but was soon restored to favor. In 1872, after the massacres at Tien-tsin, followed by his stern measures of redress, he was appointed viceroy of Chi-li, the metropolitan province. During his long service in that office he resided at Tien-tsin, where he displayed his progressive designs by many improvements, among which were a great canal and the forming of the Chinese Merchants' Steam Navigation Company. Here for 24 years (1870-95) he exercised a power in reality second only to the emperor's, controlling the foreign policy of the empire, and introducing modern tendencies from West¬ ern civilization. He negotiated important treat¬ ies with Japan, Peru and other countries, in¬ creased the military strength of China in view of foreign encroachments, and may be said to have created the Chinese navy. He was impe¬ rial commissioner of trade for the northern ports; the emperor entrusted to him supreme charge of the military and naval forces sent to Korea in the Chino-Japanese War; and though several times disgraced, he bore nearly the whole burden of the war, marine and finan¬ cial departments of the Chinese government. During the war with Japan the disasters to the Chinese armies and navy were laid to his charge, and he was degraded and punished, but still retained his office of Prime Minister. He was sent to Japan in 1895 to negotiate the peace treaty, and barely escaped assassination. Having represented China at the coronation of Nicholas II of Russia in 1896> he made a tour of the world, and was everywhere re¬ ceived as a highly distinguished guest. On his return he was again at the head of foreign affairs, and governor exclusively of the Kiang and Chi-li provinces. After the suppression of the Boxer risings of 1900-01 he played a promi¬ nent part in adjusting the relations of China with foreign powers.

The official integrity of Li Hung Chang has not gone unchallenged,

although specific acts of corruption were never proved against him, but he amassed a huge fortune in the public service. Craftiness was conspicuous in his character and political acts ; but however his conduct may have been inspired at different times, there is no question in regard to the great services which, through his extraordinary abilities and opportunities, he rendered to China and to the world. His shrewdness and thrift were shown in the curious fact that while acting so great a part in China for so many years he also held control of all the pawnshops in the empire. If he were (

the arsenals he erected; the fortifications which he equipped with foreign guns; the modern firearms and military organization and instruc¬ tion which he introduced; his gunboats and ironclads of foreign construction; railroads built under his direction ; above all in the estab¬ lishment of schools for the introduction of modern improvements and appliances; in the founding and endowment of a hospital, etc. These things showed in him a spirit and a pur¬ pose new to the official world in China, and from whose initiative still greater results may be expected. Consult Douglas, R. K., (Li Hung Chang) (London 1895), and Mannix, W. F. ed., (Memoirs of Li Hung Chang (Boston 1913).*

LIA-FAIL, or STONE OF DESTINY,

a broad gray stone on which the kings of Scot¬ land were crowned in the Abbey Church of Scone. In 1296 Edw'ard I carried it to England and it still remains under the coronation chair in Westminster Abbey. Tradition says it is the stone which the patriarch Jacob used as a pillow.

LIABILITY INSURANCE. See Insur¬ ance, Casualty.

LIABILITY OF MUNICIPALITIES.

See Municipalities.

LIAKHOF ISLANDS. See New Siberia.

LIANAS, climbing and twining plants found in profusion in tropical climates, where they form thick, woody stems. In many instances they overtop the heads of the tallest trees, when they descend and interwine the entire forest by their cable-like shoots, frequently forming an impenetrable network or matting, which it is necessary to break through with the hatchet. The thickness of the stems of some of the species of lianas become so great that their constriction kills the tree to which they originally adhered, and when this has fallen the

magnificent confusion of leaves and flowers presents one of the most striking feat¬ ures of those forest scenes. Vanilla, sarsa¬ parilla and other medicinal plants are true lianas.

LIAS, in geology, a formation consisting of thick argillaceous and calcareous deposits, which constitute the base on which the Oolitic series reposes. It is generally regarded as the lowest division of the Jurassic system, and it rests on the Triassic system. The upper por¬ tion of these deposits, including about two- thirds of their total depth, consists of beds of blue marl, containing only a few irregular lime¬ stone beds. In the lower portion the limestone beds increase in frequency, and assume the peculiar aspect which characterizes the Lias, presenting a series of thin stony beds, separated by narrow argillaceous partings, so that the quarries of this rock at a distance assume a striped and ribbon-like appearance. The Lias is remarkable for the number and variety of its organic remains, among which are belem- nites, ammonites, gryphites and other shells, together with the remains of saurian or lizard- like animals, of which the ichthyosaurus and pleiosaurus are familiar examples. The Lias crosses England from near Whitby, in York¬ shire, to Lyme, in Dorsetshire. In the Cleve¬ land district the Lias contains workable beds of iron carbonate. See Geology.

LI HUNG CHANG

.

....

■

LIBANIUS, li-ba'm-us, Greek sophist and rhetorician : b. Antioch, 314 a.d. ; d. there, 395. He taught rhetoric at Constantinople, where his school drew such vast numbers of students that his rivals caused him to be expelled from the city as a sorcerer. He subsequently returned to Antioch, and there passed his latter days. He was highly esteemed by ihe emperors Julian, Valens and Theodosius. He was a pagan, but maintained friendly relations with many Chris¬ tians, including Saint Basil and Saint Chrysos¬ tom, who were his pupils. He was a volumi¬ nous author, and several of his works are ex¬ tant, but there is no complete edition of them. Consult Sievers, (Das Leben des Libanius) (1868) ; Walden, (The Universities of Ancient

Greece5 (1909).

LIBANUS, Mount. See Lebanon.

LIBATION. Among the ancients libation was properly a drink-offering; but was used also for other offerings to the gods, as a meal-cake, or something similar placed on the altar, and a part of which was burned. Libations were also made at domestic meals, some of the food being thrown into the fire on the hearth in honor of the Lares. A libation always ac¬ companied the sacrifice offered in concluding a treaty with a foreign nation. The libations to the dead were not performed till the ninth day after the burning or interment, and consisted of milk, wine or blood, and generally concluded the funeral solemnities.

LIBAU, le'bow, Latvia, an important sea¬ port in the government of Courland, on the Baltic, 14 miles by rail southwest of ' Riga, on a narrow strip of land between the sea and a small lagoon. It has rapidly increased in recent years and become an important centre of industry as well as of trade and is a favorite bathing resort. A great artificial ice-free harbor was built between 1893 and 1904, having 27 feet of water on the outer bar and it has also a naval harbor, and ship-building, especially of ocean-steamers, is carried on. An Orthodox Naval Cathedral was consecrated in 1903, and there is a school of navigation. It exports grain, linseed, flax, hemp, timber, rye and hides ; and imports colonial produce, manufactured goods, herring, etc. Known as Lvra Portas in 1263, Libau has at different times been in the hands of Livonian and Teutonic orders, Prussia and Sweden, and came into possession of Rus¬ sia in 1795. During the Great War, Libau was attacked by German naval forces on several occasions, and considerable damage was done. Pop. 90,400; 20 per cent of which are Jews.

LIBBEY, William, American scientist: b. Jersey City, N. J., 27 March 1855. He was graduated from Princeton in 1877 and from 1882 to 1883 was assistant professor of physical geography there. From 1883 to 1898 he was professor of histology, and since 1883 professor of physical geography and director of the mu¬ seum of geology and archseologv at Princeton. He is a Fellow of the geographical and geo¬ logical societies of London and Paris. He is author, with Dr. Franklin E. Hoskins, of Jor¬ dan Valley and Petra5 (1905).

LIBBY PRISON, a famous prison at Rich¬ mond, Va., during the Civil War. It was a large brick structure named for its owner, who

used the building as a ship chandlery and also

as a tobacco warehouse before the war. The Confederate government early secured it as a military prison for Federal soldiers, and many thousands were confined here. It was divided into large rooms or lofts about 100 by 45 feet, and was inadequate for the housing of 1,200 prisoners, which at times was the total. There were ventilation and bathing con¬ veniences of a sort, but no heating, and the food was often poor and inadequate. On 9 Feb. 1864 there was a large delivery of the prisoners, 109 escaping through a tunnel that they had laboriously dug with their hands and bits of board. Col. Thomas E. Rose led the refugees and 59 of them ultimately reached the Federal lines, 48 being recaptured and two drowned. There were other escapes at times. The unsanitary conditions resulted in a very heavy mortality, and many of the poor sufferers welcomed death. In 1889, the building was torn down and removed, brick by brick, to Chicago, and set up there as a museum, but the enter¬ prise proved a failure.

LIBEL, (1) a defamation of a person, with malice expressed or implied, made public by means of writing, printing or pictures, calcu¬ lated to provoke him to anger, or expose him to hatred, ridicule or contempt. Spoken words, however opprobrious or injurious, do not amount to libel but are classed as slander; and, being more limited in their publicity, the of¬ fense is not so great as in a case of libel. There may be a libel by traducing the memory of one who is dead, as well as one which at¬ tacks the reputation of one who is living. Any publication which has a tendency to disturb the public peace or good order of society is actionable as a libel, and may usually be prose¬ cuted by either a civil action for damages or by a criminal proceeding, and both remedies are often pursued at the same time. In the absence of some statutory provision on the sub¬ ject, proof of the truth of the matter contained in the libel does not ordinarily furnish a good defense to the offending party. The publication may be very limited and yet amount to the offense. The malicious reading of a libel to one or more persons has been held sufficient and the sale of each copy of a book containing a libel has been pronounced by a court as suf¬ ficient to furnish a distinct offense. Libels against the government consist of calumnious publications in denunciation or unwarrantable criticism of the established governmental sys¬ tem or in censure of methods of administration, provided the allegations are of such a nature that their natural tendency or evident purpose is to promote disaffection among the citizens or to excite a spirit of revolution. But indict¬ ments for li'bels of this character are very rare, and would not be

resorted to except in extreme and very plain cases. Many of the States have enacted statutes upon the subject of libels, declaratory of the old common-law rules, with ancillary provisions, relating principally to forms of administration, with provisions as to punishment. A libel may be a misdemeanor only, or a felony, according to the character of the offense.

(2) Libel in admiralty practice denotes the complaint or pleadings by which an action is commenced, to enforce some claim or right in a marine matter, and contains a circumstantial

statement of the claim. The general scope of the jurisdiction of admiralty embraces all ma¬ rine contracts and maritime torts, including cap¬ tures in times of war, and seizures for revenue forfeitures, and all duties appertaining to ma¬ rine commerce and general navigation. The test of jurisdiction in torts is determined by the place where the same were committed. Such a libel is not required to be drawn with any degree of technicality, the substance being more important than the form. In the United States substantially all admiralty matters are trans¬ acted in the Federal courts. The plaintiff, or moving party in an admiralty proceeding, is called the libellant, and the defendant, or party against whom the proceeding is brought, is termed the libelee or respondent. Sometimes a libel is directed in rem or against property only, without naming a respondent. Consult Bigelow, (The Law of Torts) (7th ed., Boston 1901) ; Newell, (The Law of Libel and Slander in Civil and Criminal Cases) (2d ed., Chicago 1898) ; Odgers, (A Digest of the Law of Libel and Slander 5 (4th ed., New York 1905) ; Pol¬ lock, (The Law of Torts) (7th ed., New York 1904) ; Townshend, (Treatise on the Wrongs Called Slander and LibeP (4th ed., New York

1890).

LIBERAL PARTY, in politics, the party which claims to be distinctively that of reform and progress with a view to increased political power of the people, and to extending privileges to the masses. Most European countries have a Liberal party, but in several of them, such as Germany, Belgium and France, liberalism has lost heavily owing to the rapid spread of Social¬ ist doctrines, which involve economic and in¬ dustrial rather than political reform. In Great Britain, Liberal and Conservative ministries follow each other

at irregular intervals, and on the whole the system has worked well. The greatest of modern Liberal leaders was Glad¬ stone, but his introduction, in 1886, of the Irish Home Rule and Land Purchase bills alienated many of his supporters, and led to the forma¬ tion of the Liberal Unionist party. On the question of the war policy in South Africa in 1899-1901 the Liberal opposition was split into several groups, such as the Liberal Imperial¬ ists, who supported the government ; the so- called ((pro-Boer55 Liberals, who opposed the war throughout ; and those who tried to com¬ bine both policies.

LIBERAL REPUBLICAN PARTY, in

American politics, a party organized in 1872 by Republicans, who were dissatisfied with Gen¬ eral Grant's first administration as President. At a convention held by them in Cincinnati, in that year, Carl Schurz was elected its president, and a platform adopted demanding civil service reform, local self-government and universal amnesty, recognizing the equality of all men, recommending the resumption of specie pay¬ ment, etc. Horace Greeley and B. Gratz Brown were named for President and Vice-President. This platform and these nominations were adopted by the regular Democratic convention of that year, but dissensions arose, and other candidates were nominated, the result being that the Republican nominee, General Grant, was elected by an overwhelming majority and the Liberal Republican party was thereafter practically dead. The real strength of the

party lay in its presidential candidate, Horace Greeley, who had a large following, particularly of the farming element throughout the coun¬ try, which was secured through the large and widespread circulation of the New York Weekly Tribune, of which Greeley was the editor. Among those connected with the party were Charles Francis Adams. Lyman Trum¬ bull, David Davis, Horace White and David A. Wells. Consult Fess, S. D., (History of Political Theory and Party Organization in the United States5 (Boston 1910) ; Hart, A. B., (Cyclopedia of American Government5 (New York 1914) ; Woodburn, J. A., (Political Parties in the United States5 (ib. 1903) ; Dun¬ ning, W. A., (Reconstruction5 (ib. 1907) ;

Rhodes, J. F., (History of the United States5

(1906).

LIBERAL UNIONIST PARTY, in Brit¬ ish politics, a party formed in 1886 by the Lib¬ erals under the leadership of the Marquis of

Hartington who objected to Gladstone's Irish Government and Land Purchase bills, as being dangerous to the empire. They gained their immediate object by coalescing with the Con¬ servatives, and in the election which followed the defeat of the Gladstonian ministry they suc¬ ceeded in returning some 80 members to Par¬ liament. They have since acted with the Con¬ servatives.

LIBERATOR, The. See Garrison, Wil¬ liam1 Lloyd.

LIBERIA, a republic on the west coast of Africa ; the only part of the continent remain¬ ing in Negro hands and under Negro control. Situated in what was formerly known as Up¬ per Guinea, it extends for some 350 miles along the coast, from Mano River on the west to the Cavalla River on the east. It is between long. 7° 33′ and 11° 32′ W. and lat. 4° 22′ and 8° 50′ N. Its area is approximately 43,000 square miles, a little more than that of the State of Ohio. It is bounded on the west by the Brit¬ ish colony of Sierra Leone and on the north and east by French possessions. The coast is low, through most of its length a narrow sandy beach, interrupted at only three points by ele¬ vations. Five-sixths of the area of Liberia is covered with dense tropical forest ; there are mountains in the interior of the east half ; the Mandingo Plateau in the northwest is grass¬ land. There are no good harbors. There are more than 30 rivers, most of which have no navigation value ; the Saint Paul with the Me- surado is navigable to White Plains, a distance of 20 miles, and the Cavalla is practicable for boats of some size for about 80 miles. The cli¬ mate of Liberia is tropical with a short dry season from December to February, inclusive, and a cooler wet season ; on the Mandingo Plateau the dry season extends from November to May. Liberia was acquired by the American Colonization Society, founded in 1817, for the purpose of colonizing free blacks from the Uni¬ ted States. The first company of colonists was sent out in February 1820 on the Elisabeth. During the next 25 years 4,500 more colo¬ nists were sent over by the society and auxili¬ ary organizations. The government of the Uni¬ ted States was favorable to the enterprise and at times gave active assistance. While the colo¬ nists suffered severely from the climate and at times had difficulty with the natives, they made

a number of settlements on the 'coast and on the lower reaches of some of the rivers. The name Liberia was officially adopted in 1824 and at the same time the name of the chief settle¬ ment was changed

to Monrovia. The names were suggested by Colonel Harper of Mary¬ land who was prominent in the work of the so¬ ciety. Liberia referred to the free status of the colonists, Monrovia honored the then Presi¬ dent of the United States, James Monroe. At first under an agent, later under a governor ap¬ pointed by the society, the settlers developed a practical governmental organization and, in 1838, adopted the official title ((Commonwealth of Liberia.® To secure the funds for adminis¬ tration, duties and port-dues were instituted. These led to trouble with the British govern¬ ment which could not recognize sovereign pow¬ ers in (

ing out her financial affairs and in strengthen¬ ing her internal condition. In connection with these adjustments, the customs service of the republic is temporarily administered by an in¬ ternational commission with an American at its head. With firm backing from the United States, Liberia might not only prosper, she might become the leader of Africa. During the embroglio of the World War (1914-18) Liberia severed diplomatic relations with Germany on 8 May 1917 and formally declared war on 4 August. On 10 April 1918 a German submarine bombarded Monrovia, the capital of Liberia, destroyed the wireless telegraph station and sank the Liberian armed vessel President Grant. Ten persons were killed. The submarine was later sunk by a British cruiser. Liberia's con¬ tribution to the war consisted mainly in send¬ ing some hundreds of laborers to France. In November 1918 it was announced that the ne¬ gro republic desired a voice in the peace con¬ ference and that the principle of self-determi¬ nation should be applied to the natives of Afri¬ can colonies, not only those taken from Ger¬ many, but also former parts of Liberia which had been absorbed by France and Great Bri¬ tain.

Frederick Starr, University of Chicago.

LIBERIUS, Pope: b. Rome; d. there, 24 Sept. 366. He was Pope from 352 to 366; is one of the pontiffs that have incurred the ac¬ cusation of heresy. It is conceded that he suf¬ fered an exile of two years by order of the Emperor Constantius II for refusing to sub¬ scribe to a condemnation, by the Council of Arles (354), of the great champion of the Niceno-Constantinopolitan creed of the homo- ousian, Saint Athanasius. But it is alleged that he obtained his recall by subscribing to a heret¬ ical, formally Arian confession of faith drawn up by an assembly of bishops at Sirmium. Con¬ stantius II died in 361 and Liberius was then more free and annulled the decrees of the Council of Rimini, but was not severe upon the bishops who had signed them. He renewed relations with Athanasius and

Hilarius, re¬ ceived deputies from the Eastern Episcopate and gave the communion to many of the Arians.

LIBERTAD, le-ber-tad', Peru, a maritime department bordering on the Pacific Ocean, with the departments of Lambayeque,. Caja-marca and Amazonas on the north, Loreto on the east and Ancachs on the south. It is moun¬ tainous, with a narrow strip of level land along the coast. The Maranon, the head stream of the Amazon, waters its eastern slopes. Many of the eastern valleys are very fertile. Agri¬ culture and stock-raising are carried on. Min¬ ing is in a backward state, although consid¬ erable mineral deposits are said to exist in the mountains. Area, 10,206 square miles; pop. about 250,000. Capital, Trujillo.

LIBERTAS, the goddess of freedom. By the Greeks she was invoked by the synonymous title Eleutheria. At Rome, her most famous temple was situated on the Aventine Mount. She was represented by the figure of a woman holding in one hand a cap, the symbol of lib¬ erty, and two poniards in the other.

LIBERTINES, a name that has been given to various liberal organizations: (1) a sect of

fanatics in the 16th century in the Netherlands and Belgium, who maintained that nothing is sinful but to those who think it sinful and that perfect innocence is to live without doubt. They advocated community of goods and gave themselves the name of ˆSpirituals® ; (2) a fac¬ tion of the Hellenistic Jews who attacked Stephen, as told in Acts vi, 9; (3) the Liberal party in Geneva that opposed Calvin; (4) the early Anabaptists. The use of the term did not often imply loose morals and many think the Libertine Jews of the time of Christ were more properly called Libystines or Libyans, after Libya in Africa.

LIBERTY, Mo., city, county-seat of Clay County, on the Chicago, Rock Island and Pa¬ cific, the Chicago, Burlington and Quincy and other railroads, about 15 miles, by rail, north¬ east of Kansas City. It is situated in an agri¬ cultural region and its chief manufactures are flour, dairy products and vacuum cleaners. Its trade is principally in grain, vegetables, fruit and live-stock. It is the seat of the William Jewell College, opened in 1849 under the aus¬ pices of

the Baptists, and of the Liberty Ladies' College opened in 1899 and contains a Carnegie library and an Odd Fellows' Home. The water¬ works are the property of the municipality. Pop. (1920) 3,097.

LIBERTY, EQUALITY, FRATER¬ NITY, a well-known motto of the French Re¬ public, dating from the time of the first revo¬ lution. Equality, in this connection, means equality before the law and the absence of class privileges. The motto gives title to a work by Sir J. F. Stephens (1873).

LIBERTY, Religious. Religious liberty is the right or freedom of a person to wor¬ ship or not to worship according to his own understanding and preferences, and, within the requirements of public order, of teaching his religious beliefs without hindrance or molesta¬ tion ; the complete equality of all religions be¬ fore the law.

The question of religious liberty seems never to have arisen in pre-Christian times. The story of Paul's visit to Athens and the noted Pantheon at Rome seem to reveal a tolerant attitude of the ancient peoples toward all religions. All persons within the state might, as a matter of political necessity, be re¬ quired to pay formal homage to the god of the state, but they were also wholly free to wor¬ ship their own particular gods. This ancient toleration carried, however, the seeds of its own destruction within itself. For while it was allowed to people to worship what gods they pleased, it was rigidly required of them, re¬ gardless of what their personal faiths might be, to take part in the state religion. Naturally to persons wTho believed that there was and could be but one God, one religion, one worship, and that to take part in any other worship was ex¬ ceedingly sinful, such a demand would become intolerable. While appearing to be tolerant it actually forced a person to go against his own conscience and to do what he believed to be hateful to God. When religion became more a personal than a state affair there grew up a bitter resentment against any sort of power that sought to compel a person to go against his conscience and against his God. The truth¬ fulness or actual value of a person's religion

is no part of ,the question. It is enough that there has sprung up from the deepest depths of the human heart and mind an unalterable and unconquerable opposition to any authority that seeks to force a man to worship in a way alien to his faith.

The problem is much less simple than this seems to imply. It is hardly more than a century ago that it was finally conceded by the

governing power that religion is not a state but a purely personal affair. Even at the present time this is not conceded in all countries. From time immemorial the state has had its religion as by law established, the idea being that the safety and welfare of the state depended upon the proper performance of the state religion. To protest and refuse to perform these re¬ ligious rites was to become a disorderly and possibly a revolutionary element within the state. Thus the issue was joined, those in control of the government insisting that the public order and safety required all to wor¬ ship according to the established religion and in no other way and in opposition to these an increasing number demanding as a matter of divine right the freedom to worship according to the dictates of their own conscience. Some¬ thing more than that is involved — and this is the most serious part of the trouble; the right of a person not only to worship but to teach, propagate the doctrine he believes true, so that others may be led to worship in his way. This, under the old system of state re¬ ligion, plainly amounted to nothing less than the right to form a party within the state at variance with the state religion and the state government. To the political necessity which forced the governing powers to suppress re¬ ligions other than that by law established, add the intense feeling each person had that his religion was the only true religion and the bitterness of the struggle between those de¬ manding and those opposed to religious liberty is easily understood. That the political rulers dreaded the revolutionary possibilities of re¬ ligious dissent ; and the ecclesiastical author¬ ities feared that the freedom to teach heretical doctrines would lead the souls of men to per¬ dition, and on these grounds honestly sought to prevent such dissent and heresy by measures more or less severe, will not be doubted. But eventually the more clear-visioned statesmen saw that the evils resulting from this policy of religious suppression and oppression were a greater menace to political stability and to religion itself than any which could come from a reasonable religious freedom.

The first attempt to grant and try out re¬ ligious freedom must be credited to Con¬ stantine in the Edict of Milan, 313 a.d. This edict granted <(both to the Christians and to all others free power of following whatever religion each may have preferred . . . The

absolute power is to be denied to no one to give himself either to the worship of the Christians, or to that religion which he thinks most suited to himself.® This exceedingly liberal decree did not inspire his successors. Not until we come to the American State con¬ stitutions is so broad a statute met with. Be¬ tween 313 a.d. and approximately 1775, re¬ ligious freedom, with but one or two

excep¬ tions, was never conceded. Acts of toleration more or less generous, usually less, were

occasionally granted with the hope of effect¬ ing a compromise. The practice of persecuting persons for dissent and heresy gradually went out of fashion. More and more frequently the courts ruled that it was not the business of law to prohibit a person from exercising his religious faith so long as it did not, as Black- stone put it, ˆthreaten ruin or disturbance of the state.® In the recent (1918) trial of the followers of Pastor Russell the court made it plain that religious freedom never could be stretched to confer the right to commit crime.

Toleration was not the end sought. Tolera¬ tion is simply a favor granted. Toleration kept alive all sorts of political and other dis¬ abilities. In New England a person could not enjoy the franchise unless he were a member of a particular church in good and regular standing. In Europe similar disabilities were laid upon persons who refused to conform to the state's religion. Toleration was as odious as oppression. What was all along demanded was the right of absolute equality of all re¬ ligions before the law.

America led the way to this goal. It was the first and for a long time the only country to write the principle not of toleration but of religious freedom into the fundamental laws. What is perhaps the earliest attempt since the Edict of Milan to grant something like reli¬ gious freedom is found in the Maryland Tolera¬ tion Act of 1649. It reads ((Whereas the en¬ forcing of the conscience in matters of Re¬ ligion hath frequently fallen out to be of dangerous consequence in those common¬ wealths where it hath been practiced, and for the more quiet and peaceable government of this Province, and the better to preserve mu¬ tual Love and amity amongst the Inhabitants thereof ; Be it therefore . . . enacted . . . that no person or persons within this Province . professing to believe in Jesus Christ, shall henceforth be in any ways troubled, molested or discountenanced for, or in respect to, his or her religion, 'nor in the free exer¬ cise thereof . . . nor in any way compelled

to believe or exercise any other religion against his or her consent, so that they be not un¬ faithful to the lord proprietary, or molest or conspire against the civil government.® Just how much the liberal spirit toward religious differences which actuated the Plymouth

colo¬ nists contributed to the establishment of reli¬ gious freedom in America there is no way of telling. The contribution was undoubtedly large. More conspicuous if not more im¬ portant is the work in this direction of Roger Williams, founder of Rhode Island. To secure real religious liberty was the ambition of his life. His great desire was <(to hold forth a lively experiment, that a most flourishing civil state may stand and best be maintained with a full liberty of religious concernments.® The charter issued in 1663 reads ((No person within the said colony (Rhode Island), at any time hereafter, shall be in any wise molested, pun¬ ished, disqualified, or called in question for any difference of opinion in matters of re¬ ligion : every person may at all times freely and fully enjoy his own judgment and con¬ science in matters of religious .concernments.®

Although religious persecutions and dis¬ abilities continued far into the 18th century in many parts of America the principles of re¬

ligious liberty were gradually becoming clearer and more firmly established. When, therefore, during the Revolutionary period and soon there¬ after the various States made constitutions for themselves, liberty of religion was one of the things most explicitly provided for. The Con¬ stitutional Convention of Virginia, 1776, led the way in its adoption of the Bill of Rights. The amendment proposed by Madison and adopted puts the point clearly, ((No man or class of men, ought on account of religion to be invested with peculiar emoluments or privi¬ leges, nor subjected to any penalties or dis¬ abilities, unless under color of religion the preservation of equal liberty and the existence of the state are manifestly endangered.® Jefferson points out that the law of October 1785 entitled, ((An Act Establishing Religious Freedom® in Virginia was designed to "com¬ prehend within the mantle of its protection the Jew and the Gentile, the Christian and Ma¬ hometan, the Hindu and Infidel of every de¬ nomination.® The provisions of the act itself are so broad as to be virtually the last word in the matter. <(Be it enacted by the General Assembly, that no man shall be compelled to frequent or support any religious worship, place, or ministry whatever; nor shall be en¬ forced, restrained, molested, burthened in his body or goods, nor shall otherwise suffer on account of his religious opinions or belief ; but that all men shall be free to profess, and by argument to maintain, their opinion in matters of religion, and that the same shall in no wise diminish, enlarge, or affect their civil capacities.® Other States were moving in the same direction though not always with the same completeness. Some States hesitated to grant fullest liberty. Thus Pennsylvania, while conceding that ((all men have a natural and inalienable right to worship God, according

to the dictates of their own conscience,® required office holders (1776) to affirm belief in God, in future rewards and punishment and the divine inspiration of the Old and New Testaments. This test was abolished by the constitution of 1790, but the case of Updegraph v. the Commonwealth in 1824 disclosed the curious fact that it is still unlawful in Pennsylvania (

A limitation of religious freedom not con¬ templated in the statute or in judicial decisions

came to light in the Crapsey heresy trial of 1906. Against the defendant's claim of the right of freedom to teach what he conceived to be the truth in religious doctrine it was argued by the prosecution that as a regularly ordained priest of the Episcopal Church and by the terms of his ordination he was free only to teach what the Church set forth as true, and this argument was sustained by the ecclesiastical court that tried the case. It is doubtful whether that decision can be con¬ strued as a contradiction of the principles of religious liberty for which men fought so long. But "gradually,® as Herbert Spencer remarks, ((during recent centuries, the right of free speech on religious matters, more and more asserted has been more and more admitted ; until now there is no restraint on the public utterance of any religious opinion, unless the utterance is gratuitously insulting in manner or form.®

*The literature of the subject is widely dis¬ tributed through various historical writings and the contemporary chronicles of different periods. A very sound and comprehensive survey of the subject will be found in Sanford H. Cobb's (Rise of Religious Liberty in America.**

Charles Graves.

LIBERTY, Statue of, the name of a co¬ lossal statue on Bedloe's Island in New York harbor. On 28 Oct. 1886, after more than 12 years of preparation, this statue, given by the people of France to the United States, was dedicated and unveiled. The statue was the conception of M. Frederic Bartholdi, who de¬ signed it for the Franco-American Union in 1874. It was built by popular subscriptions in France to commemorate the hundredth anni¬ versary of American independence, and re¬ quired over five years

for its completion. It was mounted in Paris in October 1881. The American pedestal for the statute was not commenced till April 1883, and was finally finished in 1886. This was built by popular subscription. The statue was erected on an iron framework bolted firmly to the stone ped¬ estal. It was dedicated 23 Oct. 1886. The statue, which is of bronze, is of the following dimensions :

Feet Inches

Water-level to top of pedestal . 149 10

Statue proper to top of torch. . . 151 5

Total height from water-level . 301 3

Heel to top of head . Ill 6

Length of hand . 16 5

Index-finger . 8 0

Circumference at second joint . 7 6

Size of finger-nail . 13 x 10 in.

Head of chin to cranium . 17 3

Head-thickness from ear to ear . 10 0

Distance between the eyes . 2 6

Length of nose . 4 6

Right arm, length. . . 42 0

Right arm, greatest thickness . 12 0

Thickness of waist . 35 0

Width of mouth . 3 0

Tablet, length . 23 7

Tablet, width . 13 7

Tablet, thickness . 2 0

The statue weighs 450,000 pounds or 225 tons ; the bronze alone

weighs 200,000 pounds. Forty persons can stand comfortably in the head, and the torch will hold 12 people. The num¬ ber of steps from the base of the foundation to the top of the torch is 403; from the ground to the top of the pedestal 195 steps. The num¬

ber of steps in the statue from the pedestal to the head is 154, and the ladder leading up through the extended right arm to the torch has 54 rounds. The cost of the statue is esti¬ mated at $250,000; the cost of the pedestal and the erection of the statue, $350,000; total cost of the work completed, $600,000. The light in the torch at the top of the Statue of Liberty is maintained by the lighthouse service of the government. On 2 Dec. 1916 arrangements were completed for the permanent lighting of the entire statue, the signal being given by President Wilson for the turning on of the lights. The funds for the permanent illumina¬ tion were collected by the New York World through popular subscription. Liberty exceeds in height the Colossus of Rhodes, which was said to have been about 105 feet high. That of Nero is said by Suetonius to have been 120 feet high. The statue of Charles Borromeo, which is still standing on the Lake of Geneva, is 66 feet high and is mounted on a pedestal measuring 46 feet. The celebrated statue of Jupiter carved by Phidias is said to have been 60 feet in height.

*LIBERTY BELL, the bell which for¬ merly hung in the dome of the old State House (Independence Hall), Philadelphia, and was rung to announce the signing of the Declara¬ tion of Independence, 4 July 1776. It was cast in England especially for the State House and was brought from there in 1752; in being taken from the ship it met with an accident which spoiled its tone, and it was recast in Phila¬ delphia in 1753, when the words ((Proclaim liberty throughout all the land unto all the inhabitants thereof® (Lev. xxv, 10) were in¬ scribed on it. When the British occupied Phila¬ delphia the bell was taken down and hidden in the Delaware River near Trenton, but was afterward hung in its old position, and for several years rung every Fourth. On 8 July 1835 it was broken while tolling for the death of Chief Justice Marshall. In 1854 it was placed in the hall of the old State House on a pedestal with 13 sides, representing the number of original States. In 1893 it was carried to Chicago for the World's Fair, and in many cities through which it was carried was greeted with special demonstrations ; and has since been specially exhibited at expositions in other cities, notably at Saint Louis 1904 and at the Panama- Pacific Exposition, San Francisco, 1915. Con¬ sult Belisle, (History of Independence Hall.**

LIBERTY BOYS, a popular name given the Sons of Liberty during the

American Revo¬ lution.

LIBERTY PARTY, the first political

organization of the American Abolitionists (q.v.). The Anti-Slavery Society was com¬ posed of two wings steadily and at last de¬ cisively diverging: the politicals, who wished the work to be carried on as other reform measures are, by massing its supporters, and either winning a decisive victory or extorting gradual compromises from its opponents: and the Garrison wing, who refused to vote, hold office or in any way recognize a government which legitimized slavery, denounced the Con¬ stitution and denounced the churches and ministers for refusal to join the movement. The violence of this branch and the revolution¬ ary and sometimes offensive social theories

associated with it made the other wing anxious to part company; and this was brought about in 1838 by suggesting the nomination and sup¬ port of abolitionist candidates. The next year, on the refusal of the Garrisonians to listen! the political wing split away and in 1839-40 organized the (

LIBERTY OF THE PRESS. Liberty of the press means not only freedom to publish one's thought in printed form but freedom of speech as well, there being no essential differ¬ ence between the written and spoken word. Liberty to publish by speech or print one's own opinions, subject to certain limitations which can hardly be said to limit the fundamental principle, is regarded as one of the natural or absolute rights of man. The Bill of Rights (1689), while making no mention of liberty of the press, stipulates ((that the freedom of speech and debates or proceedings in Parlia¬ ment ought not to be impeached in any court or place out of Parliament.® The constitutions of Pennsylvania, Delaware, Maryland and

North Carolina, all adopted in 1776, are the earliest declarations of any legislative author¬ ity in favor of the liberty of the press. With the adoption in 1791 of Article One, amending the United States Constitution, by which it is commanded that <(Congress shall make no law . . . abridging the freedom of speech or of the press,® the principle of a free press and free speech is for the first time written into the fundamental law of an important nation. In 1768 a

Massachusetts legislative body re¬ fused to support Governor Bernard in his demand that the editor of the Gazette be pun¬ ished for libeling his honor and asserted instead that <(the Liberty of the Press is a great Bul¬ wark of the Liberty of the People: It is therefore the incumbent Duty of those who are constituted the Guardians of the People's Rights to defend and maintain it.®

The struggle for a free press began almost immediately after the introduction of printing. Though actually antedating the Reformation by a century it was not until Luther's time, how¬ ever, that the printing press revealed itself as a powerful agency in the wide and rapid distribution of ideas, creating new public opinion and stirring men to united action. Contemporary writers mention with amazement that in 14 days Luther's theses were found in every corner of Germany; in a month they had gone to the ends of Christendom ((as though the angels were the postmen.® And so, as Putnam points out, early in the 16th century <(the rulers of the State and the authorities of the church began to find occasion for alarm at the increasing range of the printed word, and came to the conclusion that if the com¬ munity was not to be undermined by . . . dangerous and demoralizing opinion, measures must be taken to maintain supervision and con¬ trol over the production of books.® This was hardly a new thing for the rulers and authori¬ ties to attempt. From the time of Augustus down, rulers of empire and Church had per¬ ceived the danger to the power and perma¬ nence of their rule in allowing men to speak and write freely in criticism of prominent per¬ sons and the established order, and uttering and advocating ideas subversive of those upon which the then existing political sway rested. The question whether those in authority who prohibited free speech and a free press were as pure-minded and as clean-purposed as those who fought for such freedom does not enter into the discussion. The situation as it existed, and still exists, is that the organization of State and of Church represents certain social ideas and relations, also certain ideas which should govern the rights, authority and power of the rulers and the duties and obligations of the people. In Luther's time, and before, satisfied — whether selfishly or unselfishly was not the point — that such organization and order were little or nothing short of divine in truth and worth, it was the natural, the inevitable thing for those in authority to try and suppress any and every word written or spoken which criti¬ cised or expressed a doubt as to the wisdom and validity of the existing order. As there would be no restriction placed upon those who spoke and wrote in favor and support of the established order, it is clear that the men strug¬ gling for a free press and free

speech were inevitably those who, for reasons good enough

for them, were opposed to things as they were, who were advocating ideas that were more or less revolutionary.

According to Tacitus, Augustus was the first ruler to undertake to punish a word writ¬ ten or spoken. The writings of Vejinto were suppressed by Nero. Concerning this incident Tacitus remarks, ((so long as the possession of these writings was attended with danger, they were eagerly sought and read ; when there was no longer any difficulty in securing them they fell into oblivion.® From 150 a.d. and on, the Church increasingly made it a practice to issue edicts against books. The fifth Council of Lateran, 1516, adopted a papal constitution which recited the injury to faith, morals and the public peace arising from the increasing number of books opposed to religion or mak¬ ing libelous attacks on individuals. In Scot¬ land in 1585 the authors of libels against the king of Scotland were punished with death, and it was the king or his servants who determined whether the king had been libeled. In 1680 12 English judges solemnly resolved <(that all books which are scandalous to the government may be seized and all persons so exposing them may be punished. And further, that all writers of news, though not scandalous, seditious nor reflective upon the government or State, yet, if they are writers (as there are few else) of false news, they are indictable and punishable on that account.® As late as 1808 a high judi¬ cial authority declares that it is ((not to be permitted to any man to make the people dis¬ satisfied with the Government under which he lives.® Milton's

"determine the judgment by an influence other than reason.® Furthermore it could be effec¬ tively answered that the opponents of liberty of speech and press were assuming not only the responsibility of maintaining public order and safety but were claiming infallibility of understanding and judgment. Dr. Robert Hall in his address ((An Apology for the Liberty of the Press® (1793) presents the matter in another fashion, "When a nation forms a gov¬ ernment, it is not wisdom but power which they place in the hands of a magistrate; from whence it follows, his concern is only with those objects which power can operate upon. On this account the administration of justice, the protection of property, and the defense of every member of the community from violence and outrage, fall naturally within

the province of the civil ruler, for these may all be accom¬ plished by power ; but an attempt to distinguish truth from error, and to countenance one set of opinions to the prejudice of another is to apply power in a manner mischievous and absurd.® That was the basis of the contention : the government whose chief business it is to preserve order by punishing crime transcends its authority and function when it proposes to determine whether this or that opinion is true. As Mill points out, when it comes to the gov¬ ernment's passing judgment on the impiety or falseness of a word written or spoken, the cases of Socrates, of Jesus and of many others indi¬ cate the menace of such exercise of authority. When a person utters sedition or incites to crime he is hardly expressing an opinion, he is plainly guilty of criminal conduct. Words are sometimes deeds. Beginning with Milton's masterly defense of the liberty of the press there is manifested a slowly growing apprecia¬ tion of the need and the possibility of keeping the press and speech free without giving free rein to those who are criminally minded. That this became the attitude of judicial authorities is seen in the opinion of Lord Wynford in Rex v. Burdett : (

liberty of the press ends.® Of much more im¬ portance in the history of the struggle for a free press is the earlier incident of the trial of John Peter Zenger in New York, 1735, for "publishing a false, scandalous and seditious libel, in which . . . the king's immediate

representative here is greatly and unjustly scandalized.® It established once and for all in North America "that in prosecution for libel the jury were the judges of both the law and the fact.® Even more significant is the temper of the people which this trial revealed. The jury despite explicit instruction of the court to the contrary brought in a verdict of "not guilty.® The mass of the people had come to see that the highest public welfare and safety depended upon the right of man to pro-

test freely against and expose publicly all wrong doing, particularly any evil doing or oppression of rulers. This right, as already pointed out, was clearly embodied in the Con¬ stitution of the United States and the con¬ stitutions of several States some 50 years later, But Louisiana in the constitution adopted in 1868 puts it down quite explicitly Sprinting presses shall be free to every person who undertakes to examine the proceedings of the legislature or any

branch of government, and no law shall ever be made to restrain the right thereof.® This same constitution recognizes very emphatically the fact of life which moved the most scholarly and large minded of men to champion the cause of a free press, viz.: that political and economic and intellectual freedom and progress, without which life is less than human, are impossible without liberty to speak and publish one's thoughts and opinions. So the Louisiana constitution continues: <(The free communication of thoughts and opinions is one of the most invaluable rights of man and every citizen may freely speak, write and print on any subject, being responsible for the abuse of that liberty.® The fundamental laws of most nations as reconstituted or modified during the last century attempt to provide for the <(free communication of thoughts and opinions® without conferring the right to com¬ mit what may properly be regarded as crime. A few instances will serve to give the general situation. The Belgian Constitution of 1831 declares that the press is free, that censorship shall never be established ; sureties shall not be exacted from writers, editors, printers, and when the author is known and domiciled in Belgium the printer and bookseller cannot be prosecuted. But an author or speaker must not incite to crime or disobedience of the law ; nor may he attack the constitutional authority or inviolability of the dynasty, nor the au¬ thority and rights of the chambers. In Italy the press has been free under fairly reasonable restrictions since the law of 1848, but Spain led the way among European nations. The con¬ stitution of 1812 promulgated by the regency in the name of Ferdinand VII provides ((that all Spaniards shall have liberty to write, print and publish their political ideas without any neces¬ sity of license, examination or approbation previous to publication,® subject of course to restrictions imposed by law. Austria-Hungary in the fundamental law of 1867 declares every one has the right of freely expressing his thoughts within the limits imposed by law. Germany, in the constitution of the empire, de¬ clares the press to be free subject to usual limitations of law. The law of 1878, however, gives the police very large powers over the socialistic press. The French law of 1881 be¬ gins by asserting the liberty of the press and bookselling under certain restraints which are plainly designed in the interests of justice and the public weal. Qualifying these constitu¬ tional declarations of freedom by certain re¬ strictive laws, while in theory a contradiction of the principle, in fact is hardly so. It is only what the constitution of Louisiana means by declaring that a person is to be held ((re- sponsible for the abuse of that liberty.® Her¬ bert Spencer puts thi matter clearly enough:

he pleases about any or all of our institutions — even to the

advocacy of a form of govern¬ ment utterly different from that which exists, or to the condemnation of all governments,® Censorship in war-times can hardly be pointed out as denial or as overthrow of the principle of a free press now so fairly well established. It will hardly be held that anyone has any more of a right to say or write a word which will lend aid and comfort to the enemy than he has to aid an enemy by armed insurrection. The ease and speed with which information can be transmitted makes it necessary to put the publishing of news in war time under re¬ strictions hitherto undreamed of. Writers on this subject of a free press have felt it neces¬ sary to direct attention to the menace contained in the ((Act of Congress approved 26 Sept. 1888® and the former act of 1878 which designed to prevent distribution through the mail of obscene matter and matter offensive to the public taste. The menace is not in the thing aimed at but in the fact that it gives to an official in the Post Office Department abso¬ lute power to determine whether an article in a newspaper or periodical or a chapter in a book is obscene or offensive to good taste, and from his decision there is no appeal, and no re¬ dress even if he should be wrong. No less a man than Thomas Erskine a century ago pointed out the serious menace in allowing any individual,' or even a self-appointed group of individuals, to determine what is offensive to good taste. It is not likely that the liberty of the press will have to be fought for again.

The bibliography on this subject is scattered and the subject is usually discussed as a part of the larger subject of personal and individual liberty. Milton, John, (Areopagitica, is the great classic; consult also Mill, J. S., (Essay on Liberty) ; (Trial of John Peter Zenger) ; Putnam, G. H., (Books and Their Makers in the Middle Ages) ; Schroeder, T., (Free Press Anthology. J*

Charles Graves.

LIBERTY TREE, (1) a famous ballad of the Revolutionary War, written by Thomas Paine in 1775. (2) An old elm tree in Boston

upon which the citizens hanged in effigy British officials connected with the Stamp Act and its enforcement.

LIBI-DIVI, le'be-de've. See Divi-divi.

LIBIDO, a term introduced into analytic psychology in 1895 by Sigmund Freud of Vienna and used by him to denote the vital urge or drive or craving, which is behind all human endeavor and especially

the desire of the re¬ productive instincts. Jung of Zurich has sub¬ stituted for it the term Horme [Greek:

The libido is regarded as having two main phases or aspects : the sexual, or race preserva¬ tive, and the nutritive, or self-preservative. Every human activity is regarded as satisfying in some form one or the other of these spheres of desire and as the result of the specification in concrete reality of one or other of them. Thus various forms of art may be the expression of the sexual libido, and various callings and professions and types of business activity such as dealing in foods or in clothing are expres¬ sions in different forms. of the self-preservative urge. This point of view is of great import¬ ance, particularly in the psychotherapeutics of

certain psychogenic nervous disorders. In hysteria, for example, the libido is regarded as fixated on the physiological level with the result that there is an exaggerated activity in some of the physiological processes producing an in¬ creased flow of blood or lymph or certain of the internal secretions in some of the organs, pro¬ ducing in turn a change in metabolism which causes an over-development. This is termed a hysterical conversion and is made manifest in many of the symptoms so varied in hysteria. In compulsion neurosis, on the other hand, the libido becomes fixated at an early age upon certain psychic elements with the result that special forms of thought, compulsive fear, com¬ pulsive doubt, compulsive action, etc., occur, without producing any specific change in the physiological functions. Analytic psychology, as practised therapeutically by physicians, aims to resolve the fixations of the libido and thus free the patient from his physical symptoms or from his mental inhibitions and therefore to educate him in such a way as to be better able to fulfil the requirements imposed upon him by society. Consult Jelliffe, (Technique Psycho¬ analyst (New York 1918).

LIBMANAN, lib-ma-nan, or LIBANAN,

le-ba' nan, Philippines, pueblo of the province of Ambos Camarines, Luzon, situated on the Polanluna River near its confluence with the Naga, 10 miles northwest of Nueva Caceres. It is on the main road, and is a telegraph and military station. It has also important hemp and rice industries. Pop. 14,500.

LIBRA, (1) the ancient Roman pound weight, also a Spanish and Italian weight. Translated into modern grains Troy, these ancient libra vary, but are usually between 5,000 and 7,000 grains. (2) The original meaning is balance or pair of scales. (3) One of the ancient zodiacal constellations. The seventh sign of the zodiac is called Libra, because at its first point the ecliptic crosses the equator to the southern hemisphere, and we have then the autumal equinox, when day and night are, as it were, equally balanced.

LIBRARIES, Ancient. The written word in some form or other is of immemorial antiq¬ uity. Discoveries in Crete and Assyria-Babylonia and at Susa (Persia) have proved that relatively advanced civilizations were in ex¬ istence as nearly as 6000 years b.c., and that the art of writing had been developed at that time. Some of the collections of stone and clay tablets unearthed at Knossos (Crete) and Nip¬ pur (Babylonia), seem to have the characteris¬ tics of libraries, even according to the strict definition of the term 'library (Latin liber, book) : a collection of books or other literary material preserved for reference or study; the designation also, by association, of the place or building wherein they are kept. This doubt¬ less cannot be said of many finds of ancient cuneiform tablets for these were merely legal, commercial or sacerdotal archives, but others are historical, philosophic or epical, — pure literature in fact. The fact that stone and clay records have been preserved does not prove that more perishable materials were not used, for there is an example of Egyptian hieratic writing dating back to 3,000 years b.c. in the Louvre. The incised stone records of Egypt, many of them of immense antiquity, contain

references to papyrus rolls. The roll (Latin volumen, volume) was the first stage in the development of the book, the second being the codex or the book as familiarly known, con¬ sisting of separate sheets bound together. This was probably a development of waxed tablets, used by the Greeks, the adoption of which has been traditionally ascribed to the kings of Per- gamus who were forced to use parchment (Pergamentum) for their books, the Egyptians having placed an embargo on papyrus. Just when paper supplanted parchment is not defi¬ nitely known, but the indications are that the Arabs were the first to make and use paper, Arabian manuscripts of the 9th and 10th cen¬ turies being in existence. Paper mills were in operation during the 12th century. Paper was known to the Chinese at a very early date, but the ancient Chinese book is a phase of the sub¬ ject yet to be investigated. Recent explorations have added a most astonishing store of knowledge regarding the ancient world and there is little obscurity now regarding the existence and constitution

of the libraries of the Classic Orient. The investigations of Paul Emile Botta, Sir Austen Henry Layard, Dr. John P. Peters and his successors, Dr. John Henry Hayes and Dr. H. V. Hilprecht of the University of Pennsylvania, have proved that a library in the strict sense of the term formed a part of nearly every temple and probably every royal palace. More than 50,000 tablets have been found, comprehending his¬ torical and traditional records, epical narra¬ tions, folksongs and ballads, hymns and prayers, medical lore and philosophy. Thus the temples were centres of literary as well as religious activity, the temple of Enlil at Nip¬ pur, that of the Sun-god at Sippar and others in Babylonia possessing large collections of tablets.

Assyro-Babylonian Empire. — Asur-bani-

pal (668-626 B.C.), known in Greek history as Sardanapalus, the grandson of the Biblical Sennacherib, was the first ruler of Assyria recorded to have taken an interest in the col¬ lection of literature. <(Being endowed with an attentive ear, and inclined to the study of all tablets, w he commanded that a great collection be gathered together in Nineveh to form the royal library. This was classified and indexed, and fortunately left undisturbed when Nineveh fell into ruins. Thousands of tablets from this library are in the British Museum and consti¬ tute one of the great sources of knowledge re¬ garding Assyro-Babylonian civilization.

Egypt. — It is impossible to say whether the libraries of ancient Egypt antedate those of the Assyro-Babylonian empires or not. Scribes, however, were known in Egypt as early as 6000 b.c. As in Assyria-Babylonia, the temples were centres of learning in which were gathered records and literary productions of all kinds. The rulers often encouraged learning and made collections as is evidenced by hieroglyphic inscriptions on their tombs and monuments. A reference of this nature is contained in an inscription on a tomb near the Pyramid of Cheops (Khufu), and another in¬ scription refers to the library (collected works) of Khufu. Papyrus was undoubtedly used in Egypt at a very early date, one of the most ancient examples being a roll relating the acts of King Assa (3580-3536 b.c.). An early ex-

ample of a purely literary papyrus is the Prisse papyrus, composed about 2500 b.c. Professor W. Flinders Petrie, during his researches in Fayum, discovered papyri in mummy cases that dated back 3000 or more years b.c. That clay tablets were also used by the Egyptians

is proved by his discovery of a collection of the reign of Amenophis IV (Amenhotep, 1466 b.c.). These were unearthed at the site of the king's palace in the city founded by him, Tel-el-Amarna. Heliopolis, the city of the Sun God, prior to the rise of Alexandria, was the centre of Egyptian culture. Here were numerous tem¬ ples, each of which had its library of papyri, among them the famous Sacred Books of Thoth, an encyclopedia of ancient wisdom. Brugsch, in his (True Story of the Exodos) (p. 204), states that there was a library in the temple at Edfu, on the walls of which was a list of the works contained in the collection. The most noted library of ancient Egypt was that formed by King Osymandyas, who has been identified with the Biblical Rameses II (1300-1236 b.c.). This collection was in the palace of the king, the Ramesseum, Thebes, and is described by Didorus Siculus (I, 58 Wessling ed.) as (

Ancient Greece. — Greek papyri of great antiquity have been found in Egyptian tombs, one of these, discovered at Abusir, near Mem¬ phis, dating as early as 4000 b.c. We do not know just when collections of literature began to be made, for classic historians state that libraries were first developed when Greece had already reached a very high degree of civiliza¬ tion. Thus Aulus Gellius asserts that the first library of Greece was founded by Pisistratus (605-527 b.c.) . The same tradition is repeated by Athenseus. That Pisistratus was a notable patron of learning is unquestioned, yet collec¬ tions undoubtedly antedated his. The tradition that he founded the first library doubtless arose from the fact that he was responsible for the collecting and editing of the various poems of the Homeric cycle. Polycrates, the tyrant of Samos (d. 522 b.c.), and friend of the poet Anacreon, was also a patron, of letters and is said to have formed a library. Others known to have been collectors and lovers of books were Nicocreon of Cyprus, the kings of Per- gamus, Euripides the poet, Euclid the mathe¬ matician, Aristotle the philosopher and Neleus, his biographer (Athenaeus, (DeipnosophistseP lib. c. 4). Strabo asserts that it was Aristotle himself, who formed the first library in Greece and gives a graphic description of its vicis¬ situdes, which included its burial for many years to keep it out of the rapacious hands of the kings of Pergamus, antiquity's prototypes of the modern bibliomaniac. The most famous libraries of Greek antiquity, however, were those at Alexandria, developed during the regime of the Ptolemies. See Alexandrian Library.

Pergamon Libraries. — Hardly less famous than the Alexandrian libraries were those founded by the kings of Pergamus. During

the two centuries prior to the Christian era, Greek civilization reached an astonishing height in the cities of Asia Minor. Among these, Pergamon was the most noted for its love of art and letters. Under Attalus I (241-197 b.c.) and his son, Eumenes II (197-159 b.c.), the city was beautified, objects of art were created or imported in great numbers and learn¬ ing in every form was encouraged. It is prob¬ able that Attalus founded the libraries of Per¬ gamon, but it was his successor that developed them, seeking throughout the world to obtain texts by any means and from any source. It has already been noted that Aristotle's library, according to Strabo, was hidden away in a cave in order to prevent its falling into the hands of the agents of the kings of Pergamon. Strabo, however, wrote more than a century after these happenings and, as he is often in error, this story is interesting more for the light it throws upon the methods pursued in developing the libraries of Pergamon. At any rate they grew until they rivaled those of Alexandria, causing, it is said, an embargo on papyrus, so that the Pergamoi were forced to resort to parchment (pergamentum) . This tradition also may be accepted with caution, for sheepskin had long been used for manu¬ scripts in Greece.*

How many rolls and codices were in the libraries of Pergamon it is impossible to esti¬ mate. About the only reference to their number is the passage from Plutarch, wherein Antony is accused in Rome of presenting Cleopatra with the collections of Pergamon, — <(more than 200,000 separate volumes.® The Acropolis of Pergamon was excavated in 1878 and the rooms assigned to the library determined. They form the subject of a monograph by Couze — {Die pergamen Bibliotek) (1884).

Ancient Rome. — There is little evidence in ancient literature indicating Roman interest in libraries prior to the wars with Greece. Rome conquered Greece, but in turn was conquered by Greek culture. It is narrated that Lucius yEmilius Paulus, who defeated Perseus and overthrew the Macedonian Empire in 168 b.c., carried the library of Perseus to Rome, <(the first that was seen in the capital of the world.® Thus Sylla, after subjugating Athens, gathered from Athenian books a library alike extensive and choice. (Consult Bacmeister, (Essai sur la Bibliotheque de l'Academie des Sciences de Saint Pet'ersbourg,) quoted in Edwards, Mem¬ oirs of libraries, Vol. II, p. 544). Lucullus (110-57 b.c.) who had been a general in the Mithridatic wars and had returned to . Rome under the spell of Greek and Oriental civiliza¬ tion, is the first Roman distinguished as a col¬ lector of books. Plutarch, in his life of Lu¬ cullus, says: <(His furnishing a library, how¬ ever, deserves praise and record, for he collected very many choice manuscripts ; and the use they were put*

to was even more magnificent than the purchase, the library being always open and the walks and reading-rooms about it free to all Greeks, whose delight it was. to leave their other occupations and hasten thither as to the habitation of the Muses.® Pliny states that Caius Asinius Pollio (76 B.C.-6 a.d.) founded the first public library in Rome. It has been seen that the library of Lucullus was open to readers but they were mainly his friends, the library thus never wholly losing the character

of a private collection. Pollio, in founding the public library, was undoubtedly carrying out a plan of Julius Caesar, to form libraries through¬ out all Rome, unfortunately miscarried by his death. (Suetonius Jul 44). Caesar, apparently, had planned a system of public libraries, and placed the execution of this in the hands of the famous scholar, Varro. That Varro was en¬ thusiastic in furtherance of the enterprise is indicated by the fact that one of his lost works was a treatise upon libraries and their develop¬ ment. It would seem that under Pollio the scheme finally assumed a definite form, and we know that in the library Varro was honored by the erection of a statue to him. Caesar's dream of establishing a widespread system of libraries was in part realized by Augustus. Two new collections were founded by him in Rome : the Octavian and the Palatine, the former founded and named in honor of his sister, Octavia. This was housed in a splendid building constructed for the purpose. C. Me- lissus was the first librarian. The Palatine, according to Suetonius, was housed in two additions made to the temple of Apollo. <(On either side of the Temple of Apollo stood libraries, one Greek and the other Latin, which contained none but works of special merit, with medallions of their authors embossed in either gold, silver or bronze.® (Consult Thomas,

(Roman life under the Caesars)- Of this Pom- peius Macer was the first librarian, who was succeeded by Julius Hyginus. The Octavian Library was destroyed during the great fire which raged for three days during the reign of Titus (79 a.d). Records are extant of some 28 libraries in the Roman provinces and other dependencies of the empire, notably at Milan, Comum, Tibur, Potrae, Athens, Smyrna, Pom¬ peii and Herculaneum. <(There was more¬ over in Timgad a unique public library. It has been identified exactly through an in¬ scription to the following effect: (Out of the funds bequeathed by Marcus Julius Quin- tianus Flavius Rogatianus, of Senatorial mem¬ ory, by his will to the colony of Thamagudi, his mother city, the erection of a library has been completed at a cost of 400,000 sesterces, under the direction of the city authorities.* The building in question consists of a rectangle of 77 by 80 feet, with recesses for receiving vol¬ umes or rolls of papyrus, with benches and seats for readers. There are also side rooms and evidently two upper galleries for book*

Gellius to the collection in the palace of Tiber¬ ius, another in the temple of Peace, founded by Vespasian, and Dion Cassius gives an account of the famous Ulpian Library, founded by Trajan, which was first housed in the Forum of Trajan, but afterward transferred to the

Baths of Diocletian. The library of Tiberius was burned in 191 a.d., during the reign of Commodus; the Palatine in the great confla¬ gration of 363 a.d. (recorded by Ammianus Marcellinus, xxiii-3-3). That there were num¬ berless private collections there can be no doubt. That of Lucullus has already been referred to, while Tyrannion, a Greek scholar captured' by Lucullus in the Greek wars, was employed in arranging the library of Apellicon the Teian, seized by Sylla at Athens. This was, accord¬ ing to tradition, the original library of Aristotle which was hidden in the cave to prevent its falling into the hands of the king of Pergamus.

(Cf . Plutarch,

LIBRARIES

The British Museum, London

LIBRARIES

"sOs4 frfcAf

•V''*

israews

Copyright, Underwood

THE VATICAN LIERARY, ROME

One of the richly decorated halls, 220 feet long. This stately hall is not the largest of the library rooms. In the Vatican Palace are 11,000 rooms and halls, and its library preserves some of the rarest and most valuable manuscripts and books in existence; these include a copy of Virgil 1600 years old; a copy of the Bible in Greek 1500 years old

LIBRARIES

o

o

Congressional Library, Washington

LIBRARIES

Public Library of the City of Chicago

mm

ˆ&Z2Sl2m

. ..i_rl.ˆ4S _ ; .

Central Library Building of the City of Boston

members of the Commenian dynasty found time in the midst of their intrigues to collect books Monastic Libraries.— The attitude of the early Fathers of the Church was rather inimical to any books save those of a religious nature, as has been indicated by the destruction of the Alexandrian libraries (q.v.) under Theophi- lus, archbishop of Alexandria, during the reign of Theodosius. This was owing to the fact that they were mainly pagan works. Soon, however, a body of Christian literature arose, and it was not long before the churchmen be¬ came as ardent collectors of books as their predecessors. Each monastery had its archivum, as had many churches. Skilful copyists were employed in transcribing religious books. Ac¬ cording to the Theodosian Code, seven copyists were attached to the library at Constantinople. The Basilica at Caesarea, founded by Pamphilus (a.d. 309), contained about 30,000 volumes.

Edwin Wiley,

Librarian, United States Naval War College.

LIBRARIES, Mediaeval and Renaissance.

— With the disruption of the Western Empire, learning passed into eclipse. It is impossible to estimate what has been lost to the world during that period of political and intellectual twilight. What was saved was saved by mon¬ asteries, for they became the refuge of both scholars and books. Thus Cassiodorus, the favorite minister of Theodoric the Goth, gath¬ ered a collection of books and retired to a monastery at Viviers which he had founded, endowing it with money and with his library. Numberless monasteries sprang up in Asia Minor and Egypt, their collections lost to the world until the researches of Tattam, Curzon and others brought them again to light. The majority of their books and manuscripts were theological, but many of these were of great importance, comprehending versions of the Gospels and books of the Old Testament in Greek, Hebrew,

Coptic and Syriac, and also texts of ancient classics and palimpsests that have revealed productions of the writers of antiquity that otherwise would have been wholly lost. During the 6th century, it is said at the instance of Gregory the Great, missionaries, among them Augustine, went to the British Isles. Soon monasteries sprang up there which became great centres of learning. Canterbury was founded, and to this went Theodore of Tarsus with books obtained in Rome for its library. A library was also founded at York by Archbishop Egbert, of which Alcuin made use when there, and the lack of which he be¬ moaned when, at the solicitation of Charlemagne, he became abbot of Tours. In the north of England, Jarrow and Whitby, the home of the Abbess Hilda and the poet Caedmon, both possessed libraries, that of the latter monastery being catalogued in the 12th century. Many of these monasteries were destroyed during the raids of the Danes, and their treasures were finally scattered as the result of the decrees of Henry VIII. The library at Christ Church Monastery, Canterbury, which was one of those to suffer at the hands of the Danes, was re¬ stored in the 11th century by Lanfranc and Anselm. A catalogue made during the 13th century contains 698 titles, about 3,000 volumes. Consult Edwards, (Memoirs of libraries) (Vol. I, p. 122). A catalogue of Saint Augustine's

Monastery at Canterbury has also been pre¬ served, revealing that it was rich in historical works and in French romances. According to Baeda, the first abbot of Wearmouth, Bennet Biscop, made five journeys to Rome, each time bringing back books for the abbeys of Wear- mouth and Jarrow. The collection at Wear- mouth was cherished and increased by Baeda himself until it became the largest in England. It was destroyed by the Danes in 867, and Jarrow in 973. Croyland Monastery also pos¬ sessed 700 volumes which were destroyed by fire in 1091. The monastery of Glastonbury, famous for its connection with the Arthurian cycle of legends, was ravaged by the Danes, splendidly rebuilt by Henry II and finally destroyed in the reign of Henry VIII. A catalogue of its collections (circa 1248) is con¬ tained in Hearne's edition of John of Glaston¬ bury. A catalogue of the Peterborough Mon¬ astery library (14th century) reveals that it possessed 344 volumes and the Surtees Society has published lists of the books in the Durham Monastery. On the Continent, Charlemagne was the first of the Frankish kings to encour¬ age learning and formed a collection of books for his palace. He also encouraged the estab¬ lishment of other libraries. His son, Louis, formed a library which was extant during the time of Charles the Bald. Everhard, Count of Triuli, formed a collection

which was later be¬ queathed to a monastery. The greatest private collector of the 11th century, however, was Gerber.t, afterward Pope Sylvester II, who spent large sums in developing his collections. The Benedictine Order was undoubtedly the most active in the cause of learning in western Europe, and its monasteries gathered large and valuable libraries. The oldest of the founda¬ tions, Monte Cassino (a.d. 529), was the begin¬ ning of a long line of institutions, among which may be named Fleury, Moelk, Saint Gall, Saint Vast, the famous Saint Maur; the English monasteries of Jarrow, Wearmouth, Bury Saint Edmunds, Croyland, Glastonbury, Whitby, Reading, Saint Albans and Tewkesbury.

The Augustinians and Dominicans rank next to the Benedictines as lovers of books. Saint Genevieve and Saint Victor had large libraries. The Barefoot Friars and other mendicant orders also collected books in their travels. Richard of Bury, the founder of a library at Oxford and the author of ˆhilobiblonP a treatise on the art of collect¬ ing and preserving books, praised their enthu¬ siasm and industry, and Sir Richard Whitting¬ ton (d. 1423) built a library for them at Grey Friars, London. In France, monasteries at Fleury, Cluny, Corbie and Saint Riquier pos¬ sessed libraries. After suffering many vicissi¬ tudes the remnant of the Fleury collection was presented to the town library of Orleans (1793). From the Corbie Monastery 400 MSS. were transferred to Saint Germain des Pres in 1638, and in 1794 the remainder was divided between the Bibliotheque Nationale and the town library of Amiens. In Germany the monasteries of Fulda, Corvey, Richenau and Sponheim had excellent collections. At Fulda, it is said that 400 copyists were busy at one time. Sponheim is famous because of its Ab¬ bott, Johannes Trithemius, who established its library. The monastic library of Saint Gall, in Switzerland, founded by its abbott, Gozbert, is

still extant. Several general catalogues of monastic libraries have been compiled, the first being one by the Franciscans (14th century), a sort of union catalogue of 160 European libraries. In the early 15th century John Bos¬ ton of Bury, an Augustinian monk, made a list of the books in 195 British libraries, each col¬ lection being designated by a number, making, as John Bale says, ((one library out of many® (cf. Tanner's (Bibliotheca, } 1748, pp. xviii- xliiii). John Leland, 1506 ?— 52, the famous antiquarian and librarian of Henry VIII, made notes of the collections in the institutions of

England visited in the years 1536-42. These lists are contained in the edition of Leland published by Hearne in 1715.

Renaissance Libraries. — The lamp of learn¬ ing which had burned during .the 8th to 10th centuries and had become almost extinguished during the period following the Crusades, flames up again during the 12th— 13th centuries, the age of the cathedral builders, and again dies down, not to revive until the 15th century. In Eng¬ land the barbaric invaders from Denmark and Norway had applied the torch to Wearmouth, Jarrow, Whitby and other of Britain's noblest foundations, and the institutions spared by the Danes suffered from fires or from accumu¬ lated wealth. Here, and on the Continent, the interest in learning passed into decay, and the monasteries that had been preservers of books now became their tombs. Boccaccio, in an ac¬ count of a visit to the Abbey of Monte Cassino, vividly describes the condition of its precious manuscripts ˆpersonifying them as gentle prisoners held in captivity by barbarous jailers.® Poggio, who made a journey to the Council of Constance as Apostolic Secretarv, also states that the manuscripts in the Abbey of Saint Gall were kept in (MSS. collected and copied by Niccolo de' Niccoli. Four hundred of these were presented to the library of the Convent of San Marco (1441), the remaining 400 pass¬ ing into his own collection, thus forming, the nucleus of the Medicean Library. This joined later with the collection of San Marco, and that of Fiesole, also founded by him, now form a part of the Biblioteca Medicio — Lauren- ziana. In this work for libraries the Medici found an able helper in Vespasiano de Bisticci (1421-98) who might well be termed the father of Italian libraries. Vespasiano also as¬ sisted Federigo de' Montefeltro, Duke of

Urbino, in creating his splendid collection of classics, theology, medicine and humanistic literature. Vespasiano tells us that he kept a large staff of scribes at work for 14 years transcribing material. Few of the collections rivalled those of Federigo, but there were other large ones, particularly that of Cardinal Bes- sarion, which, according to Vespasiano, con¬ tained 600 Greek and Latin manuscripts. This was presented to San Marco Cathedral, Venice, in 1468, but a generation passed before it was properly housed. The Vatican Library (q.v.) as now constituted also dates from the 15th century. Earlier collections had been formed by the popes, but it was not until Nicholas V (1447—55) filled the chair that the library re¬ ceived any special attention. The Pope, who as Tommaso Parentucelli, had been librarian of San Marco, Florence, had perhaps imbibed some of the enthusiasm of Vespasiano and the Medici. At any rate the library was greatly increased by him and his

immediate succes¬ sors, being housed finally in the splendid apart¬ ment in the Vatican (1475). In manuscripts, the Vatican collections are perhaps the richest in the world, many of the items being unique. They number about 34,000. The Humanistic movement spread1 rapidly over Europe and many private collections of books were devel¬ oped. Among these collectors, John Bale and John Leland in England have already been mentioned, as has Trithemius, the work of the latter being continued by Cardinal Bellar- mine in Italy. Matthias Corvinus, king of Hungary, formed a splendid library, mainly manuscripts, which is said to have numbered 50,000 items. This was dispersed by the Turks after the fall of Buda, 1526. The kings of France, particularly Saint Louis, Charles V and Francis I, encouraged the book arts in their every phase. It has been noted how the religious institutions were the conservers of learning during the Dark Ages and the Mediae¬ val Period, only to 'become their tombs or to be destroyed during the events of the reli¬ gious wars. Eight hundred, it is said, disap¬ peared at this time. Another group of institu¬ tions, however, now appeared to play the role of the builders of libraries These were the univer¬ sities. Even before the period of Renaissance the universities under direction of the Church had become centres of cultural activity. They sprang into existence throughout Europe, espe¬ cially in France, Germany and Italy. Among these might be noted Paris, Poitiers, Caen, Bordeaux, Nantes, Pisa, Florence, Bologna, Padua, Constance, Basel, Heidelberg, Cologne, Frankfort-on-Oder, Prague, Louvain, Utrecht, etc. In spite of the fact that theology was the main concern of these institutions, never¬ theless they were forums of free discussion, collectors of literature, and presented a strong front against arbitrary restrictions upon their prerogatives. Courses in physical science were offered, and books were gathered. ((John of Dalberg, appointed in 1482 Curator of Heidel¬ berg and Bishop of Worms, divided his time between the University and the bishopric; he helped to establish the first chair of Greek, and founded the famous Palatine library. Reuchlin came to Heidelberg in 1496; he was made li¬ brarian and in 1498 professor of Hebrew.® (Consult Cambridge Modern History,) Vol. I, p. 637). The invention of printing gave a

tremendous impetus to the making and the collecting of books. They became so inexpen¬ sive that many printed works could be ob¬ tained at the cost of one manuscript. Libra¬ ries accordingly began to increase rapidly in numbers, and in the size of their collections.

The breakdown, of mediaeval institutions, the decline in power of the Holy Roman Empire, and the strengthening of the principle of nationality were also influences that encour¬ aged the development of libraries within the different states of Europe. For this reason their history after the beginning of the modern era can best be told separately.

Edwin Wiley,

Librarian, United States Naval War College.

LIBRARIES, Modem. The origin and history of the modern libraries of the world will here be treated under the captions of the various nations as best suited to clearness and the purposes of an encyclopaedia.

United States.

Origins. — Library history in America be¬ gins with the first permanent settlement in the New World by the English. At Jamestown it was proposed to establish a college, and the minutes of the Virginia Company record a gift of books to the institution. The Indian massacre of 1622, however, dissipated these plans. New England was more fortunate. Harvard College was founded in 1636, and two years later, under the terms of the will of Rev. John Harvard, the school became pos¬ sessed of 300 books. An interesting chapter in early American library history was the effort of the Rev. Thomas Bray of England to establish parochial libraries in Great Britain and the colonies. In 1699, he arrived at Baltimore and established soon after a number of such col¬ lections. These libraries, with the exception of a few volumes, have disappeared, but some of the English collections are still extant. Among other libraries founded during 17th century, William and Mary College (1692) and the Yale College (1700) are still in existence, Yale Li¬ brary numbering now about 1,025,000 volumes.

*Subscription and Shareholding Libraries of the 18th Century. — The 18th century marked the origin and development of the library as an independent institution. This was due to the founding of subscription or shareholding libraries. The influence of these was, of course, restricted to the members, but even so they con¬ stituted an important advance toward the mod¬ ern free library. The founding of the earliest of these, the Library Company of Philadelphia (1732), was one of the multifarious activities of Benjamin Franklin. It was an outgrowth of a literary society, first called the * Junto,® which*

became eventually the American Philo¬ sophical Society. In 1769 the Union Library Company, and, in 1771, the Association and Amicable Library Companies were merged with the Philadelphia Library. A still more import¬ ant accession was the Loganian Library (1792), which had developed from the private collec¬ tions of James Logan, formerly a private sec¬ retary of William Penn. Other libraries of this type organized during the 18th century were the Redwood Library, Newport (1747), the first institution in America to erect a. build¬ ing solely for library purposes, which is still

standing; the Charlestown, S. C., Library (1748) ; the New York Society Library (1754) ; the Providence Library (1758), and the Balti¬ more Library Association (1795).

Athenaeums, Mercantile and Apprentice Libraries. — A further advance toward the popularization of the library idea was the organization and development of athenaeums, mercantile and apprentice libraries. A few of first group, of which the Boston Athenaeum (1807) is the best example, were closely allied with the subscription libraries, yet the majority of the athenaeums such as the Salem (1810), the Rochester, N. Y. (1829), the Providence Athenaeum (1753), the Lancaster Athenaeum (1860) and others partook more of the nature of mercantile libraries. Mercantile libraries were organized in Boston (1820), New York (1820), Philadelphia (1821), Albany (1833), Cincinnati (1835), Baltimore (1839), San Fran¬ cisco (1853). There were, approximately, 67 li¬ braries of the mercantile-mechanics type estab¬ lished before 1870. Still more popular in na¬ ture were the apprentice libraries, organized for the welfare of young men. A few of these were founded prior to the 19th century; one at Charleston, S. C., another at Lexington, Ky., and one at Newport, R. I.

It is not strange, therefore, that in some cities these libraries for many years performed the functions of the public library. Their fees were low, and social considerations played little part in the selection of their clientele, hence the growth and great educational influ¬ ence of such libraries as the Boston, the New York, the Philadelphia and the San Francisco mercantile libraries.

Growth of the Idea of the Free Public Library. — This popularization of the share¬ holding library, however, did not go far enough. It did not respond fully to American educa¬ tional demands, and as a result the idea of a free public library began to assume form. Already the public school had been established and had proved its worth, and the time was ripe for its corollary, the free public library. Many

years before, far-seeing men like Frank¬ lin and Jefferson perceived the value and need of such institutions, yet it was not until the middle of the 19th century that the movement gained strength. No account of the develop¬ ment of public libraries in America can omit reference to Prof. Charles C. Jewett, libra¬ rian of the Smithsonian Institution and later of the Boston Public Library. He can justly be 'termed the father of the modern library movement in America, for it was his broad vision of the importance of the library in the community, of the need for library co-operation, and his enthusiasm that bore fruit first in a conference of American librarians in 1853, which ultimately resulted in the organization of the American Library Association, and the founding of The Library Journal in. 1876. The work he had initiated was at this time carried to success by Winsor, Poole, Dewey, Cutter, Spofford, Billings, Greene, Leypoldt, Bowker, Putnam and other pioneers in American library work.

Library Philanthropy. — Coincident with this awakening of librarians to the value and tremendous possibilities of their profession, there was an awakening on the part of men of wealth to a new and singularly productive

field of philanthropy. Already John Jacob Astor (1849) and James Lenox (1870) had founded in New York city the institutions bear¬ ing their names; Joshua Bates of London had made munificent gifts to the Boston Public Library; the Newberry bequest had just fallen to the citizens of Chicago (1876) ; Dr. B. Rush had left $1,000,000 for the erection of the Ridge¬ way Branch of the Philadelphia Public Library; and James Lick had made gifts to the libraries of San Francisco. Now, however, began an era of gifts to American libraries that have totaled astounding figures, Andrew Carnegie, alone, giving $64,000,000, the terms of his gifts making it possible for nearly any com¬ munity willing to support and develop it to have a library. State and municipal aid have also entered strongly into this great ex¬ pansion of library activity, and more and more rapidly is the ideal aim of placing books freely within reach of all is being realized, even in the remote districts of mountain and prairie. This has meant a complete transformation of the whole concept of the library. Formerly it was only a conserver of knowledge, a mere store¬ house of books, now it realizes its true destiny by becoming a vital and progressive force in its community, reaching out and inviting all to

share in its treasures. The library thus be¬ comes an active and not a passive agency, joining with and supplementing the schools and other institutions. It becomes, in reality, a con¬ tinuing university, free to all and supported by all. The support that has been given libraries by the communities and by the States is a very tangible recognition of the popular esteem in which libraries are held. Library enabling laws have been enacted by nearly every State in the Union, and under their provisions nearly any community may establish a public library and tax itself for its maintenance. These laws are usually permissive, yet the opportunity they offer has been generously seized upon. Local control is also universal, authority being in¬ vested in boards of trustees who determine the policy and expenditures of the institution. In addition many States have library commissions, which as a rule have advisory jurisdiction, but in certain instances, such as California, actively administer a widely extended system of State libraries. Traveling library systems have also been established in various States. These are generally under direction of the State library commission. The activities of American public libraries are protean, only a few of which can be pointed out. They work hand in hand with the schools, often maintain¬ ing branches in the latter; they use every means to get in touch with the child and encourage him to read good books ; they reach out to the immigrant, offering him books in his own language but at the same time endeavor to introduce him to the language and ideals of his adopted country; they endeavor to supply the needs of the business men, manufacturer, etc., building up collections, as at Grand Rapids, relating to the peculiar industries of the region; they keep in touch with the work of the clubs and associations and supply as far as possible their bibliographic necessities; they offer lec¬ ture courses. These are a few of the manifold phases of the work of the modern library that have been superimposed upon the original idea of the library as a mere storehouse of books.

The First Free Public Libraries in Amer¬ ica. — It is almost impossible to determine the identity of the first library in the United States supported by public funds and wholly free to its users. The earliest recorded gift of books to a municipality is that of the Rev. John Sharp who bequeathed, in 1700, his library to the city of New York for the benefit of the people. This has disappeared, as has another collection founded in 1803 at Salisbury, Conn. The Town Library at Petersborough, N. H., founded through the efforts of Rev. Abiel Abbot in 1833, appears, from the data at hand, to have been the first free library which has continued to the present. This, however, was essentially a local development, and the move¬ ment

in its larger aspects was probably initiated by the enactment of a law in 1848 enabling Boston to establish a free public library. In 1851 this was extended to the whole State. The Boston Public Library is thus one of the first American free public libraries in time and for many years it was the first in importance, taking second place only to the New York Public Library after the merger of its various foundations, the New York Public Library (q.v.) becoming thereby the greatest institution of the kind in the world. This primacy of the Boston Library comprehended not only the ex¬ tent and scope of its collections, but also build¬ ing, librarians and general cultural activities. The first home of the library, built according to the discarded alcove plan, was nevertheless for many years the most imposing public library building in the country, a position that was regained when the new structure was erected at Copley Square in 1895, at a total cost of $2,750,000. This beautiful Renaissance building, with its mural decorations by Abbey, Sargent and other distinguished artists, was the fore¬ runner of the great library constructions of to-day, few of which have surpassed it in dig¬ nity and fitness. The Boston Public Library has 30 branches and contains collections total¬ ling 1,157,326 volumes.

The Chicago Public Library assumes a posi¬ tion next to that of the Boston and New York libraries, bu't differs from them to the extent that it is, in fact, as well as in name, a popular library. Its collections are restricted in the main to books that would be called for by the general public and not by the scholar; the student of literature and the humanities being left to the Newberry, and the one in science and the useful arts to the John Crerar. The same principle applies to the building, which is an imposing but simple Renaissance structure, the idea of fitness for use being uppermost. This building was erected in 1898. It is an interesting fact that the Chicago Li¬ brary originated in a gift of 7,000 books gathered in England by Thomas Hughes, the author of (Tom Brown at Rugby,) and pre¬ sented to the people of the city after the great fire of 1871. This humble nucleus has grown into a collection of about 800,000 volumes dis¬ tributed through the central library and its 45 branches.

Another public library that supplies a great constituency most efficiently is the Saint Louis Public Library. This was established in 1893, being a merger of several earlier collections, the most important of which was the Public School Library founded in 1860 by Ira Diyoll,

Wurtz Brothers, Architectural Photographers

Philadelphia Public Free Library

LIBRARIES

LIBRARIES

San Francisco Public Library

Newberry Library, Chicago

LIBRARIES

The Public Library of the District of Columbia, Washington, D. C.

Saint Louis Public Library, Saint Louis, Mo,

LIBRARIES, MODERN

361

then superintendent of public schools. It was further developed by Dr. W. T. Harris, and by the remarkable group of thinkers then in Saint Louis. It is at present housed in a beautiful building, completed in 1912 at a cost of $1,900,- 000. The collections number 487,330 volumes distributed through the central building and seven branches.

Another city library formed of smaller col¬ lections and now occupying an attractive new building is the Denver Public Library. This was formed by an amalgamation of the Denver Public Library, housed in the East Denver High School, and the Mercantile Library. It has four branches in addition to the central building with collections numbering 192,366 volumes. Mr. Carnegie's gifts have aided the larger libraries as well as the smaller ones, the most notable gift being the sum of $5,200,000 to construct branch library buildings for the New York Public Library. Toward the con¬ struction of central libraries, however, among the many, may be noted the beautiful building of the District of Columbia Library, founded in 1896. Its collections number about 200,000 volumes. Another splendidly vital library, almost wholly due to his munificence, is the Carnegie Library of Pittsburgh (1895) with eight branches and 434,469 volumes. The Louisville Public Library building was also con¬ structed with Carnegie funds ($250,000), to which he later added .$200,000 for eight branch libraries. Two of these branches were con¬ structed for 'the colored people of the city.

Nearly all the libraries in the Southern States, in fact, have branches of this type. Among the other public libraries of the country worthy of much fuller attention are Brookline, Mass. (4 branches, 90,000 vols.) ; Cambridge (1858; 5 branches, 113,314 vols.) ; Somerville (3 branches, 115,216 vols.); Springfield (1857; 3 branches, 229,990 vols.) ; Worcester (3 branches, 244,047 vols.) ; Providence (1878; 4 branches, 181,307 vols.); Hartford (2 branches, 118,000 vols.); Philadelphia (1891 ; 26 branches, 534,152 vols.) ; Buffalo (1836; 7 branches, 363,546 vols.) ; Cleve¬ land (1867; 44 branches, 584,340 vols.) ; Brook¬ lyn (33 branches, 862,112 vols.) ; Pratt Insti¬ tute, Brooklyn (1888; 114,775 vols.); Newark (1889 ; 3 branches, 256,581 vols.) ; Enoch Pratt, Baltimore (1886; 16 branches, 355,817 vols.) ; Cincinnati (1814; 24 branches, 515,906 vols.); Detroit (1865; 13 branches, 450,910 vols.); Milwaukee (10 branches, 342,194 vols.) ; Minne¬ apolis (1889; 15 branches, 334,763 vols.) ; Saint Paul (4 branches, 161,609 vols.) ; Grand Rap¬ ids (1837; 13 branches, 147,761 vols.); Kansas City (12 branches, 271,077 vols.) ; Los Angeles (1872; 19 branches, 309,463 vols.); Cossitt Li¬ brary (Memphis 1888 ; 8 branches, 120,263 vols.) ; New Orleans (1897; 4 branches, 102,927 vols.) ; Atlanta (1899; 4 branches, 94,770 vols.).

College and University Libraries. — In point of time the college and university libraries antedated the other types, and while they have developed to an amazing extent yet the growth of each collection has been determined by the character and demands of the institution of which it forms a part. The collegiate library must co-ordinate its activities with those of its school, forming, as it were, a sort of biblio¬ graphic laboratory. During recent years the conception that the library was but a store¬ house of reference and source material has

given way in some cases to a separation of the different groups of books, each group assigned to the care of the academic department most interested. This method was extensively tried out at Johns Hopkins and Chicago universities, but the difficulties of administration, the over¬ lapping of interests and the irregular develop¬ ment of collections has forced the return to the idea of the central library, the principle of the seminary or special departmental libraries being adhered to, yet restricted in scope and usually under control of the university librarian. Hence seminary libraries are to be found in practically every university in the country, some of them constituting special collections of the highest value.

It has already been noted that all that is known of the College of

Henrico is the brief notice regarding its gift of books. The ex¬ perience of Harvard, however, was not so un¬ fortunate. By the death of the Rev. John Har¬ vard in 1638 the college came into possession of a collection of about 370 volumes, mainly theological. These were added to, until the library at the end of a century contained some 5,000 volumes, the largest collegiate collection in America. In 1764, however, this was de¬ stroyed by fire, only a few hundred books being rescued. Steps to reconstitute the library were immediately taken and in 1790 its collections numbered about 12,000; in 1840, 40,000; in 1856, 70,000 volumes and 30,000 pamphlets; in 1875, 154,000 volumes; the aggregate number of vol¬ umes of the various libraries of Harvard being 227,650 volumes. The main library now num¬ bers 792,117 and all the libraries total 1,088,000.

In 1840 the collections were moved into the Gore Hall, at that time considered adequate for the growth of many years. Nevertheless owing to the rapid growth of the library it has long been inadequate, making the necessity for a new building imperative, which was realized in 1907 by the bequest of the late Harry Elkins Widener, who also donated to the library a splendid collection of book rarities.

William and Mary College, founded in 1692 under the auspices of the Church of England, was long the wealthiest institution in the colo¬ nies. It is known to have possessed books from its beginning, though doubtless the collection was small. It, too, suffered from fire in 1705, but its collections were replenished by gifts from the mother country and from France, Queen Anne, the Georges and Louis XV being numbered among the donors of books. The college went into eclipse during the Civil War and it is only recently that it has again begun to take its place among the schools of the. country.

It seems that Yale had a library provided for it before its foundation in 1700, for gifts of books had been made in anticipation of the establishment of a school in Connecticut. In 1765 the collection comprehended 4,000 volumes ; in 1808, 4,700 volumes; 1913, 1,000,000 volumes; the total collections of Yale now aggregating 1,025,000 volumes.

*During the first half of the 19th century a movement was well under way that forms a most important chapter in American educational and library history. This was the establishment of State universities. The national policy of permitting the States . to handle their educa¬ tional problems in their own way has resulted **

in an unequal, but on the whole a remarkable, development of institutions of learning. Some universities, Harvard and Columbia for exam¬ ple, partook of the nature of State schools at an early date, which they have since lost, hence it remained for the University of Virginia, which sprang to the last detail from the mind of Thomas Jefferson, to be the forerunner and model of succeeding foundations. Jefferson correctly estimated the importance of the li¬ brary in the scheme of a university, and all of his plans for the school centred around that fact. Hence when the university set to work in 1825 the library building was not only com¬ plete but a collection of books, selected by him, was on the way from Europe. It may be noted that this central library building and the funds for equipping it were only obtained after a bitter struggle with short-sighted politicians and reactionaries. As might be surmised, in found¬ ing this institution Jefferson was profoundly in¬ fluenced by English and French models, and the university in turn has transmitted the educa¬ tional principles of its founder to many other schools in the South and Southwest. That it has been outstripped by some of these has been due to conditions that need not be discussed, one of which, the burning of the Rotunda, or library building, in 1895, was a positive disaster from which the library has not yet recovered, although the building was immediately recon¬ structed.

University Libraries in the South. — Per¬ haps it was due to the influence of Virginia that the idea of the State university was first accepted in the Southern States. At any rate it was in these States that for decades they were the most important institutions of higher education. Each one of them possessed some sort of a library, many of which collections were de¬ stroyed during the Civil War and are only now taking place with the other collections of the country. Among these may be noted the Uni¬ versity of North Carolina (1795; 79,205 vols.) ; South Carolina (1805; 46,000 vols.); Georgia (1800; 41,000 vols.) ; Tennessee (1796: 37,379 vols.).

University Libraries in the West. — During the middle of the 19th century, the Middle and Far West had developed to such an extent that the demand of the people for schools and li¬ braries began to find response and then began a most remarkable development in these fields. The earliest of these educational institutions, the University of Missouri (1841 ; 161,470 vols.), owed more to Southern influences than North¬ ern, as did the University of Texas

(1836; ,134,342 vols.), hence it is in the University of Michigan (1837; 383,976 vols.) that we find the earliest type of the great universities that have sprung up throughout, the West. Among these that have large libraries the following may be noted: California (1865; 355,463 vols.); Illinois (380,000 vols.) ; Iowa (1850; 130,040 vols.) ; Minnesota (1867; 251,000 vols.); Nebraska (1871; 138,650 vols.); Ohio (1873; 176,526 vols.); Wisconsin (1849; 255,000 vols.).

Privately Endowed Universities. — Equally important has been the development of libraries of institutions owing their origin wholly or in part to private munificence. One of the earliest of these, Cornell (1868), has a library of 489,656 volumes; Lehigh (1877), 130,000; Leland Stan¬ ford (1891), 287,634. The growth of the li¬

braries of these schools has been relatively moderate compared with that of the University of Chicago founded in 1892 by John D. Rocke¬ feller, its collections growing from nothing to half a million volumes in 25 years. Other col¬ leges and universities having collections of more than 100,000 volumes are : Dartmouth (1769), 140,000; Georgetown (1789), 106,341; Bowdoin (1794), 115,789; Amherst (1821), 118,000; Oberlin (1833), 175,625; Johns Hopkins (1876), 202,247; Princeton (1746), 397,126

volumes. The character of a college library is determined, of course, by the nature and aims of its institution. In schools mainly technological, like Lehigh, Cornell or Massa¬ chusetts Institute of Technology, the collections are strongly scientific or technical. The same is true of many of the libraries of the State universities, the latter often specializing in agri¬ culture and kindred topics.

State Libraries. — Another and relatively early development of libraries in the United States was that of the State libraries. Orig¬ inally these were merely reference collections, mainly law books and public documents, housed in the State capitol. In time, however, many of these collections quite outgrew their limita¬ tions, becoming general libraries, the most of them remaining essentially reference collections. A few like the New York and California State libraries in addition serve as capstones to splendidly organized State- library systems. In general, the funds for the maintenance and de¬ velopment of these institutions are supplied by appropriations from the State treasuries, which, it must be confessed, have not always been sufficiently generous to warrant large extensions of their activities. A few of the larger State libraries, such as that of Massachusetts, of Connecticut and of Arkansas, still adhere to the

law and document principle, whereas in the case of Colorado, Illinois, Ohio, Oregon, Rhode Island, Texas and Virginia the State library has developed into a general or historical collec¬ tion, which had resulted in the establishment of special law or reference libraries for official use. In 1811 the State Library of Massachusetts initiated the custom of exchanging State docu¬ ments which it has kept up to the present. It is difficult to say which State had the earliest collection. Pennsylvania is said to have had an official library in 1777 and New Hampshire claims to have possessed one prior to the Revo¬ lution. In some cases the libraries had de¬ veloped before any official recognition was made of them. Thus Virginia appointed a State librarian in 1825, before an appropriation had been made for books, and Tennessee had accumulated some 8,000 volumes prior to the first official enactment regarding the collection in 1854. The following are the most important State libraries: Arkansas (1836), 100,000 vol¬ umes; California (1850), 207,283; Connecticut (1835), 200,000 (law); Iowa (1846), 142,841, Kentucky (1820), 116,626; Maine (1820), 110,- 000; Massachusetts (1826), 192,015 (law); New Hampshire (1820), 153,861; New York (1818), 449,542; Ohio (1817), 213,723; Pennsylvania (1816), 176,624; Tennessee (1854), 150,000; Vir¬ ginia (1823),. 114,520. In addition, Louisiana, Georgia, Maine, Maryland, Minnesota, New Jersey and Nebraska have State law libraries, and Colorado, Illinois and Ohio have Supreme Court libraries.

LIBRARIES, MODERN

363

Special Libraries. — The development of the special library in the United States has as¬ sumed two phases which might be termed the early and the recent. The former comprehends the establishment and expansion of types of libraries already differentiated in Europe, such as theological, legal, medical, historical and, to a lesser degree, pedagogical and associational libraries. The second group is the result of the development of science during the 19th cen¬ tury, and of recent economic and social move¬ ments.

Theological Libraries. — The earliest of

these were the theological libraries, the ma¬ jority of which were developed in connection with institutions of learning. Indeed, some of the college libraries of the 18th century con¬ sisted mainly of theological literature. As the secular aspects of the institutions became more and more emphasized, the theological elements 'tended

to become segregated, forming depart¬ ments of the school, rather than permeations of the whole. The libraries followed this tend¬ ency hence we find the development of the splendid theological collections at Harvard, Princeton and other universities. The Harvard, now the Andover-Harvard Theological Library, numbers 109,321 volumes and the Princeton Theological Seminary Library 103,427 volumes. One of the few institutions whose library has remained true to the earlier type is the George¬ town University. Its collections consist to a large extent of Catholic theologic literature and number about 106,000 volumes. In addition to these university collections, the foundation of sectarian seminaries during the first half of the 19th century has resulted in the upbuilding of some very excellent special libraries of theology, such as the Union Theological Seminary (1835; 130,018 vols.) ; the Drew Theological Seminary (Methodist, 1867; 128,054 vols.); the Hartford Theological Seminary (1834; 109,620 vols.) and the General Theological Seminary (1817; 59,- 691 vols.).

Law Libraries. — Another early type of special libraries is the law library. These were first developed, as was the case of the theolog¬ ical libraries, in connection with colleges, the Harvard Law Library, housed in a splendid # building of its own, still remaining one of the ' largest collections in America (172,073 vol¬ umes). Other colleges with special jaw li¬ braries are Columbia (59,262 vols.), University of Chicago (40,236 vols.), Yale (40,127 vols.), Northwestern (45,000), New York University (25,791 vols.), University of Pennsylvania (57,- 152 vols.). Legal literature is predominant in the collections of State libraries, but as many of these have developed into general libraries, a number of States have developed in addition special legal libraries, among them being the Indiana State Law Library (55,000 vols.), Min¬ nesota State Law Library (79,662 vols.), New York State Law Library (69,000 vols.), the Ohio Supreme Court Library (36,000 vols.). A few of the State libraries, such as the Massa¬ chusetts (192,015 vols.), remain essentially law and documentary libraries. In addition to these, bar associations and legal societies have organ¬ ized and developed law collections, some of them of first importance such as that of the New York Association of the Bar (114,437 vols.), Philadelphia Law Association (62,858 vols.), Chicago Law Institute (67,072 vols.),

Social Law Library, Boston (65,000 vols.), Bar Association of San Franciso (35,000 vols.), San Francisco Law Library (28,000 vols.), New York Law Institute (81,209 vols.).

Medical Libraries. — The literature of a science so progressive as that of medicine and its allied subjects loses its value after a very

limited period, hence many of the books have little save historical interest. For this reason only a few institutions undertake to obtain and care for the great mass of medical lore of the past. This has been left to institutions with the necessary funds and facilities for its preserva¬ tion. One library in particular in the United States has essayed to play this part with dis¬ tinguished success — the Library of the Sur¬ geon-General's office of the United States Army. Under direction of Dr. John S. Billings, the largest collection of medical literature in America has been gathered, classified and a catalogue issued that is a monument of biblio¬ graphic research. The library now numbers 190,310 bound volumes and 328,036 pamphlets. The majority of the medical libraries are con¬ nected with the medical departments of univer¬ sities or of independent medical schools, the largest being that of the library of the College of Physicians and Surgeons, Philadelphia, with collections numbering 107,782 volumes. The Harvard Medical School has collections num¬ bering 27,000 volumes, and Columbia with 28,- 960 volumes. Medical societies have also de¬ veloped excellent libraries, among them being the Medical Society, County of Kings, Brook¬ lyn, with collections numbering 70,000 volumes; New York Academy of Medicine, 101,593; Rhode Island Medical Society, 25,000; Boston Medical Library, 85,963.

Pedagogical Libraries. — Educational li¬ braries form a comparatively recent phase in the development of special libraries. The lar¬ gest and most comprehensive, that of the Bureau of Education, was founded in 1868 and numbers about 150,000 volumes. With the establishment of teachers' colleges many special pedagogic libraries have come into being, the most important of which are that of the Teach¬ ers' College (1887), affiliated with Columbia University (63,770 vols.) ; State Normal School of Indiana (Terre Haute, 1870; 70,926 vols.); State Normal School of Kansas (Emporia, 1865; 40,900 vols.); State Normal College of Michigan (Ypsilanti, 1852; 43,000 vols.);

Southern Illinois State Normal University (Carbondale, 1869; 30,210 vols.) ; Chicago Nor¬ mal College (1898; 25,000 vols.); Colorado State Teachers' College (44,800 vols.) ; School of Education, University of Chicago (35,000 vols.) ; Nebraska State Normal School (25,245 vols.) ; Peabody College for Teachers (Nash¬ ville, Tenn., 35,000 vols.) ; Hampton Institute (44,962 vols.) ; Glenville Normal School (W. Va. ; 42,000 vols.); Wisconsin State Normal (Milwaukee; 27,510 vols.U There are approx¬ imately 208 normal school libraries in the United States.

Historical Libraries. — The majority of special historical libraries in America have been organized by historical societies, either regional, State or group. Many State libraries, in that they endeavor to collect local historical material, partake of the characteristics of spe¬ cial historical libraries. Among these may be noted the Alabama State Department of Ar-

*chives (100,000 vols.) ; Colorado State Library (40,000 vols.) ; California State Library *(207,134 vols.) ; New York State Library (449,542 vols.). Among the libraries whose collections cover the history of an area larger than a State may be mentioned the New Eng¬ land Historical Genealogical Society (39,711 vols.) ; American Antiquarian Society (Wor¬ cester, Mass.; 140,000 vols.).- The State his¬ torical societies, however, have been most as¬ siduous in collecting and preserving local his¬ torical material. Nearly every State has an active association of this nature and several possess very valuable collections, notably Kan¬ sas (1875; 90,689 vols.); Maine (1822; 40,000 vols.); Maryland (1844 ; 45,399 vols.); Massa¬ chusetts (1791; 56,000 vols.); Minnesota (125,- 000 vols.) ; Nebraska (53,000 vols.) ; New Jer¬ sey (30,000 vols.) ; New York (130,866 vols.) ; Pennsylvania (202,000 vols.) ; Rhode Island (90,000 vols.); Virginia (15,300 vols.); Wis¬ consin (376,000 vols.). A still more restricted phase is that of city historical societies, of which a number possess interesting collections, not¬ ably the Chicago Historical Society (24,738 vols.) ; Buffalo, N. Y. (40,000 vols.) ; New Haven Colony (8,000 vols.) ; New York Genea¬ logical and Biographical Society (15,000 vols.) ; Essex Institute (Salem, Mass.; 115,856 vols.); Newport (R. I.) Historical Society (8,000 vols.) ; Western Reserve (Cleveland, Ohio, Historical Society; 44,850 vols.). A collection of great importance to students of early Amer¬ ican literature and American history is the John Carter Brown Library at Providence (25,000 vols.). There are other collections representing special groups and interests that partake of the nature of historical societies, such as the Hispanic Society of New York (82,461 vols.) ; the Pan-American Union (Co¬ lumbus Memorial Library, Washington ; 37,965 vols.); Congregational Society (Boston; 64,- 561 vols.) ; the Presbyterian Historical Society (Philadelphia; 20,000 vols.); the Holland So¬ ciety (New York; 6,500 vols.) ; National Soci¬ ety of the Daughters of the Revolution (Wash¬ ington ; 6,693 vols.).*

Scientific and Technical Libraries. — The

tremendous advances made in pure and ap¬ plied science during the 19th century have re¬ sulted in the establishment of many scientific and technical libraries. The various activities of the national government has caused the lo¬ cation of a number of these collections at Washington. The special libraries in Wash¬ ington in the most cases have been developed in connection with scientific bureaus and de¬ partments of the Federal government. In pure science may be noted the Library of the Bu¬ reau of Standards (14,900 vols.) and the li¬ brary of the Smithsonian Institution with its magnificent collection of the publications of learned institutions and scientific societies f (521,616 vols.). The Coast and Geodetic Sur¬ vey has a collection of 25,000 volumes on geod¬ esy, surveying, hydrography, etc. ; the Geo¬ logical Survey, 220,000 books and pamphlets on geology, mineralogy and palaeontology; and the Weather Bureau of 35,500 volumes and pamphlets on meteorology and climatology.

- *Not including Sutro Library in San Francisco, 81,851 volumes.*

Peposited in the Library of Congress,

The Bureau of American Ethnology has a col¬ lection of 33,430 items on ethnology, anthropol¬ ogy and American aborigines ; the Bureau of Fisheries, 29,155 volumes on fisheries, fish cul¬ ture, etc. ; the Department of Agriculture, 137,- 700 volumes and pamphlets on agriculture, for¬ estry, chemistry, botany, etc.; the Forest Serv¬ ice, 18,852 items on forestry. In military and naval sciences the Army War College has 100,- 000 items, Navy Department, 50,000, the United States Army Engineers' School, 45,115. Other collections on military and naval topics are at the United States Military Academy (West Point, N. Y. ; 16,121 vols.); United States Naval Academy (Annapolis, Md. ; 56,851 vols.) ; Coast Artillery School (Fortress Monroe, Va. ; 28,034 vols.) ; Naval War College (Newpdrt, R. I. ; 21,000 vols. and pamphlets) ; Army Serv¬ ice Schools (Fort Leavenworth, Kan.; 32,000 vols. and pamphlets).

*Libraries of Economics, Political Science * and Sociology. — The literature of economic and social problems is to be found in the col¬ lections of the Interstate Commerce Commis¬ sion, 23,000 volumes and pamphlets; Bureau of Foreign and Domestic Commerce, 20,000 vol¬ umes and pamphlets; Bureau of Labor Statis¬ tics, 32,000 volumes and pamphlets ; Department of Commerce, 103,738 volumes and pamphlets ; Treasury Department, 11,580 volumes and*

pamphlets. There is also in Washington a li¬ brary of the United States public documents under direction of the superintendent of public documents which contains 193,533 volumes. Other special libraries in Washington, but non- official, are the Bureau of Railway Economics, 60,000 volumes and pamphlets, and the Volta Bureau (deafness), 9,000 volumes and pam¬ phlets. The Library of Congress has a large collection of embossed books for the blind. An¬ other interesting special collection at Washing¬ ton is that of the Carnegie Endowment for In¬ ternational Peace, containing 11,000 items, peace, international conciliation and league of nations.

Science and Technology.— There are many scientific libraries, however, outside of the Dis¬ trict of Columbia. The oldest collection of the sort is undoubtedly that of the American Phil- • osophical Society, Philadelphia, founded in 1743. This has 65,413 volumes, mainly relat¬ ing to pure and applied science. The American Academy of Sciences of Boston is probably the next in point of age, its date of foundation being 1780. It has 34,681 volumes. The lar¬ gest library specializing in scientific and tech¬ nical literature is the John Crerar Library of Chicago, with 384,603 volumes. Other collec¬ tions of importance are Boston Society of Nat¬ ural History, 40,617 volumes; Franklin Insti¬ tute, Philadelphia (1824), 71,020 volumes, 28,- 845 pamphlets. The schools of technology have necessarily developed libraries along the lines of work treated in their courses. The largest is perhaps the library of the Massachusetts In¬ stitute of Technology numbering 121,711 vol¬ umes. The library of Cornell is also strong in technical works (489,654 vols.) ; Sheffield School (Yale; 12,500 vols.); Lehigh (130,000 vols.) ; Wagner Free Institute of Science (Philadelphia; 25,000 vols.); Rose Polytech¬ nique Institute (Terre Haute; 15,360 vols.); Armour Institute of Technology (Chicago; 27,869 vols.); Stevens Institute (Hoboken;

12,700 vols.) ; Worcester Polytechnic Institute (15,000 vols.); Michigan College of Mines (28,050 vols.) ; Missouri School of Mines (20,- 495 vols.) ; Virginia Polytechnic Institute (28.'- 072 vols.) ; Alabama Polytechnic (27,550 vols.). Many State universities pay attention to tech¬ nology and the applied sciences, agriculture in particular. Among the noteworthy collections are those of the State agricultural colleges of Kansas (57,800 vols.) ; Michigan (38,561 vols.) ; North Dakota (26,620 vols.) ; and Utah (28,- 946 vols.). The

University of Tennessee also has a valuable collection of agricultural books and pamphlets. The largest collection, how¬ ever, is the spendid library of the Department of Agriculture at Washington, numbering 137,- 700 items.

Social Sciences, Economics, etc. — A very recent library development has been indicated in the departments of economics and sociology. The great industries have discovered the value of collections of literature, both as history and as. a guide to future developments. Thus the railways of the United States have organized a Bureau of Railway Economics for the study of transportation problems. This has a library of some 50,000 items at Washington, D. C. Other libraries similar in purpose but in a dif¬ ferent field are those that have been developed by the great insurance companies, the most noteworthy being that of the Prudential In¬ surance Company, at Newark, N. J., which has a collection which is said to number 200,000 items on life insurance and allied topics. The Mutual Life has 30,000 items; the Metropoli¬ tan 20,000 volumes ; and the Insurance Library Association, Boston, 21,000 items. Finance is represented also by some interesting collections. Thus the National City Bank of New York has a library of 24,000 volumes on banking, etc.; American Bankers' Association, New York, 48,000 items; Lee, Higginson & Company, Boston, 50,000 items. See Libraries, Com¬ mercial and Industrial.

A few special collections in sociology and social reform have appeared recently, the lar¬ gest probably being that of the Russell Sage Foundation, New York, with 51,695 items. The Children's Bureau at .Washington has a collec¬ tion of books upon its specialty and the Bu¬ reau of Labor has a library of 32,000 volumes on economic and social topics. There are a great many society and association libraries in the United States, the collections of Masonic Order being of interest, that of the Supreme Council of the Scottish Rite at Washington containing some 75,000 items.

Bibliography. — Bostwick, (The American Public Libra ry) (New York 1910) ; Dana, (Chicago 1910) ; Fletcher,

(Public Libraries in America) (Boston 1899) ; Jewett, (Notices of Public Libraries in the United States (Smithsonian Reports. Appen¬ dix. Washington 1857) ; United States Bureau of Education, (Public Libraries in the United States) (Special report 1876; Washington 1876) ; id., (List of Public Society and School Libraries) ; (American Library Annual. **

Canada.

There are few records of collections of books in Canada prior to the establishment of the British colonies. Le Moyne d'Iberville is

said to have gathered together all the works on the New World and carried them with him on his expeditions, but what became of them is unknown. The Jesuit Fathers, as is well known, were indefatigable chroniclers, but whether they were equally enthusiastic readers is less certain. At any rate the first library re¬ corded in Canada was one organized by a group of British officers stationed at Quebec in 1779, who expended £500 in London in the purchase of books. This was first housed in the Bishop's Palace. In 1843 it was transferred to the Que¬ bec Literary Association, and again in 1866 to the Literary and Historical Society, at which time it numbered about 7,000 volumes. The collection now numbers 16,000 volumes, mainly Canadian history.

Collections in Ottawa.— In Ottawa, the seat of the Dominion government, are centred the libraries developed by the various official departments. . Of these the T arliament Library is the most important and, prior to the fire of 3 Feb. 1916, was the largest in Canada, numbering between 300,000 and 400,000 vol¬ umes. The departments of Justice (8,000 vols.), State Geological Survey (20,000 vols.) and the Supreme Court (38,000 vols.) are spe¬ cial collections that are growing rapidly.

Provincial Libraries. — The most import¬ ant collection in Quebec is the library of the legislature of the province (1792; 107,218

vols.) and the University of Laval in the same place possesses about 102,000 volumes and con¬ tains much important historical material rela¬ tive to Canada, and the B. Saint Sulpice (80,000), also in Montreal, has a most attrac¬ tive building. Public libraries have developed to a very limited degree in Quebec, but the con¬ trary is true of the province of Ontario. This has a widespread and thoroughly modern sys¬ tem modeled upon American and British meth¬ ods. The value of the library is recognized and it is liberally supported. A considerable num¬ ber are an evolution out of mechanics' libra¬ ries. These were taken over by the municipali¬ ties, the communities being taxed to maintain them under provisions of the Free Libraries Act, passed in 1882. Libraries were provided for in the law reorganizing the school system drawn up by Dr. Ryerson and passed in 1848, but only a few libraries were established at that time. There are more than 500 libraries, large and small, in Ontario.

The largest and most active public library in Canada is the public library of Toronto with 15 branches and 300,- 000 volumes. The activity in Ontario has ex¬ tended to the middle and western provinces, the Provincial Library of Manitoba at Winnipeg numbering 60,000 volumes ; British Columbia having several active libraries, the Provincial Library at Victoria containing 30,000 volumes; while Alberta has three collections of over 10,000, the most important being the Public and Strathcona Library at Edmonton, containing 35,000 volumes. Many new and splendidly equipped buildings are being constructed in Canada, especially in the western provinces.

Traveling Libraries. — In 1890, a system of traveling libraries was initiated by Lady Aber¬ deen at a meeting of ladies in Winnipeg. This, called the Aberdeen Association, has endeav¬ ored to supply reading matter to settlers and iso¬ lated families in the Canadian Northwest. This

dee

association has distributed thousands of books, magazines, etc., and has brightened the lives of many lonely people.

University Libraries. — The largest and most modern university library in Canada is that of McGill University at Montreal. This has six branches and its collections number about 152,000 volumes. The University of To¬ ronto has also an excellent library numbering some 148,434 volumes.

There is an active library association in Can¬ ada, which was established in 1900. Canadian libraries have suffered severe losses by fire dur¬ ing the recent years — the collections of the Uni¬ versity of Toronto, of the Provincial Library of Quebec and finally the Parliament Library at Ottawa was partially destroyed in the burning of the Parliament buildings, 3 Feb. 1916.

Latin America.

The continuous social and political unrest and the upheavals that have marked the course of affairs in the Latin American countries have had an injurious effect upon the development of libraries. Prior to the establishment of the various states, the only collections were in the religious institutions. These, however, in most cases were of minor importance, and during the 19th century were allowed to

decline or were merged with the public collections. In a few of the more progressive states, such as Argen¬ tina and Mexico, provision was made for na¬ tional libraries in the middle of the last cen¬ tury. As early as 1867 a national library was instituted in Mexico and in 1873 the librarian of the Argentine National Library, V. G. Que-sada, made a trip to Europe in order to study its famous libraries, which resulted in an elab¬ orate work entitled (Las Bibliotecas Europas y algunas de la America Latina) (Buenos Aires 1877).

Mexico. — In 1913 there were about 150 li¬ braries in Mexico, of which the most important is Biblioteca Nacional. This was formed from the collections of the various religious and edu¬ cational institutions that came into control of the state when the Liberal party came into power. It was opened to the public in 1884. Its collections number about 200,000 volumes.

Central America. — Several of the Central American states have libraries, the majority, however, being relatively unimportant, that of Costa Rica, at San Jose, being housed in a new building with a system of arrangement, cata¬ loguing, etc.

Cuba. — One of the most active and up-to- date libraries of Latin America is the B. Na¬ cional at Havana, Cuba, founded in 1901.

South America. — With the exception of Argentina, Brazil and Chile there are very few collections of great importance in South Amer¬ ica. Colombia has a national library at Bo- ˆ>ta, Bolivia has a number of small collec¬ tions, as has Peru at Lima, while Paraguay es¬ tablished a Biblioteca Nacional in 1915.

Brazil. — The largest and perhaps the best equipped library in South America is the Bib¬ liotheca Publica Nacional at Rio de Janeiro, Brazil. This was founded in 1810 and its collec¬ tions of over 330,000 volumes and 500,000 man¬ uscripts, etc., are housed in a splendid new building completed in 1910 at a cost of $1,500,- 000. The most modern methods are in use here and in other libraries in the country.

Argentina. — The interest in libraries is more active and widespread in Argentina than any other South American state. There are fully 200 libraries of all types, the most im¬ portant, of course, being the Biblioteca Nacional at Buenos Aires. This was founded in 1810 by Dr. Mariano Moreno, the first collections being derived from the library of the bishop of Bue¬ nos Aires. The collections now number about 300,000 and contain some interesting manu¬ scripts relative

to the early Spanish period.

Great Britain.

The English kings apparently were indif¬ ferent lovers of books. So far as is known, none but George III formed a library worthy of the name. In one case the power of the king reacted injuriously upon British libraries, for as a result of the conflict of Henry VIII with the Holy See the valuable monastic and other ecclesiastic collections of the pre-Ref- ormation period were destroyed or scattered. Some of these books, however, were saved by John Leland (q.v.) and other book-lovers. For this reason but few of the existing British libraries assign a very early date to their foundation. In fact, according to published records, only 37 containing more than 50,000 volumes were founded prior to 1800. Of these, two, the Cambridge University Library (1444) and Lincoln's Inn Library (1497), were founded during the 15th century; six during the 16th century, eight during the 17th century, 11 dur¬ ing the 18th century and 64 during the 19th century.

Among these institutions, the British Mu¬ seum (q.v.) of course assumes greatest im¬ portance. The date of its foundation is usually designated as 1753, the year of the bequest of Sir Hans Sloane, yet Edward Edwards finds the origins of its collections in a much earlier period. A royal library, according to Walpole, was established by Henry VIII, which was in- creased'by gifts from monarchs abroad. Slight additions were made under Henry VIII, but during the brief reign of Edward VI was a decided development owing to the efforts of Sir John Cheke and Roger Ascham. The ac¬ cessions later of the collections of Henry, Earl of Arundel, Lord Lumley, Archbishop Cranmer, Casaubon, Sir John Morris and the Orientalia of Sir Thomas Roe formed the nucleus, to which was added the splendid collections of Sir Hans Sloane and King George III.

University Libraries. — As one would ex¬ pect, the earliest large collections were formed by the universities, many of which have grown into imposing libraries. The oldest of these, and one of the most ancient in England, is the Cambridge University Library. That it was in existence prior to 1425 is indicated by a list of its books made at that time. Its first great benefactor was Thomas Scott, arch¬ bishop of York, who erected the building (1475) in which it was housed until 1755, and who made additions to its collections and endow¬ ment. It contains about 900,000 volumes, which include many early English imprints. More famous, even, than the Cambridge Library is that of Oxford, named the Bodleian, after the founder, Sir

Thomas Bodley. It was due to the enthusiastic labors of this bibliophile that the Bodleian was opened to the public in 1602 with 2,000 volumes, almost entirely gifts from

his private collection. These activities were crowned by the generous provisions contained in his will. Other distinguished benefactors were Archbishop Laud, Sir Kenelm Digby, John Selden, Francis Douce, etc. The library now contains about 800,000 volumes, 41,000 manu¬ scripts, which include a wonderful collection of Orientalia, Greek and Latin manuscripts, and much valuable material in history and litera¬ ture. In 1860 it was united with the Radcliffe Library of Medicine and Science, the collec¬ tions being transferred to the Radcliffe Camera, its present home. Among the university libra¬ ries of Scotland, those of Edinburgh and Saint Andrews are the most important. The library of the latter is perhaps the older of the two, as the university is known to have possessed books as early as 1456, but the assigned date is 1610 at which time the various collections were united by command of King James VI. It contains about 150,000 volumes, including valuable local history. Edinburgh University was founded in 1583 by the bequest of the library of Clement Little, a lawyer of Edin¬ burgh. This collection was transferred to the university at its foundation in 1583. Among the library's benefactors was the famous Scotch poet and bibliophile, Drummond of Hawthorn- den, who made a large donation of books in 1627. The collections number 270,000 volumes and 800 manuscripts. The library of Trinity College at Dublin had a somewhat romantic beginning, having been founded by a gift of £1,800 made by the English army as a memorial to its victory over the Spanish at Kinsale in 1602. This sum was placed in the hands of James Usher, later primate of Ireland, who was a friend of Bodley, the two co-operating in the interest of their libraries. Usher's own library was purchased at his death in 1655 but its transfer to the university was held up by Cromwell, and not consummated until the Res¬ toration. The library has received many valu¬ able gifts of books and manuscripts and now numbers about 350,000 volumes and 2,078 manu¬ scripts. Among the more recent university foundations may be named the University Col¬ lege Library, London (1823; 150,000 vols.) and the University of London (1839; 100,000 vols.). The majority of the English cathedrals have collections of books. The most of these, how¬ ever, are small and their use is usually restricted to the diocesan purposes. A few, however, are open

to the public.

Public Libraries. — The development of the free public library has in the main followed a course parallel with that in the United States, the movement toward popularization of exist¬ ing collections and the establishment of new ones occurring simultaneously in both countries. The work of the public library of to-day was formerly done by proprietary and subscription libraries, analogous to the mechanics' libraries in the United States. Some of these, such as the London Library, founded by Carlyle, Glad¬ stone and other distinguished men, are still operative, but in great part they have been absorbed by the public libraries. The most active worker for the establishment of free public libraries was Edward Edwards, the au¬ thor of (Memoirs of Libraries.) At a meeting of the Statistical Society, 20 March 1848, he read a paper in which he deplored the lack of interest in free libraries. He found only

29 free libraries, possessing more than 10,000 volumes each, while France had 107, Austria 41 and Switzerland 13. This paper attracted the attention of William Ewart, M.P., and resulted in the appointment of a library commission on the subject of public libraries, and finally in the Public Libraries Act of 1850. (Consult Axon, Statistical Notes on the Free Town- Libraries of Great Britain, > Journal of the Statistical Society, September 1870). The de¬ velopment under the provisions of this act was slow. Prior to 1886, 133 libraries had been established; from 1887 to 1890, 70; since which date the annual average was 17. Under a new law, which came in force in 1893 (XVIII, p. 422). Since 1900 the growth of free public libraries in Great Britain and her colonies has been remarkable. Not a little of this has been due to Andrew Carnegie, whose benefactions have been extended to the British Empire.

Only two of the great British public libra¬ ries, Dundee, Scotland (1601 ; 154,922 vols.), and Bristol (1613; 180,825 vols.), were established prior to the 19th century. Indeed, the tremen¬ dous growth in free public libraries has been a very recent thing in all countries. This is indi¬ cated in Great Britain by the fact that some of the most important free libraries in the kingdom have been established during the last few dec¬ ades. Thus Glasgow (430,000 vols.) was founded in 1877 ; Lambeth-Tate, London (159,000 vols.), in 1886; Edinburgh Public Library (200,000 vols.), in 1887; Hull (106,000 vols.), in 1892; John Rylands in Manchester (200,000 vols.) is one of the relatively few private endowed li¬ braries in England. This was founded by Mrs. E. A. Rylands in 1899 as a memorial to her husband and is housed in a splendid building Its

collections are based upon the famous Al- thorp Library, formed by Earl Spencer. Other public libraries of more than 100,000 volumes are Birmingham (1861; 445,675); Bolton

(1852; 128,322); Bradford (1871; 178,035); Cardiff (1862; 221,000); Liverpool (1850; 338,- 796); Guildhall Library, London (1824; 148,- 757) ; Westminster, London (125,000) ; Man¬ chester Free Public Libraries (1852; 500,000) ; Newcastle-upon-Tyne (1874; 170,000) ; Notting¬ ham (1868; 149,657), and Sheffield (1853;

186,551).

Special Libraries. — There are many valu¬ able special collections in Great Britain, among which may be noted: Law: London, Inner Temple (1540; 58,000); Lincoln's Inn (1497, 72,000) ; Edinburgh, Signet (1722; 122,000). Political Science Statistics, etc.: London, Brit¬ ish Library of Political Science (1896 ; 300,- 000) ; Foreign Office (75,000 public docu¬ ments) ; Reform Club (1836; 56,000); Royal Colonial Institute (1868; 100,000) ; Royal Sta¬ tistical Society (1834; 50,000). Medicine: Lon¬ don, Royal College of Physicians and Surgeons (60,000). Science: London, Royal Society (1662 ; 80,000); Science Museum (105,000); British Museum, Natural History Library (1881 ; 72,000) ; Society of Antiquities (40,000) ; Geological Society (1807; 30,000); Linnean Society (1788; 35,000); Royal Geographical Society (1830; 50,000); Chemical Society

(1841; 25,000). Military and Naval Science: London, British Admiralty (1700; 50,000) ; Royal United Service Institution (1831; 32,- 000). Fine Arts: National Art Library (1841; 115,000). Consult Edwards, (Memoirs of Li- braries) (London 1859) ; Garnett, (Essays in Librarianship) (London 1899) ; Ogle, (The Free Library) (London 1897) ; Rye, (The Li¬ braries of London) ; Savage, (The Story of Libraries and Book-Collectors> (1909).

Austria-Hungary.

Owing to the fact that Austria has remained firm in her allegiance to the Roman Catholic Church, the library situation there is rendered interesting by the great number of monastic collections remaining intact. From the view¬ point of the bibliographer they are of

immense interest, some of them having been founded in the early mediaeval period and still in pos¬ session of their ancient treasures. There are 13 of these libraries containing over 50,000 volumes of which the following may be noted : the Benediktinabtei at Admont (1074; 88,000); Closternburg (1106; 81,000); Kremsmiinster (777 and 1571; 91,000); Moelk, Salzburg (fd. circa 790 by Archbishop Arno, 72,000). In modern library movements, however, Austria, until recently, has not taken an active part. For a long period the empire possessed the richest collections in Europe, but they have not kept pace with those of Germany, Great Britain and France during the 19th century. In the K. K. Hofbibliothek at Vienna, Austria pos¬ sesses, however, a library of the first import¬ ance. This is based upon the palace collections of Emperor Frederick III, established in 1440, but its growth was limited until the reign of Maximilian I, who is considered to have been the real founder by its noted librarian, Lam- brecius. One of its early librarians was Enea Silvio Piccolomini, who later became Pope Pius II. The library is housed in an imposing and elaborately decorated building on Josephplatz and was completed in 1826. It has many exceedingly valuable and interesting collections, among them being the library of the famous Fugger family, manuscripts from the collec¬ tions of Matthew Corvinus, king of Hungary, the library of Tycho Brahe, the astronomer, that of Prince Eugene of Savoy, etc. The collections number about 1,000,000 volumes, 8,000 incunabula and 27,000 manuscripts. Of particular importance is the collection of 100,- 000 papyri formed by the Archduke Ranier.

*University Libraries. — With the excep¬ tion of the Hofbibilothek at Vienna, the most important collections in Austria are those pos¬ sessed by the universities, the largest being the K. K. Universitats-B at Vienna. This was founded in 1775 by the Empress Marie Theresa, and contains 882,394 volumes, 663*incunabula and 906 manuscripts. Other large university collec¬ tions are Budapest (1635; 491,831 vols.) ; Cra¬ cow (1400 ; 429,355 vols.); Czernowitz (1852; 222,133 vols.); Graz (1586; 271,000 vols.); Innsbruck (1746; 266,812 vols.) ; Klausenburgh (1872 ; 253,000 vols.); Lemberg (1784; 241,000 vols.); Prague (1784; 381,000 vols.).*

Special Libraries. — The following special collections may be noted : Law, Politics, Statistics, etc.: Fiirstl. Leichsteinische Fidei- Kommiss-B. (100,000 vols.); K. K. Familien- Fideikommiss-B. (1784; 250,000 vols.);

Archiv u. B. des K, K. Finanz-Ministeriums (63,000 vols.); B. des 0.

Reichsrats (1873; 56,- 000 vols.), in Vienna, and B. des K. Ungar Statistiches Amt. (1867; 118,132 vols.), in

Buda-Pest; Theology: Reform-Theologische- u.-Rechts-Academie B., Sarospatak (1531; 60,- 000 vols.) ; Science and Technology : K. K. Geologische Reichsanstalt-B. (1849; 65,000

vols.) ; Hungarian Academy of Sciences (160,- 000 vols.) ; the Konigl. Ungar. Josephs-Technis. Hochschule-B. (1850; 105,098 vols.), in Buda- Pest, and the K. K. Technis. Hochschule-B. (140,173 vols.), in Vienna. Consult Bohatta and Holzmann, (Adressbuch der Bibliotheken der oesterreich-ungarischen Monarchic5 (Vienna 1900) ; Kukula, (Die oesterreichischen Studien- bibliotheken in den Jahren 1848-19085 (Vienna 1908) ; Gulyas, (Das ungarische Oberinspektorat der Museen u. Bibliotheken5 (1909) ; (Die fiber 10,000 Bande zahlenden oeffentichen- Bibliotheken ungarns in Jahr 1908 5 (Buda- Pest 1910).

France.

The greater part of the French libraries originated in the collections of religious orders and the mediaeval universities. These collections, many of which date back to the 14th and 15th centuries, remained relatively intact until the Revolution, during which the libraries suffered in common with all of the institutions of the nation. Yet its effect on library development in France, on the whole, was beneficial, for while many valuable manuscripts and books were lost, yet their loss was more than com¬ pensated by the foundation of the public library system of France, which was for many years superior to any. When the monasteries and other religious foundations were disestab¬ lished, their libraries were made the property of the state and placed in the care of the com¬ munes, thereby forming the nuclei of the present bibliotheques municipals, or free public libraries. This transfer was made under the Decrees of the Constituent Assembly, 1789 and 1790, and of the Legislative Assembly, 1792 and 1793. The Decree of 1793 fixed the distinction between libraries and archives and laid the foundation for the provincial libraries. The provisions of these enactments were strength¬ ened by the Orders of Napoleon, 1803 and 1809, which provided for the organization and ad¬ ministration of these libraries.

Municipal Libraries. — The majority of the municipal libraries, therefore, as now con¬ stituted, were established during the early por¬ tion of the 19th century, yet, as has been indi¬ cated, their original collections are vastly older. The earliest existent collection,

if the German guns have spared any of it, is the Bibliotheque Municipale of Rheims founded in 1146, while that oi Angers was established by Alain de la Rue in 1376. Michel Anglici began the collection now the library of Charpentras in 1452. This still retains many of the manu¬ script rarities of the original collection. The Bibliotheque Municipale of Bourges was estab¬ lished in 1466, and that of Clement-Ferrand by Mathieu de la Porte in 1490. Francis I founded the library of Lyons in 1527, which was originally a part of the College de la Trinite, established at the same time. The col¬ lection later passed into the hands of the Jesuits, and suffered considerable losses when the order was suppressed. Its collections have

LIBRARIES

Library and Museum of the Hispanic Society of America, New York City

LIBRARIES

Bibliotheca Nacional, Rio de Janeiro

Central Library Building of Baroda, India. Formerly a Palace of the Maharaja

LIBRARIES

Public Library, Petrograd

LIBRARIES

1 Bibliotheque Sainte Genevieve, Paris 2 Bibliotheque Nationale, Cour d'honneur, Paris

3 Bibliotheque de la Ville, Bordeaux

LIBRARIES, MODERN

369

been largely increased by private benefactions. A library, free to the public, was established at Aix-en-Provence in 1409. This was partially scattered, but restored in 1705 with the gift by Andre Tournon of his private collection and 7,000 francs for the establishment of a free public library. The Bibliotheque Municipal of Tours originated in the collections of the abbey of Marmoutiers and

other religious foundations of the region. Its earlier collec¬ tions have suffered losses, but is now one of the largest public libraries in France. Another ancient library of France is that of Caen, Wil¬ liam the Conqueror's town, which was founded in 1431. In spite of the vicissitudes of many wars, particularly the religious ones, it has de¬ veloped into its present collection of 128,000 volumes. It was suppressed in 1701, but re¬ opened in 1736. Cardinal Fleury was one of its most liberal benefactors. The Bibliotheque Municipale of Lille is based like the others upon church collections and must have been established prior to the 14th century as a catalogue of that period is still in existence. It likewise suffered losses during the Revolu¬ tion, but at the same time was augmented by additions from other monastic collections. Just what it has suffered from the German occupa¬ tion is yet Jo be determined. One of the largest municipal libraries to develop from ecclesiastical origins is that of Rouen, which has steadily grown to its present size of 150,- 000 volumes. It was largely increased in 1855 by the accession of the splendid collection of M. Leber, containing 50,000 choice books and manuscripts. The Bibliotheque Municipale of Troyes was founded in 1651, by the gift of the library of Jacques Hennequin, to the Cordeliers of Troyes, on the condition that the library be opened to the public (135,550 vols.). When the religious orders were sutr ressed this collection, with that of the Oratorians and the remnants of the collection of the famous abbey of Clairvaux, were united to form the municipal library. Many of its treasures have been lost, but rare and precious items still remain, some antedating the death of Charle¬ magne. Among its collections of particular in¬ terest are the autograph works and correspond¬ ence of the Port Royal fraternity. The library of Besanqon (103,830 vols.), founded by the Abbe Boisot in 1696, contains many manu¬ scripts from the famous library of Cardinal Granvelle which had passed into the hands of the abbey of Saint Vincent and turned oyer to the city during the Revolution. Douai library (96,186 vols.), founded in 1767 unde the aus¬ pices of the university, received in 1791 the splendid collection of the Benedictine Com¬ munity of Marchiennes, which contained 1,718 rare manuscripts. The Bibliotheque Munic¬ ipale of Bordeaux (200,000 vols.) owes its origin to the bequests of MM. Bel and Cardoze to the Bordeaux Academie des Sciences in 1738. This collection has been generously added to by the city. Among other French libraries of interest may be noted: Rochelle, originating in the collection of the Consistoire Reforme de la Rochelle, 1604 (109,712*

vols.); Dijon (125,000 vols.), founded by P. Fevret in 1701; Nancy (142,018 vols.), founded by Stanislas in 1750; Nantes (220,000

vols.), 1753; Nice (60,000 vols.), founded by Abbe Massa in 1786; Nimes (110,000 vols.), founded

by Jean de Dieu and R. Bion in 1778; Perpig¬ nan (35,000 vols.), founded by Marechal de Mailly in 1759; Rennes (120,000 vols.), 1733; Toulouse (213,000 vols.), founded by the archbishop of Brienne in 1782; Marseilles (124,039 vols.), 1799,

Paris, of course, is richest in libraries of all types. The principal institution is the Bibliotheque «Nationale, one of the world's greatest libraries, the importance of which calls for a detailed description. (See special article National Library of France). Next in im¬ portance to the Bibliotheque Nationale is the Bibliotheque Saint Genevieve, founded by Cardi¬ nal de Rochefoucauld in 1642. Originally it was the library of the abbey of Saint Genevieve, which he gathered upon his appointment as abbot. From this small beginning, it de¬ veloped under the librarianships of Du Molinet, Gillet, Le Courayer, Mercier de Saint Leger, Pingre, Lemonnier and the historian Daunou. It steadily increased until at the outbreak of the Revolution it possessed about 80,000 printed books and 2,000 manuscripts. Two noteworthy collections were added during the 18th century; the splendid collection of Archbishop le Tellier (1716; 45,000 books and manuscripts) and that of the Duke of Orleans in 1791. At the dis¬ solution of the abbey (1791), the library be¬ came state property and was renamed the Bibliotheque Pantheon. Durine the empire it was united with the Lycee Henri IV. The collections of the Bibliotheque Saint Genevieve number at present about 400,000 books, 1,225 incunabula and 3,855 manuscripts. The Bibliotheque Mazarine is of great interest in part owing to its founder, the great cardinal, and in part to the treasures it contains. The famous Gabriel Naude, the first librarian, opened it to the public in 1642. It was dis¬ persed by the Fronde but reconstituted in 1661, at which time it contained about 40,000 volumes. The collection remained in the Mazarine Palace until 1688 when it was transferred to the College de Mazarine. Its collections num¬ ber about 250,000 volumes, 1,900 incunabula and 4,600 manuscripts. The Bibliotheque de l'Arsenal owes its origin to Antoine d'Argen- son, Marquis de Paulmy, who in the midst of a life of greatest activity as a general, statesman and author contrived to gather a private librarv of approximately 100,000 volumes. At his death in 1789, this was acquired by the Comte d'Artois who united it with the equally splendid collection of the Due de La Valliere. This collection, in 1858, contained 202,000 volumes and some 6,000 manuscripts. Its collections in 1915

numbered 624,904 volumes and 10,341 manuscripts. It possesses the most complete collection extant of romance literature, of drama, particularly of the period of mystery plays and by early French poetry.

Special Libraries. — There are, in all, about 200 libraries in Paris of which many are special collections of great importance. Of these the Bibliotheque des Archives may be mentioned. It was founded by the Daunou in 1808 and con¬ tains 30,000 volumes, mainly source material in history. A library similar in nature is that of the Office de Legislation Etrangere et de Droit Internationale. Other special libraries are Law: Bibliotheque des Avocate (1704; 65,000 vols.) ; Bibliotheque de la Faculte de Droit (100,000 vols.) ; Legislation: Bibliotheque de la

*Chambre dcs Deputes (1706; 200,000 vols.) ; Bibliotheque d'u Senat (1818; 140,000 vols.); Medicine: Academie de Medecine (1820; 60,- 000 vols.) ; Faculte de Medicine (220,000 vols.) ; Military and Naval Sciences: Bibliotheque du Ministere de la Guerre, founded by Louvois (135,000 vols.); Bibliotheque et Archives du Ministere de la Marine (1836; 100,000 vols.); Bibliotheque Hydrographique d*e la Marine (60,000 vols.) ; Education: Bibliotheque de l'Enseignement Public (80,000 vols.); Science and Technology: Lcole Nationale des Ponts et Chausees (100,000 vols.); fLcole Polytechnique (50,000 vols.) ; Lcole Superieure des Mines (1778; 5,000 vols.); Museum d'Histoire*

Naturelle (220,000 vols.) ; Societe de Statistique (60.000 vols.) ; Bibliotheque de la Societe de Geographic (60,000 vols.) ; Music , Fine Arts: Bibliotheque d'Art dt Archeologie (100,000 vols.) ; Conservatoire National de Musique (1775; 80,000 vols., 500,000 music manuscripts) ; Miscellaneous : ficole Speciale des Langues Orientales Vivantes (75,000 vols.) ; Bibliotheque Historique d'e la Ville de Paris (1872; 24,000 vols.) ; Institut de France (1795; 550,000 vols.) ; Bibliotheque Polonaise (1838; 100,000 vols.) ; Societe de l'Histoire du Protestantisme (60,- 000 vols.).

University Libraries. — In comparison with the libraries of some of the provincial univer¬ sities, that of the Universite de Paris, or the Bibliotheque de la Sorbonne (600,000 vols.), is of relatively recent birth, having been founded in 1762. Next to the Bibliotheque

Nationale it is the richest in special collections and source material. In 1897 it was housed in the build¬ ings of the New Sorbonne, even then inade¬ quate for its collections. Many of the pro¬ vincial university libraries date from the mediaeval foundations of their schools. Thus the Bibliotheque Universitaire, Aix-en-Provence (85,000 vols., 63,000 theses) was established in 1409, that of the University of Bordeaux (107,- 000 vols., 174,400 theses) in 1441. More recent foundations are the University of Grenoble (1879; 175,000 vols.) ; Lille (407,000 vols., 194,- 000 theses) ; Lyon (137,352 vols., 117,000 theses) ; Montpellier (126,399 vols., 127,000 theses) ; Nancy (107,254 vols., 106,000 theses) ; Poitiers (114,000 vols., 170,000 theses) ; Rennes (1733; 193,000 vols., 68,000 theses); Toulouse (1879; 140,000 vols.).

Prior to the 20th century France was per¬ haps better supplied with excellent collections of books than other countries. Her institutions have tended to cling to old methods, hence the modern movement that has transformed biblio¬ graphic systems in the United States and Eng¬ land has been but slowly accepted there. In 1906, however, the Minister of Public Instruc¬ tion appointed a committee to study the condi¬ tion of the archives and libraries of France which presented a report recommending radical reforms in methods, and a more liberal treat¬ ment of libraries and their personnel in income and scholarly recognition. At this time, also, a national library association was founded and a periodical started which might serve as an organ of intercommunication between libra¬ rians. There is every reason for believing that this movement will prove as wholesome for library conditions in France as the similar ones in Great Britain and America. Consult Mar¬ cel, H., and others, (Bibliotheque Nationale5

(2 vols., Paris 1907) : Franklin, ˆGuides des savants, des litterateurs, etc., de Paris5 (Paris 1908) ; Le Prince, (Essai historique sur la Bibliotheque du Roi, aujourd'hui Bibliotheque Imperiale5 (Paris 1856) ; Martin, (Histoi-re de la Bibliotheque de l'Arsenal5 (Paris 1899) ; Morel, (Le Developpement des Bibliotheques publiques5 (Paris 1899) ; Mortreuil, (La Bibli¬ otheque Nationale5 (Paris 1878) ; Pecheur, (Histoire des bibliotheques publiques du De¬ partment de l'Aisne5 (Soissons 1884) ; Saint- Albin, (Les bibliotheques municipals de la Ville de Paris5 (Paris 1896) ; Supercaze, (Les bibliotheques populaires, scholaires et peda-gogiques5 (Paris 1892).

German Empire.

The German Empire has a great number of large libraries. This is due in the main to the existence of the many separate states that form the empire, the rulers of which have encouraged the formation of libraries in their capital .cities. The interest, likewise, taken by the Germans in popular education and in scholarship has had its effect also. Hence, while Germany has no individual collections that compare with the Bibliotheque Nationale or the British Museum, it has a dozen that exceed 500,000 volumes in size. Four classes of libraries may be distin¬ guished in Germany, the Hof or Royal, the Stadt or Municipal, the university and the pop¬ ular libraries, or Volk-bibliotheken.

In origin the German libraries, like the French, may be traced to three movements:

(1) The mediaeval or ecclesiastic foundations;

(2) the humanistic or university; (3) the mod¬ ern. As in France, it has been the privilege of the last period to gather together and organize the material that has been saved from the earlier collections. For this reason many of the German libraries assign their foundations as early as the 14th and 15 centuries. The sup¬ pression of the religious orders during and after the Reformation resulted in the liberation of many collections of books, some of great interest, and, while many valuable items were lost, a large proportion was saved as is evi¬ denced by the splendid collections of manu¬ scripts and early printed books in the various libraries.

Germany has produced many librarians and bibliographers of distinction, among whom may be noted Lipsius, Pertz, Panzer, Halm, Petz- holdt, Heyne, Ritschl, Hain, Jahn, Forstmann and Dziatzko. The modern library movement, owing to the early efficiency and completeness of Germany's early library system, did not de¬ velop in that country until the beginning of the present century. While an excellent library journal, Zentralblatt fur Bibliotekswesen, has been in existence since 1884, no national association of librarians was formed prior to 1889. During the last decade legislation has been enacted in Prussia and Bavaria providing for more careful attention to the development of libraries and for raising the standard of librarianship, it being enacted in 1904 that librarians should be university graduates and candidates for the doctorate, and in 1907 a director of library affairs, under the Minister of Education, was established.

The Konigl. Bibliothek at Berlin (1661) is not only the greatest

library in Prussia, but, in a sense, fills the role of the national library of

the German Empire. It is one of the 10 great¬ est libraries in the world, containing now about 1,500,000 volumes, 5,000 incunabula and 42,000 manuscripts. Its founder was the Elector of Brandenburg, Friedrich Wilhelm, who formed a collection in his palace in 1650, consisting mainly of spoils from monasteries destroyed during the religious wars. In 1699 the copy privilege was assigned, but no large ad¬ ditions were made either during the reigns of Friedrich Wilhelm I and Frederick the Great. The predilection of the lat¬ ter for French literature, however, indi¬ rectly benefited the Royal Library, for he immediately turned over to it every book in the German language that came into his possession. Under Friedrich Wilhelm III many large addi¬ tions were made. The library possesses im¬ portant special collections, among which may be noted German history and literature, philology, the sciences and a splendid collection of in¬ cunabula. Its collections were housed for more than a century in an imposing but sombre building erected by the command of Frederick the Great during the years 1775-80. A new and more commodious building was erected in 1909.

The Konigl. Hof-u. Staatsbibliothek, the Royal Library of Bavaria at Munich, has long been recognized as a model institution. It was founded during the reign of Gross-Herzog Al¬ brecht V during the years 1550-79, its nucleus being the private library of the ruler. A build¬ ing was erected for it in 1575 and the collec¬ tions have gradually increased until it pos¬ sessed about 20,000 volumes at the beginning of the 16th century. It suffered losses during the Thirty Years' War, but gained in the end, for a number of valuable collections, such as that of Gross-Herzog Christopher of Wiirttemberg and the library of Tubingen, came to it as spoils of battle. All pre/ vious accessions, how¬ ever, were overshadowed by the expansion un¬ der Maximilian Joseph resulting from the sup¬ pression of religious institutions, 150 of which were closed in 1803. Vast collections came from the Jesuits' College at Ebersberg, the Benedictine abbey of Saint Emmeran, Ratisbon and other monasteries of the same order; the canonries of Saint Udalrich, Saint Afra, and from libraries at Mannheim and Bamberg. Ludwig I was equally generous and during his reign many important special collections were received, such as those of von Moll and K. F.

Neumann. He built the splendid palace on Ludwigstrasse, which houses the collections, the library being reorganized and reclassified when installed. The collections number about 1,200,- 000 volumes, 50,000 manuscripts, and are par¬ ticularly rich in Hebrew literature and Orientalia.

The Royal Library of Saxony, at Dresden, was founded by Elector Augustus in 1556, who established a collection in his palace, Castle Annaburg. In 1595 it contained 5,668 volumes. Its greatest expansion was experienced under Friedrich Augustus II, the second founder of the library. He installed it in a new home, add¬ ing a number of valuable collections such as those of von Besser and Maurice of Saxe. Under Friedrich Augustus III it took first rank, due mainly to the efforts of Prince Xavier, guardian of the young prince. Two vast col¬ lections were added; the Biinau (43,000 vols.) and the Briihl (62,000 vols.). In 1800 the col¬

*lections numbered 200,000 volumes, in 1850 300,000 volumes, and at present it contains about 600,000 volumes and 6,000 manuscripts. * It is particularly rich in German history, literature and the fine arts.*

Among the other royal libraries may be men¬ tioned Konigl. Landesbibliothek of Stuttgart (603,186 vols.), opened to the public in 1777, containing at that time 6,000 volumes and 4,000 manuscripts from the palace collections at Ludwigsburg. It contains many of the books from the private library of the famous French scholar De Thou which were purchased when his library was dispersed. It is also famous for its collection of editions of the Bible. The Hertzogl. B. of Wolftenbiittel (300,000 vols.), founded by Julius, Duke of Braunsweig-Lune- burg, in 1558, was a large collection at the be¬ ginning of the 18th century. The poet Lessing, at one time was librarian and among its patrons was the philosopher Leibnitz, many of whose papers, however, are in the Konigl. u. Provinzial-Bibliothek at Hanover (211,200 vols.), founded by Duke Johann Friedrich in 1660; Gotha, Offentliche B. des Herzogl. Hauses, founded 1646 by Ernest I of Saxony, has been developed by the reigning sovereigns (25,000 vols. in 1723; 150,000 in 1858; 205,638 in 1912 and 7,655 manuscripts). The Grossherzogl. Hof-B. at Darmstadt (564,512 vols.) was founded in 1670 by Ludwig I, but based upon the col¬ lections of the Landgrave Ludwig VI. It contains manuscripts from Cologne Cathe¬ dral. Saxe Weimar has long been a centre of art and literature, its rulers encouraging all things that would foster learning. Hence the Grossherzoglidh Bibliothek (300,000 vols.) is large and most interesting. It was founded in 1700

by Duke Wilhelm Ernest, who gathered all of the books of his predecessors together into one collection. During the 18th century it was accounted the best library in Germany. It contains a fine collection of militarv litera¬ ture.

Municipal Libraries. — One of the most in¬ teresting and perhaps oldest of the German stadt or town libraries is that of Niirnberg, founded in 1445 by Dr. Konrad Kiihnhofer, who presented his private collection to the city. To this has been added many valuable collec¬ tions, notably that of Jerome Paumgartner, the friend of Luther. It also contains monastic books, the manuscripts of Hans Sachs and of Diirer, and many rarities greatly treasured by the city. The collections, numbering about 112,000 volumes and 2,550 manuscripts, are housed in the ancient monastic building of the Dominicans. The Staats-Kreis.-u.Stadtbiblio thek of Augsburg was founded in 1537, its col¬ lections originally having been monastic. . In 1806, when the city of Augsburg was ceded to Bavaria, the greater part of its library was transferred to Munich. Steps were soon taken to rebuild it and books were gathered from the convents and monasteries to that end. These amounted to 42,791 volumes, which were formed into a Kreisbibliothek. The collections number (1912) 205,000 volumes, 2,300 manuscripts.

Hamburg contains a number of excellent li¬ braries, of which the most important is the Stadtbibliothek, founded in 1529. This contains about 418,000 volumes, 917 incunabula, 8,000 manuscripts. Frankfort-on-Main also is well .. supplied with libraries, possessing four of more

than 50,000 'volumes each. The Stadtbibliothek, founded in 1668, is the largest, containing ap¬ proximately 370,000 volumes. The Konigl. Offentliche B. of Bamberg (1611) contains splendid collections, being particularly rich in examples of early printing, the majority coming from the libraries of suppressed religious insti¬ tutions. It is housed in the building of the former Jesuits' college. Among the other pub¬ lic libraries in Germany, too numerous to be discussed, may be noted those of Berlin (124,- 866 vols.) ; Liibeck (1620; 129,056 vols.) ; Mainz (1803 ; 235,000 vols.); Bremen (1660; 148,837 vols.) ; Breslau (185,000 vols.) ; Cassel (1580; 250,000 vols.); Cologne (1602; 255,000 vols.); Danzig (1591; 167,000 vols.); Treves (1803; 100,000 vols.) ; Weisbaden (1813;

172,211 vols.). Leipzig, the centre of German publishing activi¬ ties, is also the home of a number of excellent libraries, among which may be noted the Biblio- thek des Reichsgerichts (1870; 170,000 vols.), the Padegogische Zentralbibliothek (1872; 190, 000 vols.) and the Universitats-B. (1543; 610,000 vols.). The Stadtbibliothek originated in a bequest of Hulderich Gross in 1677. It contains many valuable collections, among them that of Prof. H. L. Politz, the historian, be¬ queathed in* 1838.

University Libraries. — The universities have played an extraordinary role in the de¬ velopment of modern Germany. This has been due in part to their large and well- equipped libraries and to the German research methods which enforce constant reference to their collections. The oldest German univer¬ sity library is probably that of Heidelberg, founded in 1386. It's modern development, however, dates from the purchase of the private library of the scholar Graevius by the Elector Palatine Johann Wilhelm, in 1707, who incor¬ porated with it the remnant of the ancient library. Other collections were received from dissolved monasteries and other sources, and by careful purchases, until it comprehends at present 500,000 volumes, 200,000 theses and 3,530 manuscripts.

The University of Halle (Friedrichs-Uni- versitat Halle-Wittenberg) possesses an excep¬ tionally well-organized library, rich in early printed books and research literature. Its foundation was laid in the purchase of the library of Prof. J. G. Simon in 1696, by dupli¬ cates from Berlin and the collections of Bergen Convent. The merging of the University of Wittenberg with Halle in 1816 resulted in another large increase. The collections now number about 300,000 volumes and 2,016 manu¬ scripts. Another admirably equipped library is that of the University of Gottingen, founded by .George II in 1734. The famous bibliog¬ rapher Heyne was librarian for 50 years, and to this fact is due the completeness of its col¬ lections and their excellent catalogues. Heyne's successors were equally devoted. The library contains many valuable special collections, among them those of the historian Heeren, of von Biilow, Uffenbach and J. C. Jahn. The library is particularly rich in philology, history and science, and contains about 619,102 vol¬ umes and 6,940 manuscripts. The united Royal and University Library of Konigsberg was founded b}r the Margrave Albert of Branden¬ burg, 1st Duke of Prussia, in 1534. The library at first was called the Schlossbibliothek. It

numbers some 318,000 volumes and 1,500 manu¬ scripts.

The Jena University Library (270,000 vols.) was founded by the

transfer of books from Wittenberg in 1548. The Grand Duke Karl Augustus of Saxe-Weimar was a patron of it and Goethe took great interest in its de¬ velopment. Another splendidly equipped uni¬ versity library is that of Leipzig, containing some 610,000 volumes and 6,500 manuscripts. It was formed out of monastic collections in 1543 and is particularly rich in history, the sciences and classics. Among other university libraries of Germany may be noted Erlangen (254,083 vols.), formed by the Margrave Friedrich, in 1743, out of the collections of the margraves of Anspach and dissolved monas¬ teries; Breslau (402,767 vols.), founded in 1811 from earlier collections and from the library of the former University of Frankfort- on-Main; Bonn (376,800 vols.), founded 1818 by the purchase of the collections of Prof. C. G. Harless and those of the former University of Duisburg; Marburg (265,000 vols.), founded in 1527 by Philip, Landgrave of Hesse; Rostock (294,000 vols.), founded by Grossherzog Al¬ brecht of Mecklenburg in 1552, based in part upon 'the collections of the short-lived Univer¬ sity of Biitzow; Wurzburg (400,000 vols.), founded by the Prince-Bishop Julius Echter v. Mespelbrunn; Giessen (261,747 .vols.) , formed of a collection purchased in Prague in 1605, and Tubingen (555,283 vols.), founded in 1477, based originally in monastic collections.

Special Libraries. — Germany has many ex¬ cellent special libraries, of which the most im¬ portant are at Berlin, the collections in law, medicine and technology being particularly note¬ worthy. As might be expected, the military collections are impressive, the Bibliothek des grossen Generalstabes, Berlin, numbering about 100,000 volumes, and that of Kreigsakademie about 105,000 volumes. The majority of the schools of technology have large and well- selected libraries. Consult (Addressbuch der deutschen Bibliotheken) ; Ebert, (Geschichte u. beschreibung der K. Oeffentlichen Bibliothek zu > Dresden > (Leipzig 1822); Hortzschansky, (Die K. Bibliothek zu Berlin) (Berlin 1908); Jaeschke, Wolks-bibliotheken5 ; (Jahrbuch der deutschen Bibliotheken) (Leipzig 1902) ; Petz- holdt, (Addressbuch der bibliotheken Deutsch- lands mit einschluss von Oesterreich — Ungarn u. der Schweiz) (3 vols., Dresden 1875).

Italy.

The library history of the kingdom of Italy has its roots in antiquity. Here was estab¬ lished the first Western monastery, Monte Cassino, whose, library still exists. This was founded by Saint Benedict in 529. It was in Italy that Petrarch, Boccaccio, Poggio and their confreres began the search for manuscripts and objects of ancient art that initiated the Renais¬ sance. As in Germany, another thing that

en¬ couraged the development of libraries was de¬ velopment of the small states and free cities. The rulers of these, during the later mediaeval period and throughout the Renaissance, were often patrons of art and learning who loved books and found much delight in collecting them. Many of the modern Italian libraries originated in such collections, and in spite of numberless wars and vicissitudes of all kinds

they still possess a great share of their original treasures. Italy was deprived of many rarities during the wars with the first French republic and Napoleon, but the majority were' returned after the fall of the latter. The unification of Italy and the establishment of the present king¬ dom. resulted in the nationalization of the li¬ braries, most of which passed under govern¬ ment control. Successive laws have been en¬ acted for the organization and administration of these biblioteca governati which are under direction of the Minister of Public Instruction, who has under him a Board of Library Control. Careful watch is made over the library treas¬ ures. In 1875, 1,700 monastic libraries were confiscated by the state. These were trans¬ ferred to the governmental libraries already in existence or new collections were formed (371 in 1875, 415 in 1878). The personnel of the libraries are government employees and are divided into the following classes: (1). libra¬ rians; (2) keepers of manuscripts; (3) assist¬ ants, cataloguers, etc. ; (4) ushers, messengers, etc.

The national library of Italy is the Nazion- ale Centrale Vittorio Emanuele, in Rome, founded 1875, and based on the collections of the Collegio Romano, or Jesuits' College. It has the copy privilege and contains many splen¬ did collections, such as the Farfensi, the Sesso- viani manuscripts of Santa Croce, Jerusalem, and much material on the history of Italy, par¬ ticularly the period of the Renaissance. An¬ other important library in Rome is the Biblio¬ teca Casanatense, founded by Cardinal Casanate in 1698. This contains 200,000 volumes, 2,000 incunabula, 5,000 manuscripts, many of them of the 8th to 10th centuries, and is rich in the literature of theology, law, economic, political and social sciences and history, particularly that of the Middle Ages. Among the other libraries of Rome may be mentioned the Biblioteca Uni- versitaria Alessandrina called the Sapienza, founded by Alexander VII, in 1667, the Cossini and the Chiagi. The collections at Milan are perhaps next in importance to those of Rome, the largest being the Biblioteca

Nazionale, or Braidense, founded in 1770 by Maria Theresa, who purchased the collections of the naturalist Haller consisting of 14,000 volumes and manu¬ scripts. The collections have been greatly in¬ creased by transfers from religious institutions and by public and private munificence. It con¬ tains many interesting items, among the manu¬ scripts of Dante, Galileo, Tasso and Manzoni. The collections number 259,680 volumes, 167,948 pamphlets, 1,834 manuscripts. There is an excellent catalogue in three parts, accession, author and subject, developed by Sacc'hi and Rossi. The classification system devised by Rossi for the Braidense has been adopted by other Italian libraries. More famous, even, than the Braidense is the Biblioteca Ambrosi- ana founded in 1609 by Cardinal Federico Borromeo, and based on his private collections. This is housed in an ancient conventual build¬ ing adapted to the purposes of a library, and contains many bibliographic treasures, among them manuscripts of Petrarch and Laura, draw¬ ings and manuscripts of Leonardo da Vinci and rare examples of early books. In 1879 it re¬ ceived the library of Prof. C. Mensinger, ((Bib- lioteca Europea,)} containing material on the history and linguistics of Europe. Cardinal

Mai, the celebrated antiquarian, was librarian of the Ambrosiana for several years.

Florence has a number of interesting col¬ lections, the oldest and most important being the Mediceo-Laurenziana housed in the Uffizzi Palace. It was formed from the collections, that of Lorenzo the Magnificent and the one gathered by Niccolo Niccoli and Cosimo. Ed¬ ward Edwards, (Memoirs of Libraries, > Vol. 2, p. 369, calls this ((The noblest monument which the Medicis have left of the glory of their line.ˆ It has suffered many losses, par¬ ticularly during the regime of Savonarola, yet it still remains one of the most interesting collections of bibliographic treasures in the world. Second only to the Vittori Emanuele at Rome is the Biblioteca Nazionale Centrale of Florence. This has developed from the amalgamation of the private collections of the famous bibliographer Magliabechi and the Bib¬ lioteca Palatina, formerly the library of the grand dukes of Tuscany and housed in the Pitti Palace. Magliabechi was librarian of the ducal library for many years during which time he gathered his own splendid collection, be¬ queathing it to the Grand Duke in 1714. Many valuable additions have been made to these col¬ lections, among them Poggi and Reviczky li¬ braries. The library is very rich in Italian history and literature. Manuscripts of Machia- velli and of Galileo, Torricelli, Viviana and other early Italian scientists are among the collections. A new building, appropriated for in 1902, has

been erected on the Corso dei Tintori, near Santa Croce. Its collections now number about 600,000 volumes, 900,000 pam¬ phlets and manuscripts including many prior to the 11th century. Others of special interest are those of Boccaccio and Cellini. Among other Florentine libraries are the Biblioteca Riccardiana, rich in. Italian literature, and the Biblioteca Marucelliana, remarkable for its collection of Italian art. The Biblioteca Marciana (library of Saint Mark's) is the most important one in Venice, and if the tradi¬ tion that Petrarch founded it in 1362 is correct it is the oldest. At any rate books from Petrarch's collections were discovered by Tomasini. The present collection is based upon the gift of manuscripts and codices brought by Cardinal Bessarione from Constantinople and presented to Saint Mark in 1468. Many addi¬ tions have been made from the collections of religious institutions and by private gift. The library is particularly rich in Venetian history and early geography and travel. It was first housed in the Libreria del Sansovino, from which it was transferred in 1812 to the Palazzo Ducale and in 1904 to the Palazzo della Zecca, or The Mint. Naples has a number of libraries, the most important being the Biblioteca Nazion¬ ale, opened in 1804. It originated in the library of Cardinal Seripando, to which large additions have been made, particularly in 1848 from monastic collections. It contains 395,439 vol¬ umes, 221,859 pamphlets, 4,218 incunabula, 7,997 manuscripts, and is very rich in scientific litera¬ ture, particularly the publications of learned societies. The Biblioteca Brancacciano (115,000 vols.) was founded by Cardinal Brancaccio in 1690. Balogne, long famous as a centre of learning, has an excellent library, the Biblioteca Comunale, founded 1801 (313,133 vols.),

which is especially rich in Orientalia, as has

Padua (Museo Civico, founded 1778, 230,000 vols.) and Modena, whose library, the Bib- lioteca Estense, is based upon the collections of the famous Este family, which were transferred from Ferrara to Modena by Cesare d'Este in 1598. It now forms the Biblioteca Estense- Universitaria. Other large collections are at Genoa, Pavia, Lucca, Palermo, Perugia, Pisa, Verona and Vicenza. The library at Messina was destroyed by the earthquake of 1908, but reconstituted in 1910.

University Libraries. — The universities of Italy are very ancient and

the majority possess excellent collections of books. One of the oldest of these, Bologna, doubtless had some type of a library at an early date, yet the founding of its present collection is assigned to 1605 at which time the naturalist Aldrovandi bequeathed his collection of 3,800 volumes and 350 manuscripts to the university. Great addi¬ tions were made by gifts from Count Luigi Marsili (1712), Mezzofanti, the famous biblio¬ phile and linguist, and others. The collections now number 255,000 volumes, 880 incunabula, 5,000 manuscripts. The University of Padua, another early foundation, has a library of 300,- 000 volumes and Pisa one of 203,000 volumes. The Biblioteca Universitaria of Naples is based on a collection established by Joachim Murat in 1812. This was transferred to the unversity and opened to the public in 1849. It contains a number of monastic collections and is rich in medical and scientific works. Other import¬ ant collections are at the universities of Pisa, Pavia, Genoa and Turin.

Special Libraries. — There are a number of important special libraries in Italy, the majority being in Rome. Among these are Law , etc.: The Biblioteca dei Deputati (133,700 vols.), Biblioteca del Senato (100,000 vols.) ; Mili¬ tary Science: Biblioteca Militare Centrale (70,- 000 vols.) ; Music: Biblioteca Musicale (115,- 000 vols.) ; Agriculture : Institute Interna¬ tional d'Agriculture (60,000 vols.). Con¬ sult (Le biblioteche governative del regno d'Italia) (Rome 1893) ; (Le biblioteche popolari in Italia, relazione al Ministro della Pubblico Instruzione) (Rome 1893) ; Fabietti, (Manuale per le biblioteche popolarP (Milano) ; (Sta- tistica della biblioteche) (Rome 1893-96).

Netherlands.

The Netherlands has long been a centre of culture and there were many excellent public and private collections during the era of their greatest prosperity. Popular libraries have been in existence for centuries, but Belgium and Holland fell behind the states of Europe during the 19th century. Since 1900, however, con¬ siderable progress has been made. Modern methods have been applied, old libraries have been rejuvenated and many new ones estab¬ lished.

Belgium. — It is quite impossible to give any true statement of the libraries of Belgium at the present, on account of the destructive in¬ vasion of the Germans in the World War. We know that the wonderful collection of manu¬ scripts and book rarities of the University of Louvain has perished, as doubtless is true of the collections at Liege, Tournai, Alost, Courtrai, Namur, Malines

(Mechlin) and Mons.

Brussels of course has the largest. and richest collections in Belgium, the Bibliotheque Royale

containing about 700,000 volumes. Its present collections date from 1837, but it is based upon the ancient Bibliotheques des dues de Bour¬ gogne, afid the Austrian rulers of the Low Countries. These were augmented by collections from suppressed religious institutions, particu¬ larly the Jesuits, but many valuable works were confiscated by the French during their occupa¬ tion. Much of its modern development has been due to the activity of Van Hulthem, under whose direction it became one of the best li¬ braries in Europe. It is particularly rich in Netherlands history. Brussels is also the head¬ quarters of the Institut International de Bib¬ liographic designed to constitute a centre for co-operative bibliographic work throughout the world.

Special Libraries. — The majority of the governmental departments have collections re¬ lating to their special fields, notably the library of the. Ministry of War (120,000 vols.), Cham- bre des Representants (100,000 vols.), Com¬ mission Centrale de Statistique (70,000 vols.), Ministere des Affaires Etrangeres (100,000 vols.), Ministere de la Justice (50,000 vols), and Ministere des Sciences et des Artes (75,- 000 vols.). Other important collections are the Bibliotheque des Bollandistes (1640 ; 200,000 vols.), Bibliotheque de l'Academie Royale (141,000 vols.), the Bibliotheque Collective International (75,000 vols., proceedings of learned societies), Academie Royal de Medecine (100,000 vols.), Conservatoire Royal de Musi- que (60,000 vols.) and the Musee Plantin Moretus (1640), containing 26,000 books and manuscripts on the history of printing.

The Bibliotheque Communal et Universitaire at Ghent is based upon the collections of the Conseil de Flandres, College des Echevins, the Baudeloo Abbey and other suppressed religious institutions. It was made a public library in 1797 and merged with the university upon its foundation in 1817. Collections, 450,000 vol¬ umes. The only library of importance in Ant¬ werp is the Bibliotheque Municipale, founded according to some authorities in 1476, but prob¬ ably a century later. It contains, if still extant, about 125,000 volumes.

Holland. — The most important libraries of Holland are the Koninklijke Bibliotheek at The Hague, and the university libraries of Utrecht and Leiden. The Koninklijke Bibliotheek (1798) was formed from the collections of the princes of Orange and the library of the

Staats-General, and various smaller collections, which are notably augmented by the bequest of Baron van Westreenen in 1848. It numbers some 600,000 volumes, comprising a very com¬ plete collection of Netherlands history. The library of the University of Utrecht originated in a collection brought together by the town council in 1581, but its true establishment was probably the date of the foundation of the uni¬ versity in 1636. It contains many rarities in its collections, among them the famous ((Utrecht Psalter." Its collections number about 400.000 volumes. The University of Leiden, founded as a memorial to the brave and successful de¬ fense of the city against the Spaniards in 1574, was long one of the most noted in Europe, and immediately upon its establishment by William of Orange (1575) steps were taken to develop a library. This has been augmented by books

from many sources, particularly by bequests and gifts from its distinguished scholars such as Grotius, Vossius and Joseph Scaliger, Ruhnken and Hemsterhuis. In 1877 the Library of the Society of Netherlands History was merged with it, forming a notable collection of national history and literature. It is also strong in Orientalia, Greek manuscripts and early Dutch travels. Its collections number 400,000 volumes, 6,000 manuscripts.

Russia.

*ftThe first library ever known in Russia was organized in the 11th century when the great Duke Yaroslaw, the Sage, ordered several books on religion to be copied and kept in the Church of Saint Sofia, at Kief.® (Mme. Haff- kin-Hamburger, (Russia Libraries, > in Library Journal, March 1915). The principal libraries of Russia originated in the spoils of war. This is particularly true of the Imperial Li¬ brary at Petrograd. * Its first collections were seized in 1714 in Courland, and its true estab¬ lishment dates from the transfer of the great Zaluski collection from Warsaw in 1796. It is perhaps true that the collection was de¬ teriorating in Poland, yet that only in part justifies the transaction. This collection was formed by Counts Josef and Andrei Zaluski, who had devoted their lives and great wealth to its accumulation, and when opened to the public in 1747 it probably numbered about 300,000 items. The addition of this to its other collections made the Imperial Library one of the largest in the world, a position it still main¬ tains. Among the many*

collections of which it was formed may be noted those of Catherine the Great, containing Shcherbatof, Voltaire and Diderot, the Slavonic collections of Tolstoi, Tischendorf manuscripts, including the wonder¬ ful Codex Sinaiticus, Dolgorousky's Orientalia, the libraries of Adelung, Tobler and Jungmann and the collections of the Jesuits' college of Polotzk. The library was opened to the public 2 Jan. 1814. The development of the collection was due in large part to the librarians of Olenin and Korff, the increase during the latter's ad¬ ministration being .remarkable, growing from 640,000 volumes to over a million. There is a catalogue in manuscript, and lists of special collections have been published from time to time. The collections number 2,615,374 vol¬ umes and 207,816 manuscripts.

Other large collections at Petrograd are the Academy Library (1725; 200,000 vols.) ; Ar¬ chives of the Senate (4,061,042 vols.) ; Goruyi Institute (1773; 250,000 vols.); Imperial Acad¬ emy of Science (1728; 500,000 vols.). At War¬ saw is the library of the Polish Kingdom (1,749,- 837 vols.). Moscow has also some large col¬ lections of books, notably the Rumiantseff Museum (1828; 1,000,000 vols.) and the Du- chovanja (1689; 240,000 vols.). Russian uni¬ versities have also extensive libraries, Charkov (1804; 240,916 vols.); Helsingfors (1640, 1827; 150,000 vols.); Kiev (1832; 500,000 vols.); Moscow (1756; 394,845 vols.); Odessa (1865; 280,144 vols.) ; Imperial University, Petrograd (453,772 vols.); Warsaw (1817; 576,387 vols.). The university at Tomsk, Siberia, has a collec¬ tion of 226,167 volumes.

There are a few special libraries of interest, the majority being in Petrograd. Agriculture : Archives of the Department of Agriculture

(1837; 300,000 vols.); library of the College of Agriculture and Forestry at Novaya-Alex- andriya (79,374 vols.). Law, etc.: Archives of the Senate (4,061,042 vols.). Theology: Clerical Academy, Kazan (1842; 106,666 vols.). Science and Technology : Archives of the De¬ partment of Roads (140,000 vols.) ; Imperial Academy of Science (1728; 500,000 vols., 13,- 000 MSS.) ; Russian Geographical Society (70,000 vols.). Medicine: Academy of Medi¬ cine (1725; 200,000 vols.). There has been no particular development of popular libraries in Russia, but during the last 10 years efforts have been made to establish them.

Scandinavia.

Prior to the latter part of the 19th century there was no general interest in library develop¬ ment in the Scandinavian countries.

There were a few collections in the larger cities and the universities possessed libraries, but none of these were extensive. During the last few dec¬ ades, however, there has been an awakening to the value of the library to the community and Scandinavian librarians have gone abroad, especially to America, to study modern systems.

Denmark. — The most important Danish li¬ braries are at Copenhagen, the largest being the Royal Library (Det Kongelige Bibliothek), founded originally by Christian III in 1533-39, but re-established by Frederick III in 1665, who erected the building in which it was housed until 1906 when it was transferred to a new home. It is essentially a national library and possesses a most complete collection of Danish literature and history. Among its treasures are the manuscripts of the astronomer Tycho Brahe. Its collections number about 770,000 volumes.

Next in importance is the Universitets Bibliotheket, the oldest research collection in Denmark, having been founded in 1482, the foundation date of the university. The col¬ lections were burned 1728, but soon reconsti¬ tuted. It contains the famous Arne-Magnean collections. The collections number some 400,- 000 volumes, 150,000 theses, 6,500 manuscripts, rich in medicine and science.

Copenhagen also contains some special li¬ braries of importance (law, history and eco¬ nomics), the Town Hall library (local history), the Royal Veterinary and Agricultural College (agriculture) and the Academy of Fine Arts. There are also several collections on military and naval sciences, aggregating about 100,000 volumes. The only large collection outside of the capital is at Aarhus, which contains 200,000 volumes. A new building was erected for this in 1902. During the last decade of the 19th cen¬ tury a movement was initiated to establish popular libraries throughout . Denmark. Prior to that time there had been a few parochial collections in cathedral towns, but they were relatively inactive. The new movement invig¬ orated these and resulted in the establishment of many new collections, hence there were some 500 of these in 1904, with an aggregate of 200,000 volumes. The libraries are controlled by a state library commission.

Norway. — The chief library of Christiania is that of the University. It contains about 500,000 volumes and was founded by Frederick II in 1811, its first collections being duplicates from the Royal Library. Next in importance is the Deichmanske Bibliothek, the free public

library. This was established in 1780, reorgan¬ ized in 1898 and contains 126,638 volumes ; Bergen (1872; 117,831 vols.) and Trondhjem (1760; 132,000 vols., 1,940 MSS.) are the other libraries of importance in Norway. The formation of small public libraries has been encouraged since the municipal reform of 1837, but their growth was slow prior to the reorganization in 1901, since which time the development has been more rapid. They num¬ ber about 1,000. The books for these collec¬ tions are purchased co-operatively.

Sweden. — The most important collections of Sweden are the Royal Library (Kungliga Biblioteket) at Stockholm and the university libraries at Upsala and Lund. The Royal Li¬ brary has a somewhat unusual history, for it has been established three times. Gustavus Adolphus presented the original collections, founded in 1585, consisting of books confis¬ cated from monasteries, to the University of Upsala. Another collection was then developed from other libraries conquered during the Thirty Years' War. This Queen Christina gave the Vatican upon her abdication, where it now remains among the treasures of that library. The third collection was, in the main, destroyed by fire in 1697, about one-third being saved. It grew slowly during the 18th century, but the gift of the Royal Antiquarian Collections in 1786 added 30,000 valuable books to the shelves. Its collections now number about 400,000 vol¬ umes and 1,000,000 pamphlets. A new build¬ ing was erected in 1882. Owing to the efforts of the librarian, G. E. Clemming, the collec¬ tion of Swedish history and literature is very complete. At Stockholm is also the Kungl. Svenska Vetenskapsakademie or the Royal Academy of Science. This was established in 1739, the naturalist, Linnaeus, being one of the founders. Its collections number about 115,000 volumes and contain among other items of interest the manuscripts of the Swedish scientists, Swedenborg and Berzelius. The Nobel Institute, which awards the Nobel Prize, has a valuable reference library, and in addition there are several special collections of import¬ ance, particularly that of the Royal Statistical Office. The library of the Royal University, at Upsala is perhaps the oldest in Sweden, having been established in 1477. It was reconstituted in 1593, but its present development dates from 1620, when Gustavus Adolphus presented the Royal Library to the university. It contains the magnificent De la Gardie collection, re¬ ceived during the latter part of the 17th cen¬ tury. The collections number about 400,000

volumes, to which may be added hundreds of thousands of theses. The library of the Uni¬ versity of Lund was founded in 1666, being based on the old collection of the cathedral of Lund. It has been supported by the Swedish rulers and numbers 200,000 volumes. Gothen¬ burg and Linkoping each have public libraries containing more than 100,000 volumes, the lat¬ ter possessing some interesting manuscripts.

Spain and Portugal.

Spain.-— The interest shown in libraries in Spain, prior to the end of the 19th century, has not been very keen. Indeed many old col¬ lections have stood still or deteriorated. Re¬ cently, however, there has been a revival, par¬

ticularly in the larger cities, and considerable advance has been made in augmenting . the collections and in improving their adminis¬ tration. Madrid, of course, has the . richest collections, the Biblioteca Nacional being the largest and most important library in the kingdom. This was founded in 1711 by Philip V, being based upon the royal collections. It has occupied several buildings ; the present one, the only one constructed for its purpose, was erected by Fernando VII in 1826. The collec¬ tions number about 700,000 volumes, 2,057 in¬ cunabula, 30,000 manuscripts, and contain much valuable and interesting material on Spanish history and literature, especially early discov¬ ery and exploration. Madrid has 23 libraries in all, containing collections aggregating 1,500,- 000 volumes, among which may be noted the Biblioteca de Universidad Central (1508; 270,000 vols.) and the Real Biblioteca (100,000 vols.). In the environs of the city is the famous library of the Escorial (q.v.). The universi¬ ties of Barcelona and Seville also have excel¬ lent collections.

Portugal. — The National Library of Por¬ tugal at Lisbon was founded in 1796 and num¬ bers about 400,000 volumes, 16,000 manuscripts. It is based upon monastic collections. An¬ other notable collection is that of Academia das Sciencias (1779), numbering 120,000 vol¬ umes. Oporto has a public library, founded 1833, of 200,000 volumes, and the university at Coimbra (1591) has a collection of 100,000 volumes.

Switzerland.

Switzerland has many libraries (5,798 lit 1917) in comparison with its population and area. Only seven of these, however, contain more

than 200,000 volumes. The majority of these are cantonal or communal collections. There are, however, 1,335 devoted to science or technology. This showing is all the more re¬ markable as the state did not concern itself with library development until the first half of the 19th century. A few of the ancient monastic collections of Switzerland still exist, the most interesting being the library of the famous abbey of Saint Gall. This collection was established by Abbott Gozbert about 820. <(There remains enough of the old collection to attract and gratify the student of mediaeval literature.® Edwards, (Memoirs of libraries) (Vol. I, p. 262).

The largest collection is the Oeffentliche Bibliothek at Basel (1460), which contains about 330,094 volumes, 175,000 pamphlets, 5,140 manuscripts. This was united with the uni¬ versity in 1905. The National Library (Biblio¬ thek Nationale Suisse) is at Berne. It was founded in 1895 and already has collections numbering 225,500 volumes. The city library (Stadt Bibliothek) has about the same number of volumes. Freiburg i. U., Geneva, Lausanne and Zurich each has a public library of over 200,000 volumes, while Zurich has in addition a library of technology in connection with the Technische Hochschule. Zurich also is the headquarters of the Consilium Bibliograph- icum, the purpose of which is to develop a universal card bibliography of scientific liter¬ ature. The Swiss libraries are also co-operating in the formation of a general catalogue of Swiss literature, the libraries at Berne and Lucerne forming the collections upon which

it is based. A Swiss library association was organized in 1900.

Greece.

There are two libraries of importance in Athens, the Chamber of Deputies library (160,- 000 vols.) , and the National Library (1842; 314,000 vols.).

Asia.

Japan.— The early history of libraries in Japan is involved with that of China and presents no important distinctions. During the last quarter of the 19th century, however, the great transformation produced in Japan by the introduction of Western ideals and methods has had an influence equally far-reaching upon the

libraries. These are now modeled upon accepted modern systems and a number are large and very active.

The most important is, of course, the Im¬ perial Library at Tokio, founded in 1872. This is a reference library and contains about 298,663 volumes, of which one-half are Japanese and Chinese works. There are several other large collections in Tokio, among them the University Library (1872; 491,082 vols.); the Imperial Cabinet Library (1885; 507,500 vols.); the Hibaya Library (1908; 153,000 Vols.) ; and the Waseda University Library (1902; 151,000

vols.).

There are also large libraries at other places, notably the Imperial University Library (291,117 vols., mainly technology) and the Fukuoka Medical College (113,000 medical works) at Kioto. Osaka has a public library containing 109,186 volumes, of which 8,218 are in the native tongues. There are, in addition, collections of books in nearly all the cities and towns. None of these are large, but the gov¬ ernment is encouraging their development in every way, and undoubtedly the future of Japanese libraries is bright.

China. — Very little is known regarding the library history of China, yet it is believed that collections were formed' at an early period. Huang-ti, one of the semi-mythical emperors, is said to have organized a board of historians to collect and transcribe the records of the empire. It is known, too, that the so-called <(First Emperor® (221 b.c.) decreed that all books save those on medicine, magic and agri¬ culture should be burned, and himself took charge of the censoring of the books. It was only through concealment that many treasures of Chinese learning, including the works of Confucius, were saved from destruction. Hsiao Wu (139-86 b.c.) established what were known as ˆRepositories,® the Chinese equiva¬ lent of the modern reference library. During the first century before Christ, Liu Hsiang (80-9 b.c.) and his son were commissioned to transcribe the masterpieces of Chinese litera¬ ture and form a library. An annotated cata¬ logue resulting from their labors which con¬ tains 11,332 entries is still extant.

There are also records of Chinese travelers, particularly Buddhist priests, who brought books from India and elsewhere into China and translated them into the vernacular. Of these Fa Hsien (circa. 400 a.d.) and Hsuan (629 a.d.) are of especial consequence.

The National Library at Peking was formed originally from a collection of 100,000 bamboo books and the Shu King, which had been con¬

cealed from destruction. These were added to by successive dynasties, but suffered many losses by fire and war. At present the library has about 200,000 volumes and manuscripts. There are collections at Canton and other cities. These are mainly for reference use only. There are a few small modern libraries in China, the one at Boone University being of some importance.

India.— There are many libraries in India, both native and foreign. Few, however, of them are of considerable size. The largest collection is doubtless that of the Imperial Library, Calcutta (1891; 152,000 vols.). The Royal Asiatic Society has collections at both Calcutta and Bombay, the latter numbering 80,000 volumes. In general, particularly in the British ruled states, the interest in libraries has not been very keen, the greatest development along modern library lines being in a few of the native states. A most remarkable instance is that of the state of Baroda. The library movement here was initiated by the Maharaja of Baroda, a highly enlightened and clear-visioned ruler. Under direction of an Amer¬ ican librarian, Mr. Borden, a modern library system has been established which comprehends every portion of the state, all administered from the Central Library, a reference collec¬ tion of 200,000 volumes housed in a beautiful building, a former palace of the Maharaja. All the libraries are state supported, and free to everyone without restriction of caste or posi¬ tion. A library school has also been established for training native librarians.

The only other state having a free library system is Indore. There are libraries at Madras, Benares, Allahabad and other cities but they are mainly used by scholars. A num¬ ber of the native princes have made it a point to collect manuscripts, that of the Rajah of Tanjore being famous for its Sanskrit rarities. Eight thousand of its items are written on palm leaves.

Siam. — As a memorial to their father, the children of King Mong Kut founded a library in Bangkok. This was enlarged in 1904 and made the depository for the national archives. Its collections are divided into three sections : works in foreign languages, native languages and ancient languages. The last is of particular interest and contains over 100,000 items, many of them unique. The library also contains a collection of ancient inscribed stones.

Hawaiian Islands.

The most important library of the Hawaiian Islands is the Public Library of Hawaii which occupies an attractive Carnegie building at the civic centre of Honolulu. It grew out of a merger of several libraries, the Honolulu Li¬ brary and Reading Room, founded in 1878, forming the bulk of the collection. The new building was occupied in 1913, and the library was made free to all in 1914. Oahu College has a growing collection housed in a $75,000 build¬ ing, the gift of C. M. Cooke.

Philippine Islands.

There were collections of books in the Philippine Islands prior to the American oc¬ cupation, the most of them developed by the Church. None of these, however, appear to have been of great importance. The first

modern collection established was that of the American Library at Manila founded through the efforts of Mrs. Charles R. Greenleaf, the wife of General Greenleaf, and based upon books contributed by the Red Cross Society of California. This was turned over to the Philip¬ pine government in 1901 and is now under direction of the Bureau of Education. It is housed in a large building constructed by the Spanish government. The Bureau of Science also has an excellent collection, which is rich in material relative to the resources of the Philip¬ pines.

Australasia.

Australia. — Great interest in libraries has been evidenced in Australia, virtually all of which are state supported. The most import¬ ant libraries of Australia are the New South Wales Public Library, Sydney (1869; 258,742 vols.), the Victoria Public Library, Melbourne (1854; 254,756 vols.) and the Adelaide Public Library (85,804 vols.). The Victoria Library is housed in a splendid new building, erected in 1915. There are two modern university libraries, the Sydney University (100,000 vols.) and the Melbourne University. Tasmania has also established a system of public libraries. While none of these are large they are grow¬ ing rapidly. The largest collection is the Pub¬ lic Library of Hobart, containing about 50,000 volumes. A library association was founded in 1902 and reorganized in 1911.

New Zealand.— New Zealand is not less alive to the value of libraries, which have been encouraged by very liberal library acts. The four largest centres of population, Auckland, Wellington, Christ Church and Dunedin, each has an excellent collection, the largest being the Auckland Free Public Library with approxi¬ mately 100,000 volumes. Dunedin Library is housed in a Carnegie building erected at a cost of $50,000. Trained librarians, only, are employed

in New Zealand libraries, whose in¬ terest in their work is shown by the organiza¬ tion of a library association in 1910.

Africa.

i

Although there are a few libraries in northern Africa, such as the Bibliotheque

Universitaire (58,620 vols., 135,252 theses) at Algiers, and the Bibliotheque Khediviale (75,- 000 vols., 12,000 MSS. at Cairo, it is only in South Africa that any noteworthy prog¬ ress is evidenced. This has been encouraged by the enactment of library laws, the first being an ordinance passed by Cape Colony govern¬ ment in 1818 establishing the South African Public Library at Cape Town. This was given the copy-privilege in 1836. Grants of money have been made from time to time. The

library is very rich in local history, due in part to the bequest (1862) of the large col¬ lection of Sir George Grey, the famous colonizer. Collections of books are to be found in nearly all of the South African centres, notably Fort Elizabeth, Durban, Kimberley, Johannesburg, etc. See also Library Data;

Library Periodicals.

Bibliography. — General References: Adams, ˆPublic Libraries and Popular Education)

(Albany 1900) ; (American Library Annual) (New York 191 1—) ; Brown, (Manual of Library Economy0 /'London 1907) ; Clegg,

Edwin Wiley,

Librarian , United States Naval War College.

LIBRARIES, Rural. See Rural Libra¬ ries.

LIBRARIES, Special. Commercial and Industrial. — Industrial and commercial libra¬ ries are now found in manufacturing, and busi¬ ness corporations of all kinds. Their purpose is to supply managers, heads of departments, foremen, clerks and workers with information and suggestions. They are not parts of the equipment for the welfare work (q.v.), which is carried on in many plants for the comfort,

convenience and education of employees, though they are sometimes closely allied to that equip¬ ment.

These libraries are one of the results of the recent rapid development of certain manufac¬ turing, commercial and financial methods and of extensions and modifications of the use of print in the preservation and distribution of knowledge. They are so recent that they have no history, save as it is suggested in a state¬ ment of the factors which brought them into existence.

The movement toward concentration and specialization in production, distribution and allied industries, which began with the inven¬ tion of .the steam engine, has been very rapid in the last few decades. Many industrial leaders have seen the modest businesses they helped to establish grow rapidly into vast organizations, employing thousands of men and handling millions of dollars annually. This has been true in railroading, water transportation, min¬ ing, farming, manufacturing of all kinds, finance, insurance, construction and many other industries and occupations. The central offices of these large enterprises have developed many and varied methods, devices and tools to meet their respective needs, and to help to keep under proper control the infinity of details that threaten to consume the time, thought and energy of those creative, inventive and managerial minds whose undisturbed activities are absolutely essential to the continued success of any great enterprise.

The demands from these central offices and from other sources for suggestions and advice in the field of business, — and by business is here meant management of persons and things and not the science or technique of making or transporting things, — led to a rapid increase in the production of books and journals of busi¬ ness, — the first journal specifically devoted to business appearing about 30 years ago.

LIBRARIES, COMMERCIAL AND INDUSTRIAL

379

Before industry had entered on its swift modern development, trade and technical jour¬ nals were relatively few and unimportant. Ex¬ panding industries demanded journals which should tell of that expansion and give to managers, department heads and special workers, who were often men of great native ability but of limited education, all obtainable information and suggestions in the fields of technique, science and management. Trade journals grew rapidly in

number and in value. Within each industrial field soon appeared journals devoted, some to labor in that trade, some to production, some to distribution and to consumers. Meanwhile, book production on all aspects of industrialism grew rapidly.

This, then, was the situation about 15 years ago : thousands of industrial and commercial organizations were expanding rapidly and daily meeting new conditions and new problems. They demanded of their creators, managers, experts, salesmen, advertisers, heads of depart¬ ments, foremen, clerks and laborers greater efficiency, fresh ideas, new devices and broader views. To the offices of these organizations came, almost haphazard, a few books and jour¬ nals, and these were read by a few and treated at haphazard. They were helpful to some but gave slight assistance to most.

Then came industrial and commercial libraries. Great organizations found that they needed, for their proper growth, all the knowl¬ edge, wisdom, technique, science and sugges¬ tion anywhere to be found; that they needed to know every day all that all inquirers, in the special field of each organization, had learned the previous day; that they needed to know of all experimentation by others that they might avoid costly experiments for them¬ selves; that they needed, in fact, as complete a collection as could be made of the recent, and of some of the older, books, journals and pamphlets on their activities; that they needed not only to have these at hand, but also to have them so arranged, filed and indexed as to bring out all they contained of value to them ; and that they needed to have that part of their contents which particularly fitted their work digested, arranged by topics and pre¬ sented daily, weekly or monthly to all the di¬ rectors of special activities in their whole army of workers.

A commercial or industrial library, then, is the resultant of two things, — the great modern growth of organizations and the great modern flood of business, technical and scientific litera¬ ture; and it is, briefly, a carefully controlled collection of such printed material relating to the work of the organization which it serves, as a librarian, expert in print, and his assistants can gather, index, digest and present to all its personnel.

The development of these libraries is not an isolated phenomenon. In the same three dec¬ ades in which they have appeared in large num¬ bers, libraries of the older types have increased in number, size and effectiveness, and have ex¬ tended their fields of work. The demand of the industrialist for the latest word on his industry was one of the immediate causes of the coming of the industrial library; but other

and more general causes were, of course, be¬ hind this proximate one. Extension and im¬ provement of public schools; education through

newspapers, journals and cheap books, in the use of print and in the habit of learning; growth of the habit of travel, and many other factors, all helped to make over the old type of library and to create new types. About 40 years ago free public libraries ceased to be mere storehouses and began to ask to be used, that is, to advertise. Soon they allied them¬ selves to schools, and vastly widened their fields. High schools awoke to library needs and installed special libraries of their own. College and university libraries began to adopt new and broader methods. State libraries, herein anticipating and in a measure suggesting the industrialists' libraries, began to make themselves useful and indispensable to state officers and legislators.

Industrial and commercial libraries can be well understood, their quite inevitable character and purpose clearly visualized and their short history easily grasped, in the light ot the broad movements thus briefly noted.

• These libraries have grown in number so rapidly and so quietly in recent years that a census of them would be difficult to make and would be inaccurate the day after its comple¬ tion. Those who were in charge of a few of the more important ones formed, 10 years ago, a Special Libraries Association, using the word ((special)) because their work is in most cases confined to a special field, that of the operations of the corporations which respectively employ them. In 1910 this association founded a mod¬ est journal, called Special Libraries, whose nine volumes contain most of the published literature on the subject of this article.

Large and small corporations engaged in the following, and many other, industries and businesses, have established libraries of the kind under consideration : Banking, insurance, public utilities, manufacturing in many lines, department stores, wholesale houses, statistical establishments, engineering experts, electrical experts, bureaus of standards and economics, civic and commercial bodies.

The list can be extended. But it is long enough to show that the movement toward gathering special knowledge for the special needs of special groups of workers is as broad as are industry and commerce themselves.

These libraries collect anything printed or in manuscript which is

proper to their respective purposes. Some consist almost entirely of typed, written and printed sheets and leaflets, kept in filing cabinets. Some, are made up almost solely of pamphlets and of articles clipped from papers, journals, all classified and indexed.

Some are composed chiefly of journals and proceedings, and some contain little save books. Most of them adjust both collections and methods of handling to the fact that to-day the majority of the more valuable contributions to human knowledge, — and knowledge is here used in its widest sense — appear first in jour¬ nals and publications of societies and are un¬ bound. These, being clipped or pulled apart, form a collection of leaflets and pamphlets, ca¬ pable of being closely classified and compactly and conveniently stored in filing cabinets, with manuscript and typed notes and data added as the corporation activities and needs suggest. That is, the industrial or commercial library tends more and more to the method, in its

acquisitions, of taking from a vast annual mass of print only so much as is quite specifi¬ cally related to the activities of the corpora¬ tion which maintains it.

These libraries are usually located close to the central offices of their respective corpora¬ tions. They are, in many cases, put in charge of experts in the art of mastering printed material. Under general instructions from a manager, the expert studies the field of print; gathers what is proper for the corporation's needs; puts it in systematic form by classifying and indexing processes ; and, each week or each month, makes brief abstract sheets of such articles or books or parts of books as his knowledge of his corporation's activities leads him to think will be useful, and places these sheets in the hands of such executives, ex¬ perts, foremen and heads of departments as may find them of value.

REFERENCES.

The following list of references is not in any sense intended to be inclusive even of larger industrial and commercial libraries. Only those mentioned several times by author¬ ities are listed. The list merely suggests the application made in these days of the library idea to all branches of industry and business, and will serve as a directory to those seeking information on the subject.

A list of special libraries appears each year in the (American Library Annual, $5, R. R. Bowker Company, 241 West 37th street, New York City. Gives brief statement about each library.*

The New York Special Libraries Associa¬ tion maintains a permanent exhibit of forms and methods used by the members of the Asso¬ ciation at the Municipal Reference Library, Room 512, Municipal Building, New York City.

References on the Theory, Policies and Methods of Commercial Libraries.

Business number of Library Journal, April 1917. $4 year, single copy 35 cents. R. R. Bowker Company, 241 West 37th street, New York City. Consult index to Library Journal for individual articles.

Lee, G. W., ˆCommercial Research® (1909). Stone and Webster, Milk street, Boston. Pam¬ phlet sent on request.

Johnson, E, M., ((Training of the Business Librarian® (in Special Libraries, November 1917, p. 141-144).

Buell, D. C., <(Sources of Information for Business Men® (in Special Libraries, October 1916, p. 142-144).

Lapp, J. A., <(Organized Information in the Use of Business® (in Special Libraries, April 1915, p. 57-61).

Gifford, W. S., ˆSuggestions for Making a Business Library Practical® (in Special Libra¬ ries, June 1915, p. 100-104).

Johnson, E. M.,. ˆSpecial Library and Some of Its Problems® (in Special Libraries, Decem¬ ber 1915, p.'l57-161).

Handy, D. N., ((The Library as a Business Asset — when and how® (in Special Libraries, October 1912, p. 162-165).

Marion, G. E., ((The Special Library Field® (in Special Libraries, March 1918, p. 59-64).

Kerr, E., ((Building up the Special Library® (in Special Libraries, April 1918, p. 95-96).

Lapp, J. A., ((Growth of a Big Idea® (in Special Libraries, September-October 1918, p. 157-159).

Bibliographies.

Bibliography of Library Economy for Business Librarians® (in Powers, R. L., Bos¬ ton's Special Libraries, > p. 121-127. $1. Pren¬ tice-Hall, Inc., New York).

Bibliography of Articles Relating to In¬ dustrial Libraries® (in Special Libraries, Feb¬ ruary 1911, p. 12).

Meyer, H. H. B., ((Select List of References on Special Libraries® (in Special Libraries, October 1912, p. 172-176).

<(List of Descriptions of Special Libraries Appearing in Special Libraries, 1914® (in Spe¬ cial Libraries, November 1914, p. 133-134).

Meyer, H. H. B., Bist of References on Business Libraries, and the Relation of the Business Library to the Business Man® (in Special Libraries, November 1917, p. 147-149).

Special Libraries, published by the Special Libraries Association, monthly, 1910 to date, 108 Jersey street, Boston. Subscription, 10 is¬ sues, $4; single copies, 50 cents. Principal source of information.

Public Affairs Information Service. H. W. Wilson Company, 958 University avenue, New York. Indexes articles and books about in¬ dustrial and commercial libraries and an¬ nounces establishment of new libraries, etc.

Some Leading Firms and Institutions Maintaining Commercial Libraries.

Financial. — American Bankers Association, New York; National City Bank, New York; Guaranty Trust Company, New York; Fisk and Robinson, New York; Farmers' Loan and Trust Company, New York, etc.

Public Utilities. — American Telephone and Telegraph Company, New York; Stone and Webster, Boston; H. M. Byllesby Company, Chicago; Boston Consolidated Gas Company; Boston Elevated Railway Company, etc.

Manufacturing. — Brighton Mills, Passaic, N. J.; B. F. Goodrich Company, Akron, Ohio; Studebaker Corporation, South Bend, Ind. ; General Electric Company, Schenectady, N. Y. ; National Cloak and Suit Company, New York; Goodyear Tire and Rubber Company, Akron, Ohio; National Cash Register Company, Day- ton, Ohio; Winchester Repeating Arms Com¬ pany, New Haven, Conn.; Robert

H. Ingersoll and Brothers, Brooklyn, N. Y., etc.

Dry Goods Stores. — Marshall Field and Company, Chicago ; William Filene's Sons Com¬ pany, Boston, etc.

Commercial Organisations. — Philadelphia Commercial Museum; Merchants Association, New York; National Automobile Chamber of Commerce, New York; Chamber of Commerce of the United States, Washington, D. C. ; Bu¬ reau of Railway Economics, etc.

Government Departments. — Bureau of Standards; Bureau of Foreign and Domestic Commerce; Library of Congress; United States Forest Service; Federal Trade Commission, etc.

Special Departments in Public Libraries. — Technology department, Carnegie Library, Pittsburgh; business branches of public libra-

ries in Newark N. J, Saint Paul, Minn, Indianapolis, Rochester, etc.

Miscellaneous. — Sears-Roebuck Company Chicago (mail order) ; Curtis Publishing Com¬ pany, Philadelphia (advertising) ; McGraw Pub¬ lishing Company, New York; Retail Credit Company, Atlanta; Youth's Companion, Boston (editorial) ; Price, Waterhouse and Company, New York (accountants) ; Arthur D. Little, Inc, Boston (chemists) ; Detroit News (news¬ paper) ; Harvard College, School of Business Administration ; A. W. Shaw Company, Chi¬ cago, etc.

Consult also following journals: Library Journal, 241 West 37th street, New York, monthly, $4 a year. Public Libraries, 6 North Michigan avenue, Chicago, monthly except Au¬ gust and September, $2 a year. Library World, 8 Coptic street, Bloomsbury, W, London, Eng¬ land, 6d. Library, 32 George street, Hanover Square West, London, England, 3s. Library Assistant, Shepherds Hill Library, Highgate, North, London, England, 4s. Library Associa¬ tion Record, Caxton Hall, Westminster, Lon¬ don, England, 2s. Special Libraries, 108 Jersey street, Boston, monthly except July and August, $4 a year.

John Cotton Dana,

Librarian, Public Library, Newark, N. J.

LIBRARIES, Traveling. See Traveling Libraries.

LIBRARY ADMINISTRATION. In

recent years the conception of a library's field and functions has grown so rapidly that li¬ brary administration has become a recognized science with problems vastly broader and deeper and demanding well-equipped profes¬ sional schools giving systematic instruction to those in whose charge the leading libraries will be placed.

Certain library schools now require for en- trace a college degree; in others the course is a regular part of the work of a college. Many colleges and normal schools conduct courses in bibliography and elementary library adminis¬ tration to enable students to use library facili¬ ties to the best advantage or to take charge of school libraries in connection with teaching positions. There are also numerous summer courses for those already engaged in library work and classes in individual libraries to train their own assistants. There is a growing movement, vigorously supported by the library profession, for certifying librarians, as we do teachers; and several States have already passed laws requiring tests or a certain degree of training or experience for some classes of library positions. This has greatly improved the librarian's status. In salaries, hours of service and vacations he has his place beside other educational officers, as the public recog¬ nizes that in general education, professional training, executive capacity and all factors which determine salary, the successful librarian should rank with the highest educational offi¬ cer of the same community. In a college the proper salary of the college librarian is that of a full professor. In a university he should rank with deans of departments and in public libraries with superintendents of schools or high school principals. Usual daily hours are now seven and usual vacation one month.

Functions. — The chief function of the old

library was to get all the books it could and preserve them safely. The modern library does this also, but has placed free public use infi¬ nitely above getting and keeping. First the word library meant any collection of books. It is now losing that sense and means the community intellectual headquarters for not only books and pamphlets, but also periodicals, newspapers, maps, pictures, music scores, player rolls, phono¬ graph records and other material for informa¬ tion on subjects of current interest, as well as coins, medals and collections illustrating science, history or art. It is no

longer a reservoir whose chief function is to take in and accumulate, but a fountain. Its work is no longer passive, but aggressive. The modern librarian is as anxious to put his wares before the public and have his books and other material used as is the store or factory to secure custom for its goods. He tries to attract the attention and rouse the interest of every resident or transient, child or adult, by bulletins, by book lists and notices in newspapers and in shop and office pay-envelopes, by exhibits, by floats in parades, by posters in hotels and other public places, by talks and by any other creditable means of (

We have learned that reading is the greatest engine human genius has evolved. It grows constantly in importance. While most reading is better than most conversation, it is as power¬ ful for evil as for good, so that the greatest problem for educators and statesmen is to de¬ velop in youth a taste for the best reading and to supply it free through life. Hence, develop¬ ment of a children's department in public li¬ braries and fostering of school libraries.

Reading has three great functions: (1) To inform, so that one may stand on the shoulders of all his predecessors and utilize their labors and experience in any subject. This cumulative wisdom of the race passed on in books makes possible the marvels of civilization. Books give this information which builds material pros¬ perity. Increasing interest in vocational books and development of' business and other special libraries powerfully stimulate this function. (2) A still more vital function, but less tan¬ gible, is the inspiration which lifts up and builds character, the work of the books of power, the books of all time. (3) The last great function is to afford rest and recreation for the tired and overworked to fit them better to carry life's burdens. The free public library is the only practicable method for shaping this reading, which in its threefold form of infor¬ mation, inspiration and recreation is the great¬ est influence in modern life.

Children's Department. — This aims to in¬ terest children in books, to develop taste for good reading, to establish the ˆlibrary habit,® to co-operate with schools, and, incidentally, to teach how to use reference books, indexes, catalogs and other bibliographic tools. It ranges from a few separate shelves or an alcove in the general reading-room to one or more separate rooms in charge of a specially qualified children's librarian. Users may include children of all ages up to those beginning to. appreciate adult literature. Besides an attractive collection of carefully selected books, there should be tables, chairs and other furnishings adapted to users of various sizes. Specially effective is the. story hour, conducted by the children's

librarian or

some other childlover skilful in rousing in¬ terest in reading among those not naturally so inclined and in selecting from the great classics what appeals to children and also in interesting them in the daily events of world importance.

Work with Foreigners. — The public library should be a strong Americanizing factor where there is a considerable foreign population, often largely of those who can read only their own languages. Among many means are: (1) Books in their own languages and in simple English to which access is made easy by : (2) branches and deliveries in immigrant dis¬ tricts; (3) lectures and story telling; (4) classes in English and elementary civics.

It is in leading foreigners to read books in English that librarians meet their greatest obstacle. Spoken English is easily learned, but in print appears a new language, with words not spelled but made up of arbitrary combinations of letters incapable of being ex¬ plained or reduced to rule, and condemned by English lexicographers and philologists as un- etymologic, unphonetic and altogether inde¬ fensible. Simplifying English spelling is vital to the librarian's highest success, for his treas¬ ures are useless to foreigners till they take the meaning readily from the printed page.

Spelling Reform.

School Libraries. — These are in school

buildings to provide, close at hand, reference and other books supplementing school text¬ books and aiming to stimulate interest in cur¬ riculum or, like children's departments, to de¬ velop taste for good reading. These are some¬ times a public library branch or deposit station, sometimes managed jointly by the school and the public library and sometimes owned and managed by the school. For lower schools the branch system works best, while high schools tend to have their own libraries, with trained librarian specially qualified to influence stu¬ dents' reading habits and to teach them how to use the library. Among States leading in de¬ velopment of school libraries are New York, New Jersey, Michigan, Wisconsin, Minnesota, California and Oregon.

Administration. — Books and other suitable material are no more a library than a pile of bricks is a building, or a mob of men is an army. To be effective there must be such ar¬ rangement and organization that its great func¬ tions can be performed promptly and efficiently without undue cost. Experience proves that to make books into a successful library the chief factors are in order of importance: (1) Li¬ brarian; (2) methods; (3) building. Because it is most prominent and readily understood by the inexperienced, the least important is usually thought of first.*

Library Buildings. — To compete success¬ fully with places of amusement the library should be as accessible as possible, but prefer¬ ably a few steps off the main street for greater quiet. Books increase in a ratio beyond the plans of architects and librarians, and few li¬ braries provide' adequately for growth, either for books, readers or administration. Good natural light and ample room for growth are essential. Steel, glass, brick, stone, concrete and tile are the best materials for large libraries, but fireproof construction is import¬ ant only for central libraries which preserve

rare books not readily obtainable in open market. The most needed best books should be housed within easy walking distance of every citizen. This requires in larger towns branches or deliveries at convenient points. The most used books should be freely accessible in read¬ ing-rooms, but economy and convenience both demand that the main supply should be kept in stacks. In a standard storage stack the cases are double-faced and only 75 centimeters apart; but in small libraries cases may be 120 centi¬ meters (4 feet), apart, to invite public access. Each case is 8 or 7 shelves high and 5 tiers long, thus giving 80 or 70 shelves on its two faces. Each foot, shelves about 7 books, so each foot of wall, 7 shelves high, holds about 50 books. Each foot of double-faced case holds 100. Each shelf is better 75 centimeters long, rather than 36 inches; 20 centimeters (8 inches) deep, and 25.5 centimeters (10 inches) high, thus taking all books up to the largest standard (8vo.) which by library rules is limited to 25 centi¬ meters. These cases make a one-story stack, with every book within reach without ladders. Steel is better than wood for tall stacks (some¬ times 10 stories) and grows steadily in favor because it is strong, compact, clean, fireproof and more open for light. An atmospheric steam heat is best as it can be regulated as closely as hot water and does not annoy readers by cracking or hammering. Electric light should be provided on all reading-tables. In¬ direct lighting has removed the most serious objections to high lights, but for greatest com¬ fort a reader should have a light under his control and near his book. When the stack section can have abundant

daylight, it should be of glass with only steel or masonry enough for support, with glass always opposite aisles; but if it has only electric light, it should be well and draftlessly ventilated both for welfare of books and of persons working in it.

Spiral stairs are costly, wasteful and incon¬ venient. Straight stairs under which space can be used for shelves take less space. Doors to bookcases are worse than useless and have been abandoned except for rare, costly or re¬ stricted books. Tables and desks should be 78 centimeters high, not 75 centimeters as usual; for short people can use higher chairs, but tall people cannot shorten their legs. Skilful ar¬ rangement of rooms will greatly reduce cost of administration. Permanent partitions should be used only where necessary for support. Tem¬ porary partitions, usually glass, can be readily moved as growth requires. These allow better light and supervision from another room, while shutting off noise, and give a more spacious look. In small libraries, departments for adults, for children and for selection and delivery of books may be included in a single open room, separation being marked by bookcases not more than four feet high, the whole under direct central desk supervision. Consult (Carnegie Corporation Notes) for valuable suggestions.

Most important after the central rooms are first a quiet study:room, then a children's room. Even small libraries need one or more class, . or lecture rooms for clubs, classes and meetings which find their natural home at the library. Larger . libraries require a growing number of special rooms for newspapers, art, patents and various other needs of the staff and public.

LIBRARY ADMINISTRATION

383

Acquisition. — Boqkbuying for a small li¬ brary is simple, requiring mainly selecting an agent and arranging for discounts. A large library, buying thousands of volumes yearly, has often several agents for home and foreign buying, including auction sales, and requires accurate financial and order records with care¬ fully elaborated routine to prevent confusion, error and waste of time. Large libraries often add by exchanging their own publications and duplicates with other institutions. In libraries of every size, gifts from individuals as well as from societies, institutions and government departments, if tactfully sought and apprecia¬ tively acknowledged, are a large and valuable annual increase.

Book Selection. — In selecting from the vast flood of books, pamphlets and periodicals con¬ stantly printed the chief considerations are: (1) Needs, interest and tastes of the community; (2) funds available; (3) merits of individual books. While every general library must have general cyclopedias, dictionaries, atlases, etc., and some books on the most important subjects, many communities have distinct interests, in¬ dustrial, sociologic or cultural, which should be specially fostered. Funds available should be apportioned among various subjects and must often determine whether to buy a special work. Deciding on a particular book depends on: (1) Importance of its subject; (2) its interest to the community; (3) its trustworthiness; (4) its probable influence on character and taste; (5) its style (whether interesting or dull) ; (6) for fiction, the interest of the plot or theme; and (7) its physical make-up, specially type and quality of paper. Some of these factors the librarian must decide, but his knowledge of reliability and probable influence of the books usually depends on outside aid, personal or printed.

Need of printed guides has been partly met by bibliographies, catalogs and lists to help de¬ termine quickly what is best to buy, its cost, where and by whom published and perhaps to track it through auctions and stores. Many think of these bibliographies as a dozen or so reference books, but their growing numbers run into many thousands. It is one great factor in the professional training of a librarian to learn how to use this extensive apparatus effectively. Of the preceding essential items, 3-7 are cov¬ ered by the notes forming a regular feature of most of the following very helpful printed aids. They embody the best from leading English and American reviews, besides much expert indi¬ vidual judgment. (A. L. A. means American Library Association, 78 E. Washington street, Chicago).

On the selection of books consult A. L.. A. Catalog, 1904, and Supplement, 1911 (United States Superintendent of Documents) ; (Book Review Digest) (Monthly, with semi-annual and annual cumulations);

A.) ; Government Documents in State and City) (A. L. A.).

Accessions. — After a book is received it must be made part of the completely organized library which has as its ideal the choice and de¬ livery to each inquirer, with the least possible delay, of the book, pamphlet, article, essay or other item which then and there to him will be most useful.

This is most difficult even in a small library, and in large ones with a million or more items from which to choose, no satisfactory results can be reached without an elaborately organ¬ ized system, administered as carefully as the details of a great factory or railway, where mistakes and carelessness are intolerable. There are 30 distinct steps in accession department routine alone in a large library before a book is ready to be classified or cataloged. Econ¬ omists have repeatedly tried to shorten the processes, but after several years' experience usually incur the extra cost of going back and supplying omissions as the only way to avoid the more serious expense of resulting delays and confusion. Ownership is marked by a bookplate inside the front cover with name of library and official marks. The name is also repeated (stamped, embossed or preferably per¬ forated on the titlepage so that it cannot be removed by book thieves, and private marks at some special page, to be found only by one knowing the key, serve to identify lost or stolen books. Call numbers on the back ensure quick finding and replacing on shelves, and most lending libraries put a manila pocket inside the back cover to carry book or reader's card. The accession book is the business record, in which every volume in the library has a numbered line as its pigeonhole for its complete his¬ tory. The number of this line, the accession number, is stamped on first recto after title, on shelflist and cards, and exactly identifies that particular volume. In trying to escape making accession entries, some librarians use bills, order slips for orders filled or shelf-list; but while these substitutes require less time at the start they lack the accuracy, uniformity, per¬ manence and convenience of the properly kept accession book.

Shelf-list. — As its name implies, this is a list of the books in the order in which they stand on the shelves, and so serves for taking inven¬ tory. Since the usual arrangement of books is (by subject, the shelf-list serves also as a subject catalog for the main subject of books, though strictly as a shelf-list it contains no references to material in books shelved under other subjects. Such references may, however, be added to the shelf-list in any library where this double use warrants it. A third important use of the shelf- list is as the record of book numbers in each class. Books on the same subject group un¬ der the same class symbol are distinguished from each other by a separate book number. This is generally assigned from the author's name, but in some cases, e.g., individual biography, from the subject. Class and book (with sometimes volume or copy) number, together form the wcall number,55 distinguishing each book from every other in the collection. The shelf-list, by showing immediately what book numbers have been assigned in any group,

prevents duplica¬ tion and consequent confusion. .

While the present tendency is toward shelf-

lists on cards because they allow exact inter¬ calation and save rewriting, these advantages are counterbalanced by danger of having so vital a record as the library inventory in such form that an entry may be removed without detection and by inconvenience of seeing only one entry at a time in shelf reading. Useful as cards are, they should not be used where busi¬ ness safety, efficiency or ease of reference re¬ quire sheets or bound books. Rewriting is in¬ frequent when the New York shelf sheet (10 by 25 centimetres, about 4 by 10 inches) is used and when in large classes separate sheets are used for each initial, so that, e.g., if entries in C become too disarranged, as many «C sheets can be rewritten as are necessary to restore order without touching B or D. When the shelf-list is on cards and printed cards are used in the catalog, an extra copy may be used for a card shelf-list, thereby duplicating in full the catalog entry; otherwise the shelf-list entry, whether for card or sheet shelf-list, is very brief, including merely class number, book number, author, short title, some distinguishing detail when the library has more than one edition, accession number and volume or copy number.

Classification. — Shelf arrangement of books is now almost universal by subject. A few of the oldest and largest libraries follow their old systems, but most libraries are arranged according to some widely used printed scheme of classification which brings together related subjects, first broadly and second under more or less minute divisions according to amount of material. Adoption of such a generally ac¬ cepted scheme not only saves the librarian the enormous labor of developing one of his own, but also brings his library into harmony with many others, thereby facilitating both the use of various libraries by the same reader and also co-operative work among libraries them¬ selves. As the same book bears the same class number in each of many libraries using this system there is an immense saving possible by utilizing the work of others. The decimal classification, now most widely used by libraries, has over 20,000 subject headings and many new ones are added yearly. By means of its very full and simple index a book may readily be classed minutely; and may be found with equal ease by one knowing clearly what subject he seeks. The classifier's work involves not only

familiarity with the system used, but often also careful examination of the book in hand and acquaintance with scope, relations and ter¬ minology of the subject treated.

Author Catalog. — This like all other cata¬ logs and indexes is kept on cards 7.5 centimetres high and 12.5 centimetres long, the size adopted for national and international use and rapidly displacing all other sizes except for peculiar uses. (See Office Labor Savers, Card Index System). The author catalog gives under each name all oi any author's work which the library has. It is often expanded to include titles of anonymous books, striking titles of other books, biographies, criticisms and reviews, or any topic for which subject entry would be name of per¬ son or place. It is then a ˆname® catalog as it includes more than authors.

Subject Catalog.— This shows what the li¬ brary has on any given subject. For lack of time or money it records in many libraries only books, but a complete catalog adds pam¬

phlets, articles in periodicals, papers, transac¬ tions, essays and collected works, maps and whatever material one studying that topic might want. Subject catalogs arranged by the usual systems of classification are partly indext by the alphabetic index to the classification tables, but continual advance of knowledge outruns possibilities of corresponding printed records, so a printed index needs to be constantly sup¬ plemented by new topics, either interlined or separately listed on cards or sheets. It does not matter that a printed index refers to heads lacking in the catalog, for it often leads to valuable related material that might otherwise be overlooked.

Dictionary Catalogs. — The separate logic¬ ally arranged subject catalog, with its corre¬ sponding name catalog, best meets scholarly or technical library needs, but for general public use the dictionary catalog is almost universally accepted. It has all entries (author, title, sub¬ ject, etc., with references from synonymous and related terms) in a single alphabet like the words in a dictionary.

The author catalog corresponds to personal names in a directory; the classified catalog to the business section showing all engaged in each specific line of business. A dictionary catalog requires least explanation and is most popular, but it is more difficult to make well, and ex¬ cept at prohibitive cost cannot give intelligent investigators as clear and methodic exhibits of a library's resources as a classified catalog. Large libraries have many special catalogs,

bibliographies and indexes as keys to their own special collections.

Annotation or evaluation is a most import¬ ant factor in modern cataloging. Its purpose is to tell in fewest words what readers ought to know about a book's scope, treatment and value; but for such guidance we still depend mostly on printed bibliographies. See list at end of Book Selection.

Printed Cards. — There is a great saving by utilizing cataloging done by large libraries which print their cards and make them readily available for others. The Library of Congress prints, with minute bibliographic detail, cards for its own books, which include practically all current American publications through copy¬ right provision, and also many foreign works. Any library may buy these cards (35,000 to 40,000 titles a year) for little more than blank cards. They are author entries, with sugges¬ tions for subject and title entries, etc. Li¬ braries adapt them to their own catalogs by any necessary changes in detail and by adding sub¬ ject or title. headings and their own call num¬ bers. Full information is given in the Library of Congress Handbook of card distribution.

Lending. — A loan system must give the quickest service consistent with accurate and complete records. The card system is best. The librarian must know where every book is, when it should be returned and must find de¬ linquents daily. Extra privileges in number of books or time retainable are given during vaca¬ tions and to scholars having special claim. Many libraries allow more than one book if only one is fiction. Inter-library loans are fre¬ quent so that a reader may, when necessary, secure from another library a book not in his own.

For readers impatient of waiting their turn

for a free copy some libraries have duplicates of the newest and most popular books to rent for a small fee. Branches, deposit and delivery stations scattered through a city greatly increase library use by those to whom distance from the main collection would be prohibitive. Parcel post and rural free delivery carry the library to the doors of more remote readers, while traveling libraries serve groups such as schools and clubs, or isolated students requiring an un¬ usual number of books for longer time.

Reference. — Libraries grow more liberal in privileges to readers who now find on open shelves books most used instead of having to ask for each book consulted. In many libraries not only so called reference books but thou¬ sands of others are thus thrown open. Losses are small compared with benefits, and the prac¬ tice has become very general, its extent depend¬ ing mainly on size of library and space avail¬ able. An information bureau or reference desk in charge of an expert whose sole function is to answer readers' questions is common, while large libraries have a library faculty, each tak¬ ing some special subject on which he will be a recognized authority. Besides aiding readers at the library, a reference librarian utilizes mail and telephone both for giving ahd getting in¬ formation. His department is the clearing¬ house for information from all available sources. There are special rooms for import¬ ant subjects, each in charge of a specialist. Rooms for women's exclusive use are little used, women apparently seeing no more need of separation than in churches, lecture halls or theatres. The children's room becomes the best possible training school for supplying readers who will use the library properly. (See Chil¬ dren's Department). Special libraries belong¬ ing to factories, business or public offices, are increasingly available to all either through co¬ operation with public libraries or by operation as public library branches.

Paid Help. — A highly appreciated accommo¬ dation in some libraries is assistance of an ex¬ tent or nature not properly provided at public charge, for mere cost of time spent, estimated at rate of annual salary. This saves costly journeys, because an expert trained in a given library can often find as much in an hour as a reader himself would find in a day. Telegraph and telephone make central cyclopedic libraries quickly available for large areas, and editors, lawyers and others whose time is specially valu¬ able may quickly get needed information, and if wished translations, verified or photostat copies or other library service at the trifling cost of the time of the lowest salaried assistant competent to do the work.

Legislative Reference Libraries.— Progres¬ sive States have followed New York (in 1890) by establishing a bureau specially for its law¬ makers. A librarian versed in political and legal science keeps at his fingers' ends laws and pending legislation of other States and counties, with available discussions, to enable legislators of his State to stand on the shoulders of those dealing with similar problems elsewhere.

Municipal Reference Libraries.— These are essential to intelligently conducted city govern¬ ments. Through them city officers and public-

spirited citizens keep in touch with each other s actual or proposed measures or projects, and the pros and cons of civic questions. vol. 17 — 25

County Libraries. — These provide for scat¬ tered rural communities too small to support separate efficient libraries, and bridge the gap be¬ tween state and city or town libraries. Instead of setting up an independent library some coun¬ ties contract with a city public library for service throughout its county. Some county libraries absorb weak local libraries as branches or de¬ livery stations. Though most of these libraries are in the West, California leading, they are spreading rapidly.

People's University. — Support of libraries

by fees has largely given way to support by taxation. A fee is prohibitive to many, and communities recognize that it is as much for their interests to have the "people's university^ as the public schools free to all. Hours of opening have been lengthened from 2 to 3 a day till the larger lioraries usually open from 8 or 9 a.m. to 9 or 10 p.m. and no longer close for evenings, holidays, vacations or annual inven¬ tory. Sunday opening, for at least reading and reference, is common in all but the smallest libraries. The modern library is available to readers at any time when they are inclined to use it.

Bibliography. — Including only recent gen¬ eral books (or those not superseded), in many of which are more extensive and specific lists of references, as well as in the following in¬ dexes to periodical literature: Cannons, H. G. T., (Bibliography of Library Economy } (1876- 1909) and (Library Work Cumulated (1905- 11), supplemented by monthly lists in Library Journal , 1914-date, under the section (Library Work) ; A. L. A., 'Manual of Library Econ¬ omy J (ed. by J. I. Wyer, Jr.; being issued in parts, 1919; consists of over 30 chapters, each dealing with a special phase of library work) ; Bostwick, A. E., 'American Public Library0 (new ed., 1917) ; Dana, J. C., (Library Primer) (5th ed., 1910) ; id., (Modern American Library Economy, as Illustrated by the Newark, N. J., Free Public Library) (being issued in parts; 1919) ; Dewey, Melvil, Simplified Library School Rules (1898) ; Fay, L. E., and Eaton, A. T., Hnstruction in the Use of Books and Libraries) (1915). Binding: Bailey, A. L., li¬ brary Bookbinding) (1916). Buildings : Koch, T. W., (A Book of Carnegie Libraries) (1917) ; Snead & Company Iron Works, (Library Plan¬ ning, Bookstacks and Shelving) (1915) ; Soule, C. C., 'How to Plan a Library Building for Library Work)*

(1912). Cataloging : American Library Association, (List of Subject Headings for Use in Dictionary Catalogs) (3d ed., 1911) ; Bishop, W. W., (Practical Handbook of Mod¬ ern Library Cataloging (1914) ; Catalog Rules: Author and title entries; compiled by commit¬ tees of the American Library Association and the (British) Library Association (1908) ; Cut¬ ter, C. A., (Rules for a Dictionary Catalog (4th ed., 1904); Fellows, J. D., 'Cataloging Rules* (1914) ; Hitchler, Theresa, 'Cataloging for Small Libraries) (revised ed., 1915) ; United States Library of Congress, 'Preliminary List of Subject Headings.* Children's Work: Hazeltine, A. I., ed., 'Library Work with Chil¬ dren) (1917). Classification: Cutter, C. A.,*

'Expansive Classification (1891 —) ; Dewey, Melvil, 'Decimal Classification and Relative In¬ dex* (10th ed., 1919) ; Richardson, E. C., 'Classi¬ fication, Theoretical and PracticaP (enlarged ed., 1912) ; Sayers, W. C. B., 'Canons of Classifica-*

tion, Applied to ((the Subject,® <(the Expansive,® ((1914). Special Libraries: Kaiser, J. B., (Law, Legislative and Municipal Reference Libraries) (1914). Periodicals : American Library Asso¬ ciation Bulletin (Chicago; bimonthly) ; Library Journal (New York; monthly); Public Li¬ braries (Chicago; monthly); Special Libraries (New York; monthly); Bulletins of the vari¬ ous library commissions.

Melvil Dewey.

LIBRARY ARCHITECTURE AND CONSTRUCTION. The problems of library

construction have been considered so often dur¬ ing the last few decades that the erection of a faulty library building would appear unneces¬ sary, yet, judging from complaints made by librarians from time to time, some of the build¬ ings erected have failed to respond to all of the demands made upon them. In general this condition appears to have resulted from one or more of the following causes: (1) An effort to erect a monumental building, (2) to conform it to a type of architecture unsuited to library purposes, (3) the appointment, often by com¬ petition, of an architect unschooled in the re¬ quirements of a library, (4) failure to consult with the librarian or with library experts. Much advancement has undoubtedly been made toward co-operation between architect and

li¬ brarian, and many good designers have made library buildings their specialty, nevertheless it seems that the ideal type of library is not yet realized — the type so adapted to its purpose that it would be immediately recognized as such, as is the case with school buildings at the present time. This does not mean that li¬ brary constructions should conform rigidly to a fixed standard of appearance and arrange¬ ment, but it does mean that the exterior should express as nearly as possible the purpose and functions of the interior. The body should properly and adequately house the spirit. The modern library building is the product of many years of experimentation and of fruitless efforts to adapt old types to new conditions. This applies with especial force to the one known as the alcove type, which was inherited from the mediaeval cloister libraries. This still has many advantages for small libraries and for special collections, but when its principle is applied to large libraries, as was the case with the old Boston Public Library and the Astor, its de¬ fects more than outweighed its advantages. Hence as early as 1882 we find the American Library Association protesting against the con¬ struction of more buildings according to this plan. To-day the constructional requirements of a library building are comprehended to such an extent that library planning has become a science determined by definite laws. (Tilton, ˆScientific Library Planning,® Library Journal, September 1912). It seems strange, therefore, that library buildings are still being erected that fail to respond to the legitimate demands made upon them.

The fundamental problems of a library are:

(1) Accessibility ; (2) economical storage of books, and (3) their rapid distribution. With regard to these elements, the well-known de¬ signer of libraries, Mr. Cass Gilbert, has this to say: ((The first principle of library location and library planning should be accessibility. The whole efficiency of a public library depends upon its being accessible to the public in point of location, and being accessible in all of its parts to the working force and to the public parts by the people who are using it. I should like if practicable to have the main rooms of a library on the ground floor so that the public would not have to climb stairways to get to the delivery hall, yet in practice it appears to have been impossible to solve the problem in that way except in small libraries for reasons of space or economy of construction. In planning library buildings I have considered that the di¬ rect access of the public to the point of dis¬ tribution of books is of prime importance and that this point of distribution should be as close as possible to the place where the books are stored. This results then in the entrance leading direct to

the delivery hall, the delivery hall being in close connection with the stack room. The open shelf room should also be near to the delivery hall. Special collections may be placed at more remote locations, but those books which are constantly used by the public should be accessible. A type of plan which is suitable for a large city library is ob¬ viously not suitable for a small village library. A college or university library, a special re¬ search library, or a law library is essentially different from a city library so it is impossible to lay down any standardized plan.® In small libraries these questions are not so urgent. In¬ deed, for such wall cases, alcoves or small stacks all prove equally serviceable, but when the collections attain to 50,000 volumes or more the question of storage and administration be¬ comes acute.

• Three elements enter into the construction of any building: (1) Fitness; (2) permanence ; (3) beauty. In library construction that is the order of their relative importance. The ques¬ tion of fitness is essentially the concern of the librarian. Here he should be supreme, for un¬ less the architect has a correct knowledge of the problems of library administration he is not competent to decide questions of arrange¬ ment, etc., that so intimately affect the opera¬ tions of the library when it is completed. The architect does not have to work in the building after completion, but the librarian does. This does not, of course, mean that the librarian shall meddle with purely constructional details but it does mean that either he or the trustees should determine the policy or program of con¬ struction ; the size of the building, its cost, ma¬ terials, arrangement of rooms, etc., etc. The librarian and the architect should work together, and in order to do so most successfully the sphere of each should be so delimited that no possibility of misunderstanding can arise. In order to attain this happy result, the librarian or building committee should prepare a state¬ ment setting forth the characteristics of the proposed building so clearly and fully that the architect can have no excuse for presenting a plan at variance with the proposals. This, in effect, will constitute an order on the architect and its nature will be determined by data pos-

LIBRARIES

Library of the State Historical Society of Wisconsin, Madison, Wis.

Library of the University of Virginia

Carnegie Library, Atlanta, Ga,

LIBRARIES

Minnesota Historical Society

Louisville Free Public Library

LIBRARIES

1 Harvard College Library, Harvard University

2 General Reading Room, Widener Memorial Library, Harvard University

LIBRARIES

Public Library of the City of Denver, Denver, Col.

Library of the University of California

LIBRARY ARCHITECTURE AND CONSTRUCTION

387

sessed only by the librarian or building com¬ mittee ; i.e., the amount of appropriation, the nature and purpose of the library, the site, etc. The question of permanency is next in order of importance and involves not only the type of material to be used, such as stone, terra¬ cotta, brick, concrete, etc., but also the prob¬ lem of providing for future expansion. Failure in the latter respect has been the cause of more distress to librarians than anything else. Ap¬ parently a library does not grow by arithmetical progression, but by geometrical, and as soon as an adequate home is constructed it attracts ma¬ terial from undreamed-of sources and in a steadily increasing volume. Hence any esti¬ mates of future development are generally much below the mark. A notable example of this was the case of the Library of Congress building. When planned, it was anticipated that it would accommodate the additions for several decades. This proved so mistaken that a new stack providing for a million volumes was under construction some 10 years after the building was first occupied. It is clear, there¬ fore, that the growth of a library cannot be foreseen with any great accuracy. That it will be greater than any apparently liberal estimate may be taken for granted. Building for the fu¬ ture, therefore, does not mean a structure vastly larger than the needs of the present and immediate future, but it does mean that no building shall be erected that cannot be en¬ larged without injury to its design or without needless

expenditures for demolitions and modifications. In short the additions should be considered in the original plans. With this in view, it is evident that a library building should not have ornamental faQades on all sides, ex¬ pensive to construct, and a complete loss if ex¬ tensions are made. The question of material should be determined by the appropriation, by local conditions, etc. It is needless to say that it should be as nearly fireproof as possible. So-called absolute fireproof construction costs one-third more than a relative fireproof con¬ struction and ordinarily the latter will present a sufficient factor of safety. Stone, of course, is favored for the greater library buildings, but is the most expensive type of material. Excel¬ lent effects have been attained with much sav¬ ing by the use of terra-cotta, brick and con¬ crete. Frame construction, on account of its great inflammability, is not desirable, yet it would be better for a community to construct such a building rather than none at all. At least, it will be a nucleus for something better. The element of beauty, as far as it concerns a library, is essentially a by-product. Failure to recognize this point has been the prime cause of unfit library buildings. The designers of the public schools have learned this lesson and now library architects should recognize it uni¬ versally and thereby avoid experiments and sad mistakes. It is difficult to fix the responsibility for the common error that a library should be something ornate and monumental. Sometimes it is due to the desire of the building committee to supply an architectural wonder to the com¬ munity; again it may be that the librarian either favors or fails to oppose with sufficient energyr an ornate structure. Generally, how- evei, it would appear that the chief sinner is the architect who has seized upon an oppor¬

tunity to express himself in the grand style. Another fruitful cause of unfit buildings is the predilection of architects for certain styles of architecture. Thus, for instance, the follower of classic traditions will build nothing but Greek temples, although the Greek temple is un¬ doubtedly the very worst thing wherein to house a collection of books; a lover of the Gothic will construct lofty apartments, difficult to heat and expensive to build, ignoring, more or less, the most important element of floor space. The craze for libraries built after the Romanesque pattern, which sprang up owing to the genius of Richardson, certainly resulted in an advance in library construction, but their thick walls and deficient fenestration give them a tomb-like quality thoroughly depressing to the average reader.

To sum up, the aesthetic requirements of a library are satisfied by a construction marked by taste, dignity and repose, with no excess of decoration and ornamentation. In fact, warmth, homelikeness and

restfulness are the charac¬ teristics that good psychology would recom¬ mend for a building dedicated to the conserva¬ tion and distribution of knowledge. Should these principles be adhered to there can be no doubt that a purely library type of architecture will develop, if it has not already done so. Like the modern skyscraper, the library will find a type of construction all its own, sufficiently lovely and none-the-less a library. To gain this end, only one thing is necessary : to plan libra¬ ries from within, for all beautiful buildings be¬ came such because first of all they were fit. From the viewpoint of interior efficiency the following are the minimum requirements: (1) Sufficient floor space; (2) compactness ; (3) light; (4) heat and ventilation; (5) storage. 1. Floor space. The amount of floor space as¬ signed to the various departments will neces¬ sarily depend upon the nature of the library, but taking the public library as the norm, the assignment of floor space would average as follows : Reading-room, delivery-room, etc.,

50 per cent ; administration, 20 per cent ; lecture hall, 10 per cent ; stack, 20 per cent. There will of course be variations, particularly with regard to the stacks, which of course ex¬ pand more rapidly and easily than the other groups. 2. Compactness. This is closely re¬ lated to the preceding requirement, and means that the library be planned for economical administration. What is known in military science as <(interior lines of communication® should be adhered to, so that the various processes in handling the book will link up without loss of space or time. Every step that is wasted and every needless operation caused by constructional exigencies stamp the building as faulty to that degree. All portions of the building from the basement to the attic should be available, and waste spaces formed by un¬ necessary passages and stairways should be avoided. 3. Light. The eye is the organ used almost exclusively in a library, hence the illumi¬ nation should be abundant in quantity and dif¬ fused in quality. Therefore any form of con¬ struction that decreases light, such as over¬ hanging porticoes, massive walls or dark tones in decoration, are distinctly bad. Direct sun¬ light and glares are bad, but otherwise there is little danger of too much light. This applies

equally to artificial lighting, which should be supplied by electricity where available. In¬ direct systems of illumination are considered preferable, but they are not economical, and certainly are not recommended for stacks and situations requiring concentration of

light. 4. Heat and Ventilation. Mental work is most efficiently performed where the temperature is neither too warm nor too cool, 68° to 70° Fahrenheit, and where there is an abundance of fresh air, without drafts. In general the direct- indirect method of heating appears to be the most satisfactory, for by means of it 'not only is the building heated but it is also supplied with fresh air. Furthermore the space-wasting and unsightly radiators are avoided, air-ducts in convenient positions in the walls or at po¬ sitions being substituted. There should, of course, be ventilating exits for impure air and, in addition, some libraries use forced or artificial ventilation. Such a system has its advantages, but it is expensive to install and to maintain, and in certain cases has not been wholly a success. It might, however, be used to advantage in the reading-rooms and other assembly halls. The nature of the collections and the uses to which they are put will neces¬ sarily have a determining effect upon the type of building demanded. Thus, for instance, a special or associational library will require different arrangements from a public library, and the public library from a university library. For a technical collection, a small reference library or university seminar collection, the alcove system has very decided advantages, which disappear, however, as soon as the col¬ lection exceeds, say, the 50,000-mark. These points apply, though with less force, to theo¬ logical, medical and law libraries. The lat¬ ter, in particular, requires special treatment, for a law library is a reference library in the strictest sense, not partially but as a whole. The entire collection, sometimes very exten¬ sive, should be immediately accessible. In many cases, such as that of the Social Law Library, Boston, the problem has been solved by placing the stacks down one side of a long apartment, the other side of the room being arranged for readers, who have direct access to the books on the shelves. A similar arrange¬ ment would be satisfactory for the larger medical, technical and scientific libraries. Theo¬ logical, historical and document collections, par¬ taking more of the characteristics of general libraries, could make use of stack system. Gen¬ eral reference libraries are subject to the con¬ ditions determining any library building, yet there are certain differences that require special attention. The university library is perhaps the best type of this class. This has some very special problems that influence the construc¬ tion of the building. One of these is the neces¬ sity for making it conform with the other build¬ ings in the academic group, for more and more the universities are planning all new buildings according to predetermined architectural styles. The necessity for conformity on the part of the library could conceivably result in an un¬ satisfactory building, unless great care were taken in its design. Another serious

problem of the university library is the necessity for providing for the special collections demanded by the different academic departments. In some institutions the university library is little

more than a collection of separate special li¬ braries, the general library containing only a minority of the total collections. However, the difficulties of administration and oversight, the danger of losses and changes of position, more than offset the advantages of this system and has led to its general abandonment. A compromise has been adopted either in the nature of a rigid restriction of the books in a department's collection to its particular sub¬ ject, or by providing seminar or special rooms for the various departments in the central li¬ brary, where they can be administered by the staff. In some cases there is direct access to the stacks and the main body of the literature from the seminary room. This system, in the main, follows the principles advocated by Dr. Poole and followed out by him in the New¬ berry. Library. Practically all of the university libraries have adopted it, notably Harvard, Johns Hopkins, Chicago, Illinois, Michigan and California. In most cases provision is made for research work in the stacks, table alcoves being installed for the use of professors and advanced students. This policy of course requires the construction of wider aisles along the stack ranges. In general no dis¬ tinction is made in the reading and refer¬ ence rooms between the serious student and the casual reader or those who make use of these rooms as study halls between classes. The last group presents a very serious problem in large university libraries and in certain buildings an effort is made to solve it by providing study halls. The constructional prob¬ lems of a large public library are infinite, but as such a library, owing to its size and the variety of its interests, tends to split up into very distinct departments, these problems can best be solved by considering each department as a unit. By determining its particular needs first, and then defining its relations to other departments and co-ordinating the whole, a satisfactory basis for a plan could be attained. With regard to the site a main public library should be situated as near to the centre of population as possible without establishing it on a traffic artery, with the accompanying in¬ conveniences of noise, dust, etc. The building should be of durable material, preferably stone or brick; and as nearly fireproof as possible. As great public libraries are both reference and circulating libraries the plans should provide for a separation of these activities. This prob¬ lem has been most admirably solved in the plans of the New York Public Library. It appears to be traditional that a public library should possess a large auditorium. This is more or less of a luxury and as it is only

occasionally used it would seem wiser to hire a hall when lectures are offered by the library, rather than carry so much unused space. The suggestions already presented regarding light, ventilation and provision for expansion apply with particular force to the public library. In the larger cities the central library cannot keep in touch with the whole community. For this reason branch library systems have been estab¬ lished. Special buildings have been erected or rooms acquired. The constructional problems of these, however, are those of the small li¬ brary, the only differences being extreme com¬ pactness permitting a small administrative force, absence of cataloguing rooms, etc. ; small

stacks, preferably open to the public; and pro¬ visions for the reception and return of books forwarded by the parent library. The stack question is, of course, a most vital one in li¬ brary planning, yet it is one that has been fairly well answered by American constructive genius. The modern stack to be found in the libraries of our country constitute a most adequate adap¬ tation of construction to the demands of the situation. There is nothing to compare with it in foreign countries. One step is yet to be taken, which is for the architect to frankly accept the stack and, instead of hiding it away behind screens of walls, often unnecessary, to concern himself with its architectural pos¬ sibilities. The admirable results obtained in the Denver Public Library and in some smaller li¬ brary buildings point the way to a new and most interesting field of development in library construction.

Bibliography. — Burgoyne, cLibrary Con¬

struction) (The Library Series, II, London 1905); Champneys, (Public Libraries; a Treatise on Their Design, Construction and Fitting (London 1907) ; Koch,*

Edwin Wiley,

Librarian, United States Naval War College.

LIBRARY BUILDINGS. See Library Administration ; Library Architecture.

LIBRARY OF CONGRESS, The. See

Congress, Library of, Washington, D. C.

LIBRARY DATA. For convenience of ready reference the principal libraries through¬ out the world are here tabulated by nations :*

Argentina.

Buenos Aires . . . . Australia.

Melbourne .

Sydney .

Austria-Hungary.

Budapest .

Cracow .

Graz . .

Klausenburg .

Prague .

Vienna .

Belgium.

Brussels .

Ghent .

Li&ge . .

Louvain .

Brazil.

Rio de Janeiro . . . Canada.

Ottawa .

Toronto .

China.

Peking .

Denmark. Copenhagen .

France.

Grenoble .

Lille .

Lyon .

Paris .

Germany.

Bamberg .

Berlin .

Bonn .

Dresden .

Erlangen . .

Frankfort-a-Main . . .

Freiburg-i.-B . .

Giessen .

Gottingen .

Halle-a.-d.-S .

Hamburg .

Heidelberg .

Jena .

Kiel .

Konigsberg .

Leipzig .

Munich .

Biblioteca Nacional .

Victoria Public Library .

N. S. Wales Public Library .

Magyar Nemzeti Muzeum .

Universytet Jagielldnski Bibliothek .

Konigliche Kaiserliche Universitats-Bibliothek .

Konigliche Universitats-Bibliothek .

Konigliche Kaiserliche Universitats-Bibliothek .

Konigliche und Kaiserliche Hofbibliothek . , .

Konigliche und Kaiserliche Universitats-Bibliothek. . .

Biblioth&que Royale .

Bibliotheque de l'Universit6 .

Bibliotheque Universitaire .

Bibliotheque de T University Catholique (destroyed by the Germans, 27 Aug, 1914) .

Bibliotheca Nacional .

Library of Parliament .

Public Library .

University Library . .

Imperial Library .

Kongelige Bibliothek . .

Universitets Bibliothek .

Bibliotheque de la Ville . . .

Bibliotheque des Facult£s Catholiques .

Bibliotheque de la University .

Bibliotheque de la Ville .

Bibliotheque d ’Arsenal .

Bibliotheque de l’lnstitut .

Bibliotheque Nationale .

Bibliotheque de Sainte Genevieve .

Bibliotheque de l’Univ ersity . .

Konigliche Oeffentliche- Bibliothek .

Konigliche Bibliothek .

Konigliche Universitats Bibliothek .

Rheinische.-F. W.-Universit&ts-Bibliothek .

Konigliche Oeffentliche Bibliothek .

Konigliche Universitats-Bibliothek .

Stadt-Biblio thek .

Universitats -Bibliothek .

Universitats -Bibliothek .

Universit ats – Bibliothek .

Universitats-Bibliothek .

Stadt-Bibliothek .

Universitats-Bibliothek .

Un i versit ats- B ibliothek .

Universitats-Bibliothek .

Konigliche Universitats-Bibliothek .

Universitats- Bibliothek .

Konigliche Hof-u.-Staatsbibilothek .

Konigliche Universitats-Bibliothek .

Status

Founded

Number of Volumes

Reference .

1810

300,000

Public .

1854

258,756

Public .

1869

258,742

289,098

Reference .

1802

University .

1400

429,355

University .

1586

270,959

University .....

1872

252,443

University .

1773

380,769

Reference .

1440

1,000,000

University .

1775

883,394

Reference .

1837

700,000

Reference .

450,000

University .

1817

300,000

University .

1627

230,000

Reference .

1810

330,000

Reference .

400,000

Public .

258,000

142,860

University .

Reference ……

100,000

770,000

Reference .

1665

University .

1482

400,000

Public .

1772

269,024

University .

235,000

University .

407,000

Public .

1527

450,000

Reference .

1797

624,904

Reference .

1795

550,000

Reference .

1367

4,050,000

Reference .

1624

400,000

Reference .

1762

600,000

Public .

1611

350,000

Reference .

1661

1,500,000

University .

1829

265,856

University .

376,800

Reference .

570,000

254,083

University .

1743

Public .

1668

365,529

University .

300,000

University .

1612

261,747

University .

1736-37

619,162

Public .

1696

284,970

Public .

1529

418,000

University .

1386

500,000

University .

1558

270,000

University .

1665

309,118

University .

1534

318,000

University .

1543

610,000

Reference .

1550-78

1 , 190,000

University .

1472

691 ,475

- *Obtained from the latest reliable sources, 'The American Library Annual-1915-1918' in particular. Through the kindness of Mr. Bowker and Miss Huxley of The Library Journal, it has been possible to bring the figures relative to many American libraries quite up to date ; in other cases, however, only approximations are presented. This is especially true of the foreign collections.*

Status

Founded

Germany — continued

Rostock .

Uni versitats- B ibliothek .

University .

Strassburg . . .

Kaiser liche Un i versitats- B ibliothek .

University .

1870

Stuttgart

Konigliche Landes-Bibliothek .

Public .

1765

Tubingen .

Konigliche Universit&ts-Bibliothek .

University .

1477

Weimar . .

Grossherzogliche Bibliothek .

Reference .

Wolfenbiittel .

Herzogliche Bibliothek .

Reference .

1568-

1644

Great Britain.

Birmingham .

Free Libraries .

Public .

1861

Cambridge .

University Library .

University .

1444

Edinburgh .

Advocates Library . .• .

Reference .

1682

University Library .

University .

1583

Glasgow .

Corporation Library .

Public .

1877

Leeds .

Central Public Free Library .

Public .

1870

Liverpool .

Public Libraries .

Public .

1850

London .

British Museum .

Reference .

1753

London Library .

Public .

1841

Public Libraries (13) .

Public .

U niversity College Library .

University .

1829

University of London .

University .

1839

Victoria and Albert Museum .

Reference .

1837

Manchester .

John Rylands Library .

Public .

1899

Public Free Libraries .

Public .

1852

Oxford .

Bodleian. Oxford University .

University .

1598

Greece.

Athens .

National Library .

Reference .

1842

Holland.

Amsterdam .

U n i versiteits- B ibliothek .

University .

1600

The Hague .

Kon-inklijke Bibliothek .

Reference .

1798

Levden .

Rijks-Universiteit Bibliothek .

University .

1575

Utrecht .

Rijks-Universiteit Bibliothek .

University .

1584

Italy.

Bologna .

Biblioteca Comunale .

Public .

1801

Biblioteca Universitaria . .

University .

1605

Florence .

Biblioteca Archivo di Stato .

Documents .

1852

Biblioteca Marucelliana .

Reference .

1703

Regale Biblioteca Nazionale Centrale .

Reference .

1714

Biblioteca Scientifico .

Reference .

Milan .

Biblioteca Ambrosiana .

Reference .

1609

Biblioteca Nazionale (Braidense) .

Reference .

1770

Naples .

Biblioteca Archivo di Stato .

Documents .

1818

Regale Biblioteca Nazionale .

Reference .

1734

Regale Biblioteca Universitaria .

University .

1812

Padua .

Regale Biblioteca Universitaria .

University .

1629

Parma .

Regale Biblioteca Palatina .

Reference .

1769

Pavia .

Biblioteca Universitaria .

University .

1778-82

Rome .

Biblioteca Apostolica Vaticana .

Reference .

1750

Biblioteca Nazionale Centrale Vittorio Emanuele. . . .

Public .

1875

Turin .

Biblioteca Nazionale Universitaria .

University .

1720

Venice .

Biblioteca Nazionale Marciana .

Reference .

1468

Vicenza .

Biblioteca Comunale Bertoliana .

Public .

1708

Japan.

Kioto .

Imperial University Library .

University .

Tokio .

Imperial Cabinet Library .

Reference .

1885

Imperial Library .

Reference .

1872

University Library . .

University .

1872

Norway.

Christiania .

Universitet Bibliothek .

University .

1811

Portugal.

Lisbon .

Bibliotheca Nacional .

Reference .

1796

Russia.

Helsingfors .

Universitet Bibliothek .

University .

1640-

1827

Kazan .

Universitet Bibliothek .

University .

1903

Kief .

Vladima Universitet Bibliothek .

University .

1832

Moscow .

Duchovnaja Akademia Bibliothek .

Reference .

1689

Pub. i Rumantzovski Musei .

Reference .

1828

Rossyski Istoriceski Musei .

Reference .

1875-83

Universitet Bibliothek .

University .

1756

Od essa .

Novorossijski Universitet .

University .

1865

Pet.rograd .

Academija Nank .

Reference .

1728

Imperial Public Library .

Reference .

1814

Universitet Bibliothek .

University .

Warsaw .

Library of the Polish Kingdom .

Reference .

Varsavski Universitet Bibliothek .

University .

1817

Spain.

Madrid .

Biblioteca Nacional .

Reference .

Biblioteca de la Universidad Central .

University .

1508-

1836

Sweden.

Lund .

Universitets-Bibliothek .

University. . .

1668

Stockholm .

Kungliga Bibliothek .

Reference .

1585

Upsala .

Kungl. Universitets-Bibliothek .

University .

1620

Switzerland.

Basel .

Oeffentliche Bibliothek .

Public .

1460

Berne .

Bibliotheque Nationale Suisse .

Reference .

1895

Geneva .

B. Publique et Universitaire .

R eferenoe

1560

Stadt- Bibliothek .

Public .

1528

Lausanne .

Bibliothek Cantonale .

Public .

Zurich .

Stadt-Bibliothek .

Public .

1629

Number of Volumes

294,000

1,023,133

603,186

555,283

300,000

300,000

445,675 860,000 632 , 000 270,000 430,000 327,210 338,796 3,000,000 260,000 1,125,270 150,000 100,000 125,000 200,000 500,000 800,000

314,000

600,000

600,000

400,000

397,000

313,133 255,000 566,000 200,000 595,592 400,000 230,000 259,680 1 ,378,000 395,439 353,620 297,359 313,323 250,000 350,000 450,000 350,000 426,819 240,000

291,117 507 , 500 298,663 491,082

495,000

400,000

400,000

309,936

500,000

240,000

1,000,000

300,000

394,845

280,144

500,000

2,615,374

453,772

1,749,837

576,387

650,000

267,000

200,000 400 , 000 400,000

330,094

225,000

200,000

225,000

300,000

257,599

LIBRARIES

Provincial Library, Victoria, British Columbia

ˆ a- L ■

1 if§”

I I®,

- a

i n

New Hampshire Historical Society, Concord, N. H

LIBRARIES

The Home of the National Geographic Society. On the right is the Gardiner Greene Hubbard Hall, erected for the Society by the heirs of its first president. In this building are the Board rooms and Library. The administration building adjoining is devoted to the editorial and business offices of the Magazine

The National Library, Berlin

LIBRARIES

1 California State Library, Sacramento, Cal,

2 Harper Memorial Library of the University of Chicago

LIBRARY DATA

391

Library Data — Continued

United States.

Albany, N. Y .

Ann Arbor, Mich. . . . Baltimore, Md .

Berkeley, Cal Boston, Mass

Brooklyn, N. Y .

Buffalo, N. Y .

Cambridge, Mass. . . .

Chicago, Ill

Cincinnati, Ohio

Cleveland, Ohio .

Columbus, Ohio .

Detroit, Mich .

Denver, Colo .

Harrisburg, Pa .

Hartford, Conn .

Ithaca, N. Y .

Kansas City, Mo . . . . Los Angeles, Cal Madison, Wis .

Milwaukee, Wis .

Minneapolis, Minn . .

New Haven, Conn. . . New York, N. Y . . . .

Newark, N. J. . . Philadelphia, Pa

Pittsburgh, Pa .

Portland, Ore .

Princeton, N. J .

Providence, R. I . . . .

Sacramento, Cal .

Saint Louis, Mo .

Salem, Ore .

San Francisco, Cal.. .

Stanford, Cal .

Urbana, Ill .

Washington, D. C. . .

New York State Library .

University of Michigan Library .

Enoch Pratt Free Library . . .

Johns Hopkins University Library .

Peabody Institute Library .

University of California Library .

American Academy of Arts and Science .

Boston Athenaeum .

Boston Medical Library .

City Free Library .

Congregational Library . _ .

Massachusetts Historical Society . . . ' .

Massachusetts Institute of Technology .

New England Historical and Genealogical Society. . .

Social Law Library .

State Library .

Public Library .

Public Library .

Harvard University, Andover-Harvard Theological

Library . .

Harvard University, Arnold Arboretum Library .

Harvard Astronomy, Observatory Library .

Harvard College Library .

Harvard Gray Herbarium .

Harvard Law School .

Harvard Museum of Comparative Zoology .

Harvard Peabody Museum .

Chicago Historical Society .

John Crerar Library .

Municipal Reference Library .

Newberry Library .

Public Library . . .

University of Chicago .

Public Library .

Public Library .

State Library .

Public Library .

Public Library .

State Library .

State Library . .

Cornell University Library .

Public Library .

Public Library . . . . . .

University of Wisconsin Library .

Wisconsin Historical Society .

Wisconsin State Library .

Public Library .

Public L'brary . . .

University of Minnesota . .

Yale University Library .

American Geographical Society Library .

Association of the Bar .

Columbia University Law Library .

Columbia University Library .

Columbia University Teacher's College .

Engineering Societies .

Mercantile Library .

Metropolitan Museum . . . .

New York Academy of Medicine .

New York Historical Society .

New York Law Institute Library . . .

New York Society Library .

Free Public Library. . .

Russell Sage Foundation .

Union Theological Library .

Free Public Library .

Prudential Life Insurance Company .

Academy of Natural Sciences .

Franklin Institute .

Free Library . .

Historical Society of Pennsylvania .

Library Company of Philadelphia .

Library of the College of Physicians and Surgeons. . .

Philadelphia Commercial Museum .

University of Pennsylvania Library .

Carnegie Library . .

Library Association .

Princeton University Library .

Brown University Library .

Public Library .

Rhode Island State Library .

California State Library . .

Christian Brothers College Library . .

Public Library .

Oregon State Library .

Public Library .

Mechanics Mercantile Library .

Leland Stanford University Library . ; .

University of Illinois Library .

Bureau of Railway Economics .

District of Columbia Public Library .

Status

Founded

Number of Volumes

Reference .

1818

449,542

University .

1841

383,976

Public .

1882

355,817

University .

1876

202,247

Reference .

1857

197,634

University .

1869

355,192

Scientific .

1780

34,287

Reference .

1807

264,531

Medical .

1875

85,963

Public .

1848

1,157,326

Theological .

1853

64,561

History .

1791

58,502

Technological. . .

1889

121,711

History .

1844

39,711

Law .

1803

65,000

Law .

1826

192,051

Public .

1896

862,112

Public .

1836

363,546

Theological .

1817

106,771

Forestry .

31,213

Astronomical. . . .

1848

14,986

University .

1638

792,117

Botanical .

1864

17,525

Law .

1817

172,073

Scientific .

1859

54,683

Ethnological ....

. . ,

7,119

History .

1856

24,738

Scientific .

1904

384,603

Economics .

1900

15,957

Reference .

1887

375,182

Public .

1871

806, 172

University .

1892

517,936

Public. . .. .*

1828

515,906

Public .

1868

584,340

Legislative .

1817

213,723

Public .

1865

450,910

Public .

1884

192,366

Legislative .

1816

176,624

Legislative .

1854

200,000

University .

1868

489,656

Public .

1876

271,077

Public .

1872

309,163

University .

1850

255,000

History .

1849

376,000

Law .

1836

58,000

Public .

1875

342,194

Public .

1885

334,763

University .

1867

251,000

University .

1700

1,025,000

Geographical ....

1852

45,000

Law .

1870

114,437

Law .

59,262

630,075

University .

1754

Education .

1887

60,500

Engineering .

62,446

Public .

1820

246,817

Art .

1879

29,000

Medicine .

1847

101,593

History .

1804

130,866

Law .

1828

81,209

Society .

1754

100,000

Public .

1854

2,538,000

Sociological .

1893

15,695

Theological .

1836

133,944

Public .

1847

256,581

Insurance .

1893

100,000

Scientific .

1812

80,000

Scientific .

1824

71,000

Public .

1731

534,152

History .

1824

202,000

Public .

1731

249,209

Medicine .

1789

107,782

Commercial .

. .

37,314

University .

1755

413,519

Public .

1890

434,469

Public .

1864

266,729

University .

1746

397,427

University .

1768

240,000

Public .

1878

181,307

Legislative .

40,144

Legislative .

1850

207 , 283

University .

1860

273,842

Public .

1865

487,336

Legislative .

1851

136,986

Public .

1878

191 ,960

Reference .

1854

127,866

University .

1891

287,634

University .

1868

388,000

Railways .

1910

50,000

Public, .

1898

200,000

Library Data — Concluded

United States — con. Washington, D. C. . .

Worcester, Mass . . . .

Status

Founded

Georgetown University Library .

University .

1791

Law Library of Congress . . .

Law .

Library of Congress .

Reference .

1800

Library of t.he Surgeon -General's Office .

Medical .

1865

Pan-American Union .

History .

1890

Public Documents Library .

Documents .....

1895

Smithsonian Institution .

Scientific .

1846

Supreme Council Thirty-third Degree (Masonic) ....

Masonry .

1886

United States Army War College .

Military .

1885

United States Rureau of Education .

Education .

1868

United States Bureau of Ethnology .

Ethnological ....

United States Rureau of Eisheries .

Fisheries .

United States Rureau of Labor Statistics .

Economic .

United States Rureau of Mines .

Mining .

1911

United States Rureau of Standards .

Scientific .

1901

United States Coast, and Geodetic Survey .

Scientific .

1832

United States Department of Agriculture .

Agriculture .

1868

United States Department, of Commerce .

Commerce .

1866

United States Department of Justice .

Law .

1831

United States Department of the Naw .

Naval .

1882

United States Department, of State .

Diplomatic .

1789

United States Engineers' School .

Military .

United States Forest Service .

Forestry .

United States Interstate Commerce Commission .

Railways .

United States Geological Survey .

Geological .

1882

United States House of Representatives .

Documents .

United States National Museum .

Scientific .

United States Patent Office .

Technical .

1836

United States Senate Library .

Law . .

1852

United States Treasury Department .

Finance .

United States Weather Bureau .

Meteorological . .

1870

Volta Bureau .

Deaf .

American Antiquarian Society .

History .

1812

Public Library .

J

Public .

1859

Number of Volumes

104,785

168,719

2,451,974

190,310

32,834

193,533

521,616

75,000

100,000

150,000

20,430

29,155

30,282

12,000

13,621

25,000

131,693

54,540

45,000

50,000

73,000

45,115

12,245

13,000

120,000

275,000

43,692

93,300

200,000

11,060

34,000

9,000

140,000

224,482

LIBRARY LAWS AND LEGISLA¬ TION IN THE UNITED STATES. As in

the case of education, each State has complete control of the library situation within its bound¬ aries. In many States the libraries have re¬ ceived great assistance and encouragement from the State administration ; in many others, on the contrary, they have been neglected and sometimes discouraged. State library legisla¬ tion has concerned itself mainly with the fol¬ lowing topics: (1) Founding of libraries; (2) their administration and supervision by library commissions, etc. ; (3) development of school libraries; (4) of country and rural libraries; (5) of traveling libraries. Legislative refer¬ ence bureaus and provision for popular lectures and for educational extension by means of the library are more or less liberally provided for by certain States.

1. The laws regarding the foundation of libraries are universally permissive and not mandatory. That is, a community is empow¬ ered to vote an appropriation for the establish¬ ment and support of a public library. The method of obtaining the endowment differs, in different States, the usual one, however, being the addition of a small percentage (one-half to five mills on the dollar) to the tax rate. In other cases a popular subscription up to a cer¬ tain amount is

authorized, which, in a very few cases, is supplemented by an additional fund from the State treasury. Virtually all of the States have library enabling or foundation acts in some form or other.

2. Less unanimity is discoverable regarding the laws for administration and supervision, 11 of the States having no legislation on that sub¬ ject. It is not surprising furthermore to find that these States are the ones in which library facilities are least developed. In those States which have enacted laws on this subject there

is considerable difference of method in obtain¬ ing the desired end. In general, however, a State library commission is provided for, which has oversight and direction of the libraries. In the case of California and of Virginia, the State library has the functions of a library commission, while in New York, Rhode Island, Tennessee and Utah, the State Board of Edu¬ cation has control, acting through special com¬ missions or representatives. In Alabama the State Department of Archives and History has the function of a library commission. Colo¬ rado provides for two library commissions, one of which has direction of the traveling libraries.

The following States have laws providing for a library commission or some other form of direction and control : Alabama, Arkansas, California, Colorado, Connecticut, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, Penn¬ sylvania, Rhode Island, South Dakota, Tennes¬ see, Texas, Utah, Vermont, Virginia, Washing¬ ton, Wisconsin (37).

3. The following States make provision in their laws for school libraries : Alabama, Ari¬ zona, California, Colorado, Connecticut, Dela¬ ware, Florida, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Mas¬ sachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New York, North Carolina, North Da¬ kota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyom¬ ing (43).

4. The following States have laws provid¬ ing for the extension of library facilities to

counties and rural districts: California, Dela¬ ware, Indiana, Iowa, Maryland, Minnesota, Missouri, Montana, Nebraska, New York, Ohio, Oregon, Texas, Virginia, Washington, Wiscon¬ sin, Wyoming (17).

5. Traveling libraries are provided for in Iowa, Kansas, Kentucky, Maryland, Minnesota, New York, North Carolina, North Dakota, Ver¬ mont, Virginia and Wisconsin (11) ; and leg¬ islative reference bureaus in Alabama, Georgia, Illinois, Indiana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Texas and Wisconsin (13). Pen¬ sions for library employees are provided for in Illinois and Nebraska (2) and Kansas provides for libraries in penitentiaries.

Edwin Wiley,

Librarian , United States Naval War College.

LIBRARY PERIODICALS. The spe¬ cial publications devoted to library work throughout the world will be found detailed by nations in the following list:

United States. — American Library Annual (New York 191 1-) ; American Library Asso¬ ciation. Bulletin (Chicago 1907-) ; American Library Association. Proceedings (Chicago) ; Bibliographical Society of America. Papers (Chicago 1906-) ; Library Journal (New York 1876-) ; Public Libraries (Chicago 1896-) ; Special Libraries (Boston 1910—) .

Austria-Hungary. — Oesterreichische Zeit- schrift fiir Bibliothekswesen (1897-) ; Zeit- schrift des Osterreichischen V ereins fiir Biblio¬ thekswesen (Vienna 1910—) .

Belgium. — Bulletin de l' I ns ti tut Interna¬ tional de Bibliographie (Brussels 1895-) ; Revue des, Bibliotheques et Archives de Belgique (Brussels 1903-).

Denmark. — • B og samling sbladet (Copen¬ hagen 1906-).

France. — Bulletin de l' Association des Bib- liothecaires Frangais (1907-) ; Bulletin du Bibliophile et Bibliothccaire (1834 —) ; Bulletin des Bibliotheques Populaires (Paris 1906-) ; Courrier des Bibliotheques (Paris) ; Revue des Bibliotheques (Paris 1 89 1 —) .

German Empire. — Bibliothekar (Leipzig 1909-) ; Blatter fur Volksbibliotheken u. Lese- hallen (Leipzig 1900-) ; Jahrbuch der Deutschen Bibliotheken (Leipzig 1902-) ; Zentralblatt fur Bibliothcksivesen (Leipzig 1 884—) .

Great Britain. — Librarian and Book World (1910-) ; JJbrary (1884-) ; Library Assistant (1898—) ; Library Association Record (1899-) ; Library World (London 1898-).

Holland. — De Bibliothecaris (Rotterdam 1912—) ; De Bockzaal (The Hague 1907-) ; Het Boek (The Hague 191 2—) ; Maandblad voor Bibliothekwesen (The Hague 191 3—) .

India. — Library Miscellany (Baroda 1913-).

Italy. — Bolletino della Civica Biblioteca e del Museo ; Bollettino delle Biblioteche Popolari (Milano 1907-) ; Revista della Biblioteche e degli Archivi (Florence 1890-).

Norway. — For F oik eo ply suing (Christiania 1907.-) ; Nordisk Tidskrift for Bok-och Biblio- teksvdsen (Upsala 1914 —) .

Russia. — Le Bibliothecaire (Saint Peters¬ burg 1910—) .

Spain. — Revista de Archivos, Bibliotecas y Museos (Madrid 1897).

Sweden, — Bibliotheks Blqdet (Stockholm

1916—) ; Folke Bibliotheks Bladet (Stockholm

1903-).

LIBRARY SCHOOLS. See Library Training.

LIBRARY TRAINING. M. W. Schret- tinger, in his (Versuch eines vollstandigen Lehr- buchs der Bibliotheks-wissenschafG (Munich 1829) was probably first to suggest special schools for training librarians. F. Rullman, librarian of the University of Freiburg, in 1874 outlined a university course in library science. The older libraries and librarians were intensely individualistic, and these, as well as other early schemes, emphasized the bibliographical side rather than the administrative. Recogni¬ tion of librarianship as a profession and the consequent professional co-operation of libra¬ rians were necessary for substantial progress in library training. The first really construc¬ tive work in this direction followed the forma¬ tion of the American Library Association in 1876. A regular course in bibliography was established at the University of Michigan in 1882 and a chair of library science at Gottin¬ gen under Karl Dziatzko, in 1886.

The beginning of systematic library training in America is largely due to Melvil Dewey, who on 5 Jan. 1887 opened the School of Li¬ brary Economy at Columbia College, New York City. This was transferred to Albany in 1889 and renamed the New York State Library School. From this pioneer school five types of library training agencies have developed : li¬ brary schools ; apprentice and training courses ; short courses ; library courses in schools and colleges and miscellaneous agencies.

Library Schools. — Regular library schools give courses of either one or two school years. All are connected with libraries which are used for study and practice. The location of the school usually determines whether public, col¬ lege or reference library work is emphasized. The principal subjects are substantially the same in the different schools. They include bibliogra¬ phy, reference work, selection and evaluation of books, history of books and libraries, binding, cataloging, classification, library administra¬ tion, library buildings and many other technical and social aspects of library work, sometimes grouped under the term ˆlibrary economy.® Practice in varied library work is required. Entrance requirements range from high school graduation to college degree.

The Association of American Library Schools was formed at Albany, N. Y., 29-30 June 1915, for the improvement of library school training. Membership is limited to schools giving at least one full year of library training and meeting the minimum standards of equipment, faculty personnel and curriculum prescribed by the association. The present members of the association (1919), with date of founding, length of course and degrees granted are :

1887. New York State Library School, Albany, N. Y. (2 years. College graduates only. Bachelor of Library Science. Master of Library Science.)

1890. Pratt Institute School of Library Science, Brooklyn, N. Y. (1 year.) #

1893. University of Illinois Library School, Urbana, Ill. (2 years. College graduates only. Bachelor of Library Science.)

1897. Syracuse University Library School, Syracuse, N. Y. (2 years. Bachelor of Library Economy.)

1900. Carnegie Library School, Pittsburgh, Pa. (3 courses of 1 year each.)

1902. Simmons College. School of Library Science, Boston, Mass. (1 year. Bachelor of Science.)

1904. Library School of Western Reserve University, Cleve¬ land, Ohio. (1 year.)

1905. Library School of the Carnegie Library of Atlanta, Ga. (1 year.)

1906. Library School of the University of Wisconsin, Madi¬ son, Whs. (1 year.)

1911. Library School of the New York Public Library, New York City. (1 year and advanced electives.)

1914. Los Angeles Public Library Training School, Los Angeles, Cal. (1 year.)

Other library schools giving a one-year course are the California State Library School, Sacramento, Cal. ; Saint Louis Public Library School, Saint Louis, Mo.; University of Wash¬ ington Library School, Seattle, Wash., and the Riverside Library Service School, Riverside, Cal. (33 weeks).

Apprentice and Training Classes. — Be¬ fore the establishment of library schools, serv¬ ice as an apprentice was the usual method of library training. Most large library systems now conduct elementary classes for training assistants for their own libraries. The instruc¬ tion is usually local in emphasis and chiefly concerned with administrative details. Train¬ ing classes vary greatly in length, subjects treated and methods of instruction.

Short Courses. — These are elementary courses of three or more weeks' duration, usu¬ ally given in the summer months and chiefly intended to aid librarians in small public or school libraries or in subordinate positions in large libraries. They are rather numerous and, without any generally accepted standard. They fall, for the most part, into one of four classes: (1) Those conducted independ¬ ently by State library commissions as in Indi¬ ana, Michigan, Minnesota, New Jersey and Pennsylvania; (2) those given by library schools, with or without the co-operation of library commissions, e.g., the summer course of the New York State, University of Illinois, Simmons College and University of Wisconsin library schools: (3)

those given as summer courses by colleges, universities and normal schools as at the universities of California, Iowa, Michigan and Missouri and at Columbia University; (4) the independent short course, represented by the Chautauqua (N. Y.) School for librarians.

School, College and University Courses.

— These, unlike the (

Miscellaneous Agencies. — Many library commissions conduct local library conferences or ˆinstitutes® of from one day to two weeks' duration. The American Library Association and many State and local library associations regularly hold meetings for professional dis¬ cussion. These meetings are important aux¬ iliary forces in promoting professional spirit

and encouraging library training. Several States employ library organizers who give per¬ sonal instruction in library matters to librarians whose libraries they inspect or organize. Corre¬ spondence and extension courses in library work have so far made little material progress. The near future will probably see important developments in both directions.

Library Training Outside the United States. — As early as 1877, Italy had prescribed examinations for library positions but, as a whole, libraries outside the United States still depend chiefly on the apprentice system toˆ re¬ cruit their staffs. Most of the training given is primarily bibliographical. Extended service and rigid examinations are required in Prussia and Bavaria, and schools for women librarians are maintained in Berlin and Leipzig.

In England, regular extension courses in library subjects, with prescribed examinations, are held under the auspices of the Library Association, chiefly to provide assistants for the public libraries.

In Canada, summer courses have been held at McGill University, Montreal. A nine weeks course is regularly conducted by the Ontario Department at Toronto.

The number of Scandinavian librarians trained in American library schools is steadily increasing. Norway has elementary library courses, in the interest of the rural libraries, in most of her normal schools, and several general library summer courses have been held.

Successful library courses, modeled on American lines, were conducted by Mme. Haff- kin-Hamburger, at Shaniawsky University,

Mos¬ cow, 1913-17. In India two library courses have been established : at «Baroda by W. A. Borden and at the University of Lahore by A. D. Dickinson.

Bibliography. — Cannons, H. G. T., bibli¬ ography of Library Economy) (London 1910) ; (Librarianship as a Profession (Albany 1912) ; Plummer, Mary W., (Training for Librarian- ship) (Chicago 1913) ; (Library Instruction in Universities, Colleges and Normal Schools) (United States Bureau of Education, Bulletin 606; Washington 1914). For library schools and short courses consult current American Library Annual, New York; (First Quarter Century of the New York State Library SchooP (Albany 1912) ; the circulars of the various schools and library commissions; Amer¬ ican Library Association Proceedings, 1917 ; Reports of the Committees on Summer Schools and Apprentice Training Classes (Chicago

1917).

Frank K. Walter,

Vice-Director, New York State Library School.

LIBRATION, in astronomy, an apparent oscillatory motion of the moon which causes parts near the edge to appear and disappear from time to time. It is threefold in character and was first recorded by Galileo who noted the longitudinal and diurnal libration, while the latitudinal libration was demonstrated by Johann Hevelius, the German astronomer, in the 17th century. The longitudinal libration is due to the moon's rotation in her orbit being irregular from our viewpoint, so that two small strips or gores from pole to pole are visible alternately in the east and west sides, increasing the area we can see. The latitudinal libration

arises from the moon's axis being at a slight angle from the perpendicular of its orbit, so that at times we see more of the north polar and at other times more of the south polar region. The diurnal libration is very minute, arising from the altered position of an observer on the rotating surface of the earth. The re¬ sult of all the apparent eccentricities of move¬ ment is that there falls under human observa¬ tion almost 60 per cent of the lunar surface instead of the half we would see if only one surface was continually toward us.

LIBRI CAROLINI. See Caroline Books. LIBRI-CARRUCCI DELLA SOM- MAIA, Guillaume Brutus Icile Timoleon,

ge-yom broo-tiis e-sel te-mo-la-on le'bre ka- roo'che del'la som- ma'ya, Count, French mathe¬ matician : b. Florence, Italy, 2 Jan. 1803; d. near Fiesole, Italy, 28 Sept. 1869. His father was an Italian adventurer, in 1816 condemned at Lyons to 10 years' imprisonment at hard labor and to branding for counterfeiting goods, and who finally became a secret agent of the king of the Netherlands. The son became pro¬ fessor at the University of Pisa, where he published in the scientific journals several arti¬ cles on the theory of numbers, on analysis and the resolution of indeterminate equations of the first degree. Having been compromised by his political views, he fled in 1830 to France, where the friendship of Arago introduced him to the world of science. Naturalized in 1833 as a Frenchman, he was called to the Academy of Sciences as successor of Legendre. He be¬ came inspector-general of public instruction, obtained the cross of the Legion of Honor and was appointed inspector-general of the libraries of France, an office created expressly for him. Several works published by him dur¬ ing this period gave him a widely extended reputation. Among these were (Histoire des Sciences Mathematiques en Italie depuis la Renaissance jusqu'a la fin du I7e siecle) (1838—41) ; (Souvenirs de la jeunesse de Napoleon (1842) ; and (Lettres sur de clerge et la liberte de l'enseignement* (1844). During the latter part of the reign of Louis Philippe, he was suspected of having made use of his office of inspector-general of libraries to plunder them extensively. After the minutest investigation, Libri, who had escaped to London, was found guilty and condemned in June 1850 to 10 years' imprisonment and degradation from public em¬ ployment. A remarkable paper was written on his behalf by Paul Merimee entitled, (Le proces Libri, > and published in 1852 in the Revue des Deux Mondes.*

LIBURNIA, li-ber'ni-a, in ancient geog¬ raphy, a district of Illyricum along the coast of the Adriatic, now included partly in Croatia and partly in Dalmatia. > The country is moun¬ tainous and the inhabitants were celebrated from early times as sailors. They occupied the northern islands of the Adriatic and had set¬ tlements on the Italian coast. Their chief towns were Scardona and Iader.

LIBYA, lib'i-a, the geographical term of the ancients for Africa. At first it had mythical boundaries. Though Herodotus seems to have known that Africa was a peninsula, the moderns knew little about this till the Portuguese doubled the Cape of Good Hope in 1497. Homer and Hesiod comprised under Libya all

the territory west of Middle and Lower Egypt. Macedonian kings of Egypt, on the development of commerce, necessarily acquired a more exact knowledge, and the wars of Rome with Carthage first gave men accurate knowledge of the interior. The sandy tract in which the Sahara is included was called the Libyan Desert, and that portion of the Mediterranean extending between the coast of Africa and Crete was known as the Libyan Sea. See Africa.

LICENSE, in law, permission by proper authority, as to enter upon land, sell liquor, etc. ; also, the written or printed document giving such authority. Among the most im¬ portant of private licenses are licenses to enter land, licenses to make or sell patented articles and licenses granting the sole right to print or ■to sell certain books. Among the most im¬ portant of public licenses are those given by municipalities or other governmental authority to persons pursuing certain callings, trades, professions or the like, as for sale of liquor, the practice of medicine, driving of public vehicle's, peddling of goods, etc.

A license to enter land vests no estate in the licensee, and the death of either party revokes the license. A license of this kind may be for a consideration or purely gratuitous, but in either case it may be revoked at any time by the licensor. However, if the licensee has paid a consideration for the license and it is revoked by the licensor in such a way as to amount to a breach of contract, the licensee can sue, if there is no fault on his part, for damages for breach of contract. If the licensee refuses to leave after his license has been revoked, he ordinarily becomes a trespasser, whether the time agreed upon has expired or not. Occa¬ sionally courts of law and more frequently courts of equity modify this doctrine. A license to enter land, being personal, is not assignable, and it is revoked if the licensor conveys the premises to a third party. A licensee who has been granted exclusive use to land by the owner cannot bring an action against a third party who uses the same land. Similarly, the licensee of a copyright cannot bring an action against one who infringes the copyright. The same rule applies to patents.

Licenses to sell intoxicating liquor and li¬ censes regulating certain callings, as peddling of goods, are usually regulated by State stat¬ utes or municipal ordinances, and a fixed fee therefor is generally charged. Usually a high fee is charged for a license to sell intoxicating liquor, either for the purpose of raising revenue or to restrict its sale, or both. This restriction is justified on the ground of public policy, as experience shows that a low license fee favors an increase in the number of places where intoxicating liquor is sold,

which in turn leads to an increase in the amount of intoxicating liquor consumed by the general public. The State, under its police power, exercises the right to regulate the practice of certain trades, pro¬ fessions, etc., and this has proved by experi¬ ence to be a policy in the interest of the people as a whole. See Local Option.

Certain licenses imposed by municipalities or States have been held unlawful by the Federal courts of the United States, as a tax upon drummers soliciting orders for firms in another State, a license tax upon an agent of a

railroad company doing interstate business, and likewise upon a telegraph company doing interstate business.

LICH OWL, or LITCH OWL (A. S. lie, a body, and ule, an owl), a provincial British name for any owl, which screams at night, and is superstitiously regarded as portending death. From the earliest ages the hoot of the owl has been regarded as ominous. Ovid, Virgil and Shakespeare contain many illus¬ trations of this common superstition. See Owls.

LICHENS, li-kenz (Lat. lichen, lichen, Gr. luxhv) , a large but artificial group of the higher fungi (Carpophyta) , characterized by parasitic growth upon the lower blue-green and yellow-green algae (Protophyta , Chlorophy- cece). Lichens are of the wildest occurrence in nature, appearing as gray, yellow and brown crusts or masses almost everywhere upon trees, rocks and soil. The number of genera and species differs more or less with the authority cited: the valid genera number not far from 250, while the species are in the neighborhood of 4.000.

The vegetative body or thallus varies from a fraction of a millimeter to several decimeters in size, though it shows relatively little varia¬ tion in 'thickness. In texture it is powdery, leathery, paper-like, or, in the case of many forms with blue-green algas, gelatinous ; the prevailing colors are gray, brown and yellow, while green and black sometimes occur. The shape of the thallus is typically orbicular or stellate ; it is often irregular, especially in branched forms. In general appearance the thallus varies within wide limits; as a rule, however, three types, crustose, foliose and fruticose, may be clearly distinguished. The crustose type is the primitive one, showing in its

granular, warty and areolate forms the various .stages through which the thallus has passed in its development from the original mycelium. The crustose thallus is so closely in contact with its substratum that it cannot be separated from it without tearing. The foliose type is a higher development of the crustose. It is usually a definite, leaf-like structure, more or less lobed at the margin and attached to the stratum somewhat loosely or at but a single point. The fruticose type is a special modification of the foliose, in which the latter is more or less flattened or cylindrical and erect or pendulous. This form is prob¬ ably an adjustment to conditions of diffuse light. It is especially characteristic of tree- lichens and of certain ground forms, such as Cladonia, where it is termed the podetium. In the latter there is also developed an accessory or secondary thallus, consisting of minute, leaf¬ like scales.

The simplest thallus consists merely of a few fungus threads enclosing the irregularly dis¬ posed cells of the host or alga. Ordinarily, however, the algal cells not only have a definite position, but the fungal portion of the thallus is likewise highly specialized. Naturally, this dif¬ ferentiation is least in the crustose forms and greatest in the fruticose ones. The structure of the foliose type may be taken as fairly rep¬ resentative, except of the gelatinous lichens, in which the algae are scattered throughout the thallus. A definite epidermal layer is wanting

except in a few of the higher lichens, where the outer filaments have been gelatinized, resulting in the formation of a structure closely resem¬ bling a cuticle. As a rule, however, the upper¬ most part of the thallus is the cortical layer. This consists of hyphae (filaments) compacted in such a way as to produce a tissue which looks much like parenchyma and is called in conse¬ quence pseudoparenchyma. The function of the cortical layer is in part mechanical or sup¬ portive and in part protective. Its structure seems, to depend primarily upon the latter func¬ tion : it is least in those forms growing in for¬ ests and greatest in those found in the open. Below the cortical layer and continuous with it is found the host or algal layer, consisting of filaments more or less loosely intertwined with the algae. This is the nutritive layer, in which the fungal hyphae draw their nourishment from the host-cells. The connection between the two may be merely by contact or by penetration. In the latter case the fungal hyphae either pene¬ trate the protoplasm of the host and finally destroy it, or merely pierce the cell-membrane and lie in contact with the protoplasm. In either event, the hyphae develop special branches for contact or penetration, which are called haustoria. The algal layer is a specialized por¬ tion of the medulla

which lies just below it. The hyphae of the two layers are continuous, but they do not develop haustoria in the me¬ dulla, where they tend also to run more or less parallel with the direction of growth. The med¬ ullary layer primarily serves the function of transport; it is likewise used for the storage of lichenin (lichen-starch) and fats. The lower surface of the thallus is covered with a cortical layer similar in structure to that of the upper surface. Generally, however, it is somewhat thinner and is designed rather for absorption than for protection. It is frequently produced into facicles of hyphae termed rhizoids and cilia.

The thallus of many lichens exhibits several peculiar structures, which are the direct result of the symbiosis of fungus and alga. The most frequent and most important of these is the soredium. This is a minute irregular mass of fungal hyphae and algal cells, readily carried by wind or water, and able to grow directly into a lichen thallus under the proper conditions of moisture and warmth. Soredia occur upon the upper face of the thallus of many lichens as elevated powdery masses or tubercles. They arise in the algal layer of the thallus by the re¬ peated branching of a fungal filament in such fashion as to completely enclose one or more cells of the alga, which also increase in number. The hyphae become more or less gelatinized and compacted into a surface very resistant to desic¬ cation. The soredia are pushed upward through the thallus by the growth of the filaments below and are finally extruded through a rift in the cortical layer, constituting a sorus. Normally, the soredia are carried away from the sorus and develop independently, but in some cases they grow while still in contact with the mother- thallus, producing minute, leaf-like scales upon the latter. These are the so-called isidioid growths or phylloclades, found in Usnea and related genera. Soralia are structures which arise from the medulla or even from the lower¬ most layer by the . upgrowth of a mass of par¬ allel filaments which penetrate the algal layer

LICHENS

1 Parmelia stellaris z Cladonia retipora

3 Parmelia olivacea

4 Cladoma perfoiiata

5 Sticta pulmonaria

6 Cladonia verticillata

7 Parmelia caperata

8 Cladonia squamosa (center);

C. fimbriata (left); C. cornu- copiae (right)

9 Hagenia crinalis

•

.

and there develop into normal soredia. Cepha- lodia bear the general appearance of soredia, but in origin and function they are quite differ¬ ent. They are distinguished as external and internal. The cause of their development is unknown : they are said to arise from the soredia of other lichens, which have lodged upon the thallus. They have never been produced ex¬ perimentally, however, and it seems much more probable that they are modifications of the thallus due to a change in the life form of the algal element. The cyphellae are flat or concave gaps in the lower cortical layer of the thallus of Sticta and Stictina, They are filled with variously branched hyphae of the medullary layer and probably function as organs of ab¬ sorption and respiration. The spermagonia are minute black dots occurring on the upper face of many lichens, especially near the margin of the thallus. Structurally they are identical with those propagative organs of black fungi that are termed pycnidia. They are spherical bodies with a membranous or carbonaceous envelope, containing a layer of rod-like filaments which bear at their tips tiny spore-like bodies called spermatia. As the names indicate, the sper¬ magonia were supposed to be male reproductive organs and the spermatia the fertilizing cells. There now seems to be little doubt, however, that they are propagative organs or pycnidia inherited from fungus ancestors. In a few cases they may be pycnidial parasites, such as Phyllosticta.

The fruit (sporocarp) of those lichens which bear spore-sacs (ascolichens) is called a peri- thecium when the fungus is one of the black fungi (Pyrenomycetales) , a hysterothecium, when it belongs to the cleft fungi (Hysteriales) , and an apothecium when the lichen is a cup fungus (Discomycetales) . All these agree es¬ sentially in structure, though they differ in form : the perithecium is globoid,

opening by a minute pore at the top, the hysterothecium, linear or irregular, opening by a cleft, and the apothecium usually open and disc-shaped. The essential parts in each are the same, namely, spore-sacs (asci), the spores, and the sterile threads (paraphyses). The apothecium is the highest type of spore-fruit and the most widely distributed. It consists usually of the following parts : the thecium, the central portion consist¬ ing of the asci, sometimes called thekes, and the paraphyses ; the epithecium, which lies above the asci ; and the hypothecium which is found be¬ low them. The latter often extends around the sides of the thecium also, and is there termed the exciple (proper exciple, parathecium). All of these consist of densely compacted elongate hyphae (prosenchyma) which are without algae and are often more or less dark colored. In most of the higher lichens the exciple is sur¬ rounded by the tissue of the algal layer, pro¬ ducing a thalline margin (thalline exciple) about the apothecium. The apothecium usually sits directly upon the thallus; occasionally it is stalked, and less frequently it is immersed or innate. Lichens show the same differences with respect to paraphyses, asci and spores that are to be found among the other cup-fungi and black fungi. The paraphyses are simple or re¬ peatedly branched, continuous or septate, gelat¬ inized or non-gelatinized, persistent or evanes¬ cent. They are often compacted and dark- colored at the tip, appearing to be continuous

with the epithecium. The spore-sacs of lichens are cylindrical or calvate in form, more rarely obovoid. Their walls are thin, though some¬ times gelatinized; they do not react to iodine as a rule, except when very young. The asci usually open by a terminal slit ; in a few cases the entire wall breaks away. The number of spores in an ascus varies from one (Pertusaria) to many (Acarospora) ; the normal number is eight, six or four. The arrangement of the spores is usually irregular, though they are sometimes in one row (monostichous), or in two rows (distichous). Lichen spores are or¬ dinarily colorless and simple, less frequently dark brown and many-celled. They may be two-celled (bilocular), several-celled (pluriloc- ular), or muriform, when the partitions run in both directions. The wall of the spore is smooth and without appendages; the contents may be hyaline, granular or guttulate.

Physiology and Reproduction.— The func¬ tions of lichens are essentially those involved in the relation between parasite and host, modified to an important degree in those forms with well-developed thallus. Absorption of water takes place readily upon both surfaces of the thallus, but especially on the under side, where hyphae, cilia and rhizoids all act more or less efficiently as absorptive agents.

According to Zukal, the hyphal hairs are capable also of absorbing moisture directly from the air, in Physcia, Peltigera, Sticta, etc. Water-storage takes place in the algal and medullary layers. It is effected primarily by the algal membranes, especially of the blue-green slimes, and to a degree also by the lichenin of the hyphae. Zukal has suggested that the cephalodia, be¬ cause of their blue-green algae, are probably to be regarded as structures for the storage of water. The ability of the lichen thallus to re¬ tain water arises from its complexity, and from the presence of the gelatinized cortex. Lichens exhibit a number of somewhat primitive devices for the exchange of gases. These are often mere rifts in the thallus, or degenerate pycnidia ; sometimes definite openings are present, or absorption takes place through loose protuber¬ ances. A specialized organ for this purpose is found in the cyphellae of Sticta and Stictina, which are primitive breathing pores, making direct connection between the air and the medullary layer. The latter serves as a path¬ way for the transport of water and gases to the various parts of the thallus.

The relation of the lichen thallus to the environment is obscure. Of all macroscopic plants lichens resist drying-out the most suc¬ cessfully. With respect to the temperature ex¬ tremes which they can endure, they are sur¬ passed only by the bacteria. Many lichens withstand temperatures greater than 65° C, and nearly all are able to resist the intense cold of Arctic and Alpine winters, with minima of — 40° to — 60° C. Lichens exhibit very different sensibility to light: the majority of them grow in the fullest sunlight, while some, Evernia, Usnea, Peltigera, Graphis, etc., are adapted to more or less intense shade. In Alpine regions especially, orange and yellow thalli occur almost exclusively on the under, or shaded, side of rocks. This fact is explained by Zukal's re¬ searches, in which he found that the algal layer was most highly developed under a cortex orange or yellow in color, these colors being

most penetrable by the rays active in carbon assimilation. The color of the cortex is also thought to be a protection against excessive illumination, though this explanation can scarcely hold for those lichens in which the lower cortex is highly colored. According to Schwendener, the growth of the thallus is largely intercalary, marginal or apical growth being relatively insignificant. In lichens with yellow-green algae, the growth of the thallus is determined by

the fungus, and the development of the algal layer takes place subsequently. In this process, the algae and hyphae show a tend¬ ency to aggregate into tubercles, which modify the surface of the thallus. Somewhat similar sculpturings are produced by tensions in the growing thallus, especially by the alternation of wet and dry periods. In nearly all the gelati¬ nous lichens, and particularly those parasitic on filamentous algae, growth is controlled by the alga, and the fungus has little or no influence upon it.

The propagation of lichens occurs ordinarily by means of soredia. It may take place also by fragments of the thallus, whether abstrictea naturally or cut off by accident. The propaga¬ tive value of the pycnidium (spermogonium) in nature is unknown. The conidia have been germinated in cultures with difficulty, and at present there is no evidence that they grow more readily under normal conditions. Repro¬ duction is a characteristic feature of the lichens : a few species produce apothecia rarely, while in certain sterile forms they are never de¬ veloped. It is still an open question whether the apothecium is the result of fertilization. Some investigators have thought to demonstrate the presence of a carpogone and trichogyne, and to follow the development of a spore fruit, which results from the contact of spermatium and trichogyne. The germination of many spermatia points strongly to the conclusion that these are mere conidia and not male sexual cells. No fusion of sexual cells has yet been seen in lichens, and, until this is seen, it is impossible to settle the question of their sexual nature. The apothecium arises usually from certain more or less distinctly twisted hyphae lying between the medulla and the algal layer. Sometimes the point of origin is just beneath the cortex, especially near the margin, and in crustose forms it is in the hyphal layer just above the substratum. The development is essentially the same as in the other cup-fungi ; the hyphal fundament increases in size, and be¬ comes differentiated above into two sorts of threads. The first to grow up are the para- physes, in the centre of which push up the club- shaped branches, which become the asci. Spore formation in the ascus follows the method typical of all sac-fungi. The escape of the spores takes place through a terminal rift in the ascus or by the breaking up of the latter. The mature spores germinate readily under the proper conditions, usually sending out a single filament from each cell ; large spores, however, such as those found in Megalospora and Pertusaria, produce many germinating filaments. The young mycelium is capable of slight de¬ velopment only, unless it comes in contact with the proper alga, when it grows at once into the thallus. The uncertainty that the spores will germinate in a place where the proper host occurs makes

multiplication by spores much

less sure than by soredia. In a few cases (Endocarpon , Staurothele, etc.), this disad¬ vantage has been overcome by the develop¬ ment of algae in the thecium between the para- physes and spore-sacs (hymenial gonidia). These are ejected with the spores, and, clinging to the latter, furnish a certain substratum for the germination of the spores.

Origin and Classification. — Lichens are sac-fungi and rod-fungi which show more or less similarity in their vegetative body because of their parasitism upon certain algae. The clew to their origin and relationship is to be found in the inherited reproductive organ, the sporocarp, and not in the thallus. From this standpoint, the group is highly artificial, con¬ taining representatives of two distinct classes of fungi, the Ascomycetes and the Basidiomy- cetes. The basidiolichens are a small group, containing but a few genera: the ascolichens consist of the representatives of several un¬ related families. It is evident that the lichens have not arisen from a single point, as members or offshoots of one line of development, but that they have originated at several widely separated points. They are of multiple origin; that is, they are polyphyletic. In ascolichens, the form of the sporocarp indicates the main places of origin: the Verrucariacece, with perithecia, are Pyrenomycetales ; the Graphi- dacece, which show the hysterothecium, be¬ long to the Hysteriales ; the remaining families, Caliciacece, Collemacece, Parmeliacece, etc., be¬ long to the Pezizales.

The following synopsis will indicate the re¬ lationship and limits of the various families of lichens :

Class Ascomyceteae: fruit a sporocarp, spores borne in sacs (asci).

Order Pyrenomycetales: sporocarp a peri- thecium.

Family Sphceriacece: mycelium filamentous, saprophytic or parasitic on tissues.

Family Verrucariacece : mycelium thalloid, parasitic on yellow-green algae.

Order Hysteriales : sporocarp a hysterothe¬ cium.

Family Hysteriacece : mycelium filamentous, hysterothecium carbonaceous.

Family Hypodermatacece : mycelium filamen¬ tous, hysterothecium membranaceous.

Family Graphidacece : mycelium thalloid, on algae, hysterothecium membranaceous or car¬ bonaceous.

Order Pezizales : sporocarp an apothecium.

Apothecia and thallus leathery, waxy or car¬ bonaceous, never gelatinous.

Family Patellariacece : mycelium filamentous, mostly saprophytic.

Family Lecidiacece : mycelium thalloid, apo¬ thecium sessile, exciple without algae (proper).

Family Cladoniacece : mycelium thalloid of two sorts, primary and secondary; apothecia borne on stalks (podetia), proper exciple.

Family Parmeliacece : mycelium thalloid, al¬ gae yellow-green, exciple with algae (thalline).

Family Pannariacece : mycelium thalloid, algae blue-green, proper exciple.

Apothecia and mycelium gelatinous.

Family Bulgariacece : mycelium filamentous.

Family Collemacece: mycelium thalloid, on blue-green algae.

Class Basidiomyceteae: fruit a hymeno- phore spores borne on stalks (basidia).

Order Hymenomycetales : hymenophore ex¬ posed on a pileus.

Family Thelephoracece : hymenophore smooth, mycelium filamentous or thalloid (in Cora, Rhipidonema, Dictyonema, and Laudatea) .

Order Gasteromycetales : hymenophore en¬ closed in peridium.

Family Sclerodermatacece : peridium broad subsessile, gleba

excavate, mycelium filamen¬ tous, or thalloid in Emericella.

Distribution and Role. — lichens are dis¬ tributed over the entire earth; they are least numerous in the tropics and reach their maxi¬ mum development in Alpine and polar lands, where they often form the principal vegetation over immense stretches. Many species are widespread, especially in the northern hem¬ isphere : some of these, such as Cladonia rangi- ferina, Urceolaria scruposa, Usnea barbata, etc., are truly cosmopolitan. In the tropical and temperate zones, the greatest wealth of lichens is found upon bark and wood. In Alpine and polar regions the stone and earth forms are predominant. In th'ese places lichens play their most important part in the economy of nature. They take the initiative in the disintegration of the hardest rock by virtue of the acids secreted by the thallus ; they are likewise very effective in binding together the new soils which result in this way and in contributing organic ma¬ terial by their decay. In all rocky habitats they are the pioneers which prepare the way for the appearance of more highly organized plants, mosses, grasses, etc. In the case of tree-lichens, the tree is not affected by the lichen, except in so far as the bark may be ruptured by it mechan¬ ically. It is a question whether lichens exert any really injurious effect upon timber, though they probably hasten the decay of boards, posts, etc., by increasing the amount of moisture present.

A few lichens are of value as food. The most important among these is the so-called "reindeer moss,® Cladonia rangiferina, which covers vast stretches in the north and consti¬ tutes an invaluable supply of food for the rein¬ deer and caribou. In Japan, Gyrophora escu- lenta, which is collected in abundance in the mountains, is of sufficient importance to be an article of export. The arid regions in northern Africa and western Asia produce large quan¬ tities of the manna-lichen, which is used to make bread, especially by the Tartars. This lichen is readily torn away from the substratum by the wind and is carried often to considerable distance before falling as ((manna rain.® This phenomenon has been observed repeatedly in modern times, and probably accounts for the manna of the Israelites. "Trip-de-roche® is an edible Umbilicaria of Arctic America, but the presence of the bitter principle so common in lichens restricts its use as a food. Lichens owe their food value almost wholly to their high content of lichenin, or lichen-starch. Lichens, though once of extensive application in dyeing and in medicine, have fallen almost completely into disuse in both. The various kinds of orseille, which were made from Roc- cella tinctoria and held in high esteem for their brilliant purples, have been entirely replaced by the aniline dyes. Litmus, which is a similar dye made from a species of Lecanora. is

still extensively used in chemistry because of its red coloration in the presence of an acid. “Iceland

moss,® Cetraria islandica, is still used officially : it contains cetrarin, a bitter principle which is tonic and astringent, and a large amount of lichenin.

Consult Hale, E. H., (Flowerless Plants } (New York 1909) ; Massee, G. E., ‘British Fungi* (ib. 1912) ; Marshall, (Mosses and Lichens) (ib. 1907) ; Tuckerman, E., ‘Synopsis of the North American Lichens* (Amherst 1882) ; Schneider, A., (A Textbook of General Lichenology) (1897) ; Schneider, A., ‘Guide to the Study of Lichens) (Boston 1898) ; Sar¬ gent, F. L., ‘Lichenology for Beginners) (Cambridge 1906).

Frederic E. Clements,

Head of the Department of Botany, University of Minnesota.

LICHFIELD, llch’feld, England, episcopal city and civic county of Stafford, 17 miles southeast of Stafford. The principal edifice is the cathedral, a noble structure of early English and transitional architecture with a richly decorated west front, and three spires — two on the west, each 180, and one in the centre 280 feet high. Its length internally is 370 feet, and breadth of nave 68 feet. Among other notable monuments is Chantry’s celebrated recumbent figures of the “The Sleeping Chil¬ dren.® The cathedral suffered greatly during its sieges in the civil wars from 1643 to 1646, and was restored by Wren. The see of Lichfield was founded in 656, and the city’s charter dates from 1549. The city has interesting literary associations, Johnson, Addison and Garrick, born in the town or neighborhood, having been educated at the old grammar school. Johnson’s house is now a Johnson Mu¬ seum. Brewing and carriage and harness works form the principal industries. Pop.

8,616.

LICHNOWSKY, Prince Karl Max, Ger¬ man diplomat : b. 8 March 1860. His father was Prince (Fiirst) Lichnowsky, a general of cavalry, and his mother a Princess of Croy. He is the head of an old noble Bohemian family and of immense wealth, possessing estates at Kuchelna in Silesia and Gratz in Austria. As an hereditary member of the Upper House of the Prussian Diet he has played some part in domestic politics, adopting in general a moder¬ ate attitude and deprecating party legislation. Though, a Roman Catholic, he steadily

avoided identifying himself with the Clerical party in Germany. Entering the diplomatic service, the prince was appointed an attache at the Lon¬ don embassy in 1885 and later served as legation secretary at Bucharest and as coun¬ cillor of the German embassv in Vienna. He was for a time employed in the Foreign Office in Berlin, and on his marriage, in 1904, to the Countess Mechthilde von und zu Arco-Zinne- berg, he retired to his estate with the rank of Minister. "I spent my time on my farm and in my garden, on horseback and in the fields, but I read industriously and published occasional political articles. . . . Thus eight years passed.® For several years newspaper rumor in Ger¬ many had connected the name of Prince Lich¬ nowsky with practically every important dip¬ lomatic post vacant from time to time, and even with the Imperial Chancellorship. No official appointment was forthcoming, however, beyond the designation of "Wirklicher Geheim-

rat® or Privy Councillor, in 1911. In Octo¬ ber 1912, Prince Lichnowsky, ((to his great surprise,® was offered the post of Ambassador to Great Britain. In May of that year Count Wolff-Metternich, then German Ambassador in London, retired and was succeeded by Baron Marschall von Bieberstein (q.v.). The latter, however, died in September. Prince Lichnow¬ sky, who was ((inclined to think that they settled on him as no other candidate was available,® held the post in London until the outbreak of the European War. He had al¬ ways been credited in England with a sincere desire to encourage friendly relations between his country and Great Britain, and on numer¬ ous occasions at festive gatherings in London and the provinces had expressed his earnest wish that the two nations should work har¬ moniously in the cause of civilization. Little mention is made in official publications of the prince's diplomatic activity in London, espe¬ cially during the final crisis. Various inter¬ pretations have been placed upon the reports he submitted to his government on the attitude of England. After his return to Berlin he assured the American Ambassador there that he had (

Henri F. Klein,

Editorial Staff of The Americana.

LICHNOWSKY MEMORANDUM, a

remarkable document and a valuable contribu¬ tion to the pre-history of the European War, written in retirement of Prince Lichnowsky (q.v.), former German Ambassador in London. Under the title of (My Mission to London, 1912— 1914) and dated <(Kuchelna (Prussia) August 1916,® the ex- Ambassador reviewed the course of German foreign policy and diploma¬ tic relations, which, in his opinion, were directly responsible for the war. The document, it appears, was written by the prince for his private family archives as well as to explain and justify to his personal friends his posi¬ tion as the representative of Germanv in Eng¬ land at the outbreak of the war, and the part he had played during the crisis. Its contents were of a kind which would normally not have been available till after many years, till the chief actors had passed away. At first only a few typewritten copies were made, one of which — by a breach of confidence — reached the German Foreign Office, while another copy appears to have fallen into the hands of the minority Socialist party in the Reichstag, by whom, in all probability, it was communicated to the Politiken, a Socialist newspaper in Stock¬ holm, Sweden. Early in March 1918 that jour¬ nal began to publish extracts from the memo¬ randum, the omitted portions having been

suppressed by the Swedish government. In April it transpired that a member of the Ger¬ man deputy general staff, Capt. Hans von Beer-felde, had had numerous copies made and had sent them to the Crown Prince and various military and political leaders. After the first partial publication by Politiken , the German government made strenuous efforts to prevent further disclosures, but by the end of March 1918 the whole document had become public property and caused a profound sensation. Reproduced all over Europe, as well as in Vorwdrts, the German Socialist organ, the ((revelations® of Prince Lichnowsky were for¬ mally debated by the Main Committee of the Reichstag on 16 March 1918. On that occasion the Vice-Chancellor, Herr von Payer, read a letter of apology, dated 5 March and addressed to the Imperial Chancellor by Prince Lichnow¬ sky, in which the latter expressed his regret that the document had been made public against his wishes, and declared that it had leaked out in the summer of 1917, after the fall of Beth- mann-Hollweg (q.v.). Th£ prince resigned his rank as Minister and was placed under police surveillance on his estate. Criminal proceed¬ ings, on a charge of high treason, were ordered to be instituted against him. Captain Beerfelde was later arrested and charged, at first, with having taken part in promoting a peace strike in Berlin during January 1918. So far as could be gathered outside of Germany, no further steps had been taken in the matter up till the summer of 1918.

*Although the memorandum contained much information that was already embedded in of¬ ficial and unofficial publications, there still re¬ mained certain gaps to be filled in the knowl¬ edge hitherto inaccessible — evidence which could only be supplied by the man who was the mouthpiece of the German government during the critical days immediately preceding the con¬ flict, and who was the recipient of the proposals put forward by the British government. The general style of the document, with its small personal touches and certain unimportant in¬ accuracies, indicates that it was not intended for publication ; in tone it is a clear and simple testimony to*what really happened by one who played a prominent part in the events which he recalls. In effect it is an indictment of the whole policy of the German Foreign Office spread over many years, and a severe criticism of the cardinal point of that policy — the alli¬ ance with Austria-Hungary. That alliance, the author contends, has ever been a source of weakness to Germany, in that it ruined any hopes of an understanding with Russia, with the result that instead of being made subserv¬ ient to German interests, Germany had eventu¬ ally found herself in the position in which she was compelled to subordinate her own interests to those of a weak and decrepit ally. Prince Lichnowsky raises some great historical questions on which divergent views will always exist. These, however, are mainly of interest to Germany. By far the most important state¬ ments he makes are those in which he en¬ deavors to fix the responsibility for the Euro¬ pean War. He emphatically asserts that the British government, and particularly Sir Ed¬ ward (now Viscount). Grey and Mr. Asquith, went to the very limit of what was possible in order to prevent the conflict. He ridicules*

the German theory that the war was treacher¬ ously plotted by (

1918).

Henri F. Klein,

Editorial Staff of The Americana.

LICHTENBERG, Georg Christoph, ga-

org' kris'tof lih'ten-berg, German satirical writer and physicist; b. near Darmstadt, 1 July 1742; d. Gottingen, 24 Feb. 1799. He was educated at the University of Gottingen and be¬ came professor there

in 1767. During frequent visits to England he collected material for his explanations of Flogarth, whom he thus as¬ sisted to popularize in Germany. He gained great celebrity as a lecturer on physical science. He being a hunchback may very possibly have embittered him and sharpened a naturally sa¬ tirical disposition. The best of his satires are those on the notorious literary pirate, Tobias Gobhard; the essay on (The German NoveP ;

(1871).

LICHTENBERG, Leopold, American mu¬ sician : b. San Francisco, Cal., 22 Nov. 1861. In early childhood he showed his fondness for the violin and received careful training. In his 12th year was asked by Henri Wieniaw- ski, then on a visit to California, to become his pupil, and accordingly spent three years at Brussels Conservatory. Fresh from his Euro¬ pean successes, he was engaged in 1877 in Theo¬ dore Thomas' orchestra and then spent three years more abroad playing in the chief cities. On his return to America he became a member of the Boston Symphony Orchestra and later was appointed head of the violin classes at the National Conservatory of Music, New York. With Adele Margulies (piano) and the cellist, Leo Schulz, he formed the Margulies Trio, which became one of the foremost cham¬ ber-music organizations of the United States.

LICHTENSTEIN, one of the most popular of German historical novels (1826) and the masterpiece of Wilhelm Hauff, a Suabian nov- vol. 17 — 26

elist and poet who died full of promise at the age of 29, was a romantic and patriotic Ger¬ man's tribute to the work of Sir Walter Scott. No foreign author was more popular than Scott in the Germany of the early 19th cen¬ tury. His novels, translated in full, were so generally read that it was said that the soil of old Scotland was more familiar to Germans than their native land. Yet the hills of Scot¬ land, Hauff said, were not of a richer green than the German Harz, the waves of the Tweed were no bluer than those of the Donau, Scotch men were no braver, Scotch women no lovelier than the old Suabians and Saxons. Lichtenstein, modeled after the Waverly novels, was a direct protest against the novel with a foreign historical background and was an at¬ tempt to recreate the romance of a bit of Suabian history (the reign of Ulrich of Wurt- temberg in the 16th century) as Scott had done for the country of Ivanhoe and Waverly. But Hauff lacked the genius and scholarship of Scott, although he was a brilliant story-teller, full of the enthusiasm and the romance of youth, full of his own love-story which he permitted

to add a glow to his pen-portraits, and with a rare sense of humor. And Lich¬ tenstein, failing of historical value, has suc¬ ceeded in making its own place as one of the picturesque love stories of German literature.

Edith J. R. Isaacs.

LICINIUS, li-sin'i-us, Gaius, Roman tribune. He came of a plebeian family, but rose to the rank of tribune, receiving the sur¬ name of Stolo, or Useless Sprout, by reason of the law which he established forbidding any one to possess more than 500 acres of land. His reason for this was that when more land was cultivated by any one owner the latter could not pull up the useless shoots (stolones) which grew from ihe roots of trees. Another law of his enactment allowed the plebeians to share the consular dignity with the patricians; and he himself became one of the first plebeian consuls, 364 b.c.

LICINIUS, Gaius Flavius, Roman em¬ peror: b. Dacia, about 270; d. 324. He was made Augustus by the emperor in 307, and be¬ came emperor of Rome after the death of Galerius about 312. He was defeated by his brother-in-law, Constantine, 323, and put to death the year following. His son, Flavius Valerius, declared Caesar in 317, was slain at Constantinople in 326.

LICK, James, American philanthropist : b. Fredericksburg, Lebanon County, Pa., 25 Aug. 1796; d. San Francisco, Cal., 1 Oct. 1876. In 1821 he set up in the pianoforte business at New York, and later was a manufacturer of musical instruments at Buenos Aires, Philadel¬ phia, Valparaiso and elsewhere. In 1847 he went to California, where he gained wealth through investments in real estate and various enterprises. In 1874 he placed $3,000,000 at the disposal of seven trustees, by whom they were to be applied to specific uses. The principal divisions of the funds were: To the University of California, for the construction of an ob¬ servatory and the placing therein of a tele¬ scope to be more powerful than any other in existence, $700,000 (see Lick Observatory) ; for the building and maintenance of free public baths in San Francisco, $150,000; to found and

endow an institution of San Francisco to be known as the California School of Mechanic Arts, $540,000; for the erection of three appro¬

priate groups of bronze statuary to represent three periods in Californian history and to be placed before the city hall of San Francisco, $100,000; to erect in Golden Gate park, San Francisco, a memorial to F. S. Key, author of (The Star-Spangled Banner, > $60,000.

LICK OBSERVATORY, astronomical department of the University of California. James Lick (q.v.), by deeds made in 1874 and 1875, charged a board of trustees to expend the sum of $700,000 for the purpose of purchasing land ana constructng (

Astronomical observations of precision and delicacy require a steady atmosphere as well as a very transparent one, and the site chosen is favorable in both respects. This was thoroughly tested in 1879 by Prof. S. W. Burnham before any buildings were erected. The first board of trustees (D. O. Mills, president) chose as chief advisers Profs. Simon Newcomb and Edward S. Holden, and appointed Professor Holden as director. In October 1874 the latter submitted a plan for the building of the ob¬ servatory and a program of work, which, were accepted by the trustees, according to which the buildings were constructed and the work carried on from 1874 to 1897. The county of Santa Clara built a fine mountain road to the summit, in 1876, at a cost of $78,000. The work of construction was begun in 1880 by the third board of trustees (Capt. R. S. Floyd, president) with Thomas Fraser as superintend¬ ent. To obtain a level platform for the ob¬ servatory 70,000 tons of rock were blasted from the summit. The instruments were ordered from specifications by Dr. Holden, except the object-glass of the great telescope. After a series of experiments Professor Newcomb ad¬ vised the construction of a refracting telescope for the main instrument of the observatory. The glass discs were founded by Feil and Mantois of Paris and figured by Alvan G. Clark. The finished objective is 36 inches in diameter, and has a focal length of 56 feet 2 inches. Besides the visual objective, there is a third lens of 33 inches aperture. When this is placed in front of the visual objective the combination becomes a photographic ob- jeot-glass of 570 inches focal length (the di¬ ameter of the photographic image of the moon is about 5.2 inches). The cost of the visual objective was $50,000, of the photographic cor¬ rector about $13,000, and of the mounting of the telescope about $45,000. The cost of the dome complete was about $85,000; of the whole observatory about $610,000. The mounting of the great telescope was made by Warner and Swasev, of Cleveland. The whole weight of iron pier and mounting is about 37 tons. The moving parts of the latter weigh about seven tons ; the tube weighs nearly three tons. The

telescope is used for visual purposes, and mi¬ crometer measurements; it is also used for photographic and for spectroscopic observa¬ tions. Its steel dome is 75 feet in diameter, and weighs 100 tons. It was built by the Union Iron Works of San Francisco. The floor of the dome is movable vertically (about 16ˆ4 feet), according to a plan by Sir Howard Grubb, which ensures a convenient position for the observer, no matter whether the telescope is pointing horizontally or vertically. Other in¬ struments are a 12-inch and a 6-inch refractor, a 4-inch comet-seeker, a 6-inch meridiari-circle, a 5-inch photographic telescope, a 4-inch tran¬ sit, a 5-inch photoheliograph, etc.

The great telescope has been in constant use since its erection, and its optical quality has been proved to be excellent. The admirable design and construction of its mounting and dome have much facilitated its work. In 1895 Edward Crossley, M.P., of Halifax, England, presented to the observatory his. 3-foot reflector, which has been a powerful auxiliary to the great refractor. The observatory constitutes the Lick Astronomical Department of the Uni¬ versity of California. Its staff has comprised many noted observers : Messrs. Burnham, Bar¬ nard, Schaeberle, Tucker, Perrine, Hussey, Aitken, Wright and others.

The observatory was one of the very first to be located on a site specially chosen for its adaptation to astronomical work, and its suc¬ cess has had an important effect upon the sci¬ ence of practical astronomy. No one would now think of locating a great observatory without careful consideration of the site to be occupied. The mountain observatories of the world owe much to the experiments made at Mount Hamilton.

The principal objects of research have been: The visual and photographic observation of planets and satellites; the fifth satellite of Jupiter was discovered here by Barnard in 1892. A systematic search for comets has been kept up and 14 unexpected comets have been discov¬ ered — Barnard (3), Perrine (9), Coddington (1), besides a comet discovered by Schaeberle during his observations of the solar eclipse in Chile. Many periodic comets have also been detected and observed. The orbits of new comets have always been promptly computed at the observatory and ephemerides sent out to other stations. Four asteroids were discovered by Coddington in 1898-99. Meteors have been observed and photographed, and their orbits calculated. Double stars have been assiduously observed and many new discoveries made by Burnham, Hussey and Aitken ; the orbits of a considerable number of binaries have been cal¬ culated.

Observations of the zodiacal light and of the aurora have been made by Barnard and others. Successful expeditions have been sent to observe all total solar eclipses since 1888, and very much has been added to our knowledge of solar physics in this way. The transit of Venus of 1882 and three transits of Mercury have been observed and photographed here. The posi¬ tions of a large number of fixed stars have been determined with great precision by Tucker. Many photographs of the sun and moon have been made. The negatives of the moon have been utilized in the preparation of an atlas of the moon (scale 10 feet to the moon's diam-

eter) by Professor Weinek, and on a scale of three feet by Messrs. Holden and Colton. A great number of important photographs of the milky way were made here by Professor Barnard and others, and of comets and nebulae by Keeler, Hussey, Perrine and others. A com¬ plete outfit of seismometers for recording the intensity of earthquake shocks was installed at the observatory in 1888, and it was supple¬ mented by similar instruments at Berkeley and at other points in California and Nevada, which regularly report to Mount Hamilton. In this way the elements for seismometric record for the State were collected and regularly pub¬ lished. At the same time a list of all recorded shocks on the Pacific coast since 1769 was compiled and discussed by Dr. Holden. Spec¬ troscopic observations of nebulae, new stars, comets, stars and planets have been made in great number and with previously unattained precision by Messrs. Keeler, Campbell, Wright, Perrine and others.

The chief problem of the great telescope is to determine the motion of the solar system by spectroscopic observations. The photography of stellar spectra was proposed in the plan of 1874 and attacked in 1888, and it has been followed with marked success, especially in the hands of Professor Campbell. Since 1896 more than 2,000 negatives of stellar spectra have been secured. A preliminary discussion by Camp¬ bell leads to the result that the solar system is moving toward a point in 277° R. A. and 20° N. D., at a speed of 19.89 kilometers (12.35 miles) per second. An expedition was sent (at the expense of D. O. Mills) to the southern hemisphere in 1903 to extend this research to southern stars.

The observatory publishes a series of octavo (Contributions) (No. 1 in 1889, No. 5 in 1895), of quarto

LICKING, (1) a river of Kentucky, rising in Floyd County, among the Cumberland Moun¬ tains, and, after a course of about 200 miles, falling into the Ohio at Newport, opposite Cincinnati. (2) A river of Ohio, the former Indian Pataskala, rising near the centre of the State, and, after a course of 80 miles, flowing into the Muskingum near Zanesville. It fur¬ nishes valuable water power.

LICORICE, or LIQUORICE, a genus of perennial herbs (Glycorrhiza) of the order Le- guminosce. About a dozen widely dispersed species are recognized, of which G. glabra is the most important, since it furnishes the licor¬ ice of commerce. It is characterized by long rootstocks, odd-pinnate leaves and racemes of separated flowers of various colors, usually pale violet. The plant is a native of southern Europe and western Asia, and is cultivated in Spain, Italy, Russia and some other countries

of the Old World, 'the best grades coming from the first two countries mentioned. The roots and the extracted sweetish principle, of which about $500,000 worth are imported into the United States annually, are used in making plug tobacco and porter, to flavor cooling drinks and by druggists to disguise the un¬ pleasant taste of some drugs. Attempts to cul¬ tivate the plant in Louisiana and California have proved partially successful, but the crop is not profitable, since three to four years must elapse before it can be dug, and the selling price is small. Cuttings of rootstock are planted about three feet apart, and when estab¬ lished the plants are allowed to shift for them¬ selves until harvest, when the land is plowed and the rootstocks are pulled bv hand. No further planting is necessary, since the bits of root left will restock 'the land.

LICTORS, in ancient Rome, a name given to those public servants who attended upon the chief magistrates to fulfil their commands, bear¬ ing axes tied up in bundles of rods, which were called fasces. When a magistrate of high rank appeared in public the lictors preceded him in a file, following each other. It was their duty to clear the road of the populace. The dictators were preceded by 24 lictors; the consuls, decemvirs and military tribunes, by 12 ; the provincial praetors, master of the horse and propraetors, by six ; and the quaestors by five.

LIDDELL, lid'el, Henry George, English classical scholar and Anglican clergyman : b. near Bishop, Auckland, 6 Feb. 1811; d.

Ascot, Berkshire, 18 Jan. 1898. He was educated at the Charterhouse and Christ Church, Oxford; took priest's orders in 1838; and for some years lived in Oxford as a tutor of Christ Church. He took no part in the theological controver¬ sies which stirred the Oxford of his time, but worked steadily with R. A. Scott of Balliol, afterward dean of Rochester, at the (Greek Lexicon) — the well-known (Liddell and Scott) of successive generations of students — which forms his chief title to remembrance. It first appeared in 1843, but has undergone extensive revision and enlargement in subsequent edi¬ tions, of which the eighth appeared in 1897. In 1846 Liddell was appointed the head-master of Westminster School, and from 1855-91 was dean of Christ Church. Besides the

LIDDON, lid'on, Henry Parry, English

preacher and theologian: b. North Stoneham, Hampshire, 20 Aug. 1829; d. Weston-super- Mare, 9 Sept. 1890. He was educated at King's College School and Christ Church, Oxford, where he was graduated in 1850. He was or¬ dained to the priesthood in 1853, and in the fol¬ lowing year he was appointed vice-principal of Cuddesdon College, which Bishop Wilberforce of Oxford had recently founded, but as his un¬ compromising High Church teaching made him the object of suspicion, he resigned in 1859 and became vice-principal of Saint Edmund's Hall, Oxford. In 1870 he was chosen as Ireland pro¬ fessor of exegesis at Oxford, but after the Uni¬ versities Commission had completed its work

and issued its reforms, which he looked upon as desecration, he resigned (1882). From 1870 till his death he was canon of Saint Paul's and his sermons under the dome attracted crowds of breathless hearers. He was in fact the last prominent survivor of the theological school represented by Pusey and Keble and carried its tradition even into the period of the new Ox¬ ford movement represented by (Lux Mundi, a work by Charles Gore (q.v.) which he ardently controverted. He also was prominent in the controversies concerning the Public Worship Regulation Act, which he opposed, and the Atnanasian Creed, which he defended: An in¬ flexible High Churchman, an uncompromising theologian of the Nicene school and the great¬ est Anglican pulpit orator of his generation, he had much influence even where his rigid dog¬ matism carried no conviction, through the loftiness of his personal character, his trans¬ parent*

sincerity and a noble eloquence, whose power and sweetness recalled the best utter¬ ances of Bossuet and Massillon, preachers on whom he palpably bestowed much earnest study. During the last years of his life he was en¬ gaged in writing Pusey's life on a voluminous scale, but had completed but three volumes when he died. He was elected bishop of Edin¬ burgh, in 1886, while traveling in the East for his health, but his decline prevented him from accepting. He published many sermons, but the only series likely to prove of permanent im¬ portance is his Bampton Lectures (On the Di¬ vinity of Our Lord and Savior Jesus Christ (1866), which has run into many editions. Con¬ sult Donaldson, A. B., (Five Great Oxford Preachers* (London 1900) ; Johnston, J. O., < Life and Letters of H. P. Liddon) (London 1904) ; Russell, G. W. E, -'H. P. Liddon* (Lon¬ don 1903).*

LIE, le, Jonas Lauritz Edemil, Norwegian novelist: b. Eker, Norway, 6 Nov. 1833; d. Christiania, 5 July 1908. He was educated at the University of Christiania, where he culti¬ vated the friendship of Bjornson and Ibsen, and in 1859 settled as a lawyer at Kongsvinger. He went to Christiania in 1868 to support himself by journalism and literary work and in 1870 be¬ came famous with his novel (The Visionary.- The profits from its publication enabled him to spend some time in northern Norway and to visit Holland, Belgium, France and Italy. Returning in 1874, he received the poet's pen¬ sion from the Storthing, resided in Dresden 1877-81 and from 1882 till 1891 lived in Paris in comparative retirement, writing hU most not¬ able works, and in the latter year he went to Rome, from which he returned in 1892 to Nor¬ way. The following are his chief novels and stories: 'Stories and Sketches of Norway)*

(1872), containing the story entitled (The Horse of Nordfjord ; (The Three-Master Fu¬ ture, or Life in the North* (1873), a series of loosely connected stories or sketches dealing with the life of Norwegian seamen; (The Pilot and his Wife) (1874), showing a consid¬ erable advance on his earlier works ; 'Thomas Ross* (1878); 'Adam Schrader* (1879); 'Rutland* (1880); 'Forward! Scenes of the Sea* (1882); 'Life's Slaves* (1883), a pow¬ erfully realistic study of a soul involved in the net of circumstance; (The Family of Gilie* (1884), a lighter story of Norwegian life; 'The Gulf* (1885), treating of the gradual de¬*

cline of an old Norwegian family; 'Eight Stories (1885); 'The Commandant's Daugh¬ ters* (1886), by many regarded as his master¬ piece; 'Two Lives* (1887), a penetrating study in the psychology of marriage; 'Maisa Jons* (1888); 'Mischievous Powers*

•(1889) ; 'Trold* (1891-92) ; 'Niobe* (1893), in which his sub¬ ject is family troubles arising out of differing social, political or religious views held by par¬ ents and children; and 'Grandfather* (1895); 'Wulffie and Co.* (1901). He published a vol¬ ume of poems in 1867 and he also wrote sev¬ eral dramas, 'Faustina Strozzi* (1875); 'Gra-bow's Cat* (1880) and 'Merry Wives* (1894). In 1894 he published an important critical work, 'Honore de Balzac, The Man and the Artist.* Lie's chief works were translated into German, English and other languages. He was a realist who, however, avoided the excesses of his school, was especially happy in his por¬ trayal of sailors and the sea and was gifted with a fine sense of humor and profound sym¬ pathy with the humble and the unfortunate and was a master in psychological analysis. A uni¬ form edition of his works was published at Co¬ penhagen in 15 volumes (1902-04). See The Pilot and His Wife.

LIE, a statement, which is thought to be false by the person who utters it and is in¬ tended to be believed by another. Lying has been recognized as an evil by many different religions and civilizations and there is prob¬ ably no race which does not consider a lie as evil, provided it is asserted under some sacred form of oath. The evil of lying is due to the fact that communication between different in¬ dividuals is a necessity of life, and that unless the truth is communicated much more often than a falsehood, a communication will come to have no meaning to its recipient — that is, will come to be no communication at all. This was well brought out by Kant, who pointed out that a community would be impossible in which lying was the rule, for then a lie, by ceasing to convey the false opinion which it is meant to convey, would cease to be a lie at all. There is no need, however, of making the evil of lying depend, after the fashion of Kant, on a cate¬ gorical imperative which permits no action that cannot be willed as an example of a universal maxim of conduct. While lying involves in general evil consequences, it does by no means follow that every lie is an evil deed, in the sense that it is worse than the telling of the cor¬ responding truth, or even worse than silence, rhough a word is a medium of communication, it is often much more. To tell a burglar the combination of the safe is as much the act of an accomplice as to put a key into his hands. To tell a sick man that he is incurable may be on the same moral plane as to blow out his brains. On the other hand, the deception of an enemy spy has consequences not very different from those of repelling a hostile attack. Thus it may be seen that besides its truth-value, a proposition very generally has a moral value only indirectly connected with its usefulness in communication and often directly

counter to the latter. Which of the two shall then pre¬ ponderate is a matter which must be decided on the merits of each particular case. A great many accusations are brought against the sin¬ cerity of modern society on the basis of little untruths popularly called white lies. These

range from the "Dear sir® and "Respectfully yours® which begin and end a letter, to the con¬ ventional "not at home® of a person who does not wish to be disturbed, or the perfunctory ap¬ plause which follows a boresome lecture. These are in no proper sense lies, for the essence of "lying resides in the wilful transmission of a false belief to another,® and not in any form of words used in an especial sense. It is, therefore, useless to speak of a conventional lie, for a con¬ ventional form of expression is an expression which by frequent repetition has come to have a single universal interpretation — perhaps the interpretation of a meaningless form. It must, therefore, be interpreted by its hearer or reader in the precise sense intended by its user unless its user has gone out of his way to employ it in an extraordinary and unconventional sense. A lie need not be conveyed by written or spoken language. A look or a gesture may well be intended by one person to give a definite im¬ pression to another. If this impression is thought to be false by the person who conveys it, the look or gesture is a lie. Silence itself is enough to constitute a lie if it has the purpose of deception.

LIEBER, le'ber, Franz, American publi¬ cist : b. Berlin, Germany, 18 March 1800 ; d. New York, 2 Oct. 1872. He volunteered as a soldier at 15 and was in the battles of Ligny, Waterloo and Namur. He served also in the Greek war of independence, recording his ex¬ periences in (Journal in Greece) (1823). He settled in the United States in 1827 and during the next five years was occupied with the com¬ pilation of an Encyclopaedia Americana> (13 vols.). While professor of history and political economy in South Carolina College (1835-56), he wrote the .three great works by which he is best known, (Manual of Political Ethics (1838) ; (Legal and Political Hermeneutics or the Principles of Interpretation and Construc¬ tion in Law and Politics) (1839) ; (Civil Lib¬ erty and Self Government * (1853). In 1857 he became professor of history in Columbia and later of political science in the Columbia Law School. During the Civil War period he was a firm supporter of the Federal government and was frequently consulted by the Secretary of War. His war code,*

officially designated as (Instructions for the Government of the Armies of the United States in the Field (1863), made him still more widely known. He was a mem¬ ber of the French Institute and of many learned societies at home and abroad. Consult (Lives* by Perry (1882) ; Harley (1899).*

LIEBER, Oscar Montgomery, American

mineralogist and chemist : b. Boston, Mass., 8 Sept. 1830; d. Richmond, Va., 27 June 1862. He was a son of Franz Lieber (q.v.) and was edu¬ cated at the universities of Berlin and Gottin¬ gen and the School of Mines at Freiberg, Sax¬ ony. In 1850 he became State geologist of Mis¬ sissippi and afterward engaged in the survey of Alabama and South Carolina. In 1860 he went to Labrador as geologist of the American astronomical expedition. During, the early part of the Civil War he served in the Con¬ federate army and was fatally wounded at the battle of Williamsburg. He published (T'he Assayer's Guide) (1852) ; (The Analytical Chemist's Assistant (1852); (Geology of Mis¬ sissippi } (1854).

LIEBIG

LIEBIG, Justus, yoos'toos le'big, Baron von, German chemist : b. Darmstadt, 12 May 1803 ; d. Munich, 18 April 1873. He studied in Bonn and Erlangen, was graduated in 1822 and the same year went to Paris, where he gained the favor of Humboldt by his paper on fulminic acid and the fulminates, read before the French Academy (1824). He thus obtained access to the private laboratory of Gay-Lussac. In 1824 he was appointed extraordinary professor and in 1826 ordinary professor of chemistry at Giessen. Here he opened the first experimental laboratory for college students and the uni¬ versity soon became the European centre of chemical studies- He had remarkable success as a teacher and pupils streamed into his class¬ room from every country. The most illustrious chemists of the last century acknowledged their obligations to him as their master. He gave chemistry a settled position in Germany and turned it into a real science to be taught and learned by means of experiment. As an original investigator in the domain of chemistry he has shown himself a reformer of the sciences of physiology and agriculture. He may be said to have been the founder of modern organic chemistry and its necessary method of analysis. He analyzed many organic acids ; discovered chloroform and chloral; he made the theory of the composition of ether and the oxidization of alcohol subjects of new experiments, in the course of which he discovered aldehyde. He determined the basicity of many acids ; ana¬ lyzed the chemical

*composition of urine and the products of uric acid and made profound in¬ quiries into the juice of flesh and its compo¬ nent substances. He raised chemistry from a position of obscurity and unprofitable hypothe¬ sis into its present all-dominating position by his theory of the constitution of alcohol, ether, etc., and his work on the benzoyl compounds is espe¬ cially remarkable in this connection. The in¬ dustrial importance of his discoveries is great. Cyanide of potassium is now largely employed in electroplating and in the manufacture of fer- rocyanides. His improved method of produc¬ ing this cyanide has cheapened its manufacture, just as the discovery of aldehyde has led to improved methods in the making of vinegar and looking-glasses. The result of his great dis¬ coveries has been especially felt in medicine, agriculture and food-hygiene. His great gen¬ eralization that the mineral and organic worlds were composed of the same chemical elements and were subject to the same chemical muta¬ tions revolutionizing science. He traced for the first time the transformation of inorganic into organic substances in plants, from which they were transferred to the organisms of ani¬ mals. His exact statement of the elements re¬ ceived by plants from the soil and air enabled him to prescribe the composition of efficient fer¬ tilizers and thus, in the treatment and analysis of soils, to raise the fundamental operations of agriculture to the level of exact science. Con¬ sult Liebig, (The Natural Law of Husbandry) (1863) ; (Animal Chemistry in its Application to Physiology and Pathology) (1846) ; hand¬ book of Organic Analysis) (1853) ; Hoffmann, (The Life-Work of Liebig in Experimental and Philosophical Chemistry * (1876). See Chem¬ istry; Agriculture.*

LIEBKNECHT, lep'kneht, Karl (Paul August Ferdinand), German Socialist leader: b. Leipzig, 13 Aug. 1871 ; d. 15 Jan. 1919. The eldest son of the famous Socialist, Wilhelm Liebknecht (q.v.), he was a lawyer by profes¬ sion and, since 1912, a member of the Reichstag representing the constitutency wherein the ex-Kaiser resided — Potsdam. A fearless and outspoken critic of the government militarist policy, he came into frequent colli¬ sions with the authorities. He earned consid¬ erable notoriety by bringing grave charges of corruption against the Krupp firm at Essen, charging it with tampering with petty officials of the German War Office and Admiralty. He was sentenced to 18 months' imprisonment in 1907 for publishing an anti-militaristic pam¬ phlet, and in 1912 attacked the government for permitting the Tsar of Russia to visit Germany.

He was the only member of the Reichstag to oppose the war, which he condemned with fiery eloquence from the beginning. Much has been written on the failure of the German So¬ cial Democratic party to live up to their prin¬ ciples in supporting the government policy of aggressive war. But it is only just to bear in mind that the storm fell upon the German So¬ cialists as suddenly as upon France and Eng¬ land; they knew less of the causes of that storm than the French or British knew; like those two peoples, they saw that their country was in danger and resolved, as they also did, to subordinate everything to the pressing duty of saving it from ruin. The isolation of Lieb¬ knecht, therefore, was more apparent than real. Though he alone uttered his thoughts, they were shared by many of his colleagues. Early in the war he visited Belgium and explained to the Belgian Socialists that, although the vast majority of German Socialists were in favor of fighting the war to the bitter end, there were numerous representatives of the party in the Reichstag who maintained that the misguided foreign policy of their country had been largely responsible for the war. When Liebknecht's father and August Bebel (q.v.) resisted in the Reichstag the proposal in 1870 to annex Alsace-Lorraine, both were thrown into prison. Karl went much further than his father. It was he, who, when the German press was fan¬ ning the flame of hatred against the Belgians by stories of atrocities committed against Ger¬ man soldiers, hunted the stories to their source in hospitals and elsewhere, proved them to be baseless and denounced them as such in V or- wdrts. On 2 Dec. 1914, while those of his fel¬ low Socialists who opposed the war walked out of the Reichstag while the credits were voted, Liebknecht remained to utter his protest. The president would not allow him to speak and when he handed in his speech in writing the president refused to insert it in the records. In that undelivered speech, later published in England, he denounced the war as having been (

ions uncompromising, his honesty unquestioned, his courage equal to any occasion. In June 1916 he was charged with attempted high treason and sentenced to 30 months' imprisonment. He had been expelled from his party five months earlier by a vote of 60 against 25 ; he was now dis¬ missed from the army, in which he was serv¬ ing as a private. He was liberated in Novem¬ ber 1918. In the same month a volume of his speeches was published in New York entitled (The Future belongs to the Peopled Lieb¬ knecht led the radical Spartacus group against the Ebert government during the disorders fol¬ lowing on the Kaiser's flight. He was arrested and later shot down by a soldier on the al¬ leged grounds of attempting to escape.

LIEBKNECHT, Wilhelm, German So¬ cialist: b. Giessen, 29 March

1826; d. Berlin, 6 Aug. 1890. He studied at the University of Giessen and later at Marburg and Berlin. He was early interested in the writings of St. Simon, and in 1848 went to Paris to take part in the revolution there; then joined in the un¬ successful attempt to make Germany a republic, and was imprisoned nine months without trial. When released he went to Switzerland, where he. tried to unite the trade unions on a social¬ istic basis, was again arrested, handed over to the French authorities and banished to Eng¬ land. While there he became an intimate friend of Marx and Engels (qq.v.) and was a member of the Communist League. In 1862 he returned to Germany, continued his socialistic agitation and in 1865 was banished from Prussia. He went to Leipzig, where he met Bebel (q.v.), was active in trade union organization and was one of the founders of the Saxony Volks- partei soon absorbed by the German Social Democratic party (1868), of which he was from the first a leading member. In 1867 he was candidate for the North German Parliament, but was under arrest and lost the election ; he was, however, elected later. In 1868 he was made editor of the Demokratisches Wochen- blatt, the next year enlarged and published un¬ der the name of Volkstaat. In 1870 he de¬ nounced the Franco-Prussian War, for which he was imprisoned three months, and later so bitterly attacked Bismarck that he was again imprisoned. In 1874 he was elected to the Reichstag of which he was a member almost constantly till his death. He was one of the strongest leaders of his party in that body, and very popular and highly respected among Ger¬ man workingmen. In 1890 the name of the Volkstaat was changed to Vorw'drts, and Lieb¬ knecht was retained as editor. He wrote (1890); (Robert Owen) (1892), and Socialism, what it is and what it seeks to accomplish (translated and published in the United States). Consult Aveling, (Wil¬ helm Liebknecht and the Social Democratic Movementˆ (1896).

LIECHTENSTEIN, leh'ten-stln, a small independent municipality, practically a portion of the Austro-Hungarian monarchy and united with the Austrian Customs-Union since 1866, between Vorarlberg, Tyrol, and Switzerland; area, 65 square miles; population about 10,000.

The surface has a fertile soil, yielding abun¬ dance of pasture, corn, wine, fruit and flax. The capital, Vaduz, has about 1,000 inhabitants. The reigning family date from the 12th cen¬ tury, and

are descendants of free barons who became princes of Liechtenstein in 1608.

LIED VON DER GLOCKE, Das. This poem of Schiller's deals with the casting of a bell from the moment when the mold is com¬ pleted to the one in which the new bell is lifted from the pit. In 10 stanzas distributed all through the poem the different stages of its making are described. Between these stanzas reflections on and scenes from human life, sug¬ gested by certain data in the different stages of the casting, are inserted. Such happy and un¬ happy events and conditions in the life of the individual and of the community as are usually announced by the ringing of bells are portrayed, e.g., wedding and family life by the wedding bells, revolution by the alarm bells. The whole is spoken by the master bell-founder to his assistants during the work. (The Song of the Bell, composed in 1799, gives better evidence of Schiller's genius than any other of his shorter poems. It is distinguished alike by matter-of-fact accuracy, vivid description, ideal¬ ism and practical wisdom of life. In form the stanzas dealing with the casting are all of the same fixed structure and constitute the back¬ bone of the poem, while the other portions allowing full sway to the spontaneous flow of conceptions display the most diverse means of versification. On 10 Aug. 1805 Goethe had (The Song of the Bell* produced on the stage as a memorial to Schiller (died 9 May 1805), and he himself composed for this occasion his famous poem (Epilogue to Schiller's Bell.* Consult edition of Schiller's works in (Deutsche National-Literatur) (Vol. I, 1882-98) ; Schil¬ ler's poems selected by J. S. Nollen (1905) ; special edition by C. P. Otis (1885) ; English translation in (German Classics) (Vol. III).*

Ewald Eiserhardt.

LIEGE, le-azh, Belgium, (1) the eastern¬ most province bordering on Rhenish Prussia and the Netherlands. Area, 1,117 miles. The surface is diversified with heights varying from 300 to 2,000 feet and well wooded. It contains rich coal and iron mines. The northern part called Herveland is exceedingly fertile and highly cultivated, affording pasturage for cattle and producing large quantities of butter and Limburg cheese. Pop. about 896,649. (2) An

episcopal city and the capital of the province at the confluence of the Ourthe and Meuse, 54 miles southeast of Brussels. The city has been considerably modernized since 1860 by the con¬ struction of fine quays and bridges along the course of the Meuse throughout the city. It has numerous striking public buildings including the Gothic

cathedral of Saint Paul, the Palais de Justice and the celebrated university, occu¬ pying extensive grounds, with special institutes for various sciences, a school of mines, a school of arts and manufactures, and an important library. Liege is one of the largest manufac¬ turing towns of Europe, owing principally to its situation in a district abounding with coal, iron, lead, copper and marble. Cannons and firearms of every description, steam engines and machinery, hardware of every kind, watches, jewelry, bronze and other ornaments,

vooleiir, co'.tons, etc., are made. Liege dates from the 6th century. Pop. about 170,634, chiefly Roman Catholic. Liege was defended by a girdle of forts, six on the left bank and six on the right bank of the Meuse. At the outbreak of the Great War in August 1914 the town was taken possession by the Germans on 7 August, but the defense of the forts was maintained until after the arrival of heavy and siege artillery, and the German advance was thus delayed for more than a week.

LIEN, le'en or len, a legal claim on or upon property; a legal right in one person to detain the goods of another until some claim of the former against the latter has been satisfied. Blackstone says a lien may be either particular or general; the former where the claim of retainer is made upon the goods themselves, in respect of which the debt arises, a claim which the law favors. The other, or general lien, is where goods are retained in respect of a gen¬ eral balance of account, which is less favored. Though general liens are not favored by law, yet in some cases they have been allowed and established by usage, as in the case of attorneys upon the title-deeds and documents of their clients; and factors, warehousemen and others, upon goods confided to them in the ordinary course of business.

LIEUELY, Greenland. See Godhaven.

LIEUTENANT, lu- or lef'ten'ant, a mili¬ tary term, which, like captain and many others, has acquired gradually a much narrower mean¬ ing than it had originally. Its true meaning is a deputy, a substitute, from the French lieu (place, post) and tenant (holding). A lieuten¬ ant-general du royaume was a person invested with almost all the powers of the sovereign. Lieutenant-general is the title of the command¬ ing general of each division of an army, per¬ sonating the general-in-chief. Lieutenant- colonel is the officer between the colonel and major. The term lieutenant by itself, in mili¬ tary language, signifies the officer next below a captain, whether in the cavalry or infantry. There are also second lieutenants ranking be¬

low lieutenants. A lieutenant in the United States and British navies is the officer next in rank to the commander of a ship who is next to the captain. He takes rank in both these services with a captain in the army, and after eight years' service he ranks in Britain with a major. In the United States a lieutenant rank¬ ing with a major is called lieutenant com¬ mander.

LIEUTENANT-COLONEL, a military title, given the officer next in rank to a colonel, and the senior of a major. He assumes com¬ mand of the regiment only in the event of the • disability or temporary absence of the colonel of the regiment.

LIEUTENANT-GENERAL, formerly general officer in the United States army, rank¬ ing above a major-general and below a general. The office of lieutenant-general was first created by Congress for George Washington in 1798, during the troubles between the United States and France. It then lapsed till renewed by Congress for Gen. Winfield Scott, who was made lieutenant-general by brevet. In 1864 it was again revived for Gen. U. S. Grant, and continued for Generals Sherman and Sheridan.

The grade was also conferred on Gen. John M. Schofield, 5 Feb. 1895, who held it till his re¬ tirement, 29 September following. An act of Congress of 6 June 1900 provided that <(the senior major-general of the line commanding the army shall have the rank, pay and allow¬ ances of a lieutenant-general® ; and on the re¬ organization of the army in February 1901 the grade was revived and President McKinley ap¬ pointed Maj.-Gen. Nelson A. Miles its incum¬ bent. In 1903 the rank was again abolished, an act of Congress providing for a general staff, the chief of staff to take the place of the lieu¬ tenant-general.

LIEUTENANT-GOVERNOR, an execu¬ tive office of several of the States, ranking next to the governor. He performs the duties of a governor in case of the latter's death, ab¬ sence from the State or inability to act, and is presiding officer of the State senate.

LIEZEN-MAYER, le'tsen-ml'er, Alexan¬ der, Hungarian painter : b. Raab, Hungary, 24 Jan. 1839; d. 1898. He studied at Vienna and Munich, attending the art academies in those places and afterward entered the studio of Piloty (1862) in the latter city. Under this

master he painted his (Queen Maria and Eliza¬ beth of Hungary at the Grave of Louis le Grand and (The Coronation of Charles of Durazzo in the cathedral of Stuhlweissenburg.* Three years later he carried off the first prize at the Munich Academy exhibition. In 1867 he painted (Maria Theresa*; (The Child of a Poor and Sickly Mother) ; and as drop-scene for the Munich Theatre, (Poesy Surrounded by the Muses.* In 1867 he began to paint por¬ traits, and also furnished illustrations for the works of Goethe and Schiller. During a resi¬ dence in Vienna (1870-72) he executed por¬ traits of the emperor and many of the nobility. On his return to Munich he painted some ideal figures from Shakespeare's (Cymbeline* and some scenes from Goethe's (Faust,* and in 1873 (Elizabeth Signing the Death Warrant of Mary Stuart* (in the museum at Cologne), and one of his masterpieces, although its principal merit lies in the perfection of the technique. He produced also many cartoons for wood- cut reproduction as illustrations of the poets. For three years he was director of the Art School at Stuttgart (1880-83), when he was ap- oointed professor of historical painting in the Munich Academy.*

LIFE. No definition of life has ever proved quite satisfactory. Some include too much, others omit certain phenomena, a third class assumes conditions purely hypothetical, while many are unintelligible. Bichat says that life is <(the sum total of the forces that resist death®; Treviranus, that it is "the constant uniformity of phenomena with diversity of ex¬ ternal influences® ; Duges, that it is "the special activity of organized bodies,® and Beclard, that it is "organization in action.® De Blainville's definition is: "Life is the twofold internal movement of composition and decomposition, at once general and continuous.® But according to Herbert Spencer this conception is in some re¬ spects too narrow and in others too wide. Of his own definition, that it is "the co-ordination of actions,® he says — "like the others this definition includes too much, for it may be said of the solar system with its regularly recurring

movements and its self-balancing perturbations, that it also exhibits co-ordination of actions.® His amended conception of life is: "the definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external coexistences, and sequences.® G. H. Lewes suggests the definition : "Life is a series of definite and successive changes, both of structure and composition, which take place within an individual without destroying its identity.® However, this amounts to defining ignotum per ignotius. The most recent at¬ tempts have been in the direction of proving that life is merely a form of energy or motion, and show the influence which the physical sci¬ ences have had in recent years over

knowledge and speculation, which formerly were mainly based on biology and theology. The simplest answer to the question probably is: Life is metabolism.

Leaving the subject of attempted definition, it will be profitable to observe some of the char¬ acteristics of life as compared with its absence; that is, substantially, a comparison of the or¬ ganic with the inorganic part of the universe. The boundary between living and not-living mat¬ ter is much less distinct than rough inspection suggests, but some of the most striking charac¬ teristics which distinguish living organisms from other objects of our experience which are not- living may be pointed out. The distinctive prop¬ erties of living matter are, first, the fact that it is organized; second, that it has the power of perpetuating itself within definite limits by chemically taking and adapting (assimilating) suitable material from the surrounding media, and in the process generating heat (energy) in the absence of which it disappears; and, third, that it has the power of self-reproduction. Life cannot exist without that chemical interchange between the organism and its inorganic environ¬ ment, and between the constituent parts of the organism which is summed up in the word metabolism (q.v.). Objections have been made to some of the definitions quoted above, and to others, that they assumed the existence of or¬ ganization. But so far no evidence is present of any living thing without organization. The simplest one-celled animals and plants (see Amceba; Protista) consist of organized proto¬ plasm. This fundamental living substance, called protoplasm (q.v.), is of complicated structure and chemical composition. Its struc¬ ture differs in different organisms; but it every¬ where consists of a combination of viscous "plasma® and water. The plasma contains the chemical substances upon whose changes life depends. Protoplasm is, however, not homo¬ geneous. At least two kinds are found in every mass, the cytoplasm, constituting the major part of the whole; and usually the nucleus, the nutritive and reproductive centre. The combination of cytoplasm and nucleus forms a cell. Combinations of cells constitute the bodies of all organisms, large or small, past or present. These combinations are accumula¬ tions resulting from the property, characteristic, regularly and fundamentally, only of living organisms, of the doubling of molecules, by which growth is effected.

The fundamental vital phenomena may be regarded as (1) nutrition and (2) reproduction. The conditions under which these activities may be manifested are narrow in general, and the

more closely limited in respect to a particular organism in proportion as its organization is more or less complicated. These conditions be¬ long to the environment, from which the organ¬ ism must take the elements necessary to its continued repair of loss — in other words, get food. Essential elements are oxygen, water and certain salts ; in a word, all the constituent ele¬ ments of protoplasm, at the least, must be ob¬ tainable from the air or water, in order that vitality may persist. It is needful, however, that certain harmful things (poisons) should be absent, or the organism will be killed. Death will also follow excess or deprivation of the proper proportions of the food elements ; too much or too little water; a raising or lowering of the temperature above certain points; ex¬ cess or defect of light, improper electrical con¬ ditions, etc. The simplest animals and plants, consisting of little except protoplasm and water, have great power of resistance to untoward conditions, and the range of diversity in cir¬ cumstances in which they are able to survive is very wide. Life in its higher manifestations is dependent upon the maintenance of a few well-defined conditions, and that innumerable accidents may bring it to a permanent end (see Death), whereupon the material which it ani¬ mated instantly becomes inert matter subject only to the laws that governing the inorganic world.

Reproduction is the means of securing that continuity of life which is one of its primal characteristics, and consists in the separation from the original organism of a part, relatively greater or less in proportion as the organiza¬ tion so divided is simple or complicated, which part is equally endowed with the potentialities of living and reproduction, and normally will reproduce its kind in turn.

For an account of the speculations and rea¬ soning as to the origin of life on the earth, see Origin of Life; Protista; Mechanism and Vitalism.

LIFE AND ADVENT UNION. See

Adventists.

LIFE-BOAT, a specific type of boat de¬ signed especially for saving the lives of persons on ships wrecked near a shore. It must be con¬ structed with strength sufficient to resist violent shocks from the waves, the rocky beach or collision with the wreck; be buoyant enough to avoid foundering, and to float though loaded with men and filled with water; have facility in turning, and when capsized be

able to right itself. Such boats are now maintained at most of the life-saving stations in America and Europe, ready to put to sea at once if their services are required, and provided with the means of being conveyed to the beach and launched with all possible rapidity. The first distinctive lifeboat was designed by Lionel Lukin, an English coach-builder, in 1785. He called his boat an Gmmergible® and gave it the desired non-capsizable qualities by affixing to the frame a thick projecting gunwale of cork. He also provided watertight air-chambers at the bow and stern, and along each side, and ballasted it with a heavy iron keel. Following him, William Wouldhave and Henry Greathead simultaneously invented a boat on the curved- keel principle — in general shape very like a sixth part cut lengthwise from a longish musk-

melon. This provided a self-righting model, but that idea alone did not prove altogether successful in practice, and many cubic feet of cork were built into the two boats. Great- head's model was accepted officially and several of his boats were put in use and saved many lives. Till 1851 Greathead's invention was al¬ most the sole one in use, though numerous others had been either introduced or proposed; but in that year no fewer than 50 models of improved lifeboats were sent to the London Exhibition in competition for a prize offered by the Duke of Northumberland for improved construction. The prize was won by James Beeching, a practical English boat-builder, with a boat that was self-righting when capsized and self-bailing when water entered. The model utilized the principle of water-ballasting, James Peake of Woolwich Dockyard, by com¬ bining the excellencies of the competing boats, and adding others suggested by his own ex¬ perience, designed a boat which, gradually im¬ proved from time to time, became the recog¬ nized model, and has been adopted as the stand¬ ard for lifeboats in all countries. This life¬ boat possesses great lateral stability or resist¬ ance to upsetting ; speed against a heavy sea ; facility for launching and taking the shore; immediate self-discharge of any water break¬ ing into it ; strength ; stowage-room for a large number of passengers. The great breadth of beam (eight feet) in proportion to her length (33 feet) is to diminish the liability to capsize in a heavy sea. The relieving-tubes, by which any water that breaks into the boat is immedi¬ ately self-discharged, are most ingeniously con¬ trived. The self-righting characteristic, at first considered of prime importance, was soon found to militate against other qualities more desirable, and while the self-righting principle is applied to the small surf boats, the lifeboat is now made very difficult to capsize, and the crew are specially drilled in. the process of righting the boat if by any rare accident it should be overturned.

Such are the precautions for the safety of the crew in these English boats that loss of life in the cqnduct of the boat is of rare occurrence. Some are made with two centreboards for greater stability. The lifeboat transporting carriage or truck is an important auxiliary to the boat. The life¬ boat is kept on this carriage in the boat-house ready for immediate transportation to the spot most favorable for launching to the wreck. In this way a greater extent of coast can secure the benefits of the lifeboat than could otherwise be the case. Even when the launch is from the immediate vicinity of the boat-house the use of the carriage saves much time, which in a case of shipwreck may prove of vital importance. Besides, a boat can be readily launched from a carriage through a high surf, when without a carriage she could not be got off the beach. The machine is admirably contrived, and the boat may be launched from it in an upright position with her crew on board. To render it more manageable and of the greatest possible utility the fore and main bodies can be detached from each other by the withdrawal of a fore¬ lock pin. The British Life-Saving Institution now maintains a fleet of about 300 lifeboats at stations along the English coast, and expends about $600,000 a year in their maintenance. In the 94 years up to 1917 they had saved more than

50,000 lives. Since 1890 the institution has been introducing steel lifeboats, 50 feet in length and of 20 beam, with steam engine power and propellers operated on a turbine principle. A little later the motor-boat type was introduced and is now preferred to the steam-propelled lifeboats. Practically all European countries maintain coast life-saving stations equipped with lifeboats and other apparatus, but in India, Australia, New Zealand and Japan these services are maintained by voluntary associa¬ tions.

American Lifeboats. — These were orig¬ inally patterned on English models, but through a system of steady improvement have developed along slightly different lines, and now exhibit distinct types. The earlier boats used air-com¬ partments fore and aft, and sometimes along the sides or under the seats. It was more common, however, to stow the lines, grapnel- ropes, etc., under the seats. The whaleboat type of rowboat was preferred, owing to its strength ; they were built quite broad of beam, and high at the ends, so as to bring the air-chambers above the water-line as much as possi¬ ble. At first tanks were built of galvanized iron, but copper was found much more

service¬ able, and gradually it has become customary to cut up the tanks into an increasing number of compartments, so that late models comprise a series of copper boxes, fitting into their places in the hull. The ship's lifeboat pattern dis¬ appeared from land use, and they became dif¬ ferentiated into surf-boats and power-boats. The surf-boat is based on the fishermen's boats that are shaped to come readily through the surf, and that can be landed with little danger of overturning. The typical American surf- boat of the Coast Guard is of the Beebe-Mc- Lellan type, 26 feet over all, 7 feet beam and 2 y2 feet deep. It carries four oars, is clinker- built, of cedar, sharp at both ends, gracefully curved, very light and strong. There are three thwarts, seats around the sides, a centreboard and a place for stepping a mast. A. water-tight deck is placed high up in the framing, so that when the boat capsizes the water can be led off by gravity, being thus what is termed <(self- bailing.® It is so buoyant that it can be upset and righted in 20 seconds by a crew on drill. Lines are rigged especially so that the crew can grasp them when in the water and obtain a leverage for righting the boat. More and more of these surf-boats are being equipped with gasoline motors. At first eight horse-power motors were installed, but now they are always 12 horse-power and higher power is under con¬ sideration. Some special types of surf-boats have been built for localities, after which they are named, as the Jersey and Race Points surf- boats. Power lifeboats are increasing in num¬ ber and every good-sized station now has at least one. The typical power-boat is 36 feet in length by nearly 9 feet beam and 4J4 feet in depth. There are five thwarts or seats and steps for two short masts. The upper part of the deck is arranged to be self-bailing, and there are large air-compartments fore and aft, and a great number of small copper compartments stowed wherever there is space for them. The gasoline motor, usually 35 horse power, is car¬ ried in the water-tight after bulkhead, and so arranged that if the boat overturns the engine is automatically stopped. The starting crank

and reversing clutch are set in the bulkhead, out of the way and safe from accident. The twin engine shafts run at a slightly inclined angle down to the propellers, which are quite small and above the keel-line. Often the pro¬ peller shafts are hinged, so that the propellers may be raised when the boat is to be beached. The keel is made preferably of gun-metal. The rudder is ham-shaped. The gasoline tanks are forward near the centreboard, which is of brass in the best boats. A speed of 10 to 12 miles an hour is obtained. These boats are designed to be loaded on a beach-wagon at a life-saving station, and as they weigh only 3,000 pounds can be easily launched with less

than the full crew of eight men. A smaller type of power¬ boat is built, 34 feet over all and 8.4 feet beam, 3.6 depth, with 5 thwarts. These were mostly designed for sail or oar propulsion, but have been fitted with 25 horse-power motors, giving a speed of seven to nine miles an hour. The Revenue Service and Life-Saving Service hav¬ ing been combined in 1915, under the title of the Coast Guard, all the lifeboats of the two United States coasts and the Great Lakes are in their custody, divided among the 270 stations. There are about 50 of the best class of 36-'foot power-boats, and some 200 second-class power¬ boats, perhaps 300 surf-boats and a number of smaller rowboats for various purposes. The larger fleet in the Coast Guard service, some¬ times referred to as lifeboats, consists of 23 cruising cutters, mostly steel boats from 150 to 210 feet. These cutters are armed with four six-pounders and carry rockets and radio appa¬ ratus. In cruising off coast they discover and help many vessels in distress, and if near enough may summon the lifeboats of some station by S O S calls. There are also 24 harbor cutters and launches under the Coast Guard's jurisdiction, used mostly in the im¬ portant harbors for dealing with accidents to pleasure boats, assisting in putting out fires on the water-fronts and the like. There is rarely a day that the Coast Guard does not rescue some vessel somewhere in trouble, and perhaps five a day is _ a fair average, while in bad weather sometimes 12 and 15 rescues are re¬ corded in a single day. In 1916 they rescued 2,153 persons from peril, rendered assistance to 1,594 vessels, removed or destroyed 11 derelicts, and a lot of miscellaneous work that the reve¬ nue service and the navy puts upon them for convenience.

Steamship Lifeboat Requirements. — The

United States Steamboat Inspection Service has control over the lifeboat regulations in all classes of vessels in United States waters. Their rulings require pleasure steamers on short routes to carry one lifeboat to every 180 cubic feet of capacity. Ocean steamships and mis¬ cellaneous passenger carrying steamers are obliged to carry enough boats and life-rafts combined to accommodate all their passengers in case of need. Many of their lifeboats arc collapsible 'affairs with cork floats or compart¬ ments designed to be 'blown up and filled with air before they can float. Coastwise steamships, in the summer-time, are allowed to carry some excess of passengers above their lifeboat ca¬ pacity, and two-thirds of their equipment may be life-rafts or collapsible equipment. Lake, bay and sound steamers, and others going over shallow waters not over five miles from" land,

From Annual Report (1916) United States Coast Guard

1 Typical Power Lifeboat. Crew of the Chicago Coast Guard Station returning from a rescue

2 Preparing to launch surfboat

.

. *■)

•

are permitted to carry lifeboat equipment for only 10 per cent of their passenger capacity, in¬ cluding crew; but if they go beyond five miles from land they are required to carry 30 per cent equipment. Of this three-fourths may be collapsible. Only 10 per cent equipment is re¬ quired of ordinary river steamers. Consult Cameron, (The Life-Boat and Its Work> (Lon¬ don 1911) ; Haydon, A. L., (The Book of the Lifeboat (London 1909) ; Sawman, (The Life- Boat* (Brooklyn 1912) ; (Annual Reports*

United States Coast Guard (Washington,*

D. G).

LIFE-BUOYS. See Life-preservers.

LIFE IS A DREAM ((La vida es sue- no). Calderon's (Life is a Dream) was writ¬ ten about 1635 and published in 1636. The play was probably composed for the theatre of the Royal Palace at Madrid. In grandeur of con¬ ception, if not in style and execution, it is one of the masterpieces of Spanish dramatic litera¬ ture. To develop the theme that <(life is such stuff as dreams are made of,® and that this transitory life is but a preparation for the real life of the next world, Calderon adapted to his purpose a story told of Philip, Duke of Burgundy, but of Oriental origin. The jest of bewildering a drunken man found in a market place into the idea that he is a duke, who, upon meditating on the princely life he has led for a day, is un¬ certain whether it has been reality or a dream, was also used by Shakespeare, but for comic effect, in the induction to the (The Taming of the Shrew. > Not content with one theme, Calderon wove

into his play another, suggested to him by the story of Barlaam and Josaphat, likewise of Oriental origin, which he found in one of the many lives of the saints and in Lope de Vega's play, (Barlan y Josafa, 1611. This story of a prince who is brought up in a prison in order to forestall the predictions of astrolo¬ gers was used by Calderon to illustrate the doc¬ trine of free will, a subject hotly debated at the lime in Spanish universities. Finally, as all Spanish plays had a love element, and ended happily in the marriage of all the characters, the dramatist added a further complication,— love intrigue. This element of his play Cal¬ deron treated as an unwilling concession to the taste of the time, interlarding the dialogue de¬ voted to it with hackneyed quibbling about honor, and the conventional, euphuistic verbiage so popular in comedies of the 17th century. The main themes he developed with great sim¬ plicity of diction, and a wealth of fine lyrical passages which atone for the blemishes just noted. Chief of these lyrical outbursts is the soliloquy of Segismundo, (*

act (11. 2359-2371, 2423-2427). There too he defines his conception of free will : "No mortal can forestall the decrees of fate (predestina¬ tion), but the wise man can so prepare himself by prudence, moderation and humility that he is fortified against its blows.® (11. 3215-3227).

The strength of the play lies in its grandiose conception and its lyrical passages. The de¬ fects are equally conspicuous. Chief of these is the failure — common to most Spanish plays of the 1 7 th century- — to develop the character of the protagonist. The transition from a sav¬ age state, in which Segismundo is a Caliban without knowledge of the world; his titanism and eagerness to rule and impose his will on everybody when brought to the palace ; his disil¬ lusionment upon realizing that life is only a dream, and the final conviction that if life is only a dream, truth is eternal, and that he must curb his passions, as the safest procedure against the time when he may awake ■ — all these transitions are abrupt and unconvincing, and mar one of the world's masterpieces. Con¬ sult the edition by Buchanan (Toronto 1909) ; (La Vita e un Sogno, Farinelli (Torino 1916) ; the translation in the metre of the original by D. F. McCarthy in (Calderon's Dramas) (Lon¬ don 1875), and the adaptation by Edward Fitz¬ gerald, (Letters and Literary Remains> (Lon¬ don and New York 1889).*

Milton A. Buchanan.

LIFE-ESTATE, in the common law, a? applied in England and the

United States, a freehold not of inheritance; an estate or inter¬ est in real property for a life, and which is either conventional or legal. A conventional life-estate is expressly created by the act of the parties, and is for the life of the owner, or for the life of another, in which case it is called an estate pour autre vie. A legal life-estate is either tenancy-in-tail after possibility of issue extinct ; or what in the older country is tech¬ nically designated courtesy of England, that is, the life-interest held by a husband in his wife's fee-simple or fee-tail estates, general or special, after her death; or dower, that is, the right which a wife has for her life in the third part of the lands and tenements held in fee-simple, fee-tail-general or as heir in special tail by her husband at the time of his decease. The tenant for life may cut wood to repair fences and for household fuel. If there is an open mine on the estate he may work it for his own profit, but he cannot open one. See Estate; Fee Sim¬ ple; Enfeoffment; Forfeiture.

LIFE-EVERLASTING, one of the ever¬ lasting (Anaphalis margaritacca) , called the pearly or large flowered; also silver-leaf, cotton- weed, none-so-pretty, etc. See Everlasting.

LIFE EXTENSION. Among the many facts which have been revealed by the investiga¬ tions of scientific shop management none has proved more startling than the disclosure of the economic waste involved in the sickness and premature death of skilled workers in all in¬ dustries. While it may, at first thought, seem contrary to the spirit of modern industrial management to speak of men as "machines,® those who are most interested in the promotion of the principles of sickness prevention and life extension insist that it is necessary that this view should be taken if one is to fully com¬ prehend the fact that the human body is a great

laboratory which transforms food into the energy that industry requires in its work of production. As Dr. F. C. Wells said, in an address before the Executive's Club of New York: ((We should look upon the men at work in the shops and stores as human machines — marvelous human machines, yet still machines. It is tremendously important to you as em¬ ployers that these human machines are work¬ ing properly. . . . We often hear it said that

a man has died a sudden death. This is a mis¬ take. This apparently sudden death is merely the end of a long-preceding process of decay,

and this decay, which is during every working day attacking some of your men, ought to be detected so that, as with a turning lathe, the proper methods of upkeep may be provided. Each machine has what may be called its nor¬ mal load, under which it works without strain. With men, too, it is not unusual for strains to be so serious that they crumble up. The machine is working poorly. You cannot tell how much work a man should do unless you give him a physical examination. The amount of work which he does, and which anybody can see, is no proper test."

This is the principle back of life extension work in industry. How badly such activities are needed was shown by the investigations of the Metropolitan Life Insurance Company, under whose direction seven community sur¬ veys were made, in widely separated localities, to determine the extent of sickness, especially among the wage-earning population. The per¬ centages of those sick as well as the percentages of those who were so sick as to be unable to work are given in the following table :

Percentages

COMMUNITY

Rochester, N. Y . .

Trenton, N. J .

State of North Carolina .

Boston, Mass .

Chelsea Section, New York

City .

Cities in Pennsylvania and West Virginia (white and

colored) .

Cities in Pennsylvania and West Virginia (colored) .... Cities in Pennsylvania (white) Cities in West Virginia (white)

Pittsburgh, Pa. (white) .

Kansas City, Mo .

Average, all surveys .

Unable

to

Survey made

Sick

work

September 1915

2.31

1.92

October 1915. . .

2.55

1.98

April 1916 .

2.85

2.29

July 1916 .

1.96

1.80

April 1917 .

1.48

1.38

March 1917. . . .

1.96

1.85

March 1917. . . .

2.31

2.18

March 1917. . . .

1.75

1.65

March 1917. . . .

3.30

3.11

March 1917. . . .

1.62

1.55

April 1917 .

2.52

2.39

2.02

1.88

While comprehensive figures as to the ex¬ tent of sickness throughout the United States are not obtainable, the surveys of the Metro¬ politan Life Insurance Company are illumina¬ tive, for they also show that the average loss for the 376,573 persons covered by these in¬ vestigations was 8.4 days per year, or 6.9 work¬ ing days, and if the same ratio applies to the entire industrial population of the

country, it can easily be estimated that the annual wage loss through sickness for 40,000,000 workers would be in excess of $500,000,000.

Although there are no figures on which even estimates of the loss due to premature death from preventable disease can be based, the United States army statistics disclose conditions which must exert an important effect upon the earning capacity of the individual and, naturally

and inevitably, upon national efficiency. Such are the facts relating to individual defects and disabilities which not only impair the produc¬ tive capacity of the worker thus afflicted but which later result in disabling disease and death. For example, of the 2,500,000 men between the ages of 21 and 31 years who were examined for military service in 1917, approximately 33 per cent were rejected because physically unfit, while a more particular study of the reasons for rejection shows the prominence of such disabilities as defective hearing, impaired vision, decayed teeth, heart affections, defects of the nose and throat, flatfoot, etc., not to mention the more serious organic ills, all disabilities that are certain to constitute' a handicap to the victim in any line of work that he may pursue, for all are physical defects that would in all probability have an effect upon the worker's capacity for production. Even in cases where the disabilities do not result in extended absence from work, it is obviously impossible to expect anything like maximum efficiency from a work¬ ing force, 25 per cent of whom are suffering from disorders or deformities of the eyes, nose, heart, lungs or other organs.

Modern industrial management is endeavor¬ ing to meet these conditions by insisting that all employees submit themselves to a thorough physical examination, not only at the time of employment but at subseciuent periods, with a ' view to seeing that those who are found to be suffering from preventable defects shall re¬ ceive proper medical or surgical treatment and so be restored to the highest position in the ranks of the wage-earner that it is possible for them to attain.

In the beginning the workers have often been suspicious of the physical examination on the ground that it is designed to afford a means of detecting the less desirable operatives with a view to discharging them but this is a fear that is soon overcome. Following the examination, the results are gone over in detail with the man and, where medical, dental or surgical treat¬ ment is deemed

necessary, he is advised con¬ cerning it, and, not infrequently, he is given substantial aid in carrying out the directions of the examiner. If the examination shows that the worker is suffering from a disability that unfits him for the particular task in which he is engaged and remedial treatment promises small results, as in affections of the heart, he is assigned to a job which he can hold with less danger and with higher possibilities of efficient service.

The question of sickness prevention and life extension was considered a matter of such great importance to the nation that the National Industrial Conference Board made a special investigation of the subject and, in May 1918, its findings and recommendations were pub¬ lished in (Research Report No. 64 It declared that existing ˆconditions call for a vigorous policy of remedial action" ; and continued :

. . all sickness and disability which can

reasonably be prevented should be prevented instead of being allowed to remain unremedied until they impose a burden of misery and poverty on the individual and a burden of cost on society.

"Preventive work in the case of such com¬ municable diseases as typhoid fever, tuberculosis,

pneumonia and diphtheria has been brilliantly successful. . . . The results already achieved . . . through local effort with limited funds

establish beyond a doubt the urgent need of a thoroughgoing investigation of its further pos¬ sibilities under a definite national policy. . . . Periodic physical examination, not only of in¬ dustrial workers but of the entire population is another important matter for consideration.

((First a national study of prevailing disease and its causes ; then a national program for the prevention of all preventable sickness, with liberal but. intelligent provisions for unpre- ventable sickness, through compensation or otherwise, as a duty of society to its members : — this is submitted as a rational, constructive and humane program for dealing with the sickness problem in its individual as well as its social and industrial aspects.®

In many manufacturing plants and com¬ mercial houses where no regular examining physician is a member of the staff, this service in prevention of disease is obtained through one of the commercial agencies engaged in such work.

John R. Meader,

Labor and Service Department, Brighton Mills, Passaic, N. J.

LIFE INSURANCE. See Insurance, Life.

LIFE INSURANCE, Commercial. See

Commercial Life Insurance.

LIFE INSURANCE STATISTICS. See

Insurance, Life, Statistics.

LIFE OF JESUS, The (1863), by Renan, is the effort of an Oriental scholar and Biblical critic, who was also a subtle psychologist, to disengage the Gospel narratives from what he believed to be legendary accre¬ tions and to show the ((incomparable man® Jesus ((not as a founder of dogmas, a maker of symbols, but as the initiator of a new spirit® who, indeed, founded (

Roussel, (The Romance of M. Renan and The Christ of the Gospels) ; and R. H. Hutton's (M. Renan's Christ, in his (Theological Essays) (1902). There are translations by W. G. Hutchinson and others.*

Benjamin W. Wells.

LIFE-MORTARS. See Life-rockets.

LIFE-PRESERVERS are inventions for the preservation of life in cases of shipwreck. In the mercantile marine and passenger ships there are now life-belts for every passenger and every member of the crew. Buoys are car¬ ried on the bridge and at the stern of most ships in the mercantile marine. Sometimes the handiest life-buoy is an empty water-cask, well bunged up and with ropes around it to hold on by. There are various kinds of buoyant pillows, life-jackets of india-rubber cloth and mat¬ tresses. The cork-mattress can float three men in an upright position.

The life-belt commonly used was designed by Admiral Ward of England. It is made of cork covered with canvas and is both strong

and buoyant. It has four separate compart¬ ments, so that if one is punctured and bursts, the belt's buoyant power is not entirely de¬ stroyed. Each life-belt must have sufficient extra buoyancy to support a man heavily clothed, with his head and shoulders above the water, and to enable him to support another person besides himself. It must be flexible in order to fit tightly to the wearer. There is a division between the upper and lower parts so that it can be securely fastened round the waist and will not impede breathing or the muscular action of the chest or arms. See Lifeboat; Life-rafts.

LIFE-RAFTS are various floating appa¬ ratus for saving life in case of shipwreck. The primitive ones are merely square frames buoyed up by a cask at each corner. Empty water- casks well bunged up are very ready and ef¬ fective instruments of safety in shipwreck and should have ropes attached to them to hold on by. Frames of bamboo and inflated skins have long been in use as life-preservers among dif¬ ferent nations, and contrivances more or less ingenious to preserve the buoyancy of the body in case of accidental immersion in water are re¬ sorted to in all countries. Whatever is lighter than water, if used on account of its buoyancy as a means of personal safety, may be consid¬ ered a life-raft. A life-raft invented in Eng¬ land in 1870 is triangular in shape and con¬ structed of wood, cork and rope-netting. It has the advantage of being handy and could be easily hauled to and fro between a ship in dan¬ ger and the shore. The typical modern life- raft consists of two metal cylinders, usually cone-shaped on the ends, with a frame-work built between them. Owing to the large amount of air space in the cylinders, these have great supporting capacity and will carry all the peo¬ ple who can climb on to or hang on them when in the water. Steamships prefer them to life¬ boats because they can be stored in less space on board ship. Their character is regulated by the United States Steamboat Inspection Serv¬ ice, and those for lake and river steamers must have three and one-half cubic feet of air space to each person accommodated. For ocean steamships four and one-half feet must be pro¬ vided. Another and less popular form of life- raft consists of a copper compartment tube in the form of an O, this being covered with cork and protected with canvas. A olatform of slats and lines, oars, etc., complete the equip¬ ment. Steamers are usually permitted to use

rafts instead of boats for half or two-thirds of their life-saving

equipment.

LIFE-ROCKETS are cylinders of metal carrying a small projectile in front and an ex¬ plosive mixture in the rear for propulsion and are so framed because used to communicate be¬ tween a distressed ship and the shore. These are especially useful where no lifeboat can be had, or where it cannot be used on account of the roughness of the sea. They are available, however, only at moderate distances from the shore. By means of them a rope is thrown either from the ship to the shore, or from the shore to the ship, generally the latter, and when communication is thus established a slinging ap¬ paratus may bring the crew ashore one by one. Of the primitive projectiles for life-preserving purposes, one of the simplest is the heaving- stick, which can be discharged by hand, but cannot be relied on for distances greater than 50 yards. A piece of stout cane two feet long, one end loaded with two pounds of lead and the other attached to a thin line, is whirled ver¬ tically twice or thrice, and then discharged. Kites have been tried, but cannot be relied on with certainty. The first trial of the explosive rocket is believed to have been in 1791 by Ser¬ geant Bell, of the English artillery, who fired his projectile from the ship to the shore, but it was soon perceived that it was better to fire from the shore to the ship. John Dennett, of Newport, Isle of Wight, is believed to have been the first to use rockets with success. His faking box for paying out the line is still util¬ ized. The rocket is fired in the same way as a signal rocket, but has a light cord attached de¬ signed to fall across the ship. This is hauled in by the crew and brings a start rope strong enough to carry a breeches-buoy (q.v.). A light mortar or gun firing a projectile is now generally preferred to the life-rocket. See Life-Saving Service.

LIFE-SAVING GUNS. See Life-rockets.

LIFE-SAVING SERVICE, The United States, for many years an important and ef¬ fective branch of the public service, under the direction of the Treasury Department, lost its distinct individuality on 28 Jan. 1915, when it was merged with the Revenue Cutter Service to form the Coast Guard. The system was inaugurated in 1871, by Sumner I. Kimball, then chief of the Revenue Cutter Service. In June 1878, by act of Congress, it was organized into a separate bureau. The service covered the coasts of the Atlantic and Pacific, the Gulf of Mexico and the Great Lakes.

The first life-saving stations in the United States were established by the Massachusetts Humane Society at Lovell's Island and Co- hasset. All efforts for saving life and property in cases of shipwreck were

made by this society till 1837, when the President of the United States was authorized to employ ships to cruise along the shores and render assistance to distressed navigators. William A. Newell, afterward governor of New Jersey, witnessed a fearful shipwreck off Barnegat Island in which many bodies were washed ashore, and was so impressed by the sight that when he was elected to Congress i'n 1848 he introduced a bill for the relief of shipwrecked persons. The result of the passage of this bill was the placing of a few life-saving stations between Sandy Hook

and Little Egg Harbor, N. J., and a little later a few stations were established on the coast of Long Island. Volunteer crews were depended upon at all the stations until the introduction of government organization and control.

The last report issued by the Life-Saving Service under that title is for the year ended 30 June 1914. In that year aid was given to 1,937 vessels, having on board 9,296 persons, whose lives were in more or less danger. Of the whole number 82 vessels were totally lost, and with them 38 lives. The property loss, including vessels and cargoes, was $2,724,660. The value of the vessels and cargoes saved amounted to $18,783,000. The number of lives actually saved, of persons brought to shore, and of those who were removed to places of safety — as in the Texas flood rescues — numbered 4,762. Succor was given to 920 persons for an aggregate of 1,234 days at the stations. The work was carried on from 285 stations, 203 being on the Atlantic and Gulf coasts, 68 on the Great Lakes and 19 on the Pacific coast.

The figures for the remaining seven months of existence of the Life Saving Service were incorporated with those of the new Coast Guard in its first annual report. With the passing of this notable organization into history it is appropriate to present a summary of its accom¬ plishments from its initiation in 1871 to the close of its last official season. The records show that in the 33 years aid was given to 28,121 vessels on which were 178,741 persons in danger. The total number of lives lost was 1,455, attributable in many instances to the great distance from stations at which disasters took place. The total value of vessels and cargoes in the cases in which aid was given amounted to $355,401,084, of which a value of $288,871,237 was saved.

Besides the usual official activities of the Life Saving Service many instances are on record of aid given in other ways. The crews at the stations aided in extinguishing fires along shore; captured burglars;

rescued lost property — among which are mentioned aero¬ planes and balloons, automobiles, fishing nets, domestic animals and small boats ; resuscitated persons near death by drowning; supplied pilots in dangerous waters ; replenished failing sup¬ plies of water, provisions and fuel to vessels in need; and cared for sick and injured boat¬ men and sailors.

In the reorganization of the service the personnel has been increased and the life¬ saving work goes on much as before. But, whereas the duties formerly were along shore exclusively, they now cover also the open seas, wherever the revenue cutters go. See Coast Guard.

LIFFEY, lif H, Ireland, a river which rises in Wicklow County, flows west into Kildare, then turns northeast and passes through the county and city of Dublin into the Irish Sea after a course of 50 miles.

LIFT BRIDGES. See Bridges, Lift.

LIGAMENT, in anatomy, human and com¬ parative, a band of white fibrous tissue which connects bones. To this class of tissue also belongs the tendons or sinews of muscles, by which these structures are attached to the sur¬ faces of bones. Ligaments differ from tendons in being of a stouter structure, and less liable

to give way or to be ruptured. When liga¬ ments break during life they seldom snap across or transversely, but generally tear in an irregu¬ lar manner. Tendons, on the contrary, when subjected to great strains, break across. Liga¬ ments possess little or no elasticity, and when stretched do not recover. To the same class of structures as ligaments and tendons, the fasciae or sheet-like bands of white fibrous tis¬ sue spread over muscles and regions also be¬ long. Microscopically examined, both ligament and allied structures exhibit sets of fibres ar¬ ranged in parallel bundles, embedded among which little nucleated bodies known as connec¬ tive-tissue corpuscles are seen. These latter are minute corpuscles of various shapes, and their function has been assumed to be that of minis¬ tering to the growth and nutrition of the fibres amidst which they are placed.

LIGAO, le-ga'o, Philippines, a town of the province of Albay, Luzon, situated near the Inaya River, 22 miles northwest of Albay, the provincial capital, on the main road. It is in one of the best hemp

growing regions in the archipelago. Pop. 17,900.

LIGATURE, in surgery, a cord, thread, bandage, etc., by means of which structures are tied or bound. A ligature is used for tying a bleeding artery or other vessel ; for tying the pedicle of a tumor to prevent effusion of blood or other fluid after its removal. It may be tightly fastened around the base of a tumor to cause its subsequent removal by arrest of its blood-supply and consequent death. Thread of silk or hemp was formerly employed. Liga¬ tures of animal material are now mostly used such as catgut, silkworm gut, etc., also those of silver wire, which are usually rendered anti¬ septic by steeping in carbolic acid or other antiseptic solution.

LIGATURE. See Monogram.

LIGHT. The word light is used in two distinct senses, namely, to designate the sensa¬ tion which is characteristic of the organ of vision (q.v.), and also as a name for the usual cause of that sensation. This double meaning of the word would result in little inconvenience if there were always a definite relation between the sensation and its cause ; but this is far from being true. For example, when we speak of white light, we may mean a sensation which is perfectly definite and familiar to all persons of normal vision, or we may mean that form of energy which can give rise to such a sensa¬ tion. In this second sense the term is wholly indefinite, since there is an infinite variety of forms of energy which may give rise to the sensation of whiteness. The difficulty, which is a serious one in scientific language, may be avoided by restricting the use of the word to one of its significations, preferably to that of sensation, after the analogy of the use of the word sound. But such a restriction would not be in accordance with well-established usage, and it would necessitate the frequent employment of awkward circumlocutions. An¬ other means of avoiding confusion is to so divide the subjects treated that the sense in which the word is used is unmistakable. This second method has the advantage of conciseness as well as that of being in accordance with the usage of most writers. The present article treats of light as a phenomenon of wave mo¬

tion, wholly independent of the sense organ which betrays its existence to us. In it the eye is regarded as a simple optical instrument, quite like the photographic camera. This limitation admits of a satisfactory definition of the terms ((white light,® (

Theories Concerning the Nature of Light. —It is now a little more than two centuries since the Dutch philosopher, Huyghens, pub¬

lished a paper in which he explained the fa¬ miliar phenomena of light by waves in a medium that pervades all space and is called the luminiferous ether. His reasoning was so convincing, the explanations so simple, and the experiments supporting his views so apt, that except for the labors of the single philosopher then living who was greater than Huyghens himself, they could hardly have failed to re¬ ceive at an early day the universal accept¬ ance which they now command. Nine years earlier, in 1669, Newton had commenced his labors in the field of optics, by which, largely on account of fame and authority won in the domain of mechanics and astronomy, he estab¬ lished a theory of light which remained al¬ most unquestioned for nearly a century and a half. Newton supposed light to consist in ex¬ tremely small particles of matter projected from shining bodies with enormous velocities. We now know that this hypothesis was not only less fruitful than that of Huyghens, but, even within the comparatively limited range of optical phenomena known to Newton and his contemporaries, was also less probable.

*According to' this view of Newton, visual sensations are produced by the impact upon the retina of minute corpuscles emitted from iu *i-nous bodies which pass freely through trans¬ parent substances, differences of color, being due to differing size in these small bodies. When these corpuscles approach the boundary of an optically denser medium they are sub¬ jected to a force of attraction which causes them to deviate from their otherwise rectilinear paths. This is the explanation of the phenom¬ enon of refraction. The secondary phenome¬ non of dispersion was very simple and naturally explained by an assumption that this attracting force varies with differing size. Singularly enough, the explanation of one of the most common phenomena, that of partial reflection at the boundary of a transparent medium, offered formidable difficulties : How is an attraction which is necessary to account for refraction also to act as an apparent repulsion for those corpuscles which are thrown back from the surface in reflection? This is a difficulty which the advocates of the Newtonian theory have never been able to meet in a satisfactory manner.*

Wren-Newton attempted to extend his theory to the explanation of the colors of thin plates, a subject which he was the first to investigate in a scientific manner, it was found even less satisfactory. He was obliged to supplement it

with the highly artificial hypothesis that the corpuscles experience periodic changes in the ease with which they enter a refracting body. Even this addition to the theory fails to yield more than a rough approximation to an explana¬ tion of the phenomena, since the blackness of the central spot in Newton's rings apparatus, when the plates are brought into contact, is in contradiction with it. But it was only on ac¬ count of a subsequently accumulated knowledge of optical phenomena which refused to adjust themselves to this theory, no matter how it might be modified, that its final overthrow came about. This not only required a long time, but also a champion of transcendent power to break with a system which had the force of tradition as well as the authority of the greatest of all philosophers to support it.

From 1704, the date of the. publication of Newton's Optics, until 1815, the corpuscular theory was hardly questioned ; at any rate, it reigned supreme in all treatises on light, and it was questioned only by a very few investigators who failed to acquire an influence that was any¬ where decisive. In the latter year Augustin Fresnel, a young French government engineer, entered upon a career of scientific activity which proved of almost unprecedented brilliancy and success. This, as far as it bears upon the purely physical theory of light, may be regarded as completed in 1826. Beginning with a highlv philosophical criticism of some of the accepted doctrines of optics, supported by the most apt appeals to ingenious experiments, he quickly extended his investigations until he embraced nearly all phenomena of light known to his contemporaries ; and this with such success th t he not only established as beyond question the essential truth of a wave theory but brought it to so high a degree of completion that his views were long supposed to be practically final. On account of the importance of this work of Fresnel in the history of physical science of the past century, it is well worth while to briefly review its character.*

The phenomena of diffraction first engaged the attention of Fresnel. It had long been known that the shadow of an opaque body cast by a point-source of light is somewhat different from what would be supposed from simple geometrical considerations, the difference con¬ sisting chiefly in an encroachment of the light upon the borders of the shadow. Newton, who called this phenomenon inflection, attributed it to an attractive force exerted by the opaque body upon the corpuscles while in its neighbor¬ hood, thus causing an inbending of their paths. Fresnel showed that this explanation was quite untenable, since the inflection caused by the back of a razor is exactly the same as that caused by the edge, although in the former

case it is manifest that the time during which the corpuscles are subject to the deflecting force is far greater than in the latter. By similar ap¬ peals to ingenious crucial experiments he demonstrated that none of the current theories was sound; but far from resting here, he showed that all the observed phenomena could be perfectly accounted for in the undulatory theory of light, by an application of the prin¬ ciple of Huyghens. Extending this principle, so fertile in his hands, to wider fields in the do¬ main of optics, he found in every case that the new method was adequate to yield perfectly

satisfactory results. With quite simple and natural hypotheses as to the conditions which must exist at the common boundary of two transparent media, he was even able to deduce quantitative laws governing the phenomena of reflection and refraction, which accord sur¬ prisingly well with experiments devised to test them.

A few years before the commencement of Fresnel's activities, Malus, while looking through a double-image prism, observed that the two images of a distant window which hap¬ pened to be in such a position as to reflect light strongly to his eye were quite different in brightness, and that under some conditions one image might entirely disappear. Further study showed that all ordinary transparent substances were capable of thus modifying light by reflection, and that the modification is com¬ plete at an angle which is simply related to the refractive index; moreover, that under the lat¬ ter conditions the light would be transmitted through doubly refracting crystals in certain directions without bifurcation. Such modified light is called polarized light, and the phenom¬ ena thus briefly described are two of the sim¬ plest of an enormously extensive class, many of which are of extraordinary beauty. This discovery and those which quickly followed in the same field presented a host of new and difficult problems to physicists. Of the many active and able workers in this domain Fresnel was easily the leader. In a very few years he had proposed and developed a general theory of light which embraced these new phenomena and which stood almost unquestioned until our own day; and even now the most essential principles of his theory are wholly unshaken. In its barest outlines the theory may be described as follows: Fresnel assumes that the motion of the particles which constitutes the vibrations of light is always in a direction at right angles to the line of propagation of the waves. When the paths of the particles are quite irregular or without order, the light is ordinary light ; but when the paths are similar, whether straight lines, ellipses with their axes parallel, or circles with a common direction of motion, the light is said to be polarized. From this simple hypothesis he succeeded in erecting an extraordinary

structure which harmonized and explained nearly every known phenomenon of light in a manner that until the most recent times practically withstood all destructive criti¬ cism. Even recent achievements in this field of science have been supplementary to, rather than subversive of, Fresnel's general work. Of the phenomena known to his contemporaries, that of dispersion alone was unconsidered by him, a phenomenon which obviously depends upon the ultimate molecular structure of the refracting substance and which has recently been reduced to comparatively simple laws. This great work of Fresnel was looked upon, as indeed it well deserves to be, as one of the greatest monu¬ ments to the human understanding — compar¬ able to Newton's doctrine of universal gravita¬ tion — and it long remained of almost unques¬ tioned authority. Ultimately, however, one of its fundamental postulates, namely, that the vibrations are always at right angles to the direction of the motion of the light, began to give rise to difficulties. The fact also that the theory could not determine specifically whether

the direction of vibration of plane polarized light is in the plane of polarization or perpendic¬ ular to it. was not only a manifest incomplete¬ ness, but it was a constant stimulus to a critical inspection of its premises. The more these points were studied the more insoluble the dif¬ ficulties appeared, until there came to be a tolerably widespread belief that the theory was not only incomplete, but that in some way it must be essentially in error. To acquire a notion of what modern science has done to clear up these points, we must first review a class of phenomena which seem to be totally unconnected with optics, but which in the end will afford a very remarkable example of the tendency of all science toward unity.

In 1845 Faraday discovered that if polarized light is passed through a transparent substance in a magnetic field and in the direction of the field, the plane of polarization is rotated. The amount of rotation for a given substance is found to be proportional to the strength of the magnetic field and to the length of the path in the material. As many substances, such as turpentine, a solution of common sugar, quartz crystals in the direction of their crystalline axes, etc., present us with a similar fact, this would not be so surprising save for a remark¬ able difference in the two cases which may be thus described : When the plane of polarization is rotated by passing through a sugar solution or a similar body, and the transmitted light

is reflected back upon its course so as to retrace its path, it is found that the original angle of polarization is perfectly restored by a precisely equal rotation in the opposite direction in the return; but a similar experiment upon the body given the magnetic rotation shows a doubled change of angle. This indicates that, although in the first case we must explain the rotation by the molecular constitution of the material, we are not permitted to suppose that the mag¬ netic field has produced a similar molecular structure in the second case, since the rotation is constant in direction irrespective of the di¬ rection of motion of the light. Of course, from the known nature of magnetism, this is equiva¬ lent to asserting that there must be some rela¬ tion between light and electricity. But this is not the most obvious connection between these two classes of phenomena, for as we now know, the earliest division of materials in accordance with their electrical properties involved a classi¬ fication according to their most characteristic optical properties also. Thus all conductors of electricity, excepting only those liquids which undergo a chemical decomposition when they transmit an electrical current, and therefore be¬ long to an obviously different class, are ex¬ tremely opaque to light ; conversely, all sub¬ stances which are good insulators are also trans¬ parent to light, at least to an extent which would make a sheet a few hundred-thousandths of an inch in thickness appear perfectly trans¬ parent, although such a sheet of metal or simi¬ lar conductor would not differ greatly in opacity from a thick plate. An excellent illustration of the generality of this law is furnished by the element carbon, which in the dense opaque form — like graphite, for example — is a very good conductor of electricity, but in the form of the transparent diamond is an insulator.

Before the middle of the 19th century two methods of measuring electrical magnitudes had vol. 1 7 — 27

been developed; one of these is based upon the repulsion which exists between two electrically charged bodies, and the other upon the repul¬ sion which exists between two similar magnet poles. Elaborate and repeated investigations have demonstrated that if a given electrical magnitude is measured according to one of these systems, and the value thus found is compared to a measurement of the same quan¬ tity in the other system, the ratio involves a velocity only. This statement is quite inde¬ pendent of the kind of magnitude chosen for the experiment. Within the limit imposed by unavoidable errors of observation the value of this velocity always appears to be the same as the velocity of light.

Here, therefore, are three distinct relations between light and

electricity, which have long been known and to no one of which it is pos¬ sible to attach any a priori reason. It was left to Maxwell to illuminate this obscure field. His long and successful investigations in electricity and magnetism, especially his efforts to reduce Faraday's brilliant discoveries to correlation and to a consistent scientific statement, led him to the conclusion that light itself consists of elec¬ trical vibrations. He attempted to test the va¬ lidity of this hypothesis by every means at his command. For example, according to his theory a non-magnetic substance ought to have a die¬ lectric constant, or what Faraday named its specific inductive capacity, equal to the square of its index of refraction. This indicated relation was found to hold with all expected precision in some cases, but to be widely re¬ moved from the truth in others. Again, since, according to the theory, only those substances are transparent which will offer a resistance to the motion of electricity within them analogous to elastic reaction, there ought to be a de¬ terminable relation between electrical conductiv¬ ity and opacity. Maxwell attempted to find this relation in the case of gold-leaf, which is sufficiently thin to transmit a measurable por¬ tion of the light falling upon it. Notwithstand¬ ing that the discrepancy was here found dis¬ appointingly great, the gradual accumulation of knowledge of the more recondite phenomena of the electrical field had led the great majority of physicists to the conclusion that Maxwell's theory was at least a close approximation to the truth, and accordingly one of the most brilliant discoveries of the 19th century. This may be regarded as a fair statement of the attitude of the world of science in 1888, when Hertz, a German physicist, made a series of remarkable experiments which have eliminated all possible doubt as to the essential verity of Maxwell's theory of light. Fortunately it is not difficult for us to gain a sufficient knowledge of the character of these experiments to make clear their general bearing.

It had long been known that a Leyden jar suddenly discharged through a thick wire gives rise to an oscillatory current of very brief dura¬ tion, and that in certain simple cases the period of the oscillations can be calculated with con¬ siderable accuracy. Hertz recognized that dur¬ ing the time of discharge such an electrical circuit must be a source of oscillatory changes in the magnetic field, which, if the views of Maxwell are in accordance with fact, should be propagated through space with the velocity of light. Although it is difficult, if not quite im-

possible, to measure directly this velocity, if one knows the wave-length and the period it is perfectly easy to deduce the velocity from these two elements, since in its period every wave moves a distance equal to its own length. In these experiments the period was calculated from the elements of the electric circuit; it only remained therefore to determine the length of the waves. Hertz accomplished this in the fol¬ lowing simple and ingenious manner: At a con¬ siderable distance from the source of the waves he placed a large sheet of metal perpendicular to its direction from the source. From this sheet the waves were returned upon them¬ selves by reflection. Now, a well-known fact in wave motions is that when two systems of waves of like period are moving in opposite directions, they combine to form a system of standing waves of half the length of the free waves. The regions where motion is destroyed bv this kind of interference are called nodes. Hertz demonstrated the existence and position of these nodes by means of an apparatus which possessed the same electrical period as the source. This apparatus he called a resonator. The value of the velocity of these waves de¬ duced from his observations differs no more from the known velocity of light than would be expected from the unavoidable errors of obser¬ vation; thus it complies with the requirements of Maxwell's theory. These waves, therefore, are shown to differ from light waves only in their enormously greater wave-lengths, and that they must be subject to all the established laws of optics which are independent of the length of the waves. The last conclusion was thoroughly tested by Hertz by a series of most interesting and convincing experiments. He found that strictly according to the laws of optics these waves are reflected from the sur¬ faces of all bodies which conduct electricity; that they readily pass through substances which behave as insulators; and that in passing from one insulating medium to another the direction of propagation is altered in accordance with the law of sines. Further than this, he showed that such electrical waves admit of polariza¬ tion, and they are, therefore, characterized by motions at right angles to the direction of propagation. During the time which has elapsed since these investigations a host of experi¬ menters have improved the methods and ap¬ paratus of Hertz, and have largely extended the range of wave-lengths that can be observed. On the other hand, many investigators have been employed in the application of analysis to both the old and the new problems in optics. The difficulties which attach to Fresnel's mode of regarding the optical phenomena of crystal¬ line media are found to disappear, and all the complex phenomena of light admit of explana¬ tion from a consistent body of premises.

Reflection — Refraction — Dispersion. — When light waves originating at a point fall upon a surface separating two media, the sys¬ tem of waves is broken up into two systems, one of which remains in the first medium, though moving in a changed direction, and the other entering the second medium. The former system constitutes reflected light, and the latter, also in general changed in direction, is called refracted light. If the bounding surface is smooth the phenomena of reflection and of re¬ fraction are regular and the modified paths of

the light can be calculated. The total intensity of the reflected light varies greatly with the nature of the media on either side the interface and also upon the angle at which the wave sur¬ faces meet this surface. If we consider only the case of the first medium being air, we may describe two general cases of interest. (1) If the second medium is a transparent substance, like most liquids, ice, glass, etc., the reflected light is ordinarily of small intensity as com¬ pared to the incident light, but increases with increasing angle of incidence, until, as this angle approaches 90 degrees, the rate of increase be¬ comes very great. (2) If the second medium is a metal the reflected light is ordinarily a large portion of the whole, but its intensity does not vary greatly with the angle of incidence. Turning now to a consideration of the light which passes the interface and enters the second medium we find that in some substances these waves will go a great distance without notable diminution of intensity. Such substances are called transparent. In others, described as opaque, the light waves are converted into other forms of energy in longer or shorter dis¬ tances, and are destroyed as light. In the case of metals and other good conductors of electric¬ ity this destruction follows a penetration of only a few millionths of an inch. The laws which determine the directions of the reflected and refracted light are simple. Let us call the angles which the incident, the reflected and the refracted waves make with the surface separat¬ ing the two media, the angles respectively of incidence, of reflection and of refraction. For the law of reflection, the angle of reflection is then equal to the angle of incidence. For re¬ fraction, the sine of the angle of incidence divided by the sine of the angle of refraction is equal to the velocity of the propagation of the waves in the first medium, divided by the velocity is the second medium. The angle of incidence being 'the polarizing angle for trans¬ parent substances, the tangent of the polar¬ izing angle equals the index of refraction. This is known as Brewster's law. These laws are not absolutely without geometrical am¬ biguity, but are made so by the addition that the change of direction in both cases is the least possible. If the refracted light is

ob¬ served critically it will be found that the di¬ rection varies somewhat for lights of different colors, so that, if white light is incident, the light will be arranged in direction according to its component colors, the red being least changed, then yellow, green, blue, and, most of all, violet. This phenomenon is called dis¬ persion. Since the maximum difference of de¬ viation for small angles of incidence is never more than a small part of the whole — very few substances exhibiting a ratio greater than one- twentieth — dispersion should be regarded as a secondary phenomenon of refraction.

Optical Images — Optical Instruments. — When light waves originating at a point are modified by one or more smooth surfaces — either by reflection, or refraction, or by a com¬ bination of the two — so that after these modi¬ fications they either pass through a new point or seem to do so, this new point is called the optical image of the first. To distinguish the cases of real points from those which only ap¬ pear to be new centres, the terms real image and virtual image are employed.

If an optical system can form an image, real or virtual, of a point, it follows from the law of continuity that it will also form simultaneous images of near lying points with a like degree of precision ; the images of remoter points, however, may be, and in general will be, im¬ perfect. The simplest of all optical systems is a plane mirror, and it is the only optical in¬ strument which is absolutely perfect, provided only that it is not of too small dimensions. Such an instrument forms virtual images of all points in front of it, the sources and images being symmetrically placed with reference to the plane of the mirror. Bodies of transparent substances bounded by smooth curved surfaces, ordinarily spherical surfaces, are called lenses. Almost all optical instruments employ lenses for producing the required modification on transmitted light. If a lens increases the curva¬ ture of the wave-surfaces which pass through it — which in general requires the middle of the lens to be thicker than its periphery — it will produce real images of remote objects near its geometrical axis. Such a lens is called a positive-lens. A screen to receive the images and an opaque enclosure to shield it from ex¬ traneous light constitutes the important instru¬ ment known as the camera obscura. One of the earliest optical instruments invented, it has only been of importance since the discovery of a method of fixing

the images a short time before the middle of the last century. The re¬ quirements of modern photography, especially the demand for brightness and wide angular extent in the images, have led to inventions of wonderfully complex camera lenses, so that ordinarily they are made of combinations of from 4 to 10 different lenses, involving two or three different kinds of glass in their con¬ struction.

The eye is properly a camera obscura, in which images of objects neither too near the observer nor too far from the axis of vision are formed upon the retina as a screen. The most important difference between the eye and the photographic camera lies in the fact that the interior of the eye is filled with a substance optically different from air, which introduces some remarkable modifications in the phenom¬ ena of vision. These may be ignored in this casual review of the construction and func¬ tion of optical instruments.

In almost all optical systems, excepting the camera obscura, the eye is a necessary part in use, and it is, therefore, convenient to specify the conditions under which distinct vision is possible. To a normal eye, any object very near the axis of vision can be distinctly seen if it lies at a distance comprised between five or six inches for a nearer limit and infinity for the farther. Thus, the moon and a printed page held at the customary distance for reading can be seen equally well. We shall assume a distance of 10 inches as a standard of comparison.

Microscope — Telescope. — If a small ob¬ ject be brought quite close to the eye it will appear larger, but when too close vision will be indistinct. This is because the refractive power of the eye is insufficient to cause the light waves to form new centres at the retina ; but if the refractive power of the eye be suitably increased by the aid of a positive lens placed between it and the object, vision is

rendered distinct with the increased apparent size. A lens so used is called a simple microscope and the ratio of the apparent diam¬ eter of the object to that which it would have at the conventional distance of 10 inches is called the magnifying power of the miscroscope. Since nature presents us with innumerable ex¬ amples of such microscopes in small drops of water, of transparent resins, etc., the phenom¬ enon has doubtless been known since prehis¬ toric times, and we have the best of reasons for believing that some of the artisans of antiquity employed magnifiers as aids in their work.

There is no theoretical limit to the magnifi¬ cation attainable with simple microscopes ex¬ cept that set by the nature of light itself, but

very high powers demand inconveniently small lenses and such close approximations to the eye that illumination of the object becomes difficult. These difficulties can be greatly re¬ duced by employing two systems of positive lenses, one of which serves to form a real and enlarged image of the object, while the other is a simple microscope used to observe the real image quite as if it were the object itself. The former system is called the objective, or object-glass, and the latter the ocular, or eyepiece. The instrument thus constituted is called the compound microscope, and its magni¬ fying power is equal to the product of that of the objective into that of the ocular. The com¬ pound microscope was invented about the mid¬ dle of the 17th century, but it was not perfected so as to be of real value as an instrument for scientific research until after the second dec¬ ade of the 19th.

If a lens, or lens system, is employed to form a real image of a distant object and this image be viewed through a microscope, the combination forms a telescope. Since the real image is in general inverted, the object ap¬ pears inverted to the observer if he employs a simple magnifier as an ocular, but it appears erect if the ocular is a compound microscope. The inverting telescope is optically superior and is universally used for astronomical obser¬ vations, but for terrestrial observations the second type is ordinarily preferred, which, when it is desired to distinguish it by a name, is called a terrestrial telescope, or a spy-glass. The terms objective and ocular are also applied to the two lens systems in the telescope.

Since concave mirrors can also produce real images of distant objects they may be used in place of the objective. Such instruments are called reflecting telescopes; they have been very extensively used for astronomical purposes in the past.

Achromatism — Achromatic Combina¬ tions. — Newton was led by his experiments to conclude that the secondary phenomenon of dispersion bears a constant ratio to the refrac¬ tion. It follows from this that a separation of composite light into colors. is the inevitable concomitant of change of direction by refrac¬ tion, and that this imposes a somewhat narrow limit upon the power of all optical instruments involving refraction. This belief led him to invent the reflecting telescope, which remained the leading form for astronomical purposes for more than a century. About the middle of the 18th century, however, Dolland found that Newton's conclusion was founded upon too

limited a range of experiment and showed that it is possible, by a combination of two or more materials, to secure a change ot direction of light by refraction with little or no evident dispersion. Thus, he found that a prism of crown glass, say of 10 degrees, combined with a prism of flint glass of 5 degrees, turned in an opposite direction, would yield a deviation nearly as great as a prism of crown of 5 de¬ grees and without the colors of dispersion. Such a combination is called an achromatic combination, and a pair of lenses similarly combined to give colorless images is called an achromatic lens. All refined optical instru¬ ments utilize this invention of Dolland. In telescopes the objective ordinarily consists of two members only, a positive crown lens com¬ bined with a negative (diverging) flint lens; in microscopic objectives there are rarely less than four lenses, and sometimes, in the case of very high powers, not less than 10.

Interference Phenomena — Diffraction. — That light is in fact some form of wave-motion does not appear from the phenomena of reflec¬ tion and refraction in their commoner mani¬ festations, although if the acting surfaces are made very small there are deviations from the simple laws given above which inevitably lead to a wave theory for an adequate explanation. For the present purposes it seems far better to describe some of the simpler and easily produced phenomena which demonstrate the wave-motion.

One of the most striking properties of all varieties of waves is their propagation independ¬ ently of the state of motion of the medium in which they exist, for example, water waves of all possible lengths and having all possible di¬ rections of propagation may coexist on a sin¬ gle surface of water. In familiar acoustic phe¬ nomena we have excellent analogies which will greatly help in the comprehending of the less familiar optical phenomena. If two tuning- forks of exactly the same pitch be sounded to¬ gether it is found that there are regions where all evidence of sound vanishes, provided that the forks are equally loud. These regions of silence are those where the maximum of density due to one set of waves corresponds with the minimum of the other set, and they are so sim¬ ply related to the positions of the two forks that having established their places, it is easy to deduce from the geometrical relations the length of the waves. Could we get two sources of light which emitted waves exactly alike, there should be corresponding regions where illumination from the two sources would be wanting, provided that light is in fact pro¬ duced by a wave-motion. Since, however, the ultimate sources of

light are the molecules of luminous bodies and we are unable to control such small bodies, so simple a test is impos¬ sible; but a perfect optical image of a source is exactly like the source itself, hence, if light is allowed to fall upon a screen and a portion of the same radiation is reflected by a mirror upon the screen, the conditions for interference are met. The experiment is a delicate one and liable to escape observation, only, however, be¬ cause of the shortness of the waves. Fresnel tried the experiment, not only by using two mirrors, enclosing an angle a very little less than 180 degrees, but also by using two prisms of very small angle, with complete success. The advantage of using a pair is obvious when

similarity of the two sources — here two virtual images of the same source — is considered. His measurements showed that the waves which are found in ordinary white light have all lengths between those of ' g-Hoii and jshra of an inch, the former being that of the extreme red of the prismatic spectrum, and the latter of the extreme violet. The mean value for white light may be taken as of an inch.

A much easier, though less simple, method of exhibiting interference phenomena is the fol¬ lowing: If a hole, less than ˆ of an inch in diameter, be pierced in a piece of paper, a distant bright point, such as an arc light or the bright point of a mercury thermometer-bulb in sunshine, will appear to an eye looking through the hole as a disc surrounded by one or. more concentric rings. If now a second similar hole be made within less than ˆ of an inch from the other and the experiment be repeated, the disc will appear brighter and traversed by a series of dark lines perpendicular to the di¬ rection of a line joining the two holes. These dark lines mark the regions of complete inter¬ ference and are exactly like the dark bands produced by Fresnel's method. The fact that the point-source of light appears as a disc of appreciable magnitude is also explicable by the fact that light is a wave-motion. Broadly stated the condition is this : if light consists of waves, we ought not to expect that the laws of reflection and of refraction will hold unmodi¬ fied when the acting surfaces are no longer large with respect to the length of a light-wave. These deviations from the laws are called dif¬ fraction.

Since most of the light with which we ordi¬ narily experiment is composite, that is, made up of a combination of many different wave¬ lengths, the places of complete destruction of illumination differ for differing wave-lengths. Such phenomena are, therefore, generally, some¬ times splendidly, colored. Familiar cases of simple interference are presented by thin re¬ flecting plates, such as soap-films, rifts in trans¬ parent media, as in precious opal, etc. In these

cases we have the two sources produced by re¬ flection from the two sides of the plates, and the phenomena are generally known as the colors of thin plates, first studied by Newton.

Diffraction phenomena are even more com¬ monly seen. The peculiar lustre of satin spar, of the gems known as cat's eye and of the star sapphire find their explanation here. The iri¬ descence of mother-of-pearl and of certain feathers, and the brilliant-colored pattern seen when an electric arc light is viewed through a fine and uniform fabric, like silk or the web of many feathers, are diffraction phenomena of greater regularity than the former group.

Optical Phenomena of the Atmosphere. — Of the many optical phenomena which belong either to the air as a transparent body or be¬ cause of foreign bodies temporarily suspended in it, mirages, coronas, rainbows and halos are among the most striking. The refractive power of the air increases with its density, and, as this is increased both by pressure and by lowering of temperature, there results varying effects of re¬ fraction. With the normal condition of the air, in which the density increases in a geometrical ratio as we rise above the surface of the earth, the only very obvious effect is to prolong the length of the day to twice the time which it re-

quires the sun to sink at the horizon by its own diameter. Atmospheric reflection is well illus¬ trated by twilight; this reflection takes place partly from the air itself and partly from minute, solid particles in the atmosphere. It commonly remains visible until the sun has sunk 18 degrees below the horizon, which indicates that at a height of 50 miles above the earth's surface the air is still dense enough to reflect an appreciable amount of light. Atmospheric dis¬ persion is also present, but is not sufficiently marked to be detected by the unaided eye, al¬ though conspicuous enough with a telescope under favorable conditions. The scintillation of the stars, however, is a direct effect of atmospheric dispersion.

In the not infrequent cases when the air de¬ parts widely from the normal law of continu¬ ous decrease of temperature with increasing height above the surface of the earth, the paths of the light waves which are nearly horizontal may change the direction of curvature between the object and the observer, in other words, may have points of inflection. In low latitudes the prevailing condition, when such

abnormal re¬ fraction may be observed, corresponds to a lower layer of air at a higher temperature than that immediately above. In such cases distant objects near the horizon appear lifted above their real positions and portions of these much elongated vertically. A further development shows inverted images, -generally without much distortion, underneath the raised images. Over sun-heated plains the inverted image is that of a portion pf the sky, whence the effect of a sheet of water between the observer and the horizon. In high latitudes it is sometimes pos¬ sible to find the condition of a layer of much cooler air in contact with sheets of ice or of cold water, in which case the inverted image is seen above the erect image. These phenomena are known under the name of mirage.

When the atmosphere is not quite clear one may sometimes see colored circles concentric with the sun or moon, generally not more than four or five times the diameter of the sun and invariably having the inner edge blue. Such circles are called coronas. They are diffraction phenomena produced by very small spherical drops of water suspended in the air, and their diameters are in an inverse ratio to the diameter of the drops to which they are due. The only necessary conditions for well-developed coronas are smallness and general uniformity of size in the drops.

When sunlight falls on drops of water which are not small compared to the length of a light wave, an entirely different phenomenon, involv¬ ing reflection, refraction and dispersion, results. It can be shown that, when flat wave-surfaces of light enter a sphere of water, there are two cases in which a portion of the wave emerges from the drop still nearly flat, and that in these directions, therefore, the light will be trans¬ mitted with relatively great, intensity. The first case corresponds to refractions at entrance and emergence with a single interior reflection; and the second case to the two refractions separated by two interior reflections. The total change of the direction of the light in the former case is 138 degrees and in the latter 231 degrees. It, therefore, follows that all drops at these two angular distances from the sun should appear relatively bright, in other words, that opposite

to the sun there should appear two concentric circles under proper conditions of illumination, one, much the brighter of the two, of 42 degrees radius and the other of — 51 degrees radius. The secondary phenomenon of dispersion causes these angles to vary continuously for different wave-lengths, hence the circular arcs, constitut¬ ing the double rainbow when perfectly devel¬ oped, appear as bands of prismatic colors. It is not difficult to see that the primary bow, often

the only one which can be traced, must be red on the outer border, whence we conclude from the algebraic sign attached to its radius, that the secondary bow should present the red border on the inner margin.

When the temperature is low, water cannot exist in the form of drops, but only in that of snow crystals and of a perfectly transparent vapor. On those occasions when there are nu¬ merous ice crystals of very regular form sus¬ pended in the air and illuminated by the sun or the moon, we may see one or more of a series of highly complicated phenomena which bear the names of halos, parhelia, sun-dogs, etc. A bare description of all the features which have been observed and recorded would demand far more space than is available ; only the most common ones can be noted here. The simplest form of ice crystals, and the only form which is necessary to produce all the known forms of halos, is that of a right hexagonal prism. Such a body supplies two refracting angles, namely, that of 60 degrees contained between two alter¬ nate faces of the prism, and that of 90 degrees embraced between each of these faces and a base. As light traversing a 60-degree prism of ice has a minimum deviation of 22 degrees, if there are present a sufficient number of such prisms between the sun or moon and the ob¬ server, the luminous body would seem to be surrounded by a concentric circle of 22 degrees radius, having, on account of the secondary effect of dispersion, a red inner margin and a pale bluish outer one. Similarly the rectangular edges would give rise to a colored circle of 44 degrees radius. The smaller circle can be seen very frequently — perhaps on 60 to 80 days a year in our latitude — while the 44-degree circle is rarely seen.

When the length and width of a small hex¬ agonal prism differ greatly, it will not remain while falling through quiescent air in a purely chance position, but it will set itself more or less perfectly in a definite position with respect to a vertical. Thus a flat prism will fall with its base horizontal, and an elongated crystal will maintain its axis nearly horizontal. This pecu¬ liarity in falling crystals produces a large num¬ ber of features in complicated halos which are generally recognizable because they are all sym¬ metrical with respect to a vertical circle pass¬ ing through the sun. Some of these are com¬ parable with the most brilliant rainbows in their coloring. The most familiar of this class of phenomena are the two bright prismatic spots to the right and left of the sun, respectively, having the same altitude as the sun and their red side turned toward the sun. When the sun is very low they are 22 degrees distant and appear merely as bright portions of the inner halo, but as the altitude of. the

sun increases they increase their angular distances, and above a moderate altitude they disappear. These spots are called parhelia, or sun-dogs; they are some-

times the only feature of the halo visible and are by no means infrequent. See also Camera; Electricity; Electric Light; Microscope; Polarization of Light; Telescope; Vision.

Charles S. Hastings,

Sheffield Scientific School, Yale University.

LIGHT, Therapeutics of. In medicine light has been, used from the earliest times, and the therapeutic application of sunlight is an empirical mode of treatment, in many diseases, which has been handed down through genera¬ tions. The reaction of the human body to different degrees of light is very striking, and however various the sources of light, the mode of reaction is often marvelously similar. Thus, the surface capillaries of the skin are dilated, there is exudation of serum into the subcutane¬ ous tissues, and the nerve-endings are stimu¬ lated. The results of the application of light widely vary, the variations depending upon the area exposed and the part affected. At the present time sunlight is used as a general tonic and as a special tonic to the skin, while as a dis¬ infectant its powers are systematically applied. There is undoubtedly a life-giving principle or growing stimulus in sunlight. Men and animals require it as well as vegetation. It is markedly helpful in tuberculosis and in numerous sani- toriums it is now customary to give sun-baths to the patients. The solarium (q.v.) is being revived and ought to regain popularity, for people who lead an indoor life require some such stimulus to maintain health.

LIGHT, Velocity of, the rate at which light is propagated. This may be found either from astronomical observations or by direct terrestrial measurements. Of the former there are two methods, the first by observations of the satellites of Jupiter and the second by measurement of what is known as the "aberra¬ tion® of the stars. The satellites of Jupiter revolve regularly around the planet ; when the earth is farthest away from Jupiter -there is a delay of 16 minutes, 38 seconds in the times at which they are seen to enter the planet's shadow, as compared with the corresponding times when the

earth is nearest Jupiter. Thus it is found that it takes light 16 minutes, 38 sec¬ onds to pass across the earth's orbit, a distance of 186,000,000 miles : the velocity thus found is 186,330 miles a second. As the passage of a moon into the planet's shadow is, however, a gradual phenomenon, the true instant of its disappearance cannot be accurately determined. This method of determining the velocity of light is hence not susceptible of accuracy; it has, however, a high historic interest, since it was in this way that Roemer, in 1675, first dis¬ covered that light requires a definite time to pass through space.

The second astronomical method depends upon the aberration of the fixed stars. It can be shown that if the transmission of light is not instantaneous, then when a star is viewed from our moving earth it will appear constantly dis¬ placed by a small amount from its true position. This displacement will be a forward one in the plane in which the direction of our own motion at the instant lies and which also contains the ray of light from the star; the amount of the displacement varies as the quotient of the observer's velocity divided by the velocity of light. The total effect of all displacements as

*the earth passes around its or.bit is that each star appears to describe a small orbit in the course of a year about its true place. The mo¬ tion of the earth in its orbit carries the spec¬ tator at one time so as to increase the relative velocity of the light from the star and at an¬ other time so as to diminish this velocity. The maximum displacement of a star due to this cause is the so-called ((constant of aberration** ; its value is 20.47". The velocity of light corre¬ sponding to this is about 186,000 miles a second.*

The most accurate method of directly meas¬ uring the velocity of light on the surface of the earth is by causing a ray to be reflected from a very rapidly rotating mirror to a dis¬ tant fixed mirror and finally back to the first mirror again. If the time occupied by the ray in passing from the first to the second mirror and back again is sufficiently long so that the first (revolving) mirror has taken a new direc¬ tion, the ray after its last reflection will take a different course than it would have done had the first mirror been at rest. From the known velocity of rotation of the mirror, and the measured amount of the deflection, the time taken by the ray in passing twice over the course which separates the two mirrors can readily be computed. In this manner Newcomb, in 1882, determined the velocity of light in air to be 186,273 miles a second. From theoretical considerations it is known that the velocity in a vacuum should be slightly greater, and upon applying a correction for this

cause the final value of 186,324 (in a vacuum) resulted. An equally accurate determination afterward made by Michelson led to the value, 186,320. The uncertainty of these values hardly can exceed 15 or 18 miles a second.

It is a matter of importance and interest to ascertain whether the above value of the veloc¬ ity for white light also represents the velocity of transmission of light waves of different colors. But this question is readily answered by a consideration of the behavior of eclipsing variable stars. Even with such stars so dis¬ tant that their light requires from 30 to 100 years to come to us, we find that rays of all colors reach us simultaneously upon the eclips¬ ing body being removed. It is thus certain that to a _ very high order of approximation the velocities of transmission of light waves of all different wave lengths are equal.

LIGHT OF ASIA, The. The story of the life and teaching of Gautama, founder of Bud¬ dhism, was published in 1879. Sir Edwin Arnold, then editor of the London Telegraph, had gained through some years of life in India and study of its literature the interest in its thought and poetry that produced not only (The Light of Asia1 but (The Indian Song of Songs* and other translations and reproductions. Out of the mass of tradition, legend, and record that sprang up about the life of Buddha, Sir Edwin has drawn a figure of real dignity and charm. The poem narrates Gautama's renun¬ ciation of wealth, royalty, and love for the sake of sharing the common lot and delivering his people; his attainment, after years of suffer¬ ing and solitude, of the Nirvana of Enlighten¬ ment. A greater artist might have given us a poem of greater imaginative beauty and poetic power. The bent of this poet-journalist and the taste of his public produced an elaborate*

Orientalism of descriptive detail that is often effective, but less convincing to a Kipling-fed generation. The exposition of Buddhism has been criticized both by scholars and by theo¬ logians. In substance it is not inaccurate but inadequate, not only because of the exigencies of poetic form but because of a lack of the completer data produced by the critical scholar¬ ship of the last 30 years. The verse, though sometimes stately, is often prosaic or pompous.

To us, the chief interest of (The Light of Asia is its testimony to the*

19th century con¬ cern with the Orient, which, expressed in the romanticism of (Lalla Rookh, was to inspire the scholarship of the Pali Text Society. So successfully did Sir Edwin Arnold popularize Buddhism, we are told, that in spite (or be¬ cause) of the opposition of English pulpits, 60 editions of the poem were sold in England and 80 in America. To-day (The Light of Asia) at least fulfils the author's wish by preserving "the memory of one who loved India and the Indian peoples.®*

Frances W. Cutler.

LIGHT-HORSE HARRY. See Lee, Henry.

LIGHT AND SHADE. We are able to distinguish objects owing to our ability to dis¬ cern differences in brightness and in hue or differences in light, shade and color. If we did not possess the gift of color-vision the magical drapery of color would disappear and the gray of dawn would persist throughout the day. The color-blind eye, which is otherwise normal, sees only the series of neutral grays from white and black. These the artist terms "values.® Brief consideration is convincing that "Light and Shade® is an extensive subject of great importance to us because of its relation to vision, to the appearance of objects, to the imitation of objects and to everything, with the exception of hue, which appeals to human con¬ sciousness through the doorway of vision. Al¬ though color is useful and appealing to man, generally he is much less conscious of its exist¬ ence than he is of form, or brightness distribu¬ tion. It is the distribution and modulation of light and shade which model form, so that as an essential to vision the perception of color is much less important than the perception of "values® or brightnesses.*

Objects are visible usually because they emit light either by transmission or by reflec¬ tion but there must be a contrast either in brightness or in hue in order that they be dis¬ tinguishable from their surroundings. Further¬ more, objects are modelled by the distribution of light, shade and color upon their surfaces. In order to eliminate the necessity of including color in the present discussion the objects which may be considered will be assumed to have neutral surfaces, that is, white or gray. Even the surface characteristics of objects play an important part in their appearances. There are many kinds of surfaces from the regularly reflecting mirror to the diffusely reflecting sur¬ face such as blotting paper, or powdered zinc oxide. A study of these surfaces and of their

♦The courtesy of D. Van Nostrand Co. is hereby acknowledged for

their permission to use the accompanying illustrations and other material which have been taken from the author's book on 'Light and Shade and Their Applica¬ tions,' 1916.

appearances under different kinds of lighting is of vast importance in relation to vision and to the imitative arts.

For example, assume two gray spheres, iden¬ tical in every respect except that one has a glossy surface and the other a dull one. If lighted by a small light-source at a considerable distance from them, they will appear identical when in the same position with respect to the light-source except for the brilliant high-light on the glossy sphere. This high-light is an image of the light-source formed by the glossy convex surface. If the surface is optically convex the image will be seen to be reproduced in accurate minute detail. If the two spheres be illuminated outdoors under an overcast sky, the comparatively less brilliant high-light will extend over a large area and will be unnoticed. The minute high-light of the small light-source in general will not be at a point on the sphere nearest the light-source or the observer but will be found to lie on an element of surface which is so oriented that the angle of incidence of the beam from the source is equal to the angle of reflection of the beam of light reaching the eye by regular re¬ flection from the object. On changing his position the observer will note that the position of the high-light changes so that this simple law of optics is always fulfilled.

The character of the lighting has much to do with the appearance of an object. If the dull sphere receives equal amounts of light from all directions it will not appear spherical but will appear to be a flat disc. • No modulation of light and shade is present to model it. If the glossy sphere be placed at the centre of a diffusing glass globe which is uniformly illumi¬ nated over its exterior, the sphere will appear flat. However, under most conditions the brilliant high-lights will reveal its form under lighting conditions which would "flatten® the dull sphere.

Metallic moldings owe their appearance quite predominantly to these bright high-lights which are more or less perfect images of the light-sources. It is interesting to note the effect of the medium on the expression of sculptured objects. A Venus in white marble of dull sur¬ face is most beautifully expressive of the human body but the same figure in polished bronze is sometimes hideous with grotesque metallic high-lights. These effects are illus¬ trated in Figs. 1 and 2, respectively. On the other hand, a bay horse may be well represented in polished bronze and the appearance of a sculpture of a swarthy-

skinned Indian is quite congruous if done in semi-polished bronze. This does not mean that the artist may not dis¬ play his skill in any medium but it brings forth the fact that the medium influences the final appeal of the sculpture to us through the appearance for which it is partly responsible.

Shadows are of utmost importance from many standpoints. The cast shadow is the shadow of an object upon another surface and the shadow is that on the object itself. Al¬ though these two classes of shadows are sub¬ ject to different minor influences they are in general subject to the same major influences. In this brief discussion they will be considered together. There are three dominant factors which influence the appearance of shadows: (1) The position of the dominant light-source de-

termines their general direction; (2) the solid- angle subtended by the light-source determines the character of the shadow-edges; (3) the amount of light scattered or diffused by the surroundings determine the brightnesses of the shadows. By controlling these three factors the sculptor, the photographer, the lighting specialist, the architect, the museum director and others are able to produce the desired modelling of the subject.

The sculptor does not actually strive to re¬ produce an object in true relative dimensions. He paints in light and shade with his chisel by leading lines and areas of light and shade in order to fix an expression of light. The appearance of a model depends upon the light¬ ing and in a similar manner the final product should receive a proper lighting resulting from thoughtful consideration of these factors. But these factors appear not to be considered in many museums because we often find sculpture displayed collectively in large rooms in which these factors differ widely. A large skylight flattens the objects especially if the surround¬ ing walls and floors are highly reflecting. In general, sculpture should be exhibited amid brighter surroundings than paintings because the shadows should not be too dark. Dark, sharp shadows produce a harshness and severity appropriate to a relatively few subjects but in general the light-source should be extended to a moderate solid-angle and the shadows should receive an appreciable amount of light from the surroundings.

*The effects *are usually more satisfactory if the object is so placed*

with respect to the dominant light-source that the shadows fall aslant. In large rooms sculptured objects are usually displayed to the best advantage when near the walls and properly oriented. Such rooms when illuminated by windows are usu¬ ally less satisfactory owing to the multiple shadows due to two or more light-sources (windows) and to the nearly horizontal direc¬ tion of the dominant light. The effects of the position of a small light-source are shown in the upper four illustrations in Fig. 3. The lower four illustrations show various lighting effects as noted in each case. The head is a plaster cast of the head of Laocoon and it is evident that some of the lights fail to suggest the tragic expression of this wonderfully ex¬ pressive antique sculpture. In the lightings shown in Fig. 3 an attempt has been made to illustrate the influence of the three factors already noted so that they do not represent com¬ plete lightings which would ordinarily be en¬ countered. However in Fig. 4 are shown three lightings which were just as found in practice. The head was placed on the wall at a height of five or six feet in a room having windows on two sides and equipped with direct and in¬ direct lighting fixtures hung from the centre of the ceiling. The harsh effect of the direct light¬ ing is evident. This is due to the small solid- angular extent of the light-source measured at the object and to the relatively less light which falls upon the shadows. The indirect lighting, in which the ceiling is the dominant source of light, produces softer shadows, because their edges are less defined and brighter. The un¬ satisfactory direction df daylight and the effect of multiple shadows from the three windows — two on one side and one von an adjacent .side

— is evident in the third illustration in Fig. 4. The best lighting of this subject as is usually the case is from a source at an angle between the horizontal and the vertical. The ideal method of exhibiting three-dimensional objects is to provide an environment and lighting suit¬ able to the object. This ideal is seldom pos¬ sible of attainment in practice but it may be approached in various ways. Objects may be placed near the walls and properlv oriented if the light-source is a ceiling skylight, an in¬ directly lighted ceiling or a central fixture. They may be placed in alcoves and t-hus obtain an approximation to an individual environment or they may be grouped in small rooms which are properly lighted. If windows are used they should be located high as a general rule. It is interesting in this connection to study various museums for there are many unsatisfactory con¬ ditions to be found and some which indicate distinct steps toward the ideal in respect to lighting and other environments.

Low relief is not so susceptible to careless lighting although highly diffused light or such a condition as approximately equal intensities of light from several directions has a greater tendency to flatten it and it should be lighted in general with more directed light than sculpture of true dimensions. Incidentally it is of inter¬ est in this connection to note that low relief approaches the principles of drawing usually more closely than the principles of sculpture in true dimensions.

The portrait photographer and also the por¬ trait painter deal with the same modelling characteristics of light and shade. Large sky¬ lights, especially on dark days, cannot be sufficiently reduced in area to render satis¬ factory modelling in most cases without re¬ ducing the intensity of illumination to a low value which is often unsatisfactory. Artificial light-sources are much more adaptable to the needs of both the photographer and the portrait painter because they are more readily con¬ trolled as to solid-angular extent, position and general distribution of light. Such units are available and are being adopted for this work. One of the chief principles of obtaining light and shade effects in the studio is shown in Fig. 5. If ab represents a vertical skylight the same

light and shade effects will be obtained at o by a light-source of the size of cd or cf if the other dimension is reduced a corresponding amount in each case. Thus the same effect may he obtained with a smaller source placed closer

to the subject and it is evident that a smaller room may be used.

The architect depends finally upon light, shade and color to realize his desired effect. By means of modelled ornament, pigments, lighting effects and relative brightnesses of the various important areas, the architectural pic¬ ture is completed. Numberless architectural in¬ teriors testify to the lack of a common goal for all those who contribute toward the light and shade effects. The distribution of light and shade largely influences the mood or spirit of the interior and the simple laws which govern light and shade effects should be applied with the final aim definitely in mind. The im¬ portance of lighting in architecture may be seen in any interior and it may be illustrated by photographing an interior under different lightings or by means of a detail. In Fig. 6

Fig. 6.— Different lightings of the same moulding.

are shown the various expressions of the same molding under five different lightings. Lighting is often responsible for certain illu¬ sions as well as for the expression or mood of the interior as a whole. For example, if a row of columns or pilasters be of high brightness as contrasted with a dark background they will appear more massive than when they are in deep shadow against a bright background. Innumerable effects of light and shade are

visible on every hand. Notwithstanding this fact the author is perhaps the first to attempt to formulate the science of light and shade and to relate it to the art.

The decorator arranges his values in an in¬ terior just as a painter would in a landscape or other scene, but these values do not depend alone upon his pigments for they must borrow light and reflect it in order to be effective. Therefore the relative values of the different areas in an interior depend also upon the inten¬ sities of illumination. But usually the decorator and the lighting specialist work independently and the final effect is not that which either had contemplated. It is a compromise depend¬ ing upon the relative effectiveness of the illumi¬ nation intensities and of the pigments. The decorator usually decides upon his values in the daytime and the distribution of light is playing a part in the values which he chooses for the various areas. The lighting specialist who installs the artificial lighting provides a radically different distribution of light with the result that it is not always harmonious.

The stage presents a picture in light, shade and color. Here more than in any other activity is lighting used for its expressive value. But bound by tradition and prejudice and handi¬ capped by lack of familiarity with the simple laws of light and shade, the stage picture is full of incongruities and even grotesque effects. The footlights, common to the theatre, produce unnatural expressions of the human face as well as of the entire scenes. Throughout the ages during which the prejudices and artistic tastes of mankind have been formulated, dominant light from below the horizontal has never been a factor. The effects which it produces are un¬ natural and have no logical place in the stage picture excepting for unusual purposes. The footlights are of value in contributing, along with the borders and sidelights, a dim ˆfog® of light for illuminating the shadows but there is an opportunity for someone to come forth with a combination of architecture and lighting in the theatre which will produce artistic light and shade effects. The possiblities in such ef¬ fects range from a

concentration of light to a flood of it and from a picture in silhouette against a bright background to the reversed ef¬ fect of a bright picture against a dark back¬ ground. The modernists in the theatre are striving to eliminate such incongruities as the grotesque effect of footlights, the conflict of painted and real shadows and persnective. Not long ago a stage-setting often consisted of mea¬ gre furnishings and all kinds of objects and shadows were painted upon the enclosing scenery. The painted shadows were usually in¬ congruous with the real shadows and the perspective could not be correct from all view¬ points. Later some producers introduced fur¬ nishings in great detail which have the advan¬ tage of real shadows but may be criticized from many viewpoints, the chief one perhaps being the "distraction from the drama itself. In the modern theatre the aim is to produce harmony of action, lighting and setting with the drama and this appears best brought about by sim¬ plicity in lighting and in setting. This is accomplished by proper light and shade (also color) effects and by real. shadows ; in fact by utilizing the language of light, shade and color.

LIGHT AND SHADE

The skeleton of any picture is its values or distribution of light and shade. Painting is an imitative art which depends upon pigments but the limitations of these are a great handicap to the artist. The greatest range of contrast on an artist's palette is represented by white and ˆblack® but the latter is never a total absorber of light, and white is merely a relative term. The amount of light reflected by the best white pigment is about 90 per cent and the purest black pigment ordinarily found among commer¬ cial pigments reflects several per cent of the incident light. Therefore the ordinary range of contrast in brightness which the artist is able to command is about 30 to 1 ; that is, his white is only 30 times brighter than his black under equal intensities of illumination. With these he must represent the extreme range of values in a landscape in which the sky is com¬ monly hundreds and even thousands of times brighter than the deepest shadow. This is one of the reasons why the artist must resort to illusions in imitating nature. In photography the same difficulties are met and when the sci¬ entific facts are realized it is quite wonderful that the painter and photographer are able to satisfy us with their products. This approaches the psychological aspect of light and shade and we must conclude that the imagination of the observer supplies much that is missing in the painting or in the photograph. In fact it is perhaps true that nearly all that we experience in viewing

such a work of art we must supply. The work of art is merely an object which taps the imagination of the observer and by associa¬ tions, memories and imagination he is capable of putting into the picture that which he de¬ sires. Of course this does not apply to the aesthetic value of the picture which arises from its own harmony of parts, its rhythm and its grace of line. A simple example of interest from the psychological aspect is the appearance of a white hemispherical cup lighted by a source of fairly large solid angle. If the sur¬ roundings are such that no inkling of the posi¬ tion of the light-source is possible, this object will invariably be taken for a hemispherical solid lighted from a source exactly opposite to the actual position of the source. It is called a hemispherical solid or even a sphere because the light and shade distribution is similar but reversed and because these objects are more commonly encountered than the hemispherical cup.

Inasmuch as values are such an important factor in painting, photography, architecture, sculpture and in everything which appeals to the human organism through the doorway of vision, it is of interest to have a standardized value-scale. Textbooks on art usually include a scale of shades from white to black but such a scale should be standardized in order to have a definite meaning. From an acquaintance with pigments and with the practical requirements of a value-scale the author has proposed the fol¬ lowing standardization which is applied to the rune values commonly used by the artist.

Value

Black .

Low dark. .

Dark .

High dark. Medium . . .

Reflection factor (per cent)

0 to 10 10 to 20 20 to 30 30 to 40 40 to 50

Value

Low light . .

Light .

High light. White .

Reflection factor (per cent)

50 to 60 60 to 70 70 to 80 80 to 90

The whitest pigment reflects about 90 per cent of the total incident light and, although white is a relative term, those pigments which reflect 80 per cent or more of the incident light are commonly considered white. The ordi¬ nary black pigments often reflect as much as 10 per cent of the incident light but usually less. These facts have formed the basis of this standardization and a value-scale can be di¬ vided in this manner and subjected to measure¬ ment. If the scale be printed upon the best grade of white paper the highest value will be about 80 per cent or slightly above and the lowest value will be somewhat under 10 per cent because the best black ink, under the conditions of printing, reflects an appreciable amount of the incident light. Such a stand¬ ardization at least eliminates the ordinary cru¬ dity of visual estimates and should have a place in the scientific aspects of light and shade.

It is an obvious conclusion from the fore¬ going that the distribution of light and shade is not fixed by pigments but depends upon the relative illumination intensities as well. For example, a black pigment which reflects 10 per cent of the incident light will appear as bright under nine units of illumination as a white pig¬ ment which reflects 90 per cent of the incident light will appear under one unit of illumination. If both pigments are perfectly neutral (without hue) they will appear identical under these conditions of illumination. This is often a startling revelation to those who use pigments and it emphasizes the fact that black and white are merely relative terms. This indicates that uneven distribution of light on large flat areas and on paintings may be very effective in en¬ hancing contrasts. Experiment shows this to be true and that along this line there are possi¬ bilities in lighting.

In practice, color is seldom separated from values or distribution of light and shade and it has its influence upon values. For example, let us take two pigments, red and blue of a given tint or shade. They possess certain val¬ ues or relative brightnesses under a given il¬ lumination. Let us assume that their values are the same under daylight illumination, then under the illumination from a tungsten lamp the red will appear considerably brighter,, not uncommonly twice as bright. On the value- scale this change under the latter illuminant would often amount to enough to raise the value of the

red to the next higher value. There are many interesting influences of color on light and shade as will be apparent from ob¬ servation and from a study of the science of color. All of these have their place in the art of light, shade and color but unfortunately rela¬ tively few artists are familiar with the under¬ lying scientific principles. It is a noteworthy fact that masterful artists are commonly fa¬ miliar with the sciences underlying their art and this is to be expected because there is noth¬ ing mysterious about art. Mysteries are merely facts which are not understood and to the sci¬ entist in light, shade and color there are fewer mysteries in art than to the artist himself. It is true that the aesthetics of light, shade and color have less scientific foundation than the physics and physiology of the subject but aesthetics is a science which is not yet com¬ pletely explored or unraveled.

LIGHT AND SHADE

Above

Below

Side

Side

Point source on left Point source on left Diffused light

Diffused light on right Diffused light on right

Fig. 3 Different lightings of the head of the Laocobn

Four point sources

; "lit : ‘ j St*

- *Jm-mM*

Direct lighting Indirect lighting Natural lighting from windows

Fig. 4 The Laocoon head in the s'.ms positnn in a room lighted by three ordinary lighting systems

LIGHT AND SHADE

By courtesy of Metropolitan Museum of Art

1 Clytie, by W. H. Rouchart in marble

2 Venus, by C. G. Allegrain in polished bronze

Having had a glimpse into various aspects of light and shade it should be of interest to note a few facts pertaining to nature. We go to nature for many lessons, for here we find a picture gallery containing an infinite variety of canvasses. Any individual scene is continu¬ ally changing, so nature provides unlimited op¬ portunities for studying light and shade as well as color. Some idea of the variety in nature's lighting is obtained when it is noted that on a cloudless day the direction of light from the sun varies throughout the day from horizontal to vertical and again to horizontal at sunset. Most of this time the sky is contributing from 10 to 30 per cent of the total light. Here we have a combination of a powerful directed light with a weaker light from the hemisphere of sky. Add to this variety that from an infinite number of different combinations of light from clouds, sky and sun, and end the brief review with the perfectly overcast sky, and it must be concluded that the light and shade effects in nature are numberless.

It is an interesting fact that on a perfectly overcast day no object on the earth's surface can be brighter than the sky unless it be self-luminous. On cloudless days a white object may be as much as 10 times brighter than the sky although usually it is about six times brighter. Incidentally the clear noon sun is many million times brighter than the shadows in a landscape.

It is difficult to discuss the artistic aspect of light and shade in nature because this involves taste which, in general, is more or less inde¬ terminate. However a few points will be brought forth because they appear so definitely established after years of observation. Variety is perhaps the keynote of nature's beauty. Take a scene which may appear commonplace at mid¬ day on a clear day and it is not uncommon for it to be enchanting in the early morning or late afternoon. A study of this scene ap¬ pears to indicate definitely that the beauty near the ends of the day is due to the long shadows and hence a greater variety in light and shade. A clear sky may be pleasing in its tranquillity, but to be beautiful or powerfully effective variety is necessary and this is obtained by cloud effects. Great areas of uniform bright¬ ness such as an overcast sky conspire with the absence of defined shadows to produce an effect toward which we are indifferent and often dis¬ pleased.

It is interesting to note that the sharply defined shadows outdoors on a clear day are not annoying and are even very pleasing yet shadows of a similar sharp contour are usually displeasing indoors under artificial lighting. The difference may be accounted for by the much greater luminosity of the shadows out¬ doors and the adaptation of the eye to a much higher level of illumination intensity so that the contrasts are less violent. These points might well be borne in mind in the practice of artificial lighting. A symmetrical distribution of light in interiors produces effects which ap¬ proach the light and shade of nature and the finer sensibilities recognize that there is much to be gained in departing from the common symmetrical distribution of light in artificial lighting systems.

It is seen that light and shade is of great importance in many activities, both from the

scientific and artistic viewpoints. It is the most important factor in vision because every¬ one is more conscious of form than of color; however color plays a part in vision even though unconsciously. For example, in provid¬ ing an illumination for a certain activity it is well to study how the perception of .the ob¬ jects is best accomplished. It may be that cer¬ tain small objects may be best seen outlined in shadow against a bright background or vice versa. If they have polished surfaces, the regularly reflected high-lights may be of the greatest importance. Thus it is seen that the background is a large factor in the discrimina¬ tion of objects.

The shadow is an important factor in model¬ ling an object and the cast shadow likewise lends its aid. Under the illumination of an overcast sky or an indirect lighting system, ob¬ jects are less distinctly visible because in these cases only the profile or silhouette is the dominant factor. Under such conditions of illumination much of the advantage of the modulation from light to shadow, and of the form of the cast shadow is absent. Although somewhat disadvantageous in the perception and recognition of fine detail, such types of light-distribution are exceedingly applicable to some classes of problems. Perhaps no system of lighting has been as successful as the so- called indirect lighting in producing light and shade effects befitting the spirit or mood of an interior. An excellent field for such observa¬ tions is in churches because so many types of architecture are available and the different creeds call for different expressions of the interior. This is not commonly recognized but it is nevertheless true and the possibilities of lighting in this respect have been recognized to some extent even though subconsciously.

Without taking the space to summarize this article, which in itself is a brief summary of an extensive subject, it may be repeated that light and shade must be ranked as one of the most important factors in human existence because it is the most essential factor in vision. It is a many-sided subject, embodying the scientific aspect of the appearance and hence of the discrimination of objects, the aesthetic aspect of many scenes, the psychology of light, the aims and limitations of the imitative arts and many other aspects. See Art Drawing.

M. Luckiesh,

Nela Research Laboratory, National Lamp W orks, General Electric Company.

LIGHT THAT FAILED, The, by Rud- yard Kipling, a novel first published in 1891, tells of Dick Heldar, a young artist, who after vivid experiences of war in Egypt scores a decided success in London. There he again meets his boyhood sweetheart, Maisie, striving for fame as a painter. He loves her but she is wholly bound up in her ambitions. Dick sud¬ denly goes blind. He finds that Maisie is incap¬ able of making a sacrifice for his sake and goes back to Egypt to be killed in a skirmish. Opin¬ ions in regard to this book are widely divergent, many critics finding fault especially with Maisie, whom the Edinburgh Reznezv found to be ((utterly uninteresting, which is the one thing that a heroine may not be." On the other hand there is undoubted power and interest in the portrayal of the hero, his adventures, his friends and acquaintances. Furthermore, Rich-

ard Le Gallienne, by no means an unqualified admirer of Kipling, said, <(Nowhere else that I know of has the hopelessness of blindness been so brought home to us. . . . (The Light that Failed) is perhaps the story of all Mr. Kip¬ ling's stories that strikes the most universal note of human pathos. The story, before its issu¬ ance in book form, appeared in Lippincotf s Magazine with a conventional ((happy ending.ˆ This version, though rejected by the author as not his original conception, has been used in the successful drcfmatization of the novel.

Arthur Guiterman.

LIGHTER, a flat boat or barge for trans¬ porting merchandise on

rivers and canals, and to and from vessels .moored in a stream, or where they cartnot be laden from or discharged on to a wharf or pier alongside.

LIGHTHOUSE, a structure on some con¬ spicuous point of seashore, island or rock, or on the bank of rivers and lakes, from which a light is exhibited at night as a guide to mariners. Lighthouses are generally placed on salient points, each requiring structures specially designed to meet the exigencies of varied sites. When placed on headlands or large islands lighthouses are very much alike in general features, the differences being mainly in the height of the towers, depending on the dis¬ tance at which the light requires to be seen, and the lighting apparatus. Towers erected on isolated, wave-swept rocks in the open sea, such as the MincJt's Ledge and Spectacle Reef in the United States, the Eddystone, the Bell Rock, Skerryvore and Chickens Rock light¬ houses in Great Britain, and that of Brehat in France, are triumphs of engineering.

History. — The history of lighthouse build¬ ing and illumination may be said to extend over a period of more than 2,000 years; but the regularly organized life-preserving system of modern lighthouse engineering goes back very little further than the beginning of the 19th century. None of the early lighthouse buildings now exist. The Pharos of Alexan¬ dria (331 b.c.) gave its name to its successors. The Romans built lighthouses at Ostia, Ra¬ venna, Puteoli and other ports. The Phoenician Pharos at Coruna, repaired during the reign of the Roman Emperor Trajan, was re-established as a lighthouse about 1634, and in 1847 had a dioptric apparatus placed in it. On the cliff at Boulogne there are the remains of a lighthouse ascribed to Caligula (40 a.d.), and at Dover there are remains of another Roman Pharos. Until the end of the 18th century the light¬ houses of the United States and of Great Britain were few in number, and of an inferior description in the great essential of a lighthouse, namely, sending the greatest number of rays of light toward the horizon. In the United States of America the first aot of Congress relating to lighthouses was passed in 1789. Many of the public lights in England were private property, as was also the case with the Isle of May in Scotland, the patent for which was ratified in 1641. There were only 25 lighthouse stations and six floating lights in England at the beginning of the 19th cen¬ tury. The coast and harbor lights in Great Britain and Ireland are now upward of 1,000 in number.

The early lighthouse towers had on their

summits grates or chauffers, in which billets of wood or coal were

burned, but though ex¬ pensive to maintain — some of them using 400 tons of coal yearly — were uncertain in their appearance, varying with the ever-changing character of the atmosphere. Such coal-lights survived in Scotland till 1816, in England till 1822 and on the Baltic till 1846.

Construction. — The difficulties of building are very great, the greatest usually being to effect a landing of men and material. At Minot's Ledge, off the Massachusetts coast, General Alexander got only 30 hours of work in the first year, and 157 in the second, and the earlier histories of the Bell Rock, Skerry¬ vore, Dhuheartach, Chickens, Eddystone in Great Britain and others tell the same tale. The cost of lighthouses may vary much; for in¬ stance, Spectacle Reef, on Lake Huron, cost $300,000; an ordinary land station, fully equipped, will cost much less — as a matter of fact, about $25,000 to $50,000. Light-vessels cost about $45,000.

These towers are constructed of steel, or hard stone, such as granite, or cement-concrete faced with hard stone, and of such a mass and strength as to prevent their being overturned or destroyed by the waves. A typical stone lighthouse is built of granite, say 140 feet in height, with a diameter at the base of 42 feet and at the top of 16 feet, and contains 58,580 cubic feet, or about 4,308 tons of masonry. A staff of four light-keepers is attached to such rock lighthouses, three residing in the light¬ house and one on shore, the reliefs being fort¬ nightly, so that each man has six weeks on the rock and two weeks ashore. At land light¬ house-stations, where women and children can be stationed, the keepers' families reside with them, and the staff consists of three men when there is a fog-signal, and two men when there is only the light to attend to. It is considered essential that a constant watch be kept in the light-room during darkness to ensure the proper exhibition of light.

Optical Apparatus — The object of using optical apparatus in a lighthouse is to direct, as far as possible, all the rays of light that proceed from the radiant , or source of light, so as to be visible only on the sea between the near sea and the sea horizon. In the Eddy¬ stone lighthouse, up to the commencement of the 19th century, the lighting apparatus con¬ sisted of a chandelier of tallow candles, though parabolic reflectors made of facets of silvered glass mirror, set in a mold of plaster of Paris, were introduced in 1768 and used in several lighthouses, the effect of these reflectors being to concentrate and throw seaward the rays of light from a flat-wick lamp placed in the focus. At a later date reflectors composed of sheet copper, plated with silver and formed into a parabolic curve, were

largely introduced and are still in use. These reflectors, where a fixed light was desired, were arranged in two tiers on a frame, as many as 26 being necessary to show a light of equal power all around the horizon, and in the case of flashing lights seven were grouped on each of four faces of a frame that was rotated by clockwork. This mode of lighting is termed catoptric, or reflect¬ ing system. The method of building lenses of separate rings or prisms of glass, so as to form a larger lens than could be obtained from

LIGHTHOUSE

5

1 New Revolving Light, Barnegat, N. J.

2 Holophotal Univalve Apparatus with Dioptric Mirror

3 Sectional Plan of Bell Rock Tower

4 Fixed Dioptric Light

5-7 Parabolic Reflector with Oil-fountain Lamp 6 Elevation of Triple-flashing Apparatus

a mere bull's eye formed of one piece of glass, was first adopted for lighthouses in 1822. For a fixed light the built-up lens was so arranged as to form a polygon with one burner in the focus, and for a flashing light annular lens panels were grouped round the one central burner and revolved by clockwork. In 1892 Charles A. Stevenson made the lenses spherical in form in the vertical plane, and in 1895, with great advantage of the power of the light, abol¬ ished the old section of the elements and gave them an equiangular section. This equiangular profile also permits of the refracting elements being extended to 80 degrees of focal open¬ ing, and indeed farther, without loss of effi¬ ciency. The setting of lenses eccentrically has rendered possible a diminution in the diameter and consequent saving in cost of lantern and •tower. Besides the fixed-light apparatus and the lens panels many other forms of prisms for various purposes have been introduced. Thomas Stevenson's catadioptric mirror, formed of totally-reflecting prisms, and - subsequently improved by James I. Chance, is largely used; and vertical straight prisms, placed in front of either fixed light or holophotal panels, are .used to deviate the light azimuthally over par¬ ticular arcs where the light is required. The desire to increase the power of the lights in¬ duced some lighthouse authorities to advocate the use of larger burners without increasing the focal distance of the apparatus, with the result that little advantage was gained, as most of the light was ex-focal. It was not, however, till 1885 that the first hyper-radiant lens was constructed, with the result that when tested it was found to produce a beam twice as intense as that from the previous lenses with the same large burners in the foci. This hyper¬ radiant lens is now largely used where great power is desired. See Plate.

Radiants. — The radiants used in the focus of the apparatus in foreign lighthouses are generally 1-, 2-, 3-, 4-, 5-, 6-, or even 10-wick cylindrical paraffin burners, though gas burners, incandescent burners and the electric light, both arc and incandescent, are also in use. The use of paraffin resulted in a large saving. The elec¬ tric light is now generally used in the United States. The popular idea that the electric light is not so good in fog as oil or gas lights was confuted in 1885, when it was found that oil and gas were usually affected by atmospheric variations, that the electric arc light is absorbed more largely proportionately to its initial power by haze or fog than oil or gas lights, but that in all weathers and at all distances its pene¬ trative power was found superior to the gas and oil lights, and that all three are nearly equally affected by rain. These results are confirmed by practical experience in our lighthouses.

Characteristics. — To enable the sailor to distinguish one lighthouse from another, lights in proximity to one another are arranged to exhibit different characters. The characters in common use are : fixed light ; flashing light, showing one flash at regular intervals of a Jew seconds; group flashing lights, showing two or more flashes in quick succession, followed by a longer period of darkness than that which separates the flashes; occulting lights, which show a fixed light and are eclipsed for a few seconds at regular intervals. Colored lights, red and green, are also used with any of the

foregoing characters to produce further dis¬ tinctions, but in general only to mark danger arcs, or in conjunction with a white flash, as the tinted-glass shades interposed to produce the desired color seriously cut down the power of the light, and are not, unless of a very dark shade, easily distinguishable in foggy weath r from a white light.

Machines. — To produce these various char¬ acters the lenses are placed on a carriage which revolves on conical rollers, or is floated in a mercury trough, and is driven round by clock¬ work actuated by a falling weight. The tend¬ ency has been in recent years to drive the apparatus faster, so as to make the period phase of the light as short as possible. While this is a desirable object it involves at the same time shortening the duration of the flash on the eye of the sailor, to which there is ob¬ viously a limit, if distinct vision is to be ob¬ tained under practical conditions. A flash of about half a second in length is regarded as what should be aimed at. The light on the Navesink Highlands above Sandy Hook, N. J., is one of the largest of modern flash¬ lights.

Lanterns. — The apparatus is placed in a glazed lantern erected on the top of the light¬ house tower. With the view oi intercepting as little light as possible, the framing or sashes are made of as small sectional dimensions as is con¬ sistent with strength, and are made either diagonal, with diamond-shaped flat panes, or helical with curved panes. The upper part of the lantern is made dome-shaped with a ven¬ tilator to carry off the fumes from the lamp. The size of the lantern varies with that of the apparatus, the usual size for a first-class light being 12 feet in diameter and 10 feet height of glazing.

Lightships. — In certain situations, such as on rocks where there is not sufficient room to get a large enough base for a tower, or on sandbanks where the sand is liable to shift, it is impossible, except at a prohibitive cost, to erect towers to carry the light. In such situa¬

tions recourse is had to mooring in the vicinity a vessel which carries the light on a mast. The light is generally shown from a lantern formed round the mast, and the apparatus consists of parabolic reflectors or small dioptric apparatus. These light-vessels have a crew consisting of a master, mate and nine men.

Beacons and Buoys are used in situations where powerful lights, such as can be shown from lighthouses and lightships, are not neces¬ sary, and where the extinction of the light would cause inconvenience and not disaster, but where some guidance is desirable, as, for ex¬ ample, in narrow sounds, rivers and estuaries. Beacons are now frequently lighted with small dioptric apparatus, the illuminant being either compressed oil-gas stored in a receiver, in which case they need no attention for several weeks, or with oil-burners, in which case they must be trimmed every three days. Buoys are made of various shapes to denote on which side of them the safe channel lies. Thus, can¬ shaped buoys, those with a flat top, are to be passed on the port hand, and conical-shaped buoys on the starboard hand when the ship is going up an estuary or with the flood-tide, and vice versa. Spherical buoys denote a mid¬ dle danger which mav be passed on either hand.

Buoys for particular places are further differ¬ entiated by color and 'top marks. See Buoy.

Fog-signals. — During the prevalence of fog and snowstorms the most powerful lights are obscured, and it becomes necessary to guide the mariner by sound signals. Hence a fog-signal has become a necessary adjunct of a fully- equipped lighthouse station. Various instru¬ ments, such as bells, gongs, guns, steam- whistles, explosive charges of tonite, reed trumpets and sirens sounded by steam, elec¬ tricity or compressed air, are used. The most efficient and powerful fog-signal is the siren sounded by compressed air. In spite of the recent improvements in fog-signals they are undoubtedly the weak point in coast protec¬ tion, as the exact direction from which a sound is coming is not easy to locate, and owing to the capricious and uncertain range at which sound can be heard. Submarine signals have been developed in recent years and have a more effective and constant range than signals sounded in the air. The usual type consists of a bell of special design, submerged to a distance free from wave disturbance and with a striking mechanism attached. At light

sta¬ tions the bell is often supported on a tripod on the sea bottom and the striking mechanism is operated electrically by means of a cable ; a characteristic number of blows at intervals may be given in this manner to identify 'the station. To obtain the best results with submarine sig¬ nals, a receiving apparatus is attached to ships ; it is similar to a telephone and by it the bear¬ ing of the signal can be determined approxi¬ mately. The sound is heard on ships without the apparatus when the observer is below the water line, and particularly in iron or steel ships, but in this case the bearing of the signal is not easily determined.

Administration. — The United States Light¬ house Board was formed in 1789, and recon¬ structed in 1852 ; a reorganization of the Light¬ house Service under Act of Congress took effect 1 July 1910. In Great Britain, the Trin¬ ity House of London, the Irish Lighthouse Board and the Northern Lighthouse Board are the lighthouse authorities. The two last named were not constituted till 1786, but the Trinity House may be said to have originated in 1514. The French Commission des Phares was con¬ stituted in 1792 and remodeled in 1811. In Sweden, Norway, Holland, Denmark, Russia and Austria the lighthouse administration is under the Admiralty or Minister of Marine. In Spain, the system of administration is similar to that of France. For American administra¬ tion see the article Lighthouse Service of the United States.

Progress in America. — From one of the poorest-lighted coasts, the American Atlantic seaboard, within a quarter of a century, be¬ came one of the best in the world, with a new system of lighthouses and signal lights far more comprehensive than anything hereto¬ fore attempted. The Cape Hatteras region, and the scarcely less important Cape Cod district, early received special attention. Both of these capes were in the direct route of commerce, and the storms and shoals that made them dangerous, to navigators had to be offset by adequate lights which would warn mariners of their proximity. The first attempts at light¬ house construction were consequently made at

a few such danger points along the coast, and from these in either direction new lights were gradually erected. They formed the begin¬ ning of the new system which sought to make all of our coast so well protected that navi¬ gators need have little apprehension in ap¬ proaching the land from any direction at any point.

The full extent of the lighthouse service can best be appreciated by simply stating that there are some 14,550 warning lights and signals

stretched along the American coast, forming a perfect link so that the navigator need never be beyond the sight of one of the beacons. The "aids,® so-called, include a great variety of modern inventions, from the tall flashlight lighthouse, with its base of steel and stone, and costly lamp operated by electric power, to the modern gas and electric-lighted •'buoys, bea¬ cons and lightships. .The advances made in lighthouse and buoy construction represent some of the marvels of modern engineering science.

The most important light in the United States, the great tower at Barnegat, N. J., was completed in 1903, with a light equipment equal to 30,000,000 candle-power. Steam and power are generated for local use, for the hear.t of the light is a 6,000 candle-power arc light. This .is intensified by a great lens built up of rims of prismatic glass, with a bull's eye in the centre 18 inches in diameter. This monster light can be seen from the lookout at a dis¬ tance of 100 miles ; but, taking the world's curvature into consideration, from the deck it is seen while still over 20 miles away. The Barnegat station is a most important one, be¬ ing located on the most easterly point of the dangerous, low-lying Jersey coast. See Plate.

More than 40 lightships are stationed at points along our coast where beacons are neces¬ sary, but where the building of lighthouses is impracticable. The Diamond Shoal lightship warns the navigator of his approach to dreaded Cape Hatteras. For years the Lighthouse Board tried to build a lighthouse on Diamond shoal, but at last, after more than $250,000 had been spent and several lives lost, the attempt was given up.

The Fire Island lightship is one of the line of ocean lampposts which mark the entrance to New York Harbor. It is equipped with a steam engine, electric lights, a steam whistle and many other improvements. The new South Shoal lightship, which is anchored 26 miles off Nantucket, is farther from shore than any other lightship in the world. It is the first American outpost and guards a shoal which in times past was a veritable graveyard for ships.

Steel Tubular Structures. — One of the

most noted advances in modern times has been the abandonment of the old towers of stone or brick and the adoption of the steel tubular structures in their places. The latter are built more easily on a solid, rocky foundation than the old huge piles of masonry. The steel skele¬ ton is bolted into the solid rock or anchored there by means of long spindle-like legs, which sink many feet down into the firm*

foundation. These huge cylindrical towers of steel withstand the pressure of wind far better than the stone and brick structures, and their strength is so great that there is practically no danger of their ever being seriously injured by the elements.

lighthouses

1 Rock Island Lighthouse, Japan

Courtesy of William Elliot Gritiis, Ithaca, Y

2 Lighthouse at Satonomisaki, at the extreme tip of South Japan

.

LIGHTHOUSE SERVICE OF THE UNITED STATES

431

Even where the lighthouses are built in the water to mark shoals or dangerous reefs, the steel tubular style of structure is adopted. The foundation work of the structure is built up above the water with stone or concrete, and to this the steel tower is bolted. The latter looks more like a giant smokestack than any¬ thing else, and it stands as a permanent bea¬ con of the sea to warn mariners of their danger. Not only is additional strength and security obtained through the adoption of the steel tubular lighthouses, but the cost of con¬ struction is greatly reduced. Modern light¬ houses cost far more than they did in former days, but that is due to the fact that they are built on a larger and more enduring scale, and the lights are of far greater power and inten¬ sity. A modern American lighthouse frequently costs $125,000, and often one-third of this is spent in the electric light and apparatus alone. In the old system the lights represented a com¬ paratively small proportion of the expense.

Bibliography. — Adams, W. H. D., light¬ houses and Lightships (London 1870) ; Barn¬ ard, J. G., (Lighthouse Engineering* (New York 1879) ; Heap, D. P., (Ancient and Modern Lighthouses) (Boston 1889) ; Jenkins, H. D., (The Lights, and Tides and Fog-signals of the World* (London 1900) ; Smiles, S., (Harbors, Lighthouses, Bridges) (London 1874) ; Steven¬ son, D., (Lighthouses* (London 1865) ; Steven¬ son, T., (Lighthouse Construction and Illumi¬ nation (London 1881) ; (List of the Lights of the World) ; Wryde, J. L., (British Light¬ houses : Their History and Romance.**

LIGHTHOUSE SERVICE OF THE UNITED STATES. Under the act of 17 June 1910 the present general organization of the service is as follows : The commissioner of lighthouses and the deputy commissioner pre¬ side over an office in Washington, D. C., which is the executive centre of the service. In this office are an engineering construction division, under the chief constructing engineer; a naval construction division, under the superintendent of naval construction ; a hydrographic division, under an assistant engineer, and the general office force, under the chief clerk. Outside of Washington the service is divided into 19 light¬ house districts, each under the charge of a lighthouse inspector. In each district there is a central office and one or more lighthouse depots. Each district is provided with light¬ house tenders for distributing supplies to the various stations and light vessels for transpor¬ tation 'of materials for construction or repair and for care of buoys. On Staten Island, New York Harbor, there is also a general lighthouse depot where supplies are purchased in quanti¬ ties, special apparatus is manufactured or re¬ paired and various experimental work is con¬ ducted.

The total number of aids to navigation on 30 June 1915 was 14,544 as compared with 11,713 on 30 June 1910, representing a total net in¬ crease during the five years of 2,831, or 24 per cent, an average of 566 per year. For the pre¬ ceding five years from 30 June 1905 to 30 June 1910 the total increase was 1,793, or an average of 359 per year.

Careful consideration was. given, in the in¬ terests of economy and efficiency, to the dis¬ continuance of lights and other aids no longer

required by navigation, so that the above figures represent a net increase, after allowing for 2,850 aids to navigation which were discon¬ tinued during the five years.

Careful attention was also given to the im¬ provement of apparatus and equipment, in ac¬ cordance with the best modern practice of coast lighting. Gas buoys, which are more appreci¬ ated by mariners than any other recent addition to coast lighting, were increased from 225 in 1910 to 479 in 1915, a total increase of 254, or 113 per cent.

The use of oil-vapor lamps increases the illuminating power from a given quantity of kerosene oil by about eight times, and these lights have been greatly appreciated, because of their superior brilliancy. The number of oil- vapor installations at light stations were in¬ creased from 80 in 1910 to 286 in 1915, a total increase of 206

stations, or 257 per cent. Most of the primary coast lights are now provided with oil-vapor lamps. On the Atlantic coast, of the 70 primary lights 16 used oil-vapor in 1910 and 64 in 1915; on the Pacific coast 2 used oil- vapor in 1910 and 32 out of the 34 primary lights used oil-vapor in 1915.

Many of the older lights were fixed and did not have a characteristic which would distin¬ guish them from other lights. Steady progress was made in changing such lights, where doubt might occur, to flashing or occulting, and 169 lights were so improved in the five-year period mentioned. Especially marked progress in this respect was made on the Pacific coast, where of the primary lights in 1910, 11 were fixed lights, whereas in 1915 only 2 out of 34 are fixed lights; of the total primary lights on the Atlan¬ tic and Pacific coasts in 1910, 65 were flashing or occulting and 37 fixed, and in 1915, 80 were flashing or occulting and 24 fixed.

There was a strong demand for improved lighting of Alaskan waters, and the number of lights on the coast of Alaska were increased from 37 in 1910 to 112 in 1915, an increase of 75, or 203 per cent.

Tfie total number of fog signals, including sounding buoys, increased from 844 in 1910 to 1,044 in 1915, an increase of 200, or 24 per cent. Classified as to types, the increases were : Fog signals on shore, 498 to 527 ; whistling buoys, 104 to 149; bell buoys, 200 to 318; suffi marine bells, 42 to 50.

Although the number of aids to navigation steadily increased, as shown in the preceding paragraphs, involving an increase in all the operations of the service, it was possible to maintain this increased number of aids with a less number of lighthouse tenders, owing to the simplification of work and concentration of authority under the reorganization. Thus in 1910 there were 51 lighthouse tenders, in 1913 44 tenders and in 1915 47 tenders. With the considerable increase of 24 per cent which was made in the total number of aids to navigation, a gradual increase in tenders became necessary. Both for this reason and because of the neces¬ sity of replacing tenders as they are worn out in service, three tenders were being constructed and estimates accepted for others.

The number of light vessels and light-vessel stations diminished by a slight amount, two vessels and stations during the five years' period, the increase which might normally have been expected having been offset by the large in-

crease in gas buoys, many of them equipped with whistles, bells and submarine bells, thus supplying important aids to a much larger num¬ ber of localities and at much less expense than would have been possible with light vessels. There was, however, a steady construction of new light vessels to replace those worn out in service.

Typical of the more important aids which were established or materially improved dur¬ ing a recent year are: New light vessels with flashing lights and compressed air fog signals at Poe Reef, Straits of Mackenac, Lake Huron, Mich., and Buffalo Entrance, Lake Erie, N. Y. Both of these were former light-vessel stations which had been temporarily discontinued, one having been discontinued during 1915. New light and fog signal stations .were constructed at Brandywine Shoal, Del., and Thimble Shoal, Va., in place of former structures. A complete new system of lighted aids was established at the approaches to the Cape Cod Canal, Mass. ; important coast lights were changed from fixed to flashing or occulting in Alaska, Washington, Hawaii and Florida, whil.e fog signals, electric bells, electric and automatic sirens, submarine bells, important gas buoys, flashing acetylene gas lights and systems of minor aids and buoy¬ age were established, extensively rearranged or improved in important localities, all over the States and dependencies. The systematic in¬ spection and relief of all buoys at least once a year is carried out throughout the service with a greater degree of completeness than in prior years, particularly in those districts where diffi¬ culties had been previously experienced on ac¬ count of the large number of inaccessible buoys.

A systematic plan was developed of keeping records of extinguishments of various types of automatic gas lights, both on fixed and floating aids, with arrangements for reporting the per¬ centage of nights extinguished as compared to the entire period under observation. This is be¬ lieved to be useful in compiling information as to the comparative efficiency of various types in service and the degree of reliance which, may be placed on such lights. Further improve¬ ments in publishing notices to mariners were undertaken during the year, by adopting a more concise form, giving only such facts as are of principal interest to the mariner. The light lists for the Atlantic, Lake and Pacific coasts were each issued in octavo form, which, it was believed, would increase their usefulness to mariners. Special effort was made to publish the seacoast light lists as soon

after the first of the calendar year as possible, and the Lake list was issued immediately prior to the open¬ ing of the season of navigation.

During the five years from 1910 the organi¬ zation and business methods of the lighthouse service were thoroughly examined and revised wherever it appeared advantageous to do so; 19 persons were appointed as civilian lighthouse inspectors, all selected solely on their technical qualifications; 15 of these were promoted in the Lighthouse Service, where each had served from 5 to 40 years, and the other four had had experience of from 8 to 13 years each on other government vessels engaged in related technical work. The two offices in each district were combined into one, and the office force and the use of the lighthouse tenders rearranged on a business basis. A general inspector and an ex¬

aminer were appointed, who make periodic in¬ spections of the technical and business methods in each district. A cost-keeping system for the whole service was inaugurated. The regulations and instructions were thoroughly revised. An¬ nual conferences of lighthouse inspectors, are held, and a monthly lighthouse bulletin is issued to the service. Aids and cadets have been ap¬ pointed for training in lighthouse engineering and nautical work. The lighthouse publications have been simplified and systematized. Import¬ ant economies and improvements have been in¬ troduced in the use and handling of supplies and accounting for property. The form of ap¬ propriations has been simplified. Full co-opera¬ tion has been arranged between the Lighthouse Service and other branches of the Department of Commerce, other correlated bureaus of the government and maritime interests. Radio in¬ stallations have been made on several tenders, and many improvements of apparatus have been perfected or introduced.

In securing increased efficiency and economy the welfare of the staff and assistants has also been constantly considered. Legislation has been secured providing for compensation for injuries received in hazardous work of the Lighthouse Service, the subsistence arrange¬ ments on vessels and the accommodations for crews have been improved, leave of absence has been granted to employees engaged by the day, a medical handbook has been published and the co-operation of the Public Health Service ar¬ ranged for. A retirement system is also being persistently advocated for deserving employees who have earned this consideration.

LIGHTNING ARRESTER, a contrivance

for guarding against passage of atmospheric electricity through electrical apparatus. The line wires are attached to a plate of brass, usually serrated on the under side. This plate rests on another plate connected with the ground, the two being separated by a thin layer of insulating material. See Electrical Terms.

LIGHTNING AND LIGHTNING-RODS.

Franklin in 1751 proved that lightning was simply a visible display of electricity — an ex¬ tended spark; and until a generation ago little was added to his exposition to define the differ¬ entia of this phenomena. The origin of atmos¬ pheric electricity is believed to be simple fric¬ tion. Faraday showed that a powerful current could be excited by steam-driven spray against a water surface, and the friction of wind-driven mist on the earth's surface may produce a great difference of potential between the latter and the upper air, possibly though not probably as¬ sisted by the friction on dust particles in the air. In any event, rain conducts a portion of it to earth; so that a period of dry weather causes a great accumulation of electricity, the particles of air distributing their charges through each other. This would make the earth and sky, in Lodge's comparison, the two coat¬ ings of a Leyden jar, but ordinarily the dis¬ tance is too great for a spark to pass. The effect of electrical discharges on vapor, how¬ ever, is to condense it into larger globules; this causes it to sink toward the earth as cloud, and the enormous tension relieves itself by passing from one cloud to another or to the earth or objects upon it, preferably projections of some height. If conduction through the cloud were

instantaneous, it would be drained of its charge in one immense flash; but it being a poor con¬ ductor, several flashes at different points are common.

The discharge is determined by the tension of the air, the maximum of which without rupture is one-half gramme per square centi¬ meter. If the rupture is local, there is no flash, but only a brush ; but it is often the case that when the weakest spot has given way, a gen¬ eral breach follows for a long distance, some¬ times miles, creating the flashes which pass either from cloud to earth or from cloud to cloud; and as the discharge of this portion draws the remaining current toward it, a second flash or set of flashes is made probable.

But this analysis shows what experiment proves, that this flash is not a single discharge, but the successive discharges of a countless number of vapor particles or raindrops toward the earth or other electrified particles in the air, with such rapidity of progress that they seem simultane¬ ous; since it is most improbable that if vast numbers of points gave way at once, they should all give way in the same line. It has been further proved by Prof. Ogden N. Rood that the flash is not a single sequence merely too swift for the eye to individualize; but although it lasts only a fraction of a second, it is itself composed of primary flashes in irregular se¬ quence, each lasting but from a thousandth to a few thousandths of a second. This result was obtained by photography, which has invaluably supplemented laboratory experiment. By the latter, Prof. John Trowbridge has formed arti¬ ficial flashes of lightning many feet long, made up of a combination of small discharges from a great number of petty cells. It had been long before proved by Joseph Henry that every elec¬ tric discharge is an alternating or oscillating current, the periods of oscillation being only a few millionths of a second each and diminish¬ ing very rapidly in intensity; the entire dura¬ tion depending on the magnitude and distance of the bodies. Hence it has been inferred that the small primary flashes are instances of these alternating discharges. Photography steadily tends to confirm these views.

Lightning according to its manifestations is divided into three classes. The "flash® or 6 stroke® lightning is the one had in mind when the name is used without qualification; it ap¬ pears either as a sharp zigzag line of extreme brilliancy, or the same forked, but as more clearly revealed by photography shows a wavy line oscillating with enormous rapidity, or in tree shapes with endless branches, or ribbon shape, or in a mass of strands of close but dis¬ tinct parallel flashes like unraveled rope, or still other shapes. Dark flashes in photographs are only photo-chemical decompositions on the plate. The second sort is sheet lightning;- a sudden glow of a golden or reddish tinge on the horizon, with no definite shape or bounds. It is not usually an actual discharge in that form, the very genesis of lightning making it rare; but is the reflection of lightning flashes out of sight beyond the horizon, cast on the clouds or atmospheric haze, and visible some¬ times for many scores of miles beyond the place of the actual storm which causes the flashes. A third is ball lightning, which for a long time was not admitted as a genuine form of electric discharge, and is still a very difficult vol. 17 — 28

and in some points unexplainable phenomenon. It has. not been photographed, though some¬ thing like it has been produced on a

small scale in the laboratory. It is described as a ball or globe of brilliant light moving slowly a short distance above the surface of the earth, as if rolling on an invisible support a few feet high, and it has been said on occasion to float through an open door or window into a house, as though drawn in by a draft of air; it usually explodes, but without doing much damage. Un¬ der the head of lightning is sometimes included Saint Elmo's fire or corposant — jets and brushes of light seen not only at the tips of masts and yards of a ship in a thunderstorm, but on mountain tops, in hissing tongues of brilliant white and blue light several inches long.

The rope-strand lightning is not wholly ac¬ counted for; though there is general agreement that the first flash makes a rent or tube-like break in the air, along which succeeding dis¬ charges rush back and forth. Of the multiple flash, the explanation most conformable to laboratory experiment — where a spark between electrodes has been made to assume a like shape by blowing across it — is that the tube or open¬ ing does not close for a fraction of a second, and the wind, always violently present in a thunderstorm, moves the mass of air sidewise simultaneously enough to keep the tube intact for a moment. Another theory holds that the tube or break in the air closes up too quickly for this, but is so large that the alternate flashes appear side by side.

The thunder and the large raindrops accom¬ panying lightning are well understood. The heat produced by the electric discharge travers¬ ing the atmosphere causes a sudden expansion of the particles next it, with a sharp compres¬ sion of those beyond, in a great wave ; on its passage the particles contract as suddenly, and the waves roll violently back, producing the noise of thunder. From the relatively slow passage of sound in the air and the increased and uneven refraction due to differences of temperature and wind movement, the thunder- waves very soon begin to rise and pass inaudi- bly overhead; so that it is rarely heard more than 15 or 20 miles off. The reason why the thunder follows the lightning usually at an ap¬ preciable interval is due to the fact that light travels so much faster than sound. When a flash occurs at the distance of a mile, the thunder is heard about five seconds later, and by noting the interval an observer can judge with considerable accuracy the distance of the dis¬ charge. Any flash of lightning within an eighth of a mile seems instantaneous with the thunder because the light persists and is retained in the vision for a short interval. The consolidation of the vapor into drops has been exactly imi¬ tated in the laboratory by electrifying spray, which causes the mist particles at once to begin aggregating in large globules. It has been shown that the mutual

repellence of particles ceases as soon as a difference of potential is es¬ tablished by electrification, which substitutes a sort of suction around centres of force.

Protection from Lightning. — The annual destruction of life and property by lightning is very considerable; the former cannot be pre¬ vented to any great extent — though common- sense as to exposure can be instilled, — the latter

could in part. In the United States during 1899, 563 persons were killed and 820 injured; parts of the Rockies and the upper Missouri Valley were the most dangerous. This rate, about 5 per 1,000,000, is larger than in other countries, from our great population of outdoor agricul¬ tural and ranching laborers. Fatalities are everywhere increased by the tendency to seek shelter from the rain when caught out in a storm, and these isolated shelters, as trees, barns, monument buildings in public parks, etc., are among the most liable to be struck. Statis¬ tics of buildings struck are in some respect sig¬ nificant, in others not detailed enough for util¬ ity. Thus, in Schleswig-Holstein during 1874— 83, the annual average of strokes for wooden and thatched roofs was nearly two and one- half times greater than for slate or metal roofs, that for chimneys over 16 times as many even as the former, and that for windmills over one- third larger still. On the other hand, we learn nothing from the fact that in the United States during 1900, out of 1,847 buildings struck, 40 had lightning-rods, 855 had not and there is no report of 952, because not knowing what pro¬ portion of all buildings had them — probably a very small one — we have no percentages. On the other hand, it is notable that in nine years ending 1892, 2,335 barns, 104 churches and 664 dwellings were struck, and the larger fire-in¬ surance companies have generally ceased insur¬ ing farm buildings. Isolated buildings in gen¬ eral were in five times as great danger as those in city blocks, perhaps partly because protected by metal cornices, etc. The Chronicle Fire Tables in 1902 recorded 3,012 fires in the United States caused by lightning, with a property loss of $3,397,000. This total is considered so small that since there has been no effort to gather the statistics.

Is it worth while attempting to protect build¬ ings in general from lightning? Aside from the fact that we are never sure a building struck may not involve a loss of life, the matter re¬ solves itself into

a question of cost, and it is clearly demonstrated that it is not worth while. The problem was decided by the insurance com¬ panies some years ago. In the eight years 1885-92, in the United States, there were 3,516 fires from lightning, with a loss of $12,663,835, or a little over $1,500,000 a year The insurable part of this was nearly all insured and the prac¬ tical question for property-holders is whether lightning-rods secure lower rates. Notoriously they do not. The companies make not the least difference in rates for "protected® buildings, as to insurability or rates, and the officials rarely put them on their own dwellings; the lightning- rod business is virtually extinct in this country. The public would, therefore, gain nothing by the outlay; except that with uninsurable isolated buildings, it would probably pay to enmesh them with metal points rather than undergo the risk. Of course also there are many cases where even a heavy expense ought to be incurred, as with buildings or their contents not replaceable with money — historic or noted architectural structures, museums; etc. But the fact remains that to reduce this $1,500,000 to one-third that amount would cost probably 50 times the sav¬ ing in gross and several times the amount in yearly interest.

If protection is desired, however, it is fully

proved that a great quantity of scattered metal points — whether iron or copper is immaterial, and iron is cheaper — is the most effective; a mesh of barbed-wire fence over the roof and chimneys would be not only the cheapest, but one of the most effective protections. The great steel buildings in New York City have all been struck time and again by lightning with¬ out damage. The numerous metal points and corners draw the electricity and it is promptly absorbed and distributed through the massive steel framework. Perfect safety is thus ob¬ tained by enclosing the building in a metal sheath, as no electric discharge can penetrate into an enclosed metal safe. The consensus of expert opinion now is that if a building is to be protected at all, numerous light iron rods are best, supported at a little distance from the structure and with numerous points. The old "conduit® theory of draining off the lightning and having a good conductor to prevent re¬ sistance and insulators to prevent jumping is now discarded : it is recognized that there is an enormous amount of electric energy to be dis¬ charged almost instantly, it is almost certain to distribute itself around a considerable area and all that the points can do is to ensure and regu¬ late that distribution. If lightning-rods are used there should always be a good "ground® or "earth® at the bottom, as a ton of coke or a water ditch. The last statistics on lightning damage gathered and published by the United States Weather Bureau was in 1900, giving fig¬ ures for the previous

year, as nearly as they could be obtained. A total of 5,527 “strikes® were recorded, injuring 6,256 buildings. The property loss was a little over $3,000,000 and 4,251 head of livestock were killed, of a value of $130,000. Most of this latter was due to cattle contacting barbed wire fences in thunder storms. Consult Lodge’s (Lightning Conduc¬ tors and Lightning Guards) (1892) ; and the report entitled (Modern Lightning Conduc¬ tors,) edited by Lodge, of the Lightning Re¬ search Committee of the Royal Institute of British Architects (1905).

LIGHTNING-STROKE. About five or six persons per million die annually from lightning-shocks. The effects of lightning- stroke on the body are similar to those pro¬ duced by large amounts of electricity at high voltage. Persons subjected to the influence of lightning-stroke may suffer very slightly or may be killed, and between these extremes a vast variety of minor or major injuries may result. The most characteristic form of injury is some sort of burn. This occasionally shows on the skin as an arborescence, which was formerly thought to resemble the tree under which a patient had sought shelter during a storm, but is, of course, solely an effect of the zig-zagging of the electrical discharge. In many persons mental shock and prolonged nervousness are frequent symptoms. Mild stunning, with a sense of suffocation, may be experienced when an electrical bolt strikes near a person, and oc¬ casionally nervous and hysterical attacks are in¬ duced. Suppression of menstruation and abortion have been reported. Numbness and prickling of various areas of the body ; paraly¬ sis of the muscles; deafness; loss of smell and taste; and paralysis of the bladder and rectum have all been described. Occasionally insanity

has followed lightning-stroke. Other experi¬ ences of persons who have been exposed irr- clude flashing in the eyes, buzzing in the ears, general tremor, which may go on to convulsions, with or without loss of consciousness, and peo¬ ple who have been seen in this stage have been described as being blue, with muscles tightly contracted, the pupils dilated, the breath deep and snoring and pulse feeble. Since there are more than 30 deaths by suicide to one by light¬ ning-stroke, it would seem wholly unnecessary for the average individual to worry over the likelihood of his earthly career being ended by lightning.

In death by lightning, changes in the nerv¬ ous system have been found and it is probable that the cause of death may be either the re¬ sult of minute hemorrhages, which take place in the important centres of breathing and of the heart-action and in the medulla ; or death may be the physiological effect of the electric¬ ity on the heart, causing a form of heart-tet¬ anus, with rapid cessation of the movement of this organ.

The treatment of lightning-stroke, as well as of other forms of electrical injuries, should be promptly instituted. If commercial currents are the cause they should be removed at once, care being taken to use insulating materials to remove live wires. External heat to the body with hot-water bottle, cardiac stimulation with whisky, ammonia, etc., with artificial respira¬ tion, should be simultaneously used.

No method of artificial respiration or other attempt to produce consciousness should be abandoned under three to six hours, as often no signs of life may be brought out in less than two to three hours. It is seriously advised by some observers that, before giving up all hope, an injection of an alkaline solution into the blood should be used. Hot saline solution may be thrown into the rectum and the treatment should be continued until all possible methods of resuscitation have been employed. Consult Jelliffe, (Death by Lightning and Electricity (in (Text-book of Legal Medicine and Toxi¬ cologyˆ 1903) ; (Death by Electric Currents and by Lightning) (in British Medical Journal, London 1913).*

LIGHTON, William Rheem, American prose writer: b. Lycoming County, Pa., 13 July 1866. He was admitted to the Kansas and Ne¬ braska bar in 1891 and has published (Sons of Strength : a Romance of the Kansas Border Wars (1899) ; (Lewis and Clark,* in River¬ side Biography) Series.*

LIGNIN, the substance of wood-fibre, formed in part at least by conversion from cel¬ lulose (q.v.), and contained within the cellular tissue, giving hardness and weight to the woody . parts of plants. Its chemical composition is not determined, but it is characterized by being sol¬ uble in weak alkalis and insoluble in water.

LIGNITE, a partially carbonized fossil wood, retaining its woody fibre and intermedi¬ ate in its qualities between peat and coal. It is found in the Mesozoic and Tertiary strata, but chiefly in the latter. Much of the coal of the Culf States, the Great Plains and Alaska is lig¬ nite. For description of lignite and especially for composition of

American lignites, see Coal.

LIGNUM VIT.®, vl'te. See Guaiacum.

LIGNY, le'nye', a village in Belgium, prov¬ ince of Namur, nine miles northeast of Charle¬ roi and 14 miles northwest of Namur. Here was fought the prelude to the battle of Water¬ loo on 16 June 1815. The Prussians were sta¬ tioned at Ligny and the British at Quatre- Bras. Napoleon made a simultaneous attack on the two forces, striking at 84,000 Prussians under Blucher with his own 60,000. After a long and desperate struggle the Prussians were driven from the field with a loss of about 12,000. Napoleon lost 8,000 killed and wounded. Two days later came Waterloo (q.v.).

LIGUORI, le -gwo're, Saint Alfonso Maria

de, Catholic prelate, founder of the religious order called Redemptorists : b. Naples, 26 Sept. 1696; d. Nocera, Italy, 1 Aug. 1787. He was originally a lawyer, but became a priest in 1722, joined the Congregation for the Propagation of the Faith, instituted in Naples, and occupied himself as a missionary in the instruction of the ignorant peasantry. In 1732 he founded a monastery at Villa Scala, the members of which comprised the Order of the Most Holy Re¬ deemer as it was called and were to be em¬ ployed in the instruction of the people. This order, approved by Pope Benedict XIV in 1749, rapidly extended in Italy, Germany, Spain and France. Liguori was in 1762 appointed bishop of Sant Agata de' Gotici by Clement XIII, from which office he resigned in 1775. He was canonized in 1839 and in 1871 was declared a doctor of the Church. His (Theologia Mo- ralis has appeared in several recent editions (Ratisbon 1881; Turin 1892; Genoa 1898) and there is a German edition of his letters (Ratis¬ bon 1893, et seq.).*

LIGURIA, li-gu'ri-a, in ancient Greek and Roman geography that portion of northern Italy extending along the Mediterranean from the frontiers of Gallia Cisalpina to those of Etruria, bounded on the north by the Po, east by the Macra and west by the Varus. These were its limits at the time of Augustus, but at an earlier period it extended to the borders of Gaul, or even to the mouths of the Rhone. In 1797 Genoa received from Napoleon I a demo¬ cratic constitution, under the appellation of the Ligurian Republic. This republic ceased to ex¬ ist in 1805, when the emperor incorporated it with France. After 1814 it formed part of the kingdom of Sardinia and now of Italy, and comprises the provinces of Genoa and Porto Maurizio.

LIGURIAN REPUBLIC. See Liguria.

LIJA, a fish. See File-fishes.

LILAC, a genus of ornamental, deciduous shrubs and trees (Syringa) of the order Olea- cece. The species are characterized by opposite slender-staiked leaves and purplish or white and usually fragrant flowers in erect panicles. Nearly all the species which have developed many horticultural varieties are valued for park and garden planting, on account of their hardi¬ ness and free-blooming qualities. The common lilac (S. vulgaris) is a native of southwestern Asia, whence it was taken to Vienna during the closing years of the 16th century. It is probably the most widely planted of all the species. The wood of its larger specimens, which sometimes attain a height of more than 20 feet, is valued by cabinet-makers, for turn-

ing and inlaying. About a dozen species are cul¬ tivated in America. They do best in deep, rich soil, but will succeed almost anywhere ; indeed, they are likely to become a nuisance from their habit of suckering, a habit taken advantage of for propagating purposes. Cuttings are also used, and some of the newer and choicer varie¬ ties are grafted upon ordinary lilac or upon privet stocks. During the closing years of the last century the plant came into vogue as a florists' flower, large quantities being forced for the winter and early spring markets.

LILBURNE, lfl'bern, John, English sectary and political agitator : b. Thickney Puncharden, County Durham, about 1614 ; d. Eltham, Kent, 29 Aug. 1657. For putting forth tracts hostile to the Anglican Church he was whipped and imprisoned in 1637, but was released by the Long Parliament in 1640, and his conviction having been declared illegal and tyrannic, he received $15,000 indemnity. He then joined the arm}'' and rose to the rank of lieutenant-colonel. He was one of the party known as the <(Level- lers® (q.v.), and for his attacks on Cromwell and others was several times committed to the Tower. Having been exiled and having re¬ turned without leave, he was put in prison and tried for his life, but was acquitted although not liberated for sometime. Subsequentlv he be¬ came a member of the Society of Friends. Hume describes him as (

LILIACEiE, lil-i-a'se-e, or LILY FAMILY, one of the most important

orders of plants because of the uses made by man of many of its species, about 2,500 of which are comprised in nearly 200 genera. The character¬ istics of the group are monocotyledonous seeds ; usually herbaceous stems which arise from bulbous, tuberous or rarely fibrous roots; generally narrow, simple leaves ; and six-parted or toothed flowers, solitary or arranged in vari¬ ous ways, such as panicles, racemes, etc. In habit, many are adapted to deserts, some to ponds and streams, others are climbers, etc. Among those useful for food may be men¬ tioned asparagus, onion, garlic, leek, chive, rocambole, shallot, camass and various species of lilies. A very large number of species are used for ornament; for example, lily, hyacinth, tulip, fritillary, lily-of-the-valley, tuberose, al¬ lium and yucca. Several species of Xanthorea .and Dracozna yield useful resins; some of the genus Chloragalum furnish a substitute for soap; and certain species of yucca, sanseveria and of other genera yield valuable fibres. Iso¬ lated species of various genera have been used in medicine.

LILIENTHAL, Max, American rabbi : b. Munich, Bavaria, 15 Nov. 1815; d. Cincinnati, Ohio, 5 April 1882. Graduating from the uni¬ versity of his birthplace he was called to the di¬ rectorship of a Hebrew school in Riga, Russia, and at government expense traveled through the 17 western provinces of Russia to encour¬ age the Jews to make educational reforms. In 1842 this mission was ended and until 1845 he remained in Saint Petersburg, perfecting his educational system, when the Tsar Nicholas is¬ suing orders which aimed at the conversion of the Tews to the Greek Church, he emigrated to America. On his arrival in 1844 he was made rabbi of three synagogues, but in 1850 resigned

to establish a school. In 1855 he accepted a call as rabbi of the B'nai Israel Congregation of Cincinnati, a position he held until his death. He was foremost in civic and educational re¬ form, an active member of the board of educa¬ tion and a director of the Cincinnati Univer¬ sity. He was prominent in the councils of the Free Religion Associations and always cham¬ pioned the cause of progressive Indians with his voice and pen. He aided largely in the es¬ tablishing of the Hebrew Union College and as an orator did much in his addresses in churches and on the public platform to promote social and religious reform.

LILIENTHAL, le'H-en-tal', Otto, German aeronautical engineer: b. Anklam. Prussia, 23 May 1848; d. Rhinow, Prussia, 9 Aug. 1896. He studied at the Berlin trade school and then worked for Schwartzkopff and Hoppe at Ber¬ lin. Early in 1880 he founded a

factory of his own, at which he made boilers, wrought-iron pulleys and sirens of his own invention. He also devoted himself to aeronautics and tried to solve the problem of flight by heavier-than-air machines. He invented the glider and made several successful glides, but met his death in an accident to one of his machines. He wrote (Der Vogelflug als Grundlage der FliegekunsD (Berlin 1889; tr. as (Birdflight as the Basis of Aviation, > 1911); (Die Flugapparate : allge-

meine Gesichtspunkte bei deren Herstellung und Anwendung) (ib. 1894). See Aeronau¬ tics, History of.

LILIS, or LILITH, a character in Jewish mythology. The Talmudists say that Adam had a wife before Eve, whose name was Lilis. Re¬ fusing to submit to Adam, she left Paradise for a region of the air. She still haunts the night as a spectre and is especially hostile to new¬ born infants. Some superstitious Jews still put in the chamber occupied by their wives four coins with labels on which the 'names of Adam and Eve are inscribed with the words <(Avaunt thee, Lilith!® Our word (

LILIUOKALANI, le-le-wo-ka-la'ne, Ly¬ dia Kamekeha, ka-ma-ka'ha, ex-queen of Ha¬ waii : b. Honolulu, 2 Sept. 1838; d. 11 Nov. 1917. She was a sister of King Kalakaua and suc¬ ceeded him in 1891. She was married to John O. Dominis, a native of Boston (d. 1891) who became governor of Oahu. She attempted to substitute a less liberal constitution for that of 1887, and this course resulted in her being deposed 30 Jan. 1893. The islanders then adopted a provisional government, which soo'n became a republic. She endeavored to secure assistance from the United States, visiting Washington in 1896 for that purpose, but on the annexation of Hawaii to the United States, in 1898, returned to the island. She revisited the United States in the winter of 1901-02 to press her claims for indemnity on the Crown lands, afterward residing in California and making a visit to Hawaii in 1914. See Hawaii.

LILIUS, Aloisius, author of the Gregorian calendar, originally called Aloigi Giglio. Noth¬ ing is known about him outside of his connec¬ tion with the reform of the calendar and the fact that he was professor of medicine at the University of Perugia in 1552. He is some¬ times mistakenly known as Luigi Lilio Giraldi. See Calendar.

LILIES AND AMARYLLIS

1. Golden Lily (Lilium auratum). la. Blossom, enlarged. 2. Garden

Amaryllis. 2a. Blossom, enlarged. 3. Crinum scabrum. 4. Eucharis amazonica. 4a. Root-stock. 5. Jacob's Lily (Amaryllis formossima).

LILLE, lei, France, an important town, capital of the department of the Nord and. chief fortress of the north, 154 miles north of Paris and seven miles from the frontier of Belgium. It is well built and has spacious, regular streets, lined with large, massive houses. In the north¬ west of the town stands the citadel, a master¬ piece of Vauban. New fortifications include a circle of detached forts. Among the churches are Saint Maurice, in the flamboyant style, re¬ cently restored; Notre Dame de la Treille, in 13th century Gothic; Saint Catherine; the Madelaine ; and the Protestant Church. Among secular buildings are the Hotel de Ville, with rich collections of pictures, drawings, etc. ; the exchange (1652) ; the prefecture; the palace of justice; the arsenal; the Paris Gate, a trium¬ phal arch in honor of Louis XIV ; the general hospital; the theatre; and the concert-hall. Lille possesses a state university with four ((faculties,® a Roman Catholic university, ly- ceum, communal college, school of art, con¬ servatory of music, public library of 100,000 volumes, botanic garden, zoological garden, etc. The industries include cotton spinning and weaving, fine linen thread, linen and cotton twist, broadcloth, beet-sugar (raw and refined), soap, oil, ribbons, tulles, tobacco-factories, en¬ gine-works, foundries, dye-works, bleach-fields, breweries and distilleries. Its situation on the frontier and extensive railway and water com¬ munication made Lille a great entrepot of trade. Lille is said to have originated in 1030, when Count Baldwin IV of Flanders fortified the little settlement around the castle of Buc. From this as a nucleus, the town grew rapidly until it gained communal privileges. Its his¬ tory has been a stormy one. It was destroyed in 1213 by Philip Augustus, rebuilt by Joanna, Countess of Flanders, and was retaken in 1297. It was finally given to the king of France in 1312. It became a Burgundian possession through Margaret, wife of Philip the Bold, during which regime it grew in prestige. It fell into Austrian and then into Spanish power and was finally recaptured by Louis XIV of France in 1667. Captured in 1708, it was re¬ stored to France by the Treaty of Utrecht. The Austrians were unable to conquer it in 1792. In 1914, after a stubborn resistance by the al¬ lied English, French and Belgian armies, dur¬ ing which the city changed hands many times, Lille was captured by the Germans and a heavy tribute was exacted. See War, Euro¬ pean.

LILLIBULLERO, lil"i-bu-le'ro, a politi¬ cal ballad that ((sung James II out of three kingdoms.® A scurrilous attack on the Irish re¬ cruits, it is said to have been written by Lord Wharton in 1686 and the setting is ascribed to Henry Purcell.

LILLIPUT, Hl'i-put, the name of a fabu¬ lous kingdom described by Jonathan Swift (q.v.) in (Gulliver's Travels,5 of which the in¬ habitants wrere not greater in size than a man's finger.

LILLO, fil'd, George, English dramatist : b. London, 4 Feb. 1693; d. there, 3 Sept. 1739. The son of a Dutch jeweler, he was brought up to his father's trade, and was for several years in partnership with him. (Silvia, or the Country Burial (1730), a ballad opera, was his first piece; and was followed (1731) by the*

famous (London Merchant, or the History of George Barnwell, nowadays better known by its subtitle, which made its author famous, and held the stage for nearly a century. It had a marked influence in its day, and may be re¬ garded as a precursor of the <(domestic drama.® His other dramatic productions include Britan¬ nia, or the Royal Lovers* (1734) ; (Fatal Curi- osity) (1736); (Arden of Feversham,* an*

adaptation of an Elizabethan play, revised or completed by John Hoadly after Lillo's death.

LILLY, lil'i, William, English astrologer: b. Diseworth, Leicestershire, 1 May 1602; d. Horsham, Surrey, 9 June 1681. In 1632 he became interested in astrology, and two years later was associated with others in an unsuc¬ cessful search for treasure in the cloisters of Westminster Abbey. In 1644 he published the first volume of his almanac, (Merlinus Angli- cus Junior, the English Merlin Revived, or a Mathematical Prediction upon the Affairs of the English Commonwealth, which appeared annually till his death. The king of Sweden sent him a gold chain and medal in 1659 in recognition of a favorable horoscope cast for him a short time before. He published many works, and was frequently engaged in contro¬ versy. His chief writings are (Christian As¬ trology, modestly treated in Three Books5 (1647), reprinted in 1852 by Zadkiel as (An Introduction to Astrology) ; (An Astrological Prediction of the Occurrences in England for the Years 1648, 1649, 1650) (1648) ; (Monarchy and No Monarchy* (1651); (True History of King James I and King Charles I5 (1651); (Annus Tenebrosus* (1652) ; (Anima Astrol- ogiae5 (1676) ; and (Catastrophe Mundi5 (1683). Butler satirizes Lilly in Hudibras under the name of Sidrophel. His autobiography*

was published in 1715.

LILLY, William Samuel, English contro¬ versial writer: b. Fifehead, Dorsetshire, 10 July 1840. He was educated at Cambridge and has been secretary to the Catholic Union of Great Britain from 1874. His works include (A Cen¬ tury of Revolution5 (1899) ; (First Principles in Politics (1899) ; (Essays and Speeches* (1897); (A Year of Life* (1900); (Renais- sance Types* (1901) ; (India and Its Problems) (1902) ; (Studies in Religion and Literature5 (1904); (Many Mansions5 (1907) ; (Idola Fori* (1910) ; (The New France5 (1913).*

LILY. The type genus (Lilhim) of the family Liliacece (q.v.). The several hundred well-marked species which have been described are succulent herbs with scaly bulbs and usually leafy upright stems terminated by solitary or variously grouped six-segmented flowers of very diverse colors and markings. In general, lilies are among the most popular of garden flowers, having held this position for centuries. But in the United States they have not taken the high rank that they hold in Europe, espe¬ cially in Great Britain. This is probably due largely to the dryer, hotter climate, and the injudicious planting of the bulbs where they cannot long survive.

The various species and their varieties are adapted to a wide range of soils, a few, such as L. tigrinmn, L. canadense and L. superbum , often succeeding in heavy land if well drained, and some, such as L. washing tonianum, L. phila- delphicum and L. concolor withstanding the

peculiar conditions of slaty ridges if deeply planted and well mulched during the growing season. But the greater number thrive best upon fairly rich, well-drained, deep, sandy loam, especially if sheltered from prevailing winds and the hot sun of midsummer. Not 'that the stems cannot stand sunlight; but the bulbs and roots should be cool and well but not exces¬ sively supplied with moisture and food. The bulbs should always be planted deeply, six inches or more, and the soil stirred to double the depth of planting. This not only assists in keeping the roots cool but protects the bulbs from excessive freezing, which seems to have some effect upon the vitality of shallow-planted specimens of even the hardiest species. Since vitality is also impaired by the exposure of the bulbs to the air, great care should be taken in transplanting to place 'the bulbs back in the soil as soon as possible

after their removal. Transplanting is best done in early spring, the clumps being dug up, divided, the large bulbs planted in new, permanent quarters and the small ones and the bulb scales in nursery beds, where they should remain from one to three years, according to size when planted and to the species. One reason why bulbs obtained from seedsmen fail is because of undue drying. Orders for lilies should be given before the seedsmen can obtain the bulbs, and they should be filled by him without delay after the bulbs arrive. Often bulbs become so flabby from loss of moisture that they may fail to grow until the second year. Hence it is advisable to plant all but plump and turgid bulbs in a nurs¬ ery bed, or where they may remain undisturbed for a year or two before being placed in per¬ manent quarters. Propagation by means of seeds is slow in most cases; and many species rarely produce seeds in the United States.

The Bermuda Easter lily (L. longiflorum, var. eximium) is the only kind that is forced upon a commercial scale in the United States, though several other kinds are to be found in the principal florists' stores and in private con¬ servatories. For forcing, the bulbs of this vari¬ ety are planted as soon after their arrival from Bermuda as possible, generally before the end of September, and are kept in a cool, dark place until roots are well developed and the tops commence to form, when they are brought into the light, and by judicious management of heat are hastened or retarded to ensure their blos¬ soming at desired seasons, especially Easter Sunday The management of other varieties used in greenhouses is more or less closely similar.

In general, lilies are most effective when mixed in small masses among shrubbery and hardy flower borders, the various kinds being sufficiently separated either in distance between the groups, or in season of blossoming, to avoid the clashing of inharmonious colors. Many of them have been used 'thus for orna¬ mental planting, but though the great majority are well worth growing, scarcely a dozen haˆe become widely popular in the United States, and of these not one is a native American species.

The following are probablv the best-known species: Tiger lily (L. tigrinum), a Japanese soecies, often exceeds three feet in height and bears a loose raceme of sometimes a dozen nod¬ ding dark-red, purplish-spotted flowers. It is

a very hardy, useful species for the border, where it does best in masses. Madonna lily (L. candidum), a native of southern Europe, often attains three feet, bears from half a dozen to two dozen large,

pure white, fragrant flowers in a raceme. It is a highly ornamental species, will do well upon sandy soils and in full sunlight. The Siberian coral lily (L. tenuifolium) , which seldom exceeds two feet in height, bears from one to a score of scarlet, nodding flowers. Being very easy to prop¬ agate from seeds and bulb scales and of sim¬ plest culture, it is especially popular with be¬ ginners. Gold banded or Japan lily (L. aura- turn), which sometimes attains four feet, bears a few yellow banded, purple-spotted, white flowers in a short raceme. It is less persistent than the tiger and the showy lily, and some¬ what less easy to cultivate, but is particularly useful for planting among groups of dark- colored shrubbery. Showy lily (L. speciosum) , a Japanese species, often exceeds three feet, bears six or more white or pinkish, red-dotted flowers in a raceme. It is a specially hardy, thrifty and satisfactory species both for out-of- door planting and for greenhouse use. Next to the Bermuda Easter lily and L. longiflorum it is probably more widely grown by florists for cut¬ ting than any other kind. It has both white and red varieties. L. longiflorum, the original species of the Bermuda Easter lily, is forced in the same way as its variety. It is a native of Japan, from which country most of the bulbs are imported.

Besides the species mentioned the following are considered worthy of wide popularity: L. choice donicum, elegans, testaceum, maxivno- wiczii, martagon, maculatum, henryt, monadel- phum and superbum. These do well with little care upon ordinary light loamy soils. L. c ana- dense and superbum succeed upon the same soils but require rather shady places. For cold climates even as far north as Ottawa, Canada, the following have proved successful : L. browmi, wallacei, citrinum, croceum, melpomene, pardalinum, pomponium, dahuricum and bate- mannice. The odors of L. croceum and pom¬ ponium are very offensive even in the garden, and when they are planted they should be at some distance from the house. Among the most fragrant are L. longiflorum, aura turn, can¬ didum and varieties. Consult Bailey, < Stand¬ ard Cyclopedia of Horticulture) (1916) ; El- wes, (A Monograph of the Genus LiliuirC (1880; Botanical Gazette, Vol. XXVII, p. 235,

1899).

LILY-OF-THE-VALLEY, a low -growing

perennial herb (Convallaria majaHs) of the lily family, with creeping rootstocks from which as¬ cend radical leaves and little white or pink fragrant flowers arranged in racemes upon scapes. The plant being a native of western Asia is one of those popularly

supposed to be referred to in the Sermon of the Mount, the tulip being another. It is a native also of Europe and of the mountains of the south¬ eastern United States. The plants are perfectly hardy. They thrive in partially shaded, fairly rich loam, and may be readily propagated bv means of the underground parts. Since beds are apt to run out they should be renewed every few years. The strong terminal buds known as pips are extensively used by florists

LILIES

1 Lilies of the Valley

2 Golden-Banded Lily of Japan

MOUTH OF THE RIVER LIM

■

for forcing the flowers throughout the year. Several horticultural varieties have been pro¬ duced, some with variegated or striped foliage, others with pink, variegated, or double flowers. A highly esteemed perfume, eau d'or, is made in France from the flowers; and the rootstocks have been used by druggists, but are 'less popu¬ lar than formerly.

LILYBiEUM, lil-i-be'um, the ancient name of Cape Boeo (q.v.).

LIM, a picturesque affluent of the Drina River, which rises on the northern slope of the Albanian Alps in Montenegro, between Beda-vero and Priboy forms the boundary with Ser¬ bia, and after the first 30 miles of its entire course of 140 miles, flows beyond the border through Bornia to its junction with the Drina.

LIMA, II' ma, Ohio, city, county-seat of Al¬ len County, on the Ottawa River, and on the Erie, the Pennsylvania, the Cincinnati, Hamil¬ ton and Dayton, the Detroit Southern and the Lake Erie and Western and other railroads, about 70 miles north of Dayton and 80 miles south of Toledo. It is situated in an agricul¬ tural region and in the natural gas and petro¬ leum belt of the State. The oil fields extend into six counties in the northwestern part of the State. The chief industrial establishments are locomotive and car works, machine-shops, petroleum refineries and railroad shops. The shipping

trade is chiefly in petroleum, farm and dairy products and railroad car equip¬ ments. The city is the seat of Lima College, opened in 1893 under the auspices of the Lu¬ therans. The city owns and operates the water¬ works. The Ohio State Hospital for the Crim¬ inal Insane, one of the largest institutions of its kind, is located here. Pop. (1920) 41,306.

LIMA, le'ma, Peru, South America, a de¬ partment in the western part, on the Pacific Ocean; area, 13,310 square miles. It is moun¬ tainous in the east, but along the coast the land is low, and in the river valleys productive. A number of villages and towns are in the val¬ leys. One of the principal agricultural produc¬ tions is sugar. There are rich mineral deposits, but as yet the mines are undeveloped. Pop. about 300,000. The capital is Lima (q.v.) and the chief port, Callao, is, with a few miles of surrounding territory, now a separate depart¬ ment.

LIMA, Peru, South American city, capital of the department of Lima, on the Rimac River, seven miles from the Pacific. Callao, on the Pacific, at the mouth of the Rimac, is the port of Lima ; it is connected with Lima by two railroads, one on each side of the Rimac. Another railroad extends from Lima to Con¬ cepcion, a town on the eastern slope of the Andes. This railroad is in one place 15,000 feet above the sea. The city was founded by Francisco Pizarro, 1535, and named Ciudad de los Reyes, <(City of the Kings,® because the site was chosen on 6 January, the feast of the (

bull ring. The exposition grounds form a fine pleasure garden and here are also zoological and botanical gardens. Lima's houses are in the Spanish style with the central patio and are mostlv of adobe stuccoed with plaster. The cathedral, begun in 1535 and reconstructed in 1758, is the most notable building. There are about 70 other churches, some of architectural merit and several fine hospitals. Lima has considerable manufacturing industries including furniture, iron and copper articles, dyestuffs, pottery and is developing rapidly. The adobe walls which surrounded the city were destroyed in 1870, and boulevards made in their place. The city has long been famed for its educational institutions; the national university, chartered in 1551, is the oldest university in America. It has courses in theology, law, medicine, applied science, political science, art and music. The National Library, founded in 1822, with some books from older libraries, was destroyed in 1880 by 'the Chileans. It contained then 60,000 volumes. It now contains about 50,000 volumes. There are several other libraries in the city. There are several technical schools, professional, classical, naval and

military, and about 100 ele¬ mentary schools, besides a number of small pri¬ vate schools. Several scientific and literary so¬ cieties provide public lecture courses. The city is noted for being the home of the first Ameri¬ can canonized by the Roman Catholic Church, Saint Rose of Lima (1586). It has frequently suffered from earthquakes; the most destructive of which any record exists occurred in October 1746. The water supply and sewage system are grood and the city is lighted by electricity. In Spanish colonia.l times Lima was the capital of the vice-royalty of Peru, which then included the greater part of Spanish South America. At the time of the war between Peru and Chile, Lima capitulated and the Chileans kept posses¬ sion for two years. Many of its finest treasures and monuments were destroyed at this time. Pop. about 143,000, mostly Indian or mestizo. Consult Enoch, C. R., ˆertP (London 1908) and Pradie-Fordere, C., ˆima ct ses environs) (Paris 1897).

LIMA E SILVA, Luiz Alves de, loo'es al'ves, da le'ma e sel-va, Duke of Caxias, Bra¬ zilian soldier and politician : b. Rio de Janiero, 25 Aug. 1803 ; d. Santa Monica, province of Rio de Janeiro, 7 May 1880. He became briga¬ dier in the Brazilian army, was President of Maranhao, Vice-President and military com¬ mandant of Sao Paulo and President of Rio Grande do Sul ; and in 1851-52 commanded the Brazilian army. In 1855 he became Minister of War; and from 3 Sept. 1856 to 3 May 1857 and again from 3 March 1861 to 4 May 1862 was Prime Minister. He commanded the army of Brazil against Paraguay in 1866-69, and from 25 June 1875 to 5 Jan. 1878 was a third time Premier.

LIMANTOUR, Jose Ives, Mexican states¬ man : b. Mexico City, 26 Dec. 1854. He was graduated from the National Preparatory School of Mexico City in 1871 ; and from the National School of Law in 1874, receiving his lawyer's diploma at the age of 20, after having successfully passed the required examinations, both in that institution and the National School of Jurisprudence. He traveled and studied abroad until 1876 and soon after his return to Mexico was appointed assistant professor and

subsequently professor of political economy in the National School of Commerce, and still later professor of international law in the National School of Jurisprudence. In 1881 he was elected to the Mexico City council and after¬ ward served several terms in the

lower branch of the national Congress, of which he was sev¬ eral times presiding officer. During the 10 years prior to 1892 he served in various diplo¬ matic and financial positions and was con¬ nected with the Department of Formento much of that time. In 1892 Mr. Limantour was ap¬ pointed assistant Secretary of the Treasury and Secretary on 9 May 1893. During his admin¬ istration many important financial reforms were inaugurated. In recognition of his pub¬ lic services he has been decorated by several foreign governments. He has written much on financial and other subjects.

LIME, also known as caustic lime, quick¬ lime or calcium oxide (CaO), is snow white in color and strongly alkaline, being one of the strongest bases. In contact with water, for which it has great affinity, it increases in bulk, evolves much heat and changes to the hydrate (CaH202). Unless kept in a dry place it will absorb moisture and carbonic acid gas from the air and change to the carbonate (CaCOs) (see Calcium). Lime, except for certain impurities, is entirely soluble in water, the principal insolu¬ ble impurities being silica, alumina and iron oxide. It is never found native, but limestone may contain a very large percentage. For ordinary commercial uses lime is obtained by heating limestone, shells, or other material com¬ posed of calcium carbonate, to a temperature high enough to drive off the carbonic acid gas. As the materials used vary in purity, so is there a corresponding difference in the purity of the lime produced. Owing to its property of hardening, by change to calcium carbonate, and its comparative cheapness, lime is the most important of building materials. For commer¬ cial purposes the many varieties of lime are grouped into, (1) common or fat limes con¬ taining less than 10 per cent of impurities, (2) poor or meagre limes containing 10 to 25 per cent of impurities, (3) hydraulic limes con¬ taining 15 to 40 per cent of impurities and (4) hydraulic cements which may contain as high as 70 per cent of impurities.

Common or fat limes in slaking evolve much heat and increase in bulk from two and a half to three times ; they are soluble in water. In hardening they shrink, and hence in making mortar require the addition of a large amount of sand. As fat limes are cheap and abundant and can take a large proportion of sand in making mortar, they are generally used for masonry. The poor or meagre limes are seldom used in this country. The hydraulic limes, so called from their property of hardening under water, though valuable for certain purposes, are also seldom used in the United States for masonry. They slake more slowly than ordi¬ nary limes with little rise of temperature and little increase in volume. Hydraulic cements (see Cement) do not slake and do not require the addition of sand to form

mortar. They also set' or harden much more quickly than ordinary limes, as the formation of calcium car¬ bonate is a slow process that may under certain conditions take years, while in some quick-set¬

ting cements the formation of the calcium sili¬ cates and aluminates to which setting is due may take place in a few hours.

Limestone, marble and shells are burnt to lime by exposure to a temperature of 850 to 900° C. in a current of air. The harder the limestone the longer the time required for burn¬ ing, but the better the product. Impurities in the limestone may or may not be injurious, de¬ pending on the quality of lime desired. Mois¬ ture in the limestone, or added to the charge, as by a steam jet, helps carry off the carbonic acid and hastens burning. Lime burning may be done in heaps or kilns. Heap burning in which pieces of limestone are piled on a grate of wood, then covered with fines or clay and fired, is now little used. Of kilns there are vari¬ ous types, intermittent and continuous firing. Of intermittent kilns the old ((dug out" kilns built of ordinary brick on masonry into the side of a hill require about 72 hours for each firing. Heat is supplied by a coal or wood fire at the bottom. For continuous firing vertical kilns 20 to 25 feet high with draw openings, prefer¬ ably below the fire line, are used, the lime being drawn about every six hours. To sup¬ ply moisture, water is kept in an iron pan in the ash-pit. In the kilns most commonly used there is no grate, but the fuel, preferably charcoal or anthracite, is charged with the limestone. The lime is not as pure as from furnaces with a bot¬ tom grate, but the consumption of fuel per pound of lime made is less. In such kilns burn¬ ing is started by partly filling the kiln with lime¬ stone, putting in a thick layer of kindling wood and coal, starting the fire, and then adding alter¬ nate layers of coal and limestone. The type of continuous kiln in most favor is vertical, about 25 feet high, bottle-shaped and made of boiler iron lined with fire-brick. Such a kiln may use petroleum for fuel, the oil being iniected through openings in the wall just above the widest part of the furnace. Vertical kilns fired with gas have not proved successful. The type of kiln that requires the least fuel for amount of lime produced is the horizontal cir¬ cular Hofman kiln, also used for making brick, drain, tile, etc. The fuel is fine coal or even coal dust, and is put in through openings in the top. The lime produced is lighter than that from vertical kilns, slakes more easily and hence cannot be stored as well.

Most of the lime made is used for building purposes, or mixed with clay for cement (q.v.), but lime is also used for making glass and artificial stone, as an agent in many chemical processes, as

whitewash, and was formerlv largely used in sugar-making to separate sugar from molasses. The statistics of the amount of lime annually made in the United States show that the value of the 1909 output was over $13,- 800,000 ; but at present the largest use of lime is in the Portland cement industry, which mines vast quantities of limestone, this being now the most valuable stone in the United States. See Limestone; Portland Cement.

Lime has some medicinal value, counteracting excessive acid conditions. Various preparations of limewater are recommended for dyspeptics and pregnant women. Mixed with milk it often reduces the tendency to vomit. Lime- water with glycerine has been found useful in cases of creeping eczema. As an alkaline,

lime has many uses in the arts and in chemical processes. It softens ®hard® water; neutral¬ izes acids, as in soils, and is indispensable in the making of sulphite for paper and gaseous am¬ monia. Consult (The Mineral Industry > (New York 1916).

LIME, a shrub or small tree (Citrus au- rantifolia), related to the citron (q.v.), re¬ sembling the lemon in habit but rather more prickly and spreading; its fruits, also, are more nearly spherical, more acid and rather more bit¬ ter than commercial varieties of lemon. It is a native of southeastern Asia, whence it has spread to other warm countries where its juice is highly valued for making cooling drinks. In Florida and the West Indies and Mexico, which supply the American market, large thickets of wild limes are to be found and these add to the crops from the cultivated groves. In California the lime is little culti¬ vated because the cheapness of Mexican fruit prevents the realization of a profit from orchards. The lime is one of the most im¬ portant sources of citric acid (q.v.). The trees are propagated, cultivated and trained much like lemon trees, but are planted closer to¬ gether. They will stand poorer, stonier soil and nearer proximity to the ocean than other citrous fruits. The name is given in the Orient to various sour-fruited trees related to the true lime; in Europe and occasionally in the United States to the lindens (q.v.) ; and locally in the Southern States to the sour tupelo (q.v.), whose tart fruit is eaten.

LIME AS A FERTILIZER. See Fer¬ tilizers.

LIME LIGHT. See Calcium Light.

LIMERICK, lim'e-rik, Ireland, a city and civic county, capital of Limerick County, at the interior extremity of the estuary of the Shannon, 120 miles by rail southwest of Dub¬ lin. It consists of three portions connected by five bridges, English Town on King's Island, and Irish Town and Newtown Perry or New Town on either side of the river. Limerick is of very ancient foundation, being mentioned by Ptolemy as Regia. The principal buildings are the Episcopal and Roman Catholic cathedrals, custom-house, chamber of commerce, town-hall, exchange, assembly house and. linen- hall. The manufactures include the curing of bacon, the preparation of butterine and the making of army clothing and fish hooks. There are, besides, distilleries, breweries, tanneries, corn mills, a patent slip for vessels of 500 tons, and a large graving dock for vessels up to 2,500 tons and a floating dock for vessels of 3,000 tons. Limerick is the leading port on the west coast for the shipment of raw produce. Bacon, butter, oats, salmon, condensed milk, are the chief articles of export and grain, petroleum and sugar the chief imports. Lime¬ rick is the seat of a consular agent of the United States. The harbor, naturally a fine one, has been improved at a considerable outlay. The strategic position of Limerick rendered its capture extremelv important to the Danes., who arrived in the 9th century and practically founded the city and port. They held posses¬ sion of it until the closing years of the 10th century when Brian Boru weakened them sufficiently to exact a yearly tribute. It passed definitely to Irish hands after the rout of the

Danes at Clontarf in April 1014. The Normatt- English occupied the city soon after their ar¬ rival in 1172 and in 1210 King John visited it and erected fortifications. Edward Bruce led his forces against it in 1314 and while only partially successful burned a great part of the city. The Catholic party supporting Charles I against the Parliamentarians occupied Limerick' in 1641 but were obliged to surrender to Iretorr in 1651. In the Revolutionary War of 1688-91 Limerick was the scene of the last stand of the' Irish forces under Sarsfield who supported the house of Stuart. After the disasters of the Boyne, Athlone and Aughrim, Sarsfield was besieged in Limerick by William's army under Ginkel. The defense was brilliant and success¬ ful, and after a train of siege artillery had been intercepted and destroyed by Sarsfield on its way to the city, an armistice was proposed by William, after which a treaty was signed under the terms of which Irish Catholics were to be permitted the free exercise of their religion, and those who so desired were permitted to leave the country. The greater part of Sars- field's force immediately departed

for France, w-here they formed the nucleus of the famous Irish Brigade. William's adherents soon forced him to violate many provisions of the treaty, particularly that granting to Catholics the free exercise of their faith, and an era of persecu¬ tion was soon ushered in. In Irish history, Limerick is known as (

LIMESTONE, a common and widely dis¬ tributed rock, consisting essentially of car¬ bonate of lime and varying greatly in com¬ position, color and texture. Most limestones are of organic origin and represent the calcare¬ ous remains of sea animals, such as corals, foraminifera and mollusks. These remains may be reduced to a fine ooze by the action of the waves and in other ways, and the rock resulting from the consolidation of this ooze may show no trace of organic origin. Some limestones have been formed by the precipita¬ tion of calcium carbonate from sea water through evaporation in confined estuaries. Other limestones (travertine, calcareous tufa) have been formed by the deposition of calcium carbonate from springs, while still others repre¬ sent calcareous deposits in fresh-water lakes. The varieties of limestone are almost endless, including the crystalline limestones or marbles. Thus starting with nearly pure calcium car¬ bonate, the calcium may be replaced gradually by magnesium till finally we have dolomite,. the double carbonate of calcium and magnesium. Magnesian limestone is the proper designation until the ratio of calcium carbonate to mag¬ nesium. carbonate becomes 100 to .84, beyond wrhich it is dolomite. Pure dolomite contains 21.72 per cent of magnesia, but limestones con¬ taining over 5 per cent are said to be dolomitic.. Again the lime may be replaced by silica, with a gradual transition from limestone through cherty limestone to. pure cherts; or again iron oxide may replace lime with a resulting transi¬ tion. from limestone, to merchantable iron ore. Besides these chemical transitions silicious or

argillaceous sediments may be laid down with the Calcareous material, and in the resulting rocks we may trace gradual changes from limestone through limy sandstones to pure Sandstone and from limestone through marls or calcareous shales to ordinary shales. Bitu¬ minous matter may make limestone black or give rise to asphaltic varieties. Besides all these varieties of composition, limestones are often classified according to their texture, as earthy limestone, oolithic limestone with a con¬ cretionary texture, like the roe of fish, etc. Under rock stresses, with possible rise in tem¬

*perature, limestone becomes recrystallized and is then known as marble. Chalk is a soft and powdery textured limestone. Limestones are also classified according to the uses to which they are put, and thus we have cement rock or hydraulic limestone used for making cement, lithographic limestone, st~*uary marble, etc.*

The various limestones and marbles are widely used for building purposes, and a great amount of limestone is annually burnt to lime Or to cement, though no statistics of the amount thus used are available (see Cement; Lime). Limestone is also used as a flux in smelting iron and other ores, the total amount thus used in the United States in 1902 amounting to fully 9,000,000 tons. Of the limestones used as build¬ ing stone, particular mention may be made of the buff or dark gray oolitic Bedford limestone of Indiana and of the marbles of Vermont, Georgia and Tennessee. Marble or limestone is also used as a source of carbonic acid gas for aerated waters.

The uncertainty of composition of a lime¬ stone deposit is a constant difficulty in utilizing it for cement and flux. It is a matter of com¬ mon experience among quarrymen that to obtain uniform stone they must follow the beds of desirable composition, rather than to cut in straight lines. Limestone is found in horizon¬ tal deposits in successive layers, on what was once a sea bottom, and it varies in composition with depth. That which was laid at one period is most likely to be uniform, and this means quarrying along the strata selected, and also following what was formerly the shore line, if this can be determined.

Limestone is one of the most common rocks, and is found in almost every State and Terri¬ tory of the United States. Being heavy for its value, it does not pay to freight it great distances, hence efforts are made to quarry it in various localities for nearby consumption. About 15 per cent of the area east of the Rockies bears limestone. Most of the New England limestone occurs in the form of mar¬ ble, but denosits suitable for lime are found in large quantities in Berkshire County, Mass., and Litchfield and Fairfield counties, Conn. New York and Pennsylvania are both rich in limestone beds. There are extensive quarries near Buffalo that supply the blast furnaces. The Lehigh district of Pennsylvania contains immense quantities of cement rock and purer limestone beds. The valley of Virginia con¬ tains great deposits suitable for lime-burning, and easily accessible. This limestone belt ex¬ tends across the corner of West Virginia, through Maryland into Pennsylvania. Calcare¬ ous rocks predominate in Tennessee, northern Alabama and northern Georgia. The greater part of the lime made in Wisconsin is burned

from Silurian magnesian limestone found in the eastern part of the State. An extension of this belt of rock runs into Michigan. In In¬ diana the Bedford limestone, which is light gray, has attained a reputation as a building stone. Limestone is quarried in the southern part of Mississippi, and at intervals all the length of the Mississippi River. There is also a wide distribution in Missouri and Kansas, as well as Texas, Utah, Washington, Wisconsin, etc.

The total value of the limestone produced in the United States in 1909 was fully $32,000,- 000. See Calc-Tufa; Calcite; Chalk; Coral; Dolomite; Marble and Marl.

LIMICOLzE, ll-mik'6-le, a group of birds, within the order Charadriiformes, containing the plovers, sandpipers, snipes, sheathbills, coursers, seed-snipes, stone-curlews, jacanas (qq.v.) and their immediate allies, most of which are known to gunners as ((shore birds' or ((beach birds, ** because they haunt the shore of the sea or of inland bodies of water. They are mostly small, with slender bills of varying length, grooved f^or the nostrils, and in some families flexible at the tip, where nerves come close to the surface and enable the bird to feel about in the mud for its food. The legs are rather long, and the toes are ordinarily quite free, as these birds run about, and do not wade or swim as a rule ; some, indeed, rarely approach the water, but dwell upon dry plains. The wings are strong and the powers of flight con¬ siderable; the most extensive migrations known are performed by some of the limicoline birds. All make their nests on the ground, and many breed only in the far north; the young run about as soon as freed from the shell. Light and pleasing, but not conspicuous, colors pre¬ vail, but some species display great beauty. Nearly all are edible and are the objects of skilful sport by the aid of dogs, decoys and other devices to overcome their wit and wari¬ ness. Consult Evans, (Birds* (Vol. I, Cam¬ bridge Natural History,* 1900) ; Steineger, birds' (Vol. IV, (Standard Natural History, * 1885) ; Elliot, (North American Shore Birds* (1895) ; Baird, Brewer and Ridgway, (North American Water Birds* (1884); Sclater and Hudson, (Argentine Ornithology* (1888) ; and general works on ornithology and shooting.*

LIMINA. Among the most interesting phenomena of psychology are those that have to do with the relation between the intensity of a sensation and the intensity of the stimulus that excites it. It is found that it requires a certain definite amount of stimulus before any sensation whatever ensues. This is called the sensation-limen or lower threshold of sensation. Furthermore, even in the region within which the stimulus excites a sensation, an increment of the stimulus

to produce a noticeable incre¬ ment in the sensation must exceed a certain amount, known as the difference-limen. After a certain intensity of stimulus is attained no further increase in sensation-intensity can re¬ sult. This is known as the terminal stimulus. According to Weber's Law, which is very nearly attained for moderate stimuli, the difference- limen for a given sense is a definite fraction of the intensity of the stimulus. Limina of ex¬ actly the same nature as those for intensity exist for the quality, duration, extension and prob-

ably for clearness (though this case has not been so thoroughly investigated), and have the same properties and obey the same laws as those for intensity. The domain of feeling is like¬ wise subject to limina. For a discussion of the history of psychology work on limina and of the theories that have been put forward to ex¬ plain their existence and for a bibliography, see Weber's Law.

LIMITATION OF ACTIONS, a legal limitation to the period within which actions may be brought, varying usually in the United States from 6 years or less to 20 years. The sound policy of placing a reasonable limit to the time within which actions might be brought was early recognized in the law, and among those who enforced this were the Romans, who looked upon it as a proper punishment for the person who failed to assert his rights. They qualified it, however, by exempting lunatics and minors under 14 years of age — an exception that is recognized, with some modifications, in modern codes. The difficulty of preserving evi¬ dence for a long time, the death of witnesses, the probability that old demands are bad ones, the necessity of obviating uncertainties in titles and claims, and the discouragement of long credits, are also given as grounds for placing limitations on actions. In English law, it was first adopted in the reign of Edward I by stat¬ ute. Equity likewise recognized at an early period the justice of the principle.

By the weight of authority, actions for de¬ termining a status, and not to adjust claims against a particular defendant, are not limited. Examples of these are the validity of a mar¬ riage or other legal relation, the genuineness of a written instrument, or the like.

In actions on contracts not under seal, as a general rule, both in England and in the United States, no action can be brought after six

years, and the time is computed from the time the plaintiff could legally have brought his action. In the case of a bill of exchange payable at sight, the time is computed from the date of presentment. In actions upon contracts under seal or actions affecting the title to real estate, suit must be brought within 20 years. Any part payment of the debt or interest thereon or a new promise to pay it operates to suspend the statute, but it begins to run again immediately after the part payment or new promise. The promise may be expressed or implied. It has been held that an unqualified _ acknowledgment of the debt will be considered in law an implied promise to pay. It is provided generally by statutes in the United States and Great Britain that the limitation will not run if the plaintiff is under disabilities, as coverture, minority, im¬ prisonment, lunacy or absence from the coun¬ try. Fraud of the defendant wh'ch prevents the plaintiff from asserting his right will also, as a general rule, prevent the statute from run¬ ning until the plaintiff discovers such fraud. In actions of tort there is less uniformity in the statutes of the United States than in actions of contract as to the time when suit is barred. This varies in the case of torts from two to six years.

LIMITED LIABILITY, in modern stat¬ ute law, a principle whereby the nersons liable are bound under certain clearlv defined condi¬ tions. The phrase is chieflv used in connection with stock companies, meaning that the stock¬

holders shall not be called upon, under any cir¬ cumstances, to contribute more than the par value of the shares of stock for which they have subscribed. If the debts of such a com¬ pany, when wound up, amount to more than the resources of the company can meet, the creditors must bear the loss. In the United States shareholders in national and other banks, insurance companies, etc., are held to a specific and strict liability; in the case of the national banks, it is for twice the amount subscribed. In England the shareholders of a limited com¬ pany from whose name the word ˆlimited® is omitted must pay its debts in full. The United States Congress has adopted the rule followed by the British Parliament, and prevailing in European countries generally, with respect to the maritime law (q.v.) whereby a ship¬ owner, by surrender of the ship and the freight, may absolve himself from liability for negli¬ gence on the part of master or crew. Under the amended United States Revised Statutes the principle of limited liability is clearly main¬ tained and defined as applicable in this country; wherefrom it appears that ((the owner of any vessel, whether steamer or canal-boat, employed whether in seagoing or inland navigation, whether he be an American citizen or a foreigner, may obtain a limitation to the value of his interest in the

vessel and her pending freight, of his liability not onlv for the results of a single disaster, but for the results of a disastrous voyage, including all debts due on account of the vessel save seamen's wages.® If the ship and freight are lost, the owner must abandon all claims in regard to • the vessel and cargo to the injured party. If he collects these he is liable to the injured parties to the extent of the proceeds. This limitation is confined to the owner of a vessel who is not in charge thereof and master and seamen are not exempted from liability if the injury is due to their misconduct. Consult Benedict, E. C., (The American Admiralty, its Jurisdiction and Practice > (New York 1898).

LIMITED MONARCHY. See Mon¬

archy.

LIMITS, Theory of. See Real Variable, Theory of Functions of the; Series; Cal¬ culus, the Infinitesimal; Assemblages, General Theory of.

LIMNiEA, the central genus of the pulmo- nate family Limnceidce, containing the typical fresh-water snails. See Pond-snails.

LIMNANDER DE NIEUWENHOVE,

lim'nan-der da ne'ven-ho've, Baron Armand Marie Guislan, Belgian composer : b. Ghent, 1814; d. Paris, 1892. He studied at the Jesuit College of Saint Acheul, near Amiens, later at Fribourg, and Fetis was his instructor in har¬ mony and composition. He became conductor of an amateur symphonic society, and founded the <(Reunion Lyrique,® a choral society, at Mechlin, where he started his career as a composer after his return from Switzerland. He published a

performed at the Opera Comique in 1849. This was followed by (Le chateau de la barbe bleue} in 1851 and (Yvonne > in 1859. His (Maitre- chanteur) presented at the Opera in 1853 was revived as

LIMNO, LIMNOS, a name given to the island of Lemnos and also applied to the town of Kastro or Kastrow (q.v.).

LIMOGES, le-mozh, France, an episcopal city, capital of the

department of Haute- Vienne, situated on a hill sloping to the Vienne, here crossed by three bridges, 88 miles west of Clermont. The streets are narrow and tor¬ tuous ; but the fortified walls which sur¬ rounded the town have been replaced by fine shady boulevards. The principal edifices are the cathedral, commenced in 1273, presenting both Romanesque and Gothic features ; the Gothic church of Saint Michel des Lions; the church of Saint Pierre du Queyroix; a modern town-hall, palace of justice, bishop's palace, public library of 90,000 volumes, school of decorative art, and meteorological observatory. It is the headquarters of the 12th army corps. The art of enamel is said to have flourished here from the 12th century, and the city is not¬ able for a series of artists eminent for beautiful paintings in enamel. The principal industry is the manufacture of porcelain, b -gun in 1736, and employing thousands of workpeople; there are. also wool and cotton spinning mills, paper mills, and shoe and clog manufactures. Book printing is of importance ; a press was set up in 1496. It has a considerable trade in cereals, wfine and spirits, wood and cattle.

Limoges was originally the capital of the Gallic tribe, the Lemovices, and an important city as the Roman <(Augusboritum Lemocicum.® There are some remains of the Roman occupa¬ tion inscriptions and other fragments. The city has been twice depopulated by pestilence, in the 10th century when 40,000 are reported to have perished, and in 1630-31, when 20,000 were taken. It was taken by assault by Edward the Black Prince in 1370, when a massacre of 3,000 of the inhabitants ensued. Pop. 92,181.

LIMON, le-mon', or PUERTO LIMON,

poo-ar'to le-mon, Costa Rica, Central America, a port on the northeast coast, 72 miles (103 by rail) east of San Jose, the capital at the eastern terminus of the interoceanic railway. The port has been greatly improved by modern docks and iron piers, and a growing export trade is carried on especially in coffee, also in bananas, rubber, mahogany, dyewood, etc. The town has ice factories, a brewery, a fine water supply and a modern sewerage system. Pop. 7,021.

LIMONITE, an ore of iron (q.v.), varieties of which are bog iron ore and yellow ochre. It is a hydrated oxide of iron (2Fe203.3H20) , of a brownish color, occurring in mammillated or botryoidal masses, which when broken across show a fibrous radiating structure, and also in compact and earthy masses. It is opaque, rather brittle, moderately hard, and has specific gravity 3.6 to 4. It dissolves in*

warm aqua regia ; when heated it loses water and becomes magnetic. It is an important ore of iron, and is found abundantly in the United States, es¬ pecially in Virginia and Alabama, and in other parts of America; also on the continent of Eurone, and in some parts of Great Britain. In 1914 the United States produced 1,537,750

long tons of this ore, that is, about 3 per cent of the total iron ore production. See also Iron Ores.

LIMPET, a gastropod mollusk, with a low, conical, non-spiral shell ; properly a representa¬ tive of the families Patellides and Acmesides. The former has no ctenidia or true gills, 'but breathe by means of a ring of special branchial filaments between the mantle and the foot; in the latter the left ctenidium functions as a gill and there is no accessory ring. By means of a muscular, sucker-like foot, the limpets adhere so firmly to rocks near low-water mark that they defy the beating of the heaviest surf and are difficult to detach without injury. At high- tide they move about in search of the algae on which they feed, but are said to return to exactly the same place and position, the muscle in time wearing a smooth spot or "form® on the rock, and the shell becoming adapted to its irregularities. A widely distributed circum¬ polar species (Acmes a testudinalis) is common on the New England coast, and may he recog¬ nized by its low, conical, smooth shell with the eccentric apex slightly turned forward. In Europe limpets are utilized as food and in this country for bait. The key-hole limpets belong to the family Fissurellides, in which the shell is usually perforated like a key-hole at the apex to permit the protrusion of a process of the mantle. Numerous species occur in the littoral zone of warm seas. The Haliotides, ear-lim¬ pets or abalones (q.v.), are closely related. The cup-and-saucer limpets and slipper-limpets (Calypt resides) have flat shells usually provided with an internal lip or shelf. Several species of Crepidula, having interesting commensalistic habits, are abundant on our coasts, and are known to fishermen as (Vol. Ill, London 1895) ; ˆStand¬ ard Natural History) (Vol. I) ; Arnold, (Sea Beach at Ebb-tide) (New York 1901) ; Mayer, (Sea-shore Life> (New York 1906).

LIMPKIN, a crane-like bird of the swamps of tropical America, known and superstitiously feared by the ignorant natives on account of its sombre plumage and wailing cry. Two species exist, Aramus scolopaceus and A. pictus.

LIMPOPO, lim-po'po, or CROCODILE RIVER, South Africa, a river which rises to the south of Pretoria in the Witwatersrand, flows northwest through the Transvaal, then northeast, forming for a

considerable distance the northern boundary of the Transvaal prov¬ ince, then southeast into the Indian Ocean north of Delagoa Bay; length about 1,100 miles. Its largest tributary is the Olifants, which flows through the Transvaal and joins it in Portu¬ guese territory.

LINACRE, lin'a-ker, Thomas, noted Eng¬ lish physician and scholar: b. Canterbury, Eng¬ land, 1460; d. London, England, 20 Oct. 1524. He was the projector of the College of Physi-

cians in London and the founder of lectureships in both Oxford and Cambridge.

LINARES, Jose Maria, hd-sa' ma-re'a le- na'res, Bolivian statesman : b. Potosi, 10 July 1810; d. Valparaiso, Chile, 1861. He was' ad¬ mitted to the bar, was appointed one of the commissioners to prepare a legal code for Bolivia, in 1839 became Minister of the Interior, later Minister to Spain, and in 1848 president of the Senate. In 1857 he was chosen President, but was deposed by revolutionists in January

1861.

LINARES, Chile, (1) a southern province bounded north, south and west by the provinces of Talca, Nuble and Maule, and on the east by the Andes; area, 3,942 square miles; pop. 1 12,- 566. Its surface is mountainous, but there is a large acreage well adapted to grazing. Stock raising is the chief industry. A railway, one of the main arteries of Chile, traverses the province from north to south. (2) A town, the capital of the above province, 10 miles south¬ east of Talca, 55 miles from the coast and about 85 miles north by east of Concepcion. It has a large trade and is the distributing centre for the commerce of the province. It is reached by rail from Santiago. Pop. 11,122.

LINARITE. A basic hydrous lead-copper sulphate PbO.CuO, SO3. H2O. in Cerro Gordo mine, Inyo County, Cal., and Silver Horn mine, Beaver County, Utah.

LINCOLN, Abraham, 16th President of the United States : b. in a rude farm cabin near Hodgensville, Ky., 12 Feb. 1809; d.

Washington, D. C., 15 April 1865. The birthplace is marked by a memorial structure dedicated on his hundredth anniversary. He was the first son and second child of Thomas Lincoln and Nancy Hanks, both born in Rockingham County, Va., of parents who were among the earliest emi¬ grants to the new country beyond the moun¬ tains. They were married in Washington County, 12 June 1806, at the home of Richard Berry, guardian of the bride and husband of Lucy Shipley, her aunt. Thomas was not yet six when his father, Abraham, was killed by lurking Indians while he was at work on his farm. The estate, mostly of wild land, de¬ scended by the existing law to his eldest son. No account remains of the widow's subsequent life. Probably she did not long survive the tragedy. Thomas grew up utterly without edu¬ cation and apparently without a definite home. Principally occupied as a farm and forest la¬ borer he acquired some knowledge of the tools and trade of a carpenter. For reasons not uncommon in the lives of families separated by distant migration's the President had little knowledge of his forbears beyond the paternal grandfather. Long after his death it tran¬ spired that the first American progenitor was Samuel Lincoln who came from England as a weaver's apprentice in 1637. Two elder brothers had previously settled at Hingham, Mass.; named after the English shire town of County Norwich, their ancestral home. Samuel joined them there after completing his apprenticeship at Salem. Neither of the brothers left issue, the name being perpetuated through Mordecai, son of the young weaver; Mordecai 2d, his grandson; John, a great-grandson who lived for a time in Berks County, Pa., removing to Virginia; Abraham, the Kentucky pioneer; and

Thomas, fifth in the order of American birth. The pedigree has been further traced through four generations in England. In both the old home and the new the main and converging lines of heredity gave promise of familv dis¬ tinction should time and occasion propitiously meet. It was mistakenly believed for a time that Thomas and his wife were first cousins. She was the daughter of Joseph Hanks and Nancy Shipley ((as named in the hus¬ band's will), who was a sister of Lucy Shipley, wife of Richard Berry before mentioned. Another sister, Mary by name, had married Abraham Lincoln the elder, and it was assumed that she was the mother of all his children. In fact, however, Mary Shipley died prior to the Kentucky migration and was succeeded by Bathsheba Herring, daughter of Leonard Her¬ ring, a Virginian of English parentage. Thomas was the son and only child of this second marriage and therefore unrelated by blood to Nancy his wife. It is worthv of passing mention that still another of the Ship-ley sisters was married to Thomas Sparrow and went with him to the

Kentuckv wilderness. Through the marriage of their daughter with one Charles Friend she became the grand¬ mother of Dennis Friend who somehow came to be known as Dennis ˆHanks® ; and was no credit to either name. The irresponsible chatter of this waif did much to mislead the biographers both as to the story of Lincoln's youth and the Hanks genealogy. (Consult Lea and Hutchinson, (The Ancestry of Abra¬ ham Lincoln, y Boston 1909). The first home of Thomas and his wife was at Elizabethtown, Ky., where he pursued his trade as carpenter. Two adventures in farming ensued, the first on the Nolin Creek place where their famous son was born. A second son, also born there, lived but a few weeks. Upon neither farm apparently were payments made sufficient to create a salable interest. In 1817, several re¬ lated families accompanying them, they moved to Indiana, settling on a wooded tract near Gentryville in Spencer County; so named after the keeper of a cross-roads store. A railroad junction point called Lincoln City occupies a part of the chosen homestead. In October of the following year a mysterious epidemic swept the district, Mrs. Lincoln being one of many victims. During the next 14 months, the daughter, but two years older than Abraham, kept house for the sorrowing family. On 2 Dec. 1819, Thomas took another wife from Kentucky, Sarah Johnston (nee Bush), a widow with three children residing at Eliza¬ bethtown. Her advent greatly improved the family circumstances, for besides household conveniences such as the children had never known she brought a kind and cheerful na¬ ture. Among crther benefits conferred she en¬ couraged the boy in studies, which his father regarded as a form of idleness. Less than a year of school attendance is all that fell to his lot, but with this meagre help he learned to read and write and to ((cipher to the rule of threeA Luckily there were a few good books within reach, all of which he eagerly read. He remembered well, thought much and diligently exercised the knowledge gained. In other re¬ spects he was a boy among boys, loving fun and not enamored of manual toil. He was made to work at home or on the neighboring farms,

clerked at odd times in Gentry's store and at the age of 19 accompanied the son of that worthy on a flat-boat trip to New Orleans, trading along the way and returning by river packet. On that memorable venture he first came into conscious contact with slavery, wit¬ nessing, it is said, an auction sale of negroes and vowing that if ever the opportunity came to (< h i tJ) that system he

would “hit it hard.® In the spring of 1830 at the beginning of his majority the family moved to Illinois to settle (temporarily as it proved) near Decatur. After helping to fence and break up part of a prairie farm and to erect a cabin thereon for the fam¬ ily shelter the young man turned to face the world on his own account. Besides the cloth¬ ing he wore, he had nothing but his well-mus¬ cled frame of six and one-third feet in height, a mind matching his great stature in native strength and manners, rude and quaint, to be sure, but springing from a brave and generous soul. After a few weeks of labor with axe and hoe he engaged with John Hanks, one of his mother’s tribe, to conduct another flat-boat down the great river. Their employer, Dennis Offut, had failed to provide the boat as prom¬ ised whereupon the two men proceeded to build one. The delay caused Hanks to abandon the voyage but Lincoln with other help completed it. Offut, a merchant, loosely planted at New Salem, on the Sangamon, near Springfield, formed a liking for the stalwart youth, with the result that Lincoln became a resident of the mushroom village and a helper in the varied and often disastrous enterprises of his new- made friend. Offut soon drifted awTay but Lin¬ coln remained, serving the small community as a mill-hand, clerk in the village stores, postJ master, deputy surveyor and the like, rapidly growing in public esteem. Indian disturbances (the Black Hawk War) called for the creation of a military force. Lincoln volunteered as a private and was elected captain. No fighting occurred in his vicinity and the “war® soon ended. Returning to New Salem he became a candidate for the legislature, failing of elec¬ tion but receiving nearly the entire vote of his precinct. Settled in nothing save the desire for self-improvement, he ventured, with another as poor as himself and wholly on credit, to pur¬ chase a failing store. It continued to fail till only the debt remained. This burden, which he whimsically called (

he moved to Springfield and engaged in the practice. That day 28 years later, at the sum¬ mit of national power and fame, an assassin’s shot was to lay him low.

In politics the young statesman was of the minority faction. The Democratic party was dominant in both his State and the nation, such opposition as there was holding loosely to¬ gether under the nondescript name of Whigs; but it gradually strengthened until in 1840 its presidential candidate (Harrison) was elected. In 1838 and again in 1840 Lincoln received the Whig vote for speaker of the assembly. He was also on the Whig electoral ticket in the campaigns of 1840, 1844 and 1852. His one election to Congress occurred in 1846, the term ending at the inauguration of the second Whig

President (Taylor) 4 March 1849. He did not seek re-election, his district being governed by a kind of a <(gentleman's agreement® that the honor should be passed around. Meanwhile (4 Nov. 1842) he was married to Mary Todd, daughter of Robert S. Todd of Louisville, Ky. She with two of their four sons lived to mourn his untimely death. One of the sons died in early infancy, another in the White House at the age of 12. Mrs. Lincoln was of high social rank, brilliant, cultured and ambitious. She proved a devoted wife and mother, but by rea¬ son of a cerebral ailment not generally known her married life was not altogether happy. Her last days (1882) were clouded by a mild insan¬ ity, hastened no doubt by the awful tragedy en¬ acted in her presence and by the loss of her young son Thomas (<(Tad®), who died 15 July 1871. The political activities referred to of course retarded Mr. Lincoln's progress in the law. Besides the legislative attendances at home and in Washington, there were repeated canvasses of his district and State to be cared for and no end of letters and conferences. As a ((case® lawyer, however, his reputation stead¬ ily widened. The death of President Harrison almost at the beginning of his term and the early apostacy of Tyler, his successor, left noth¬ ing of Federal preferment to the Whig poli¬ ticians. The advent of Taylor opened the door to a hungry crowd. Lincoln had supported him by speeches in Congress and elsewhere and the new Congressman from the Spring- field district was of the opposite party. By current practice, therefore, Lincoln was en¬ titled to a voice touching Federal appointments. The office of land commissioner was accorded to Illinois. After recommending others with¬ out success he sought the place for himself. Instead he was offered the governorship of Ore¬ gon Territory, a post which seemed to prom¬ ise early promotion to the Senate. His wife rejected it and thus he was saved for greater things. During the next five years he practised law more assiduously than every before, ad¬ vancing to high rank among the leaders of the Illinois bar. He appreciated the handicap of a defective education and strove mightily to over¬ come it. As he had studied grammar and sur¬ veying at New Salem he now grappled geom¬ etry, in order as he said to master the art of "demonstration.® But political events were soon to reclaim his attention. The controversy over slavery, measurably quieted by the Mis¬ souri Compromise of 1820, broke out afresh 30 years later and was again partially sup¬ pressed through a series of Congressional acts

Mv

ABRAHAM LINCOLN

known as the compromise measures of 1850. Within a short four years the slave-holding South demanded and obtained the overthrow of all legislation which tended to confine or dis¬ credit her favorite institution. Stephen A. Douglas, the leading senator from Illinois, was chairman of the Committee on Territories. He had championed the settlement of 1850, and in doing so had proclaimed undying allegiance to the Missouri Compromise whereby <(Mason and Dixon's Line® was made the northernmost limit of slavery. Now he had fathered the <(Kansas-Nebraska bill,® the act which both in terms and by necessary implication rejected the compromises and denied their legality. His agency in the matter made the storm of pro¬ test especially violent in Illinois and Lincoln was thoroughly aroused. Douglas had great ability and towering ambition. He desired and expected to be President, having already con¬ tested the nomination of 1852. His advocacy of the repeal was likely, he believed, to ensure undivided support in the South which, with but a fraction of the Northern party strength, would give- him the prize. His term in the Senate had yet four years to run but his col¬ league and friend from Illinois, James Shields, would be re-elected or replaced by the legisla¬ ture shortly to be chosen. Lincoln entered the contest with vigor, speaking throughout the State and (against his own preference) stand¬ ing for election to the lower house from San¬ gamon, his home county. <(Anti-Nebraska® won by a slender margin and by general ac¬ claim Lincoln became its candidate. To avoid a legal quibble touching eligibility he resigned his membership, only to see the vacancy filled by a Democrat chosen at a special election. Five of the majority, formerly Democrats, re¬ fused to support him, preferring Lyman Trum¬ bull, one of their kind. After many ballots, the choice of a pro-slavery senator being immi¬ nent, he persuaded his friends to vote with the stubborn few ; a fortunate outcome as it proved, though for the moment sorely disap¬ pointing.

The events of 1854-55 thus lightly sketched were accompanied and followed by a bitter struggle for the control of Kansas, first of the new States to seek admittance. Settlers from the North, some of them aided by anti¬ slavery societies, were met by ((border-ruffians® so-called, entering from Missouri. Armed con¬ flicts ensued and (

three, other free States, including Illinois, went to him, but only because the majority was divided between Fremont and Fillmore. Slav¬ ery was continued in official power, but the triumph was big with disaster.

The new administration was wholly sub¬ servient. Unscrupulous efforts to force slavery upon unwilling Kansas were favored and seemed likely to succeed. Douglas, whose senatorial term was drawing to a close, could not lose his hold upon Illinois without aban¬ doning all hopes of the Presidency. Making a virtue of necessity, therefore, he resisted the Kansas intrigues, and the State came in with a free constitution. This strategy worked marvelous improvement in his prospects at home. In 1854 when he returned red-handed from the slaughter of compromise he had encountered public obloquy and sullen resent¬ ment, resulting as already noted in the choice of a colleague inimical to his party. Now he came as the hero of a knightly rescue ; the savior of free Kansas in some eyes, to others a stern defender of justice unshaken by per¬ sonal risk. Republicans in and out of the State began to advise that his re-election be not op¬ posed, deeming it ®good politics® thus to pro¬ mote schism in the enemy's household. Lincoln moved promptly to steady the Republican phalanx and the danger soon passed. Partly to head off the threatened defection, in part to bind the new legislature by a definite man¬ date from the people, a convention called for the nomination of State officers named Lincoln for the Senate. He responded (16 June 1858) in a speech which exhibited at their best both his intellectual power and his rare facility of terse and accurate expression. In this, the much-quoted (

the first branch of his familiar sobriquet. Lin¬ coln, the taller by eight inches or more, was of corresponding intellectual reach. Less volu¬ ble, less gifted in voice and exterior attractive¬ ness, he was more thoughtful, better tempered, surer in his knowledge of the history involved and far above Douglas in the saving quality of humor. His own estimate of the comparative merits of their speeches was expressed late in the following year when he caused both to be reprinted side by side, for campaign pur¬ poses, without change and (

The State was carried on the popular vote, but the existing apportionment gave the advan¬ tage to Douglas who was returned to

the Senate by a majority of five. Commenting upon the outcome Lincoln wrote 19 November, <(I am glad I made the late race. It gave me a hearing on the great and enduring question of the age, which I could have had in no other way ; and though I now sink out of view, and shall be forgotten, I believe I have made some marks which will tell for the cause of liberty long after I am gone.® But he was not to be lost from sight or memory. The great debate continued on a wider field. He was called to speak in other States and finally (27 Feb. 1860) by a masterly address at Cooper Institute, in New York City, the growing impression of his leadership was greatly extended. But there were few to think of him then as a possible chief magistrate. The national convention was to meet within the next 80 days (16 May 1860) and it was the general belief that Senator William H. Seward of New York would be the Republican nominee. Fully two-thirds of the delegates expected to vote for him. There were, however, elements of weakness in his candidacy. He had echoed the sentiment of Lincoln's house-divided speech, terming the slavery dispute an irrepressible conflict be¬ tween opposing and enduring forces,® one of which must eventually triumph, but he had previously declared in a Senate debate that there is a higher law than the Constitution governing the nation's stewardship of the pub¬ lic domain. This had associated him in the public mind with the extreme abolitionists by whom the constitution was openly flouted. Some of the Northern States which Fremont had failed to carry were necessary to Republican success. Three of them, Pennsylvania, Indiana and Illinois, were to elect State officers in October. Republican leaders, in the last two especially, were convinced that Seward's nomi¬ nation would alienate many voters otherwise friendly. Their firm opposition coupled with the purely personal hostility of Horace Greeley, whose newspaper, the New York Tribune, was widely read by Republicans, led to caution and delay. There was the usual array of ((favorite sons® to receive perfunctory support on the opening ballot, but it was soon apparent that if Seward were set aside Lincoln would be the choice. The nomination was dictated by considerations of availability. Lincoln could carry Illinois — had done so but two years before. Indiana probably would favor him also. Pennsylvania, pledged to Simon Cameron, was indifferent toward Seward. In the midst of excitement prudence worked powerfully. Seward received but 1 73p votes at first, 40ˆ4 fewer than the required majority. Lincoln had

102. The leader gained 11 votes on the second ballot as against a gain of 79 for his rival, The third resulted in a majority for Lincoln, and after a painful delay the nomination on motion of New York was made unanimous.

The Democratic convention had met at Charleston, S. C., in the preceding month (23 April 1860) hopelessly divided. Douglas held a decided preponderance over all opponents but not a two-thirds majority as required by the party usage. He had offended the South beyond forgiveness by his course in the debates with Lincoln hardly less than by his contumacy on the Kansas issue. The North refused to yield and the convention split into two angry factions without

nomination by either. Eventu¬ ally two Democratic candidates were presented, Douglas being named by the Northern wing and John C. Breckenridge of Kentucky by the Southern minority. A fourth ticket, headed by John Bell of Tennessee, appealed to the neutral element and proved stronger than was expected ; it prevailed in three of the slave¬ holding States whose electoral votes aggre¬ gated 39. While division in the dominant party lent encouragement and vigor to the Republican campaign it can hardly be doubted that the pro-slavery element would have failed in any event. Lincoln received 180 electoral votes, all from the North, and Breckenridge 72, all from the South. Douglas carried Missouri only, but through a fusion agreement obtained three elec¬ toral votes from New Jersey, a total of 15. The popular vote, however, varied remark¬ ably, that of Breckenridge being but a trifle more than that accorded to Bell. Douglas out¬ stripped the former by more than half a mil¬ lion and fell behind Lincoln by a slightly lower number. The combined opposition polled nearly a million more votes than were cast for the candidate whose majority in the electoral col¬ lege was 57 over all. Lincoln never forgot that he was a minority President, nor that his nomination had come from a convention <(which was two-thirds for the other fellow.® To his analytical mind these circumstances evinced a confused state of public feeling and opinion calling for caution no less than firmness in the execution of his official trust.

The interval between the election and inau¬ guration day (4 March 1861) was utilized by the southernmost States in perfecting measures of secession. Though it . was well known that the incoming administration intended no inter¬ ference with, slavery where it already existed, its protagonists were stung to the quick by the decision of the country to confine the sys¬ tem to a limited area, and that upon the avowed ground that it was both politically and morally a wrong. Such a decision they regarded as insulting, but more than that, they perceived that it placed their cherished institution, as Lincoln had phrased it, <(in the course of ulti¬ mate extinction.® Their resentment and their fears led to speedy action. Pretexts for dis¬ solving the Union were not wanting; the thought was not new. Buchanan, confused and terrified bv the situation, interposed no obstac¬ les. In his message to the new Congress (3 Dec. 1860) he easily demonstrated the utter illegality of all attempts to secede, but with astonishing want of logic maintained that the Federal government possessed no lawful right to resist secession. In a word, that a nation

ordained to be perpetual could not defend its . perpetuity without breaking the law of its being. The result was that when the President¬ elect arose to repeat the inaugural oath, with its specific obligations to protect and defend the national Constitution and to take care that the laws be faithfully executed, the forms of secession were already accomplished and a new nation, ((all slave,® was asserting its separate existence.

The inaugural address, as tactfully as the case would admit, but without the slightest hint of uncertainty, declared that in view of the Constitution and the laws the Union was un¬ broken; that all resolves and ordinances of attempted secession were legally void; and that so far as the means were provided the Presi¬ dent would execute the laws in all the States alike. The rest was a calm review of the grounds of dissension and a moving appeal to the minds and hearts of all lovers of the Union for a peaceable settlement and a resumption of healing friendships. The address made no im¬ pression in the South except as its moderation was construed as a sign of weakness. The North indeed failed to grasp its real signifi¬ cance. As a declaration of policy it never stood in need of revision or enlargement. Doc¬ trine, duty, purpose and method are all clearly defined; only the wisdom, perseverance, re¬ sourcefulness and will of the speaker were as yet unknown. With sagacity which seemed to border on rashness he summoned to his Cabinet the four principal leaders who had contested his nomination, Seward, Chase, Bates and Cameron. At least two of these deemed them¬ selves vastly superior to their chief in all the qualities of statesmanship. Their great abil¬ ities served the country well, but the President's mastery was not long in doubt.- Carefully avoiding acts of aggression, and with equal care declining to recognize by word or deed the claims of the so-called Confederate government, he waited for the crystallization of Union senti¬ ment. It came with the assault upon Fort Sumter and its enforced surrender, 14 April 1861. The following day he proclaimed a state of insurrection, called forth the militia to the number of 75,000 and summoned Congress to assemble on the ensuing 4th of July. Four days later a blockade of some of the Southern Tpˆprts was announced. Other measures of de¬ fense were taken, including calls for volunteers to re-enforce the regular army and navy, sus¬ pension of the writ of habeas corpus in dis¬ affected quarters, extension of the blockade, and the like, all in harmony with the declared purpose to protect the Union and execute its laws.

Pending the meeting of Congress loyal sentiment gradually

strengthened. In a mes¬ sage of great power the case for the govern¬ ment was explained and enforced. All sug¬ gested legislation was promptly enacted. The South, more firmly united and not less deter¬ mined, plunged into a military struggle and four years of bloody warfare ensued. The story of battles and campaigns must here be omitted; neither can the civil history of that troubled neriod be narrated except in barest outline. There were many in the loyal States whose resentment of Southern domination led them to favor separation as a fortunate rid¬ dance. Others accepted the extreme view of

.State rights, including the right of secession. Many shrank from civil war and would con¬ sent to disunion rather than fight. The aboli¬ tionists would make the war a means of de¬ stroying slavery forthwith, while the President and a vast majority of his party were com¬ mitted to the doctrine that abolition could not lawfully be enforced. These must unite, if at all, upon the single purpose of saving the Union. The avowal of any other aim within the first year inevitably would have wrecked the national cause. Lincoln almost alone per¬ ceived that the one unifying appeal must be kept in the foreground, and with undying patience, disregarding ridicule, distrust and ob¬ loquy, he restrained rashness, encouraged the timid, reassured the doubtful, persuaded the hostile. At bottom his title to enduring fame rests upon his unerring comprehension of the great task before him and his matchless skill in putting into timely and convincing words the fundamental truths to which the minds of honest men at last must yield. Slavery which had invoked the sword perished by the sword. Emancipation came (1 Jan. 1863) not of set purpose but as a by-product of national self- preservation. Neither side expected it. (

tounding.® But Lincoln's credit for the event is no less because he waited for an occasion to strike lawfully and with assured effect. It must have given him intense satisfaction. ((I am naturally anti-slavery,® he wrote to A. C. Hodges, 4 April 1864. (

promise of freedom to every slave. The 13th amendment to the Constitution was but the for¬ mal recognition of a fact already accomplished.

A marked example of both the sagacity and the magnanimity of the President is found in his selection of Edwin M. Stanton as Secretary of War upon the early retirement of Cameron. This imperious but intensely loyal man had treated Lincoln with marked discourtesy both before and after the latter came to the Presi¬ dency. But Lincoln comprehended both the strength and the weakness of his waspish critic. Disregarding the personal affronts he placed Stanton in a position of almost despotic power, and reaped for himself and the country a harvest of incomparable service. In the same spirit he made Salmon P. Chase chief justice of the United States Supreme Court, after that great minister of finance had retired from his Cabinet a disappointed aspirant for the presi¬ dential succession. General McClellan, while in command of the Potomac army, displayed toward his great superior a very unfortunate attitude. Remonstrances against submission to such treatment called forth no response but this : ((I would hold McClellan's horse if that

would bring us victories.® Chief among his many disappointments was the failure, one after another, of his chief military appointees. The field of choice was limited, of course, to those educated for the army and not openly disloyal. Only experience could determine who of these were fit to command. He would not condemn any in haste. Some were retained perhaps too long because better were as yet unknown. Re¬ peated disasters at last sent incompetents to the rear and possibilities of victory began to emerge. High hopes inspired by the fall of Vicksburg (4 July 1863) and the concurrent defeat of Lee at Gettysburg suffered painful relapses. The following spring (9 March 1864) General Grant, whose successful career in the West had won the country's confidence, was placed in supreme control. Thence onward unity of plan and movement took the place of divided efforts. Meanwhile, very largely under the President's personal direction, the dangers of foreign intervention were met and averted. But as the season for nominations and elec¬ tions approached conditions were extremely de¬ pressing. Immense losses attended the grapple with Lee's army in the Wilderness of Virginia. In Georgia the forces under Johnston were eluding the efforts of General Sherman to bring them to bay. Financial difficulties accumulated; discontent spread among powerful leaders in Congress and elsewhere. Lincoln naturally de¬ sired re-election, both on his own account and for the national cause, but the clamor of the few and the slow progress of events in the field led him at times to forbode defeat both in convention and at the polls. The convention met at Baltimore, 7 June 1864. His renomina¬ tion, never in doubt, was made unanimous upon the first ballot. For reasons of expediency, a Vice-President was

named from the South, An¬ drew Johnson of Tennessee succeeding Hanni¬ bal Hamlin of Maine. Opposition on the part of radicals did not cease immediately. They had previously (31 May 1864) held a mass convention which assumed to name Fremont as a Republican candidate, but no manifestation of popular support was evoked and its ticket was later withdrawn. The Democratic conven¬

tion (29 Aug. 1864) nominated Gen. George B. McClellan, who despite his repeated failures as a general had retained a singular hold upon popular favor. His failures indeed had en¬ hanced his popularity, owing to strenuous claims that the administration had thwarted his military plans in order to disgrace him. No more dangerous candidate could have been chosen as matters then stood, but the conven¬ tion platform was a marvel of political unwis¬ dom. It recited as an historical fact that the war so long waged for the Union had been a "failure,® and demanded the immediate cessa¬ tion of hostilities that peace might be obtained through a convention of the States. Opportune victories, however, put an end to the charges of failure. The capture of Atlanta (2 Sept. 1864) and Sheridan's whirlwind progress through the Shenandoah Valley were campaign arguments of compelling force. McClellan car¬ ried but three States, New Jersey, Delaware and Kentucky, casting 21 electoral votes. Lin¬ coln received all the rest, 212 in number, and a popular majority of nearly 500,000,

Opposition in the North practically ceased with this overwhelming vote of confidence. There were murmurs of discontent over the President's, evident inclination to deal leniently with the misguided South, but these came from would-be leaders rather than the masses. The Confederacy speedily fell apart. By his patience and sagacity, by his steadfast resolve and his faith in the integrity and capacity of the people, by his ready sympathy with the common sufferings and his eagerness to receive and to grant petitions for help and for mercy he had acquired and at last enjoyed an influence far greater than the mere authority of his office. Constantly assailed by ignorance and malice he had so administered his great trust as to make reunion comparatively easy. Hardly a word of denunciation fell from his lips or pen throughout those trying years. "I shall do nothing in malice,® he wrote. "What I deal with is too vast for malicious dealing.® His almost unbounded charity was based upon a profound study- of the feelings and motives of men. He ruled by a right more Divine than any right of kings.

The principal army of the Confederacy sur¬ rendered to General Grant 9 April 1865. It was confidently expected that further resist¬

ance would shortly cease. In the elation of the moment it was resolved to celebrate the fourth anniversary of the fall of Fort Sumter by a harmless bit of ceremony, signalizing upon 'the same spot the restoration of the national au¬ thority throughout the land. Accordingly at noon of that day the identical flag which Major Anderson had been forced to haul down as the, first definite concession to armed insurgency was by the same hand again unfurled above the crumbling fortress. That, evening, the mission of the great President being in substance per¬ formed, his martyrdom was also accomplished. He had sought relaxation by witnessing a play at Ford's Theatre in Washington. There he was shot by a crazed secession zealot, J. Wilkes Booth by name, stealthily approaching from the rear. He fell unconscious in the arms of his wife and died at about seven of the following morning. The tragedy proved but a part of an infamous plot to slay several leading officials of the government. Secretary Seward, at about

the same hour, was dangerously stabbed by one of the conspirators while lying sick at his home. Other intended victims escaped through miscarriages in the concerted scheme. Booth, leaping from the President's box to the stage below, sustained a fracture of the leg, but with the aid of confederates escaped across the Potomac. He was soon discovered in hiding and was fatally shot while resisting arrest. Four of the remaining conspirators, including a widow named Mary Surratt, were convicted by a military court and hanged (7 July 1865). Four others were sentenced to prison. Natu¬ rally the Confederate government was suspected of direct complicity in the crime. The suspicion was unfounded, but the mingled grief and rage of the people brought upon the South distress¬ ing consequences. Harsh measures of recon¬ struction were adopted, such as Lincoln surely would have disapproved and by his great in¬ fluence might have averted. Friend and foe suffered in a common calamity.

Bibliography. — 'Writings and Speeches; Lincoln's Complete Works,) edited by his secre¬ taries, J. G. Nicolay and John Hay (2 vols., New York 1894; same extended to 12 vols., id. 1905) ; (The Writings of Lincoln, 5 Federal Edition, ed. by A. B. Lapsley (8 vols., New York 1906) ; 'Life and Works,5 ed. by M. M. Mills (8 vols., New York 1907; same in 4 and 6 vols., respectively, ed. by Mills and J. H. Clifford, id. 1907-08) ; 'Uncollected Letters,5 ed. by G. A. Tracy (1 vol., Boston 1917) ; (Political Debates5 (Columbus, Ohio,

I860) ; same, Cleveland 1894; same, ed. by A. T. Jones, Battle Creek, Mich., 1895 ; reprinted, Chicago 1900; same, ed. by E. E. Sparks, Springfield, Ill., 1908; same, with introduction by G. H. Putnam (New York and London 1912).

Biographies : Scripps, J. L. (New York and Chicago 1860; reprinted, Detroit 1900); How¬ ard, J. K. (Columbus 1860) ; Howells, W. D., 'Life and Speeches5 (id. 1860) ; Barrett, J. H. (Cincinnati 1860; enlarged, id. 1864 and 1865) ; (Lincoln and His Presidency5 (2 vols., id. 1904) ; Raymond, H. J., 'Life5 (New York 1864) ; 'History and Administration5 (id. 1864) ; Wife and Services5 (id. 1865) ; Hol¬ land, J. G., (Life5 (Springfield, Mass., 1867) ; Lamon, W. H., Wife to Inauguration5 (Boston 1872); Arnold, I. N., Wife5 (Chicago 1885; 5th ed., 1891) ; Nicolay and Hay, (Abraham Lincoln, a History5 (10 vols., New York 1890) ; Nicolay, J. G., (A Short Life5 (id. 1902) ; Nicolay, Helen, (The Boy's Life of Lincoln5 (New York 1906) ; (Personal Traits5 (id. 1906) ; Browne, F. F., 'The Every-day Life5 (New York and Saint Louis 1887 ; curtailed ed. in 2 vols., Chicago 1913) ; Stoddard, W. O.,

phies exist, representing nearly every printed language.

Personal Reminiscences: Carpenter, F. B., (Six Months at the White House with Abraham Lincoln: The Story of a Picture5 (Boston 1866; republished as (The Inner Life,5 etc.) ; Oldroyd, O. H., (The Lincoln Memorial,5 etc. (New York 1882) ; Rice, A. T., (Reminiscences of Abraham Lincoln by Distinguished Men of His Time5 (New York 1886; rev. ed., id. 1909) ; Ward, W. H., (Abraham Lincoln, Tributes from His Associates,5 etc. (New York 1895) ; Chittenden, L. E., 'Recollections of President Lincoln and His Administration5 (New York 1891) ; Whitney, H. C., Wife on the Circuit with Lincoln5 (Boston 1892) ; Dana, C. A., (Recollections of the Civil War with the Lead¬ ers at Washington and in the Field in the Six¬ ties5 (New York 1898) ; Gilmore, James A., 'Personal Recollections of Abraham Lincoln and the Civil War5 (Boston 1898) ; Schurz, Carl, 'The Reminiscences of Carl Schurz5 (3 vols., New York 1908) ; Phillips, I. N., 'Abraham Lincoln. By some Men who Knew Him5 (Bloomington, Ill., 1910) ; Welles, Gideon, 'Diary5 (3 vols., Boston 1911) ; Thayer, W. R., 'The Life and Letters of John Hay5 (2 vols., Boston 1911) ; Chapman, Ervin, Watest Light on Abraham Lincoln and War-time Memories5 (New York 1917).

Sermons and Eulogies: Simpson, Matthew, "Funeral Address delivered at the Burial of President Lincoln at Springfield, 4 May 186555 (New York 1865) ; Beecher, H. W., "Oration on Raising the

Old Flag at Sumter and Ser¬ mon on the Death of Abraham Lincoln55 (Man¬ chester, England, 1865) ; Brooks, Phillips, "The Life and Death of Abraham Lincoln. A ser¬ mon preached 26 April 186555 (Philadelphia 1865) ; Dudley, John L., "Discourse preached 16 April 1865 at Middletown, Conn.55 (Middle- town 1865) ; "Sermons preached in Boston on the Death of Abraham Lincoln. Together with funeral services in the executive mansion at Washington55 (Boston 1865) ; "Our Martyr President. Voices from the Pulpit of New York and Brooklyn55 (New York 1865) ; Sum¬ ner, Charles, "The Promises of the Declaration. Eulogy on Abraham Lincoln delivered before the Municipal Authorities of Boston, 1 June 186555 (Boston 1865) ; Bancroft, George, "Mem¬ orial Address . . . delivered before the Con¬ gress, 12 Feb. 186655 (Washington 1866) ; Stod¬ dard, R. H., "Abraham Lincoln. An Horatian Ode55 (New York 1865) ; Douglas, Fred, "Ora¬ tion on the Unveiling of the Freedmen's Monu¬ ment in Memory of Lincoln55 (Washington (1876); Arnold, I. N., "Abraham Lincoln: A paper read before the Royal Historical So¬ ciety, London, 16 June 1 88 1 55 (Chicago 1883) ; Watterson, Henry, "Abraham Lincoln. An Ora¬ tion, 12 Feb. 189555 (Chicago 1900) ; Choate, J. H., "Abraham Lincoln. . Address delivered before Edinburgh Philosophical Society, 13 Nov. 190055 (London 1900; New York 1901); Inger- soll, Robert, "Abraham Lincoln. A Lecture55 (New York 1895 ; 1907) ; Reid, Whitelaw, "Ad¬ dress at University of Birmingham55 (London 1910) ; addresses before Republican Club, city of New York, "Abraham Lincoln, 1 887-1 909)5 (New York 1909) ; "Abraham Lincoln. The Tribute of a Century; principal Addresses of the Centennial Year,55 ed. by W. McChesney (Chicago 1910).

Topical Studies: Schurz, Carl, (An Essay' (Boston 1891; republished 1909); Welles, Gideon, 'Lincoln and Seward' (New York 1874) ; Kelly, W. D., 'Lincoln and Stanton' (New York 1885) ; Coggeshall, W. T., (The Journeys of Abraham Lincoln: From Spring- field to Washington . . . and from Washing¬ ton to Springfield' (Columbus, Ohio, 1865) ; Collis, H. T., and Ingersoll, Robert, 'The Re¬ ligion of Abraham Lincoln' (New York 1900) ; Maynard, Mrs. W. C., 'Was Abraham Lincoln a Spiritualist?' (Philadelphia 1891) ; Rems- burg, J. E., (Abraham Lincoln; Was he a

Christian?' (Philadelphia 1893) ; Jackson, S. T., (Lincoln's Use of the Bible' (Philadelphia 1909) ; Johnson, W. J., (Abraham Lincoln

the Christian' (Philadelphia 1913) ; Peters, M. C., (Abraham Lincoln's Religion' (New York 1909) ; Wettstein, C. T., (Was Abraham Lin¬ coln an Infidel?' (New York 1910) ; Lowell, J. R., (The President's Policy' (Boston 1864, 1871 and 1888) ; Hart, A. B., 'Slavery and Abolition' (New York 1906) ; Creelman, James, (Why We Love Lincoln' (New York 1903) ; Hill, F. T., 'Lincoln the Lawyer' (New York 1906) ; Richards, J. T., (Abraham Lincoln the Lawyer-Statesman' (Boston 1916) ; Rothschild, A., (Lincoln Master of Men' (Boston 1906) ; 'Honest Abe' (id. 1917) ; Norton, E., Abra¬ ham Lincoln, a Son of Mankind' (New York

1911) ; Pillsbury, A. E., 'Lincoln and Slavery' (Boston 1913) ; McCarthy, C. H., 'Lincoln's Plan of Reconstruction' (New York 1901) ; Learned, M. D., ' Abraham Lincoln: an Ameri¬ can Migration' (Philadelphia 1909) ; Lincoln, S., 'Notes on the Lincoln Families of Massa¬ chusetts, etc.' (Boston 1865) ; Lea and Hutch¬ inson, 'The Ancestry of Abraham Lincoln' (Boston 1900) ; Jenkins, H. M., 'The Mother of Lincoln' (Philadelphia 1900) ; Hitchcock, Caroline H., 'Nanc}r Hanks' (New York 1899) ; De Witt, D. M., 'The Assassination of Abraham Lincoln and Its Expiation' (New York 1909) ; Oldroyd, O. H., (The Assassina¬ tion of Abraham Lincoln' (Washington 1906) ; Pitman, Benn, (The Assassination of President Lincoln and the Trial of the Conspirators' (Cincinnati 1865) ; Surratt, John H., 'Trial of in the Criminal Court of the District of Colum¬ bia' (Washington 1867) ; Dodge, D. K., Abra¬ ham Lincoln, the Evolution of His Literary Style' (Urbana, Ill., 1900) ; Gilder, R. W., Lin¬ coln the Leader and Lincoln's Genius for Ex¬ pression' (Boston 1909) ; Garret and Hadley, 'The Civil War from a Southern Standpoint' (Philadelphia 1905) ; Hosmer, J. K., (The Ap¬ peal to Arms and Outcome of the Civil War' (New York 1907) ; Rhodes, James F., (History of the United States' (7 vols., New York

1912) .

Daniel Fish,

Judge, District Court, Minneapolis ; Author of Lincoln Bibliography, etc.

LINCOLN, Benjamin, American general : b. Hingham, Mass., 24 Jan. 1733; d. there, 9 May 1810. Until the age of 40 he followed the calling of a farmer, holding also at different times the offices of magistrate, representative in the provincial legislature and colonel of militia. He was also an active member of the three provincial congresses of Massachusetts, and as militia officer displayed an

efficiency which procured his promotion in 1776 to the rank of major-general. In this capacity he be¬

came favorably known to Washington during the siege of Boston. In the beginning of 1777 he joined Washington at Morristown with a new levy of militia, and soon after, at the sug¬ gestion of the commander-in-chief, was trans¬ ferred to the continental service with the rank of major-general. He was sent to join the forces assembled to oppose the progress of Burgoyne, and during the battle of Bemis' Heights commanded inside the American works ; and was severely wounded in the leg and compelled for nearly a year to retire from service. In September 1778 he was appointed to the command of the southern army, and upon the arrival of Count d'Estaing co-operated with the French troops and fleet in the unsuc¬ cessful assault on Savannah. From the unwill¬ ingness of his allies to continue the siege he was obliged to return to Charleston, where in the spring of 1780 he was besieged by a supe¬ rior British force under Sir Henry Clinton. After an obstinate defense he was forced in May to capitulate, and retired to Massachusetts on parole. In the spring of the succeeding year he was exchanged, and subsequently partici¬ pated with credit in the siege of Yorktown. In consideration of his merits and misfortunes Washington appointed him to receive the sword of Cornwallis upon the surrender of the British forces. He held the office of Secretary of War 1781-83, and in 1787 commanded the forces which quelled the Shays' Rebellion in western Massachusetts, and in the same year was elected lieutenant-governor of the /State, which office he held one year. He was collector of Boston 1789 till about two years before his death. He was a member of the commission which in 1789 formed a treaty with the Creek Indians, and of that which in 1793 unsuccessfully attempted to enter into negotiations with the Indians north of the Ohio. In his later years he took great interest in science and wrote several papers many of which attracted attention at the time. Lincoln's earnest character and his unselfish public spirit were greatly admired and he was deservedly popular toward the close of his life. Consult life by Bowen in Jared Sparks' (American Biography' (2d series, Vol. XIII, Boston 1847).

LINCOLN, Charles Perez, American law¬ yer : b. Quincy, Mich., 7 Oct. 1843. He was educated at Hillsdale College ; entered the Union army at the beginning of the Civil War and served until mustered out of the service m June 1864. He was admitted to the bar m 1871 ; was consul at Canton, China, 1875-81, and then began to practise his profession in Wash¬ ington. He was elected commander of the De partment of the Potomac, G. A. R., in 1888, and was 2d deputy

commissioner of pensions 1889-

93.

LINCOLN, David Francis, American hy¬ gienist: b. Boston, Mass., 4 Jan. 1841; d. 15 Oct. 1916. Graduated at Harvard University in 1864 and at its medical school in the same year, and served as acting assistant surgeon in the United States navy during part of the Civil War (1864-65). He practised as specialist in nervous diseases, lectured and did literary work in connection with Hobart College, Geneva, N. Y., for some years, beginning in 1881, having pre¬ viously relinquished medical practice. He pub¬ lished Electro-Therapeutics' (1874) ; 'School

LINCOLN, NEB

City Library Building

LINCOLN, NEB

1 Main Building, University of Nebraska

2 Library, University of Nebraska

LINCOLN

453

and Industrial Hygiene^ (1880); (Hygienic Physiology, > a school textbook (1893); ^Sanity of Mind> (1900), and a work on the education of the feeble-minded.

LINCOLN, Mary Johnson Bailey, Amer¬ ican household economist : b. South Attleboro, Mass., 8 July 1844. She was educated at Wheaton Seminary, Norton, Mass., in 1864, was married to David A. Lincoln (now dead) in 1865, and since 1879 has been prominent as a lecturer and writer on household matters. She was the first principal of the Boston Cooking School, and edited the American Kitchen Maga¬ zine from 1893 to 1903. She has lectured on cookery in seminaries and in most of the large cities of the country. She has published (The Boston Cook Book (1884) ; (Peerless Cook Book) (1886) ; ^Carving and Serving* (1886) ; (The Boston School Kitchen Text Book* (1888) ; (What to Have for Luncheon) (1904) ; (School Kitchen Text Book) (1915).*

LINCOLN, Robert Todd, American law¬ yer: b. Springfield, Ill., 1 Aug. 1843. He is the eldest son of Abraham Lincoln, and was graduated at Harvard College in 1864. He en¬ tered the Harvard Law School, but left it for the army and served on the staff of General Grant as captain. On the close of the war he resumed his legal studies and was admitted to the Chicago bar in 1867. He was Secretary of War, 1881-85, and although mentioned as a can¬ didate for the Presidency in the last-named year declined to allow his name to be placed in opposition to that of President Arthur. Lie was Minister to Great Britain in 1889-93, and became counsel of the Pullman Company in 1893; in 1897 he became president and in 1911 chairman of the board of directors of the Pull¬ man Company.

LINCOLN, England, an episcopal _ city, civic county and parliamentary and municipal borough, the capital of Lincolnshire, on the Witham, at the junction of several railroads, 130 miles north of

London. It dates from pre- Norman times, was the Roman (

and there are important manufactures of ma¬ chinery and agricultural implements. The municipality possesses valuable estates in Buckinghamshire and Lincolnshire and much valuable property in the city. The public utili¬ ties are municipally owned. A new water sup¬ ply was introduced from Elkesley, Nottingham¬ shire, in 1911. The city returns one member to the House of Commons. Pop. of county borough 57,285. Consult Allen, (History of Lincoln (London 1833), and Kendrick, A. F., (The Cathedral Church of Lincoln) (in Bell's Cathedral Series, London 1898).*

LINCOLN, Ill., city, county-seat of Logan County, on the Illinois Central and the Chicago and Alton railroads, about 28 miles northeast of Springfield and 135 miles southwest of Chi¬ cago. The place was settled in 1835 and incor¬ porated in 1854. It is situated in an agricul¬ tural region and extensive deposits of coal are in the vicinity. The chief ' manufactures are cellulose, horse-collars, corn-cutting machinery, signal horns, flour, mattresses, caskets and coffins, excelsior. The farm and dairy products and the coal mines contribute to the wealth of the city. Lincoln is the seat of the State In¬ stitution for Feeble-Minded Children, and of the Lincoln University, opened in 1865 under the auspices of the Cumberland Presbyterians. It has a free public library, the building a gift from Andrew Carnegie ; a Deaconess Home and Hospital, Saint Clara's Hospital and Odd Fel¬ lows' Orphans' Home. Abraham Lincoln prac¬ tised as a lawyer in the old courthouse here. The city was named in his honor and he as¬ sisted in laying it out. Lincoln adopted the commission form of government in 1915. Pop.

(1920) 11,882.

LINCOLN, Kan., city and county-seat of Lincoln County, on the Saline River, and on the Union Pacific Railroad, about 155 miles west of Topeka and 105 miles west of Wichita. It is in an agricultural region in which are raised large quantities of wheat and corn and a number of cattle. Limestone quarries in the vicinity contribute to the industrial wealth of the city. The industries and trade are con¬ nected chiefly with farm and dairy products and with live stocky The waterworks and light¬ ing plant are municipally owned. Pop. 1,613.

LINCOLN, Neb., city, capital of the State and county-seat of Lancaster County, on the Chicago, Burlington and Quincy, the Chicago, Rock Island and Pacific, the Union Pacific, the Missouri

Pacific, the Chicago and Northwestern and other railroads, about 55 miles west of the Missouri River, and about the same distance north of the Kansas State line. The city, lo¬ cated in the midst of a fertile agricultural dis¬ trict, in the Salt Creek basin, at an elevation of 1,045 feet, rises gradually to the south and east, leaving the creek to the west and north. The location of the capital at this point was due in part to the numerous radiating branches of Salt Creek, but more especially to the saline springs which in early days furnished salt to the Indians and the buffalo, and later to the overland emigrants and the early settlers of Nebraska. The site selected by a commission. 14 Aug. 1867, was surveyed the same fall, and from the proceeds of lots sold at auction th° first capitol, the insane asylum and the original

university building were erected and completed by 1871.

Lincoln bids fair to fulfil the prediction of its founders by becoming a great railroad cen¬ tre, as it already has 12 radiating lines, owned by five of the great corporations that now dominate in the West as already mentioned. With one exception each railroad has its own station and yard. The Chicago, Burlington and Quincy repair and construction shops, employing 500 skilled mechanics, are located at Havelock, a suburb of Lincoln. About 50 passenger trains enter, and the same number leave, Lincoln every 24 hours. Lincoln's rail¬ road connections make it the great convention centre of the State. The names of Lincoln and Douglas are strangely associated in Ne¬ braska history. The site selected for the capi¬ tal in 1867 and named Lincoln is practically identical with the one proposed 10 years earlier to have been called Douglas. Thus the author of the law organizing the Territory of Nebraska failed to have his name perpetuated in its capital, but yielded that honor to his great rival. Lincoln is laid out, like most Western cities, on the checker-board plan, with streets 100 or 120 feet in width. These broad streets are in gen¬ eral lined with trees and flanked with large lawns. The city contains an unusually large number of comfortable homes, excelling in this respect its development in business blocks. Over 20 miles of the streets are paved with brick, asphalt or cedar blocks. The waterworks are owned by the city; 50 miles of mains distribute the water from two deep wells, from which about 1,500,000 gallons of the very purest water are pumped per day. There are over 40 miles of sanitary and 6 miles of storm-water sewers in the city.

Manufacturing is of course yet in its infancy, but the total output per year approximates $5,000,000. A few industries are, however, well established. The making of leather goods, such as horse-collars, harness, etc., is not equaled west of the Missouri River. The production of oils and paints, mattresses and bed-springs, overalls and shirts is large and developing rapidly. A large butter and creamery station is located at Lincoln. It receives cream from some 200 substations. The jobbing and whole¬ saling industry is well under way, and in a few lines has reached creditable proportions. Lin¬ coln, with 22 branch houses, is the largest dis¬ tributing centre for farm machinery in the West. The jobbers in butter and eggs, fruits and groceries are doing a good business. There is also a fair beginning in hats, hardware, drugs, furniture, coffins, paper, sash and doors, iron for plumbing, jewelry, crockery and queens- ware, lumber and coal. Two fair-sized grain elevators have recently been constructed. Total estimated business of jobbers and wholesalers annually about $18,000,000. Lincoln is also be¬ coming quite a centre for insurance business. Two strong life insurance companies, two fire insurance, three fraternal companies, including the Modern Woodmen with headquarters here, and several mutual companies indicate the scope of development. The banking capital is small for a city of its size : five commercial banks, capital $500,000, surplus $180,000, and deposits $5,115,000, and one savings bank, deposits $140,- 000, supply the business community. The State fair grounds, the penitentiary, one of the insane

asylums and the Home of the Friendless arc located in or near the city. The other public buildings are the capitol, costing $750,000; the county courthouse, $200, 000; city hall, $150,000; Federal building, $350,000; Carnegie library, $75,000 and the grounds; 19 public school houses that cost from $15,000 to $50,000 each; Saint Elizabeth's Hospital, $150,000; the Cath¬ olic Orphans' Home and the Tabitha Home — private institutions — aid in caring for the sick and unfortunate. The mineral waters are used in several private sanitariums.

For outdoor amusement there are one small public park; the university athletic field, the Ep- worth Assembly park and the ˆCountry Club® grounds afford meagre facilities. The city sup¬ ports one theatre and an auditorium.

The commission form of government was adopted in 1913, and provides for a mayor and council of five members, elected for two years.

Lincoln is at present rather an educational than a business centre. Its population is largely American, representative of the North and Mid¬ dle West. Neither great wealth nor extreme poverty is found. The public schools are effi¬ cient and enroll 6,210 students. The high school employs 36 teachers and registers 1,090 pupils, a number claimed to be unsurpassed by any city of its size. There are three musical conserva¬ tories, three universities, three colleges, one preparatory school and two parochial high schools, which tend to give a distinct educa¬ tional tone to the public as well as private life of the city. _ The largest and most important educational institution is that of the State Uni¬ versity and Agricultural College (q.v.). The Wesleyan University (q.v.), situated in Univer¬ sity Place, a suburb of Lincoln, ranks next in importance. Union College (q.v.), a Seventh Day Adventist school, with three buildings and over 400 students, and Cotner University (q.v.), controlled by the Christian Church, with one good building and 200 students, are prospering. The conservatories and other schools add sev¬ eral hundred more students to this list. The public libraries are the University, 60,000 vol¬ umes ; the State, 40,000; the City, 15,000, and the High School, 2,500. Lincoln's educational output is indicated in the second-class mail matter sent through its post office. One per cent of all the second-class mail matter of the United States originates in Lincoln. In all 66 publications are entered, one with 750,000 cir¬ culation, two others with about 150,000 each, and a fourth with over 100,000. There are 30 church buildings in Lincoln. The following organizations are represented: Methodists, Congregational, Presbyterian, Christian, Bap¬ tists, Lutheran, Episcopal, Catholic, United Presbyterian, Jews, Christian Science, Uni¬ tarian, Reformed, Swedish, Free-will Baptists and several minor denominations. There are three colored churches. The leading denom¬ inations all have exceptionally fine buildings. Lincoln's growth has been somewhat irregular, yet counting decades gradual, Lincoln in 1867 — then called Lancaster — contained only one store and some half-dozen dwellings. By 1870 it contained 2,441 people. In 1880, 13,004. The padded census of 1890 gave the city 55,154 population — a number too large by at least 20,000. Pop. 54,934. Consult Cox and Hayes, (History of the City of Lincoln > (Lincoln

1889).

LINCOLN MEMORIAL, WASHINGTON

.

.

.

LINCOLN COLLEGE, established at Lincoln, Ill., in 1866, under the auspices of the Cumberland Presbyterians, since 1906 is affili¬ ated to the Presbyterian Church U. S. A., when the chief section of the Cumberland Presby¬ terians united with the parent body. It has a preparatory department, and the college courses lead to the degrees of A.B., B.S. and B.L. In 1917 there were connected with the college 20 professors and instructors and 254 students. The library had about 7,000 volumes ; the grounds, buildings and apparatus were valued at nearly $80,000; the productive funds were $120,000, and the income from productive funds, tuition and other fees amounted to about

$20,000.

LINCOLN COLLEGE, Oxford, England, a foundation of Oxford University (q.v.) dat¬ ing from 1427. It consists of a rector, 12 Fel¬ lows and 14 scholars. The founder was Rich¬ ard Flemyng, bishop of Lincoln, at first a sup¬ porter but later a strong opponent of Wvclif's doctrines. The foundation was strengthened and firmly established in 1478 by Thomas Roth¬ erham; a subsequent bishop of Lincoln. John Wesley, Fellow from 1726-57, was one of the distinguished associates of this college. A modern library building of Jacobean architec¬ ture, opened in 1906, has been added to the buildings, the earliest of which, the hall, dates from 1436.

LINCOLN HIGHWAY, a continuous connecting improved road, the backbone of a national highway system, crossing the conti¬ nent through the heart of the most densely populated regions between New York and San Francisco. The highway was laid out by the Lincoln Highway Association, a Michigan cor¬ poration with headquarters at Detroit, in 1913, as the first inter-State highway connecting the two coasts and as a memorial to Abraham Lin¬ coln. The route was determined upon entirely from the national standpoint and with no local interests in view. It is the shortest and most direct road consistent with the topography of the country between the two coasts ; due to the efforts of the Lincoln Highway Association and the co-operation of the various States and coun¬ ties traversed, the original distance of 3,389 miles having been cut to 3,324 miles, by the elimination of unnecessary detours and by nu¬ merous instances of

shortening and straighten¬ ing. A total of over $15,000,000 was expended upon Lincoln Highway improvement and main¬ tenance from the laying out and dedication of the road until 1 Jan. 1919. Plans for 1919 con¬ struction indicated the expenditure of about $10,000,000 on the highway. With the co-opera¬ tion of the State Highway department of Utah, the Great American Desert between Salt Lake City and Ely, Nev., was bridged and 50 miles cut from the transcontinental route. This im¬ portant keystone section of the highway was completed in July 1919.

The Lincoln Highway starts at Times Square, 42d street and Broadway, New York city and passes through the following principal cities in 11 States: Jersey City, Newark and Trenton, N. J. ; Philadelphia, Lancaster, York, Gettysburg, Chambersburg, Bedford, Ligonier, Pittsburgh and Beaver, Pa. ; East Liverpool, Canton, Ashland, Mansfield, Bucyrus and Lima,

Ohio; Fort Wayne, Ligonier, Goshen, Elkhart, South Bend and Valparaiso, Ind. ; Chicago Heights, Aurora, Geneva, Rochelle, Dixon and Fulton, III. ; Clinton, Cedar Rapids, Marshall¬ town, Jefferson and Council Bluffs, Iowa; Omaha, Columbus, Grand Island, Kearney, North Platte and Big Springs, Neb.; Cheyenne, Laramie, Medicine Bow, Rawlins, Rock Springs and Evanston, Wyo. ; Salt Lake City, Garfield, Tooele, Clover and Ibapah, Utah; Ely, Eureka, Austin, Fallon, Reno and Carson City, Nev.; Truckee, Placerville, Sacramento, Stockton, Oakland and San Francisco, Cal. The terminus is at Lincoln Park overlooking the Golden Gate. The Lincoln highway is free to traffic of all descriptions between the two coasts. The route is marked with a distinctive red, white and blue marker, bearing a blue (

LINCOLN MEMORIAL, Washington, D. C., erected in Potomac Park on the axis of the United States capitol and the Washington monument, was commenced on Lincoln's Birth¬ day 12 Feb. 1914. The foundation was com¬ pleted and the cornerstone laid 12 Feb. 1915. This beautiful memorial was erected in accord¬ ance with an act of Congress approved 9 Feb. 1911, a subsequent act of Congress 28 Feb. 1916, limiting the cost to $2,594,000 to include the ap¬ proaches. The building is constructed of Colo¬ rado Yule marble, Indiana limestone and Massa¬ chusetts pink granite, and is 201 feet 10 inches long by 132 feet wide at the bottom step of the stylobate course, 79 feet 10 inches high from the top of the foundations to the top of the attic. The building is in the general form of the classic Greek temple, consisting of one large enclosed hall, oblong in shape and surrounded by a colonnade of doric columns, representing the

States of the American Union. The longer axis of the building extends north and south. The entrance is a wide doorway on the eastern side, facing the Washington monument and the capitol building, which are in direct line with this memorial. On the inside of the building opposite the entrance is a seated statue of Lin¬ coln, cut in heroic proportions from white Geor¬ gia marble by Daniel Chester French. To the right and left of the statue are four large col¬ umns on each side, forming two rows which partly cut off the ends of the hall. On the north wall of the interior is a tablet containing Lincoln's second inaugural address, while a similar tablet on the south walls bears the Get¬ tysburg speech. Over each of these memorials is a large allegorical painting by Jules Guerin, portraying the principles which it embodies. The memorial was constructed from plans by Mr. Henry Bacon, architect, under the direction of the Lincoln Memorial Commission, which was created by the act above referred to and under the supervision of the Secretary of War,

LINCOLN MEMORIAL UNIVER¬ SITY, a coeducational institution, at Cumber¬ land Gap, in Claiborne County, Tenn., char¬ tered in 1897, largely through the efforts of Gen. O. O. Howard, of Burlington, Vt., who desired to see a school established in some place easy of access for the mountaineers of this locality, because of the great interest which Abraham Lincoln had in the people of this section. The institution comprises : De¬ partment of letters, department of science, school of music, school of nursing, school of agriculture, school of industrial arts, school of domestic science, school of business. Much emphasis is laid on agricultural and industrial work. The agricultural department conducts a large and thoroughly modern creamery which has a capacity of some 400 gallons of milk per day and can produce 1,200 to 1,400 pounds of butter per week. In the industrial department, carpentry, typesetting and other trades are taught to the boys and young men and domestic science is taught to the young women. By working for the school in the agricultural and industrial departments the students can earn at least a part of the cost of their education. The university owns 675 acres of land, besides controlling 3,000 acres of forest land. The endowment fund, in addi¬ tion to the productive property, is a little in excess of $100,000. It has a number of build¬ ings, including a library building, recitation halls, dormitories, creamery, barns, shop, etc. Exclusive of the summer school, it has an or¬ ganization of about 20 teachers and 15 other workers. School is carried on for 48

weeks per year. About 700 students in the year enter the various departments of the institution.

LINCRUSTA-WALTON. See Linoleum.

LIND, Jenny (Madame Goldschmidt), Swedish singer: b. Stockholm, 6 Oct. 1820; d. Malvern, England, 2 Nov. 1887. In very early childhood she displayed the faculty for tune and of musical memory in such degree as to attract observation and at nine her voice was considered so remarkable that she was admitted to the Stockholm Conservatory of Music as a pupil of Croelius and Berg. After years of thorough study and voice-building, in 1838 she made her debut, with great success, as Agathe in (Der Freischutz.) As operatic star in Stockholm and other cities in Sweden and Norway, she extended her fame, and in 1841 studied for the greater part of the year in Paris under Manual Garcia. She went to Berlin in 1844, studied German, and in Meyerbeer's (Feldlager in Schlesien) appeared as Vielka. During the next year she made a Continental tour which established her in a position of su¬ premacy, her great successes being, won in Dresden, Leipzig, etc., and finally in Vienna. In 1847 she made her first appearance in Eng¬ land, which was followed by a succession of unprecedented triumphs. Her tour of the Uni¬ ted States (1850-52) brought her not only fresh honors, but also large financial returns, and wras long remembered by many who shared in the material and spiritual benefits which her noble womanhood and artistic genius conferred. In 1852 she was married in Boston to Otto Goldschmidt (q.v.), then conducting the Bach choir, and virtually retired from her profession, though subsequently reappearing on special oc¬

casions. She returned to Europe; at length settled in London ; and made her last public appearance at Diisseldorf in 1870. In 1894 a bust of her was unveiled in Westminster Ab¬ bey. Consult Rockstro and Holland, (Jenny Lind the Artist > (1891) ; Rockstro and Gold¬ schmidt, (Jenny Lind, Her Vocal Art and Culture) (1894).

LINDEN, or BASSWOOD, a genus of trees (Tilia) of the family Tiliacece, ordinarily known as basswoods in the United States. The species, of which there are about a dozen, are natives of the northern temperate zone and more or less resemble each other in general appearance. They are characterized by alter¬ nate, usually heart-shaped, leaves with toothed edges; small yellowish, often fragrant, flowers in cymes, the peduncles of which are attached to membranous bracts ; and globular nut-like fruits about the size of peas. The trees, in many horticultural varieties, are widely planted in Europe, where they are known to the Eng¬ lish as limes, and in

America, for their pleas¬ ing form and dense shade, and to some extent also because of their abundant yield of nectar, from which bees make one of the finest quali¬ ties of honey. They are also planted for their timber, usually called ˆwhitewood,® which is highly valued on account of its whiteness, lightness, toughness and durability, and is used for turned and carved ornaments and for mak¬ ing honey-boxes and other light articles, the whiteness of which is desired to enhance the appearance of the goods they contain ; also extensively used for carriage bodies, cabinet¬ work and interior parts of furniture. The wood makes a high grade of charcoal, used by druggists, gunpowder-makers and artists. The fibrous inner bark is made into mats and cord¬ age and strips of it are widely used for tying plants, etc. When stock-food is scarce in early spring the twigs and budding shoots are often fed to farm animals, being very mucilaginous and nutritive, though liable, it is said, to in¬ jure the quality of butter made from the milk of cows fed upon them. The best-known spe¬ cies are the American basswood (T . ameri- cana), a stately tree often exceeding 75 feet in height and 10 feet in girth. Its range extends from New Brunswick to Minnesota and south¬ ward to the elevated lands of Georgia and Texas. In the more thickly settled parts of this region it is becoming scarce as a timber tree because of the great demand for its wood. In America it is the most frequently planted species. Owing to confusion in nomenclature, the name <(European linden® is applied to at least three species, T. platyphylla, T. vulgaris and T. ulmifolia. The first is most widely planted in America. The last is very late in blossoming and should be more extensively cul¬ tivated in order to extend the season of honey production. Lindens all thrive best upon good land. They are easily propagated from seeds, layers and grafts and by <(stooling,® the small trees being cut down close to the ground, the sprouts covered with soil and when rooted re¬ moved to nursery rows.

In some countries the fibrous inner bark of the linden is separated by soaking in water and manufactured into fishing-nets, mats, shoes and clothing; and the cordage made from it is said to be remarkably strong and elastic. (See Bast). The wood is sometimes cut into thin

strips and used in the manufacture of chip hats, which resemble those made of straw.

LINDLEY, lind'li, John, English botan¬ ist and horticulturist: b.

Catton, near Norwich (Norfolk), 5 Feb. 1799; d. Acton, 1 Nov. 1865. He became Belgian agent for a London seed merchant in 1815, later took up botanical stud¬ ies, published in 1819 a translation of Richard's (Analyse du Fruit) and was appointed assist¬ ant librarian to Sir Joseph Banks at London. Later, he was successively made assistant sec¬ retary to the Horticultural Society (1822-41), professor of botany in the University of Lon¬ don (1829-60) and lecturer in botany to the Apothecaries' Company (1836-53). In 1828 he was elected to the Royal Society, whose royal medal he received in 1857, and in 1853 became a corresponding member of the Institut de France. He was appointed editor of the Bo¬ tanical Register in 1826, of the Journal of the Horticultural Society in 1846; and in 1841 was a founder of the Gardeners' Chronicle, whose chief editor he was until his death. He was an able lecturer, a constant opponent of the Lin- naean as contrasted with the natural system of classification and the author of several valuable works such as (The Theory and Practice of Horticulture) (1842) and

LINDSAY, or LYNDSAY, lind'za, Sir David, Scottish poet, usually described as (

LINDSAY, Harry. See Hudson, H. L.

LINDSAY, Samuel McCune, American political economist and educator: b. Pittsburgh, Pa., 10 May 1869. He was graduated from the University of Pennsylvania in 1889 and took post-graduate courses there and in Berlin, Vi¬ enna, Paris and Rome. After his return to the United States he was appointed assistant pro¬ fessor of sociology at the University of Penn¬ sylvania and was professor from 1904 to 1907, when he was appointed professor of social leg¬ islation at Columbia University; he has also been editor of the department of sociological notes in the (Annals of the American Acad¬ emy of Political and Social Science' (1895- 1901) and associate editor of the (Annals' and

was president of the academy in 1901. In 1892 he was special agent of the United States Sen¬ ate Finance Committee to report on wholesale prices in Europe; in 1899-1900 was expert of the Industrial Commission to report on rail¬ road labor; and from 1902 to 1904 was commis¬ sioner of education to Porto Rico, being granted leave of absence from the University of Pennsylvania. He has written (Railway Labor in the United States' (1902) ; (Social Work at the Krupp Foundries' ; (The Study and Teaching of Sociology' ; (The Unit of In¬ vestigation in Sociology' ; and other articles in the (Annals of the Academy of Political and Social Science' ; Report on

Education in Porto Rico' ; (History of Establishment of Public School System in Porto Rico' (1905) and edited three annual reports on Child Labor, National Child Labor Committee, New York (1904-07) ; edited the (American Social Prog¬ ress Series' and contributed to various re¬ views and magazines.

LINDSAY, William, American lawyer: b. Rockbridge County, Va., 4 Sept. 1835 ; d. 15 Oct. 1909. He was educated in his native State; removed in 1854 to Clinton, Ky., where after teaching school and studying law, he was ad¬ mitted to the bar in 1858. Throughout the Civil War he served in the Confederate army, rising to the rank of captain and acting as a staff officer and after the war returned to Clinton and resumed the practice of law. In 1867 he was elected State senator as a Democrat ; in 1870 took his seat on the bench of the Supreme Court of Kentucky; and was chief justice of the State, 1876-78, declining a renomination and re¬ turning to the practice of law at Frankfort. In 1889 he again entered the State senate ; in 1893 served as commissioner of the World's Colum¬ bian Exposition ; in the same year was elected to the United States Senate for the unexpired term of John G. Carlisle, who had resigned to become Secretary of the Treasury; and in 1894 he was re-elected, but differed from his party on the money question, and toward the end of his term usually voted with the Republicans. After leaving the Senate he went to New York City and once more resumed the practice of law. In 1901 he was appointed by President McKin¬ ley a commissioner for the Louisiana Purchase Exposition at Saint Louis in 1904.

LINDSAY, Canada, the capital of Vic¬ toria County, Ontario, a town and port of en¬ try on the navigable Scugog River, and on the Grand Trunk and Canadian Pacific railways, 69 miles northeast of Toronto. The town is well built, chiefly of brick, has a large trade in lumber and grain and is the seat of a United States consular agent. It has lumber and flour mills, foundries, tanneries, breweries and manu¬ factories of carriages, agricultural implements, sash, doors and blinds, woolens, boots and shoes, woodenware, etc. Pop. 6,964.

LINDSBORG, lTnz'borg, Kan., city in Mc¬ Pherson County, on the Smoky Hill River and on the Missouri Pacific and the Union Pacific railroads, about 115 miles southwest of To¬ peka and 64 miles north by west of Wichita. It is in an agricultural region and its trade is chiefly in livestock, grain, broom-corn, flour and dairy products and manufactures brooms, brick, flour and spark plugs. It has large brick and lumber yards and grain elevators. An import-

ant industrial establishment is the Bethany Book Concern, the Western publishing insti¬ tution for Lutheran literature. There are a number of Swedish Lutherans in Lindsborg. It is the seat of Bethany College, opened in 1881 under the auspices of the Lutherans. Among its departments, that of music is well known for its annual concerts, when the stu¬ dents render the (Messiah.) The water and electric plants are the property of the city. Pop.

(1920) 1,897.

LINDSLEY, lmz'li, John Berrien, Amer¬ ican educator: b. Princeton, N. J., 24 Oct. 1822; d. 7 Dec. 1897. He was graduated from the University of Nashville in 1839 and received his degree in medicine at the University of Pennsylvania in 1843. Studying theology, he was ordained to the Presbyterian ministry in 1846 and preached for several years. He be¬ came professor of chemistry in the University of Nashville in 1850 and was chancellor .of the institution 1853-73. He was likewise professor of chemistry in the University of Tennessee, 1880-97, and of materia medica in the Tennes¬ see College of Pharmacy, 1876-97. He pub¬ lished (Our Ruin: its Causes and Cure1* (1868) ; (The Military Annals of Tennessee) (1886). He also edited for many years the Nashville Journal of Medicine and Surgery and was a frequent contributor to periodicals.

LINE, Mathematical. In geometry, a line may be defined (1) as the locus described by a moving point; (2) as a magnitude which, at each of its points, has extension in one direction only; (3) as the boundary which separates two contiguous parts of a surface; or (4) as the intersection of two surfaces, or of a surface with itself. Each of these definitions has its own merits, and geometers use one or another of them, according to convenience.

In physics, ˆlines® of various kinds are con¬ stantly referred to, the context usually indicat¬ ing the sense in which the word is used. A Uine of force,® in a field of electric or magnetic force, for example, is a line whose direction, at every point, coincides with the direction of the force at that point. In the mechanical theory of heat (see Thermodynamics) the state of a homogeneous body, with respect to its tem¬ perature, to the pressure exerted upon it and to the volume occupied by a unit of its mass, is often represented by means of a diagram in which two of these qualities are taken as abscissa and

ordinate, respectively. In such a diagram an ˆisothermal® line is a line along which the temperature of the body remains con¬ stant ; an ((adiabatic® (or (

In steam engineering the various parts of the diagram that is drawn by an indicator are designated as <(lines,® although they are but ihe several parts of a single line. Thus the <(admission line® is that part of the diagram which the indicator draws while steam is being admitted to the cylinder; the (

der is expanding; the <(exhaust line® is that part drawn while the cylinder is in free com¬ munication with the atmosphere (or with the condenser) ; and the ˆcompression line® is that part which the indicator draws after the ex¬ haust valve has closed, and before the admis¬ sion valve from the boiler opens again. The <(atmospheric line® upon such a diagram is the line that the indicator draws when disconnected from the engine, and in free communication with the atmosphere. . See also Color; Draw¬ ing ; Perspective.

LINE ENGRAVING. See Engraving

and Photo-Engraving.

LINEN, a cloth of very extensive use, made of flax, and differing from cloths made of hemp only in fineness. Hemp is in part now used in manufacturing cloths which are called linen. The flax from which linen is made is put through a number of processes previous to manufacture; rippling, the separation of the seed from the plant by means of beaters; retting, the elimination of resinous matter in the plant by steeping the stems in water and allowing fermentation to take place ; grassing, in order to dry the flax stems ; scutching, the removal of the woody portions of the stem from the fibrous; and heckling, the separation of the best of the flax. In common linen the warp and woof cross each other at right angles ; if figures are woven in it is called damask (q.v.). The species of goods which come under the denomination of linen are table¬ cloths, plain and damasked, cambric, lawn, shirting, sheeting, towels, etc. Linen cloth, or cloth woven of combinations of cotton or other textile fabrics with linen, is printed in the same manner as calico. Fancy cloths are also made by weaving with yarns dyed of various colors, and 'sometimes with printed yarns. Linen is extensively manufactured in England, Scotland and Ireland. It is also a staple in various parts of Europe.

The beauty of linen consists in the evenness of the thread, its fineness and density. The last of these qualities is sometimes produced by

subjecting it to rolling; hence linen with a round thread is preferred to that with a flat thread. The warp or woof is not unfrequently made of cotton yarn, which renders such stuff, called union cloth, less durable; and this is sold in many shops as linen.

Cotton is the chief adulterant, and it is somewhat difficult to distinguish. Wetting with the finger and moistening the material is a popular method tried to detect adulteration: if the moisture absorbs quickly it is linen; but owing to the various weights of linen, it is not an infallible test. An infallible way is to boil a sample to wash out all the dressing and then put it in a 50 per cent solution of caustic soda. The cotton will take on a light yellow color and the linen becomes almost brown. Irish linen is whiter and generally wears best ; but the Scottish product for a medium-priced article is greatly in demand. The fragilitv of French linen confines this beautiful fabric to the wealthier classes. The best Irish and Scottish are sun- and grass-bleached. Sun-bleached linens are the best; artificial bleaching oxidizes and destroys the natural gum which binds the fibres together. The moist and mild climate of Ireland is admirably

adapted for the growing of flax and for its manufacture up to bleaching. With a view to protecting the handloom weaver, the British Parliament passed in 1910 the Handloom Weavers Protection Act, under which the words (hand woven' are worked into the selvage of the hand product. From a historical view linen is interesting from its use by several nations in their religious ceremonies. Linen is mentioned in Genesis as in use for robing the royal princes of Egypt ; and throughout the Bible it is a symbol of purity and excellence. Linen of 5,000 years ago has been found in Egyptian tombs. The Egyptian and Jewdsh priests wore it at all their religious ceremonies, hence the former are styled by Ovid and Juvenal, "linen- w earing." Linen was an article of export from Egypt in the time of Herodotus. From Egypt the use and manufacture of linen probably passed to the Greeks and Romans, but the use of linen did not become common at Rome till late in the history of the republic. The Roman priests wore linen garments at that time. Among the Greeks a linen tunic was a regular part of the male costume as early as the Homer period. Linen was also used as a material for writing, as shown by the Roman libri lintei, <(linen books." The mummy bandages, covered with hieroglyphics, are also proofs of this use of linen. In the Middle Ages linen and woolen cloth formed the*

chief materials for dress, and fine linen was held in very high estimation. Germany and Brabant then carried linen manu¬ factures to the greatest perfection.

The weaving of linen has been practised in Great Britain for a very long period, beginning with the Anglo-Saxon times, but though the manufacture has been much extended since the introduction of machinery, its expansion is lim¬ ited by the greater cheapness and convenience in many respects of cotton. The English linen industry owed much to Flemish weavers, who settled in England at various times from the 11th or 12th century onward. Flax-spinning machinery was introduced by John Kendrew and Thomas Porthouse, at Darlington, in 1787, and a mill was opened at Glamis in Forfarshire in 1790. The chief seat of the English linen manufacture is Leeds and its neighborhood, where spinning is done . on a very exten¬ sive scale. A single room in one of the facto¬ ries at Leeds is said to cover two acres. Ireland and Scotland, however, are much larger manu¬ facturers of linen than England. Of the $40,- 000,000 worth of linens exported from the United Kingdom in 1913 four-fifths were from Ireland.

Linen was woven in Ireland as early as the 11th century. The manufacture was improved by the refugees who left France on the revoca¬ tion of the Edict of Nantes and settled at Lis¬ burn and Lurgan on the invitation of William III. The manufacture never reallv flourished till it was carried on in mills, and by the aid of machinery. The value of linen goods now ex¬ ported from Ireland to Great Britain is esti¬ mated at $40,000,000.

Dundee Dunfermline and Perth are the seats of the Scotch linen manufacture.

*The introduction of machinery in the linen manufacture is of recent origin. It followed *he adantation of machinery to the manufacture of cotton, but as there were some snecial diffi¬ culties to be overcome — such as the want of*

elasticity on flax yarn — an interval took place between the invention of the various cotton machines and their adaptation to the linen manufacture. The machinery used both in spinning and weaving linen is in general, how¬ ever, the same as that used for cotton. See Textile Industry, American; Textiles or Textile. Fabrics.

Bibliography. — Consult Charley, 'Flax and its Products' (Belfast 1862); Gibbs, G. M,, 'Household Textiles> (Boston 1912) ; Leggatt,

'The Origin and Practice of the Art of Weav¬ ing' (London 1893); Moore, A. S,, 'Linen > (ib. 1914) ; Warden, 'The Linen Trade, Ancient and Modern' (ib. 1867); Woodhouse and Milne, 'Jute and Linen Weaving' (2d ed., London 1914).

LINES, Edwin Stevens, American Epis¬ copal Church bishop: b. Naugatuck, Conn., 23 Nov. 1845. He was graduated from Yale in 1872 and two years later at the Berkeley Di¬ vinity School, at Middletown, Conn. He was ordained in 1874. He was rector of Christ Church, West Haven, Conn., 1874-79 and of Saint Paul's Church, New Haven, 1879-1903. In November 1903 he was consecrated bishop of the diocese of Newark, which comprises the northern third of New Jersey.

LINES OF FORCE. See Force.

LING, a sea-fish (Lota molva), resembling a pike in shape and three to four feet long, but a member of the cod family (Gadidco) . It abounds around the British coasts; its fishery approaches in importance and resembles in methods that for cod. Great quantities are preserved by drying, salting, etc. ; and an ex¬ cellent oil is extracted from the liver.

The name is also given to the eel-pout or burbot, another species (L. vulgaris) so-called not only in Europe but in northern New York, the Great Lakes and Canada. See Burbot.

LINGA, ling'ga, an emblem commonly used in the sectarian worship of the Hindus. It represents the male or generative power of nature. . Originally of an ideal and mythical nature, it has degenerated into practices of the grossest description; thus taking the same course as the similar worship of the Chaldaeans, Greeks and other nations. The manner in which, the linga is represented is generally in¬ offensive — a pillar of stone or other cylindrical objects being held as appropriate symbols of the generative power of Siva, the third of the Hindu triad of deities. Its counterpart is "Yoni," or the symbol of productive female nature. See also Siva.

LINGARD, lmg'gard, John, English his¬ torian: b. Winchester, 5 Feb. 1771; d. Hornby, Lancashire, 17 July 1851. Born of poor parents, he was educated for the Roman Catholic priest¬ hood at Douay. On the passing of the Catholic Relief Act the English Catholic students re¬ moved to Crook Hall, where a theological col¬ lege was erected. Lingard was ordained to the priesthood in 1795, and was vice-president of the Crook Hall seminary near Dur¬ ham, removing with

it to the new college of Saint Cuthbert, Ushaw. In 1811 he declined a professorship at Maynooth, and accepted the charge of the rural mission at Hornby. He published in 1805 'Catholic Loyalty Vindicated.' His next work of importance was 'Antiquities

of the Anglo-Saxon Church J (1806). His greatest work, the (History of England from the Invasion of the Romans to the Year 1688,) printed in eight volumes (1819-30), reached a fifth edition in 1850, when it appeared in 10 volumes. It has since been regarded as a valuable work of reference by historians of all parties. It possesses for Protestant his¬ torians the valuable quality of giving the views on controverted points of an able, well-in¬ formed and judicially-minded Catholic writer. The 1850 edition of the history was elaborately- revised by the author. Apart from the sympathies of the writer, the work is uni¬ versally regarded as one of high authority. He refused a cardinal's hat offered him by the Pope, but accepted a pension of £300 a year from the queen. Consult Haile and Bonney, (Life and Letters of John Lingard) (London 1911).

LINGAYEN, lin-ga-yan', Philippines, a pueblo and the capital of the province of Pan- gasinan, Luzon, situated on a low and fertile island of the delta of the Agno River, formed by one of the outlets of the river and the Gulf of Lingayen. The climate is cool and healthy. It has a fine parish church and the buildings generally are well constructed, many being of stone. The Manila and Dagupan Railroad has a station within eight miles at Dagupan, and Lingayen is the converging point of several im¬ portant highways and has frequent communica¬ tion by water with Manila. It has, therefore, an important trade. Pop. 21,529. The city was founded in the 16th century by the Augustine fathers, who handed over the work to the Dominicans in 1611.

LINGAYEN, Gulf of, an arm of the China Sea indenting the western coast of the island of Luzon, Philippines, north of Manila Bay. The width of the entrance from San Fernando Point to Santiago Island is 20 miles. The east shore is mountainous ; the west shore is generally level and less elevated and is fringed by low wooded islands, the channels between which are navigable for native coasters. Typhoons are prevalent in September and October.

LINGG, Hermann von, German epic and lyric poet: b. Lindau,

Bavaria, 22 Jan. 1820; d. Munich, 18 June 1905. He attended the gym¬ nasium at Kempten, Bavaria, and (1837ˆ13) the universities of Munich, Berlin, Prague and Freiburg, where he pursued the study of medi¬ cine. After obtaining his degree he became a physician in the Bavarian army and served at Augsburg, Straubing and Passau, but fell sick in 1851 and was granted a pension. He retired to Munich, where Geibel introduced him to the poets of the so-called Munich Circle, and ob¬ tained an annual stipend from King Maximilian II. Of all the lyric poets of the Munich School, he is one of the most gifted and tal¬ ented as shown by such poems as Ummer leiser wird mein SchlummerP As an epic poet, he is unquestionably their leader, as is shown by his long historical epic, (Die Vblkerwanderung) ((The Migration of Nations, -1866-68), in stanzas, divided into 25 cantos. Particularly famous is his ballad, (Der schwarze Tod.* His few attempts as a short-story writer produced perfect results, particularly his (Byzantinische Novellen) (1881), while his dramatic works (collected edition, Stuttgart 1897) are poor,*

LINGUATULA, or TONGUE-WORMS,

a highly aberrant parasitic form often classed as an Arachnid. The external appearance of a linguatulid simulates that of a tapeworm, but the structure approximates that of the mites. The adult parasite is found in the nasal cavities or respiratory organs of air breathing verte¬ brates, chiefly reptiles and mammals; the larva in its first stage a four-legged form of simple structure looking like some mites (Demodex) encysts in the connective tissue of various ver¬ tebrates and reaches a condition ready for transfer by a period of growth involving sev¬ eral stages. The final host is reached when this encysted larva is eaten with the flesh of its host.

LINGUISTICS. See Language, Science of.

LINGULA. See Brachiopods.

LINIERS Y BREMONT, Santiago An¬ tonio Maria de, san-te-a'go an-to-ne-o ma-rea da'len-e-ars' e bra-mont, Spanish naval officer : b. Niort (Deux-Sevres), France, 6 Feb. 1756; d. near Buenos Aires, Argentine Republic, 26 Aug. 1810. After the French Revolution he entered the Spanish naval service, in which he attained captain’s rank. He defended Monte¬ video against the British in 1806, and in 1807 forced them to relinquish Buenos Aires, which they had occupied. The ruling viceroy was then deposed by popular demand, and Liniers selected for the post (16 May 1808). The British soon attacked Buenos Aires, and 1 July gained a battle under its defenses;

but Liniers successfully managed the resistance and the enemy, after retreating with large losses, with¬ drew from the country. He was succeeded in 1809 by Cisneros, whose rule was followed by the. revolution of 10 May 1810. Liniers there¬ upon marched from Cordoba to Buenos Aires for the purpose of quelling the revolt; but was captured and shot.

LINLEY, lin'li, Thomas, English com¬ poser: b. Wells, 1732; d. London, 19 Nov. 1795. He was a pupil of Chilcot at Bath and of Para- dies at Naples, became one of the best English vocal instructors, and for several years directed the concerts at the Bath assembly-rooms. In 1774 he became join-t director of the Drury Lane oratorios, in 1776 purchased Garrick's share in Drury Lane and in 1776-91 directed the music there. His music contributed greatly to the success of Sheridan's ˆDuenna,® which was performed 75 times during the season. He also composed the much admired accompani¬ ments to the ((Beggar's Opera,® various other music for dramatic works, and glees, canzonets and songs. He obtained high place among English composers through his simplicity and excellent taste.

LINLITHGOW, lin-lith'gd, Scotland, the county town of Linlithgowshire, 16 miles west of Edinburgh. It is an ancient royal burgh, dating from the reign of David I, with a fine 12th century Gothic church, now restored, and other historical edifices, chief of which is Lin¬ lithgow Palace (mostly rebuilt between 1425 and 1628), the birthplace of James V and Mary Stuart, burnt down by the carelessness of the Duke of Cumberland's soldiers in 1746, and now an interesting ruin. In 1570 the Regent Moray was assassinated by Hamilton of Bothwell-

haugh. Tanning, shoemaking and distilling are among its industries. Pop. 4,002. Consult YVa'ldie, history of Linlithgow) (1879).

LINN, William Alexander, American jour¬ nalist : b. Sussex, N. J., 4 Sept. 1843. He was graduated at Phillips Academy, Andover, Mass., in 1864, at Yale in 1868, and in 1883 was admitted to the New York bar. From 1868 to 1891 he was engaged in newspaper work, dur¬ ing part of that time being on the staff of the New York Tribune, and was managing editor of the Evening Post, 1891-1900, resigning to devote himself to literary work. He has been president of the Hackensack Mutual Building and Loan Association from its

organization in 1887 and was president of the People's National Bank of Hackensack, N. J., from its organiza¬ tion in 1903 to 1916; was president of the First National Bank of Ridgefield Park, N. J., from its organization in 1910 to 1913; elected county collector of Bergen County, N. J., 3 Jan. 1916. Was a member of the New Jersey Commission of 1899 which secured the legislation under which the Palisades Interstate Park Commis¬ sion, which has saved the Palisades front from destruction, was appointed, and was a member of the latter commission from its organization to 1913. He has published (The Story of the Mormons) (1902) ; (Horace Greeley) (1903) ; and (Rob and His Gun> (1902). He is a mem¬ ber of the National Geographic Society, the New Jersey Historical Society, Bergen County Historical Society, and trustee of the' Johnson Public Library of Hackensack.

LINN.7EUS, li-ne'us, Carolus, the Latinized form of the name of Carl von Linne, Swedish botanist: b. Rashult, Smaland, 23 May 1707; d. Upsala, 10 Jan. 1778. He showed an early in¬ terest in botany; entered the University of Lund, where his botanical tastes were encour¬ aged by Kilian Stobaeus, physician to the king, from whose library he was supplied with neces¬ sary books. In 1728 he went to Upsala, where he undertook the supervision of the botanic gar¬ den. Here he made the acquaintance of the botanist, Rudbeck, whose assistant he became, and assisted Olof Celsius in the preparation of the latter's ˆierobotaniconP Aided by the Academy of Sciences at Upsala, Linne made a journey about 4,600 miles through Lapland, the result of which was shown in his (Flora Lap- ponicaP published 1737. In this year he went to the University of Harderwyk in Holland and took an M.D. degree, and later visited Leyden, where he published his first sketch of his (Sys- tema Naturae) and (Fundamenta BotanicaP In 1736 he visited England, and in September 1738 settled in Stockholm as a physician. He slowly acquired a practice, was made naval physician of Stockholm and obtained some minor ap¬ pointments. He became professor of medicine at Upsala in 1741, exchanging for that of botany in 1742. He was ennobled in 1761. During his professorship of botany he drew students from all over the civilized world, increasing the num¬ ber attendant on the university from 500 to 1,500. The importance of Linnaeus' work can scarcely be overrated. It has been said that (

nal nomenclature of both. He was a careful observer, a methodical worker and a clear and succinct writer. As a teacher he was of great influence in revolutionizing the methods of botanical study. He .published more than 180 works, among which the most important are (Systema Natural (1735) ; (Fundamenta Bo- tanica) (1736) ;*

(Genera Plantarum (1737) ; (Flora Lapponica) (1737); (Classes PlantarunP (1738) ; (Fauna Suecica) (1745); (Flora Sue- cica> (1746) ; (Hortus Upsaliensis) (1748) ; (Philosophia Botanica) (1751) ; and, chief of all, (Species PlantarunU (1753). The Linnaean Society of London was founded in his honor in 1788. Consult (1877); Fries, (Linne, Lefnadsteek- ning) (2 vols., Stockholm 1903) ; Levertin, (Carl von Linne) (ib. 1906).*

LINNALITE, a cobalt mineral, C03S4 con¬ taining some nickel and copper. Mined for- ' merly in Maryland and Missouri.

LINNELL, lin'el, John, English painter: b. London, 16 June 1792; d. Redhill, Surrey, 20 Jan. 1882. He began his artistic career as a pupil of West and Varley and was for some time a successful teacher of drawing, number¬ ing among his pupils Mary Wollstonecraft Shelley. He had painted from his 15th year, confining himself exclusively to landscape. Be¬ tween 1824 and 1838 he produced a number of excellent pictures of this class. Originally an imitator of Gainsborough, he soon developed a brilliant and original style. He was particularly successful in portraying the insular sky scenery of England with its varied cloud forms, and play of sunlight, and his works combine de¬ lightful freshness with supreme skill in hand¬ ling. In the South Kensington Museum is one of his pictures <(Girls Gathering Flowers,® and in the National Gallery are his ((Wood Cutter,® and <(Windmill.® Consult Story, (Life of John LinnelP (1892).

LINNET, a very common and attractive song-bird, one of the smaller migratory finches, of southern Europe and adjacent countries of Africa and Asia. In autumn and winter the plumage is brown-streaked and dull, but in the spring molt; on the approach of the breed¬ ing season, the breast and head of the mature male become bright crimson. This gay dress is assumed and -put off gradually, and bird-catch¬ ers speak of brown, gray, red or rose linnets as if they were separate species, but there is only one — Linota cannabina. The name refers to the fondness of the bird for hemp, flax-seed and the like, formerly called the ((lint® crops, whence come the Scotch names ((lintie,® ((lint- white,® etc., and the English <(linnet.® The hab¬ its of these birds in the fields are much the same as those of their relatives the American goldfinches, or of the redpolls, called ((linnets® in Canada. These are among the most prized of cage-birds for the sake of their song, and are taken in great numbers in traps as well as extensively bˆed. They will interbreed with the canary and an interesting and valuable hybrid has thus been produced. The song is loud, flute-like and exceedingly agreeable; it consists of several

connected strains, and is esteemed by connoisseurs in proportion to the frequency with which certain clear sonorous notes, or ((crows,® recur. It sings throughout the year, except when molting, and may be taught various

airs and melodies not its own — even to imitate well the complicated song of the nightingale. Such education is rarely given it, however, ex¬ cept in Germany. The care and feeding of a linnet should be the same as those given a canary. See Canary ; Ca&e-Birds.

LINNET-HOLE, in glass-making, a table connecting the glass-melting furnace with the arch.

LINOLEIC ACID, one of the constituents of linseed oil, obtained by saponifying the oil with soda, separating the soap, and decompos¬ ing it with chloride of calcium. After washing, the soap is treated with ether, which dissolves the linoleate of calcium. This salt is next de¬ composed with hydrochloric acid, and the linoleic acid taken up by ether. After distilling off the ether the oily acid remains, which is converted into a barium compound which is purified by crystallization, and from this the acid is finally obtained by addition of sulphuric . acid. It is a pale-yellow oil, insoluble in water, but readily soluble in ether. It is lighter than water, has a slight acid reaction and harsh taste.

LINOLEUM, a kind of floor-cloth, intro¬ duced in England in 1860. It consists of a mixture of oxidized linseed oil and ground cork spread in a uniform layer upon canvas, the sur¬ face of which may be printed in patterns of dif¬ ferent colors as in ordinary floor-cloth. The oxidizing of the linseed oil, by which process it becomes a caoutchouc-like substance possess¬ ing a certain amount of elasticity, is effected by exposing it in thin films to the influence of air. Certain proportions of kaurigum, resin and pig¬ ments, according to the ground color desired, are added to the oxidized oil, which is then inti¬ mately mixed with the ground cork, and firmly squeezed on and rendered adherent to the sur¬ face of a rough canvas backing, which is after¬ ward coated or waterproofed with oil paint. In inlaid linoleum the pattern goes right through the fabric, the different patterns being pieced together and then rolled over with heated rolls. An embossed linoleum, washable, waterproof and warm, invented by Frederick Walton as a substitute for wall paper, is

named after him (

LINOTYPE, The. See Composing Ma¬ chines.

LINSANG, one of the beautiful spotted civets of the Oriental genus Prionodon, of which various species are to be found from northern India to Borneo. The West African linsang (Poiana poensis) is a rare species from the Fernando Po district, closely allied to the Malayan ones. They have the general char¬ acteristics and habits of the civets (q.v.) but are especially expert in tree-climbing and feed mainly upon birds.

LINSEED, or LINSEED MEAL. See

Flaxseed.

LINSEED OIL INDUSTRY, The. In

the commercial world there are known at the present time a number of vegetable oils, which in the raw state and without the aid of chemi¬ cals are capable of absorbing the oxygen of the air to a greater or less degree and becom¬ ing solid. These are commonlv called ((drying oils.® By far the most valuable to commerce, both as to usage and results obtained, is linseed

oil, expressed from the seed of the plant Liman tisitatissimum, the common flax. In early times the object of its cultivation was principally for the flax fibre. Although the great economic importance of linseed oil, due to the large increase of manufactured products in which it is used, has been of but compara¬ tively recent years in this country, the seed or plant bears the hall mark of great antiquity. It is positively known that drying oils had been discovered prior to the Christian era, and, though uncertain, it would seem reasonable to assume that linseed oil was among them. For centuries it appears that the oil's greatest characteristic, its wonderful drying properties, was given little attention. It was not until the 12th century, when oil painting was discov¬ ered, that we may say a true appreciation of the essentially exclusive properties of linseed was felt, and from that day to this it is the only oil that has successfully satisfied all the require¬ ments of oil painting.

Manufacturing. — In earlier years the small amount required, principally by the artists, was produced by little, if any, apparatus, and often in the studio. Later, the oil began to find en¬ larged fields of usefulness, and the crudest of mechanical apparatus was devised for its manu¬ facture. With such appliances, however, oil could be

produced only at an excessive cost, and its use on a broad commercial basis was not feasible. Indeed, up to within comparatively recent years the invention and improvement of linseed oil machinery has been slow, and in fact to the United States may be attributed the greater part of the advance made in this indus¬ try in the past 100 years. The earliest method recorded for the production of linseed oil is a receipt by Theophilus, a monk writing in the 12th century, and which becomes particularly interesting when we find that the treatment of the seed or method was almost identically the same as it is to-day. <(Take linseed and dry it in a pan without water, on the fire; put it in a mortar and pound to a fine powder ; then re¬ place it in the pan, and pouring a little water on it, make it quite hot. Afterward, wrap it in a piece of new linen, place it in a press used for extracting the oil of olives, of walnuts, or of the poppy, and express it in the same manner.® It will be seen from the above that the seed was treated separately four times, as follows : Dried, crushed, cooked and pressed. With the exception of the drying, which is not necessary, the plan of procedure to-day is the same. Dur¬ ing the intervening years, however, many dif¬ ferent methods have been used as well as dif¬ ferent kinds of machinery.

In the making of linseed oil there are two very essential steps which must be carefully watched ; the first is the crushing or grinding of the seed ; the second is the cooking or <(temper- ing® of the ground seed. In the proper manipu¬ lation of these two processes rests a crusher's ability to make a good yield of oil. Heat and moisture are of the greatest importance in pro¬ ducing the best yields; we find, in fact, that many times the ground seed or meal was pressed entirely without cooking. Oil made in this manner was called ((cold pressed® oil. In the cold process the oil expressed is beautifully light in color and heavy in body; furthermore, upon boiling to a high temperature the oil does not darken but becomes lighter, and after mix-

ing with the varnishes is perfectly clear and without sediment. On the contrary, oil made from the tempered meal is thinner and darker in color ; on boiling at high temperatures it darkens still more, and throws down a quantity of white and greasy precipitate. Owing to the light yield of oil in the cold process, however, the cost is excessive and little is now made.

The first attempt to manufacture linseed oil in quantities was by the

ancient screw and lever press, a modification of the old cider press. It consisted of a barrel, sometimes of cast iron, perforated to give a free outlet to the oil, and fitted with a plunger which, when actuated by the screw, descended into the open barrel upon the mass of meal contained therein, and by means of slow pressure expressed a reasonable amount of oil. This press was worked by a hand lever placed through an eye at the head of the screw, like a bar in a capstan. Little oil was secured, however, in comparison with presses actuated by machinery. On this account considerable oil remained in the dry residue known as oil cake ; these ˆcakesT weighed about 25 pounds each and were about 18 inches in diameter by 8 inches thick, resem¬ bling a cheese in shape and thus giving to it the name of ((Cheese Box)} press. The capacity of this press was less than one barrel of oil a day. The screw and lever press was retained in use as late as 1848. Some years prior to that date, however, the improved Dutch mill or wedge press had come into vogue. These mills were imported from Holland, and were con¬ sidered a great improvement over the old screw and lever presses. The wedge press consisted of a very heavy rectangular frame work of oak or iron, placed horizontally on its base. The ground seed was shoveled by hand into woolen bags and these were hung vertically between hinged partitions, consisting of wooden plates. The capacity of the press was about 9 or 10 of these bags, giving a daily pressing of not over 15 to 20 bushels. The cakes left in this press weighed from 8 to 10 pounds each, after the raw edges had been trimmed. The pressure requisite for the ex¬ pression of the oil was obtained by driving wooden wedges between the plates by means of sledges driven by wind or water power. This press was still in use in 1853.

The wedge press was discarded for the horizontal hydraulic press, the next step in the advancement of the industry and undoubtedly the most important. Probablv the first hydrau¬ lic presses used in the United States for linseed oil were those installed in a New York mill shortly after the War of 1812. In these the plates were of iron instead of wood, and mov¬ able; the ground seed was shoveled into the woolen bags as before, flattened by the hand of the workman, and placed in mats of horsehair, which were folded in book form. After plac¬ ing in the press vertically, one at a time, the iron plates were moved up against each bae, when the ram of the hydraulic cylinder moving horizontally compressed the eight or nine cakes contained in the press, the oil running into a trough or pan beneath. The yield of oil was verv much increased by this method. The horizontal press, however, had its disadvan¬ tages, and in 1851 the first patents for vertical hydraulic presses for linseed oil were

granted. The capacity was not increased over the hori¬

zontal type at first, the press holding only 6 to 10 cakes. The clumsy and unwieldy manner of packing the meal in the bags and filling the presses, however, was done away with. What is known as ((boxes)) were used, the ground seed being molded into soft cakes, packed in wrap¬ pers and placed in the press, one above the other, the boxes acting as shelves. A large saving was made here in labor and time, neces¬ sarily resulting in considerable increase of daily capacity and consequent reduction in the cost. With the improvements in the manner of pressing the seed came improvements in grind¬ ing or crushing. Linseed was crushed first in this country by rolling through a mill worked by hand; the rollers in this mill consisted of one large and one small, the seed being passed through once or twice, according to the views of the crusher. The earliest method for reduc¬ ing the linseed to meal by machinery was that used in connection with the Dutch mill or wedge press, and was called the ˆTamper® mill. This was a mortar and pestle on a large scale. The mortars were of heavy cast iron, the bottom flat on the inside and holding a small amount of flax seed; the pestle was an iron-shod log, standing vertically in a frame, the foot resting on the bottom of the mortar; these logs, weigh¬ ing from 150 to 200 pounds each, were raised, by means of cams on a horizontal shaft, by water or wind power, and falling of their own weight exerted a crushing or grinding force upon the seed. The tampers, as they were called, numbered one or more in the set. The capacity of a mill was necessarily cut down very much by such a slow process, and rolls run by machinery were resorted to ; these were of different design from the old hand rolls, and were designated in the trade as ˆcracker® rolls, for the reason that they cracked or opened the seeds. These rolls were arranged in pairs only and varied in size from 12 to 18 inches in diameter and 7 to 18 long, according to the views of the manufacturer. After being bruised in these rolls, the seed was placed in an edge-runner or chaser, also known as a muller. This consisted of a circular trench of iron, several feet in diameter, placed horizon¬ tally on a firm foundation. Running around this, like wagon wheels in a rut, were two ponderous iron-shod wheels, 5 to 6 feet in diameter with steel tires 10 to 16 inches wide. These were sometimes made of stone and set opposite one another on a shaft and weighed about 7,000 pounds each. Around and around these wheels revolved, chasing one another until the meal was finely crushed and rolled, when water was added until the meal acquired the consistency of putty, or what was termed ˆdobby.® It was then mixed or ˆmulled® for some 10 or 15 minutes and then tempered with heat. These muller stones proved very

satisfactory as to results, but were clumsy and took a great deal of power; furthermore, the expense of two grindings was unnecessary. Nevertheless, no change was made for many years.

The tempering or cooking of the crushed seed having such an important bearing on the v'eld of oil has also suffered many changes. There was considerable variation in the tem¬ perature used, from cold to hot, according to the manufacturer. Often the spontaneous heat of the crushing was considered sufficient. In the tamper of the Dutch mill water was played

on the meal in the mortar, when vapors began to arise, in order to keep it from getting too hot and thus spoiling the oil. No further tem¬ pering was considered necessary. Later, how¬ ever, and notably in connection with the muller stones regular cookers began to be used ; these were heavy sheet iron drums or tanks, slowly revolving over a charcoal fire until the proper temperature was attained. With the advent of the hydraulic press, improvements were made in cooking devices and stationary heaters be¬ gan to be used in which the meal was cooked by steam. Up to the year 1856, and as related, the cooked meal was placed in the bags by hand ; at this date, however, a device was patented to form the cooked meal into soft cakes or molds preparatory to placing them into the cloth or wrapper which was to take the place of the bags originally used. This was considered a great boon, saving as it did the laborious process of handling and molding the meal by hand to fit the press ; though some¬ what clumsy at that time, the <(molder® or ® former® has been much improved. Where in former years the molder was run by power from the shaft, now hydraulic pressure is utilized, and the <(foriner)) is in reality a minia¬ ture press, consisting of a square mold or box into which a plunger presses the required amount of meal. Very light pressure is suffi¬ cient, and it is so arranged that the cooked meal will not be compressed to the point where the oil is separated.

The tempering, crushing and pressing of linseed was carried on, with a few exceptions, substantially as related up to the year 1878, when the most lasting improvement to oil machinery was made, and which introduced practically the system in use at the present time ; namely, the automatic <(Lawther® process. Greater economy was immediately secured and larger yields of oil. The old muller stones and cracker rolls gave way to the stack of ((four or five high®

chilled iron rolls, by means of which the seed was bruised three or four times in passing through. Apparatus for controlling and regulating the high pressure was intro¬ duced; kettles or cookers were steam jacketed and had larger heating area, and steam was fed into the meal to moisten as well as heat it. The plate press had also been given the pref¬ erence over the box press, which was clumsy. Although the very best mills to-day have some improvements over the original Lawther process, they make rather toward greater economy than increase of yield. The modus operand) in the largest and most complete mill to-day is as follows : The flax seed is first thor¬ oughly cleaned by separators and dust collectors until the original dirt, amounting to 10 or 20 per cent, has been reduced to less than 1 per cent. This seed is now passed through the rolls, there being about one set of five rolls high to every three presses. The crushed seed falling from these rolls is led by screw con¬ veyors into the steam jacketed cookers of large capacity and holding a considerable quantity, where it is tempered. This consists of heating the ground seed to a temperature of from 120° to 180° F., according to the quality of the seed used, and moistened with live steam, all the time being kept in constant motion to prevent burning. When the temper is considered per¬ fect a batch is made. This consists of draw¬

ing off the cooked meal on to the formers and molding the cake. A piece of cloth somewhat wider than the molded cake is placed so that the tempered meal may be drawn out onto it. This cloth or wrapper, as it is called, is a sub¬ stitute for the horse hair cloth and woolen bags of former days, but now made of pure camel's hair to stand the high heat and enormous pres¬ sure. By a single motion the former is now closed and immediately reopened, when the ends of the cloth protruding are automatically wrapped around the soft cake and it is placed in the press (by automatic nippers, in the Lawther press). The batch makes 20 of these cakes, which fills one press. The pressure is now turned on by an automatic valve or change cock which slowly increases the pressure up to about 4,000 pounds to the square inch. This enormous pressure is generated by very power¬ ful hydraulic pumps, connected to what is known as the accumulator system, the first pres¬ sure being up to 800 pounds per square inch and the second from 2,600 to 4,000 pounds. The accumulators are for two purposes ; first, to act similar to a safety valve on a boiler, preventing the pressure from exceeding the limit; secondly, keeping the pressure at a steady level through¬ out the time the seed is in the press. Before the adaptation of the accumulator and change cock, the oil was pumped directly into the press, causing an unequal flow and consequent re¬ duction in the yield of oil. Six presses are generally

grouped, one being emptied and re¬ filled every 10 minutes, the six thus completing one hour in time and allowing each press in the group to drain every 50 minutes. In some mills seven batches are made instead of six, and the weight of the cake is also increased from 11 and 12 to 14 pounds. This is done in order to increase the capacity of the mill, but generally at a sacrifice in the percentage of oil. As each batch is removed from the press, the camel's hair cloth wrapper is stripped off, the rough edges of the cake trimmed automatically, and the cake piled up in the cake house, where it is allowed to dry for at least 48 hours. The raw oil, after having been run from the settling troughs at the back of the presses, is carefully filtered and placed in tanks ready for barreling.

An improvement over the intermittent action of the simple hydraulic press was the Anderson continuous action press, appearing in 1905. In this machine the seed, ground or unground, is pressed in a perforated cylinder of hardened steel by a series of revolving screws, the oil dripping from the perforations, and the residue being expelled as dry meal at the farther end of the machine. The seed may be heated to not more than 140°, or pressed cold. The product is of the finest quality, suitable for the best varnishes. The Anderson machine has a capacity of about eight bushels per hour.

While probably four-fifths of the total lin¬ seed oil output of the United States is manu¬ factured in some kind of a press, by what is termed the ((old process® (as above described), the remaining fifth is made by the ((new proc¬ ess,® in which naphtha is used as a solvent of the. oil. The seed is first thoroughly crushed as in the old process and is heated, but without any added moisture. In fact the heater is so arranged as to drive off the natural moisture of the seed. . The crushed seed is placed in a jacketed cylinder called a percolator, 1,000

bushels at a time. Naphtha, heated by passing through a coil feed water heater, is run in on top of the linseed, and steam is let into the percolator jacket to keep up the heat. The naphtha with its content of dissolved oil is drained off from time to time into a con¬ densing tank, where the naphtha is boiled off, the vapor passing to a cold condenser, and thence back to the naphtha reservoir. The separated oil is carried to an open tank where it is heated and subjected to a vigorous air blast to remove any lingering odor of the naphtha. The

operation is continued with each charge of seed for three days. The residue in the percolator is then treated with live steam, and again leached with hot naphtha. This treatment reduces the oil left in the meal to about \y2 per cent. The product ranks with the best on the market. The plant for this process costs about 25 per cent less than for the old process, and the profits are more than 60 per cent greater.

The Oil and Its Uses. — Linseed oil as manufactured may be classified under three headings: raw, boiled and refined. Raw linseed oil is the term applied to oil as it comes from the press in its original state. The principal consumer of raw linseed oil is the paint grinder; as it was used as a vehicle for paint hundreds of years ago, so it is used now. Every year millions of gallons are spread on buildings in the form of mixed paints, one concern alone using over 1,500,000 gallons yearly. Every 100 pounds of white lead requires at least 7ˆ2 gallons. Boiled linseed oil is, as the name denotes, raw oil boiled over a fire, chemicals being added, the object being to increase its drying properties. Many formulas are used by the different crushers for making boiled oil, the oldest and most reliable, however, containing principally red lead and black oxide of man¬ ganese, the addition of these substanoes to the heated oil stimulating the linolein and increasing its affinity for oxygen. The uses for boiled oil are many and varied, but it is principally used as the quick drying oil in paints. The refined or varnish oils are many, and there is the great¬ est rivalry to-day among oil manufacturers as to the qualities of their respective varnish oils. Hundreds of thousands of gallons of these oils are used every year. While the different gums used in the manufacture of varnishes are ti e basis or foundation, some variety of refined oil is the most important component of the varnish. As stated before, raw linseed oil has certain component parts which must be removed and all tendency to "break® must be eliminated. Descriptions, however, of these methods will not be attempted, as they pertain more partic¬ ularly to the chemistry of linseed oil and not to its manufacture. The reliable varnish oils are few and are furnished only by the largest manufacturers. Linseed oil in some form plays a very prominent part in the manufacture of linoleum and oil cloths also. Varnish oils are used in the manufacture of patent leather, for shoes and other purposes, carriage tops, and all kinds of dressed leathers are finished with lin¬ seed oil. The oil clothing worn by sailors and fishermen is soaked with it. It appears by the thousands of gallons before our eyes in the printers' ink on newspapers, and smaller quan¬ tities are used in the manufacture of oil silks. Linseed oil has no value as an edible oil, or as

an illuminant or lubricant. While not very large in comparison with other industries, the consumption of linseed oil in the last few years as compared to former years has increased very rapidly, and at the present time the above in¬ dustries consume annually an amount computed at nearly 62,000,000 gallons. The price of lin¬ seed oil is of course governed by the cost of manufacture and principally by the price of seed and cake. The greatest fluctuation experienced in earlier years was in 1867, when oil went from $1 per gallon to $2.03, and in later years, in 1901, when it went from 50 to 82 cents per gal¬ lon. Linseed oil has always been subject to great fluctuations, and it will be seen bv aver¬ aging that from 1876 the annual fluctuation has been about 14ˆ2 cents per gallon, the smallest fluctuation known being in 1883, when there was only three cents difference in price at any time during the year. On 15 June 1917 the prices in the New York market for five-barrel lots were raw oil, $1.21 per gallon; boiled oil, $1.22 per gallon; refined oil, $1.23 per gallon.

The Cake and Its Uses. — While really a by-product, the manufacture and sale of the cake is equal in importance to the sale of the oil, and although netting a smaller price per pound, the value has a very great influence on the course of oil prices and the policy of the business as a unit. Practically the only use for cake is as a food for livestock, principally cattle, for fattening and for results in the dairy. The actual protein in cake is about 36 per cent, of which about 85 per cent is digestible, and the nutritive value is consequently about four times that of hay, while the fat varies from 4 pec cent to 8 per cent, according to the crusher. Although used extensively abroad, it is a singular fact that our farmers in the United States have little, if any, appreciation of its value. Our own country should be the largest consumer of this most valuable by-product ; actual figures, however, show that only about 20 per cent is retained for home consumption. The first cost is somewhat greater than for other food stuffs, and our farmers as a general rule lack the knowledge of its value, which comes only by experiment and valuable experi¬ ence. The manurial value alone of linseed oil cake has been estimated at over $16 per ton, whereas the first cost is only from $18 to $25 per ton. Our farmers, it is true, are waking up to its value and more is being used in this country every year, but the bulk of our output is taken by Holland and Belgium with France third. The exportation of cake has grown with the industry and the proportion of export remains practically the same, with the exception that each year a little larger part is retained for home consumption.

The total exports in 1895 were about 120,000 tons, and in 1913 about 290,000 tons. A glance at the figures will show that of the total 290,000 tons the three countries above mentioned consumed 242,000 tons, the balance being divided largely between France and Germany with 18,000 tons each, Canada and West Indies 5,000 each, and Nor¬ way, Sweden and Denmark insignificant amounts.

Growth of the Industry. — To the early settlers the flax plant was of value for the flax and not for the seed and oil. In 1719 the spin¬ ning wheel was first introduced in New Hamp¬ shire by the Protestant Irish who settled there,

and flax was grown more abundantly. The seed was for the most part exported, a few thousand bushels being sufficient to supply the domestic demand. The first impetus to the growth of flax for linen fabrics and consequent increase in seed and oil was given in 1722, when bounties for its growth were granted. The in¬ crease was immediate, and the plan worked so well that the bounties were continued, and in fact increased, until in 1751 we find it reported that 60 wagon loads of seed were exported at Baltimore. In 1752 a further increase was noted, 10,000 hogsheads or 70,000 bushels of seed being exported from Philadelphia. Twenty years later, 110,000 bushels were sold abroad, and in 1791 292,000 bushels, or upwards of one- half of the total crop of the United States in 1860, which was 567,000 bushels. Some idea of the rapid growth of the oil industry after the Revolution will be gained from the fact that in 1791 only 450 gallons were exported, while in 1795 nearly 50,000 gallons were sent abroad, an amount which was not again equaled until 60 years later. In 1792 the invention of the cotton gin placed a severe check on the growth of flax for the fibre, cheapening as it did cotton and cotton fabric. Undoubtedly at this time closer attention was paid to the flax seed for its oil¬ bearing seed; the business was a profitable one, as had been shown by the small export business done. From 1795 the export steadily decreased, showing ever-increasing home consumption, and in fact considerable quantities were now being imported. From about 80,000 gallons in 1825, the imports increased to 3,200,000 gallons in 1867. Immediately after this, however, the im¬ ports dropped to an insignificant quantity, and have continued so to this day, a certain quantity of Calcutta oil only being imported each year at high prices, for special uses, it being a well- known fact that the finest oil in the world is made from East Indian seed. In 1839 the first cargo of flax seed was imported, and importa¬ tions have increased to the figure of 10,666,215 bushels*

for 1916 — most of which came from Argentina. From 1880, when the crop grown in this country aggregated some 7,000,000 bushels, the crop increased to at least 30,000,000 bushels in 1903. The average for recent years has been about 15,000,000 bushels each year. The production of flax seed in the United States in 1916 amounted to 15,459,000 bushels. Of this total North Dakota produced 8,137,000 bushels ; Montana, 3,088,000 bushels ; Minnesota, 2,338,000 bushels, and South Dakota, 1,395,000 bushels. Iowa and Kansas each produced about 150,000 bushels. The total value of the crop, as estimated at the price ruling on 1 Oct. 1916, was $38,350,000. The average consump¬ tion amounted to 8,000,000 to 10,000,000 bushels of seed up to about the year 1892. From that time the statistics show a steady increase in the consumption, until about the year 1916 the amount crushed was a little over 26,000,000 bushels, yielding about 25,000,000 gallons of oil.

Price of Seed. — While at times the fluctua¬ tion of seed prices has been caused by specula¬ tion and manipulation, the law of supply and demand has generally fixed the value. In 1885 Cincinnati was the principal centre for the sale of the seed. From about 1870 Chicago became the great market, its location being more cen¬ tral. Ten years later, however, Chicago lost its prestige, and Duluth became practically the only

market. Since then Minneapolis has divided the honor with Duluth. The highest price ob¬ tained for flaxseed in modern times was in 1862, when sales were made on a basis of $3.25 per bushel. From 1862 to 1874 seed never sold under $2 per bushel but averaged about $2.50; after 1874, however, prices steadily declined until 1886, when $1.03 was reached. The low¬ est price ever obtained was in 1897, when seed went to about 63 cents. The greatest fluctu¬ ation was in 1862, seed going from $1.25 to $3.25. The average farm value of flaxseed for 1916 was $1.99 per bushel, and on 1 May 1917 the price reached $3 per bushel. In earlier times, almost all the seed was grown in the Eastern States ; large amounts were grown in New York, whereas now scarcely any is grown there. Ohio long held a good share of the crop; from Ohio it traveled to Indiana and Illi¬ nois; then to Kansas and Iowa; and from there to Minnesota and Dakota, and finally, in the last few years, almost the entire crop has been grown in North Dakota, South Dakota, Minne¬ sota and Montana. The historical records fur¬ nish us with very meagre data as regards the number of mills in operation at different periods. In 1810, the census tells us there were 383 mills in 14 States, 171 in Pennsylvania alone. These mills were small affairs, but the number is

con¬ clusive of the large interest taken in this indus¬ try. These mills made 770,000 gallons of oil, valued at about $900,000. In 1860 there were 94 mills, turning out nearly $6,000,000 worth of oil and cake; in 1870 the number of mills was reduced to 85, but the value of the products had increased to $9,000,000 worth of oil and cake, and in 1880, 81 mills produced $15,400,000 worth of products. The number of mills was still further reduced in 1890 to 62, making $23,500,000 worth of oil and cake, and in 1900 48 mills wrere producing a value of nearly $30,000,000. The steady decrease in the number of plants in operation is due to the inability of plants with old-fashioned machinery to work on the lowest basis of cost manufacture.

According to the 1914 census of manufac¬ tures there were in that year in the United States 25 linseed oil mills of factory grade, em¬ ploying 1,488 wage earners receiving annually a total of $1,127,000 in wages. The capital in¬ vested amounted to $39,873,000, and the value of the year's output was $44,882,000 : of this, $5,327,000 was the value added by manufacture. The yield of linseed oil was 24,481,623 gallons. More of the crushing is done at Minneapolis and Saint Paul than at any other locality in the United States, though there are important mills also at Chicago, Cleveland, Toledo, Buf¬ falo, New York and Philadelphia. Exports for the calendar year 1916 amounted to 824,052 gal¬ lons of oil and 667,645,566 pounds of oil cake. Consult Ennis, W. D.. (Linseed Oil and Other Oils) (New York 1909) ; United States Depart¬ ment of Agriculture, (Farmers' Bulletin 785 > (Washington 1916).

LINSEY, the name of an English country- made fabric of linen warp and worsted filling.

LINSEY-WOOLSEY, a mixed fabric made of linen and wool.

LINSLEY, James Harvey, American

naturalist: b. Northford, Conn., 5 May 1787; d. Stratford, Conn., 26 Dec. 1843. He was gradu-

ated from Yale College in 1817, and became a Baptist clergyman, but on account of ill-health resigned from the pulpit and devoted himself to the study of natural history. Many cata¬ logues of mammalia and birds from his pen may be found in the American

Journal of Science.

LINSLEY, Joel Harvey, American clergy¬ man : b. Cornwall, Vt., 15 July 1790; d. Green¬ wich, Conn., 22 March 1868. He was graduated from Middlebury College in 1811, and was tutor there for three years; afterward studied law, but in 1822 was licensed as a Congregational clergyman and went to South Carolina as a missionary. During the years 1824-32 he was pastor of a church in - Hartford, Conn., and was at Park Street Church, Boston, 1832-35. In the latter year he was elected president of Marietta College, Ohio, which post he held 10 years, raising a considerable fund for the in¬ stitution.

LINSTOCK, a gunner's forked staff to hold a match of lint dipped in saltpeter.

LINT, in surgery, the scrapings or ravel- ings of fine linen, made into a sort of cloth and used by surgeons in dressing wounds. It is prepared in various forms, which have dif¬ ferent names, according to the difference of the figures. Lint made up in an oval or obicular form is called a pledget; if in a cylindrical form or in shape of a date or olive-stone, a dossil. The advantages of this material for the purposes for which it is used are very great owing to its softness of texture, the ease with which it may be folded or rolled into any shape required, its capacity to absorb discharges, and its cheapness, on account of which it may be thrown away when once used. For modern surgery it is rendered antiseptic by steeping in carbolic acid, perchloride of mercury solution, etc., and subsequent drying.

LINT-DOCTOR, a sharp-edged ruler on the delivery side of the calico-printing cylinder, to detain any lint or fibres which may come off the cotton cloth.

LINTEL, in architecture, a horizontal tim¬ ber or stone over a door, window or other opening, to support the superincumbent weight.

LINTON, Eliza Lynn, English novelist: b. Keswick, Cumberland, 10 Feb. 1822; d. Lon¬ don, 14 July 1898. In 1858 she married William James Linton (q.v.), but they separated in 1867, though continuing to maintain friendly re¬ lations until his death. She was connected with the press for nearly all her literary career, writing for the Saturday Review, the cele¬ brated (Girl of the Period) pape'rs. She some¬ times dipped her pen in acid, but in private she was warm-hearted and self-sacrificing. Among her numerous works are (The World Well Lost; (The One Too Many) ; (In Haste and at Leisure) ;*

(The Girl of the Period, etc. Her best novels are (The True History of Joshua Davidson: Christian and Communist* (1872), and (Autobiography of Christopher Kirkland.)*

LINTON, Sir James Dromgole, English painter: b. London, 26 Dec. 1840. He was edu¬ cated at Cleveland House, Barnes. He after¬ ward studied art and has done much to pro¬ mote the interests of the English school of water-color painting. He was elected a member

of Institute of Water-Color Painters (1867). When it was reorganized its title being hence¬ forth the Royal Institute of Painters in Water- Colors, he was chosen president (1884). In the following year he was knighted. His pictures in oil include the (Marriage of - the Duke of Albany, painted in 1885, and a series of panels illustrating 16th century history for a private mansion at Nottingham.*

LINTON, William James, Anglo-Amer¬ ican wood engraver and author : b. London, 1812; d. near New Haven, Conn., 29 Dec. 1897. As a wood engraver he took very high rank, and some of his finest work may 'be found in the pages of the Illustrated London News, to which he frequently contributed from its com¬ mencement till he came to the United States in 1867. As an author, in which capacity he was more widely known than as an engraver, the zealous Chartism of his youth tinged much of his earlier production. Among his works may be mentioned (The Plain of Freedom (1852) ; (Claribel and other Poems> (1865) ; (The Eng¬ lish Republic ; (Some Practical Hints on Wood Engraving) (1879) ; (Life of Thomas Paine) (1879) ; (A Manual of Wood Engraving> (1884) ; (Poems and Translations) (1889), and (The Masters of Wood Engraving) (1890).*

LINZ, lints, Austria, the capital of the Crownland of Upper Austria, on the Danube, 98 miles west of Vienna (117 by rail). It is de¬ fended by detached forts extending over a cir¬ cuit of nine miles, and has an old cathedral, a new' cathedral, provincial parliamentary house, castle, town-house, bishop's palace, etc. The manufactures include woolen, linen, silk and cotton goods, locomotive machinery, lamps and hardware, tobacco factory and shipbuilding, and there is an extensive trade on the Danube, .on which steamers ply upstream to Ratisbon and down to Vienna. Pop. 67,817, the majority German Catholics.

LION, the largest and most celebrated of the cat tribe, forming the widespread species Felis leo. The outward form and appearance of

the lion are familiar. The apparently ex¬ cessive size of the head, due chiefly to the great mane which covers the head, neck and shoulders of the males ; the uniform, unmarked, tawny color of the skin ; the great development of horny papillae upon the rasp-like tongue; the growth of long hair on the elbows and along the middle line of the belly, and the tuft at the extremity of the tail (hiding a horny spine) are distinctive external characters. The length of the lion from nose to tip of tail, rarely, if ever, exceeds 10 feet, and that of the lioness nine feet, of which the tail forms a third.. The older books separated a supposed species of maneless lion, especially one in India desig¬ nated the maneless lion of Gujerat; but the development of the mane varies greatly, some lions in all regions having this feature much more abundant than others, and in all cases it is a product of age, appearing fully, only when the animal has reached full maturity at the age of five to seven years, so that no dis¬ tinction of this kind is valid; nor can any be made upon color, the mane in certain specimens being very much darker than in others without regard to locality, dark and amply maned and scantily maned individuals belonging some¬ times to the same litter. The period of gesta-

tion in the lions is five months. Only one brood is produced annually, and from two to four young are produced at a birth. They re¬ main where born for a few weeks; the mother may leave them for 48 hours to go hunting. The mother nourishes the whelps for about a year; their size at birth being about that of a pug- dog. In their young state the whelps may be marked with various markings ; brown bands upon a tawny body color and a stripe along the spine being most frequently observed. As they grow older, however, the markings disappear, and the uniform tawny hue of the adult is reached. The proba'ble limit of age of the lion has been differently stated by different writers. Buffon fixed it at 22 years. But a lion which died in the Tower of London in 1760 had lived in captivity above 70 years.

The habits of lions have been observed and described by more writers than in the case, perhaps, of any other animal, and they are known to vary constantly with circumstances, locality and the kind of prey available. In general this heavy animal, which is entirely un¬ able to climb into trees, and frequents open rather than forested regions, gains its food by stealth and power rather than by agility and speed, and kills his quarry most frequently by stalking rather than by

waiting at watering places. Lions often go abroad by day, wander¬ ing and hunting widely, but are chiefly active at night. Then this great cat goes to some accustomed lurking place near a spring or by the side of a river, where, concealed among the brushwood, he lies in wait for the animals coming to drink. A single powerful leap gen¬ erally lands him upon his prey which is crushed down by the weight of the attack and mauled and bitten about the head until the neck is broken by a wrench or the veins and arteries are torn open. If no rivals are near and the animal is very hungry, the prey may be de¬ voured on the spot to the extent required to satisfy appetite; and then, after drinking copiously, the beast will usually go away to his lair, leaving the remains for his family, if they have come near (as often happens), or to hyenas and jackals. In most cases, however, the lion, like other great cats, chooses to take his quarry to some retired spot where he may feed upon it unobserved; and amazing stories are told, with apparent truth, of the strength displayed in carrying or dragging the carcasses of large antelopes, cattle and horses ; it is not to be believed, however, as sometimes has been asserted, that a lion is able to ((fling a bullock over its shoulder® and run away with it. Such a feat is limited to goats and small animals, if, indeed, it ever occurs. Lions sometimes hunt together for mutual support. The lioness hunts by herself, especially when her kittens are young, at which time the father of the family is wandering alone, or with other males, and would be resisted if he attempted to join his spouse. The young remain with the mother until they are full-grown. The lion alone among cats is regularly polygamous, each male having three or four lionesses whose allegiance he gains by prowess in battle over rivals, and keeps by killing or driving off all newcomers. The result of these constant encounters in the arena of the desert is not only a scarcity of males but the continuous selection of the best

to become progenitors of the race. One pecu¬ liarity of the lion developed by this incessant warfare among the males is the development of the defiant and terrifying voice which elevates the growl, and enlarges the scream, of other cats, into a tremendous roar — a volume of noise beyond that made by any other animal. The statement that the lion roars at stated periods appears to be almost wholly without foundation; in summer alone, and especially be¬ fore storms, the lion roars before dawn. In rage the lion beats his sides with his tail, agi¬ tates his mane and facial muscles, protrudes the tongue and claws, utters the peculiar sharp, frequent growl and altogether presents a very terrific appearance, all of which, primarily, has reference to the savage rivalry of males above described.

The natural disposition of all animals to get their food as easily as possible has led lions everywhere to prey upon domestic cattle which, in a region where they are numerous, suffer nightly despoliation. Lions that have discov¬ ered this comparatively easy method of supply¬ ing their wants soon learn that mankind is equally, or even more, readily obtainable, and become ˆman-eaters.® Beasts so sophisticated must be put out of the way; and barbarians organize great bands of men who learn the lair of the animal, surround it and effect the ani¬ mal's death by any rude means possible. (

these great quantities laws were promulgated protecting the beasts in the Carthaginian prov¬ inces, to the great detriment of agriculture there and risk of the peasantry, and breeding establishments were created to produce enough lions to meet the imperial demand. The taming and training of lions have continued ever since, and to-day this great shaggy cat is the most impressive, if not the most intelligent, of the troupe which the menagerie showman gathers about him. For a long period almost all the lions exhibited in zoological gardens and shows have been those born in captivity, where the species breeds freely.

At the present day few lions exist north of the Soudan and Abyssinia; a few are left in the recesses of the Atlas Mountains; British and Portuguese East Africa and Rhodesia are the chief hunting grounds left ; and they have become extinct or scarce in the civilized regions of South Africa. In 1850 the last lion in the vicinity of Cape Town was shot. They no longer exist in Asia Minor, but are numerous in the extensive marshes along the lower Euphrates and Tigris, and thence occur at in¬ tervals to the valleys of the Indus, where a few still remain in the wilder deserts of Cutch and Gujerat. Formerly they were known over all northern and western India.

Books of special value relating to lions and lion hunting are Flower and Lydekker's Mam¬ mals, Living and ExtincC ; Blanford's < Zoolo¬ gies } (of India, Persia and Abyssinia) ; Ander¬ son's (The Lion and the Elephant5 ; Porter's (Wild Beasts) ; the hunting narratives of Gor¬ don Cumming, Gerard, Harris, Holub, Baker and Selous; Lyddeker, (Game Animals of Af rica) (London 1908); Patterson, (The Man- Eaters of Tsavo) (ib. 1908) ; Pease, Sir A., (Book of the Lion5 (ib. 1914) ; Roosevelt and Heller, (Life History of African Game Ani¬ mals5 (New York 1914).

LION IN ART. With the ancient Egyp¬ tians the lion was dedicated to the god Shu and the goddess Sechmet, both of which were, therefore, represented with the heads of lions. Again, the kingly dignity was represented by a lion's body, its head being given the features of the ruler. As the Nile inundations occurred when the sun was in the zodiacal constellation Leo, the lion was symbol of water; hence that animal is found in the decorations of pitchers, pails and other water containers. Cybele (Rhea) with the Assyrians and Greeks was depicted riding on or standing by a lion because that animal was dedicated to her. The lion was also symbol of the all-penetrating, vitalizing and mastering power of fire. The Assyrians and Greeks, in their architecture, made the lion guardian over the palace. To the Greeks and Romans this animal became guardian over springs, doorways, stairways, etc. Dedicated to springs (as Kreno phyla: r) the flowing water gushed out of a lion's mouth; again, in Doric architecture we find an open-mouthed lion's head decorating the outlets that released the rainwater from the roof. The lion was the Mithraic svmbol of the sun. In Christian art the lion is symbol of Christ as the «Lion of Judah,® and sometimes bears the cruciform nimbus. This animal is the attribute of Saint Jerome and of Saint Mark the Evangelist as well as of the Prophet Daniel. The lion and

serpents are ecclesiastical symbols of (

LION OF FLANDERS, The.

It was natural that with this aim he should have turned for some of his material to the earlier history of his country, the days of the glory of Bruges and Ghent, of the struggles of the guilds and of the old Flemish knights. This provides the background for the moving story of the Lion of Flanders (Robert of Bethune), who made common cause with the Flemish burghers against the French tyranny of Phillip the Fair. It is full of the pageantry of a rich epoch, and. moves rapidly with a large, full sweep and swing. The more important male characters are powerfully drawn, though the heroine, is weak and uncon¬ vincing. Though the (Lion of Flanders5 is substantially accurate, as a picture of the time,

it should nevertheless be remembered that the events are marshaled and colored by the au¬ thor's patriotic fervor and not drawn with the dispassionate analysis of the modern historian. As an historical

novel, however, it stands with the best of its class and deserves the celebrity which has brought about its translation into nearly all European languages.

Christian Gauss.

LIPARI, le'pa-re, or .®OLIAN IS¬ LANDS, a group of volcanic islands in the Mediterranean, about 24 miles from the north coast of Sicily, situated between lat. 38° 20′ and 38° 55; N. ; long. 14° 15′ and 15° 15′ E.; and comprised in the province of Messina. Total area, about 45 square miles. Pop. about 20,000. These islands called by the ancients ZEoliae, Vulcanise and Insulae Liparaeorum, were supposed to be the residence of zEolus and Vulcan. Lipari, the largest, is populous and well cultivated, producing great quantities of corn and fruit, especially figs, grapes and raisins ; it likewise produces alum, sulphur, nitre and cinnabar. It is abouit 15 miles in circumference; the air is healthful, the inhabit¬ ants industrious and the males good sailors. On the eastern coast is situated a town of the same name (pop. of commune 15,616), con¬ taining a castle built by Charles V, a cathedral, a college, several convents and a hospital. A considerable trade is carried on in the prin¬ cipal produce of the island. The other islands are Stromboli, the scene of volcanic eruptions in 1902 and 1907; Panaria, Vulcano, Salina, Alicuri and Filicuri, with a number of smaller ones. The peaks in the islands range from 1,000 to 3,140 feet, the highest, in Salina. Lipari is composed of pumice-stone, lava, volcanic glass and black sand; and the warm baths and heated vapors of the stoves (excavations which emit hot sulphurous exhalations) prove the activity of the subterranean fires.

LIPPI, Filippino, fe-le-pe'no, Italian painter, son 6f the preceding by Lucrezia Buti : b. Prato, 1459; d. Florence, 5 April 1504. He was a pupil of Fra Diamante, but seems to have closely followed the artistic example of his father and Sandro Botticelli. He gained con¬ siderable reputation before he was out of his teens. Among his wall paintings, which show a wonderful advance beyond his predecessors, are those in the chapel of the Brancacci family at Florence, in which is portrayed the history of Saints Peter and Paul, and the decoration of the walls of the church of Santa Maria Sopra Minerva, at Rome (1488-93) illustrating the life of Saint Thomas Aquinas. His mas¬ terpieces, however, are to be found at Florence — -in the Strozzi chapel of Santa Maria Novella, where his frescoes portray the legendary life of the Apostles Philip and John (1502); and in the Badia, which has his (Vision of Saint Bernard,5 regarded as the most perfect ex¬ pression of his genius. Some of his canvases are in the

galleries of Florence, Bologna, Ber¬ lin, Munich, Copenhagen; and the National Gallery, London, which has the (Virgin and Child, with Saint Terome and Saint Dominic.5 Mrs. P. Warren, Boston, Mass., has a repre¬ sentation of the (Holy Family with Saint Mar¬ garets

LIPPI, Fra Filippo del Carmine, fra

fe-lep'po del kar-me'na lep'pe, Italian painter:

b. Florence, 1406; d. Spoleto, 9 Oct. 1469. In his 15th year he entered the Carmelite monas¬ tery at Florence and became a professed monk in 1421, to which calling he had no vocation. Early formed his style on the example of Masaccio, but was later influenced by Masolino, and Angelico of Fiesole (Fra Giovanni). In 1431 he left his convent, but without release from his vows. In 1434 he was commissioned to paint the (Coronation of Our Lady5 for the high altar of Saint Ambrogio. In 1442 he was appointed by the Pope, rector of the parish of San Quirico, at Legnaia, near Florence. In 1452 lie began his work at Prato, and three years after, being convicted of fraud, was de¬ prived of his benefice. He was appointed in 1456 chaplain to the nuns of Santa Margherita at Prato; was commissioned by them to paint a panel f

In his best work he united with the spiritual feeling of Fra Angelico of Fiesole the strong historic imagination, energetic modeling and unconventional loveliness of form and face, characteristic of Masaccio. His greatest mas¬ terpiece is in the parish church at Prato, and consists of a series of frescoes illustrating the life of Saint Stephen, John the Baptist, etc. Many of his altar-pieces are now in the Floren¬ tine Academy. His last frescoes in the cathe¬ dral at Spoleto were executed with the collab¬ oration of Fra Diamante. Examples of this painter are also to be found in the galleries of Berlin, Munich, Rome and the National Gallery, London. His (Saint Lawrence, with Saint Cosmas and Damian and Two Donors5 are in the Metropolitan Museum, New York. Consult Strutt, Edward C., (Fra Filippo Lippi5 (London 1901) ; and Vasari's (Lives of the Painters.5

LIPPI, Lorenzo, lo-rend'zo, Italian poet

and painter : b. Florence, 1606 ; d. there, 1664. He wrote a comic epic poem in 12 cantos, (I1 Mal- mantile vacquisdato5 under the anagrammatic pseudonym, <(Perloni Zipoli55 (publ. 1676). The poem abounds in rare humor and is writ¬ ten in light, swift verse.. The language, how¬ ever, abounds in Florentine provincialities, and

is unintelligible without such a commentary as is furnished to the edition of 1688 by P. Mu- nucci. As a painter he was an imitator of Santi di Tito's manner and was reputed the best draftsman of his time. There is a Cruci¬ fixion > of his in the Uffizi Gallery at Florence; and

LIPPINCOTT, lip'm-kot, Horace Mather,

American author on historical subjects: b. Philadelphia, 20 April 1877. He was educated at Germantown Academy and the University of Pennsylvania. He is a member of the So¬ ciety of Friends, a Quaker organization, and is the author of (The Mather Family of Chel¬ tenham, Pennsylvania5 (1910); (The Colonial

Homes of Philadelphia and Its Neighborhood5 (1913) | (A Portraiture of the People called Quakers (1915); < Early Philadelphia* (1917). He is also editor of The Alumni Register, the graduate monthly toagaHfi© of the University Of Pennsyivariia:*

LIPPINCOTT, Joshua Ballinger, Amer¬ ican publisher: b. Juliustown, N. J,, 18l6; d, Philadelphia, 5 Jan. 1886. He was a book¬ seller in Philadelphia 1831-36 and in the last named year founded the house of J. B. Lippin¬ cott and Company. In 1850 he bought the business of Griggand Elliott, and his firm then assumed the leading position in the publishing business in Philadelphia. After his death, in 1886, the firm was converted into the J. B. Lippincott . Company. Lippincott's Magazine was established in 1868. Upon the death of T. B. Lippincott, his son Craige (1846-1911) became head of the firm. The latter was born in Philadelphia, educated at the University of Pennsylvania and in Europe, and entered the publishing business in 1866.. On his death in 1911 he was succeeded by his brother, Joshua Bertram, b. Huntington Valley, Pa., 1857.

LIPPINCOTT, William Henry, Amer¬ ican artist : b. Philadelphia, Pa., 6 Dec. 1849. He began his art studies in the Pennsylvania Academy of Fine Arts, and his first profes¬ sional appearance was as a book illustrator and later as a scene painter. In 1874 he became the pupil of Bonnat and for the eight years he remained at Paris exhibited annually in the Salon. The wide range of the work which he has done since he took up his residence in New York includes portrait, genre, landscape and scene painting, and he appears

regularly as an exhibitor in the annual American art exhibitions. His most important pictures in¬ clude (The Duck's Breakfast5 ; (Un Jour de Conge5 ; (Pink of Old Fashion) ;

LIPTON, Sir Thomas Johnstone, Irish

merchant and yachtsman: b. Glasgow, Scotland, 1850. He came to America as a steerage pas¬ senger in 1865, for two years worked in. the South Carolina rice fields, later in various Northern towns, opened a provision shop in Glasgow, attained great business success and finally organized <(Lipton, Limited,55 the largest commercial establishment in the United King¬ dom, where it controls 420 shops. This busi¬ ness is capitalized at $200,000,000, with tea, coffee and cocoa estates in India and Ceylon, fruit-orchards in Kent and elsewhere, . and a packing-house and refrigerator-car line in Chi¬ cago. Lipton has given largely for charitable purposes. He is best known, however, for his attempts as a representative of the. Royal Ul¬ ster Yacht Club to win the America Cup in the international yacht-races of 1899, 1901, 1903 and 1920. His British-built yachts were de¬ feated in three straight races. In the fourth his yacht won two out of five races. He was knighted in 1898 and made a baronet in 1902. During the European War he used his steam yacht to carry relief to the stricken inhabitants of Serbia.

LIQUEFACTION OF GASES. See

Liquefied and Compressed Gases.

LIQUEFIED AND COMPRESSED GASES. Introductory Statement. — Matter, that is all physical substance, commonly is understood to exist in three forms, solid, liquid and gaseous. Under ordinary conditions this is a true concept but it is not generally appreciated that in reality matter may be changed from one form to another, that a solid under one con¬ dition of temperature and pressure becomes a liquid at another, and a gas at a third. Con¬ versely a gas by similar changes in temperature and pressure may be converted into a liquid or a solid. The earth typifies all matter, its crust being composed of solids, its oceans, lakes, rivers and in part its molten interior liquids, and its atmosphere and the vapors pent up within, its interior, gases. The genius of mankind in the past has been directed to utilizing for man's comfort and convenience mainly solids , and liquids. Only in compara¬ tively recent times, however, has attention been seriously directed to the utilization of gases and to applying commercially the principle that solids and liquids may be reduced to gaseous forms, and so reduced find many fields of em¬ ployment in the arts and

sciences. It was as late as 1827 that the first commercial employ¬ ment of gas was made in this country in which, year illuminating gas was introduced in New York City. The next commercial use was in 1870 when carbonic acid gas was developed in¬ dustrially. It is employed largely in carbonated beverages, fire extinguishers, insecticides and many other products.

In 1863 nitrous oxide was applied in dental operations for the purpose of permitting work without pain.

In 1875 oxygen was developed for medical purposes in diseases of the lungs. About the same time oxygen was employed in connection with calcium light for spotlights and scenic effects.

In 1895 acetylene was introduced commer¬ cially to illuminate country homes and in bicycle headlights. About the same time anhydrous ammonia began to be used for refrigerating purposes.

In 1907 the manuiacture of oxygen on a commercial scale for industrial purposes was commenced in. this country by the liquid air process; and in connection with the industrial application of this gas, acetylene was used in welding and cutting steel with the oxy-acetylene blowpipe or torch.

Since 1907 many new gases, the existence of which in quantities in the earth or in sub¬ stances known on the earth was unsuspected, have been discovered and put to commercial use. For example, it was supposed until recent years that the air which we breath was com¬ posed of four parts of nitrogen and one part of oxygen. It is now known that in addition to these two gases which make up the maior portion of our atmosphere, there are eight other gases contained in minute quantities in it, among them, argon, neon and krypton. Of these gases, argon and neon have been found to have a commercial value, the former in the manu¬ facture of incandescent lamps and the latter for lighting purposes. In like manner, helium, a gas which was known to exist in the sun but which was supposed to be a rare element on the earth, is now known to exist in many sub¬ stances and since the declaration by the United*

States of a state of war with Germany, methods have been found for extracting this gas in large quantities from various substances at com¬ paratively small cost. This gas is now being employed

extensively for military ballooning, because it is not inflammable.

Within the last decade the discovery of new gases and the development of new uses for the known gases has brought into being a new industry which in the same period has grown with rapid strides until it has become an in¬ dustry vital to the commercial life of the coun¬ try and one which played an important part in the World War. As an example of this un¬ precedented development, a single branch of that industry, namely, the oxygen business, may be taken. In 1907 there existed in this country a single plant which had been built in that year and which produced annually 24,000,000 cubic feet of oxygen. At the date of this article, some 12 years later, the yearly production of oxygen is estimated at over a billion cubic feet and the oxygen plants scattered throughout the entire expanse of the United States number over 200. The commercial utilization of the other liquefied or compressed gases has par¬ alleled that of oxygen and to-day the United States is dotted with plants manufacturing com¬ mercial gases representing an investment of well over $100,000,000 and an annual production of billions of cubic feet of gas. Despite all this the present stage of development represents the merest scratch of the surface of an immense field yet untouched which lies beneath for exploitation.

As the industry has grown and the use of various gases has developed, the transportation of these gases has become an important factor. When gases first were employed commercially they were transported in large metal containers under relatively small pressure. As the demand for gas increased, however, it was found that the old type of container did not permit of transportation in sufficient quantities because of the limitations placed upon the size of con¬ tainers by the necessity of convenient handling. To overcome these difficulties the containers were made stronger and smaller and the quan¬ tity of gas in an individual container, or cylinder as it is termed in trade circles, was increased by subjecting the gas to a great increase of pressure. In this connection one must under¬ stand that as the pressure on the gas increases its volume decreases in certain proportions which vary with different gases. By increasing the pressure on the gas to a certain point and at the same time reducing the temperature the gas may be changed to liquid form and many gases are shipped in the form of liquids but on being released from the presure in the con¬ tainer they again assume the gaseous form desirable for utilization. It is because of this fact that these gases are termed commercially liquefied or compressed gases as distinguished from other gases like illuminating gas which are employed generally at approximately at¬ mospheric pressure.

With the change in the character of con¬ tainers there grew up the hazard from breakage of a container and the sudden expansion of the compressed gas by its release from pressure. In consequence the Federal and State authori¬ ties found it necessary for the safety of the public to devise rules and regulations governing

the character of containers which Wotild be permitted for certain gases and rules for their handling while in transit. This necessity has resulted in legislation governing the transporta¬ tion, storage and employment of gases under pressure. The chief agency having charge of these matters and the one .which has shaded in large measure the legislation ih this field is the Bureau of Explosives.

With the development of the industry there came also the need for co-ordination between manufacturers of compressed and liquefied gases and of equipment used in connection there¬ with. In consequence there have been organized several trade organizations having for their object the promotion of uniform and proper legislation governing compressed and liquefied gases, as well as the commercial application of the gases generally. In most works of reference the treatises on gases have been separate, arranged alphabetically in differ¬ ent parts of the work. However, it has been deemed advisable in this article to deal under one title with all gases which in a compressed or liquefied state have a commercial use be¬ cause this industry represents to-day a separate and distinct field, and because there is much about the employment, transportation and use of every compressed gas which is common to all. The foregoing short history of the commercial use of gases is followed immediately by separate treatises, alphabetically arranged, which deal at length with all the more important liquefied or compressed gases.

ACETYLENE. Chemical Properties.*

C_2H_2 — carbon 92.25 per cent, hydrogen 7.75 by weight. At atmospheric pressure and 60° F., the volume of one pound of acetylene is 14.53 cubic feet. Acetylene requires 11.92 volumes of air or 2.5 volumes of oxygen for its com¬ plete combustion. Acetylene is a colorless, tasteless gas; when chemically pure it has a sweet ethereal odor ; when in commercial form traces of impurities impart to it a pungent odor suggesting garlic. Acetylene is an unsaturated hydro-carbon. It exists in a state of unstable chemical equilibrium and owing to this fact it combines very energetically, having low igni¬ tion temperatures, namely, 804° F. in air and 782° F. in oxygen, compared with about 1200° for other gases under similar conditions.

When mixed with the proper proportions of air and ignited, acetylene will give rise to a so-called gas explosion, as will any other combustible gas or combustible solid if in a state of sufficiently minute subdivision. The explosive range for acetylene under ordinary conditions is from 3 per cent of acetylene and 97 per cent of air to 24 per cent of acetylene and 76 per cent of air, the point of maximum explosibility being 12 per cent of acetylene and 88 per cent of air. Unlike other gases, how¬ ever, acetylene possesses high endothermic energy, greater than that of any other ordinary substance. By this it is meant that the ele¬ ments forming actylene may be considered as being in a state of chemical stress and capable of giving rise to a very considerable amount of heat by the mere act of their separation. In other words, an endothermic substance will give

*. * All temperatures in degrees Fahrenheit; all pressures*

in pounds avoirdupois,

more heat when burned as a compound than can be obtained from burning its separate ele¬ ments in the uncombined state. The carbon and hydrogen forming one cubic foot of acety¬ lene would produce 1,248 heat units if they were burned separately. One cubic foot of acetylene, however, formed from the same car¬ bon and hydrogen will produce 227 heat units more than this amount, making a total of 1,475 per cubic foot. The 227 heat units represent endothermic energy. Owing to this endother¬ mic energy, acetylene acquires true explosible properties and will dissociate with explosive violence without admixture of air or oxygen if it is compressed slightly in excess of 20 pounds per square inch and ignited. Owing to this property, insurance, police, transportation and fire authorities prohibit the manufacture, stor¬ age and transportation of acetylene at a pres¬ sure exceeding 15 pounds per square inch, ex¬ cept when the acetylene is compressed into cylinders containing a porous substance having a degree of porosity which will prevent the propagation of an explosion.

Acetylene, at atmospheric pressure, is solu¬ ble to the extent of about volume for vol¬ ume in water. It is also soluble in vary¬ ing proportions in alcohol, chloroform, benzene, paraffin, olive oil, ether, carbon- bisulphide, etc. It is soluble to a remarkable extent in

acetone, which liquid will dissolve 25 times its own volume of acetylene at atmos¬ pheric pressure and an additional 25 volumes for each atmosphere of pressure to which the acetylene may be subjected. Commercial ad¬ vantage is taken of this property and acetylene under pressure is now stored and transported in cylinders which are packed with a porous, substance soaked with acetone. The porous, mass employed in such cylinders generally con¬ sists of asbestos in the form of blocks built up and reinforced with silicate of soda, or of a mixture of charcoal, kieselguhr and cement,, molded into the cylinders. Cylinders contain¬ ing acetylene compressed into a porous sub¬ stance of a proper degree of porosity, or com¬ pressed into a porous substance soaked with acetone, or other suitable solvent, are safe and their use is permitted. Acetylene stored in this way is commonly known as dissolved acety¬ lene. The use of acetylene dissolved in ace¬ tone gives to this gas a portability and a uni¬ versality not possessed by any other lighting or heating agent. Cylinders of acetylene are now carried on motor cycles, trucks and small boats, and they are obtainable at country stores as well as in the cities. This has resulted in the education of thousands of people in the use of gas who used to depend upon the liquid fuels for their light and heat.

Acetylene has no toxic properties and may be taken into either the lungs or stomach with impunity, even when mixed in air in consider¬ able proportions. Acetylene is a true gas, that is, it consists of only one chemical compound and is not a mixture of a number of gases each with its own peculiar characteristics, as is the case with most other illuminating and fuel gases. Under pressure, acetylene obeys Boyle's Law for the compression of gases and its Pres¬ sure-Volume Curve is practically straight up to the liquefaction point, which at ordinary temperatures is 700 pounds per square inch. Owing, however, to the dangers in unabsorbed

compressed acetylene this gas is never sub¬ jected to pressures anywhere approaching its liquefaction point. Acetylene may be mixed with most ordinary gases with impunity, but if mixed with chlorine and subjected to sunlight, it will combine with considerable violence. Acetylene may be used as an enricher of other gases to increase their candle powers and calo¬ rific values. It is employed for this purpose in European countries in the Pintsch gas used for train lighting. When added to an illuminat¬ ing gas, acetylene will increase the heating value in direct proportion to its presence in the mixture and the illuminating value by about two candle power for each per cent of acetylene added. It cannot compete however in point of price with oil and other enrichers and for this reason is not

ordinarily used for this purpose.

As stated above, acetylene obeys Boyle's Law for the behavior of true gases under vari¬ ations of volume and pressure. It also obeys Charles' Law, governing the relation of tem¬ perature to volume. However, if acetylene is subjected to a temperature in excess of 538° F., changes of great chemical complexity take place in its structure. For this reason, care must be taken not to overheat this gas in its generation or in the appliances in which it is used. Under the influence of heat acetylene will break up or rather double up — polymerize — into a vast number of hydro-carbons, rang¬ ing from benzene (CeH6) to heavy black tars according to the degree of temperature. If once heated to the point where polymerization occurs, no amount of subsequent cooling or purification will restore the acetylene.

Acetylene has a density of 0.92, air being 1. Its atomic weight is 26. Its critical tem¬ perature is 99° F., which means that the curve of power for compression reaches a straight line at this temperature and hence no amount of pressure will serve to liquefy, if in excess of this temperature. The critical pressure of acet¬ ylene is 995 pounds per square inch.

Domestic and Commercial Uses. — Acety¬ lene is used for isolated lighting plants throughout the country; homesteads, farms, churches, lodges and similar institutions are illuminated with acetylene from generators de¬ vised for the purpose. Owing to its relatively higher cost, acetylene does not compete in its present stage of development with electric or illuminating gas for city lighting. It is used quite extensively for cooking purposes in con¬ nection with isolated lighting plants. Dissolved acetylene is used for buoy lighting and for other aids to navigation. Buoys carrying suf¬ ficient gas to supply their lights continuously for 15 months are in use practically all over the world. These are veritable self-attending light ships. A large number of them are pro¬ vided with <(sun valves® which are actuated by the direct heat of sunlight, turning off the acetylene when the sun shines and turning it on again when darkness, fog or clouds intervene. There are some 360 acetylene buoys marking the channel of the Panama Canal. Owing to its low ignition temperature, acetylene cannot be compressed in an engine cylinder to a suffi¬ ciently high point to render the engine effi¬ cient; hence acetylene has never developed into a power proposition.

Acetylene is used in small portable lamps for mining purposes, the present acetylene min-

er's lamp being practically the first improve¬ ment in mine illumination for 200 years. Prac¬ tically all the metal mines in the United States and its dependencies, as well as the coal mines which are not gaseous, are now lighted with acetylene. The acetylene cap lamp has about 18 candle power, head on, as compared with three-fourths candle power given by the old form of oil lamp, and its light can be directed to any spot desired by means of the reflector which is an integral part of the lamp. Acety¬ lene is used to a very large and increasing ex¬ tent for welding and cutting purposes, because of certain physical peculiarities now to be dis¬ cussed. The theoretical temperature of any flame may be calculated from the amount of heat generated by the combustion of the fuel and the amount of heat absorbed by the prod¬ ucts of the combination. Water vapor will absorb four times more heat for a given in¬ crease in temperature than carbon dioxide and those fuels which burn to carbon dioxide have a higher flame temperature than those which burn to water vapor. The flame temperature of any hydro-carbon varies in proportion to the relative amounts of carbon and hydrogen of which it is composed. Acetylene has more car¬ bon and less hydrogen than any other known substance, with the exception of the solid naph¬ thalene which is devoid of the endothermic energy mentioned. This being the case, its products of combustion have a maximum of carbon dioxide and a minimum of water vapor. Added to this is the fact that acetylene pos¬ sesses a very high endothermic heat content which gives off heat without producing any additional products of combustion. When the volume of the combustion products is reduced by the removal of the nitrogen from the air and when pure oxygen is used, the combustion of acetylene results in a higher flame temperature than that of any other substance known or rec¬ ognized as possible in chemistry. The combus¬ tion of acetylene with oxygen produces the acme of flame temperature — 7878° F. being the theoretical maximum. Owing to radiation and convection losses, the actual available flame temperature is in the neighborhood of 6300° F. This gives to a blow pipe consuming acetylene and oxygen the power to produce, in portable form and small compass, a temperature ap¬ proaching nearly that of the electric arc. This has resulted in the wide employment of acety¬ lene in conjunction with oxygen for the weld¬ ing and cutting of metals. The oxygen cutting blow pipe, in which acetylene is commonly em¬ ployed as the fuel gas, is used extensively for cutting steel bars, plates and ingots to shapes and lengths, and in wrecking work. The oxy- acetylene cutting

torch was employed in cutting up the Maine in Havana Harbor, and for cut¬ ting out the Quebec Bridge. The cutting process has proven invaluable in fire fighting and in marine, mine and railroad rescue work, notable examples being the Equitable Building fire in New York and the Eastland disaster in Chicago. The process is used extensively in scrap yards and for all classes of demolition work. It is successfully employed for cutting steamships into sections where necessary, as in the case where a ship has to be transported through a lock which is too small to handle it. The oxygen-acetylene cutter has revolutionized wrecking and scrap yard practice in the past

few years and the acetylene welding torch has produced great changes in the methods of metal construction during the same time. If a cutˆ ting blow pipe is provided with a sheath of compressed air to force water away from its nozzle, cutting can be performed Under Water It is said that the Germans Used the process of cutting under water for freeing their subma¬ rines from submarine nets. The under-water cutting blow pipe is commonly employed for cutting metal sheet piling under water. Acet¬ ylene is used to a limited extent as a basis in the formation of chemical substances. This use, although it possesses considerable promise, is in the laboratory rather than in the commer¬ cial stage at this writing.*

History. — As a theoretical possibility and laboratory curiosity acetylene has been known for many years. It exists in illuminating gas in fractional percentage and was produced as early as 1876 by scrubbing coal gas with a copper solution. It was prepared on a labora¬ tory scale by Berthelot and Wohler many years ago. Its birth, however, as a commercial pos- sibilty occurred 4 May 1892, when calcium car¬ bide was produced in an electric furnace located at Spray, N. C., by the Willson Alum¬ inum Company. This company was experi¬ menting with a view to improving its process for the production of aluminum and was en¬ deavoring to produce metallic calcium to be used as a reducing agent for aluminum oxide. To this end a mixture of calcium oxide (quick lime) and coal tar was fused in an electric furnace in the hope that the carbon would act as a reducting agent, removing the oxygen from the lime, and leaving the calcium free, the metallic calcium to be used in a subsequent step in the process of producing metallic aluminum. The reaction removed the oxygen from the lime, as was expected, but left the calcium in combination with a portion of the carbon in¬ stead of in a free state, and this combination was found to be calcium carbide. The devel¬ opment of the production of calcium carbide has progressed steadily from that date until the present time, most of the development being under the supervision of two of the men who were operating the

original furnace and who are still prominently identified with the indus¬ try. There have been revolutionary changes in the process of manufacturing carbide, espe¬ cially in the size and extent of the operation. The main underlying process, however, of sub¬ jecting lime and carbon to the intense heat, ob¬ tainable only in the crater of an electric arc, has not changed from 1892 to date. Carbide was introduced into Europe shortly after its discovery. European production has developed to a very large extent. The present advance¬ ment in the process is, however, practically all due to American efforts; the foreign manufac¬ turers have followed American practice with¬ out substantial contribution to its progress. The temperature necessary to form calcium carbide is so intense that the process does not lend itself to laboratory methods and as far as is known it has never been produced on a small scale.

Bibliography. — Bowles, J. D., < Acetylene for Lighting Country Homes,) (Bui. of the University of Missouri, 1910) ; Claude, G., (Liquid Air, Oxygen,ˆ Nitrogen ˆ (trans. ,by Cottrell, H. E. P., Philadelphia 1913) ; Leeds,

F. H. and Butterfield, W. A., (Acetylene, Its Generation and Use5 (Philadelphia 1915) ; Lewes, V. B., (Acetylene, a Handbook for the Student and Manufacturer5 (London 1900) ; Pond, G. G., (Calcium Carbide and Acetylene5 (Bui. of the Pennsylvania State College, 1917).

AMMONIA, Anhydrous (NHa). — Priest¬ ley, in 1774, was the first to isolate ammonia, having collected it over mercury. Scheele, in the same year, discovered that it contained ni¬ trogen. Its true composition was determined by Berthollet in 1785. Liquid ammonia, however, was first obtained by Faraday, in 1823, by warming the compound 2AgC13NH3 in a sealed tube.

Physical Properties. —

Colorless, with pungent odor, strongly alkaline taste, and has alkali reactions.

Molecular weight, 17.03.

Specific gravity, calculated, 0.5883 ; spe¬ cific gravity, observed, 0.5962; specific gravity of liquid, 0.6234.

Melting point, — 77.34° C.

Boiling point, —38.5° C.

Critical temperature, — 130° C. (Dewar) ; critical pressure, 115 atmospheres (Dewar).

Coefficient of expansion at constant pres¬ sure, 0—100° C., 760 mm., .003800; at 0° C, 760 mm., .00386; coefficient of pressure at constant volume, 0° C., 760 mm., .003800; at 0—100° C., 760 mm., .003770.

Specific heat, 0.5009 at 0° C. ; 0.5317 at 100° C.; 0.5629 at 200° C.; 0.5202 between 23- 100° C.

Heat of formation of gas, 11,887 calories; in solution, 20,322 calories.

Heat of formation of gas, at 15° C., 12,200, and of liquid 16,600 (Chem. Kalendar).

Heat of absorption in water, 8,435 calories.

Weight of one liter, calculated, 0.7606 grams; observed, 0.7708 grams; weight of one cubic foot at 32° F., 29.9 2″ pressure, .04812 lbs.

Solubility in water (Roscoe and Ditt- mar). Grams of ammonia in one gram of water. At 0° C, 0.875; 10° C., 0.679; 20° C., 0 526; 30° C., 0.403; 40° C., 0.307; 50° C., 0.229.

Latent heat of evaporation, being higher than that of any other known liquid except water, is 5,000 cal. at 15° C. and 5,600 cal. at boiling point. Hence the use of ammonia for refrigeration.

Chemical Properties. — Ammonia is poison¬ ous and attacks the mucous membrane. Seri¬ ous effects on human beings are experienced when the atmosphere in which they are has a greater quantity of ammonia than five one- hundredths of 1 per cent. Ammonia will not burn in air at ordinary temperature, but will do so when heated, and burns still more readily when mixed with oxygen. With the aid of catalysts (copper, iron, nickel, and especially platinum), ammonia is oxidized by oxygen or air at low temperatures. At atmospheric pres¬ sure ammonia begins to decompose below 500° C., the rapidity of decomposition varying with the nature of the surfaces with which it is in contact, glass being

inactive but porcelain and many metals and oxides accelerating, decompo¬ sition being nearly complete when the latter are present. Ammonia is very soluble in water,

alcohol, ether and many saline solutions. The aqueous solution of ammonia is strongly alka¬ line and unites with acids to form salts.

How Obtained. — Ammonia occurs mostly in combination with acids, but is found in a free state in fumaroles of Monti Carboli in Tuscany, which also contain ammonium sul¬ phate and borate. It is present in the air to the extent of one hundred parts of ammonia to one million parts of air. For laboratory pur¬ poses it can be obtained by the action of cal¬ cium oxide on ammonium chloride. A mixture of hydrogen and any oxide of nitrogen, passed over a heated porous body, such as spongy platinum, pumice, or ferric oxide, produces ammonia. It may also be produced by passing moist nitric oxide over hot iron filings ; and also by heating solutions of nitrates or ni¬ trites with caustic alkali and zinc.

Laboratory Methods of Preparation. — (1) By gently warming the aqueous solution of ammonia and passing the gas over quicklime. (2) From lime and an ammonia salt (e.g., chloride or sulphate) by heating together in a retort.

Ammonia is a decomposition product of the decay or destructive distillation of nitrogenous organic matter.

Commercial Methods of Preparation. —

I. Destructive Distillation Processes. 1. By-product in Manufacture of Illuminating Gas. — When coal is destructively distilled as in the production of coal gas for illuminating pur¬ poses, a number of extremely valuable by-prod¬ ucts are obtained such as benzol, toluol, am¬ monia, phenol, tar, coke, etc. Until some years ago the greatest part of the ammonia produ don of the world was obtained from the ammo- niacal liquors of gas works. These liquors are distilled with excess of slaked lime with the aid of steam (in coils) in stills provided with rectifying columns for concentrating the am¬ monia gas. The latter is scrubbed by passing successively through towers containing caustic soda solution and paraffin oil, and is thus freed from impurities, such as H2S, CO2 and pyri¬ dine basis. The purified ammonia gas is then converted to ammonium sulphate, or to aqua ammonia by absorption in distilled water. A small amount of ammonia is made from the materials used in purifying illuminating gas (freeing the latter from H2S and cyanogen compounds). The purifying material, ((spent oxide55 or ((sludge55 (Bueb or Feldmann process) contains a large percentage of combined am¬ monia which is recovered by gas works or manufacturers who purchase this material from gas plants.

2. By-product in Manufacture of Coke for Metallurgical Use. — Until recently, most of the coke required for metallurgical purposes (espe¬ cially in the manufacture of iron and steel) was made by the distillation of coal in bee-hive ovens in which all the valuable volatile in¬ gredients of the coal were lost. Now, how¬ ever, particularly since the great demand for coal tar products of all kinds caused by the World War, an increasingly large percentage of coke is being made in by-product coke ovens in which the gaseous and liquid distillates from the coal are recovered and used or sold.

Similarly in some countries (e.g., Scotland) in which blast furnaces have been operated

with coal instead of coke the recovery of the volatile ingredients of the coal has met with commercial success.

3. By-product in the Distillation of the Bi¬ tuminous Shale. — In Scotland where this in¬ dustry has had a large development, and to some extent in this country, the recovery of ammonia has been successfully carried out. About 42 pounds of ammonium sulphate are recovered from one ton of Scotch shale.

4. By-product in the Manufacture of Glue. — After glue has been extracted from animal substances, like bones, cartilages, hoofs and horns the residue is destructively distilled, yielding among other products ammonia as a valuable by-product.

II. Synthetic Processes. — The world's re¬ quirements for nitrogen compounds in the last few years, 1914 to 1918, were so great that the destructive distillation processes were insuffi¬ cient to meet the demand. As a result, several processes for the fixation of atmospheric nitro¬ gen developed in the last two decades have been successfully applied on a commercial scale. This has been particularly the case in Germany which could not have lasted for more than a year at war without the cyanamid and Haber processes.

1. The Haber Process. — In this process, nitrogen and hydrogen are directly combined to form ammonia. The mixed gases are passed at high pressures, 200 atmospheres or more, and at temperatures of 500 to 700 degrees C over a catalyst, such as osmium, uranium or palladium, when combination occurs resulting in the forma¬ tion of ammonia to the extent of 3 to 12 per cent of the mixed gases. The ammonia formed is then separated by cooling and the remaining gases, together with fresh nitrogen and hydro¬ gen, pumped over the catalizer again. Heating of the gases is effected electrically, the power consumption for the whole process being one- fourth to one-sixth of that required by the cyanamid process. Since the power consump¬ tion is so low the production of synthetic am¬ monia by the Haber process need not be con¬ fined to districts having large amounts of cheap power. It is particularly important in a process depending upon the action of catalysts (which are very sensitive to impurities), that gases of the highest degree of purity be used. Nitrogen of satisfactory quality is obtained by the frac¬ tional distillation of liquid air. For the manufac¬ ture of hydrogen the electrolytic process pro¬ duces a gas of higher purity than that obtained by any other commercial process, and is there¬ fore, of great value in this connection (see sec¬ tion on hydrogen and oxygen). In the United States the Haber process has not been a com¬ mercial success owing to failure to overcome the engineering difficulties of working with gases of high pressures. In Germany the Haber process, as already mentioned, has been de¬ veloped much

further than in the United States. Consult Haber and Le Rossignol, (Zeitschrift fur Rlektrochemie) (1913, 19, 53, 72, abstracted in Journal, Soc.ietv of Chemical Industry, 1913) ;

2. Cyanamid Process. — Ammonia is pro¬ duced indirectly in this process by the following reactions :

(a) CaO + 3C = CaC2 + CO.

(b) CaCa + N2 = CaCN2 + C.

(c) CaCN2 + 3H20 = CaC03 + 2NHS.

(a) Quicklime is mixed with coke and allowed to react at the highest temperature of the electric furnace. The molten calcium car¬ bide thus formed is run off, cooled and ground in ball mills filled with nitrogen gas.

(b) The powdered calcium carbide is next charged into small electric resistance furnaces and a current of pure nitrogen gas passed through. The start of the reaction requires some electrical energy, after which the tempera¬ ture is maintained by the heat of reaction. Cal¬ cium cyanamid is formed.

(c) The calcium cyanamid or <(lime nitro- gen® is finely powdered and treated in stirred autoclaves with high pressure steam and a dilute solution of caustic soda. The ammonia begins to evolve in large quantities at four to five atmospheres. This process requires a large amount of cheap electrical energy and high initial outlay of capital for .equipment.

3. Serpek Process. — When bauxite (the mineral hydrated alumina) is heated with coal in an atmosphere of nitrogen at 1,700° to 1,800° C. in an electric furnace, the following reaction takes place:

Ai203 + 3C + N2 — 2AiN + 3CO.

Absorption of nitrogen begins at 1,100° C., is rapid at 1,500° C. and extremely rapid at 1,800° C. The reaction is endothermic (213,220 calories being absorbed, according to Richards). The aluminum nitride formed is treated with caustic soda, forming ammonia and sodium aluminate:

AiN + 3NaOH = NH3 + NaaAtOs.

According to German Patent 243,839 (Badische Company), the

formation of nitride from alumina and coal is facilitated by the addition of certain catalysts, 5 to 10 per cent of the oxides of Si, Ti, Zr, V, Be, Mo, Ur, Ce, Cr, which are capable of forming stable nitrides. Consult Serpek, British Patent 13,086 (1910) ; Richards, J. W., Transactions American Elec¬ tro Chemical Society (1913, 23, 35) ; Tucker,

S. A., Journal Society Chemical Industry (1913, 32, 1143) ; Fraenkel, (Zeitschrift fur Elektro- chemie> (1913, 19, 362).

Preparation of Anhydrous Ammonia. — Aqua ammonia obained by either a destructive distillation or synthetic process is distilled and the ammonia vapors dried by passing over quicklime. The dry gas is then generally com¬ pressed and liquefied in steel cylinders, a pres¬ sure of 6.5 atmospheres being required at plus 10° C. The purified ammonia formed in the process may also be dried and liquefied directly.

Uses.— The principal use of anhydrous ammonia is for refrigeration, as in the 'manu¬ facture of artificial ice. When liquefied am¬ monia is allowed to expand in a suitable machine the fall in temperature is sufficient to freeze water. Consult Lunge, (Coal Tar and Ammonia ; Vincent, C., (Ammonia and Its Compounds) ; Marten, G. and Barbour, William,*

LIQUEFIED AND COMPRESSED GASES

477

1 Industrial Nitrogen Compounds; (Synthesis of Ammonia and Oxidation to Nitric Acid* (in Metallurgy and Chemistry, 17, 345) ; Boyce, J. C., ˆBibliography of Production of Synthetic Nitric Acid and Synthetic Ammonia) (in Metal¬ lurgy and Chemistry, 17, 328) ; (Nitrogen Fixa¬ tion Patents) (in Metallurgy and Chemistry, 17 606) ; Hosmer, (Literature of the Nitrogen In¬ dustry, 191 2— 1 9 1 6 > (in Journal Industrial Engi¬ neering and Chemistry, 9, 424).*

*ARGON, symbol A (or Ar), a gaseous element, was first actually obtained in 1785 by Cavendish who observed that <(not more than 1/1 20th part** of the atmosphere remains after treating the air for removal of oxygen and nitrogen. Attention was not called to this statement by Cavendish until 1894 when Lord Rayleigh found ((atmospheric nitrogen** to be V2 per cent heavier than <(chemical nitrogen.**

For some years previous to this discovery Lord Rayleigh had been

*engaged in a careful determination of the densities of certain gases and consistent results had been obtained for all of them save nitrogen, which, when prepared from air by the abstraction of all other known components, was found to be heavier by about one part in 200 than the nitrogen prepared from nitrogen compounds such as ammonia, ammo¬ nium nitrite, urea, nitric or nitrous oxides. There could be no doubt about the reality of the difference, because the same experimental methods, when applied to other gases, gave re¬ sults that were consistent with one another to about one part in 10,000. Lord Rayleigh pub¬ lished a letter in Nature narrating these facts and calling for suggestions from chemists as to the cause of the consistent difference in den¬ sity. No ideas of value were elicited. The possibility that the ((chemical nitrogen** was contaminated with hydrogen or that the ((at- mospheric nitrogen** had polymerized into a state analogous to <(ozone** was then disproved by the most careful experiments. At this stage in the investigation Professor Ramsay asked permission to co-operate in the work and his services were gladly accepted.*

*The hypothesis was made that ((chemical nitrogen** contains an unknown gas, lighter than true nitrogen; or, that ((atmospheric ni¬ trogen** contains some similar gas that is heavier than true nitrogen. In spite of the many anal¬ yses that had been made of the air, it was thought more probable that the unknown gas would be found in <(atmospheric** rather than in <(chemical** nitrogen.*

*It was known that at a red heat nitrogen will combine with metallic magnesium, with the formation of magnesium nitride. ((Atmos- pheric** nitrogen, carefully freed from all known impurities, was therefore passed through a long tube of hard glass filled with magnesium shavings and heated in a furnace. The first experiment of this sort was made in May 1894, and gave encouraging results, the ((atmos- pheric** nitrogen showing a slight but unmis¬ takable increase in density. A more elaborate experiment of the same sort followed in which f(atmospheric** nitrogen was caused to pass over hot magnesium for more than two weeks. By this means, its density, originally about 14 (that of hydrogen being 1), was increased to 19.09, and the bulk of the gas under examina¬*

tion was diminished until not much more than 1 per cent of it remained. Plainly a great concen¬ tration of the unknown gas had been effected. To remove the last traces of true nitrogen, pure oxygen was next added, and the mixture exposed to a rain of electric sparks in the pres¬ ence of caustic soda. When so treated, the ex¬ perimental gas contracted, indicating that the nitrogen was being

withdrawn in the form of nitrate of sodium. When contraction was no longer noted, the nitrate of sodium and the excess of oxygen were removed and it was found that the remaining gas was about 20 times as heavy as hydrogen.

When subjected to the electric spark and examined by the spectroscope, this residual gas was found to exhibit certain characteristic groups of red and green lines that did not cor¬ respond to any element previously known. The experimenters therefore felt reasonably sure that a new element had been discovered and this conclusion has been borne out by all sub¬ sequent investigations.

The discovery of this element (to which the name (

Occurrence. — Argon makes up 1.3 oer cent by weight of the atmosphere or 0.933 per cent by volume. It has been found in mineral waters, in the volcanic gases of Mount Pelee and also in fire damp and in coal as well as in gases given out on heating numerous minerals.

Preparation. — The various methods for the preparation of argon use air as the raw ma¬ terial :

*(1) Sparking air with oxygen, the method originally used by Cavendish in 1785. Know¬ ing that air contained a considerable quantity of nitrogen, Cavendish raised the question whether all of the apparently nitrogenous part of the air <(could bp reduced to nitrous acid, or whether there was not a part of a different nature from the rest which would refuse to undergo that change.** To decide this point he added an excess of oxygen to air and passed electric sparks through the mixture (precisely as Rayleigh and Ramsay did) until no further diminution of volume occurred. He then re¬ moved the excess of oxygen, together with the oxide of nitrogen that had been formed, and found that only a small bubble remained un¬ absorbed, which, he says, was not more than one-120th part of the bulk of the original nitro¬ gen. The bubble that he thus obtained and the nature of which he did not further question must have been nearly pure argon.*

*(2) Separation from ((atmospheric** nitro¬ gen, the nitrogen being absorbed by a metal. Red-hot magnesium shavings were used by Rayleigh and Ramsay, but this material is no longer used, as a mixture of five parts pure lime and three parts of magnesium dust has been found preferable. By passinr <(atmos- pheric** nitrogen over this red-hot mixture and the residual gas over metallic calcium*

at a dull red heat, Maquenne readily effected complete absorption of the nitrogen; metallic lithium has also been utilized for this secondary absorption.

(3) The most convenient laboratory method for preparing argon is to absorb oxygen and

nitrogen from the air by passing it slowly over a mixture of nine parts calcium carbide and one part calcium chloride, heated to 800° C., the remaining gases being led over hot copper oxide to remove the hydrogen, hydro¬ carbons and carbon monoxide present and finally removing the water vapor and carbon dioxide. It is stated that by using seven kilo¬ grams of carbide, 11 litres of argon may be ob¬ tained from air in two days.

(4) Argon is more soluble in water than nitrogen ; this property is the basis of some re¬ cent patents for the separation of argon and nitrogen, but there has been no production by this method to date.

As obtained from the atmosphere argon always contains traces of neon, krypton, xenon and helium. The total quantity of these gases present amounts to only about 0.25 per cent of the argon, 85 per cent of this impurity being neon.

Properties. — Argon is 1,379 times as heavy as air. The critical temperature of argon is — 117.4° C. and the critical pressure 52.9 at¬ mospheres. At atmospheric pressure the boil¬ ing point of liquid argon is — 186.1° C., the freezing point — 187.9° C. and the melting point of solid argon — 18 8° C. The density of liquid argon at — 186.1° C. is 1.4046.

Since its discovery argon has been treated with the most violent reagents known to chem¬ ists, but it refuses to react with any of them. Rayleigh and Ramsay stated that <(argon does not combine with oxygen in the presence of alkali under the influence of the electric dis¬ charge, nor with hydrogen in the presence of acid or alkali, nor when sparked, nor with phosphorus at a bright red heat nor with sulphur. Tellurium may be distilled in it and also sodium and potassium. Red-hot sodium peroxide has no effect. Persulphides of sodium and calcium have no effect at a red heat. Platinum sponge does not absorb it. Aqua regia, bromine water, bromine and alkali and potassium permanganate are all without in¬ fluence. Mixtures of

metallic sodium and silica or of sodium and boric acid are likewise without influence and hence also nascent silicon and boron.® Moissan found that even fluorine does not act upon argon at any temperature. Villard claims to have formed a crystalline hydrate with water, but this result requires confirmation.

The chemical inertness of argon has made it impossible to study its atomic weight and molecular weight by methods other than the determination of its density which is 19.14 ± (0—16). On this basis the molecular weight is 39.88. The atomic weight is the same, as has been deduced from a comparison of the specific heats of the gas under constant pressure and at constant volume.

The spectrum of argon is very characteris¬ tic. The most permanent lines are two in the red, a yellow line, two green lines and a violet line. It varies slightly depending on the method of preparation, but this is doubtless due to the presence of traces of impurities introduced by the reagents used in removing the large quan¬ tities of nitrogen, etc., from the argon..

Manufacture and Uses. — Commercial pro¬ duction of argon in the United States began in the latter part of the year 1914, when it was being manufactured for use as an inert gas in

incandescent electric light bulbs. The fact was soon developed that it possessed distinct advan¬ tages in connection with incandescent electric lighting, and the demand for this purpose grew rapidly. At the present time commercial pro¬ duction in the United States amounts to thou¬ sands of cubic feet of pure argon per month.

The commercial product sold as argon con¬ tains 25 to 30 per cent pure argon. This is purified by the consumers to a product contain¬ ing approximately 80 per cent argon and 20 per cent nitrogen, in which form it is intro¬ duced into lamps.

All of the argon used commercially at the present time is made by air liquefaction proc¬ esses. Both of the commercial air liquefaction processes in use to-day, the Linde and the Claude, are readily adaptable to the production of argon on a commercial scale.

CARBON DIOXIDE. The popular belief

that poisoning from carbon dioxide occurs in unventilated and overcrowded rooms is a mis¬ taken one. Results observed on such occasions are due in large part to the reduction in the amount of oxygen present and not to the in¬ crease of carbon dioxide, which in

no sense is a poison, but which is frequently confounded with carbon monoxide, one of the deadliest of poisons.

Commercial Methods of Manufacture. —

Carbon dioxide is extracted from natural sources at many places in Europe and at Sara¬ toga Springs, N. Y. Its origin is debatable but is generally considered to be volcanic and it is obtained by sinking wells from which the gas issues as such, or combined with saline water. A purity of less than 98 per cent is not commercially satisfactory and if a ((dry gas® well does not come up to this the desired purity is generally obtained by sinking to greater depths. Failing this the impure gas must be treated by absorption as described under the coke process.

Where the gas occurs, as at Saratoga Springs, saturating the escaping spring water in proportions as high as five volumes of gas to one . of water,, iis recovery is a simple matter. The pipe carrying the saturated spring water delivers its burden to a separator whose trapped water outlet offers greater resistance than the water seal of the storage gasometer, with the result that the water flows away, holding only that amount of gas due to atmospheric pressure and temperature of emergence — about equal volumes , of gas and water — and the surplus gas is piped from the top of the separator to the gasometer.

If, as sometimeˆ occurs, hydrogen sulphide is present, its removal is effected before storage of the gas. by passing it through trays filled with iron oxide mixed with wood shavings. After saturation the oxide is revivified by exposure to air.

The natural carbon dioxide at Saratoga Springs has a. purity of about 98.5 per cent and in common with gas of like origin from several other sources has been found to be radio-active.

A process for manufacture of carbon dioxide which has been largely displaced depends upon the calcination of magnesite (carbonate of magnesia). The rock, crushed to suitable fine-

ness, is fed to oil-fired retorts, and carefully held at the proper temperature. The escaping gas, passed if necessary through purifiers for removal of traces of sulphur compounds, and then through

coolers, is conveyed to the gas¬ ometer while the calcined magnesia, containing always more or less unburnt magnesite, is al¬ lowed to cool, ground and sold as a by-product. Its value is largely affected by the care with which the calcination is conducted and by the presence of calcium salts which are highly de¬ leterious for certain uses. Until the develop¬ ment of the California deposits, the chief source of supply was Grecian. Importations from that source were suspended early in the war.

A small amount of carbon dioxide is pro¬ duced by plants engaged in the manufacture of epsom salts. The process is purely the labora¬ tory one on a large scale, of adding an acid, sulphuric, to a carbonate, magnesite. There is, however, a variation, wherein dolomite, a mixed carbonate of magnesia and lime, is treated with sulphuric acid and the resulting mixed sulphates separated. In both cases the carbon dioxide obtained is of high purity and passes to the gasometer without further treat¬ ment. The normal demand for epsom salts is not such as to stimulate production along these lines.

A small amount of carbon dioxide has been produced in the manufacture of beer, but the advent of prohibition has closed this avenue. Such great difficulties were found in removal of odorous products of fermentation that gas from this source never became a product of import¬ ance.

The coke process is the one most generally used in the commercial production of carbon dioxide. Substantially it involves the com¬ bustion of coke with effort to secure as high a percentage of carbon dioxide as possible in the resulting gaseous products. These are passed through scrubbers and thoroughly washed to ensure removal of any sulphur compounds, and then enter the absorbing towers. _ These are generally of steel, about eight feet in diameter and 50 feet high and of any desired number, depending On the capacity of the plant. In general about 10 cubic feet tower capacity per pound carbon dioxide per hour is accepted as a suitable distributing proportion. The gases are there brought in contact with a solution of car¬ bonate of soda or potash which is pumped to the top and flows counter-current against the gases.

The carbon dioxide of the mixed gases of combustion unites with the carbonate and forms bicarbonate, though the interchange is far from complete. Some of the carbon dioxide escapes unabsorbed and some of the carbonate is un¬ converted to bicarbonate.

The solution issuing from the towers, con¬ taining bicarbonate, is

now pumped through suitable heat exchangers to the lye boiler. This may either be heated by the coke fire which served to produce the gases or by exhaust steam from the engine and compressor. In the latter case the coke is burned under the steam boiler.

By boiling the bicarbonate solution, it is reconverted to carbonate and the released car¬ bon dioxide is piped through heat exchangers and coolers to the gasometer.

Final preparation for the market consists in liquefying the gas in compressors operating in

either three or four stages at about 900 pounds per square inch and storing it in steel cylinders holding either 20 or 50 pounds of the gas.

Commercial Uses of Carbon Dioxide. — The larger portion of commercial carbon dioxide is used in the manufacture of car¬ bonated beverages. It is also used in refriger¬ ating machines, especially in connection with marine work. It is used for spraying paint and insecticides and is the active reagent in many fire extinguishers.

Medicinal Uses. — When liquefied carbon dioxide is allowed to expand rapidly a very low temperature is produced with the resultant formation of solid carbon dioxide. This may be collected in snow-like form and has been found efficacious as a local application where the removal of warts or wens is desired.

The gas as such or dissolved in saline water has marked therapeutic effects. The carbonated baths of Bad-Nauheim have a world-wide reputation and numerous other resorts are now equipped to give the Nauheim bath treatment. The effect of immersion in such baths is to stimulate the circulation and to reduce the pres¬ sure on an overloaded heart. The action of the gas is undoubtedly reflex. Remarkable re¬ sults are obtained as well with rheumatic and neurasthenic cases as with cardiac ones.

CHLORINE. Chlorine, Cl, atomic weight 35.4, at ordinary temperature and pressure is a gas of greenish yellow color and has an irritat¬ ing and pungent odor. The specific gravity of the gas is about 2.48. Under pressure chlorine is easily liquefied. The specific gravity of the liquid at 15° C. is 1.425 (Lange), and the vapor tension at this temperature is 5.75 atmospheres. The boiling point of the liquid is — 33.6° C. (Regnault), and its freezing point is — 102° C. The critical temperature of chlorine is 146° C. and the critical

pressure is 93.5 atmospheres. The coefficient of expansion of liquid chlorine grows with increasing tempera¬ ture and at 90° C. is about equal to that of gases.

Chlorine is easily soluble in water. The solution, especially under the influence of sun¬ light, will form hydrochloric acid under libera¬ tion of oxygen. Chlorine forms compounds with practically all elements; in many respects its resembles oxygen. It shows great affinity for hydrogen ; equal volumes of chlorine and hydrogen mixed and exposed to the direct sun¬ light will combine under explosion, producing hydrochloric acid. If hydrocarbons are mixed with chlorine, and a flame is applied to the mixture, it will catch fire and the chlorine will combine with the hydrogen whereas the carbon will be deposited on the walls of the vessel. Chlorine attacks organic matters and destroys the lower animal and vegetable life. For human beings it is not poisonous but very obnoxious as it attacks the mucous membranes.

History. — Chlorine was discovered in 1774 by Scheele while he was treating manganese dioxide with hydrochloric acid, but up to 1809 it was considered a compound substance. At that time Gay-Lussac pointed out that it was probably an element. Investigations were made by Davy, who confirmed Gay-Lussac's opinion and gave the gas its present name. As early as

1805 chlorine was liquefied by Northmore and later on in 1823 by Faraday. Faraday heated chlorine hydrate crystal's (CI2+IOH2O) in one branch of a sealed and bent glass tube, while the other branch was exposed to a freezing mixture. The chlorine hydrate was decom¬ posed and liquid chlorine was obtained at the other end of the glass tube. In the laboratory chlorine is generally made by treatment of hydrochloric acid with manganese dioxide. Sometimes it is made by decomposition of hydrochloric acid by nitric acid. Commercially the <(Weldon® process was formerly used to a very large -extent. Weldon decomposed hydro¬ chloric acid with manganese dioxide but added lime to the waste liquor and blew air through the mixture which enabled him to recover the manganese dioxide and use it over and over again. Later on, the <(Deacon® process was largely used in which process the hydrochloric acid is decomposed by air in ithe presence of catalysers at a temperature of about 450° C. The disadvantage of this process is the great dilution of the produced gas

so that it cannot be used when the chlorine is to be liquefied.

Commercial Method of Manufacture. — To-day by far the largest quantity of chlorine is produced electrolytically. This process fre¬ quently is called (

Commercial Uses of Gases. — By far the

largest quantity of chlorine is used in the manufacture of chloride of lime or bleaching powder, which is formed when slacked lime is exposed to the action of chlorine gas. Up to the time that liquid chlorine was produced com¬ mercially nearly all shipments of chlorine were made in the form of chloride of lime and even to-day the bulk of the chlorine which is used for bleaching of textiles, etc., is shipped in this form. Prior to the commercial production of liquid chlorine most chemical works, etc., using chlorine in the manufacture of their products produced it on their premises, but since that time many users of the gas purchase the liquid which is easily transported. The first com¬ mercial plant to liquify chlorine was built in Germany in 1888 by Knietsch of the Badische Company. Knietsch used a compressor in which a body of sulphuric acid was placed between the piston and the chlorine so that the chlorine was compressed without getting in touch with the piston or the stuffing box. The compressed gas coming from the compressor entered the condenser where it was cooled and thus liquefied. In order to be suitable for ship¬ ment in steel containers the liquid chlorine had to be absolutely free from water so that it

would not attack the steel. The liquid is filled into steel cylinders or tank cars. Knietsch heated the sulphuric acid in order to reduce the absorption of chlorine by the acid. This system is still used by most manufacturers, al¬ though sometimes it is used in modified form. The Linde Ice Machine Company, Germany, did not use any compressor to liquify the chlorine, but simply exposed the gas to a temperature of —45° fo — 50° C. at atmospheric pressure. This system is also in use commercially but not to a large extent. A third system was de¬ veloped in the United States of America. In this system sulphuric acid is pumped to a high tower from where it is allowed to drop down in vertical tubes entraining the chlorine ac¬ cording to the injector principle. The chlorine is then again carried into a condenser where it is cooled and liquefied. This system was in¬ stalled at the large government plant at Edge- water Arsenal, during the World War of 1914 — 18.

Not until about 1909 was any liquid chlorine made commercially in

the United States, but since that time the production of liquid chlorine has grown very rapidly. It is estimated that during the year 1918, over 15,000 tons of liquid chlorine were manufactured in the United States.

Medicinal Uses. — During the war the manufacture of chlorine and of liquid chlorine grew rapidly because chlorine was used to make picric acid and very large' quantities of the various poison-gases, most of which were chlorine compounds.

However, chlorine during the war was not only used to destroy human beings but also to protect them from typhoid fever and other diseases. The drinking water in the various war zones was sterilized nearly always by the use of liquid chlorine which no doubt has helped to reduce mortality from epidemics far below the figures prevailing in former wars. Nearly all large cities in the United States to¬ day are sterilizing their drinking water by use of liquid chlorine, which is introduced into the water main either directly as a gas or mixed with water and then introduced into the main. This application of liquid chlorine is constantly growing and a number of cities have already started to use liquid chlorine for sterilization of sewage. During the last few vears liquid chlorine has started to replace chlorine of lime for bleaching purposes to a considerable ex¬ tent. The detinning industry uses large quan¬ tities of chlorine to recover the tin and the steel of tin scrap according to the Goldschmidt patents. The product, tetrachloride of tin, is used in the silk industry. Zinc chloride is used to impregnate telegraph poles, railroad ties, etc., and is also used for vulcanizing fibres.

Carbon tetrachloride is used to a large ex¬ tent for the extraction of fats and in the rubber industry. It is also used in dry cleaning estab¬ lishments and in fire extinguishers. In the medical field chlorine is used to make chloro¬ form, aspirin and a great many other pharma¬ ceutical products. In the organic chemistry chlorine is used in the manufacture of synthetic indigo, sulphur colors, benzoic acids, etc. The chlorination of ores in future will probablv con¬ sume very large quantities of chlorine. Consult Lunge, Dr. G., (Hand-Buch der Soda Industrie)

*(Eng. trans. as (Manufacture of Sulphuric Acid and Alkali A, and Geoffrey-Martin, (Chlorine and Chlorine Products.**

HELIUM, the lightest of the group of so- called <(inert gases® discovered in the air by Rayleigh and Ramsay, was first observed by Janssen in 1868, when, in studying the spectrum of the solar chromosphere, he found a line in the yellow (i.e., coincident with two of the sodium lines) which was not attributable to any terrestrial substance then known. Lockyer and Frankland decided it was due to the presence in the sun of a new element which they named ((helium® (Greek, helios, <(the sun®).

The first terrestrial discovery of helium was made by Hillebrand (1889, United States Geo¬ logical Survey Bulletin), who, when working with the mineral uraninite, observed the evolu¬ tion of a gas which gave a fluted spectrum and was attributed by him to nitrogen. When searching for argon Ramsay found helium in the gases evolved from cleveite. Its presence in the atmosphere was first observed by Kayser (1895), who detected the helium line in the air- spectrum.

It has since been shown that helium occurs in the air in the proportion of 0.000056 per cent by weight, or about one volume of helium in 250,000 volumes of air. It also occurs in many minerals, including monazite sands, in the gases of many mineral springs and is present in com¬ paratively large amounts in several of the nat¬ ural gases of Canada and the United States, particularly those of Kansas and Texas. In 1907 Cady reported 1.84 per cent of helium in the natural gas at Dexter, Kan. Helium has also been found occluded in meteoric iron.

Helium is one of the products of the dis¬ integration of radium. The rate of produc¬ tion of helium is 0.37 cubic millimeter per day from 70 milligrams of radium chloride. Helium is also a product of the disintegration of actinium and of thorium radioactivity, which accounts for its presence in the gases given off by monazite sands.

Preparation — Helium is prepared by isola¬ tion from a mixture of other gases: (1) Nitro¬ gen, argon, krypton, neon, xenon and helium, as obtained by removal of the oxygen from air (see Argon in this section) or as separated by fractional distillation of liquid air; (2) oxygen, nitrogen and helium as obtained from certain mineral springs. The gases from King's Well at Bath, England, contain 0.12 per cent of helium by volume and were used as a source of the gas by Rayleigh. This well is said to produce 1,000 litres (about 36 cubic feet) of helium per year.

Helium may be obtained in small quantities by heating certain minerals (such as cleveite, uraninite or monazite sand) either alone

or with dilute sulphuric acid or an acid sulphate. One gram of cleveite is said to yield 3.2 cubic feet of helium, and 1,000 grams of the mineral costs about $5.

Isolation. — The French workers Jacquerod and Perrot found that quartz is permeable to helium at 1,000° to 1,200° C. so that by sur¬ rounding a quartz tube with impure helium at that temperature and pumping away the gas from the interior helium could be obtained free from nitrogen and other inert gases, but

it has been shown that this process is not prac¬ ticable with some kinds of quartz. Ramsay found that at the temperature of liquid air cer¬ tain kinds of charcoal would absorb all gases except helium and neon. The vapor pressure of neon is so different from that of helium that a systematic repetition of the process yields a pure product.

Properties. — The density of helium has been determined as from 1.98 to 2.02. Its atomic weight is taken as 3.99. It is 0.1368 times as heavy as air.

When working with the rare gases, Olszew¬ ski obtained a sample of about 140 cubic centi¬ meters from Lord Ramsay and tried to deter¬ mine its critical constants, but found it im¬ possible with the refrigeration means then at hand to reach the liquefaction point.

Dewar, in 1898, after obtaining liquid hydro¬ gen, placed a sealed glass tube containing helium in the liquid hydrogen. A colorless liquid imme¬ diately condensed on the sides of the tube, but the same tube in liquid air boiling under re¬ duced pressure gave no condensation; thus the conclusion was drawn that the boiling point of helium is very close to that of hydrogen. In 1909 Onnes first liquefied helium by cooling it in solid hydrogen and then allowing it to ex¬ pand ; thus showing that the ordinary lique¬ faction process can be applied to helium as well as to the other so-called inert gases. From 200 litres of helium gas Onnes obtained over 60 cubic centimeters of liquid helium in three hours. This liquid is colorless and its density is 0.122, which means it is the lightest liquid known. Its critical temperature is about — 268° C. (5° above absolute zero). It boils at 4.5° above ab¬ solute zero and has a critical pressure of 2.26 atmospheres. Rapid evaporation of the liquid causes a temperature below 2.5° absolute or — 270° C. but there is no indication of the formation of a solid.

Up to the present time helium has resisted all efforts to combine it with other elements.

The spectrum of helium is characterized by a strong line in the yellow (which has been shown to be double) and a dark green line.

Manufacture and Uses. — Helium is next to hydrogen in lightness among the elements, and this fact, together with its chemical inactivity and the fact that it is non-combustible, was the reason for its recent and much discussed ap¬ plication for use in balloons.

Helium has about 92 per cent of the lifting power of hydrogen. It was Sir William Ram¬ say who first suggested, in 1915, to Dr. Moore of the United States Bureau of Mines, the use of helium for balloons. Its buoyancy, the fact that its rate of diffusion and consequent wast¬ age through the balloon fabric is only about one-half that of hydrogen and the freedom from fire hazard attained by its use make it an ideal balloon gas.

Certain Canadian gas wells carry approxi¬ mately 0.3 per cent helium. Attempts to obtain helium commercially from this source were not successful, as the amount of helium present was comparatively small.

In 1917 interest in the use of helium for balloons was revived by Dr. Moore, on learning of its presence in the natural gases of Kansas. Late in the same year the Air Reduction Com¬ pany, Inc., and the Linde Air Products Com¬ pany each erected, for the United States gov-

ernment, a plant for the production of helium from the natural gas wells of Texas. These plants started operations early in 1918 and after some experimental work produced helium on a commercial scale. Up to the time of the sign¬ ing of the armistice, November 1918, 147,000 cubic feet of 93 per cent helium had been pre¬ pared and was on the dock about to be loaded aboard ship for Europe. It was stated that at pre-war prices this quantity would represent a value of about $250,000,000. Needless to say such quantities could never have been obtained by the laboratory methods used in working with the small quantities of helium obtainable from various sources by the early methods de¬ scribed in the literature.

The two above-mentioned plants in Texas are now temporarily closed, but owing to the great possibilities of the use of helium in bal¬ loons, both for war and peace purposes, the ETnited States government is planning to con¬ tinue the production of helium. In addition to the two plants already built the .United States government is erecting an experimental plant at Petrolia, Tex., but at this writing this installation has not produced any helium.

The three plants referred to above are all making use of gas liquefaction processes based on the removal by liquefaction of all the gases occurring in the natural product except the helium, which passes out of the system in the gaseous state.

HYDROGEN (Gr., "producing water,® in reference to the fact that in burning in air or oxygen hydrogen forms water-vapor), a gaseous element, discovered by Paracelsus in the 16th century. In the year 1766, Cavendish, an Eng¬ lish chemist, investigated this gas more thor¬ oughly, and gave it the name of inflammable air, and, by continued investigations, in 1781 proved its elementary character. Lavoisier, finally, gave it the name of hydrogen. Hydro¬ gen is the lightest known substance, and it also has the smallest known atomic weight. Its chemical symbol is H, its molecular formula H2, and its atomic weight 1.008.

Physical Properties. —

Colorless, tasteless, odorless.

Specific gravity, 0.06949 (air=l).

1 liter at 0° C., 760 mm., 0.089873 g.

1 cubic foot at 32° F., 29.92-inch pres¬ sure, .00561 pounds.

Atomic volume of liquid, 1.4.

Specific heat at 0° C. (gas), 3.410.

Specific heat of liquid, 6.00.

Atomic heat, 3.44 (gas) ; 6.05 (liquid).

Valence, I.

Thermal conductivity at 0° C. (Ag=l),

.000327.

Freezing (and melting) point,' — 259° C.

Boiling point, — 252.5° C.

Density of liquid hydrogen, 0.070 (lightest liquid known).

Solubility in water, 2.1 volumes of hydro¬ gen to 100 volumes of water.

Obeys Boyle's Law under pressure, with variations according to Van der Wall's equation.

(a = 0.00042) (b = 0.00088).

Coefficient of expansion at constant pres¬ sure (760 mm., 0 — 100° C.), 0.003661.

Coefficient of pressure, at constant volume (520—694 mm., 0—100° C.), 0.0036626.

Chemical Properties. —

1. Hydrogen is inflammable. In admixture with oxygen in the presence of moisture and dust and under the influence of sunlight com¬ bustion takes place slowly. With the aid of catalysts, however, e.g., finely divided Pt, Pd, Ir, Os or Au, the reaction between hydrogen and oxygen is rapid. The ignition tempera¬ tures of mixtures of hydrogen and oxygen vary between 507° and 540° C. (electrolytic hydrogen 536° C.) Hydrogen is not poisonous nor toxic.

2. Hydrogen combines directly with fluor¬ ine, even in the dark at room temperature, with explosive violence. With chlorine, it does not combine in dark at room temperature, but does when heated above 400° C. In diffused light combination is slow at room temperature. Under influence of direct sunlight (or other active rays) combination is violent. Combines directly with bromine in dark at temperatures above 400° C. and slowly even at 100° in the presence of light.

3. Hydrogen is very active chemically when occluded in certain finely divided metals, such as Pd or Pt or Os; and also when in contact with finely divided Ni, Co, Fe and Cu. In the presence of nickel many organic compounds can be reduced or saturated by hydrogen (hydro¬ genation of oils.

How Obtained. — Hydrogen may be ob¬ tained by :

(1) Decomposition of Water by Metals. — The alkali and alkaline earth metals react with water and liberate hydrogen; e.g., sodium, potassium or calcium.

Na2 plus 2H20 = 2NaOH plus H2.

Fine aluminum turnings (containing 1 — 2 per cent bichloride of mercury and 0.5 per cent potassium cyanide) will decompose water at 70° ; 1 kg. yielding 1,300 liters of hydrogen. (Fr. P.. 392,725, 1908. Compt. rend. 1908, 147,-

310).

By Metallic Hydrides. — "Hydrolith® is calcium hydride. This reacts very rapidly with water, evolving hydrogen.

CaH2 plus 2H20 = Ca(OH)a plus 2H2.

Consult French patent 327,878,1902. 1 kg. yields over 1 cu. m. of hydrogen.

(2) Decomposition of Acids by Metals. — When dilute sulphuric or muriatic acid is treated with an acid-soluble metal like Zn or Fe, hydrogen is formed,

H2S04 plus Fe = FeS04 plus H2.

This is the usual laboratory method for gen¬ erating hydrogen gas.

(3) Decomposition of Alkali Solutions by Metals. — Aluminum and zinc react with aqueous solutions of the alkalis, liberating hydrogen.

Zn plus 2NaOH = Na2Zn02 plus H2.

Very pure hydrogen is obtained in this way. Consult British patent 11,838, 1912.

(4) Electrolysis of Water. — This method which is of great commercial importance will be dealt with later.

Commercial Methods of Manufacture. —

(1) Electrolysis of Aqueous Solution. — When an electric current is passed through water containing an acid or alkali in solution, the water is decomposed, hydrogen gas being liberated at the cathode and oxygen at the anode.

Full description of methods, apparatus and production is given under the heading of Oxygen. By this method hydrogen is obtained in the largest volume, purest state and at the lowest cost. This method was originally in¬ troduced into this country by a firm of French jewelers, and the manufacture of apparatus for this purpose was initiated and perfected by the International Oxygen Company. The industry has, however, grown so rapidly that there are at the present time several firms manufacturing apparatus of this kind. Consult (Oxygen — By Electrolysis of Water.*

(2) Decomposition of Water by Means of Iron. — When steam is passed over iron heated to redness, the steam is decomposed,

3Fe plus 4HaO — Fe304 plus 4H2.

The iron oxide can be reduced by means of water gas, yielding metallic iron and more hydrogen. The production of hydrogen may be made continuous by alternately passing steam and water gas through the furnaces containing the iron. Consult British patents 10,356, 1903;

17,591, 1909; 11,878, 1910.

For data regarding the physical condition of iron most desirable for this process, consult

British patent, 27,735, French “ 453,077,

U. S. " 971,206,

German “ 280,964,

French “ 461,480,

British “ 18,028,

U. S. “ 1,109,448, German “ 279,726,

| Badische Co.

1908, A. Messerschmidt. 1913 H. Dicka.

1913 1

1913 ˆ A. Messerschmidt.

1914 J

1913, Naher and Noding.

For further data on this method of produc¬ ing hydrogen, consult :

German patent,

u a

a u

French

it it

u a

u it

u a

u u

British

a u

u tt

u u

tt a

u a

u a

u. s.

British

it U

u tt

French U. S.

a a

263,391, 1912, Messerschmidt.

268,062, “

268,339, “

444.105, 1912,

444.106, “

461.623, 1913.

461.624, “

461.625, “

462,379, “

12,117, 1912.

12.242, “

12.243, “

17.690, 1913.'

17.691, “

17.692, “

18,942, “

1,109,447, 1914.

2,096, 1913, Badische Co.

28,390, “

6,155, 1914.

465,474, 1913. Berlin Anhaltische 1,118,595, 1914. Machinenbau A. G.

1,129,559, 1915.

Regarding the reaction of steam on iron at high pressures, consult:

Journal Soc. Chem. Ind. 32 (1913), p. 462, Bergius.

German patent, 254,593, 1911.

French " 447,080, 1912.

British " 19,002, 1912.

" " 19,003, 1912.

U. S. " 1,059,817, 1913.

- *" 1,059,818, 1913.*

Steam acts upon heated coke in the following way :

C plus HaO — CO plus H2.

The gas produced according to this reaction is called water gas.

Owing to the great difference between the boiling points of hydrogen (— 252.5° C.) and carbon monoxide (— 190° C.) and nitrogen (— 195.5° C.) the hydrogen is best separated by liquefaction. In the Linde-Frank-Caro proc¬ ess water gas having the approximate compo¬

sition H2 — 48 per cent, CO — 42 per cent, C02 — 2.5 per cent, N — 3.5 per cent (with other impurities) is freed from C03 by water under pressure followed by scrubbing in alka¬ lis. It is then dried and cooled. The carbon monoxide and nitrogen are liquefied, the hydro¬ gen passing on in gaseous state. Consult in¬ dustrial Gases) by Martin and others, p. 21 and p. 39. Consult also French patents 329,839, 1903; 469,854, 1913; and British patent 13,160, 1914.

According to several methods, the carbon monoxide is taken up by suitable absorbents. For example, water gas and steam are passed over lime heated to about 500° C. (and mixed with about 5 per cent of powdered iron as catalyst). The following reaction takes place:

Ca(HO)2 plus CO = CaC03 plus H2.

For further details, consult:

British patent, 2,523, 1909.

“ “ 13,049, 1912.

French “ 453,187, 1912.

British “ 7,147, 1913.

U. S. “ 1,135,355, 1915.

German “ 253,705, 1910.

Hydrogenite contains 5 parts ferrosilicon (containing 90-95 per cent silicon), 12 parts caustic soda and 4 parts slaked lime. When “ignited® by a hot iron ball in a suitable ap¬ paratus hydrogen is evolved (1 kg. yielding 320 liters of hydrogen). Consult British patent 153,

1911.

Hydrogen by Decomposition of Hydrocar¬ bons. — Hydrocarbons, such as petroleum, ben¬ zine, etc., can be decomposed bv the action of steam at high temperature, yielding hydrogen and carbon monoxide. (British patent 14,703, 1911; Pictet. U. S. patent 1,134,416, 1913.)

Hydrogen is also produced by passing a mixture of hydrocarbons and steam over an inactive refractory oxide such as magnesia covered with nickel oxide (as catalyst) at a temperature of 800-1000° C. Consult

French patent, 463,114,1913 Badische Co.

British “ 12,978,1913

U. S. “ 1,128,804,1915

Natural gas, vaporized oil or casing-head gasoline, when passed through red-hot pipes, are decomposed and deposit lampblack and form an impure hydrogen (impurities are methane, carbon monoxide and traces of oil vapor).

Very pure hydrogen, according to Bergius, may be produced by the reaction between water and iron at sufficiently high pressure to prevent vaporization of the water.

The following table gives the experimental data on the liberation of hydrogen by this method :

Charge

Volume

> –

- N

of gas

Volume

Fe

Cu

H20

FeCla

Temp.

Time

gener-

of gas

g

g

g

g

°C.

Hrs.

ated

per hr.

C C

C C

50

100

300

3:30

800

230

50

100

3

300

3:30

4,650

1,330

50

25

100

3

300

3:00

5,800

1 ,930

The electrolyte, ferric chloride and the copper (electropositive to iron) increase the reaction velocities enormously. For fuller details consult

Journal Soc. Chem. Ind. 32 (1913), p. 462.

German patent, 254,593, 1911.

'French " 447,080, 1912.

*British * 19,002, 1912.*

" " 19,003, 1912.

U. S. " 1,059,817, 1913.

" 1,059,818, 1913.

Commercial Uses. — When hydrogen is burnt in oxygen temperatures up to 2,800° C. may be obtained. This property renders hydro¬ gen invaluable for fusing and welding platinum, iron, lead, copper, etc. Hydrogen and oxygen obtained from cylinders of the compressed gases are brought together in a suitable burner and ignited.

It is well known that rapid cooling of hot metals hardens them. That the opposite is true has recently been demonstrated in striking fashion by the General Electric Company. One of its scientists annealed American ingot iron surrounded by hydrogen gas for three hours at a temperature above 1,600° F. The product was very little harder than the softest copper, and could be whittled with a knife. (Taken from American Machinist.)

Below are given some of the present prin¬ cipal commercial uses of hydrogen :

1. Hydrogenation of Oils. — Solidifying liquid oils for edible products; preparing fats for manufacture of soap; renovating and de¬ odorizing certain oils.

2. Metallurgical. — Reduction of copper oxide; reduction of tungsten; reduction of molybdenum; lamp work; jewelry work.

3. Aeronautical. — Balloons, dirigibles; por¬ table wireless stations.

4. Cutting. — Oxy-hydrogen cutting. (The oxy-hydrogen flame is far superior to any other method for cutting metals and will cut ■ metals of such thicknesses as to be beyond the penetration of the oxy-acetylene flame).

5. Platinum and Lead Melting. — Lead cham¬ bers for sulphuric acid.

6. Chemical. — Reducing agent; combining agent.

7. Fuel. — Heating.

8. Annealing.

Hydrogen has been used with some degree of success in the manufacture of ammonia synthetically by the Haber process. Hyd.ogen and nitrogen are combined at high pressures, and temperatures around 500 — 600° C., with the aid of catalysts. The process has been de¬ veloped to a much greater extent in Germany than in the United States. During the recent World War a plant was erected by the United States government at Sheffield, Ala., for the manufacture of ammonia and thence ammonium nitrate by a modified Haber process. Although some ammonia was produced, continuous pro¬ duction was not achieved owing to the mechan¬ ical difficulties involved in working with gases at high pressures.

Hydrogen is used in steel works for autoge¬ nous welding and for filling up the blow-holes frequently found in steel castings.

Limelight is produced by impinging an oxy- hydrogen flame on a block of quicklime, yield¬ ing a very brilliant lieht (Drummond light).

In glass works, the heating of furnaces and crucibles is greatly accelerated by the oxy- hydrogen flame. In the preparation of fused silica ware the oxy-hydrogen flame is extremely valuable.

Hydrogen finds extensive use for filling bal¬ loons. Theoretically, the ascensional force of hydrogen is the difference in weight of a cubic metre of air and a cubic metre of hydrogen (1.293 — 0.090 kg.) and is thus 1.203 kg., except

at higher altitudes. Practically 1 kg. is taken as the lifting force of 1 cubic metre of hydro¬ gen.

Synthetic sapphires, amethysts, emeralds, rubies, etc., are made by the deposition of alumina and fusion in the oxy-hydrogen flame.

Recently hydrogen has found a very valuable application in the hydrogenation of oils.

The saturated glycerides and fatty acids have higher melting points than the unsaturated compounds :

Cis H34 O2 plus H2 Ci& H36 O2.

(Oleic Acid) (Stearic Acid)

In this way various soft oils and fats, such as fish oil, linseed oil and cottonseed oil, are hardened and their commercial value increased. The higher melting point fats are advan¬ tageously used in soap making, candle making and edible fats (such as butter and lard sub¬ stitutes). Consult Martin's (Industrial Chemis¬ try > ; Ellis, C., (Hydrogenation of Oils — Cata¬ lysis — Generation of Hydrogen and Oxygen J ; Thorpe, dictionary of Applied Chemistry> ; Martin, G. F., Hndustrial Gases. }

LIQUID AIR. Liquid air varies in compo¬ sition. It boils at about — 190° C. and con¬ tains by weight 54 per cent of oxygen (air, 23.2 per cent oxygen). Many interesting ex¬ periments can be performed with liquid air aside from its use by scientific investigators. The properties of familiar substances are greatly changed by the low temperatures attain¬ able by its use : e.g., rubber becomes brittle, milk becomes highly phosphorescent, an egg is a shining blue globe, photographic films lose most of their sensitiveness; sodium, potassium and even phosphorus are unaffected by liquid air; metals lose their electric resistance to a remarkable degree; the magnetic moment of magnets is greatly increased; curiously, the various bacteria and low forms of life, while rendered inactive by the intense cold, recover their activity on being brought back to normal temperatures and the germinating power of seeds is unimpaired.

Experimental work with liquid air or gases naturally calls for a container. Liquid air is preserved in an open container of a design called a ((Dewar bulb® — a double-walled glass bulb, the space between the walls being com¬ pletely exhausted of air and the glass being silvered like a mirror to reflect radiation. This is, of course, the principle of the ordinary thermos bottle.

NEON. In 1898, Sir William Ramsey dis¬ covered this gas in the atmosphere. He secured it by means of the distillation of liquefied air. Claude has since developed the process of sep¬ aration of the elements of the air by liquefac¬ tion to a point which allows the production of Neon as an industrial product suitable for use for commercial purposes. Neon is found in the atmosphere in the very small proportion of one part of Neon to 66,000 parts of air. It

belongs to the group of inert gases, i.e., those which do not combine chemically with other elements, and, like the other inert gases, is monatomic. Its valence is 0.

Physical Properties. —

Chemical symbol, Ne.

Colorless, odorless, tasteless.

Atomic weight, 20.2.

Specific gravity, 0.695 (Air = l).

Boiling point, — 243° C.

Melting point, — 253° C.

Critical temperature, <; — 205° C.

• Critical pressure, 29 atmospheres.

Spectrum consists of green lines and several orange lines.

Neon has been proved to be monatomic by determining the ratio of its specific heat at con¬ stant pressure to its specific heat at constant volume.

Commercial Uses. — When a tube contain¬ ing Neon is rarefied it is readily permeated by an electric discharge. Neon has found a limited use commercially as a gas for filling tubes for the production of light by the passage of an electric current through the tube. Difficulties have been met in employing it in this way be¬ cause it is sensitive to the presence of the smallest quantities of other gases, and its lumin¬ ous properties are entirely overcome by them. Claude has devised a process of removing this difficulty by utilizing the absorbent properties of charcoal when cooled, which were discovered by Dewar. This is done by purifying the Neon in the tube during the passage of the electric current, by means of charcoal, the temperature of which has been lowered by liquid air. When the impurities have been removed in this man¬ ner and the Neon left, the tube is separated from the charcoal receptacle.

Neon tubes used in lighting have an advan¬ tage over nitrogen tubes in that the candle- power is much greater and the efficiency better. A disadvantage is that the light produced is too red because there is an absence of blue rays. This quality is desirable, however, in display illumination where the dazzling light produces a beautiful effect. Neon tubes were used in 1910 in Paris for lighting the Grand Palace on the Champs Elysees. Their use, however, has not been developed commercially to any extent.

NITROGEN, a colorless, odorless gas, non- inflammable under ordinary conditions and non-explosive. The density of pure nitrogen under normal temperature and pressure condi¬ tions is 0.96737. The density of atmospheric nitrogen (containing the inert gases) is 0.97209. The atomic weight of nitrogen is 14.01. The critical pressure is 35 atmospheres, and the critical temperature — 146.25° C. The melting point of solid nitrogen is — 210.5° C., and the boiling point of liquid nitrogen — 195.5° C. The nitrogen thermometer is used in modern precise thermometry, and the following constant was determined with the greatest possible care: If a given mass of nitrogen at initial temperature of 0° C. and pressure of one meter of mercury be heated at constant volume to 100° C., its pressure becomes equal to that due to 1.36745 meters of mercury.

Historical. — Nitrogen was first recognized as a distinct substance by Rutherford of the University of Edinburgh in 1772. His demon¬ stration consisted in showing that when a small animal breathes the air in an enclosed space for

a while, and the carbon dioxide produced is removed by absorption, there still remains a gas that is incapable of supporting respiration. The individuality of nitrogen and its existence in the atmosphere was first demonstrated by Lavoisier, who named it (

Occurrence. — Nitrogen is one of the most widely distributed elements. In the free form it makes up 79 per cent by volume of the atmos¬ phere, or 77 per cent bv weight. It also occurs in the air in chemical combination as nitric and nitrous acids as well as ammonia, but in only small quantities, it being estimated that the nitrous gases are present to the extent of about one part in 3,000,000. Nitrogen is found in volcanic gases, in the air-bladders of certain fish, the bone cavities of birds, the cavities of plants, in meteorites, in the nebulae and in the atmosphere of the sun. Nitrogen is found in many forms in combination with other elements. It occurs as an essential constituent in vegetable and animal matter in the form of proteins which average about 16 per cent nitrogen. It is

found in Bengal in the form of potassium nitrate (saltpetre) and in Chile and Peru in the form of sodium nitrate (Chile saltpetre). Quantities of combined nitrogen are obtained in the form of ammonia by destructive distilla¬ tion of coal. The natural manures, such as the guanos, also contain considerable combined nitrogen.

Preparation. — There are various ways of obtaining nitrogen from the air by use of chemicals to absorb the accompanying oxygen. Such nitrogen is never more than 99 per cent pure, as the inert gases (see Argon) are still present. Nitrogen is also obtained from com¬ bustion gases, for example, from gas producers, and it can, of course, be obtained by factional distillation of liquid air, the average purity by this method being about 99.9 per cent nitrogen.

In order to obtain pure nitrogen the earliest experimentalists resorted to chemicals. The simplest method is to heat ammonium nitrite, but as this compound is somewhat unstable and inclined to decompose, the same result is ob¬ tained by using the more stable form — sodium nitrite; this is mixed with ammonium chloride, and when heat is applied to the mixture, ammonium nitrite is formed and immediately decomposes into water and pure nitrogen. It is also possible to obtain pure nitrogen from air by means of metallic nitrides. Nitrogen combines directly with lithium, calcium and magnesium when heated. These nitrides, on further heating, again give up their nitrogen. Comparatively pure nitrogen is obtained in large quantities as a residue from the carbonat¬ ing towers in the Solvay plants for making soda by the ˆammonia-soda® process.

Compounds of Nitrogen. — Although there are so many chemical compounds of nitrogen, it is a very indifferent or inert element as com¬ pared with the activity of oxygen. One of the great problems of science has been the so-called ((fixation® of nitrogen and it cannot be said that the problem is at the present time by any means satisfactorily solved. Granting, however, that the nitrogen has been fixed, whether naturally or synthetically, in the form of nitric acid or

ammonia or their salts, the compounds are many of them intensely active ; e.g., nitric acid, and the well-known explosive, nitroglycerine, T.N.T. and picric acid. The literature of the nitro¬ gen compounds is very extensive and new work is constantly being reported on the thousands of derivatives of nitrogen. Nitrogen does

not combine with oxygen under ordinary conditions. The combination takes place under the in¬ fluence of an electric spark, and such a combina¬ tion always accompanies lightning. For this rea¬ son, some oxides of nitrogen are always present in rain water but the small amounts thus formed could scarcely have supplied vegetation through¬ out the ages. Certain classes of plants, notably legumes (alfalfa, cowpeas, soy beans, etc.), are provided with means of taking up the free nitrogen from the atmosphere by the assistance of bacteria which flourish on the nodules of the roots of the plants. These bacteria have the power of converting the free nitrogen of the air into compounds which in turn are taken up by the nodules and assimilated by the plants, sometimes to the extent of over 5 per cent of combined nitrogen, in the form of proteins. A great deal of work has been done on design¬ ing suitable apparatus for the combination of nitrogen and oxygen by electric means, but the process is still only commercially possible where water power is very cheap, as in the plants in Norway.

The combination of nitrogen with oxygen was first brought about by Cavendish in 1785. The use of the electric arc was introduced by Sir William Crookes in 1892. The commerical manufacture of nitric acid was at empted at Niagara Falls in 1902 by Bradley and Lovejoy, who subjected a mixture of oxygen and nitro¬ gen or air enriched with oxygen to a high ten¬ sion arc drawn out as long as possible. Mechanically and chemically the operation was a success, as the efficiency of the process was greater than that obtained by Birkeland and Eyde in Norway in 1903. Nevertheless, the cost of power is high at Niagara Falls, and financial backing for the development was lack¬ ing, so that the work was discontinued. In Norway, where power is much cheaper, arc processes are now being operated on a large scale. With oxygen, nitrogen forms five oxides as follows: (1) Nitrous oxide (N20) is prepared by cautiously heating ammonium nitrate. Some of its properties are similar to those of oxygen, in that it supports the combus¬ tion of certain materials, such as phosphorus, which also burn easily in oxygen. On the other hand, metals do not rust in it, and the haemoglobin of the blood cannot use it as a source of oxygen. Davy noticed that when taken into the lungs, it produced a mild form of intoxication or hysterical condition, which gave rise to the name of (

monly prepared by acting upon metallic copper with cold dilute nitric acid. Nitric oxide com¬ bines directly and readily with oxygen, the combination taking place promptly upon con¬ tact with air, the brown colored higher oxides of nitrogen being formed. The dioxide may be liquefied by the application of cold and pres¬ sure; the

critical temperature is 93.5° C. and the critical pressure 71.2 atmospheres. The solidified gas melts as about 167° C. ; (3) Nitro¬ gen trioxide or nitrogen sesquioxide, N2Oa, may be prepared (though in rather an impure state) by the action of nitric acid upon starch, or upon arsenic trioxide. It is a reddish gas, which condenses to a volatile blue liquid upon being cooled by a freezing mixture. Nitro¬ gen trioxide also dissolves in ice-cold water with the formation of a blue liquid containing nitrous acid, HN02. (See Nitrous Acid). On account of the difficulty of preparing this gas in even a moderate degree of purity, its chemical and physical properties have not 'been determined with any degree of exactness ; (4) Nitrogen peroxide, N204, formerly known as the <(dioxide® (N02) may be prepared by heating dry nitrate of lead, which breaks up into lead oxide, oxygen and nitrogen peroxide. It is a dark orange-colored gas, which has the molec¬ ular formula N2O4 at low temperatures, for which reason it is also called the (

Ammonia. — Under very high pressures (175 to 200 atmospheres) and at high temperatures, (approx. 600° C.) with the assistance of a catalyst, nitrogen and hydrogen can be com¬ bined directly, forming ammonia (NHa). The first commercial development of this process was accomplished by Haber and his associates in Germany in 1910. The apparatus used is difficult to construct, and the catalyst is easily rendered inactive, yet Germany made consider¬ able quantities of ammonia by this method dur¬ ing the war; the costs of production by this process, however, have not been disclosed.

Large quantities of ammonia have been manufactured during the last few jˆears by the so-called Cyanamid process, in which calcium

LIQUEFIED AND COMPRESSED GASES

Single Unit Oxygen and Hydrogen Generator

Single Unit Generator

A. Oxygen offtake

B. Hydrjgen offtake

C. Indicator and Pressure Equalizer

D. Positive electrode Terminals

E. Negative “

F. Filling cup

G. Hydraulic Joint

H. Diaphragm

I. Insulating supports

DIMENSION OF GENERATORS

Height of cell 2′ 10″

' over all 5’ 6″*

Length over all 3’ 9″

Width “ " 1’ 9″

Weight empty 1000 lbs. full 1500 lbs.

Fig. 2. — First development of Fig. 1 with a view toward economy of floor space

LIQUEFIED AND COMPRESSED GASES

Fig. 4. — The third stage of development, representing higher efficiency, compactness, and durability. View from the rear of a 15-cell battery of generators, with a rated capacity at normal current of 600 amperes of 1728 cubic feet of oxygen and 3456 cubic feet of hydrogen per 24 hours

Installation of thirty Claude System Liquid Air Machines for the production of 15,000,000 cubic feet pure nitrogen per day. Erected at Muscle Shoals, Ala., by

Air Reduction Company

carbide is first manufactured in an electric fur¬ nace; this carbide is ground fine and subjected to the action of nitrogen in suitable ovens, the resulting product is called Cyanamid and contains 20 to 23 per cent nitrogen. By sub¬ jecting this Cyanamid to steam, under pressure, almost the theoretical yield of ammonia is ob¬ tained. The method has been in operation in Europe for some time as well as at

Niagara Falls, Ontario. (See Cyanamid). Several processes for the production of NH3 through the intermediate formation of cyanides are in process of development and show promise of successful operation. In these processes a mix¬ ture of alkali metal compound and carbon, with or without a catalyst, is subjected to the action of nitrogen at a temperature of approximately 1000° C. Cyanides are produced which, by the action of steam, are converted into ammonia and a residue which can be returned to the cycle of operations. (See Cyanides). Am¬ monia can also be obtained by the hydrolysis of suitable nitrides. This process was first in¬ troduced by Serpek in Italy. Interest in this process has recently been revived and one or more plants are in prospect. The process de¬ pends upon the reduction of alumina in one form or another by means of carbon at a very high temperature in the presence of nitrogen. The aluminum nitride thus formed is after¬ ward subjected to the action of steam, pro¬ ducing ammonia and alumina. Notwithstand¬ ing the methods described above, the fact re¬ mains that the world still depends upon nature to supply the bulk of the ammonia required arid until comparatively recently nearly all of our ammonia came from the destructive distillation of coal. An oily liquid known as chloride of nitrogen (NCh) is formed by passing chlorine through a solution of ammonium chloride or, more conveniently, electrolyzing a solution of ammonium chloride. This compound is one of the most dangerous explosives known. A num¬ ber of synthetic nitrogen compounds, not found in nature but now widely used, are of great im¬ portance. In addition to the oxides and ammo- nia mentioned above, there are such derivatives of nitric acid as nitroglycerine, gun cotton and a series of so-called ˆazo-compounds,® which are either dyes or intermediates in the manu¬ facture of dyes. A number of alkaloids that contain nitrogen show considerable physiolog¬ ical activity and are of importance as medi¬ cines.

Uses. — Free nitrogen gas is used in very large quantities in the manufacture of cyana- mide, cyanides and synthetic ammonia. It is also used in the incandescent lamp industry as the filaments last much longer and give greater efficiency in an atmosphere of nitrogen than in one of air. Nitrogen is likewise finding an in¬ creasing number of applications as an inert gas in various manufacturing operations, for in¬ stance where oxidation is to be avoided. Cer¬ tain compounds of nitrogen, e.g., nitrates, am¬ monium salts and cyanamid (nitrohm), are used in enormous quantities as fertilizers. Nitric acid and an almost endless list of nitro com¬ pounds obtained by treatment of various or¬ ganic materials with nitric acid are used in very large quantities in the manufacture of dyes and explosives,

drugs, celluloid and simi¬ lar products. Ammonia is used in large quan¬

tities in ice machines and in the manufacture of soda by the Solvay process. Cyanides are used for the extraction of the precious metals from their ores and also in considerable quantities in the electroplating industries, as well as in the manufacture of numerous small amounts of chemicals useful in the practical arts.

Bibliography. — Boyce, John C., bibliog¬ raphy of the Production of Synthetic Nitric Acid and Synthetic Ammonia) (in Metallurgi¬ cal and Chemical Engineering, Vol. XVII, p. 328, 1917) ; (Reference List Electrical Fixation of Atmospheric Nitrogen, etc., > Bulletin No. 63, United States Bureau of Soils; Literature of the Nitrogen Industries, 1912-16, originally published serially in the General Electric Re¬ view and later assembled in the Journal of In¬ dustrial and Engineering Chemistry, pp. 424— 438 (1917); Thorpe, dictionary of Applied Chemistry > (Vol. Ill, pp. 676-712, 1916).

NITROUS OXIDE. Nitrogen monoxide — nitrous oxide — laughing gas — N20 — specific gravity 1.52 — atomic weight 43.76. A colorous gas possessing a pleasant, slightly sweet smell and taste. Used largely by surgeons and den¬ tists — preferably with a small admixture of oxygen as a general anaesthetic. It is not in¬ flammable and not explosive except in the pres¬ ence of some easily oxidizable material when it acts in manner similar to oxygen under same conditions. Soluble in water to the extent of approximately one volume at ordinary temper¬ atures and atmospheric pressure. Much more soluble in alcohol and many of the volatile oils. At temperatures below its critical point (30° C. — • 86° F.) it is readily liquefied by pressure. Its critical pressure (tension of the gas at its criti¬ cal temperature) is 75 atmospheres. At tem¬ peratures below the critical the tension of the saturated vapor is approximately as below:

— 100° C. — Freezes.

— 88° C. — 15 lbs. (Atmospheric pressure).

0° C. — 30 Atmospheres.

+ 7° C. — 50 Atmospheres.

+ 20 — 60 Atmospheres.

+ 55 — 116 Atmospheres.

The liquefied gas is a colorless and very mobile liquid having a specific gravity of 0.9369, freezes at — • 100° C. and expands rapidly when heated — is not miscible with water but dis¬ solves or mixes readily with alcohol — chloro¬ form — ether and the volatile oils generally. It is also a ready solvent of many gums and hy¬ drocarbons.

If a cylinder containing the liquefied gas be immersed, valve up, in a freezing mixture of ice and salt, in order to condense and freeze any moisture present, and then after attaching a short bent delivery tube to the valve, be in¬ verted with the tube extending into a glass flask and the valve cautiously opened, the first liquid flowing will evaporate with great rapidity and some spluttering until the temperature of the tube and flask are sufficiently reduced, when the liquid will collect in the flask and may be re¬ tained for a considerable period. If the liquid be agitated or the gaseous atmosphere over the liquid be removed by blowing with the mouth or otherwise, the surface will be immediately covered by a thin film of the frozen gas. In

this or similar experiments great care is neces¬ sary to prevent the liquid or frozen gas from striking the unprotected skin, as it will quickly freeze the surface and produce an ugly sore similar to that produced by contact with molten lead or other metal.

History. — Nitrous oxide was first prepared by Priestley in 1772 by deoxidizing nitric oxide — NO. In 1823 the gas was liquefied by Far¬ aday by heating anhydrous nitrate of ammonia contained in one limb of a hermetically sealed glass tube bent in the middle at an obtuse angle. The gas together with the water vapor formed by the decomposition of the salt distilled over into the cooled end of the tube and both being condensed by the pressure and cold to liquids — the gas collected on top of the water.

> Through the experiments of Natterer of Vienna and Bianchi of Paris (1845) carbonic acid — nitrous oxide and some other gases were liquefied on a semi-commercial scale by the use of a small but powerful pump specially < con¬ structed for the purpose. The pump cylinder of small diameter and long (not unlike a gun barrel) was cooled by a water jacket and deliv¬ ered the gas in successive charges through an automatically operated valve into a strong iron

reservoir which was surrounded by ice or a freezing mixture.

Many early observers called attention to the peculiar physiological effects of the gas when breathed: in some instances it would seem prob¬ able that they must have made use of an impure gas in their experiments. In 1809 Sir Hum¬ phrey Davy mentions among these effects in¬ toxication and ultimate loss of consciousness and even suggests its use as an anaesthetic. This suggestion bore no fruit until 1844 when Mr. G. O. Colton in the course of a lecture or entertainment given at Hartford, Conn., ad¬ ministered the gas to a number of individuals from his audience and among others to Mr. Samuel A. Cooley, who in the course of the antics induced by breathing the gas injured his leg quite severely. Upon coming out from un¬ der the influence of the gas Mr. C. stated that he had no recollection of the injury nor did it give him any pain. Dr. Horace Wells, a dentist of Hartford who was present, imme¬ diately suggested the use of the gas as an anaesthetic in the extraction of teeth.

Within a few days. Dr. Wells arranged to put his idea to a test. Mr. Colton adminis¬ tered the gas to Dr. Wells, and Dr. J. M. Riggs, also a Hartford dentist, extracted a tooth from Dr. Wells' mouth. This experiment was a complete success, and monumental, be¬ ing the first recorded instance of a painless surgical operation under the influence of a gen¬ eral > anaesthetic. Dr. Wells made use of the gas in a number of minor surgical operations, but, owing to crude methods and imperfect ap¬ paratus, with varying success. Dr. Wells died a little later, and the anaesthetic properties of sul¬ phuric either and chloroform being discovered, the anaesthetic properties of nitrous oxide were apparently forgotten until the year 1862, when its use was revived, this time in New Haven, Conn.

In July 1863 Mr. Colton, in conjunction with a number of influential dentists, organized the Colton Dental Association and opened an office in New York City for the painless extraction

of teeth, nitrous oxide being the anaesthetic em¬ ployed. This venture proved a great success, and in 1881 Dr. Colton reported 121,709 admin¬ istrations of the gas at the office of his asso¬ ciation and with no accidents. In a catalogue of surgical instruments and apparatus issued by James Coxeter & Son of London, England, in 1870 we find cuts and price lists of iron cylinders containing the liquefied gas together with inhalers and other apparatus. This is without doubt the first instance of the com¬ mercial development of the liquefied gas in¬ dustry.

Coxeter apparatus was brought to American immediately upon its introduction to the den¬ tal profession in England, and various sizes of iron cylinders, containing from 100 to 1,000 gallons of the gas, soon became common in the American dental -trade. The liquefied gas was first produced commercially in this coun¬ try by Johnston Brothers of New York City, who developed and patented improved com¬ pressing methods and machinery, and who later united with S. S. White of Philadelphia, con¬ tinuing the manufacture under the name of The S. S. White Dental Manufacturing Com¬ pany.

Commercial Method of Manufacture, Etc.

— Nitrous oxide may be made by a number of methods depending upon the deoxidation of the higher oxides of nitrogen, as, for instance, by the action of dilute nitric acid upon zinc or iron. An impure gas may be made also by heating a mixture of ammonium sulphate and nitrate of soda or potash in a closed retort. The general commercial method for its manu¬ facture, however, is bv heating in a closed glass or metal retort having a proper protective lining a pure fused nitrate of ammonia. At a temperature of about 170° C. the salt fuses completely and at temperatures between 240° and 260° C. gives off gas freely — the latter temperature should not be exceeded.

The formula of the reaction is:

NH4N08 + Heat = N20 + 2H20.

It thus appears that the nitrate of ammonia is completely decomposed, each molecule break¬ ing up and forming one molecule of nitrous oxide gas and two molecules of the vapor of water or steam. The products of the distilla¬ tion are cooled, the steam being of course con¬ densed to water, and then having passed through proper washing apparatus the gas is collected in a holder from which it is taken by pumps and compressed into steel cylinders. Among the concerns now engaged in the manufacture of nitrous oxide are the Lennox Chemical Com¬ pany and the Ohio Chemical Company, both of Cleveland, Ohio, The S. S. White Dental Manufacturing Company of Philadelphia, Pa., and the Standard Oxygen Company of New York City.

The American Red Cross has, it is said, constructed in France at Montreux a large plant capable of producing and liquefying 100,-000 gallons of N20 per day, and for a few months previous to the signing of the armistice N20 was very largely used in the army and navy hospitals with great success. The annual pro¬ duction of N20 in

America is variously esti¬ mated at from 10,000,000 gallons (133,333 cubic feet) to three times this figure.

OXYGEN. Historical. — Oxygen was rec¬ ognized by its properties as far back as the 8th century among the Chinese who knew that the "active® component of the air combines with some metals, with sulphur and with char¬ coal and that this active component could be obtained pure from saltpetre and certain other minerals. Leonardo da Vinci (1451-1519) was the first European to state that the air contains two gases, but it was not until 1774 that Joseph Priestley made the first pure sample of oxygen. It is true that Scheele, a Swedish apothecary, had made oxygen in 1771— 72 from at least seven different substances, and that he had made quite an extensive study of its combination with various materials, but as his results were not printed until 1777, Priestley is generally con¬ sidered the discoverer of oxygen. Many other chemists worked on air and the commonly known gases at that time, and these studies furnished the material on which Lavoisier, the great French philosopher and scientist, based his conclusions which may be said to form the foundation of modern chemistry. The name oxygen (meaning acid-torming) was given to the gas by Lavoisier who at that time thought it was an essential constituent of all acids.

Occurrence. — Oxygen is the most widely distributed element in nature and it has been estimated that it makes up nearly half of ter¬ restrial matter. It forms approximately 21 per cent by volume of the atmosphere ; it makes up eight-ninths by weight of all the water on the globe; more than three-fifths of the human body; nearly half of three of the chief con¬ stituents of the earth's crust, namely, silicious rock, chalk and alumina. Many other minerals contain oxygen in considerable proportions. It is an essential constituent of all living organ¬ isms, aside from its existence in the water of the tissues. It is absorbed by all animals dur¬ ing respiration and is given off in the free state b> growing vegetable organisms when exposed to sunlight.

Preparation. — Pure oxygen is best pre¬ pared in small quantities from one of the many substances in which it occurs in chemical com¬ bination.

I. Heat applied under the proper conditions causes oxygen to be liberated from the follow¬ ing compounds : oxides of mercury, silver,

gold and platinum ; peroxides of hydrogen, barium, lead and manganese; chlorates, nitrates, bi¬ chromates, etc., of potassium and other metals. Of chief interest are the following:

1. Ignition of nitre, which gives up only one-third of its oxygen. Priestley first ob¬ tained impure oxygen in this manner in 1771.

2. Ignition of mercuric oxide, the method used by Priestley on 1 Aug. 1774, when he made the first pure oxygen.

3. Heating manganese dioxide, formerly one of the cheapest methods of commercial prep¬ aration of oxvgen, and the one used by Scheele.

4. Heating potassium chlorate alone or preferably with about one-eighth of its weight of manganese dioxide, or a little spongy plati¬ num. Oxygen prepared in this way usually con¬ tains chlorine which can be removed bv caus¬ tic soda solution. The manganese dioxide (pyrolusite) should be tested as the occasional adulteration of it with coal dust has been the cause of fatal accidents.

II. A convenient laboratory method for the preparation of pure oxygen is to treat ˆoxone® (a convenient form of sodium peroxide) with water. This material is prepared in a handy form especially for this purpose.

III. The electrolysis of water made slightly acid with sulphuric acid furnishes pure oxygen, which is liberated at the positive pole, and at the same time twice the volume of hydrogen is liberated at the negative pole.

Properties. — Oxygen is a colorless, taste¬ less and odorless gas. It is 1.1056 times as heavy as air. Owing to the large number of elements that combine with oxygen, it has been selected by the International Committee on Atomic Weights as the standard of comparison for all atomic weights, that of oxygen being 16 (according to this scale the atomic weight of hydrogen is 1.008).

Oxygen was first liquefied in 1877 but was not obtained in the liquid form in considerable quantities until 1883. (See Liquefaction of Gases, p. 495). Liquid oxygen is a pale, steel blue, transparent, liquid when in considerable masses. The density of liquid oxygen at — 182.5° C. is 1.1181; the density of solid oxygen is 1.4256, at — 252.5° C. The critical temperature of oxygen is — 118° C., and the critical pressure 50 atmospheres. At atmospheric pressure, the boiling point is — 182.5° C. ; the melting point is —218° C.

One volume of liquid oxygen at — 182.5° C., if allowed to evaporate, furnishes an amount of gas which, at 0° C. and atmospheric pres¬ sure, occupies a volume 782 times that of the original liquid taken.

In a Geissler tube, oxygen shows a luminous spectrum containing a bright band in the red, two in the green and one in the blue, but the spectrum is said to vary under varying condi¬ tions.

Oxygen is slightly soluble in water. Its introduction into all animal life is by this means. Fish get the oxygen for their blood directly from the water in which it is dissolved. Among the air-breathing animals, including mankind, the process is not so obvious ; the air is breathed into the lungs, oxygen is ab¬ sorbed 'by the moisture in the walls of the air sacs of the lungs and thus passes into the blood in the dissolved state.

While the oxygen of the air supports respira¬ tion, and oxygen is the only gas suitable for this need of animal life, the proportion found in air is the one to which all life has become adjusted. Pure oxygen can be inhaled for a while with safety, but only relatively small amounts are required to produce a sense of narcotism in a normal, healthy person. A con¬ tinued supply of pure oxygen furnished to a small rabbit caused it to eat voraciously but nevertheless it became very much emaciated from lack of ability to assimilate the food so rapidly. Under certain conditions, the animal became speedily narcotized, and the supply of mire oxygen had to be discontinued to prevent its death. The cold-'blooded animals were found to be very little affected, but most of the warm-blooded animals experimented upon speedily showed symptoms of great weakening. Oxygen, however, has been found very efficient in restoring persons overcome by noxious

gases, and also, judiciously used, in the treat¬ ment of certain affections of the lungs.

Oxygen forms oxides by direct combustion with nearly all other elements, the only excep¬ tions being argon, bromine, chlorine, fluorine, gold, helium, iodine, neon, platinum and silver. Most of the non-metallic elements combined with oxygen form acid anhydrides; hydrogen forms a neutral oxide, water. A few of the metals in the

molten state absorb oxygen which is given off again when the metal solidifies. Heated rat 450° C., silver takes up about five times its volume of oxygen, gold 35 to 40, platinum 65 to 75 and palladium about 500 times its volume. Finely divided platinum ab¬ sorbs about 100 times its volume of oxygen and palladium sponge about 1,000 times. Cer¬ tain substances absorb increasing amounts of oxygen as the temperature is lowered, and give it off again as the temperature is increased ; on the contrary, wood charcoal absorbs about 18 times its volume of oxygen at ordinary tem¬ peratures, but as the temperature is lowered, it takes up increasing quantities of oxygen, so that at — 185° C. one volume of charcoal ab¬ sorbs 230 volumes of oxygen.

Liquid oxygen is a very perfect insulator and is a comparatively inert substance; phos¬ phorus, sodium, potassium, etc., may be im¬ mersed in it without any reaction taking place.

Oxygen is non-inflammable per se but its combination with other elements or materials with evolution of heat and light is commonly known as "combustion,® and the material com¬ bining thus with oxygen is said to be "in¬ flammable® ; examples are, burning of wood, coal, gas, etc.

Many combinations with oxygen, however, are not accompanied by light or extreme genera¬ tion of heat, and these are classed, along with the combustion described above, under the term "oxidation,® a familiar example being the rusting of iron.

All substances which burn in air burn with very much greater brilliancy in pure oxygen, and many which refuse to burn in air can be burned quite easily in oxygen. Thus, an iron wire, if previously heated to the ignition tem¬ perature, burns with dazzling brilliancy in oxygen; even the diamond (dense form of car¬ bon) if heated to redness and then plunged into oxygen burns readily without further appli¬ cation of heat. Further, the temperature of a hydrogen or coal gas flame burning in oxygen is very much higher than that of the same gas burning in air. Some of the less obvious cases of slow oxidation are of particular interest. The bodily heat of all animals is furnished by the oxidation of certain constituents of the blood as it passes through the lungs, the oxy¬ gen being furnished by the air. Slow oxidation of organic materials, which otherwise would cause discomfort or disease, takes place uni¬ versally in nature so that the waters of streams automatically purify themselves by absorbing oxygen from the air; this process is imitated when large volumes of pure water are mixed with sewage, thus introducing dissolved oxygen

which, aided bv bacteria, rapidly renders the organic matter harmless. Not all slow oxida¬ tions are beneficial, however. In cases where circulation of air through large masses of material is sufficient for slow oxidation but not

for carrying off the heat generated, there may be sufficient accumulation of heat to bring about actual combustion; the result of such so- called "spontaneous combustion® may be a burning hay-stack, a fire in the coal bunkers of a ship or a burning building set fire by a col¬ lection of greasy waste rags or tow that has slowly heated itself up to the burning tempera¬ ture. Insurance companies have very strict rules concerning the disposal of such waste as many serious conflagrations have resulted from such causes.

Somewhat similar and exceedingly danger¬ ous are the explosions of finely divided ma¬ terials which in their ordinary form are con¬ sidered anything but explosive. Finely divided coal dust mixed with air has been the cause of many disastrous mine explosions and fires. In 1878 a tremendous explosion in the Washburn Flour Mills in Minneapolis, Minn., demon¬ strated the fact that any finely divided car¬ bonaceous material constitutes an explosive substance when mixed with certain proportions of air. Indeed, many finely divided metals which ordinarily do not burn in air or oxygen will burn readily in an ordinary gas flame if the material is in the form of a fine powder. All of these are instances of a combination of oxygen with other materials.

It is not generally appreciated that in our various forms of explosives we have combus¬ tion or recombustion of oxygen with other constituents and that in such materials we com¬ monly . distinguish between rapid combustion, explosion and detonation, all being different de¬ grees of speed of oxidation. Explosive pow¬ ders, for example, are so regulated as to give any desired rate of combustion to meet the projectile or gun requirements.

It has been shown that even at high tempera¬ tures the presence of a trace of moisture is necessary for free oxidation, and in absolutely dry oxygen even sulphur and phosphorus can be distilled and carbon made red hot without any combustion taking, place. A jet of burn¬ ing carbon monoxide is entirely extinguished when introduced into pure and absolutely dry oxygen, but the presence of the minutest trace of moisture is sufficient to restore the oxygen to its activity.

Manufacture. — The following methods have at various times been tried out commercially for the production, of oxygen in quantity:

1. The ignition of nitre. The oxygen from this source was contaminated with oxides of nitrogen.

2. Heating manganese dioxide. (See p. 489). This was one of the cheapest of the early methods.

3.. Heating a potassium chlorate-manganese dioxide mixture as described (p. 489). Until about 1885 this was the almost exclusive source of the considerable quantities of oxygen used for lime-light purposes.

A number of processes such as the follow¬ ing, are now obsolete: extraction from air by utilizing solubility of ox)ˆgen in water; the alternate oxidation of cuprous chloride by air, the absorbed oxygen being recovered at dull red heat; alternate formation and decomposition (with liberation of oxygen) of alkaline manga.nates ; heating a concentrated solution of bleaching powder at 70 to 80° C. with a cobalt catalyst, etc.

4. The alternate formation and decomposi¬ tion of barium peroxide. Thorpe's diction¬ ary of Applied Chemistry > (1916) gives the following account of this process:

aIn 1851 Boussingault found that when barium oxide (baryta) is heated to a dull-red heat in a current of air it is converted into barium peroxide, and that at a higher tempera¬ ture this peroxide is again resolved into barium oxide and oxygen. But his attempts to utilize this reaction as a practical and economical source of oxygen failed owing to the fact that after a few oxidations and deoxidations the baryta lost its power of reabsorbing oxygen. Many other attempts were made to overcome

mining the respective phases of oxidation and deoxidation. Neither the oxidation nor the deoxidation is as complete as when two tem¬ peratures are used, and the yield per opera¬ tion is much less. But the duration of the operation was reduced from about 4 hours to 8-15 minutes, and the total daily yield therefore largely increased. At the same time the opera¬ tion was much simplified, the wear and tear of furnace, retorts, etc., very greatly reduced, and the fuel required lessened. Labor was also economized, the multiplied reversals of cocks, etc., necessitated iby the single-temperature method of working being effected automatically by reversing gear

designed by K. S. Murray. The labor required was therefore little more than that needed for stoking the furnace, and oiling and supervising the pumps, etc. The oxygen obtained had a purity of about 93-96 per cent.

**For a producer capable of delivering 10,000 cubic feet of oxygen per 24 hours the con¬ sumption of coke in the furnace is about 12-15 hundredweight per day, and for plant of that or smaller size the pump power required is*

this difficulty, but for long without success. In 1879, however, the MM. Brin freres were more successful, and took out a patent for the process (Eng. Pat. 1416 of 1880). Further improve¬ ments were made under the auspices of the company formed to develop and work the patents, and the process was made practical and economical and was worked on a large scale at various places.

aThe permanence of the baryta is mainly dependent on its physical condition, the use of reduced pressure during deoxidation, and con¬ sequent avoidance of excessively high tempera¬ tures, and the careful purification of the air used. It was found possible to dispense with change of temperature in the reaction, change of pressure being alone trusted to for deter¬

Fig. 3. — The second stage of economy in floor space — the filter press type. Capacity, 3600 cu. ft. oxygen and 7200 cu. ft. hydrogen per 24 hours.! Length, 15 ft.; width 5 ft.; height 8 ft.; plates 36-in. square. Current required — 320 amperes by 120 volts D.C. Purity of the oxygen direct from generator, 99.6 per cent, and of the hydrogen 99. 8i cent or better.

about 1 I. H. P. per 1,000 feet of oxygen pro¬ duced per day, the ratio decreasing for larger plants.

<(It is necessary that the barium oxide should be as hard and as porous as possible, and this is best obtained by preparing it by igniting the nitrate. The nitrate fuses and decomposi¬ tion soon commences with evolution of a mix¬ ture of oxygen and oxides of nitrogen. This action continues for about two to three hours, during which time the contents of the crucible remain in ebullition. A porous mass is then left, which is heated for another hour to com¬ plete, as far as possible, the decomposition. In this way a very hard but also very porous baryta is obtained.

((This process was thoroughly practical and economical, and large

numbers of plants were erected all over the world and worked success¬ fully for many years. Some plants are still working, but in the last few years the process

has been largely superseded by the still cheaper liquid air process, which also produces oxygen of greater purity.®

Commercial Manufacture. — The commercial manufacture of oxygen has thus reached the stage where oxygen in any appreciable amount is made either by the electrolytic method or by air liquefaction.

WATER FEED

HYDROGEN

-OVERFLOW TRAP EYE BOLT

INSPECTION DOORS;

PETTI COAT – INSUi-ATOR-

RESEPVOIR

Ifor

'electrolyte

electrical

CONNECTIONS

Fig. 5. — A section of one cell shown in bank of fifteen in Fig. 4.

By Electrolysis. — When an electric current is passed through water containing sulphuric acid or an alkali (to facilitate the passage of the current) hydrogen is formed at the cathode and oxygen at the anode. By providing suit¬ able means for collecting the gases, they are obtained in a very pure condition.

This method lends itself readily to the prep¬ aration of hydrogen and oxygen for the laboratory or for larger industrial uses.

With each volume of oxygen two volumes of hydrogen are evolved.

For laboratory purposes the electrolyte may be dilute sulphuric acid and the electrodes of platinum.

For the commercial production of these gases the electrolytic cell is made as compact as possible; the electrolyte is a solution of caustic potash or caustic soda, and the elec¬ trodes are of cast iron (the anode being nickelplated to increase efficiency and to pre¬ vent rusting). A very efficient type of cell now on the market is shown in the accompany¬ ing cuts.

Essentially this consists of a thin rectangu¬ lar box to which are bolted two cast-iron

*plates or electrodes. The cavity thus formed between the electrodes *is divided by a dia¬ phragm of asbestos fabric. In the upper part of the cast-iron frame are reservoirs for the electrolyte from which it is fed to the two sides of the diaphragm. The two gas cham¬ bers which permit the separation of the gas from moisture and electrolyte are also located in the upper part of the frame of the cell, and serve as gas traps and gas offtakes, as well as automatic pressure controlling devices. At the bottom of the frame are the communicating passageways which permit equalization of densities in the electrolyte. The inside of the electrodes carry a great number of pyramid¬ shaped projections which greatly increase the area in contact with the electrolyte and which facilitate the release of the gases at the gen¬ erating surface.*

The interior of the cell, both sides of the asbestos diaphragm, is filled with a solution of caustic potash or caustic soda in distilled water. When the electric current is passed through, the gases form and rise upward along the surfaces of the electrodes to the collecting chambers above. Any tendency for them to flow from one electrode to the other is pre¬ vented by the intervening diaphragm of asbestos.

In the special type of cell here described, with a normal current of 600 amperes at 2.2 volts and an electrolyte of caustic soda solu¬ tion, a kilowatt-hour efficiency of 3.65 cubic feet of oxygen and 7.3 cubic feet of hydrogen is obtained. It has a normal rated capacity of 4.8 cubic feet of oxygen and 9.6 cubic feet of hydrogen per clock hour. This cell can be operated at current strengths up to 1,000 am¬ peres, at which point the capacity is greatly increased though the efficiency is somewhat lower. The gases are extremely pure, the oxygen analyzing as high as 99.7 per cent and the hydrogen as high

as 99.9 per cent.

The three prototypes of this cell, the first of which was introduced into the United States in 1910, are shown in the accompanying cuts. The improvements have been along the lines of compactness, higher electrical efficiency and simplicity of construction.

From Liquid Air. — By fractional distilla¬ tion. Since the boiling point of oxygen at atmospheric pressure is — 182.7° C., while that of nitrogen is — 195.5° C., by a proper frac¬ tionating apparatus the nitrogen in liquid air can be allowed to boil off first, leaving pure oxygen behind. See Liquefaction of Gases, p.

495.

Commercial Uses. — Because it costs noth¬ ing, the oxygen which plays so large a part in the burning of fuel for the production of light, heat and power, or wherever fuel of any kind is burned, is generally overlooked in listing the uses of oxygen. However, each ton of coal burned consumes about three tons (about 70,000 cubic feet) of oxygen. The amounts of oxygen con¬ sumed in this way are scarcely comprehensible. One moderate sized blast furnace uses 40,000 cubic feet of air per minute and since it is becom¬ ing possible to make oxygen cheaply the use of super-oxygenized air for blast furnaces is being seriously considered. Experiments made on a 100-ton furnace in Belgium before the World War showed that by increasing the percentage of oxygen in the air only from 21 to 23 per

cent, a saving of over 100 pounds of coke is effected in smelting 1 ton of iron, and at the same time the output of the furnace is in¬ creased by from 10 to 15 per cent.

1. For Welding and Cutting of Metals. — Oxygen in conjunction with hydrogen or acety¬ lene in the oxy-hydrogen or oxy-acetylene flame finds very extensive use for cutting all kinds of iron and steel even up to massive struc¬ tures. The accompanying cut shows an oxy-hydrogen torch fed by oxygen and hydro¬ gen from two steel cylinders containing the compressed gases. The oxygen is supplied to the inner and the hydrogen to the outer tube. The quantity of the two may be regulated at will so that an oxidizing or reducing flame is obtained. For cutting an oxidizing flame is em¬ ployed. When the metal upon which the flame is directed has attained the desired

temperature the hydrogen gas is shut off. The stream of oxygen plays upon the hot metal and combines with it to form FesOi which is then blown away in the gas current. For autoge¬ nous welding a reducing flame must be em¬ ployed. The cutting out of a manhole in a boiler of average size by mechanical means will employ two workmen seven to eight hours ; by means of oxygen this can be done in about eight minutes. Similarly large steel boiler plates, rails, girders (e.g., in demolishing buildings), etc., may be cut away with extreme ease and nicety. Metals autogenously welded are fre¬ quently stronger at the welded portion than elsewhere. The above properties of the oxy-hydrogen and oxy-acetylene flame have found extensive application in the motor car industry, in railroad and boiler and machine shops, in mining and tunneling, also in the tinning and enameling industries.

2. For Combustion. — Air enriched with oxygen allows the smokeless combustion of certain fuels in furnaces; also for the produc¬ tion of producer and water gas. It is finding application as well for obtaining high furnace temperatures; e.g., in the glass industry, sav¬ ing fuel and time.

3. In Varnish Manufacture. — Animal and vegetable oils, such as fish oil, linseed oil, soya bean oil, etc., may be oxidized by blowing with oxygen gas to form oils of much higher vis¬ cosity and specific gravity.

4. Medicine. — Oxygen is advantageously used in cases of asphyxia, asthma, autointoxi¬ cation, pulmonary diseases, heart diseases, anaemia and diabetes. It has a cicatrising ac¬ tion in the cure of wounds and prurulent in¬ fections.

Oxygen in cylinders is used for freshening the air in submarines; for high altitude work in aeroplanes; for experimental and analytical work in laboratories; for medical purposes as noted above, for melting silicon and in the blow¬ pipes used in the manufacture of synthetic gems.

The most important industrial use is for oxy-acetylene or oxy-hydrogen welding and cutting. Though a very recent development in the engineering and construction field, the amount of oxygen consumed in this way is enormous.

According to the Engineering (London) No. 98 for the year 1915, in 1911 Germany used 150,000,000 cubic feet of oxygen, France 100,-

000,000 cubic feet and England about 70,000,000 cubic feet. Of these amounts at least 90 per cent was used for welding and cutting metals. The same authority states that in 1915 there were some 50 liquid-air oxygen plants operating in Europe and that the British Oxygen Com¬ pany had eight factories equipped in this way; at the same time there were only five such plants in the United States. The growth of the industry abroad is indicated by the figures given in an address delivered before the Royal Institution in London, on 17 Jan. 1919, by Sir James Dewar. It was stated that in Great Britain the total output of the 12 factories then manufacturing liquid oxygen was 118 tons per day, 85 per cent of which was used for cutting and welding purposes and 15 per cent for medical purposes; and that in Germany one plant alone was turning out 100 tons per day.

At the present writing there are oxygen plants in every industrial region in the United States. Each of the two large companies oper¬ ating liquefaction processes now produces more pure oxygen than was produced in the entire world prior to a few years ago.

Fig. 6. — An oxygen-hydrogen cutting torch in operation.

The oxy-acetylene and oxy-hydrogen weld¬ ing and cutting process have revolutionized the steel and construction industries. Hundreds of thousands of tons of steel scrap, formerly too heavy for handling, now are cut easily into convenient sizes for remelting. Many machines formerly rendered useless by breakage now can be repaired quickly, and many high-grade cast¬ ings now can be reclaimed, instead of being remelted. Cutting and welding torches, in con¬ sequence, are to-day an indispensible part of the equipment of factories, scrap yards and machine shops.

Bibliography. — Thorpe, dictionary of Ap¬ plied Chemistry > ; Martin, G. F., (Industrial Gases) ; Claude, C., diquid Air* ; Miller, S. W., (Oxy- Acetylene Welding* ; Ellis, Carleton, (Hydrogenation of Oils — Catalysis — Gener¬ ation of Hydrogen and Oxygen.*

OZONE, a colorless gas, an allotropic form of oxygen, having a peculiar odor like that of chlorine and extreme chemical activity. Its density is one and one-half times that of oxygen and it is changed into oxygen only at a high temperature. Ozone is found in country atmos¬ phere to a much greater extent than in cities and towns, and on mountain tops to a greater extent

than in deep valleys. Its molecular formula is 0; and its molecular weight, 48.00.

The peculiar odor around an electrostatic machine in operation was noticed long before its cause was discovered. In 1840 Schonbein explained the cause of this phenomenon and succeeded in preparing ozone by the electrolysis of water and by the slow combustion of phosphorus.

Physical Properties. — 1. Ozonized air is colorless and has an odor somewhat similar to that of chlorine. It exerts a stimulating action on the salivary glands. Pure ozone (obtained by liquefaction) is bluish in color and danger¬ ous to handle on account of its tendency to ex¬ plosive decomposition. Like oxygen, ozone is a supporter of combustion.

2. Specific gravity, 1.658 (air=l). Boiling point, — 119° C. Decomposing temperature, 270° C. Solubility in water per 100 volumes, 0.88 volume. Ozone dissolves in and combines with the etheral oils, especially turpentine, cin¬ namon oil and with aqueous quinine solutions.

Chemical Properties. — 1. The formation of ozone is an endothermic reaction, the heat of formation being 36,208 calories.

2. Ozone is a powerful oxidizing. agent. It bleaches solutions of litmus and of indigo. It oxidizes phosphorus, sulphur and arsenic to the corresponding acid anhydrides. Sulphides are converted to sulphates ; and nitrogen into N2O3, ammonium nitrate, and nitrite, in the presence of water. Manganese in solution is quantitatively precipitated as Mn02. It attacks almost all organic compounds and rapidly cor¬ rodes rubber tubing, and cork or rubber stoppers. The albuminoids and saturated hydro¬ carbons are practically unaffected.

3. Unsaturated organic compounds with a double bond between carbon and carbon absorb ozone quantitatively forming characteristic ozonides.

4. Ozone is a strong bactericidal agent..

Laboratory Methods of Preparation. —

1. Electrolysis. — Fisher and Massanez (1907) obtained oxygen

containing 23 to 28 per cent of ozone by electrolyzing between cooled platinum electrodes dilute sulphuric acid (specific gravity 1.223 to 1.07) by a current of 80 amperes per square centimeter at 7.8 volts. They obtained a yield of 7.2 grams ozone per kilowatt hour.

2. Thermal Method. — As stated above, the formation of ozone is an endothermic reaction. Nernst has shown that free atoms of oxygen form ozone only when their concentration is 10 to 20 times greater than in ordinary oxygen. Therefore ordinary oxygen should be readily transformed into ozone when exposed to high temperatures and pressure. To minimize the decomposing effect of the high temperature on the ozone the air must be rapidly cooled after exposure to heat.

A current of dry air is brought in contact with an electrically heated Nernst filament. Better results, however, are obtained by im¬ mersing the incandescent filament in liquid oxygen. (German patent 195, 985; 1906).

3. By Ultra-Violet Rays. — A current of air is subjected to the influence of the rays from a mercury vapor lamp. The lamp has a bulb of quartz (transparent to ultraviolet ravs) and the air is passed spirally between the bulb and an outer wall of glass (fairly impervious to the

ultraviolet rays). (United States patent

845,965).

Commercial Methods of Manufacturing Ozone. — Of the methods which have been tried for making ozone, the only practical ones have been those involving the passage of air or oxygen through an apparatus and subjecting it to the influence of the silent electrical dis¬ charge. A very good ozonizer is the Siemens and Halske machine. Each ozone tube (of which there are six or eight set in a suitable metal tank through which water flows for cool¬ ing purposes) consists of a cylinder of glass around one of aluminum. The aluminum cylinders are connected to the alternating cur¬ rent, the glass being grounded by contact with the cooling water in the tank. Air enters a lower chamber beneath the cooling tank, passes through the ozone tubes, where it is subjected to the influence of a silent electrical discharge, and passes off as ozonized air from an upper chamber. The tension of the current will vary between 10,000 and 90,000 volts at, at least, 100 alternations per second. A higher

tension yields a greater output of ozone. The Siemens- Halske ozonizers yield about 60 grams of ozone per horse-power hour. For further de¬ tails regarding this machine and several other modifications, consult Martin, industrial Gases.)

Uses of Ozone. — (1) Ozone finds some application in the bleaching of sponges and straw.. (2) The principal use of ozone depends upon its bactericidal property. It is used for sterilizing water, as well as air. The advan¬ tage in the use of ozone for purifying water lies in the fact that it is non-toxic and leaves no objectionable residue. Furthermore it does 'not attack the salts usually found in water which give it its characteristic taste. (3) The disagreeable effects of air in crowded rooms are not entirely produced by the excess of carbon dioxide present. They are partly due to organic substances given off from the skin and lungs of the people present. The intro¬ duction of a slight amount of ozone into such rooms is found to offset the bad effects by oxidizing these impurities. However, the bac¬ teria present in such crowded rooms cannot be destroyed by the amount of ozone permis¬ sible, for the concentration required to kill bacteria would be such as to make the air intolerable to those present. (4) Ozone has recently found application in the commercial manufacture of vanallin from iso-eugenol and in the production of artificial camphor. Consult Martin, Undustrial Gases) ; Thorpe, (Dictionary of Applied Chemistry) ; Vosmaer, Alexander, (Ozone, Its Manufacture, Properties and Uses (New York 1916).*

SULPHUR DIOXIDE. Sulphur dioxide

(SO2) is found free in considerable quantities in Nature, in certain volcanic emanations, and being an exothermic compound it is readily formed together with a trace of SO3 by burn¬ ing sulphur in the air: S 4- O2 — SO2 + 71.6 cals., and 1 kilo of sulphur develops 2,165 cals, on burning. The formation of SO2 by burning solid sulphur occurs without change of volume, that is, from one volume of O2 one volume of S02 is obtained, and from this

its composition may also be deduced, because if SO3 were to be formed then from three volumes of O2 one would obtain two volumes of SO3. Sulphur dioxide is manufactured in¬ dustrially by roasting certain metallic sulphides, especially pyrites (sulphides of iron, copper, etc.), in special furnaces: CuS + 110 = CuO + SO2 and also :

2FeS, + 110= = Fe203 + 4S02 + 419.8 cals.,

that is, 105 cals, for each molecule of SO2.

The SO2 from large copper smelting plants is sometimes utilized for the manufacture of sulphuric acid in lead chambers, but cannot be used for the manufacture of catalytic sul¬ phuric acid, because the catalyst soon becomes covered by powdered zinc oxide and the ex¬ cessive amount of moisture renders the acid very dilute. Liquefied sulphur dioxide is now a regular article of commerce and it is generally transported in steel cylinders or flasks, holding approximately 100 kilos. It is also shipped in small cylinders holding about 10 pounds for use in laboratories and medical institutions. Within late years sulphur dioxide has been used quite extensively in the manufacture of ice, particularly in small ice machines manu¬ factured for domestic purposes. This substance is also used extensively as a reducing agent, a bleaching agent, a disinfectant and as a fire extinguisher. Sulphur dioxide is a dry, color¬ less gas of suffocating, disagreeable and pene¬ trating smell; it gives white fumes in moist air; it is harmful to respiration and to vegetation. It is readily liquefied when cooled with ice and salt at a pressure of three atmospheres. In the liquid state it has a specific gravity of 1.53 at 0° F., boils at — 8°, and solidifies at —76°.

History. — Sulphur dioxide was first lique¬ fied by Monge in Clouet about the beginning of the 19th century. In 1878 R. Pictet prepared liquid sulphur dioxide for his ice machines by allowing a continuous stream of strong sul¬ phuric acid to pass on to molten sulphur, which was placed in a cast-iron retort heated to 400°. 2H2SO4 + S = 3SOa + 2H20. Regular develop¬ ment of SO2 may be obtained in the laboratory by heating one part of mercury or of copper turnings with three parts of strong sulphuric acid in a flask.

Cu + 2SOJ-L = CuSCh + 2H2O + SO2.

Commercial Methods of Manufacture.—

The general method of commercial manufacture of sulphur dioxide is in accordance with the Hanisch and Schroeder patent, dated 1883 and perfected later (German Patent 52,025 of 1889). Briefly this method consists of 'the burn¬ ing of pure brimstone in a suitable furnace, the very hot gases from the burner passing through a suitable cooling apparatus and thence to an absorption tower where the SO2 gases only are absorbed by cold water which flows to a digester where the solution is heated sufficiently to drive off the SO2 gases, ; which after passing through drying chambers is com¬ pressed into a liquid. One of the functions of the absorption tower just mentioned is to release from the SO2 gases any nitrogen or oxygen which escapes from the top of the tower.

Commercial Uses of Gases.— Formallv most of the sulphur dioxide produced was used directly on the spot for the manufacture of

sulphuric acid. However, its uses are now varied and greatly extended, and a considerable market is found for it for use in wood pulp factories, paper mills, sugar refineries, bleaching and dye works, ice manufacturing plants, chem¬ ical and metallurgical processes, as well as a disinfectant and fire extinguisher. New fields are constantly appearing where it is found that sulphur dioxide can be used to great advantage. A unique use to which it is occasionally put is to freeze and solidify moist soil around coffer-dams where it is impossible 'to keep out the water by ordinary piling or sheathing methods.

Medicinal Uses. — Very recently it has been shown by medicinal men that sulphur dioxide when properly handled is of great value in stay¬ ing the action of tubercular affection. This opens a very interesting field for the use of this substance, and without doubt other uses, in a medicinal way, will be found for it. As a powerful disinfectant the

effects of sulphur dioxide gas are well known.

The manufacture and use of Sulphur Diox¬ ide is described at length in Molinari's in¬ dustrial Chemistry) as well as in various books by Lunge, which treat on sulphuric acid and alkali.

LIQUEFACTION OF GASES. It has

been long known that most solids can be trans¬ formed into liquids by the application of heat, and that many liquids can also be transformed into vapor by a further addition of heat. Con¬ versely, it was known that certain aeriform substances, such as steam, can be converted into, liquids by the mere abstraction of heat. It was believed, however, that an essential difference existed between gases and vapors, vapors being condensible to the liquid form, while gases were believed to be permanently aeriform, and not condensible.

In the early part of the 19th century the validity of this distinction came to be doubted, and Faraday, at the suggestion of Davy, un¬ dertook the systematic study of the question. He succeeded in reducing to the liquid form quite a number of gases that had previously resisted liquefaction. His general method con¬ sisted in generating the gas in large quantities in a limited space, so as to produce a very high pressure, under the influence of which (when the experiment was successful) the gas passed into the liquid state. The most convenient way of carrying out this experiment is to make use of an inverted V-shaped glass tube, one of whose legs contains a chemical preparation suit¬ able for the generation of the gas in question, while the other end dips into a freezing mix¬ ture, the tube being hermetically sealed. If cyanide of mercury be heated in one of the legs of a tube of this kind, for example, cy¬ anogen gas is generated in such quantities that the pressure causes a large part of it to con¬ dense in the chilled end of the tube.

Chlorine was liquefied by Faraday in this manner in 1823. Shortly afterward Thilorier succeeded in liquefying and solidifying carbon dioxide by the combined application of intense cold and great pressure; Cagniard de la Tour, Regnault, Natterer and many other experi¬ menters improved the methods in use, with the result that many of the gases that had been

previously regarded as non-condensible were reduced to the liquid

form. Oxygen, hydrogen, nitrogen and some few other gases still re¬ sisted all attempts at liquefaction, however, and these were still called ((permanent gases,® although the conviction had forced itself upon physicists that all gases could be conquered if the necessary conditions could be discovered. The subject was in this state when Andrews undertook his classical study of the phenomena of liquefaction of carbon dioxide. In 1863 he made the following announcement : <(On par¬ tially liquefying carbonic acid by pressure alone, and at the same time gradually raising the temperature to 31° C. the surface of demar¬ cation between the liquid and gas became fainter, lost its curvature, and at last disap¬ peared. The space was then occupied by a homogeneous fluid which exhibited, when the pressure was suddenly diminished or the tem¬ perature slightly lowered, a peculiar appearance of moving or flickering striae throughout its entire mass. At temperatures above 31° C. no apparent liquefaction of carbonic acid, or separation into two distinct forms of matter, could be effected, even when a pressure of 300 or 400 atmospheres was applied.® It appeared, therefore, that a certain temperature exists above which carbon dioxide cannot be lique¬ fied by any pressure whatever and this dis¬ covery was soon verified in the cases of other gases. It was apparent, therefore, that for each gas there is a temperature above which it cannot be liquefied by any pressure. This tem¬ perature is known as the <(critical temperature,® and the pressure necessary to bring about lique¬ faction at the critical temperature is called the <(critical pressure.® The reason that oxygen, nitrogen and hydrogen had resisted previous attempts at liquefaction, even when the pressure was increased to 3,000 atmospheres, was that the critical temperatures of these gases are very low indeed — far below any temperature at which attempts at liquefaction had been made. The problem of liquefying the so-called ((permanent gases® was then resolved into the production of exceedingly low temperatures.

Methods of Production. — The methods in use for the production of low temperatures are as follows :

1. Freezing Mixtures. — The most common freezing mixture, ice and salt, produces when mixed in suitable proportions (1 part salt to 3 parts ice) a temperature of — 23° C. In 1834 Thilorier found that by mixing solid carbon dioxide with ordinary ether he could obtain a temperature as low as — 110° C. This ((Thi- lorier's Mixture® was for a long time the only means available for securing very low tem¬ peratures.

2. Evaporation. — The first use of this method of cooling was in

1824 by Bussy, who found that he could get a temperature as low as — 65° C. by rapidly evaporating liquid sul¬ phur dioxide. By this means he liquefied chlo¬ rine, ammonia and even solidified cyanogen. This method of refrigeration is still in use. Subsequent to Bussy's experiments it was soon learned that both carbon dioxide (C02) and ammonia (NH3) are well adapted to liquefac¬ tion with subsequent evaporation to produce low temperatures. These two gases are in com¬ mon use in our present-day refrigerating sys¬

tems, carbon dioxide being preferred where leaks due to accident would make the ammonia system undesirable or even hazardous, as, for instance, on board ship.

3. Expansion (without external work). — The first practical use of the fact that a gas undergoes a drop in temperature when allowed to expand through a small orifice, without do¬ ing external work, was made by Thilorier in 1834, when he liquefied and solidified carbon dioxide by this method.

In 1799 Van Marum observed that at high pressures ammonia gas does not obey Boyle's Law (i.e., that the product of the pressure and volume of a gas is a constant quantity). An extended series of tests by Amagat, extending up until 1888, has shown that the same is true of practically all gases, i.e., under high pres¬ sures, the volumes of all gases (except hydro¬ gen, helium and neon at comparatively high temperatures) are less than those calculated by the gas laws, due to the tendency of the gas molecules to cohere as the approach is made to the liquid state. A ((perfect® gas expanding into a vacuum should undergo no fall in tem¬ perature, since it would do no work, but ordi¬ nary gases do become cooled.

The work they do in expanding thus cor>- sists in overcoming the cohesion between their molecules, so that a tearing apart of the sub¬ stance occurs and this consumes heat ; this action takes place so quickly that there is no time to absorb heat from surrounding ma¬ terials, and as a result the gas itself is cooled. Since the cohesion of the molecules becomes more marked as the temperature approaches the liquefaction point of the gas, the cooling effect of expansion becomes also greater as the tem¬ perature falls.

The heat lost by the expansion of non-ideal gases was investigated in 1854 by Joule and Thomson. The cooling of gases in this way is known as the Joule-Thomson effect, and it holds good for all gases except hydrogen (helium and neon) which above — 80° C. is warmed by expansion.

The Linde apparatus (1898) for the lique¬ faction of air depends on the Joule-Thomson effect. In this apparatus the gas under 200 atmospheres pressure is precooled by an ordi¬ nary refrigeration machine and introduced into the actual liquefying column, where it is allowed to expand through an orifice without performing external work; the gas, cooled thus, is used to cool more incoming gas which in turn expands through the orifice and becomes further cooled; thus the temperature falls lower and lower until the liquefaction point of the gas in question is reached. Suitable ar¬ rangements are made for withdrawing the liquid as desired, or, in the case of air lique¬ faction, for submitting the liquid mixture to fractional distillation, by which method oxygen, nitrogen, argon, etc., may be obtained. Obvi¬ ously, hydrogen cannot be liquefied in such an apparatus unless previously cooled lower than -—80° C., as was shown by Dewar, Ramsay, Olszewski and others.

4. Heat Exchanger. — The so-called ((Regen- erative Method® of cooling refers merely to the use of a gas cooled by expansion to further cool more incoming gas, thus obtaining further decreases in temperature. This method was

first used in 1857 by Siemons and was applied to liquefaction of gases at the suggestion of Houston in 1874. This principle is embodied in all the liquefaction processes, the arrange¬ ment being known as a "heat-exchanger," a series of concentric tubes in which the less cool gas passes along the inner tube counter cur¬ rent to the cooler gas as it flows in the sur¬ rounding outer tube. So efficient are well- constructed heat exchangers that in manufac¬ turing liquid air there is a difference of only 3 or 4° C. between the temperatures of the entering air and the escaping gases ; i.e., dur¬ ing the passage of a few seconds through the exchanger, the escaping air is heated from — 190° C. to nearly room temperature. Obvi¬ ously the manufacture of liquid air owes much of its success to the "heat-exchanger."

5. Expansion (with external work). — In this case an expansion engine is inserted in the circuit of a liquefaction system so that the gas expanding through the small valve (ori¬ fice) may do external work and thereby lower the temperature more than can be accomplished by mere expansion without external work. This principle was applied commercially by Claude and his work has made possible an industry that has expanded until at the present

time liquefaction machines based on the Claude system are located in all parts of the world for the production of oxygen and nitrogen from atmospheric air.

Acknowledgments.

The compiler of this series of articles on liquefied and compressed gases wishes to acknowledge with grateful appreciation the assistance of the authors of individual articles, as follows:

J. M. Morehead: Acetylene.

Leola E. Marrs : Argon ; Helium, Liquefac¬ tion of Gases; Nitrogen; Oxygen (Liquid Air).

J. C. Minor, Jr. : Carbon Dioxide.

Eugen Becher : Chlorine.

Edward O. Benjamin : Anhydrous Am¬ monia; Hydrogen; Oxygen (Electrolytic); Ozone.

W. A. Johnston : Nitrous Oxide.

Warren C. King: Sulphur Dioxide.

He also wishes to acknowledge the kind help of the Compressed Gas Manufacturers Associa¬ tion and its special committee composed of Messrs. Arthur S. Beves, Lee W. Greiner and O. S. King.

Robert N. King, New York City.

LIQUEUR, li-ker' (the French name), a palatable spirituous drink composed of water, alcohol, sugar and some aromatic infusion ex¬ tracted from fruits, seeds, etc. The great dif¬ ferences in the qualities of the different liqueurs are due principally to a variation in the pro¬ portions of the sugar and alcohol. The French distinguish three qualities: the ratafias , or simple liqueurs, the oils, or the fine liqueurs, and the cream or superfine liqueurs. Consult Mew and Ashton, (Drinks of the World) (1892).

LIQUID AIR. See Air; Liquefied and Compressed Gases.

LIQUID -A MBAR, lik'wid-am'Tar, SWEET, RED, or STAR-LEAVED GUM,

a tree (Liquidambar styraciflua) , also called vol 17 — 32

bilsted and alligator-tree, of the witch hazel family, widely diffused through North America, from lat. 43° to Florida, and along the shores of the Gulf into the provinces of Mexico. The leaves are five-lobed, and the lobes are pointed, and serrated on the margin, giving them a very distinct and elegant form, and in autumn they turn rich purplish red. The flow¬ ers are inconspicuous. The fruit consists of a hanging ball of woody pointed pods which open and release the seeds, — a most singular fruit, suggesting the globular spiked head of the mediaeval war-club called "morning star."

LIQUID FIRE. The "flammenwerfer" or "flame thrower" was first employed by the Germans in the European War, 1914-18. It re¬ sembles a fire extinguisher and is hung on the back of the soldier while an extension that is held in the hands throws the flames. The cylinder contains oil and compressed gas. As the oil is forced out of the cylinder by the compressed gas it catches fire and spreads out in a sheet of flame and smoke. A single "flammenwerfer" can cover a frontage of about six yards when stationary and the flame burns for about one minute. The extreme range is about 300 yards and the kind of oil used depends upon the atmosphere. The discharge is accompanied by a loud roar, yellowish-red flames and a dense black smoke, making it very difficult for green troops to realize that it is effective for such a short distance. While the heat of the flames is intense the burning takes place entirely in the air and the stream cannot be turned downward as the heat causes an upward current. Protection is easily ob¬ tained by any non-inflammable cover above and a soldier is safe if kneeling on a fire step or just within the entrance of a dug-out. There are two principal kinds or sizes of "flammen¬ werfer" — the smaller size being carried by one man. The iron container is usually three feet long by one and a half feet wide, with two hooks for the body and the mixture is of heavy and light oil plus gasoline. The com¬ bustible used in the flame throwers has varied in source and composition from time to time, but it has one characteristic which is essential for good results — it must have light or easily volatile and heavy and less volatile fractions mixed in carefully graded proportions. The heavy oil is usually a petroleum product or a tarry residual oil from the distillation of wood. The light portion, which ensures the jet's keep¬ ing alight, was originally a light gasoline. The lighting device, fixed at the end of the flexible hose, is the most ingenious part of the contriv¬ ance and is so made that the oil ignites spon¬ taneously the minute the jet is turned on, and is kept alight by a fiercely burning mixture which lasts throughout the discharge. The noz¬ zle is about nine inches long and detachable so that replacement is easy.

LIQUOR LEGISLATION. The exces¬ sive use of intoxicating liquors has been, in all ages of human history down to our own times, a serious problem for those charged with the government of tribes or nations. For thou¬ sands of years legislators have endeavored with more or less success to control the use of and traffic in drink. The early Mosaic law¬ givers attempted to repress drunkenness, and over 2,000 years b.c. King Hammurabi of Baby-

Ion ordained that a wine-seller who permitted riotous persons to assemble on his premises should be put to death. There seems to be no example of a people, however primitive or civ¬ ilized, without drink or drugs of some kind, whether wine, beer, spirits, opium, hashish, hemp, betel nut, tobacco, coffee, kava, etc. With the growth of population and expansion of communities into great states during the last two centuries there has arisen an elaborate code of laws in most countries to restrict and control the liquor traffic. Despite the ever- increasing burden of taxation laid upon intoxi¬ cating drinks, their sale and consumption rose steadily. In the United States, the first laws aiming at prohibition of the manufacture and sale of liquors date back to 1838 (Tennessee) and 1846 (Maine). For many years a strenu¬ ous campaign raged between the <(wet® and (

The entry of the United States into the Eu¬ ropean War was destined to produce the most revolutionary changes in liquor legislation re¬ corded in American history. Up to that time the liquor laws differed considerably in the 48 States of t'he Union, each of which exercised its own police laws within its borders. In some States (

On 1 Jan. 1917 prohibition was in force in 19 States; on 1 July, when the Reed Amend¬ ment came into effect, there were 23 ((bone-dry® States. That Amendment, introduced by Senator Reed of Missouri, imposed a fine of $1,000 or imprisonment for six months or both on ttwho shall order, purchase, or cause intoxi¬ cating liquors to be transported in interstate commerce except for scientific, sacramental, medicinal, or mechanical purposes into any State or Territory the laws of which prohibit the manufacture or sale therein of in¬ toxicating liquors for beverage purposes.® The same penalties were prescribed for violators of the anti-advertising section. This measure was followed by the Food Control Act, under which the distillation of alcoholic beverages was prohibited for the duration of the war. War-time prohibition went into effect 30 June 1919. _ The

Eighteenth Amendment to the Con¬ stitution, in effect from 16 Jan. 1920, prohibits the manufacture and sale of intoxicating liquors for beverage purposes within the United States and its dependencies. See Prohibition.

In Great Britain the liquor laws are strict and complicated. For nearly 400 years suc¬ cessive Parliaments have struggled with the drink problem, though prohibition has never been seriously contemplated. Beer is the prin¬

cipal beverage ; the per capita consumption in 1913 was 26.2 gallons, as against 20.62 for the United States and 22.0 for Germany. The per capita consumption of spirits was about half that of the United States. Licenses are distin¬ guished as Mull® or ((on® license, <(off® license (not to be consumed on the premises of sale) and <(ale and beer license.® In pre-war times the closing hours for public-houses (strictly enforced) were 12.30 a.m. and midnight on Saturday in London; 11 p.m. in the provinces. On Sundays (in England and Wales) opening hours were from 1 to 3 p.m. and 6 to 11 p.m. In Scotland all public-houses are closed Sun¬ days. Since 1905 there has been in operation a government scheme of reducing licensed prem¬ ises, the owners being compensated from a fund created out of the revenue. During the 11 years 1905-15 a total of £9,326,589 ($46,632,- 945) was paid in compensation for 10,146 ex¬ tinguished licenses, an average of roughly $4,596 each. For nearly 20 years attempts have been made in Great Britain to bring public- houses under public management by means of Public-House Trust Companies, with the ob¬ ject of eliminating as far as possible the ele¬ ment of private profit from the retail sale of drink. The manager who is put into the house receives a fixed salary and is allowed no profit whatever on the sale of alcoholic drinks. This movement, originated by the bishop of Chester and the late Earl Grey, now operates over 300 houses on this plan. During the war a number of restrictions were laid upon the drink trade; hours were curtailed, ˆtreating® prohibited and numerous licensed places were closed by naval and military authority. Advisory committees were appointed by government to consider the question of the State purchase of the licensed liquor trade. The proposal was not consid¬ ered practicable. In January 1919 some of the regulations were relaxed and government sanc¬ tioned the brewing of 25 per cent more beer and of a better quality than the standard to which it had deteriorated owing to war condi¬ tions.

On the European continent, liquor legisla¬ tion was not of a drastic nature before the war. In France, licenses were cheap and easily ob¬

tainable. There was estimated to be a wine shop for every 40 of the population. As in Germany, saloons were open at all hours of the night. In Russia, the government took over the vodka traffic in 1894 and made it a complete government monopoly. During the next 20 years the consumption of liquors rose over 500 per cent. In September 1914 the sale of all spirits was prohibited by imperial ukase. Shortly afterward the sale of vodka was pro¬ hibited ((for ever® in Russia, yet that industry is to-day as flourishing as ever. Boys and girls began to drink spirits while yet at school, be¬ tween the ages of 8 and 13. Under the old regime several legislative experiments were made to lessen the drink evil, though with small result. In Belgium and Holland, mild legisla¬ tion and cheapness of alcohol were responsible for enormous annual drink bills. In Italy and the Balkans, as in France, the profusion of vineyards makes wine the principal beverage. The cheaper kinds are but lightly taxed and re¬ strictions were practically non-existent. Local option obtains in Sweden and Norway. Early in the 19th century every farmer and peasant*

in Sweden was permitted to manufacture brandy for a small license fee. Brandy be¬ came so cheap, abundant and readily procur¬ able that an epidemic of intoxication swept over the country. Vain attempts were made to check that by penalties on drunkenness and limitation of production. What came to be known as the Gothenburg system (q.v.) origi¬ nated in Sweden and is to-day largely practised in Scandinavia. In the self-governing British dominions local option generally prevails. Ac¬ cording to the China Medical Journal of July 1918, <(there is a general impression that the suppression of the opium traffic is leading to an increased consumption of alcohol.® Liquor legislation has existed in China for thousands of years, one ancient ordinance forbidding more than three persons drinking together without special cause and license. In 1918 distilleries and breweries were spread all over China, in addition to which the farmers manufactured large quantities of alcoholic liquors for home consumption.

Bibliography. — Black, H. C, (A Treatise

on the Laws regulating the manufacture and sale of intoxicating liquors) (Saint Paul, Minn., 1892) ; Carter, H., (The Control of the Drink Trade: a contribution to national efficiency 1915—17 > (New

York and London 1918) ; Eaton, E. L., (Winning the Fight against

Drink) (New York 1912) ; Fanshawe, E. L., (Liquor Legislation in the United States and Canada (London 1893) ; Joyce, H. C., (The Law Relating to Intoxicating Liquors* (Al¬ bany, N. Y., 1910) ; Kelynack, Dr. T. N., (The Drink Problem in its Medico-Sociological As- pects) (New York 1909) ; McKenzie, F., (Sober by Act of Parliament (London 1896) ; Mida's (Epitome of all Liquor Laws of every State in the Union> (Chicago 1913) ; Shadwell, A., (Drink, Temperance and Legislation (New York 1915) ; Tompson, F. W., (High License, a critical examination of the license duties pre¬ vailing in the United Kingdom and in the Unit¬ ed States) (London 1909) ; Walker, J., (The Commonwealth as Publican : an examination of the Gothenburg System* (ib. 1902) ; Webb, S. and B., (The History of Liquor Licensing in England 1700— 1830> (London 1903) ; Wines, F. H., (The Liquor Problem in its Legislative Aspects * (New York 1897) ; Woollen, W. W., (Intoxicating Liquors: The Law relating to the Traffic in Intoxicating Liquors and Drunken- ness) (2 vols., Cincinnati 1910).*

LIQUOR AND THE LIQUOR TRAF¬ FIC. The term liquor is applied to alcoholic or spirituous fluids whether distilled or fer¬ mented. The first of these include wine and liquor made from the juice of fruits and in which the natural sugar is converted into alco¬ hol by exposure to the open air. The second class includes beer, ale and porter, in which the starchy ingredients are by certain processes changed into sugar before fermentation can take place. The third division includes brandy, whisky, rum and gin, and whether these be de¬ rived from fruits or grain, the distillation process is carried on further by condensation and vaporization.

Wines. — France and Italy are the two great¬ est wine-producing countries in the world. The former is noted for the two distinct varieties of red wine, claret and Burgundy, and two

varieties of white wines, Chablis and Sauternes, all healthful and innocuous beverages. The finest sparkling wine, champagne, also comes from France, and is not permitted (since 1910) to be shipped abroad under the name of ((cham- pagne® unless it was produced within the two topographical districts delimitated by the gov¬ ernment — those of the Riviere, facing the river Marne, and those of the Montagne de Reims, which include a number of famous vine¬ yards. The Italian soil and climate are ad¬ mirably suited to viticulture; prodigious quan¬ tities of grapes are produced with but little care or attention. Sparkling wines are made on the low hills of

the Azti and Montferrat region, while dry red wines are largely pro¬ duced in Tuscany. The island of Capri yields some excellent white wines ; the white Muscat wines of Vesuvius and the red Lacrima Christi are grown in the Neapolitan district. Algeria produces some fine natural and wholesome wine, which is shipped principally to France. Hungary is famous for the celebrated Tokay wine, while Austria, Switzerland, the Balkan states, Greece, Turkey and many of the Mediter¬ ranean islands boast extensive vineyards. Spain is noted for its sherry and Tarragona. The three principal classes of sherry are the Fino, a pale, delicate wine, the Amontillado and the Oloroso, a full dark wine. In Germany the vine can only flourish within a restricted area of the south and west. The (

On the American continents vineyards flour¬ ish and vines are grown in the United States,

both cast and west of the Rockies, in Canada, Chile, Peru, Mexico, Argentina, Brazil, Uru¬ guay and Bolivia. The early Spanish mission¬ aries who settled in California found the wild vine growing in profusion, and devoted much time and labor to the cultivation both of the native species and the cuttings which they from time to time imported from European stocks. Owing to the attraction of the gold mines viticulture received but scant attention until 1875, when a viticultural commission was appointed for the purpose of encouraging the wine-making industry of that country. A State board of viticulture was created in 1880 to carry on the development. In 1887 the out¬ put of Californian wine was 4,000,000 gallons; 16 years from the creation of the board it had risen to 18,000,000 gallons, while the average for the five years 1908-12 was 43,500,000 gal¬ lons of wine and 2,200,000 gallons of brandy. Before the war nearly 800,000 acres of vine¬ yards existed in the Crimea, the Caucasus and Bessarabia, which produced an average of over 77,000,000 gallons of wine per year. The statis¬ tics for the production of wines in 1914 were thus stated by the French trade journal, Moni- teur Vinicole (gallons) :

France .

1,584,532,000

Brazil .

11,887,000

Italy .

1,137,136,200

Serbia .

9,246,000

Spain .

. 427,108,500

Australia .

7,925,100

Algeria .

. 272,563,200

Tunis .

7,925,000

Argentine ….

145,293,500

Uruguay .

5,283,400

Russia .

. 126,801,600

Cape of Good

Austria-

Hope .

4,623,000

Hungary . . .

. 118,876,500

Peru .

4,226,700

Portugal .

. 105,668,000

Bolivia .

1,226,700

Chile .

. 105,668,000

Bulgaria .

1,056,700

Greece and

Madeira, Azores

islands .

72,646,750

and Canaries

792,500

United States.

45,965,600

Canada .

449,100

Germany .

26,417,000

Mexico .

224,500

Turkey .

21,133,000

Persia .

66,400

Rumania .

17,461,000

Egypt .

39,600

Switzerland.. .

13,393,400

Luxemburg ....

26,500

In the third year of the European War the French government requisitioned for mili¬ tary consumption 200,000,000 gallons of wine of the 1917 vintage, representing one-fifth of the total production, and also 40,000,000 gal¬ lons from her Algerian colony. Storage arrangements were made to receive this enor¬ mous quantity of wine, which represented a value of $100,000,000. So essential was the regular supply of pure wine considered for the well-being of the troops that similar excep¬ tional precautions were taken to safeguard the wine crop in Italy, not only for soldiers serving at the front, but also for the sick and wounded in hospitals.

In the United States, the annual product of wine was valued at $13,120,846, but deducting the cost of the grapes and materials used in the process of manufacture, the value was only

$6,495,313.

Brandy is the spirit obtained by the distilla¬ tion of wine. It was known in Europe in the 11th century, though its use did not become general till the 16th century. All brandies should be grape spirits; there are many differ¬ ent types and qualities, though none of

greater excellence than those of Cognac, the name of a small town on the river Charente in France. The only brandy entitled to the name of Cognac is that distilled from the wines grown within

a limited district known as the Region Delim- itee. A good type of brandy, known as Armag- nac, is made in the department of Gers ; and large quantities are distilled in the south of France, in Spain and every part where the wine industry flourishes.

Rum, in the olden days, used to be distilled from the juice of the sugar-cane, and ((tafia)) was the name given in the sugar-cane growing districts to the spirit distilled from molasses. The quantity of real rum which is now dis¬ tilled as of old is almost negligible, and the spirit sold as rum is in practically all cases what is known in the West Indies as tafia.

Gin is a spirit distilled from grain and recti¬ fied or redistilled with juniper berries, and is one of the purest spirits made. Holland pro¬ duces and consumes more gin than any other country ; England ranks second.

Absinthe, or wormwood, has long been known as a medicinal plant of value in cases of fever, but it was only at the end of the 18th century that it was first used at Couvet, in Switzerland, for the preparation of a spirituous liqueur. As usually sold it is a spirit contain¬ ing as much as 72 per cent of alcohol, though some varieties contain only 57 per cent. On account of the deadly ravages it caused among those addicted to it, absinthe is prohibited in Switzerland and France.

Medicated wines are mixtures, consisting usually of port or Tarragona, to which various extracts of meat or malt and many other sub¬ stances, such as iron, pepsin, cocaine, etc., have been added. Their indiscriminate use is to be deprecated, as they correspond to no formula, and the patient who takes them may be ex¬ posed to the peril of becoming the unconscious victim of alcoholism, and, in the case of coca wines, of the cocaine habit as well.

Whisky, variously described as a ((universal beverage® and a ((universal curse,® was prac¬ tically unknown outside the Celtic races until quite recent times. How and by whom it was invented or discovered is unknown, though it is more than probable that the art of distillation was discovered and rediscovered again and again in different parts of the world. A de¬ scription of its manufacturing

process is given under Whisky (q.vO ; see also Ale and Beer.

Distilled and Malt Liquors. — The dis¬ tilled liquor industry of the United States is larger than that of any other country, though it was exceeded by Russia 'before the ukase of 1915 doing away with vodka. The malt liquor industry of the United States is greater than that of either Germany or the United King¬ dom. Taking both liquors together as one in¬ dustry in the United States it ranks as the eighth in value of manufactured products. This method of measuring the liquor industry is mis¬ leading, however, owing to high taxes paid on liquor, which swell the apparent volume of business, when counted in dollars. Measured by the number of employees and of wages paid, the combined liquor industries of the country would rank 'below the 13th industry. The malt liquor or brewing industry, which is capitalized at over $671,000,000, and has annual expenses of $300,000,000 a year (of which $62,000,000 is taxes), only pays wages of $41,000,000 a year; while the distilled liquor branch of the industry, with over $72,000,000 capital and annual ex-

penses of $200,000,000, pays over $150,000,000 tax, and only $3,000,000 in wages. The manu¬ facture of beer became an active industry in the United States about 1840, being largely due to the energy of the German population.

Capital Invested in Liquor Manufacture.

YEAR	*Distilled liquors*	*Malt liquoi s*	*Wines*	*Total*
1850	*$5,409,000*	*$4,072,000*		

$9,481 ,000

1860

12,445,000

15,782,000

$306,000

28,534,000

1870

15,545,000

48,774,000

2,334,000

66,638,000

1880

24,247,000

91,208,000

2,582,000

118,037,000

1890

31,006,000

232,471,000

5,792,000

269,270,000

1900

32,551,000

415,284,000

9,838,000

457,674,000

1910

72,450,000

671,158,000

27,908,000

771,516,000

Nearly all the liquor consumed in the United States is made in the country. For several years prior to the European War the United States did import about $10,000,000 a year worth of foreign wines, $7,000,000 worth of dis¬ tilled liquors and $3,000,000 worth of malt liquors, but this trade has been materially re¬ duced. In 1914 the American manufacture was

88,698,797 gallons of whisky, 3,526,085 rum, 4,012,542 gin, 31,715,199 alcohol for beverage, besides 47,132,535 of commercial or denatured alcohol. Besides this there was made nearly 2,000,000,000 gallons of fermented liquor, mostly beer.

Consumption of Liquor. — Both the produc¬ tion and use of alcoholic liquors continued to increase in the United States faster than the growth of population. The per capita con¬ sumption, which in 1902 was 19.48 gallons, rose to 22.52 gallons in 1914. The total consumption in 1914 was 2,252,272,765 gallons, of which 2,053,457,000 was malt liquor or beer, 58,381,000 wines and 143,397,000 distilled spirits. The fig¬ ures for distilled spirits are based on the stand¬ ard 50 per cent United States proof gallons. This was considerably in excess of any other country, except that France and Italy drink more wine and Germany and Great Britain more beer per capita than the United States. Esti¬ mating that one in three of the population use alcoholic beverages, the average consumption of liquor per individual using it is about 68 gal¬ lons a year, of which 62 gallons is beer or other malt liquor. The following table shows the consumption of liquors in the United States for 11 years.

YEAR

Distilled spirits consumed

Wines consumed

Malt liquors consumed

Total

consumption

Domestic spirits

Imported

spirits

Domestic

wines

Imported

wines

Domestic

malt

liquors

i

Imported

malt

liquors

From fruit

All other

1905

1,595,021

116,544,802

2,729,826

29,369,408

5,690,309

1,533,325,442

5,201,168

1,694,455,976

1906

1,781,643

122,961,612

3,108,328

39,847,044

6,638,179

1,694,458,014

5,963,207

1,874,758,027

1907

1 , 993 , 688

134,308,693

3,782,055

50,079,283

7,659, 565

1,815,141,683

7,171,842

2,020,136,809

1908

1,670,031

119,951 , 185

3,758,098

44,421,269

7,700,377

1,821,418,322

7,314,126

2,006,233,408

1909

1,850,700

114,913, 702

4,365,634

53 , 609 , 995

8,169,554

1,745,523,769

7,110,657

1,935,544,011

1910

2,204, 184

126,593,951

4,340, 549

50,684,343

9,863, 735

1,844,065,029

7,301,629

2,045,353,420

1911

2,434,045

132,315, 123

3,836,821

56,655,006

7,204,226

1,959,671,296

7,240,458

2,169,356,975

1912

2,449,331

133,502,079

3,544,921

50,619,880

5,804,831

1,925,361,507

7,169,677

2,128,452,226

1913

2,801,767

140,521,880

4,121,981

48 , 683 , 849

6,643,612

2,022,678,149

7,669,223

2,233,420,461

1914

2,704,752

136,521,805

4,220,670

44,973,643

7,444,787

2,049,236,412

7,170,696

2,252,272,765

1915

2,516,054

121,690,596

2,952,448

27,255,690

5,656,219

1,852,136,960

3,387,324

2,015,595,291

Consumption of Liquors in Principal Countries, in Gallons.

COUNTRIES

Year

Malt liquors

Wine

Alcohol

United States .

1914

2,053,457,000

1,508,358,000

269,533,000

1,817,968,000

418,500,000

52,418,000

**146,397,000*

United Kingdom .

1913

13,705,000

43,538,000

Russia .

1910

229,722,000

Germany .

1913

55,467,000

98 , 863 , 000

France .

1912

1,758,900,000

80,096,000

Spain .

1912

350,343,000

Belgium .

1912

446,422,000

19,126,000

563,978,000

70,216,000

13,500,000

61,499,000

8,453,000

12,812,000

Italy .

1912

1,125,366,000

12,046,000

Austria .

1912

tl29, 126,000

f 54, 65 7 ,000

Sweden .

1912

819,000

10,065,000

Norway .

1913

1,030,000

2,338, 000

Denmark .

1912

1,004,000

6,842,000

Portugal ... . . .

1909

146,271 ,000

Netherlands .

1913

46 , 893 , 000

2,052,000

8 , 483 , 000

Switzerland . . .

1912

f82 ,051 ,000

88 , 365 , 000

62,344,000

3,857,000

Hungary .

1912

53,838,000

§43,667,000

Rumania .... .

1909

4,914,000

33,682,000

6,657 ,000

Bulearia . .

1909

3,196,000

34,870,000

581 ,000

*Note. — Alcohol in United States proof gallons (at 50 per cent). * Distilled spirits. t Year 1911. J Year*

1910. § Year 1909. Later data of some foreign countries not available because of war.

During the fiscal year ending 30 June 1916 the consumption of spirits in the United States rose to 139,973,684 proof gallons ; of

wine, 47,- 587,145 gallons; beer, 1,818,275,042 gallons; total consumption, 2,005,835,871 gallons. For 1917 the figures were 167,740,325 gallons spirits; 42,723,376 gallons wine; 1,884,265,377 gallons fermented liquors. During the fiscal year 191 7— 18 a total of 173,476,473 gallons of spirits was produced; 87,787,823 gallons were withdrawn tax-paid, while 158,959,264 gallons remained in warehouses. In June 1918 there were engaged in the production of distilled spirits 72 grain distilleries, 27 molasses distilleries and 137 fruit distilleries, a total of 236 compared with 507 in 1917, 605 in 1916 and 635 in 1915. The decrease in the number of breweries is shown as follows: In 1915 there were 1,372 breweries; in 1916, 1,332; in 1917, 1,217; in 1918, 1,092; showing that 125 breweries went out of business during 1917-18. In 1900 the United States revenue from the liquor traffic amounted to $177,172,000 ; in 1910, $226,207,000; in 1915, $237,054,000; in 1916, $262,739,000 ; in 1917 it rose to $297,399,000, and in 1918 to $443,839,544.

In Great Britain the total expenditure on alcoholic liquors during 1915 was estimated at £181,959,000 ($909,795,000), an increase of

£17,496,000 ($87,480,000) over 1913, the last normal year before the war.

LIQUORICE. See Licorice.

LIRA, le'ra, an Italian silver coin valued at about 18 cents in American money. It is the basis of the Italian monetary system ; the gold coins are pieces of 100, 50, 20, 10 and 5 lire; the silver coins, of 5 and 2 lire, besides 1 lira and a half lira (50 centesimi) ; also lower coins in nickel and bronze.

LIRRODENDRON. See Tulip Tree.

LISAINE, le -zan, Battle of, an engage¬ ment of the Franco-German War, 15—17 Jan. 1871, on the banks of the Lisaine River near Belfort (q.v). See Bourbaki Charles Denis Sauter.

LISBON, liz'bon, Ohio, village, county- seat of Columbiana County, on the Beaver River and on the Erie Railroad, about 130 miles northeast of Columbus. It is situated in an agricultural region with extensive coal fields in the vicinity. Sheep and cattle raising, the cultivation of grain and vegetables and mining are the prominent occupations in this section. Lisbon is the trade centre for a large

portion of the county. It contains also copper mills and manufactories of pottery, sewer pipe, etc. The village owns and operates the waterworks. The public library has about 4,000 volumes. The city was the birthplace of Mark A. Hanna. Pop. (1920) 3,113.

LISBON, Portugal, the capital and prin¬ cipal seaport, beautifully situated on the right bank of the Tagus, where the river expands itself out into a lake, about nine miles above its mouth. It is built on a succession of hills, rising from the quays in the form of an amphi¬ theatre. The streets of the older parts, more especially in the east, are steep, narrow, crooked, badly paved and dirty; the houses, with a few exceptions, are old-fashioned and mean. The modern portion, however, which Ties on even ground, in the valley between the Monte do Castello on the east and the hills of San Fran¬

cisco and Do Carmo on the west, consists of several parallel streets crossed by others at right angles, and is regular, well built, clean, traversed by street railways, electrically lighted and provided with a telephone service. Of these the D'Ouro (Gold), Do Prato (Silver), D' Augusta, Do Chiado (Cloth) streets extend about one-half mile, north to south, having at their southern extremity the Praga do Com-mercio, a large and handsome square, sur¬ rounded on three sides by the naval arsenal, the exchange, custom-house and other public build¬ ings, and having the Tagus on the south. At the northern extremity of these streets are the Praga da Figueira, a picturesque square, used as a public market, and a handsome square called the Rocio or Praga de Dom Pedro IV, with a fine bronze statue of Dom Pedro IV, surmounting a tall marble column. To the northwest extends, for nearly a mile, a broad avenue, the Avenida da Liberdade, lined with handsome houses and planted with shrubs, etc. Besides this the finest open spaces are the Estrella Gardens, the Botanic Garden, the Praga do Principe Real and that of Pedro de Alcantara. The western quarter, called Buenos Aires, is airy and pleasant, and here foreigners chiefly reside. The town of Belem, on the west, beyond the river Alcantara, forms a sort of suburb to Lisbon, and has electric car connec¬ tions. It has a well-known tower, forming one of the defenses of the harbor.

The principal residence is the Ajuda Palace, built of white marble on the summit of a hill. The castle of Saint George is remarkable for the beauty of its situation. Other noteworthy buildings are the cathedral, once a Moorish mosque, on the slope of the Castle Hill, on the east; the church do Coragao de Jesus, sur¬ mounted by a splendid dome ; the church of the Martyrs, erected on the spot where Alphonso I

mounted the walls of the city and rescued it from the Moors; the church of Saint Vincent, a Renaissance building of noble proportions, and the burial place of kings; the handsome church of Santa Engracia ; the magnificent church and monastery of Belem, in which Vasco da Gama and the poet Camoes are buried, and the church of San Roque. The numerous con¬ vents which crown the hills, and appear like palaces and fortresses, are for the most part massive and imposing structures. But unques¬ tionably the most remarkable specimen of architecture is the aqueduct which conveys water to the city from springs rising near the village of Bellas, about six miles distant. It is partly conducted underground, but on ap¬ proaching Lisbon it crosses the deep valley of Alcantara, which is spanned for nearly 2,500 feet by a bridge of 30 arches, the loftiest of which is 240 feet high and 110 feet wide. An additional supply is 'brought in by another series of works from a distance of 18 miles. The scientific and literary institutions comprise the Royal Academy of Sciences, founded in the latter part of the 18th century; the well-equipped Polytechnic School, with a museum, botanic garden and observatory; an academy of medicine and surgery; institute of agriculture and veterinary medicine; Marine Academy; Military College, School of Music, National Library, containing about 400,000 volumes, and that of the Academy of Sciences, numbering

about 90,000 volumes; the Schools of Vicente de Fora; School of Drawing and Architecture. The harbor, or rather the roadstead, is one of the finest in the world, and the quays and graving docks, which extend for miles along the bank of the river, are elegant and com¬ modious. The exports consist chiefly of wine, oil, fruit, cork, fish, onions and other vegetables and salt; and the principal imports are grain, silk, linen, cotton and woolen cloths, iron, steel, hardware, dried fish, petroleum, colonial prod¬ uce and coals. The manufactures include vari¬ ous textile goods, tobacco, paper, chemicals and soap; there are also sugar refineries, iron foundries and potteries.

Lisbon was anciently called Olisipo. Suc¬ cessively in the hands of the Phoenicians, Car¬ thaginians and Romans, it was called Felicitas Julia by the last-named. It was captured by the Moors in 716, and remained in their pos¬ session till 1147. Vasco da Gama sailed from Lisbon on his famous expedition of 1497. Un¬ der the Spanish occupation from 1580-1640 the city greatly declined. In 1755 it was

visited by the historic and terrible earthquake, which threw down a considerable portion of the city and destroyed above 30,000 of its inhabitants. It was taken by the French in 1807, but resisted an attack by Massena in 1809. Pop. about

435,359.

LISBURN, lis'bern, Ireland, a market and cathedral town in the counties of Antrim and Down, eight miles southwest of Belfast, on the river Lagan. It is in general well built and has a clean and thriving appearance with a market- house and courthouse, the episcopal cathedral church of the united dioceses of Downs, Con¬ nor and Dromore, containing a monument to Jeremy Taylor, who died here in 1667; a Ro¬ man Catholic church and other places of wor¬ ship; county infirmary; a fine park, donated by Sir R. Wallace in 1888, etc. It is an important centre of the linen industry. Pop. 12,388.

LISSAJOUS (le-sa-zhoozD FIGURES, curves formed by compounding two simple harmonic motions at right angles to one an¬ other. They are generated when a ray of light is reflected from the limb of an upright tuning- fork to the limb of a horizontal tuning-fork, and thence to a screen, a point of which It illuminates. When the tuning-forks vibrate, if they are perfectly in unison the spot on the screen describes a straight line, or a circle, or an ellipse, but if not, various complex curves are described. They can also be formed by the bob of a pendulum, the effective length of which differs in two perpendicular planes. Such a pendulum maybe formed by suspending a string and bob from the middle of a string the ends of which are fixed. The equation of a Lissa- jous curve is of the form

x ~ a-i sin (fri + cR) y — a2 sin (fr2 + c20

Lissajous curves derive their name from Jules Antoine Lissajous, who presented a paper con¬ cerning them to the Paris Academy of Sciences in 1857. Some of his work, however, had been anticipated by Nathaniel Bowditch of Salem, Mass., in J815.

LIST, Friedrich, German economist: b. Reutlingen, Wiirttemberg, 1789 ;.d. 1846. He began life as a clerk in the public service and

in 1816 was ministerial under-secretary. The following year he was appointed to the chair of political economy at Tubingen, but resigned in 1819. He became a member of the Wurttem- berg Diet, but was expelled in 1822 and impris¬ oned for his censures on the

government. He effected his escape and lived successively in Baden, Alsace and in Switzerland. He emi¬ grated to America in 1825, engaged in farming in Pennsylvania but soon became editor of a German journal. Coal was discovered on his farm lands about this time and he became wealthy. He was appointed United States con¬ sul at Hamburg in 1830 but the Senate refused to confirm him in this office. Three years later he was made consul at Leipzig, but remained in office only a short time. He became interested in railroad development in Germany and advo¬ cated a national navy and a national commercial system for the German states. He traveled in Austria and Hungary in 1844 and England two years later, where he tried to promote a com¬ mercial treaty with Germany. His failure in this project caused him to become depressed and he shot himself during a fit of insanity. He wrote ˆOutlines of a New System of Polit¬ ical Economy } (1827) ; (Das nationale System der politischen Oekonomie) (1841). Consult lives by Goldschmidt (Berlin 1878) and Jentsch (ib. 1901) and (Friedrich List, ein Vorlaufer und ein Opfer f fir das Vaterland) (Stuttgart) ; Palgrave, (Dictionary of Political Economy) (London 1899).

LISTER, Joseph (Baron Lister), Eng¬ lish physician, the founder of aseptic surgery : b. Upton, Essex, 5 April 1827; d. Walmer, 10 Feb. 1912. The son of a member of the Society of Friends who was engaged in business in London as a wine merchant, he was educated for his profession at University College, Lon¬ don, and became house surgeon at Edinburgh Royal Infirmary under Professor Syme, whose daughter he married. He was professor of surgery at Glasgow University, 1860-69; pro¬ fessor of clinical surgery at Edinburgh Univer¬ sity, 1869-77 ; and from 1877-93 held the same chair in King's College, London, and practised as a consulting physician. His claim to be re¬ garded as the founder of modern surgery is indisputable. The discovery of anaesthetics had widened the field for the surgeon, making possible a vast increase in the number of oper¬ ations ; but his footsteps were followed by a great mortality among the patients due to what would now be attributed to blood poisoning. Lister realised the significance in their applica¬ tion to surgery of the results of Pasteur's ex¬ periments on fermentation, and in 1865 he an¬ nounced his new method of disinfecting wounds, bandages and instruments by means of antiseptic dressings, originally cotton wool and carbolic acid and thereby killing the germs. Later he improved on his methods by the intro¬ duction of aseptic surgery, which aims at the exclusion of bacteria in wounds by a scrupulous cleanliness in the operating theatre and the sterilization of instruments rather than by poisoning them after they have obtained lodg¬ ment. Summing up

Lord Lister's work, the British Medical Journal declared that ((he had saved more lives by the introduction of his sys¬ tem than all the wars of the 19th century to¬ gether had sacrificed? Honors world wide

rained thick upon him ; he was created a baro¬ net in 1893, raised to the peerage in 1897 and was one of the first recipients of the Order of Merit. He left no issue.

*LISZT, Franz, frants list, Hungarian pianist and composer: b. Raiding, near Oden- burg, Hungary, 22 Oct. 1811; d. Baireuth, 31 July 1886. He was scarcely nine years of age when he made his first appearance as a pianist and improvisator in.Odenburg and Presburg with such success that several noblemen under¬ took the expenses of his training at Vienna under Czerny the pianist, a*nd Salieri the com¬ poser. In 1823 he made a great sensation as executant and improvisator on the piano in Vienna, Munich, Paris and other cities. His father thereupon traveled with him through France, Switzerland and England for further study of his art. While yet a boy he composed the operetta (Don Sancho5 (1824) and the following year launched out into grand opera at Paris. For a time he experienced the conflict between his religious predilections, which beckoned him to the Church, and his father's wishes for his musical success, which resulted finally in the choice of music as his profession. His hearing of Paga¬ nini in 1831 affected him greatly and had a most stimulating influence on his cultivation of vir¬ tuosity. In 1835 he had completed his studies as composer for the piano, and in company with the Countess d'Agoult who afterward became the mother of his children (one of whom be¬ came the wife of Von Billow and afterward of Richard Wagner) he began his travels, during which he gave a series of concerts in Switzer¬ land, Italy and Hungary, winding up with some remarkable performances in Vienna. From 1839 to 1847 he made a triumphal progress through the whole of Europe. His success was due less to the astounding power of execution with which he rendered the masterpieces of every age, than to the sublimity, the noble feeling, the depth of expression with which he rendered every number of his program. Honors now were showered upon him; he was made Kapell¬ meister to the Grand Elector of Weimar; Fred¬ erick William IV knighted him, and he was decorated by every court in Europe. In 1848 he settled at Weimar with the Princess Karo- line Sayn-Wittgenstein, and became the*

teacher and <(inspirer55 of a large circle of young musi¬ cians. In 1861 he settled at Rome; in 1865 he took minor orders in the Catholic Church, and became known as Abbe Liszt. In 1870 he was made president of the Royal Musical Academy at Budapest and henceforth lived in turn there, at Rome and at Weimar. The villa in the last city which he occupied now contains the Liszt museum.

In the career of Liszt as a composer there are three distinct periods. The compositions of his first period consist partly of (Transcrip-tions> for the pianoforte (a department in piano music inaugurated by him) ; partly of piano pieces, songs and choruses for male voices. In the second period, during his residence at Weimar, he applied himself to purely instru¬ mental music, in accordance with the principles which he had learned of Berlioz. He sought on the piano to express by a symphony familiar poetic objects and by means of this to adum¬ brate ideas of a lyric or dramatic order, To

this class of compositions belong his twelve (Symphonic Poems,5 namely, (1) (Ce qu'on entend sur la Montagne5 known also as (The Mountain Symphony 5 ; (2) Tasso's (Lamento e Trionfo5 ; (3) Preludes, after Lamartine's

LIT DE JUSTICE, le de zhiis-tes, a sol¬ emn proceeding in France, in which the king, with the princes of the blood royal, the peers, and the officers of the Crown, state and court proceeded to the Parliament, and there, sitting upon the throne or lit, caused those commands and orders which the Parliament did not ap¬ prove to be registered in his presence. The Parliament had the right of remonstrating in behalf of the nation against the royal com¬ mands and edicts. Louis XV held such a lit de justice in 1763, in order to introduce certain imposts, but on account of the firm resistance of the Parliaments he was finally obliged to yield. The last fits de justice were held by Louis XVI in 1787 and 1788.

LITANY (from the Greek litaneia, sup¬ plication, prayer), a form of prayer or song, first used especially on occasions of public ca¬ lamity and introduced according to Zonaras and Nicephorus by Proclus, about the year 446, at Constantinople, in the reign of Theodosius ; according to Paulus Diaconus, under Justinian, at Antioch, in consequence of the following circumstance : An earthquake, says the legend, having driven the people into the fields, a boy was suddenly taken up into the air in their presence, but was again let down unhurt, on the people crying out <(Kyrie eleison!55 (O Lord, have mercy). The boy related that he had heard the song of the angels, ((Holy God! Holy and Mighty, Holy and Immortal! have

mercy upon us!55 and this gave rise to the Litany. This kind of common prayer was perhaps not

unusual among the Tews, and Psalm cxxxvi seems to have been adapted to this purpose.

The litanies in general use in the Roman Catholic Church are the ((Litany of the Most Holy Name of Jesus,® the <(Litany of the Saints® and the ((Litany of Loreto.® The <(Lit- any of the Most Holy Name of Jesus® is com¬ posed of a series of addresses to Jesus Christ, in which the different names by which He is called are used. Like all the litanies it begins with ((Kyrie eleison® (Lord have mercy) and ends with an entreaty to the <(Lamb of God who taketh away the sins of the world.® This litany is said aloud in the churches by the mem¬ bers of the ((Holy Name Societies® on general communion days. The ((Litany of the Saints® is composed of supplications to God for favors, the rendition of thanks and a number of peti¬ tions to saints asking their intercession. This litany is a part of the special church service for Saint Mark's day, the rogation days, the ru¬ brics for the consecration of churches and cemeteries, for ordinations and for other church services. The ((Litany of Loreto® re¬ ceives its name from being sung on Saturdays and feasts of the Virgin Mary, in the Santa Casa of Loreto. It consists of a number of petitions to the Virgin Mary using her differ¬ ent titles as found in the Scriptures and in sacred writings and asking her intercession.

Litanies are found in the old hymnbooks of the Lutherans, but are no longer used by Prot¬ estant Germans. In the Anglican prayer-book the litany is retained, and though it adheres in many respects to the ancient forms, it differs from those of the Roman Catholic Church and contains no invocation of the Virgin or the saints. Since 1661 it is no longer a distinct service, but, when used, forms part of the morning prayer, after the third collect for Grace.

LITCHFIELD, Conn., borough, one of the county-seats of Litchfield County, near Bantam Lake, and on the New York, New Haven and Hartford Railroad, about 15 miles northwest of Waterbury and 28 miles west of Hartford. The first settlement was made in 1719 and the place was called Bantam, but after a few years the name was changed to Litch¬ field. During the Revolutionary War Litch¬ field

was used for the storage of supplies. The women of Litchfield melted and made into bul¬ lets the statue of George III which the people of New York City had torn down from Bowl¬ ing Green on 9 July. Sarah Pierce opened here, in 1792, a school for the higher education of women. Judge Tapping Reeve, in 1784, also founded here the first law school in the United States. It was patronized by many young men who afterward became prominent in the af¬ fairs of the nation. It was the birthplace of Ethan Allen and of Henry Ward Beecher and Harriet Beecher Stowe. Lyman Beecher was a pastor here for 16 years from 1810. Litch¬ field is situated in a region where grazing and dairying are the prominent industries, but valu¬ able deposits of nickel ore are found in the vicinity. The beautiful _ scenery, mild climate and places of historic interest make it a fa¬ vorite pleasure resort. The chief industrial es¬ tablishments are creameries. Bantam Lake, nearby, is the largest in the State. Pop.

(1920) 707,

LITCHFIELD, Ill., city, in Montgomery County, on the Illinois Central, the Cleveland, Cincinnati, Chicago and Saint Louis, the Wa¬ bash, the Chicago, Peoria and Saint Louis, the Chicago and Alton and the Chicago, Burling¬ ton and Quincy and Litchfield and Madison railroads, about 50 miles northeast of Saint Louis, Mo., and 45 miles south of Springfield. It is in a good farming section, with oil, coal and natural gas in the vicinity. The chief in¬ dustries are mining and manufacturing. The principal manufactures are railroad cars, foundry products, glass, briquet ornaments, mine engines, brick, tile, flour, lumber, steel gates and farm accessories, . galvanized cans, silos, cement sack bailers, wind-mills and creamery products. The trade is in the manu¬ factures, coal, oil and some farm products. It has good schools, a public library and several prominent buildings. The government is vested in a mayor whose term of office is two years, and in a council, with administrative officials appointed_by the mayor and approved by the council. Pop. (1920) 6,215.

LITCHFIELD, Minn., village, county- seat of Meeker County, on the Great Northern Railroad, about 63 miles west of Saint Paul it is situated in an agricultural and stock-rais¬ ing region. Its chief industries are connected with farm products and the shioping of live¬ stock. It has machine shops, flour and lumber mills, wagon and carriage factory, a foundry and brick yards. Pop. (1920) 2,790.

LITCHI, lich'T, or LEE-CHEE, a tree (N ephelium lit chi) of the soapberry family, native to southern China. It is of moderate size,

with brown bark, large leaves and fruit produced in bunches, which are pendant from the extremities of the twigs. Each berry, known in trade simply as ((litchi,® is one to two inches in diameter, with a tough, thin, leath¬ ery coat and a colorless half-transparent pulp, in the centre of which is a single brown seed. The fresh fruit is pleasantly sweet and reputed to be one of the most delicious known. It is sold extensively in America and Europe in a dried state, and though the pulp is much di¬ minished in size it retains a considerable por¬ tion of its original flavor. Attempts have been made to cultivate it in the United States with some success in southern California and Flor¬ ida, but the tree seems extremely susceptible to cold. Other species of Nephelium, as the longan tree (N . longanum) of the East Indies, 3'ield similar fruit and seem better adapted to American cultivation. The nuts of the last are smaller and less sugary than those of the litchi, but are regarded by the Chinese, by whom they are also cultivated, as having useful medicinal qualities.

LITERARY FORMS. The term litera¬ ture is sometimes applied to all printed dis¬ course intended to be preserved for permanent use ; but more specifically it is reserved for forms of discourse intended to serve artistic rather than utilitarian purposes and developed chiefly by the processes of the imagination rather than those of the reason and the sense of fact. (De Quincey, in a famous passage, distinguished this class of writings as ((Litera- ture of Power,® in contrast to <(Literature of Knowledge^). These forms are classified most

inclusively tinder the main divisions of prose literature and poetry, though some, like the drama, exist amphibiously in both divisions.

Prose Literature.

The Essay is the simplest form of prose dis¬ course, and the form most closely related to the ^literature of knowledge.® In the least devel¬ oped type it may be looked upon as a collection of gnomic sayings or aphorisms and be called Gnomic or Aphoristic. In the Old Testament (Book of Proverbs) one may see, in certain chapters, the aphoristic essay growing out of the mere collection of aphorisms. For English literature the chief example of this type is the Essays of Francis Bacon (q.v.). If, instead of expressing general ideas, the writer sets down his individual experiences and feelings, frankly

representing his personality rather than ab¬ stract truth, the essay becomes personal or fa¬ miliar; of this type the chief example in Eng¬ lish literature is the (Essays of Elia) (q.v.), by Charles Lamb. A further development takes place when the essay represents critical think¬ ing, elaborated on themes literary, political, historical, etc. ; often this type takes its rise in a book review. It may be called the critical or expository; the chief example in English lit¬ erature is the Essays of Lord Macaulay (q.v.). See further under Essay.

Prose Fiction , or imaginative narrative, is closely related to poetry, because so freely cre¬ ative in character; and at certain periods, not¬ ably in the Middle Ages, the distinction be¬ tween prose and verse romance is almost negli¬ gible. In general, fiction is most distinctively classified under the two heads of Romance and Novel. The romance deals characteristically "with the unfamiliar or wonderful — with mat¬ ters distant in time or space, with heroic or su¬ pernatural adventure, and with romantically moving backgrounds and emotional situations ; the novel deals characteristically with the famil¬ iar, with the sense of reality and the represen¬ tation of the problems of contemporary life. The romance, therefore, tends to be more po¬ etic and to be less concerned with ethics and social organization ; the novel tends to be more critical — often satiric, and frequently, though not invariably, concerns itself with sociological and kindred themes. A third type, the tale or (as it is now commonly called) the short story, may partake of the character of either romance or novel ; the short stories of Haw¬ thorne and Poe exemplify the former tend¬ ency, those of recent American writers like Sarah Orne Jewett and ((0. Henry,® the latter. Poe distinguished, in a well-known passage, the true short story (which some prefer to write (

The Drama is fiction presented not in the words of the author, but solely through the action and speech of the imagined characters. This type is commonly classified as comedy and tragedy; formerly comedy was distin¬ guished as dealing with unimportant person¬ ages and with the complications of common

life, tragedy as dealing with great personages and lofty and fateful themes, but in modern times the usual distinction is based on the pre¬ vailingly ((happy ending® of comedy and the hero's defeat (and, usually, death) character¬ istic of the end of tragedy. In the period when tragedy normally confined itself to characters of rank or importance, an exceptional type was often distinguished as bourgeois tragedy, or tragedy of common life. Comedy may be con¬ veniently classified as comedy of manners, romantic comedy, and farce. The

comedy of manners satirizes familiar types of contempo¬ rary life; examples are the chief plays of Ben Jonson, in the Elizabethan Age, and of Bernard Shaw in the present. As this sort of comedy is akin to the novel, romantic comedy is akin to the romance, dealing with the less familiar side of experience, and treating it sympathet¬ ically rather than satirically. Shakespeare re¬ mains the chief exemplar of romantic comedy; it does not flourish in modern times. Farce is comedy based on amusing action, in which plausibility of plot and emphasis on character are frankly abandoned. (Farce is sometimes distinguished as ((low comedy,® comedy based on the delineation of character as ((high comedy®). Besides these principal types, vari¬ ous mixed or indeterminate forms must be noted. Tragi-comedy — a term chiefly used in the 1 7th century — is drama dealing with dignified persons and serious events, but reach¬ ing a solution instead of a catastrophe; Shake¬ speare's (Cymbeline) and (A Winter's Tale5 are examples (though the former was classified as a tragedy, the latter as a comedy, in the folio edition of his plays). To these late Shakespeare plays of blended character the term ((Romance® is also applied. Modern usage tends to call the blended type simply <(a play® or a <(drama® (French drame) ; this class may also include plays which end with death or disaster (like Rostand's (Cyrano de Bergerac5 and Ibsen's (Hedda Gabler5), which for one or another reason the dramatist does not wish to call tragedies. The Melodrama (originally meaning music-drama) is a term somewhat loosely applied to what might be called the serious farce, — a drama dependent on incident rather than character, and appealing not to the comic sense but to the sentiments. The Masque (or Mask) is an early form, occasionally re¬ vived in the present time, in which music and pageantry are used to embellish the dramatic art, and in which the characters are usually symbolic or allegorical ; the chief English ex¬ ample is Milton's (Comus5 (q.v.). See further under Drama.

In addition to the definitely established types of prose literature, there remain certain kinds imperfectly definable, of which one might note the fantasy or prose-poem, — a form of compo¬ sition seeking the effects of poetry while keep¬ ing to the medium of prose. In English litera¬ ture the chief examples are certain reveries of De Quincey, such as that called (Levana and Our Ladies of Sorrow.5

Poetry.

For the definition of poetry in general, see under Poetry. Poetic literature is commonly classified as Narrative, Lyrical, or Dramatic, though there are certain other subsidiary kinds.

Ihis distinction is primarily based on the poet's subject matter and his relation to it. In nar¬ rative poetry the principal subject is action, objective or external, usually related by the poet as one standing outside it; in lyrical poetry the principal subject is feeling, personal or subjective, expressed by the poet as for him¬ self or for an imagined speaker; in dramatic poetry the subject is both action and feeling, but the action is represented objectively while the feeling is expressed subjectively by the various characters.

Of narrative poetry the chief types are those of early periods, this kind having greatly diminished in significance in the modern period characterized by the rise of prose fiction; these chief early types are Epic and Ballad. The epic is a long narrative poem dealing with heroic adventures of a traditional character, usually concerned with national or racial themes and involving supernatural elements. One may distinguish the primitive or communal epic, like the (Iliad> (q.v.), of uncertain authorship and representing the legendary of a whole race rather than the invention of an original poet, and the individual or art epic, like the <ˆEneid) (q.v.), representing the conscious art of a single composer. Modern epics, like Milton's (Paradise Lost5 (q.v.), are usually written in deliberate imitation of the ancient, with an application of the old methods to more reflec¬ tive or spiritual subject matter than is charac¬ teristic of the primitive type. The Ballad is a shorter narrative, intended to be recited (in early days perhaps more commonly sung) at a single sitting, and dealing with a single adven¬ ture or episode of popular story. Many of the old ballads centre about certain popular themes and heroes, forming what is called a ((cycle55 ; the best-known example is the cycle dealing with Robin Hood and his outlaws of the Greenwood. Another early type, though be¬ longing to the era of written rather than oral poetry, is the Metrical Romance, distinguished from the epic very slightly at times, but chiefly in 'being less concerned with national themes, and more with those of chivalric adventure and love. Like the ballads, the romances ap¬ pear in cycles, the most notable examples be¬ ing those concerned with the story of King Arthur and the knights of the Round Table. In modern English poetrv the metrical romance was revived by Walter Scott and Lord Byron. The Fabliau, still another mediaeval type, is a humorous tale analogous to the comic short story in prose. In general, modern narrative verse avoids the following of fixed types. The term Idyl has been loosely and variously used, — most often to

describe a narrative poem with a large descriptive element, especially in pas¬ toral setting, but in a special sense by Tennyson, for the separate narratives (spiritualized re¬ workings of Arthurian romances) which he called Hdylls of the King5 (q.v.). Finally, we may note that occasional experiments have been made in the use of poetry for narratives of familiar life in the manner of the novel; examples are Clough's (Bothie of Tober-na- Vuolich5 and Owen Meredith's (Lord Lyt- ton's) (Lucille5 (q.v.).

Lyrical Poetry is characterized on the one hand by its association with music, and on the other, by the personal or subjective feeling which it normally expresses. Its simplest and

most typical form is the Song. As the type develops, with the natural course of civilization, a larger and larger element of reflection, or intellectual expressiveness, is added to the originally simple and song-like utterance of feeling, resulting in what may be called the Reflective Lyric. Of the song-lyric the poems of Burns are the most important examples m .modern English literature; of the reflective lyric the chief masters are Wordsworth, Shel¬ ley and Tennyson (e.g., (Tintern Abbey,5 (To a Skylark, 5 'Tears, Idle Tears5). Special forms of the reflective lyric are the Ode, the Elegy, and the Sonnet. The term Ode is loosely applied to a lyric of a highly dignified or impassioned character, elaborated at some length, especially when addressed to some per¬ sonified idea (as Coleridge's (Ode to France5 and Wordsworth's (Ode to Duty5) or expres¬ sive of public feeling on some important occa¬ sion (as Tennyson's (Ode on the Death of Wellington5 and Lowell's (Commemoration Ode5). The Elegy is (for English usage, hav¬ ing a much more general significance in class¬ ical poetry) a lyric expressive of melancholy or grief, in particular when commemorative of a dead friend. The most representative ex¬ amples are Milton's

We may also note under the head of ly¬ rical poetry certain forms which in a sense combine the method of lyric with that of nar¬ rative. Thus a poem may be at once song and story, or be intended equally to express feeling and narrate action; for this the term Lyrical Ballad has been used, notably by Wordsworth, who said that in his narrative poems called by this name the reader was to understand that the feeling awakened <(gives importance to the action and situation, not the action and situation to the feeling.55 Or, a poem may represent a song expressive of the feeling of a particular imagined person in a particular situation ; for this the term Dramatic Lyric is used, notably by Browning (e.g., his (Cavalier Tunes5). If it is the speech, rather than the song, of an imagined

character, reflectively developed, the poem is called a Dramatic Mono¬ logue; this is one of the most characteristic of modern types, being represented especially in the work of Tennyson and Browning (e.g., the former's (Ulysses,5 the latter's (My Last Duchess5). In the poem (Maud 5 Tennyson told the story through a series of dramatic lyrics and monologues, and called the whole a Monodrama.

Dramatic Poetry is not, in general, distin-

guished in its kinds from those of prose drama; see, therefore, the account given above under prose forms. For the most part, the use of poetry in drama is confined to tragedy and romantic comedy, and even there, in modern English drama, it has been largely displaced by prose.

A separate class is sometimes made for Descriptive Poetry, as represented by examples like Thomson's (Seasons) ; but description in poetry, as in prose literature, is usually sub¬ ordinated to some more characteristic end. Still another class is made up of Didactic or Expository Poetry, in which the functions of prose are most closely approximated, for the exposition of ethical or social theory; import¬ ant examples in English literature are Dry- den's (Religio LaicP and Pope's (Essav on ManP Wordsworth's

In Latin literature, and in English literature of the Renaissance and the 18th century, Satire is a distinct form of poetry, — the imaginative indictment of contemporary follies and vices. In modern literature no such distinct type is commonly recognized, but the mood and pur¬ pose of satire may be discovered in prose or verse, and in narrative, lyrical or dramatic form. Somewhat similarly, the Pastoral or Eclogue was a recognized form of poetry, under classical influence, in the Renaissance and later; Spenser's (Shepherd's Calendar1* forms an important collection. But the term Pastoral was loosely used, and is now applied as an ad¬ jective in connection with romance, drama or lyric, when the theme concerns the traditional beauty and happiness of rural — particularly shepherd — life.

Bibliography. — For works dealing with the separate literary forms, see under Essay, Drama, Novel, and Poetry. For the types in general, consult Gayley and Scott, introduc¬ tion to the Methods and Materials of Literary Criticism* (Boston 1899) ; Painter, F. V. N.,

(Elementary Guide to Literary Criticism (Boston 1903) ; Hunt, T. W., (Literature, its Principles and Problems) (New York 1906) ; Hudson, W. H., introduction to the Study of Literature) (Boston 1910) ; Moulton, R. G., (The Modern Study of Literature * (Chicago*

1915).

Raymond M. Alden,

Professor of English, Leland Stanford Junior U niversity.

LITERARY LABOR SAVERS. See

Office Labor-Savers.

LITERARY PROPERTY. See Copy¬ right.

LITERATURE (in Latin, litteratura, literatura, writing, from littera, letter), in the widest sense is the expression, representation or manifestation of thought by means of alphabetic symbols called letters — the products being considered as a collective body, without special regard to the excellence and beauty of the form of expression. But in a restricted and usually preferred sense only the more polished or artistic class of such products, to¬ gether with the critical knowledge and apprecia¬ tion of them, may be called literature; for the term is, according to this latter usage, applied exclusively to writing which has claim to con¬ sideration on the ground of beauty of form or emotional effect. Thus, a declaration conform¬ ing to the latter usage is John Morley's often cited sentence: ((Literature consists of all the books . . . where moral truth and human

passion are touched with a certain largeness, sanity, and attractive form® ; and the best recent expression of the same high view is to be credited to Lieut. Coningsby Dawson, who writes in October 1917: ((In the light of my experience at the front, the petty personal problems which we cloak in words and call literature seem so ignoble a presentation of men and women who are planned for im¬ mortality and live in an infinity world.® The passport to this higher class (literature in the usually preferred sense and belles-lettres) is the possession of what is known as literary quality; and the foregoing statements enable us to conclude that any work in this field should, if its possession of this passport quality is to be fully conceded, rise above pettiness or triviality of thought and expression, and should attain or approximate not only attractiveness of form but also soundness and adequacy of treatment.

There is certainly room for doubt as to the correct classification of the main divisions of this subject, especially in regard to the admis¬ sion or exclusion of distinctive groups. For instance, the literary quality of a work in the field of science or in the field of oratory (after the oration has been printed) may be so marked and striking that we easily think of the former as literature in the restricted, and not merely in the widest, sense; and we may also, and almost as easily, overlook the fact that oratory must be held to be expression by vocal sounds and not primarily representation by alphabetic symbols. On the other hand, some of the dramatic works that are now by common con¬ sent classed as secular literature's best offering were originally designed simply to be acted, to be played, and without one thought of the effect they would produce when printed and read. In general usage, however, six or seven main groups are recognized, and all of these, except the first and the last, were developed in Greece or Greek colonies before (some of them long before) the middle of the 4th century b.c. We have thus the literature of religion, of philosophy, of poetry (epic, dramatic and lyrical), of history, of oratorv (unless this be excluded for the reason already mentioned), of criticism and of fiction. In this work the

literature of the several peoples of the world, both ancient and modern, are treated fully under their special or national titles, as Ameri¬ can Literature, Celtic Literature, English Liter¬ ature, Greek Literature, Latin Literature, Latin- American Literature, Jewish Literature, Lithuanian Literature, Persian Literature, Polish Literature, Russian Literature, etc., etc. Reference to the Classified Index will give a complete list of articles dealing with special periods or phases of literature and literary his¬ tory, as Comparative Literature, Classical Literature, Literature of the Middle Ages, Elizabethan and Victorian literatures, etc. In addition, the great masterpieces of world liter¬ ature have received special treatment under their own titles, giving an outline of the plot, characters, literary excellence and literary his¬ tory of the work in question, e.g. Hedda Gabler, Autobiography of Franklin, Man without a Country, Jane Eyre, Peter Ibbotson, Hernani, Gil Bias, La Vita Nuova, Amiel's Journal, Anna Karenina, Kalevala, Madame Bovary, etc.

LITERATURE, ART AND MUSIC, Influence of the World War On. All wars have a profound influence on the life and thought of the nations — they either sterilize when disasters are overwhelming or

awaken to new energy when conditions are more favorable. The inspiration of any momentous and long- continued struggle is contagious — it spreads from camp to city and enters every sphere of activity, molding a nation's literature, art and music, spheres that are so readily affected. Naturally the full force of that influence may not be felt immediately, but it cannot long be deferred nor its importance underestimated. For war in intensifying the sense of national¬ ity arouses attention to those lines of activity in which nations take special pride — arts and letters.

The war of 1914 had at first an unfavorable effect on literature, with the whole bent of the nations turning in other directions. The old Latin proverb that amid arms the laws are silent has a much wider application. A shrink¬ age followed in the output of books ; and literary plans, including notable translations, had to be changed or deferred in the severance of relations with the Central Powers and the added difficulty of researrfi work in certain lines. It did not take long, however, before compensation followed in the rapid output of war literature. It was found necessary after October 1918, owing to the shortage of paper, for American publishers in the interest of economy to cut down the number and titles of books for general readers as well as in some lines of textbooks. The total number of books, inclusive of pamphlets, issued in the United States in 1914 was 8,563; in 1915, 6,932; in 1916, 8,430; in 1917, 8,107 ; in 1918, 7,686. The de¬ crease in fiction and in general literature for 1918 was more than counterbalanced by war books in different lines.

The various departments of war literature included diplomacy of war, diaries of diploma¬ tists, international relations between United States and Germany, documentary histories of diplomatists. Then comes newspaper corre¬ spondence, usually reprinted in book form, the causes of war, military history, war poetry, soldiers' letters, fiction in the style of Wells,

Sinclair and Barbusse, personal sketches, novels, camp journalism, — wide in range and variety of subject. Happily the tension of war has not been allowed to interfere with the average reader's enjoyment of books. The work of the American Library Association in providing a million and more books for various camps, the result of a public appeal, was of marked value.

It is difficult to be specific in examples of war literature that have merit enough to be given mention here. Many books of the day are written only for the day, and quickly pass into forgetfulness. In the

haste of composi¬ tion and lack of literary qualities, the majority of war books belong to that category. Some will be treasured as keepsakes or considered as curiosities of a notable epoch, and be con¬ signed to the vault with curios, antiques, etc. A few works, however, have done their share in forming public opinion. Schreiner's (From Berlin to Bagdad1 ; Wood's (The Cradle of the War1 ; Jastrow's (The War and the Bag¬ dad Railway,1 have undoubted excellence and historic value. Dr. Miihler's (The Vandal of Europe,1 his diary in the early days of the war, has its place next to Prince Lichnowsky's famous Memorandum,1 as the most-talked-of books of the era. In fiction (The Four Horse¬ men of the Apocalypse1 by the Spanish novel¬ ist Ibanez is a war story vibrant with Spanish feeling, while Malherbe"S (The Flame' that Won1 gives the emotional French point of view. In poetry, which is never ceasing, as Leigh Hunt puts it in an oft-quoted sonnet, Frank Fox-croft's (War Verse1 will be found fairly repre¬ sentative. Those who like to read soldiers' letters, many of which are written with much simplicity of diction and beauty of thought, may turn to the (The Good Soldier,1 by N. P. Dawson. Villiers' (Britain after the Peace1 opens up the question of revolution or recon¬ struction for Great Britain after the war.

It will take some years before the authorita¬ tive history of the war, with broad vision and free from prejudice, will be written. Diploma¬ tists' diaries, written originally for the maga¬ zines and utilized by the movies, while vivid and suggestive, lack the even poise and dignity of histories. The far-sighted, well-balanced historian demands a few years of preparation and another perspective than that of the jour¬ nalist or the occasional letter-writer. A prac¬ tical help for the future historian has been be¬ gun in the Universal Library of Bologna, Italy, with its collection of books, pamphlets, publica¬ tions, photographs, documents, etc., pertaining to the war of 1914-18. The works are cata¬ logued under 800 different classifications and numbered at the close of 1918 nearly 10,000 volumes and pamphlets, exclusive of rare docu¬ ments and special reviews. The collection is not restricted to Italy but includes every coun¬ try and phase of the war.

It is generally admitted that the war inter¬ rupted a general renaissance of industrial art in Europe. In England, it is true, thanks to William Morris and his immediate predecessors, the awakening had already come. In fact in the summer of 1914 an exhibition of the decorative arts of Great Britain was held to show the French people hovv far England had advanced in the task of making artisans of her artists and artists of her artisans. In the same year in the report to

the London county coun-

cil of the Central School of Arts and Crafts, it was stated that <(workmen, employers, and educationists are awaking to the need of an organized scheme of education in art which shall be both ideal and practical.® Further and more detailed testimony to the progress of art education in England are furnished by the special autumn number of 1916 of the Inter¬ national Studio, which gave a careful review of the work done by students in a limited num¬ ber of the leading art schools of Great Britain and Ireland. The problem of meeting foreign competition is being resolutely met.

In the United States the war has not been allowed to check efforts in industrial art, but the modest beginning made will be developed in due course when suitable methods adapted to our people will be acquired. France has shown its vigilance by organizing in war time its art teaching and establishing committees to ascertain conditions and requirements in its various manufacturing centres. Paris had an exquisite display in the exhibition of Pagnot typography in 1918. The four brothers of that name, who were leaders in the book art, had fallen in battle. In other lines the master craftsmen have had their gatherings and demonstrations — the metal workers' craft showing a particularly remarkable develop¬ ment.

As the direct outcome of the world con¬ flict has sprung into prominence what might be termed the technique of war, in which the in¬ fluence of impressionists and cubists might be traced as well as that of legitimate art, under the popular name of camouflage. Among English painters C. R. W. Nevinson with his (Searchlight) merits the highest praise for the genius displayed; among the French, Faivre and Farre may be mentioned. The en¬ trance of artists and craftsmen in this field of art was everywhere successful and their work in the military and naval service was very help¬ ful. If America owes the initiative to the camouflage corps of the French army, it has shown an ability and a versatility of its own, especially in the problem of marine camouflage. Patrol "boats and merchantmen have been painted so as to create low visibility at sea. In New York the work has been chiefly concerned in designing and carrying out street decora¬ tions for the many receptions given to com¬ missions from the Allies, which culminated in the Avenue of the Allies for the Fourth Liberty Loan drive, of whose fine features perhaps the most

remarkable was the series of paintings done by American artists, one each day, to commemorate the spirit of the 22 nations engaged on our side of the world strug¬ gle.

Further work of the artists was to make signs and posters for the army and navy to encourage enlistment — which were scattered all over the country. As a consequence, a camouflage corps was formed for service in France, and it included painters, sculptors, architects, craftsmen such as scene painters, stage carpenters, plaster cast molders and masons. Thus France received a little repay¬ ment for her copyright in camouflage. Some further commendable work in this direction was done bv artists beyond the draft age in sending original paintings and decorative pieces to the various rest homes and Y. M. C. A. huts.

Thus art was brought into the lives of our soldiers in the many centres of army life in America and France, to wield a more than transient influence on character and efficiency both during war time and the peace that was to follow.

As to the effect of the war on art prices, any inquiry is legitimate. We shall probably wit¬ ness a change in the class of art purchasers and the appearance of a new coterie of wealthy buyers, with whom an intelligent appreciation of the best work is only a matter of time, and who at first will pay higher prices.

American music has to be grateful to the war for a larger share of attention and appre¬ ciation. The tendency to lay emphasis on the foreign element both in programs as well as in education has been followed by a proportionate higher regard for the American teacher and methods as well as for the typical American features in composition. If Wagner went to mediaeval Teutonic legends for his themes, why cannot the American utilize the Indian chant and folklore with as superb results? It all de¬ pends upon the genius and equipment of the composer. There is possibly a larger field for the American music-drama in the very com¬ plexity of the American nation and the role it has assumed in diffusing democracy in all lands — a field which offers a richer oppor¬ tunity both for theme and elaboration.

The first effect of the war was hardly in¬ spiring in the flood of patriotic and war songs, only a few of which possessed fair merit. Next followed a change in the concert program, with the Teutonic music less and less represented, and greater prominence given to French, Eng¬ lish, Italian, Russian and even Japanese com¬ posers.

Bands of music and special artists from the Allied nations toured the country and did much to increase popular knowledge and appreciation. A number of prominent symphony societies in our large cities were obliged to dispense with their German con¬ ductors.

It was a timely protest against tendencies that seemed likely to injure American stand¬ ards of music when the Musical Alliance of the United States was founded by John C Freund, whose aim was to add a Secretary of Fine Arts to the Cabinet. A further step was the effort to organize a National Conservatory of Music and Art, which was introduced in the House of Representatives on 17 Tune 1918. Its purpose was the national control of music and revised standards of music. It was shown that there was no need to pay many millions yearly and educate in music boys and girls abroad, when our own country afforded opportunity for good training, if it could only encourage its students as a number of European nations do. It was pointed out forcefully that music was more than an accomplishment and a luxury for the rich — it was a great ethical force and rta factor in refining and elevating character.®

In marked contrast to the attitude of Ger¬ many and England where the music of enemy countries was played and sung, the United States, witnessed a boycotting of German music at recitals and . concerts — a war measure that had both its critics and supporters. Mr. H. T. Finck mentioned the case of the French govern¬ ment which arranged concerts for the wounded, and allowed the preference for Bach,'

Beethoven, Mozart and Schumann to be granted.

The war stimulated recitals and musical entertainments for war charities, giving a more cosmopolitan character to programs. It had its effect, also, on community and pageant music in our larger and smaller cities and the development of mass singing in the army camps. Abroad the war possibly encouraged the man¬ agers to produce many novelties at the various capitals — London, Paris, Rome, Berlin, Vienna. At least it had no adverse influence. One in¬ teresting fact might be mentioned — a Welsh composer of much power gave to the public a number of excellent songs, some of which were written in the German prison camp a't Ruhle'ben. If a Bunyan could write in prison, why cannot a singer compose in captivity?

One may confidently anticipate a marked revival in popular interest in music after the war — the efforts made at camp and canton¬ ment, abroad and at home, to reach the soldiers cannot fail to have more than a transient in¬ fluence. The public school is likely to de¬ velop as a music centre and music will prove more and more a factor in public enlighten¬ ment.

Abram S. Isaacs.

LITERATURE, Comparative. 1. History and Development of Study. — • Comparative literature is a term that only within the last 30 years has come into prominence, but is applied to so many different fields and lines of research that it would be difficult to find two scholars who would agree absolutely on the particular scope and purpose of this discipline. The English term, — obviously a misnomer, — seems of quite recent coinage, whereas the cor¬ responding French, German and Italian terms have been in use for nearly a century (Littera- ture comparee; Vergleichende Literaturge- schichte). The first scholar who pro¬ jected a study of human civilization on a philosophical and comparative basis was Francis Bacon: some remarkable adum¬ brations of modern theories of evolution may be found scattered through his (In- stauratio magna.5 Other pathfinders in this field are the Italian Giovanni Vico, (Sci- enza nuova) (1725) ; Dryden, John Dennis, Thomas Warton in England; Perrault, Saint Evremond, Montesquieu, Batteux in France; Baumgarten and Winckelmann in Germany. The greatest synthetic mind of his age was Her¬ der whose ambition it was to understand all literary phenomena as manifestations of deeper cultural impulses and who first insisted upon a relative valuation of literary productions ac¬ cording to the specific character and genius of each individual nation. Goethe's broad humani¬ tarian views and genuinely cosmopolitan tastes remain an inspiring example for all times. It is one of history's little ironies that many of these critics, like Perrault, the Warton brothers and Herder, were primarily moved by the de¬ sire to defend their aspirations toward a na¬ tional literature against the tyranny of absolute standards or traditions and that, in speaking pro domo, they were indirectly obliged to speak pro universo. The Romantic movement gave a new impetus to the expansion of literary interests all over Europe. The rediscovery of the for¬ gotten treasures of mediaeval poetry, or older

ballad and saga literature, the opening up of the Oriental world and the study of Southern liter¬ atures, — all these activities tended to enlarge the horizon, although they contributed very little to comparative analysis. It is sufficient to mention the names of

Coleridge and Scott, of the Schlegel and Grimm brothers, of Mme. de Stael and Ampere, and to remind of the fact that three leading French periodicals : Le Globe, la Revue des deux Mondes, and especially la Revue Europeenne , were international in char¬ acter and had correspondents in all European countries. From 1850 on, with the strengthen¬ ing of the philological disciplines on one side and the rapid growth of biology and sociology on the other, new tendencies and methods were introduced in the treatment of literary prob¬ lems. Philological analysis resulted in a large number of investigations in which literary cur¬ rents, themes and forms were traced through different literatures or periods and studied in their reaction upon each other. Benfey's (Pantschatantra) (1859), in which literary rela¬ tions between Orient and Occident are investi¬ gated, was one of the first attempts in compar¬ ative criticism, although Dunlap's ˆHistory of Prose Fiction) and Graesse's (Sagenkreise des Mittelalters) (1837) should not be omitted as earlier forerunners. The philosophical and synthetic tendency, on the other hand, drew inspiration from biology, ethnography and soci¬ ology, in particular from the new gospel of evo¬ lution and its prophets from Darwin to Weis- mann and De Vries. The influence of environ¬ ment, climate, race, social institutions upon lit¬ erary life was studied and laws were formulated to explain the growth and decline of literary types and forms. The theories of Taine, Le- tourneau, Posnett, Brunetiere, Manly and others are the result of these investigations. At the present time literary research shows rather a preponderance of technical and analytic studies, but a certain speculative element is noticeable in many of them and some biological analogies seem to have become established.

2. Field of Study and Topics for Inves¬ tigation. — There is no reason why any literary problem within any field should not be treated in a comparative spirit, but it seems reasonable to limit the term

to investigations which do not merely introduce parallels and analogies occasionally, but make them their chief end and object. It will not be difficult, within these boundaries, to set aside certain topics and problems as belonging pri¬ marily to the domain of Comparative. Literature. The following list may serve this purpose. From the inexhaustible supply, of books and articles only a few are quoted in each case to furnish illustrations, (a) Authors (compari¬ sons for the purpose of analogy or contrast; for studies in literary influence see under d) : Stendhal, (Racine et Shakespeare1* (Paris 1823) ; Stapfer, P., (Moliere et Shakespeare) (Paris 1890) ; Bekk, A., (Shakespeare und Homer5 (Leipzig 1885) ; Wiehr, J., (ITebbel und Ibsen) (Stuttgart 1908) ; Raveggi, P., (I poeti della visione celeste: Dante, Milton, Klop- stock5 (Firenze 1903) ; Betz, L., (Heine und Musset5 (Zurich 1897).. (b) Literary Produc¬ tions (comparisons, not including studies of in¬ fluence) : Bauer, (Das Buch Hiob und Dante's Gotti iche Komodie5 (Gotha 1904) ; Meinck, (Hebbels und Wagner's Nibelungen Trilogie5

(Leipzig 1905) ; Moguel, A., (Calderon's Magi- cien prodigieux et Goethe's Faust-* (Paris 1883). (c) Literary Themes , Legends, Types, Motifs: Paris, G., (Histoire poetique de Charlemagne* (Paris 1865) ; Castle, E., (Die Isolierten Varie- taten eines literarischen Typus) (Berlin 1899) ; Mallinger, L., (Medee. Etude de litterature comparee* (Paris 1897) ; Simone-Brouwer, (Don Giovanni nella poesia e nell' arte musi cale) (Napoli 1894) ; Berg, L., (Der Ueber- mensch in der neueren Literatur* (Leipzig 1897). (d) International Relations, Imitations,

Sources and Influences : Comparetti, D., (Vir- gilio nel Medio Evo) (1896) ; Reinhardstottner, C. von, (Plautus in der Weltliteratur) (Leipzig

1896) ; Rossel, V., (Histoire des relations lit- teraires entre la France et rAllemagne) (Paris

1897) ; Schmidt, E., (Richardson, Rousseau und

Goethe) (Jena 1875) ; Oelsner, H., influence of Dante on modern thought * (London 1895) ; Baldensperger, (Goethe en France-* (Paris 1904). (e) Literary Currents and Tendencies :

Egger, E., (L'Hellenisme en France) (Paris 1869) ; Texte, J., (Rousseau et les origines du cosmopolitisme litteraire (Paris 1895) ; Brandes, G., (Main Currents in Nineteenth Century Literature) (New York 1905) ; Hamann, R., (Impressionismus in Leben und Kunst* (Cologne 1907).' (f) Literary Forms, Flistory of Genre: Bedier, (Les Fabliaux* (Paris 1893) ; Rajna, (Le origini dell'epopea francese> (Firenze 1884) ; Greg, W., (Pastoral Poetry and Pastoral Drama* (London 1906) ; Fiirst, R., (Vorlaufer der modernen Novelle* (Halle 1897) ; Bovet, E., (Lyrisme, epopee, drame* (Paris 1911). (g) FEsthetic Emotions: De Laprade, (Histoire du Sentiment de la Nature* (Paris 1883) ; Biese, (Entwicklung des Naturgefiihls* (Leipzig 1888) ; Kawczynski, M., (Essai comparatif sur l'origine et l'histoire des Rythmes* (Paris 1889) ; Volkelt, (yEsthe tik des Tragischen* (Miinchen 1897). (h) Liter¬*

ature as Determined by Intellectual or Emo¬ tional Currents, Social or Political Institutions, Physiographic Conditions, Racial Factors ; Cor¬ relation of Literature and Art, etc.: Posnett, H. M., Comparative Literature (London 1886) ; Carriere, (Die Poesie, ihr Wesen und ihre Formen* (Leipzig 1884) ; Letourneau, C., (L'evolution litteraire dans les diverses races humaines* (Paris 1894) ; Mackenzie, A. S., (The Evolution of Literature-* (New York 1911) ; Maigron, (Le Romantisme et les Moeurs* (Paris 1910) ; Stephens, (English Literature and Society* (London 1903) ; Grosse, E., (The Beginnings of Art* (New York 1897) ; Hos¬ kins, F. P., (Biological Analogy in Literary Criticism,* Modern Philology (April 1909).*

There is no reason why the comparative and international point of view should not be ap¬ plied to narrower fields within national or even provincial boundaries. Scherer for. instance in his (History of German Literature is very fond of comparing or contrasting writers for pur¬ poses of <(reciprocal illumination,** to use his favorite term. Schiller's famous essay . on ((Naive and Sentimental Poetry** may be cited as one of the few cases in which two widely re¬ mote epochs of human thought are con¬ trasted.*

3. Principles of Comparative Criticism.—

These may be reduced to three : evolution, val¬ uation and causation. The principle of evolu¬ tion covers problems stated under (h), (f) and

(c) : literary history, forms and themes. In how far biological laws may be safely applied to literary problems is a question that might

arouse scepticism. Works of art, the organiza¬ tion of the human mind and the whole process of intellectual transmission are such complex phenomena that biological facts or theories could furnish only very crude analogies. Soci¬ ological theories have been applied by Posnett in his book on Comparative Literature in which literary evolution is traced through the four stages of clan life, city, commonwealth, national life and cosmopolitan humanity. The ethnographical point of view dominates in Grosse's (Anfange der Kunst* and Mackenzie's Cvolution of Literature.* Very illuminating are books in which certain phases and currents of literature are correlated with a particular social milieu or with corresponding movements in Art and Culture, as in Stephen's (English Literature and Society,* or in Taine's (Philoso¬ phic de l'Art.* The principle of literary valua¬ tion involves questions as to the absolute or relative validity of aesthetic standards and offers splendid opportunities for the student of com¬ parative literature. The natural reaction in aesthetic questions is the naive expression of likes and dislikes or the judicial attitude, whereas continued training and reading in a comparative spirit is bound to develop a sense of relativity of literary and aesthetic values and thus to save us from ithe tyranny of one-sided, absolute norms of taste. The literary move¬ ments of the last four centuries from the mani¬ festo of the French Pleiade down to the claims of the Naturalistic school, took in most cases the form of revolts against aesthetic or intellec¬ tual absolutism of some description, and while they often ended by enthroning a new dogma in place of the discarded one, yet they helped im¬ mensely to widen the horizon and to foster the spirit of tolerance. Among modern critics the Dane, Georg Brandes, leads by far with regard to breadth of taste and fairness of judgment. He has a marvelous ability to project himself into literary characters and productions of all kinds, countries and ages, and yet to establish a definite centre of interest and an illuminating principle of interpretation. A third group of problems fall under the head of the law of causation, such as literary sources, borrowings, influences, adaptations, etc. If carried to an extreme this method develops the type of the philological antiquarian or fanatic source- hunter who is not happy until he has traced every effect back to an external cause. The mistake made in so many cases is to assume influences or definite relations, where it would be safer to speak of parallels or analogies, in other words to work with the principle of cau¬ sation instead of correlation. The comparative study of literature ought to encourage critics and scholars to have more faith in the sponta¬ neity of literary growth and originality of the human mind, instead of looking always for de¬ rived inspiration. The Marivaux-Richardson controversy illustrates the various*

possibilities of interpreting a literary parallel as conscious imitation, as a play of chance or as an analogy due to similar literary impulses in England and France. A collection of literary analogies which could definitely be proved to fall outside of the principle of causation would be one of the most grateful tasks for comparative analy-

sis and might for a while dampen the enthu¬ siasm of our source-hunters.

4. Definition. — A brief survey of the sub- jects and principles of a comparative study of literature will be quite sufficient to demonstrate the difficulty, if not impossibility, of giving a brief satisfactory definition. There will always be wide differences of opinion among scholars with regard to the real nature, province and purpose of Comparative Literature, while in the popular mind the term will probably continue to call up a more or less vague conception of a philosophical, speculative or at any rate broader treatment of literary problems. Strictly speak¬ ing, the comparative method is not at all on a level with other methods, but has to be regarded as one of the fundamental principles or instincts of scientific investigation in all forms and fields. It has as its natural opposite the isolat¬ ing method. Specialization, concentration and isolation would be found on one side, generali¬ zation, expansion and correlation on the other. Any subject in any field of research may be treated either by isolating the problem or by introducing analogies and collateral material. It is self-evident, however, that, in the first place, scholars will differ widely in the choice of their methods and that, secondly, different subjects require different treatment in order to yield the best possible results. Biographies like Brandes' Shakespeare, Woerner's Hbsen,* Campbell's (Holberg,) Lafoscade's (Musset) are written in a comparative spirit, without be¬ longing to the field of Comparative Literature proper. Perhaps the comparative treatment of the lives of great men will become gradually recognized as a special type of biography. The phrase ˆComparative Literature® ought to be reserved for research or criticism which is con¬ ducted on the basis of comparisons, influences and analogies for the purpose of interpreting international or interindividual relations in terms of literary evolution, valuation or causa- tion.*

5. Comparative Literature as Related to Universal and World

Literature. — These three terms are often used interchangeably whereas they represent three different aspects of literary study. Universal or general literature refers to the sum total of all literatures and, as a literary study, expresses rather a broad, catholic attitude of the reader or scholar toward his subject than any particular purpose or method of research. Among the publications in this field may be mentioned Loliee's (Short History of Compar¬ ative Literature, because the title is altogether misleading; the book is merely an aggregate of national literatures with occasional cross-refer¬ ences. The term ((World Literature® may be employed either to include recognized represen¬ tative writers of all countries and ages, or a selected list of writers from all literatures vary¬ ing according to the subjective taste of nations and individuals. Moulton's (World Literature> and R. M. Meyer's (Weltliteratur im zwanzig- sten Jahrhundert* are books of this kind in' which selected writers or writings are focussed to the eyes of English or German readers. Several German publications, like Baumgart¬ ner's and Busse's histories of (Wcltliteratur* are in reality handbooks of universal literature. The well-known series 'Periods of European Literature,* ed. by Saintsbury, gives cross-sec¬ tions of the leading movements, arranged geo-*

graphically, but treated in a somewhat compar¬ ative spirit.

Bibliography. — The most indispensable book is the bibliography by Betz, P., (La Liter¬ ature comparee (2d ed. by Baldensperger, F., Strassburg 1904). Many valuable references and critical remarks are found in Gayley- Scott's (Introduction to the Methods and Mate¬ rials of Literary Criticism* (Boston 1899). More recent articles on definition and theory: Gayley, Ch. M., <(What is Comparative Litera¬ ture® (Atlantic Monthly, Vol. XCII, July 1903) ; Routh, H. V., 'The Future of Comparative Literature* (Modern Language Review, Vol. VIII, January 1913). Courses in Comparative Literature are offered at the larger American universities, though many of them would come rather under the head of General Literature. The most valuable contributions will be found in the publications of the Modern Language Association of America, in Modern Philology and in the Modern Language Review.*

■ *Ewald A. Boucke,*

Professor of German and Scandinavian, Uni¬ versity of Michigan.

LITHIA, in chemistry, oxide of lithium (q.v.).

LITHIA MICA. See Lepidolite.

LITHIC ACID. See Uric Acid.

LITHIOPHILITE or TRIPHYLITE.

A mineral consisting of phosphate of lithium, manganese and iron, Li (Fe Mn) PCh, of sal¬ mon to honey yellow color. Occurs in southern California and Black Hills of South Dakota.

A possible source of lithia salts.

LITHIUM, a name applied to an alkali discovered in the year 1817. Lithia has since been detected in spodumene, lepidolite, triphy- lite, amblygonite, tourmaline, meteoric stones, mineral waters, coffee, tea, blood, milk, etc. A process for procuring it is the following: One . part of petalite or spodumene in fine powder is mixed intimately with two parts of fluor-spar, and the mixture is heated with three or four times its weight of sulphuric acid, as long as any acid vapors are disengaged. The silica of the mineral is attacked by hydrofluoric acid, and dissipated in the form of fluosilicic acid gas, while the alumina and lithia unite with sulphuric acid. After dissolving these salts in water, the solution is boiled with pure ammonia to precipi¬ tate the alumnia ; is filtered, evaporated to dry¬ ness and then heated to redness to expel the sulphate of ammonium. The residue is pure sulphate of lithium. Its color is white; it is not deliquescent, but absorbs carbonic acid from the air; it is soluble in water; it is acrid and caus¬ tic, and acts on colors like the other alkalis ; heated with platinum it corrodes it rapidly. It combines with the different acids, and forms crystallizable salts with them. The phosphate and carbonate are sparingly soluble; the chloride is deliquescent and soluble in alcohol, and this solution burns with a red flame. Un¬ like the other alkalis it cannot be reduced from its carbonate by carbon, but it requires the ac¬ tion of a galvanic battery. The compound em¬ ployed is the chloride, which, while in a state of fusion, is acted on by the battery. Small globules collect round the negative pole, and these are removed and cooled under petroleum.

It is the lightest of metals. It has a bright

silver-white metallic lustre, melts at 356° F., and can be welded at ordinary temperatures. It is rather harder than potassium, can be drawn into a wire, but has a low degree of tenacity. Exposed to the air it tarnishes, but it combines with oxygen less rapidly than either sodium or potassium. It decomposes water, and when heated in oxygen, chloride and other gases burns with a brilliant light.

Compounds of lithium are used in pyro- techny on account of the splendid red color they impart to flame. • In medicine the car¬ bonate is employed especially as a solvent for uric acid, to prevent the formation of calculi and to remove it from the system in gout. Effervescing lithia water is sometimes used in place of soda or potash water. Citrate of lithia is also employed. It is a white, soluble, crystalline salt, prepared by dissolving the car¬ bonate of lithium in citric acid. Its thera¬ peutic properties are similar to those of the carbonate. See Mineral Production of the United States.

LITHOGRAPHIC CRAYON. See Li¬

thography.

LITHOGRAPHIC STONE. See Li¬

thography.

LITHOGRAPHY. (Greek lithos, «stone ,» and graphein, ((to write®), may be divided into two distinct branches — the art of writing, drawing or engraving on stone, and the process of chemical or surface printing from stone or metal, by means of which such writings, drawings or engravings are multiplied, in a manner differing essentially from letter- press or relief printing and from steel and copper plate or intaglio printing. Lithographic printing is based upon the physical principle of the antagonism of grease to water and upon the porous nature of the printing surface. By virtue of this property, a drawing made upon such surface with unctuous ink or crayon will adhere to it so that the parts of the surface containing the drawing or design will accept and hold grease or ink, and those parts of the surface free from design will receive and retain water to the evaporating point. Thus if a roller covered with fatty printing ink is passed over the printing surface previously moistened, the ink will adhere only to the parts constituting the design and will be repelled by the moisture covering the remaining nart of the surface, in consequence of which the design only w'll appear in the impression.

History. — Aloys Senefelder is generally conceded to be the inventor of lithography. He was born at Prague in 1771, the son of an actor, and at an early age removed to Munich. Al¬ though disposed to follow his father's calling he entered the university at Ingolstadt, which later, through the death of his father he was compelled to leave and was thrown on his own resources for a livelihood. He met with in¬ different success as an actor, and later, as a playwright, his inability to pay for the publica- tion of his work bestirred him to devise some means of doing it himself, and he set about to become familiar with the printing art. He pur¬ chased a small press and being unable to pay for the engraving of his compositions, he turned his attention to etching on copper. Frequent errors through his inexperience in forming the reversed characters on the plate, and being

unfamiliar with the <(stopping out® so-called solution used by etchers in rectifying mistakes, he succeeded in devising one of his own. The ingredients he used were those nearest at hand < — the wax with which he coated the plates pre¬ vious to etching, the soap with which he washed the ink from the plates, and the lamp-black which he used in preparing his ink for printing. Thus accidentally he discovered the compo¬ sition which forms the basis of all crayons and lithographic drawing inks. The labor of grind¬ ing and repolishing the copper plates led him to experiment with a piece of Kellheim stone and by treating this in the same way as the copper plates he succeeded in getting fair im¬ pressions. He later reversed the etching proc¬ ess by writing on the stone with the ((stopping out® composition and biting down the surface with aqua fortis, bringing out the characters in relief, which he inked in and printed in the manner of type. He further discovered that relieving the characters was unnecessary and that by simply writing on the stone with his composition he produced the same results. This was in the year 1798; eight years later, after many disappointing and discouraging experi¬ ences, the inventor succeeded with the assistance of the Bavarian government in establishing himself as a lithographic printer in Munich. This city became the centre of the art, and three years thereafter no fewer than seven separate concerns were established as well as a number of private presses. Senefelder died in 1834, and with the possible exception of the introduction of photography the general meth¬ ods and underlying principles he laid down are those in use to-day.

Of the early lithographers many others are entitled to credit, they having done much to develop and foster the craft. Ferdinand Pilotti in 1808 published 432 copies of the old masters, and in 1815

reproductions from the Munich gallery. His partner, Lochle, was also con¬ spicuous in the early development of lithog¬ raphy, as well as Count Lasterie, who intro¬ duced the art in Paris. It fell to Gottfred Engelmann to found the first permanent estab¬ lishment in Paris in 1816. In 1837 he was granted letters patent on the invention of chromo-lithography. The first house in Berlin was established in 1834 by Franz Hanfstangel, and in London in 1822, by Hullmandel, a pupil of Engelmann. Senefelder also attempted to establish himself in London but failed owing to difficulties with his partner, Andre of Offenbach.

Lithography as an art reached its climax in Paris during the reign of Louis Philippe. Among the masters who distinguished them¬ selves were the satirists Daumier, Grandville, Travies and Gavarni, Deveria, Delacroix, Johannot and Gigoux, the delineators of ro¬ mantic literature; Charlet, and Raffet, who found material in the glorification of Na¬ poleon's career. Other painter-lithographers of the day were Gericault, Richard Park Boning¬ ton, James Duffield Harding, Eugene Isabey, Alexandre Calame and Tulien, whose <(Etudes en Deux Crayons® made him famous. Since the introduction of the power-press and the consequent development of the lithographic in¬ dustry as a commercial factor, the medium of lithography has found less favor as a mode of individual artistic expression. Commercially it has grown to be one of the most important

LITHOGRAPHY

Plates and Printing- required for Design of Six Colors

a

1. Outline of Design

4. First and Second Color Plates Combined

5. Third Color Plate

6. Combination of Three Color Plates

branches of the printer's craft. The Depart¬ ment of Commerce, census of manufactures for 1914, published in 1917, gives the

number of establishments 336, employees 15,171, invested capital $36,685,000, and value of annual product

$25,119,000.

Materials. — The stone used, known as lithographic stone,® is a compact, homogeneous limestone of porous texture and varies in color from light cream, dull yellow, drab or gray to darker shades of the same colors, the best being found among the light gray varieties. The darker the color the harder the stone. Litho¬ graphic stone is quarried chiefly at Solenhofen, Germany, from beds of Jurassic Age, and while similar stone has been found in England, France and America, none possess the quality of the Solenhofen product. The most satisfactory American product is said to come from Bran¬ denburg, Ky. It is sawn at the quarries into slabs of from three to five inches in thick¬ ness, varying in size from 6X8 inches to 44 X 64 inches, and is sold by weight. The price per pound being based on quality and size, the very large stones when free from blemishes such as veins and chalk spots are the most expensive and very scarce. Owing to the expense in¬ curred in handling and storing the cumbersome stone, a substitute embodying the same prop¬ erties has been the desideratum of lithographers almost since the invention of surface printing. Zinc has been in use for 50 years or more, but up to 10 years ago was used only for very ordinary work. Since that time it has come into considerabe use for offset lithography (de¬ scribed later). Aluminum has been satisfac¬ torily used as a substitute for stone for about 20 years and for some purposes is preferable to zinc as a substitute.

Lithographic crayon is composed of bees¬ wax, shellac, tallow, mastic turpentine, soap and lampblack in several degrees of hardness. Lithographic ink adapted for pen work on stone contains the same ingredients as the crayon, with a larger quantity of the soap, in order to make it soluble in water. The ink is furnished in sticks and rubbed over a plate or saucer and then gradually dissolved with water or turpentine until it becomes fluid. Gum arabic and .acids are important factors in li¬ thography; in fact, Senefelder's original inven¬ tion would have proven of little practical value had he not also discovered the use of these in reinforcing the qualities of the stone.

Process. — The stone is first leveled and if desired for crayon work the surface is grained by grinding with fine sand and water between two slabs of stone until its surface has a grain similar to the grain on fine drawing paper. For pen or stipple work the stone is polished with

pumice or scotch stone. The drawing is made on the stone in the same manner as if it were drawn on paper, except that the design is reversed. Considerable experience is required by the artist to obtain proficiency in rendering a reverse facsimile of the original. In the hands of a capable artist no reproductive art can offer greater possibility than that of crayon on a grained stone. It permits greater freedom as compared with steel, copper plate or wood engraving, inasmuch as technique is less im¬ portant than true artisticability, while an infinite variety of tones, from the most delicate shade to rich, deep black, lies within its possibilities.

Somewhat more mechanical is the pen stipple manner, and which as its name implies consists of drawing with small dots, the relative values of shading being determined by the varying density of the dots. This manner is employed mainly in chromo-lithography, its chief recom¬ mendation being the clean, sharp, solid nature of the work.

When the drawing is completed, its sur¬ face is treated with a solution of gum arabic and nitric acid, effecting a chemical change in its nature where it is not protected by the grease or ink of the drawing. The carbon is freed and a nitrate deposited in the form of a full-grained pellicle, the pores of which re¬ tain the gummed water, thus creating a sur¬ face impermeable to grease. Furthermore the drawn parts are rendered insoluble in water by decomposing the alkali contained in the crayon or ink. The object of this etching is not to elevate the drawing so much as to make the impression cleaner and sharper. _

After the 'stone is etched, it is washed suc¬ cessively with water and turpentine; the de¬ sign is scarcely perceptible, but after repeated moistening and rolling in with ink it reappears and accepts the ink. It is then covered with a weak solution of gum arabic and is ready for printing.

The stone-engraving manner — used exten¬ sively for bank notes and stationery — is based on the same principle, although the mode of procedure differs in every respect. A polished stone is used and its face is prepared or etched with gum-water acid and covered with a dark ground consisting of lampblack in solution with gum-water or albumen. Into this ground the design is engraved or scratched with an en¬ graving needle or a diamond. Linseed oil is then poured over the whole and is absorbed by the stone where the needle has laid it bare. The ground is washed off, the surface moistened- and printing ink rubbed in with a tampon or dauber, the ink adhering only to the

lines of the design, by reason of the oil which they have absorbed.

The greatest achievement of lithography undoubtedly centres in reproduction of oil paintings and aquarelles, commonly known as chromo-lithography. Either the crayon or pen stipple manner alone, or both together, in con¬ nection with other manners, such as ((rub-tints,® ((asphalt tints,® etc., are brought into the work. Its most simple form is the tint used for crayon drawings, its highest, the reproduction in colors of an oil or water color painting, re¬ quiring a series of drawings on separate stones, one for each of the colors necessary to pro¬ duce the facsimile. To obtain perfect register of the various printings, a key plate is neces¬ sary. A detailed tracing is made of the original by means of an engraving needle, scratching the surface of a sheet of transparent gelatine or celluloid, indicating the boundaries of even the most minute patches of color. These engraved lines are charged with litho¬ graphic ink and then transmitted to stone by pressure. Register marks (usually crossed lines) are then put in the margins. The stone is etched, rolled up with printing ink, and im¬ pressions corresponding to the number of colors or printings required, are pulled. These impressions 'are then powdered with finely ground powder (usually Venetian red) and are

called <(offsets,):> which are then transmitted to the surface of the stones to be drawn on and furnish a guide for the artist in drawing his color plates. In cases where no key of the original is made, offsets from the drawing of the black supplied with the necessary register marks answer the same purpose. The number of colors necessary to produce a given result varies largely according to the nature of the original to be reproduced, ranging for com¬ mercial purposes from 3 to 15, although es¬ pecially fine results may require 20 or more.

Photography. — Since its invention pho¬ tography has been more or less allied with the lithographic art. Its early application was the process called photo-lithography, by means of which pen or line work or reprints from type could be inexpensively transferred to stone or plate. The half tone or Meisenbach process was also used to advantage in furnishing key plates for chromo-lithography, but the introduction and development of the offset press, which was made possible through development of rotary printing from plates instead of stone, has greatly enlarged the use of photography, opened entirely new fields, and possibilities in the art of color reproduction,

and has caused an immense expansion of the lithographic in¬ dustry. One of the earliest photo-lithographic processes is that of Lemercier, patented in 1852, which is based on the sensitive property of asphaltum, discovered by Niepce in 1833. A lithographic stone is coated with a solution of asphaltum in oil of lavender and exposed to light under a half-tone screen negative, the film of which has been turned on the glass to secure the necessary reversed position, effect¬ ing a slow change in the asphaltum.. The parts thus affected by the light become insoluble in turpentine, leaving the other parts soluble. Thus a (reversed) positive is rendered on .stone, which, owing to the unctuous nature of its composition, can be prepared for printing purposes in the usual manner. The method most commonly used is the albumen process, invented by Poitevin in 1855. In this case the stone is coated with albumen in solution with bichromate of potassium which is much more sensitive to light action than asphaltum; after exposure the stone is immediately covered with printing ink to prevent further action, and washed with water which removes the parts that remain soluble, while the ink adheres only to the parts that have become insoluble.

The same general principles apply where plate instead of stone is used, with variations of solutions and methods for the preparation of the plate, the developing and reversing of the design.

The perfection reached in printing half-tone work on the offset press has made possible the faithful reproduction of almost any color sub¬ ject, through the use of color sensitive or col¬ lodion emulsion photographic plates, usually three plates, one for each of the primary colors yellow, red and blue, which when prop¬ erly developed give color-separated negatives which are then printed on the plate in the usual manner. For variations of the primary colors the plates are either over or under printed and after development are carefully worked over by the artist adding to or taking from the work as desired.

Transferring. — Unless limited editions are

required, designs that have been drawn or en¬ graved on stone are very rarely printed from directly. By the process of transferring, one design may be reproduced as many times as the relative size of the work and sheet to be printed will allow — ensuring greater economy in print¬ ing and keeping intact the original drawing stone. Transfer impressions are taken on a paper, coated with a sizing of starch and gly¬ cerine with a specially prepared ink. These impressions are laid in their proper positions on a sheet of paper of the required size and

fastened to it by means of pricking with the dull point of an engraving needle. The sheet to which the transfers adhere is laid face down on a polished stone or plate and pulled through a hand press until the transfers adhere firmly to the stone, the paper being frequently dam¬ pened during this process. This done, the sheet is carefully raised from the stone, leaving the thin paper transfers still adhering to its surface and these in turn are dampened and removed. A weak solution of gum and water is applied and the stone rolled up with printing ink. It is then etched in the same manner as an original drawung- and is ready for the press. In chromo-lithography the first transfer made is that of the key plate, supplied with register marks. An impression from this transfer is mounted on a sheet of aluminum or zinc and coated with shellac to nrevent shrinking or stretching. All succeeding transfers are ((stuck up)) or fixed on this key sheet, which ensures accurate register of the colors.

Lithographic Printing. — The lithographic hand-press consists of a frame provided with rollers on which the bed runs to and fro, the scraper or impression-bar and a tympan of leather, fitted to an iron frame hinged to that end of the bed nearest the scraper. The scraper consists of a flat piece of bpx wood beveled on both sides and covered with leather. The manner of printing is as follows : The stone with the design upon it is placed face up upon the movable bed, then moistened with a sponge, rolled up with ink and the sheet which is to take the impression laid thereon. Several sheets of paper are placed over it to secure the necessary backing, the tympan lowered upon it to cover the entire bed and stone, and the carriage brought forward under the scraper. Pressure is applied by means of a hand-lever at the side of the press, and the entire length of the bed passed under the im¬ pression bar. The pressure is then released, the bed brought back to its original position, the tympan raised and the printed sheet taken off. Until the introduction of the power-press in 1867 this method of printing was exclusively used for lithographic printing. At the present time its only utility is for the purpose of mak¬ ing artist-proofs and transfers for printing on power-presses. The lithographic flat bed power-press differs but slightly from that of the typographic power-press. The principle of operation remains the same, taking in place of the letter-press form a lithographic stone in its bed and being supplied with a contrivance for distributing the moisture with which the stone must be covered before the ink is ap¬ plied. The use of rotary printing presses, with an increased speed of 50 per cent over the flat-bed presses, has been made possible by the substitution of the flexible aluminum plate for

lithographic stone, and has enlarged the field of multi-color printing by the lithographic process, whereby two or more colors are printed in rapid succession before the sheet is delivered. The rotary press consists prin¬ cipally of two cylinders — one to hold the plate and the other to furnish the pressure — and is supplied with a mechanism similar to that of the flat-bed press for distribution of moisture and ink. Rotary presses having two, three and four plate cylinders and printing re¬ spectively two, three and four colors each time a sheet is fed a-re in general use. The presses described above all print by direct con¬ tact from the stone or plate to the paper, whereas the offset press, a very imoortant de¬ velopment in modern lithography, prints from the plate to a rubber blanketed cylinder, which in turn prints on the sheet. These presses are built on the same general principle as the rotary press but having three cylinders, one to carry the printing plate, another to carry the * rubber blanket and a third to carry the sheet which takes its impression from the rubber blanket. Provided with automatic feeding ap¬ paratus, a production double the rotary presses is possible. They produce wonderfully soft effects on rough or uncoated papers being in fact the only method whereby half-tone color subjects can be printed on other than the highly glazed or coated papers.

Bibliography. — Bergman, (Das Ganze des Steindrucks, nebst Angang von der Zinkog- raphie) (1843) ; Bregeant, (Nouveau Manuel complet de lTmprimeur Lithographe5 (1850) ; Engelmann, (Traite theorique et pratique de Lithographie> (1849) ; Richmond, grammar of Lithography > (1879, 1880, 1881, 1883, 1885); Weishaupt, (Das Gesammt Gebiet des Stein¬ drucks, nebst Anhang von der Zinkographie) (1865) ; Weishaupt, (Theoretisch-praktische Anleitung zur Chromolithograph^ (1847) ; Aluminum Press and Plate Company, (Alum- ography> (New. York 1899) ; Audsley, (Art of Chromo Lithography* (London 1883) ; Curtis, (Vienna 1912) ; Goodman, Practical Method of Modern Metalithography* (London 1914) ; Rhodes. (The Art of Lithog¬ raphy* (London 1914) ; Fuchs and Lang Com¬ pany, invention of Lithography,* Senefelder, translated by J. W. Muller (New York 1911) ; Browne, 'Textbook of Practical Lithography) and 'Offset Lithography* (New York 1917).

Revised by Frederick Rausch, Of Sackett and Wilhelms Corporation , New York.

LITHOLOGY. See Petrology.

LITHOSPHERE, the solid rock crust of the earth as contrasted with the waters, hydro¬ sphere, and the air, atmosphere. See .Rocks and also section on Geognosy in the article on Geology.

LITHOTOMY, in surgery, the operation .of cutting for stone. (See Calculus). As usually performed it consists in cutting by the side of the anus in the perinaeum, so as to reach and divide the urethra and neck of the bladder, where it is surrounded by the prostate gland. A grooved and curved staff is introduced into

the bladder first, and then the incision is made in the perinaeum to reach the bladder, the groove in the staff serving as a guide to the knife. When the calculus or stone is felt with the finger the staff is withdrawn and the stone extracted by means of forceps, proper treat¬ ment to ward off inflammation and other acci¬ dents being then adopted. When thus per¬ formed, unless there be unusual difficulties, the length of time required to extract the stone is seldom more than three minutes, often one or one and a half. At first the urine escapes through the wound, but in favorable cases it issues by the natural passage within a week, and the wound heals in the course of a month.

LITHOTRITY, in surgery, the operation of crushing a stone in the bladder into frag¬ ments of such a size that they may be expelled by the urethra. The instrument is called a lithotrite, by which the stone is broken up. It is introduced in the same manner as a catheter or sound into the bladder, and after catching the stone crushes it to pieces. The instrument has two movable blades at the extremity introduced into the bladder, and these are brought together to crush the stone by means of a powerful screw. This operation is only applicable where the bladder is .not irritable, where the canal of the urethra is of good size and the stone small. It is inapplicable to children, but this is the less to be regretted, because there is perhaps no surgical operation more generally successful than that of lithotomy in children. In lithotrity care must be taken that no portions of the stone are left in the bladder, as such fragments are almost certain to form the nuclei of fresh con¬ cretions.

LITHUANIA (Lietuva), a republic of northeastern Europe, bounded north by Latvia, east by Russia, south by Poland, southwest by East Prussia, west by East Prussia, Memel and the Baltic. It occupies the former Russian province of Kovno, most of the province of Vilna, part of that of Grodno, most of the prov¬ ince of Suvalki, part of Courland and part of the district of Illuksta. The eastern frontier is de¬ fined in the treaty with Russia, signed at Mos¬ cow 12 July

1920. The northern frontier with Latvia has been settled under a special arbitra¬ tion convention. The frontier with Poland has not yet been conclusively decided on. The area of the present territory is 59,633 square miles with a population of 4,800,000. The Lithuanians also claim Memel, with an area of 1,080 square miles and a population of 145,000, but so far this region is administered by the Allied Powers. The total purely Lithuanian popu¬ lation is estimated at about 3,350,000. Thus, while Lithuania proper is generally regarded as the region between the Lower Dvina and the Niemen, the historical-geographical name is applied to a far larger area. The Lithuanians were tributary to Russia in the 11th century, but gained their independence when Russia was distracted by the troubles under the successors of Vladimir. Ringold, in 1235, bore the title of grand-duke, and under his successors the whole of Russian Lithuania became independ¬ ent. At that time (during the 13th century) the Lithuanians, hemmed in between the Slavs and the Germans, were also confined between two civilizations — Oriental and Occidental — Greek Christianity on the one side and the

Roman Church on the other. Though lacking natural frontiers, they not only maintained their national existence and customs, but even ex¬ tended their dominions to the Black Sea. Ringold (or Ryngald) gained several victories over the Mongols and stopped their advance into western Europe. His successor, Mindaugis, fought against the Russians, the Poles, the Sword-Bearers and the Teutonic Knights. He appealed to the Pope for aid against the Knights, was baptized in 1252 and defeated his enemies in 1261. Two years later he was mur¬ dered. His sons drenched the soil with blood in revenge upon the murderers, and the country fell into a 20 years' anarchy. The real founder of Lithuanian power was Gediminas (131 5— 40), head of the Jagellans dynasty. He ruled the country wisely and formed alliances with western Europe. He arranged with the Pope to establish Christianity in Lithuania, but Ger¬ man intrigues prevented the plan. One of his sons, Algirdas (1345-77), defeated Teutonic Knights, Poles, Tartars and Muscovites, marched three times to Moscow and even in¬ vaded the Crimea. Jagello, son of Algirdas, by his marriage with Hedwige, united Lithuania with Poland and succeeded in establishing Christianity. At the time of the union with Poland (1386), Lithuania included the basin of the Niemen and of its tributary, the Neris, with Vilna as the metropolis; Samogitia (Zemai-tiga) ; White Russia: the ancient principalities of Polotsk and

Vitebsk; Black Russia, with Kiev, Chernigov and Perejaslav; and Volynia and Podolia, with Brest-Litovsk, Lutsk and Cherson. Though forming the largest Euro¬ pean state at the time, the Lithuanians lacked unity; the country was split between the Greek and Roman Catholic creeds. By the ((Political Union® at Lublin in 1569 Lithuania and Poland became more closely united under one head, with the proviso, however, that each country should retain its own laws, army, chancellor and other dignitaries. The ((Poloniization® of the country was inevitable, the Lithuanians be¬ ing in a minority. But the ((union® produced only disunion, internecine, strife and anarchy. Instead of having two armies, they had none, and in consequence the three partitions of Poland-Lithuania by Russia, Prussia and Aus¬ tria were easily accomplished in 1772, 1775 and 1779. Poland was cut up between Russia, Prus¬ sia and Austria, and the two former shared Lithuania between them. In 1840 an imperial ukase abolished the name of Lithuania; the process of ˆRussification® was carried through with bloody repression. The Latin alphabet was prohibited and many thousands of Lithu¬ anian books were burnt by government orders. It was not till 1904 that the former persecu¬ tion regulations were repealed by Russia.

That part of Lithuania under Prussian dominion enjoyed better treatment at first. The kings of Prussia favored and protected the people. A chair of Lithuanian language and literature was established at .Konigsberg Uni¬ versity. From the days of Bismarck to 1918, however, things changed ; the Lithuanian lan¬ guage was suppressed and the people were ˆPrussianized® with but little effect. In the early stages of the European War the Russians overran the Lithuanian part of East Prussia, but the victory of Hindenburg in the Mazurian Lakes region led to the German invasion of the Baltic provinces, while the whole of the

great Polish salient also fell to the Germans. Russia having alienated Lithuanian sympathies, the people welcomed the German invaders in 1915. While recognizing Lithuanian sovereignty in 1916, the German government would not acknowledge the independence of the country. During the war the general movement for liberation among the subject races of Russia, Germany and Austria-Hungary revived the smoldering national sentiment of the Lithu¬ anians. They formed a State Council and pressed their claims for independence and for political union with their half-brothers, the Letts. In 1916 they appealed to President Wilson for recognition of sovereignty, though the country was in German possession at the time. A con¬ vention of Lithuanian delegates assembled in Vilna in October 1917 and adopted a resolution demanding independence. At a similar gather¬

ing in the same place that independence was proclaimed by the delegates in January 1918. On 23 March the council announced that, it advocated a permanent relation of alliance with Germany. Four months later (July 1918) the Lithuanian bureau of information in Switzer¬ land revealed that the council proposed to offer the crown of Lithuania to the Duke of Urach, a lineal descendant of the ancient Lithuanian dynasty and an officer in the German army. But already in March a convention of American Lithuanians held in New York had declared for a republic and advanced the territorial claims referred to above. The inspired Ger¬ man press denied that the council had power to form a state without conforming to German interests. Early in May 1918 it was announced in the American press that a Lithuanian deputa¬ tion had been received by President Wilson. The end of the war on 11 Nov. 1918 and the ensuing Peace Conference at Paris in 1919 marked the beginning of a new era for Lithu¬ ania. There are said to be over 700,000 Lithu¬ anians in the United States. See War, Euro¬ pean.

LITHUANIAN LANGUAGE AND LIT¬ ERATURE. — The Lithuanian language is more ancient than Greek, Latin, German, Celtic and the Slav tongues. It belongs to the Indo- European group and is the nearest idiom to Sanskrit. The resemblance, indeed, is so close that Lithuanian peasants can understand Sans¬ krit sentences pronounced by learned scholars. Hence philologists are generally agreed that Lithuanian is the most ancient of all the living languages. It is not easily possible to compare it with Arabic, the antiquity of which has not been fathomed. A remarkable feature of Lithuanian is also the fact that it has as much likeness to Greek and Latin as to Sanskrit:

Lithuanian — Virai traukite jungan;

Latin — Viri trahite jugum

(((Men drag the yoke®"

Lithuanian — Dzievs (Dievs) dave dantis, duos duonos ;

Greek — Zeus dedoke odontas dosei siton.

(((God has given teeth, he will give bread®).

The invaluable service of the language to philologists was recognized by Kant (1724- 1804), who was born in Prussian Lithuania and acquired a knowledge of it. In his preface to ’ a Lithuanian grammar he wrote : <(Lithuania having a royal character, deserves the

protec¬ tion of the state. She must be preserved, for her tongue possesses the key which opens all

the enigmas not only of philology but also of history.® This statement was scientifically sup¬ ported and confirmed by the great philologist Schleicher in his work on that language, while Reclus, in his monumental (Geographie Univer- selle, says: ((If the value of a nation in the whole of humanity were to be measured by the beauty of its language, the Lithuanians should rank first among the inhabitants of Europe.®*

Lithuania had no writers at the time of her existence as a great state. Traditional . songs, poems and legends were chanted by itinerant burtininkas or national bards. About the 16th century they ceased to exist owing, to clerical persecution, and their songs died with them — they are lost. The bards differed from the minstrels of other countries and races in that they glorified no heroes real or legendary: they sang only dirges for the dead, the so-called raudas. A popular style of lyric singing with musical accompaniment is the ((daina,® mild and tender in spirit, simple and resigned, breathing resignation in grief and devotion to patriarchal customs. There is in them nothing of the slashing, fire-eating bravado that distinguishes most of the ancient ballads of love and war. If the soul of a nation is revealed in its songs, then the Lithuanians deserve to be classified as the most harmless, peaceful race in the world. Even the German poets Goethe and Herder are said to have borrowed inspiration from the Lithuanian ((dainos,® of which many thousands exist, adapted to all phases of life excepting war.

During the Reformation religious literature, written by Jesuits, made its appearance in Prussian Lithuania. The oldest book in the language was a catechism translated from the German and dated 1547. Until the 18th cen¬ tury only translations of the Bible and other devotional works existed in Lithuanian, when the fine national epic poem, (Metas) (The Four Seasons), by Duonelaitis (1714-80) was published. The three leaders in the national revival were Daukantas, Poszka and Bishop Valanczevskis. The first wrote a number of literary and historical works, among, which the most important are (Lietuvos Istorija (His¬ tory of Lithuania) and (Budas Lietuviu Kal- nenu ir ZemaithP (Character of the Lithuanian Highlanders) ; the. second produced many poems and translations ;*

and the bishop wrote a history of the introduction of Christianity into Samogitia. During the first half of the 19th century the national literature progressed favorably if slowly when the Russian govern¬ ment intervened in 1864 and ordered the Latin type hitherto used to be replaced by Russian characters. Proscribed in Russian territory, the printing presses were removed to Prussian Lithuania, where books and papers were printed (mainly at Tilsit) and smuggled across the borders to the Lithuanians under the Tsar's rule. Since that time some notable additions have been made to the literature, though it can hardly claim a prominent position as yet. The majority of later writers devoted themselves to poetry — the national favorite. Kudirka wrote

been favorably compared with Shakespeare's work. The poet and publicist, Jaksztas, con¬ ducts his own review, Draugijci, in the columns of which his original works make their first appearance. Quite a number of women writers have added to the modest total of the budding Lithuanian literature: Rogana, Peleda, Bite- Petkevicz, Lazdynu, Zemaite and Szatrijos. The famous Polish novelist, Henryk Sienkie- wiecz (d. 1916) was of Lithuanian origin, as also was the patriot Kosciuszko. Political re¬ pression and lack of educational opportunities have hitherto hampered the development of both language and literature in the past. The law of 1905 permitted the introduction, during the first two years, of the Lithuanian language in schools where the teaching was exclusively Russian. All the higher schools have been abolished and elementary education is not com¬ pulsory. Beyond a few native societies which promote popular lectures, there is no facility whatever for adult education. Two such so¬ cieties were broken up by Russia as recently as 1908. Consult Gabrys', Jerzy, (Sketch of the Lithuanian Nation (Paris 1911).*

LITITZ, lit'its, Pa., borough, in Lancaster County, on the Philadelphia and Reading Rail¬ road, about 28 miles southeast of Harrisburg, and eight miles north of Lancaster. The first permanent settlement was made in 1757 by Moravians. Some of the United Brethren had formerly lived in Bohemia and they named the place after their old home. They showed their loyalty to their new country by providing shel¬ ter, food and care for wounded soldiers of the Revolutionary War. The graves of some of the early patriots are still pointed out. Lititz is situated in a region where there are many good farms, but its chief industries are in manufacturing. The principal manufactures are corn-starch, knit-goods, planing mills, ani¬ mal traps, shoes, box board, paper, pretzels, cocoa, chocolate, cigars and some dairy products. The mineral springs are noted and much fre- ouented. The borough is the seat of Linden Hall Seminary,

established in 1794. Pop. 3,680. Consult Mombert, (History of Lancaster County, Pa. (Lancaster 1868) ; (Moravian*

Historical Society Records> (Vol. II, Bethle¬ hem, F'a.).

LITMUS, or LACMUS, is a blue pigment obtained from any lichen which yields archil. (See Lichens, Fungi). The plant, bruised be¬ tween stones, is exposed to the air for several weeks, and moistened with some liquid. contain¬ ing ammonia, lime and potashes being also added. Fermentation sets in, the lichens be¬ comes red and finally blue, and when it has acquired the proper tint, chalk or. sulphate, of lime is added, and the soft paste is made into square cakes by pressure in molds, and the cakes are then dried. Litmus is complex in nature; it contains several coloring matters of definite composition, which can be separated by the use of glacial acetic acid and absolute alcohol.

LITOLFF, lit'olf, Henry Charles, Euro¬ pean composer and pianist: b. London, 6 Feb. 1818; d. Paris, 6 Aug. 1891. He studied piano¬ forte playing under Moschele.s, and made his first public appearance as a pianist at the Co¬ vent Garden Theatre, London, in 1832. At 17 he went to France and for some time lived

a wandering life, traveling in France, Holland and Germany, giving concerts. In 1851 he settled in Brunswick, married the widow of the music-publisher Meyer, and took control of the business. Later he transferred the management of affairs to his adopted son, who began the publishing of cheap editions of classical music. In 1860, after the death of his wife, he moved to Paris, and married the daughter of the Count de la Rochefoucauld. His compositions include piano pieces (including the ˆpinn- lied)) ; symphony concertos; and the operas (Heloise et Abelard ; (Die Braut von Kynast) ; (Les Templiers,* and (King Lear.* As a pian¬ ist he showed feeling and was brilliant of ex¬ ecution, but uneven, and sometimes inaccurate.*

LITOPTERNA, a group of extinct South American hoofed animals of the order Toxo- dontia, herds of which pastured on the Argen¬ tine pampas during the whole Tertiary Period. It has been thought that these animals should be merged with the Perrisodactyla, but the later view is that they present a case of conver¬ gence, fulfilling on the plains of South America the role of the horses in North America; yet

not all of the Litopterna were horselike. In the Miocene and Pliocene two very dis¬ tinct families existed within this order — the Macrauchenidae and the Proterotheriidae. The former were grotesquely camel-like, the early forms (as Thesodon) having much the size and shape of a llama, with a remarkably long snout, while their later descendants (Macrauchenia) resemble long-necked, heavily-built camels whose nose had developed into a real trunk nearly as long as the skull. The legs were long and stout and the feet had three toes, but in structure the foot was not like either the camel's nor the horse's. This queer, composite creature is believed to have obtained its living by browsing on trees.

LITORINA. See Periwinkle.

LITRE, le'ter, or LITER, the French

standard measure of capacity in the decimal system. It is a cube, each side of which meas¬ ures 3.937 inches, and it contains 61.02 cubic inches, or 1.056 quarts. See also Metric System.

LITTELL, li-tel', Eliakim, American pub¬ lisher: b. Burlington, N. J., 2 Jan 1797; d. Brookline, Mass., 17 May 1870. He learned the printer's trade, and in 1819 established at Philadelphia a literary periodical, the National Recorder, the name of which was changed in 1821 to the Saturday Magazine. In 1822 he began to publish a monthly, the Museum of Foreign Literature and Science, giving selec¬ tions from the best periodical literature of Europe. In 1844 he started in Boston Littell's Living Age, a weekly literary eclectic periodical which is still continued.

LITTLE BELT, The. See President and Little Belt.

LITTLE BLUE CREEK, a small stream in Jackson County in the western part of Mis¬ souri. A contest occurred, in 1864, on the banks of this stream, between Federal troops under General Curtis and Confederate troops under Gen. Sterling Price. The contest lasted several hours, when the Confederates fell back on Big Blue Creek, in the same county, and made a strong resistance. The Union cavalry,

under General Pleasanton, finally routed the Confederates, who retreated into. Arkansas.

LITTLE COLORADO, a river which has its rise in Apache County, Ariz., running northwest to its junction with the Colorado River. The amount of water is sometimes large, but again the river resembles a chain of small lakes or ponds, with dry or nearly dry river bed in

many places. The river is about 230 miles long. It flows a little south of the southern boundary of the Navajo Indian Reser¬ vation, around the region where many <(Cliff Dwellers® once lived in Arizona, and on through arid wastes and among low mountains to near the Colorado, where it enters a deep canon, through which it passes into the Colo¬ rado just at Marble Canon.

LITTLE CORPORAL, The, a name be¬ stowed upon Napoleon by his admiring soldiery after the battle of Lodi, in affectionate allusion to his small stature.

LITTLE CROW, the family name of a ruling dynasty of the Medaywakanton Sioux Indians prominent in the history of the North¬ west. Leaders among them were : Chatan Wakoo wa mani (((He who walks pursuing a hawk®), b. 1769; d. 1827; Wamde Tanka (<(Big Eagle®), b. 1800; d. 1845; Ta Oyati Duta («His Red People®), b. 1820; d. 3 July 1863. By the Treaty of Mendota, Minn., 5 Aug. 1851, the Dakota ceded nearly all their lands in Minnesota to the United States Although he was a signer of the treaty, Ta Oyati Duta chafed under its terms, and was the leader of the uprising which culminated in 1862 when over 1,000 settlers were killed. He was unsuc¬ cessful in an attack on Fort Ridgley, Minn., and after a disastrous defeat at Woods Lake, fled with about 300 followers to his western kinsmen. He was killed by a settler named Lampson in McLeod County, Minn. Consult Bryant and Murch, 'History of the Great Massacre by the Sioux Indians in 1862.

LITTLE DORRIT, a novel by Charles Dickens (q.v.) published in 1856. There is but slight plot to the story, which contains more than 50 characters.

LITTLE EGRET, any of several small,

white herons. See Egret; Heron.

LITTLE FALLS, Minn., city and county- seat of Morrison County, on the Mississippi River and on the Northern Pacific Railroad, about 100 miles northwest of Saint Paul. The place was settled in 1856, and in 1889 was incorporated. A dam across the river aids in furnishing extensive water power. It is situ¬ ated in an agricultural and lumbering region. Its chief manufactures are flour, lumber, machine-shop products, paper, bricks and dairy products. It is the commercial centre for a large part of Morrison and adjoining counties. It has a fine courthouse, Saint Gabriel's Hos¬ pital, Saint Otto's Orphan Asylum, a city library and several good school

buildings. Pop. (1920)

5,500.

LITTLE FALLS, N. Y., city, in Herki¬ mer County, on the Mohawk River, the New York State Barge Canal and on the West Shore and the New York Central and Hudson River railroads, midway between Albany and Syracuse. The country around is rolling and diversified by many low hills, but Little Falls

occupies that spot in the Mohawk Valley where in ages past the foothills of the Adirondack Mountains, the ((Alps of America® were joined to the headlands of the Catskill range by a barrier that set the waters back over a con¬ siderable portion of the fertile lands now under cultivation. When the barrier broke away by the action of the waters, the western gatewav of New York State was opened, with its pecul¬ iar rock formations. Through that narrow gateway occupied by Little Falls runs the Mo¬ hawk River, the new barge canal, the tracks of west- and east-bound steam and electric rail¬ roads and the main highway for automobile and carriage travel. So narrow is the gateway that in early colonial days the Indian warriors sped their messages on arrows from one hilltop to the other. The city occupies the site of an Indian village, visited in the 17th century by Jesuit missionaries. A white settlement was made here about 1770 or a few years later. In 1782 this settlement was destroyed by In¬ dians and Tories. General Herkimer, a Rev¬ olutionary officer after whom the county is named, is buried in a cemetery near the city. No successful efforts were made to rebuild until 1790, when a colony of Germans took possession. The place was incorporated as a village in 1811; as a town in 1827; as a city in 1895. The city gets its name from the falls, or a series of cascades in the riyer, which descends 45 feet in less than a mile. (

LITTLE GIANT, The, a familiar name applied to Stephen A. Douglas (q.v.) by his political admirers in allusion to his small stat¬ ure and great intellectual capacity.

LITTLE JOHN, one of the outlaw com¬ rades of Robin Hood. He was famed for his strength and was the only one of the company who could approach Robin Hood in skilful han¬ dling of the bow. By some authorities his name is sunnosed to have been John Nailor.

LITTLE KANAWHA, ka-na'wa, a river which rises in the central part of West Virginia,

flows west and northwest and enters the Ohio River at Parkersburg. It is about 100 miles long, has considerable rapidity in the mountain section and is of benefit as a route for the transportation of the oil and lumber of that portion of the States through which it flows. It has been made navigable as far as Burning Springs, about 40 miles from Parkersburg.

LITTLE KEI, one of the important mem¬ bers of the group of East Indian islands known as the Kei Islands (q.v.).

LITTLE LORD FAUNTLEROY, a pop¬ ular story for children by Mrs. Frances Hodg¬ son Burnett, originally published in 1885 as a serial in the magazine Saint Nicholas.

LITTLE MAC, a nickname applied by the soldiers of the Union army during the Civil War to Gen. George B. McClellan (q.v.).

LITTLE MINISTER, The, by Sir James Matthew Barrie, <(a love story, thrown into relief by a backing of Scotch puritanism,® as it was epitomized by an English reviewer, has for its scene of action the same as that of so many of Barrie's other tales and sketches, the Scotch village of ((Thrums,® under which alias the author presents his own birthplace, Kirriemuir, a town largely populated by linen-weavers, about 62 miles 'north of Edinburgh. The novel was first published in 1891. The hero, Gavin Dishart, the young minister of that rock of rigidly orthodox Presbyterianism, the <(Auld Licht Kirk,® serious, conscientious and indomitably brave, falls deeply in love with the fascinating and mysterious gypsy, Babbie, who, we are told by a Scottish critic, is de¬ lightful, yet ((belongs not to Scotland, but to the realm of Oberon and Titania.® The young minister has no doubt that his first duty is toward the woman he loves, though a tempest of wrath is brewing in his devoted, but fiercely bigoted congregation ; and in bringing the ro¬ mance of his antithetical pair of lovers to a happy yet plausible ending through the heroism of the Little Minister, the author exhibits not only his ingenuity as a disentangler of plots but also, incidentally, his acknowledged masterv in depicting the pathos and humor of Scotch village life. Barrie's own dramatic version of the story has been repeatedly produced in both the United States and Great Britain with a success rivaling even the exceptional success of the book.

Arthur Guiterman.

LITTLE NELL, a child character in the novel (01d Curiosity ShopP by Charles Dickens. She was reared amid vice and crime, yet pre¬ served a beautiful purity of character.

LITTLE OLD WORLD, The (((Little Old WorldOt (The Sin¬ ner > and (The SaintP these novels project against the background of Italian life in the sec¬ ond half of the 19th century the spiritual prob¬ lems of the protagonists and their offspring. In the entrancing setting of Lake Lugano amidst whose beautiful hills Fogazzaro spent the im-

pressionable years of his youth, (Piccolo mondo antico) is a study of somnolent Valsolda during the eight years that preceded the expulsion of the Austrians in 1859. With a fidelity born only of accurate observation, Lombards and Venetians of every type appear in this magnifi¬ cent evocation of those years of silent prepara¬ tion. They speak their various northern dia¬ lects and are set off by that rich humor so typ¬ ical of Fogazzaro's minor characters. The stony-hearted marchesa and her train of satel¬ lites, the lovable uncle Piero, the provincial gen¬ try, the minions of Austrian despotism, patriots and spies, all stand forth with individual dis¬ tinction. It is in this milieu that the main theme develops out of the conflicting ideals of husband and wife. Essentially a love match which has resulted in the young man's disin¬ heritance, this union, through the inactivity and lack of energy of the dilettantic Franco Mai- roni, a devout religious idealist and a dreamer, is fast approaching disaster. The wife, Luisa, is a woman of strong will and moral force, filled with a sense of rectitude and justice, but lacking in religious faith. In the crisis brought about by the accidental drowning of their child, it is the husband who proves the stronger of the two. Taking consolation in his religion, he arouses himself, leaues for Piedmont to join his regiment and die for his country. The clash between the divergent ideals of Franco and Luisa, the separation and final reconciliation are worked out with characteristic poignancy. The novel typifies the intellectual and emotional conflict so favored by Fogazzaro. As is usual with him, it is the man whose spiritual nature is the higher, and in the triumph of Franco's in¬ tensely emotional and fervent Catholicism over Luisa's colder rationalism, we see exemplified the author's fundamental aspiration: ((To live, love, labor, suffer and ascend.®

Consult Lapham, L. E., (Fogazzaro and his triology) (in The Catholic World, Nov. 1906- Jan. 1907) ; Faguet, Emile, is by M. Pritchard-Agnetti (New York 1906).

Alfred G. Panaroni.

LITTLE ROCK, Ark., capital of the State, the seat of Pulaski County and the largest city in the State, on the Missouri Pacific, the Rock Island and the Saint Louis Southwestern rail¬ way systems, 133 miles west of Memphis, 346 miles southwest of Saint Louis, 165 miles east of Fort Smith and 145 miles northeast of Texarkana. Little Rock and North Little Rock is situated on both banks of the Arkansas River and takes its name from the rocky promontory which rises on the south bank some 50 feet above the river, now used as one of the abut¬ ments of one of the four bridges which span the river. This rock is the first seen ascending the river and was called Little Rock in con¬ tradistinction to the bold precipice, about 10 times higher, which rises some three miles above upon the opposite bank and called the Big Rock. This commanding eminence is now the site of an army post. The eastern border of the city touches rich alluvial cotton lands, without rocks and subject to a high state of

cultivation; its western border reaches to the foothills of the Ozark Mountains. It is situ¬ ated near lat. 35° and long. 92°, almost at the center of the State. The Arkansas River is navigable up to this point during the major portion of the year for the large steamboats, while smaller vessels ply as far up as Fort Smith. Pop. (est. 1919) about 90,000.

Trade and Commerce. — The growth of the commerce of Little Rock has been gradual but steady. The total annual business is estimated at $300,000,000, of which the retail business exceeds $100,000,000; a large portion of the other consists of cotton and its by-products. For example, in an average year Little Rock handles approximately 250,000 bales of cotton, representing financial transactions of over $35,- 000,000. The total freight traffic for the year 1918 employed 105,332 cars. The real estate transactions during the same year aggregated 3,555 sales, amounting to $5,237,194. The pos¬ tal receipts for the fiscal year total about $890,763. The local Board of Commerce, a consolidation of all commercial organizations, is the organ for concert of action among busi¬ ness men. Little Rock is also the supply head¬ quarters of the United States Bureau of Mili¬ tary Aeronautics for Arkansas, Oklahoma and northern Texas, and a million dollar warehouse plant is located at this point. During the late war the government

constructed a munition plant at a cost of $7,000,000, which it is pro¬ posed to convert into a chemical or fertilizer plant, while Eberts Field, located 20 miles east, is a flying field, costing nearly $2,000,000. Camp Pike, an army cantonment built during the war, through which between 200,000 and 300,000 men passed, located eight miles north of Little Rock, has been designated by the government as a permanent army division post and has a capacity for 70,000 soldiers. This camp was named in honor of Gen. Zebulin Montgomery Pike, the explorer of the great West and South¬ west, who discovered Pikes Peak. The citizens of Little Rock, through its Board of Commerce, donated in fee simple for $1 to the govern¬ ment the site for Camp Pike, 3,000 acres, and the munition plant, 400 acres, at a total cost of over $400,000.

Manufactures. — The largest single industry is the manufacture of cottonseed oil. There are six mills which have shipped, during a single season, 877 cars, or about 4,000,000 gal¬ lons of oil, 2,200 cars of meal and 584 cars of hulls. The latest available figures show 273 factories, employing about 15,000 persons, with an approximate annual pay-roll of $20,000,000. The manufacture of lumber and lumber prod¬ ucts, such as staves, sash and doors, etc., prin¬ cipally hard woods, takes prominence, followed by furniture, tractors, automobiles, fertilizers; the largest brick factory and stone quarries and crushers in the State are located here; 80 per cent of the Bauxite ore of the United States from wh;ch aluminum is made is mined within a radius of 20 miles. Ice factories, print¬ ing and lithographing, overalls and garments, tents and awnings, harness, candies, packing¬ house products, foundries and railroad shops and four cotton compresses operate here.

Banks. — There are two national banks with a capital stock of $500,000 and surplus of $325,- 694.73, and annual deposits amounting to

$4,727,159.93 ; also \2 trust companies with a capital stock of $2,983,000, surplus and profits $1,201,315.89, with deposits of $25,780,355.39 and loans of $23,300,000. The local bank clearings for 1918 aggregated $272,875,892. Besides these, there are building and loan associations with ag¬ gregate stock of about $10,000,000.

Government and Finances. — All municipal corporations in

Arkansas are governed by gen¬ eral laws and not by special charter. The mayor, treasurer, police judge, city clerk and city attorney as well as the aldermen are elected biennially. The city council is composed of the mayor and 18 aldermen, two of whom are elected from each of the nine wards by the voters of the entire city and are required to reside in their several wards. The adminis¬ trative officers are partly appointed by the mayor and partly elected by the council.

Churches and Charitable Institutions. — Little Rock is a city of numerous churches and cnapels. It is the seat of .Roman Catholic and Protestant Episcopal cathedrals, Saint An¬ drew's and Trinity. The former, at the corner of Seventh and Louisiana streets, is a noble edifice, built of native granite, the most striking piece of architecture in the city. Other notable buildings are Christ Church (Protestant Epis¬ copal), the Eighth Street Methodist, the Ger¬ man Evangelical Lutheran, the First Presby- teral Church and the Jewish Temple. There are 7 Baptist churches, 4 Catholic churches, 3 Christian churches, 1 Congregational, 1 Chris¬ tian Science, 6 Episcopal, 2 Hebrew, 3 Holiness, 2 Lutheran, 12 Methodist, 6 Presbyterian and 4 miscellaneous. Of the charitable institutions the more notable are the county and city hos¬ pitals, Saint Vincent's Infirmary, conducted by the Sisters of Mercy, the Children's Home, the Methodist Orphanage, the Jane Kellogg Home for Aged Women, the Home for Aged Colored Women, and the Boys' Club; the Y. M. C. A. and Y. W. C. A. both operate well- equipped and commodious homes.

Buildings, Parks and Suburbs. — Little Rock i§ noted for the beauty of its homes. The profusion of its flowers have won for the city the name of <(the City of Roses.® All of the State's public institutions, except the Univer¬ sity of Arkansas at Fayetteville and the Branch Normal Institute for colored youths at Pine Bluff, are located here. These include the State House, the School for the Blind, Deaf-Mute Institute, State Hospital and the State Peni¬ tentiary. The State has erected a new capitol, built of Arkansas marble. Other public build¬ ings of note are the Pulaski County Court¬ house, constructed of granite quarried in the vicinity, the customhouse and post office, and the Board of Trade building. Of club houses are the Country Club, the Athletic Association, Quapaw, and the Elk's Lodge ; social organiza¬ tions, Concordia Association, a Jewish Club, Jewish Country Club, the Masonic Temple, the Albert Pike Consistory, and the new Shriner's Temple. The City park, consisting of 35 acres of ground, is situated in the heart of the resi¬ dence portion of the city and is tastefully laid out in walks and drives and well kept up. The Arkansas River is crossed by three railroad bridges and a free bridge

erected by Pulaski County at an expense of nearly $400,000, unit¬ ing the northern and southern portions of the

city. A new concrete free bridge costing over $1,000,000 is contemplated. There are two in¬ corporated suburbs of the city, Baring Cross, a thriving town of 800 inhabitants lying north of the Arkansas River and west of the city limits, and North Little Rock, a small town lying north of the river and of the city; Pu¬ laski Heights, a picturesque hill overlooking the city and river, has become fashionable for residences. Mount Holly, the oldest cemetery in the city, is beautifully adorned with shrubs and flowers, and has many fine monuments. Other cemeteries are Oakland, the Jewish, the Catholic, the National, the Confederate and the Colored. The city is aboundantly supplied with pure water obtained from the Arkansas River and deep wells. There are two reservoirs with a storage capacity of 17,000,000 gallons, with an average daily consumption of 6,000,000 gal¬ lons. There are 65 miles of water mains.

The streets are laid out with regularity. The principal retail thoroughfare is Main street, the jobbing street is Markham, the former running north and south and at right angles to the lat¬ ter. There are within the city 249.02 miles of opened streets, 78.49 paved with brick, granite, asphalt, Telford or macadam pavement, 190 miles of sewers and 180 miles of sidewalks. The street railway lines cover 29 miles.

Education. — The single school district of Little Rock is a corporation distinct from the city, its territory including only that portion of the city which is south of the river. Here there are 20 schools, with 24 buildings, of which five schools with five buildings are for the colored children, 325 teachers and an en¬ rollment of 11,425, of whom 1,607 are colored. The school census shows a total of 15,000, of which about 3,500 are colored. The North Little Rock school district, including so much of the city as lies north of the river, has in all six school buildings, two of which are for col¬ ored children, 15 teachers and an attendance of 885. The school census shows that 2,600 are entitled to attend the public school in that district. Besides the public schools there are private and parochial schools. For higher edu¬ cation the Little Rock College for boys and Saint Mary's Academy for girls, both Catholic institutions, are the largest ; the University of Arkansas, the main departments of building of which are located at Fayetteville, has branch schools of law and medicine located here. Be¬ sides these are the Arkansas Military Academy, a military training school, and the Philander Smith College for colored youths.

History. — When the territory now known as Arkansas passed to the United States in 1803, the site of the future capital was an un¬ broken wilderness. By the act of Congress of 2 March 1819, the seat of government of the newly created territory was fixed at the Post of Arkansas on the Arkansas River some 30 miles above its confluence with the Missis¬ sippi. On 24 Oct. 1820, an act was passed re¬ moving the capital to Little Rock. It has been aptly said that so manifest was the destiny of the future city that it was made the seat of government before it had become a town. A post office was established on 10 April 1820. It was incorporated as a town 27 Oct. 1825. It is said that the inhabitants numbered only 450 in 1830. On 2 Nov. 1835 it was, by special

act, incorporated as a city. When the momen¬ tous question of secession arose in 1861, a con¬ vention was called by the legislature to meet, at Little Rock, which adopted an ordinance dis¬ solving the union existing between the State of Arkansas and those united with her under the compact entitled, ((The Constitution of the United States of America.® On 10 Sept. 1863, Little Rock was captured by the Northern army under General Steele and remained in posses¬ sion of the Federal forces during the remain¬ der of the war. The unexpected increase in the population between the years 1860 and 1870, covering the period of the Civil War, may perhaps be attributed to the fact that during that period of disintegration society was form¬ ing new associations. The growth of the city since 1880 has been constant and rapid. Pop.

(1850) 2,167; (1870) 12,380; (1890) 25,874; (1900) 38,307; (1910) 45,941; (1920) 64,997.

George Firm in,

General Manager, Little Rock Board of Com¬ merce.

LITTLE ROCK, Capture of. The State

authorities of Arkansas seized the United States arsenal at Little Rock 8 Feb. 1861, and until 10 Sept. 1863 the city remained in Confederate occupation. After the fall of Vicksburg and Port Hudson, 4 and 8 July 1863, Gen. F. Steele was ordered from Vicksburg to Helena and directed to form a junction with General David¬ son, who was moving south from Pilot Knob, Mo., to break

up Sterling Price's army, and occupy Little Rock. Steele arrived at Hel¬ ena 31 July and organized his expedition, find¬ ing at that place two divisions of infantry, a brigade of cavalry and 39 guns; in all, about 7,000 men. On 5 August he marched for De- vall's Bluff on White River, reached it without incident and there was joined by Davidson with 6,000 cavalry and three batteries, making his force about 13,000 men and 57 guns. A few days later he was joined by a brigade which raised his aggregate to over 14,000, of whom 10,500 were effective, many being sick. August 24 Davidson's cavalry advance skir¬ mished with Marmaduke's cavalry up to and through Brownsville and up to his entrench¬ ments at Bayou Meto. Davidson fell back to Brownsville, where, 2 September, Steele joined him, and concentrated all his available force. The position on the Bayou Meto, 12 miles from Little Rock, was flanked, and on the 7th Steele reached the Arkansas River near Ashley's Mills, where Davidson's cavalry had a sharp skirmish and drove the Confederates across the river. Steele repaired the main road back to Bayou Meto, and on the 10th Davidson crossed to the south side of the river by a pontoon bridge and marched on Little Rock, but 10 miles distant, Steele marching along the north bank. The city was defended by Sterling Price with about 7,700 men, of whom 6,500 were en¬ trenched on the north side of the Arkansas, and about 1,200 on the south side, on the line of the Bayou Fourche, about five miles from the city. Davidson moved directly on the city, without much opposition until he reached Bayou Fourche, where he found Marmaduke's cavalry, dismounted, a brigade of infantry and two . batteries, all drawn up to oppose him. Davidson attacked on two roads, driving the Confederates back; Steele, who had marched

abreast of him on the opposite side of the river, opened an enfilading artillery fire; and Marma- duke fell back through the city, closely fol¬ lowed by Davidson's cavalry. Price had with¬ drawn from the north bank of the river when he learned that Davidson had turned the posi¬ tion, and evacuated the city at 5 p.m., retreating to Arkadelphia. Steele's cavalry followed Mar¬ maduke's cavalry for a day, and returned to Little Rock on the 12th. At 7 p.m. the city was formally surrendered to Davidson by the civil authorities. Price burned eight steamers, one of them a powerful gunboat, but the arsenal was saved. Steele reported a loss of 137 killed, wounded and missing; Price reported a total loss of 64. Consult (Official Records) (Vol. XXII) ; Lossing, (History of the Civil War5 (Vol. II) ; The Century Company's (Battles and Leaders of the Civil War5 (Vol. III).

E. A. Carman.

LITTLE RUSSIANS. See Ruthenes.

LITTLE TURTLE, Miami chief : one of those who signed the Treaty of Greenville in 1795. He defeated Harmar on the Miami in 1790 and St. Clair at Saint Mary's in 1791.

LITTLE WOMEN, a popular story for children by Louisa M. Alcott (q.v.), published in 1868.

LITTLEHALES, George Washington,

American hydrographic engineer : b. Schuylkill County, Pa., 14 Oct. 1860. He was graduated from the United States Naval Academy in 1883. He is an associate editor of the Inter¬ national Journal of Terrestrial Magnetism, and has published (The Development of Great Circle Sailing5 ; (The Methods and Results of the Survey of Lower California5 ; (The Mag¬ netic Dip or Inclination5 ;

LITTLEJOHN, Abram Newkirk, Amer¬ ican Protestant Episcopal bishop: b. Florida, Montgomery County, N. Y., 13 Dec. 1824; d. Williamstown, Mass., 3 Aug. 1901. He was graduated at Union College in 1845 and took orders in the Episcopal Church in 1850. He was rector of Saint Paul's, New Haven, Conn., 1851-60, and of Holy Trinity Church, Brooklyn, N. Y., 1860-69. • He was made bishop of Long Island in 1869, and from 1874 was in charge of American Episcopal churches on the continent of Europe. He wrote (Philosophy of Re¬ ligion5; (The Christian Ministry,5 etc.

LITTLETON, or LYTTLETON, Sir Thomas, English jurist: b. Frankley, Wor¬ cestershire, 1422; d. there, 23 Aug. 1481. He was a member of the Inner Temple, sheriff of Worcestershire in 1447, recorder of Coventry in 1450, and in 1453 was made sergeant-at-law and justice of assize in 1455. After holding- several legal appointments he became justice of the common pleas in 1466. His treatise on (Tenures, 5 with the well-known commentary by Sir Edward Coke, (Coke upon Littleton,5 was long the standard authority on the English law of real property. It was written in legal French, and first published in London about 1481.

in English in 1628, and there are many sub¬ sequent editions.

LITTLETON, N. H., town, in Grafton County, on the Ammonoosuc

River, and on the Boston and Maine Railroad. When it was first settled in 1770 it was called Apthorp. When it was incorporated, in 1784, the name was changed to Littleton. It is in a section of the State noted for its beautiful scenery and cool summer climate. The river furnishes consider¬ able water power; the chief manufactures are shoes, gloves, wagons and carriages, whetstones, bobbins, stereoscopic views, woodenware and furniture. Electric lighting is municipally owned, and the town has a Carnegie library and a hospital. The government of the town is administered by means of the annual town meeting. Pop. (1920) 2,308. Consult (History of Littleton> (3 vols., Cambridge, Mass., 1905).

LITTMANN, lit'man, Enno, German Ori¬ ental scholar: b. Oldenburgh, 1875. He traveled extensively in the near East, including Abys¬ sinia, Palestine and Syria; came to America where he spent several years as lecturer on Semitic philology at Princeton University. He was appointed to the chair of Semitic languages at the University of Strassburg in 1906. In 1910-12 he was professor at the University of Egypt, after which he returned to his old chair at Strassburg. He visited Abyssinia and Syria with the Princeton archaeological expedition and accompanied the Axum expedition of 1906. He has published (Arabische Schattenspiele> (1901) ; (Zur Entzifferung der Safa-Inschrif- ten) (1901) ; (Chronicle of King Theodore of Abyssinia (1902) ; (List of Arabic Manu¬ scripts* (1904) ; (Zur Entzifferung der thamu- denischen Inschriften) (1904) ; (Philosophi AbessinP (1904) ; (Geschichte der athiopischen Literatur> (1907) ; (Arabische Beduinenerzah- lungen* (1908) ; (Nabataean Inscriptions**

(1913).

LITTORAL, that belt along a coast, be¬ tween low and high tide limits. The term is sometimes extended to include the very shallow water just beyond low tide limit. Currents parallel to the shore are known as littoral cur¬ rents, and the deposits of the littoral belt are called littoral deposits. See Sandstone.

LITTRE, Maximilien Paul Emile, mak-

si-mil-i-on pol a-mel le-tra, French lexicogra¬ pher and philosopher: b. Paris, 1 Feb. 1801; d. there, 2 June 1881. After completing his course at school he studied deeply in English and Ger¬ man and in classical and Sanskrit literature. He intended to follow the medical profession ; his study of medicine was interrupted by the death of his father. He then engaged in teach¬ ing for a livelihood, took an active

part in the Revolution of 1830, and soon after was invited by Armand Carrel, editor of the National, to write for that paper. In 1839 he published the first volume of an edition of Hippocrates in the original, with a French translation and copious note-s. This work, in 10 volumes, se¬ cured his admission to the Academie des In¬ scriptions et Belles-Lettres. He translated Strauss' (Leben Jesu, and having adopted Comtist principles, wrote an able and lucid synopsis of them in his (De la Philosophic Positive> (1845). In 1854 he was appointed editor of the Journal des Savants. In 1863 he commenced the publication of his great work,*

begun nearly 20 years earlier, the (Dictionnaire de la Langue franqaise, which has been called the best dictionary of any living language yet published, and is a monument of its author's patience and lucidity no less than of his erudi¬ tion. This was finished in 1873, two years previous to which Littre had been admitted into the Academie Franqaise. Another important work of his was an edition of Pliny's (Natural Histcuy* with a translation and notes. During the siege of Paris he was forced to retire with his famly to Bordeaux, and was appointed professor of history and geography in the poly¬ technic school there. He was afterward sum¬ moned to Versailles to take his seat in the Senate, having been chosen by the department of the Seine. He became a life senator in 1875. Among Littre's other works are Application de la Philosophic Positive au Gouvernement des Societes* (1849) ; Conservation, Revolution et Positivisme) (1852) ; (Paroles de la Philosophic Positive) (1859) ; (Histoire de la Langue franqaise* (1862) ; Auguste Comte et la Philosophic Positive) (1863) ; Atudes sur les Barbares et le Moyen Age* (1867) ; (Medecine et Medecins* (1871); 'Literature et Histoire> (1875), and 'Etudes et Glanures) (1880).*

LITTROW, lit'ro, Joseph Johann von,

Austrian astronomer: b. Bischofteinitz, Bo¬ hemia, 13 March 1781 ; d. Vienna, 30 Nov. 1840. In 1807 he obtained the chair of astronomy in the University of Cracow, and in 1810 accepted a similar chair in Kasan, where he founded the observatory. He became in 1816 joint director of the observatory of Buda, and from this he removed in 1819 to become director of the ob¬ servatory of Vienna. He completely reorgan¬ ized this establishment, and in his lectures yearly attracted great audiences, many of them strangers from abroad. By far the most popu¬ lar of all numerous astronomical works is his (Die Wunder des HimmelsP of which the 8th edition was published (1895-97). It ranks as one of the best works of astronomy for the use of general readers.

LITTROW, Karl von, Austrian astrono¬ mer: b. Kasan, Russia, 18 July 1811 ; d. Venice, 16 Nov. 1877. He was a son of Johann Littrow (q.v.), whom he assisted in the Vienna Observa¬ tory from 1831 and succeeding him as director in 1842. He edited the works of his father, adding considerably to 'Die Wunder des Him¬ melsP developed a new method of reckoning longitude at sea, and was the author of 'Popu- lare Geometrie) (1839) ; (Verzeichniss der geographischen OrtsbestimmungeiP (1844-46).

LITURGY (Greek fciTovpyla means a pub¬ lic service; used at Athens to mean a public service which the richer citizens discharged at their own expense). The Septuagint translators used the Greek word leitourgos for that serv¬ ice of God in the sanctuary. In the Hebrew it had various kindred meanings; in the Old Tes¬ tament is usually denotes the service of a Jew¬ ish priest, but in the New Testament it is used of any service rendered to God. In the 4th century, the word as applied to priestly ministrations was generally recog¬ nized ; and while it continued in use as meaning any Solemn service, it was applied especially to the Eucharistic service. It is in this sense that the word is used by the Greek Church when they say "Divine liturgy.®

The records extant which show the exact liturgy of the Christian Church in the 1st cen¬ tury are mainly allusions found in documents of the 2d century. From the year 150 there are numerous proofs to show the existence of a fixed order and fixed words for the service of the mass or for the Eucharistic service. This service or liturgy was not made just when men¬ tioned by Cyprian, and in 138 by Justin, and many others who committed to writing the or¬ der of the services or the liturgy. But there is not sufficient proof to warrant the assertion that there was any entire written liturgy before the second half of the 4th century. As the liturgies exist to-day they may be divide into five groups or families of liturgies, distinguished from each other chiefly, though not entirely, by the different arrangement of their parts. Three of the groups are Oriental and two are West¬ ern. They are :

(1) The West Syrian Group, which includes the liturgies of Saint James, Saint Basil, Saint Chrysostom and that of Armenia. In this group the intercession for the living and the dead is placed after the invocation of the Holy Spirit, which in the Oriental liturgies follows

the con¬ secration.

(2) The Alexandrian Group, which includes three Greek liturgies : Saint Mark, Saint Basil, and Saint Gregory; also the Coptic liturgies. This group is characterized by the <(Great In¬ tercession® for the living and the dead being placed in the midst of the Preface.

(3) The East Syrian Group includes the liturgies in the Syriac language as used by those who belong to the Roman Catholic Church. In this group the <(general intercession® is placed between the words of institution and the invo¬ cation of the Holy Spirit.

(4) The Liturgies of Gaul and Spain. In this group the (

(5) Gallican Liturgy. In this the interces¬ sion is divided, that of the living is before con¬ secration, and that of the dead after consecra¬ tion.

That part of the <(Liturgy of the Mass® called the <(canon® is very ancient, and existed almost as at present since the time of the Apos¬ tles (see Mass; Missal). The liturgy of the Church of England is derived from the Ephe- sine original through the ancient Gallican liturgy which was brought to France by Greek missionaries, who were accustomed to use the form known as the liturgy of Saint John. There is no invocation of the Holy Spirit in the present English form, although the Prot¬ estant Episcopal Church has restored the invo¬ cation, like the Scottish Episcopal Church. There is, however, no ritual element wanting in these two English forms- whether they be com¬ pared with the Greek or Latin liturgies. The liturgy in use in the Protestant Episcopal Church more nearly resembles the Gallican liturgy than any other group, but in some re¬ spects there is a difference in arrangement, and also in meaning. There is no intercession for the dead, and the intercession for the living comes before the Communion.

Bibliography. — An exhaustive bibliography appears in the catalogue of the British Museum. Consult also Tertullian, (De Corona) ; Cyprian,

EpistleO Report of Council in Trullo5 Probsl, (Liturgie der drei ersten Jahrhunderte,) who claims that there was a written liturgy before 150; Hammond, (Ancient Liturgies) ; Smith and Cheetum, ; Rock, (The Church of Our Fathers, as Seen in Saint Osmond's Rite for the Cathedral of Salisbury > (1904) ; De Herdt, (Sacra Liturgie) (3 vols.) ; Fortescue, (The Mass: A Study (1912); Staley, litur¬ gical Studies) (1907) ; York, (The Roman Liturgy* (1908), and (The Prayer Book Dic¬ tionary edited by Hartford and Stevenson*

(1912).

LITUUS, lit'u-us, (1) a crooked staff, rep¬ resented in works of art as borne by the ancient Roman augurs in their divinations. It was like a crozier in shape. (2) A trumpet, having a mouth which curved upward, and which was used by the Roman cavalry. (3) In geometry, a spiral, of which the characteristic property is that the square of any two radii vectores are Reciprocally proportional to the angles which they respectively make with a certain line given in position and which is an asymptote of the spiral.

LIUDGER, li-ood'ger, Saint, the first bishop of Munster, Germany: b. Friesland, about 744; d. Billerbeck, 26 March 809. He studied in England under Alcuin and returned to preach Christianity to his countrymen. When Wittekind was sent to Friesland in 784 Liudger abandoned his mission and went to Rome. Sub¬ sequently he returned to become the first bishop of Munster. The various Vitce S. Liudigeri are collected in the (Geschichtsquellen des Bistums Munster (Diekamp 1881). Consult also the Lives by Hiising (1878); Pingsmann (1879), and Krimphove (1886).*

LIUDPRAND, li-ood'orand, LIUT- PRAND, or LIUZO, Italian historian : b. about 922; d. 972. He was of a noble Lom¬ bard lineage. His father, who was King Hugo's Ambassador to Constantinople, dying when the son was not more than five years old, young Liudprand was educated as a page in King Hugo's court in Pavia, and later entered the Church. Hugo's successor, Berengar, made him chancellor, and in 949 sent him on an import¬ ant diplomatic mission to Constantinople. Soon afterward he fell into disgrace with Berengar, joined himself to the Emperor Otho I, who, in 962, made him bishop of Cremona, and in 968 sent him on an important but unsuccessful mis¬ sion to the court of the Eastern Church, which called forth his bitter but interesting and 'lively (De Legatione ConstantinopolitanaP His (Antapodosis covering the perio d from 886— 950, and (De Rebus Gestis Ottonis Magni im- peratoris,* from 960 to 964, are important sources of 10th century history. They are all found in the Pertz' (Monumenta Germanise HistoriaP*

LIU-KIU (le-oo'ke-oo') or LOO-CHOO ISLANDS, Japan, a chain of 55 islands, three large and 52 small, with a total area of 808 square miles. They form a integral part of the empire, and, extending in a southwesterly direction from a series of stepping stones be¬ tween Kiu-shu and Formosa. Oshima in the northwest, 30 miles long, contains a mountain peak 2,300 feet high, and has a mean annual temperature of 70°. Tokuno-shima is in the centre of the group. Okinawa or Greater Loo-

choo in the southwest is 60 miles long by two to 14 broad. Naha, the capital of the group (pop. 48,000), is a modern Japanese town. The islands constitute the Japanese prefecture of Okniawa and have a population of 502,000. Sugar, wheat, potatoes, bananas and sago are the principal crops. An active trade is main¬ tained with Japan by means of a steamship service. The inhabitants are honest, courteous, industrious and peaceable. Their language differs from the Japanese in being more archaic. Liu-Kiu Islands were originally part of the kingdom of Liu-Kiu, and were conquered for Japan by the Prince of Satsuma in 1609. See Japan.

LIU-KUN-YI, le-oo-koon'yi, Chinese statesman: b. Hunan, about 1820; d. Nanking, 6 Oct. 1902. He received a military education, and though not a scholar held high official posi¬ tions. In 1860 he commanded one of the armies raised to oppose the Taiping rebels, and de¬ feated them by a series of successful manceuvers. At the time of the Boxer outbreak in 1900 he was viceroy of Nanking, the so-called ((southern capital® of China, and in spite of the vigorous anti-foreign agitation in his own province and the hostile attitude of the imperial government at Peking, he refused to join the anti-foreign movement, and used his foreign-drilled troops to suppress all Boxer demonstrations. In this he was supported by the viceroy of Wuchang, and these two viceroys prevented the spread of the Boxer movement to the valley of the Yang-tse-Kiang, and were consequently in¬ fluential in safeguarding Chinese interests in the subsequent peace negotiations. He took a leading part in negotiating with Sir James Mackay the commercial treaty of 1902.

LIUTPRAND, le-oot'prant, Italian his¬ torian. See Liudprand.

LIUTPRANT, or LIUTPRAND, king of the Lombards (q.v.) from 712 to 744, the period of their greatest power : b. about 688 ; d. 744. He was an active and popular prince. He captured Ravenna in 728, defeated the dukes of Spoleto and Beneventum in 741, joined with Charles Martel against the Arabs and extended the Lombard sway over practically the whole of Italy. His death marked the beginning of the downfall of the kingdom. His laws are codi¬ fied in the

LIVADIA, llv-a-de'a, or LEBADEA,

Greece, a town on the Hercyna, 52 miles north¬ west of the capital of the monarchy of Boeotia. Under Turkish rule it was the most import¬ ant town in Greece. It is defended by a castle, and has manufactures of cotton goods and a trade in small articles or raw produce. Pop. 6,500. Higher up the river, in a narrow gorge, is the site of the ancient Hieron or cave of Trophonius and the fountains of Lethe and Mnemosyne.

LIVADIA, a Russian imperial residence near Yalta, on the southern coast of the Crimea, Russia. It is an extensive and beautiful estate, with two fine palaces, the new or large palace completed in 1911, and many less important villas and lodges. It was the favorite residence of Alexander III, who died there 1 Nov. 1894. When the Emperor Nicholas II was forced to abdicate the throne, 15 March 1917, he ex¬ pressed the desire to go to Livadia, to his gardens.

LIVE-FOR-EVER, or GARDEN OR¬ PINE, a small cultivated stonecrop, Sedum tlephium. See Stonecrop.

LIVE OAK, species of evergreen oaks found growing in various parts of the United States, Central America and Cuba. See Oak.

LIVE STOCK. See Cattle.

LIVE STOCK, The Feeding of. Bal¬ anced Ration. — A ration is the amount of food fed to an animal in one day of 24 hours. As with humans this ration is usually fed in three meals. A balanced ration is a ration which will fully meet all the physiological needs of the particular animal to which it is to be fed. Very briefly a properly balanced ration must meet the following principal needs :

1. There must be sufficient food to furnish the energy to enable the given animal to do its work.

2. The ration must have the proper amount of protein and the right kind of protein to meet the body needs for this important constituent.

3. The ration must supply the proper mineral elements.

4. The ration must supply the proper amounts of those not very well understood sub¬ stances which are called growth accessories or vitamines.

Only those rations which meet these four primary needs can be said to be properly bal¬ anced. Therefore it is necessary to know some¬ thing of the composition of the animal body and of feeds in order to

understand why feeds should be grouped in certain proportions to constitute what is called a ration.

The body of any animal is made up of water and dry matter which must all come from the food.

The Water in the animal body serves four purposes: first, it is a part of all bone and flesh second, it serves as a carrier of food from the digestive tract, or from those parts of the body where the food is put into suitable shape to be used by the body cells, to those cells wherever they may be located; third, water serves to carry away the wastes of the body through the perspiration and the urine; fourth, it serves to equalize the temperature. This water in the body comes from the water that the animal drinks and from the water in the succulent parts of the food. The water in the animal body constitutes on an average about 50 per cent of the live weight.

The Dry Matter of the Body is made up of many chemical elements — for example, carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus and perhaps half a dozen others. These ele¬ ments are arranged in all sorts of combinations, to form bones, flesh, hide, hair, hoofs and other parts of the body. For the purpose of this dis¬ cussion, in order to get a clear understanding of the relation of the food to the body the dry matter may be divided into four groups of sub¬ stances, namely, ash, nitrogenous substances or protein, carbohydrates and fast. The dry mat¬ ter of the body is so grouped because this is the usual grouping of the chemical compounds that make up plants, and it is desired to study the relation, of the groups in plants with the same grouns in the body.

Demands of the Animal from Its Food. —

Animals need food to maintain their existence, which is dependent on matter and energy. The

pari of the body that is more or less permanent is that made up of ash and protein, while the carbohydrates and fats are more changeable and have to do more with the energy of the body. However the tissues are constantly be¬ ing worn out, and must be replaced, and this requires a new supply of ash and protein from the food.

Besides the ash and the protein constantly being replaced in the mature animal, the grow¬ ing animal must have matter to form new tis¬ sue, and the productive animal must have matter for products such as milk, eggs, wool and the like, all of which contain ash, fat, protein and carbohydrates. Then, in the preg¬ nant female, ash, fat, protein and carbohydrates are needed for the growth of the young.

After this matter has been supplied from the food for the maintenance of the dry matter of the body, there is a still further demand on the food to furnish energy to the animal for vari¬ ous uses. First, the temperature of the animal body must be about 100° F., and, while the tem¬ perature of the surrounding air may vary all the way from — 20° to + 90° F., this body temperature must be kept practically constant, requiring considerable energy in the form of heat; second, energy is required to keep up all the changes in the body in preparing food for use by the body, to take that food where it is needed, and to carry out waste matter from the body; third, energy is needed to manufacture products such as milk, wool, eggs and the like; fourth, energy is needed to enable the animal to do work, as in the case of the horse.

In addition to the requirements for mainte¬ nance of tissues and for energy the body re¬ quires a supply of water daily, in order to keep up the water content of the body and to provide a medium for the transfer of the food material from different parts of the body to other parts and for the elimination of waste matter.

How the Food Fulfills These Require¬ ments. — Like the body, the common coarse feeds, grains, meals and feedstuffs in general used for animals are made up of the following groups of constituents:

Water

' Ash

Dry matter •

. Nutrients

Protein (nitrogenous) Carbohydrates (fiber, nitrogen-free extract) Fats

The use of the water in the food has already been indicated.

The Ash required by the animal does not need to be computed carefully because all the ordinarj' feeds furnish it in sufficient

amount, provided a good variety is given and plenty of salt is supplied. Corn is slightly deficient in ash, but in the ordinary ration the feeds fed with corn make up for this deficiency.

Protein , carbohydrates and fats in food are commonly spoken of as the nutrients of the dry matter, since it is from those groups of con¬ stituents that animals derive the matter and energy necessary for the uses already enumer¬ ated. The protein is used to keep up the pro¬ tein of the body — that is, to replace worn-out tissues, to build up new tissues, for growth of hair, hoofs, horns and the like. A very import¬ ant fact in this connection is that any protein in the ration in excess of that required for keeping up the nitrogenous tissues of the body

can be used by any animal for the production of heat and energy. On the other hand, while protein can be used thus for the production of heat and energy, thus serving the purpose of carbohydrates and fat, protein cannot be pro¬ duced from the carbohydrates or the fats of feeds. Therefore it is always necessary to have a sufficient amount of protein in the ra¬ tion. The discussion of the necessary amount of protein for different uses will be taken up later under various rations given.

The amount of digestible protein in feeds varies within somewhat wide limits. The per¬ centage varies from 0.8 of 1 per cent in succu¬ lent feeds, such as mangels, through 7.6 per cent for red clover hay and 8.5 per cent among the cereals, to as high as 37 per cent for cotton¬ seed meal. Thus it is seen that there is a large list from which to choose in regulating the amount of protein in a ration.

The Carbohydrates are divided by the chemists into what are called ((crude fibre® and <(nitrogen-free extract,® because the crude fibre is less digestible than the other carbohydrate material. In a feed analysis, ash, protein, fat and fibre are first determined. Their sum is then subtracted from the total dry matter, and the result is called ((nitrogen-f ree extract.® This term includes all the carbohydrates except the fibre. The digestible nitrogen-free extract and the digestible fibre have the same food value for all practical purposes and perform the same work in the nutrition of the animal. This work consists mainly in furnishing energy for whatever need the animal may have. If there is more energy provided in the ration than is needed at that particular time, the excess energy may be stored in the body as fat.

The amount of fibre and nitrogen-free ex¬ tract in feeds, taken

together, varies as much as does the protein, but there is always a rela¬ tively larger amount of carbohydrates than of protein. In every case, when there is a low percentage of protein there is a high percentage of carbohydrates.

The Food Fats are used by the animal in about the same way as are the carbohydrates. They provide energy to be used in any way that the animal needs, and if the animal has more energy than is needed, it may be stored in the form of fat. The fat, however, has an energy value equal to about two and one-fourth times the energy value of the same weight of carbohydrates.

The amount of digestible fat in the different feeds varies without respect to the other con¬ stituents. It is low in the coarse fodders, run¬ ning up to 11.6 per cent in distillers' dried grains.

Factors in an Ideal Ration. — In actually

computing a ration for a given purpose there are six factors that should be considered:

1. Amount of food.

2. Digestibility of the ration.

3. Variety in the ration.

4. Suitability of the feeds to the animal.

5. Palatability of the ration.

6. Cost of the ration.

The Amount of Food in a ration has refer¬ ence to the relative amounts of roughage and concentrates. By roughage is meant the coarser feeds, such as hay, corn fodder, silage; by concentrates are meant the grains and the

other feeds in the ration that are low in their percentage of fibre and water and high in their percentage of total digestible nutrients.

Horses at work should be given two to three pounds of feed (roughages and concen¬ trates combined) daily per 100 pounds live

weight, the allowance of concentrates ranging from 10 to 18 pounds, depending on the severity of the work.

Dairy cows in milk should be fed about two pounds of dry roughage or one pound of dry roughage and three pounds of silage daily per 100 pounds live weight, with one pound con¬ centrates to three or three and one-half pounds of milk yielded.

Fattening steers need two and one-tenth pounds or more of concentrates and dry roughage (or the equivalent in silage) daily per 100 pounds live weight, the allowance of concentrates ranging from less than one pound to one and seven-tenths pounds, or more, per 100 pounds live weight, depending on the rate of gain desired and the kind of roughage.

Fattening lambs will consume about one and one-fourth pounds of dry roughage daily when fed all the grain they will eat, and up to two and three-tenths pounds or over when the grain allowance is restricted. Silage may replace a corresponding amount of dry matter in dry roughage.

Pigs can make but limited use of dry roughage, except in the case of brood sows not suckling young.

The Digestibility of the ration also depends a great deal on the relative amounts of roughage and concentrates, and on the character of the concentrates. As a general rule the more in¬ tense the feeding the more concentrated the ration will be and consequently the more highly digestible it will be. Care must always be taken that the ration is not too concentrated.

Variety in the Ration. — All feeders of ani¬ mals should provide variety in the ration. Vari¬ ety stimulates the animal's appetite. Best re¬ sults are obtained from rations for dairy cows that have two different feeds in the roughage and three feeds in the concentrated part of the ration. These feeds should come from not less than three different plants. Other classes of animals do not seem to need so much variety, although it is wise to supply it with all classes.

Suitability of Feeds to the Animal. — The feeds in the ration should be suited to the ani¬ mal and to the purpose for which the animal is fed. For example, wheat bran is not suitable for feeding hogs because of its bulk; wheat middlings are much to be preferred.

Palatability of Feeds to the Animal. — The ration should be palatable if the best results in production are to be obtained. With dairy cows palatability is easily obtained by providing succulent feed in the ration. The condition of the feed has much to do with its palatability. No musty nor damaged feed should be given.

Cost of the Ration. — Without doubt, the cost of the ration is the most important factor to be considered by the farmer. However, the other factors must not be sacrificed for cost in every case. There is no general rule to be given in regard to cost. If one has access to a set of tables which give the pounds of total digest¬ ible nutrients, a rough way, efficient in most cases, to choose feeds for the greatest economy in the ration is to calculate the cost of 100 pounds of total digestible nutrients in the

different feeds available, then to choose those that will yield total digestible nutrients the cheapest — always taking into consideration the five other factors that have just been explained. Too little attention has been paid to the proper compounding of rations to get the best returns in product from the money paid out for feed, whether that feed has been actually bought in the market or produced on the farm. The pos¬ sible usefulness of many home-grown crops is not known to many farmers. If clover hay, alfalfa hay, roots and silage are raised, the bills for grain may be reduced very much. These crops can all be raised and fed at a profit,, since at their usual market price they will yield digestible material cheaper than will any of the commercial feeds. A knowledge of the composition of these home-grown crops is necessary, in order to fit them into the ration intelligently. A farmer should study from all sides the possibilities of his farm, and produce all the feed for his stock that he can. Then he should buy those commercial feeds that will round out his rations properly. Many farmers never set any price on the feeds produced on the farm, considering them merely as feeds pro¬ cured at no money cost and therefore to be fed without regard to quantity or composition.

Instead of feeding in a haphazard manner, a farmer should know, at least approximately, the cost of producing his homegrown feeds, how to plan his rations in order to use these feeds to the best advantage and how to buy intelligently the feeds on the market. This knowledge will enable him to calculate the most economical ration for the animal that he wishes to feed, whether dairy cow, sheep, horse or

beef animal.

A Ration for a Dairy Cow Illustrating the Factors Given. — A ration is desired for a cow weighing 1.000 pounds and yielding daily 30 pounds of milk testing 3.5 per cent butterfat.

The following feeds are commonly used for cows except the skimmilk, tankage and dried blood. They are divided into three groups for convenience in the discussion of rations which follow.

Concentrates.

Low protein. Corn meal or chop.

Corn and cob meal.

Hominy feed. Wheat.

Rye.

Oats.

Barley.

Kafir.

Beet pulp, dried. Molasses, cane.

Medium protein. Red dog flour.

Flour wheat middlings. Standard wheat mid¬ dlings.

Wheat bran.

Wheat feed (shorts and bran).

High protein.

Gluten feed, high grade.

Malt sorouts.

Brewers' grains, dried.

Buckwheat middlings.

Cottonseed meal, good.

Linseed meal, old process.

Pea, field.

Skim milk, centrifu¬ gal.

Tankage, over 55 per cent protein.

Dried blood.

Distillers' grains, dried, from corn.

Roughage.

Dry roughage.

Com fodder.

Com stover.

Sorghum fodder, dry.

Millet hay, common or Hun¬ garian.

Timothy hay.

Clover and wild grass hay. Oat straw.

Alfalfa hay.

Red clover hay.

Soybean hay.

Peas and oats hay.

Cowpea, hay.

Succulent roughage.

Corn fodder.

Sweet sorghum fodder.

Green millet, common or Hungarian.

Mangels.

Rutabagas.

Com silage.

Alfalfa, green.

Red clover, green.

Cowpeas, green.

Soybeans, green.

Peas and oats, green.

Rape, green.

Field pea silage.

In feeding cows the usual rule is to feed the roughage that is available and to use what concentrates may be available on the farm, buy¬ ing enough others to complete a suitable ration. It will be assumed in this case that there are available clover hay, corn silage and corn-and- cob meal. Therefore it will be necessary to select two other concentrates. A good rule is to select for a dairy cow equal parts by weight of high, low and medium protein concentrates in order to provide concentrates that will pro¬ vide sufficient protein. By following this rule the rations could be made up as follows: 10 pounds red clover hay; 30 pounds corn silage; 3 pounds corn-and-cob meal ; 2 pounds wheat mixed feed; 3 pounds gluten feed; 1 pound oil meal. By following these rules in general innumerable combinations may be made under different con¬ ditions of home supply.

A Rat'on for a Horse Weighing 1,000 Pounds Doing Medium Work. — Observing the general rule given above as to the amount of feed necessary for horses at work the fol¬ lowing is given as a typical ration : 12 pounds

timothy hay; 8 pounds oats; 4 pounds corn. Rations for horses do not require as much pro¬ tein as rations for cows. The feeds used are generally limited to timothy, clover, alfalfa and mixed hays and to barley, corn, oats and hominy for concentrates with molasses

sometimes added when cheap enough. The only high protein food used in any quantity for horses is linseed oil meal.

Beef Cattle Ration. — A ration is desired for a 1,000-pound steer. The following is sug¬ gested: 10 pounds red clover hay; 40 pounds corn silage; 4 pounds corn-and-cob meal; 2 pounds oats (ground) ; 3 pounds gluten feed. As the steer became fatter and nearer the time for selling the silage should be cut down and the amount of corn increased. Practically all of the feeds listed under the ration for a cow can be used for steers. Less of the high pro¬ tein feeds are needed because the gain of pro¬ tein in the body is less than the protein put into the milk.

A Ration for Breeding Ewes with Lambs.

— A ewe of the large breeds will weigh about 125 pounds. A pen of eight would make 1,000 pounds. The following ration is suggested for each group of eight to be fed : 12 pounds red

clover hay; 25 pounds turnips; 5 pounds ground oats ; 5 pounds cornmeal ; 3 pounds wheat bran ; 1 pound oilmeal. The feeding of milking ewes is practically the same as feeding small dairy cows. Sheep are particularly fond of turnips. If turnips are not available 16 to 20 pounds of corn silage or pea vine silage could be substi¬ tuted. Also it will be noted that less high pro¬ tein feeds are necessary.

In feeding lambs for market it is a general practice to limit the amount of succulent feed a little more than in feeding ewes for milk pro¬ duction. The basis of fattening rations is prac¬ tically always a large percentage of corn grain, which must be supplemented with good rough- age and one high protein feed. _ Legume hays and roots for the roughage and linseed oil meal for the high protein concentrate make an ideal combination with corn in all fattening and growing rations.

A Ration for Fattening Pigs. — It will be

assumed that pigs weigh 125 pounds each when they are about half fattened for market. It

would then take eight of them to weigh 1,000 pounds live weight. The following is suggested as a good ration at this point : 20 pounds corn- meal; 16 pounds flour wheat middlings; 2 pounds tankage.

It is intended, in a ration such as the one just given, that the grain shall be fed as a slop mixed with water. The corn might be fed whole.

If skimmed milk or buttermilk were available, of course less middlings and no tank¬ age would be necessary. The feeds used for pigs are not so numerous as those used for dairy cattle. The one thing to avoid in rations for pigs is a feed that is too high in fibre. Brood sows like some succulent feed and will consume rather large quantities of alfalfa or clover hay if it is kept before them in a rack. Through the feeding of hay money may be saved in the purchase of concentrates. In the feeding of pigs and sows in the summer time much larger gains can be made and feed saved if the pigs and sows are kept on good pasture.

Bibliography. — Armsby, H. P., (Bui. 459, U. S. Dept, of Agriculture, Washington, D. C., 1916).

Elmer S. Savage,

Professor of Animal Husbandry, Cornell Uni¬ versity.

LIVEING, George Downing, English chemist and surgeon: b. Nayland, Suffolk, 21 Dec. 1827. He was graduated at Saint John's College, Cambridge, in 1850, and in 1853 he be¬ came a Fellow and lecturer in natural science in that college. He was appointed professor of chemistry at the Royal Military College, Sand¬ hurst, in 1860; and from 1861-1908 professor of chemistry in the University of Cambridge. In 1911 he was appointed president of Saint John's College, Cambridge. In 1852 he estab¬ lished at his own expense the first chemical laboratory for undergraduates in Cambridge and may be said to be the founder of the sys¬ tem of experimental teaching that is now such a prominent feature of that university. He was instrumental in securing the examination and inspection by the university of secondary schools and the admission of girls' schools to the examinations. He has published

LIVER. The liver is the largest glandular organ of the body. In man it is situated on the right side of the abdominal cavity immediately beneath the diaphragm. Its weight in the adult is approximately from three to four pounds, and its size is roughly indicated by the follow¬ ing measurements: Greatest diameter about 12 inches, anteroposterior diameter about seven inches, thickness at different parts from one to three inches. The organ is divided into five lobes, of which the right and left are the prin¬ cipal ones; the former comprising the greatest

part of the bulk of the entire organ. On the under surface may be seen a square lobe lying anteriorly between the right and left lobes and known as the quadrate lobe. In a S'milar po¬ sition between the right and left lobes at the posterior part of the organ is the Spigelian lobe, while a bridge-like lobe extending from the latter to the right lobe is known as the cau¬ date lobe. The upper surface of the right and left lobes is convex and fits into the arch of the diaphragm. The lower surface of the or¬ gan is more or less concave and is divided by five fissures. Of these a longitudinal furrow extends from the anterior to the posterior bor¬ der of the organ separating the right from the left lobe ; a transverse fissure extends at right angles from this at a point somewhat nearer the posterior than the anterior surface; it di¬ vides the longitudinal fissure into an umbilical fissure in front (so called on account of its lodging the umbilical vein in the fcetus) and the fissure of the ductus venosus behind (on account of its lodging the ductus venosus in the fcetus). Between the lobus Spigelii and the right lobe of the liver is the fissure of the inferior vena cava, lodging that vein, while at the anterior edge of the organ at the side of the quadrate lobe is a fissure which accommo¬ dates the gall-bladder. The transverse fissure is the most important, as it serves for the en¬ trance into and emergence from the organ of the blood vessels, nerves and hepatic ducts.

The liver is held in place by five ligaments, four of which are simple folds of peritoneum, while the fifth, or ligamentum teres, is a round cord formed by the obliteration of the umbilical vein and extending from the anterior edge of the liver at the notch between the left and right lobes to the umbilicus and along the under sur¬ face of the liver to its posterior border. The peritoneal folds which serve the purpose of lig¬ aments are a longitudinal one extending on the upper surface of the organ from the notch in front to the posterior border, a coronary liga¬ ment which is found along the posterior bor¬ der, and a right and a left lateral ligament. These peritoneal reflexions serve to hold the organ in place, keeping it more or less firmly in apposition with the diaphragm.

The blood vessels entering the liver are the hepatic artery and the portal vein ; the former being a branch of the coeliac axis, the latter being the large venous trunk which is formed by the union of the superior mesenteric and splenic veins. Both the hepatic artery and por¬ tal vein divide in the transverse fissure into two parts, a right and a left, which enter the substance of the right and left lobes, respec¬ tively.

The hepatic veins are the efficient veins of the liver conveying the blood from this organ into the inferior vena cava. In addition to. these vessels, the liver, like other organs, is supplied with large and numerous lymphatics. The nervous supply of the organ is. derived from the left pneumogastric, the hepatic plexus of the sympathetics and from the right phrenic nerve. The bile ducts and hepatic ducts will be described below.

The gall-bladder is a small pear-shaned sac lying on the under surface of the liver. At its narrow end it opens into a small duct, (cystic duct) which passes back and down to ioin the hepatic duct forming the common bile duct,

which terminates in the duodenum. The gall¬ bladder is the reserve sac in which bile is stored and by the contracting of which a uniform flow of this liquid is maintained.

Structure of the Hepatic Substance. — The substance of the liver is made up of lob¬ ules of more or less equal size, separated by areolar connective tissue, which is a continua¬ tion of the fibrous covering of the organ or capsule of Glisson. In these fibrous septa be¬ tween the lobules are found the larger blood vessels, biliary ducts, lymphatics and nerves. The lobule under a low power of the micro¬ scope is seen to be composed of radiating col¬ umns of liver cells converging to a central point in which is situated a large vein (intra¬ lobular vein) belonging to the system of the inferior vena cava. The columns of liver cells branch and anastomose with each other, and be¬ tween them are spaces occupied by blood capil¬ laries and the primary biliary passages. The liver cells themselves are polyhedral in shape and are so arranged that a capillary space, known as the biliary capillary, is left between them. The capillary blood vessels are simi¬ larly formed by the peculiar juxtaposition of the liver cells, leaving spaces in which the ca¬ pillary blood vessels extend from the terminal branches of the portal vein in the septa at the periphery of the lobules to the central vein al¬ ready mentioned. The latter, collecting the blood from the capillary system, transports it to larger vessels known as sublobular veins, which finally unite and form the hepatic veins and discharge the blood into the inferior vena cava. The hepatic arteries and their terminal branches occupy the septa and supply blood to the connective tissue constituting the septa and to the walls of the portal veins and biliary ducts. The venous blood of this distribution is dis¬ charged into the terminals of the portal vein within the septa.

At the periphery of the hepatic lobules, the epithelial cells of the

hepatic columns continue directly into the smaller bile ducts which are situated in the interlobular septa. These pri¬ mary bile ducts unite to form larger ducts and finally a right- and left hepatic duct emerging from the transverse fissure unite to form a common bile duct. This is further joined by the cystic duct or duct of the. gall-bladder and it terminates in the duodenum in a common ori¬ fice with the pancreatic duct.

The structure of the liver is such that the blood entering through the portal circulation comes in contact with the liver cells on one side while the capillary biliary passages are on the other side of the hepatic cell.

The lymphatic vessels accompany the portal vein and hepatic artery and another system ac¬ companies the branches of the hepatic vein. The capillaries penetrate into the lobules, pass¬ ing between the hepatic cells.

Functions of the Liver. — The physiologi¬ cal functions of the liver are probably very nu¬ merous and are but imperfectly understood. • In the fcetus the liver is an important source of the red blood cells, reversing the process of adult life in which they are destroyed by the formation of bile. The position of the organ indicates that one of its imnortant functions is the elaboration of materials presented by the blood coming from the gastro-intestinal tract, and probably also the purification of this blood.

As far as they are known, the functions of the organ may be divided into the metabolic and

biliary.

Metabolic Functions. — It is known that the liver acts upon sugars and other carbohydrate materials to convert them into glycogen which is stored up by the hepatic cells. This accumu¬ lates during digestion and is utilized in the in¬ tervals, so that the percentage of sugar in the blood is kept at an approximately uniform stand¬ ard. It is known that in certain diseases (for example, diabetes), the function is greatly dis¬ turbed with resulting consequences that affect the general health. The liver shares with the muscles of the body this glycogenic function.

It also has the function of removing or neu¬ tralizing certain toxins and of removing cer¬ tain metallic salts.

Another important metabolic function is that of forming urea, the final stage in the meta¬ bolism of albuminous food. Uric acid also is to some extent formed in the liver but is more particularly the product of the lymphatic or¬ gans and tissues.

Biliary Function. — The formation of bile is one of the important attributes of the liver, though possibly this function is less predomi¬ nating than has hitherto been believed. The bile is an albuminous liquid containing bile pig¬ ments (bilirubin, biliverdin), bile salts (glyco- cholate and taurocholate of soda), nucleo-albu- min, cholesterin, fat and other less important substances including various salts. The bile is secreted more or less intermittently, the amount being greatest about the middle part of the day and increasing after meals. The daily output is from one to two pints. Its functions are nu¬ merous. Among other properties it aids in the absorption of fatty foods, stimulates intestinal peristalsis and prevents intestinal fermentation, and is the vehicle of excretion from the body of certain waste products, notably hemoglobin. It is known that bacteria and other minute for¬ eign bodies are discharged from the system through this medium.

Authorities are divided as to the amount of the work which the liver performs in the production of sugar. Bernard believes that the . glycogen is a reserve of carbohydrates, making the deduction from the fact that the liver is found to contain more glycogen than any other organ and that after death the glycogen is re¬ placed by sugar. Another authority, Pavy, is of the opinion that the liver forms no sugar, but uses it in the form of glycogen. Still another, Seegen, declares that sugar is formed in the liver and not from glycogen but from protein and fat. As the blood normally has about 0.15 per cent of sugar, an amount which is cut in half, if the action of the fiver is removed from the circulation, it is considered reasonably good evidence that the sugar in the blood comes either from the liver or from some other prod¬ uct formed in the liver. Also the amount of sugar in the blood does not normallv rise above 0.3 per cent without overflowing through the kidneys into the urine, which shows that the amount of sugar that can be destroyed by the liver is limited. The liver thus permits the accumulation and storing of this valuable ma¬ terial which would otherwise be lost. If sugar in the form of a glucose solution is introduced into the blood in such a way as not to pass

through the liver, it is immediately discharged via the urine, while if

it is so injected as to pass into the liver first, a comparatively large quantity remains there.

Diseases of the Liver. — The diseases of the liver may be classified under the following heads: Derangements of the Circulation; Nu¬ tritional and Inflammatory Disease of the Sub¬ stance of the Liver; Tumors; Parasitic Dis¬ eases; Functional Disturbance.

Circulatory Disturbances. — Congestion of the Liver is an increase in the volume of blood in the organ. This may be transient or more or less permanent.

(a) Transient congestion follows the inges¬ tion of food and drink, especially when these are of stimulating quality sudh as alcoholic beverages, spiced and rich foods. It is also occasioned by circulatory activity, such as ac¬ companies malarial and other fevers and other conditions of systemic excitement. In these cases the increase of blood in the liver is the result of an excessive supply of blood to the organ.

An excess of blood in the liver frequently occurs after a flow of blood, such as that of menstruation, has been stopped, or when, through catching cold or even because of some nervous condition, such flow of blood, or a blood flow that has been caused by 'hemor¬ rhoids, has been stopped.

(b) Passive congestion is the form in which the outflow of blood from the liver is interfered with. This form is likely to be more or less durable or permanent. Among the causes, most important are diseases of the heart and the lungs, or any other cause of obstruction to the circulation in the thorax.

It is said that malaria is the most frequent occasion of an attack of congestion of the liver and that it occurs most frequently in autumn and in persons of middle age.

Pathological Anatomy. — In active or acute congestion no marked alteration is observed on examination of the organ. In passive conges¬ tion the liver becomes enlarged, and the cen¬ tral veins within the lobules are seen to be in¬ creased in size, while the peripheral parts of the lobule often become light-colored from degen¬ eration of the liver cells. This gives the sur¬ face of section of the organ a peculiar appear¬ ance that this has been well designated <(nutmeg liver. ® When passive congestion is long con¬ tinued, the hepatic cells, compressed by the di¬ lated blood-vessels and

otherwise disturbed in their 'nutrition, undergo atrophy, while at the same time some fibrous tissue growth replaces the degenerated hepatic cells, and the whole organ becomes darker in color from deposit of pigment from the stagnated blood. The result is that the organ decreases in size, becomes harder and of a darker color than normal. The term cyanotic or red atrophy is given to this condition.

The symptoms of congestion of the liver vary with the kind, the degree and stage of the disease. In acute congestion, such as follows over-indulgence in stimulating food and drink, a sense of heaviness in the region of the liver, and perhaps slight disturbances of digestion with general malaise constitute the symptoma¬ tology. In chronic or passive congestion, such as accompanies heart disease, the symptoms are

quite distinctive.. The organ increases in size so much that it is easily felt in the upper part of the abdominal cavity and it becomes tender or even acutely painful. Digestive disturbances are very common, partly as the result of the condition of the liver itself and partly as the result of the underlying condition which occa¬ sioned the congestion of the liver. Among these digestive symptoms, loss of appetite, diffi¬ cult and painful digestion, nausea and vomiting are the most conspicuous. When the conges¬ tion of the liver is pronounced, more or less jaundice occurs. This results from the thicken¬ ing of the walls of the biliary ducts and the compression of the finer biliary channels by the swollen state of the organ. In marked cases, the jaundice may be intense; usually it is slight.

In the last stages of congestion of the liver when the organ has undergone cyanotic indura¬ tion, the symptoms may be similar to those of cirrhosis (q.v.).

Treatment. — The treatment of congestion of the liver is directed primarily toward the relief of the condition which causes the congestion. In heart diseases, cardiac tonics are important. Sometimes a prompt relief is obtained by vene¬ section. Depletion from the portal circulation by brisk purgation may also be efficacious, and regulation of diet is important as the congested organ is less able to withstand injurious effects of stimulating foods or drink than the healthy liver.

Diseases of the Substance of the Liver. — Among these may be considered: (1) Simple atrophy; (2) acute yellow atrophy; (3) fatty lfver; (4) cirrhosis, and (5) abscess.

Simple Atrophy of the Liver occurs in cases of starvation or inanition from long-continued disease. Pressure atrophy is found in cases of deformities of the chest, in which the ribs are pressed inward against the liver, as a result of tight lacing and the substance of the organ does not change very greatly in atrophy, though the individual liver cells are smaller than nor¬ mal and usually somewhat pigmented. The shape of the liver is often peculiar. In the case of deformities of the chest, the pressure exerted by the ribs may cause deep grooves in the surface of the liver, or there may be a single transverse furrow at the lower, margin of the ribs where this is pressed against the organ.

The function of the liver is probably not seriously impaired in any of these cases, though some disturbance undoubtedly occurs..

Acute Yellow Atrophy is. a disease in which the liver is decreased in size, often to a re¬ markable degree. It is soft and on transverse section the substance is of a light yellow color with mottled areas of reddish or purplish hue, the latter being portions in which the substance is congested or in which hemorrhages have

taken place. . . .

Changes are found also in various other tis¬ sues of the body, showing that acute, yellow atrophy is not wholly a disease of the liver but a general infection or intoxication, having its most marked manifestations in the liver..

Symptoms. — After a period of indefinite di¬ gestive disturbances, acute jaundice. and marked nervous svmptoms set in. The patient also be¬ comes delirious, and sometimes comatose. In the course of 10 days or two weeks the disease

in a large percentage of cases terminates fatally. The treatment consists in stimulation or other measures called for by the general condition.

Fatty Liver. — There are two varieties of fatty disease of the liver, that known as infil¬ tration and that termed fatty degeneration. In the former there is a deposition of fat in the liver cells, similar to that which is found in the subcutaneous tissues in ordinary obesity. In the latter the liver cells undergo destruction with formation of fat. Fatty infiltration may be the result of excessive supply of nutriment as in

ordinary obesity, and is also found in certain states of general weakness and wasting, particularly in association with diseases of the lungs. In the latter cases, the cause is to be found in the deficient consumption of fat, owing to diminished oxygenation. Fatty , de¬ generation may be caused by various infectious diseases, but is more particularly the result of poisoning with phosphorus, arsenic, mercury and other poisons.

In fatty infiltration, the liver is enlarged, lighter than the normal organ in specific gravity and in color, and on section with a knife the increased fat is indicated by an oily character of the cut surface. In fatty degeneration the liver is usually diminished in size and the sub¬ stance is of a friable softened character.

Cirrhosis of the Liver is the most frequent and important of the diseases of this organ. It is essentially a replacement of normal liver tissue by connective tissue, causing more or less hardening.

The causes of cirrhosis of the liver are numerous, though one in particular occupies a very prominent position on account of its fre¬ quency. The cause referred to is over-indul¬ gence in alcohol, especially raw spirits, whence the terms alcoholic liver, gin drinker's liver, etc. It must not be supposed, however, that alcohol is the invariable cause. Over-eating, gouty con¬ ditions, syphilis and various other infectious diseases may ffie followed by cirrhosis entirely like that caused by alcohol. It has been noted in the description of congestion of the liver that a form of cirrhosis (cyanotic induration) results from long-standing congestion. Some¬ times cirrhosis of a peculiar type is caused by obstruction of the biliary ducts. This produces a stagnation of the bile and an irritation of the substance of the liver that terminates in the formation of connective tissue.

Pathological Anatomy. — Two forms of cir¬ rhosis of the liver are recognized. One known as the atrophic, in which the liver is decreased in size; the other, hypertrophic, in which the organ is increased in size. In atrophic cirrhosis (hob-nail liver, granular liver), the organ has an irregular nodulated or granulated surface, the irregularities being caused by the contrac¬ tions of the connective tissue which forms the basis of this pathological state of the organ. It is very firm, and on section the increased connective tissue can be recognized in the form of more or less distinct septa interlacing the lobules or groups of lobules of the liver sub¬ stance. The lobules and groups of lobules are compressed by the contracting connective tis¬ sue, and as a result undergo atrophy and de¬ generative change. The

connective tissue formation which is characteristic of this. form of cirrhosis is found in the interlobular tissues

surrounding the terminal branches of the portal vein. Consequently the portal circulation is ob¬ structed, and congestion of the various abdom¬ inal organs whose blood is discharged through this circulation results. When cirrhosis has proceeded for some time, new channels of cir¬ culation may be established, by which the con¬ gestion of the abdominal organs is relieved. There results from this visible enlargement of the veins of the abdominal walls an increased size of the veins in the lower end of the oesophagus and in the rectum.

Hypertrophic cirrhosis of the liver is a form in which the liver is increased in size. The surface is usually smooth and the substance of a uniform character. This is due to the fact that the new connective tissue is uniformly dis¬ tributed within as well as between the liver lobules. This form of disease may be the result of the same causes as the atrophic variety, but is more commonly due to obstructions of the flow of bile. Very commonly interference with the discharge of bile is found in this form, as interference with the circulation of blood is characteristic of the other variety.

Symptoms. — The symptoms of cirrhosis of the liver in earlier stages are very obscure and uncertain, but frequently include a pallor and sallowness with peculiarly muddy complexion. Later interference with the portal circulation causes congestion of the mucous membrane of the stomach and intestines, with resulting dis¬ turbances of digestion, such as dyspepsia, vomiting, constipation and even hemorrhages from the stomach or bowel. There is also a thinness and emaciation with drawn and oc¬ casionally bloated face, sunken eyes with dis¬ colored whites. The spleen is enlarged from congestion of its substance, the abdomen is distended forming a marked contrast to the fleshless face and limbs, and the last phase of the disease is marked by dropsical effusion in the abdominal cavity (ascites). Cirrhosis of the liver is a chronic disorder which may ex¬ tend over a period of many years and which may be arrested even after it has reached an advanced stage. Among the symptoms of hy¬ pertrophic cirrhosis are tenderness and increase in the size of the liver, the development of jaundice, and sometimes the occurrence of fever. The disease is more rapid in its course than the atrophic

variety.

Treatment. — The treatment of this condition is preventative rather than curative. When due to alcohol it may be arrested if not too well advanced, by a control of the habit of drink¬ ing; and a restitution of normal conditions may be favored by careful diet, including mainly the avoidance of stimulating or irritating food, and of general excesses of diet. The use of saline waters may be beneficial. When advanced to the stage of dropsy of the abdominal cavity, depletive measures, such as are used for the relief of dropsies in general, may be useful; or it may be necessary to remove the liquid by tapping.

Abscess of the Liver may resiilt from dysen¬ tery and other ulcerative conditions of the in¬ testines, in which cases the abscess is likely to be solitary; or it may accompany a septicaemia originating in the abdominal cavity from some local disease like appendicitis or puerperal in¬ fection, in which case multiple small abscesses

are found throughout the substance of the liver. Another variety of multiple abscess is that in which obstructions of the biliary ducts by gall¬ stones occasion retentions of bile and the for¬ mation of local foci of suppuration. Abscess is more common in tropical countries, probably on account of the greater frequency of dysen¬ tery in such localities.

Pathological Anatomy and Symptoms. — The liver is enlarged, and sometimes a project¬ ing mass can be seen in the upper right portion of the abdomen. The abscess may be of small size, but frequently reaches very considerable proportions, containing perhaps a pint or more of thick pus. It may discharge externally through the skin, into the abdominal cavity or some of the abdominal organs, and even through the diaphragm, into the lung and bronchi. Occasionally a spontaneous cure re¬ sults in this way. More commonly the patient perishes before the abscess ruptures, from gen¬ eral infection or from prostration. The disease is frequently attended with great pain, with jaundice and with irregular fever.

Treatment. — The only effective treatment of abscess is surgical operation.

Tumors. — Among the tumors of the liver, the most important is cancer. This is usually secondary to cancer of the stomach or intes¬ tines. It may, however, be primary in the liver. The liver is found enlarged and its surface irregularly studded with nodules vary¬ ing in size from that of a pea to that of an apple, or even larger masses.

Symptoms. — The important symptoms are profound disturbance of general health with emaciation, such as characterize cancer in any part of the body; pain in the region of the liver, and increase in the size of the organ ; jaundice of intense and lasting character; and occasionally dropsy of the abdominal cavity.

Parasitic Diseases. — The most important of these is the hydatid cyst, which results from the lodgment of the embryo of the Tenia echi¬ nococcus, a tapeworm occurring in the adult state in the intestines of dogs and some others animals. The eggs of this tapeworm are com¬ municated by the dog to the human through drinking water or fresh vegetables. As all of the blood from the enteric canal passes through the liver the parasite embryo is generally lodged) there. Fortunately this disease is rare in North America. In man the larval condi¬ tion alone is met with. The embrvo in the liver becomes surrounded by a capsule in which a light liquid collects and thus a cyst is formed. Secondary cysts (daughter-cysts) may develop within the original one and thus a large cavity filled with smaller spherical cysts may result. The liver increases in size and the cyst may be visible, or it may be feU through the abdominal walls as a resilient projecting mass. The hy¬ datid cyst may subsequently contract by absorp¬ tion of its liquid contents or it may rupture in the same manner as an abscess. The symptoms of this disease are frequently obscure, but jaundice (from pressure on the bile ducts), dropsy of the abdominal cavitv from nressure on the portal vein and other "mechanical® symptoms may occur.

Jaundiceˆ is a functional disturbance of the liver in which the biliary coloring matter is ab¬ sorbed by the blood and deposited in the tissues

of the body. Jaundice may result from any cause of obstruction of the outflow of the bile through the biliary ducts or from any serious disease of the liver substance, such as abscess, cancer, acute yellow atrophy, etc. Various poi¬ sons and infectious diseases cause jaundice by their destructive action on the liver.

The most frequent form of jaundice is that known as simple catarrhal jaundice, which re¬ sults from digestive disturbances, especially such as follow great excess in eating or drink¬ ing and exposure to cold. In this variety, the outflow of the bile is impeded by swelling of the

mucous membrane of the duodenum where the common bile duct discharges, and also by swelling of the lining membrane of the larger bile ducts themselves. When the bile formed within the liver cannot find normal discharge, it is absorbed into the blood, and finding its way to various parts of the body discolors these, causing the yellow appearance of the skin and mucous membranes which characterizes the disease.

Symptoms. — The symptoms of catarrhal jaundice are, in the first place, those of intense disturbances of digestion, such as great pain in the region of the stomach, nausea and vomit¬ ing; later, the appearance of a yellowish dis¬ coloration of the skin and mucous membranes. The faeces become light-colored from the ab¬ sence of biliary coloring matter, and in ad¬ vanced cases they are actuallv a light clay color or even white. The urine becomes dark brown or greenish in color. The patient is depressed, often even melancholy. The pulse is slow; the temperature as a rule is depressed, though there may be a moderate degree of fever.

Treatment. — Careful dieting is an essential in the treatment. The patient must abstain from food entirely at first, and later take the less irritating of foods, such as milk, broths and the like. Bismuth, pepsin, small doses of calomel and salines are administered to im¬ prove the state of digestion and lessen the con¬ gested condition of the stomach and duodenum. Drastic purgatives are harmful. Warm appli¬ cations over the region of the liver are effica¬ cious. The disease usually subsides in a few days or in a week or two.

Gall-stones. — Gall-stones are usually formed within the gall-bladder; very rarely in the biliary ducts within the liver. The gall-stone consists of biliary pigment matters, but in some cases almost wholly of one of the constituents of bile, cholesterin. On section through a gall¬ stone, a central nucleus may be seen which is composed of epithelial detritus and inspissated mucus, together with bacteria in many cases. Around this is deposited cholesterin or biliary pigment. The gall-bladder may contain a sin¬ gle stone or, more commonly, a number, and sometimes even hundreds are found.

Gall-stones are more common in women past middle life than in younger persons or in the male sex.

Symptoms may be wanting until a stone en¬ ters the cystic duct and becomes lodged in the latter, or passing through this, becomes ob¬ structed in the common bile duct, and causing what is known as biliary colic. The patient is seized with intense pain, radiating to the

right and to the back, sometimes as high as the right shoulder. Vomiting and other reflex disturb¬

ances and even collapse may occur. When the stone lodges, jaundice is the most pronounced symptom. Frequently the gall-stone passes with some effort and the paroxysm is relieved. Sometimes this relief is brought about by a recession of the stone into the gall-bladder.

Treatment. — The treatment of gall-stone consists of careful diet and the use of saline waters to improve the digestive conditions and render the bile as liquid as possible. Gall¬ stones may thus be diminished in size and enabled to pass through the ducts. During the paroxysm of biliary colic, remedies to relieve pain are imperatively necessary. Hypodermic injections of morphine and even narcosis with ether or chloroform may be required. Surgical operation for removal of the stone is often de¬ sirable.

LIVER-LEAF, or NOBLE LIVER¬ WORT. See Hepatica.

LIVER OILS. See Oil.

LIVERMORE, Mary Ashton Rice,

American reformer and lecturer : b. Boston, Mass., 19 Dec. 1821 ; d. Melrose, Mass., 23 May 1905. She was married in 1845 to Rev. D. P. Livermore, a Universalist minister (d. 1899), and was early in life active in the anti-slavery and temperance movements. In 1862 she was appointed agent of the Northwestern branch of the United States Sanitary Commission at Chicago, and after the Civil War period was conspicuous in her efforts to promote the woman suffrage and temperance movements. With Frances E. Willard she edited American Women. Among her popular lectures are 'What Shall We Do with Our Daughters?; 'Women of the War ; 'The Moral Heroism of the Temperance Reform.) She is the author of 'Pen Pictures) (1865) ; (Thirty Years Too Late) (1878) ; (My Story of the War (1888) ; (The Story of My Life) (1897), etc.*

LIVERPOOL, Charles Jenkinson, 1st

Earl of, English statesman : b. Winchester, 26 April 1727; d. London, 17 Dec. 1808. He was educated at Charterhouse School, and later en¬ tered University College, Oxford, whence he was graduated M.A. in 1752. In 1760 he be¬ came private secretary to Lord Bute; in 1761 he was elected to Parliament and during the same year was appointed to the post of Under Secretary of State; in 1763 became joint Secre¬ tary of the Treasury; was made Lord of the

Admiralty by the Grafton administration in 1766; became one of the vice-treasurers of Ireland in 1772; Master of the Mint 1775, and Secretary of War under Lord North 1778-82. He was appointed by Pitt in 1783 a member of the Board of Trade and continued to serve in that body till 1801, from 1786 serving as its president, but he did not enter public life from the time of his retirement from the Board till his death. In 1786 he became president of the council for trade and the plantations, and the same year Chancellor of the duchv of Lancas¬ ter, and was created Baron Hawkesbury, and Earl of Liverpool 1796. His association with Lord North in the closing years of the Ameri¬ can War made him for a time very unpopular; but this he outlived, and he took a prominent part in arranging the first commercial treaty with the United States. He published, among other works, 'Discourse on the Conduct of

Government Respecting Neutral Nations' (1758) ; Collection of All the Treaties of Peace between Great Britain and Other Powers from 1648 to 1783' (3 vols., 1785) ; (A Treatise on the Coins of the Realm' (1805), etc.

LIVERPOOL, Robert Banks Jenkinson,

2d Earl of, English statesman : b. London, 7 June 1770; d. there, 4 Dec. 1828. He was the eldest son of Charles Jenkinson, 1st Earl of Liverpool (q.v.). He was educated at Charter- house School and Christ Church College, Ox¬ ford, 1786-89; in the latter year traveled in Europe, reaching Paris during the French Revolution and witnessing the fall of the Bas- tile. He was elected to Parliament in 1790; in 1803 was created Baron Hawkesbury; and in 1808 upon the death of his father succeeded to the title of Earl of Liverpool. In Parliament he was prominently identified with the Tories; for seven years was a member of the India Board; in 1799 became Master of the Mint; and in 1801 became Foreign Minister in the Addington Cabinet, and while in that office negotiated the Treaty of Amiens with Napoleon. On 12 May 1804, when Pitt was returned to power, he accepted the office of Home Secre¬ tary and became leader of the House of Lords and held that post until Pitt's death. During the Whig ministry of 1806-07 he led the op¬ position, but on 25 March 1807 was again ap¬ pointed Home Secretary in the Portland ad¬ ministration; and Secretary of War and the Colonies, 1809-12. He held various portfolios during Perceval's administration and when

the latter was assassinated in 1812 became Premier, and continued to direct English affairs until April 1827, when a stroke of paralysis forced him to resign office. He opposed the Roman Catholic emancipation movement and the re¬ form of Parliament and his term of office was marked for a time by a somewhat retrograde policy on the part of the ministry and wide¬ spread discontent among the people. Public finances were criticized as being poorly admin-isteied; the duty on imported grain was in¬ creased; and the policy of forcible repression was followed by him till 1826, but from that time he sought to modify and reform the bur¬ densome Corn Laws. He was instrumental in sending Napoleon to Saint Helena and in read¬ justing French affairs in 1815 and 1818. With¬ out being a man of eminent talents, he was pos¬ sessed of unfailing tact, good temper and an instinct for practical solutions.

LIVERPOOL, England, a city, municipal, county, and parliamentary borough, and seaport, on the right bank of the Mersey, three miles from the sea, and extending about eight and a half miles along the east side of the river. It is the second seaport of the British Empire, and is fourth in population among the cities of the United Kingdom. The port of Liverpool ex¬ tends from Hoylake, at the mouth of the river Dee, along the Cheshire coast of the river Mer¬ sey to Ince Ferry, and from Dungeon Point on the Lancashire coast of the river to Formby Point at its mouth. Liverpool is (by rail) 201 miles northwest of London, 251 miles from Harwich (northwest), 92 miles from Birming¬ ham (northwest), 34 miles from Manchester (west), 96 miles from York (southwest), 124 miles from Hull (southwest), and 227 miles southwest of Edinburgh.

Area. — The area of the city is 16,642 acres (23 square miles) ; the ratable value £4,470,837. The population in 1905 (officially estimated) was 730,143. The following statistics of population will show the comparatively rapid growth of the city: 11,833 (1720); 35,600 (1770) ; 77,708

(1801); 376,065 (1851); 517,980 (1891); 684,-

958 (1901); 746,421 (1911).. The great ad¬ vance in the population in later years indicated by these figures is partly explained by the extension of the city boundaries so as to take in several adjoining townships.*

Divisions. — The city is divided into nine parliamentary divisions returning nine members to Parliament ; and into 35 wards, returning 137 members to the city council.

Public Buildings. — Down to the middle of the 19th century Liverpool contained very few public buildings ; the streets were narrow and architecturally unattractive. During the last 60 years a complete change has taken place, and within a radius of half a mile from the town-hall the city has been rebuilt ; new streets have been made, and old ones widened. The following are amongst the most important of the public buildings :

Saint George's Hall, opened 1854, cost £328,500; town-hall, 1795, cost £170,490; munici¬ pal offices, 1867, cost £141,170; post office, 1899, cost £400,000 (including site) ; Picton Reading- Room, 1878, cost £20,000; Central Technical Schools, 1901, cost £110,000; University build¬ ings, cost £220,000 (including sites). The Wil¬ liam Brown Library and Museum (1860) and the Walker Art Gallery (1877) were the gifts of the generous citizens whose names they bear. The Anglican Cathedral, begun in 1904, will, when completed, be one of the most im¬ posing ecclesiastical buildings in the British Empire. The Royal Infirmary, the Blue Coast Hospital and the Seamen's Orphanage are hand¬ some buildings devoted to the cause of charity.

Many of the buildings associated with com¬ merce have been designed by some of the fore¬ most architects of the day and must be ranked amongst the finest in the city.

With the completion of the three great buildings now in progress, viz. : the cathedral, the dock offices and the cotton exchange, Liverpool, from an architectural point of view, will be unsurpassed by any provincial city or town in the United Kingdom.

Libraries. — The free public libraries of the city consist of one large central reference library (already referred to) and 11 lending libraries and reading-rooms. An extension of the reference library has been made to receive the Hornby collection of art books, prints and autographs. Other important libraries in the city are the Athenaeum (founded 1798), The Liverpool Library (founded 1758), and The University (founded 1881). There are also special theological, legal and medical libraries.

Art Gallery and Museums. — The famous collection of pictures in the Walker Art Gallery is extremely valuable, and contains works by Burne-Jones, Herkomer, Holman Hunt, Leigh¬ ton, Millais, Albert Moore, Poynter, Briton Riviere, D. G. Rossetti and others. Modern sculpture is also well represented. An autumn exhibition is held annually when the most im¬ portant pictures of the year are placed

on view. The public museums containing archaeological,

ceramic and natural history collections (the latter including an aquarium) are amongst the most popular institutions in the city.

Places of Worship. — The bishopric of Liverpool was founded in 1880, when an endow¬ ment of £100,000 was raised by public subscrip¬ tion. There are over 100 churches in the city (which does not comprise the whole of the dio¬ cese). The various Non-Conformist denomina¬ tions have amongst them about 190 places of worship.

Education. — The city possesses an efficient system of education. The elementary, second¬ ary and technical schools are under the control of the city council. There are a considerable number of scholarships to enable students to pass from the elementary to the secondary schools and on to both the Liverpool Univer¬ sity and the universities of Oxford and Cam¬ bridge.

The Liverpool University was first estab¬ lished as a college in 1881, and obtained its charter as a university with power to confer degrees in 1903. The teaching staff numbered in 1914 138 members, with 700 students. The university is endowed both for teaching and research and connected with it is the famous School of Tropical Medicine.

Water, Electricity and Tramways. — The city and district are supplied with fresh water from Rivington in Lancashire, and Lake Vyrnwy, Montgomeryshire (Wales). The engi¬ neering difficulties connected with the supply of water from such distances have been very great and the cost proportionately heavy. The total cost of the water undertaking has been £6,586,793. There is a total capacity of 70,000,- 000 gallons per day, and the daily consumption in the city is about 40,000,000 gallons. In 1896 the corporation purchased the works and rights of the Liverpool Electric Supply Company at a cost of £400,000. Since that date the demand for electricity for light and power has rapidly developed and the undertaking has proved finan¬ cially successful. The total capital expenditure was, on 31 Dec. 1904, £1,719,000. For many years a portion of the profits has been contrib¬ uted to the rates of the city. In 1904 the amount so contributed, after paying all working expenses, charges for interest

and sinking fund, was nearly £17,000.

In 1897 the corporation decided to purchase the tramways, which down to that date had belonged to a limited company. The amount paid was £567,375. The overhead trolley sys¬ tem of electric traction was quickly substituted for the horse system hitherto in use. New routes were opened up, streets widened, the length of track nearly doubled and fˆres re¬ duced. The length of track is now over 116 miles and the average length of the penny stage two and one-half miles. The introduction of ˆfirst-class® cars at enhanced fares has been attended with success.

Insanitary Houses. — During the past 40 years the corporation has spent large sums of money in the demolition of insanitary cottage property, and in the reconstruction of artisans' dwellings. The city is also well provided with public baths, the oldest in the kingdom, being established in 1794, including open air baths (free), and in the poor quarters of the town there are corporation buildings efficiently equipped for public laundry work.

Parks, Etc. — The city possesses a number of fine parks, gardens and recreation grounds, The total number of acres thus allotted to pub¬ lic use is about 1,200 — including Sefton park with 269 acres, the cost of which, including the laying out, was £410,269. About 100 acres of the above represent churchyards, and plots of land varying in size from one-fourth of an acre to three acres, which have been turned into gardens and recreation grounds, thus greatly improving the appearance of many lo¬ calities and adding to the pleasure of the inhab¬ itants.

All the land here referred to has not been purchased by the corporation. The Wavertree playground, 108 acres, was the gift of a gener¬ ous citizen, and cost about £100,000; while the Roby estate (100 acres), situated on the eastern boundary of the city, was donated by Alderman Bowring and dedicated to the use of the citi¬ zens. The estate of Calderstones, south of the city, is the most recent purchase.

Hospitals. — The medical charities are on a very extensive scale. Some of the charities are old, but all are now housed in modern buildings possessing all the latest scientific re¬ quirements. Most of the charities are main¬ tained by endowments and public subscriptions, but seven of the largest hospitals in the city have been built and are maintained by the cor¬ poration, and in 1904 the sum of £46,000 was expended in their administration. In addition to the

hospitals in the city there are sanatoria for consumptive patients at Delamere Forest and Heswall Hills. The Royal Southern Hos¬ pital has special arrangements for patients suf¬ fering from tropical diseases.

Railways. — Nearly all the English railway companies are connected with Liverpool. The London and North Western, the Lancashire and Yorkshire and the Midland Railway companies have large and commodious passenger stations. In 1895 a new riverside railway station was opened for the convenience of ocean travelers. There are 100 stations in the Liverpool area. The city is also connected by canals with the manufacturing towns of Lancashire, Yorkshire and the Midlands. Within recent years the Mersey Railway, which connects Liverpool with Birkenhead by a tunnel under the river, and the Lancashire and Yorkshire line to Southport were electrified, and the latter was connected at Seaforth with the Overhead Electric Railway which runs along the line of docks from The Dingle.

Trade and Shipping. — Liverpool has a few

manufactures, but it is essentially a pork So far as the export trade is concerned statistics prove that it is the leading port in the United Kingdom, while for imports it is second only to London. It is the natural outlet for the great manufacturing industries of Lancashire, and most of the raw cotton is imported here. The total value of exnorts to the United States in 1917 was $24,065,832 compared with $30,144,189 in 1916, a decrease due to the war of over $6-000,000 chiefly in Egyptian cotton. Shipments of manufactured goods, however, increased from $8,200 834 in 1916 to $10,444,820 in 1917, a gain of $2,243,986. Not the least important part of the shipping industry is the ocean pas¬ senger traffic. Connected with the. port of Liverpool are fleets of the largest ships afloat, and the daily sailings and arrivals of these

steamers to and from all the great ports in the world draw to the city large numbers of emi¬ grants and other passengers. The tonnage of arrivals and departures, including Birkenhead, but excluding coastwise shipping, was in 1914 22,771,000 tons.

Docks. — The first wet dock dates from 1715, when an area of four

acres was enclosed. The Mersey Docks and Harbor Board, which was constituted by act of Parliament in 1858, has control of the systems of Liverpool, Birken¬ head and Bootle. There are 65 wet docks, which, from Gladstone Dock at the north end to the Herculaneum Dock at the south end, occupy a river frontage of over seven miles, with a water area of 450 acres, and quayage ex¬ tending for 27 miles. Herculaneum Dock has a fine petroleum reservoir cut out in solid rock, with a holding capacity of 60,000 gallons. The Birkenhead Docks on the south side of the river have a water area of 172 acres and a quay length of 10 miles. The warehouses of the port, particularly those devoted to the stor¬ age of grain and tobacco, are of gigantic dimen¬ sions, and fitted with every modern appliance. The great passenger steamers nearly all embark and discharge their passengers at the landing stage, which is one of the attractions of the city.

Landing Stage. — It is a floating structure 2,478 feet in length with a general width of about 80 feet. The northern portion of this stage is allotted to the use of the ocean going and coasting steamers, while the southern por¬ tion is reserved for the busy ferry traffic across the river to the Cheshire coast..

River Dredging. — One of the most import¬ ant duties of the Mersey Dock Board is the dredging of the river and increasing the depth of water at the bar which is 11 miles from the landing stage. By the end of the year 1909 nearly 42,000,000 tons of sand had been removed from the bar. The revetment of certain sand¬ banks has also been undertaken, with 100,000 tons of stone to protect the under stone from erosion. Before dredging was commenced the depth of water at low water of spring tides was 11 feet, whilst now under the same conditions there is a depth of 30 feet.

Such are the efforts necessary to maintain the city in that position so eloquently described by James R. Lowell in the words which appro¬ priately close this notice :

History. — The history of Liverpool practi¬ cally dates from the issue of the letter patent, or charter, by King John in 1207, and the erec¬ tion of a castle. This latter, structure has long since disappeared, part of its site being now occupied by a statue of Queen Victoria. In 1709 a wet dock was constructed, the first in the kingdom. From this event dated the rapid ex¬ tension of its commerce and population. In 1880 Liverpool was made the see of a bishop, and in that year a charter was granted consti¬ tuting it a city. The town developed very slowly until after the civil wars, m

which it played a prominent part, being besieged three times. The facts stated in this article will prove that Liverpool is in every sense of the word a

modern city, its development during the 19th century being almost unparalleled.

Liverpool is justly proud of the distinguished men and women who have been either born within its boundaries or associated with it. There are statues of William Roscoe, William Ewart Gladstone, William Rathbone and others, while the birthplaces of Mrs. Hemans, Arthur Hugh Clough and W. E. Gladstone have had memorial tablets placed on them. The house at Rock Ferry, wherein Nathaniel Llaw-thorne resided, is well known.

Bibliography. — Baines, (History of the Commerce and Town of Liverpool (1852) ; Ellison, (The Cotton Trade of Great Britain, with a History of the Liverpool Cotton Mar¬ ked (1886) ; Morton, (The Geology of the Country Around Liverpool } (1891) ; Picton,

(Memorials of Liverpool, Including a History of the Dock Estate) (2 vols., revised ed., 1903) ; Muir and Platt, (History of Municipal Govern¬ ment in Liverpool to 1835 J (1906) ; Muir, (Municipal History of LiverpooP (1907) ; (Vic¬ toria History of Lancashire (Vols. II and IV, 1908) ; Young, H. S. and H. E., (Bygone Liver¬ pooP (1918); 'Handbook for the City of Liverpool. **

George T. Shaw,

Master and Librarian, The Athenceum, Liver¬ pool.

LIVERPOOL, Nova Scotia, Canada, the capital of Queen's County, a town and port of entry on the south bank of the Mersey estuary at its entrance into Liverpool Harbor, 80 miles southwest of Halifax. Founded by settlers from Connecticut in 1760, and at one time a centre for privateers, and possessing later an important shipping trade, it has large fisheries and some manufactures of lumber and machin¬ ery, grist, pulp, paper and saw mills. Pop. 2,109.

LIVERSIDGE, liv'er-sidj', Archibald, Aus¬ tralian chemist and mineralogist: b. Turnham Green, England, 17 Nov. 1847. He was edu¬ cated at the Royal School of Mines and the Royal College of Chemistry and at Christ's Col¬ lege, Cambridge. In 1867 he was appointed acting instructor of chemistry in the Roval School of Naval Architecture; in 1870 became university demonstrator in chemistry at Cam¬ bridge ; and since 1874 has been professor of chemistry,

*from 1883-1904 dean of the faculty of science, and from 1870-1904 Fellow of the senate in the University of Sydney, New South Wales, Australia. He retired in 1909. He also founded the Australasian Association for the Advancement of Science. He has written (The Minerals of New South Wales) ; (Reports upon Technical Education and Museums, * etc. For many years he edited the Journal of the Royal Society of New South Wales.*

LIVERWORTS, or HEPATICˆ, a group of cryptogamous plants, forming one of the two divisions of the class Bryophyta or Muscinece (moss-worts), and closelv related to the true mosses (Musci), with which some of the species are apt to be confounded. Tbev are either spread out m the form of a simple lobed thallus, showing differentiation into a dorsal (upper) and a ventral (lower) surface, or they are com¬ posed of a small ramified stem bearing sessile leaves in two or three ranks. Root-like bodies (rhizoids) attach the plant to its substratum.

Many liverworts reproduce themselves by means of brood-cells (thallidia or gemmae), formed asexually in cups on the surface, in leaf-margins, etc. They are also reproduced sexually by means of club-shaped antheridia, containing the male elements (antherozoids), and flask-shaped archegonia, containing each an egg-cell or oosphere. These sexual organs occur in groups either in small depressions or special outgrowths of the thallus, or as so-called flowers at the tips of the leafy shoots, or in the axils of their leaves. The spore-capsule is formed after fertilization within the archegonium, and the spores are often provided with hygroscopic elaters which assist in their dispersal. On ger¬ mination a spore produces, not the common liverwort plant, but a very small filamentous protonema. There are four families of liver¬ worts, namely, Ricciacecu, Marchantiacece, An- thocerot'acecu and Jungermanniacecu. The first includes the duck-weed-like crystalwort (Riccia natans) ; the second the exceedingly common Marchantia polymorphic], formerly used as a basis for medicine for ailments of the liver (whence the name ˆliverwort®) ; and the last, which is much the largest family, comprises all the leafy, as well as some thalloid forms. The Hepaticse are generally distributed over the world, and prefer situations similar to those occupied by the mosses. There are about 4,000 species, of which about 3,500 belong to the Jungermanniacecu. See authorities on crypto- gamic botany,

especially Cooke's (British He- paticse (1893) ; and Strasburger, (Text-book of Botany) (1903).*

LIVES, Parallel (/3/oz 'KapaXk^loC) , the work upon which Plutarch's fame chiefly rests, were published by him late in life after his re¬ turn to Chaeronea, and, if one may judge from the long lists of authorities given, must have taken many years in the compilation. . The bi¬ ographies appear in pairs, each of which places a Greek and Roman in juxtaposition. For ex¬ ample, Theseus and Romulus are compared as the legendary founders of states. Twenty-two pairs are extant : Theseus and Romulus, Ly- curgus and Numa, Solon and Valerius Publi- cola, Themistocles and Camillus, Pericles and Fabius Maximus, Alcibiades and Coriolanus, Timoleon and /Emilius Paulus, Pelopidas and Marcellus, Aristides and Cato the Elder, Philo- pcemen and Flaminius, Pyrrhus and Caius Ma¬ rius, Lysander and Sulla, Cimon and Lucullus, Nicias and Crassus, Sertorius and Eumenes, Agesilaus and Pompey, Alexander and Julius Caesar, Phocion and Cato the Younger, Agis and Cleomenes and Tiberius and Caius Grac¬ chus (a double comparison), Demosthenes and Cicero, Demetrius Poliorcetes and Antony, Dion and Brutus. To these are added the four single lives of Aratus, Artaxerxes Memnon, Galba and Otho, making a total of 50 lives. There are traces of perhaos 12 more biogra¬ phies that are now lost. Eighteen of the 22 pairs close with a sort of balanced judgment (ovyKpicuy) of the two careers and characters. These formal comparisons abound in con¬ trasts rather than in resemblances, the latter in¬ deed being sometimes a trifle forced. This need not be wondered at, inasmuch as Plu¬ tarch's object was not to write history, but to prove that the more remote past of Greece could show its men of action and achievemenl

as well as the nearer and, therefore, more im¬ pressive past of Rome.. In these biographies, therefore, the interest is primarily ethical, al¬ though they have no mean historical value. In spite of his lack of judicious discrimination in the use of authorities and the consequent er¬ rors and inaccuracies, Plutarch gives an abun¬ dance of citations and incidentally a large num¬ ber of valuable bits of information which fill up numerous gaps in the historical knowledge obtainable elsewhere. Owing to the liveliness and warmth of portrayal and the moral earnest¬ ness and enthusiasm displayed by their author, the (Lives) have not failed to attract a large circle of readers throughout the ages, in spite of a certain degree of uniformity inherent in the -very plan of the series. Their wide appeal is instanced by the fact that (Julius Caesar, the first of Shakespeare's Roman plays, like those that followed, namely, and An¬ tony and Cleopatra,* was based on Plutarch's as translated*

from the French trans¬ lation of Jacques Amyot (1559) and published by Sir Thomas North in 1579. (Timon of Athens) likewise is based, at least in part, upon Plutarch's life of Mark Antony. The chief manuscripts of the (Lives date from the 10th and 11th centuries; the first edition appeared at Florence in 1517. The most generally ac¬ cepted text is that of the minor edition of Carl Sintenis in the (Bibliotheca Teubneriana) (5 vols., Leipzig 1852-55 ; reissued without much change in 1873-75). There are annotated edi¬ tions by I. C. Held, E. H. G. Leopold, Otto Siefert and Friedrich Blass and Carl Sintenis, all in German; and by Holden, in English. Be¬ sides North's translation (mentioned above), there are English translations by John and William Langhorne (1770), by Dryden and others (1683), and, of the Roman lives, by George Long. A. H. Clough's revision of the so-called Dryden edition was published in five volumes in 1859 and reprinted in one large oc¬ tavo volume in 1876 and 1880. Finally, mention must be made of Bernadotte Perrin's transla¬ tion, with the Greek and English texts en re¬ gard, in the (Loeb Classical Library,* in 10 volumes, five of which have already appeared.*

Herbert F. Wright,

Sometime of the Department of Latin , The Catholic University of America.

LIVES OF THE POETS. The

which he was not thoroughly familiar. So far as possible he confined himself to the poets of the classical school. Forty-eight of the 52 poets were named by the booksellers ; Black- more, Watts, Pomfret and Yalden were added upon the request of Johnson. There is little doubt that the booksellers would have been glad to follow any suggestions that Johnson cared to make. The "little® work originally contemplated steadily grew. (

Johnson did not follow modern methods of research; he wrote from a full mind, took what easily came to hand and gave little thought to what he could not find. Of mere details, he was impatient: "To adjust the minute events of literary history,® he asserted in the life of Dryden, "is tedious and troublesome : it re¬ quires indeed no great force of understanding, but often depends upon inquiries which there

is no opportunity of making, or is to be fetched from books and pamphlets not always at hand.® Not all of the narratives were writ¬ ten for the purpose in hand, nor were all, the result of Johnson's own labors. The (Life of Savage) had been published in 1744. The (Life of Edward Young5 was written at Johnson's request by Herbert Croft. The (Life of But- ler) was derived from a comparison of ac¬ counts given by an unknown writer of doubt¬ ful authority, and by Anthony Wood. The (Life of ParnelP is an abstract from the nar¬ rative by Goldsmith. Of Edmund Smith, John¬ son says: "I shall subjoin such little memorials as accident has enabled me to collect.® He confessed at the close that he had written "dila¬ torily and hastily, unwilling to work, and work¬ ing with vigor and haste.® His standards of criticism, those of the classical school, pre¬ vented him from doing full justice to such poets as Milton, Collins and Gray. Against the defects of work so produced, the general reader should be warned. "With its slips and errors uncorrected,® says J. Churton Collins, "and read without guidance, no unfitter book could be placed in any reader's hands; properly edited, and with a proper commentary, no book more serviceable.®

What, then, is the value of such a work? It is manifold. For one thing, Johnson killed forever the merely panegyric type of biography. "We have had enough honeysuckle lives of Milton,® he said ; "mine shall be in a different strain.® In none of the narratives is he merely a praiser or a fault-finder; he strikes a sane balance. The greatest value of the whole lies not alone in the facts, although students must always reckon with Johnson for certain facts, many of which, but for him, might have been lost. It does not depend upon the mere meth¬ ods of biography, which in many respects might have been improved. Its greatest value arises from the fact that we are therein given the last judgments of a great literary dictator. The (Lives of the Poets5 is the product of Johnson's privileged old age. He had read much, experienced much, thought much. We

are enabled to listen to the mature mind of one great literary man delivering itself in regard to other literary men, small as well as great. The (Lives5 are thus invaluable as documents of that school of classical criticism so well rep¬ resented by Johnson. They are equally invalu¬ able for the element of philosophical comment which runs throughout. "His work closes an age; it is the Temple of Immortality of the great Augustans, and, when it was published, already Burns and Blake, Crabbe and Cow per, were beginning to write.®

Two of the best critical articles are J. Chur¬ ton Collins' "Dr.

Johnson's (Lives of the Poets5 55 (in Quarterly Revievu, Vol. CCVIII, pp. 72-97) ; and Chapter 6 of Prof. Walter Ra¬ leigh's (Six Essays on Johnson.5

Waldo H. Dunn.

*n**

LIVIA DRUSILLA, li'vi-a dro-sil'la, wife of the Roman Emperor Augustus : b. about 55 b.c. ; d. 29 a.d. She was the daughter of L. Livius Drusus Claudianus, who committed suicide after the battle of Philippi. Livia be¬ came the wife of Tiberius Claudius Nero, by whom she had two sons, Tiberius the future emperor, and Drusus. While still pregnant with the latter she was married to Octavianus (Augustus), who had been captivated by her beauty and her talent, and who to bring about this union had divorced Scribonia, and forced Tiberius Nero to divorce Livia. The union with Augustus seems to have been a happy one, but there is a suspicion that Livia's ambition to secure the succession for her own sons caused her to commit many crimes in order to remove the members of the family of Augustus, to wrhom the succession would naturally have fallen. Thus the death of Marcellus, nephew of Augustus, and of Lucius and Gaius Caesar, sons of Agrippa, was charged to her machina¬ tions, nor was she free from the suspicion of having hastened the end of Augustus himself. Meantime her surviving son, Tiberius, had been adopted by Augustus, who designated Livia and Tiberius as his principal heirs. On her son's succession to the imperial dignity Livia con¬ tinued for a long time to exercise great in¬ fluence, so much so that at first it seems to have been felt that Tiberius was subservient to her will; but in fact Tiberius, while con¬ siderate of his mother, always maintained an attitude of independence toward her in all affairs of state, and thus by degrees a spirit of alienation grew up between them which in¬ creased so much with years that Tiberius re¬ fused to visit her on her death-bed, or even to execute the directions of her will. She died at an advanced age. Consult Tiibker, Frederick,*

(Reallexikon des klassischen Altertums5 (Vol! II, 8th ed., Leipzig 1914).

LIVING MAMMALS, Distribution of.

See Distribution of Living Mammals.

LIVINGSTON, Burton Edward, American plant physiologist: b. Grand Rapids, Mich., 9 Feb. 1875. In 1898 he was graduated at the

University of Michigan and in 1902 obtained the degree of P'h.D. at the LJniversity of Chicago. In 1895-98 he w as assistant in plant physiology at the University of Michigan and from 1899 to 1905 was Fellow and assistant in plant physiol¬ ogy at the University of Chicago. He served as soil expert of the United States Bureau of

Soils and had charge of fertility investigations in 1905-06. From 1906 to 1909 Mr. Livingston was staff member of the department of botan¬ ical research of the Carnegie Institution, Wash¬ ington, D. C. In the latter year 'he was ap¬ pointed professor of plant physiologv at Johns Hopkins, where since 1913 he has also served as director of the laboratory of plant physiol¬ ogy. He has published (Role of Diffusion and Osmotic Pressure in Plants) (1903) and numerous scientific papers. He translated and edited Palladin's (Plant Physiology > (1918).

Professor Livingston has invented a porous cup atmometer for measuring evaporation as a climatic factor and of an auto-irrigator for automatic control of soil moisture in potted plants.

LIVINGSTON, Edward, American states¬ man : b. Clermont, N. Y., 26 Mav 1764; d. Rhinebeck, N. Y., 23 May 1836. He was grad¬ uated from the College of New Jersey in 1781, was admitted to the bar in 1785, was a New York representative in Congress (1795-1801) and was a leader of the opposition. In 1801 he was appointed by President Jefferson United States attorney for the New York district, and in that year became also mayor of New York. During the yellow fever epidemic in 1803 he was stricken with the disease, and during his illness $43,666, for which he was responsible to the United States government, were misap¬ propriated by his fiscal agent. He confessed judgment in favor of the United States for $100,000, and resigned both his offices. Every dollar of this amount was subsequently repaid. In 1804 he began the practice of law at New Orleans and, accepting land in lieu of fees, acquired a lucrative practice, and drew up a code of legal procedure. At the time of the preparation for the battle of New Orleans, he was president of the committee of public de¬ fense, and Jackson's chief assistant. During the battle he served on Jackson's staff. In 1820 he was elected a representative to the State legislature of Louisiana, in 1822-29 represented the New Orleans district in Congress, and from 7 Dec. 1829 to 3 March 1831 was United States senator from Louisiana. In

1831 he be¬ came Secretary of State in Jackson's Cabinet. This post he resigned to become Minister to France in 1833; and in 1835 he returned to the United States. He was a distinguished lawyer ; and as Secretary of State exercised strong in¬ fluence on the administration of Jackson, whose state papers, including the Nullification proclamation of 10 Dec. 1832, are generally be¬ lieved to have been written by him. The most remarkable of his legal works is his ˆSystem of Penal Law for the State of Louisiana, > which, written between 1821 and 1824, was accidentally destroyed by fire, was rewritten and published in 1826, and earned for its author from Sir Henry Maine the description of ((the first legal genius of modern times.® He also wrote System of Penal Law for the United States (1828). His (Complete Works on Criminal Jurisprudence* appeared in 1873. Con¬ sult the biographies by C. IT. Hunt (New York 1864) ; and Carleton Hunt (New Orleans 1903).*

LIVINGSTON, Henry Brockholst, Amer¬ ican jurist: b. New York, 26 Nov. 1757; d. Washington, D. C., 19 March 1823. He was a son of William Livingston (q.v.), and grad¬

uated from the College of New Jersey in 1774, was commissioned a captain in the Continental army and later became aide to Gen. Philip Schuyler in the northern department with rank of major. He was also aide to Gen. Arthur St. Clair, took part in the siege of Ticonderoga and was present at Saratoga. Subsequently he was again with Schuyler and was promoted lieutenant-colonel. In 1779 he went to Spain as private secretary to John Jay, in 1782 on the return voyage was captured by the British, and was for a time imprisoned at New York. In 1783 he was admitted to the bar and entered practice in New York. He was judge of the New York Supreme Court in 1802-07, and from 1807 was associate justice of the United States Supreme Court until his death. On the organization of the New York Historical So¬ ciety in 1805 he became its second vice-presi¬ dent. He was popularly known as Brockholst Livingston.

LIVINGSTON, John H., American divine and virtual founder of two institutions of learning, Rutgers College and the Theological Seminary of the Reformed Church in America, at New Brunswick, N. J. : b. Poughkeepsie, N. Y., 30 May 1746; d. 20 Jan. 1825. He was graduated from Yale College and studied law two years, but in New York came under the influence of Archibald Laidlie (Flushing) and chose the ministry. He sailed for Europe, 12 May 1766, being the last of American youth in the then Dutch Reformed Church to study theology in Holland. At Utrecht University, he sought and won, by discussion in the Latin language, the degree of doctor of divinity and

wrote a Latin thesis. Called to the Collegiate Reformed Church in New York City, he acted as a peacemaker between the parties in the denomination formed chiefly on the idea of speedy, or of slow Americanization and use of the English language. Largely under his personal influence, Rutgers College (chartered in 1766) and the Theological Seminary, the second oldest in America, were begun. In the Revolution, his Americanism was so ar¬ dent during the British occupation that he had to leave the city. To the Utrecht Uni¬ versity motto, of 1648, after the end of the Netherlands '80 years' war for freedom, <(Sol- j ustitiae illustra,® Livingston added for Rut¬ gers College ((et occidentem® — (<[Divine] Sun of righteousness illuminate also the West.® Probably no institution of learning, with the Atlantic between, has a closer historical con¬ nection with Europe than Rutgers College with Utrecht University. On 9 July 1909, the friends of Rutgers College unveiled in the aula of the University of Utrecht a bronze tablet to the memory of Livingston with the inscription in Latin, meaning ((We salute Utrecht University as the dear mother of our dear mother.® Livingston's voluminous writ¬ ings include the first hymnbook (in English) and the constitution of the Reformed Church in America. Consult Gunn, 'Memoirs of Dr. Livingston (1836).*

LIVINGSTON, Peter van Brugh, Amer¬ ican merchant: b. Albany, N. Y., October 1710; d. Elizabethtown, N. J., 28 Dec. 1792. He was graduated from Yale in 1731, at New York was active in the shipping business with William Alexander, Lord Stirling, and in 1755 provided

the supplies for Governor Shirley's expedition to Acadia. He was long a member of the provincial council, and in 1775-76 was a dele¬ gate to the 1st and 2d provincial congresses of New York, of the former of which he was president. In 1776-78 he was treasurer of the congress. He was prominent in most of the measures that led up to the Revolu¬ tionary War, notably as a Mohawk of the <(Nancy Tea Party® in New York City in 1774, and was referred to by John Adams as <(staunch in the cause.® As a Presbyterian he was also one of the founders of the College of New Jersey, which later became Princeton College.

LIVINGSTON, Philip, American patriot: b. Albany, N. Y., 15 Jan. 1716; d. York, Pa., 12 June 1778. He was graduated from Yale in

1737, became a prosperous merchant in New York, in 1758-69 was a member of the Colonial assembly, of which he was speaker in 1768, but was unseated by the Tory majority because of his strong Whig views. In 1774-78 he repre¬ sented New York in the Continental Congress, and in 1776 signed the Declaration of Inde¬ pendence. Subsequently he sat in the New York provincial congress, in the State assem¬ bly and in the senate. His legislative services were many. He was also a benefactor of King's (later Columbia) College, of Yale Col¬ lege, and was one of the founders of the New York Chamber of Commerce.

LIVINGSTON, Robert, American colonial- proprietor: b. Ancrum, Scotland, 13 Dec. 1654; d. Albany, N. Y., 20 April 1725. He emigrated to America in 1673, spent a part of a year at Charlestown, Massachusetts Bay, removed to Albany, N. Y., and was there in 1675-86 sec¬ retary of the commission who directed the affairs of Albany, Schenectady and the region adjacent. In 1686-1721 he held the corre¬ sponding office of town clerk. In 1686 he re¬ ceived from Gov. Thomas Dongan the grant of a large tract, which comprised extensive portions of the present counties of Dutchess and Columbia, and which was confirmed by royal charter of George 1 in 1715. This tract was erected into the lordship and manor of Livingston, and as Livingston Manor has since been known. Livingston was the first to ob¬ tain the means for the equipment of the ex¬ pedition of Capt. William Kidd (q.v.) against the pirates. He was elected member of the assembly for Albany in 1711, and sat for his manor in 1716-25. From 1718 he was speaker. Consult (The Livingstons of Livingston Manor5 (New York 1910).

LIVINGSTON, Robert R. (the initial R.

having been assumed for purposes of distinc¬ tion), American statesman, commonly known as ˆChancellor Livingston® : b. New York, 27 Nov. 1746; d. Clermont, N. Y., 26 Feb. 1813. He was graduated from Columbia (then King's College) in 1765, was admitted to the bar in 1773, was for a brief period partner in legal practice with John Jay, in 1773-75 was recorder of New York city, lost this post through his revolutionary spirit, and in April 1775 was elected from Dutchess county to the New York State assembly. In 1776 he was sent by the assembly to the Continental Congress, where he was one of the committee of five appointed to draft the Declaration of Independence, which, however, he did not sign owing to his return

to enter the provincial convention. He took his seat on 8 July 1776,

and was of the com¬ mittee to draw up a State constitution. Under this instrument he became the first chancellor of New York (1777-1801). He resigned from the Continental Congress in 1777, but was again one of its members in 1779-81. He was secre¬ tary for foreign affairs of the United States Confederation in 1781-83, in which post he con¬ ducted with much success the business previ¬ ously entrusted to the committee of secret cor¬ respondence. As chancellor he administered the oath of office to George Washington on the latter's inauguration as first President of the United States (30 April 1789). In 1801-05 he was Minister to France, in which capacity he, with James Monroe as additional plenipoten¬ tiary, concluded the treaty by which Louisiana was ceded to the United States for the sum of $15,000,000. He became the partner of Robert Fulton (q.v.) in experiments toward the em¬ ployment of steam-power in navigation ; launched a boat on the Seine, but was not fully successful ; and later continued the work with Fulton in the United States, where in September 1807 the Clermont made the trial trip from New York to Albany in 22 hours, the average rate of speed thus being five miles per hour. Liv¬ ingston also introduced merino sheep into New York, made general the use of gypsum for fer¬ tilizing purposes, was the principal founder (1801) of the New York Academy of Fine Arts and its first president, and was also for a time president of the New York Society for the Promotion of Useful Arts. He was styled by Franklin the ((Cicero of America.® By act of Congress his statue was placed in the Capitol at Washington, as one of the two representa¬ tive citizens of New York State, George Clinton being the other. He published (Essays on Agriculture,5 an (Essay on Sheep5 (1809), and some addresses. Consult the biographical sketch by De Peyster (New York 1876) ; Dela- field, (Robert R. Livingston of New York and his Family > (Albany 1911) ; and E. B. Living¬ ston, (The Livingstons of Livingston Manor) (New York 1910).

LIVINGSTON, William, American states¬ man : b. Albany, N. Y., 30 Nov. 1723; d. Eliza¬ bethtown, N. J., 25 July 1790. He was gradu¬ ated from Yale in 1741, was admitted to the bar in 1748, attained distinction in practice, was elected to the provincial legislature from Liv¬ ingston manor, and in 1760 established himself at the well-known country-seat of C(Liberty Hall® at Elizabethtown, N. J. In 1774 he became a delegate for New Jersey province to the First Continental Congress, and later served in the second and third congresses. He was a member of the committee of the first congress that pre¬ pared the address to the people of Great Britain. It was with great reluctance that he set himself in opposition to the mother

country; but the step having been taken, he supported the Revo¬ lution with all his powers. In June 1776 he took command of the militia of New Jersey, with rank of brigadier-general, and was thereby prevented from signing the Declaration of Inde¬ pendence. On 28 Aug. 1776 he was elected first governor of New Jersey, and this post, having resigned his military command, he held until his death. During the first two years of his administration the State of New Terse}' was

perhaps more than any other exposed to the operations of the British forces, and this was the cause of many difficulties and dangers. The legislature was compelled to meet at various dif¬ ferent places, and Tory hostility was strong against the governor, whose capture was several times attempted. In his message of 1777 to the assembly, Livingston recommended the abolition of slavery, and in 1786 caused the passage of an act forbidding the importation of slaves into New Jersey and himself liberated his two slaves. In 1787 he was appointed a delegate to the convention that framed the Constitution of the United States. He was at one time presi¬ dent of the ((Moot,)) the well-known lawyers' club founded at New York in 1770. He pub¬ lished in 1752 52 numbers of The Independent Reflector, a weekly periodical, in which he opposed the Episcopal Church. His writings include (Philosophic Solitude) (1747) ; (with W. Smith, Jr., 1752-62). Consult Sedgwick, (Life and Letters of William Livingston> (1833).

LIVINGSTON, Guatemala, seaport situ¬ ated on the Gulf of Amatique, at the embou¬ chure of the Dolce. It is an important trade mart as the port of Izabal, with which it has boat connections on the Dolce. Cabinet woods, coffee and bananas are the chief items of its export trade, which is mostly with the United States. A consular agent of the United States maintains an office here. Pop. 2,000.

LIVINGSTON, Mont., city, county-seat of Park County, on the Yellowstone River, and on the Northern Pacific Railroad, about 45 miles north of the Yellowstone National Park, and 100 miles southeast of Butte. It is situ¬ ated in a mining and lumbering section of the State. A branch of the Northern Pacific Rail¬ road extends from Livingston to the Yellow'- stone park. It is the division headquarters for the Northern Pacific. Its chief manufacturing establishments are machine shops, lime works, railroad shops and

lumber mills. Its trade is mainly in mining tools, wool, coke, coal and gold, and it is a distributing centre for gro¬ ceries, dry goods and clothing for an extensive region. Livingston is a favorite resort for sportsmen, as game and fish abound. Pop.

(1920) 6,326.

LIVINGSTON MANOR, at one time a large tract of land in New York State, on the east side of the Hudson River, and the north¬ ern part of what is now Dutchess County. This land was obtained by Robert Livingston, in 1674, and comprised about 160,240 acres. The title was confirmed in 1715, and the patent ob¬ tained gave the land to the heirs forever. In 1752-54 Governor Clinton of New York had to settle a dispute as to the eastern boundary; Massachusetts and the Livingstons both claim¬ ing the same land. The manor was divided and subdivided into holdings which were let to ten¬ ants. In 1795 the tenants made an effort to have the title pronounced invalid, but it was decreed that the land was Livingston property. In 1844 the tenants again sought to get posses¬ sion, and they petitioned the legislature to set aside the grant, but the petition was not granted. Since that time the owners have sold to indi¬ viduals the larger part of the old Livingston

Manor. Consult Vol. Ill of documentary His¬ tory of New York State (Albany 1850).*

*LIVINGSTONE, liv'Ing -ston, David, Scottish missionary and African traveler: b. Blantyre, Lanarkshire, 19 March 1813; d. near Lake Bangweolo, Africa, 1 May 1873. His parents had settled in the neighborhood of the cotton mills near Blantyre, where David be¬ came a ˆpiecer** at the age of 10. While at work in the mill he learned Latin and read extensively, and having attended the medical and Greek classes at Glasgow University dur¬ ing the winter months finally became a licentiate of the Faculty of Physicians and Surgeons of Glasgow. Under the direction of the London Missionary. Society he proceeded in 1840 to South Africa, where he joined Robert Moffat in the missionary field. His first sta¬ tion was in the Bechuana territory, and here his labors for nine years were associated with Mr. Moffat, whose daughter he married. Hear¬ ing from the natives that there was a large lake north of the Kalahari Desert, he proceeded to explore that region, and discovered the valley of the Zouga and Lake Ngami. Subsequently he penetrated farther northwest until he reached Linyanti, the capital of the Makololo territory, situated on the Chobe, a tributary of the Zam¬ besi, which river he also visited. In 1853-56 he made a great exploratory journey, or series of*

journeys. Starting from Linyanti he ascended the Leeambye (Upper Zambesi), journeyed overland to Lake Dilolo, and thence to Saint Paul de Loanda on the west coast. Returning to Linyanti, he went eastward from there in

1855, tracing the Zambesi to the Indian Ocean, and reaching Quilimane on the east coast in

1856, having thus crossed the entire continent. The record of this journey is found in his (Missionary Travels and Researches in South Afric.a) (1857). He severed his connection with the London Missionary Society in 1858 and was appointed British consul at Qudimane. From that year until 1864 he with Sir John Kirk ex¬ plored the Zambesi, Shire and Roouwa rivers and discovered Lake Nyasa, the literary result of which was (The Zambesi and its Tributaries' (1885). Livingstone set forth in 1865 to set at rest the question of the sources of the Nile. From this time till his death he was engaged in laborious explorations in the lake region of South Africa, especially to the westward of Nyassa and Tanganyika, where he discovered Lakes Bangweolo and Moero, the Upper Kongo, etc. For about three years no communication had come from him, and the doubts regarding the traveler's safety were only set at rest when it was known that H. M. Stanley, the special correspondent of the New York Herald, had seen and assisted Livingstone at Ujiji, on Lake Tanganyika. They parted in March 1872, Liv¬ ingstone going to explore the southern end of Tanganyika and Stanley proceeding to Zanzi¬ bar. After another year's wanderings he was attacked with dysentery near Lake Bangweolo, and there he died. His body was buried in Westminster Abbey, having, been conveyed to the coast, rudely preserved in salt, by his faith¬ ful followers. Consult ˆLivingstone's Last Journals (1874) ; Stanley, (How I Found Liv- ingstone) (1873) ; Blaikie, (Livingstone's Per¬ sonal Life> (1880) ; Hughes, (David Living- stone> (1891); Johnston, (Livingstone and the*

Exploration of Central Africa> (1897) ; Mac- lachlan, (David Livingstone) (1900) ; Stanley's (Autobiography 5 (1911) and (How I Found Livingstone) (1913), and Horne, (David Liv- ingstone) (1913).

LIVINGSTONIA MISSION, British Ny-

assaland Protectorate, central Africa, founded in 1875 by Stewart of Lovedale for the Free Church of Scotland (now the United Free Church). The first settlement was made at Cape Maclear at the southern end of Lake Nyassa, but the chief settlement is at Bandawe, on the west shore of the lake. The establishment of the mission was the result of a suggestion made by Livingstone (q.v.) that the shore of this lake was a good position for a mission that might counteract the slave trade which was carried on by the Arabs and Portuguese. The Church of Scotland established a mission at Blantyre, in the Shire Highlands, near the lake — a mission which it is anticipated may soon be united with the Livingstonia Mission. At Blantyre some manufacturing establishments have been established, a foundry, basket fac¬ tory, cloth mill (the cloth is made from the bark of trees) and a cotton factory. The Portuguese, in 1889, tried to get possession, but since 1890 the British have had control.

LIVIUS ANDRONICUS, the founder of Roman epic poetry and drama, by birth a Greek of Tarentum. He first went to Rome at the commencement of the 3d century b.c. as in¬ structor to the children of Livius Salinator. He introduced upon the Roman stage dramas after the Grecian model and wrote a transla¬ tion of the

LIVNY, lyev'ni, Russia, capital of the dis¬ trict of the same name, situated in the govern¬ ment of Orel, on the Sosna River, 95 miles southeast of the city of Orel. It contains a bank, a gymnasium or high school and two li¬ braries. Its industries include manufactures of flour, leather, soap, tallow and tobacco. There is also a large trade in grain. The city dates from 1586. Pop. 23,700.

LIVONIA, li-vo'ni-a (Ger. Livland; Russ. Livlandya), a former government of Russia and one of the three Baltic provinces, bounded on the north by Esthonia, south by Courland, on the west by the Gulf of Riga and east by Lake Peipus and the governments of Petrograd, Pskov and Vitebsk. Together with Oesel, Mohn, Paternoster and some smaller islands in the Gulf of Riga the total area is about 17,500 square miles, with a population of 1,740,000 in 1914. Riga, the capital, is the most German town outside Germany and has a popu¬ lation of 560,000. Consisting mainly of marsh and low sand, the territory has little fertility and few forests. Over 18 per cent of the area is meadow land, over which great herds of cattle are spread, particularly horses. There is an abundance of inland waterways, though only the Dvina, the Pernau and the Aa near the Embach are of any importance for communica¬ tion. The Salis and the Pernau are only par¬ tially navigable, owing to rapids, narrowness and shallow bottom. The one trunk line of

railway runs from Riga through Dorpat and Taps to Petrograd. Little wheat is grown in Livonia; rye, potatoes and oats are standard crops ; dairy farming, though extensively car¬ ried on, yields but little profit. Altogether the country is in a backward and neglected con¬ dition. Some 400 factories were in operation before the war; Riga was the centre of the Russian flax and timber trade, also of rubber and textiles, foundries, pulp-mills and china manufacture. In 1915 the Russians started scrapping and dismantling all the machinery to prevent it from falling into German hands, leaving Riga little more than an empty shell.

The population of Livonia is predominantly Russian; about 8 or 10 per cent is German; the aborigines are of Finnish origin and are more closely allied to the Slavs than the Germans. Letts, Esthonians, Swedes, Poles and Jews make up the remainder of the inhabitants. The Esthonians occupy the north and east portion of Livonia; the Letts the south and west. Most of the people are Protestants of the Augs¬ burg Confession.

During the 12th and 13th centuries the Lett tribes of the Baltic were

considered by the Russian princes and republics of the north¬ west as their subjects or tributaries. Danes conquered Esthonia, and Yaroslav the Great founded Yuriev (Dorpat). With the German Hanseatic merchants Latin missionaries ap¬ peared on the Baltic. The archbishop of Bremen sent the monk Meinhard to convert the Livonians. In 1187 the latter built a church at Uexkiill and a fortress round the church. From this day the tribes lost their lands and their liberty. The Livonians rose in revolt in 1198 and Meinhard's successor, the second bishop of Livonia, was killed in battle. The natives re¬ turned to their heathen gods and plunged into the Dvina <(to wash off the baptism they had received, and to send it back to Germany55 (Rambaud). Pope Innocent III (reigned 1 198— 1216) preached a crusade against the Livonians and another bishop was appointed over the natives. He arrived with a fleet of 23 ships, built the town of Riga and made it his capital in 1200. This ecclesiastic, Albert of Bux- hcevden, founded the German rule in Livonia. The natives implored the help of the princes of Polotsk and marched on Riga, where they were defeated in 1206.. The Prince of Polotsk besieged the town during the bishop's absence, but it was saved by the arrival of a German flotilla. In 1410 the power of the Teutonic Knights, was. broken by the Poles under the Lithuanian kings. The expansion of Muscovy (Russia) turned the Tsar's desires toward the Baltic; between them and the goal, however, lay Sweden, the Livonian Knights, Lithuania and Poland. . War broke out in 1554 under Ivan the Terrible and Gustav Vasa of Sweden. Four years later the Russians conquered a con¬ siderable part of Livonia. The Poles come to the rescue, and by 1562 they had gained con¬ trol over the Baltic provinces. Gustav Adolph of Sweden captured Riga in 1621, and Sweden enjoyed the supremacy of the Baltic for nearly a century. The war between Peter the Great assisted by Prussia and Charles XII resulted in the defeat of Sweden in 1709, and in 1721 Russia finally received Livonia, Esthonia, In- gria, Carelia and part of Finland. For 196

years Livonia remained part of the Russian Empire, until it was overrun by the Germans in 1917, and Riga fell on 3 September. That event led the Kaiser to declare that the Ger- manization of the Baltic lands was <(now made secure for all time.® Under the terms of the Brest-Litovsk peace treaty, signed by the Bol¬ shevist leaders on 3 March 1918, Russia agreed to abandon territories amounting to nearly a quarter of the total area of European Russia, in which

Livonia, Esthonia and Courland were included. Under the terms of the armistice, dictated by the Allies to Germany on 11 Nov. 1918, all German troops were to be withdrawn from territories which had before the war be¬ longed to Russia, as soon as the Allies should decide. On 15 Nov. 1918 it was announced that Livonia, Esthonia and Courland had decided to form a joint Baltic state.

LIVRE, le -vr', an ancient French coin, now superseded by the franc as the unit of value. The livre was equal to about 20 francs ($4). The livre was also the unit of weight until superseded by the kilogram — the equivalent of two livres — in the metric system.

LIVY (Titus Livius), Roman historian: b. Patavium (Padua), 59 b.c. ; d. there, 17 b.c. He spent most of his time at Rome, but kept aloof from active political life, although among his friends were numbered the most eminent men of his day. In spite of his republican leanings he was befriended by Augustus, who counted him, with Virgil and Horace, as one of the literary ornaments of his court. His principal work is the (History of Rome' in 142 books (T iti Livii ab Urbe Condita Libri), which comprehends a period extending from the build¬ ing of the city to the year 9 b.c. Only 35 of these books are extant, namely, the first 10, which cover the period ending 293 b.c., and the 25 from the 21st to the 45th books, which com¬ prehend the years between 218 and 167 b.c., as well as a number of fragments and short ab¬ stracts, or tables of contents of all the books excepting the 136th and the 137th. Livy under¬ took this work, as he states in his preface, partly that he might plunge his mind into things of the past, and so forget the grievances of the present, and partly that he might spread out before his contemporaries a picture of the nation's ancestral glories. He has indeed pro¬ duced a work which is truly national, which has always received the admiration and esteem of antiquity and is in modern times regarded as one of the most precious relics of Latin litera¬ ture. Since his time it has been the source of all knowledge of the period it deals with. He began its composition between the years 27 B.c. and 25 b.c., and published it from time to time in a series of detached parts; the present di¬ vision into decades is of later origin. It ap¬ pears that he was engaged upon his history up to the time of his death, but failed tp carry it on to the end he had meditated, which would have included the death of Augustus. He had a practical object in view in the accomplishment of this task, but this was less to achieve a critical and scientific exploration of the past than to produce a moving, lifelike and readable representation of the time and country in which he lived. With this end in view he has chosen a style of his own; not the transparent splendor of Cicero, nor the condensed and epigrammatic

pungency of Tacitus, nor the dilettante, though sometimes effective, archaism of Sallust. His narrative moves along with stately dignity; it teems with anecdote and glows with patriotic emotion. He employs a phraseology remark¬ able for copiousness, for picturesqueness, for vivid description and occasionally for an elo¬ quence that is burnished into poetic lustre. His materials must mainly have been derived from preceding annalists, but he weaves into his work the local traditions of a mythic age and rivals Virgil in his love for the fables of Tus¬ cany and Latium. His account of the Punic wars he draws from Polybius. We must not, however, expect to find in his writings a clear account of the origin and development of the Roman constitution. He seems to have cared little for the study of constitutional law, and even less for that of military art. Yet his political views were very decided, and in his account of the civil war, which resulted in the downfall of the republic, he shows himself a strong partisan of the aristocratic party, so that Augustus did not hesitate to style him a Pom¬ peian. The historic basis for the Roman his¬ tory of Livy cannot be fully understood with¬ out reading the works of Niebuhr. Livy's com¬ plete works have been published by Gronov (1679) ; Drakenborch (1828) ; Zingerle (1883) ; an English translation appears in the Bohn Li¬ brary, and a complete German translation b}r Klaiber and Teuffel appeared (Stuttgart 1854— 56). Fugner's (Lexicon LivianunP (1889), al¬ though incomplete, is important in Livian litera¬ ture. Consult Niemann, (Etudes sur la Langue et Litterature de Live) (1884) ; Taine, (Essai sur Tite Live* (1888); Madvig, (Emenda- tiones Livianae* (1877).

LIXIVIATION, lik-siv'i-a'shun, the proc¬ ess of separating by percolation a soluble from an insoluble substance. "Leaching® is the com¬ mon English term for this process. Advantage is taken of the different degrees of solubility of the components of the chosen solvent. In metallurgy the process has been used from the earliest times in the extraction of copper and silver ores. Solvents are employed to dissolve the silver, after which the silver is precipitated from the solution. Usually sodium hyposulphite is used as solvent and sodium sulphide as the precipitant. In recent years investigations have resulted in discovering lixiviation processes which may be employed on a commercial scale for ore extraction. See Copper; Silver.

LIZA. By Ivan Sergeyevitch Turgenief. There are several translations for the original title of this novel, (Dvoryanskoye Gnyezdo* — (A Nest of Nobles,* (A Nobleman's Nest,* (A House of Gentlefolk.* The

title is evi¬ dently more or less symbolical, (The Nest) not referring to the residence of any particular gentleman or nobleman. The action passes mainly in the city home where Liza lives with her worldly-minded mother and her shrewish- tempered great-aunt. The principal character, Lavretsky, occupies only for a brief time a small country-house which had belonged to his father's sister. The preliminary chapters are largely devoted to tracing the heredity of the various actors in the drama and portray selfish men and women of an earlier genera¬ tion and their environment. When these ex' planations have been cleared away and or.z

understands the hidden forces of relentless cir¬ cumstances, the development of the simple yet unexpected complication of the plot is con¬ ducted with a masterly knowledge of human nature. The solution of the tragedy of dis¬ appointed love is seen to be in exact accord¬ ance with the psychology of the persons in¬ volved.

Lizavieta Mikhailovna Kaletina, known as Liza, is the daughter of a government official, stubborn and harsh, who died when she was 10 years of age, leaving a large property in the hands of his widow, Marya Dmitrievna, a woman fairly well educated, sentimental and amiable when her will was not crossed. Dur¬ ing her impressionable childhood Liza was given over to the care of the old nurse, Agafya Vlasievna, who had occupied an equiv¬ ocal position in her grandfather's household but on the old man's death had become fanat¬ ically devout. Liza's mother made no attempt to offset the influence of those early religious practices. At the beginning of the story Liza is about 20, very pretty, graceful, winning, unselfish and affectionate, ((loving everyone in general but no one in particular.® When a distant kinsman of the family, Feodor Ivano- vitch Lavretsky, returns to Russia after a long residence abroad, she considers it her duty to try to reconcile him with his wife, whom he had repudiated on account of her immoral relations with a Frenchman. Lavretsky is no longer young; but he is still attractive and Turgenief evidently did his best to depict him as a sympathetic type of the Russian gentle¬ man, in spite of his birth (his mother had been a servant maid, first seduced and then hastily married against his tyrannical grand¬ father's wishes). Notwithstanding a one-sided and distorted education, Lavretsky has done his best to remedy the defects in his training and is now ready to take up his duties as benefactor to his serfs and as manager of his large estates. While

studying at the univer¬ sity he had married Varvara Pavlovna Korobuina, the beautiful daughter of a general who had been disgraced by reason of certain dis¬ honest practices. She was unworthy of him and when he found proofs of her unfaith¬ fulness, he settled a pension on her and left her. He is immediately attracted by Liza, whom her mother wishes to marry to Vladimir Nikolayevitch Panshin, a good-looking young official who had been sent to the provincial

town of O – (evidently intended to mean Orel

where Turgenief was born). Panshin is the type of the brilliant and superficial Russian, half-educated after the Western mode, speaks several languages, plays the piano, composes sentimental songs, sketches with a clever hand, acts well in private theatricals and considers any woman as legitimate game. He and La¬ vretsky are admirably contrasted. When Liza, at the fateful moment before she has made up her mind to accept Panshin's offer, reads the newspaper report of Varvara Pavlovna's death, she confesses her love for Lavretsky. They have one hour of happiness; then Fate interposes. Lavretsky's wife is not dead : she arrives at Lavretsky's house with her little daughter. Liza begs Lavretsky to forgive Var¬ vara Pavlovna and she herself follows the ex¬ ample of her old nurse and takes refuge in a nunnery in a distant part of Russia. Varvara

Pavlovna is the exact antithesis of Liza: she is beautiful but false. She immediately be¬ gins a new intrigue with Panshin, and again Lavretsky finds himself alone. Eight years later he revisits the house where Liza had lived. <(The Nest® still belongs to the family though all the old people are dead ; a new generation is living there. He catches a glimpse of their gaieties; he sees the bench on which he and Liza had sat in the bliss of their love con¬ fessed; he touches the piano: ((a faint pu^e tone rings out and trembles in his heart.® He realizes that he had ceased to think of his own happiness; his mind is calm but he is old, old in body and in soul; but he is not unhappy; breathing a silent blessing on youth, he turns away Svith sadness yet without envy® and drives slowly to his deserted home.

Nathan Haskell Dole.

LIZARD FISH, a fish of the family Syno- dontidce of the order Iniomi, remarkable for its wide mouth and very long body. It abounds inshore in tropical seas but is sometimes found in deep water. A well-known Antillean species is the Synodus fattens,

variously known as galliwasp, soap-fish and, in Latin- America, lagarta. It is olive above and yellow beneath, attains a length of 12 inches and is very vora¬ cious.

LIZARD POINT, or THE LIZARD,

England, a headland in Cornwall, 181 feet high, forming the southernmost point of Great Brit¬ ain, 24 miles southeast of Land's End, and having two lighthouses with flashes seen 21 miles, 230 feet above sea-level. The Lizard was the Promontorium Damnonium of Ptol¬ emy. The name is also applied to the penin¬ sula, with its broken and charming coastline, off which are the Manacle Rocks, a dangerous reef which has been the scene of many ship¬ wrecks.

LIZARD, a subclass of reptiles, whose anatomical features and classification have been described under Lacertilia. A general account of their habits and ecology has been reserved for the present article. Lizards as a group are of comparatively recent origin, most of the fossils known not being older than the middle of the Tertiary, when representatives of many of the modern genera were in exist¬ ence. The Pleistocene rocks of Queensland have furnished skeletons of several gigantic extinct representatives of the monitor family, one of which (Megalonia) was about 30 feet long. The lizards, as a group, are remarkable

AMERICAN LIZARDS

1 Uraniscodon umbra 3 Surinam ameiva

2 Teju or Tupmambis 4 Gila Monster or Heloderma

I

OLD WORLD LIZARDS

1 Skink

2 Lacerta agilis

3 Nile Monitor or Varanus

4 Zonurus cordylus

5 Agama colonorum

6 Wall geckos

for the great variety in size and shape, and in the character of the skin-armature and the dentition. These variations are usually mani¬ festly adaptations to the local environment.

Lizards abound in all the warmer parts of the world, most numerously in the tropics. In North America only three or four species pass the northern boundary of the United States, penetrating southern Ontario in the east and British Columbia on the Pacific side of the continent, where, in the arid Southwest, most of the species known in this country are to be seen. Most kinds of lizards are re¬ stricted in range, being adapted to a definite sort of environment, yet the families may have a very wide distribution. Thus that of the geckos (q.v.) is spread all over the tropical and subtropical zone of the Old World, and also in South America; and it includes both arboreal and terrestrial forms, diversified by modifications of the type to meet conditions as different as are the steaming jungles of Malaya from the sandy deserts of Persia and Africa. On the other hand the big monitors (V aranidcu) , scattered from the Nile to the Philippines and Australia, are able to seek their prey on burning desert- ground, in and under water, and among the branches of forest-trees. This is a case of remarkable versatility, for there is little adap¬ tive alteration of structure in the family. Again, similarity of habitat and local influ¬ ence sometimes produce striking likeness in appearance in totally disconnected species, as, for example, our spiny-coated horned toads and the Australian molochs (q.v.), which are not at all related structurally. A large number of lizards belonging to widely different families have taken to a more or less complete under¬ ground life; and in these the limbs show reduction from a slight degree in some to en¬ tire absence in others, for instance the boa-like glass-snake (q.v.). Many species are good swimmers, and are of aquatic habit to a large extent, but only one truly marine species is known — the large, gregarious sea-lizard (Am – blyrhynchus) of the Galapagos Islands, which feeds on seaweed, gathered at a considerable depth; yet it is reluctant to take to the water except for food. The American iguanas, how¬ ever, although habitually residents of tree-tops, stay as near to rivers as they can, and plunge into them for safety whenever frightened.

Lizards are primarily terrestrial animals, and most sorts run with amazing swiftness, usually on all four feet, but the curious frilled lizard (q.v.) of Australia holds up its fore parts and runs on its hind

legs when in haste. Except a few heavy forms, and those that dwell in burrows, lizards are extremely agile, climb¬ ing walls and tree-trunks, and running and leaping about their branches, with speed and precision ; and some Oriental species, as the flying dragon (q.v.), have expansions of the skin about the forearms enabling them to make long, sailing leaps through the air.

The senses of sight and hearing are highly developed, as is requisite for their livelihood. Most species are carnivorous, the larger kinds feeding on small mammals, birds and their eggs, and the lesser reptiles, including other lizards. These are seized by a rush and leap, and are passed down the throat whole. Many of the smaller kinds live altogether on worms

and insects, the latter caught in most cases by a swift dart and recovery of the sticky tongue, a method peculiarlv characteristic of the chameleons (q.v.). The tongue in this group assumes a wide variety of shapes, in some families having a slender, forked form like that in snakes, and acting only as a feeler. One lizard only, the Gila monster (q.v.), is aided by the injection of poison into its victim when he bites it, and this is the most sluggish of all its race. The iguana family and certain other species eat vegetable food.

Lizards themselves are sought as prey by all sort of carnivorous beasts, birds and reptiles, in avoiding which they must rely mainly on their alertness and agility in dodging or out¬ running the foe. Most of them are conspicu¬ ously colored, and many exhibit as great gaudi¬ ness as do tropical birds, so that this class of animals would seem to have been denied any benefit that might accrue from ((concealirig coloration® as ordinarily understood. One re¬ markable peculiarity of lacertilian structure, however, is perhaps protective, although the expedient is rather a costly one, namely, the ability of most lizards to part easily with the tail. This is the part of the lizard most likely to be snapped at by a captor, the more so as it is commonly held aloft when its owner runs, and breaking off easily enables the remainder of the lizard to go on running, while the baf¬ fled foe contemplates his useless booty. A new tail speedily replaces the lost member, but it is never quite as good as the original one. Some small lizards, when startled, cast off their tails with a jerk before they are touched; on the other hand, the big monitors indulge in no such sacrifice, but utilize their long and strong tails as powerful whip-like weapons of defense.

Reproduction in lizards as a rule is by a small number of eggs laid in damp earth, but a few, as the skinks, bring forth young alive. Lizards

are of service to mankind in de¬ stroying insects and other vermin, and in the tropics are welcomed in native houses for that reason. The water monitor is a valuable curb on crocodiles, by devouring their eggs and young. Many lizards furnish good human food, especially the larger iguanas, that are a regular part of the aboriginal diet in South America, as are other lizards among the Blackfellows of Australia. Certain species also make amus¬ ing pets. Consult, besides general works, Ga- dow, (Amphibia and Reptiles> (New York 1901) ; Pycraft, (Story of Reptile Life) (Lon¬ don 1905) ; Ditmars, ˆhe Reptile Book) (New York 1907) ; Boulenger, (Reptiles and Batra- chians) (London 1914).

Ernest Ingersoll.

LLAMA, la'ma, one domesticated form (often specifically distinguished as Lama glama) of the huanaco (q.v.), the other being the wool¬ bearing alpaca (q.v.). It is larger than the wild huanaco (about three feet at the shoulder), and may be white, brown, black or variegated with patches of all three colors. This animal was domesticated long before the era of the Incas. When the Spaniards conquered Peru they found hundreds of thousands in use as riding animals and beasts of burden in the southern part of the country; and as they were the only domestic ungulate of the kind in South America their importance was very great. The

Spanish conquerors adopted llamas as burden- beasts, and soon long strings, in charge of a few native drivers, were passing back and forth between the mountain mines and the coast, laden with ore or bullion or with sup¬ plies, a proper burden not exceeding 120 pounds, which may be carried about 12 miles a day. Until toward the middle of the 19th century this remained almost the only means of car¬ riage in the Cordilleras, where the endurance of cold, ability to live on the mountain herbage and sure-footedness peculiarly fitted them for this service. Only the mature males were used as burden- beasts, the smaller females being reserved for their milk and flesh, which re¬ sembles mutton, and is extensively eaten. Llamas produce only one offspring annually, so that care is needed to sustain the herds which are still numerous and valuable. Various breeds are known, but the differences are not very great. The wool, which is inferior to alpaca, is used among the native Indians for the manufacture of textile fabrics. The skin is made into leather. The

dried dung is used for fuel, and the milk is also employed as an article of native diet. When overloaded these animals lie down and refuse to budge; when irritated they have the habit of kicking at their adversaries, supplemented by the ejection of food when undergoing remastication in the mouth, along with quantities of evil-smelling saliva. An unsuccessful attempt has been made to acclimatize them in Australia.

LLANDUDNO, lan-dud'no, Wales, a sea¬ side resort of Caernarvonshire, 40 miles south¬ west of Liverpool, on the London and North¬ western Railway, 227 miles northwest of Lon¬ don. It has a magnificent marine drive around Great Omre Head, on which is the ancient oratory of Saint Tudno. Druidical remains abound in the neighborhood. Up to 1850 Llan¬ dudno was a poor fishing village but it has since become a fashionable resort with golf links, palatial hotels and all the appanages of such places. The water-supply, gas, power and electric-light plants and refuse incinerator are municipally owned. There are also nju- nicipal slaughter-houses and markets. Pop.

10,400.

LLANELLY, la-neth'H, Wales, a seaport town of Carmarthenshire, on the Burry Inlet, 14 miles southeast of Carmarthen. It is the outlet for the products of a great mining dis¬ trict, with extensive collieries, iron-foundries, copper works, tin-plate works, potteries, chem¬ ical works and lead and silver works. The trade is facilitated by commodious docks and ample harbor accommodation. It is the seat of a United States consular agent. Pop. 32,-

071.

LLANES, lya'nas, Spain, seaport on the north coast, in the province of Oviedo, on the Bay of Biscay at the embouchure of the Car-rocedo, 45 miles west of Santander. It has narrow, irregular streets lined with many an¬ cient dwellings, an old monastery and a 14th century Gothic church. A meteorological sta¬ tion is now housed in the monastery and part of the buildings are used for school purposes. It has a large coasting trade carried on in light-draught vessels. This trade is concerned mainly with agricultural products, timber, but¬ ter, fish, etc. Pop. 21,700.

LLANGOLLEN, lan-goth'len, Wales, town and summer-resort of Denbighshire, on the Dee, 10 miles southwest of Wrexham and 202 miles from London, on the Great Western Railway. There are many

interesting ruins in the town and in its vicinity, including a famous 14th century bridge, two monasteries and an abbey church of the 13th century. There are linen and woolen mills, collieries and iron works, breweries and quarries. Pop. 3,240. Consult Simpson, Robert, (History of Llan- gollen) (3d ed., Llangollen 1852).

LLANO ESTACADO, la'no as-ta-ka'do, or STAKED PLAIN, Tex., an extensive plateau forming part of the Great Plains of the eastern slope of the Rocky Mountains, east of the Pecos River, in northwestern Texas and eastern New Mexico and the source of many rivers flowing to the Mississippi and the Gulf of Mexico. It has an area exceeding 40,000 square miles, and is dry and almost woodless; grass is produced for cattle in the rainy season ; water is obtained by boring, and irrigation necessary for the growing of crops. In the north the plateau has a general elevation of about 5,000 feet, but it slopes to the south where it is not over 3,000 feet high. The name is Spanish and means a plain with stakes, referring to the many stalks of the

Yucca or Spanish bayonet which abound in the region.

LLANOS, la'nds or lya'nos, the name given in the northern part of South America, particularly in Colombia and Venezuela, to vast plains, almost entirely level, and inter¬ rupted only at intervals by detached elevations, called in Spanish mesas. The superficial area of the llanos is estimated at 300,000 square

miles; they extend from the delta of the

Orinoco inland to the Yapura, a tributary of the Amazon. A large portion of them is sandy and without much vegetation, except on the banks of the rivers and during the wet season. At this period great stretches are in¬ undated to the depth of 12 to 15 feet, owing to the rivers overflowing their banks. The

villages must, therefore, be built on the ele¬ vated ground. Considerable portions are cov¬ ered with forest ; in the grassy regions great herds of cattle pasture; the climate is warm and moist. Not including the forest section, nor any of the foot-hills of the Andean Cor¬ dillera, the llanos of the northern part of South America would cover only about 150,000 square miles. The inhabitants of these plains are called Llaneros. They are a hardy, vigorous race, and although mainly of Indian extraction are proud of their descent from the first Span¬ ish colonists ; but their mode of life resembles more that of the Indians than that of their boasted

ancestors. Farther to the south such plains are called pampas.

LLANQUIHUE, lyan-ke'wa, a lake in the

province of the same name, in Chile, South America. Largest lake in Chile ; nearly cir¬ cular in form, about 30 miles in length and the same in width. It is a deep lake, with only very small inlets, being mainly fed through the porous granite rocks of the region, and having its outlet in the Maullen River.

LLORENTE, Juan Antonio Don, hoo-an' an-to'ne-o don lyd-ran'ta, Spanish historian: b.

Rincon de Soto, near Calahorra, Aragon, 30 March 1756; d. Madrid, 5 Feb. 1823. He studied theology at Tarragona and Madrid; was ordained priest in 1770; was doctor in canon law, chancellor of the University of Toledo; was commissary of the Inquisition at Logrono in 1785, and general secretary of the Inquisition at Madrid in 1789. He was com¬ missioned in 1793 to draw up plans for a general reform of the procedure of the court. During the crisis of 1808 he sided with the Bonapartists, superintended the measures for the abolition of monastic orders and made a close examination of the archives of the In¬ quisition. His greatest work is the (Critical History of the Spanish Inquisition (1815-17), which, however, has no authoritative standing among scholars. He wrote also (Memoirs Re¬ lating to the History of the Spanish Revolution (1815-19). His autobiography was published in 1818.

LLOYD, loid, Arthur, Anglican clergyman and missionary to Japan, who, engaging in the study of Buddhism, early Christianity and patristic literature, opened new lines of inves¬ tigation and made important discoveries con¬ cerning the early contact of the two religious systems, revealing the great borrowings of the one from the other, especially of the Bud¬ dhists from the Gnostics (q.v.). Consult his (Wheat among the Tares1 (1908) ; Shinran5 (1910); (Every Day Japan) (1909), and his contributions to the Transactions of the Asi¬ atic Society of Japan.*

LLOYD, Charles Hartford, English mu¬ sician : b. Thornbury, Gloucestershire, 1849 ; d. 16 Oct. 1919. He displayed musical talent early, and at 10 was organist of Rangeworthy Church, and after 1862 studied music with Barrett of Bristol, confining his attention

almost entirely to Bach and Beethoven. He graduated from Oxford, where he came under the influence of Stanier and definitely determined to make music his calling. He conducted the Gloucester mu¬ sical festivals of 1877 and 1880, became or¬ ganist of Gloucester Cathedral in 1876 and of Oxford Cathedral in 1882. In 1892 he was precentor and musical instructor at Eton. Among important compositions of his are the cantatas of (Hero and Leander5 ; (The Song of Balder) ; Andromeda5 ; (Alcestis) ; Song of Judgment ; Songbeard's Saga.1 He also wrote many can¬ ticles and anthems for the church, glees, madri¬ gals and part songs, choruses, etc., and several instrumental pieces.*

LLOYD, Francis Ernest, American botan¬ ist : b. Manchester, England, 4 Oct. 1868. In 1891 he was graduated at Princeton University and studied also at the universities of Munich and Bonn. In 1891-92 he was instructor in Williams College; in 1892-95 professor of biology and geology; in 1895-97 of biology at Pacific University. From 1897 to 1906 he was adjunct professor of biology at Teachers' Col¬ lege, Columbia University. In 1906 Professor Lloyd was investigator of the Desert Botanical Laboratory, Carnegie Institution, Washington; in 1907 instructor at the Harvard Summer School and cytologist of the Arizona Experiment Sta¬ tion. From 1908 to 1912 he was professor of botany at the Alabama Polytechnic Institute and in the latter year was annointed MacDonald professor of botany at McGill University, Mont¬

real. In 1905-08 he edited The Plant World, and has published (The Teaching of Biology in the Secondary School5 (1904) ; (The Com¬ parative Embryology of the Rubiacese5 (1902) ; (The Physiology of Stomata) (1908) ; (Guayule, a Rubber Plant of the Chihuahuan Desert5 (1911), also various other botanical papers, in¬ cluding studies on transpiration, stomata, tan¬ nin, rubber, cotton, etc.

LLOYD-GEORGE. See George, David Lloyd.

LLOYD, Henry Demarest, American

writer on economics: b. New York, 1 May 1847; d. 28 Sept. 1903. He was graduated from Columbia University; lectured on political economy in New York schools; studied law and was admitted to the bar in 1869. In 1872 he went to Chicago where he was employed on the Chicago Tribune till 1885, the latter part of the time as a member of the editorial staff. His later life was devoted to writing. His publica¬ tions include (A Strike of Millionaires against Miners, the Story of Spring Valley) (1890) ; (Wealth against Commonwealth5

(1894), a his¬ tory of the growth and methods of the Stand¬ ard Oil Company; (Labor Copartnership 5 (1899), notes of visits to various co-operative shops and farms in Great Britain; (A Country without Strikes1 (1900), an account of the history and workings of compulsory arbitration in New Zealand; and (Newest England1* (1900); (A Sovereign People: A Study of Swiss Democracy5 (1907) ; (Men, the Workers5 (1909) ; (Lords of Industry) (1910) ; (Mazzini and Other Essays) (1910). He made the labor question his special field of research, and was an advocate of co-operation and a believer in socialistic — or, as he called it, democratic — control of industry, to which he maintained that social evolution was leading. He possessed the power of presenting economic facts in an unusually interesting manner, especially his (Wealth against Commonwealth, 5 though com¬ piled from court records and other official docu¬ ments, is written with a force and vividness which give it real literary quality.*

LLOYD, John Uri, American chemist and author: b. West Bloomfield, N. Y., 19 April 1849. He was educated in private schools ; was professor of pharmacy at the Cincinnati Col¬ lege of Pharmacy, 1883-87 ; professor of chem¬ istry at the Eclectic Medical Institute, 1878— 1900, and president of the Eclectic Medical In¬ stitute, 1896-1904. He has been president of the Lloyd Library since its inception, and is senior member of the firm of Lloyd Brothers, manufacturing pharmacists and chemists of Cincinnati, Ohio; and in the laboratory has devoted his life work to plant pharmacy, in¬ cluding investigations of plant alkaloids and proximate principles. He has contributed very largely to current chemical and pharmaceutical literature, and outside his professional writings has made special studies in the dialect, super¬ stitions and folklore of northern Kentucky. His best-known publications are (The Chemistry of Medicines) (1881) ; Supplement to King's American Dispensatory> (1885) ; (King's

American Dispensatory,5 revised and rewrit¬ ten with H. W. Felter, M.D. (189&-1900) ; ˆElixirs, their History and Preparation5 (1892); (A Study in Pharmacy5 (1894); (Etidorpha, the End of Earth5 (1895) ; (The

Right Side of the Car> (1897); (1903); (1904); (The Eclectic Alkaloids, Resinoids and Concentrations (1910) ; (History of the*

*Vege¬ table Drugs of the Pharmacopeia of the United States) (1911); (A Study of Digitalis) (1912), and (A Study of Coca) (1913). He is the author of the article on ((Pharmacy** in the Encyclopedia Americana.* He is a mem¬ ber of the Society of Colonial Wars, Sons of the Revolution, Sons of the American Revolu¬ tion, Authors' Club of New York, New York Deutscher Apotheker Verein (honorary), Franklin Inn Club and Franklin Institute of Philadelphia, the Literary Club of Cincinnati, and is also a Fellow of the Royal Society of Arts, England.*

LLOYD, Nelson McAllister, American journalist and author: b. Philadelphia, 18 Dec. 1872. He was educated at the Germantown Academy, and was graduated in electrical engi¬ neering at the Pennsylvania State College in 1892. He engaged in newspaper work on the New York Evening Sun , of which he was city editor from 1897 to 1905. He retired in 1908 from newspaper work. He has contributed many historical sketches and short stories to magazines and has also published (The Chronic Loafer (1900) ; (A Drone and a Dreamer * (1901) ; (The Soldier of the Valley1* (1905) ; (Mrs. Radigan* (1906) ; (Six Stars> (1907) ; (The Robberies Company* (1908) ; (David*

Malcolm) (1913). He is a member of the National Institute of Arts and Letters.

LLOYD'S, an incorporated firm engaged in marine insurance in London, its other activ¬ ities being in the line of collecting and pub¬ lishing news of shipping. The corporation has rooms in the London Royal Exchange. Mem¬ bers are admitted by subscription and the affairs of the institution are conducted by a committee. Reports are received daily from all foreign ports, and this information is posted in the common or merchants' room. This service requires an enormous staff of corre¬ spondents and the conducting of a chain of special signal stations to which ship captains are required by law to report certain maritime news when passing. Besides this there are other rooms for the use of the underwriters and for ship-auctions, a library, restaurant, etc. Lloyd's list, containing shipping reports, is pub¬ lished daily, and various other publications re¬ lating to shipping are also issued. (See also Lloyd's Register). Originally the London underwriters met at Edward Lloyd's Coffee¬ house, that institution dating as far back at least as 1688; hence the name. Consult Martin, F., (History of Lloyd's (London 1876).*

LLOYD'S BONDS, in England, from 1850 to 1870 a well-known commercial security; mostly instruments under the seal of a rail¬

way or other such company admitting the in¬ debtedness of the company to a specified amount, with a covenant to pay such amount with interest within a stated time. These companies had generally statutory authority to borrow only when a certain amount (usually the whole) of their capital had been sub¬ scribed and a specified portion paid up; their power of borrowing must also be. exercised with the sanction of a general meeting. Such

restrictions were severely felt by companies whose works were being constructed. A bar¬ rister, John Horatio Lloyd, relieved the com¬ panies from this embarrassment by taking ad¬ vantage of the fact that companies, though prevented in such cases from borrowing, could contract debts in any other way and acknowl¬ edge their obligations in various forms. He introduced a form in which such acknowl¬ edgments would become almost as binding on the grantors as a statutory debenture, and so become sufficiently marketable. Railway com¬ panies now having ample borrowing powers, the necessity for these instruments no longer exists.

LLOYD'S REGISTER, a shipping record of vessels in commission and their ratings ac¬ cording to construction, physical condition and equipment. Lloyd's Register had its beginning in 1799, when the Underwriters' Registry, or Green Book, published by a committee of Lloyd's (q.v.) was denounced as unfair by the British ship owners whose vessels were therein given arbitrary ratings. The ship owners formed an association of their own and began publishing the Red Book, with ratings accord¬ ing to their own judgment. The rivalry con¬ tinued until 1833, when Lloyd's engineered a combination of the two publications under the control of the ship owners, and they accepted the name ˆLloyd's Registry of Shipping® as the title. The society has a staff of skilled surveyors who examine vessels periodically, changing their rating as occasion demands. They are also detailed to watch the construc¬ tion of vessels in the yards, make inspections and tests of steel used, strength of cables and chains and examinations of equipment. The rating 100 A 1 is the type of wholly approved ship; 90 A 1 for a ship not wholly approved in build; 100 A — for a ship approved as to build, but lacking as to equipment. The general committee of the society is located at London; there are subcommittees at Liverpool, Glasgow and in the United States. Besides the Register the society publishes a separate register of American yachts and motor-boats, and rules and regulations for the building of steel vessels and yachts.

LOA, the African eyeworm of man. One of the Filariidae among the Nematoda (q.v.), conspicuous because of its migrations through the

subcutaneous connective tissue of the human body, a habit which brings it at times in front of the eyeball. It has often been re¬ moved from this place and said to occur in each eye. Cases in North America are all im¬ ported from the west coast region of Africa, which is its proper home. It is transmitted to man by the bite of the mangrove fly.

LOAD. See Electrical Terms.

LOAD LINE, a mark placed by recognized authority on the side of a vessel to indicate the maximum depth to which she may be legally loaded under the British law. It is required to be 12 inches in length and one inch in width, and is accompanied or enclosed by a circle struck from the centre of the upper edge of the line. Generally the line is made longer than the required 12 inches, and extends be¬ yond the circle in both directions. On wooden ships the line and the circle are to be cut into

the wood at least one-fourth of an inch deep. Oil steel vessels the line and circle are to be painted on — in white or yellow, if the hull is dark; in black if the hull is light in color. In the case of the steel ship it is required that the centre of the circle shall be indented with a punch, so that if painted over for any reason the point may be identified beyond any ques¬ tion. The load line as indicated is for the summer loading of ships traversing salt water. Several modifications have been allowed by law : a slightly deeper loading for the Indian Ocean in summer, and a still deeper loading if the vessel is to navigate only in fresh water. In the other direction a lighter loading is re¬ quired for winter, and a still lighter loading if the winter voyage is to be made in the stormy north Atlantic Ocean. These modifi¬ cations of the load-line are painted alongside of the line and circle somewhat in the form of a gridiron — as shown in the diagram.

Load Line.

The signification of the letters is as fol¬ lows :

FW, fresh water load-line (steamer).

IS, summer load-line, Indian Ocean.

S, summer.

W, winter.

WNA, winter, north Atlantic.

F, fresh water sailing ships.

There are three executive bodies authorized by the British law to affix or to approve these marks: Lloyd's Register, the Bureau Veritas and the British Corporation. Initial letters (LR, BV or BC) are usually placed at the ends of the line which project beyond the cir¬ cle, showing which of these bodies has verified the correct placing of the line.

The load line is a development of the for¬ mer "Plimsoll mark® established by Samuel Plimsoll (q.v.) in the effort to prevent the hazard to the lives of seamen in the overload¬ ing of vessels. Consult Lloyd's Register, ˆules and Regulations for Steel Vessels) (or

LOADSTAR. See Lodestar.

LOAM, soil consisting of a mixture of clay, sand and lime, with animal and vegetable matters in intimate mixture. The clay varies from 20 to 50 per cent; the proportion of lime is usually not more than 5 per cent. _ Loamy soils are among the best and most fertile; they are not stiff and tenacious like clay soils, and they are much more fertile than sandy soils. Even in mere mechanical properties, they are superior to both. The "clay® used for bricks is often really a loam in which the proportion of true clay is large. In Italy, France and some other countries, walls are made of loam beaten down between planks placed at the requisite width. These walls become very solid and last for centuries. The loam used

in foundries consists of a mixture of clay, sand and horsedung, ground up with water in a sort of mortar called a loam-mill. When cold, the loam has sufficient consistency to be struck up to any desired outline by means of a "loam-board.® (See Clay; Sand; Soil). Consult Van Slyke, fertilizers and Crops) (New York 1912) and Hilgard, (Soils) (ib.

1904).

LOAN, anything lent or given to another on condition of return or payment. In civil law loans are considered to be of two kinds — mutuum and commodatum ; the former term being applied to the

loan of such articles as are consumed in the use, as provisions or money ; the latter to the loan of such articles as must be individually returned to the lender. The acknowledgment of a loan of money may be made by giving a bond, a promissory note or an I. O. U.

LOANGO, French West Africa, the chief port of the French colony, 100 miles north of the Kongo River. Under native rule it was a flourishing city of 15,000 souls, but is now re¬ duced to a few wharves and warehouses. Steamers are unloaded by means of lighters. There is a submarine telegraph connecting it with Europe.

LOANGO, West Africa, a district on the Atlantic Coast, extending 200 miles to the north from the mouth of the Kongo. The coast is thinly wooded; inland the surface rises, but the interior is a succession of pla¬ teaus. Palm-oil, gum, wax, copper, rubber, orchil and ivory are exported. Cotton, coffee and bananas are the chief crops. Loango was formerly a part of the native kingdom of Kongo and is now divided between French Kongo, the Portuguese Kabinda and the Belgian Kongo. The native population are of small size but are skilled in many industries, espe¬ cially as weavers of bast and straw. Loango is the principal city.

LOBACHEVSKY, or LOBATCHEW- SKY, Nicholas Ivanovitch, Russian mathema¬ tician ; b. Makareif, Nigni-Novgorod, 1793; d. 24 Feb. 1856. He entered the University of Kazan in 1807, became assistant professor of mathematics in 1814 and extraordinary pro¬ fessor in 1816. In 1823 he became ordinary professor retaining his chair (in addition being for 19 years rector) until 1846, when he fell into disfavor. Unlike many professional men, he was a good business man and his adminis¬ tration of the affairs of the university was marked by many beneficial changes. He or¬ ganized the force of teachers, and even studied architecture, so that when the new buildings were erected he supervised their erection, econ¬ omized space and saved thousands of dollars. He wrote his (Pangeometrie) in 1855, giving die result of his long years of geometrical studies, and presented it to the university. He was one of the first thinkers to apply a critical treatment to the Euclidean principles of geom¬ etry. He gave his first contribution to the theory of hyper-geometry in a lecture at Kazan in 1826, but later wrote several treatises on the subject. He also wrote a treatise on algebra (Kazan 1834) and contributed many other arti¬ cles on mathematics. His complete works were edited by Janischevsky (1870) and have

been translated by several writers. His collec¬ tion of geometrical writings was published in Kazan in 1883, the first volume containing Rus¬ sian articles only, and the second and last vol¬ ume containing the French and German arti¬ cles. For his geometry consult (New Princi¬ ples of Geometry with Complete Theory of Parallels,) translated by Halsted (Austin, Tex. 1897). Consult also Engel, F., (N. I. Lobatchewsky) (Leipzig 1899).

LOBBY, The, a class of persons who seek to influence legislation outside of the regular legislature which has come in the United States to be known derisively as the ((third chamber.ˆ The term was originally applied to the waiting- rooms of legislative halls, and then to those persons who frequented these rooms for the purpose of interviewing legislators with a view to influencing their votes. The lobby includes both those who are regularly employed in the work, and those who on particular occasions wish to promote or oppose some specific legis¬ lation. All large corporations and firms have regular paid lobbyists at Washington and at State capitals where legislation is likely to affect their interests. Women as well as men are employed as lobbyists, and are said to be very successful. The lobby is not in theory, nor necessarily in practice, a corrupting agency. It may furnish an entirely legitimate and de¬ sirable method of giving legislators necessary information in regard to certain laws; but it may also be, and often is, the means of obtain¬ ing legislation in the interests of a few with¬ out regard to the public good. The methods of the lobby differ with the character of the lobby¬ ist and of the legislator approached. They vary from the legitimate presentation of facts and argument in regard to a law to the use of bribery, threats of preventing re-election, etc. ; and include the obtaining of letters and peti¬ tions from constituents, the employment of press articles and social attentions. The suc¬ cessful lobbyist must thoroughly understand the men with whom he has to deal and the methods of legislation ; it has been found, therefore, that former members of the legis¬ lature make the most successful and sometimes the most dangerous lobbyists. The dangers of the lobby are due to three chief causes: (1) the large number of special and private bills, all of which cannot be fully considered at the reg¬ ular sessions; (2) the system of referring all bills to committees, and accepting, as a rule, the report of the committee, so that the lobby¬ ist has practically but few men to deal with; (3) the secrecy which attends the work of the lobby, giving the public no effective means of knowing or dealing with its evils. To oppose the grosser evils of the lobby both Federal and State laws attach heavy penalties to giving or

taking a bribe for legislation. Many of the States also have lessened the number of bills to be presented by forbidding in their constitu¬ tions the passing of special acts in certain cases. Among States that have passed enact¬ ments to lessen the lobbying evil are • — Cali¬ fornia, Georgia, Utah, Tennessee, Oregon, New York, Montana, Arizona and South Dakota. Massachusetts has sought to lessen the secrecy by requiring every promoter of a law in the interest of others to be registered, with the name and address of his employer and a state¬ ment of the matter on which he is employed,

This law has had the effect of giving legal sanction to the lobbyist's work, improving the character of the lobbyists, and of lessening, though not entirely preventing, the evils attend¬ ing secrecy. The lobby sent to Washington to oppose the Underwood Tariff Bill of 1913 drew forth strong criticism and warning from Presi¬ dent Wilson, and the operations of the Na¬ tional Association of Manufacturers were in this connection severely animadverted on by the Investigation Committee in 1914. Consult Bryce, (American Commonwealth ; Bridgman, (The Lobby* (in New England Magazine, n. s. Vol. XVI, p. 131) ; Tanner, H. C., The Lobby and Public Men- (Albany 1888) ; Reinsch, R. S., American Legislatures and Legislative Methods) (New York 1907) ; (First Report of the Interstate Commerce Commission (Wash¬ ington 1887) ; and the (Cyclopedia of American Government.**

LOBELIA, a genus of annual and peren¬ nial herbs and a few undershrubs of the family Lobeliacece, closely allied to the harebells. More than 200 species are distributed through¬ out the temperate and tropical zones, especially in damp soils. They are characterized by al¬ ternate, usually narrow leaves and two-lipped tubular flowers (three petals forming one lip and two the other), arranged in terminal racemes. Several of the species are highly prized as garden plants, the best known being the cardinal-flower (q.v.), the great lobelia (L. syphilitica) , both common natives in marshy grounds and along streams; L. Erinus, a favo¬ rite African plant for edging flower beds; and L. fulgens, a Mexican species, which like the first named has brilliant red flowers. The other two have blue blossoms. They are all of simplest culture. Some species have been used in medicine, and one common species, L. inflata, is called Indian tobacco because its dried leaves were extensively smoked by the southern Indians, who enjoyed the narcotic effect in spite of the bitter flavor. Lobelin, lobelacrin, and lobelic acid are organic deriv¬ atives.

LOBENGULA, lo-beng-goo'la, king of the Matabeles (see Matabei.eland) : b. about 1833;. d. 1894. He was a son of

Mosilikatse, whom: he succeeded in 1870. Fixing his capital at Bulawayo (q.v.), he made himself a powerful opponent of Western civilization, and pro¬ hibited his people, on pain of death, from accepting Christianity. After years of diplo¬ matic effort, following the discovery of gold in his domain, Great Britain, by treaty in 1888 acquired suzerainty over his kingdom, and in 1890 the British South Africa Company ob¬ tained from him permission to settle in Mash-onaland (q.v.), paying him a stipulated rent. After preparing to hold the country and work the gold mines, the company provoked the en¬ mity of Lobengula, who began against the English a war which resulted in his disastrous defeat, after shocking slaughter of his men by Maxim guns. Bulawayo was taken, and Lobengula fled. During his flight he ambus¬ caded and killed Major Wilson and a British detachment, but the contest ended with his own death. Consult Wills and Collingridge, (The Downfall of Lobengula> (London 1894).

LOBITO BAY, Portuguese West Africa, seaport and railway terminus pf Angola. It is

the terminus of the railroad to Katanga. There is a good harbor permitting ocean-going vessels to dock.

LOBLOLLY BAY, or TAN BAY, an

elegant pyramidal shrub or tree (Gordonia las tan thus) of the tea family, which covers considerable tracts of swampy coast along the Gulf of Mexico. It is a handsome tree, some¬ times 50 or 60 feet tall, with evergreen leaves and large white fragrant flowers. Its bark is used in tanning.

LOBNOR, Lake, a lake of central Asia

situated on the border of the desert of cen¬ tral Asia and near the base of the Altyn Tagh Mountains in East Turkestan. It is fed by the Tarim, of which the lake is merely the sink. According to the Chinese the lake was for¬ merly of much greater area than at present but modern explorers do not support this view. The lake's borders are reed-covered marshes. The portions of the lake distant from the mouth of the Tarim are salt. Consult Hedin, Sven, (Trans-Himalaya) (New York 1912).

LOBO, Francisco Rodrigues, Portuguese author: b. Leiria, about

1575; d. about 1627. Nothing is known of his life beyond the fact that he came of a wealthy family; that he studied at the University of Coimbra where he took the degree of licentiate about 1600; and that he lived at ease near his birthplace, writing pastoral and' other verse. His first volume of verse, III in 1623. In his day Spanish was the language of Portuguese high society and Lobo rendered an important service to his native land by writing in Portuguese at the critical period in the his¬ tory of that language during the Spanish domi¬ nation of Portugal, ˆrimaveraR a novel, ap¬ peared in 1601, and was continued in (0 Pas¬ tor PeregrinoR in 1608, and (0 DesenganadoR in 1614. Although considered his best prose they are dull for the modern reader, for whom their only relieving features are the pastoral songs or serranilhas. In his eclogues he fol¬ lowed Camoens closely and they are poor imitations at best. His redondilhas are infi¬ nitely superior, due perhaps to his reliance upon true national inspiration. His (Corte na Al- deia} contains an interesting series of philo¬ sophic and literary discussions in the form of dialogues. Lobo also wrote an epic in 20 can¬ tos, (E1 Condestable de PortugaP (1610), but it falls far below the level of his other works. Lobo ranks as one of the leading authors of Portugal because of the purity and elegance of his style. His works went through several editions in the 17th and 18th centuries — a remarkable feat for Portugal. An edition of his works appeared at Lisbon in one volume in 1723, and a less complete edition there in four volumes (1774). Consult Bouterwek, F., (History of Portuguese Literature) (London 1823) and la Silva, I. R, cDiccionario biblio-graphico portuguez) (Vols. Ill, IX, Lisbon

1859; 1870).

LOBOC, lo-bok', Philippines, a pueblo of the province of Bohol, situated in the southern nart of the province on the Socar-V ilar-Loay River, three miles from its outlet, and 12 miles east of Tagbilaran, the provincial capital. It is

on the road leading from the coast. Pop.

10,756.

LOBOS, lo'bds, or SEAL ISLANDS,

Peru, two groups of small islands in the Pacific, 12 miles from the mainland, so named from the Spanish lobo, ˆseal,® large numbers frequenting the islands. The largest and most northerly is Lobos de Tierra, five miles long and two broad. They were famous for their

extensive deposits of guano, which have been depleted.

LOBSTER, the name of certain large crustaceans of the crab group, and especially of the genera Homarus, Nephrops and Pali – nurus. To the first belong the common Euro¬ pean and American lobsters (Homarus gam- marus and americanus) . Nephrops differ chiefly in possessing 19, instead of 20, pairs of gills, and its most important species is the Nor¬ wegian lobster (N . norvegicus) . To Palinurus belongs the rock-lobster or marine crayfish (P. vulgaris) of Europe, as well as some trop¬ ical species, all of which differ from the com¬ mon lobster in the absence of the large claws, while they possess long rigid antennae and spiny shells. A large and handsome species of this group is abundant in West Indian waters.

The American lobster is found along the western Atlantic Coast from Delaware to Lab¬ rador; from the shore to a depth of 100 fath¬ oms. It is most abundant on the shores of Maine and Nova Scotia and less common on the New Jersey coast. Though living amid a variety of surroundings, the lobster prefers rocky bottoms, on which it reaches the greatest size and abundance, probably a direct result of a more plentiful food supply. Like many fishes, but to a much less degree, the lobster is migratory, moving into shallow water in the spring and returning to greater depths as the water grows colder in the fall. This habit, however, is very far from being universal, and many lobsters remain in shallow waters throughout the year. The food of the lobster consists of all kinds of animals, both living and dead, and to a less extent of vegetable matter, the indigestible parts of which are regurgitated. At times they are cannibalistic. Although so well protected by their hard shells, powerful claws and burrowing habits, lobsters have many enemies besides man. The most important of these are bottom-feeding fishes, such as the cod, tautog, skate and dogfish, which destroy great numbers of young lob¬ sters when two to six inches long, as well as the egg-bearing females and moulting adults. During the free-swimming larval stages great numbers probably fall a prey to surface-feeding fishes like the menhaden and herring, though little direct proof of this exists. The num¬ ber of eggs produced by a female lobster varies from 3,000 to nearly 100,000, according to the size and age of the animal, maturity being attained at an age of three or four years and a length of about 8 to 12 inches. The great majority (about four-fifths) lay their eggs during the summer, the remainder during the fall and winter, and it is probable that each female lays once in two years. After extru¬ sion the eggs are borne on the appendages attached to the lower side of the abdomen or tail of the female, where they remain under¬ going a slow development for 10 to 11 momhs,

most of those laid during the summer hatch¬ ing in June of the following year. After hatching, the young passes a period of six to eight weeks as a free-swimming pelagic larva, which moults five or six times, with corresponding changes in form and color. By this time it has assumed the form of the adult and is about three-fourths of an inch long. It now sinks to the bottom and burrows into the gravel or hides in rock crevices near shore. At the end of the first year it is about four or five inches long and has moulted from 14 to 17 times, after which growth is much less rapid and moulting less frequent. The rate of growth varies greatly according to the food supply and other conditions, but a lobster of 10 or 12 inches is about five years old. A great age and size are sometimes attained, individuals weighing upward of 40 pounds be¬ ing recorded, though even 25 pounds is very rarely reached.

The toothsomeness of the American lobster was early recognized and a regular fishery has existed on the Massachusetts coast for nearly a century. Owing to a rapidly extending de¬ pletion of the fishing grounds and a consequent diminution in the size and number of lobsters, the centre of the fishery has shifted northward, first to Maine and then to the British provinces. The lobster fisheries of the United States in 1913 employed 4,508 persons with a capital in¬ vestment of $2,460,898. The catch numbered 8,832,017 lobsters, weighing 12,067,017 pounds, of a value of $2,394,822. Between the years 1889 and 1913 there was a decrease of 18,- 504,556 pounds, or 60 per cent, while the re¬ ceipts of 1913, compared with those of 1889, increased 178 per cent. The price of fish in Maine rose from 1.8 cents per pound in 1880 to 19.8 cents in 1913, or 11 times greater.

There are no better oyster grounds in the world than the eastern provinces of Canada, from Grand Manan to the Labrador boundary. Not so many years ago the finest lobsters could be bought and sold for 50 cents per 100. In Chaleur Bay they occurred in such numbers that farmers used them by thousands to manure the land. Canneries began to be established about 1870, and in 1910 there were 677 canneries in the eastern provinces. The catch in 1890 amounted to 11,559,984 pound cans, while the quantity shipped to market in shell amounted to 104,940 hundredweight*. the whole of a value of $1,648,344. During the next 20 years the quantity taken remained al¬ most stationary, but the value greatly increased. In 1910 the

total was 9,071,600 pound cans, with shipment in shells of 103,907 hundred¬ weight, with aggregate value of $3,657,146; in 1915-16 the catch was 445,277 hundredweight, and value $4,506,155. As measures toward maintaining the lobster supply, laws have been enacted fixing fines for the possession of egg¬ bearing lobsters or those below a specified) minimum size, and recourse has been had to artificial propagation. In the latter practice many millions of eggs are annually taken from the bearing lobsters, artificially hatched, and the larvae distributed by the fish commissions of the United States and the British provinces. In 1914 our bureau planted upward of 194,670,- 000 of fry, and the Canad'an government operates on an even more extensive scale. The beneficial results have been scarcely apparent,

but the recent successful rearing of lobsters be¬ yond the larval stages has introduced a more hopeful outlook. The methods of the lobster fishery are very simple and uniform. Use is made of a trap or pot, a box-like affair gener¬ ally made of laths placed about one inch apart, and with a funnel-shaped opening of coarse net¬ ting placed in one end. The pot is baited with otherwise useless fish, weighted with stones, and lowered to the bottom by means of a rope to the upper end of which a buoy, with the owner's private mark affixed, is attached. The pots are visited daily, and the lobsters, which after en¬ tering are unable to find their way out, re¬ moved. They are kept alive in floats until a sufficient number for shipment has been gathered. Besides those sold in the shells, large quantities of the meat are canned, partic¬ ularly at Portland.

Consult especially the elaborate account of the American lobster by Herrick in (Bulletin of the United States Fish Commission for 1895, in which full bibliographical references will be found; also Barnes, E. W., (Methods of Oyster Protection and Propagation (Provi¬ dence 1911) ; Herrick, H. F., (Natural History of the American Lobster (Washington 1911) ; and the evidence laid before the Canadian Fisheries' Commission on (Lobster Fishery in Quebec and the Maritime Provinces* (Ottawa*

1909-10).

LOBWORM. See Lugworm.

LOCAL GOVERNMENT, Principles of.

In all countries of any size the work of govern¬ ment is divided between the central authorities and officials in local districts; and

the general character of the government as a whole is affected largely by the system of local govern¬ ment and the relations between the central and local authorities. The principles involved in local government systems are more complicated than are often realized; and governments which resemble each other in the main features of the central government may differ radically in their machinery of local government. This article calls attention to some of the leading factors to be considered in the study of local government, with illustrations from some of the more important countries.

Local Government Areas. — One import¬ ant consideration is the nature of the local government areas. In some countries, there are comparatively large districts, often called provinces, which in modern times are historical divisions, in some cases representing formerly independent states. Such are the provinces of Prussia and Italy. In other countries, the older provinces have disappeared, and more recently established districts, generally smaller than the provinces, have been created, as the ((depart- ments® of France. With these may be com¬ pared the counties of England. Both of these classes of districts include both urban and rural territory.

In addition to such districts, in most coun¬ tries there are now somewhat smaller local government areas, — such as the ˆcircles® in Germany, the (

urban and rural territory; but with the develop¬ ment of urban population during the last cen¬ tury, there are now distinctively urban dis¬ tricts of this type, and the district government is oflen combined with that of the city.

Still further, there are in all countries local communities of smaller area, ranging from rural villages, parishes or towns, to large metropolitan cities. In some countries, as in Germany and England, there is an important legal distinction between rural towns or parishes and urban municipalities, such as cities and boroughs. In France both rural and urban communities are organized as communes. In the United States there are wide variations be¬ tween the different States. In the north Atlan¬ tic States, the term city is limited to places of over 10,000 or 12,000; in the Southern and Western States the minimum population for cities is lower, — from

5,000 in Ohio to 300 in Kansas. Smaller semi-urban districts are classed as villages or boroughs; while in New England the town government usually includes that of the villages.

In addition there is a great variety of special districts for particular purposes, overlapping the other areas. These are frequently organ¬ ized as administrative subdivisions for the central government ; but in England and the United States many such districts have also been established with locally elected authori¬ ties, — such as poor law, port and burial dis¬ tricts in England ; and school, drainage, sani¬ tary and many other districts in the American States. The recent tendency in England is to eliminate such special districts; and to carry on public functions, as on the continent of Europe, by the more general local authorities, sometimes uniting several such districts for particular pur¬ poses.

Centralization and Decentralization. — In

the organization of government one of the most important factors is the relative degree of central control and local autonomy as to the work done by local officials. In this respect both history and present systems show a wide range of variation from extreme centralization to an extensive field of local home rule.

As Rome extended its dominion, the former city-states which it conquered were allowed to retain a large measure of self-government. But beginning with a centralized system of military and tax administration, the sphere of central control was gradually enlarged; and as ultimately organized in the time of Diocletian the whole system of government became thoroughly centralized, with the officials of the praetorian praefectures, the provinces and the municipalities appointed by and subject to the control of the higher authorities.

With the decline and breakup of the Roman Empire, the highly centralized system disap¬ peared ; and the feudal system which prevailed through western Europe during the Middle Ages was largely one of decentralized local government, where power was largely in the hands of the feudal lords. This system was modified by the development of cities, which also gained a large measure of local autonomy, exercised mainly by the merchant classes, and leading to another form of local oligarchy. Beginning in the latter part of the mediaeval period, principalities and kingdoms arose, the rulers of which steadily gained power, reducing

the autonomy of the local communities and minor nobles on the one hand, and at the same time weakening the central authority of the mediaeval empire and the Roman Church.

Local institutions in Anglo-Saxon England were highly decentralized, in the hands of shire or county courts, composed of representatives of the hundreds and presided over by the sheriffs, appointed by the Crown. After the Norman Conquest the power of the sheriffs in¬ creased ; and the central control of the Crown was still more strengthened by the develop¬ ment of law courts held by judges appointed by the Crown. But the movement toward complete centralization was affected by the de¬ velopment of justices of the peace and Parlia¬ ment. The unsalaried justices were appointed from property-owners and were thus more in¬ dependent and weie also not subject to active central control. In Parliament, the more im¬ portant local districts — counties and boroughs — as well as the local nobility, were represented. The result was a system of legislative rather than executive centralization, with the control over both central and local government in the hands of the well-to-do classes.

During the 19th century, the English system of local government was extensively altered. It has been made much more democratic by the establishment of popularly elected local coun¬ cils. The scope of local functions has been radically enlarged. At the same time, the local authorities have been made subject to a large degree of central administrative control, exer¬ cised by the Local Government Board and other departments of the central government. The fundamental legal basis of ultimate legis¬ lative centralization in the hands of Parlia¬ ment remains ; but Parliament has been reor¬ ganized on a more democratic basis, and with a more equitable representation of the local districts.

On the continent of Europe the tendencies toward centralization in each country continued to the end of the 18th century. These were most marked in France, where, after a brief in¬ terruption in the early years of the Revolution, a new and completely centralized system was established under Napoleon I, with prefects, sub-prefects, mayors and local councils, all ap¬ pointed by and subject to the control of the central government. Since 1830, however, there has been some relaxation. Locally elected councils have been established; and the munic¬ ipal councils elect the mayors of the communes, except in Paris. But the system of local gov¬ ernment remains more highly centralized in form than in any other important country.

In Italy, Spain, Holland and Belgium the local government systems have been largely in¬ fluenced by the French system; but with some¬ what more local autonomy.

German local institutions have also been re¬ organized during the 19th century; and the recent system showed the influence of both French and English factors, as well as distinctly German elements. The general tendency has been toward an increase of local autonomy; and the expansion of local functions has been much more marked than in France and in some respects more than in England. Administra¬ tive control by the central governments of the several states over the local authorities has been less intensively organized than in France,

but more highly developed than in England. On the other hand, with the comparative weak¬ ness of popular control and the importance of professional officials, the local government has operated much as a highly centralized sys¬ tem.

What will be the permanent result of the changes following the great war cannot be definitely predicted.

Local government as developed in the Ameri¬ can colonies followed the main lines of the English system of the 17th century; and until the middle of the 19th century the tendencies toward legislative centralization and adminis¬ trative decentralization continued to develop. Since about 1850 there has been some move¬ ment in the opposite direction. The power of the State legislatures has been limited to some extent ; and State officials have been established with supervision over local authorities and in some fields with powers of. direct administra¬ tion.

Each State has control over its own system of local government, which is determined in part by the State constitution and more largely by detailed statutory legislation, with no clear distinction between State laws of general in¬ terest and those dealing with local affairs. At the same time these laws are largely adminis¬ tered by locally elected officials ; and many State constitutions provide for the local elec¬ tion of county officers. Legislative control is also limited in many States by constitutional provisions prohibiting and restricting special legislation ; and in some of the Central and

Western States cities have authority to adopt their own charters of local government. On the other hand, there are now State officials with powers of administrative supervision over local officers in the fields of education, chari¬ ties, public health, public utilities and finances; and in these and other lines there has developed a considerable amount of direct State adminis¬ tration. These tendencies toward a more cen¬ tralized administration are, however, still far behind the conditions in continental Europe, or even in England. There is need for further changes so as to develop a more coherent policy of local government.

Local Organization. — In the organization of local institutions it is important to note: (1) The degree of concentration or division of authority in the several local districts ; and (2) the professional or non-professional character of local officials.

Local powers in England are almost uni¬ formly vested in elected councils of unpaid members, such as the county council, the bor¬ ough council and the urban or rural district council. These councils act largely by means of committees of their own members; and the chairman or mayor is merely the presiding of¬ ficer. Subordinate to the council are perma¬ nent expert officials.

In France there is also a series of popu¬ larly elected councils in each local district, with financial and local legislative powers. But the executive authority of each district is vested in a single official — as the appointed prefects of the departments, and the mayors of com¬ munes elected by the communal councils. The prefects are a class of professional officials ; but the mayors are not usually trained. Under

these are subordinate experts for the various branches of administration.

German local organization is more compli¬ cated ; it includes elected local councils and trained professional experts; but the latter have more independent authority and larger in¬ fluence than in France or England. The may¬ ors of cities, as well as the chief executive of¬ ficers in the provinces, districts and circles, are professional officers. Much use is made of ad¬ ministrative boards, composed of professional and non-professional members, in contrast with the single-headed executive authority in France.

In the United States there is a wide variety in the forms of local organization. County government is divided between a series of

elected officials, with no common superior, and an elected board of commissioners or super¬ visors — the latter in most States a small body elected at large, but in some States a larger body elected by towns or districts. New Eng¬ land town government has a similar unconcen¬ trated organization ; but in some of the Central States the town supervisor or trustee is the head officer. Cities formerly had a similarly loosely organized government ; but in recent years there have been marked tendencies to¬ ward a more concentrated organization. In many places this has been brought about by in¬ creasing the power of the elected mayor; in many others by placing the city government in charge of a small commission of three or five elected members ; while the latest plan provides for the election of a small council, which chooses, a city manager as the chief executive officer. Civil service laws have also secured a better trained and more permanent subordinate service.

The method of electing a large number of officials by popular vote for short terms has hindered the development of a professional ex¬ pert service ; and as a result local administra¬ tion has been extremely inefficient. The more recent tendencies in city government toward a more concentrated organization have been accompanied by an increase in the class of trained officials. But local government in the United States remains more loosely organized and with a larger proportion of untrained of¬ ficials than in any other of the countries here noted.

Popular Control. — The general tendency in all governments since the end of the 18th century has been toward an increase of popular control by the extension of the elective fran¬ chise. This has reached its maximum in the United States, where the prevailing system is one of the general adult suffrage, with short residence qualifications. In a consider¬ able number of States women also have the right to vote — and in some States where women do not vote in all elections, they may do so in some local elections. In the Southern States, however, the negro vote has been prac¬ tically eliminated. But the numerous elections and long lists of elective officials have hindered the effective exercise of popular control, and the real power is often in the hands of party and other political organizations.

France also has manhood suffrage in local elections. In England local councils are elected tinder a widely extended suffrage, including women but excluding the floating population. In Germany the suffrage for local elections

LOCAL OPTION

has been more restricted : in Prussia all tax¬ payers could vote ; but the voters were grouped in classes based on the amount of taxes paid, and this placed the effective control in the hands of the well-to-do classes.

Summary. — To sum up, local government in the United States is the most democratic in form, and the most loosely organized, makes the least use of trained officials and has the maximum of administrative decentralization ; but is subject to a large degree of State legisla¬ tive control. English government is demo¬ cratic and has a more concentrated organization, more trained officials and a considerable de¬ gree of central administrative supervision. In France, local government is democratic, but has a highly concentrated executive organiza¬ tion, expert officials and the highest degree of administrative centralization. The Prussian system has had the least popular control of any important country, a complicated organiza¬ tion, a large degree of central administrative control and the most highly trained, expert pro¬ fessional officials.

Bibliography. — Ashley, P., (Local and Cen¬ tral Government > ; Fairlie, J. A., (Local Gov¬ ernment in Counties, Towns and Villages J ; Goodnow, F. J., Principles of Constitutional Government (chs. 23, 24, 25).

John A. Fairlie,

Professor of Political Science, University of Illinois.

LOCAL OPTION. The phrase local op¬ tion may be applied to a great variety of mat¬ ters which may be determined by the action of local communities. In the broadest sense, it includes all powers of local government, as dis¬ tinguished from mandatory duties. More com¬ monly the term is used with reference to per¬ missive or adoptive laws dealing with specific subjects — such as the choice between the county and township forms of local govern¬ ment, the alteration of boundaries and the con¬ duct of elections. Before January 1920 when national prohibition was to take effect, the term was commonly used with reference to. the local prohibition or license of the sale of intoxicat¬ ing liquors, usually by popular vote.

In 1829 the selectmen of each town in Maine were authorized to decide whether or not to permit the sale of liquor; but this method soon ceased to have statutory warrant. In 1868 Massachusetts

recognized the local op¬ tion principle in its liquor laws; and in 1881 definitely established the local option system. Other States gradually provided for some method of local prohibition of liquor selling; and by 1900 laws for this purpose had been passed by 37 States. Later a number of local option States adopted State prohibition, while other States provided for some form of local option. In 1916 there were 19 States where the sale of liquor was prohibited ; 26 others had lo¬ cal option laws, applying to a variety of dis¬ tricts; while in the three remaining States (Pennsylvania, New Jersey and Nevada) methods had been found to exclude the sale of liquor from certain limited areas.

In three States — Maryland, Michigan and Montana — the local option laws on the sale of liquor applied to counties. In eight other States, the vote could be taken bv coun¬ ties or by smaller districts ; and in such cases

smaller districts might usually be voted ftdryw although the county as a whole was ˆwet.® This group of States included Florida, Ken¬ tucky, Louisiana, Minnesota, Missouri, New Mexico, Texas and Utah. In 15 other States the vote was taken by cities, villages, towns or county districts. This group included the New England States (except prohibition Maine), New York, Delaware, Ohio, Indiana, Illinois, Wisconsin, Nebraska, South Dakota, Wyoming and California. In New York the option of prohibiting the sale of liquors was given only to towns and not to cities. In Illinois a town¬ ship which included a city might exclude sa¬ loons from the whole area, although the city gave a ((wet® majority. In a few States, as Ohio and Minnesota, districts within a city might exclude saloons.

Local option elections on the sale of liquors in most of the States were held on petition of the electors — the percentage required ranging from 10 per cent in Connecticut to 40 per cent in Ohio, with 25 per cent as the prevailing ratio. The question might be resubmitted at inter¬ vals, varying from one to four years in the different States, two years being the most com¬ mon period. In Massachusetts, New Hamp¬ shire and Vermont the question of license or no license was voted on without petition at each town election. South Dakota was all considered ®dry® until a local district voted ˆwet ; and a new election had to be held each year to continue saloons. In Wyoming, the municipal councils might refuse to license saloons.*

Under local option laws and State prohibition 80 per cent of the land area of the United States with 54 per cent of the population had no

licensed saloons. Of the local option States, 12 had more than half the population in <(dry):> territory; and 14 had less than half. The dry regions were mainly in States with a large rural population and also the States where the proportion of native population was largest ; while the States with a large urban and foreign population were predominantly SvetC1 The most important instances where urban districts excluded saloons under local option laws were Cambridge and other suburban cities near Boston ; while a similar situation . existed in the no license districts within the city of Chicago.

Notwithstanding the large increase of no¬ license territory, there was a steady increase in the per capita consumption of intoxicating liquors in the United States. From 1840, the per capita consumption had multiplied five-fold; but the greater part of this had been in the milder fermented liquors; and the rate of in¬ crease had been less during the last 25 years. In the 10 years from 1903 to 1913, while popu¬ lation increased about 20 per. cent, the con¬ sumption of distilled spirits increased about 25 per cent and of malt liquors about 40 per cent. During the same period, the production of distilled spirits increased about 70 per cent. Part of the increase in distilled spirits was probably due to the larger use of alcohol in the arts. See Science; Liquor Traffic.

Bibliography. — (Local Option in the United States } in the National Municipal Review, Oc¬ tober 1916; Anti-Saloon League Year Book; U. S. Brewers' Association Year Book; Rown-

tree and Sherwell (Public Control of the Liquor Traffic (1903).*

John A. Fairlie,

Professor of Political Science, University of Illinois.

LOCALITY, Perception of. Our sensa¬ tions are associated with positions in space. That this is the case with vision and joint sensations is obvious, while in all the other senses a stimulus is referred to the approxi¬ mate spatial position of the organ that perceives it, and is possibly further referred to some place in space from which it is believed to arise. The senses with the most direct spatial reference appear to be vision, the sensations of the skin, and those of the joints. The spatial relations of two objects presented to the eye are as immediately given as their relations of color-intensity

or color-quality. In the same way, the location of an object on the skin or the position of a joint are primitive attributes of the experience of the object. However, the visual, tactile and articular spatial worlds are per se of a bi-dimensional character. The relations of space in the third dimension are not directly given in experience, but are the result of the synthesis of a large number of different factors. In the case of vision, these factors are the parallax of the visual objects with reference to the interocular distance, the experiences of the muscles of the eyeballs as they focus the eyes and regulate their degree of convergence and such phenomena of geo¬ metrical and atmospheric perspective as have been given by habit a three-dimensional inter¬ pretation. The cutaneous senses acquire their three-dimensional interpretation through asso¬ ciation with visual experiences and experiences of joints, and through the complex of cutaneous sensations resulting when two parts of the in¬ tegument are brought into contact with one another. The sensations of a single joint are necessarily uni-dimensional or bi-dimensional, as the joint cannot have more than two degrees of freedom, but the combined sensations of two adjacent joints furnish a three-dimensional manifold, corresponding to the three degrees of freedom of a point at the end of a doubly jointed rod. The three-dimensional worlds of sight, touch and joint-position formed in the manner thus indicated are amalgamated into a single space by that intimate association of their phenomena which is impressed on us from the very start of our experience, and which is possibly even prior to our consciousness of this association. An important theory in this con¬ nection is that due to Lotze, and known as the theory of local signs. According to this view, each cutaneous sensation carries with it a peculiar qualitative distinction that is always associated with the point of its origin. As it appears impossible, however, to discover any qualitative characteristic peculiar to each place on the skin, the local sign of a cutaneous sensa¬ tion is probably just that visual localization that accompanies it.

It is altogether probable that hearing and smell, at any rate, have no distinctly spatial attribute, and that the localization of sounds and scents is due to the association of certain non-spatial characters on their part with the sight-touch spatial system. In the case of sound the chief factor is the relative intensity of the

sensations in the two ears, as is shown by the poorness of localization in cases where hearing of one ear is lost, and by the practical impos¬ sibility of determining the source of a sound in the median plane. The quality and absolute intensity of the sound are also indices of its source. The quality is somewhat dependent on the

direction from which the sound reaches the pinna, and so enables a certain degree of local¬ ization in hearing with a single ear. In the case of smell, localization depends on the relation between the position of the head and the in¬ tensity of the sensation.

The accuracy of localization can be measured in two ways. The first is to determine the lower limen (see Limjna) of the interval be¬ tween two stimuli ; the second is to indicate the absolute position of a stimuli, and measure the average error of the localization. While the former method often indicates a greater sen¬ sitivity than the latter, the relation between the acuity of absolute and relative discrimination of locality varies in the different senses. In sight relative discrimination preponderates, and two points subtending an angle of one minute or a retinal distance of .004 millimetre can be dis¬ tinguished. A binocular parallax of five seconds suffices to give an impression of depth. In the case of the pressure sense, the average absolute error of localization is 5 to 10 milli¬ metres on the wrist. The discrimination limen for the tactile senses is not clearly defined, and the sensation from pressure at two points goes through several stages of elongation before it is distinctly double. If the pressure is applied at pressure spots, the two point limen assumes a much smaller value than otherwise, and is about 0.3 millimetre on the back of the hand, 0.5 millimetre on the forehead, .08 millimetre on the chest, and 4 millimetres on the back. The corresponding values for the cold sense are 2, 0.8, 2, and 1.5 millimetres; for the sense of warmth, 3, 4, 4, and 4 millimetres respectively. The least noticeable movement of the hip- joint is 0.5 degree; for the ankle, 1 degree. The localization of organic sensations is highly irregular, and exhibits many anomalies. (See Limina; Space; Vision). Consult Kiilpe, O., (Outlines of Psychology (tr. New York 1909) ; Ladd, G. T., and Woodworth, R. S., (Elements of Physiological Psychology* (New York 1911) ; Lotze, R. H., ˆedizinische Psychol¬ ogic* (Leipzig 1852) ; Titchener, E. B.,*

LOCARNO, lo-kar'no, Switzerland, town in the canton of Ticino, on Lake Maggiore at the embouchure of the Maggia, 14 miles south¬ west of Bellinzona. It is only 680 feet above sea-level and is said to be the lowest part of Switzerland. Nearby is the sanctuary of the Madonna del Sasso, frequented annually by great numbers of pilgrims. Brushes and can¬ dles are the only industries of importance. The Milanese lost Locarno to the Swiss in 1512; in 1 798 it was included in the canton of Lugano in the Helvetic republic. In 1555 its Protestant inhabitants were driven out and, going to Zurich, founded the silk industry there. Pop. 5,630, mostly Italians.

LOCH, lok, Henry Brougham Loch, First

Baron. British colonial administrator: b. 23

May 1827; d. London, 20 June 1900. He joined the navy in 1840, but in 1842 entered the service of the East India Company, being commis¬ sioned in the Bengal Light Cavalry. He served in the Sutlej campaign. In the Crimean War he commanded a brigade of irregular Bulgarian cavalry and in 1857 was made attache to Lord ' Elgin on a mission, to China. In 1858 he brought home the treaty of Yedo. In 1860 he went to China a second time as secretary of embassy. During the negotiations for peace at Tungchow he was .made prisoner, taken to Pekin, where he and Parker endured all the horrors of a Chinese prison. He was released within a short time but his health was greatly impaired. Loch was knighted on his return to England and in 1863 was made lieutenant-gov¬ ernor of the Isle of Man. From 1884 to 1889 he was governor of Victoria and in the latter year became governor of Cape Colony and high commissioner of South Africa. In South Africa Loch supported the policy of Cecil Rhodes and several times opposed Presi¬ dent Kruger in the latter's attempts to prevent British expansion to the north. In 1895 Loch returned to England and was raised to the peerage. At the outbreak of the Boer War he raised and equipped the body of men known as <(Loch's Horse.®

LOCH LOMOND. See Lomond, Loch.

LOCHES, losh, France, town and capital of an arrondissement in the department of Indre-et-Loire, situated on the Indre, 30 miles southeast of Tours. It contains an ancient castle of the Anjou family with many inter¬ esting mediaeval remains. Here, also, are the oratory of Anne de Bretagne and the tomb of Agnes Sorel. It has also a fine town hall, the church of Saint Ours, a communal and train¬ ing college. Leather, liqueurs and textiles are manufactured. The town grew up about the monastery founded here in 500 by Saint Ours. For a long time after 1250 the castle was a residence of the kings of France. Pop. 3,940.

LOCHINVAR, lok'm-var', the hero of a famous ballad in Sir Walter Scott's (Mar- mionP

LOCHLEVEN. See Leven, Loch.

LOCHNER, loch'ner, Stephen, German

painter : b. Meersburg, on Lake Constance, date unknown; d. 1451. Very little is known of his life or of his artistic education. About 1426 he removed to Cologne where he soon be¬ came prominent. In 1447 and in 1450 he was councilor to the Painters' Guild of that city. Lochner's greatest work is the triptych called the Kolner Dombild (lit. Cologne Cathedral Painting). The centre panel is devoted to (The Adoration of the Magi, the right con¬ tains, (Saint Ursula and her Handmaids, y . and the left (Saint Gereon and the Theban Legion.) It is the greatest work of the Cologne school and one of the finest in Germany. Other works of Lochner are (The Madonna with Violets, > in the Archepiscopal Museum, Co¬ logne, (Christ and Saints, } in the Nuremberg Museum; 'Madonna in the Rose Arbor, > in the Wallraf-Richartz Museum, Cologne, and (The Presentation in the Temple, } at Darmstadt. Lochner was an excellent colorist but a medi¬ ocre draftsman. Consult Aldenhoven, Carl, 'Geschichte der kolner Malerschule) (Lubeck*

1902) and Escherich, Mela, (Die Schule von Koln) (Strassburg 1907).

LOCK, a mechanical appliance used for fastening doors, chests, etc., generally opened by a key; or more broadly speaking, a lock is a bolt guarded by an obstacle, and controlled by a key. The bolt may be pivoted or rotary, but usually slides; the key generally rotates, but may act by sliding or pushing; the obsta¬ cle, which in order to operate the bolt must be overcome by the key, may be of the warded (fixed) or of the tumbler (movable) types.

History. — The history of the art of the locksmith is probably as old as the history of civilization, and references to it are found in the early literature of every nation. Wood was undoubtedly the first material used in construction, but the Egyptians appear to have, at an early date, employed brass and iron also. The Hebrews and Greeks used crooked keys, with ivory or wooden handles, for the purpose of bolting or unbolting doors. Some of the modern Greeks still em¬ ploy the primitive method of closing doors from the inside by a wooden or metallic bar, attached to the door by means of leather strings or small iron chains; wood or iron keys, made in the shape of hooks, were in¬ serted through a hole in the door and by turning lifted up the bar on the inside. The similarity of these primitive locks rendered access to the house easy and soon led to an improvement upon the method, resulting in the so-called Lacedaemonian lock. This too was improved, but of the workings of

this lock no description has come down to us.

Among the nations of antiquity lock-mak¬ ing made little progress in advance of what had been done by the Egyptians. Even the Romans, who excelled the other nations of the world in iron-work, used very simple locks, resembling those of the modern Greek. The tumbler lock was next in suc¬ cession, and was probably first invented and used by the Chinese. In this lock a lever or slide entered a notch in the bolt, which could not be moved till the tumbler was lifted by the key. The warded lock, used by the Etrus¬ cans, was the next form of lock which came into general use. While the Roman locks belong to the same description, they were dis¬ tinctly different. In locking and' unlocking the keys did not make a complete revolution and consequently were identical with the spring locks of modern days. After the downfall of the Roman Empire, lock-making took on an unprecedented impulse, owing to the increased danger of robbery, and human in¬ genuity was taxed to the ' limit to provide means for the safe-keeping of valuables. About 1650 a fourth type of lock, the letter or dial lock, was invented by M. Regnier, director of the Musee d'Artillerie at Paris, and these four types form the basis for the majority of our modern locks.

Locks were first manufactured in England during the reign of Alfred (a.d, 871-901), but no substantial improvement in their con¬ struction was made till the latter part of the 18th century. These improved locks were the Barron, first patented in 1778, the Bramah lock, patented in 1784; these were followed in 1818 by the Chubb, and later by the American

Parautopic lock of Day and Newell. Of those then manufactured, this latter lock became the most generally used for safes because it presented the least possibility of being picked, but this lock finally succumbed to the skill of Linus Yale, Jr., an American inventor (b. 1821; d. 1868). Yale had for a number of years been interested in and had patented locks of diverse types and ingenious construction. The modern combination lock was then un¬ known, and Yale's earlier inventions related to locks operated by keys, but great security was obtained by making the "bit® of the key changeable at will and also detachable from the handle, so that, as the latter was rotated in the lock, the former was detached and carried away from the key-hole to a remote part of the lock, and there brought into

contact with the tumblers to set them ’in position to permit the bolt to move, the continued rota¬ tion of the key handle then operating the bolt and returning the “bit® to the key-hole for re¬ moval. Yale then perfected the dial lock, the improved form of which is now in universal use in America for safes and vaults, and which, as now made, is proof against picking by any methods thus far discovered.

Mr. Yale’s most important invention, brought out in 1860 to 1864, was the key lock univer¬ sally known as the Yale lock, the United States patents for which were issued on 29 Jan. 1861 and 27 June 1865. This combination of a flat key and revolving “plug® has almost entirely superseded the crude and bulky lock, of indiffer¬ ent security and inferior workmanship, which was opened by a round key, and the intro¬ duction of the Yale or cylinder type com¬ pletely revolutionized the art of lock-making in America.

Yale’s inventions led to the dial lock of James Sargent, but as the user of both of these, the Yale and the Sargent, could be coerced to open them, and were indeed picked by ex¬ perts, the inventors turned their attention to making the onlv lock which is absolutely unas¬ sailable — the time-lock. This was first sug¬ gested in 1831 by an Englishman, William Rutherford ; in 1857 Holbrook and Fish of the United States devised another, but the first successful time-locks put on the market were the Sargent and Yale time-locks, brought out in 1875, and followed later by the Pillard, the Homes, the Hall and others.

Warded Locks. — In the majority of this class there is a “back spring® or dog, the feel¬ ing of which, when using the key, resembles that of a tumbler, but which adds nothing to the security.

Lever Tumbler Locks. — These locks may contain several tumblers, the number of key changes usually being limited to from 12 to 24 and possibly 72, while in a good three-tumbler lock of this style as many as from 200 to 500 key-changes are possible. Round, barrel and flat keys are used.

Cylinder and “Pin-Tumbler® Locks. — The

former term applies to locks in which the pin tumbler is contained in a cylinder separate from the lock case; the latter is applied to those wherein the pin tumblers are contained in the lock itself.

Master-Keyed Locks. — A series of locks is said to be “master-keyed® when so constructed that each lock can be operated by its

own key,

which fits no other lock of the series, and also by another key which will operate every lock in the entire series. Warded locks are master-keyed by means of a "skeleton® key, with the bit cut away sufficiently to avoid all the wards in all of the locks of the series. Lever-tumbler locks are master-keyed in three ways, either by providing two "gatings® on each tumbler, one of which is brought in line with the corre¬ sponding "fence® or post on the bolt by the change-key and the other by the master-key; by providing a "lifter,® which, when actuated by the master-key, moves the tumblers in the same manner as does the change-key when the latter acts directly on the tumblers ; or by pro¬ viding a set of secondary levers, which, when operated by the master-key, move the primary tumblers in the same manner as the change-key which acts on them directly. Pin-tumbler locks are master-keyed by cutting each pin in two places, or by encircling the plug (which con¬ tains the key-way) with a larger annular plug, thus providing two points at which each tum¬ bler may be set to permit the plug to rotate, and utilizing one set of these points for the change- key and the other set for the master-key.

Time of Chronometer Locks. — In these the mechanism is actuated by clock-work, and is used, in connection with the heavy bolt work of a safe door, to prevent the unlocking of the latter except upon the hour at which the clock is set. There are generally three chronometer movements, each of which will of itself actuate the lock, so that should one or two be disabled or inoperative, the other will open the door at the time indicated. In connection with the time lock an automatic bolt operating device is often used.

Dial or Combination Locks. — These con¬ sist essentially of a bolting mechanism guarded by a set of changeable tumblers or wheels, and actuated by a spindle passing through the door, provided on the outer end with a graduated dial, by rotating which in a certain manner the tumblers can be set and the lock be operated.

Lock-Making. — The first locks made in this country naturally were patterned after those made in Europe, but whereas the Euro¬ pean artisan used wrought metal in con¬ struction, the American manufacturers soon turned from this and employed cast metal. This change, together with the introduction of vastly improved _ machinery, soon reduced the cost of production, so that now locks of the best type can be purchased at a merely nominal cost, and while, for a few years after 1870, the sharp competition among manufac¬ turers tended to reduce the quality of the production, the mechanical

advancement since that time has been marked and at the present time the highest grade of workman¬ ship and mechanical skill is manifest in the articles on the American market. The chief centres of lock-making are in Eastern Pennsyl¬ vania and Connecticut. Consult Fox-Pitt- Rivers, (On the Development and Distribution of Primitive Locks and Keys) (London 1883) ; F. E. Kidder, section on Locks in Building- Construction > (part 2, pp. 580-603, New York 1913) ; and H. R. Towne, Bocks and Hard¬ ware > (ib. 1904).

LOCK HAVEN, Pa., city, county-seat of Clinton County; on the Susquehanna River and on the New York Central and the Pennsylvania

railroads; about 68 miles northwest of Harris¬ burg. The first settlement was made in 1769 and, in 1833, it was incorporated as a town. In 1844 it was made a borough, and in 1870 re¬ ceived its city charter. It is situated in an agri¬ cultural, manufacturing and lumbering region. Its chief industrial establishments are lumber and planing mills, tanneries, cigar factory, foundries, fire-brick works, silk mills, breweries, paper mill, woven wire works, steam laundries, dye and chemical works and furniture factory. The State Central Normal School is situated here and there is a new high school. Some of the prominent buildings are the courthouse, a hospital and several fine churches. The citv has a circulating library containing about 6,000 volumes. The waterworks are 'the property of the municipality. Lock Haven has adopted the commission form of government. Pop. 8,557.

*LOCKE, lok, David Ross (ˆPetroleum V. Nasby®), American humorist and satirist: b. Vestal, Broome County, N. Y.,H*20 Sept. 1833; d. Toledo, Ohio, 15 Feb. 1888. He learned the trade of printer and after being connected with several newspapers was editor and owner of the Toledo Blade in 1865, and very soon became popular as a humorous writer and later as a lecturer. He began his ((Nasby® letters in the Findlay Jeffersonion in 1860 and continued them throughout the Civil War. They exer¬ cised much influence in molding popular opin¬ ion, upholding as they did the policy of the Lin¬ coln administration. In later years the satire of the letters, which still continued to appear, was aimed at President Johnson and his pecu¬ liar methods. They were collected and pub¬ lished in book form under the titles (Divers Views, Opinions and Prophecies of*

Yours Truly > (1865) ; (Swingin' Round the Cirkle) (1866) ; (Ekkoes from Kentucky (1867) ; (The Struggles — Social, Financial and Political — of P. V. Nasby) (1872). He. also published (Hannah Jane* ; (The Moral History of Amer¬ ica's Life Struggle* ; (The Morals of Abou Ben Adhem) ; (A Paper City) (1878), and (1882).*

LOCKE, John, English philosopher: b. Wrington, Somerset, 29 Aug. 1632; d. Oates, Essex, 28 Oct. 1704. He was the son of an at¬ torney who became a captain in the Parlia¬ mentary army. Locke was educated at West¬ minster School and at Christ Church, Oxford, where he was graduated and took his bachelor's degree in 1656; two years later took the degree of M.A. and entered upon the study of medi¬ cine. He lectured at Oxford (1660-64) on Greek, rhetoric and philosophy, and during this period became interested in experimental phys¬ ics, especially chemistry and meteorology, and in metaphysics showed a preference for study¬ ing Descartes, although his own philosophy powerfully antagonizes that of the French master. 'Theology and politics, including diplomacy, also engaged his attention. At Ox¬ ford before 1666 he is said to have practised medicine, in which, however, he was never graduated. As secretary to Sir Walter Vane, British envoy, he went in 1665 to Cleves, Prus¬ sia, returning to Oxford in the following year, during which time he made the acquaintance of Lord Ashley, afterward 1st earl of Shaftes¬ bury, became his family physician . and secre¬ tary, under his patronage held various offices, vol. 17 — 36

and in 1682 accompanied him into exile to Hol¬ land. Locke continued to reside abroad until 1689, when, after Revolution had been accom¬ plished, he returned to England to become com¬ missioner of appeals. His association with Lord Ashley, between whom and himself there was close intellectual sympathy, was stimulating to his genius, and it was in Ashley's house that Locke first planned the (Essay on the Human Understanding. Fully elaborating this work during his voluntary exile, he published it in complete form in 1690, with a dedication to the earl of Pembroke, whose acquaintance he had made at Montpellier many years before. The (Essay, J which had largely occupied him for almost 20 years, met with much criticism in England, being particularly opposed at Ox¬ ford; but on the Continent it brought him great celebrity, and was translated into French and Latin and later into other languages. For the copyright of the first edition he received but £30, and although he had previously published two works this was the first to bear the author's name. In 1696 Locke was made a commissioner of trade and plantations, but in a few years be¬ came incapacitated and retired, and from 1700 until his death lived with his friend, Sir*

F. Masham, at Oates. Meanwh-le being drawn into the violent controversies over the essay which arose among different sects and schools, he had sturdily maintained his ground in a style of epistolary polemics which still possesses an academic interest.

As a philosopher Locke's place is usually fixed at the head of the English Sensational School, although this classification by no means does justice to his many-sidedness as a thinker, and the term ˆsensationalism,® with its ordi¬ nary connotations, is wholly inadequate for a correct representation either of his speculative inquiries or of those still less definable medita¬ tions which led him profoundly to search the realms of ethics and of spiritual laws, in an en¬ deavor to assign the relations and functions of these in the world of practical politics and that of instituted religion. Of that sensationalist school of which he is reputed to have been founder, it has been said with much pertinence that its ultimate conclusions are such as ((his calm and pious mind would have indignantly repudiated.® The (Essay on the Human Under- standing) holds a permanent place among the greater works of philosophy, in the history of which, however, Locke's method mav be super¬ seded, and although his main doctrine be ex¬ ploded, the book retains its importance as an epoch-marking achievement. It seeks the primal sources and the scope of human knowl¬ edge, denying the existence of innate ideas, presenting the mind as a sheet of white paper prepared to be written upon by experience, which alone supplies the knowledge there im¬ pressed, and tracing the sources of all ideas to what he calls sensation and reflection. This doctrine of the tabula rasa or white paper found a vigorous controverter in Leibnitz (q.v.). The opposition which Locke thus repre¬ sented between all intuitional and experiential philosophies still remains a central point of dispute among thinkers of various schools, but he was a forerunner in psychology, as he was also in the advocacy of civil and religious liberty, for which he suffered persecution and betook himself to exile.

Upon questions of government Locke was in the main a follower of Hobbes (q.v.) in so far as the latter regarded governmental author¬ ity as something delegated by the subjects for the creation of the state, through a compact which carried in itself the principle of obliga¬ tion. But he went far beyond Hobbes in the application of his views to the concrete affairs of politics. In 1689 a constitution for

the Caro¬ lina colonists was drafted by him, and was an evidence of his concern to put political philos¬ ophy to practical service. (See Essay concern¬ ing the Human Understanding). Besides the (Essay,) his works include letters Concerning Toleration^ (1689); (Two Treatises on Govern¬ ment } (1690) ; Rome Thoughts Concerning

Education) (1693) ; (The Reasonableness of Christianity) ; and a little book (On the Con¬ duct of the Understanding,) posthumously pub¬ lished. Frazer's edition of the (Essay) (1894) is the most desirable. His philosophical writ¬ ings have been published in various editions, Saint John's (1854 et seq.) being one of the most useful. Consult King, (The Life of John Locke) (1829) ; Fox Bourne, (The Life of John Locke) (1876) ; Fowler, (John Locke) (1880) ; Frazer,

LOCKE, William John, English novelist : b. 20 March 1863. He was educated at Queen's Royal College, Trinidad, and Cambridge Uni¬ versity, and was secretary of the Royal Insti¬ tute of British Architects, 1897-1907. His fic¬ tions include (At the Gate of Samaria) (1895) ; (The Demagogue and Lady Phayre) (1896) ; (A Study in Shadows> (1896) ; (1900); (The Glory of Clementina) (1911); (The Joyless Adventures of Aristide PujoP (1912); (Stella Maris) (1913); (The Fortunate Youth) (1914); (Taffery> (1915); (1919). He has also written several plays.

LOCKER-LAMPSON, Frederick, English lyric poet : b. Greenwich, 29 May 1821 ; d. Row- faul, England, 30 May 1895. He wrote a vol¬ ume of ((1879). In 1874 he married for his second wife the daugh¬ ter of Sir Curtis Lampson and took her name in addition to his own. Consult (My Confi¬ dences, } his autobiography (1896).

LOCKHART, lok'art, John Gibson, Scot¬ tish editor and biographer: b. Cambusnethan, Lanarkshire, 14 July 1794; d. Abbotsford, 25 Nov. 1854. He was graduated at Glasgow and Balliol College, Oxford, and became a member of the Scottish bar in 1817. He never practised as an advocate, but devoted his time to literary pursuits. In 1817, with Professor Wilson, he established Blackwood's Magazine, a Tory organ, which at the outset created an immense sensation by the ability and keen satire dis¬ played in many of its articles. In 1819 he pub¬ lished (Peter's Letters to his Kinsfolk,) in which Edinburgh society was keenly satirized. In 1820 Lockhart, who had previously become

a favorite with Sir Walter Scott, married his eldest daughter, and much of his future life took its color from this connection. In 1825

he became editor of the Quarterly Review, which he conducted with marked ability, and continued in the position till 1853. His translations of Rpanish Ballads,) originally contributed to Blackwood, were collected in 1823. He also published the novel

LOCKHART, lok'hart, Texas, town, county-seat of Caldwell County; on the Mis¬ souri, Kansas and Texas, and the San Antonio and Arkansas Pass railroads, about 28 miles south of Austin and 140 miles west of Houston. It is situated in a fertile agricultural section in which cotton and live-stock are raised ex¬ tensively. Some of its industrial establishments are a soap-factory, cotton-gins, cottonseed-oil mill, wagon and carriage factory, cotton-com¬ press, stock-yards, grain-elevators, and lumber¬ yard. Pop. (1920) 3,731.

LOCKJAW. See Tetanus.

LOCKLAND, Ohio, village of Hamilton County, on the Cincinnati, Hamilton and Day- ton, the Cincinnati Northern and the Cleve¬ land, Cincinnati, Chicago and Saint Louis rail¬ roads, 11 miles north of Cincinnati. Its indus¬ trial establishments include cotton factories, paper mills and a roofing establishment Pop.

(1920) 4,007.

LOCKOUT, the discharge and keeping out of employment of artisans and laborers by their employers. It is a retaliatory measure adopted by capitalists to resist the demands for shorter hours, more pay, etc., made by their workmen. The workmen may themselves be responsible for a lockout, just as an employer may be responsible for a strike upon the part of his workmen. (See also Strikes and Lock¬ outs), with authorities quoted thereunder.

LOCKPORT, Ill., city in Will County, on the Des Plaines River, the Illinois and Michi¬ gan Canal, the Atchison, Topeka and Santa Fe and the Chicago and Alton railroads, 30 miles southwest of Chicago. The city contains Dell- wood Park, one of the finest in the State, also oil mills, breakfast food works, a lock factory and great quarries. The water-supply system is municipally owned. Pop. 2,550.

LOCKPORT, N. Y., city, county-seat of Niagara County; on the New York Barge Canal, and on the Erie, the International and the New York Central railroads, 12 miles from

Lake Ontario, 20 miles east of Niagara Falls, and about 25 miles north by east of Buffalo. It was settled in 1823 by workmen who were em¬ ployed on the Erie Canal. On 26 March 1829 it was incorporated as a village and became a city 11 April 1865. It is situated in a fertile agricultural region, one of the richest fruit producing sections of the United States; but the extensive water power obtained from the canal has made it an important manufacturing city. The 10 large locks of the canal (now re¬ placed by a tier of two locks operated by elec¬ tricity), gave its name to the city. The canal passes through a deep cut, an excavation in the solid rock, several miles in length. The New York Central Railroad bridge, 500 feet long, crosses the canal here, at a height of 60 feet above water. There are large sandstone and limestone quarries in the vicinity.

The chief manufactures are pulp and paper, Holly waterworks machinery, wood-work ma¬ chinery, machinery for flour mills, glass, roll¬ ing-mill products, cotton-batting, wagons and carriages, brooms, flour, indurated fibre, crucible steel, aluminum, cotton and woolen goods and creamery products. The products of the manu¬ facturing plants amount annually to over $11,- 000,000. In addition to the trade in manufac¬ tured articles, the city has an extensive trade in the quarry products, and in grain and fruits. Some of the prominent buildings are the Odd Fellows Home, the high school, the new govern¬ ment building and the courthouse. It has several churches and good public and parish schools and two business colleges. It is the seat of Saint Joseph's Academy. There are about 18 miles of paved streets and the total assessed valuation is nearly $14,000,000. The city owns and operates the waterworks. The government is vested in a mayor, elected for two years, and a council of 10 members. Pop. 21,308% Con¬ sult Pool, 'Landmarks of Niagara County* (Syracuse 1897).

LOCKROY, lokrwa', Etienne Auguste Edouard, French statesman: b. 1838; d. 22 Nov. 1913. He was a Republican journalist under the Second Empire, he fought with Garibaldi in 1860 and acted as secretary to Ernest Renan in Syria. During the siege of Paris he commanded a battalion and was later one of the signatories to the proclamation for the election of the Commune. He sat in the French Chamber from 1872 to 1906, was minister of commerce and industry 1886-87, of education 1888 and minister of marine 1895-99.

LOCKS, Canal. See Canals.

LOCKSLEY HALL. Tennyson's 'Locks- ley HalP is perhaps not only the best known among his shorter poems but is also one of the most widely read poems in the language. It is a lyrical monologue, 194 lines in length, in eight-stress trochaic couplets. Published in 1842, when the poet himself was only 33 years of age, it is pre-eminently the poem of youth with both its weakness and its strength. Its boy hero is passionate, both in his love and his disappointment ; fretful, moody . and unsure, unreasonable in his general attitude toward life, yet aglow with humanitarian, enthusiasm, on fire with his own splendid vision of the future of the race. He is not an altogether likable and wholesome person, and rather un¬ pleasantly suggests the hectic hero of (

but he has in him so much of essential and universal youth as to engage the unseen lis¬ tener of his tale of disappointed love, of pas¬ sionate upbraiding, of altruistic hopes and dreams. Though the coast setting is that of Lincolnshire, both hero and hall are entirely imaginary. The idea of the setting Tennyson gained from an Arabic poem of the 7th cen¬ tury, which shows a lover, traveling with com¬ panions, asking that he be left alone for a time as he stands before the tent of his be¬ loved; the Arabic poem even ends with the coming of a storm, as does 'Locksley Hall. But Tennyson's subject-matter, replete .with allusions to the latest discoveries in electricity, astronomy and engineering, and the latest social movements, is "aggressively modern.® His hero, even in the midst of his complaint, is very much taken up with the events of his time. Yet with all. this the poem is highly per¬ sonal and romantic. The structure is plain, when one notes that the monologue presents the thoughts that pass naturally, and discon¬ nectedly, through the hero's mind as he recalls the past and newly resolves for the future. Remarkable in the light of later events are the famous couplets foretelling aerial commerce and warfare, and those prophesying universal peace by means of a league of nations. The poem is striking even among Tennyson's in the beauty of its figures of speech. One of these, "Love took up the harp of life,® the poet considered his best. Owing to its tropical quality, to the youth that beats through it, and to its spirited verse, "Locksley is one of the most quoted of English poems,® and some of its lines and phrases, such as "In the spring a young man's fancy lightly turns to thoughts of love,® have passed into the common speech.*

Marion Tucker.

LOCKWOOD, Belva Ann Bennett,

American lawyer and reformer: b. Royalton, N. Y., 24 Oct. 1830; d. Washington, 19 May 1917. She was graduated from Genesee Col¬ lege, Lima, N. Y., in 1857, and taught school 1857-68. She was married in 1848 to Uriah H. McNall (d. 1853), and in 1868 to Dr. Ezekiel Lockwood. She studied law at Wash¬ ington, and was admitted to the bar in the Dis¬ trict of Columbia after a hard struggle in 1873. Before that time she had secured the passage of a bill giving women employees of the gov¬ ernment equal pay for equal work; in 1879 she obtained the passage of a bill permitting women to practise before the United States Supreme Court, and was admitted under this law. in the same year. She was engaged in many impor¬ tant law cases, some before the Supreme Court, and was one of the attorneys in. the probate of the will of Myra Clarke Gaines. She was active in temperance, peace and women suffrage movements; was secretary of the American branch of the International Peace Bureau; and in 1884 and 1888 was the nominee of the Equal Rights Party for President of the United States. In 1896 she was commissioned by the Secretary of State to represent the United States at the Congress of Charities and Corrections in Geneva, Switzerland; in 1901 she was elected president of the Women's National Press Association. She was for sev¬ eral years interested in the claims of the North Carolina Cherokee Indians, and in 1900 had a

bill before Congress to prevent encroachment upon their territory. She was an attorney of record in their case against the government, when they obtained a $5,000,000 judgment. She also prepared an amendment to the Statehood Bill before Congress in 1903, granting suffrage to women in Oklahoma, Arizona and New Mexico.

LOCKWOOD, Henry Hayes, American military officer: b. Kent County, Del., 17 Aug. 1814; d. Washington, D. C., 7 Dec. 1899. In 1836 he was graduated at the United States Military Academy; served with the 2d cavalry in the Seminole War and in 1838 resigned from the army and undertook agriculture in Dela¬ ware. He became professor of mathematics in the United States navy in 1841 ; in 1845 pro¬ fessor of natural philosophy at the Naval Academy, where he was professor of artillery and infantry tactics in 1845-61, and of astron¬ omy and gunnery in 1851-61. He entered the Civil War as colonel of the 1st Delaware in¬ fantry, became brigadier-general of

volunteers in August 1861. At Gettysburg he commanded a brigade of the 12th corps and in 1863-64 was commander of the middle department. Sub¬ sequent to the war he was professor of natural philosophy at the Naval Academy, and in 1871— 76 was connected with the Naval Observatory. He published (A Manual for Naval Batteries) (1852) and Exercises in Small Arms and Field Artillery, > arranged for naval service

(1852).

LOCKWOOD, James Booth, American soldier and Arctic explorer: b. Annapolis, Md., 9 Oct. 1852; d. Cape Sabine, 9 April 1884. He entered the army as 2d lieutenant in 1873, and served till 1880 in the West. He volunteered to accompany the Lady Franklin Bay expedi¬ tion to the Arctic regions in 1881 and was made second in command to Gen. A. W. Greely (q.v.). His fame rests on the discovery of Lockwood Island, in 1882, in lat. 83° 24′ N., the farthest northern point of land or sea up to that time. He was one of the victims in the Cape Sabine tragedy in the winter of 1883- 84. His body was brought to the United States and interred in the grounds of the Naval Academy. Consult Lanman, (Farthest North)

(1885).

LOCKWOOD, Wilton, American painter: b. Wilton, Conn., 12 Sept. 1861 ; d. 21 March 1914. In New York he studied under La Farge and subsequently spent 10 years in Paris. In 1904 his works attracted general attention in Europe and the following year an exhibition of his work in Boston was a great success. His best known works are his portrait of La Farge, in the Boston Art Museum; (The Vio¬ linist in Mr. Carnegie's residence at Skibo ;

(Frank Seabury> ; (A. J. Cassatt) ; (Grover Cleveland) ; (Jerome Wheelock in the Worces¬ ter Museum ; justice Holmes.) Outside the field of portraiture Mr. Lockwood was con¬ spicuously successful as a flower painter. Nu¬ merous samples of his work in the latter field are preserved in the Art Museum, Boston, the Corcoran Art Gallery, Washington, and the Metropolitan Museum of Art, New York. In 1912 he was elected to the National Academy.*

LOCKYER, lok'yer, Sir Joseph Norman, English astronomer: b. Rugby, 17 May 1836; d. 16 Aug. 1920. He entered the War

Office in 1857, and in 1870 was appointed secretary of the royal commission on the ad¬ vancement of science. Five years later he be¬

came astronomical lecturer at South Kensing¬ ton ; was director of the Solar Physics Observ¬ atory, South Kensington, 1885-1913, and in 1913 director of the Hill Observatory, Sal- combe Regis, Sidmouth. He directed eight eclipse expeditions on behalf of the . British government. He was created K.C.B. in 1897. He initiated in 1866 the spectroscopic observa¬ tion of sunspots; invented in 1868 a spectro¬ scopic method of observing the solar promi¬ nences in davlight ; and from 1872 successfully engaged in investigations of the chemistry of the sun. He published Elementary Les¬ sons in Astronomy (1870); Contributions to Solar Physics) (1873) ; (The Spectroscope) (1873); Erimer of Astronomy) (1874); (Studies in Spectrum Analysis) (1878) ; (Star- Gazing) (1878); Chemistry of the Sun) (1887); Che Movements of the Earth) (1887); Che Meteoritic Hypothesis) (1890); Che Dawn of Astronomy * (1894) ; Che Sun's Place in Nature) (1897) ; (Recent and Com¬ ing Eclipses* (1897); (Inorganic Evolution) (1900) ; Purveying for Archaeologists* (1909).*

LOCLE, lo'kl', Le, Switzerland, town of the Canton of Neuchatel, on the French fron¬ tier. The chief industry is watch-making, for which the place is famed. A fire destroyed the greater part of the town in 1833, since when it has been substantially rebuilt. It has a watch-making institute, mechanic school, col¬ lege, several museums, and a public library. It has an electric-lighting plant. Pop. 12,750.

*LOCO DISEASE, a disease found in sheep and horses and occasionally in cattle. It is caused by eating certain species of Astralagiis, a genus of the natural order Leguminosoz , com¬ monly known in the Rocky Mountain region as loco or crazy weeds. The first effects of the weed are stimulating, but continued eating pro¬ duces vertigo, champing of the jaws, partial or perhaps total deafness or blindness, and if the disease be acute, death may occur within three days. In the chronic form death may be averted for months and sometimes years, but the animal develops nervous symptoms and muscular incoordination, and becomes unable to walk, finally dying of exhaustion or starva¬ tion, or both. The disease is a habit acquired usually by healthy animals through association with infected, animals that search for and feed almost exclusively on loco weeds. As no medic¬ inal treatment is effective, locoed animals should be separated from a healthy herd. Seg¬ regation of infected animals is absolutely nec¬ essary to prevent the spread of the disease. Consult Marsh, C. D., (The Loco-Weed Dis¬ ease * (in (Farmers' Bulletin No. 3802 Depart¬ ment of Agriculture, Washington 1909).*

LOCOFOCO, formerly a familiar name for a member of the Democratic party; applied especially to the radical or equal rights section of that party, because at a meeting in Tam¬ many Hall, New York, on 29 Oct. 1835, in which there was great diversity of sentiment, the. chairman left his seat, and the lights were extinguished, with a view to dissolving the meeting; when those in favor of extreme measures produced loco-foco matches — then a comparatively recent invention, rekindled the

lights, continued the meeting, and accomplished their object. (See Democratic Party). Con¬ sult Byrdsall, F., < History of the Loco-Foco Party } (New York 1842) ; Alexander, De A. S., (Political History of the State of New York) (Vol. II, New York 1906) ; Woodburn, J. A., (Political Parties and Party Problems in the United States (2d ed., ib., 1914).*

LOCO-WEED, or LOCO-VETCH.

See Crazy Weed.

LOCOMOTION, in plants falls naturally into the following divisions : independent loco¬ motion, or free spontaneous movement, occur¬ ring in lower forms ; extension through growth; projection by elastic machinery, waf- tage by winds, flotage by water, and carriage by animals. With all of these modes, except the first, this article does not deal. These modes are dealt with under Plants, Distribu¬ tion of; Pollination, etc. In regard to inde¬ pendent motion, however, it must be stated that none of the higher plants possess this power, although it is well developed in the lower

flagellae depend on the power of contractility in protoplasm. Vibration is used by the blue- green algae to secure motion. The diatoms and others push out protoplasmic threads which work against the bottom. It would appear that the resemblance to animals in all these modes of locomotion is not accidental, but a persist¬ ence from an ancient condition in which the two kingdoms were one.

LOCOMOTIVE, a self-propelling vehicle, usually a vehicle consisting of a steam engine and boiler, mounted on wheels and so con¬ nected as to be capable of self-propulsion along a track.

Historical. — The steam locomotive has been in commercial use since the early part of the 19th century. It was about the year 1825 that manufacturers in Europe and in America began earnestly the construction of locomotives. Prior to this time what locomotives had been built were the results of individual inventors. A Frenchman, Mr. Nicholas Cagnot, exhibited the first model of a steam locomotive, or steam

Fig. 1. William Hedley's "Puffing Billy" (1813), now in South Kensington Museum.

forms which lack the firm cellulose skeleton. The method of locomotion is similar to that of the simpler animals. Thus some kinds creep; for example, the slime-molds (myxomy- cetes) get about by directing their protoplasmic streaming in one constant direction, as do some of the Amoeba among animals. Other plants, or their reproductive spores, swim freely in water in a manner so similar to that of animals that they are called zoospores, and these are very characteristic in the Algae or Seaweeds. The motion is effected either by the action of innumerable cilia, tiny hairs which all in unison beat the water more strongly in one direction than another, or else by flagellae, resembling tails, except that instead of pushing the spore, they pull it behind them by an action the reverse of that of the tail of a fish. The movements of both cilia and

carriage as it is more often described. The exhibition took place in 1763 and is the first of which we have any record. In 1769 Mr. Cag¬ not built a locomotive, that might be better described as. a self-moving steam engine, which was to run on common roads. It had a speed of less than four miles per hour with stops every 15 minutes to build up the steam pressure. Cagnot's second engine was more successful and created considerable attention. While run¬ ning the engine at a speed of three miles per hour it overturned. The public authorities, who. considered it dangerous and a menace to public safety, ordered it locked up. William Murdock of England built a steam carriage in 1784. It had a copper boiler, ran on three wheels and used high pressure steam. Among the earliest and probably the first engine built to run on the public highway in the United

»

Stales was that designed and built by Salem Reed of Salem, Mass., in 1790.

We of to-day are inclined to think of these inventions as the forerunners of our steam automobiles and think of the locomotive as operating on rails. In 1802 Richard Trevethick patented the application of the non-condensing engine to the propulsion of carriages on rail¬ roads. On 1 Feb. 1804 his engine bearing his name was run on the Merthyr Tydvil Railway in South Wales. The boiler of this locomo¬ tive was of the cylindrical type with internal furnace and flue. The steam cylinder which was eight inches in diameter had the relatively long stroke of four feet and six inches. The driving wheels were plain and were driven by means of a connecting rod and crank through a train of gears. The locomotive drew its load of 10 tons, besides the wagons at the rate of 5 miles per hour. It is interesting to note that Trevethick's locomotive was the first to be used for drawing wagons and the Merthyr Tydvil Railway can justly claim the honor of being the first railway company in the world. An act of Parliament established it in 1803. The Tom Thumb built in 1829 by Peter Cooper was the first locomotive used on rails in America. During the same year an English locomotive, The Stourbridge Lion , was im¬ ported. Many types of locomotives combining ingenious ideas besides those referred to were

The first successful locomotive was built up of a strong rectangular frame upon which the boiler and engine were supported. Axles were fastened to the frame and the two pairs of wheels kept in parallel motion. The first radical change was to extend the base by sup¬ porting the front end on a four-wheeled truck, or <(bogie>:> and the back end upon a pair of drivers. Later two pairs of drivers were coupled up and considerable improvement re¬ sulted. Subsequently more drivers were added and in some cases a small pair of wheels were placed under – the rear end of the boiler.

After the locomotive had been in active service about 20 years there was a demand for

Railway $ Locomotivt Engineering

Fig. 2. Stephenson's

built and experimented with in these early years.

The names of Stephenson, Baldwin and Brooks appear in the following list of early locomotives. Their work is known to all in¬

terested in locomotive equipment and their work is largely responsible for the magnificent locomotives we see running to-day.

Blenkinsop's rack locomotive . England, 1811

Chapman's chain locomotion . England, 1812

Brunton's locomotive . England, 1813

Hedley's "Puffing Billy" . England, 1813

Stephenson's locomotive. . . . . England, 1815

Stephenson's " The Locomotion" . England, 1825

Hackworth's "The Royal Gorge" . England, 1826

Stephenson's " The Rocket" . England, 1829

Miller's "The Friend" . America, 1830

Stephenson's " Robert Fulton" . America, 1831

Baldwin's "Old Ironsides" . America, 1832

Brook's locomotive . America, 1837

"Rocket" (1829).

higher speed. Heretofore the speed was very- moderate. To secure the higher speed the drivers were increased to seven feet in diameter, but thev were soon discarded as the locomotive was slow in getting up speed. The time had not arrived, however, for high speed in railroad travel. As yet there were no fixed signals, no air brakes nor reliable systems for regulating single track operation. The appli¬ cation of the air brake in 1873 paved the way for our modern freight and passenger service. For a time the early builders of locomotives believed that there was not sufficient adhesion between the wheels and the track to climb an incline or draw loads. The tractive effort of any locomotive is reached when the driving wheels begin to slip. To 'increase this limit a definite part of the total weight was carried on

the drivers to give the desired adhesion. Another method was to drive

separately the individual pairs of drivers. The load on one pair of drivers was limited, however, to the load the right of way would bear with safety. This fact brought into use leading trucks or “bogies® and trailing trucks which received a

Since 1904 the Walschaert valve gear in¬ vented in 1844 by a Swiss named Egide Wal¬ schaert and used quite extensively in con¬ tinental Europe has increased in favor among locomotive builders and is now used to a greater extent in this country. In modern loco¬ motives the use of an outside valve gear such

portion of the weight of the locomotive. An arrangement of this kind increased the wheel base considerable and additional provisions had to be made to enable the locomotive to run around curves. Lateral play was allowed the axles, radial axles were used, axle trucks turn¬ ing about a pivot which receives a portion of the weight were also used.

Many forms of valve gears were applied to the earlier locomotives. <(01d Ironsides® is equipped with what is known as ((the Hook Motion.® This gear was the standard form used in this country for some time even after the invention of the shifting link.

((The Hook Motion® was replaced by the Stephenson link mechanism invented in 1843 by William Howe, an employee of the Robert Stephenson & Company of New Castle, Eng¬ land. Up to 1904 practically all the locomotives

as the Walschaert is practically necessary, be¬ cause of the increase in size of our locomotives. In the large locomotive the parts of the Stephenson mechanism are very large, thus per¬ mitting rapid wear and the accumulation of a great amount of lost motion. The Wal¬ schaert valve gear has no eccentrics, only pins, links and bushings. It is easily accessible and maintained. Using a valve gear outside of the frame also permitted better frame bracing and thus reduced the chance of frame failure.

During the last 25 years many improve¬ ments have been made. These have led to the superb locomotives now running in Europe and America. Many investigations have been made relative to increased boiler pressures, com¬ pounding, use of superheated steam and pre¬ vention of smoke, all of which have been of inestimable value.

Fig. 4. Early American Locomotive.

in the United States were equipped with this gear. The gear is located between the drivers and provides a means of reversing the engine at will and also permits the volume of steam admitted to the cylinders to be varied by the operator while the engine is running.

The Locomotive of To-day.— The loco¬ motive might be dealt with as a power plant complete in itself, consisting of boiler, fur¬ nace, stack, engine and auxiliaries. It will de¬ velop the same amount of power as a station¬ ary power plant occupying several times the

amount of space. Modern locomotives are built as high as 3,000 horse power, with a tractive effort of 105,000 pounds. Comparing the econ¬ omy of the modern locomotive with the loco¬ motive of 20 years ago it will be found that in many cases 50 per cent more work is obtained per pound of coal burned.

The ever-increasing demands and distribu¬ tion factors presenting themselves have resulted along with other things in increased train loads and as a result greater capacity in tractive effort. This increase has been met by con¬ structing larger locomotives with greater steam¬ ing capacity. The average locomotive is in service something less than 20 per cent of the time with an average daily mileage of about 80 miles. Considerable attention is being paid to the possibility of increasing the amount of time the locomotive is in active service. This

of course means the changing of crews while the engine is doing useful work.

For the fiscal year ending 30 June 1914, 64,760 locomotives of all classes were in use in the United States as reported by the Inter¬ state Commerce Commission. The total mile¬ age was 1,755,972,325 miles, an average of 27,- 115 miles per annum per locomotive.

Types. — There are between 30 and 40 types of locomotives in use in the United States, divided between passenger, freight and switch¬ ing. They are as a rule known and designated according to the number of wheels and drivers. The first figure denotes the number of lead¬ ing wheels in the front truck or under the front; the second gives the number of drivers and the last the number of trailing wheels under the rear end. The following are some of the types now in use :

SYMBOL

TYPE

WHEEL ARRANGEMENT

SERVICE

0-4-0

4- wheel switcher .

ZTOO

Contractor or industrial service. Light switching.

0-6-0

6-wheel switcher .

zTOOO

Switching.

0-6- 6-0

Mallet articulated ....

zroocrooo .

Heavy freight.

0-8-0

8-wheel switcher .

zroooo

Switching.

0-8- 8-0

Mallet articulated ....

Zl = 0000“0000

Heavy freight.

2-4-0

4 coupled .

o

o

a

a

Suitable for short runs, light service and moderate speed.

2-6-0

Mogul .

ZlrTOOO

Freight.

2-8-0

Consolidated .

Zlo = 0000

General freight.

2-10-0

Decapod .

zb = COOOO

Heavy freight.

4-4-0

American (8 wheeler) .

ZlcToOO .

Passenger, freight and mixed service.

4-6-0

10 wheeler .

zJo = oOOO

Passenger and fast freight.

0-4-2

4 coupled and trailing.

ZI = OOo

For short runs and limited supply of fuel and water.

0-6-2

6 coupled and trailing.

zhoooc

Short runs.

0-4-4

Fordney, 4 coupled. . .

ZL°OOoo

Used as double enders.

2-4-2

Columbia .

c

0

o

Q

c

Light road service .

2-6-2

Prairie .

Zlo = OOOo

Heavy passenger and fast freight.

2-8-2

Mikado .

Zlo“0000 O

General freight service on sharp curves.

2-10-2

Santa Fe .

Zlo = OOOOOo

Heavy freight service on sharp curves.

2-4-4

4 coupled, double ender .

Zlo˚OOoo

For logging, industrial or light road service.

2-6-6-2

Mallet articulated ….

zlo˚000 = 000o

Heavy freight.

2-8-8-2

a u

zlo“0000˚0000n

it U

2-8- 8-0

u u

zlo“000000000

u u

2-10-10-2

u u

Zlo = 00000000000 O

((u

2-8-8-8-2

Mallet artic triplex . . .

ˆo = 00OT˚0000 = 000O o

Heavy freight.

4-4-2

Atlantic .

Z]n˚nOOo

High speed passenger service.

4-6-2

Pacific .

Ao˚o OOOo

Heavy fast passenger and fast freight.

4-8-2

Mountain .

Zlo˚nOOOOo

Heavy passenger.

1 American Locomotive of 1830 2 American Locomotive of 1840

3 American Locomotive of 1900

LOCOMOTIVES

1 Pacific type for heavy passenger service 3 Heavy freight service type

2 Mountain type for passenger service 4 Freight type with three groups of driving wheels one

of the largest engines in the world

LOCOMOTIVE

569

The most common types in railroad service • are the 4-4-0 (American) ; 4-4-2 (Atlantic) ; 2-6-0 (Mogul); 4-6-0 (10 wheeler); 2-6-2 (Prairie) ; 4-6-2 (Pacific) ; 2-8-0 (Consoli¬ dated) ; 2-8-2 (Mikado) ; and 0-6-0 (6 coupled switching) .

Each type is manufactured in different weights with various tractive efforts dependent to a certain extent upon the weight. The fol¬ lowing table indicates the average range in weight :

type Weight in pounds

4—4—0 American . 30,000 to 136,000

4-4-2 Atlantic . 126,000 to 215 ,000

2-6-0 Mogul . 30,000 to 164,000

4—6—0 Ten-wheeler . 5 1 , 000 to 205 , 000

2—6—2 Prairie . 28,000 to 134,000

4-6-2 Pacific . 90,000 to 282,000

2—8—0 Consolidated . 42 , 000 to 234 , 000

2-8-2 Mikado . 86 , 000 to 3 20 , 000

0-6-0 Six-coupled, switching . 18,000 to 155 ,000

2-8-8-2 Mallet . 204 , 000 to 5 20 , 000

Types for Passenger Service. — The 4-6-2, or Pacific type

locomotive, is best suited for the present-day demands in fast passenger service. It is used to a considerable extent where a tractive effort of 40,000 to 45,000 pounds is required. Where long heavy trains are operated or where extra heavy grades are prevalent, the Mountain type of locomotive, or 4-8-2, is growing in favor. The Atlantic, 4-4-2, and the Prairie, 2-6-2, are used exten¬ sively on the shorter runs or where local opera¬ tion prevails.

Types for Freight Service. — It was but a few years ago that the Consolidation, 2-8-0, locomotives comprised about 30 per cent of the locomotives in use. For heavy freight service and for fast trains it is being replaced by the heavier type of Mikado or 2-8-2. The Mikado is used mainly where the tractive ef¬ fort required is about 55,000 pounds. For heavier service and up to 83,000 pounds trac¬ tive effort, the Santa Fe, 2-10-2, is becoming popular. The Santa Fe appears to give better results for heavy slow service than either the Consolidated or Mikado. Where the service is exceptionally heavy the Mallet articulated types of locomotives are growing in favor. These engines are built with tractive efforts ex¬ ceeding 100,000 pounds. . The Mallet articu¬ lated compound locomotive was used in some of the mountainous districts of Europe prior to such modifications as were necessary to adapt it to requirements set by the railroads of this country. Practically two locomotives, considering the drivers and cylinders, are com¬ bined. It has one boiler and one furnace and lends itself to a more advantageous application of the compounding principle.

Types for Switching Service. — The 0-6-0 type is the most common type of switch engine. Occasionally the Mallet 0—8— 8—0 is used with a tractive effort of 100,000 pounds. A type more commonly found, . however, than the 0-8-8-0 for heavy switching is the 0-8-0, espe¬ cially where the tractive effort required is about 70,000 pounds.

Fuels.

As a general rule the major operating cost in the operation of steam locomotives is for fuel which to a considerable extent comprises different kinds of many grades. The kind of fuel used plays an important part in the pro¬ portioning of the boiler and furnace and should

always be given careful consideration. A thor¬ ough knowledge should be had relative to the various fuels, their composition, condition of operation when using same, quantities required, cost,

availability and education of crews oper¬ ating the locomotive.

Wood. — On logging railroads wood is al¬ most universally used as a fuel for locomo¬ tives. Approximately two and one-fourth pounds of dry wood are equivalent in heating value to one pound of soft or bituminous coal. The average composition of several kinds of dry wood by weight is as follows :

Carbon . 49.75 per cent

Hydrogen . 6.05 per cent

Oxygen . 41.35 per cent

Nitrogen . 1.05 per cent

Ash . 1.80 per cent

100.00

Wood which has not been specially dried contains considerable moisture, generally be¬ tween 20 and 40 per cent. It is advisable, therefore, to dry the wood and keep the same protected as it will absorb about 15 per cent of water when exposed to the atmosphere.

Comparative value of different kinds of wood for fuel are given in the following table :

Relative Weight of value as one cord in

kinds of wood a fuel pounds

Red oak .

. 1.00

3,254

Shell bark hickory .....

. 1.45

4,469

Chestnut white oak .

. 1.25

3,955

White oak .

. 1.17

3,821

White ash .

. 1.12

3,480

White beech .

. .94

3,236

Black walnut .

. .94

3,044

Black birch .

. .91

3,115

Yellow oak .

. .87

2,919

Hard maple .

. .87

2,878

White elm .

. .84

2,592

Large magnolia .

. .81

2,704

Soft maple .

. .78

2,668

Soft yellow pine .

. .78

2,463

Sycamore .

. .75

2,391

Chestnut .

. .75

2,333

White birch .

. .70

2,369

Jersey pine .

. .70

2,137

Pitch pine .

. .62

1,904

White pine .

. .61

1,868

Fuel Oil.— Fuel

oil has been used

to a

limited extent and more especially in the ter¬ ritory adjacent to oil wells. Where economic and commercial conditions permit it is the most desirable fuel. The absence of smoke and ashes, prompt kindling and extinguishing of fires, extreme rate of combustion and ease with which it can be handled and controlled are marked advantages in favor of fuel oil. The reduction in volume and weight over an equiva¬ lent quantity of coal for heating value and the increase in boiler efficiency are factors of no mean importance.

Crude oil consists mainlv of hydrocarbons together with small quantities of nitrogen, oxygen, sulphur and water. The average com¬ position by weight of typical American fuel oils is as follows :

Carbon, per cent . 82 0 to 86 0

Hydrogen, per cent . 14.0 to 11.0

Oxygen, per cent . 3. 8 to .6

Sulphur, per cent . 0 to 1.6

One barrel of crude oil contains 42 gallons and weighs from 310 to 350 pounds. Com¬ pared with coal, oil occupies 50 per cent less

space and is 35 per cent less in weight for equal heat values.

Comparative Heat Values of Coal and Oil.

Barrels of Pounds of oil equal to coal equal to 2,000 lbs. of

B. T. u. PER POUND of coal 1 barrel of oil coal

10,000 . 620 3.2

11,000 . 560 3.6

12,000 . 520 3.9

13,000 . 480 4.2

14,000 . 440 4.5

15,000 . 410 4.8

Coal. — The principal fuel used for loco¬ motives in America is coal. Coal may be divided into three principal kinds, anthracite, semi-bituminous and bituminous coal.

Anthracite. — Anthracite coal used in this country comes mostly from Pennsylvania and its use for locomotives is confined almost ex¬ clusively to a few railroads operating in the eastern part of the United States. This coal ignites very slowly and burns at a high tem-perture. It gives off almost no smoke and the flame is very short.

Heating Value of Anthracite Coal.

Fixed Volatile Heating value per

location carbon matter Ash lb. of combustible

Lackawanna... 84.0% 5.0% 11.0% 13,900 B. T. U.

Lykens Valley.. 81.0% 5.0% 14.0% 13,650 B. T. U.

Scranton . 84.4% 6.5% 9.0% 13,800 B. T. U.

Semi-Bituminous. — This is a softer coal than anthracite though in appearance it re¬ sembles the hard coal. It is lighter than anthracite and burns more rapidly and is capable of maintaining a very intense heat.

Heating Value of Semi-bituminous Coal.

Fixed Volatile Heating value per

location carbon matter Ash lb. of combustible

Blassburg, Pa.. 73.0% 15.0% 11.0% 13,500 B. T. U.

Cumberland,

Md . 80.8% 13.0% 5.0% 16,320 B. T. U.

Pocahontas, W.

Va . 74.5% 18.1% 6.6% 15 , 740 B. T. U.

Bituminous Coal. — Coals that contain over 20 per cent volatile matter are usually classed as bituminous coals, and are divided into three

Heating Value of Typical Bituminous Coals.

LOCATION

Fixed

carbon

Volatile

matter

Ash

Water

Heating value per lb. of com¬ bustible

Per ct.

Per ct.

Per ct.

Per ct.

B. T. U

Freeport, W. Va. Hocking Valley,

61.55

28.58

8.39

1.48

14,069

Ohio .

Pere Marquette,

49.54

34. 14

9.67

6.65

13,053

Mich .

53.95

31.14

2.76

12. 15

14,160

Brazil, Ind .

Eastern Field,

50.30

34.49

6.33

8.98

12,417

Ky .

Horse Creek,

56.39

36. 12

4.39

3. 10

14,148

Ala .

53.28

31.84

12.54

2.34

12,850

Fleming, Kan. . .

49.36

32.68

12.97

4.99

12,242

Laddadale, la. . .

45.02

30.74

16.00

8.24

11,027

Rich Hill, Mo . .

28.73

33.58

19.36

8.33

10,586

Coffeen, Ill .

42.81

29.48

13.28

14.43

10,064

Cambria, Wyo. .

34.82

35.02

20. 72

9.44

9,650

Chariton, la. . . .

41.49

30.49

12.63

15.34

10,242

classes : coking, non-coking and cannel coals. (

■ *that fuse together and become pasty on being heated. They are rich in hydrocarbons and are used in gas manufacture. ((Non-Coking Coals® do not fuse together during combus¬ tion and are free burning. ((Cannel Coals® are rich in carbon, burn readily and with a bright flame. It is very homogeneous, breaks without any definite line of fracture and has a dull, resinous lustre. It is a valuable gas coal and is used but to a small extent for steaming purposes.*

The principle bituminous coals used are mined in Ohio, West Virginia, Pennsylvania and Illinois.

Powdered or Pulverised Coal. — The value of powdered coal as a fuel for steaming pur¬ poses has long been known. Despite the many advantages of powdered fuel, little progress has been made toward its general adoption. Among the advantages obtained in burning powdered coal are :

Complete combustion and total absence of smoke.

A cheaper grade of bituminous coal can be burned.

The locomotive boiler may be rapidly forced above its rated capacity. The labor of firing is reduced to a minimum. The constantly in¬ creasing demand for the better grades of coal and oil throughout the country has brought about a condition where it is difficult to obtain such fuel at reasonable prices. The yearly expenditure for fuel used in locomotives of the United States exceeds $300,000,000. The limited supply of oil should of necessity be con¬ served for other purposes.

Investigations show that any fuel in a dry- powdered state 66ˆ per cent combustible is suitable for generating steam. Anthracite, bituminous and semi-bituminous coals, lignite, peat, anthracite culm, dust and slush slack, screenings and dust may all be burned in a pul¬ verized state. They should all be in about the same condition as dry Portland cement.

The raw fuel is dried, pulverized and stored in fireproof containers. It is handled with the same care as fuel oil. For firing up a lo¬ comotive the usual steam-blower is turned on in the stack, a piece of

lighted waste is put through the firebox door opening and placed on the furnace floor, just ahead of the pri¬ mary arch, after which the pressure blower and one of the feeders is started. Less than an hour is generally sufficient for getting a full head of steam. The powdered fuel, hav¬ ing been supplied to the enclosed tank on the tender, gravitates to a helicoidal conveyor which conveys it to the feeders where it is commingled with air under pressure which forces the mixture through the connecting hose to the nozzles leading into the fuel and air mixers. Additional air is supplied in the mixers and the mixture is then drawn into the furnace by the flue draft and combustion takes place.

The maximum temperature is from 2500° to 2900° F. under the main arch. Liquid ash runs down the front and sides of the combus¬ tion zone and is precipitated into self-cleaning slag pans where it is cooled and solidifies.

Many experiments are being conducted and various applications for burning powdered fuel are being tried out. Extensive developments

may be expected within the next few years and the locomotive equipped for burning pul¬ verized fuel will not be uncommon.

Coke. — Coke is used to a limited extent in certain portions of roads where smoke is ob¬ jectionable, such as in tunnels, cities, etc. It is not as a general rule desirable on account of its slow ignition and great bulk for a given weight. The best cokes are those from Penn¬ sylvania and Virginia.

Composition of Coke.

Carbon

location carbon Ash Sulphur

Connellsville, Pa . 89% 10% 1%

Pocahontas, Va . 93% 6% 1%

Combustion. — Combustion takes place when the elements or the constituents of a fuel, which are mainly carbon and hydrogen, form a chemical combination with oxygen and produce oxides. Heat

accompanies this chemi¬ cal action and it is this heat which is partially utilized in generating steam.

Air Required for Combustion. — Air is used to supply the necessary oxygen for maintaining and supporting the combustion. The composi¬ tion of air is approximately 23 per cent oxygen (02) and 77 per cent nitrogen (N2) by weight, or 21 per cent 02 and 79 per cent N2 by vol¬ ume. To secure one pound of oxygen in the furnace it will therefore be necessary to sup¬ ply or 4.35 pounds of air. Ordinarily in

practice from 25 to 100 per cent more air is provided than is required for complete combus¬ tion. Naturally the less this excess, still main¬ taining complete combustion, the better the efficiency as this excess air leaves the boiler at a much higher temperature than when intro¬ duced into the furnace, thus carrying away heat.

Let C, H and O denote respectively the parts by weight of carbon, hydrogen and oxy¬ gen in one pound of fuel. Carbon dioxide (C02) is formed by the complete combustion of carbon and by the proportion of molecular weights 12 – pounds of C combine with 32 pounds of oxygen to form 44 pounds of C02. In other words one pound of carbon requires 2.67 pounds of 02 or 11.6 pounds of air. By a similar method one pound of H2 requires 8 pounds of 02 or 34.8 pounds of air.

There is often a small quantity of oxygen in the fuel itself and we consider that this will be united with the hydrogen as far as it is pos¬ sible. Then the minimum weight of air re¬ quired for complete combustion may be ob¬ tained by the following equation.

11.6C + 34.8(H— ˆ) = Pounds of air.

The volume of air at 62° F. and atmospheric pressure theoretically required for. complete combustion is arrived at by multiplying by the corresponding volume per pound of air which gives

147C + 441 (H — ˆ)— Cu. ft. of air.

Example: Determine the pounds of air and cubic feet of air theoretically required for the

complete combustion of the wood with the composition as given above.

11.6X.4975 + 34.8(.0605— ••iˆ?) = 65.077 lbs. of

O

air.

41 T.Z

147X. 4975 +441 (.0605 —) = 77.0 cu. ft. of

air.

One pound of fuel oil requires considerablv more air than wood and more than any of the fuels mentioned heretofore.

11.6X.82 + 34.8(.14—

O

44.22 lbs. of air.

147X-82 + 441 (.14 — -) = 178.19 cu. ft. of air.

O

The above figures indicate the importance of giving due consideration to the fuel used as space must be provided for admitting the proper quantity of air. At the same time the resistance offered to the passage of air through the fuel bed should be considered.

Heating Value. — As mentioned before a chemical action is accompanied by the gener¬ ation of heat. The heat generated when one pound of combustible is completely burned is called the heating value. Heating values are determined as a rule by various calorimeters. The heating value of a fuel depends upon the quantities of carbon and hydrogen which it contains. Some fuels contain sulphur which generates some heat and requires a definite amount of oxygen for combustion. It is gen¬ erally disregarded however in making computa¬ tions.

The heating value of a fuel may be approxi¬ mated by computing the quantities of heat which the combustible constituents contained in the fuel would produce if burned separately and taking the sum.

The heat liberated in burning one pound of carbon completely is 14,650 B. T. U. One pound of hydrogen completely burned liberates 62,100 B. T. U.

Using the same symbols for the constituents as were used in arriving at the theoretical quantity of air necessary for combustion we can write.

British thermal units (B. T; U.) = 14,650 C + 62,100 (H — tt).

The above formula is known as Dulong's equation and is used extensively in estimating the heating value of fuels when the ultimate analysis is known. To determine the heating value of wood from the composition hereto¬ fore given, we write

41 55

14,650 X .4975 + 62,100 (.0605 — 0 = 8,835 B. T. U. per lb.

Fuel oil according to the analysis given under fuel has the heating value of

n-JO

14,650 X .82 + 62,100 (.14- ˆ) = 20,412 B. T. U. per lb.

If it is desired to consider the heating value of the sulphur content, one pound of sulphur when completely burned will liberate 4,050 B. T. U. The weight of sulphur in one pound of the fuel is therefore multiplied by 4,050

and added to the sum of the heat liberated by the other constituents in determining the heat¬ ing value of the fuel.

Water. — For many years, the water sup¬ ply was considered one of quantity only, re¬ gardless of the kind. Quantity of course is of prime importance, but considerable expense in maintenance and operation can be saved by scientific handling and treatment of the water used. In certain localities the waters, though unfit for drinking purposes, may not contain substances which make them undesirable for boiler use. Some waters though very good for drinking purposes contain material which either cause the formation of soft scale, hard scale, corroding or foaming. Soft and hard scale are poor conductors of heat, and upon collecting in the tubes and on the heating surfaces sur¬ rounding the firebox reduce the heat trans¬ mission besides clogging up the passages. As the heat transmission is retarded the

boiler plates next to the hot gases and the tubes be¬ come overheated which causes leaks and trouble with the engine's cylinder parts and steam passages. Relief is found by constant washouts, but this is an expensive method to pursue. It causes delays, layovers of consid¬ erable time and is hard on the life of the boiler in that cooling and heating up cause unequal expansion in the various parts which results in a loosening at the connections.

Foaming is the most troublesome and most difficult to remedy. Broken cylinder parts, blowing out of packings, cutting of reciprocat¬ ing parts are quite frequently the result of foaming. Quite often foaming causes trouble with the fire-box sheets and tube sheets. Con¬ siderable waste of water and heat occurs in that water is carried along with the steam to the cylinders, especially when the boiler is be¬ ing forced as in climbing grades.

Treatment of Water. — In the case of soft scale due to the presence of lime carbonate and magnesia carbonate it is advisable to neu¬ tralize with slaked lime and give the boiler washouts frequently. Hard scale is due to the presence of lime and magnesia sulphates. Foaming is possible as an after trouble. Soda ash with slaked lime acts as a remedy and the boilers should be washed out frequently. Changing of the water and blowing out is also advisable whenever possible.

Acids and chlorides in the water cause cor¬ rosion and foaming. The boiler should be closely inspected frequently, blown out and the water changed. Slaked lime or soda ash are helpful in relieving this trouble.

Foaming is frequently caused by the pres¬ ence of alkali and mud in the water fed to the boiler. Diluting the water with other waters quite often gives relief. Distillation alum acts as a neutralizer. The boiler should be blown out often and the water changed frequently. Where water of sufficient purity is not avail¬ able for the boilers many of the railroad com¬ panies are finding it necessary to render the available supply suitable by treatment and water-softening plants are being installed at the watering stations and terminals. Most of the companies employ chemical engineers to make a study of different waters used along the right of way and treat the waters, figuring the cost as against the interest and depreciation on the additional locomotives required for their

service. Cost of cleaning the boilers, decrease in efficiency and capacity are also balanced up.

The Locomotive Firebox and Combus¬ tion Chamber. — The locomotive boiler consists essentially of a rectangular firebox and a cylindrical shell through which numerous tubes pass from firebox to the smoke box, terminating in tube sheets. The products of combustion after passing the length of the tubes enter the smokebox and pass up the smoke stack with the exhaust steam from the steam cylinders. A forged steel ring joins the fire¬ box with the outer shell. Near this ring are several hand holes for cleaning out the space between the shell and the firebox. This space is commonly called the water leg. All plates of the boiler and firebox that are not of cylindrical shape require staying to keep them in place. For example, the cylindrical shell of a tubular boiler does not require staying or bracing as the internal pressure tends to keep it cylindrical. Flat surfaces tend to bulge and must be held in place. The placing of stays and the arrangement plays an important part in the design of a boiler and must be worked out for each special type. Many dif¬ ferent methods of staying will be found, and there are quite often several ways of staying the same kind of surface. The firebox and flat ends of the boiler require staying. How¬ ever, a portion of the tube sheets are suffi¬ ciently held in place by the tubes. The water leg is stayed by screwed stay bolts riveted at the ends. These stay bolts are likely to crack or break off on account of the expansion of the firebox. In order to detect such a failure the stay bolts are often drilled from the outer end nearly through to the inner end. In case of failure steam will blow out the defective stay and thus give warning. The crown sheet of the firebox is exposed to intense heat while covered with but a few inches of water. The staying of the crown sheet is one of the most difficult problems met in locomotive boiler con¬ struction. To avoid the difficulties of staying the crown sheet, the firebox end of the boiler shell is sometimes made flat on top. Tubes for a locomotive boiler are as a rule made smaller than for stationary boilers and are spaced much more closely. Two-inch tubes are used generally, although in some cases smaller tubes have been used. The boiler is fastened rigidly to the frame of the locomotive at the smoke- box end. A small longitudinal motion on the frame at the firebox end is provided for by expansion pads.

Firebox. — Two functions are performed by the firebox. Burning of the fuel and liberation of the heat contained is first and most import¬ ant. The second function is to permit the transmission of the heat through the firebox heating surfaces to the water. Under normal conditions only a part of the fuel burns on the grates. A considerable portion, approxi¬ mately one-half, of the heat is liberated by the burning of the gases above the fuel bed and in the tubes. Sufficient

air supply, com¬ plete mixing of the gases and ample combus¬ tion space are necessary to prevent a large amount of combustible gases from passing out the smoke stack.

Combustion Chamber. — The firebox fur¬ nishes seldom more than 10 per cent of the total heating surface, but is responsible for

more than 25 per cent, and sometimes as high as 50 per cent of the total evaporation. It is very essential that sufficient combustion space be provided in which the combustible gases given off by the fuel bed can burn and give off their heat. The carbon in the fuel next to the grates may be completely burned to carbon dioxide, but in passing up through the fuel bed freshly placed will leave largely as carbon monoxide. If no place is provided for this gas to burn it will pass up the stack and lower efficiency will result.

Mechanical Stokers. — Mechanical stokers have been applied to a limited extent within recent years. On account of the increased size of the locomotive the ultimate capacity of the heating surface cannot be realized by hand firing and relief is sought in the application of mechanical firing. Many experiments are being conducted and the use of stokers is be¬ coming more general.

Steam Action. — To understand the action of the steam in a modern locomotive let us take for example a locomotive about to start on its trip. A good fire is burning on the grates, the steam pressure is up to maximum and a suffi¬ cient coal and water supply is on the tender. On opening the throttle, after setting the shift¬ ing lever, the steam enters the steam chest above the engine cylinders, having passed through the • superheater, if the locomotive is so equipped, and through the steam pipes con¬ necting the superheater or boiler with the steam chest.

The steam then enters whichever end of cylinder is opened through the steam chest or valve chamber and due to its pressure causes the piston to move. The piston being con¬ nected to the piston rod forces the crosshead and connecting rod and crank to perform their function of turning the axles upon which are mounted the driving wheels and valve mechan¬ ism. A movement of the valve mechanism causes a movement of the valve in the valve chest which admits the steam alternately to opposite ends of the cylinder and at the proper

lime permits the steam in the cylinder that has done its work to escape through the exhaust pipe and pass up the stack, thus producing a suction and creating a draft in the firebox.

The valve and its movement are so designed that four events take place in each end of the cylinder as the piston moves from one end to the other and back again, which requires one revolution of the drivers. One revolution of the drivers causes the valve to move from one end of its travel to the other and back again. When the valve is at one end of its stroke steam can enter the cylinder and when it is at the other end the steam can leave the. cylinder. The opening and closing by the valve is a proc¬ ess continually kept up and the opening varies from zero to its maximum. The valve starts to uncover the steam port slightly before the piston reaches the end of its stroke and we say admission takes place. Steam continues its flow into the cylinder and the piston starts on its working stroke. Before the stroke is com¬ plete the valve shuts off the steam and we have the cut off. The steam in the cylinder then ex¬ pands, doing work until the valve moving in the opposite direction opens the exhaust port and allows the steam to escape. This last

event is called release, which as a rule occurs slightly before the piston reaches the end of its working stroke. The piston completes its working stroke and starts its return stroke, forcing the steam out of the cylinder. Before the piston completes its return stroke the valve has started to close the exhaust port and upon closing we have the fourth event or com¬ pression. Some steam is caught in the cylin¬ der and compressed until admission occurs and a new cycle begins.

A similar cycle is performed in the other end of the cylinder and so timed that when ex¬ haust and compression are taking place in one end admission and expansion are taking place in the other. The above-described events are changed at the will of the engineer by setting the shifting link for different cut-offs. When the shifting link is moved forward from mid¬ position the cut-off is increased and the loco¬ motive will run ahead. If he pulls the lever back of mid-position the locomotive will be re¬ versed. The nearer mid-position, the earlier the cut-off occurs and the less steam is ad¬ mitted. The events of the stroke are ex¬ pressed in per cent of the stroke completed in which they occur. For instance 25 per cent cut-off means the steam is cut off when the piston completes 25 per cent of its working stroke.

Valve Gears. — The Stephenson link mo¬ tion and the Walschaert radial valve gear are the most common valve gears used in this

country and have been briefly described under the caption Historical. More detailed descrip¬ tion will be found in texts on Valve Gears.

Superheaters. — Few locomotives are now built without superheaters. The Schmidt fire- tube superheater was applied successfully as early as 1906, and the resulting economy in fuel and water together with its suitability to the requirements of American railroads has placed the superheater among the important elements of the modern locomotive. To-day there are over 21,000 locomotives equipped with superheaters in the United States and Canada. Superheaters are applied to between 90 and 95 per cent of all the standard gauge steam loco¬ motives built in the United States. The appli¬ cation of superheaters results in an increased boiler capacity of about one-third, and a sav¬ ing in fuel of between 20 and 25 per cent. This increase in economy has made it possible for the average fireman to fire heavier locomotives. Superheated steam effects an economy by rea¬ son of its temperature being above the satura¬ tion temperature of steam at the same preA sure and also by reason of its increased vol¬ ume. At high temperatures superheated steam behaves like a gas. Considerable heat may be abstracted without producing liquefaction, whereas the slightest absorption of heat from saturated steam results in condensation. If superheat is high enough to supply not only the heat absorbed by the cylinder walls but also the heat equivalent of the work done during ex¬ pansion, then the steam will be dry and satu¬ rated at release. Greater superheat than this will result in a loss of energy unless the steam is exhausted into another cylinder. In most cases superheat is only carried so far as to reduce initial condensation. To obtain dry steam at release the steam at cut off must be

superheated 100° to 300° F. above satura¬ tion temperature, depending upon the initial condition of the steam and the. number of ex¬ pansions. It is evident that the increased ef¬ ficiency obtained by any superheat in excess of that needed to prevent condensation must be due to increased volume of the steam per unit weight.

A moderate amount of superheat produces a considerable increase in volume, the pres¬ sure remaining constant, and reduces the weight of steam per stroke for a definite amount of work.

The general trend of engineers is toward the use of higher superheats

and steam tem¬ perature of 600° F. are not uncommon. There is no doubt that the limit of su¬ perheat is reached when the exposed machine parts are unable to withstand the higher tem¬ peratures.

Several types of superheaters have been ap¬ plied to locomotives but the design of the fire tube superheater fits so well the requirements of American railroads that it is the universal favorite.

Feed-Water Heaters. — The function of the feed-water heater as applied to the locomo¬ tive is that of heating the feed water, while that of the feed-water heater installed in a power plant is often to assist in purification of the feed water. Generally speaking there is a gain of 1 per cent in heat for every 10 de¬ grees that the feed water is heated when the heat which increases the feed water tempera¬ ture would otherwise be wasted. Again, the smaller the difference in temperature between the feed water and the steam, the less would be the strain on the various parts subjected to changes of temperature. In European coun¬ tries the application of feed-water heaters is rapidly becoming general. Not a great amount of attention however has been given to the methods of heating feed water for locomotive boilers in this country, though many American railways are alive to the possibilities and the increased economy resulting therefrom.

Waste heat from two different sources is available, namely, exhaust steam and gases from the combustion chamber. The thermal efficiency of the average locomotive operating under good condition is about 7 per cent. In other words, 7 per cent of the total heat in the coal fired represents useful work at the draw bar. Losses in the gases from the com¬ bustion chamber total nearly 18 per cent and that lost in the discharged exhaust steam about 65 per cent. Proportional and maintenance tji faculties are greater in heaters designed to absorb heat from the furnace gases though the gases are at a higher temperature and greater transmission per unit of area might be ex¬ pected if sufficient quantities of the gases could be brought in contact with the heating surfaces. Attention should be first given to perfecting a feed-water heater to absorb all the heat possible from the exhaust steam and later attempt to use the heat in the hot gases as is done by the economizer in steam-power plants. The exhaust steam does some work in producing draft, and of course cannot be con¬ sidered as a dead loss. However, a small pro¬ portion of this heat could perform the work in producing a satisfactory draft.

A feed-water heater based on the principle

of the Lovekin film heater applied in marine practice has been

designed and used on high¬ speed passenger locomotives capable of heating feed water from 45° to 225° F. A back pres¬ sure of 10 pounds existed in the cylinder. Two hundred and twenty-five degrees feed water is still about 160° below steam tempera¬ ture and any additional heating could be done by the exhaust gases which frequently have a temperature of 700° F. or more.

From what work has been done it appears that a 10 per cent economy can be expected under reasonable conditions of operation. The logical location of a feed-water heater is on the front deck, close to the cylinders, and un¬ der the extension at the front. It is advisable in order to secure higher temperatures in the feed water to use the closed type of heater with a pump to deliver the water to the boiler through the heater against the boiler pressure. The exhaust steam from the pump should be discharged into the heater.

Locomotive Performance. — The indicated horse power, or horse power developed in the cylinders, of any locomotive may be computed as for any steam engine. The work done in the cylinder equals the product of the average force acting on the piston and the space traversed. Using the units in pounds and feet gives a result in foot pounds which if divided . by 33,000 foot pounds considering one minute in time gives horse power.

Let A — Area of piston in square inches.

= diameter of cylinder in inches.

L'— length of stroke of piston in feet.

N = revolutions per minute.

P — mean effective pressure on piston in pounds per square inch during one revolution.

Then the horse power developed in one end of the cylinder will equal

PL'AN PXL'XnXdtXN l.H.P. 33,000 4X33,000

As work is done in each end of the cylinder and there are ordinarily two cylinders on each locomotive the total horse power of the loco¬ motive equals

ˆ4 PL' A N _ 4 X PL' X 7T X d2 X N _ PL'P-N

33,000 “ 4X33,000 10,504

If L is expressed in inches

l.H.P.

*PLd*N*

126,050

Let V — speed in miles per hour

D — diameter of drivers in inches.

Then I.H.P. =

PL'd V 31.25 D*

PLd'-V 375 D ‘

t The maximum horse powrer is usually at¬ tained at speeds of from 25 to 35 miles per hour in freight locomotives, and at speeds of 50 to 60 miles per hour in passenger locomo¬ tives.

Efficiency (Mechanical). — Mechanical effi¬ ciency represents the ratio of the horse power at the tender drawbar to the indicated horse power (I. H. P.) developed in the cylinder.

The losses include (a) friction in all the mechanisms; (b) air resistance; (c) grade re¬ sistance, and (d) acceleration resistance. These losses vary from 10 to 30 per cent of the I. H. P.

Tractive Force. — The tractive force in pounds for simple locomotives considering drop in pressure due to expansion, friction and wire drawing is expressed by the formula

„ .8 PPL

*~ D **

Some authorities use .85 instead of .8.

The following formulae for different types of locomotives are used by certain locomotive builders :

*Simple 2 -cylinder locomotives working simple „ _ .85 Pd*L*

D '

Compound 2-cylinder locomotives working .8 PdPL

simple F = – — — .

Compound 2-cylinder locomotives working .67 PdlL compound F = – — – .

Compound 4-cylinder locomotives working 1.6 PdlL simple F = – — – .

Compound 4-cylinder locomotives working

[– .67 PdtL .25 Pd ? L

compound F— – — – ■ -I – -

D D

Mallet compound 4-cylinder locomotives

.52 Pd ?L

working compound F — — — — — .

d V — diameter of high pressure cylinder in inches.

d _~ diameter of low pressure cylinder in inches.

Tractive force determined by the above formulae holds when the locomotive is operat¬ ing on a level track at a uniform speed up to seven miles per hour.

As the speed increases and the cut-off is re¬ duced or takes place earlier in the stroke the resulting tractive force is less.

Drawbar Pull. — The drawbar pull or trac¬ tive force of a locomotive is indicated on a dynamometer. This force is dependent upon the weight of the locomotive on the driving- wheels and upon the power of the locomotive. The drawbar pull at that point where the driv¬ ing-wheels begin to slip is known as the ad¬ hesion of the locomotive. The adhesion varies with the coefficient of friction between the driving-wheels and the track. Values of the coefficient of friction are given in the following table :

Dry rail, good condition . f—.20 to .25

Maximum with sand . f—.33

Moist rail . /— .15

Worst condition . f~. 125

Drawbar pull — weight on drivers in pounds times /.

V

Engineering News gives R = 2Jr-ˆ

V

Baldwin Locomotive Works [gives i? = = 3 + —

in which R = resistance in pounds per ton (2,000 pounds) on straight level track and V ~ velocity in miles per hour.

Under good conditions the drawbar pull necessary to haul one ton varies from 6 to 8 pounds on straight level track, increasing with curves and grades. The increased resistance due to grades is as follows : One mile con¬

tains 5,280 feet, and the force necessary to move one ton up a grade of one foot per mile is .3788 pounds. When the grade is expressed in feet, per mile the number of feet per mile multiplied by .3788 will give the resistance in pounds per ton. When the grade is expressed in feet per hundred, or per cent, the resistance for each per cent of grade will be 20 pounds per ton. The resistance due to curves is not easily determined. The construction of the roadbed, speed of train and various other con¬ ditions of service make it impossible to give an exact rule for computing the resistance due to curves of any given radius. This resistance has been estimated at from .6 to .7 pounds per ton per degree of curve. By degree of curve is meant the number of degrees of central angle subtended by a chord of 100 feet. One degree of curvature equals a radius of 5,730 feet. Therefore, the number of degrees di¬ vided into 5,730 gives the radius in feet to a very close approximation.

A starting force of about 18 pounds per ton is necessary to overcome train resistance. However, considerable variation from this force is likely to be experienced. Values mentioned by numerous authorities range from 14 to 30 pounds per ton. These figures are not in¬ tended

to cover inertia but represent slow starts. The resistance reduces the instant the train moves. Slack in couplers or compression in draft springs aid the locomotive by permit¬ ting the train to start one car at a time. Engi¬ neers realize this and locomotives draw trains with entire satisfaction which if all the cars in the train were rigidly coupled could not be started. The effect of wind resistance is of such importance that consideration should be given the same. Winds blowing with the train help the locomotive while head-on winds add to the resistance to be overcome by the loco¬ motive. Winds at right angles to the direc¬ tion of travel of the train are, as a rule, considerably harder on the locomotive than head winds. The side wind causes high flange friction on the far side and it is not uncommon during heavy wind storms on the prairies to have trains delayed as the locomotives are unable to maintain their scheduled speed.

Trains in starting will require, as stated above, about 18 pounds per ton and as the speed increases to five miles per hour will drop to four or five pounds per ton. The formulae as hereinbefore given for determin¬ ing the value of R, or draw4 bar pull, are not general. We know that R does not increase at the same rate for heavy trains as for lighter trains. For a 100-ton train 30 pounds per ton will be the approximate tractive effort when the speed is 80 miles per hour and for a 600-ton train 15 pounds per ton at the same speed will be required.

Inertia. — Inertia, the amount of which de¬ pends upon the weight and change in velocity, effects all bodies in motion. Locomotives move on the track at varying speeds, some of the parts have various speeds with respect to eacfi other and the motions of the parts are in different directions. The locomotive must be built to withstand these inertia forces safely. The inertia forces are small when the speed is low, but should nevertheless be given care¬ ful consideration. At high speeds many fail¬ ures have resulted due to improper size of the

parts. For instance, a locomotive running at 60 miles per hour has its brakes applied as it approaches a curve. It is obvious that the locomotive must be built to withstand the iner¬ tia forces and be balanced to resist the tend¬ ency to overturn as curves are met.

Economy of Modern Locomotives. — Tests reported (Bulletin No. 26,

University of Illinois Experiment Station) show the follow¬ ing increase in economy with increase in boiler pressure :

Boiler pressure, lbs.

per sq. in . 120 140 160 180 200 220 240

Steam per I. H. P.

per hr. in lbs . 29.1 27.7 26.6 26.0 25.5 25.1 24.7

Coal per I. H. P. per

hr. in lbs . 4.0 3.8 3.6 3.5 3.4 3.4 3.3

In Engineering News, 8 March 1894, Mr. C. H. Quereau reports that the mean effective pressure decreases as the speed of the loco¬ motive increases :

Miles per hour . 46 51 53 54 57 60 66

Revolutions per min¬ ute . 224 248 258 263 277 292 321

Mean effective pres¬ sure, lbs. per sq. in. 51.5 44.0 43.0 41.3 42.5 37.3 36.3

Mr. Quereau also states the following rela¬ tive to the variation of steam consumption with speed :

TWO-CYLINDER

COMPOUND

SINGLE EXPANSION

Revolu¬

tions

Miles

per

hour

Steam per I. H. P. per hour in lbs.

Revolu¬

tions

Miles

per

hour

Steam per I. H. P. per hour in lbs.

100-150

21-31

18.33

151

31

21.7

150-200

31-41

18.9

219

45

20.91

200-250

41-51

19.7

253

52

20.52

250-275

51-56

21.4

307

63

20.23

•- .

321

66

20.01

The maximum indicated horse power per square foot of grate surface lies, for the freight locomotives, between 21.1 and 31.2. for passenger locomotives between 28.1 and 35.0.

Cylinder Performance. — Cylinder per¬ formance is affected by variation in both speed and cut-off. Run at a constant speed, the steam consumption per indicated horse power in simple locomotives is a minimum at from

SPEED

DRY STEAM PER I.H.P. PER

LBS.

HOUR,

R.P.M.

Miles per hour

Per cent cut-off —50

20

40

30

40 .

6!

30.0

28.8

28.0

27.4

60 .

10

27.5

26.8

25.9

25.1

80 .

13i

26.0

25.5

24.6

24.0

100 .

16§

25.5

24.9

24.0

23.6

120 .

20

25.6

24.5

23.8

23.3

140 .

23§

26.0

24.5

24.0

23.3

160 .

26§

24. 7

23.5

180 .

30'

25.0

/

200 .

33j

25.5

•

30 to 40 per cent cut-off, increasing at either earlier or later cut-offs. When run at constant cut-off, the steam consumption decreases rap¬

idly with the speed until it reaches a minimum

at a speed of approximately 150 revolutions per minute, and then increases as the speed increases beyond this point.

The preceding table gives typical perform¬ ances for a simple freight locomotive operating at 200 pounds pressure.

Boiler Performance. — The evaporation per square foot of heating surface per hour varies from 5 to 15 pounds. Under ordinary conditions the evaporation is about 11 pounds per hour and the locomotive is seldom driven above this amount. Under the conditions of service prevailing it will average nearer 7: Therefore each square foot on the average will be good for about .2 of a boiler horse power and when driven will supply around .4 B.H.P. Slightly less than one-half of the evaporation takes place on the heating surface of the firebox although it constitutes between 4 and 8 per cent of the total heating surface. Most of the heating surface is in the tubes.

Evaporation results in ordinary practice will as a rule fall between the values given in the following table :

Water evaporated per lb. of

dried coal as

fired

Waters evaporated per sq. ft. of heating surface per hour in lbs.

8.0 to 11.5 . 3

7.7 to 11. 1 . 4

7.5 to 10. 7 . 5

7.2 to 10.2 . . 6

7. 0 to 9.8 . 7

6.8 to 9.4 . 8

6.5 to 9.0 . 9

6. 2 to 8.5 . 10

6.0 to 8.1 11

5. 8 to 7.7 . 12

5.5 to 7.2 . 13

5.2 to 6.8 . 14

5.0 to 6.4 . 15

Compound Locomotives. — Any locomotive equipped with cylinders in which the expansion of steam is begun in one cylinder and con¬ tinued in another is called a compound loco¬ motive. When steam is expanded in two or more cylinders successively the number of ex¬ pansions per cylinder is less than when only one is used, and therefore the range of tem¬ perature in each cylinder is less. Reducing the range of temperature in each cylinder reduces the condensation losses. The main object of compounding is to reduce the amount of steam per horse power per hour. With compound en¬ gines as applied to locomotives the saving in steam consumption as compared with simple engines is a very uncertain quantity. Ten to 20 per cent less steam is used per indicated horse power per hour in compound locomotives than in the simple engine when the cylinders, pis¬ tons and valves are all in good condition.

Locomotives with more than two cylinders are as a rule made compound. In two-cylin¬ der compounds it is quite important that the work done in each cylinder be equal. The ex¬ haust or. back pressure of the high pressure cylinder, is the initial pressure of the low pres¬ sure cylinder. They are arranged, however, to start as simple engines and the general arrange¬ ment is to allow the high pressure cylinder to exhaust directly into the atmosphere, the steam from the boiler to the low pressure cylinder being reduced in pressure by passing through a reducing valve.

'

.

.

*; • **

•

• ;

*w • ** • – ' – -»* — • *■*

Under ordinary conditions the cylinder per¬ formance of compound locomotives as com¬ pared with simple locomotives is as given in the following table :

LBS. OF DRY STEAM PER I.H.P. PER HOUR

speed in r. p. m.

Simple

locomotives

Compound

locomotives

40 .

20.3 to 22.0

60 .

20. 1 to 21.7

80 .

19.9 to 21.6

100 .

19.8 to 21 .4

120 .

19.8 to 21.5

140 .

. .. 23. 6 to 24. 7

20.0 to 21.7

160 .

. .. 23.7 to 24. 8

20.2 to 22.0

180 .

. .. 24.0 to 25.2

20.6 to 22.3

200 .

. .. 24.5 to 25.9

21.0 to 23.0

220 .

21.4 to 23.8

240 .

... 26.7 to 28.2

22.0 to 24.6

260 .

... 27 . 7 to 29 . 2

22.8 to 25.5

Geared Locomotives. — Geared locomotives are especially designed for logging service, where steep grades, sharp curves and uneven tracks are encountered. They are carried on 8 or 12 wheels, which are grouped in two or three trucks; each truck having four wheels. Power is applied to all the wheels, in order that the whole weight of the locomotive, in¬ cluding the fuel and water supply, is available for adhesion. As a general rule the engine drives a transverse shaft. The transverse shaft is bevel gear connected to longitudinal shafts which extend to the trucks. Universal joints are arranged as fitted to the longitud¬ inal shafts to compensate relatively changing positions of the trucks when the engine is traversing curves.

The trucks are so arranged that the boxes can play in their respective pedestals without throwing the gears out of mesh. In case it is desired to transport the locomotive on its own wheels the gears can be

thrown out of mesh so that the transmission mechanism does not act when the locomotive is moved.

Bibliography. — American Locomotive Com¬ pany, 'Locomotives5 (New York 1902 to date) ; American Railway Association Proceedings (New York 1886 to date) ; American Railway Engineering and Maintenance of Way Asso¬ ciation Proceedings and Reports (Chicago 1900 to date) ; American Railway Engineering Association Manual (Chicago 1915 to date) ; American Railway Master Mechanics Associa¬ tion, Locomotive Dictionary (Newark, N. J., 1870 to date) ; American Society of Mechanical Engineers Transactions and Journal (New York 1880 to date) ; Baldwin Locomotive Works, 'Locomotive Data) (Philadelphia 1909 to date) ; Engineering News (New York 1875 to date) ; Garbe, R., (Locomotives> (London

1908) ; Goss, W. F. M., (Locomotive Perform¬ ances5 (New York 1907) ; Henderson, G. R., 'Locomotive Operation5 (Chicago 1904) ; Inter¬ national Railway Fuel Association Proceedings (Chicago 1914 to date) ; Master Car Builders Association Proceedings (Chicago 1875 to date) ; Pennsylvania Railroad Company, loco¬ motive Testing5 (Altoona, Pa., 1904 to date) ; Pettigrew, W. F., (Locomotives5 (London

1909) ; Purdue University, (Locomotive Test¬ ing5 (Lafayette, Ind., 1895 to date) ; Sinclair, A., 'Locomotive History5 (New York 1907) ; United States Interstate Commerce Association, 'Locomotive Boilers5 (Washington, D. C., 1912 to date) ; University of Illinois, 'Engineering

Experiment Station Bulletins5 (Urbana, Ill., 1904 to date).

W. F. Verner,

Assistant Professor of Mechanical Engineering , University of Michigan.

LOCOMOTIVE, Principal Parts of. —

The following list embodies brief descriptions of 'the construction and operation of the vari¬ ous principal parts of the modern locomotive. For further information consult articles under the titles Locomotive; Locomotive Industry; Engine Industry in this Encyclopedia.

Air Bell-ringer. — Air-pressure connection for ringing the signal bell.

Air-brake Hose. — The flexible hose connection by which the brake-pipe of the locomotive is attached to that of another locomotive.

Air-cylinder of Brake-pump. — The lower cylinder of the air-pump which furnishes the compressed-air for setting the air-brakes.

Air-drum. — The main air-reservoir. See Main Reservoir. Air-gauge. — A pressure gauge provided with two hands, one of which indicates the amount of air-pressure in the main reservoir, and the other one the pressure in the main brake-pipe or train -pipe. In the latter the pressure is usually maintained at 70 pounds as indicated by the gauge, and in the main reservoir somewhat in excess of this amount, so as to ensure the proper action of the valves of the air-pump.

Air-pump. — An air-compressing pump which is worked by steam taken from the boiler. It supplies the com¬ pressed-air used for operating the air-brakes, and for signal purposes.

Air-pump Exhaust-pipe. — The pipe from the steam cylinder of the air-pump to the steam-pipes in the smoke- box.

Air-pump Lubricator. — The cup or arrangement which contains the oil used in lubricating the air-pump. It is located in the cab.

Air Signal-hose. — The flexible hose which connects the air signal-pipe in the cab with the air signal-pipe con¬ nections in the cars.

Apron. — The sheet-iron plate which covers the space between the locomotive and the tender.

Arch-pipes. — The steam-pipes in the smoke box which connect the branches of the T-pipe with the steam-chests. Bell- yoke or Bell-stand. — The cast-iron arch placed upon the top of the boiler, in which the bell is swung. Bissel-truck. — A wheel arrangement or truck designed to relieve the lateral rigidity in locomotives, and facilitate their travel around curves.

Blow-off Cock. — A plug-cock at the bottom of the fire¬ box, by the opening of which the boiler is blown off or emptied.

Blower-pipe. — The pipe in the smoke-box connected with the blower-cock in the cab. By blowing steam through it, a draft is produced when the locomotive is at rest.

Boiler. — The large sheet-iron cylindrical structure, con¬ stituting the main upper body of a locomotive, filled with tubes, in which the steam used for driving the locomotive and operating its various auxiliary appliances is generated.

Boiler-jacket. — See Jacket.

Bonnet. — The wire cap or netting placed over the smoke¬ stack to restrain the sparks and cinders.

Boxes. — The bearings which rest upon the journals of the axles.

Brake. — The appliance by which a locomotive or a train is brought quickly to a standstill. Ordinarily, it consists of a flexible piece of strap-iron lined with wooden blocking which is applied to the tires of the wheels by means of rods and levers actuated by the pressure of compressed-air, or by hand.

Brake-pipe. — The pipe through which compressed-air is conducted from the various air-reservoirs connected with the air-pump, to the brake-cylinders of the loco¬ motive, the tender, and the cars composing the train. Each car has its own brake-pipe and brake-cylinder. When the cars are made up into a train, these pipes are connected with each other and with those of the tender and the locomotive, by means of flexible hose, and when thus connected, it is called the train-pipe. Brasses. — The brass boxes on the cross-heads and the crank-pins.

Bumper Blocks.— Pieces of .timber bolted to the bumpers for the purpose of reducing the shock of impact when the cars come together.

Bumper Sheet. — A sheet of metal placed on the front end of the frame, to cover the space between the bumper and the cylinders.

Bumpers or Buffers. — Massive pieces of timber bolted to the front end of the engine frame, and to the rear end of

the tender to receive “ bumps ” without fracturing the metal behind.

Cab. — The hood or house placed on the back end of the boiler, and over the foot-plate, for occupancy by the engineer and fireman.

Cab Handles. — Handles attached to the sides of the cab for the use of the engineer and fireman, in getting on or off the engine.

Cellars. — Recesses or chambers in the jaws of the boxes, which hold the oil for lubricating the journals.

Centre-casting. — The cast-iron plate which connects the truck bolster to the front-end of the boiler.

Check-chamber. — A chamber attached to the waist of the boiler, through which the water passes from the connecting pipe to the boiler.

Check-valve. — A wing- valve inserted in the feed-pipe between the feed-pump and the boiler, to prevent the return of the water from the boiler to the pump.

Connecting-rods. — The rods or bars attached to the piston-rods, by means of which the power developed in the cylinders is transmitted to the driving-axles. They convert the rectilinear reciprocating motion of the pistons into the rotary motion of the crank-pins of the main driving wheels.

Counter-balances or Counter-weights. — Large blocks of iron cast on or otherwise secured in place between two or more spokes of each driving-wheel, opposite the crank-pin, for the purpose of balancing the weight of the parallel and connecting rods, and to steady the motion of the engine by equalizing the forces or moments around the axle.

Coupler. — See Draw-bar.

Coupling-rods. — The rods by which the crank-pins on adjoining driving-wheels are connected together, so as to cause the wheels to rotate in unison.

Cow-catcher or Pilot. — A triangular structure of steel, or iron bars, or curved sheet-metal, attached to the front end of the locomotive. It is provided for the purpose of removing stray cattle and other obstructions from the track, and thus prevent them from getting under the wheels.

Crank-pin. — A pin in the crank of a driving wheel uniting the connecting-rod with the driver.

Cross-heads. — 'Blocks, which move in guides and unite the piston

and connecting-rods, and slide-blocks together.

Crown-bars. — Bars placed on the upper side of the crown- sheet in the water-space, with their ends resting on the edge of the furnace-sheet, to strengthen the crown-sheet..

Crown-sheet. — The top sheet of the furnace, to which the crown-bars are attached. It is placed directly over the fire.

Cut-off. — The termination of the period of admission of steam into the cylinders. The point of cut-off is regulated by the amount of lap on the slide-valves.

Cylinders. — Steam-tight, cylindrical, metal receivers at¬ tached to the front end of the boiler on each side of the lower part of the smoke-box. They contain the pistons, which are actuated by the steam obtained from the boiler. There may be two, four or eight of them, according to the type of locomotive — simple-engine, compound-engine and tandem-compound engine, respectively. They are called high-pressure or low-pressure cylinders, according to the manner in which the expansive energy of the steam is utilized therein, and are given the additional designations — outside or inside cylinders, according to their position relative to the engine frame.

Cylinder-cocks. — Small cocks placed on the lower parts of cylinder-heads, to drain off water of condensation.

Cylinder-heads. — The front and back ends of the cylinders. The latter hold the stuffing-boxes through which the piston-rods move.

Dampers. — The doors in the front and rear ends of the ash pan, by which the air admitted to the furnace is regulated.

Dashers. — The sheet-iron plates attached to the inside shell of the boiler, opposite the pump-check, to prevent the cold water from drenching the tubes.

Deflector. — A bell-shaped or trumpet-mouthed opening used in the furnace to effect a mixing of the air and gases so as to cause the latter to ignite and thus render the combustion of the fuel more perfect.

Dome-bodies. — The sheet-iron jackets which envelop the dome outside of the wooden “ lagging.”

Dome-stays. — The braces attached to the crown-bars and the dome, to strengthen the dome and the crown-sheet.

Dome or Steam-dome. — The elevated, dome-shaped chamber on the top of the boiler, from which the supply of steam for the cylinder is taken, because it is partially superheated.

Draw-bar or Coupler. — The bar attached to the front of the pilot, by means of which the locomotive may be attached to cars or to another locomotive. The name is also applied to the rod or bar by which the locomotive is coupled to its tender.

Drip-cock or Drip. — The receptacle placed under the gauge-cocks, to receive the water and steam discharged.

Driving-axles. — The axles which communicate the motion of the connecting-rods directly to the driving-wheels.

Driving-saddles. — The yokes which straddle the frame and support the driving-springs.

Driving-wheels or Drivers. — The wheels which are

l_ attached to the driving axles. The driving-wheel arrange¬ ment of a locomotive may consist of the 4-coupled, 6-coupled, etc., wheel type. They form what is called the " wheelbase " of the locomotive. The tractive power of a locomotive is derived from the adhesion of the driving- wheels to the rails, and depends upon the weight of the locomotive and the area of the wheelbase.

Eccentric. — A device for operating the slide-valves. This change in motion is effected by giving the eccentric a definite " throw " or eccentricity equal in amount to one-half of the travel of the valve. A locomotive has two pairs of eccentrics and their attachments. One eccentric of each pair is set on the shaft in such a position that the operation of the valves will run the engine in one direction, and the other one is set so as to operate the valve to run the engine in the opposite direction. The ends of each pair of eccentrics are attached to a link by means cf which either of the eccentric-rods is engaged with or dis¬ engaged from the rockers.

Eccentric-sheave. — The body of the eccentric or the eccentric itself, which is forged or keyed directly on to the axle or crank-shaft.

Engineer's Brake-valve. — The air-valve arrangement located on the right side of the cab, by means of which the engineer operates the

driving-wheel and other brakes on the locomotive, and also the several sets of air-brakes attached to the cars of the train.

Engine-truck. — See Truck.

Equalizing-levers. — Bars suspended at their middle points underneath the engine-frame, and connected at their ends to the springs of the driving-wheels, for dis¬ tributing the force of the shocks.

Equalizing-springs. — The spiral or elliptical springs on the reverse-shaft, provided for the purpose of equalizing the weight of the links.

Exhaust-port. — The middle opening in the seat of each slide-valve.

Expansion-clamps. — The clamps bolted over the main¬ frames and the furnace-pads, to allow for the expansion of the boiler under the influence of heat. Also, the clamps bolted to the fire-box under the main-frame to hold the latter against the liners.

Feed-pipe. — The pipe which conveys the feed water from the feed-pump to the boiler. See Injector.

Feed-pump. — The force pump which supplies the boiler with feed-water. It forces the water into the boiler against the pressure in the boiler. See Injector.

Feed-tank. — The water tank provided for the purpose of holding the feed-water for the boiler. It is located in the tender.

Feed-water. — The water used for the supply of the boiler.

Fire-box. — The furnace, or that part of the boiler, in which the fuel is burned.

Fire-door. — The door in the back end of the boiler, through which the fuel and the firing irons are introduced into the fire-box.

Flues. — The pipes in the boiler which carry off the smoke and the waste-gases from the fire-box to the smoke-box, and thus produce the draft necessary for the combustion of the fuel. They are made of iron, the diameter of the tubes being kept as small as possible so as to subdivide the volume of the smoke and gases into a large number of small streams, thus exposing them to a large radiating surface, through the medium of -which the heat is trans¬ mitted to the water surrounding the tubes.

Follower-plates. — The plates which cover the spring¬ packing on the front ends of the piston-heads.

Foot-board. — A platform on the back end of the boiler, on which the engineer stands.

Foot-plate. — – A cast-iron plate bolted to the back end of the frame opposite the fire-door.

Frame. — The strong metal skeleton which supports the boiler, machinery, and axles of the locomotive.

Frame-splice. — The connecting arrangement between the front and main frames.

Front-end. — That part of the locomotive which includes the extended outer-shell of the boiler, comprising the smoke-box and all of the appliances contained therein, such as steam and exhaust pipes, nettings, diaphragms, draft-pipes and the base of the smoke-stack. The function of the front-end is to draw atmospheric air into the ash-pan, and thence through the grate and the fire-box, and to draw the furnace gases through the flues, and thence under the diaphragm into the smoke-stack, and force them out into the atmosphere.

Front- rail. — A single-bar attachment which extends from the front of each of the main frames to the front bumper.

Frost-cocks. — Cocks provided for the purpose of admitting steam from the boiler to the feed-pipes, to prevent them from freezing in cold weather.

Frost-plugs. — Plugs screwed into the pump chambers and pump cages to allow the water to drain out and prevent them from freezing.

Furnace-pads. — The knees bolted on the shell of the fire-box, to place the weight of the boiler on the frame.

Furnace-rings. — The wrought-iron rings which connect the outside and inside sheets in the water space at the bottom of the furnace.

Gib. — The fixed wedge employed to compensate the wear in the

boxes, on the cross-heads, and of the crank-pins.

Gland. — A bush by means of which the packing in the stuffing boxes is secured in place, to receive the wear of the piston-rod, and to prevent the leakage of steam.

Goose-neck. — A bent pipe of brass, or iron, employed' to connect the front end of the feed-pipe with the lower chamber of the pump.

Governor or Pump-governor. — A valve arrangement con¬ nected with the steam pipe and the brake-pipe or train- pipe attached to the air-pump. It is employed to regulate the action of the pump in operating the air-brakes. It is usually set to maintain a pressure of 70 pounds as indicated by the air-gauge.

Grate. — – The area made up of the grate bars in the fire-box, on which the fuel is burned.

Grate Shaking-rig. — A bar attached to the movable grate-bars of shaking or rocking grates, by which they are moved back and forth with a rocking motion, thus dis¬ turbing the fire over the whole area of the grate, to effect proper combustion. It is operated by means of a suitable lever placed in the cab.

Guide-bars. — The parallel bars between which the cross¬ heads move, thus giving a perfectly horizontal motion to the piston-rods. They may consist of two parallel bars, double-guides or a single guide-bar, attached to the back head of the cylinder and to a support called the guide- yoke, a strong plate usually fastened to both the frame and the boiler, and placed across the frame at a point well forward of the front driving-wheels.

Guide-blocks. — – The blocks on the back-head of the cylinders, and on the guide-yoke, to which the guide-bars are attached.

Hand-holes. — Openings provided in the outside shell of the furnace near the ring, through which deposits of rust or dirt in the water-legs of the furnace are removed.

Hand-rails. — Brass or iron pipes attached by brackets or studs to the upper part of the boiler, and extending from the cab to the smoke-box. They are used by the engineer in getting on or off the running-board.

Headlight. — A large light placed on the front end of the locomotive to illuminate the track in front and thus disclose any obstructions

that may exist thereon, and to signal the approach of the locomotive.

Heater-cocks. — Cocks attached to the back end of the boiler, by which steam is blown through the feed-pipes, to prevent them from freezing in cold weather.

Hollow-stays. — – Hollow stay-bolts inserted through the inside and outside sheets of the furnace near the crown- sheet, through which air is admitted to the furnace to increase the combustion.

House. — See Cab.

Induction-ports. — The passages in the valve-seats, through which steam is admitted to the cylinders. See Steam-ports.

Injector. — A mechanical device by means of which a continuous supply of feed- water is given to the boiler. Partial condensation of the steam is essential to efficient action. The injector will not feed water too hot to condense the steam.

Jacket. — The outside coverings of the cylinders and the boiler. The boiler jacket is composed of layers of wood called " lagging " about seven-eighths of an inch in thickness, felt, and iron, placed around the boiler to prevent the loss of heat by raidation and convection.

Jam- nuts. — • Lock-nuts used for setting-out the spring¬ packing in the piston-heads.

Jaws. — The parts of the frame formed by the frame-legs, and which hold the axle-boxes.

Journals. — That part of the axle on which the weight of the locomotive rests. The journals are situated on the inner side of the wheels, and turn on brass " journal- bearings " which resists the friction of the axle. The bearings are held in cast-iron or steel boxes called ' ' journal- boxes " or " axle-boxes." M

Keys. — The wedges employed to tighten the " straps which hold the " brasses " at the ends of the connecting- rods. .

King-bolt or Centre-pin. — The bolt or pm which passes through the centre-casting and the centre of the truck, thus making a flexible connection between the engine and the truck, enabling the latter to turn about the king-bolt so as to allow the axles to assume positions approximating the radii of the curves of the track.

Knuckle-joints. — The joints on the valve-rods, which allow the rods to vibrate freely with the radius of the rocker-arm.

Link. — A variable-radius expansion-gear by means of which the slide-valves are operated. _ See Eccentric.

Link-block. — A block which fits into the curved slot of the link, and moves freely from one end to the other thereof.

Link-hangers. — Rods or bars by which the links are suspended to the horizontal arms of the lifting-shaft.

Lubricator. — The valve through which oil or tallow is admitted to the cylinders for the purpose of lubrication.

Main Reservoir. — The main air-reservoir of the loco¬ motive. It is usually located on the front of the main frame, and immediately behind the cylinders.

Main-rods. — See Connecting-rods.

Mud-drum. — A cylinder attached to the under side of the " waist " of the boiler, to receive the deposits from the feed-water. This material is discharged from the drum by means of a valve called the " mud-cock."

Mud-holes. — • Openings provided in the back end of the

ˆfire-box, through which the accumulations of mud in the lower water-space are removed. These openings are usually closed by means of brass plugs.

Mud-ring. — The wrought-iron ring which unites the inner and outer shells of the fire-box; completely surrounding the inner shell and closing the water space between the two shells.

Netting. — Wire netting placed in the front end of the smoke-box, and in the smoke-stack. This netting acts as a sieve, arresting the sparks and cinders, but allowing the smoke to escape.

Oil-cups. — – Cylindrical metal receptacles with glass linings, employed to contain oil, and to distribute it to moving contact surfaces, for the purpose of lubricating them.

Packing. — The hempen, metallic or other substance used in the stuffing-boxes, and in the steam and pump cylinders, to make the

moving parts of the pistons steam and water tight.

Petticoat or Draft Pipe. — -The pipe through which the exhaust-steam is conducted to the exhaust-nozzles in the smoke-box, thus creating a partial vacuum in the smoke-box, which sucks the smoke and gases out of the flues with great power, and forces them out into the open air by the blast or the action of the exhaust steam.

Pilot. — See Cow-catcher.

Piston-head. — ■ The disc-like plunger in the cylinder which is moved with a reciprocating movement by the steam, converting the energy of the steam into motion.

Piston-rod. — The rod attached to the piston-head, and by means of which the motion of the piston-head is communicated to the connecting-rod or crank.

Primer. — The valve by means of which the air in the water-space of the pump is expelled, and a partial vacuum produced so as to cause an inflow of water to start the action of the pump.

Quadrant. — ■ A slotted curved bar which holds the reverse- lever in the proper position by means of a reverse-latch. Also, a toothed bar located in the cab, by means of which the variable exhaust is regulated.

Radius-bar. — The angle-bar attached to the back end of the truck frame and to the radius-bar cross-tie by means of a pin.

Reach-rod. — The rod which connects the reverse-lever with the reverse-arm of the reverse-shaft.

Reverse-latch. — The tongue which fits into the notch of the quadrant by which the reverse-lever is held in the right position.

Reverse-lever or Reversing-lever. — The lever by which the direction of motion of the locomotive can be changed, and the travel of the valves increased or decreased. It is located in the cab within easy reach of the engineer.

Rockers. — The double-cranks connected with the link- blocks at one end and the valve-rods at the other, and through which the valves receive the motion of the eccen¬ trics and links.

Saddle-pin. — A pin by which the link-hangers are attached to the

saddle-plate, and by means of which the link is raised or lowered.

Saddle-plate. — – The plate which fits into and slides in the slot of the link.

Safety-hangers.— Chains fastened to the front-bumper and to the front end of the truck-frame, to prevent the truck from swinging around and breaking the links in case the locomotive happened to run off the track.

Safety-valves. — Spring- valves attached to the dome-cover, by which the steam-pressure in the boiler is prevented from exceeding a certain limit.

Sand-box. — The cylindrical or dome-shaped box attached to the top of the boiler to contain the sand used for the purpose of sanding the rails in order to increase the adhesion, and prevent the driving-wheels from slipping at starting, or when hauling a heavy load, or when running up a heavy grade.

Sand-pipes. — The pipes on each side of the locomotive through which the sand from the sand-box is conveyed to the rails in front of the driving-wheels.

Side-rods or Parallel-rods. — See Coupling-rods.

Sight-feed Lubricator. — -See Lubricator.

Signal-pipe. — The air-pressure pipe by means of which the engineer communicates with the trainmen.

Signal-whistle. — A steam-whistle attached to the top of the dome. It consists of an inverted metal cup, usually made of brass, which is placed immediately over the annular opening of a hollow valve-stem screwed into the top of the dome.

Slide-valves. — The valves which control the admission and exhaust of steam to and from the cylinders.

Smoke-box. — A cylindrical chamber at the front end of the boiler, which is utilized to contain the arch-pipes, lifting-pipes, exhaust-pots, exhaust-nozzles, steam-pipes and exhaust-pipes. It also forms a

convenient receptacle for the smoke before it escapes into the open air through the smoke-stack.

Smoke-stack. — The chimney through which the smoke escapes from the smoke-box.

Springs. — Bundles of steel plates placed one on top of the other and bound together at the middle by metal bands, and their end connected to the equalizing beams, for the purpose of reducing the effects of the shocks delivered to the locomotive by inequalities in the smooth¬ ness of the track. In order to place the weight of the locomotive on the axle-boxes of the driving-wheels, the axle-boxes are arranged to slide up and down in the jaws formed by the legs of the frames, and the springs are placed on saddles which rest on top of the axle-boxes.

Spring-balances.— The spring attachments in the cab which connect the safety-valve levers to the top-sheets of the boiler.

Stack-base. — The lower part of the smoke-stack, by which the stack is attached to the top of the smoke-box. In some forms it is provided with a hand-hole through which the accumulation of sparks may be conveniently removed.

Stand-pipe. — See Steam-pipe.

Stay-bolts. — – The bolts screwed through the inner and outer shells of the fire-box at frequent intervals, usually about four and a half inches apart, to connect the shells together and enable them to resist the full pressure of the steam.

Steam-chests. — The boxes located on top of the cylinders, and which contain the slide-valves through which the steam is admitted to the cylinders.

Steam-gauge. — A gauge attached to the back end of the boiler, in the cab, to indicate the pressure of steam per square inch in the boiler.

Steam-pipe. — Any pipe carrying steam, but especially the pipe through which steam is conducted from the boiler to the steam-chests, thence through the openings in the seats of the slide-valves to the cylinders. Starting at the dome, the pipe makes a bend called the throttle-pipe; then it extends vertically downwards until it clears the vertical walls of the dome, this vertical part is called the stand-pipe. The stand-pipe is connected to the dry-pipe which extends to the top

of the smoke-box where it is connected to the T-pipe, the branches of which are con¬ nected to the arch-pipes or steam-pipes connecting with the steam-chests.

Steam-port. — A port or passage in a slide-valve for admis¬ sion of steam.

Steam- valve. — The valve inserted in the steam-pipe connecting the boiler with the injector.

Stuffing-boxes. — The chambers in the back-heads of the cylinders, through which the piston-rods move.

Supply-ports. — The openings in the steam-chests through which the steam is admitted from the steam-pipes.

Swing-bolster.— A swinging bearing in the centre of the truck on which the forward end of the locomotive reMs, and which enables it to make curves easily.

T or Nigger Head. — See Steam Pipe.

Tender. — The carriage coupled to the back end of the locomotive, and used for the purpose of carrying water and fuel.

Throttle. — The double poppet-valve or throttle- valve, placed in the throttle-pipe near the top of the dome. This valve is operated by the engineer by means of a lever called the throttle-lever located in the cab, and connected by a rod called the throttle-stem to the lower arm of a bell-crank called the throttle bell-crank, the other arm of which is connected by a rod to the throttle- valve.

Tires. — The steel bands which form the peripheries of the driving-wheels.

Trailing- wheels. — The back pair of driving-wheels in a four-coupled wheel arrangement, or a small pair of wheels placed behind the main driving-wheels where only one pair of driving-wheels is employed.

Train-pipe. — See Brake-pipe.

Truck-brake. — The air-brake equipment of the truck, as distinguished from the air-brake equipment of the driving- wheels.

Truck or Engine-truck. — The frames, wheels, springs, swing-

bolsters, etc., which support the weight of the front of the locomotive.

Tubes. — Pipes for the passage of water. Compare flues.

Tube-sheets. — The plates at the front and back ends of the boiler in which the tubes are inserted.

Tumbling Shaft. — See Lifting Shaft.

Valve Ports. — See Slide-valve.

Valve- yokes. — The wrought-iron or steel bands placed around the slide-valves in the steam-chests, and to which the valve-stems are attached.

Waist. — The cylindrical portion of the boiler.

Waist Sheet. — A sheet of wrought-iron bolted to the waist by an angle-iron, to which the guide-brace:;, guide-bearers a id cross-ties are attached.

Water-pipe. — The pipe to which the feed-pipe hose is connected.

Water-tubes. — Any tubes carrying water, as the iron tubes, about two inches in outside diameter, which are attached to the front and back ends of the fire-box at such an inclination as to allow a continual circulation of water through them to keep them cool and thus prevent them from being burned out by the intense heat. Water-valve. — See Injector.

Whistle-rig. — See Signal Whistle.

LOCOMOTIVE DEVICES. See Safety

Devices.

LOCOMOTIVE ENGINE, The. See

Locomotive.

LOCOMOTIVE INDUSTRY, The. Un¬ like many of the great American industries the history of the inception and growth of loco¬ motive engineering in the United States may be clearly traced from the day when the first loco¬ motive was run upon the rails of the Baltimore and Ohio Railroad. Other lines of rails had previously been laid but they had been con¬ structed for special purposes, and it was not until 1828, when both the Baltimore and Ohio and the South

Carolina railroads were started, that there was any system constructed with the definite object of conveying both passengers and freight. The first American built loco¬ motive was operated upon the Baltimore and Ohio tracks, and although it was nothing more than the mere working model which was con¬ structed by Peter Cooper in 1829, and was not intended for permanent service, it demonstrated the practicability of the invention so conclu¬ sively as to prove to the world that railway lines might be operated by locomotive power. In fact, it was largely due to this successful demonstration that the road was finally com¬ pleted. If the experiment had failed, the proj¬ ect would have been abandoned.

The Peter Cooper model was a little engine with a single cylinder three and a half inches in diameter, with a boiler that was scarcely larger than that of an ordinary kitchen range, and with tubes that were improvised from gun- barrels. In spite of all the crudities in its con¬ struction, however, its trial run was completed so successfully that Peter Cooper, who himself was the engineer, was able to drive his loco¬ motive, which hauled 41 persons, including him¬ self, at a speed of 18 miles an hour. Slight as such speed would seem at the present time, it was a great achievement for those days, when the locomotive was so generally regarded as the dream of an impracticable visionary. Moreover, it meant the beginning of the great development of the American locomotive and engine industry.

The first locomotive to be constructed in the United States for actual work was made in 1830. In 1829, however, Horatio Allen had im¬ ported a locomotive from Stourbridge, England, for the use of the Delaware and Hudson Canal Company. It was known as the ((Stourbridge Lion,® and was the first ((real® locomotive ever used in this country. The first distinctively American locomotive, the <(Best Friend,® was manufactured to the order of the South Caro¬ lina Railroad by the West Point Foundry. Both of these machines were operated success¬ fully.

It was in 1831 that Matthias W. Baldwin, a manufacturer of bookbinders' tools in Philadel¬ phia, was employed by the proprietors of Peak's Museum, in that city, to construct a model loco-

motive for exhibition purposes. This was the time when the public

excitement over the Rain- hill contests that had been held in England was at its height, and Robert Stephenson's victory with his <(Rocket® had made the people very curious to witness the operations of such an engine. To gratify this craving for novelty the museum managers built a circular track, and, upon this, the Baldwin locomotive was operated. His model worked so well that the officials of the Philadelphia, Germantown and Norristown Railroad Company engaged him to construct a larger machine for use upon their lines. This locomotive, which was completed in November 1832, was named ((01d Ironsides.® It was a four-wheeled engine, very similar in design to that of the English make, and weighed, when placed on the tracks, a little more than five tons. The rear, or driving wheels, which were 54 inches in diameter, were placed on a crank axle ; while the cylinders, which were nine and a half inches in diameter, by 18 stroke, were attached horizontally to the smoke box. The frame was made of wood, while its wheels, which had wooden spokes and rims, were strengthened by the wrought-iron tires and heavy cast-iron (hubs. There was no cab, and the tender, which also ran on four wheels, had wooden sides and back to hold the wood that was required for fuel, and an iron tank, used for carrying water. Roughly made as this locomotive would seem if compared to the engines of this day, the speed which it was able to attain, with its train of cars attached, was frequently over 30 miles an hour. In September 1832, the firm of Davis and Gart¬ ner of York, Pa., built three locomotives of the ((grasshopper® type for the use of the Balti¬ more and Ohio Railroad. They were made from designs prepared by Phineas Davis and Ross Winans, and were so serviceable that several of them were in use for fully 60 years. Thus, step by step, the locomotive industry was developed. By 1834, the building of such en¬ gines had extended to many works in several parts of the country, and such pioneers of railway mechanics as Cooper, Allen, Baldwin, Rogers, Norris, Winans, Campbell and others paved the way for the greater achievements of Mason, Cooke, Milholland, McQueen and Hudson, to say nothing of the countless geniuses whose accomplishments represent the modern development of the art of engine building. In the old days, of course, there was no guide that anybody could follow. There was no such teacher as experience. Moreover as there were few skilled workmen, and practically no shop facilities, the pioneer locomotive builders labored under difficulties which make their suc¬ cess remarkable as the extraordinary achieve¬ ment of indomitable perseverance.

The early American locomotives were so similar in every essential feature to the en¬ gines of English make that it seems quite probable

that they were constructed as a close copy of that model. Later, however, the Amer¬ ican inventive genius came to the front, ex¬ hibiting itself in such radical, departures from the imported machines that it was no longer necessary to bring locomotives from Europe. Taking these evidences of development the im¬ provements upon the locomotives of English type were reached in about the following order : The four-wheel swiveling truck, or bogie, was

substituted for the pair of fixed carrying wheels in 1832 ; the cross-head pump for supplying feed water to the boiler was invented in 1833 ; the half-crank driving axle took the place of the crank-axle in 1834; outside connection to the driving wheels was introduced in 1835 ; the coupling of two pairs of driving-wheels was patented by H. R. Campbell in 1836 ; counterbalance weights for -the revolving and reciprocating parts were first used in 1837 ; equalizing beams connecting the driving springs were first applied by Eastwick and Harrison in the same year; the use of lap-welded wrought-iron boiler tubes first took place in 1838; and of bar-frames of forged iron with forged pedestals, in 1840; the wooden cabs with glass windows originated during the winter of 1840-41, having been invented in New Eng¬ land, where the excessively cold weather neces¬ sitated some such protection for the engine- men; the Baldwin flexible-beam truck was in¬ vented in 1842 ; the first ((ten-wheel® locomotive, with six coupled wheels and a leading four- wheeled truck, was used in 1846; the Mogul locomotive, with six coupled wheels and a lead¬ ing two-wheeled truck, came into use in 1861, while the Consolidation type, consisting of eight coupled wheels and a leading two-wheeled truck, an engine which was designed by Alex¬ ander Mitchell of the Lehigh Valley Railroad, was first built at the Baldwin Locomotive Works in 1866. Among the other features of the locomotive which have been added from time to time, and all of which appealed to the eye of the foreign manufacturer as peculiarly American inventions, are the pilot, or ((cow- catcher,® the bell, the boiler covering of plan¬ ished or Russian iron, the large headlights and the directness and visibility of the pipes and other appurtenances. Up to within as recent a time as the early seventies the so-called ((American® type of locomotive, with its four coupled wheels and its four-wheeled truck, was the class of engine most generally adopted by railroad men in the United States. In fact, ever since the day of its first construction by Campbell, in 1836, it had been continuously used for almost every kind of general service — for the carrying of passengers as well as for freight and switching purposes, and it was not until the demand of the public upon the railways in¬ creased so greatly as to create the need of more

powerful locomotives that special engines for freight service were constructed. It was to meet these requirements that the Mogul and ten-wheel types were adopted during the sixties, and that the Consolidation engines became the standard for the heaviest freight service be¬ tween 1870 and 1880. During the seventies, the maximum load per axle was limited by the strength of the track to approximately 12 tons. This period, however, witnessed the general introduction of steel rails and steel tires; and the way was thus paved for a great increase in the weight and capacity of locomotives. Rail¬ way men became convinced of the superiority of the large locomotive, with its high tractive force and liberal heating surface; and the weight of the engines was increased to the limit permitted by the strength of tracks and bridges. If, in the beginning, the building of these excessively heavy engines was largelv an experiment, it was not long before their practicability had become so well established

that their size and weight continued to increase until cars were made that were capable of carrying loads of 50 tons or even more, in special cases ; and locomotives were constructed with over 30 tons weight per axle. Such power¬ ful locomotives were more costly and difficult of construction, but when the practicable economies in the matter of transportation which were made possible only by the use of cars of such great carrying capacity were taken into consideration, the balance was so strongly in favor of the big cars and the heavy, powerful locomotives, that railroad men found no reason to hesitate because of the question of first cost.

Since the beginning of the art of locomotive construction in the United States. American en¬ gine designers have been actuated by one desire : To produce a machine with sufficient flexibility of wheel-base to enable it to pass sharp curva¬ ture and adapt itself to the unevenness of track surfaces resulting from the action of severe frosts, as well as to facilitate the matter of repairs by striving to make every part so accessible that it might be removed without affecting the other parts of the engine.

Among the locomotive-builders whose ex¬ periments contributed to this result and who also played an important part in the work of increasing the capacity of the American engine were several establishments that either disap¬ peared altogether or that discontinued the manufacture of this kind of machine to enter lines

of business in which the competition was less intense. To speak of these firms recalls such names as the Norris Brothers of Philadel¬ phia, whose work, in the early days of the in¬ dustry, presented the most active competition to such builders as Baldwin and Rogers. After many business vicissitudes this firm ceased to exist in 1865 ; and in 1873 their plant was in¬ corporated in the Baldwin Locomotive Works. In Baltimore, in the old days, there were two works, those of Ross Winans and the Den- meads. Boston had several plants, notably those of Seth Wilmarth, John Souther's Globe Works, the McKay and Aldus Works at East Boston and the Hinckley Locomotive and Ma¬ chine Works, which was one of the representa¬ tive houses .in the industry up to 1888 or 1889. In fact, New England has always been a sec¬ tion of the country most actively interested in the work of locomotive building, the prin¬ cipal plants, in addition to those already named, being the works of Ballard Vail, at Andover, Mass. ; Corliss and Nightingale, of Providence, R. I., a firm which, although George H. Cor¬ liss, the great engine builder, was at its head, proved less successful in the building of loco¬ motives than in other branches of the trade ; A. Latham and Company, of White River Junc¬ tion, V t. ; the Locks and Canal Works, at Lowell, Mass. ; the Amoskeag Locomotive Works, at Manchester, N. H. ; the Lawrence Locomotive Works, at Lawrence, Mass. ; the Taunton Locomotive Works, and the Mason Machine Works, at Taunton, Mass.; and the Portland, Me., Locomotive and Car Company.

Among other sections of the country New Jersey has been a special field for the manu¬ facture of locomotives. The plant of William Swinburne, at Paterson, afterward known as the New Jersey Locomotive Works, and later as the Grant Locomotive Works, was one of

the offshoots from the Rogers Works. For vears it conducted business most successfullv. Finally, in 1885, the Grant Locomotive Works found that it was impossible to meet the de¬ mands of modern requirements with its antiquated shop and inadequate facilities. Hence the works at Paterson were closed and the company removed to Chicago, where, after they had reorganized with new capital and thoroughly modern shops, they continued in operation until 1893. The financial depression of that year was too much for them, however, and the entire plant was sold to the Siemens and Halske Electric Company of Chicago. For a time it was operated both for the manufacture of electrical equipment and locomotives, but the business at last proved so unprofitable that the plant was closed. Among the other New Jer¬ sey manufacturers of locomotives were

Breese, Kneeland and Company, who operated the Jer¬ sey City Locomotive Works, and Van Cleeve, McKean and Dripps, whose shops were located at Trenton.

For several years the firm of Eastwick and Harrison built locomotives at Newcastle, Del., and, when they failed in 1840, they were suc¬ ceeded by the Newcastle Manufacturing Com¬ pany, a concern that gained both wealth and international fame by their railway operations in Russia. In the West there were several manufacturers of note, some important works being located at Cleveland, Detroit, Milwaukee, Chicago and San Francisco. The Rome Loco¬ motive Works, at Rome, N. Y., started under favorable auspices, but, after several years of more or less disastrous operations, went out of business in 1891.

The Baldwin Locomotive Works, of Phila¬ delphia, has the distinction of being not only one of the pioneers in the business of locomo¬ tive manufacture but is still one of the repre¬ sentative establishments in the industry. Es¬ tablished in 1831, by Matthias W. Baldwin, its product has steadily increased until it is now in excess of 200 locomotives a month. The works occupy an area of about 20 acres in the central part of the city, and when running at full capacity give employment to about 19,000 men. An extensive plant has also been erected on a tract of 225 acres of Eddystone, Pa., about 12 miles from Philadelphia; and a tract has been purchased at East Chicago, Ind. ; where shops will be erected when business conditions warrant such expansion.

Another important plant was that of the Rogers Locomotive Works at Paterson, N. J. Founded in 1836, by the firm of Rogers, Ket- chum and Grosvenor, the mechanical genius of the concern was Thomas Rogers. When he died, in 1856, the firm was incorporated under the title of the Rogers Locomotive and Ma¬ chine Works, with Jacob S. Rogers as presi¬ dent, and business was transacted under this name until 1892, when the corporation was again reorganized and assumed the name of The Rogers Locomotive Works. The Rogers Company then had an annual capacity of more than 300 locomotives, and gave employment to about 2,000 persons.

Up to the time of the war with Spain the spirit of consolidation which had already shown its effect in other industries had been an un¬ known factor in the business of locomotive

making. Soon after 1898, however, several of the competing works began to talk of the organization of a larger corporation, or com¬ bination, and the movement finally became so popular that, in July 1901, eight of the large manufactories were consolidated under the name of the American Locomotive Company, with a capital of $50,000,000, half of which is in common stock, and half in 7 per cent cumu¬ lative preferred. The works acquired by the organization were as follows:

	Locomotives per annum.
Schenectady Works, Schenectady, N. Y .	450
Brooks Works, Dunkirk, N. Y .	450
Pittsburgh Works, Pittsburgh, Pa .	200
Rhode Island Works, Providence, R. 1 .	150
Richmond Works, Richmond, Va .	150
Cooke Works, Paterson, N. J .	125
Manchester Works, Manchester, N. H. .	100
Dickson Works, Scranton, Pa . .	85
Approximate total capacity .	1,710

In March 1904, the American Locomotive Company also acquired the stock of the Loco¬ motive and Machine .Company of Montreal, Limited, with works in Montreal, Canada, en¬ gaged in the building of locomotive and struc¬ tural steel works. With the addition of the Ro gers and the Montreal works the American Locomotive Company operated 10 plants with a total annual capacity of 3,100 locomotives.

operation late in 1865. Originally intended as a small shop, its capacity being at first limited to 30 locomotives per annum, they were so suc¬ cessful in placing orders for their product that the establishment now occupies an area of fully 12 acres. In their work

of extending their ca¬ pacity the best of fire-proof buildings have been erected, and the works are equipped with the latest and most improved electric, hydraulic and pneumatic appliances known to the art of loco¬ motive construction.

The Rhode Island Locomotive Works, at Providence, R. I., commenced operations in 1865, and continued to occupy one of the most prominent positions in the rank of locomotive manufacturers up to the time of their absorp¬ tion by the combination.

The Brooks Locomotive Works, at Dunkirk, N. Y., was originally intended to serve exclu¬ sively as the locomotive building and repair shops of the Erie Railroad. In 1869, however, the railway company decided to abandon these shops. Newer works had already been con¬ structed in a more convenient location for the railway company's purposes and Jay Gould, who was then president of the road, saw no reason why the Dunkirk plant should not be closed. At that time, however, Horatio G. Brooks was the superintendent of motive power and machin¬ ery construction for the Erie road. As his home was at Dunkirk, and as all his interests

Schenectady Works of the American Locomotive Company (1864).

Of the 10 plants the Scbenectadv Locomo¬ tive Works was established by the Norris Brothers in 1848. In 1863 it passed into the hands of John Ellis, who was eventuallv suc¬ ceeded by his sons. Tohn C., Charles G., Edward, William D. Ellis and Walter McQueen.

The Cooke Locomotive and Machine Com- panv of Paterson, N. J.. was established about 1800 but for nearly half a century they were employed almost exclusively in the manufacture of machinery. In 1852, however, they began to make locomotives, and as this branch of their business increased, the old shops were aban¬ doned and new and up-to-date works were constructed.

The Pittsburgh Locomotive Works began

centred about that place, he realized that the removal of these works would prove a severe blow to the prosperity of the town. As the re¬ sult, he offered to lease the shop and its ma¬ chinery for the purpose of undertaking the es¬ tablishment of an independent concern, and as Mr. Gould was nothing loath to make such a mutually advantageous agreement, the lease was signed in November. Before the close of the year 1869, two locomotives had been turned out, and from that time the works were extended until, in 1883, the entire

plant, which then covered an area of more than 20 acres, was nurchased from the New York, Lake Erie and Western Railroad Company by the Brooks Locomotive Works.

«

The Richmond Locomotive and Machine Company, of Richmond, Va., was the only locomotive manufacturing plant in the South. When it was established, in 1865, it was in¬ tended for the manufacture of plantation and saw-mill machinery, and it was not until many years later that it began to build street cars — horse cars at first, and, finally, motor cars. In 1889 the company secured a contract from the government to build the machinery for the new battleship Texas , and, although this work was successfully completed, the concern has since devoted its attention almost exclusively to the making of locomotives.

The Dickson Manufacturing Company, of Scranton, Pa., was establishc I in 1862, and, ever since that time, the concern has been suc¬ cessful manufacturers of locomotives and min¬ ing machinery, operating two separate estab¬ lishments in Scranton for these purposes. The locomotive works were acquired by the Ameri¬ can Locomotive Company in 1901.

The Manchester Locomotive Works, of Man¬ chester, N. H., have been prominently identified with the locomotive building industry since they were established, in 1854, by Aretas Blood, one of the pioneers in engine construction.

The works of the H. K. Porter Company at Pittsburgh, Pa., were established by the firm of Smith and Porter, in 1866. Later the concern was known as Porter, Bell and Company. Al¬ though locomotive builders in the strict appli¬ cation of the term, their efforts have been de¬ voted exclusively to such lines as light loco¬ motives for use in mines, manufacturing estab¬ lishments and for all kinds of contractors' and construction work.

A concern which has attained considerable prominence in locomotive building, especially during the past few years, is the Lima Locomo¬ tive Corporation of Lima, Ohio. This com¬ pany built its first locomotive in 1879, at which time it was known as The Lima Machine Works, and made a specialty of saw-mill ma¬ chinery. In

1880 a geared locomotive was con¬ structed in accordance with patents granted to Ephrarin Shay, a Midhigan lumberman. This type proved especially suitable for work on heav}ˆ grades, sharp curves and uneven tracks : and large numbers of Shay geared locomotives have been built, the great majority of them for logging service. The company was sub¬ sequently reorganized as the Lima Locomotive Corporation and new shops were built and were equipped to handle the heaviest kind of locomo¬ tive work. With its present facilities, the com¬ pany is successfully building all sizes of both geared and direct connected locomotiVes, from light engines for contractors' or industrial service, up to the heaviest classes of motive power for trunk line railways.

From the figures covering annual produc¬ tion which have already been given, it is not difficult to estimate that the aggregate capacity of the locomotive manufacturing establishments of the country, not including the railroad shops and the shops not regularly engaged in this business, is in excess of 5,000 locomotives. Of course, the demand for such machines varies from time to time, being dependent upon two factors: (1) The general prosperity of the country, a condition upon which the volume of freight to be transported, which is the basis of railroad earnings, sq largely depends, and (2)

the mileage of new lines under construction, the completion of which means new equipment. These two factors are really one, as new lines are scarcely ever built in those periods of financial stagnation when the people are hoard¬ ing their money and capitalists are too timid to venture to encroach upon their principal. As a result, business prosperity in the locomotive¬ manufacturing industry is intermittent. As the average life of a locomotive is about 20 years, it requires an annual production of some 2,500 machines to supply the demand due to natural conditions ; and as the locomotive shops of the country possess a capacity of about twice that number of engines, the difference between these 2,500 and the total production of all the Ameri¬ can works must find an outlet through one of these three channels : They must be used in the equipment of new lines ; in the improvement and extension of old lines, or they must be ex¬ ported to other countries. The following table shows the total production from 1898 to 1915 as well as the number exported to other lands than Canada or Mexico.

Locomotives

Produced and Number

Exported.

Total

Number

exported

omitting

Remainder

production

Mexico and

not

Year

reported

Canada

exported

1898 .

1,875

468

1,407

1899 .

2,473

517

1,956

1900 .

3,153

525

2,628

1901 .

3,284

423

2,861

1902 .

4,070

365

3,705

1903 .

5,152

289

4,863

1904 .

3,441

504

2,937

1905 .

5,491

583

4,908

1906 .

6,952

720

6,232

1907 .

7,362

798

6,564

1908 .

2,342

456

1,886

1909 .

2,887

291

2,596

1910 .

4,755

314

4,441

1911 .

3,530

387

3,143

1912 .

4,915

512

4,403

1913 .

5,332

771

4,561

1914 .

2,235

273

1 ,962

1915 .

2,085

835

1,250

Beginning

with 1905,

the figures

for total

production include the Canadian output ; and beginning with 1912, they also include locomo¬ tives built in railroad company's shops. Sta¬ tistics published by the Interstate Commerce Commission show the number of locomotives in service on railroads in the United States to be as follows: 1908, 56,733; 1909, 57,212; 1910,

58,947; 1911, 61,327; 1912, 62,262; 1913, 63,378 ;

1914, 64,760. Recent statistics covering the number of men employed in the locomotive building industry are difficult to obtain. In 1905, this number was approximately 40,000; and their wages amounted to fully $25,000,000 per annum. At the present time the total value of the products of the locomotive building es¬

tablishments in the United States, when op¬ erating at full capacity, would annually be about $110,000,000.

Although American locomotive builders at first depended upon English models in their work, they were soon able to produce ma¬ chines that attracted attention abroad. As far as is known, the first locomotives exported from this country were shipped to Cuba in 1838, by the Baldwin Locomotive Works. In 1840, locomotives were built for the Birming¬ ham and Gloucester Railway, in England, by William Norris. In the following year, the

Baldwin Locomotive Works built a locomotive for Austria ; and in 1845 they built three for the Royal Railway of Wurtemberg. Three years later the Rogers Locomotive Works shipped locomotives to Cuba, and the export business was well under way. Even England and Continental Europe, in spite of their fa¬ cilities for locomotive construction, have at times purchased American built locomotives. Unfortunately there are no figures that can tell authoritatively how many locomotives were exported by the United States builders during the early years of the industry, and, as even the later statistics are incomplete, in view of the fact that they do not cover the shipments to Canada and Mexico, it is very difficult to ob¬ tain anything like a comprehensive idea of the subject. According to the best figures obtain¬ able, during the 26 years that elapsed between 1879 and 1904, inclusive, no less than 6,173 were sent to foreign countries from ports in the United States, while their value was placed at $57,843,005. At the present time, American locomotives are in use in almost every inhab¬ ited portion of the globe.

One excuse for England's interest in Amer¬ ican locomotives may be found in the labor conditions that have existed from time to time in that country. Thus, in 1898, when the Mid¬ land, the Great Northern and the Great Cen¬ tral railroads together ordered no less than 80 of our machines, 70 from the Baldwin works and 10 from the Schenectady works, they were somewhat compelled to resort to this method of relief. All through the year 1897 the engi¬ neering works of Great Britain had been af¬ fected by a strike, and, in 1898, when the men finally returned to their work, the several plants were so overcrowded with orders that it was impossible for them to meet all the de¬ mands that were made upon them. Naturally, when the American locomotives appeared they were subjected to all sorts of

adverse criti¬ cism by the British builders. Efforts were made to show that they could not be com¬ pared to the English machines, either in point of speed, or in matter of economy, but as the statements made were all biased and incon¬ clusive, the American manufacturers have not taken them greatly to heart, especially in view of the fact that they are constantly being called upon to furnish machines for use in various parts of Asia and Africa, where, coming into direct competition with the English product, the railroads have had an opportunity to test the truth of such charges.

The European War, which broke out in 1914, caused a considerable demand for Amer¬ ican locomotives for service abroad. Engines for military purposes were ordered by the British, French and Russian governments and were built in remarkably short time. For ex¬ ample the Baldwin Locomotive Works built 20 light tank locomotives for the Frendh gov¬ ernment in 16 working days from the time the order was received.

In 1832, the Philadelphia, Germantown and Norristown Railroad Company paid Matthias W. Baldwin the sum of $3,500 for the locomo¬ tive ((01d Ironsides.® From that time the price charged for such machines slowly but steadily increased until, during the period of the Civil War, sums ranging from $30,000 to $35,000

were received for the heavy freight or passen¬ ger locomotives. Of course, locomotive build¬ ing was no exception to the other industries, and, after war times, the prices of its product declined to about $7,000 for a 35-ton passenger locomotive. This was the price that prevailed about 1879. During 1880 and 1881, prices rose rapidly until fully $15,000 was paid for a simi¬ lar machine ; and they then declined gradually until 1896, when from $8,000 to $9,000 was paid for an average passenger locomotive and from $9,000 to $10,000 for an average freight loco¬ motive. In general, as the total weight of loco¬ motives has increased, there has been a de¬ crease in the price per pound.

The introduction of the 50-ton steel car, in 1897, brought about a marked advance both in the weight and power of locomotives. To meet this new demand the weight of the ordi¬ nary consolidation freight locomotive, which had ranged from 60 to 70 tons, was increased to 80 to 100 tons, while some of the machines that were constructed were as heavy as 115 tons, exclusive of tender. As such an increase of weight and power had been inspired solely by business conditions, the railroads were quick to respond to such an evidence of pros¬ perity by ordering the kind of rolling stock that was

necessary to enable them to meet these new requirements and which would just as certainly increase their own earning power. In 1897 materials were expensive and wages were high. Taking these facts into considera¬ tion, it is by no means surprising that the con¬ struction of such heavy locomotives should have brought the price to $15,000 or $16,000.

During more recent years, the weight and power of locomotives has continued to advance. The Consolidation type has been superseded, to a considerable extent, by the Mikado, which provides increased steaming capacity in pro¬ portion to adhesion. Locomotives with five pairs of coupled driving-wheels have also been introduced, on a number of roads, for heavy freight service ; while for the heaviest kind of work the Mallet articulated type, with driving- wheels arranged in two groups, is successfully employed. This type is the invention of Ana- tole Mallet, a French engineer, whose first ar¬ ticulated locomotives were built in Europe in 1889. The American Locomotive Company built the first Mallet for service in the United States in 1904. This engine was constructed for the Baltimore and Ohio Railroad and proved a decided success. The largest Mallet locomotives built for service in this country far exceed in weight and capacity any that are in use abroad.

The Baldwin Locomotive Works has devel¬ oped the Mallet articulated design by placing driving-wheels under the tender, and thus uti¬ lizing the weight of the latter for tractive pur¬ poses. The first locomotive of this type was built in 1914, for the Erie Railroad. It runs on 28 wheels, 24 of which are used as driving- wheels ; develops a tractive force of 160,000 pounds and weighs in working order 853,000 pounds. At the time of its construction, it was the heaviest steam locomotive ever built.

It was a similar demand for more powerful locomotives, for engines not only capable of hauling heavy trains at sustained high speed, but also of accelerating speed rapidly after

starting, that brought the new and heavier types of passenger locomotive into existence. The old American, or eight-wheel type, was wholly incapable of meeting such requirements. The ten-wheel engine, which had been used quite successfully on heavy grades, proved unsatisfactory in such an emergency, owing to its

comparatively small driving wheels, its in¬ adequate firebox, an adhesion considerably in excess of the requirements, and excessive re¬ sistance within the machine itself. To over¬ come these difficulties the Baldwin Locomotive Works constructed the Atlantic type of engine. It was substantially a ten-wheel locomotive, in which the rear pair of driving wheels was replaced by a pair of trailing Wheels of smaller diameter, permitting the introduction of a deep firebox with ample grate area and volume suffi¬ cient to admit of thorough combustion. Great boiler capacity was available in proportion to the adhesion ; the driving wheels were closely coupled, and the total wheel base was suffi¬ ciently long to give smoothness of motion at high speed, and, at the same time, sufficient flexibility.

A development of the Atlantic type is found in the Pacific type, which has three pairs of driving-wheels with a four-wheeled leading and a two-wheeled trailing truck. Since the intro¬ duction of steel passenger cars, which fre¬ quently weight 75 tons or more apiece, Pacific type locomotives have come into extensive use, because of their great starting power and their ability to run at sustained high speed when hauling heavy trains.

The prices of these heavy locomotives are materially higher than those of the engines built in 1897 ; and large locomotives for road service now frequently cost $25,000 or more.

The fuel cost is the largest single item of expense in the operation of locomotives, and various devices have been tried, from time to time, with a view to promoting fuel economy. Compound locomotives, which were first intro¬ duced in Europe, were built with this end in view; and were at one time extensively used in the United States. These locomotives were successful as fuel savers; but, under the methods of operation prevailing on American railways, they proved difficult to maintain ; and they are no longer being built, except in the case of the Mallet articulated compound loco¬ motive, which is practically two single expan¬ sion engines placed under one boiler. The cylinders of the two engines are of different sizes, the larger, or low-pressure, receiving the exhaust from the smaller, or high-pressure; but the various features which proved unde¬ sirable in other types of compound locomotives are eliminated in the Mallet design.

The most effective fuel saving device at present in use on locomotives is the super¬ heater. When saturated steam is used in the cylinders of a locomotive, a considerable por¬ tion of it — sometimes as much as 25 or 30 per cent — is condensed into water, and does no useful

work. This loss can be avoided by heating the steam, before it enters the cylinders, to such an extent that its temperature will not be lowered to the point of condensation. In a locomotive using superheated steam, a number of the small boiler tubes are replaced by con¬ siderably larger tubes, and in these are placed groups of pipes through which the steam cir¬

culates before it enters the cylinders. The steam absorbs heat from the furnace gases passing through the large tubes, and its tem¬ perature is raised to such an extent that cylinder condensation is avoided. The increase in temperature depends upon the design of the superheater and the conditions under which the engine is working. It frequently amounts to 200° F. or more, and the fuel saving effected per horse power developed, as compared with a similar locomotive using saturated steam, averages about 25 per cent.

The economies resulting from the use of superheated steam have long been known, but it is only during comparatively recent years that superheaters fitted for use in locomotives have been devised. Much of the pioneer work along this line has been done by two German engineers, Wilhelm Schmidt and Robert Garbe. The great majority of heavy locomotives built in the United States since 1912 have been equipped with superheaters, the Schmidt sys¬ tem being used to the practical exclusion of all others. Many railroads have improved the efficiency of old locomotives, built to use satu¬ rated steam ; and the results obtained have been highly satisfactory.

Fuel economy has also been promoted by improved furnace design, and the use of such devices as brick arches and combustion cham¬ bers. The largest coal-burning locomotives are now fired with mechanical stokers, and are developing powers which would be unattainable with hand firing.

*As has been stated, Peter Cooper's first model attained a speed of 18 miles per hour. According to statements that ought to be re¬ garded as reliable Baldwin's <(Okl Ironsides^ once attained a record speed of 60 miles an hour for a short distance, and other examples of hig*h speed had several times been shown by the old-time locomotives. In fact, the real progress in locomotive development in the United States had not been marked by an in¬ creased capacity for speed so much as by an increased hauling power. Instead of designing locomotives capable of breaking the speed record the American builders had been endeav¬ oring to construct locomotives that would draw heavy trains at a steady rate of speed, and in this effort their success had been phenomenal. In the early nineties, however, there was a marked*

tendency to increase the speed of trains, especially on the principal Eastern lines. The following are some of the speed records made by American-built locomotives :

In November, 1892, locomotive No. 385 — a Vauclain compound — running on the Philadel¬ phia and Reading and the Jersey Central rail¬ roads, between Philadelphia and Jersey City, with a train of four heavy cars attached, at¬ tained a speed equal to 97 miles per hour, by covering one mile in 37 seconds. On 19 July 1893, locomotive No. 682, on the Philadelphia and Reading Railroad, accomplished the re¬ markable feat of hauling a train of nine heavily loaded passenger cars from Winslow Junction to Pleasantville, a distance of 26 miles, in 22 minutes, which was equivalent to an average speed of 70.9 miles an hour. On 27 August the same locomotive succeeded in hauling 17 loaded passenger cars the same distance in 27 minutes, or at an average sneed of 57 miles per hour, a performance which was even more

remarkable, considering the weight of the train attached.

On 11 Sept. 1895, the Empire State Express, on the New York Central Railroad, with its four cars, ran from New York to East Buffalo, a distance of 436ˆ4 miles, in 407J4 minutes, this being an average speed of 64.26 miles per hour. In 1897, and for several years thereafter, the Philadelphia and Reading Rail¬ road operated during the summer months a service in which trains of five or six passenger cars were hauled between Camden and Atlantic City, a distance of 55ˆ2 miles, in 48 minutes, and these runs were made with great regularity. The locomotives used for this purpose were of the Atlantic type, with Wootten boilers and 84-inch driving wheels.

On 9 July 1905, what is known as the Scott Special, on the Atchison, Topeka and Santa Fe Railway, left Los Angeles for a continuous trip to Chicago. The distance of 2,245 miles was covered in 43 hours and 55 minutes, making an average of 52 miles per hour for the entire distance, the highest speed officially recorded for a given distance being at the rate of 106.1 miles per hour.

During the past few years, the subject of electric traction has received considerable atten¬ tion from railway managers, and several instal¬ lations are in successful operation. Among these may

be mentioned the New York Central, the New York, New Plaven and Hartford and the Pennsylvania electrifications, in and about New York City; the electrification of the Pennsylvania's suburban service between Phila¬ delphia and Paoli ; and the electrification of the Hoosac Tunnel, on the Boston and Maine; of the Cascade Tunnel on the Great Northern Railway, and of the Saint Clair Tunnel at Detroit, on the Michigan Central Railroad. The tunnel electrification of the Baltimore and Ohio Railroad at Baltimore should also be mentioned, as the first undertaking of this kind to be tried on an extensive scale. Two examples of heavy grade electrification — those of the Chicago, Milwaukee and Saint Paul Railway in the Rocky [Mountains, and of the Norfolk and West¬ ern Railway in the Elkhorn district — are notable as cases where through traffic is being moved over trunk line railways for consider¬ able distances, using electricity as a motive power.

In all the cases mentioned above, the oper¬ ating results have proved satisfactory, and some remarkable records are made in regular service. On the Norfolk and Western, for ex¬ ample, the speed of freight trains up the heavy grades has been practically doubled, while two electric locomotives handle as much tonnage per train as three of the large Mallet steam locomotives formerly used.

The general electrification of steam railways is highly improbable for some time to come, not so much because of the difficulty in design¬ ing suitable equipment as because of the enor¬ mous cost involved. The electrification of a steam railway requires, not merely the re¬ placing of steam locomotives bv electric loco¬ motives, but also the installation of power house and transmission equipment, of new shop and terminal facilities and various other items. Thus, while material savings in operation may, under favorable conditions, be effected bv the use of electric locomotives, the first cost in

the majority of cases is prohibitive. For some time to come, therefore, electrification will probably be confined to city terminals and large tunnels, to mountain grades and to congested districts where the amount of traffic moving is fairly constant during the greater part of the day.

No uniform method of developing, trans¬ mitting and utilizing electric power in railway work has as yet been adopted. Direct and alternating current, the overhead wire and the third rail, and various different types of loco¬ motives, are all in successful use. Each elec¬ trification problem must be studied by itself, and that system used which is best fitted for the special conditions to be met.

The majority of electric locomotives are built on a co-operative plan, one company sup¬ plying the mechanical parts and another the electrical equipment. The Baldwin Locomo¬ tive Works and the Westinghouse Electric and Manufacturing Company have worked together in this way, as have also the American Loco¬ motive Company and the General Electric Com¬ pany. Thus the locomotives, in both their mechanical and electrical features, represent the work of designers and builders who are experts in their respective lines.

Before closing this review, mention should be made of the use of internal combustion motors in locomotive work. The extremely variable conditions as to speed and load, under which locomotives operate ; the weight and space limitations which are necessarily imposed, and various other considerations, have hin¬ dered the introduction of this class of motor in general railway service. There is, however, a growing field for the internal combustion loco¬ motive in light switching, contractors' and industrial service; and the success of these machines in such work points to their increas¬ ing use in the future.

The fact that the internal combustion loco¬ motive consumes no fuel while standing idle makes it specially suitable for work in which the service requirements are intermittent. In plantation service, for example, when the mills are not grinding, it is desirable to have loco¬ motives ready for immediate use, even though they may only occasionally be needed. Gasoline locomotives meet these conditions admirably, as they are dependent upon no external source of power, consume fuel only when operating and can be placed in service without previous preparation.

The Baldwin Locomotive Works has made a special study of the gasoline locomotive, and has developed a series of four standard designs weighing three and one-half, five, seven and nine tons, respectively. In many respects these machines follow steam locomotive practice. The entire construction, including the motor and transmission,, is spring supported. The motor drives a transverse jack-shaft, from which power is transmitted to the wheels by means of side rods. No chains are used in the trans¬ mission system, and there is a positive drive from motor to wheels. The minor fittings and equipment are arranged, in each _ case, to suit the special conditions under which the loco¬ motives operate. The locomotives can be built for any practicable track gauge, and can, if desired, be arranged to use alcohol for fuel instead of gasoline.

The immediate future will probably witness a continued increase in the weight and capacity of steam locomotives, and a greater refinement in their design for the purpose of developing maximum power in proportion to the fuel and water consumed. Electrification will be ex¬ tended in districts where its advantages can be fully realized. The internal combustion motor possesses many advantages for railway work, and its extensive use in large locomotives may be expected as soon as a suitable design is produced. The difficulties here are by no means insurmountable, and there are prospects that a type of internal combustion motor will be de¬ veloped which will, in turn, revolutionize the present methods of railway operation.

LOCOMOTIVES, Compound. See Lo¬

comotive.

LOCOMOTIVES, Electric. See Elec¬ tric Railways.

LOCOMOTOR ATAXIA, a popular

name for a disease of the nervous system, which is caused exclusively by syphilis, al¬ though less than half of 1 per cent of those who have syphilis develop it, and usually occurs in adults from 40 to 50. It is characterized by pain, inability to walk and by progressive weak¬ ness which leads finally to death. The malady is long drawn out, becoming serious sometimes as many as 40 or 50 years after the first in¬ fection, and while not entailing, as a rule, a great amount of physical pain, causes extreme inconvenience to the patient. It is present in men more frequently than in women, because syphilis is more frequent in men. In the vast majority of patients it first shows itself by neuralgic pains of the lower extremities. Thus, there may be acute darting and lightning-like pains, lasting from half an hour to an hour or two, about the ankles, in the instep, shooting up the leg or in the thighs. Occasionally these pains are present in the arms and trunk. They are frequently diagnosed as neuralgia, and it is not until development of the symptoms of ataxia (q.v.), a word which means ((inability to co-ordinateˆ — inability to walk in the dark and to place the foot or hand where the mind wishes it to be placed — that the true nature of the constant neuralgic pains is recognized. The patient finds himself insecure on uneven sur¬ faces. He stumbles and falls, and must keep his eyes glued to his legs or the surface on which he is walking if he is to be able to con¬ trol them. With the gradual development of the inability to walk there may be a number of other

symptoms — acute, lightning-like pains in the stomach, intense, sometimes acute, pain in the bladder, sometimes loss of voice, etc. There may be patches of anaesthesia over the body and there is usually progressive muscular weakness. Loss of knee-jerks is an important early sign.

Associated with ataxia of the 'legs, which prevents the patient from walking readily in the dark, or up and down stairs, there may be some ataxia in the hands, whereby the finer movements of buttoning the clothing, of writ¬ ing, etc., may be interfered with, although there may be no loss in muscular strength un¬ til the last stages of the disease. A very con¬ stant and usually a very early sign of locomotor ataxia consists in certain changes in the reac¬ tions of the pupil of the eye to light. This

symptom is technically known as the Argyll- Robertson pupil, and shows a fixed pupil when exposed to the influence of light, but a pupil that dilates or contracts normally when tested for its powers of accommodation. Thus in a patient who has this symptom the pupils con¬ tract on looking at a near object and dilate on looking at a far object; but if a candle or beam of light is thrown suddenly on the eye, normal quick contraction of the pupil is dimin¬ ished or absent. The Argyll-Robertson pupil is sometimes found as early as the neuralgias, and a diagnosis may often be made on that alone.

The progress of the disease is usually very slow ; remissions occur, which give great hope to the patient and afford ample opportunities for all forms of charlatanism; but the final outcome is usually hopeless. Many conditions of the spinal cord are known in which some of the symptoms of locomotor ataxia are present, chronic neuritis from alcoholism being one. As many of these are recoverable, the diagnosis of locomotor ataxia is an extremely difficult one, and can be made only by the com¬ petent specialist. Consult Jelliffe, White, (Diseases of the Nervous System) (1917). See Syphilis of the Nervous System; Tabes Dorsalis.

LOCRIS, the parts of ancient Greece in¬ habited and named after the Locrians, the old¬ est Grecian peoples. There were four branches — the Epicnemidian, the Opuntian, Ozolian and Epizephvrian Locrians, the last a colony from the Ozolian stock, living in Lower Italy. Their capital, Locri, was one of the most powerful, splendid and wealthy cities of Magna Graecia.

LOCUS, in mathematics, a converging lo¬ cation ; when the conditions of a problem are not sufficient to determine the absolute

position of a point, but restrict it to a certain line (or lines), this line is called the locus of the point. Thus, if the base and area of a triangle are given, the locus of the vertex is a straight line parallel to the base; or if the distance of a point from another point is in a given ratio to its distance from a given fixed line, the locus of the point is a conic section.

LOCUST. See Grasshoppers; Cicada.

LOCUST, a genus (Rohinia) of legumi¬ nous trees and shrubs. The species have odd- pinnate leaves ; pea-like flowers in drooping racemes, and pods containing several bean-like seeds. They are all useful for ornamental planting, and one species, R. psendacacia, is highly valued for its timber. This species, which is the best known, and is also called false acacia and black locust, is the largest of its genus, attaining heights exceeding 75 feet and girths greater than eight feet in the rich al¬ luvial soils of Tennessee and Kentucky. Its hard, tough, close-grained yellow wood is espe¬ cially useful for ship-building, fence-posts and other purposes in which great durability is re¬ quired. It is also employed for making cog¬ wheels, tree-nails, for the interior finish of houses, for furniture and other uses where a highly polished wood is needed. It is the favorite material for policemen's clubs, not only because of its weight and toughness, when well seasoned, but because of its unusual reso¬ nance, giving a ringing report when struck

upon the pavement as a signal which can be obtained from no other wood. In various parts of Europe great attention has been paid to the propagation of this tree, for ornament as well as for its useful properties, and its cultivation is further encouraged by the absence of the de¬ stroying insects mentioned below. It forms a pleasing object along the borders of many of the railways on the Continent, its spines adding to its usefulness as a hedge. When in bloom the large pendulous racemes of fragrant white flowers, contrasting with the light-green foliage, produce a fine effect and give this tree a rank among the most ornamental.

The chief objection to the tree is its liability to the attacks of insects, more than 40 species being known to feed upon its leaves and wood. The foliage destroyers, which include leaf-roll¬ ers, leaf-miners and several species that feed in exposed positions, are sometimes*

seriously destructive, the larvae of one species, a saw-fly (Nematis similaris), sometimes destroying all the green parts. But they are less destructive than the borers, which tunnel through and weaken the wood. Sometimes these are so numerous that the trees become mere shells of bark with a honeycomb of wood. The more important of them are the locust borer (Cyllene robinice), a black and yellow striped, long¬ horned beetle in the adult stage, which is com¬ mon in the eastern United States; and the larvae of a moth (Sciapteron robinice) , trouble¬ some in the Pacific Coast region. These and some others have discouraged the commercial planting of this valuable tree.

Other American "locust® trees are the two species of the genus Gleditsia of the senna family. These are the water or swamp locust (G . aquatica) of Florida, which has enormous spines and reddish flat oval pods; and the well- known and widely-planted honey locust or honey shucks (G . triacanthos) . This large, graceful but exceedingly thorny tree bears especially fragrant flowers, and its pods are gathered by country people in the South and eaten for the sake of the sweet pulp between the seeds. The great pods measure 10 to 20 inches long, are curved, and "in drying twist and retwist while they open, and skilfully scat¬ ter seeds in diverse directions.®

LOCUST BIRD. See Pastor.

LOCY, William Albert, American zoolo¬ gist: b. Troy, Mich., 14 Sept. 1857. In 1881 be was graduated at the University of Michi¬ gan, and subsequently studied at Harvard, Ber¬ lin and Chicago. In 1887-89 he was professor of biology, in 1889-96 of animal morphology at Lake Forest University, Illinois. Since 1896 he has been professor of zoology at Northwest University. In 1902-03 he was employed as in- vestigator at the Naples Zoological Station. He has written numerous scientific papers and monographs in technological journals; was editor in charge of zoological articles, and au¬ thor of several in cyclopedias and author of

LODDON, Australia, one of the most im¬ portant rivers of Victoria, rising on the north¬ ern slopes of the Dividing Range, in Talbot County, flowing northwest for 250 miles, and joining the Murray at Swan Hill. It drains a basin of 4,800 miles and is subject to floods. Good cod and bream abound in it.

LODE, a metalliferous deposit, usually having the character of an ore-producing vein ; or often a parallel system of closely spaced veins. See Veins.

LODESTAR, LOADSTAR, POLARIS, or GUIDING STAR, various names given to the polar star which is the last star in the tail of the Little Bear. It is a star of the second magnitude, located 1° 20′ from the North Pole.

LODEVE, lo'dev', France, town and capi¬ tal of an arrondissement in the department of Herault, on the Lergue, 36 miles west-north¬ west of Montpellier. It has many interesting remains, including its ancient walls, a fortified cathedral dating from the 10th century, an ancient monastery and a communal college. The principal industry is the manufacture of army woolens. Cloth, wine, brandy and wool are exported. Lodeve, the ancient Luteva, ex¬ isted before the Roman period. By the Romans it was known for a time as Forum Neronis. In the 4th century (323) it became a Christian city under Saint Flour, its first bishop, and remained an episcopal see down to the Revolution of 1789. The town fell suc¬ cessively to the Visigoths, Franks, Ostrogoths, the Arabs and Carolingians, became a count-ship in the 9th century and afterward became the domain of its bishops. It was sacked in 1573 during the religious wars. Pop. 6,300.

LODGE, Gonzalez, American classical scholar: b. Fort Littleton, Pa., 19 Dec. 1863. He was graduated from Johns Hopkins Uni¬ versity in 1883, and in 1886 was professor of Greek in Davidson College, N. C., 1886-88, and of Latin at Bryn Mawr College, 1889-1900. Since 1900 he has been professor of Greek and Latin at Teachers College, Columbia Univer¬ sity. He has published (Lexicon Plautinum> (1901-14), and with Gildersleeve, (Gilder- sleeve-Lodge Latin Grammar and Latin Com¬ position. y He has edited (The Gorgias of Plato (1890), and supervised the (Gilder- sleeve-Lodge Latin Series * (16 vols.). His*

*studies in the essential vocabulary of Latin, (The Vocabulary of High School Latin * (1907) have formed the basis of all recent high-school textbooks. He was joint-founder and editor of the Classical Weekly from 1907—*

1913.

LODGE, Henry Cabot, American states¬ man and historian : b. Boston, 12 May 1850. He was graduated at Harvard in 1871 and from the Law School there in 1874. From 1873 to 1876 he edited the North American Review. In the three years following he lec¬ tured on American history at Harvard and in 1879-81 edited the International Review. He was a member of the Massachusetts House of Representatives in 1880-81, member of Con¬ gress 1886-93 and

thereafter United States senator from Massachusetts, being re-elected in 1899, 1905, 1911 and 1917. He was perma¬ nent chairman of the Republican National Convention of 1900 at Philadelphia, chairman of the committee on resolutions of the Chicago Republican Convention of 1904 and permanent chairman of the Republican National Convention of 1908 at Chicago. He was a member of the Alaska Boundary Commission: was regent of the Smithsonian Institution, 1886-93, and again appointed regent in 1905. In politics he is a Re¬ publican of conservative tendency; was a

staunch supporter of the McKinley administra¬ tion during the war with Spain. He has fa¬ vored laws to safeguard the franchise and has advocated an educational test law for immi¬ grants. He is a member of the American Institute of Arts and Letters and many other societies and has received academic honors from several of the leading American universi¬ ties. His published works include (The Land Law of the Anglo-Saxons) (1877) ; 'Life and Letters of George Cabot (1881) ; 'Short His¬ tory of the English Colonies in America) (1882) ; 'Life of Alexander Hamilton) (1883) ; 'Life of Daniel Webster* (1885) ; editor 'Works of Alexander HamiIton) (9 vols., 1886) ; (Studies in History1* (1889); (Life of Washington* (2 vols., 1891) ; 'History of Bos¬ ton* (1892) ; (Historical and Political Essays* (1895) ; (Hero Tales from American History,* with Theodore Roosevelt (1897) ; 'Certain Ac¬ cepted Heroes* (1898); 'S'tory of the Revolu¬ tion* (2 vols., 1899) ; 'Story of 'the Spanish War, (A Fighting Frigate* (1906) ; (A Fron¬ tier Town and Other Essays* (1910) ; Speeches and Addresses 1884-1909* (1913) ; (Early Memories* (1915); (One Hundred Years of Peace* (1915) ; 'The Democracy of the Constitution and Other Essays* (1915).*

LODGE, Sir Oliver Joseph, English physicist: b. Penkhull, Staffordshire, 12 June 1851. He was educated at University College, London, became demonstrator in physics there in 1875, and professor of the same subject in 1877. He was professor of physics at Univer¬ sity College, Liverpool, 1881-1900, and in the latter year was appointed principal of the Uni¬ versity of Birmingham. He was Rumford Medallist of the Royal Society in 1898; Ro¬ manes lecturer at Oxford 1903 ; president of the Physical Society of London 1899-1900; president of the Society for Psychical Research 1901-04; and president of the British Associa¬ tion, 1913-14. He was knighted in 1902. He achieved eminence as a physicist in his

work in connection with electricity, including the theo¬ ries of contact electricity and electrolysis, the oscillatory discharge of Leyden jars, the pro¬ duction of eleotro-magnetic waves in air, ex¬ periments in the mitigation of fogs through electrical dispersion, and in the invention of the ((coherer** in wireless telegraphy. His work as an educational reformer has been overshadowed in the public mind by his atti¬ tude on the vexed question of religion and science, and by his views on psychical research and spiritualism. He has expounded the view that communication between the living and the dead may be attained unhampered. In this connection his latest book, 'Raymond; or Life and Death* (1916) has a pathetic interest. His son Raymond was killed in September 1915 in the Great War, and the book, records com¬ munications begun soon after his death, made in the ordinary spiritualist way at seances held in presence of Sir Oliver and his family. His works include 'Elementary Mechanics* (1877); ' Modern Views of Electricity* (1.889) ; light¬ ning Conductors and Lightning Guards* (1892); (Pioneers of Science* (1893); 'Mod- ern Views on Matter* (1903) ; 'Life and Mat¬ ter* (4th ed., 1907) ; (The Substance of Faith* (1907); (Man and the Universe* (5th ed., 1909) ; 'The Immortality of the Soul* (1908) ;

Child* (1910); 'Modern Problems* (1912); Continuity* (1914); 'Raymond, or Life and Death* (1915); 'Christopher* (1919).

LODGE, Thomas, English dramatist and poet: b. West Ham, near London, England, about 1556; d. London, September 1625. He entered at Lincoln's Inn, but seems to have 'led a wild and rollicking life, and in 1589-91 varied his life by taking part in two sea expeditions against the Spaniards, in the neighborhood of the Azores and Canary Islands. On the earlier of these he wrote the famous pastoral 'Rosa- lynde Euphyes's Golden Legacie* (1590), which supplied Shakespeare with the basis of 'As You Like It.* Lodge himself wrote two dramas, 'The Wounds of Civil War* (1594; reprinted in Hazlitt's Dodsley's 'Select Collec¬ tion of Old Plays,* Vol. VII), and (A Looking- glass for London and England* (1594), in col¬ laboration with Robert Greene. Consult Jus- serand, 'The English Novel in the Time of Shakespeare* (1890).

LODGING-HOUSES. Shelters for home¬ less people. The modern trend of workers to the cities has greatly increased the floating population and many people of this class are without means of purchasing adequate accom¬ modations. Many systems for caring for this homeless population have been tried with more or less success and in all large cities there are now rescue missions and lodging-houses where a bed or room for the night may be had for a

few cents. In New York conspicuous among • such institutions are the Mills hotels with pri¬ vate rooms, free baths, etc., for a charge of 20 to 40 cents. The larger cities of America, such as Boston, Chicago, New York, have in recent years established municipal lodging-houses where lodging and breakfast are given in re¬ turn for a few hours' labor, or free of all labor or compensation of any kind. There are strin¬ gent regulations, however, regarding the num¬ ber of times a homeless person may avail him¬ self of such accommodations. The Salvation Army and other charitable organizations also minister to the homeless. In Europe the mat¬ ter is similarly handled. Consult Riis, Jacob, 'The Children of the Poor* (New York 1902) ; Dawson, W. H., 'The German Workman* (London 1906) ; Robins, Raymond, 'What Constitutes a Municipal Lodging House* (New York 1904).

LODGINGS, furnished rooms or apart¬ ments let by the owner or sublet by a tenant in possession for occupancy for limited periods, usually by 'the week or month. An agreement to let furnished lodgings is an agreement to land under the Statute of Frauds, and, in the absence of part performance, cannot be en¬ forced, unless in writing signed by the de¬ fendant. In the letting of furnished apart¬ ments there is an implied warranty that the rooms are fit for occupation. Any person who lets lodgings without disinfecting them after infectious, disease, or gives a false answer to any question as to the existence of any infec¬ tious disease, is liable to fine or imprisonment. A lodging-house-keeper is not liable for the loss or destruction of the lodger's goods with¬ out the former's fault. The relation is not that of landlord and tenant, the lodger acquir¬ ing by his contract no right of property in the premises but only a license to use the same,

subject to the terms of agreement. The above provisions are the features of the New York code which in general is followed in other State jurisdictions. See Landlord and Tenant.

LODI, lo'de, Cal., city in San Joaquin County, situated on the Mokelunme, and on the Southern Pacific and Central California rail¬ roads, 35 miles south of Sacramento. It con¬ tains a city administration building, Carnegie library and a high school. It has extensive fruit-growing interests and has great packing sheds, fruit juice factories, etc. The city owns the water-supply system and the electric-light¬ ing system. Pop. (1920) 4,850.

LODI, Italy, a town in the province of Milan, Lombardy, on the Adda, 18 miles south¬ east of Milan. The principal buildings are the duomo or cathedral, a Gothic structure of the 12th century ; the octagonal church of the In- coronata, built in the 15th century; the town- house; the episcopal palace; the Barni and Merlini palaces. Majolica and delftware, re¬ fined wax, saltpeter and chemical products are manufactured. Stracchino and Parmesan cheese, which, though it takes its name from Parma, from which it was first exported, is almost wholly made in the district around Lodi, utilizing the milk of thousands of cows. The chief incident in Lodi's history is the entry by Napoleon after the famous passage of the bridge of Lodi effected against the Austrians, 10 May 1796. Four miles to the west are the famous ruins of an old Roman colony. Pop. of commune, 28,032.

LODI, N. J., borough in Bergen County, adjoining Passaic on the northeast, on the New York, Susquehanna and Western Railroad. It contains several silk and cotton mills, bleaching works, rubber works, etc. The borough owns the water-supply system. Pop. (1920) 8,175.

LODOMERIA, lo-do-me'ri-a, Poland, a former independent principality in Volhynia, after the division of Poland in 1772 constituting an integral part of Galicia (q.v.).

LODZ, lodz, Poland, the capital of a dis¬ trict in the government of Piotrkow, 76 miles southwest of Warsaw, and an important manu¬ facturing centre, the terminus of a branch line from the Warsaw and Vienna Railway. It has made considerable modern progress, owing to the flourishing condition of its cotton, woolen and other manufactures. Silk goods are also manufactured, and there are dyeworks, breweries, machine-works, etc. The Roman Catholic Poles number about 40 per cent, Ger¬ man Protestants 33 per cent and Jews 27 per cent of the population, which from 50,000 in 1872 had increased in 1912 to 450,000. Cap¬ tured by the Germans in the early days of the Great War which began in 1914, it was recap¬ tured by the Russians in 1916, and again fell into the hands of the Central Powers in 1917.

LOEB, leb, Jacques, German-American physiologist and biologist : b. Germany, 7 April 1859. He studied at Berlin, Munich and Strassburg, was assistant at both Wurzburg (1886-88) and Strassburg (1888-90), studied at the Naples zoological station, and in 1891-92 was associate professor of biology at Bryn Mawr College. In 1892 he became assistant professor of physiology and

experimental biol¬ ogy at the University of Chicago, and in 1895

associate professor. He was also professor of physiology at the Rush Medical College of Chi¬ cago from 1900. In 1902 he was appointed pro¬ fessor of physiology in the University of Cali¬ fornia. Since 1910 he has been a member of the Rockefeller Institute for Medical Research in New York. His experiments have been in different fields of physiology and biology, all trying to show that complicated life phenomena can be reduced to simple physico-chemical laws. In his earlier work he showed that com¬ plicated animal instincts are identical with those reactions of plants which are known as tropisms, and he and his collaborators have re¬ cently shown that the law of Bunsen and Ros- coe which controls the chemical effects of light also expresses the influence of light upon those animal instincts which fall under the name of heliotropism. His experiments on artificial parthenogenesis have furnished the proof that the fertilizing effect of the living spermatozoon can be replaced by simple solutions. Other ex¬ periments deal with the influence of salts upon life phenomena, with regeneration and hetero- morphosis, with effects of temperature, etc. He has published numerous papers in scientific journals and the following books: Der Helio- tropismus der Tiere und seine Ubereinstim- mung mit dem Heliotropismus der Pflanzen> (1890) ; (Untersuchungen zur physiologischen Morphologie der Tiere) (1891-92) ; Compara¬ tive Physiology of .the Brain and Comparative Psychology) (1900) ; (Studies in General Phys¬ iology J (1906) ; (Untersuchungen fiber kfinst- liche Parthenogenese) (1906) ; (The Dynamics of Living Matter (1906) ; (The Mechanistic Conception of Life) (1912) ; Artificial Par¬ thenogenesis and Fertilization (1913).*

LOEB, James, American banker and Hel¬ lenist : b. New York, N. Y., 6 Aug. 1867. He was graduated at Harvard University in 1888 and from that year until 1901 was a member of the banking firm of Kuhn, Loeb and Company, New York. He is a member of the English Society for the Promotion of Hellenic Studies; in 1911 he turned over his collection of Aretine pottery to the Fogg Museum at Harvard, and in the same year perfected plans for the publi¬ cation of a library of Greek and Latin authors — text and translation. The volumes, known as the Loeb Classical Library, began to appear in 1912 and were continued in the following years. Mr. Loeb has published translations of Paul Delcharme's (Euripides and the Spirit of His Dreams, and of Maurice Croiset's Aristophanes and the Political Parties at Athens. >*

LOEB, Leo, American pathologist : b. Ger¬ many, 21 Sept. 1869. He

received his education at the universities of Heidelberg, Berlin, Zfirich and Freiburg (1889-96) and in 1903 was research Fellow at McGill University, Montreal. In 1900-01 he was adjunct profes¬ sor of pathology at the University of Illinois; in 1902 experimental pathologist of the New York State Pathological Laboratory at Buffalo; in 1904-10 assistant professor of experimental pathology at the University of Pennsylvania; in 1910—15 director of the department of pa¬ thology of the Barnard Skin and Cancer Hospi¬ tal, Saint Louis, and since 1915 professor of comparative pathology at Washington Univer¬ sity. Professor Loeb is fellow or member of

many scientific societies and is a contributor, chiefly on tissue and tumor growth, physiology of generative organs, pathology of circulation, venom of Heloderma, etc., to professional journals.

LOEB, Louis, American artist : b. Cleve¬ land, Ohio, 1866; d. 1909. He completed his studies in art under Gerome in Paris, winning honorable mention at the Salon in 1895, and a third medal in 1897. As artist, illustrator and teacher he secured a notable place. As an il¬ lustrator of books and magazines he showed both strength and inventive ability. In 1903 his exhibition of oils at the new rooms of the Co-operative Society in New York aroused in¬ terest in his later work, which shows a steady progress in his artistic achievements. His best- known works are temple of the Winds) (1898), in the Metropolitan Museum, New York; (The Breeze> (1900); (The Dawn) (1903) ; (The Siren (1905) ; portrait of Elea¬ nor Robson (1905); (Miranda) (1906), in the Metropolitan Museum, New York; (The Sum¬ mit (1907) ; (Princess Zomona* (1908). He was. awarded two silver medals at the Saint Louis Exposition 1904.*

LOEB CLASSICAL LIBRARY. See

Loeb, James.

LOEFFLER, lef'ler, Charles Martin Tor- nov, American musician and composer : b. Miihlhausen, Alsace, 30 Jan. 1861. He was educated in Switzerland, Germany and France, came to America in 1881 and for over 20 years was violinist with the Boston Symphony Or¬ chestra. Since 1909 he has been director of the Boston Opera Company. His compositions are remarkable for »their technique although lack¬ ing in originality. They include (Les veillees de

l'Ukraine, suite for orchestra and violin (1891); (Fantastic Concerto * (1894); diverti¬ mento in A minor, > for violin and orchestra (1895) ; the symphonic poem, (The Death of Fintagiles,* for orchestra and viola d'amore (1897); divertissement Espagnol,* for or¬ chestra and saxophone (1901) ; da bonne chanson,* a symphonic poem; da Villanelle du diable,* symphonic poem; quartet in A minor, chamber music; deux RapsodiesP for oboe, viola and piano (1901) ; (By the Waters of BabylonP Psalm 137, for female chorus (1902) ; dor One Who Fell in BattleP chorus for eight parts . (1906) ; (Pagan PoemP for orchestra and piano, also many songs, tran¬ scriptions, etc.*

LOEFFLER, Friedrich, German bacteri¬ ologist: b. Frankfort-on-the-Oder, 1852; d. 1915. He was educated at Wurzburg and Ber¬ lin, in 1879 was made assistant in the Imperial Health Office and in 1884 staff physician at the Friedrich Wilhelm Institute, Berlin. Four years later he was appointed to a cha'ir at the University of Greifswald. Loeffler rendered important and lasting services to bacteriology by his original methods of staining, by the dis¬ covery of the bacillus of glanders in 1882, and by the discovery of the bacillus of diphtheria. He also investigated the foot-and-mouth dis¬ ease. In 1887 Professor Loeffler founded the Zentralblatt filr Bakteriologie und Parasitik. To it he contributed several articles on profes¬ sional topics, also articles on malaria in Leyden and Klemperer (Deutsche Klinik) (1903). He

published (Vorlesungen fiber die geschichtliche Entwicklung der Lehre von den Bakterien) (1887) and (Die Schutzimpfung gegen die Maul und Klauensenche) (1903).

LOESS, les or loes, a loamy deposit of Pleistocene Age, abundantly developed in the valleys of the Rhine, the Danube, the Rhone and many of their tributaries. It is a pulveru¬ lent yellowish-gray or brownish loam, homo¬ geneous and non-plastic, and consists principally of clay with small angular grains of quartz, and extremely minute scales of mica, together with a larger or smaller admixture of carbonate of lime and some iron oxide. It has a tendency to cleave in vertical planes, and thus forms cliffs where streams intersect it. The organic re¬ mains of the loess consist principally of land- shells of existing species, but now and again fresh-water shells are met with. Occasionally, also, the remains of man and the Pleistocene mammals are encountered. The deposit varies from a small thickness up to nearly 300 feet, and occurs at greatly differing levels, so that more than one agency would seem to have been active in its formation. Escaping flood- waters from

glaciers are believed to have made some of the deposit; some of it may have been the result of weathering and rain-washings. The European loess is undoubtedly associated with the glacial deposits of the Continent, and in North America the same relationship ob¬ tains. Many geologists of the United States Geological Survey maintain that the accumula¬ tions which cover enormous areas in the great basin traversed by the Mississippi and its affluents are essentially fluviatile. Richthofen believes the Chinese accumulation, the largest in the world, to have been ofZEolian origin, and this theory of wind-blown material has also been advanced with respect to deposits in the United States. There is no unanimity of opinion as to its origin, but loess is probably in part fluviatile and in part wind-blown. Consult Sixth Annual Report of the United States Geological Survey (1888) ; Chamberlin and Sal¬ isbury, (The Driftless Area of the Upper Mississippi Valley) ; McGee, (The Pleistocene History of Northeastern Iowa, in the United States Geological Survey, Eleventh Annual Re¬ port (1891); Geikie, (Prehistoric Europe)*

(1881).

LOEWE, le've, Wilhelm (also called Loewe- Kalbe), German politician: b. Olven- stedt, near Magdeburg 1814; d. 1886. He was educated at Halle, and adopted the medical pro¬ fession. Elected in 1848 to the Frankfort Parliament, he acted with the extreme party of democracy; became first vice-president of the Parliament; and later, at Stuttgart, was its president. Charged with sedition in this, which was considered a revolutionary procedure, and once acquitted, he was nevertheless sentenced to life imprisonment for contumacy. After some years in Switzerland, France and Eng¬ land, he came to this country, and for eight years, practised medicine in New York. Avail¬ ing himself of the amnesty in 1861, he returned to Germany, and in 1863 was elected to the Prussian House of Deputies. Four years later he was a Progressist .member of the North German Reichstag. Disagreeing with his party in 1874 on the military law, he attempted to form a new Liberal party. He favored the

policy of high protection adopted in 1879. In the elections of 1881 he lost his seat.

LOEWY, le-ve', Maurice, French astrono¬ mer : b. Vienna, 1833 ; d. Paris, 16 Oct. 1907. He was given a position in the observatory at

Paris by Leverrier, and after the latter's death assisted Mouchez in the observatory of Montsouris, becoming director in 1896. He was noted for his invention of the equatorial-coude , or Elbow-equatorial, in which the observer re¬ mains seated at the tipper end of the polar axis of the telescope, as if working with a microscope on a table, with the means of di¬ recting his view to any part of the heavens under his control. He also devised improved methods of determining the constants of as¬ tronomical refraction and aberration. He was joint author (with Puiseux) of (Atlas photo¬ graphic de la lune) in six volumes (1896-1908).

LOFFTZ, leftz, Ludwig, German painter: b. Darmstadt, 1845 ; d. 1910. He studied at Nuremberg under Kreling and Raupp and at Munich under Diez. In 1879 he became pro¬ fessor at the Academy of Munich, and from 1891 to 1899 was director of this institution. His best-known paintings are (Cardinal Playing the Organ (1876; exhibited in New York 1909); portrait of Liszt; (Avarice and Love) (1879, owned by W. H. Vanderbilt, New York) ; Arasmus,* in the Stuttgart Museum; (Pieta,) and (Eurydice) (1898), both in the New Pinakothek, Munich, Assumption of the Vir¬ gin* (1889), in Freising Cathedral. In his later years he painted several landscapes, but his greatest success lay in his work as a teacher.*

LOFOTEN, lo-fd'ten, or LOFODDEN,

Norway, a group of islands off the northwest coast, stretching southwest to northeast about 175 miles and including the Vesteraaelen islands to the north. The largest are Andoen, Langoen, Hindoen (the largest 860 square miles), East and West Vaagen and Flagstadoe. They have bold, precipitous, rugged and deeply indented coasts, the channels between which are deep, narrow and tortuous, and an elevated, sterile interior, several containing mountains which, though not lofty, are covered with per¬ petual snow. The highest peak is Higrafstind (3,811 feet). Immense shoals of cod and herring frequent their shores, and extensive and valuable fisheries are carried on. The princi¬ pal cod-fishery beginning January-February ends in April, but the herring-fishery continues, and furnishes an important branch of national revenue. In ordinary years about 4,000 boats, each manned by five hands, are employed. The celebrated whirlpool, the Maelstrom, is situated at the southwest extremity of these islands. Permanent population of group, about 40,000.

LOFTIE, William John, Irish- Anglican clergyman, writer on antiquities: b. Tandragee, County Armagh, 25 July 1839; d. 16 June 1911. He was educated at Trinity College, EHiblin, and after holding

church appointments joined the staff of the Saturday Revieiv, and in 1894 that of the National Observer. As a writer on antiquarian subjects he combined learning and picturesque statement. He pub¬ lished (Round About London> (1877; 4th ed., 1880);

VOI-. 17 — 38

(1886); (London* (1887); (Windsor* (1887);

(Westminster Abbey) (1890) ; (The Cathedral Churches of England) (1892); Hnigo Jones and Wren* (1893) ; Hnns of Court and Chan- cery) (1894); (London Afternoons) (1901); (Coronation Book of Edward VIP ; 'Colour of London) (1907).

LOFTUS, Lord Augustus William Fred¬ erick Spencer, English diplomatist: b. 4 Oct. 1817; d. 9 March 1904. He entered the diplo¬ matic service in 1837 as attache at Berlin and was likewise attache at Stuttgart in 1844. He was secretary to Stratford Canning in 1848, and after serving as secretary of legation at Stuttgart (1852), and Berlin (1853), was en¬ voy at Vienna (1858), Berlin (1860) and Munich (1862) ; became Ambassador at Berlin 1865, to the North German Confederation (1868-71) and to Saint Petersburg (1871-79). He was governor of New South Wales (1879- 85). He published his Reminiscences (1892-

94).

LOG, in nautical parlance, an apparatus used to measure the rate of a ship's velocity through the water. For this purpose there are several inventions, but the one most generally used is the following, called the common log. It is a piece of thin board, forming the quad¬ rant of a circle of about six inches radius, and balanced by a small plate of lead, nailed on the circular part, so as to float vertically in the water, with the greater part immersed. The log-line is fastened to the log by means of three leads, two being knotted, through holes at one corner and the top while the other is attached to a pin fixed in a hole at the other corner, so as to draw out when a considerable force is exerted on it. The log-line is divided by means of knots of colored cloth into equal lengths, which are in the same proportion to an equal number of geographical or nautical miles, as a half or quarter minute is to an hour of time. It is wound upon a reel. The whole is employed to measure the ship's head-way in the following manner: — The reel being held by one man, and the half-minute glass by another, the mate of the watch fixes the pin and throws the log over the stern, which floating vertically offers immediate resistance

through its area set at right angles to the direction of the ship, and is considered as stationary, the line being allowed to run freely over the stern to prevent the pin being pulled out. The knots are measured from a mark on the line at the distance of 12 or 15 fathoms from the log. The part of the line between the log and this mark is called the stray-line. The glass is turned at the instant that the mark passes over the stern, and as soon as the sand in the glass is run out the line is stopped. The resistance of the water then acting on the log dislodges the pin, so that the board, now presenting only its edge to the water, is easily drawn aboard. The number of knots which had run off at the expiration of the glass determines the ship's velocity. Two types of sand-glasses are in common use among mariners, one emptying in 30 seconds, and the other in 28 seconds. In the first instance, in laying out the knots in a log line the proportion would read :

i hour (3,690 sec.): 30: : 1 mile (6,080 feet): I knot.

making the length of the "knot** — that is, the length between two knots on the line — 50 feet

7 inches. Where the 28-second sand glass is used the "knot® is 47 feet 3 inches in length. Where the speed of the vessel is greater than six knots that is, six nautical miles per hour — the line would run out an inconvenient distance in 28 or 30 seconds, so in faster ships a 14- second or 15-second glass is used, and the num¬ ber of knots passing in that period multiplied by two to give the speed per hour.

The patent log or taffrail log is an alto¬ gether different instrument for the same pur¬ pose. Instead of a long line running out freely, the patent log has a fixed length of line, about three fathoms for each knot of the ship's average speed, and is dragged after the ship. The drag is an arrangement similar to a screw, having a central shank, and fins running lengthwise around it in helical form. When it is dragged through the water the fins cause it to rotate, and the faster it is dragged the faster it rotates. The entire log line turns with it and the number of turns is recorded by mechanism fastened to the taffrail of the vessel, and is shown on a dial.

LOG-BOOK, a book in which are offici- cially recorded the proceedings on board a ship, supplied in England by the Board of

Trade. In it the contents of the log-board are daily tran¬ scribed at noon, together with every circum¬ stance deserving notice that may happen to the ship or within her cognizance, either at sea or in a harbor, etc. In addition to the weather, speed, astronomical observations, etc., the en¬ tries required to be made include convictions, offenses, punishments, conduct of crew, illnesses and injuries, deaths, births and marriages, quit¬ ting the ship, wages of men entering the navy, wages of deceased seamen, sale of deceased sea¬ men's effects, collisions — in short, every con¬ dition, occurrence and transaction which comes under official notice. The log-book must be signed by master and mate, and certain other persons in particular cases. Properly authenti¬ cated entries are admissible in a court of law. A log is also kept by the master for the bene¬ fit of the owners. On steamships the chief engineer is also responsible for the keeping of a log in which are recorded all details con¬ nected with his department while the ship is at sea.

LOG CABIN AND HARD CIDER, a

term used in American politics in the campaign of 1840. The Whig candidate for President, William Henry Harrison, was a military man of plain manners. One of the Democratic papers, scoffing at the Whigs for taking a can¬ didate not of the first calibre, advised that Harrison be given a log cabin and a barrel of hard cider, and he would stay contentedly in Ohio. This was taken up by the Whigs, and really helped to make their candidate popular with the masses. Log cabins were erected in great numbers in the cities, and were carried in processions, accompanied with barrels of hard cider.

LOG-CABIN HARRISON. See Log

Cabin and Hard Cider.

LOG PERCH, a fish of the darter group, and its largest member. It is locally known as hogfish, hog molly, rockfish, etc., and is easily distinguished by its zebra stripes. It attains a length of eight inches and frequents clear cold streams. Consult Jordan and Copeland,

(Johnny Darters > (in American Naturalist, Vol. X, Salem 1876).

LOG-ROLLING, in American politics, a

term used for manceuvers of politicians, by which they seek to secure co-operation in carry¬ ing favorite measures through legislatures and other bodies. Generally log-rolling is employed by individuals who approach others in support of personal schemes and interests. The

word was formerly very popular in the United States, but has become almost obsolete, being sup¬ planted by the term "button-holing.®

LOGAN, lo'gan, English name of the American Indian chief Tah-gah-jute : b. about 1725; d. 1780. He was the son of Shikellamy, a celebrated chief of the Cayugas, who lived at Shamokin on the Susquehanna, and was called Logan from James Logan, the secretary of Pennsylvania and a firm friend of the Indians. In his early manhood he was known throughout the frontier of Virginia and Penn¬ sylvania for his fine personal appearance, en¬ gaging qualities and his friendship for the whites. About 1770 he removed with his family to the banks of the Ohio, where he gave way in a measure to intemperance. In the spring of 1774 his family were massacred, it was alleged, by a party of whites led by Captain Cresap, under the pretext of retaliation for Indian murders ; but it is exceedingly doubtful whether Cresap had any connection with the transaction. Logan at once instigated a war against the scattered settlers of the Far West, and for several months fearful barbarities were perpetrated upon men, women and children. He disdained to appear among the chiefs who subsequently sued for peace, but sent by an interpreter to Lord Dunmore, the governor of Virginia, the noted speech explaining his con¬ duct, which was first published in Jefferson's (Notes on Virginia. } Its authenticity is open to much doubt, however. While intoxicated he attacked a party of friendly Indians and was killed by his relative Tod-hah-dohs in self- defense.

LOGAN, Benjamin, American pioneer: b.

Augusta County, Va., about 1752; d. Shelby Countv, Ky., 11 Dec. 1802. He early crossed the Alleghanies and became a settler in Ken¬ tucky. He was an associate of Simon Kenton and Daniel Boone in the Indian fighting then constantly in progress on the frontier. During the Revolutionary War he was also active in the contests between the colonial frontiersmen and the British and their Indian allies. In 1776 he built one mile east of Stanford, Ky., on the site now called Saint Asaph's Spring, the stockade known as "Logan's fort.® When this fort had for weeks in 1777 been besieged by Indians, Locan made his way through the enemy's lines and traveled 150 miles to Holston where he obtained supplies and reinforcements. He participated as second in command in Col. John Bowman's expedition against the Shaw- nees at Chillicothe, and led the force sent against the Indians under Simon Girty. His advance guard, through over-haste, was de¬ feated at Blue Licks, and Logan himself did not reach the scene of battle until the succeed¬ ing day. In 1788 he commanded a force of 600 against the northwestern Indians. He was for many years a

member of the Kentucky legislature; and sat also in the State constitu-

tional conventions of 1792 and 1799. His prowess was celebrated on the frontier.

LOGAN, George, American statesman and philanthropist; grandson of James Logan (q.v.) : b. Stenton, now a part of Philadelphia, 9 Sept. 1753; d. there, 9 April 1821. He was educated in England, subsequently studied medicine in Edinburgh, where he took the de¬ gree of M.D., and afterward returned in 1779 to America. For many years he devoted him¬ self to agricultural pursuits, which he was one of 'the first in America to prosecute successfully in a scientific manner. He also served several terms in the Pennsylvania legislature. At the outbreak of the French Revolution he embraced with enthusiasm its democratic doctrines, and joined Jefferson and the Republican party in opposition to the Federalists. In 1798, the United States being then on the brink of a rupture with the French republic, he departed for France, under the idea that he might con¬ tribute to 'the preservation of peace. He was well received by Talleyrand and Merlin, then chief of the Directory, and returned to Amer¬ ica with the assurance of the desire of the French government to renew amicable relations with .the United States. But as he had taken with him letters of introduction from Jefferson and Governor McKean instead of passports from the State Department, he was denounced by the Federalists on his return as the treason¬ able envoy of a faction who had undertaken to institute a correspondence with a foreign and hostile power. He was coldly received by Washington and President Adams, and in the latter part of 1798 an act, known as the (

LOGAN, James, American colonial states¬ man and author: b. Lurgan, Ireland, 20. Oct. 1674; d. Stenton, near Philadelphia, Pa., 31 Oct. 1751. By his own efforts he acquired a knowledge of the chief ancient and modern languages, and in 1699, being then established in trade in Bristol, England, accepted an invi¬ tation from William Penn to accompany him to America in the capacity of secretary. In 1701, upon the return of Penn to England, he was appointed provincial' secretary, and subse¬ quently filled the offices of commissioner of property, chief justice and president of the council, discharging in the last capacity the duties of governor of the

province for two years after the demise of Governor Gordon in 1736. The latter years of his life were passed at his country-seat called Stenton, in the pur¬ suit of literature and science. His chief work, (Experimenta et Meletemata de Plantarum Generatione) (Leyden 1739; London, trans¬ lated from the Latin by Fothergill, 1747), an expansion of a paper on the growth of maize published in the Philosophical Transactions> for 1735, was considered an important contribu¬

tion to the science of botany. He wTas the au¬ thor of two other Latin treatises of a scientific character published in Holland, of an English translation of Cicero's (De Senectute, pub¬ lished in 1744 by Benjamin Franklin, and of Cato's (Distichs,* the latter in verse; and he left a variety of papers on ethics and philology. The translation of Cicero was the first original one of a classical author printed in America. His library, numbering about 2,000 volumes, was, in conformity with his desire, presented to the city of Philadelphia, and is deposited in a separate department of the Philadelphia library under the name of the Loganian library. He was one of the founders of the University of Pennsylvania. He was a member of the Soci¬ ety of Friends.*

LOGAN, John, Scottish poet and Presby¬ terian clergyman : b. Soutra, Midlothian, Scot¬ land, 1748; d. London, 25 Dec. 1788. In 1773 he was licensed as a preacher, was in the same year ordained to the second charge of South Leith, and because of his eloquence and fervor in the pulpit soon became popular. In 1783 his tragedy of (Runnamede) was acted at the Edin¬ burgh Theatre. His association with the stage gave offense to his flock, and owing to this, and to intemperate habits which he had inher¬ ited from his father, he was in 1786 constrained to leave the ministry and going to London there engaged in literary work. His name is now best known in connection with that of Michael Bruce and the controverted authorship of the (Ode to the Cuckoo.) That Logan is entitled to a place among the minor poets of Scotland is sufficiently attested by his exquisite lyrics, (The Braes of Yarrow. Consult Ander¬ son, R., (British Poets) (vol. xi, 1795) ; and separate edition (1805).*

LOGAN, John Alexander, American sol¬ dier and politician: b. Jackson County, Ill., 9 Feb. 1826; d. Washington, D. C., 26 Dec. 1886. He studied at Shiloh College, volunteered as a private in the Mexican War, became a lieuten¬ ant in the First Illinois Infantry, after the war studied law, was graduated from Louisville University in 1851, was admitted to the bar, and was elected to the Illinois legislature in 1852 and 1856. In 1858 he was elected a repre¬

sentative in Congress as a Douglas Democrat, in 1860 was re-elected, but resigned his seat in 1861, and on 13 September was appointed colonel of the 31st Illinois Infantry. He led this regi¬ ment in the attacks on Fort Henry and Fort Donelson, and was wounded at the latter. On 5 March 1862, he was made a brigadier-general of volunteers, and after .commanding the 3d division of McPherson's corps (the 17th) in the northern Mississippi campaign, became major-general on 26 Nov. 1862. He fought at Port Gibson, Raymond, Jackson and Champion Hill, commanded the centre at Vicksburg and was appointed military governor of the town upon its capture. In November 1863 he was made commander of the Fifteenth corps, which he led until the fall of Atlanta, save for a short period when in command of the Army of the Tennessee. He then returned to take part in the Lincoln presidential campaign, but rejoined his corps, continued with it till Johnston's sur¬ render, 26 April 1865, and afterward for a time commanded the Army of the Tennessee. In 1866-69 he sat in the 40th and 41st congresses

as a Republican. He was one of the managers of the impeachment proceedings against Presi¬ dent Andrew Johnson. He was also re-elected to the 42d Congress, but before taking his seat was chosen by the Illinois legislature to the Senate, where he served from 1871 to 1877. He began legal practice in Chicago, but on 18 March 1879 again entered the Senate. While in Congress he distinguished himself by his elo¬ quence. He was consistently opposed to the restoration of Fitz-John Porter to the army, and in June 1880 made a four days' speech on the Porter bill. At the Republican National Convention in Chicago in June 1884, he was a candidate for nomination to the Presidency, and after Blaine's nomination was nominated Vice-President by acclamation. Shortly after the defeat of this ticket, Logan was again chosen Republican senator from Illinois. Blaine said of him : "While there have been more illustrious military leaders in the United States and more illustrious leaders in legisla¬ tive halls, there has, I think, been no man in this country who has combined the two careers in so eminent a degree as General Logan.}) Major-General Logan published a volume on the Civil War entitled 'The Great Conspiracy: Its Origin and History) (1886) and 'The Vol¬ unteer Soldier of America) (1888). Consult Andrews, G. F. Byron, 'Biography of General John A. Logan, with an Account of his Public Services in Peace and in War> (New York 1884), and Dawson, (Life and Services of General John A. Logan) (Chicago 1887).

LOGAN, Olive, American actress, lec¬ turer and author: b. Elmira, N. Y., 16 April 1839; d. Bunstead, England, 27 April 1909. She was educated in Paris and London and fitted for a stage career, which began in Philadelphia in 1854. She appeared at Wallack's Theatre, New York, in 1864, in her own play, 'Eveleen, retired from the stage in 1868 and became a lecturer on social topics and a contributor to various periodicals. She published 'Chateau Frissac) (1865) ; (Photographs of Paris Life) (1861); 'Women and Theatres* ; and 'Before the Footlights and Behind the Scenes : a Book about the Show Business) (1870) ; a metrical translation of Coppee's 'Le Passant* and a dramatization of Collin's (Armadale. *

LOGAN, Stephen Trigg, American ju¬ rist: b. in Franklin County, Ky., in 1800; d. 1880. After studying law and for a while prac¬ tising in Kentucky he removed (1832) to Springfield, Ill., and there continued in the work of his profession. He became a circuit judge in 1835; was three times (1842, 1844, 1846) elected to the Illinois legislature; and was associated as law partner with Abraham Lincoln, from 1841 to 1844. He was one of those who in 1847 framed the new constitution of Illinois; was again elected to the legislature in 1854; joined the Republican party at its for¬ mation, and was a delegate to its national con¬ vention in Chicago in 1860, at which Lincoln was nominated. In 1861 he attended the Peace Conference at Washington and then retired from public life. He was regarded as the lead¬ ing member of the Illinois bar.

LOGAN, Sir William Edmond, Canadian

geologist: b. Montreal, 20 April 1798; d. Castle Malgwin, Cardiganshire, Wales, 22 June 1875.

He was educated chiefly in Edinburgh ; was for a time a clerk in London, and afterward be¬ came manager of a copper-smelting works in Swansea. While there he devoted himself to the study of geology. In 1840 he went to Can¬ ada, and he was the chief of the Geological Survey of that country 1842-70. His writings appeared in the annual reports of the Canadian Survey; in the Proceedings of the British Association, the Geological Society, etc. He published 'Geology of Canada) (1863).

LOGAN, Ohio, village, county-seat of Hocking County, on the Hocking River, and on the Hocking Valley Railroad, about 45 miles southeast of Columbus. It is situated in the natural gas and oil belt, and in the vicinity of some good farm lands. Nearby is found clay suitable for pottery and bricks. Its chief man¬ ufactures are flour,

furniture, brick for pav¬ ing and building, pottery, foundry products, sewer pipe, shoes and machinery. The village owns and operates the waterworks. The pub¬ lic library has nearly 3,000 volumes. Note¬ worthy features are the Cherrington Hospital, Rock House, Rock Bridge and Ash Cave. The village is named after John Logan, the famous Cayuga chief. It was first settled in 1802. Pop. (1920) 5,493.

LOGAN, Utah, city, county-seat of Cache County, on Logan River, and on the Oregon Short Line Railroad and Ogden, Logan and Idaho Interurban Railroad, about 70 miles north of Salt Lake City, by rail, 105 miles. It was settled in 1859 and incorporated in 1866. It is located in an agricultural region with valuable mineral deposits in the vicinity and is sur¬ rounded by 30 towns of Cache Valley. The chief industrial establishments are sugar fac¬ tory, condensed milk factory, knitting mills, flour mills and lumber mills. Some of the educational institutions are the Utah Agricul¬ tural College, the Brigham Young College, opened in 1878 under the auspices of the Latter Day Saints, New Jersey Academy, under the auspices of the Presbyterians. The water¬ works and electric-light plant are owned and operated by the city. The city government is conducted on the commission plan. Pop.

(1920) 9,439.

LOGAN, Mount, the second highest peak in North America, Mount McKinley (q.v.) being first, in the southwestern part of Yukon Territory, 'Canada. Its height is 19,500 feet. It was long considered the highest peak in the continent, but in 1898 the United States Geo¬ logical Survey found that it was exceeded by Mount McKinley.

LOGANBERRY, a 'fruit related to the raspberry and blackberry. It was originated in 1881 by Judge J. H. Logan of Santa Cruz, Cal., and is believed to be the result of a cross between a wild blackberry (Rubus vitifolius) of California and a red raspberry, probably the Red Antwerp. The fruit is pur¬ plish red and very large, and is similar in form to the blackberry, while its flavor is in¬ termediate between those of the parents. Loganberries are cultivated extensively from British Columbia to southern California. They are used fresh as a dessert fruit, and in addi¬ tion are canned and dried in large quantities. The juice has become a popular beverage.

LOGANIACEiE, a natural order of corol- Idloral exogens, consisting of trees, shrubs and herbaceous plants, with opposite entire leaves, and usually with stipules, which adhere to the footstalks to form sheaths. It includes about 30 genera and 400 species and is common in the tropics and in the warmer regions of the temperate zones. The calyx is 4—5 partite ; the corolla hypogenous, regular or irregular, 4-5 or 10-cleft. The stamens arise from the corolla. The ovary is generally two-celled; there is one style. The fruit is a capsule, a drupe or a berry. No natural order of plants is more strongly characterized by poisonous properties, especially by strychnine. It includes the strychnos, from which is ob¬ tained nux vomica and the woorali poison.

LOGANSPORT, Ind., city, county-seat of Cass County, locally known as the ((City of Bridges, }) 77 miles north by west of Indian¬ apolis, where the Eel River flows into the Wabash. The city is an important railroad centre, being entered by the 'Chicago, Rich¬ mond, Bradford and Effner divisions of the Pittsburgh, Cincinnati, Chicago and Saint Louis Railroad; the Michigan division of the Van- dalia, and its 94-mile branch northeast of But¬ ler, and by the Wabash. It is also the west¬ ern terminal of the interurban line operated by the Fort Wayne and Wabash Valley Trac¬ tion Company apd the northern terminal of the line operated by the Indiana Union Trac¬ tion Company. The business of the city is de¬ rived largely from its railroad shops, from its manufactories and from the surrounding agri¬ cultural region, and the chief products being wheat, corn, oats and small fruits. There are manufactories of automobiles, radiators, lum¬ ber, carriages, plows, flour, baskets, lime, brooms, window shades, soaps and foundry products. Kenneth quarries, two miles west of the city limits on the north bank of the Wabash, furnish large quantities of crushed limestone. The city has several churches. Its educational facilities are embraced in the Logansport Business College, Holy Angels' Academy (R. C.), a high school, the building being of Lake Superior red sandstone, and ward schools, in addition to the Catholic and Lutheran parish schools. The most important public institution is the Northern Indiana Hos¬ pital for the Insane, popularly known as (CLong- cliffU comprising over 34 buildings, and several hundred acres of land. Saint Joseph's Hos¬ pital (R. C.), the Llome for the Friendless, the Orphans' Home, the Carnegie library, the Fed¬ eral building, completed in 1905 and costing $75,000, and the Masonic Temple, are among the more prominent institutions. The city also has about 15 acres of parks. The soldiers' monument in Mount Hope Cemetery, costing $10,000, was dedicated 14 July 1887. Logans¬ port was named after Captain Logan, a Shaw¬ nee

chief, killed by the Indians in November 1812, near the Maumee River, and was first written Logan's Port. The first permanent settlement was made in August 1826 by Alex¬ ander Chamberlain, who erected a log cabin on the south bank of the Wabash, directly op¬ posite the mouth of the Eel River. It was in¬ corporated as a town 5 Sept. 1831 ; as a city, 3 April 1838. Its elective officers consist of a mayor, judge, clerk and treasurer, each for four years, ineligible for two consecutive

terms; and seven councilmen, one from each of the five wards, and two at large. The business of the city is largely delegated to its board of public, works, which consists of three members, appointed by the mayor, and not more than two of which can belong to the same political party. The police commissioners are appointed by the governor. The city also •owns and operates its own electric light and water plant. Pop. (1920) 21,626.

LOGACEDIC, (log'a-e'dik), VERSE. The

derivation of the adjective, logaoedic, from Gr. Aoyof (pr. logos = speech, discourse, prose) and aod?/ (pr. a-oi-de = song) , the combination giving the sense of prose-song, prose-poetry, shows sufficiently the basic mean¬ ing of the phrase. In other words, logaoedic verse is so called because, to some extent at least, its rhythmic effect is supposed to re¬ semble that of prose. Logaoedic verse, as used in Greek and Latin prosody, may be defined as a rhythm, in three-eighths time, based on the trochee (— o>), but admitt ng with considerable freedom the use of other feet instead of the trochee. The substitute feet thus generally used are the cyclic dactyl (kj), that is, a dactyl in three-eighths instead of four-eighths time; the irrational trochee (— >), which gets its name from the fact that its parts are not, or at least seem not to be, related to each other in the regular ratio of two to one ; the triseme (l_) ; the tribrach (o o> o) ; and occasion¬ ally, but only in the first foot, or base, of the line, the iambus —), the pyrrhic (v> s^), or*

the anapaest —). Anacrusis, that is, a

short or unaccented initial syllable, occasion¬ ally occurs; double anacrusis not so frequently. Throughout this article the sign A indicates a pause or rest.

The principal logaoedic forms are :

I, Dipody (two feet) ; II, Tripody (three feet) ; III, Tetrapody (four

feet) ; and IV, Composite: (a) Pentapody (five feet) and (b) verse containing more than five feet.

Examples are :

I. Dipody.

1. Adonic ~

ovdev er ocior

JL O'

IKEl

aura

(This may also be scanned | l | O A)

II. Tripody.

Pherecratics. These are known as First or Second Pherecratic according as the cyclic dactyl is the first or second foot.

2. (a) First Pherecratic (acatalectic) or Aristophanic :

o

oc xaP'L temperat

u. o

TUV fJLEV

ora

OˆEL

frenis

This may also be scanned: vo | – u |

li | ˆ A

(b) First Pherecratic catalectic (not known in Latin, except in composite verse) :

A; o'

ipevdeoi

-r. o'

ˆ rood

Xoig

3. (a) Second Pherecratic (acatalectic)

eras do

~~\j o

rat T'sni naberis

luadQ

haedo

598

LOGARITHMIC SPIRAL

This may also be scanned -a > | -\j |

LA | _'A, that is, as a syncopated tetrapody

catalectic.

(b) Second Pherecratic catalectic (not known in Latin, except in composite verse) :

Vˆ/

Ka'nrep

At

axvvfie

O A

vog

III. Tetrapody.

Gly conics. These are called First, Second, or Third, according to the

position of the cyclic dactyl.

4. First Gly conic (not known in Latin) :

r

£jU/3o

5. Second Gly conic:

KCU

j

Kvav

-Z. >

7T 6VT0V

Sic te

X,eipepl

divapo

\oi do

Cl) vo

tens Cy

A

ai

~Z- A

TO)

pri

-z. o

< pG)Td

fbavra

:

>

— Vj

to :

d'ivdev

appeg

d'av to

sn ;

vae la

boran

tes ge

6. Third Gly conic (not known in Latin, ex¬ cept in composite verse) :

A^, y -c A

7r avoay'i a

7. Nine-syllable Alcaic (with anacrusis) :

pecaov luque

8. Lesser Alcaic (decasyllabic) :

. ' >

Ova dev cuto

IV. Composite: (a) Pentapody.

9. Lesser Sapphic (two trochaic dipodies, separated by a cyclic dactyl) :

f VlTCl

dirae

10. Greater Alcaic (hendecasyllabic ; begins with anacrusis) :

O A

7TEV

mul

A_ > y

y

JL ^

olvov EV

EUiape

voig pE

flumina

constite

rint a

b

VC

“TV ˆ

—

irouu

7i6dpov

adavaF

’A

iam sa

tis ter

ris nivis

atque

— >

~Z- y

XPP na

KOLGl

dvpov £

7 TLTpk

mitte

divis

cetera

qui si

per

11. Phalcecean (hendecasyllabic) :

y >

Aj w

-Z. V

•Z-

tv pvp

rov n?iadi

TO ft

(f>og (po

cui do

no lepi

dum no

vum li

pijao) bellum

Composite: (b) more than five feet:

12. Greater Sapphic (third Glyconic and first Pherecratic) :

~Z-

fili

ˆ > um di

—\j ˆ

cunt Theti

LA

dis

sub lacri

-Z.KJ

mosa

or: u I — >

-\j

z < Troiae jz w I

I ˆ A

13. Lesser Asclepiadic (second and first Pherecratic catalectic) :

r >■

✓

LA

—

& A

phdeg

kli 7TEpa

T0)V

ycig eXe

r pavTi

vag

Maece

nas ata

vis

edite

regi

bus

14. Greater Asclepiadic (this is the Lesser Asclepiadic with a syncopated or catalectic dipody (HAˆo |lL) inserted between the two tripodies) :

> ppArv

Nullam

**Aˆ ˆ*

LA

~A j w

LA

Teh

ar/g TrpbTt

pov

Vare sa

era

vite pri

US

(UvAptov

severis

JL O

apnE

arbo

rem

Most of Horace's (Odes) are in logaoedic verse. He adopted his measures from the Greek poets, but in his practice he generally shows greater strictness than his models. Thus, for instance, he always has a spondee (— —) or irrational trochee (— >), instead of a trochee

proper (— kj), before the first occurring cyclic dactyl v^). When he

uses anacrusis, its quantity is usually long, and in the fourth book of the (Odes) always so. Catullus, Horace's predecessor, as a rule uses the trochee as the basis of his Glyconic and Pherecratic verse, more rarely the spondee or the iambus. In his Asclepiadic lines he uses the spondee as the basis. Great variety of Glyconic verse is found in Greek poetry. The tragedians use as the basis not only the trochee and the spondee, but also the iambus (^ —), the pyrrhic (^ and the tribrach ('w' ^ v. j), and Euripides even admits the anapaest (yj —). Sophocles, and more frequently Euripides, secured still greater variety by the displacement of the dactyl and other licenses. Such verses are known as Glyconei polysche – matisti.

On account of the frequent occurrence of an apparent Choriambus (— —), as, for example, in the Adonic and the Greater Sap¬ phic, logaoedic verses were formerly, and some¬ times still are, called Choriambic, and it is possible to scan them so ; but it is doubtful if they are truly Choriambic, and it is in conform¬ ity with the practice of modern scholarship to name and scan them as logaoedic.

Logaoedic verse is found in English but rarely, and then generally in imitation of a classic form. Thus Tennyson has the follow¬ ing reproduction of the Alcaic strophe :

O mighty-mouth'd inventor of harmonies,

O skill'd to sing of Time or Eternity,

God-gifted organ- voice of England,

Milton, a name to resound for ages.

And Swinburne has this imitation of the Sap¬ phic strophe :

Clothed about with flame and with tears, and singing Songs, that move the heart of the shaken heaven,

Songs, that break the heart of the earth with pity,

Hearing, to hear them.

See Versification.

Bibliography. — Schmidt, J. H. H., (Intro¬ duction to the Rhythmic and Metric of the Classical Languages > (tr. by J. W. White, Boston

1878; new ed., 1902) ; Hadley, J., and Allen, F. De F., (Greek Grammar) (New York 1887) ; Muller, L., (Greek and Roman Versifi¬ cation (tr. by S. B. Planter, Boston 1892) ; Moore, C. H. (ed.), (Horace: The Odes, etcP (New York 1892) ; Greenough, J. B., and Allen, J. H., (Latin Grammar > (revised ed., Boston 1895) ; Goodell, T. D., (Chapters on Greek Metric) (New York 1901) ; White, J. W., (Verse of Greek Comedy) (London 1912) ; Journal of Classical Philology (Vol. VIII, Chi¬ cago 1913) ; Shorey, P., and Laing, G. J. (ed.), (Horace: Odes and Epodes) (Chicago 1916).

P. J. Lennox.

LOGARITHMIC (log'a-rith'mik) , SPI¬ RAL, the curve described by a point which moves along a uni former revolving straight line with a velocity proportional to its distance from the fixed point of the line. Its equation in polar

co-ordinates is r = CEa®. It cuts all the radii through the origin at a constant angle, whose tangent is 1/a. When a = 0 the spiral

becomes a circle. The evolute of the spiral is an equal spiral. Descartes and Bernoulli studied the properties of this curve and New¬ ton showed that if the force of gravity had varied inversely as the cube of the distance the paths of the planets would have been loga¬ rithmic spirals. Consult Bernoulli, J., (Acta Eruditorum) (1691) ; Brocard, (Notes de bibliographic des courbes geometriques) (Bar- le-Duc 1897) ; id., (Partie complementaire) (ib.

1899).

LOGARITHMS. The common logarithm of a number is the index of the power to which 10 must be raised to be equal to the number. Thus 103= 1,000, so that the logarithm of 1,000 (usually written log. 1,000) is 3. Now 10*= 10, 10ˆ= 100, lO3ˆ 1,000, 10*= 1,000,000, and it is well known that 100= =: 1, 10-'1=0.1, 10—2= 0.01, etc., thus :

Log. o.ooi = —3 Log. o.oi = — 2 Log. 0.1 = — ’1

Log. 1 = 0

Log. 10=1 Log. 100 – 2 Log. 1,000 = 3 Log. 10,000 = 4

It is evident that the logarithm of any num¬ ber greater than 1 and less than 10 is frac¬ tional ; the logarithm of any number greater than 10 and less thdn 100 is greater than 1 and less than 2. Again, the logarithm of any num¬ ber fess than 1 is negative. The logarithms of numbers have been calculated by Napier, Briggs, Mercator, Newton, Leibnitz, Halley, Euler, L'Houillier, Vlacq, Sherwin, Gardner, Hutton, Taylor, Callet, Schron, Huntington, Moore and others. Of works giving tables of logarithms we may mention those to which the names of Hutton, Callet and Vega are respec¬ tively attached. Chambers' Mathematical Tables is a useful little treatise; it gives loga¬ rithms of numbers to seven places of decimals. Suppose we wish to know the logarithm of the number 18.1. In a book of tables we only find the fractional part of the logarithm, it is .257679. Now 18.1 is greater than 10 and less than 100, so that its logarithm is greater than 1 and less than 2; hence log. 18.1 = 1.257679. To give examples :

Log. 18100 = 4.257679 Log. 1810= 3.257679 Log. 181 = 2.257679 Log. 18.1 = 1.257679

Log. 1.81 = 0.257679 Log. 0.181 = 1.257679 Log. 0.0181 = 2.257679 Log. 0.00181 = 3ˆ257679

3.257679 means — ■ 3 + 0.257679. (For a full ex¬ planation of the finding of logarithms and nat¬ ural numbers by tables # consult treatises on trigonometry, etc.). The integral part of a loga¬ rithm is called its characteristic, the fractional parts its mantissa. Logarithms make arith¬ metical computations more easy, for by means of a table of them the operations of multiplica¬ tion, division, involution or the finding of powers, and evolution or the finding of roots, are changed to those of addition, subtraction, multiplication and division, respectively. For instance, if x and y are the logarithms of any two numbers, the 10® and 10y; now the product of these numbers is 10 x + y, so that the. loga¬ rithm of the product of two numbers is the sum of the logarithms of the numbers. Again, the quotient of the numbers is 10 x-v\ so that the logarithm of the quotient of two numbers is the difference of the logarithms of the num¬ bers. Again, 10® raised to the nth power is 10n®; so that the logarithms of the nth power

of a number is n times the logarithm of the

X

number. Again, the nth root of 10® is 10- ;

n

so that the logarithm of the nth root of a num¬ ber is— th of the logarithm of the number.

Hitherto we have spoken of common loga¬ rithms, which were invented by Briggs; their base, as it is called, is 10. Now logarithms were first used by Napier of Merchiston (see Napier, John), and he employed a base which is smaller than 10, it is the number 2.7 182818…., or the sum of the infinite series 2 +§ — ■j 1 ■j + 2-s -i ~K etc. This base is denoted by £ in mathematical treatises, and the Napier¬ ian logarithm of any number, say 7, is log. £ 7, to distinguish it from log. 7, which is the com¬ mon logarithm, whose base is 10. The com¬ mon logarithm of a number is found from the Napierian by multiplying by 0.43429448. Napierian logarithms are of great importance in mathematics.

LOGCOCK, a local name for either of two birds: (1) the pileated woodpecker (see Wood¬ pecker) ; (2) the woodcock (q.v.).

LOGGERHEAD SHRIKE. See Turtle. LOGGERHEAD TURTLE. See Hawks-

B1LL.

LOGGIA, loj'a, a word used in Italian architecture with several significations. It was applied to a hall open on two or more sides, where there were pillars to support the roof. Such are the Loggia de' Banchi in Genoa and the Loggia de' Lanzi in Florence. It is also applied to an open colonnade along the side of a building. The name loggia is also given to the large ornamental window consisting of sev¬ eral parts, which is often seen in old Venetian palaces; and lastly, it is used to designate a small airy hall, usually open on all sides, con¬ structed on the roof of an edifice. See also Architecture.

LOGGING, a name given by lumbermen to the practice of rolling logs from whence they are cut, or drawing them on sleds or wagons, to the stream by which they are transported to the mill. In some places logs are thus moved from one point to another by means of flumes and waterways.

LOGIC. Logic is that philosophical science which deals with the principles and methods of all thinking. The processes of thought, although varied in form and content, have always a single end; to interpret the past and the present, and by means of such interpre¬ tation to forecast the future. It is by think¬ ing that we are able the

better to understand the experiences of to-day and the more wisely to prepare for the events of to-morrow. Any object of thought — a thing, a person, an event — if it is to be really grasped by the thinking mind and to become a part of our body of knowledge, must be correctly interpreted by us. And by interpretation is meant the revelation of its essential significance in the light of the universal principle or the universal nature which the particular object under investigation illustrates. The primary function of logic is this : the interpretation of the particular by means of the universal which underlies it. The development of all logical theory is merely the

elaboration of this fundamental principle. To refer any object of consciousness to a universal is the sole method of describing its character¬ istics, or expressing its significance. If, for instance, I declare a certain plant to be poison¬ ous, I have characterized it by an adjective which admits an indefinite variety of applica¬ tions but preserves always one and the same essential significance, and this is the meaning and the function of the universal. Any noun which stands for a class or group of objects, or any adjective which may be variously ap¬ plied, is a universal ; or as it is technically known in logic — a concept. Moreover, the reference of any particular object of thought to a universal, i.e., to a concept which serves to interpret it, is a judgment.

Inasmuch as the reference is always con¬ fronted with the possibility of error, it is of the very nature of a judgment to raise the question of its truth or falsity, according as the knowl¬ edge upon which it is based is accurate or in¬ accurate, adequate or inadequate. In the manifold conflict of opinion there is an obvious need of some definite and fundamental cri¬ terion to discriminate between the true and the false. The final court of appeal as to the truth or the falsity of knowledge must be to the main body of knowledge as a whole. This is the test : does the new experience square with our accumulated experience or not? Truth as regards its logical significance must measure up to the supreme standard, namely, of consistency with all that constitutes the world of knowledge as we understand it. As the judgment is the logical vehicle of expressing truth, it is natural that it should take the form of a reference of the immediate object of consciousness to the general body of knowledge which has been already received, tested and assimilated by the mind. Thus, every new experience is to be illuminated and interpreted by the old. This

is the program of thought and the way of all logical procedure and progress. However, there can be no essential progress in thought when the judgment is merely the recognition of the appropriate place of a new thought in our general body of knowledge. Progress is mani¬ fest when the object of thought, in the light of our knowledge as a whole, gives rise to some new idea which is not expressed in the given object of thought alone, nor yet in our general body of knowledge alone, but which is never¬ theless necessitated and revealed by the com¬ bination of the two sources taken together. Our general body of knowledge contributes a part, and the given object of thought con¬ tributes the other part. When brought together the two parts fuse into one, forming a complete whole. Thought in this sense is creative. The given elements at hand may be old, but. thought constructs them into new forms, ever adding to the store of knowledge from the very ele¬ ments which knowledge itself furnishes. This process is the consummation of all the various logical functions and is known as the process of inference. Inference is possible because our judgments contain more knowledge than they ever express upon the surface. There is a de¬ posit of knowledge which is implicit in every judgment, and this is due to the fact that all of our judgments are interrelated and inter¬ dependent. The complete significance of a judgment is revealed only in the light of all

%

its relevant and cognate judgments. The im¬ plicit becomes explicit only when a given judg¬ ment is brought into relation to some other judgment which has already been tested and found place in our body of general knowledge; this is what occurs in the process of inference. For instance, if it is asserted that a bar of soft iron will become a magnet if an electric current is allowed to pass through a coil of wire bound about it, such an assertion is based upon our general knowledge which is con¬ tained in the judgment that a current of elec¬ tricity passing through a coil of wire always transforms an iron bar within the coil into a magnet. Without this general knowledge the mere fact of having a coil of wire wound around a piece of iron would be meaningless. To have any significance such a fact must have the light of our general knowledge brought to bear upon it. Then only does the given fact become suggestive and fertile in the increase of knowledge. Or again, if in any triangle there are given the two angles and the included side, one can infer by means of the knowledge of trigonometrical principles the other angle and the remaining two sides. Such a process of inference consists in # the combination of what is given with certain general principles which constitute a part of our body of knowl¬ edge. That which is given

without the general principles to interpret and develop it in all of its implied bearings and relations would remain devoid of significance and with no value as knowledge whatsoever.

In inference, therefore, there is always the extension of our knowledge, for the given judgment contains something which is not ap¬ parent when observed in its own light simply, but which is revealed only in the light which plays upon it from our general body of knowl¬ edge as a central source of illumination,

The ground of inference, indeed, that which makes the inferential process a possibility at all, is the supposition which we are constrained to make and upon which we are constantly rest¬ ing, in the exercise of our reasoning faculty, namely, that the various elements which con¬ stitute our body of knowledge as a whole must-be related to each other in such a way as to form a system of interconnected and interde¬ pendent parts. When we have given a single part, other parts of the whole to which the part belongs can be inferred, because of our knowl¬ edge of the general system which binds them together through the inner connections of necessity. That which is implicit in any judg¬ ment and which forms the germ of inference can be revealed only when one thoroughly un¬ derstands the complete system of relations and connections which underlies the judgment m question. If our knowledge were not system¬ atized, and the various parts duly related and properly co-ordinated and subordinated each to each, then there could be no basis for any inference, and no possibility of constancy and consistency in our thinking. As aids to sys- temization there are the processes of definition, division and classification which are treated at length in textbooks on the formal logic and can only receive passing mention here.

While inference depends upon organized knowledge it is also instrumental in producing the very organization of our knowledge itself. It draws from it and at the same time it con-

tributes to it. This twofold function gives rise to the two kinds of inference, known as de¬ ductive and inductive. In deductive inference we proceed from our general knowledge to the characterization of the special case which de¬ pends upon it ; or inasmuch as our general knowledge is expressed in the form of uni¬

versal concepts we can put it simply — that de¬ duction is from the universal to the particular. Induction, on the other hand, is from the par¬ ticular case, or rather particular cases, to the universal. It is essentially a process of general¬ ization, by which we rise in thought from the investigation of special cases to the universal principle or law which embraces them and underlies their nature. Inference is always either the interpretation or else the elaboration of knowledge. When that which is given is illuminated by some universal principle or law so that its implicit significance is thereby made explicit, we have the process of deduction. But when there is no recognized universal, and such must evidently be sought, we turn naturally to the relevant instances before us so as to discover in them some suggestion of the desired law or principle. Such a procedure is induc¬ tion. For example, when the physicist sees certain dark lines in the solar spectrum, he in¬ fers that they indicate the presence of iron vapor in the sun. This is deductive inference because it is a process of thought which rests upon the universal and well-known connection between certain definitely positioned lines in the solar spectrum and the presence of iron. On the other hand, however, suppose the in¬ vestigator is ignorant of the meaning of these dark lines. In his knowledge they possess no significance whatever and suggest nothing to his mind. It is obvious that he must experi¬ ment in various ways with the phenomena of these lines until he is able to discover their general relations and significance. Then he will be able to formulate the results of his investi¬ gation in a universal law which not only shall embody the special cases coming under his observation but all others also of a similar nature. It will be readily seen that deduction and induction are complementary phases of one and the same process. With every special case which comes before consciousness one of two methods of procedure is possible, that is, if it is to be the subject of inference at all; if it evidently falls under some universal law or principle to which we do not hesitate to refer it, then it becomes invested with the full pur¬ port and significance of such a universal; if, however, there is no recognized universal to which we can refer it, the special case presents a problem for us to solve by experiment and observation, namely, what is the universal which we are constrained to believe must underlie it, and which the special case in some way not yet revealed necessarily illustrates. Whenever, therefore, we face a new experi¬ ence, a new fact or event we must treat it by one or the other of these two methods accord¬ ing as our knowledge is adequate to its inter¬ pretation or not. In the one case we are rea¬ soning deductively; in the other, inductively. Where the limitations of knowledge obstruct progress in one direction, it is possible to pro¬ ceed in the other direction so as to remove

eventually these very limitations themselves. If we do not possess sufficient knowledge to

suggest the appropriate universal from which to reason deductively, we can proceed in an inductive manner to search for the universal which invites our investigation.

In our thinking these two processes cannot be separated, for some elements in the phe¬ nomena under observation appear immediately illuminated by our knowledge, others again are not so illuminated, but when properly tested are found to emit the light which is in them; these various elements are so closely joined together that the two processes must ever run parallel.

The form of inference which best illustrates the deductive reasoning, although by no means exclusively, is that of the Syllogism (q.v.). The syllogism is that method of reasoning which combines two judgments so as to pro¬ duce a third; as for example:

Whatever turns blue litmus paper red is an acid. This compound turns blue litmus paper red. Therefore, it is an acid.

It will be observed that the two judgments which combine to produce the third have a term in common; this is called the middle term of the syllogism. Moreover, the third judg¬ ment or conclusion is proved by the process of eliminating the middle term, and taking as the subject and predicate of the conclusion the remaining terms of the given judgments. The subject of the conclusion is called the minor term; the predicate, the major term, and of the two given judgments, the one containing the major term is called the major premise, and the one containing the minor term, the minor premise. It is the peculiar function of the major premise to exhibit some aspect of our general knowledge, and of the minor prem¬ ise to exhibit a more particular phase of our general knowledge, or as it more frequently occurs some special case embodied in a con¬ crete experience. It is the combined function of the two together to apply some portion of our general knowledge to a special case so as to yield its true interpretation. It is impos¬ sible to discuss here at length the various rules by which the validity of the syllogism may be tested. It may be said, however, that the rules of the syllogism depend upon the fundamental principle that if a special case can be proved to fall within the area of a uni¬ versal, then the inference follows that the spe¬ cial case becomes invested with the essential characteristics of the universal itself. But if the special case falls outside the scope of the universal, either wholly or in part, then the inference does not follow. For instance, in

all cases at law the special case is referred to some law principle, that is, to a universal which completely covers its essential signifi¬ cance and thereby determines the issues of the trial with the attending damages or punishment. Whenever a judicial decision is reversed by a superior court it is because the special case under investigation did not properly come under the law principle to which it was re¬ ferred. It is obvious that the syllogistic method of reasoning admits of abuse by con¬ necting premises in a merely formal manner which have no real connection. Such an arti¬ ficial and mechanical treatment of the syllogism leads naturally to empty subtleties and weak sophistries. It was this exclusive emphasis upon the formal and technical side of the syllo-

gism that brought the writings of the. school¬ men to such ill repute, so that the term scholas¬ tic has become suggestive of a complete divorce of thought from reality. Aristotle, to whom we owe the formulation of the syllogistic method of reasoning, placed supreme stress upon the real connection which must underlie all formal relationship in the structure of the syllogism. Thus he states that ((the middle term must express the real caused to fitv yap alnov TO litoov. Anal. Post. ii. 2, 90A 6.

The force of Aristotle's observation will be appreciated if we trace the usual process of thought whenever any judgment of ours is questioned. Suppose that one asserts that there is going to be a storm within a few hours, and he is asked concerning the ground of his opinion. The reply would be that there is a rapidly falling barometer, and also that a rapidly falling barometer indicates an ap¬ proaching storm. Here the middle term, ((rap- idly falling barometer,® serves to unite the uni¬ versal judgment to the special case as observed and at the same time to connect the two parts of the reasoning process by a real tie repre¬ senting the underlying cause upon which they are based. Inference, indeed, is often defined as the process by which the ground of a judg¬ ment is explicitly disclosed.

The ordinary categorical syllogism, that is, one which is formed of judgments in the sim¬ ple form, x is y, although it is essentially grounded in the causal relation, nevertheless in a large measure conceals it. On the other hand, in the hypothetical syllogism, whose major premise is a hypothetical judgment, that is, of the form, if x is y, z is w, and whose minor premise affirms or denies one of these two

clauses categorically, the causal relation is brought into the foreground, inasmuch as it states explicitly a consequence as dependent upon its ground. There is still another kind of syllogism known as the disjunctive syllogism in which the major premise is a disjunctive judgment that is of the form, x is either z or w, and the minor premise is an affirmation or denial of one of these alternatives while the conclusion is the corresponding denial or affir¬ mation of the other. This affords a method of reasoning by elimination, and is most useful in deciding between possibilities. In this form of the syllogism the causal relation is not ex¬ pressed on the surface at all, but is essen¬ tially implied; for in order to state possibilities one must know all the underlying causal rela¬ tions of the system in which these possibilities emerge. For instance, one cannot state that the contents of a stomach which have been chemically examined indicate the presence of arsenic or antimony unless there is known also the exact causal connection between these two poisons and the partially digested food; the disjunctive judgment standing as the major premise of the disjunctive syllogism always presupposes some definite knowledge of deter¬ mining causal relations which exist in the sys¬ tem under consideration.

The validity of the syllogism turns, as will be readily seen, upon the possibility of re¬ ferring a special case to its appropriate univer¬ sal. But there are often situations and cir¬ cumstances when this method of reference is not at all possible and yet nevertheless a valid inference can be drawn. In other words, the

syllogistic procedure by no means exhausts the possibility of deductive inference. There may be other relations which grow out of a system of interconnected parts and which are of such a nature as to warrant an inference from them. For instance, we may have the follow¬ ing inference:

The two angles of a triangle, A and B, equal 95 degrees. Therefore, the third angle must equal 85 degrees.

This is not a syllogism proper and yet is a perfectly valid course of reasoning. While there is no middle term there is an identical point of reference, namely, the given triangle ; and there is also the universal upon which the inference depends, namely, the relations which underlie the very nature of the triangle itself and are rendered constant by it. Thus, all of the essentials of inference are found to be present in such a form of reasoning. Various kinds of inference may thus arise according to the different relations which may obtain in the system wherein they occur. To have a valid inference in any such

case we must establish some identity of relation between the parts which we are comparing; otherwise we can¬ not logically pass from one to the other. And identity of relationship can be established only in systems of such simplicity that no unknown elements which might enter to disturb the exist¬ ing relations can be conceived. Our thought in other words must command the system com¬ pletely; otherwise we are never justified in using our knowledge as the basis of reasoning.

In the inductive process as we have seen, the procedure is from particular instances to the universal which underlies them and which they illustrate ; there is here, however, an evident break in the continuity of the logical process. The conclusion contains more than the prem¬ ises ; for in the universal reached by induction our knowledge goes beyond our actual experi¬ ence. This is the so-called (

tation of the concrete case must reveal the uni¬ versal element which underlies it and gives it a place and meaning in our world of knowl¬ edge. Nature after all is only another word for the world as we know it — a world of uni¬ versal and necessary relations ; otherwise it could not be a world of order and uniformity.

The one relation above all others which enables us to discover the universal significance of concrete instances is the relation of cause and effect. \\ hen in the phenomena of nature or the events of life, a simple causal relation can be discovered, even though it is illustrated only in a certain case, there is sufficient ground for the generalization of the connection thus discovered. The method of inductive investi¬ gation, therefore, consists in various tests for the exhibition of true causal relations of such a simple nature as to furnish evidence that these relations are both definite and constant. A complex relation is too indefinite and vari¬ able to warrant any generalization which is based upon it. But however complex the phe¬ nomenon may be, it may be always subjected to some process of analysis which will reveal a more simple causal relation underlying it. Moreover, it is necessary by proper inductive tests to discriminate between a causal con¬ nection and a mere coincidence. All of this is provided for in the so-called inductive methods — the method of agreement, of difference, of agreement and difference, of concomitant vari¬ ation and of residues. These are essentially the

methods of scientific procedure, the methods of research and experimentation. The func¬ tion of hypothesis in inductive investigation must not be overlooked. An hypothesis is a supposition which is made concerning the prob¬ able cause of a phenomenon either as prelim¬ inary to an experiment which may prove or disprove the supposition or in the place of an experiment or systematic observation wThen such are impossible owing to the peculiar conditions of the phenomenon itself. In the first instance the function of hypothesis determines the line of experiment in a definite manner and does not leave the phenomenon in question to inde¬ terminate and haphazard investigation. This may be illustrated by a quotation concerning Charles Darwin, taken from the (Reminis- cences) of his son, Francis Darwin: ((He often said that no one could be a good ob¬ server unless he was an active theorizer. It was as though he were charged with theoriz¬ ing power ready to flow into any channel on the slightest disturbance, so that no fact how¬ ever small could avoid releasing a stream of theory and then the fact became magnified into importance. In this way it naturally happened that many untenable theories occurred to him; but fortunately his richness of imagination was equalled by his power of judging and con¬ demning the thoughts that occurred to him. He was just to his theories and did not con¬ demn them unheard ; and so it happened that he was willing to test what would seem to most people not at all worth testing.® ((Life and Letters of Charles Darwin, > Vol. I, p. 126). But there is a second function of hypothesis — where an explanation is needed to account for phenomena which it is impossible to repro¬ duce in the form of an experiment. We are not always able to perceive the relations be¬ tween facts and yet we are constrained to

think of them as related; but in order to syste¬ matize them we must supply the lacuna which appear in the phenomena as perceived. A sup¬ position of this nature which is necessary in order to construct a body of facts into a sys¬ tem is an hypothesis — as for instance the nebular hypothesis of Laplace. No course of reasoning, however, can be carried on to any extent or to any effect which does not combine the two processes of deduction and induction in a manner provided for by the complementary relation which they sustain one to the other. The combination of the deductive and inductive processes has been called by John Stuart Mill the deductive method simply. A more dis¬ tinctive name, however, would be — the induc- todeductive method. This combined method consists of three stages :

1. A preliminary process of induction whose results may be expressed tentatively at least in the form of a universal law or principle.

2. A process of deduction based upon this universal principle or law as its major premise, and thus extending our knowledge to the de¬ termination of new cases which have not as yet gained a place in our body of knowledge.

3. A process of verification, by which the results of the process of deduction are com¬ pared with the facts as actually observed. When there is not an exact correspondence be¬ tween- the theoretically deduced results and the observed facts, and we are able to assure our¬ selves that there has been no flaw in the proc¬ esses of deduction, then the original induction stands as so far forth discredited and must be revised so as to square it with fact. This com¬ bined method of deduction and induction serves as a check on the one hand upon all tendency to hasty generalization, and on the other it is most valuable as a means of extending our knowledge into unknown regions beyond the sphere of immediate observation. We are con¬ stantly using our inductive results as a basis for a deductive inference concerning the things not yet seen ; and then when seen, at once com¬ paring the former inference with present fact we are either confirmed in the result which we had reached by the processes of reasoning, or else compelled to discard the earlier inference as false or inadequate as may be. The unseen which we are determining in our minds by what we think the seen necessitates we are, however, from time to time compelled to alter. Bacon has insisted that ˆanticipations of na¬ ture® are a source of innumerable errors and that the truly scientific method consists in the interpretation of nature by means of direct ob¬ servation and experiment simply. It must be remembered, however, that it is largely through these anticipations of nature that progress in science has been attained. A distinction must be drawn between anticipations of nature which are subjected to careful verification and those which are in themselves regarded as final.

Bibliography. — Aikins, (The Principles of Logic} ; Aristotle's various writings, sp. Or¬ ganon (Eng. trans. by O. F. Owen, 2 vols., London 1908-10) ; Bacon, Francis, (Novum Or- ganunP ; Baldwin, J. M., (Thought and Things* (New York 1906—1 1) ; Bain, Alexan¬ der, (Logic, Inductive and Deductive* (2 vols., London 1895) ; Bentham, (Essay on Logic) (Vol. VIII of his Works) ; Bergmann, Julius, (Die Griindprobleme der Logik) (Berlin 1895) ;*

Bosanquet, Bernard, 'The Essentials of Logic) (New York 1895) ; id., 'Logic5 (2d ed., 2 vols., Oxford 1911) ; Bradley, F. H., 'The Princi¬ ples of Logic5 (New York 1905) ; Bode, B. H., 'Outline of Logic5 (ib. 1910) ; Clarke, 'Logic5 (London 1889) ; Couturat, Louis, 'L'Algebre de la logique) (Paris 1905; Eng. trans., Chi¬ cago 1914) ; Creighton, J. E., 'Introductory Logic) (3d ed., New York 1909) ; Croce, Bene¬ detto, 'Logica como scienza del concetto puro) (2d ed., 1909) ; De Morgan, 'Formal Logic) ; Descartes, 'Discourse on Method5 ; Dewey, John, 'Studies in Logical Theory5 (Chicago 1903) ; Dinwiddie, William, 'Essentials of Logic5 (New York 1914) ; Erdman, J. E., 'Logik) (Halle 1892) ; Fischer, Kuno, 'Sys¬ tem der Logik und Metaphysik, oder Wissen- schaft5 ; Fowler, Thomas, 'The Elements of Deductive Logic5 and 'Elements of Inductive Logic5 (10th ed., Oxford 1892) ; Gibson, W. R. B., 'Problem of Logic5 (London 1908) ; Gilbart, J. W., 'Hope for the Million5 (Lon¬ don 1913) ; Hamilton, Sir William, 'Lectures on Logic5 (London 1859) ; Harms, Friedrich, 'Geschichte der Logik5 (Berlin 1881) ; id., 'Die Philosophic in ihrer Geschichte5 ; Hegel, G. W. F., ' Wissenschaft der Logik5 (Berlin 1831) ; id., 'Encyklopadie der philosophischen Wissenschaften im Grundrisse ; Erster Theil, Die Logik5 (Heidelberg 1817; Eng. trans., 1894) ; Herroont and Van di Waile, 'Les prin¬ cipals theories de la logique contemporaries5 (Paris 1909) ; Hibben, J. G., 'Inductive and Deductive Logic5 (New York 1905) ; Hob- house, L. T., 'Theory of Knowledge5 (London 1896) ; Hyslop, J. H., 'Elements of Logic5 (New York 1892) ; Husserl, E., 'Logische Un- tersuchungen5 (2 vols., Halle 1901) ; Jevons, W. S., 'Substitution on Similars5 (London 1869) ; id., 'Pure Logic5 (New York 1890) ; id., 'Elementary Lessons in Logic5 (London 1895) ; 'Studies in Deductive Logic5 (3d ed., New York 1896) ; id., 'Principles of Science5 (ib. 1900) ; Joseph, H. W. B., 'Introduction to Logic5 (Oxford 1906) ; Jones, A. L., 'Logic, Inductive and Deductive5 (New York 1909) ; Kant, Immanuel, 'Logik) (Konigsberg 1800) ; Lange, 'Logische Studien5 ; Laird, 'Les logi- ciens anglais contemporains5 (Paris 1878) ; Leibniz, 'Nouveaux Essais sur l'entendement humain5 ; Lotze, R. H., 'System der Philoso¬ phic: Logik5 (Leipzig 1880; Eng. trans., Ox¬ ford 1881) ; Locke, 'Essay Concerning Human Understanding5 ; McColl, H., 'Symbolic Logic and its Applications5 (New York 1906) ; Mc- Cosh, 'The Laws of Discursive Thought5 ; Mansel, H. L. ed., 'Aldrich's Artis Logi¬ cs Rudimenta5 (London 1851) ; id., 'Prole¬ gomena Logica5 (Oxford 1851) ; Mellone, 'In¬ troductory Textbook of Logic5 ; Mill, John Stuart, 'System of Logic, Ratiocinative and In¬ ductive5 (8th ed., New York 1900) ; Minto, Wil¬ liam, 'Logic, Inductive and

Deductive5 (ib. 1894) ; Newman, 'Grammar of Assent5 ; Pear¬ son, 'Grammar of Science5 ; Prantl, Karl von, 'Geschichte der Logik im Abendlande5 (4 vols., Leipzig 1855-70) ; Russell, L. J., 'Introduction to Logic from the Standpoint of Education5 (New York 1914) ; Schiller, F. C. S., 'Formal Logic: A Scientific and Social Problem5 (Lon¬ don 1912) ; Schopenhauer, 'Ueber die Vier- fache Wurzel des Saltzes vom zureichenden Grundes5 ; Schiippe, Wilhelm, 'Erkenntniss- theoretische Logik5 (Bonn 1878) ; Sidgwick,

Alfred, 'The Process of Argument5 (London 1893) ; id., 'The Application of Logic5 (New York 1911) ; id., 'Elementary Logic5 (ib. 1914) ; Sigwart, Christoph von, 'Logik5 (3d ed., Tubingen 1904; trans. by Denby, London 1895) ; Shearman, A. T., 'Development of Sym¬ bolic Logic5 (London 1906) ; id., 'Scope of Formal Logic5 (ib. 1911) ; id., 'Formal Logic5 (ib. 1912) ; Stoeckl, 'Geschichte der Philosophic des Mittelalters5 ; Stock, George, 'Logic5 ; Thomson, William, 'Outline of the Necessary Laws of Thought5 (4th ed., New York 1863) ; Trendelenburg, 'Logische Untersuchungen5 (3d ed., Leipzig 1870) ; Turner, 'Lessons in Logic5 (Washington 1910) ; Ueberweg, 'Friedrich, 'System der Logik5 (5th ed., Bonn 1882) ; Ul- rici, H., 'System der Logik5 ; Venn, John, 'Symbolic Logic5 (London 1881) ; 'Empirical Logic5 (ib. 1889) ; Welton, J., 'Manual of Logic5 (ib. 1896) ; Whately, Richard, 'Ele¬ ments of Logic5 (New York 1855) ; W'hewell, 'History of the Inductive Sciences5 ; Wundt, Wilhelm, 'Logik5 (2d ed., Stuttgart 1895).

John Grier Hibben, President of Princeton University.

LOGIC, Symbolic. Symbolic Logic, or Mathematical Logic, or the Calculus of Logic, — called also the Algebra of Logic (Peirce), Exact Logic (Schroder), and Algorithmic Logic or Logistic (Couturat), — covers exactly the same field as Formal Logic in general, but differs from Formal Logic (in the ordinary acceptation of that term) in the fact that greater use is made of a compact symbolism — the device to which mathematics owes so largely its immense development.

Formal Logic may be defined as that science which has for its object the complete analysis and systematic presentation of the principles and methods of deductive reasoning, or the type of reasoning in which conclusions are drawn from given premises. It is not con¬ cerned with the truth of the premises or of the conclusions, but simply takes care that if the premise is true the conclusion shall be; it is the study of the forms of valid inference with¬ out regard to the content or subject matter of the propositions which are inferred or of those from which the inference is drawn. Symbolic Logic is then that

treatment of For¬ mal Logic which employs, instead of many of the words of ordinary language, a system of special symbols which secure not only greater precision and compactness, but also greater generality in its discussions. These symbols, like the symbols of mathematics, form, in real¬ ity, a new symbolic language; and it may be said that the choice of a convenient and accu¬ rate symbolism has been, in logic as in mathe¬ matics, an indispensable condition for the prog¬ ress of the science.

A partial use of symbolism in Formal Logic is as old as the time of Aristotle; for example, "If both A and B include the whole of C, it follows that some A is P.55 What is called Symbolic Logic simply carries this device farther ; it would express the whole of the above statement in symbols, as, for example, thus: A >■ C. B >• C. < A Y B. The immense advantage that accrues from the full carrying out of this idea of Aristotle's can only be realized by those who have given some atten¬ tion to mastering the details of the method.

LOGIC, SYMBOLIC

605

The thorough-going application to Formal Logic of the symbolic method, with the accom¬ panying extension of the field of logical inquiry, is a development of the latter half of the 19th century. The essential features of the modern theory, to be sure, were known to Leibnitz as early as 1700, and some valuable contributions were made by Lambert in 1781 ; but the first work which brought the possibilities of the symbolic method forcibly to the attention of logicians was (An Investigation of the Laws of Thought by George Boole, in 1854; and Boole is commonly regarded as the founder of the modern science. The new ideas did not at first meet with favor; the logicians, wedded to the classical methods, in which reasoning is carried on by means of living words, refused to admit what they called a mathematical intru¬ sion into their science; while the mathemati¬ cians on their side regarded the whole move¬ ment as of no possible interest except to logi¬ cians. The field remained for some decades a no-man's land between mathematics and logic ; the few who cultivated it worked largely without knowledge of previous or contem¬ porary workers in the same field ; and the difficulty of defining the relation of logical symbolism to mathematical form, and the limits of the analogy between them, led to many errors. By the end of the century, however, owing to the labors of Peirce and Schroder, the new methods had established themselves on a sound footing, and had proved their value in logical investigations. To

mention only the illustration of their power, the Syllogism, and the so-called (

While this development was taking place in logic, an equally important movement in a similar direction was being carried forward in the field of Pure Mathematics, and 3. brief ac¬ count of this movement must be given before we can understand the present position of Symbolic Logic. Up to the middle of the 19th century, mathematics had been so busily en¬ gaged in testing the power of the newly ac¬ quired calculus of Newton and Leibnitz, and obtaining results by its aid, that few inquiries had been made into the logical foundation of the theory. Since that epoch, however, increas¬

ing attention has been paid to these funda¬ mental questions, among the early leaders being such men as Bolyai, Lobatchevsky, Cauchy, Weierstrass, Reimann, De Morgan and Robert Grassmann, all of whom, except the first two, were contemporaries of Boole's. The first re¬ sult of these inquiries was the recognition, more clearly than ever before, that every mathemat¬ ical theory is based on a small number of fundamental hypotheses, or postulates, from which all the other propositions of the theory can be deduced, and careful lists of postulates are now being worked out for most of the im¬ portant mathematical branches. Secondly, it became increasingly evident that the real in¬ terest of the mathematician lies not so much in the material content of the hypotheses which he assumes, as in the logical processes by which further propositions are deduced from those hypotheses. The natural outcome of this con¬ viction was an immediate and very great ex¬ tension of the field of mathematical inquiry. No longer confined to the study of number, quantity and space, mathematicians invented for themselves new systems of hypotheses, and de¬ duced from them new theories. Any set of postulates would serve, provided they involved no internal contradiction, and in the exuberance of new freedom the subject matter was some¬ times chosen with an almost playful disregard of practical utility. Perhaps the most striking example of the new tendency was the accept¬ ance of the non-Euclidean geometries of Lo¬ batchevsky and Bolyai as legitimate branches of mathematics. These theories had at first been regarded as heretical, or at least as non- mathematical ; but now, when it became clear that their assumptions, though unusual, were still not self-contradictory, they were assigned their proper places as hypothetical-deductive theories; they therefore became as much a part of mathematics as the older theory of Euclid, that theory being itself now recognized as a hypothetical-deductive theory; and the mathematical interest of either theory was seen to be quite independent of the question

whether an illustration of it could or could not be found in the world of space-perceptions. Another example is that of Hamilton's quaternions, which is a new algebra in which the funda¬ mental assumptions differ in several respects from the laws which hold in the more familiar algebra of quantity. Similarly, all the host of artificial algebras, the invention of which was promoted especially by Hankel (1867) and Benjamin Peirce (1870), are hypothetical- deductive theories exhibiting varying degrees of divergence from the ordinary algebra of quantity; perhaps the simplest of all these alge¬ bras is that invented by Boole himself for the purposes of symbolic logic. In arithmetic and geometry the work of Peano, Padoa and Pieri in Italy, and of Pasch, Frege and Hil¬ bert in Germany, should be especially mentioned. Finally, the theory of abstract groups, and the whole operational calculus, are outgrowths of the same tendency. In short, pure mathema¬ tics came to be regarded, at the end of the century, as a collection of hypothetical-deduc¬ tive theories, distinguished from one another by the nature of the assumptions adopted as the basis of each theory, but depending for their mathematical interest not so much on the material content of those assumptions as

on the logical relations between the resulting propositions.

As the outcome of these two movements, therefore, the sciences of logic and mathematics found themselves in a wholly unexpected posi¬ tion at the beginning of the 20th century. Instead of being separate, almost antagonistic, disciplines, they suddenly discovered that they were both working in the same direction — that their problems and aims were identical. The field of symbolic logic, which had hitherto occupied a rather uncomfortable position be¬ tween the two opposing forces, now became the common meeting-ground where mathematicians and logicians can work together to mutual advantage. The researches of Peirce and his pupils in America, and of Schroder in Germany, became more widely known. Peano and his school in Italy began the publication of the (Formulaire de Mathematiques,> which is in¬ tended to become a complete cyclopaedia of mathematical knowledge, expressed in the lan¬ guage of symbolic logic. Russell and White- head in England, and Couturat in France, be¬ came active exponents of the new mathemat¬ ical-logical theory. Even the strictly mathe¬ matical researches of Georg Cantor began to arouse lively interest among the logicians. Finally, it remained for Russell (1903) to announce the surprising thesis that

logic and mathematics are in reality the same science ; that pure mathematics requires no material be¬ yond that which is furnished by the necessary presuppositions of any logical thought; and that formal logic, if it is to be distinguished as a separate science at all, is simply the ele¬ mentary, or earlier, part of mathematics.

It is too early to predict what the final out¬ come to this new movement will be ; the limits of the inquiry are not yet well defined ; the terminology and notation are still in an ex¬ perimental stage ; many important matters of detail are likely to remain for some time in debate ; but at any rate this much is clear : a new program has been proposed for mathe¬ matics and logic, and the true nature and scope of what is now called symbolic logic cannot be finally determined until this broader question of the relation between logic and mathematics is decided. It may be that, in the merging of these two sciences; no place will be left for symbolic logic as a distinctive science; it may be that the studies now pursued under that name will be supplied with a more appropriate title; or it may be that some new form of symbolic logic will absorb the whole of logic and mathematics.

In view of these considerations it is clear that any account of the subject which can be given at the present time must be regarded as tentative and transitional — a snap-shot at a rapidly moving phenomenon — certain to be¬ come obsolete with the change of perspective which is taking place in all our mathematical- logical notions. The sketch which now follows, after this long introduction, must therefore be understood as containing not a body of uni¬ versally accepted facts, but merelv the writer's individual selection of some of the results which, in their view, seem most likely to be¬ come of recognized value.

The main results which Svmbolic Logic claims to have secured are brieflv the following:

1. A thorough-going investigation into the

foundations of logic, — an enumeration of ap¬ propriate groups of first principles (axioms and postulates) and the deduction from them of the whole structure.

2. The furnishing of a wonderfully concise and compact method of expressing premises and deductions from premises. It is impos¬ sible to overestimate the mastery which this gives over trains of thought.

3. A method for putting any number of premises, of any degree of complexity, into the intellectual mill, and extracting all the in¬ formation which they convey about any term or any combination of terms, without the fatigue of conscious reasoning. Machines have been devised, like Jevons' (

These results have been due to :

(a) The generalization of the relation is, implies (made possible by the convention that < (all a is 6® does not involve the existence of a; this generalization is due to Leibnitz).

(b) The introduction of the logic of and and or (there is no reason why logic should not discuss, e.g., equivalences — perfectly common in real life — such as (

(c) The introduction of the Special Terms, o and oo (nothing and everything, or the non¬ existent and the existent).

(d) The excision of the non-valid syllo¬ gisms, and hence the reduction of valid syl¬ logisms to a perfectly symmetrical collection, all (universal and particular) tested by one simple and easy rule.

(e) The introduction of an appropriate sym¬ bolism.

As has already been intimated, much of the new matter of modern logic has no necessary connection with its symbolism. The first four of the above improvements could perfectly well have been attained without its use; that they were not is the greater proof of the utility and power of the symbolic method.

For the purposes of more detailed exposi¬ tion, the subject may be divided into three parts :

(1) The Logic of Classes or Concepts;

(2) The Logic of Propositions; and

(3) The Logic of Relations;

although this can hardly be called a scientific division. (The use to which the term ((Algebra of Logic® is now commonly restricted will be explained below).

1. The Logic of Classes or Concepts. — In

conducting any scientific inquiry, we usually, whether consciously or

unconsciously, confine our attention to a particular realm of thought, which may be called the universe of discourse, or simply the universe , for that particular in¬ quiry; any object outside the universe is irrel¬ evant to the discussion. For example, astron¬ omy deals with the universe of material objects on a large scale; anthropology deals with the universe of human beings; botany deals with the. universe of flowers and plants; etc., etc. This universe, in any narticular discussion, is represented by the svmbol oo , or bv the svm- bol 1.

Within any given universe, we have to speak of classes, a class being a group of objects of thought which are distinguished in any way from the rest of the universe. The objects belonging to -a class are usually characterized by the possession of certain common characters in which we are interested; and of these charac¬ ters we then may form a ˆconcept? But in Symbolic Logic we view a class merely as (in any way whatever) distinguished from the other classes of the universe.*

Any class is represented in symbolic logic by a letter of the alphabet, and the comple¬ mentary class, comprising all the rest of the universe,ˆ by the same letter with a dash or accent. Thus, in the universe of men, we may let o = the class of Americans, b — the class of bankers and r = the class of Californians; then a'f will represent the class of all foreigners, b' the class of all non-bankers, and c' the class of all men who do not live in California. Of course it is possible at any time to enlarge the borders of our universe, so that, for example, b ' may come to mean not only all men who are not bankers, but also all things of any kind which are not bankers, as microbes, demonstrations, virtues. In any case, two classes x and x' together exhaust the universe considered, and have no part in common; either of two such classes is called the negative of the other. When a criterion, or means of distinguishing the objects of a class x from the rest of the universe, is so defined that no object in the universe will satisfy this crite¬ rion, it is convenient to speak of x as an "empty or "null* class. Any null class is rep¬ resented by the symbol 0. Thus, the class of all plane figures which are at the same time round and square, and the class of all prime numbers which end in the digit 4, are exam¬ ples of null classes.*

The common part of two classes x and y is represented by xy , and is

.called their logical product. Thus, in our example, ab = the class of American bankers, a'b = the class of foreign bankers, dc = the class of foreign Californians (this last being of course a null class).

The class composed of two classes x and y together (whether or not these classes overlap) is represented by x + y, and is called the logical sum of x and y. Thus, a + b — the class con¬ taining all Americans and all bankers; a-\~db, or the class containing all Americans and all foreign bankers, is of course the same class.

When two classes x and y are given, it may happen that every element of x is also an element of y; this relation is represented by x

Obviously x ■< oo , whatever x may be ; if it happens also that co ■< x, then and then only it will follow that x — co . Similarly the equation, x = 0 is equivalent to the two relations 0*< x and x 0, the first of which, like x < , is tau tologous being true for every value of x.

We give next, without proof, a list of the principal theorems which have been discovered concerning the fundamental notions represented by oo, 0, x* xy, x + 3', and x

attached to some of the theorems are the out¬ growth of a varied and uncertain history, and do not always suggest very clearly the meaning of the theorem).

1. a «< a. (Principle of identity).

2. If and only if a < b and b < a, then a — b.

3. If a < b and b

4. a + a — a and aa = a. (Tautology).

5. a j ab — a and a (a + b) —a. (Absorption) .

6. a + b — b -f a and ab = ha. (Commuta¬ tive laws).

7. (a + &) + c = a-f (6 c) and (ab)c=a(bc).

(Associative laws).

8. a -f (be) = (a + b) (a + c) and a(b + c) — (ab) + (ac). (Distributive laws).

9. a

10. If a

11. If a

12. If a < b, then a j b — b and ab = a.

13. If a

14. 0

15. a -f 0 = a and a oo = a.

16. a j co = co and aO = 0.

17. aa'— 0 and a-fa'=oo. (Principle of contradiction, or exclusion; and principle of excluded middle, or exhaustion).

18. If x

19. (a')'— a. (Double negation).

20. If a

21. (a + by=a'b' and (aby=a' + b'. (De Morgan's Theorems).

22. If ax~\~bx' =0, then —0.

23. If (a f x) (b + x')=°° , then a -f b = . (Theorems 22 and 23 are other forms of the principle of the syllogism).

24. =0. (Postulate of existence).

25. co = a j a'

= (a a') (b + b'). . .

= ab + ab ' J a'b + a'bf-\- . . .

= abc f a'bc + ab'c + . . . and 0 — aa' = aa' + bb' — aa' + bb' + cc' + ... (Formulae for the complete development of oo and 0).

26. (pab -f qa'b -f rad + sa'b')' = p'ab + q'a'b + r'ab' + s'a'b'.

(Formula for obtaining the negative of a well- developed expression, — of great utility in the solution of problems).

In verifying the truth of these theorems, the familiar Eulerian circles may render some service by exhibiting to the eye the relations of the

several terms; but Euler's diagrams become inadequate and even misleading in any really fundamental discussion, because they fail to represent satisfactorily the negative term, the complete introduction of which into modem logic is one of the most important enlargements of the subject. A better method of diagrammatic representation has been proposed by Venn (loc. cit.).

2. The Logic of Propositions. — We now turn to the second division of our subject, which will prove to be not a separate branch of the theory, but merely another aspect of the branch already considered.

In this branch of the subject, letters are used to represent not classes, but propositions, and the notation x < y is used to express the relation: ((the proposition x implies the proposition y}) or ((the

truth of x entails the truth of y.® For example, if p — the proposition that John Smith endorsed this protested note, and q = the proposition that he is liable for its payment, then p < q. Here, as in the logic of classes, the notation p — q is used to express the double relation p < q and q

The notation pq, called the logical product of P and q, represents a proposition the assertion of which is equivalent to the simultaneous assertion of the propositions p and q\ and p-\-q, called the logical sum of p and q, represents a proposition the assertion of which is equivalent to the alternative assertion of the propositions p and q. For example, if p — <(the testator was of sound mind,® q — (f q') ; it happens that in this particular case we have also P'\-q'

Finally, the symbol co is used in this theory to represent any typical true proposition, such as 2 + 2 = 4; and the symbol 0 is used to represent any typical false proposition, such as 2 f 2 = = 5. These symbols enable us to express the assertion of the truth or falsity of any proposition as follows : oo ■< p is equivalent to the assertion c(p is true®, and p < 0 is equivalent to the assertion ap is false.® Obviously 0 ■< x and x< oo whatever the value of x\ so that the relations oo

f pf = oo and pp' — 0.

If now we proceed to give the theorems which hold concerning the notions we have just represented by oof 0, x', xy, x -f y, and x

As a most interesting example of the way in which compound propositions can be handled by the Logic of Propositions, we mention Mrs. Ladd-Franklin's ˆinconsistent triad® :

(ab — 0) (b'c =0) (ac=|=0) <0;

since this is the form to which all the 8,192 valid syllogisms (both universal and particular) can be reduced. By transposing the third factor, we have the universal syllogism : (ab— 0) (&'<; = 0) •< (ac=0) ; and by transposing

the second factor we have the particular syllo¬ gism: (ab— 0) (ac4=0) < (6'c=4=0) ; the <(incon- sistent triad® thus furnishes a perfectly general rule for testing the validity of any syllogism.

The Logic of Classes and the Logic of Propositions are included together in the Algebra of Logic of Peirce and Schroder; in recent years, however, the term (*

The Algebra of Logic, Strictly so Called.

— If we define terms in general to be any ob¬ jects of thought which can be elements of an asserted relation — whether simple terms, like classes or concepts, or compound terms, like propositions, relations between propositions, etc. — we may say that the logic of classes and the logic of propositions have, formally, the same fundamental notions to deal with, namely: (1) terms, represented by letters of the al¬ phabet; (2) two special terms, 0 and oo ; (3) three functions of terms: negations

The theorems 1-26 are therefore capable of at least two interpretations : first, in the theory of classes, and secondly, in the theory of propositions; and there are doubtless many other theories also in which these formal state¬ ments can be given a concrete significance. It, therefore, becomes a natural inquiry to in¬ vestigate this body of theorems in their ab¬ stract form (that is, without specifying any interpretation for the symbols), to study the logical relations that exist among them, and to select certain of them as fundamental, from which all the others can be deduced as formal consequences. The body of theorems so con¬ sidered, with their consequences, forms a mathematical algebra, called (in distinction from the algebra of quantity, the algebra of complex numbers, the algebra of abstract groups, etc.) the algebra of logic. The algebra of logic bears the same relation to the or¬ dinary algebra of quantity that the non- Euclidean geometries bear to the ordinary . geometry of

space; and it has been the analogy between the algebra of logic and the algebra of quantity that has led to the importation of several mathematical terms into the study of symbolic logic (as (

logic from its mathematical side are given by Whitehead and Couturat (see Bibliography) . A searching inquiry into the nature of the algebra, and its relation to other branches of mathematics, was 'begun by Kempe in 1890, and has recently been carried farther by Royce (1905).

The Logic of Relations. — The Logic of Relations, or the Logic of Relatives, was founded, as regards first principles, by De Mor¬ gan ((Trans. Camb. Phil. Soc.,> Vol. X, 1864), developed by Peirce, carried further by Schroder, and has now' met with what is pos¬ sibly a farther important development in the hands of Russell (1903). We can give, in this space, only a cursory account of the principal terms which are employed.

In many inquiries we are concerned with the relation in which some term stands to some other term ; for example, a number x may be less than a number y; a person A may be a debtor of a person B ; a circle M may lie within another circle N: the notions <(less than,® <(debtor of,® ((within,® are relations. Every relation has a converse relation. For example, if x is less than y, then y is greater than x\ if A is a debtor of B, then B is a creditor of A ; if M lies within N, then N includes M. It is customary to represent a relation by a capital letter, as R, and the inverse relation by the same letter with a curved dash above it, as R. Thus if R stands for (

Again, if R stands for ((parent of,® R will stand for ((child of.®

If xRy and ySz, then x stands in a certain relation to z, called the relative product of the relations R and .S' and denoted by RS. Thus if xRy stands for C(x is brother of y,® and ySz for <(y is father of £,® then xRSz will signify <(x is uncle of 2® ; or again, xRSz may mean ((x is an agent of a landlord of 2,® etc.

If a relation R is such that xRy always im¬ plies yRx, then R is called a symmetrical rela¬ tion. For example, the relations ((equal to,® ˆdifferent from,® ((spouse of,® are symmet¬ rical relations. If R is such that yRx is false whenever xRy is true, then R is called an asymmetrical relation ; as ((less than,® Mather of,® etc. Relations

like Mister of,® which are neither symmetrical nor asymmetrical, are called simply not-symmetrical.

A relation R which is such that xRx for every value of .r is called a reflexive relation, like the relation of equality, or the relation which we have devoted by < in the preceding part of this article (see theorems 1 and 2).

Again, if a relation R is such that zRy and yRz together always imply xRz, then R is called a transitive relation. For example, wless than,® ((less than or equal to,® ((ancestor of,® etc., are transitive relations. The. asym¬ metrical transitive relations are .more import¬ ant than any other relations in the exact sciences; for example, ((less than,® ((below,® (

In conclusion, we may notice that the whole theory of arithmetical operations, like addition and multiplication, may be regarded as a part vol. 17 — 39

of the theory of relations; for, as M. Bocher has pointed out, instead of saying: ((two num¬ bers a and b determine a third number c, called their sum,® we may say: ((the three numbers a, b, and c satisfy a certain relation, say R (a, b, c).® Relations of this type are more complicated than those described above, since they hold not 'between two terms, but between three or more terms.

Bibliography. — The most extensive treatise on this subject is E. Schroder's (Algebra der Logikp in four volumes, begun in 1890; the last volume is being published posthumously by E. Muller. J. Venn's (Symbolic Logic> (1881, 2d ed. 1894) is especially valuable for its historical references. The (Manuel de Logistique,5 by L. Couturat, contains the clear¬ est exposition of the whole subject, with an account of the most recent progress. A. N. Whitehead's (Universal Algebra1 (1898) and L. Couturat's P'Algebre de la logique) (1905) treat the algebra of logic from the mathemati¬ cal point of view. J. N. Keynes, in his (Studies and Exercises in Formal Logic) (1894), has developed the subject without mathematical formulation, but in a very useful way for one who approaches it from the point of view of the logician. Other references are the following: (Opuscules et fragments inedits de Leibniz, } ed. L. Couturat (1905) ; Lambert, J. H., (Neues Organon) (1764) ; De Morgan, A., (Formal Logic) (1847) ; Boole, G., (Laws of Thought* (1854; see above) ; Macfarlane, A., (Algebra of Logic* (1879); Johnson, W. E., (Mind* (new series, Vol. I, 1892) ; McColl, H., Proceedings London Mathematical Society) (Vol. IX, 1877), and later papers ; Peirce, C.*

S., American Jour¬ nal of Mathematics (Vols. Ill, IV, VII), Pro¬ ceedings American Academy of Arts and Sci- ence) (Vols. VII, X, XIII), (Memoirs) of the same (Vol. IX), (Studies in Logic by Members of the Johns Hopkins University) (1883) ; Ladd, Christine (Mrs. F. Franklin), (Studies in Logic, etc. (1883), and later papers; Mitchell, O. H., 'Studies in Logic, etc.* (1883); Frege, C., Pegriffsschrift* (1879) ; Muller, E., (Ueber die Algebra der Logik) (1900-01) ; Peano, G., Pormulaire de Mathematiques* (1895, and later editions) ; Huntington, E. V., transac¬ tions American Mathematical Society* (Vol. V, 1904) ; Kempe, A. B., Proceedings London Mathematical Society1* (Vol. XXI, 1890) ; Royce, J., transactions American Mathemati¬ cal Society1* (Vol. VI, 1905) ; Russell, V., (Revue de Mathematique) (Vol. VII, 1901); Principles of Mathematics) (Vol. I, 1903).*

Edward V. Huntington, Associate Professor of Mathematics, Harvard University ; with the co-operation of

Christine Ladd-Franklin, Lecturer at Columbia University.

LOGIER, ld'zhya, Johann Bernhard, Ger-

man-English inventor and musician : b. Cassel, Germany, 1777; d. Dublin, 1846. In 1787 he was taken to England, where he learned to play the flute and piano. For some time he was mem¬ ber of the band of an Irish regiment, subse¬ quently becoming organist of a church at West- port (Cathair-na-Mart), Ireland. He wrote several pieces for the piano, but came into gen¬ eral notice through his invention of the chiro- plast, an apparatus designed to assist beginners in piano-playing. He also evolved a simplified

method of instruction for this and other instru¬ ments. His inventions and method divided music teachers into two groups and Logier took advantage of this publicity to further the sale of his inventions and amassed a large for¬ tune within a short time. From 1821 to 1824 he taught his system in Berlin at the request of the government. He retired to his home near Dublin in 1826. His most popular work was Practical Thoroughbass) (1818).

LOGISTICS, the name given by the Greeks to the art of computation which they distin¬ guished from thei-; arithmetic, the latter term being applied by them to the theory of numbers ; in military science,

logistics means the art of moving troops, in which is comprised the de¬ tails of marches and the fixing of places for encampments and cantonments together with estimates for ammunition and other supplies.

LOGOGRAM, an abbreviation or sign for a word, especially in phonography or short¬ hand, as $ — dollar; .) = establish. It is also a form of anagram in which the maker seeks to find all the words that may be made from all or some of the letters of a word. The whole is interspersed in a series of verses which contain synonyms of these words. To resolve the puzzle the concealed words must be named and also the primary word from the letters of which they have been formed.

LOGOGRAPHERS, or LOGOGRAPHI,

among the ancient Greeks the designation of writers of prose histories prior to Herodotus. In Thucydides, however, the term is applied by this author to all his predecessors. Almost all of these writers were Ionians who wrote in their native dialect. Their works were merely crude attempts to reproduce in prose the cur¬ rent legends and traditions, genealogies, man¬ ners and customs, etc., treated in the great ep¬ ics. There was no criticism, scientific or oth¬ erwise, in these narratives and they appear to be intended rather to amuse their readers than to impart accurate historical knowledge. The principal logographers were Cadmus of Mile¬ tus, Pherecydes of Leros, Hecataeus of Miletus, Acusilaus of Argos, Charon of Lampsacus, Xan- thus of Sardis in Lydia, Hellanicus of Myti- lene, Stesimbrotus of Thasos, Hippys and Glaucus, both of Rhegium, Damastes of Si- geum. Logographers also were called those orators who composed pleadings and sold them to those who required them in the law courts and who were forbidden to employ advocates. The extant fragments of the logographers, with Latin notes, translation, prolegomena and co¬ pious indices, are contained in Muller, C. W., (Fragmenta historicorum GraecorunP (1841— 70). Consult Bury, J. B., (The Ancient Greek Historians) (New York 1909).

LOGOGRAPHI. See Logographers.

LOGOS (Greek Myof, from . Izytiv, to speak), word, language, speech in general. Language being peculiar to man as a reason¬ able being, and speech presupposing thought, logos signifies reason, the faculty of thinking in general. Thus logos has the meaning both of thought and utterance. In Christian theol¬ ogy this term, as used in certain passages of the Scriptures, has been the source of continual

disputes ever since the 3d century of our era. The passage in the Bible which gives rise to

*this discussion is the opening of the Gospel of Saint John: ((In the beginning was the Word, and the Word was with God, and the Word was God. The same was in the beginning with God. All things were made by Him, and with¬ out Him was not anything made that was made,® etc. In the Greek text the expression here translated <(Word® is logos. What is here to be understood by logos, what is its essential character, whether it is a person of the Deity or not, the creative intellect of God, or the Son, through whom He created, or the divine truth which was to be revealed, etc., this is not the proper place to examine, nor will our limits permit us even to enumerate the different opin¬ ions which have been entertained on this inter¬ esting point of Christian metaphysics. We can refer the reader to no better source of informa¬ tion than Neander's (General History of Chris¬ tianity and the Church.**

The generally received doctrine of the logos makes it a person and not a mere name, and maintains that the Word is called God, not by catachresis but in the strict and rigorous mean¬ ing of the term; that the most ancient Fathers of the Church always taught the divinity of the Word and that they derived the idea from the Holy Scriptures alone and not from the Platonic philosophy as many have asserted. On the contrary, it is held that the Hebrew con¬ ception of the logos is of independent origin, though it was natural that in the New Testa¬ ment the Greek word should be adopted to ex¬ press it.

Some of the opinions of modern theolo¬ gians on the meaning of the logos are as fol¬ lows : It is necessary, some say, in order to understand the true meaning of logos, to begin with the examination of Wisdom (sophia), which was prevously used to express the same notion. (Consult the book of Proverbs, viii, 1, seq., and the book of Wisdom, vii, 22, seq.). The poetical author of the Proverbs does not imagine a person separate from God, but only an interior power of God, because in his time there could be no idea of a being pro¬ ceeding from God, the Jews having borrowed this notion at a later period from the Oriental doctrine of emanations. The author of the book of Sirach (xxiv, 3) first uses <(The Word® (logos) of God as equivalent to ((Wis- dom® (sophia), to signify the almighty power of God. The Word being an act of wisdom gave rise to the symbol. John speaks of the logos in the beginning of his Gospel only, and afterward uses the expression pneuma tou theou. From his representation, the following positions have been deduced: the logos was (a) from the beginning of all things (comp. Proverbs viii, 22; Sirach xxiv, 9); (b)

from the beginning with God (comp. Sir. i, 1 ; Wisd. Sol. x, 16; ii, 14; Sir. xxiv, 12). Saint John, therefore says, those who thus interpret him had the same idea of the logos as the apoc¬ ryphal writers ; for the circumstance that the latter ascribe to the logos the creation of all things, while Saint John leaves this point unde¬ cided in his en arche en (in the beginning was), does not amount to a contradiction. Others, particularly the earlier commentators, under¬ stand by logos the Deity himself, that is, the second person of the Deity (according to Saint John viii, 58). But those who adhere to the

former opinion maintain that this is in contra¬ diction to John xiv, 28; xii, 49, 50; v, 19, 20; and that he understood by logos only a power of God, which was communicated to Jesus, on account of which he could claim divine attrib¬ utes and yet call the Father, as the source of this power, greater than himself. Others, as Herder, Paulus, Eckermann, understand by logos the Word of God, which in the Old Tes¬ tament, as the expression of the will of God, is the symbol of his creative power (Gen. i, et seq.). The later Jews represented the divine omnipotence by the Word of God. But it is maintained, on the other hand, from the man¬ ner in which John speaks of the logos, that he understood by it not merely omnipotence, but the Omnipotent. Others following the Fathers of the Church, particularly Eusebius, under¬ stand by logos an independent substance, ex¬ ternal from God, like the nous (intellect) of Plato. But this again, it is said, involves an error, because Plato means by nous only a power of God. Still others, as Mosheim and Schlegel, declare with Irenseus the logos of Saint John to be identical with the logos of the Gnostics; but it is objected that John did not conceive of a plurality like that in the doc¬ trine of scons. Lange considered logos equiva¬ lent to the sophia of the Old Testament, and that to the logos of Philo, and as a distinct per¬ son from God; but, say the others, sophia is not something distinct from God. Paulus, in his Commentary, also identifies the logos of Philo with that of Saint John. But it is said, on the other hand, that John cannot be sup¬ posed to have been acquainted with Philo's notion, as it was not an opinion current at the time, and that the view of the apocryphal writers is more in harmony with his ; moreover, that if Saint John means anything more than an original, external power in God, his <(was God® (Saint John'i, 1) would imply dualism. Doderlein and Storr translated the word logos by doctrina, the abstract being put for the con¬ crete, doctrine for teacher, as in Gen. xlii, 38; 2 Sam.

xxii, 23 ; Luke iv, 36. According to others, ho logos means ho legomenos (the prom¬ ised). The ancient philosophers often dis¬ tinguish two logoi an interior in God or man which merely thinks (logos endiathetos) , and an exterior or uttered (logos prophorikos) . Consult Aall, (Der Logos) (Leipzig 1896) ; Allen, A. V. G., Continuity of Christian Thought* (London 1907) ; Harnack, (History of Dogma* (ib. 1894-99) ; Inge, W. R., in dictionary of Religion and Ethics* ; and (Personal Idealism and Mysticism* (ib. 1907) ; Mackintosh, (The Doctrine of the Person of Christ* (London 1912).

LOGROfiO, lo-gro'nyo, Spain, capital of the province of Logrono, on the Ebro, 30 miles southeast of Vittoria. It is surrounded by ancient walls and ramparts, has a 12-arch bridge over the Ebro, erected in 1138, an arcaded street, an immense bull-ring seating 11,000 persons, and a very ancient church of Santa Maria de Palacio, dating according to tradition from the time of Constantinus Magnus. Lo¬ grono has a large wine trade. In pre-Roman times the district belonged to the Berones. From the Romans it received in succession the names of Juliobriga and Lucronius. In the 8th century it fell to the Moors, but they were soon

driven out. In 1521 the city was besieged by the French unsuccessfully and from 1808 to 1813 French forces occupied it. The dumb painter, Juan Fernandez Navarrete, was born here in 1526. Pop. 23,900.

LOGROSCINO, lo'gro^-she'no, Nicolo, Italian composer: b. Naples, 1700; d. 1763. He wrote several operas in which he developed the opera-buffa style and concluded several in ensemble, an innovation which has since become the custom. His operas are Hnganno per In-ganno* (1738) ; (La violante* (1741) ; (I1 gov- crnatore* (1747) ; cGiunio Bruto* (1750) ; (Tanto bene, tanto male* ; HI vecchio marito* ; (La furba burlata* (1760). Consult Kretzsch- mar, H., (Zwei Opera Nicolo Logroscinos* (in Jahrbuch der Musikbibliothek Peters, Leip¬ zig 1908).

LOGUE, log', Michael, Cardinal, priest of the Roman Church and primate of all Ire¬ land : b. Raphoe, 1 Oct. 1840. Before he was yet a priest he filled the chairs of theology and belles-lettres in the Irish College, Paris, where he was ordained in 1866. Returning to his native diocese of Raphoe in 1874, he was con¬ secrated its bishop five years later. The chair of Saint Eunan in the early ’80’s was no mere seat of Hearned leisure** for its occupant and for his flock in famine times he in one year collected close on £30,000 ($150,000). The parish priests of Armagh chose him as coadjutor to Primate

McGettigan in 1887, their choice was approved by Rome and he became within a few months archbishop and primate of all Ireland. His elevation to the cardinalate in 1893 was a dig¬ nity never before attained in the line of 108 primates from Saint Patrick. Like his English compeer, Cardinal Vaughan, who received the red hat at the same consistory, he has labored strenuously for his own cathedral, the memorable consecration of which took place in the presence of the papal legate in July 1904. Cardinal Logue visited the United States and Canada in 1908, and was present at the ceremonies in cele¬ bration of the centenary of the archdiocese of New York. A second visit was made to Amer¬ ica two years later. An omnivorous reader and a close student and follower of public affairs, he is an admirable though not a prodigal speaker; and is a keen student of nature, a lover of the sea and an expert yachtsman. Cardinal Logue is a representative of the old school of con¬ servative Irish churchmen, whose policies and ideas differ widely from those of the younger clergy of the Ireland of to-day.

LOGWOOD, the heart-wood of Hcema- toxylon campechianum, a leguminous tree which grows wild, in most places, along the eastern shores of Mexico and Central America. From its abundance in some parts near the Bay of Campeachy it is sometimes called Campeachy-wood. The leaves are pinnate ; the flowers small, yellowish and disposed in auxiliary racemes at the extremity of the usually spinous branches. The wood is red, tinged with orange and black, so heavy as to sink in water, and susceptible of receiving a good polish ; and it yields an extract much used in djˆeing. (See Dyes). Though cultivated to some extent in Jamaica, the logwood of commerce is chiefly obtained from Honduras, where the cutting of it forms an extensive but unhealthy branch of business. Haiti and Santo Domingo also pro-

duce much. The finest kind comes from Cam- peachy, the inferior qualities from Honduras and from Jamaica, to which island it is not indigenous although it grows abundantly since its introduction. In the preparation of this wood for use, the trees, which are 20 to 50 feet high, are cut down, the bark and alburnum re¬ moved and the hard centre parts cut up into three-foot logs. It is afterward hewn into much smaller pieces, and ground or rasped to small chips. The aqueous extract is muddy and of a reddish-brown color. By acids the red color is made paler; by alkalis it is converted to purple. Salts of iron, aluminum and lead give precipitates of a blue, violet or purple

color. Logwood is chiefly consumed in dyeing cotton cloth, silk, wool and leather; by mor¬ danting the fabric with iron, black is produced ; with alumina, violet and lilac ; with copper, blue; and with chromium, a black or green — the exact tint depending on the composition of the mordants and logwood liquors, and the mode of application. The coloring power of logwood depends chiefly on a crystalline in¬ gredient called hcematoxylin (q.v.). In medi¬ cine both the extract and the decoction of logwood are used to some extent. The former is prepared by exhausting the wood with boil¬ ing water, filtering and evaporating to a thick- ish syrup ; the latter is the water extract of the wood along with some cinnamon. Both are used as astringents in diarrhoea and dysentery.

LOHE, le'e, Johann Konrad Wilhelm,

German divine and philanthropist: b. Fiirth, near Nuremberg, 21 Feb. 1808; d. Nuremberg,

*2 Jan. 1872. He received his education at the universities of Erlangen and Berlin and in 1831 was appointed vicar at Kirchenlamitz. Here his fervent evangelical preaching won him gen¬ eral attention and also caused his removal by the authorities on a charge of mysticism. A similar experience awaited him at Saint Egidia, Nuremberg; in 1837 he became pastor at Neu- endettelsau, where his work transformed the community and made his name and fame inter¬ national. Fearing spiritual dangers for the Germans emigrating to the United States he founded twTo missionary training houses for them. He founded the Lutheran Society of Home Missions in 1849 and an institution of deaconesses in 1853. He also founded a lunatic asylum, a Magdalen refuge and hospitals. He was a forceful preacher, being gifted with a fine physical presence and a powerful voice. He wrote (Sieben Predigten) (1836) ; (Sieben Vortrage fiber die Worte Jesu am Kreuze) (1859) and other volumes of sermons; also *Samenkorner des Gebets) (36th ed., 1899) ; *Drei Bficher von der Kirche) (1845; 4th ed., 1904) ; (Von der weiblichen EinfalD (13th ed., 1903). Consult Deinzer, J., (Wilhelm Lohes Leben) (3 vols., Gfitersloh 1873; 3d ed., Nurem¬ berg 1901).*

LOHENGRIN, lo'en-gren, a romantic opera in three acts, both music and words by Richard Wagner; first performed at Weimar, Germany, on 28 Aug. 1850; first production in America,

3 April 1871, at the Stadt Theatre, New York; in London, 1875. In this, perhaps the most popular of all his operas, Wagner draws his material from the old 13th century legend of the Holy Grail. The

scene is laid near Antwerp,

early in the 10th century. The German suze¬ rain, King Henry (the Fowler) has arrived to levy troops, and finds a general commotion. Count Frederick of Telramund accuses the fair Elsa of Brabant of having killed her young brother, Godfrey, heir to the late Duke of Brabant, who had left the two children in Telramund's charge. The latter has married Ortrud of Friesland and lays claim to the duchy of Brabant. Elsa is innocent of the crime imputed to her and declares that her brother was taken away. The king resolves to decide the case by a tourney or ordeal by combat, in which Telramund must fieht any champion who may take up the gauntlet on behalf of Elsa. The latter has no champion ; in strong faith she tells of a heavenly knight she had dreamed of who would come to her aid, and publicly declares she will bestow her hand and crown upon her defender. In answer to her prayer a boat drawn by a swan appears on the water, bearing a gallant knight in silver armor. He agrees to fight for her on two conditions — that she shall marry him, and never ask his name, to both of which Elsa pledges herself. Telramund is quickly thrown in the contest, but the knight spares his life. Telramund and his wife are both outlawed; it is she in fact who has stolen the boy and then told her husband that she had witnessed his murder by Elsa. Seeking revenge, Ortrud appeals to Elsa's sympathy and fills the girl's mind with suspicions about her lover. The knight and Elsa are married, in which scene occurs the famous wedding march. In the third act the couple are alone when Elsa, prompted by the incitements of Ortrud, asks her husband the fatal question. Telramund bursts into the room, sword in hand, but is stricken down dead by the knight, who now leads his wife before the king and announces that she has broken her pledge ; he must now divulge his name and leave her forever. He proclaims himself to be Lohengrin, the son of Percival, and a knight of the Holy Grail. The swan reappears with the boat; when Ortrud declares that she had changed young Godfrey into a swan by sorcery. Lohengrin utters a prayer — the swan changes again into the missing boy; Lohengrin glides away in the boat — drawn by a dove, and Elsa falls broken-hearted in her brother's arms.

LOHSE, 16′ ze, Otto, German orchestral leader: b. Dresden, 1859. He received his artistic training under Draeseke, Wfillner, Griitsmachcr and Richter at the Dresden Con¬ servatory of Music. In 1877-79 he was cellist in the Court Orchestra at Dresden and in 1880- 82 was piano teacher at the Vilna Imperial Music School. Subsequently he was conductor of the Wagner Society of Riga where in 1889 he was made conductor of the new Municipal Theatre. Four years later he was made first conductor of the Hamburg opera. In

1895-97 he made a tour of the United States as con¬ ductor of Damrosch's German Opera Company. In 1897-1904 he was general musical director at Strassburg and in the latter year removed to a similar post at Cologne.

LOIGNY, lwa'nye', France, village in the department of Eure-et-Loir, 43 miles south by west of Paris. It was the scene of a battle during the Franco-Prussian War, on 2 Dec.

1870. I he Grand Duke of Mecklenburg gained a great victory over the French under Chanzy. The French lost 15,000 in killed, wounded and prisoners and the Germans 4,200. The Ger¬ mans as a result of the victory at Loigny were enabled to move on Orleans, which soon after¬ ward fell into their hands.

LOIR, lwar, France, a river which rises in Eure-et-Loir, flows southwest for a distance of 186 miles and debouches into the Sarthe. It has been rendered navigable for a total dis¬ tance of about 70 miles.

LOIRE, lwar' (anc. Liger), France, the largest river of the country, dividing it into two nearly equal portions. It rises on the western slope of the Cevennes, in the department of Ardeche, and flows generally northwest and west to its outlet in the Bay of Biscay below Nantes. Its principal affluents on the right are the Arroux, Nievre, Maine, etc. ; on the left the Allier, Vienne, Cher, Indre, etc. Below Nantes, it is more a tidal estuary than a river, and is studded with islets. Above Nantes navi¬ gation is much impeded by shallows. Its whole course is about 645 miles, of which about 450 miles are navigable. The river is subject to disastrous inundations, and dikes (levees) have been constructed along its course. It is connected by canals with the Saone, Seine and Vilaine.

LOISY, lwa-se', Alfred Firmin, French

ecclesiastic and exegete : b. Ambrieres (Marne), 28 Feb. 1857. Of peasant extraction, he attended the school of his native village. Two prizes, one in history and one in orthog¬ raphy, which he received in his last year at school (1868), drew attention to him and led to his being sent to the college at Vitry. The Franco-Prussian War interrupted his studies and returned him to his family; but in October of the following year we find him back at col¬ lege, this time,

however, at Saint Dizier. Dur¬ ing a religious retreat he conceived the desire of becoming a priest and, rather against the wishes of his family, entered the Grand Semi- naire of Chalons-sur-Marne, without taking his degree. Among his instructors was Abbe Ludot, who fell under the suspicion of insinu¬ ating into his students the ideas of Montalem- bert and Lacordaire. In November 1878, after he had been ordained subdeacon, Loisy was designated by his bishop, Monsignor Meignan of Chalons, later cardinal-archbishop of Tours, to continue his studies in the newly organized Institut Catholique in Paris. He did not, how¬ ever, enter into the spirit of the new founda¬ tion, and in less than two months returned to his seminary at Chalons, where in June of the next year (1879) he was ordained by special papal dispensation a priest in the 23d year of his age, and at once appointed cure of Broussy- le-Grand and later of Landricourt, the latter quite near his native Ambrieres. Academic studies being more to his liking, however, than parochial duties in a small curacy, Loisy ob¬ tained the permission of his diocesan to resume his interrupted course at the Institut Catho¬ lique. Here he threw himself with such ardor into the study of Hebrew and Biblical exegesis that in little more than a year he was given a lectureship in Hebrew, to which was added in 1883 a course in Old Testament exegesis based directly on the Hebrew text, and in 1886 still

another in Assyriology. All the while he was engaged on his own dissertation for the doc¬ torate ((Histoire du Canon de l'Ancien Tes¬ tament), which was published in 1890. Al¬ ready therein he exhibits a bias toward the new Scriptural criticism which later on was defined by papal encyclicals as Modernism.® The tendency was so marked in his next work, ((Les mythes Chaldeens de la creation et du deluge (1892), that the seminarians of Saint Sulpice were forbidden to attend his lectures. His dis¬ missal from the Institut followed the appear¬ ance of a number of articles of adjudged modernistic trend in the L'Enseignement bib- lique, a bi-monthly, written throughout and published by himself. This publication he voluntarily suppressed shortly thereafter on the issuance of the encyclical ((Providentissimus Deus® of Pope Leo XIII, which condemned the very critical views championed by Loisy. A retirement for the next five years to the chaplaincy of a girls' school at Neuilly-sur- Seine, under the direction of a convent of Dominican nuns, afforded Loisy the necessary leisure to perfect his apologetic method and prepare for his weighty articles in the Revue d'histoire et de litterature religieuse and the Revue du clerge frangais under various pseu¬ donyms, until, after the appearance in the latter of the first of a series of articles on ((La religion d' Israel (October 1900), Cardinal Richard forbade their acceptance. Separated from*

the Institut and denied the clerical jour¬ nals, Loisy asked and obtained leave from the Minister of Instruction to give courses in the ficole des Hautes Etudes, which he continued until 1904. The works of Loisy which brought him most sharply in conflict with the Church were (La Religion d'lsraeP (1901) ; (Etudes evangeliques> (1902) ; (L'Evangile et l'Eglise) (1902, Eng. trans. 1903) ; (Autour d'un petit livre) (1903), an elaboration of the views ex¬ pressed in the preceding work; and (Le quat- rieme Evangile) (1903). All these books were condemned by the Congregation of the Index on 4 Dec. 1903. Five years later he was ex¬ communicated on the publication of (Les Evangiles synoptiquesP He thereupon ceased the attempts he had previously made at recon¬ ciliation with the Church, discarded the clerical garb and accepted the chair of history of reli¬ gions in the College de France. Among the modernistic French clergy in the last decade of the 19th century and the first of the 20th Loisy was the very storm centre of the movement, carrying its critical exegesis to the logical con¬ clusion of denying to the Church all vestige of dogmatic magisterium in the traditional sense. Yet throughout the whole period of his most active participation in the movement, at least up to the moment of his formal excommunica¬ tion, he stoutly maintained his devotion to the See of Peter and the Church for which it stands, c Catholique j'etais, catholique je

rested he wrote to Bailey Saunders in 1904 ((Quelques Lettres, p. 21) ; but he adds, C(Critique j'etais, critique je rested His friends and foes alike, both within his communion and without it, expressed surprise at this attitude. Yet it was not that he was merely straddling the fence. His anomalous position is perhaps understandable from the nature of his reply in ((L'Evangile et l'Eglise) to Harnack's (Wesen des ChristentumsP Against the ultra-Protest-

antism of Harnack that the essence of Chris¬ tianity, being the interior and individual reali¬ zation of God in the human soul, does at the present time not only not need an organized church, which, at all events has deteriorated from its pristine purity, but is perhaps better off without it, Loisy strenuously maintained the necessity of the church's being a genuine organization, with all hierarchic and governing machinery, with sacraments and means of grace, ordained by God and directed by Him, whose specific function it is to mediate God to the inward man, of course, but to mediate Him through externalities and symbols, and whose function thus to mediate God

ever be¬ comes more perfect. Harnack conceives the transformations through which the Church has past under the metaphor of a stream issuing from a pure fountain, but becoming polluted by the soils through which it flows and discol¬ ored and vitiated by the tributaries that pour into it; Loisy, who claimed to regard the de¬ velopment of the Church in the same light as Newman did, looks upon these transformations as necessary and inevitable, as much so as those of a tree from the seed. But he leaves Rome when he refuses to admit that this Church was really founded by Christ in the form it later assumed. Rather he regards it as the eschat¬ ological <(kingdom," which in the designs of God was to become the repository of faith by a process of development, but which the his¬ torical Jesus of the Gospels, when that narra¬ tive is stripped of later Christian accretions, knew naught of, nor could know aught of, be¬ cause He was unconscious of divine consub- stantiality with the Father and assumed the Messianic role only in the sense in which it was understood by the Jews of His time. It was only with the Council of Nicea that Jesus was recognized to be, in the words of its Creed, ((true God of true God; begotten not made; consubstantial with the Father." With this explanation of the development of the Gospel, Loisy was prepared to accept the whole authoritative teaching of the Roman Catholic Church. The objection usually brought against Loisy's method of apologetics, by Catholic as well as Protestant opponents, is that:,, whereas he professes to be a historical critic, he is rather a rationalistic philosopher; that instead of reasoning from critically authenticated facts of history, he puts reason above history, whence too readily that which is thought to be counter to reason is necessarily assumed to be unhistorical and fictitious.

Bibliography. — A sympathetic biographical sketch is furnished by Alfred Detrez, (L'Abbe Loisy: Biographie critique, etc.' (1909) con¬ taining a bibliography of Loisy's books and principal articles, and some critical references. Fair but adverse criticisms of Loisy's views may be found in Sterrett, J. M.. (The Freedom of Authority' (1905) and Lepin, M., (Les The¬ ories de M. Loisy: Expose et Critique' (1909). Consult also Pesch, C., (Theologische Zeit- fragen' (4 Folge, 1908) ; Lillev, A. L., Mod¬ ernism' (1908) ; Ba'mpton, J. M., Modernism and Modern Thought' (1914) ; Gisler, A., Modernismus' (2d ed., 1912).

Francis J. Hemelt,

Associate Professor of English Language and Literature, Catholic University of America.

LOJA, lo'ha, or LOXA, Ecuador, capital of the province of the same name, situated near the southern frontier of the republic, in a beautiful valley and at an elevation of nearly 7,000 feet. The climate is moderate, due to the great elevation. The city has a cathedral and a college. Its industrial establishments are limited to woolen mills. Gold, silver and cop¬ per are mined in the vicinity; stock raising is carried on with success and cereals, sugar, cotton and tobacco are grown in the surround¬ ing district, giving the city a large trade in these articles and their products. Alonzo de Mercadillo founded Loja in 1546. Pop. about

10,000.

LOJA, or LOXA, Spain., town in the province of Granada, situated 30 miles west of the city of that name, on the Genii, and on the Granada- Algeciras Railway. The town is built on the slope of a hill atop which is a Moorish citadel. It contains two ancient churches and a modern ducal palace. Coarse woolens, leather, paper and silk are manufactured. Loja was a place of great military importance during the struggle with the Moors and was strongly fortified by the latter, being one of the two keys to Granada. Loja is first mentioned in Arab chronicles of 890 a.d. It was taken by Ferdinand III in 1226; was afterward abandoned, fell to the Moors, who lost it to Ferdinand and Isabella after a siege on 28 May 1486. A fine Moorish bridge and many ancient dwellings were destroyed by the earth¬ quake of December 1884. Pop. 18,900.

LOKJEREN, lo'ker-en, Belgium, town in the province of East Flanders, situated at the southern end of the district called Pays de Waes, on the Durme, 20 miles south of Ant¬ werp. It contains a fine church dedicated to Saint Laurent, is well built and has manufac¬ tures of cottons, damasks, chemicals, linen and tobacco. The neighboring region until 1830 or thereabouts was merely a sandy moorland, but has been rendered onˆof the most fertile re¬ gions of Belgium, producing grain, hemp and flax, in which articles the town has a large trade. Lokeren, like other towns of Belgium, suffered severely from the German invasion and occupation (1914-18). The machinery of its factories was cither destroyed or trans¬ ported to Germany, its industries being thus de¬ stroyed. Pop. 22,600.

LOKI, lo'lce, in mythology, the god of strife and spirit of evil. He artfully contrived the death of Balder, when Odin had forbidden everything that springs ((from fire, air, earth and water" to injure him. The mistletoe, not being included, was made into an arrow, given to the blind Hoder, and shot at random ; but it struck the

beautiful Balder and killed him. This evil being was subsequently chained with 10 chains, and will so continue till the twilight of the gods appears, when he will break his bonds ; then will the heavens disappear, the earth be swallowed up by the sea, fire shall con¬ sume the elements, and even Odin, with all his kindred deities, shall perish.

LOKMAN, lok-man', a name that figures in the nroverbs and traditions of the Arabians. According to tradition Lokman was a scion from the stock of Ad, and was once sent with a caravan from Ethiopia to Mecca to pray for

rain in a time of great drought. But God's anger destroyed the whole family of Ad except Lokman, the only righteous one, whereupon the Creator of the world gave him his choice to live as long as the dung of seven gazelles, which lay in an inaccessible hole in a mountain, should last, or for a period equal to the lives of seven successive vultures. Lokman chose the last, and lived for an almost incalculable length of time. The fables bearing the name of Lokman were for the first time made known to Europe through the press in 1615. They were first published in Arabic, with a Latin translation, were afterward appended to an Arabic grammar, published by Erpenius at Leyden, and have since gone through many editions. The most complete manuscript of the fables of Lokman is in the library of the Vati¬ can, in Persian.

LOLA MONTEZ. See Montez, Lola.

LOLACH. See Lepidosiren.

LOLIEE, lo'lya', Frederic Auguste, French essayist and critic : b. 1856. Always devoted to literature he has written a great number of works the majority of which deal with com¬ parative literature. He has been the recipient of several prizes from the French Academy. Among his principal works are (Nos gens de lettres) (1887) ; (Le paradoxe) (1888) ; (Les immoraux) (1891) ; (Dictionnaire des ecrivains et des literatures (1897) ; (Histoire des li¬ teratures comparees* (1905; Spanish and English translations) ; (Les femmes du Second Empire) (1906; English and German transla¬ tions) ; (La comedie frangaise, histoire de la maison de Moliere* (1906) ; (La fete impe¬ rial (1907; English and German transla¬ tions) ; (La vie*

d'une imperatrice (1908; Eng¬ lish and German translations) ; (La comtesse de Castiglione) (1912).*

*LOLLARDISM, lol'ar-dizm, in Great Britain, the tenets of the followers of John Wyclif. The views of Wyclif underwent a process of development as his researches and experience extended, and were by no means the same at all periods of his life. In so far as they departed from Roman Catholicism, they approached and, in some cases, went be¬ yond what subsequently became the doctrine and discipline of Calvinism or Puritanism, commingled with an antagonistic element, Erastianism ; in a large measure they reconciled the English people later to the establishment of the Reformation. Among the articles pro¬ nounced ˆheretical** by an assembly of ecclesi¬ astical notables, convened in. London in 1382 by William Courtnay, archbishop of Canter¬ bury, were these:*

" 1. That the substance of material bread and wine doth remain in the Sacrament of the Altar after consecration.

" 3. That Christ is not in the Sacrament of the Altar truly and really in His proper corporeal person.

"5. That if a man be only contrite, all exterior confes¬ sion is to him superfluous and invalid.

" 7. That it hath no foundation in the Gospel that Christ did ordain the mass.

" 8. That if the Pope be a reprobate and an evil man, and consequently a member of the devil, he hath no power over the faithful of Christ given to him by any, unless, per- adventure, it be given him by the emperor.

" 9. That after Urban VI. none other is to be received as Pope, but that Christendom ought to live after the man¬ ner of the Greeks under its own laws.

"10. That it is against the sacred Scriptures that eccle¬ siastical persons should have any temporal position."

Among 14 articles adjudged to be fterro- neous® were the following :

"13. That a prelate or bishop excommunicating a cleric who hath appealed to the king or the council of the realm, in doing so is a traitor to the king and the realm.

15. That it is lawful for any deacon or presbyter to preach the Word of God, without the authority or license of the Apostolic See, or of a Catholic bishop or of any other recognized authority.

17. Also that temporal lords may at will take away their temporal goods from churches habitually delinquent.

"18. That tithes are pure alms, and that parishioners may for the offenses of their curates detain them, and bestow them on others at pleasure, and that tenants may correct delinquent landlords at will.

" 24. That friars are bound to get their living by the labor of their hands, and not by begging.

Consult Gairdner, J.,

LOLLARDS, lol'ardz, a name which arose in the Netherlands in the 14th century, and which during that and the following century was applied somewhat indiscriminately as a term of contempt to various sects or fraterni¬ ties deemed heretical by the Roman Catholic Church. Different accounts are given of the derivation of the name. According to one opinion the name was first applied to a frater¬ nity formed about the year 1300 at Antwerp, the members of which devoted themselves to the care of the sick and the burial of the dead, and were called Lollards from the Low German lollen or lullen, meaning to sing in a low tone, from the subdued and plaintive dirges that they were in the practice of singing while accom¬ panying dead bodies to the grave. According to another opinion the name was first bestowed upon the followers of one Walter Lollard, who preached peculiar doctrines both in England and on the Continent between 1315 and 1322, till in the latter year he was burned as a here¬ tic. Whatever may have been the origin of the name, it became well known in England about the end of the 14th century, when it was applied to the followers of Wyclif. See Lol- lardism ; Wyclif.

LOLOS, lo'los, an ancient people, so called by their neighbors, holding a large, mountain¬ ous territory in the western edge of Sze-Chouan, China, and hitherto almost unknown, by reason of their savage exclusiveness. They formerly occupied, with the Miao-tze (q.v.) and other primitive tribes, an extensive region in southwestern China conquered from the local autocthones ; but they were themselves con¬ quered by the Chinese in Yunnan in the 14th century, and more completely subjugated about 1727 by the Manchu power. A part of the Lolos then succumbed to circumstances and remained in Yunnan, where they still form a large but humble part of

the population. Great num¬ bers of the tribe, however, migrated to the wild, elevated region in western Sze-Chouan between the Blue River (Yang-tze Kiang) and the Great Snowy Mountains along the border of Tibet, where they set up a community of independent clans with a feudal social system. Their hereditarv chiefs, . however, were orig¬ inally appointed by China, and acknowledge vassalage to China, although refusing admis¬ sion to their country, or any sort of obedience, to Chinese officials. They go boldly among the Chinese — are in fact great wanderers; but no stranger is permitted to enter Lolo territory

except by arrangement with a native prince who will guarantee his good behavior arid final exit. It was only by accommodating himself tactfully to this custom that Vicomte D'Ollone, to whom we owe most of our knowledge of this secluded race, was enabled to travel in Lolo Land.

The Lolos are in race allied to the eastern Tibetans. They are tall and powerfully built, most of the men exceeding six feet in height; have straight, vigorous forms, a complexion resembling that of a swarthy Greek or South Italian, with the eyes large and protected by well-arched eyebrows, the nose aquiline, the mouth shapely, and a self-assured expression and demeanor. Their country has a cold and stormy climate, and the dress of the men is much like that of the Chinese, but each man carries habitually a mantle of thick felt which is his wrapping by day and his bed by night. The women are tall, with regular, often hand¬ some features, and a frank and cheerful dis¬ position, and wear garments singularly like the ordinary dress of European women, often of rich materials procured from the Chinese. Their hair is tastefully arranged, and covered out of doors by a silken turban. The serving class is, of course, much more simply appareled. Soldiers wear a kind of armor, and carry swords, lances and bows, with a few in pos¬ session of poor guns. They travel and fight mainly on horseback, and are skilful riders on their small, tough horses.

The social system is purely feudal. A powerful family has attached to it a group of hereditary serfs that attend to the simple farm¬ ing and care of livestock, of which a large amount is kept, including pigs and chickens. They are assisted by slaves. These slaves are the captives of war-raids, or their descendants; and after a few generations they

become serfs; but nowadays few slaves can be captured. A group of the landholding Hords® are united in vassalage to some one of the several heredi¬ tary ˆprinces® that exercise some sort of con¬ trol of certain large districts, and are fre¬ quently at war with each other. The feudal lords replenish their wealth by raids on their neighbors, by payments from Chinese for the privilege of going into the Lolo country to obtain timber, minerals, furs, the eggs of the wax-insect, etc. The country abounds in coal, copper and precious minerals, but mining ceased with the expulsion of the Chinese since about 1906.

The Lolos, despite the fine personal fea¬ tures described, and a respectable body of laws, formalities and courtesies, are without much civilization. They have no roads or bridges or wheeled vehicles, and almost no industry or trade among themselves. Their best houses even are the rudest of plank-built huts, and contain no furniture except some chests and cupboards ; in the centre is a stone fireplace, the smoke from which escapes where the rain comes in, for the roof is simplv unmatched boards held in place by big stones. Around the lord's house are clustered the even worse huts of his servants, and' the whole is usually enclosed by a defensive wall, for robber-raids are frequent. The villages are walled. Rice is cultivated in the valleys where irrigation is possible, and elsewhere oats, barlev, buckwheat ..and potatoes. The , low .degree t of .social cul¬

ture is a result of isolation and hardships, rather than of stupidity, for in old times the Lolos had the art of writing, which seems to have been general among them, using the equivalent of very ancient Chinese characters. Certain nobles and a class of learned men among them still preserve and copy ancient manuscripts of a genealogical and religious nature; and many such documents are sacredly guarded in Lolo communities in Yunnan, where carved inscriptions in the Lolo language may be found. A collection of these literary relics was taken to France by the D'Ollone expedi¬ tion, and a French-Lolo dictionary has been compiled. French missionaries have reached the independent Lolos, and interested them in Western knowledge; and preparations are mak¬ ing, with the help of one of the most influential ˆprinces,® to express their language in Roman letters, and to print books for these benighted but quick-witted people, to whose many ster¬ ling qualities every European who has become acquainted with them willingly testifies. A period of regeneration therefore seems to be at hand for the Lolo race. Consult Davies, R. H., (Yunnan, the Link between India and the Yanktze> (London 1909) ; D'Ollone, Vicomte, (In Forbidden China) (Eng. trans. by B. Miall, Boston 1913) ; Andrews, R. C. and Y. B., (Camps and Trails in China y (New York

1918).

LOMAMI, lo-ma'me, Kongo Free State, a navigable river of Central Africa which rises near Kazaidi (Msoa), and after flowing almost parallel with the upper course of the Kongo River enters the latter at Isangui several miles below Stanley Falls.

LOMAX, John Avery, American folklor¬ ist : b. Goodman, Miss., 23 Sept. 1870. In 1897 he was graduated at the University of Texas and subsequently studied at the universities of Harvard and Chicago. He was instructor and associate professor of English at the Agri¬ cultural and Mechanical College of Texas from 1903 to 1910 and became secretary of the Uni¬ versity of Texas in 1910. He is well known as a lecturer on American folklore and folk¬ songs; is member of the Modern Language As¬ sociation of America and was president of the American Folklore Society in 1912 and in 1913. He is one of the founders of the Texas Folk¬ lore Society. He has published (Cowboy Songs) (1911) ; (The Book of Texas, with H. Y. Benedict (1916) ; Plantation Songs of the Negro* (1916).*

LOMAX, Lunsford Lindsay, American

soldier: b. Newport, R. I., 1835; d. 1913. His father was an army officer of a Virginia family. Young Lomax was graduated at West Point (1856) and assigned to a cavalry regi¬ ment. He served on the frontier until Virginia seceded when he resigned and entered the Confederate army as captain. He served as a staff officer under Joseph E. Johnston in 1861, and in the West under McCulloch and Van Dorn (1862). While with the Western armies he was engaged in the battles of Pea Ridge, Shiloh and Baton Rouge. From 1863 to 1865 Lomax held a cavalry command in Lee's army and took part in all the great battles. He reached the rank of major-general in 1864. When Lee surrendered, Lomax escaped to Johnston in North Carolina with whom he sur-

redered. After the war he engaged in farm¬ ing in Caroline County, Va., until 1889, when he became president of the Virginia Polytechnic Institute. He was afterward engaged in com¬ piling the official war records at Washington and served as a member of the Gettysburg Battlefield Park Commission.

LOMBARD, lom'bard, Peter, also known under his Latinized name,

Petrus Lombardus, Italian theologian: b. Lugelogno, near Novara, Lombardy, about 1100; d. Paris, 20 July 1164. He was a scholar of Abelard, and traditionally the first doctor of the University of Paris. He then became a teacher of theology, and in 1159 bishop of Paris. In his (Sententiarum Libri Quatuor,) which became the subject of almost countless commentaries, and until the Reforma¬ tion had almost classical authority among theo¬ logians, he placed the opinions of the Fathers, particularly Augustine, in regard to doctrines under certain titles, and then stated the ob¬ jections made to them and the answers given by Church authorities, but without offering any judgment of his own. The name of his work has given him the surname of Master of Sen¬ tences. Consult (Life) bv Protois (1881).

LOMBARD ARCHITECTURE. See

Architecture.

LOMBARD COLLEGE, a coeducational institution founded, in 1851, in Galesburg, Ill., under the auspices of the Universalists. In 1917 there were connected with the school 27 instructors and 234 students. The library con¬ tains about 8,000 volumes. It has a preparatory department and a classical department. The degree A.B. is conferred on those completing the classical course.

LOMBARD STREET, a short street in London, which received its name from having been the residence of the Lombards, the first bankers of modern Europe, who began to flour¬ ish in the 12th and 13th centuries, and whose usurious transactions caused their expulsion from the kingdom in the reign of Elizabeth. It is now chiefly occupied by bankers, and is a place of much importance in the London com¬ mercial world. It is the English equivalent of Wall street.

LOMBARDS, LONGOBARDI, or LAN- GOBARDI, a Germanic or Teutonic people who at the beginning of the Christian era were dwelling on the lower Elbe. They make little appearance in history till the 6th century, when, under their king, Albion, they entered Italy in April 568, and, with the help of Saxons and others, conquered the northern portion, which hence received the name of Lombardy. From 713 to 744 the Lombards had a powerful k;ng in the person of Liutprant, who extended h:s sway, at least temporarily, over the whole of Italy. From that time the power of the Lom¬ bards gradually declined, and finally Char¬ lemagne captured Pavia after a six months' siege, and nut an end to the Lombard kingdom (773 or

774), the last monarch being Desiderius.

LOMBARDY, lom'bar-di, Italy, that part of upper Italy between the Alns and the Po, with Venice on the east and Piedmont on the west. It formed an ancient kingdom, now a northern compartimento embracing the eight provinces of Bergamo, Brescia, Como, Cremona, Mantua, Milan. Pavia and Snndrio, with an

aggregate area of 9,299 square miles and a population in 1911 of 4,790,473. Lombardy took its name from the Longobardi or Lombards. (See Lombards). Herding is a thriving indus¬ try on the mountains; on the lower slopes vines, fruit trees and silkworms are cultivated; on the plains rice and maize are among the principal crops. Linen and cotton are among the manufactures, also motor cars and accesso¬ ries. After the fall of the Lombard kingdom (774) this territory remained attached to the empire of Charlemagne and his successors till 843, when an independent kingdom arose, though before its end (961) it had broken up into a number of independent duchies and civic repub¬ lics. They successfully resisted the attempts of the Emperors Frederick I and II to curtail their liberties, and defeated them in battle. Freed from external danger, they quarreled among themselves, and the country was for many 3'ears more or less an object of contention be¬ tween the king of France and the emperor. The last named having won, Lombardy passed through Charles V to Spain (1535) which held possession until 1713, when Austria acquired the duchies of Mantua and Milan. The provinces were then called Austrian Lombardy, a name which they retained till Napoleon formed in 1797 out of them and other districts the Cisalpine, afterward the Italian, Republic, and at last, in 1805, the kingdom of Italy. By the Peace of Paris, 1814, and the act of the Congress of Vienna, 1815, Austria received back its old Lombard possessions; but in con¬ sequence of . the war of 1859 was compelled to cede them to Victor Emmanuel, king of Sar¬ dinia, by the Peace of Zurich, and in 1861 they became part of the new kingdom of Italy.

LOMBOK, Dutch East Indies, one of the Lesser Sunda Islands, east of Java, between Bali on the west and Sumbawa on the east. Area, 3,136 square miles. The island is moun¬ tainous and of volcanic origin. Between the two ranges which traverse the island, one of them rising to the height of 11,800 feet, there is a plain fertile in rice, cotton, maize, coffee and tobacco. The upper and former ruling class are Brahmans, and the mass of the peo¬ ple of Malay extraction are Mohammedans. The capital, Mataram, on the west coast, was bombarded in 1894 by a Dutch expedition, since when the island is

administered by the Dutch resident on Baili, with which it is conjoined for administrative purposes. Pop. about 400,-

000.

LOMBROSO, lom-bro-zo, Cesare, Italian

criminologist, the founder of the science of criminology: b. (of Jewish parents) Verona, 1836; d. Turin, 19 Oct. 1909. He developed early, and was writing on learned subjects be¬ fore he was out of boyhood. He was educated at Paris, Padua, and in 1862 he was ap¬ pointed professor of psychiatry at Pavia. In 1872 he made the important discovery that pellagra, a disease that affects the Italian peasantry, is caused by diseased maize. He became widelv known through his investiga¬ tions of the abnormal human being, and spent much time in minute measurements of criminal types. His theories encountered great opposi¬ tion, and are not yet entirelv accepted ; but they formed in part the basis for the present crimi- roj anfbrooology.. He looked on genius as a

form of degeneracy; and criminality as mark¬ ing a reversion to an earlier type and as largely the product of nervous disease. He was the author of numerous works including (The Criminal (1887-95) ; (The Man of Genius> (1890; Eng. trans., 1891) ; (The Anarchists5 (1895) ; (The Causes of and Con¬ test against Crime) (1902); (After Death — \Yhat?> (Eng. trans. 1909), and (The Female offender5 (with Ferrero; Eng. trans., New York 1895). Consult the study by Kurella (1892) ; the biography by his daughter (Turin 1906) ; and Ferrero, T. L., (Criminal Man ac¬ cording to the Classification of Cesare Lom- broso) (New York 1911).

LOMENIE DE BRIENNE, lo'ma'nede bre'en, Etienne Charles de, French eccle¬ siastic and politician : b. Paris, 9 Oct. 1727 ; d. 16 Feb. 1794. He entered the Church, in order to facilitate his personal advancement. He be¬ came a doctor of theology in 1751 and in the following year became grand vicar to the arch¬ bishop of Rouen. In 1760 he was consecrated bishop of Condom and three years later was translated to the archbishopric of Toulouse. He was intimate with Morellet, Turgot and Voltaire. He became prominent in the gen¬ eral assembly of the clergy and took a deep interest in social questions. In 1770 he was elected to the Academy and in 1787

became president of the Assembly of Notables. In the same year he succeeded Calonne as head of the Council of Finances. He was involved in several disputes with the Parliament, and finally was obliged to promise to summon the States-General in return for the abolition of Parliament. In 1788 he became archbishop of Sens and on 29 August of that }rear he was forced out of office. He was made cardinal 15 Dec. 1788 and spent the following two years in Italy. After the outbreak of the Revolution he re¬ turned to France and subscribed to the civil constitution of the clergy. For this he was re¬ pudiated by the Pope. The leaders of the Revolution viewed his activity with suspicion in the light of his past political acts and had him arrested at Sens on 9 Nov. 1793. He died in prison either by poison or of an attack of apo¬ plexy. Cardinal Lomenie of Brienne published (Oraison funebre du Dauphin5 (1766) ; (Compte-rendu au roi5 (1788) ; (Le Concilia- teur,5 with Turgot (1754). Consult Perrin, J., (Le Cardinal Lomenie de Brienne episodes de la Revolution5 (Sens 1896).

LOMOND, Loch, lok lo-mond, Scotland, the largest and one of the most beautiful of Scottish lakes in the counties of Stirling and Dumbarton. Its length is about 24 miles; the breadth at the lower or southern end five miles, at the upper end less than half a mile. For 14 miles from the head the breadth does not ex¬ ceed one and one-half miles. The lake is al¬ most entirely surrounded with ranges of hills; and its surface is studded with numerous islands. The principal hills are on the eastern side, where a branch of the Grampians culmi¬ nates in Ben Lomond, 3,192 feet h'gh, on the very border of the lake. Through the glens intersecting the surrounding hills the drainage of the district flows into the lake by the Fal- loch, Endrick, Fruin, Luss and other streams; and the river Leven at the southwestern ex¬ tremity conveys the overflow to the Clyde.

The greatest depth is in the narrower part of the lake, where it reaches 623 feet. Rail¬ way steamboats ply on the loch.

LOMONOSOV, lo-md-no'sof, Mikhail Vasi- lievich, Russian poet and man of science : b. Denisovka (now Lomonosov), near Archangel, 1711; d. 1765. His father was a fisherman in poor circumstances and the youth's schooling was confined to a few books which he almost committed to memory. At the age of 17 he decided to go to Moscow to obtain an educa¬ tion and in that city with the aid of friends secured admission to a school. There he lived in want but made rapid progress in his studies and in 1734 was sent to Saint Petersburg. In the capital he made great progress in physical science and was chosen one of the youths to be sent abroad to finish their

education. At Mar¬ burg he studied metallurgy and subsequently spent two years at Freiberg. In 1739 he pub¬ lished his (Ode on the Taking of Khotin from the Turks,5 which attracted great attention. He also wrote dramas, epigrams, etc., in the style of the period. In Germany Lomonosov married a German girl and soon found himself unable to maintain his domestic establishment on the irregular remittances from his govern¬ ment. He left Germany secretly and in his native country soon rose to distinction. He was at first professor of chemistry in the Uni¬ versity of Saint Petersburg of which he was later made rector, and was appointed Secretary of State in 1764. His Russian grammar was long the standard work in its field and did much to stamp the form of the new Russian after its break with Church Slavonic. Per¬ haps Lomonosov's greatest monument is the great University of Moscow, of which he was the founder and the early policy of which he planned. He was one of the most learned men in Europe. His Russian grammar is said <(to have drawn out the plan, and his poetry to have built up the fabric of his native lan¬ guage.55 He is called ®the father of Russian literature.55 Consult the edition of his works issued by the Imperial Academy of Sciences (4 vols., Saint Petersburg 1892-98) ; Pekarsky, (History of the Academy of Sciences5 (Vol. II, ib. 1873) ; the lives by P. Borzakovsky (Odessa 1911) and B. N. Menshutkin (Saint Petersburg 1911).

LOMZA, 1 o-m'zha, Poland, town on the Narew, 100 miles northeast of Warsaw. It contains an ancient church, a theatre, gymna¬ sium and government buildings. It formerly had a large trade with Prussia and Lithuania; was well fortified; had two citadels, but was several times taken by Germans, Tartars and Cossacks. It fell to Prussia in 1795, but in 1807 came under the rule of Russia. In the Great War of 1914 a battle was fought here between the Germans and Russians, in which the latter were defeated and forced to fall back. In 1918 it became part of the newly erected Polish state. Pop. 28,000, mostly Poles and Jews.

LONDON, Jack, American author: b. San Francisco, 12 Jan. 1876; d. Glen Ellen, Cal., 22 Nov. 1916. He was the son of John London, a frontiersman, scout and trapper, who had come to San Francisco in 1873. His early life was spent on California ranches up to the age

LONDON, CANADA

1 Normal School

Young Men's Christian Association Building

of nine years, when the family removed to Oakland, Cal. From his ninth year, with the exception of intermittent periods at school, his life was one of toil, which has been vividly presented to the readers of his work, for prac¬ tically all of his novels and short stories have a background taken from his own life.

His experiences in youth as an oysterman and bayman, his long voyage on a sealing schooner along the coast north of the Russian side of the Behring Sea, his many short voy¬ ages, his year of following the life of a tramp bent on acquiring experience and investigating social and economic conditions, have all been brilliantly built into his many works of fiction. At 19 years London entered the University of California, but half way through his freshman year he had to quit for lack of money or means to support himself. He went to work in a laundry, writing in all his spare time. London gave up work in the laundry to go to the Klondike during the gold rush there in 1897. He was one of the few who made it in the win¬ ter of that year over Chilcoot Pass. After a year of unsuccessful gold seeking he fell a victim of the scurvy. Unable to get a home-bound steamer, he and two camp mates em¬ barked in an open boat for the Behring Sea. It was immediately upon his return to San Francisco that he began to turn out literature. More than once in his books London insisted that he gained his literary equipment through his hard life. His Alaskan experiences were reflected in his earlier works. He leaped into fame as one of the foremost young American authors with (The Call of the Wild) (1903). In 1904 and 1905, after the series of Alaskan stories had given him great fame and founded the school of writers who for some years after placed their stories in an Arctic setting, London went to Korea as a war correspondent. After his return he settled down to produce fiction in amazing volume, interrupting this only for a number of picturesque cruises. In recent years he and Mrs. London had lived a large part of the time at Hawaii. London was the author of the following: (The Son of the Wolf> (1900) ; (The God of His Fathers> (1901) ; (A Daughter of the Snows5 (1902) ; (The Chil¬ dren of the Frost) (1902) ; (The Cruise of the Dazzler5 (1902) ; (The Faith of Men5 (1904) ; (1904); (1908) ; devolution5 (1910) ; (Burning Daylight5 (1910) ; (1911) ; (The Cruise of the Snark5 (1911); (Smoke Bellew> (1912);

LONDON, Meyer, American lawyer and Socialist: b. Russia, 29 Dec. 1871. His early years were spent in southern Russia but in his 20th

year desiring to obtain a higher education, then impossible in Russia for a man of Jewish race, and being under the surveillance of the secret police because of his known sympathy with the radical elements in Russia, he emi¬ grated to the United States. He earned a pre¬ carious livelihood in New York as printer and cigarmaker for several years. At length he was engaged by the Educational Alliance and there was afforded his long-sought opportunity of educational advancement. He studied law and was admitted to the bar in 1898. Estab¬ lishing his practice in New York's great East Side Mr. London soon became prominent as counsel for labor unions, many of which he organized and helped to build up. In 1910 he helped in the settlement of the cloakmakers' strike in New York by means of the industrial protocol. Two years later he was equally suc¬ cessful in bringing about a settlement between the garment workers and their employers. Meanwhile, Mr. London was very active on the East Side as a community worker and had become a prominent member of the Socialist party. He attended several of the national conventions of that party and in 1914 was ap¬ pointed delegate to the International Socialist Congress at Vienna, which, however, was not held because of the outbreak of war that year. In November 1914, Mr. London was elected member of the 64th Congress from the 12th New York District, being the first member of his party in the East and the second in the country to be so honored. He was re-elected to the 65th Congress in 1916. Considerable criticism was directed toward his attitude to the many measures introduced in the House after the entry of the United States into the Great War. He voted against the declaration of war and against the selective service act and many other measures for the active participa¬ tion of the country in the war. In November 1918 Mr. London was for the third time the Socialist candidate for Congress from the 12th District, but his defeat was brought about by a coalition of the Democrats and Republicans, who placed a fusion candidate in the field against him, and by a united vote were enabled to overcome the strong Socialist vote in the district.

LONDON, Canada, city in the County of Middlesex, Ontario, at the junction of the north and south branches of the Thames River, midway between Niagara Falls and Windsor, about 23 miles north of Lake Erie, and on the Grand Trunk, the Canadian Pacific, the Michi¬ gan Central and the Pere Marquette railroads. London was selected by Governor Simcoe in 1794 as the location of the future capital of Upper Canada, but this selection was set aside in favor of York (Toronto). The first clear¬ ings were made by the Talbot settlers here in 1818. The principal manufactures are stoves,

furniture, car works, lumber products, chew¬ ing gum, cigars, clothing, agricultural imple¬ ments, carriages, electrical machinery and sup¬ plies, shoes, iron rolling mills, flour mills, chemicals, breweries and cement products.

The principal institutions are the Western University, the Academy of the Sacred Heart,

the Provincial Asylum for the Insane, Victoria and Saint Joseph's hospitals, two orphanages, Conservatory of Music and Harding Hall, a college for young ladies and a collegiate insti¬ tute. London is the seat of Roman Catholic and Anglican bishoprics. Pop. 58,056.

LONDON, England, the largest city in the world, the capital of the United Kingdom of Great Britain and Ireland, and of the British Empire, situated on both banks of the Thames River, about 40 miles from its mouth, the latitude and longitude of Saint Paul's Cathedral being respectively 51° 30′ 48″ N. and 0° 5′ 48″ W. Modern London consists of the city of London as the nucleus, and the occupied sur¬ rounding parts of about 120 square miles taken from the counties of Middlesex, Surrey and Kent. In 1855 the Metropolis Management Act was passed, defining for sanitary purposes, out¬ side the nucleate city of London with 675 acres, 85 parishes, the whole, including the city, cover¬ ing an area of 75,379 acres, 31,422 acres being the county of Middlesex, 23,893 acres in Sur¬ rey and 20,064 acres in Kent. By the Local Government Act of 1888 this area was consti¬ tuted the administrative county of London. In 1899, by the London Government Act of that year, the boundaries of the county were slightly altered, and the whole, with the exception of the city of London, was divided into 28 metro¬ politan boroughs, including the city of West¬ minster. The area of the administrative county is now 74,816 acres, including 31,652 acres formerly in Middlesex, 23,100 formerly in Sur¬ rey and 20,064 formerly in Kent. See London County Council.

Table of the metropolitan boroughs, with their acreage and population in 1901 and 1911:

BOROUGHS

Area — acres

Pop.,

1911

Pop.,

1901

North of the Thames

City of London .

675

19,657

26,923

City of Westminster .

2,502

160,261

183,011

Bethnal Green .

759

128,183

129,680

Chelsea .

660

66,385

73,842

Finsbury .

586

87,923

101,463

Fulham .

1,703

153,284

137,289

Hackney .

3,287

222,533

219,272

Hammersmith .

2,286

121,521

112,239

Hampstead .

2,265

85,495

81,942

Holbom . .'....

405

49,357

59,405

Islington .

3,091

327,403

334,991

Kensington .

2,291

172,317

176,628

Paddington .

1 , 356

142,551

143,976

Poplar .

2,327

162,442

168,822

Saint Marylebone .

1 ,473

118,160

133,301

Saint Pancras .

2 , 694

218,387

235,317

Shoreditch .

658

111,390

118,637

Stepney .

1,766

279,804

298,600

Stoke Newington .

863

50,659

51,247

South of the Thames

Battersea .

2,160

167,743

168,907

Bermondsey .

1,500

125,903

130,760

Camberwell .

4,480

261,328

259,339

Deptford .

1,563

109,496

110,398

Greenwich .

3,852

95,968

95,770

Lambeth .

4,080

298,058

301,895

Lewisham .

7,014

160,834

127,495

Southwark .

1,131

191,907

206,180

Wandsworth .

9,107

311,360

232,034

Woolwich .

8,277

121 ,376

117,178

Total .

74,816

4,521,685

4,536,541

The name London is therefore legally and properly applicable to the entire area within the county boundaries. But outside the county

limits the urban aggregation extends, with numerous large and connected towns, to 15 miles around Charing Cross. These are em¬ braced in the boundaries of the metropolitan and city police districts and constitute Greater London, bringing the total area to 443,424 acres with a population (1901) 6,581,402, (1911) 7,- 251,358; estimate of 1914, 7,419,704.

Climate. — London is one of the healthiest of the large cities of Europe. The death rate per 1,000 living in 1841-50 was 24.8; 1851-60,

23.7; 1861-70, 24.4; 1871-80, 22.5; 1881-90, 20.5;

1891-1900, 19.1. The death rate for 1914 was 15 per 1,000, and the birth rate 24.8 per 1,000. The mean annual temperature is about 50° and the general range of the thermometer is from 20° to 81°; the highest and lowest markings being, for the most part, in August and Janu¬ ary respectively. The prevailing wind is the southwest, and there are few places in the kingdom where less rain falls. In the begin¬ ning of winter London is occasionally envel¬ oped in fogs, which are especially dense in the lower parts, and greatly aggravated by the per¬ petual pall of smoke-laden air overhanging the metropolis. This pall -is occasioned by the general domestic and industrial use of bitumi¬ nous coal. Even when this smoke-cloud does not take the unpleasant form of fogs it keeps the sunshine away to

quite a considerable ex¬ tent, in winter robbing London of fully half the sunshine it ought to enjoy, and giving to the metropolis that general gloom and begrimed aspect of buildings which are so depressing to visitors.

General Aspect, River, Bridges, Main Thoroughfares, etc. — London stands on allu¬ vial deposits consisting of beds of clay and gravel, below which is the hard clay stratum known to geologists by the name of the ftLon- don clay,® in the middle of the great chalk basin extending from Berkshire to the east coast. On the north bank of the Thames, where the prin¬ cipal part of London stands, the site rises gradually at the rate of 36 feet per mile, while on the opposite bank the houses cover a nearly uniform and extensive flat, lying in some places several feet below the highest tides. Within the limits of London the Thames varies con¬ siderably in width. At Putney it is 550 feet, at Battersea 960, at Vauxhall 630, at West¬ minster 275 feet, at Waterloo 1,140 feet, while at Blackfriars it narrows down to 830 feet. At London Bridge, it is 800 feet wide, and at Wool¬ wich 1,470 feet wide. The bridge farthest down the river is Tower Bridge, just below the Tower of London — a bascule bridge, which allows the passage of large vessels. London Bridge con¬ nects the city atˆ King William street with Southwark at the junction of Wellington street and Tooley street. About 500 vards further up the river stands Southwark Bridge, connect¬ ing the city and Southwark. About half a mile farther west Blackfriars Bridge, con¬ necting the city at Bridge street with South¬ wark at Blackfriars road, was widened in 1908. Waterloo Bridge, nearly half a mile above the former, is a granite structure of 9 elliptical spans, and is 1,240 feet long between the abut¬ ments. It is perfectly level, and connects the Strand with the Waterloo road. Westminster Bridge crosses the river at the north end of the Houses of Parliament from Westminster to

rChesham

leshuuti

South Mims

Chipperfield

Shcnhy

IJunton \ KBridgt

Waltham Cross

j Turners HijX >

Waltham Abbe;

jˆuckt mil

Forth Lodge

Chesham', 5s. Doit ij

Mu i/il. ”

Lcaveadon'f

Radlctt.

.Wrolbar

)Flaunden

'Uricket Wood

hallˆLanes

Holmahill

Chandlers V J Cross _ _

\J/ 7%

>ˆAIdenlmn.f

Cheneys

Bailer's Green]

i Sarratt '

'Ordnance)

F.ir/n,,, I

Trent

Park

Thai font Road

Amersham

Loud hams Vf

Enfield

ttchmoreˆ

Chipping \ Barnet

Pore) aim Ho.

Hounds

.11 / /■/./.-

Rowley v Bank

FurzeljiJJ-

jj mDuryiStrcet7 / C=sa \ UMarahl \ ) • Side/

Edmonton] \ / ,

' 'XEdittdntoii/'i

A rkley

Ullauie

llW/cocA'

WSJT'

Elstree 2/j

f/Broe/cley %Hill I

Tottte ridge'

yttemTye .iV/ietatoTie .«<

~).Yatfodd\ // IJr 'aih ■odge\7\ˆ

Kick in aivs woim

Coingforaˆ Sfe]J Chingturd Hatch

7 \

■Broom Uil

Jhghwood Hill /A I I ,,c

f\Hyc – TToo < 7«ztA? Park jo/ikleigh Par

1/7*111 1 hill ˆ~\Stal I |

jBT\ SSL

Uartsbourne-

< *ldr(orj}*

./tig wet

Chalfout St.OlleaˆT

N Fewlands

Fewlandi

Bentley v Priory

\

Angel JrTi

iStcu

fjate\

Sta.

Linatera

.MiUhAlHtcu' Dollia F In (MY 1ˆ

ChureMEnd

Harebell

> Park/

’inning ‘

Higham Hill J

’ Barkij

Grore Pt

(Hendon

Kenton

;Beaopn§field

altha'instov

iraMldˆSta. i

(fcnaresb

Wan8tea

HaridAgay . tlarrlilgay , Crouqhe’nd

*\ Hendon St \Wel*h IK*

•Sin Black

Ley Street

'A’inpif/Ui

f reenhill

Bwbops Wood (Nbith Uiiil

. \\ Ml \ N. ’

\\ Ken wood ffF= =?-—

’ Preston

Gaidars

Green

Tuialip \ Windmill Hill

■ *rcoir*

'^St^ilfesdcn . Paddocks *

’.ingsend

Hedgcrlcyi

s Child's Uil

.Manor Park

'sia7ky7

Cl apt,,,}.

-Ho\iert*

BurnhamSt

Irwkl/wuodS. /nSUampatead

Tckenham

/ r\ B i^ftdefUuryKta.)

sAVnlesden')

^rj-rTs't oke bridge Park a£&//

s. \d 1 ar leaden

Woodend

/.'forylCfntL 7ft.K?to,

fia

,M atii-Park n [’”"//ord

Hackney ^

BudUurt, t \ Wembley Sta. \ S^\A Ipcrton

^ East Burnham]

Brockhursl

^Wood)/

^/llound

iifCoppiee

ffortholtA

, Langlfy

'Hillingdon ‘ Court.'/

'Pen full

/Fplaistow v 'East Hum

r/illingdon

Farnham

Royal

Weeieml Ho.

Canning

' Mount Pleasant

Langlcj) Pork /

ham Li

' Southall

*11 Mar she**

\Thorpebai

[anvvell

Chalvey'

‘ Heat Drayton

'Slough'

Horsemoorm

Sutton.

"•™™FS7r}v*uiri

Gr$en\s

ita'i ri./l

| (Btohinga L

Plums teas

Charlti

'ennington \ [nVaTtuorrJ

/OBterlejr: Park A

'Dep tfo riiVr^*^

ili'KKNAVlf'ir

xDltton Park

Tbeeruatox

vysukii

l Pur satis-/ \Grecn7 A

Uarhngti

fCastlenau.'

i worth

Spring { Grove /

Kidbrooke ,

Tat chain

Colnt'r/iwk

< amp ton

lewer =v^_ _

Windsor.

— Clewcr Few Town , ^^T^Spltal

Queen, A nne's 7/ k Gate 7f

SSCaatle >

IIAThe

Home Park

*Heathrow *

'South lea.

Hatton

Horton

^uimon o T1

Putney'

^-L^Eost

iclmioncl-

'Clarei

'u. nek

Bedfont

li Putney r

oehampton

Hither Green ,

'ilounslow

Heath

Middle'

\ Old iVinctaor

*LWVay*6uj*

'IKAitton

Heat – '

Bedfont

StanwiiU

y'Eaat

Bedfont

ntahilb

(.Garrfii

■ Halfway Street

•'HVaˆV

\Dulwic)

gamer a Tuujt&ˆs, ˆ Ujwcr Tooting'

rXoWˆ voting

> 'treat]

%f'7 I

'*Vimbledon(

Coin mon /j

Chattcrpfˆ Hul

i Hanworth

'ingstuni

npton \

1 'iXjdiliKtobA „ — 1 iBusby I’arltˆs. .1

Ha nip t o?iQ V i cAfT]

// _

IsfH'ai

fjCoumbeˆ

rˆNeWs

Hiwfttg

*Wimble**

Windsor

•wood

Chieelhuret

Forest

HOI

*Cottenhan « Par/czf**

rˆBroinle>;

Obelisk Pon>l 1

*TiSunbury SLuMT" Charlton s' *

r"' /T1

/ lSunlury 7 Upper < UalUfjrdA

Lower // faUifordW

Merton/r M or den SUtfi

'eiXbalirC

Kelsey' Park

H ut more1'

Thoi-nlonheatK'

■Mewbams /v

/Laleham

Mitchai

*Stroude * Thorpe*

(Littleton

tSjiepj)erto

'Ktuv Maid a

Callowhill.

Enmore Phrk A

Coopers Farin'

[ordon,Park,

Langley . Park ˆ

lit f ham

Sunningdale

utalonvule

// Shepperton: Sta.

Shepperton –

M or den

•Woodsy

Thames— Dit Ion

Loiver

Morden

[Monks

Orchard]

(]dl Trumpsgroe Knoulehill % //

The Greer

Tahvortk1

Chertsey

rultOD

in Thamej

Forth

■*'estongn*

j Hackbrui

[Shirley

'Jl The\ ji ^}£p/tluP'

Carshalton1

Jlesfonemoor ,

Walton Sta.

Addlestonc

Bandonhill

LONDON

Furn borough

.SouthAddingy

Y Hills

Burwood

Park

;Clieain.

Keaton

Ottershaw

Addington

ChesalngU^n

and Yicinity

SCALE OF MILE8

/Clay gate

^mU-Ccuri,

Bollards

[laremont

Woodcote

Lodge

Selsdon Rd.

Great J Woodcufe

Ceston Court

Belmont

Esher

Common

'X Adlingt'.

- *l“Jr*

, Stokcshea th^Jl Lower Malden \ ^ Farm _ S

Selsdon

Burwood

keshott .Heath

Hsf

-

-

-

f ■ ' r' - >. »

■

V •

-

,

■ ..

!r"..

• :

LONDON

621

Lambeth. Further up the river Westminster and Lambeth are again connected by Lambeth and Vauxhall bridges. The Chelsea Suspension bridge connects Chelsea and Pimlico on the north side with Battersea to the west of Batter¬ sea Park; and the Battersea Bridge unites Chelsea and Battersea a littler further west. Putney Bridge, a magnificent structure of granite, connects Fulham and Putney; and Hammersmith Bridge, the last in London, con¬ nects Hammersmith with Barnes. There are also six railway bridges across the Thames. One of them, at Charing Cross, displaced the old Hungerford Suspension Bridge, but is provided with a footway on one side. The two railway bridges at Pimlico, which look like one, belong to the London, Brighton and South Coast Railway Company and the London, Chatham and Dover. The latter company owns a bridge close to Blackfriars Bridge. The modern bridge at Vauxhall is said to be as notable a combination of art and utility as the famous Alexander III bridge in Paris. The once famous Thames tunnel, two miles below London Bridge, opened in 1843 as a roadway under the river, now serves as a railway tunnel. A subway under the river, lined with iron hoops, connects Tower Hill and Tooley street, South¬ wark; and there is a great tunnel for foot- passengers and vehicles between Blackwell and East Greenwich and one for foot-passengers only between the Isle of Dogs and Green¬ wich. A tunnel for both vehicular and pedes¬ trian traffic between Shadwell and Rotherhithe was opened in 1908. Three underground elec¬ tric railways pass

under the river. There is a free steamboat ferry between North and South Woolwich.

Since the passing of the Metropolis Manage¬ ment Act of 1855 great changes have been made in the condition of London. The gigantic operations connected with the sewerage of London and the embankment of the Thames, from Blackfriars to Chelsea on the north side, and from Westminster Bridge to Vauxhall on the south, have produced great changes, while important lines of streets have opened up dis¬ tricts formerly almost inaccessible. These operations have also absorbed the former little rivers and rills, leaving only a corner, an alley or a street — for example, Fleet street — with their name for a monument. In all the districts of London, and particularly in the city and west end, there has been great improvement in the quality of architectural decoration and in public buildings, and stone has to a considerable extent replaced brick and plaster, though not so far as to change the aspect of some localities. Though some of the leading streets are wide, others are narrow and irregular. The decora¬ tive character of the streets about Lombard street, and the Mansion House in the city, has been fostered by the growth of numerous bank¬ ing and insurance companies, while the new office and store buildings in various quarters, especially the one opposite Saint Mary-le- Strand, the hotels and apartment-houses on the American steel structure plan, have added an entirely new style of brick architecture.

«The City" — the historic centre of London — is bounded south by the Thames; it extends north to Charterhouse Square, east to Middle¬ sex street and west to the New Law Courts. Till 1878 this last boundary was marked by

Temple Bar, an old gateway crossing Fleet street near the Temple; but in that year this structure was removed, and a memorial was erected on the site. The portion of the city inside the area of the former mediaeval walls is known as <(London within the walls" ; and all the wards are bounded by the site of the old walls ; the portion outside extends irregularly all around and is known as ((London without the walls."

Of the streets that run through modern London the most important from west to east is that which enters from Kew into Hammersmith, and passing through Kensington forms the finest of all the approaches to London. It stretches on through Brompton, Knightsbridge and Piccadilly, past fashionable Belgravia, with Kensington Gardens, Hyde Park and Padding¬ ton on the north, and

with Apsley House and numerous other palatial edifices facing the Green Park, which constitutes its south bound¬ ary for about half the length of Piccadilly. This line is broken at the east end of Pic¬ cadilly, but passes by Regent street (or by the Haymarket) and Trafalgar square into the Strand, which continues it farther east and much nearer the river, and it stretches on past the Temple, along Fleet street, Ludgate Hill, Saint Paul's Churchyard, where it runs into Cannon street, leading to the Tower on one side, and on the other into Cheapside, Poultney, Lombard street, Fenchurch street, Aldgate and by Whitechapel road and Mile-end road through the congested poorer districts to the county boundary at Bow. The next great artery be¬ tween the west and east extends along the Uxbridge road from Acton, entering the county boundary at Shepherd's Bush and pass¬ ing through Notting Hill, along Oxford street, through Holborn and Newgate street, where it joins the more south line above described, at the west end of Cheapside. Farther north is a third line, extending from near Kensington Gardens, through Oxford and Cambridge Ter¬ race along the Marylebone, Euston, Pentonville road, to Islington, and thence by the city road to Finsbury square. Among the leading thoroughfares running north and south the extreme west is Edgeware road, which enters the county at Kilburn, terminating at its south extremity in Oxford street, from which it runs northwest, but communicating through Park lane with Piccadilly, a little to the west of which, from Hyde Park Corner place, Gros- venor place leads down to Buckingham Palace road, from which Vauxhall road forms a con¬ necting line with the river. Park lane and Grosvenor place on this line contain many of the most select residences of the aristocracy. East of the Edgeware road, Regent street with Portland place, Tottenham Court road with Charing Cross road, and other connecting lines leading to Westminster, Pimlico and Chelsea, Gray's Inn road, and the line of Chancery lane, Farringdon street, etc., leading to Fleet street and Blackfriars Bridge, form some of the most important communications in this direction. Piccadilly and Pall Mall, running east and west. Bond street, Regent street and Saint James' street, north and south, are among the most fashionable streets in the West End, each with its own distinctive character. Bond street con¬ tains the shops most patronized by the aristoc¬ racy; Regent street, according to some tastes

the handsomest street in London, is the fashion¬ able promenade and has some of the finest shops. It unites by Portland place in the north

with Regent's Park and Primrose Hill Park, and intersects Oxford street and Piccadilly, and reaches south to Waterloo place, by which it communicates with Saint James' Park. The greatest and most picturesque thoroughfare in London, not of an exclusively mercantile char¬ acter, is the line of the Strand and Fleet street. By the clearing away of congested streets, and the construction of Kingsway and Aldwich, the largest and most important improvement has been carried out since the construction of Regent street in 1820, and a connection given between North and South London at that part which needs it most.

The Thames Embankments belong to the modern features of London. The Victoria Em¬ bankment on the north side consists of a wide roadway, with a granite retaining wall, sur- • mounted by a parapet broken by pedestals for lamps. There are well-contrived landing-stages and recesses, these features of the Embank¬ ment being rendered highly ornamental by balustrades, pedestals for sculpture, etc. From the Temple to Charing Cross portions of land reclaimed from the Thames have been laid out in public gardens. The Chelsea Embankment extends from the Albert Suspension Bridge eastward past Chelsea Hospital. From the fine building of Saint Thomas' Hospital next West¬ minster Bridge, on the south side of the river, extends the Albert Embankment, continuous with the old quay at Lambeth. A very valuable improvement in the city was the Holborn Val¬ ley Viaduct, extending from Newgate street to the end of Hatton Garden. Broad roads also lead to the Central Meat Market, and to the lower level of Farringdon street, which is crossed by the viaduct obliquely, with three Gothic arches supported on 12 hexagonal columns of polished red granite. The estimated length of streets in London is considerably over 2,000 miles.

Public Buildings in the City. — A number of the most important buildings are situated within the ancient city. The nucleus of the whole is formed by the Bank of England, the Royal Exchange and the Mansion House, which all face toward an open area, the centre of bustle and business, near the middle of the city, adorned with the handsome offices of several assurance companies. The Bank of England, in Threadneedle street, was built in 1732-34 and now forms a low flat, insulated, irregular parallelogram covering four acres of ground. The Royal Exchange is an extensive and ornate building, having a portico sur¬ mounted by a pediment enriched by sculpture. It surrounds an open interior quadrangle, in the centre of which is a marble statue of Queen Victoria. In this court, which is surrounded by covered arcades, the meetings of the merchants on Change are held. An equestrian statue by Chantrey of the Duke of

Wellington occupies the area in front of the building. The Royal Exchange, originally founded by Sir Thomas Gresham in 1566, was burned down in 1666, rebuilt, and again burned down in 1838, the present edifice being erected on its site. The exchanges for special purposes are : The Stock Exchange in Capel court ; the Coal Exchange,

Lower Thames street, a sumptuous though rather incongruous building, the great hall of which is circular, 60 feet in diameter, and 74 feet to the apex of the glazed dome; the Corn Exchange, in Mark lane, opened in 1747, enlarged and partly rebuilt in 1827, and again almost entirely rebuilt. The Mansion House, the official residence of the lord-mayor, was built in 1739-53. The Guildhall, at the north end of King street, Cheapside, is where the principal business of the corporation of the city of London is conducted. The civic ban¬ quets are given here. A splendid new council chamber was completed in 1885. The hall itself is now covered with a decorative open timber roof of the Perpendicular Gothic style ; the old front has been replaced by a new Gothic front. The hall is capable of seating 3,000 persons, and contains some monuments of ordinary sculpture ; and at the west end, raised on ped¬ estals, are colossal figures of Gog and Magog. In 1872 a handsome suite of rooms was added to the Guildhall for the Corporation Library and Museum. Of late years some of the city companies have remodeled or rebuilt their halls. Of these the Clothworkers' Company have pro¬ duced the most elaborate street fagade, but its confined situation in Mincing lane does not permit it to be seen to advantage. The Gold¬ smiths' Hall behind the post office; the Fish¬ mongers' Hall near London Bridge ; and the Ironmongers' Hall, in Fenchurch street, are the principal structures. In the city many old and familiar landmarks have beer removed. The once famous East India House in Leadenhall street, and the Excise Office in Broad street, have been replaced by immense piles of offices ; Doctors' Commons was cleared away for the new street to the Mansion House; Sir C. Wren's College of Physicians is supplanted by meaner buildings ; the site of the Steel-yard, memor¬ able in the history of old London, is absorbed by the city terminus of the South Eastern Rail¬ way; old churches have been leveled, and old inns, hostelries and streets, replete with great historic and literary associations, have dis¬ appeared ; while outside the city a whole region full of good and bad memories was cleared way for the new Law Courts ; the Statepaper Office is displaced by the Foreign Office; Tattersall's is crossed by streets; cham¬ bers occupy the ground of the Old Thatched House ; and a gymnasium has supplanted the British Institution.*

The Tower. — This celebrated fortress, which formed the dominating feature of Nor¬ man London, stands on the north bank of the Thames, immediately adjoining the boundary of the city. Besides its use as a fortress the Tower was the temporary residence of several kings and queens of England, but is now only used as a storage for armor and as headquarters for certain military matters. It occupies an area of 12 acres, enclosed within a wall surrounded by a ditch, now dry, and laid out as a garden. On the south side is an archway called the (

which was erected about 1078 for William the Conqueror by Fundolph, bishop of Rochester. It stands near the centre of the quadrangle, around which are placed several other towers, each having its distinctive name. The Tower contains the Wellington Barracks, erected on the site of the grand storehouse, burned down in 1841; the jewel room, a modern edifice, in which are preserved the regalia of Great Bri¬ tain ; the horse armory, Queen Elizabeth's armory and the church of Saint Peter-ad-Vin- cula.

Church Buildings. — Saint Paul's Cathedral stands on the summit of Ludgate Hill, on a site which was formerly used for pagan worship, and has been occupied by a church from early Saxon times. Old Saint Paul's, a vast Gothic building, was destroyed by the great fire of 1666 and only a few columns of the chapter house now remain to view. The present church, on the same site, the greatest and most conspicu¬ ous architectural ornament of London, planned and carried out by Sir Christopher Wren, was begun in 1675 and completed in 1710. It is 510 feet in length from east to west, while the tran¬ sept is 250 feet long, exclusive of the semi¬ circular portico at each end; the breadth of the west front is 180 feet and the height of the walls 110 feet. The building is crowned with an immense dome, surmounted by a lantern with ball and cross, the height of the latter being 404 feet from the ground. It is built of Portland stone and cost £747,954, which was paid by levying a tax on coal. The interior has bee'n decorated at great cost by voluntary means, ac¬ cording to the original intentions of Wren. Among the monuments it contains are those of Wellington, Nelson, Sir Ralph Abercromby, Sir John Moore, Dr. Johnson, Howard, Sir Joshua Reynolds and eminent men of more modern times. Near together, under the centre of the dome, lie interred Lord Nelson and the Duke of Wellington. Westminster Abbey, one of the finest specimens of the

Pointed style in Great Britain, dates from the reign of Henry III and Edward I, when it was erected on the site of the Saxon minster founded by Sebert. The beautiful chapel at the east end was added by Henry VII, and at the beginning of the 18th century the upper parts of the two towers at the west end were erected from designs of Sir Christopher Wren. It is 360 feet long and 195 feet wide within the walls. Here kings and queens have been crowned, from Edward the Confessor to George V, and here many of them are buried, some with and others without monu¬ ments. In the south transept are the tombs and honorary monuments of great poets, from Chaucer down to Tennyson, whence it is called "Poets' Corner, w and in other parts are numer¬ ous sculptured monuments to statesmen, war¬ riors, philosophers, divines, patriots and emi¬ nent individuals generally, many of whom are interred within its walls. Of other sacred edifices in London the most remarkable are Saint Bartholomew's in West Smithfield, which consists of the chancel and lady-chapel only of the original church and contains some beauti¬ ful specimens of Norman, Early English and later styles of architecture; Saint Saviour's in Southwark, now a cathedral, boasts of the best Early English architecture in London in its choir and lady-chapel, the principal portions of the old church which remain ; Saint Giles',

Cripplegate, a beautiful pre-Reformation church ; Saint Stephen's, Walbrook, the inte¬ rior of which is extremely fine and generally regarded as one of Wren's best works; and the Temple Church, which is one of the very few round churches now remaining in Eng¬ land, and combines transition Norman archi¬ tecture with Early English, the latter in the choir, which was founded in 1240. Besides these there are very few of the older churches left, among the most interesting of which is Bow Church. Of the remainder, Wren's churches are very beautiful, and perhaps Saint Bride's in Fleet street and Saint Martin's-in- the-Fields may also be specified. During the Georgian period hideous specimens of archi¬ tecture were erected, and these still predominate. Among Roman Catholic churches in London are Saint George's Cathedral, in Southwark, finished in 1848, and the magnificent new cathe¬ dral of Byzantine architecture at Westmin¬ ster, with an imposing campanile 300 feet high. The largest arch over any known church doorway admits 10,000 worshippers to ample accommodation under a central dome 120 feet high. The plan dispenses with stained-glass windows — a wise arrangement in dark Lon¬ don. Twenty-nine marble columns support aisles, galleries and arches of transepts, with bases of Norwegian granite and capitals of white Carrara elaborately carved. Many of the Non-Conformist churches are handsome structures. Among the

finest of them are the City Temple on the Viaduct, opened in 1874; Christ-church in Westminster Bridge road; the Apostolic (or Irvingite) Church in Gordon square; and the Tabernacle, Newington Butts; while the site of the former Royal Aquarium at Westminster is now occupied by a mammoth connectional building, built by the Wesleyan Methodists.

The Houses of Parliament. — These consist of the House of Peers and the House of Com¬ mons, with the connected apartments and offices, the whole practically forming one struc¬ ture. It is a highly decorated structure in the Tudor Gothic style, after designs by Sir Charles Barry. It stands on the left bank of the Thames, between the river and Westminster Abbey, and extends over an area of about eight acres. The facade which overlooks the river is 900 feet in length. The walls are of brick, faced externally with magnesian limestone, and the whole edifice is separated from the river by a terrace of Aberdeen granite. It is paneled with rich tracery, and profusely decorated with statues and shields of arms of the kings and queens of England from the Conquest to the present time. In the southwest angle is the Victoria Tower, supported on four pointed arches 60 feet in height; it is 75 feet square and 340 feet in height. There is also a tower in the centre, 300 feet high bv 60 feet, surmounted by a lantern ; and the clock tower, at the north end of the edifice, with its richly decorated spire, rises 320 feet. The House of Peers is an apart¬ ment 97 feet long, 54 feet wide and 45 feet high ; magnificently decorated throughout with carved oak paneling, a profusion of gilding, paintings in fresco and richly stained glass win¬ dows. The House of Commons is a somewhat smaller apartment, fitted up in a much plainer style. Paintings in fresco and the water-glass medium and statues of great statesmen have

been added to the internal decorations; and a statue of the architect has been placed on the staircase leading- up to the committee rooms. Westminster Hall, the most magnificent hall in the kingdom, 290 feet long, was built by Wil¬ liam Rufus and improved 'by Richard II. The hall is not now used except as a members' en¬ trance to the House of Commons.

Palaces. — Saint James', erected by Henry VIII, from a design by Holbein, at the foot of Saint James' street, is an irregular and pictur¬ esque brick building. It is well adapted in¬ ternally for royal

levees and drawing-rooms, which are held here during the fashionable season. Buckingham Palace, facing the west end of Saint James' Park, was built by George IV, and consists, since the erection of the east front, of a quadrangular range of buildings. In the gallery, which is 160 feet long, are some good pictures. The king resides here oc¬ casionally in the spring and summer. White¬ hall — the Banqueting House — designed by Inigo Jones in the Paladian style, is the only remnant of the ancient palace of Whitehall ; the ceiling, painted by Rubens, is the most ex¬ tensive work of that artist existing in the coun¬ try. Kensington Palace, in Kensington Gar¬ dens, is a brick building of the Jacobean period, and was thrown open to the public by Queen Victoria shortly before her death. It was the birthplace of her majesty. Lambeth Palace on the Surrey side of the river, opposite the Houses of Parliament, has been for many centuries the residence of the archbishops of Canterbury. It is a brick edifice, and comprises a great variety of styles in architecture, from Early English downward, and contains a magnificent library. Fulham Palace, the residence of the bishops of London, is a building of no archi¬ tectural pretension. It is pleasantly situated on the Thames, and at one time had extensive and well-timbered grounds. Greenwich Palace, once the home of the Tudor and Stuart sover¬ eigns, is a stone building of considerable beauty, now used as a training school for the navy. Eltham Palace, once a residence of Henry VIII, is now a picturesque and well-preserved ruin.

Government Offices. — These are mostly situated in and near Whitehall. The Treasury, Home Office and Education Department occupy one range of buildings, which have been im¬ proved by a uniform and handsome faqade. The India Office and the Local Government Board face Saint James' Park. The Horse Guards, which are somewhat nearer Charing Cross, have little to admire in their external appearance, but opposite, and next to the ban¬ quet hall of the old Whitehall Palace, from the window of which Charles I stepped to his execution, rises the New War Office, and farther on the New Admiralty Office. An ex¬ tensive pile of government offices, for the Foreign Office and the Colonial Office, has been erected in Downing street. The style is Italian, and the building exhibits a large amount of decorative detail, part of it in red and other colored marbles and granites. Some of the public offices are in Somerset House, once a royal palace of Charles II. It has a spacious and handsome quadrangle, finished in 1782, from designs by Sir W. Chambers; its north faqade, 200 feet in length, faces the Strand; and its south front, 800 feet long, overlooks

the river. The post office, near Saint Paul's, is a spacious and

handsome building. It is 390 feet long, 130 feet wide and 64 feet high. Its faqade, which is toward Saint Martin's-le- Grand, has three Ionic porticoes. A supple¬ mental building for telegraph and other busi¬ ness occupies the opposite side of Saint Mar- tin's-le-Grand. The mint, a stone building of the ordinary Georgian architecture, finished in 1810, stands on Tower Hill, and occupies about 10,000 square yards. The royal arsenal and dockyard for military stores is at Woolwich.

Courts of Law. — London is the seat of the supreme courts of the kingdom. Several of these were long accommodated at Westminster Hall, but in 1883 were removed to the New Law Courts at the junction of the Strand and Fleet street. This great building occupies an area of nearly four acres. It is of a somewhat heavy mediaeval character, a large western tower be¬ ing its chief feature. The Old Bailey, adjoin¬ ing the famous Newgate Prison, has, with the latter, been demolished to make way for the palatial Sessions House of the city of London. It is the central criminal court for the trial of prisoners who have committed serious offenses in the metropolitan district. One or more of the judges of the law courts sit here also in the old court, while the new court is presided over by the recorder and common sergeant of the city of London. There are numerous County Courts within London for the trial of small debt cases. Besides the above there are also the Clerkenwell Session House ; the city police courts, which are held at the Mansion House and Guildhall, and are presided over by the lord-mayor and one of the aldermen ; and numerous police courts, each of which is pre¬ sided over by a barrister of at least seven years' standing. The Inns of Court, as they are called, are four, the Inner Temple, Middle Temple, Lincoln's Inn and Gray's Inn. Every law student, before he can be called to the bar, has to be entered as a member of one of these inns, and to dine a certain number of times in the common hall. The Inner and Middle Temple are close to Temple Bar, be¬ tween Fleet street and the river. The roof of Middle Temple Hall, built in 1572, is considered the best specimen of Elizabethan architecture in London. Lincoln's Inn is situated between Chancery lane and the extensive square called Lincoln's Inn Fields, now open as a public garden. A handsome hall and library in the Tudor style, from the designs of Hardwick, have been erected in the gardens. Gray's Inn stands on the north side of Holborn. The other (< I nns,® Staple Inn, New Inn, Sergeant's Inn, are now in private hands and not connected with the law.

Clubs. — Many of these establishments, hav¬ ing most elaborate and ornate buildings, are among the principal architectural features of

West London. They are situated chiefly in and near Pall Mall and vie with each other in elegance and luxury. The principal are the Athenaeum, possessed of a fine library, and having a great many artists and men of science and letters among its members; the Army and Navy, the United Service, the Guards' and the Junior United Service; the Carlton, the great Tory Club, standing side by side with the Reform Club in Pall Mall, the former number-

LONDON

■y.™.'— — «*"*

1

1 Trafalgar Square

2 Houses of Parliament

WESTMINSTER ABBEY

LONDON

625

ing 2,000 and the latter 1,450 members; the Junior Carlton; the Oriental; the Travelers'; Brooks', one of the oldest of the clubs; White's, a still older club, much frequented by the Con¬ servative nobility; the Conservative; the Devon¬ shire; the Oxford and Cambridge; the Garrick, frequented by lovers of the drama; the Royal Automobile, and four political clubs, which have the largest numbers of members, the Con¬ stitutional having 6,500, the National Liberal 5,000, the Junior Conservative 2,500, and the Junior Constitutional 5,000.

Hotels. — The Grand Hotel, Trafalgar square, occupying part of the site of old North¬ umberland House; the Victoria Hotel and Hotel Metropole in Northumberland avenue; the Hotel Cecil in the Strand; the Savoy Hotel on the Embankment; the Carlton Hotel at the corner of the Haymarket ; the Russell Hotel, occupying the greater part of the east side of Russell square, recently built ; the Piccadilly, occupying the site of Saint James' Hall; and De Keyser's immense hotel at Blackfriars, are the most important and attractive. There are large hotels at Charing Cross and Cannon street in connection with the South Eastern Railway, at Saint Pancras in connection with the Midland Railway, the last named being the largest and one of the handsomest in London ; and at Marylebone in connection with the*

Great Central Railway. Also associated with railways are the Great Western Hotel at Pad¬ dington; the Great Northern Hotel in King's Cross; the Grosvenor Hotel at Pimlico. Other large hotels are the Langham Hotel, Portland place; the Westminster Palace Hotel in Vic¬ toria street; the Salisbury Hotel, in Salisbury square, Fleet street ; the First Avenue near Gray's Inn; and the famous Ship Hotel at Greenwich.

Theatres, Public Halls, etc. — The principal

theatres are Covent Garden (the Royal Opera House), opened in 1858; His Majesty's, the historic Drury Lane, the Haymarket, the Strand, the Adelphi, the Surrey, the Gaiety, the Vaudeville, Saint James', the Savoy, the Avenue, the Comedy, Criterion, Terry's, the Lyric, the Garrick, the Shaftesbury, the Duke of York, the Prince of Wales, Wyndham's, the Court, Daly's, the Kingsway and the London Opera House. There are also many new erec¬ tions, whose names are not so familiar as those just named. Local theatres have been built in many of the outlying parts of London. Saint James' Hall, remarkable almost entirely for its interior and chiefly devoted to musical entertainments of a high class, has recently been demolished. The Queen's Hall in Port¬ land place, and the Albert Hall at Kensington, are devoted to high-class music. Hanover Square Rooms were once famous as concert rooms. The Freemasons' Hall in Great Queen street is well known, and Olympia, at West Kensington, is a large and imposing hall in an extensive area. The Congregational Memorial Hall, and the Agricultural Hall, Islington, the largest covered area in London, are also im¬ portant buildings of this kind. The Empire and the Alhambra in Leicester square and the Hippodrome in Charing Cross, road are the chief of numerous music halls in London.

Markets. — These are numerous, but have generally little to attract either in external beauty or in internal arrangement. The prin- VOL. 17 — 40

cipal ones are Billingsgate for fish; the Borough Market, Southwark, and the famous Covent Garden for vegetables, fruit, flowers and plants; Leadenhall for poultry, game, etc.; Deptford for foreign cattle; Smithfield for fresh meat, poultry and fish; the Islington Cattle Market, in the Caledonian road. The Spitalfields Market and the Woolwich Market, for vegetable products, are included in the pub¬ lic markets. But London is inadequately pro¬ vided. The city corporation owns all the largest markets, and exercises charter rights to prevent others being erected. The result is that all retail markets

are in the hands of costermongers.

Museums, Galleries, Libraries. — The Brit¬ ish Museum (q.v.), founded in 1753, in Great Russell street, is a spacious and imposing edi¬ fice, with a classical facade and sculpture in the pediment, built between 1823 and 1857. It contains an immense collection of books, manu¬ scripts, engravings, drawings, sculptures, coins, minerals, stuffed animals, fossils, preserved plants, etc., and a magnificent collection of ethnographical objects, Egyptian, Assyrian, Etruscan, Greek and other antiquities. An ex¬ tensive building (about 650 feet long) has been erected in the South Kensington quarter for the accommodation of the natural history collec¬ tions. The museum of the Royal College of Surgeons, on the south side of Lincoln's Inn Fields, a rather handsome building, contains a magnificent collection of human skulls from all parts of the world, and many curious surgical preparations. The Soane Museum, on the north side of Lincoln's Inn Fields, possesses many valuable objects, consisting of books, paint¬ ings, prints, manuscripts, drawings, maps, models, plans, etc. The Dulwich College Gal¬ lery contains many interesting pictures left by Alleyne, a contemporary actor of Shakespeare's age. The great South Kensington or Victoria and Albert Museum contains most valuable collections, carefully arranged for purposes of instruction, in connection with which are the schools and headquarters of the Department of Science and Art. The London Museum has, since 1914, through the munificence of Sir William Lever, been accommodated at Lancaster (formerly called Stafford) House, which he bought and presented to the nation. .Museums have also been established at Bethnal Green and in South and North London, and Hertford House, acquired in 1900, with its priceless art treasures, the gift of Sir Richard Wallace, and the Horniman Museum at Forest Hill, the gift of the late Mr. F. J. Horniman, have been added to the London museums. The chief picture gallery in London is the National Gal¬ lery, on the north side of Trafalgar square. It contains upwards of 1,600 paintings, acquired partly from donations, partly by purchase. The National Portrait Gallery is a collection of over 1,600 portraits, busts and medallions, brought together since 1858. For this collec¬ tion a new building beside the National Gallery has been provided by private munificence; and the Tate Gallery of British Art, on the Thames Embankment, has been similarly acquired. The Royal Albert Hall of Arts and Sciences, a memorial to the prince consort, is a huge building between the Horticultural Gardens and Kensington road. It was erected for the pur¬ poses of science and art, musical performances,

exhibitions, etc. It is chiefly used for concerts and is capable of accommodating; an audience of 8,000, while the orchestra itself accommo¬ dates 1,000 performers. The building also con¬ tains a picture gallery. In Hyde Park, im¬ mediately opposite this building, is the Albert Memorial. The north wing of Burlington House, Piccadilly, has been granted to the Royal Academy and a suite of rooms built in the rear of it for exhibitions. The east and west wings of Burlington House are occupied by various learned societies, the Royal Society, the Society of Antiquaries and others. Near the South Kensington Museum and the Albert Hall is the splendid block of buildings of the Imperial Institute, with its various permanent collections and exhibitions and institutions. Besides the British Museum Library the chief libraries are Lambeth Palace Library, the Guild¬ hall Library, Sion College Library, the London Library (subscription), London Institute Li¬ brary, and in addition large circulating libraries and many free public libraries supported by rates.

Educational Institutions. — At the head of these stands the London University (q.v.) which promises to become the foremost scien¬ tific university in the kingdom. Other institu¬ tions are denominational colleges for theology (in some combined with general education), the Royal Naval College, Greenwich; the Royal Military Academy, Woolwich ; the Royal Col¬ lege of Science; the medical schools attached to the hospitals; Royal Academy of Music; Royal College of Music; Trinity College, chiefly for music; several colleges for ladies, etc. Among the grammar and secondary schools are Saint Paul's School, founded in 1509, which provides a free education for 153 boys, with scholarships to Oxford and Cambridge; the Merchant Tay¬ lor; Westminster School, founded by Queen Elizabeth in 1560; University College School, King's College School, City of London School. Mercers' School and schools of the several other city companies. Besides the above and numberless private schools, there are the city and guild institutions for technical education, many high schools for girls, many free schools, numerous schools of the National Society, and the numerous schools of the London county council. . Several polytechnics and centres of technical education have been equipped and sup¬ ported by the London county council, who have also established a system of county scholarships for students. The county council expends an¬ nually about $25,000,000 on elementary and $5,000,000 on higher education.' Of this sum about $10,000,000 is furnished by the govern¬ ment, the remainder being raised through a special tax levied by the council.

Scientific Associations, etc. — Associations for promoting science, art, learning, etc., are exceedingly numerous. The chief are the Royal Society, Burlington House, founded in 1660; the Society of Antiquaries, in the same build¬ ing, originally founded in 1572; the Royal Academy (of painting, etc.), in Trafalgar square, founded in 1768; the Royal College of Physicians, founded by Linacre, physician to Henry VIII, in 1518; the Royal College of Surgeons ; the Royal Geographical Society, with a choice geographical library and large collec¬ tion of maps; the Institution of Civil Engi¬ neers; the Royal Institute of British Architects,

possessing a good library of architectural works; the Royal Institution of Great Britain, established in 1799; the Royal Horticultural Society, which possesses the botanic gardens in Regent's Park, as also at South Kensington and at Chiswick; the Royal Astronomical So¬ ciety; the Royal Asiatic Society; the British Association ; the Zoological Society, with its collection of animals in Regent's Park; the Geological Society and the Anthropological Institute.

Hospitals and Charitable Institutions. —

Besides the three great endowed hospitals, Saint Bartholomew's, in West Smithfield, Guy's, Southwark, and Saint Thomas, Lambeth, oc¬ cupying a large and splendid range of buildings on the Thames Embankment opposite the Houses of Parliament, there are the London Hospital, Saint George's Hospital, the Middle¬ sex Hospital, Westminster Hospital, Charing Cross Hospital, King's College Hospital, Uni¬ versity College Hospital, Saint Mary's Hospital and Royal Free Hospital, all with medical schools attached. Other general hospitals are the Great Northern Hospital, the West London Hospital and the Metropolitan Hospital; be¬ sides the German Hospital, Dalston; hospitals for special diseases, as consumption, fever, can¬ cer; hospitals for women, for children, etc. Bethlehem Hospital (Bedlam), in Saint George's Fields, south of the river, is the chief hospital for lunatics; Saint Luke's Hospital is also for insane patients. The Foundling Hospital (see Foundling) is rather an asylum for illegitimate children generally than a hospital for found¬ lings. Chelsea Hospital and Greenwich Hos¬ pital are institutions by themselves.

Prisons. — There are altogether about a dozen criminal prisons. The most celebrated of these, Newgate, near Saint Sepulchre's Church, a gloomy and massive structure, the scene of a great many executions, was pulled down in 1903. Millbank penitentiary, or prison, an im¬

mense brick edifice with external walls enclos¬ ing upward of 16 acres, has been demolished, and the site utilized partly for workmen's dwellings, and partly for the Tate Picture Gallery. The chief existing prisons are the Wandsworth prison, Holloway prison (for females) ; the model prison, Pentonville, con¬ taining 1,000 cells, in which the inmates are taught useful trades; Wormwood Scrubs prison, a large building standing on the borders of London.

Squares and Public Monuments. — The

squares of London are characteristic; many of them are of great beauty and extent, and planted with shrubbery. Among them are Saint James' square, north of Pall Mall; Eaton, Belgrave (10 acres), Grosvenor, Portman, Cavendish squares, all in the West End; Russell square (10 acres), Bedford, Bloomsbury, Tavistock and Euston squares, in the west central part of the town; Trafalgar square, at Charing Cross, fronting one of the principal thoroughfares, and adorned with public buildings, fountains, the Nelson Column and statues of Charles I, George IV and others. The most conspicuous public monuments are <(the Monument® on Fish Street Hill, London Bridge, a fluted Doric column, 202 feet high, erected in 1677, in com¬ memoration of the great fire of London; the York Column, at the south end of Waterloo Place, a plain Doric pillar of granite, 124 feet

high, surmounted by a bronze statue of the Duke of York; a fluted Corinthian column in Trafalgar square, 176J4 feet high, raised in honor of Nelson, and surmounted with a colos¬ sal bronze statue of the hero, having the pedes¬ tal decorated with bronze sculptures in high relief, and four magnificent lions, by Sir E. Landseer, at the angles; the Albert Memorial, Hyde Park, the most splendid and costly monu¬ ment of recent times, being a Gothic structure, 176 feet high, with a colossal seated statue of the prince under a magnificent canopy elabo¬ rately sculptured and adorned ; and the magnifi¬ cent memorial to Queen Victoria (designed by Sir Thomas Brock and unveiled in 1911) with its beautiful surroundings in front of Bucking¬ ham Palace. There is a statue of the Duke of Wellington in front of the Exchange, and a statue of Sir Robert Peel at the top of Cheap- side. Statues of Sir Charles J. Napier, Sir Henry Havelock and General Gordon stand in Trafalgar square. On the Thames Embank¬ ment, not far from the Temple, now stands the Egyptian

obelisk known as Cleopatra's Needle; and west of it are statues of Robert Raikes, the founder of Sunday schools, General Out- ram, John Stuart Mill and others. In Water¬ loo place is a memorial to the Guards who fell in the Crimea, and here is also a statue of Sir John Franklin. An equestrian statue of the Duke of Wellington at Hyde Park Corner was erected in 1888. A monument to Sir Hugh Middleton, who brought the New River water to London, has been erected on Islington Green. Among other memorials are the Westminster Crimean Memorial, in the open space at the west of the Abbey: the Peabody statue behind the Royal Exchange; an equestrian statue of Prince Albert in Holborn Circus, a statue of Carlyle on Chelsea Embankment and of Lord Beaconsfield in Westminster Palace Yard.

The Parks. — Of these the finest and most fashionable is Hyde Park (q.v.), which lies between the Uxbridge and Kensington roads, and contains about 364 acres. Kensington Gar¬ dens (275 acres), with which Hyde Park com¬ municates at several points, are beautifully wooded and finely laid out. Here carriages are not admitted. Saint James' Park (93 acres) extends from Buckingham Palace to the Horse Guards, and in its centre is an ornamental sheet of water, studded with islets covered with trees and shrubs, and around which swim a great variety of aquatic fowls. The Green Park, 53 acres in extent, lies between Saint James' Park on the south and Piccadilly on the north. Re¬ gent's Park, on the north side of London, covers an area of 472 acres. Round the park is a drive nearly three miles long, and an inner circular drive encloses the Botanic Gardens. At the north end are the Zoological Gardens, to which a fine broad avenue leads along the centre of the park. Battersea Park (200 acres) is on the south bank of the Thames, opposite to Chelsea Hospital. Victoria Park (217 acres) is in the northeast of London, laid out and planted as a place of recreation for the poorer inhabitants of this part of London. Southwark Park (63 acres) is another artificially formed recreation ground. Greenwich Park (185 acres) is one of the most delightful features of South London, and has great natural beauties; the famous Greenwich Observatory is situated here. There are many other parks acquired for use of the

public during late years. Brockwell Park and Dulwich Park in the south ; Avery Hill in the southeast ; Finsbury Park and Clissold Park, on the north borders of London, are the most extensive. But even more typically a part of modern London are the numerous and beautiful heaths and commons preserved for the public: Hampstead Heath on the north, Hackney Marsh on the northeast, Blackheath and Plumstead Common on the southeast and Tooting and Streatham

commons on the south.

Places of Popular Resort. — There are vari¬ ous places of popular resort in London. The Exhibition at Earl's Court, a vast open-air en¬ tertainment accompanied by exhibits of special descriptions arranged in courts and buildings within the grounds, is the largest. Olympia at Kensington is of less magnitude. The Zoologi¬ cal Gardens and the Botanical Gardens, both in Regent's Park, are very largely frequented. The People's Palace, established by contribu¬ tions of the benevolent, in the East End of London (Mile-end road), and opened in 1887, provides a hall for concerts and other enter¬ tainments, a library and reading-rooms, swim¬ ming baths, gymnasiums, social meeting-rooms, winter garden, technical schools, etc. Outside London there are other places of this descrip¬ tion. The most important is the Crystal Palace (q.v.), at Sydenham, formed to a considerable extent of the materials of the exhibition build¬ ing of 1851, removed from Hyde Park. It was originally designed as a great educational mu¬ seum of art, natural history and ethnology; and its gardens and fountains were to rival or sur¬ pass those of Versailles. For years music has taken an important place in the arrangements of the palace. Entertainments of a merely amus¬ ing character have also been largely introduced. A somewhat similar building is the Alexandra Palace, occupying a conspicuous site on Mus- well Hill on the north. Both the Crystal Pal¬ ace and the Great White City at Shepherd's Bush, also an amusement centre, were used for military purposes during the Great European War. Kew Gardens (q.v.) on the west and Hampton Court palace (q.v.) and grounds, built by Cardinal Wolsey and enlarged by William III, are situated further out toward the southwest.

Lighting, Sewerage and Water. — London

is supplied with gas by three separate com¬ panies. These companies include in their area of supply a considerable district outside Lon¬ don. Since 1886 a large number of electric lighting companies have come into existence in 1916 13 companies and 16 local administra¬ tions possessing statutory powers to supply electricity. The county council has been given powers to buy out the electricity undertakings. The sewage works, with which the metro¬ politan board was charged, were formally opened in 1865. The system consists of lines of intercepting sewers on both sides of the Thames intersecting the old outlets, which are retained for service during heavy rainfalls. It consists of three main lines on the north of the river, at different levels, called, respectively, the High Level, Low Level and Middle Level sewers; and of three on the south side, called*

the High, the Effra and Low Level sewers The lines on the north side converge at Lee River, whence, after the Low Level sewage hnr> been pumped to the higher level, the whole

flows in five parallel brick culverts, built in an embankment upward of five miles in length, on to the Northern Outfall and reservoir, about 14 miles below London Bridge. On the south side the Low Level sewage is pumped to the higher level at Deptford, whence the whole is conveyed to a point near the mouth of the river. Works have been established for precipitating the sewage; the deposit after precipitation is carried out to sea and deposited several miles from land. There were formerly eight water companies supplying London and an extensive area around, extending into Essex, Hertford¬ shire, Kent, Middlesex and Surrey. In June and July 1904, the undertakings of these com¬ panies were transferred to the metropolitan water board. The total quantity of water sup¬ plied in 1914-15 amounted to nearly 243,000,000 of gallons daily, an average per head of 36.08 gallons. About 56 per cent of the supply is drawn from the Thames area, 24.7 from the Lee, and 19.3 from wells and springs. The reservoir now under construction at Chingford, with those to be built at Littleton and Stanwell, will enable the board to face its obligations for the next 20 years. Bv an act passed in 1852 all the companies making use of the Thames are obliged to draw from above the limit of the tidal flow. Even above this point the water is not free from pollution by the sewage of numerous populous towns and by the drainage of richly-manured land. Means are adopted for storing the water, and it is all filtered through layers of gravel and sand before en¬ tering the mains; but the system of supply is liable to various objections.

Cemeteries. — The provision of cemeteries for London is in the hands of the metropolitan borough councils and of private companies. Many of those provided by the borough councils and most of those under private management are situated outside the county. Amongst the latter may be mentioned Kensal Green Ceme¬ tery, in which several royal personages have been buried. It was opened in 1832, occupies about 70 acres of ground, and is tastefully planted and laid out. Kensal Green Roman Catholic Cemetery occupies 30 acres. The City of London Cemetery is at Ilford, in Essex.

Communications. — The London population commands two systems

of locomotion, namely, internal and external. The former has refer¬ ence to the purely London requirements, and is by means of omnibuses, tramways, steamboats and railways ; the latter has reference to the connection of London with the rest of the kingdom and the Continent, and are by canals, railways and the Thames. The internal traffic of London has become almost overwhelming. There are 626 railway stations in Greater Lon¬ don and 669 route miles of railways. In 1913 there were 1,933 horse-drawn cabs, 6,308 elec¬ tric tramcars and motor omnibuses and onlv 182 horse omnibuses and tramcars and 8,376 motor cabs. There were also available the Metropolitan, the Metropolitan District and the electric railway systems on other lines.

These are extending in all directions. The great English railways long ago reached the limit of their ability to cope with suburban traffic in and out of London. The old under¬ ground railway was designed to be complete in an inner and outer circle, but the outer circle

was found to be insufficient before it was built, while the inner circle does not even touch what might be called suburbs. Yet so long as it was without competition the two companies owning this system drew great dividends and ignored the demands of their dependent patrons for better service. Not until competition arose in the shape of the Central London Electric Tube Railway did the directors of the District and Metropolitan lines bestir themselves. Ameri¬ can enterprise in acquiring control of the Dis¬ trict Underground brought a flood of under¬ ground railway schemes forward, and Parlia¬ mentary committees were kept busy deciding between rival schemes. They have been care¬ ful to reserve all manner of rights to the gov¬ ernment, refusing, for instance, to grant any route unless the proposed company agreed to provide and maintain a subway for pipes and wires along its lines. This is an effort to un¬ ravel the tangle of such things which the least upturning of the streets shows. These lines are also refused complete independence of each other, and are compelled to arrange transfers and joint time tables.

There are 157 miles of tramways in Lon¬ don, almost entirely under the county council, and Greater London has 353 miles. For 1913-14 the county council tramways carried 522.952,640 passengers, and the receipts were £2,202,489. Some idea of the immensity of the traffic may be obtained from the Greater London passen¬ ger statistics for 1913: Tramways, 811,397,317; omnibuses, 733,931,201 ; local railways, 462,- 019,537 ; trunk railways from a 30-mile radius, 250,000,000. The continuous battle between road and rail for public support, and the en¬ croachments of the latter on

the former, may be illustrated by stating that whereas in 1909 60 per cent of journeys were by road and 40 by rail in 1913 the figures were 68 by road and 32 by rail. Motor power for passenger traffic has developed with enormous rapidity in London : in 1914 the fast horsed vehicles had dwindled down to 4 per cent of the fast vehicles on the street, and that within a period of 12 years. In 1911 they formed 13 per cent. This development as regards goods traffic has been comparatively slow : 85 per cent horse- drawn vehicles compared with 94 per cent in 1911. The faster moving motor power has assisted materially in the migration of the pop¬ ulation from the inner to the outer ring; but the liability to accidents is greater, the number of fatal street accidents having increased from 1 5 1 in 1911 to 658 in 1914. Previous to 1905 the Thames had almost been allowed to drop out of existence as a local traveler's route. In that year the county council inaugurated a steamboat service between Hammersmith and Greenwich, with calls at 25 intermediate points ; but the venture did not prove a success, and the especially built fleet of 30 steamboats was sold.

The principal railway stations are : The Great Eastern, Liverpool street, Fenchurch street; the London, Tilbury, and Southend, Fenchurch street; the London and North West¬ ern, Euston; North London, Broad street; Great Western, Paddington; the Great North¬ ern, King's Cross; Midland, Saint Pancras ; Great Central, Marylebone; South Eastern, London Bridge, where there is a congeries of

stations, Charing Cross and Cannon street ; London, Chatham and Dover, Ludgate Hill and Victoria; the London, Brighton and South Coast Railway, Victoria and London Bridge; the South Western, Waterloo. Many of these stations communicate by the Metropolitan and District railways, distinct systems, but both popularly known as the ˆunderground,® afford¬ ing means of internal communication within the city. Many of the termini are elaborate piles of costly architecture, and have associated with them large and handsome hotels. The Thames affords communication by steam ves¬ sels with the most important points on the British and Continental coasts, as well as with all parts of the world.

Manufactures. — It is impossible within the limits of this article to specify the different kinds of articles manufactured in London. It

contains the largest breweries, distilleries and sugar refineries in the kingdom ; was long the principal seat of silk weaving; has extensive manufactures in metal, including machinery of all kinds, plate jewelry, watches and brass works, and an enormous production of books and prints. Millinery, the making of clothes and of boots and shoes are also extensive branches of industry. Besides these, there are cabinet making, coopering, coach building, rope making, leather working, hat making, ship¬ building, mast making, etc., all of which are departments of manufacture conducted on a large scale; and there are numerous extensive chemical works, soap manufactories and dye works. It is not generally known that London is a very large manufacturing centre.

Commerce, Docks, etc. — For customs purposes the port of London may be said to extend from Teddington Lock to. the sea, a distance of 70 miles. Up till within recent years the upper section was under the care of the corporation of the city for sanitary pur¬ poses, under the Thames Conservancy for navigation and under all sorts of other au¬ thorities for various other purposes, London enjoying the unenviable distinction of being probably the worst-managed port in the world. In 1908 a drastic reform was effected, under which the various and conflicting division of powers was abolished, and the Port of London Authority created to administer everything concerning the port. It consists of a chair¬ man and vice-chairman and 10 nominated and 18 elective members, who are chosen by various persons and bodies representative of the trade of the port. Under its enlightened manage¬ ment London is rapidly becoming one of the most up-to-date ports in the kingdom.

Until the beginning of the 19th century there were no wet docks in the port of London, and ships were loaded or discharged in the river or at wharves. The West India docks, the first to be constructed, were opened in 1802. The docks, some of which are of great extent, are surrounded by wharves, sheds, store¬ houses, vaults and warehouses of the most spacious kind. Saint Katherine's docks, Lon¬ don docks, the West India docks, the East India docks and the Millwall docks (in the Isle of Dogs) extend along the north side of the river from the Tower to Blackwall ; and on the south side, between Rotherhithe and Dept¬ ford, are the extensive Surrey Commercial docks (350 acres), forming one compact sys¬

tem of water basins, extending from the port to Limehouse Reach. The Blackwall tunnel blocks the channel to the upper docks for large vessels, and steamers are compelled to dis¬ charge at from 10 to 20 miles below London Bridge. The dock accommodation of the port was

greatly increased by the construction of the Victoria and Albert docks (opened re¬ spectively in 1855 and 1880), which follow next in order on the north side of the river (op¬ posite Woolwich), which, with extensions, will have a combined water area of 252 acres. Be¬ sides these, there are the splendid docks at Tilbury, on the Essex shore opposite Graves¬ end, 22 miles by river from the Tower, con¬ structed for the purpose of admitting the lar¬ gest vessels at any state of the tide. Here the docks have an area of 90 acres, with two large graving docks. The total water area of the London docks is 645 acres. From London Bridge to Blackwall Tunnel the channel is from 450 to 500 feet wide and 14 feet deep at low water; from Blackwall Tunnel to the Royal Albert dock it is from 500 to 600 feet wide and from 16 to 20 feet deep; from the Royal Albert dock to Crayfordness 600 feet wide and 30 feet deep, and from Crayfordness to the Nore it is 1,000 feet wide and 30 feet deep. The vessels registered at the port in 1914 numbered 3,313, with an aggregate ton¬ nage of 2,513,588 tons.

London is the greatest importing and dis¬ tributing centre in the kingdom, holding as regards imports a position analogous to that held by Liverpool in exports. For East and West India goods, London is the great port; tea, sugar, tobacco, wine, corn, timber, tallow, hides, wool and drugs form large items. Value of imports in 1913, £253,879,289; exports (of United Kingdom), £99,104,682 (of foreign and colonial goods), £58,808,178. The revenue of the Port of London Authority for the year ending 31 March 1915 was £3,738,795, and ex¬ penditure £3,550,987.

Administration. — Greater London has a representation of 62 members in the House of Commons. London is governed by the county council with the city corporation and 28 metropolitan boroughs administering local matters. The most ancient civic officer of London is the lord-mayor of the city of Lon¬ don. He is annually elected from among the aldermen who have been sheriffs of the city, on 29 September, and installed in office on 9 November, when a procession takes place, called the lord-mayor's show. The court of aldermen consists of 26 members, including the lord-mayor. They are chosen for life by the taxpayers of the wards. There are 27 wards. One alderman is elected for each of 24 wards, one for 2 wards, and one serves (is not elected) for a nominal ward. They are prop¬ erly the subordinate governors of their re¬ spective wards, under the jurisdiction of the lord-mayor, and preside over the business in the courts of Wardmote. The civic sheriffs, two in number, are annually chosen by the livery or general assembly of the freemen of London. The common council is a court con¬ sisting of

206 representatives returned by 26 of the wards in proportion to their relative extent; the 27th, or Bridge Ward Without, be¬ ing represented by an alderman. . The general business of this court is to legislate for the

internal government of the city, its police, reve¬ nue, etc. The recorder is generally a barrister of eminence, appointed for life by the lord- mayor and aldermen as principal assistant and adviser to the civic magistracy and one of the justices of oyer and terminer. The "livery® of London is the aggregate of the members of the several city companies, of which there are 75. Of these 12 are termed great companies, and from one or other of them the lord-mayor was formerly chosen. In order of precedence they are : The Mercers, Grocers, Drapers, Fishmongers, Goldsmiths, Skinners, Merchant Tailors, Haberdashers, Salters, Ironmongers, Vintners, Clothworkers. Many of the companies are very rich and possess large halls. Besides the ancient city of London there are under the act of 1899 the 28 metropolitan boroughs, al¬ ready enumerated, each of which for local pur¬ poses is governed by a mayor, aldermen and council. The county council consists of the chairman of the council, 19 aldermen and 118 councillors, the latter being elected by the tax¬ payers of the several divisions, which are, however, not coincident with the boroughs. Other London authorities are 31 boards of guardians, dealing principally with poor re¬ lief ; four boards of school district managers and two boards of sick asylum district man¬ agers, appointed from among their own num¬ ber by the guardians of those unions which are combined into districts ; the metropolitan asylum board, partly elected by the guardians and partly nominated by the local government board, and whose chief duty is provision for infectious sick and harmless insane; the cen¬ tral (unemployed) body and 29 distress com¬ mittees, for the piovision for distress from lack of employment, the latter appointed by the city of London corporation and the metro¬ politan borough councils, the former (with the exception of eight members) appointed by the London county council, the distress com¬ mittees and the local government board ; the metropolitan water board, appointed by the London county council and the local authori¬ ties in the area supplied by the board. The cost of administration of city and county is about £18,000,000 annually. Assessed valua¬ tion, 1915-16, £45,384,722.

Including city, county and borough councils, district councils and boards of guardians, about 170 authorities minister to the needs of Greater London — to what is really one community.

The Police. — The city police, confined to the city proper, is administered by the city corporation as a municipal force, and num¬ bers about 1,161 men. The metropolitan police is not municipal. It is administered by a com¬ missioner appointed by the Home Office. It consists of nearly 22,500 men, whose central offices are New Scotland Yard, a massive build¬ ing on the Embankment near Westminster Bridge. Its area of jurisdiction extends for 15 miles from Charing Cross.

For postal purposes the authorities divide the major portion of Greater London into dis¬ tricts designated by their initial letters, E. C., W. C., W,, S. W., S. E., E., N., N. W., signify¬ ing East Central, West Central, etc.

History. — Though, by the evidence of its name and by archaeological remains, London was occupied by the Celtic Britons before the arrival of the Romans, it was not till the Ro¬

man era that it became a place of importance. There were probably two Roman Londons : the first destroyed by Boadicea and probably con¬ sisting of the area extending from near the Tower on the east by the course of the Lang- bourne (now preserved in Langbourne ward) ; on the north, by the course of the Walbrook on the west and the Thames on the south ; the second probably coincident with the mediaeval walled city. The Roman walls were destroyed by the Danes and were restored by King Al¬ fred. After the Romans left Britain, London assumed a certain amount of independence, and throughout the Anglo-Saxon period it appears to have supported the monarch who was ac¬ ceptable to the rest of the kingdom. Alfred was the first king of the Anglo-Saxons who thoroughly understood the importance of its military position. It suffered by fire in 764, 798 and 801. It was sacked by the Danes, who obtained a considerable settlement in South¬ wark and on the western boundary of the city beyond the Ludgate. At the Conquest London treated with and finally submitted to William. William's first act was to dominate the city by building his military stronghold, the beginning of the Tower of London. He then granted the city its ancient rights by a charter, which is still preserved ; on the accession of Henry I a new charter was granted, and the charter grants increased considerably under the Plan- tagenets, while its municipal privileges were made the standard for governing many of the municipal boroughs in the provinces.

London sided with Stephen against Matilda, took part in the struggle against John for Magna Charta, was severely oppressed by Henry III, strongly supported Edward IV and the Yorkist party in the wars of the Roses, and was faithful to Richard III ; it equipped and dispatched ships to the navy collected to fight the Spanish Armada, and its citizens, officered by the aider- men of the city, fought for the Parliamentarian side against Charles I. Under the later Stuarts and the Georges it became more political than municipal and lost much of its ancient power. In the reign of Henry II the walls on both sides of the river are described in a contemporary account as supplied with numerous towers ; London Bridge, erected instead of a wooden one, was begun in 1176 and finished in 1209. This was to a great extent the same that was taken down in 1832. In 1218 the forest of Middlesex was cleared, and that portion of London north of the city began to be built. In the year 1328 the village of Southwark was in¬ corporated with the city, as it had previously served as a place of refuge for malefactors. In 1349 and 1361 London was visited by the plague. In 1381 broke out the rebellion of Wat Tyler, who fell by the hands of the lord- mayor, hence the dagger on the city arms. In 1416 street lamps were introduced; in the same century some of the principal streets were paved, and wooden houses began to be replaced by others of brick. In the next century im¬ provements were continued, and Westminster was connected with the city by a row of noble¬ men's mansions along the river, the last of which, Northumberland House, has made way for the road leading from Trafalgar square to the Embankment. In the 17th century Spitalfields was covered with houses, and the space north of the Strand as far as Holborn

and from Temple Bar to Saint Martin's lane was extensively built on, as well as the neigh¬ borhoods of Charing Crpss and Pall Mall. The New River was completed and many houses were supplied with water; sewers were dug; smooth pavements were laid down for passen¬ gers and hackney coaches came into general use. But the streets were so narrow and dirty and the houses in so filthy a state that the city was scarcely ever exempt from the plague, which sometimes committed great ravages. In 1666 the great fire broke out and spread over 336 acres, destroying 13,200 houses, 90 churches and many public buildings. In rebuilding con¬ siderable improvements were introduced, and a fire in Southwark 10 years after gave a similar opportunity of improving that district. Popula¬

tion and trade now rapidly increased, partly from the immigration of French Protestants driven from their country by the revocation of the Edict of Nantes. In the 18th century Lon¬ don steadily advanced in extent, prosperity and splendor. In 1780 took place the Gordon Riots, when the mob was in possession of London for two days and committed frightful havoc. Since that disgraceful outbreak the peace of London has never been seriously endangered, and the troops stationed in and around the capital, together with the effective police force that now exists, seem quite adequate to insure it against any similar disturbance. The exten¬ sion and improvements which took place during the 19th century are greater than in any former period, and further changes of great import¬ ance are in operation. The most remarkable event of the century in the history of Lon¬ don was the carrying into effect in 1851 of the first great truly international industrial ex¬ hibition, which has since led to numerous ex¬ hibitions of a similar kind both there and abroad. In 1862 took place the second great international exhibition, and since that time various exhibitions of an international charac¬ ter and largely representing the colonies have been held in specially constructed buildings at South Kensington. The history of London contains many episodes of vast importance to the nation as well as to London itself. As now united for government, it will have to face problems of vast moment. The largest, most populous and richest city that civilization has ever produced, the study of its history and its development must ever be of great import¬ ance and interest.

For incidents in London during the Great War and the air raids on the city see War, European.

Bibliography. — The earliest account of London is Stow's Survey of London, published in 1598, which incorporates the account by Fitzstephen, a monk of the 12th century. Stow's work was continued by other hands. Consult edition published in Oxford in 1908. Among numerous publications the following are recommended: Adcock, St. J., (Booklover's London5 (New York 1913) ; Allen, 'History and Antiquities of London, Westminster and Southward (London 1827-29) ; Besant, Sir Walter, 'Survey of London) (8 vols., London 1902-10); (The Fascination of London> (11 vols., London 1902-08) ; Bond, Francis, 'West¬ minster Abbey5 (Oxford 1909) ; Booth Charles, 'Life and Labours of the People of London) (4 vols., London 1892-1902) ; Bos-

worth, G. F., 'East London) (Cambridge 1911) ; 'West London) (Cambridge 1912) ; Bradley, E. T., 'Annals of Westminster Abbey5 (London 1895) ; Cecil, Evelyn, 'Lon¬ don Parks and Gardensˆ

(London 1907) ; Chancellor, E. B., 'Walks Among London's Pictures) (London 1910) ; 'History of the Squares of London5 (London 1907) ; 'The Private Palaces of London) (Philadelphia 1909) ; Cook, E. C., 'Highways and Byways in London5 (London 1902) ; £)itchfield, P. H., 'London Survivals : Old Buildings and their As- sociations> (London 1914) ; 'Memorials of Old London5 (2 vols., London 1908) ; Dugdale, Sir William, 'History of St. Paul's Cathedral5 (London 1818) ; Gomme, Sir Laurence, 'Lon¬ don in the Reign of Victoria5 (London 1898) ; 'The Governance of London5 (London 1907) ; Hare, Augustus J. G., 'Walks Around London5 (2 vols., London 1878) ; Hutton, Laurence, 'Literary Landmarks of London5 (Boston 1885) ; Knight, Charles, 'London5 (1841-44) ; Loftie, W. J., 'London City: Its History, Streets, Traffic, Buildings and People5 (Lon¬ don 1891) ; Lucas, E. V., 'A Wanderer in London5 (London 1912) ; May, T. R., 'Ancient Royal Palaces In or Near London5 (New York 1901) ; Stanley, A. H., 'Historic Memorials of Westminster Abbey5 (3 vols., London 1888) ; Timbs, John, 'Clubs and Club Life in London5 (New York 1899) ; Wheatley, H. B., 'Ho¬ garth's London5 (New York 1907) ; 'London, Past and Present5 (3 vols., London 1891) ; 'The Story of London5 (in the Mediaeval Towns Series London 1904). The guidebooks of Baedeker and Ward Locke and Murray's 'Handbook for Travelers5 contain, besides a wealth of information, valuable maps and plans. For statistical information the annual 'London Statistics5 and 'Municipal Year Book5 may be recommended.

G. L. Gomme, F.S.A.,

Clerk to the London County Council; Revised by D. S. Douglas, Toronto.

LONDON, Ohio, village and county-seat of Madison County, on the Pittsburgh, Cin¬ cinnati, Chicago and Saint Louis, the Cleve¬ land, Cincinnati, Chicago and Saint Louis and the Ohio Electric railroads, about 25 miles southwest of Columbus and 65 miles northeast of Cincinnati. It is situated in an agricultural and stock-raising region. The manufactures are agricultural implements, tiles, flour, lum¬ ber, shoes and cigars. _ Meat-packing and corn¬ canning are also of importance. The village has a public library, courthouse, State peni¬ tentiary farm and a State fish hatchery. The village owns and operates the electric-light plant. Pop. (1920) 4,080.

LONDON, Declaration of. See Declara¬ tion of London.

LONDON, Pact of. An agreement en¬ tered into and signed by the representatives of Great Britain, France and Russia on 5 Sept. 1914,

according to which

The British, French and Russian governments mutually engaged not to conclude peace separately during the Great War.

The three governments agreed that when terms of peace came to be discussed no one of the allies would demand conditions of peace without the previous agreement of each of the other allies.

The declaration was signed by Sir Edward (now Viscount) Grey, M. Paul Cambon,

French Ambassador in London, and the late Count Benckendorff, the Russian Ambassador. Japan became a party to the agreement on 19 Oct. 1915, and Italy on 30 Nov. 1915. The United States did not subscribe to the treaty, for, as Mr. A. T. Balfour declared in Wash¬ ington on 25 April 1917, ((no treaty could in¬ crease the undoubted confidence with which we look to the United States, who, having come into the war, are going to see that war through. If there is any certainty in human affairs, that is certain.®

LONDON, Treaties and Conventions of.

The following are the most important of the treaties and conventions concluded in London in modern times. The Quadruple Alliance, formed 2 Aug. 1718. On 6 July 1827, a treaty was signed between England, France and Rus¬ sia for regulating the affairs of Turkey and Greece, which led to the establishment of the kingdom of Greece. On 22 'April 1834, a quadruple alliance was formed between Eng¬ land, France, Spain and Portugal against the claims of Don Carlos and Don Miguel to the crowns of Spain and Portugal. On 15 July 1840, a treaty was concluded between England, Russia, Austria and Prussia to compel Mehemet Ali to restore Candia and Syria to the Porte, and on 27 November, at the conclusion of a short campaign by an Anglo-Austrian army in Syria, Mehemet Ali agreed to the terms of the treaty. A convention to close the Dardanelles against ships of war was signed on 13 July 1841 ; and a convention between France and England for suppression of the slave-trade, 29 May 1845. Austria, France, England, Prussia, Russia and Sweden were parties to a treaty, signed 8 May 1852, for settling the succession to the Danish crown and guaranteeing the in¬ tegrity of its dominions in relation to the duchies of Schleswig-Holstein. The rights of the

German Confederation were reserved and the claims of the Duke of Augustenburg on the duchies relinquished on satisfaction. On 13 March 1871, at a conference of the great powers, the neutralization of the Black Sea, effected by the Treaty of 1856, was abrogated. The neutralization of Luxemburg was guaran¬ teed by the five powers at the conference of London, 11 May 1867. The Convention of Lon¬ don, which was concluded on 27 Feb. 1884, be¬ tween the Transvaal and Great Britain, abro¬ gated the Pretoria Convention of 3 Aug. 1881, and instead gave the Transvaal (thenceforward to be known as the South African Republic) independence in regard to its internal affairs, but reserved to the queen the right of veto over all treaties concluded (

Following on a conference of the 10 leading maritime powers convened in London on 4 Dec.

1908, a code of rules was drawn up in February

1909, under the title of the Declaration of Lon¬ don, for the purpose of unifying international practice in the treatment of commerce on the high seas in time of war. This declaration hade fair to revolutionize the position of Great Britain, as the leading maritime power, in wars of the future. Great Britain's traditional pol¬ icy has been to maintain the right of capturing

and confiscating the goods of alien enemies found in enemy ships, and also contraband of war found in neutral vessels. Under the Dec¬ laration of Paris, 1856, the right to capture enemy goods in neutral ships was given up. Under the Declaration of London a further step was taken, and enemy property at sea was to be treated on practically the same footing as enemy property on land. Its advocates con¬ tended that it would save England from many of the difficulties she might otherwise experi¬ ence in time of war in securing supplies ; and its opponents contended that it would mean a virtual abrogation by England of the advan¬ tages her sea power gave her, especially in the destruction of an enemy's commerce. The pro¬ posed adoption of the Declaration of London gave rise to a spirited controversy in England. At the instance of the British government, the Declaration passed the House of Commons, but was refused ratification by the House of Lords. Accordingly the Declaration of London failed to secure that unanimous consent of the subscribing powers necessary to put it into op¬ eration. At the outbreak of the Great Euro¬ pean War in August 1914 Great Britain an¬ nounced her intention to adhere to the terms of the Declaration of London, but this attitude was later abandoned and the constricting

pres¬ sure of her sea power on the commerce of the Central Powers was exerted with increasing vigor by the application of her traditional policy.- This action led to vigorous protests from neutral powers, headed by the United States. See War, European.

LONDON, Treaty of (1915). A secret agreement concluded between Italy, France, Great Britain and Russia on 26 April and finally signed on 9 May 1915, declaring the terms un¬ der which Italy agreed to enter the war on the side of the Entente Allies. ((By the future treaty of peace® Italy was to receive the Tren- tino, the whole of Southern Tyrol, as far as its natural and geographical frontier, the Bren¬ ner Pass; the city of Trieste and its surround¬ ings, the county of Gorizia and Gradisca, the whole of Istria as far as the Quarnero, in¬ cluding Volosca and the Istrian Islands, Cherso and Lussin, as also the lesser islands of Plav- nik, Unia, Canidoli, Palazzuola, S. Pietro Nerovio, Asinello and Gruica, with their neigh¬ boring islets. The province of Dalmatia (

Mohammedan state. 1 he Holy See was not to be permitted to intervene by diplomatic action in regard to peace or questions arising from the war. Finally, Great Britain undertook to provide Italy with a loan of £50,000,000 ($250,- 000,000) on favorable conditions, and Italy agreed to enter the war within one month from the signing of this treaty, the terms of which were to be kept secret.

The treaty was first made public by order of the Bolsheviki Foreign Minister Trotzky in November 1917 as a protest against (

LONDON BRIDGE. A celebrated bridge connecting the city of London with the Bor¬ ough. It was designed by John Rennie and built by his sons (1825-31). Its dimensions are as follows.: Length, 928 feet; width, 54 feet; height above the river, 56 feet. An immense traffic passes over the bridge daily. The pres¬ ent structure took the place of a stone bridge (completed 1209), which was a short distance farther down the river.

LONDON CLAY, in geology and palaeon¬ tology, a formation of the Lower Eocene Age ; so called from its existing at or near London, England. It consists of a tenacious brown and bluish-gray clay, with layers of concretions called septaria. It has a maximum thickness of 600 to 700 feet.

LONDON COMPANY, a joint-stock company organized in London, in 1606, by gen¬ tlemen and merchants for the purpose of found¬ ing an English colony on the Atlantic coast of North America south of 41° north latitude. A council was established in England which con¬ trolled the company. On 23 May 1607 James¬ town was founded by the company. It was governed despotically until 1619 when a repre¬ sentative assembly was instituted. The charter was annulled by the king in 1624 and its pow¬ ers and interests were vested thereafter in the Crown. Consult Brown, A., (The First Repub¬ lic in America) (Boston 1898) ; Ellyson, J. T., (The London Company of Virginia (New York 1908) ; McDonald, W., (Select Charters and Other Documents) (ib. 1899) ; Tyler, L., (England in America) (1904).*

LONDON COUNTY COUNCIL. The

county of London, nearly 120 square miles in area, is split up into 29 districts for local ad¬ ministrative purposes. Of these, two are cities, those of London and Westminster; one is a royal borough — Kensington — and 26 are bor¬ oughs. Each is self-contained and self-gov¬ erning for all purely local matters and the dif¬ ferent districts are clearly defined and recog¬ nized. There are other areas for other pur¬ poses — for instance, the Poor Law is admin¬ istered by 31 duly elected boards of guardians, but the districts controlled by these boards do not exactly correspond with those governed by the borough or city councils. It is expected that future legislation may do away with this anomaly and make the Poor Law areas the same as those of the boroughs, possiblv also abolishing the boards of guardians and trans¬ ferring their duties to the borough councils. On the other hand there are those who predict the abolition of the borough councils also and the unification of London under one central authority. The present system leaves much to

be desired, if only for the equalization of rates, each borough differing from the others in the amount annually required — the inhabitants of the poorer districts, with their smaller rateable value, having as a rule to pay much higher rates than their more fortunate fellow-citizens in dis¬ tricts where better conditions prevail.

Up to 1855 there was no uniformity of any sort for local administration. The city of Lon¬ don, the (

Each borough is governed by a mayor, al¬ dermen and councillors, the numbers of the two latter being fixed by an order in council. The maximum number of members of the councils are 10 aldermen and 60 councillors in addition to the mayor, who need not previously

have been a member of the council, but must be qualified to be one. The mayor may receive any remuneration the council may think rea¬ sonable. He is also, by virtue of his office, a justice of the peace for the county borough for the year of his mayoralty and the succeeding one. No one can be elected to any council un¬ less he is either a parochial elector, or has re¬ sided in the borough for 12 months preceding his election. It is noticeable that by a special provision in the act no woman is eligible to hold any of the above offices, although this was not the intention when the bill was introduced.. Once elected the councils remain in office for three years. The first councils took office on 9 Nov. 1900.

For details of the constituent boroughs of the county of London see under Battersea; Bermondsey; Bethnal Green; Camberwell; Chelsea; Deptford; Finsbury; Fulham; Greenwich; Hackney; Hammersmith; Hampstead; Holborn; Islington; Kensing¬ ton; Lambeth; Lewisham; Paddington; Pop¬ lar; Saint Marylebone; Saint Pancras; Shoreditch; Southwark; Stepney; Stoke

Newington; Wandsworth; Westminster, City of; Woolwich.

LONDON UNIVERSITY, England, es¬ tablished as a joint-stock company in 1826, re¬ ceived in 1836 two charters, one for an associa¬ tion retaining the name of London University and having power to examine candidates and grant degrees, and the other for a teaching body — the University College — entitling it to prepare students for the degrees conferred by the university. The object was to render aca¬ demic honors accessible to all without distinc¬ tion of creed or class. The university became purely an examining body, granting degrees to all who passed the prescribed examinations but not undertaking any teaching functions. In 1878 women were admitted to degrees. An in¬ fluential movement in favor of the establish¬ ment of a teaching university in the metropolis arose, however; from 1888 commissions had the matter in hand and in 1898 the London University Act was passed to give effect to their recommendations. A commission appointed to draw up statutes and regulations for the uni¬ versity in accordance with the act had its work formally ratified 29 June 1900, and the newly- constituted university was established, the gov¬ ernment granting the eastern and central por¬ tions of the Imperial Institute building to the university for its accommodation. The eight faculties comprise arts,

science, law, medicine, theology, music, engineering and economics and political science and the degrees conferred are LL.D., LL.B., M.D., M.B., M.S., B.S., D.Sc, B.Sc., D.Lit., M.A., B.A., D.Mus., B.Mus. Can¬ didates for any degree must first pass the ma¬ triculation examination, for which the subjects are Latin, English, mathematics, general ele¬ mentary science and one other subject selected from a prescribed list, including Greek, French, German, Sanskrit, Arabic, elementary mechan¬ ics, chemistry, sound, heat and light, magnet¬ ism and electricity and botany. For the ordi¬ nary degrees of B.A. and B.Sc. two other ex¬ aminations must be taken. In the faculty of arts the highest degree is doctor of literature. Examinations are held at provincial centres as well as in London. The incorporated colleges and schools of the university are 36 in number and include University College and King's College in all faculties; Hackney College, New College, Regent's Park College, Wesleyan Col¬ lege (Richmond), London College of Divinity in theology; Royal Holloway and Bedford Col¬ leges in arts and science ; the Royal College of Science ; the South-Eastern Agricultural Col¬ lege, Wye ; the medical schools of Saint Bar¬ tholomew's, the London, Saint Thomas's, Saint George's, the Middlesex, Saint Mary's, Char¬ ing Cross and Westminster hospitals; the Lon¬ don School of Medicine for Women ; the Cen¬ tral Technical College of the City and Guilds Institute ; and the London School of Economics and Political Science. The supreme governing body is the senate, consisting of the chancellor, 4 members appointed by the Crown, 17 mem¬ bers elected by convocation, 1 of them being the chairman of convocation, 2 each elected by the Royal Colleges of Physicians and of Sur¬ geons, 1 appointed by each of the four Inns of Court and 2 by the Incorporated Law Society, 2 each chosen by University and King's Col¬ leges, 1 representing the Corporation of London,

2 appointed by the London county council, 1 representing the City and Guilds Institute and 16 elected by the faculties. The senate is de¬ barred from imposing any religious test, or from imposing any disability on the ground of sex. There are three standing committees of the senate, namely, the academic council, the council for external students and a board to promote the extension of university teaching. The chancellor, vice-chancellor and chairman of convocation are ex officio members of all three committees. Convocation consists of the chancellor, the vice-chancellor, the members of the three standing committees and the registered graduates of the university of prescribed stand¬ ing. The Parliamentary representative of the university is elected by the duly qualified male members of convocation.

In 1909 a royal commission was appointed to enquire into the affairs of the university, under the chairmanship of Mr. (now Lord) Haldane. The commission's report, issued in 1913, expresses the view that the entire organ¬ ization of the university is radically defective; recommends certain limitations in the admis¬ sion of external students to its examinations ; the creation of a small executive senate pre¬ dominatingly lay in character ; organization by faculties ; and effective control of the medical schools by the university. Steps are now being taken to carry out these recommendations.

The library of University College contains 150,000 books and pamphlets. In 1913-14 the total number of students who appeared for ex¬ amination at London University was 11,920, and the total of internal students was 4,888. There are 1,078 accredited teachers.

LONDONDERRY, Charles William Stewart Vane, 3d Marquis of, British mili¬ tary officer and diplomat : b. Dublin, Ireland, 18 May 1778; d. London, 6 March 1854. He served under Sir John Moore and (as adju¬ tant-general) Sir A. Wellesley, in the Penin¬ sula, distinguishing himself there at the bat¬ tles of Fuentes D'Onora and Ciudad Rodrigo, was present at Lutzen and Leipzig and was English Ambassador to Berlin in 1813. He was Ambassador to Vienna the next year and Min¬ ister-Plenipotentiary at its congress in 1815. By his marriage with Miss Vane-Tempest he suc¬ ceeded to immense estates in the county of Dur¬ ham and devoted himself to their improvement and to the welfare of his tenantry. He suc¬ ceeded to the marquisate of Londonderry on the death of his brother. Under his original name of Stewart he wrote the ˆHistory of the Peninsular War> (1808-13); (Narrative of the War in Germany and France, 1813— 14) (1830) ; and edited the of Viscount Castlereagh, his brother (1850).

LONDONDERRY, or DERRY, Ireland, city, seaport, county borough. Parliamentary borough and assize town in the county of the same name, province of Ulster, on the Fovle, 23 miles from its mouth and 95 miles hv rail north-northwest of Belfast. Waterside, a— ub- urb on the opposite river bank, is united to the city by the iron Carlisle Bridge, 1,200 feet long. The houses of the town rise on the hill tier upon tier, while the summit is crowned by the cathedral. The ancient portion of the city is surrounded by a rampart 1,708 yards long. It

contains a small square, called the Diamond, from which four main streets diverge. The walls are pierced by seven gates, giving com¬ munication with other pˆrts of the town, the greater part of which lies outside the walls. The most important public buildings are the guildhall, the county courthouse, the post office, the custom-house, the harbor offices, the jail, Gwyn's Institution, the model school, Magee College, Foyle College, Saint Columb's College, the school of science and art, the lunatic asy¬ lum and Ebrington Barracks. The harbor is commodious and vessels of large tonnage can discharge at the quay, which extends for nearly two miles along the river and is provided with a graving-dock. An extensive foreign, colonial and coasting trade is carried on with English and Scotch ports, while Glasgow transatlantic steamers call at the mouth of the river. The principal export is agricultural produce ; the chief imports are timber, grain, iron, coal, flax¬ seed, flour and guano. Shirt factories employ thousands of workers and there are timber- mills, grain-mills, foundries, coach-factories, bread and biscuit factories, distilleries and a ship-building yard. Intermediate education is supplied by Foyle College, founded in 1617, and by Saint Columb's Catholic College. Magee College, opened in 1865, besides teaching secu¬ lar subjects, has a theological course adapted to young men studying for the Presbyterian ministry. The Anglican cathedral dates from 1633. The Roman Catholic cathedral is a mas¬ sive and magnificent structure, opened in 1873. The population is about equally divided into Roman Catholics and Protestants. Derry origi¬ nated in a monastic establishment founded by Saint Columba in the 6th century. It remained an ecclesiastical settlement until 1566, when it was occupied by the English in their wars with the O'Neills of Ulster. In 1608 the place was burned and the English governor slain by Sir Cahir O'Dogherty, one of the Irish chiefs of Donegal. During the 20 years that followed, the corporation of London, which obtained a grant of the place from James I, rebuilt the city, surrounded it with a wall, fortified it with cannon and gave it a new name. Henceforth it was known as Londonderry. Here the Prot¬ estants of Ulster took refuge at the Revolution of 1688 and held the fortress against the forces of James II, the siege lasting from 19 April till 30 July 1689; the defense by untrained men against superior numbers being regarded as one of the most heroic and successful military ac¬ tions of modern times. Pop. 40,799.

LONE STAR STATE, The, a name given to Texas from the device on its coat of arms: one star, or a ((lone star® in the centre of a wreath.

LONE WOLF (Guipago), a noted Indian chieftain of the Kiwoa tribe : d. 1879. He be¬ came head chieftain of his tribe in 1866 but re¬

fused to bring the tribe into a reservation,, in accordance with the Medicine Lodge Treaty which he had refused to sign in 1867. General Custer after the battle of Washita had secured possession of Lone Wolf and Satanta and threatened to hang them both unless they consented to bring in their tribe, and this they finally consented to do in the spring of 1869. Lone Wolf, however, continued to maintain an attitude of defiance and in 1872 headed a dele¬

gation of his tribesmen to Washington to ad¬ just their difference, but about this time his son and nephew were killed in Mexico while raid¬ ing and Lone Wolf immediately set out for Mexico at the head of a small party to secure their bodies and inflict vengeance on their slay¬ ers. Upon his return he headed the warlike portion of his tribe in the southern outbreak of 1874, the first battle with the troops taking place at the agency at Anadarko on 22 August. The outbreak was finally quelled by General Mac¬ kenzie in the spring of 1875; Lone Wolf, with the other chiefs, one by one, surrendered and were held prisoners at Fort Marion, Fla., from 1875 until May 1878, when those surviving were returned to their tribes.

LONG, Charles Chaille. See Chaille- Long, Charles.

LONG, Crawford W., American physi¬ cian : b. Danielsonville, Madison County, Ga.,

1 Nov. 1815; d. Athens, Ga., 16 June 1878. He was graduated from Franklin College, Pa., in 1835, and from the Medical School of the Uni¬ versity of Pennsylvania in 1839, and after prac¬ tising a short time in Jefferson, Ga., removed to Athens, Ga., in 1851. He claimed to have performed on 30 March 1842 the first surgical operation ever made while the patient was un¬ conscious from inhaling ether. This appears to have been done in accordance with careful rea¬ soning upon the subject, but although he re¬ peated the experiment successfully in three other cases not far from that time the facts did not then become generally known. L> De¬ cember 1844 Dr. Horace Wells in Boston dem¬ onstrated practically the principle of anaesthesia by the use of nitrous-oxide gas, and in 1846 W. T. G. Morton followed him in a similar dis¬ covery and publicly demonstrated the feasibil¬ ity of employing anaesthetics in surgical opera¬ tions. In 1902 the Georgia Medical Association proposed to place a statue of Long in the Na¬ tional Capitol as the discoverer of anaesthesia. See Anaesthesia; Morton, W. T. G. ; Wells, Horace.

LONG, George, English classical scholar: b. Poulton, Lancashire, 4 Nov. 1800; d. 10 Aug. 1879. He was educated at Macclesfield Gram¬ mar School and Trinity College, Cambridge, where he was Craven University scholar in 1821. Three years later he was appointed to the chair of ancient languages at the Univer¬ sity of Virginia, but returned to England in 1828 and became first Greek professor at the new University of London. He became pro¬ fessor of Latin at University College in 1842 and from 1846 to 1849 was reader in jurispru¬ dence and civil law at the Middle Temple, and

from 1849 to 1871 was classical lecturer at Brighton College. He was one of the founders of the Royal Geographical Society and mem¬ ber of the Society for the Diffusion of Useful Knowledge, for which he edited the Journal of Education, also the (Penny Encyclopedia5 and Knight's ˆPolitical Dictionary.5 He con¬ tributed the articles on law of Smith's dic¬ tionary of Greek and Roman Antiquities.5 His great claim to fame, however, is as editor of the (Bibliotheca Classica,5 the first critical edi¬ tion of classical texts with commentaries in English. To it he contributed an edition of Cicero's (Orations5 (1851-62). He also pub¬ lished (Summary of Herodotus5 (1829) ; edi-

tions of (Herodotus 5 (1830-33), Xenophon's

LONG, John Davis, American lawyer and politician : b. Buckfield, Oxford County, Me., 27 Oct. 1838; d. 28 Aug. 1915. He was gradu- uated from Harvard in 1857 ; taught in West- ford Academy for two years ; and studied law at Harvard Law School and was admitted to the bar in 1861. He built up a large practice and became senior member of his firm, Long and Hemenway. He was an active member of the Republican partv ; served in the Massachu¬ setts legislature, 1875-78, being speaker of the house from 1876-78, and was elected lieuten¬ ant-governor of the State in 1879; the next year he was elected governor, and re-elected in 1881. He was also for several years on the State house Construction commission of the State. In 1883 he was elected to Congress, serving there till 1889 ; he was then a candidate for the Senate but was defeated, and did not hold public office till appointed Secretary of the Navy by President McKinley in 1897. He held this office through the Spanish War, con¬ ducting its affairs with marked ability, and resigned in March 1902. He encouraged an agitation for a larger naval armament. He published in 1879 a translation of the (2Eneid) of Virgil; edited (The Republican Party: Its History, Principles, and Policies5 (1888) ; and was part-author of (The American Business Encyclopaedia and Legal Adviser5 (5 vols., 1913). He wrote (The New American Navy5 (2 vols., 1903).

LONG, John Harper, American chemist: b. near Steubenville, Ohio, 1 Dec. 1856; d. 14 June 1918. In 1877 he was graduated at the University of Kansas and in 1877-30 he studied at Tubingen, Wurzburg and Breslau. From 1881 until his death he was professor

of chem¬ istry at the Medical School of Northwestern University. From 1913 to 1917 he served as dean of the Northwestern University School of Pharmacy, was a member of the referee board of consulting experts of the United States De¬ partment of Agriculture ; member of the revi¬ sion committee of the United States Pharma¬ copoeia and member of the council on pharmacy and chemistry of the American Medical Asso¬ ciation. He was president of the American Chemical Society in 1903-04. His publications are ˆElements of General Chemistry5 (1898; 4th ed., 1906) ; (Textbook of Analytical Chem¬ istry5 (1898; 3d ed., 1906) ; (Textbook of Urine Analysis5 (1900) ; laboratory Manual of Physiological Chemistry5 (1894) ; (The Op¬ tical Rotating Power of Organic Substances5 (translated from the German, 1902) ; text¬ book of Physiological Chemistry5 (1905; 2d ed., 1909).

LONG, John Luther, American novelist:

b. Pennsylvania, 1861. He read law; was ad¬ mitted to the bar and engaged in practice at Philadelphia. Meanwhile he began his literary career with (Miss Cherry-Blossom of Tokyo5 (1895). His other works are (Madame .Butter¬

fly5 (1898), dramatized by Belasco, and the inspiration of Puccini's great opera; the Fox- Woman5 (1900); the Prince of Illusion5 (1901); (Naughty Nan5 (1902); (Little Miss Jov-Sing5 (1902); (Sixty Jane5 (1903); (Heimweh and Other Stories5 (1905) ; (Billy Boy5 (1906); (Felice5 (1908); and the plays. (Andrea5 (1904) ; the Dragon Fly,5 with E. C. Carpenter (1905) ; (Dolce 5 (1907) ;

(Kassa5 (1910); (Baby Grand5 (1912) ; (War — or What Happens When One Loves One's Enemy5 (1913); (Lady Betty Martingale5 (1914) ; (Billy Boy5 (1915) ; cantatas, (Yo- Nennen,5 with Mr. Leps (1903) ; (Gar-Anlaf,5 with the same (1905) ; the Song of Times,5 with Dr. Parker (1911); the operas, (Andon,5 with Leps (1904) ; and (Hosni-San,5 with the same (1906).

LONG, Stephen Harriman, American en¬ gineer: b. Hopkinton, N. H., 30 Dec. 1784; d. Alton, Ill., 4 Sept. 1864. He was graduated at Dartmouth College in 1809, and after teaching school entered the United States engineer corps in 1814. Lie taught mathematics at West Point 1814-16, and was subsequently engaged for sev¬ eral years in surveys of the country west of the Mississippi River, as well as of the Upper Mis¬ sissippi. Long's Peak in the Rocky Mountains was named in his honor. When the construc¬ tion of the Baltimore and Ohio Railroad was commenced in 1827 Long became chief engi¬

neer of surveys and introduced many improve¬ ments in wooden bridges, to adapt them for railroad purposes. In the construction of rail¬ roads he established a system of curves in locating roads. He served for some years on the board for the improvement of the Mis¬ sissippi, and in 1856 was placed in charge of that work. He was appointed colonel of engi¬ neers in 1863, retiring the same year. His (Railroad Manual5 (1829) was the first work of its kind published in the United States. Consult Keating, W. H., (Narrative of an Ex¬ pedition to the Source of St. Peter's River, Lake Winnipeck, Lake of the Woods, etc., Per¬ formed in the Year 1823 5 (2 vols., London

1825).

LONG, William Joseph, American Con¬ gregational clergyman and author: b. North Attleboro, Mass., 3 April 1867. He was gradu¬ ated from Harvard in 1892 and from the Andover Theological Seminary in 1895. He held a pastorate at Stamford, Conn., 1899-1904, and is at present pastor at large. He has lec¬ tured on animal life, literature and nature and made a notable defense of ministerial liberty at the Cambridge Council of 1898. He is the author of (The Making of Zimri Bunker5 (1898); (Ways of Wood Folk5 0899); (Wil- derness Ways5 (1900); (Beasts of the Field5 (1901) ; (Fowls of the Air5 (1901) ; (Secrets of the Wood5 (1901) ; {School of the Woods5 (1902) ; (Following the Deer5 (1903) ; (A Lit¬ tle Brother to the Bear5 (1903) ; Northern Trails5 (1905); (Brier Patch Philosophy5 (1906) ; (Whose Home is the Wilderness5 (1907) ; (History of English Literature5 (1909) ; 'American Literature5 (1913), and contribu¬ tions to magazines.

LONG BEACH, Cal., a city in Los An¬ geles County, situated on the beautiful San Pedro Harbor, directly south of Los Angeles, about 20 miles distant. It is on the Southern

Pacific Railroad and is connected by steamers with Santa Catalina Island. It has an excellent commerce in fruit and produce, as well as lum¬ ber, and is also well known as a watering place, having many attractive scenic features and points of interest. Pop. (1920) 55,593.

LONG BEACH, N. Y., a seaside resort, 25 miles from New York City, situated on an island just off the coast of Long Island, beyond Rockaway. It has a winter population of 500 and a summer

population of 3,000. It is reached by the Long Island Railroad, and has several hotels, many cottages and a fine board walk built on concrete piles and girders.

LONG BRANCH, N. J., city, in Mon¬ mouth County, on the Atlantic Ocean, and on the Pennsylvania, the New Jersey Southern and the Central of New Jersey railroads, about 35 miles by water, 45 miles by rail and 30 miles in direct line south of New York City. Long Branch extends four miles on the Atlantic Ocean, with about 5,000 acres of area. During the summer season steamers run regu¬ larly several times a day between New York and Long Branch and there are numerous elec¬ tric and railway lines. The city is governed by the commission plan, composed of five com¬ missioners who choose the mayor from their number. They are elected at large and serve for four years. Assessed property values ex¬ ceed $16,000,000. There are five banks with a combined capital of $400,000, with deposits of upward of $2,500,000. Long Branch is one of the oldest summer resorts in the United States, taking its name from a brook, a branch of the South Shrewsbury River, which runs in a direct line northward. The Indians had a fish¬ ing village here in 1734 and called the nlace Land's End. Before the Revolution Long Branch was owned by Colonel White, a British officer of New York who had a summer home here. After the war the property was con¬ fiscated by the government and in 1788 was taken by Elliston Perot of Philadelohia. Perot was a pioneer landlord on the New Jersey coast and his boarding-house was the fore¬ runner of the multitude of modern hotels. From the beginning Long Branch attracted fam¬ ilies from both New York and Philadelphia soon becoming noted as a resort of wealth and fashion. During the administration of President Grant, Long Branch was the summer capital of the United States and became not only the gathering place of the leaders of so¬ ciety but the home as well of the President of the United States, members of the Cabinet and foreign ambassadors. President Garfield sought rest and recreation here and when felled by the assassin's bullet was brought here think¬ ing the benefits of the wonderful atmosphere would restore his health. Its proximity to New York, Philadelphia and other large Eastern cities give it a large transient summer popu¬ lation. Pop. (1920) 13,521.

LONG BRIDGE, a bridge connecting the city of Washington, D. C., with Virginia on the opposite bank of the Potomac. It was of su¬ preme importance as a line of communication during the Civil War, and was strongly held by the Union forces.

LONG ISLAND, N. Y., an insular pro¬ jection which forms the

southeasternmost por¬ tion of the State and is connected by five

bridges and several ferries across East River with Manhattan Island, New York City. It is bounded on the north by Long Island Sound, separating it mainly from the south shore of Connecticut. The Atlantic Ocean bounds it on the east and south, while The Narrows, New York Bay and East River, already mentioned, connecting the ocean with the Sound, complete the boundaries on the west and northwest. Several small islands around the coasts are in¬ cluded in its political boundaries, the best known being Coney, Rikers, Berrian, South Brother, Fire, Barren, Shelter, Gardiner, Fisher and Plum. Long Island has a maximum length of about 118 miles, varies in width from 12 to 23 miles and has an area of 1,682 square miles. It is divided into four counties, Nassau, Suffolk, Queens and Kings, the last two, metropolitan boroughs of New York City, occupying a con¬ siderable portion of the western end of the island. Queens County embraces the populous centres of Long Island City (q.v.), Maspeth, Corona, Flushing, Jamaica, Woodhaven and Far Rockaway, while the boundaries of Kings County are those also of the former city, now the metropolitan borough, of Brooklyn (q.v.).

The 280 miles of coast line are indented with numerous bays and inlets. A deep bay, 30 miles long, divided into Great and Little Peconic and Gardiner's bays, splits the eastern end of the island into two long, narrow penin¬ sulas, the southern terminating at Montauk Point, and the northern at Orient Point, with Plum and Fisher's islands extending beyond. Great South Bay, from two to five miles broad, extends along the southern coast for nearly half the length; it is separated from the Atlan¬ tic Ocean by Fire Island or Great South Beach, a sandy strip from a quarter of a mile to one mile wide, communicating with the ocean by several openings. Jamaica Bay is on the south coast also, New York Bay on the west, while along the north coast are Flushing, Little Neck, Manhasset, Hempstead, Oyster, Huntington and Smithtown bays. A government system of lighthouses, life-saving stations, fortifications and masked batteries extends around the coast.

The level sea-coast of the south side, with its extended views of bay and the broad ocean, contrasts sharply with the hilly north side and its deep indentations looking out upon the land¬ locked Sound. The rolling stretches of Mon¬ tauk Point and Shelter Island afford another contrast to the many square miles of scrub oak and level sandy plains in the centre of the island. The island reaches a height of over 380 feet in West Hill, Suffolk County, and in Har¬ bor Hill at Roslyn, the loftiest points in the range of glacial hills that extends

along the northern coast. The island is well watered, by several small streams, the Peconic, 15 miles long, flowing into Great Peconic Bay, being the largest. Natural ponds or lakes abound, and there are about 116 square miles of salt marsh throughout the island. The eastern portion especially is well wooded and noted for its pine forests well stocked with deer and other game. Like other insular positions the climate is milder than that of the adjacent continent, the average temperature being several degrees be¬ low that of the metropolis, while the hottest days are tempered by cool and refreshing breezes from ocean or Sound. The soil gen¬ erally is productive and under a high state of

cultivation. In the southern flat lands it is of a light, sandy nature, well calculated for raising grain, especially Indian corn; in the hilly north the soil is strong and adapted to the culture of grain, hay and fruits. Market gardening for metropolitan demands constitutes the principal portion of the agricultural industry of Kings and Queens counties. Oyster, clam and other fisheries are important sources of food supply.

The Long Island and other railroads give easy access from New York City to the remot¬ est parts, Montauk Point, the southeastern- most point, being only three hours away. Long Island is noted especially for exceptional op¬ portunities, embracing all sorts of summer recreation. The roadways are admirably adapted to all forms of locomotion, and riding, driving, automobiling and wheeling are equally desirable methods for enjoying the region. In the numerous villages and towns along Jamaica Bay, Great South Bay, Peconic Bay and the Sound, there are ample facilities for sailing, rowing, fishing and bathing, which are fully utilized. For golfing, lawn tennis and all other forms of outdoor sport and recreation, every possible facility is found, and the golf courses, especially at Garden Citv and Shinnecock, are notable. The chief seaside resorts along the south coast are Bath Beach, Bensonhurst, Coney Island, Brighton, Manhattan, Rockaway Beach, Far Rockaway, Long Beach, Fire Island, Patchogue and Montauk Point; along the north coast are Greenport, Port Jefferson, Cold¬ spring Harbor, Oyster Bay, Glen Cove, Seacliff, College Point and North Beach. The popula¬ tion of Long Island is over 2,000,000; of this number over 1,800,000 reside in Brooklyn borough.

When discovered in 1609 by Hudson, Long Island was inhabited by 13 tribes of Algonquin Indians, by whom the island was variously called Panmancke, Wamponomon, Mautowacks and Sewanhacky. A few descendants mixed with negro blood, and retaining no knowledge of their ancient language, dwell near Montauk Point and Shinnecock Neck. French Protes¬ tants from near the river Waal, in the Nether¬ lands, made the first settlement in 1625 under Dutch protection, and immigrants from New England established themselves in different lo¬ calities shortly afterward. Lange Eylandt, the Dutch name, was changed by the colonial legis¬ lature to that of Nassau, a name which survives in one of the counties, but was never adopted by the people for the island. Long Island was a busy base of military movements during the Revolutionary War, . and the battle of Long Island (q.v.) is the principal event in its history.

LONG ISLAND, Battle of, one of the

early American defeats in the Revolutionary War, was fought 27 Aug. 1776, in Brooklyn, N. Y., mainly within the present limits of Pros¬ pect Park, the column in Battle Pass to the memory of the 400 Maryland troops who fell in the battle, and the foundation remains of the redoubt on Lookout Hill, marking the central point of defense and attack. After the evacu¬ ation of Boston by the British, Washington made strenudus efforts to fortify New York and its approaches. General Greene, in com¬ mand of a considerable body of troops, mostly raw recruits, was entrusted with the defense of Long Island, and constructed a line of en¬

trenchments and redoubts from Wallabout Bay to Gowanus Cove. The main works at the Wallabout end were on the hill afterward known as Fort Greene, now marked by Wash¬ ington Park. At Gowanus Cove, a battery was erected at Red Hook and a fort on Governor's Island, nearly opposite. About two and a half miles from the entrenchments, between them and the southwest side of the island, the range of low hills in this section was then densely wooded and crossed by three roads ; one on the right of the works passing near the Narrows to Gravesend Bay, the central one through Flat-bush and the third far to the left through Bed¬ ford to Jamaica. In the midst of his prepara¬ tions, General Greene fell ill and the com¬ mand devolved upon General Sullivan, then just returned from Lake Champlain. Unacquainted with the ground and with Greene's plans the change of command caused considerable con¬ fusion. Nine thousand British troops landed in Gravesend Bay on 22 August without resist¬ ance ; they were commanded by Sir Henry Clinton, assisted by Lords Cornwallis and Percy, General Grant and Sir

William Erskine. Lord Cornwallis, rapidly advancing to the central pass, found it occupied by the rifle regiment of Colonel Hand, and without risking an en¬ counter took up a position at Flat'bush. Wash¬ ington inspected the American lines on the 24th and placed General Putnam in command. The following day the British were reinforced by two brigades of Hessian troops, under Gen¬ eral De Heister, and on the 26th began to carry out their plan of operations. The road through Bedford to Jamaica unfortunately had been comparatively neglected by the Americans, and eluding the patrol, the British contingent under General Clinton, accompanied by General Howe, the commander-in-chief, and by Lords Percy and Cornwallis, guided by a local Tory, gained possession of the road and neighboring heights undiscovered during the night of 26-27 August. In the morning General Grant, with the left wing of the British army, advanced along the road by Gravesend and the Narrows, and was resisted by Colonel Atlee with a guard of Penn¬ sylvania and New York militia, who retired fighting until he had fallen back upon Gen. William Alexander (Lord Stirling), whose two reeiments had hastened to his assistance. Here active firing was kept up by both sides without an attempt at a general action. At the same time, as diversions, De Heister opened up a cannonade from Flatbush upon Colonel Hand and his riflemen, while the guns of the British war-vessels were trained upon the Red Hook battery. Meanwhile on the right Clinton opened his guns upon the Americans, and at this signal De Heister advanced to storm the central pass and the redoubt of which General Sullivan had taken command. The latter, who found his left flank engaged and himself in danger of being surrounded, ordered a retreat, but not soon enough to escape the British light infantry, who drove him back upon De Heister and his Hes¬ sians. The Americans fought with desperate valor, a large body cutting their way through the entrenchments, the rest who were not killed either escaping among the hills or surrendering as prisoners, among the latter being General Sullivan. On the left Colonel Atlee and Lord Stirling, who had maintained their position in

front of General Grant, found themselves cut off by Cornwallis. They gallantly attacked the enemy with such determination that the British held their ground only by the assistance of re¬ inforcements, when Stirling seeing the useless¬ ness of further resistance surrendered.

Having forced all the approaches the British proceeded to invest the American works.

Washington arrived in the evening and took command, the following day bringing over ad¬ ditional troops. But with the formidable British force opposed to him, and indications that the British fleet intended moving up the river so as to cut the force in Brooklyn entirely off, Wash¬ ington, on the night of 29-30, favored by a thick mist, made a strategic and masterly retreat to Manhattan, greatly to the discomfiture of the British, who were unaware of the movement until some time after the last American had crossed in safety. The Americans lost over 900 men in the battle, while the British loss in killed, wounded and missing was 400. Consult Carrington, H. B., (Battles of the American Revolution > (Brooklyn 1876) ; Dawson, H. B., (Battles of the United States (New York 1858) ; Field, T. W., ˆBattle of Long Island) (Brooklyn 1869) ; Johnston, H. P., (Campaign of 1776 around New York and Brooklyn) (ib. 1878)'; Raye-Smith, E. M., (Battle of Brooklyn) (New York 1913) ; Mather, F. G., (The Ref¬ ugees of 1776 from Long Island to Connecticut (Albany 1913), and Adams, C. F., (Battle. of Long Island * (in American Historical Review, New York 1896).*

LONG ISLAND CITY, N. Y, formerly

a city in Queens County, but now the first ward of the borough of Queens, city of New York. This section became a part of Greater New York by the Act of Consolidation of Janu¬ ary 1898. As early as 1640 Dutch settlers had taken possession of the land in this vicinity and gradually a number of little villages were formed on the western end of the island, on the East River and the Sound. In 1870 a number of little villages, Astoria, Blissville, Dutch Kills, Hunters'. Point, Middletown, Ravenswood and Steinway, were united into one municipality and called Long Island City. Newtown Creek separates this section for a distance of four miles from the borough of Brooklyn. It is connected with the borough of Manhattan at 59th street via the Queens- boro Bridge, which was opened in 1909 ; and by the <(Queensboro Subway,® opened June 1915, to 42d street, Manhattan. The Second avenue elevated extension in New York and the new tunnel under the East River at 60th street will give additional rapid transit connections. The Long Island Railroad and the Pennsyl¬ vania Railroad furnish excellent railroad com¬ munication, and the New York Connecting Rail¬ road, joining the New Haven and Pennsylvania systems across the bridge at Hell Gate, gives an all-rail route with the mainland. This section has extensive manufacturing interests, excellent schools, several hospitals and

churches of all denominations. Pop. (1920) 50,000.

LONG ISLAND HISTORICAL SOCI¬ ETY, an association founded in 1863 at Brook¬ lyn, N. Y., and having for object the promotion of the study of the history and antiquities of Long Island. It maintains a library of 80,000 volumes, and museum rich in Americana. The

*Society has published a number of volumes on early American history, including two volumes on the battle of Long Island, a volume of George Washington's letters, town records of Jamaica, L. I., and (Dankers and Sluyters Voyage to New York in 1 679-80. **

LONG ISLAND SOUND, a body of water which separates Long Island, in New York State, from the mainland. It is an arm of the Atlantic Ocean, extending northeast and southwest, about 110 miles long and from 10 to 25 miles wide. It is connected with the Atlantic on the east by The Race, a narrow passage south of Fisher's Island; and on the west by a strait called the East River, which enters New York Bay and through the Narrows to the ocean. The coast on the north is irreg¬ ular, and has a number of small bays and capes. The south or Long Island coast is irregular from East River to near Port Jefferson; and from Port Jefferson to Orient Point the coast line has few indentations. The largest indenta¬ tions on the north side are New Haven Harbor and Pelham Bay. There are several good har¬ bors at the mouths of rivers and in places sheltered by small islands. On the south shore the principal indentations are Northport, Oyster, Manhasset, Little Neck and Flushing bays. The north coast is fringed by small rocky islands or reefs. In the western part of the Sound there are a number of small islands, which have been improved so as to be desirable resorts or resi¬ dential locations. Chief among these are Glen Island and City Island. At the entrance to East River there are a number of islands used chiefly by the health department of New York City. At the east entrance is a group of islands which extend diagonally from Long Island to the State of Rhode Island. The largest of this group is Fisher's Island. (See New York City). The chief rivers which flow into the Sound, all from the north, are Connecticut, Mystic, Thames and Housatonic.

Since the improvements made (1865-85) at Hell Gate (q.v.), Long Island Sound is an available route for ocean steamers.. The large passenger steamers which ply daily between New York and New England ports pass through the Sound. A large number of forts with modern equipment are located along the shores, thus guarding most carefully the entrance to New York City by this route.

LONG PARLIAMENT, in English his¬ tory the fifth Parliament of Charles I, sum¬ moned in 1640. Largely liberal and holding tenaciously by its own rights, thanks to the campaigning efforts of John Pym, it declared ship-money illegal, claimed the right of taxa¬ tion as belonging solely to the Commons and not to the Crown, passed the Triennial Bill, abolished the Star Chamber and the High Com¬ mission and, attacking the king's favorites, put Laud in prison and Strafford to death. It also passed an act declaring that it could not be dissolved except by its own consent. In Novem¬ ber 1641, passing successfully a reactionary crisis, it adopted the Great Remonstrance, and in January of the next year refused to obey the king's order to surrender (

members who, supporting an attempted com¬ promise with the king in 1648, had made them¬ selves obnoxious to the chiefs of the Parliamen¬ tary army. The handful of members left com¬ posed the ((Rump,)) which was nominally in power until expelled in 1653 by Cromwell. After the death of Cromwell it was again summoned in 1659, but in October of that year the members were turned out by General Lambert. In 1660 it was again briefly reconvened. See Cromwell.

LONG-TAILED DUCK. See Old Squaw.

LONG-TAILED HUMMER, a humming¬ bird very common in Jamaica (Aithurus polyt- mus), remarkable for its pair of long crossed tail-feathers. It is also distinguished by a long black crest. It builds a nest of silk cotton, bark, lichen, etc., and covers the outside with spiders' webs.

LONG TOM, (1) the name given a 42- pound gun captured by the British in 1798 from the French battleship Hoche. It was afterward purchased by the Americans and used in the attack on Haiti by the French in 1804, and re¬ mained idle till 1812, when it was placed on the General Armstrong. This vessel ran the British blockade at New Orleans, 9 Sept. 1814, and put into the bay near Horta, Fayal, being disabled in an encounter with a British squadron. Here the gun was dismantled and remained till Colonel Reid, son of the commander of the General Armstrong, had it brought back to New York, 18 April 1893. (2) An apparatus for

washing gold from the earth or gravel in which it is found. It consists of a wooden trough, from 12 to 25 feet long and about a foot wide. At its lower end it widens and its floor there is of sheet-iron pierced with holes half an inch in diameter, under which is placed a flat box a couple of inches deep. A stream of water is kept running through it by means of a hose ; the dirt is shoveled in, and stirred at the lower end, where the earth and gravel fall through the sieve into another box, where they are again sifted. The machine, like the <(rocker,® was cheap and wasteful ; and both were soon dis¬ placed by the sluice.

LONGACRE, James Barton, American engraver: b. Delaware County, Pa., 11 Aug. 1794; d. Philadelphia, 1 Jan. 1869. He was apprenticed in Philadelphia, first attracted at¬ tention by his plate of Andrew Jackson after Sully, and in 1819-31 was employed in the illustration of many of the foremost American works then published. At first with James Her¬ ring, and later independently, he published the (National Portrait Gallery of Distinguished Americans J (1834-39), many of whose engrav¬ ings were from sketches by himself. His por¬ traits are good likenesses, executed with con¬ siderable life. Stipple work was his forte but he occasionally turned to line engraving. In 1844 he was appointed engraver to the United States mint, and from that time until his death designed all new coins. He also remodeled the coinage of Chile.

LONGAN, a tree and its fruit. See Litchi. LONGARD DE LONGGARDE, Doro¬ thea. See Gerard, Dorothea.

LONGCHAMPS, lon-shon, Paris, France, a celebrated racecourse on the southwest side of the Bois de Boulogne, where the race for the "Grand Prix® is run. Prior to its sup¬

pression in 1792, part of the site was occupied by the Convent of Longchamps, founded in 1260 by Isabel, sister of Saint Louis. Miracles performed at her tomb caused many princesses to seek the veil there; but in the 16th century it began to lose its sanctity, and in 1652 Saint Francis de Sales protested against the worldly life of its inmates. In 1727 the celebrated opera singer, Mile. Le Maur, took the veil here. It was a popular resort for carriage driving, es¬ pecially during the week preceding Easter. The Emperor William I of Germany held a review of troops at Longchamps during the War of

1870.

LONGE, a local name (Vermont) for the lake trout (q.v.).

LONGEVITY. The normal duration of life differs in different species of animals, but what factors determine the length of life of a particular species have not been discovered. Observation has taught a few generalities, that large animals live longer than small ones, that species having a numerous progeny are short¬ lived, that those that have a long period of gestation live longer than those that have a short period of gestation, etc. Buffon, Fleuron and other naturalists have devised formulae for estimating the normal duration of life, but none will apply to more than a few species or will apply to man.

To obtain a rational basis for estimating the normal duration of human life we must consider the human being possessing the in¬ herent factors and living under the most favor¬ able conditions necessary to complete the nor¬ mal cycle of life. Possessing the inherent fac¬ tors of heredity and sound constitution and living in the proper environment and follow¬ ing a natural mode of living, the normal cycle of life falls naturally into three distinct periods, development, maturity and decline, each lasting about 30 years. That few complete the nor¬ mal cycle is due in most cases to accidental and avoidable causes, while the few who greatly exceed the normal duration are consid¬ ered as freaks of nature, comparable to giants in growth. An important factor conducive to longevity is the adaptability of the human or¬ ganism to diverse environmental and living conditions. Instances of longevity are found in the torrid and frigid zones as well as in the temperate zone, in the smoke-laden atmosphere of manufacturing cities as well as in the clear atmosphere of the plains and mountains, in the ghettoes and slums and in the homes supplied with every known hygienic device. The factor of heredity is dominant as long as there is no change in environment and mode of life. A large proportion of the Jews in the European ghettoes reach old age. Transplanted to the United States and subjected to the same influ¬ ences that shorten the lives of Americans, they deteriorate and few reach the age of their parents. The same applies to the children of Irish and Russian peasants when they come to this country. The factors especially conducive to longevity, beside the inherent factors of heredity and constitution, are outdoor active life, the activity being gauged by the physical capacity of the individual; coarse, fresh food not in excess of the needs of the body, as indicated by the sense of hunger ; immediate attention to the call for the elimination of

waste; sleep, the time and amount regulated by the needs of the body without regard to the clock; rational recreations on the principle that the recreation should be the antithesis of the work which made it necessary; freedom from worry and other causes of mental de¬ pression. These factors prevail to the greatest extent in the peasant class and in this class is found the largest number and largest propor¬ tion of persons who complete the normal cycle of life. The peasant as he grows old gradu¬ ally adapts his mode of life to the changing physical conditions, he works more slowly, rests more, sleeps longer and takes naps dur¬ ing the day, eats less, and as the mental powers wane he takes a lessened interest in the events o f the day and is less affected by cares, wor¬ ries and excitement. Under the stress of mod¬ ern commercial and manufacturing activity, especially in the cities, it is becoming more and more difficult to live in such a manner that the factors conducive to longevity can be made available, and consequently premature senility and avoidable causes of disease and death are everywhere becoming more prevalent.

The statistics and records of longevity are notoriously unreliable. Records are either absent or defective. With advancing years the faculty of memory becomes weakened and the mind shows a tendency to exaggeration and the appropriation, through auto-suggestion, of incidents belonging to the lives of others, or the invention of incidents which through frequent telling become so firmly impressed upon the mind as to appear real. Forgetting their exact age they say they are near or about the next semi-decade and in a year or two they will have passed that semi-decade and are near or about the next semi-decade. Having thus reached 90 they say they are near 100, about 100 or have passed the century mark. This explains Why the census records show more persons living at the age of 80 than at the age of 79, more at 85 than at 84, more at 90 than at 89, more at 95 than at 94 and many more at 100 or over than at the age of 96, 97, 98 or 99.

According to the Bible man's days shall be 120 years (Gen. vi, 3), but this does not har¬ monize with the ages of antediluvian Biblical characters. We find however a progressive reduction in ages after the flood. Noah was 950 years old, his son Shem was 600 years old and Shem's son Arphaxad was 438 years old. The first born of the 4th, 5th and 6th genera¬ tions after Arphaxad were between 230 and 239 years and those who came later were less than 200 years old. Abraham was 1 75 and Joseph, the third generation after Abraham, was 110 years old. Few later Biblical charac¬ ters exceeded this age. Moses was 120 years old and Aaron reached the age of 123 but David was only 70 when he was described as being old and stricken

in years.

Numerous instances of extreme longevity are recorded by ancient writers but it is impos¬ sible to verify them. Pliny records 170 cen¬ tenarians found in a population of 3,000,000 inhabitants living between the Apennines and the Po, in a tax census taken during the reign of Vespasian. Pliny, Lucian and other writ¬ ers record ages ranging from 200 to over 800 years. It is possible that under the rigorous regimen then in vogue the weaklings died

young and those who survived reached old age but we have no means of verifying those ages. Hippocrates is one of the few notables whose age is supposed to have exceeded 100, yet his biographers give his age variously as 84, 90, 104 and 109 years.

In most modern instances of extreme lon¬ gevity critical investigation fails to substantiate the reputed age. In the celebrated case of Thomas Parr, the Shropshire peasant who died at the reputed age of 153, and who was buried in Westminster Abbey, critical investi¬ gation has virtually disproven the recorded age. In the case of Petraz 'Czarten, a peasant who died in 1724 in the village of Kapros, Hungary, at the reputed age of 185, there are no records except the statement of his son who was 95 years old at the time of his father's death. In 1797 Joseph Surrington, a Norwe¬ gian peasant, died at the reputed age of 160, leaving several children, the oldest claiming to be 103, the youngest 9 years old. A factor which makes the verity of these great ages still more doubtful is the late age at which they are said to have married. Parr is said to have married at the age of 120 years; Drakenburg, a Danish peasant, married at the age of 111 and reached the age of 146, and a number of other centenarians are said to have married in the ninth and tenth decades of life. Gurgen Doug¬ las who married at the age of 85 had eight children, Peter Albrecht had seven children after he married at the age of 85. In these cases the individuals were ignorant peasants, there are no records by which the ages can be verified and the ages given were probably rough guesses made by persons who had no means of determining the real age.

A number of cases of extreme longevity have been reported in the United. States but. in very few cases has it been possible to verify the ages owing to lack of records. Most cases were those of Indians, negroes and illiterate whites who had no means of knowing their exact age. The tendency to exaggerate is evi¬ dent from the census

reports which show a greater number of persons who give their age as at a semi-decade, 80, 85, 90, 95 or 100, than at a year or two younger. In cases, where it has been possible to make a critical, investiga¬ tion exaggeration has almost invariably been found. In the celebrated case of Noah Raby who died in 1904 in Piscatawney almshouse, New Jersey, at the reputed age of 132, the Census Bureau made a critical investigation. No record of his birth could be found. Raby stated that he was in the United States navy in 1809 but the records of the navy showed that Noah Raby was first mentioned in the navy records in 1839. The census records showed that Noah Raby was in the almshouse in 1870, his age then given being 59. This and other incidents of his life that could be verified made his actual age. 93 or 94.

The unreliability of longevity statistics is apparent when we consider, that the largest number of reputed centenarians are found, in countries having a large illiterate population and incomplete reco-rds or no records at all. According to the 1910 census there were 3,300 centenarians in Rumania in a population of 8,000,000 and the same number in Bulgaria with half that population. The largest number is reported from Russia. In countries where

census and church records are fairly reliable the number of centenarians is small. In France there were 164, in Great Britain there were 94, in Germany there were 76 and in the United States there were only 40 centenarians whose ages could be verified. Statements from igno¬ rant peasants which cannot be verified through reliable data are devoid of scientific value. It is safe to assume, however, that under the un¬ hygienic conditions existing in Rumania, Bul¬ garia and Russia only the most vigorous sur¬ vive the vicissitudes of childhood and these have a fair chance to complete the normal cycle of life. In other countries where im¬ proved methods of hygiene have been intro¬ duced, where the science of medicine has di¬ minished infant mortality and through a better understanding of tuberculosis and other infec¬ tious diseases diminished the death rate in early life, more persons reach middle age. After this time, however, the causes for rapid ageing, especially insufficient sleep, improper food, intense excitement and depressing emo¬ tions, cause a rapid increase in the death rate and few reach old age. Only a complete revolution in our mode of life, involving a re¬ turn to the slow, quiet life of the country, and applying to it the

advantages of modern sani¬ tary science, gives any hope for an increase of human longevity. See Old Age; Senility.

I. L. Nascher, M.D.

Author of Geriatrics: Diseases of Old Age and Their Treatment.

LONGFELLOW, Ernest Wadsworth,

American artist: b. Cambridge, Mass., 23 Nov. 1845. He studied under Couture in Paris, and among paintings by him may be named (Italian Pines5; (Misty Morning5 ; portrait of his father, Henry W. Longfellow, the poet; (Evening on the Nile5; (Morning on the ZEgean5 ; (Solitude5 ; (The Matterhorn,5 ana many pictures of Egypt and a number of por¬ traits. ' He is a member of the Century Asso¬ ciation, New York.

LONGFELLOW, Henry Wadsworth,

American poet: b. Portland, Me., 27 Feb. 1807 ; d. Cambridge, Mass., 24 March 1882. He was the second son of Stephen Longfellow, lawyer and congressman, and Zilpah, daughter of Gen. Peleg Wadsworth — thus coming from excellent stock on both sides. He seems to have combined the best characteristics of both parents and to have passed an ideal kind of childhood in the beautiful seaport town. His disposition was gentle, sympathetic and studi¬ ous, and his education was such as to bring out his finest qualities. He was encouraged to read the best English poetry and early began to write verses on his own account, doubtless finding in the success of his favorite volume, Irving's (Sketch-Book, 5 encouragement to be¬ lieve that a bright future lay in store for Amer¬ ican writers.

In 1822 he entered Bowdoin College, of which his father was a trustee. He continued to lead much the same wholesome life he had led at home, avoiding rough sports, showing a chivalrous regard for women, especially his mother, reading and writing poetry, and per¬ forming faithfully his academic duties. Some of his poems were published in The United States Literary Gazette, of Boston, and brought him in a tiny sum of money besides an amount

of notice altogether out of proportion to their merits. He also gave much thought to the choice of a profession, and, rejecting the law and, despite his piety and attachment to his faith, the Unitarian ministry, 'he fixed his mind upon the calling of a man of letters. His father prudently did not altogether thwart him, and soon another but not alien calling offered itself. He stood so well in his class — of

which Nathaniel Hawthorne (q.v.) was a member — that the trustees proposed to him that he should go to Europe to fit himself to be the first in¬ cumbent of a chair of modern languages they had determined to establish. Their offer was accepted, and after a few months of study at home he sailed for Havre, landing there on 15 June 1826.

His friend George Ticknor (q.v.) had ad¬ vised him to get all he could from the systema¬ tized scholarship of Germany, but Ticknor was in advance of his fellow-countrymen, and Long¬ fellow wisely followed his own instinct to steep himself in the color and movement and romance of the Old World's life and literature. He was not idle — for in France, Spain, Italy and Ger¬ many he cultivated his exceptional linguistic gifts and prepared himself for the main duties of his chair; but the end he proposed to him¬ self was plainly culture, not scholarship. It was Old-World culture and romance that the new world needed, and these Longfellow later showed that he could transmit even better than Irving had done, and much better than his light¬ hearted contemporary N. P. Willis (q.v.) was to do. Although his popular reputation will always be that of a poet, Longfellow's import¬ ant place in the history of American literature is partly due to his eminent services as a trans¬ lator and a transmitter of culture.

1. *Although very young, the traveler made friends everywhere, both with natives and with fellow Americans, and although his precocious Muse was singularly silent for some years, he laid up a valuable stock of poetic impressions. There was a slight hitch with regard to his pro¬ fessorship, but this was overcome and he re¬ turned to America in August 1829 and entered upon his duties at Bowdoin. These he fulfilled with great success, acting also as librarian. He translated and edited textbooks for his students, with whom he always stood in friendly rela¬ tions, he prepared his lectures carefully, he wrote articles for The North American Review on topics of foreign literature, and he pub¬ lished, in another magazine, sketches of travel, which were collected in 1835 under the title of (Outre-Mer.5 It was a quiet and useful life and one that was rendered still happier by his marriage in September 1831 to Miss Mary Storer Potter, of Portland.*

A little over three years later he was invited to succeed Ticknor as Smith professor of modern languages at Harvard, with the inti¬ mation that he would do well to spend some months in Germany before beginning his work. He sailed with his. wife in April 1835, and spent, the summer in Sweden and Denmark, studying the

Scandinavian literatures, which were destined to have a strong influence upon his writings. In the autumn Holland was vis¬ ited, and there at Rotterdam, after a protracted illness, his young wife died. Much affected, Longfellow went to Heidelberg and settled

down for study, yielding his bereaved spirit all the more willingly to the influence of German sentiment and the not yet outworn romanticism of. the epoch. Then, after some pleasant trav¬ eling in Switzerland, he returned home in October 1836.

Two months later found him at work in Cambridge and soon he was established in the famous Craigie House. He devoted himself to his lecturing and to superintending his assist¬ ants — foreigners, who gave him not a little trouble. He was no recluse, and enjoyed es¬ pecially the society of such men as the historian W. H. Prescott (q.v.), Charles Sumner (q.v.), and that (

In 1842 he paid a third visit to Europe, forming his memorable friendship with the German poet Freiligrath and getting the in¬ spiration for such poems as 'The Belfry of Bruges.5 While sailing back he wrote his 'Poems on Slavery,5 published late in the year. His gentle nature did not fit him to be a mili¬ tant poet like Whittier, but his slave lyrics were effective through their sincerity and their met¬ rical and descriptive power.

In July 1843, he married Miss Frances Eliza¬ beth Appleton, of Boston, a beautiful, cultured and wealthy young woman whom he had met on his second visit to Europe and had portrayed as Mary Ashburton in 'Flyperion.5 She bore him children, made his home a hospitable cen¬ tre and ministered to him in an ideal way until her tragic death. The next 17 years formed a period of quiet work and maturing fame. His drama (The Spanish Student5 (1843) was a failure, but 'The Poets and Poetry of Europe> (1845) and 'The Belfry of Bruges and Other Poems5 (1846) did him credit, and the beauti¬ ful idyll Evangeline5 (1847) not only won all hearts, but enabled his admirers to proclaim him as an American poet who had succeeded in a fairly elaborate work of art. The not yet naturalized hexameters and the bookish origin

of the descriptions have not effectively counter¬ acted the narrative power and the pathos of the story, and Evangeline5 seems destined to

hold its own with readers yet unborn.

Longfellow had already planned a still more elaborate work on which he labored for many years, but which he was never able to make a success. This was (Christus, a Mystery,5 finally completed in 1872, a poem designed to picture Christendom in the apostolic, the mediaeval and the modern periods. The second portion, 'The Golden Legend > (1851), was the part first published and was by far the best. Its pictures of mediaeval life have deservedly won high praise, but the general public has re¬ mained singularly cold to the merits of the work.

Meanwhile, the duties of his professorship, little onerous though they seem to have been, weighed more and more heavily on Longfellow, who was also troubled with weak eyes, fre¬ quent attacks of neuraligia and the importuni¬ ties of autograph hunters and other bores. In 1854 he resigned his chair and thenceforth de¬ voted himself entirely to literary work and pleasant social life. His Indian epic 'Hiawatha5 (1855), written in the trochaic measure of the Finnish 'Kalevala,5 was immediately popular, and three years later in 'The Courtship of Miles Standish, > he reached his highest point as a narrative poet. Excellent though 'Evange¬ line,5 'The Golden Legend5 and 'Hiawatha5 had been, they had, nevertheless, been too plainly the work of a sophisticated poet writing in his library; 'Miles Standish, > dealing as it did with the past of Longfellow's native New England, drew part of its inspiration from the poet's own life and character, molded as they were by tradition and environment.

During the agitated period which immedi¬ ately preceded the Civil War Longfellow sym¬ pathized with the cause represented by his friend Sumner, but took no active part in the strife. In July 1861 the tragedv of his life came to him late — his wife was burned to death, her light dress having caught fire from a match on the floor. He was practically heart-broken, but bore his bereavement man¬ fully. Taking up a task that had long before interested him, he sought solace in translating the great poem of Dante. With the aid of Lowell and Prof. Charles Eliot Norton (q.v.) he completed the work in about five years (published 1867-70). It ranks with the best of such renderings of great poems into English, though some have questioned whether Longfellow was not more successful in his earlier attempts to translate a poet always dear to him.

Meanwhile, in 1863, he had published his 'Tales of a Wayside Inn,5 some portions of which, such as 'The Saga of King Olaf,5 were excellent. In 1868 'The New England Trage¬ dies,5 the final section

of 'Christus,5 failed to attract readers, as did also the first section, 'The Divine Tragedy,5 which appeared in 1871. In the spring of 1868 he sailed for the last time to Europe and remained over a year, re¬ ceiving degrees from Oxford and Cambridge and other evidences of the affection and ad¬ miration his works had gained for him abroad. The rest of his life was marked only by the appearance of an occasional volume, and by a growing veneration among his countrymen for

his character and his genius. Probably the most significant productions of his old age were some of his sonnets and his dignified (Morituri Salutamus,5 delivered at Bowdoin (in 1875) at the semi-centennial of his class. He lived on, declining in health but still preserving the serenity of his disposition, until 24 March 1882, when he died after a short illness. Two years later his bust was placed in the Poets' Corner of Westminster Abbey — for his fame was almost as truly a British as an American pos¬ session.

Longfellow is generally admitted to be the most popular of American poets, and the cele¬ bration of his centenary showed that there has been no real abatement of his countrymen's regard for his character and his works. Natu¬ rally, however, he has not escaped censure on the score of the comparatively derivative and facile quality of his genius. Authors of greater individuality, of finer artistic powers and train¬ ing, of more pronounced national and demo¬ cratic qualities — Emerson, Poe, Hawthorne, Whitman, for example, — have received higher praise from critics and have aroused in their devotees a more perfervid admiration than has fallen to Longfellow's lot, at least of late years. Waiving comparisons, we may frankly admit that Longfellow did follow, in the main, well- beaten paths, that he was much indebted to the culture of other nations, that he fell short of the higher reaches of the art of poetry, that a considerable proportion of his work is of but slight value. On the other hand, we should in¬ sist that nearly all his work, whether in prose or verse, was important in the development of American literature and the American char¬ acter, that within his limits he was a true and very accomplished artist, that he succeeded in both elaborate and unelaborate forms, that his fame transcended the bounds of his own lan¬ guage, and that, as a narrative poet and a writer of appealing lyrics of sentiment and re¬ flection, he has left a body of work of per¬ manent and individual value. It seems to be hypercritical not to allow the author

of cFlowers,) (The Building of the Ship,5 (The Bridge, 5 (The Day is Done,5 and scores of similar lyrics, of such sonnets as the beautiful (Cross of Snow) (in memory of his second wife), and of such sustained poems as (Evan¬ geline, 5 (The Golden Legend,5

Longfellow's more important publications have already been named, but to them may be added (The Seaside and the Fireside5 (1850), which contained (The Building of the Ship5 ; (Flower-de-Luce5 (1867) ; (Aftermath5 (1874); (The Masque of Pandora and Other Poems5 (1875), which included (Morituri Salutamus5 ; (Keramos and Other Poems5 (1878) ; (Ultima Thule5 (1880);

Bibliography. — There are good editions of the complete works (e.g., the Riverside in 11

vols., Boston 1886-90), and of the poems (e.g., Cambridge, 1 vol.). The standard biography is that by Samuel Longfellow (3 vols., Boston 1891 — superseding the (Life,5 2 vols., and (Final Memorials5). An excellent brief sketch is that by G. R. Carpenter in the (Beacon Biographies5 (Boston 1901). The volume in the (American Men of Letters5 is by Col. T. W. Higginson. Consult also W. D. Howells. (My Literary Friends,5 (New York 1900), and Charles Eliot Norton's (Longfellow5 (Boston 1907 — with poems of an autobiographical char¬ acter) ; Robertson in the (Great Writers Series5 (London 1887) ; Wendell, (Literary History of America5 (New York 1900) ; Bliss, Perry, (The Centenary of Longfellow5 (Boston 1908) ; Liv¬ ingston, L. S., (Bibliography of the First Edi¬ tions in Book Form of the Writings of Henry Wadsworth Longfellow5 (New York 1908). For criticism consult Stedman's (Poets of America5 (New York 1885), and the histories of American literature.

William P. Trent,

Professor of English Literature , Columbia Uni¬ versity.

LONGFELLOW, Samuel, American Uni¬ tarian clergyman and poet; b. Portland, Me., 18 June 1819; d. Cape Elizabeth, Me., 3 Oct. 1892. He was a younger brother of H. W. Longfellow, and was graduated from Harvard in 1839 and from Harvard Divinity School in 1846. After his ordination to the ministry he was pastor of the Unitarian church at Fall River, Mass., 1848-51 ; of the Second Unitarian Church in Brooklyn, N. Y., 1853-60; and of the Unitarian church at Germantown, Philadel¬ phia, 1877-82. His remaining years were spent in Cambridge. His fame as a poet has been

overshadowed by that of his brother, but he had a very distinct poetic gift, and his hymns, of which he wrote many, are among the best of modern religious lyrics. He wrote a number of essays for the Radical, 1866-71. His published works include (A Book of Hymns,5 with S. Johnson (1846), a compilation revised in 1864 as (Hymns of the Spirit5; (Thalatta: a Book for the Seaside,5 with T. W. Higginson (1853), a verse compilation partly original ; (Life of Henry Wadsworth Longfellow5 (1886); (Final Memorials of Henry Wadsworth Longfellow5 (1887) ; (Essays and Sermons5 (1894) ; (Hymns and Verses5 (1894). Consult 'May, Joseph, (Memoir and Letters of Samuel Longfellow5 (Boston 1894).

LONGFELLOW, William Pitt Preble,

American architect : b. Portland, Me., 25 Oct. 1836; d. 1913. He was a nephew of Henry W. Longfellow (q.v.), and was graduated from Harvard in 1855. He was assistant architect of the Treasury Department, 1869-72; was a Fellow of fhe American Society of Architects, and was the original editor of The American Architect. In 1881-82 he was adjunct professor of architectural design at the Massachusetts In¬ stitute of Technology. He was chairman of the architectural section of the Board of Judges of the World's Columbian Exposition, 1893. He published (Abstract of Letters on Perspec¬ tive5 (1889) ; (Cyclopedia of Architecture in Italy, Greece and the Levant5 (1895; new ed., 1903), a work of great value; (The Column and the Arch5 (1899) ; (Applied Perspective5

(1901).

LONGFORD, Ireland, county-town of Longford County, on the Camlin River, and on the Midland Great Western Railway, 75 miles west northwest of Dublin. It contains the magnificent cathedral of Saint Mel of the diocese of Ardagh, one of the finest ecclesiasti¬ cal buildings in Ireland. It is also the seat of a Roman Catholic college and has corn mills, a spool factory, brick yards and tanneries. A large trade is carried on in bacon, butter, grain and other farm produce. Early in the 16th century the ancient name of the town Athfada was Anglicized Longford. It was chartered in the reign of Charles II and sent two members to Parliament. It lost its representation in 1800. The town government is vested in an urban district council. Pop. 3,760.

LONGICORNES, or LONG-HORNED BEETLES. See Cerambycule.

LONGINUS, Cassius, Athenian Neo¬ platonic philosopher and rhetorician : b. about 213 a.d. ; d. Palmyra, Syria, 273 a.d. Greek literature was the principal subject of his studies. He studied the philosophy of the day under Ammonius Sacas at Alexandria, but subsequently became an ardent adherent of the Platonic philosophy and annually celebrated the birthday of its founder by a banquet. He afterward visited the East, and on the invita¬ tion of Queen Zenobia went to Palmyra to in¬ struct her in Greek learning and to educate her children. On the death of her husband he was employed by her in the administration of the state, and advised her to throw off the Roman yoke, by which means he was involved in the fate of this queen. For when Zenobia was taken prisoner by the Emperor Aurelian, and could save her life only by betraying her coun¬ sellors, Longinus, as the chief of them, was seized and beheaded 273 a.d. He suffered death with all the firmness of a philosopher. He was distinguished by his oratory as well as his statesmanship and love of liberty. He ap¬ pears to have known Latin and Syriac as well as Greek. The work known as (Longinus on the Sublime, the best piece of literary criti¬ cism in the Greek language, was written either by him or by a certain Dionysius Longinus, whose date is the 1st century after Christ. It was edited by Vahlen, and published at Bonn in 1887. (See Sublime, The). Consult Rob¬ erts, (Longinus on the Sublime* (2d ed., Cam¬ bridge 1907).*

LONGITUDE. The longitude of a place on the earth is the angle at the pole between the meridian of Greenwich and the meridian passing through the observer's place; or it is the arc of the equator intercepted between these meridians; or, since this arc is measured by the time required for the earth to turn suffi¬ ciently to bring the se-cond meridian, into the same position held by the first, it is simply the difference of their local times, usually reckoned in hours, minutes and seconds, instead of degrees. Since it is easy for the observer., to find his own local time by the methods which have been given, the problem is really this: being at any place, to find the corresponding local time at Greenwich without going there. There are three principal methods of finding longitude.

Finding Longitude by Means of Signals Simultaneously Observable at the Places be¬

tween which the Difference of Longitude is to be Found. — 1. A Lunar Eclipse. When the moon enters the shadow of the earth, the phe¬ nomenon is seen at the same moment, no mat¬ ter where the

observer may be. By noting, therefore, his own local time at the moment, and afterward comparing it with the time at which the phenomenon was observed at Green¬ wich, he will obtain his longitude from Green¬ wich. 2. Eclipses of the satellites of Jupiter may be used in the same way, with the advan¬ tage that they occur very frequently — almost every night, in fact; but the objection to them is that they are not sudden. 3. The appearance and disappearance of meteors may be and has been used to determine the difference of longi¬ tude between places not more than two or three hundred miles apart, and gives very accurate results. This method is now superseded by the telegraph. 4. Artificial signals, such as flashes of powder and rockets, can be used between two stations not too far distant. The differ¬ ence of longitude between the Black Sea and the Atlantic was determined by means of a chain of signal stations on the mountain tops; so also, the difference of longitude between the eastern and western extremities of the north¬ ern boundary of Mexico. This method is now superseded by the telegraph.

Finding Longitude by Regarding the Moon. — Since the moon revolves around the earth once a month, it is continually changing its place among the stars; and as the laws of its motion are now well known, and as the place which it will occupy is predicted for every hour of every Greenwich day three years in advance in the nautical almanac, it is possible to deduce the corresponding Greenwich time by any observation which will determine the place of the moon among the stars. The almanac place, however, is the place at which the moon would be seen by an observer at the centre of the earth, and consequently the actual observa¬ tions are in most cases complicated with very disagreeable reductions for parallax before they can be made available. 1. That of Moon Culminations. — We merely observe with a transit instrument the time when the moon's bright limb crosses the meridian of the place; and immediately after the moon we observe one or more stars with the same instrument, to give us the error of our clock. As the moon is observed on the meridian, its parallax does not affect its right ascension, and accordingly, by a simple reference to the almanac, we can ascertain the Greenwich time at which the moon had the particular right ascension deter¬ mined by the observation. The method has been very extensively used, and would be an admirable one were it not for the effects of personal equation. 2. Lunar-Distances. — At sea it is impossible to observe the moon with a transit instrument, but we can observe its distance from the stars near its path by means of a sextant. The distance observed will not be the same that it would be if the observer were at the centre of the earth, but by a mathe¬

matical process called ˆclearing a lunar® the distance as seen from the centre of the earth can be easily deduced, and compared with the distance given in the almanac. From this the longitude can be determined. 3. Occupations. — Occasionally, in its passage through the sky,

the moon overruns a star, or ˆoccults® it. The star vanishes instantaneously, and, of course, at the moment of its disappearance the distance from the centre of the moon to the star is pre¬ cisely equal to the apparent semi-diameter of the moon : we thus have a <(lunar-distance)) self-measured. Observations of this kind fur¬ nish one of the most accurate methods of de¬ termining the difference of longitude between widely separated places, the only difficulty aris¬ ing from the fact that the edge of the moon is not smooth, but more or less mountainous, so that the distance of a 'star from the moon's centre is not always the same at the moment of its disappearance. 4. In the same way a solar eclipse may be employed by observing the mo¬ ment when the moon's limb touches that of the sun. This and the preceding methods (the methods of occultation and solar eclipse) do not belong in the same class with the method of lunar eclipse, because the phenomena are not seen at the same instant at different places, but the calculation of longitude depends upon the determination of the moon's place in the sky at the given time, as seen from the earth's centre.

There are still other methods, depending upon measurements of the moon's position by observations of its altitude or azimuth. In all such cases, however, every error of observation entails a vastly greater error in the final re¬ sults. Lunar methods (excepting occultations) are only used when better ones are unavailable.

Finding Longitude by Mechanical Meth¬ ods. — 1. By the Chronometer ; which is simply an accurate watch that has been set to indicate Greenwich time before the ship leaves port. In order to find the longitude by the chronom¬ eter, the sailor has to determine its <(error® upon local time by an observation of the alti¬ tude of the sun when near the prime vertical. If the chronometer indicates true Greenwich time, the error deduced from the observation will be the longitude. Usually, however, the indication of the chronometer face requires correction for the rate and run of the chro¬ nometer since leaving port. 2. The Telegraph. — When we wish to find the

longitude between two stations connected by telegraph, the process is as follows : the observers at both stations proceed to determine their own local time by a series of star observations with the transit in¬ strument. Then, at a time agreed upon, the observer at the first station ˆswitches his clock® into the telegraphic circuit, so that its beats are communicated along the line and received upon the chronograph of the second, or say the Western station. After the Eastern clock has thus sent its signals, it is switched out of the circuit, and the Western observer now switches his clock into the circuit, and its beats are re¬ ceived upon the East chronograph. The oper¬ ation is closed by another series of star obser¬ vations. We now have upon each chronograph sheet an accurate comparison of the two clocks, showing the amount by which the West¬ ern clock is slow of the Eastern. If the trans¬ mission of electric signals were instantaneous, the difference shown upon the two chronograph sheets would exactly agree. Practically, how¬ ever, there will always be a small discrepancy amounting to twice the time occupied in the transmission of the signals ; but, the mean of the two differences will be the true difference

of longitude of the places after the proper cor¬ rections have been applied. Care must be taken to determine with accuracy and eliminate the personal equations of the observers. See Latitude.

LONGLEY, James Wilberforce. Canadian politician: b. Paradise, Nova Scotia, 4 Jan. 1849. He was educated at Acadia College, Nova Scotia, studied law in Halifax and was called to the bar in 1875. He was chief editorial writer for the Acadian Recorder, 1873-87, and was managing editor of the Halifax Morning Chronicle (1887-91). Since 1882 he has been a member of Nova Scotia Assembly and in 1884-96 was attorney-general and from 1896- 1905 was commissioner of Crown lands. He passed in 1890 a bill for the abolition of im¬ prisonment for debt. He was appointed a puisne judge of the Supreme Court of Nova Scotia in 1905. His literary works include Socialism: Its Truths and Errors; (,Canada and Imperial Federation1* ; and (Joseph Howe) in the makers of Canada series.*

LONGMAN, Mary Evelyn Beatrice,

American sculptress : b. Winchester, Ohio, 1874. In 1896-98 she studied at Olivet Col¬ lege, Michigan, and in 1898-1900 studied sculp¬ ture at the Art Institute of Chicago, taking her degree with honors in the latter year. For several years after 1901 she was assistant in the studio of Daniel Chester French. At Saint Louis in

1904 she was awarded a silver medal .for her

1915.

LONGOBARDI. See Lombards.

LONGMANS, London publishers for many years identified with high-class literature. Thomas Longman (1699-1755) was apprenticed to John Osborne, bookseller, Lombard street. Longman bought the business of William Tay¬ lor, publisher of conducted in Paternoster Row, whence he moved in 1726 to the present site. Longman was a share¬ holder in many important publications, such as Boyle's (Works, Ainsworth's (Latin Diction¬ ary, } Chambers' (Cyclopedia* and Johnson's (Dictionary. * His nephew and successor, Thomas Longman (1730-97), published a new edition of Chambers. With Thomas Norton Longman (1771-1842) the firm reached a high degree of literary and commercial prosperity. Lindley Murray's (Grammar* was published and proved valuable, while the firm had literary connection with Wordsworth, Southey, Cole¬ ridge, Scott, Moore (to whom it paid £3,000 for*

view became the property of Longmans. The next important members of the firm were Thomas Longman (1804-79), the eldest son of T. N. Longman who issued a beautifully illus¬ trated New Testament, and William Longman (1813-77), the third son, who wrote (Lectures on the History of England5 (1859); 'History of the Life and Times of Edward IIP (1869) ; and (History of the Three Cathedrals of Saint Paul5 (1873). The events of this generation were the publication in succession of Macau¬ lay's (Lays of Ancient Rome5 (1842) ; As¬ says5 (1843) ; and 'History.5 The famous check for £20,000 paid to Macaulay as his share of the profits of the third and fourth volumes for the first few months (1855) is still pre¬ served. The partners of the fifth generation were Thomas Norton Longman and George Henry Longman, sons of Thomas Longman, and Charles James Longman and H. H. Long¬ man, sons of William Longman. One of the earliest ventures of this time was Disraeli's 'Endymion,5 for which the author received £10,000. The connection with Lord Bea- consfield had begun in 1870, when they pub¬ lished his and ceased publication in 1905. In 1890 Longman's took over the business of Riving tons, an

older firm even than their own. In the persons of Thomas Norton Longman, Charles James Longman and Sir Hubert Harry Longman, the family connection with the busi¬ ness is still maintained.

LONG'S PEAK, one of the highest eleva¬ tions of the Rocky Mountains, in Colorado, about 48 miles northwest of Denver. Its height is 14,271 feet. It was named in honor of Col. Stephen Harriman Long (q.v.).

LONGSPURS, a group of large finches, typically of the genus Calcarius, distinguished by the great size of the claw of the hind toe. All are northern birds, frequenting open lands and inclined to form into flocks. The Lapland longspur (C. lapponicus) is known throughout the northern parts of Europe and Asia as well as America, and breeds only in the extreme north, coming south of the area of deep snow in winter, but always rare and irregular in the United States. Three other species are re¬ stricted to North America, one of which, the chestnut-collared (L. ornatns), is well known in the West, as it breeds abundantly on the plains of Dakota and Montana, making its nest on the ground. All are handsome birds, with a mixture of colors, in which black, chestnut, red and buff are conspicuous. Detailed descriptions of all may be found in Dr. E. Coues' (Birds of the Northwest5 (Washington 1874).

LONGSTREET, Augustus Baldwin, son of William Longstreet (q.v.), American jurist and author: b. Augusta, Ga., 22 Sept. 1790; d. Oxford, Miss., 9 Sept. 1870. He was grad¬ uated at Yale College in 1813, began the study of law at Litchfield, Conn., and was admitted to practice in Georgia in 1815. In 1821 he represented the county of Greene in the legis¬ lature, and in 1822 was made judge of the Superior Court of Ocmulgee circuit. Declining re-election to the bench, he returned to the bar, and was especially distinguished for his efforts and successes in criminal cases. In 1822 he re¬ moved to Augusta, Ga., and founded the

Sentinel. In 1838 he entered the ministry of the Methodist Church, and was president of Emory /College 1839-48, then of Centenary Col¬ lege, Louisiana, and subsequently of the Uni¬ versity of Mississippi. He resigned this post after six years and became a planter, but in

1857 he became president of South Carolina College, and a few years later resumed his former post at the University of Mississippi. His works include 'Georgia Scenes,5 a series of broadly humorous sketches, long popular (1840). He is said to have disowned the

second edition (1867) and vainly tried to destroy the first, 'Letters From Georgia to Massachusetts.5

LONGSTREET, James, American soldier: b. in Edgefield district, S. C., 8 Jan. 1821 ; d. Gainesville, Ga., 2 Jan. 1904. He was grad¬ uated at the United States Military Academy in 1842; entered the army as lieutenant of in¬ fantry and, after performing duty at various Western posts, served in the Mexican War, in which (at Chapultepec) he was badly wounded and for gallantry in which he received the bre¬ vets of captain and major. From 1847 to 1852 he was stationed on the Texas frontier and in

1858 became paymaster with the rank of major. In June 1861, the Civil War having broken out, he resigned from the United States army and entered that of the Confederacy as a brigadier- general. At the first battle of Bull Run (q.v.) he commanded a brigade, and in 1862 was made a major-general. In the retreat before Mc¬ Clellan, during the Peninsular campaign (q.v.), he was in command of Gen. J. E. Johnston's rear guard, and contributed greatly to the safe withdrawal of the main army to Richmond. In the Seven Days' Battles (q.v.) he fought with credit to himself and his division, whose losses were very heavy; and at the second bat¬ tle of Bull Run (q.v.) he displayed promptness, energy and generalship to which the Confederate victory was largely attributed. He com¬ manded the right wing at Antietam, and at the battle of Fredericksburg (q.v.) had command of the left, repulsing the desperate assault of Burnside's army. After Fredericksburg he was made lieutenant-general, and with that rank commanded one of the three corps of the Con¬ federate army of invasion, known as the Army of Northern Virginia. At the battle of Gettys¬ burg (q.v.) during the second and third days, he commanded the right wing, which sustained the chief burden of the conflict, furnishing the columns that made Pickett's charge. Trans¬ ferred to the Army of Tennessee, Longstreet arrived on the field in time to save the day at the battle of Chickamauga (q.v.). He next moved unsuccessfully against Burnside at Knoxville (q.v.) and early in 1864 rejoined General Lee in Virginia. Again distinguishing himself in the battles of the Wilderness, he was severely wounded and for some months disabled, but was in command of the first corps of the Army of Northern Virginia during the later months of 1864 and took some further part in active field-service, retaining to the last his distinction as a general and a fighter, and com¬ ing out of the war at its close with the respect of the whole country, which has never dimin¬ ished. After the war he engaged in business as a cotton factor in New Orleans and, having become a Republican in politics, was surveyor of customs at that port, 1869-73. In the same

city he was afterward postmaster. He re¬ moved to Georgia in 1875 ; was United States Minister to Turkey, 1880-81 ; in 1881-84 served as United States marshal of Georgia, and was appointed United States railway commissioner in 1898. He wrote for periodicals, and pub¬ lished (From Manassas to Appomattox5 (1896; 2d ed., Philadelphia 1904). Consult Long- street, Helen D., (Lee and Longstreet at High Tide) (Gainesville, Ga., 1904).

LONGSTREET, William, American in¬ ventor: b. New Jersey, 1760; d. Georgia, 1814. He settled in Augusta, Ga., in early life and on 26 Sept. 1790 wrote a letter to Thomas Telfair of Savannah asking his assistance in raising the means to construct a boat to be propelled by steam. This letter was published in the Savan¬ nah and Augusta newspapers, but funds were not immediately obtained, though he stated his entire confidence in the success ofthe scheme. He was subsequently furnished with the neces¬ sary means for experiment, and constructed a small model boat, upon a plan very different from Fulton's, which went on the Savannah River against the stream at the rate of five miles an hour. Cotton had previously been ginned by two rollers, not quite one inch in diameter, which caught the fibres, pressed out the seed and delivered the clean cotton on the other side, where it was taken by the ginner's hand, and deposited in a bag attached to his person. Long¬ street invented and patented the ((breast roller,® moved by horse power, which entirely super¬ seded the old method. The inventor set up two of his gins in Augusta, which were propelled by steam, worked admirably and promised him a fortune. They were, however, destroyed by fire within a week. He next erected a set of steam mills near Saint Mary's, Ga., which were destroyed by the British in an invasion in the War of 1812. These disasters exhausted his resources and discouraged his enterprise, though he was confident that steam would soon super¬ sede all other motive powers.

LONGTON, England, former town of Staffordshire, two miles southeast of Stoke-on- Trent, on the North Staffordshire Railway. It is situated in the potteries district and there are coal and iron mines nearby. Chinaware and earthenware are manufactured in great quan¬ tities. It contains the fine recreation ground named Queen's Park. In 1865 Longton was incorporated as a town; in 1910 it

became part of the borough of Stoke-on-Trent. Pop.

37,470.

LONGUEUIL, lon-gel, Canada, town of Chambly County, in the province of Quebec, on the Saint Lawrence River, and on the Canadian Pacific Railroad. It is situated opposite Hochelaga, the northeastern part of Montreal. Longueuil is a residential suburb of Montreal, and the country around contains many summer homes of city residents. Its in¬ dustries include the Armstrong- Whitworth steel plant, saw mill and foundry. Pop. 3,972.

LONGUEVILLE, Anne Genevieve de Bourbon-Conde, an zhen-ve-ev de boor-bon kon-da long-vel, Duchess of, French beauty and politician: b. Vincennes, 28 Aug. 1619; d. Paris, 15 April 1679. Her father, Henry II, Prince of Conde, was prisoner in the chateau of Vincennes at the time of her birth. Her brothers were the great Conde and the Prince

of Conti. The Prince de Joinville, to whom she had been betrothed, having died, she mar¬ ried in 1642 the Duke de Longueville, a widower double her age. Imbibing a fondness for poli¬ tics, and actuated by hostility to the court and Mazarin, she took an active part in organizing the first Fronde. In order to punish the duchess, her brothers and husband were ar¬ rested by order of Anne of Austria, the regent, in 1650; but she persisted in her resistance to the court, and repaired to the citadel of Stenay in Flanders, of which she took the command, and was able to induce Turenne to join the Fronde. After the peace of 1659 she devoted herself to a religious life and her influence in Rome was said to have secured for the Jan-senists the so-called peace of Clement IX (1668). The later part of her life was spent in the Carmelite convent of Paris in most string¬ ent observance of religious duties. Cousin, in his (Madame de Longueville) (6th ed., 1859), calls her ((the soul of the Fronde.® Consult also Cousin's. (Youth of M. de Longueville) (1854); and Williams, H. N., (A Princess of Intrigue) (London 1907).

LONGUS, long'us, Greek writer, supposed to have lived about the close of the 4th or the beginning of the 5th century a.d. Concerning his history nothing is known. He was the author of a pastoral romance entitled (The Pastorals of Daphnis and Chloe,5 of which the best editions are those of Villoison (1778), Courier (1810), Passow (1811). Longus is the latest of the bucolic poets and in the Renais¬ sance period was widely read, his pastoral descriptions, as given in Amyot's French trans¬ lation (1559), having not a little to do with

the revival of the pastoral form. (Seˆ Daphnis and Chloe). Consult Wolff, (Greek Romance in Elizabethan Prose Fiction5 (New York

1912).

LONGVIEW, Tex., town, county-seat of Gregg County, on the Texas and Pacific, the Texas, the International and Great Northern, and the Texas and Gulf railroads, about 240 miles northeast of Austin and 120 miles east of Dallas. It is situated in an agricultural section, in which are raised large crops of grain and cotton. The chief manufacturing establish¬ ments are foundry, lumber mills, railroad shops, cottonseed-oil mills, crate and box factories and plow works. The principal offices of the Texas, Sabine Valley and Northwestern Rail¬ road are in Longview. The trade is principally in agricultural products, livestock, hides, cot¬ tonseed-oil and lumber. The waterworks and sewage system are the property of the munic¬ ipality. Pop. (1920) 5,713.

LONGWORTH, Nicholas, American wine manufacturer and horticulturist: b. Newark, N. J., 16 Jan. 1783; d. 1863. At 21 he went to the then unimportant settlement of Cincinnati, where he studied law. After 25 years' ex¬ perience at the bar he retired from professional life in order to devote himself to the cultivation of the grape, with a view of manufacturing wine. At first his efforts were unsuccessful from his having adopted the erroneous notion of the early American vine growers, that foreign plants were alone to be relied upon. He had imported many different species from every vine-growing country in Europe before trying those indigenous to the United States.

About 1828 he commenced the experiment, and became a high authority in agricultural matters as well as in vine culture, being not infre¬ quently called the "Father of American Grape Culture.® His writings, now obsolete, attained a wide influence in his time.

LONGWY, long've', France, fortified town in the department of Meurthe-et-Moselle, 90 miles northwest of Nancy, 19 miles southwest of Luxemburg, near the Belgian frontier. It is situated on a plateau, 1,240 feet above the sea, overlooking the Chiers, an affluent of the Meuse. The town comprises an upper and lower town. The former on a hill 390 feet high commands the Luxemburg road and is

strongly fortified. The industrial establishments are in the lower tower and include manufactures of iron and steel, jewels, gold and silver ware and porcelain. It has a fine town-hall, built in 1730, a hospital and a 17th century church. Longwy (Longus Vicus) is known as the Iron Gate of France. In 1678 it came into French possession and was fortified by Vauban. The Prussians took it in 1792, 1815 and 1871. In the Great War of 1914-18 Longwy was the first French fortress attacked and although de¬ fended with spirit it soon fell to the German invader. Pop. 9,700.

LONNROT, len'rot, Elias, Finnish philolo¬ gist : b. Sammatti, in Nyland, 9 April 1802; d. there, 19 March 1884. Recognizing the value of the people's songs and ballads for Finnish language study, he spent years — for the most part alone and on foot — in collecting such material in Finland, Lapland and adjoining provinces, and published the fruits of his re¬ searches in a series of volumes. Among his "finds® is to be numbered the great popular epic

LONS – LE – SAUNIER, lon-le-so'nya, France, town and capital of the Department of Jura, situated on the Valliere, and on the Paris-Lyons Railway, 75 miles northeast of Lyons. It is surrounded by vine-clad hills ; contains a 12th century church, law courts, chamber of commerce, lycees, training colleges and a bank. There are salt works in the neighborhood. There is a brisk trade in livestock, cheese, cereals and wood. Wine and leather making are the principal industries. The town was founded by the Gauls, by whom it was called Ledo. The Romans called it Ledo Salinarius. The English burned it in 1364 and it suffered a like fate in 1637 at the hands of the Duke of Longueville. Not until 1674 did it become definitely a part of France. At Lons-le-Sau- nier Ney and Napoleon met after the latter's return from Elba. It is the birthplace of General Lecourbe, to whom a monument has been erected. There is also a monument to Rouget de l'Isle, author of (La Marseillaise, } who was born nearby at Montaigu. Pop. 11,060.

LOO (short for lanterloo, from the Dutch name), a game of cards best played with five (three cards is the more common form), dealt from a whole pack, either by threes and twos, or one at a time. After dealing, a card is

turned up for trumps. The jack of clubs, or the jack of the trump suit, as agreed on, is the highest card, styled "pam® ; the ace of trumps is next, and then the other cards as in whist. Five cards of a suit, or four with "pam,® com¬ pose a <(flush,® which sweeps the board, and yields only to a superior flush, or the elder hand. When the ace

of trumps is led, it is usual to say, “Pam be civil® ; the holder of the jack (of trumps or clubs; see above) is then expected to let the ace pass. Each player has the liberty of changing his cards for others from the pack, or of throwing up the hand, in order to escape being looed, that is, failure to gain a trick. All those that win tricks divide the pool or (

LOO-CHOO ISLANDS. See Liu-Kiu

Islands.

LOOFAH, Egyptian, the fibrous portion of the fruit of one or two species of the genus Luffa of the gourd family, sold for use as a bath-sponge or flesh-rubber. There are about 10 species of the genus known, but the ((towel gourd,® as this bath-sponge is sometimes called, appears to be obtained chiefly from L. cegyptiaca. In the West Indies the fruit of L. acutangula yields a similar network of fibres, and is there used as a sponge or dishcloth, and worked up into baskets and small ornamental articles.

LOOKING BACKWARD, 2000-1887, a

romance by Edward Bellamy, published in 1888. It had a sale of nearly 400,000 copies in the next 10 years, and is still in demand. It re¬ counts the strange experiences of Julian West, born in 1857, who in 1887 is put into a hypnotic sleep. In the year 2000, Dr. Leete, a retired physician, is conducting excavations in his garden, when West’s subterranean chamber is disclosed. The doctor discovers and resusci¬ tates the young man, who finds himself in a regenerated world.

LOOKOUT MOUNTAIN. See Chat¬ tanooga, Battle of.

LOOM, a term originally meaning simply “tool,® but now particularized so as to apply to a machine for weaving. The simplest form of the loom, still in use among semi-primitive tribes and up to the middle of the 18th century practically the only form, was the hand loom, a rectangular frame, from one side of which yarn is stretched to the opposite side, where it is so secured that the transverse threads may be passed by hand “over and under® the threads already stretched. Fig. 1 shows the simplest form of this loom. From ancient carvings it appears that this simple loom frame was at first hung vertically from an over¬ head support, and in all probability was ar¬ ranged to be lowered as the weaving progressed, so as to keep the work at a convenient level.

So long as the warp lay inert before the

weaver it was a very slow process to pick up each alternate thread by hand in order to pass the weft under them. This was overcome from the earliest times by the device of attaching these alternate threads to a staff on which was a loop into which the weaver inserted his great toe and pulled the alternate threads of the warp down together, producing a <(shed® below the level of the cloth through which he could throw his shuttle with a single cast. The loose¬ ness of the cloth thus woven called for some method of firming it as the weaving proceeded, and at first this was done by lengthening the shuttle so that it was longer than the width of the cloth, and using that to press the newly laid thread or <(pick® snugly into the angle or shed of the divided threads of warp. This function was later performed by the <(reed® or <(sley® — a frame hanging upright, from pivots at the top and filled, at first, with very thin strips of bamboo, but later of fine polished wire. According to the firmness of the cloth to be woven the wires were passed between every two threads of warp, or between every other pair or every other triplet. After each throw of the shuttle the reed is pulled forward, pressing the pick solidly against the newly woven cloth on the cloth roll. When working a wide piece of cloth it was customary to have an assistant at one end to throw the shuttle back to the weaver's end, or if the piece were very wide two shuttle throwers were required, on at each side of the loom.

The first important improvement was the ((fly shuttle® invented by John Kay in 1733. This consisted of a pair of shuttle boxes fastened each at one end of a smooth wooden shelf or deck running along the lower part of the reed, and coming close up against the threads of the warp. In each of the shuttle boxes was placed a block of hard wood known as a <(picker® strung on a wire, and connected by a cord to a handle immediately above the cloth and in front of the weaver. A sharp pull on the handle would drive the picker against the shuttle with a quick blow and send it flying through the shed. Kay's invention practically revolutionized the weaving industry, as it in¬ creased four or five fold the output of a loom fitted with the (

The hand loom for most of the modern textiles has been superseded by the power loom, but for some classes of work it cannot be re¬ placed. It is still in constant use for working out new patterns to be eventually wrought on power looms, and many kinds of high grade

fabrics in silks, velvets, fancy cloths and the so-called art fabrics are still made on it.

The accompanying illustration (Fig. 2) shows in a simplified form the essential parts of the hand loom as it existed up to the time of Cartwright's invention of the power loom in 1785. The primitive frame (Fig. 1) occupies a horizontal position in the framework (AAAA), and the former end pieces have become rollers, so that the length of the piece of cloth is no longer necessarily less than the length of the

frame. These rollers are the beam or yarn- roll (B), which is at the back of the loom, and upon which the warp threads are wound, and the cloth beam (C) to which the threads are fastened and which winds up the cloth as it is made. The threads of the warp, held tight by weights (b, b) acting upon the yarn-roll to pull it backward, pass through the eyes of the healds, by which they are separated to permit of the passage of the shuttle, and also between the wires of the reed. The shuttle in the hand loom is thrown by the operator, and in the power loom by the picker-staff machinery; in either case it is made of hard wood, is pointed at either end with iron and carries in a recess the quill or bobbin. D shows the hanging batten frame with the reed at the bot¬ tom, and the shuttle boxes at each end. At E are the treadles which operate the healds (H) and at G are the points which separate the threads of the warp so that a broken yarn can be quickly identified and mended.

This hand loom was first improved, after the unsuccessful attempts of De Gennes in 1678, by Edmund Cartwright, who undertook in 1785 to counterfeit by mechanical means the three simple motions of weaving. He was a clergyman, with neither mechanical nor textile training, but his loom though cumbrous and awkward is essentially that now in use. Dr. Jeffrey, working independently, achieved about the same indifferent results. The first substan¬ tial advance was made by Andrew Kinloch in 1793 and William Horrocks added his contri¬ bution in overcoming some of the mechanical difficulties. But some minor inadequacies re¬ maining, his loom was quickly superseded by the superior Richard Roberts loom built on the same principles but with greater mechanical skill. The simplest modern loom differs essen¬ tially from the hand loom in that the warp yarn is no longer stretched direct from the yarn roll to the cloth beam, and these two parts are no longer placed at the same height from the base of the frame nor at so great a distance as before. The yarn runs upward from the warp-beam over the whip-roll, thence is carried through heald, heddle or (the American term) harness, and through

the reed, and down from the latter to the cloth roll. The advantage of

LOOM

1 Improved Combing Machine (front) 2 Improved Yarn Reel 3 Cotton Roving Frame 4 Twisting Frame with tape-driven Spindles

LOOM

1 Silver Lap Machine

2 Ribbon Lap Machine

Heavy Duck Loom

LOOM

swEfo rr. ‘ '".r? ^

*\mam vr ' mm. Ifj&su m*i mJm,*

tm will*

*K^» *T*N «Sk*

s.,i««nt ~~‘. c£ ' — ?,1 'mill*

Kp» w

r-> »

.apn •»# v£

,'m '£ – ^Si A &»*

*' ** 1? f* k** #•**

*£££: 2s ?***»* *}*

- '“ •“ “” •*. . * r ir «k. JH*

Tape Drive Spinning Frame 2 Wool Spinning Frame 3 Quiller 4 Revolving Flat Card

LOOM

1 Dobby Loom

this arrangement is greater stability and a dis¬ tinct saving in space, the depth of the loom being materially decreased. The ordinary power loom has no mechanical device for re¬ newing the weft as it is used. The ordinary bobbin will run in a power loom for not more than four to six minutes — depending upon the fineness of the yarn. Then the loom must be stopped and a new bobbin put in. Two meth¬ ods have been adopted to overcome this diffi¬ culty : changing the shuttle, as in the Harri- man loom, and changing the bobbin, as in the Northrop loom. In practice it has been found that at the speed the loom is usually run, changing the shuttle takes too much time, and the loom has to be slowed down to a standstill. This is accomplished automatically, the shuttle changed and the loom started again. The other method has been even more effective, and the necessary mechanism quite simple. At the proper moment the loom sets in operation a lever which pushes a fresh bobbin from a mag¬ azine into the shuttle at the moment it lies stationary in the shuttle box, and the same movement releases a catch and the empty spin¬ dle drops out.

With, the old-fashioned heddle only the sim¬ plest and most regular webs could be woven, the number of heddles being limited to six. The demand for a greater variety in color, pat¬ tern and texture led to the invention of the dobby, a lever operated by a projecting pin which engages in the pattern chain. The dobby is not operated alone but in a series, or <(baj- tery,® ranging in number from 10 .up to 25. Each dobby works a harness connecting with a certain set of warp threads in forming the shed, and the more dobbies on the loom the greater variety possible in the fabric. For highly ornate and figured patterns the most ef¬ fective mechanism is the Jacquard attachment, patented by a weaver of Lyons, Joseph Marie Jacquard, in 1801. This machine lends itself readily to use with any loom. It may be de¬ scribed as a means of controlling the shed. A revolving prism or <(cylinder® is so perforated as to receive certain selected needles, which in turn govern a set of perpendicular hooks. These hooks lift or depress the threads of the warp, so that the weaving is no longer of neces¬ sity simply ((under or over.® How many threads are to be skipped is determined by a perforated card-board, the perforations occur¬ ring where the thread of the warp is to lie above the weft; but if the warp-threads are not to be raised no holes are cut

in the cards, the needles do not enter the cylinder and the hook attached to the needle does not. lift (by means of its neck-cord or loop of twine), the thread of the warp. A connected series of these cards, each with different perforations, makes an almost infinite combination of pat¬ terns possible, as each card makes a different shed. As each card represents a single pick, a series for an intricate pattern is very large, reaching sometimes 30,000 cards.

The hand loom is still used for the manu¬ facture of rugs and fine carpets, but the power loom, driven by various powers, electricity being the latest and in some ways the most economical, is used for almost any purpose. The ribbon loom, for instance, weaves simul¬ taneously a number of narrow pieces. Many attachments, invented in a long series, have

continuously and wonderfully decreased the need of any supervision of the loom, making it more and more automatic: thus a shuttle protector automatically stops the machinery if the shuttle fails to fiy all the way across the warp; the filling stop motion protects the machinery from running on uselessly when the filling breaks or runs out; and take-up, let-off and warp-stop motions are further automatic devices. A very ingenious machine known as the Chernack circular loom is used in weaving tubular fabrics such as constitute the basis of fire-hose. This loom resembles in appear¬ ance a knitting machine. Its shuttle travels around the circuit of upright needles in a circu¬ lar track being propelled by a pinching move¬ ment of the rising and falling needles, in a fashion similar to jumping a fresh apple seed with the pressure of thumb and finger. This loom is used also for weaving wire.

Consult Ainley, A., (Woolen and Worsted Loomfixing) (Lawrence, Mass., 1900) ; The Draper Company, (Labor-Saving Looms) (Hopedale, Mass., 1907) ; International Library of Technology (Vol. LXXX, Scranton, Pa., 1905) ; Murphy, W. S., (Textile Industries) (Vol. IV, New York 1912) ; Posselt, E. A., (Manufacture of Narrow Woven Fabrics) (Philadelphia 1916).

LOOMIS, Alfred Lebbeus, American phy¬ sician: b. Bennington, Vt., in 1833; d. 23 Jan. 1895. He was graduated at Union College in 1851, and studied medicine in New York City at the College of Physicians and Surgeons, where he was graduated in 1852. He gave his attention to diseases of the lungs at a time when auscultation and percussion were acquir¬ ing great scientific importance in medical prac¬ tice, and in the treatment of such diseases be¬ came an efficient specialist. In 1859 he was appointed visiting physician to

Bellevue Hos¬ pital, New York, and was made lecturer on physical diagnosis at the College of Physicians and Surgeons in 1862. Having spent some months in the Adirondack Mountains for the improvement of his health, in later years he established the Sanitarium at Saranac and the Hospital for Consumptives at Liberty, N. Y. In 1866 he accepted the professorship of theory and practice of medicine at the University of the City of New York, remaining in connec¬ tion with that institution until his death. The work done by him for its medical department was of great and lasting importance, as were also the services he rendered to the New York Academy of Medicine. In 1874 he was ap¬ pointed visiting physician to Mount Sinai Hos¬ pital ; was president of the New York Academy of Medicine, 1889-90 and 1891-92. His publi¬ cations include (Lessons in Physical Diagnosis) (1870) ; (Lectures on Fevers (1877) ; and (A Text-book of Practical Medicine) (1884). He also edited (An American System of Medicine)*

(1894).

LOOMIS, Charles Battell, American hu¬ morist: b. Brooklyn, N. Y., 16 Sept. 1861; d. 1911. He was educated at the Brooklyn Poly¬ technic Institute and held a business clerkship 1879-91, which he resigned to devote himself to the writing of humorous sketches. He was a frequent contributor to periodicals and pub¬ lished (Jiist Rhymes) (1899) ;

(1900) ; (A Partnership in Magic (1903) ; (Cheerful Americans) (1903) ; (More Cheer¬ ful Americans> (1904) ; H've Been Thinking) (1905); (Minerva's Manoeuvres* (1905); (Cheer Up* (1906) ; (A Bath in an English Tub) (1907) ; (Poe's <(Raven** in an Elevator * (1907) ; a third edition of (More Cheerful Americans, The Knack of It) (1908) ; (A Holi¬ day TouclP (1908) ; (Just Irish) (1909).*

LOOMIS, Chester, American painter: b. near Syracuse, N. Y., 18 Oct. 1852. He was educated at Cornell University (1868-71) ; studied painting at Paris under Leon Bonnat, and after a residence of 11 years in France opened a studio at Englewood, N. J. He is favorably known as a figure, portrait and land¬ scape painter and his pictures are found in many private collections. His (Christopher Sly) was purchased by the Indianapolis Art Association. His

(Normandy Milkmaid) was awarded a gold medal at the Massachusetts Charitable and Mechanics' Institution Exhibi¬ tion. Of recent years he has turned his atten¬ tion more to portrait and mural painting than to the production of genre pictures and land¬ scape. He is an associate member of the National Academy of Design, and member of the National Society of Mural Painters, the Architectural League, the Artists' Fund Society and the National Arts Club.

LOOMIS, Elias, American physicist: b. Willington, Conn., 7 Aug. 1811; d. New Haven, Conn., 15 Aug. 1899. He was graduated at Yale College in 1830, and was tutor there in 1833-36. He was the first person in America to obtain a view of Halley's comet, at its return in August 1835, and his observations on that body, with a computation of its orbit, were published in the American Journal of Science. After a year's study in Paris he was professor (1837-44) of mathematics in West¬ ern Reserve College, Ohio, of natural philoso¬ phy (1844-60) in the University of New York, and of natural philosophy and astronomy (from 1860) at Yale. He devoted much of his time to original research, wrote more than 100 scientific treatises and published a series of textbooks on mathematics, natural philosophy, astronomy and meteorology, of which more than 500,000 copies were sold; they included (Elements of Algebra- ; (Elements of Geometry and Conic Sections1* ; (Recent Progress in Astronomy.)*

LOOMIS, Francis B., American journalist and diplomatist: b. Marietta, Ohio, 27 July 1861. Fie was a graduate from Marietta College and in 1883 joined the staff of the New York Tribune. He was State librarian of Ohio 1885-87; consul at Saint Etienne, France, 1890- 93, and editor-in-chief of the Cincinnati Daily Tribune 1893-%. He was United (States Envoy- Extraordinary and Minister Plenipotentiary to Venezuela, 1897-1901, and while there was active in promoting the interests of Amer¬ ican commerce in South America. His succes¬ sor, H. W. Bowen, charged that Loomis had carried on improper business transactions while in Venezuela, but these charges were dismissed by President Roosevelt. He filled the same diplomatic position at the court of Portugal 1901-02, and became Assistant Secretary of State in January 1902, resigned in 1905. He was designated as special Ambassador to France

in 1905 to receive the remains of John Paul Jones, was special envoy to Japan in 1908, com¬ missioner-general to the Tokio Exposition 1911, and to the Exposition at Turin in 1912. He was made grand officer of the Legion of Honor, France, 1904, and has received

decorations from the emperor of Japan and the king of Italy.

LOOMIS, Gustavus, American soldier: b. Thetford, Vt., 1789; d. 1872. He was gradu¬ ated at West Point and received his commission as sub-lieutenant of artillery in 1811. He saw service on the Niagara frontier from 1812 to 1813, in which latter year he took part in the capture of Fort George (27 May) and was made prisoner the following December at Fort Niagara. During the war with Great Britain, the Black Hawk War and the campaign against the Seminole Indians, he held important com¬ mands, and after the Civil War, in which he served as superintendent of the general recruit¬ ing service, was retired with rank as colonel of infantry. In 1865 he received the brevet of brigadier-general of the United States army.

*LOOMIS, Silas Laurence, American scien¬ tist and inventor : b. Coventry, 'Conn., 1822 ; d. 1896. He was graduated from Wesleyan Uni¬ versity in 1844, from the Medical School of Georgetown University in 1856 and was pro¬ fessor of physiology at Georgetown in 1859- 60. In 1857 he was appointed * astronomer to the United States Coast Survey, in 1860 instruc¬ tor in mathematics to naval cadets, in 1861-67 was professor of chemistry and toxicology at Georgetown, and subsequently occupied a chair at Howard. Among his inventions are a process for manufacturing a textile fabric from the palmetto, and another for making profitable use of chromium ores. He wrote textbooks of arithmetic, a (Key to the Normal Course) (1867); (The Education and Health of Woman* (1882), and other works.*

LOON, Id-on', Philippines, a pueblo of the province of Bohol, situated on the west coast 13 miles north of Tagbiliram, and opposite Dalaguete, Cebu. A mole 328 feet long, pro¬ tecting the harbor, extends to the town, which is reached by steps cut in the rock. It is pic¬ turesquely situated on the slope of the Cam- manoc hills and has an old Spanish fort with bastions. It is centrally located for trade, and is the largest town in the province. Pop.

15,400.

LOON. See Diver.

*LOOS, lo*s, Charles Louis, American edu¬ cator: b. Woerth-sur-Sauer, Basse- Alsace, France, 23 Dec. 1823; d. 1912. He came to the United States in 1832, and settled at New Franklin, Ohio, where he studied English. He was graduated from Bethany College in 1846, where he was professor of ancient languages 1858-80. He was*

president of Kentucky Uni¬ versity 1880-97. In 1849 he was ordained to the ministry of the Disciples and was of great prominence in his denomination. He held pastorates at Wellsburg, Va., Somerset, Pa., and Cincinnati, Ohio.

LOOSESTRIFE, a plant of the genus Lysi- machia, of the primrose family, about 40 species of which grow in the temperate zones. Several yellow-flowered species belong to the United States, but those best known are the whorled or four-leaved, L. quadrifoUa, and the bulb-

bearing, L. terrestris. Two or three species, es¬ pecially L. nummularia, popularly known as moneywort, creeping Charley and creeping Jenny, have been introduced from Europe. One kind is eaten in India as a pot-herb with fish.

Again and again,® says Miss Lounsberry, in her (Southern Wild Flowers and Trees,) ((we come across the loosestrifes during our summer and early autumn rambles. And soon we learn to associate with them their opposite, or whorled, leaves, always entire, and their up¬ right, rather stiff manner of growth, and very frequently we look for their petals to be darkly spotted near the bases. In personality the genus reminds us somewhat of the St. John's-wort, but we think of the latter as being usually freer, more prolific bloomers. The old and pretty legend concerning our present plants is that they loose strife; that they act as peace-makers especially among cattle that are quarrelsome. Believing this, people in the old country used to tie such a spray to their yokes before starting out on a long journey.®

The name loosestrife is also given to species of the genus Lythrum of the familv Lytliracece , of which about a dozen species are widely dis¬ tributed in temperate climates. They are char¬ acterized by four-angled stems, usually opposite leaves which are sometimes whorled, and red¬ dish-purple or white flowers, solitary above and whorled lower down the stems. Some are culti¬ vated for ornament in borders and among shrubbery, where they succeed well. The best-' known species is the purple loosestrife (L. salicaria), which is frequently planted.

LOOT, formerly the plunder taken from an enemy in war, now more specifically, goods of citizens or soldiers of the enemy country taken

without authority by the invaders. All civilized nations forbid looting under pain of severe penalties. During the Great War (1914-18), frequent complaints were made by the in¬ habitants of the occupied regions of Belgium and France that the Germans were systematic¬ ally looting the country either with the con¬ nivance or under the express order of the higher command. After the liberation in November 1918 these complaints in many in¬ stances were shown to have been well founded.

LOPE DE VEGA, lo-pa da va-ga. See Vega Carpio.

LOPES, or LOPEZ, lo'path, Fernao, Por¬ tuguese chronicler: b. about 1380; d. after 1459. He was appointed chief archivist of the king¬ dom by Dom Joao I in 1434, and spent his life in historical research and the composition of chronicles, which for literary and critical value were unsurpassed in his century.. His Chron¬ icle of Senor Don John V describing the great struggle between Portugal and Castile, invites comparison with Froissart's chronicle on ac¬ count of its picturesqueness, naive simplicity and dramatic reality. Equally vigorous are his chronicles of Dom Pedro I and Don Fernando.

LOPEZ, lo'paz or lo'path, Carlos Antonio, President and dictator of Paraguay: b. near Asuncion about 1790; d. there, 19 Sept. 1862. He was educated in Asuncion, studied civil and canon law at the ecclesiastical seminary there and became noted for his legal acquirements. During Dr. Francia's incumbency of the presi¬ dency Lopez lived in seclusion to avoid the hostility of the former. After the death of

President Francia, in 1840, he was secretary of the junta which controlled Paraguay for a few years. In March 1844 the Paraguay Congress adopted the constitution he had drawn up and elected him President of Paraguay for 10 years. He was re-elected for three years in 1851 ; and again in 1857 for seven. He followed Francia's policy in the main and became in¬ volved in quarrels with foreign nations. In 1859 the United States sent a naval force to the Plata to enforce demands against him. He offered to submit the question of damages to arbitration, but afterward evaded the claim. He organized an army and navv and made com¬ mercial treaties with several foreign nations, built a railroad and in general furthered the material prosperity of the country. The Con¬ gress had empowered him to name his successor at will, and he was succeeded by his son, Fran¬ cisco Solano Lopez (q.v.).

lc5pez, Francisco Solano, Paraguayan President: b. Asuncion, 24

July 1827; d. near the Aquidaban, 1 March 1870. He was the son of Carlos Antonio Lopez (q.v.). He was edu¬ cated in Paris and in his 18th year his father made him a brigadier-general in the war against Rosas, the dictator of Buenos Aires. He after¬ ward filled some of the principal offices of state, and was sent to Europe in 1853, accredited to the chief courts there. He negotiated treaties with England, France and Sardinia. In 1855 he returned to Paraguay, became Minister of War, and on the death of his father, in 1862, President for 10 years. He had aimed at the foundation of a great inland empire, and as his military preparations were now complete, and his army superior to that of any of the South American states, he began hostilities against Brazil in 1864 by taking possession of the province of Matto Grosso. He was made marshal of the army by Congress and extraor¬ dinary powers were granted him. In 1865 he demanded permission of Argentina to cross her territory in order to invade Rio Grande do Sul, Brazil. Permission being refused he seized Corrientes and had a measure of success in his early campaigns. The Argentine Republic and Uruguay allied themselves with Brazil, and after five years' conflict Lopez was reduced to extremities, and was finally surprised on the banks of the Aquidaban by a troop of Brazilian cavalry and slain. Lopez recruited his forces by a conscription of all males between 12 and 70 years. The latter part of his career had been stained by many cruelties and wanton murders. (See Paraguay — History). Consult Thomp¬ son, (The War in Paraguay) (1869) ; Master- man, (Seven Eventful Years in Paraguay) (1869) ; Burton, (Letters from the Battle Fields of Paraguay } (1871) ; Washburn, (History of Paraguay) (1871): Schneider, (Der Krieg der Triple-Allianz) (1872-75).

LtfPEZ, Jose Hilario, ho-sa' he-la' re-6, Colombian politician: b. Popayan, 18 Feb. 1798; d. Neiva, 27 Nov. 1869. He was Presi¬ dent of New Granada (Colombia) from 7 March 1849 to 7 March 1852, and in the last- named year slavery was abolished and changes were made looking to the formation of a fed¬ eral government. In the revolutions of 1854 and 1859—62, he fought with the Federalists and was commander-in-chief for part of this period. He was a member of the provisional govern-

ment 1862-63, and subsequently President of Tolima. In 1867 he was named commander-in¬ chief of the army.

lc5pez, Martin, the first shipbuilder of

the American continents. He was in the em¬ ploy of Cortes, or formed one of the army of the conqueror when he began his famous march against the city of Mexico (Tenochtit- lan). He was a shipbuilder by trade and had been attracted to the New World by the stories of wealth to be had there and the spirit of adventure that had taken possession of all Spain at the beginning of the 16th century. While Cortes was in the city of Mexico for the first time, he -made the Emperor Moctezuma a prisoner in his own palace, and to please his captive he had Lopez construct two vessels to navigate the waters of Lake Texcoco, which then surrounded the capital of the Aztecs ex¬ cept on one side. This gave him the idea, a year later, of building a number of larger vessels of various sizes with which to attack the city of Mexico from water while his army con¬ tinued the siege from land. Lopez built 13 vessels in the neighboring town of Tlaxcala, all brigantines, and some of them of considerable size. He made them in parts, so that they could be carried on the backs of Indian peons over the mountains to the town of Texcoco, where he had them set up. From there a canal a mile and a half long and 12 feet deep was dug to the lake to float the vessels down to it. It required 20,000 men, warriors and car¬ riers, to bring the ships from Tlaxcala to Texcoco, a distance of 60 miles; and the work of transportation occupied nearly a week. The convoy stretched across the country for six miles. At the Texcoco end of the line 8,000 men were employed for over two months dig¬ ging the canal to connect the city with the lake. All the Spaniards in Mexico, the Tlaxcalans in Texcoco and thousands of Texcocans, includ¬ ing all the representatives of royalty and nobility, a mighty host in holiday attire, turned out to see the 13 vessels launched (1521) at an elevation of a mile and a half above sea-level. These 13 brigantines played a very important part in the reduction of the capital of the Aztecs. They held the whole water front and prevented the Aztecs getting supplies of food and other necessities ; and the guns on the vessels frequently directing a cross-fire at the besieged while the land cannon were pounding them from several other directions. Finally they prevented the escape of the emperor, Guatemotzin and numerous nobles after further defense of the city had become impossible. Consult Letters of Cortes ; Diaz del Castillo, Bernal, (The True History of the Conquest of New Spain5 ; Prescott, (The Conquest of Mexico.5

l<5pez, Narciso, Cuban revolutionist: b. Venezuela, 1799; d. Havana, Cuba, 1 Sept. 1851. He served for some time in the Spanish army, from which he retired in 1822 with the rank of colonel. After the evacuation of Venezuela by the Spanish troops, he established

himself in Cuba, and afterward during a stay at Madrid joined the party of Isabella against Don Carlos, and became successively adjutant of Valdes, governor of the Spanish capital, and senator for Seville, but threw up his offices after the refusal of the Cortes to admit the representatives of

Cuba. Valdes became governor-general of that island, and Lopez on returning thither was em¬ ployed by him in various capacities. He was soon absorbed by the project of throwing off the yoke of Spain, and he proceeded in 1849 to the United States, where he sunk almost his whole fortune in the organization of three suc¬ cessive expeditions to Cuba : the so-called Round island expedition in 1849 ; the ˆinvasion of Cardenas55 expedition in May 1850, both of which failed, and the Bahia-Honda expedition, of August 1851, which ended fatally. Lopez, with several hundred persons of different nationalities whom he had enlisted in various parts of the United States, landed at Morillo, near Havana, where he left 200 of his men under the command of Colonel Crittenden, who were taken by the Spaniards and shot. Lopez went to Las Pozas, where he succeeded in re¬ pelling an attack of the Spanish soldiers; but, isolated from his friends, sought refuge in the mountains, where he was captured and taken to Havana. He was sentenced to death, which he met with great firmness. Consult Claiborne, J. F., (Life and Correspondence of John A. Quitman5 (New York I860) ; Morales, V., Uniciadores y primeros martires de la revolucion cubana5 (Habana 1901) ; D. T., (E1 General Narciso Lopez y la Isla de Cuba5 (Caracas 1851).

LOPEZ, Cape. See Cape Lopez.

LOPEZ DE AYALA, Adelardo, Spanish dramatist and politician : b. Seville district, 1 May 1828; d. Madrid, 30 Jan. 1879. He was educated at the University of Seville, and at Madrid in 1851 had* his first drama, (E1 Hombre de Estado,5 produced. In 1857 he was elected deputy from Badajoz to the Cortes, and subsequently he w?as a member of Alfonso XII's first Cabinet. He was the author of numerous lyrics which take excellent rank in Spanish literature, especially of the (Epis- tola.5 But he was better known as a dramatist of high literary and popular success skilful in his construction of plot but deficient in his drawing of character. Chief of his plays are (Tanto por Ciento5 (So Much per Cent), which was recognized by the bestowal upon him of a gold crown, and (Consuelo.5 Both are search¬ ing arraignments of the principles of modern life.

LOPEZ DE AYALA, Pedro, pa'dro, Span¬ ish poet: b. Murcia, 1332; d. Calahorra, 1407. He served, with an eye to his own interest,

Henry II, John I and Henry III, kings of Castile. He was taken prisoner by the Black Prince at Najara in 1367, and again at Aljabar- rota in 1385, and is said to have spent 15 months in an iron cage at Oviedes. He attained the highest dignities, including those of lord chan¬ cellor (1398) and high chamberlain of Castile, and wrote the (Cronicas de los Reyes de Castilla5 ((Chronicles of the Kings of Castile,5 first complete edition 1780). which covers the period from King Peter to Henry III. In this work he strove to substitute for the dry record of the historiographers a pragmatic account of historical events which is remarkable for its vivid pen portraits. He also wrote lyrics, and the 'Rirnado de Palacio5 ((Rime of the Pal¬ ace5), a satiric poem on political and social questions.

L(5PEZ DE LEGAZPI, la-gath'pe, or LEGASPI, la-gas'pe, Miguel, Spanish soldier and navigator: b. Zumarraga, about 1510; d. 1572. He went to Mexico in 1545 and for a time served with distinction as chief secretary of the city and government there. As a re¬ ward he was placed in command of Velasco's expedition, fitted out in 1564 for the conquest of the Philippines. He took the expedition over in four vessels, arriving there in 1565. He established the first settlement at San Miguel on the island of Cebu. Several parties were sent out to explore and occupy the country, and by May 1571 Lopez had conquered Luzon and in that month founded Manila. He named the islands Isles Filipinas in honor of his sovereign, Philip II. His conquest was accomplished with littffi trouble due to the tact and kindness of Lopez.

LOPEZ Y PLANES, lo'paz or lo'path e pla'nes, Vicente, Argentine poet : b. Buenos Aires, 1784; d. there, 1856. He was prominent as a soldier and politician, was member of Con¬ gress, 1819-25, and provisional President of the republic, 5 July to 13 Aug. 1827. He presided over the Supreme Court of Justice, and was governor of the province of Buenos Aires. He was the author of the (Argentine National Hymn) and other poems.

LOPHIODON, an extinct tapir-like animal, found in the Eocene fresh-water deposits of central Europe and to some extent in the White River and neighboring formations of Wyoming. It is one of the early and general types of perissodactyls, or odd-toed ungulates. The genus is typical of a family (Lophiodontidcc) which includes also the genera Hyracotherium, Hyrachus, Systemodon and Orohippus,

and is a very generalized group probably ancestral to the rhinoceroses.

LOPHOBRANCHII, 16-fo:brang'ki-I, a suborder of bony fishes, including the “sea¬ horses® and “pipe-fishes® (Syngnathidce) . See Ichthyology.

LOQUAT lo'kwat, or JAPAN PLUM, a

shrub or small tree (Eriobotrya japonica) of the family Malacece. It attains heights of about 20 feet, bears thick evergreen leaves near the ends of the branches, and fragrant, woolly, whitish flowers in terminal panicles in late sum¬ mer and autumn, followed by downy, yellow, oval or pyriform fruits (pomes) which ripen in very early spring. The fruits, which in favorable climates are borne in profusion, are highly esteemed for their sub-acid flesh and their pleasantly flavored seeds, the former being used as a dessert, the latter for flavoring cook¬ ery. The tree is a native of Japan and China, whence it has been taken to subtropical climates throughout the world. In the Gulf States and in California it is widely popular as a home fruit, though it appears in Northern markets. In California several highly improved varieties were produced during the closing decade of the last century. In the North it is often grown in conservatories.

LORAIN, lo-ran', Ohio, city, in Lorain County, on the south shore of Lake Erie, at the mouth of the Black River, and on the New York, Chicago and Saint Louis (Nickel Plate), Baltimore and Ohio and other railroads, about 26 miles west of Cleveland. The first

permanent settlement was made in 1822 by Barney Meeker. It was incorporated as a vil¬ lage in 1873 and as a city in 1895. It is situ¬ ated in an agricultural and natural-gas region, and is a shipping port for farm products, for the output of the central Ohio coal fields, and for the lumber and iron ore of a large section of the. State. The chief industries of the city are ship-building, coal shipping, manufacturing steel, automatic shovels, stove works, general manufacturing and fishing. The city has ex¬ cellent public and parish schools, a public li¬ brary, 22 churches and Saint Joseph’s Hospi¬ tal. About 75 per cent of the inhabitants are American born. The government is vested in a mayor, elected biennially, a unicameral coun¬ cil and administrative boards. The water¬ works are owned and operated by the city. Pop. (1920) 37,295.

LORCA, lor'ka, Spain, city, in the province of Murcia, on the

Sangonera River, about 20 miles north of Aguilas, the Mediterranean port. It is an ancient city, established before the Moors came to Spain, as is evidenced by the older houses; but the main part of the city now existing is of Moorish construction. It has a fine old castle, considerable flour and textile manufactures, and in the vicinity are valuable mines of silver, sulphur and lead. The farms in the surrounding country have to be irrigated in the dry seasons, and for the storage of water of the Sangonera a dam, 800 feet long and 160 feet high, was built near the city. In 1802 the dam burst, and the valley was flooded, when many lives were lost. The dam was reconstructed in 1886. Lorca was the scene of many battles between the Christians and the Moors. Pop. 70,807.

LORD, Chester Sanders, American jour¬ nalist : b. Romulus, N. Y., 18 March 1850. He studied at Hamilton College, was for a time associate editor of the Oswego (N. Y.) Ad¬ vertiser, and in 1872 became a member of the staff of the New York Sun, and of which he was managing editor in 1880-1913, when he retired from business. He was regent of the University of the State of New York 1897—1904; was re-elected regent in 1909 for the term ending in 1922.

LORD, Edwin Chesley Estes, American geologist and petrographer : b. Brooklyn, N. Y., 7 May 1868. Educated in the public schools of New York City and in Brunswick and Heidel¬ berg, Germany, and in Harvard University, Cambridge. Received the degrees of Ph.D. (Heidelberg) and M.S. (Harvard). He served as field assistant in the United States Geological Survey, 1895-97, was professor of Geology and mineralogy in Hamilton College, New York, 1899-1900, Austin Teaching Fellow and assistant in mineralogy and petrography, Harvard Univer¬ sity, 1900-01. He was assistant in petrography and chemistry of the United States Department of Agriculture 1901-04, and has been petrog¬ rapher in the office of public roads and rural engineering of the United States Department of Agriculture since 1904. He has published a geological and petrographical paper on igneous rocks from Bavaria, Germany, Mexico, Texas and Maine, U. S. A., 1894-1900. Since 1900 has published papers on the petrography of rocks for road building, and the relation of mineral composition and rock structure to the

physical properties of road materials, bulle¬ tins 31 and 37, Office of Public Roads, and bulletin 348, > United States Department of Agriculture; and on the mineral composition and utilization of blast furnace and other slags, Proceedings Seventh International Congress of Applied Chemistry, 1909.*

LORD, Herbert Gardiner, American phi¬ losopher: b. Boston, 29 March 1849. He was the son of the Rev. Daniel Miner Lord and was graduated at Amherst College in 1871 and at the Union Theological Seminary in 1877. iJe was ordained to the Presbyterian ministry in 1878 and served as pastor of the church of the Redeemer, Buffalo, 1877-95. During 1895-98 he was professor of philosophy at the School of Pedagogy, University of Buffalo; from 1890 to 1900 was principal of Franklin School, Buffalo ; and in 1900 was appointed professor of philosophy at Columbia University. He was one of the joint authors of ˆEssays Philosophical and Psychological in Honor of William James- ; and is the author of (The Psychology of Courage* (1918).*

LORD, John, American historian and lec¬ turer: b. Portsmouth, N. H., 10 Sept. 1812; d. Stamford, Conn., 15 Dec. 1894. He was grad¬ uated from Dartmouth in 1833; studied theol¬ ogy for a time at Andover Theological Semi¬ nary, and in his second year there wrote a series of lectures on the Dark Ages, which he delivered soon after during a tour of northern New York. He became an agent of the Amer¬ ican Peace Society. Though not ordained to the ministry occupied Congregational pulpits in New Marlboro and Stockbridge, Mass. After 1840 he devoted himself to literary work and lecturing. In 1843ˆ16 he was in England giv¬ ing lectures on the Middle Ages, and on his return to the United States continued to lec¬ ture for many years in the principal towns and cities, giving over 6,000 lectures in all. From 1866-76 he was lecturer on history at Dart¬ mouth College. His lectures were published under the title beacon Lights of History) (1883) ; he also wrote (Modern History for Schools (1850) ; (The Old Roman World) (1867); and (Ancient States and Empires> (1869) ; boints of History* (1881).*

LORD, John King, American educator: b. Cincinnati, Ohio, 21 Oct. 1848. He was gradu¬ ated at Dartmouth College in 1868. In 1869 he was made a tutor in Latin in Dartmouth; professor of Latin and rhetoric, 1872-80; pro¬ fessor of oratory and belles-lettres, 1880-82; associate professor, 1882-92, and after 1892 professor of the Latin language and literature. He was acting president of Dartmouth College, 1892-93 ; and acting president of the faculty in

the absence of the president, 1893-1900. He has edited many Latin textbooks and Chase's (History of Dartmouth ,College) (Vol. I, 1891), is the author of an (Atlas of the Geog¬ raphy and History of the Ancient World (1902), and has translated Hertzburg's (Ge-schichte der Romer in Alterthum* (1902) ; bis¬ tory of Dartmouth College, 1815-1909* (1913).*

LORD (Anglo-Saxon ((hlaford,® for <(hlaf- weard,® bread-keeper), English title of honor or dignity, used in different senses. In feudal times the lord was the grantor or proprietor of the land, who retained the ultimate property in it, the use only being granted to the tenant.

Between the superior lord, or lord paramount, and the actual tenant, stood the lord of the manor or mesne lord. Lord is also a mere title of dignity, attached to certain official sta¬ tions, which are sometimes hereditary, but sometimes only official or personal. Of the latter may be cited the lord's justices in Eng¬ land and the judges of the Court of Session in Scotland.; lord advocate, the chief law officer of the Crown in Scotland; lord mayor and lord provost, the former applied to the chief magis¬ trate in certain English and Irish cities, and the latter to the corresponding officials in sev¬ eral Scottish cities, as lord advocate, or lord mayor, a title applied to the chief magistrates of London, York and Dublin. (See also Lord Chamberlain and Lord Lieutenant). In its most definite sense in English it is equivalent to peer, but does not express any special rank or degree of nobility. The five orders of no¬ bility — dukes, marquises, earls, viscounts and barons — constitute the ((lords temporal,® in contradistinction to the prelates of the Church, or (

LORD CHAMBERLAIN, an officer in England who has control of the establishment attached to the chapels royal ; of officers and servants attached to the royal chambers, except of those of the bedchamber; and over the med¬ ical men of the household. He appoints royal tradesmen, directs all great royal ceremonies, receives all applications to attend levees and drawing-rooms, superintends the royal ward¬ robe and the jewel house at the Tower, and licenses theatres and plays, his power extend¬ ing to the cities of London and Westminster, and certain other parts of the metropolis, as well as to those places within which the sover¬ eign may reside occasionally.

LORD HERBERT OF CHERBURY, The Autobiography of. See Herbert, Edward, Lord Herbert of Cherbury, Autobiography of.

LORD HIGH CHANCELLOR. The

highest legal dignitary in the British govern¬ ment and principal legal adviser to the Crown ; ex officio president or speaker of the House of Lords and Keeper of the Great Seal. He may fulfill those offices even though not a peer. By virtue of his office he is a Privy Councillor and takes precedence of all but royal dukes and the archbishop of Canterbury. He presides when the House of Lords sits as a Court of Appeal, and reads the speech from the throne in the absence of the sovereign. He is also a mem¬ ber of the judicial committee of the Privy Council ; of the commission for giving the royal assent to bills ; president of the Chancery division of the High Court and of the Court of Appeal ; visitor of all hospitals of royal founda¬ tion ; general guardian of all infants, idiots and lunatics, and general supervisor of all chari¬ table trusts. It is his duty to nominate the younger and County Court judges and most of the county magistrates, in addition to which he is the patron of numerous ecclesiastical benefices. Until recently a Roman Catholic was not eligible for the office. The Lord Chancellor has a seat in the Cabinet and goes out of office with the

ministry, with a pension of $25,000. His salary is $75,000. y

LORD HOWE ISLANDS, a group of small islands in the Pacific Ocean, nearly 500 miles east of Sydney, Australia. They are of volcanic origin, are steep and mountainous and have a fine climate; area, 3,220 acres. The group was discovered in 1788 by Lieutenant Ball, but was not occupied until 1834; in 1840 New South Wales was given charge of the gov¬ ernment. In the surrounding waters there is an abundance of fish. The only article of ex-

?ort is the seed of the palm Ficus colom naris. 'op. 107.

LORD OF THE ISLES, a title borne by chiefs who ruled the western islands of Scot¬ land. They were descended from Somerled, the Lord of Argyll, on whom David I conferred the islands of Arran and Bute after he had driven the Norwegians out. The father of John, the first to adopt the title, fought at Bannockburn. John, fourth and last Lord of the Isles, was deprived of his title and estates by the Parliament of May 1493. In 1540 the Lordship of the Isles was annexed to the Scot¬ tish crown, and from it the Prince of Wales de¬ rives one of his titles.

LORD-LIEUTENANT, a British official of high rank, representing the

sovereign, as : (1) The viceroy, or Lord-Lieutenant of Ireland, who is nominally a member of the ministry, and retires from office on the resignation of the Cabinet. The office dates back to a remote period in the English occupation; but since the union its holder has resided in Dublin. His powers are nominally quasi-regal, and he con¬ fers the honor of knighthood; but the substance of power is in the hands of the secretary to the Lord-Lieutenant, who is generally a member of the British Cabinet. The abolition of the office is contemplated. (2) The Lord-Lieutenant of a county, the principal honorary official of a county, at whose nomination all deputy-lieu¬ tenants and justices of the peace are appointed. The office dates from the time of Henry VIII. He was head of the militarv organization of the county; but after the Cardwell reorganization in 1871 his powers were transferred to the Secretary for War; but under the territorial scheme of 1907 the ancient authority in defense was to a great extent restored.

LORD-MAYOR'S DAY, the 9th of No¬ vember, on which a great procession accom¬ panying the newly elected lord mayor of Lon¬ don from Westminster to the Guildhall takes place. The procession, formerly famous for its historical and allegorical devices, notably the huge wooden effigies called Gog and Magog (now deposited in the Guildhall), has recently been shorn of much of the burlesque-spectac¬ ular features that formerly attended it.

LORD ORMONT AND HIS AMINTA,

a novel, by George Meredith, published in 1894. In this tale the author's enigmatical laughter sounds louder than usual ; possessing at the same time a quality which leaves the reader in doubt whether the mirth is at his expense or at the expense of the characters. The basis of the story is founded on the secret marriage of Charles Mordannt, Earl of Peterborough, with Anastasia Robertson.

VOL. 17 — 42

LORD ULLINS' DAUGHTER, a bal¬ lad written by Thomas Campbell in 1809. It became a prime favorite and found its way into many schoolbooks. It was set to music by George Thomson.

LORDS, House of. See Great Britain — Parliament.

LORDS OF THE CONGREGATION,

a title given in Scottish Church history to the chief nobles and gentlemen who signed the Covenant of Liberty of Worship (3 Dec.

1557). The whole body of adherents was called the Congregation, probably because the word con¬ gregation is found so frequently in the docu¬ ment. See Congregation and Covenant of Liberty of Worship.

LORD'S DAY. See Sabbath.

LORD'S PRAYER, The, sometimes called (

*The doxology, ((For thine is the kingdom, and the power, and the glory for ever, Amen,** is not found in many of the best ancient au¬ thorities, and for that reason it is omitted in Tischendorf's eighth edition of the New Testa¬ ment and in the Westcott and Hort Greek New Testament.*

*The prayer was introduced or taught in the ˆSermon on the Mount,** and as given in Mat¬ thew consists of nine parts — one salutation or invocation, seven petitions and ((Amen.** In the salutation there are three distinct points; first, the word (*

*The ((Amen** is a common ending to prayer, usually derived from the Hebrew verb meaning ((to be firm,** or from a Hebrew noun meaning <(trnth,** and commonly rendered <(so be it** or <(may it be so.** In this place its signification is usually regarded as meaning a stronger con-*

firmation of what has just been said. In places in the liturgy of the Roman Catholic, the Protestant Episcopal and the Greek churches where the word "Amen® occurs, it is usually said by the server or clerk ; but the "Amen® belonging to the "Lord's Prayer® is said by the celebrant of the mass.

Some of the early writers divided the peti¬ tions into six, joining the sixth and seventh. Many Protestant writers make this division, but Roman Catholic writers follow Saint Au¬ gustine, and divide the prayer into seven peti¬ tions. Lutheran writers generally follow this division, also the Protestant writers, Bleck, Hilgenfield, Keil and Tholuck. The gradation of the petitions is remarkable: First, the honor and glory of God is sought ; second, our own greatest good ; third, the necessary means to attain eternal life; fourth, necessities for the present life; fifth, to be freed from the great¬ est evil ; sixth, to be freed from the evil next to the greatest ; seventh, to be freed

from all evil. The fifth, sixth and seventh petitions are directed against the respective impediments op¬ posed to the good mentioned in the second, third and fourth petitions.

The doxology is explained in various ways, as a liturgical addition, as an ancient continua¬ tion used by the priests and then the people. The "kingdom® in the doxology seems to refer to the first and second petitions; the "power® to the third petition; and the "glory® to the fol¬ lowing petitions.

Directly following the "Lord's Prayer,® in the gospel of Saint Matthew vi, 14, there is an extension or explanation of the fifth petition, giving again the conditions of forgiveness ; "For if ye forgive men their trespasses, your heavenly Father will also forgive you.®

Commentators differ as to the exact relation between the form of the "Lord's Prayer® in the gospel of Matthew and in Luke. It is held by many authorities that the prayer was tanght on two different occasions, to different persons, ex¬ cept the apostles who were present on both oc¬ casions. Both forms were given as models and both contain the essentials. It appears in the earliest manual of Christian devotion, the

Many polyglot collections of the prayer have been published from the 16th century down¬ ward, the most remarkable of which were those of John Chamberlayne in 150 languages (1715), of Conrad Gesner in 200 (1748) and that of Padre Hervaz in 307 (1787). There are ex¬ positions of the Lord's Prayer by Origen, Chrysostom, Gregory Nyssa, Cyprian, Luther, Leighton and Tholuck.

Bibliography. — Maas, (The Gospel Ac¬ cording to Saint Matthew' ; Kenrick, the gos¬ pels of Saints Matthew and Luke in (The Four Gospels' ; Saint Thomas Aquinas, (The Lord's Prayer' ; and the following authors in various writings, Bleck, Meyer, Kiel, Schanz, Spirago, Jannaris, Tholuck, W. Grimm, Hilgen¬ field, Peischel, Wendt, Weiss, Saint Augustine and Saint Alphonsus. Consult also Plummer

in Hastings' (Dictionary of the Bible' and Nestle and Lambert in the (Dictionary of Christ and the Gospels, } with authorities quoted thereunder.

LORDS SPIRITUAL, in Great Britain, archbishops and bishops of the Anglican Church who are given seats in the House of Lords. These are the archbishops of Canter¬ bury (the Primate of all England) and

York, and 24 of the bishops. The bishops of London, Durham and Winchester are invariably mem¬ bers of the House of Lords; the other bishops are called according to seniority. Suffragan bishops are not eligible for the Upper House. On his retirement from his bishopric the Lord Spiritual ceases to be a member of the House of Lords. The Lords Spiritual are not peers of the realm, but only Lords Spiritual of Par¬ liament. They have no right to demand trial by the House of Lords as peers, but are amen¬ able to the jurisdiction of the ordinary courts of law. Although the Lords Spiritual of the Upper House are distinct from the Lords Tem¬ poral, they do not vote separately, but jointly, forming for purposes of legislation one estate. The prelates vote on every subject brought be¬ fore the Lords, except in trials for high trea¬ son and other cases of a criminal nature. On such occasions they never attend or vote ; this, however, is in deference to those canon laws which forbid them from participating in mat¬ ters of blood, and not owing to any Parliamen¬ tary requirement. The Spiritual Lords cannot vote or even take their seats in the House un¬ less robed in their ecclesiastical vestments, with rochet, lawn sleeves and mortar-board cap complete. The distinction between peers of the realm and the Lords Spiritual of Parlia¬ ment also extends to the families of the latter, courtesy titles not being accorded to them.

LORD'S SUPPER (Lat. Ccena Domini, Fr. La Sainte Cene, Ger. Abendmahl) , one of the sacraments of the Christian religion, in the observance of which Christians commemorate the death of the Founder of their religion. It is so called because the Lord Jesus Christ insti¬ tuted the rite when he took his last meal with his disciples. It has also the names of eucha- rist and communion, and is celebrated by all Christian bodies however much their views may differ as to its nature and efficacy, except the Quakers. It was instituted at the time of the Jewish passover, as we read in the gospels of Matthew, Mark and Luke, the two former agreeing very closely in their accounts, while that of Luke has features of its own. A brief statement to the same effect is in 1 Cor. xi. There is no corresponding section in the fourth gospel, though in John vi Christ speaks of the eating of his flesh and the drinking of his blood. In all the churches founded by the Apostles the Lord's Supper was introduced. In the 1st and 2d centuries this rite was cele¬ brated in connection with the agapce or love- feast. After the 3d century, when the congre¬ gations became more numerous, the agapce ceased, and the Lord's Supper was from thence celebrated separately in the churches, in such a way. that all present could partake, with the exception of catechumens (that is, Christians not yet baptized) and unbelievers. These were obliged to withdraw when the celebration of the Lord's Supper commenced,

because com-

m union was considered as a mysterious act, which was to be withheld from profane eyes. The deacons carried the bread of life to those whom sickness or imprisonment had prevented from being present at the meeting of the con¬ gregation. It was always believed to possess a peculiar efficacy, and ideas of the awful and mystical were associated with it. From the first Christians ascribed supernatural power to the rite, and the consecrated bread and wine were regarded as more than mere bread and wine, and as having became, in some mystical way, the body and blood of our Saviour.

In the early Church there was no definite dogmatic formulation of the change undergone by the sacred elements, but in the 9lh century, in consequence of the attacks o'f Berengarius (q.v.) on the doctrine of the Real Presence, the term transubstantiation, commonly ascribed to Paschasius Radbertus, first came into use to describe metaphysically the real and objec¬ tive change of the elements of bread and wine into the body and blood of Christ. This term was adopted by the Council of Rome in 1079, and confirmed in 1215, in the Fourth Lateran Council, by Innocent III, and has ever since been employed by the Roman Catholic Church as the authentic expression of her faith in the doctrine of the Eucharist. The Council of Trent in the 16th century laid it down as of faith to confess the <(change of the whole sub¬ stance of the bread into the body, of the whole substance (substantia) of the wine into the blood [of Christ], only the appearances (spe¬ cies) of bread and wine remaining; which change the Catholic Church most fitly calls Transubstantiation.®
The Roman Catholic Church holds that the Eucharist has been both a sacrament and a sacrifice from the beginning. This, she declares, is evident from Christ's words of institution, as narrated in the synoptic gospels, and from Saint Paul's words in his first Epistle to the Corinthians. And unbroken tes¬ timony from the Apostles through the Fathers of the Church, she further avers, bears ample evidence to her claim ; besides this, she claims that her own witness as the duly divinely ap¬ pointed guardian of the deposit of revelation and its infallible interpreter commissioned to teach all nations is sufficient seal to the truth of the doctrine. As a sacrament it is the true body and blood of Christ under the appearance of bread and wine to be partaken by the faith¬ ful as a means of grace and union with Christ; as a sacrifice it is the unbloody oblation of the body and blood of

Christ by a duly appointed minister, that is, priest, by whom alone the ele¬ ments can be consecrated. Such she declares has been the Christian teaching and practice from the beginning. The reception of the sac¬ rament under both kinds, that is, under the forms of both bread and wine, was general until the Middle Ages, when communion under one kind, bread alone, began to be adopted, partly to avoid the danger of spilling the con¬ secrated wine and partly to counteract a grow¬ ing heresy that Christ was not received whole and entire under either kind alone. The Coun¬ cil of Constance, in the 15th century, made it universally obligatory to communicate under one kind to meet the heresy of Huss and Jerome of Prague.

The position taken up by the Protestant re¬ formers in the 16th century was that the

Church had deviated in the celebration of the Lord's Supper from the purpose of Christ and the example of the apostolic age. Both the German and Swiss reformers agreed in reject¬ ing the doctrine of Transubstantiation and the Mass, maintaining that the Lord's Supper ought always to be celebrated before the whole con¬ gregation, and with the administration of both bread and wine. In explaining the words by which the supper was instituted, Luther and Zwinglius differed, and their different opinions on this subject formed the principal subject of the dissension between the Lutheran and Cal- vinistic churches. Luther took the words, ((This is my body,® etc., in their literal sense, and maintained that the body and blood of Jesus Christ were united, in a mystical way, with the bread and wine, which, however, remain un¬ changed, so that the communicant receives, in, with and under the bread and wine, the real body and blood of the Redeemer. Zwinglius, on the other hand, understood the words in a figurative sense: that Jesus Christ meant to say, ((The bread and the wine represent my body and my blood.® He maintained, there¬ fore, that the bread and wine were mere sym¬ bols of the body and the blood of Christ, and that the Lord's Supper was a simple com¬ memoration of the death of Christ, and a pro¬ fession of belonging to his church, and this view was in substance adopted by the Socin- ians and Arminians. From this difference of opinion arose a violent dispute between Luther and Zwinglius, which in later times has been continued between the Lutheran and Cal- vinistic divines. The opinion advanced by Cal¬ vin, by which the spiritual presence of the body and blood of Christ is manifest in the com¬ munion, and by partaking of which the faith¬ ful receiver is brought into union with Christ, through the medium of the Holy Ghost, though it came nearer to the Lutheran doctrine than that of Zwinglius did, yet was essentially dif¬ ferent, and therefore also met

with a strong opposition from the strict adherents of Luther. The Calvinist position is known as Reception¬ ist or virtualist. Melanchthon inclined to the Calvinistic notion, and so did many other Lutheran divines, who were called, by the op¬ posite party, Philippists and Crypto-Calvinists. The formula concordia, or articles of religious peace, suppressed the Crypto-Calvinists in the greatest part of the Lutheran Church, and established the position of Luther; conse¬ quently there was a final separation of the Lutheran and Reformed or Calvinistic churches, but in recent times many Lutheran divines have inclined to the Calvinistic doc¬ trine. The Greek Church has substantially held the doctrine of Transubstantiation in its whole extent. The Oriental Christians differ from the Western in using leavened bread in the Lord's Supper and in administering it to chil¬ dren. (See Greek Church).

It thus appears that the differences between the contending churches hinge on the mode in which the body and blood of Christ are present in the elements of bread and wine, for that they are in some way way present is admitted by them all. The majority of Protestant churches hold that presence means presence in efficacy, and will admit that it is ((real® in the sense of being efficacious, though not in the sense of being corporeal. However, when they

are called on to define efficacy they differ in this, that some mean by it a sacrificial, and others a mysterious supernatural efficacy, ema¬ nating from Christ's glorified body. The con¬ fessions of the Protestant churches were framed expressly to conciliate the Lutherans, and contain, in consequence, more of the mys¬ tical element than is consistent with the senti¬ ments of the framers, as expressed in their writings. The 28th article of the Church of England, while repudiating Transubstantia- tion as <(repugnant to the plain words of Scripture,® declares (

In the Greek and Roman Catholic churches the Eucharistic sacrifice is offered daily; in the Anglican Church the practice varies, the High Church ideal being a daily celebration of Holy Communion. It was formerly the custom in the Scottish Presbyterian Church to observe the rite once a year; but it is now more fre¬ quently administered, generally four times a year.

Bibliography. — Onljr a partial and frag¬ mentary list can be

included here: Adamson, R. W., (Christian Doctrine of the Lord's Sup- per) (Edinburgh 1905) ; Armstrong, Sacra¬

ments of the New Testamentˆ (New York 1880) ; Bridgett, T. E., (History of the Holy Eucharist in England) (London 1908) ; Bright- man, (The Eucharistic Sacrifice) (ib. 1890) ; Dimock, N., (On Eucharistic Worship in the English ChurclP (ib. 1911) ; (Papers on the Doctrine of the English Church Concerning the Eucharistic Presence> (2 vols., ib. 1911) ; Frankland, W. B., (The Early Eucharist (Cambridge 1902); Gardner, P., (Origin of the Lord's Supper> (London 1893) ; Gore, C., (The Body of Christ > (ib. 1901) ; Groton, W. M., (Christian Eucharist and the Pagan Cults> (New York 1914) ; Harnack, (History of Dogma > (Eng. trans., London 1894—99) ; Lam¬ bert, J. C., (The Sacraments in the New Testament* (Edinburgh 1905) ; Mortimer, A. G., (Catholic Faith and Practice) (Philadel¬ phia 1898) ; Moule, (The Supper of the Lord) (London 1889) ; Perowne, J. J. S., (The Doc¬ trine of the Lord's Supper) (London 1887) ; Pusey, E. B., (The Doctrine of the Real Presence as contained in the Fathers) (Oxford 1870) ; Sanday, W., (Priesthood and Sacrifice) (London 1900) ; Stone, D., (History of the Doctrine of the Holy Eucharist* (ib. 1909) ; Wilberforce, R. I., (The Doctrine of the Eu¬ charist* (ib. 1854) ; Wiseman, Cardinal, lec¬ tures on the Real Presence) (Dublin 1852) ; and the article in the Encyclopaedia of Reli¬ gion and Ethics. *

LORDWOOD. See Ltquidambar.

LOREE, Leonor Fresnel, American rail¬ road president: b. Fulton City, Ill., 23 April 1858. In 1877 he was graduated at Rutgers College and the same year entered the railway service as assistant in an engineers' corps of the Pennsylvania Railroad. In 1879-81 he was transitman in the engineer corps of the United States army. He was leveler, transitman and topographer of the preliminary survey and loca¬ tion of the Mexican National Railway from the Rio Grande to Saltillo, Mex., in 1881-83. In the latter year he became assistant engineer of the Chicago division of the Pennsylvania, engineer of the maintenance of way of the I. and V. division in 1884—86, divisional engi¬ neer 1886-88 and superintendent of the Cleve¬ land and Pittsburgh division from 1889 to 1896. In 1896-1901 he was general manager of the system and became fourth vice-president in 1901. In 1901-04 he was president of the Baltimore and Ohio Railroad, of the Rock Island Com¬ pany of New Jersey in 1904. On 10 April 1907 he became president of the Delaware and Hudson Company and is president or director of 34 companies controlled or affiliated with it. Mr. Loree served as chairman of the United States delegation to the

International Railway Congress at Paris in 1900. In April 1918 he was appointed member of the War Labor Board, Washington, D. C.

LORELEI, ld're-H, or LURLEI, loor'li,

a rock on the right bank of the Rhine, near Saint Goar, about 425 feet above the river, through which a tunnel has been bored. Once a serious menace to passengers on the river and always famed for its echo, the rock has been personified by . German poets, notably Heine, as a siren, lurifig sailors to destruction by the music of her voice, an evident idealiza¬ tion of the danger of the rock and of its echo.

LORENTZ, 16' rents, Hendrik Antoon,

Dutch physicist : b. Arnheim, 1853. He received his education at the University of Leyden ; was a teacher for five years in 1872-77 in his native place and in the latter year was made professor of mathematical physics at the Arn¬ heim University. He developed Maxwell's ether theory, and was one of the founders of the electron theory. He arrived at the formula for the function of refraction at the same time as his namesake Lorenz of Copenhagen and subsequently developed the so-called <(Zeeman effect.ˆ In 1902 Lorentz was awarded, with Zeeman, the Nobel prize for physics. In 1906 he lectured at Columbia University and in 1912-13 at the College de France. In 1907 and 1909 he was director of scientific expeditions to New Guinea. His published works include (La theorie electromagnetique de MaxwelP (1892) ; (Versuch einer theorie der electrischen und optischen Erscheinungen in bewegten Kor- periP (1895) ; (Textbook of Differential and Integral Calculus) (1882; 2d ed., 1907); text¬ book of Physics) (1888-90; German trans., 1907) ; (Zichtbare en onzichtbare bewegingen) (1901; German 1902); (Abhandlungen fiber

theoretische Physik) (1907) ; the Theory of Electrons (1909).*

*LORENZ, lo'rents, Adolf, Austrian ortho¬ paedic surgeon : b. 1854. He was graduated from the University of Vienna in 1880, and worked as an assistant under Theodor Billroth in Vienna. On the advice of the latter he be¬ gan specialization in orthopaedic surgery, and after years of study developed his so-called ˆbloodless** method of reducing congenital dis¬ location of the hip joint. Before he*

developed his own method of operation he was one of the chief exponents of Hoffa's cutting method, which, however, he modified largely. His oper¬ ation consists of the forcible stretching of all the soft parts about the hip until the head of the bone can be brought to the place where the socket should be (the acetabulum), and then holding it in that position and rotating the joint to secure it in the depression of the acetabulum. A plaster of paris cast is worn by the patient from six to nine months after the operation. Dr. Lorenz has performed this operation successfully in a large percentage of his cases; he demonstrated his method before the Medical Congress at Berlin in 1895; and has also given demonstrations in England and the United States. His visit to the United States (1902) aroused widespread interest and enthusiasm. He is now professor of ortho¬ paedic surgery at the University of Vienna and a government councillor. His publications in¬ clude (Orthopadie der Hiiftgelenks-Kontrak- turen und Ankylosen) (1889) ; (Das instru- mentelle kombinierte Redressement der Hiift- gelenks-Kontrakturen) (1898) ; UJeber die Heilung der angeborenen Hiiftgelenks-Verren- kung durch unblutige Einrenkung und func- tionelle Belastung) (1900) ; and with Saxl, (Orthopaedics in Medical Practice) (translated by L. C. P. Ritchie (New York 1913).

LORENZ, lo'rentz, Ottokar, German his¬ torian: b. Iglau. 7 March 1832 ; d. 1904. His first work was

his writings are (German History in the 13th and 14th Centuries) (1863) ; (Sources of

*Mediaeval German Historv) (1870); (History of Alsace, * with Scherer (1871); (History and Politics* (1876) ; (Genealogical Manual of the History of European States) (1895); (The Jubilee of Frederick, Duke of Baden) (1902); (Kaiser William and the Foundations of the Empire from 1866 to 1871 > (1902).*

LORENZO, lo-ren'so, or LOURENCO MARQUES, lo-ran'sd mar'kes, East Africa, capital and one of the principal ports of Portu¬ guese East Africa, and the name of one of the districts of the province of Mozambique. The port, which is on Delagoa Bay, is the entrepot for a great hinterland, including the Trans¬ vaal colony. The railway to Pretoria was com¬ pleted in 1895 ; a new line to the Swagiland border is under construction, 44 miles being open for traffic in 1915. The number of vessels entered in 1915 was 546. Pop. about 13,514, of which about half are Europeans. See Delagoa Bay.

LORETA, lo^-ra'ta, Pietro, Count, Italian surgeon : b. Ravenna, 1831

; d. 1889. He re¬ ceived his education at the University of Bo¬ logna; became anatomical prosector there in 1861 and four years later became director of the surgical clinic. He was appointed to the chair of surgery at Bologna University in 1868. His publications include (Nuovo metodo di cistotomia perineale ; (Nuovo metodo di cura degli aneurismi* ; (La divulsione digitale del piloro) ; {La divulsione instrumental del car- dia) ; (La resizione del fegato.**

LORETO, 15-ra'to, Italy, city in the province of Ancona, about five miles from the Adriatic Sea and 15 miles south of the city of Ancona. It is situated in a fertile agricultural region, remarkable for its beautiful scenery. It is a famous place of pilgrimage, being visited by about 50,000 pilgrims annually, the centre of attraction being the Santa Casa, said to be the house in which Jesus, Mary and Joseph lived while in Nazareth. The building is 31 feet in length and 13 feet in width. It is enclosed in a stately domed church (the church of the Holy House), the work of Bramante, in which there is a bronze statue of the Virgin and Child by Girolamo Lombardo, and stands under the dome. The original outer walls have been covered, but inside the coarse stonework of the original masonry is visible. The material is a dark reddish-colored stone, unlike the stone in the vicinity. The tradition is that after the power of the Christians was destroyed in Palestine, bv the capture of Acre, in 1291, on 10 May 1291, angels moved this house from Nazareth to tbe hill of Tersatta, near Fiume. After a time, on 10 Dec. 1294, the house was again removed by angels to the opposite side of the Adriatic, near Recanati ; and again, in 1295, it was removed to where it now stands. The trade is mainly in the making of crucifixes, rosaries, etc. for the pilgrims. Pop. of commune about 7,066.

LORETO, Peru, an interior department bounded on the north by Ecuador and territory claimed by Ecuador and Colombia, on the east bv Brazil, on the south by the departments of Cuzco and Huanuco, and west bv Amazonas and Libertad. It is watered for thousands of

miles by the Maranon and its tributaries; area, 288,456 square miles ; pop., chiefly Indians, about 100,000. The quickest route from the coast to this province, which is only about 700 miles distant in a direct line, is round the northern coast of South America and up the Amazon, a journey of 6,500 miles. Loreto is separated from the coastal departments by the Andes, has a tropical climate and is

densely forested; the chief products are rubber, salt, quinine, tobacco and tropical fruits. Rich gold deposits are believed to exist in the river beds. The principal towns are Iquitos, the capital, Moyobamba and Taropoto.

LORETTE, Ancienne, an-se-en lo^ret, Quebec, Canada, a village seven miles south- southwest of Quebec city, on the Canadian Pacific Railway, with industries connected with the waterworks of Quebec on Lake Charles. Pop. 1,600. Three miles to the north is In¬ dian or Jeune Lorette, peopled by about 300 Christianized Indians, descended from the last of the Huron Indians who had found a refuge at Ancienne Lorette in 1650. The settlement was removed to Jeune Lorette in 1697. Jeune Lorette commands a fine view of Quebec, for which it is visited, as also for the falls of Lo¬ rette and for its ancient chapel and statue of the Virgin, a replica of those at Loretto, Italy. Pop. 1,588.

LORETTO, or LORETO, Sisters of.

See Orders, Religious.

LORIA, 16're-a, Achille, Italian econo¬ mist : b. Mantua 1857. He studied law at Bo¬ logna and proceeding successively to Rome, Berlin and London made a study of economical problems. He was professor of economics at Siena, 1881-91 ; at Padua, 1891-1903 ; and in the latter year was appointed to Turin. He has approached the subject of wealth distribu¬ tion and land-tenure in a spirit of optimism and has published many works on the subject. Among his writings are (Studii sul valore della moneta) (1891) ; (La terra ed il sistema so- ciale1 (1892) ; (La costituzione economica odierna) (1889) ; and (I1 capitalismo e la sci- enza1 (1901); (La scutesi economica) (1909; Eng. trans., (The Economic Synthesis,1 1914) ; (Le basi economiche della costituzione societa) (Eng. trans., (Economic Foundations of So¬ ciety) (1899).

LORICATA (from Latin looricare, to clothe in mail). In zoology, (1) the group of pagolins (see Manis) ; (2) the group of Cro- codilia; (3) a group . of decapod Crustacea, which includes the spiny lobsters (Palinurus , etc.), and the bear-crabs (Scyllarus , Ibacus, etc.). These forms are large, with thick shells and without pinching claws. All are edible, the spiny lobster replacing the true lobster as an article of food in the warmer parts of the earth; (4) in ichthyology, a sub-order of ga¬ noid fishes; (5) animalculae provided with a lorica, such as certain infusorians and roti¬ fers.

LORIENT lo-re-on, or L'ORIENT,

France, a fortified seaport town, in the depart¬ ment of Morbihan, at the junction of the Scorff with the Blavet, on the Bay of Biscay, about 40 miles west of Vannes. It was founded in 1666 bv the French East Indies Company and in 1690 it became a military fort. After the dissolution of the company, in 1782, the

government bought the ship-building plant. The large harbor can accommodate with safety a great number of vessels. Lorient is a sta¬ tion of the French fleet and has extensive docks, two graving docks and is a great port for naval construction, the shipyards occupy¬ ing 38 acres. It has also large artillery bar¬ racks, an artillery park, a marine arsenal and a great powder magazine in the middle of the channel. It has an observatory, schools of marine, artillery and hydrography and other educational institutions and a large number of manufacturing establishments, including iron foundries and forges. The principal imports are coal, pitch and timber; the exports include oil, wood and sardines and there are extensive oyster beds. Lorient was unsuccessfully . at¬ tacked by the British in 1746. Pop. about 42,463. About five miles south of Lorient is the fortified town of Port Louis.

L'ORIGNAL, lo're'nyal', Canada, town and county-seat of Prescott County, Ontario, on the Ottawa River and the Canadian North¬ ern Railway, 50 miles east of Ottawa. Steam¬ boats connect it with Ottawa and Montreal. Lumbering is the principal industry. The town is the seat of a Roman Catholic convent and possesses an electric plant. Pop. 1,350.

LORIKEET, a small kind of lory (q.v.).

LORIMER, lor'i-mer, George Claude,

American Baptist clergyman : b. Edinburgh, Scotland, 1838; d. Aix-les-Bains, France, 7 Sept. 1904. He came to the United States in 1856 and was educated at Georgetown College, Kentucky. In 1859 he was ordained to the Bap¬ tist ministry and held pastorates at Harrods- burg, Paducah and Louisville, Ky. ; he wras then at Albany for a short time, at the Shaw- mut Avenue Church and Tremont Temple in Boston in 1870-79 and in Chicago till 1891. In the latter year he returned to Boston to be¬ come pastor at Tremont Temple. In 1902 he went to New York as pastor of the Madison Avenue Church. He was associate editor of' the Watchman and wrote (Isms Old and New) (1882) ; (Under the Evergreens) (1872) ; (The Great Conflict1

(1876); (Studies in Social Life1 (1886) ; Christianity and the Social State1 ; Christianity in the Nineteenth Cen¬ tury1 ; 'Messages of To-day to the Men of To¬ morrow1 (1897) ; 'Master of Millions1 (1903), a story of modern life; 'The Modern Crisis in Religion1 (1904). He edited 'The People's Bible History Prepared in the Light of Recent Investigations1 (1895).

LORIMER, George Horace, American editor and author : b. Louisville, Ky., 6 Oct. 1868. He was educated at the Mosely High School, Chicago, at Colby and at Yale. He was engaged in business in Chicago until 1896 when he became a reporter and correspondent, 1896-97. He became literary editor and man¬ aging editor of the Saturday Evening Post 1897, becoming its editor-in-chief in 1899. His remarkable faculty of discerning popular taste and fancy has made for the immense success of that periodical. His best-known work is 'Let- ters of a Self-Made Merchant to His Son1 (1902), remarkable for its humor, wit and use of slang to drive home a work-a-day philoso¬ phy. Other works are Cld Gorgon Graham1 (1904); 'The False Gods1 (1906); 'Jack Spurlock — Prodigal1 (1908).

LORIMER, John Henry, English painter: b. Edinburgh, 1856. He was educated at the Edinburgh Academy and University and began his art studies at the Royal Scottish Academy. One of his pictures was admittted to the an¬ nual exhibition of that institution when he was but 19. He was elected a member of the Royal Scottish Academy in 1900. His most important exhibited pictures are (The Ordination of El- ders) ; (Pot Pourri) ; (The Eleventh Hour) (1896), which in 1900 was awarded a gold medal at the Paris Exposition. In 1894 the French government bought his ˆenedicite, which is now in the Luxembourg, where his portrait of Col. Anstruther Thompson has also been deposited.*

LORIMER, William, American capital¬ ist and politician : b. Manchester, England, 27 April 1861. At the age of five he came to the United States with his parents and in 1870 to Chicago. At 10 he became a sign-painter's ap¬ prentice and subsequently obtained employment in packing-houses and with a street railroad company. He received no schooling, but ob¬ tained the rudiments of an education through his own efforts. He entered the real estate business in 1886 and later was member of the firm of Murphv and Lorimer in building and brick manufacturing business. Since 1900 he has been a

member of the contracting firm of Lorimer and Gallagher. He was connected with the Chicago water department as super¬ intendent of water-main extensions and later superintendent, in 1887-93. Lorimer was a member of Congress from 1895 to 1909, with the exception of the term 1901-03. On 26 May

1909 Lorimer was elected United States sen¬ ator for the term 1909-15. He resigned from the House of Representatives and took his seat in the Senate on 18 June 1909. The validity of his election was challenged in the Senate, 9 Jan. 1911. By a vote of 46 to 40, on 1 March 1911, the challenge was not sustained. This de¬ cision was unpopular as corrupt practices were suspected to have secured the election and when Congress reconvened the Senate decided to re¬ open the investigation (1 June 1911). A ma¬ jority of the Committee on Privileges and Elections reported that Lorimer's election had not been brought about by corrupt practices. A bitter quarrel followed in the Senate, which divided into reactionaries and progressives ir¬ respective of old party lines and on 14 July 1912 a resolution was sustained by a vote of 55 to 28, declaring that corrupt methods and practices had been employed in the election ; that the election was in consequence invalid; and Lorimer's seat vacant. Almost a direct result of the Lorimer case was the triumph of the movement for the election of United States senators by direct popular vote. From

1910 to 1915 Lorimer was president of the La Salle Street Trust and Savings Bank. This and a number of affiliated concerns failed in 1914, and Lorimer and several others were in¬ dicted for misappropriation of funds.

LORING, lor'ing, Charles Greely, Amer¬ ican lawyer and orator: b. Beverly, Mass., 1794; d. 1868. He was graduated from Harvard in 1812 and practised his profession in Boston, be¬ coming in 1857 actuary of the Massachusetts Hospital Life Insurance Company. In 1862 he entered the State senate. He was of much

prominence as an orator and a prominent mem¬ ber of the Massachusetts Historical Society, was the author of 'Neutral Relations between the Llnited States and England) (1863) ; 'Life of William Sturgis) (1864).

LORING, Charles Greely, son of the

preceding: b. Boston, 1828; d. Pride's Crossing, Beverly, Mass., 20 Aug. 1902. He was gradu¬ ated from Harvard in 1848 and served in the Union army during the Civil War, being bre- vetted major-general

of volunteers at its close. He became a trustee of the American Museum of Fine Arts in 1873 and was the executive officer of the institution from 1876 until his death.

LORING, Charles Harding, American naval engineer: b. Boston, Mass., 1828; d. 1907. He received his education in the public schools ; became a machinist's apprentice and in 1851 was appointed third assistant engineer in the United States navy. During the Civil War he was civil engineer of the Minnesota and participated in the action with the iron¬ clad Merrimac. Afterward he had charge of the construction of monitors; was fleet engi¬ neer of the Asiatic squadron and in 1881 be¬ came a member of the first Naval Advisory Board. In 1884 he was engineer-in-chief of the United States navy, a position he held until his retirement in 1890. When war broke out with Spain in 1898 he was made inspector of engineering work at the New York navy yard. He was honored, in 1892, with the presidency of the American Society of Mechanical Engi¬ neers.

LORING, Ellis Gray, American lawyer : b. Boston, 1803 ; d. 1858. He was educated at the Boston Latin School, entered Harvard in 1819, but without graduating left college and studied law. In 1827 he was admitted to the bar, where he soon won high distinction. He was one of the first pleaders for the abolition of slavery and one of the founders of the first anti-slavery society, in Boston, 1832, whose constitution he wrote. As a defender of fugi¬ tive slaves he gave freely of his time and tal¬ ents and shared the odium visited upon all the early abolitionists. Before the Supreme Court of Massachusetts he made a memorable de¬ fense of a slave-child called Med, by which, against so formidable an opponent as Benja¬ min R. Curtis (q.v.), he secured a decision de¬ claring that every slave brought into that State thereby became legally free. The effect of his convincing argument was both instantaneous and lasting, and his triumph was a substantial service to the anti-slavery cause. He published numerous addresses on the slavery question.

LORING, George Bailey, American agri¬ culturist: b. North Andover, Mass., 8 Nov. 1817; d. Salem, Mass., 14 Sept. 1891. He was graduated from Harvard in 1838 and from the Harvard Medical School in 1842, and after several years of medical work at the Chelsea Marine Hospital devoted himself from 1850 onward to scientific agriculture, writing many essays and papers, on farming and allied topics. He became famous as an orator, served several terms in Massachu¬ setts legislature, was member of Congress 1876 — 81, United States Commissioner of Agriculture 1881-85 and

Minister to Portugual 1889-90.

He was president of the Massachusetts State Agricultural Society for many years and a member of the Republican national conven¬ tions of 1868 and 1872. He published (The Farm-Yard Club of JothanP (1876).

LORING, William Wing, American sol¬ dier : b. Wilmington, N. C., 4 Dec. 1818 ; d. 30 Dec. 1886. He entered the United States army as a private in a troop of volunteer cavalry and was active in the Florida War in 1835-42. He studied at Georgetown College and then vol¬ unteered in the Texas struggle for independ¬ ence. From 1839 to 1842 he was a member of the Florida Territorial legislature and in the latter year was admitted to the bar. During the war with Mexico he was distinguished for bravery at Contreras, Churubusco and Chapul- tepec and was brevetted lieutenant-colonel and colonel. In 1849-51 he commanded the troops in the Department of Oregon and campaigned against the Indians in the Rio Grande region 1851-56. In 1857-58 he served under A. S. Johnston in Utah. Although opposed to seces¬ sion he held State Right views and in May 1861 resigned his commission and became a brigadier-general in the Confederate army and later major-general. He served in West Vir¬ ginia and as a corps commander in Georgia, Mississippi and Tennessee; was active in the Vicksburg and Atlanta campaigns and served as second in command to John B. Hood at Franklin and Nashville. He also served under Joseph E. Johnston in the Carolinas, and with him surrendered to Sherman in April 1865. For a few years after the close of the war he was a banker in New York, then went to Egypt in 1869 and was made a pasha and chief of staff in the army of the Khedive. He re¬ organized the Egyptian army with great suc¬ cess, was successively commandant of Alex¬ andria, chief of the coast defenses and general of division. In 1879 he returned to the United Stees and published a description of his Ori¬ ental experiences in (A Confederate Soldier in Egypt) (1883).

LORIS. See Lemur.

LORIS-MELIKOFF, ld'ris – mel'i – kof, Mikhail Tarielovitch Tainoff, Count, Rus¬ sian soldier and statesman : b. Tiflis, Russia, 1 Jan. 1826; d. Nice, France, 22 Dec. 1888. He was of Armenian descent, entered the army in 1843, served in several campaigns in the Cau¬

casus and became major-general in his 30th year and distinguished himself at the capture of Kars in 1854. He served in the Crimean War and was made lieutenant-general in 1863. In the Turco-Russian War of 1877 he won the victory of Aladja Dagh in October, following up which he took Kars in November and for his services in the campaign was made a count in 1878. He was recalled from Tiflis (where in charge of several districts he had intro¬ duced liberal reforms) during the Nihilist menace in 1879, and in 1880 was appointed Minister of the Interior, in which post he be¬ gan by introducing liberal measures, but the assassination of the Tsar (13 March 1881) was followed by the adoption of a reactionary policy on the accession of Alexander III, his position became untenable and he resigned.

LORNA DOONE, by Richard Doddridge Blackmore, published in 1869, was one of the

earliest and by far the most popular of all Blackmore's dozen or more novels. By some critics it has been esteemed one of the great pieces of English fiction, but this praise is un¬ doubtedly excessive. The theme is entirely romantic, there being little realism and no ˆproblem® writing whatever. It is the theme of apparently hopeless, but finally triumphant, love ; of feminine pity and distress ; of manly courtesy and resolution ; of the success of the noble-hearted and the discomfiting of evil men. John Ridd, a young rustic giant of North Devon, rescues the high-born Lorna from the hands of her outlaw relatives and finally rises not only to the possession of Lorna's hand, but to high position on the strength of his own merit. There is some historical background out of the reigns of Charles II and Tames II, most vividly represented at the battle of Sedgemoor. The Doones themselves are largely legendary. Probably their formidableness and knavery are very much exaggerated over any actual facts, just as the scenery of Devon and Somerset, es¬ pecially the description of Doone Valley, are great exaggerations. Interwoven with the ro¬ mantic and semi-historical pictures of the tale are many pleasant details of country life and many quiet scenes and adventures of a placid rural sort. The length of the story is not di¬ minished by being told in the first person by the hero, but it is full of honest spirit and of attractive detail.

William T. Brewster.

LORNE, lorn, Marquis of (John George Douglas Sutherland Campbell). See Ar- gyle, Campbells of.

LORRAINE, Claude. See Claude Lor¬ raine.

LORRAINE, lo-ran', or LOTHARIN- GIA, a province of France, situated on its northeastern frontier and includes such import¬ ant towns as Metz and Thionville. It was in¬ corporated in the Germanic Empire in 855, when Lothair II, son of the Emperor Lothair I, obtained the lands between the Scheldt, Meuse and Rhine, called Lotharingia, or Lorraine. It at first included Alsace and Friesland; but these provinces were separated in 870, being divided between Louis the German and Charles the Bald, king of the West Franks. About 911 the county of Lorraine was elevated into a dukedom. In 945 it was divided into two parts, Upper and Lower Lorraine. Lower Lorraine came into possession of the dukes of Brabant in the 13th century and from that time was known as Brabant. Philip the Good of Bur¬ gundy incorporated it in his dominions in 1429 and it now forms part of the kingdom of Belgium and province of Brabant and Guelder- land in Holland. Upper Lorraine continued to be governed by its own dukes until 1736, was given to Stanislas, ex-king of Poland, and on his death in 1766 was awarded to France. It was afterward divided into four departments, Meuse, Moselle, Meurthe and Vosges. The dis¬ trict between Metz and the Vosges, which in¬ cludes Metz and Thionville, was ceded to Ger¬ many at the close of the Franco-German War, under the Treaty of Frankfort, 10 May 1871, and wras part of the Reichsland of Alsace-Lo- thringen, until its occupation by the troops of the Allied nations in November 1918.

LORTZING, lorts'ing, Gustav Albert,

German composer : b. Berlin, 23 Oct. 1801 ; d. there, 21 Jan. 1851. His parents were actors and at 19 young Lortzing made his theatrical debut at Aachen and Diisseldorf. In 1824 he brought out his first opera, (Ali Pascha von JanninaP but attracted little notice. Two years later he became a member of the Court Thea¬ tre Company at Detmold. (Der Pole und sein Kind) appeared in 1831. Lortzing's fame, how¬ ever, rests on the two operas, (Czar und Zim¬ merman^ (1837) and (Der Wildschiitz) (1842). The former is one of the master¬ pieces of comic opera and still holds the boards in German opera-houses, although it was indif¬ ferently received at its first production at Leip¬ zig. (Undine) appeared in 1845 and

LORY, any of several East Indian and Australian parrots, but more

especially one of the brush-tongued Australian family Tricho-glossidce, the smaller examples of which go by the name of lorikeets. Both the lories and the lorikeets are remarkable *for their extensible tongue, furnished with a pencil at its extrem¬ ity, by which they are enabled to lick up the nectar of flowers. In doing so they carry pol¬ len from blossom to blossom, performing an important service of cross-fertilization, espe¬ cially for the eucalyptus trees. (See Flowers, Fertilization of, by Birds). The lorikeets are smaller than the lories and have long taper¬ ing tail-feathers. Swainson's lorikeet (T . no- vczhollandice) is the best-known species. It is found in eastern Australia and Tasmania and is popularly known as the Blue Mountain lory or the Blue Mountaineer.

The name lory is also given to the large, brilliantly colored parrots of the psittacine genus Eclectus. Consult Newton, (Dictionary of Birds* (1896) ; Evans, (Birds* (in Cam¬ bridge Natural History, Vol. IX, New York 1901) ; and see Parrots.

LOS ANGELES, Cal., city, county-seat of Los Angeles County, about 15 miles in an air line from the Pacific Ocean, in the valley of the Los Angeles River, a dry river-bed in sum¬ mer, but in winter a considerable stream after heavy rainfalls. The Sierra Madre range of mountains, about 10 miles north of Los An¬ geles, may be seen from most any part of the city. There is also a lower range of mountains extending from the city to the ocean. Origi¬ nally Los Angeles covered an area of 36 square miles, extending three miles in each direction from the old plaza. Within the past few years numerous additions have been made, including a ((shoe-string strip® extending from the city to the ocean and taking in the ports of Wil¬ mington and San Pedro. The area at present is 351.1 square miles. The average altitude is 270 feet above sea-level. The northern part of the city is hilly.

The city has railroad competition in four transcontinental lines, two southern Pacific systems, by way of Ogden and El Paso, the Santa Fe, by way of Albuquerque, and the Los Angeles and Salt Lake Railroad, from Salt Lake. Altogether there are a dozen lines of railroad leading to Los Angeles, including an elaborate suburban electric railroad system, ag¬ gregating over 1,100 miles of track, some of the lines having four tracks. The electric street railway system is also extensive, the total mile¬ age of single track being over 300 miles. Half a dozen lines run large and commodious steam¬ ships 475 miles northward to San Francisco, also to Portland and Puget Sound on the north, and to San Diego on the south.

Los Angeles Harbor is guarded from the rare storms of the Pacific by a breakwater two and one-half miles long, built by the United States government at a cost of $3,500,000. Active work has been accomplished on the further dredging of the harbor, construction of wharves and warehouses. The harbor is municipally owned and controlled. The harbor projects under construction include 21 miles of munic¬ ipal wharfage, besides a large area of wharfage under private ownership. Los An¬ geles Harbor is absolutely safe and in any weather may be entered by vessels under their own power. Los Angeles has the advantage of being located on the shortest road by the low¬ est grades between the Atlantic and Pacific oceans. Since the opening of the Panama Canal it is close to the direct route of vessels sail¬ ing from the Atlantic to the Orient. Los An¬ geles is the commercial and social metropolis of the Southwest, including southern Califor¬ nia, southern Nevada and Arizona. It also does a large and increasing trade with northern Mexico, Central and South America. The two most important products of the country sur¬ rounding Los Angeles are citrus fruits and. petroleum. The annual value of the orange and lemon output of this section is about $40,000,000. These fruits are marketed under a thoroughly organized co-operative system of distribution. Los Angeles is the central dis¬ tributing point for important petroleum fields with an annual output aggregating about $40,000,000. There are half a dozen beet sugar factories in the country tributary to Los An¬ geles, with a total output of $18,000,000. Other important products of the surrounding coun¬ try are beans and other vegetables, deciduous fruits, walnuts and grain. Los Angeles is rap¬ idly becoming an important manufacturing city, possessing great advantages in the way of mild climate and cheap fuel in the shape of crude petroleum and electric power, derived from mountain streams. The annual value of its manufactured products is placed at $140,- 000,000. There are 32 banks in the city with a total combined annual clearance of about $1,293,000,000. Building operations have an an¬ nual average value of about $20,000,000.

Los Angeles is a residential city, a large proportion of the people owning their own dwellings. The city is practically frostless; callas, heliotropes and other delicate plants flourishing throughout the winter in the open air. The residence streets are generally aligned by evergreen shade trees. The city is the seat of the University of Southern Cali¬ fornia, a Methodist establishment. Occidental

College is conducted by the Presbyterians. The Roman Catholics have a college and three acad¬ emies. There is a State normal school, several high schools, a polytechnic high school, a pub¬ lic library with nearly 280,000 volumes, 350 handsome church buildings of all leading de¬ nominations and a model institutional church. There are 25 public parks within the city lim¬ its, aggregating over 4,000 acres, four of them having lakes of considerable size. The city de¬ rives its water supply from the snow-clad slopes of Mount Whitney, in Owens Valley, 240 miles from Los Angeles, and from wells. A sewer system extends to the ocean. The mayor of Los Angeles holds office for two years. He appoints five trustees for the li¬ brary and is ex officio a member and chair¬ man of several committees. The city council of nine members, chosen by election from the city at large, has four commissioners who have charge respectively of police, health, fire and park departments. The board of education consists of nine members chosen by election from the city at large.

The pious Spanish pioneers who first in¬ troduced civilization in Alta, California, were in the habit of giving names to places in accord¬ ance with the Church calendar. Consequently, when mass was first celebrated on the present site of the city, in 1781, it was named Nuestra Senora Reina de Los Angeles, which the prac¬ tical Yankees upon their arrival at once pro¬ ceeded to abbreviate.

The growth of Los Angeles has been re¬ markable. Until 1817 Los Angeles alternated with Monterey as the seat of Mexican provin¬ cial government of Alta, California. In 1846 it was taken by Commodore Stockton of the United States navy. It received its city char¬ ter in 1851. In 1850 its population was 1,610. The census of 1880 gave it a population of 11,311. The census of 1910 gave it 319,198. In 1914 the government estimate of the popula¬ tion was 438,914, and the present (1920) popu¬ lation is 576,673.

LOS INTERESES CREADOS, los m'ta- ra'ses kra'a-dos ((The Bonds of Interest) by Jacinto Benavente, the most popular and widely-known production of Spanish letters during the 20th century, was first presented at Madrid, 9 Dec. 1907. With this comedy the modern movement in Spanish art attained full maturity, the play taking its place immediately among the classics of the stage. The theme is the duality of human nature in the conflict be¬ tween the real and the ideal, ever present to the Spaniard in the persons of Don Quixote and Sancho Panza, but here transferred to the domain of the will and embodied in Leander and his servant, the rogue Crispin, Jo whom falls the task of grovelling that his. master may rise. The philosophy of the play is prag¬ matic, while life is depicted as a series of ap¬*

proximations incapable of unification. In feel¬ ing and technique, (Los Intereses Creados belongs to the neo-romantic school, of which it must be accounted one of the finest exam¬ ples. Delicacy of poetic feeling is combined with an unfailing many-sided humanity in a portrayal of varied lights and shades, which is reinforced by the vivid colors of the satiric picaresque tradition, and couched in a diction which is among the most notable specimens of*

modern Spanish prose. Although employing the forms of the Italian commedia dell ' arte Benavente achieves as in his other works an absolute de-artificialization of theatric effect. A continuation, (La Ciudad Alegre y Confiada,) followed in 1916, but in this the intellectual element is directly predominant, both in con¬ ception and style, the second part being wholly distinct from its predecessor.

(Los Intereses Creados) has been translated into the principal European languages. It is included in Benavante's (Teatro) (Vol. XVI, Madrid 1908), having previously been issued independently by the Sociedad de Autores Espanoles. The English version is published in the (Plays by Jacinto Benavente- (New York 1917).*

John Garrett Underhill.

LOS SUENOS, los sua'nyos. Francisco Gomez Quevedo Villega composed his of personal satire and scandalous attack. The satire of the Buenos is rather journalistic than philosophic, more akin to the opportunism and animosities of the periodical press than to the spirit of belles lettres. Ductile and incisive by turns, the humor is both crushing and keen. Clergy, physicians, merchants, Jews, actors, poets, all the cherished abominations of the author, pass in rapid kaleidoscopic review, more effective indeed at the outset, as in the ((Vision of the Last Judgment,® and in miniature than in the later pages, which suffer from the repetition in¬ evitable in the monotony of the scheme. Usually reckoned as six in number, an addi¬ tional vision is admitted by many editors — <(La Hora de Todos y la Fortuna con Seso.® Mature and highly mannered in style, this was printed posthumously in 1658, constituting a substantial volume in itself. It is properly a cento of later writings of the author. The earlier (Visions* circulated in manuscript, or surreptitiously as pamphlets. Two years after the first collected edition, a reprinting under the title (Juguetes de la Ninez y Travesuras del Ingenio* was authorized by the Inquisition at Madrid (1629), the more offensive passages being deleted, and the text revised through the substitution of names of pagan deities for those of the Christian dispensation. Although inferior in directness and energy, this version is that which*

has since been commonly known. The standard Spanish text, edited by Aurelio Fernandez Guerra, is included in the (Obras of Quevedo, (Biblioteca de Autores Espanoles* (Vols. XXIII and XLVIII, Madrid 1880 et seq.). The (Suenos* are also reprinted in the series of (Clasicos Castellanos* (2 vols., Madrid 1916-17), with an introduction by Julio Cejador y Frauca. The familiar English ver¬ sion is by Sir Roger L'Estrange.*

John Garrett Underhill.

LOSE, George William, American clergy¬ man and author: b. Pleasant Unity, Westmore¬ land County, Pa., 28 Sept. 1852; was gradu¬ ated Capital University, Columbus, Ohio, 1871,

LOS ANGELES, CALIF.

1 One of the principal streets in the shopping district

2 Terminal Wholesale Market

Bungalow Court

LOS ANGELES, CALIF

LOSSING — LOST PLEIAD

667

and from the theological seminary of same institution 1874. Entered the Lutheran min¬ istry and held several pastorates in Ohio and Pennsylvania. Editor of several Lutheran pe¬ riodicals and author of many books, including (Esther and Other Poems5 (1883); (The Tri¬ umph of Faith) (1888) ;

(Ralph the Orphan (1906) ; (Bread Upon the Waters) (1908) ; {The Secret of Happiness> (1909); (Christmas Eve at Eddington Place5; *The Melnore Parish) ; (The Song of the Pilgrim5 ; (Promises Fulfilled) ; (Their Mother's Prayers) ; ˆTheodore5 ; Dorothy' ; (The Better Way' ; (A Good Investment) ;*

Lord) ; (The Sandrock Estate5 ; (Lifting the Sandhill Mortgage) ; (Aunt Hannah's Cup of Cold Water5 ; (The Last Son) ; (The Good Shepherd5; (Clouds and Sunshine5 (1914);

(Coals of Fire> (1914) ; (Through the Fire) (1914) ; (Catechism Bible Xarratives) (1915).

LOSSING, los'ing, Benson John, Amer¬ ican historian and engraver : b. Beekman, Dutchess County, N. Y., 12 Feb. 1813; d. near Dover Plains, N. J., 3 June 1891. In 1826 he was apprenticed to a watchmaker in Pough¬ keepsie and subsequently entered into partner¬ ship with his employer, "but in 1835 relinquished the business and became joint owner and edi¬ tor of the Poughkeepsie Telegraph. He soon after settled in New York as an engraver on wood, and at the same time edited and illus¬ trated the Family Magazine. His connection with his newspaper enterprises in Poughkeepsie, however, continued until 1841. That year ap¬ peared his (Outline History of the Fine Arts,5 followed in 1847 by an illustrated work, ˆSeven¬ teen Hundred and Seventy-Six,5 and in 1848 by

(1887).

LOST CAUSE. The, a phrase which first became current through the title of a history, of the Civil War (1886) by E. A. Pollard. It is used as an expressive designation for the purposes and aims which the Southern people, through the war, vainly sought to realize in the

permanent establishment of the Confederate States of America.

LOST CHORD, The, title of poem writ¬ ten by Adelaide A. Proctor. It was first printed in Household Words, and appeared again in her collection of (Legends and Lyrics5 (1858). The verses became widely known when set to music by Sir Arthur Sullivan ; his mood was so attuned to that of the poet that words and music both sound a strain of grandeur, intellectual and emotional, mutually interpretative.

LOST or HIDDEN ISLAND, an appel¬ lation anciently applied to Cephalonia, early navigators often being unable to find it on ac¬ count of its diminutive size. The name also has been given to islands in different parts of the world that once discovered have disap¬ peared or have not been found again.

LOST PARADISE, The. The symbolical

title of (Das verlorene Paradies5 (<(The Lost Paradise55) (1892) by Ludwig Fulda designates the world in which the vast majority of men and women eat bread in the sweat of their brows. The play is intended to arouse sympa¬ thy for workmen who strike rather than see their families starve. Contrasted with their state is that of an absentee Berlin proprietor whose luxurious mode of life leaves but a narrow margin for charitable concessions to his workmen, and who

is just now especially impeded by having admitted to equal partner¬ ship in the business a young man of aristo¬ cratic name about to become his son-in-law. The latter attempts to cow the laborers into submission. But the daughter, visiting the factory for the first time on the occasion of her betrothed's appearance there, is touched with pity for the employees, and is stirred to such indignation at the bargain for a son-in- law which her parents have made that she breaks the engagement and beseeches her father to grant the demanded increase of wages.

The drama reflects conditions in Germany rather than any conceivable conditions among us. No American manufacturer would sup¬ pose that a gilded youth — though the son of an inventor — could assume the management of a machine-shop, or could avert a strike; none would regard his business as merely the dowry of his daughter, or would face bank¬ ruptcy rather than dispense with a socially dis¬ tinguished son-in-law. And even in Germany Herr Bernardi's daughter — sophisticated, but inexperienced, unused to feeling and yet sensi¬ tive to others' wrongs — is an unlikely prod¬ uct of her environment. The superintendent of the factory has a keen sense of the joy of work and of social justice; Bernardi's attitude is a mixture of aloofness and sentimentality. The play contains a number of dramatic mo¬ ments and an abundance of realistic dialogue, but also considerable stretches of sententious conversation. Translated by H. C. De Mille (New York 1897) ; edited by P. H. Grum- mann (Boston 1906).

William G. Howard,

Assistant Professor of German, Harvard Uni¬ versity.

LOST PLEIAD, ple'ad, a star of the Plei¬ ades constellation which tradition says was once visible, being the seventh of that cluster.

Only six stars are now to be seen with the naked eye. In mythology the lost Pleiad is said to represent both Merope and Sterope who hid themselves ashamed at having married mortals; also as Electra, mother by Jupiter of Dardamus, who fled to avoid seeing the fall of Troy. The legend figures in modern poetry and art; a poem by Letitia Landon and a paint¬ ing by Thomas Buchanan Read each bear the title.

LOST TEN TRIBES, The. After the death of Solomon the 10 northern tribes of Israel seceded and established the separate kingdom of Israel. It existed for 200 years, until it was finally brought to an end when Samaria was overthrown by Sargon of Assyria in 722 b.c. At that time 27,000 people were taken to different parts of the Assyrian Empire. It was formerly one of the puzzles of history to know what finally became of the Ten Tribes. There were several theories. Because of the fact that some Jewish monuments were found in China some writers, traced them to that land. Others found their descendants in India. The theory that the Anglo-Saxons were the descend¬ ants of the Ten Tribes had many propagators, and the Anglo-Israelite theory, as it is called, produced a large literature. The general con¬ sensus of scientific opinion, however, is that the tribes became absorbed, as subsequent van¬ ished races have, in neighboring nations, and thus were not lost in the real significance of the term. In the Palestinian Talmud and Midrach Gen. Rabba lxiii, the region of the exile of the 10 tribes is recorded as around the river Sabbation (q.v.), the Sabbatic River, so named from the sacred Sabbath of the Jews, identified in modern times with the stream running from the seven-days intermittent spring Fauwar ed-Deir in the Lebanon. In the (Eldad ha-Dani, the narrative of Eldad the Danite which appeared in northern Africa about the 9th century, and the source of con¬ siderable mediaeval legend and speculation, the lost children of Moses are described as a pow¬ erful Utopian race whose territory was sur¬ rounded by this wonderful river. Among re¬ cent recensions of his text are Epstein's edi¬ tion (Pressburg 1891) and Muller, D. H., in the Denkschriften of the Vienna Academy (Phil- hist. cl. xli, I p. 41). Dr. Giles Fletcher (1548—1611) identified the Tartars with the. lost 10 tribes; consult his (The Tartars, } printed in Usrael ReduxP edited by S. Lee (1667). .Dr. Whiston (1667-1752) revived this identification. Dr. Frangois Bernier (1620-88), French physi¬ cian for 12 years to the Great Mogul of India, in (Les voyages de Bernier contenant la de¬ scription des Etats du Grand Mogul de 1'Hin- doustan) (1699), speculates on the Kashmiris as descendants of the lost 10 tribes from cer¬ tain customs and rites, and the prevailing type of facial features, as also of the neighboring Afghans and the Tajiks of Badakshan, being distinctly Hebraic. Numerous authors propa¬ gated the doctrine that the British races are descendants of the lost 10 tribes. (See Anglo-Israelite Theory). Consult Streator, M. L., (The Anglo-Alliance in Prophecy, or the Promises to the Fathers* (2 vols., New Haven, Conn., 1900). The relation of the lost 10 tribes to the ˆwhite* Indians of North Amer¬ ica, reputed descendants of Madoc (q.v.), the*

Welsh prince who with his followers, accord¬ ing to tradition, emigrated to America in 1170, has also been a source of fruitful discussion, for which consult Henshaw, H. W., ((Popular Fallacies respecting the Indians" (in American Anthropology n. s. Vol. VII, pp. 104-113, 1905) ; Mooney, J. (in American Anthropology Vol. IV, pp. 393-394, 1891) ; Mallery, G., Israelite and Indian: A Parallel in Planes of Culture) (in Proceedings of American Association for the Advancement of Science, Vol. XXXVIII, pp. 287-331, 1889) ; The (Book of Mormon) (q.v.) (1830) is typical of a recurrent phase of the theory.*

LOT, according to the book of Genesis, the son of Haran, and the nephew of Abraham. In order to avoid dissensions between his follow¬ ers and those of Abraham, he went east into the plain of Jordan, toward Sodom, while his uncle dwelt in Canaan. After being taken cap¬ tive by some marauders (styled kings in Gen. xiv), Lot was delivered by Abraham. Having received two angels into his hotise in Sodom, an attack was made upon it by the inhabitants, who were struck blind, and the impending de¬ struction of the city was announced to Lot. He escaped with his family; but his wife, look¬ ing back, ((became a pillar of salt." The name ((Lot's wife" is still given to a detached pillar about 40 feet high, on the Jebel Usdum, a height near the Dead Sea. According to Gen¬ esis xix, 31-38, from Lot's incestuous inter¬ course with his daughters originated the Moa¬ bite and Ammonite nations.

LOT (ancient Loda or O litis), France, one of the largest tributaries of the Garonne River, rises at Mount Lozere, one of the Cevennes, near Mende, department of Lozere. It flows west by south across the departments of Lozere, Aveyron and Lot, and joins the Garonne at Aiguillon, in the department of Lot-et-Garonne. Total course about 250 miles, of which 180 miles, commencing at Entraigues, are navigable.

LOTA, Chile, a city in the province of Concepcion, situated on Arauca Bay, lat. 37° 5′ S. At present the centre of Chilean coal min¬ ing, it was a fishing village until 1852, when the Cousino family demonstrated the existence of coal there in paying quantities. The Com- pania Esplotadora de Lota y Coronal, formed and controlled by the same family, with capital of about $20,000,000, has mines at Playa Negra, Coronal and Buen Retiro, in addition to those at Lota. LTndersea and underground galleries in the Lota mines have electric lighting and tramways. The company controls also the Lota copper-smelting, pottery, bottle and fire¬ clay-brick works, and a fleet of coasting steam¬ ers and sailing vessels. It provides for its workpeople

free housing, schools, coal, medical attendance, hospitals and almshouses, a church and chaplain. A part of the Cousino fortune has been employed in the creation of the fa¬ mous park above the town, containing trees and plants from all quarters of the globe, the statue of Caupolican, by Nicanor Plaza, etc. Pop. about 15,000.

. LOTHAIR (ld-thar') I, Roman emperor, eldest son of Louis-le-Debonnaire : b. about 795; d. Priim, Prussia, 29 Sept. 855. He be¬ came associated with his father in the govern¬ ment of the empire in 817 and was crowned and

named king of the Lombards in 820 and em- peror in 823. On his father's death Louis and Chailes, his brothers, joined their forces and defeated him at Fontenoy in June 841. In 843 the three brothers concluded the noted treaty of \ erdun, by which Lothair retained the title of emperor, with Italy, and some French prov¬ inces beyond the Rhine and the Rhone. Charles then became king of France and Louis received a tract of country bordering on the Rhine.

LOTHAIR II, called The Saxon, Roman emperor: b. about 1060; d. near Trent, 4 Dec. 1137. He became Duke of Saxony in 1106 and was elected king of Germany in 1125, and crowned by Pope Innocent II in 1133. By his performing certain acts of homage to the Pope, the claim was made that the empire wa's a fief of the Holy See. It was during his reign that the Diet of the empire claimed for itself the sole right to levy taxes, and to have in its hands the issues of peace or war.

LOTHAIR, a novel by Benjamin Disraeli, published in 1870. The scene of this extravaˆ gant, but remarkable, story is laid chiefly in England about the period of its publication. The hero, Lothair, a young nobleman of wide estates and great wealth, has been surrounded by a Protestant atmosphere. When, in accord¬ ance with his father's will, he goes to Oxford to complete his education, his other guardian, Cardinal Grandison, determines to bring him into the Roman Church. The story is a graphic description of the struggles of rival ecclesias¬ tics, statesmen and leaders of society to secure the adherence of the young nobleman.

LOTHROP, Amy. See Warner, Anna Bartleit.

LOTHROP, Harriet Mulford Stone,

((1881); (The Pettibone Name (1883); (The Golden West) (1885) ; (The Minute-Man) (1886); (Dilly and the Captain) (1887);*

(Little Maid of Concord Town) (1898) ; (The Judge's Cave: a Romance of the Days of Regi- cides) ; (Little Maid of Boston Town, etc. She was also a constant contributor to the lead¬ ing juvenile periodicals. Her*

LOTI, lo'te, Pierre, pen-name of Louis Marie Julien Viaud, French author: b. Roche¬ fort, 14 Jan. 1850. After a school education in his native town he entered the French navy in 1867, becoming midshipman in 1873, and resign¬ ing in 1898 with the rank of lieutenant. He has seen, in the course of his calling or otherwise, a great part of the world, and descriptions of foreign scenery figure largely in his works. .He served with distinction in the Tonkin campaign, but incurred official displeasure by. describing the cruel proceedings of French soldiers at Hue in a series of letters to the Figaro in 1883. In 1887 he was honored by admission into the Legion of Honor, and in 1891 was elected a member of the Academy, Zola being a rival candidate on the occasion. He has published

many stories, tales and sketches under the pseudonym (< Pierre Loti,® among them being (Aziyade) (1879); (Rarahu> (1880), reprinted in 1882 as (Mariage de LotP ; (Le Roman d'un SpahP (1881); (1882) ; cPecheur d'Islande) (1886), his chief work; for which he received the Prix Vitet from the Academy; (Madame Chrysantheme) (1887);

(Japonneries d'Automne> (1889); (Au Maroc> (1890); (Le Roman d'un Enfant) (1890); (Fantome d'OrienP (1892), a sequel to

(1894).

LOTION, a wash, solution or medicinal mixture for external application to the body; usually a liquid remedy, consisting principally of water, as a menstruum, and applied to cir¬ cumscribed portions of the skin, or of the mucous surfaces. Lotions are either cooling, stimulating, astringent, soothing or sedative. Water combined with spirit or vinegar is an example of the first. The spirit is added to the water in the proportion of half an ounce and upward to the half-pint. The lead lotion is at once cooling and astringent. A good stim¬ ulating lotion is procured from a mixture of water with a third or a half of its bulk of spirit of wine, which is applied to the skin by means of lint, and covered to prevent evapora¬ tion. Astringent lotions are formed by adding from 1 to 10 grains of

sulphate of zinc or of white vitriol to an ounce of very cold water, having other astringents in solution. Soothing lotions consist of the various preparations of opium, of the. decoction of poppies, hemlock, etc., and prussic acid is employed in the prep¬ aration of sedative lotions. Stimulating lo¬ tions are applied to indolent ulcers and tumors, and sedative and narcotic mixtures are em¬ ployed to alleviate pain. A fomentation is a lotion used hot. So-called antiseptic lotions contain bichloride of mercury, or carbolic acid, or boracic acid.

LOTOPHAGI. See Lotus-eaters.

LOTTA. See Crabtree, Charlotte.

LOTTER (lot'ter) FAMILY, a family of printers in Germany, the founder of which, Melchior Lotter, born at Aue, appeared in Leipzig about 1491. There his publications of breviaries and missals brought him reputation, which his larger enterprises extended. He published (1512) ; (Horatii Episto- lae (1522) ; (Lutheri Tessaradecos Consolato- ria pro Laborantibus) (1520), etc. One of his innovations was the reservation of Gothic types for German and use of Roman for Latin. He is supposed to have given at least secret sympathy and aid to the Reformation. His son, Melchior, who died about 1540, was the original printer of Luther's Bible (1522-24), and was succeeded by Hans Lufft (q.v.). His publications also included various works of Luther, Melanchthon and other writers.*

LOTTERY, a public gambling scheme, by which, for a valuable consideration, one may by favor of the lot obtain a prize of a value su¬ perior to the amount or value of that which he risks. In its best and most frequent applica¬ tion, the word describes those schemes of this nature which are conducted under the super¬ vision and guaranty of government, and the proceeds of which are devoted to public objects. Almost all modern states have, at some period of their history, employed lotteries as a means of revenue. But though they supply a ready mode of replenishing the public treasury, they have always been found to exert a mischievous influence upon the people. The poor are in¬ vited by them rather than the rich. They are diverted from persistent labor and patient thrift by the hope of sudden and splendid gains ; and as it is the professed principle of these schemes to withhold a large part of their receipts, a necessary

loss falls upon that class which can least afford to bear it. Between the years 1816 and 1828 the French government derived from lotteries an annual income of $2,400,000. Some years later the government suppressed them, and in January of the next year $110,000 more were found to be in the savings banks of Paris alone than in the same month of the preceding year. In France of to-day the lottery is used to secure state and municipal bonds at a low rate of interest — some of those in¬ vestments being subscribed 20 times over. Each subscriber gets a lottery bond, with prizes drawn four, six or eight times a year, and every care is exercised in the drawings for prizes. In several other European states gov¬ ernment lotteries are still maintained. They have become an almost indispensable source of revenue; and they are defended by the argu¬ ment that as the passion for play is irrepres¬ sible among the people, and their money would otherwise be invested in foreign or in secret and less fairly managed schemes, the state may well assume the conduct of lotteries at home; that under its supervision the evils attendant upon them are diminished, and their earnings are devoted to the public welfare. Dice for the casting of lots have been found in ancient Egyptian and Assyrian tombs. The lot is fre¬ quently mentioned in the Bible as a means of settling disputes and partitioning land. One of the Apostles, Matthew, was chosen by lot. Venetian and Genoese merchants are known to have got rid of surplus stock by lottery. The first recorded public lottery was held at Bruges in 1446. The first in England was drawn in 1569; they were finally abolished in 1826.

In the United States, the lottery has been from the earliest settlement of the country a familiar means of raising funds, which in this country could have been secured in no other mode so easily, if at all. The Virginia com¬ pany derived a large profit from English lot¬ teries, and the influence of them extended grad¬ ually to the Eastern colonies; for it is reported that an assembly of ministers at Boston in 1699 denounced the lottery as ((a cheat,® and its agents as <(pillagers of the people.® Generally, however, lotteries enjoyed a fair reputation and certainly were soon extensively employed throughout the country. In the 18th century they were extraordinarily popular in America. Legislatures authorized lotteries for every spe¬ cies of public improvement, for the building of

churches and colleges, for the repair of losses to individuals by fire and otherwise; for exam¬ ple, Faneuil Hall, after the fire of 1761, was rebuilt by lottery. The Continental Congress tried to raise money by lottery in 1777.

In 1833 a society was formed in Pennsyl¬ vania which advocated

their suppression. In July 1834 the society issued an address to the public, setting forth its objects and views. It was the educative work of this society that first arrested public attention to the evils inherent in lottery systems, and it has been followed by legislative action. Lotteries are now prohibited in all the States and Territories of the United States; in Massachusetts raffling is forbidden by express statute. The schemes known as art unions 'are held to be lotteries by express deci¬ sions. In the language of the court in New York: ((These associations distribute a small number of prizes among a great number of persons. The prizes and blanks are drawn in the same manner as in other lotteries. The intention of these schemes is to sell works of art for more than they can be sold for at private sale, and this is to be brought about by an appeal to the universal passion for playing at games of chance. They have all the attributes and elements of lotteries.®

The sums annually employed by Americans in lottery speculations probably amounted to hundreds of thousands. The last lottery sup¬ ported by governmental encouragement was the Louisiana State Lottery. An Act of Congress passed in 1890 attempted to crush it by for¬ bidding it the use of the United States mails, which act compelled its removal to Honduras, where in 1903 it was still in existence, and thousands of tickets for this lottery were sold monthly in the United States, particularly on the Pacific Coast, where as late as November 1903 the daily newspapers issued (

LOTTO, a game having its origin in Italy but now played occasionally in other countries. It is played on boards, divided into 27 small squares arranged in three horizontal rows ; five squares in each row are marked with numbers between 1 and 90, four of the squares being left blank. Each person playing is provided with a board upon which he covers the space marked with the particular number called out by the dealer, who draws the counters from a bag. The player.who first covers all the five numbers on any horizontal row is declared the winner.

LOTUS, in art, the lotus played an import¬ ant part in the art of the ancients. It is com¬ mon in all Egyptian decoration, especiallv in borders. It was not unknown in the art of the Assyrians and Persians and from all these sources it was derived bv the Greeks and made familiar to the West by the Romans. Some scholars unduly overrated its importance and

frequency in Egyptian ornament, ascribing to it a kind of solar symbolism; this is denied by others of equal authority. Consult Goodyear, W. H., (Grammar of the Lotus> (London 1891) and Flinders Petrie, W. M., (Egyptian Decora¬ tive Art> (ib. 1895).

LOTUS-EATERS (Latin Lotophagi) , in ancient Greek legends a people on the north coast of Africa who lived on the fruit of the lotus-tree. According to Homer they received Ulysses and his followers hospitably, but the sweetness of the fruit induced such a feeling of happy languor that they forgot their native land and ceased to desire to return to it, their sole object being to live in delicious dreamy idleness in Lotusland. See Lotus.

LOTZE, Rudolph Hermann, German phi¬ losopher and physiologist: b. Bautzen, Saxony, 21 May 1817 ; d. Berlin, 1 July 1881. He studied philosophy and medicine at Leipzig and in 1842 was appointed extraordinary professor of phi¬ losophy in that university and in 1844 ordinary professor in Gottingen. In 1881 he filled the same chair in Berlin. His philosophical posi¬ tion is that of a teleological idealist, and he makes metaphysics to be destitute of all inde¬ pendent existence, apart from ethics. The uni¬ verse has its cause in the notion of the Good, which underlies all the phenomena and activities of the world. His position as a teleologist is (he same as that of Asa Gray, and while allow¬ ing that mechanism obtains in the movements of the universe he denies that this excludes the possibility of creative design. Lotze is, how¬ ever, considered to have done his most original work in the domain of psychology. He teaches that our space-consciousness is built out of the distinctive, non-spatial sense-attributes, which vary according to the locality of the sense- organs stimulated. Among his works are (1843); (Mi-kroskosmus) (1856-64); and (Geschichte der 2Esthetik in Deutschland) (1868). Consult Falckenberg, (Hermann Lotze) (Stuttgart 1901) ; Hall, C. S., (Founders of Modern

Philosophy> (New York 1912) ; Hartmann, (Lotze's Philosophy) (Leipzig 1888) ; Jones, H., (Critical Account of the Philosophy of Lotze> (Glasgow- 1895).

LOUBAT, Joseph Florimond, zho-zef flo-ri-mond loo-ba, Due de, French author and philanthropist: b. New York, 21 Jan. 1831. He was graduated from the University of Paris and has been a liberal giver to public institu¬ tions, among his' benefactions of this char¬ acter being a gift of $1,000,000 to Columbia University, including

valuable books and manu¬ scripts. He has likewise given much to the Roman Catholic Church, and in recognition of this fact received his title of Due de Loubat from Pope Leo XIII in 1893. He has written (Narrative of the Mission to Russia in 1866 by G. V. Fox) ; ˆedallic History of the United States. J

LOUBET, loo-ba, Emile Frangois, French

statesman: b. Marsanne (Drome), 1838. He was graduated in law at Paris, in 1865 was admitted to the bar at Montelimar, attracted attention by his legal ability, became counsel for the Paris, Lyons and Mediterranean Rail¬ way, in 1869 was elected conseiller d'arrondis- sement, and 4 Sept. 1870 was chosen mayor of Montelimar. Elected in 1871 to the general

council of the Drome, of which he afterward (1885) became president, he was returned to the Chamber of Deputies for Montelimar in 1876, where he served with the Republican left until 1885. In 1885 he entered the Senate for the department of Drome, and from December 1887 until April 1888, when he retired with his colleagues of the ministry, filled with much credit the post of Minister of Public Works in the Tirard Cabinet. He was chairman of the Finance Committee of the Senate in 1890, chairman of the Customs Committee in 1893; and on 29 Feb. 1892 was made Premier by President Carnot. His Cabinet, in which he held the portfolio of the Interior, lasted until November of that year, when its retirement was caused by attacks on its supposed laxity in the prosecution of the Panama case. In 1896 he was chosen president of the Senate. Upon the sudden death of President Faure (16 Feb. 1899), the National Assembly met in congress (18 February) and elected Loubet President of the Republic on the first ballot. His position in politics is that of a moderate Republican, without the tendency to Radical views some¬ times ascribed to him. He has been not only a skilful administrator, but a close student of economic questions. He is a protectionist, though not of the extreme type, and an ad¬ vocate of economy in finance, having made an able speech on financial reform in 1895. His administration as President did much to strengthen the Republicans, and the Monarchist party has almost entirely disappeared as a serious factor in national affairs. Among the events of his term were the trial of Captain Dreyfus at Rennes and the remission of the 10 years' sentence there passed upon him ; the strike of the miners at Montceau and of the dock-workers at Marseilles; the complete separation of Church and State and the dis¬ turbances attendant on the passing of the law of the associations; and the conclusion of an entente with England, which left France a

free hand in Morocco in return for non-inter¬ vention in Egypt. In 1906 he was succeeded in the Presidency by Clement Armand Fallieres (q.v.). See France — History.

LOUDON, low'don, James, Canadian

physicist: b. Toronto, 1841. He received his education at the College of Upper Canada and at Toronto University. In 1862 he was ap¬ pointed instructor in classics at the latter insti¬ tution and subsequently became assistant pro¬ fessor of mathematics. From 1875 to 1887 he held the chairs of mathematics and physics and from 1892 to 1906 was president of Toronto University. In 1872 he was one of the original Fellows of the Royal Society of Canada and was its president in 1901-02. He is a member of several learned societies. His publications include papers in the transactions of the Canadian Institute, the American Journal of Mathematics, the Philosophical Magazine, etc., and the volume (Elements of Algebra* (1873).*

LOUDON, Fort, a name given to two forts built during the Colonial period, and in¬ tended for defense against the Indians. One, built in 1750, was in Loudon County, Tenn., on the Tennessee River. An Indian massacre took place here a few years after the erection of the fort. The other Fort Loudon was erected in 1752, near Winchester, Va. It was

a square building with four bastions, mounting 24 guns. It was large enough to accommodate nearly 500 men.

LOUGHBOROUGH, luf'bur-6, England, market town and municipal borough of Leices¬ tershire, on the Loughborough Canal, and the Great Central, the London and Northwestern and the Midland railways. It contains a 14th century church (restored) and several modern churches, a grammar school, free library, town and county halls, etc. It has hosiery, engi¬ neering, iron and dye works and bell foundries. The town has undergone extensive improve¬ ments. There is a fine public market, and the water, gas and electric plants, market, ceme¬ teries and allotment gardens are municipally owned. Garbage and waste are used to gener¬ ate steam for pumping the sewage, which is utilized on farms. Loughborough (Lucteburne) was given by William the Conqueror to Hugo Lupus. Pop. 23,000.

Consult Fletcher, W. G. D., (Chapters in the History of Loughborough)

(1883).

LOUGHEAD, ld'hed, Flora Haines, Amer¬ ican novelist and journalist: b. Milwaukee, Wis., 12 July 1855. She was graduated from Lincoln University, and was married in 1875 to C. E. Apponyi, and in 1886 to John Loug- head, a journalist. She has done much jour¬ nalistic work in Chicago, Denver and San Francisco, and is the author of (The Libraries of California) (1878) ; (The Man Who Was Guilty } (1886) ; c Handbook of Natural Sci- ence) (1886) ; (Quick Cooking) (1890) ; (The Abandoned Claim) (1892) ; (The Man from Nowhere (1892) ; (Santos's Brother) (1892) ; (A Crown of Thorns) (1892) ; (The Black Curtain) (1897); (The San Franciscan); and of several plays. She edited the (Biography of Oscar Lovell Shafter) (1915).*

.LOUGHREA, loch-re-a, Ireland, market- town and episcopal seat in County Galway, on the north shore of Lough Rea, and on the Midland Great Western Railway, 20 miles east by south of Galway and 116 miles west of Dublin. It contains the magnificent cathe¬ dral of Saint Brendan, erected 1900-05, and is the seat of the Roman Catholic bishop of Clonfert. Near the railway station are the remains of an early English Carmelite friary (about 1300) which survived the Dissolution. It was founded by Richard de Burgh, part of whose castle also survives. The town was once fortified and parts of the old ramparts remain. Later it was a military station ; the military barracks still remain. The town has a large trade in farm produce; a great market is held every Thursday. Lace-making is the chief in¬ dustry, and is of small proportions. During the Agrarian strife, Loughrea was the scene of several disturbances. Pop. 3,100.

LOUGHRIDGE, loch'ridj', Robert Mc¬ Gill, American Presbyterian clergyman, mis¬ sionary and lexicographer: b. Laurensville, S. C., 24 Dec. 1809; d. Waco, Tex., 8 July 1900. His father, James Loughridge, was a native of County Antrim, Ireland, and his mother, Deborah Ann (McGill) Loughridge, was a native of South Carolina and of Scotch- Irish extraction. His parents removed to Eu- taw, Ala., in his early youth. Robert M. Lough¬ ridge was educated at Miami University, gradu¬

ating in 1837. He then entered Princeton Theological Seminary, but remained only one year, the death of his father necessitating his return home to aid his mother in the manage¬ ment of the family's

affairs. He continued to pursue his theological studies under the direc¬ tion of his pastor, Rev. Dr. John H. Gray. He was licensed to preach by the Presbytery of Tuscaloosa, in 1841. In October 1842 he was ordained by the same Presbytery being under appointment of the Presbyterian Mission Board as a missionary to the Creek Indians. He went to the Creek Nation only five years after the people of that tribe had expelled all mis¬ sionaries. When he presented himself before the Creek Council and asked permission to take up his work it was granted with great reluct¬ ance and he began the organization of the mis¬ sion at Coweta, in February 1843, where a school was established. Six years later, his work had so prospered that the Creek Nation founded a manual labor school at Tullahassee, of which he was made superintendent, and where he continued to labor until the work of the mission was interrupted by the outbreak of the Civil War. Mr. Loughridge then moved to Texas, where he engaged in pastoral work until 1880, when he returned to the Creek Nation to accept the superintendency of the new manual labor school at Wealaka, in which capacity he continued to labor until his final retirement in 1892, after having reached the age of 82. He mastered the Creek or Muskogee language, translating the catechism, portions of the Bible and many hymns into that tongue and also compiling a Creek-English dictionary, which, however, was not printed until after his death.

LOUIS, loo'is (Fr. loo-e), called The Child, king of Germany: b. 893; d. 911. He was the son of the Emperor Arnulphus, and succeeded him in 899/ During his nominal kingship the government was mainly conducted by Archbishop Hatto of Mainz. At this time the empire was constantly ravaged by the Hun¬ garians. He was the last prince in Germany of the Carlovingian race.

LOUIS I, surnamed Le Debonnaire, Roman emperor: b. 778; d. near Mainz, Ger¬ many, 20 June 840. He was the 3d son of Char¬ lemagne, was early appointed by his father king of Aquitania, and in 813 was named joint- regent of France, of which, in the following year, he became sole sovereign, as well as em¬ peror of the West. In 817 he divided his do¬ minions among his three sons, Lothair, Pepin and Louis, and thereby gave rise to disturbances and contests which lasted during the whole period of his reign. In 829, in consequence of the solicitations of his second wife, Judith of Bavaria, who had borne him a son, Charles the Bald, he made a new division of the empire. In 830 the brothers Lothair and Pepin combined against their father, took him prisoner, charged their stepmother with adultery, and shut her up in a monastery. The design of Lothair to make himself sole sovereign having been dis¬ covered, the Diet of Nimeguen obliged

him to submit at discretion. Strife continued for the rest of Louis' life. In 837 Louis made a new division in favor of Charles, who obtained Neustria in addition to Aquitania. Though not without good qualities Louis had neither the

statesmanship nor decision necessary for ruling so large an empire. He was succeeded as em¬ peror by Lothair, to whose protection he had recommended his favorite son, Charles.

LOUIS II, Roman emperor : b. about 825 ; d. Brescia, 12 Aug. 875. He was the son of Lothair I, was made king of the Lombards in 844, and became emperor, in succession to his father, in 855. He was an able ruler, who contended victoriously against the Saracen in¬ vaders of southern Italy.

LOUIS III, Roman emperor, surnamed The Blind: b. about 880; d. 928. He was the son of Boson, king of Province, and Ermen- garde, daughter of the Emperor Louis II. He succeeded his father on the throne of Provence at the age of 10, and in 900 contested the im¬ perial throne – with Berengar I. Berengarius forced him to leave Italy, and take oath never to return. In 904 he returned and won some successes ; but Berengarius surprised and took him prisoner at Verona in 905, and deprived him of his sight.

LOUIS IV, surnamed the Bavarian, Ro¬ man emperor: b. 1287; d. near Munich, 11 Oct. 1347. He was the son of Louis the Severe, Duke of Bavaria, and succeeded his father in the dukedom in 1294 and was elected emperor in 1314. Frederick le Bel of Austria was also chosen at Cologne by a minority of electors, and a war between the rivals ensued. Freder¬ ick was taken prisoner in 1322, and only gained his liberty by renouncing his claims. Pope John XXII then issued his bull of deposition against Louis, and the latter, appealing to a general council, went to Italy, where he declared the deposition of John and set up Peter de Corbiere as Pope under the name of Nicholas V, by whom he was crowned at Rome. In 1338 the German electoral princes in a council at Rhense announced that the emperor's title to the Ger¬ man and imperial crowns were derived from his election by them and required no further sanction from the Pope, the validity of which proceeding was not recognized by the papacy.

LOUIS I, king of France. See Louis I, Roman emperor.

LOUIS II, surnamed Le Begue (the Stam¬ merer), king of France: b. 846; d. Compiegne, France, 10 April 879. He was the son of Charles the Bald, was crowned king of Aqui¬ taine in 867 and succeeded his father on the throne of France in 877. He was obliged to deliver up Provence to Boson, by whom it was erected into a kingdom. His children, Louis and Carloman, divided the kingdom between themselves and a posthumous son, afterward known as Charles the Simple.

LOUIS III, king of France: b. about 863 ; d. 882. He was the son of Louis II and the brother of Carloman, with whom he divided the rule of the kingdom. He defeated Hugh the Bastard, son of Lothair, marched against Boson, king of Provence, and successfully op¬ posed the Normans at Saucourt (3 Aug. 881), a battle celebrated in the famous German poern, the

LOUIS IV, surnamed D'Outremer (<(from beyond the seas"), king of France: b. 921; d. September 954. He was the son of Charles the Simple, was educated at the court of King vol. 17 — 43

Athelstan of England, and became king in 936, on the death of Rudolph of Burgundy. He invaded Normandy, but was defeated and taken prisoner in 944. He was set free the next year after being obliged to concede Normandy to Richard, son of Duke William, and Laon to Hugh, father of Hugh Capet, the latter being, however, restored.

LOUIS V, surnamed Le Faineant (Do Nothing), king of France: b. 966; d. May 987. He was the last French monarch of the Carlo-vingian dynasty. In spite of the name con¬ ferred upon him he was an active ruler. He succeeded his father, Lothair, in 986, and soon after becoming king took the city of Rheims and was preparing to march to the assistance of the Count of Barcelona, hard pressed by the Saracens, when he is said to have been poisoned by his mother. Consult Lot, (Les derniers Carolingiens : Lothair, Louis and Charles) (Paris 1891).

LOUIS VI, surnamed Le Gros (the Fat), king of France: b. 1081; d. 1 Aug. 1137. He was the son of Philip I, with whom he was as¬ sociated in the government in 1100, and whom he succeeded in 1108. His reign was greatly disturbed by contests with the Normans, and by wars among his turbulent vassals in the Isle de France. He quarreled with Henrv I of Eng¬ land, and thus was begun the struggle

between the English and the French, which continued three centuries. He was a benefactor of the Church and of the poor. He was ably coun¬ seled by his minister, Abbe Suger. Consult Luchaire, (Louis VI le Gros) (Paris 1889) ; Thompson, J. W., (DeveloDment of French Monarchy under Louis VI le Gros} (Chicago

1895).

LOUIS VII, called Le Jeune, king of France: b. about 1120; d. 18 Sept. 1180. He was the son of Louis VI, and succeeded him in 1137. He contested with Pope Innocent II the right of presentation to benefices, and was ex¬ communicated by Innocent and his kingdom placed under interdict. By the persuasions of Saint Bernard, Louis embarked on the Second Crusade, but was defeated by Saladin, and while returning to Europe was captured at sea by the Greeks, but afterward rescued by Roger, king of Sicily. His divorced queen, Eleanor of Aquitaine, married Henry of Normandy, afterward Henry II of England, bringing with her as dowry the provinces of Poitou and Guienne. This caused a long war between Eng¬ land and France. Consult Luchaire, (Etudes sur les actes de Louis VIP (Paris 1885) ; Hirsch, (Studien zur Geschichte Konig Ludwigs VII von Frankreich) (1892) ; Lavisse, (Histoire de France) (Vol. Ill, Paris 1901).

LOUIS VIII, surnamed The Lion, king of France: b. 1187; d. Montpensier, Auvergne, France, 8 Nov. 1226. He was the son of Philip Augustus of France and married Blanche of Castile in 1200. Accepting the offer of the English crown made him by the English barons, in 1216 he landed in England, took Rochester and Winchester, and received the homage of the barons at London. After the death of Tohn and the accession of Henrv III he was de¬ feated at Lincoln, signed the Peace of Lam¬ beth in 1217 under which he received a small indemnity. He was excommunicated by the legate and withdrew to France in September

1217. He succeeded his father in 1223, and soon regained most of the English possessions in France. In 1226 he led a crusade against Raymond, Count of Toulouse, and the Al- bigenses; took Avignon after a three months' siege, and laid waste Languedoc. Consult Petit-Dutaillis, (Etude sur la vie et la regne de Louis VIIP (Paris 1894).

LOUIS IX, called Saint Louis, king of France: b. Poissy, France, 25

April 1214; d. near Tunis, Africa, 25 Aug. 1270. He was the son of Louis VIII and Blanche of Castile, and came to the throne on the death of his father. Being only in his 12th year he was placed under the guardianship of his mother, who was made regent of the kingdom, and he was declared of age in 1236. In 1243 Louis defeated the English in several engagements, and a truce for five years was concluded. Having made a vow, in the event of recovering from a dangerous dis¬ ease, to march against the infidels in the Holy Land, he in 1248 embarked at Aigues-Mortes with an army of 50,000 men. This expedition proved disastrous, and Louis with his army was captured by the Saracens. Damietta, which had been taken by the French, was demanded as the price of the monarch's freedom, and a vast ran¬ som was also claimed for his followers. In 1254 he returned home, and in the interval Queen Blanche, who had ruled the kingdom well in his absence, had died. Louis now turned his attention to the administration of the law. The subjects were now suffered to appeal from the decision of their lords to four royal tribu¬ nals, and men of learning were introduced into the Parliament. Louis also diminished the taxes and he founded the Sorbonne. The code of laws known as the III. He was canonized by Boniface VIII in 1297. The Sieur de Joinville wrote his life, of which an English translation by Hutton appeared in 1868. Consult Berger, (Saint Louis et Innocent IV (Paris 1893), and (Histoire de Blanche de Castile* (ib. 1895) ; Faure, (Histoire de Saint Louis* (2 vols., Paris 1866) ; Lavisse, (Histoire de France* (Vol. Ill, Paris 1901) ; Lecoy de la Marche, (La France sous Saint Louis* (ib. 1893) ; Perry, F., cSaint Louis the Most Chris¬ tian King* (New York 1901) ; Sepet, (Life* (Paris 1903).*

LOUIS X, surnamed Le Hutin (the Quar¬ reler), king of France: b. Paris, 1289; d. Vin¬ cennes, 4 June 1316. Through his mother he inherited the kingdom of. Navarre in 1305, and in 1314 he succeeded Philip the Fair, his father, on the throne of France. His posthumous son, John I, survived but a few months, and Louis' brother then succeeded as Philip V.

LOUIS XI, king of France; b. Bourges, France, 3 July 1423; d. Plessis-les-Tours, France, 30 Aug. 1483. He was the son of Charles VII. but in all respects very unlike him, and in 1440 he left the court and headed an insurrection against his father. Charles par¬ doned his son but the latter soon entering into new conspiracies was obliged to take refuge in Burgundy, and lived there five years in a de¬ pendent condition. On reaching the throne after the death of his father, in 1461, he dis¬

missed the former ministers and surrounded himself with obscure men, having neither char¬ acter nor talents to recommend them. In all his acts a crooked policy and sinister views were evident. Pretending to reconcile contending parties, he secretly instigated them against each other, and when negotiating with a foreign government he bribed its messengers and estab¬ lished secret correspondences with them. He carried on a war with Charles the Bold, after¬ ward Duke of Burgundy, which lasted 1465-72, and on the death of Charles in 1477, at the bat¬ tle of Nancy, he joined Burgundy to France. In 1481 he united Anjou, Maine and Provence to the kingdom. Louis both reigned and governed, and was inflexible in his purposes. He vanquished the feudal lords, put an end to anarchy, consolidated the central power, art¬ fully played off the cities against the nobility and was implacable in his revenges. He greatly improved the means of communication. Until his last years he had no regard for the appear¬ ances of power, and dressed meanly. His later years were spent in the dread of death ; he lav¬ ished gifts upon the saints, and spent his time in ascetic practices which failed to bring relief to his tortured mind. Consult (Louis XI et les villes (Paris 1893s) : Hare, C., (Louis XI* (London 1907) ; Kitchen, (History of France* (Vol. I, Oxford 1885) ; Lavisse, (Histoire de France* (Vol. IV, Paris 1902), and, for its vivid presentation of the king, Scott's (Quentin Dur- ward.*

LOUIS XII, surnamed the Father of His People, king of France: b. Blois, France, 27 'June 1462; d. 1 Jan. 1515. He was the son of Charles, Duke of Orleans, and on coming to the throne in 1498 he pardoned all who had wronged him previously. His reign was con¬ tinually disturbed by war. He subdued the Milanese, Genoa and Naples. His joining of the League of Cambrai (1508) enabled him to conquer Venice; but the Holy League was formed against him in 1511; and in 1513 the French were expelled from Italy. Henry VIII of England, a member of the league, attacked Louis in his own dominion and he was obliged to sue for peace after the battle of the Spurs in August 1513. For his third wife he married the young Princess Mary, sister of Henry VIII, who after his death was married to her first lover, Charles Brandon, Duke of Suffolk. Louis XII was honest and magnanimous; he was friendly to science, and France prospered under him and his able chancellor, Cardinal d'Am- boise. Consult Claviere, (Histoire de Louis XII (Paris 1890 et seq.) ; Hauser, (Les sources l'histoire de France XVIe siecle* (ib. 1906), and' Lacroix, (Louis XII et Anne de Bretagne*

(1882).*

LOUIS XIII, king of France: b. Fon¬ tainebleau, France, 27 Sept. 1601 ; d. Saint Ger- main-en-Laye, France, 14 May 1642. He was the son of Henry IV, whom he succeeded under the regency of his mother, Mary de Medicis, and who made alliances with Spain and the Pope. In 1614 he was declared of age and the next year he married Anne of Austria who after 23 years of married life gave birth to a son, afterward Louis XIV. The realm at the beginning of his reign was in a very disturbed state. The Huguenots were threatening and a great part of the kingdom rebelled. In 1624

Louis chose Cardinal Richelieu as his Prime Minister, and the remainder of his reign was to all purposes that of the great cardinal. Under him the Huguenot power was broken by the capture of La Rochelle in 1628. The govern¬ mental power centralized and the influence of Austria materially weakened. In the Thirty Years War he supported Gustavus Adolohus and the Dutch against Spain and Austria. During his reign the Etats generaux — a body more ancient than the parliaments — met for the last time till the reign of Louis XVI. Con¬ sult Patmore, K. A., (The Court of Louis XIIP (London 1910) ; Raumer, (Geschichte Ludwigs XIII und des .Kardinals Richelieu (1830) • Topin, XIII et Richelieu* (1876); Zel¬ ler, (La Minorite de Louis XIIP (1897). See Richelieu.*

LOUIS XIV, king of France: b. Saint German-en-Laye, 5 Sept. 1638; d. Versailles, 1 Sept. 1715. He was only five years old when he succeeded to the throne, but his mother, Anne of Austria, was made regent during his nonage which ended in 1651, when he was 13. Cardinal Mazarin was then Prime Minister, and the French army under the leadership of Conde and Turemie was gaining much glory in the war with Spain and the emperor. But inter¬ nally the nation was in the throes of a civil war; Mazarin's avarice and the peculations of Fouquet had disgusted the Parisians, who were moreover incensed with Anne of Austria's con¬ duct of the regency and the supremacy of her agent the cardinal. The king and his mother were compelled with the unpopular Prime Min¬ ister to flee from the capital, and the Spanish armies streamed over the northeast boundaries from Holland and held their way victoriously through Champagne and Lorraine. When war broke out between England and Holland, Louis threw his strength on the side of the latter; but the conflict was largely confined to the sea, and after a few sea fights the war was ended by the Peace of Breda in 1667. Mazarin had died in

*1661, Fouquet was condemned to per¬ petual imprisonment after being compelled to disgorge his ill-gotten gains and when the king was asked who was to be referred to on mat¬ ters of public business he astonished his cour¬ tiers by saying r(Myself.** And indeed he reigned as absolute monarch to the end of his days. He appointed Colbert to take charge of the public exchequer, and the consequence was a multitude of needed reforms. He had forced the court of Spain as well as Pope Alexander VII to submit to his personal dictation and make ample reparation for the wrongs suffered by French ambassadors at the hands of Span¬ iards and Italians in foreign capitals; the king of England was his pensioner. All Europe was impressed by his bold self-assertion, and his well-known saying ((L'etat Eest moi ,** (*

But the great desire of Louis was the at¬ tainment of military glory. When a child his chief amusement had been to turn his play¬ mates into soldiers and engage in a mimic war. After his victorious campaign in Holland, closed by the Treaty of Nimeguen in 1678, he was acknowledged to be the leading sovereign in Europe. He had the most numerous, the best drilled, the best equipped army in the world. His diplomacy had triumphed in every court, and the French nation led Europe in

art, science and letters, while trade and indus¬ try were amazingly flourishing; and he success¬ fully established the liberties of the Gallican Church (1682). Louis shone among his min¬ isters, generals and literary courtiers as the sun among the stars, an ideal king, a paragon of learning, strength and wisdom. At Ver¬ sailles he built himself a palace at a cost of 150,000,000 francs. Here the splendor of his surroundings was the envy and admiration of all other monarchs. But his wisdom and polit¬ ical sagacity were much criticised when in 1685, under the influence of Madame de Main-tenon, he revoked the Edict of Nantes by which the policy of Henry IV had made cer¬ tain indulgences to Calvinists of France. By unsheathing the sword of religious persecution he drove away many citizens whose industrial skill and steady lives formed one of the sta¬ blest and most precious elements in French national life. Soon after this half of Europe formed a league against France. Holland, Germany and Spain joined their forces in an attempt to humble the overweening arrogance of a monarchy whose greatness was a menace to each of them. In 1688 the Dauphin took Philipsburg on the Rhine, but was forced to evacuate and retreat before the overwhelming forces of the allies. The war continued with varied fortunes until the Peace of Ryswick, 1697. The death of Charles II of Spain, the last of the house of Hapsburg (1700), brought on the war

of the Spanish Succession. He left his crown to Philip of France, Duke of Anjou, who assumed the title of Philip V, but his claim was disputed by the Archduke Charles, who had the support of the emperor, as well as of Holland and England. In 1704 Prince Eugene and Marlborough routed the French forces at Blenheim, Barcelona surrendered to the Arch¬ duke Charles, Marlborough won the battle of Ramillies in 1706, and in 1708 that of Oude- narde. The fatal defeat of Malplaquet the fol¬ lowing year decided the struggle in favor of the allies and the Peace of Utrecht (1713) completed the humiliation of France and added to the power and ascendancy of England. The treaty inflicted a heavy blow on French power in America, as under it Newfoundland, Acadia and Hudson Bay were ceded to England. France was, however, saved from dismember¬ ment, mainly through the boldness and vigor of Louis and his counsellors, and the principal foreign conquests of the king were not for¬ feited. For the two remaining years of his reign the country enjoyed tranquillity. Louis in his declining years expressed regret for the distress he had brought on his well-loved coun¬ try by his love of foreign conquest and war¬ like glory. His unworthy private life had some part in rousing the remorse which tortured his last days, and caused him to show that snirit of piety and devotion which Lesage ridiculed as hypocrisy. His mistresses, La Valliere, Montespan, Fontanges and others had made his court a by-word of scandal. Madame de Main- tenon, who was married to him a year after the death of his queen, Maria Theresa (1683), was influential in rousing his sense of past licentiousness. In this she was aided by the eloquence of Bossuet.

The reign of Louis le Grand was made bril¬ liant by the great soldiers, sailors, literary men, artists and men of science who were his con-

temporaries. His reign has indeed been aptly styled the Augustan or golden age of France. Among his sea commanders were Chateau-Re- nand, Duquesne and Tourville; Vauban was his military engineer; Perault, Mansart and Blondel architects ; among his painters were Claude Lorraine, Poussin and Lebrun ; among poets and writers of his reign were Corneille, Racine, Moliere ; among his great preachers were Massillon, Bossuet and Flechier. He was worthy of the title of

the Great Monarch for his strong and astute statecraft, the magnifi¬ cence of his court, his dignity and munificence, and he fixed for the French monarchy that type of absolutism which Balzac has declared to be in France the safest and best foundation on which national greatness was to be devel¬ oped.

Consult Barine, 'Louis XIV et La Grande Mademoiselle) (Paris 1905) ; Blennerhassett, 'Louis XIV and Madame de Maintenon) (London 1910) ; Bourgeois, E., 'The Century of Louis XIV5 (Eng. trans. by Hoey, ib. 1895) ; Gerin, 'Louis XIV et le Saint-Siege5 (Paris 1894) ; Hassall, 'Louis XIV and the Zenith of the French Monarchy5 (New York 1895) ; Lavisse, 'Histoire de France5 (Vol. VIII, Paris 1906) ; Ormesson, (De l'administration de Louis XIV5 (ib. 1850) ; Pardoe, J., (Louis XIV and the Court of France in the 17th Century5 (3 vols., London 1886) ; Philippson, 'Das Zeitalter Ludwigs des Vierzehnten5 (Berlin 1879) ; Voltaire, 'Siecle de Louis XIV5 (Eng. trans., ed. Masson and Prothero, 3 vols., Cam¬ bridge 1882-1912) ; and 'Cambridge Modern History5 (Vol. V, Cambridge 1908). An an¬ notated edition of his letters and other docu¬ ments was published at Paris in six volumes in

1806.

LOUIS XV, king of France: b. Versailles, France, 15 Feb. 1710; d. there, 10 May 1774. He was the great-grandson and successor of Louis XIV, and coming to the throne when only five years old, Philip, Duke of Orleans, was made regent. Louis was declared of age in 1723 and married Marie Leczinska, daughter of the king of Poland. The Duke of Orleans died that year and was succeeded as Prime Minister by the Duke of Bourbon, who was removed in 1725 to make way for Cardinal Fleury, who died in 1743. After the cardinal's death the king's mistresses, Pompadour and Du Barry, controlled the election of the prime min¬ ister and other officers. In 1741 France be¬ came entangled in the war of the Austrian Succession against Austria, which was ended by the Treaty of Aix-la-lChapelle in 1748. In 1756 she was involved in the Seven Years' War, in which Austria was the ally oi France. This was ended by the Peace of Paris in 1763. By this treaty Louisiana and Canada, as well as her Indian possessions, were lost to France. In 1764 the Jesuit order was suppressed. The kingdom was left impoverished at the death of Louis, partly by war and partly through the enormous sums squandered upon the royal mis¬ tresses. Consult Broglie, (Le secret duroi5 (Paris 1878) ; Carre, H., 'La France sous Louis XV5 (Paris 1891) ; De Tocqueville, 'Histoire philosophique du regne de Louis XV5 (Paris 1846) ; Fleury, 'Louis XV intime et les petites maitresses5 (Paris

1909) ; Gon- court, (Le maitresses de Louis XV5 (ib. 1860) ;

Haggard, (The Real Louis XV5 (2 vols., Lon¬ don 1906) ; Pajot, (Les guerres sous Louis XV5 (Paris 1881-92); Cambridge, 'Modern History5 (Vol. VI, Cambridge 1908).

LOUIS XVI, king of France: b. Ver¬ sailles, 23 Aug. 1754; d. Paris, 21 Jan. 1793. He was the third son of Louis and of Marie Josepha, daughter of Frederic Augustus, king of Poland and Elector of Saxony. During the lifetime of Louis XV he bore the title of Duke of Berri. Amid the corruptions of the French court he kept aloof from licentiousness, was reserved and taciturn, and took most delight in practising some mechanical art, such as lock¬ making or printing. In 1770 he married Marie Antoinette, archduchess of Austria, and four years later became king by the death of his grandfather. He began his reign with many popular measures tending to alleviate the finan¬ cial distress under which the country labored, and his appointment of Turgot (1775) as Min¬ ister of Finance, gave general satisfaction. The people were moreover pleased to see the par¬ liaments again convened (1774), and the king set an example of national economy and re¬ trenchment by the simplicity of his personal life, and the reduction of his retinue. The war of the American Revolution had sent Franklin and Deane to Paris to ask help for the young republic. Louis XVI was weak enough to take sides with the English colonists against their mother country, and the French and English war cost France an amount of treasure that almost plunged her into bank¬ ruptcy. At the same time French enthusiasm, roused in favor of republicanism, caused a feel¬ ing to prevail which threatened to endanger the stability of the monarchy. Necker, who had become Controller-General in 1776, by his at¬ tempts at reform and economy in order that the privileged orders should bear their share of taxation, so offended the nobility that he was compelled to resign (1781) and was suc¬ ceeded by the reckless and wasteful Calonne. The queen was meanwhile very unpopular, and the affair of the "Diamond Necklace55 in 1785 (q.v.) was made to aggravate public disaffec¬ tion toward the throne. The notables met in 1787, but rejected a measure for universal tax¬ ation which would comprise the notables and clergy of the realm. Calonne, the finance min¬ ister, resigned, bankruptcy menaced the nation and Necker was recalled (1778), and suggested the convening of the States-General. The assembly met amid great popular excitement in May 1789, at Versailles; a series of reforms in public expenditure was begun, and the country was filled with enthusiasm. Necker sought to reproduce on French soil the limited monarchy of Great Britain. Louis proposed concessions, which were coldly greeted, and when he dis¬ solved the

assembly, Mirabeau, who sat in the Third Estate, defied the royal power, and re¬ fused, in the name of the people, to obey the mandate of dissolution. So great meanwhile was the excitement and anxiety which reigned in Paris that a national guard was formed with Lafayette for a commander. The king vacil¬ lated, dismissed Necker, surrounded Paris with his army and the people rose in a burst of frenzy and sacked the Bastile. The king or¬ dered the approach of the troops on Paris, but to conciliate the people appeared at Hotel de

Ville wearing the tricolor. Meanwhile the princes of the blood and the nobles were leav¬ ing the country, Necker was recalled, and the king returned to Versailles, but on 5 October the mob took possession of the royal palace there, and compelled the king and the royal family to return with them to Paris, where they were kept strictly guarded in the Tuileries. There they were confined as prisoners till the following year (1790). Necker had fled to Switzerland; Mirabeau, the one hope of the monarchy, had died. The king made an at¬ tempt to visit Saint Cloud (1791) but was pre¬ vented by the mob. He then escaped unnoticed from the Tuileries, but was stopped at Va- rennes, 150 miles from Paris. The invasion of France by the Prussians and Austrians roused the Parisians to fury. They stormed the Tui¬ leries and massacred the Swiss guard ; the royal family were imprisoned in the ancient fortress known as the Temple. The national conven¬ tion met on 20 September; in December they brought the king to trial on a charge of con¬ spiring to overthrow the constitution and re¬ store the ancient order of things. He was condemned to death by an absolute majority of one vote in a house that contained 749 mem¬ bers (5- Jan. 1793) and was guillotined. A feeble but well-meaning ruler, he suffered for the sins of his house. His elder son had died in 1789; his younger son (Louis XVII) became the Dauphin, and his daughter was known as the Duchess of Angouleme. Consult Beau- court, (Captivite et derniers momento de Louis XVP (Paris 1892) ; Bouvet, (Histoire de Louis XVI> (ib. 1825); Courian, XVI et la Revolution (ib. 1893) ; Haggard, A. C. P., (Louis XVI and Marie Antoinette) (London 1909) ; Jobez, (La France sous Louis XVP (Paris 1877-93) ; Lavisse, (Histoire de France) (Vol. IX, ib. 1910) ; Saint-Amand, (Marie An¬ toinette and the Downfall of Royalty) (Eng. trans. by E. G. Martin, New York 1898).

LOUIS XVII, titular king of France: b. Versailfes, 27 March 1785; d.

Paris. 8 Tune 1795. He was the second son of Louis XVI and Marie Antoinette; was at first styled Due de Normandie; and after the death of his elder brother, in 1789, became heir to the throne. With his relatives, in 1792, he was imprisoned in the Temple; after his father's death in the following year was styled king by the Royal¬ ists; but being given into the keeping of a shoemaker named Simon, in derision called his tutor, was subjected to brutal treatment, from which he died. The fact of his death was denied by certain impostors, whose claims to his name and to the throne found some sup¬ porters, was discredited by many, and there was no lack of claimants to the title, there being in all some 40 persons who claimed to be the legitimist king. The chief among these was the so-called Comte de Richemont, whose real name was Francois Hebert, a native, of ' the Rouen district, and who first claimed in 1828; and the Potsdam watchmaker, Karl Wilhelm Naundorff (d. 1845), who certainly bore a striking resemblance to the Bourbon family, resided in France for three years, and was banished in 1836, and whose children raised actions in 1851 and 1874 to vindicate their claims. About the middle of the 19th century, Eleazar Williams (q.v.), a half-breed Indian

missionary, born in the State of New York, was led to believe that he was the lost Dauphin, he and his friends declaring that he had been delivered from prison and while still very young brought to this country. He died in 1858. Although Williams made little attempt to enforce his own claim, others argued it, and a book was written in its support. But nothing in the nature of historical proof has been established to cast doubt on the actual death of the Dauphin as above related. Con¬ sult Bourgeois, A., (Etude historique sur Louis XVIP (Paris 1905) ; Biilau, (Geheime Ge- schichten undratselhafte Menschen) (Vol. II, 2d ed., Leipzig 1863) ; Chantelauze, (Louis XVII, son enfance, sa prison, et sa mort au Temple> (Paris 1895) ; Evans, (The Story of Louis XVII' of France) (London 1893) ; Hanson, (The Lost Prince) (New York 1854) ; and J. Sanford Saltus' (Bibliography of Louis XVII } (New York 1908).

LOUIS XVIII, ((Stanislaus Xavier® (given the title of Le Desire, by the Chamber of Deputies), king of France: b. Versailles, France, 17 Nov. 1755; d. Paris, 16 Sept. 1824. As the younger brother of Louis XVI he was designated Monsieur, his rank in the nobility being Count of Provence. He early showed himself a political marplot, a hinderer of re¬ form and one of the great obstacles to his brother's success in handling the difficulties of the revolutionary movement. When the king escaped from the guards of the Tuileries (1791), Monsieur -was by his side, and while Louis XVI was seized and taken back to con¬ finement, escaped to the frontier. With his brother, the Count d'Artois, he held court for some time at Coblenz, where he issued animad¬ versions on the revolutionists in France, and seriously complicated the difficulties of the roy¬ alist cause by his want of temper and judg¬ ment. When the Duke of Brunswick invaded France, Monsieur and the Count d'Artois joined his forces and shared his disasters. On the death of Louis XVI (1793) the Count of Provence declared his nephew king, and when Louis XVII died (1795) he took the title of king of France. He wandered from court to court of Europe, and finally settled in England (1807), where he remained until the fall of Napoleon. At last he crossed the Channel and entered Paris (3 May 1814) after an absence of 23 years.

His reign was inaugurated with the bitter retaliatory measures of the White Terror (q.v.). When Napoleon made his escape from Elba and arrived at Paris (1 March 1815) the unpopularity of the Bourbon restoration was proved by the enthusiasm and devotion of those who flocked to his standard. The king fled from Paris, but, after the battle of Waterloo, was once more restored, entered the capital under the protection of victorious Wellington, and appointed a new ministry with Talleyrand at the head of it. Louis proceeded to disband the army, to exclude from the general amnesty those who came under the head of ˆrebels,® those who had voted for the death of Louis XVI and were consequently ((regicides,® and those who had received rank and honors from Napoleon in 1815. The rest of his reign was satisfactory neither to Blues nor Reds, and the real stay of the country was the Due de Riche-

lieu, the successor of Talleyrand. In accord¬ ance with the policy of the Holy Alliance the despotic Ferdinand VII was re-established on the Spanish throne by a French army (1823) and the last year of the

king's life was spent in disease, followed by paralysis, which carried off a feeble and illiberal monarch whose only work in life had been to prove that political disquiet in France had not been and was not to be allayed by the restoration of the Bour¬ bons. Consult Daudet, E., (La terreur blanche) (Paris 1878) ; and (Histoire de la restauration, 1814-3CP (ib. 1882) ; Dulaure and Anguis, (Histoire de la revolution depvuis 1814 jusqu'a 1830> (1834-38); Hall, J. R., (The Bourbon Restoration (Boston 1909) ; Romberg and Malet, (Louis XVIII et les cent-jours a Gand) (Paris 1898) ; Saint-Amand, (The Duchess of Angouleme and the Two Restorations) (trans. by J. Davis, New York 1902) ; Viel Castel, (Histoire de la Restauration (Paris 1860 et seq.).

LOUIS PHILIPPE, fe-lep, king of the French: b. Paris, 6 Oct. 1773; d. Claremont, near Windsor, England, 26 Aug. 1850. He was the eldest son of Duke Louis Philippe Joseph of Orleans, afterward surnamed Egalite, and of the Princess Louise Marie Adelaide of Pen- thievre. In infancy he held the title of Duke of Valois, and in 1785 that of Duke of Chartres. In 1782 his father entrusted the education of Louis Philippe and his other children to Ma¬ dame de Genlis. Having entered the national guard in 1790, he became a member of the Jacobin Club. In May 1792 he commanded a brigade of cavalry in Luckner's army, rose under Kellerman in September to be lieutenant-general and did good service in the famous cannonade at Valmy. He next ioined the army of Dumouriez, and took part in the victory of Jamappes. Dumouriez had formed a scheme for placing him on the throne as a constitutional monarch, and being included in the order of arrest directed against Dumouriez, in April 1793 he took refuge within Austrian territory. After many wanderings he procured the situation of teacher of geography and mathematics in the school of Reichenau, near Coire, where, during eight months, he passed under the name of Chabaud-Latour. In 1796 Louis Philippe, since his father's death Duke of Orleans, arrived in America, where, in the following year, he was joined by his two younger brothers. The three princes traveled in the United States, and at last took ship for England, where they landed in 1800. The brothers lived about seven years at Twicken¬ ham, near London. After the news of Na¬ poleon's downfall the Duke of Orleans set out for Paris, where he was received by Louis XVIII, not without distrust and in 1814 ap¬ pointed colonel of hussars. On the news of Napoleon's return he set out for Lyons to assist the operations of the Count d'Artois. After an unsuccessful attempt to hold the northern departments for the Bourbons, he left Lille and set out for England to join his family, who had preceded him. He returned in July 1815 and obtained the

removal of the sequestration of his domains, which had been imposed by the imperial government. The estrangement of Louis XVII from him was, however, increased, and he withdrew in October

1815 to England, but returned to Paris in the following year. After the coronation of Charles X his relations with the court became more friendly. During the bloody days of 27, 28 and 29 July, the court had entirely for¬ gotten him. Nor during the struggle was his name mentioned in Paris. On the 29th the provisional chamber, on Laffitte's suggestion, resolved to offer him the regency as lieutenant-general of the kingdom. In a sitting of the chamber on 9 August he swore to the reform charter, and ascended the throne as king of the French. Being hated by the extreme Demo¬ crats, frequent attempts were made on his life; but during this period France made vast prog¬ ress in industry and wealth, and the durability of the July throne seemed to be thereby con¬ solidated. But his selfish policy had estranged the European courts, and a loud demand for a change in the electoral system being foolishly opposed by the king and the Guizot Ministry, his position in France became extremely precarious. On 22 Feb. 1848 an insurrection began in the streets of Paris. Next day Guizot gave in his resignation ; but the insurrection gained in extent and intensity, and neither the command given to the troops on the morning of the 24th to stop firing, nor the abdication of the king a few hours after in favor of his grand¬ son, the Count of Paris, sufficed to allay the storm. Louis Philippe, completely disheartened, unsupported by any administration, and for¬ saken even by the courtiers, about midnight of 24 February quitted the Tuileries with his family, and fled from Paris, and on 3 March 1848 took up his residence in England, which he never again left. Consult ; (Paris 1849) ; Arnaud, R., (Louis Philippe and his Sister> (London 1908) ; Blanc, Louis, (Histoire de dix ans 1830-40) (Paris 1841-44) ; Lemoine, Abdica¬ tion du roi Louis Philippe) (ib. 1851) ; Dumas, A. (1852) ; Nouvion (1861) ; Villault de Gerain- ville (1870-76) ; Sternberg, (The Secret of Louis Philippe) (New York 1914) ;♦ Weill, G., (La France sous la monarchic du J uillet > (Paris 1902) ; and Cambridge Modern His- tory> (Vol. X, Cambridge 1907).

LOUIS D'OR, loo'e dor (Fr. <(golden Louis"), a gold coin formerly current in France. It was first struck in consequence of an edict of Louis XIII, dated 31 March 1640. It was 22 carats fine, and originally was worth 10 livres of the period (equal to 21 francs 33 centimes). Afterward it ranged in value from about $4 to $4.60. In 1810 the louis d' or was replaced by the napoleon of 20 francs. In some parts of Germany the five-thaler gold piece was popu¬ larly known as the louis d'or.

LOUISA, loo-e' za, queen of Prussia. See Luise, Auguste Wilhemine Amalie, Queen of Prussia.

LOUISBURG, loo'is-berg' or loo'e-berg, town of Cape Breton Island in the province of Nova. Scotia: on the coast at the entrance to the Gulf of Saint Lawrence. The earliest men¬ tion of English Harbor, later called Louisburg, is found on Champlain's map of 1612 and was, in his time, the resort of fishermen mainly from England. It was not until 1713 that Louisburg came into prominence bv the removal to it of the French officers and inhabitants from Acadia

and Newfoundland, then ceded to England under the Treaty of Utrecht. The city is chiefly noted for the historical events which transpired in and around it and for the ruins of the fortifications. These fortifications were commenced in 1720 and completed about the year 1744 at a cost to the French government of 30,000,000 livres, equal to-day to about $10,000,000. They enclosed an area of about 100 acres and had a circumference of 2ˆ4 miles. On the declaration of war in March 1744 between France and England, Louisburg was the object of an attack by the expedition sent out by the New England colonies. This was composed of 3,250 men from Massachu¬ setts, 516 from Connecticut, 304 from New Hampshire and 150 from Rhode Island, sup¬ plemented by 14 vessels, carrying 200 guns, fitted out by the provinces, and by Commodore War¬ ren's West India fleet of 10 vessels carrying 460 guns, beside the captured Vigilante of 64 guns. The siege, begun on 30 April 1745, ended in the capitulation by Governor Ducham- bon on 16 June. By the Treaty of Aix-la- Chapelle in 1748, the island of Cape Breton was restored to France and the fortifications at Louisburg were considerably strengthened and a new battery erected at Point Rochefort at a cost of $5,000,000. In 1758, two years after war had been declared between France and Eng¬ land, a second expedition, consisting of 23 ships of the line, 18 frigates and 120 transports with 12,000 troops, assembled at Halifax, ar¬ rived at Louisburg on 28 June, laid siege to the fortress; and on 26 July it was surrendered to the British under the command of General Amherst, who had as one of his brigadiers James Wolfe. Thus what has been called 'the <(Keystone of the arch of French power in America" had been shattered, and the way was cleared for the culminating attack on the for¬ tress of Quebec. Shortly after the capture the great fortress was razed to the ground, and to-day only the casements or bomb-proofs re¬ main. The

ruins are now being preserved, and a memorial tower has been erected bearing the names of the killed and wounded in both sieges.

The first school in Nova Scotia is said to have been established at Louisburg by the Ladies of the Congregation in 1737.

Louisburg is now becoming a port of con¬ siderable importance, having been established as the eastern terminal port of the Intercolonial Railway and used by the Dominion Steel Cor¬ poration as a shipping port for a large portion oi their products. See Colonial Wars in America.

LOUISE, loo-ez, an opera of Parisian life by Gustave Charpentier. First performed in Paris 1900; in New York 1908. Louise, a charming young dressmaker, attracts the atten¬ tion and love of a romantic young artist, Julien, who finally persuades her to give ut) her life of drudgery and live with him in a little home amid the gay and careless Bohemian circle of Montmartre. During a lively revel Louise's mother appears and begs the girl to return home, as her father is ill. With an effort Louise tears herself away and resumes her former drab life. The reproaches of her father serve only to accentuate the memory of Julien's loving kindness — and she goes back to the man who had given her happiness.

LOUISEVILLE, loo'ez-vil, or RIVIERE DU LOUP (enhaut), re-ve-a dii loo, Canada, town, capital of Maskinonge County, in the province of Quebec, on Lake Saint Peter, an expansion of the Saint Lawrence River, and on the Canadian Pacific Railroad, about 18 miles west of Three Rivers. The mineral springs of Saint Leon in the vicinity, bring many people to Louiseville. The chief industries are a foundry, planing mill, box making and shirt factory. Pop. 1,675.

LOUISIADE (loo-e-ze-ad) ARCHIPE¬ LAGO, in the Coral Sea, southeast of New Guinea; belongs, administratively, to British New Guinea. The largest islands of the group are Southeast (Sudest) Island, Saint Aignan and Rossel. Southeast Island is about 45 miles long and from 4 to 10 miles wide. Rossel and Saint Aignan each have an area of over 100 square miles. They are all mountainous. Saint Aignan has a peak about 3,500 feet in height. Many of the small islands are of coral forma¬ tion; and the vegetation is varied and luxuriant. The islands were discovered in 1666 bv Torres, and became British possessions in 1888. The majority of the inhabitants are uncivilized, and are of the Papuan race.

LOUISIANA, one of the United States, bordering on the Gulf of

Mexicq, one of the most important of the Southern States. The name ˆLouisiana" was first applied by La Salle in 1683 to the vast territory watered by the Mississippi and its tributaries, which he thus dedicated to King Louis XIV. It was admitted as a Territory 20 Dec. 1803 after the completion of the purchase and was the fifth State admitted to the Union under the Federal Constitution in 1812. It lies between lat. 28° 59' and 33° N. and long. 88° 40' and 94° W. . Its extreme length is 281 miles, and extreme width 275 miles, with an area of 48,506 square miles. It is bounded on the north by Arkansas on parallel of 33° to the Mississippi and thence on the parallel of 31° eastward to Pearl River; on the south by the Gulf of Mexico, on the west by the Sabine River and a line drawn from it directly north to meet the 33° parallel. Within these limits are included 45,409 square miles of land and 3,047 of water, 637 in rivers and 3,370 in lakes. The State is divided into 64 parishes gradually created from the five original divi¬ sions under French and Spanish domination.

Rivers and Lakes. — The Mississippi River in its devious course splits Louisiana in twain with 37,0(30 square miles on the western bank. With but rare interruptions the river flows through alluvial soils of low elevation requir¬ ing the protection of levees. The coast line of the delta and eastward consists of lands little above sea-level intersected by small tracts of elevated prairies and low ridges covered with live oak. Northwestward the land rises until in North Louisiana the hills attain the height of 500 feet. Both on the Mississippi and the other river valleys, the highest land is formed by the banks themselves, from which the land slopes away gradually to the marshes. To pro¬ tect these low-lying lands there have been built at vast expense some 1,500 miles of levees of great strength. These, however, give way oc¬ casionally before the mass of waters brought down by the Mississippi in flood, and great dam¬ age results. (See Levee). The drainage sys-

tcm of the State is toward the Gulf and mainly through the Mississippi and its tributaries, the Red River and the Ouachita. On the east Pearl River and on the west the Calcasieu River and the Sabine, which divides Louisiana from Texas — each drain small districts. The Red River formerly flowed directly to the Gulf of Mexico. Its old channel is now filled by the Atchafalaya, which has increased so rapidly of late years as to give rise to fears of its becom¬ ing the main channel of the Mississippi. The lakes of

Louisiana are of two kinds. Those on the coast are shallow estuaries enclosed within the delta, of which the greatest are lakes Pontchartrain and Maurepas. At the entrance to the former is Lake Borgne. A second class is formed by the curved sections of the river which are cut off and silted up as in the smaller rivers by the action of accumulated debris and rafts of driftwood such as are found above Shreveport. These are rapidly disappearing through the removal of the obstructions, and the lands are being reclaimed.

Of the 28,000,000 acres of land in the State only 6,861,247 are in cultivation. Nearly the en¬ tire upland is covered by strata of drift or red sandy clays. One thousand nine hundred square miles are alluvial. The soil next the river is the lightest ; the surface of the back- lands consists of a peculiarly friable soil known as buckshot to such a depth as to permit of the deepest cultivation and with a high absorptive power which secures crops against drought. South of the Red River the soils are less varied in character, but all are rich in the essential elements of plant food and require only drain¬ age and good culture to produce excellent crops. The land is distributed as follows: Alluvial lands, 13,225 square miles; bluff prairies, 5,739 square miles ; oak uplands, 8,103 square miles ; long-leaf pine hills, 7,582 square miles ; long- leaf pine flats, 2,556 square miles ; central prai¬ ries, 785 square miles ; coast marshes, 7,420 square miles.

Geology and Mineralogy. — The entire State is part of the Mississippi deposit on the bottom of an ancient gulf whose shore touched Cairo, Ill. Its oldest sediments were Cretaceous, now covered except in a few small spots in the north¬ west. The upland region west of the northern course of the Calcasieu, and of the Ouachita, is a mass of horizontal Tertiary beds, clays and clay sandstones. The entire alluvial region and coast swamps, besides much bordering prairie, is Quarternary. Such formations could hardly be rich in minerals, and though some iron ore and low-grade brown coal are found in the Tertiary districts, the only important minerals are rock salt, sulphur and petroleum. The salt is found in the chain of isolated hills known as islands, commencing with Petite Anse on the Gulf and extending to New Iberia. The first workings were at Avery's Island; two other mines have been opened and the output has been increased to 200,000 tons annually. The development of the oil and gas industries has been very large. From the nine fields were pro¬ duced in 1917 11,682,539 barrels. Several other localities show indications of great promise. The production of natural gas from seven fields was over 32,000,000,000 cubic feet. The amount of sulphur produced from the mines at Cal¬ casieu was, in 1915,

379,885 tons.

Climate and Rainfall. — Louisiana, ranging

from the parallel of lat. 33° to 29° N. is semi- tropical in climate and products. The summer heat reaches 105 and averages 85 for the hottest month; it does not reach zero south of Shreve¬ port, and the coldest month ranges on an aver¬ age from 45° to 60°, according to location. The gulf vapors make it very equable, the prevail¬ ing winds being south and southwest — that is, from the ocean. There are only three months of frost in the year, the beginning varying from the 1st of November to the 1st of December. The rainfall varies from an average of 60 inches a year in the southeastern part, to 50 in the northern. This abundant moisture and the steady warmth cover the State with luxuriant tropical growths, and the magnificent profusion and beauty of its flowers are famous. The mag¬ nolia is most familiar as a specially Southern product, but the roses, jasmines, oleanders, camellias, etc., are notably beautiful. The orange, fig and most other semi-tropical fruits will flourish here.

Fauna. — The only large quadrupeds sur¬ viving are black bears and a few catamounts in the less accessible forests and swamps. Many deer are found during the winter. The wild¬ cat is not uncommon, and the raccoon and opossum are familiar. The alligator is com¬ mon to all bayous and ponds. Bird-life is plentiful; it comprises eagles and vultures, peli¬ cans and cranes, besides wild turkeys, geese and ducks. Under the working of the Con¬ servation Commission created in 1916 the fauna of the State are fully protected and exact sta¬ tistics are compiled showing the value pro¬ duced. Deer have largely increased in number. In 1917, 185,614 ducks were marketed, a de¬ crease from the number of preceding years. The yield of fur-bearing animals, of which 5,002,840 were killed in 1912, fell to 1,813,190 in 1917. The alligator catch is diminishing rap¬ idly. Through the action of the Sage Fund the area of bird preserves is now the largest in the United States and many rare species have been saved from utter extinction which threat¬ ened them.

Forestry. — A large proportion of the entire forest wealth of the State is represented by im¬ mense areas of long and short leaf pine. It is estimated that the standing timber in 1918 was 91,000,000,000 feet of pine, cypress and hard¬ wood. The present rate of cutting over 60,000,- 000 annually cannot be maintained for more than 10 years. Fortunately the cut-over lands are valuable for farming purposes. The for¬ estry division of the Conservation Commission

has done much for the protection of the for¬ ests from destructive fires and has taken steps toward reforestation. In lumber production Louisiana ranks second in the United States.

Agriculture. — From the considerations men¬ tioned, an exceptionally fertile soil, a warm climate with variations from northern high¬ lands to southern coast plains, Louisiana has remarkable natural advantages for a great va¬ riety of products, from temperate to semi¬ tropic. Yet less than two-fifths of the soil has been even nominally in farms, and only one- fourth improved; and of the total in 1916, $154,735,819 in value of farm crops, $123,567,- 811, or over eleven-twelfths, was in two money crops and two food crops, cotton and sugar¬ cane, corn and rice. This lack of diversifica¬ tion of crops is largely a result of the old

Pop.

LOUISIANA.

Estimated population, 1,829,130

COUNTIES

31,847 Acadia . F6

. Allen . E 5

(Pop. incl. in Calca¬ sieu Co.)

23,887 Ascension . F 9

24,128 Assumption . G 8

34,102 Avoyelles . D 7

. Beauregard . . E 4

(Pop. incl. in Calca¬ sieu Co.)

21,776 Bienville . B4

21,738 Bossier . A3

58,200 Caddo . A3

62,767 Calcasieu . F4

8,593 Caldwell . B 6

4,288 Cameron . G 4

10,415 Catahoula . D7

25,050 Claiborne . A 5

14.278 Concordia . D7

27,689 DeSoto . B3

34,580 East Baton Rouge. E 8

11,637 East Carroll . A 8

20,055 East Feliciana .... E 9

. Evangeline (Pop. incl.

in St. Landry Co.)

E 6

11,989 Franklin . B 7

15,958 Grant . C 5

31,262 Iberia . G 7

30,954 Iberville . F8

13,818 Jackson . B 5

18,247 Jefferson . G 10

. Jefferson Davis . . .F 25

(Pop. incl. in Calca¬ sieu Co.)

28,733 Lafayette . F 6

33,111 Lafourche . G 10

Pop.

9,402 LaSalle . C 6

18,485 Lincoln . A 5

10,627 Livingston . F 9

10,676 Madison . B 8

18,786 Morehouse . A 7

36,455 Natchitoches . C4

339,075 Orleans . F 11

25,830 Ouachita . B6

12,524 Plaquemines ....Gil

25,289 Pointe Coupee \ . . . E 7

44,545 Rapides . D6

11,402 Red River . B4

15,769 Richland . B7

19,874 Sabine... . D4

5,277 St. Bernard . G 12

11,207 St. Charles . G 10

9,172 St. Helena . E 9

23.009 St. James . F9

14,338 St. John the

Baptist . F 10

66,661 St. Landry . E 7

23,070 St. Martin . F 7

39,368 St. Mary . G 8

18,917 St. Tammany _ F 11

29,160 Tangipahoa . E 10

17,060 Tensas . C 8

28,320 Terrebonne . H 9

20,451 Union . A 6

26,390 Vermilion . G6

17,384 Vernon . D4

18,886 Washington . E 10

19,186 Webster . A 4

12,636 West Baton Rouge E 8

6,249 West Carroll . A 8

13,449 West Feliciana . ...E 8 18.357 Winn . C 5

Pop.

1.079 Ray ville . B7

319 Richardsontown,

Washington ... E 10

265 Rio . Ell

438 Robeline . C 4

586 Roseland . E 10

325 Rosepine, Vernon. D 4

3,377 Ruston . B 5

346 Saline . B 4

239 Scott . F 6

35,230 Shreveport . B 3

282 Simsboro . B 5

287 Slaughter . E 8

2,188 Slidell . F 11

966 St. Francisville ...E8

740 wSt. Joseph . C 8

2,318 St. Martinville . . . . F 7

377 Sunset . F 6

847 Tallulah . B 8

394 Tangipahoa . E 9

3,824 Thibodaux . G 9

633 Tioga . D 6

182 Verda . C 5

(New Verda P. O.)

1,345 Vidalia . D 8

603 Ville Platte . E 6

826 Vivian . A 2

592 Walker, Livingston. F 9

1,528 Washington . E6

445 Water Proof . C 8

1,250 Welsh . F 5

1,127 West Monroe . B 6

2.289 White Castle . F8

762 Wilson . E8

2,925 Winnfleld . C 5

821 Winnsboro . B 7

328 Youngs ville . F7

419 Zachary . E 8

973 Zwolle . C 3

Incorporated Cities, Towns, and Villages

2.907 Abbeville .- . G 6

365 Abita Springs. . . .F 10

15,333 Alexandria . D 6

1,677 Amite . E 10

346 Angie . . E 11

1,079 Arcadia . A 5

279 Arnaudville . . ,F7

514 Athens . B 5

311 Atlanta . C 5

854 Bastrop . A 7

17,176 Baton Rouge . F 9

630 Bayou Sara . E7

318 Benton . A3

781 Bernice . A 5

2,1 83 Berwick . G 8

606 Bienville . B 4

273 Bonita . A 7

775 Bossier City,

Bossier . A3

865 Boyce . G 7

1,339 Breaux Bridge .... F 7

499 Broussard . F 7

390 Brusly Landing,

West Baton

Rouge . E 8

1,765 Bunkie . E 6

664 Campti . C 4

609 Carencro . F 7

181 Chatham . B 6

498 Cheney ville . E 6

481 Church Point . F 6

918 Clinton . E 9

1,049 Colfax . D 5

500 Columbia . B 6

333 Collinston . A 7

866 Cottonport . E 7

564 Coushatta . B 4

2,601 Covington . F 10

5,099 Crowley . F 6

308 Delcambre . G 7

685 Delhi . B 8

574 Denham Springs .F 9

715 De Quincy . F 4

2,100 De Ridder . E4

845 Dodson . B 5

4,090 Donaldsonville. . . .F 8

714 Dubach . A 5

*120 Duson. Lafayette .F 6 238 Echo, Rapides . . *•. D 6*

575 Erath . G 7

898 Eros . . B 6

544 Esterwood, AcadiaF 6

1 .684 Eunice . E 6

299 Evergreen . E7

598 Farmerville . A 5

577 Ferriday . C7

3,857 Franklin . G 7

814 Franklinton . E 11

1,238 Fullerton . D 4

1,065 Gibsland . B 4

485 Grand Cane . B3

392 Grand Coteau . F7

268 Greensburg . E9

1.081 Gueydan . F 6

2,942 Hammond . F 9

361 Harrisonburg . C 7

249 Haughton . A3

663 Haynesville . A 4

1 ,855 Homer . A 5

459 Hornbeck . D 4

5,024 Houma . G 9

1,004 Independence... E 10

769 Iota . F 5

2,146 Jackson . E 8

2,206 Jeanerette ..... G 7

689 Jena, La Salle . . . .C 6

3,925 Jennings . F 5

1,134 Jonesboro . B 5

287 Jonesville ..... .C 7

396 Junction City,

Claiborne . A 5

315 Kaplan . G 6

3,609 Kentwood . E9

635 Kinder . F 5

6,392 Lafayette . ., . F 7

1,093 Lake Arthur . F5

14,447 Lake Charles . F5

1,568 Lake Providence . .A 8

1,058 Lecompte . D 6

2,043 Leesville . D 4

669 Lockport . G 10

/420 Logansport . C 3

1 028 Madisonville . F 10

1 166 Mandeville . F 11

470 Maugham . B 7

1,799 Mansfield . C 3

695 Mansura . E 6

683 Many . C 4

447 Maringouin . E 7

226 Marion . A 6

1,076 Marksville . D 7

285 Marthaville . C4

T,093 Melville . E 7

323 Mermenton . F 5

536 Mer Rouge . A 7

3,002 Minden .. . . A 4

13,214 Monroe . B 7

174 Montgomery . C 5

728 Moreauville . D 7

5,477 Morgan City . G 8

296 Morganza, Pointe

Coupee . E 7

237 Morse . F 5

1,201 Napoleonville . G8

2,532 Natchitoches . C4

424 Newelton . B 8

7 499 New Iberia . G 7

271,747 New Orleans. .. .G 11

1,352 New Roads . E8

453 Noble . C 3

398 Oak Grove . A 8

332 Oak Ridge . A 7

232 Oberlin . E 5

260 Olla . C 6

4,623 Opelousas . F 7

2,998 Patterson . G 8

277 Pearl River . F 11

1,212 Pineville . D 6

474 Plain Dealing .... A 3

4,955 Plaquemine . F8

380 Plaucheville . E 7

442 Pleasant Hill . C 3

675 Pollock . D 6

1,055 Ponchatoula . F9

262 Provencal . C 4

215 Quitman . B 5

425 Ramsay, St. Tam¬

many . F 11

2,247 Rayne . F 6

✓

LOUISIANA

681

slave system, which tended to concentrate at¬ tention upon a few staples roughly cultivable by gangs. There are some indications of a change ; but the chief feature has been the enormous de¬ velopment of irrigated rice culture, as told be¬ low. There has also been a progressive subdi¬ vision of farms ; the average plantation of 1860 was over 500 acres, the average farm of 1910 was under 90. This does not, however, imply the cessation of large farms; on the contrary, Louisiana is the State of great plantations, there being over 11,000 containing more than 1,000 acres each. This is due to the heavy capi¬ tal needed to carry on the sugar business, which must have a large territory to make fair re¬ turns. One result of the growth of the class of colored farmers, besides the cutting up of farms — their average being 40 acres to 150 for the white farmer — is the increase of rentals, they being usually too poor and unthrifty to buy. They slightly outnumber the white farm¬ ers, but they own only about one-seventh of their farms against nearly two-thirds owned by the whites, and there are nearly three times as many cash tenants and two and a half times as many share tenants as white. They operate but about one-fifth of the farm area, however. In cotton culture, Louisiana has been slower to recover from the Civil War than any other State, having not yet reached the figures of 1860. while several others have immeasurably surpassed them, and it has not greatly grown since 1890 ; its product in 1916 was 442,770 bales of a value of $33,207,750. Cane sugar, the great specialty of the State, produced in 1916 305,352 tons, worth $36,642,240. Louisi¬ ana produces three-fourths of all the cane grown in the United States, outside of Hawaii, and more than 11 times as much as the next heaviest producer, Georgia. This is an exten¬ sive crop, concentrating a great value on a small area ; while the value of the crop was over half that of cotton, its acreage was only one-fifth as much ; with nearly one-fourth the total value of farm products, it occupied only 8 per cent of the farm acreage. One of the great draw¬ backs to Louisiana sugar-cane raising is that about one-fifth has to be kept for seed and cannot be replaced in the same season, while in Cuba the tops of unfit canes are simply dropped into hoe-made holes, and there are plenty always to be had; the Louisiana seed cane often rots, the Cuban never. The Cuban cane is also much richer in sugar, and the yield per acre is about double. From all these causes, the cost of making a pound of sugar is about double in Louisiana what it is in Cuba. Corn, as in all the Southern States — owing to its value as a food crop, for feeding swine, and in some States for distilling — has always had far greater attention than anv other cereal. In 1916 the crop was 44,009,772 bushels valued at $35,207,817. But the great coming food crop is rice, whose culture increased about two and a

half times in the last decade, and nearly all of this in the last three years ; owing to the in¬ troduction of improved methods by a number of Iowa immigrants, and of a new system of irrigation, which has revolutionized rice cul¬ ture and worked a complete transformation in the great coast-prairie belt of southwestern Louisiana and southeastern Texas, formerly almost in primitive solitude. Up to 1897 nearly all the rice grown on these prairies was "Provi¬

dence® rice, dependent mainly on rainfall. Then two years of drought showed that there was no security without irrigation, and there was a stampede to the "pump lands,® where a new world was created by raising water from bayous. This district, as above said, is full of slightly raised ridges ; the canals are run along these, not by digging, but by throwing up parallel dikes for a channel ; as the water in all these regions lies below the land to be irrigated, it is raised by pumping plants at the heads of the canals and distributed to the lands by grav¬ ity ; sometimes two or more pump stations are needed on the same canal to lift the water high enough. This immense draft on the water sup¬ ply has created alarm for the future ; but the whole region is underlaid with exhaustless water-bearing gravel strata, and easily bored wells can irrigate 100 acres without diminish¬ ing the flow. This prairie has the further ad¬ vantage over the delta district, formerly the chief seat of the culture, that in the latter the heavy machinery needed for improved cultiva¬ tion was apt to sink in the soil. In 1916 the

rice grown was 4,627,581 sacks of a market

value of $18,570,004.

The values of other crops for 1916 were:

Molasses . $4,826,630

Syrup . 4,315,900

Hay . 4,813,980

Oranges . 127,460

Tobacco . 175,000

Vegetables . 2,310,000

Strawberries . 1,750, 000

.Stock Raising. — The importance of the State for stock raising is receiving recognition and large increases are shown in statistics for

1918:

Horses .

Milch cows. Other cattle

Sheep .

Swine .

207,000 324,000 578,000 209 , 000 1,568,000

The parish fairs have been highly success¬ ful.

Fisheries. — Louisiana ranks next to Florida among the Gulf States in the value of its fish- catch. As a whole, however, the industry seems not to be increasing largely; the statis¬ tics for 1917 show fresh fish, $1 , 141 ,259.33 ; salt water, $750,000. The oyster fishery is second only to that of Chesapeake Bay. It produced in 1917 2,310,972 bushels employing 680 boats. The oyster reefs extend almost unbroken from the mouth of Atchafalaya Bayou to the State line. Large canneries have been established on the Gulf. The seine fishery is declining; but Louisiana is still the chief source of shrimps. The catch of shrimps in 1918 was 23,160,5S1 pounds, value $850,000. The alligator industry is decreasing with the gradual exhaustion of the supply ; at the same time the scarcity of hides constantly enhances the market value.

Manufactures. — These are chiefly repre¬ sented by the working up of the large natural resources and are principally carried on in New Orleans, by far the largest of the six cities of the State. In 1914 the manufactured products were valued at $255,312,648, and those of New Orleans $69,814,081. The industrial tendency is to increase production, but to reduce labor. With the exception of sugar the chief industries of the State show a steady increase in value accompanied by a regular decrease in the num-

bers of wage-earners, a proof of a growth of labor efficiency. The number of laborers in 1910 was 84,243. In 1914 it was 77,665. The

largest industry in the State was concerned with the utilizing of the immense timber re¬ sources. In 1914 516 establishments turned out products valued at $66,656,268. The sugar and molasses produced in 1914 were in value $57,- 948,322. The manufacture of cotton-seed oil and cake holds third place in 1914 ; the products were 5,910,907 gallons from 37 mills. This in¬ dustry is fostered by the immense facilities for export and import afforded by the Mississippi River. The cleaning and polishing of rice gave a product of 391,728,722 lbs. from 24 mills. A wonderful increase occurred in the manufacture of food preparations, which starting in 1900, in the year 1914 attained the value of $11,714,543. War conditions largely influenced manufac¬ turing in 1918. One of the principal effects has been the erection of important shipbuilding in¬ dustries in and about New Orleans and the digging of a wide and deep canal connecting the Mississippi with Lake Pontchartrain.

Commerce and Transportation. — Louisiana is the richest State in the Union in total length of navigable streams, 3,771 miles. Its lower part is a vast web of paths to the ocean, aggre¬ gating 2,500 miles. The entire 600 miles of the Mississippi's length in the State is navigable and largely navigated; the jetties have trebled its value and made New Orleans a far greater corn and cotton port than before. A canal from the river to Lake Borgne has greatly lessened the distance from the city to the Gulf and to the coal fields of Alabama, hence reducing the cost of fuel for manufacturing purposes. The railroad facilities have not been very extensive till the last decade, when they increased from 1,739 to 2,801 miles and are now 3,221. The growing importance of New Orleans has led a number of trunk lines to make a special effort for its business; owing to the nature of the Gulf coast all turn away many miles from it. The chief lines are the Southern Pacific, the Texas Pacific, the Louisville and Nashville, the Queen and Crescent and the Illinois Central. Many others are laying plans for entering the city. As with most Western and Southern States now. rates are fixed by railroad com¬ mission. New Orleans is the third port in the United States in amount of foreign commerce, next to New York and Boston. For the year ending 30 Tune 1909 its imports and exports (principally the latter) amounted to over $190,- 000.000. For the year ending 30 June 1917 its imports were $104,517,000 and exports $303,- 510.000. In the year 1917 there were entered ships of a tonnage of 2,883,117 and cleared

3.018.989.

Banks. — The State has an excellent banking system, very conservative in its holdings of re¬ serves: the New Orleans banks

were notable for their exceptional solidity and punctuality in meeting Northern obligations when the Civil War broke out. On 18 Sept. 1916 there were in ooeration 219 State banks with resources of $221,316,903,000. There were also 14 stock sav¬ ings banks with 100,000 depositors and $33,863,- 885 deposits. In the year 1918 the exchanges at the United States clearing-house at New Orleans were $1,799,857,000.

Government and Finance. — The constitu¬ tion of 1898 was devised to exclude the illiterate

negro vote, except for owners of property to over $300 who are not subject to educational qualification. Otherwise than that, each voter must be able to fill out his application blank for registration, but this does not apply to anyone who was a voter on 1 Jan. 1867 (that is, before the 14th or 15th Amendment was passed), or his son or grandson of mature age. Women taxpayers can vote on all questions of tax¬ paving in anv subdivision of the State. State officers are elected for four years. The gov¬ ernor has $5,000 salary, the pardoning power and a veto by items, which may be overridden bv a two-thirds vote of the elected members of each house. The legislature holds biennial ses¬ sions limited to 60 days ; both houses are elected for four years; the senate may be from 36 to 41 in number, the house from 98 to 110, and as a fact the numbers are now 39 and 114; there must be one representative to each parish, and to each ward of New Orleans. The ju¬ diciary is headed by a Supreme Court, consist¬ ing of a chief justice and four associates ap¬ pointed by the governor with the consent of the senate, for 12 years. There are judicial dis¬ tricts, to be not less than 20 nor more than 29; the judges are elected for nine years, as is the district attorney for each.

From and after 1 July 1904 there has been a Court of Appeals, composed of two district judges designated by the Supreme Court. The State has a large Democratic majority. It sends two senators and seven members to Con¬ gress. The assessed valuation of property in 1918 was $1,412,552,191 ; the State tax is $5 per $1,000. The legislature cannot incur debts ex¬ cept to repel invasion or suppress insurrection. A poll-tax on each adult male goes to the school fund (see Education'). The bonded debt for the fiscal year 1918 was $11,108,300. The budget for 1918 was $6,993,527.

ˆEducation. — Louisiana, formerly near the foot of the ladder in the general education of its people, has made extraordinary efforts in the past two decades, and in some respects has surpassed all other Southern States ; a fact more creditable from its large negro

population. The average school term (191.4 days) was the longest of any Southern State. The term of colored schools was as long as those of the white, and the amount expended is exceedingly creditable, being in 1915, $5,961,596.86, or nearly half as much as the current receipts of the State. The school revenues are made up of 1 13/20 mills from the State property tax of six mills on the dollar, a poll-tax of $1 13/20 on all males over 21 — retained in the parish where levied, and other local taxes may be laid — special corporation taxes, etc. By the law of 1902 the school administration is cen¬ tralized in a State board of education consisting of the governor and eight appointees, the super¬ intendent of education and the attorney-gen¬ eral; this appoints a four-year board of educa¬ tion for each parish (county), who appoint parish superintendents. The enrolment in schools during 1915 was 63 per cent of the white children from 6 to 18, and 40 per cent of the colored ; in both cases more than a three¬ fold increase in 20 years. Despite all efforts, however, the load of illiteracy is a heavy one to struggle against. In 1915 there were 5,658 teach¬ ers, nearly three-fourths female; over 1,176 col¬ ored teachers, about evenly divided. Besides

*s'Vt'i * **

LOUISIANA

State Capitol at Baton Rouge

.

»

.

I

these there were many hundred private teach¬ ers. The oupils in the Catholic schools alone were about 25,000. Total pupils enrolled in common schools were 254,861. For higher edu¬ cation there were 38 public and 135 private high and secondary schools, two industrial col¬ leges, the Industrial Institute at Ruston (North Louisiana) and the Southwestern Industrial In¬ stitute at Lafayette, two normal schools, the State at Natchitoches and that of the city at New Orleans; the State University and Agri¬ cultural and Mechanical

College at Baton Rouge, partly supported by the United States; Tulane University, with affiliated special colleges, one of the best reputed institutions in the South, and a number of Roman Catholic and sectarian colleges. For the colored people are four — Southern University, Leland University, New Orleans University and Straight University.

Charitable and Penal Institutions. — The State Board of Charities and Corrections can only inspect and report. The old system of leasing out convicts to private contractors was abolished by the constitution of 1898, and they are now only employed on public works or con¬ vict farms, or in manufactures owned and operated by the State; and parish jail inmates may be employed on public works within that parish. The State Insane Asylum is at Jack- son, a Lepers' Home in Iberville Parish, insti¬ tutions for the deaf and blind at Baton Rouge and there are State hospitals at New Orleans and Shreveport. The health of New Orleans is regulated by a board of health composed of three members appointed by the New Orleans city council.

Churches. — The strongest denominations in order of church societies are the Baptists, Southern Methodists, the two forming the bulk of the Protestants, Roman Catholics, Presby¬ terians. Protestant Episcopalians, Lutherans and Unitarians. The Roman Catholics are stronger here from the long Spanish and French domination than anywhere else in the South. In New Orleans are located a Roman Catholic archbishop and bishops of the Protestant and Methodist Episcopal churches. There are also Roman Catholic bishops at Natchitoches and Lafayette.

History. — The earliest knowledge of Louis¬ iana dates from the discovery of the mouth of the Mississippi in 1528 by Narvaez. De Soto, 13 years later, crossed the great river on rafts at some point about the Arkansas ; of the im¬ portance of this discovery t'he Spaniards were wholly ignorant. The next Europeans to sail on the great river were the French. In 1673 Marquette and Joliet were sent by the governor of Canada to seek the river which might lead to the great western ocean. They descended as far as the mouth of the Arkansas. In 1682 they were followed by La Salle, who completed the work of discovery and took possession of the country, which he called Louisiana, in the name of Louis XIV. In 1684 he sailed from France with colonists to form a settlement. He missed the mouth of the river, landed at Matagorda Bay and was murdered in 1687. Brave men were not lacking to take up the enterprise, and in 1698 Iberville, with his brother.. Bienville, sailed from Brest for the

Mississippi. Finding the Spanish in possession of Pensacola, he stayed for a short time at Mobile and then entered and explored the lower part of the

rivers. His first settlement was at Biloxi, despite the protest of the Spanish governor of Pensacola. In 1702 the site of the colony was removed to Mobile. Antoine Crozat obtained the concession of Louisiana in 1712. It was handed over for 25 years to the Western or Mississippi Company, founded by John Law. Bienville was again made governor and was able to carry out his long-formed plan to create a city where is now New Orleans. Later, in 1 722. he was able to make it the capital of the colony. The Western Company sent out large numbers of emigrants, and the colony increased in population, but not in prosperity; misgov- ernment and Indian wars prevented all progress. In January 1732 Louisiana was surrendered to the king. Iberville resigned in 1743 and was succeeded by Vaudreuil, under whom were is¬ sued levee ordinances and police regulations for New Orleans. In the following years there was no improvement in the condition of the colony, of which the annual expense was a drain on the exhausted resources of France. In 1762, by the Treaty of Fontainebleau, Louisiana west of the Mississippi, together with the island of Orleans, was ceded to Spain, and in the next year Louisiana east of the Mississippi, together with Florida, was surrendered to Great Britain by the Treaty of Paris. The dissatisfaction of the Louisianians and the long delay of Spain in taking possession of her new colony gave rise to a serious revolt which was sternly suppressed by O'Reilly. He, however, provided for a form of government under which the colony made considerable progress. The great growth of the population on the upper Mississippi caused a demand for freedom from all restrictions of commerce on the river. This was obtained temporarily by concessions from the Spanish governors, but when the right of deposit was refused in 1803, there was grave danger of a descent on New Orleans. The desire of Napo¬ leon to create a colonial empire in America led to the secret Treaty of Saint Ildefonse in 1800, bv which France acquired that portion of Louis¬ iana formerly ceded to Spain. In 1803 fear of English invasion induced Napoleon to sell Louisiana to the United States for $15,000,000. (See Annexation; Louisiana Purchase, for statistics of size and location). On 28 March 1804 the part south of lat. 33° N. was organ¬ ized as Orleans Territory; the northern part being organized as Louisiana Territory, after¬ ward changed to Missouri Territory. An en¬ abling act was passed 20 Feb. 1811 to form Orleans into a State, and it was admitted 8 April 1812. The French element was so strong that the constitution

allowed members of the legislature to debate either in French or in Eng¬ lish, and the dividing line in politics was usually between the two, wth temporary alliances of other elements. The organization of the Whig party, one of whose cardinal tenets was. pro¬ tection, which helped sugar, turned Louisiana into one of the strongest Whig States in the South, she twice voting for Whig. Presidents. The slavery issue, after 1860, made it more and more strongly Democratic, and in 1860 it was heavily for secession. New Orleans was cap¬ tured by the Federal troops 25 April 1862, and the State government, whose seat had been Baton Rouge since 1852, was transferred to Opelousas. During the rest of the war the territory held by the Federals was recognized

as the legitimate State government, though un¬ der a military governor, and sent members to Congress. On 30 July 1866 an attempt of the colored leaders to hol'd a constitutional conven¬ tion at New Orleans and secure the admission of their race to the franchise resulted in the massacre of many of the delegates by the whites, which had much to do with the exces¬ sive severity with which the subsequent Recon¬ struction government bore on the latter. (For the general history of the time, see Recon¬ struction. For the part borne by the State in the imbroglio of 1876, see Electoral Commis¬ sion). The most important item in the subse¬ quent history was the passing of the Constitu¬ tion of 1898, with the (cGrandfather Clause,® to disfranchise the negroes, which reduced the negro registration to about 7,000, as against over 120,000 whites.

Governors of Louisiana

TERRITORY OF ORLEANS

William C. C. Claiborne . 1804-12

STATE

William C. C. Claiborne. Democratic Republican. 1812-16 Jacques Philippe Villere. “ " 1816-20

Thomas B. Robertson . . “ “ 1820-24

Henry Schuyler Thibo¬ deaux (acting) . “ “ 1824

Henry Johnson . “ “ 1824-28

Pierre Derbigny . ... “ “ 1828-29

Armand Beauvais (act¬ ing) . “ “ 1829-30

Jacques Dupre (acting). “ “ 1830-31

Andre Bienvenu Roman. Whig . 1831-35

Edward E. White . “ . 1835-39

Andre Bienvenu Roman. “ . 1839-43

Alexander Mouton . “ . 1843-46

Isaac Johnson . Democrat . 1846-50

Joseph Walker . “ . 1850-53

Paul Octave Hebert. ... “ . 1853-56

Robert C. Wickliffe. ... “ . 1856-60

Thomas O. Moore . “ . 1860-62

George F. Shepley . Military . 1862-64

Henry W. Allen . Governor of Confederate

part of State . 1864-65

Michael Hahn . Unionist and Military . . 1864-65

James M. Wells . Democrat . 1865-67

Benjamin F. Flanders. . Military . 1867

Joshua Baker . “ . 1867-68

Henry C. Warmoth. . . . Republican . 1868-71

John McEnery . Democrat and Liberal

Republican. Not rec¬ ognized by President

or Congress . 1873

“ Custom House ” Re¬ publican. • • ■ ; . 1873-77

Republican claimant ;

not recognized . 1877

Francis T. Nicholls . Democrat . 1877-80

Louis A. Wiltz . “ . 1880-81

Samuel D. McEnery. . . “ . 1881-88

Francis T. Nicholls . “ . 1888-92

Murphy J. Foster . Anti-Lottery Democrat. 1892-1900

William W. Heard . Democrat . 1900-04

Newton C. Blanchard. . “ . 1904-08

Jared Y. Sanders . “ . 1908-12

T .uther E. Hall . “ . 1912—16

Ruffin G. Pleasant . “ . 1916-20

John M. Parker . " . 1920-

The following are the names of the principal authors who have written on Louisiana: His¬ tory: Le Page du Pratz, Villiers du Terrage, Martin, Gayarre, Fortier. Description: Darby, Stoddard. Botany: Rafinesque, Chapman. Ornithology : Audubon. Literature: Fortier.

History and Development of New Orleans: Cable, King, Castellanos.

For official information consult reports of State officers published at Baton Rouge and of Chief of Engineers, Washington, D. C.

Population. — The census figures from 1810, when it was first counted separately as the Territory of Orleans, are as follows: (1810)

WTilliam Pitt Kellogg. Stephen B. Packard..

76,556; (1820) 152,923; (1830) 215.739; (1840) 352,411; (1850) 517,762; (1860) 708,002; (1870) 726,915; (1880) 939,946;

(1890) 1,118,587;

(1900) 1.381.625. In 1910 it was 1,656,388, an increase of 19.9 per cent. The foreign born were 52,903, of whom 17,431, or about one-third, were Italians. 12,604 Germans, 6,500 French and 6,436 Irish. The colored population was 650,804, or nearly half, a relative decrease since 1890 of over 12 per cent, due to the higher death rate among the negroes. Louisiana was sixth in ab¬ solute number of colored inhabitants and third in relative number, next below Mississippi and South Carolina. The population in 1920 was 1,798,509. The legislature is forbidden to create new parishes with less than 625 square miles and 7,000 inhabitants, or divide an old parish so as to leave either portion less than these magnitudes. There are no large cities, except New Orleans with 287,104 people, in 1900, and in 1910 over 339,075, in 1920, 387,219; the great Mississippi port, and destined to a much larger growth. Shreveport, the next, on the upper Red River, had 43,874; Baton Rouge, the capital, on the Mississippi, 21,872. Among the others above 5,000 are New Iberia in the south and Lake Charles in the southwest and Monroe in the northwest, Alexandria on the lower Red River and Minden, east of Shreveport.

Sociology. — Owing to the preponderance of population and the general importance of New Orleans it has been found useful to locate these institutions usually found at the State capitol. The Supreme Court sits in the newly built Law Courts, in which is the State Library. The two most important libraries in the State are the Howard Memorial Library for refer¬ ence and the New Orleans Public Library for circulation established, which provide for the public of New Orleans the use of nearly 100,000 books. There are published in the State 188 newspapers, of which the New Orleans Times- Picayune is the most important daily. The literature of the State consists of two groups of writings: the one in French covering the period between 1835 and 1855, including those of Gayarra and Rouquette, and a brilliant series of works in English prose and poetry by Town¬ send, King, Davis, Fortier, Ficklen, etc., which have been produced in the last 30 years of the 19th century.

William Beer,

Librarian, Hozvard Memorial Library, New Orleans.

LOUISIANA, Mo., city, in Pike County, on the Mississippi River, and on the Chicago and Alton and the Chicago, Burlington and Quincy railroads, about 85 miles northwest of Saint Louis. It is situated in

an agricultural region, and is the trade centre for a large ex¬ tent of country in both Missouri and Illinois. Its chief industrial plants are flour and lumber mills, button factories, brick yards, tools, baskets and lime works, shoe, stove and tobacco fac¬ tories, wagon and carriage factories. Nearby are large quarries and extensive nurseries. The trade is chiefly in its manufactured articles, dairy and nursery products, grain, fruit and live¬ stock. There is a good public library. Pop. about 4,060.

LOUISIANA, Code of. In the history of law in the United States the first important

experiment with a code in the United States was made in Louisiana, which State, originally a French colony afterward ceded to Spain, again returned to France, and subsequently ac¬ quired by the United States from France, has had many changes of law. After the United States acquired Louisiana there arose a strong demand for a code, owing to the great con¬ fusion of laws. In 1806-08 a code was adopted, but only to suoersede the ancient laws when they conflicted with it. A complete civil code was adopted for the State in 1824, which had for its basis the Code Napoleon, although some provisions of the common law were injected into it. The Louisiana code was the founda¬ tion for a later code prepared for the State of New York under the guidance and supervision of David Dudley Field. This code, although published, and having formed the foundation for many of the codes adopted by the various States, was never accepted by the legislature of New York. See Code.

LOUISIANA, District of. See Orleans, Territory of.

LOUISIANA CREOLES. This appella¬ tion belongs exclusively to persons of French and Spanish .descent born in Louisiana: not¬ withstanding the prevalent error to the contrary according it to Louisiana-born children of any European blood. Though often misrepresented, the creoles of Louisiana, as a matter of fact, are intelligent, brave and generous, and are, by no means, inferior in the matter of educa¬ tion ; they are also in the enjoyment of the highest social privileges. The women of true creole lineage are world-famed for grace and beauty. The creoles have furnished Louisiana some of its ablest governors, its most distin¬ guished military men, its eminent writers, its leading professional men, financiers and mer¬

chants. In 1904 they held a number of the most exalted offices in the State, and were likewise fully represented in all branches of high and meritorious effort. Very many of the creoles now in Louisiana are descended from high and noble families in France and Spain, and they treasure the lofty traditions of their ancestry. The expression <(creole negro® is of¬ ten used, and its employment has perhaps con¬ tributed to the false impression which some entertained that the Louisiana creole, truly such, must be, or is, of negro blood. The term un¬ der immediate consideration simply means that the negro to whom it is applied, or his progeni¬ tors, has been reared under a creole master. So far as the true creole families are con¬ cerned, they have been jealous of their Cau¬ casian lineage and careful to maintain the purity of their blood. The word ((creole® is often used to designate the origin of certain products of -the field and farm, such as creole chickens, eggs, butter, etc. The meaning of this is that the products thus named are strictly from creole portions of the State of Louisiana. A certain debased idiom of the French em¬ ployed among negroes, and, to some extent, among creole children and lower whites, is popularly called <(creole.® It has figured in literature in the shape of short stories, proverbs, etc. The better element of creole adults speak and write the French language in its purity. The majority likewise have a correct and fluent

use of the English language. An effective an¬ swer to the aspersions, by some sought to be cast upon the character of the olden creoles, is the following citation from the Chevalier Guy Soniat du Fossat, a distinguished officer of the French army who was in New Orleans in 1751. In his (Synopsis of the History of Loui¬ siana, etc.,} he gives the following:

<(Creoles are defined to be (the children of Europeans born in the colony.) They, in gen¬ eral, measure about 5 feet 6 inches in height ; they are all well shaped, and of agreeable figure ; they are lively, alert and agile, _ and, notwithstanding the great heat of this climate, are laborious. They are born with ambition, and an honest self-esteem. They are endowed with a natural disposition for all sciences, arts, and exercises that amuse society. They excel in dancing, fencing, hunting and in horseman¬ ship. Nature has favored them with a pene¬ trating and active mind, and they are capable of being easily instructed. The lack of teachers renders their education somewhat incomplete, and it must be said, in all justice, that among the many qualities which they possess are polite¬ ness, bravery and benevolence. They are good fathers, good friends and good kinsmen.

<(The women, besides having the qualities above enumerated, are

agreeable in figure and seldom deformed. They make good mothers, and are devoted to their husbands and their children, and in their marital relations seldom are they unfaithful. I must also add that the stranger arriving in this wild and savage coun¬ try will be surprised to see in this capital, as exists in all countries of Europe, brilliant as¬ semblies where politeness, amiability and gayety reign supreme.®

Bussiere Rouen,

Officer d'Academie, Secretaire perpetuel de

I'Athenee Louisianais.

LOUISIANA PURCHASE, The. See

United States — Louisiana Purchase, The.

LOUISIANA PURCHASE EXPOSI¬ TION, an international exposition held in Saint Louis, Mo., 30 April 1 Dec. 1904, to commemorate the 100th anniversary of the pur¬ chase from France of the Louisiana. A tract of 1,142 acres in Forest Park was selected for the site. The plan included 15 large exhibition buildings, of which the main group were laid out in the form of a fan. The apex of the fan was formed of the four great Art Palaces, of which one in brick and stone survives as a memorial. These were from designs by Cass Gilbert. E. L. Masqueray designed the Hall of Sculpture, the Palace of Agriculture and the Palace of Transportation. The Palace of Edu¬ cation was designed by Eames and Young in reformed classic style. Carrere and Hastings designed the Palace of Manufactures in Cor¬ inthian. Other groups were the Palace of Electricity by Walker and Kimball, the Palace of Machinery by Widman, Walsh and Bois selier, the Palace of Forestry, Fish and Game by E. L. Masqueray, the United States Govern¬ ment Building, housing exhibits by the various departments of the national government. In addition -to these there were about 500 other buildings on the grounds, built bv foreign gov¬ ernments, the States and Territories or for special exhibits. The French building was a

reproduction of the famous Grand Trianon of Versailles. There were 250 groups of decora¬ tive sculpture and over 1,000 single figures, erected under the supervision of A. Saint- Gaudens, J. Q. A. Ward

and D. C. French. The landscape effects comprised a six-acre rose garden, sunken gardens and a colossal floral clock. There were several waterfalls and miniature lagoons on which were to be found Venetian gondolas and other watercraft. At the northern end of the grounds there was a street about one mile in length. Along it were leased various amusement concessions. It was known as <(The Pike.® Perhaps the most in¬ teresting and important were the anthropo¬ logical exhibits of aboriginal tribes, including the Philippine Division which represented all the important native tribes, with exhibits of their domestic life, arts, industries, etc. Of the total recorded admissions, 19,694,855, 12,804,616 were paid.

LOUISIANA STATE UNIVERSITY,

the head of the public school system of Loui¬ siana, is located at Baton Rouge, La. The organization of the institution was authorized in the State constitution of 1845. It was to be supported by the income from the sales of the ˆseminary® land grants. In 1855 the legis¬ lature provided for the organization of the institution and its location near Alexandria, La. In 1860 it was opened as the Louisiana State Seminary under the superintendency of W. T. (later General) Sherman. From 1863 to 1865 the institution was closed on account of the Civil War. In 1865 it was reopened under the presidency of Col. David French Boyd, who was for many years afterward president of the institution. Owing to the destruction of the buildings by fire the seminary was removed to Baton Rouge in 1869. In 1870 the name was changed to Louisiana State University and in 1877 it was merged with the Louisiana Agricul¬ tural and Mechanical College, which three years earlier had been organized in New Or¬ leans under the (

The university is organized into the follow¬ ing schools and colleges : the College of Arts and Sciences ; the College of Agriculture ; the College of Engineering; the Audubon Sugar School; the Law School and Teachers College. The Law School offers a three-year course leading to the degree of LL.B. ; the Audubon Sugar School has a five-year course, in which agriculture and engineering are combined, leading to the degree of bachelor of science; the College of Engineering and the College of Agriculture each offers several four-year courses leading to the degree of bachelor of science ; the four-year courses in the College of Arts and Sciences and Teachers College each leads to the degree of bachelor of arts. All of the

courses offered by the university are based upon the uniform admission requirement of four years of high school work. A model

high school for observation and practice is attached to Teachers College. There is no preparatory department. The total enrolment for 1915-16 was 1,797, distributed as follows: In regular four- or five-year courses, 783 ; in the Law School, 66; in the Summer Session, 603; in the Farmers' Short Course, 358. The total in¬ come for the session 1915-16 from State and Federal grants and other sources amounted, to $269,764. . In 1915-16 the staff of administration and instruction numbered 100; the research and extension staffs numbered 36, a total of 136 of all grades. A military department is main¬ tained as required by Federal and State law. Graduate courses of one and two years in length are offered leading to the master's degree. The institution is coeducational.

LOUISVILLE, loo'is vil or loo-i-vil, Ky.,

the capital of the county of Jefferson, and the principal city of the State of Kentucky, is situated opposite to the falls of the Ohio River, on the southern shore of the river, on the Louisville and Nashville, the Southern, the Chesapeake and Ohio, the Baltimore and Ohio Southwestern, the Pennsylvania and other rail¬ roads, 110 miles south of Cincinnati.

Falls of the Ohio. — The falls of the Ohio River are caused by a ledge of Devonian rocks, rich in corals and other fossils, which were lifted from the bottom of the Silurian Sea, in which they were formed, and left here thou¬ sands of feet above their place of formation. In ancient geological times this wall of rock, in the form of an anticlinal axis, dammed up the water 25 feet and formed a lake a mile wide and several miles in length, above the dam, while the water below rushed down the other side of the axis, at the rate of a dozen miles an hour, until it was lost in a seething whirlpool below. When the river was low, it was dangerous to attempt to conduct a boat over these falls, but when it was high, on ac¬ count of the narrowmess of the stream below and its width in the lake above, the excess of water filled the narrower stream below to a level with the wider one above and vessels passed over the falls as if they had not been there. In 1830 a canal two miles long was fin¬ ished around the falls, on the Kentucky side, and on the 5th day of December the steam¬ boat Uncas passed through it. The canal has since been enlarged and improved so as to meet the wants of the largest boats and is always used in going over the falls in low water.

Plan of Louisville. — The plan of Louis¬ ville as originally laid out by John Corbly, in the spring of 1779, consisted of one range of streets parallel with the river and another range cutting them at right

angles. The streets parallel with the river and running east and west bore names such as Water, Main, Market and Jefferson, while the cross streets were known by numbers, such as One, Two, Three, etc. This plan was adhered to until additions to the original boundary made it necessary or gave an excuse for laying out new streets differently. In some of the additions the streets now run in all directions. Broadway as orig¬ inally laid out is 120 feet wide; Main, Market

and Jefferson each 90 feet, and the other streets with a few unimportant exceptions 60 feet in width. In 1813 the paving of streets began. Previous to this time they were mud holes in winter and dirt-piles in summer. That part of Main street from Third to Sixth was paved after the McAdam style. There are now in the city about 200 miles of streets and as many miles of alleys paved with vitrified brick, asphalt, granite or boulders, and a few with broken stone after the McAdam fashion.

Original Area of Louisville. — The original tract of land given to Louisville for a site by the legislature of Virginia contained 1,000 acres. The land cost the State of Virginia nothing because it was confiscated from Dr. John Con¬ nolly, an adherent of the British during the War of Independence. The legislature simply took the land from Connolly and gave it to Louisville. The city has since added many other tracts of land to the original until its external boundary now embraces 27 square miles.

Dwelling-houses. — The first dwelling-houses built in Louisville were 16 by 20 log cabins with board roof and puncheon floor where there was any floor at all, but in many in¬ stances the native earth was the floor. Louis¬ ville is to-day distinguished for no one thing more than for the handsome and comfortable dwelling-houses of her citizens.

Business Houses. — The few rude dwellings were promptly followed by business houses equally rude if indeed the cabin used for a dwelling was not at the same time used for a shop or manufactory. Michael Humble so soon as the town was laid out erected a cabin near the fort at Main and Twelfth streets in which he made and mended guns and wrought out of metal the few things that were used. Joseph Cyrus had next to him a shop in which he made spinning-wheels and looms and every¬ thing that was carved out of wood.

George Vensonier followed next with a tailor's shop and Henry Duncan with a hat-shop. A little further up town, between Fifth and Sixth streets, Daniel Brodhead had a store in which every kind of article used in the community was sold over the same board counter. These were humble beginnings at manufacturing, but they continued to increase until now, accord¬ ing to the census, we have in Louisville 800 manufacturing establishments which turn out manufactured articles valued at $101,000,000 annually. Our pioneers who were used to log cabins for all purposes could not conceive of the necessity of the modern establishments if they were to behold them now in use, built of stone or brick, some covering whole squares and others ribbed with steel ascending into the clouds. The public buildings of the city have proportionately increased in dimension and style until they have become real orna¬ ments. The courthouse with its severe classic features, the city hall in its Gothic outlines, the custom-house in its blended styles of archi¬ tecture, the sky-scrapers at the corner of Fourth and Main, and Main and Market, some of the great tobacco warehouses on Main street and many of the manufacturing estab¬ lishments and stores in different parts of the city are fine specimens of architecture adapted to the wants of business. The Galt House on

the corner of Main and First is one of the finest hotels in the country and a new hostelry has just been erected on Fourth street which ascends high into the air and meets every want of the guest. A new jail has been erected on the site of one of the early churches which will not only rob the prison of some of its horrors, but will be an ornament to the city. The great department stores by furnishing the purchasers with every want have revived the fashion of pioneer times when every article which was for sale was sold under the same roof and made shopping a delight rather than a burden. The building of the American Na¬ tional Bank on the corner of Third and Main and that of the Louisville Trust Company at Fifth and Market are palatial business houses, well suited to the purposes for which they were erected as well as ornaments to the city.

Education. — Louisville as an educational centre is surpassed by but few cities. The University of Louisville with its law and med¬ ical departments, the Female High School, the Male High School, the Manual Training School and the Normal School, which are colleges of a high order, the ward schools where children are trained free of cost for the higher depart¬ ments, the medical colleges, the theological seminaries, the musical societies, the Catholic institutions and the educational associations in some of which the sciences are taught, all together offer advantages to students in almost every

branch of knowledge. The Male High School, the Female High School, the Normal School and the Manual Training School, like the ward schools, are free institutions entirely supported by the city.

Charitable Institutions. — Hospitals, asy¬ lums and homes are almost as numerous in Louisville as schools. The Children's Free Hos¬ pital, where afflicted little ones are cared for, the Kentucky Institute for the Blind, where the sightless are taught to read and write, and 51 other institutions maintained for different purposes are prepared to meet almost every form of infirmity.

Churches. — There are 265 churches in Louisville, representing nearly all denomina¬ tions. The principal denominations are the Baptists, the Methodists, the Presbyterians, the Christians, the Episcopalians, the Catholics and the Lutherans, but there are also Unitarians, Evangelists, Jews, and those who call them¬ selves Non-Sectarians, Scientists, Seventh-Day Adventists, Social Settlements, Spiritualists, Swedenborgians, United Brethren and The- osophists. Some of the houses of worship, like the cathedral of the Assumption, the Warren Memorial, the Third Avenue Baptist and the Fourth Street Christian, are fine specimens of ecclesiastical architecture and capable of seat¬ ing large congregations.

Banks. — There are 14 banks and banking institutions in Louisville with a combined cap¬ ital of about $7,000,000 and a surplus of half as much more. If the trust companies and title companies which necessarily do a good deal of banking business are added to the banks the capital and surplus of all combined will exceed $15,000,000. A farm loan bank was established here in 1916. Bank clearings are about $750,000,000 yearly.

Finances. — The finances of Louisville will

compare favorably with those of any other municipality. According to the last published report of the assessors the assets of the city amounted to $17,442,552 and the liabilities to $8,836,129. If the liabilities therefore are de¬ ducted from the assets, a balance. of $8,616,422 will remain in favor of the city. The city, moreover, besides owning this large amount of property in its own name has an income from taxes sufficient to meet all of its fixed liabili¬ ties and current obligations. The property within the city limits owned by

individuals is assessed at over $207,000,000. The charter only allows 95 per cent of this amount to be considered in providing for current expendi¬ tures to be expended by the city during the year. The annual revenue from all sources exceeds $11,250,000. The tax rate averages about $1.79 for all purposes. This amount is distributed through the different departments of the city so as to provide for every liability and at the end of the year balances are gen¬ erally left in different departments which are again distributed.

Largest Industries. — The largest industries are tobacco, cement, wagons, plows and leather. More leaf-tobacco is handled here than in any part of the world. The quantity of hydraulic cement and plows and wagons and leather made here is also enormous. The Board of Trade gives the following figures for 15 leading articles :

Agricultural implements — pounds . 40 , 000 , 000

Boots and shoes — cases . 114, 000

Dry goods and notions — cases . 678,000

Flo ur — barrels . 710, 000

Furniture — pounds . 30 , 000 , 000

Hardware — cases . 985 , 000

Fine leather — pounds . 11, 500 , 000

Saddlery — packages . 255 , 000

Stoves and stove castings — pounds . 29 , 500 , 000

Soap — pounds . ; . 27 , 000 , 000

Manufactured tobacco — pounds . 52 , 000 , 000

White lead and paints — pounds . 17, 500 , 000

Wagons — pounds . 35 , 900 , 000

Whisky — barrels . 365 , 000

Woolen goods — pounds . 15 , 000 , 000

Water. — The city owns the works which supply the citizens with water. A filter, cost¬ ing $3,000,000, has been added to the plant.

The water is sold to the citizens at a price much lower than they could obtain it in any other way.

Light. — The citizens have choice of three kinds of light furnished by different companies : these are electricity, artificial and natural gas. Natural gas is also much used for heat on ac¬ count of its cleanliness and convenience.

Street Railways. — Street railways on which cars run by electricity reach every part of the city and extend into the suburbs and to dis¬ tant neighboring towns. There are over 300 miles in operation.

Steamboats. — Steamboats with headquar¬ ters at Louisville, in spite of the interference of railroads, are yet seen upon the Ohio and other Western waters, and afford cheap rates of freight. There are not, however, so many floating palaces upon the Western rivers as there were before railroads came into use, but there are yet a few which prevent the Ohio and its glories of old from being forgotten.

Board of Trade and Commercial Club. — There is a board of trade which keeps an eye on the interests of Louisville, and a com¬

mercial club which helps in the work. Any enterprise which looks to the interests of the city can be brought before either or both of these associations and secure recognition and help if deemed worthy. Both of them have done valuable work in behalf of the city.

Newspapers. — There are five daily news¬ papers, three issued mornings and two even¬ ings. Many weekly, semi-weekly, monthly and periodical sheets are also issued. The Courier- Journal and Herald appear mornings and the Times and Post evenings.

Libraries. — The only public library in the city is the Louisville Free Public Library, suc¬ cessor to the Polytechnic Library, which was in turn successor to the Public Library of Ken¬ tucky. It has some 177,000 volumes on its shelves, and its present equipment is due to the generosity of Andrew Carnegie. The Southern Baptist Theological Seminary has a valuable library at the corner of Sixth and Broadway, and there are several other smaller collections which have something of a public character. There are also several large li¬ braries in the city which belong to private citizens, and one of these, which has upon its shelves some 50,000 volumes, is one of the largest private collection in the country.

Sewers. — The -sewerage system of Louis¬ ville is extensive. The early engineers were disposed to do all the draining of the city

toward ((Paddy's Run,® a probable survivor of the Ohio when its channel was farther to the south. This system, however, had to be aban¬ doned when it was found that Paddy's Run would itself have to be drained as the city enlarged. The present sewerage system termi¬ nates in the Ohio River, where it should have gone at first.

Fire Protection. — The fire department of the city, under a chief, several assistants and firemen, has a modern equipment of steam engines, chemical engines and all the necessary accompaniments of water-towers, hooks and ladders, etc. It is kept up at an annual ex¬ pense to the city of about $320,000.

Police. — The police force is maintained at an annual cost of about $436,000. The mem¬ bers are arranged after somewhat of a mili¬ tary grading, and consist of one chief with the rank of colonel, one assistant with the rank of major, captains, lieutenants, sergeants, cor¬ porals, chief of detectives, detectives, special de¬ tectives, district detectives, mounted men, sta¬ tion-keepers, wagoners, patrolmen and a secre¬ tary.

Parks.— The parks of Louisville have only been established in recent years. The present system was organized in 1891, and lands pur¬ chased for an eastern, a southern and a west¬ ern park. There was no use for a northern park, as the river was on that side. The west¬ ern, known as Shawnee Park, consists of com¬ paratively level land and embraces 180 acres ; the eastern, named Cherokee Park, has 409 acres of gently rolling land cut into picturesque ravines by Beargrass Creek; and the southern, called Iroquois Park, contains 676 acres of land, partly level, but mostly hilly, with some of its eminences nearly 300 feet into the air. The park commissioners purchased of the Dupont estate 18 acres known as Central Park, which, added to Baxter and Boone squares, will en-

large the intramural part of the system and meet the wants of those who cannot enjoy the suburban parks. The parks were named after the three Indian tribes who once asserted own¬ ership over the land.

History. — In 1773 Dr. John Connolly lo¬ cated 2,000 acres of land, to which he was en¬ titled for military service in the French and Indian War, on the south side of the Ohio River, immediately opposite the falls. This land was surveyed for him by Capt. Thomas

Bullitt, and on 10 Dec. 1773 Lord Dunmore executed a deed to him for it. Connolly then conveyed to Col. John Campbell one-half of this land, and the two undertook to establish a town thereon, which Bullitt had laid out in the original sur¬ vey. In 1774 they advertised lots for sale, but Indian disturbances arose and no one came to buy the lots. To the Indian troubles difficulties between Great Britain and her colonies suc¬ ceeded, and increased until actual war was on between them. Connolly, as an adherent of England, was arrested by the patriots and thrown into prison, and Campbell fell into the hands of hostile Indians on his way from the Falls to Fort Pitt. Under such adverse condi¬ tions, with both proprietors in prison, the projected town at the Falls came to an end, and was probably forgotten by all except the unfortunate projectors.

In the spring of 1778, while Gen. George Rogers Clark was floating down the Ohio with his boats loaded with soldiers for the conquest of the Illinois country, he felt the necessity of some safe place in which he could discipline his raw recruits. When he reached an island in the midst of the Falls, afterward known as Corn Island, and saw the rapid waters dashing around it, he concluded that was the place he wanted, and that no deserter could make his escape from this island. Hence he landed on this island, on 27 May 1778, and immediately went to work to erect cabins for some 20 fam¬ ilies of emigrants who came on his boats, and a blockhouse for his soldiers and supplies. Fie was opposed to these families coming on his boats, but was glad they had come, as he could leave the supplies he could not take with him in their care on the island and thus take with him every soldier. At the end of a month he thought his raw troops had been disciplined enough to make them reliable soldiers and moved off with them down the r'ver to Fort Massac, leaving the emigrants on the island, while the sun was in a full eclipse. The fam¬ ilies thus left on the island became the founders of Louisville. So far as has been ascertained, there were about 50 in number, consisting of men, women and children and one negro. They remained on the island until the news came that General Clark had conquered Kaskaskia, Vincennes, etc., and put an end to the Indian raids that came from the British posts there to prey upon the helpless families of the Vir¬ ginia border. Then, by order of General Clark, they built a fort on the main shore and moved into it in time to celebrate their first Christ¬ mas in the wilderness with a dinner and a dance.

The interest attached to the subject among the descendants of these founders of Louis¬ ville, who are numerous, will justify the record of their names here for the preservation of VOL. 1 7 — 44

their memories. So far as has been ascer¬ tained they were the following:

James Patton, his wife, Mary, and their three daughters Martha, Peggy and Mary.*

Richard Chenowith, his wife, Margaret, and their four children, Mildred, James, Jane and Thomas.

John McManess, his wife, Mary, and their three children, John, George and James.

John Teweil, his wife, Mary, and their three children, Ann, Minnie and Jessie.

William Faith, his wife, Elizabeth, and their son, John.

Jacob R6ager, his wife, Elizabeth, and their three children, Sarah, Mariah and Henry.

Edward Worthington, his wife, Mary, his son, Charles, and his two sisters, Mary (Mrs. James Graham) and Elizabeth (Mrs. Jacob Reager).

James Graham, his wife, Mary.

John Doune, his wife, Martha, their son, John, and their colored man, Cato Watts.

Isaac Kimbley, and his wife, Mary.

Joseph Hunter and his children, Joseph, David, James Martha (Mrs. John Doune) and Ann.

Neal Dougherty, Samuel Perkins, John Sinclair and Robert Tevis.

The above-named persons who came to the Falls with General Clark and those who joined them as immigrants in the following spring held a public meeting 10 April 1779 and ap¬ pointed William Harrod, Richard Chenowith, Edward Bulger, James Patton, Henry French, Marsham Brashears and Samuel Moore trus¬ tees to lay out a town. These trustees met on 17 April 1779, and, having agreed upon a plan of the town, named it Louisville and employed John Corbly, a su-veyor, to lay it out and make a map of it. The plan of the town, as mapped out by Corbly, consisted of nothing but one street running along the bank of the river and 12 cross-streets cutting in at right

angles.

On 1 May 1780, the legislature of Vir¬ ginia, in response to a petition of those who had laid out the town, confirmed their act and appropriated 1,000 acres of the land which had been forfeited from Connolly, for the benefit of the town. The same act of the legis¬ lature appointed nine trustees to manage the affairs of the town.

The city continued under the government of trustees, either appointed by the legislature of Virginia or Kentucky or elected by the people, from 1780 to 1828.

By the charter of 1828 Louisville passed from the government of trustees to that of a mayor and 10 councilmen. The first election under the charter occurred 4 May 1828, when John C. Bucklin was elected mayor.

The city has greatly prospered since the adoption of this charter, although the charter itself was not of long duration. It was super¬ seded by the charter of 1851, which added to the governing power a board of 12 instead of 10 aldermen, and increased the number of councilmen to 24. It also established the school board, the waterworks, the board of health, the board of police, the board of fire and the sinking fund. A third charter superseded the second in 1870, but the charter which added most to all departments of the city government was that of 1892. Under this charter a score of new departments or bureaus of the city were established. All of them report to the mayor and council, but it takes them all to conduct the affairs of the city.

Population. — In the spring of 1779, joined by other immigrants, the 20 families of immi¬ grants who had come with General Clark laid out a town on the mainland and named it Louis-

ville, in honor of Louis XVI, king of France, who was then helping the colonists in their rebellion again Great Britain. By 1 May 1780 these emigrants had increased possibly to 100, and were at work building log cabins so as to free themselves from the confine¬ ment of the fort. By 1790 they had prob¬ ably increased to 350, and in 1800, when the United States census for the first time recorded the population, but did not give it accurately, they had increased to 600. The population at present (1920) is 234,891.

Consult Casseday, B., (History of Louis¬ ville, from its Settlement till the Year 1852> (Louisville 1852) ; Allison, Y. E., (City of Louisville and a Glimpse of Kentucky) (ib. 1887) ; Powell, L. P., (Historic Towns of the Southern States) (New York 1900) ; (The Book of Louisville and Kentucky) (1915).

LOUISVILLE AND NASHVILLE RAILROAD. The Louisville and Nashville Railroad Company's main lines extend from Cincinnati, Ohio, to Atlanta, Ga., via Lexington, Knoxville and Chattanooga; from Cincinnati to Memphis, Tenn., via Louisville and Guthrie; from Saint Louis, Mo., to Pensacola, Fla., and to New Orleans, La., via Nashville, Birming¬ ham, Montgomery and Mobile, and to inter¬ mediate cities.

The road was chartered on 5 March 1850, and the main line was opened to the public in November 1859. The company prospered, and from time to time other branches of the road were built and other systems absorbed, until at the close of the fiscal year ending 30 June 1916 the company operated 5,041.61 miles of railroad, in Illinois, Indiana, Kentucky, Tennes¬ see, Alabama, Florida, Georgia, Mississippi, North Carolina and Louisiana. It also owns a majority of the capital stock or is joint owner or lessee of 2,360.07 miles more railroad lines, comprised in the following roads: Nashville, Chattanooga and Saint Louis Railway, the Birmingham Southern Railroad, the Georgia Railroad and its dependencies, the Atlanta, Knoxville and Northern Railway, and the Chi¬ cago, Indianapolis and Louisville Railway, operated under separate organizations. If to this mileage be added that of 41 miles of roads operated by the Louisville and Nashville Rail¬ road, but whose earnings are not included in the earnings of the last-named railroad, and 264.91 miles of branch lines owned but not operated by the Louisville and Nashville Rail¬ road, the grand total of mileage for the Louis¬ ville and Nashville system amounts to 7,642.38 miles.

The operating revenue for the fiscal year ended 30 June 1916 was 860,317,993, earned by the transportation of 11,925,101 passengers and 35,488,688 tons of freight. The passenger travel averaged 44.40 miles, at a charge of 2.17 cents per mile — aggregating in the year 529,- 426,981 miles, and $11,488,086. The freight traffic averaged 183.49 miles per ton, at a charge of 0.686 cents per ton mile — aggregat¬ ing in the year 6,511,946,570 ton-miles, and

$44,658,860.

The operating expenses for the year were $39,790,481. After deducting taxes and uncol¬ lectible revenue, the total operating income was $18,265,906. Interest on funded debt amounted to $7,681,718, and the total non-operative in¬ come was $4,456,167. The total net income

from all sources was $14,039,130, of which $13,- 953,849 was transfered to profit and loss ac¬ count. The dividend appropriations from sur¬ plus amounted to $4,320,000.

The equipment of the system on 30 June 1916 consisted of 1,042 locomotives, with an aggregate tractive capacity of 32,593,600 pounds; 392 passenger cars; and 45,761 freight cars, of which 20,368 were coal cars with an aggregate capacity of 894,462 tons. Bitu¬ minous coal constitutes the largest item of freight tonnage, amounting to 13,943,804 tons, or 40 per cent of all the freight handled. The operating revenue per mile of road was $11,964, and the operating expenses $7,892, making the net operating revenue per mile of road $4,072.

The entire investment in the road and its equipment on 30 June 1916 was $271,683,491. Other investments of the company amounted to $35,026,729. The total stock outstanding on the date mentioned was $72,012,117, and the total long-term debt was $178,230,412. Accrued depreciation was placed at $31,538,865. The credit balance of the profit and loss account on the same date was $50,172,752.

The Louisville and Nashville Railroad Com¬ pany owns but does not operate the Yellow River Railroad of Florida, a short line of less than 30 miles, operated independently. It also leases or operates the following roads, whose earnings are not included in the income ac¬ count of the lessee company: The Eastern Railroad of Alabama, about 20 miles of lines ; the Elkton and Guthrie Railroad of Kentucky, about 11 miles of lines, and the Glasgow Rail¬ road of Kentucky, about 10 miles of lines.

On 30 June 1916, $36,720,000 of the capital stock of the Louisville and Nashville Railroad was owned by the Atlantic Coast Line Rail¬ road Company.

LOULANGES CANAL. See Canadian Canals.

LOULE, lo-la, Portugal, town in the dis¬ trict of Faro, 10 miles from the seaport of Faro. It contains many interesting remains, including its old walls and towers of the Moor¬ ish period, the pilgrim church

of Nossa Sen- hora da Piedade. Copper and silver mines are worked nearby. Basket-making is the chief industry, but there are also manufactures of leather, porcelain and esparto grass arid palm products. Pop. 19,680.

LOULE, lo-la', Marquis of, Portuguese nobleman and statesman: b. Lisbon, 1785; d. 1824. His early education was received in com¬ pany with John VI. In 1807 Louie was given the title of Marquis and was placed in com¬ mand of the Portuguese army which formed part of the great force collected by Napoleon I in the Peninsular War. Louie later joined John VI in Brazil and when that monorch returned to Portugal Louie accompanied him. The Abso¬ lutists were antagonized by his loyalty to the king and by his liberalism and through devious means effected his assassination.

LOUNSBURY, lownz'ber-I, Thomas Raynesford, American scholar: b. Ovid, N. Y., 1 Jan. 1838; d. 9 April 1915. He was graduated at Yale in 1859; in 1862 he enlisted as a volun¬ teer in the Union army and served as 1st lieu¬ tenant of the 126th New York Volunteers. He was mustered 'out at the close of the war, and, after private tutoring for three years, became

in 1871 professor of English in the Sheffield Scientific School of Yale University.' For 33 years he was also librarian of the school. He retired from active service in June 1906. He was a member of the American Academy of Arts and Letters. He became well known as a student and critic of 'Chaucer and Shake¬ speare. He edited Chaucer's (House of Fame5 and 'Parlement of Foules5 (1877) ; (Works of Charles Dudley Warner5 (1904); Wale Book of American Verse5 (1912), and is the author of (History of the English Language5 (1879) ; 'James Fenimore Cooper5 in 'Amer¬ ican Men of Letters5 series (1883) ; 'Studies in Chaucer, his Life and Writings5 (1892) ; 'Shakespeare as a Dramatic Artist5 (1901) ; 'Shakespeare and Voltaire5 (1902) ; 'The Standard of Pronunciation in English5 (1904) ; 'The Text of Shakespeare5 (1906); 'The Standard of Usage in English5 (1908) ; 'Eng¬ lish Spelling and Spelling Reform5 (1909); 'Shakespeare as a Dramatic Artist5 (1912).

LOURDES, loord, France, town, in the de¬ partment of Hautes-Pyrenees, on the Gave de Pau, about 85 miles southeast of Bayonne. It is situated where seven mountain passes lead to favorite resorts in

the Pyrenees. Nearby are valuable marble and slate quarries. Formerly Lourdes was famed for its chocolate and its fortified castle, which was considered impreg¬ nable in the days before the invention of fire¬ arms. Lourdes was then called the "key of the Pyrenees.55 In the 18th century the castle was converted into a prison and became the Bastile of the Mountains. In the year 1858 Lourdes acquired new fame. A little peasant girl, about 14 years of age, named Marie-Bernarde Soubir- ous (better known as "Bernadette55) reported to her parents, on 11 Feb. 1858, that she had seen a most beautiful lady in a grotto at the rocks of Massabielle, a part of the town. The pastor of the Roman Catholic church at Lourdes, and the priests of the neighboring towns, also the bishop of Tarbes, the diocese in which Lourdes is located, all gave the matter no attention un¬ til people from a distance began to visit Lourdes, and miracles were reported and scien¬ tists had begun observations and investigations. On 25 Feb. 1858 a spring appeared in a place where no water had been seen before. It was some days before the child gave a name to the lady ; it was then Virgin Mary, under the name L'lmmaculatee Conception. The matter was then investigated by the ecclesiastical authori¬ ties and pronounced a genuine apparition and many cures were said to be miraculous. The place has become noted for the large number of visitors, fully 600,000 annually. A magnifi¬ cent church, the Basilica of the Rosary, has been erected at the grotto, in which there is a great collection of votive offerings,. and the flags of all nations show that pilgrims from the countries of the whole world have visited the place. The prosperity of the town is de¬ pendent on the pilgrims. Pop. about 8.805.

Consult Benson, R. H., 'Lourdes5 (London 1914) ; Bertrin, 'Histoire critique des evene- ments de Lourdes5 (2d ed., Paris 1905) ; Bois-saire, 'Lourdes histoire medicale5 (ib. 1891) ; Estrade, J. B., 'Appearances of the Blessed Virgin Mary at the Grotto of Lourdes5 (New York 1913) ; Saint John, 'The Blessed Virgin in the 19th Century5 (1902) ; Zola, E., 'Lourdes5 (Paris 1894).

LOURENQO, Marques. See Lorenzo.

LOUSE, a small parasitic insect of a family (Pediculidce) of doubtful affinities, but usually considered to be Hemiptera, much de¬ graded through long-continued parasitism. The lice are all of small size, have soft, much flat¬ tened bodies with thin integument, the ab¬ domen enlarged, the thorax indistinctly seg¬ mented and without the slightest trace of wings, and the short legs terminated with strongly hooked, stout claws. The mouth-parts are adapted for sucking. There is a short proboscis provided with hooks, from the

centre of which, when fixed in the skin of the host, protrudes an extremely delicate tube. The head is also provided with a pair of short, three- or five- jointed antennie, and small simple eyes. Probably on account of their disgust¬ ing habits the lice have been but little studied, and beyond the fact of their parasitism very little is known of their habits. They feed ex¬ clusively upon blood, which is secured by wounding the host's skin, fixing the proboscis by means of its hooks, and inserting the delicate tube above mentioned in the wound. A suction-bulb in the head propels the blood through the long writhing oesophagus into the bilobed stomach. Lice never leave their host except to pass to another, and the eggs, as well as all stages of the young, are found with the adult. Only six genera and less than 50 species have been described, but probably many others remain undiscovered. They are found on mammals exclusively, each species of mammal commonly harboring a peculiar species of louse. Man is more richly endowed, having three species: the head-louse (Pediculus capitis), the body-louse (P . corporis) and the crab-louse (q.v.). The two first mentioned are very closely alike and are said to vary according to the different races of men which they infest. Human lice are of course associated with filth, and are found only upon neglected children and persons of uncleanly habits. A very re¬ markable louse is found on the seal, and is consequently aquatic.

The bird-lice (q.v.), or Mallophaga, are en¬ tirely distinct from the true lice.

Consult Piaget, 'Les Pediculines5 ; Giebel and Nitzsch, 'Insecta Epizoica5 ; Ealand, 'In¬ sects and Man5 (New York 1915).

LOUSEWORT, the plants of the genus Pedicularis, of the family Scrophulariacece, which are low, usually pubescent, perennial herbs, with chiefly pinnatified leaves and sp'kes of purplish yellow, two-lipped flowers. The species are few in North America, the most common being P. canadensis, sometimes called wood-betony.

LOUSIAD, low'zi-ad, The. An heroic- comic poem in five cantos bv John Wolcott (1785), in which the author ridiculed the home life of George III. The poem, according to the author, was suggested by the presence of a louse on a dish brought to the king's table. An order went forth immediately to shave the heads of the royal scullions.

LOUTH, lowth, England, market town and municipal borough of Lincolnshire, on the river Lud and on the Grimsby branch of the Great Northern Railway, 141 miles north of London. A canal connects it with the Humber. The town contains the fine old church

of Saint

James, a town hall, corn exchange, a grammar school, commercial school, a hospital, several almshouses, Thorpe Hall and the ruins of a Cistercian abbey. It has manufactures of agri¬ cultural implements, iron foundries and rope and brick-making establishments. There are municipal markets and a cemetery. Louth, ac¬ cording to the Domesday Book, was a bor¬ ough held by the bishop of Lincoln from Saxon times. It was surrendered to Henry VIII. In 1536 the Lincolnshire Rebellion broke out here. The town was incorporated under Edward VI in 1551 and a new charter was granted in 1830. Pop. 9,880. Consult Goulding, Richard W., (Louth Old Corporation Records) (Louth

1891).

LOUVAIN, loo-van (Flemish, Leuven; German, Lowen), Belgium, city in the province of Brabant, on the Dyle, 15 miles east by north of Brussels. It was surrounded by earthen ramparts, which have been converted into pleas¬ ant promenades, which form almost a perfect circle, diameter nearly two miles. There are many buildings of historical interest, among which are the Hotel de Ville, one of the rich¬ est and most beautiful Gothic buildings in the world, elaborately and exquisitely decorated in every part of its exterior by sculptures of sub¬ jects taken, for the most part, from the Old Testament (restored 1842, injured by lightning 1890) ; the collegiate church of Saint Peter, al¬ most opposite the Hotel de Ville, built at the end of me 14th century, an edifice of vast ex¬ tent, which was rich in works of art, particu¬ larly a fine (Holy Family) by Matsys. The educational institutions were numerous, among them the university, which had a number of American students who were studying for the priesthood. It had an attendance of nearly 3,000 students and a library of 120,000 volumes, specially rich in examples of 15th and 16th century printed books. There are also a col¬ lege, an academy of fine arts, two normal schools for the training of teachers, several secondary and elementary schools. There are hospitals, homes for orphans and other chari¬ table institutions. It has a number of manu¬ factories, the most important of which are the tanneries. For a general trade the town is well situated, having ample communication both by railroad and the Louvain Canal. The name of Louvain first appears in history about

the end of the 9th century. It was surrounded with walls in 1115, but was afterward much en¬ larged. The dukes of Brabant inhabited the castle till the 13th century. At the beginning of the 14th century Louvain was the capital of Brabant, contained 200,000 inhabitants and had an extensive and flourishing trade in the man¬ ufacture of broadcloth and all kinds of woolens. The populace, jealous of the privileges of the nobles, revolted in 1382, and being overcome by Duke Wenceslaus and subjected to severe oppression, emigrated in great numbers to Eng¬ land and thus caused the decav of the town. During the European War Louvain was taken by the Germans on 19 Aug. 1914. After six days of peaceful occupation the Germans ad¬ vanced beyond the city, but were driven back by the Belgian troops about Malines. Return¬ ing to Louvain, the German troops under the command of Major von Manteuffel, began to devastate the city. At midnight the houses

were set in flames, while rifle and machine-gun fire swept the streets. The German version stated that the fighting was the outcome of a plot among the civilian population ; the Bel¬ gians declare that a detachment of German troops, driven back from Malines, was fired upon in mistake by the Germans occupying Louvain. On the 26th fire and destruction con¬ tinued; the university with its library were set on fire, also the church of Saint Peter and many houses. Citizens were shot and others taken prisoners and compelled to go with the troops. Many of the civilians hid in cellars, but the soldiers fired down through the grat¬ ings. On 27 August orders were given that everj^one should leave the city; it was going to be bombarded. The exodus began in the morn¬ ing; streams of men, women and children passed along the roads — in opposite directions — leading to Malines and Tirlemont. Groups of prisoners with tightly-bound hands were led by long ropes. About 1,000 refugees were brought back to Louvain on 28 August and placed in a large building on the cavalry exercise ground. <(These prisoners were prac¬ tically without food from early morning on the 26th until midnight on the 29th. Of the corpses seen on the road some had their hands tied be¬ hind their backs, others were burnt, some had been killed by blows, and some corpses were those of children who had been shot.

On the way from Rotselaer to Wespelaer 50 bodies were seen, some naked and carbonized and unrecognizable® (Bryce Report). A crowd of men, women and children from Aerschot (q.v.) were marched to Louvain and exposed to rifle and machine-gun fire. One batch of prisoners comprised 27 ecclesiastics, of whom Father Eugene Dupiereux, aged 23, was executed in the presence of his colleagues for having in his pocket a piece of paper on which was written :

((The Germans have in¬ vaded Belgium with fire and sword when Omar destroyed the library of Alex¬ andria, none believed that such vandalism would ever be repeated. It was repeated in Louvain . . . such is the Germanische kul-

tur of which they boasted so much.® Father Schill, S. J., a native of Luxemburg, was com¬ pelled to read the document — which was in French — and translate it into German. Con¬ sult Massart, Jean, (Belgians under the Ger¬ man Eagle> (London 1916) ; Morgan, J. H., (Official Investigation on German Atrocities5 (London 1916) ; (An Eye-Witness at Louvain5 (per Father Thurston, S. J., London 1914) ; Toynbee, A. J., (The German Terror in Bel¬ gium5 (New York 1917). See War, Euro¬ pean: Invasion of Belgium. Pop. 42,123.

LOUVAIN, University of. An institution for higher education situated at Louvain, Bel¬ gium. It was founded in 1425 and was richly endowed. At one time it had 28 constituent colleges, including the Collegium Trilingue, founded in 1517 for the study of Hebrew, Greek and Latin. In the 16th century the uni¬ versity was attended bv 6,000 students and was one of the first scientific institutions of Eu¬ rope, celebrated especially for its department of Roman Catholic theology. The university played an important part in the reformation from within of the Catholic Church in the 16th century. Some of its faculties were trans-

'erred to Brussels in 1788, but during the trench Revolution the university was sup¬ pressed and although it was reconstituted in 1817 it has not regained its past glory. The present foundation dates from 1834-35 when the Belgian bishops re-established the univer¬ sity on its present basis. In 1913 it had 2,855 students and a library of 250 incunabula and 120,000 volumes. In August 1914 the univer¬ sity and library were razed by the German hordes pouring over the border to attack b ranee. All the work of the university was suspended at Louvain, but the leading British universities made generous offer of their facili¬ ties to the homeless faculties of Louvain and to such of its students as were able to continue their course. Consult Gill, H. V., (Louvain and its University) (in Irish Monthly , Vol. XLII, Dublin 1914).

L'OUVERTURE, Toussaint. See Tous-

LOUVOIS, Frangois Michel Le Tellier,

fraii-swa me-shel le tel-e-a loo-vwa, Marquis of, Minister of War to Louis XIV : b. Paris, 18 Jan. 1641 ; d. 16 July 1691. He was early made a royal councillor through the influence of his father who was War Secretary. After 1666 he had the whole management of the Ministry of War and soon exercised great power under the king and over the army. His extensive knowledge, his decision, activity, industry and talents, rendered him an able minister; but he was too lavish of the blood and treasure of France and he pandered to the vanity and pas¬ sion for military glory of his master. Justly appreciated, Louvois must be considered as the evil genius of the showy but disastrous reign of Louis XIV. The war of 1672 against Hol¬ land was begun at his instigation. The vic¬ tories of Turenne in 1674 and 1675 were gained by a disobedience of the orders of the Minister of War; but the devastation of the Palatinate was commanded by him. On the death of Col¬ bert (1683), of whom he had been the enemy, his influence became still greater; he opposed Louis' secret marriage with Madame de Main- tenon ; and to a large extent he was respon¬ sible for the revocation of the Edict of Nantes (1685), the dragonnades, and the consequent flight of so many peaceful and industrious Cal¬ vinists. The encroachments of France had united the European powers in the League of Augsburg. Louvois would have the king com¬ mence operations against the allies at once, but the growing influence of Madame ere Mainte- non was sufficient to prevent this. In 1688 how¬ ever, the French forces took Philipsburg on the Rhine, and on the order of Louvois the Pala¬ tinate was reduced to a wilderness in midwin¬ ter (1689). Louvois' scheme of army organ¬ ization lasted till the empire; but he undid the constructive work of Colbert and destroyed the commerce of France. Consult Rousset, (Histoire de Louvois) (Paris 1872) ; Michel, 'Louvois et les protestants> (ib. 1870).

LOUVRE, loovr, The, an old royal palace at Paris, on the north bank of the Seine, a splendid quadrangular edifice, with a court in the centre, completed by Napoleon. The origin of its name and the time of the erection of the oldest part of it are unknown. It is only known that Philip Augustus, in 1214, built a fort and a state prison in this place, that Charles V,

during the years 1364-80, added some embellish¬ ments to the building and brought his library and . his treasury thither. From the

great donjon tower in the centre of the castle the great fiefs of France took the feudal oath. Francis I erected that part of the palace which is now called the old Louvre. Henry IV laid the foundation of the splendid gallery which connects the Louvre on the south side with the 1 uileries ; Louis XIII erected the centre, and Louis XIV, according to the plan of the physi¬ cian Perrault, the elegant fagade toward the east, together with the colonnade of the Louvre, which is still the most perfect work of archi¬ tecture in France. At a later period Louis XIV chose the palace built by him at Versailles for his residence. After Napoleon had taken possession of the Tuileries he began a second gallery, opposite to the former, by which the two palaces would have been made to form a great whole, with a large quadrangular court in the centre; only 600 feet of it were completed at the time of his abdication, and it remained uncompleted till 1857, when the work, in an improved and extended form, was finished. It was greatly injured by the communists in May 1871, the Richelieu pavilion, containing the magnificent library, being burned. A great re¬ construction was made between 1900 and 1902. The Louvre was set apart by the Convention as a museum for the national collections in science and art and was first called Le Musee National. It contains the museums of paint¬ ings, drawings, engravings, bronze antiques, sculptures, ancient and modern, tapestries, fur¬ niture, together with special collections of an¬ tiquities and an ethnographical collection. The collection of paintings is the largest in the world, French being best represented, and Dutch masters next. There are works by Raphael, Leonardo da Vinci, Titian, Rubens and Van Dyck. Since 1895 the Louvre has been given the right to buy and sell like a private individual, and a society exists for the purpose _ of helping the museum to buy works of importance. In 1909 the Museum of Decorative Arts was transferred from the Palais de l'lndustrie to the Louvre.

LOUYS, loo'e, Pierre, French 'novelist and poet : b. Paris, 1870. He was educated at the Lycee of Janson de Sailly and at the Sor- bonne. In 1889 he founded the review, La Conqne. He came into prominence in 1896 with the publication of the novel (Aphrodite. > Ten years later it was produced as an opera. The scene is laid in Alexandria at the begin¬ ning of the Christian era. Louys' (Chansons de Bilitis, roman lyrique) purports to be a Greek translation. Its subject matter is objec¬ tionable. Other works are (1909), and a translation from Lucan, (La vie des courtisanes) (1894).

LOVAGE, an umbelliferous plant of the genus Levisticum , native to the south of Europe, sometimes cultivated in gardens, and notwithstanding its strong and peculiar odor, used as a salad plant.

Its roots and seeds are aromatic, acrid and stimulant, and a liquor called Hovage® is made from them. The Scot¬ tish lovage is a native of the sea-coasts and

has become naturalized in maritime New Eng-, land. It is eaten, both raw and boiled, by the Shetlanders. The flavor is aromatic, but acrid and very nauseous to those unaccustomed to it.

LOVAT, lo-'vat, Simon Fraser, 12th Baron, Scottish chieftain: b. 1667; d. London, 9 April 1747. He was educated at King's College, Aberdeen, and in 1699, on the death of his father, assumed the title of Lord Lovat, to which on the death of the 10th Lord Lovat his father had acquired a disputed claim. In con¬ sequence of proceedings taken in 1698 against him and his clan, in which he was declared guilty of treason, he went to France. He afterward obtained a pardon and returned to Scotland. Being summoned before the High Court of Justiciary in 1701 for an outrage done to the Dowager Lady Lovat, whom he married by violence, he failed to appear, and was out¬ lawed. In 1715 he was asked by the Jacobites of his clan to espouse the cause of the Pre¬ tender, but inducing them to support the gov¬ ernment he received in reward the estate and title of Lovat, the other claimant of which had been involved in the rebellion. In 1740 he was the first to sign the association for the sup¬ port of the Pretender, and on the breaking-out of the rebellion, in 1745, sent his eldest son with a body of his clan to join the Pretender, while he remaining at home asserted his loyalty to the house of Brunswick. It was only after the prince's success at Prestonpans that he al¬ lowed his real sympathies to be shown. He was arrested after Culloden, found guilty of treason and was executed on Tower Hill, in the 80th year of his age. Consult Burton, (Life of Simon, Lord Lovat) (London 1847) ; and Mackenzie, W. C., (Simon Fraser, Lord Lovat: His Life and Times) (ib. 1908).

LOVE, Court of. See Court of Love.

LOVE-APPLE. See Tomato.

LOVE-BIRD, one of the very small par¬ rots of the genus Agapornis, not larger than sparrows, which show extreme affection for one another, two or more sitting as close as possible to one another, and cooing and caress¬ ing in a manner most delightful to watch. Thev

are common as cage-birds all over the world, are pretty in color and fond of being petted. They are to be treated and fed in the cage in the same way as canaries. The true love-birds are African, but dealers give the same name to various other diminutive tropical species of similar habits. See Parrots and the books cited there.

LOVE FEASTS, religious meetings held quarterly by the Wesleyan and other . sects. Love feasts are retained in avowed imitation of the ancient Agapae. See Agape.

LOVE LIES A-BLEEDING. See Ama-

RANTHUS.

LOVEDALE, Sputh Africa, an important educational and mission station about 40 miles west of King William's Town and 650 miles northeast of Cape Town. It was founded in 1841 by the Free Church of Scotland (now the United Free Church). Besides a general edu¬ cation, it trains teachers for native schools, and gives technical instruction in printing, book¬ binding, telegraphy, carpentering and other use¬ ful arts and crafts; its success has been most creditable.

LOVEJOY, Arthur Oncken, American professor: b. Berlin, Germany, 10 Oct. 1873. In 1895 lie was graduated at the University of California, and subsequently studied at the uni¬ versities of Harvard and Paris. In 1899-1901 he was assistant and associate professor of philosophy at Leland Stanford Junior Univer¬ sity; from 1901 to 1908 professor of philosophy at Washington University, Saint Louis. In 1908-10 he held a similar chair at the Univer¬ sity of Missouri, and since 1910 has been pro¬ fessor of philosophy at Johns Hopkins. In 1907-08 he was lecturer in philosophy at Columbia University. Professor Lovejoy is Fellow of the American Association for the Advancement of Science; was president in 1909 of the Western Philosophical Associa¬ tion, and in 1915 served as secretary of the American Association of University Professors. He is a contributor to the Journal of Philoso¬ phy , the Journal of Ethics, the Hibbcrt Journal, Mind, the Monist, the Nation, etc.

LOVEJOY, Elijah Parish, American

abolitionist: b. Albion, Me., 9 Nov. 1802; d. Alton, Ill., 7 Nov. 1837. He was graduated at Waterville College in 1826, and at the Prince¬ ton Theological Seminary in 1833, and was or¬ dained to the ministry, but soon after assumed the editorship of the Saint Louis Observer, a Presbyterian paper of considerable influence. His

utterances on the slavery question did not begin to appear in the Observer until he had been for some time in charge of its columns, and his first references to that subject were marked by moderation. But, stirred by the lynching of a negro murderer by burning, he published an editorial which incensed the pro¬ slavery part of the community. Hostility was so violent that he removed the paper to Alton, Ill., where a mob threw his press into the river. He was presented with another by Alton friends, and 8 Sept. 1836 published the first issue of the Alton Observer. He soon took a bolder anti-slavery stand, and began to call for the organization of a State abolition society. Again, in August 1837, he was mobbed, his office wrecked and the press destroyed, and when a new press was bought the ruin was again repeated. The fourth press was set up in a warehouse under an armed guard; but during the night of 7 Nov. 1837 a score or two of men attacked the building, disregarded Lovejoy's warning, were fired upon and one of the assailants was killed. An attempt was then made to set the warehouse on fire, and when Lovejoy was preparing to shoot the in¬ cendiary, he himself received a mortal gunshot wound. The mob then took possession of the place, and once more Lovejoy's press was de¬ stroyed. The whole country was excited by these events ; public feeling was manifested in various ways ; but the most significant effect of the tragedy was a more distinct arraying of forces for the (

*(William Lloyd Garrison * (New York 1885), and Martyn, (Wendell Phillips — the Agitator**

(1890).

LOVEJOY

LOVEMAN

695

LOVEJOY, Owen, American abolitionist: b. Albion, Me., 1811; d. 1864. He was a brother of E. P. Lovejoy (q.v.) ; was educated at Bowdoin College, and in early life he re¬ moved to Alton, Ill. Entering the ministry of the Congregational Church, he preached and lectured against slavery with a power that roused his hearers and carried wide conviction. At Princeton, Ill., where he began a pastorate in 1838, he became conspicuous for the earnest¬ ness of his anti-slavery addresses, and for his persistence in holding anti-slavery meetings in defiance of legal and official prohibitions. In 1844 he was elected to the legislature, and resigned his pulpit.

Elected to Congress in 1856 he participated in its most exciting de¬ bates until the time of his death. He was with his brother Elijah at Alton, Ill., 7 Nov. 1837, and was a witness of his tragic death.

LOVEJOY, Owen Reed, American soci¬ ologist: b. Jamestown, Mich., 9 Sept. 1866. In 1891 he was graduated at Albion College, Mich¬ igan. From 1891 to 1898 he was minister of the Methodist Episcopal Church and from 1899 to 1904 served as pastor of a Congregational church at Mount Vernon, N. Y. In 1904 he became assistant secretary and three years later general secretary of the National Child Labor Committee. He is a member of the American Association for Labor Legislation, the Ameri¬ can Economic Association, the American Polit¬ ical Science Association, the National Confer¬ ence of Charities and Corrections, the New York Academy of Political Science, etc. He has published bulletins and papers on uniform child-labor laws, child labor in the glass indus¬ try, etc.

LOVELACE, Francis, American colonial governor : b. Hurley, Berkshire, England, about 1618; d. England, about 1675. He was a younger son of the 1st Baron Lovelace; was an adherent of the royalist cause during the Puritan uprising and during the Common¬ wealth. In 1668 succeeded Richard Nicolls as governor of New York. He encouraged trade and the fishery interests and permitted re¬ ligious freedom, but oppressed the inhabitants by heavy taxation and became very unpopular. During his temporary absence from the town in 1673 the Dutch fleet appeared in the harbor and the citizens speedily surrendered willingly. Lovelace was permitted to return to England, and it is believed that he died there about two years afterward.

LOVELACE, Richard, English lyrical poet-: b. Woolwich, Kent, 1618; d. London, 1658. He was educated at Oxford, entered the army and became a captain. He joined the ex¬ pedition to Scotland in 1639. He spent his fortune in support of the royal cause ; was im¬ prisoned in 1642 for petitioning for a restora¬ tion of the rights of the king. After entering into the French service, in 1648, he returned to England and was imprisoned until the king's death. His destitute condition at this time is in marked contrast to accounts of his hand¬ some person and splendid appearance earlier in life. He died in great poverty. His poems, which are light and elegant, were published in 1659 under the title of 'Lucasta. The best known of his lyrics are (To Althea, from Prison* and (To Lucasta, on Going to the*

Wars. Lovelace, who for spirit and gallantry has been compared to Sir Philip Sidney, also wrote (The Scholar* (1636), a comedy, and*

*(The Soldier * (1640), a tragedy. An edition of his poems, edited by W. C. Hazlitt, was published in 1864.*

LOVELAND, luv'land, Colo., city in Lari¬ mer County, on the Colorado and Southern and the Great Western railroads, 60 miles north of Denver. The city has a Carnegie library, hos¬ pital, the Loveland Canon, Estes Park, also beet-sugar mills, canning factories, brick-yards, gvpsum mills and a co-operative condensing plant. The electric-light plant and the water- supply system are municipally owned. Pop.

(1920) 5,279.

LOVELL, James, American patriot : b. Boston, Mass., 31 Oct. 1737; d. Windham, Me., 14 July 1814. He was a son of John Lovell (q.v.), was graduated from Harvard in 1756 and taught in the Boston Latin School under his father in 1757-75. In 1771 he delivered the first anniversary oration on the so-called ((Bos- ton Massacre.® He was imprisoned by Gen¬ eral Gage and carried to Halifax, but was ex¬ changed in November 1776, and sat in the Con¬ tinental Congress, 1776-82. He was collector of the port of Boston, 1788-89, and its naval officer, 1790-1814. He failed to appreciate Washington's qualities as leader and supported the Conway Cabal to place General Gates in supreme command.

LOVELL, John, American educator: b. Boston, Mass., 16 June 1710; d. Halifax, N. S., 1778. He was graduated from Harvard in 1728. The next year he was appointed usher in the Boston Latin School and was its master from 1734 till the siege of Boston caused its suspension, 19 April 1775. He was a rigid dis¬ ciplinarian, but nevertheless genial and popular, and many of his pupils were leaders of the Revolution. In 1743 he was the chosen orator at the dedication of Faneuil Hall. A loyalist in his sympathies he went to Halifax on the evacuation of Boston by the English troops and died there. A portrait of him by Smybert is in Memorial Hall at Harvard University.

LOVELL, Mansfield, American soldier: b. Washington, D. C., 1822; d. 1884. In 1842 he was graduated at the United States Mili¬ tary Academy; was commissioned lieutenant of artillery and saw active service against Mex¬ ico. He was wounded at Monterey. He re¬ signed from the army in 1854 and entered civil life, becoming in 1858 superintendent of street improvements and deputy street commissioner of New York. On the outbreak of the Civil War he became a major-general in the Con¬ federate army; was attached to

the Department of the South with New Orleans as headquar¬ ters. He surrendered that city to Farragut. In the later phases of the war he served in Mis¬ sissippi, Georgia and South Carolina. For some few years after the war he retired to a plahtation near Savannah, but subsequently served as assistant to John Newton in deepen¬ ing the ship channel at Hell Gate in the East River, New York.

LOVEMAN, Robert, American poet: b. Cleveland, Ohio, 11 April 1864. He received an academic education at Dalton, Ga., and thereafter traveled and studied abroad. He

has been a frequent contributor to magazines, and his verse is marked by simplicity and ear¬ nestness. He has published (Poems) in 1889, 1893 and 1897; (A Book of Verse) (1900); (The Gates of Silence, > with ˆInterludes of Song) (1903); (Songs from a Georgia Gar- den) ; (Echoes from the Gates of Silence)

(1905); (The Blushful South and Hippocrene) (1909); (On the Way to Willowdale) (1912).

LOVER, Samuel, Irish painter, novelist and poet: b. Dublin, 24 Feb. 1797 ; d. Saint Helier, Island of Jersey, 6 July 1868. He first devoted his attention to painting, and in 1828 became a member of the Royal Hibernian Academy of Art. He afterward wrote novels, which he illustrated himself, dramas, operettas and songs which he set to music of his own. In 1844 he gave a series of public entertain¬ ments called Irish evenings, which he repeated in the United States and Canada in 1846. Among his works are (Legends and Stories of Ireland) (1831); (Rory 0'More) (1837); (Songs and Ballads (1839) ; (Handy Andy* (1842) ; (Treasure Trove) (1844). The (Angels' Whisper) ; (Rory O'More* ; (Molly Bawn} and the (Low-backed Car) are among his most popular songs. His works in six vol¬ umes, with introduction by O'Donohue, were issued iu New York in 1900, and with intro¬ duction by Roche, in Boston, 1902.*

LOVE'S LABOUR'S LOST (circa 1590) is the most obviously experimental of Shake¬ speare's plays and for that reason is reckoned his earliest unaided work (that it was actually earlier than (The Comedy of Errors, which was written under classic guidance, cannot be asserted). It has o'ne of Shakespeare's two or three most original plots and technically one of the worst, though it is distinctly*

entertaining. The central situation is the converse of that in Tennyson's (Princess : for the sake of study a company of young gentlemen have bound themselves to absurd regulations against com¬ munication with women. Around the inevi¬ table shattering of these self-imposed vows the author puts together a loose succession of scenes quite lacking in coherence, but sug¬ gested by all the varied ideas which at the time happened to be in his mind ; his recollection from Stratford of the comicality of the country par¬ son, schoolmaster and yokel ; his almost naive admiration of the superficially brilliant London lords and ladies; and his yet far from intelli¬ gent interest in foreign affairs. The chief fig¬ ures are leading personages in contemporary French history: the Princess of France (Queen Catherine de Medici), Henry of Navarre, two Huguenot generals associated with him (Lo'nga- ville and Biron), and — bizarrely enough — Na¬ varre's arch-enemy, the Due de Mayenne (Du- maine). These veteran diplomats and war¬ riors are represented as sentimental young peo¬ ple of the most charming wit and volatility. Insouciance is the keynote; the play's the thing; but nothing that happens really matters and the plot leads nowhere. This comedy is primarily interesting as a study in style. Lyly exerts the strongest literary influence and there is much echoing of his mannered prose, as well as of his artificial pictures of social life at court; but rhyming couplets, blank verse, quatrains, anapaestic rhyme, hexameter, dog¬ gerel and various tyric measures are all experi¬*

mentally employed. Naturally enough, greater maturity appears in the lyric than in the dra¬ matic portions. Masefield calls the final song ((When daisies pied and violets blue) (*

" Taffeta phrases, silken terms precise,

Three-pil'd hyperboles, spruce affectation,

Figures pedantical; these summer-flies Have blown me full of maggot ostentation.

I do forswear them — " (V.ii, 406 ff.)

The play enjoyed a lasting esteem on the Eliza¬ bethan stage. There is no question that the text as we have it includes alterations and ad¬ ditions made when Shakespeare's art had fur¬ ther developed — probably when the comedy was revived for performance before Queen Elizabeth herself on Christmas of either 1597 or 1598 (consult Gray, H. D., (The Original Version of (

Tucker Brooke.

LOVETT, Edgar Odell, American mathe¬ matician : b. Shreve, Ohio, 14 April 1871. In 1890 he was graduated at Bethany College, West Virginia, and later studied at the univer¬ sities of Virginia, Leipzig and Christiania. In 1890-92 he was professor of mathematics at West Kentucky College; from 1892 to 1895 was instructor in astronomy at the University of Virginia. In 1897 he became instructor in mathematics, in 1898 assistant professor, in 1900 professor at Princeton. In 1905-08 he held the chair of astronomy there. In 1908 Pro¬ fessor Lovett was made president of Rice In¬ stitute, Houston, Tex. He is a contributor on geometry, mechanics and mathematical as¬ tronomy to various American and foreign journals.

LOVETT, Robert Scott, American rail¬ way official: b. San Jacinto, Tex., 22 June 1860. He was educated in the public schools and Houston High School, followed by private in¬ struction. In 1882 he was admitted to the bar; was attorney for the Houston, East and West Texas Railway Company in 1884-89, assistant general attorney of the Texas and Pacific Rail¬ way in 1889-91 and general attornev of this road in 1891-92. From 1892 to 1903 Mr. Lovett was general attorney and counsel for all Southern Pacific lines in Texas. From 1904 to 1909 Mr. Lovett was general counsel for the Union Pacific and the Southern Pacific and affiliated railroads, and from 1909 to 1913 he was chairman of the executive committee and president of these svstems. In March 1918 he became director of the division of additions and betterments under the United States Railway Administration.

LOW, Albert Peter, Canadian geologist: b. Montreal, 1861. He received his education at McGill University; began his connection with the Canadian Geological Survey in 1881

and was appointed geologist in 1891. From 1892 to 1899 he made extended explorations of the Labrador Peninsula (Ungava). In 1900, at the Paris Exposition Mr. Low had charge of the Canadian mineral exhibit. In 1901-02 he discovered workable iron deposits in Hudson Bay and in 1903 was in charge of an Arctic ex¬ pedition which claimed the Arctic islands for Canada. In 1906 he was made director of the Canadian Geological Survey and in the follow¬ ing year

Deputy Minister of Mines. In 1896 he was awarded the Gill prize by the Royal Geographical Society of England and has served as vice-president of the Geological So¬ ciety of America and of the Canada Forestry Association.

LOW, A(lfred) Maurice, Anglo-American author and journalist; b. London, England, 1860. He was educated at King's College, London, and in Austria. He has been chief American corre¬ spondent of the London Morning Post and writer on American affairs for the London National Review since 1896. He investigated certain phases of English labor legislation for the United States Department of Labor in 1900, and English trade unions and industry in 1903. He has written (The Supreme Sur¬ render (1901); Protection in the United States5 (1904); (American Life in Town and Country5 (1905) ; (A Short Historv of Labor Legislation in Great Britain5 (1907) ; (The American People: A Study in National Psychology5 (2 vols., 1909-11), and contribu¬ tions to leading English and Americans re¬ views.

LOW, Charles Rathbone, English histo¬ rian and naval officer: b. Dublin, Ireland, 30 Oct. 1837. He went to sea in 1853, has served in Asiatic and African waters and holds the rank of commander in the Indian navy. He is the author of numerous works, including (Tales of Old Ocean5 (1860) ; (Land of the Sun5 (1870) ; (History of the British Navv5 (1872) ; (History of the Indian Navy5 (1877) ; (History of Maritime Discovery5 (1899) ; Per Majesty's Navy5 (1902) ; (Britannia's Bul¬ warks5 (1895) ; (The Epic of 01ympas) (1897), etc.

LOW, Mary Fairchild, American artist: b. New Haven, Conn., 1866. She studied in the School of Fine Arts, Saint Louis, the Academie Julien, Paris, andl with Carolus-Duran. In 1888 she married Frederick MacMonnies, the sculptor, and in 1909 Will Hicok Low, the fig¬ ure and genre painter. She was awarded a medal at the Chicago Exposition of 1893, a bronze medal at Paris, in 1900, bronze medal at the Buffalo Exposition 1901, gold medal at Dres¬ den 1902, the Julia M. Shaw memorial prize of the Society of American Artists, New York 1902, and a gold medal at Rouen in 1903 ; her picture was bought by the city of Rouen and placed in the Museum of Fine Arts. In 1905 she was awarded a gold medal at Marseilles and a gold medal at Rouen in 1911. Mrs. Low is an associate National Academician. Her works in¬ clude (Earlv Morning Flower Market5 ; (Little Women;5 (Christmas Eve5 ; Portrait of Will Hicok Low5 ; Pogwood in Bloom,5 etc.

LOW, Sampson, English publisher: b. London, 1797; d. 1886. He became manager in 1837 of a fortnightly trade journal styled The Publishers' Circular, on which his (British

Catalogue5 was afterward based and of which he became proprietor in 1867. He established the publishing house of Sampson Low & Co., in 1848. His various compilations include (In- dex to Current Literature5 (1859-60) ; (Low's Literary Almanac5 (1873), etc.

LOW, Seth, American educator and ad¬ ministrator: b. Brooklyn, N. Y., 18 Jan. 1850; d. Bedford Hills, N. Y., 17 Sept. 1916. He was educated at the Brooklyn Polytechnic In¬ stitute and at Columbia, graduating from the latter in 1870. He then entered his father's tea and silk importing business as a clerk, and passing through all the intermediate grades be¬ came a junior partner in the firm in 1875. In 1879 he and the other junior partners took full control of the business which was finally liqui¬ dated in 1888. He was early interested in pub¬ lic affairs, especially in charities, was prominent in the movement which resulted in abolishing the system of outdoor relief of Kings County, and was organizer and first president of the Bureau of Charities. He was also active in the Republican party, being president of the Young Republican Club in the Garfield campaign of 1880; and though he resigned the presidency re¬ mained an active member of this club, which soon began agitation for the non-partisan ad¬ ministration of city affairs. In 1881 he was nominated for mayor of Brooklyn on an inde¬ pendent ticket, and elected; after an efficient administration he was re-elected in 1883, serv¬ ing another two years. His administrations were marked by reforms in the system of taxa¬ tion, and in the public schools, but more es¬ pecially by the introduction of the civil service system and non-partisan appointments in city affairs. In October 1889 he was offered the presidency of Columbia College (now Columbia University), which he accepted. While he was president, the undergraduate department was enlarged, the graduate schools and Barnard closely affiliated, the institution organized as a university and the site changed. He also gave the university $1,000,000 for the erection of a library building. He retained his interest in public affairs, was a member of the Rapid Transit Commission, and of the Greater New York Charter Commission, and an earnest ad¬ vocate of consolidation ; he was also twice a referee in labor troubles. In 1897 he was an independent cancidate for mayor of Greater New York and was defeated, though polling over 150,000 votes. In 1899 he was a member of the United States delegation to The Hague Peace Conference. In 1901 he was nominated for mayor of Greater New York on a Fusion ticket, and was elected. His administration of the

next two years led to a reduction of the taxes, sweeping reforms in the police depart¬ ment and an enlargement of the public school system, and showed a strict adherence to the principles of business-like administration of public affairs which characterized his Brooklyn mayoralty. In 1903 he was again Fusion candi¬ date for mayor, but was defeated, a defeat gen¬ erally attributed not to any serious mistakes or faults in his administration, but rather to party questions and complications. From 1907 until his death he was president of The National Civic Federation. In 1914 he was elected president of the Chamber of Commerce of the State of New York, which office he held until his death. In 1914 he was appointed

by President Woodrow Wilson chairman of The President's Colorado Coal Commission. In connection with this appointment the great coal strike in Colorado was called off. He was delegate-at-large and chairman of the Cities Committee of the New York State Con¬ stitutional Convention, 1915.

LOW, Will Hicok, American painter : b. Albany, N. Y., 31 May 1853. He learned paint¬ ing at Paris under Gerome and Carolus-Duran (1873-77), and since 1890 has been Academician of the National Academy of Design, and is one of the founders of the Society of American Artists. He is classed among the most active and versatile of living American artists and has been alike successful in decorative wall paint¬ ings, stained glass (at which he worked with John La Farge, q.v.), portrait and book illus¬ tration in black and white. His strength as a designer and colorist has been recognized by the public awards made to his work and by the demand for his services on the part of private and public patrons and connoisseurs. He has also had charge of life classes in the schools of Cooper Union and the National Academy of Design. He delivered the Scammon lectures at the Chicago Art Institute in 1910. These were published later under the title, (A Painters' Progress) (1910). The following are some of his best-known pictures: (Portrait of Albani> (1877) ;

LOW CHURCH, a popular name given to a section of the Church of England whose opinions are opposed to those of the High Church party, and are especially hostile to ritualism and sacerdotalism.

LOW COUNTRIES. See Belgium and Holland.

LOW POTENTIAL SYSTEM. See

Electrical Terms.

LOW SUNDAY, the first Sunday after Easter, so called to emphasize the contrast be¬ tween the great feast of the Resurrection and the Sunday which ends the octave. In the Mis¬ sal (q.v.) and the Breviary (q.v.) the name is <(Dominica in Albis,55 because on this day the newly baptized wore their white robes for the last time. Mention is made of this custom in the Breviary hymn used in the vespers of Low Sunday, <(Ad regias Agni dapes.55 The name ((Beloken Paschen,55 close of Easter, is used fre- quentlv in Holland; and ˆQuasimodo,® the first word in the Introit of the Mass for the day, is the common name for this day in Germany and France.

LOWDEN, Frank Orren, American pub¬ lic official: b. Sunrise City, Minn., 26 Jan. 1861. In 1885 he was graduated at the State University of Iowa, and two years later re¬ ceived the degree of LL.B at the Union College of Law, Chicago. From 1887 to 1902 Mr. Lowden practised his profession in Chicago and in 1889 held the chair of law at North¬ western University. In 1906 Mr. Lowden was elected member of the 59th Congress for the unexpired term of R. R. Hitt, deceased. He was re-elected to the 60th and 61st Congresses (1907-11), and in 1916 was elected governor of Ulionis for the term 1917-21.

LOWE, Charles, English journalist and biographer: b. Balconnel, Forfarshire, Scot¬ land. He was educated at the University of Edinburgh and on the Continent, and was for 13 years Times correspondent at Berlin, returning to England in 1891. He published two biographies of Bismarck; (Bismarck's Table Talk5 ; (Alexander III of Russia) ; (King Edward VIP ; (Our Greatest Soldiers,5 etc.

LOWE, Sir Hudson, British general : b. Galway, 28 July 1769; d. London, 10 Jan. 1844. He entered the army at an early age and saw much service in Europe ; in 1813 was attached to the army of Bliicher, and took part in the invasion of France in the early part of the following year. Appointed in 1815 to the com¬ mand of the English troops which were to co-operate with the Austro-Sardinian army in Italy. He was the first to bring to England news of Napoleon's abdication, in 1814, and was created K.C.B. in 1816. On the fall of Napoleon he was appointed governor of Saint Helena, and entrusted with the care of the ex¬ emperor. He returned to England in July 1821, and was afterward on the staff in Ceylon, 1825-30. He

has been accused by the partisans of Napoleon for want of courtesy and for rigor and cruelty to his prisoner. It is, how¬ ever, freely admitted that Napoleon and his suite made a system of exaggerating their grievances, and even sedulously tried to pro¬ voke them, with a view to exciting sympathy in Europe and especially in England. Many of the grievances were puerile, as that Sir Hudson would not give Napoleon the title of emperor, which England had never recognized, and which he was forbidden by his government to use. Consult Forsyth, (Captivity of Napoleon at Saint Helena from Letters and Journals of Sir Hudson Lowe5 (London 1853) ; O'Meara, (A Voice from Saint Helena: Napoleon in Exile5 (the work of the deposed emperor's physician: ib., 1822) ; Rose, J. H., (Napoleonic Studies5 (ib. 1904) ; Lord Roseberv, (Napoleon: the Last Phase5 ; Seaton, (Sir Hudson Lowe and Napoleon5 (ib. 1898).

LOWE, John, American rear-admiral : b. Liverpool, England, 11 Dec. 1838. He was edu¬ cated in his native city and Columbus, Ohio, and entered the American navy in 1861. He served through the Civil War and accom¬ panied the Greely Relief Expedition in 1884. He was the first naval officer of any nation to serve in a submarine torpedo-boat. This he did in 1898. He made the first report ever presented to the Secretary of the Navy upon that topic. He was promoted rear-admiral 11 Dec. 1900, and retired the same day.

LOWE, Robert, Viscount Sherbrooke, English politician: b. Bingham, Nottingham¬ shire, 4 Dec. 1811; d. London, 27 July 1892. He was educated at Winchester College and at University College, Oxford, and directly upon his admission to the bar in 1842 went to Aus¬ tralia, where he quickly attained prominence in political affairs. In 1843 he became a member of the Legislative Council of New South Wales, and made himself famous by his opposition to the land monopoly, as well as by the part he performed in the development of education and the regulation of finance. He also made effect¬ ual protest against the English practice of transporting convicts to Australia. Meanwhile he was not neglectful of his private affairs, but acquired great wealth, and returned to England in 1850 and became a leader writer on the Times. He sat for Kidderminster, 1852- 58 ; Caine, 1859-67 ; and London University, 1868-80. He was vice-president of the Board of Control 1852-55, and vice-president of the Board of Trade 1855-58; joint secretary of the Board of Control, and in 1859, under Palmerston, was placed practically at the head

of educational affairs. In consequence of a mistaken vote of censure by the House of Commons in 1864 he resigned his office, but only to participate with ability more marked than before in the pro¬ ceedings of that body. The rejection of the Whig Reform Bill in 1866 was considered to have been largely due to his brilliant and power¬ ful speeches against it. As one of the Adul- lamites (q.v.) he received overtures from the government of Lord Derby, but although he called himself an outcast from the Liberal party he refused to leave it. In 1867 he made a number of speeches designed to justify his opposition to extension of the suffrage. His strong support of the resolutions for disestab¬ lishment of the Irish Church, in 1868, restored him to favor in the Liberal party ; and in December of that year he became Chancellor of the Exchequer under Gladstone, giving up that office in 1873 to accept the post of Home Secre¬ tary, in which, however, his tenure was brief. His reforms as Chancellor of the Exchequer related especially to reduction of sugar duties, the replacing of assessed taxes by license duties and like readjustments. After the fall of the Gladstone ministry in 1874 Lowe took comparatively little part in public affairs. He was raised to the peerage as Viscount Sher¬ brooke in 1880. Consult Parkes, (Fifty Years of Australian History) (1892) ; Martin, (Life of Lord Sherbrooke) (1893) ; Hogan, (Robert Lowe, Viscount Sherbrooke) (1893); also Hansard, Parliamentary Debates. >

LOWE, Thaddeus S. C., American in¬ ventor and scientist: b. Jefferson, N. H., 20 Aug. 1832; d. 1913. He constructed balloons in 1856 and 1858-59 in order to study atmos¬ pheric phenomena, and during the Civil War was chief of the aeronautic corps. He devised a system of signaling in 1862, and valuable in¬ struments for atmospheric investigation, etc., constructed and operated in 1858 the largest aerostat ever built up to that time, invented a compression ice machine and made the first artificial ice in the United States (1865) : and established the Lowe Observatory in the Sierra Madre Mountains, Cal. Other inventions by him were metallurgical furnaces for gas and oil

fuel 1869-72, and the water-gas apparatus 1873- 75. After 1897 he put into operation the Lowe coke-oven system.

LOWELL, lo'el, Abbott Lawrence, Amer¬ ican educator and author: b. Boston, 13 Dec. 1856. He was graduated from Harvard in 1877, from the law school of the university in 1880, was a legal practitioner in Boston in 1880-97, and from 1897 to 1899 was a lecturer at Harvard. In 1900 he was appointed there to the chair of the science of government, and in 1909 he became president of

Harvard Uni¬ versity. He has thoroughly reorganized the financial affairs of the university. He is a trus¬ tee of the Lowell Institute since 1900, and of the Carnegie Foundation of the Advancement of Teaching, is a member of the American Acad¬ emy of Arts and Letters, of the British Acad¬ emy and honorary member of the Royal Irish Academy. He has received academic honors from the leading American and foreign uni¬ versities.

Among his works are (Transfer of Stock in Corporations, with Francis C. Lowell (1884) ; (Essays on Government (1889) ; Govern¬ ments and Parties in Continental Europe* (1896); (Colonial Civil Service,* with H.*

Morse Stephens (1900) ; (Influence of Party in England and America) (1902) ; (The Gov¬ ernment of England> (1908) ; Public Opinion and Popular Government (1914).

LOWELL, Charles, American clergyman: b. Boston, 15 Aug. 1782; d. Cambridge, 20 Jan. 1861. He was a son of John Lowell (1743—1802). He was graduated from Harvard in 1800, studied theology at Edinburgh, Scotland, and from 1 Jan. 1806 until his death was pas¬ tor of the West (Unitarian) Church of Boston. His ill-health caused his absence in Europe and the East (1837-40), and in his later years his place in the pulpit was largely taken by his colleague, Cyrus A. Bartol (q.v.). He was an able orator and of strong anti-slavery views. A founder and member of the Society of Northern Antiquarians of Copenhagen, he was also secretary of the Massachusetts Historical Society and a corresponding member of the Archaeological Society of Athens. He was the father of James Russell Lowell and Robert Traill Spence Lowell. Among his published writings are (Meditations for the Afflicted, Sick and Dying ; (Devotional Exercises for Communicants) ; Occasional Sermons) ; Prac¬ tical Sermons> (1855).*

LOWELL, Charles Russell, American soldier: b. Boston, 2 Jan. 1835; d. near Middle- town, Va., 20 Oct. 1864. He was graduated from Harvard in 1854, at the beginning of the Civil War was manager of the Mount Savage ironworks, Maryland, on 20 April 1861 was made a captain in the 6th United States Cavalry, and during the Peninsular campaign, at the close of which he received the brevet of major, commanded a squadron of that regiment. Having been assigned to the personal staff of General McClellan, he distinguished himself at Antietam. In November 1862, he organized the 2d Massachusetts Cavalrv, of which he be¬ came colonel on 10 May 1863. In the winter of 1863-64 he commanded the advanced de¬

fenses of Washington, and subsequently he was in command of the provisional cavalry brigade

under Sheridan in the Shenandoah, and, ulti¬ mately, of the reserve brigade, consisting of three regiments of United States cavalry, the 2d Massachusetts and a battery of artillery. With this force he fought at Opequan Creek (Winchester) (19 Sept. 1864), and defeated General Rosser's cavalry (9 October). In the battle of Cedar Creek (19 October), he suc¬ cessfully resisted the Confederate attack until the arrival of Sheridan, but later in the action, while leading the final charge, was mortally wounded.

LOWELL, Edward Jackson, American author : b. Boston, 18 Oct. 1845 ; d. Cotuit, Mass., 11 May 1894. He was the grandson of Francis Cabot Lowell (1775-1817) (q.v.). He was graduated from Harvard in 1867, was ad¬ mitted to the Suffolk County bar in June 1872, for a time practised law in Boston, but subse¬ quently devoted himself exclusively to literary work. He was a member of the Massachusetts Historical Society and a fellow of the Amer¬ ican Academy of Arts and Sciences. Among his writings are (The Hessians and the other German Auxiliaries of Great Britain in the Revolutionary War (1884), recognized as standard; (The Eve of the French Revolu¬ tion (1892) ; and the section on (The Diplo¬ macy and Finance of the Revolution > in Win- sor's (Narrative and Critical History of Amer- ica) (1884-89), and numerous magazine and review articles.*

LOWELL, Francis Cabot, American manufacturer: b. Newburyport, Mass., 7 April 1775 ; d. Boston, 10 Aug. 1817. He was grad¬ uated at Harvard in 1793 and entered on a mercantile career in Boston. During a visit to England he was seized with the idea of intro¬ ducing and successfully carrying out the manu¬ facture of cotton in America. In 1812 he be¬ gan his attempts to manufacture cotton cloth, an undertaking then rendered the more difficult by the fact that the war in progress with Great Britain prevented the importation of English machinery. He finally succeeded, by the aid of Paul Moody, a mechanic of Newburyport, in making a suitable loom, and with P. T. Jack- son, his brother-in-law, obtained a charter as the Boston Manufacturing Company, with $100,000 capital, and established at Waltham what is believed to have been the first mill in the United States to combine in one establish¬ ment the several

operations necessary in manu¬ facturing finished cloth from the raw cotton. He was active in introducing into the tariff act of 1816 the clause imposing a minimum duty on imported cotton fabrics. Jackson, subse¬ quent to Lowell's death, bought a portion of Chelmsford and there located mills; and in 1826 the town was incorporated as Lowell.

LOWELL, Guy, American architect : b. Boston, 6 Aug. 1870. In 1892 he was gradu¬ ated at Harvard University and in 1894 at the Massachusetts Institute of Technology and in 1899 at the £cole des Beaux-Arts, Paris. . He began practice in Boston in 1900, was architect of the Boston Museum of Fine Arts, the Cum¬ berland County Courthouse, Portland, Me., and the New Hampshire Historical Society Build¬ ing at Concord, N. H., and. numerous educa¬ tional, commercial and residential buildings. From 1900 to 1913 he was lecturer on landscape architecture at the Massachusetts Institute of

Technology. In 1912 Mr. Lowell visited Rome and made careful studies of the architectural remains there, especially of the Coliseum. In the following year he submitted plans for the courthouse in New York City which were an adaptation of the Coliseum to modern business requirements. The plans were accepted, but construction has been delayed due to the very unsatisfactory state of the city finances during the so-called reform administration of Mitchel and the restrictions on building operations wrhile the country was energetically prosecut¬ ing the war.

LOWELL, James Russell, American poet, critic and diplomat : b. Cambridge, Mass., 22 Feb. 1819; d. there, 12 Aug. 1891. The Lowells were descended from Pcrcival Lowell of Bris¬ tol, England, who emigrated to Massachusetts in 1639. Judge John Lowell, grandfather of the poet, contributed a clause to the Bill of Rights which effected the abolition of slavery in the State. Qne of the poet's uncles, Fran¬ cis Cabot Lowell, was a leading promoter of manufactures in New England, and is remem¬ bered in the name of the city of Lowell. An¬ other uncle, John Lowrell, founded the Lowell Institute of Boston. Rev. Charles Lowell, the poet's father, b. 1782, was graduated at Har¬ vard in 1800, and after some study at the Uni¬ versity of Edinburgh was settled over the West Church of Boston, and remained its pas¬ tor till his death in 1861. He married Harriet Spence, from a family of Spences in Ports¬ mouth, N. H., who were of Scotch origin. She was the sister of Robert Traill Spence, of naval fame, and is remembered as having the gifts of ((a great memory, an extraordinary aptitude for language, and a passionate

fondness for ancient songs and ballads,® as also a lively sense of humor. There were five children, two daughters and three sons, of whom James Russell was the youngest. He was prepared for college by William Wells, an English schoolmaster, who gave him an excellent drill in the rudiments of Latin. But perhaps the best part of his early education was derived from the unrestricted use of books at home. His father had come into possession of the old Tory mansion, on the Watertown road, later called Elmwood, and its abundant library was well stocked with attractive authors. He en¬ tered Harvard College in his 16th year, grad¬ uating in the class of 1838. He was not dili¬ gent in the prescribed work of the course, but engaged mainly in desultory reading and in writing essays and verse for college societies and magazines. Because of cleverness thus shown, he was made class poet. But the poem, his first considered effort, was not delivered, as the author had been ordered to Concord, for a brief rustication, on account of some neglect of college rules. It was published the next year, under the title of CA Poem Recited at Cambridge. > Lowell now entered the Harvard School of Law, took its degree in 1840 and attempted practice. But he was quickly drawn aside to literature, largely through the influence of Maria White, a young lady of Watertown, to whom he became engaged in the latter part of the same year. The poetic gifts and moral enthusiasm of this young woman quickened Lowell's nature, and gave his bent a purpose. In 1841 he collected some of his best poems

.

■■*I*

'

■

into a volume called (A Year's Life,5 and in¬ scribed it in covert language to his betrothed.

I wo years later he began, with Robert Carter, the publication of a literary monthly, called The Pioneer, with Hawthorne, Poe and Whit¬ tier among the contributors, but after three issues it was discontinued. In 1844 occurred his marriage with Maria White; and

during the year were published an enlarged edition of the Poems, including (A Legend of Brittany,5 'Prometheus,5 (Miscellaneous Poems,5 and (Sonnets, 5 and a volume called Conversations on some of the Old Poets.5 In 1848 he again published an edition of the Poems, with the addition of the Third Series, including several poems against slavery. Later in the year (The Vision of Sir Launfal,5 (A Fable for Critics5 and (The Biglow Papers5 came out, the last-named being a reprint of dialect poems fur¬ nished to the newspapers of the day. In noth¬ ing had Lowell been so effective as in these satires; nothing in the literature of those stir¬ ring times attracted more attention. In 1851 he sailed for Europe, with his wife, who was in failing health, and spent a year, mainly in Italy, in study and travel. After their return Mrs. Lowell's health did not improve, and in 1853 she died. A volume of her poems was printed, after' her death, for private circulation. In 1855, on the resignation of Professor Long¬ fellow, Lowell was elected Smith professor of the French and Spanish languages, and profes¬ sor of belles-lettres in Harvard College. He spent two years in Europe, to prepare himself more fully, and in 1857 took up the duties of his chair. He married Miss Frances Dunlap, of Portland, Me., the same year. For the next 20 years his strength was taxed inces¬ santly, being devoted, outside of his service in his college, to editorial and critical rather than poetic writing. He was the first editor of The Atlantic Monthly, and continued in the posi¬ tion for two years. He had an editorial con¬ nection with the North American Review from 1862 to 1873, and contributed to it many critical essays of unusual merit. In 1864 he reprinted, in (Fireside Travels,5 a few papers of less sub¬ stantial worth. In the lighter work of this busy period falls the (Biglow Papers,5 Second Series, which he began in 1862. These were reissued in 1867. In the next year appeared (Under the Willows,5 a collection of his poems written since 1848. In 1869 he published (The Cathedral,5 over which he had long worked, and in 1870 (Among my Books,5 a reprint of some of his best essays on literary themes. In 1871 followed (My Study Windows,5 of like contents, and in 1876 (Among my Books,5 Sec¬ ond Series. In 1877 Lowell was called to take the post of Ambassador to Spain, and after three years at Madrid was transferred to the court of Saint James. Here he won the ad¬ miration not only of his countrymen, but also of the more exacting English public, by his executive abilities and his social and oratoric gifts. He received public honors from Oxford, Cambridge. Edinburgh and Bologna, and in 1883 was chosen lord rector by the University of Saint Andrews. His residence at Saint Tames terminated in 1885, and the affliction of his wife's death came to him, the same year, before return. He resumed to some degree his

literary labors, after coming back to Cam¬ bridge. He published democracy, and other

Addresses5 in 1887, and (Heart's-ease and Rue,5 and (Political Essays,5 in 1888. He pre¬ pared the public address for the celebration of the 250th anniversary of the founding of Har¬ vard University, in November 1886, and deliv¬ ered a course of lectures on the Old English dramatists before the Lowell Institute in the spring of the following year. In the year be¬ fore his death he revised and edited a defini¬ tive edition of his writings in 10 volumes. Sup¬ plemental to these, (American Ideas for Eng¬ lish Readers,5 (Latest Literary Essays and Addresses,5 and (01d English Dramatists,5 were issued posthumously in 1892. Lowell was first and chiefly a man of books, yet essentially without bookishness or pedantry. The most scholarly of all the group then making a name in literature, he was incapable of rigid applica¬ tion or of learning for learning's sake. He confessed himself half mystic, half humorist, and could shift from the one to the other vein in a single paragraph. Inheriting traits and principles from the Puritan age, he failed of its discipline and conscious dignity. Because of his untactful and uncompromising attitude upon questions of the day, as slavery and civil service reform, he came to be regarded as an academic thinker and the typical <(scholar in politics.55 But he materially helped win respect for his class from the public of a later gener¬ ation, which has elevated a college professor to the presidency of the country. As ambassador at the court of Saint James and at Madrid, he proved himself less a classroom doctrinaire than a man of the world, an esteemed social figure and a facile speaker. Yet he had been thought of at home as too nearly what the Englishman looks for in the typical American. He never lost the point of view of life, never lost sympathy with people, and was perhaps as wise in affairs as in the field of letters and aesthetic criticism. This concord of opposite qualities is conspicuous in the (Biglow Papers,5 his most brilliant and least considered perform¬ ance, which has carried most influence and bids fair to be longest remembered of all his works. As a writer of prose he was often distin¬ guished, yet often wilfully whimsical or sensa¬ tional, — he could speak of a landscape as (with snow. His essays show more reading — which was wide except in its liter¬ ature of northern Europe — than originality, though he was gifted with deeper insight than any other of the New England school save Emerson. As a critic he sometimes lost his sense of perspective, as in his estimate of Mrs. Browning's (Aurora Leigh.5 In his chosen field of poetry, Lowell's work is uneven, often savoring of book'shness and formality in his lvric pieces, as (To a Dandelion5 and (Beaver

Brook.5 While at times informal and unnoble in his higher strains, yet here and there at his best, as in ˆPrometheus5 and (The Cathedral5 he has left ((immortal phrases55 which no other American poet can parallel. An elaborate in¬ ternational centennial commemoration of his birthday was celebrated in New York Citv 19-22 Feb. 1919. See Biglow Papers; Commemo¬ ration Ode.

Bibliography. — Lowell's works were is¬ sued in a complete edition (Riverside edition, 11 vols., Boston 1899). His letters were edited in two volumes by Charles Eliot Norton (New York 1894). Consult Brownell, W. C., (Amer-

ican Prose Masters > (New York 1909) ; Cooke, G. W. (compiler), 'Bibliography of James Rus¬ sell LowelP (Boston 1906) ; Greenslet, Ferris, 'James Russell Lowell: His Life and Work) (ib. 1905) ; Hale, E. E., 'James Russell Lowell and His Friends (ib. 1899) ; Howells, W. D., 'Literary Friends) (New York 1900) ; Hudson, W. H., 'Lowell and His Poetry) (ib. 1912) ; James, Henry, 'Essays in London and Else- where) fib. 1893); Livingston, L. S. (com¬ piler), 'Bibliography of the First Editions in Book Form of the Writings of James Russell LowelP (ib. 1914) ; Pollok, Gustav, 'Interna¬ tional Perspective in CriticisnP (ib. 1914) ; Reilly, J. J., 'Lowell as a Critic) (ib. 1915) ; Richardson, C. F., 'American Literature, 1607- 1885 J (ib. 1893-94) ; Scudder, H. E., 'James Russell LowelP (2 vols., Boston 1901) ; Sted- man, E. C., 'The Poets of America) (11th ed., Boston 1892) ; Underwood, F. H., 'The Poet and the Man: Recollections of James Russell LowelP (ib. 1893) ; Wendell, Barrett, 'Literary History of America) (4th ed., New York*

1907).

L. A. Sherman, Of the University of Nebraska.

LOWELL, John, American jurist: b. Newburyport, Mass., 17 June 1743; d. Roxbury, Mass., 6 May 1802. He was graduated from Harvard in 1760, studied law, entered practice at Newburyport in 1762, represented that town in the general court in 1777 and Boston in 1779, and was a delegate to the convention of 1780 which framed the constitution of Massa¬ chusetts. He obtained the insertion in this document of the clause of the preamble which declares that "all men are born free and equal,® with the belief that slavery would thus be

abol¬ ished in Massachusetts. The Supreme Court of the State upheld his contention in 1783, and thereby slavery in the State was abolished at his initiative. In 1782-83 he was a delegate in the Continental Congress, and in 1782 was ap¬ pointed by the Congress one of three judges of a Court of Appeals to hear appeals from courts of admiralty. In 1784 he was a member of the New York-Massachusetts Boundary Commis¬ sion. He was made by Washington in 1789 judge of the United States District Court of Massachusetts, and by Adams in 1801 chief justice of the First Circuit of the United States Circuit Court. He was a founder of the American Academy of Arts and Sciences (1780), and one of its councillors. He published an oration on James Bowdoin the elder in Vol. II of the 'Memoirs) of the American Academy; and a poem in 'Pietas et Gratulatio) (1761).

LOWELL, John, American publicist : b. Newburyport, Mass., 6 Oct. 1769; d. Roxbury, Mass., 12 March 1840. He was a son of John Lowell (1743-1802) (q.v.). He was graduated from Harvard in 1786 studied law, was ad¬ mitted to the bar in 1789, retired from practice in 1803 and after travel in the East (1803-06) devoted his attention to literature. He wrote on _ agriculture and theologv, but chiefly on politics. In various publications he attacked the War of 1812; and by his pen made himself a valuable aid of the Federalists. His interest in horticulture obtained for him the sobriquet of "the Columella of the New England States® • and he was the first in the United States to build extensive greenhouses on a scientific plan.

For many years he was president of the Massa¬ chusetts Agricultural Society. Among his pamphlets were 'Peace Without Dishonor, War Without Hope) (1807) ; 'Diplomatic Policy of Mr. Madison Unveiled (1810) ; 'Candid Com¬ parison of the Washington and Jefferson Ad¬ ministration (1810), and 'Mr. Madison's War*

(1812).

LOWELL, John, American merchant and philanthropist: b. Boston, Mass., 11 May 1799; d. Bombay, India, 4 March 1836. He was the son of F. C. Lowell (1775-1817) (q.v.). He studied at Harvard (1813-15), became a success¬ ful merchant in Boston, was several times elected to the Boston common council and the State legislature of Massachusetts and collected a large and valuable library. After 1830 he passed a large part of his time in travel in foreign lands. By the gift of about $250,000, — then the largest ever made in America by an individual for the endowment of a literary in¬ stitution, with the exception of Girard's be¬ quest for Girard College — he

established in Boston the Lowell Institute, to consist of regular annual courses of free public lectures. The institute was opened in the winter of 1839— 40, and has proved exceedingly successful. Consult' Everett, 'Memoir of John Lowell, Jr. (1840), and Smith, 'History of the Lowell In- stitute) (1898).*

LOWELL, Josephine Shaw, American

philanthropist: b. West Roxbury, Mass., 16 Dec. 1843; d. New York City, 12 Oct. 1905. She was educated in Boston, New York and in Europe, and during the Civil War she was con¬ nected with the work of the Sanitary Commis¬ sion, and subsequently with labors among the freedmen and with other causes of philanthropy and reform. In 1863 she married Col. Charles Russell Lowell, who was killed at Cedar Creek, Va., 1864. She was a founder of the Charity Organization Society of New York in 1881, in 1886-89 was commissioner of the State Board of Charities of New York, and in 1899 was ap¬ pointed to the board of managers of the New York State reformatory for women. Among her writings are 'Public Relief and Private Charity (1884) ; 'Industrial Arbitration and Conciliation * (1893). Consult Stewart, W. R., 'Philanthropic Work of Josephine Shaw LowelP (New York 1911).*

LOWELL, Maria White, American poet:

b. Watertown, Mass., 8 July 1821; d. Cam¬ bridge, Mass., 27 Oct. 1853. She was the first wife of James Russell Lowell, whom she mar¬ ried in 1844. The best known of her poems are 'The Alpine Shepherd) and 'The Morning Glory, > which appeared in the collection printed privately at Cambridge in 1855. The death of Mrs. Lowell, occurring the same night that a child was born to Mr. Longfellow, called forth the latter's poem beginning:

"Two angels, one of life and one of death,

Passed o'er our village as the morning broke."

Mrs. Lowell is known for her influence on her husband in the cause of abolition and for her own writings against slavery.

LOWELL, Percival, American astrono¬ mer: b. Boston, 13 March 1855; d. Flagstaff, Ariz., 13 Nov. 1916. He was a brother of Ab¬ bott Lawrence Lowell, and was graduated at Harvard in 1876. He went to Japan in 1883

and lived there and in Korea from time to time till 1893. He was counsellor and foreign secre¬ tary to Korean Special Mission to the United States in 1894. In 1894 he established the Lowell Observatory; undertook an eclipse ex¬ pedition to Tripoli in 1900 and in 1907 sent an expedition to photograph the planet Mars. He received the Janssen medal of French Astronomical Society in 1904 for his researches on Mars. In 1908 he received a gold medal from La Sociedad Astronomica de Mexico. He made various discoveries on the planets Mer¬ cury, Venus, Saturn and especially Mars. In 1902 he was appointed non-resident professor of astronomy at the Massachusetts Institute of Technology. He was a Fellow of the American Academy of Arts and Sciences, and many other societies in America and Europe. He pub¬ lished (1891) ; (Occult Japan* (1894) ; (Mars) (1895) ; (Annals of the Lowell Observatory* (Vol. I, 1898; Vol. II, 1900; Vol. Ill, 1905) ; (The Solar System) (1903) ; (Mars and Its Canals* (1906) ; (Mars as the Abode of Life) (1908) ; (The Evolution of Worlds) (1909) and various papers to learned societies.

LOWELL, Robert Traill Spence, Amer¬ ican Episcopal clergyman ; b. Boston, 8 Oct. 1816; d. Schenectady, N. Y., 12 Sept. 1891. He was a son of Charles Lowell (q.v.) and a brother of James Russell Lowell (q.v.). He was graduated from Harvard in 1833, for a time studied medicine in the Harvard Medical School, and later was in mercantile life at Bos¬ ton. In 1839 he began the study of theology; went to Hamilton, Bermuda; was there ordained deacon in 1842 and priest in 1843 ; and became inspector of schools for the colony and domes¬ tic chaplain to the bishop. In 1843-47 he was rector at Bay Roberts, Newfoundland, and dur¬ ing the famine of 1846 in that district rendered valuable service as chairman of the relief com¬ mittee. Having returned to the United States in 1847, he was active in mission work among the poorer classes at Newark, N. J. ; was rector of Christ Church, Duanesburg, N. Y., in 1859— 69, head-master of Saint Mark's School (South- boro, Mass.) in 1869-73, and professor of Latin language and literature in Union College in 1873-79. He published (The New Priest in Conception Bay) (1858; revised in 1889), in which Bay Roberts appears as ((Peterport® ; (Fresh Hearts That Failed Three Thousand Years Ago, and other Poems) (1860) ; (Anthony Brode) (1874) ; (Burgoyne's March* (1877), written for the Saratoga County celebration at Bemis Heights, and (A Story or Two from an Old Dutch Town* (1878).

LOWELL, Mass., city, county-seat of Mid¬ dlesex County, at the

junction of the Concord and Merrimac rivers, and on the New York, New Haven and Hartford and the Boston and Maine railroads, about 25 miles northwest of Boston. Lowell, formerly Chelmsford, was founded in 1822, by the <(Merrimac Manufactur¬ ing Company,® and named in honor of Francis Cabot Lowell (q.v.). In four years it was in¬ corporated as a town, and in 1836 it was char¬ tered as a city known as the ((Workshop of the World.® The city now has an area of over 14 square miles. The city is noted for its great number of manufactories and its large annual output of manufactured articles. The power is

obtained from the falls of the Merrimac which here descend 32 feet and from the Concord River ; but 80,000 horse-power steam power is used. The ˆProprietors of Locks and Canals® was organized early in the 19th century, for the purpose of obtaining and supplying power for cotton factories. The canal system was nearly completed in 1825, but the first canals were more like ordinary ditches ; now they are walled and fitted with locks and bridges, all of the best Construction and latest improvements. They are so well built that the annual amount spent for repairs is comparatively small. By means of this canal system of seven and one-half miles water power is furnished to many fac¬ tories in Lowell, then returne_d to the Merrimac to be used lower down the stream to turn the wheels for the mills in Lawrence.

Some of the manufacturing establishments are woolen and cotton factories, hosiery and knitting mills, carpet and felt factories, bleach-eries, dyeing works, machine-shops, patent- medicine works, a cartridge factory and fur¬ niture factories. Lowell has many points of historic and scenic interest and a number of fine public buildings. The educational institu¬ tions are the State Normal School, the Rogers Hall School, the Lowell Textile School, Saint Patrick's Academy, a high school, and public and parish elementary schools. The city has the Lowell Hospital, Lowell General Hospital. Saint John's Hospital, Saint Peter's Orphanage, Theodore Edson Orphanage, Ayer Home for Young Women and Children, Saint Patrick's Home for Working Women and the Old Ladies' Home.

The annual amount of municipal expendi¬ tures is about $2,206,859.30; the principal items are for schools about $463,942; for hospitals, almshouses, etc., $120,000; for police depart¬ ment, $167,000; for the fire department, $193,000; for municipal lighting, $121,000; for water¬ works, $240,000. The waterworks were built in 1873 at a cost of about $2,875,000. There are now about 130 miles of mains. The water¬ works are owned and operated by the

*city. Pop. 112,759, about 40 per cent of whom are of foreign birth. Consult Drake, (History of Middlesex County) ; Ullustrated History of Lowell.**

LOWELL INSTITUTE, a Boston insti¬ tution founded with a bequest of $250,000 by John Lowell (1799-1836) for ((the maintenance and support of public lectures, to be delivered in Boston, upon philosophy, natural history, the arts and sciences, or any of them, as the trus¬ tees shall, from time to time, deem expedient.® Edward Everett delivered the first lecture 31 Dec. 1839, since when the leaders in philosophy, art and science of the English-speaking world have delivered regular annual courses of lectures. The institute is managed by a single trustee, who must be a member of the Lowell family of Massachusetts. Consult Smith, H. K., (History of the Lowell Institute) (Boston

1898).

LOWER CALIFORNIA. See Califor¬ nia, Lower.

LOWER HELDERBERG, in geology, a series of Pentamerous limestone of eastern New York, well developed in the Hudson Val¬ ley region and extending southward along the Appalachians to eastern Tennessee. The upper

part of the formation was called Scutella limestone by Vanuxem. The lower Helderberg includes also the impure limestones above the Encrinal limestone at Becrafts Mountain, near Catskill and southward. The upper Pentamer- ous is distinct at Schoharie and westward to the centre of New York State, where all the subdivisions merge together. In Tennessee, the limestones of this period abound in fossils and occur in Hardin, Henry, Denton, Decatur and Stewart counties. The maximum thickness is about 100 feet. In the Appalachian region in Pennsylvania the lower Helderberg, here of impure limestone, has a thickness of 100 feet or more in the middle belt, and 200 to 250 feet in the southeastern. Cement, lime and building stone are extracted from the series. See De¬ vonian System.

LOWESTOFT, lo'stoft, England, munic¬ ipal borough, seaport, and summer resort of Suffolk, on the Great Eastern Railway, 117 miles northeast of London. It is divided by the Waveney into the old town on the north and South Lowestoft. It contains the 14th century

church of Saint Margaret, town and county halls, a hospital, two foundation schools, an esplanade and Bellevue Park. The fish trade is important. The harbor is 48 acres in extent and has a depth of 16 feet at high water. Its industrial establishments comprise boat and shipyards, motor works, flouring and oil mills, rope works, etc. Cromwell took the town in 1643 and off the coast in 1665 the Dutch fleet was defeated by the Duke of York. In the 18th century there existed flourishing manu¬ factories of china ware. Pop. 33,770. Consult Nall, (History of Lowestoft* (London 1866).

LOWESTOFT PORCELAIN. One of

the most interesting and prolonged controver¬ sies that was ever entered into by connoisseurs and collectors of <(china® was concerning the term Lowestoft® as applied to certain pieces of porcelain ware. William Chaffers, a former authority on ceramics, in his <(Gallery® (1872) claimed that certain pieces of porcelain (now known to be <(Canton ware®) were made and decorated in the English village of Lowestoft. His argument was based on a system of forced circumstantial evidence. Sir Augustus Wolla¬ ston Franks (the great expert) disclosed, in 1878, the deception Chaffers had been innocently guilty of. Many pieces of this Oriental porce¬ lain, especially in America, are still termed Lowestoft® ware of which there is docu¬ mentary evidence of their importation in Amer¬ ican ships from the port of Canton, some of these pieces, with the heraldic bearings of the original owners, even have the word <(Canton® and date of make as well as a picture of the ship that brought the ware to this country figuring in their decoration. Excavations (in the years 1902-04) made on the site where the factory was that tradition stated made such ware finally disposed of the contention. <(Wasters® (defective pieces and fragments) and some molds were unearthed which show clearly that all stages of porcelain making were carried on at this spot. Research among con¬ temporary literature and documents disclose the following interesting facts as to the historv of this porcelain pottery: Hewlin Luson, of Gun- ton Hall, near Lowestoft, discovered in 1756 some kind of china clay and set up (

porary kiln and furnace® at Gunton and put practical potters from London at work there. In fear of successful competition, London manufacturers bribed the workmen to spoil each batch baked in the experiment. Such dis¬ couragement stopped the work. The chemist Robert Brown in association with Philip Walker, Obed Aldred (bricklayer) and John Richmond started a kiln, next year, in Lowe¬ stoft (at Bell Lane). The same spoiling of the output by tampering

with the workmen oc¬ curred. But the cause of the trouble was found out and precautions permitted success to attend later efforts. Gillingwater's contem¬ porary (History of Lowestoft says they ((have now established the factory upon such a per¬ manent basis as promises great success® and they <(employ a considerable number of work¬ men, and supply with ware many of the princi¬ pal towns in the adjacent counties.® The pieces and molds unearthed prove the following wares were produced: <(fluted cups, basins, cream jugs, sauce boats, teapots (one with a raised floral design dated 1761), cabbage jugs of Worcester pattern, openwork baskets,® also ®birth plates® with a name and birth date inscribed across the piece, and souvenir pieces with the words: ((A Trifle from Lowestoft® on them. A character¬ istic ware consisted of barrel-shaped mugs hav¬ ing a picture of a herring yawl painted on one side and a woman smoking a spit of herrings on the other. Proof is afforded by these wasters that forged marks of the factories that originated some of these wares were used; ((Allen Lowestoft® is on some pieces. Lowestoft paste has creamy appearance sometimes hidden under a colored glaze making them look like Oriental ware; the glaze is mostly of pale bluish color, sometimes bluish green, at other times colorless. Pieces show fine execution. It is a soft paste, not hard as in Oriental ware. The painting is in feeble drawing of a style like that of Saint Cloud, besides close copies of Wor¬ cester, Bow, Caughley, Plymouth, Bristol, Dresden, etc., decoration. Floral decoration is in conventional sprays, and diaper, trellis, scale patterns occur. Under the present nomencla¬ ture such ware is termed <(true Lowestoft® and the Canton, long disputed pieces of hard paste are known as <(Sino-Lowestoft® or <(pseudo- Lowestoft.®*

Bibliography.— Crisp, F. A., Catalogue of Lowestoft China in the Possession of F. A. Crisp (London 1907) ; Spelman, W. R., Lowe¬ stoft China) (London 1905).*

Clement W. Coumbe.

LOWICZ, lo'vich, Poland, town 50 miles southwest of Warsaw, on the Bzura. It con¬ tains an Abbey church, ancient chateau, mili¬ tary barracks, a gymnasium, and a monastery. Candles, flour, leather and soap are manufac¬ tured. No mention of the town is made prior to 1136. About 1350 it became the capital of a principality. In the Great War of 1914-18 Lowicz was occupied by the Germans, who heavily fortified it. In 1918 it became a part of the new Polish state. Pop. 14,500.

LOWIE, lo'T, Robert Harry, American anthropologist: b. Vienna,

Austria, 12 June 1883. At the age of 10 he was brought to the United States and in 1901 was graduated at the College of the City of New York and in 1908 at Columbia University. In 1908-09 he was

assistant in the department of anthropology ; in 1909-13 assistant curator, and since 1913 associate curator at the American Museum of Natural History, New York. In 1917-18 Dr. Lowie was associate professor of anthropology at the University of California. From 1906 to 1914 he conducted anthropological expeditions to the Indians of the northern plains, to Lake Athabaska in 1908, to the Plateau tribes in 1914-15, to Hopi in 1915, 1916. Since 1912 he has been associate editor of the American An¬ thropologist and in 1912-13 was editor of Cur¬ rent Anthropological Literature. He is a Fel¬ low of the American Association for the Ad¬ vancement of Science and of many other learned societies. He has published (The As- sini| boine> (1909); (Social Life of the Crow Indians (1912) ; (Societies of the Crow, Hi- datsa and Mandan Indians) (1913) ; (The Sun Dance of the Crow Indians) (1915); (The Age-Societies of the Plains Indians) (1916) ; (Culture and Ethnology * (1917).*

LOWNDES, lownz, Marie Adelaide Belloc, English author : b. 1868. She is a sister of Hilaire Belloc (q.v.) and was married to F. S. Lowndes in 1896. She has published (Life and Letters of Charlotte Elizabeth, Prin¬ cess Palatine (1889) ; (King Edward VIP (1901); (The Heart of Penelope) (1904); (The Pulse of Life) (1907) ; (The Uttermost Far- thing) (1908) ; (When No Man Pursueth* (1910) ; (A Child's History of the War* (1914) ; (Good Old Anna-* (1915) ; (The Red Cross Barge* (1916).*

LOWNDES, Rawlins, American states¬ man : b. in the West Indies 1722; d. 1800. His parents removed with him to Charleston when he was very young, and his career was ever after associated with that city. Having studied law he became an associate judge of the Colo¬ nial Court in 1766, and in that position opposed the Stamp Act. He assisted in outlining a new constitution for South Carolina in 1776, and in 1788 became president of the State. He was subsequently a member of the State legislature and vigorously opposed the ratification of the Federal constitutions.

LOWNDES, William, American legislator: b. Saint Barthomew's,

Colleton County, S. C., 7 Feb. 1782; d. at sea, 27 Oct. 1822. He was taken to England when he was seven years of age, and sent for three years to an English grammar-school. On his return to Charles¬ ton he was graduated at Charleston College, studied law and was admitted to the bar in 1804, but he soon abandoned his profession to attend to his plantation. In 1806 Mr. Lowndes was elected to the lower house of the general assembly of South Carolina, retaining his seat until 1810, when he was chosen a member of Congress as a Democrat, and re-elected five times successively, serving from 4 Nov. 1811, till 8 May 1822, when failing health compelled his resignation. He was an earnest supporter of the War of 1812, and spoke frequently on matters pertaining to the army, the navy, the finances., the national bank, the Missouri Com¬ promise, the Spanish treaty and the tariff. His friends regarded him as a suitable candidate for the Presidency, and he was nominated by the legislature of South Carolina. His health having been benefited by a visit to England in 1819, he decided to return to that country, and

had embarked with his family from Philadel¬ phia, but did not live to complete the voyage. As a debater he occupied the front rank, in spite of a weakness of voice caused by diseased lungs, while his memory was remarkably re¬ tentive. It is said that Henry Clay expressed the opinion that Lowndes was (

LOWRIE, low're, Walter, American legis¬ lator and philanthropist : b. Edinburgh, Scot¬ land, 1784; d. 1868. At the age of seven his parents brought him to America and settled in Pennsylvania. Through his own exertions he qualified himself for the ministry. In 1811-18 he was member of the senate of Pennsylvania and from 1818 to 1824 was United States sen¬ ator. He organized the congressional prayer¬ meeting and a total abstinence society. In 1836 Mr. Lowrie became corresponding secretary of the Western Foreign Missionary Society and subsequently for over 30 years was correspond¬ ing secretary of the Presbyterian Board of Foreign Missions.

*LOWTH, Robert, English prelate and biblical scholar : b. Winchester, Hampshire, 27 Nov. 1710: d. London, 3 Nov. 1787. Educated at Winchester School and Oxford University, he became professor of poetry in the latter in 1741, and in 1750 archdeacon of Winchester. In 1753 he published his lectures on (The Sa¬ cred Poetry of the Hebrews, * and became fa¬ mous as one of the first biblical critics of his age. Ecclesiastical preferments followed, and he was made successively prebend of Durham, bishop of Saint David's (1766), of*

Oxford the same year and of London in 1777. In 1783 he declined the archbishopric of Canterbury. In 1758 he published a life of William Wykeham, in 1778 he published (Isaiah, a New Transla¬ tion, } with a preliminary dissertation and notes, which was highly commended.

LOWVILLE, 16'vil, N. Y., village, county- seat of Lewis County, on the New York Cen¬ tral and Hudson River railroad, about 100 miles northwest of Albany and 60 miles north by west of Utica. It is situated in an agricul¬ tural section, and the industries of the village are connected chiefly with hop-growing and with farm and dairy products. Its trade is principally in hay, grain, vegetables and the noted Lewis County butter and cheese. The principal buildings are the town-hall, the county buildings, a clubhouse and the Lowville Academy. The academy library has about 5,000 volumes. The waterworks are the property of the municipality. Pop. (1920) 3,127.

LOYAL AMERICAN LIFE ASSO¬ CIATION. Incorporated in November, 1896, in Illinois as a fraternal beneficiary society. Home office in Chicago since October 1911; before that date in Springfield. Does life in¬ surance business, and operates actively in 25 States. On 1 Jan. 1916 had over 600 local branches. On same date this Association had 13,000 policies outstanding with $13,500,000 of insurance in force, and has paid benefits in sum of $3,300,000. Has $400,000 in assets. Last annual valuation showed 101.24 per cent of solvency. Business in excellent condition. It

has a good form of representative government and ritualistic work that is patriotic, charming and instructive. As a mascot it hses the ((Spirit of 76,)) and of the best-known and most-beloved pictures in America. Its rates are based upon the well-known N. F. C. Table of Mortality with 4 per cent interest assump¬ tion. Annual valuations are made upon the same basis. It now issues ordinary Whole Life Policies exclusively. Its rates are from 15 per cent to 40 per cent lower than old line rates for same kind of policy. Besides a death benefit, the Association voluntarily pays nine other benefits for injuries arising from acci¬ dent. Its low cost, liberal benefits and privi¬ leges constitute a very attractive life insurance proposition. Just recently the Association has begun a national advertising campaign for agents and policyholders. The Association is conservatively managed.

LOYAL LEGION OF THE UNITED STATES, Military Order of the, was the first society formed by officers in the Civil War, who were honorably discharged. Its objects are to cherish the memories and associations of the Civil War, to strengthen the ties of fellow¬ ship and sympathy, to relieve the widows and children of dead companions of the order and to advance the general welfare of the soldiers and sailors of the United States. On the day after the assassination of President Lincoln, Col. S. B. Wylie Mitchell, Capt. Peter D. Key- ser, M.D., and Lieut.-Col. T. Ellwood Zell met in Philadelphia to arrange for a meeting of ex¬ officers of the army and navy to adopt resolu¬ tions relative to the death of President Lin¬ coln. It was decided to effect a permanent or¬ ganization, and an adjourned meeting was held for this purpose in the hall of the Hibernia Fire Company in Philadelphia 3 May 1865. Eligibility to membership is as follows : Orig¬ inal companions of the first class — commis¬ sioned officers and honorably discharged com¬ missioned officers of the United States army, navy and marine corps, regular or volunteer, in¬ cluding officers of assimilated or corresponding rank by appointment of the Secretary of the War or Navy, who were actually engaged in the suppression of the Rebellion prior to 15 April 1865, or who served under the Presi¬ dent's call of 15 April 1861 ; or who, having served as non-commissioned officers, warrant officers or enlisted men, during the War of the Rebellion, have since been or may hereafter be commissioned as officers in the United States regular or volunteer army, navy or marine corps. All midshipmen in the United States navy and all cadets of the United States army, wrho, while pursuing their course in the United States Naval Academy or the United States Military Academy, actually rendered service. Hereditary companions of the first class. The direct male lineal descendants, who shall have attained the age of 21 years, of deceased orig¬ inal companions of the first class, and of de¬ ceased officers not members of the order, but who were eligible as such, and whose direct descent shall in every case be traced anew from the original founder of the membership in the order, or from the deceased eligible officer, and not otherwise. Any original companion having no direct lineal male descendant may, by writ¬ ing, filed with the recorder of his commandery, nominate a companion of the second class from

among the collateral male members of his family, descending only from his own brother or sister, and the person so nominated when he shall have attained the age of 21 years shall become eligible to membership for life in the second class. Second class — the sons, and if there be no sons, the grandsons, of living com¬ panions of the first

class, whether original, in succession, or by inheritance, who shall have attained the age of 21 years, shall be eligible to membership. Third class. — Companions of this class are those gentlemen who in civil life during the Rebellion were specially distin¬ guished for conspicuous and consistent loyalty to the national government and were active and eminent in maintaining the supremacy of the same; and who, prior to 15 April 1890, were elected members of the order pursuant to the then existing provisions of the Constitution, the power to elect such having ceased at that date. There are State commanderies in Penn¬ sylvania, New York, Maine, Massachusetts, California, Wisconsin, Illinois, District of Co¬ lumbia, Ohio, Michigan, Minnesota, Oregon, Missouri, Nebraska, Kansas, Iowa, Colorado, Indiana, Washington, Vermont and Maryland. The total membership in 1917 was 6,914.

LOYAL ORANGE INSTITUTION.

See Orangemen.

LOYAL TEMPERANCE LEGION, an

organization of children founded in 1886, by the Woman's Christian Temperance Union, for the purpose of teaching children the evil effects of alcohol, tobacco and other narcotics. The graduates, who follow a systematic course of instruction, are organized into State legions, holding annual conventions. There are upward of 100,000 members in the United States.

LOYALISTS, or TORIES, in American history, those persons who remained loyal to Great Britain during the Revolutionary War.

The issue of independence divided the American colonies into two parties : Whig and Tory, or Patriot and Loyalist. No contempo¬ rary figures exist which enable the respective numbers of the two parties to be definitely stated. They varied from time to time and from colony to colony. The Loyalists main¬ tained that in the colonies as a whole they were in the majority. On the other hand, John Adams and others of the Patriot party held that the Loyalists constituted only a third of the population, and this estimate seems to be generally accepted by historians. The propor tion varied greatly, however; the Patriots wen clearly, in the majority in New England and Virginia. In North Carolina the two parties were about evenly divided, in South Carolina the Loyalists were the more numerous, and in Georgia they were much more numerous. In New York, New Jersey, Pennsylvania, Dela¬ ware and Maryland the Loyalists were

very strong, although probably in the minority. Pennsylvania seems to have had the largest absolute number of Loyalists.

It is probably impossible to draw any de¬ ductions from the distribution of racial ele¬ ments. New England and Virginia, where the Patriots .were strongest, were almost exclu¬ sively British in population (about 99 per cent and 94 per cent respectively), but so also was South Carolina, where the Loyalists were in the majority. New York, however, was 16 per

cent Dutch, and Pennsylvania was 26 per cent German, and in these States the Loyalists were very strong. The total free population of the colonies in 1780 is estimated at 2,453,000, and was distributed racially about as follows: British, 91.8 per cent; German, 5.6 per cent; Dutch, 2 per cent ; all others, less than 1 per cent.

The Loyalists took in all classes of the population. In New England the more sub¬ stantial and better educated citizens, office hold¬ ers and members of learned professions tended to be Loyalists ; others were adventurers who adhered to England with the hope of gain or official preferment. The Loyalists probably contributed about 60,000 men to the military forces in America.

In all the States severe laws were enforced against the Loyalists, and it is estimated that nearly 200,000 left the country during or at the close of the Revolution. Between 40,000 and 50,000 Loyalists were said to have fled to Can¬ ada and settled mainly in the Maritime Provinces prior to 1786. Confiscation of Loyalist prop¬ erty was resorted to in all the States. In New York alone the sales of confiscated property brought over $3,500,000. Consult Flick, A. C., (Loyalism in. New York during the American Revolution J (New York 1901) ; Myers, T. B., (The Tories or Loyalists in America) (Albany 1882) ; Ryerson, E., loyalists of America, 1620— 1816) (1880); Sabine, L., biographical

Sketches of Loyalists of the American Revo¬ lution with an Historical Essay) (2 vols., Bos¬ ton 1864) ; Van Tyne, C. H., (The Loyalists in the American Revolution (New York 1902). See American Loyalists.

LOYALISTS IN CANADA. In the 20th century it is easy to review without prejudice the motives and sacrifices of those Americans who

chose to adhere to British allegiance when the 13 colonies declared themselves independent States. That the great majority of the Loyal¬ ists, or ˆTories,® as they were called by their enemies, were sincerely devoted to the royal cause there can be no sensible doubt, and offi¬ cial records recently brought to public notice present a pathetic picture of the sufferings and losses endured by the unfortunate supporters of British rule in the War of the Revolution. While as a result of that struggle the United States secured their independence, they also lost a host of valuable citizens who emigrated chiefly to Canada, where they established new homes and helped to strengthen Great Britain's hold on that portion of her empire. The de¬ scendants of those emigrants compose a large and influential part of Canada's population, and the names of men prominent in the politics, the professions and industries in the Dominion can be traced back to time-worn folios which tell the story of the plea of the poverty-stricken refugees for aid from the motherland.

The migration of Loyalists to Canada began as early as 1774, before the actual clash between the colonies and British authority. This was due to the fact that families which found them¬ selves menaced and beset on account of their unpopular opinions saw no safe refuge nearer than Canada. The movement continued through¬ out the war, varying in degree with British suc¬ cess and defeat, until the surrender of Corn¬ wallis extinguished any remnant of hope in the

breasts of the royal adherents, who hastened in multitudes, by land and sea, to seek shelter and protection in the Canadian provinces. Many who tried to live down the past, trusting that, with hostilities over, their former attitude would be pardoned, if not forgotten, found their situation intolerable and followed in the footsteps of earlier refugees, and this went on until 1789, when the Loyalist migration ceased.

The total number of Loyalists who settled in Nova Scotia, New Brunswick, Cape Breton and Prince Edward Island is estimated at not less than 35,000, of whom about 30,000 went from New York, although probably the homes of many of these had been elsewhere before they sought shelter in that final stronghold of the British. In 1791 the English-speaking popula¬ tion of Lower Canada had increased to about 20,000, owing chiefly to the Loyalist arrivals, and in Upper Canada 10,000 Loyalists settled in 1783 alone; the next year the population had doubled and in 1791 it was estimated at 25,000. The province of Ontario may be said to owe its foundation to American Loyalists.

The British government and the provincial authorities extended cordial and liberal aid to the exiles. Those who were transported at the expense of the government received provisions for one year on leaving New York, and were supplied with rations regularly as long as their necessities continued. They also received cloth¬ ing, grants of land and assistance in stocking their farms, building homes and clearing and cultivating the land. Tools and arms were also distributed.

The British Crown and Parliament took steps in July 1783 to compensate the refugees from the United States for injuries suffered through their loyalty and a commission con¬ sisting of five members was appointed to ex¬ amine into and classify the losses and services. The following were held to be entitled to com¬ pensation : (1) Those who had rendered serv¬

ices to Great Britain; (2) those who had borne arms against the Revolution; (3) uni¬ form Loyalists; (4) Loyalists resident in Great Britain; (5) those who took oaths of allegiance to the American States, but afterward joined the British ; (6) those who armed with the Americans and later joined the British army or navy.

Compensation was not allowed for antici¬ pated professional profits, losses in trade or through depreciated paper money, or losses caused by the British army, which were ac¬ counted as obligations of the British govern¬ ment outside the province of the commission. By the Treaty of Peace between the United States and Great Britain it was stipulated that Congress should earnestly recommend to the States the restoration of the rights and pos¬ sessions of (

Apart from the expenditures already noted in supporting and establishing Loyalists on

their farms, and which amounted in Upper and Lower Canada to probably $4,000,000, the Brit¬ ish government paid $9,448,000 on 1,680 claims examined and allowed by the commission ap¬ pointed under the Act of 1783. This commis¬ sion sat in London. In 1785 two commission¬ ers were sent to Canada to examine claimants who had failed, through ignorance, inability or other causes, to present their claims in Lon¬ don. This commission allowed $2,745,000 on 1,401 claims. After the departure of the com¬ mission claims

continued to be sent to Great Britain, where many more were allowed. The claims ranged in amount from $60 to $777,000, and the sums allowed from $50 to $221,000, the latter amount having been granted to Sir John Johnson, the noted "Tory® commander. Every one of the 13 States — or 14, including Ver¬ mont — was represented in the number of claim¬ ants, as follows: New York, 941; South Caro¬ lina, 321 ; Massachusetts, 226; New Jersey, 208; Pennsylvania, 148; Virginia, 140; North Caro¬ lina, 135 ; Georgia, 129 ; Connecticut, 92 ; Mary¬ land, 78; Vermont, 61; Rhode Island, 41: New Hampshire, 31; Delaware, 9; total, 2,560.

It is estimated that the British government expended in all about $30,000,000 during the Revolution and afterward in aiding Loyalists in America and Great Britain. Those who set¬ tled in Canada soon became self-supporting and as a rule prosperous. In 1789 it was decreed that all Loyalists should be "distinguished by the letters U. E. affixed to their names, alluding to their principle, the Unity of the Empire.® This distinction has fallen into disuse, although occasionally recalled when some eminent Ca¬ nadian of old Loyalist stock passes away.

LOYALTY ISLANDS, a group in the Pacific Ocean, 60 miles east of New Cale¬ donia, of which French colony they form a de¬ pendency. They consist of the islands Uvea (Uea), Lifu and Mare, with many small islands. Total area, about 800 square miles. Water is scarce, but some fruits, vegetables and grains are cultivated. Copra and rubber are the chief exports. The inhabitants are of mixed descent, Melanesian and Polynesian, and nearly all Protestants. Pop. about 15,000.

LOYOLA. Saint Ignatius Loyola, founder of the Society of Jesus: b. 1491, at the Castle of Loyola, Azpeitia, in Guipuscoa, Spain ; d. Rome, 31 July 1556. He was the youngest son of Beltran Yanez de Onez y Loyola and Marina Saenz de Licona y Baida. Inigo, as the child was baptised, after Saint Enecus or Innicus, abbot of Ona, adopted the name Ignatius dur¬ ing his life in religion. .

I. Early Years, 1491-1521. — The youth of Ignatius was mostly passed in the chivalry and grandeur that surrounded the court of Ferdinand and Isabella, rulers of Castile and Aragon. He became an officer of the army, and commanded the Spanish forces during the siege of Pampeluna by the French. So soon as their brave leader was wounded, the garrison surrendered, 21 May 1521. A cannon ball had lacerated the left and broken the right leg of Ignatius. Surgery was then primitive; so the shattered shin caused much trouble. It was

set, broken and then reset ; and a protruding bone 'was sawed off. In the end, the healing leg had to be stretched with weights. During days of enforced convalescence, the soldier called for

some light reading, — the tales of chivalry that then had a vogue. None was to hand, at Loyola Castle; so the (Life of Christ } . by Ludolph of Saxony and the lives of the saints were brought to the sick man. At first his interest was that of a knight in the tales of deeds done by heroes. Then his own knightly deeds began to stand out in bold relief and strange contrast over against the chivalry of the knights of Jesus Christ. He mused on the possibilities of imitation and rivalry. The heroism of each saint opened out to him a new vista of life, and aroused the thought, "Why not I ?® The truth came home that there was a Captain, worth far more than any earthly leader; the battles fought by that Cap¬ tain were entirely different from those that the high-spirited Spaniard had been wont to esteem. The Kingdom of Christ loomed larger and larger. He saw that the principles of action of his whole life would have to be re¬ adjusted; they were selfward, and not fully Christward.

II. Preparation for the New Knighthood, 1522-34. — So soon as health was restored Ignatius, with that singleness of purpose which was his characteristic, set out at once to be¬ come a knight of Jesus Christ in the King¬ dom whose dynamic power is Christ-love. He made a pilgrimage to Montserrat, put his soul right with God by a general confession, laid his sword and poniard at Our Lady's altar, spent the night there in a vigil at arms, received communion next morning, — the Feast of the Annunciation 1522, — gave his courtly raiment to a beggar, donned a sack-cloth tunic and started the war against self-love for 'the Reign of Christ on earth. A year of solitude, prayer and penance was then spent in a cavern, the "Santa Cueva,® just outside Manresa. The spiritual experiences of this year, its severe mortifications, scruples, extremes of consolation and desolation, wonderful graces, visions and miraculous interventions, were all formative of his character and of the system of asceticism which has become famous by the little book called "The Spiritual Exercises.® Next year, 1523, he made a pilgrimage to the Holy Land, to suffer the poverty, contumely and oppro¬ brium which were emblazoned on the standard of his King. The plan was foiled by well-meaning persons of authority in the Holy Land, who deemed that the presence of the enthusi¬ astic pilgrim would impede their work. So Ignatius returned to Barcelona. He now re¬ solved to draw others to the standard of Christ; and to that end began a course of studies that lasted 11 years. At 33 (1524) the intrepid patrician, in the garb of a poor man, took up the elements of Latin together with a class of mere

schoolboys. In two years, 1526, he matriculated at the University of Alcala. Here the Inquisition looked askance at the zealous student's doctrine, imprisoned him for two months, and forced him to Sala¬ manca, 1527. Studies at this university town were equally impossible, because of citation and imprisonment by the Inquisition. So Ignatius betook him to the University of Paris, February 1528. At Paris many trials came round from poverty and misunderstandings; but studies were successfully pursued, and much of value was learned in the science of education and that of the care of souls. Ignatius took his

licentiate in theology in 1534, and his M.A. in 1535. Ill health prevented him from going up for the doctorate in theology. Meanwhile, a band of faithful followers were gathered. They were Blessed Peter Fabre and Claude Le Jay, Savoyards; Saint Francis Xavier, of Na¬ varre; James Laynez Alonso Salmeron and Nicholas Bobadilla, Spaniards; Simon Rodri¬ guez, a Portuguese; Jean Codure and Paschase Broet, Frenchmen. These 10 knights, all thor¬ oughly educated university men, formed the nucleus of the Society of Jesus.

III. Founder of the Society of Jesus. — 1534—56. — On 15 Aug. 1534, the companions took the vows of poverty and chastity, at Montmartre, Paris, and founded the Society of Jesus. They also bound themselves to make a pilgrimage to the Holy Land after two years; or, if this were not feasible, to put themselves at the disposal of the Holy Father. Works of charity occupied them for several years. In 1537, with permission of the Holy See, all were ordained to the priesthood. About this time, on his way to Rome, Ignatius had a vision of the Eternal Father directing him to companion¬ ship with Jesus, and saying: ((Ego vobis Romse propitius ero." This vision fixed the knight's determination to call his society <(La Com- pania de Jesus," in keeping with the military idea of recruiting a body of picked knights, priests of singular worth and noteworthy edu¬ cation, who should be a select corps of trained warriors, named after its Captain, Jesus Christ, and ever ready at the beck of the Pope to go even to the utmost ends of the earth to spread the Kingdom of the Saviour. There were delays and difficulties at Rome. The plan re¬ ceived pontifical viva voce approval, 3 Sept. 1539; and, on 27 Sept. 1540, the bull ((Regimini militantis ecclesiae" of Paul III established the Society of Jesus as a .new religious order. In April 1541 Ignatius was elected the first general of the society. He and his companions

made their solemn profession, the 22d of that same month, at Saint Paul's outside the walls. Within a very short time, the new religious were sent on important missions to various parts of the world: Rodriguez to Portugal, where he founded a province; Xavier to India; Salmeron and Broet to Ireland; Fabre, Cani- sius, Bobadilla and Le Jay, to Germany. In 1546 Laynez and Salmeron were papal theolo¬ gians at the Council of Trent; here also Le Jay, Covillon and Canisius represented various bishops. Ignatius remained at Rome, to draw up the constitution (Cf. art. Jesuits). What pains he took in this work, and how he yv as guided therein by extraordinary graces,— illu¬ minations of the reason, inspirations of the will and visions, — may be established by a journal of prayer still extant, wherein are recorded the deliberations for 40 days upon one vital issue in the matter of religious pov¬ erty. Ignatius founded the Roman College in 1551, and the German College at Rome in 1552. He died in 1556, the 16th year after the canoni¬ cal institution of the Society of Tesus. It had grown to a membership of about 1,000, divided into 12 provinces, and toiling in more than 100 religious houses. The saint was beatified by Paul V, 27 July 1609; and canonized by Gregory XV, 22 May 1622. His remains rest under a beautiful altar, in the church of the Gesu, Rome.

IV. " The Spiritual Exercises." — The spirit of Saint Ignatius was Pauline, — intrepid yet tender; motivated by two great principles, — love of Jesus Christ and zeal for the salvation of souls. These two principles were brought together in his motto : A. M. D. G., ((Omnia ad Majorem Dei Gloriam" (All for the greater glory of God). It was this spirit, which breathed in (

Bibliography. — (Monumenta Historica So- cietatis Jesu) (1894, 36 vols., especially the (Monumenta IgnatianaP 9 vols., containing the (1907). More than 130 lives of Saint Ignatius have been written; important are Ribadeneira (1572), Clair (1894), Bartoli (1650), Bouhours H679), Stewart Rose (1891) and Thompson (1910).

Walter Drum, S.T.,

Professor of Scripture, Woodstock College, Maryland .

LOYOLA, Martin Garcia Onez de, Span¬ ish cavalier, nephew of Saint Ignatius Loyola : b. Guipuzcoa, about 1548; d. 1599. He joined the knightly order of Calatrava ; came to Amer¬ ica, where, in 1572, he fought against the Inca, Tupac Amaru, whose niece he married and through her secured some of the Inca's fortune. In 1592 he was made governor of Chile. The seven years of his

administration were occupied with the campaign against the Arancanians, the

most redoubtable opponents of Spain in the New World. Loyola was slain by the Indians at Curalava. Consult Arana, Diego Barros, (Historia generale de Chile) (4 vols., Santiago de Chile 1884-S5).

LOYOLA UNIVERSITY, Chicago, Ill., Saint Ignatius College, the Arts Department of Loyola University, was founded in 1869 in Chicago by the Rev. Arnold Damen, S.J., and fellow-priests of the religious order of the Society of Jesus, or Jesuits. It is the oldest and largest Catholic institution of higher learn¬ ing in Chicago. At the time of its foundation, Saint Ignatius College was in the suburbs of the city, but owing to the unprecedented growth of Chicago the college has long since become a down-town institution. Realizing the need of providing suitably for the future growth of the college, the board of trustees found it ad¬ visable to purchase in 1906 20 acres of ground on the north shore. On this site two buildings have been erected — the Loyola Academy and the Michael Cudahy Science Hall — the latter the gift of the man whose name it bears. Loyola University, which is a development of Saint Ignatius College, was incorporated in 1909. A department of law was opened in 1908 under the name of the Lincoln College of Law, which was afterward changed to the Loyola Univer¬ sity College of Law. The university was asso¬ ciated with the Illinois Medical College in 1909 and since 1910 with the Bennett Medical Col¬ lege. In 1917 it purchased the Chicago College of Medicine and Surgery and now conducts its medical department under that name. For several years an affiliation was maintained with the Central States College of Pharmacy, but in 1917 it was discontinued. A department of sociology was opened in 1913 and located in the Ashland Block in the loop district of Chi¬ cago has been unusually successful. A junior college in engineering is maintained. Two high schools are under the control of the university authorities. Present enrolment is 1.170 in col¬ legiate and graduate studies ; 850 in high schools. The institution is a member of the Federation of Illinois Colleges.

LOY.SON, Charles, sharl lwa-zon (known by his monastic name, Pere Hyacinthe) , French ecclesiastic: b. Orleans, 10 March 1827; d. 1912. He studied in the College of Pau and the ecclesiastical college of Saint Sulpice. was or¬ dained priest in 1850, taught philosophy at

the Seminary of Avignon and theology at that of Nantes, entered the Carmelite order, and be¬ came renowned as a preacher at Lyons, Bor¬ deaux, Nantes and Paris. But his unorthodox utterances soon drew the censure of ecclesi¬ astical authority, and his superiors prohibited him from preaching. He then left the Order, and refusing to remain silent he was excom¬ municated. In 1869 he visited the United States, where he was heartily welcomed. In 1872 he married an American lady in London. He protested against the dogma of papal in¬ fallibility, attended the Old Catholic Congress in Munich, fraternized with Protestants, but repeatedly declared that he had no intention of leaving the Catholic Church. In 1873 he be¬ came pastor of an Old Catholic church at Geneva, and the founder of the Christian Catholic Church of Switzerland. In 1878 he opened in Paris an independent church, the

Eglise Gallicane, holding communion with the Old Catholic and Anglican churches. Pere Hyacinthe traveled extensively and during a visit to the Orient in 1900-01 with his wife was welcomed by patriarchs of the Eastern churches. From 1901 he ministered again to Old Catholic and Protestant churches in Swit¬ zerland. Among his writings are (La societe civile dans ses rapports avec le Christianisme) (1867); (La Reforme Catholique> (1872-73; extended, 1867) ; (Liturgie de l'Lglise Catho- lique-Gallicane> (4th ed., 1883) ; (Mon Testa¬ ment (1893) ; (Christianisme et Islamisme) (1895) ; and he edited the magazine Catholique Frangaise. Consult Houtain, A., (Vie du Pere Hyacinthe) (in Grande Revue, Vols. LXXVII- LXXXII, Paris 1913).

LOZADA, lo-sa'da, or LOSADA, Manuel,

Mexican bandit and guerilla leader: b. near Tepic, about 1825; d. 1873. Lozada was a mes¬ tizo, with Indian, negro and white blood in his veins. He became a prominent leader among the Indians over whom his influence was very great. He resorted to banditry and with his followers forced tribute from the law- abiding citizens of the lowlands. When war broke out between the Conservative and Lib¬ eral factions Lozada allied himself with the former and during the French occupation of Mexico was an ardent supporter of Emperor Maximilian, by whom he was commissioned a general of division. By Napoleon III Lozada was decorated with the ribbon of the Legion of Honor. While Maximilian was in power Lozada was virtual autocrat of Tepic. After the fall of the empire he opposed Juarez and in 1872 led a force against Guadalajara. He was unsuccessful but managed to elude his pur¬ suers until the following year when he was taken and summarily executed.

LOZANO, 16-tha'no, Pedro, Catholic mis¬ sionary: b. Spain, date unknown; d. 1759. He became a member of the Society of Jesus, was sent on the South American mission and sub¬ sequently was appointed professor at the Col¬ lege of Cordoba at Tucuman. Charlevoix's histories owe much to the material furnished by Father Lozano, who published several works, including (La descripcion chorografica del ter- reno, rios, arboles y animales de las dilata- disimas provincias del Gran Chaco Gualamba y de los ritas y costum'bres de las innumer- ables naciones barbaras e infieles que la habitan> (Cordoba 1733) and (Historia de la Compania de Jesus en la provincia del Paraguay) (2 vols., Madrid 1754-55).

LOZEAU, lo'zo, Albert, Canadian poet: b. Montreal, 1875. _ He was educated in the schools of his native city; became an invalid in his youth and has of necessity lived in retirement. His poetry is very popular in Que¬ bec and has been praised by several Parisian critics. It breathes the introspection caused by his detachment from active affairs. His works include (L'ame solitaire) (1907); c Billets du soir) (1911), and (Le miroir des jours) (1912). Consult Roy, Camille, (French-Canadian Litera- ture) (in cCanada and its Provinces,* Vol. VI, Toronto 1914).*

LOZNITZA, lds'mt-sa, Serbia, town situ¬ ated on the Drina, 65 miles west-southwest of Belgrade. Tt was taken by the Austrians in

the War of 1914—18, the passage of the river being forced at this point after a heavy bom¬ bardment. When the Serbian forces assumed the offensive and forced the Austrians out of Serbian territory Loznitza was the scene of the last stand of the invaders; they were finally obliged to evacuate the town but in their re¬ treat set it on fire. See War, European — Ser¬ bian Campaign.

LUALABA, loo-a -la'ba. Central Africa, a head-stream of the Kongo River, which rises near Kabinda on the southern boundary of the Kongo Free State, receives several affluents such as the Lufira and Lubudi, passes through a hilly, forest and lake region, and after a course of about 650 miles, the last 250 of which are navigable, unites with the Luapula (q.v.) at Ankoro to form the Kongo.

LUANG-PRABANG, loo'ang-pra'bang. (1) Native state of Indo-China under the protection of France. (See French Indo-China). (2) The

capital of the state of the same name, in Indo-China, situated on the Mekong at its juncture with the Nam-kan, 250 miles west- southwest of Hanoi. A pagoda on a hill is a feature in the city's centre. There are several other pagodas, temples and a royal palace. The town is also the seat of a French resident- agent. Pop. 40,000.

LUAPULA, loo-a-poo'la, Central Africa, a river, the chief of the two principal head- streams of the Kongo. It rises as the Cham- bezi south of Lake Tanganyika, near Fwamba on the Stevenson Road, flows southwest through Lake Bangweolo whence it issues as the Lua¬ pula, flows northward through Lake Moero, then northwestward until it unites at Ankoro with the Lualaba (q.v.) to form the Kongo.

LUBANG, loo-bang', Philippines, the largest and only inhabited island of the group of the same name lying at the western entrance of the Verde Passage between Luzon and Min¬ doro, southwest of Manila. The island of Lu- bang is 17 miles in length from northwest to southeast; area, 51 square miles; area of group, 76 square miles. The interior of the island is mostly mountainous, but the coasts are low. The chief town is Lubang on the north coast, which has considerable native trade ; the only port safe for all vessels at all seasons of the year in Tilig, on the northeast coast. Civil government was established in these islands in 1901, and in June 1902 they were detached from the province of Cavite and annexed to the province of Marindique. Pop. 3,000.

LUBAO, loo-ba'o, Philippines, a pueblo of the province of Pampangas, Luzon, situated on the northwestern channel of Pampanga delta, five miles south of Bacolor. It is the trade cen¬ tre of an agricultural region cultivating sugar, rice and indigo. Pop. 21,200.

LUBBOCK, lub'ok, Francis Richard,

American governor: b. Beaufort, S. C., 16 Oct. 1815; d. Austin, Tex., 1905. After receiving an academic education Lubbock was engaged in business in South Carolina, in New Orleans and finally in Texas. Before the Civil War he held several minor offices and clerkships. In 1857 he was elected lieutenant-governor and in 1861 governor. He refused re-election and as soon as his term expired Lubbock entered the military service as colonel on the staff of

President Davis. He was captured with Davis in May 1865 and imprisoned until December. Lubbock then entered business, first at Houston and later at Galveston. In 1878 he was elected State

treasurer and was three times re-elected. He wrote a volume of reminiscences called (Six Decades in Texas) (1900).

LUBBOCK, John, 1st Baron Avebury, British archaeologist and man of science : b. London, 30 April 1834; d. Kingsgate Castle, near Ramsgate, Kent, 28 May 1913. He was educated at Eton and joined the banking business of his father, Sir John William Lub¬ bock (q.v.), in 1848, becoming a partner in 1856. He rose to great eminence in his profession, and was appointed to various honorable and responsible posts in connection with it. He en¬ tered Parliament in 1870 as member for Maidstone in the Liberal interest, and from 1880 till 1900 sat for London University, from 1886 as a Liberal Unionist. In 1900 he was raised to the peerage as Baron Avebury. He was a recognized authority on financial and educational questions, and his name is asso¬ ciated with three notable measures of social reform — the Bank Holidays Act, 1881, which secured three national holidays to the workers, on Easter Monday, Whit Monday and the first weekday after Christmas Day. Each of these is often referred to as (

Flowers in Relation to Insects' (1873) ; (Origin and Metamorphoses of Insects) (1873) ; (Fruits, Flowers and Leaves' (1886) ; (On Seedlings> (1892) ; (Buds and Stipules' (1899) ; (Notes on the Life History of British Flowering Plants' (1905) ; (2) Geology, Palaeontology and Phys¬ ical Geography; (Prehistoric Man' (1865); cThe Origin of Civilization' (1870) ; (The Scenery of Switzerland' (1896) ; (The Scenery of England' (1902) ; the two latter of import¬ ance as explanations of how the present-day scenery has come to be what it is. (3) Econ¬ omics: (A History of Coinage' (1902); (Free Trade' (1904). (4) Miscellaneous: (Fiftv

Years of Science' (Presidential address to the British Association, 1881); (The Pleasures of

Life) (1887) ; (Peace and Happiness) (1909) ;

' and a number of other essays and addresses, of which a very popular one was an attempt to specify the best 100 books in the world's litera¬ ture. These have frequently been published in sets and are known as <(Lubbock's Hundred Best Books.

LUBBOCK, Sir John William, English

astronomer and mathematician: b. Westminster, London, 26 March 1803; d. 20 June 1865. He was graduated from Trinity College, Cam¬ bridge, in 1825 ; became a banker ; found an avocation in scientific studies; made particular investigations in physical astronomy and La¬ place's theory of probability; and was the first vice-chancellor of London University (1837-42). Among his scientific writings are (An Ele¬ mentary Treatise on the Computation of Eclipses and Occultations) (1835) ; (An Ele¬ mentary Treatise on the Tides) (1839) ; and (On the Gnomonic Projection of the Sphere)

(1851).

LUBBOCK, Sir Nevile, English banker: b. 31 March 1839; d. 12 Sept. 1914. A brother of the first Lord Avebury (q.v.), he was educated at Eton. He became governor of the Royal Exchange Assurance Corporation ; a director of the Colonial Bank; vice-president of the Royal Colonial Institute; and president of the West India Committee. He was created IC. C. M. G. in 1899.

LUBEC, loo'bek, Me., town in Washington County, four miles south of Eastport. Fishing is the sole industry of the inhabitants. Smoked fish and sardines are exported. The water-sup¬ ply system is the property of the municipality.

Pop. 3,371.

• •

LUBECK, Germany, one of the three free city-states (see Free Cities) and a constituent of the German confederation, situated on a low ridge at the confluence of the Wackenitz with the Trave, 38 miles northeast of Ham¬ burg and 12 miles from the Gulf of Liibeck, on the Baltic. It was anciently surrounded by walls and bastions, which have been leveled and converted into pleasant walks ; but it is still entered by four gates and furnishes strik¬ ing specimens of the architecture of the 15th and 16th centuries. Among the buildings are the cathedral, a structure of red brick, begun in 1173, surmounted by two spires 416 feet high, and containing a finely carved choir-screen; the Marienkirche (Saint Mary's Church), a fine specimen of early Gothic, the 2Egidienkirche (Saint Giles' Church) and the Petrikirche (Saint Peter's Church) ; the town or senate house, an ancient Gothic building; the Hospital of the Holy Ghost (13th century) ; the Hol¬ stein Gale, with its two lofty towers, etc. There is a public library of about 130,000 volumes. Scholastic establishments include technical, architectural and naval schools. The city has fine

municipal waterworks, electric lighting and a system of electric street railroads connecting the suburbs. The manufactures are compara¬ tively unimportant, but the trade is extensive, especially with Hamburg, the Baltic ports and the interior of Germany. The Elbe-Trave Canal connects Liibeck and Lauenburg. Lu- beck possesses a territory of 116 square miles and includes the port of Travemiinde and sev¬ eral isolated portions in Holstein and Lauen¬ burg. It .has a senate of 14 members and a

council of burgesses of 120 members. It be¬ came an imperial free city in 1226, and about 30 years later it became the head of the Han¬ seatic League. It is represented by one mem¬ ber in the Bundesrat and one in the Reichstag (q.v.). There is a court of first instance and a high court. Pop. of city about 116,599; of city and state about 130,000. The principality of Liibeck belongs to the grand duchy of Olden¬ burg and lies north of the state (pop. 41,300). Consult King, Wilson, 'Three Free Cities: Hamburg, Bremen, Liibeck (London 1914).*

LUBIN, David, American agriculturist, founder of the International Institute of Agri¬ culture: b. Poland, of Jewish parents, 10 June 1849; d. Rome, Italy, 1 Jan. 1919. He was taken to England when he was two years old. On his father's death, David's mother married again and they emigrated to America. He re¬ ceived a scant education and at an early age was placed in a jewelry factory in Attleboro, Mass. Finding slight opportunity of advance¬ ment there he drifted to California. He reached Sacramento and after working at odd jobs he amassed sufficient funds to start a dry- goods store of his own. David dealt largely in overalls and thus came in contact with the farmers of California, and as he met them in person he learned something of their prob¬ lems and his keen mind was soon interested. He bought a farm and became a fruit grower, retaining also his dry-goods business which had prospered. In his new vocation of farmer there came to him the idea of an international agricultural congress, whereby one side of the globe might learn what the other side was pro¬ ducing and how and at what cost. He began collecting statistics on the subject; studied plant life and domestic animals and made in¬ vestigations into their diseases and sought remedies therefor. In 1904 Mr. Lubin found support in Italy for his projected international agricultural congress. King Emmanuel saw the need for such an institution and gave it his ardent support, giving a building for the con¬ gress and an annual income of $60,000. At the first gathering 40 nations were represented and Mr. Lubin was appointed the delegate from the United States by President Roosevelt. Mr. Lubin lived to see 53 nations taking part in the congress. He was

responsible also for the introduction of the rural credits system in the United States and he brought about the passage of a measure in Congress for increasing the parcels post service for the benefit of the farmer, promoting direct selling and buying of farm produce through the mails. He also took a keen interest in farmers' co-operative societies and granges and was interested in oceanic shipping. He introduced the national marketing proposal on the lines of the German Landwirtschaftsrat. In 1913 on the occasion of the meeting of the congress in Rome Mr. Lubin received a silver cup as a token of ap¬ preciation of his efforts in originating the or¬ ganization. Since that year he had lived in Rome much of the time. He published (Let There be Light.) See International Insti¬ tute of Agriculture.

LUBKE, Wilhelm, vil'helm liib'ke, German historian of art: b. Dortmund, Westphalia, 17 Jan. 1826; d. Karlsruhe (Baden), 5 April 1893. He studied at Bonn and Berlin; held the chair

of architecture at the Building Academy of Berlin in 1857-61 ; was professor of the history of art and archaeology at the polytechnic school at Zurich 1861-66, at Stuttgart 1866-85 and at the high school in Karlsruhe 1885-93. Chief among his works are (Mediaeval Art in West- phalia> (1853), which at once gave him a high place among art critics; the (History of Archi- tecture) ((Geschichte der Architektur,5 1855), the first popular manual of the subject, and a great success: (Outlines of the History of Art5 (1860; 11th ed., 1891), translated into English by Clarence Cook, 1880; (History of the Renaissance in France) (1868) ; (History of the Renaissance in Germany) (1873); Eccle¬ siastical Art in Germany 5 (Eng. trans. by Wheatley, 1876) ; (History of Sculpture5 (Eng. trans. by Bunnet, 1878) ; ˆHistory of German Art) (1888) ; (Recollections) (1891). He was extremely versatile and previous to his work in art gave instruction in vocal and pianoforte music.

LUBLIN, loo'blin, Poland, capital of the government of Lublin, on the Bistritza, about 95 miles southeast of Warsaw. Lublin was, in the 12th century, a place of importance. The union of Poland and Lithuania was decreed at a diet which met here in 1568. There are at present some manufactures, chiefly woolen goods, agricultural implements and leather. There is a jail with which is connected a gov¬ ernment cloth factory. It was the headquarters of the Russian 14th Army Corps. Lublin has a number of good educational

institutions and a number of ancient buildings. Pop. 65,870, one-half of whom are Jews.

LUBLINSKI, loo-blin'ski, Samuel, German literary critic: b. Johannisburg, East Prussia, 18 Feb. 1868; d. Weimar, 26 Dec. 1910. He is the author of a number of dramas and a book attacking the naturalistic movement in the Ger¬ man literature of the last decade of the 19th centurv ((Die Bilanz der Moderne,5 Dresden

1904).

LUBRICANTS, substances haying a low . degree of cohesion applied to solid surfaces rubbing against each other; the object being to reduce the friction at the points of contact. The theory as to lubricants is that they interpose an almost frictionless film between the sur¬ faces to which they are applied. The require¬ ments of a good lubricant, therefore, are a minimum of internal cohesion and sufficient body to resist being squeezed out of place by the pressure to which they may be subjected — as, for example, in the bearings of a heavy shaft. Other important qualities demanded are freedom from all corrosive ingredients and also from any component which has a tend¬ ency to absorb oxygen and become gummy. Lubricants for use in the cylinders of gasoline engines must possess the further qualifications of having a high flash point and a relatively very high fire point.

The lubricants generally in use belong to the group of oils and greases. Outside . of these but one substance ranks with them in im¬ portance, and that is graphite. Although nearly all of the so-called non-drying oils and most of the greases have been used at one time or another as lubricants, it is now recog¬ nized that animal oils and fats are liable to de¬

compose with use, developing acids which are corrosive, and thus destructive to the bearings in which they are used ; and oils of vegetable origin have a tendency to become gummy within a brief period. For all fine machinery, therefore, the preferred lubricants are the min¬ eral oils derived from crude petroleum. For many purposes, however, sperm oil, lard oil, whale oil, neatsfoot oil and tallow oil, among the animal oils, and olive oil, rape oil and cas¬ tor oil among the vegetable oils are in consid¬ erable use, both alone and in mixtures with one another and with the various mineral oils. Solid tallow is also used in mixtures with vari¬ ous oils to form lubricating greases. Castor oil has proved of special value in lubricating the high-speed engines of the aeroplane and the racing automobile.

Graphite, preferably of the ((flake>:> type, is used on the finest of ma¬ chinery, usually in mixture with oil or grease.

The fine lubricating oils are made from crude petroleum by first distilling off the naph¬ thas and the illuminating oil, and then distilling the residue with superheated steam in a vac¬ uum. The lower temperatures give the lighter spindle oils, and the higher give cylinder oils of greater viscosity up to a buttery paste, called cup grease. These lubricants are graded to ex¬ tremes of nicety for the pressures under which they must work and the temperatures they must endure, and the manufacturers offer them in almost endless variety. Consult Archbutt, L., and Deeley, R. M., (Lubrication and Lubri- cants) (London 1912) ; Battle, J. R., (Lubricat- ing Engineer's Handbook5 (Philadelphia 1916) ; Hurst, G. H., (Lubricating Oils, Fats and Greases5 (London 1911).

LUCAN, lu'kan (Marcus Annaeus Luca- nus), Roman poet: b. Cordoba, Spain, 39 a.d. ; d. 65. His father, a Roman knight, was the youngest brother of the philosopher Seneca. Lucan went to Rome when a child, and hav¬ ing early obtained celebrity, was forbidden by Nero, who himself aspired to literary honors, to recite in public. This induced Lucan to join the conspiracy of Piso. The plot was discov¬ ered, and Lucan, who is said to have informed against his own mother as accessory, was con¬ demned to death. He chose the death of Sen¬ eca, and had his veins opened. Of his poems, only his (Pharsalia5 had come down to us, in which he narrates, in 10 books, the events of the civil war between Caesar and Pompey. The poem is unfinished, and as it appears to have been composed at different times, it is uncertain whether it was left unfinished by the author or whether the latter part has been lost. In the earlier portions the liberal sentiments of the author are checked by deference to the emperor, in the latter he is inveighed against in unsparing language. The best editions are Burmann's (Leyden 1740), Weber's (Leipzig 1821-31) and those of Haskins (Cambridge, England, 1887), Hosius (Leipzig 1892) and Francken. (Levdeti 1896-97). Lucan has been translated into Eng¬ lish by Rowe (1718) and by Ridley (2d ed., 1905). Consult Butler, H. E., (Post- Augustan Poetry> (Oxford 1909).

LUCANIA, lu-ka'm-a, Italy, a district of ancient Italy, southeast of Cambria and bor¬ dering on the Gulf of Tarentum, corresponding nearly to the present province of Potenza and the eastern part of Salerno. The region was

almost wholly occupied by the Apennines, and covered with extensive forests. The Chones and the CEnotrians were the ancient people of this section; but before the introduction of Christianity into Italy, they had been nearly destroyed. Lucania became Roman territory about 300 b.c.

LUCAS, Albert Pike, American painter and sculptor: b. Jersey City, N. J., 1860? He was educated at the Lcole des Beaux-Arts, Paris, under Hebert and Boulanger 1882-88, and subsequently was a pupil of Gustave Cour- tois and Dagnan Bouveret. Since 1889 he has exhibited regularly at the Paris Salon, also at leading expositions. He was awarded a medal at the Buffalo Exposition of 1901 and received an honorable mention at the Paris Ex¬ position of 1900. Mr. Lucas has painted por¬ traits of many prominent persons and is repre¬ sented in the National Gallery, Washington, and by a marble bust, 'Ecstasy5 in the Metropolitan Museum of Art, New York. Among his paint¬ ings are (The Golden Madonna) ; (October Breezes) ; 'Little Church on the HilP ; '•Walk¬ ing against the Wind.5

LUCAS, Captain Lord (Auberon Thomas Herbert), English statesman and soldier: b. 1876; d. November 1916. He lost a leg in the South African War while acting as correspond¬ ent of The Times. He afterward held various official posts — Under-Secretary at the War Office, Under-Secretary for the Colonies, and parliamentary secretary to the Board of Agri¬ culture, entering the Cabinet as president of that board in 1914. On the formation of the coali¬ tion government in 1915 he abandoned politics and, notwithstanding his physical disability and the fact that he was much over the regulation age, joined the Royal Flying Corps and quickly gained his pilot's certificate. He first served in Egypt, flying over the Turkish lines; after instructing recruits for some months in Eng¬ land he was sent to the western front. On 4 November he made a flight over the German lines and failed to return. His death was re¬ ported in December. The barony of Lucas dates from 1663.

LUCAS, Edward Verrall, English author; b. 12 June 1868. He was educated at Univer¬ sity College, was connected with the London Globe 1893-1900, and with the Academy 1896- 1901. He published a populer 'Book of Verses for Children5 (1897), as well as other works for young readers, and then began an association with Punch. Biographer, essayist anthologist, editor, traveler, he brings to all his work sympathy, uncommon powers of observation and description, and a genial, kindly humor. His works include 'The Open Road5

(1899) ; 'Highways and Bvways in Sussex5 (1904) ; 'A Wanderer in Holland5 (1905) ; 'A Wanderer in London5 (1906) ; 'Character and Comedy5 (1907) ; 'Over BemertonV (1908) ; 'A Wanderer in Paris5 (1909) ; 'Old Lamps for New5 (1911) ; 'A Wanderer in Florence5 (1912) ; 'Loiterer's Harvest5 (1913) ; 'A Wanderer in Venice5 (1914) ; 'Landmarks5 (1914). He has edited a notable edition of the works of Charles and Mary Lamb.

LUCAS, Frederic Augustus, American museum director: b. Plymouth, Mass., 25 March 1852. He was educated in the public schools and from 1871 to 1882 wras assistant at

Ward's Natural Science Establishment, Roches¬ ter, N. Y. From 1882 to 1904 he was succes¬ sively osteologist, assistant curator of the division of comparative anatomy and curator of the United States National Museum. In 1904-11 he was curator-in-chief of the museums of the Brooklyn Institute of Arts and Sciences and in the latter year was made director of the American Museum of Natural History. Dr. Lucas was member of the commission appointed to investigate the condition of the fur seal herd of the Pribilof Islands. He has written various papers on the anatomy of birds, fossil verte¬ brates and museum methods and the volumes 'Animals of the Past5 (1901) ; 'Animals be¬ fore Man in North America5 (1902).

LUCAS, George J., American clergyman : b. Youghal, County Cork, Ireland, 22 May 1852. He was educated at Saint Francis Xavier's Col¬ lege, New York City, Woodstock College, Saint Mary's Seminary, Baltimore, the Catholic Uni¬ versity of America, Washington and the Ponti- ficial University, Rome. Further studies were made in Canada, England and Belgium. He entered the Society of Jesus, but left it be¬ cause of his poor health. In 1889 he was ordained to the priesthood and from 1889 to 1896 was curate successively at Scranton, Arch¬ bald and Dunmore, Pa. In 1896-1908 Father Lucas was rector of Saint Andrew's Church, Blossburg, Pa. ; from 1908 to 1912 of Saint Mary's, Pittston, and after 1912 permanent rector of Saint Patrick's Church, Scranton. Father Lucas is synodal examiner of the diocese of Scranton. He contributed to 'The Catholic Encyclopedia5 and is the author of 'Agnosticism and Religion5 (1895), which drew a commendatory letter from the Right Hon. W. E. Gladstone, one-time Prime Minister of England. The book is a refutation of the doctrines of agnosticism propounded by Herbert Spencer in his synthetic philosophy and is con¬ sidered the standard work on agnosticism from the Christian viewpoint in both continents. In March 1919 the Gladstone autograph letter to Dr. Lucas was placed in the collection of Vatican

documents exposed for public view in . the exhibition cases of the Vatican library.

LUCAS, John Seymour, English artist; b. London, 21 Dec. 1849. He studied with the woodcarver Gerard Robinson ; and painting at the Royal Academy ; first exhibited at the Academy in 1872; first made his mark by his 'By Hook or Crook,5 shown at Burlington House in 1875; and obtained recognition for the high technical excellence of his work. He became a Royal Academician in 1898. Among his later canvases are 'Fleeced5 ; 'For the King and the Cause5 ; 'Intercepted Despatches ; 'Charles Before Gloucester5 ; 'After Cul- loden5 ; 'The Call to Arms.5*

lucbAn, look-ban', or LUGBANG, loog-

bang', Philippines, pueblo of the province of Tayabas, Luzon, eight miles northwest of Taya- bas, the provincial capital. It is in the heart of a mountainous region, and in the surrounding country rice is grown on Sawas or terraces on the hillsides. It is on the main road, and has a profitable trade. The chief industries are the weaving of fine straw hats from the fibre of the buri palmleaf, and the manufacture of pandanus mats. Pop. 10,227.

LUCCA, look'ka (originally Lucas), Paul¬ ine, Austrian opera singer: b. Vienna, 24 April 1841 ; d. there, 28 Feb. 1908. She was a pupil of Uschmann and Lewy, but being too poor to pursue her studies joined the chorus of the Vienna Court Opera. She made her first ap¬ pearance in opera in 1859 as Elvira in Verdi's (Ernani) at Olmiitz; at once attained great success on the Continent ; and later sang in London (1863-65) and New York (September 1872). From 1874 to 1889 she was a member of the Vienna Opera. Illness impaired her voice and in 1889 she retired. Among her chief parts were those of Margeurite, in

LUCCA, Italy, the capital of the province of Lucca, and former capital of the ancient Tuscan republic and duchy of Lucca at the base of the Apennines, near the left bank of the Serchio, 37 miles by rail northwest of Florence, and 26 miles from the Mediterranean. En¬ circled by walls flanked with bastions, it stands in a fertile plain surrounded by the Apennines, and has a striking appearance. It is entered by four gates and is well built. Lucca is an archiepiscopal see, and the seat of several im¬ portant courts and public offices. It contains numerous antiquities; one of the most interest¬ ing is the fish-market, the large oval of which is the Roman amphitheatre ; while the buildings around it, though converted into modern dwell¬ ings, are in a great measure composed of the ruins of the amphitheatre, and exhibit huge solid arches, and masses of brick and stone, on their original sites. The principal edifices are the Duomo, or cathedral (begun 1204), with a •magnificent fagade, a Romanesque portico, stained glass of the richest kind and a famous life-size crucifix, carved, according to legend, by Nicodemus, and which is only exhibited four times a year; the church of San Michele (8th century), an ancient and imposing structure; the church of San Frediano, founded in 686, furnishing an interesting specimen of early Christian architecture, and adorned with fine mosaics, frescoes, and paintings; the ducal palace ; academies of science ; public library with over 220,000 volumes ; the Palazzo Borghi, now converted into a poor-house ; and an aque¬ duct, carried from a distance into the city over 459 arches. The manufactures consist chiefly of silk goods; and there are numerous silk mills; near by are extensive jute mills. The trade is almost confined to the above articles of manufacture, agricultural produce and olive- oil, particularly the latter, which bears a high name, and is largely

exported.

First an Etruscan, then a Ligurian, town Lucca 177 b.c., became a Roman colony. It be¬ came a episcopal see in 347. It followed the varied fortunes of northern Italy until about 1115 it was made the seat of a republic. In 1320 it fell under the dominion of Castruccio Castracani, who became Duke of Lucca, and after his death Lucca was sold to Florence. It purchased its liberty from Charles IV in 1369, and maintained its independence until the French occupation in 1799. Tn 1814 the Con¬ gress of Vienna recreated it a duchy. In 1847 it was reunited to Tuscany, and it became part

of the kingdom of Italy in 1860. Pop. about

76,160.

The Bagni di Lucca, situated north of the city in the valley of the Lima, a tributary of the Serchio,, is celebrated for its warm springs and baths, with temperatures ranging from 98° to 130° F.

Consult Del Carlo, (Storia nopolare di Lucca (2 vols., Lucca 1877) ; and Ross and Erichsen, (The Story of Lucca) (in (Mediseval Town Series,* New York 1912).*

LUCCOCK, George Naphtali, American clergyman : b. Kimbolton, Guernsey County, Ohio, 31 March 1857. In 1878 he was graduated at the University of Wooster and in 1881 at the Western Theological Seminary. In the latter year he was ordained to the Presbyterian ministry and for 10 years was engaged in home missionary work in Kossuth, Emmett, Dickin¬ son and Greene counties, Iowa, and Westminster Church, Des Moines. In 1891-94 he was pastor at Bloomington, Ind., in 1894-1903 at Wash¬ ington, D. C., in 1903-17 at Oak Park, Ill., and at the College Church, Wooster, Ohio, since February 1917. In 1910 Dr. Lucas was a dele¬ gate to the World's Missionary Conference at Edinburgh and is member of the commission of the general assembly charged with the prepara¬ tion of a new Intermediate Catechism. He is the author of Christianity and War (1917).*

LUCE, Auguste Simeon, French historian: b. Bretteville-sur-Ay, Manche, 1833 ; d. 1892. He received his education at the Ecole des Chartes in 1856-58. In 1858 he was appointed archivist of the department of Deux-Sevres and eight years later was made chief of the historical division of the National Archives. In 1882 M. Luce was elected member of the Academie de Inscriptions et Belles Lettres. In

the same year he was appointed to the chair of historical sources of French history at the Ecole des Chartes and in 1883 received the cross of the Legion of Honor. His publications in¬ clude an edition of Froissart 0866-88) and (Le chronique du Mont-Saint-MicheP (1879-86) ; (De Gaidone poemate Gallico Vetustiore Dis- quisitio Critica) (1860) ; (Chroniques des quatre premiers Valois (1862) ; (Histoire de Bertrand Duguesclin et de son epoque* (1876; 2d ed., 1883) ; (Jeanne d'Arc a Domremy* (1886) ; (La France pendant la guerre de Cent Ans> (1890).*

LUCE, Stephen Bleecker, American naval officer: b. Albany, N. Y., 25 March 1827; d. Newport, R. I., 28 July 1917. He was appointed midshipman from New York in 1841; saw service in various waters and made the circuit of the globe; during the Mexican War was on the Pacific Coast; and in the Civil War was commander of the monitor Nantucket, and of the Sonoma, Canandaigua and Pontiac. He revived the naval apprentice system and later established it at Newport, R. I. He founded the Naval War College and was its first presi¬ dent, and in 1886-89 was in command of the North Atlantic station. On 25 March 1889 le was retired. He was an associate editor of the Standard Dictionary, and author of Sea¬ manship* (1863-98), (Naval Songs) (1889) and (The Patriotic and Naval Songster.*

LUCENA, loo-tha'na, Spain, an Andalu¬ sian city in the province of Cordova, 37 miles

southeast of that city, in a picturesque hilly situation. It is well built, has a fine parish church, schools, benevolent institutions, a town-house, a magnificent <(paseo)) or public promenade, and in the neighborhood are medic¬ inal baths of repute. It manufactures linens, shoes, earthenware, glass, iron, copper and other metallic vessels, oil, vinegar, brandy, and is in a region noted for its wines, and for horse-raising. Pop. 21,029.

LUCERNE, lu-sern', (Fr. lii-sarne), Swit¬ zerland, the capital of the canton of Lucerne, and one of the three seats of the Swiss Diet, on an acclivity at the northwest end of Lake Lucerne. The Reuss, which issues from the lake and flows through the town, is crossed by five bridges, two of which are covered and orna¬ mented with curious mediaeval paintings, in¬ cluding a Danse Macabre. The town retains

its feudal walls and watch-towers, and with the neighboring mountains, including the Pilatus and Rigi, is noted for its picturesque features and scenic beauties, making it a much-frequented tourist centre. Lucerne is well-built, has regu¬ lar, clean streets, electrically lighted and tra¬ versed by street railroads, a town-hall, with val¬ uable stained glass of the 14th century, Jesuit college, now the government building; a 15th century parish church, with two slender towers ; a Gothic Protestant church; Ursuline convent, with handsome church ; a museum and cantonal library of 90,000 volumes ; large town hospital, poorhouse, deanery, arsenal, a new International Museum of War and Peace, mint, casino, etc. ; and besides the college or lyceum, several well- conducted educational establishments. The water supply is obtained from springs on Mount Pilatus, 14 miles off. An interesting monument is the (Lion of Lucerne,) designed by Thor- waldsen, in memory of the Swiss guards who fell in Paris in 1792 while defending the Tuile- ries, and hewn out of the solid rock. Lucerne has some transit trade, but the manufactures are unimportant; it depends chiefly on the im¬ portant tourist traffic, accommodating annually 250,000 visitors. Pop. about 41,500. Lucerne was founded dn a.d. 750. It was at one time under the Austrian yoke ; but it has belonged to the Swiss Confederation since 1332. During the Ref¬ ormation period it was a stronghold of Catholi¬ cism, and such it has remained. Under the Helvetic Republic it was the seat of the central government, and ;it led in the Sonderbund War, but was captured by the Federals in 1847.

LUCERNE, also called PURPLE ME- DICK, a leguminous forage plant (Medicago sativa); native to Europe, and extensively grown there, in the United States and other coun¬ tries of the temperate and semi-tropical zones. It is of the natural order Leguminosse, and is often found in a wild state in Europe and western Asia. Lucerne has a well-developed tap-root, often three-fourths of an inch in diameter in old plants, with strong lateral roots which de¬ scend to a depth of several feet, where the sub¬ soil is open and adapted to the growth of the plant. From the root-stock, which is perennial, many upright stems are sent up to a height of one to three feet, bearing trifoliate leaves, the leaflets of which are somewhat narrow, obovate, with dentate margins and projecting tips to the midribs. The flowers, which grow in racemes or clusters, are generally purple, though plants

with pale yellow flowers are met with occasion¬ ally. The pod is a spirally coiled legume con¬ taining several greenish-yellow seeds about the size of those of red clover. Seed does not

usually ripen well in Great Britain and in

Europe the best comes from southern France.

When fully established lucerne is one of the most valuable of all farm crops, yielding a highly nutritive green fodder. Since it rapidly deteriorates in feeding value when the flowering period commences, it should be cut just before the bloom appears. In America it is very gen¬ erally known by the Spanish name of alfalfa (q.v.). Hardy Siberian species are now being introduced in the Northern States and in

Canada.

LUCERNE, Lake of, or VIER-WALD- STATTERSEE (Lake of the Four Forest Cantons), Switzerland, the largest, and in many respects the most magnificent, Swiss lake, near the centre of the country, 1,433 feet above sea- level, surrounded by the cantons of Lucerne, Schwyz, Uri and Unterwalden ; area, 49 square miles. It is irregular in shape and divided into reaches, separated by narrow straits, giving it the appearance of three distinct lakes. The ex¬ treme length from west to south through its centre is 22 > V2 miles; greatest breadth a little over two miles ; while the depth varies from 300 to 702 feet. It presents every variety of lake scenery. In the upper reach, lofty moun¬ tain masses, including Pilatus and the Rigi, tower above the lake, and descend in sheer prec¬ ipices to its very edge. It never freezes over. Owing to the violent storms which suddenly burst over the lake, its navigation is dangerous. Steamers ply regularly upon it. The Reuss River enters the lake at Fliielen and flows out of it at Lucerne. Cut out of the solid rock on the eastern shore is the Axenstrasse, one of the most beautiful of lakeshore roads. At Brunnen the league was made (1307) that achieved Swiss independence ; and there are interesting tradi¬ tional memorials of William Tell. Over 20 pleasure steamers ply the lake, carrying annu¬ ally over 2,000,000 passengers.

LUCHAIRE, Achille, a-shel lii-shar, French historian: b. Paris, 24 Oct. 1846; d. 14 Nov. 1908. He was professor in the Bordeaux faculty of letters ; was made a professor at Paris, where in 1889 he obtained the chair of mediae¬ val history. In addition to studies of the Basque language, such as (Noms de lieux du pays basque^* (1872), and (De lingua aquitanica* (1877), he published a comprehensive work on the Gascon dialects, (Etudes sur les Idiomes pyreneens de la Region frangaise5 (1879), crowned by the Academy, and a number of his¬ torical narratives, such as institutions mon-

archiqiies de la Fance sous les premiers Cape- tiens) (1884), and (Les communes francases a l'epoque des Capetiens directs (1890) ; (L'Uni- versite de Paris sous Philippe- Auguste) (1899) ; an exhaustive history of the Papacy in the time of Innocent III in six volumes (1904-08) ; Social, (France at the Time of Philip Augus- tus) (Eng. trans., 1912). Consult Imbert de la Tour, (Achille Luchaire) in Revue des Deux Mondes (Vol. LII, 1909).*

LUCIA DI LAMMERMOOR, loo-che'a

dela'mer-moor, a tragic opera by Gaetano Doni¬ zetti ; text by Salvatore Cammerano. First per¬ formed in Naples on 26 Sept. 1835. Though

based on Walter Scott's romance, (The Bride of Lammermoor, > the opera differs from the book and its English characteristics have been given an Italian atmosphere. Of the 64 operas composed by Donizetti the (Lucia di Lammer- moor' — -his masterpiece — and two others, (Lucrezia Borgia and (The Daughter of the Regiment,* are about the only ones ever per¬ formed nowadays. In the story Lucia, sister of Henry Ashton, Lord of Lammermoor, is in love with Sir Edgardo of Ravenswood, her broth¬ er's mortal enemy. Although Lord Ashton had slain Edgardo's father and burnt his castle, Edgardo is willing to forego his vengeance for the love of Lucia. The lovers swear eternal fidelity to each other and Edgardo departs for France on service. During his absence Lord Ashton shows his sister a forged document pur¬ porting to show that her lover has broken faith. Much against her will she agrees to marry Ar¬ thur, Lord Bucklaw, a wealthy suitor chosen by her brother. The wedding takes place, when Ed¬ gardo arrives at the end of the ceremony — too late. Lucia loses her reason and kills her hus¬ band ; Edgardo, desiring to see her once more, arrives to find her dead. He stabs himself and prays to meet his bride in heaven.*

LUCIAN-, lu'shi-an, Greek author: b. Sa- mosata, Syria, about 125 a.d. ; d. Egypt toward the close of the 2d century a.d. He went to Antioch and devoted himself first to law and afterward to rhetoric, and traveled in several countries (among others, Greece, Italy, Spain and Gaul) as a professional orator. On re¬ turning home, probably about his 40th year, he abandoned the profession of rhetoric, which he seems partially to have resumed in his old age, and confined

himself to philosophy and literature. He lived to an advanced age, and was at a late period of his life made procurator of part of Egypt. The works of Lucian, of which many have come down to us, are narra¬ tive, rhetorical, critical, satirical, mostly in the form of dialogues. The most popular are those specifically known as the (Dialogues,* in which he derides the popular mythology and the philosophical secrets, particula ly his 'Dialogues of the Gods) and (Of the Dead.* These have given him the character of the wittiest of an¬ cient writers. He seems not to belong to any system, attacks imposture and superstition freely and boldly where he finds them, but is devoid of inspiration. The Epicureans, who in this respect agree with him, are therefore treated with more forbearance. The Christian religion, of which, however, he knew little, and that only through the medium of mysticism, was an object of his ridicule. His writings were once largely studied as textbooks, but his diction is not of the best. (See Dialogues of the Dead). Among editions of his works may be mentioned Lehman's (1822-29), F. Fritsch's (1882-85), incomplete; and Sommerbrodt's (1886-99), and Fowler's (4 vols., 1905). The most complete English translation is by Howard Williams (1888, in Bohn's series), and there are also renderings by Francklin (1781) and Tooke. Consult Allinson, (Boston 1905) ; Croiset, (Essai stir la vie et les oeuvres de Lucien) (Paris 1882) ; Harmon, in (Loeb Classical Library) (Vol. I text and translation, New York 1913) ; Hine, (Lucian the Syrian Satirist* (ib. 1900).

LUCIFER. Of Vondel's voluminous works the favorite with the Dutch is (Gysbrecht van Amstel,* but (Lucifer * (1654) has a

more universal interest because of its start¬ ling subject matter, which combines the naivete of the mediaeval religious play with ultramodern boldness of thought. Lucifer, the Stadholder of God, fearing the subjection of the archangels under man as a result of the Incarnation, revolts and is defeated. From revenge he tempts man and is plunged with all his hosts into eternal perdition where he loses his original beauty to become the monster of popular tradition. The Catholic poet's dedi¬ cation to Emperor Ferdinand III who Nike Divine Majesty is seated in unapproachable light,® along with his political pasquinades, cause his drama to seem a oolitical allegory rather than a religious play. In his preface to the printed work he claims he was ((the more eager to bring Lucifer upon the tragic stage since he stricken at last by the thunderbolt of God is thrust down to Hell as a signal example to all thankless and ambitious persons who audaciously dare to rise up against consecrated powers and majesties and lawful authorities.® The pasquinade ((To the Regicides® and ((Pro- tector Werewolf® make of Cromwell the (

The drama was produced at Amsterdam on 2 and 5 Feb. 1654, and withdrawn in answer to the vehement protests of the Calvinistic clergy. It was printed in 1654 and 1661, but not once during the 18th century, though more than 20 editions appeared in the 19th. It is written in Alexandrines in powerful and picturesque lan¬ guage often of Miltonic grandeur, but it lacks true dramatic quality, since all action of im¬ portance is narrated, not presented.

George Edmundson has proved the indebted¬ ness of Milton to (XVII, Leiden 1894) ; Vondel's (Treur- spelen, J. van Vloten (Vol. I, Historical In¬ troduction, Schiedam 1875) ; Eng. trans., C. L. van Noppen (New York 1898) ; (Milton and Vondel,* George Edmundson (London 1885).*

Carl E. Eggert.

LUCIFER, lu'sl-fer, (1) in ancient as¬ tronomy, the morning star. A name given to the planet Venus when she appears in the morning before sunrise. When Venus follows the sun, or appears in the evening, she is called Hesperus, the evening star. (2) A name com¬ monly given to Satan, the prince of darkness, due to the Fathers of the Church having mis¬ interpreted the reference to Lucifer (the king of Babylon) in Isaiah xiv, 12 as being to Satan. (3) A term originally applied to matches tipped with a mixture of chlorate of potash and sul- phuret of antimony, which were inflamed by friction on a piece of emery paper. These have been superseded by a variety of mixtures con¬ taining phosphorus.

LUCIID.7E, lu-si'i-de, or ESOCID££, the pike and pickerel family of bony fishes. These fishes have an elongated, somewhat compressed, powerful body, with rather small cycloid scales, an imperfect lateral line; the head and snout prolonged and depressed, the mouth large and lower jaw longest. The mouth is filled with strong teeth, and these fishes are the fiercest carnivores of the fresh waters. The family is widely distributed in northern waters, and may be traced back to the Miocene Age. See Pike.

LUCILE, lu-sel', an epic poem by Lord Lytton. (Owen Meredith), published in 1860. The narrative was founded upon the French novel (Lavinia) by George Sand.

LUCILIUS, lu-sll'i-us, Gaius, Roman au¬ thor: b. Suessa, 180 b.c. ; d. Naples, 103 b.c. He was grand-uncle to Pompey the Great on the maternal side. He served his first campaign against Numantia under Scipio Africanus, with whom he was very intimate. He is considered the inventor of the Roman satira, because he first gave it the form under which this kind of poetry was carried to perfection by Horace, Juvenal and Persius. His satires were superior, indeed, to the rude productions of Ennius and Pacuvius, but he in turn was surpassed by those who followed him. Horace compares him to a river which carries along precious dust mixed with useless rubbish. Of 30 books of satires which he wrote only 940 fragments have been preserved. In his lifetime these satires had an uncommon popularity. Consult the edition by Lachmann and Vahlen (1876) ; Muller, (Leben und Werke des Gaius Lucilius) (1876); Marx (2 vols., Leipzig 1904-05); Cichorius, (Untersuchungen zu Lucilius) (Ber¬ lin 1908) ; and for criticism of these two later editions Knapp, C. (in American Journal of Philology, Vol. XXIX, New York 1908).

LUCIN CUT-OFF. A famous link in the

Southern Pacific Railroad Overland route completed in 1903 across the centre of Great Salt Lake west of Ogden, Utah. At Lucin it joins the old line which circles far to the north around the head of the lake and climbs over several high ridges, one 680 feet high. It cuts off 44 miles and the new line is practically level for 72 miles. It consists partly of rock fill and about 12 miles of trestles.

LUCINA, lu-si'na, in Roman mythology, the goddess of light, a surname of Juno (ac¬ cording to some of Diana; according to others the name of a daughter of Jupiter and Juno) derived from the root of luceo (I shine). Her festival was celebrated 1 March, on which oc¬ casion the matrons assembled in her temple, adorned it with flowers and implored a happy and brave posterity.

LUCIUS, lu'shi-us, the name of three popes, as follows :

LUCIUS I: d. March 254. He succeeded Pope Cornelius on 23 June and by some au¬ thorities is said to have suffered martyrdom under Gallus, but this cannot be proved.

LUCIUS II (Gherardo Caccianemici, ga- rar'do ka/'che-a-na-me'che) : d. 15 Feb. 1145. He was legate to Germany from Honorius II, supported Innocent II against the antipope, An- acletus II, and became chancellor of the Holy See. In 1144 he succeeded Celestine II, but

was unsuccessful in quelling revolts against the papal authority in Rome and while heading his troops to suppress a disturbance, was killed by a paving stone thrown from the mob.

LUCIUS III (Ubaldo Allucingoli, oo- bal'do al-loo-chen'go-le) ; d. Verona, 25 Nov. 1185. He was the cardinal-bishop of Ostia and became Pope 1 Sept. 1181. He was the first Pope elected solely by the cardinals. The Em¬ peror Frederick Barbarossa having claimed the estates bequeathed to the papacy by Matilda of Tuscany, Lucius demanded their surrender. Frederick refused and the quarrel ended in the expulsion of Lucius from Rome. He died an exile in Verona.

LUCK OF EDENHALL, The. See

Eden hall.

LUCK OF ROARING CAMP, The, a

celebrated short story of California mining life written by F. Bret Harte (q.v.), which was first published in the Overland Monthly in 1869. The story attracted attention in the East and appeared in book form the following year. It is perhaps the most notable of the many short stories of Western life written by this author.

LUCKENWALDE, luk'en-val'de, Prus¬ sia, town in the province of Brandenburg, situ¬ ated on the Nuthe, 30 miles south of Berlin, on the Berlin-Dresden-Leipzig Railroad. It is an important industrial centre, its establishments including cloth and woolen manufactories, cot¬ ton, printing and dye works, metal and bronze works, foundries, machine shops, hat factories, paper, piano and cardboard factories, etc. Pop. 23,500.

LUCKNOW, India, former capital of Oudh, 666 miles northwest of Calcutta and 885 miles from Bombay. It is situated on both banks of the Gumti, and is connected by the Oudh and Rohlkund line with the general In¬ dian railway system. The cantonment is in the southeast corner of the city. Lucknow has an imposing appearance at a distance which a nearer view fails to realize, but it has some beautiful open spaces, and has been called the (

Lucknow was founded by Lakshmana, brother of Rama Chandra. After the Moham¬ medan conquest it was occupied by Shaiks and Pathans. It rose to its highest splendor as the

capital of the kingdom of Oudh, established during the decay of the Mogul Empire; but a selfish and sensual race of rulers imposed heavy burdens on the people; and the country fell under British control in 1856. Lucknow is associated with spine of the most stirring in¬ cidents in the Indian Mutiny (q.v.), when 1,200 men held out against 10,000 mutineers until re¬ lief came through re-enforcements brought by Havelock and Outram. The residency, the Secunder Bagh and the Alumbagh, where Havelock is buried, are interesting memorials of the siege. Pop. about 259,798. Consult Innes, (Lucknow and Oudh in the Mutiny)

(1905).

Lucknow also gives its name to a division of the United Provinces as well as to a district and tahsil. The division is the westernmost of Oudh, and it lies between the Ganges on the southwest and the Gogra on the northeast, and contains six districts. Area, 12,051 square miles. Pop. about 5,911,642. In 1901 87 per cent of the population were Hindus and 13 per cent Mohammedans. The district is the small¬ est in the United Provinces, and comprises three tahsils. Area, 967 square miles. Pop. about 764,411. In 1901 78 per cent were Hindus and over 20 Mohammedans. The tahsil, in which the city of Lucknow is situated, has an area of 360 square miles.

LUCKOCK, Herbert Mortimer, English

clergyman: b. Great Barr, Staffordshire, 11 July 1833 ; d. Lichfield, 24 March 1909. He graduated from Jesus College, Cambridge, was twice vicar of All Saints, Cambridge, and was rector of Gayhurst with Stoke-Goldington. Subsequently he was residentiary canon of Ely and principal of the Ely Theological College, and in 1892 became dean of Lichfield. Among his writings are (Tables of Stone) ; (After Death) ; footprints of the Apostles, > and Characteristics of the Four Gospels.*

LUCRETIA, lu-kre'shi-a, Roman matron of distinguished virtue, whose ill-treatment by Sextus Tarquin led to the destruction of the kingdom, and the formation of the republic of Rome. She was the wife of Collatinus, near relation of Tarquin, king of Rome. Sextus Tarquinius, who contrived to become a guest in the absence of her husband, whose kinsman he was, found means to reach her chamber in the middle of the night, and threatened, unless she gratified his desires, to stab her, kill a slave, place him by her side and then swear

that he had slain them both in the act of adultery. The fear of infamy succeeded. She afterward summoned her husband, father and kindred, and after acquainting them with the affair stabbed herself to the heart. The story has been variously adapted by poets and romancers.

LUCRETIUS, lu-kre'shi-us, Carus Titus,

Roman author : b. probably 97 b.c. ; d. 53 b.c. About his life almost nothing is known. He is supposed to have studied Epicurean philosophy at Athens. He is said to have been made in¬ sane by a philtre, in his lucid intervals to have produced several works, and to have committed suicide in his 44th year. We possess of his composition a didactic, poem, in six books, the

Cicero, and is entire but, evidently, not com¬ plete. The theory of corpuscles and their prop¬ erties; the origin of the vital and intellectual principles; of the senses; of the world and the movements of the heavenly bodies; of the rise and progress of society; and of arts and sciences, with other expositions of natural phenomena, are successively treated. Lucretius purpose was to free his readers from the fear of death which he believed to be bound up with the superstitions of the popular religion. As a work of art his poem has received the unanimous praise of critics for the skill with which the most unyielding materials are re¬ duced to a poetic diction full of life and sus¬ tained majesty. It has influenced the foremost English poets. (See De Rerum Natura). Con¬ sult Giussani, C., (Note lucreziane) (Turin 1900); Masson, John, (Lucretius : Epicurean and Poet) (2 vols., London 1907-09) ; Mallock, W. H., (Lucretius on Life and Death' (ib. 1900) ; Wallace, W., (Epicureanism) (ib. 1880) ; Zeller, E., (Stoics, Epicureans and Sceptics) (ib. 1880).*

LUCULLUS, lu-kul'us, Lucius Licinius,

Roman soldier of the 1st century b.c. When a young man he served with distinction in the Marsic War, and accompanied Sulla as quaestor into Asia on the breaking out of the Mithridatic War, 88 b.c. He expelled Mithridates from Chios and Colophon and defeated him off Tene- dos. After peace had been concluded with Mith¬ ridates he remained in Asia till 80 b.c. In 79 he was elected curule aedile, an office which he held in conjunction with his younger brother. Subsequently he held the office of praetor. On the conclusion of this magistracy he went to. Africa, the administration of which province he conducted with ability and impartiality, and in 74 b.c. obtained the consulship with M. Aurelius Cotta. As consul he

maintained the constitutional laws of Sulla. On the breaking out of the war with Mithridates he obtained the proconsulship of Cilicia and the command of the army. He vanquished the squadron of Mithridates near the island of Lemnos, and this victory enabled him to drive all the othef squadrons of Mithridates from the Archipelago. The generals of Lucullus subdued meanwhile all Bithynia and Paphlagonia. Lucullus, again at the head of his army, although overcome by Mithridates in a battle, soon acquired such advantages that he finally broke up the hostile army, and Mithridates himself sought protec¬ tion in Armenia. Lucullus now changed Pon- tus into a Roman province. Tigranes, king of Armenia, refusing to surrender Mithridates to the Romans, Lucullus marched against Armenia and vanquished Tigranes 69-68 b.c. Mithri¬ dates, however, contended with varying fortune, till Lucullus was prevented from effectively con¬ tinuing the war by the mutiny of his soldiers. Lucullus was deprived of the chief command, which was bestowed first on Glabrio, and after¬ ward on Pompey, and recalled 66 b.c. After a delay of three years he succeeded in procuring the merited recognition of his services in a public triumph. He laid out his gardens at Rome with such splendor that they became proverbial, and Pompey called him the Roman Xerxes.

LUCY, Sir Henry (William), English

journalist: b. Crosby, near Liverpool, 5 Dec,

1845. He was for a time a member of the Shrewsbury Chronicle staff ; in 1870-73 was connected with the Pall Mall Gazette (morning edition) ; and from 1873 with the Daily News, of which — with the exception of the period January 1886-July 1887, when he was editor-in- chief — he was the Parliamentary correspond¬ ent. He visited the United States in 1883, on his way around the world ; an account of which journey appeared in the New York Tribune in the form of letters, subsequently collected as (East by West (1885). On the death of Tom Taylor (q.v.) Lucy continued the former's Es¬ sence of Parliament in Punch as (The Diary of Toby, M. P.p and as such has proved himself a racy and entertaining writer on British pub¬ lic men. Among his books are (Men and Man¬ ners in Parliament (1874) ; (A Diary of Two Parliaments J (1885-86), and on the same lines the diaries of the Salisbury, Home Rule, Union¬ ist and Balfourian parliaments (1892, 1895,*

1901, 1906). (Memories of Eight Parliaments (1908) ; (Sixty Years in the Wilderness* (1909, 1912) and (Nearing Jordan* (third series, 1916), are his most recent works. He was knighted in 1909.*

*LUCY, Sir Thomas, English landed pro¬ prietor: b. 1532; d. Charlecote, 7 July 1600. He was educated by John Foxe (q.v.), the martyrologist ; and he foiiowed the Puritan sentiments of his tutor. In 1552 he came into possession of great estates in Warwickshire, in 1558-59 rebuilt the manor-house, which still exists, an excellent specimen of the Tudor style. He was knighted in 1565, and elected M.P. for Warwick in 1571 and 1584. His chief interest is in his alleged connection with Shakespeare (q.v.) whom he is said, in a story dating from the 17th century, to have prosecuted for deer-stealing. This story is ■now thought to be based on fact, though burdened with false details ; and Shakespeare is believed undoubtedly to satirize him as Justice Shallow in (The Merry Wives of Wind¬ sor.) Consult Lee Sir Sidney, (Life of Shakespeare. **

- *LUDDITES, in British history a name given to rioters in 1811-16, in Yorkshire, Lan¬ cashire and Nottinghamshire, in England, who attributed the prevailing distress to the intro¬ duction of machinery in manufactures, and did a great deal of damage in destroying it. For a time these counties were in a perpetual state of disturbance, but on the return of prosperity the riots ceased.*

LUDENDORFF, General Von, German soldier: b. Posen, Prussia, 1865. He passed out of the War Academy in 1895 and was soon afterward appointed to the Great General Staff in Berlin, where his high mental attainments won him recognition and rapid advancement. A born soldier, strong-willed, endowed with an iron constitution and obsessed with but one idea — the perfection of the great fighting ma¬ chine of which he was a part — Ludendorff be¬ came by far the most dominant figure pro¬ duced on the German side during the war. At the end of 1912 he was chief of a depart¬ ment at the General Staff with the rank of colonel ; in April 1914 he was promoted to major-general and placed in command of an infantry brigade at Strassburg. He was given another command shortly after the outbreak

of war, but before the war was a month old he was sent to East Prussia as chief of staff of the 8th army under Hindenburg. The impression prevailed that Ludendorff was re¬ sponsible for the recall of Hindenburg from his retirement to command the 8th army operating against the Russian invasion, and that Hindenburg had

returned the compliment by asking for Ludendorff as his chief of staff. From this stage the two men worked together and it would be difficult to assert how much the chief of staff contributed to Hindenburg's successes and made him for a time the idol of the German people. According to some authorities, Ludendorff was the brain and Hin¬ denburg the arm of the German military power. The failure of Von Falkenhayn at Ver¬ dun in 1916 led to his being superseded by Hindenburg as virtual commander-in-chief, and Ludendorff became first quartermaster-general. It was also alleged that the shuffle of commands was a plot between the Kaiser and Falkenhayn to discredit Hindenburg and lower his enormous popularity by giving him free rein, in the cer¬ tainty that he would run his head against a wall. A more probable explanation was that if the bitter truth had at last to be told the German people, he alone could perform the task and carry the nation with him. Ludendorff, how¬ ever, was the principal power — a mysterious personality that gradually overshadowed even the Kaiser. Silently and unobtrusively he ma¬ tured strategic plans, intrigues and press cam¬ paigns in his solitary and closed office, making his calculations and solving his problems. As a strategist Ludendorff takes high rank among the master minds who planned the battles and troop movements on the battlefields of Europe. His task was by no means an easy one. He had, up to the middle of 1917 at least, to hold back millions of troops in the Eastern and Western Fronts. With the collapse of Russia, and the fading out of the battle line on the Eastern Front, his task was simplified somewhat although the entrance of the United States into the war was fast bringing to the Entente a preponderance in men and materiel. Well informed of the nature and extent of America's effort, Ludendorff in the winter of 1917-18 made extensive preparations for a grand final offensive with the object of breaking the Allied lines in France before the weight of America's effort could be brought to bear against him. This historic drive began 21 March 1918 and for days proceeded according to schedule. Up to the middle of July the strategic plans of Ludendorff still bore fruit, but at this very moment America's participation in the conflict turned the tide and the end of the month saw the German armies . in retreat. The morale of the Ger¬ man civilian population had meanwhile been undermined and Ludendorff found it increas¬ ingly difficult to maintain discipline at the front. He was among the very first mem¬ bers of the German High Command to recog¬ nize defeat as imminent. Already in Au¬ gust 1918 Ludendorff had launched peace kites and endeavored to persuade the Kaiser of the hopelessness of the struggle; it was he, also, who prompted the request by Germany for an armistice. When the inner history of the

war is written on the German side, the genius of-, Ludendorff, his rise and his fall, will stand as one of the romantic episodes in the great con-

fiict. Consult (Ludendorff's Own Story) (New York 1919).

LUDENSCHEID, lu'den-shidj Prussia, town m Westphalia, 20 miles southeast of Hagen and 32 miles northeast of Cologne. It is a manufacturing town, with cutlery and hardware works, musical instrument factories, watch, umbrella, cane and wire works, iron foundries, cotton-mills, etc. Pop, 32,300.

LUDINGTON, Mich., city, county-seat of Mason County, on Lake Michigan and Mar¬ quette River. It is the terminus of the Pere Marquette Railroad, about 85 miles northeast of Milwaukee, Wis., 130 miles northwest of Lansing and 61 miles from Manitowoc on the opposite side of the lake. It has regular steamer communication with the large ports on Lake Michigan and direct freight connection, by ferry, with Manitowoc, Wis. It was settled in 1851, incorporated in 1867 and chartered as a city in 1874. The principal industries are connected with the manufacture and shipment of salt and lumber. There are large lumber mills, game-board factories, watch-case, print¬ ers' supplies, furniture and clothes-pin fac¬ tories. Lumber, grain, flour, salt and fruit are among the articles shipped to outside markets. The city has many guests in the summer months,, attracted by the cool climate and op¬ portunities for fishing in the several lakes nearby. The Epworth League Training As¬ sembly has nearby grounds and cottages. There are also a students' military camp, a Carnegie library, a courthouse, a station of the United States Weather Bureau, a clubhouse and park. The waterworks are owned by the city. Pop. (1920) 8,810.

LUDLOW, lud'lo, Edmund, English leader of the Republican party in the civil wars of Charles I and regicide: b. Maiden Bradley, Wiltshire, about 1617; d. Vevay, Switzerland, 1692. He was graduated from Trinity College, Oxford, in 1636; fought at Edgehill in 1642 ; in 1646 was elected to Par- bament from Wiltshire; and in December 1648 was one of the chief promoters of ((Pride's purge® (q.v.). He was one of the judges who signed the death-warrant of Charles I, sat in the council of state in 1649- 50 and was lieutenant-general of the horse in Ireland and a commissioner for the civil gov¬

ernment of that country in 1650-55. In 1656, upon the proclamation of Cromwell as lord protector, he declined to recognize Cromwell's authority, or to give security to keep the peace. Having been allowed to go into retirement in Essex, he was elected to Parliament for Hindon in 1659, and upon the recall of the Long Parliament became a member of the committee of safety (7 May), of the council of state (14 May) and commander-in-chief of the Irish army, with rank of lieutenant-general (4 July). He was impeached upon the Restora¬ tion (1660), surrendered, was allowed his lib¬ erty on providing sureties and escaped to Switzerland. His

LUDLOW, Fitzhugh, American journalist: b. Poughkeepsie, N. Y., 11 Sept. 1836; d. Ge-

neva, Switzerland, 12 Sept. 1870. He was graduated from Union College in 1856, in 1858-59 studied law in New York, in 1859 was admitted to the bar, but from 1860 devoted himself exclusively to literature. In 1860-61 he was connected with the World and the Commercial Advertiser, for a time was dra¬ matic, art and musical critic of the Evening Post, to which he long contributed, and held a similar post as critic on the Home Journal. He was also a frequent contributor to Har¬ per's Monthly and other magazines. In 1863 he journeyed across the plains to Oregon and California, and in an article styled (Through Tickets to San Francisco,) laid out a route for a Pacific railroad largely identical with that later followed. He was among the earliest con¬ tributors to Northern Lights of Boston, upon the establishment of that magazine. Among his works are (The Hasheesh Eater: Being Passages from the Life of a Pythagorean) (1857); (Little Brother and Other Genre Pic- tures) (1867) ; (The Opium Habit (1868) ; and (The Heart of the Continent: A Record of TraveP (1870).*

LUDLOW, James Meeker, American Presbyterian clergyman and author: b. Eliza¬ beth, N. J., 15 March 1841. He was gradu¬ ated from Princeton in 1861, from the Prince¬ ton Theological Seminary in 1864, entered the Presbyterian ministry and was pastor of the First Presbyterian Church of Albany 1864-68 and of the Collegiate Reformed Church of New York in 1868-77. His subsequent pas¬ torates were that of Westminster Church, Brooklyn, N. Y. (1877-85), and that of the First Presbyterian Church of East Orange, N. J., 1886-1909. In 1885 he declined the presidency of Marietta College (Ohio). Dr. Ludlow received honorary title of D.D. from Williams College, and that of L.H.D. from Princeton University. In 1909 he

resigned his pastoral charge in East Orange, becoming by vote of the people pastor emeritus. He has since spent much time in Italy. Dr. Ludlow is a member of New York Authors' Club; Amer¬ ican Historical Association; New Jersey His¬ torical Society; Long Island Historical Soci¬ ety; Washington Society of New Jersey and many other social and scholarly organizations. For many years he has been a director of the Union Theological Seminary in New York. He is a frequent contributor to the periodical literature of the day. His works are (My Saint John) (1883) ; (Concentric Chart of His¬ tory > (1885) ; (Captain of the Janizaries,)

a tale of Albania (1886) ; (A King of Tyre, a story of ancient Phoenicia (1891) ; (That An¬ gelic Woman' (1891) ; (History of the Cru- sades) (1896) ; (Baritone's Parish) (1897) ;*

(Deborah, a story of the time of Judas Mac¬ cabeus (1901); Uncentives for Life* (1902); (Sir Raoul,* a story of Venice and the Fourth Crusade (1905) ; (Jesse Ben David,) a story of the time of Christ (1907) ; (Judge West's Opin¬ ion, J a study in optimism (1908) ; (Discovery of Self,* lectures to young men (1910) ; (Avanti!* a story of Sicily in 1860 (1913).*

LUDLOW, John Malcolm Forbes, Eng¬ lish social reformer and author: b. Nimach, India, 8 March 1821; d. 17 Oct. 1911. He was educated at the College Bourbon, Paris, be-

came a barrister of Lincoln's Inn, London, in 1843, and practised as a conveyancer till 1874. His interests, however, lay mainly outside his profession. Reforms in India and the Anti-Corn law movement deeply interested him, and he was associated with the beginnings of the Chris¬ tian Socialist and industrial co-operative move¬ ments. He was chief registrar of Friendly So¬ cieties 1874-91, and has published (Letters on the Criminal Code) (1847) ; (The Master Engi¬ neers and Their Workmen) (1852); (British India: Its Races and Its History > (1852);

(Thoughts on the Policy of the Crown To¬ ward India) (1859) ; (Sketch of the History of the United States from Independence to Seces¬ sionˆ (1862) ; President Lincoln Self-Por- trayed} (1866) ; (The War of American Inde- pendence) (1876), etc.

LUDLOW, Roger, American colonial statesman : b. Dorchester,

England, 7 March 1590; d. Virginia, about 1665. He was by pro¬ fession a lawyer, came to Boston in 1630, was there assistant to the General Court of Massa¬ chusetts in 1630-34, in 1634 became deputy gov¬ ernor, but was defeated for the post of gov¬ ernor, removed with a Massachusetts colony to Windsor, Conn., and was, it is thought, the first practising lawyer in Connecticut. In 1639 he was a member of the convention for prepar¬ ing a constitution, and the document is believed to have been drafted by him. In Connecticut also he was made deputy governor, and here, too, John Haynes, who had defeated him for the governorship in Massachusetts, was again victorious in the gubernatorial election. In chagrin Ludlow sought to evade his ((evil gen¬ ius,® as he styled Haynes, by founding the town of Fairfield. Here he held each public office of any importance, was a commissioner to the New England congress and revised the laws of Connecticut (published 1672). The In¬ dians having threatened Fairfield, the citizens declared war against the Dutch, at whose instigation the savages were believed to be acting; and Ludlow was made captain of the forces. The New Haven General Court, how¬ ever, quashed this proceeding and punished Ludlow's subordinate officers. Ludlow then (1654) withdrew in high dudgeon with all the town records to Virginia, where he quite dis¬ appeared.

LUDLOW, William, American soldier: b. Islip, Long Island, N. Y., 27 Nov. 1843; d. Con¬ vent, N. J., 30 Aug. 1901. He was graduated from West Point in 1864, entered the engineer service, was chief engineer of the 20th corps in the Georgia campaign (July-September 1864), in 1864-65 was engineer of the army in Geor¬ gia, was assistant engineer on Sherman's staff in the "March to the Sea® and in the Carolinas, and 13 March 1865 was brevetted lieutenant-colonel, U. S. A., for meritorious conduct in the Carolinas campaign. After various serv¬ ice, he was chief engineer of the Department of Dakota in 1872-76, engineer in charge of the Delaware River and harbor improvements and defenses in 1882-83, by authority of Congress chief engineer of the Philadelphia water de¬ partment in 1883-86, and was at different times in charge of lighthouse districts and engineer¬ ing work. In 1895 he became president of the Nicaragua Canal Commission and 13 August was promoted lieutenant-colonel of engineers

in command of the lighthouse depot. In 1 893— 96 he was military attache at the United States embassy in London. Commissioned brigadier- general of volunteers 4 May 1898, he became engineer-in-chief of the American army in the field in the Spanish-American War, served in the Santiago campaign, was made maior-gen- eral of volunteers 7 Sept. 1898, and from 13 Dec. 1898 to April 1900 was

military governor of Havana, in the rehabilitation of which city he took an important part. On 13 April 1899, he became brigadier-general of United States volunteers, and on 21 Jan. 1900 brigadier-gen¬ eral United States army. As president of the board of officers appointed for the considera¬ tion of the establishment of an army war col¬ lege, he visited France, England and Germany for purposes of study. In 1901 he was ordered to the Philippines as commander of the Depart¬ ment of Visayas, but immediately returned on sick-leave. He wrote Explorations of the Black Hills and Yellowstone Countrv) and (Report of the United States Nicaraguan Canal Commission. >

LUDLOW, England, market town and municipal borough of Shropshire, on the Great Western and the London and Northwestern railways, at the junction of the Corve and Teme rivers. It is picturesquely situated and has many interesting remains of antiquity, in¬ cluding an ancient castle, an old city gate, and an ancient church and grammar school. The town was once a royal residence. Tanning and flour milling are carried on. The fortifications were dismantled in 1689. Pop. 5,925. Consult Clive, (History of Ludlow (London 1841) and Wright, (History of Ludlow) (ib. 1851).*

LUDLOW, Ky., city of Kenton County, situated on the Ohio River opposite Cincinnati, Ohio, on the Cincinnati, New Orleans and Texas Pacific Railroad. Its industrial estab¬ lishments include railway repair shops, sheet metal works, brass works, etc. The city is a residential suburb of Cincinnati. Pop. 4,160.

LUDLOW, Mass., town in Hampden County, five miles northeast of Springfield, on the Boston and Albany Railroad and on the Chicopee River. It contains the Stevens Me¬ morial Institute, the Ludlow Hospital, Hub- hard Memorial Library and fine school build¬ ings. It manufactures carpet yarn, twine, web¬ bing, sacking, etc. Pop. (1920) 7,470.

LUDWIG, loot'vik, Otto, German drama¬ tist and writer of short stories : b. Eisfeld, Thuringen, 12 Feb. 1813; d. Dresden, 25 Feb. 1865. His father, Ernst Friedrich Ludwig (d. 20 Jan. 1825), was a well-known Central German jurist; his mother's maiden name was Sophie Christiane Otto (d. 21 Nov. 1831). He attended the gymnasium at Hildburghausen (1828-29), as well as that of Saalfeld (1832- 33) , made an unsuccessful attempt to enter business with his uncle, Christian Otto (whom he later called "der dicke Herr® — the stout gentleman), and obtained his higher education chiefly by self-instruction, laying the founda¬ tions for a very extensive

musical culture. The scene of his studies was mostly a pretty little garden and lodge, belonging to him, just out¬ side the city of Eisfeld, where his friend Karl Schaller was his constant companion. One of the results of his musical studies was the opera

(Die Kohlerin> (performed privately at Eis- feld 1838), in recognition of the merits of which the Meiningen conductor, Grund, had an annual pension of 300 gulden conferred on Lud¬ wig for three years. In 1839 Ludwig went to Leipzig to pursue his musical studies, chiefly under the direction of Mendelssohn. Illness and a shifting of his interest to literary studies prevented the successful prosecution of a musi¬ cal career. In 1840, Ludwig published his first short story, (Das Hausgesinde, which shows distinct traces of the influence of Kotzebue's (Rehbock) and Lortzing's (WildschiitzP After a return to Eisfeld in 1840, he was sent back to Leipzig, with a fresh supply of money, in 1842. His literary production was now increas¬ ing. Before moving to Dresden, in 1843, he had begun a tragedy, (Der Engel von Augs- burg> ; a comedy, (Hans Frei) ; a prelude, (Die Torgauer Haide) ; and two short stories. He passed the summers of 1844 and 1845 very pleasantly at Niedergarsebach near Meissen (became engaged there to Emilie Winkler, 1844; married her, 1852). The winters of the succeeding years, until 1847, when, at Devrient's wish, he settled finally at Dresden, were spent m Leipzig. At Dresden he became one of a literary and artistic circle that included Karl Gutzkow, Langer, Oehme, Ludwig Richter, etc. It was here that he produced his most famous work, the tragedy (Der ErbforsteU (first performance, Dresden, 4 March 1850). This tragedy deals with the sad fate of a simple man who believes that since he and his ancestors have always occupied a certain office, the of¬ fice has in a way become his property, and who is disastrously disillusioned when he finds that the mere authority of his employer, who owns the forest on which he is employed, is suffi¬ cient to throw him out of his life-position. The coloring is local, that of the Thuringian forest ; the appeal is universal, in that it reveals the economic dependence of every man on him who holds the purse-strings. In 1852 came another great play, (Die Maccabaer) (first perform¬ ance, Vienna, 1 Nov. 1852), of which there had been an earlier version, called (Die Macca- baerin,* a family tragedy in four acts, while the revised version had five. These two trage¬ dies are considered by German critics as plac¬ ing Ludwig almost on the same level with Hebbel (q.v.) : they have great pith and vigor of speech*

and a tense, dramatic action. Lud¬ wig is almost equally well known, however, for his short stories: (Die Heiterethei und ihr WiderspieP (written 1854, published at Frank¬ fort 1857), and

art. The (German Classics) (Vol. IX, New York 1914) contains translations of (The Hereditary Forester) and (Between Heaven and Earth.) Consult his (Ausgewahlte Werke> (2 vols., Leipzig 1896) ; (Werke) (3 vols., Leipzig 1896) ; (Werke) (6 vols., Leipzig 1900) ; (in Westermanns Mo- natsliafte, Vol. XXXV) ; essay by Bulthaupt in Dramaturgic des Schauspiels (Vol. IV, Olden¬ burg 1894).

Jacob Wittmer Hartmann.

LUDWIG, Salvator von Toscana, lood'vik

sal-va'tor fon tos-ka'na, Archduke of Aus¬ tria, Austrian traveler : b. Florence, 4 Aug. 1847. He was the son of Leopold II, Grand Duke of Tuscany. His principal writings, all illustrated by himself and most of them pub¬ lished anonymously, are (Levkosia, Capital of Cyprus> (1873) ; (Yacht Voyage to the Syrtes> (1874) ; (Los Angeles in Southern California) (2d ed., 1885) ; (The Caravan Route from Egypt to Syria) (1878) ; (The Balearic Islandˆ superbly illustrated (7 vols., 1869-91) ; (Around the World without Intending It) (4th ed., 1886) ; (Paros and Antiparos) (1887) ; (The Lipari Islands> (1893) ; (Helgoland

(1900); (Summertime in T'hiakP (1903);

bound Majorca) (1910) ; (Summer Dreams by the Seaside) (1912) ; (Harbour of Port Palma in Majorca) (1913).

LUDWIGSBURG, loot'viks-berg, Wiirt- temberg, town, 10 miles north of Stuttgart, dating from 1704, when it was founded by Eberhard Louis. It contains a royal residence, a monument to Schiller and beautiful gardens and public squares. It contains also a cannon foundry, arsenal and military training school. Metal and ironware, pianos, organs, cottons, woolens, linen and wire are manufactured. Pop. 25,000.

LUDWIGSHAFEN, lootViks-ha'fen, Ger¬ many, city on the Rhine opposite Mannheim. It is a thriving commercial and industrial centre ; is connected with Mannheim by a bridge over the Rhine, and has an improved harbor. Its chief items of trade are coal, iron and timber. Its industrial establishments include the Badische Anilin- und Soda-Fabrik, the largest chemical works in the world, fertilizer works, shoddy, flour, spirits, acids, cellulose, lumber, bricks, pottery,

textile, machinery, wagons, etc. Its commercial life dates from 1843. It became a city in 1859. In September 1921 an explosion at the Badische works cost 1,400 lives. Pop. 83,300.

LUDWIGSLIED (III over the Normans at Saucourt (881). The Old High German readers of Wackernagel and Braune, as well as Muller's (German Classics) (Vol. I, New York 1900), have reprinted the poem, the author of which is unknown.

LUECOCK, Naphtali, American Metho¬ dist bishop : b. Kimbolton, Ohio, 28 Sept. 1853 ;

d. Lacrosse, Wis., 1 April 1916. He was a graduate of the universities of Pittsburgh and Syracuse and a former professor at Allegheny College, Meadville, Pa. In 1912, four years prior to his death, he was elected bishop on the 1 5th ballot at the quadriennial conference of the Methodist Episcopal Church. He published several religious works; the last of these, (Roy¬ alty of Jesus,) a collection of sermons, ap¬ peared in 1906.

LUFFT, luft, Hans, hants, German printer and publisher: b. 1495; d. 1584. He printed the first complete edition of Luther's Bible in two quarto volumes at Wittenberg, in 1534. He also printed other works of Luther and more than 100,000 copies of the Bible were issued from his press. See Lotter Family.

LUFKIN, Tex., city and county-seat of Angelina County, on the Houston, East and West Texas, the Saint Louis Southwestern and other railroads, 120 miles northeast of Houston. It has wagon factories, sheet metal works, foundries, machine shops, railroad re¬ pair shops, bottling works, canneries, etc. There is also a fine high school building. The water-supply system is owned and operated by the municipality. Pop. (1920) 4,878

LUGANO, loo-ga'no, Switzerland, town, in the canton of Ticino, on the north shore of Lake of Lugano, about 15 miles northwest of Lake Como. Its principal edifices are several churches ; one, Santa Maria degli Angiolo, con¬ tains a fresco of the (Passionˆ by Bernardino Luini, as well as a (Last Supper) and Wa¬ dena and Holy Child } by the same artist; con¬ vents, a hospital and a theatre. The manufac¬

tures are chiefly spun silk and silk goods, choc¬ olate and furniture. The transit trade is considerable. Till 1881 it was, alternately with Locarno and Bellinzona, 1'he seat of the legis¬ lature of the canton of Ticino. It is the seat of a bishopric. A funicular railway runs to the top of San Salvatore (3,000 feet). Pop.

13,262.

LUGANO, Lake of (Latin, Ceresius La- cus) , is partly in the Swiss canton Ticino and partly in Italy, between Lakes Como and Mag- giore, into the latter of which it discharges its waters. It is of very irregular shape, a nar¬ row body which throws out arms in all direc¬ tions. Its length is about 20 miles, its breadth about one and one-half, and its depth about 300 feet. Its scenery is very wild and beautiful.

LUGANSK, loo-gansk', Russia, town in Ekaterinoslav, on the river Lugan, 240 miles east of Ekaterinoslav. It contains a meteoro¬ logical station, mineralogical museum, library, foundries, engine works, gun shops, candle works, leather mills and brick yards. Its indus¬ trial development dates from the establishment of a foundry here in 1795. Pop. 60,300.

LUGO, loo'go, Italy, capital of the province Ravenna, on the left bank of the Senio and on the Castelbolognese-Ravenna and the Lugo-Ferrara railways. It has an ancient castle, a lyceum, gymnasium, technical school, library, etc. Its industries consist of rope-works and a lively trade in grain, wine, cattle, hemp and silk. Its annual fair, lasting from the 1st to 30th September, draws great crowds. Pop.

27,867.

LUGO, Spain, capital city of a province of the same name, on the left bank of the Mino and on the Palencia-Coruna Railway. It was the ancient Roman city Lucus Augusti and has five churches, one of which is a Romanesque cathedral of the 12th to 18th century, a priests' seminary, tannery, linen and hat factories and a considerable trade in cattle and pickled meat. The ancient fortified wall surrounding the town, with its towers, has been turned into a promenade. Near the railroad station is a noted sulphur spring known since Roman days. Its population is about 35,726.

LUGOS, lu'gosh, Rumania, capital, town of the county of Krasso-Szoreny and junction of the Temesvar-Orsova and the Gattaja-Maros-Illye railways. The town consists of the German and the

Rumanian sections divided by the Temes River. It has a Minorite mon¬ astery and a convent. The chief industries are wine-culture, silk mills, distilleries, linen fac¬ tory, etc. It is the seat of Greco-Catholic bishop and has a cathedral, courthouse, high gymnasium, etc. It was here that the Turks (1695) were victorious over the imperial Gen¬ eral Veterani, and here also (1849) was the last resort of the fleeing Hungarian army and its government.

LUINI, Bernardino, ber-nar-de'no loo- e'ne, Italian painter : b. Luino, on Lago Mag- giore, between 1475 and 1480; d. soon after 1533. He was perhaps the most distinguished representative of the Milanese school, and be¬ tween 1500 and 1533 was active as a fresco and easel painter in Milan and other places of northern Italy. He began his studies as the pupil of Ambrogio Vorgognone, whose influ¬ ence is plainly seen in his ˆieta5 (1510) in the church of Santa Maria della Passione at Milan, though the blandness and delicacy of the early Milanese school is in his work somewhat ani¬ mated and vitalized by the spirit he derived from the study of Leonardo da Vinci, under whose name some of his riper work has fre¬ quently gone. But though his frescoes are full of spiritual faces, and distinguished by the ten- derest coloring and the most lifelike movement, he never quite made his own the grandeur in composition and passionate energy which dis¬ tinguish the paintings of Leonardo. Most of his productions are found in Upper Italy. Many of his easel pictures are to be seen in the Ambrosiana (library), Brera (palace) and in private galleries at Milan; others in the ca¬ thedral at_ Legnano. In the Uffizi at Florence is his (Beheading of John Baptist.) His chief- work is (The Enthroned Madonna with Saint Anthony and Saint Barbara > (1521), a mag¬ nificent fresco in the Brera. Other examples of this painter are now in the Palazo Sciarra at Rome, as well as in the Louvre, the National Gallery of London and the Berlin Museum. Consult the studies by James Mason in Jack's (Masterpiece in Colour } series; and C. C. Wil¬ liamson in (Great Masters in Painting and Sculpture) (London 1899).

LUISE, loo-e'ze, Auguste Wilhelmine Amalie, queen of Prussia: b. Hanover, 10 March 1776; d. Strelitz, 19 July 1810. She lost her mother in her sixth year, and was brought up in charge of her grandmother at Darm¬ stadt. In her 17th year she was married to the

Crown Prince, afterward Frederick William III of Prussia. On her husband's accession to the throne she won all hearts by her beauty, grace and kindness of disposition. Her highest hap¬ piness was found in her husband and children, but she was also a queen who has left a deep impression on the annals of the Prussian court. In her travels with the king through the prov¬ inces she was constantly engaged in helping the poor and unhappy. When the war of 1806 broke out she accompanied her husband to Raumburg and, after the disaster of Jena, to Konigsberg and Memel, setting an example to all by her unbroken fortitude. Before Tilsit she hoped to win from Napoleon more favor¬ able conditions for her beloved country and in¬ terceded with the conqueror in vain. She is a household name to this day in Prussia: the Luise foundation for the education of girls was established in her honor, as was the Order of Luise by her husband, the king (3 Aug. 1814). It is the object of this order to honor patriotic and benevolent women of the Prus¬ sian nation. Consult Hudson, (Life and Times of Louisa, Queen of Prussia> (1874) ; and Adami, (Luise, Konigin von Preussen> (1888); and her correspondence with her husband, pub¬ lished in 1903.-

LUKE, author of the third Gospel and of the <(Acts of the Apostles.® From the letters of Paul we learn that Luke was an honored fellow-worker, a physician by profession and a companion of the apostle in imprisonment. In his own two historical works he furnishes con¬ siderable information as to himself in addition to what Paul gives. It is plain that he was not a Jew by birth or religion, and it cannot safely be asserted that before he became a Christian he had been one of the ((devout® persons of whom he repeatedly speaks, usually meaning such Gentiles as attended the Jewish synagogues without, however, becoming full proselytes. The fact that he was a physician, which profession was at his time largely in the hands of Greeks, his facile grace in the use of the Greek language, and the personal character¬ istics revealed in his writings, taken together, render it sufficiently certain that he was of Hellenic descent. His name, however, is of Latin origin, as Lukas is to be reckoned a diminutive of Lucanus (other derivations, even if possible are less probable, especially as Lu¬ canus actually appears in the title of the Gospel in several Latin manuscripts), and .the most plausible explanation of the situation is that he was the son of a Greek freedman of some wealthy Roman. From Eusebius we learn that he had at least a family connection with Syrian Antioch, which is confirmed by the way in which he speaks in Acts of that city. It is possible that he and Paul had earlier become acquainted at Antioch or even at Tarsus, and it is certain that they met at Troas where a

per¬ sonal appeal from Luke to the apostle to work in Philippi may have preceded the vision which convinced Paul that it was the will of God that he should cross to Europe. It seems that Luke remained in Philippi after Paul and his company had gone on to other cities and pre¬ sumably for a time at least he practised his pro¬ fession in that city, as supposably he had done previously. Whether during the intervening years he was in any wav associated with Paul

cannot be positively asserted, but it is certain that he rejoined him at Philippi on his way from Ephesus for his last visit to Jerusalem, and Luke is known to have been with him both in Jerusalem and at Caesarea, though we cannot be sure that he was constantly with the apostle. He certainly sailed from Caesarea with Paul and shared the fortunes of the voyage of which he has given such a marvelously vivid account. It appears that after the shipwreck on the coast of Malta he used his medical skill during the following winter for the benefit of the inhabitants of that island. We hear of him as with Paul during his first imprisonment, and again during his second, when Paul says <(Only Luke is with me.® It may well be believed that Paul valued and encouraged Luke's presence, not only for companionship, but also on account of the helpfulness of the (

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

LUKE, Gospel According to. This Gos¬ pel, like Matthew, conforms in general to the outline of Mark, on which consequently it is generally regarded as dependent, but Luke contains a much greater amount of narrative material independent of Mark than does Matthew.

Contents. — The following is the general out¬ line of the book, after a brief prologue. I. The birth, infancy and childhood stories (i, 5-ii, 52).

II. Preparation for the ministry of Jesus, including the preaching of John and the Bap¬ tism and Temptation of Jesus (iii, 1-iv, 13).

III. The early Galilean ministry (iv, 14-vii, 50). IV. The later ministry in Galilee and its neighborhood (viii, 1-ix, 50). V. The Perean ministry (ix, 51-xix, 27). VI. The entry of Jesus into Jerusalem and His final public teaching there (xix, 28-xxi, 4). VII. The Eschatological Discourse (xxi, 5-38). VIII. The closing scenes, last supper, agony in Gethsemane, trial, crucifixion, death, resurrec¬

tion and ascension (xxii, 1-xxiv, 53). As com¬ pared with the other Synoptic Gospels are to be noted the long story of the Perean min¬ istry to which, except for the last few verses, there is no parallel in either Mark or Matthew, the much fuller treatment of the appearances of the risen Christ and the narrative of the ascension. Much narrative material is found in this Gospel only, as, for example, five miracles are recorded only here, and there is also much teaching of Jesus which is peculiar to Luke, e.g., of the 41 parables Luke has 28, of which 17 are found in it alone. The dis-

courses are as a rule carefully connected with their occasions, and seldom, if ever, is other material appended because of its likeness in thought or expression. Still another peculiar¬ ity of this Gospel is its introduction of the first great Christian hymns, the Magnificat (i, 46-55), the Benedictus (i, 68-79) and the Nunc Dimittis (ii, 29-32).

Purpose. — The purpose of the book is clearly stated in the brief introductory address to Theophilus, who seems to have been a Chris¬ tian of at least respectable standing in society. It is not, however, to be thought that the book Was intended for his sole use, but rather that it was dedicated to him as in some sense a repre¬ sentative of many Christians for whose benefit it was really prepared. The purpose given may be restated thus : to give an orderly account of the events which are the historical foundation of the Christian faith on the basis of accurate and thorough investigation.

Sources. — That there had been previous attempts to write the Gospel story, and that Luke had made thorough investigation the basis of his own work, Luke assures us in his pro¬ logue. But just what the sources of his in¬ formation were and how he used them we are left to infer for ourselves. On careful study of his book in comparison with Mark and Matthew it is plain that he used the material which dominates the second Gospel as his chief source. The order of the book, its back¬ bone, so to speak, is the same we find in Mark, and most of the material found there is repro¬ duced here. At the same time it seems scarcely reasonable to hold that Luke had in his hands the Gospel of Mark as we now have it, for had he known the personal touches, the striking details plainly due to an eyewitness, as they now stand in the second Gospel, Luke with his literary instinct as well as historic sense could scarcely have failed to reproduce them. In whatever earlier form the Marcan material may

have existed, it seems plain that we must regard this as Luke's chief source. Comparison with the first Gospel shows no less clearly that Luke used ˆLogia® or <(Q® ma¬ terial, and at the same time we must hold that it lay before him in a form varying somewhat from the material which was employed in Matthew. While we are bound to recognize that Luke used his sources as a responsible writer of history, and not as a slavish copyist, the above inferences commend themselves to¬ day to the majority of critical scholars. (See article Gospels). As to the other sources from which he drew, we have no decisive clues. His stay of two years with or near Paul in his Caesarean prison must have given him oppor¬ tunities to gain access to many first hand sources of information, which would be still accessible in the year 60. It has been acutely noted that much of the material peculiar to this Gospel seems to bear in some sense the stamp of a woman. Not only is it character¬ ized by a special gentleness and tenderness, which may be in part, but scarcely wholly, due to the character of Luke himself, but also in the large space and careful details given in relation to women, and, still more, in the man¬ ner of putting things, there seems to many conclusive evidence that one of his chief author¬ ities was a woman. This is true not only in regard to the birth-stories, which would most

naturally be connected, though perhaps indi¬ rectly, with Mary herself, but also in regard to many other incidents and sayings. Two such sources have been suggested as possible, the daughters of Philip (Acts xxi, 8, 9) and Joanna, the wife of Herod's steward (Luke viii, 3), who is named because of apparent acquaintance with affairs at Herod's court. He may also have gained much valuable informa¬ tion from other persons whose very names have perished.

Authorship. — Not only is the third Gospel uniformly associated in the tradition of the Church with the name of Luke, the companion of Paul, but this is confirmed by comparison with Acts, which also with no less unanimity of tradition is ascribed to Luke and which so shows itself to be his work as according to the judgment of the majority of scholars to make his authorship of both books a historic cer¬ tainty. A special argument for this view is found in both the Gospel and Acts in the in¬ terest taken by the author in cases of disease and in the peculiar accuracy with which he speaks of it, this naturally implying that the author was a physician as we know Luke to have been.

Date and Place of Composition. — There

is a decided difference of opinion as to the date. The extreme late date, perhaps 90-100, though not necessarily inconsistent with

Lucan authorship, is at present advocated by so few that this view may now be regarded as negligi¬ ble, especially as the alleged dependence on Josephus has been discredited. The real point of discussion lies in the relation to Acts and the implications of the latter book. The Gospel preceded Acts in composition, but the question is as to the date of Acts. That Acts need not have been written till as late as 80 has been held by many, and certain turns of expression in Luke have been taken as confirmatory of this date. On the other hand, it is held by a group of scholars, which apparently is gaining in number and influence, that Acts should be dated during Paul's imprisonment, not later than the year 64. If so, the Gospel must of course be dated still earlier, presumably in the year 60, or not much later. The place of composition would on the latter hypothesis naturally be Rome, though the gathering of the material and possibly the putting it more or less in shape might be connected with Caesarea. If the later date (80) is accepted, there is no clue as to where it was written, as we have no historical hint and no trustworthy tradition as to where Luke lived and worked after the death of the Apostle Paul.

Authenticity and Value — The trustworthi¬ ness of this Gospel depends upon the character of the sources employed and the accuracy with which they were reproduced. So far as can be ascertained Luke's sources were of a very high order. Especially his third main source, as also many of his reports of minor incidents, seems even as reproduced to bear the stamp of the testimony of an eyewitness who stood very close to the events recorded, the discourses re¬ peated, the persons discussed. It also appears that Luke reproduced his material with scrupu¬ lous accuracy. This is shown, among other ways, by the number of Semitic idioms to be found in the Gospel as also in the first part of Acts. The sources used must, in part at least,

have been originally in the Aramaic language, and, while Luke's own Greek style is admirable, he faithfully reproduces these idioms, so that his work contains proportionally quite as many Semitisms as do the other Gospels. The late conclusions of scholars, based in many cases on comparatively recent investigations and discov¬ eries, are very favorable to Luke's accuracy as a historian as it appears in Acts, where the greater number of points of contact with the history and circumstances of the time give bet¬ ter opportunity for

verification, and he is of course to be credited with the same accuracy in the Gospel. Accepting the trustworthiness of the material and the accuracy of its presen¬ tation, the value of the book is enhanced by the manner of the presentation. Beyond his liter¬ ary style, which is singularly rich in vocabulary and natural and graceful in expression, Luke possessed an unusual gift or art of what might be called pictorial narration. His Gospel, which is the most comprehensive in the scope of matters reported, seems also to have a special character of universality. It presents Jesus at once as the man whose speech and character are ideal and as the pitying and pardoning Savior of every believing penitent, so that it ' has been called both the Gospel of repentance and faith and the Gospel of pity and pardon. Particularly does this universality appear in the character of those whose relation to Jesus is depicted. It is the Gospel in which woman¬ hood and infancy find the largest place, and it is to be remembered that women and children were alike looked down upon at that time by both Jews and Gentiles. It is the Gospel which finds a special place for the publican, the Samaritan, the leper, in short, for all the humble, the despised and even the outcasts. When we thus see Jesus depicted in Luke's Gospel as scattering his grace of pardon and helpfulness on all who would receive, we can but feel that he was in rare sympathy with him of whom he wrote, and that he must have re¬ flected to an unusual degree the kindliness, the gentleness, the helpfulness of which he speaks, and we lose all wonder that Paul called him (

Bibliography. — Harnack, Adolf, (Luke the Physician > (E. T.) (1907) ; Moffatt, (Introduc¬ tion to the Literature of the New Testament > (1911) ; Plummer, Alfred, Commentary on the Gospel According to St. Luke (Int. Crit. Comm., 1906) ; Ramsay, Sir W. M., (Was Christ Born at Bethlehem?* (1898) ; Zahn, Theodor, Hntroduction to the New Testament (Eng. trans. Vol. Ill, 1909).*

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

LUKE OF LEYDEN (Lucas van Ley¬ den, properly Lucas Jacobsz), one of the founders of the Dutch school of painting: b. Leyden, 1494; d. there, 1533. In earlier life he was taught painting by his father, Huig Jacobsz, and afterward by Cornelius Engel- brechten. At 9 he began to engrave, and in his 12th year astonished all judges by a painting, in water-colors, of Saint Hubert. In his 1 5th year he produced several pieces, composed and engraved by himself, among which the (Temptation of Saint Anthony and the Con¬*

version of Saint Paul, in regard to composi¬ tion, characteristic expression, drapery and management of the graver, are models. After this he executed many paintings in oil, water- colors and on glass ; likewise a multitude of en¬ gravings, which spread his fame widely. He formed a friendly intimacy with the celebrated Tohn of Mabuse and Albert Diirer, who visited him in Leyden. His overwork at last resulted in hypochondria, and he imagined himself poisoned by envious painters, aiid hardly left his bed for the last six years of his life. The fullest and most beautiful collection of engrav¬ ings by this master is in the library at Vienna. A triptych of Christ's Cast Judgment is in the town-hall of Leyden. His paintings are scattered through the galleries of London, Ber¬ lin, Rome, as well as in Holland, where is his masterpiece, (Mount Calvary,* a composition containing some 80 figures. Much of his work has been lost owing to his having painted much on cloth in distemper.*

LULEA, loo'le-a, Sweden, capital of the Lans Norbotten, on the Sarnie Peninsula at the mouth of the Luleelf on the Gulf of Bothnia. It is a terminal of the Lulea-Malmberget State Railway and has a college. Its main industry is ship-building, and it has considerable trade in lumber, woodenware, tar, salmon and rein¬ deer. The iron ore from the Gellivara mines finds shipment from this port, which has steamship connection with Stockholm. The town was founded in 1621 and was devastated by fire in 1887, to be rebuilt on better plans with straight streets, etc. Pop. 9,021.

LULLY, lul'lT, or LULLI, Jean-Baptiste or Giovanni Battista, French composer: b. Florence, 1633 ; d. Paris, 22 March 1687. He went to Paris at the age of 14 and found work as scullion at the court, but, showing musical talent, he was made music page and soon became a member of the royal ((24 violin¬ ists.® By 1652 he was their director and chief of the newly-established ((16 petits violons) besides becoming, by 1653, court composer. His compositions for the royal orchestra were really the starting point of a true chamber music apart from orchestra music, the <(Lully ma- niere® becoming quickly a new type, inasmuch as the overtures and dance music of the opera ballet by him, put together in suites, were played apart from the stage. His great suc¬ cesses in placing French opera on the stage led to his being raised to the rank of royal music superintendent in 1672, taking Cambert's place as creator of a national French opera which not only differed from the Italian in its roles, ballets and choirs but contained rhythmic elements that outweighed the melody. Among the most important of his operas are (Alceste) (1674);

(Doctor Illuminatus), Spanish scholastic: b. Palma, Majorca, 1235; d. at sea in sight of

Palma 1315. After having been attached to the court of James I of Aragon and leading a dissolute life, he retired to a cell on his estate, where he lived as an ascetic. In 1272 he joined the third order of Saint Francis. Encouraged by visions, he came to believe himself appointed to refute Mohammed and convert the Moslems to Christianity, and studied Latin, Arabic and logic in preparation for this work. Three times he went to Tunis with a view to con¬ verting its inhabitants, was twice imprisoned and banished, and on his third attempt was stoned at Bugia, from the effects of which he died. His (Ars Demonstrativa Veritatis was devised as an infallible and universal logical method to be used in making conversions, for the purpose of proving that the mysteries of faith were not contrary to reason. Lully be¬ lieved that his method was destined to supplant the scholastic logic of the Middle Ages. He endeavored without success to obtain aid from Pope Nicholas in establishing colleges for the study of Oriental languages. The Ars Lulliana consists mainly in categorizing ideas and com¬ bining them mechanically, by which means Lully thought to exhaust their possible combinations. The method was taught and commented on in some schools of little influence in Spain, France and Italy, but it is hardly necessary to say that it never took root or produced any direct effects. Lully's works are very numerous and they were condemned as heretical by the Church. An incomplete edition is that begun by Galizinger (1721-42; Vols. VII and VIII never published). Consult Erdmann, (Grund- riss der Geschichte der Philosophy (2d ed., 1869) ; Zweiner, S. M., (The First Missionary to the Mohammedans* (New York 1902).*

LUMBAGO from Latin lumbus, loin), a sudden and painful affection of the muscles of the back and tendinous attachments of the lum¬ bar region usually following some strain in bending or lifting, which is but the final cause in upsetting a balance in the metabolism of certain groups of muscles which are under special unconscious emotional strain. See Rheu¬ matism.

LUMBER INDUSTRY IN THE UNITED STATES, The. History.— The

early history of lumbering in the United States is substantially the history of the country's settlement. Wood afforded the early settlers their building material and their fuel. Forest areas had to be cleared for cultivation and it was possible to use but a small part of the timber thus cut in the construction of pioneer homes. Trees were a hindrance to agriculture, of no value except as they afforded the bare necessities of life. Tremendous areas of tim¬ ber were destroyed without thought of use for the product, until the progress of colonization had reached the point where there was a demand for logs, heavy timber and framing for buildings in the non-agricultural commu¬ nities along the Atlantic Coast that later grew into towns and great cities. The early settlers had no tools more potent than the axe and the handsaw, but as the demand for building material grew the process of converting trees into a merchantable material passed through several evolutionary stages in which first water power and. subsequently steam were applied.

The early sawmills ranged in capacity from

1,000 to 5,000 feet a day, board measure, and were operated principally in the white pine regions of the north Atlantic coast territory and in the Carolinas and Virginia. The prod¬ uct was heavy material of the sort then used in building and involved little production of thin lumber, which was produced with diffi¬ culty in these primitive establishments. With the development of cities along the seaboard, however, a new source of demand arose in the shipbuilding industry, for which wood was the most important raw material. The rise of shipping and the opening of many ports created a need for material for wharves and also af¬ forded a means of developing a trade in timbers with the West Indies and Europe. Thus an industry gradually took form, its earliest tangi¬ ble appearance in Maine and New Hampshire, with Vermont, New York and Pennsylvania following closely as producers of white pine, the one product of the forests of those States that was deemed valuable. These early lum¬ bering operations were invariably located where streams were available for rafting logs to the mills. Unless the mill was situated on tide¬ water its function was limited to supplying local demand and the scope of the operation was necessarily small.

With the gradual opening up of the Central States, the lumbermen again assumed the role of pioneer, but the demand for lumber grew so rapidly that within a few years after the first commercial lumbering operation was estab¬ lished in what was then the Far West, Michi¬ gan and Wisconsin were producing great Quan¬ tities of lumber needed in the prairie country. The first lumbermen to

venture into the Lake States assumed that the supply of timber was inexhaustible and proceeded on that theory. Statistics covering production in Michigan, Wisconsin and Minnesota show that in 1873 mills in these States manufactured slightly less than 4,000,000,000 feet, practically all of which was white pine. With some slight interrup¬ tions the output increased steadily until 1890 when the maximum was reached with a total of 8,597,623,000 feet, after which pine produc¬ tion began a steady decline.

With a rapidly increasing population, and a gradual lessening supply of white pine from the Lake States, it was natural that the industry should turn to the tremendous forest resources of the Southern States, where yellow pine of several varieties, cypress and many varieties of hardwoods were obtainable. Thus, as the saw¬ mills of Michigan, Wisconsin and Minnesota finished with their white pine supply, the oper¬ ators, seeking other fields, found opportunities in the South and, in a few instances, on the Pacific Coast. Every timbered section of the country rapidly became of interest to investors because timber values kept moving steadilv upward. The transcontinental railroads opened great areas of the West and acquired extensive land grants which were rapidly thrown on the market and seized by lumbermen and timber speculators who subsequently sold to lumber¬ men. And thus the industry spread wherever timber of merchantable character was obtain¬ able, acquiring national scope and in a number of the States leading all other industries in capital investment, people employed and wages paid,

During the earlier stages of the industry's growth, the hardwoods, products of the ((broad leaf0 trees, such as the oaks, maples, birches, elms, basswood, hickory, gum, etc., received little consideration. In the white pine sections of Michigan and Wisconsin, later to become famous for their maple and birch, these woods were ignored by the early white pine manufac¬ turers, in most instances, but the development of innumerable uses for hardwoods resulted in the rapid growth of what has become prac¬ tically a separate branch of the lumber manu¬ facturing industry, producing hardwood lumber. This branch of the industry is even more widely scattered than the soft wood branch and has developed methods, practices and a trade termi¬ nology of its own.

The most outstanding point of difference between the softwood and hardwood branches of the industry is to be found in the fact that the most important use of the softwoods and the use on which the softwood branch is really based is as a structural material. For struc¬ tural uses, softwood lumber is ordinarily mar¬ keted, either rough or dressed, through lumber dealers who retail the commodity to building contractors and other consumers in substantially the same form in which it comes from the manufacturer. Hardwoods, on the other hand, are marketed chiefly to woodworking industries, such as door and millwork establishments, im¬ plement and vehicle manufacturers, the furni¬ ture and musical instrument trades, etc. Thus, with hardwoods, there is usually a process of further manufacture after the lumber leaves the sawmill and before it is ready for use by the consumer. It seldom reaches its consumer des¬ tination through the medium of the retail lum¬ ber dealer.

Timber Supply of the United States.—

Foresters have disagreed sharply in their esti¬ mates of the actual amount of standing timber in the United States, it having been demon¬ strated that the early estimates were far under the mark and that the predictions of an im¬ pending timber famine which were given great prominence a few years ago were, for the time being, without foundation. In his book, ‘ˆLum¬ ber and Its Uses,’ Royal S. Kellogg, lately of the United States Forest Service, gives the fol¬ lowing estimates as representing the minimum acreage and stand of timber :

Area Stumpage

Forest Regions Million acres Billion feet

Northern .

Southern .

Central .

Rocky Mountain Pacific .

90

270

150

630

130

300

100

300

80

1,300

Total

550 2 , 800

The same authority estimates the stand by principal species as follows:

Species Billion feet

Douglas fir .

Western pine .

Southern pine .

Western hemlock .

Redwood .

Western cedar .

Sugar pine .

Other Western softwoods

Cypress .

Other Eastern softwoods Hardwoods .

650

475

375

150

100

75

60

85

40

190

600

Total

2,800

These estimates include all forest resources, publicly and privately owned. Of the publicly owned forests, largely embraced in the National Forest Lands held by the United States gov¬ ernment, accurate estimates of area are obtain¬ able. On 30 June 1917, the Forest Service, which is a bureau of the Department of Agri¬ culture, estimated the aggregate area of the national forests at 155,166,619 acres.

Aside from the national forests, practically all of the forest area in which lumbering operations are proceeding is being managed without regard to reforestation, so that it might be assumed that the life of the country's pri¬ vately-owned forests may be determined by dividing the total timber supply by the rate of normal timber cut and making proper al¬ lowance for the growth of the immature timber now standing. This method, however, fails to yield accurate results because it fails to take into account a large amount of natural re¬ forestation which is bound to occur in cut-over areas that are not suitable for agriculture or stock-raising and that therefore afford an op¬ portunity for regrowth, and also, because it ignores the fact that many substitutes are being found for lumber and are tending to reduce the per capita rate of consumption more. rapidly in proportion than the population is increas¬ ing.

If no precautionary measures should be taken during the next 25 years, it is not im¬ probable that the people of the United States would find themselves without an adequate tim¬ ber supply in 75

years and that by the end of a century all of the privately-held timber would have been cut. Private enterprise cannot be depended upon to engage in timber growth because the process of growing trees is too slow to appear attractive to investors and also because the various States have levied unrea¬ sonably heavy and unscientific taxation on standing timber to such an extent that owners have been driven to ranid cutting rather than to conservation. It is probable, however, that the development of wider public knowledge of the problem of timber supply which may be expected as the result of the opening of schools of forestry in many of the leading universities and the consequent increase in the influence of the professional forester will result in a de¬ mand for a forestry policy, put into operation through the Federal government, the purpose of which will be to insure against the ultimate timber famine which otherwise might be ex¬ pected. Such a policy necessarily will, involve the co-operation of the States in arriving at an equitable and scientific method of taxing timber as a crop when cut, rather than on the present annual basis and will also necessitate more complete control over the protection from fire of those varieties of timber that are readily susceptible to fire damage and in which heavy fire losses occur practically every year. The Forest Service has demonstrated that timber can be protected against fire by two principal means: Education of the public to avoid care¬ lessness in the woods which each year results disastrously, and the installation. of efficient pa¬ trol systems that discover fires in the incipient stages and control them before they become conflagrations. The extension of such methods to private holdings as well as to reforestation projects operating under subsidy or some other

form of governmental encouragement will

eventually be necessary;

Manufacturing Processes and Methods.—

The processes involved in converting timber into lumber fall into two principal divisions, Logging and Sawmilling. In all sections of the United States except the North Pacific coast these processes are commonly found as departments of a complete lumber manufactur¬ ing enterprise. In the States of Washington and Oregon, logging is frequently a separate business, and the sawmill buys its logs from

logging contractors.

The first essential of a lumbering enterprise is a Supply of timber within reasonable distance of the manufacturing point. On account of the bulky character of the raw material it can¬ not be hauled long distances for manufacture. The timber supply must be sufficient to amortize the plant investment in a reasonable term of years and the size of the plant will depend, Usually, on the amount of tributary timber. The average life of a sawmill ranges from 15 to 30 years, depending on the locality and the character of the timber and plant.

In the early stages of the industry the raw material was usually conveyed to the mill by floating the logs down a stream or by hauling over snow and ice-covered roads during the winter season. These methods are still prac¬ tised in some places, but in the majority of lumbering operations a railroad for handling the log supply is part of the enterprise. This railroad consists of a ˆmain-line® which is of permanent character, and logging ˆspurs® which are projected into the timber and moved from time to time as the timber is taken out.

Trees are felled by hand labor and are cut into log lengths by hand labor or by power drag saws. They are then hauled to the rail¬ road or <(tram)) either by the use of oxen or mules or by the steam ((skidder, a machine operating on the railroad track which by means of wire cables and grapples pulls the logs to the railroad right-of-way. There they are picked up by a steam loader, which is a crane with swinging boom, and loaded on cars that are especially designed and equipped to handle logs. When a train of these loaded cars is made up, they are hauled to the mill and there dumped into the log pond or, if heavy hard¬ woods, ˆbanked® or piled to await their entry to the mill. Where a pond is employed, it facilitates handling and sorting the logs, and also tends to clean them and keep them wet and in good condition for the saw.

The sawmill itself is apt to vary in equip¬ ment from a single circular saw, the simplest type, to one or more band saws with gang saws, resaws, edgers, trimmers and a variety of other high speed machines, and may range in capacity from a few thousand feet a day to 1,200,000 feet daily, board measure, which is the capacity of the largest mill in operation.

The product of the sawmill is rough lumber and the manufacturing operation may stop at this point; on the other hand, a planing mill may be operated as an accessory, its function being to surface or (

ous types for turning out smooth-surfaced lum¬ ber, moldings and like products.

The lumber as it comes from the saw is <(green® or wet and must be dried before it is shipped to market. This is accomplished by piling it on the yard in such manner that every piece has adequate ventilation, allowing it to stay in pile until it is ˆair-dried,® or by putting it through the steam dry kiln, which by sub¬ jecting it to degrees of heat and moisture that are scientifically determined according to the wood and its thickness dries it rapidly. The process of kiln drying is a delicate one, because too rapid drying may cause <(checking® or cracking of the lumber and may result in many defects and blemishes that greatly reduce the market value of the product. Particularly in the case of thick material, if the moisture is suddenly entirely dried out of the surface of the piece while its centre is still moist, the uneven shrinkage that results is bound to show and greatly to impair the value of the piece.

Other equipment of the sawmill plant may include shingle and lath mills that utilize mate¬ rial especially suited for such purposes and also short pieces and other waste from the sawmill in the manufacture of these minor products.

In addition to ample storage yard space in which the lumber of the lower grades is piled and also the stock that is to fie air-dried, the plant will usually include storage sheds for the accommodation of a stock of dressed lumber and perhaps moldings, flooring and other prod¬ ucts of the planing mill.

Because plants of this character are usually located in rather remote places, the larger estab¬ lishments usually include housing facilities for employees, fire protection equipment, a com¬ missary store doing a general merchandise busi¬ ness and often an electric-light plant. In many instances, also, schools, churches and other pub¬ lic buildings are provided and maintained by the operators.

Where a mill is located on tidewater, it usually has dock and loading facilities for shipping its product to market by water, and thereby enjoys the advantage of low water freights. The great majority of the mills, how¬ ever, are dependent on the railroads for their shipping facilities and their markets are usually restricted to some extent by freight rates which make unduly long hauls prohibitive. Thus, the Douglas fir producers of the North Pacific coast are able to ship the large structural tim¬ bers which can be turned out of giant fir logs to all parts of the United States because they have no competition for

this trade, but the common building lumber made by these same mills cannot be shipped by rail to the eastern part of the United States because the freight is so high that yellow pine from the Southern States can be sold at lower prices.

Grading and Inspection of Lumber. — Lumber is graded according to its strength, durability and, in the case of material for cer¬ tain uses, its external blemishes. Thus, in the case of a piece that will be used as a beam or joist, the appearance of the piece is of little consequence, but its strength is highly important and if it is to be used in a position where it will be exposed to moisture and heat the ques¬ tion of durability under such exposure becomes

equally important. But in the case of a piece of oak that is to be used for a drawer front or a table top, strength is of less consequence than a clear surface.

The commonest of all the defects found in lumber is the knot, and it is apt to impair the grade and value of the piece in which it is found regardless of the use to which the mate¬ rial is to be put, since it affects both strength and appearance. A large knot in a partly rotten pocket may reduce the strength of the piece to the minimum, while a small tight knot may have little effect, as far as strength is concerned, but will deface the surface of the piece to such an extent that it cannot be used for an exposed part in a piece of fine furniture.

Other important and common defects that affect the grading and value of lumber are checks, splits, pockets of foreign material, such as pitch in pine or sand in some hardwoods ; various kinds of stain or discoloration ; wind shake, which is a product of strains set up in the fibre of the wood when the tree is bent by heavy winds and takes the form of splits; sapwood in a piece that is intended to be used where heartwood is specified; various kinds of rot and fungus decay, such as <(red heart® in yellow pine and ((peck® in cypress ; ((waney® or bark edges ; warpage and twisting that affect • the usefulness of the material; wormholes and like products of insect blights; discoloration from age and exposure, etc.

Each of the principal commercial woods is graded by fixed rules that establish certain grades and define the limits of each grade. These

rules are made and maintained by asso¬ ciations of lumber manufacturers — also in¬ cluding in a few cases the wholesale distributors — and are usually enforced by means of an inspection force whose function is to settle dis¬ putes regarding grades and to make certain that the lumber inspectors employed at each mill are accurately and fairly interpreting the grades, as the lumber is sorted and marked when it comes from the mill. The associations maintaining grading rules and inspection serv¬ ice include Northern Pine Manufacturers' Association, Minneapolis, Minn, (white and Norway pine) Southern Pine Association, New Orleans, La. (southern yellow pine) ; North Carolina Pine Association, Norfolk, Va. (short- leaf and loblolly pine from Virginia and North and South Carolina sold under the trade name <(North Carolina pine®) ; West Coast Lumber¬ men's Association, Seattle, Wash. (Douglas fir, western spruce, cedar and hemlock) ; Western Pine Manufacturers' Association, Spokane, Wash, (western white and yellow pine, larch) ; Southern Cypress Manufacturers' Association, New Orleans, La. (southern cypress) ; National Hardwood Lumbermen's Association, Chicago, Ill. (all hardwoods). Each of these organiza¬ tions has established its grading and inspection service as standard for the particular wood or woods covered.

Volume of Production. — The statistics of the timber cut for the war years of 1917 and 1918 are not available; they would show a tremendous increase because of the great quan¬ tity of timber required for shipbuilding during the war and also the special woods required for airplane construction. The following table, compiled by the United States Forest Service,

gives statistics of the country's lumber pro¬ duction 1899-1916 :

Number of active sawmills reporting

Quantity of lumber

Year

Reported,

M ft. b. m.

Estimated total cut,

M ft. b. m.

1899 .

31,833

2 18,277

35,084,166

34,135,139

1904i .

43,000,000

1905 .

11,666

30,502,961

43,500,000

1906 .

22,398

37,550,736

46,000,000

1907 3 .

28,850

40,256,154

46,000,000

1908 3 .

31,231

33,224,369

42,000,000

1909 .

4 45,584

44,509,761

44,509,761

1910 3 .

231,934

40,018,282

44,500,000

1911 3 .

228,107

37,003,207

43,000,000

1912 .

2 29,005

39,158,414

45,000,000

1913 .

2 21,668

38,387,009

44,000,000

1914 i .

2 27,506

37,346,023

40,500,000

1915 .

2 16,815

31,241,734

38,000,000

1916 .

2 17,269

34,791,385

39,807,251

1 Custom mills excluded.

2 Mills cutting under 50 M feet excluded.

3 Including mills which manufacture lath and shingles exclusively (1,500 estimated).

4 Includes- 4,543 mills cutting less than 50 M feet, and all cooperage, veneer, millwork, box, furniture, and other fac¬ tories cutting any lumber at all in 1909.

The table on following page compiled by the Forest Service lists the principal woods in the order of their commerical importance by reason of volume of production and affords a basis for comparison of production over a period of 17 years.

Characteristics of the Principal Commer¬ cial Woods. — For purposes of botanical class¬ ification, and also in commercial practice in the lumber trade, trees are divided into two principal classes, the Conifers or Softwoods, and the Broadleaf trees or hardwoods. The hard¬ woods are often referred to, also, as <(Decidu- ous® but this term is unfortunate, since in fact some of the broadleaf woods are not deciduous. The terms ((Hardwood® and ((Softwood® have little relation to the actual hardness or soft character of the wood of any given variety. In fact some of the hardwoods are considerably less hard than the average of the softwoods.

The woods whose characteristics are dis¬ cussed in the following paragraphs are those of chief importance from the standpoint of lumber production and commercial utility. No attempt is made to cover the tremendous range of minor woods.

Softwoods or Conifers. — Yellow pine, which leads all other woods in volume of production, includes three important species, longleaf pine (Pinus palustris), shortleaf pine (Pinus echi- nata) and loblolly pine (Pinus tceda) and sev¬ eral of less commercial importance. Longleaf pine is characterized by its greater average strength, is

usually very resinous, shows a high percentage of heartwood and typical pieces are very durable, even under exposure to moisture and other adverse conditions without preserva¬ tive treatment. It is a slow-growing timber and its strength and durability are practically proportionate to its density. It is particularly well adapted to the production of high grade structural timbers and construction lumber for use where strength and durability are required, or where hard wear is involved, as in the case

Quantity of Each Kind of Lumber Reported, 1914, and Computed Total 1915 Production.

KIND OF WOOD

1915

1914

1913

1912

1911

1910

1907

1899

M feet b. m.

M feet b. m.

M feet b. m.

M feet b. m.

M feet b. m.

M feet b. nt.

M feet b. m.

M feet b. m.

Total .

- *37,011,656*

37,346,023

38,387,009

39.158,414

37,003,207

40,018,282

40,256,154

2 35 , 084 , 166

Yellow pine .

14,700,000

14,472,804

14,839,363

14,737,052

12,896,706

14,143,471

13,215,185

9,657,676

Douglas fir .

4,431,249

4,763,693

5,556,096

5,175,123

5,054,243

5,203, 644

4,748,872

1,736,507

Oak .

2,970,000

3,278,908

3,211,718

3,318,952

3 , 098 , 444

3,522,098

3,718,760

4,438,027

White pine .

2,700,000

2,632,587

2,568,636

3,138,227

3,230,584

3,352, 183

4,192,708

7,742,391

Hemlock .

2,275,000

2,165,728

2,319,982

2,426,554

2 , 555 , 308

2,836,129

3,373,016

3,420,673

Spruce .

1,400,000

1,245,614

1,046,816

1,238,600

1,261,728

1,449,912

1,726,797

1,448,091

Western yellow pine. . . .

1,293,985

1,327,365

1,258,528

1,219,444

1 ,330,700

1,562,106

1,527,195

945 , 432

Cypress .

1,100,000

1,013,013

1,097,247

997,227

981,527

935,659

757,639

495,836

Maple .

900,000

909,763

901,487

1,020,864

951,667

1 ,006,637

939,073

633,466

Red gum .

655,000

675,380

772,514

694,260

582,967

610,208

689 , 200

285,417

Chestnut .

490 , 000

540,591

505 , 802

554,230

529,022

535 , 049

653,239

206,688

Velio w poplar .

464,000

519,221

620,176

623,289

659,475

734,926

862 , 849

1 ,115,242

Redwood .

420,294

535,199

510,271

496,796

489,768

543,493

569 , 450

360,167

Cedar .

420,000

499 , 903

358,444

329,000

374,925

415,039

251,002

232,978

Birch .

415,000

430,667

378,739

388,272

432,571

420,769

387,614

132,601

Larch .

375,000

358,561

395,273

407,064

368,216

382,514

324,509

50,619

Beech .

360,000

376,464

365,501

435,250

403,881

437,325

430 , 005

(3)

Basswood .

260,000

264,656

257,102

296,717

304,621

344,704

381,088

308 , 069

Elm .

210,000

214,294

214,532

262,141

236,108

265,107

260,579

456,731

Ash .

190,000

189,499

207,816

234,548

214,398

246,035

252,040

269,120

Cottonwood .

180,000

195,198

208,938

227,477

198,629

220,305

293,161

415,124

Tupelo .

170,000

124,480

120,420

122,545

98,142

92,071

68 , 842

(3)

White fir .

125,048

112,627

88,109

122,613

124,307

132,327

146,508

(3)

Sugar pine .

117,701

136,159

149,926

132,416

117,987

103,165

115,005

53,558

Hickory .

100,000

116,113

162,980

278,757

240,217

272,252

203,211

96,636

Balsam fir .

100,000

125,212

93,752

84,261

83,375

74,580

53,339

(3)

Walnut .

90,000

25,ˆ73

40,565

43,083

38,293

36 , 449

41 , 490

38,681

Lodgepole pine .

26,486

18,374

20,106

22,039

33,014

26,634

(3)

(3)

Sycamore .

25,000

22,773

30,804

49 , 468

42 , 836

45 , 063

46,044

29,715

All other kinds .

47,893

55,624

85,366

82,145

69,548

68,428

27,734

2 514, 721

1 Computed total 1915 production by kinds of wood.

of flooring. Longleaf pine is sometimes known as (

Shortleaf pine is a lighter wood, softer than typical longleaf, and typical specimens show a larger percentage of sapwood, which is always less durable than heartwood. It is more easily worked than longleaf and because it usually contains less resinous material is more suitable for finishing lumber, taking stains, paints and varnishes satisfactorily. It makes good flooring and the low grades are extensively used in the box trade.

Loblolly pine is the least valuable of the three principal varieties of yellow pine, being a variety of rapid growth seldom suited to uses requiring great strength, but yielding a good quality of interior

finish. It is extensively used for boxes and crates. It is characterized by coarse annular rings and small heart.

The trade name ((North Carolina pine® is used to describe a mixture of shortleaf and loblolly pines marketed from the States of North and South Carolina and Virginia. The term (

Douglas fir (Pseudotsuga taxi folia) is the most important product of the northwestern part of the United States, particularly Oregon and Washington, and also of British Columbia. In respect to supply it is the most important timber of the United States and in utility covers practically the same range as the yellow pines. Its most important use is in building construction, and eventually it will be the most important wood used in building.

White pine, by virtue of its light weight and soft texture, is the most favored of all soft woods for uses where strength is not the chief

2 Includes lumber cut in Alaska. 3 Not separately reported.

factor, being used extensively in building con¬ struction and also in the manufacture of many articles requiring a wood that is soft, easily workable and free from pronounced grain, such as musical instrument parts, foundry patterns, etc. In addition to the common white pine of the Eastern and Lake States (Pinus strobus), Western white pine (Pinus monticola) , which is frequently marketed as Idaho white pine, and the sugar pine (Pinus lambertiana) of Califor¬ nia and Oregon are legitimate members of the white pine family.

Cypress (Taxodium distichum), which is produced chiefly in the South Atlantic and Gulf Coast States, is one of the most valuable of American woods for those uses requiring great durability under exposure to moisture. Heart cypress is practically immune from decay and is therefore favored for the construction of water tanks, greenhouses, in the manufacture of cross-ties, shingles, siding and for many other uses involving a degree of durability found in no other American wood.

Hemlock is of two species. Eastern hemlock (Tsuga canadensis) is produced chiefly in New York, New England, Pennsylvania, West Vir¬ ginia, Michigan and Wisconsin. Western hem¬ lock (Tsuga heterophylla) is found chiefly in the North Pacific coast section. The chief uses of hemlock are as a general utility building lumber and for boxes and crating. The wood of the eastern hemlock is light, not particularly durable under exposure without, the protection of paint

or preservatives, but strong and serv¬ iceable. The western variety is more dense and possesses many characteristics similar to those of Douglas fir.

Spruce as a trade term covers several species which are found widely scattered from the Atlantic to the Pacific coasts. The most im-

portant are Picca rubens, found chiefly in New England, New York and Pennsylvania and sold as (

Redwood (Sequoia sempervirens) is a Cali¬ fornia product noted for the great sizes to which it grows. It is a light, durable wood, used extensively in building, particularly for siding and shingles. It possesses the charac¬ teristic of resisting fire to an unusual extent.

The various cedars, including many species, furnish the principal raw material of the shingle industry and the most satisfactory wood for the manufacture of pencils. The name (

Hardwoods or Broadleaf Timbers. — Oak is the most important of the hardwoods in volume of production. Botanically there are more than 50 oaks, the most important of which are the white oak (Quercus alba) and red oak (Qner – cns rubra). The oaks yield a wood that is very useful in building construction because of its varied and beautiful texture or < (figure.® It is very hard and will withstand extreme wear, qualities that make it valuable in the manufacture of flooring, interior finish, furni¬ ture and cabinet work of many varieties, vehicles and agricultural implements, and in ship and boat building. The greater part of the production of oak centres in the Southern States, although the timber is found in practi¬ cally all parts of the country.

Maple includes several species, the most im¬ portant commercially being the hard maple (Acer saccharum) , also known as the ((sugar maple.® This wood is found scattered widely through the Northern and Eastern States, but attains its greatest importance in Michigan. It is a strong, dense hardwood, the most important uses of which are for flooring, finish and furni¬ ture.

Birch of several species is found chiefly in the Northeastern and Great Lakes States, the most important variety being the yellow birch (Be tula lute a), produced in largest quantity in Wisconsin and

Michigan. The wood is heavy and tough and is particularly suited to the manufacture of finish and furniture. It is ex¬ tensively used stained in imitation of mahogany, although it possesses characteristics that makes it very attractive when finished in the natural.

Red gum (Liquidambar styraciflua) is sec¬ ond to oak as a hardwood product of the South¬ ern States. It is moderately soft, possesses an attractive figure and is extensivelv used for finish and furniture. Properly stained it af¬ fords a good imitation of mahogany. Other important uses are for boxes, cooperage and vehicles.

Chestnut (Castanea dentata) is produced in largest quantities in the Eastern States. It is

used chiefly in the production of interior finish, furniture, musical instruments and coffins.

Yellow poplar (Liriodendron tulipifera) is found chiefly in West Virginia, Tennessee, Ken¬ tucky and scatteringly through the Southern States. It is one of the softest of the hard¬ woods, readily worked and finds its most im¬ portant outlets to market in the production of millwork, boxes and crating, furniture and vehicles. It was at one time the most important material used in the production of automobile bodies but was largely displaced by the de¬ velopment of satisfactory metal bodies.

Among the other hardwoods of chief im¬ portance are included the elms, the chief species of which are the white elm (Ulmus arnericana) and the rock elm (Ulmus racemosa) which is also known as cork elm. The most important uses of elm lumber are in the manufacture of boxes and crating and in furniture of the cheaper varieties. Basswood (Tilia amcri- cana), which has a very wide range of growth, produces a very soft lumber of straight grain that is used in the production of boxes, crating, millwork, wood novelties, trunks, etc. Tupelo gum (Nyssa aquatica) is found in the same localities as cypress and is used largely for boxes and crates. Cottonwood (Populus del- toides) is another southern product that is used chiefly for box and crating purposes. Black walnut (Jug Ians nigra), once the most favored of American woods for furniture manufacture, has become comparatively scarce and is now manufactured chiefly from scattered woodlots. It is used in the production of fine furniture and in the making of gunstocks, for which it is preferred over all other woods.

Manufacture of Imported Woods. — The manufacture of woods imported in the log has become an important annex to the hardwood branch of the lumber industry, the products of chief importance being mahogany and Circas¬ sian walnut. Mahogany as it is known in the trade includes Swietenia mahogani, from Cen¬ tral America and southern Mexico, and Khaya senegalensis, from Africa. Though the latter is not a true mahogany botanically, it pos¬ sesses characteristics that place it commercially on a par with the product from the American tropics. The chief uses of mahogany are for furniture and interior finish. Importers of ma¬ hogany also bring into the United States a considerable quantity of Spanish cedar, the principal use of which is for cigar boxes. Cir¬ cassian walnut is a wood of very pronounced figure used principally for interior finish and furniture.

The Veneer Industry. — The manufacture of wood veneers is an important subsidiary factor of the lumber industry. VeneCrs range from the extremely thin material used in the production of fine furniture, piano cases, etc., to the thick veneers used in producing baskets and light boxes. Thin veneers are produced by ˆcooking® the log until it is very soft and slicing it. The heavier veneer stock is produced by sawing the log with a high-speed circular saw. Mahogany, Circassian and American wal¬ nut are the most important of the woods used in making thin veneers of fine furniture and finelv figured mahogany logs suitable for the production of veneers bring extremely high prices. Since furniture veneers are apt to be but one-thirty-second of an inch in thickness

or even less and are usually sold by the square foot, a single log will produce enough stock to cover a very large amount of surface.

In some cases veneer mills are operated in connection with sawmill plants, but generally veneer manufacture is a separate enterprise.

Preservative Treatment of Wood. — In the early period of the lumber industry's develop¬ ment only those woods of most serviceable character were marketed, but with the expan¬ sion of demand that has come in recent years, bringing with it the rapid extermination of the varieties that had first preference for com¬ mercial purposes, it has become necessary to develop means of utilizing practically all woods that grow to commercial size. One of the prin¬ cipal

difficulties with some of the timbers that have appeared in the markets in recent years is their lack of durability. On this account, the development of processes of wood preserva¬ tion by chemical treatment has become an im¬ portant adjunct to the lumber industry, deriv¬ ing a large part of its impetus from the desire of American railroads to get away from the expense of frequent renewal of cross-ties, poles and posts. It has been estimated that the average life of an untreated cross-tie is about seven years and that the same tie, properly preserved, will last 17 years.

The most important agents used in preserv¬ ing wood are coal tar creosote, zinc chloride and mercuric chloride. Various methods of applying the preservative include brush treat¬ ment, dipping in an open tank, application of the solution under pressure and the combina¬ tion of a vacuum to open the pores of the wood and pressure to force the solution into them. Preservative salts that are soluble in water are of no value in the treatment of wood that is to be exposed to the elements and for this reason the creosoting processes have made most headway. Creosoting plants are in opera¬ tion in all parts of the United States and are the most influential factors in the practical conservation of America's timber supply thus far developed. Before the European War a large part of the supply of creosote oil came from Germany. According to data gathered by the American Wood Preservers' Associa¬ tion, the consumption of creosote oil, domestic and foreign, and zinc chloride, 1910 to 1914, inclusive, was :

Zinc

chloride,

Domestic Foreign made in creosote creosote U. S.

YEAR ' (gallons) (gallons) (gallons)

1910 . 18,184,000 45,082,000 16,803,000

1911.. . 21,511,000 51,517,000 16,360,000

1912 . 31,136,000 52,531,000 20,752.000

1913 . 41,700,167 66,673,192 26,466,803

1914 . 28,026,870 51,307,736 27,212,259

Exports and Imports of Forest Products.

— The export business is an important factor in the lumber trade of the United States. The growth of exports of sawed lumber from the United States is indicated by the following figures: 1870, $2,817,906; 1880, $5,086,880; 1890,

$9,974,888; 1900, $17,731,696; 1910, $36,774,219; 1913, $61,975,919.

The principal export markets for American lumber are western Europe, South and Central America, Mexico and the Orient. Extensive studies of these markets have been made by the Department of Commerce to encourage the de¬

velopment of a greater foreign business, made possible by the devastation of Europe's forest resources during the great war.

As the result of this activity of the govern¬ ment and the enactment of the Webb bill, legitimating combinations for the development of foreign trade, a number of substantial ex¬ port corporations were formed after the close of the European War to develop this class of business.

Aside from a small quantity of valuable hardwoods, the greater part of the lumber im¬ ported into the United States comes from Can¬ ada. The volume of the import business has been variously affected by changes in import tariffs and by war conditions during the years 1914-18. The following table indicates the value of wood and manufactures thereof im¬ ported from all sources during typical years from 1900 to 1917, inclusive:

year Value

1900 . $11,711,446

1905 . 16,707,735

1910 . 27,489,155

1911 . 24,709,532

1912 . 24,414,943

1913 . 27,851,295

1914 . i . 12,181,772

1915 . 4,456,846

1916 . 4,583,269

1917 . 5,207,265

Tendency of Lumber Prices. — The manu¬ facture of lumber in the United States, prac¬ tically from the beginning of the industry, has been characterized by extreme fluctuations in prices. No other industry is more sensitive to conditions affecting general business, a fact that is accounted for, to some extent, by the im¬ mediate association between lumber and the building business. When building is active the demand for lumber is proportionately active, but building is subject to extraordinarily diver¬ sified influences that induce violent fluctuations in volume. This fact, coupled with the inten¬ sive competition that has long existed within the lumber industry, is responsible for frequent periods of depression, in the course of which lumber prices at the mills have actually gone below the costs of production.

In a general way the tendency of lumber prices is always upward, forced thus by eco¬ nomic influences. The lumber manufacturer is converting into a merchantable commodity a natural raw material representing a large in¬ vestment on which interest charges begin ac¬ cumulating as soon as the property passes into the hands of a private owner. In addition to interest on the investment, also, taxes paid on the property from the time the government — State or Federal — granted title up to the time of actual cutting are a charge that must be included in the cost of the product. The in¬ terest item is cumulative and the tax rate has shown steady increase in most sections of the United States. Consequently it becomes neces¬ sary for the producer to exercise care in com¬ puting the cost of logs entering the mill and this cost is ever increasing.

Another factor that tends toward higher prices at the mills is the necessity of logging less accessible timber. When timber was more plentiful and the manufacturer was able to se¬ lect his supply at practically his own price, the operation could be conducted without regard to

conservation and the timber which presented serious logging difficulties could be passed by. To-day, however, the less accessible timber is too valuable to be ignored and is taken, even though it

cannot be delivered to the mill at the low cost possible with better located stumpage. Small logs, also, are handled at considerable higher cost in the woods and through the mill, but have become too valuable to be left in the woods as they once were.

Still another potent factor in bringing about higher prices is the change that has come in labor conditions. Before the beginning of the European War wages paid in the lumber indus¬ try were low, as compared with wage scales in other large industries, and the hours of labor were long. In some sections 11 hours and in others 10 hours constituted a day's work. One of the effects of the war was to reduce the working day throughout the Pacific Northwest to an 8-hour basis, and another was a general increase in wages, in many cases exceeding 100 per cent, with little prospect of eventual return to former wage schedules.

As the cost of lumber at the mills is com¬ posed chiefly of raw material cost, which shows constant increase, plus labor cost, which before the war was abnormally low, plus amortization of plant which proceeds more rapidly as the timber supply diminishes, it is an economic cer¬ tainty that, disregarding extraordinary fluctua¬ tions such as occurred during the war period, the price must show gradual increase until it reaches the point at which timber can be grown, converted into lumber and marketed at a profit. That point marks the limit of rise of lumber prices, from the standpoint of the lumber in¬ dustry, but in fact is arrived at by ignoring one particularly important factor — the competition of other materials that can be used in place of lumber. The economic forces that tend to force the price of lumber upward are absent or in¬ consequential in the cases of most of the com¬ peting materials, but it is evident that lumber cannot find a market at prices materially in ex¬ cess of those applying on such competing ma¬ terials. Consequently the lumber industry is rapidly approaching the point at which it will be compelled to meet the problem of constantly increasing raw material and manufacturing costs on the one hand and a price limit fixed by competition on the other. The solution will have to be found in the more complete utiliza¬ tion of the raw material and in the manufacture and marketing of by-products of many varie¬ ties. It is estimated that waste through the leaving of potentially valuable raw material in the woods ranges from 20 to 40 per cent, but this waste is largely unavoidable and will con¬ tinue so until, by the development of mechanical and chemical processes, material now left in the woods can be profitably converted and marketed.

What has been said about price tendencies relates to the prices

prevailing at the mills. The cost of lumber to the consuming public, how¬ ever, is not subject to such extreme fluctuations as the mill price, for the reason that on the average it includes a large item of freighting cost, in which abrupt changes are not apt to occur. In the case of lumber hauled a long dis¬ tance by rail, the freight charges may exceed the mill price of the material. The opening up of water transportation facilities, therefore, be¬

comes an important influence tending to lower the cost of lumber to the consumer. On ac¬ count of its bulky character it can be shipped by water at a fractional part of the cost of rail transportation. The opening of the Panama Canal made possible the shipment of Pacific coast lumber to the Atlantic seaboard at freight rates that compare favorably with rail rates on pine from the Southeastern States, thereby cre¬ ating competition in Eastern markets that tends to hold prices down, to the benefit of the con¬ sumer. The actual effects of the canal's opera¬ tion were greatly delayed because of the scarcity of tonnage during and immediately after the close of the European War, but the begin¬ ning of 1919 brought Douglas fir from the North Pacific coast into active competition in the Eastern markets.

By-products of the Lumber Industry. — The

most important of the by-products made from $ wood waste include paper of several varieties, fibre board, methyl (wood) alcohol, ethyl (grain) alcohol, charcoal, acetate of lime, pyroligneous acid and numerous tars and oils. Paper and fibre board are manufactured by mechanical and chemical manipulation of slabs, edgings and other saw-mill waste. Wood

alcohol, acetate of lime, pyroligneous acid and charcoal are products of destructive distillation. Grain alcohol is produced by a process involv¬ ing the extraction of the starch content from wood waste, its conversion into sugar and dis¬ tillation. In addition to these processes methods have been developed for recovering the turpen¬ tine and resinous contents from longleaf pine stumps, and for the manufacture of various fabrics from wood waste, including an imitation silk sold as ((fibre silk.ˆ

The production of tanning extracts from the bark of oak, chestnut, hemlock and other woods is an important means of utilizing what otherwise would be a waste product, but is carried on as a separate business, the lumber business furnishing the raw material.

Careful surveys made by competent chem¬ ists have demonstrated

that in connection with almost any large lumbering operating the com¬ plete utilization of the raw material through the development of suitable lines of by-products may be made to increase the profits of opera¬ tion to such a degree that the lumber price can be lowered materially, the by-products opera¬ tion thus carrying its proportionate share of the overhead cost of the business. It is not possible, however, for the individual operator of a small saw mill to undertake enterprises of such character, since they invariably involve large investments in plant facilities, and the de¬ velopment of the by-products business is tend¬ ing in the direction of centralized plants that can utilize waste products from all mills in contiguous territory.

Willard C. Howe, Editorial Director of (< Lumber

LUMBER STATE, a popular designation for the State of Maine, because of the large forests and the great number of its people en¬ gaged in lumbering.

LUMBRICOID, lum-bri'koid, from Latin lumbricus , intestinal worm, and the Greek eidoi form. One of the nematodes or round worms, which are classed in four families: (1) as- carides, (2) strongylides, (3) trichotrachelides

and (4) filariae. In the first is the ascaris lum- bricoides, known at least 2,000 years ; Aristotle naming them, but the Linnaean name being used at this day. Their appearance resembles an ordinary earth worm, the males being from four to six inches long and the females from 10 to 14, even reaching 18 inches. The mouth is three-lobed and both ends are pointed, the tail of the male having a double^ spiculum or penis. The female may contain 60,000,000 eggs according to some estimates. Development, it is believed, takes place after leaving the faeces, and they endure adverse temperatures and con¬ ditions well. The mode of development is as yet not clear, nor its manner of entering the human system. Drinking water is generally supposed to be the source whence it finds its way to the intestine. It develops rapidly in the human intestine, but whether from embryo or after its escape from the egg is unknown. The middle part of the small intestine is where it locates, several together ; sometimes in great numbers, even up to 1,000. It infests also the pig and beef ; it is found in every country, but thrives best in warm climates, dryness

not affecting its destruction. A year is supposed to be the limit of the existence of the Ascaris lumbricoidcs. Cobbold developed the egg to embryo stage in fresh water and sustained life three months. Eggs fed to animals had nega¬ tive effect. The presence of a few ground worms in the intestines probably create no symptoms, but when numerous they bring about itching of the nose, colic of the umbilicus, dis¬ tention of the epigastrium, lack of appetite, mucous or bloody evacuations and other symp¬ toms.

Round worms find their way at times into the nose, larynx or eustachian tubes, and in subcutaneous tissue are discoverable in ((worm abscesses.® Santonin and its compounds are the most successful remedy.

LUMINIFEROUS ETHER. See Ether.

LUMINOSITY OF ANIMALS is most familiar to us in the fire-fly and glow-worm, on land, and in what is called phosphorescence, at sea ; with regard to the latter popular term, arising naturally from the resemblance to the wavering light of phosphorus, it may be said that the phenomenon has nothing to do with phosphorus. It appears in plants, especially in the mycelium of fungi and certain agarics, often causing rotten wood, decaying vegetables, etc., to glow in the dark. Bacteria on such objects are another source of ˆphosphorescence,® caus¬ ing the shining appearance of putrid fish. There appears to be no essential difference between the luminosity of plants and of animals, and it is believed by some that the power to produce it belongs to all creatures, although visible in only a few, mostly living in the sea. On land some myriapods and worms, and various in¬ sects or their larvae and in the ocean a great number and variety of invertebrates, including mollusks (cephalopods), crustaceans and many fishes, manifest luminosity. <(On a dark night,® says a writer, ((the crest of every wave often seems to break in a pale glow, the wake of the vessel is a trail of light, and an oar dipped in the water seems on fire.® The narratives of voyagers abound in descriptions of such phe¬ nomena seen at their best in the tropics, but observable even in Arctic waters. The origin

and nature of this light are not clearly known, although it has been extensively studied. It appears to be dependent on the presence of oxygen in an alkaline medium. This lumi¬ nescence is never manifested by fresh water, al¬ though so common among marine fishes, which are in contact with sodium chloride or calcium chloride. It is thought by some to be the prod¬ uct of the chemical action of oxygen on fatty constitutions in the cells, by others of two

special substances, one an enzyme, the other an element of the blood that betrays itself as light when it flows into a luminous organ. Watase considers the light-giving material a cell-secre¬ tion, not a product of a gland. Still another view is that the light is the effect of chemical action resulting in an electrical manifestation. The spectrum of the fire-fly shows greatest in¬ tensity in the central (green) part, and disap¬ pears before reaching either end of the solar spectrum — that is, it exhibits neither heat nor chemical energy. Langley and Very, who de¬ voted much effort to its investigation, called it the <(most economical light known,® and very near to the ideal of light without heat. The manifestation of such light may occur in three ways. In the minute protozoans (Noctiluca, etc.), which sometimes are met with in warm seas in such dense masses that the water is like a glowing broth, the light issues from a myriad of points, a diffuse illumination along the muscle fibres.

In a class that includes such mollusks as the pholads, and also the copepod crustaceans, the photogenic material is ejected as a liquid (slime) from the body, according to Watase, and becomes luminous only by contact with the water, or, more strictly, with the oxygen mixed with it; and the same is true of luminous ter¬ restrial worms and annelids, but here the ma¬ terial emanates as fine granules that glow when they encounter the air. A third class includes the more highly organized insects, squids, fishes, etc., which possess definite light-producing organs.

The luminous insects with few exceptions are beetles of the pentamerous families Lampy- ridae and Elateridae. The former family is well represented in North America, and furnishes us with several species of fire-flies. The females of some species in this group are wingless, or nearly so, creep about among the herbage, and are called glow-worms ; in other species it is the larvae that are glow-worms. Their luminous organs are situated on the head or the ab¬ dominal segments or both, in positions varying with the species, and consist of cells just be¬ neath the cuticle, reached by nerves and sur¬ rounded by a wrapping of tracheal filaments, supplying air — the necessary oxidizing agent. Their light is usually given out in intermittent flashes, but in some species continuously, and in all, apparently, it is under nervous control. The most famous of the fire-flies is the cucuyo of the American tropics (Pyrophorus noctilucus) , one of the Elateridae; but several other species equal its powers. This beetle is an inch and a half or more long, dull in color, and has on each side of its thorax an oval, whitish ((lantern,® from which at will streams a bright light. Gosse ˆNaturalist's Sojourn in Jamaica, > 1851) says that when this beetle was handled these spots would

ignite gradually, <(the centre

ol each tubercle first showing a point of light which in a moment spreads to the circumfer¬ ence and increases in intensity until it blazes with a luster almost dazzling.® The color of the thoracic light is a rich yellow-green. In a pitch-dark room this insect gives $o much illu¬ mination as to cast a definite shadow of any object on the opposite wall, and when held two inches from a book the whole line may be read.®

Gosse and the many others acquainted with these phosphoric beetles describe another light on their abdomen, just behind the legs. ((When fully illuminated,® the Beebes ((Search for a Wilderness, 1910) tell us, (< this area was brilliant and of a figure-of-eight shape. The light, however, was radically different from that of the thorax, being yellowish and candle-like, giving an illusive impression of an opening from the incandescent interior of the insect. In flight the abdominal searchlight comes into play, burning brightly with a strong yellowish glare.® In other species the glare is orange or reddish, and the insect races along like a rail¬ road train, with two green head-lights and a red tail-light. Beebe found that two or three in a glass tube answered the purpose of an electric flash-light. These and similar insects are worn in the hair, and otherwise adapted to the pur¬ pose of ornament by the Mexicans and Bra¬ zilians.*

One of the surprises of the early explorers of the depths of the ocean was that many of the tropical pelagic fishes had luminous organs ; and for a long time it was believed that all of these came from the abysses where no particle of sunlight penetrated, and that thus the sty¬ gian depths were illuminated. Later investiga¬ tions have modified this view. The luminous fishes belong mainly to the families Stomiatidae, Sternoptychidae, Scopelidae and Ceratidae. All these are pelagic families and have species ranging from the surface to the deepest bot¬ toms (see Deep Sea Exploration). The exten¬ sive explorations of the ocean depths carried on in the Valdivia, the Michael Sars and other vessels in recent times show that light-organs are Specially characteristic of fishes belonging to the upper 500 meters in warm oceanic waters.® This is true of the crustaceans and cephalopods, in the latter case squids, living at intermediate depths. The light-organs in these animals are distributed in various parts of the body, and are highly complicated, eye-like glands, each having

not only a lens to increase its power, but a layer of black pigment in the rear, to act as a reflector. There is no doubt that this structure .enables the fishes and squids to project the light in definite directions. The function and importance of these organs have been much discussed ; and the purpose is still in question. (VOL. 17 — 47

tween them and the eyes of these fishes and other oceanic animals must be studied ; but the data for this are defective and confusing. It appears that a remarkable coincidence exists between the development of light-organs and eyes in pelagic fishes. The Scopelidae, Sternop¬ tychidae and Stomiatidae, which live above 500 meters, possess well-developed light-organs and eyes, while from 500 meters downward light- organs and eyes both decrease in size. Along the sea-bottom, however, the fishes have only eyes and no light-organs.® The eyes of the bottom fishes (Macrurus) are large, as if to admit as much as possible of a scanty supply of light. In those depths all the invertebrate animals are aglow, clothed in a copious mucus that emits light ; and it is believed that this il¬ lumination is sufficient to enable the big large¬ eyed bottom fishes to see what is about them. The situation is, nevertheless, full of puzzling contradictions. Consult books mentioned under Deep Sea Exploration ; and for the most recent discussion of the matter consult Murray and Hjort's (Depths of the Ocean) (London 1912).

Ernest Ingersoll.

LUMINOUS PAINT, a paint containing phosphorus, which after exposure to strong light becomes luminous in the dark for a time. It is used for street signs, buoys, clock dials, etc. See also Paint, Phosphorescence.

LUMMIS, Charles Fletcher, American au¬ thor : b. Lynn, Mass., 1 March 1859. He was graduated from Harvard in 1881, went to Los Angeles, Cal., there was an editor of the Daily Times (1885-87), and later became editor of the monthly Out West. He spent five years among the Pueblo Indians of New Mexico, studying their speech and customs. Among his writings are (A Tramp across the Continent (1892); (The Land of Tiempo) (1893); (The King of the Broncos) (1897) ; (The Enchanted Burro) (1897); (The Awakening of a Nation) (1898), and the collection, (The Man who Mar¬ ried the Moon, and other Pueblo Indian Folk- Storks (1894).*

LUMPKIN, Joseph Henry, American

jurist: b. Oglethorpe County, Ga., 23 Dec. 1799; d. Athens, Ga., 4

June 1867. He was a brother of Wilson Lumpkin. He was graduated from the College of New Jersey (now Prince¬ ton) in 1819. studied law in the office of Judge Cobb at Athens, was admitted to practice in October 1820, and practised at Lexington, Ga., until 1844. In 1824 and 1825 he represented Oglethorpe County in the State legislature of Georgia, and in 1845 became associate justice and soon after was appointed chief justice of the Georgia Supreme Court. He was one of the chief organizers of the Lumpkin Law School of the University of Georgia, and occupied the chair of law in the school in 1859-61. He re¬ sumed the professorship in 1865, and retained it until his death. In 1833 he assisted in the com¬ pilation of the Penal Code of Georgia. Both as an advocate in criminal cases and as a judge he is described as exceedingly able. For many years he was prominent in the temperance movement.

LUMPSUCKER, an extraordinary marine fish (Cyclopterus lumpus) , of oval, ugly form and allied to the sea-snails (Li Paris) and gobies. It is remarkable for the brilliant red

and purple colors which the male puts on in the breeding season in the spring, when it ap¬ proaches rocky shores on both sides of the northern Atlantic to deposit its spawn. This fish has the short ventral fins so united as to form a sucking disc by which it attaches itself to the bottom and holds on against waves and currents, while it preys upon small fishes, crus¬ taceans, etc. It is well known and eaten in Scotland under the name “cockpaidle.®

LUMPY JAW. See Actinomycosis.

LUNA, loo'na, Alvaro de, Spanish poet, constable and leading spirit of the reign of John II: b. 1388; executed Valladolid, 22 June 1453. A natural son of Alvaro de Luna, a rich Spanish noble, he was nephew of the famous ˆanti-pope® Benedict XIII and near relative of the Count of Morala and the Marquis of Vilu- eha. He was sent to the court, while still a boy, by his uncle, the bishop of Toledo (1408). There he soon became page to John II, who conceived a great affection for him; and he became a general favorite at court, especially among the ladies. While scarcely of age he began to exercise a strong influence at court partially through the liking of the

king for him, and partially through the royal high maiordomo, Juan Hurtado de Mendoza, son- in-law of the king. Luna followed the progress of John II from place to place and to his standard flocked young men of the highest rank to bask in the sun of the favorite of the sover¬ eign. The infante, Don Enrique, rose against the king and seized him and Luna; but the latter, with the help of friends, succeeded in freeing himself and the king (1420), whom he afterwards strove to make independent of the infante and the nobles who supported him. To this end he gathered about him a strong party which stood for the maintenance of royal power and fidelity to the ruling sovereign. The infante, Enrique, and his party were driven from the court. The property of the most conspicuous of the followers of the infante was confiscated, among these being the powerful hidalgo Ruy Lopez Duvalos. This confiscated property was divided among the followers of the king; and, as the leader of these, Luna ob¬ tained great wealth, including several castles and the title of Count San Esteban, to which was added that of high constable, a position which gave him control of the royal forces and empowered him to look after the security of the sovereign's person. Next to the king, he was, therefore, all powerful ; so powerful indeed that he dared to imprison the infante. In 1425, through the influence of his enemies, the king was forced to exile Luna from the court. But, during his absence of a year and a half, the unsettled condition of the country grew rapidly and steadily worse ; and finally Luna was re¬ called, with great rejoicing. But civil war broke out between the different independent principalities of Spain. In the attempt to re¬ store order and to defend the interests of the king Luna took a very prominent part. He made several successful campaigns and captured a number of strongly fortified towns. In 1430 a truce for five years was concluded. Luna at once set out on a war expedition against Granada, then a Moorish stronghold, and, de¬ feating the enemy several times, he reached the outskirts of the capital (Granada). When vic¬

tory was in sight he was forced to retire owing to trouble in his own forces, and personal ill¬ ness. Again in 1431, with additional forces, he invaded Granada, conquered numerous towns and laid waste the land in the name of his sovereign, John II of Castile. Notwithstanding these brilliant military successes, Luna's enemies at home constantly conspired against him for the next 20 years. After a while their hands were strengthened by the support of the second wife of John II, who finally succeeded in poi¬ soning the mind of the king against his favorite, who was finally arrested at Burgos, tried and condemned to be beheaded at Valladolid. Among his other great talents, Alvaro de

Luna was a poet of no mean order and a great friend of the troubadours. His songs are graceful and harmonious and often beautiful. He has a good command of language and the quick and sensitive imagination of the poet. He was one of the most finished musicians of his age; and the touch of the musician is seen in his poetry. But his prose, which possesses the harmony of the poet, is stronger than his poetry. His (Librode las claras e virtuosas mujeres) is a stout defense of the fair sex. The work is divided into three books. These treat, respec¬ tively, of the women of the Bible, the pagan women and the Christian women. The style of this work is simple ; and the great number of references which it contains from sacred and profane history credit the author with a wide historical knowledge for his age. Consult Ticknor, (Histcry of Spanish Literature) (New York 1854) ; (The Chronicle of Alvaro de Luna) (Madrid 1784) ; (Chronicle of John IP ; Quintana, Jose, (Vidas de espanoles celebres) (Vol. XIX, Biblioteca de Autores Espanoles).

LUNA, Pedro de, pa'dro- da, anti-pope : b. Spain, 1334; d. Peniscola, Valencia, 1424. He was sprung from a noble family of Aragon, and, after entering the priesthood, became distin¬ guished as a canonist, and was appointed pro¬ fessor in the University of Montpellier. He re¬ ceived a cardinal's hat in 1375 and was elected to Avignon as anti-pope in 1394. The conclave of cardinals annexed as a condition to his elec¬ tion, that he should resign if ever an opportu¬ nity occurred when, by so doing, he could put a stop to the schism. This he refused to do although he was deposed by the Council of Pisa 0409), and by that of Constance (1417). Ban¬ ished from Avignon, he retired to the fortress of Peniscola, near Valencia, where he spent the rest of his life in excommunication.

LUNA, lu'na (the moon), among the Greeks Selene. Her worship is said to have been introduced among the Romans in the time of Romulus. She had a temple on the Aven- tine, one on the Capitol, a third on the Palatine.

LUNA MOTH, one of the largest and most beautiful of the great American silkworm moths, Tropcea lima. Its general color is deli¬ cate green, there is a purple brown band along the front edge of the fore wings and a pair of richly colored ocelli upon each of both pairs of wings, the hinder pair of which terminate in long curving Hails. » The caterpillar grows to a length of about three inches and is pale blu¬ ish green with a pearl-colored head; it has a pale yellow stripe along each side of the body, and a transverse yellow line on the back be-

tween each two abdominal segments. It feeds upon leaves of forest trees, as the hickory, walnut, etc. The cocoon is formed of a very thin, leaf-like material with little silk, and is usually found upon the ground.

LUNACY, LUNATIC, etc. See Insan¬ ity.

LUNALILO, loo-na-le'lo, William C.,

king of the Hawaiian Islands (1873-74) : b. 1835 : d. 3 Feb. 1874. He received a good edu¬ cation and was liberal in his political views. His health failed soon after his ascending the throne and he paid inadequate attention to administra¬ tive business.

LUNAR CAUSTIC. See Nitrate of Sil¬ ver.

LUNAR TABLES, in astronomy, ponder¬ ous volumes of solid figures which are the nu¬ merical development and tabulation of the ana¬ lytical theory of the moon's motions and per¬ turbations. See Moon.

LUNAR THEORY, The, in astronomy, the deduction of the moon's motion from the law of gravitation. See Moon.

LUNAR YEAR. See Year.

LUND, Sweden, town, in the lan of Mal- mohus, on an extensive plain, about eight miles from the Sound and 24 miles east of Copen¬ hagen. It is a very ancient place, and was once surrounded with wooden fortifications, and had its warehouses filled with the merchandise and treasures. In the Middle Ages it was the lar¬ gest city in Scandinavia ; the monarchs were elected kings of Scania on a hill in the imme¬ diate vicinity. The present town occupies a large extent of space, and is very irregularly built. It has an ancient Romanesque cathedral, one of the finest churches in Sweden, erected in 1145 and recently restored; a university, founded in 1688, attended by over 1,000 stu¬ dents, and occupying buildings erected in 1878- 82, while the old building contains the library (180,000 volumes), historical museum, etc. With the university are connected a zoological museum and a botanic garden. The town boasts of a statue of Tegner, and the house in which he lived. Sugar refining, glovemaking and iron-founding are among the industries, and there is a trade in agricultural produce. It was ceded by Denmark to

Sweden in 1658. Pop. 20,423.

LUNDY, Benjamin, American abolition¬ ist: b. Hardwick. Warren County, N. J., 4 Jan. 1789; d. Lowell, La Salle County, Ill., 22 Aug. 1839. His parents were members of the Soci¬ ety of Friends. At 19 he removed to Wheel¬ ing, then in Virginia, where he labored as an apprentice to a saddler. At this place, which was a centre of the slave trade in those days, his attention was first directed to the subject of slavery. He subsequently settled in business in Saint fclairsville, Va., where in 1815 he orig¬ inated an anti-slavery association, called the ((Union Humane Society® and had a member¬ ship of nearly 500. Soon after a journal enti¬ tled The Philanthropist was commenced at Mount Pleasant, Ohio, to which Lundy con¬ tributed. He then visited Saint Louis, where he remained nearly two years engaged in a newspaper exposition of the slavery question., At Mount Pleasant, he commenced, in 1821, the

publication of the Genius of Universal Emanci¬ pation, the office of which was removed to Bal¬ timore in 1824. In 1825 he visited Haiti to make arrangements for the settlement of eman¬ cipated slaves and a few years later he made a second voyage there for the same purpose. His efforts f on abolition aroused the bitter hos¬ tility of the Slave-holding class and the slave dealers, one of whom assaulted Lundy in Balti¬ more in 1827. In 1828 he visited the Eastern States, where he formed the acquaintance of a number of prominent abolitionists, one of whom, William Lloyd Garrison, afterward be¬ came associated with him in editing his journal. Garrison and Lundy differed in their policies for bringing about abolition. Lundy favored colon¬ ization abroad while Garrison advocated imme¬ diate emancipation on the soil. In 1830-31 he traveled in Canada and Texas to obtain sub¬ scribers to his paper and to continue his obser¬ vation on the condition of the slaves. He con¬ tinued his literary connection with the Genius of Universal Emancipation as long as it was published, and was the first to establish anti¬ slavery periodicals and the delivery of anti¬ slavery lectures, and probably the first to into- duce the formation of societies for the encour¬ agement of the produce of free labor. Consult Armstrong, W. C., (The Lundy Family and Their Descendants of Whatsoever Name (Nutley, N. J., 1902) ; Earle, (The Life, Trav¬ els and Opinions of Benjamin Lundy* (Phila¬ delphia 1847).*

LUNDY'S LANE, Battle of, also called the Battle of Niagara, or Battle of Bridgewater, a severe engagement fought on Canadian soil near Niagara Falls, 23 July 1814, between Brit¬ ish and American forces. Two days after the defeat of the British under General Riall

at Chippawa by Brigadier-General Scott 5 July 1814, the American forces under General Brown, numbering about 3,000 men, crossed the Chippawa River and took post at Queenstown ; Riall, after throwing a portion of his force into Fort George, retreated to a strong position near the head of Lake Ontario. Occasional skir¬ mishes took place between the outposts of both armies; but Brown, finding that he had no bat¬ tering cannon to besiege Fort George, and being unwilling to leave that fortress in his rear, fell back after a few days to the Chippawa. Here on the 25th he received intelligence that General Drummond, who had reached Fort George with British reinforcements, had crossed the Niagara River at Queenstown to attack Fort Schlosser, where the American supplies were deposited. Scott was at once detached with 1,200 men to make a demonstration at Queenstown, and about sunset unexpectedly came up with Riall and his whole force at the head of Lundy's Lane. The small American force received the full fire of the British infantry, and held their ground until the arrival of the main body of the American army. Fighting continued during the night. Scarcely an officer remained un¬ wounded in the American ranks, and the men, faint with their exertions and tormented by thirst, were ready to sink with exhaustion. Un¬ willing, however, to relinquish the field, they re¬ plenished their ammunition from the cartridge boxes of their fallen comrades and foes, who covered the ground around the battery, and then calmly awaited the assault of the British,

Alter an hour's pause the latter, reinforced by fresh troops from Fort George, advanced under General Drummond to the last assault. The conflict which ensued was more deadly than ever. At length the enemy, broken and foiled at all points, retired. Brown and Scott being now disabled by wounds, the command devolved upon Colonel Ripley, who, finding the enemy indisposed to renew the attack, drew off his troops to the camp. In this battle, the most obstinately contested perhaps ever fought upon the American continent, the British force of 4,500 beside greatly outnumbering their oppo¬ nents, had the advantages of position and prep¬ aration. Against these odds the troops of Brown fought with an unparalleled valor and ob¬ stinacy which did much to disabuse the country of the idea, then prevalent, that American troops could not cope with the trained veterans of Europe. According to the official accounts, the American casualties amounted to 571 wounded, 171 killed and 110 missing; and the British to 559 wounded, 86 killed and 42 prison¬ ers.

Ripley, finding his forces reduced to less than 2,000 effective men, retired to the neigh¬ borhood of Fort Erie, having first destroyed the bridge over the Chippewa and a portion of his stores. See Chippawa, Battle of.

LUNEBURG, lu'ne-boork, Germany, capi- ital city of the government district of the same name in the province of Hanover, on the navi¬ gable Ilmenau River. It contains many ancient dwellings but the well-laid-out gardens of the suburbs give the place a modern aspect. There are four churches including the Catholic, and a synagogue besides. The Michaelis Church dates from the 15th century, and the Johannis Church, with its five naves, belongs to the pur¬ est 14th century Gothic period. The Nikolai Church and its colossal central nave dates from the 15th century. Among its other notable buildings are the ancient courthouse in the market place, full of art treasures, the great structures of the Michaeli monastery (now a seminary), the old Kaufhaus, etc. Its indus¬ tries consist of lime-kilns, iron, cement, carpet, stoneware and dye works, a horsehair weaving factory, wax bleachery, etc. The trade is ably assisted by its Chamber of Commerce and con¬ sists of exports in wrine, grain, lumber, hay, straw, wool, wax, etc. It is the junction of several railways. Among its other public build¬ ings figure the gymnasium and realgymnasium, the Evangelical teachers' seminary trade school, museum, public library, etc. Documentary evi¬ dence of this town dates from 1228 and munic¬ ipal rights were conferred in 1247. As a mem¬ ber of the Hansa League in the Middle Ages the city had considerable prominence and great wealth. In the Thirty Years' War the city was taken by Duke George of Brunswick-Liineburg and fell to a relatively low estate and has since gone through the vicissitudes of Brunswick and Hanover. Its population, in 1910, was 27,790. Consult Volger,

LUNENBURG, loo'nen-berg, Canada, town, seaport, capital of Lunenburg County, in the province of Nova Scotia, and about 40 miles west-southwest of Halifax. The first settlement was made by Germans, in 1753, and

it still bears interesting marks of its origin. It has a large, safe harbor. The chief indus¬ tries are ship-building and fishing. Lunenburg is the chief seat of the deep-sea fisheries of Canada and it exports considerable fish and lumber to the West Indies. It is the seat of a United States consular agent. The settlement was raided by American privateers in 1782. Pop. about 2,681.

LUNEVILLE, lu'na-vel', France, city, in the department Meurthe-et-

Moselle, on the river Meurthe, where it is joined by the Vezonze, and junction of lines of the East Rail¬ way. It has a beautiful 18th century church (Saint Jacques), a great palace formerly be¬ longing to the dukes of Lorraine but now used as barracks and a lovely park. There are also a town-hall, war memorial erected 1870, statue of Bishop Gregory, a college library, museum, chamber of agriculture, etc. The chief in¬ dustries are glove, stocking, lace, yarn and textile factories, also potteries and brewery. Considerable trade is done in grain, wine and tobacco. It was the capital of a county in the 10th century and fell into the possession of the duchy of Lorraine in 1344. When Stanislas Lesczynski, former king of Poland, came into the possession (1735) of Lorraine he made this city his residence. In history the city is noted for the Peace of Luneville (1801) between Germany and the French Republic, by which Belgium and the left bank of the Rhine was apportioned to France, while Milan and Man¬ tua fell to the Cisalpine Republic, Venice and its district as far as the Etsch (Adige), Istria and Dalmatia with Cattaro were given over to Austria. As compensation for the loss of their territory on the left bank of the Rhine to the Imperial princes the ecclesiastical foundations were secularized and the free cities were an¬ nexed to such principalities. The city suffered greatly during the German invasion 1914—18. Pop. about 25,587. Consult Baumont, (Histoire de Luneville5 (Luneville 1900) ; Sloane, W. M., (Life of Napoleon Bonaparte5 (New York

1910).

LUNGCHOW, or LUNGCHOWFU,

China, walled city in the province of Kwangsi, located on the Tsol £iang, at the confluence of the Sungchi-kiang and the Kaoping-ho, near the border of Tonkin with which much trading is done. It is on the trade route between Yunnan and Tonkin and much import trading is done through its open port, amounting in 1912 to 76,532 taels, with an export trade of 7,303 taels. It has a population of about 20,000.

LUNGFISH, a fish of the group Dipnoi (q.v.), few existing species of wrhich remain. These are mostly sluggish fishes of tropical fresh waters, whose respiratory organs are lung-like. See Barramunda; Ceratodus; Lepidosiren ; and Ichthyology.

LUNGS, the principal organs of respi¬ ration in air-breathing vertebrates. They are enclosed in the chest, an air-tight chamber which, mainly by means of the diaphragm (q.v.), acts as a bellows

and moves the air in and out oi them. The purpose of the inhalation of air is to supply oxygen to the blood and to re¬ move carbon dioxide. There are two lungs, one on the left, the other on the right side of the chest, and between them and almost com¬ pletely covered by them are situated the heart

LUNG-FISHES

1 Australian Lung-fish or Barramunda 2 Amazonian Mud-fish or Lepidosiren

3 African Mud-fish or Protopterus

and the great blood-vessels springing from it the oesophagus, the thoracic duct, etc. The left lung is the smaller of the two, and both consist of a mass of ramified tubes, branches of the trachea, which unite them. The color of the lungs is pinkish white at birth, which changes to the mottled slate color of the adult lungs, and the still darker hue of the lungs of the aged. Through the walls of the lungs all the blood of the body passes, receiving oxygen and throwing off carbonic acid. The simplest lung imaginable would be an elastic membranous bag, well supplied with blood-vessels, and with a pipe connecting it with the air; the most com¬ plicated lungs that exist are essentially of that construction, the purpose of the complications being merely the enlarging of the surface ex¬ posed to the air.

In all air-breathing vertebrates, the atmos¬ pheric air reaches the larynx through the nasal and the buccal cavities, then passes into the trachea, and into its ramifications which are called bronchi or bronchial tubes, and from these tubes into membranous pouches named alveoli. The terminal twig of a bronchial tube is a small canal, in which are found many open¬ ings or orifices of very short tubes, which are the ultimate- ramifications of the tube. The lung-substance is composed of the alveoli, the air-sacs, the small bronchi, blood and lymphatic vessels and nerves ; the whole enclosed in a membrane that surrounds each of the lungs and is known as the pleura. The trachea or windpipe extends from the lower part of the larynx, of which it is the continuation, to the middle of the thorax, where it divides into the two large bronchi. It is situated in the middle line of the body, in front of the last cervical and the first five or six dorsal vertebrae. In the back part of the trachea there are

transversal muscular fibres of the unstriped variety. The fibrous tissue found in the trachea belongs to the two varieties of yellow elastic and white fibres. The mucous membrane is thin and in perfect continuity with that of the larynx and that of the bronchi. Its most remarkable fea¬ ture is that its epithelial covering is composed of ciliated cells having in high degree the vibra- tile movement. All along the trachea there are many mucous glands, and these are espe¬ cially numerous upon its back part. The cilia lash upward, and thus keep the passages free from mucus and remove foreign particles. As the passages become smaller they lose their cartilages, and the muscles form a continuous circular layer. The length of the trachea is from four to five inches. The average, trans¬ versal diameter of this tube is between 9 and 12 lines in adults. The anterior two-thirds of the trachea is cylindrical, the posterior third is a flattened wall. In the neck the trachea is covered by the skin and a few flat muscles ; in the chest it is placed between the two lungs and covered by muscles, lymphatic glands and the bony and cutaneous walls of the thorax. The structure of the trachea is complicated. This tube is essentially composed of an internal layer which is a mucous membrane and an external one which is fibrous. Imbedded in these mem¬ branes are from 16 to 20 cartilaginous pieces, with the shape of a horseshoe, or of a ring one- third of which is missing. These incomplete rings are placed transversely at nearly equal distances one from the other; they give to the

anterior two-thirds of the trachea the cylindri¬ cal form.

The essential parts of the lungs are the air- cells or air-sacs, in which the function of respi¬ ration is performed. They are estimated to be about 600.000,000 in number and to be about one-two hundred and fiftieths of an inch in diameter. They consist of somewhat elongated cavities, which communicate with a bronchial ramification bv a circular opening, usually smaller than the cavity of the cell. ' The air-cells are arranged in groups and separated from each other by thin walls. Many small, shallow, cup-like depressions, separated from each other by portions of membrane, are found at the bot¬ tom and on the lateral walls of the air-sacs. These, the alveoli, have no communication with

each other except by their opening in the cavity of the air-sac. An epithelial layer exists in the air-cells and the alveoli. The walls of the air- cells are formed of a thin membrane in which the blood and lymph-capillaries ramify. Minute openings lead from the air-cells into the lymph- spaces of the membrane. The membranous walls are partly formed of elastic tissue. It is this that gives to the lungs their

elasticity. At the root of the lungs the membrane known as the vis¬ ceral pleura is continuous with a membrane which lines the chest-cavity (the parietal pleura). The space between the two is the pleural cavity; it is in reality a large lymph- space, and communicates with the lymphatics of the pleura. Owing to the air-pressure within the lungs, the two pleurae are closely pressed together, the lungs entirely filling the chest- cavity.

The lungs are united with the heart and with the trachea by a part called the root, which, in each side, is composed of the large bronchus, a branch of the pulmonary artery, two pulmonary veins, and smaller vessels and nerves, the whole being almost completely covered by the pleura. Each lung is divided into lobes, two in number in the left one and three in the other. Each lobe is divided into lobules, which are arranged on the bronchial tubes like grapes on a bunch. Each lobule is surrounded by condensed areolar

tissue mixed up with yellow elastic tissue. Each lobule is a fair representation, on a small scale, of a whole lung, as it hangs upon a bron¬ chial tube, a branch of the pulmonary artery, branches of bronchial vessels and nerves. In the roots of the lungs the two large bronchi divide, the right into three, and the left into two bronchial tubes, one for each of the pulmo¬ nary lobes. The primary bronchial tubes are very short, and divide into two or three smaller tubes, each of which gives off two or three divi¬ sions. Before reaching their termination, the tubes branch off four or five times more.

The weight of the lungs varies much accord¬ ing to age and sex. In adult men the two lungs weigh from 40 to 50 ounces, and in women from 28 to 35 ounces, thus, being the lightest of the organs of the body. The ratio of the weight of the lungs to that of the body is as 1 to 30 or 40. The specific gravity of the lungs is very slight, and. unless the air has been expelled from the cavities of the bronchial tubes and of the alveoli, any part of the lungs dipped into water will rise and float.

As respiratory organs the lungs bear a cer¬ tain average relation to the physical proportions and condition of the individual. The average amount of air in the case of an individual five feet eight inches in height that goes in and out of the lungs at each inspiration and .expiration is about 20 cubic inches ; this is called the tidal air. This

is only about one-seventh of the total capacity of the lungs, and as the ordinary adult takes about 18 breaths a minute, the air of the lungs would be renewed only about twice a minute if it were not for the diffusion of gases. By means of forced inspiratory movements the ingoing tide may be increased by 120 cubic inches; by means of a forced expiration the outgoing tidal air may be increased by 90 cubic inches. After the most forced expiration pos¬ sible there always remain within the lungs about 90 to 100 cubic inches of air. So that if a person takes as deep a breath as possible, and then makes as forced an expiration as he can, he will drive out 120 + 20 + 90 = 230 cubic inches of air. This is termed the respiratory capacity. Since the tidal air is only 20 cubic inches, and 180 cubic inches remain in the chest after an ordinary expiration, it follows that the air di¬ rectly changed during the respiration is not that really within the lungs themselves, but is that within the nose, windpipe and larger bronchi, the pipes that result from the branching of the windpipe. Therefore the changes of the air within the essential parts of the lungs are the result of diffusion between it and the purer air of the bronchi, aided by the rush with which the tidal air flows in. The total amount of air inhaled daily by an average person at rest is estimated to be nearly 700,000 cubic inches, while if he is working the amount is of course much larger. This is a basis for the planning of the size and ventilation of schoolrooms and other public places.

The ordinary respiratory movements differ in the two sexes and at different periods of life. In young children the chest is altered in size chiefly by the movements of the diaphragm, and the protrusion of the abdominal wall during inspiration is therefore very marked. In men also it is the diaphragm which is chiefly opera¬ tive, but the ribs are also moved. In women it is the movement of the ribs, especially the

upper ones, which is the most extensive. The respiratory rhythm is the relation of the acts of inspiration and expiration to each other as regards time. See Anatomy; Breathing and Health ; Circulation ; Lungs, Diseases of ; Respiration.

Smith Ely Jelliffe, M.D.

LUNGS, Diseases of. The disorders to to which the lungs of man are subject form a long list of maladies, involving numerous com¬ plications. Of these the more important will be considered here.

Congestion of the Lungs. — Pulmonary con¬ gestion (hyperaemia) may be active or passive. In the majority of cases active congestion is a symptom or a condition associated with bron¬ chitis, pleurisy,

pneumonia or tuberculosis. It may also be caused by the (inhalation of irri¬ tating vapors. In rather rare instances it may result from violent exertion, or from drunken¬ ness and exposure to great cold or heat, fol¬ lowed by oedema, possibly by death. As symp¬ toms this primary congestion presents an initial chill, a cough, rapid breathing, frothy, blood- tinged expectoration, harsh respiration with fine moist rales, and absence of fever unless there is coexisting inflammation. The disease may last only a few days and is almost impossible to distinguish from an abortive pneumonia. Pas¬ sive hyperaemia may be mechanical or hypo¬ static. Mechanical congestion is due to the pres¬ ence of some obstruction to the return of the blood to the left side of the heart, such as emphysema or affections of the left ventricle, especially mitral narrowing or incompetency. Rarely it arises from pressure by tumors. The symptoms are cough, shortness of breath, blood¬ stained. frothy expectoration and possibly spit- tine of blood (haemoptysis). Cases where there are intense dyspepsia, orthopncea, coughing and cyanosis are known as cardiac asthma. Hypo¬ static congestion (settling of blood to the low¬ est parts of the lungs) occurs in conditions of great debility attended by feebleness of the heart, and is favored by prolonged lying upon the back. There is, however, an uncomplicated passive congestion which is hard to recognize as it produces no physical signs. It is, how¬ ever, most common in long-continued typhoid fever, paralysis, prolonged unconsciousness, abdominal dropsy or tumors, and wasting dis¬ eases, especially tuberculosis and cancer. The physical signs are slight dullness over the bases of the lungs posteriorly, with weak or harsh and perhaps broncho-vesicular respiration, and moist rales.

CEdema of the Lungs. — This condition — an effusion of watery fluid (serum) from the capillaries into the air-cells and their walls — is almost invariably a sequel of congestion or inflammation of the lungs and is so frequently a concomitant of congestion that it is hard to tell them apart. It may be local, surrounding a cir¬ cumscribed and usually 'inflammatory lesion; or general, due to causes in all respects similar to those which produce congestion. Pulmonary oedema occurs most commonly in. connection with pneumonia, cancer, grave anaemias, Bright's disease, acute specific fevers with weak heart, valvular disease of the heart and apoplexy. The oedema may occur suddenly, especially in Bright's disease, for the reason that toxic mat¬ ter which should have been excreted by the

kidneys is thrown back upon the lungs which thus have to do a double duty. Usually its on¬ set is gradual. The symptoms are increasing shortness of breath (dyspnoea), blueness (cya¬ nosis) of fingers, lips and skin, cough and abundant watery, frothy, perhaps blood¬ stained, expectoration, without fever except from a causative inflammatory or febrile dis¬ ease. The physical signs are slight dullness over the bases, and weak, perhaps broncho- vesicular, breath-sounds, with many unusually liquid large and small rales.

Embolism of the Lungs. — Foreign bodies (emboli) carried by the blood and lodging in the smaller arteries or capillaries of the lungs usually consist of disintegrated blood-clots (thrombi) ; less commonly of vegetations from diseased heart-valves, or masses of pathogenic germs. As a result of the cutting-off of the blood-supply to the lungs, circumscribed dark- red wedge-shaped areas of necrosis (hemor¬ rhagic infarctions) occur, this is practically equivalent to saying that certain portions of the lungs are already dead. Emboli may be non- septic (not containing disease-germs), originat¬ ing; most commonly from chronic disease of the heart where the growths from the dis¬ eased heart break loose from it and are finally lodged in the lungs; or septic, arising from a gangrenous or suppurating focus in some part of the body. A non-septic infarct may in time be replaced by scar-tissue; if sep¬ tic, abscess of gangrene of the lung may re¬ sult. If the embolus is so large as to obstruct a main branch of the pulmonary artery, sudden death may take place. A complete stopping-up of a large blood-vessel always causes death. In occlusion of medium-sized branches there will be cough, spitting of blood, intense breathless¬ ness, fainting, perhaps coma and convulsions. When the smallest branches are involved there may be slight cough, haemoptysis and dyspnoea. The spitting of dark frothy blood during the course of chronic disease of the heart is par¬ ticularly suggestive. If the infarction is very large the physical signs of a limited consolida¬ tion are present, followed, if the embolus is septic, by the evidences of pulmonary abscess or gangrene.

Pneumonia. — Two main varieties are rec¬ ognized, lobar pneumonia and broncho-pneu¬ monia.

Lobar Pneumonia. — This disease (called variously croupous pneumonia, pneumonitis, lung fever, inflammation of the lungs) is caused directly in the large majority of cases by the pneumococcus or Diplococcus pneu¬ monia ?■ (or lanceolatus) of Fraenkel. Expo¬ sure to cold and wet, alcoholism and debility from pre-existing disease predispose, but it is an important fact that half or three-quarters of all normal people's mouths or throats contain the germ

all the time. One attack renders a second more likely. Three stages are recog¬ nized in the pathological anatomy — congestion, red hepatization and gray hepatization. In the first stage the lung is deep-red, rather firm, does not collapse and the cut surface exudes a frothy, blood-stained, watery fluid. In the sec¬ ond stage the affected portion is dark-red, firm and sinks in water. It tears easily, the torn surface is granular and dry and the air-cells (alveoli) are filled with coagulated fibrin con¬ taining many red and some white blood-cells.

In the third stage the color becomes a mottled gray and the cut surfaces are moist. The exu¬ date in the alveoli undergoes softening and liquefaction and is either expectorated or car¬ ried away by the lymphatics.

The symptoms of a typical case begin abruptly with a severe shaking chill and a sharp stabbing pain in the side, followed by a quick rise of temperature to 105° F. or above. The breathing is rapid because the patient feels that deep breathing will excite the cough, vary¬ ing from 40 to 60 or over, with an expiratory grunt and a dry, restrained and painful cough. The cough is generally present though not al¬ ways and is one of the most painful symptoms, because it prevents sleep, and accelerates ex¬ haustion. The face is flushed, there is often a circumscribed redness on the cheek of the af¬ fected side and the nostrils dilate with each in¬ spiration. A thick, tenacious, rusty or blood¬ stained expectoration appears. The pulse is rapid (100 to 120) and bounding. The tongue is coated, the bowels constipated, the urine scanty, high-colored, often slightly albuminous and as a rule strikingly deficient in chlorides. The lips are often bluish and present herpetic eruptions (cold-sores). Delirium is frequently manifest. In the majority of cases there is an increased number of white cells in the blood (leucocytosis) , the count ranging from 12,000 to 50,000. The fever, having risen to its high¬ est point (as a rule within 24 hours), remains high, with remissions, for from 5 to 10 days, when typically it falls (by crisis) within a few hours (5 to 12) to or below the normal.

Death may take place at any time during the disease. It is a very fatal malady in drunkards and in persons of 60 years or over (60 to 80 per cent) ; so also in infants under one year. Otherwise the younger the patient the better the outlook for recovery. The most common cause of a fatal result is the toxaemia (blood-poisoning) due to the products formed by the causative germ, and to the heart-weak¬ ness arising therefrom. Meningitis as a com¬ plication is always fatal. Unfavorable symp¬ toms are the supervention of the ((typhoid status, ˆ very high fever (105° F. or over), marked

cyanosis, severe dyspnoea, rapid exten¬ sion of the disease to other lobes or to the opposite lung and. increasing weakness of the heart with pulmonary oedema.

In some instances of recovery the consolida¬ tion may persist for from 8 to 10 weeks (de¬ layed resolution), during which there is fever of a remittent type. In rare cases lobar pneu¬ monia may terminate in abscess, gangrene or chronic fibrosis. Recurrences are frequent; third or fourth attacks are common and 8 to 10 have been reported. Relapses are rare.

Like other infections due to specific micro¬ organisms, lobar pneumonia may present strik¬ ing variations both in symptoms and character. Thus the fever may be slight or entirely absent in old persons and chronic alcoholics. The crisis may be as early as the third day. The fever may terminate by a gradual fall instead of by a sudden fall, especially in children. There may be a false crisis two or three days pre¬ vious to the final fall. The sputum may be of a red, rusty, yellow or dark-brown (((prune- juice)}) color. Very seldom there is spitting of blood early in the disease. Pain is absent in deep-seated pneumonias when the pleura is not

involved. In children the pain is usually re¬ ferred to the abdomen ; and abdominal pain, often severe, and generally due to involvement of the diaphragmatic pleura, is not uncommon in adults. An excessive amount of gas in in¬ testines is by no means rare. The pulse may be small and rapid, or full but soft and fol¬ lowed by serious weakness of the heart. A per¬ sistent absence of leucocytosis is, except in mild cases, a symptom of bad omen. Convulsions often initiate the disease in children, and in them the symptoms may closely resemble those of meningitis. Deafness not depending upon inflammation of the middle ear is not infre¬ quent. The delirium of lobar pneumonia, es¬ pecially in drunkards, may be active or mania¬ cal.

The variations in the character of the dis¬ ease depend partly upon the site and extent of the local lesions, but mainly upon differences in the resisting power of the patient and the viru¬ lence of the pneumococcus. Among the atyp¬ ical cases are those occurring in old persons. In them the disease is often latent, there is no chill and but slight cough or expectoration. The general prostration is marked, while the physical signs are indefinite or obscure. In in¬ fants and young children the disease frequently begins at the apex (top) of the lungs, the tem¬ perature is high and convulsions, delirium, stu¬ por and coma are often prominent symptoms. Not infrequently vomiting and diarrhoea are so severe and persistent that the pneumonia may be overlooked. Typhoid pneumonia is charac¬ terized by muttering delirium, dry brown tongue, teeth covered with sordes, twitching of the tendons (subsultus tendinum), and perhaps picking at the bed-clothes or grasping at im¬ agined objects in the air (carphologia) — symp¬ toms resembling those which may appear in a severe attack of typhoid fever. In drunkards the disease may begin gradually, the fever may not be high, the delirium is commonly of the violent type and the typhoid status often de¬ velops, ending in death by exhaustion. The lo¬ calization of pneumonia is variable. Most fre¬ quently the right lower lobe is attacked, and in double pneumonia both lower lobes are usually involved. When the consolidation steadily ad¬ vances from lobe to lobe it is called wandering or migratory penumonia. Cases presenting de¬ layed physical signs are very perplexing unless rusty sputum is present. The evidences of con¬ solidation may not appear until the fifth or even the eighth day of the disease, a fact doubtless to be explained by the consolidation beginning in the centre of the lung and extending slowly to the surface.

Among the complications of lobar pneumo¬ nia, the most frequent is

pleurisy, either serous or purulent (empyema). The ordinary dry pleurisy which covers the consolidated area, and which is responsible for the stabbing pain in pneumonia, cannot be considered a compli¬ cation. When the pleurisy, however, is so se¬ vere and extensive that it rivals or surpasses the pneumonia element it constitutes pleuro¬ pneumonia. When a pleurisy follows pneumo¬ nia an irregular, perhaps slight, rise of tem¬ perature persists, the physical signs of fluid in the pleura become manifest and leucocytosis continues. Endocarditis, usually affecting the left side of the heart, is the next most frequent complication, and ,it may be of the ulcerative

type. From 15 to 25 per cent of cases of the malignant form of the disease originate from pneumococcic infection. Symptoms are uncer¬ tain and sometimes absent. A prolonged irregu¬ lar fever, with chills and sweating, is suspi¬ cious; if evidences of embolism occur and men¬ ingitis is present, together with the develop¬ ment of a loud diastolic murmur not previously found, the diagnosis of ulcerative endocarditis is assured. Pericarditis, usually fibrinous or ser¬ ous, rarely purulent, occurs particularly in the double or left-side pneumonia of childhood. It is often latent or overlooked. Increased dysp¬ noea, weak pulse and prsccordial pain may de¬ clare its presence. Meningitis, a very serious and fatal complication, is fortunately rare, and when occurring often coexists with malignant endocarditis. Marked cervical retraction, in¬ tense headache, delirium and coma indicate a basilar inflammation. Meningitis of the con¬ vexity is usually not recognized. Jaundice orig¬ inating in the poisoning of the blood by the pnuemonia germ is very common in some epi¬ demics of pneumonia. Middle-ear catarrh is not infrequent in children, parotitis is of occa¬ sional occurrence, so also are colitis and ven¬ ous thrombosis; Pneumonia and malarial fever may either precede or occur during an attack of pneumonia. Redness, swelling and pain in one or more joints may become manifest during or after the crisis of a pneumonia and the inflam¬ mation proceed to suppuration. The pneumo¬ coccus is found in the diseased joints (pneu¬ mococcic arthritis).

The diagnosis of lobar pneumonia is as a rule readily made, most cases presenting dis¬ tinctive and unmistakable symptoms. The dis¬ ease may be overlooked in the very old or the very young, or in those already seriously ill. Hypostatic congestion can usually be distin¬ guished from pneumonia by the absence of rusty sputum, or of fever, and is commonly bilateral. In pulmonary oedema, cardiac dis¬ ease or nephritis usually coexist, and although dyspnoea, cough and expectoration are present, there is no fever, the breath sounds are weak, there are numerous fine and coarse liquid rales on both sides

*of the chest and marked dullness and bronchial respiration are absent. In oedema the sputum is fluid, frothy and not rusty. Acute bronchitis in children may simulate pneu¬ monia, but there is no chill, convulsions, dullness or bronchial breathing, the fever is not so high as in pneumonia and there are dry and moist rales over both sides of the chest. Broncho¬ pneumonia generally follows a bronchitis or an acute infection like measles. The fever is ir¬ regular, lasts for weeks and does not terminate by crisis. The sputum is streaked with blood rather than rusty. They physical signs con¬ sist mainly of dry and moist rales over both chests. If evidences of consolidation are found they lie in a vertical strip on both sides of the spine, while, on the other hand, in lobar pneu¬ monia they a*re quite as well and often better perceived on the sides of the chest. Pleurisy with effusion is very rarely mistaken for pneu¬ monia, except in children. In pleurisy there is seldom a chill, the fever is not so high and de¬ clines gradually, the cough is dry and there is no rusty sputum. The affected side is dis¬ tended, vocal! fremitus is absent, the line of dullness may shift as the patient is moved, the voice-sounds are absent or diminished, or there*

is egophony (a quavering quality of sound), and the respiratory murmur is absent or de¬ creased. Bronchial breathing, if heard, is dis¬ tant. The apex-beat may be displaced. Fi¬ nally puncture affords proof positive of the pres¬ ence of fluid. Acute pneumonic phthisis may exactly resemble lobar pneumonia until the 8th or 10th day, when the fever continues with pro¬ fuse sweats and the signs of softening (gurgling rales, amphoric or cavernous breathing) gradu¬ ally appear. The sputum becomes green and tu¬ bercle bacilli and elastic fibres are discovered in it. It may be impossible to distinguish between pneumonia presenting the typhoid status and typhoid fever complicated by pneumonia unless the case is seen from the outset, or rose-spots appear and a positive Widal reaction is present.

The treatment of lobar pneumonia involves careful attention to the details of nursing. The room should be especially well ventilated in order that the air of the chamber should con¬ tain the maximum natural percentage of oxy¬ gen. The freshest cold air that can be secured will aid the injured lung in doing its work as perfectly as possible. The patient is best kept on a roof or balcony except when it is neces¬ sary to expose some part of the body. Too much bed-clothing and the swathing of the trunk in cotton, both too often seen,

tend to keep the fever higher than it would otherwise be, and add to the discomfort of the patient. If it is not possible to keep the patient in the open air, it may be necessary to administer oxy¬ gen, which is sometimes given for 20 minutes at a time, by means of a needle placed under the skin. Absolute rest in the recumbent posi¬ tion together with the use of the urinal and bed-pan is, with rare exceptions, to be insisted upon. The regular free giving of water is of great importance, although in some cases a glassful of water, where circulation is irregu- .lar, has been found too great a load upon it. The diet should be that usually given in fever, comprising milk, clear or diluted, flavored or not, perhaps peptonized, plain ice cream and junket; broths of beef, mutton, chicken, oysters or clams ; tea, coffee or weak cocoa ; grape or orange juice, lemonade, ginger-ale and fruit- ices; albumin water, egg lemonade; and if nec¬ essary one of the proprietary liquid foods. It is, however, very important that the patient should not be overfed, but that he should be given a diet as high in protein as he can stand. It has been found that milk, unless easily digested, may form curds which become quite dangerous. The medicinal treatment depends so much on the character of the individual case and the in¬ tensity of the special symptoms that it is not practicable to describe it here in detail. There is as yet no specific — a remedy which cures or tends to cure a particular disease — for lobar pneumonia. While some physicians have ex¬ perimented with a serum in the treatment of this disease, it cannot yet be said that alto¬ gether satisfactory results have been obtained, possibly because of the fact that the pneumo¬ coccus contains no true toxin, as does the bacil¬ lus of, for example, diphtheria. Sodium sali¬ cylate and carbonate of creosote, the latter es¬ pecially; have given apparent good results. One or two initial doses of quinine, say seven or eight grains of the sulphate, are highly recom¬ mended. An initial dose of calomel does good

service. Side-pain is to be relieved, preferably by mustard poultices, or the ice-bag; if nec¬ essary by the smallest efficient doses of mor¬ phine or Dover's powder. The use of oxygen is desirable except in the milder cases. Deli¬ rium and restlessness may need the use of tri- onal, veronal, bromides, chloral, camphor, hyo- scine hydrobromate or morphine. For very high fever frictions with cold water are desir¬ able. The cold tub may or may not be advis¬ able, but its use is as a rule not to be com¬ mended. For weakness of the heart — the main channel through which life runs away in this disease — strychnine, caffeine, ammonia and wine or spirits are most useful. In addition may be required digitalis, nitroglycerine, spar¬ teine, strophanthus, camphor and musk. Treat¬ ment and prophylaxis by vaccination

have also been tried, but with unsatisfactory results.

Broncho-pneumona. — This (called also capillary bronchitis, lobular pneumonia, catar¬ rhal pneumonia) is an inflammation of the ter¬ minal bronchi and their communicating air- cells, due to the presence of two or more varie¬ ties of micro-organisms. Those most com¬ monly found are the Pneumococcus lanceola- ius, Streptococcus pyogenes, Staphylococcus aureus et albus, and the germs of diphtheria and influenza (la grippe). It is noteworthy that the high mortality of the epidemic of Span¬ ish influenza in the winter of 1918-19 was due largely to the secondary pneumonia which su¬ pervened in most of the cases. The disease may come suddenly during good health, or may be secondary to some pre-existent disease. It attacks especially the very young (under five), the very old or the debilitated of any age. It is most common among those who live in un¬ sanitary surroundings. The primary cases are usually due to cold and exposure. The second¬ ary cases follow acute bronchitis, measles, whooping-cough, diphtheria, scarlet fever, ery¬ sipelas and small-pox. They may succeed the inhalation of food or drink while the patient is unconscious ; or operations on the mouth or nose ; or any accident or disease which permits germ-containing particles to enter the bron¬ chial tubes.

The pathology of the disease involves the presence of small areas of consolidation around the bronchioles and small patches of collapsed lung (which can be inflated) due to occlusion of the bronchi. The terminal bronchioles and the air-cells are filled with an exudate com¬ posed of leucocytes and degenerating epithe¬ lium. The bronchial walls also contain num¬ bers of leucocytes. In the majority of instances both lungs are involved.

The symptoms, if the disease is primary, be¬ gin abruptly with a chill and a rapid r:se of temperature, thus resembling lobar pneumonia. A low temperature, that is, not above 100° is an indication of low vitalitv in the patient. Of such patients about 75 per cent die. The best temperature indication is one which rises grad¬ ually to 103° or 104° and as gradually subsides. If on the other hand there are sharp rises and falls, pus is indicated and the prognosis is less favorable. If there is a pre-existing bronchi¬ tis of the larger tubes the onset is less abrupt and there is rarely a distinct chill. The char¬ acteristic symptoms are cough, dyspnoea, rapid respiration (40 to 80) with an expiratory moan,

rapid pulse and perhaps cyanosis. A fatal re¬ sult is to be expected if the cyanosis continues for more than a day or so. As the disease af¬ fects both lungs, the physical signs are bilat¬ eral. There are numerous sibilant and sonor¬ ous rales, at first and perhaps all through the disease, without evidences of consolidation. If areas of consolidation sufficiently numerous and confluent exist, there will be slight or even decided dullness, broncho-vesicular or bron¬ chial respiration, and increased vocal fremitus and bronchophony. These signs are commonly found at the bases posteriorly and on either side of the spine.

The type of the disease varies. In certain cases (suffocative catarrh) the dyspnoea and cy¬ anosis steadily increase, the cough lessens, the respirations become rapid and shallow, and the rales larger and moister. The patient is drowsy but restless, and death ensues from weakness and overdistention of the right ven¬ tricle. The fever in some instances, especially in children, may be of a remittent type and lead to a mistaken diagnosis of malaria. The primary form in infants and young children sets in abruptly with chill and high fever and bears a close resemblance to lobar pneumonia; in adults it may begin like a severe acute bron¬ chitis, but the fever, cough and dyspnoea are more marked than in a bronchitis and the spu¬ tum is tenacious and rusty. The secondary form begins as a bronchitis, often of slow de¬ velopment, with increase in the fever of the primary disease (for example, measles), cough, dyspnoea and rapid breathing.

The duration is variable. Cases of great severity, especially in children, may prove fatal in from three to six days; the common type ending in recovery endures from one to three weeks ; exceptionally the disease may be pro¬ tracted to six or eight weeks, rarely even to 10 or 12 weeks. Death may occur at any time. The fever gradually declines.

In the diagnosis of the disease the cardinal symptoms are fever, cough, dyspnoea, rapid res¬ piration and bilateral physical signs. Its differ¬ ential diagnosis from lobar pneumonia has been stated in the description of the latter disease. From the broncho-pneumonic form of pulmo¬ nary tuberculosis the distinction may be ex¬ tremely difficult. A tuberculosis family history, progressive emanciation, the finding of tubercle bacilli in the sputum and the occurrence of the signs of softening, will declare for tuberculosis.

With regard to the prognosis, it is to be remembered that broncho-pneumonia is always a grave disease. The primary cases usually re¬ cover ; the fatality is greatest in the secondary forms. In children among the well-to-do the mortality varies from 10 to 30 per cent; in hos¬ pitals and among the very poor, from 30 to 70 per cent. Inhalation broncho-pneumonia is usually fatal because of its frequent termina¬ tion in abscess or gangrene.

Concerning treatment, the utmost importance should be attached to prophylaxis, for instance, the prevention of the spread of an ordinary bronchitis of the larger tubes to the terminal bronchi, especially in children. Perhaps the most important measure of prevention is to keep the patient in an even temperature of 68° to 70° F. during the day and about 10 degrees colder at night and to avoid all depressing agencies, as overfatiguc, improper food, etc.

The disease, having declared itself, requires in the main the same management as a lobar pneu¬ monia. Opiates, however, should rarely be em¬ ployed. Local counter-irritation of the chest, poultices, wet compresses and frictions with stimulating liniments constitute a much more important element of the treatment than in lo¬ bar pneumonia; so also perhaps do the so- called expectorants, such as the ammonium preparations. If the child is unable to expel accumulated mucus the use of an emetic (ipe¬ cac, alum) may be desirable.

Pneumonoconiosis. — This is a chronic pneumonia due to the inhalation of dusts inci¬ dent to various employments, and giving rise to anthracosis, or coal-miner's disease; chalicosis, stone-cutter's phthisis, or grinder's rot; sidero- sis, caused by the inhalation of metallic par¬ ticles by metal-workers; and there is a fourth form of dust associated with disease, viz., the organic dust caused in flour milling, in the manufacture of tobacco and of various textiles. There is much evidence of late, however, that the particles of dust never reach the lungs, and that the dust diseases of the lungs are caused by pathogenic germs which are swallowed. The symptoms and signs are those of chronic bron¬ chitis with emphysema and fibroid changes. In the later stages the lungs may become tuber¬ culous. The prognosis is favorable in the early stages upon quitting the obnoxious work ; in advanced cases grave, although the disease is essentially chronic. Dust diseases are best con¬ trolled by prophylactic measures, among which appropriate legislation is of the utmost im¬ portance.

Atelectasis. — Collapse of the lungs — par¬ tial or entire

disappearance of air from the air- cells — may be congenital, occurring in the new¬ born as a result of weakness or some form of obstruction in the air passages. The acquired variety is due variously to obstruction of the smaller bronchi by mucus ; to compression of the lung by large effusions or tumors in the chest ; to respiratory paralysis ; or to great ab¬ dominal distention. It is sometimes a result of whooping cough.*

Emphysema. — The lungs in this disease contain an abnormal amount of air. The com¬ mon form — hypertrophic emphysema — is characterized pathologically by distention of the air-cells and thinning of their walls. The lungs are large, pale and do not collapse. Many of the pulmonary capillaries are obliterated, thereby, causing obstruction in the pulmonary circulation with compensatory hypertrophy of the right ventricle.

The predisposing cause is a congenital weak¬ ness of the lung structure ; the exciting cause is increased intrapulmonary tension due variously to chronic or severe cough, heavy lifting, glass-blowing or using wind-instruments.

The symptoms come on insidiously, often in early life. These are dyspnoea, perhaps only on exertion ; cough, ultimately becoming chronic ; frequent attacks of bronchitis or spasmodic asthma, and cyanosis, with subnormal temper¬ ature and cool skin.

When the right ventricle fails there are swellings of the feet and other evidences of general venous congestion. The physical signs are usually distinctive. Inspection shows the short broad barrel-shaped chest of emphysema, with its vertical movement, poor expansion and.

prolonged expiratory motion. Usually there is a marked epigastric pulsation. The apex-beat is not seen. The percussion note is hyper¬ resonant, even slightly tympanitic. The normal limits of pulmonary resonance are extended in every direction. The characteristic ausculta¬ tory finding is that of a low-pitched, often wheezy, greatly prolonged expiratory sound. The inspiration is short and weak. Bronchitic rales, at times in great frequency, are often heard.

The course of the disease is essentially pro¬ gressive and chronic. It is incurable, although the patient may live to old age. Death may

occur from intercurrent pneumonia or phthisis, or from heart failure.

The treatment is that of chronic bronchitis (q.v.). When practicable, the subject should live in a warm equable climate in order to avoid recurrent acute bronchitis. The bowels should be kept regular, and the diet carefully super¬ vised to avoid abdominal distention. Inhala¬ tions of oxygens and appropriate treatment by compressed and rarified air may be helpful. Strychnine, iron and digitalis are of much serv¬ ice when judiciously employed; so also are the arsenic and iodine compounds.

Abscess of the Lung. — An acute sup¬ purative inflammation caused by pus-producing organisms. The pus collections may be single or multiple. The organisms may reach the lung by way of the bronchi, as in an inhalation pneumonia, or by infective emboli (see Embol¬ ism), or by direct extension, as from a puru¬ lent pleurisy. Very rarely it is a sequel of an ordinary broncho-pneumonia or lobar pneu¬ monia.

The symptoms are chills, high and irregular fever, sweats and leucocytosis. In time the physical signs of cavity are manifest. The sputum is yellow or green, of an offensive, but not putrid, odor, and contains particles of lung tissue and elastic fibres.

The prognosis is usually hopeless. There are occasional recoveries in the cases following pneumonia (except of the inhalation type), or the penetration of external abscesses into the lung. If the abscess is single and accessible, operation may be successful.

Gangrene of the Lung. — A result of in¬ fection of a necrotic portion of lung by the bactenia of putrefaction, conjoined with an ab¬ normal vulnerability of the tissues. Diabetes and long continued fevers predispose; pneu¬ monia (particularly inhalation-pneumonia), tu¬ berculous cavities, new growths, embolism and abscess are the most frequent antecedent con¬ ditions.

The symptoms are irregular, generally mod¬ erate, fever, with rapid pulse, cough, dyspnoea and prostration. The physical signs, when present, are those of cavity. The characteristic symptom is the excessively fetid odor of the breath and sputum. The latter contains frag¬ ments of lung tissue, elastic tissue, blood pig¬ ment and numerous bacteria. If allowed to stand the sputum separates into three layers — the uppermost frothy, the middle watery, the lower with a heavy greenish-brown sediment.

The prognosis in the majority of cases is bad. Small, strictly circumscribed areas may become encapsulated, the broken down tissue discharging by way of the bronchi. In accessi¬ ble cavities surgical interference may succeed.

New Growths in the Lung. — The most common forms are carcinoma and sarcoma, usually bilateral and secondary to cancer else¬ where. Associated lesions are pleurisy, enlarge¬ ment of the tracheal, bronchial and cervical glands ; perhaps also pulmonary gangrene. The symptoms may be latent. Ultimately cough, pain and dyspnoea appear. The physical signs are variable, depending largely upon the pres¬ ence or absence of pleural effusion. According to the size and location of the growth, pressure symptoms will be present, for example, hoarse¬ ness from pressur.e on the recurrent laryngeal nerve ; or distention of the veins and swelling of the face, neck and arms from the pressure of the growth on the venous trunks in the chest.

The diagnosis depends largely upon the presence of malignant growths elsewhere, or upon the history of the previous removal of such growths. The disease ends fatally with a duration varying from six weeks to two years. It has been found that 9 per cent of cancers, whether in the lung or in the pleura, may be operated upon, and while the successful opera¬ tions have not been many, some progress has been made along a path only recently traversed in surgery. See also Consumption ; Consump¬ tion, Prevention of.

Glentworth Reeve Butler, M.D., Author of. (Diagnostics of Internal Medicine P

• LUNGWORT. The name of several plants supposed to have medicinal value in re¬ spect to diseases of the lungs. One is a lichen (Sticta pulmonacca) growing on the trunks of trees in moist subalpine regions. In Siberia it is used as a substitute for hops. Other such plants belong to a genus of borages (Pulmon – aria). The narrow-leaved lungwort is P. an g us ti folia, and the common lungwort P. officinalis; the former is wild. These are Euro¬ pean ; but an American borage, the blue-blos¬ somed Virginia cow-slip (Mertensia virginica) , is called lungwort in the Southern States and used by compounders of simples. A near rela¬ tive is the sea-lungwort (Mertensia maritima). Another lungwort is one of the hawkweeds (Hieraciun pulmonarium) . Bullock's or cow's lungwort is the common mullein (V erbascum thapsus) .

LUNN, George Richard, American legis¬ lator: b. Lenox, Iowa, 23

June 1873. He was graduated at Bellevue College 1897 and in 1901 at the Pinion Theological Seminary, in 1901 he was ordained to the Presbyterian ministry and from 1901 to 1904 was associate pastor of the Lafayette Avenue Church, Brooklyn, from 1904 to 1909 of the First Dutch Reformed Church of Schenectady, N. Y., and since 1909 of the United People's Church of the same city. In 1912-14 Mr. Lunn was mayor of Schenectady, the first Socialist mayor elected in New York State. He was re-elected for the term 1 Jan. 1916 to 31 Dec. 1917 and in 1917-19 was Member of Congress from the 30th New York district. His administration in Schenectady was marked by great efficiency and by many much-needed reforms. As Member of Congress Mr. Lunn was one of the foremost and most progressive members of the House.

LUNN HEMP. See Fibre.

LUNT, Orrington, American merchant and philanthropist : b. Bowdoinham, Me., 24 Dec.

1815 ; d. Chicago, 6 April 1897. After working in his father's store he was made partner at 21, but removed (1842) to Chicago, where he carried on a general commission business, start¬ ing in the grain trade in 1844 to become wealthy by 1862, when he retired and traveled, to re¬ gain his lost health, through Europe and Asia for two years. For some years then he was president and treasurer of the board of water¬ works at Chicago and was elected (1855) di¬ rector of the Galena and Chicago Union Rail¬ road. He founded the Northwestern Univer¬ sity and established the Orrington Hunt Li¬ brary Fund. From the organization of the university he was its secretary and treasurer and for many years acting president of the executive board, being made its president in 1895. Among the numerous other philanthropic works in which he became deeply and actively interested was the Garrett Biblical Institute, which he founded ; the Chicago Orphan Asylum, the Relief and Aid Society of Chicago, etc.

LUPERCALIA, lu-per-ka'li-a, an ancient Roman festival celebrated annually in honor of Lupercus, an ancient pastoral god of the Ital¬ ians, afterward identified with the Arcadian Pan, who protected the flocks against wolves and gave them fertility. The festival dates from the earliest period of the history of Rome; it was held on the

Lupercal, where Romulus and Remus were supposed to have been nurtured by a she-wolf. The day of cele¬ bration was 15 February, which was originally the last month of the Roman year.

LUPINE, a genus of annual and perennial herbs and a few shrubs (Lupinus) of the family Fabacece. The species, of which there are about 100, are sparsely represented in the Mediterranean region and in the eastern United States, but very numerous in the Western and Pacific Coast States. They have usually digitate leaves ; pea-like showy blue, yellow or white flowers in terminal racemes, and flattened pods containing several large seeds. Several of the species have been long used for forage, for human food and for green manuring. Many others are grown for ornament. They thrive especially well upon light, dry soils deficient in lime, and are said to fail upon wet and limy soils. They are readily propagated by means of seed, or the perennials by division, but these cannot be satisfactorily transplanted when once established. The most important species are the blue lupine (L. hirsutus), the white lupine (L . albus) and the yellow lupine (L. luteus), all of Old World origin. The plants are rich in nitrogenous matter and are thus especially useful for stock-food as well as green manure. Like clover, peas and beans they can obtain free nitrogen from the air by means of their root tubercles. The ripe seeds are rich in proteid substances and but for their bitter prin¬ ciple would probably be more popular as human food than they are even in Europe, where their consumption is enormous. The bitterness may be removed by long soaking in water. In America, though gaining in popularity as soil improvers and forage crops, the plants are sel¬ dom grown except for ornament.

LUPOT, lu'pd, Nicolas, most famous of French violin makers: b. Stuttgart, 1758; d. Paris, 1824. He was one of the third genera¬ tion of a family of well-known violin makers and has been called the FFrench Stradivarius.®

He produced fine instruments quite early in his career, as those made by him at Orleans (Rue d'Hliers) before his 20th year are considered bargains now in Paris at 500 francs. He moved to Paris in 1794, setting up shop (1798-1803) at Rue de Grammont, next removing to Rue Croix des Petits Champs, at which place he produced the famous Italian copies. He favored the Stradivarius form for his copies, but made some instruments on Guarnerius lines. His- au¬ tograph was placed on many of his creations or copies. One of his tours-de-force was the making of several quintets of two violins, two tenors and a bass, aiming at giving them true unity of tone and appearance. They are highly prized and priced by connoisseurs. From 1,000 to 1,200

francs is considered a low price for any of his instruments dated between 1805 and 1824, 'cellos fetching as high as 2,000 francs. Experts claim his weakest point to have been his varnish, which is usually thick, semi¬ opaque and lumpy.

LUPUS, a generic term used to describe several varieties of chronic localized infiltrations of the skin. The most common of these are Lupus erythematosus and Lupus vulgaris. The former occurs in slightly elevated, scaly, red patches, varying in size, which show a strong tendency to the production of atrophic scars. It is most common on the face, ears and scalp, more rarely occurring on the hands and feet. It begins in several isolated or grouped red spots little larger than a pin-head and having a thin scale. These spots increase in size by peripheral extension, while the surface is partly covered by the grayish scales or thin scar tis¬ sue. The color is characteristic and is viola¬ ceous. They may remain small, or may grow large enough to cover the side of the face. Practically nothing is known of the etiology. The comparatively small patches have little effect on health, but the disseminated variety may cause death.

Lupus vulgaris is a chronic disease of the skin, due to its invasion by the tubercle-bacillus ; characterized by one or more brownish-red lumps or patches that tend to absorption, ulcer¬ ation and scar formation. The disease usually begins in childhood, the most frequent site be¬ ing the face, particularly the cheek and nose. There may be one or more such spots, but they show no tendency to symmetrical development. After a time slightly scaly patches will form by the coalescence of the tiny red spots. Some¬ times the disease has a slow course, for years remaining quiescent; in other cases it suddenly takes on a rapid growth. The erythematous form is treated by superficial caustics. Lupus vulgaris being a tubercular disease, hygiene is of great importance, and the X-rays and other powerful rays seem to exert a curative in¬ fluence on the growths.

LURAY, lu-ra', Va., town, county-seat of Page County, on the Norfolk and Western Railroad, about 100 miles north by west of Richmond and the same distance west by south of Washington. It is situated in a beautiful valley almost surrounded by mountains ; nearby are a number of mineral springs and the cele¬ brated Luray Cave (q.v.). A spring which flows through the town furnishes water power. It manufactures flour, lumber, wagons, car¬ riages and some agricultural implements. It has flour mills and a large tatinery, also can-

nerics and woodworking plants. The Luray College for Young Ladies is located here. The waterworks are the property of the municipality. Pop. 1,381.

LURAY CAVE, in Page County, Va., is near the town of Luray, and on the Norfolk and Western Railroad. This cave was discov¬ ered by Andrew J. Campbell and companions in August 1878. It is in the limestone belt of the Shenandoah Valley, on the western side of the Blue Ridge, and extends under the low spurs of some of the mountains. The area explored underlies about 100 acres. Electric lights have been installed, and they enable one to see the numerous stalactites, the tiers of galleries, nearly 300 feet in height, the various rooms or cavities, the colors from white to yellow, brown and red, and the marks which indicate the action of water for ages. Many of the columns are over 50 feet in height and are hollow; when struck they give out bell-like notes. Many peo¬ ple visft this cave each year.

LURGAN, lur'gan, Ireland, town in the county, of Armagh, 15 miles by rail to Armagh. It has a handsome parish church, Roman Catho¬ lic chapel, college, courthouse, bridewell, work- house, three banks, etc. Here are located great manufactures – of linen cambrics, muslins, damasks, lawns, etc., and its weekly market has an important trade in agricultural products. Pop. about 12,553.

LURIA, loo're-a, Isaac Ben Solomon,

Jewish mystic: b. Jerusalem, 1534; d. Safed, 1572. He was called (

LURTON, Horace Harmon, American

jurist: b. Newport, Ky., 26 Feb. 1844; d. 12 July 1914. He entered (1859) Douglas Uni¬ versity, Chicago, but on the outbreak of the Civil War enlisted in a Tennessee regiment. Ill health caused his discharge (1862) when he had been serving as sergeant-major. Later he took part in the battle of Fort Donelson where he was taken prisoner but escaped and served during the ˆMorgan raid® to be again captured in Ohio, remaining a prisoner till the end of the war. He next studied law at Cumberland University, Lebanon, Tenn., where he was grad¬ uated in 1867. Practising law at Clarksville under different auspices and partners he became (1875) chancellor of the sixth chancery divi¬ sion of Tennessee. In 1886 he was elected justice of the Supreme Court of Tennessee and, in 1893, was made

chief justice. Two months

later President Cleveland appointed him circuit judge of the sixth United States Judicial Cir¬ cuit. In these later offices he had shown re¬ markable juridical talent, acting on the lines of human justice backed by courage. In 1898 he accepted from Vanderbilt University the chair of professor of constitutional law, re¬ taining it till 1910, when President Taft ap¬ pointed him associate justice of the Supreme Court.

LUSHAIS, loo-shiz, a people native to the eastern border of Bengal, in Assam and Upper Burma, living in the little explored, wooded hills. They are divided into several clans under chieftains and have an organized military system. Those who have become more or less subjected to English rule are often called Kuki (((hill-men®). The men are tall, strong and well-built ; the women, aided by wooden or ivory discs, draw their upper lips to won¬ derful size. All work is done by the women but they are held in some respect. These na¬ tives are brave hunters, herd cattle, sheep and swine and make cotton textiles, weave baskets, etc. They were continually making looting raids on British settlements but were subjected to influence at last in 1872. Their religion appears to extend to devotional exercises in time of trouble, to immediately fall into disuse when prospering. They are nature worship¬ pers. Consult Lewin, (Wild Races of South Eastern India® (London 1870) ; Soppit, C. A., (Short Account of the Kuki Lushai Tribes on the Northeast Frontier5 (1887).

LUSIADS, The. (The Lusiads5 ((Os Lusiadas5) by Camoens (Luis de Camoes, 1524 or 1525-1580), published in 1572, is the great Portuguese national epic and is by far the out¬ standing masterpiece of Portuguese literature, as also one of the great epics of the modern world. More than possibly any other epic it may be called national in that the poet's at¬ tempt is to picture the great glory of his people, the pleasantness and beauty of his na¬ tive land and the generous deeds of her princes on land and sea. It is an epic in 10 cantos containing altogether 1,102 eight-line stanzas of the same verse form as Ariosto's (Orlando Furioso.5 Even more striking than the Italian model is the influence of Virgil in the celestial machinery of the poem and the frequent refer¬ ence to classical mythology. The poem is, how¬ ever, by no means imitative ; for the funda¬ mental conception and its working out are vigorous and original. Unlike the

The story is told, however, through the per¬ son of an immediate hero, Vasco da Gama, and it deals with his great voyage of 1497-98 to India. After a spirited and serious invocation of 18 stanzas, the

expedition is described as well on its way. Meanwhile the gods and god¬ desses of Olympus are holding conclave to determine the fate of the adventurers. The chief disputants are Venus, who was much af¬ fected toward the Portuguese, and Bacchus, who feared that, should the Portuguese succeed in reaching India, his renowned name would be ttburied in the dark vase of the water of oblivion.® Venus prevails, and the Portuguese are hospitably received at Mozambique and Mombasa and other towns on the east coast of Africa. At Melinde, Vasco da Gama, in the

third and fourth cantos of the epic, relates the story of the Portuguese nation from the time of the hero, Viriatus, and the Lusitanian shep¬ herds, who fought against the power of Rome, through the stirring days of Aljubarotta, down to the voyage to India. Most of the deeds are martial, as the account of the heroism of Alfonso Henriques, the sacrifice of Egas Moniz and the chastising of the Saracens by Sancho. The loveliest and best-known episode is the tale of Inez de Castro. The famous story shows the gentle, more pathetic side of the poem, the tenderness of the poet for his na¬ tive land. The stanzas in which da Gama relates the leavetaking at Lisbon show with impressive dignity the sadness of such a scene, and the old man who addresses his warning from the sea-shore typifies the spirit of the Portuguese people who, like other unambitious folk, are unable to see good of such lust for fame and glory.

In the fifth canto, da Gama continues his narrative, confining himself to the story of the voyage. Escaping from various snares of the natives, they double the Cape of Storms (now the Cape of Good Hope). The tem¬ pestuousness of the sea and the savage aspect of the land is personified to the mariners by the giant Adamastor. This derelict Titan, in¬ corporated forever in the rocky headland, rails at them as they pass and foretells the unending series of disasters which shall follow them and other mariners from their audacious voyage. The sultan of Melinde, pleased with the story and the martial aspect of the Portuguese, dis¬ misses them with pilots to show the way to India. Bacchus, however, has not done with them. He succeeded in persuading yEolus and Neptune to harry them between Melinde and Calicut. Their journey is beguiled by half¬ legendary tales of Portuguese honor or of Portuguese adventure, and they reach Calicut in safety.

The seventh and eighth cantos tell what hap¬ pened in India. The ruler of Calicut gives them leave to trade and visit, and his wonder at the armament of the Portuguese, and his curiosity with regard to their banners and en¬ signs, gives Paulo da Gama an opportunity to recount the warlike deeds of his countrymen. This he does in spirited language and with no repetitions of the story told by his brother at Melinde. The nabob, however, is corrupted by Bacchus, with the result that the Portuguese have a narrow escape from treachery. Then the fleet, well laden with merchandise, explores the coast further to the east and finally turns back toward Lisbon.

In the last cantos Venus, well pleased with the success of her beloved race, places in their path the Isle of Lovfc, where the ships anchor and where the crews receive joyous welcome. The song of a siren foretells the future of a glorious nation, and the goddess Tethys, leading Vasco da Gama to the top of a high moun¬ tain, points out the lands of the earth and prophesies the share that the Portuguese shall have in them, naming to him the great men who shall follow and make worthv his dis¬ covery. There follows the closing address to the unfortunate king, Dom Sebastian, in a pas¬ sage of great dignity, earnestness and patriot¬ ism, a fitting close of a great poem.

The management of the poem evidently rests on an anachronism: the constant use of pagan and classical gods furnishes the movement of the epic, while at the same time the facts are those which the poet has observed for himself or taken from history, and the morality and religion are contemporary. The episodes, how¬ ever, are combined with unusual skill, and serve to show a complete and general picture of the spirit which animated the nation. Alto¬ gether the poem is, as Hallam said, the first successful attempt in modern Europe to con¬ struct an epic poem on the ancient model and it is also the work of a man in whom the love of the fatherland was unfailing.

In style, the epic is regarded by native critics as the best model in the language. At its best, it is direct, reserved, swinging, sometimes brilliantly emphatic; at its worst, prolix and without humor. Like the Portuguese style, it is accumulative, — that is, it works by massings and repetitions, rather than by swift epigram, terseness, spontaneity and the single phrase.

The influence of (The Lusiads) has been great in Portugal and elsewhere. In Portugal it was followed by many epics dealing with the deeds of the Portuguese, of which the (Lisboa Edificada5 of Gabriel Pereira de Castro and the (Naufragio da Sepulveda) by Jeronymo de Cortereal are good examples. The epic period lasted for 30 or 40

years in Portugal, and the form has had several recur¬ rences both in Portugal and Brazil in the 18th and the 19th centuries. Outside of Portugal, (The Lusiads) has been translated over 80 times into as many as 15 different languages. There are at least nine published versions in English, ranging from that of Sir Richard Fanshaw in 1665, to that of Sir Richard Bur¬ ton in 1880, the most ambitious and sympa¬ thetic of all. The most accurate translation in almost all respects, the best for the reader who wishes to follow the Portuguese with an almost line for line English version, is that of J. J. Aubertin. The reader should refer to the Vis- conde de Juromenha's

William T. Brewster.

LUSITANIA, lu-si-ta'ni-a, Spain, the name of an ancient region of Hispania, the boundaries of which appear to have varied at different times: (1) on south by the Tagus and the ocean on the north and west ;

(2) bounded on the north by the Douro ;

(3) one of the three provinces in which Augustus divided the Iberian Peninsula, and lying south of the Tagus. The inhabitants were warlike and brave, lived upon plunder and were rude and unpolished in their manners. The Romans had great difficulty in conquering them, being frequently defeated by Viriathus, chief of the Lusitanians, who was captured by treachery and put to death, about 140 b.c., Lusi¬ tania shortly afterward coming under Roman control.

LUSITANIA, British Cunard liner, tor¬ pedoed and sunk by a German submarine 10 miles off Old Head of Kinsale, on the south-

western coast of Ireland, at 2.05 p.m. on Friday, 7 May 1915. The Lusitania was built by the firm of John Brown and Company and launched on 7 June 1906, at Clydebank. The length of the vessel was 785 feet; breadth, 88 feet; depth to the boat-deck, 80 feet; maximum draught, 37 feet, and a height to the mast-head of 216 feet ; gross tonnage, 40,000. She was fitted to carry 2,800 passengers, besides the crew. The Lusitania and her sister ship the Mauretania were built by the Cunard Steamship Company under special agreement with — and subsidized by — the British government. The funda¬ mental condition of that agreement was that the vessel should be (

LUSK, Graham, American physiologist: b. Bridgeport, Conn., 15 Feb. 1866. He was graduated (1887) at Columbia University, studied at Munich and was appointed (1891)

instructor of physiology at Yale University, then successively assistant professor (1892-95), and professor (1895-98). He was (1898-1909) pro¬ fessor of physiology at the University and Bellevue Hospital College, and professor of physiology at Cornell University Medical Col¬ lege, New York, from 1909. He has acted as scientific director to Russell Sage Institute of Pathology and has written (Elements of the Science of Nutrition) (1906) ; (The Funda¬ mental Basis of Nutrition> (1914), besides con¬ tributing to numerous scientific journals.

LUSK, William Thompson, American

physician: b. Norwich, Conn., 23 May 1838; d. New York, 12 June 1897. He entered Yale in 1855 but failing sight caused him to leave in a year for treatment of the eyes in Europe. He next (1858) took up the study of medicine at Heidelberg and after two years studied at Berlin for one year. On his return to America he served (1861—63) in the army, going to the front on. the staff of Gen. I. I. Stevens, and (1863) resigned at request to take command of a regiment recruiting in New York City, but accepting instead the appointment of adjutant-general, with rank of captain, under Gen. Dan¬ iel Tyler. He was cited for conspicuous gal¬ lantry on several occasions. Resigning in 1863 he entered Bellevue Medical College, New York City, where he was graduated. After studying in Europe he settled at Bridgeport, Conn., and practised medicine (1865-66), then removed to New York City. From 1869-71 he was profes¬ sor of physiology and microscopic anatomy at Long Island Medical College, delivering lec¬ tures at Harvard Medical School. In 1871 he accepted the chair of obstetrics and diseases of women at Bellevue Hospital Medical College which he held till his death. In his latter years he was coeditor with Dr. James B. Hun¬ ter of the New York Medical Journal. Among his many works he wrote (Science and Art of Midwifery (5th ed., 1897), which has been translated into many languages.

LUSKA, Sidney. See Harland, Henry.

LUSTRATION, in ancient Roipe, a cere¬ mony of solemn purification or consecration of the Roman people, by means of an expiatory sacrifice, which was performed after every census. The sacrifice consisted of a bull, a sow and a sheep or ram. The ram was ded¬

icated to Jupiter, the swine to Ceres and the bull to Mars. As this lustration took place at the end of every five years, lustrum came to signify a period of five years.

LUTE, a stringed musical instrument for¬ merly much in use. It originally contained six strings, but the number was gradually increased till it reached 24. The lute consists of four parts, namely, the table ; the body, constructed of nine convex ribs ; the neck, which has as many frets or divisions; and the head or cross, in which the screws for tuning it are inserted. In playing this instrument the oerformer strikes the strings with the fingers of the right hand, and regulates the sounds with those of the left. The notes of the lute are generally written on six lines, and not on five. There were formerly various kinds in use.

LUTETIA. See Paris.

LUTHER, Martin, German religious re¬ former: b. Eisleben, Saxony, 10 Nov. 1483;

d. there, 18 Feb. 1546. Hans Luther, his father, a miner in very humble circumstances, removed with his family to Mansfeld in 1484, and in the course of time was appointed to a seat in the council. Martin was educated in the deepest respect for religion, and under the severest discipline, his parents practising the most aus¬ tere lives of virtue and piety. At 14 he was sent to the school at Magdeburg, whence he removed in 1499 to Eisenach. At first he ob¬ tained his support by singing songs at the door like many other poor scholars ; but was soon taken under the care of a benevolent lady named Ursula Cotta. At school he made raoid progress in Latin and in other studies; in 1501 he entered the University of Erfurt, wThere his mental ability soon won him distinction among his fellows. In 1505 he received the degree of master. He was orginally destined by his father for the law, but circumstances at this time turned his attention to religious truth, and he began the study of divinity. Then to the surprise and regret of his father came the young man's <(great renunciation® and his de¬ termination to enter the monastery of the Augustines at Erfurt in 1505. Luther regarded himself as an unprofitable servant, tortured himself with bitter reproaches and was attacked by a severe fit of sickness, during which one of the elder brothers consoled him and promised him the forgiveness of his sins

through faith in Jesus Christ, a doctrine which Luther after¬ ward declared brought a new light into his soul. He was also much encouraged by Stau- pitz, the provincial of the Order, who perceived his great talents and encouraged him to con¬ tinue his theological studies. Staupitz himself had a singularly clear gospel conception of the cardinal doctrines of faith, repentance, the love and holiness of God, and it is no doubt true that Luther owed much of his "insight® into truth and the opportunity to give it expression to the kindly vicar-general. It is also well to remember in considering the life and work of Luther that some of his best and most cherished works — • the Epistles to the Romans and the Galatians, his edition of Tauler's (Theologia Germanicap and the exposition of the Seven Penitential Psalms were conceived while he was a member of his Order; as late as 1516 even, the year before his renunciation, he emphasized in a sermon the cardinal principle, "The Church cannot err in proclaiming the faith, only the individual within her is liable to error/

In 1507 he was ordained priest, and in 1508, by the influence of Staupitz, Luther was called by Frederick of Saxony to the chair of philoso¬ phy at the newly-founded University of Wit¬ tenberg. He lectured on the Aristotelian phi¬ losophy at the university as well as in the mon¬ astery, and at the same time began his activity as a preacher. In 1510 he made a journey to Rome on business of his order. In 1512 he took the degree of doctor of theology. It was shortly after this, in 1514, that Leo X issued a bull, granting an indulgence to all who should contribute to the rebuilding of Saint Peter's Church at Rome. Tetzel, a Dominican friar, was chosen by the cardinal archbishop of Mainz, who, jointly with the guardian of the Fran¬ ciscan friars, was named commissary of the indulgence for Saxony and the north of Ger¬ many, to preach the indulgence through this district. It was the preaching of Tetzel which

was the occasion of the beginning of tne Ref¬ ormation. Tetzel was preaching at Juterbogk, a few miles from Wittenberg, when, on the eve of All Saints' day, 31 Oct. 1517, Luther affixed his 95 theses to the door of the Scholss- kirche, challenging the Dominican friar. Though carefully guarded in their wording, Luther's propositions were clearly contrary, in some respects, to the current doctrine. The sixth thesis denied the power of the keys, and maintained that the Pope can only declare a sin to be forgiven by God ; the 36th, that through true contrition a Christian is freed from all guilt and punishment ; the 66th spoke not of abuses, but said of indulgences in gen¬ eral that they were nets to catch money with ; but the 71 st declared anathema to him who would reject indulgences altogether.

It is clear that Luther at this time had no concep¬ tion of the Reformation as a movement in op¬ position to the Catholic Church, nor any idea of denying the supremacy of the chair of Saint Peter, but was worked into a fury by abuses which he thought the ecclesiastical authorities were not sufficiently active in regulating, and his zeal carried him to the breaking point with the ancient Church. His propositions were condemned as heretical as soon as they ap¬ peared. Hoogstraaten, a Dominican of Co¬ logne, Eck at Ingolstadt, and Prierias, an officer of the Roman court, immediately made replies to his theses ; but neither argument, invective, the summons to Rome, which he did not obey, nor the mild counsels of Cardinal Cajetan at Augsburg in 1518, and of the nuncio Militz at Altenburg in 1519, were sufficient to induce him to recant. His replies were made with great boldness and determination, and even after his dispute with Eck at Leipzig in 1519, he still maintained the invalidity of indulgences and of the supremacy of the Pope. He appealed from the decision of Cardinal Cajetan to the Pope, and from the Pope to a general council.

In the year 1519, at Leipzig, occurred the famous public disputation between Luther and Carlstadt on the one side and Eck on the other, upon the questions at issue. The result was barren. Both sides claimed the victory and the contestants parted unchanged in their respec¬ tive attitudes. The Leipzig disputation only precipitated a long and bitter controversy, and Luther remained as determined in his opposi¬ tion as ever. Militz tried once more to make peace, and met Luther for a second time at Liebenwerde. But the conference was again without fruit. Luther's position had now grown more and more radical, though as yet there was no formal, complete and definite rup¬ ture with Rome. The controversy by this time had spread throughout all Germany, and princes and people were arrayed in bitter fac¬ tions over the issue. Early in 1520 Luther ap¬ pealed to Charles V, who had succeeded the Emperor Maximilian. He also addressed let¬ ters to the bishops of Mainz and Merseburg to enlist them in his cause. The bishop of Mainz, in his reply, treated the questions at issue as of a trivial and frivolous character, and the bishop of Merseburg repudiates Luther's posi¬ tion and exhorts him to submit. Among his friends at this time were Willibad Pirkheimer and Albrecht Diirer, though they did not follow him when the formal break with Rome came. Ulrich Von Hutten encouraged and urged him

(

MARTIN LUTHER

m

■

,

•

■

forward. Franz von Sickingen and Sylvester von Schaumberg declared their readiness to put a number of armed knights in the field for him, should it be necessary. Two notable books now appeared from Luther's pen defining his attitude: (To the Christian Nobility of the German Nation, > and the (Babylonian Captiv¬ ity.' In the former he proclaims the universal priesthood and declares against any especially instituted prestlv order. He also contests the right of the Pope to interpret the Bible, which he declares to be free to everybody. He like¬ wise inveighs against the Pope's exclusive right to sumirfbn a general council. In the (Babv- lonian Captivity he altogether repudiates the doctrine of indulgences, holds that the papacy is nothing but Babylon, and reduces the sacra¬ ments to three only — (*

The attitude of Luther was more and more one of outspoken opposition to the Pope and to the doctrines of the Church itself, and so far had his opposition now advanced that the Ro¬ man authorities decided to proceed to extreme measures to crush it. In October 1520, there¬ fore, the memorable bull excommunicating Luther and his friends was published at Leip¬ zig. His writings were burned at Rome, Co¬ logne and Louvain. The answer to the papal bull was characteristic of Luther. At Witten¬ berg, 10 Dec. 1520, he burned the bull of ex- commun'cation and the decretals of the papal canon. Bv this act he dissolved all connection ■with the Pope and the Roman Catholic Church. Frederick, the elector of Saxony, doubted whether he should protect him. But the Ger¬ man noblemen, Hutten, Sickingen, Schaum¬ burg, whom he called upon to defend the new opinions, hailed him as the champion of reli¬ gious liberty and offered him the protection of their fortresses and their arms. On 28 January Charles V opened the Diet of Worms and com¬ manded Frederick to bring Luther with him to appear before that body to answer for his con¬ duct. Frederick demurred, on the plea of his fear

for the safety of his protege. When, how¬ ever, Luther's opinion was asked, he declared that he was ready to appear, and that not even illness would hold him back. In the meantime Charles had revoked his command in order to allow the 60 days to pass granted by the bull of excommunication. Another papal bull was issued, however, after the burning of the first, in which Luther was definitely declared a here¬ tic, and an interdict put upon all places har¬ boring him. Summoned a second time, before the Diet, he expressed his willingness, if he were granted a safe conduct, which was ac¬ corded him by the emperor. He was met by about 2,000 persons on foot and on horseback at the distance of a league from Worms. When the palatine sent a messenger to warn him of his danger he answered, (

speech has been transmitted from generation to generation as follows : ((Let me then be re¬ futed and convinced by the testimony of the Scriptures or by the clearest arguments, other¬ wise I cannot and will not recant, for it is neither safe nor expedient to act against con¬ science. Here I take my stand; I can do no otherwise, so help me God! Amen.® Whether or not this is historically correct (and its form is certainly very doubtful) makes little differ¬ ence : the fact is beyond question that he did stand firm and refuse to yield or recant. Fred¬ erick the Wise conveyed him privately to the Wartburg to save his life. Luther took advan¬ tage of this retirement to translate the New Testament into German. But this seclusion con¬ tinued only 10 months. When informed of the disturbances excited by Carlstadt on the sub¬ ject of images he could no longer endure re¬ straint, notwithstanding the new outlawry which the emperor had issued against him at Nuremberg; and at the risk of provoking the displeasure of the elector he hastened to Wit¬ tenberg through the territory of George, Duke of Saxony, who was one of his most bitter enemies. The sermons which he delivered for eight successive days after his return (in March 1522) to quell the violence of the en¬ raged insurgents in Wittenberg are patterns of vigorous and popular eloquence.

Amidst these disputes and attacks his plans for a total reformation of the Church were matured. In 1523 at Wittenberg he began to revise the liturgy, and in 1524 laid aside his cowl. In 1525 Luther married Katharina von Bora, who some years previously had left the cloister and joined the reformed religion. He prepared, from 1526 to 1529, a new church serv¬ ice, corresponding to his ideas of the doctrines of the gospel, under the patronage of the elec¬ tor and with the aid of Melanchthon (q.v.) and other members of the Saxony Church. His

larger and smaller catechisms, to be used in schools, were also of great service. An unsuc¬ cessful effort was made in 1529 at Marburg, in a conference between Luther and Zwingli, the Swiss reformer, to bring the German and Swiss movements into harmony. But Luther's per¬ emptory refusal to accept Zwingli's views upon the question of the Lord's Supper precluded any possibility of agreement. The Reforma¬ tion (q.v.) spread rapidly, and the Augsburg Confession, the earliest symbol of Lutheran Protestantism, was drafted by Melanchthon from articles prepared by Luther. During all these years he waged a ceaseless polemic against Rome, and made strenuous efforts to establish harmony among German Protestants. The in¬ tolerance which he manifested toward the Swiss reformers, because their views differed from his own in regard to the Lord's Supper, shows that he was not yet ready to grant that liberty to others which he demanded for him¬ self. He was in this matter the chief cause of the separation which took place between the Calvinists and the Lutherans. The rapidity with which the Reformation advanced after the Confession of Augsburg in 1530 rendered the papal bulls and the imperial edicts against Luther ineffectual. In 1537 Luther wrote the Schmalkaldic articles; he gave no heed to the ambassadors of Brandenburg and -Anhalt, who were sent in 1541 by the Diet of Ratisbon to make him more submissive to the Church, and

«

in 1545 he refused to participate in the Coun¬ cil of Trent.

In his controversies with his foes and op¬ ponents Luther's spirit was oftentimes savage, biting, coarse, displaying almost uncontrollable anger and sometimes unjustifiable hatred. The occasional asperity which he showed in the defense of his faith, however, by no means diminished the merit of his constancy; and an apology may easily be found for the frequent rudeness and coarseness of his expressions in the prevailing mode of thinking and speaking; in the nature of his undertaking which required continual conflict ; in the provocations by which he was perpetually assailed; in his frequent sickness; and in his excitable imagination, evi¬ dent from the days of his novitiate. The same excitab'lity of temperament will serve to ex¬ plain those dreadful temptations of the devil which disquieted him. That age regarded the devil with horror as a personage ever active; and those devoted to the cause of God felt themselves constantly obliged to

resist attacks of the evil one. Luther himself says, < (I was born to fight with devils and factions. This is the reason that my books are so boisterous and stormy. It is my business to remove ob¬ structions, to cut down thorns, to fill up quag¬ mires, and to open and make straight the paths; but if I must necessarily have some failing let me rather speak the truth with too great severity than once act the hypocrite and con¬ ceal the truth.® No one can behold without astonishment his unwearied activity and zeal. The work of translating the Bible, which might well occupy a whole life, he completed, with some assistance from Melanchthon and other friends, between 1521 and 1534. This transla¬ tion takes the same place in Germany as the King James version does in England and the United States with regard to the religious life and literature of the people. Luther equaled the most prolific authors in the number of his treatises on the most important doctrines of his creed. After the year 1512 he preached several times every week, and at certain periods every day; he officiated at the confessional and at the altar; he carried on an extensive corre¬ spondence in Latin and German on various subjects with men of rank and of distinguished literary attainments and with his private friends. Lie gave advice and assistance wherever it was needed and interested himself on behalf of every indigent person who applied to him. In company he was lively, and abounded in sallies of wit and humor preserved in his

easy, like that of a guest leaving the inn; I pray only that God will be gracious to me in my last hour, and I shall quit the world without reluctance.® His wife died in 1552.

The 400th anniversary of the birth of Luther was commemorated with special observances throughout Protestant countries in the year 1883. The Tercentennial Commemoration of the Reformation begun by Luther at Wittenberg, on All Saints' Eve, 31 Oct. 1517, had been cele¬ brated in 1817, and the Protestant world had been looking forward with increasing anticipa¬ tion to the Quadricentennial Commemoration in 1917. The event, however, was overshadowed by the Great World War which had been raging for three years from August 1914. Neverthe¬ less the event had wide, if subdued, recog¬ nition in many countries. As expressed by a prominent New York Lutheran divine, "With¬ out any spirit of hostility to the Roman Catho¬ lic Church, but with a cheerful recognition of its conscientious devotion and labor of love and sacrifice for the cause of Christ. . . . the

idea of the observance is to study the causes, the necessity and the generic truths of that epochal event, so as to emphasize anew their

vital significance. It is done out of fealty to the word of God and with the conviction that the principles enunciated by the reformers are essential to a true church, and to a scrip¬ tural Christianity.® From Wittenberg, on the anniversary day, 31 Oct. 1917, rejecting peace proposals, the German Evangelical League, how¬ ever, launched a manifesto in which militant sayings of Luther were forcibly applied to the current events of the war. It read in part as follows, "We especially warn against the heresy promulgated from America that Chris¬ tianity enjoins democratic institutions, and that they are an essential condition for the estab¬ lishment of the kingdom of God on earth. As Luther said, (The freedom of a Christian does not depend on forms of government ; these are shaped by historical developments and the ac¬ cumulated experience of nations.5® The Quad¬ ricentennial Commemoration gave rise to a great quantity of magazine literature, Protestant and Catholic, on the influence of Luther on modern history, which may be studied with advantage as throwing greater light on the civi¬ lizing trend of the four centuries since Luther's inception of the Reformation, and the remark¬ able Catholic revival known as the Counter- Reformation. Consult Butler, N. M., in Cele¬ brating 400 years of Protestantism5 from New York Times, 23 Sept. 1917; and for further articles (Luther, Martin,5 and Reformation5 (in Cumulative Index of Periodical Literature, New York 1917), and New York Times Index (New York 1917) ; also bibliography attached to this article.

No great historic character has been more of a "problem® to friend and foe alike than Luther. Historians without number have utterly failed rightly to understand or satisfactorily to interpret the reformer and his strenuous and eventful life. No man has been more violently assailed, and none has had warmer defenders. He has been pictured as an inspired personality, an extraordinary genius, a national hero, the "prophet of a new religious point of view and the creator of a new ethical ideal® ; the chosen of God; the deliverer of the Church; the champion of conscience and individual free-

dom ; the creator of a national literature; and again he has been bitterly assailed as a raving monk; a barbarous writer and demagogue; a child of the devil; the insane monk; a cor¬ rupt and shameless sensualist; false to his vows and hypocritical and deceitful in his life. For this reason the writer has endeavored to limit this sketch simply to a faithful and suggestive outline of the history of

Luther's life, believ¬ ing that a fuller understanding must be sought in the larger study afforded by extended sources relating to the man, and the time and nature of his activities. See Christian Doc¬ trine, Development of; Reformation; Coun¬ ter-Reformation ; and related references.

Bibliography. — Luther's works are partly in German, partly in Latin. Of earlier editions the most complete is that by Walch (174CL53) ; and of later, the Erlangen-Frankfort editions (German writings 1826-57; Latin writings 1829- 86) ; and that published at Weimar (1883 et seq.). There are separate collections of his letters and his table-talk. Of accounts of his life may be mentioned those by Meurer (3d ed., 1870) ; Kostlin, J. (4th ed., 1889), Eng¬ lish translation (1883) ; and Peter Bayne (1887). Consult also Beard, (Martin Luther and His Reformation in Germany } ; Tulloch, (Leaders of the Reformation ; Lindsay, Lu¬ ther and the German Reformation) (1900) ; McGiffert, A. C., (Martin Luther: The Man and His Work} (New York 1911) ; Bohmer, H., (Luther in Light of Recent Research* (New York 1916). For Roman Catholic view of Luther, consult Evers, M., (M. Luther, Lebens und Charakterbild* (1883-91) ; Verres,*

George Edwin Rines.

LUTHER COLLEGE, situated at De¬ corah, Iowa. It was founded in 1861 under the auspices of the Synod of the Norwegian Lutheran Church in America. There is a preparatory department, besides the regular col¬ legiate department. The degree of A.B. is con¬ ferred. In 1916 the value of the productive funds was $279,000; the annual income amounted to $35,000; the library contained 26,000 volumes. The students numbered 207 and the faculty 17. For boys only. President, Rev. Christian Key- ser Preus. Total number of graduates up to and including 1916, 697.

*LUTHER LEAGUE OF AMERICA, The, a society organized in 1895 at Pittsburgh, Pa., with the object of linking together the Lutheraa young people who are laboring for the good of the Church by means of many individual societies of various names and styles of organization, each within its own immediate church. The constitution declares that its ob¬ jects shall be ((to encourage the formation of the young people's societies in all Lutheran congregations in America, to urge their affilia¬ tion with their respective State or Territorial leagues, and with this league to stimulate the various young people's societies to greater Christian activity and to foster the spirit of loyalty to the Church.** The*

fundamental prin¬ ciples are federation and co-operation, and it is non-synodical in character. The total mem¬ bership is over 100,000. These are comprised in

25 States, 14 of which already have permanent State organizations, and five foreign countries. A monthly journal, The Lutheran League Re¬ view, is published in New York. Consult the (Luther League Handbook (New York) and Bacon and Northrop, (Young People's So- cieties) (ib. 1900).

LUTHERAN CHURCH IN AMERICA. Early History. — The first Lutherans in Amer¬ ica came from Holland during the Thirty Years' War on account of religious oppression, and settled in the colony of New Netherlands. The exact year of their arrival is not known; some seem to have come with the very first settlers in 1623, but they are mentioned in 1643 as living in Manhattan (New Amsterdam — New York). A congregation was established in 1648. The recognized religion of the colony being strict Calvinism, the Lutherans were treated very harshly, especially by the governor, Peter Stuyvesant. Their children had to be brought to Calvinistic preachers for baptism, and they were fined and imprisoned even for holding informal services for the reading of the Bible. They applied to their home church for a pastor of their own faith and John Ernest Gutwasser (Goetwater) was sent them in 1657, but was sent back by the authorities in 1659. They ob¬ tained religious freedom only with the capture of the city by the English in 1664. In the fol¬ lowing years ministers were sent to them from Amsterdam, Holland, but sometimes long va¬ cancies occurred, and they were obliged to apply to the Lutheran Swedes on the Delaware for spiritual ministration. Prominent among their ministers in the 18th century was the German, Justus Falckner (1703-23), the first Lutheran minister ordained in America, who also served the Lutherans on both sides of the Hudson as far up as Albany; W. C. Berkenmeyer, also a German, and M. Knoll. Gradually the con¬ gregations turned from the Dutch to the Ger¬ man and English languages.

Distinctively Lutheran settlements were made by the Swedes along the Delaware, where Wilmington is now situated, beginning with 1638. Reorus Torkillus was their first pastor. He was succeeded by John Campanius, who was the first to begin mission work among the North American Indians, and who translated Luther's Catechism into the Delaware language. His labors enabled William Penn, in after years, to carry out his pacific policy toward the Indians. Campanius also dedicated the first Lutheran church in the new world on the island of Tinicum, near Philadelphia. As most of the Swedish pastors

returned to Sweden after some years, and as the Swedish was replaced by the English language, the congregations gradu¬ ally fell away from their mother church and entered into communion with those of the Protestant Episcopal Church.

The great influx of German Lutherans took place in the first half of the 18th century, after the first German colony, under the leadership of Pastorius, had arrived in 1683 and founded Germantown, now a part of Philadelphia. In Germantown the first German Lutheran service was conducted in 1694 by Rev. H. B. Koester, and in Falckner's Swamp (New Hanover, Pa.), near Philadelphia, the first German Lutheran church was in existence in 1704. This first German Lutheran congregation was

served by Daniel Falckner. the older brother of Justus Falckner. In New York the leader of the immigrants was Joshua Kocherthal, a Lutheran minister from the Palatinate, arriving on New Year's day 1701. The Palatinate had been ravaged with fire and sword under Louis XIV of France, the inhabitants were obliged to flee in order to save their lives and many of these fugitives found a temporary refuge in England, where Queen Anne arranged for their emigration to America. In 1710 not less than 11 ships came to New York carrying some 3,000 immigrants. They settled in the Catskill Hills on the banks of the Hudson; later on many of them went westward and moved into the Schoharie Valley. All were served by the inde¬ fatigable and faithful Kocherthal. In 1734 the Lutheran Salzburgers, driven from their homes in Austria through persecution, settled in Georgia not far from Savannah. Their settle¬ ment was named Ebenezer, and their pastors were Bolzius and Gronau. Gradually groups of German Lutherans were found along the whole Atlantic Coast. In Pennsylvania alone some 60,000 Lutherans were settled about the year 1750, for whose spiritual wants there was, at first, no adequate provision. Several of these Pennsylvania congregations joined in sending a delegation to London (Court-chaplain Ziegen-hagen), and to Halle in Germany (Prof. A. H. Francke), representing the needs of the immi¬ grants and asking for able clergymen. These negotiations finally resulted in the coming to America of Henry Melchior Muehlenberg, the pious and indefatigable so-called "patriarch of the Lutheran Church in America.® He arrived in 1742, served the congregations that had called him, organized new congregations far and wide, built churches (Saint Michael's,

Philadel¬ phia) and in every possible wav was active for the Church. He was followed by a number of educated and faithful men from Germany (Kurtz, Kunze and others), and thus an era of great activity began among the scattered Lutheran churches, their number being con¬ tinually increased through the coming of more immigrants, and the Lutheran Church attain¬ ing considerable influence.

Synodical Organizations. — One of the most important things done by Muehlenberg was the founding of the first Lutheran synod in America, the still existing ((Evangelical Lutheran Ministerium of Pennsylvania and adjacent States.® It took place 26 Aug. 1748, and Ger¬ man and Swedish pastors participated in the organization. Before Muehlenberg's death (1787) the second Lutheran synod was organ¬ ized through the efforts of his son, Rev. F. A. C. Muehlenberg, and his son-in-law, Rev. J. C. Kunze (1786), and in the following decades other bodies were formed: the North Carolina Synod (the mother of all the southern synods), in 1803; the synod of Ohio in 1818; the Ten¬ nessee Synod in 1820. Throughout the 19th century such synodical organization took place, partly in consequence of branching off from the older synods, sometimes also in opposition to them, but chiefly on account of the rapid and remarkable expansion of the Church through the coming of immigrants from Europe, especially to the Western States. The entire number of synods now in existence is 62. The internal condition of the Church, however,

in the closing years of the 18th and in the first decades of the 19th century, was not a good one. The ravages of two wars left their marks ; the problem of transition from German to English worship was not always solved in the right way; but above all the rationalistic and unionistic tendencies in the European churches bore their fruits also in America and left the Lutheran Church in a deplorable state of desolation. The founding of the Missouri Synod (Evangelical Lutheran Synod of Mis¬ souri, Ohio and other States) in Chicago, 26 April 1847, had a most significant influence on the external and internal development of the Lutheran Church in the United States. In 1839 a colony of Saxon Lutherans numbering about 700 souls had come to America, having left their native land on account of the bad condition of their home church, showing itself in the opposition to the Lutheran Confessions and the prevalence of rationalism, and had settled in Saint Louis and in Perrv County. Mo. Their leader was Martin Stephen and with him came a number of earnest and devout pastors and candidates. When their leader was found to be a deceiver he was excommunicated, and C. F. W.

Walther, one of those younger pas¬ tors, a man of remarkable ability as theologian, preacher, author and church organizer, came to the front. In 1844 he began to edit the semi¬ monthly church paper Der Lutheraner, which rapidly became the organ for confessional Lutheranism. About the same time Pastor F. Wyneken had come to America and had spent some years in serving the scattered Lutherans in Indiana and Michigan. Not being able to take care of the great number of them he returned to Germany and interested the home churches in the work. Especially Pastor W. Loehe of Neuendettelsau, Bavaria, took a very active part in preparing an 1 sending ministers to America; and these three parties, the Saxon immigrants (Walther, Loeber, Keyl, Fuerbrin- ger and others), the Loehian pastors (Sihler, Craemer and others) and Wyneken, combined and organized the Missouri Synod, which has ever stood for strict confessionalism and through its testimony has had decided influence for good upon the whole Lutheran Church, also in foreign countries, although it severed all connection with the German state churches and upholds and emphasizes the principle of absolute separation of church and state. Through the untiring labors of its pastors in home mission work, and through the attention given to the training of the young in parish schools, it has become by far the largest Lutheran synod in America, consisting at present of 23 district synods and extending over practically every State of the Union, to Canada and even to Brazil and Argentina. About the same time (1839) another band of German Lutherans had left Prussia on account of the Prussian Church Union between the Lutheran and Reformed churches (1817) and under the leadership of J. A. Grabau organized the Buffalo Synod in 1845. Some years later (1854) the Iowa Synod was founded, also by German missionaries sent by Loehe, after the Missourians and Loehe had parted on account of doctrinal differences. Finally, the Scandi¬ navian Lutherans must be mentioned. Even before the middle of the 19th century a tide of

Scandinavian immigration had set in, leading in the course of time to synodical organization. The most prominent was the Norwegian Evangelical Lutheran Synod of North America, founded in 1853 by H. A. Preus, J. A. Ottesen and others. A controversy on the doctrine of predestination led to a seoaration and to the forming of the United Norwegian Lutheran Church in America, in 1890. Prior to this the Norwegian Hauge Synod had been or¬ ganized through the influence of E. Eielsen, originally a lay preacher and adherent of Hauge, a

theologian of pietistic tendency. The largest Swedish Lutheran body, the Augustana Synod, was founded in 1860. Besides these, the Danes, Finns and Icelanders have their own synods. The Slovak Evangelical Augsburg Confession Synod, organized in 1902, is in sympathy with the Missouri Synod.

General Bodies. — Most of the 62 Lutheran synods in the United States are combined in larger ((general organizations.® The oldest of these is the General Synod of the Evangelical Lutheran Church in the United States of America, formed in 1820 through the efforts of the Pennsylvania ministerium, at that time the largest Lutheran synod in America. The Gen¬ eral Synod aimed at a union of all Lutherans, but, when the Pennsylvania Synod withdrew in 1823, it comprised for some years only a number of smaller English synods. Gradually it grew, the Pennsylvania Synod again united with it and in 1860 it embraced 26 synods. However, during the Civil War the synods south of the Potomac withdrew, and in 1866 the Pennsyl¬ vania Synod again severed its connection on account of the liberal and unionistic standpoint of the general body. The General Synod had formally declared that it stood on common ground with the Union Church of Germany and did not consider the distinctive doctrines separating the Lutheran and Reformed churches essential. It was more intent on fraternal re¬ lations with other denominations than on union with Lutherans of strict confessional princi¬ ples. (S. S. Schmucker and the (

Synod and the Norwegian Synod. It was founded on a strict confessional basis as laid down in the Lutheran Confessions, and became at once the largest general organization in America; and although the Ohio Synod left this general body in 1881 on account of a con¬ troversy over the doctrines of election and con¬ version, and also the Norwegian Synod severed its connection in 1883 on account of internal troubles, the Synodical Conference is still the lar¬ gest general body. In 1886 the Southern synods which had withdrawn from the General Synod at the time of the Civil War formed a new general body, The United Synod of the Evangelical Lutheran Church in the South, com¬ prising eight smaller synods. The jubilee year of the Lutheran Reformation (1917) developed two important combinations. The three Norweg¬ ian synods mentioned above joined and formed the Norwegian Lutheran Church of America; and the General Synod, now more confessional than formerly, the General Council, and the United Synod in the South took action and formed a union called The United Lutheran Church in America, which action was formally ratified 15 Nov. 1918. The synods of Wiscon¬ sin, Minnesota and Michigan, which had formed what may be called a

general organiza¬ tion in 1892, have rearranged their organiza¬ tion into a general body consisting of six dis¬ trict synods, but retaining their membership in the Synodical Conference.

Church Polity. — According to Lutheran principles the congregation is the unit of church organization, the source of all authority exer¬ cised by the Church and the final court of ap¬ peal. Congregations combine and organize themselves into synods for conducting the Church work on a larger scale and for the sake of mutual assistance and oversight ; but the synods have no power except that which the congregations confer upon them; they are purely advisory bodies. It must be said, how¬ ever, that while these principles are conceded by most Lutheran organizations, not all bodies conform to them in practice, some of them out¬ side of the Synodical Conference allowing synods a greater power and placing greater weight upon their decisions.

Church Worship. — Because the Lutheran churches in Europe always had great diversity in their forms of public worship the Lutheran Church of America shows no uniformity in this respect, the different bodies having at first followed the usages of their mother churches to a greater or less degree. However, a greater uniformity has been brought about since the so-called ((Common Service,® based upon the consensus of the Lutheran liturgies of the 16th century, was prepared by a com¬ mittee representing the General Synod, the General Council, and the United Synod in the South. This form of service is used also by a number of congregations in other Lutheran bodies, especially after they had introduced the English language in their services.

Church Work. — All the church bodies named are very active in various forms of educational, missionary and benevolent work. They maintain a high standard of ministerial education and have founded a large number of theological seminaries. They, have their own colleges and academies preparing their men for

the theological courses and giving a general education. They prosecute intensively home mission work, conducting such work also among the Indians and negroes in the United States, and maintain foreign mission fields in the dif¬ ferent parts of. the globe. The American Lutheran Church is indeed a polyglot church proclaiming

the gospel in no less than 20 lan¬ guages. All of the larger bodies have their own publishing houses for the printing of their church papers and the dissemination of Lutheran literature. The statistics of 1917 report 27 theological seminaries, the largest among them being Concordia Seminary at Saint Louis, Mo. (Missouri Synod, 344 students) ; Concordia Seminary at Springfield, Ill. (Missouri Synod, 127 students) ; Augustana Seminary at Rock Island, Ill. (Augustana Synod, 101 students) ; Norwegian Seminaries, combined in 1917, at Saint Paul, Minn. (88 students) ; Lutheran Seminary at Mount Airy, Philadelphia (Gen¬ eral Council, 58 students) ; Lutheran Seminary at Maywood, Chicago (General Council, 52 students) ; Wartburg Seminary at Dubuque, Iowa (Iowa Synod, 48 students) ; Lutheran Seminary at Wauwatosa, Milwaukee, Wis. (Wisconsin Synod, 42 students) ; Wittenberg Seminary at Springfield, Ohio (General Synod, 38 students) ; Lutheran Seminary at Columbus, Ohio (Ohio Synod, 38 students) ; Theological Seminary at Gettysburg, Pa. (General Synod, 34 students) ; Luther Seminary at Saint Paul, Minn. (Ohio Synod, 30 students). The num¬ ber of Lutheran colleges in 1917 was 41 ; of academies 58, a number of them coeducational; of ladies' colleges 7. The General Synod con¬ ducts foreign mission work in India and Liberia; the General Council in India, Burma, Japan; the Missouri Synod in India and China; the different Scandinavian bodies in India, China, Natal, Madagascar; the Ohio Synod in India. Missions among the American Indians are conducted by the Scandinavians, the Missouri Synod and the Wisconsin Synod; among the negroes by the Synodical Confer¬ ence and by the Ohio Synod. The statistics for 1917 enumerate 66 orphanages, 46 homes for the aged, 7 homes for defectives, 9 dea¬ coness mother-houses, 50 hospitals, 18 immigrant and seamen's missions, 12 miscellaneous insti¬ tutions, 13 home finding and children's friend societies. There are 13 official Lutheran pub¬ lishing houses, the more important ones being located in Philadelphia (General Synod and General Council) ; Saint Louis (Missouri Synod) ; Rock Island (Augustana Synod) ; Minneapolis (Norwegian Synod) ; Chicago (Iowa Synod) ; Columbus, Ohio (Ohio Synod) ; Milwaukee (Wisconsin Synod) ; Columbia, S. C. (United Synod in the South). The number of Lutheran periodicals goes well into the hundreds.

General Statistics. — The Lutheran Church

is the fourth largest denomination in the United States coming after the Roman Catholics, Methodists and Baptists. The statistics here¬ with given are obtained from official sources and are published in the (Lutheran Church Year Book for 1918. The several bodies are ar¬ ranged according to the year of their organiza¬ tion. The latest*

developments in the organi¬ zation of general bodies mentioned above must not he overlooked in the following tables.

General Synod — 1820

Synod of Maryland .

Synod of West Pennsylvania.

East Ohio Synod .

Allegheny Synod .

Synod of East Pennsylvania. .

Synod of Miami .

Pittsburgh Synod .

Wittenberg Synod .

Olive Branch Synod .

Synod of Northern Illinois. . . Synod of Central Pennsylvania

Synod of Iowa . . . .

Synod of Northern Indiana . .

Synod of Central Illinois .

Susquehanna Synod . .

Synod of Kansas .

Synod of Nebraska .

Wartburg Synod. ; .

Synod of California .

Rocky Mountain Synod .

German Synod of Nebraska. . Synod of Southern Illinois . . .

Synod of New York .

Synod of West Virginia .

Total — 24 Synods .

General Council- — 1867 Ministerium of Pennsylvania. Ministerium of New York. . .

Pittsburgh Synod .

Texas Synod . ._ .

District Synod of Ohio .

Augustana Synod .

Lutheran Synod of Canada . .

Chicago Synod .

English Synod of the North¬ west .

Manitoba Synod .

Pacific Synod .

Synod of New York and New

England .

Nova Scotia Synod .

Synod of Central Canada. . .

Total — 14 Synods .

Synodical Conference —

1872

Synod of Missouri, Ohio and

other States .

Synod of Wisconsin .

Minnesota .

Michigan .

Nebraska .

Slovak Synod .

Total — 6 Synods .

United Synod — 1886 Synod of North Carolina ....

Tennessee Synod .

Synod of South Carolina .

Synod of Virginia .

Synod of Southwestern Vir¬ ginia .

Mississippi Synod .

Synod of Georgia .

Holston Synod . . .

Total — 8 Synods .

Independent Synods Joint Synod of Ohio and other

States .

Buffalo Synod .

Eielsen's Synod (Norwegian). Synod of Iowa and other States Danish Lutheran Church ....

Icelandic Synod .

Suomi Synod (Finnish) .

United Danish Lutheran

Church .

Lutheran Free Church (Nor¬ wegian) .

Norwegian Lutheran Church

of America .

Other bodies and independent tongregations .

Total — 10 Synods .

Summary total — 62 Synods. .

0)

N

.'H

1820

1825

1836

1842

1842

1844

1845

1847

1848 1850 1853 1855 1855 1867

1867

1868 1871 1876 1891 1891 1891 1900 1908 1912

1748

1773

1843

1851

1857

1860

1861

1871

1891

1897

1901

1902

1903 1909

1847

1850

1860

1860

1904

1902

1803

1820

1824

1829

1842

1855

1860

1861

1818

1845

1846 1854 1871 1885 1890

1896

1897 1917

Ministers

Congregations

Communicant

Members

115

131

36,335

93

158

38,783

53

72

12,909

72

153

25,730

145

150

43,266

44

54

10,686

90

125

26,711

59

78

17,318

34

48

7 , 342

55

61

12,496

50

92

12,598

36

32

5 , 465

46

73

9,679

25

31

4,955

52

81

20,320

44

46

6,362

49

54

8,544

48

52

10.030

42

30

5,346

24

23

2.139

90

115

10,439

11

17

2,172

146

143

30,142

15

38

4,305

1,438

1,857

364,072

408

580

161,486

157

155

56,795

157

192

37,631

9

14

1,171

55

92

15,151

720

1,225

191,390

42

74

14,410

50

64

8,753

45

53

12,372

31

58

4,760

20

24

1,849

65

56

21,367

8

26

3,029

12

16

1,813

1,779

2,631

531,978

2,743

3,094

598,777

315

362

155,261

48

75

26,319

43

58

12,121

22

21

5 , 969

30

79

8,570

3,201

3,689

807,017

51

76

10,782

56

135

13 , 820

53

75

10,648

30

58

6,858

29

70

4 , 850

6

10

552

22

31

3,861

10

29

1,855

257

484

53,226

685

916

138,542

36

49

7 , 395

6

26

1,232

576

1,056

125,458

74

112

14,463

16

55

4,598

40

151

16,511

143

185

14,996

198

420

20,536

1,247

3,378

300,000

92

257

33,925

3,113

6,605

692,119

9,788

15,266

2,448,412

LUTHERANISM

759

Bibliography.- — Of the large literature only a small selection is given. The sources are, as a rule, mentioned in the general works.

Histories of the Lutheran Church in Amer¬ ica: Graebner, A. L., (History of the Lutherans in America5 (German, Vol. I, up to 1820; Saint Louis 1892) ; Hazelius, E. L., (History of the American Lutheran Church 1685— 1842) (Zanes¬ ville 1846) ; Jacobs, H. E., 'History of the Evangelical Lutheran Church in the United States)

(Vol. IV of the American Church Series,5 New York 1893; trans. into German by Fritschel, G. J., with additions, Guetersloh 1896) ; Neve, J. L., (Brief History of the Lutheran Church in America5 (Burlington 1916; German ed., Burlington 1915).

Histories of Individual Bodies: Bergh, J. A., 'The Norwegian Lutheran Church in North America5 (Norwegian; Minneapolis 1914); Bernheim, G. D., (History of the German Set¬ tlements and of the Lutheran Church in North and South Carolina5 (Philadelphia 1872) ; Deindoerfer, J. D., 'History of the Evangelical Lutheran Synod of Iowa and other States5 (German; Chicago 1897); Finck, W. J., (Lutheran Landmarks and Pioneers in America5 (Philadelphia 1913) ; Henkel, S., (History of the Evangelical Lutheran Tennessee Synod5 (New Market 1890) ; Hochstetter, C., 'History of the Evangelical Lutheran Missouri Synod5 (German; Dresden 1883); Nicum, J., (History of the Evangelical Lutheran Ministerium of New York and Adjacent States5 (German; New York 1888) ; Ochsenford, S. E., docu¬ mentary History of the General Council of the Evangelical Lutheran Church in North America5 (Philadelphia 1912) ; Peter, P. A., and Schmidt, W., 'History of the Joint Synod of Ohio and other States5 (Columbus 1900) ; Schmauk, T. E., (History of the Lutheran Church in Penn¬ sylvania 1638-18205 (Philadelphia 1903) ; Spaeth, A., Jacobs, H. E., and Spieker, G. F., documentary History of the Evangelical Lutheran Ministerium of Pennsylvania and Adjacent States 1748—1821 5 (Philadelphia 1893).

Biographies : Guenther, M., (Walther, C. F. W., A Biography5 (German; Saint Louis 1890) ; Mann, W. J., (Life and Times of H. M. Muehlenberg5 (Philadelphia 1877) ; Spaeth, A., (Charles Porterfield Krauth5 (2 vols., New York 1898; Philadelphia 1909).

General: Bente, F., 'What hinders the Union of the Lutheran Synods in America?5 (German; Saint Louis 1917); Jacobs, H. E., and Haas, J. A. W., dutheran Cyclopedia5 (New York 1899) ; Lenker, J. N., dutherans in All Lands5 (Milwaukee 1894; German ed., Sunbury 1901); Morris, J. G., (Bibliotheca Lutherana5 (Philadelphia 1876) ; 'The Distinc¬ tive Doctrines and Usages of the General Bodies of the Evangelical Lutheran Church in the United States5 (Philadelphia 1893; new ed., 1914). See Lutheranism.

Ludwig E. Fuerbringer, Professor of Theology, Concordia Theological Seminary, Saint Louis, Mo.

LUTHERANISM. The first of the 95 theses which Martin Luther affixed to the door of the castle-church of Wittenberg on 31 Oct.

1517, read as follows: <(Our Lord and Master, Jesus Christ, saying, Repent ye, would have the whole life of believers to be repentance.55 This academic act has been generally looked upon as

the inaugural act of the Lutheran Reformation, so much so, that 31 October is to this day cele¬ brated by Lutherans in all lands as the Festival of the Reformation. And the thesis quoted above is perhaps the most concise exhibition of Lutheranism extant. The thesis is, as a whole and in all its parts, a positive doctrinal state¬ ment. Doctrine, positive doctrine, is, and was from the beginning, of first importance, the groundwork, the very life, of Lutheranism. The first and foremost task of the Lutheran Church is the promulgation and maintenance of sound doctrine. Preaching, in the Lutheran Church, is not primarily exhortation but teach¬ ing, and doctrinal preaching is considered the chief element of Lutheran public worship. Even the better part of Lutheran hymnology is preponderatingly doctrinal. The great bulk of Luther's voluminous writings is doctrinal, and no other church has so extensive a doctrinal literature as the Lutheran Church. Even its controversial theology partakes of this char¬ acter. It is true, the. Lutheran Church in all its best periods was eminently an ecclesia militans (a militant church) ; but the subjects at issue were again doctrinal. Perhaps the most mas¬ terful polemical work in Lutheran, if not in all Protestant theology, Chemnitz' (Criticism of the Decrees of the Council of Trent5 (Examen Concilii Tridentini) , is also one of the richest storehouses of doctrinal theology.

But doctrine is knowledge communicated. Teaching presupposes or implies a master and a disciple or a number of disciples. And of the Master Luther says in his thesis ; ((Our Lord and Master Jesus Christ.55 No councils nor synods, no traditions of the Church, no Fathers, early or late, not Luther himself, not any of these, nor all of these together, must be ac¬ knowledged as empowered to establish articles of doctrine which every disciple is bound to accept. For the Master is also the Lord. He comes with authority: His teaching is not human but divine. Christian doctrine is not a product of evolution, nor of human specu¬ lation, nor of self-consciousness of the Church, but the truth of God set forth by the Foun¬ tain of divine truth, who has said, ((I am the Truth.55 He is the one and only au¬ thoritative teacher in the Church. There is no such thing as an evolution or perfectibility of Christian doctrine. Here the ancient avroc etyrj "He hath said it,55 is in its place. Here man has no alternative but either to accept or to reject. Here to add or to modify is. to adulter¬ ate, and to take away or to yield is to deny. Such is the Lutheran concept of the primary source of Christian doctrine.

But the means also whereby such communi¬ cation of divine knowledge to man is effected is indicated in Luther's thesis when he says: "Our Lord and Master Jesus Christ, saying, Repent ye.55 Here he refers to an express dictum of Holy Scripture. Christ and the Spirit of Christ taught man in the 16th century and teaches man in the 20th century in and through the written Word. Not by awaiting direct revela¬ tions, not by following the traditions of the Church or the definitions or decrees of its rep¬ resentatives, are we disciples of Christ, but by searching the Scriptures which were written aforetime for our learning. What is clearly taught in Scripture, that and that only is Chris-

tian doctrine. That the Bible is the only and sufficient source of Christian doctrine is the formal principle of Lutheranism.

The material principle of Lutheranism, the cardinal doctrine, around which all other doc¬ trines radiate, because it is the central doctrine of Scripture, is also indicated in the thesis. Luther there describes the subjects and disciples of their Lord and Master Christ as believers. According to the Lutheran concept of Christian¬ ity and the Christian Church it is faith that constitutes a Christian and a member of the Church of Christ, which is simply the whole number of all believers. Christianity, as dis¬ tinguished from all other religions, is that re¬ ligion according to which salvation is not by works of righteousness which we have done, but by what God has done in Christ, reconciling the world unto Himself. And faith is simply the acceptance of this reconciliation. Not as a work of obedience, with any merit of its own, but only as the acceptance of the merits of Christ, faith is saving faith. It is justifying faith inasmuch as, in view and consideration of the merits of Christ accepted by faith, God in His judgment pronounces the believer righteous. And this doctrine, that God justifies the sinner by His grace, for Christ's sake, through faith, is the material principle of Lutheranism, the cardinal doctrine of Lutheran theology. This doctrine is looked upon by the Lutheran Church as doctrina stantis ct cadentis ccclcsice, the doc¬ trine with which the Church stands and falls.

On the other hand, the doctrine of justifica¬ tion, while the central and ruling doctrine, is not the only doctrine of Lutheranism. Accord¬ ing to our thesis, Christ would have the whole life of believers to be repentance. This, too, is a doctrinal statement. Repentance, [

lefavoia , is a change of heart and mind in man. In his natural fallen state man is wholly evil, spiritu¬ ally dead in sin, unable to will or to do that which is spiritually good. He cannot, there¬ fore, work his own restoration, nor contribute thereto. But God, prompted by His universal grace, and because of the merits of Christ, the redeemer of all mankind, through the gospel, the ever efficacious and ever irresistible means of grace, quickens the sinner into spiritual life, translating him, by the bestowal of faith, from a state of wrath and enmity against God into a state of grace and communion with God. This is the Lutheran doctrine of conversion or re¬ generation in the stricter sense of the terms. In a wider sense, in which repentance also stands in our thesis, it includes the preservation and growth of spiritual life and its activity in works of the spirit, or sanctification. For while the Lutheran Church maintains that man's salva¬ tion is in no sense, manner or measure, his own work, but wholly and solely the work of God, and hence denies the necessity of good works unto salvation, it strenuously asserts that good works are necessary fruits and evidence of faith.

There have been Svncretists (Unionists) within the pale of the Lutheran Church, who held that the real obstacles to mutual recognition between the Lutheran Church and others were only two — the doctrines of predestination and of the Lord's Sup¬ per. Bin by these assertions Syncretism exhibits itself as thoroughly un-Lutheran in letter and spirit. These differences are in¬

deed, while they stand, insurmountable barriers between the conflicting theologies. But the chasm which separates them is far deeper and wider, a difference of the very fundamental principles which affects a multitude of particu¬ lar doctrines. The formal principle of Luther¬ anism is, as we have seen, that of the exclusive authority and absolute sufficiency of the canon¬ ical Scriptures in matters of faith. The mate¬ rial principle of Lutheranism is the scriptural doctrine of justification. Lutheranism holds that Christ, the only head and foundation of the Church vested all the rights and powers of the Church, the keys of heaven, the power of re¬ mitting ahd retaining sins in His name as His agent, the government and discipline of the Church, in the local congregation of believers. Lutheranism maintains that Christ, the only mediator between God and man, has instituted an office in the Church, the ministry of the word, for the public administration of the means of grace, that this office is conferred on its incumbent by Christ's authority through the call of the congregation, and has no power but the power of the word as set forth in the Scrip¬ tures, all ministers being equal in rank among themselves. Lutheranism looks upon the Lord's Supper as a*

means of grace, whereby Christ, by virtue of His words of institution pronounced in the night in which He was betrayed, gives to all communicants His body and blood, really pres¬ ent, not by transubstantiation or the change into another substance, nor by consubstantiation or the formation of a new substance, but by sacramental union, 'to be eaten and drunk in, with and under the consecrated bread and wine, for an assurance of the forgiveness of our sins, procured by His sacrifice on Calvary.

Lutheranism also holds and teaches a doc¬ trine of predestination, not, however, a decree of damnation, but only an election and predes¬ tination of the children of God to eternal sal¬ vation by faith in Christ Jesus, who is the re¬ deemer not only of the elect, but of all man¬ kind, and by whom the decree of election is determined as by its meritorious cause, and not as an accessory means of execution. Thus, likewise, the gospel and the sacraments, accord¬ ing to the Lutheran concept, are the ordained means, whereby the same universal grace, ac¬ cording to which God earnestly desires the sal¬ vation of all men, and, by the power of His Spirit in all cases efficaciously, but in no case irresistibly, exerted through such means of grace, calls, converts or regenerates, sanctifies and preserves to eternal life all those who do not wilfully and obstinately resist the saving grace of God.

Having thus briefly portrayed the nature and principles of Lutheranism, we proceed to a sum¬ mary sketch of its rise and progress and its spread in the era of the Reformation.

The cradle of Lutheranism was Saxony in Germany. Here, at Wittenberg, the great Re¬ former taught and preached and wrote under the protection of the Elector Frederick the Wise, and hand in hand with his successors John and John Frederick. The effects of his 95 theses far exceeded the expectations of their author. When Luther published this manifesto, he had no thought of the establishment of a new church. The very name of Lutherans was not adopted by the free choice of those who bore it, but was solemnly inflicted upon them

in a bull published by Pope Leo X 3 Jan. 1521. By this bull Luther and his adherents were ex¬ communicated from the Roman Catholic Church, and when Luther had refused to recant at the Diet at Worms, April 1521, he and the Lutherans were also politically

outlawed by an imperial edict, which exposed them to persecu¬ tion and the death of confirmed heretics. The execution of this edict was suspended in Ger¬ many because of the great headway which the Lutheran movement had by this time made, and for various political reasons, which bound the emperor's hands, and at the Diet at Spires, in 1526, the German princes and representatives formally agreed that everyone should so conduct himself toward the Edict of Worms as he would deem himself able to answer before God and His Imperial Majesty.

Luther, who had for a time been concealed by the Elector in Wartburg castle, had made good use of his enforced rest by translating the New Testament into German and issuing the first instalments of his Church Postil, a collec¬ tion of sermons, from which hundreds of min¬ isters learned how to preach to the people. After his return and during the subsequent years the Lutheran Church in Saxony was or¬ ganized along conservative lines. Luther pro¬ vided the congregations with forms of worship and collections of hymns for public service, catechisms for the instruction of young and old and an extensive religious literature. A system of schools of various grades was established throughout the land and an able ministry was educated at the university. The translation of the whole Bible was completed in the course of years. At a second Diet of Spires, in 1529, a majority made an effort to stay the progress of Lutheranism in Germany, and in spite of the protest of the Lutheran members, from which they were called Protestants, these efforts were continued at the Diet at Augsburg, in 1530. Here, however, the Lutheran princes and cities succeeded in presenting to the emperor and Diet and thus publishing to the world a statement of their faith and doctrine, the Augsburg Con¬ fession, which, in the course of time, was adopted as its fundamental creed by the Lu¬ theran Church the world over. In the same year an apology of the Augsburg Confession was framed and published, which also gained sym¬ bolical standing. Although the transactions of the Diet of Augsburg resulted in another pro¬ scription of Lutheranism and the inauguration of measures for its extermination, the political conditions of the empire continued to be such that the emperor and his party could not ven¬ ture to proceed against the dissenters, and while Luther lived the progress and spread of Luther- arfism continued, not only in Germany, but throughout Europe. Even when, after Luther's death, Charles V marched his armies against his Lutheran subjects and by fraud and force led away into captivity the two foremost of the German Lutheran princes and began the work of stamping out Lutheranism, these reverses, though causing

considerable disturbance also within the Lutheran Church, lasted a few years only. The political conditions having once more turned in favor of the suppressed party, the Lutherans, in 1552, by the Treaty of Passau, secured temporary recognition as a church of lawful standing in Germany. This recognition

was made permanent by the Peace of Augsburg in 1555. This settlement included the Lutherans only of all those who dissented from the Roman Catholic Church, Zwinglians, Calvinists, Ana¬ baptists and others being excluded. It was thus menacing the religious as well as the political status of Lutheranism, when men of influence in Saxony, the Cryptocalvinists, by clandestine operations endeavored to change the Lutheran Church of Saxony into a Calvinistic establish¬ ment. At the same time a number of doctrinal controversies threatened to vitiate the orthodox character of the Church of the Augsburg Con¬ fession, until, by the united labors of Lutheran theologians and princes, sound in doctrine and deeply concerned about the peace of the Church and the purity of its doctrine, the last of the great Lutheran Confessions, the Formula of Concord, closed the series of Lutheran stand¬ ards, all of which, the Augsburg Confession, its Apology, the Smalcald Articles, Luther's Larger Catechism, Luther's Smaller Catechism, the Formula of Concord, together with the three ancient Ecumenical Creeds of all Christendom, constitute the body of Lutheran Symbols, known as the Book of Concord of 1580.

While Germany was the home of the Luther¬ an Church, Lutheranism obtained a permanent foothold and became the church of the realm in a number of extra-German countries during the period of the Reformation.

In Sweden Luther's doctrine was dissem¬ inated as early as 1519 by two brothers, Lars and Olav Petersen, who had studied at Witten¬ berg. Under Gustavus Vasa, Lars Petersen was made professor of theology at the University of Upsala, and Olav Petersen was the leading preacher at Stockholm. The Bible was trans¬ lated into Swedish and at the Diets of Westeras, 1527, at Orebro, 1529, and at Westeras, 1544, the organization of the Swedish Lutheran Church as a national church with an episcopal form of government was effected.

The first Lutheran preachers in Denmark were Peter Lille and Hans Tausen. The or¬ ganizer of the Danish Lutheran Church was John Bugenhagen, pastor of Wittenberg, who came to Denmark in 1537 and prepared the new constitution, which was adopted at Odense in

1539. Soon after Norway and Iceland were also Lutheranized, and thus the Lutheran Church was permanently established without bloodshed throughout all the Scandinavian countries.

In Prussia the Lutheran Church was planted and made the church of this ancient territory of the German knights under John George of Polenz, bishop of Samland. The new Agenda and Church-Order was introduced in 1525 and 1526, and the new Lutheran University of Konigsberg was a colony of Wittenberg, of which Sabinus, Melanchthon's son-in-law, was the first rector.

In Silesia Luther's doctrine was preached as early as 1518. John Hess was called as a Lutheran minister by the city council of Bres¬ lau.

In Poland Luther's writings were prohibited. But in 1521 the Bible was translated into Polish. Jacob Knade preached at Danzig. From Dan¬ zig Lutheranism spread to Elbing and Thorn, and by 1548 the Polish Church was preponder¬ atingˆ Lutheran.

In the Baltic territories, Riga, Dorpat and Reval were Lutheran in 1523, and within two decades the Reformation spread throughout these whole regions.

In Hungary the doctrines of the Reforma¬ tion were promulgated by men who had been Luther's students at Wittenberg. In 1549 five free cities adopted the Augsburg Confession, and under the influence of the Reformation numerous elementary and advanced schools were opened in cities and villages throughout all Hungary. Merchants who returned home from the fair at Leipzig brought Luther's doc¬ trine to Transylvania, and others, who had been students at Wittenberg, promoted its spread. A Lutheran school was opened at Hermannstadt. From 1533 John Honter labored as ((Evangelist of the Lord at Kronstadt, w and the Reforma¬ tion took its course from town to town. In cities and villages and in the open country schools were established, and even in the village schools Latin and Greek were taught. With the Schools libraries for the people were connected, and endowments were provided for the support of young men who were willing to study at German universities.

In Bohemia and Moravia a large part of the population embraced the Lutheran faith during Luther's lifetime, and when, after the re¬

former's death, the emperor made war against the Lutherans in Germany, the Bohemian Lu¬ therans refused to take up arms against their brethren in the faith.

In the Netherlands, also, the Church of the Reformation gained headway, principally through the reading of Luther's works. In Antwerp a great Lutheran movement took place, brought on by the preaching of Flacius and Cyriacus Spangenberg, in 1565 and 1566. But if was not long before Lutheran services were prohibited. The Dutch Reformed Church was organized in 1568 and 1571 and proclaimed the church of the realm in 1583. With the Spaniards in possession of Antwerp, in 1585, the Lutherans scattered and founded congre¬ gations in Frankfort, Hamburg, Amsterdam, Leyden and other cities. Even there they had no rest. In Amsterdam they were antagonized and Lutheran services were again prohibited. Still the Lutheran congregations continued to enjoy a rapid and steady growth; so much so that a scarcity of ministers began to make itself painfully felt. The Lutherans in Holland had made the great mistake of neglecting the estab¬ lishing of schools and colleges for the education of ministers, and this eventually brought about their decadence; for the importation of preach¬ ers from foreign countries was accompanied by the introduction of unionistic, syncretistic doc¬ trines and practices.

France is another country in which Luther's writings were widely circulated and had great influence in the Church. A Lutheran congrega¬ tion was organized at Maux. Faber Stapulen- sis, Brigonnier, Jean and Pierre Leclerc were some of the most noted preachers. Lefevre translated the Bible into French. A sound Lutheran movement promised a bright future for Lutheranism, but the influence of Geneva, the stronghold of the Reformed Church, was very strong in France, and through this influ¬ ence the Lutheran movement in France was directed into other channels.

In England Luther's books were read as early as 1519, especially at the universities, where they were of vast influence. »Great ef¬ forts were made to suppress these books, and they were proscribed very early, but this only had the effect that they were now read more than ever. Thomas Cranmer embraced the Lutheran faith, and, though in many ways in¬ consistent, he remained a Lutheran in doctrine until the year 1548, when he was won to Cal¬ vinism. He became a martyr in 1556. A col¬ lection of Lutheran hymns was published being translations of German hymns, most of them Luther's. In 1536 the Augsburg Confession was printed in an exquisite translation by Taverner. In Sarcerius' (Commonplaces, a Lutheran handbook of*

dogmatic theology was given the English people. Cranmer, in the same year, at the close of which he abandoned Lutheranism, wrote an extensive explanation of Luther's Smaller Catechism, in which the first English translation of this catechism, also by Cranmer's hand, was embodied. The death of Henry VIII, whose political ambition had been to make himself the head of the Lutheran League of the continent, the personal acquaint¬ ance of many English and Scotch refugees with Calvin at Geneva and the imposing work there being reared, and other reasons contrib¬ uted to the ascendency of Calvinism in England and Scotland, and the Lutheran movement be¬ came virtually extinct about the middle of the century.

For Lutheranism in America see Lutheran Church in America.

Augustus Lawrence Graebner, Late Professor of Theology , Concordia Sem¬ inary , Saint Louis, Mo.

Revised hy Ludwtc, E. Fuerbrtnger, Professor of Theology, Concordia Seminary, Saint Louis, Mo.

*LUTHER'S HYMN, a name given to the celebrated German hymn composed bv Luther about 1521. entitled ˆEin' feste Burg ist unser GottP well known in the English version, (A mighty fortress is our God.**

LUTKE, lut'ke, Feodor Petrovitch,

Count, Russian world circumnavigator: b Saint Petersburg, 29 Sept. 1797; d. there, 30 Aug. 1882. He entered (1813) the English service, taking part in the siege of Danzig and made the first journey round the world (1817- 18) under Golovnin. He explored (1821-25) the Arctic for a passage, was raised (1823) to lieutenant-captain and commanded (1826-28) the fourth voyage round the world, exploring the coasts of Russia and America and discov¬ ered several islands. In 1842 he was raised to the rank of adjutant-general and, in 1845, 'to vice-admiral. In 1864 he became president of the Saint Petersburg Academy of Sciences and was raised to the nobility in 1866. He wrote several works in the Russian language, chief of which is (Four Voyages into the Arc¬ tic Seas> (Saint Petersburg 1829) and (Jour¬ ney Round the World in the corvette Senjar- vin) (ib. 1835-36). His biography in Russian was written by Besobrasov (1889).

LUTON, loo'ton, England, town in Bed¬ fordshire, 30 miles northwest by north of Lon¬ don by rail, situated on the river Lea. It

has an old Gothic church (Saint Mary's), contain-

hig highly interesting brasses and monuments and an Early English font. Here are also a fine town-hall in Italian style, corn exchange and municipal park. It is the chief centre of Englands' great straw-plait industry, which originated when James I planted a Lorraine colony of straw-plaiters here. There are also brass and iron foundries and motor car works. The population in 1911 was 49,978. Consult Davis, (History of Luton5 (Luton 1855).

LUTTRINGHAUSEN, lut'rmg-hou'zen, Germany, town in the government district Diis- seldorf, on the Barmen-Rittershausen-Marien- heide State Railway and five miles from Elber- feld. It is really a group of settlements number¬ ing no less than 110, having municipal rights since 1856. There are large gas and water meter, gas oven, bathing apparatus, boiler, hardware factories, etc. Its population in 1910 was 13,560, mostly Evangelical.

LUTZ, loots', Frank Eugene, American biologist : b. Bloomsburg, Pa., 15 Sept. 1879. He was graduated (1900) at Haverford College, Pennsylvania, studied (1902) at University of Chicago, then entered University College, Lon¬ don, England. He was (1904-09) resident-inves¬ tigator at the station for experimental evolu¬ tion, Cold Spring Harbor, then (1909-16) assistant curator of invertebrate zoology at American Museum of Natural History, New York City, to become associate curator in the latter year. He has written (Field Book of Insects> (1917) and numerous contributions to the scientific journals on the subjects variation,

heredity, assortive mating, entomology, etc.

• •

LUTZEN, lut'sen, Germany, small town of Prussian Saxony, nine miles southwest of Leipzig. It derives all its interest from the two battles fought in its neighborhood. The first belongs to the Thirty Years' War, being fought on 16 Nov. 1632, between the Swedes under Gustavus Adolphus, and the Imperialists under Wallenstein. The Swedish monarch, having joined his forces with those of Bernard, Duke of Saxe-Weimar, attacked the enemy in a strongly intrenched position. The issue was long doubtful, but the Swedes finally triumphed, though Gustavus fell in the action. The place of his death is marked by a square block of granite, called the

Schwedenstein (the Swedes' stone). The second battle was fought 2 May 1813, somewhat farther south, at Gross-Gor- schen. It was the first important conflict be¬ tween the allied Russian and Prussian armies and the French under Napoleon in that de¬ cisive campaign. The French numbered 115,- 000, while the allies had only 70,000. Napoleon maintained his position though at a loss of 18,000 men, against 10,000 of the allies killed and wounded. Napoleon being unable to nress his advantage owing to lack of cavalry, the allies retreated in good order. Pop. about

4,086.

LUTZK, lutsk, Polish LUCK, Poland, town in the government Volhynia, on the river Styr and a branch of the South-West Railway. It has a 16th century castle, three Greco- Catholic and two Roman Catholic churches, two convents, two synagogues, Catholic seminary, etc. This is the centre of a great German colony. In the 11th century it was the capital

of an independent principality but fell (1791) into the possession of Germany. Its population is about 31,806.

LUTZOW, lut'so, Franz Heinrich Valen¬ tin, Count, Austrian author. He was born at Hamburg, educated at Vienna and Innsbruck and followed a diplomatic career. He was appointed chamberlain of the emperor of Aus¬ tria from 1881. He was Ilchester lecturer at Oxford (1904), and in 1912 lectured at Amer¬ ican universities. He has published (History of Bohemian Literature5 (1899) ; (Prague,) in Mediaeval Tow,n) series (1901) ; (Historians of Bohemia) (1905) ; (Life and Times of Master John Hus) (1909) ; and (The Hussite Wars5 (1914).

LUTZOW, Karl von, German historian of art : b. Gottingen, 25 Dec. 1832; d. 1897. He assisted Liibke (q.v.) in editing (Denkmaler der Kunst,5 and in 1867 became professor of the Polytechnicum, Munich. He published (Munich Antiques5 (7 vols., 1861-69) ; Master¬ pieces of Ecclesiastical Architecture5 (1862); Monuments of Art,5 with Liibke (6th ed., 1892) ; (History of German Copperplate and Wood Engraving5 (1891). He was the founder, in 1866, of the (Zeitschrift fur bildende Kunst,5 and edited it till his death.

LUTZOW, Ludwig Adolf Wilhelm, Baron of, Prussian general : b. Berlin, 18 May 1782; d. Berlin, 6 Dec. 1834. He is renowned as the leader of the noted Freischar (volunteer cavalry). He entered the ranks (1795) of the Prussian Guards, fought in the Reizenstein

regiment (1806) ac Auerstadt, and joined the Schill corps at Kolberg when his regiment was disbanded. He organized the cavalry, fighting and being wounded at Stargard and, receiving (1808) his discharge with the rank of major, he rejoined Schill, to be again wounded at Dadendorf. He re-entered (1811) the cavalry and was empowered (1813) to organize a corps of volunteers in Silesia and Jahn, Friesen, Korner, etc., joined him. The Liitzow Volun¬ teers were generally called the (

general in 1822, retiring in 1830 as a lieutenant- general. Theodore Korner the poet, one of his volunteers, has made the Black Troopers eter¬ nally, noted by his gripping poem (Liitzows wilde JagedP Consult Ciselen, (Geschichte des Liitzowschen Freikorps) (2d ed., Halle 1841).

LUVERNE, lu-vern', Minn., village, county-seat of Rock County, on the Rock River, and on the Chicago, Saint Paul, Minne¬ apolis and Omaha and the Chicago, Rock Island and Pacific railroads, about 220 miles southwest of Saint Paul and 30 miles northeast of Sioux Falls, S. Dak. Luverne is situated in an agri¬ cultural region in which are granite quarries and fire-clay deposits. The chief industrial es¬ tablishments are flour-mills, grain elevators, brick and lumber yards, automobile factories, tile works, concrete-block plant and creameries. Large nurseries are in the vicinity. The trade is principally in flour, granite, grain, live-stock, nursery products and dairy products. The waterworks and electric-light plants are the property of the city. Pop. about 2,782.

LUXEMBOURG, Frangois Henri de Montmorency-Bouteville, fran-swa on-re de mon-mo-roii-se boo-te-vel luk-son-boor, Duke of, marshal of France: b. Paris, 8 Jan. 1628; d. Versailles, 4 Jan. 1695. He served when young under the Prince of Conde ; in 1662 was made a duke and peer of France, and in 1667 lieutenant- general. In 1672 he commanded during the in¬ vasion of Holland; in 1673 made a masterly retreat from Utricht to Maestricht, although outnumbered by three to one ; and having gained the battle of Senef in 1674, was created a mar¬ shal of France (1675). Louvois attempted to compass his ruin by involving him in (The Af¬ fair of the Poisons > ; he was imprisoned in the Bastile, but acquitted; and in the war of France against England, Holland, Spain and Germany he won the three great battles of Fleurus (1690), Steenkirk (1692) and Neer- winden

(1693). Consult Segur, R. de, (La feu- ncsse de Marechal de Luxembourg) (Paris 1900) ; (Le Marechal de Luxembourg et le prince d'Orange 1668-78) (ib. 1902).

LUXEMBOURG (luk'sem-berg, Fr. luk- son-boor) PALACE, a structure famous for its architecture, art gallery and gardens ; situated in Paris, in the Rue de Vaugirard. It was be¬ gun in 1616 and completed in 1620. The art gallery was opened in 1780 and closed during the Terror, was altered in 1790 and was much enlarged in 1830. Here Ney was condemned to death after the Restoration in 1815. At this latter date a magnificent semi-circular hall was built for the session of the House of Peers, and later for the Senate. The Senate hall was burned in 1859, but was soon after rebuilt. The name of the palace is derived from the Duke of Piney-Luxembourg, whose mansion once stood on the same site. From 1870 to 1879 the palace was occupied by the Prefecture of the Seine and the Paris municipal council. Since 1879 it has been again occupied by the Senate.

LUXEMBURG, Rosa, German Socialist agitator: d. Berlin, 15 Jan. 1919. A Russian- Polish Jewess of obscure origin, she was be¬ tween 50 and 60 years of age. According to some accounts she married a German in order to obtain German nationality, and left him

immediately. A remarkably eloquent speaker, she always expounded the most extreme views, which gained her the nickname of ((Red RosaA She was a cripple, barely five feet high. In 1906 she was already working in alliance with Lieb- knecht (q.v.), arguing the doctrine of the gen¬ eral strike against Bebel (q.v.) at the Jena Con¬ gress of the German Socialist party, which occa¬ sion led to her first imprisonment for incitement to violence. She invariably advocated direct action for the seizure of power, a principle anal¬ ogous to that exemplified by the Russian Bol- sheviki. Early in 1914 she made accusations of brutality against German army officers, for which she was sentenced to imprisonment. Re¬ leased in 1916, she was soon put under preven¬ tive arrest and severely treated. During the revolution that followed the German military collapse in November 1918 Rosa Luxemburg was the fiercest firebrand of the Spartacide group. Conflicting reports stated that she was shot while being removed under arrest, or was felled by the butt-end of a rifle and thrown into the canal during a riot in Berlin. Liebknecht was killed about the same hour.

LUXEMBURG, William Alexander,

Grand Duke of: b. April 1852; d. 25 Feb. 1912. His branch of the family (Walram) suc¬ ceeded to the dukedom on the extinction of the male line of the Otho branch on the death of the king of Holland in 1890. He became inca¬ pacitated by cancer in 1908, when his consort — a Portuguese princess — was appointed to act as regent. He left six daughters, the eldest of whom, Marie, came of age (18) in 1911 and assumed the sovereignty of the grand duchv.

LUXEMBURG (Fr. luk-son-boor, Ger. look'sem-boorg), Grand-duchy of, northwest¬ ern Europe, an independent state, bounded north, east and south by Germany, southwest by France and west by Belgium; greatest length, north to south, 55 miles; greatest breadth, 34 miles; area, 998 square miles. It forms part of the plateau of the Ardennes, and has a rugged and mountainous surface, covered in many parts with heaths and morasses, though in general well wooded. Its drainage belongs almost en¬ tirely to the basin of the Moselle. Agriculture is limited in extent by the nature of the surface, but the pastures rear great numbers of cattle, sheep and horses, the last long in high repute for light cavalry. Considerable quantities of iron are smelted from the ore of the duchy. The inhabitants are mostly of German origin, but French is the language of the educated classes and of business. Pop. about 259,891 (4,007 Protestants, 1,270 Jews).

Luxemburg in early times formed a part of Germany. In 1354 it was erected into a duchy by Charles IV. In 1814 it was converted into a grand-duchy under the king of Holland. Though governed by the Dutch kings as grand- dukes it was distinct from the kingdom of Hol¬ land; and on the death of Wilhelm III in 1890 it passed over to Adolf, Duke of Nassau. It is included in the German Customs Union and formerly was a member of the German Confed¬ eration, 1815—66. By the terms of the Treaty of London of 1867 it became an independent state, and its integrity was guaranteed by the great European powers. The ruler is assisted in the government by a chamber of deputies of 53

members, elected directly by the cantons for six years, half of whom retire and submit them¬ selves for re-election every three years. The revenue for 1917-18 was estimated at 43,761,428 francs, and the expenditure 48,845,794 francs. There are 325 miles of railway in the grand- duchy, and 439 of telegraphs. On the outbreak of the

Great War in August 1914, its neutrality was violated by Germany, despite the protests of the reigning grand-duchess, Marie Adelaide, who had succeeded 12 Feb. 1912, on the death of her father, the Grand Duke Wilhelm. The territory was occupied by the German army. Under the terms of the Peace Treaty of 7 May 1919 (Section III) it was stipulated that Ger¬ many renounce her various treaties and con¬ ventions with the Grand Duchy and recognize that it ceased to be a part of the German Zollverein as from 1 Jan. 1919; to renounce all right of exploitation of the railroads; to adhere to the abrogation of its neutrality and to accept in advance any international agreement concern¬ ing Luxemburg arrived at by the Allied Powrers. (See War, European). Capital, Luxemburg (q.v.). Consult Passmore, T. H, 'In further Ardenne> (London 1905) ; and Renwick, G., 'The Grand Duchy of Luxemburg and Its People> (ib. 1913) ; Putnam, Ruth, Luxemburg and Her Neighbors) (New York 1919).

LUXEMBURG, the capital of the grand- duchy of the same name, situated 117 miles southeast of Brussels and 42 miles by rail north of Metz. Its natural position is so strong, and the different powers into whose hands it suc¬ cessively fell did so much to extend and im¬ prove its means of defense, that it was called <(the northern Gibraltar.® From 1839 till 1866 it was garrisoned for the Germanic Con¬ federation by Prussian troops, but in accordance with the Treaty of London (1867) the fortifica¬ tions were dismantled, the Prussians withdrew their troops and the neutrality of the duchy was guaranteed by the great European powers. During the Great War which began in 1914 it was in German occupation. It is divided into a low and a high town. The former lies along the banks of the Alsette. The latter stands 200 feet higher, on a plateau with precipices on three sides, the surrounding ravine being crossed by great viaducts. The town is well built ; con¬ tains a town-house, government-house, house of deputies, cathedral of Notre Dame dating from 1613, Athenaeum, Roman Catholic seminary for priests, grand-ducal palace dating from 1580 but rebuilt' 1893-94, library, a handsome public park, etc. It has manufactures of machinery, leather gloves, breweries, dye-works, etc. ; and a con¬ siderable trade. Luxemburg is the see. of a bishop ; and during part of the year is the lesidence of the leading families of the duchy. Its neighborhood abounds with fine promenades and picturesque features of various kinds. Pop.

20,848.

LUXOR, luk'sor or look'sor, Upper Egypt, a village on the right bank

of the Nile, occupy¬ ing the site of ancient Thebes and containing splendid ruins of that historic metropolis. See Thebes.

LUZAC, Jean, Dutch editor and champion of American independence: b. Leyden, 2 Aug. 1746; d. 12 Jan. 1807. Editor of the Leyden Gazette which, from 1722 to 1783, published in Dutch and French, circulated all over Europe

as a standard authority, giving authentic and correct news from the United States of the Continental Congress and armies. He served grandly the American cause, for which he was thanked by Washington, who sent him a souve¬ nir of his campaigns. Of Walloon descent and well educated, he became one of the ablest news gatherers and newspaper men in Europe. After 1785, he was professor of Greek in Leyden University, and in 1794-95 was Rector Magnifi- cus. He was active during his life as a publicist and among his many writings in Dutch and Latin was a eulogy on Washington. His tomb is in Saint Peter's Church, Leyden, and there are portraits of him. On 8 Sept. 1909 a tablet was placed by grateful Americans on his former dwelling, at No. 112 Rapenburg, Leyden, which was unveiled by one of his descendants, to the singing of ((The Star Spangled Banner.® Con¬ sult address by Gulian G. Verplanck, 1818, be¬ fore the New York Historical Society; Griffis, 'Brave Little Holland^ (1894) ; 'Nieuw Neder¬ land Biografisch Woordenboek) (Vol. I, 1911).

LUZAN, loo-than, Ignacio de, Spanish writer: b. Zuragoza, 1702; d. Madrid, 19 May 1754. He was son of Antonio de Luzan, Lord of Castillazuelo and governor of Aragon, while his mother belonged to the family of the counts of Villar. He was graduated with the degree of doctor of theology from the University of Catana (Sicily) in 1727 with an excellent knowledge of ancient and modern languages, mathematics, philosophy, literature, history and theology. In 1747 he was appointed secretary to the Spanish embassy at Paris. On his re¬ turn to Spain, two years later, he occupied several important public offices, among them head of the mint and treasurer of the Real Biblioteca. He became a great favorite with the king who liberally pensioned his widow. He was a voluminous writer and he left at the time of his premature death over 60 works, the most important of which are 'Chronologia para uso del estudio) ; 'Compendio de las cuatro prin¬ cipals partes de la Filosofia) ; 'Tratados de Dote, etc.; 'R(sumen de las Instituciones, con notas en auxilio de los textos del Codigo) ; 'Relorica de las conversaciones* ; 'Tratado de Ortografia espanola* ; 'Metodo para ensenar y aprender las lenguas) ; 'La Poetica* ; 'Discurso apologetico> ; 'La*

Geganteina) ; 'Perspectiva politica ; 'La vitud coronada) (comedy) ; 'Origen y Patria de los godos) ; 'Doctrina politica sacada de proverbios y palabras de la Sagrada Escritura) ; 'La razon contra la moda* (comedy, translated work of Nivelle de la Chaussee) ; 'La Gatomiomaquia) (satire). His literary work also includes many and varied translations, among them being odes of Sapho, Anachreon, Metastasio, Ovid, Horace and Biblical poetry, especially the Psalms. He also composed poems in Latin and Italian. The range of his literary wosk was very wide, cover¬ ing poetry, philosophy, politics, grammar and languages, criticism and translation. Spanish critics place him among the foremost writers of Spain; Spanish reviewers who. have paid much attention to his work are inclined to rank his poems and his criticism as superior to his other productions. Of the latter his 'Poetica* is his best. Luzan is distinguished bv imagination, beauty of style and clearness of thought. All these qualities are present in the 'Poetical*

which is a notable work for the age in which it was written. It has, therefore, had a powerful influence on the development of Spanish litera¬ ture. Consult Ticknor, (History of Spanish Literature ; White, Blanco, Wife of Thom) ; any good history of Spanish literature.*

LUZENBERG, loo'zen'berg, Charles Alo- ysius, American physician: b. Verona, Italy, 1805; d. 1848. He was educated at London and at Weissenburg College, Alsace. Leaving Italy for the United States in his 14th year, he sub¬ sequently received a medical education at the Jefferson Medical College of Philadelphia. He removed to New Orleans in 1829, where he made a reputation for brilliant surgery and was enabled to establish the famous New Orleans Medical School. He visited Paris in 1832, where his reputation had preceded him, and he was elected corresponding member of the Paris Academy. His most important work in Louis¬ iana (where he took up his residence again in 1834) was the founding of the Society of Natural History (1839), and the Louisiana Medico-Chirurgical Society (1843), by which science has been much fostered and promoted in the South. It is believed that he was the first physician in the United States, who prevented pitting in cases of smallpox, by excluding light from the sick chamber.

LUZERNE, lu-zern, N. Y., town, includ¬ ing a village of the same

name, in Warren County, on the Hudson River, at the mouth of the Sacandaga River, about 20 miles north of Saratoga and 10 miles southwest of Lake George. Lake Luzerne is in the vicinity. The village is situated in an agricultural and lum¬ bering region, and its chief industries are con¬ nected with the manufacture of paper, shirts, lumber and with farm products. A bridge crossing the Hudson connects Luzerne with Hadley, a station on a branch of the Delaware and Hudson Railroad. The cool climate in this region in summer, the beautiful scenery and the opportunities for fishing make it a favorite summer resort. Pop. 1,185.

LUZERNE, Pa., post borough of a county of the same name eight miles by rail from Lackawanna Junction. It has two drill fac¬ tories, four flour and feed mills, etc., besides coal mines. Pop. 5,998.

LUZON, loo-zon' (Sp. loo-thon'), Philip¬ pines, the largest, most populous and wealthy and with the exception of the Batanes and Babuyanes groups, the northernmost island of the Philippine Archipelago, lying south-south¬ west of Japan and south-southeast of China, It lies between lat. 12° 32′ and 18° 39′ N. and between long. 119° 42′ and 124° 8′ E. On the north is the Bashi Channel, connecting the Pacific Ocean and the China Sea ; on the south are the San Bernardino Strait, separating it from Samar, the channels of the Visayas Sea and Tayabas Bay.

Topography. — The island is very irregular in shape, elongated from north to south and southeast, and much wider at the north than at the south. It narrows at lat. 14° 30', and much more at lat. 14° between Lamon Bay and Tay¬ abas Bay, where an isthmus unites the larger and northwestern part of the island with the smaller southeastern part ; it is thus divided into three territorial divisions, Northern Luzon,

Central Luzon and Southern Luzon. The length of Luzon is 283 miles from the north coast to Manila, and from there 225 miles south¬ east to Babulgum Point ; at its widest point near the centre of Northern Luzon it is 138 miles wide ; at its narrowest point, the isthmus in lat. 14°, eight miles wide; area, 40,969 square miles, with dependent islands, 42,196 square miles. The mountain system of Luzon consists of three large ranges, the nucleus of which is Caraballo de Baler in the province of Neuva Ecija. The Caraballos Occidentales form the water¬ shed of Northern Luzon, and extend about 150 miles near the western coast and parallel with it; the Sierra Madre range, starting at Cara¬ ballo de Baler, extends northeast to Cape Engano ; the Caraballos Sur, starting at the same

point, extends south to Banahao, then turns to the southeast and terminates near the straits of San Bernardino. This range has several important branches, one ending on the south side of the bay of Baler. Among the more important single mountains the following may be mentioned: Data (7,364 feet), and Bur- nay (6,376 feet), of the Caraballos Occidentales; Cana (3,830 feet) of Sierra Madre; and Bulusan and Mayon (7,916 feet) of the southern range. The three last mentioned are volcanoes, of which Mayon is the most active. Luzon is well watered ; the longest river is the Rio Grande de Cagayan, running nearly the whole length of Northern Luzon; three other large rivers traverse this part of the island, and there are numerous smaller streams. The Pasig River, although the shortest of all, is from a human standpoint by far the most important of all. Its length is 15 miles, and it affords communica¬ tion between the Laguna de Bay, the largest of the island's lakes, and Manila Bay. Its importance is mainly due to the great volume of commerce which travels along it and to the fact that the capital of the archipelago is situated at its mouth. This river is tidal in its lower section, and very deep up to Fort Mc¬ Kinley; from that point to the lake it is much narrow-er and quite shallow in places, and has a very treacherous current. The coastal plains about the island are, as a rule, very narrow, the maximum width being about 10 miles. The mountains are nearly everywhere close to the sea. The dominant features of Luzon, as of other portions of the archipelago, are the enormous coast line and the mountainous char¬ acter of much of its interior.

Roads and Industries. — There are a number of fine roads in Luzon, which centre at Manila, connecting it with remote points. In 1917 there were 616 miles of railways in operation. All the staple crops of the archi¬ pelago grow in abundance, and the chief in¬ dustries of the island are agriculture, and the development of the products into the advanced forms of manufacture; the mechanical indus¬ tries^ are very largely confined to Manila. Luzon is also rich in forests, having all the woods used in building, as well as the gum- producing, medicinal and dye-trees.

Mineral and Agricultural Products. — Gold is found in Nueva Ecija; copper (in the form of arsenates and sulphides) in the Mancayan-Suyoc district of the Mountain province ; iron occurs in a fairly well-defined belt which follows the east coast for a short distance,

D

E

122 0

G

123°

H

Pt. Cabicungan

1 Hermanob Iblandb> Gran Laja C. Eqgano frf Escucha I.

.Palaui Is], and Esearpada

Pasuquin

18

17

Sevllla\c

&

Bolinao rV. XI!. Bolinaoˆˆpˆvˆ Pt. Piedray

*Zaragoza Olanin Bay**

Tagudin/ˆˆBUMˆAN ° ...

Raivˆar Mt- Giiiravan

SamacpacaL/ˆ/jˆW, .8t“ˆo Pt. Darigayos/- '"/“."f*

Bacnotanb . „

S.Juan£c EaMakMJtLA?ˆ

Fm.anJ. Har-lˆC San/Vf /§ >'i

lVrltuiulo §“5“!p5j Daklaif

Bauantfl E N G U £ T ilbkc

NaguifliarDP13dl8ˆ o/nibiay-ˆv// n 1 w LaTHnidad-'ˆˆ

Si?iT'A001- Aringayt "TlTˆT "'I ■

Tub\a° JjjV 'ˆA

AgooV o Bam

AEARRUYAN IJ \ ˆ ˆ !

i Sto. TomabjJ, /I ' Twin Peaks "Vc

... Lingayen'\ o\S)[?sjji*

Pt. Reno | ani A gno Bay Alamiho

Pt.Baran

,, -.ysario

"0

Badoo l.- Sinait Cabugao

Salomague L.ˆ u ˆ

Lajiog Bay\ o life o i t MlKslngaREaˆPaS

SaloiMgu. J.yˆ gˆVioO,

Sto. Domingo o

*S. Melon*0 Btt®,, C. istill Sta. Catalina P*

VlganVˆTs. QuiAtiSP, _ _

c.A«r'®J?nt. O' f

Sta. MariajˆQ

'H°o

Dt)u>

ngaquSS'gˆn]ˆ| -Banco or s

Sta. Lucla\o „ TlbT5"&w -Banco o«i | a

Sta. Cnuˆl Sgggw JSfSp -n V. , f\ ' ' ° '*

Divilacan Bay

Port Dimalansan

Palanan Bay Pt. Palanan

LUZON ISLAND

SCALES

Statute Miles, 3G= 1 Inch.

Kilometres, 50=1 Inch.

0 5 10 20 30 40 50 60 70

Rand McNally's New 11 x 14 Map of Luzon Island. Copyright by Rand McNally & Co,

18"

Saiwoae vunuuu v- ^_ iA'—'\ .

/ Cervˆi\ˆefeˆ"»>u'ˆ y o Sabarigan U

te /#./

,£ozocrvbi5ˆ

'ctlagueˆ. "'Uv""

*aJˆF**

Pt. Disumangit

Digollorin Bag

. Dinapiqui r Dilasac Bay

vt

Port Alasi Salvador -Matalaba Palauig Bay

Los Capones.

Gabanatruan

"fjSibul" S. Miguel1"""

*4,593 ftS Pt. Luzon l. MarivelesVj Monja L-**

p;i _ _ MalabonV

rnarˆ A y Caloocah

14

11

niu\an U “U „ ˆˆae iviT c pananao

UI15ANG IS. LASmV ˆ4′ JCˆm°U““

— > 4otˆ2t'

NasugbuUˆJ-,'.

Fortune I.' ,

iyqitijtu tYi'fot n’Mˆi

AJ t

~

Cl

2. S. Ildefonso

D

c

(MpaViBa’1

c

t. Banla

Upˆ Uala Is.

0 ˆ

BAYˆf /)Cabalete I.

LUBANG

Looc Bay golo ir'1

_ U ^ . “to

ˆai/ v j I5;itˆtn g;," ˆ ' V'of . Tayahas ˆ Bay

r, MABICABAJIJjUˆ- # Bmtigui Of,'-

I. Locoloco

C. Santiagoˆ Balayan .

’Ve

Ss/,

Pt. .Pantocomiˆ u™

;3

13

V Q.

-oˆ°

£ Lantao L

JOMALIG I.

Pt. AgtEt

PlNACOAPAN L

Samur 1.0 _ . mCuA,.

Pt. p. Tinaga L

J6

VˆO/ ˆ

Gumtinua I.

dr. % LAuliA

rT.

scan I.

Pa lupart y \ Ba g

MmAL. > A£oeli I- ParacaleM '■P*flu L MatJndumaten I.*

Ilodan

eN ie^ S.'

Gumaca

«Lopez- .

*Unisa^G/^W^*

,

v _ _ _ _ t_ ^

Pl-^"T sigaganBag TuquianU^v^ ^

■^crssaere ^VerdeI. Pt. Malabrigo Pt. San Andres, anjrayas isTt c^v Pt pu^vP^VP) ^ >

Medio Bay Port Banalacan^^rC^A^ ^^p^V^ Ab^^Pusgo^Tanuan^^V \ M

*r rtr.a-.,tin*fi-BAC0a Is. . SK\&r'*- Crd? r ^J^laWX^Po > 7 Pusgo^ Pasacao ^ — U '-aV*

*MLON.r I. Pt. > Jte. *cwi > arS^W^ J1 •*

*•Sil > TNaguiba MAEfe#4PtGvagU^S^'"“'"^*

5 “pt1! Balingauan Gi„XR^a|.njigr

Rb"1

ABUGAN iaponan • • Z?i „

FatoakI...

t'

. i(> Cay08 del Bajo _ Aro I.U MosokX^-P0^'0” ° ^

*V*b – . u*

*%. Inront^^*

Colocoto or North Rock £ ˆ MagaranD ˆ

Pt.

MelchorALˆ,-ˆ

Tres Pt. Dumali \ M A " •

Carlota I.o

_ o

Pt. Suban

Pt. Bondoc

0 Is,

Dos Hermanas Is.

t. Balete .

Bantoncillo Maestre DE CAMPO I.

JPt. Arena

™p“ˆ ij

S. PaSˆ

*Pt. Guinduganan**

amuraon

Bag

Caurusau

ˆ Pantao Pa i/

Colorado y£> J Port

Busaingtt

I <ˆJ Banton I.

0

f Simara II

Bongabon

Pt. Origon [

*Pt. Duyagau Andagao^*

Pt. Sangilan (T

&

■

^S. Miguel I.

VV^Cacraday i.

VA, C^Syi- Guininyan I. B;^.2^rkJ>AIAHl.

BURIAS

• Cobra dor T. o Alad L-

•^KOMBLONr. xX9»eS 9

Parnagoialb ^°T \Ro\ublon Canloa/

MamalayBay .earpagoj f /SaL^joz^* /^O-gXnbug*

Odiongan/j fAHI.AS (.SililAAN"

11

Mabiton

Cabarian

Pt. CatundulanN

Don Sol£

Pt, Dumaquitv . _

MALUMAHUAN 1.^ f

*Ires Marias BagaTAO I. **

13

Catpatin I.

Pt. Bugui

Majaba Lp

*onI. av^*

>1 > . M' Capulft Sd" ^ cap\t

120

B

C

121 0

Longitude E East from F

Greenwich.

123 0

724 a

LUZZATTI — LYALL

767

beginning in the Camarines and then turning toward the interior, where it reaches, so far as our knowledge now goes, its greatest develop¬ ment near the town of Angat in Bulacan province. One of the principal localities in which coal is found is Batan Island, Albay province, where it is of a sub-bituminous variety, with volatile combustible, 39.98 per cent ; fixed carbon, 48.80 per cent ; ash, 5.70 per cent ; moisture, 5.74 per cent and sulphur, 0.66 per cent. Salt springs occur in the Mountain province. Agricultural products are those of the buri and nipa palms (buri and tuba), cocoa, coffee, cotton, tobacco, hemp, pineapples, bananas, betel nuts, copra, mangoes, corn, rice, sugar, sweet potatoes, etc. The live-stock raised on this island is given as two-thirds of the total (including domestic animals and poultry) for the entire archipelago.

Salient Facts. — A writer in the Journal of Geology (Vol. XXI, pp.

29-61, Chicago 1913) observes that ((because of its great strategic importance and because it is the home of the only Christianized people of Malay origin, Luzon is of more than passing interest. Geo¬ logically, it is worthy of constant study as it is a link in that great Circle of Fire which girds the Pacific. As a mining field, evidence is already abundant that Luzon will before many years have a place in the very first rank.® He adds that its geographical position is also noteworthy, this beins: a region of tremendous rainfall (45 inches in 24 hours, Baguio Ob¬ servatory record, July 1911) and in the track of the most frequent and violent typhoons; and that as it extends to lat. 21° N. and has much high level country, which is at the same time fertile, it should be colonized bv white men. Historically interesting are the following facts: It was the first of the Philippine Islands to come under the control of the United States; it was the scene of the earliest military opera¬ tions against the insurgents, and the base of operations for campaigns of occupation of the other islands. See articles on individual provinces and general article Philippine Islands.

According to the official post route maps, showing post-offices, etc., in operation on 1 Oct. 1914, Apayao, Kalinga, Lepanto, Bontoc, Ifugao and Benguet are all included in Moun¬ tain province. The total number of Luzon's inhabitants (including about 220,000 uncivilized) is. in 1917. somewhat more than 3,800,000. Con¬ sult (Census of the Philippine Islands, taken under the Direction of the Philippine Commis¬ sion > (Washington 1905) ; Philippine Journal of Science (Vol. V, Manila 1910) ; Wilcox, M., (Harper's History of the War in the Philip¬ pines J (New York 1900) ; Worcester, D. C., (The Philippines Past and Present* (New York 1914).

Provinces and Population. — The provinces into which Luzon is divided are as follows:

Albay.

Apayao.

Ambos Camarines (Norte and Sur).

Bataan.

Batangas.

Benguet.

Bulacan.

C apayan.

Cavite.

Ifugao.

Tlocos (Norte and Sur). Isabela.

Kalinga.

Laguna.

La Union. Lepanto-B ontoc. Nueva Ecija. Nueva Vizcaya. Pampanga. Pangasinaru Rizal.

Sorsogon.

Tarlac.

Tayabas.

Zambales.

LUZZATTI, loo -tsat'te, Luigi, Italian

statesman and financier: b. Venice, 1841. Of a wealthy Jewish family, he studied law in the Instituto Tecnico at Milan and was appointed (1867) professor of political economy at the Padua University. In 1870 he was elected a member of the Chamber of Deputies but the election was declared illegal because he had not yet become of the necessary legal age and he was not admitted till 1871, after a third elec¬ tion had been held. He quickly gained fame on questions of finance and was several times mem¬ ber of the Budget Committee. He was Minis¬ ter of the Treasury (1891-92) in the Rudini- Nicotera Cabinet and filled that office also 1896- 98, when he went to Perugia as professor. In 1903 he was given a portfolio for the third time as Minister of the Treasury under Giolitti, con¬ tinuing in office under Sonnino (1906). In 1910 he became president of the ministry with port¬ folio of Minister of the Interior. He wrote (Lo Stato e la Chiesa nel Belgio (1866) ; (I1 socialismo e le questioni sociali dinanzi ai par- lamenti d'Europa) (1883) ; cLe classi dirigenti e gli operai in Ingkilterra* (1893); (La liberte de conscienze et de science) (1910).*

LUZZATTO, loo-tsat'to, Samuel David,*

Jewish theologian and Hebraist: b. Triest, 22 Aug. 1800; d. Padua,

29 Sept. 1865. He greatly advanced the study of Jewish science independ¬ ently through such work as translating the He¬ brew prayers and biblical works such as the Pentateuch with the Ilastarot, Isaiah, Job, etc., into the Italian, through commentaries, disserta¬ tions on the Hebrew and Chaldaic languages,. Targum Onkelos, Kabbala, etc. He issued treasures in manuscript from his library and sent many monographs to the periodicals. Among the most prominent of his other works are (Eleinenti grammaticali del caldeo biblico e del dialetto talmudico babilonese) (1865) ; (Grammatica della lingua ebraica) (1853) ; Untroduzione critica ed ermeneutica al Penta- teuco) (1870).

LVOFF, l'vof, Alexei Fedorowitch, Rus¬ sian violinist and composer: b. Reval, 6 June 1799; d. Kovno, 7 Jan. 1871. He obtained a thorough training on the violin early in life but continued his studies after entering the army. His zealous work brought him the rank of major-general and adjutant of the Emperor Nicholas as well as director of the choir at the court (1837-61), during the same time acting as inspector of musical education at the schools. Toward the last he lived a retired life on ac¬ count of his loss of hearing. He composed (1833) the music for the Russian national an¬ them, (God protect the Tsar for the ceremony of unveiling the monument of Shukovski, who wrote the words. Among his operas are (Un- dine) (1848), his only one that was a success; (Bianca e Gualterio-* (1845) ;*

LYALL, ll'al. Sir Alfred Comyn, English

author and civil servant: b. 1835; d. 10 April 1911. He was educated at Eton and Hailey-

bury, entered the Bengal civil service and served with distinction in the volunteer cavalry during the Indian Mutiny. He was appointed home secretary to the Indian government in 1873, and foreign secretary in 1874, and was governor of the Northwest Provinces of India 1882-87. He was afterward a member of the Council of India, 1888-1903. He was the founder of the new university of Allahabad. He was created K.C.B. in 1881, and G.C.I.E. in 1896. He was the author of (Verses Written in India> (1889) ; (British Dominion in India (1893); (Asiatic Studies> (1882, 1899); by H. M. Durand, was published in 1913.*

LYALL, Edna. See Bayly, Ada Ellen.

LYALL, James, American inventor: b. Auchterarder, Scotland, 13 Sept. 1836; d. New York, 23 Aug. 1901. He was brought to this country as a child ; when old enough worked at loommaking in his father's shop ; was a soldier of the 12th New York Infantry during the early part of the Civil War; and afterward became a manufacturer of jute and cotton goods and of machines. He designed corset-making machin¬ ery and produced the first machine-made corsets ever manufactured. He also invented a water¬ proof varnish, and in the latter part of the war knapsacks and haversacks waterproofed by his process were largely used in the Union army. The Lyall positive-motion loom, for weaving wide fabrics, was invented by him in 1863. Va¬ rious other inventions of his are much em¬ ployed in cotton manufacture. He received many medals and decorations, including the gold medal of honor from the American Insti¬ tute, bestowed on him in 1869.

LYCANTHROPY. See Were- Wolf.

LYCAON, H-ka'on, a mythical king of Ar¬ cadia, generally represented as a son of Pelas- gus by Meliboea, daughter of Oceanus, and de¬ scribed by some as the first civilizer of Arcadia, by others as a barbarian who defied the gods. He became by several wives the father of a great number of sons, so notorious for arro¬ gance and impiety that Jupiter resolved to pun¬ ish them. Appearing to them at their dwelling in Arcadia disguised as a poor man, they invited him to a repast, at which was served up the flesh of a boy whom they had murdered. The god, rejecting the food, transformed Lycaon and all his sons save one into wolves, or according to other accounts destroyed them by a flash o£ lightning. The flood of Deucalion was said by some to have been a consequence of the crimes of the Lycaonidae.*

LYCAONIA, lik-a-o-'ni-a, Asia Minor, the name of an ancient division which was bounded north, east, south, southwest and west by Gala¬ tia, Cappadocia, Cilicia, Isauria. and Phrygia, and is now included in the Turkish province of Caramania. It is a somewhat bleak region; sheep and wild asses were bred here in ancient times. Lycaonia is first mentioned in Xeno¬ phon's history of the expedition of the younger Cyrus as belonging to the Persian Empire. After its conquest by Alexander and his death, it was attached to the kingdom of Syria, and subsequently came into the possession of

Eumenes, king of Pergamus, while the other part was ruled by native

chieftains. In the lat¬ ter half of the 1st century b.c. it was conquered by Amyntas, king of Galatia, with which coun¬ try it passed on his death to the Romans under Augustus, being annexed to the province of Cappadocia. The inhabitants, according to the Acts of the Apostles, spoke a peculiar dialect. They were warlike and skilled in archery. The principal town was Iconium, now Konieh, which stood close by the great highroad from Sardis and Ephesus to the Sicilian gates. Consult Ramsay, historical Geography of Asia (Lon¬ don 1890) ; and cCities of 'Saint PauP (New York 1907).*

LYCEE (French for lyceum), the designa¬ tion in France for state schools for secondary or intermediate education providing a three years' classical course preparatory to the higher and final courses of instruction given by uni¬ versities, with their faculties of letters, law and medicine. The number of lycees for boys is 112, with an average attendance of 63,000, maintained at an annual expenditure of nearly 45,000,000 of francs; the number of lycees for girls is 52, maintained at an expenditure of about five and one-half millions of francs. Nearly 5,000,000 of francs are devoted annu¬ ally to scholarships and prizes in lycees for boys and girls. There are also communal col¬ leges for secondary education, comparable to the American high school. The course of studies in the lycee, however, is of a much more extended character than that of the communal college, the lycees of the larger towns prepar¬ ing students for positions in the different ad¬ ministrative departments of the national gov¬ ernment. The lycees originated under the first republic, and their courses of instruction, ad¬ ministration and discipline occupy an import¬ ant position in the decree of 17 March 1808, on the reorganization of the university system. From 1815 to 1848, during the restoration of the monarchy, the lycees were called royal col¬ leges (colleges royaux).

*LYCEUM (Latin, from the Greek Lykeion the great gymnasium of ancient Athens), a school of higher, education preparatory to the work of the university; and in a secondary sense, a public building or hall in which lectures of a scientific and informative nature are given. A later meaning of the word, which has, in the United States and 'Canada pretty nearly sup¬ planted its more primitive significations, is that of an association for literary and educational improvement. The American Scientific Lyceum was the idea of Josiah Holbrook of Derby, Conn., who, in 1826, organized the <(Millbury Branch No. 1 of the American Lyceum.** Hol¬ brook was one of the first advocates in the United States of the necessity of teaching the natural sciences in American schools. Previous to 1826 he had spent some years lecturing from town to town throughout Massachusetts*

and Connecticut on geology and mineralogy and incidentally on others of the natural sciences ; and he organized, in the various villages and towns where he lectured, societies for the pur¬ pose of collecting specimens and the extension of mutual aid on the part of the members in their study of science. His efforts, long per¬ sisted in, did much to introduce into the public

schools of the United States the systematic and practical study of the natural sciences. Hol¬ brook dreamed of seeing established in every town and village of the United States a branch of what is called ((The American Lyceum,® with library and natural history, minerological, geo¬ logical and other specimens, catalogued, grouped and arranged in the best manner for study on the part of the members of the lyceum, who were expected to mutually aid one another. According to his plan there were to be country, town, State and national lyceums, the national lyceums being composed of delegates from the State lyceums, and the latter of delegates from the country and town institutions. Some 15 neighboring villages responded to Holbrook's call within a few months of the organization of the Millbury branch. By the end of 1827 these had increased to over 100; and a year later there were lyceums in nearly every State in the Union ; and by 1834 some 3,000 lyceums had been established in towns throughout the United States. Some States, like Massachusetts, ap¬ pointed State boards to promote lyceum work. The States ran races with one another in their efforts to organize State lyceum associations. New York was the first in this race, but was followed closely by Massachusetts and several other New England States. Florida, too, was up near the top of the list. In May 1831 a convention for the organization of an American Lyceum met in New York City representing, through its delegates, over 1,000 town lyceums. The new organization took its stand for <(the advancement of education, especially in the com¬ mon schools, and the general diffusion of knowl¬ edge.® A national convention was held in 1839, constituting itself the American Lyceum Union; and its enthusiastic meeting, which was extensively reported in the press, had very con¬ siderable influence upon the improvement of the public school system of the United States. It and the State and town lyceums bequeathed to the American people educational, literary and other associations, lecture bureaus, scientific societies and a nation-wide interest in the study of science. From one end of the land to the other men prominent in educational, literary, ecclesiastical and

political life took an active part in the lyceum movement, and the larger cities were as active and enthusiastic in the work as the towns and country villages. There was scarcely a New England town that, did not have its lyceum organization. In this work Boston led the way, and its lyceum was pre¬ sided over for several years by no less a per¬ sonage than Daniel Webster. Down into the closing years of the 19th century the activity of the lyceum continued to hold aloft the banner of self-instruction through lectures, debates, classes for study and mutual help, essays, con¬ versation and public readings and recitations. Weekly meetings were generally held and home talent, for the most part, supplied the program free of charge during the first 15 or more years of the life of the lyceum. About this time some of the more flourishing of the town and city lyceums began to pay the traveling ex¬ penses and even to occasionally, offer a small fee for the services of some bright particular star of some other lyceum. Concord paid Daniel Webster $100 for a lecture and Ralph Waldo Emerson and Thoreau were in demand vol. 17 — 49

as attractions for special lyceum events. The custom of paying lecturers once established, a galaxy of lyceum stars soon appeared in the horizon. Among these were Starr King, Theo¬ dore Parker, Horace Greely, Edward Everett Hale, Henry Ward Beecher, Oliver Wendell Holmes, Agassiz, Lowell, James T. Fields, George W. Curtis, Edwin Whipple, Wendell Phillips and Charles A. Dana. It was about this time that the professional lecturer made his appearance. Emerson led the way, being immensely popular and may be said to have created the profession. He was soon followed by John B. Gough, Willits, Curtis, Whipple, O. W. Holmes, Bayard Taylor, W. L. Garrison and Fred Douglas. The most brilliant names in the history of American oratory began to appear on lyceum programs ; among them being those of women lecturers who were later on the road to achieve national reputations. Lucy Stone, Anna Dickinson, Elizabeth Cady Stanton and Mary Livermore were among the <(burning brands® of these early days of lyceum activity and enthusiasm.

Lyceum Reconstruction. — The heat of po¬ litical opinion occasioned by the agitators pre¬ ceding the outbreak of the Civil War and the years of the war itself destroyed fully 90 per cent of the lyceums throughout the land; and when the war was over there was little left of them but the material with which to begin building anew. Although the lyceums had fared badly they had left behind them a won¬ derful abundance of high class talent which was to be found, for the most part, in the East. In 1867 the ˆAssociated Western Literary Soci¬ eties® was organized for the purpose of bring¬ ing west, through the mutual efforts of the Western lyceums, the best

Eastern lecturers. The first year the organization, which con¬ sisted of 110 lyceums, brought west 35 lecturers and gave them consecutive dates at much better pay than they had ever before received. The association was a success from the first, and after three years it joined hands with the Amer¬ ican Literary Bureau of New York. The Boston Lyceum Bureau was already in the field in 1868, and the Williams Lecture and Musical Bureau began business the following year. The East had begun to outbid the West for the best lyceum talent and got it. The greatest names of the day appeared on the lyceum bureaus' bill of fare. The thorough organization of the lec¬ ture field followed and the popular lyceum stars soon found themselves in clover. Early in his career as a lecturer Mark Twain received $300 a night and Beecher $500. Among those who received $200 and upward for a single lecture were Barnum, Robert Collyer, Anna Dickinson and Gough. The Pond Bureau suddenly raised these high prices in order to secure the best talent in the field, paying Beecher $1,000 per lecture and Henry M. Stanley, just back from Africa, $100,000 for 100 lectures. Stanley's first lecture brought in almost $18,000. So great was the demand for good lecturers that there were not enough to fill the bill, and readers and mus¬ ical entertainers were pressed into service. Some of the former, like Helen Potter, Mrs. Scott Siddons and Charlotte Cushman became immensely popular and were eventually as highly paid as the lecturers. Musical clubs, lyceum opera companies, concert companies and dra-

matic readers became a fixed part of the lyceum program ; and the expenses of the bureaus arose to such high proportions that more organization was necessary to meet them. Then the advance agent, the seller of lyceum talent, was put upon the road and scores of new bureaus for the handling of lyceum talent came into the field. By the end of the 19th century these numbered over 100 and five years later they had reached 150, with thousands of entertainers of all kinds on their lists.

Chautauqua Societies came to intensify the life of the lyceum movement. By this time these societies had already neared the 500 mark, and they went on increasing rapidly and in so doing made further demands upon the efforts of the bureaus. The organization of talent into bands which gave their time, throughout the summer season, to the summer Chautauqua fol¬ lowed, and the selling of

bureau talent became the business of trained agents who completely covered the country.

Out of these Chautauqua courses sprang Uni¬ versity Extension work with its many ramifica¬ tions; and the free lecture courses furnished by schools, colleges, other institutions, cities and towns. Of these the most noted are the free lecture courses of the New York City board of education. Boston, Chicago, Milwaukee, Philadelphia and other large American cities have been active along this line. The natural result of all this activity was the organiza¬ tion, in 1903, of the International Lyceum Association in Chicago, which has yearly, since that date, held meetings of several days' duration in some prearranged city, such as Philadelphia, Elkhart, Ind., Valparaiso, Ind., and Chautauqua. The lyceum movement early extended to Canada where it became very active, established talent-selling bureaus and perfected its own organizations. (See Univer¬ sity Extension ; Chautauqua Societies ; Lit¬ erary Societies ; New York City Free Lec¬ tures; International Lyceum Association). Consult the biographies of Beecher, Gough, Emerson and other noted lecturers mentioned in this article, Lyceum Magdzine, Lyceum World, and Wright, A. A., (A Brief History of the Lyceum) (in (Who's Who in the Lyceum, > Philadelphia 1906).

John Hubert Cornyn, Editorial Staff of The Americana.

LYCEUM MOVEMENT, an educational project launched bv Tosiah Holbrook at Mill- bury, Mass., in 1826. Its primary object was to establish lyceums in various cities to stimulate educational institutions and ventures along three lines: (1) the improvement of the public schools; (2) the organization of libraries and museums; (3) the formation of lecture courses and the establishment of classes for the educa¬ tion of adults. The movement became exceed¬ ingly popular, especially in regard to the second and third purposes. Noteworthy monuments testifying to the work accomplished are the Lowell Institute and the Mercantile Libraiy Association in Boston, and the Brooklyn Insti¬ tute. The American Lyceum Association was organized to further the plans of the movement. It was active in stimulating a live interest in the public school question, in introducing new subjects and equipment into the school curricula ; furthering education of girls and women and

correlating the work of. the secondary schools with that of higher institutions of learning. A number of lyceum bureaus were established to serve as central offices for making arrange¬ ments for speakers, exhibits, etc., and for the gathering of information for

lyceum centres. The school work of the lyceum movement is carried on largely to-day by the various educa¬ tion and teachers' associations; its program for the education of adults has been absorbed and enlarged by the Chautauqua and University Ex¬ tension (qq.v.) movements and various women's and civic clubs ; and the American Library As¬ sociation has taken over the work of establish¬ ing libraries.

LYCH-GATE. See Lich-Gate.

LYCHNIS, lik'nis, a genus of plants of the pink family (Silenacece) comprising many species well known both as weeds in waste places throughout the northern hemisphere, and as garden ornaments. They have a five-toothed naked calyx, five clawed petals, 10 stamens, and five styles, with flowers generally in termi¬ nal corymbs. Ragged Robin, or cuckoo-flower (L. flos-cuculi), a native of Europe, is often cultivated and sometimes runs wild in the United States; white campion (L. alba) is another species naturalized from Europe; as also are the red campion (L. dioica), and some others. Many foreign species are cultivated in gardens, among which are the scarlet lychnis (L. chalcedonica) and the mullein-pink (L. coronaria) . Several species are indigenous to Arctic North America.

LYCIA, lis'i-a, Asia Minor, an ancient maritime province, bounded by Caria on the west, Pamphylia on the east and Pisidia on the north. Its fertility and populousness are at¬ tested by the 27 cities mentioned by Pliny, which formed a confederated republic, with a congress which regulated the public concerns, and a presi¬ dent called the Lyciarch. Lycia was colonized by the Greeks at a very early period, and its his¬ torical inhabitants were Greeks, though with a mixture of aboriginal blood. They and the Cili- cians were the only people west of the Halys whom Croesus did not conquer, and they were the last who held out against the Persians. Con¬ sult Fellows, (Account of Discoveries in Lycia)

(1841).

LYCIDAS, lis'i-das. A pastoral elegy con¬ tributed by John Milton to a memorial vol¬ ume published at Cambridge in 1638 in honor of Edward King, a prospective parish priest, who, while on a voyage to Ireland, perished in a shipwreck off the Welsh coast in August 1637. Little is known of Milton's relations with King or of the circumstances attending the writing and publishing of 'Lycidas, but there is evi¬ dence that the poet bestowed much pains upon his elegy which has come to be regarded as a masterpiece in its kind, being*

practically un¬ surpassed in English poetry in rich beauty and noble harmony. Tennyson told Edward Fitz¬ Gerald, who seems to have shared the opinion, that cLycidas) ((was a touchstone of poetic taste.®

In kind the poem holds by the pastoral elegies of the ancients, Theocritus, Bion, Moschus, Virgil and of their Renaissance imi¬ tators, but it dispenses with some typical features, e.g., the refrain, and it swells, partic-

ularly in the passage that introduces Saint Peter denouncing the corruption of the English clergy, to an ode-like intensity of lyric utterance that might warrant the claim that in (Lycidas> Mil- ton created a new form of elegy, one blending the primary poem of lamentation with the pastoral and the ode. The exceptional features to be observed in the verse-lengths and the rhymes, which show Italian influence, give color to this view. Few poems better repay the student who is interested in the sources from which a great poet draws his materials, but such study of (Lycidas) only enhances respect for Milton's art and leaves his right to be re¬ garded as essentially original unimpaired.

Admirers of

William P. Trent.

LYCIUM, a genus of shrubby and thorny, erect or climbing plants of the Solanacece family, about 75 species of which are scat¬ tered throughout the temperate and warm parts of the world. Of the American species none is noteworthy except one naturalized from Europe called box-thorn or matrimony-vine (L. halimi- folium), which bears funnel-form flowers, pur¬ plish changing to greenish, and red berries.

LYCOMEDES, Hk-6-me'dez, legendary king of the island of Scyros. He was the son of Apollo and Parthenope, and Thetis gave to him the charge of her son, Achilles, disguised in woman's apparel, to prevent his going to the Trojan War.

LYCOPERDACE.7E, li"kd-per-da'se-e. See

Fungi.

LYCOPHRON, H'kof-ron, Greek poet and grammarian : b. Chalcis, Euboea, 3d century b.c. He lived at Alexandria, under Ptolemy Phila- delphus (283-247), whose favor he won by the invention of anagrams. Of all his writings there remains but one tragedy,

It is, properly speaking, a continued soliloquy, in which Cassandra predicts the fall of Troy, and the fate of all the heroes and heroines who shared its ruin. It affords some informa¬ tion of value respecting antiquities and mythol¬ ogy.

LYCOPODIALES. See Ferns and Fern- allies.

LYCOPODIUM, the principal genus of club-mosses (q.v.), containing many species of the northern hemisphere, of which several be¬ long to the United States. They are low creep¬ ing evergreen plants. A common example is the ground-pine (L. clavatum), which creeps upon the ground in heathy tracts with long, branch¬ ing stems. L. rubrum is a violent cathartic, and has been used successfully in Spanish America in cases of elephantiasis. L. clavntum and L. selago excite vomiting. The yellow powder contained in the spore-cases of all the species is very inflammable, and is employed in the manu¬ facture of fireworks and in the flashing of torches or production of mimic lightning on the theatrical stage. It is also employed to cover pills, so as to prevent them being acted upon by moisture, and is known in England under the name of lycopode or vegetable brimstone, and in Germany as Blitsmehl or Hexenmehl (light¬ ning meal or witches' meal). Many of the species are prized for their beauty, and are cultivated in hothouses or fern-cases, where they thrive well.

LYCURGUS, li-ker'gus, Spartan lawgiver; flourished in the 9th century b.c., according to the commonly received traditions. He was the youngest son of the Spartan king Eunomus. His eldest brother, Polydectos, succeeded his father in the government, but died soon after. His wife proposed to Lycurgus to destroy her unborn child by her late husband, if he would share the throne with her. When she gave birth to a son, Charilaus, Lycurgus proclaimed him king, and became his guardian. Being desirous of examining the political constitutions of other lands, Lycurgus left Sparta. On his return the entire community requested him to draw up a constitution for them, and he undertook the task. The old constitution was completely remodeled ; the highest position in the state was to be shared by two kings, whose powers were coun¬ terbalanced by a senate (gerousia) . The peo¬ ple obtained a voice in public affairs. The native race or Lacedaemonians were confined to the pursuits of trade, commerce

and agricul¬ ture; the Helots or slaves to all those menial employments which a freeman would consider as a disgrace ; while the Spartans became the warriors of the state. Lycurgus also intro¬ duced a redistribution of property. Obtaining from the god at Delphi an approving oracle for his institutions, he exacted a promise from his countrymen not to make any alterations in the laws before his return from a journey he was about to make. He then left Sparta, de¬ termined to finish his life in voluntary exile in order that the Spartans might be bound by their oath to preserve his constitution inviolate forever. The time and place of his death are unknown.

LYCURGUS, one of the 10 Attic orators; b. Athens, 396 b.c. ; d. there, 325 b.c. He was a pupil of Plato and of Isocrates. In 343 he was sent with Demosthenes on an embassy to coun-

teract the intrigues of Philip. He won his chief glory as guardian of the public revenue 338-326 b.c. The decree of the Athenians commending his administration of this trust (307 b.c.) is still extant. He was also appointed superin¬ tendent of the city, and censor, and in the latter capacity caused his own wife to be fined for violating one of his sumptuary enactments. Of the prosecutions which he conducted, the most celebrated was that against Lysicles, who had commanded the army of Athens at Chaeronea; Lysicles was condemned to death. There were 15 orations of his extant in the ages of Plutarch and Photius, but all have since perished except that against Leocrates, and some fragments. Consult Jebb, R. C., (The Attic Orators) (3d ed., Oxford 1907).

LYDDA, Palestine, town mentioned under the name Lod several times in the Old Testa¬ ment; later known as Diospolis. It is about nine miles east of Joppa and appears to have been built mostly by the Benjaminites, though considerably outside of their territory, being within the confines of Ephraim and on the road to Jerusalem. The place gained importance under Vespasian and finds a description as a village equalling a city in size by Josephus. Here Peter healed ZEneas and a church was erected to commemorate the event. Cestus Gallus (65 a.d.) burned down the town but it was soon rebuilt. Ecclesiastical annals tells us this place became the seat of a bishop, being especially distinguished as the probable birth¬ place of the

celebrated Saint George and assuredly his burial-place, a handsome church at some uncertain date being erected there to his honor. At present this town, spelled gen¬ erally Ludd, is a village only of considerable size and is surrounded by fine gardens and orchards.

LYDDITE, a high explosive which was adopted by the English government in 1888 for charging its torpedo-shells. Its composition has been varied from time to time, but a typical formula is picric acid 88 per cent, dinitrobenzene 8 per cent and vaseline 4 per cent. These mate¬ rials are melted and mixed together in a water- bath, and while in the fused condition they are poured into the shells, where, on cooling, they solidify to a stone-like mass, bright yellow and bitter to the taste. A central canal is left in the explosive charge in which is placed a detonator containing ammonium picrate by which the charge is exploded. Its fumes are suffocating and it is supposed to kill by shock, or suffocate. It is stable under varying tem¬ peratures. This explosive was practically tested in the Boer War and the results were very disappointing, mainly because the positions selected by the Boers were such as minimized its destructiveness. It is, however, still believed to be an efficient explosive for use against armor. The explosive owes its name to the fact that the first experiments made with it were carried on in the environs of the village of Lydd in England.

LYDEKKER, Richard, English naturalist : b. 1849; d. 16 April 1915. He was educated at Cambridge University and was a member of the staff of the Geological Survey of India 1874-82. He prepared for the British Museum in 1884, a catalogue in 10 volumes of the fossil mam¬

malia, reptilia and birds therein, and was in Argentina, 1893-94, to examine the mammals in the La Plata Museum. Among his numerous publications are (Phases of Animal Life) • Geographical History of Mammals) ; (The Deer of All Lands> (1898); (Wild Oxen, S'heep and Goats of All .Lands, Living and Extinct > (1898) ; descriptions of South American Fossil Animals) ; (The Game Animals of India, Burma and Tibet > ; (The Game Animals of Africa) ; (The Sportsman's British Book) (1908) ; (Mostly Mammals: Zoological Essays) (1903) ; (The Ox and Its Kindred and the Sheep and Its Cousins } (1912).

LYDGATE, lid'gat, John, English monk and poet: b. Lydgate, Suffolk, about 1370; d. Bury Saint Edmunds, about 1450. After study¬ ing at Oxford, and visiting France and Italy, he entered the monastery of Bury Saint Ed¬ munds, and established a school for instructing the

sons of the aristocracy in versification and composition. He began to write about 1400. His chief works are his (The Falls of Princes) (1430; first printed 1494) ; (Story of Thebes) (1420) ; and (Histoire, Siege, and Destruction of Troye) (1412-20). His minor poems were published by the Percy Society in 1840. Ritson, in his (Bibliographia Poetical gives a complete catalogue of his works. Lydgate was an ad¬ mirer of Chaucer, whom he imitated in (The Story of Thebes, > a Canterbury tale in 10 syllabled couplets. An edition of his (Troy Book, edited by Berg was published at Oxford in 1906.*

LYDIA, lid'i-a, Asia Minor, the name of an ancient large and fertile country, inhabited along the coast of the Ionian Sea by the Ionians. Toward the south it was separated from Caria by the Mseander (now Meinder) ; toward the east it was bounded by Phrygia and on the north by Mysia. It was in early times a kingdom, divided from Persia by the river Halys (now Kizil Irmak). Its original inhabit¬ ants were a people called Maeonians, either of Semitic or of Indo-Pelasgic origin. This race was subdued by the Lydians, a Carian tribe. It attained its highest prosperity under the Merm- nadae dynasty, beginning with the semi-mytho- logical Gyges (716 b.c.), and ending with Croesus (546 b.c), who was conquered by the Persians under Cyrus. The people were the richest and perhaps the most effeminate in all Asia. They delighted in luxurious garments, costly carpets, precious ointments and exquisite viands, and a kind of Grecian music called the Lydian. They also laid out beautiful gardens. Their example corrupted the Ionians. The wealth of the Lydians, however, was probably, in a great measure, confined to the kings and chief men. These could fill their coffers with the gold washed down by the Hermus (now Sarabat) and the Pactolus, and that obtained from the mines; and they procured all the necessaries of life by the labor of their slaves. The Lydians are said to have been the first to coin money and to establish inns ; they are cred¬ ited with the invention of certain musical in¬ struments, the art of dyeing wool (which was afterward carried to such perfection in Miletus), also the art of melting and working ore. At Sardis, the capital of the country, the

Grecians, Phrygians and even the nomadic tribes bartered their goods. There was here a great market for the slave-trade, which fur¬ nished the harems of Persia with eunuchs. The great tumuli graves of the ancient Lydian kings are still to be seen near the Gygaean Lake.

Interesting Lydian inscriptions have been un¬ earthed by American and other excavators. Consult Ramsay, Sir W. M., (Historical Geog¬ raphy of Asia5 (London 1890).

LYE, 11ˆ a solution of an alkali ; water im¬ pregnated with alkaline salt imbibed from the ashes of wood. It is largely used in soap¬ making.

LYELL, li-el, Sir Charles, English geolo¬ gist: b. Kinnordy, near Kirriemuier, Forfar¬ shire, Scotland, 14 Nov. 1797 ; d. London, 22 Feb. 1875. He was educated at Oxford, and on leaving Oxford he studied and passed for the bar. His life was almost wholly given, how¬ ever, to geology. His first writings on the sub¬ ject consisted of contributions to the (Transac- tions) of the Geological Society, of which he was secretary, 1823-26, and president in 1835-36 .and 1849-50, and to which he continued to fur¬ nish papers throughout his life. His first im¬ portant work, and the one on which his fame rests, (The Principles of Geology,5 appeared in three volumes in 1830-33. A portion of it subsequently formed the basis of a separate work,

(1897).

LYGODIUM. See Ferns and Fern-ai.lies.

LYKENS, li'kens, Pa., postal village in Dauphin County, at the foot of Bear Moun¬ tain, about 35 miles nortji-northeast of Harris¬ burg. Its rich anthracite coal mines are its chief source of income, but it has hosiery mills and a paper-box factory, foundry, etc. A bank and two newspaper offices are located here and no less than seven churches. The population in 1920 was 2,880.

LYLY, lil'i, John, English author: b. about 1554; d. London, 30 Nov. 1606. He was grad¬ uated from Magdalen College, Oxford, in 1573; studied also at Cambridge ; wrote plays for the children's companies of the Chapel Royal and Saint Paul's, London ; took side with the bishops in the Mar-Prelate controversy; and sat in Parliament for Hindon in 1589, for Ayles¬ bury in 1593 and 1601 and for Appleby in 1597. It is, however, for his ˆuphues5 (Part I, (Euphues, the Anatomy of Wit,5 1579; Part II, (Euphues and his England,5 1580) that Lyly is best known. This work is a tedious narrative of the fortunes and interests of a young Athenian, and is remarkable for a prose style that exhibits a uniform and continuous affecta¬ tion of epigram and antithesis. This fashion of writing, .vStyled (Euphuism,5 was much in favor at the court of Elizabeth, influenced numerous

writers and may fairly be assumed to have been ridiculed by Shakespeare, and it has excited the derision of successive genera¬ tions of authors. Lyly's plays, (Alexander and Campaspe5 (1584), ˆndymion5 (1591) and (Midas5 (1592), contain some worthy lyrics. Consult Bond's edition of his works (3 vols., London 1902) ; Child, C. G., (John Lyly and Euphuism5 (ib. 1894) ; Feuillerat, A.,

LYMAN, li'man, Benjamin Smith, Amer¬ ican geologist and mining engineer: b. North¬ ampton, Mass., 11 Dec. 1835. He was educated in the common schools, followed by one year of private tuition, then by one year at Phillips Exeter Academy and three years at Harvard College, receiving the degree of A.B in 1855. Taught school a few months, as principal of Deerfield (Mass.) Academy, and as assistant in Short's Classical School at Philadelphia, and in Sanborn's school at Concord, Mass. In 1856 he went to live at Philadelphia. In 1857 traveled extensively in the Middle and (Southern States, collecting statistics of the iron manufacture for the American Iron Association. In 1858 he took up geology for life work and became assistant geologist of the State of Iowa. In 1859-61 he studied at the Paris ficole des Mines, and then spent a year at the Freiberg Mining Academy. Returning to Philadelphia, he resumed work at geological surveys in Pennsylvania, Virginia, eastern Nova Scotia, California, Alabama and Lower Canada, often in collaboration with J. P. Lesley, his original preceptor in such work, and, like him, based his work on instrumental topo¬ graphical surveying. About 1866 Lyman de¬ vised the method of indicating the geological structure, the direction and steepness of the dip and the height of rock beds above sea- level, or other given level, at every point, by means of curves equidistant in level upon the surface of the rock beds. About four years later he devised a method of most compactly marking on maps the observed direction and steepness of dips at different points, so that any number of them could be clearly marked without confusion. In 1870 he was employed by the government of India in surveying oil fields. In 1871 he patented a solar transit sur¬ veying instrument, and in 1872 resumed geolog¬ ical surveys in West Virginia. From 1873 to 1879 he was employed by the Japanese govern-

mcnt as chief geologist and mining engineer, first in a geological survey of Yesso (ascertain¬ ing an extensive coal field) ; then in a survey of the oil lands on the main island and exam¬ ining many mines, and finally in beginning the geological survey of Japan. The

surveys were economical in character, and moreover resulted in training a dozen young students to become capable practical geologists. .The survey, re¬ quired traveling in every considerable part of Japan, but the winter headquarters were at Tokio. Returning in 1881 to America, he went to live at his native town, and resumed the practice of private geological surveys in Penn¬ sylvania, Ohio, New Mexico and Colorado. In 1885 and 1886 he served as common councilman of the city of Northampton. In 1887 he re¬ turned to Philadelphia and began, for the Penn¬ sylvania State Geological Survey, geological survey of the New Red of Bucks and Mont¬ gomery counties, of which the results were finally published in 1895. He determined the thickness of the New Red to be about 27,000 feet, over five times as much as it had pre¬ viously, after 75 years' discussion, been gen¬ erally conjectured to be; and he demonstrated the fact by a map with a couple of thousand dips rqarked, and the structure of the rock beds fully indicated in conformity with them by equidistant curves, and with the outcrop of im¬ portant building stone beds marked for many miles through the country. In _ 1906 he went for a six months' trip to the Philippines to in¬ vestigate coal lands on the island of Cebu. Since that other private geological work in Pennsylvania has claimed his attention. He has published over 150 reports and papers on geological surveying and other subjects. He is an honorary member of the Engineers' Club of Philadelphia and of the Japan Mining Institute and member of many other societies.

LYMAN, Chester Smith, American as¬ tronomer: b. Manchester, Conn., 13 Jan. 1814; d. New Haven, 29 Jan. 1890. In youth he was self-taught in astronomy and other branches of science, making for himself serviceable appa¬ ratus. He calculated eclipses 15 years ahead and computed almanacs for 1830-31. He was graduated at Yale in 1837 and studied theology there after a previous course at Union Theo¬ logical Seminary. After a short pastorate (1843-45) at New Britain, Conn., he went to the Hawaiian Islands, where he became in¬ structor at the Royal School. Two years later he was surveying in California. In 1850 he re¬ turned to the East and resumed his early study of sciences; in 1858 accepted the professorship of industrial mechanics and physics at Yale; from 1871 to 1884 was professor of astronomy and physics in the Sheffield Scientific School, which he had assisted in organizing, and con¬ tinued to teach astronomy alone until 1889 when he became professor emeritus. He made a number of useful scientific inventions, including a combination zenith telescope and transit for latitude, longitude and time, and was a con¬ tributor of papers to the New Englander and the American Journal of Science.

LYMAN, Phineas, American soldier: b. Durham, Conn., about 1716; d. West Florida, now Mississippi, near Natchez, 10 Sept. 1774. He was graduated at Yale in 1738, was tutor

there until 1741 and subsequently practised law in Suffield. He acquired a great legal reputa¬ tion and succeeded in having Suffield annexed to Connecticut. He was a member of the upper house of the Connecticut legislature from 1749 to 1755. In the latter year he was ap¬ pointed major-general and the same year, being commander-in-chief of the Connecticut militia, he served with Sir William Johnson at the battle of Lake George, and, after his com¬ mander had been disabled, conducted the en¬ gagement to a prosperous conclusion. He con¬ structed Fort Edward, which at first was known as Fort Lyman, but the name was changed by Johnson, who was jealous of Lyman's popu¬ larity. He wras present at the attack upon Ticonderoga by Abercrombie and at the cap¬ ture of Crown Point and the surrender of Montreal, and in 1762 commanded the provin¬ cial troops in the expedition against Havana. Subsequently he passed many years in England in efforts to procure a grant of land on the Mississippi for the purpose of establishing a colony, and in 1774 embarked with his eldest son and some others for the country in ques¬ tion. The emigrants who followed him en¬ countered many misfortunes, and after the sub¬ jugation of the country by the Spaniards in 1781-82 were obliged to take refuge in Savan¬ nah.

LYMAN, Theodore, Amercan philanthro¬ pist: b. Boston, 20 Feb. 1792; d. Brookline, Mass., 18 July 1849. He was graduated from Harvard in 1810, studied at the University of Edinburgh in 1812-14, was for a time aide-de- camp to the governor of Massachusetts, in 1823- 27 commanded the Boston brigade of the State militia with rank of brigadier-general, was a representative in the State legislature in 1821— 24, and became State senator in 1824. In 1834—35 he was mayor of Boston. He opposed the radical Abolitionists, and in August 1835 presided over a pro-slavery meeting in Boston, but on 21 Oct. 1835, at the risk of his own life, rescued William Lloyd Garrison from the <(gentlemanly mob® that had vowed to bring the Abolitionist to the tar-kettle before dark. In order to save him he had him confined to jail. From 1835 he devoted himself to philanthropic work, and in 1844 removed to Brookline, Mass. In 1840-46 he was president of the Boston Farm School. To this institution he gave $10,000; to the Massachusetts Horticultural So¬ ciety, of which he was a life-member, $10,000, and to the State Reform School, now the Lyman School, at Westboro, $72,500. He wrote (Three Weeks in Paris) (1814) ; (The Political State of Italy (1820) ; (The Hartford Convention (1823), a defense of the*

'Conventionists ; (The Diplomacy of the United States with Foreign Nations* (1828), a work still of use for the period covered.

LYMAN, Theodore, American naturalist; b. Waltham, Mass., 23 Aug. 1833; d. Nahant, Mass., 9 Sept. 1897. He was a son of Theodore Lyman (1792-1849) (q.y.). He was graduated from Harvard in 1855, from the Lawrence Sci¬ entific (School in 1858, and was assistant in zoology at the Museum of Comparative Zool¬ ogy. In 1863-65 was volunteer aide on the staff of General Meade, with rank of lieuten¬ ant-colonel. Having been mustered out on 20

April 1865, he was fish commissioner for Massa¬ chusetts in 1865-82, and in that capacity made the first experiments undertaken by any State of the Union for the cultivation and protection of food-fishes. In 1883-85 he served in Con¬ gress as an independent representative. He was also president of the Boston Farm School, a member of the National Academy of Sciences (from 1872), and a trustee of the Peabody education fund. He donated $10,000 to Har¬ vard and his library of scientific works to the Museum of Comparative Zoology. His most important researches were connected with the Radiata. Among his publications are (Illus¬ trated Catalogue of the Ophiuridse and Astro- phytidae in the Museum of Comparative Zool¬ ogy J (1865), with a (Supplement) (1871) ; (01d and New Ophiuridse and Astrophytidse* (1869) ; (Papers Relating to the Garrison Mob) (1870) ; ˆProdrome of the Ophiuridse and Astrophy- tidse of the Challenger Expedition (1878-79), and 'Report on the Ophiuridse Dredged by H. M. S. Challenger during the Years 1873-76)

(1882).

LYME REGIS, lim re'jis, England, sea¬ port town in Dorsetshire, at the mouth of the Lyme at its entry to the English Channel, and 22 miles west of Dorchester. It is a favorite summer bathing resort and its record goes back at least to the 13th century as a town. There is a Gothic (Saint Michael's) church, old town- hall, assembly rooms, custom house, etc. The harbor has two piers which form it into a basin useful for small craft in stormy weather. Its population in 1911 was 2,772. In 1664 the town was besieged by Prince Moritz of the Palatinate, and it was here that the Duke of Monmouth landed in 1685. An ichthyosaurus and a plesiosaurus were discovered in this

sec¬ tion buried in the Lias rock. Consult Roberts, (History of Lyme Regis1 (London 1834).*

LYMPH, the fluid contained in the lym¬ phatic glands and in the lacteals (q.v.). It is elaborated primarily by the assimilation of food, and is also obtained from the blood and tissues, the system of vessels in which it is contained ramifying throughout the bodies of vertebrates. The clearest and simplest view of the nature and functions of the lymphatic vessels is that which considers them as forming a connecting- link between the digestive and circulatory sys¬ tems. It is to be understood that the largest portion of all the cells in the body never comes in direct contact with the blood, which itself touches only the linings of the veins and arteries and the cells of the pulp of the spleen. What builds up the tissues of the body is not therefore the blood, but the lymph. Also the waste matters which are formed in the tissues are collected by the lymph, which turns it over to the blood, from which it is carried to the lungs, kidneys, skin, etc., from which it is excreted. The matters absorbed from the alimentary canal and from the blood and tissues are converted in the lymphatic glands into lymph, which supplies initial and essential ele¬ ments of the blood. The lymphatic system, con¬ cerned in absorption, is also called the ab¬ sorbent system. None of the invertebrates have such a defined set of vessels; in the lower ani¬ mals matters pass from the digestive system into the blood-system directly and without the

intervention of any absorbent vessels. The lymphatic vessels constitute a distinctive char¬ acter of the highest sub-kingdom of animals. Fresh supplies of nutritive matter are poured from the lymphatic system into the current of circulation, but it is difficult, if not impossible, to determine where the function of circulation ends and that of absorption begins. Hall, ex¬ perimenting upon a patient from whom an acci¬ dent permitted the chyle to be taken, found that the fat contained in it varied according to the diet, while the protein and sugar varied very little.

The lymph as it exists in the lymphatic vessels of a fasting animal is a colorless, trans¬ parent fluid, odorless, with a slightly saline taste and an alkaline reaction. Four kinds of lymph are recognized: (1) the tissue lymph which fills the spaces between the cells in all parts of the body; (2) circulating lymph which flows along the lymph vessels and returns to the blood system; (3) chyle, which is a circu¬ lating lymph in the intestines, and (4) the serous lymph which the serous cavities con¬ tain. When microscopically examined it is seen to be a clear plasma containing corpuscles. It resembles blood in being an alkaline fluid, and in that it coagulates or clots by the

separation of the fibrinous part of the plasma; but it differs from blood in that its corpuscles are nearly all colorless, and because its solid mat¬ ters are present in very small proportions. Ex¬ cepting chyle, all lymph is about 95 per cent water, the rest being made up of about 3.75 per cent of proteins, 0.1 per cent of extractives and a very small proportion of inorganic mat¬ ter. In chyle the water is about 90 per cent. The lymph-corpuscles, when passed into the current of the blood, by a simple change of medium become the white blood-corpuscles, and when partially altered they give origin to red corpuscles. The lacteals absorb the chyle di¬ rectly from the alimentary canal, and pour it, as rudimental blood, into the current of the circulation. Then from the body generally the ordinary lymphatic vessels bring the lymph, which is further elaborated in the lymphatic glands, and pour it into the current of the blood. The actual termination of the lymphatic vessels is in the large veins in the neighbor¬ hood of the heart. The lymphatic circulation may thus be regarded as corresponding in its general direction to the course of the venous blood.

The lymphatic vessels resemble small veins in their general structure. They are provided with valves permitting the flow of the lymph only toward the large veins near the heart and into which the lymph is poured. The only structures in which lymphatic vessels do not exist are the non-vascular parts, such as the hair, nails, outer skin and cartilaginous tissues. The flow of lymph toward the heart is induced partly by the general pressure and action of the muscles of the body, the valvular structure aid¬ ing its propulsion as in the veins ; and to this, as well as to the absorptive power, must be added the action of the contractile muscular fibres of the lymph-vessels themselves. It is not known to what extent the flow of lymph may be under the direct control of the nerves.

The fluid employed in vaccination . (q.v.) is also called lymph, of which two varieties are

distinguished, human and bovine. The term has likewise been applied to various serums made from bacterial cultures for preventive or cura¬ tive use in certain diseases, especially to those serums known as antitoxins (q.v.). See Im¬ munity; Koch, Robert; Serum, Therapy; Tuberculosis.

LYMPHATIC GLANDS, small organs, round and smooth and comparatively solid, which form part of the lymphatic system in vertebrates. (See Lacteals; Lymph). Into these, sooner or later in their course, the other lymphatic vessels run, and from them emerge again. The lymphatic glands are highly im¬ portant structures, since only after passing through them does the lymph contain, in any abundance, lymph-corpuscles. In size the glands may be compared to small almonds, and they are generally arranged in groups. Each gland is entered by a number of afferent vessels which bring lymph to it, while those (efferent vessels) which leave the gland carry lymph away from it. Externally a lymphatic gland presents an envelope of connective tissue, from which the stroma, consisting of a fibrous frame¬ work of processes, is prolonged into the in¬ terior of the gland. Within the stroma the essential gland-structure is contained. Within the stroma also, as well as within the softer portions or pulp contained in the meshes of the fibrous network, minute blood-vessels are distributed. Corpuscles are added to the lymph in the glands, while in the composition of its fluid it undergoes further elaboration. The lymphatic glands are regarded as factories of leucocytes or white blood cells. The lymphatic trunks of the greater part of the body finally pour their contents into the thoracic duct, a small tube which opens into the current of the blood at the point of junction of the internal jugular and subclavian veins of the left side of the body. On the right side of the body is a still smaller duct which receives the contents of the lymphatics of the right half of the chest, the right arm and the right side of the head and neck; and this smaller lymphatic channel or right lymphatic duct opens into the angle formed by the junction of the right jugular and subclavian veins, similarly to its larger neighbor of the left side. The thoracic duct begins in the upper part of the abdomen and runs up in front of the spine to the root of the neck, where it opens into the great veins. The re- ceptaculum chyli, or cistern of the chyle, is the dilation at the commencement of the thoracic duct in the abdomen, which receives the con¬ tents of the lacteals or intestinal lymphatics. The orifices by which the thoracic duct and right lymphatic duct open into their respective great veins are guarded by valves which permit the lymph to flow from the ducts into the veins, but prevent the flow of blood into the ducts.

The spleen has been considered by physiolo¬ gists to be merely a ductless lymphatic gland of large size, since it appears to be concerned in the elaboration of the blood, and also to be a place of disintegration of the red corpuscles and a manufactory of the white corpuscles of the blood. And the thymus, another ductless gland, has

also been supposed to be connected with the function of blood-elaboration, and thus to be associated with the lymphatic system.

LYNCH, Anne Charlotte. See Botta, Anne Charlotte.

LYNCH, Arthur, Irish journalist and au¬ thor : b. Smythesdale, Ballarat, Victoria, Aus¬ tralia, 1861. He was educated at Melbourne University and the University of Berlin; prac¬ tised as an engineer, lectured on engineering and scientific subjects at Melbourne; was for a time a journalist in London; was a war cor¬ respondent in Ashanti, and twice visited America. During the second Boer War he was colonel in the Irish Brigade No. 2 of the Transvaal forces, and upon his landing in Great Britain subsequent to the war was brought to trial for high treason. He was sentenced to death ; but this sentence was afterward com¬ muted to life imprisonment. Lynch was elected member of Parliament for Galway in 1901. Among his books are (Modern Authors> (1891) ; (Approaches } (1892) ; cOur Poets)

(1895); (Religio Athletse) (1895); (Human Documents (1896); (Prince AzreeP (1911); ˆSonnets of the Banner and the Star> (1914), and Ureland: Vital Hour) (1915).*

LYNCH, Charles, American planter and soldier: b. Chestnut Hill, Va., 1736; d. 1796. He was one of the pioneers of Bedford County at: 19. In 1767 he was elected to the House of Burgesses. His influence was thrown in favor of the Revolution and it is in great part due to him that the Virginia delegation was sent to Congress with instructions that culmi¬ nated in the Declaration of Independence. He became justice of the peace in 1774 and colonel of militia in 1778. He lived on the Staunton River in Virginia, and in support of the Rev¬ olutionary government in that region during the early part of the war with Great Britain, joined Robert Adams and Thomas Callowav in the punishment and exile of Tories. As justice of the peace, he sentenced them to various terms of imprisonment in order to prevent their acting against the Revolutionary movement. A frequent punishment, so says tradition, was to suspend the disaffected by their thumbs until they were willing to exclaim <(Liberty forever !» The summary acts of this self-appointed court are generally accepted as the origin of the term lynch-law (from <(Lynch's Law®). But whereas the expression is now used almost ex¬ clusively of punishment by death without legal authority, it does not appear that Lynch ever exacted the death penalty. After the surrender of Yorktown, Lynch returned to Bedford County, and the Tories threatened to prosecute him for his activities against them which were in excess of his powers. On Lynch's appealing to the

legislature, the latter branded his actions as illegal, but exonerated him in view of the circumstances.

LYNCH, Frederick (Henry), American

clergyman and educator: b. Peace Dale. R. I., 21 July 1867. He was graduated (1894) at Yale University, taking the B.D. degree in 1897. In 1899 he was ordained to the Congregational ministry, becoming assistant pastor of the United Church, New Haven, Conn., 1896-98, and pastor of the Pilgrim Church. New York, 1904-10. He has been editor of Christian Work and Evangelist since 1908; executor and direc¬ tor of the New York Peace Society; founder of the Peace Arbitration Society of New York, and delegate to the International peace con-

gresses at Munich (1897) and London (1908) ; also secretary of the Church Peace Union of America. He has written 'The Enlargement of Life) (1903); (Is Life Worth Living?> (1905); 'The Gospel for To-Day) (1905); (The Peace Problem) (1911) ; (New Oppor¬ tunities of the Ministry (1912);

LYNCH, James Mathew, union labor leader: b. Manlius, N. Y., 11 Jan. 1867. He was educated at his native town (1874-81), then entering the printing trade. He has been active as a leader in union labor circles, serv¬ ing for seven terms as president of the Syra¬ cuse Trade Assembly, and filling the positions, successively, of first vice-president (1899- 1900), and president (1900-14) of the Inter¬ national Typographical Union. At present he is a member of the New York State Indus¬ trial Commission, member of the National Civic Federation and of the American Asso¬ ciation for Labor Legislation.

LYNCH, John Joseph, Canadian Roman Catholic prelate: b. Ireland, 1816; d. 1888. He was educated at Dublin and Paris, was ordained to the priesthood in 1843 and three years later came to the United States. He next went to. Canada, where he became coadjutor bishop of Toronto in 1859, bishop in 1860 and arch¬ bishop in 1870.

LYNCH, Patricio, Chilean naval and mili¬ tary officer: b. Santiago, Chile, 1824; d. at sea, May 1886. He was educated at the Chilean Naval Academy; entered the English navy in 1840 and took part in the Anglo-Chinese War ; in 1847 he re-entered the Chilean navy and served during the war against Spain and be¬ came governor of

Valparaiso. In 1879-80 he commanded a military and naval expedition against Peru, and ravaged the northern part of that state, destroying a large amount of prop¬ erty. He also took part in the battle of Chor- rillos, the battle of Miraflores and the attack against Lima, and was made commander-in¬ chief of the Chilean army; in the city of Lima he strictly observed martial law, suppressed the Peruvian government and took Calderon, the provisional President, prisoner, though this act called forth a protest from the United States Minister. In 1883 he evacuated the city, having placed Iglesias at the head of affairs. He was made vice-admiral of the navy, and in 1884 sent as Minister to Spain. He died on his homeward voyage two years later.

LYNCH, Thomas, Jr., American patriot, one of the signers of the Declaration of Inde¬ pendence : b. Prince George's parish, S. C., 5 Aug. 1749; perished at sea in the latter part of 1779. He was educated at Eton and the Univer¬ sity of Cambridge, and was subsequently ad¬ mitted as a student in the Temple, London. In 1772 he returned to South Carolina, and at the outbreak of hostilities in 1775 was appointed a captain in the first regiment of provincial regu¬ lars raised by South Carolina. Being unani¬ mously chosen by the provincial assembly to succeed his father as a member of Congress, he took his seat in that bodv in 1776, but in a few months was compelled by ill health to retire

from active political life. One of his last public acts was to affix his signature to the Declaration of Independence. In the latter part of 1779, as the only means of saving his life, he sailed for Saint Eustatius, West Indies, intending to find there a neutral vessel which would convey him to France. The ship in which he sailed was never heard from and is supposed to have been lost in a storm.

LYNCH, William Francis, American na¬ val officer: b. Norfolk, Va., 9 April 1801; d. Baltimore, 17 Oct. 1865. He entered (1819) the United States navy, becoming lieutenant in 1828. A Palestine expedition was placed in his command (1848) and he explored the Dead Sea and the Jordan, publishing (1849) an ac¬ count of the survey under the title of Narra¬ tive of the United States Expedition to the River Jordan and the Dead Sea,) which has gone through several editions. He was pro¬ moted (1849) commander and (1856) captain, in which latter rank he joined the Confederate forces in 1861, in which he rose to commodore. He wrote also Naval Life: The Midshipman, or Observation Afloat and Ashore) (1851).

LYNCH LAW, or JUDGE LYNCH, a

name for irregular punishment, especially capi¬ tal, inflicted by private individuals independ¬ ently of the legal authorities. Extra judicial punishments in states which are in a condition of loose organization have been common in all ages, as the V ehmgerichte in Germany, the Lydford law in England, "Jeddart Justice® in Scotland and the Spanish Hermanadad. The origin of the term ((Lynch law® is doubtful; by some it is said to be from James Lynch Fitz-Stephen, warden of Galway, Ireland, who, about 1526, sentenced his son to death for mur¬ der, and to prevent a rescue by a mob executed him with his own hands without due process of law. By others the term is said to have had its origin in the State of Virginia, where a farmer of the name of Charles Lynch (q.v.) took his own way of obtaining redress for a theft by catching the culprit, tying him to a tree and flogging him. This mode of admin¬ istering justice has always prevailed more or less in every country in times of great popular excitement, and is necessarily resorted to in newly-settled territories, where the power of the civil government is not fully established. As early as 1768, in the United States the terms "regulating,® ((regulation® and <(regulator® were in use in the Carolinas ; illegal whippings were at that time inflicted by the Regulators, and it is claimed that a meeting of the Regu¬ lators took place at Lynch's Creek. Whether there is any historical connection between the Regulators of the Carolinas and the Regulators who flourished along the Western frontiers where lynch law was well known, in and after 1819, is one of the many obscure points in the early history of lvnch law which await elucida¬ tion. At first in the United States, "lynch law® was not mob law, as it is now understood. It was almost necessary under the conditions then obtaining, when territory extended faster than effective government organization for the punishment of offenders. T was orderly, methodical and fair in its practices, and was stronglv opposed to violence or mob rule. Its distinctive feature was simplv that its decrees and findings were executed sternly and swiftly

on the spot where they had been decided upon. This was true of the conditions in California in 1849 when Judge Lynch held frequent court, and hundreds of culprits were executed be¬ tween 1849 and 1860, in an orderly manner, with nothing of the mob violence or excite¬ ment common in recent years. During the Civil War and

afterward, lynching was prac¬ tised in the Southern States at the instigation of the Ku Klux Klan (q.v.). From 1870 it became an unwritten law in the South to lynch by mob rule every negro charged with rape or assault, or with the murder of a white per¬ son ; and it is still the Southern States that bear the unenviable record for lynchings. Grad¬ ually this practice spread to Northern States, and negroes were not only ˆlynched,® or hung, but were burned at the stake in Indiana, Illinois, Ohio and other States. According to figures prepared by the Chicago Tribune, there were 3,539 lynchings in the United States be¬ tween 1885 and 1912. About one-third of these were for violence to women, another third for murder, but none were for the killing of one negro by another. The number of lynchings vary considerably from year to year, as the following totals show: in 1906, 68; 1907, 71;

1912, 64; 1913, 79; 1914, 50; 1915, 96; 1916, 54.

In the last-named year 50 negroes were lynched and four whites; less than a quarter of the punishments being inflicted for rape. Georgia headed the list of lynchings for 1916 with 14, Florida had 8 and Oklahoma 4.

Rarely is there conviction or punishment of persons who participated in lynchings, owing largely to the sympathy of jurors for the accused. In Kansas and Indiana laws have been passed providing for the suspension from office of sheriffs who fail to protect prisoners from the violence of the mob, and in South Carolina and Ohio the counties are held liable for compensation to the relatives of persons who suffer death by lynching. As the adminis¬ tration of the criminal law is in the hands of the several States, the Federal government is unable to mitigate or stamp out the practice. The best remedy for lynch law is prompt ac¬ tion by the courts and the prompt execution of sentence after a culprit has been convicted. Consult Calter, J. E., (Lynch Law) (New York 1905) ; Hart, A. B., (The Southern South? (ib. 1910) ; (Cyclopaedia of American Govern¬ ment, } ed. by McLaughlin and Hart (New York 1914) ; and the volumes of the (American Year BookP

LYNCHBURG, Va., city Campbell County, on the James River and on the Norfolk and Western, the Southern and the Chesapeake and Ohio railroad 174 miles south-southwest of Washington. The city is situated in a river valley which forms a pass through the moun¬ tains. The irregularity of the surface upon which stands the city, the hills, the numerous terraces, the many trees along the streets, the well-built, handsome houses with neatly kept grounds, all make the

place most attractive.

History. — Lynchburg was founded in 1786 by John Lynch, but it was not incorporated until 1823. It was early in the 19th century, as now, a distributing centre for places above on the river and for many settlements and towns south of the James. The Confederates used it as a supply depot during the Civil War.

On 18 June 1864 General Hunter, of the Fed¬ eral army, attacked the city, but was defeated.

Manufactures, etc. — The chief manufac¬ tures are iron products, tobacco, cotton goods, plows, wagons, shoes, bark extract, candy, fertilizers, overalls, hardware, flour and lum¬ ber. It has extensive tobacco interests, as a manufacturing and jobbing centre being among the seven leading shoe jobbing cen¬ tres of the Union. The trade is principally in tobacco, raw and manufactured; coal, granite and its own manufactures. Lynchburg is the seat of Randolph-Macon Woman's Col¬ lege, Virginia Christian College (coeduca¬ tional) and Episcopal School for Boys, and it has four hospitals, the Miller Female Orphan Asylum, a Presbyterian orphanage, an Odd- Fellows' orphanage, Y. M. C. A., Y. W. C. A. and Chamber of Commerce. Granite quarries are near by, and large coal fields and iron ore are in the neighboring counties. The river fur¬ nishes extensive water power, which aids in the development of the manufacturing interests of the city.

Government, etc. — • The government of the city is vested in a mayor, who holds office four years, and a council and board of aldermen (biennial). The city treasurer, clerk of the courts and commissioner of revenue are chosen by popular election, and the other officers are appointed. The waterworks plant is owned and operated by the city. Pop. (1920) 29,956. Con¬ sult Cabell, (Sketches and Recollections of Lynchburg.)

LYNDE, lind, Francis, American novelist: b. Lewiston, N. Y., 12 Nov. 1856. After many years in the railway service in various capacities he turned to literature in 1893, beginning as a contributor to magazines; work which he still continues and which now comprises over 200 short stories and novelettes. His published books are (A Romance in Transit > (1898) ; (The Helpers) (1899); (A Private Chivalry) (1900) ; (The Master of Appleby) (1902) ; (The Grafters (1904); A Fool for Love) (1905); (The Quickening* (1906) ; (Empire B-uilders* (1907) ; (The King of Arcadia* (1909) ; (The Taming of Red Butte Western> (1910) ; (The Price) (1911) ; Scientific*

Sprague) (1912) : (The Honorable Senator Sage-brush) (1913) ; (The City of Numbered Days (1914) ; (The Real Man* (1915). With a single exception, Mr. Lynde's books deal with modern condi¬ tions of American life, industrial, social and political, with a strong emphasis laid upon character development.*

LYNDHURST, lmd'herst, John Singleton Copley, Baron, English lawyer and statesman : b. Boston, 21 May 1772; d. London, 12 Oct. 1863. His father was the well-known painter of the same name. He was taken to Eng¬ land in early infancy, his parents having gone to reside in London. He was educated at the University of Cambridge, became a Fel¬ low of Trinity College, traveled in the United States, was called to the bar at Lincoln's Inn in 1804 and soon gained a high position. In 1817 he ably defended Watson and Thistlewood for high treason, and obtained their acquittal. He was first known as a Liberal, but early be¬ came Conservative. In 1818 he entered Parlia¬ ment for Yarmouth, Isle of Wight, which he soon exchanged for Ashburton. In 1819 he be-

came solicitor-general and was knighted. He conducted the prosecution in the trial of Queen Caroline. In 1824 he succeeded to the post of Attorney-General, in 1826 was elected for Cam¬ bridge, and became Master of the Rolls. He succeeded Lord Eldon as Chancellor in 1827, which post he retained until 1830, and was raised to the peerage as Baron Lyndhurst. In March 1829, he delivered a great speech against Catholic emancipation. He was chief baron of the exchequer from 1831-34. He was a formidable opponent of the Reform Bill, and in 1834 became a second time Chancellor, but in 1835 retired with the Peel Ministry. Lynd- hurst's speeches and annual reviews of the session contributed greatly to the return to power of the Conservatives in 1841, on which occasion he was a third time raised to the woolsack. He retired in 1846, from which time he took little part in home politics, confining his attention more to matters of foreign policy. For a long time he was virtually the Tory leader in the upper house. Brougham said: <(Lyndhurst was so immeasurably superior to his contemporaries . . . that he might well be pardoned for looking down rather than prais¬ ing.® He was distinguished alike as a debater, advocate and judge; his decisions were models in arrangement and clearness of exposition. Consult Sir Theodore Martin's

LYNDON, Vt., post-village of Caledonia County, located on the Passumpsic River, about 36 miles east by northeast of Montpelier. It has two churches, an academy, graded school, national bank, two marble works, pulp-mill, an institute, school of agriculture, public li¬ brary, etc. Pop. about 3,204.

LYME, lin, Joseph Leycester, commonly known as "Father Ignatius,® or "Ignatius of Jesus,® English clergyman: b. London, 23 Nov. 1837 ; d. 16 Oct. 1908. After taking deacon's orders in the Church of England and doing mission work in London, he conceived the idea of reviving the Benedictine rule in a modern monastic foundation. With this view he first formed a community at Claydon, near Ipswich, in 1862 and finally built Llanthony Abbey in Wales, where he was joined by a few enthusi¬ asts, though his movement made no progress at all commensurate with his program. He visited Canada and the United States (1890- 91) as a missioner. He was a striking preacher, and his warmly evangelical discourses were in curious contrast to his mediaeval ideas. . But he was always in conflict with the authorities of the Church of England, was finally prohibited from preaching and was forced to preach in hired halls. Among his published works are

(Brother Placidus) (1870) ; (Leonard Morris, or the Benedictine Monk) (1871); (Mission Sermons and Orations) (1886) ; (Jesus Only >

(1889).

LYNN, lin, Samuel H., American physi¬ cian : b. Philadelphia, 1843 ; d. Rochester, N. Y., 27 Feb. 1917. He was a graduate of the School of Dentistry of the University of Pennsylvania and of the School of Medicine there. He re¬ moved to Rochester in 1888. He spent much of his time abroad, and for 18 years lived in

Russia. He studied at the clinics in Vienna, Saint Petersburg and other European cities and obtained a world-wide knowledge of medicine. He was a veteran of the Civil War, having served under Admiral Farragut at the battle of Mobile Bay and participated in the Cushing expedition. He was one of the men who planted a bomb on the deck of the Albemarle. He was a member of several medical societies.

LYNN, lin, Mass., city in Essex County, on Massachusetts Bay, and on the Boston and Maine, the Boston, Revere Beach and Lynn railroads, about 10 miles northeast of Boston and five miles

southwest of Salem. Area, nearly 12 square miles. Lynn was first settled in 1629 by Edmund and Francis Ingalls and for a time was called Saugus. It receives its present name in 1637 from King's Lynn, Eng¬ land, the home of Samuel Whiting, then pastor at Saugus (Lynn). It was incorporated in 1630 and chartered as a city in 1850. The city in¬ cludes what were several independent villages : Glenmere, Highlands, East Lynn, West Lynn, Linwood, Lynmere and Wyoma. The Lynn Harbor is shallow, but it is considered safe. The three-mile shore-line adds to its attrac¬ tions. The city is noted for its shoe factories. The annual amount of shoe business is in the neighborhood of $50,000,000; and the number of persons employed, about 25,000. The chief manufactures are shoes, cut leather, shoe ma¬ chinery, electrical supplies, meters, arc lamps, morocco and patent medicines. The city, has several churches of the various denominations.

Some of the principal buildings are Lynn Public Library, which has about 115,947 volumes; two hospitals, the city hall, Lynn Home for Aged Women and an orphanage. There are two high schools, over 100 grammar schools and an equal number of primary schools, together with several large parish schools, containing primarv, grammar and high school departments.

The annual expenditure for municipal main¬ tenance and operation is about $1,348,000; the chief items are, schools about $385,000; for poor, sick, homeless and other charities, $63,- 000; for police department, $112,000; for fire department, $112,000; for waterworks,. $185,000; for sanitation, $104,000. The waterworks plant opened in 1870, and costing about $2,500,000, is owned and operated by the city.

The government of Lynn is conducted by a single council. Pop. (1920) 99,148. Consult Newhall, F. H., (History of Lynn, Mass/

(Lynn 1883), and Sanderson, H. K., Wynn in the Revolution* (2 vols., Boston 1909).

LYNN EPISCOPI ("Bishop's Lynn®), a seaport town in the county of Norfolk, Eng¬ land, situated on the Great Ouse near its mouth ; and generally known as King's Lynn (q.v.).

LYNN REGIS, KING'S LYNN, a port

town in Norfolk, England, situated on the Great Ouse, not far from its mouth. See King's Lynn.

LYNX, a wildcat, distinguished from the larger members of the family Felidce chiefly by the shortness of the tail and the presence of a pencil-like arrangement of hairs at the tips of the ears. It was long customary to regard these cats as constituting a separate genus Lynx, to which the North American wildcats, the caracal and some others, were assigned, but

modern zoologists include them with the gen¬ eral genus Felis. (See Wildcat). The fur known to trade as "lynx® is furnished by the Canadian lynx, and is described as of a light- brown color, with a light silvery top on the back, that on the under part long, soft and spotted; about 30,000 to 80,000 are exported yearly from the Dominion of Canada, Califor¬ nia and Alaska to Liverpool, besides what is consumed in domestic trade.

LYON, David Gordon, American Assyri- ologist : b. Benton, Ala., 24 May 1852. He was graduated from Howard College, Alabama in 1875, and at Leipzig in 1882. From 1882 to 1910 he was Hollis professor of divinity at Harvard, and since the latter year has been Hancock pro¬ fessor of Hebrew and other Oriental languages. Since 1891 he has served as curator of the Har¬ vard Semitic Museum. He was recording sec¬ retary of the American Oriental Society 1886- 95 ; corresponding secretary of the Society of Biblical Literature 1894—99, and director of the American School for Oriental Study and Re¬ search 1906-07. He is a Fellow of the Amer¬ ican Academy of Arts and Sciences. He has published (Heilschrifttexte Sargons Konigs von Assyrien) (1883) ; (An Assvrian Manual (1886), and articles in the Journal of the Amer¬ ican Oriental Society.*

LYON, George Francis, English naval captain and traveler : b. Chichester, 1795 ; d. at sea, 1832. He entered (1808) the navy and was commissioned (1818-20) to travel in Africa for the government. From 1821-23 he was a mem¬ ber of Captain Parry's Arctic expedition, and (1824) he attempted with the Griper to reach Repulse Bay, but was unsuccessful. In 1826 he went to Mexico and South America. He wrote (A Narrative of Travels in North Africa) (1821) ; (Journal of a Residence and Tour in the Republic of Mexico (1829).*

LYON, Mary, American educator: b. Buckland, Mass., 28 Feb. 1797 ; d. South Had¬ ley, Mass., 5 March 1849. She began teaching at

18, and later studied at the Sanderson Acad¬ emy, Ashfield, and at the Byfield Academy, near Newburyport, continuing to teach at intervals. In 1821 she began teaching at the Sanderson Academy, and in 1824 became associate prin¬ cipal of the Adams Female Academy at Lon¬ donderry, N. H. In 1828, with the principal of this school she moved to Ipswich, Mass., where they were followed by a number of their pupils, and established a seminary of which Miss Lyon had practically the entire charge for several years. The establishment of a seminary for girls, embodying the same principles of educa¬ tion as the Ipswich school, and at the same time offering its advantages at a low price, became the main purpose of her life; and in 1834 she resigned her position at Ipswich, and, amid great discouragements, undertook the work of founding such a seminary. Aided to some ex¬ tent by clergymen and others, she succeeded in obtaining contributions, and on 8 Nov. 1837, a part of the buildings having been completed, the school was opened in South Hadley with about 80 pupils, under the name of the Mount Hol¬ yoke Female Seminary. She was president of this school for 12 years, during which time it was enlarged and gained a national reputation for its high intellectual and moral standard. (See Mount Holyoke College). She wrote

tendencies of the Principles embraced and the System adopted in the Mount Holyoke Fe¬ male Seminary * (1840) and the (Missionary

Offering) (1843). Consult Hitchcock, Edward, (Life and Labors of Mary Lyon* (New' York 1860) ; Gilchrist, B. B., (Life of Mary Lyon* (Boston 1910) ; Foster and Adams, (Heroines of Modern Progress* (New York 1913) ; Nut¬ ting, M. O., ˆHistorical Sketch of Mount Hol¬ yoke Seminary * (Washington 1876).

LYON, Matthew, American politician: b. Wicklow County, Ireland, 1746; d. Spadra Bluff, Ark., 1 Aug. 1822. He went to New York in 1755, and, being too poor to pay for his passage, was bound out by the captain of the ship to a farmer in Connecticut, in whose service he re¬ mained a number of years. Subsequently he be¬ came a citizen of Vermont, and in July 1776 was commissioned as lieutenant in one of the companies of <(Green Mountain boys.® He served later as commissary-general, and even¬ tually rose to the rank of colonel of militia. He was one of the founders of Fairhaven (1783), where he engaged in paper-making, iron casting and other occupations, and at one time edited a newspaper of an ultra-democratic character, en¬ titled The Scourge of Aristocracy and Repos¬ itory of Important Political Truth, of which the types and paper were manufactured by him¬ self. Becoming an active political

leader, he was elected in 1797 to Congress by the Anti- Federal party. In October 1798 he was con¬ victed of a libel on President Adams, and im¬ prisoned for four months, a fine of $1,000 which had also been imposed upon him being paid by his friends. An attempt to expel him from Congress as a convicted felon failed for want of a two-thirds vote. During this Congressional term he had a violent altercation on the floor of the House with Roswell Griswold of Connecti¬ cut, ending in blowTs ; but the motion to expel them was defeated. In 1799, while a prisoner, he was re-elected to Congress from Vermont. After the expiration of his term he removed to Kentucky, where at the next Congressional election (1803) he was returned to the House, of which he continued a member until 1811. Subsequently he held the office of United States factor for the Cherokee Indians by the appoint¬ ment of President Monroe and removed to Ar¬ kansas, of which he was the territorial delegate-elect to Congress at the time of his death. Though rough and impetuous in manner, he was an able debater, and to the end of his life •continued a man of active business habits. He built gunboats on speculation during the War of 1812 and lost his fortune in the venture. Consult Bassett, T. S., (The Federalist System (New York 1906) ; Channing, Edward, (The Jeffersonian System* (ib. 1906) ; McLaughlin, (Matthew Lyon, the Hampden of Congress: A Biography) (ib. 1900).*

LYON, Nathaniel, American soldier: b. Ashford, Conn., 14 July 1818; d. Wilson's Creek, Mo., 7 Aug. 1861. He was graduated from West Point in 1841 ; served in the Mexi¬ can War 1846-47, being present at the siege of Vera Cruz and the assault on the City of Mex¬ ico ; and was on duty in Kansas during the Free State agitation. In February 1861 he was as¬ signed to Saint Louis, Mo., where he had charge of the arsenal ; he was most active and efficient in the Union cause, organized the Home Guard

LYNXES

1 Canada Lynx

2 European Lynx

3 Chaus

and on 10 June 1861 captured Camp Jackson, a rendezvous of the

seccessionists. Soon after¬ ward he was made brigadier-general of volun¬ teers and given command of the department. He refused all compromise with Governor Jackson, who sympathized with the secession¬ ists, and in June occupied Jefferson City, the capital of the State, and defeated the gov¬ ernor's troops at Boonville on the 1 7th. He then went to Springfield, whence he advanced on 1 August to meet a part of the Confederate army, which was advancing into Missouri under McCulloch ; he defeated them at Dug Spring and returned to Springfield. But the Confederate forces were soon increased by the arrival of the troops under Price and General Lyon was opposed by an army considerably greater than his own. Unwilling to surrender southwestern Missouri without a struggle, he decided to risk a battle and accordingly advanced from Spring- field to Wilson's Creek, where his troops were defeated and he himself killed after a gallant fight. He bequeathed nearly all his property, about $30,000, to the government to aid in the preservation of the Union. In 1862 a collection of his letters in favor of the Republican party and the election of Lincoln (1860) was pub¬ lished under the title (The Last Political Writ¬ ings of General Nathaniel Lyon. Consult Carr, Lucieri, (Missouri: A Bone of Conten¬ tion (New York 1888) ; Hosmer, J. K., (The Appeal to Arms) (ib. 1907) ; Rhodes, J. F., (History of the United States from the Com¬ promise of 1850) (ib. 1907) ; (Life) (Hartford 1862) by Woodward; Peckham, (General Na¬ thaniel Lyon and Missouri in 1861 } (New York 1866) ; and Churchill's novel, (The Crisis.*

LYONNESSE, li'6-nes, LYONESSE, LEONAIS, LEOMOYS, England, the land from which King Arthur came and now sub¬ merged <(forty fathoms under water® or, as in Tennyson's (Morte d'Arthur : "Until King Arthur's table, man by man, had fallen in Lyon- nesse about their lord,® we find it the (*

LYONS, Richard Bickerton Pemell, Eng¬ lish diplomat : b. Lymington, Hampshire, 26 April 1817; d. 5 Dec. 1887. He studied at Win¬ chester College and Christ Church, Oxford, tak¬ ing (1843) the degree M.A. He had been ap¬ pointed (1839) attache at Athens without pay, but in 1844 he was in government's pay at that city, to be transferred to Dresden in 1852. The following year he was transferred to Florence, becoming secretary of that legation in 1856. From 1858-65 he was British Minister at Wash¬ ington, and then (1 865-67) Ambassador at Con¬ stantinople. He was Ambassador at Paris from 1867-87. He was created Viscount Lyons of Christchurch in 1881, and Earl Lyons in 1837. His wonderful tact and broadness of vision were oftentimes displayed while he repre¬ sented the Court of Saint James in Washing¬ ton. This was the trying period of the

Civil War, calling for much tact, especially during such an episode as the Mason and Slidell re¬ lease controversy.

LYONS, li'onz, or LYON, le-on, France, the former capital of Lyonnais and now of the department of the Rhone, 320 miles by rail

southeast of Paris, and 170 miles north of Mar¬ seilles, is the second city of industrial and mili¬ tary importance and the third in point of popu¬ lation in the country. It is strikingly situated at the confluence of the Saone and Rhone, the cen¬ tral business section being on the tongue of land that projects between the rivers to their junction, and extends northward to the hill of La Croix Rousse ; while the ancient mediaeval town is. on the steep slopes of the Fourvieres hill, rising from the west bank of the Saone, and the modern industrial suburb of La Guil- lotiere, with its numerous factories, is on the east bank of the Rhone. Thirteen bridges span the Saone at this point, varying from 250 to 450 feet wide, and 11 bridges the Rhone, over 600 feet wide. A series of detached forts crown different heights within a circuit of 43 miles, making Lyons, with its extensive bar¬ racks and considerable garrison, a defensive position of great strategic importance. It is the centre for the 14th Army Corps. The older quarters of the town are crowded, dirty and un¬ healthful, with narrow, irregular streets, lined by tall, ungainly buildings. The best parts are the 13 miles of magnificent quays, built since the 18th century as a protection against the pe¬ riodical river floods, and now laid out with finely planted walks, stately mansions, munici¬ pal buildings, railroad depots, capacious ware¬ houses, etc.

Among the notable squares and open places are the Place des Terreaux, facing which stands the Hotel de Ville and the large and handsome Place Bellecour, the fashionable promenade. The chief public edifices are more remarkable for their antiquity than for the beauty of their architecture. The cathedral of Saint John on the slope of the Fourvieres, on the right bank of the Saone, is in the Gothic style of the 12th century, and has four towers, two of which flank the west front, while the other two, shorter but more massive, form the transepts. Higher up the slope is the modern church of Notre Dame, an imposing composite edifice occupy¬ ing the site of the Forum Vetus built by Trajan. Beside it is a tower or Belvedere 680 feet above the Saone from which on a clear day Mont Blanc, 100 miles off, may be seen. On the other side of the Fourvieres is the church of Saint Irenasus, the second bishop of Lyons. The church itself is an uninteresting modern struc¬ ture, but it stands on the grave of the martyred bishop, and has beneath it the reputed crypt in which Polycarp preached, and 19,000 Christians at a later period

were massacred by orders of Septiinius Severus, 202 a.d. A little above the cathedral is the Palais de Justice, and lower down on the opposite bank of the Saone is the church of the Abbey of Ainay, dating from the 6th century, beneath whose sacristy, and pene¬ trating below the bed of the river, are dungeons without light or air, in which many of the early Christians were immured previous to martyr¬ dom. Other noteworthy churches are the church of Saint Nizier, of the 14th century, one of the largest in the town; that of Saint Bona- venture, the patron saint of Lyons; and the church of the Chartreux, surmounted by a superb dome seen from all quarters of the city. The archepiscopal palace (15th century), situated near the cathedral, is a large edifice of no architectural merit. The Hotel de Ville is considered one of the finest edifices of the kind

in France. Il is an isolated sauare, and is sur¬ mounted by a dome 164 feet. high. The public library, occupying part of the buildings of the college on the Quai de Retz, is the best provin¬ cial collection in France, containing 450,000 volumes and over 1,000 incunabula. The Palais des Arts, facing the Place des Terreaux, is a fine majestic edifice. It contains a picture-gal¬ lery (with works by Pugin, Rubens, Paul Veronese and Teniers), a museum of natural history, a cabinet of medals, a gallery for statutes, and another for ancient stuccoes, a depot of mechanical inventions for the fabrica¬ tion of silks, with a library attached, a free school of design and a large hall used as the exchange. Among the city's monuments are those to President Carnot, a memorial of the Franco-German War and a fountain by Bartholdi.

The chief educational establishments are the college, or university, founded 1808, occupying a fine modern building and attended by over 3,000 students in the different faculties; the Mar- tiniere, a great school of science and the indus¬ trial arts with 500 students ; a free Catholic university; various institutions of a special character, such as schools of chemistry and chemical industry, schools of design, of com¬ merce, of weaving; a celebrated veterinary school, the botanic garden, etc. Charitable es¬ tablishments are large and numerous. The most important are the Hotel-Dieu, the Maison de la Charite, the Mont de Piete, occupying the Manecanterie or deanery attached to the cathe¬ dral ; and the Hospice de l'Antiquaille, on the site of the ancient Roman palace or prsetorium now used partly as a lunatic and partly as a Magdalen asylum, and general penitentiary.

There are several prisons — the New Prison, an extensive building, well arranged ; the Maison des Recluses, now employed as a mili¬ tary prison ; and the prison of Roanne, regarded as a model of its kind.

As a manufacturing town Lyons early ac¬ quired and has long maintained a first place. It is a great financial centre, with very large foreign investments. One of its great insti¬ tutions, the Credit Lyonnais, has branches in 100 cities of France. It is the most important centre of silk manufacture in the world, employ¬ ing directly and indirectly over 200,000 persons. Other manufactures are hats, boots, jewelry and liqueurs ; besides dye-works, foundries, glass-houses, potteries, tanneries, breweries, chemical works and printeries. Lyons, albeit the climate is foggy and rainy, is admirably situated for trade, on two navigable rivers, which make it a great entrepot both for the north and the south. It forms the common centre where the highways and railroads from Paris, Marseilles, Bordeaux, from Switzerland and Italy, all meet; it communicates with the Rhine by the Rhone and Rhine Canal, while several other canals, branching off from its rivers, give it ample means of transport over a great part of the interior of the country. The chief imports are raw silk, wine, brandy, oil, soap, flax, hemp, rice, salt, cotton, wool, coffee, dyes, earthenware and tim'ber; and the exports, spun-silk and silk-goods ribbons, hats, straw- bonnets, woolens, flannels, linens, corn, flour, chestnuts, liqueurs, paper, hemp, ironware, etc.

The United States is represented by a consulate.

$

As Lugdunum, Lyons was an early Gallic town, and when Caesar invaded Gaul was a place of some importance; it figures more or less in the subsequent history of the Roman Empire, several emperors in succession making it their occasional residence and vying with each other in adorning it. It early received Christianity, and toward the end of the 2d cen¬ tury numbered thousands of Christians, among its inhabitants. Its first bishop, Pothinus, died a martyr in 197, and his successor, I renaeus, died also a martyr in 202. Lyons was afterward sacked by the Huns and Visigoths, who destroyed many of its noblest Roman structures. In the 8th century it fell for a time into the hands of an army of Saracens from Spain, and suffered severely; 'but recovered its pros¬ perity under Charlemagne, on the dissolution of whose empire it became the capital of the king¬ dom of Provence. Subsequently it fell under ecclesiastical domination, and was long

gov¬ erned by a succession of archbishops. Two Ecumenical Church Councils were held in the city (1245 — 74). In 1312 Lyons was annexed to the crown of France. It received its first munic¬ ipal charter in 1320. * It owes its new quays and several of its finest edifices to Louis XIV, of whom there is a fine equestrian statue. The Revolution of 1793 occasioned fearful reverses. The inhabitants, finding their industry paralyzed and their trade destroyed, rebelled against revo¬ lutionary violence, and the convention let loose its forces upon them ; wholesale butcheries for many days deluged the town with blood. Since that period questions of an economical, or rather socialist nature, culminated in the san¬ guinary revolts of 1831, 1834, 1849 and 1871. Several important figures in history were natives of Lyons, among them the Roman emperors Marcus Aurelius, Claudius and Car- acalla, and the celebrated general Germanicus, Saints Irenseus and Ambrose, and Meissonier the artist. Poo. about 523,796.

LYONS, Kan., city, county-seat of Rice County, on the Atchison, Topeka and Santa Fe, the Missouri Pacific, the Saint Louis and San Francisco railroads, about 180 miles west by south of Topeka and 25 miles north by west of Hutchinson. It is situated in a fertile agri¬ cultural region, in which stock-raising is a prominent industry. Nearby are salt deposits, like that at Hutchinson in Reno County, a re¬ markably fine salt, obtained from a considerable depth below the surface. Some of its indus¬ trial establishments are salt works, grain ele¬ vators, gas-engine works and flour-mills. Its trade is chiefly in grain, salt, livestock, flour and corn. The city owns and operates the water¬ works. Pop. (1920) 2,516.

LYONS, N. Y., village, county-seat of Wayne County, on the Erie and new Barge Canal system. Is 49 miles west of Syracuse and 36 miles east by south of Rochester. On the main line of the New York Central, West Shore and Rochester, Syracuse and Eastern railway systems, being the terminal of the Pennsylvania division of the New York Cen¬ tral, tapping the Pennsylvania coal fields. Lyons was founded in 1795 and incorporated as a village in 1854. It is situated in a fertile agri¬ cultural region and centre of the fruit belt. The Niagara, Lockport and Ontario Power Com-

pany maintains a large power plant here, fur¬ nishing the Empire United Railways with power and surrounding villages with current

for all purposes. The Empire Gas and Electric Com¬ pany maintains its power plant here, utilizing an extensive water power. The Barge Canal will have warehouses and terminals here cost¬ ing $125,000. It is estimated that 15,000 horse power can be realized from the Barge Canal at this point. State officials estimate that one- third of the local tonnage on the Barge Canal will be received at this point, being coal to be transferred here from the Pennsylvania coal fields. The New York Central has exten¬ sive car shops here with a payroll of over $800 per day. Lyons has the cheapest elec¬ tric power in the State of New York out-, side of Niagara Falls. This is an important coal transfer point, the New York Central transferring here, while the Philadelphia and Reading Coal and Iron Company has a mammoth coal transferring trestle in the Penn¬ sylvania division yards.'

Its chief industries are two of the largest canning plants in the State ; a large cider vine¬ gar plant, cement pipe and block factory ; tile yards, machine shops, planing mill, distilleries of peppermint and other essential oils. Mail bags, sacks, carriers' bags, satchels and straps for the United States postal system are made here with a factory for making fanning-mills and slipper soles.

*The Lyons Cold Storage Company, Incor¬ porated, recently erected a 75,000-barrel cold- storage plant here, the only plant of its kind between Syracuse and Rochester *on the main line of the New York Central. There are ex¬ tensive warehouses for the handling of fruit and produce of various kinds. Lyons has been made a grading station for handling hay from the Western States and grading it for ship¬ ment. A warehouse has just been completed for receiving, grading and picking beans, giv¬ ing employment to 60 hands, using power ma¬ chinery. A new municipal waterworks plant costing $100,000 and a sewer system with dis¬ posal plant costing $140,000 has been installed the past year. Tax rate and fire insurance rates are low. The mortgage indebtedness of Lyons is the smallest of any village in the Empire State, while the fact that its mortality rate is the lowest of any New York village and 78 per cent of its residences are occupied by owners speaks well for the frugality of its residents. The Hough Shade Corporation of Janesville, Wis., maintains storage warehouses here, sup¬ plying the New England, Middle and Eastern States to and including Washington, D. C. Lyons has an aggressive Business Men's Asso¬ ciation and Civic Club. The union school li¬ brary with over 7,000 and the Civic Club library with over 3,000 books are maintained. Its school system is of the best. Pop. (1920) 4,253.*

LYONS, Councils of, two synods held at the city in France from

which they derive their name and which are received as ecumenical by the Roman Catholic Church. When the quar¬ rel between the Emperor Frederick II and In¬ nocent IV had resulted in the banishment of the latter from Rome, the Pope summoned a council in 1245 at which the patriarchs of Aqui- leia, Antioch and Constantinople, as well as the Emperor Baldwin II, were present, with sev¬ eral royal delegates. Thaddaeus of Susa repre¬

sented Frederick II, who was, in spite of that delegate's emphatic protests, solemnly deposed and his subjects released from their allegiance. When Gregory X took the tiara, his first step Avas to attempt a reunion of Christendom, as represented by the Greek and Latin churches, which had been parted by schism mainly on the question of the filioque (q.v.), and Latin accre¬ tions to the doctrine of purgatory. Accordingly the second Council of Lyons met 1274 under his presidency and the desired union Avas ap¬ parently effected, for both Greek and Latin prel¬ ates sang the Creed including the clause assert¬ ing the double procession. The tie that bound them, however, proved a rope of sand and the schism has continued to this day. The synod also made regulations concerning papal elec¬ tions. See Greek Church.

LYONS, Gulf of, a large bay of the Medi¬ terranean on the south of France, extending from the Spanish frontier eastward to the Hyeres Islands.

LYRE, the most ancient of stringed instru¬ ments, which originally had but three strings. The Egyptian and Grecian lyres were at first strung writh the sinews of animals. The number of the strings w?as at last increased to 16. It was played with a stick of ivory or polished wood, also with the fingers. The body of the lyre was hollow, to increase the sound. Few objects are so graceful in form and susceptible of such various application in the fine arts. As a musical instrument it has now gone out of use among the civilized nations, though a rude form of it is still to be met with in the hands of the shepherds of Greece, and among the negro tribes of Africa. It is the symbol of Apollo.

LYRE-BAT (Megadernia lyra), a small bat of the family Nycteridce, common in India and Ceylon, Avhere it is known as the <(Vam¬ pire® bat. It haunts old buildings,, ruins and cave-temples. The name vampire is given to it from ks blood-sucking habits, for it first sucks the blood of its prey before consuming the body. It eats insects, smaller bats and fish. Enormous ears are characteristic of the lyre-bat. Consult Blyth, E., (Notice of the Preda¬ tory and Sanguivorous

habits of the bats of the genus Megadenne'> (in the Journal of the Asiastic Society of Bengal, Vol. XI, pt. I, p. 255-262, Calcutta 1842).

LYRE-BIRD, a remarkable Australian bird wffiich derives its name from the form of the tail in the male, which much resembles that of the conventional Apollo's lyre; the tail of the female is rather long, but simply Avedge-shaped. There are tAvo species, about the size of chickens, both reddish brown and called <(native pheasants® by the colonists, constituting the genus Mcnura and family Menuridce, and re¬ garded as the loAvliest of the Passeres, and of very ancient origin. They dwell in the ((scrub® or open woods, and rarely leave the ground, avoiding their enemies by swift running. Their nests are placed upon the ground, are well woven of sticks and plant-stems and are covered by a dome-like roof, leaving an en¬ trance only at the sides. In the mating season the males scrape up mounds of leaves and rub¬ bish upon wffiich they strut about, sing and do their best to display their long and handsome

tails to the hens. The better known species is the long-tailed one (M . superba) but both are now rare.

LYRIC POETRY. The origins of lyric poetry are merged with those of narrative, be¬ cause of the primitive conditions under which the distinction between these types did not ex¬ ist, — that is, when there was no clearly felt difference between the relating of an incident and the expression of the emotions associated with it. With the development of art there seems to have been a gradual differentiation of lyric and narrative expression, as there was a differentiation of the originally united arts of poetry and music. The progress of poetry was, in general, marked by an increased emphasis on the individuality of the artist and on the per¬ sonal or subjective elements in lyric poetry; further, by the diminished importance of its association with music, and a corresponding growth of the reflective or intellectual elements, so that modern lyric poetry is but slightly asso¬ ciated with actual song, though it is still cen¬ tred on the expression of subjective emotion. The surviving sense of the original connection between this utterance of personal feeling and song is well illustrated by Wordsworth's ob¬ servation that his lyric poems, though none of them songs, could not have their full force without a supposed musical accompaniment. For the various types of lyric

developed from primitive song to late reflective lyric, see under Literary Forms.

Song Lyric. — In Greek poetry this type is commonly called ((melic,)) and is distinguished according as a poem was intended to be sung by an individual or a chorus ; the former class was associated especially with the zEolian race and its music, the latter with the Dorian. The principal names representative of Greek lyric are those of Terpander and Aleman, in the 7th century b.c., Anacreon, Alcaeus and Sappho in the 6th century, and Pindar and Bacchylides in the 5th. It should also be remembered that the Greek drama was in large degree a lyric form, containing choral odes made for musical rendi¬ tion ; so that in this sense 2Eschylus, Sophocles and Euripides are authors of some of the greatest of ancient lyrics. From the standpoint of its later influence, the most important feature of Greek lyric was its elaborate strophic structure, adapted to corresponding musical form. Thus the threefold structure of the choral odes, divided into ((strophes,® <(anti- strophes® and ((epodes,® became the model for the few formal odes in modern poetry. The music of the Greeks and the corresponding types of lyrics were imitated by the Romans; but since the art of song held a much less im¬ portant place at Rome, these types passed over into the literary lyric, and practically no ex¬ amples of pure song-lyric are preserved from the period of classical Latin. In the 4th cen¬ tury of the Christian era occurred an important development of the hymn, especially under the influence of Saint Ambrose of Milan ; and that form of lyric remains important to this day in connection with ecclesiastical music. From the mediaeval period a great body of popular song- lyric survives, usually without association with any known author; it was also cultivated with elegant formality at the courts of princes, espe¬ cially by the troubadours of Provence and the

minnesingers of Swabia. In the Renaissance period this development of the art by courtly poets was continued, and in western Europe received a new stimulus under Italian influence. At the court of Henry VIII of England vocal music, both sacred and secular, was diligently cultivated, and from this period date several collections of songs; the Bassus, for example, printed in 1530 by Wynkyn de Worde, is one of the earliest English printed books. In Elizabethan England the connection between music and lyric poetry was maintained with enthusiasm, and musicians — – courtly and other¬ wise — vied with each other in producing col¬ lections like William Byrd's salmsC (Son¬ nets and (Songs of Sadness and Piety > (1588), and (Songs of Sundrie Natures } (1589) ; John Dowland's three (

Books of Songs or Airs) (1597-1603), and Thomas Campion's four (Books of Airs > # (1601-18). A special form called the madrigal, introduced at this period from Italy, exerted an influence on Elizabethan music and poetry alike, as is ex¬ emplified in Yonge's (Musica Transalpina, a collection of madrigals from the Italian (1588), and Wilbye's (First Set of Madrigals) (1598). The greater number of these Eliza¬ bethan songs are of comparatively slight in¬ terest as poetry, but to this Thomas Campion is an exception, a number of his lyrics remain¬ ing classics — such as ˆCherry Ripe® and «The man of life upright.® In the modern period the increasing development of the reflective and literary elements of poetry has diminished the importance of the song lyric and few import¬ ant names are associated with it. Of these the greatest is Robert Burns, whose poems (pub¬ lished 1786 and 1793) were written for the most part as songs set to traditional Scottish airs and represent more nearly the primitive conditions of union of music and verse than any other work of modern times. Other groups of song lyrics of some importance are the (Irish Melodies* of Thomas Moore (1807-34) and the (Hebrew Melodies > of Lord Byron (1815). In Germany the chief representatives of this type are Wilhelm Muller (died 1827), Uhland (died 1862), Heine (died 1856) and Morike (died 1875).*

Reflective Lyric. — The line between this group and the preceding is often a slight or arbitrary one ; but in general the reflective lyric may be distinguished as arising from meditation on a personal experience rather than from the spontaneous impulse to express it musically. In modern practice it is read rather than sung. But in ancient times, when the lyric art was more largely musical, the same distinction can¬ not be observed; thus many of the Greek lyrics are reflective, though intended for song. The forms of Greek poetry called <(elegiac® (repre¬ sented by Tyrtseus and Mimnermus) and ((iambic® (represented by Archilochus) may be distinguished in this way from the <(melic,® as less closely associated with song. Among the Romans the chief masters of the lyric were Catullus, in the first half of the 1st century b.c., and, in the second half of the cen¬ tury, Horace, Tibullus, Propertius and Ovid. Horace's most familiar poems, the ((odes,® were originally called carmina, or songs, but appear to have been much more commonly read than sung; in the ((epodes® he was less lyrical and

LYRE BIRD

i

.

more reflective. Tibullus, Propertius and Ovid are classed as the "elegiac" lyrists, but in Latin literature even more than in Greek the term has reference to traditional form rather than to distinctive subject-matter. In the mediaeval pe¬ riod the formal lyric was less important than narrative poetry, but with notable exceptions among the courtly poets, particularly in France ; to these are traced the lyrics in "fixed forms," like the rondeau, the ballade and the yillanelle. The Renaissance brought about an immense revival of literary lyric, especially in Italy under the influence of Petrarch (died 1374), and in France under the leadership of the "Pleiade poets" — Ronsard, du Bellay, etc. — of the 16th century. The most important re¬ sulting type was the sonnet, the vogue of which in France and Italy was carried into England, reaching its height toward the close of the 16th century. This, with other forms of lyric of the Italian school, was introduced to Eng¬ lish readers by the posthumous publication, in 1557, of the poems or Sir Thomas Wyatt and the Earl of Surrey (see under Tottel's Mis¬ cellany). In the Elizabethan period there ap¬ peared not only many collections of son¬ nets, but a number of poetical miscellanies in¬ dicating the growing interest in lyric poetry of a cultivated character. Of the sonneteers, the chief are Sidney, Daniel, Drayton, Shakespeare and Spenser. Spenser also contributed to the Elizabethan lyric the pastoral poems of his (Shepherd's Calendar, } 1579, and Drayton a brilliant collection called (Poems Lyric and Pastoral,* 1606. Ben Jonson, though himself a minor lyrist, exerted an important influence on the more correct or classical school of post- Elizabethan lyric ; of his followers, some¬ times called the "sons of Ben," the chief repre¬ sentative is Robert Herrick, who in 1648 pub¬ lished the collections of lyrics called (Hes- perides) and (Noble Numbers. * John Donne, a contemporary of Jonson's, exerted an influence of a different character, and is sometimes viewed as the founder of the so-called "meta¬ physical" lyric poetry of the 17th century, — that is, poetry characterized by the use of in¬ tricate and ingenious imagery drawn from the field of learning rather than art. In this cen¬ tury the most characteristic development of the English lyric was in the religious type; besides Herrick, already mentioned, its leading repre¬ sentatives are George Herbert and Richard Crashaw. The Restoration saw a brief revival of secular lyric poetry, especially of the courtly type, in the region of occasional verse and vers de societe, but the

lyric spirit was ebbing rapidly in the interest of poetry of satiric and didactic mode?. In the 18th century the most characteristic English lyrics are odes like those of Collins and Gray, in which the form of the ancient classical ode, now divorced from its association with music, is made the means of elaborate poetic thinking, and equally formal and reflective elegies, of which Gray's, again, is the chief. The ode form was cultivated, in France in the same period by Jean Baptiste Rousseau (died 1741) and ficouchard Lebrun (died 1807) ; and in both France and Germany there was also a vogue of "anacreontics," rep¬ resenting another revival of classical fashion ; but in general the age was one in which the lyric languished on the Continent as well as in vol. 17 — 50

England. With the "romantic revival," at the end of the 18th and the beginning of the 19th century, there came a great renewal of the lyrical impulse. The emphasis placed by the romantic spirit upon individual emotion leads to the characteristic expression of such emotion in lyric form and the whole 19th century presents a new development of the effort to unite with this expression the processes of re¬ flection. In England the finest representatives of this tendency are Wordsworth, Keats and Shelley, in the opening years of the century; Wordsworth's ode on "Intimations of Immor¬ tality," Shelley's "Odes to Naples" and Keats' ode "On a Grecian Urn" are masterpieces ex¬ emplifying the lyric development of thought on the subjects of immortality, liberty and art. In the mid-19th century the reflective lyric finds equally notable representation in the poems of Tennyson's (In Memoriam (1850). Tenny¬ son also wrote a number of "dramatic lyrics," — that is, lyrical utterances of imagined per¬ sonalities — and the same type was developed even more brilliantly by Robert Browning. The personal sonnet-sequence was revived by Mrs. Elizabeth Barrett Browning in her (Sonnets from the Portuguese* (1850), and by Dante Rossetti in the collection called (The House of Life) (1881) ; and the pastoral elegy, in the manner of the classic tradition, reappeared in Matthew Arnold's (Thyrsis) (1866). Of the later Victorian lyrists Algernon Charles Swin¬ burne may be counted the chief. Meantime the romantic movement had developed the reflec¬ tive lyric with equal importance on the Con¬ tinent. In the earlier years of the century Goethe represented it in Germany, followed later by such lyrists as Ferdinand Freiligrath (died 1876), Emanuel Geibel (died 1884), Detlev von Liliencron (died 1909), Friedrich Nietzsche (better known as philosopher, died 1900), and Richard Dehmel (born 1863). In France the chief lyrists of the century are Beranger (died 1857), Lamartine (died 1869), Alfred de Vigny (died 1863), Alfred de Musset (died 1857),*

Theophile Gautier (died 1872), and Victor Hugo (died 1885). Some will have it that the lyric poetry of Hugo, in its combina¬ tion of personal fervor, range of intellectual interest and sensuous beauty, is unsurpassed in the verse of any modern tongue. In Italy among the more important representatives of the lyric are Leopardi (died 1837), Manzoni (died 1872), and Carducci (born 1836). Amer¬ ican literature has not been distinguished pri¬ marily for lyric poetry, though in Edgar Allan Poe (died 1849) it has an important represen¬ tative of the type which is close to song. Ex¬ emplars of the more reflective type are found in the poetry of Bryant, Longfellow, Lowell, Whittier, Emerson, Whitman, Aldrich, Sidney Lanier, Emily Dickinson, William Vaughn Moody and John B. Tabb. Perhaps the high- water marks of American lyric might be meas¬ ured from three or four occasional poems which are expressive of national as well as personal feeling, — Emerson's "Concord Hymn," Lowell's "Commemoration Ode," Whitman's "Captain, my Captain," and Moody's "Ode in Time of Hesitation." It is clear that the vogue and the value of lyric poetry remain wholly .undimin¬ ished; indeed it remains the characteristic type of the present era. In the early 20th century,

however, there has been a tendency among the younger poets to relax the emphasis on the re¬ flective or intellectual element, and to make the lyric a more momentary or fugitive representa¬ tion of a personal mood. See Poetry.

*Bibliography. — On lyric poetry in general, consult Gummere's (The Beginnings of Poetry 5 (New York 1901), especially chapter IV. For Greece, consult Farnell's (Greek Lyric Poetry) (London 1891) ; Smyth's (Greek Melic Poets' (London 1900) ; Fairclough's article on ((London 1913) ; Schelling's cThe Eng¬ lish Lyric5 (Boston 1913) ; Wright's (01d Christmas Carols5 (London 1841) and (Songs and Carols) (1847) ; Schelling's (Elizabethan Lyrics and Seventeenth Century Lyrics5 (Bos¬ ton 1895, 1899) ; Lee's (The French Renais¬ sance in England5 (London 1910) ; Bullen's (Shorter Elizabethan Poems5 and Lee's (Elizabethan Sonnets5 ((New English Garner5 1904) ; Erskine's (The Elizabethan Lyric5 (New York 1*903) ; Bullen's Eyries from Elizabethan Dramatists5 (1889) ; Eyries Lorn Elizabethan Song-Books5 (1889) ; and (Lyrics from Elizabethan Romances5 (1890) ; Padel- ford's Early Sixteenth Century Lyrics5 (Bos¬ ton 1907) ; Cox's (English Madrigals in the Time of*

Shakespeare5 (London 1899) ; Pal- grave's (Golden Treasury of Songs and Lyrics5 (many editions). For America, consult Knowles' (Golden Treasury of American Songs and Lyrics5 (Boston 1897), and Rickert and Paton's (American Lyrics5 (New York 1912). For France, consult Jeanroy's (Origines de la Poesie Lyrique en France au Moyen Age5 (Paris 1889) ; Fonsny and Van Dooren's (Anthologie des Poetes Lyriques Franqais5 (Venders 1902) ; Wyndham's (Ronsard and La Pleiade5 (London 1906) ; Brunetiere's Evolu¬ tion de la Poesie Lyrique au XIXe Siecle5 (Paris 1889) ; Lang's (Ballads and Lyrics of Old France5 (London 1872). For Germany, consult Lee's (The German Lyric5 (London 1914), and Munsterberg's (Harvest of German Verse5 (New York 1916).

Raymond M. Alden,

Professor of English, Leland Stanford Junior U niversity.

LYS, les, or LEYE, li-e, Belgium, an af¬ fluent of the Scheldt, which rises near Lysbourg, Pas-de-Calais, France, and after a northeasterly course of 130 miles unites with the Scheldt at Ghent, Belgium. Some of the most stubbornly contested engagements in the early months of the Great War were fought in its valley.

LYSANDER, li-san'der, Spartan general : d. 395. His father was Aristocritus, a Lace¬ daemonian of the purest blood, being of Hera- cleidan descent, his mother a Helot who brought him up in povertv. His fine qualities, however, procured him the command of the

Spartan fleet off the coasts of Asia Minor (408). He established his headquarters at Ephesus, which he raised to prosperity. Next year he was succeeded by Callicratidas. In a short time his reputation had so increased that the Asiatic allies of Sparta requested the Lace¬ daemonians to invest him a second time with the command. Accordingly, Lysander, with the title of vice-admiral (405 b.c.), defeated and captured the Athenian fleet off Egospo- tamos. This decisive victory put an end to the Peloponnesian War. Shortly afterward he set sail for Athens, which he blockaded. The city was starved into capitulation (404) ; the long walls and the fortifications of the Piraeus were demolished; and the oligarchy of the Thirty Tyrants was established, which gov¬ erned with terrible cruelty. Lysander then re¬ turned to Lacedaemon, where his ambitious and unscrupulous character made itself more pal¬ pable than ever. He was excessively fond of praise, and was the first of their own country¬ men to whom the Greeks erected altars, offered sacrifices as to a god and celebrated festivals. On his return to Sparta

Lysander, stung by the ingratitude of Agesilaus, whose succession to the throne he had secured, resolved to de¬ stroy the constitution of his country by abolish¬ ing hereditary monarchy, making the throne elective, but the Delphic and other oracles were unfavorable, in spite even of his bribes. On the outbreak of the Boeotian War (395 b.c.) he marched against Haliartus and was killed in battle under its walls.

LYSANIAS, (1) an Athenian of the deme Sphettus, who according to some accounts was the father of Eschines, the disciple of Socrates. Consult Plato, (Apol5 ; Socrates, c. 22; Diog¬ enes' Eaertius,5 ii, 60. (2) The father of Ceph- alus, one of the interlocutors in the republic of Plato. Consult Plato, (Polit.5 p. 330b. (3) A

friend of Alexander the Great, who was sent with Philotas to the coast in charge of the booty taken after the victory over the Thra¬ cians (355 b.c.) . Consult Arrian, 1, 2. (4) A

Greek grammarian, native of Cyrene, mentioned by Athenseus as the author of a work on the Iambic poets (vii, p. 304 b. ; xiv, p. 620 c.). Suidas speaks of him as the instructor of Era¬ tosthenes. He may be the same person men¬ tioned by Diogenes (Eaertius5 vi, 23) as the son of Eschrion.

LYSANIAS, tetrarch of Abilene (on the eastern slope of the Lebanon Mountains near Damascus), mentioned by Saint Luke (chap¬ ter iii, 1) at the time when John the Baptist began his ministry (25 a.d.). He is supposed to have died about the time that the Emperor Claudius ascended the throne 'for in the first year of Claudius' reign the tetrarchy of Abilene was given to Herod Agrippa. It is probable that Lysanias was the son of Lvsanias, spoken of by Josephus as a prince named Lysanias who ruled over a territory in the neighborhood of Lebanon in the time of Antony and Cleopatra and who was put to death by Antony to gratify Cleopatra (26 b.c.). This ambitious queen seems to have received a good part of the territory (Joseph, Ant. Jud. xv, 4; Dion. Cass., xlix, 32). . The obscurity surrounding the name of Lysanias has attracted the attention of scholars, many of whom confused the two Ly¬ sanias supposing there was but one. Consult

LYSENIAS

LYSTRA

McClintock and Strong (Vol. V, p. 589, New York 1891).

LYSENIAS, a piece of statuary found in the island of Scio and bearing this name on the base and an inscription showing that the

sculptor's father was named Dionysus and that the statue represented the god Dionysus.

LYSIAS, lis' l-as, Athenian orator: b. about 458 b.c. ; d. about 380. He was a son of Cepha- lus, an orator, of whom Plato makes honorable mention in his

1880).

LYSICRATES, li-sik'ra-tez, Monument of,

located in Athens ; one of the earliest examples of Corinthian architecture. It was dedicated 334 b.c. to Dionysus, by Lysicrates, as a trophy for winning the Dionysian games. The monu¬ ment, which was built in the form of a round temple, was surmounted by a bronze tripod and stood on a cubical base 13 feet high. The build¬ ing on account of its shape was popularly known as the ((Lantern of Demosthenes.®

LYSIMACHIA. See Loosestrife.

LYSIMACHUS, li-sim'a-kus, general and one of the diadochoi of Alexander the Great : b. Pella, Thessaly, 361 b.c. ; d. near Corus, 281 b.c. He was a low-born Macedonian of great physical strength and courage. On the death of Alexander, 323 b.c., Thrace fell to the share of Lysimachus, who became also satrap of Mace¬ donia in 286. The murder.of his son Agatho- cles, a great favorite of the people, at the insti¬ gation of his Egyptian wife, Arsinoe, provoked a revolt in Asia ; Seleucus, satrap of Syria, took up the cause of the widow of Agathocles, Ly- sandra, and Lysimachus was killed in the battle near Corus which ensued. He founded a city on the Hellespont, named after him Lysimachi.

LYSIMETER (a rain gauge) from two Greek words, lysis, dissolving, and metron, measure, an invention for collecting and meas¬ uring the rain that percolates through the soil ; and also for the study of the composition of drainage water. The lysimeter is a water¬ tight box (or cylinder), enclosing a definite area to a given depth and provided with a bot¬ tom arranged so that the percolating water that has drained through the soil may be drawn off and measured. This box is sunk into the soil to a level with its top. Sometimes the lysimeter

is placed in a pit dug for the purpose and filled with the soil removed from the pit. Usually the conditions of the soil in the lysimeter are like those of the soil outside. Lysimeters are variously made. In some

cases a trench has been dug in the soil and perforated iron plates are inserted to support the mass, with a zinc funnel to collect the drainage water and con¬ duct it to a receptacle. Although lysimeters cannot represent accurately the conditions of the natural soil, they are valuable for compara¬ tive scientific studies on percolation, drainage and the processes of vitrification in soils. The best work with lysimeters has been done by Stockbridge at the Agricultural College, Am¬ herst, Mass. ; Sturtevant, Babcock and Goff at the Agricultural Experiment Station, Geneva, N. Y. ; and . Lyon at Cornell University. In other countries the leading experimenters are : England, by Lawes, Gilbert and Warrington at Rothamsted ; France, by Deherain at Grignon; Germany, by Gerlash at Bromberg; in Hawaii, by Eckert ; and Moscow, by Klucharov. Con¬ sult Stockbridge, (Investigations in Rainfall, Percolation and Evaporation (Boston 1879) ; Gilbert, Observations on Rainfall, Percolation and Evaporation (in (Rothamsted Memoirs, > Vol. VII, London 1890) ; Deherain, (Les coux de drainage des terres cultives) (Paris 1893) ; Cameron, F. K., (The Role of the Lysimeter in Soil Solution Studies) (in Eighth International Congress of Applied Chemistry Proceedings, Vol. XV, 1912) ; and New York State Experi¬ ment Station Reports, 1882, 1887, 1888 and 1890.

LYSIPPUS, ll-sip'us, Greek sculptor who flourished in Sicyon between 360 and 316 b.c. Alexander the Great would permit no one but Apelles to paint his portrait, and no one but Lysippus to make his statue. Lysippus was first a smith and afterward devoted himself to sculpture, adopting the canon of Polycletes, as exemplified in that artist's ˆoryphorusP This canon, or standard of beauty, presents the hu¬ man form with the head smaller and the limbs longer and slenderer than in life. His statues were wrought with much greater ideal beauty than those of his predecessors. They were al¬ most all, if not all, in bronze, and he is said to have left behind him some 1,500 works. Sev¬ eral of his more celebrated statues were those of Alexander, the most noted of which repre¬ sented the Macedonian hero bearing a lance. This was considered as a sort of companion to the picture of Apelles, in which Alexander was seen, like a second Zeus, launching a thunder¬ bolt. Among his principal ideal works are the colossal (Zeus) at Tarentum; Phoebus Apollo in his four horse Chariot at Rhodes; the bronze statue of Opportunity* at the entrance of a temple in Sicyon, of which several copies are extant; the colossal bronze statue of (Her- cules) at Tarentum and the famous Athlete,* of which the ˆpoxyomenus* of the Vatican is a copy.*

LYSOL, a brown, oily liquid, having an odor resembling creosote. It

is prepared from tar oil by saponification ; is a useful antiseptic for the hands in a 1 or 2 per cent solution, and is chiefly used in obstetrical operations.

LYSTRA, lis'tra, Asia Minor, a village of importance in ancient Lycaonia between Cap¬ padocia and Phrygia. Lystra was a Roman col¬ ony and the place where Saint Paul healed the

impotent man and was, with Saint Barnabas, worshipped as a god ((1889).

LYTE, Henry Francis, English Anglican clergyman and hymn writer : b. Ednam, near Kelso, Scotland, I June 1793; d. Nice, France, 20 Nov. 1847. He was graduated from Trinity College, Dublin, and took orders in the Angli¬ can Church, 1815. He was curate of Lower Brixham, Devonshire, 1823-47. He published (Tales Illustrative of the Lord's Prayer) (1826); (Poems, Chiefly Religious> (1833); Miscellaneous Poems (1868) ; Memoir of Henry Vaughan) ; (Abide With Me* ; (Pleasant Are Thy Courts*; (Jesus, I My Cross Have Taken) ; and other hymns of his have become widely popular both in America and England. His Miscellaneous Poems) were issued with a memoir by his daughter (London 1868).*

*LYTLE, lit'l, William Haines, American general and poet: b. Cincinnati, Ohio, 2 Nov. 1826; d. Chickamauga, Tenn., 20 Sept. 1863. He was graduated at Cincinnati College, studied law and practised for a short time. He served as a captain in the Mexican War, and later was a member of the Ohio legislature. During the Civil War he was colonel of the 10th Ohio Regiment and was brigadier-general of volun¬ teers, having been promoted to that rank for gallant conduct. He was killed at the battle of Chickamauga. His best-known poem is the famous (Address of Antony to Cleopatra, * the opening line of which is (*

LYTTELTON, New Zealand, a seaport town on the east coast of South Island, on an inlet on the northwestern side of Banks Penin¬ sula. It is the port of Christchurch, seven miles northwest, with which it is connected by a tunnel over a mile long. Lyttelton steamers connect the railway system of South Island with Wellington in the North Island. The

abrupt hills (the walls of an extinct volcano), surrounding it, rise to

1,600 feet. The harbor, protected by great artificial breakwaters, has an area of 110 acres, and is about 10 miles long. A graving dock permits vessels of 6,000 tons to land. Lyttelton is the port for the commerce of the region of the rich agricultural district of Canterbury. The town was settled in 1850 and was called Port Cooper, Port Victoria and, finally, Lyttelton. Pop. 4,392.

LYTTON, lit'on, Edward Robert Bulwer- Lytton, Earl of, English poet and diploma¬ tist: b. London, 8 Nov. 1831; d. Paris, 24 Nov. 1891. He was the only son of the well-known novelist, Bulwer-Lytton (q.v.). He was edu¬ cated at Harrow and Bonn, and entered the diplomatic service in 1849, being appointed at¬ tache at Washington, where his uncle, Henry Bueller; afterward Lord Dalling, was Minister. Subsequently he held diplomatic posts at Flor¬ ence (1852) and other European capitals, and was secretary of legation successively at Copenhagen, Athens, Lisbon and Madrid. In 1874 he was appointed Minister at Lisbon, and was made viceroy of India by Disraeli in 1876. At a great durbar held at Delhi in 1877, he pro¬ claimed Queen Victoria empress of India. In the great famine of 1877-78 he conducted admi¬ rably the work of relief. He adopted an aggres¬ sive policy in Afghanistan, which brought about the second Afghan War (1879). His adminis¬ tration was marked by notable internal reforms, such as the abolition of the inland customs, the repeal of duties on cottons and the promulga¬ tion of new civil service rules. In 1880 he was created earl of Lytton, and on the accession of the Liberals to power in that year, who were strongly opposed to his policy in Afghanistan, he sent in his resignation as viceroy. In 1887 he was appointed British Ambassador at Paris. For many years Lytton was better known as a poet than as a diplomatist, under the pseudonym of ((Owen Meredith.® His published works in¬ clude (Clytemnestra, and Other Poems) (1855) ; (The Wanderer (1859) ;*

Poppy, } his best poetical work, abounding in lofty poetry and gay irony, appeared posthu¬ mously (1892). As a prose writer Lytton takes high rank. Consult the works by his daughter, Lady Betty Balfour, (History of Lord Lytton's Administration, 1876-1880 (London 1899) ; and (Personal and Literarv Letters) (New York*

1906).

LYTTON, Lord. See Bulwer-Lytton, Edward George Earle.

f . i

| ! ■

.

,

r

wm

f

m.

\

i « «

L : i

i « «

L : i

Mill

1 \

A wi

mi j Ji

i

>

*

t

I

.

.

d

I

I

1

I

I

I

THE

M

AMERICANA

JT

liBˆr

Urivehsal

.Knowledge,

In Thirty Volumes

j >

> •

1922

CORPORATION

NEW YORK CHICAGO

I

1

I

1

1

I

p

Copyright, 1919 BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

•\

* > ■

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 1 8 1922

* g > C!.AG54317

•-'V-VT} |

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XVIII

ALDEN, RAYMOND M., Ph.D., Litt.D.

Professor of English, Leland Stanford Jr. University

MARMION

BABASINIAN, V. S.

Professor of Chemistry, Lehigh University

METHANE

BARRUS, GEORGE H., C.E.

Expert and Consulting Steam Engineer,. Boston

MECHANICAL ENGINEERING

BAXTER, JAMES PHINNEY, Litt.D.

Editor of “ The Documentary History of Maine ”

MAINE

BENNETT, CHARLES E., Litt.D.*

Late Professor of Latin, Cornell University

METAMORPHOSES

BERRY, GEORGE RICKER, Ph.D., D.D.

Professor of Old Testament Interpretation and Semitic Languages, Colgate University

MALACHI, BOOK OF

BREWSTER, W. T., A.M.

Professor of English, Columbia University

MEREDITH, GEORGE

BROOKE, TUCKER, M.A., Litt.B.

Professor of English, Yale University

MEASURE FOR MEASURE MERRY WIVES OF WINDSOR, THE

BRUBACHER, A. R., Ph.D.

President of State College for Teachers, Albany N. Y.

MANUAL TRAINING MECHANICS' INSTITUTES

BRYCE, GEORGE, LL.D.

Founder of Manitoba College and a Founder of the Manitoba University

MANITOBA, UNIVERSITY OF

BUCHANAN, MILTON A., B.A., Ph.D.

Professor of Italian and Spanish, University of Toronto

MAYOR OF ZALAMEA, THE

CAIRNS, WILLIAM B., Ph.D.

CALDWELL, HOWARD W., Ph.B.

Head Professor American History, University of Nebraska

MEXICAN WAR

CALLAHAN, JAMES M., Ph.D.

Professor of History and Political Science, West Virginia University

MEXICO — DIPLOMATIC RELATIONS OF THE UNITED STATES WITH

CANFIELD, ARTHUR G., Ph.D.

Professor of Romance Languages, University of Michigan

MAGIC SKIN, THE MAXIMS

CARMAN, E. A.*

General United States Army

MALVERN HILL, BATTLE OF MARK'S MILLS, ENGAGEMENT AT

MARYLAND CAMPAIGN OF SEPTEM¬ BER, 1862

MARYLAND HEIGHTS MECHANICSVILLE, BATTLE OF

CARROLL, HENRY K., LL.D.

Author of 11 Religious Forces in the United States," *etc.*

METHODIST CHURCHES OF THE WORLD

COCHRANE, CHARLES H.

Author of “ Wonders of Modern Mechanism,” *etc.*

MACHINE FORGING MECHANICAL MOVEMENTS, POWERS AND APPLIANCES

CORNYN, JOHN HUBERT, B.A., LL.B.

Professor of History, National University of Mexico

MEXICO

COUMBE, CLEMENT W.

Technical Art Expert

MADONNA IN ART, THE MAJOLICA AND MEZZA-MAJOLICA

CREIGHTON, JAMES E., Ph.D., LL.D.

Professor of Logic and Metaphysics, Cornell University

MATERIALISM

CUTLER, FRANCES W.

Instructor in English, Vassar College

MAUD

Associate Professor of American Literature, Uni versity of Wisconsin

MARBLE FAUN, THE

* Deceased

Contributors to Volume XVIII — Continued

DEARBORN, GEORGE VAN NESS, M.D., Ph.D.

Medical Corps, United States Army

MEDICAL PEDAGOGY MEDICINE AND PSYCHIATRY

DODGE, CHARLES RICHARDS

MATTING

DOOLITTLE, ERIC, C.E.

Director of Flower Astronomical Observatory, University of Pennsylvania

MERCURY

DRUM, WALTER, S.J.

Professor of Scripture, Woodstock College, Woodstock, Md.

MANUSCRIPTS, ILLUMINATED MANUSCRIPTS OF THE BIBLE

DUNN, WALDO H., M.A., Litt.D.

Professor of English, College of Wooster, Wooster, Ohio

MACAULAY, TREVELYAN'S LIFE OF

DUTTON, GEORGE B., Ph.D.

Assistant Professor of English, Williams College, Williamstown, Mass.

MANSFIELD PARK

EGGERT, CARL E., B.Ph., Ph.D.

Assistant Professor German, University of Michigan

MACAULAY'S ESSAYS MESSIAH, THE

ELLWOOD, CHARLES A., Ph.B., Ph.D.

Professor of Sociology, University of Missouri

MARRIAGE, HISTORY OF

ESTES, DAVID FOSTER, D.D.

Professor of New Testameht Interpretation, Colgate University

MARK

MARK, GOSPEL ACCORDING TO MATTHEW

MATTHEW, GOSPEL ACCORDING TO

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

MACHINE GUN TACTICS

FELTER, HARVEY WICKES, M.D.

Professor of Materia Medica and Therapeutics, and Medical History, Eclectic Medical College, Cin¬ cinnati, Ohio

MEDICINE, ECLECTIC FOOSHE, GEORGE W.

Memphis Chamber of Commerce

MEMPHIS, TENNESSEE

GARNER, JAMES W., Ph.D.

Professor of Political Science, University of Illinois

MEDIATION

MERCHANT VESSELS, NEUTRAL RIGHTS OF

MERCHANT VESSELS, TRANSFER OF, FROM BELLIGERENT TO NEUTRAL FLAGS

GEDDES, JAMES, JR., Ph.D.

Professor of Romance Languages, Boston University

MEMOIRS OF CARLO GOLDONI MEROPE

GEHRING, ALBERT, A.M.

Author of “ The Basis of Musical Pleasure,” *etc.*

MENSURAL MUSIC

HALE, EDWARD EVERETT, Ph.D.

Professor of English, Union College, Schenectady, N. Y.

MARIUS THE EPICUREAN

HALL, LOUIS D.

Specialist in Marketing Livestock and Meats, Bureau of Markets, United States Department of Agri¬ culture

MEAT

HANFORD, JAMES H., Ph.D.

Associate Professor of English, University of North Carolina

MANFRED

HARRY, JOSEPH E., Ph.D.

Author of “ The Greek Tragic Poets,” *etc.*

MEDEA

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor, Department of German Lan¬ guage and Literature, College of the City of New York

MANN, HEINRICH MANN, THOMAS MEHRING, FRANZ

HENNEMAN, JOHN B., Ph.D.

Late Professor of English in the University of the South

MACAULAY, THOMAS BABINGTON

HOWARD, WILLIAM G., A.M.

Assistant Professor of German, Harvard University

MAGDA

INGERSOLL, ERNEST

Zoologist, Editor and Author

Contributors to Volume XVIII — Continued

ISAACS, ABRAM S., Ph.D.

Professor of Semitic Languages and Literature, New York University

MACCABEES

MACCABEES, BOOK OF THE

ISAACS, EDITH J. R.

Critic and Essayist

MERLIN

JELLIFFE, SMITH ELY, M.D., Ph.D.

Professor of Psychiatry, Fordham University

MALARIA

MASTURBATION

MECHANISMS, MENTAL

MEDICINE, RECENT PROGRESS IN

MENTAL DISEASES

KAINS, M. G., B.S.. B.S.A., M.S.A.

MELONS

KEYSER, CASSIUS J., Ph.D.

Adrain Professor of Mathematics, Columbia Uni¬ versity

MATHEMATICS

KLEIN, HENRI F.

Editorial Staff of The Americana

MESOPOTAMIA

KUNZ, GEORGE F., Ph.D., Sc.D.

Gem Expert, Tiffany & Company, New York City

METRIC SYSTEM

LAWRENCE, WILLIAM WITHERLE, Ph.D., Litt.D.

Professor of English, Columbia University

MANDEVILLE, SIR JOHN

LENNOX, P. J., B.A., Litt.D.

Professor of English Language and Literature, The Catholic University of America

MASS

LIVINGSTON, ARTHUR

Professor of Romance Languages, Western Uni¬ versity, London, Ontario, Canada

MASCHERONIANA

LOISEAUX, LOUIS A., B.S.

Associate Professor of Romance Languages and Literatures, Columbia University

MADEMOISELLE DE MAUPIN MANON LESCAUT

LOWIE, ROBERT H., Ph.D.

American Museum of Natural History

MACH, ERNST

MARTIN, CHESTER

Professor of History, University of Manitoba

MANITOBA

MARTIN, FRANKLIN, M.D.

Chairman Committee on Medicine and Sanitation Advisory Commission, Council of National Defense

MEDICAL ORGANIZATION IN THE UNITED STATES ARMY

MARVIN, WINTHROP L., Litt.D.

Author of “ The American Merchant Marine; Its History and Romance,” *etc.*

MERCHANT MARINE OF THE UNITED STATES

McGregor, james h., Ph.D.

Professor of Zoology, Columbia University

MAN, PREHISTORIC RACES OF

McVEA, EMILIE W., A.M.

Assistant Professor of English, University of Cin¬ cinnati

MADISON, JAMES MARSHALL, JOHN

MIMS, EDWIN, Ph.D.

Professor of English, Vanderbilt University

MACBETH

MERCHANT OF VENICE, THE

MOORE, WILLIS LUTHER, LL.D., D.Sc.

Professor of Meteorology, George Washington University

METEOROLOGY

MOSES, BERNARD, Ph.B., Ph.D., LL.D.

Professor of History and Political Science, Uni¬ versity of California

MANILA

MUMFORD, HERBERT W., B.S.

Professor of Animal Husbandry, University of Illinois i

MEAT AND MEAT PRODUCTION

NELSON, ALFRED B., M.D.

Late Professor of Mathematics, Centre College, Danville, Ky.

MAGIC SQUARES

OGDEN, CHARLES J., Ph.D.

New York City

mahAyAna

OSLER, WILLIAM, M.D., LL.D., Sc.D.

Late Regius Professor of Medicine, Oxford Uni¬ versity, England

MEDICINE, HISTORY OF

Contributors to Volume XV1I1 — Concluded

PANARONI, ALFRED G., B.S.

Instructor in Romance Languages, College of the City of New York

MARGHERITA PUSTERLA

PFEIL, STEPHEN *

Formerly of the Philadelphia “ Press ”

MARITIME LAW MARRIAGE, THE LAW OF

SCHIERBRAND, WOLF VON, Ph.D., LL.D.*

Chief Correspondent, Associated Press, Berlin: Author of “Germany: the Welding of a World Power.” *etc.*

mahAbhArata

MARATHI LANGUAGE AND LITERA¬ TURE

SHEARER, JOHN S., B.S., Ph.D.

Assistant Professor of Physics, Cornell University

MAGNETISM

SHOWERMAN, GRANT, Ph.D.

Professor of Latin Literature, University of Wis¬ consin

MARTIAL'S EPIGRAMS

SPALDING, S. C.

Halcomb Steel Company, Syracuse, N. Y.

METALLURGY

STEINER, BERNARD C., Ph.D., LL.B.

Librarian of The Enoch Pratt Free Library, Baltimore, Md.

MARYLAND

STILLSON, H. LEONARD, 32°

Masonic Historian; and

KLEIN, HENRI F.

Sir Edward Clarke Lodge, London; Editorial Staff of The Americana

MASONIC FRATERNITY, THE

SUTTON, CHARLES W.

Chief Librarian, Manchester Public Free Libraries

MANCHESTER, ENGLAND

SWIFT, LOUIS F.

President of Swift and Company, Chicago, Ill.

c ■ 7 j t

MEAT PACKING

THORNDIKE, ASHLEY H., L.H.D., Ph.D.

Professor of English, Columbia University

MARLOWE, CHRISTOPHER

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

MAN WITHOUT A COUNTRY

TRUE, FREDERICK W., B.S., M.S.

MAMMALS

UNDERHILL, JOHN GARRETT, Ph.D.

Author of “ Spanish Literature in the England 01 the Tudors ”

MARTA OF THE LOWLANDS

WADLIN, HORACE G., Litt.D.

Librarian Emeritus, Boston Public Library

MASSACHUSETTS

WALSH, JAMES J., M.D., Ph.D., Litt.D., Sc.D—

New York City

MAN, CHRISTIAN ANTHROPOLOGY

MEDICAL EDUCATION IN THE UNITED STATES MEDICAL JOURNALISM MEDICAL SCIENCE AND THE WORLD WAR

MEDITATIONS OF MARCUS AURE¬ LIUS, THE

WEBSTER, ARTHUR GORDON, Ph.D., D.Sc., LL.D.

Professor of Physics, Clark University

MECHANICS

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern French Literature ”

MADAME BOVARY MARRIAGE OF FIGARO, THE MEDITATIONS OF LAMARTINE

WHIPPLE, GUY M., Ph.D.

Author of “ Manual of Mental and Physical Tests ”

MENTAL TESTS

WHITE, WILLIAM A., M.D.

Superintendent Saint Elizabeth's Hospital, Wash¬ ington, D. C.; Professor of Psychiatry, George Washington and Georgetown Universities

MENTAL HYGIENE

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

MECHANISM AND VITALISM METAPHYSICS

WRONG, GEORGE M., A.M.

Professor of History, University of Toronto

MAC DONALD, SIR JOHN ALEXANDER

* Deceased

KEY TO PRONUNCIATION.

a

far, father

n

Span, h, as in canon (can’ydn), pihon (pen’yon)

a

fate, hate

ng

mingle, singing

a or a

at, fat

nk

bank, ink

a

air, care

a

ado, sofa

6

no, open

a

all, fall

o or o

not, on

ch

choose, church

A

o

corn, nor

e

eel, we

6

atom, symbol

e or e

bed, end

o

book, look

e

her, over: also Fr. e, as in dc ; eu, as in neuf ; and oeu, as in

oi

oil, soil ; also Ger. eu, as in beutel

boeuf, coeur; Ger. d (or oe), as in okonomie.

6 or oo

fool, rule

e

befall, elope

ou or ow

allow, bowsprit

e

agent, trident

s

satisfy, sauce

ff

off, trough

sh

show, sure

g

gas, get

th

thick, thin

gw

anguish, guava

fh

father, thither

h

hat, hot

u

mute, use

k or h

Ger. ch, as in nicht, wacht

u or u

but, us

hw

what

u

pull, put

I

file, ice

between u and e, as in Fr. sur ,

Ger. Miiller

i or i

him, it

V

of, very

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

y

(consonantal) yes, young

j

gem, genius

z

pleasant, rose

kw

quaint, quite

zh

azure, pleasure

h

Fr. nasal m or n, as in embon¬

‘(prime),

“(secondary) accents, to indicate

point, Jean, temps

syllabic stress

■

,

, r- ; ‘ ei . : . * ■ ‘

11 i. /’ •

• . ,!

,i !

■

-i

‘

Mthe thirteenth letter of the English and most of the other West Eu¬ ropean languages, is one of the four liquids, or semi-vowels ; it is also classed as a labio-nasal, its sound being produced when with lips closed and the whole uvula lowered the breath makes a humming noise as it issues through the nostrils. The lips play the same part in the pronunciation of m as in that of b, but in pronouncing b the nasal passage has no part. Hence when that passage is obstructed or closed the sound produced is that of b not of m.

The M as a capital letter has the same form in the Greek and the Latin alphabets and in all the alphabets derived from them, and in all those alphabets generally the same sound value.

In English there are a few words of Greek origin, mostly technical, in

which mn begins a syllable or a word : in such cases the m is silent, for example, mnemonic, nemonic.

In many words derived from other languages the m of the original word is changed to n in English, examples: Comitatus (Lat.) county, or contrariwise n is changed to m; Anglo-Saxon henep becomes hemp. Often p is added after m to give that letter greater distinctness, for ex¬ ample, exemtus, exemptus, unkemmed, unkempt.

M. QUAD. See Lewis, Charles Bertrand.

MAARTENS, Maarten, mar'ten mar-tenz, pseudonym of the Dutch author, Joost Marius Willem van der Poorten Schwartz: b. Amsterdam, 15 Aug. 1858; d. Zeist, Holland, 4 Aug. 1915. He passed his early life in Eng¬ land ; was educated in Germany and at the Uni¬ versity of Utrecht, was admitted a barrister but chose literature as a profession, and in 1890 published his first work, (The Sin of Joost Avelingh,' which at once arrested the attention alike of critics and of the reading public. This, like all his volumes, was written at first hand in English, not, as has been sometimes supposed, translated from Dutch MS. Maartens thus pre¬ sented the curious instance of an author elect¬ ing to address wholly a foreign public. Indeed it was only with reluctance, to safeguard him¬ self against unsatisfactory^ translations, that he consented to the publication of his books in Dutch. His further works are (An Old Maid's Love> (1891) ; (A Question of Taste) (1891) ; < God's Fool> (1892); <The Greater Glory> (1894) ; (My Lady Nobody) (1895) ; (My Poor Relations) (1903); 'Dorothea' (1904); 'The Healers' ; 'The Woman's Victory* (1906); 'The New Religion' (1907) ; broth¬ ers All' (1909) ; 'The Price of Lis Doris*

(1909) ; (Harmen Pols, Peasant' (1910) ; (Eve* (1912). In America (The Greater Glory' first appeared serially in The Outlook.

(God's Fool' is perhaps Maartens' best, but (The Sin of Joost Avelingh* and (The Greater Glory' have had the greatest popular success. These books afford a by no means flattering pic¬ ture of the Dutch bourgeoisie, but are admit¬ tedly accurate.

MAASIN, ma-a'sin, Philippines, (1) a pueblo of the province of Leyte, island of Visayas, situated on the extreme southwestern coast, 75 miles southwest of Tacloban. It is a hand¬ some, well-built city, and has a large trade, mostly in hemp. Pop. 18,500; (2) a town of the province of Iloilo, Panay, on a tributary of the Sague branch of the

Jalaur River, 18 miles northwest of Iloilo. Pop. 9,700.

MAASTRICHT. See Maestricht.

MAAT, or MA'T, in ancient Egypt, the god¬ dess of truth and justice. She is said to have guided the souls of the dead to Osiris (q.v.).

MAB, the fairy queen of Connaught and a familiar name in Celtic folklore. Mab has been celebrated by Shakespeare and other Eng¬ lish poets. The name is of uncertain origin, being variously derived from the Midgard of the Eddas, the Habundia or Dame Abonde of Norman fairy lore, and from the Cymric mab, a child. According to Voss, Mab was not the fairy queen, the same as Titania, this dignity having been ascribed to her only by mistaking the use of the old English word queen, which originally meant only a woman. Queen Mab is mentioned in Shakespeare's 'Romeo and Ju¬ liet,' Ben Jonson's 'Satyr,' Randolph's pastoral of 'Amyntas,* Drayton's 'Nymphidia' and Mil¬ ton's (L' Allegro.'

MABALACAT, ma-ba-la'kat, a pueblo of the province of Pampanga, Luzon, 16 miles north of Bacolor, the provincial capital. It is on the main road, and on the Manila and Dagupan Railroad. Pop. 10,600.

MABERY, ma'ber-T, Charles Frederic,

American chemist: b. North Gorham, Me., 13 Jan. 1850. He was graduated at the Lawrence Scientific School, Harvard, in 1876, and was as¬ sistant instructor in chemistry there from 1875 to 1883, when he became professor of chemis¬ try in the Case School of Applied Science of Cleveland, Ohio, and emeritus professor since that date to 1901. In the investigation of the composition of American petroleum his work has brought him into special prominence. He

O.

has also done valuable work in connection with electric smelting. The results of his original in¬ vestigations since 1876 were published in the Proceedings of the American Academy of Arts and Sciences and in

various chemical journals at home and abroad.

MABIE, Hamilton Wright, American

editor, critic and essayist: b. Cold Spring, N. Y., 13 Dec. 1846; d. Summit, N. J., 31 Dec. 1916. He was graduated at Williams College in 1867 and from the Columbia University Law. School in 1869. He joined the staff of the Christian Union (now the Outlook) in 1879 and later be¬ came associate editor. He was a member of the American Academy of Arts and Letters and received honorary degrees from Williams, Union, Western Reserve and Washington and Lee universities. In his lectures and papers he constantly advocated the reading of good books, and his own works on literature, etc., have done much to cultivate a good taste in the American reading public. Among others he published (Norse Stories Retold from the Eddas5 (1882) ; (Nature in New England)

(1890); (My Study Fire,5 first series (1890); (Short Studies in Literature) (1891) ; (Underthe Trees and Elsewhere* (1891) ; (Essays in Lit¬ erary Interpretation (1892); (My Study Fire,* 2d series (1894) ; (Nature and Culture) (1897)

(Books and Culture5 (1897) ; (Work and Cul ture> (1898); <The Life of the Spirit5 (1889)

(William Shakespeare — Poet, Dramatist and Man5 (1900); (Works and Days5 (1902)

(Parables of Life5 (1902) ; backgrounds of Literature5 (1903) ; (Myths Every Child Should Know5 (1905) ; <Fairy Tales Every Child Should Know5 (1905) ; (The Great Word5 (1905); (Heroes Every Child Should Know5 (1906) ; ˆLegends Every Child Should Know5 (1906); cChristmas To-day5 (1908); (Intro¬ ductions to Notable Poems5 (1909) ; (American Ideals, Character and Life5 (1913); (Japan, To-day and To-morrow5 (1914).

MABILLEAU, Leopold, French econo¬ mist: b. Beaulieu (Indre et Loire), 1856. After teaching in a number of institutions he be¬ came in 1906 professor at the National Con¬ servatory of Arts. He held many positions for the improvement of social conditions and lec¬ tured in the United States on social and eco¬ nomic questions. Mabilleau was made an officer of the Legion of Honor and a number

of his works have been crowned by the Academy of Moral and Political Sciences. He has edited the works of several authors, has contributed to French magazines and has published (Victor Hugo5 (Paris 1893; 5th ed., 1911); (Histoire de la philosophic atomistique5 (1895) ; (La pre-voyance sociale en Italie5 (1898) ; (La coopera¬ tion en France5 (1900) ; (La mutualite fran-caise, doctrine et applications5 (1904) ; ˆNotions elementaires destruction civique de droit usuel et d'economie politique5 (1912). The latter was in collaboration with E. Levasseur and E. Dela-courtie.

MABILLON, Jean, zhoii ma-be-yon, French ecclesiastic and author: b. Saint Pierre du Mont, Champagne, 23 Nov. 1632; d. Paris, 27 Dec. 1707. Having joined the Benedictines of Saint Maur, he was chosen to assist Dom Jean d'Acherv in the compilation of his < Spicilegium Veterum Scriptorum,5 and subsequently edited the works of Saint Bernard (1690) in

the series of the fathers published by his con¬ gregation. In 1683 he was sent to Germany by Louis XIV to collect documents relating to French history ; and the applause with which his Uter Germanicum,5 a narrative of the journey, was received, induced the king to send him to Italy in 1685 to make purchases for the royal library. A result of this tour was his (Musseum Italicum5 (1687-89), a work of great value. Later he was selected by his superiors to refute Ranee, abbot of La Trappe, who had con¬ demned the custom of permitting monks _ to study. His (Essay on Monastic Studies,5 which appeared in consequence in 1691, was equally remarkable for sound argument and good tem¬ per. His most important other works are < Vetera Analecta5 (1675-85) ; (De Re Diplo-matica5 (1681); and (De Liturgia Gallicana* (1685). He edited and published with Ruinart (Acta Sanctorum Ordinis Sancti Benedicti5 (1668-1702) and prepared the first four vol¬ umes of the (Annales Ordinis Sancti Bene-dictini5 (1703-39). A collection of his (Ouv-rages posthumes5 appeared in 1724, and his Unedited Correspondence with Montfaucon, Magliabecchi, etc.,5 was edited by Valery (1847). Consult Baackner, A., (Mabillions Reise durch Bayern im Jahre 1863 5 (Munich 1910) ; Denis, P., bom Mabillon en so Miethode historique5 (Paris 1910).

MABINI, ma-be'ne, Apollinario, Filipino

insurgent : d. Philippine Islands, 1903. He was educated in the Catholic College of Manila, entered the public service under Spanish rule, became advocate of the treasury, resigned in 1896, and entered

the insurrection. He was imprisoned for nine months by the Spaniards and then associated himself with Aguinaldo, Rizal and Agonchillo. Although a sufferer from paralysis he was the soul of the revolutionary movement and by many is considered the ablest man produced in the revolution. He became privy councillor of Aguinaldo and for a time was Minister of Foreign Affairs and chief of the Supreme Court in the latter's so-called gov¬ ernment. In 1899 he surrendered to the United States, was sent into exile, but allowed to return in 1903 when he took the oath of allegiance. He was the brains of the Malolos government but opposed the Malolos constitution because he believed that the Islands needed a strong centralized government and also because it did not provide for a separation of Church and State. He was of the Tagalog tribe. Consult Worcester, Dean C., (The Philippines, Past and Present5 (2 vols., New York 1914) and Philippine Insurrection Records5 in the Ar¬ chives of the War Department, Washington, D. C.

MABINOGION, mab-i-no'gi-on, The, the name generally but incorrectly applied to all mediaeval Welsh stories. Of the general title (Mabinogion,J which Lady Charlotte Guest's English version (1838-49) has made familiar, John Rhys gives an explanation. <(An idea prevails,55 says Principal Rhys, <(that any Welsh tale of respectable antiquity may be called a mabinogi ; but there is no warrant for extending the use of the term … For, strictly speaking, the word mabinog is a technical term belonging to the bardic system, and it means a literary apprentice. In other words, a mabinog was a young man who had not yet acquired the art of

making verse, but who received instruction from a qualified bard. The inference is that the (Mabinogion) meant the collection of things which formed the mabinog's literary training

his stock in trade, so to speak ; for he was probably allowed to relate the tales forming the (four branches of the Mabinogion) at a fixed price established by law or custom. If he as¬ pired to a place in the hierarchy of letters, he must acquire the poetic art.® In Lady Charlotte

Guest's later edition in one volume (1877), — • the most convenient edition for reference, — 12 tales in all will be found. Of these, the most natively and characteristically Welsh in char¬ acter are such tales as the vivid, thrice romantic (Dream of Rhonabwy,* which owes little to outside sources. (The Lady of the Fountain,* on the other hand, shows in a very striking way the influence of the French chivalric romances that Sir Thomas Malory drew upon so freely in 1 is (Morte d' Arthur.* In the admirably edited Oxford text of the Welsh originals by Rhys and Evans (1887-90), (The Lady of the Fountain* appears under the title of (Owain and Lunet* ; and Lunet's name at once recalls Tennyson's (Idylls of the King.* The old manuscript volume of the (Mabinogion,* known as the (Llyfr Coch o Hergest,* — the (Red Book of Hergest,* — written in the dialect of South Wales, is in the famous library of Jesus Col¬ lege, Oxford, the one college in the older English universities which has a time-honored connection with Welsh scholarship and Welsh literature. The tales, though in their present form not older than the 12th century, embody traditions that were afloat prior to that date. Consult John, I. B., (The Mabinogion* (Lon¬ don 1901) ; and Lloyd, E. J., (The Mabinogion as Literature* (in the Celtic Review, Edin¬ burgh 1911).

MABLY, Gabriel Bonnot de, ga-bre-<el bon-o de ma-ble, French ecclesiastic and pub¬ licist: b. Grenoble, 14 March 1709; d. Paris, 23 April 1785. His family name was Bonnot. Like his younger brother, the philosopher Condillac (q.v.), he was destined for the Church, and after studying at the seminary of Saint Sulpice in Paris was ordained subdeacon. He showed little liking for theology, and for some time was secretly employed in affairs of state by his relative Cardinal de Tencin, minister of Louis XV, conducting the most difficult negotiations and writing elaborate reports with an ability for which the minister received all the credit. Later he applied himself to literature, and in 1748 published his (Droit publique de l'Europe,* which achieved a remarkable success. It was followed by Observations sur les Grecs* (1749) ; Observations sur les Romains* (1751); (Entretiens de Phocion* (1753); Ob¬ servations sur l'histoire de France* (1755) ; (Principes des negociations* (1757) ; (De la maniere d'ecrire l'histoire* (1773) ; (De la legislation* (1776) ; (De l'ldee de l'histoire* (1778); and (Principes de morale) (1784). Having been requested by the government of Poland to prepare for them a code of laws, he visited that country in 1771, and published in 1781 a work (Du Gouvernement de la Cologne.* He was also consulted by the American Con¬ gress in 1783 on the preparation of the Consti¬ tution, and embodied his views in his Observa¬ tions sur le gouvernement et les Lois des Etats-Unis d'Amerique) (1784). In this work

he foretold the speedy downfall of the United States. He was an idealiser of ancient Rome and was enamored of the socialistic state and the communism of wealth, and from his pessi¬ mistic views on modern social organization was known as the “prophet of woe.** Consult Guervier, (L’Abbe Mably, moraliste et politi¬ que* (1886); de la Serae, (Mabylet les physiocrates* (1911).

MABUCHI, ma-boo’che, Japanese writer and religious teacher: b. 1693; d. 1769. He was distinguished as a scholar, and utilized his great learning in the endeavor to purify the native religion, Shinto, from the accretions of Chinese and Buddhist philosophy, etc., whereby he re¬ garded it as having been corrupted. His love and knowledge of antiquity enabled him to pre¬ sent the native faith in its original simplicity, and his teachings were exemplified in his own life. To him modern students are largely in¬ debted for direct access to ancient Japanese poetry. He added greatly to the knowledge of the past. He was the first of the three great scholars (Motoori and Hirata being the others) who dedicated themselves to this work of sim¬ plifying the ancient faith of the country.

MABUSE, ma’buz’, Jan, Flemish painter: b. Mauberge, Hainault, in 1472; d. Antwerp,

1 Oct. 1552. His real name was Jean Gossart (or Gossaert). When he became a member of the Guild of Saint Luke at Antwerp in 1503, he signed the register as Jennyn van Henegouwe (John of Hainault). He signed his early pictures Jennyn Gossart and those of his middle and last period Joannes Malbodius (John of Mauberge), In the register of the Guild of Our Lady at Middleburg he is entered as Jan de Waele (John the Walloon). It is not known from whom he learned his art, but at Ant¬ werp he fell under the influence of Quentin Matoys (15th century). In 1508 Mabuse, as he is familiarly known, went to Rome with his patron, the magnificent Philip of Burgundy, visiting Verona and Florence on the way. He stayed in Rome a year and returned to the court of Burgundy in November 1509. He :hen was employed at the -Duke of Burgundy’s castle of Zuytburg, painting for Philip. After Philip’s death in 1524, he entered the service of Adolphus of Burgundy. When Christian II of Denmark visited the Low Countries he asked Mabuse to paint his dwarfs and in 1528 he requested the artist to design the tomb for his queen, Isabella, in the abbey of Saint Pierre, near Ghent. Mabuse also painted the children of Christian II — John, Dorothy and Christine, which came into the collection of Henry VIII of England. Mabuse also design’ d and erected the tomb of Philip of

Burgundy in the church of Wyck. Van Mander's biograohy accuses him of habitual drunkenness, but the great works produced by him, as well as their num¬ ber, prove that he was a hardworking and painstaking artist, perfectly in command of his powers. In 1527 he accompanied Lucas of Leyden on a pleasure trip to Ghent, Mechlin and Antwerp. Mabuse seems to have been the first of the Netherland painters to go to Italy. He brought back a new style; and from his time to that of Rubens and Van Dvck it was considered the proper thing for all Flemish painters to go to Italy.

The best specimen of his early and purely Netherland is the famous (Adoration of the Magi,5 long at Castle Howard, England, and purchased by the National Gallery, London, in 1911 for the extraordinary sum of $192,000. This great picture was painted in 1500 for the abbey of Grammont in eastern Flanders and was sold by the monks in 1605 to the Archduke Ferdinand, who placed it in a private chapel in Brussels. In the 18th century Charles of Lor¬ raine acquired it and at his death in 1775 the picture passed to England. The signature of Jan Gossart appears in golden letters on the band of the crown on the negro king. In this great work there are 30 figures with an archi¬ tectural background, much in the style of Memling and Roger van der Weyden.

The National Gallery (London) contains five other precious works by Mabuse, including the portrait of Jacqueline of Burgundy; por¬ trait of a man holding his gloves* and the portrait of a man with a rosary. Hampton Court has the (Three Children of Christian II, King of Denmark) ; '■Adam and Eve in Paradise) ; a portrait of <Holbein) ; Eleanor of Austria5 ; and a (Holy Family.5 The Louvre has a magnificent portrait of Jean Carondelet, chancellor of Flanders; a (Virgin and Child5; a portrait of <Benedictin) ; and <a man and his wife.5 (Saint Luke painting the Blessed Vir¬ gin and Child5 formerly in the cathedral of Mechlin but now in that of Prague, painted in 1515, is a fine example of Italianized Nether¬ land art. Another celebrated picture was a large triptych, (The Descent of the Cross,5

painted for Maximilian of Burgundy for the monastery of Our Lady and Saint Nicholas at Middleburg, which perished when that building was burned in 1568. Diirer saw it in 1520 and admired it extremely, although he said <(the composition was not as good as the execution.55 Mabuse excelled in portraiture. Occasionally Mabuse turned to mythological subjects, such as (Neptune and Amphitrite) (1516) in the Berlin Museum. His architecture is beautifullv drawn and his painting of rich materials — damasks, embroideries and tapestries — is superb. Con¬ sult Segard, Achille, (Mabuse, JaiP (in Les Arts, No. 123, p. 1, with illustrations including (Adoration of the Magi,5 Paris 1912) ; Weisz, Ernst, <Jan Gossart5 (Freis 1913).

MAC, or MC, a Gaelic prefix, as Mac¬ Gregor, MacDonald, McKinley, *etc.* It corre¬ sponds with son in surnames of Teutonic origin, Fitz in those of Romance origin, or Ap or Ab in Welsh surnames.

MACA, a tribe of people living in the forests of the eastern slope of the Andes in central Ecuador. They live in huts of palm leaves, make pottery, hunt and cultivate yucca, corn and tobacco. The various tribes, not yet classified as to language, frequently war with one another. Their weapons are spears, blow-guns and poisoned arrows. They dry the heads of slain enemies.

MACABEBE, ma-ka ba'ba, Philippines, a pueblo of the province of Pampanga, Luzon, situated at the head of the Pampanga River delta, nine miles from Manila Bay and seven miles southeast of Bacolor. Pop. 10,400.

MACABER (ma-ka'ber) DANCE. See

Dance of Death.

MACADAM, mak-ad'am, John Loudon,

Scottish engineer: b. Ayr, 21 Sept. 1756; d. Moffat, Dumfriesshire, 26 Nov. 1836. In 1770 he was sent to an uncle at New York, where he remained during the War of Independence, and realized a considerable fortune as agent for the sale of prizes. At the close of the war he re¬ turned to Scotland, and in 1798 was appointed agent for revictualing the navy in the western ports of Great Britain, and took up his resi¬ dence at Falmouth. He afterward resided for many years at Bristol. It was here, in 1815, on being appointed surveyor-general of the Bristol roads, that he resumed experiments he had made in Scotland, and first had full scope for putting in practice the important

improve¬ ments in road-making which had long before occupied his thoughts. By 1823 his general suc¬ cess was admitted; and in 1827 he was made general surveyor of roads. In carrying out his improvement he had expended several thousand pounds from his private resources; and the House of Commons, having been satisfied of the fact by the investigation of a committee, both reimbursed the actual outlay and presented him with an honorary tribute of £2,000, presenting to him a total of £10,000. His invention was rapidly introduced throughout the civilized world, and his own name was made synonymous with it.

MACADAM, a modern system of road¬ making invented by J. L. Macadam (q.v.), which consists in forming the roads out of hard materials such as granite, or basalt broken into pieces, none of which are too large to pass through an iron ring 2 inches in diameter, and then deposited evenly in a bed of from 6 to 12 inches in thickness. The bed thus laid be¬ comes perfectly compact and smooth, and in proportion as it is worn away or cut into ruts by traffic can easily be restored by a new coat¬ ing of materials. See Roads and Road-making.

McADOO, mak'a-doo', William Gibbs, American jurist: b. near Knoxville, Tenn., 4 April 1820; d. 1894. He was graduated in 1845 from the East Tennessee University at Knoxville, sat in the Tennessee legislature 1845— 46 and served in the Mexican War in 1847. He was afterward admitted to the bar and was attorney-general of the Knoxville judicial dis¬ trict, 1851-60. He removed to Georgia in 1862, served in the .Confederate armˆ during the Civil War and in 1871 became judge of the 20th judicial district of Georgia. He published a volume of poems and, with H. C. White, Ele¬ mentary Geology of Tennessee.5

McADOO, William Gibbs, American cabi¬ net minister and railroad official : b. near Marietta, Ga., 31 Oct. 1863. Descended from a distinguished Southern family, his father, Judge William Gibbs McAdoo, a jurist and soldier of the Mexican and Civil wars, became attor¬ ney-general of Tennessee some years after losing his wealth in the general devastation in the South caused by the Civil War. The sub¬ ject of this sketch was educated at the University of Tennessee and admitted to the bar in 1885, notwithstanding that circumstances obliged him to leave the university in his junior year and earn his living as a clerk of the United States Circuit Court. He practised law in Chattanooga till 1892, when he came to New York and opened a law office. In 1898 he

formed a law partnership with Mr. William McAdoo (a native of Ireland and no relation whatever), who since 1910 has been chief city magistrate, and was formerly Assistant Secre¬ tary of the Treasury under President Cleveland. In his early days Mr. McAdoo had gained some practice in railroad work by running a street railway in Knoxville, an undertaking that proved a failure. His railroading propensities revived during his first years in New York City and he conceived the plan of tunneling the Hudson. With the aid and confidence of capi¬ talists he succeeded in carrying that great undertaking to a successful issue. In 1902 he organized the New York and New Jersey Rail¬ road Company (now the Hudson and Manhat¬ tan, of which he was elected president and di¬ rector), and completed the Hudson tunnel scheme. He was vice-chairman of the Demo¬ cratic National Committee in 1912, and in the following year Mr. Wilson, on his accession to the Presidency, invited him to take the office of Secretary of the Treasury. Mr. McAdoo sev¬ ered his railroad connections and devoted him¬ self to a task that was destined to become his¬ toric in the annals of national finance. The enormous financial transactions in which the United States government was involved owing to the European War are a matter of common knowledge. The raising of huge war loans and the financing of Allied belligerents were only the more conspicuous events of Mr. McAdoo's tenure of the. Treasury. He was a leading architect of the Federal Reserve System and an active promoter of the Federal Farm Loan System. Throughout the vast network of na¬ tional finance — taxation, distribution of gov¬ ernment funds, war-risk insurance and the in¬ surance of soldiers and sailors, economic prob¬ lems of trade and agriculture, etc., Mr. McAdoo handled the complex ramifications and details with remarkable facility and judgment. When the United States government took over the entire railroads of the country in January 1918 Mr. McAdoo was appointed Director-General of Railways. He resigned as Secretary of the Treasury 16 Dec. 1918 and as Director General of Railways 10 Jan. 1919. In 1920 he was a candidate for the Democratic nomination for President. Mr. McAdoo was married in 1885 to Miss Sarah Fleming of Chattanooga; she died in 1912, leaving three sons and three daugh¬ ters. On 7 May 1914 he married Miss Eleanor Wilson, daughter of President Wilson.

McADOO, Pa., a borough on the Lehigh Valley and Pennsylvania railroads, five miles south of Hazleton and 78 miles northwest of Philadelphia. There are. rich deposits of anthracite coal in the vicinity, and, conse¬ quently, coal-mining is one of the chief indus¬ tries. Shirts are also manufactured here. In this borough of McAdoo are situated the pic¬ turesque Silver Brook Hollow and Tresckow water falls. Pop. 3,389.

McAFEE, mak'a-fe, Cleland Boyd, Amer¬ ican clergyman : b. Fulton, Mo., 25 Sept. 1866. He was educated at Park College, Union Theological Seminary, New York, and Westminster College, Missouri. He was ordained a Presbyterian minister in 1888, and from that date to 1 891 he was professor of mental and moral philosophy in Park College. In 1901 became pastor of the Forty-first Street Presbvterian Church, Chi¬ cago, which he held until 1904, when he became

pastor of the Lafayette Avenue Church, Brook¬ lyn. In 1912 he was made professor of didactic and polemical theology at the McCormick The¬ ological Seminary, Chicago. He received the degree of Ph.D. in 1892. His books are (Where He Is) (1898) ; (Wherefore Didst Thou Doubt) (1900) ; (Faith, Fellowship and Fealty) (1902) ; (The Growing Church* (1903) ; (The Worth of a Man* (1903) ; (The Tenth Commandment (1903) ; (The Mosaic Law in Modern Life) (1906) ; ˆStudies in the Sermon on the Mount (1910) ; (The Greatest English Classic* (1912) ; (His Peace) (1913); { Westminster Confession of FaitlC (1914) ; (The Old and the New in Theology) (1914), and (Psalms of the Social Life* (1917).

McAFEE, Joseph Ernest, American clergy¬ man : b. Louisiana, Mo., 4 April 1870. He is a brother of Cleland Boyd McAfee and was grad¬ uated from Park College in 1889, after which he studied in Union, Auburn and Princeton theological seminaries from 1889 to 1896. At Park College he taught Greek, the history of religion and ethics until 1906. In that year he became associate secretary of the Presbyterian Board of Home Missions of the Presbyterian Church in the United States, of which he was secretary, 1914-17. In 1918 he became secretary of the American Missionary Association. His publications include (Missions Striking Home) (New York 1908) ; (World Missions from the Home Base) (1911) ; (Religion and the New American Democracy* (1917).

MACAIRE, ma-kar (Le Chevalier Rich¬ ard), a French chanson de geste of the 12th cen¬ tury, and one of the great poems of the Middle

Ages, the theme of which is the false accusa¬ tion brought against the queen of Charlemagne, called Blanchefleur. Macaire is a fusion of two legends: that of the unjustly repudiated wife, and that of the dog that detects the murderer of his master. Macaire, a French knight, aided by Lieutenant Landry, murdered Aubry de Montdidier (q.v.) in the forest of Bondy. Montdidier's dog, named Dragon, showed such aver¬ sion to Macaire that suspicion was aroused and Macaire and the dog were summoned to a single combat. The result was fatal to Macaire, who died, confessing his guilt. Dragon was called the Chien de Montargis because the mur¬ der took place near the castle of Montargis. The encounter was depicted over the chimney of the great hall in the castle in the 15th cen¬ tury. Macaire is only preserved in the Franco-Venetian geste of Charlemagne (Bibl. St. Mark MSS. XIII), in a mixed form of French and Venetian dialects. It has been reprinted several times. Consult <Macaire> (Paris 1866), ed. Guessard in the series of (Anciens poetes de la France-* ; Paris, Paulin, (Hist. litt. de la France> (Vol. XXIII, 1873) ; Gautier, L., (Epopees frangaises* (Vol. Ill, 3d ed., 1880) ; Paris, G., (Hist. poet de Charlemagne) (1865). Jean de la Trille, (Discours notable des duels) (Paris 1607), says the encounter with the dog took place under Charles V. The story was also told in another chanson de geste of the 12th century called (La Reine Sibille,* which only exists in fragments. There are two French plays on the subject: one (La Chien de Mon¬ targis* by Guilbert de Pixerecourt (1814), which was translated and played at Covent Garden, London (1814) ; and the other, (Le chien d' Aubry.*

A manuscript in prose of (Macaire) was found in the Bibliotheque de l'Arsenal in Paris about 1866.

MACAIRE, Robert, name of the villain in

the French melodrama, (Auberge des Adrets* (1823), in which Frederic Lemaitre made his reputation. The character was modified by Lemaitre in his comedy (Robert Macaire, \ a sequel, in collaboration with Benjamin Antier. It was performed at the Theatre des Folies-Dramatiques, Paris, in 1834. In this, which Theophile Gautier calls

“the. great triumph ot the revolutionary art® which followed the “Revolution of July,® is expressed audacity and wit. It is an attack against social order. “Frederic Lemaitre,® says Gautier, “created in the personage of Robert Macaire a kind of humor that is almost Shakespearean. In it we find terrible gaiety, sinister laughter, bitter de¬ rision, pitiless raillery and a biting sarcasm, mingled with elegance, suppleness and astonish¬ ing grace. Robert Macaire and Bertrand are Don Quixote and Sancho Panza in crime.® Consult Alhoy, Maurice, and Huart, L.. (Les cent Robert Macaire, composes et dessines par H Daumier > (Paris). Robert Louis Stevenson and W. E. Henley wrote a play c Robert Macaire) (Stevenson’s Works, Vol. XX). Consult The New Review (Vol. XII, p. 685).

McALESTER, ma-kal’es-ter, Miles Dan¬ iel, American general: b. New York, 1833; d. 1869. He was graduated from the United States Military Academy in 1856 and entering the engineer service became chief engineer of the Department of the Ohio in 1862. He served under Grant before Vicksburg and took part in the operations against Mobile.

McALESTER, Okla., city and county-seat of Pittsburg County. It is situated on two main trunk lines of railway — the Missouri, Kansas and Texas and the Chicago, Rock Island and Pacific railways, and has an interurban railway system that connects with the coal mines in the outlying district. McAlester is surrounded by rich agricultural land and stock-raising is an extensive business, thousands of cattle being shipped every year from Mc¬ Alester. It is also the centre of the immense coal fields of eastern Oklahoma. Almost 50 companies are now operating in this new field with an annual output of 3,500,000 tons, all having their main offices in the city. Mc¬ Alester also has extensive wholesale interests with an annual business of $6,000,000 in south¬ west Oklahoma, western Arkansas and north¬ ern Texas. The city has a high school, which cost $350,000, seven ward schools and two business colleges. The chief public buildings are the Busby Hotel, Federal Building, Ma¬ sonic Temple, Mine Rescue Station and Busby Theatre. The Oklahoma State Penitentiary is located near the city. McAlester has the city manager form of government. Pop. 12,095.

MACALESTER COLLEGE, Saint Paul, Minn., a coeducational institution, founded in 1885 under the auspices of the Presbyterian Church. A four-years’ college course leads to the degrees of bachelor of arts and bachelor of science, and a conservatory of music grants the degree of bachelor of music. The average an¬ nual enrolment of students is 360, and its faculty 38. Its total endowment is $558,000. It

has seven buildings and total resources of $960,- 000. Its library has over 15,000 bound volumes. Its total income (tuition and endowment in¬ terest) is $60,806.

McALL (ma-kal') MISSION, a Protestant association founded in 1871 by Robert Whitaker McAll and his wife for religious work among the working people of France. On 17 Jan. 1872 the first station was opened in Belle¬ ville, one of the manufacturing suburbs ot Paris. The work consists largely in striving to interest people in the questions pertaining to salvation of souls and then urging them to affiliate with some one of the nearby Protestant churches. No effort is made by the mission to establish churches, but some educational work has been begun in the large cities. Friends of the movement in America founded an Ameri¬ can McAll Mission in 1883 with Philadelphia as headquarters, and there are also auxiliary societies in Great Britain and Canada. It was a McCall missionary who introduced the Boy Scout movement into France. During the Great War its agents served as chaplains and in other capacities, and its establishments were con¬ verted into hospitals. The expense of the work in France in 1916 was $60,000.

McALLISTER, Addams Stratton, Amer¬ ican engineer: b. Covington, Va., 24 Feb. 1875. He was educated at the Pennsylvania State Col¬ lege and at Cornell University. In 1898 he be¬ came electrical engineer for the .Berwind-W hite Coal Mining Company and in 1899 held a sim¬ ilar position in the Westinghouse Electric and Manufacturing Company. In 1901 he was as¬ sistant in physics in Cornell, instructor in 1902-03 and acting assistant professor of electrical engineering there in 1903-04. He also was lec¬ turer on engineering at the Pennsylvania State College in 1909-14. In 1905 he became associate editor of the Electrical World and in 1912 was made full editor of this publication. In 1917 he became secretary of American Engineering Service of Engineering, a member of national lighting committee of the Advisory Commission of Council of National Defense and also a member of the War Committee of Technical Societies. In 1914-15 he was president of the Illuminating Engineering Society, afterward becoming its chairman and secretary. He is also president of the New York Electrical So¬ ciety. Cornell gave him the degree of Ph.D in 1905. He is the inventor of alternating-current machinery. Dr. McAllister has contributed more than 100 articles on engineering to various technical journals and is the author of Alter¬ nating Current Motors) (1906; 3d ed., 1909), and (Standard Handbook for Electrical Engi¬ neer (1907). He is a member of a

number of clubs and societies, including Engineers' Club of New York and the New York Southern So¬ ciety.

McAllister, ward, American society leader: b. Savannah, Ga., about 1830; d. 1895. He came of a family several of whose .members were conspicuous at the bar. With his father, in 1850, he went to California, where he re¬ mained two years, and whence he removed to Newport, R. I., and afterward to New York City. Becoming possessed by marriage of a considerable fortune he was able., by means of influential connections through his mother and wife, to enter into social life with the advan-

tages of personal qualifications and family prestige. As a raconteur as well as an accom¬ plished gourmet he had already attained prom¬ inence within a select circle when, by a well-turned remark, he became the leader of leaders in New York society, which, according to his strict limitation, included but 400 persons. The 'popular expression <(The Four Hundred" orig¬ inated from this assertion of McAllister's. He made contributions to the press, which, how¬ ever, impaired rather than strengthened Lis unique position, as did also his volume (Society as I Have Found IF (1890).

McALLISTER, Fort. See Fort McAl¬ lister.

MACALLUM, Archibald Byron, Cana¬ dian educator: b. Belmont, Ontario, in 1859. After receiving his education in the Toronto and Johns Hopkins universities he became lec¬ turer on physiology (1887) and professor in the medical faculty of Toronto University (1891-92). From 1892 to 1901 he was associate professor in the arts faculty there and full professor after 1901. In 1895-97 he was presi¬ dent of the Canadian Institute. In 1901 he was made a Fellow of the Royal Society, Canada, and in 1906 of the Royal Society of London. In 1911 he was elected president of the Ameri¬ can Society of Biochemists. He has published scientific articles in the Journal of Physiology, Proceedings of the Royal Society Quarterly Journal of Microscopical Science , American Journal of Morphology and Journal of Anat¬ omy

and Physiology.

McALPINE, ma-kal'pm, William Jarvis,

American engineer: b. New York, 1812; d. New Brighton, Staten Island, N. Y., 16 Feb. 1890. He took up engineering in 1827 under J. B. Jer¬ vis, with whom he continued till 1839, and suc¬ ceeded him as engineer of the Erie Canal en¬ largement. In 1851 he became State engineer of New York and State railroad commissioner in 1855-57. He was subsequently engineer of several important railways, constructed the city waterworks at Albany and Chicago, and in 1870 his plans for improvement of the cataracts of the Danube were accepted by the Austrian gov¬ ernment. While engineer of the department of parks, 1879-80, he constructed the Riverside drive in New York.

McANENY, George, American civic ad¬ ministrator : b. Greenville, N. J., 24 Dec. 1869. He was graduated at the Jersey City High School in 1885 and entered journalism, serving on the staff of several New York newspapers from 1885 to 1892. From 1892 to 1894 he was assistant secretary of the Civil Service Reform League, of which he became secretary in 1894. He held this position until 1903, serving on committees that drafted the municipal home-rule section of the State constitution in 1894 and the State Civil Service Law in 1899. In 1902 he was a member of the New York Civil Service Commission and also of the commission to revise the city charter in 1908. In 1903-06 he read law with Edward M. Shepard. In 1906-09 he was president of the City Club of New York; in 1910-13 he was president of the borough of Manhattan, and in 1914-16 president of the board of aldermen (fusion ticket), and was active in obtaining municipal markets for New York City. In 1902 he drafted the civil

service rules now in force in New York City; was a member of the commission appointed by the governor to revise the New York City char¬ ter (1908); chairman of the transit committee of the New York board of estimate and ap¬ portionment, which, with the Public Service Commission, developed New York's new $300,- 000,000 subway system, and chairman of com¬ mittee on city plan 1914-16. In national politics he is a Democrat. In 1913 Paris gave him the medal of the Societe des Architects Diplomes par le Gouvernment Frangais for services to city planning and architecture in the United States. In 1915 he received the medal of the Architectural League in New York. Hobart gave him the degree of LL.D. in 1914. He is chairman of board of trustees of College of the City of New York; a trustee of the Tusk-

egee (Alabama) Institute and of Jeanes Fund for Negro Education; vice-president Hampton Association National Municipal League, and president of the New York Kindergarten Asso¬ ciation. In 1914 he was Dodge lecturer at Yale. The lectures were published under the title of (Municipal Citizenship) (New York 1915).

MACAO, ma-kow' or ma-ka/o, China, a Portuguese settlement and seaport on the west shore of the mouth of the Canton River, 40 miles west of Hongkong. It occupies a high peninsula, formerly the island of Macao, but now united by a narrow isthmus north of the town with the island of Hiang-shan, and, with, the small islands of Taipa and Caloane, forms a province. The settlement is about eight miles in circuit, and its limits landward are defined by a barrier wall stretching across the isthmus, where a guard of Chinese troops is stationed to prevent foreigners from trespassing on the Inner Land. The town occupies a slope grad¬ ually descending to the sea, backed by a range of lofty hills, and having an extensive plain stretching east. It is nearly surrounded with water, and is open to the seaJbreezes on every side. The houses occupied by the foreign popu¬ lation are large, roomy and open, and the shops are numerous. The city is divided into two wards, one inhabited by Chinese and the other by non-Chinese, each with its own adminis¬ trator. The quay or (<Praya Grande" is com¬ modious, forms a pleasant drive and is pro¬ tected by a battery. The harbor is formed be¬ tween the peninsula on which the town stands and the large island of Twee-lien-shan, to the west. Macao is considered the healthiest resi¬ dence in southeast Asia with a mean annual temperature of 74°. . Near it, in a beautiful garden, is the grotto in which the poet Camoens is said to have finished the ˆLusiad." The prin¬ cipal exports are tea, cassia and cassia oil, anise and anise oil and opium. The commerce (mainly in the hands of the Chinese), which is chiefly carried on with Hongkong, Canton, Batavia and Goa, has greatly declined since the opening of the rival free ports, and a consid¬ erable part of the colonial revenue is drawn from a tax on the gambling tables for which Macao is notorious. In 1913, 4,110 merchant steamers entered, with a gross tonnage of 1,008,814 tons, and 13,389 junks, totaling 303,764 tons. The Portuguese first obtained permission to form a settlement and to trade at Macao in 1557. From 1563 they were required to pay a yearly tribute to the Chinese government, and their trading privileges were much restricted

till 1844, when they were allowed to carry on commerce with the five ports then open to for¬ eigners. Macao was then declared a free port, but the Chinese continued to ignore the terri¬ torial claims of the Portuguese until 1887, when a treaty was concluded. Macao from its con¬ venient situation was the place of retreat for European merchants and missionaries when threatened by uprisings of race or religious feelings in China. Robert Morrison, the first Protestant missionary in China, was buried.. here. Pop. about 74,866 (2,171 Portuguese).

MACAPA, ma-ka-pa, Brazil, town on the delta of the Amazon, 110 miles from the mouth of that river. It has a fine harbor with forti¬ fications. The exports are chiefly timber and fine woods for the furniture trade. Pop. 4,000.

MACAQUE, ma-kak', one of the small, short-tailed Asiatic monkeys of the genus Maca-CUS and family Cercopithecidce , which are so docile, intelligent and interesting as a rule that they are common in menageries and frequently kept as pets; their gentleness and playfulness disappears as they grow old, however, and they are then likely to become morose and savage. They go about in troops, keeping by themselves, and differing from other monkeys in most of their actions and cries. Some of the best known are the quaintly crested capuchin or bonnet-monkey (M. sinicus), excessively common and pestiferous in southern India; the entellus monkey (q.v.) of northern India; the large pig¬ tailed (M. leoninus) of Japan, whose likeness is seen in numberless Japanese drawings and carvings. Ranging over so wide a variety of countries their habits and food differ greatly. Besides the fruit, juicy leaves and insects eaten by most monkeys they devour small reptiles, young birds, frogs and crabs, the last-named forming the principal diet of a Malayan species (M. cynomolgus). One species is isolated in the mountains of Algeria and Morocco, whence they were long ago carried, no doubt, to the island of Gibraltar, where they are known to the English of the garrison as ((Barbary apes (M . innus), and the small band upon the Rock are carefully protected from harm.

MACARONI (Ital. maccheroni) , a pecu¬ liar paste or dough prepared from wheat flour and" manufactured into tubes or ribbons. It is an Italian invention, and, though made by a simple process, has never been produced with so great success in any other country. < The

grain grown in the more southern countries of Europe is said to possess a greater amount of gluten, and is therefore better adapted to this manufacture. The wheat, after being washed, is freed from the husks and ground in water mills, when hot water is added till it is of the consistency of stiff dough. Five different quali¬ ties of flour are obtained by an equal number of siftings, the last giving the finest and most delicate that can be made. To reduce the dough to tubes or ribbons a hollow cylindrical cast iron vessel is used, having the bottom perfor¬ ated with holes or slits. When this is filled with the paste a heavy iron plate is driven in by a powerful press, which forces the paste through the holes and gives it the shape of the perforations, the workman cutting off the pieces of the desired length as they come through. During this process it is partially baked by a fire made under the cylinder. Sometimes the flat

pieces are formed into tubes by uniting the edges before they are thoroughly dry. After being hung up for a few days they are ready for use. The largest tubes are called maccheroni, the smaller vermicelli and the smallest fedelint. Macaroni is prepared for the table by boiling and baking with grated cheese, and is in common with vermicelli and the other varieties much used in the preparation of soups. Since about 1880 the use of macaroni in the United States has largely increased, and where it was once only consumed by Italians in this country, it is now eaten by all classes. Numerous macaroni factories have been established in New York and elsewhere. The United States imports an¬ nually from Italy over 500,000 boxes of maca¬ roni.

MACARONIC VERSE, a kind of fa¬ cetious poetry in which foreign words are dis¬ torted and jumbled together; so called by Teo-filo Folengo, a Mantuan monk of noble family, who published a book entitled (Eiber Maca-ronicorunV a poetical rhapsody, made up of words of different languages. His principal poem was called macaronic, because it was mixed up of Latin and Italian, as macaroni is mixed up with cheese. Consult Morgan,

(Macaronic Poetry. 5

MacARTHUR, Arthur, American soldier: b. Springfield, Mass., 2 June 1845; d. Milwaukee, Wis., 5 Sept. 1912. Having enlisted in the United States volunteer service in Wisconsin he served through the Civil War period, being promoted lieutenant-colonel and brevet-colonel in May 1865, for gallant and meritorious con¬ duct in the battles of Perryville, Ky., Stone River, Tenn., Mission Ridge and Danridge, Ga.,

Franklin, Tenn., and in the Atlantic campaign. He was mustered out of the volunteer service in June 1865 and entered the regular army with the rank of lieutenant in the 17th United States Infantry the following year. In the Spanish-American War he was appointed a brigadier-general of volunteers and assigned to the Phil¬ ippine expeditionary forces. He was promoted brigadier-general in the regular army, 2 Jan. 1900; commanded the Military Division of the Philippines, major-general U. S. A., 1901, and lieutenant-general, 15 Sept. 1906. He re¬ turned in 1901, and in 1902 commanded the Eastern department, 1902-03 the Lakes, 1903—04 of California, and 1904-07 the Pacific division. He was retired by operation of law 2 June 1909.

MacARTHUR, Duncan, American pio¬ neer: b. Dutchess County, N. Y., 14 June 1772 ; d. Ohio, 1839. His family removed in 1780 to the western frontier of Pennsylvania, and at 18 years of age he went to seek his fortune in the wilderness, and participated as a ranger or scout in the warfare with the Indians in Ken¬ tucky and Ohio, until the victory of General Wayne in 1794 gave peace to the Western coun¬ try. About the commencement of the present century he settled in Ohio as a surveyor, and in 1805 became a member of the Ohio legislature, and was appointed major-general of the terri¬ torial militia. In the War of 1812 he received the commission of brigadier-general jn the army, and succeeded General Harrison in 1814 in command of the army of the West. After the peace, as a joint commissioner with General Cass, he negotiated the treaty with the Indians of Ohio for the sale of their lands in that State,

which was ratified in 1818. He served again in the Ohio legislature 1815-21, and in 1823-25 was a representative in Congress from that State. In 1830 he was elected governor of Ohio.

MacARTHUR, Robert Stuart, American Baptist clergyman: b. Dalesville, Quebec, 31 July 1841. He was graduated from the Univer¬ sity of Rochester, N. Y., in 1867, and from the Rochester Theological Seminary there in 1870, and from May 1870 to September 1911 was pastor of Calvary Baptist Church, New York, when he resigned, having been elected president of the Baptist World Alliance. He went to Russia to secure from the Tsar's government permission to buy land on which to erect a Baptist Bible College. He later went to Burma as president of the Alliance to assist in cele¬ brating the centennial anniversary of Adoniram Judson's mission work in Burma. He was for a long period connected editorally with the Christian Inquirer and Baptist Review, and has lectured on foreign travel. His publications in¬ clude (Calvary Pulpit5 ; (Current questions for Thinking Men5 ; ˆLectures on the Land and the Book> ; (Around the World) ; Old Testament Difficulties) ; < Advent and Other Sermons> ;

(Royal Messages of Cheer and Comfort5 ; (The Christie Reign) ; (The Old Book and the Old Faith) ; (Divine Balustrades) ; (The Celestial Lamp5 ; (The Question of the Centuries,5 and (Quick Truths and Quaint Texts.5

MACASSAR, Celebes, the capital of a dis¬ trict of the same name in the island of Celebes on the west coast of the southern peninsula near the southern end of Macassar Strait sep¬ arating Celebes from Borneo. It is the chief town of the Dutch government of Celebes. Ma¬ cassar consists of the Dutch town and port, Vlaardingen, where the governor of Celebes resides, and the Malay town, which lies inland. The Portuguese claim to have visited Macassar in 1512; but there was no permanent Portuguese settlement until the 17th century when the Eng¬ lish and Dutch also appeared on the scene. In 1669-68 the Dutch, after decisive victories on land and sea, succeeded in driving the Latins from Celebes and establishing themselves. All attempts of the English to supplant the Dutch were unsuccessful and the Dutch

have been masters for twro centuries and a half, with the exception of one short period of British occu¬ pation in the early 19th century. _ The import¬ ant buildings are the official residence of the governor of Celebes ; the new museum, con¬ taining a valuable collection of objects illustra¬ tive of the native arts and industries, arms, armor, costumes, choice fabrics and jewelry; and Fort Rotterdam, a relic of the time of Por¬ tuguese supremacy and its capture by the Dutch. <(Aside from the military forces quartered in Fort Rotterdam,55 writes A. S. Walcott, ((Macassar has a population of about 27,000, includ¬ ing about 1,000 Europeans and 5,000 Chinese; but so many of the inhabitants live in the out¬ lying kampongs to the north and south of the city proper, that it is hard to realize that the figures have not been greatly exaggerated. The houses of the kampongs vary in many details from those to which we have become accus¬ tomed in Java. They are generally raised sev¬ eral feet above the ground on poles, and have gabled roofs, shuttered windows and consider¬ able ornamentation in the way of carved wood¬

work. The walls are of matting or of neatly plaited bamboo, the roofs of nipa, or palm-leaf thatch. The people of this southern end of Celebes are nearly all either Macassarese, or Bugis. They resemble the Javanese in face and figure, but are more sturdily built and are decidedly less polite and pleasing in bearing and manners. The Bugis are the seamen of the Archipelago, the greatest navigators and the most enterprising traders to-day and in times gone by the greatest pirates as well. All the people of the coast districts of southern Celebes are in religious proclivities Mohametan-Animists — Mohametans in their profession of faith, Animists and fetish-worshippers in their practices.55 Macassar trades in coffee, rice, copra, trepang, spices, gum, rubber, pearls, mother-of-pearl, cocoa oil, maize, sandal wood and valuable timber. Pop. about 27,000. Con¬ sult Gervaise, N., description historique du royaume de Macagar5 (Ratisbon 1700) ; Wal¬ cott, Arthur S., (Java and her Neighbors5 (New York 1914).

MACASSAR OIL, the trade name for an unguent that made its appearance in England early in the 19th century, manufactured by one Rowland. It took its name from the district of Macassar, where it was first produced, be¬ ing pressed from the fruit, or seed, of the Schleichera trijuga, the East Indian kusum tree. This fixed vegetable oil is used by the natives for cooking, illuminating and for me¬ dicinal purposes. The name is now given to a pomade made of almond, olive or peanut oil, to which other substances are added to give color and perfume. The original Macassar oil became so well known that Byron

spoke of it as ((Thine incomparable oil, Macassar,55 and Lewis Carroll alludes to it in the Song of the Man sitting on the Gate in (Alice Through the Looking-glass.5 So general was its use that in England a covering was specially made to throw over the back of a chair or sofa as a protection from tlhe grease in the hair ; and to these cov¬ erings the name Anti-macassar was given. Anti-macassars were at first made of white cotton in crochet-work. They were stiff, hard and uncomfortable; but in the third quarter of the 19th century they were simpler and were more artistically \v orked in colored wools or crewels, or colored silks in pretty patterns. The Lady's Newspaper (1852) describes anti-macas¬ sar materials as (<crochet cotton,55 ((pink and drab crochet twine,55 *etc.* All the Year Round (1879) ((the anti-macassar on the arm chair55; and Miss Braddon's (Vixen 5 (1879) <(To sit alone by the fireside and work anti-macassars in crewel55 shows that the word was still fa¬ miliar in England to a comparatively recent period. In the United States the word (<tidy5> was used to describe the article.

MACAULAY, ma-ka'li, Catharine Saw-bridge, English historian : b. Wye, Kent, 2 April 1731 ; d. Binfield, Berkshire, 22 June 1791. In 1760 she was married to George Macaulay, a London physician. She was an ardent Re¬ publican and a great admirer of Washington, with whom she corresponded, and whom she visited in 1785. She published a (History of England from the Accession of James I to the Revolution5 (8 vols., 1763-71), once very popu¬ lar and eulogized bv Pitt in the House of Com¬ mons, but now neglected.

MACAULAY, James, Scottish novelist: b. Edinburgh, 22 May 1817; d. there, 20 June 1902. He was educated at the University of Edin¬ burgh and for 35 years was in the service of the Religious Tract Society as editor-in-chief. In 185 1—57 he was joint editor of the Literary Gazette and in 1858 became editor of the Leis¬ ure Hour Sunday at Home. The Boy's Own Paper and The Girl's Own Paper were founded by him. He was a voluminous writer, and among his published works the following may be mentioned: (Across the Ferry; First Im¬ pressions of America and its People5 (1871) ;

(Memory Helps in British History5 (1873) ; <A11 True: Records of Adventure) (1879); (Luther Anecdotes) (1883) ; (Gordon Anecdotes) (1885) ; (Livingstone Anecdotes> (1886) ;

< Wonderful Stories of Daring, Peril and Ad¬ venture5 (1887); and (Victoria, Her Life and Reign5 (1887).

MACAULAY, Sir James Buchanan, Ca¬ nadian jurist: b. Niagara, Ontario, 3 Dec. 1793; d. Toronto^ 26 Nov. 1859. He was an ensign in the British army during the War of 1812, and subsequently studying law was admitted to the bar in 1822. In 1829 he was appointed a judge of the King's Bench, from 1849 to 1856 he was chief justice of the Court of Common Pleas, and just prior to his death became judge of the Court of Error and Appeal. He was knighted in 1859.

MACAULAY, Thomas Babington, Eng¬ lish essayist, historian and statesman : b. Rothley Temple, Leicestershire, 25 Oct. 1800; d. Holly Lodge, Kensington, 28 Dec. 1859.

Macaulay was the son of Zachary Macau¬ lay, a Scotchman of remarkable character, who achieved distinction by his lifelong advocacy of the abolition of slavery and by his efficiency, as a young man, in the governorship of Sierra Leone, the colony of African freedmen. The family removed to Clapham, then a suburb of London, where much of Macaulay's youth was spent. Hannah More was a friend of the fam¬ ily and she encouraged the lad as a writer and presented him with books to start his library. Young Macaulay was regarded as a prodigy, and his memory was something startling. He attended school near Cambridge under a Mr. Preston; his range of reading, particularly in poetry and fiction, was immense, but his taste for mathematics and the exact sciences steadily declined. In October

1818 he entered Trinity College, Cambridge, and in the citadel of mathe¬ matics his aversion for this study became pro¬ nounced. Twice he gained the Chancelffir's medal for poetry, and he displayed classical attainments, but was «gulphed55 in mathematics. However, after a third trial, he won a Fellow¬ ship in 1824. His mental training was thus one-sided; and a certain lack of philosophical grasp and a dislike of facing abstruse # intel¬ lectual problems became thus characteristic.

The association with his college mates, rather than his studies, left the deepest impres¬ sion upon Macaulay. His great friend was Charles Austin, whose influence converted the young Tory into an uncompromising Whig. He shone in the Union Debating Society, develop¬ ing powers that afterward became conspicuous in the House of Commons. Politics he had heard discussed from early childhood, in the circles which gathered round his father's table,

and along with literature politics was his abid¬ ing passion. At college he had competed for a prize in history on the subject which he de¬ veloped fuller in later years : (<The Conduct and Character of William III.®

Before leaving the university he began writing for publication i'n Knight's Quarterly Magazine (1823). Two lyrics, (Ivry5 and (Naseby5 still live; but the most important con¬ tribution was the ingenious Conversation be¬ tween Mr. Abraham Cowley and Mr. John Mil-ton, touching the great Civil War.5 It seems likely enough that the freshness and delicacy ievealed in this early work became injured by the author's entrance into the rougher world of political strife. On the other hand, it may be maintained that Macaulay's gifts were pre¬ eminently those of the man in public life, and to him literature, always a delight, was never¬ theless really but an avocation.

Macaulay's father unexpectedly became finan¬ cially involved. Full of courage, the son began tutoring while still at Cambridge, and cheer¬ fully assisted in supporting his sisters. Ulti¬ mately, together with his brother, he paid off all his father's obligations.

Macaulay was called to the bar in 1826 and joined the Northern circuit; but soon gave up the law for politics. Interestingly enough, his entrance into politics came by way of literature. In August 1825 appeared the essay on Hil¬ ton,5 the first of the series that Macaulay con¬ tributed to the Edinburgh Review, which, for the next 20 years,

made both him and the Re¬ view famous. Jeffrey, the editor, expressed his frank wonder as to where Macaulay ((picked up that style.55 Upon Jeffrey's resignation Ma¬ caulay was offered the editorship, but he was not willing to leave London. Papers on (Machiavelli5 (1827), (Dryden,5 (History5 and Dal¬ lam's Constitutional History5 (1828), followed, and soon after controversial articles on James Mill, Sadler and Southey, which revealed the declared Whig. Their reputation introduced him into both social and political life. He was made commissioner of bankruptcy in 1828 and in 1830, Lord Lansdowne, who had been favor¬ ably impressed by the attack on Mill, offered Macaulay a seat in Parliament for Caine in Wiltshire which he held until in 1832 he was elected for Leeds.

His time of entrance into the House of Commons was propitious. It was just before the death of George IV and the accession of William IV, and consequently on the eve of the battle for the reforms of 1832. Macaulay was 30 years of age, was widely read in history and literature and was a ready and fluent speaker aflame with interest in .public questions. In 1824 he had made a notable speech at a meet¬ ing of the Anti-Slavery Society; later, in the discussion for Catholic emancipation, he headed a coachload of M.A.'s from London to Cambridge, arriving in time to vote down a pe¬ tition in the university senate against the act. He now threw himself ardently into the strug¬ gle for reform and took an honorable part in the fight from begininning to end. His Parlia¬ mentary success was immediate. "Whenever he rose to speak,55 Mr. Gladstone testified, <(it was a summons like a trumpet-call to fill the benches.55 His earliest effort was on the re¬ moval of the civil disabilities of the Jews, which he followed by an essay on the subject in the

Edinburgh Review (January 1831). On the emancipation of slaves in the colonies he never wavered, but stood unflinchingly true to his father's principles. He offered to resign his position with the ministry rather than yield his views on this subject; but the question was satisfactorily settled and his resignation not ac¬ cepted.

Meanwhile he found time to write. The es¬ says on (Byron, (Johnson5 and <Hampden) ap¬ peared in 1831 ; <Burleigh) and (Mirabeau,) in 1832; (War of the Succession in Spain5 and (Horace Walpole,5 in 1833, and the first essay on (Chatham, 5 January 1834.

His appointment in 1832 as a commissioner of the Board of Control was followed by ab¬ sorption in East Indian affairs, and in 1833, when the charter of the East India Company was renewed, he was offered a position on the East Indian Council with a salary of £10,000 per annum for five years. His brilliant career in Parliament was seemingly permanently en¬ dangered ; but Macaulay did not hesitate. He estimated that he could save half his salary and in five years have a competence. He needed money on account of his father's pov¬ erty, for the sake of his two sisters, as well as for his own career; and he accepted, going out in 1834 and returning in 1838. The genius for government which the father had displayed at Sierre Leone, the son now manifested at Cal¬ cutta. His important permanent reforms were the creation of the Indian Penal Code and the Code for Criminal Procedure, achieved in the face of bitter local opposition, and the organ¬ ization of a sound educational system.

Macaulay's family ties were very strong and there is no record of any love affair in his life. A sister, Jane, had died in 1830, and his mother in 1831. One of his favorite sisters, Margaret, was married in 1832, an occurrence which he accepted as a source of personal dis¬ tress. The other, Hannah, accompanied him to India, and there she met and was shortly married to Charles Trevelyan, an officer in the government service. Macaulay was much pleased with the match, and the two households lived together under the same roof. Ever af¬ terward, as the young Trevelyans, his nieces and nephews, grew up, they became a very real part of Macaulay's life. His love for children, and

particularly for these, was a marked trait, and one of them afterward filially wrote his uncle's biography. Meanwhile his sister Mar¬ garet had died in England, and likewise his father died while Macaulay and the Trevelyans were on their homeward voyage. These deaths affected him deeply, and the home-coming was a sad one.

While in India he made opportunity for an immense amount of reading, particularly of the Latin and Greek classics, to which he returned with increasing delight. He also read widely in Italian and French, and did some German on the return voyage. His love for the great poets, dramatists, orators and historians af¬ fected his culture, his style and his ideals. The lists of his reading from now to the end of his life became a part of his biography and would stock a good library. His long walks with a copy of Homer or Virgil, from which he was reading or spouting, became an accustomed sight. Thenceforward he determined that he would write a history in emulation of Thucy¬

dides and Tacitus and Livy, and his set speeches caught something of the spirit of Lysias and Cicero.

Upon his return to England he left for a tour in Italy, revelling in its beauties and as¬ sociations with the enthusiasm of a first visit and the eye of an historian and student of Latin and Italian literatures. The literary fruits were the (Lays of Ancient Rome.5

Returned home, he sincerely hoped to begin his (History of England,5 which he had planned to write from the Revolution of 1688 to the death of George III. Had he begun it then, with 20 years of life to devote to it, he might easily have left 10 or more volumes covering the century instead of the first five extending through but 15 years — a brilliant fragment. But he was again dragged into politics and Macvey Napier, editor of the Edinburgh Re¬ view, made heavy draughts upon his time.

In India he had contributed but two essays to the Review, that on Mackintosh's History5 and the very long one on (Bacon. 5 However, his experience furnished him the material for the brilliant narratives on <Clive) (1840) and (Warren Hastings) (1841). Besides these in the six years after his return he contributed (Sir William Temple5 (1838) — written in an entirely fresh spirit; Gladstone on Church and State) (1839) ; Won Ranke's History of the Popes) (1840); the (Comic Dramatists of the Restoration and Word Holland5 (1841) ;

(Frederick the Great5 (1842) ; (Mme. d'Arblay5 and (Addison5 (1843); (Barere) and the second essay on the (Earl of Chatham5 (1844). This, perhaps his noblest essay, proved to be his last. He was forced to give up writing in order to find time for his (History. 5 His complaisance in continuing to write for the Review had un¬ doubtedly worked to his detriment. But the entrance into politics was only in part due to the exigencies of his friends; for public life exercised a subtle fascination over him.

In 1839 he was elected member of Parlia¬ ment for Edinburgh and was made Secretary at War with a seat in the Cabinet. Fortunately the ministry soon expired, and his freedom from official duties gave him some leisure. He retained, however, his seat for Edinburgh, and his most important work was the Copyright Bill, which, after many radical suggestions, passed in almost the exact terms in which he advocated it.

In 1842 the <Lavs) appeared and achieved a great success despite the natural fears of friends. ((Christopher North55 of Blackwood's, who had attacked Macaulay on account of the Southey reviews, made up — on poetry they could agree. In 1843 the (Essays5 were col¬ lected and published. There had been a con¬ stantly growing demand for them in a per¬ manent form, which their author at first resisted. They had been written at odd moments of leisure, and he regarded them as ephemeral, but copies were being introduced from Amer¬ ica, and Macaulay had to consent. The sale proved their popularity to be a permanent one. Macaulay's Essays still are unapproached of their kind, as condensed booklets of knowledge. An analysis of their contents shows how their author's mind was revolving constantly upon a definite period of English history — the Revo¬ lution and the consequent development under constitutional government, the subject he set

for himself in writing his (History) — and these are uniformly among his best. Those on for¬ eign subjects and the controversial ones are less satisfying.

The < History* had been delayed year after year for lack of leisure to begin actual work. At length the first two volumes appeared in 1849. They comprised the reign of James II and the Revolution, but reproduced the setting as a whole and included details at once pic¬ turesque and dramatic such as could only be drawn by a supreme master of narrative. Macaulay had set for himself high ideals ; he wished to be read and to be understood ; he sought to give a series of brilliant mental pic¬ tures ; and he achieved what he set out to do. He is weakest, perhaps, on the side of ethical interpretation, in searching out the causes and setting forth the nexus of events; his narrative is brilliant and effective, but it has the supreme fault in a history of being entirely lacking in detachment of view. In opinions he repre¬ sented the great middle class and the world of Whiggism and its mode of thinking; in many things, Philistine; in some things, even vulgar; where mysticism and all esoteric systems of philosophy and kindred schools of poetry were accounted as foolishness.

The popularity of the (History 5 was some¬ thing enormous, surpassing even that of By¬ ron's poems and of Scott's and Dickens' novels. In 1849, in consequence of this success, Macaulay was made rector of the University of Glasgow and Fellow of the Royal Society. He had been appointed trustee of the British Museum in 1847. He declined a professorship of history at Cambridge, and steadily refused positions under the government which would take up his time.

He had represented Edinburgh in Parliament for eight years, when in 1847, on account of his characteristic independence in voting for the Maynooth grant-— for the maintenance of a Catholic university in Ireland — he offended many Edinburgh electors, and was not returned at the polls. He accepted his defeat with relief, and turned the more eagerly to the (History.* In 1852, without any solicitation on his part and with a steady refusal to give pledges, he was returned voluntarily by the electors of Edin¬ burgh to his former seat. Under such circum¬ stances he felt he could not refuse election ; but the duties it involved aided in sapping his strength, and that year he had a spell of illness from which he never wholly recovered.

In 1853 his speeches were collected and pub¬ lished. In 1855 the third and fourth volumes of his (History) appeared. Macaulay feared for their success after the splendid reception ac¬ corded to the former two; but the new subject was the life and career of William of Orange, his favorite hero, he had worked hard to sustain himself and 26,500 copies were sold in 10 ˆ weeks. In 1856 he withdrew from the House of Commons ; and in 1857 he was made a peer, and chose the title, Baron Macaulay of Rothley, from his birthplace. Likewise this year he

was made a foreign member of the French Acad¬ emy, member of the Prussian Order of Merit and high steward of Cambridge. In 1858 he wrote five short biographies for the eighth edition of the Encyclopedia Britannica — Atter-bury, Bunyan, Goldsmith, Johnson and Pitt. These show greater compactness and maturity

in judgment than his earlier treatment of the same themes.

In 1856 he left his bachelor quarters in town, at The Albany, and leased a pleasant villa, Holly Lodge, Campden Hill, Kensington. In 1859 his brother-in-law, now Sir Charles Tre¬ velyan, was appointed governor of Madras, and the thought of the separation bore heavily upon him. Fortunately his sister and the children remained behind a while longer. Macaulay had not been well for some time, and he died at Holly Lodge, 28 December. On 9 Jan. 1860, he was buried in Westminster Abbey in the Poets' Corner at the foot of Addison's statue.

A fifth volume of the (History,* concluding the reign of William III, had been completed, was edited posthumously by Lady Trevelyan and appeared in 1861. See Macaulay's Essays; Lays of Ancient Rome.

Bibliography. — The official life, written by George (afterward Sir George) Otto Trevelyan (his nephew), appeared in London in 1876, and is generally conceded to be one of the best biographies in the English language. Consult also Lord Avebury, Essays and Addresses* (London 1903) ; Bagehot, Walter, (Literary Studies* (ib. 1879) ; Canning, Eord Macaulay and his History* (ib. 1822); Hughes, D. A., (Thomas Babington Macaulay the Rhetorician: an Examination of his Structural Devices) (Ithaca, N. Y., 1898) ; Macgregor, D. H., Eord Macaulay* (London 1901) ; Viscount Morley, (Critical Miscellanies* (ib. 1877); Morrison, J. Cotter, (Macaulay* in the Eng¬ lish Men of Letters *(ib. 1882) ; Spedding, Evenings with a Reviewer* (ib. 1881).

J. B. Henneman,

Late Professor of English in the University of the South.

MACAULAY'S ESSAYS. Macaulay did not originate the essay of literary and historical criticism. But Macaulay's essays so far sur¬ pass all others in brilliancy, style and solidity of matter that his name ranks with those of Bacon and Montaigne, each a master in his own special field. Macaulay's first published articles, writ¬ ten while he was still in residence at Cambridge University, appeared in Knight's Quarterly

Magazine in 1823 and 1824, and from that time until his death in 1859 he wrote two score essays for the Edinburgh Review and many articles for the Encyclopaedia Britannica.) The subjects he wrote upon were many — Dante, Dryden, Mill on Government, Mr. Robert Mont¬ gomery's poems, Moore's Life of Byron, Lord Bacon, Von Ranke, Leigh Hunt, Frederick the Great, Madame d'Arblay, Barere, etc., but by far the greater number deal with poets and men of letters or political personages in English history. Perhaps his most famous essays are those on Lord Clive, Warren Hastings and Wil¬ liam Pitt, but others that deal with men of letters, Addison, for instance, or Samuel John¬ son, are just as brilliant.

Macaulay's essays are set off by all the arts of rhetoric; they are ornamented by all the re¬ sources of omnivorous reading and a marvelous memory; they sparkle with a youthful enthusi¬ asm, and are compact of sound informat'on. In their own class they have no rivals. They are books to be taken on a long sea voyage, to be put on the shelf of a lonely ranchman, to be read and reread by all who have any taste for

literature. Pick up the essay on Addison and you are delighted with the tender sympathy of the critic who can set forth a good man's char¬ acter in so generous and beautiful a manner. Read that on Croker's edition of (Boswell's Johnson, * and you not only derive pleasure from Macaulay's admiration for Johnson, but you also get a lively idea of what the editor of a biography should not do. Take up any essay you please and you find knowledge, wit, sympa¬ thy, admiration ; you are delighted to find with what extraordinary ease you acquire informa¬ tion, and how your horizon rapidly reaches out as if you were going up in a balloon, how places and things once so dark become enveloped in light as if the sun were rising, how great his¬ torical events seem to have been familiar to you from boyhood and how eminent personages, hith¬ erto unknown, leap into your sudden intimacy.

Thus to delight, in form, and exhilarate the reader is a wonderful feat, and for nine men out of 10 Macaulay's essays are wholly satisfac¬ tory. They give a busy man what he wants to get from history and literature; but the 10th man finds himself not wholly satisfied. He feels oppressed by the arts of rhetoric. These animated pages, paragraphs, sentences that ad¬ vance upon him, rank by rank, marshaled ac¬ cording to the most brilliant rules of tactics and strategy, trouble his spirit. Not a single sen¬ tence, here or there, appears in undress uni¬ form. Such prose affords no room for subtle¬ ties. And the author's dogmatism rings in our ears like a trumpet in a room; this world of ours so full of perplexities, uncertainties, ob¬ scurities, cannot be truly expressed in opinions of absolute definiteness. History, literature, art, are not mathematics; a column of figures adds up the same for all; but William of Orange, James the Second, Archbishop Laud, Alexander Pope, Francis Bacon, must seem different to different people. We need, in liter¬ ature, in history, light and shade, we need twi¬ light and even night; high noon all the time is intolerable. It seems unlikely that all right views on English politics, during the 17th, 18th and 19th centuries, were embodied in the Whig creed, that all the good in religion is with the Protestants and none with Roman Catholics, that a comparative estimate of national char¬

acters summed up in the phrase ((as the Italian is to the Englishman, as the Hindoo is to the Italian, as the Bengal is to other Hindoos," etc., should not need explanations and qualifica¬ tions. And why should a historical writer, all the time, be giving his personages good or bad marks for conduct, like a village schoolmaster ?

Such faults certainly exist. Macaulay had the temperament and the manner of. an orator. He took, or rather he inherited, a view, he ac¬ cepted it unquestioningly with enthusiasm, even with passion, he expressed that view in as ab¬ solute and as lucid a manner as possible. He had the method of an orator whose oration will be heard but once, and who must be positive in order to convince. This may be a merit in an advocate but it is a grave fault in a writer ; and one would say that with such a fault it would be impossible for a man to be a great writer. But this very fault is proof of Macaulay s ex¬ traordinary talents ; with his eloquence, with his immense fund of information, with his obvious honesty and his contagious enthusiasm, he is able to cover up and conceal what in any other writer would be fatal defects.

A man without doubts, without metaphysics, without high imagination, without dreams, can¬ not be one of the world's greatest writers; but Macaulay was a great English writer and occu¬ pies a place in which he not only has no rival, but no competitor who can be compared with him.

Carl E. Eggert.

MACAULAY, Trevelyan's Life of. The

authoritative biography of Thomas Babington Macaulay is the (Life and Letters) by Sir George Otto Trevelyan. It is likely always to remain the chief source of information on ac¬ count of the opportunity open to the biographer of knowing the subject thoroughly and of hav¬ ing free access to all available material. The writer is a nephew of Lord Macaulay, the son of Hannah More Macaulay, one of the histo¬ rian's favorite sisters; from his earliest boyhood he knew his uncle intimately, and was 21 years old when Macaulay died in Decem¬ ber 1859. Lady Trevelyan bequeathed to her son the task of writing his uncle's biography, a task that occupied many years, the completed work appearing in 1876.

The excellence of the work was recognized from the first. John Morley and William Ewart Gladstone approved it at once in exten¬ sive

reviews, and succeeding years have de¬ tracted not at all from their judgments. Mr. Morley commended c(the skill and candor with which Mr. Trevelyan has executed a very deli¬ cate and difficult task.” Excellent and abun¬ dant materials and extensive knowledge do not necessarily ensure the production of a great biography. Nor do intimacy and strong affec¬ tion; close relationship, indeed, is frequently the snare that prevents success. It is a tribute to Trevelyan’s genius that he was not blinded by relationship or affection, nor overcome by the excess of material with which he had to deal. The biography exhibits careful selection. If now and then the loyal nephew is unable to see anything but good in the famous uncle, he nevertheless does not represent him as faultless ; he admits that Macaulay had both limitations and prejudices. Trevelyan does not intrude himself unduly upon the narrative : he keeps our attention at all times chiefly upon Macaulay. Gladstone said that one of the greatest merits of Trevelyan’s work is the fact that it has movement — life. And Gladstone . was night. The biography is no lifeless transcript of facts; it is a characterization and an interpretation, possessing all the qualities of the best artistic work — proper perspective,, proportion, grada¬ tion. The style is attractive and contributes much to the delight of reading.

Trevelyan adopted the method employed and established by Boswell, that of allowing the subject to tell, <(as far as possible,” His own story. The (Life of Macaulay> is sometimes, to be sure, mentioned along with the (Life of John¬ sonˆ and there is no doubt that it has taken its place as one of the greatest English biographies. It is true, however, that with all of the advan¬ tages open to Trevelyan, he yet falls short of the success attained by Boswell. The < Macau¬ lay* contains no such record of conversation, no such variety of <(exquisite personal touches,” no such dramatic quality as the (Johnson.* Neither does it so freely portray faults and foi¬ bles. Falling somewhat short of the (Life of Johnson* in sheer artistry, it surpasses Lock¬ hart’s (Life of Scott* in movement and concen-

tralion. Morley was giving high yet just praise when he expressed the belief that this Life oi Macaulay) would be read throughout the world with a curiosity and an interest only to be sur¬ passed by the success of Lord Macaulay s own writings. Consult the review of the ‘ Life by John Morley (in the Edinburgh Review, Vol. 143) ; and that by Gladstone (in the Quartet ly Review, Vol. 142). Waldo H. Dunn.

McAULEY, Catherine, Irish founder and first superior of the Sisters of Mercy: b. Stor¬ mont House, County Dublin, Ireland, 29 Sept 1787; d. Dublin, 11 Nov. 1841. In childhood she was adopted by a wealthy Protestant family who allowed her to remain in the church of her father, the Roman Catholic, and left her a large fortune which she wished to use for the benefit of the poor. She first erected a commodious house wherein might be taught a number of poor children, and where homeless young women might find lodging and board. This in¬ stitution was opened in Dublin, 24 Sept. 1827, but the religious order was not established until 12 Dec. 1831. The members of the order take the vows of poverty, chastity and obedience; and the works which they perform are visiting the poor, sick and imprisoned, teaching, estab¬ lishing hospitals, orphanages, homes for the friendless and other works of mercy, there are houses of her order in nearly all parts of the world. In the United States it comprises over 4,700 members. The order includes a col¬ lege for young women, at Mount Washington, Md., a large number of academies, high and ele¬ mentary schools and hospitals and orphanges in nearly every State in the Union. Consult Hart¬ nett, < Memoir of Mother McAuley5 ; Murphy Sketches of Irish Nunneries) ; Member of Order of Mercy, ‘Life of Catherine McAuley.* See Mercy, Sisters of.

McAULEY, m’ka’li, “Jerry,® New York City missionary: b. Ireland, in 1839; d. New York City, 18 Sept. 1884. He came to New York in 1852 and became a thief and prize¬ fighter. In 1857 he was sent to Sing Sing prison on a false charge of highway robbery, but was pardoned in 1864. He returned to his evil life. In 1872, having reformed, he opened a mission, (<The Helping Hand,® in Water street, a criminal neighborhood in New York. In 1882 he opened another mission, (<The Jerry McAuley Cremorne Mission® and in 1883 began the publication of Jerry McAuley’s Newspaper. He appealed with the greatest success to out¬ casts considered beyond redemption. After his death the work was continued by Samuel H. Hadley and John H. Wyburn. In 1912 a mod¬ ern sanitary building was erected on the site of the first mission in Water street. Consult ‘Terry McAuley: his Life and Work,5 auto¬ biography edited by the Rev. Robert M. Offord (New York 1885).

MACAW, ma'ka', name given to 15 or more species of large, long-tailed and strong¬ flying parrots of gaudy coloring. They belong to the genus Ara, and are natives of the West¬ ern Hemisphere. They live on the mainland of America from Mexico to Paraguay, being es¬ pecially abundant in Bolivia, where no fewer than seven (or nearly one-half) are found. They are also in Colombia and in Cuba. In the true macaws (Ara) the bony orbitical ring is complete and the lores (space between the eye

and the upper mandible) and, to a greatei or less extent, the cheeks are naked. One of the handsomest and best known is the Blue and Yellow Macaw (Ara ararauna) , which enjoys an extensive range in South America from Guiana in. the east to Colombia in the west and from Panama to Bolivia. A little over 30 inches long it has the upper parts blue, the forehead olive-green and the ear-coverts, sides of neck, breast and abdomen yellow-orange, while the wings and long tail are blue above and golden olive-yellow below. This bird is seen in almost every zoological garden and is often kept in private houses. It possesses a fairly good temper and grows much attached to those who tend it ; but, like all other macaws, it persists in violent screaming. Salmon-fishers use its feathers for the making of artificial flies. Larger and even more gorgeously plumaged is the great Red and Blue Macaw (Ara inacao) , which is mainly scarlet-red both abo\e and below, but with the back and uppei and lower tail coverts pale blue, as are the wing-quills, while the shoulders and greater coverts are chrome yellow; The tail feathers are scarlet, the two central ones scarcely tipped with blue, the blue tips increasing in extent on the outer feathers, the three outermost being almost exclusively blue. The home of the Red and Blue Macaw extends from Mexico, through Central America, to Bolivia. Guiana and the Amazon Valley. It is usually seen in pairs, or in companies of pairs. It is also a common bird in captivity. The Red and Green Macaw (Ara chloeoptera) , ranging from Panama to Brazil, has a shorter tail than the other two and is not so frequently met with in zoological gardens. It does not extend north of Panama. It differs from the Red and Blue in being of a darker red, or crimson, and having the middle wing coverts olive-green instead of yellow. The Green Macaw (Ara milateris) >s green through¬ out, except for the presence of a scarlet patch on the forehead and blue on back, rump, wings and tail. It is 27 inches long and ranges from Mexico to. Peru and Bolivia —the most northern of all in distribution. It is well known in captivity. Colonel Grayson and other writei s explain that this macaw is called ((guaca-mayo® by the natives of Mexico and Central America, because they believe that it descends to

the ground only once a year, and this in the month of May, when it searches the gro.und for a very hard-shelled palm-nut of which it is fond. This rather surprising statement is prob¬ ably substantially true, as there seems no other reason why it should ever alight on the ground, where it would be exposed to much more dan¬ ger than in the treetops, where it finds abun¬ dant • food the year round. The tree of this nut the Mexicans call Ava, a species of Nux vomica. Both the milky sap of the tree, as well as the fruit, are deadly poison to any other creature but this parrot. The shell is exceedingly hard, but the enormous bill # and powerful jaws of the Guacamayo enables it to split the nut with ease. When migrating to some distance these birds pass at a great height, flying in pairs and uttering harsh and discordant cries.

The Hyacinthine Macaw (Ara hyacinthus) of the central provinces of Brazil is a splendid bird. It is about three feet long, the plumage being nearly uniform cobalt blue, relieved by

bright yellow skin about the eyes and at the base of the lower mandible and a black bill which is of enormous size. This appears to be a rare species, occurring, according to Riker, about the inland ponds in the dense forests of the interior, where it feeds chiefly upon the fruit of a palm peculiar to these localities. Some of these palm fruits are of extraordinary hard¬ ness, but these birds crush them to pulp by their bills. The nesting habits of the Hyacinthine differ from those of other macaws in that they excavate a hole in the river bank for their nest instead of placing it in a hollow tree. In Spixi Macaw (Cynopsittacus Spixi), of the province of Bahia, Brazil, the lores are naked and the general color also blue; but parts of the head are more or less grayish.

All macaws live well in captivity and are often kept chained to a perch. Few persons are acquainted with their strong, wonderful and graceful flight. They all scream harshly. Thev are gregarious and apparently monogamous, and lay two lustreless white eggs in nests in hollow trees. One of their characteristics is a long and graduated tail

with the individual feathers tapering to a point and the middle pair always the longest. The bill is powerful and usually deeper than long. Consult Greene, William Thomas, (Parrots in Captivity, 5 with notes (3 vols., London 1884-87) ; id., (Parrots in Captiv¬ ity, J colored illustration (London 1884) ; Lear, Edward, illustrations of the Family of Psittacidae, or Parrots5 (folio, London 1832) ; Page, Charles N., (Parrots and Other Talking Birds: their Foods, Care and Training5 (Des Moines 1906).

MACAW TREE (Acrocomia sclerocarpa) , a palm of the same family as the cocoanut. It is a native of the West Indies and of the warm parts of America. It grows from 20 to 30 feet high with pinnated leaves from 10 to 15 feet long. The fruit yields oil of a yellowish hue, sweetish taste and with an odor like violets. This oil is about the consistency of butter. In the native regions of the tree the inhabitants use this oil as an emollient for affections of the joints. It is extensively imported and is used in the manufacture of toilet soaps as palm oil. The leaves yield a fine, soft fibre. In Guiana the tree is called Macoya, in Brazil it is called Macahuba, in Jamaica Grugru. In southern California this palm is cultivated as an orna¬ mental tree.

MACAYO, ma-si-6, Brazil. See Maceio. MACBETH, or MACBETHAD, Mac-Finlegh, king of Scotland, who reigned from 1040 to 1057. The facts of his life, so far as known, are these. During the reign of Duncan he was ((mormaer55 of Moray by inheritance, and by his marriage with Gruoch, granddaughter of Kenneth IV. Duncan, in his attempt to subdue the independent chiefs of the north, was de¬ feated in a battle with the Earl of Orkney and Shetland at Burghead, near Elgin in 1040; but was murdered at Pitgaveny, nine miles from the battlefield, by Madbeth, his general. By this means Macbeth became king, and, accord¬ ing to accounts, his reign was fairly successful. He was finally defeated in battle and slain by Malcolm Ceannmor, son of the murdered Dun¬ can, at Lumphanan, Aberdeen (1057). The legends which gradually gathered round the name of Macbeth were collected by John of

Fordun and Hector Boece, reproduced by Holinshed in his (Chronicle5 (1577) and made use of by Shakespeare for his great tragedy. These writers appear to have overlooked the excellent qualities of Macbeth as king, and re¬ garded him with horror as a usurper. Consult Robertson, (Scotland under her Early Kings5 (1862) ; Skene, (Celtic Scotland5 (1876-80), and Rhys, E., (Celtic Britain5 (3d ed., London

1904).

MACBETH. This play was not published until 1623, though it was probably written several years before Shakespeare's death. A reference to it in 1610 by Dr. Simon Forman, the probable reference to the accession of James the First (1603) that brought about the union of two crowns, and the proportion of rhyme, blank verse and prose, point to 1605-06 as the prob¬ able date. Because of its late publication the text is one of the most corrupt of Shakespeare's plays. It may have been taken down from the play as acted, or it may be a transcript of the author's manuscript which was in great part not copied from the original but written to dictation. Act 1, scene 2, and part of scene 3 may be an interpolation, but the Porter Scene, which was long considered to be the work of a collaborator, is now justified by reason of its dramatic contrast with the preceding scene and by the amazing felicity of such lines as, ((go the primrose way to the everlasting bonfire.55 With the exception of a few lines and scenes Mac¬ beth is an example of amazing concentration — it has neither underplot, nor, with the excep¬ tion of the Porter Scene, such comic scenes as are found in nearly all of the other tragedies of Shakespeare. It is shorter by some thousand lines than any other tragedy and moves along with the swiftness of a tempest. The 20 years of history become nine days of dramatic time, and so swift is the passage of time that it seems but a few hours.

Shakespeare was indebted for the main events of the play to Holinshed's (Chronicles of Scotland.5 The character and the story of Macbeth, partly historical and partly legendary, were drawn largely from this source, but the witches were the creation of Shakespeare's genius from the shadowy creatures of a crude folklore. There is just enough of the popular conception of supernatural creatures of evil to satisfy the demands of the age in which he lived, but he informed this popular and some¬ what vulgar superstition with a moral significance suited to all ages alike. These invisible, un¬ earthly creatures do not create the evil in Mac¬ beth's mind; they only serve to bring into life¬ like reality the evil that is already there. They are an embodiment of the same forces as the thunder, lightning, rain — nature ((red in tooth and claw55 — that constitute the background for the evil forces that are at plav in this drama. While the minor characters of the play, and especially Banquo, are adequately presented, the interest centres in Macbeth and Lady Mac¬ beth, who while engaged in the same evil deeds yet reveal differences of temperament and char¬ acter that afford the most significant dramatic contrasts. Lady Macbeth before

the murder of Duncan displays firm, sharp, wiry, matter-of- fact intellect and energy of will ; she becomes for the time being possessed by one thought, one ambition. She has no imagination to represent

for her the inevitable consequences of the murder. As soon, however, as the deed is done, her womanly nature asserts itself; her amazing self-control gives way, and remorse wells up in her conscience-tortured heart. She had denied the quality of her sex, only to find that the woman was stronger than the queen or the wife. Macbeth, on the other hand, is possessed from the beginning by a vivid imagination that visualizes the deed itself and falters at its contemplation. Deeper and deeper he plunges into guilt until a sort of world-weariness and sick despair settle upon his brooding spirit. In words as eloquent as Shakespeare ever wrote he pronounces a requiem upon his wife and summarizes his pessimistic indictment of old age and of life; life is to him but ((a tale told by an idiot, full of sound and fury, signifying nothing.” He dies with the harness on his back, the intrepid soldier that he has always been, but with a sigh that pierces to the depths.

Edwin Mims.

McBRIDE, mak-brld, Sir Richard, Cana¬ dian statesman: b. New Westminster, British Columbia, 15 Dec. 1870, where his father held office under the Crown. He was educated at Dalhousie University, Halifax, Nova Scotia, graduating in 1890, called to the bar in 1892, .he practised his profession in Victoria. Entering politics he was elected in 1898 a Conservative of the provincial legislature. In 1900-01 he was Minister of Mines in the Provincial Ministry; in 1902 —03 a leader of the Conserva¬ tive opposition; in 1903 Premier and Minister of Mines; in 1906 a delegate to the Interprovin¬ cial Conference at Ottawa; and in 1907 a delegate to the Colonial Conference at London (England). In 1912 he was knighted. Con¬ sult Gregg, T. A., (Richard McBride,5 with portrait, Canadian Magazine (July 1904).

MACBRIDE, Thomas Huston, American educator and botanist: b.

Rogersville, Tenn., 31 July 1848. After graduation at Monmouth Col¬ lege in 1869 he taught mathematics and modern languages at Lenox College from 1870 till 1878, in which year he became assistant professor of natural sciences. In 1884 he was made pro¬ fessor of botany and held this post until 1914 when he became president. Since 1916 he has been president emeritus. His specialty is fungi. Dr. Macbride has had many degrees: Monmouth gave him A.M. in 1873 ; the Univer¬ sity of Bonn the same in 1891 ; Lenox gave him Ph.D. in 1895 ; Monmouth that of LL.D. in 1914, and Coe the same in 1915. He is a mem¬ ber of many scientific societies, of the American Forestry Association, Iowa Park and Forestry Association and of the Society of Botanists of the Central States. He is also a Fellow of the Botanical Society of America. He has pub¬ lished many of his lectures and addresses, has contributed to the Popular Science Monthly, Science, etc., and is the author of a textbook on 'Botany5 (1895) and (North American Slime Moulds> (1899).

McBURNEY, mak-ber'ni, Charles, Amer¬ ican surgeon: b. Roxbury, Mass., 17 Feb. 1845; d. 1913. He was graduated at Harvard in 1866; and from the Columbia Medical School in 1870, and thereafter practised his profession in New York. He was professor of surgery in the College of Physicians and Surgeons, New York, and was visiting and consulting surgeon

at Saint Luke's, the Presbyterian, Roosevelt, New York Orthopedic and other hospitals. He became widely known as a very skilful operative surgeon, and was Fellow or member of many medical societies of this country and Europe. He discovered "McBurney' s point," which is pathognomonic of appendicitis. He was a world-wide authority on appendicitis. When President McKinley was shot, Dr. McBurney was summoned to Buffalo as consulting sur¬ geon. He was a great teacher as well as a great surgeon.

McBURNEY, Robert Raikes, American

religious worker: b. Castleblaney, Ireland, 31 March 1837 ; d. Clifton Springs, N. Y., 27 Dec. 1898. He came to the United States in 1854, and from 1862 was the general secretary of the New York Young Men's Christian Association. He was devoted to his work, and with the progress of years came to be recognized as the leading Y. M. C. A. secretary in the world.

McCABE, ma-kab', Charles Cardwell,

American Methodist bishop: b. Athens, Ohio, 11 Oct. 1836; d. New York, 19 Dec. 1906. He was educated at Ohio Wesleyan University. In 1860 he entered the Methodist Episcopal ministry, and in 1862 was appointed chaplain of the 122d Ohio Infantry. At the battle of Winchester he was captured, and held in Libby prison for four months, and soon after his re¬ lease entered the service of the United States Christian Commission and succeeded in raising a large amount of money for its work. Later he became financial agent for Wesleyan Uni¬ versity; and in 1884 was made secretary of the Methodist Episcopal Missionary Society. He was remarkably successful in raising large amounts of money for missionary purposes. He became a bishop of his Church in 1896, and in December 1902 was elected chancellor of the American University at Washington, D. C.

McCABE, James Dabney, American au¬ thor: b. Richmond, Va., 30 July 1842; d. Ger¬ mantown, Pa., 27 Jan. 1883. He was the son of James Dabney McCabe (1808ˆ75), a Protestant Episcopal clergyman and writer, and was educated at the Virginia Military Institute. He began to write very early. At the begin¬ ning of the Civil War he published a pamphlet entitled fanaticism and its Results, by A. Southerner (Richmond 1860) and throughout the war he employed his pen effectively in the cause of the Confederates. Three martial plays were performed in Richmond in 1862-63 and his war-story, (The Aide-de-Camp,5 was issued in 1863. In 1863 he published a Christmas compilation called (The Bohemian5 and in 1863-64 edited The Magnolia Weekly. His war-poems were very popular, particularly ‘The Sword of Harry Lee.5 He wrote several biographies, including fife of Gen. Thomas J. Jackson5 (Richmond 1863) ; ‘Memoir of Gen. Albert S. Johnston5 (1866) ; and fife and Campaigns of Gen. Robert E. Lee5 (New York 1867). His other works are (Planting the Wilderness5 (Boston 1869) ; (History of the Late War between Germany and France5 (1871) ; fights and Shadows of New York Life5 (New York 1872) ; (History of the Grange Monument,5 published under the name of Edward Winslow Martin (Chicago 1874) ; (Paris by Sunlight and Gaslight5 (Philadel¬ phia 1875) ; fentennial Historv of the United

States) (Philadelphia 1875) ; (Pathways of the Holy Land5 (1877) ; (History of the Turko-Russian War5 (1879) ; (Our Young Folks Abroad) (Philadelphia 1881), and (Our Young Folks in Africa5 (1882). Besides these he was the author of several hundreds of short stories, essays and translations, and made a compilation of the romance and humor of the war called (The Grayjackets) (1867).

McCABE, Joseph, British rationalist: b. England, 1867. He was educated at Saint Francis's, Manchester, at Saint Anthony's, Forest Gate and at the University of Louvain. In 1883 he became a Franciscan, was ordained a priest in 1890 and in 1895 became rector of Buckingham College. In 1896 he left the Roman Catholic Church and became a lecturer and writer on rationalistic subjects. His books include (Twelve Years in a Monastery5 (Lon¬ don 1897) ; (Modern RationalisnP (1897) ; (Abelard5 (1901) ; (Saint Augustine and his Age5 (1902) ; (Talleyrand> (1906) ; <The Martyrdom of Ferrer 5 (1909) : (The Decay of the Church of Rome5 (1909) ; (The Evolution of Mind) (1910) ; (The Empresses of Rome5 (1911); (The Story of Evolution5 (1912); Goethe5 (1912) ; (The Emnresses of Con¬ stantinople5 (1913) ; (A Candid History of the Jesuits5 (1913) ; (The Sources of the Morality of the Gospels5 (1914): George (Bernard Shaw5 (1914); (The Soul of Europe5 (1915); (The Kaiser5 (1915) ; (Crises in the History of the Papacy5 (1916) ; (The Romance of the Romanoffs5 (1917) ; (The Bankruptcy of Re¬ ligion5 (1917) ; (The Pope and the Church5 (1918). He has also published translations of Haeckel, Ferrer and Gunther. Under the head¬ ing <(Mr. McCabe and a Divine Frivolity55 Chesterton devotes a chapter to him in (Heretics5 (London 1909).

MACCABEES, a famous family which battled for liberty in the 2d century b.c., when the Jews were persecuted by the Syrians under Antiochus IV, Epiphanes. Originally applied to Judas, the third son of the aged priest Mattathias, who began the revolt, the name was widened to include the family of Judas and his followers, in due course to be applied to all wrestlers for freedom in the Greek period of Jewish history. The word's origin has received various fanciful explanations, but the most probable etymology is from the Aramaic maqquaba (Judges iv, 21 and elsewhere) mean¬ ing (<Hammer„55

The story of the Maccabean struggle belongs to the history of heroism in all ages. When Antiochus of Syria (175-164 b.c.) strove to impose Hellenism in its crassest form upon the Jews under his sway and Jerusalem was over¬ run, while pagan rites were ordered to be substituted for Jewish, a sacrifice to Zeus be¬ ing offered (168) on the Temple altar, an aged priest at Modin, Mattathias, spurned the man¬

date, killed the royal messenger, and destroyed the altar. Then escaping with his five sons to the mountains, he raised the standard of revolt. Two years later he died, and Judas, the third son, was acclaimed leader. His skill and genius, joined to a religious fervor that was the secret of his strength, cleared away every ob¬ stacle, as he defeated in rapid. succession the three Syrian generals, Apollonius, Seron and Gorgias, and later the regent, Lysias. In 165 he vol. 18 — 2

reconsecrated the Temple amid the exultation of the people — the festival of Hannukkah, in memory of this restoration is still observed by the Jews of every land. In 162 Lysias granted religious freedom but Judas resolved to fight on until political liberty was also attained. A year later he defeated Nicanor at Adasa, but shortly afterward he fell at Elasa, while resisting Bacchides with greatly superior forces.

The command was now assumed by his brother Jonathan, who was astute enough to secure the favor of the Syrian ruler and was made high priest (153). For a time he fought for Antiochus VI, who owed his crown to Tryphon, and succeeded so well as to awaken Tryphon's jealousy. He fell into his power at Ptolemais and was finally put to death (143). Simon, the last surviving son of Mattathias, be¬ came leader of the Jewish people. By his abil¬ ity and force of character, he outwitted Tryohon and secured the independence of Judaea. In 141 he was appointed by the people hereditary leader and high priest. With him began prop¬ erly the Hasmonean dynasty — the name being traced to an ancestor of the house Asamonaios (Josephus, Antiq. xii, 6) ; according to Wellhausen (Phar . und Sadd. x, Note 94) he was the grandfather of Mattathias. The first year of his reign marked the beginning of a new era (Seleucid year 170 = 143-142 b.c.). The coun¬ try enjoyed much prosperity, its resources were greatly developed and the outlook was dis¬ tinctly more favorable than at any previous period since the Exile. With a change of rulers in Syria, Antiochus (VII) Sidetes be¬ coming king, Simon and two of his sons were murdered by his son-in-law who wished to curry favor with the new monarch. But the third son, John Hyrcan, escaped and succeeded to the throne, reigning 30 years with much ability. Partisan strife, however, disturbed the kingdom's peace and weakened its strength, with the constant clashing of Pharisee and Sadducee.

On the death of John Hyrcan (105), his son Aristobulus reigned for a year when his brother Alexander Jannaeus became ruler (104-78), a man of considerable energy, in his persistent conflicts to extend and defend his realm. His sympathies were with the Sadducees, and once

when officiating as high priest, some of the Pharisees in their anger threw at him and the attending Sadducees citrons which had been supplied for the Feast of Tabernacles. As pun¬ ishment, he attacked them with his troops, killing 6,000. On his death his widow, Salome Alex¬ andra, ruled (78-69), reversing his policy and making the Pharisees her favorites, the land enjoying peace and prosperous growth. Her eldest son, Hyrcan II. who lacked capacity, was made high priest. The younger, Aristobulus. stronger and abler, coveted the succession and organized an army to conquer Jerusalem, when Alexandra died and Hyrcan was willing to re¬ tire in his brother's favor.

At this moment a new factor appeared in the person of Antipater of Idumaea who sought to further his own designs. An appeal to Rome was made. Pompey resolved to settle the mat¬ ter in his own fashion, at some slight which Aristobulus offered, entered Jerusalem and made Hyrcan II high priest and ethnarch, while his brother was carried a captive to Rome. And now the Roman yoke became firmlv fastened. Antipater was made procurator in 47, with his

sons Phasael and Herod governors of Jerusalem and Galilee. In 41 they became tetrarchs of Judaea. In 40, Antigonus, the sole surviving son of Aristobulus, was appointed king by the Parthians, in the swift changes of the day. But Herod who had escaped from prison, while his brother had committed suicide, was given the throne by the Romans (37 b.c.). In the same year Antigonus was put to death by Mark Antony and the Maccabean-Hasmonean dynasty ended.

Bibliography. — Curtiss, (The Name Maccabee) (Leipzig 1876) ; Henderson, F., (The Age of the Maccabees) (1898); Morrison, (The Jews under Roman Rule-* ; Streanes, (The Age of the Maccabees5; Weiss, (Judas Makka-beaus5 (1897). Consult modern histories of the Jews, Graetz, Schiirer, *etc.*

Abram S. Isaacs.

MACCABEES, Book of the, a name given to several Apocryphal books of the Old 1 estament. Of the four or five thus termed, two were declared canonical by the Council of Trent (1546), are contained in the Vulgate, and among the Apocrypha of the English Bible. The three other books may be summarized: Book III is found in the Septuagint but not in the Vulgate, Book IV is included in some manuscripts of the Septuagint and of Josephus. Book V is merely a Syriac reproduction of the sixth book of Josephus' (Jewish War5 and is of no historical value.

First Book was the record of 40 years from the accession of Antiochus (175 b.c.) to the death of Simon (135 b.c.), and is composed after the model of the Old Testament historical style, terse, simple, and at times poetic and impas¬ sioned. The narrative is written with due proportion and in sympathetic tone. All events are dated in terms of the Seleucid era. It is generally admitted that the original was in a Semitic language, most probably Hebrew, to which both Origen and Jerome bear testimony. However, it is not impossible that they were ac¬ quainted with an Aramaic version or para¬ phrase. The Greek translation of the Hebrew was made at an early date and has alone sur¬ vived. It bears all the marks of a literal translation, preserving the Semitic and at times the Hebrew idiom. The author, to judge from the book itself, was a pious and patriotic Jew: a Palestinian, to infer from his evident familiarity with the Holy Land and his want of knowledge as to the foreign lands men¬ tioned. An admirer of the

Maccabees and their military skill, he shows the influences of his day by omitting the words ((God55 and ((Lord55 as in the book of Esther, substituting ((He55 and ((Heaven.55 Owing to his omission of the dis¬ loyal priests, Jason and Menalaus, in striking contrast to the attitude of the Second Book, Geiger claims a Sadducee as its author, a view held by later authorities, even if Geiger's views as to its being a partisan document are not up¬ held. Opinions differ as to its precise date — Schiirer tracing it to the first or second decade of the 1st century b.c., while Torrey dates it early, in the reign of Simon, a little after 135 b.c. The book is one of the most vivid and valuable sources extant for Jewish history.

Second Book, has a peculiar opening — two letters written by Jews of Palestine to brethren in Egypt, held by some to be spurious. The

work itself, an abridgment of five books written by Jason of Cyrene, covers Jewish his¬ tory from a period a year earlier (176 b.c.) than its predecessor to the death of Nicanor (161 b.c.) . It is of special interest as picturing the situations in Palestine before the revolt of Mattathias and furnishing other data that are lacking in the First Book. The author, prob¬ ably a Hellenistic Jew, writes largely from the religious point of view, is a Pharisee, with a direct partisan tendency. Greek was the original language. Its exact or approximate date cannot be fixed. Among its characteris¬ tics are allusions to angels and spirits, to res¬ urrection and immortality — that the book concludes with the victory of Judas over Nicanor, indicates its aim — to arouse the Jew to observe the two Maccabean feasts, that of Dedication and of Nicanor. The incident of the mother and her seven sons, and other stories of martyrdom have given the book a value and power of its own, which appealed with special force to the Christians of the first four cen¬ turies, as Bevan states in his (House of Seleucus5 (1902, II 175).

Third Book describes the escape of the Jews from martyrdom in Alexandria in the reign of Ptolemy IV, Philopator (222-204 b.c.). It has no relation to the Maccabees, but doubtless its title was given later when all who suffered for the olden faith were called by that name. It was written by an Alexandrian Jew to give courage and endurance to his brethren in Egypt. In view of the fact that early Jewish settlements in the Fajum 'have been discovered. Both I. Abrahams and A. Biichler claim the book has distinct reference to a persecution in the Fajum — a theory that is disputed.

Fourth Book has been aptly described by Freudenthal (Breslau 1869) as a homily de¬ livered probably on the Feast of Dedication to a Greek-speaking Jewish community. It is ser¬ mon not history, to prove how the passions can be controlled by the reason, by which term he means reason enlightened by re¬ ligion and the Mosaic Law. This thesis is illustrated by many examples, notably from the Maccabean struggle. A Hellenist to a certain extent, he was nevertheless . an earnest, loyal Jew, eloquent and convincing. His precise date is unknown. He supplied the model for similar homilies by Christian writers in the early centuries, with their thrilling martyrdoms. In the Church the book was at¬ tributed to Josephus and added Jo his writings, with whose style and language it is wholly in¬ compatible.

Without historical value is the so-called Fifth Book which Cotton gives in his (Five Books of the Maccabees5 (1832), and known also as the Arabic (Book of Maccabees5 which claims to be the history of the Jews from 186 b.c. to the end of Herod's reign, but which in reality is nothing but a compilation from First and Second Books of Maccabees and Josephus. The manuscript of a c Fifth Book5 which Sixtus Senensis (1566) states that he saw in Lyons and which was subsequently lost by fire, is. char¬ acterized by Schiirer as a ˆreproduction of Josephus, the style being changed for a purpose.55 x

Bibliography. — Abrahams, I., (J. Q. RJ (1896-97, IX, 39) ; Biichler, A., (Tobiaden and

Oniaden) (Vienna 1899); Fairweather and Black, 'First Book of Macc. in Cambridge Bible Texts* ; Grimm in (Handbuch zu den Apokryphen) ; Kacutzsch, < <Apokryphen) ; Schurer, (History of the Jewish Peopled

Abram S. Isaacs.

MACCABEES, Knights of the Modern.

See Maccabees, The.

MACCABEES, The Ladies of the, a fra¬ ternal beneficiary association, founded in 1886, formerly the Ladies of the Modern Maccabees. Until 1914 it formed a species of auxiliary organization to the Knights of the Maccabees and the latter exercised over it a kind of guardianship. It has about 50,000 members and since its institution has distributed about $7,000,000 in benefits and insurance.

MACCABEES, Ladies of the Modern.

See Ladies of the Maccabees.

MACCABEES, The, a secret fraternal beneficiary association havin®- its general offices at Port Huron, Mich. An association bearing the name of Knights of the Maccabees of the World was first organized in the city of Lon¬ don, Canada, in the year 1878, by W. D. Mc-Laughlan and several other gentlemen of that city. The Association grew rapidly, and its tents, as its local lodges were called, sprung up all over the Canadian provinces and in many of the States of the American Union. In 1914 it united with the Knights of the Modern Mac¬ cabees, long a rival organization under the general title of the Maccabees.

The Association takes its name from the Maccabees, a chivalrous and religious people whose history is given in the apochryphal writ¬ ings of the Old Testament. The leading char¬ acter in this history was Judas Maccabeus, a valiant soldier and one of the foremost generals of the period in which he lived. During the wars in which the Maccabees were engaged and in which he was their leader he required that a portion of the fruits of all their victories should be set aside for the benefit of the widows and orphans of those who had fallen in battle.

It was this particular practice and charac¬ teristic that probably suggested to Mr. Mc-Laughlan and his co-laborers the name for their new society, because the purpose of this society, as set forth in their laws, was to unite frater¬ nally all white male persons of sound bodily health and good moral character, between the ages of 18 and 70 years of age, and to provide for such members benefits in case of disability, and to the beneficiaries of such members bene¬ fits in case of their death.

The main purpose of this Association is to provide social and fraternal intercourse for its members, and benefits in the way of insurance to the families of deceased members. The con¬ stituent organizations

have distributed about $80,000,000 among the disabled members and the beneficiaries of the deceased members. The assets of the new united organization amount to $20,000,000. There are more than 300,000 members.

Its work is conducted on the lodge system under ritualistic ceremony. Its form of gov¬ ernment is thoroughly representative, every member having a voice in the conduct of its affairs, making of its laws, the election of its officers and the fixing of their compensation.

The general meeting of the lawmaking body (The Supreme Tent) is held once in three years, at which the members are represented through delegates chosen from subordinate tents, conventions and great camps. In the interim between the meetings of its governing body its affairs are administered by a board of seven trustees, consisting of the supreme commander and six others elected by the Su¬ preme Tent. The board of trustees has the general custody and management of the funds of the Association; under its direction all in¬ vestments are made, the laws of the Asso¬ ciation requiring that all investments shall be made in government, State and municipal bonds.

MACCABEES, The Woman's Benefit As¬ sociation of the, an adequate rate fraternal or¬ der for women with headquarters at Port Huron, Mich. Miss Bina M. West is the founder and present supreme commander and Miss Frances D. Partridge the supreme record keeper. Organized in 1892, as the Ladies of the Maccabees of the World, reorganized under its present name in 1915 and established in the United States and Canada, the order has 3,000 local bodies with 192,000 members and a re¬ serve fund of $12 000,000; it has paid in death benefits about $15,500,000; provides whole life, term and disability protection ; 20-year plans ; junior protection for children of members; sick, last illness and burial ; and maternity benefits. It maintains a free hospital service in every State for needy sick, and a patriotic service for the aid of members affected by the war. It is the first society of its kind to own a home-office building, erected at a cost of $250,000 without extra cost to its members through the advance in values of property hold¬ ings. The order is founded, officered and man¬ aged solely by women for home protection, mutual fellowship and fraternal aid.

McCALL, Edward Everett, American ju¬ rist: b. Albany, N. Y., 6 Jan. 1863. He was educated at the Albany High School and the New York University, was admitted to the bar in 1884 and practised in New

York from 1884 till 1902. From that year until 1913 he was justice of the Supreme Court of New York (1st district) and Democratic candidate for mayor of New York in 1913, but. was defeated by the late John Purroy Mitchel (q.v.). Judge McCall is a member of various New York clubs, including the Lotus, Manhattan, Catholic, Democratic and Athletic.

McCALL, ma-kal', George Archibald,

American soldier : b. Philadelphia, 16 March 1802; d. 25 Feb. 1868. He was graduated at West Point in 1822; in 1836 reached the rank of captain, and that of colonel in 1850. Having served against the Seminoles in Florida, he won distinction in the Mexican War; in 1850 he be¬ came inspector-general, resigning from the army three years later. In 1861 he was given command of the Pennsylvania Reserves, with the rank of brigadier-general of volunteers, and participated in the work of the Army of the Potomac, particularly in the Peninsular cam¬ paign of 1862, in which he was engaged with his troops at Mechanicsville, Gaines' Mill and Frazier's Farm (qq.v.). At Frazier's Farm, 30 June, he was taken prisoner and was confined for several weeks in Libby prison. In August he was exchanged, but impaired health pre-

ven-ted him from returning to the army, and in 1863 he resigned. He wrote (Letters From the Frontier5 (1868).

McCALL, John Augustin, American in¬ surance official: b. Albany, N. Y., 2 March 1849; d. Lakewood, N. J., 18 Feb. 1906. Fie was educated in his native city and served for sev¬ eral years as clerk in the Connecticut Mutual Life Insurance Company. In 1877 he entered the New York State insurance department in which he served as clerk, deputy superintendent and superintendent. In 1887 he was made comp¬ troller of the Equitable Life Assurance Com¬ pany and in 1892 became president of the New York Life Insurance Company. In 1905 the Armstrong insurance investigation led to his resignation in 1906 and he died two months after resigning.

McCALL, Samuel Walker, American pub¬ lic official: b. East Providence, Pa., 28 Feb. 1851. In 1874 he was graduated at Dartmouth Col¬ lege, studied law and was admitted to the bar in 1876, since when he has practised in Boston. He was editor-in-chief of the Boston Daily Ad¬ vertiser in 1888-89 and served as delegate at the Republican National Convention of 1888,

1900 and 1916. He was member of the Massa¬ chusetts house of representatives in 1888, 1889 and 1892 and was a member of Congress from 1893 to 1913 from the Eighth Massachusetts district. He was an unsuccessful candidate for the governorship of Massachusetts in 1914. He was successful the following year, being elected governor for 1916. He was reelected for the two successive terms of 1917 and 1918. He has published (Life of Thaddeus Stevens> (1899) ;

(Dartmouth Centennial Address on Daniel Webster) (1902) ; (The Business of Congress) (1911); (Life of Thomas B. Reed) (1914); (The Liberty of Citizenship5 (1915), and maga¬ zine articles. Fie received honorary degrees from Dartmouth, Oberlin, Tufts, Maine, Trin¬ ity, Columbia and Williams.

McCALLA, Bowman Hendry, American naval officer: b. Camden, N. J., 19 June 1844; d. Santa Barbara, Cal., 6 May 1910. He was graduated at the United States Naval Academy in 1864 and rose to captain in 1898. In 1890 he was court-martialed on charge of cruelty to his subordinates and was suspended for three years, but in consideration of previous acts of gallantry was restored to active service in 1891. He commanded the Marblehead during the war with Spain in 1898 and was subse¬ quently restored to the place he held on the list of officers previous to his suspension. In 1899 he commanded the Newark and aided in the pacification of the Philippines. In 1900 he co¬ operated with Vice-Admiral Seymour in put¬ ting a stop to the Boxer troubles at Peking. In

1901 he was given command of the Kearsarge ; in 1905 became commandant of the Mare Island navy yard and was retired 19 June 1906.

MacCAMERON, ma-kam'er-on, Robert Lee, American painter: b. Chicago, 1866; d. New York, 29 Dec. 1912. After studying in the public schools he began to make sketches for the newspapers in Chicago, and soon re¬ moved to New York, where he illustrated for newspapers -and studied under William M. Chase. He then went to Paris and studied at the Beaux Arts under Gerome and Collin. He

became a successful portrait painter and for

several years before his death kept studios in London, Paris and New York. For his. (Mi-Careme5 he received honorable mention in the Paris Salon, and in 1912 he was made a cheva¬ lier of the Legion of Honor. He was a member of several foreign and American art societies. Among his best portraits are President Taft, President McKinley, Archbishop Ryan, Justices of the Supreme Court, Harlan and Brewer, Nellie Melba and Auguste Rodin (Metro¬ politan Museum, New York). MacCameron also achieved reputation for his cafes and scenes in theatres. (A Group of Friends, J also called (Wormwood, 5 painted in 1908, is in the Corcoran Gallery, Washington; (The Daughter's Return,5 painted in 1909, is in the Metropolitan Museum, New York. <Les Habitues (The Old Customers) hangs in the Wilstach Gallery, Philadelphia. He also painted a religious picture, (The Last Supper, 5 in 1909. His last work was (The People of the Abyss) (1912). Consult Harper's Weekly (February 1913).

McCAMMON, Joseph Kay, American

lawyer: b. Philadelphia, 13 Oct. 1845; d. 2 Jan. 1907. He graduated at Princeton in 1865; studied law; became register in bankruptcy in 1870; was special counsel of the FTnited States in Washington 1871; president of the board for investigation of the Indian service, 1877 ; Assist¬ ant Attorney-General of the United States, 1880-85, and in 1881 was appointed United States commissioner of railroads. Under Presi¬ dents Garfield and Arthur he conducted treaties with various Indian tribes. Among his writings are a (Report on Indian Service5 (1878) ; Re¬ port of Councils with Bannock and Shoshone Indians5 (1881); (Report of Councils with Flathead and Other Indians5 (1882) ; Argu¬ ments in Cases Affecting Pacific and Other Railroads.5

McCARREN, ma'karen, Patrick Henry,

American politician : b. East Cambridge, Mass., in 1849 ; d. Brooklyn, 22 Oct. 1909. In 1851 he removed to Williamsburg (Brooklyn, N. Y.) and was apprenticed to a cooper, but soon left trade and entered local politics. Before he was 21 he had been defeated for the leadership of his district. In 1881 he was elected to the New York assembly and was reelected in 1883 and 1887. In 1889 he was elected to the State sen¬ ate and was continuously a member of that body until his death. In 1893 he became virtually the leader of the Brooklyn Democracy. He

broke with Charles F. Murphy, the leader ot Tammany Hall, and from that time a bitter fight was kept up between these two politicians for the control of the Brooklyn Democracy. In 1904 one of the bitterest chapters in the his¬ tory of New York politics occurred. McCarren also opposed W. J. Bryan and Charles E. Hughes. McCarren was a man of keen intel¬ lect and an aggressive fighter. He was identi¬ fied with the Standard Oil Company and the American Sugar Company.

McCARTER, Margaret Hill, authoress: b. Charlottesville, Ind., 2 May 1860. She. be¬ gan teaching in elementary schools in Indiana in 1876; graduated A.B. at the State Normal School, Terre Haute, Ind., in 1884; was prin¬ cipal of the High School, Rensselaer, Ind., 1884—87 ; held other educational positions to 1894, and was a lecturer of the State Board of

Education. She married, 5 June 1890, William Arthur McCarter, D.D.S., of Topeka, Kan. She became widely known by her fiction which is as popular in her State as that of William Allen White of Emporia. Her publications in¬ clude (The Overflowing Waters) (1903) ; (The Cottonwood's Story1 (1903); (Cuddy's Baby) (1907) ; (The Old Quirra> (1908) ; Cuddy and Other Stories1 (1908); (The Price of the Prairies1 (1910) ; (The Peace of the Solomon Valley1 (1911); <A Wall of Men1 (1912); (Master's Degree1 (1913) ; (Winning of the Wilderness1 (1914) ; (The Corner Stone1 (1915) ; (Vanguards of the Plains1 (1917).

McCARTHY, D'Alton, Canadian politi¬ cian: b. near Dublin, Ireland, in 1836; d. Can¬ ada, 11 May 1898. He was the son of an Irish barrister who found a home for his family on the shores of Kempfendfeldt Bay, Ontario, after a six weeks' voyage in a sailing vessel. Educated at the Barrie Grammar School, he studied law and was called to the bar in 1858. In 1872 he was made queen's counsel, and at¬ tained high rank both in jury cases and appeal cases. In 1876 he was elected to the House of Commons as a Conservative and held this seat until his death, which was occasioned by a rail¬ way accident. He seceded from the Conserva¬ tive party and aided the Liberals in opposing

special legislation in the interest of Roman Catholic education. He was for a time presi¬ dent of the Canadian branch of the Imperial Federation League and a member of the Coun¬ cil of the British Empire League. Consult (The Late D'Alton McCarthy, Q.C., M.P., an Appreciation,1 by Amicus, Canadian Magazine (May 1903).

MacCARTHY, Hamilton Thomas, Cana¬ dian sculptor : b. London, England, 1847. He studied under his father and in Europe, and in 1885 removed to Canada. He lived in Toronto until 1898, when he took up his residence in Ottawa. He is distinguished for his capacity for expressing contemporary thought. The Royal Canadian Academy elected him a mem¬ ber in 1890 and councillor in 1906. Among his works are (Burns and Highland Mary1 (1877) ; the statue of Sir John S. Macdonald in Toronto; the bronze monuments for the South African War in Halifax, Ottawa, Charlotte¬ town, Quebec and Brantford.

McCarthy, ma-kar'thi, Justin, Irish au¬ thor and politician: b. Cork, Ireland, 22 Nov. 1830; d. 24 April 1912. He became connected with the Liverpool press in 1853 and in 1864 was made editor-in-chief of the Morning Star. He sat in Parliament as a Home Ruler from 1879-1900 and was chairman of the Irish Parlia¬ mentary party 1890-96. His stay in the United States extended from 1868 to 1870, during which period he was some time connected editorially with the New York Independent. His main work is (History of our Own Times1 (1879— 80), which, rejected by one publishing house, made a fortune for the firm that produced it as well as for the author. He also wrote his¬ tory of the Four Georges1 (1889), and his novels include Wady Judith1 (1871) ; (A Fair Saxon1 (1873) ; (Dear Lady Disdain1 (1875) ; (The Right Honorable1 (1886, with Mrs. CampbelDPraed) ; (The Story of Gladstone's Life1 (1898) ; (Modern England1 (1898) ;

Reminiscences1 (1899); (The Reign of Queen Anne1 (1902), and (The Story of an Irishman1

(1904).

McCARTHY, Justin Huntly, Irish jour¬ nalist and author : b. 1860. He was graduated at University College and from 1884-92 was a member of Parliament. He has been a prolific and versatile author, following in the footsteps of his father, Justin McCarthy (q.v.). Among his works are (Outline of Irish History1 (1883) ; (Serapion, and Other Poems1

(1883) ; (England Under Gladstone1 (1884); (Camiola, a Girl with a Fortune1 (1885) ; (History of the French Revolution1 (1897) ; (Short History of the United States1; (The Dryad1 (1905). He has also written plays, such as (The Candi¬ date1 ; (The White Carnation1 ; (If I Were King,1 and (The Proud Prince.1

McCAUL, ma-kal', John, Canadian scholar: b. Dublin, Ireland, 1807 ; d. 1880. He was ap¬ pointed president of Toronto University in 1848 and was prominent for many years in educational matters in Canada. He edited Horace, Longinus, Lucian and Thucydides as college textbooks, and among his valuable archaeological works are <Britanno-Roman In¬ scriptions1 (1863), and (Christian Epitaphs of the First Six Centuries.1

MacCAULEY, ma kal'i, Clay, American Unitarian clergyman and author : b. Chambersburg, Pa., 8 May 1843. He was graduated at Princeton in 1864 and at the Theological Sem¬ inary of the Northwest, Chicago, in 1867, and read philosophy and divinity at Heidelberg, 1873. In the Civil War, 1862-63, he was a lieutenant in the 126th Pennsylvania regiment, and served on the staff of Gen. S. D. Sturgis, and in 1864-65 was a member of the Christian Commission in the United States army. In 1880-81 he was a collaborator of the Bureau of Ethnology among Indians east of the Missis¬ sippi. Entering the Unitarian ministry he was pastor of the First Church, Waltham, Mass., 1869-72, and of All Souls Church, Washington, D. C., 1876-81. From 1890 to 1900 and again after 1909 he served as director of the Japan mission of the Unitarian Association, and from 1891 to 1899 was president of the College for Advanced Learning at Tokio and professor there of philosophic and historic theology. He lectured on Japan in 1904-09. He has written Christianity in History1 (1891); (The Re¬ ligious Problem of Japan — How to Solve it?1 (1894) ; (Introductory Course in Japanese1

(1896; 1905) ; Japanese Literature1 (1899) ; (A Day in the Very Noble City, Manila1 (1899) ; and has published (Single Songs of a Hundred Poets1 (1899) and other translations from the Japanese; 'Florida Seminoles1 (1884); Pres¬ ent Religious Condition of Japan1 (1902) ; 'Unitarian Mission to Japan1 (1909) ; 'A Daughter of the Samurai1 (1910) ; (Thought and Fact for To-day,1 also in Japanese (1911) ; (The Memorial Most Worthy of Our Patriot Dead1 (1911) ; (The English Language in the New Georgean Era1 (1911) ; Charles Dickens: An Appreciation1 (1912) ; (The Faith of the Incarnation1 (1913) ; 'Memories and Memo¬ rials1 (1914) ; (The American-Japanese Prob¬ lem as a Race Question1 (1915), and contribu¬ tions to periodicals in Japan and the United States.

McCAUSLAND'S RAID, an incursion of the Confederate general McCausland into Maryland and Pennsylvania, the chief incident of which was the burning of Chambersburg, Pa. General Early having defeated General Crook in the battle of Kernstown (q.v.), 24 July 1864, and driven him and Averell across the Potomac at Williamsport, ordered General McCausland with his brigade and that of Brad¬ ley T. Johnson, with four guns, in all about 2,500 men, across the Potomac to raid Pennsyl¬ vania and then move to Cumberland, Md., to destroy the machinery of the Cumberland coal¬ pits and the repair shops, stations and bridges of the Baltimore and Ohio Railroad. Early says he wished to open the eyes of the people of the North to the enormities of its armies, by an example in the way of retaliation, and that Chambersburg, Pa., was selected as the town on which retaliation should be made. The sum of $100,000 in gold, or $500,000 in currency was to be demanded of it, in default of which McCaus¬ land was ordered to burn the town. Under cover of demonstrations at Williamsport and other points along the Potomac, McCausland crossed the river at McCoy's Ferry, near Clear Spring, above Williamsport, on the 29th, and made straight for tChambersburg, about 25 miles northeast. He met with but little opposition and, on the morning of the 30th, rode into the fated town and demanded the sum fixed by Early. It could not immediately be raised; he knew that General Averell was close upon him, and setting fire to the place, laying a greater part of it in ashes, he hastily marched westward to McConnellsburg and encamped. Averell, who was in Hagerstown when he heard that Mc¬ Causland had crossed the Potomac, started in pursuit with about 2,600 cavalry, went through the burning town and, a few miles from Mc¬ Connellsburg, struck McCausland' s rear, divert¬ ing him from his intended march on Bedford and forcing him back to the Potomac at Han¬ cock, which was reached by noon of the 31st. Here McCausland formed for battle, but upon Averell's appearance and prompt attack he withdrew westward by the National road to Cumberland, where, 1 August, he found Gen¬ eral Kelley to oppose him, whom he attacked in the afternoon, and skirmished until night, when he retreated toward Old Town, on the Potomac, leaving

30 of his killed and wounded on the field.. At Old Town he forced a crossing at daylight 2 August, capturing or dispersing a regiment of new troops from Ohio, and then moved south into the valley of the south branch of the Potomac, by way of Springfield and Romney. From Romney, 4 August, he moved on New Creek and attacked the garrison, but after a stubborn fight was repulsed, leaving 25 dead on the field, the Union loss being 36 killed and wounded. McCausland then with¬ drew to near Moorefield, where the south fork joins the south branch of the Potomac, and considering himself safe from pursuit went into camp. Averell, who had remained at Hancock when McCausland drew off toward Cumber¬ land, crossed the Potomac on the 4th, and, after a forced march through Bath, Springfield and Romney, before sunrise of the 7th surprised McCausland in his camp and routed him, cap¬ turing his four guns, nearly all his wagons, several hundred horses, three battle-flags, many small arms and 420 prisoners, including 38

officers. McCausland's loss in killed and wounded was about 100. Avercll's loss was 41 killed and wounded. McCausland's shattered command fled to the mountains and made its way in squads to the Shenandoah Valley, finally assembling at Mount Jackson. ((This affair, 55 says Early, (<had a very damaging effect upon my cavalry for the rest of the campaign. 55 Consult (Official Records) (Vols. XXXVII, XLIII) ; Pond, (The Shenandoah Valley in 1864) ; Early, (The Last Year of the War for Independence. 5

MacCHESNEY, mak-che'ne, Clara T., American artist: b. Brownsville, Cal., 1861. She studied at the San Francisco Art School, at the Gotham Art School, New York, and at the Colarossi School in Paris. Her genre work has received favorable recognition. At the World's Columbian Exposition in 1893 she wras awarded two medals and she received the Dodge prize, New York, in 1894. Since then she has also received three medals from the Colarossi School, a gold medal from the Philadelphia Art Club and the second Hallgarten prize from the National Academy of Design, New York. At the Paris Exposition of 1900 she exhibited Pomegranates5 and (The Old Blind Fiddler.5

McCHESNEY, Dora Greenweil, Amer¬ ican author: b. Chicago, 1 Oct. 1871. She was privately educated, chiefly by her mother, in whose company she traveled and read widely, making special acquaintance with German liter¬ ature, Italian art and Roman antiquities, also becoming deeply interested in studying the Eng¬ lish Civil War, with characters and incidents of which her writings largely have to do.

Among these are (Kathleen Clare, Her Book, 1637-1641 5 (1895) ; (Miriam Cromwell, Royal¬ ist: a Romance of the Great Rebellion5 (1897) ; (Beatrix Infelix : a Summer Tragedy in Rome5 (1898); (Rupert, by the Grace of God: the Story of an Unrecorded Plot5 (1899).

MACCHIAVELLI, Niccolo. See Ma¬

ch iavelli, Niccolo.

McCHORD, ma-kord, Charles Caldwell,

American lawyer : b. Springfield, Ky., 3 Dec. 1859. He was educated at Centre College (now Central University), Danville, Ky., and was ad¬ mitted to the bar in 1882, engaging in practice at Louisville, Ky. He was a member of the law firm, McChord, Hines and Norman, until 1911. He was prosecuting attorney of Wash¬ ington County, Ky., in 1886-92, and was chair¬ man of the Kentucky Railroad Commission in 1892-95 and in 1899-1907. He served in the Kentucky senate in 1895 —99 and introduced the railroad rate bill enacted by the legislature. He was president of the National Association of Railroad Commissioners in 1906-07, and from 1910 was a member of the Interstate Com¬ merce Commission, serving as chairman in

1915.

McCLAIN, ma-klan, Emlin, American ju¬ rist: b. Salem, Ohio, 26 Nov. 1861; d. 25 May 1915. He was graduated at the State Univer¬ sity of Iowa in 1871, later studying law there, and until 1881 he practised law in Des Moines. He was appointed professor of law at the Uni¬ versity of Iowa in 1881 and was subsequently vice-chancellor and chancellor there. He served as judge of the Supreme Court of Iowa in 1901-12, and was its chief justice in 1906-12.

From 1913 until his death he was professor of law at the Leland Stanford, Jr., University. He was a contributor to the (American Ency¬ clopedia of Law and Procedure, > wrote exten¬ sively for the law magazines and was author of (McClain's Annotated Statutes of Iowa) (1880) ; (A Treatise on Criminal Law as Now Administered in the United States> (1897) ; Constitutional Law in the United States > (1905; 2d ed., 1910), *etc.*

McCLELLAN, ma-klel'an, George Brinton, American soldier : b. Philadelphia, 3 Dec. 1826; d. Orange, N. J., 2 9 Oct. 1885. He was educated at the University of Pennsylvania and at West Point where he was graduated in 1846. He was brevetted second lieutenant of engi¬ neers and immediately ordered to Mexico, where as lieutenant of a company of sappers, miners and pontoniers he rendered valuable service. He was at the siege of Vera Cruz, at Cerro Gordo and in the attack on the City of Mexico ; at Contreras and Churubusco he won the brevet of first lieutenant and was brevetted captain for gallantry at Chapultepec. After the war he was ordered to West Point as cap¬ tain of field labors and instructor in bayonet exercise. In 1851 he was ordered to Fort Dela¬ ware to superintend its construction. The next year he accompanied Capt. Randolph B. Marcy (later his father-in-law) on an expedition to explore the Red River, and in September 1852 was ordered as senior engineer to Texas, to survey the rivers and harbors of that State. In 1853 he was detailed for the examination of the western part of the proposed route for a Paci¬ fic railroad; and explored the Yakima Pass and various portions of the Cascade Range, and the most direct route to Puget Sound, his report forming the first volume of the (Pacific Rail¬ road Surveys) published by the government. He was soon afterward detailed to investigate the railroad system of the United States, with a view to obtain all the necessary data on con¬ struction, equipment and management for the successful operation of the Pacific railroad. Of the result of his proceedings he presented a full report in November 1854. In March 1854 he was promoted to captain in the 1st Cavalry. In the spring of 1855 he was sent to Europe to study the organization of European armies and observe the war in the Crimea. He wrote one volume of

the report of the commission, which was republished in Philadelphia under the title of (The Armies of Europe* (1861). He resigned his commission in January 1857, and was for three vears vice-president and en¬ gineer of the Illinois Central Railroad, at the end of which time he became general superin¬ tendent of the Ohio and Mississippi Railroad, and two months later president of the eastern division of the same road. He held this office when the Civil War broke out in 1861. He then received a commission as major-general from the governor of Ohio and proceeded to organ¬ ize the volunteers of the State; the States of Ohio, Illinois, Indiana, the western part, of Pennsylvania and western part of Virginia were united to form the Department of the Ohio under his command. About 1 June his army began to cross the Ohio River into Vir¬ ginia ; on the 18th McClellan himself left Cin¬ cinnati to take the field, and by the middle of July the whole northwestern part of the State had been cleared of Confederate troops and the

Wheeling legislature left free to organize a loyal government.

On 22 July, McClellan was summoned to Washington to take command of the Army of the Potomac, and commissioned as major-gen¬ eral of the United States army. On his arrival at Washington he found everything in disorder and the troops badly demoralized in consequence of the defeat at the first battle of Bull Run, and devoting himself to the organizing and disciplin¬ ing of his army, he soon brought order out of chaos and had his troops well equipped and in excellent condition. On the retirement of Gen¬ eral Scott from active service, McClellan was appointed general-in-chief of the armies of the United States. Plans were then taken under discussion for an attack upon Richmond, and here difference of opinion arose between the President and the Secretary of War and Mc¬ Clellan ; the plan finally accepted made the base of supplies on Chesapeake Bay, with line of march upon Richmond from the Peninsula. The army did not move until March 1862, and in the meantime discontent had arisen at Wash¬ ington on account of the delay. On 10 March the army advanced toward Manassas, but as the Confederates had evacuated that place and had fallen back upon Richmond, the real cam¬ paign was begun by transporting the troops to Fortress Monroe. On 11 March, some two weeks before leaving Washington, McClellan was deprived of the chief command, leaving him the command of only the Army of the Poto¬ mac; McDowell's corps and other reinforcements on which he had relied were also removed from his army for the defense of Washington. He besieged Yorktown for a month, though

op¬ posed by a much inferior Confederate force, whose numbers he greatly overestimated; when Yorktown was evacuated 4 May, he advanced toward Richmond, defeating the Confederates at Williamsburg and Hanover Court House. After reaching the Chickahominy, he found his lines too extended to protect from attack and advance upon Richmond, and decided to retreat to the James River; then followed the Seven Days' Battles which ended when the Federal forces reached Hampton's Ferry. From here McClellan had planned a new advance, but dis¬ satisfaction against him was so strong that he was relieved of his command and ordered to evacuate the Peninsula. (See Peninsular Campaign). .He was then put in command of the fortifications of Washington, till after the second battle of Bull Run, when he succeeded General Pope, again taking command of the Army of the Potomac. On Lee's invasion of Maryland, McClellan marched to attack him and fought the battle of Antietam (q.v.), forc¬ ing the Confederates to retreat from their po¬ sition and following them as far as the Poto¬ mac. He did not, however,, cross the Potomac in pursuit, as he was. awaiting supplies ; this failure to follow up his victory caused him to be deprived of his command and he was or¬ dered to Trenton, N. J. He took no further part in the war.

In 1864 he was Democratic nominee for President of the United States, and was de¬ feated, the electoral vote stood 212 for Lincoln against 21 for McClellan, but McClellan's pop¬ ular vote was 1,800,000. He remained abroad from 1864-68, and on his return had charge of the construction of the Stevens' floating battery,

which, however, was not completed on account of financial difficulties. In 1870 he was ap¬ pointed chief engineer of the department of docks for New York City, in 1877 he was elected governor of New Jersey, and during his administration reduced and finally abolished the State tax, improved the system of public education and built up an effective militia; he declined a renomination. As a general, McClellan won the confidence and aroused the enthusiasm of his soldiers to an unusual degree; he

excelled as an organizer of armies and had a thorough knowledge of the science of tactics, as shown in his plans of campaign, but in actual cam¬ paigning lacked aggressiveness and the power to act quickly and take advantage of his ene¬ my's mistakes. He wrote besides the reports mentioned (Manual of Bayonet Exercise (1852) and (Report on the Organization and Campaigns of the Army of the Potomac (1864). Consult < McClellan's Own Story, > ed¬ ited by W. C. Preine (New York 1887) ; Michie P. S., ˆGeneral McClellanˆ fin (Great Commanded series ib. 1901); Rhodes, J. F., (The First Six Weeks of McClellan's Peninsu¬ lar Campaign* (Boston 1896) ; Ropes, J. C., (Story of the Civil War* (Vol. II, New York 1895); Webb, A. S., (Peninsula: McClellan's Campaign of 1862) (ib. 1881), and Bradford, Gamaliel, (Union Portraits) (in Atlantic Monthly Vol. CXIV, Boston 1914).

McCLELLAN, George Brinton, American politician: b. Dresden, Saxony, 23 Nov. 1865. He is the son of Gen. G. B. McClellan (q.v.). He was graduated from Princeton in 1886; and took up journalism, working as a reporter and in editorial positions for several of the New York City dailies. He studied law and was ad¬ mitted to the bar in 1892. From 1889 to 1892 he was treasurer of Brooklyn Bridge. Early active in politics as a Democrat, he was elected presi¬ dent of the board of aldermen in 1893 for a term of two years. He was elected to Congress in 1894 and for four succeeding terms, and was a member of the House Committee of Ways and Means. In Congress he has been an advo¬ cate of tariff reform, and though opposed to an imperialistic policy did not sympathize with the attacks on the conduct of the United States army in the Philippines. In 1903 he was nominated for mayor of Greater New York by the regular Democratic organization (Tammany Hall), and was elected by 63,000 majority. In 1905 he was again elected mayor by 3,472 plurality In 1908 he succeeded Grover Cleveland as Stafford Lit¬ tle lecturer on public affairs in Princeton

University, and in 1912 he was elected pro¬ fessor of economic historv in Princeton Univer¬ sity, a chair which he still occupies. He is the author of (The Oligarchy of Venice* (Hougb-ton-Miffiin & Co., 1904) ; (The Heel of War'

(G. W. Dillingham & Co., 1916) and of numer¬ ous magazine and newspaper articles on politi¬ cal, historical and economic subjects. He has received the honorary degree of LL.D. from Princeton, Union and

Fordham universities.

McCLERNAND, ma-kler'nand, Edward John, American soldier; b. Jacksonville, Ill.. 29 Dec. 1848. In 1870 he was graduated at West Point and stationed on the Western frontier for the nine following years, in which he did rescue work after the destruction of Custer s command, and had a share in the capture of

Chief Joseph and the Nez Perces Indians. In 1898 he was appointed lieutenant-colonel and adjutant-general of volunteers, served with the army of Santiago de Cuba in 1898, and was ordered to the Philippine Islands, where he routed the insurgents at Cebu, 8 Jan. 1900. He was subsequently put in command of the second district in the department of the Visayas, in¬ cluding the islands of Cebu, Mactan, Baulayan and the Camotes. He was acting military gov¬ ernor from 19 April 1900 to 28 May 1901. In 1905 he went as attache with the Japanese army in Japan and Manchuria. Later he was suc¬ cessively commander of the 1st United States Cavalry, president of the Cavalry Equipment Board, Rock Island Arsenal. He retired from active service 29 Dec. 1912.

McCLERNAND, John Alexander, Amer¬ ican lawyer: b. Breckinridge County, Ky., 30 May 1812; d. Springfield, Ill., 20 Sept. 1900. He was admitted to the Kentucky bar in 1832, but in the same year volunteered for military serv¬ ice against the Sac and Fox Indians. Five years later he was elected to the Illinois legis¬ lature, and subsequently sat for tw.o terms in Congress. During the Civil War he served with distinction at the battle of Fort Donelson as brigadier-general of volunteers, and was pro¬ moted major-general. He led a division at the battle of Shiloh, relieved Sherman before Vicksburg in 1863 and was in command of the 13th Army Corps until 1864, when he resigned. In 1870 he was appointed circuit judge for the Sangamon, Ill., district. He presided at the National Democratic Convention in Saint Louis, 1876, and was appointed by President Cleve¬ land member of the Utah Commission.

MACCLESFIELD, mak'k'lz-feld, England, market town and municipal borough in Ches¬ hire, 166 miles northwest of London, on the river Bollin and on the London and Northwest-tern, North Staffordshire and Great . Central railways. In the Domesday Survey it is re¬ corded as part of the estate of the Earl of Chester and is reputed to have become a free borough in the beginning of the 13th century. The first recorded

charter, however, dates from 1261. The church of Saint Michael was founded in 1278 and was partially rebuilt and considerably enlarged in 1740. A commercial school was erected in 1840 from the funds of the free grammar school founded in 1502. There are slate and stone quarries in the vicinity and brewing is carried on; but the chief manufac¬ tures of the town are in silk and cotton textiles. The first silk mill was set up in 1755, while the manufacture of cotton was begun in 1785. The town has modern water and gas works, an in¬ sane asylum, public library, parks, baths and markets. Pop. about 34,797.

McCLINTOCK, Emory, American actuarv : b. Carlisle, Pa., 19 Sept. 1840; d. 10 July 1916. He was graduated from Columbia Uni¬ versity in 1859, and afterward took special studies in chemistry. He was tutor in mathe¬ matics at Columbia 1859-60. He was consular agent at Bradford, England, 1863-66, actuary of the Asbury Life Insurance Company, New York, 1867-77, and of the Northwestern Mu¬ tual Life Insurance Company, Milwaukee, 1871-89. From 1889 to 1911 he was actuary of the Mutual Life Insurance Company, New York, of which he was vice-president in 1905-

11, trustee after 1905 and consulting actuary after 1911. He was president of the American Mathematical Society in 1890-94 and of the Actuarial Society of America in 1895-97. He was a Fellow of the American Academy of Arts and Sciences and Fellow of the Institute of Actuaries, London. He contributed to mathe¬ matical journals.

McCLINTOCK, Sir Francis Leopold,

English admiral: b. Dundalk, Ireland, 1819; d. 17 Nov. 1907. He entered the British navy in 1831 and was commissioned lieutenant in 1845. He sailed on four Arctic voyages, being sent out in 1848 to search for Sir John Franklin, and again in 1850 and 1852, without discovering any traces of the explorer. In 1857 he renewed the search as commander of the Fox and brought back documentary and other evidence of Franklin’s death. For his services as an Arctic explorer he

was knighted in 1860, and in 1884 made admiral. He wrote (Voyage of the Fox> (1859).

McCLINTOCK, John, American scholar: b. Philadelphia, Pa., 27 Oct. 1814; d. Madison, N. Y., 4 March 1870. He was graduated at the University of Pennsylvania in 1835. He en¬ tered the ministry of the Methodist Episcopal Church and from 1836 to 1851 was professor of mathematics and of Greek and Latin in Dickin¬ son College. From 1848 to 1856 he edited the Methodist Quarterly Review. He was delegate to several conferences abroad and in 1857 be¬ came pastor of Saint Paul's Church, New York. Three years later he was appointed preacher of the American Chapel in Paris. He advocated the Union cause in the Civil War, and after his return to America in 1864 was again pastor of Saint Paul's, New York, but failing health com¬ pelled his resignation and he retired to Ger¬ mantown, Pa. He removed to New Brunswick, N. J., in 1866 and became chairman of the Cen¬ tral Centenary Committee of the Methodist Episcopal Church. For the last three years of his life he was president of the Drew Theo¬ logical Seminary. He was joint editor and compiler with James Strong of the (Cyclopedia of Biblical, Theological and Ecclesiastical Literature) which goes by their name, the last vol¬ ume of which was published in 1895. Among his other works are (An Analysis of Watson's Theological Institutes) (1850) ; and tem¬ poral Power of the Pope) (1853). He also is¬ sued a translation of Neander's (Life of Christ5 (1847) ; (Sketches of Eminent Method¬ ist Ministers5 (1863); a translation of Bungener's history of the Council of Trent5 (1851); (Living Words,5 sermons (1871) and (Lectures on Theological Encyclopaedia and Methodology5 (1873). Consult the (Life5 by Crooks (New York 1876).

McCLOSKEY, ma-klos'ki, John, American Roman Catholic prelate : b. Brooklyn, N. Y., 20 March 1810; d. New York, 10 Oct. 1885. His secondary and collegiate studies were made at Mount Saint Mary's College, Emmitsburg, Md., and his post-graduate studies in France and Rome. At 24 he was ordained priest and on returning to America was assigned to Saint Jo¬ seph's Church, New York City. When Saint John's College, at Fordham (now a part of New York City), was opened in 1841, he was made its first president, but in the next year he returned to parish work. In 1844 he was ap¬

pointed coadjutor to Bishop Llughes of the dio¬ cese of New York, and consecrated titular bishop of Axiere; and three years later was appointed bishop of Albany, a diocese just cre¬ ated from a part of the

diocese of New York. For 17 years he worked for the upbuilding of the Albany diocese and the good of his people. He built the cathedral of the Immaculate Con¬ ception at Albany, Saint Joseph's Theological Seminary at Troy, established several new par¬ ishes and founded educational and charitable in¬ stitutions, including hospitals, orphanages, hemes for the aged and reformatories. He suc¬ ceeded Archbishop Hughes in the archiepiscopal see of New York, 6 May 1864. The result of his labors in the archdiocese of New York remains his greatest monument. He was made a cardinal in 1875, under the title of Santa Maria supra Minervam. He was in attendance at the Vatican Council (q.v.) and a member of the committee on discipline. He was sum¬ moned to Rome February 1878 to attend the conclave for the election of a Pope but was too late to cast a vote, Leo XIII having been elected a few hours before his arrival. Cardi¬ nal McCloskey was noted for his gentleness, firmness, profound scholarship and great execu¬ tive ability. Consult (The Life of John Cardi¬ nal McCloskey, First Prince of the Church in America: 1810-85.
5

McCLOSKEY, William George, American Roman Catholic prelate : b. Brooklyn, N. Y., 10 Nov. 1823; d. 17 Sept. 1909. Upon com¬ pleting his studies at Mount Saint Mary's Col¬ lege, Emmitsburg, Md., he turned to the law, but subsequently entered Saint Mary's Theo¬ logical Seminary, where he pursued a six years' course in philosophy and theology, being or¬ dained priest 6 Oct. 1852. His first appointment was as assistant in the church of the Nativity. In 1853 he was named professor of Latin and Sacred Scriptures in Mount Saint Mary's College and in 1857 became director of the theological seminary. When the American College was formally opened in Rome Pope Pius IX chose Dr. McCloskey its first president, 8 Dec. 1859, a position which, for eight years, he filled to the utmost satisfaction. In 1865 he visited America in the interests of the institution un¬ der his charge and succeeded in collecting funds sufficient for its permanent endowment. Upon the death of Bishop Lavialle, Pope Pius IX appointed Dr. McCloskey to the see of Louis¬ ville, Ky., and he was consecrated at Rome 24 May 1868. During his 36 years' administration numerous churches, schools and religious insti¬ tutions were built throughout his diocese.

McCLUNG, ma-klung, Clarence Erwin,

American zoologist: b. Clayton, Cal., 5 April 1870. He was graduated at the University of Kansas in 1892 and later studied at Columbia and at the University of Chicago. He was a member of the faculty of the School of Medi¬ cine at the University of Kansas in 1897-13 and since

then has been professor of zoology and director of the zoological laboratory at the Uni¬ versity of Pennsylvania. He was a member of the embryological staff at Wood's Hole. Mass., in 1893, and headed scientific expeditions to Oregon, Washington and western Kansas. He is author of articles on heredity and cretaceous fish of Kansas ; and is associate editor of the Journal of Morphology.

McCLURE, ma'kloor', Alexander Kelly,

American journalist: b. Sherman's Valley, Perry County, Pa., 9 Jan. 1828; d. 1909. He was reared on a farm, educated at home and apprenticed to a tanner in 1842, soon after be¬ gan to write for the Perry Freeman and edited and published the Juniata Sentinel at Mifflin, Pa., in the Whig interest, 1846-50. He then published (1 850 —56) the Chambersburg Reposi¬ tory, which he made influential in the cause of anti-slavery. He was State superintendent of printing in 1855; a member of the State con¬ vention of 1855 which met at Pittsburgh to or¬ ganize the Republican party; in 1856 was ad¬ mitted to the bar and was a delegate to the first Republican National Convention in Philadel¬ phia. In 1857-58 he sat in the legislature as a Republican and was State senator in 1859. As leader of the Pennsylvania delegation in _ the Republican National Convention of 1860 he aided in the nomination of Abraham Lincoln. In 1862-64 be again published the Chambersburg Repository, and in the latter year served as as¬ sistant adjutant-general in charge of the draft in Pennsylvania. Two years later he was again a member of the legislature, and in 1868-73 practised law in Philadelphia. He was chairman of the State delegation to the Liberal Republican Convention in 1872, and of the Lib¬ eral Republican State Committee, and in that >ear entered the State senate. In a close elec¬ tion in 1873 he was defeated as an independent candidate for mayor of Philadelphia. In 1875 he established the Philadelphia Times, of which he was editor-in-chief till 1901. He published (Three Thousand Miles Through the Rocky Mountains5 ; (Our Presidents and How We Make Them5 (1901) ; (Recollections of Half a Century5. (1902) ; (01d Time Notes of

Pennsylvania) (2 vols., 1906), *etc.*

McCLURE, James Gore King, American Presbyterian clergyman : b. Albany, N. Y., 24 Nov. 1848. He was graduated at Yale in 1870, at the Princeton Theological Seminary in 1873 and ordained as a Presbyterian minister in 1874. He was settled (1874—79) at New Scot¬ land, N. Y., and at Lake Forest, Ill., 1881-1905. From 1897 to 1901 he was president of Lake Forest University. Since 1905 he has been president of McCormick Theological Semi¬ nary, Chicago. He has written Possibilities5 (1896) ; (The Man Who Wanted to Help) (1897) ; (The Great Appeal5 (1898) ; Environ¬ ment5 (1899) ; (For Hearts that Hope5 (1900) ; (A Mighty Means of Usefulness5 (1901) ; (Living for the Best5 (1903) ; (The Growing Pastor5 (1904) ; (Loyalty, the Soul of Reli¬ gion5 (1905) ; (Supreme Things5 (1907), *etc.*

McCLURE, Sir Robert John Le Mesurier, English vice-admiral: b. Wexford, Ire¬ land, 28 Jan. 1807; d. London, 17 Oct. 1873. He began his naval career in 1824, and in 1836 un¬ der Sir John Ross made his first voyage to the Arctic regions. Again he joined an expedition sent to discover the Northwest Passage in 1848, that of Sir James Clark Ross. Two years later he was placed in command of a Franklin search expedition, discovered Prince of Wales Strait which connects the Atlantic and Pacific and thus accomplished one object of the expedition, the discovery of the Northwest Passage. He was forced, however, to abandon his ship, and com¬ pleted the Northwest Passage by land. On his

return he was knighted. From his journals was published (The Discovery of the Northwest Passage5 (by Capt. Sherard Osborne, 1856).

McCLURE, Samuel Sidney, American ed¬ itor and publisher: b. Process, County Antrim, Ireland, 17 Feb. 1857. He was graduated at Knox College, Galesburg, Ill., in 1882. In 1882-83 he was editor and manager of the Wheel¬ man for the Pope Manufacturing Company, and in the following year was connected with the De Vinne Press, New York. In 1884 he es¬ tablished a newspaper syndicate which has grown to great proportions and assumed distinc¬ tive importance in the publishing world. In 1893 he founded McClure's Magazine, which through his able administration soon stood in the front rank of American periodicals. In 1899 he established the publishing house of Mc¬ Clure, Phillips and Company, New York, and was its president until the business was acquired by Doubleday, Page and Company.

The maga¬ zine was taken over by the McClure Publica¬ tions, Incorporated. Since 1893 Mr. McClure has been president of the S. S. McClure Com¬ pany and since 1894 he has been a trustee of Knox College. Consult Mr. McClure's very in¬ teresting Ely Autobiography5 (New York

1914).

McCLURG, ma-kloorg', Alexander Cald¬ well, American publisher: b. Philadelphia, 1834; d. Saint Augustine, Fla., 15 April 1901. He was graduated at Miami University, Oxford, Ohio, in 1853, engaged in business with S. C. Griggs and Company, publishers, in Chicago and in 1862 entered the Union army. He was captain in the 88th Illinois regiment of infantry, rose to the rank of colonel, was made brevet briga¬ dier-general, and in the Atlanta campaign and during Sherman's great march served as chief of staff to the 14th corps. Returning from the war, he was admitted to partnership in the publishing house above mentioned, and some years later established the firm of Jansen, McClurg and Company, afterward A. C. McClurg and Company. The business of the house pros¬ pered, and in 1899 the company was reorganized, the co-operative principle adopted and the em¬ ployees, among whom the stock was largely distributed, were granted easy terms for in¬ creasing their investments.

McCLYMONT, mak-kli'mont, James Alex¬ ander, Scottish theologian : b. Girvan, Ayr¬ shire, 26 May 1848. He was educated at the universities of Edinburgh and Tubingen, en¬ tered the ministry and in 1874-1913 he was in charge of Holburn Church, Aberdeen, when he retired. He was a member of ithe general committee of the Church of Scotland, and was a chaplain in the territorial force, retired with the rank of colonel. He collaborated in trans¬ lating Beck's (Pastoral Theologv of the New Testament5 and was author of (The,New Tes¬ tament and its Writers5 (1892; 2d ed., 1893); (The Church of Scotland5 (1893) ; (New Testa¬ ment Criticism5 (1913), *etc.*

MacCOLL, ma-kol', Evan, Canadian poet: b. Kenmore, Argyleshire, Scotland, 21 Sept. 1808; d. Toronto, 1898. He emigrated to Can¬ ada in his 42d year and became known as the poet of the Scottish colony at Kingston. He wrote with fluency in Gaelic and his (Clareach nam Beann5 created much enthusiasm among

his compatriots. He is also author of many English poems, such as (My Rowan Tree) ; (The Mountain Minstrel5 (1887) ; and (Poems and Songs) (1888).

MacCOLL, Malcolm, British theologian

and author : b. Glenfinan, Inverness-shire, Scot¬ land, 27 March 1831 ; d. London, 5 April 1907. He studied at Trinity College, Glenalmond, and at the University of Naples and was ordained in the Scottish Episcopal rr" istry in 1857. He filled curacies at different London churches, was chaplain to the British Ambassador at Petrograd in 1862-63, in southern Italy in 1867-69, and at Addington, Bucks. His hearty support of Gladstone won for him in 1871 recognition in the form of the living of Saint George's, Botolph Lane, and he was further rewarded with a canonry at Ripon in 1884. He was a keen controversialist in both ecclesi¬ astical and political fields, and was actively en¬ gaged in newspaper and pamphlet writing in support of High-Church doctrines and of Glad¬ stone's Irish policy. He traveled extensively and was prominently concerned with the airing of Bulgarian and Armenian affairs after a visit in those countries in 1876. Author of (Mr. Gladstone and Oxford5 (1865) ; lawless¬ ness, Sacerdotalism and Ritualism5 (1875) ; (Reasons for Home Rule5 (1886, nine eds.) ; (The Reformation Settlement5 (10th ed., 1901) ; (The Royal Commission and the Ornaments Rubric5 (1906), *etc.*

McCOMB, ma-kom, John, American engi¬ neer and architect: b. New York, 17 Oct. 1763; d. there, 25 May 1853. He was of Scottish descent and became prominent for his designs for both public and private buildings in New York, Philadelphia and the Eastern States. He designed the front of the old government house in New York in 1790, Saint John's Church, the Murray and Bleecker Street churches in that city, and was supervising architect of the city of New York at the time of the erection of the city hall. He is sunposed .to have de¬ signed the city hall with the assistance of a Frenchman named Mangin.

McCOMBS, William Frank, American lawyer : b. Hamburg, Ark., 26 Dec. 1875 ; d. 22 Feb. 1921. He was graduated at Princeton in 1898 and at the Harvard Law School in 1901. He practiced in New York

City, and as chair¬ man of the Democratic National committee in 1912-16 he managed the first campaign of Woodrow Wilson for President. He declined the ambassadorship to France in March 1913.

McCONNEL, ma-kon'el, Francis John,

American Methodist-Episcopal bishop: b. Trin-way, Ohio, 18 Aug. 1871. He was educated at the Ohio Wesleyan University and entered the ministry in 1894. He held pastorates in Massa¬ chusetts at West Chelmford ; Newton Upper Falls ; Ipswich ; Haward street, Cambridge ; and at New York avenue, Brooklyn. In 1909-12 he was president of De Pauw University, and in 1912 he was elected bishop. Author of (The Diviner Immanence5 (1906) ; (Religious Certainty5; (1910); Personal Christianity5 (1914), *etc.*

McCONNELL, Samuel D., American Protestant Episcopal clergyman and author: b. in Westmoreland County, Pa., in 1846. He was

graduated at Washington and Jefferson College in 1868, and was ordained a priest in 1873 ; was rector of Saint John's Church, Erie, Pa., 1872-73; held rectorships at Watertown, Conn. (1873-76), and Middletown, Conn. (1876-82) ; became rector of Saint Stephen's Church, Phil¬ adelphia, in 1882; of Holy Trinity Church, Brooklyn, N. Y., in 1896; and from 1902 to 1905 was rector of All Souls' Church, New York City. He retired in the latter year. He has published a (History of the American Epis¬ copal Church5 (1890) ; (Sons of God5 (1891) ; (Sermon Stuff5 (1888, 1895) ; (A Year's Ser¬ mons5 (1896); (The Open Secret5; (The Next Step in Christianity5 ; (Essays, Practical and Speculative5 (1900) ; and (The Evolution of Immortality5 (1901); (Christ5 (1902); Chris¬ tianity5 (1905).

McCONNELSVILLE, Ohio, village and

county-seat of Morgan County, on the Mus¬ kingum River, 27 miles below Zanesville and 30 miles northeast of Marietta, on the Baltimore and Ohio Railroad. It is situated in a fertile agricultural region, has extensive undeveloped coal resources, and has flour and lumber mills, a sash and door factory and tobacco manufac¬ tories. Pop. (1920) 1,618.

McCOOK, ma-kuk, Alexander McDowell, American soldier : b. Columbiana County, Ohio, 22 April 1831 ; d. Dayton, Ohio, 12 June 1903. He was graduated at West*Point in 1853, and with the commission of second lieutenant of the 3d Infantry was ordered to

New Mexico. In 1861 he gained his captaincy and saw much service during the Civil War. He commanded the Ohio volunteers at Bull Run and rapidly gained promotion, being appointed major-gen¬ eral of volunteers in 1862. His brilliant mili¬ tary reputation was made at the battles of Shi¬ loh, Murfreesboro, Chickamauga, etc., and in 1865 he was brevetted brigadier-general in the regular army. He was subsequently placed in command of the military school at Fort Leaven¬ worth, was commissioned major-general in 1894 and retired the following year. He represented the United States at the coronation of the Tsar in 1896 and in 1898-99 was a member of a commission appointed bv President McKinley to investigate the work of the War Department during the War with Spain. General McCook came of a fighting family. He was the son of Daniel McCook (q.v.) who was killed by Mor¬ gan's guerillas in 1863. Seven of the general's brothers took part in the War for the Union, three of whom, like their father, were killed. Four of the eight McCook brothers attained the rank of general. Consult Hosmer, J. K., (The Appeal to Arms5 (New York 1906) ; id., Out¬ come of the Civil War5 (ib. 1906) ; Rhodes, J. F., (History of the United States5 (ib. 1907).

McCOOK, Anson George, American sol¬ dier and politician : b. Steubenville, Ohio, 10 Oct. 1835; d. 30 Dec. 1917. At the outbreak of the Civil War he entered the Federal army as captain of an Ohio company recruited by him¬ self. He subsequently served as major, lieu¬ tenant-colonel in the Army of the Cum¬ berland, afterward as colonel of 194th Ohio Infantry and at end of the war was brevetted brigadier-general. He was United States assessor of internal revenue at Steuben¬ ville, Ohio, and removed to New York in 1873. In 1876 he was elected as a Republican to the

45th Congress and reelected to the 46th and 47th Congresses from the old 8th (city) dis¬ trict. Was elected secretary to the Senate of the United States, December 1883, and served as such until August 1893. On 1 Aug. 1895, he was appointed city chamberlain by Mayor Wil¬ liam L. Strong, and served until the expiration of the latter's term of

office, 1 Jan. 1898. He was president and director of the New York Law Publishing Company.

McCOOK, Daniel, American soldier: b. Canonsburg, Pa., 20 June 1798; d. near Buffing¬ ton's Island, Ohio, 21 July 1863. Having re¬ ceived a college education, he removed from Pennsylvania to Ohio and settled at Carrollton. Although 63 years old at the outbreak of the Civil War, he entered the Union army, in which he served as major of volunteers. Dur¬ ing one of the Morgan raids (q.v.) he received a wound from which he died shortly after. Eight sons of his served as officers in the Fed¬ eral army, three of whom were killed in battle.

McCOOK, Henry Christopher, American

clergyman and entomologist: b. New Lisbon, Ohio, 3 July 1837; d. 1911. He was graduated at Jefferson College (now Washington and Jefferson) in 1859, studied at the Western The¬ ological Seminary, and in the Civil War he served as first lieutenant and chaplain in the 41st Illinois reginjent, 1861-62. In 1862-63 he was minister of a church at Clinton, Ill. ; from 1863 to 1870 labored in Saint Louis as a home missionary; and subsequently became pastor of the Tabernacle Presbyterian Church in Phila¬ delphia, a charge he long retained. He served as chaplain of the 2d regiment of Pennsyl¬ vania volunteers in the Spanish-American War, and was chaplain of the Pennsylvania Com-mandery of the Loyal Legion, president of the American Entomological Sodetv, vice-president of the Academy of Natural Sciences, Philadel¬ phia, and president of the American Presby¬ terian H'storical Association. His writings in¬ clude (The Gospel in Nature 5 ; 'The Mound-Making Ants of the Alleghanies) (1877) ; (The Agricultural Ants of Texas5 (1879) ; 'Honey Ants and Occident Ants5 (1882) ; 'Tenants of an Old Farm' (1884); 'The Women Friends of Jesus' (1885); 'American Spiders and Their Smnning-Work5 (1889-93) ; (The Latimers, a Scotch-Irish Historic Ro¬ mance of the Western Insurrection' (1898) ; 'Martial Graves of Our Fellow Heroes in Santiago de Cuba) ; 'Nature's Craftsmen: Popular Studies of Ants and Other Insects> (1907) ; (Ant Communities and how they are Governed5 (1909).

McCOOK, Neb., city, county-seat of Red Willow County, on the Republican River, and on the Chicago, Burlington and Quincy Rail¬ road, about 230 miles west by south of Lincoln, the capital of the State. It is in a rich agri¬ cultural region. McCook owes much of its prosperity to the fact that it is the headquarters 2/ a raˆroad division and has railroad shops. The sugar beet, alfalfa, wheat and corn are the principal productions of the surrounding farms. A number of cattle are

raised and a large number of livestock from Willow County and vicinity is shipped from McCook. The city has a Carnegie library and a Federal court¬ house and owns the waterworks. Pop. 4,303.

McCORMACK, John, Irish operatic tenor:

b. Athlone, 14 June 1884. He was educated at Summer Hill College, County Sligo, Ireland, where he received a large share of his vocal training, finishing under Sabatini at Milan. He was awarded first prize at the Dublin Musical Festival in 1904, and in 1907 made his London debut as Turiddu in (Cavalleria Rusticana.5 He soon afterward sang with Tetrazzini in ‘Rigoletto.5 He appeared at the Metropolitan Opera House in New York in 1908. Later he sang with the Chicago-Philadelphia Opera Com¬ pany and with the Chicago Grand Opera Com¬ pany. While highly successful in grand opera his favorite field is the concert stage where his honors and awrards have rarely been equaled. He retains his operatic connection, however, appearing occasionally at the Man¬ hattan Opera House. He was active in raising funds for various purposes during the European War and sang frequently under the direction of the United War Charities. His income tax under the war levy of 1918 was $75,000. His principal operatic roles are Rodolfo in ‘La Boheme5 ; Pinkerton in ‘Butterfly5 ; Count in ‘Don Giovanni.5

McCORMICK, ma-kor’mik, Alexander Hugh, American naval officer : b. in the Dis¬ trict of Columbia, 9 May 1842; d. 21 Aug. 1915. He was acting midshipman at the United States Naval Axademy in 1859; in April 1861 entered into active service and served in blockading squadrons throughout the Civil War. He be¬ came captain in 1892. Since the Civil War he has performed various sea duties, and has served in the department of mathematics and in that of astronomy and navigation at the Naval Academy. He was inspector of ordnance, 1876-81 ; made a cruise around the world, 1881-85 ; was assigned Jo the ordnance department, 1885— 92; to the Asiatic station, 1892-94; was captain of the Norfolk navy yard, 1894-97; member of the armor and personnel board, 1897-98; and commandant of the Washington navy 3’ard in 1898. In 1899 he was raised to the rank of rear-admiral, and was retired 26 March 1900.

McCORMICK, Cyrus Hall, American in¬ ventor and manufacturer: b. in Virginia. 1809; d. Chicago, 13 May 1884. He removed from his native State to Cincinnati in 1845, and two years later went to Chicago. In 1831 he in¬ vented an improved reaping-machine, which

was patented and further improved, and which brought him great wealth and world-wide fame, with many decorations, medals, *etc.* He con¬ tributed liberally in 1859 to the establishment of the Presbyterian Theological Seminary of the Northwest, in Chicago, later called McCor¬ mick Seminary. Fie also endowed a chair in Washington and Lee University, Virginia.

McCORMICK, Joseph Medill, American

journalist and legislator: b. Chicago, 16 May 1877. In 1900 he was graduated at Yale University. He became vice-president and publisher of the Chicago Daily Tribune and also served as president of the City Press Associa¬ tion. He opposed William Lorimer and was one of the leaders in the movement to oust the latter from his seat in the United States Senate. In 1912—14 he served as vice-chairman of the J5rogressive National committee and supported Roosevelt's candidacy for the Presidencv at the

CYRUS HALL McCORMICK

Chicago Convention of 1912. In the same year Mr. McCormick was member of a committee of his party which went abroad to study social legislation. He was twice elected to the gen¬ eral assembly of Illinois and was a member of the 65th Congress, 1917-19, as Congressman-at-large from Illinois. In 1918 he was elected to the United States Senate.

McCORMICK, Leander James, American inventor: b. in Virginia, 1819; d. Chicago, 20 Feb. 1900. In early life he worked with his father in manufacturing reaping-machines; removed to Chicago in 1848, and entered into partnership with his brother, Cyrus Hall Mc¬ Cormick (q.v.), and superintended the manu¬ facturing department of their reaping-machine plant until 1879, when the firm was incorporated as the McCormick Harvesting-Machine Com¬ pany. Ten years later he retired from active business. Many of the improvements in the famous McCormick reaping-machine were made by him. In 1871 he gave an observatory with a powerful telescope to the University of Vir¬ ginia.

McCORMICK, Robert Sanderson, Amer¬ ican diplomat, father of Joseph Medill Mc¬ Cormick and Robert Rutherford McCormick: b. Rockbridge County, Va., 26 July 1849; d. Chicago, 16 April 1919. He was educated at the University of Virginia and entered the diplomatic service as secretary of the American legation at London in 1889-92. He was ap¬ pointed first Ambassador to Austria-Hungary in July 1902; was Ambassador to Russia from December 1902 to 1905 ; and Ambassador to France in 1905-07. He was decorated with the Order of

the Rising Sun, Japan, 1907. Dur¬ ing the Russo-Japanese War Mr. McCormick represented the interests of Japan in Russia.

McCORMICK OBSERVATORY. See

Leander McCormick Observatory.

McCORMICK THEOLOGICAL SEM¬ INARY, in Chicago, Ill. ; opened in 1830 under the auspices of the Presbyterians, as a depart¬ ment of Hanover Academy, at Hanover, Ind. Ten years after its opening the school was re¬ moved to New Albany, Ind. Cyrus H. Mc¬ Cormick (q.v.) offered the institution a liberal endowment, which generous gift caused the removal of the school to Chicago, in 1859. It was for a time known as the Presbyterian Theological Seminary of the Northwest. In 1886 the present name was taken in honor of its liberal benefactor. No fees are charged for lodging or tuition, and some of its income is used in assisting worthy and needy students. In 1917 there were connected with the seminary 18 professors and instructors and 206 students. The library contained about 41,000 volumes. The total income on productive funds and from other sources, but excluding benefactions, was about $98,000. Its buildings and grounds were valued at nearly $1,000,000 and its endowment funds at about $1,800,000.

McCOSH, ma-kosh', James, Scotch-Amer- ican author and educator : b. Carskeoch, Ayr¬ shire, 1 April 1811; d. Princeton, N. J., 16 Nov. 1894. He was educated at the University of Glasgow, which he entered at 13, and at the University of Edinburgh, where he went in 1829. He became a minister of the Church of Scotland; was settled at Arbroath in 1835, and

at Brechin in 1839; but at the disruption of the Scottish Church joined the Free Church, whose organization he was active in promoting. In 1850 he published (The Method of the Divine Government, Physical and Morale in which he applied the philosophy of Sir William Hamil¬ ton to questions of theology with such skill as to elicit from him the highest commendation. This work at once gave McCosh wide fame as a philosophical thinker, and in 1851 he was ap¬ pointed professor of logic and metaphysics in Queen's College, Belfast, where he remained 18 years, not only discharging his professional duties, but also entering earnestly into work of religious and social improvement, through which his spirit of benevolence and his en¬ lightened zeal for general education accom¬ plished lasting results. In 1868 he was elected president of the College of New Jersey (now Princeton

University), having previously visited this country and become impressed with its educational promise. This promise was especially bright when he assumed the presidency of Princeton, but the conditions of transition in the sphere of higher education were such as to demand consummate powers of leadership. Such powers McCosh, although a foreigner, brought to his work with most satisfying suc¬ cess. During the 20 years of his administration at Princeton he saw the number of students and professors more than doubled and pros¬ perity increased in all departments. His resig¬ nation in 1888 was due to the advance of years, and he was able to continue in the chair of philosophy beyond that period. As a philoso¬ pher he maintained the principles of the Scot¬ tish metaphysicians against all empirical methods, but went beyond his predecessors in the direction of intuitionalism, although he once declared that this (<rose out of rationalism as frogs rise out of the melted ice," and few ortho¬ dox theologians were abreast of him in wel¬ coming the evolutionary features of the new biology. His writings on theology, philosophy and psychology are very numerous and include (Typical Forms and Special Ends in Creation, > in collaboration with Dickie (1856) ; (The In¬ tuitions of the Mind Inductively Investigated) (1860); (The Supernatural in Relation to the Natural* (1862) ; (An Examination of Mill's Philosophy0 (1866) ; (Laws of Discursive ThoughP (1869) ; Christianity and PositivisnP (1871) ; (The Scottish Philosophy, Biographical and CriticaP (1874); (The Development of Hypothesis) (1876) ; (The Emotions) (1880) ; Psychology of the Cognitive Powers) (1886) ; Psychology of the Motive Powers) (1887) ; Pealistic Philosophy Defended) (1877), and Cur Moral Nature> (1892). Consult Dulles, J. H., (A McCosh Bibliography *(Princeton 1895), and Sloane, W. M., (The Life of James McCosh* (New York 1896).

McCOY, Isaac, American missionary and Indian agent: b. near Uniontown, Pa., 13 June 1784; d. Louisville, Ky., 21 June 1846. His early life was spent in Kentucky. Reared on the frontier, his educational advantages were very limited, but he was of a studious disposi¬ tion. He was married at the age of 20 and was ordained to the ministry of the Baptist Church at 24, settling in Indiana about the same time. After serving eight years as pastor of a church, he entered the mission field among the Miami

Indians, in the valley of the Wabash River, in 1817. He subsequently labored among the peo¬ ple of the Pottawatomie and Ottawa tribes in Michigan. During the course of his work among the Indians he became impressed with expediency of removing the Indians from the contaminating influences of the white settle¬ ments. In June 1824 he submitted the matter to the consideration of the Baptist Mission Board at Washington, D. C., and was author¬ ized to present the matter to the attention of the President of the United States. He failed to secure an audience with President Monroe, but he was successful in interviewing the Secretary of War, John C. Calhoun, under the jurisdic¬ tion of whose department was included all matters pertaining to the administration of In¬ dian affairs. Secretary Calhoun approved of the scheme thus proposed for the establishment of an Indian Territory west of the Mississippi and became its champion. Although several tribes had removed to the West prior to that time, the government had no settled policy in regard to the matter until after Secretary Cal¬ houn took it up officially after the suggestion was made by Mr. McCoy. In 1827 he again visited Washington, where he interviewed President John Quincy Adams and Secretary Barbour of the War Department. In 1828, Mr. McCoy and Capt. George Kennedy of Saint Louis were ap¬ pointed by the Secretary of War as commis¬ sioners to conduct delegations representing the Choctaw, Creek, Pottawatomie and Ottawa tribes on an inspection of the region to be included in the proposed Indian Territory, in the performance of which duty they made two tours of the wilderness region west of Mis¬ souri and Arkansas during the late summer and autumn of 1828. During the ensuing 10 years Mr. McCoy was almost constantly in the Indian Territory (i.e., the present States of Kansas, Nebraska and Oklahoma), selecting and survey¬ ing locations for immigrant Indian tribes for the government, and, at the same time, aiding in the location and establishment of missions and schools among them. He published a brief annual pamphlet entitled The Annual Register of Indian Affairs within the Indian (or West¬ ern) Territory, during the years 1835 to 1838 inclusive. Previous to that he had published a pamphlet, (The Practicability of Indian Re¬ form. } He was also the author of CA History of Baptist Indian Missions. His last years were spent at Louisville, Ky., where he had charge of the work of the American Indian Mission Association.

McCOY, Joseph G., American pioneer in the overland cattle trade: b. Springfield, Ill., 20 Dec. 1837; d. Kansas City, Mo., 19 Oct. 1915.

Reared on a farm, he made a specialty of feed¬ ing cattle for the beef market. At the conclu¬ sion of the Civil War the scarcity and. high price of beef and the seeming impossibility of transporting the cheap cattle from the over¬ stocked ranges of Texas to the Northern markets, because of the introduction of splenitic fever which was certain to follow among native herds, appealed to the typically American genius of McCoy for achieving that which had been reputed to be impossible. He finally proposed the establishment of a shipping point on one of the new railways, which were then being built westward across the great plains, to which the

beef stock of Texas might be slowly doyen northward during the grazing season, keeping well to the westward of the frontier settle¬ ments, and shipped thence by rail to the market at Chicago for immediate slaughter. This pro¬ posal, though simple, was so novel that railway managers at first refused to consider it seri¬ ously. McCoy finally induced one of the rail¬ way companies to back him in the enterprise and he arranged to build shipping pens at Abiliene, Kan. As the result of a diligent ad¬ vertising campaign a few Texas ranchmen were persuaded to undertake to drive herds across the Indian Territory to the designated shipping point on the Kansas Pacific Railway, during the season of 1867. Thirty-five thousand head of beef cattle were thus marketed that season. The next year the number thus driven overland to the shipping point was increased to 75,000 head; in 1869, this number was doubled, and in 1870 the number was doubled again. When the overland cattle trade was well established the railway company soon ceased to pay the stipu¬ lated royalties to McCoy, but he continued his active interest in the livestock business until old age forced his retirement. He published (Historic Sketches of the Cattle Trade in the West and Southwest* (1874). He was a pioneer settler at El Reno, Okla., in 1889, and was nominated as the candidate for Territorial delegate to Congress by the convention of the Democratic party in 1890.

McCRACKAN, ma-krak'an, William Deni¬ son, American author and lecturer : b. Munich, Germany, 12 Feb. 1864. He is of American par¬ entage, but received his earliest education at the Latin Gymnasium, Stuttgart, Germany, Saint Paul's School, Concord, N. H., and was after¬ ward graduated at Trinity College, Hartford, Conn., in 1885. He has written (The Rise of the Swiss Republic (1892); (Romance and Teutonic Switzerland) (1894) ; (Swiss Solu¬ tions of American Problems) ; (Little Idyls of the Big World) (1895) ; (The Huntington Let¬ ters* (1897) ; (Fair Land TyroP (1905) ; (The Italian Lakes >

(1907); (Christian Science: Its Discovery and Development (1912). From 1901-04 he was a member of the Christian Science Committee on Publication.

MacCRACKEN, Henry Mitchell, American Presbyterian clergyman and educator: b. Ox¬ ford, Ohio, 28 Sept. 1840; d. Orlando, Fla., 24 Dec. 1918. He was graduated at Miami Uni¬ versity in 1857 ; for four years was a teacher and school superintendent ; studied at the United Presbyterian Theological Seminary, Xenia, Ohio, and at the Princeton Theological Sem¬ inary, and later at Tubingen and Berlin univer¬ sities. He was minister of the Westminster Church, Columbus, Ohio, 1863-67, and of the First Presbyterian Church at Toledo, Ohio, 1869-81. In 1867 he was deputy to the General Assembly of the Free Church of Scotland, and to that of the Presbyterian Church of Ireland in 1884. From 1880 to 1884 he was chancellor of the Western University, Pittsburgh, Pa., and in the latter year became vice-chancellor and professor of philosophy in the University of the City of New York, of which he was made chancellor in 1891. Since then the name of the institution has been changed to New York Uni¬ versity, and the seat of the University College and School of Applied Science has been re-MacCRACKEN — McCRAE

moved to University Heights, New York City. Under his administration the Hall of Fame for Great Americans (q.v.) was added to the uni¬ versity, its growth and prosperity greatly in¬ creased and the extension of its work and in¬ fluence has given it a leading position in the field of American education. During Dr. MacCracken's active connection with the institution it grew from a college with 91 students to a university with 4,113 students, and the prop¬ erty increased in value from $547,000 to $5,- 211,000. He resigned the chancellorship 28 Sept. 1910. Besides numerous papers on subjects of education, religion and philosophy, he published ˆTercentenary of Presbyterianism) (1870) ; (Popular Sermons) (1875) ; (Leaders of the Church UniversaP (1879) ; (John CalviiP (1888) ; (Cities and Universities) (1882) ; (The Scotch-Irish in America5 (1884) ; (A Metro¬ politan University 5 (1892) ; (Educational Prog¬ ress in the United States) (1893) ; (Lives of Church Leaders: or Heroes of the Cross) (1900) ; (The Three Essentials) (1901) ; (The Hall of Fame5 (1901) ; (Urgent Eastern Ques¬ tions5 (1912).

MacCRACKEN, Henry Noble, American educator: b. Toledo, Ohio, 19 Nov. 1880. He was the son of Henry Mitchell MacCracken (q.v.) and was educated at New York and Harvard universities. He was instructor in English at the Syrian Protestant College in 1900-03; Harvard Fellow in 1907-08; instructor and afterward assistant professor of English at the Sheffield Scientific School at Yale in 1908-13. He was president of Smith College in 1913-15, and since 1915 has been president of Vassar College. Since 1917 he has been national director of the junior membership in the American Red Cross. He has written for the magazines on philology; has edited (The Serpent of Division5 (1910) ; (The Col¬ lege Chaucer5 (1913) ; (Shakespeare's Principal Plays5 (1914), *etc.* He is author of (First Year English5 (1902) ; and part author . of (English Composition in Theory and Practice5

(1909).

MacCRACKEN, John Henry, American educator: b. Rochester, Vt., 30 Sept. 1875. He is the son of Henry Mitchell MacCracken (q.v.), and was educated at the New York Uni¬ versity, the Union Theological Seminary, and the University of Halle. He was associated with New York University as Fellow, instructor and assistant professor of philosophy in 1894-99; was president of Westminster College, Mis¬ souri, in 1899-1903; syndic and professor of politics at New York University in 1903-15; and since 1915 has been president of Lafayette College, Easton, Pa.

McCRADY, ma-kra'di, Edward, American soldier and historian: b. Charleston, S. C., 8 April 1833; d. there, 2 Nov. 1903. He was graduated at Charleston College, admitted to the bar in 1855, and joined earnestly in the movement which led to the secession of his State. He took part in the capture of Castle Pinckney, 27 Dec. 1860, and was present at the bombardment of Fort Sumter in the following April. As captain of the first military com¬ pany raised in South Carolina for the whole war, he entered the Confederate army, 27 June 1861, was made major and then lieutenant-

colonel, was badly wounded at the second bat¬ tle of Bull Run (or Manassas), 30 Aug. 1862, and in January 1863 received an injury in camp from a falling tree, in consequence of which he was transferred from field service to the command of a camp of instruction at Madison, Fla., in 1864. He remained at that post until the end of the

war. Later he became major-generalˆ of State troops and a member of the South Carolina legislature (1880-90), where he proposed the South Carolina Election and Registration Law. Among his more important writings may be mentioned (The History of South Carolina Under the Proprietary Govern¬ ment, 1670-17195 (1897) ; (The History of

South Carolina Under the Royal Government, 1719-17765 (1899) ; (The History of South Carolina in the Revolution, 1775-17805 (1901) ; and (The History of South Carolina in the Revolution, 1780-835 (1902).

McCRAE, John David, Canadian physician, soldier and poet: b. Guelph, Ontario, 30 Nov. 1872; d. of pneumonia in France, 28 Jan. 1918. The second son of Lieut. -Col. David McCrae (who organized and took over a battery to France), he was educated at the University of Toronto and took his M.D. degree in 1910. He became Governor's Fellow in Pathology at McGill University; afterwards lecturer in pathology and in medicine. After attaining the M.R.C.P. he was appointed assistant physician to the Royal Victoria Hospital, Montreal, and physician to the Alexandra Hospital. With Professor Adami he was coauthor of a text¬ book on pathology and also contributed to the (System of Medicine5 by Osier and McCrae, the latter being his elder brother (see McCrae, Thomas). He served as a lieutenant of artillery in the South African War, taking part in several important engagements. At the outbreak of the European War he volunteered for service and crossed the sea in September 1914 with the Canadian Field Artillery. He served in the field till after the second battle of Ypres, when he was placed in charge of medicine and second in command of the hos¬ pital unit provided by McGill University. Shortly before his death he had been appointed consufitant to the British Armies in the Field, but had not yet entered upon that post. McCrae attained the rank of lieutenant-colonel; besides achieving high military, professional and aca¬ demic distinction, he had earned a creditable reputation as a poet. He did not write much, yet his verses have obtained a permanent place in modern anthologies. One of his best-known works is the now famous lyric, (In Flanders' Fields,5 written during the battle of Ypres and originally contributed to Punch. The style is peculiarly his own :

In Flanders' Fields the poppies blow Between the crosses, row on row.

That mark our place, and in the sky The larks still bravely singing fly.

Scarce heard amidst the guns below.

We are the dead. Short days ago We lived, felt dawn, saw sunset glow,

• Loved and were loved; and now we lie

In Flanders' Fields.

Take up our quarrel with the foe,

To you from failing hands we throw The Torch — be yours to hold it high;

If you break faith with us who die,

We shall not sleep, though poppies grow,

In Flanders' Fields.

McCRAE, Thomas, American Physician, b. Guelph, Ontario, Canada, 16 Dec. 1870. He was educated at the universities of 1 oronto and Gottingen, and in 1904-12 was associate in medicine at Johns Hopkins Hpspital, serving as associate professor of medicine of the un versity in 1906-12. He has been professor of medicine at Jefferson Medical College, Phila¬ delphia, and physician to the Jefferson and Pennsylvania hospitals since 1912. He was associate editor of Osier's System of Medicine) • is coauthor, with Sir William Osier, or 'Cancer of the Stomach' (1900) ; and assistant author of Osier's 'Practice of Medicine' (1912; new ed., 1918).

McCRARY, George Washington, Amer¬ ican justice and legislator: b. Evansville inch,

29 Aug. 1835; d. Saint Joseph, Mo., 23 June 1890. He went with his family to the YVis-consin Territory, now a part of Iowa, when a vear old, studied law in Keokuk, Iowa, and was admitted to the bar in 1856. He was elected to the State legislature in 1857, and m 1861-65 served in the State senate where he was chairman of the committees on military affairs and the judiciary. He was a member of Congress

from 1869-77, and was appointed to the committees on naval affairs, revision ot laws, elections, railways and canals, and the judiciary. He proposed the formation of a joint committee for the purpose of determining the electoral vote in the Hayes-Tilden Pi evi¬ dential election, and was connected with the preparation and passing of the Electoral Bi . He was Secretary of War under President Hayes in 1877-79, when he was appointed jus¬ tice of the United States Circuit Court. He resigned in 1884 and removed to Kansas City, Mo., where he acted as eeneral consulting attorney for the Atchison, Topeka and Santa Fe Railroad until his death. He is author of 'American Law of Elections' (1875).

McCREA, Dorothy Frances, Australian poet and story writer. See MoCrea, George Gordon.

McCREA, George Gordon, Australian poet : b Anchorfield, near Edinburgh, Scotland 29 May 1833. His father went to Australia in 1841 as warden of the Gold Fields of Australia, ta ing his family with him. Young McCrea was educated privately and entered the Audit Office in 1854. After serving in the office ot the chiei secretary and the registrar-general, he became senior examiner of patents and deputy registrai-general He was retired on a pension after 40 years' service. Among his Polished works are 'Balladeadro and Mamba' (1866-67) ; Kara-korok' ; 'The Man in the Iron Mask' (1873), 'A Rosebud from the Garden of Taj,' 'Afloat and Ashore' and a vast amount of material the greater part of which still remains unpublished. Among this are two dramas and 'A History ot Seychelles' in two volumes. His son, Hugh Raymond McCrea, is an artist and poet well known in Australia; and his daughter, Dorothy Frances, is a clever story writer and a poet ot some reputation in Australia.

McCREA, Hugh Raymond, Australian artist. See McCrea, George Gordon.

McCREA, ma-kra, Jane, American Revo¬ lutionary heroine : b. Bedminster (now Laming-ton), NV J., 1753; d. near Fort Edward, N. Y.,

27 July 1777. She was the daughter of a Scotch Presbyterian clergyman, at whose death she went to live with her brother near Port Ed¬ ward N. Y. At the commencement ot the Revolution she was betrothed to David Jones, an officer of the Crown. When Burgoyne s army was advancing from the north she was visiting a Mrs. MacNeil at

Fort Edward. Her brother, sharing the general alarm felt through¬ out the region, sent for his sister, intending to remove to a safer locality. On the morning fixed upon for her departure, a band of Indians in the employ of Burgoyne suddenly swooped down upon the MacNeil household and they, together with Miss McCrea, were made prisoners. Mrs. MacNeil and her party arrived in safety at Burgoyne's camp, but half an hour later another party of Indians arrived, bearing a number of freshly severed scalps one ot which bore the long glossy hair of Miss Mc¬ Crea whose body was later found by a roadside. The precise manner of her death never became known. The Indians claimed that she was killed by a random shot from an American de¬ tachment, whereupon her captors determined to secure the rew'ard for her scalp. It has been surmised that a quarrel arose among the Indians as to whose captive she was and that one of them in a frenzy tomahawked her. Other authorities credit the story that Lieutenant Jones hired the Indians to bring his betrothed to camp where they were to be married and that she was killed in a controversy which arose as to whose cap¬ tive she was. Lieutenant Jones denied this stoiy , he lived to an old age, a morose and gloomy man. At all events the tragedy caused a gen¬ eral feeling of horror throughout America and England. Burgoyne called a council of his Indian chiefs in order to reprove them, but as his allies would have deserted him the offender was allowed to go unpunished. A blasted pine long marked the spot where tradition relates the beautiful young girl was murdered, and her grave may be seen in a small cemetery near the ruins of Fort Edward. Consult Bascom, lv. O., 'The Fort Edward Book' (Fort Edward 1903), and Wilson, D., 'The Life of Jane McCrea' (New York 1853).

McCREARY, James Bennett, American lawyer : b. Madison County, Ky., 8 July 1838 ; d.

8 Oct. 1918. He was graduated at Centre Col¬ lege, Danville, Ky., in 1857, and from the Law School of Cumberland University, Tennessee, 1859. He entered the Confederate army in 1862 as major of cavalry and served until close of war, being then lieutenant-colonel of the 11th Ken¬ tucky Cavalry, C. S. A. He was a member, of the Kentucky house of representatives in 1869, 1871 and 1873 (being Speaker 1871-73) ; gover¬ nor of Kentucky 1875-79, and a member of Con¬ gress in 1885—97. He was a delegate to the In¬ ternational Monetary Conference at Biussels, Belgium, in 1891, and in 1903 became United States senator. In 1911-15 he was again governor of Kentucky. He was dclegate-at- large to the Kansas City National Democratic Convention and to the Baltimore Convention of

1912.

McCREERY, James, American merchant; b. Ireland; d. Aiken, S. C., 1893. He came to the United States when about 20 and engaged in the dry goods business in Baltimore, and at the beginning of the Civil War removed to New

York, where he soon established a business of his own which made him ultimately one of New York's leading merchants. He was a member of many public boards, one of the founders of the silk industry in America and director of numerous commercial enterprises. He was one of the Chamber of Commerce delegation sent to England two years before his death, and was a leading member of various clubs, chiefly of an educational or public character.

McCULLOCH, ma-kul'd, Benjamin, Amer¬ ican soldier: b. Rutherford County, Tenn., 11 Nov. 1811; d. 7 March 1862. He became a skilled hunter and boatman and joined other frontiersmen in settling Texas. In 1835 he served in the Texan war for independence, being in the battle of San Jacinto. Later he set¬ tled as surveyor at Gonzales and was elected to the Texas Congress in 1839. In the following year he was engaged in fighting the Comanches and operating against Mexican raiders. He also commanded a company of rangers in the Mexican War under Taylor and Scott, did im¬ portant work as a scout, and was specially distinguished at the battles of Monterey and Buena Vista, and in the siege of the City of Mexico. In 1853 he was appointed United States marshal in Texas. In 1857 he was one of the commissioners appointed to settle the Mormon difficulties in Utah. During the Civil War he served in the Confederate army, was appointed brigadier-general and sent into Mis¬ souri, where he was defeated at the battle of Dug Spring:, but later united his forces with those of General Price and then defeated the Federals under General Lyon (q.v.) at Wil¬ son's Creek. He commanded a corps at the battle of Pea Ridge, Ark., where he was killed by a sharpshooter while making a reconnais¬ sance. Consult Reid, S. G., (Scouting Expedi¬ tions of McCulloch's Rangers> (Philadelphia

1859).

McCULLOCH, ma-kul'oh, Hugh, Amer¬ ican financier : b. Kennebunk, Me., 7 Dec. 1808; d. near Washington, D. C., 24 May 1895. He was educated at Bowdoin College and went in 1833 to Fort Wayne, Ind., where he estab¬ lished a law practice which he continued until

1835 when he entered a branch of the State Bank of Indiana. He was chosen director in

1836 and in 1857 became president of the newly incorporated State Bank of Indiana. He was appointed Comptroller of the Currency in 1863 and in 1865 became Secretary of the Treasury under President Lincoln. Owing to the enor¬ mous expenses incurred by the Civil Warj the finances of the country were in a critical condi¬ tion; in six months the large sum due 500,000 soldiers and sailors was paid together with other heavy expenses, and a reduction of the national debt was begun. McCulloch con¬ verted more than $1,000,000,000 of short-time obligations into a funded debt, and in less than two years had succeeded in putting the finances of the country on a sound basis. Congress ap¬ proved his course and his plan for a speedy re¬ sumption of specie payment, but he met with opposition in his purpose to retire the legal-tender notes. He occupied the office until 1869 and in 1871 opened a banking business in Lon¬ don where he remained until 1878. He was re¬ appointed to the Secretaryship of the Treasury by President Arthur in 1884 and continued in

office until the close of the administration. He wrote 'Men and Measures of Half a Century, > and many of his speeches together with a large share of his correspondence have been pub¬ lished. He was the last living member of Lin¬ coln's distinguished cabinet.

McCULLOCH, John Ramsay, English political economist : b. Whithorn, Wigtown¬ shire, 1 March 1789; d. London, England, 11 Nov. 1864. He was educated at Edinburgh; became editor of The Scotsman , an Edin¬ burgh newspaper, 1818-20, and from 1818 wrote many articles for the Edinburgh Review. He was professor of political economy in London University, 1828-32, and in 1838 was appointed comptroller of the stationery office. Among his many books may be mentioned (The Prin¬ ciples of Political-Economy) (1825) ; '^His¬

torical Sketch of the Bank of England* (1831) ; dictionary of Commerce) (1832); ‘Geographi¬ cal Dictionary* (1841) ; (A Treatise on the Principles and Practical Influence of Taxation and the Funding System* (1845) ; ‘The Litera¬ ture of Political Economy) (1845), *etc.* He was one of the earliest advocates of freetrade in Great Britain.

MacCULLOUGH, ma-kul’ok, John Ed¬ ward, American tragedian : b. Coleraine, Ire¬ land, 2 Nov. 1837; d. Philadelphia, 8 Nov. 1885. He came to the United States in 1853, studied for the stage and made his debut in Philadelphia, 1857. He played with Edwin Forrest, who left him at his death all his manu¬ script plays. In 1869 he managed, with Law¬ rence Barrett, the Bush Street Theatre in San Francisco, Cal. His appearance in England in 1881 was not successful, but his popularity in America remained unbroken. Despite his lack of literary education, a serious handicap, he won high rank in his profession. He played De Mauprat to Edwin Booth’s Richelieu, and Richmond to his Richard III. His interpreta¬ tion of Virginius was unexcelled during his day. Among his leading roles were Hamlet, Macduff, Richelieu, Spartacus, *etc.* In 1884, at the height of his brilliant career, he suddenly collapsed, both physically and mentally; he died a year later in an insane asylum in Philadelphia. Consult Clark, ‘John McCullough as Man, Actor, and Spirit* (Boston 1905).

McCULLOUGH, John Griffith, American politician; b. Welsh Tract, near Newark, Del., 16 Sept. 1835 ; d. 29 May 1915. He was grad¬ uated from Delaware College in 1855 and from the law department of the University of Penn¬ sylvania in 1858.. He removed to California in 1859, engaged in law practice in . Mariposa County, was elected to the State legislature in 1861, to the senate in 1862 and in 1863-67 was attorney-general. In 1867-73 he practised law in San Francisco and then removed to Benning¬ ton, Vt., where he became director and president of several railway systems and prominently con¬ nected with various banking and commercial enterprises. He was elected to the Vermont senate in 1898 and in 1902 was elected governor of the State.

McCUMBER, m’kum’ber, Porter James,

American legislator: b. Crete, Will County, Ill., 3 Feb. 1858. He was praduated at the Uni¬ versity of Michigan in 1880 and engaged in the practice of law. He has been senior mem-

ber of the law firm of McCumber and Bogart at Wahpeton, N. Dak., since 1881. He served in the Territorial house of representatives in 1885-89; was state's attorney, Richland County, in 1896-97; and in 1899 took his seat in the United States Senate where he was reelected three times, his present term expiring in 1923.

MacCUNN, ma-kun', Hamish, Scottish

composer : b. Greenock, Scotland, 22 March 1868. He was educated in Greenock and at the Royal College of Music, London, made his debut in the musical world in 1887, and in 1888 became a junior professor of harmony in the Royal Academy of Music, which position he resigned in 1894. As a composer he has at¬ tained high rank; his productions are rich in melody, and his command of the orchestra is remarkable. His work is typically Scottish in character and in choice of subject. Among the more important of his numerous works are overtures, etc., <The Land of the Mountain and the Flood) ; <Chior Mhor) ; (The Dowie Dens o' Yarrow } ; <The Ship o' the Fiend) ; dramatic cantatas, (Lord Ullin's Daughter) ; (Bonny

Kilmeny) ; (Lay of the Last Minstrel/ and the operas, (Jeannie Deans } and <Diarmid.)

MacCURDY, George Grant, American anthropologist: b. Warrensburg, Mo., 17 April 1863. He was graduated at the State Normal School at Warrensburg in 1887, at Harvard in 1893 and subsequently studied at the univer¬ sities of Vienna, Paris and Berlin. He was instructor in anthropology at Yale in 1898-1900, and was later lecturer and curator of anthropo¬ logical collections there, becoming assistant pro¬ fessor of prehistoric archaeology in 1910. Author of <The Eolithic Problem* (1905); (Antiquity of Man in Europe* (1910) ; (A Study of Chiraquian Antiquities* (1911).

McCURDY, ma-ker'di, James Frederick,

Canadian Orientalist: b. Chatham, N. B., 18 Feb. 1847. He was educated at the University of New Brunswick, Princeton Theological Sem¬ inary and in Germany. He was assistant pro¬ fessor in Oriental languages at Princeton, 1873-82; and Stone lecturer there in 1885-86. In 1886 he was appointed lecturer in University College of Toronto,

and from 1888-1914 was professor of Oriental languages in that college. Among his works are (Aryo-Semitic Speech) (1881) ; (History, Prophecy and the Monuments) (3 vols.,' 1894-1901) ; (Life and Work of D. J. MacdonnelP (1897) ; an original com-merftary on Haggai, and various translations for the American edition of (Lange's Com¬ mentary, * *etc.*

McCURDY, Richard Aldrich, American

capitalist: b. New York City, 29 Jan. 1835; d. Morristown, N. J., 6 March . 1916. He was graduated at Harvard University in 1856, and engaged in the practice of law in New. York. He became attorney for the Mutual .Life In¬ surance Company in 1860, vice-president in 1865 and was president in 1885-1906. The in¬ vestigation of his company in 1905 revealed mismanagement and gross extravagance, particularly in the matter of salaries for the officials. He resigned and retired in 1906.

McCUTCHEON, ma-kuch'un, George Barr, American novelist : b. near Lafayette, Ind., 26 July 1866. He was educated at private

schools and at Purdue University. After leav¬ ing college, before graduation, he became a re¬ porter on the Lafayette Morning Journal, at a salary of $6 a week. Prior to that time he had written a series of dialect letters for the Sunday Leader, of Lafayette, under the caption (Wadd!eton Mail,* published in that paper in 1890. After three years on the Jour¬ nal, he became city editor of the Lafayette Daily Courier, serving in that capacity until June 1902, when newspaper work was abandoned for novel-writing alone. While with the Courier, he contributed to that news¬ paper a serial story entitled (The Wired End,-* which has never been published in book form ; and also contributed short stories to various magazines during these years. He went to Chicago to reside in 1902, and in July 1910 re¬ moved to New York City.

His novels include <Graustark) (1901), dramatised; Castle Craneycrow* (1902);

< Brewster's Millions* (1903) , dramatised ; (The Sherrods) (1903) ; (The Day of the Dog) (1904), novelette ; Beverly of Graustark* (1904), dramatised; (The Purple ParasoP (1905), novelette; <Nedra* (1905); (Cowardice Court* (1906), novelette; (Jane Cable) (1906) (The Flyers* (1906), dramatised, novelette <The Daughter of Anderson

Crow) (1907) . (The Husbands of EditlP (1908), novelette, dramatised; (The Man From BrodneyV (1908); (The Alternative* (1909), novelette; (Truxton King* (1909), dramatised; (The Butterfly Man* (1910), novelette; (The Rose in the Ring) (1910); (What's-His-Name* (1911), novelette; (Mary Midthorne) (1911); (Her Weight in Gold* (1912), novelette; (The Hollow of Her Hand* (1912) ; (A Fool and His Money* (1913) ; (Black is White> (1914) ; <The Prince of Graustark* (1914) ; (Mr. Bingle) (1915).

McCUTCHEON, John Tinney, American cartoonist: b. near South Raub, Ind., 6 May 1870. He is a brother of G. B. McCutcheon (q.v.). He was graduated from Purdue Uni¬ versity in 1889 and has been connected with the leading newspapers of Chicago since 1889, his work as a cartoonist becoming famous in the campaign of 1896. He started around the world on dispatch boat McCulloch in January 1898; was on board that vessel, durino-the war with Spain, in battle of Manila Bay 1898. In 1899 he made a tour of special service in India, Burma, Siam and Cochin China and later in northern China, Korea and Japan, returning to the Philip¬ pines during the fall campaign there. He fol¬ lowed the various campaigns on the islands until April 1899 when he was sent to the Transvaal. He joined the Boers in the interest of his paper and furnished political cartoons for the Chicago Record during the campaign of 1900. In 1909— 10 he visited Africa, the while contributing articles and cartoons for the Chicago Sunday Tribune. He went to Mexico as special corre¬ spondent in 1914; was with the Belgian and German armies in the autumn of the same year, and in France, Saloniki and the Balkans in 1915-16. He has published (Stories of Filipino Warfare* (1900) ; (Cartoons bv McCutcheon) (1903); (Bird Centre Cartoons) (1904); (The Mysterious Stranger and Other Cartoons) (1905) • Congressman Pumphrey the People's Friend* (1907) ; <In Africa* (1910) ; <T. R. in

Cartoons5 (1910); (Dawson II — Fortune Hunter 5 (1912).

McDANIEL, Henry Dickerson, American lawyer : b. Monroe, Ga., 4 Sept. 1836. He was graduated from Mercer University, Macon, Ga.,

1856, and admitted to the bar in 1857. He at¬ tended as delegate the Georgia Secession Con¬ vention in 1861 ; and served in the Confederate army until the end of the war, attaining the rank of major in the 11th Georgia Infantry. In 1865 he was a member of the Georgia Con¬ stitutional Convention. His disability to hold office having been removed in 1872 by the United States Congress, he served in the State legislature, 1873-74; was State senator, 1874-83, and in 1883 he was elected governor of Georgia, which office he occupied for three years. He has been trustee of the University of Georgia since 1884, and chairman of the board since 1899. He is also director in several industrial enterprises.

McDANIEL, Walton Brooks, American philologist and educator : b. Cambridge, Mass., 4 March 1871. He was graduated at Harvard in 1893. He was assistant in Latin and Greek at Harvard in 1896-97, instructor there and at Radcliffe College in 1899-1901, and from 1909 was professor of Latin at the University of Pennsylvania. He is associate editor of Classi¬ cal Weekly, and author of numerous magazine articles on philological subjects.

McDONALD, Andrew Archibald, Ca¬ nadian statesman: b. Three Rivers, Prince Edward Island, 14 Feb. 1829; d. 21 March 1912. He entered public life in 1853 as member of the Island assembly, serving until 1858, and again in 1863-74. He was a delegate to the Quebec Conference on the Union of the Provinces in 1864; and in 1873 became pro¬ vincial postmaster-general, also serving as act¬ ing post-office inspector until 1884. In 1884— 89 he was lieutenant-governor of the province, and from 1891 he was a member of the Dominion Senate.

McDONALD, Arthur, American crim¬ inologist and author: b. Caledonia, N. Y.,_ 4 July 1856. He was educated at the University of Rochester, the Princeton and Union Theolog¬ ical seminaries, and later studied medicine at Berlin, Leipzig, Paris, Zurich and Vienna. He was connected with the LTnited States Bureau of Education in 1892-1904 as a specialist in possibilities of education for the abnormal and weakling classes. He represented the United States at three International Psychological and Criminalogical Congresses, and was honorary president of the Congress of Criminal Anthro¬ pology in Europe. He made a special study of American and European prisons and asylums for the insane and for inebriates, and of slums for the United States Bureau of Education. Author of (Abnormal Man > (1893); (Educa¬ tion and Patho-Social Studies5 (1896) ; Statis¬ tics and Crime, Suicide and Insanitv5 (1903) ; (Tuvenile Crime and Reformation5 (1908); ‘Mentality of Nations and Social Pathology5

(1912).

MacDONALD, Charles, American civil engineer and bridge-builder: b. Gananoque, Ontario, Canada, 26 Jan. 1837. He studied at the preparatory school at Queen's University. Kingston, engaged in surveying on the Grand

Trunk Railway and later entered the Rensselaer Polytechnic Institute, Troy, N. Y., where he was graduated in 1857. He returned to railroad work after graduation and upon the completion of the Grand Trunk Railway's extension from Sarnia, Ontario, to Detroit, Mich., in 1863, he was engaged by the Philadelphia and Reading Railroad. He was for a short time engaged with the Union army on the threatened invasion of Pennsylvania, and was taken prisoner; but was held for only a brief * period. In 1868 he definitely turned his attention to bridge-building, forming a partnership with A. B. Bur¬ ton. The firm constructed the bridges between Hoboken and Dover, N. J., on the Boonton branch of the Delaware and Lackawanna Rail¬ road, and in 1872 MacDonald designed and con¬ structed Point Bridge at Providence, R. I., which has a 250-foot draw span. He was senior partner of the Union Bridge Company which constructed the Hawksburg Bridge, Australia ; the Leavenworth Bridge, Kansas ; the Poughkeepsie Bridge over the Hudson ; and the Merchant's Bridge, Saint Louis. He is a trustee of the Rensselaer Polytechnic Institute and in 1908-09 he was president of the Ameri¬ can Society of Civil Engineers.

MacDONALD, Duncan Black, American philologist : b. Glasgow, Scotland, 9 April 1863. He was graduated at the University of Glasgow in 1885 and later studied at the University of Berlin. He came to the United States in 1892 and has since been professor of Semitic lan¬ guages at the Hartford Thedlogical Seminary. He was Haskell lecturer on comparative reli¬ gion at the University of Chicago in 1906; spe¬ cial lecturer at Wellesley College in 1907, 1909, and at the Episcopal Theological School, Cam¬ bridge, in 1912. He is head of the Mohamme¬ dan department at the Kennedy School of Mis¬ sions, Hartford, and in 1914 was Haskell lec¬ turer at Oberlin College. He was lecturer at the O. T. Berkeley Divinity School in 1917-18. He discovered in the Bodleian Library the only known Oriental manuscriot of c Ali Baba and the Forty Thieves5 which he published in the Journal of the Royal Asiatic Society of Great Britain, of which society he is a member. He contributed to the Encyclopedia

Britannica,5 the Encyclopedia of Islam5 and is author of ‘The Development of Muslim Theology5 (1903) ; Selections from Ibu Kaldun5 (1905) ; (Aspects of Islam5 (1911).

MACDONALD, Etienne Jacques Joseph Alexandre, a-te-en zhak zho-zef al-eks-andr miik do-nal, Due de Tarente, French soldier: b. ‘Sancerre, France, 17 Nov. 1765; d. Courcelles, France, 24 Sept. 1840. He served in the French Revolution as colonel, brigadier-general and general, and in 1798 was made governor of the Roman states, and of Naples in 1799. In 1805 he lost the favor of Napoleon, but four years later was given command of the right wing of the army in Italy, and was made a mar¬ shal for his services at Wagram 6 July 1809. He served in Spain and# in the Russian cam¬ paign, assisted in covering the retreat from Leipzig, advised Napoleon’s abdication, was made a peer by the Bourbons and during the Hundred Days supported them.

MacDONALD, Flora, Scottish heroine: b. Milton, island of South Uist, Hebrides, 1720; d. there, 4 March 1790. She was brought up

by the chief of her clan, MacDonald of Clan-ranald, her father having died in her early childhood, and was partly educated in Edin¬ burgh. After the battle of Culloden, in 1746, her assistance was sought in securing the escape of Prince Charles Edward who had taken ref¬ uge at Benbecula where Flora MacDonald was then Living. The Pnince was disguised as a woman servant and the party succeeded in reaching Skye in safety. Flora’s assistance to the Prince became known, however, and she was imprisoned in the Tower of London, but was soon afterward permitted to live outside the prison, although under charge of a gaoler. The Indemnity Act of 1747 secured her com¬ plete liberty. ‘She was married to Allan Mac¬ Donald in 1750, and in 1774 they emigrated to America, settling in Fayetteville, N. C. Her husband served in the British army in the Revo¬ lutionary War and was taken prisoner. Flora returned alone to Scotland and was later rejoined by her husband. She was a woman of great beauty and charm of manner, Dr. John¬ son, among others, being warm in her praises. Five of her sons served in the British army or navy. Consult (Life and Times of

Prince Charles Edward5 (1886) ; Yonge, C. D., (Seven Heroines of Christendom5 (1879) ; Macgregor,

(Flora MacDonald and Her Adventures with Prince Charles5 (1882).

MACDONALD, George, Scottish poet and novelist: b. Huntly, Aberdeenshire, 10 Dec. 1824; d. Ashtead, Surrey, 18 Sept. 1905. He was educated at Aberdeen University and at King's College, London, and entered the Inde¬ pendent ministry, from which he afterward re¬ tired and became a lay member of the English Church. Macdonald's work comprises poetry, novels, religious and juvenile books and is marked by deep religious feeling and devotion to lofty ideals of life. His novels deal chiefly with Scottish character and scenery, in which they hold the place of classics. The best known of his many books are (David Elginbrod5 (1862) ; (Alec Forbes of Howglen5 (1865) ;

< Annals of a Quiet Neighborhood5 (1866) ; <Robert Falconer,5 his best work (1868) ; (The Miracles of Our Lord5 (1870); (Malcolm5 (1875); (The Marauis of Lossie5 (1877); (Sir Gibbie5 (1879); < Castle Warlock5 (1882).

MACDONALD, Sir Hector, British gen¬ eral: b. Urquhart, Scotland, 13 April 1853; d. Paris, France, 25 March 1903. In 1870 he en¬ listed and served in the ranks nine years. He first saw active service in the Second Afghan War in 1879, was with Sir F. Roberts in the march from Candahar to Cabul,. and for bril¬ liant service was made 2d lieutenant. He served in the Boer War of 1881 and was cap¬ tured at Majuba Hill. He was conspicuous in the Suakim campaign of 1 888—9 1 ; was at the capture of Tokar in 1891 ; in 1896 commanded a brigade in the Dongola campaign ; served in the Nile expedition of 1897-98, and by his adroit handling of his troops at the battle of Omdu-ram turned what might have proved disaster into victory. In 1899 he held the rank of brig¬ adier-general in India, and after the battle of Magersfontein succeeded to the command of the Highland Brigade. He was made K.C.B. and in 1902 was placed in command at Ceylon, but the following year while traveling back to England to answer a charge, subsequently

found to be false, he committed suicide in Paris. He was popularly known as (<Fighting Mac,55 and a tower 100 feet high at Dingwall, since 1907, commemorates his brilliant career. Consult Coates, T. F. G., (Hector Macdonald5 (London 1900).

MacDONALD, Sir Hugh John, Canadian

statesman, son of Sir John A. MacDonald (q.v.) : b. Middlesex County, Ontario, 13 March 1850. He was educated at Queen's College and at the University of Toronto, became a barris¬ ter in 1872, practising in Toronto until 1882, when he removed to Winnipeg. He was a member of the Canadian House of Commons in 1891-93 and in 1896-97, and in 1896 was Min¬ ister of the Interior. He was Premier and At¬ torney-General of Manitoba in 1900. Since 1911 he has been police magistrate of the city of Winnipeg and he has also served as Commis¬ sioner and Commissioner of Railways in Mani¬ toba. He served in the Fenian Raid of 1866; the Red River Expedition of 1870; and in the Northwest Rebellion he was captain of the 19th Regiment. He was knighted in 1913.

MacDONALD, Hunter, American civil engineer: b. Winchester, Va., 12 June 1860. He studied at the Washington and Lee Univer¬ sity and in 1879 became assistant engineer for the Louisville and Nashville Railroad. Later in 1879 he became connected with the Nash¬ ville, Chattanooga and Saint Louis Railroad, and in 1891-92 he was resident engineer for the Western and Atlantic Railroad at Atlanta, Ga. Since 1892 he has been chief engineer of the Nashville, Chattanooga and Saint Louis Rail¬ road. He was president of the American Rail¬ road Engineering Association in 1904-05 and of the American Society of Civil Engineers in

1914.

McDONALD, James, American physician: b. White Plains, N. Y., 18 July 1803; d. Flush¬ ing, L. I., 5 May 1849. He was graduated at thd College of Physicians and Surgeons, New York, in 1825, and was appointed resident phy¬ sician at Bloomingdale Asylum, where he re¬ mained until 1837 with the exception of a year's absence in 1831 when he was sent by the New York hospital governors to visit insane asylums in Europe. He was appointed visiting physician to the New York Hospital in 1837, and in 1841 he established a private insane asylum at Murray Hill, subsequently removing it to Flushing, L. I. He began in 1842 his lec¬ tures on mental diseases at the College of Phy¬ sicians and Surgeons, the first to be delivered in the United States. Author of (Reports on the Condition of Blackwell's Island5 (1835) ; Con¬ struction and Management of Insane Hospitals5 (1837); (Puerperal Insanity5 (1845).

McDONALD, James, Canadian statesman and jurist: b. East River, Nova Scotia, 1 July 1828; d. 1912. He was educated at New Glas¬ gow, was admitted to the bar in 1851 and be¬ came queen's counsel in 1867. He served in the legislature of Nova Scotia in 1859-67 and in 1871-72, when he resigned; and was a mem¬ ber of the Canadian Parliament in 1874-81. He was chief railway commissioner for Nova Scotia in 1863-64, and financial secretary from 1864 until the union. . He was Minister of Jus¬ tice of Nova (Scotia in 1878-81, and chief jus¬ tice in 1881-1904, when he was retired. He was

a member of the commission appointed to facil¬ itate trade relations between Canada and Cen¬ tral and South America in 1865-66.

McDONALD, James Alexander, Canadian jurist: b. 1858, Huron County, Ontario. He was educated at the University of Toronto, be¬ came a barrister in 1890 and king's counsel in 1906. He engaged in practice in Toronto until 1896 when he removed to Rossland, B. C., where he practised until 1909. He was a member of the Rossland legislature in 1903-09, when he resigned to become chief justice of the Court of Appeals, British Columbia.

McDONALD, James Alexander, Canadian clergyman and journalist: b. Middlesex County, Ontario, 22 Jan. 1862. He studied at Hamilton College and the universities of Toronto and Edinburgh, and was graduated from Knox Col¬ lege, Toronto, in 1887. He was ordained a min¬ ister in the Presbyterian Church in 1881 and became pastor of Knox Church, Saint Thomas, Ontario. He resigned in 1896 to become the first editor of the Westminster , a religious monthly. He afterward edited the Presby¬ terian; and in 1902-16 he was managing editor of the Globe. He was a delegate to the Impe¬ rial Press Conference, London, England, in 1909, one of the founders of the Canadian Au¬ thor's Club in 1899, and has been a member of the board of governors of the University of Toronto since 1906. Author of (The Signifi¬ cance of Lincoln) ; (What a Newspaper Man Saw in Britain) (1911) ; (Democracy and the Nations,) *etc.*

McDONALD, James Ramsay, British poli¬ tician : b. Lossiemouth, Scotland, 1866. He early entered politics, became secretary of the Labor party in 1900-11, and in 1906-09 was president of the Independent Labor party. He was the leader of the Labor party in 1911-14. In 1901-04 he was a member of the London county council. Author of Socialism and Society) (1905) ; Socialism and Government* (1909) ; (The Social Unrest* (1913) ; (National Defence.*

MacDONALD, James Wilson Alexander,

American sculptor: b. Steubenville, Ohio, 25 Aug. 1824; d. 14 Aug.

1908. He studied under Waugh in Saint Louis and in New York in 1849. Among his numerous works are statues of (Joan of Arc* ; <Italia) ; Edward Bates (1876) in Forest Park, Saint Louis; General Custer, at West Point; Fitz-Greene Halleck in Central Park, New York; an equestrian statue of Gen. Nathaniel Lyon; numerous busts, in¬ cluding that of Washington, in Prospect Park, Brooklyn, and those of Bryant, Cooper and Weed. He owned Houdon's original model, and from it prepared several busts of Washing¬ ton. He also painted portraits and landscapes and lectured on art, *etc.*

MACDONALD, Sir John Alexander, Ca¬ nadian statesman: b. Glasgow, Scotland, 11 Jan. 1815; d. Ottawa, Ontario, 6 June 1891. In early youth he emigrated with his father to Canada. At 21 he was a practising barrister at Kings¬ ton, Upper Canada, and in 1844 he was elected to the Canadian Parliament for that constitu¬ ency. While repudiating the name of Tory, throughout his career Macdonald was the most conspicuous figure in the Conservative party in Canada. He became a cabinet minister in 1847,

and, after various vicissitudes of his party, Prime Minister in 1857. Macdonald's most im¬ portant work is connected with the federation of Canada. The French and the English prov¬ inces, previously independent, had been united under one Parliament in 1841, and during the next 25 years each party had both an English and a French leader. Ministries changed rap¬ idly, and in 1864 there was a deadlock. This made necessary some wider union; and in that year a conference of delegates met at Quebec to consider the federation of British North America. Directed largely by Macdonald's tact and resource this conference led to the estab¬ lishment of the Dominion of Canada in 1867, under the British North America Act, passed by the British Parliament. Macdonald became the first Prime Minister of the Dominion. At first there were only four provinces, but he car¬ ried through successfully the negotiations by which the Hudson Bay company ceded its in¬ terests in the northwest to Canada; he secured also the entrance of British Columbia on the condition of building rapidly a transcontinental railway. During an election in 1872 Macdonald accepted large sums for party purposes from Sir Hugh Allan, one of the chief projectors of the Pacific railway, and in 1873 owing to this ((Pacific Scandal** he was forced to retire from office. In 1878 he again became Prime Minister with a policy of protection and he may be re¬ garded as the father of that system in Canada. He remained Prime Minister until his death in 1891. The confederation of Canada, the acqui¬ sition by Canada of the Northwest, the build¬ ing

of the Intercolonial and the Canadian Pacific railways, and the policy of protection were all effected under Macdonald's lead. His brilliant intellect and ready wit made him a really great leader. In 1867 he was created K.C.B., in 1884 G.C.B., and on his death his widow was created Baroness Macdonald in her own right. Consult Pope's (Memoirs of Sir John A. Macdonald) (1894) ; Parkin, (Sir John A. Macdonald) in (Makers of Canada* (1908).

George M. Wrong,

Professor of History , University of Toronto.

McDONALD, John Bartholomew, Amer¬ ican engineer and contractor: b. Ireland, 7 Nov. 1844; d. 17 March 1911. He was brought to the United States in 1847, and received his education in the public schools of New York. Among his successful undertakings may be mentioned the Fourth avenue improvement for sinking the New York Central Railroad tracks in New York City from 42d street to Harlem; West Shore Railroad from Weehawken to Buffalo; Baltimore and Ohio Railroad from Baltimore to Philadelphia; Illinois Central Rail¬ road from Elgin, Ill., to Dolgeville, Wis. ; the Georgian Bay branch of the Canadian Pacific Railroad; the Trenton ((cut-off** of the Pennsyl¬ vania Railroad; the Baltimore Belt Railroad, which carried the great Baltimore and Ohio Railroad under the city of Baltimore, *etc.* He constructed the Jerome Park reservoir, New York City, the largest artificial storage reservoir in the world. His greatest contract was for the construction, equipment, operation and maintenance of the Rapid Transit Railroad (the <(Subway**) in New York City.

MACDONALD, John Sandfield, Canadian

statesman : b. Saint Raphael's, Canada, 12 Dec.

1812; d. Cornwall, Ontario, 1 June 1872. He was self-educated and admitted to the bar in 1840, practising successfully in Cornwall. In 1841 he was elected to the Canadian Parliament as member from

Cornwall. Macdonald was solicitor-general in 1849-51 ; 1852-54 < was

speaker of Parliament; Attorney-General in the brief Brown-Dorion administration in 1858, and Premier in 1862-64. He was the first Premier of the province of Ontario, 1867-71.

McDonald, Joseph Ewing, American

lawyer : b. Butler County, Ohio, 29 Aug. 1819 ; d. Indianapolis, Ind., 21 June 1891. He _ was educated at Ashbury (now De Pauw) Univer¬ sity; studied law and was admitted to the bar in' 1844, and established a practice in Crawfordsville, where he was county prosecuting attorney, 1845-47. In 1848 he was member of Congress and from 1856-60 attorney-general of Indiana. He then practised law in Indianapolis and in 1864 was an unsuccessful candidate for gov¬ ernor being defeated by Oliver P. Morton. In 1872 he was chairman of the Democratic State Committee and in 1875 was elected to the United States Senate, serving until 1881, when he re¬ turned to Indianapolis where he resumed the practice of law.

MacDONALD, William, American edu¬ cator and historian: b. Providence, R. I., 31 July 1863. He was graduated at Harvard in 1892, and in 1892-93 was professor of. history and economics at Worcester Polytechnic Insti¬ tute. He was professor of history and political science at Bowdoin in 1893-1901 and from 1901 to 1917 was professor of history at Brown Uni¬ versity, He edited (Select Documents Illus¬ trative of the History of the United States* (1898); Johnston's High School History of the United States> (1901); documentary Source Book of American History* (1908) ; Parkman's c Oregon Trail* (1911). Author of (History and Government of Maine) (1902) ; Jacksonian Democracy > (1905) ; (From Jef¬ ferson to Lincoln* (1913).

MacDONALD, Sir William Christopher,

Canadian capitalist and philanthropist: b. Glenaladale, Prince Edward Island, 1831 ; d. Montreal, 11 June 1917. He early engaged in business in Montreal and achieved a large financial success as importer, merchant and tobacco manufacturer. He was a director of the Bank of Montreal, a governor of McGill University and of the Montreal General Hospi¬ tal, and also served as president of the Legis¬ lative Council of Prince Edward Island. His gifts to McGill University and the MacDonald Agricultural College connected with it amounted to more than $12,500,000. He also made large gifts to the

normal school at Sainte-Anne de • Bellevue, province of Quebec, the Ontario Agri¬ cultural College and to different hospitals. He was knighted in 1898.

McDONALD, Pa., borough of Washington County, 18 miles southwest of Pittsburgh, on the Pittsburgh, Cincinnati, Chicago and Saint Louis Railroad. It is situated in a coal and oil district and there are flour mills, bottle works and tool factories. Pop. about 2,543.

MACDONELL, mak-don'el, Alexander, Canadian Roman Catholic prelate : b. Inver¬ ness-shire, Scotland, 7 July 1762; d. Dumfries, Scotland, 14 Jan. 1840. He was educated at

the Scots College, Spain, entered the priest¬ hood in 1787, and was for several years a mis¬ sionary. He assisted in the organization of the Glengarry Fencibles and was their chaplain and in 1803 established for its disbanded members a colony in Glengarry County, Ontario, Canada. He also assisted in raising the Cana¬ dian regiment of Glengarry Fencibles, which was actively engaged in repelling the American invaders in the War of 1812-14. In 1819 he was made vicar apostolic of Upper Canada and through his influence 48 parishes were estab¬ lished in Upper Canada. He was the first Roman Catholic bishop in Upper Canada, being consecrated bishop of Kingston, 14 Feb. 1826. He was called to the Legislative Council . in 1831. He died in Scotland while on a mission to obtain funds for the founding of Regiopolis College, Kingston, and is buried in his episcopal city.

MacDONELL, Arthur Anthony, English philologist: b. Lochgarry, 11 May 1854. He was *educated at Gottingen and at Corpus Christi College, Oxford. He was Taylorian teacher of German at Oxford in 1880-99 and professor of Sanskrit in 1888-99, since when he has been Boden professor of Sanskrit there. He made a tour of study and research in India in 1907-08, and in 1914" received the Campbell Memorial Gold Medal for Oriental Research from the Royal Asiatic Society of Bombay. He is keeper of the Indian Institute; and a Fellow of Balliol College and of the Royal Danish Acad¬ emy. Author of (Sanskrit-English Dictionary* (1892) ; (A History of Sanskrit Literature) (1900) ; (The Brhaddevata* translated and critically edited (2 vols., 1904) ; <Vedic Grammar* (1910) ; (A Vedic Grammar for Students*

(1916).

MacDONELL. Daniel James, Canadian clergyman: b. Bathurst, New Brunswick, 15 Jan. 1843; d. 1896. He was graduated at Queen's College, Kingston, in 1858 and later studied at Glasgow, Heidelberg and Edinburgh universities. He was ordained in the Presby¬ terian ministry, at Edinburgh, in 1866, returned to Canada and served as minister of Saint Andrew's Church, Peterborough, until 1870, when he removed to Toronto to take charge of the imposing new Saint Andrew's Church which had been built for him there. His ex¬ pression of doubt in regard to certain doctrines of the Church, particularly that of eternal punishment, led to his being tried for heresy. While not subscribing to a personal belief in the doctrines upon which he had expressed doubts he formally endorsed them and agreed not to discuss them in the pulpit. His in¬ fluence generally was regarded as having con¬ tributed appreciably to a broader trend of thought in the Church. He took an active part in bringing about the union of the different branches of the Presbyterian Church in Can¬ ada, which was effected in 1875. He was noted for his sound learning and for his eloquence. He was one of the editors of the (Canadian Presbyterian HymnaP (1878-81).

MacDONNELL, Anthony Patrick, 1st Baron, British administrator: b. 17 March 1844. He was educated at Queen's College, Galway, and entered the Indian Civil Service in 1865. He was appointed acting chief commissioner of Burmah in 1889, chief commissioner of the

Central Provinces in 1891, acting lieutenant-governor of Bengal in 1893, and served on the council of the viceroy of India in 1893-95. He was lieutenant-governor of the Northwestern Provinces and chief commissioner of Oudh in 1895-1901, was a member of the Council of India in 1902, and Under Sectretary of State in Ireland in 1902-08. He was created a baron in

1908.

McDONNELL, Charles Edward, Amer¬ ican Roman Catholic prelate: b. New York, N. Y., 1 Feb. 1854; d. 8 Aug. 1921. He was edu¬ cated at the De La Salle Institute and Saint Francis Xavier's College in New York and studied theology at the American College, Rome, Italy, where he received the degree of D.D., and was ordained priest by Bishop Chatard 18 May 1878. Returning to America the same year, he was appointed assistant at Saint Mary's Church, New York City, and in 1879 was trans¬ ferred to Saint Patrick's Cathedral. On the death of Bishop Loughlin, Dr. McDonnell, who, at the time was Archbishop Corrigan's secre¬ tary, was named bishop of Brooklyn, being con¬ secrated by Archbishop Corrigan 25 April 1892. At his invitation the Benedictine Fathers came from the Bahama Islands to establish themselves in his diocese, and the Redemptorists also made a foundation in Brooklyn. On the passage of the French law separating Church and State, Dr. McDonnell inyited a number of French com¬ munities of men and of women to take up their residence in his diocese. He was spiritual ad¬ viser of the Catholic Benevolent Legion, and also honorary president of the International Catholic Truth Society.

McDONOGH, mak-don'o, John, American philanthropist: b. Baltimore, Md., 29 Sept. 1779; d. McDonogh, La., 26 Oct. 1850. He was educated at an academy in Baltimore and en¬ tered the mercantile business there, removing in 1800 to New Orleans, where he rapidly ac¬ quired great wealth. He was deeply interested in the problem of slavery and devised a sys¬ tem through which his slaves were enabled to earn their freedom; he educated those among them who desired it, and sent to Africa ship¬ loads of those who had earned their freedom. He was president of the American Coloniza¬ tion Society and was a generous contributor to its support. The bulk of his fortune of more than $2,000,000 he bequeathed to the cities of New Orleans and Baltimore for the estab¬ lishment of free schools. The will was ad¬ judged valid after years of litigation and Baltimore established the McDonogh schools while New Orleans invested its portion of the bequest in its public schools.

MACDONOUGH, mak-don'o, Thomas,

American naval officer: b. Newcastle County, Del., 23 Dec. 1783; d. at sea. 18 Nov. 1825. He entered the navy as midshipman in 1800 and in 1803 was attached to the frigate Phila¬ delphia, one of the squadron employed against Tripoli. On 26 Aug. 1803 the Philadelphia cap¬ tured off the coast of Spain the Moorish frigate Mesboa and MacDonough, being left at Gibral¬ tar with the prize, escaped the subsequent capture which befell the officers and crew of the

Philadelphia. In 1804 he participated in the various attacks made upon Tripoli and under

Decatur assisted in the capture and destruction of the Philadelphia, 16 Feb. 1804. In 1810 he was furloughed and for a while commanded a vessel in the merchant service. On the out¬ break of the War of 1812 he was for a time first lieutenant on the Constitution, and com¬ manded for some months at Portland. In 1814 he had command of the squadron on Lake Champlain which gained an important victory at Plattsburg harbor over the British squadron commanded by Commodore George Downie. For his valuable services on this occasion he was promoted to the rank of captain, then the highest in the United States navy, and re¬ ceived from Congress a gold medal and an estate at Cumberland Head, near Plattsburg, from the Vermont legislature. He afterward held various commands, the last of which was on the Constitution in 1824, in which he made a cruise to the Mediterranean. Consult Bab¬ cock, K. C., Pise of American Nationality) (New York 1906). •

MACDOUGAL, mak-doo'gal, Daniel Trembly, American botanist : b. Liberty, Ind., 16 March 1865. He was graduated at De Pauw University in 1890 and studied in Germany. In 1891-92 he was engaged in explorations in Arizona and Idaho for the United States gov¬ ernment, and in 1893-99 was instructor in plant physiology at the University of Minnesota. He was appointed director of the laboratories of the New York Botanical Gardens in 1899, and after 1910 was director of the botanical re¬ search department of the Carnegie Institution. He was president of the American Society of Naturalists in 1910. Among his books are (Nature and Work of Plants) (1900) ; Prac¬ tical Textbook of Plant Physiology > (1902) ; (Elementary Plant Physiology } (1902) ; (In¬ fluence of Light and Darkness upon Growth and Development (1903); ˆBotanical Features of North American Deserts) (1908) ; (The Water-Balance of Succulent Plants) (1910) ; (The Condition of Parasitism in Plants1* (1910) ; (Organic Response) (1911) ; (The Salton Sea) (1913), *etc.*

McDOUGALL, Alexander, American sol¬ dier: b. Island of Islay, Scotland, 1731; d. New York, 8 June 1786. He emigrated with his father to America in 1755 and later became a merchant in New York. He devoted himself to the cause of the colonies and was imprisoned for a time for writing an address called (A Son of Liberty to the Betrayed Inhabitants of the Colony. > At the outbreak of the Revolu¬ tion he enlisted in the American army, serving as colonel, brigadier-

general, and in 1777 was promoted major-general. He commanded at Long Island, White Plains and also attained distinction in the action at Germantown. He was elected member of the Continental Con¬ gress in 1781 and was for a time Minister of Marine. Reelected in 1784-85 he served for a time and then resigned, preferring active serv¬ ice in the field. He was elected Minister of Marine and thereby became the first Secretary of the United States Navy. He was a member of the New York State senate at his death.

McDOUGALL, George Millward, Cana¬ dian pioneer missionary : b. Kingston, Ontario, 1820; d. Canadian North West, January 1876. He removed to Georgian Bay with his parents when a child, later studied at Victoria College,

and in 1850 entered the Wesleyan Methodist ministry. He was deeply interested in the wel¬ fare of the Indians, whose habits and character he knew thoroughly, and spent his life as a missionary among them. His field covered at different times a considerable portion of the Northwest Territory and his experience made him often a valuable aid to the government in dealing with Indian affairs. He made a tour of eastern Canada and visited New York and Great Britain in 1875. His career was sud¬ denly ended by his death on the plains within a short distance of his camp. He is commonly reputed to have perished in a snowstorm; but his son, who was with him on the journey toward camp, ascribes the end to some unknown physical infirmity as the weather was favorable and his father a master woodsman. McDougall is among the most famous of the pioneer mis¬ sionaries of Canada. Consult McDougall, J.,

(George Millward McDougall, Pioneer, Patriot and Missionary' (Toronto 1888).

McDOUGALL, John, Canadian mission¬ ary, son of George Millward McDougall (q.v.) : b. Owen Sound, Ontario, 27 Dec. 1842. He was educated at Victoria University, entered the Methodist ministry in 1866 and was ordained in 1872. He was reared among the Indians of

the Georgian Bay and Lake Superior regions and before entering the ministry he taught school in the North Western Territory. As a clergyman his work was chiefly among the In¬ dians, where his knowledge of their language and customs made his work unusually effective, and he was also able to render important serv¬ ices to the government in connection with In¬ dian affairs. He was peace commissioner after the uprisings of 1869—70 and 1885. He was also closely associated with the treaties made with the Indians in his district. He was chairman of the Saskatchewan district in 1876 and of the Indian district in 1897. Author of <A Cree Hymn Book> (1888); 'Forest, Lake and Prairie> (1895); (Saddle, Sled and Snowshoe' (1896) ; 'In the Days of the Red River Re¬ bellion (1900) ; 'On the Western Trail in the Early Seventies) (1902).

MacDOUGALL, Sir Patrick Leonard,

British general and military author: b. Boulogne-sur-Mer, France, 10 Aug. 1819; d. Kings¬ ton Hill, Surrey, 28 Nov. 1894. He was edu¬ cated at the military academies of Edinburgh and Sandhurst and received his commission as second lieutenant in 1836. He served as regi¬ mental officer with the Royal Canadian Rifle regiment at Toronto and at Kingston in 1844— 54 ; served as superintendent of studies at Sand¬ hurst the following year, and in 1855 was sent on a special mession to the Crimea. He was again superintendent at Sandhurst in 1856-58. Fie was appointed adjutant-general of the Cana¬ dian militia in 1865, took an active part in the suppression of the Fenian Raid of 1866 and received high commendations for his skilful or¬ ganizing of the militia. In 1873-78 he was head of the intelligence branch of the War Office. He was again appointed to the command in Canada in 1878, at the time when relations were strained between England and Russia. He vol¬ unteered to organize a body of 10,000 trained soldiers for use whenever and wherever they might be needed, and the acceptance of his offer established the precedent of colonial mili¬

tary aid to the empire in time of need. He retired from active service in 1885. Author of <The Theory of War' (1856); 'Modern War¬ fare as Influenced by Modern Artillery' (1864) ; <The Army and Its Reserves' (1869), *etc.*

MacDOUGALL, William, Canadian jour¬ nalist and statesman: b. Toronto, 1822; d. Ot¬ tawa, 29 May 1905. He studied at Victoria College, Cobourg; was admitted as a solicitor in 1847 ; in 1849

established the Canadian Agriculturist; in 1850 founded the North American, afterward united with the Toronto Daily Globe, for which he wrote until 1870. He was commissioner of Crown lands, 1862-64, and provincial secretary, 1864. From 1867-69 he was Minister of Public Works, and was lieutenant-governor of Rupert's Land, 1869-70. On his entrance into the Red River district to assume formal possession on behalf of the Dominion government of the newly-acquired territories, he was deforced by Louis Riel, and this episode marked the beginning of the Red River Insurrection.

MacDOWELL, mak-dowel, Edward Alexander, American composer: b. New York, 18 Dec. 1861; d. there, 23 Jan. 1908. MacDowell was Scotch-Irish by birth', if not by training and temperament. It was from his father, a man of pronounced artistic tastes, that the composer inherited or acquired that fine aesthetic sense and that highly sensitive artistic tendency which played so great a part in his life and practically determined the character of his work. MacDowell's musical education was begun at the age of eight, when Juan Buitrago, a friend of the family, gave him his first piano lessons. But not being at all precocious — MacDowell was no musical prodigy — his early progress was neither rapid nor encouraging. It was not until he came to receive instruction from the professional piano teacher, Paul Des-vernine, with occasional supplementary lessons from the famous virtuoso, Teresa Carreno, that MacDowell's great musical gifts became mani¬ fest. Then, at the age of 15, the lad was taken abroad by his devoted mother for a thorough musical education. Entering the Paris Con¬ servatory, young MacDowell studied for two years under the two eminent music masters, Marmontel (piano) and Savard (theory and composition). Going next to Germany, he con¬ tinued his musical studies at the Stuttgart and Frankfort conservatories, studying piano with Karl Heymann and composition with Joachim Raff, the well-known German composer. MacDowell's unusual talent so impressed both his German teachers that in 1881 they warmly recommended their American pupil for the uni¬ versity chair left vacant by Heymann's own resignation. Nothing but his extreme youthful¬ ness (MacDowell was only 20 at the time) seems to have kept from him this much coveted Frankfort professorship. Failing of this, Mac¬ Dowell accepted an instructorship at the Darm¬ stadt Conservatory. But his duties as princi¬ pal piano instructor there were so onerous and his compensation so inadequate that he soon had to resign from this position. Returning to Frankfort, MacDowell devoted himself to com¬ position and private teaching.

It was there, at Frankfort, during his stu¬ dent days, that MacDowell's career as a com¬ poser really began. His 'First Modern Suite

ior Piano > so impressed the great Liszt, whom MacDowell was induced by Raff to visit at Weimar in 1882, that he had it performed the same year at the Allgemeiner Deutscher Musik-verein festival held at Zurich. A year later this suite and its successor, (The Second Mod¬ ern Suited were published by the famous Leip¬ zig music publishers, Breitkopf and Hartel. Thus encouraged by his early success, and more espe¬ cially by the sincere praise of Raff, Liszt and others, MacDowell resolved to settle in 'Ger¬ many permanently. And, save for a short visit to America in 1884 (when he married a former pupil of his, Marian Nevins), he did live there uninterruptedly for 12 years. In 1888 Mac¬ Dowell returned to America and settled in Bos¬ ton, which marks a turning point in his life. His European recognition, both as pianist and as composer, naturally had paved the way for his American successes. Almost immediately on his arrival MacDowell made his first public appearance in America in the double capacity of pianist and composer, performing one of his own compositions at a Kneisel Quartet con¬ cert (19 Nov. 1888). Shortly after he played his (Second Piano Concerto* under Theodore Thomas at New York, winning such success with this composition and its performance that he soon repeated it with the Boston Symphony Orchestra. Thenceforth MacDowell's rise to fame was phenomenal. His services as pianist were in great demand — far greater than his virtuoso ambitions — while his orchestral com¬ positions were performed almost as soon as they were written. Between 1890, when his symphonic poem, (Lancelot and Elaine,* was performed by the Boston Symphony Orchestra, and 1896 when the same organization placed both his (Indian Suite > and his < Piano Concerto) on the same program — which was a most signal honor for a new composer — MacDowell's name appeared prominently and fre¬ quently on American orchestral programs. . In 1891-92, too, he gave his first piano recitals which further enhanced his American fame. A couple of years later (14 Dec. 1894) Mac¬ Dowell achieved unprecedented success by his performance, with the Philharmonic Society at New York, of his own < Second Concerto for Piano and Orchestral By 1896, then, his name and fame as pianist and composer were fully established in America, if not also in Europe.

That year another important turning point in MacDowell's life was reached. Accepting the chair of music in the then newly-created music department at Columbia University, Mac¬ Dowell plunged into teaching with, such Zeal and energy — devoting almost all his time and vital¬ ity to his arduous task— that eight years of it (1896-1904) was enough to undermine his health beyond repair. In 1905, one year after MacDowell had resigned his Columbia pro¬ fessorship (owing to a disagreement with the faculty as to the proper place of music in the college curriculum), alarming symptoms of a mental disorder appeared, which soon cul¬ minated in hopeless insanity. In this sad state MacDowell lingered till 23 Tan. 1908, when he died in New York, in his 4/th year.. .

The list of MacDowell's compositions is a long one. His works extant (the composer himself, in a moment of ruthless self-criticism, destroyed a number of his compositions) in¬ clude two suites for orchestra (the Indian

Suites *Nos. 1 and 2), which are his most pre¬ tentious and best-known orchestral composi¬ tions ; two concertos for piano and orchestra, which rank among the best of their kind; four sonatas for piano (the (Norse,* the (Keltic,* the (Eroica* and the <Tragica)), which alone would have made any composer famous; five symphonic poems ((Hamlet and Ophelia,* (The Saracens,* (Lamia, } (Lovely Alda* and the (Lancelot and Elaine,* already mentioned), which possess much originality and considerable melodic charm ; two most delightful piano suites (the (Woodland Sketches) and the (Sea Pieces*), which contain some of MacDowell's most popular and fascinating shorter pieces, and numerous songs of charming simplicity and melodiousness.

As may be inferred from his musical titles, MacDowell is a romantic composer. His music is program music of the poetic, not the descrip¬ tive, kind; for MacDowell does not delineate objects, but rather the moods aroused by them. A pupil and disciple of Raff, MacDowell fre¬ quently gives his music the woodland flavor. Such titles as (Forest Idyls, *(New England Idyls> and 'Woodland Sketches,* among others too numerous to mention, clearly indicate that MacDowell is the Wordsworth of music. His lyrical pieces show the unmistakable influence of Grieg, whose music the American composer greatly admired; while as a romanticist he should be classed with Schumann and Mendels¬ sohn. Consult Gilman, Lawrence, (Edward MacDowell* (New York 1909), and Page, E. F., 'Edward MacDowell; His Work and Ideals> (ib. 1910).

McDOWELL, Ephraim ((<Father of Ovariotomy®), American surgeon: b. Rock¬ bridge County, Va., 11 Nov. 1771 ; d'. Danville, Ky., 20 June 1830. He studied medicine at Staunton, Va., and at the University of Edin¬ burgh, then the most famous medical institution in the world. He established himself in prac¬ tice at Danville, Ky., and became known throughout the Southern and Western States as the best surgeon in his part of the country. In 1809 he performed the hitherto unknown operation of extirpation of the ovary with com¬ plete success, and twice repeated the feat be¬ fore he made an official report of the cases in 1816. His delay in reporting the first case and the seeming impossibility of the performance subjected him to considerable criticism in high quarters both at home and abroad. However, the fact of the success of the operation, sev¬ eral times repeated, is fully substantiated and the method he conceived and carried out has been but little modified, with the exception of asepsis and the use of anaesthetics. In lithotomy he had operated 22 times before 1828 without a fatality. Author of a report of his most fa¬ mous cases in the Eclectic Repertory and Ana¬ lytic Review (1817). Consult Gross, S. D., (Origin of Ovariotomy> (1853) ; Jackson, J. B., biographical Sketch of Ephraim McDowell > (1873) ; Letcher, J. H., 'Memoir of Ephraim McDowell* (1875).

McDOWELL, Irvin, American soldier: b.

near Columbus, Ohio, 15 Oct. 1818; d. San Francisco, Cal., 5 May 1885. He studied at the College de Troyes, France, and was gradu¬ ated at West Point in 1838. During the Cana¬ dian troubles he was stationed on the Niagara

and on the Maine frontiers, and in 1841 served at West Point as assistant instructor in tactics, becoming adjutant in 1845. In 1845 he went to Mexico as aide-de-camp to General Wood and for gallant conduct at Buena Vista in 184/ was promoted brevet captain, shortly afteiward attaining the rank of assistant adjutant-geneial. Subsequently he was stationed at the V ar De¬ partment in Washington and in 1856 was raised to the rank of brevet major. He

was on Gen¬ eral Wood's staff at the outbreak of the Civil War and assisted in inspecting and organizing the volunteer troops at Washington. In May 1861 he was made brigadier-general of the volunteers and given command of the Army of the Potomac. Constrained by the impatience of the North, McDowell moved in July to meet the enemy and despite his carefully laid plan met a disastrous defeat at Bull Run, 21 1 uly 1861, owing to the imperfect organization of his raw recruits. Shortly after McClellan was given command of the army and MxDowell was retained at the head of one of its divisions. In 1862 he was promoted major-general of volunteers and placed in command of the Fust corps, which became the Army of the Rappa¬ hannock, stationed to guard Washington In August 1862 he received command of the ihird corps of the Army of Virginia and fought under General Pope at the battles of Cedar Mountain, Rappahannock Station and the sec¬ ond battle of Bull Run, where he performed especially good service. He was removed from the field in September 1862. Considering this action of the War Department a diiect reflection upon his military services, he. asked for an investigation, the result of which was favor¬ able to him. From May to July 1863 he was president of a board appointed to investigate alleged cotton frauds, and during the following 10 months presided over the board for retiring disabled officers. In July 1864 he was placed in command of the Department of the Pacific Coast, and in March 1865 was made brevet major-general in recognition of his gallant services at Cedar Mountain. In 1872 he suc¬ ceeded General Meade as major-general in. the regular army and was in command of various military departments until 1882, when he was retired. The last years of his life were spent in California.

McDOWELL, James, American states¬ man: b. in Rockbridge County, Va., 1796; d. 1851. He was graduated at Princeton in 1817 ; in 1831 was elected to the Virginia legislature; was governor of that State, 1842-44, and from 1847 to 1851 represented it in Congress. He favored the gradual abolition of slavery, al¬ though advocating the claim of State rights. As orator and debater in Congress he bore a prominent part in the proceedings of that body leading up to the Compromise of 1850.

McDOWELL, William Fraser, American Methodist Episcopal bishop: b. Millersburgh, Ohio, 4 Feb. 1858. He was . educated at the Ohio Wesleyan and Boston universities and was ordained in the Methodist ministry in 1882. He held pastorates at Lodi, Oberlin and Tiffin, Ohio, and in 1890-99 he was chancellor of the Univer¬ sity of Denver. He was corresponding secretary of the board of education of the Methodist Church in 1899-1904 and was elected bishop in 1904. He was Cole lecturer at Vanderbilt Uni¬

versity in 1910, has served as international com¬ missioner of the Y. M. C. A. since 1899 and since 1906 has been president of the board of trustees of Northwestern University. He made an official tour of India, China, Japan and the Philippines in 1910-11. Author of In the School of Christ> (1910); <A Mans Religion' (1913); 'Good Ministers of Jesus) (1917).

MACDUFF, mak-duf', Scottish thane, or Earl of Fife, a half-mythical personage, com¬ memorated in Shakespeare s play, 'Macbeth. He is said to have been the principal agent in the overthrow of the usurper Macbeth and the restoration of Malcolm Canmore to the thione of Scotland. For this he was granted many privileges, among them that of a place of lefuge to which he and his descendants could flee in case of committing unpremeditated murder. This sanctuary, in the form of a cross, stood till 1559, near Newburgh in Fife, in the pass leading to Strathearn. It was then demolished by the Reformers, but its pedestal yet remains.

McDUFFIE, mak-duf'i, George, American statesman and orator: b. in Columbia (now Warren) County, Ga., 1788; d. in Sumter Dis¬ trict, S. C., 11 March 1851. He was graduated at South Carolina College in 1813, admitted to the bar in 1814 and in 1818 elected to the South Carolina legislature. From 1821 to 1834 he was a member of Congress, and from 1834 to 1836 governor of South Carolina. In 1843 he took his seat in the United States Senate, resigning on account of impaired health in 1846. In his political views and in his Congressional career, he was a close follower of J. C. Cal¬ houn (q.v.), being at the outset a liberal con¬ structionist in constitutional questions, but afterward becoming a strong . opponent of the tariff and other economic policies of the govern¬ ment, and also a bold advocate of nullification. Although a supporter of Andrew Jackson (q.v.) in 1828, he became bitterly antagonistic to him, not only in respect to the tariff and State rights, but especially so on the question of the United States Bank, which, as chairman of the Com¬ mittee on Ways and Means, he strongly de¬ fended against the hostile policy of the Presi¬ dent. In 1832, as a member of the South Caro¬ lina Nullification Convention, he drafted the ad¬ dress of South Carolina to the people of the United States. He was one of the. ablest orators of his day, and his prominence in pub¬ lic affairs was maintained in spite of an early wound received in a duel, from which he suf- ■fprprl fnr the remainder of his life.

MACE, Jean, zhon ma-sa, French educator and writer: b. Paris, France, 22 April 1815; d. there, 13 Dec. 1894. He was educated at the College Stanislas, served in the French army, 1842-45, was editor of La Republique in 1848 and as such was a strong supporter of the Rev¬ olution of that year. In 1851, on the coup d'etat, he had to withdraw from Paris, and subsequently taught school in Alsace for 10 years. In 1866 he founded a league of instruction in the Bel¬ gian manner. He was decorated with the Legion of Honor in 1880, and elected senator in 1883. He was the author of many popular books for young people, the aim of which was mainly educational, among them his best-known work, 'Contes de petit-chateau1* (1862), called in the English translation 'Home Fairy Tales1* ; 'History of a Mouthful of Bread* (1861) ;

'Servants of the Stomach) (1866); (France Before the Franks* (1881).

MACE (Lat. macir, Greek ga-nep, an East Indian spice), an aromatic spice made from the arillode or false aril which covers the seed of a nutmeg (Myristica fragrans). The yel¬ low external covering of the nutmeg (q.v.) being removed, the red, rather fleshy, arillode which partially conceals the nutmeg is en¬ countered. After drying in the sun for several days this becomes more or less translucent and usually orange yellow and waxy. In this form it is largely exported from the Spice Islands, where it is native, and from the West Indies, where it has been introduced into cultivation. The powerful but agreeable nutmeg-like odor and flavor characteristic of it are due to a volatile oil which is obtained by distillation for use in perfumery and culinary articles. A but¬ tery fixed oil obtained by expression is used af¬ ter the admixture of the volatile oil under the names nutmeg balsam and nutmeg butter. White mace is obtained from M. otoba and red mace from M. tingens; also a low grade from M. fatua, but this is rarely found in the market. Mace is also largely used whole or ground in cookery.

MACE, a weapon of war formerly in use in Europe, chiefly among the cavalry, as late as the 16th century, and still used among savage

tribes. It consists merely of a staff about five feet long, with a knob at the end made of iron or some other heavy substance. The knob was sometimes covered with spikes. In England the mace is used as an emblem of the officers of state, before whom it is carried. It is made of the precious metals, or of copper, gilt and ornamented with a crown, globe and cross.

MACEDO, Joaquim Manoel de, ho-a-ken'

ma'noo-el da ma-sado, Brazilian poet, nov¬ elist and statesman: b. Sao Joao d'ltaborahi, 24 June 1820; d. Rio de Janeiro, 11 April 1882. He studied medicine, but presently began to write and became professor of national history in the College of Dom Pedro at Rio de Janeiro. He was one of the most prominent of Brazilian authors in the 19th century, and being keenly interested in politics was elected to the Brazilian Chamber in 1854. His works include (More-ninha,* a novel (1844; 5th ed., revised, 1877) ; (0 Moqo Louro,* a novel of the early stages of the Portuguese conquest (1845) ; (0 Dous Amores) (1848) ; Wicentina* (1853) ; (A Neb-ulosaP a poem (1857), his greatest work, consisting of six cantos in unrhymed hendeca-syllables ; <Cobe,) a drama; (Fantasma Branco,* a comedy (1856) ; (Nociones de cronografia do Brasil > (1873; translated into French by Halbout), *etc.*

MACEDO, Jose Agostinho de Padre, Por¬ tuguese poet and author: b. Beja, 1761; d. 1831. He received his education in Latin and rhetoric under the Oratorians at Lisbon and became a member of fhe Augustinian Order in 1778. Temperamentally unfitted for a monastic life he failed to conform to the discipline of the order and in consequence was imprisoned in one convent or another the greater share of the time. He eventually abandoned the monas¬ tery and his subsequent excesses caused him to be unfrocked in 1792. Intercession on the part of influential friends, however, secured

for him a papal brief which secularized him but restored his ecclesiastical status. He then entered journalism and-his preaching gained for him a foremost position among the orators of his. day. In 1802 he was appointed a court preacher. He established and contributed to a large number of journals and was famous for his keen satire and wit, although he also gained the reputation of being the ((chief libeller of Portugal.® He was a staunch adherent of absolutism and seriously advocated the mas¬ sacre of all opponents of Miguel. He was cen¬ sor of books in 1824—29, when he resigned upon being

threatened with proceedings by his own political party, his support having become harm¬ ful to its interests. He had gained a consider¬ able reputation through his verse, which in¬ troduced into Portugal didactic and descriptive poetry, and his (Meditation* (1813) was a notable production. His ambition then led him to covet the place held by Camoens as Por¬ tugal's leading poet, and in 1814 he published (Oriente) for which he unwisely chose the subject of Camoens' (Lusiads,* the dis¬ covery by Gama of the sea route to India. While the verse itself was not without strength and grace the epic, as a whole, was flat and insipid, and failed utterly to cause its author to outshine Camoens. Maccdo then published his (Censura dos Lusiados,* in which he bitterly attacked Camoens, and brought upon himself Bocage's scathing (Pena de TaliaoP His (Os Burros* is no less pitiless in its betrayal of his own evil character than shameless in its ex¬ coriation of men and women in all grades of society, living or dead. He translated the (Odes* of Horace and made several attempts at drama but these are not particularly notable. He was at his best in his odes to Wellington and to Alexander, and in the verse in his (Lyra anacreonticaP There is some doubt concerning (A Demonstration of the Existence of God) as being from his pen, but it is usually credited to him and shows high ability. He was notori¬ ous for his ingratitude, and merciless in his satire, but he died with many friends and a great reputation, although his fame was of brief duration. Consult T. Braga's edition of (Memorias para la vida intima de Jose Agos¬ tinho de Macedo) (1899) ; (Cartas e opusculos*

(1900).

MACEDONIA, mas-ˆ-do'm-a, an ancient • monarchical territory constituting since 1918 a part of Jugo-Slavia and a part of Greece and prior to the War in the Balkans (1913) largely included in the Turkish vilayets or provinces of Monastir and Saloniki. It is inhabited by a turbulent heterogeneous population of Turks, Greeks, Bulgarians, Serbians, Wallachians, Al¬ banians and Jews. Roughly it extends from the sanjak of Novi-Bazar in Serbia to Salon¬ ika and from the borders of Albania to the meridian of Kavala in Greece. Its earliest name was Emathia, which remained the name of the district between the Haliacmon and the Axius, two rivers falling into the Thermaic Gulf, now the Gulf of Saloniki. This district was the earliest seat of the Macedonian mon¬ archy. There was also an older form of the name Macedonia, namely, Macetia, whence the Macedonians were sometimes called Macetae, even after the name Macetia had come to be disused. In the time of Herodotus the name

Macedonia was applied only to the district situated south and west of the Lydias, an¬ other river Which falls into the Thermaic Gulf, and which flows between the two already men¬ tioned. Philip of Macedonia extended his king¬ dom as far as the Lake of Lychnitis, in Illyria, in the west, Mount Scardus and Mount Orbelus in the north (so as to include the whole of Pseonia), and the river Nestus on the north¬ east. He added also the peninsula of Chal-cidice. The part which he conquered from Thrace, lying between the Strymon and Nestus, was called Macedonia adjecta. The provinces of Macedonia were, in general, known by name before the time of Herodotus. _ In the time of Philip there were 19. Macedonia was inhabited by two different races — the Thracians, to whom belonged the Pseonians and Pelagonians, and the Illyrians. The language of the south¬ ern Macedonians shows that there must have been a large admixture of Dorian settlers among them. Pliny speaks of 150 different tribes who dwelt here at an early period. They were divided into several small states, which were incessantly at war with the Thracians and Illy¬ rians, till Philip and Alexander gave the as¬ cendency to one, and made it the most power¬ ful in the world. The first of these princes, Who came to the throne in 359 b.c., taking ad¬ vantage of the strength of the country and the warlike disposition of its inhabitants, re¬ duced Greece, which was distracted by inter¬ necine broils, in the battle of Chaeronea, 338 b.c. His son, Alexander, subdued Asia, and by an uninterrupted series of victories for 10 successive years made Macedonia in a short time the mistress of half the world. After his death this immense empire was divided. Mace¬ donia received anew its ancient limits, and after several battles lost its dominion over Greece. The alliance of Philip V with Car¬ thage during the Second Punic War gave occa¬ sion to this catastrophe. The Romans delayed their revenge for a season ; but when Hannibal was conquered they sent over T. Quintius Flaminius, who defeated Philip at the battle of Cynoscep'halae' (197 b.c.) and compelled him to sue for peace, which was only granted upon his agreeing to acknowledge the independence of Greece, to surrender his vessels, to reduce his army to 500 men and defray the expenses of the war. Perseus, the successor of Philip, having taken up arms against Rome, was totally defeated at Pydna by Paulus TEmilius, 168 b.c., and the Romans took possession of the country. Indignant at their acts of oppression, the Mace¬ donian nobility and the whole nation rebelled under Andriscus. But after a long struggle they were overcome by Quintus Csecilius Mace¬ donian;

the nobility were exiled, and the coun¬ try became a Roman province, 148 b.c. As such it is mentioned in the New Testament, and Saint Paul's letters to the Thessalonians and Philippians are addressed to Macedonian Chris¬ tians. In 395 a.d., after the dissolution of the Roman Empire, Macedonia became part of the Byzantine Empire. It came under Turkish domination in the 15th century. .While the name has no modern territorial . significance, it has come into considerable political promi¬ nence in connection with the conflict of nation¬ alities in European Turkey and the races of the Balkans Peninsula, among whom the only ob¬

ject in common is a desire to throw off Turk¬ ish rule, the Bulgarians there desiring to >be governed from Sofia, the Serbians from Bel¬ grade, the Greeks from Athern and the Turks by the Young Turk party when it shall be established in Constantinople.

In addition to this question of nationality is one of religion, which complicates matters con¬ siderably. There are seven chief religious sects in Macedonia: the adherents of the original Greek Church; those of the schismatic Bulgarian Church ; those of the New Greek Church, who recognize the patriarch in Constantinople ; those Bulgarians and Serbians, converts of American missionaries, who call themselves Protestants; the Wallacks, who are an offshoot of the ancient Greek Church; those who practise the Jewish faith; and the Mohammedans.

The Turkish government, in administering the affairs of Macedonia, adopted the principle of assisting and protecting the weak and of snubbing and persecuting the strong or pre¬ dominating party; thus, in a certain district where the Greek was strongest he was least popular with the Turkish authorities. Near the Bulgarian frontier, where the Bulgarian element was practically held in subjection, sev¬ eral public offices were held by Greeks, and so on.

This mode of government led in 1895 to a Bulgarian uprising and in 1896 to a Greek re¬ volt, but would probably long since have proved its success from a Turkish point of view were it not for the fact that the Macedonian Com¬ mittee in Sofia, a society formed for the pur¬ pose of conducting a nationalist campaign in Macedonia to effect freedom from Turkish rule, discovered its real nature and set about to disrupt it. The result was the insurrection in 1903 headed by Boris Sarafoff, the avowed aim of which was to provoke the Turks to massacre Christians and to commit acts that would arouse Christendom and compel the Great Powers to expel them from Europe.

The insurrection was crushed by the Porte, with a comparative absence of the atrocities and cruelties that formerly characterized Turkish warfare. Autonomous institutions had been provided for Macedonian Christians by the Berlin Congress of 1878, and Austria and Rus¬ sia, acting with the authority of Europe, drew up a drastic reform scheme which provided that civilian agents of the two governments must accompany the Turkish inspector-general, to direct his attention to the . needs of the population, and to report to their governments what is done and what left undone. The re¬ organization of the police in the disturbed vilayets was put under the charge of a foreign officer. Mixed commissions of Mohammedans and Christians were to report on crimes and outrages. The sultan was to be ˆrequestedˆ to allot funds for the repatriation of exiles, for the immediate needs of the populations and for the rebuilding of their homes. Taxa¬ tion of the expelled Christians was remitted for a year, while the formation of bands of Bashi-Bazouks was absolutely prevented.

The Balkan Wars of 1912—13 were waged largely for the possession of Macedonia, and the access to the sea it would afford, by the younger Balkan powers. As a result of the first war, waged in 1912 by members of the

Balkan League, which included Montenegro, Serbia, Bulgaria and Greece, Turkey was de¬ prived of considerable territory, the division of which among the mutually contending Chris¬ tian states of the peninsula was left unsettled by the unsatisfactory treaty of peace signed on 30 May 1913. War again broke out in the succeeding month • Bulgaria attacking Serbia and Greece on 30 June, and Rumania joining forces with the latter on 9 July. Three days after Turkey stepped into the field and Adrianople (taken by Bulgaria from Turkey in the former war) was recaptured. This war ended with the humiliation of Bulgaria; and when the treaty of peace was signed at Bucharest (29 September) the net result of the two wars for her was the handing back to Turkey of territory won in the preceding year,

and (apart from a very small oart) the division of Mace¬ donia between Serbia and Greece. The World War cost Bulgaria the remainder of Macedonia.

MACEDONIAN, The. See United

States and Macedonian, Battle of.

MACEDONIANS, followers of Macedo¬ nia, author of the Macedonian heresy; also called Pneumatomachi, or ˆAdversaries of the Spirit.® The Macedonians came into existence toward the decline of the Arian controversy, when Macedonius became patriarch of Con¬ stantinople (341), and taught that the Holy Ghost was ˆsubordinate to the Father and to the Son, unlike to them in substance, and a creature.® He was a semi-Arian; was deposed by the Arlans in 360; and his special tenets condemned at the Council of Constantinople in 381. In that council the clauses defining the nature of the Holy Ghost were added to the

Nicene Creed.

*

MACEIO, ma-sa-yo', Brazil, formerly Ma- £Ayo, city and capital of the state of Alagoas, on the Atlantic Coast, 135 miles southwest of Pernambuco. The city has a cathedral, lyceum, government and other buildings. It has manu¬ factures of machinery and cotton goods, and considerable shipbuilding is carried on here. Cotton, corn and hides are the chief items of export. Maceio is the seat of a United States consular agent. Pop. 33,000.

McENTEE, Jervis, American painter: b. Rondout, N. Y., 14 July 1828; d. there, 27 Jan. 1891. He was educated at the Liberal Insti¬ tute, Clinton, N. Y., and later studied under F. E. Church. He also visited Europe in 1869, studying in the principal galleries and sketching in Italy and Switzerland. He made his first contribution to the American Academy of De¬ sign in 1853, was elected associate of that insti¬ tution in 1860 and academician in 1861. After his return from Europe he took a studio in the famous studio building in West 10th street, New York, and devoted himself to landscape painting, although in later years he executed a number of figure canvasses. He belonged to the (<Hudson River School® of artists and his favorite subject was the autumn type of landscape, although his work is 'by no means confined to one phase or season. A sale of his work in New York in 1888 disposed of 75 of his pictures which he considered the best of the preceding 10 years' work, and after his death 100 more were sold.

Among his paint¬ ings are (The Melancholy Days Have Come)

(1860); (Sea From Shore) (1873); (01d Mill in Winter) (1874); (Clouds) (1879); (Glimpse of Hunter Mountain (1886) ; (A Cliff in the Catskills) (1888). His (Autumn Landscape) hangs in the Metropolitan Museum, New York.

MACEO, ma-sa'o, Antonio, Cuban patriot: b. Santiago de Cuba, 14 July 1848; d. near Mariel, 2 Dec. 1896. He joined the insurgent army as a private in 1868 and though without martial training his natural military ability and personal magnetism as a leader soon brought him to the front, making him second only to Gomez. Under his skilful leadership Martinez Campos was defeated at Demajayabo and at La Galleta ; his campaign in Baracoa in 1878 evidenced masterly generalship, as did also his utter rout of Santacledes at San Ulpiano. Ma-ceo alone of all the Cuban generals refused to sign the Peace of Zanjon and made for two months a brave effort to reanimate the ex¬ hausted revolutionary spirit. Finding his co-patriots thoroughly discouraged, he abandoned the struggle and still refusing to sign the peace, made a tour of the United States and other countries in America seeking support for the cause of Cuban independence. He was the first of the Cuban leaders to land in 1895, and in the revolution which followed took a promi¬ nent part. His achievements in the campaign in Pinar del Rio province, and his battles at Paralejo, Jobito, Mai Tiempo and Candelaria are among the most brilliant feats in the his¬ tory of Cuba's long struggle for independence. While crossing the trocha between Majana and Mariel, attended only by his staff, he was sur¬ rounded by a Spanish force and killed.

MACEO, Jose, ho-sa, Rafael, Cuban pa¬ triot: b. Santiago de Cuba, 1846; d. La Loma del Gato, Cuba, 5 July 1896. He was a brother of Antonio Maceo (q.v.) and took a conspicuous part in the Rebellion of 1868-78. He remained in Santiago de Cuba after the Peace of Zanjon, which he with his brother refused to sign. He was prominently connected with the uprising of 1879 in which he was captured and sent to Spain. An attempted escape to Gibraltar re¬ sulted in his deportation to the Fortress La Mola at Mahon, in the Balearic Isles, whence he succeeded in making his escape to Algiers. He lived in Costa Rica fom 1885 until the out¬ break of the rebellion in Cuba in 1895, when he at once joined the insurrectionary army. Fie raised a large force which he commanded with signal success at Jobito and later was victorious over Canellas at Sao del Indio. He was killed in a furious engagement at La Loma del Gato in which the Cubans were

finally victorious. For an adequate account of the importance-of the Maceo brothers consult General Weyler's (Mi Mando en Cuba, 10 Febrers 1896 a 31 Octubre 1897) (5 vols., Madrid 1910-11).

MACERATA, ma-cha-ra'ta, central Italy, (1) an episcopal city, capital of the province of the same name, picturesquely situated on an eminence 1,207 feet high, between the Apen¬ nines and the sea, 21 miles south of Ancona. It is encircled by walls, pierced by six gates, has a cathedral, provincial palace and theatre on the central public square, town-hall (13th century), a college founded in 1290, museum, *etc.* Terra cotta, chemicals and matches are among its manufactures. Pop. of commune

22,940. (2) The province has an area of 1,087

square miles.

McEWEN, mak-uen, Walter, American

painter: b. Chicago, Ill., 1860. He studied un¬ der Cormon and Tony Robert-Fleury in Paris, afterward living chiefly abroad. His work in¬ cludes landscapes, portraits, decorative panels and figure subjects and is marked by excellent sense of line and strong feeling for color. He executed panels for the Liberal Arts Building at the Columbian Exposition, Chicago, and for the Congressional Library, Washington. He has been awarded numerous prizes, including gold medals at Berlin, Vienna and Munich, the Lippincott prize at Philadelphia and the Harris prize at Chicago. He is an officer of the Legion of Honor and of the Belgian Order of Leo¬ pold. He served on the International Jury of Awards at the Panama Exposition in 1915. Many of his paintings have been acquired by public galleries. Among them are (Sunday in ITolland) (Luxembourg) ; ‘An Ancestor5 (Cor¬ coran - Gallery, Washington) ; ‘Judgment of Paris> (Art Institute, Chicago).

McFARLAND, mak’far’land, John Hor¬ ace, American master printer and civic improve¬ ment expert: b. McAlisterville, Juniata County Pa., 24 Sept. 1859. He was privatelv educated, learned the printing business and in 1878 estab¬ lished his own business, which after several changes was incorporated as the J. Horace Mc¬ Farland ‘Company in 1891. In 1890-93 he printed and was a contributor to American Gardening, and in 1901-04 he printed Country Life in America, also contributing articles and photographs. He edited the ‘Beautiful America> department in The Ladies’ Home Journal in 1904-07. He is an active member of various leagues for improving and beautifying Ameri¬ can cities and villages, is an ardent advocate of national parks and forest conservation and or¬ ganized a campaign for the preservation of Niagara Falls. He edited the American Rose Annual in 1916-18; furnished photographic illustrations for Mabel Osgood Wright’s ‘Flow¬ ers and Ferns in their Haunts,) and assisted in illustrating and printed Bailey s “Standard Cy¬ clopedia of

Horticulture. > He has contributed to numerous periodicals and is author of ‘Photographing Flowers and Trees) (1902) ; ‘Laying Out the Home Grounds) (1915); ‘My Growing Garden> (1915).

McFARLAND, John Thomas, American Methodist clergyman: b. Mount Vernon, Ind., 2 Jan. 1851 ; d. 22 Dec. 1913. He was educated at’ the Iowa Wesleyan University, Simpson Col¬ lege, Iowa, and at Boston University, and was ordained in the Methodist ministry in 1873. He filled pastorates at Millers’burg and Sweetland Centre, Iowa; Portsmouth, R. I. ; Elmwood and Peoria, Ill.; was president of the Iowa Wes¬ leyan University in 1884—91 ; pastor of Grace Church, Jacksonville, Ill., of New York Avenue Church, Brooklyn, and First Church, Topeka, Kan. He was editor of the Sunday School literature of the Methodist Church from 1904 until his death. Author of ‘Preservation vs. The Rescue of the Child) ; ‘The Book and the Child J ; ‘Etchings of the Master.5

MACFARLANE, Alexander, American mathematician : b. Blairgowrie, Scotland, 21 April 1851 ; d. 28 Aug. 1913. He was gradu¬ ated at Edinburgh University in 1875, taking

his D.Sc. in 1878, and in 1881 was appointed examiner in mathematics there. He became professor of physics at the University of Texas in 1885 and from 1897 was lecturer on mathe¬ matics at Lehigh University. He was a Fellow of the Royal Society of Edinburgh and a mem¬ ber of the Washington Academy of Sciences. Author of ‘Algebra of Logic) (1879); ‘Physi¬ cal Arithmetic (1885); ‘Papers on Space Analysis) (1894); ‘Bibliography of Quater¬

nions and Allied Mathematics5 (1904), *etc.*

MacFARREN, Sir George Alexander, English composer: b. London, England, 2 March 1813; d. there, 31 Oct. 1887. He was educated at the Royal Academy of Music, where m 1837 he became a professor of harmony and composi¬ tion and in 1875 principal. In the same year he was elected professor of music in Cam¬ bridge University. Among his compositions are the operas ‘The Devil’s Opera5 (1838); ‘Robin Hood) (1860), and the oratorios ‘St. John the Baptist> (1873); ‘King David5 (1883), *etc.* He also wrote several valuable treatises: Harmony) (1860); ‘Counterpoint5 (1879), *etc.* He was knighted in 1883. In 1860 he became blind and his wife thereafter wrote his compositions from his dictation.

McFAUL, James Augustine, American

Roman Catholic prelate: b. Larne, County An¬ trim, Ireland, 6 June 1850; d. 16 June 1917. At an early age he attended Saint Vincent s Col-We Beatty, Pa., finishing his classical studies at Saint Francis Xavier's College, New York City, and subsequently pursuing his theological course at Seton Hall, South Orange, N J. He was ordained priest 26 May 187/, Orange, Paterson, Jersey City, Newark and New Bruns¬ wick, N. J., being in turn the scene of his first labors in the ministry. In 1878 he was named assistant at Saint Mary's Church, Trenton N J., and afterward pastor of the church of Our Lady Star of the Sea, Long Branch N. J. Some years later he assumed the rectorship of the Cathedral at Trenton, and then became sec¬ retary, chancellor and vicar-general of the diocese. On the death of Bishop O Farrell in 1894 Father McFaul was chosen his successor and was consecrated at Trenton 18 October of that year. Noteworthy among his achievements were the erection of an orphan asylum at Hope-well and of a home for the aged at Laurence-ville, N. J., also a day nursery in Trenton. He is the author of some excellent articles on 'American Citizenship,5 published a volume of pastoral letters, etc., and was a leading power in forming the Saint Michael's Diocesan Union. However, he is perhaps best known as the founder of the Federation of Catholic Societies and the reorganizer of the Ancient Order of Hibernians, American branch.

MacFLECKNOE, or A SATIRE UPON THE TRUE-BLEW PROTESTANT POET, T. S., a satire by John Dryden (q.v.), published in 1682, in which Thomas Shadwell has the principal part. Dryden here introduced the name of Richard Flecknoe (1600-1678?), who by the author is represented as an Irish priest famed for his bad verse, but who is described by Andrew Marvell as "an English priest at Rome.55 Flecknoe was disliked by Dryden because of the former's abuse of the players and his attacks on their morality or rather absence of it. The name served also as a

stalking-horse from behind which Shadwell might be pilloried as the adopted son and heir of Flecknoe. The satire served Pope as model for his <Dunciad.) The authorship of (MacFlecknoe5 long disputed and attributed to Dry-den, was called in question in 1918 when there appeared a possibility that it might have been written by John Oldham, Dryden's friend. A manuscript of the latter's poems in the Bod¬ leian Library contains (MacFlecknoe,5 but Dry-den claimed authorship of the piece and his friend Oldham never did. Consult Belden, H. M., (The Authorship of MacFlecknoe5 (in Modern Language Notes, December 1918).

McFLIMSEY, mak flim'zi, Flora, the

heroine of the once famous poem (Nothing to Wear,5 'by William Allen Butler (q.v.). It was published in 1857 and became immediately pop¬ ular.

MacGAHAN, mak-ga'han, Januarius Aloysius, American journalist and war correspond¬ ent : b. near New Lexington, Ohio, 12 June 1844; d. Constantinople, 9 June 1878. He fol¬ lowed different callings in Western States, then went to Europe and studied law in Brussels. Lipon the outbreak of the Franco-German War in 1870 he went to the field as correspondent of the New York Herald, and was with Bourbaki's army. He visited Bordeaux and Lyons and his interviews with clerical, monarchical and repub¬ lican leaders attracted wide attention. He was the only newspaper correspondent in Paris dur¬ ing the whole period of the Commune and nar¬ rowly escaped death. In 1873, after heroic ex¬ ertions, with extreme hardships, he reached the Russian army before Khiva, and sent to the Herald reports of the campaign which won for him high admiration both here and in Europe, his account of the capitulation of the city being regarded as ((a masterpiece of military journal¬ ism.® Returning to America, he went to Cuba to report on 'the Virginias affair, then to Spain, upon the Carlist uprising, where he spent 10 months with the army of Don Carlos, was captured by the Republicans, mistaken for a Carlist, condemned to death and saved by the intervention of the United States Minister. He then went to England, and in 1875 accompanied the Arctic expedition on the Pandora. In 1876 he joined the Turkish army, in the service of the London Daily News, and did memorable work in his description of the Bulgarian atroci¬ ties, his accounts standing approved before the world in face of all attempts to discredit them. In behalf of Bulgaria he appealed to Russia, was at the front in the Russo-Turkish War that followed, and was hailed as a chief instrument of Bulgaria's resulting independence. While nursing a friend he contracted a fever which in a few days caused his death. In

1884 the Ohio legislature secured the removal of his body from its foreign grave to its final resting-place at New Lexington. He wrote ˆCampaigning on the Oxus, and the Fall of Khiva) (1874) ; (Under the Northern Lights5 (1876), and (Turkish Atrocities in Bulgaria) (1876).

McGEE, ma-ge', Anita Newcomb, Amer¬ ican physician: b. Washington, D. C, 4 Dec. 1864. She is a daughter of Simon Newcomb (q.v.) ; was educated at Newnham College, Cambridge, England, at the University of Geneva and at other institutions in Europe; also graduated in medicine at Columbian (now George Washington) University, 1892, and took

a post-graduate course in gynecology at the Johns Hopkins Hospital. From 1892 to 1896 she practised in Washington. In 1888 she mar¬ ried W. J. McGee (q.v.). She has held prom¬ inent positions in the National Society of the Daughters of the American Revolution, and from April to September 1898 was director of its hospital corps, which selected women nurses for army and navy. In August 1898 to Decem¬ ber 1899 she was acting assistant surgeon in the United States army, being the first woman to hold such a position, and was assigned to duty in the surgeon-general's office, where she organ¬ ized the army nurse corps. When the Con¬ gress approved this work by making the nurse corps of trained women a permanent part of the army the pioneer stage was passed, and she resigned 31 Dec. 1900. In 1904, acting as presi¬ dent of the Society of Spanish-American War Nurses and as representative of Philadelphia Red Cross Society and by agreement with Japanese government, took a party of trained nurses formerly in United States army to serve in the Japanese army for six months gratuitously. Was appointed by the Japanese Minister of War as supervisor of nurses, which placed her in the same rank with officers of the Japanese army, and inspected and reported on relative nursing conditions. She is a re¬ cipient of the Japanese Imperial Order of the Sacred Crown and of a special Japanese Red Cross decoration and two Russo-Japanese War medals. She is a member of the Association of Military Surgeons of the United States and of the Spanish War Veterans, being the only woman eligible. She lectured on hygiene at the University of California in 1911, and has lectured throughout the United States and writ¬ ten for various magazines.

McGEE, Thomas D'Arcy, Canadian jour¬ nalist and politician: b. Carlingford, Ireland, 13 April 1825 ; d. Ottawa, Ontario, 7 April 1868. In 1842 he emigrated to the United States. In 1845 he returned to Ireland, but complicity in the Young Ireland movement and an

abortive attempt to raise rebellion among the Glasgow Irish caused him to seek refuge in the United States in 1848. McGee then edited the New York Nation for two years, became converted to constitutional methods for the redress of Irish grievances and went to Canada in 1857 where he was editor of the The New Era. He entered Parliament in 1857 ; was president of the Council 1864-67 and Minister of Agri¬ culture on the carrying through of confedera¬ tion, which his eloquence and persuasiveness had done much to popularize. His assassina¬ tion was the result of his opposition to the Fenian movement. He published (History of Ireland5 (1862); (Speeches and Addresses of the British-American Union5 (1865), *etc.*

McGEE, W J, American scientist : b. in Dubuque County, Iowa, 17 April 1853; d. Wash¬ ington, D. C., 4 Sept. 1912. He was self-edu¬ cated, and from 1873 to 1875 surveyed land and practised in the courts. He also improved sev¬ eral agricultural implements, some of which he patented. In 1877— 81 he made geologic and topographic surveys of northeastern Iowa, and for the United States Geological Survey he sur¬ veyed and mapped 300,000 square miles in the southeastern part of the country, and performed many other important services in the depart-

merits of geology, ethnology and anthropology. From 1893 to 1903 he was ethnologist in charge of the Bureau of American Ethnology. He was president of the American Anthropological As¬ sociation, chief of the Department of Anthro¬ pology and Ethnology of the Louisiana Pur¬ chase Exposition and associate editor of the National Geographic Magazine. He wrote (Geology of Chesapeake Bay) (1888) ; Pleisto¬ cene History of Northeastern Iowa) (1891) ; {The Lafayette Formation) (1892) ; Potable Waters of the Eastern United States) (1894); (The Siouan Indians) (1897) ; Primitive Trephining in Peru > (1898); (The Seri Indians) (1899); Primitive Numbers* (1901); (Soil Erosion* (1911); (Wells and Subsoil Water* (1913), and many scientific memoirs.

McGIFFERT, ma-gif'ert, Arthur Cush¬ man, American theologian and

author: b. Sau-quoit, N. Y., 4 March 1861. He was graduated at the Western Reserve College in 1882, and at Union Theological Seminary in 1885, and con¬ tinued his studies at the universities of Berlin and Marburg, Germany, and in France and Italy. In 1888-90 he was instructor in Church history at Lane Theological Seminary, Cincin¬ nati, and professor there 1890-93, since when he has been professor of Church history of Union Theological Seminary, New York. In 1897 he published (A History of Christianity in the Apostolic Age,* and in consequence of criticism and threatened denominational disturbance, in¬ volving his own probable trial for heresy, to which this book gave rise, he withdrew from the Presbyterian ministry, and later, while still retaining his professorship, joined the Congre¬ gational Church. His other publications include (Dialogue Between a Christian and a Jew,* doctor's thesis (1888), and a translation of Eusebius' (Church History, > with prolegomena and notes (1890) ; (The Apostles Creed) (1902); Protestant Thought Before Kant* (1911); (Martin Luther, the Man and hiis Work* (1911) ; (The Rise of Modern Religious Ideas* (1915).

McGIFFIN, ma-gif'in, Philo Norton,

American naval officer: b. Washington County, Pa., 1863; d. New York, 11 Feb. 1897. He was graduated in 1882 at the United States Naval Academy and was stationed in China, and at the outbreak of the war between China and France was permitted to resign from the United States navy to enter the service of China. He established a naval academy at Wei-hai-wei, of which he had charge. When the China-Japan War broke out he was placed in command of the Chen Yuen, and was the first American or European to command a modern warship in action. He was in command at the battle of Yalu River, in which action he was so severely injured that he afterward shot himself at a hospital in New York.

McGILL, ma-gil', James, Canadian philan¬ thropist : b. Glasgow, Scotland, 6 Oct. 1744; d. Montreal, 19 Dec. 1813. He was educated in Glasgow and in 1770 removed to Canada, where he engaged in the northwest fur-trade, after¬ ward becoming a merchant in Montreal. Mc¬ Gill was a member of the Parliament of Lower Canada and held the rank of brigadier-gen¬ eral in the War of 1812. He used much of his wealth in philanthropic work and at his death founded McGill College (q.v.) in Montreal.

McGILL COLLEGE AND UNIVER¬ SITY, in Montreal, Canada, was founded in 1811 by James McGill (q.v.). By will he left an estate

known as the ((Burnside Estate,** which contained 47 acres of land and a fine manor house, near Montreal, and £10,000 to the ((Royal Institution for the Advancement of Learning,® for the establishment of a univer¬ sity tin Lower Canada (province of Quebec). The bequest was valued at the time as worth about $120,000. It was stipulated that one of the colleges of the university should be known in perpetuity as McGill College. McGill Uni¬ versity includes a group of schools or colleges and is affiliated with Cambridge, Oxford and Dublin universities. Many generous benefac¬ tors have supplied means for the foundation of various departments or faculties. The late Lord Strathcona and Mount Royal erected and endowed the Royal Victoria College for Women. This is a residential college, and is only one of many gifts from the same donor, the last of which was a donation of $620,000 for the erection of a medical building. Sir William Macdonald erected, equipped and en¬ dowed the Macdonald Chemistry and Mining Building, the Macdonald Physics Building and the Macdonald Engineering Building. He also gave $200,000 endowment to the Law School, besides other large donations. He has been the chief benefactor of the university. Peter Redpath gave the University Library and the Peter Redpath Museum. The degrees conferred by the university are B.A. and B.Sc., in the Fac¬ ulty of Arts, and to both men and women; B.C.L. and D.C.L. in the Faculty of Law ; B. Arch, and B.Sc., in the Faculty of Applied Science; M.D., CM. and D.D.S., in the Faculty of Medicine; B.S.A. in the Faculty of Agricul¬ ture; Mus. Bach, and Mus. Doc. in the Depart¬ ment of Music and M.A., M.Sc., D.Sc., and D.Litt. in the Graduate School. There are four affiliated theological colleges which adjoin the university grounds. The supreme authority rests with the Crown and is exercised by the governor-general of Canada. The governors, 25 in number, manage the finances, appoint pro¬ fessors, pass statutes for the general govern¬ ment of the university and attend to other im¬ portant matters. The president of the board of governors is ex officio, the chancellor. The vice-chancellor is the principal, who is the head of the academic department and chief adminis¬ trative officer. The fellows number 43 and arc chosen from all the faculties, affiliated colleges and other bodies, with due regard to the rer> resentation of each. They constitute the cor poration, the highest academic body, which deals with courses of study, matriculation, dis¬ cipline, degrees, *etc.* There are connected with the university about 1,500 students and 200 oro-fessors and lecturers, besides a large number of demonstrators. The librarv contains about 154,000 volumes. The grounds and buildings are valued at more than $8,000,000. The uni¬ versity is increasing its fine plant and equip¬ ment as fast as its finances will permit.

MacGILLICUDDY'S (ma-gil-i-kud'i) REEKS, Ireland, a picturesque mountain range, in County Kerry, extending for 1 3]/2 miles from the lakes of Killarney on the east to Lough Carra on the west, and covering an area of 28 square miles. It is the loftiest moun-

tain range in Ireland, culminating in Carran-tuohill, 3,414 feet high.

McGILLIVRAY, ma-gil'i-vra, Alexander,

chief of the Creek Indians : b. in Alabama about 1740; d. Pensacola, Fla., 17 Feb. 1793. His father was a Scottish merchant of good fam¬ ily and his mother a half-breed. He received a good education at Charleston, S. C. ; was placed in a mercantile establishment in Savan¬ nah ; but soon returned to the Creek country, where he became partner in a large trading house and rose to a high position among the Indians. After the death of his mother, a mem¬ ber of the ruling stock, he became chief of the Creeks, having received a call from a formal council, and styled himself Emperor of the Creek Nation. During the Revolution the McGillivrays, father and son, were zealous adher¬ ents of the royal cause, the former holding the rank of a colonel in the British service. After the war Alexander McGillivray, in behalf of the Creek confederacy, entered into an alli¬ ance with Spain, of which government he was made a commissary, with the rank and pay of colonel. In 1790 he was induced by President Washington to visit New York, where he eventually signed a treaty yielding certain dis¬ puted lands lying on the Oconee. He was also persuaded to withdraw from Spanish service and was rewarded with an appointment as agent for the United States, with the rank and pay of brigadier-general.

McGILVARY, Evander Bradley, Amer¬ ican linguist and philosopher : b. Bangkok, Siam, 19 July 1864, of American parents. He was

graduated from Davidson College in 1884 and from Princeton in 1888. He was appointed as instructor in the classics at Bingham School in 1884, and in 1889-90 studied at Princeton Theological Seminary. From 1891 to 1894 he was translator for the Presbyterian Board of Foreign Missions in Siam, and in 1894 began graduate work at the University of California, where he later became assistant professor. In 1899 he was appointed Sage professor of ethics at Cornell. In 1905 he was appointed professor of philosophy at the University of Wisconsin. In 1910-11 he was president of the Western Philosophical Association and in 1912-13 of the American Philosophical Association. He has translated the Gospels of Matthew, Luke and John, and the Acts of the Apostles into the Lao dialect of Siamese. Has contributed to various philosophical journals and to encyclo¬ paedias.

McGLYNN, ma-glin', Edward, American

Roman Catholic clergyman: b. New York, 27 Sept. 1837; d. Newburg, N. Y., 7 Jan. 1900. He was educated at the College of the Propaganda in Rome, and from 1866 was pastor of Saint Stephen's Church in New York. He favored the education of children by the State rather than in parochial schools and in 1886 warmly supported the candidacy of Henry George for the mayoralty, thereby bringing upon himself the censure of the Church. He was summoned to Rome to exculpate himself, but refused to go, pleading his ill-health. Persisting in his re¬ fusal he was excommunicated in 1887. He was one of the founders of the Anti-Poverty So¬ ciety and was its president. In 1893, after a hearing before the Pope's delegate, Monsignor Satolli, the ban of excommunication was reVOL. 18 — 4

moved, after signing a document drawn up by the apostolic delegate to the effect that his eco¬ nomic views were not in conflict with the Cath¬ olic faith. He was in charge of Saint Mary's parish in Newburg at his death.

McGovern, ma-gov'ern, John, American author: b. Troy, N. Y., 18 Feb. 1850; d. 17 Dec. 1917. He was connected for 16 years with the Chicago Tribune, and after 1880 was engaged in literary work and lecturing chiefly on great writers and historical characters. In the action of S. E. Gross, author of the play (The Merchant Prince of Cornville,' against Edmond Rostrand, author of (Cyrano de Bergerac, ' he acted as lit¬ erary expert for the former, furnishing in the case over 700 exhibits containing innumerable parallels between the two dramas. The United States Court at Chicago issued a decree in 1902

sustaining the claim of Gross to priority of au¬ thorship and forbidding the representation of (Cyrano de Bergerac' in this country. Mc¬ Govern's numerous writings include (The Em¬ pire of Information (1880) ; (A Pastoral Poem' (1882) ; {The Toiler's Diadem) (1885) ; (Under the Open Sky' (1890) ; (King Dar¬ win,) a novel (1894) ; (American Statesmen (1898); (Famous Women of the World' (1898); (John McGovern's Poems) (1902); (The Golden Legacy' ; (History of Grain (1913) ; (Trees) psychologically considered; (Hospitality' ; (In Bohemia,) *etc.*

McGRATH, ma-grath', Harold, American journalist and novelist: b. Syracuse, N. Y., 4 Sept. 1871. He was educated in Syracuse and has been engaged in journalism since 1890. He has written (Arms and the Woman' (1899) ; (The Puppet Crown' (1901) ; (The Grey Cloak' (1903) ; (The Princess Elopes' (1905) ; (Enchantment' (1905) ; (Hearts and Masks' (1905); (Half a Rogue' (1906); (The Wat¬ teau Shepherdess,' an operetta (1906) ; (The Best Man' (1907) ; (The Enchanted Hat' (1908) ; (The Lure of the Mask' (1908) ; (The Goose Girl' (1909) ; (A Splendid Hazard' (1910) ; (The Carpet from Bagdad' (1911) ; (Place of Honeymoons' (1912); (Parrot and Co.' (1912); (Deuces Wild' (1913); < Adven¬ tures of Kathlyn' (1913) ; (Million Dollar Mystery' (1914) ; (Pidgin Island' (1914) ; (Voice in the Fog' (1915).

McGRATH, Patrick Thomas, British-American journalist: b. Saint John's, New¬ foundland, 16 Dec. 1868. He was educated at the Christian Brothers' School, Saint John's, and in 1889 became a reporter on the Saint John's Evening Herald. He was promoted act¬ ing editor in i 893, and in 1894-1907 was editor. He established the Evening Chronicle, which in 1912 was united with the Herald, and became president of the company. He has acted as Newfoundland correspondent of the London Times since 1904 and is an extensive contrib¬ utor to both British and American periodicals. He has been president of the Legislative Coun¬ cil of Newfoundland since 1915. He assisted in the preparation of the colony case concern¬ ing the French and American fisheries and was the colony's secretary on the occasion of the Dominion's Royal Commission visit to New¬ foundland in 1914. He has been honorary sec¬ retary of the Newfoundland Patriotic Fund, the Newfoundland Regiment Finance Commit¬ tee and the Newfoundland War Pensions

Board since 1914; and chairman of the High-Cost-of-Living Commission since 1917. Au¬ thor of <From Ocean to Ocean > (1911) ; New¬ foundland in 191 IP

McGREADY, ma-gra'di, James, American Presbyterian clergyman : b. in Pennsylvania about 1760; d. 1817. He studied for the minis¬ try in the school of John McMillan, of Can-nonsburg, Pa., and in 1788 was licensed to preach. After some years of work in North Carolina, in 1796 he removed to southwestern Kentucky, and under his direction began the great revival of religion which culminated in 1800 and became memorable in the religious his¬ tory of the country. He organized and con¬ ducted the first camp-meeting, and employed as preachers unordained young men without spe¬ cial theological training, thereby provoking dis¬ sension in the Presbyterian Church. Out of this disagreement arose the Cumberland Presbyte¬ rian Church (see Presbyterian Church), or¬ ganized in 1810. McGready, however, after¬ ward became reconciled to the older Church and resumed his fellowship in it. Two vol¬ umes of his sermons were published years after his death, the first at Louisville, Ky., in 1831, the second at Nashville, Tenn., in 1833. Con¬ sult Davidson, (History of the Presbyterian Church in the State of Kentucky) (New York 1847) ; Edson, (Early Presbyterianism in In¬ diana } (1898) ; Foote, Sketches of North Car¬ olina, Historical and Biographical y (New York 1850; 2d series, 1855) ; Smith, (History of the Cumberland Presbyterian Church. >

MacGREGOR, mak-greg'er, John ((<Rob Roy®), Scottish traveler, writer and philan¬ thropist: b. Gravesend, 24 Jan. 1825; d. Bos-combe, 16 July 1892. He studied at Trinity College, Dublin, and was graduated from Trin¬ ity College, Cambridge, in 1847. He was called to the bar in 1851, but after a brief period in which he devoted himself to the law of patents he abandoned the profession and spent his time in travel and in works of philanthropy. He traveled in Europe, Egypt, Palestine, Russia, Algeria and America. He was deeply interested in the history and theory of marine propulsion and was largely instrumental in the introduction of canoeing into British sports. He con¬ structed a canoe which he christened Rob Roy, and in which he made extended journeys. His books giving accounts of these expeditions were widely and deservedly popular. He was pos¬ sessed

of ample resources and gave liberally to philanthropic purposes. He sketched cleverly and illustrated his own books, and in early days occasionally contributed sketches to Punch. Besides numerous magazine articles he was author of (Three Days in the East> (1850); (Our Brothers and Cousins, A Tour in Canada) (1859) ; (A Thousand Miles in the Rob Roy Canoe) (1866) ; <The Rob Roy on the Baltic) (1867) ; (The Rob Roy on the Jordan, Red Sea and Gennesareth) (1869), *etc.*

McGUFFEY, mak-guf'fe, William Holmes, American educator: b. Washington County, Pa., 23 Sept. 1800; d. Charlottesville, Va., 4 May 1887. He was graduated at Wash¬ ington College, Pa., in 1826, was appointed pro¬ fessor of ancient languages at Miami Univer¬ sity in that year, and in 1832 became professor of moral philosophy there. He was appointed president of Cincinnati College in 1836 and of

Ohio University in 1839. He was professor of moral philosophy at Woodward College, Cin¬ cinnati, in 1843ˆ45, and thereafter until his death he was professor of moral philosophy and political economy at the University of Virginia. He prepared the series of school reading- and spelling-books known under his name and for many years widely popular in the schools of the United States.

McGUIRE, ma-gwir', Hunter Holmes,

American surgeon: b. Winchester, Pa., 11 Oct. 1835; d. near Richmond, Va., 19 Sept. 1900. He was graduated from the Winchester Medical College in 1855, and from the Medical College of Virginia in 1858, studying also in the medical schools of New Orleans and Philadelphia. He was professor of anatomy at the Winchester Medical College in 1856-58 and afterward prac¬ tised in Philadelphia. He enlisted in the Con¬ federate army at the outbreak of the Civil War, became medical director of the Army of the Shenandoah Valley and later of the Second Army Corps. He was in attendance upon Gen¬ eral ((Stonewall® Jackson at the time of his death in 1863. In 1865-78 he was professor of surgery at the Virginia Medical College, Rich¬ mond. He organized Saint Luke's Home for the Sick in Richmond, with a training school for nurses. He was president of the American Medical Association in 1893.

MACH, mah, Ernst, Austrian physicist and philosopher: b. Turas, Moravia, Austria, 18 Feb. 1838; d. 9 Feb. 1916. After a partly pri¬ vate secondary education he studied at the Uni¬ versity of Vienna,

taking his doctor's degree in physics in 1860. After spending several years as privatdocent he was appointed professor of mathematics at Gratz and in 1867 was called to the chair of physics at the University of Prague. Here he published in 1883 his first important work, (Die Mechanik in ihrer Entwickelung historisch-kritisch dargestelltP which has run through seven German and several English edi¬ tions. Having turned his attention to the re¬ lation of physiological and physical processes, he next produced his equally epoch-making (Analyse der Empfindungen) (1886; 6th ed., 1911). Owing to his increased interest in epistemological and historical problems, Mach gladly accepted in 1895 the offer of a philosoph¬ ical chair at Vienna, where he read on the history and theory of the inductive sciences. The following year appeared his (Principien der WarmelehreP while his university lectures ultimately took the shape of a substantial vol¬ ume in 1905 under the caption (Erkenntnis und IrrtumP A paralytic stroke suffered in 1898 re¬ duced the remainder of his life to a cripple's martyrdom, though it did not interfere with his mental activity. In spite of his liberal posi¬ tion in politics hie was honored with the title of a court chancellor and was made a member of the upper chamber of the Austrian Parlia¬ ment.

Mach's aim was to liberate science from metaphysical conceptions and thus he became in a sense a precursor of pragmatism. His general trend of thought exerted a profound influence on men like William James, Jacques Loeb, Karl Pearson and Wilhelm Ostwald, and his attempt to substitute the mathematical no¬ tion of function in place of the time-honored concept of causality has recently found an ad-

vocate in Bertrand 'Russell. His definition of science as an economical description rather than an explanation of the universe aroused consid-able discussion in philosophical circles. Sympa¬ thetic insight, impartiality, a singularly sane judgment and an almost complete freedom from preconceptions render Mach an ideal historian of science and one of the trustworthiest leaders of advanced thought. His principal works are accessible in English translations. For a brief

exposition of his philosophy with biographical notes consult Carus, Paul, ‘Professor Mach and his Work1 (in The Monist, January 1911, pp.

18-42).

Robert H. Lowie,

American Museum of Natural History .

MACHA, ma’ka, Charles Ignace, Czech poet: b. Prague, 10 Nov. 1810; d. Leitmeritz, 5 Oct. 1836. His style of poetry is full of senti¬ ment and reflection, a forerunner of the present Czech school of poetry, strongly influenced by Byronic “Weltschmerz,11 i.e., the spirit bred by the realization of disharmony between ideals and concrete facts of reality. He studied in Vienna and Prague. Extreme poverty caused pulmonary trouble, from which he died after a lingering illness. His chief work, (Maj) (Prague 1836), is a lyrical epic. His historic tales, such as (The Gypsies, 1 etc., are in the style of Walter Scott. His collected works were published in Prague (1862).

MACH2ERODUS, ma-ke’ro-dus, a genus of huge extinct cats, fossil in the Miocene and subsequent formations, and including the lar¬ gest of the Nimravidce. See Sabre-toothed Tiger.

MACHAIRODONTINiE, ma-ki’ro-donti’ni, an extinct subfamily of Felidce, including the sabre-toothed cats and their allies. This group became separated from the typical cats (Felince) in the Oligocene epoch, and remained a numerous and powerful element of the carniv¬ ora of the world until the close of the Pleis¬ tocene. The general form and structure were catlike, and produced an equally effective arma¬ ment, except, perhaps, in speed, for the limbs were shorter and heavier as a rule than in the feline cats of similar size, and the hind foot had five toes, instead of four. Another dif¬ ference was in the comparative shortness of the tail. Mainly, however, the specialization of this subfamily was in the dentition, which dif¬ fered from that of the cats in many particu¬ lars, and especially in the extraordinary devel¬ opment of the upper canines into huge stabbing-tusks, especially striking in Smilodon, one of the most modern and widely distributed Amer¬ ican genera. Other genera are Hoploplioneus, a primitive genus of the White River beds, with species of small size ; Machairodus, Eusmilus and Dinictis were other White River genera of importance, while later forms illustrate the gen¬ era Archoelurus and

Nimravus.

MACHAR, ma-kar', Agnes Maule (Fidelis) , .Canadian author: b. Kingston, Ontario, about 1856. She was educated at Kingston and at an early age her contributions began appear¬ ing in the magazines of Canada, England and the United States. She is author of a volume of verse, (Lays of jthe True North1 ; two his¬ torical works, (Memorials of Rev. Dr. Machar1 — the author's father; 'The Story of Old Kingston) (1908); (Stories of the British Em¬

pire1 (1913) ; and the novels, (Katie Johnston's Cross) ; (Lost and Won1 ; (Roland Graeme, Knight1 (1892) ; 'The Heir of Fairmount Grange,1 *etc.*

McHENRY, mak-hen'ri, James, American military surgeon and politician: b. Ballymena, County Antrim, Ireland, 1753; d. 1816. He had studied at Dublin, when, about 1771, he came to America, and in Philadelphia soon entered upon the study of medicine under Dr. Benjamin Rush (q.v.). On the outbreak of the Revoluton he became surgeon of the 5th Pennsylvania bat¬ talion; in November 1776 was taken prisoner at Fort Washington; was paroled in the fol¬ lowing January, and in March 1778 exchanged. In May of that year he was made assistant private secretary to Washington, and held that position until October 1780, when as major he was appointed to a place on the staff of Lafay¬ ette. Elected in 1781 to the Maryland senate, he continued a member of that body until 1786, being also during the second half of that period a delegate to the Confederation Congress. In 1787 he was made a member of the Constitu¬ tional Convention; in 1789 was elected to the general assembly of Maryland, and sat in the senate of that State, 1791-96, when he was appointed by Washington Secretary of War, retaining that position in the cabinet under John Adams' administration. until 1800. As an ardent Federalist he used his influence in favor of a strong national defense, and was a zealous partisan of Alexander Hamilton. His partisan¬ ship in favor of Hamilton led to a request for his resignation from President Adams. After resigning from Adams' Cabinet he spent the rest of his life in Maryland. Fort McHenry (q.v.) was named after him.

McHENRY, James, American physician

and author: b. Larn'e, County Antrim, Ire¬ land, 20 Dec. 1785; d. there, 21 July 1845. He was educated in Dublin and Glasgow, practised his profession for a time in Ireland and in 1817 emigrated to

the United States and finally set¬ tled in Philadelphia, where he practised medi¬ cine and was engaged in mercantile business. In 1842 he was appointed United States consul at Londonderry and held that post until his death. Among his works are (The Usurper; an Historical Tragedy1 (played in Philadelphia 1820) ; (The Wilderness, or Braddock's Times: A Tale of the West1 (2 vols., 1823) ; (Jackson's Wreath1 (1829) ; (0'Halloran, or the Insur¬ gent1 (1824) ; 'The Betrothed of \Vyoming1 (2d ed., 1830), *etc.*

McHENRY, Fort. See Fort McHenry.

MACHETE, ma-cha'ta, a short sword¬ like tool, half knife, half cleaver, used in Cuba and. other countries of tropical America for cutting cane and as a weapon in war. It was first brought into prominence during the Cuban revolution.

MACHIAS, ma-chl'as, Me., town, county-seat of Washington County, on the Machias River, and on the Washington County Railroad, about 120 miles east by north of Augusta. It is about 12 miles from the mouth of Machias River. A trading post was established here in 1633, by Englishmen, but after a few months they were forced by the French to abandon the place. The first permanent settlement was made in 1763, and in 1784 it was incorporated

as a town. It was besieged by the British from 1 Aug. to 1 Nov. 1777, and other attacks were made later. The original township of Machias was divided into East Machias, Machiasport, Marshfield and Whitneyville. The chief industries are shipbuilding, lumbering and fishing. It has considerable coast trade. The principal buildings are the government build¬ ing, the courthouse, the United States Marine Hospital and the Porter Memorial Library. Pop. 2,089. Consult (Memorial of the Centen¬ nial Anniversary of the Settlement of Machias) (Machias 1863).

MACHIAVELLI, Niccolo, ne-ko-lo' ma-ke-a-vel'le or mak-i-a-vel'li, Italian historian and statesman, possibly the greatest prose writer of the Italian Renaissance: b. Florence, 3 May 1469; d. there, 22 June 1527. Of Niccolo's early life and education we know nothing. No trace of him remains previous to his 26th year. But of his times and the scenes amid which he grew up, we know much. It was the calm but demoralizing era of Lorenzo the Magnificent. Machiavelli was a true child of his time. He too was thoroughly imbued with the spirit of the Renaissance; and looked back, fascinated, on the ideals of that ancient world that was being revivified for the men of his day. But philosophy, letters and art were not the only heritage., that the by-gone age had handed down; politics — the building of states and of empires — this also had engaged the minds of the men of that age, and it was this aspect of their activity that fired the imagination of the young Florentine. From his writings we know he was widely read in the Latin and Italian classics. But Virgil and Hor¬ ace appealed to him less than Livy, and Dante the poet was less to him-than Dante the poli¬ tician; for he read his classics, not as others, to drink in their music or be led captive by their beauty, but to derive lessons in statecraft and penetrate into the secrets of the successful em¬ pire-builders of the past. It is equally certain, from a study of his works, that he had not mas¬ tered Greek. Like Ariosto, Machiavelli was in¬ debted for 'his superb literary technique solely to the study of the literature of his own nation.

With the expulsion of the Medici from Flor¬ ence, Machiavelli, at 30, emerged from obscurity to play a most important role in the Florentine politics of the succeeding decade and a half. In 1498 he was elected secretary to the Ten of War and Peace and from 1498 to 1512 was a zealous, patriotic and indefatigable servant of the

republic. His energy was untiring, his ac¬ tivity ceaseless and many-sided. He conducted the voluminous diplomatic correspondence de¬ volving upon his bureau, drew up memorials and plans in affairs of state for the use and guidance of the Ten, undertook the reorgani¬ zation of the Florentine troops and went him¬ self on a succession of embassies, ranging in importance from those to petty Italian states up to those to the court of France and of the emperor. He was by nature well adapted to the peculiar needs of the diplomacy of that day; and the training he received in that school must in turn have reacted on him to confirm his native bent and accentuate it until it became the distinguishing characteristic of the man. His first lessons in politics and statecraft were de¬ rived from Livy's history of the not over-scrupulous Romans ; and when he comes to take, his lessons at first hand, it is in the midst of the intrigues of republican Florence, dr at the court of a Caterina Sforza, or in the camp of a Cesare Borgia. Small wonder that his conception of politics should have omitted to take account of honesty and the moral law; and that he conceived ((t'he idea of giving to politics an assured and scientific basis, treating them as having a proper and distinct value of their own, entirely apart from their moral value.®

During this period of his political activity we have a large number of state papers and private letters from his pen; and two works of literary cast. These are his (Decennale) : historic narratives, cast into poetic form, of Italian events. The first treats' of the decade beginning 1494; and the second, an unfinished fragment, of the decade beginning 1504. They are written in easy ter sine, and are noteworthy as expressing the sentiment for a united Italy.

When in 1512 the Medici returned to Flor¬ ence in the train of her invader, Machiavelli was dismissed from his office and banished for a year from the confines of the city. Later, on suspicion of being concerned in a plot against the Medici, he was thrown into prison and tor¬ tured. He was afterward included in a general pardon granted by Leo X. But Machiavelli did not return to public life until 1525 ; and this interval of enforced leisure from affairs of state was the period of his literary activity. A number of comedies, minor poems and short prose compositions did not rise above mediocrity. But in one dramatic effort he rose to the stature of genius. His (Mandragola) achieved a flatter¬ ing success, both at Rome and in Florence. It has been pronounced the finest comedy of the Italian stage; Macaulay rated it as inferior only to the greatest of Moliere's. In its form, its spontaneity, vivacity and wit, it is not surpassed by Shakespeare; but it is a biting satire on re¬ ligion and morality, with not even a hint of a moral to redeem it.

His lesser prose works are the (Life of Castruccio Castracani,* and the (Art of War,* a treatise anticipating much of our modern tac¬ tics. A more ambitious undertaking, and his largest work, is the (History of Florence. * At the suggestion of the Cardinal de Medici, the directors of the studio of Florence commis¬ sioned Machiavelli to employ himself in writing a history of Florence, ((from whatever period he might think fit to select, and either in the Latin or the Tuscan tongue, according to his taste.® He was to receive 100 florins a year for two years to enable him to pursue the work. He chose his native tongue; and revised and pol¬ ished his work until it became a model of style, and in its best passages justifies his claim to the title of the best and most finished of Italian prose writers.

But though Machiavelli had the historical style, he Jacked historical perspective; he ar¬ ranged his matter not according to objective value, but placed in the boldest relief those events that best lent support to his own theories of politics and statecraft. He makes his facts to be as he wishes them, rather than as he knows them to be. To Machiavelli history was largely to be written as a Tendenzroman, — manufactured to point a preconceived moral.

Though Machiavelli wrote history, poetry and comedy, it is not by these he is remembered. The works that have made his name a synonym, and given it a place in every tongue, were writ¬ ten almost in the first year of his retirement from political life: (The Prince) and the dis¬ courses on the First Ten Books of Titus LiviusP Each is a treatise on statecraft; to¬ gether they form a complete and unified treatise, and represent an attempt to formulate induc¬ tively a science of politics. The <Discourses) study republican institutions, (The Prince) monarchical ones. The first is the more elemen¬ tary and would come first in logical arrange¬ ment. But in the writing of them Machiavelli had in view more than the foundation of a science of politics. He was anxious to win the favor of the Medici ; and as these were not so much interested in how republics are best built up, he completed (The Prince) first, and sent it forth dedicated ((to the

magnificent Lorenzo, son of Piero de' Medici.® In the dis¬ courses, y the author essays ((a new science of statesmanship, based on the experience of human events and history.® In that day of wor¬ ship of the ancient world, Machiavelli endeavors to draw men to a study of its politics as well as its art. In Livy he finds the field for this study.

In his commentary on the course of Romulus in the founding of Rome, we find the keynote of Machiavelli's system of political science. His .one aim is the building of a state; his one thought, how best to accomplish his aim. Means are therefore to be selected, and .to be judged, solely as regards their effectiveness to the busi¬ ness in hand. Ordinary means are of course to be preferred but extraordinary must be used when needed.

In (The Prince, > a short treatise of 26 chap¬ ters, and making little more than a hundred octavo pages, Machiavelli gives more succinct and emphatic expression to the principles of his new political science. It is the best known of all his works. It is the one always connected with his name, and which has made his name famous. For the model of his prince, Machia¬ velli took Cesare Borgia and cites him as an example worthy of imitation; and he has shared in the execration that posterity has heaped upon Borgia. The strangest moral contradictions abound throughout (The Prince, > as they do in all Machiavelli's writings. He is saint or devil according as you select your extracts from his writings.

Shakespeare, reflecting English thought, uses his name as the superlative for craft and mur¬ derous treachery. But later years have raised up defenders for him, and his rehabilitation is still going on. He has been lauded as <(the noblest and purest of patriots,® and more ardent admirers could ((even praise his generosity, no¬ bility, and exquisite delicacy of mind, and go so far as to declare him an incomparable model of public and private virtue.®

His rehabilitation proceeds from two causes. Later research has shown that perhaps he only reflected his time; and his works breathe a pas¬ sionate longing for that Italian unity which in our day has been realized. He may be worthy canonization as a national saint ; but those who are more interested in the integrity of moral standards than in Italian unity will doubtless continue to refuse beatification to one who in¬

deed knew the Roman virtus, but was insensible to the nature of

virtue as understood by the fol¬ lowers of Christ. And no amount of research into the history of his age can make his princi¬ ples less vicious in themselves. A better under¬ standing of his day can only lessen the boldness of the relief in which he has heretofore stood out in history. He was probably no worse than many of his fellows. He only gave a scientific formulation to their practices. He dared openly to avow and justify the principles that their actions implied. They paid to virtue the court of hypocrisy, and like the Pharisee of the earlier time, preached righteousness and did evil ; but Machiavelli was more daring, and when he served the devil, disdained to go about his business in the livery of heaven. (See Prince, The). Among the editions of the col¬ lective works of Machiavelli may be mentioned those of Milan, 1810-11; Florence, 1813; Milan, 1821-22; Florence, 1826, 1843; and Florence (6 vols., 1873-77) ; Boston English translation (1891). The rendering of the (Art of War' and (The Prince) (in the (Tudor Translations) Vols. XXXIX and XL, London 1905), with Cust's introduction, is an admirable piece of work. Consult Dyer, i Machiavelli and the Modern State) (Boston 1904) ; Morley, John, <Machiavelli) (London 1898) ; Mourrisson, (Machiavelli> (Paris 1883) ; Tommasini, (La vita e gli scritti di Niccolo MachiavellP (Turin 1882) ; Villari, (Niccolo Machiavelli e i suoi tempi* (Florence 1877-82), and Burd's study (in the (Cambridge Modern History) Vol. I, Cambridge 1902), with bibliography.

MACHINE COMPOSITION. See Com¬ posing Machines.

MACHINE DESIGN. See Drawing, Mechanics.

MACHINE ENGRAVING, a mechanical

process for engraving on wood, metal or stone. Since 1880 numerous machines have been in¬ vented to produce regular tints, geometrical and other designs and patterns, far more rapidly than by hand work. The most complex en¬ graving is now executed wholly by machinery. Engraving by mechanical means is now gen¬ erally employed in the making of banknotes, diplomas, stock certificates and other papers and documents, where special designs are re¬ quired. Elaborate gearing systems have been introduced whereby the cutting tools execute a certain number of symmetrical motions and thus produce elaborate geometrical patterns. The first engraving machine was the invention of Wilson Lowry and was employed to engrave the plain background, skies, etc., of a plate. Most modern machines are so fitted that the cutting tool may be moved a certain definite distance after each cut so that the succeeding cut will be a line parallel to and at a regular distance from the last. The cutting tool is also fitted so that the

depth and breadth of the cut may be easily regulated. The cutting edge is usually of highly-tempered steel for metal work, except in the case of copper, which is often coated with varnish, next scratched with the design and afterward etched by acid. For stone work, the cutting tool has a diamond-point and weights on the holder regulate the depth of the cut. See Bank Notes, Manufacture of.

MACHINE FORGING. The art of the

blacksmith, working by hand at the forge and

anvil, has almost wholly disappeared, and the shaping of wrought iron and steel is now per¬ formed by machines. The exact duplication of parts of machinery began in the United States about 1854, and it became necessary to have forgings of uniform size so that they could be properly handled in special fixtures or holders while being machined to exact dimensions.

Drop Forging. — In the first attempt to ob¬ tain uniform forgings the smith hammered by hand the rough stock into a rude suggestion of the shape wanted so as to properly distribute the material and then placed it in an impression cut in a block of steel or cast to shape and forced it into the cavity by a series of blows from hand hammer and sledge.

The growing demand for firearms and other accurately made mechanisms developed the necessity for imorovements in this line which kept pace with the requirements of the times, until the drop-hammer was produced. These hammers are named invariably by the weight of the hammer-head or ram and they range in sizes from 50 to 5,000 pounds.

Hammers are also constructed to operate by steam power of heavier types. They lift the ram or hammer head and drive it downward by steam power in a manner similar to the regu¬ lation steam-hammer. The regular belt-driven drop-hammer, as used in drop-forging, is oper¬ ated usually by a treadle which the workman trips with his foot. This movement releases a clamp or catch which holds up the hammer¬ head and allows it to fall or drop. It is raised by the friction of two rolls which revolve rapidly, gripping the surface of a board which is wedged into a slot in the top of the hammer¬ head or ram. The hammer-head is clamped or latched at the end of the upstroke by an auto¬ matic attachment and released at the will of the operator.

The hammer-head or ram is made usually with a dovetail opening at its bottom, into which is placed the upper die. It is held firmly in position by a key driven into place by sledg¬ ing. The base or anvil of .the drop-hammer is made of cast iron or cast steel, and a forged steel seat or holder for the lower die is keyed into the base in a similar manner. This seat or holder is frequently called a “sow® or “shoe,® and is adapted merely to save useless wear of the base. It can be

renewed at a small cost. A similar dovetail opening is made in this holder into which the lower die is placed. This is keyed into exact position to match the upper die so that when the faces of the dies meet at the end of the down stroke the complete impression is formed.

Drop-hammers are made generally of cast iron, i.e., the base or anvil, the side rails or guides and the lifter frame. The working parts are made from forged steel. Various heights of the fall or drop of the hammer-head can be had by shifting a “latch® or “dog® on the operating rod. From six inches to five feet fall can be obtained if desired. Foundations are best made of solid concrete. In connection with the drop-hammer a press is used to remove bv a trimming operation the “flash® or surplus metal which spreads out between the dies after the impression therein is filled. This “flash® is sheared off either hot or cold as the character of the work permits.

Making the Dies. — A model of the part to be forged is made, usually of wood, if it be a form not clearly shown by a drawing. When given this model or a scale drawing and the required weight of the finished forging, the die-sinker has the principal data required by him to make the dies. After selecting the proper size blocks which have been planed smooth and made with dovetails or shanks, the die-sinker determines from his model the best parting line for the forging in much the same way as does the patternmaker on a pattern for a casting, but the analogy between the two is comparatively slight as the conditions are radi¬ cally different.

The patternmaker can use cores and loose pieces to make cavities and overhanging parts, but the die-sinker is practically limited to a die opening in two parts, which must be made to stand the roughest usage. The outline of the piece to be forged is drawn on the surface of the die which has been coppered with a blue vitriol solution, this causing the lines to stand out sharply. The metal is then removed in a manner that is most expedient for that particu¬ lar example. If the outline be circular the stock is turned out on a lathe. If the shape of the forging be such that other means are required for removing the metal from the die, the pro¬ filing machine readily furnishes a way for fol¬ lowing the most complicated forms by means of milling cutters of various shapes and sizes. The shaper and milling machines are also impressed into service as well as the planer and drill.

Chipping by hand is commonly done, and in nearly every case a file, riffle, scraper and some emery cloth are required to finish the

impression to the required smoothness and regularity.

The forming of an irregular cavity in the face of a high carbon steel die so that when its mating die is matched to it the shape of the space enclosed will not vary from the specified dimensions more than 2-l,000ths of an inch either way is an operation requiring skill and patience.

After the complete impression is made a proof can be taken by filling the cavity with melted lead. A shallow space is cut in the face of each around the impression. This is tech¬ nically called the flash of the die. As it is prac¬ tically impossible for the drop-forger to form the bar or billet of steel into just the shape and size required for the forging, this space must be left for the overflow of surplus metal.

If the article to be forged is of a simple form only one pair of forging dies is necessary as the “roughing® or “breakdown® impressions can be cut in the same pair of blocks which contains the finishing impressions. If the niece be more complicated, separate “roughing® or “breakdown® dies are necessary.

Trimming dies, to be used in the press, are necessary to remove the flash. They are made in male and female form; the upper part being the male die and the lower one the female. The male die is made of the outline of the forg¬ ing through the parting line, and with its face conforming to all the irregularities of the upper part of the forging. The female die is open at the bottom so that the trimmed forging can fall through it into a receptacle under the press. It is also made with its cutting edge conforming to the parting line.

The dies are then heated carefully in fur¬ naces, the heat of which is usually determined by a pyrometer to ensure uniformity of tem¬ perature, and are then hardened and tempered. Any warping in hardening which may occur is remedied by grinding the surfaces with an emery wheel. See Dies and Die Making.

The operation of drop-forging consists of first heating the bar or piece to a proper tem¬ perature. The heat depends entirely on the quality of the metal used. It is then placed in the “roughing® or “breakdown® impression and given a number of blows which shape it roughly into form and it is finally placed in the finish¬ ing impression and forged to the exact shape. The flash is then trimmed off in the press and the forging is practically complete.

The number of blows required depends en¬ tirely on the shape and size of the forging. Some pieces can be made by two or three blows while others may require as many as 100.

If the forgings are made of high carbon steel it is frequently necessary to anneal them so that they can be readily machined, and in many cases pickling in a weak solution of sul¬ phuric acid is resorted to, so as to remove the scale or oxidation which forms on the surface of each forging while cooling.

Drop-forgings can be made from iron, steel, copper, bronze or aluminum, or from any metal which will not disintegrate during heat¬ ing or while being worked. For instance, brass cannot be forged successfully. They can vary in weight — from a fractional part of an ounce to over 100 pounds each.

Upsetting and Forging Machines. — To¬ ward the close of the 19th century it became recognized that forging could be accomplished by pressure as well as by blows, and this idea was developed into the commercial upsetting and forging machines which now handle the bulk of small parts and a good many large parts of modern machines. Hammer-blows cause jar and vibration which are destructive to the machine itself, and require heavy foundations, heavy bedplates, *etc.*

The pressure machines do their work with less noise and more scientifi¬ cally. The very much reduced cost of build¬ ing automobiles and a great variety of duplicate machines that are turned out in large numbers is due largely to the quick shaping made pos¬ sible by machine forging. An upsetting and forging machine is made with a very heavy steel bed. The opposed dies for gripping the work are gripped in the machine, and the pres¬ sure is applied by a toggle-joint mechanism. In all such machines it is necessary to limit the pressure, else excess would break the machine. This limitation is accomplished in two ways — by placing heavy springs in the machine which give when a certain pressure is attained; and by locking the back of one of the die supports with a bolt of a given strength, arranged between hard square edges which will cut or shear off the bolt when the pressure reaches above a given point.

The method of making a common hexagonal nut in such a forging machine consists in (1) placing the dies in the forging machine; (2) heating a bar of iron between 1.400° and 1,600° F. — the temperature varying with the character of the iron; (3) thrusting the red-hot end of the bar into the lower die in the forging

machine, and throwing the lever to cause the machine to squeeze, which upsets the end of the bar and shapes it for a nut ; (4) withdraw¬ ing the bar quickly and placing in the upper die; (5) repeating the squeeze, which forces the hole through the nut, leaving the removed metal on the bar, and separating the nut. The nut is delivered with a slight fin, which has to be removed, when it is ready to go to the thread-cutter.

The front axle of an automobile may be forged in one of these pressure forging machines in about seven operations. The last squeezing operation delivers the completely formed axle. Any quantity of more or less in¬ tricately formed parts are now made of wrought iron and steel in this manner, the heavier operations being done on the steam-hammer, as a rule.

The forging machine is also used for weld¬ ing or joining separate pieces by pressure. It is just as easy to apply a flux to assist the joining in the forging machine as on the anvil. The Ajax universal forging machine not only compresses the dies, but has an independent vertical press that can be used for any operation within its capacity; also a punching device and a trimmer.

A variety of special forging machines are made for forming common articles, or parts re¬ quired in large quantity. Many of them are named after the work they accomplish. The hot-pressed centre-feed nut machine is simply a small forging machine designed for making nuts. Bolt-heading machines and bolt and rivet headers are other examples of special forging machines.

Pressed steel is made by great hydraulic presses at the steel works. Pieces requiring but slight shaping are pressed in the cold; more or less complicated forms are heated to a cherry red and then light-pressed. Modern railway steel cars are made in this manner. Armor plates are formed in hydraulic presses under immense pressures which are maintained for a considerable time.

Charles H. Cochrane.

MACHINE GUN, a firearm of small cali¬ bre fitted with mechanism by which it may be fired successively with great rapidity. Two dis¬ tinct classes have been developed: (1) That in which the firing is done by turning a crank by hand; and (2) an automatic form which util¬ izes the recoil of the gun, or a part of the force of the exploding charge to operate the firing and reloading mechanism. The first class has been practically abandoned. In the automatic class the first shot is fired by work¬ ing a lever, and the gun then continues to fire until the ammunition is no longer supplied — leaving the gunner free to give his whole at¬ tention to the aiming of the gun.

As to the relative merits of the two existing types of the automatic machine gun, expert opinion is divided, with perhaps a preponder¬ ance in favor of the gun operated by the recoil, as a technically better design : the recoil has to be provided for in any case and is thus made to do necessary work. In this type the breech block is separated from the barrel and linked to it by multiplying cam levers. The recoil is taken up and partly stored by a powerful spring, which thus becomes the source of the

other movements — which eject the empty shell, bring a new cartridge into position, in¬ sert it in the firing chamber of the gun and explode it; this cycle continuing as long as there is a recoil to keep up the energy. In the gun operated by the gas pressure of the dis¬ charge, a very small channel leads out of the interior of the gun barrel, and this is opened to the pressure of the explosion gases as the bullet passes. In some guns the gas is taken from very near the firing chamber; in others it is taken near the muzzle just before the bullet leaves the gun. In both cases the channel leads to a piston which is thrust backward by the force of the explosion against a powerful coiled spring, which stores a part of the en¬ ergy and returns the piston to its original po¬ sition the instant the pressure is released by the bullet leaving the muzzle. In this type of gun the recoil is taken up by a buffer spring which does not do any work. The amount of force taken from the propelling gases of the explosion is so minute as to be negligible, espe¬ cially when it is taken from close to the muzzle, when the bullet has acquired its full velocity. It may be added that both methods work per¬ fectly. The Maxim, Schwarzlose and Brown¬ ing guns are operated by the recoil ; the Colt, Hotchkiss and Lewis guns and the Browning rifle by explosion gases.

The great mechanical difficulty to be over¬ come in a machine gun is the heating up of the barrel due to the rapidly recurring explosions, the cumulative effect being so to expand the barrel that the rifle grooves no longer grip the bullets, which fly out helter-skelter as from a smooth bore, falling to the ground after a verv short flight. Two methods of keeping the gun cool while in action have been utilized: air-cooling and water-cooling. In the former, thin ((fins® of metal are affixed to the gun barrel so as to expose a comparatively very large sur¬ face to the air which is expected to disperse the heat by radiation and convection. When the air is moist this device is quite successful, but the drier the air the less it absorbs the heat and the quicker the gun will go out of commission. In practice it has been found that an air-cooled gun cannot be fired continuously for longer than three and one-half minutes, when it must be allowed to cool down, or an¬ other barrel must be substituted. Tests have shown that 7,000 rounds fired without respite will destroy the gun barrel; but if the firing is stopped at the end of two minutes, and the gun cooled, the same barrel will fire 50,000 shots before a new one need be put in. On aircraft, however, the air-cooled gun never gets overheated owing to the

swiftness of the pas¬ sage through the air and the generally cooler air currents in which the aircraft move. Special mention may be made here of the Lewis gun, which is air-cooled in an unusual fashion. The aluminum <(fins® in this gun lie lengthwise along the barrel and are about two inches in depth. The whole is encased in a shell of light steel ; thus forming a jacket of 17 air channels open at both ends. When the gun is fired the ex¬ plosion acts so as to draw air from the end next the breech through these air channels at a speed of 100 feet per second, proving a thor¬ oughly effective cooling device. The Colt gun is so contrived that a puff of air is sent through the barrel after each shot.

In the water-cooled guns the barrel is en¬ cased in a jacket filled with water, and the he.at generated by the explosions is absorbed in the heating of the water to the boiling point (which takes but two and one-half minutes) and keeping it boiling. The steam is led by a flexible tube into a reservoir ©f cool water standing on the ground beneath the gun, and is there condensed. The water from this reser¬ voir is used to replenish the supply in the jacket as it boils away. The Maxim, Gardner, Schwarzlose, Vickers and Browning machine guns are water-cooled. When used in aero¬ planes however, water jackets are not needed, and are removed, the stripped guns operating satisfactorily as air-cooled guns. The water-cooled guns show greater endurance than the air-cooled type. The Schwarzlose (Austrian) gun, which is essentially a modified Maxim, is notable as having fired continuously 35,000 rounds before the mechanism required repair. The Browning gun at its official trial fired 39,500 rounds continuously after having fired 20,000 rounds and been cooled down, before the mechanism gave out. Most machine guns have their ammunition arranged in pockets of belts made of fabric, with 250 cartridges on each belt. A few types have the ammunition attached to metal bands, from 25 to 30 cart¬ ridges to each band. The Lewis gun carries its cartridges in a drum-shaped magazine. Formerly the machine gun was mounted on a gun carriage, but a stout tripod is now preferred and the gun is normally placed so as to be about two feet from the ground. The common method of transporting it is by pack-horse, though in the Great War these guns were usu¬ ally carried on automobile trucks to the nearest point possible and carried by hand or dragged on a sled-mounting to the position where they were to be used. The German machine gun has a stand with four legs which may be ex¬ tended like the poles of a stretcher, and the gun thus carried by two strong men, in case of emergency and easily by four men. Some types have adjustable skeleton wheels.

The principle of the machine gun has been applied to weapons of larger than rifle calibre and with a measure of success. The Maxim <(pompom® or 37-millimetre gun throws one-pound shells at the rate of 300 per minute. The Hotchkiss gun is also made for one-pound shells. The Maxim combination automatic nine-pounder gun fires 60 shots per minute, but cannot be aimed at this speed. It is arranged to fire also as slowly as desired.

The machine gun is regarded from a tactical point of view as an infantry gun — as dis¬ tinguished from artillery. That is, its effect is that of concentrated infantry fire. It is con¬ sidered as equivalent to 100 riflemen, is far more easily concealed and is much more effect¬ ive, due to the elimination of the human factor. It can deliver a sweeping fire over a wide front, or a concentrated fire upon a small area. While at is wasteful of ammunition, the effect of machine gun fire is peculiarly demoralizing to troops in the field. It is primarily a defensive weapon most useful in stopping advancing forces; but, given the attainment of a com¬ manding position, it is supremely effective in putting hostile artillery out of commission. It is of comparatively little use against an enemy in line directly in front, but is invaluable in

enfilade. For this reason machine-gun emplace¬ ments often occupy salients, and have loopholes that open obliquely. In the field the machine guns are moved forward with the attacking troops to hold the ground won in an advance and are often useful in firing over the heads of a force advancing to an attack. It is effective up to 2,800 yards. As used in aeroplanes it sprays solid formations and supply trains on the march with a most deadly and demoralizing fire, besides being the chief weapon in air battles.

In 1917 the Maxim gun was in use by the armies of Great Britain, Russia, Italy, Spain, Portugal, Norway, Sweden, Holland, Turkey, Greece and most of the countries of South America; the Hotchkiss gun in France, Japan, Spain and Portugal ; the Schwarzlose gun in Germany, Austria and Bulgaria. Norway, Sweden and Denmark also used the Madsen automatic rifle. The Browning guns of both light and heavy types were introduced in 1918 in the United States army and Lewis auto¬ matic rifles in the navy and the aeroplane serv¬ ice. The Lewis rifle is used also by the armies of Great Britain and France.

History. — The first machine gun to be pro¬ duced was the Gatling gun, invented by Dr. R. J. Gatling of the United States. It had 10 rifle barrels arranged in the form of a hollow cylinder and was fired by turning a crank. The several barrels were discharged in suc¬ cession, and delivered 500 shots per minute, scattered over the field at any angle. As each barrel fired only one shot out of 10, there was no difficulty from overheating. This gun was adopted by the British army in 1875. The Gatling gun was followed by the Gardner gun which had fewer barrels and in the latest type had two barrels encased in a water jacket. The Nordenfelt gun was the next (1878) , and worked on the same principle as the Gatling. In 1885 Hiram Maxim first exhibited his automatic ma¬ chine gun, and this was followed by the Hotch¬ kiss gun. The chief differences were that the Maxim gun was water-cooled and the Hotchkiss air-cooled, and that the former operated by the recoil, and the latter by gas pressure. The Colt machine gun followed. In 1906 the Schwarzlose gun created a sensation. It was modeled upon the Maxim gun, but remarkably simplified. The Lewis gun, or, more

correctly, automatic rifle was adopted by the British army in 1909. It weighs 25ˆ4 pounds, and can be fired from the shoulder. Its magazine holds 49 cartridges. The Madsen automatic rifle is similar in type, but weighs only 15 pounds, and its magazines hold from 20 to 30 cartridges. In 1916 the Browning guns were invented es¬ pecially for the United States army. The Browning automatic rifle resembles closely the Madsen rifle in appearance, weighs 15 pounds, and its detachable magazines carry generally 20 rounds although special magazines holding 40 rounds are also provided. The Browning machine gun resembles the Colt gun in some respects, and the Schwarzlose gun in others. Its ammunifion is carried in belts holding 250 cartridges, which feed into the gun from a box mounted above the tripod. The Browning gun can be strinped of its water-cooling jacket for aeroplane work, and in that form weighs only 22t/2 pounds.

Bibliography. — Alcantara, M., (Machine Guns) (2 vols., Rio de Taneiro 1915) ; Applin, R. V. K., (Machine Gun Tactics) (London 1915) ; Colvin, F. H., and Viall, E., ,(United Stales Rifles and Machine Guns) (New York 1917) ; Longstaff, F. V., and Atteridge, A. H., (The Book of the Machine Gun) (London

1917).

Richard Ferris.

MACHINE GUN TACTICS. Machine guns are preferable to infantry whenever fire alone is sufficient for the purpose. Infantry is indispensable when both fire and movement are required. The machine gun delivers a very effective grazing fire up to 900 or 1,000 yards; its fire is effective upon important targets at ranges over 1,100 provided the range is accu¬ rately estimated. The two chief uses of machine guns are in flank fire and surprise fire. The sheaf of bullets is dense and deep, but narrow; its maximum effect will be obtained upon a target having a narrow front and considerable depth — for example, a thin line taken in flank. It should be the rule to employ machine gun fire in a direction parallel to the probable front of the enemy; that is to say, in flanking positions. The sweeping movements should be employed in firing frontally on a thin line, but its densitv then becomes insufficient and its effect¬ iveness is small. The machine gun is easily concealed ; it should be kept out of sight and neglect targets of little importance ; it should deliver bursts of fire which will come as

a surprise ; in this manner it may gain important results.

Any commander who has a machine gun and who uses it only to reinforce his firing line makes use of only part of the power at his dis¬ posal. He uses his machine gun to the best advantage in flanking positions, and he should select in advance several positions from which the machine gun can be used under various con¬ ditions, depending upon the probable course of the action.

In trench warfare machine guns are ordi¬ narily grouped in platoons, detached from the company and posted in strong positions. If the enemy is preparing for an attack he makes spe¬ cial efforts to destroy the machine guns. For¬ tify them strongly, screen them from view and echelon them in the direction of depth. Ma¬ chine gun positions without overhead cover are to be invariably rejected, unless they have been concealed from the commencement of the oper¬ ation of entrenching. Gun pits with strong overhead cover cannot be used, on account of their relief, unless they are screened by favor¬ able conditions, such as being on a second slope, by woods, underbrush, *etc.* Positions of low relief and well concealed should be prepared instead and nearby shelters should be dug from which the men of the gun detachment can come quickly to the gun. The gun positions may be pits dug in the form of howitzer shell funnels, in front of the trench, and connected with the shelter by a tunnel. The number of these posi¬ tions should be increased and access provided to them by sheltered and concealed trenches, and firing frequently from positions which are to be used in repulsing attacks should be avoided. All of the machine guns should not be exposed at one time to the danger of being destroyed by placing them all in the first line.

It is best to echelon them beforehand and dis¬ tribute the greater part of them between the line of supports and the lines of reserves, in order that they may be able to crush an enemy who has penetrated the first-line trench at the conclusion of a bombardment or of an attack with asphyxiating gas.

In no case should a machine gun detachment abandon its post; if need be it will permit itself to be besieged there and will defend itself to the last. The tenacity and heroism of a few ma¬ chine gun men has often enabled the retaking of lost positions. To make it possible for them to do this, place the machine gun in a small earthwork, surrounded by well-hidden wire en¬ tanglements, and provided with several firing positions and furnished with food and water and an abundance of ammunition..

In manoeuver warfare the machine gun com¬ pany often fights as a unit and is frequently placed near the head of the column behind the security detachments in order to support the infantry at the beginning of the action. When it has no special independent mission the ma¬ chine gun company should be placed at first under the orders of a battalion commander, who may assign one or more platoons of it to companies. In manoeuver warfare machine guns are used in pits without head cover. On the offensive machine guns deploy with the advance guard and cover the deployment of the main body; they reinforce lines temporarily halted ; and gain time for a preparation for continuing the advance; they assist in the artil¬ lery preparation with rapid and concentrated fire., and take ‘the place of artillery in a very rapid pursuit or fn completing a victory; they advance on the flank of a body of troops in an attack, and cover their flank from the counter attack which will probably be made against it ; and they cover with fire intervals which have been left intentionally or accidentally between two units of the attacking line. On the defen¬ sive they provide along the front several suc¬ cessive barriers of flanking fire,, which can be opened instantly by day or by night.

Generally speaking, there are two kinds of machine gun tactics : the tactics, of long range, rendered possible by the conditions of the en¬ trenchment battle, and the tactics of medium and short ranges, which have their place in the manoeuver battle in the open, and the assault during the entrenchment battle. Long range fire is rendered practicable and effective in the entrenchment battle by the fact that the enemy’s position is fixed and easily defined. Systematic aerial reconnaissance renders it possible to map out most accurately the position of the advanced trenches which form the enemy’s firing line, the trenches farther back, where he keeps his sup¬ ports and reserves, and. the lines by which these supports and all supplies of ammunition must be brought up to the advanced trench. Recon¬ naissance of the enemy’s position can reveal the areas where it is vulnerable to machine gun fire, and this fire can be directed on these areas with certainty. Thus the fire from the guns harass the enemy, impede his movements and inflict loss upon him.

It is obvious that the longer the range the more chance there is of selecting lines of trench that are open to enfilade. The machine gunner can pick out lines of trench far away to the right or left, on which he can bring diagonal

indirect fire. The beaten zone is so moderate in extent that several guns have to be used to¬ gether to sweep a given extent of ground either in frontage or depth, though the single section of two or four guns is sufficient when firing. on a narrow target, such as a communication trench.

Machine guns effectually cover the reorgan¬ ization or retirement of the infantry they are supporting. Some guns are used to create a screen of fire between the infantry and the enemy; others use high angle fire against the reserves which the enemy is bringing up for the counter attack. In a prolonged retirement a rear guard should be well provided with machine guns. The approved plan is to divide the machine gun force into two portions, one of which is in action while the other is taking up a second position farther to the rear.

In the case of cavalry against cavalry, the action of machine guns is analogous to that of horse artillery. They must endeavor to take up a flank position, from which they can bring their fire to bear upon the enemy's cavalry while their own cavalry is advancing to the attack. The guns have to provide for their own pro¬ tection, and be able to take up a position where they are practically safe from mounted attacks. Armored cars have provided a new field for machine guns. As a rule the heavier type of car, in which the gun is permanently mounted in a kind of turret, operates on the roads. It gives invaluable support to patrols and detached parties, the men working the gun being them¬ selves fairly safe from rifle and machine gun fire. The drawback of the car is that it is rather a prominent target for artillery. In an¬ other type the gun is merely carried up by the car and is then taken out and placed in position.

Motor machine guns are successfully used to close a gap in a line or support troops who are rapidly driven in. In covering a retreat along a good road, they are invaluable. Their normal work, however, is to support patrols and ad¬ vanced parties, and to operate against enemy patrols. To sum up, (1) machine gun fire should be used liberally to save the infantry,

(2) it should be used from flanking positions,

(3) the machine guns should be concealed in order that their fire may come as a surprise, and (4) they should be echeloned in depth and sheltered to prevent their being destroyed early in the action.

Edward S. Farrow, Consulting Military and Civil Engineer.

MACHINERY-MANUFACTURING IN¬ DUSTRY IN AMERICA. Owing to the re¬ strictive measures of Great Britain this indus¬ try made a late start in America; but when a beginning was made, the very laws by which the mother-country sought to make the States de¬ pendent on her proved more stimulating to the development of our machinery-manufacturing industry than the most rigid system of protec¬ tive tariff would have been. Great Britain wished to confine manufactures to her shores and compel the American colonists to buy their manufactured articles from English factories. At first the colonists were not allowed either to manufacture or to import machinery. In the year 1774 a statute was enacted by Parliament instituting the restrictive system as to textile machinery. This statute was made more strin-

gent in 1781, and it was not actually repealed till 1845. This act prohibited the expor¬ tation of (<any machine, engine, tool, press, paper, utensil, or implement whatever, which now is, or may at any time be, used in or proper for the preparing, working, pressing, finishing, or completing of the linen, cotton, wool or silk manufactures of this kingdom, or any other goods wherein wool, silk, or cotton is used, or any part of such machine, etc., or any model or plan of any such machine,® under penalty of forfeiture of the ‘tools or machine, the payment of a fine of £200 and imprisonment for one year. Further, foreigners were prohibited, under a penalty of £500 and imprisonment for 12 months, ((from seducing artificers, and others employed in the manufactories, to depart out of this kingdom; and if any artificer has promised or contracted to go into foreign parts to practise or teach his trade, such artificer may be obliged to give security, at the discretion of the court, that he shall not go beyond the seas, and may be committed to prison until he give such security.®

These laws were rigidly enforced; and it was seldom that they were evaded. It was im¬ possible even to smuggle a textile machine into this country; and the models that were surrepti¬ tiously imported were imperfect. Tench Coxe, the coadjutor of Alexander Hamilton in the Treasury Department, made arrangements to have models of Arkwright's patents sent to him ; but before they could be shipped they were detected and forfeited. In 1786 the Gen¬ eral Court of Massachusetts appointed a joint committee to investigate textile machinery; and this led later to the employment of Samuel Sla¬ ter and to the real beginning of machinery-manufacture in this country. Slater landed at New York 17 Nov. 1789; and in the following January he made arrangements with Messrs. Brown and Almy, of Providence, R. I., to con¬ struct for them textile machinery on the Eng¬ lish plan. He made most of the machinery with his own hands and set it up at Pawtucket, R. I. This was the first textile mill in this country to use the Arkwright system. It was opened 20 Dec. 1790. It must be remembered that Slater brought with him from England no implements to work with, and no plans or models. He had to depend entirely upon his memory. Alexander Hamilton called him <(the father of American manufactures® ; but, in the first place, he was the father of American machinery. Up to the time of his coming there were no machines in this country, with the ex¬ ception of the rude sawmill, grist-mill and fulling-mill ; some rolling and slitting mills, foot-lathes, and a few home-made carding and spinning appliances. The first oarding-machine worked in the United States was constructed at Newburyport, Mass., in 1793, by John and Arthur Scofield. Until then the household looms were the only domestic source of supply of woolen cloth.

At this time the manufacture of metal work¬ ing machinery was in its infancy. The lathe was known only in its simplest form, i.e., two dead centres supporting the work as it was rotated backward and forward by a band around it, one end attached to a spring-pole above it, the other end to the foot.of the oper¬ ator, who held the turning-tool in his hand. Even after the lathe had been provided with a

revolving spindle and centre to support and rotate the work, the tools used for turning both wood and iron were still manipulated by hand. The increasing demand for accurately-cut cylin¬ drical iron pieces, which could not be made by hand, led to the general use of the slide-rest. Formerly used only by the optician and the maker of mathematical instruments, it now be¬ came a necessary adjunct of the mechanic's lathe. This gave the lathe practically unlimited capacity to

turn out exact cylindrical work ; but in order for the slide-rest to do its work, it had to be manipulated by the workman. The next step was naturally the introduction of the slide-lathe, by which the rotation of the work and the advance of the cutting tool are accomplished automatically. Owing to the lack of suitable tools to make the long flat surfaces required in such a machine, the slide-lathe had a curious development. The hammer, file, cold-chisel and straight edge were the only tools at hand. The planing-machine was the development of a de¬ mand for greater accuracy in the slide-rest. It worked an era in the life of the machinist as great as that of the slide-rest itself. It is doubtful when the first planing-machine was made in the United States; but we know that there were only four such machines in this country in 1838. With this machine the rough and uneven surfaces of castings could be . smoothed and reduced to true planes. Up to this time the drill had been limited to a revolv¬ ing vertical spindle. The boring-mill or verti¬ cal lathe was now possible and took its place in the machine-shop for the execution of a large class of turned work that did not require to be supported on centres, such as wheels to be keyed upon their shafts. In fact, the first de¬ velopment of the planing-machine was the key¬ seating machine. It was soon recognized that such a machine could be turned to other work, and further changes were made accordingly. It was provided with compound slide-rests, with a revolvable table mounted thereon and in this form it took its place as a standard tool in the machine-shop under the name of the slot¬ ting-machine. This planer, with its vertically movable tool, was the progenitor of a machine with similar attachments, but with its tool mov¬ ing horizontally, upon which work could be conveniently shaped in a great variety of forms ; and the shaping-machine, as it was called, soon became one of the standard tools of the machine-shop. Meanwhile, the old vertical spindle drill, with its compound tables, movable vertically and . adjustable horizontally, in two directions at right angles with each other, had been supplemented by the horizontal drill, with similar tables, but with its drill-spindle parallel to the tables; and the further requirements in this direction had been supplied by the radial drill, in which the vertical drill-spindle is mov¬ able about a vertical axis, to which it is adjust¬ able radially.

However, there were other factors entering into the development of our machinery industry. There were other requirements beside these machine-tools, and which these supplied inade¬ quately. Screw-bolts and nuts were needed for putting the machines together. Originally iron screw-bolts had been made by means of a split die provided with spiral threads, by rotating either the bolt or the die backwards and

for¬ wards until the thread was partly cut, while a

taper-tap was screwed into the nut first from one side, then the other, until the bolt was found to fit into the nut. These bolts were not inter¬ changeable. This primitive system of bolt-manufacture continued until 1847, when the solid die with sectional threads patented by Phi-letus W. Gates was generally introduced. This die cut the thread at one pass, then the rotation was reversed to unscrew it from the bolt, which marked the thread and was liable to mutilate the die. No compensation for wear was possible. Nothing approaching perfection was attained until 1857, when William Sellers devised a bolt-machine in which dies to cut the thread at one pass, and adjustable to size, could be opened and closed while running continuously in one direc¬ tion. Since then ordinary screw-bolts have been made interchangeable. In a few years this machine of Sellers' was introduced into Eng¬ land and also continental Europe. The first turret lathe was built by Stone in 1854. It was provided with automatic mechanism for turning the turret in 1855, and perfected to its present condition in 1858. The gear-cutter was another of the early machine-shop tools. This was simply a revolving milling-cutter, mounted upon a spindle above the dividing-plate. The wheel to be cut was forced against this. The machine was adjusted by hand. Such work was slow and very expensive; and up to 1867 the teeth of nearly all wheels, even for fine machines, were cast. In this year a machine was devised by ' William Sellers which limited the work of the operative to adjusting the wheel to be cut to the cutter. The machine was otherwise auto¬ matic; and it was now possible for one work¬ man to attend to several machines, thereby greatly diminishing the cost of such work. From that time cast wheels have been no longer allowable in first-class machines. Another typical machine-tool that deserves mention is the milling-machine. It has received its great¬ est development in this country. The manufac¬ ture of metal-working machinery has become highly specialized, and only the older establish¬ ments produce a number of different types of machines. New establishments usually make only one type of machine, or at most one class embracing tools of similar type. Some

estab¬ lishments make only engine-lathes, others only planers, others nothing . but milling-machines. The effect of specialization has been to make machine-tools more efficient, and, it may be added, more varied. If, for instance, a new construction is designed, as in the automobile, or airplane, and -strangely fashioned pants are required, a machine that will make these parts is always forthcoming.

The development of more accurate machin¬ ery, as indicated above, led to the system of interchangeability. In the . manufacture of machinery this is an economic principle of the greatest importance. Under more primitive methods individual parts had to be fitted to¬ gether with great difficulty and at much expense. Now all these parts are made by machines, with such exactness that they are completely inter¬ changeable ; and there is no longer any ques¬ tion as to their fitting.- This method of manu¬ facture has increased the output of the indi¬ vidual workman and reduced the cost of pro¬ duction tremendously. Though first applied in Europe, it remained for the United States to demonstrate its feasibility and actually put it

into successful operation, and it is generally referred to as the American system. For the economical manufacture of any kind of ma¬ chinery in which many parts are to be inter¬ changeable certain definite Conditions must be met; and success economically requires that every part shall be finished without the inter¬ vention of a skilled workman. The machine must be so designed that it will not only work automatically but work with a high degree of accuracy. Reference standards must be pro¬ vided with which to compare the several parts in order to determine the amount of variation permissible between the standard and the prod¬ uce; every part must come from the machine in the final finished form. Such are some of the details that make necessary a careful study of every part in order to design a machine that will perform each operation with the most efficiency.

The principle of interchangeability was first suggested and put into operation in a small way by Le Blanc, in France. Its importance and possibilities were at once recognized by Amer¬ ican inventors, and its first application in the United States was in the manufacture of fire¬ arms in our government arsenals under the di¬ rection of Eli Whitney, the inventor of the cotton-gin. Simeon North, a maker of pistols, and a neighbor of Whitney, also adopted the system. By 1818 both of these men were using drilling and filing jigs. The growth of the sys¬ tem was slow, being confined for a time to the principal parts ; but even in this undeveloped condition it proved successful economically. In 1822

Calhoun, who was then Secretary of War, remarked to Whitney that his improvements were saving the government $25,000 a year at the two public armories. The drop-hammer and dies were first used by Hall, at Harper's Ferry in 1827. Whitney adopted this machinery and thus was able to cut from red-hot metal all the smaller parts of a gun in a form closely ap¬ proximating the finished article. These forged parts were then subjected to the more accurate milling-machine, which turned out the parts in uniform condition, no matter how varied their shape may have been when they came from the forging-press. It only remained for the drill to fashion the bearings for the working parts and bore the holes to secure the parts together. This was a comparatively simple matter when once the order of procedure had been deter¬ mined and the guiding templets or jigs pro¬ vided. The wooden stocks of the gun were also made by machinery and with sufficient ac¬ curacy to make them interchangeable. This was accomplished by means of a turning-lathe designed by Thomas Blanchard and patented by him in 1820. After the stock came from the lathe the groove for the barrel and the cavity for the lock were hollowed out by special machinery. Measured by the standards of to¬ day all this work was crude ; but the gun of that day was itself crude, and these roughly inter¬ changeable parts served their purpose. Machine-tools were then both inaccurate and limited in variety, so that they could not be expected to turn out the various parts with mathematical accuracy. Further, at that time there were no such delicate measuring instruments as we have to-day. The most refined measuring instrument known then was the vernier caliper ; and the smallest deviation from the standard that could

be detected with this contrivance was, at best, perhaps the thousandth part of an inch. In 1848 the interchangeable system was applied to watchmaking at the Waltham factory, and in 1850-51 it was adopted for sewing-machines. The profiling machine was developed between 1848 and 1852 by F. W. Howe and E. K. Root. Since then have come great developments' in the quality of machine-tools and in their wonderful adaptability to changing needs. Measuring in¬ struments

have now been so highly developed that a variation of the twenty thousandth part of an inch can be detected immediately and with perfect accuracy.

Foreign countries did pot remain indifferent to the success of the United States in the em¬ ployment of the principle of interchangeability of parts. Various commissions were appointed to investigate the system ; and, as remarked above, the economic success of the United States in producing interchangeable parts led to the adoption of this method in Europe. In 1854 the Colt factory was established at Hartford, and shortly afterward a British commission bought from them a full outfit of machinery for making the Enfield rifle on the interchangeable system. Between 1870 and 1880 our large ma¬ chinery manufacturers were kept busy filling foreign orders, especially for gun machinery. Large orders for such machinery were received from the' German government; and it was even stipulated in the contract that the manufacturers should send over men to set up the machinery and instruct native workmen how to run it. Other governments began to look to us for their machinery; and thus our system for the manu¬ facture of interchangeable parts was gradually established in England and continental Europe. This principle of interchangeability, first ap¬ plied to the manufacture of firearms, then to pistols, has now been extended to practically every kind of machine. The sewing-machine, the typewriter, the bicycle, the watch, the vari¬ ous kinds of agricultural machinery, the gasoline engine, and notably in the automobile, may be mentioned as types showing the eco¬ nomic value of the principle of interchangeabil¬ ity. All our large machinery manufacturers are represented in foreign countries, and certain types of American typewriters, sewing-machines, cash registers, mowing-machines, reapers, etc., are just as well known there as they are here. American textile machinery and shoemaking machinery play an equally important part.

It is impossible to give statistics for our ma¬ chinery-manufacturing industry as a whole, since, with a few exceptions, the United States census does not separate it from foundry and machine-shops in general. The following fig¬ ures from the Special Census of Manufactures taken in 1914 afford the best available survey of the present condition of the machinery-manu¬ facturing industry in the United States. Of the 17,027 establishments included as foundries and machine shops, 10,640 are grouped as making machinery of some sort. These shops operated in the year, quoted with a combined capital of $1,246,042,694, and with 564,610 wage earners, who received in that year $244,146,380 in wages. The value of the product amounted to $866,544,- 677, of which $508,422,896 was the value added by

manufacture. In the following table is given the number of establishments making the

machinery named, and the aggregate value of the output in 1914.

549 internal combustion engines . $54,250,421

33 steam locomotives . 39,043,359

409 machine tools . 31, 446 , 660

243 steam engines not locomotives . 30,498,638

2 1 1 textile machinery . 30,437,689

298 pumps and pumping machinery . 27,456,916

280 mining machinery . 23,823,117

48 sewing machines . 21,710, 643

53 typewriting machines . 20,516,532

213 elevators and mechanism . 17,228,101

277 metal-working machines . 17,419,526

19 cash registers . 15,935,067

44 adding and calculating machines . 14,731,455

378 woodworking machines . 13,392,900

7 8 dairy machinery . 12,998,374

The manufacture of electrical machinery is also very large and of great aggregate value, but no separate figures are available, the census grouping the machinery of this class with elec¬ trical apparatus and supplies.

By far the largest group of all is the agricul¬ tural machinery. In this case also the census fails to separate the machines from the tools —

such as spades, rakes and ploughs. However it is certain that by far the greater values are in the drills ; the mowing, reaping and binding machines and other harvesters. The figures as given for this industry in 1914 are as fol¬ lows : 601 establishments reported a capital ag¬ gregating $338,531,673 ; and the value of their product for the year was $164,086,835, of which sum $90,578,190 was added by manufacture.

The exports of American machines and ma¬ chinery in 1914 amounted in value to $91,818,- 664, to which should be added most of the value of agricultural implements exported, $10,304,978, a decrease owing to the war from $31,965,789 in

1913.

Since the beginning of the European War the exports of other types of American ma¬ chinery have enormously increased. This in¬ crease has been most remarkable in the case of metal-working machinery. In 1913, the latest year in which the figures can be regarded as quite normal, the exports of such machinery were valued at $16,097,315. By 1916 they had risen to $61,315,032. Steam locomotives ex¬ ported in 1913 were valued at $6,442,674; those exported in 1916 at $12,665,877. The export values of electrical locomotives, automobile engines, marine engines and sugar-mill ma¬ chinery also show an increase of 100 per cent between the two years quoted.

See Hardware Industry; Farm Machin¬ ery ; and articles on special types of machinery.

MACHPELAH, mak-pe'la, Cave of, He¬ bron, Palestine; in Old Testament history the burial place of the patriarchs. Upon the tradi¬ tional site stands a superb mosque which only Mohammedans are permitted to enter, although by a special firman of the sultan the Prince of Wales visited it in 1862, the Marquis of Bute in 1866 and the Crown Prince of Prussia in

1869.

MACHRAY, ma-kra', Robert, Canadian Anglican archbishop: b. Aberdeen, Scotland, 17 May 1831 ; d. Winnipeg, Canada, 9 March 1904. He was graduated at King's College, Aberdeen, in 1851, and from the Sidney Sussex College, Cambridge, in 1855. He was of

Presbyterian stock, but joined the Church of England and was ordained deacon in 1855 and priest in 1856.

He was appointed vicar of Madingley, near Cambridge, in 1862, and in 1865 he was Ramsden preacher at Cambridge. He was appointed bishop of Rupert's Land, Canada, in 1865, and was consecrated in May of that year. His dio¬ cese covered 2,000,000 square miles of territory with headquarters at the then hamlet of Win¬ nipeg. and but 18 clergymen to assist him. He was active in the promotion of education, renewed and reorganized the defunct Saint John's College at Winnipeg, and himself lec¬ tured in ecclesiastical history, liturgiology and mathematics. He was one of the founders of Saint John's Ladies' College; and upon the es¬ tablishment of the University of Manitoba in 1877 he became chancellor, retaining the office until his death. He had meantime organized his diocese with a view to serving the fast increas¬ ing population. He became metropolitan of Canada under the primacy of the archbishop of Canterbury in 1875, and upon the union of the Canadian Anglican churches, in 1893, he became archbishop of Rupert's Land and primate of all Canada. Consult Machray, Robert, (Life of Archbishop Machray 5 (1909).

MACHUELO, ma-chwa'lo, Spanish' name current in the West Indies for the thread her¬ ring (q.v.), an inedible, shad-like fish (Opistho - ticnia oglinum) of the Atlantic coasts of the United States and the waters of the West Indies.

McILHENNEY, Charles Morgan, Amer¬ ican landscape painter : b. Philadelphia, 4 April 1858; d. 1904. Having studied under Frank Briscoe, he continued his training at the Acad¬ emy of Fine Arts in Philadelphia, and soon began to wiin recognition in his chosen field. Among his best-known works are (A Gray Summer Noon) (1884), and (The Passing Storm) (1887) ; (01d Friends) (1891) ; (On the Beach) (1891); (Grey Morning) (1892); September in the Marshes5 (1893). In 1893 he was awarded medals at the Columbian Expo¬ sition and won the first Hallgarten prize.

McILVAINE, mak'H-van', Charles Pettit,

American Protestant Episcopal bishop : b. Bur¬ lington, N. J., 18 Jan. 1799; d. Florence, Italy, 13 March 1873. He was graduated at the College of New Jersey (now Princeton Uni¬ versity), in 1816; entered the Princeton Theo¬ logical Seminary in the same year, and was ordained deacon in 1820 and priest in 1821. His first pastoral charge was at Georgetown, D. C., which he left in 1825 to become professor of ethics at the United States Military Academy, West Point. He became rector of Saint Ann's Church, Brooklyn, in 1830, and in 1831 under¬ took the duties of the professorship of the evidences of religion and sacred antiquities in the New York University. He did not long hold the chair, however, as he was the next year elected bishop of Ohio, to succeed Bishop Chase, who had resigned the see. The question of the legality of such a resigna¬ tion excited considerable interest in the General Convention of that year, but in the interest of the diocese both houses agreed in approving Dr. Mcllvaine's testimonials, and he was accord¬ ingly consecrated in Saint Paul's Chapel, New York. Upon his removal to Ohio he was elected president of Kenyon College, Gambier, founded by Bishop Chase, and held the position until 1840, acting also for some years as president of

the theological seminary an the same place. During his long episcopate he came to be recog¬ nized as one of the most influential leaders of the Evangelical or Low Church party in Amer¬ ica, and his ability and courtesy were cordially recognized by those who differed from him most widely. During the Civil War he was one of the four ambassadors informally appointed by President Lincoln to set before the English people what was considered in the North the real significance of the War. He published various sermons, addresses and more important theological works, mainly directed to defending the positions of his party in the Church.

McILWRAITH, mak'd-rath, Jean Newton,

(Jean Forsyth), Canadian author, daughter of Thomas Mcllwraith (q.v.) : b. Hamilton, Ontario, 1871. She was educated at Ladies' College, Hamilton, and studied English litera¬ ture in the correspondence classes of Queen Margaret College, Glasgow, for 10 years, en¬ gaging in editorial work in New York in 1902. She is a frequent contributor to magazines and is author of (A Book About Shakespeare 5 (1898) ; (History of Canada5 in Children's Study Series5 (1899) ; (joint author with William McLennan) (TheSpan o'

Life5 (1899) ; (The Curious Career of Roderick Campbell5 (1901) ; (A Diana of Quebec5 (1912), *etc.*

McILWRAITH, Thomas, Canadian orni¬ thologist: b. Ayreshire, Scotland, 1824; d. 1903. He was educated in Scotland and emigrated to Hamilton, Ontario, in 1853, where he spent the remainder of his life. He became known through his classification of the birds of Canada and his study of their habits, which subject he pursued as a recreation. He was a member of the conference of American ornithologists held in New York in 1883, out of which came the American Ornithologists' Union. He served for many years as superintendent of the . dis¬ trict of Ontario for the Migration Committee of the American Ornithologists' Union. His first report of Canadian birds was published in the Canada Journal in 1861, and his (Birds of Ontario5 was published by the Hamilton Asso¬ ciation (1886; author's ed., 1887; 2d ed., 1894).

McINTOSH, Lachlan, American soldier: b. near Inverness, Scotland. 17 March 1725; d. Savannah, Ga., 20 Feb. 1806. He came with his father to Georgia in 1736, received there an ordinary English education, became a clerk in the mercantile establishment of Henry Laurens at Charleston, S. C., and was later employed as a land surveyor. At the opening of the Revolution he was made colonel of the 1st Georgia battalion, and became a brigadier-gen¬ eral in 1776. In 1777 he fought a duel with But¬ ton Gwinnett (q.v.), who was fatally wounded. In 1778 McIntosh was selected by Washington to lead a small force against the Western In¬ dians, whom he subdued. In the siege of Savan¬ nah, 1779, he bore an active part. When Charleston surrendered to Sir Henry Clinton 12 May 1780 McIntosh was taken prisoner, and he never resumed his command. He was a mem¬ ber of the Continental Congress in 1784, and the next year as commissioner to the Indians he finished his public services.

MacINTOSH, William, a half-breed Creek chieftain, son of a Scottish trader: b. about 1780; d. 1 May 1825. In 1802 the United States undertook to extinguish the Indian titles to

lands within the borders of Georgia and in 1805 millions of acres of Creek lands were trans¬ ferred to Georgia. The Creeks becoming alarmed at the prospect of being deprived of all their lands, on the motion of Macintosh, now a chief, made a law in general council in 1811 forbidding the sale of any of the remain¬ ing land under penalty of death. Macintosh led the Creek allies of the Americans in the War of 1812 with the rank of major and took the chief part in the massacre of 200 hostile Creeks at Atasi on 29 Nov. 1813. He also took part in the battle at Horseshoe Bend, Ala., 27 March 1814. More lands were acquired by treaty in 1818 and in 1821 another treaty was negotiated by the Georgians with Macintosh, who was in the pay of the whites, and other chiefs controlled by him, while 36 chiefs re¬ fused to sign and demanded a general council. In 1824 about 10,000,000 acres still remained in the hands of the Creeks and in that year they re-enacted the law punishing with death any Creek who ceded land. In 1825 the whites, with bribes, induced Macintosh and the chiefs under his control to sign a treaty ceding the remain¬ ing Creek lands. The treaty was approved by President Adams, but the Creeks did not rise in rebellion ; they passed formal sentence of death on Macintosh, which a party of warriors carried out.

MACK, Norman Edward, American poli¬ tician and newspaper publisher : b. Buffalo, N. Y., 24 July 1858. He received a public school education, engaged in business and in 1879 established the Buffalo Sunday Times. In 1883 he began the publication of the Daily Times, of which he continues owner and editor. He was a delegate to the Democratic National Conventions from 1892, has served as a member of the Democratic National Committee since 1900 and became its chairman in 1908.

MACK VON LEIBERICH, Karl, Baron, Austrian military officer: b. Nennslingen, Ba¬ varia, 24 Aug. 1752; d. Saint Polten, Austria, 22 Oct. 1828. He entered the army of Austria in 1770, and was in 1797 created field-marshal. After the peace of Campo Formio, he was appointed by the king of Naples to the com¬ mand of his troops, and took the field against the French and occupied Rome; but a riot in Naples, caused by his having concluded an armistice with the French, forced him to take refuge in the French camp (1798). He was carried prisoner to Paris, but escaped in 1800 and in 1805 was sent to check the French ad¬ vance alone the line .of the Iller. But the enemy shut him up in Ulm, and on 17 October Mack capitulated with his army. He was tried by court-martial, but the sentence of death was commuted by the Austrian emperor to expulsion from the army and 20 years' imprisonment. In 1808 Mack was liberated, and in 1819 fully pardoned.

McKAY, mak-i', Alexander Charles, Ca¬ nadian educator: b. Beamsville, Ontario, 2 June 1861. He was educated at the universities of Toronto and Cambridge, England. He became professor of mathematics and physics at McMaster University in 1890, later holding the offices of dean of arts and registrar, and in 1905 he was elected chancellor of the univer¬ sity. Since 1911 he has been principal of the New Technical School, Toronto. He has col¬

laborated in the preparation of mathematical textbooks.

MACKAY, ma-ka' or ma-ki, Charles, Eng¬ lish poet, journalist and miscellaneous writer: b. Perth, Scotland, 27 March 1814 ; d. London, 24 Dec. 1889. Fie was editor of the Illustrated London News, 1852-59, lectured in the United States, 1857-58, and was a special correspond¬ ent of the London Times in New York during the Civil War (1862-65). He was famous for his songs, many of which he set to music of his own. (Cheer, Boys, Cheer,5 is the best known of these.

MACKAY, Clarence Hungerford, Amer¬ ican capitalist: b. San Francisco, 17 April 1874. The son of J. W» Mackay (q.v.), he succeeded on the death of his father to his vast business interests. Much of his boyhood was spent in France, and he was educated at Vaugirard Col¬ lege, afterward studying at Beaumont College, Windsor, England. He is president of the Com¬ mercial Cable Company, the Postal Telegraph-Cable Company, the Commercial Pacific Cable Company, the Mackay Companies, the Commer¬ cial Cable Building Company, the Postal Tele¬ graph Building Company and the Commercial Cable Company of Cuba. He is also a director of the North American Telegraph Company and the Metropolitan Opera Company. As treasurer of the Lincoln Farm Association, he was one of the prime movers of the effort to raise funds for the purchase of the log cabin in which Abraham Lincoln was born.

McKAY, Donald, American shipbuilder: b. Nova Scotia, 1810; d. 1880. He went to New York and learned shipbuilding, and began the business at Newburyport, Mass. At East Bos¬ ton, in 1845, he established a shipyard where he built many large trading ships of the clipper model, in which he made great improvements. The Great Republic , which he built in 1853, a ship of 4,500 tonnage, was a larger vessel than had ever before been seen.

MACKAY, George Eric, English poet, son of Charles Mackay (q.v.) : b. London, 25 Jan. 1851 ; d. 2 June 1898. Among his works are (Songs

of Love and Death5 (1865) ; (Ad Re-ginam) (1881) ; the popular (Love Letters of a Violinist5 (1886) ; (A Lover's Litanies) (1888) ; (Nero and Actaea,5 a tragedy (1891) ; (My Lady of Dreams5 (1895) ; (Arrows of Song5 (3d ed., 1896) ; (A Lover's Missal5 (1898).

McKAY, Gordon, American inventor and manufacturer: b. Pittsfield, Mass., 1821; d. Newport, R. I., 19 Oct. 1903. He was the son of a* cotton manufacturer, and at 12, on the death of his father, learned civil engineering, at which he worked for some time. Before he was 21 he built a machine-shop in Pittsfield which employed 100 men, and later became treasurer and manager of the Lawrence Ma¬ chine Company. He was the first successful inventor of machinery for making boots and shoes; he perfected a shoe sewing-machine, in¬ vented, but not made practicable, by L. R. Blake, of Abington, Mass.; afterward invented the heeler, lasting-machine, nailing-machine, etc., which came into general use ; and by these in¬ ventions revolutionized the boot and shoe indus¬ try of the world. At the outbreak of the Civil War he offered to make the shoes for the Union army, and within three years had leased his

machines to more than 60 firms, and shortly be¬ came a millionaire. In 1878 he formed the Mc¬ Kay Sewing-Machine Association, a strict monopoly which exacted commissions on all shoes made in the United States by the aid of his inventions, and also brought profit through European royalties. In 1893 he placed $4,000,- 000 in a trust fund for Harvard University. He made many other liberal donations for benevo¬ lent and educational objects, and established near Kingston, R. I., the McKay Institute for the manual training of colored youth. By his will the greater part of his estate was left to Harvard.

MacKAY, Jessie, Australian poet and

prose writer: b. Cambridge, New Zealand, 15 Dec. 1864. She combined teaching with literary work and has been a voluminous contributor to the Australian press, with the readers of which she is a favorite. Among her published works are (The Spirit of the Rangatira and Other Ballads) (1810) ; and (The Sitter on the Rail and Other Poems) (1891).

MACKAY, John William, American capi¬ talist: b. Dublin, Ireland, 28 Nov. 1831; d. Lon¬ don, 20 July 1902. His parents brought him to

New York in 1840, and he learned shipbuilding. He went to California as a miner in 1851, and afterward to Nevada, where he continued min¬ ing with great perseverance in the face of many disappointments. In 1872 he was one of the discoverers of the Bonanza mines of the Com¬ stock Lode (q.v.), in which mines he obtained a two-fifths share and became very wealthy. He and his partners, Fair, Flood and O'Brien, founded the Bank of Nevada, of which Mackay was president for years. His relations with Jay Gould being unfriendly, in a spirit of oppo¬ sition to him, and to the Western Union Tele¬ graph Company, Mackay in 1884 joined with James Gordon Bennett in forming the Commer¬ cial Cable Company and the Postal Telegraph Company. He succeeded in laying two cables, overcoming great obstacles, and afterward won in a long rate-war with the old lines. The Ro¬ man Catholic Orphan Asylum at Virginia City, Nev., founded by him, is noteworthy among his many public benefactions.

MACKAYE, ma-ki', James Steele, Amer¬ ican playwright: b. Buffalo, N. Y., 1844; d. Timpas, Colo., 25 Feb. 1894. In 1868 he went to Paris to study painting; but having there met Delsarte (q.v.) became interested in the latter's theories, and studied dramatic 'expres¬ sion. In 1870-71 he gave in New York and Boston lectures on the art of expression. . He opened the Saint James Theatre at New York in 1872, and appeared there in (Monaldi,5 adapted by himself from the French. In 1873-75 he was studying the drama in Paris and Eng¬ land, and at the Crystal Palace, London, he played the title-role in (Hamlet. 5 His adapta¬ tion of Blum's (Rose MicheP in 1872 ran for 122 nights at the Union Square Theatre, New York. He established in New York the Lyceum School of Acting, which later became the Amer¬ ican Academy of Dratmatic Arts. For several years he was manager of the Madison Square Theatre, and in 1885 built the Lyceum. Among his further plays were (Won at Last5 ; (Through the Dark5 ; (Hazel Kirke) ; (A Fool's Errand) ; (In Spite of A1P ; (Paul KauvarP

Consult Mackaye, Percy, (Steele Mackaye: A Memoir) (New York 1911).

MACKAYE, Percy, American dramatist and poet: b. New York, 16 March 1875. He was graduated from Harvard in 1897 and studied at the University of Leipzig in 1899-1900. He engaged in European travel in 1898-1900, residing in Rome, Switzerland, Leipzig and London. He was an instructor in a pri¬ vate school in New York in 1900-04, after which time he joined the Cornish Colony in New Hampshire and devoted his time entirely to dramatic work. He has lectured on the theatre at Harvard, Yale, Columbia and other American universities, and is a member of the National Institute of Arts and Letters. He is a leading exponent of poetic dramatic art in America and handles both tragedy and comedy with grace and surety of touch. Author of (The Canterbury Pilgrims,) a comedy, pro¬ duced by the Coburn Players in the open air at Harvard, Yale and other universities in 1909-13, and given as a civic pageant in honor of President Taft at Gloucester, Mass., 4 Aug. 1909 (1903) ; (A Modern Rendering into Prose of Chaucer's Tales5 (1904) ; (Fenris the Wolf,5 a tragedy (1905) ; (Jeanne d'Arc,5 a tragedy, produced by Julia Marlowe and E. H. Sothern in America and England in 1906-07 (1906);

(Sappho and Phaon,5 a tragedy (1907) ; (The Scarecrow) (1908); (Lincoln Centenary Ode5 (1909) ; <Mater,) an American comedy (1908) ; (The Playhouse and the Play,5 essays (1909); (A Garland to Sylvia5 (1910);

(Anti-Matrimony,5 a satirical comedy pro¬ duced and acted by Henrietta Crossman (1910); (The Civic Theatre5 (1912); (Uriel and Other Poems5 (1912) ; (Beauty and the Beast,5 a lyric drama (1912) ; (Sanctuary, A Bird Masque,5 produced for President Wilson at Meriden Bird Club Sanctuary, New Hamp¬ shire (1913) ; (The Immigrants,5 a lyric drama (1915) ; (The Evergreen Masque5 (1917), *etc.* See Scarecrow, The.

McKEAN, ma-ken', Thomas, American pa¬ triot and jurist, signer of the Declaration of Independence: b. New London, Chester County, Pa.. 19 March 1734; d. Philadelphia, 24 June 1817. He was privately educated at Newcastle, Del. ; having settled there, he studied law and was admitted to the bar in 1755, at once be¬ came register of probate and was soon made assistant attorney for Sussex County. With Caesar

Rodney (q.v.), in 1762, he entered upon a revision of Delaware laws up to 1752, and was chosen in the same year to the Delaware assembly, in which his membership continued till 1779. Elected in 1765 to the Stamp Act Congress, he took a strong position in defense of colonial rights and as judge of the Common Pleas in the same year permitted no stamped paper to be used in his court. About 1771 he began to practise law in Philadelphia, although retaining a Delaware residence, and from Dela¬ ware. in 1774, he was elected to the Continental Coneress. in which he served nine years, in¬ cluding the entire period of the Revolution, and took a prominent part in its proceedings, being president of the Congress in 1781. He was not present at the signing of the Declaration of Independence, which he had advocated, but added his signature some years afterward. The

Articles of Confederation, which he aided in drafting, were also signed by him. In Penn¬ sylvania, where he had become well known, he was made chairman of the Committee of Safety in 1776, and from 1777 to 1799 was chief justice of the State. He became a strong supporter of Jefferson, and a leader of the Republican party of that day, and was governor of Pennsylvania from 1779 to 1808. With James Wilson he wrote ‘Commentaries on the Constitution of the United States) (1790).

McKEAN, Thomas, American philanthro¬ pist: b. Philadelphia, Pa., 23 Nov. 1842; d. there, 16 March 1898. In 1862 he was gradu¬ ated at the University of Pennsylvania and entered upon a successful business career, be¬ coming: an officer in many railroad and financial corporations. He acquired a large fortune, which he spent freely in endowing educational and charitable enterprises, his various gifts to the University of Pennsylvania alone amount¬ ing to $300,000.

McKEES ROCKS, Pa., borough in Alle¬ gheny County, on the south bank of the Ohio River, opposite Allegheny and three miles north¬ west of Pittsburgh, on the Pittsburgh and Lake Erie and the Pittsburgh, Chartiers and Youghiogheny railroads. There is an abundance of bituminous coal and natural gas in the dis¬ trict, and there are large iron and steel indus¬ tries with their kindred smaller manufactories.

The town ships lumber and there are manufac¬ tures of wall plaster and concrete. The land was originally conveyed to Alexander McKee in 1764, a settlement was formed in 1830 and the town was incorporated in 1892. There is a considerable foreign population. The town is growing rapidly. Pop. (1920) 16,713.

McKEESPORT, Pa., city, in Allegheny County, at the junction of the Monongahela and the Youghiogheny rivers, and on the Pennsyl¬ vania, the Pittsburgh and Lake Erie, the New York Central and the Baltimore and Ohio rail¬ roads, about 14 miles southeast of Pittsburgh. The first permanent settlement was made in 1795 by David McKee, after whom the place was named. It was only a small village until 1829, when coal mining began on an extensive scale. It was incorporated as a borough 1 Sept. 1842, and chartered as a city 1 April 1890.

McKeesport is situated in a region noted for its extensive fields of bituminous coal and its natural gas. The chief industrial establish¬ ments are steel and iron works, one of which, the National Tube Company, has 6,000 em¬ ployees. The McKeesport Tin Plate Company has recently developed into the biggest plant of the kind in the world. There are numerous smaller manufacturing concerns, including vari¬ ous lines of the steel industry and more diversi¬ fied interests. The large industrial plants in the city proper employ about 11,000 persons with an annual payroll of approximately $8,000,000. Smaller industries employ about 1,000 persons with an annual payroll of $600,- 000. Within five miles of the city limits large manufacturing plants employ another 25,000 persons, receiving over $18,000,000 in wages a year. The city has a large trade in its own manufactures and in coal and lumber. The principal educational institutions are the 14 public and the parish schools, the Douglass Business College, the Duff's Business College

and the Carnegie library. Some of its princi¬ pal buildings are those of the schools mentioned (the new high school cost about $260,000), the Young Men's Christian Association, 50 churches and offices and store buildings. There are 18 different religious denominations and 50 congregations in the city. The church property is valued at over a million and a half dollars. There are three national banks, two State banks, one trust company and one foreign banking house; total capital aggregating $1,407,100; sur¬ plus, $1,608,290, and deposits,

$9,000,000. The city officials include the mayor, serving for four years, and four city commissioners, elected for two years. The city has the commission form of government under the Clark Act of Penn¬ sylvania. The city owns and operates the waterworks, the plant being valued at over $1,000,000. The annual municipal expenditures are about $480,000; the chief items of expense are, for police department, $32,000; fire depart¬ ment. $35,000; street department, $37,000; water department, $95,000; health department, $10,000. Pop. over 47,000. A large number of the peo¬ ple are foreign born, chiefly from Austria, Sweden, Germany and Italy, but the native born predominate.

McKEEVER, William Arch, American

educator: b. Jackson County, Kan., 12 April 1868. He was graduated at the University of Kansas in 1898, and later studied at the Uni¬ versity of Chicago and at Harvard. He was professor of philosophy at the Kansas State Agricultural College in 1900-13, and since 1913 has been professor of child welfare at the University of Kansas. He originated the 'Home Training Bulletins ' which have circu¬ lated widely among all English-speaking peo¬ ples; organized the playground movement and is a director of the National Institute of Child Life, Philadelphia. Author of 'Psychology and the Higher Life) (1898); 'The Pioneer, a Story of the Making of Kansas' (1911) ; 'Training the Boy' (1913) ; 'Training the Girl' (1914) ; 'The Successful Sunday School Teacher' (1915).

MacKELLAR, Thomas, American poet : b. New York, 12 Aug. 1812; d. 29 Dec. 1899. Having learned the printer's trade in the pub¬ lishing house of the Harpers, he went to Phila¬ delphia as a proofreader in the stereotype foundry of Lawrence Johnson and Co., in time became a partner in the business and finally its head, the new firm being styled MacKellar, Smiths and Jordan. Among his works may be mentioned 'Droppings from the Heart' (1844) ; 'Tam's Fortnight Ramble' (1847) ; 'The Amer¬ ican Printer' (1866) ; 'Rhymes Atween-Times' (1873), and 'Hymns and Metrical Psalms'

(1883).

McKELWAY, Saint Clair, American jour¬ nalist : b. Columbia, Mo., 15 March 1845; d. 16 July 1915. In 1853 he came East and was educated in New Jersey, studied law and was admitted to the bar in New York in 1866, but never practised. In 1868 he became Washing¬ ton correspondent for the New York World and the Brooklyn Daily Eagle

and in 1870 a member of the editorial staff of the latter paper. From 1877 to 1884 he was the editor of the Albany Argus, and in the latter year returned to Brook¬ lyn to become editor-in-chief of the Eagle,

which under his editorship maintained a high standard of excellence. He was a regent of the University of the State of New York since 1883, becoming vice-chancellor in 1900 and chancellor in 1913, a member of the his¬ torical societies of Long Island and Suffolk County, was director of the American Social Science Association and has lectured frequently on educational and political subjects.

McKENDREE, ma-ken'dri, William, American Methodist bishop : b. King William County, Va., 6 July 1757 ; d. near . Nashville, Tenn., 5 March 1835. He served in the Con¬ tinental army during the American Revolution, entered the Methodist ministry in 1787 and be¬ came a presiding elder nine years later. In 1801 he made a missionary tour beyond the Alleehanies and was an important factor in the evangelizing of that region. In 1808 he was elected bishop, being the first American-born person to hold that office in the Methodist Church. McKendree College (q.v.) was named in his honor. Consult <Life) by Paine (1869).

McKENDREE COLLEGE, in Lebanon, Ill., founded in 1828 under the auspices of the Methodist Episcopal Church and first called Lebanon Seminary. In 1830 the name was changed, in honor of William McKendree, who gave his estate to the college. In 1839 a new charter was obtained whereby the school was granted university privileges. Abraham Lin¬ coln rendered valuable services in securing the new charter. Students are admitted on cer¬ tificates from approved schools or on exam¬ inations. It has classical, scientific, music, law and graduate departments. The degrees to which the courses lead are A.B. and B.S. In 1918 there were 15 instructors, IIS students and 10,000 volumes in the library.

McKENNA, ma-ken'a, James Andrew Joseph, Canadian public service commissioner: b. Charlottetown, Prince Edward Island, 1 Jan. 1862.

He was educated at Saint Dunstan's Col¬ lege, Charlottetown, was connected for a time with the Prince Edward Island Railway and afterward engaged in journalism. In 1886 he entered the Indian Department of the Dominion Civil Service, and for a brief period was pri¬ vate secretary to Sir John A. Macdonald. With T. G. Rothwell he effected a settlement with British Columbia concerning the administration of the railway belt lands in 1897, and in 1899 he was a royal commissioner for the negotia¬ tion of a treaty with the Indians whereby the Peace River and Athabaska Country were sur¬ rendered to the Crown. He likewise secured the surrender by the Indians of the country around Buffalo Lake, Churchill River and Rein¬ deer Lake in 1906. He was chairman of the royal commission which was appointed to ad¬ just the claims of the half-breeds of the North¬ west, and in 1901 was the sole commissioner. Since 1909 he has been inspector of Indian Catholic schools in Manitoba, Keewatin and the Northwest provinces and territories. Author of (Sir Tohn Thompson) (1895), and (The Hudson Bay Route) (1907).

McKENNA, Joseph, American jurist: b. Philadelphia, 10 Aug. 1843. In 1855 he went to California and was graduated from the Benicia Collegiate Institute in 1865, and ad¬ mitted to the bar the same year. He was dis¬

trict attorney of Solano County in 1866-68, and in the sessions of 1875 and 1876 served as a Republican in the lower house of the California legislature. In 1885-93 he was a California rep¬ resentative in the 49th, 50th, 5lst and 52d Con¬ gresses, resigning from the House in 1893 to accept the appointment to the office of United States circuit judge in the Ninth Federal ju¬ dicial district. This post he resigned to become Attorney-General in the cabinet of President McKinley in 1897. On 16 Dec. 1897 he was made an associate justice of the United States Supreme Court to succeed Justice Field, retired, and on 26 Jan. 1898 took his seat.

McKENNA, Reginald, English statesman : b. London, 6 July 1863. He was educated at King's College, London, and at Trinity Hall, Cambridge, and became a barrister in 1887. He engaged in law practice until his election to Parliament for North Monmouthshire by the Liberal party in 1895. He soon acquired a reputation as one of the hardest workers on the Liberal benches as well as for a sound knowledge of national finance and of parlia¬ mentary procedure. In the cabinet of Sir Henry Campbell-Bannerman, formed in 1905, McKenna was appointed Financial Secretary under Chan¬ cellor of the

Exchequer Asquith. In 1907 he received cabinet place as president of the Board of Education. He instituted medical inspection of the children in the schools, and reorganized the secondary school system. When the Asauith cabinet was organized in 1908 he was appointed First Lord of the Admiralty, and in 1911 he was transferred to the office of Home Secretary, where the problems incident to the crusades of the militant suffragettes caused him considerable difficulty. The so-called ((Cat-and- Mouse Act® brought severe criticism from the supporters of the suffrage movement and from the Opposition. He was also prominently con¬ nected with the Welsh Church Bill, the Mental Deficiency Act and the affairs of the Adminis¬ tration of Criminal Justice. Upon the formation of the coalition cabinet under Asquith, in May 1915, McKenna became Chancellor of the Exchequer, succeeding Lloyd George, who was appointed to the new post of Minister of Muni¬ tions. McKenna introduced the first heavy war-tax measure and elicited high praise upon its brevity and lucidity as well as its careful dis¬ tribution of the burdens of taxation. With the progress of the war, however, McKenna was thought to lean too much toward economy and not sufficiently to favor the stringent measures public opinion deemed necessary to bring the war to a speedy and definitely victorious con¬ clusion. When the new coalition cabinet was organized under the premiership of Lloyd George, December 1916, McKenna was suc¬ ceeded by Bonar Law. In the elections of 1918 he lost his re-election from North Monmouth¬ shire, interrupting a continuous Parliamentary career of 23 years.

MACKENSEN, August von, German field-marshal : b. Hausleipnitz, Saxony, 1849. Enter¬ ing the army in 1869 he served as lieutenant of reserves in the Franco-F'russian War. In 1876 he became adiutant of the first cavalry brigade and two years later was made lieutenant-colonel. He was appointed to the general staff in 1882 and in 1894 became commander of the Life Hussars

Regiment and the following year was made aide-de-camp to the emperor. In 1914 he was made chief-of-staff under von Hindenburg on the Eastern Front and in 1915 he directed the German drive in the Balkans and was made field-marshal. He commanded the German right in the drive on Warsaw and forced the Russian evacuation of that city. In 1916 he subjugated Rumania in conjunction with von Falkenhayn.

MACKENZIE, ma-ken'zi, Sir Alexander,

Scottish explorer: b. Inverness, Scotland, 1755; d. near Dunkeld, 12 March 1820. He went to Canada when young, where he entered the em¬ ploy of the Northwest Fur Company. In 1789 he explored the great river named after him from the Western end of Great Slave Lake to the Arctic Ocean, made another expedition to the western coast (1792), and was the first white man to cross the Rocky Mountains and reach the Pacific Coast. He returned to Britain in 1801, and for his explorations received the honor of knighthood in 1802. He published (Voyages from Montreal through the Continent of North America to the Frozen and Pacific Oceans in 1789 and 1793 > (1801).

MACKENZIE, Alexander, Canadian states¬ man : b. Logierait, Perthshire, Scotland, 28 Jan. 1822; d. Toronto, Ontario, 17 April 1892. He emigrated to Canada in 1842. For five years he worked at the trade of a stonemason at Kingston, but then removed to Sarnia, where he became a contractor. But his chief interests were political, not commercial. In 1852 he be¬ gan the publication of the Lambton Shield , and soon became conspicuous as one of the Liberal leaders. He entered the Canadian Par¬ liament in 1861, and after the Confederation of Canada, in 1867, sat both in the Ontario legis¬ lature at Toronto and in the Dominion Parlia¬ ment at Ottawa. When Edward Blake (q.v.) became. Prime Minister of Ontario in 1871 Mac¬ kenzie joined his cabinet and became Provincial Treasurer, but in consequence of the passing of a law forbidding membership of more than one legislature, he elected in 1872 to sit in the Dominion Parliament. In 1873, when the gov¬ ernment of Sir John Macdonald was over¬ thrown, Mackenzie, now the leader of the Lib¬ eral party,

became Prime Minister of Canada and held office for five years. His too great devotion to the details of his office broke down his health. In 1878 his government was de¬ feated by the advocates of protection, and in 1880 he was obliged by ill-health to hand over the leadership of the Liberal party to Mr. Blake.

MACKENZIE, Sir Alexander Campbell,

Scottish composer : b. Edinburgh, 22 Aug. 1847. He received his musical education at Sonders-hausen, Germany, and at the Royal Academy of Music, London, where he won the King's Scholarship in 1862. He established himself as a teacher in Edinburgh in 1865 and soon be¬ came known as a violinist of merit. He became precentor of Saint George's Church in 1870 and was appointed conductor of the Scottish Vocal Music Association in 1873. He was a member of the orchestra at the Birmingham Festivals in 1864-73. He had composed, several notable pieces for the piano at this time, and at the solicitation of friends he abandoned his work as a teacher and settled in Florence where he spent the greater share of his time from 1875

to 1885 engaged in composition. From 1888 he was principal of the Royal Academy of Music. He conducted the Philharmonic concerts in 1892-99, and was knighted in 1894. Author of "Overture, Cervantes) ; the cantatas (The Bride) (1881) and (Jason} (1882);* the operas ˆColombo5 (1883); (The Troubadour) (1886); the oratorios (The Rose of Sharon) (1884) ; (Bethlehem5 (1894) ; incidental music for sev¬ eral plays among them (The Little Minister,) "Coriolanus5 and (Ravenswood,5 and many concertos, songs, violin pieces and works for violin and orchestra.

MACKENZIE, Alexander Slidell (origi¬ nally Slidell), American naval officer: b. New York, 6 April 1803; d. Tarrytown, N. Y., 13 Sept. 1848. He was a brother of John Slidell (q.v.) and assumed the name "Mackenzie® for an uncle in 1837. He entered the navy in 1815 and became a commander in 1841. While in command of the Somers the next year a mutiny among the naval apprentices on board was sup¬ posed to have been detected, and three of them, including a son of the Secretary of War, were hung from the yardarm on 1 Dec. 1842. He was a popular writer and among his works are (A' Year in Spain by a Young American5 (1829-31; enlarged ed., 1836), which attained great popularity in England and the United States; (Popular Essays on Naval Subjects5 (1833); (The American in England5 (1835); (Life of John Paul Jones5 (1841), *etc.* Consult (The Case of the Somers: Defense of

A. S. Mackenzie5 (New York 1843) ; Cooper, (The Cruise of the Somers5 (ib. 1844).

MACKENZIE, Arthur Stanley, Canadian educator: b. Pictou, Nova Scotia, 26 Sept. 1865. He was graduated at Dalhousie University in 1885, and in 1885-87 was assistant master at the Yarmouth Academy, Nova Scotia. He was scholar in physics at Johns Hopkins University in 1889-90 and Fellow there in 1890-91. He was connected with the staff of physics at Bryn Mawr College in 1891-1905, was professor of physics at Dalhousie University in 1905-10 and at Stevens Institute of Technology in 1910—11 , since when he has been president of Dalhousie University. Author of (The Laws of Gravita¬ tion5 (1900).

MACKENZIE, Charles Frederick, Angli¬ can bishop : b. Portmore, Peebleshire, Scotland, 10 April 1825; d. Malo, in the Manganja coun¬ try, Africa, 31 Jan. 1862. He was graduated at Cambridge in 1848, was elected a Fellow there and was ordained a deacon in 1851. He was appointed to a curacy at Haslingfield, Cam¬ bridgeshire. in 1851., which office he filled with¬ out discontinuing his work as Fellow and tutor at Cambridge. In December 1854 he accom¬ panied Bishop Colenzo to Natal as his arch¬ deacon, and returned to England after a severe illness in 1859. He became the head of the Universities' Mission to Central Africa in 1860 and in 1861 was consecrated bishop of Central Africa. He was assisted by Livingstone in pene¬ trating certain remote districts in his diocese. He died of a fever while on his way to a conference with the explorer. Consult Good¬ win, (Memoir of Bishop Mackenzie5 (2d ed., 1865) ; Livingstone, (Narrative of an Expedi¬ tion to the Zambeezi5 (pp. 348-364, 400, 410-412, 1865).

MACKENZIE, Compton, English novelist and playwright: b. West Hartlepool, 17 Jan. 1883. He was educated at Saint Paul's School and Magdalen College, Oxford, where he took the second-class in modern history in 1904. He was one of the founders of the Oxford Point of View , and was its editor from 1902 to 1904. He has since occupied himself in writing novels and plays. He holds a commission as a lieu¬ tenant in Royal Marines. His chief publica¬ tions are (The Passionate Elopement5 (1911); (CarnivaP (1912); (Sinister Street) (Vol. I, 1913; Vol. II, 1914); (Guy and Pauline5 (1915); Eensington Rhymes5 (1912); Slash¬ ers Mead,5 and a volume of poems. His plays are (Carnival5 (1912) and (The Gentleman in Grey) (1906).

MACKENZIE, Sir George, Scottish law¬ yer: b. Dundee, 1636; d. Westminster, 8 May 1691. He was a grandson of Kenneth, 1st Lord Mackenzie of Kintail, and a nephew of the 1st and 2d Earls of Seaforth. He was educated at the universities of Saint Andrew's and Aber¬ deen and later studied civil law at the Univer¬ sity of Bourges, France. He was called to the bar in Scotland in 1659 and speedily rose to distinction. In 1661 he conducted the defense for the Marquis of Argyll in his trial for high treason, and soon afterward was. appointed a justice-depute, or judge of the Criminal Court. In 1669 he sat for Ross-shire and rendered him¬ self conspicuous by his opposition to Lauderdale and by his support of popular measures. He was knighted in 1674 and in 1677 succeeded Sir John Nisbet as King's Advocate. From this time Mackenzie's principles seemed wholly, sub¬ verted, and in his endeavor to force submission to the king he earned for himself the appella¬ tions <cBloodv Mackenzie55 and ((the blood¬ thirsty advocated He opposed the . abrogation of the penal laws against Catholics in 1686 and was removed from office until 1688, when for a year he was again King's Advocate, relin¬ quishing the office at the outbreak of the Revo¬ lution. He founded the Advocate's Library at Edinburgh in 1689, and in 1690 he retired to Oxford where he was admitted as a student and spent the remainder of his life engaged in liter¬ ary pursuits. Author of (A Vindication of the Government of Charles IP (1691) ; (The Moral History of Frugality) (1691); (Methods of Proceeding against Criminals and Fanatical Covenanted (1691) ; Vindication of the Pres¬ byterians of Scotland from the Malicious Aspersions Cast upon Them 5 (1692), and many other works of earlier date. His collected works were published (2 vols., Edinburgh 1716—

22). .

MACKENZIE, George Henry, American

chess player : b. near Aberdeen, Scotland, 24 March 1837 ; d. New York, 13 or 14 April 1891. He was appointed an ensign in the 60th Rifles in 1856, served at the Cape of Good Hope and in India and was promoted lieutenant. He re¬ turned to England and in 1861 sold his com¬ mission. He came to the United States in 1863, joined the Federal army and rose to the rank of captain. He thereafter devoted himself to chess as a professional, already having won first prize in the London Tournament of 1862, de¬ feating the Prussian champion, Anderson. Settling in New York in 1865 he became a member of its chess club and won first prize in

the tournaments of 1865, 1866, 1867, 1868.

He won first prize at the Second American Chess Congress in Cleveland in 1871 ; fourth prize at the International Congress at Paris in 1878, and in 1887 he won the championship of the world at Frankfort. He was found dead in bed.

MACKENZIE, Henry, Scottish novelist and essayist: b. Edinburgh, 25 Aug. 1745; d. there, 14 Jan. 1831. He was a lawyer at Edin¬ burgh, and in 1771 published anonymously (The Man of Feeling, 5 which the booksellers had de¬ clined as a gratuitous offering, and which gained him a conspicuous place among 18th century writers. Other novels of his are (Man of the World5 (1773), and (Julia, de Roubigne5 (1777). He edited The Mirror, 1779-80 (the first Scot¬ tish paper founded on the plan of The Specta¬ tor), and The Lounger, 1785-87.

MACKENZIE, James Cameron, American

educator: b. Aberdeen, Scotland, 15 Aug. 1852. He was graduated at Lafayette College in 1878, at Princeton Theological Seminary in 1882 and was ordained in the Presbyterian min¬ istry in 1885. He founded the Harry Hillman Academy, Wilkesbarre, Pa., in 1882, and also organized the Lawrenceville (N. J.) School in that year, acting as its head master in 1882-99. In 1899 he reorganized the Jacob Tome Insti¬ tute, Fort Deposit, Md., and was its director until 1901. Since 1901 he has been director of the Mackenzie School, Monroe, N. Y.

MACKENZIE, John Joseph, Canadian

pathologist and bacteriologist : b. Saint Thomas, province of Quebec, 1865. He was educated at the universities of Toronto, Leipzig and Berlin. He was a Fellow in biology at Toronto and later was bacteriologist to the Ontario Pro¬ vincial Board of Health. Since 1900 he has been professor of pathology and bacteriology at the University of Toronto. He has contributed to various scientific magazines. He is a Fellow of the Royal Society of Canada, and member of the American Public Health Association, the Society of American Bacteriologists and of the American Association of Pathologists and Bac¬ teriologists. He is secretary of the Canadian Institute. During the European War he was attached to No. 4 Canadian General Hospital. Author of (Recent Theories in Regard to the Causes of Immunity to Infectious Disease)

(1907).

MACKENZIE, John Stuart, British edu¬ cator: b. near Glasgow, 21 Feb. 1860. He was educated at Glasgow and Cambridge universi¬ ties and later studied at the University of Ber¬ lin. He was a Fellow at the University of Glasgow in 1882-84, at the University of Edin¬ burgh in 1884-89 and at Trinity College, Cam¬ bridge, 1890-96. He was professor of logic and philosophy at the University College of South Wales and Monmouthshire in 1895-1915, then becoming professor emeritus. He was a vice-president of the Institut International de Socialogie in 1911 and president of the Moral Education League in 1908-16. Besides magazine articles and contributions to the Encyclopedia of Religion and Ethics5 he is author of (An Introduction to Social Philosophy5 (1890; 2d ed., 1895); (A Manual of Ethics5 (1893; 8th ed., 1915); (Outlines of Metaphysics5 (1902; 2d ed., 1906) ; (Lectures on Humanism5 (1907) ; Elements of Constructive Philosophy5 (1917),

MACKENZIE, Sir Morell, English lar¬ yngologist : b. Leytonstone, Essex, 7 July 1837 ; d. London, 3 Feb. 1892. He was educated at the London Hospital, Paris and Vienna. In 1859 he met Czermak in Budapest and learning from him the use of the laryngoscope he intro¬ duced its use into London. Later he became physician to the London Hospital and lecturer on diseases of the throat. In 1863 he founded the Throat Hospital in London. In 1887-88 he was associated with specialists of Berlin and Vienna in the treatment of the larynx disease of the. Crown Prince, subsequently Emperor Frederick of Germany, and for these services was knighted by Queen Victoria and received the Grand Cross and Star of the Hohenzollern Order of Germany. He was the author of (The Use of the Laryngoscope) (1866) ; (Diseases of the Throat and Nose) (1880), *etc.*

MACKENZIE, Ranald Slidell, American

soldier: b. Westchester County, N. Y., 27 July 1840; d. Staten Island, N. Y., 19 Jan. 1889. He was son of Alexander S. Mackenzie (q.v.). Graduated from West Point in 1862, he was assigned to the engineer corps, was wounded at Manassas and brevetted 1st lieutenant for services in that action. He was engineer of Sumner's division at Fredericksburg (13 Dec. 1862), and received the successive brevets of captain and major for his conduct at Chancellorsville and Gettysburg. Promoted captain of engineers 6 Nov. 1863, he took part in the Rich¬ mond campaign as commander of the 2d Con¬ necticut Artillery. On 18 June 1864 was bre¬ vetted lieutenant-colonel for services in the Petersburg siege and commanded the 2d Con¬ necticut Heavy Artillery in the Shenandoah campaign. He was present at Lee's surrender at Appomattox (9 April 1865), and was mustered out of the volunteer service 15 Jan. 1866. In 1882 he was made brigadier-general and in 1884 placed on the retired list.

McKENZIE, Robert Tait, American sculp¬ tor, educator and physician : b. Almonte, prov¬ ince of Ontario, Canada, 1867. He was grad¬ uated at McGill University in 1889 and took his M.D. there in 1892. He engaged in the practice of medicine ; was connected with the medical faculty of McGill in 1895-1904, and in 1904 was appointed professor

and director of the department of physical education at the University of Pennsylvania. He was appointed temporary major in the R. A. M. C. in 1915, and in 1916 was inspector of physical training of Kitchener's armies, and medical officer in charge of Heaton Park Command Depot. He is a Fellow of the College of Physicians at Philadelphia, and in 1912—15 he was president of the American Physical Education Association. His fame as a sculptor has been achieved with¬ out artistic training, his guide being his thor¬ ough knowledge of anatomy and his unusual ability in interpretation. He has exhibited at the Society >of American Artists, New York; the Royal Academy, London, and the Paris Salon. Among his works as a sculptor are (The Sprinter5 (Fitzwilliam Museum, Cam¬ bridge) ; (The Athlete) (Ashmolean Museum, Oxford) ; the statuettes, <The Competitor and the (Juggler 5 (Metropolitan Museum, New York) ; (The Youth Benjamin Franklin5 (Uni¬ versity of Pennsylvania). Author of (The Barnjum Barbell Drill, > and ˆExercise in Edu¬ cation and Medicine.5

MACKENZIE, William, Canadian finan¬ cier; b. Kirksfield, Ontario, 30 Oct. 1849. He was educated at the local schools and became a public school teacher. Giving up this occupation he contracted for the construction of a portion of the Victoria Railway — now the Midland division of the Grand Trunk Railway- — and later executed contracts for the Coboconk, the Credit Valley, the Canadian Pacific, the Fort McLeod and Edmonton, the Regina, the Hud¬ son Bay and Dauphin railways and other roads. He controls and is president of the Toronto Street Railway, is also interested in the Mont¬ real and Winnipeg street railways, and with others controls the Birmingham Street Railway and other European lines. His great achieve¬ ment was the construction of the Canadian Northern Railway (q.v.), of which he is presi¬ dent. He was knighted in 1911.

MACKENZIE, William Douglas, Amer¬ ican Congregational clergyman : b. Fauresmith, Orange River Colony, South Africa, 16 July 1859. He graduated from Edinburgh Univer¬ sity in 1881, studied divinity in Edinburgh and Gottingen, was professor of theology in the Chicago Theological Seminary, 1895-1903, and since 1903 has been president of Hartford The¬ ological Seminary. He published (The Revela¬ tion of the Christ5 (1896) ; Christianity and the Progress of Man5 (1897); (South Africa: its History, Heroes and Wars5 (1900) ; (John Mackenzie., South African Missionary and Statesman5 (1902); (The Final Faith5 (1910); (Galatians and Romans5 (in <Westminster New Testament,5 1912).

MACKENZIE, William Lyon, Canadian

journalist and political reformer: b. Dundee, Scotland, 12 March 1795; d. Toronto, Ontario, 28 Aug. 1861. In 1820 he came to Canada and conducted a drug and book store at Little York (now Toronto), and later at Queenstown, where in 1824—26 he published the Colonial Advocate. He transferred the Advocate office to Toronto in 1826, and there continued the paper until 1833, attacking the office-holding class and de¬ manding governmental reforms. In 1828 he entered the provincial Parliament; and having been expelled for alleged libel against that as¬ sembly, was five times reelected and as often re-expelled, until the government refused to issue another writ of election. In 1832 he went to England, and having presented to the home government a petition of grievances from the Canadian reformers, was successful in obtaining the dismissal of the attorney-general and the solicitor-general of Upper Canada and the veto of the Upper Canadian bank bill. In 1834 he was elected first mayor of Toronto, in 1836 be¬ gan the publication of The Constitution, and, in 1837 published in that journal a bold mani¬ festo which was practically a declaration of in¬ dependence of the provincial government. Soon afterward he was the moving spirit in armed rebellion. An encounter took place between his followers and the government forces at Montgomery's Tavern, in the vicinity of To¬ ronto (7 Dec. 1837), and the insurgents fled to Navy Island in the Niagara, where they were joined by about 500 Americans. The island was bombarded by Canadian troops, and as a re¬ sult of this and the strong opposition of Gen¬ eral Scott of the United States army, the in¬ surgents broke camp and Mackenzie was im-70

prisoned for a year in Rochester jail. Later he was a journalist in the United States, in 1849 took advantage of amnesty to return to Canada, was there a member of Parliament from 1850— 58, and at Toronto published the weekly Mackenzie's Messenger from 1858 until shortly before his death. The reforms for which he so persistently contended were in the main achieved in his lifetime. He wrote (Sketches of Canada and the United States} (1833). Con¬ sult the <Life) by Lindsey (1862) ; Lindsey's <(Life® in (The Makers of Canada > (1910); Dent, (Story of the Upper Canada Rebellion* (1885) ; Read, (The Canadian Rebellion of

1837)) (1896).

MACKENZIE, Canada, a district in the Northwest Territories, bounded north by the Arctic Ocean, east by Keewatin, south by Atha¬ basca, and separated on the west from Yukon by the northernmost spur of the Rocky Moun¬ tains. The district created in 1895 and admin¬ istered by the government of the Northwest Territories, is the largest in Canada, having an estimated area of 563,200 square miles, of which 82,000 square miles are water. The sur¬ face generally is diversified ; in the northwest it is a sterile waste; along the river valleys and on the western mountain slopes it is well for¬ ested with fir, pine, spruce and other northern trees, while coal and other minerals, although unexploited, are found. The principal lakes are Great Slave, Great Bear, Pelly and Clinton Colden. The chief rivers are the Mackenzie, the Coppermine and the Great Fish or Back River. The soil is comparatively unproductive, the climate being arctic and inhospitable except for the few summer months. The population, about 5,400, inhabit the trading settlements of the Hudson's Bay Company's along the Mac¬ kenzie and its tributaries. The pelts of the fur¬ bearing animals of the region are practically the only developed item of commerce.

MACKENZIE RIVER, Canada, a large river in the Northwest Territories, which flows from the Great Slave Lake, and after a north¬ westerly course of about 1,000 miles enters the Arctic Ocean by numerous mouths at the island-studded Mackenzie Bay. Its ultimate source is in Thutage Lake, the headwaters of the Finlay in northern British Columbia ; its total length from Thutage Lake to the sea is 2,525 miles. Its tributary head-streams are the Great Peace River, which rises in British Col¬ umbia beyond the Rocky Mountains, and the Athabasca or Elk River, which has its source in the Rockies ; these two rivers flowing into Lake Athabasca are discharged by the Great Slave River into Great Slave Lake whence issues the Mackenzie. The principal affluent of the Mackenzie is the Laird or Mountain River. With the exception of a slight obstruction in the rapids near Fort Good Hope, in lat. 66° N., the Mackenzie and its tributaries are navigable for a distance of over 1,800 miles, and from June to October steamboats of the Hudson's Bay Company ply from Great Slave Lake al¬ most to the Arctic Ocean. Forts Providence, Norman and Good Hope are trading stations along its banks, while Forts McPherson, Frank¬ lin, Enterprise, Reliance, Resolution, Chippe-wyan, Nelson and Graham are along its tribu¬ taries. The valley is well-wooded with spruce,

pine, poplar and birch, while coal, salt and other minerals abound in the region. The river is named after Alexander Mackenzie (q.v.), who first explored it in 1789.

MACKEREL, mak'e-rel. The common mackerel (Scomber scombrus) is the best-known and most important member of the family Scombridce and one of the most valuable of food-fishes, ranking in this respect behind the cod and herrings only. The. mackerel is a compactly built fish of smooth and regular outline, the fusiform figure tapering accurately to the pointed snout, so that it cleaves the water easily. The large, deeply-forked tail is sup¬ ported on a slender peduncle, provided with two small keels on each side, and preceded by a dorsal and a ventral series of finlets of five each. A soft dorsal and a counterpart anal fin are placed exactly opposite each other and be¬ hind the level of the vent, and the anterior dorsal fin is supported by usually 11 delicate spines. Very numerous and small scales cover the body nearly uniformly, but are absent from the head. The large mouth is provided with numerous small sharp teeth. The gill-rakers are long and the air-bladder is wanting. The color of the back is deep blue, marked by about 35 nearly vertical wavy black lines ; below, the fish is silvery white. A recent close study of the species on the European side of the Atlantic establishes the existence there of local races, as in the herring, but it appears that the Amer¬ ican representatives, while constituting a race distinct from the European, are more homo¬ geneous.

The mackerel is an abundant fish on both sides of the north Atlantic, on the American side ranging from Cape Hatteras to the Straits of Belle Isle, and on the European from north¬ ern Norway to the Canary Islands and through¬ out the Mediterranean. While a true pelagic fish of wandering and migratory habits and, like most such, capricious in its movements, the great body of mackerel approaches the Ameri¬ can coast and moves along it northward as the temperature of the water rises to about 45° F. On the approach of winter they retire to a greater distance from the land, but a few re¬ main throughout the year near the coast. Mackerel swim in great schools at or near the surface; one such covering an area of 10 square miles, and another estimated as contain¬ ing 1,000,000 barrels, have been observed. The local movements of the schools are largely regu¬ lated by the food-supply, which consists of small pelagic fishes, various kinds of small crustaceans, etc., which are pursued with great eagerness. On the other hand, the bluefish and other carnivorous fishes, porpoises, squids and fish-eating birds, are relentless enemies. Spawning takes

place in the open sea, not far from the coast from Vineyard Sound to the Gulf of Saint Lawrence, and during the months of May, June and early July. The eggs are about one millimeter in diameter, contain an oil-drop and float at the surface, where the young fish develop and live. They grow rapidly and are about five inches long by the end of the first half year, when they are known as (<spikes® ; ˆblinkers® are about one year old and six or seven inches long; <(tinkers® are seven to nine inches long and are supposed to be two years old. At the age of three or four

years the mackerel is mature and from 12 to 18 inches long. The very largest specimens weigh about four pounds and have a length of 22 to 23 inches.

The mackerel fishery is of the greatest im¬ portance in the New England States and Nova Scotia, and in Norway, Ireland and Great Britain. In Europe the fishery is prosecuted almost exclusively by means of small boats and hand lines, but in America is chiefly carried on in staunch seagoing schooners, most of which hail from Gloucester, Mass., and which are equipped with purse seines, by means of which entire schools are surrounded and captured. The fishing begins off Cape Hatteras in March or April and the schools are followed north¬ ward as they appear successively on the New Jersey, New England and Canadian coasts. In addition to the operations of this mackerel fleet, local fisheries are carried on along much of the coast, with pound-nets, gill-nets and handlines. The spring and local catches are generally sold fresh, the summer catch being split and salted. The product of the fishery has been peculiarly subject to fluctuations, due in large part to alternating periods of abundance and scarcity of the fish. Colonial writers refer to its great plenty, and statistics of the catch inspected in Massachusetts show a somewhat regular recurrence of such periods at intervals of about 20 years. From 350,000 barrels in 1880 and 395,000 in 1881, the catch steadily declined to 75,000 in 1886, and 18,000 in 1891, since which time it has greatly fluctuated.

For 1914—15 the number of fry distributed was 4,847,000, and in the

succeeding year 1,946,- 000. In 1915 the returns for salted mackerel were 19,691 barrels, exceeding the previous year by 4,170 barrels, while the total catch of fresh mackerel was 71,564 barrels against 68,582 in the previous year. The returns for New England up to 30 June 1916 show an increase of 63 per cent in quantity and 73 per cent or $259,354 in value. In the spring of 1916 mack¬ erel reached the unheard-of price of 40 cents apiece for the larger fish. The Canadian prov¬ inces in 1914-15 give 143,712 hundredweights, as against 215,442 hundredweights in the previous year, — a decline in values of $453,473; the quantity in 1915-16 was 180,990 hundredweights, representing an increased value $180,990 over 1914-15. An elaborate account of the American mackerel fishery will be found in Brown-Goode's (Materials for a History of the Mack¬ erel Fishery) (Report of the United States Fish Commission, 1884) ; for some recent views see Moore, (Report National Fishery Congress) (Washington 1898); and for methods of pres¬ ervation, Stevenson, (The Preservation of Fishery Products for Food) (Bulletin of United States' Fish Commission, 1898).

MACKEREL SHARK, or PORBEA¬ GLE, a shark of the family Lamnidce, allied to the man-eater (q.v.), and like it sometimes called blue shark, on account of its color, which is frequently seen on both sides of the north¬ ern Atlantic Ocean; it is the Lanina cornubica of ichthyologists. The ordinary length is about 10 feet, and they become very abundant in summer, when the mackerel are running, along the New England coast, and also about Great Britain, where they are called porbeagles. They are a nuisance to fishermen by destroying

their nets, through which several will often tear their way (for they roam about in bands) in pursuit of captured fish. Formerly consider¬ able quantities of oil were saved from their livers, but at present the value of this com¬ modity does not pay for the trouble of taking them.

MACKEY, Albert Gallatin, American writer on Freemasonry : b. Charleston, S. C., 12 March 1807 ; d. Fortress Monroe, Va., 20 June 1881. He was graduated from the Medical College of South Carolina in 1832 and was demonstrator of anatomy there in 1838, but after 1844 devoted himself to studies of Free¬ masonry and became a standard authority on the subject. Among his works are (A Lexicon of Freemasonry) (1845) ; (The Mystic Tie) (1849); (Book of the Chapter* (1858); (A Manual of the Lodge) (1862) ; (A Textbook of Masonic Jurisprudence* (1869); Encyclopaedia of Freemasonry * (1874).

McKIBBjEN, Chambers, American sol¬ dier: b. F'ittsburgh, Pa., 2 Nov.

1841; d. May 1919. He enlisted as a private in the volunteer service 22 Sept. 1862, was brevetted captain for gallant services in the battle of North Anna River (Va.) and in the operations on the Weldon Railway, and on 1 May 1896 attained the rank of lieutenant-colonel of the 21st United States Infantry. At the beginning of the war with Spain he went to Cuba with Shafter's armv, fought at Santiago (1 July 1898), and was made brigadier-general of volunteers and ap¬ pointed military governor of Santiago. On 12 May 1899 he was mustered out of the volunteer service. Retiring in the same year, he was put in command of the Department of Texas, and two years later was transferred to the command of an infantry regiment. In 1902 he retired with the rank of brigadier-general.

MACKIE, Pauline Bradford. See Hop¬ kins, Pauline Bradford Mackie.

McKIM, Charles Follen, American archi¬ tect : b. Chester County, Pa., 24 Aug. 1847 ; d. 14 Sept. 1909. He studied at the Lawrence Scientific School in 1866, at the Beaux-Arts of Paris in 1867-70, and shortly afterward entered into partnership with Sanford White and Wil¬ liam R. Meade. This firm achieved some of the finest triumphs of recent American archi¬ tecture. Among notable examples of ito work are the buildings of Columbia University, and the Public Library of Boston. In 1903 McKim received the royal gold medal from the Royal Institute of British Architects in recog¬ nition of his services to architecture. He was the second American to obtain this honor, R. M. Hunt (q.v.) having been the first. On the occasion of the presentation he made an able speech reviewing the progress of his profession in the United States. He was elected president of the American Institute of Architects.

McKIM, James Miller, American aboli¬ tionist: b. near Carlisle, Pa., 14 Nov. 1810; d. Llewellyn Park, West Orange, N. J., 13 June 1874. He was graduated from Dickinson Col¬ lege (Carlisle, Pa.) in 1828, studied medicine at the University of Pennsylvania and theology at Princeton (1831) and Andover (1832), and in 1835 was ordained a Presbyterian pastor in Womelsdorf, Pa. An original member of the American Anti-Slavery Society, he became its

lecturing agent in October 1836, and spoke throughout Pennsylvania, often at great per¬ sonal danger. In 1840 he removed to Philadel¬ phia, where he was publishing agent of the Pennsylvania Anti-Slavery Society and later corresponding secretary until 1862. In Novem¬ ber 1862 he called a public meeting in Phila¬ delphia to provide for 10,000 slaves suddenly liberated by the capture of Port Royal, S. C. As a result, the Philadelphia Port Royal Re¬ lief Committee was formed. This committee was expanded in November 1863 into the Pennsylvania Freedman's Relief Association, of which McKim became the corresponding secre¬ tary. In that capacity he was active in the establishment of negro schools in the South. In 1865-69 he was corresponding secretary of the American Freedman's Commission, which on his motion was disbanded in July 1869. In 1865 he assisted in founding and became a proprietor of the New York weekly Nation. During the Civil War he was an advocate of the enlistment of negro troops, and as a mem¬ ber of the Union League of Philadelphia as¬ sisted in the recruiting of 11 colored regiments.

MACKINAC (mak'i-nak or mak'i-na) ISLAND, Mich., in Mackinac County, at the entrance to Straits of Mackinac, in the north¬ west part of Lake Huron, about 255 miles north by west of Detroit. The island is about three miles long and two wide. It is rocky, and covered with trees, shrubs and flowers. The island has been prominent since the early missionaries and explorers mentioned it in con¬ nection with its command of the channel en¬ tering the straits. An interesting historic point on the island is Fort Mackinac, one of the oldest fortifications in the United States. The city of Mackinac on the southeast shore was chartered in 1900. Pop. of the city 720.

MACKINDER, ma-kin'der, Halford John,

English author and educator : b. Gainsborough, 15 Feb. 1861. He was educated at Christ Churdh, Oxford; in 1883 was president of the Oxford Union; Burdett-Coutts University scholar 1884; barrister, Inner Temple 1886; reader in geography, Oxford University 1887— 1905; and from 1903-08 director of the London School of Economics and Political Science. He was leader of the Mount Kenya Expedition 1899; and has been member (Unionist) for the Camlachie division of Glasgow since 1910. He has written (Britain and the British Seas) (1902) ; (The Rhine) (1908) ; (Elementary Studies in Geography* (12th ed., 1914); dem¬ ocratic Ideals and Realty } (1919).

McKINLEY, ma-km'li, William, Amer¬ ican statesman, 25th President

of the United States: b. Niles, Trumbull County, Ohio, 29 Jan. 1843; d. Buffalo, N. Y„ 14 Sept. 1901. He was educated at Union Seminary, Poland, Mahoning County, Ohio, and Alleghany College, Meadville, Pa. (1860-61). Forced by illness to discontinue his college course, he taught in the public schools, was a clerk in the Poland post-office and on 11 June 1861 enlisted for the Civil War as a private in Company E of the 23d Ohio Volunteer Infantry. His first battle was that of Carnifex Ferry (10 Sept. 1861), and op 15 April 1862, while in camp at Fayette¬ ville, western Virginia, he was promoted com¬ missary sergeant. For conspicuous service at Antietam (17 Sept. 1862) he was made second

lieutenant of Company D. His subsequent ap¬ pointments were, first lieutenant, Company E (7 Feb. 1863) ; captain Company G (25 July 1864) ; and brevet major (14 March 1865). When mus¬ tered out on 26 July 1865 he was acting assist¬ ant adjutant-general on the staff of Gen. S. C. Carroll, commanding the veteran reserve corps stationed at Washington. Among other actions in which he participated were those of South Mountain (14 Sept. 1862), Lexington (10 June 1864), Kernstown (24 July 1864), Ope-quan Creek (Winchester, 19 Sept. 1864), Fish¬ er's Hill (22 Sept. 1864) and Cedar Creek (19 Oct. 1864). During his subsequent political career he was generally known, especially in Ohio, as Major McKinley. At the close of the war he began the study of law at Youngs¬ town, Ohio (1865-66), continued it at the Al¬ bany (N. Y.) Law School (1866ˆ-67), in March 1867 was admitted to the bar at Warren, Trum¬ bull County, Ohio, and at once entered practice at Canton. In 1870-71 he was prosecuting attorney of Stark County, and during the cam¬ paign between R. B. Hayes and William Allen for the governorship of the State, spoke effec¬ tively against the ˆgreenbackˆ craze. He was elected to Congress as Republican representative from the 17th Ohio district in 1877, and served continually in the 45th, 46th and 47th Con¬ gresses (1877-83). It was asserted by the Re¬ publicans that he was elected in 1882 to the 48th Congress by a majority of eight ballots; but, although he had received the certificate of election, his seat was successfully contested by J. H. Wallace, who was not, however, seated until June 1884. He represented the 20th dis¬ trict in the 49th Congress (1885-87), and the 18th in the 50th and 51st Congresses; but in 1890 was defeated in the 16th for the 52d Con¬ gress by 300 ballots by J. G. Warwick, Demo¬ crat, lieutenant-governor of the State a short time previously. His defeat was attributed to the gerrymandering of the district by a-Demo¬ cratic legislature. His service in Congress was notable. In 1877 he was appointed a member of the Judiciary Committee, and in

December 1880 of the Ways and Means Committee to succeed James A. Garfield; and in 1881 was chairman of the committee in charge of the Garfield memorial exercises in the House. In 1889-90 he was chairman of the Ways and Means Committee. He was a candidate for speaker of the 51st Congress, but was defeated by T. B. Reed on the third ballot in the Repub¬ lican caucus. He was known among the fore¬ most orators of the House; and his speeches on arbitration as a solution of labor troubles (2 April 1886) and in support of the civil service laws (24 April 1890) were most favor¬ ably received. But his principal efforts were made in connection with the tariff, which, from his first appearance in the House, was the chief object of his study. On 6 April 1882 he spoke in advocacy of protection; on 30 April 1884 in opposition to the Morrison tariff bill, making what was esteemed the ablest argument against that measure ; and on 7 May 1890 in support of the general tariff bill, now known by his name, which, as chairman of the Ways and Means Committee, he had introduced before the House on 16 April. The bill was passed by the Hoyse on 21 May, by the Senate on 11 September, and on 6 October became a law. His bill obtained for him an international reputation, and

Copyright, 1902, by Rock wood

eventually the Presidency. In 1884 he was dele¬ gate-at-large from Ohio to the Republican National Convention at Chicago, where he sup¬ ported Blaine's candidacy, and where, as chair¬ man of the committee on resolutions, he helped to determine the platform of his party, which he read before the convention. In the Republi¬ can National Convention at Chicago in 1888, he was again a delegate and chairman of the com¬ mittee on resolutions. H; supported the candi¬ dacy of John Sherman, although, when it was finally learned that Blaine would decline the nomination, he was himself the choice of many delegates and was strongly urged to permit the use of his name. At the Minneapolis conven¬ tion of 1892 he was once more a delegate and was elected permanent chairman of the assem¬ bly. He supported the renomination of Presi¬ dent Harrison, and though refusing the use of his own name, received the ballots of 182 dele¬ gates. He then left the chair and moved to make Harrison's nomination unanimous, which was accordingly done. In the ensuing campaign he took a very active part, traveling, it was estimated, more than 16,000 miles and speaking to more than 2,000,000 voters. In 1892-96 he was governor of Ohio, having been elected in 1891 by 21,500 plurality, and in 1893 by the unusual plurality of 80,995. Labor riots oc¬ curred during his administration, necessitating the placing of 3,000 militia troops in active serv¬ ice, but the . difficulties were successfully ad¬ justed. McKinley also personally directed the relief work for the starving miners of the Hocking Valley district. He was nominated for the Presidency by the Republican National Convention which met at Saint Louis 16 June 1896, and was elected by a plurality of 601,854 over W. J. Bryan, receiving a popular vote of 7,104,779, and in the electoral college a vote of 271 to 176 for Bryan. Throughout the cam¬ paign he remained in Canton, where he made over 300 speeches to

more than 750,000 visitors. Under his administration decided increase in business prosperity followed the passage of the Dingley tariff measure. The most important event of his term was the Spanish-American War (q.v.), which he had believed might be prevented and had done all in his power to avert. When hostilities broke out on the part of certain inhabitants of the Philippine Islands, the President appointed a commission to study the situation and report on the most suitable mode of government for the new territory. On 7 Tuly 1898 he approved the joint resolution of Congress for the annexation of the Hawaiian Islands, and in 1898 he also selected a delegation to represent the United States in The Hague peace conference which convened in May 1899. The original Philippine commission having rendered a report (31 Jan. 1900), the President appointed a new commission, known from its head, Judge W. H. Taft, as the Taft commis¬ sion, under whose direction civil government was instituted in the islands on 1 Sept. 1900. (See Philippines, History). In 1900 the Presi¬ dent stood conspicuouslv for justice in the set¬ tlement of the difficulties in China which marked that summer. He was renominated for the Presidency by the Republican National Conven¬ tion which met at Philadelphia on 25 June 1900, receiving the entire vote of the 930 dele¬ gates. He was elected bv a popular vote of 7,206,677 to 6,374,397 for W. J. Bryan, receiving

till then, the largest popular majority ever given a candidate for the Presidency. He ob¬ tained 292 electoral votes and carried 28 States. On 5 Sept. 1901 he delivered at the PanAmer¬ ican Exposition, Buffalo, N. Y., an important address, summarizing at once the problems then before the nation and his policy for their solu¬ tion. On 6 September, while holding a recep¬ tion in the Music Hall of the Exposition, he was twice shot by Leon Czolgosz (q.v.), an anarchist. He died on 14 September; and 19 September was appointed by his successor, President Roosevelt, a day of mourning and prayer throughout the United States. Unpre¬ cedented honors were paid to McKinley's memory in foreign capitals, notably in London, where memorial services were held in West¬ minster Abbey and Saint Paul's Cathedral. A statue was erected in his honor at Columbus, Ohio, and unveiled in 1906. Consult Smith (editor), (Speeches and Addresses of William McKinley > (1893) ; Porter, (The Life of Major McKinley) (1896), and Speeches and Ad¬ dresses of William McKinley from 1897 to 1901 > (1900). See also United States, History.

McKINLEY, Mount, United States, a peak of the Rocky Mountains, the highest in North America, south of the central part of Alaska, about

155 miles north of Cook Inlet. The Indian name for this peak is Traleyka and the Russian name, Bolshaya. The fact that this is the highest land on the continent was not known till 1896 when Mr. Dickey explored the Sushitna River and the land near its source. He estimated the height of the peak at 20,000 feet, and named it McKinley, in honor of William McKinley (q.v.). In 1903 it was visited by members of the United States Geological Survey. The mountain is a great dome-shaped mass, over 20,000 feet above the sea. Consult Balch, E. S., (Mount McKinley and Mountain Climbers' Proofs) (Philadelphia 1914) ; Browne, A., (The Conquest of Mount McKinley) (New York 1914).

McKINLEY ACT, a name popularly given to a tariff bill reported to Congress, 21 May 1890, by the Ways and Means Committee of the House of Representatives, of which William McKinley was chairman. It became a law in October 1890 and was repealed in 1894. It in¬ creased the duties on wool, woolen manufac¬ tures, on tin-plate, barley and some other agri¬ cultural products and remitted the duty on raw sugar. The reciprocity feature was an import¬ ant part of the bill, providing for the remission of duty on certain products from those coun¬ tries which should remove duties on American imported products. See Tariff.

McKINNEY, Mrs. Glen Ford. See Web¬ ster, Jean.

McKINNEY, ma-km'i, Tex., city, county-seat of Collin County, on the Missouri, Kansas and Texas and the Houston and Texas Central railroads, about 30 miles north by east of Dallas. It is situated in a rich agricultural region, served by the Texas Traction Company, in which cotton is cultivated quite extensively. The chief industrial establishments are cotton¬ seed-oil mills, cotton gins, cotton compresses, wagon and carriage shops and flour mills. It is the seat of the McKinney Collegiate Insti¬ tute, has five schools and a courthouse, a fine

building, cost $100,000. The waterworks are owned and operated by

the city. The commis¬ sion form of government has been adopted. Pop. 10,000.

MACKINTOSH, mak'm-tosh, Sir James, Scottish historian and philosophical writer: b. Aldourie, Inverness-shire, 24 Oct. 1765; d. Lon¬ don, 30 May 1832. He was educated at Aber¬ deen and Edinburgh ; studied medicine and took the M.D. degree in 1787; published his (Vin-diciae Gallicse5 in answer to Burke's Reflections on the French Revolution5 ; quitted the medical profession and was called to the English bar in 1795. By reason of his brilliant lectures on the Raws of Nature and Nations,5 and his de¬ fense of Peltier, who was prosecuted for a libel on Napoleon Bonaparte, he acquired fame at the bar, and in 1804 was appointed recorder of Bombay and received the honor of knight¬ hood. After an honorable career in India he returned to England, entered Parliament for Nairn and afterward for Knares-fborough ; was professor of law at Haileybury College (1818— 24), a member of Privy Council and in 1830 commissioner of the Board of Control. Among his writings may be mentioned his (History of England, 5 a fragment extending only to the reign of Elizabeth; dissertation on the Prog¬ ress of Ethical Philosophy) in the Encyclo¬ paedia Britannica; a Rife of Sir Thomas More) in Lardner's (Cyclopaedia, 5 and nine chapters of an unfinished work on the Revolution of

1688.

MACKINTOSH, a water-proof overcoat, or outer garment, one of the products of modern rubber manufacture. It derives its name from the inventor, Charles Mackintosh of Manches¬ ter (1766-1843). See India Rubber.

MACKLIN, mak'lin, Charles, Irish actor and dramatist: b. Ireland, 1 May 1697; d. Lon¬ don, 11 July 1797. He was the son of an Irish gentleman named McLaughlin and in 1733 ap¬ peared in minor parts at Drury Lane, London. He steadily rose in public favor, till 1741 he appeared in his greatest role, Shylock. He was accounted from this period among the best actors of the time. His last performance was at Covent Garden in May 1789, at past the age of 90. In 1735 he accidentally killed a brother actor in a quarrel and was tried for murder, and was frequently afterward engaged in dis¬ putes and actions at law. Of his own plays only (The Trueborn Irishman5 ; Rove a-la- Mode5 (1759), and (The Man of the World5 (1781) have been printed. Consult Rife5 by Parry (1891).

MACKUBIN, mak-kub'in, Florence, American artist: b. Florence, Italy, 19 May 1861 : d. 7 Feb. 1918. She was of American par¬ entage, and studied under Louis Deschamps and Julius Rolshoven in Paris and Herterrich in Munich, also miniature painting under Mile. J. Devina in Paris. Since completing her studies she has lived chiefly at Baltimore, Md. She has specialized in portrait and miniature paint¬ ing, and her work was exhibited at the Colum¬ bian Exposition, 1893; the Tennessee Exposi¬ tion in 1897; at Paris, 1900; at Buffalo, 1901; Charleston, 1902, and Saint Louis, 1904. She was officially commissioned to execute various portraits for the Executive Mansion and State House, Maryland, among them a copy of Van

Dyck's portrait of Queen Henrietta Maria, and portraits of Governors Calvert and Eden of Maryland. Among other portraits are those of Sir Charles Drury at the Admiralty House, Chatham, England, and Sir William Van Horne, Canada. Her miniatures won a medal at the Tennessee Exposition. Among them is one of Cardinal Gibbons.

McLACHLAN, mak-lak'lan, Alexander,

Scottish Canadian poet: b. Johnstone, Renfrew¬ shire, Scotland, 12 Aug. 1818; d. Orangeville, Ontario, 20 March 1896. He removed to Can¬ ada in 1841 ; was Canadian immigration agent to Scotland in 1862, and in 1874 delivered in Scotland a series of lectures on Canadian life. He lectured also in Canada and the United States. He was a man of broad and demo¬ cratic sympathies and was deeply interested in the betterment of conditions among the work¬ ing classes. Author of (Poems, Chiefly in the Scottish Dialect5 (1855) ; Rvrics5 (1858) ; (The Emigrant and Other Poems5 (1861) ;

(Poems and Songs5 (1874).

MACLAGAN, William Dalrymple, Eng¬ lish archbishop: b. Edinburgh, 18 June 1826; d. 19 Sept. 1910. He was educated at Edinburgh and was graduated in mathematical honors at Cambridge University. He served in the Indian army (1847-49); was ordained deacon (1856) and priest (1857). He was appointed bishop of Lichfield (1878) and archbishop of York in 1891. He published (Pastoral Letters and Synodal Charges5 (1892).

McLANE, mak-lan', Allan, American sol¬ dier and jurist: b. 8 Aug. 1746; d. Wilmington, Del., 22 May 1829. In 1774 he settled in Kent County, Del., and in the Revolution he took a prominent part. He

became a lieutenant in Thomas Rodney's regiment of Delaware militia, where he rendered important service at Long Island and White Plains and also in the New Jersey campaign. In 1777 he was made captain and was in command of the American guard about Philadelphia, taking active part in the battle of Monmouth. With the rank of major under Gen. Henry Lee he participated in the capture of Stony Point and Paulus Hook and attained colonel's rank. At the close of the war he was appointed judge of the Delaware Court of Appeals. In 1790-98 he was United States marshal of Delaware under Washington's appointment, and from 1808 until his death col¬ lector of Wilmington (Del.) port. He also served in the Delaware legislature, being for a time speaker of the lower house.

McLANE, James Woods, American phy¬ sician: b. New York, 19 Aug. 1839; d. 25 Nov. 1912. He was graduated at Yale University in 1861 and took his M.D. at the College of Physi¬ cians and Surgeons, Columbia, in 1864. He was thereafter for many years connected with the medical faculty of the College of Physicians and Surgeons, as lecturer on materia medica in 1866-67, professor of materia medica and thera¬ peutics 1868-72, adjunct-professor of obstetrics, diseases of women and children and medical jurisprudence in 1872-79, professor of gynecol¬ ogy in 1882-85 and of obstetrics in 1891-98. He became professor emeritus in 1898; and in 1891-1903 he was dean of the medical faculty. From 1905 until his death he was president of Roose¬ velt Hospital.

McLANE, Louis, American statesman : b. Smyrna, Kent County, Del., 28 May 1786; d. Baltimore, 7 Oct. 1857. He was the son of Allan McLane (q.v.), and entering the navy at an early age, served as a midshipman under the elder Decatur. Quitting the navy in 1801 he studied law, was admitted to the bar in 1808 and rose to eminence in the profession. He represented Delaware in Congress, 1816-27, when he was chosen United States senator. In 1829-31 he was Minister to Great Britain, and on his return home was made Secretary of the Treasury. In 1833 he declined to sanction the removal of the deposits from the United States Bank, and was consequently transferred by the President to the State Department. He held the office of Secretary of State till June 1834, when he resigned and retired from political life. In 1837 he accepted the presidency of the Baltimore and Ohio Railroad, which he held till 1847. In June 1845 he was appointed by President Polk ambassador to London during the Oregon negotiations, after the settlement of which he resigned. In 1850 he was a member of the convention to reform the constitution of Maryland.

McLANE, Robert Milligan, American politician and diplomat : b. Wilmington, Del., 23 June 1815; d. Paris, France, 16 April 1898. He studied at the College Bourbon of Paris (1829-31), was graduated from West Point in 1837, took active part in the Seminole War in Florida (1837), and served under General Scott in the Cherokee country (Georgia). He re¬ signed from the army in 1843, and having al¬ ready been admitted to the bar in the District of Columbia, began practice at Baltimore, Md. In 1847-51 he was a Democratic member of the House of Representatives in the 30th and 31st Congresses. In 1853 he was appointed commis¬ sioner, with powers of minister plenipotentiary, to China, Japan, Siam, Korea and Cochin China: and from this mission he returned in 1856, having with Commodore Perry concluded important treaties. In 1859-61 he was Minister to Mexico, in which capacity he signed the treaty of 1860. In 1861 he returned to Balti¬ more and there took a prominent part in the discussions attending the secession of the Cotton States. He was one of the committee appointed by the Maryland legislature (May 1861) to con¬ fer with Lincoln in regard to alleged unconsti¬ tutional proceedings

on the part of the Federal government within the State of Maryland. Uoon the decision of the State legislature, based on the committee's report, that it was inexpe¬ dient for Maryland to secede, McLane retired from public affairs for a time. In 1877-78 he was State senator; in 1879-83 a representative in the 46th and 47th Congresses; and in 1883— 85 governor of Maryland. He was Minister to France in 1885-89 by appointment of President Cleveland. After tendering his resignation in 1889, he spent his remaining years at Paris.

MACLAREN, ma-klar'en, Ian. See Wat¬ son, John.

McLAREN, William Edward, American bishop: b. Geneva, Ontario County, N. Y., 15 Dec. 1831; d. New York, 19 Feb. 1905. He was graduated at Jefferson College, 1851, ordained to the Presbyterian ministry, 1860, and entered that of the Protestant Episcopal Church in 1872. Three years later he was appointed

bishop of Illinois; after the subsequent division of the diocese became bishop of Chicago. He founded the Western Theological Seminary at Chicago (1883) and the Waterman Hall for Girls at Sycamore, Ill. Among his writings may be mentioned (Catholic Dogma the Anti¬ dote of Doubt) (1884); (Analysis of Panthe-ism> (1885): <The Holy Priest5 (1889); (The Essence of Prayer) (1901).

McLAUGHLIN, mak-lak'lln, Andrew Cunningham, American historical writer: b. Beardstown, Ill., 14 Feb. 1861. He was grad¬ uated from the University of Michigan in 1882, from its law school in 1885, was professor of history there 1891-1906 and since 1906 at the University of Chicago. (He was director of the bureau of historical research of Carnegie Insti¬ tution. Washington, D. C., 1903-05, and manag¬ ing editor of the American Historical Review, 1901-05. He has written (Lewis Cass5 (in (American Statesman) series 1891) ; (History of Higher Education in Michigan5 ; (Civil

Government in Michigan5 (1892) ; (History of the American Nation) (1899) ; (The Confeder¬ ation and the Constitution (1905) ; (with Van Tyne) (History of United States for Schools) (1911); (The Courts, The Constitution and Parties5 (1912) ; and (with Hart) edited (The Cyclopaedia of American Government (1914).

McLAUGHLIN, Mary Louise, American

artist : b. Cincinnati. She began to decorate pot¬ tery in 1877 and made Losanti porcelain (1898), exhibiting for the first time in the

Paris Expo¬ sition of 1900. She has been awarded several public honors for her work. Among her pub¬ lished writings are (China Painting) ; (Pottery DecoratioiP ; Suggestions to China Painters) ; (Painting in OiP ; (The Second Madame.5

MACLAURIN, mak-la'rin, Colin, Scot¬ tish mathematician and philosopher: b. Kilmo-dan, Argyleshire, February 1698; d. 14 June 1746. He was educated at Glasgow University, and in 1717 became professor of mathematics in Marischal College, Aberdeen, and two years after was chosen Fello.w o>f the Royal Society. In 1720 he published (Geometrioa Organica,5 a work on curves. In 1725 he was elected pro¬ fessor of mathematics, at Edinburgh, where his lectures contributed much to raise the character of that university as a school of science. A controversy with Bishop Berkeley led to the publication of Maclaurin's great (Treatise on Fluxions5 (1742). He also wrote a (Treatise on Algebra5 ; (Account of Sir Isaac Newton's Philosophical Discoveries,5 *etc.*

MACLAURIN, Richard Cockburn, Amer¬ ican educator: b. Lindean, Scotland, 5 June 1870; d. Boston, Mass., 15 Jan. 1920. He took his M.A. at the University of Cam¬ bridge in 1897, was elected a Fellow . at Saint John's College, Cambridge, in 1897 and was professor of mathematics there in 1898-1905. He was dean of the faculty of law at the New Zealand University in 1905-07; and in 1907-09 he was professor of mathematics at Columbia University, New York. After 1909 he was president of the Massachusetts Institute of Technology. He wrote (Title to Realty5 ; (Theory of Light5 ; (Lectures on Light.5

MacLAWS, mak-laz', Lafayette, American

military officer: b. Augusta, Ga., 15 Jan. 1821; d. Savannah, Ga., 24 July 1897. He was grad-

uated at West Point in 1842; served in the Mexican War till the surrender of Vera Cruz; and at the beginning of the Civil War was commissioned a brigadier-general in the Con¬ federate army. He was promoted major-gen¬ eral 23 May 1862, and during the march of Sherman to the sea commanded the defenses of Savannah and had charge of the military dis¬ trict of Georgia. He was appointed collector of internal revenue at_ Savannah in 1875 and postmaster there in 1876.

MACLAY, ma-kla , Edgar Stanton, Amer¬ ican author : b. Foochow, China, 18 April 1863. He was graduated at Syracuse University in 1885; was reporter on the Brooklyn Times, 1886-90, and on the New York Tribune 189 1— 93 ; served on the editorial staff of the T ribune, 1893-95, and on that of the New York Sim, 1895-96. In 1896 he was appointed lighthouse-keeper at Old Field Point, and in 1901 received an appointment at the New York navy yard. He edited the (JournaP of William Maclay (q.v)., and is the author of a (History of the United States Navy,> which occasioned much controversy and brought about his dismissal from government employ, by order of President Roosevelt, in 1901. The ground of this action, following Maclay's refusal of an official request for his resignation, was a passage in the (History> stigmatizing Rear-Admiral Schley as a "caitiff, poltroon and coward® for his conduct in the naval fight off Santiago, Cuba, # 3 July 1898. Maclay has also written (Reminiscences of the Old Navy) and (The History of Ameri¬ can Privateers. }

MACLAY, Robert Samuel, American Methodist Episcopal clergyman: b. Concord, Franklin County, Pa., 7 Feb. 1824; d. 1907. He was graduated at Dickinson College in 1845 and entered the Methodist ministry in 1846. He sailed as a missionary to Foochow, China, 13 Oct. 1847. He was a member of the committee which translated the New Testa¬ ment into the Foochow dialect; and in 1852-72 he was superintendent and treasurer of the Foochow Mission. He was transferred to Japan in 1872, becoming secretary and treasurer of the mission there; and assisted in translating the New Testament into Japanese. He was a delegate from Japan to the Ecumenical Metho¬ dist Conference at London in 1881. He was one of the founders of the Anglo-Chinese Col¬ lege at Foochow in 1881 ; and in 1884 he secured from the king of Korea permission to establish Christian missions in. that country. He was instrumental in founding at Tokio in 1883 the

Anglo-Japanese College, of which he was president in 1883-87 ; and the Philander Smith Biblical Institute in 1884, serving as dean in 1884-87. He was dean of the Maclay College of Theology at San Fernando, Cal., from 1888 until his retirement in 1893. Author of (Life Among the Chinese > (1861) ; coauthor with

Rev. C. C. Baldwin dictionary of the Chinese Language in the Dialect of Foochow > (1871).

MACLAY, William, American soldier and politician : b. New Garden, Chester County, Pa., 1737; d. 1804. He was educated in his native place; was a lieutenant in the French and Indian War, taking part in the expedition against Fort Duquesne in 1758 and afterward serving under General Bouquet. He studied law, was admitted to the bar, went to England

on behalf of militia officers serving in the French and Indian War, to confer upon their claims for land-grants with the proprietors of Pennsylvania, and on his return became at¬ torney to the Penn family. In the Revolution he raised troops and equipped them, was assistant commissary of purchase and per¬ formed some field service. In 1781 he was elected to the Pennsylvania assembly, after¬ ward held other offices in the State, and with Robert Morris (q v.) was elected to the United States Senate, Pennsylvania's first representa¬ tives in that body. His service there ended in 1791, but in the Senate he had shown deep-seated hostility to Washington and his adminis¬ tration, which was the chief distinction of Ma¬ clay's senatorial career. In his later years he was a member of the Pennsylvania legislature and his last public office was that of a county judge. Consult his journal,* edited by Edgar Stanton Maclay (q.v.).

MACLE, mak'l, in mineralogy, a variety of andalusite, occurring in long, tapering crystals in clay-slate. They have the axes and angles of a different color from the rest of the crystals, owing to a regular arrangement of impurities in the interior.

MacLEAN, mak-lan', George Edwin,

American educator: b. Rockville, Conn., 31 Aug. 1850. He was graduated at Williams College in 1871 and at Yale Theological Semi¬ nary in 1874; from 1877 to 1881 was pastor at Troy, N. Y. ; studied in Germany ; and in 1883 became professor of English language and literature at the University of Minnesota. He was chancellor of the

University of Nebraska,

1 895—99, and from 1899 to 1911 was president of the University of Iowa. In 1913 he was sent by the United States Bureau of Education to make a study of the English universities and colleges. His writings include (A Chart of English Literature) (1892) ; (01d and Middle English Reader) (1893) ; and (A Decade of Development in American State Universities) (1898) ; (Present Standards of Higher Edu¬ cation in the United States* (1913) ; (Studies in Higher Education in England and Scotland, with Suggestions for Universities and Colleges in the United States) (1916). He has edited (2Elfric's Anglo-Saxon Version of Alcuini Interrogationes Sigewulfi Presbyteri in Gene-sin) (1883) ; (An Introductory Course in Old English,) by Wilkin and Babcock (1888) ; and <An Old and Middle English Reader, > by Zupitza (1889).

McLEAN, George Payne, American law¬ yer and politician : b. Simsbury, Conn., 7 Oct. 1857. He was for a time a reporter on the Hartford Evening Post, then studied law, and was admitted to the bar in 1881, and immedi¬ ately commenced practice in Hartford. In 1883-84 he was a member of the general as¬ sembly, where he soon became distinguished for facility in debate and was considered one of the leaders of the Republican party. In 1888 he was elected State senator and in 1900 nomi¬ nated by his party as governor of Connecticut and elected. Though he was not widely known at the time of his election, his independent posi¬ tion in regard to constitutional reform soon made him prominent ; both in his first gov¬ ernor's message and before the constitutional convention, he advocated representation in the

legislature according to population instead of by towns. Though in this he opposed certain elements in his own party, he gained support from a considerable number of Democrats and great personal popularity in the cities. In 1902 he was offered renomination, but declined ; in 1903-04 he was a prominent candidate for United States senator. He was elected to the United States Senate in January 1911

and took office on 4 March following. He is the author of what is known as the ((Federal Migratory Bird Bill,® which became a law on 4 March

1913.

MacLEAN, James Alexander, Canadian educator: b. Mayfair, Ontario, 2 Aug. 1868. He was graduated at the University of Toronto in 1892 and took his A.M. at Columbia in 1893. He was professor of political science at the University of Colorado in 1894-1900; presi¬ dent of the University of Idaho in 1900-13; and since 1913 he has been president of the University of Manitoba, Canada. Author of essays in (The Financial History of Canada y

(1894).

MacLEAN, John, American jurist and statesman: b. Morris County, N. J., 11 March 1785; d. 4 April 1861. He removed with his parents to Warren County, Ohio, in 1799, later went to Cincinnati, where he studied law, and was admitted to the bar in 1807, and commenced practice at Lebanon, Warren County, Ohio. He was a member of Congress 1812-16, and from 1816-22 judge of the Supreme Court of Ohio. In July 1823 he was appointed Postmaster-General, the Postoffice Department being then in a very disordered and inefficient condition. Under his administration this branch of the public service was restored to order, and man¬ aged with a vigor, method and economy that soon secured an almost unexampled degree of applause and public confidence. In 1829 he became associate justice of the Supreme Court of the United States. In this capacity his charges to grand juries while on circuit are distinguished for ability and eloquence. In the Dred Scott case he dissented from the decision of the court as given by Chief Justice Taney, and expressed the opinion that slavery has its origin merely in power, and is against right and in this country is sustained only by local law.

McLEAN, John, American educator; b. Princeton, N. J., 1800; d. there, 1886. His whole life was spent in Princeton. He was graduated from the college there in 1816, be¬ came tutor in the institution in 1818 and was a member of the faculty till 1868, when he re¬ signed the presidency, which he had held from 1854. He published (Lecture on a Common School System for New Jersey) (1829), which in later years

had much influence in the estab¬ lishment of such a system; (History of the College of New Jersey) (1877), and (The True Relations of the Church and the State to Schools and Colleges) (1853).

MACLEAN, John, Canadian Methodist clergyman and author : b. Kilmarnock, Scot¬ land, 2 Oct. 1851. He was educated at Victoria University, Cobourg, Ontario, and at the Wesleyan University, Bloomington, Ill. He served as a missionary among the Blood In¬ dians near Macleod, Alberta, in 1880-89, and

was pastor at Moose Jaw, Saskatchewan, in 1889-92; later filling pastorates at Port Arthur; and at Neepawa and Carman, Manitoba. In 1902-06 he edited The Wesleyan, and has since been stationed at Morden, Manitoba. In 1888 he was appointed a member of fhe North¬ western Board of Education. Author of (The Indians of Canada > (1892); (The Destiny of the Human Race) ; (The Hero of the Saskatche¬ wan ; (Better Lives for Common People) ; (Science and the Bible, y *etc.*

McLEAN, Norman, British Orientalist: b. Lanark, Scotland, 2 Oct. 1865. He was edu¬ cated at the University of Edinburgh and at Christ College, Cambridge. He was examiner in classics at Edinburgh University in 1891— 94; examiner for Oriental Languages Tripos in 1895-96, 1899-1900, 1909-11, and for theologi¬ cal Tripos in 1896-97, 1901-02, 1908-09, 1911-12. He was Fellow, senior tutor and Hebrew lecturer at Christ's College, Cambridge, and uni¬ versity lecturer in Aramaic. He is engaged with Rev. A. E. Brooke in the preparation of a larger Cambridge edition of the Septuagint. He was one of the editors of (Ecclesiastical History of Eusebius) (1896).

McLEAN, Sarah Pratt. See Greene, Sarah Pratt McLean.

MACLEAN, William Findlay, Canadian journalist and legislator: b. Ancaster, Ontario, 10 Aug. 1854. He was educated at the Univer¬ sity of Toronto and in 1890 founded the Toronto World of which he is still editor and proprietor. He was elected to the Canadian Parliament for East York in 1892 and since 1904 has been returned from South York. He is an advocate of government ownership of railways and of a twocent passenger rate on certain Canadian railways. He was a delegate to the Imperial Press Conference at London in

1900.

McLELLAN, James Alexander, Canadian educator: b. Shubenacadie, Nova Scotia, 1832; d. 1902. He was educated at the University of Toronto and spent many years in teaching. He was appointed high school inspector for Ontario in 1871 and was credited with considerably improving the standards of the schools under his care. He became director of normal schools in 1875 and of teachers' institutes in 1885. From 1890 he was principal of the School of Pedagogy, subsequently the Ontario Normal School. Author, with Prof. John Dewey, of (Applied Psychology) ; (The Psychology of Numbers) (1896; 4th ed., 1909).

McLEMORE'S COVE, Ga., Military Op¬ erations at. While there was little fighting in the cove, the operations there in September 1863 were vital to the success of General Rosecrans' campaign for Chattanooga. The failure of General Bragg's excellent combinations im¬ mediately increased the difficulty of interposing his army between the Union army and Chat¬ tanooga and, in the end, made it impossible.

Lookout Mountain bounds the cove on the west. Following its eastern base from Chat¬ tanooga southward, it is 24 miles to Stevens' Gap, over which the Fourteenth corps, General Thomas', which constituted the centre of Rosecrans' army, crossed Lookout from the west into the cove. Eight miles beyond is Dougherty's Gap, from which point Pigeon Mountain, run-

ning northeastwardly, forms the eastern bound¬ ary of the cove. The triangular area thus enclosed is from five to eight miles wide, the mouth opening toward Chattanooga, and con¬ tains from 80 to 100 square miles. General Bragg, in 'evacuating Chattanooga, because of Rosecrans' flank movement, had conducted his army by way of Rossville and Lee and Gordons Mill and established it behind Pigeon Mountain, from a point near Lee and Gordon's to La¬ fayette, 13 miles beyond. From this position of his army there were four gaps through which roads led into McLemore's Cove. Opposite Lafayette was Dug Gap, to the south of it Blue Bird and to the north Cattlett's and

Wrothen's. Dug Gap was directly opposite Stevens' Gap. The Chickamauga Creek rises near Dougherty's Gap and runs northward through the cove.

The right of the Union army, A. McD. Mc¬ Cook's Twentieth corps, with the cavalry corps, Gen. D. S. Stanley, crossed Lookout at Valley Head, 42 miles south of Chattanooga, and de¬ scended south of Dougherty's Gap. The left of this army, Crittenden's Twenty-first corps, had crossed the north point of Lookout near Chat¬ tanooga and, leaving one brigade in that city, had advanced to the vicinity of Lee and Gor¬ don's Mill. It there formed the left of the Union army. The centre corps was at Stevens' Gap, 15 miles distant, the right corps about 25 miles beyond that point, with the cavalry still farther south. This separation of Rosecrans' army was made necessary by the fact that there were no roads practicable for wheels crossing Lookout Mountain in closer proximity.

General Bragg was fully informed of the movements, and the isolation of the several Union corps. These movements, which placed each corps beyond supporting distance from either of the others, were immediately rendered still more precarious by reports received from General Sheridan on the extreme right that the enemy was retreating toward Rome, which led General Rosecrans to order pursuit. General Thomas urged active concentrations instead, but was overruled.

General Bragg, from his position behind Pigeon Mountain, commanding the four gaps opening directly upon the advance of the centre across the cove, was in most favorable position for first striking General Thomas with effect, and then turning upon either of the wings be¬ fore they could attain supporting distance. Had Bragg's orders been promptly and vigorously executed the situation of the Union army would have been critical.

The night of the 9th, Negley's division, forming the Union advance from Stevens' Gap along the road leading through Dug Gap to Lafayette, encountered the enemy in the gap, and later in the night it was ascertained that a strong force was concentrating there.

General Bragg, in developing his plan, had advanced Hindman's division from the Lafavette side of the mountain, and ordered General Hill to send Cleburne to co-operate. Late at night Hill sent word that Cleburne was sick, the gaps blocked with felled trees and that the move¬ ment was, therefore, impracticable.

Early the next morning General Buckner from the extreme right was

ordered to advance into the cove to support Hindman. This junc¬ tion was not effected until the afternoon of the lOfh. Meantime, Negley had withdrawn his

division from Dug Gap and was manceuvering in defense. Hindman, instead of attacking as ordered, sent a staff-officer to Bragg at Lafay¬ ette to suggest a change of plan. This officer reached Bragg at midnight and was at once directed to return and notify Hindman to carry out the orders he had received. Cleburne was then in Dug Gap, and had promptly cleared away obstructions. Walker's reserve corps was ordered forward to join Cleburne in the at¬ tack, and all impatiently waited for Hindman's guns. Bragg had ordered seven divisions to co-operate in this movement against Thomas' three which composed the Union centre. Hind¬ man did not attack until afternoon. At that time Baird's division had arrived from Stevens' Gap to support Negley, and by brilliant move¬ ments in retreat, with some sham fighting by T. R. Stanley's and Starkweather's brigades, the two divisions with their trains were with¬ drawn in perfect order to Bailey's crossroads, a strong strategic position in front of Stevens' Gap, where Brannan's division, which had com¬ pleted the crossing of Lookout, was within easy supporting distance. Thus Bragg's attempt to crush the Union centre failed. For this failure he held Hill and Hindman responsible.

Bragg then withdrew the forces operating against the Union centre to Lafayette, and at once dispatched Polk's and Walker's corps with orders to attack Crittenden's corps in the vi¬ cinity of Lee and Gordon's Mill. This corps at the time was known to Bragg to be divided, with one of its three divisions near Ringgold. Polk was urged to attack with the greatest promptness. He, however, was led to believe that a general attack on his column was about to be delivered. Instead of carrying out Bragg's orders, he therefore awaited attack and sent for the whole of Buckner's corps as reinforce¬ ments. This delay enabled Crittenden to unite his forces, cross the Chickamauga, and take a strong position on the bluffs overlooking that stream at Lee and Gordon's. Thus Bragg's attempt to crush the Union left failed, as his movement on the centre had miscarried. For this Polk was held responsible.

Meantime the Union right was withdrawing under orders to join the centre at Stevens' Gap. Rosecrans had early discovered that Bragg, in¬ stead of retreating, was concentrated for battle, and that Johnston from Mississippi and Longstreet from Virginia were about to join him.

General Rosecrans in his report says : <(It then became a matter of life and death to effect the concentration of the army.® The flanks of the army were 40 miles apart by the nearest practi¬ cable roads, and .the centre was obliged to re¬ main near Stevens' Gap until the right corps arrived.

General Bragg's third plan, for which orders were promptly given, was to move his army down the valley of the Chickamauga, cross at the bridges and fords below Lee and Gordon's Mill, sweep up the valley, attack Crittenden, the left of Rosecrans' army drive it back on the centre, and thus, interposing between the Union army and Chattanooga, push it back into the mountains and regain that most important city. Rosecrans, however, by an undiscovered night march moved his centre and right from the cove to the left of Crittenden, and at sunrise of 19 September had interposed between Bragg and Chattanooga on the field of Chickamauga.

Mclennan

These movements of the opposing armies brought on the battle of Chickamauga (q.v.).

H. V. Boynton.

McLENNAN, John Cunningham, Cana¬ dian physicist : b. Ingersoll, Ontario, 14 Aoril 1867. He was educated at the universities of Toronto and Cambridge. From 1899 he was connected with the faculty in physics at Toronto, and since 1907 he has been professor of physics and director of the physical labora¬ tory there. He was president of section III of the Royal Canadian Society in 1910; was elected to the Royal Society, London, in 1915 ; and in 1916-17 he was president of the Royal Canadian Institute. He was Dominion lecturer on the metric system in 1906; and is author of papers on radioactivity, electrical conduction of gases and spectroscopy.

McLENNAN, mak-len'an, John Ferguson,

Scottish sociologist : b. Inverness, 14 Oct. 1827 ; d. Hayes Common, Kent, 16 June 1881. He was educated at King's College, Aberdeen, and Trin¬ ity College, Cambridge, and after two years spent in journalism in London returned to Edinburgh, and was called to the bar in 1857. His first important publication was the article on Eaw} in the eighth edition of the Encyclo¬ paedia Britannica) (1857), and in 1865 he elaborated some of its sp rulations in (Primitive Marriage : an Inquiry into the Origin of the Form of Capture in Marriage Ceremonies. > In 1876 his (Primitive Marriage) was republished with (Kinship in Ancient Greece) and other matter under the title of (Studies in Ancient History. 5 An unfinished work by him, directed against Sir H. S. Maine's patriarchal theory, was completed and published in 1885 by his brother under the title of 'The Patriarchal Theory.* In 1896 a second series of (Studies in Ancient History, > treating of the origin of exogamy, was edited by his widow and Arthur Platt. Though his views are still and probably will remain matter of controversy, the study of primitive society received a powerful impetus from his important investigations.

McLEOD, mak-loud', Alexander, Amer¬ ican Presbyterian clergyman : b. Island of Mull, Scotland, 12 June 1774; d. New York, 17 Feb. 1833. He came to the United States in 1792 and was graduated at Union College in 1798. He was licensed to preach in 1799 and was ordained in charge of the First Reformed Presbyterian Church of New York and of a church in Wall-kill, N. Y. He soon resigned from the Wall-kill charge, but retained his New York pastorate the remainder of his life. He was for a time an editor of the Christian Magazine. Author of (Negro Slavery Unjustifiable* (1802) ; Ecclesiastical Catechism* (1807) ; (View of the Late War) (1815); (The American Chris¬ tian Expositor* (2 vols., 1832-33), *etc.*

McLEOD, Archibald Angus, American railway official : b. Compton County, Quebec, Canada, 1848; d. 1902. Early in life he came to the United States, where he became a rodman on the docks of the Northern Pacific Railway at Duluth, and in 1885 manager of the Elmira, Cortland and Northern line. He then was suc¬ cessively acting general manager (1886), vice-president and general manager (1887) and president (1890) of the Reading system, His consolidation of the Lehigh Valley and Jersey

Central with the Reading, under Reading con¬ trol, for the purpose of controlling the carrying trade of the coal fields, resulted in the Reading passing into the hands of three receivers, of whom McLeod was one.

MacLEOD, Donald, Scottish Presbyterian clergyman and author: b. Campsie, Stirling¬ shire, 18 March 1831; d. 17 Dec. 1911. He was a brother of Norman MacLeod (q.v.), whom he succeeded as editor of Good Words, 1872— 1905. He was educated at the University of Glasgow. He held pastorates at Lauder (1858), Linlithgow (1862) and Glasgow (1869-1909), and, like his brother, was chaplain to Queen Victoria. He published (Sunday Home Service) (1885) ; (Christ and Modern Society) (1893), *etc.*

MACLEOD, Fiona, pseudonym of Wil¬ liam Sharp (q.v.), Scottish poet and novelist: b. Paisley, 12 Sept. 1856; d. Sicily, 13 Dec. 1905. A part of his youth was spent in the Hebrides and in the islands of Iona and Arran. His stories and poems attracted great attention by reason of their freshness of treatment and orig¬ inality of conception. Under his own name he published a number of works, including poems, stories, and biography, beginning with a life of Rossetti in 1882. In 1893 he began writing mystical prose and verse under the pen name of Eiona

Macleod,* and cleverly concealed his identity, going the length of supplying a ficti¬ tious biography of the lady, to <Who's Who,* and corresponding, through his sister, with her admirers. He also wrote concurrently, under his own name. Among works published as Fiona Macleod are (Pharais* (1895), a ro¬ mance; (The Mountain Lovers) (1895) ; (The Sin-Eater and Other Tales* (1895) ; (The Washer of the Ford* (1896) ; (Green Fire* (1896) ; Erom the Hills of Dream* (1896) ; (The Laughter of Peterkin) (1897) ; (Through the Ivory Gate) (1901) ; (The Silence of Amor>

(1902).

McLEOD, Hugh, American soldier : b. New York, 1 Aug. 1814; d. Dumfries, Va., 2 Jan. 1862. He was graduated at West Point in 1835 and served on frontier duty at Fort Jesup, La., until June 1836, when he resigned. He then joined the Texans in their struggle against Mexico, and afterward practised law at Gal¬ veston, Tex. As brigadier-general of the Texas militia he was appointed by President Mirabeau B. Lamar of Texas to the command of an expedition planned to secure an establishment of trade between Texas and Mexico in 1841, but was taken prisoner by the Mexicans and not released until the following year, when the United States government intervened in his be¬ half. He served in the Texas Congress in 1842-43, fought through the Mexican War and was a member of the State legislature after the annexation to the United States. He joined the Confederate army in 1861 and served on the Rio Grande and in the first Virginia campaign.

McLEOD, John, Canadian pioneer : b. Stornaway, Island of Lewis, Scotland, 1788; d. Montreal, 24 July 1849. He was engaged in the service of the Hudson Bay Company in 1811, mustering men for the company's service in the Hebrides and conducting them to Canada. In 1812-16 he built the trading posts of the com¬ pany for 500 miles westward of the Red River

establishment. He was the first man known to have traversed the continent from Hudson Bay to the Pacific coast. He was in charge of Nor¬ way House, the most important fur-trading es¬ tablishment in that part of the country, in 1826-30. He was afterward in charge of the Saint Maurice district, extending from Hudson Bay to the Saint Lawrence. He was a man of wide influence among both the whites and the Indians and accomplished an important work in opening the. northwest for settlement.

McLEOD, Malcolm, Canadian lawyer, son of John McLeod (q.v.) ; b. Green Lake Sas¬ katchewan, 21 Oct. 1821 ; d. Ottawa, September 1898. He was educated at Edinburgh, Scotland, later studied law in Montreal and in 1845 was admitted to the bar. He engaged in practice, was district judge for the counties of Pontiac and Ottawa in 1873-76 and in 1887 he became Queen's counsel. He was prominently con¬ nected with the projects of annexation of the Northwest territory to Canada and the building of a railroad to the Pacific. He was instru¬ mental in securing the revocation of the Hud¬ son Bay Company's charter, taking the matter to the British Colonial Secretary when the Ca¬ nadian Parliament refused to act. Author of (The Peace River* (1872) ; five pamphlets on <The Pacific Railway) (1874-80); <The Prob¬ lem of Canada) (1880).

MacLEOD, Norman, Scottish Presbyterian clergyman : b. Campbelltown, Argyleshire, 3 June 1812; d. Glasgow, 16 June 1872. Educated at Glasgow, Edinburgh and in Germany, he be¬ came minister first of London. At the Scottish Church Disruption in 1843 he remained in the Establishment, and became minister of Dalkeith in ithe same year. There he published his first work. (The Earnest Student, 5 and became edi¬ tor of the Edinburgh Christian Magazine. In 1851 he became minister of the Barony parish, Glasgow, where he labored with increasing pop¬ ularity for the rest of his career. In 1857 he was appointed one of the queen's chaplains for Sootland. He became editor of Good Words in 1860 and continued in that post till his death. In 1867 he visited India, and in 1871 published (Peeps at the Far East.* In 1869 he was mod¬ erator of the General Assembly of the Church of Sootland. Consult MacLeod, D., (Memoir of Norman MacLeod) (1872).

MACLEOD, Canada, village and capital of Macleod District, Alberta, on Old Man's River, about 100 miles south of Calgary, and on the Canadian Pacific Railway. It is situated in a rich agricultural and coal-mining region, has natural gas, stone quarries, and deposits fur¬ nishing-materials for the manufacture of cement and of bricks. It has a considerable trade in grain. The village is growing rapidly and is a

post of the Royal North West Mounted Police. Pop. 2,000.

MACLISE, ma-kles', Daniel, English painter: b. Cork, 1806; d. Cheyne Walk, Chel¬ sea, 25 April 1870. He became a student at the Royal Academy in 1828, and began to exhibit in 1829, but it was not until 1833 that he estab¬ lished his reputation with his picture of (Snap Apple Night.-* Three years after he was elected an associate, and in 1840 he became a full mem¬ ber of the Royal Academy. Maclise was com¬ missioned to paint for the new Houses of Par¬

liament, and produced (The Spirit of Chivalry* ; <The Spirit of Religion, > and the two great paintings of the < Meeting of Wellington and Bliicher after Waterloo,* and the (Death of Nelson> (1858-64), for which patriotic paint¬ ings he refused all remuneration. Among his best-known pictures are (Merry Christmas in the Baron's HalP ; (The Ordeal of Touch* ; (The Marriage of Strongbow and Eva* ; the <Play Scene in Hamlet* ; the (Banquet Scene in Macbeth,* *etc.* His sketches, book illustrations, humorous drawings and outline portraits were very numerous. He declined the presidency of the Academy in 1866. His wrorks show great fertility of invention, skill in composition and excellence in drawing, but his color is coarse, and his pictures are sometimes disagreeable un¬ less seen from a distance. His mural paintings are now recognized to be the greatest historical paintings of their kind ever produced in Eng¬ land. Consult O'Driscoll, (Memoir of Daniel Maclise* (1871).

McLOUGHLIN, mak-lok'lin, John, Cana¬ dian pioneer and fur trader : b. Riviere du Loup, Lower Canada. 19 Oct. 1784; d. Oregon City, 3 Sent. 1857. He was educated in Canada and at Edinburgh, Scotland, studied medicine and in early manhood returned to Canada, where he entered the Northwest Company and was placed in charge of Fort William, the chief depot of the company, situated at the mouth of the Kaministiquia River on Lake Superior. Upon the consolidation of the Northwestern and the Hudson Bay companies, in 1821, Dr. McLoughlin was appointed chief factor of the company in the Oregon country. Arriving overland at Astoria in 1824 he founded Fort Vancouver, which, situated advantageously near the conflu¬ ence of the Columbia and Willamette rivers, became the headquarters of the company beyond the Rockies. When Dr. McLoughlin established the fort the Indians were so hostile that it was unsafe for parties of less than 60 men to travel the Columbia River, but under his management of the company's affairs it became safe for two men to traverse the distance between Oregon City and Fort Hall. In the entire period of his

administration, from 1824 to 1846, there were no Indian wars in the Oregon country, although they broke out in 1847, the year after his resig¬ nation. He made Fort Vancouver a haven of refuge to emigrants arriving after the perilous journey overland, furnishing goods and provi¬ sions on credit and caring for their sick in direct opposition of the company's policy, which was to keep the land wild for the wild fur¬ bearing animals. During McLoughlin's admin¬ istration the Oregon country was in the condi¬ tion of joint occupancy by the United States and Great Britain. His courageous and human¬ itarian method of dealing with the situation, recognizing the equal rights of the American settlers with those of the British Fur-trading Association, undoubtedly went far toward pre¬ venting war between the British and American nations. However, the strictures upon his methods by Sir George Simpson, governor-in- chief of the Hudson Bay Company, culminated in an order to render no further aid to immi¬ grants, and McLoughlin resigned rather than obey, although it cost him his income of $12,000 a year. His resignation took effect in 1846, and he then retired to Oregon City where he had

extensive and partially improved land claims. Litigation over his claims embittered his last years, but after his death the land was restored to his heirs. He became an American citizen in 1848. The McLoughlin Institute was dedi¬ cated to his memory at Oregon City in 1907, and he is generally known as the "Father of Oregon.® Consult the (Reports* of the Wash¬ ington Historical Society, the Oregon Historical Society and the Oregon Pioneer Association ; Dye, E. E., (McLoughlin and Old Oregon* (1900; 8th ed.. 1913) ; Holman, F. V., (Dr. John McLoughlin, the Father of Oregon* (1907).

McLOUGHLIN, Maurice Evans, Amer¬ ican tennis champion: b. Carson City, Nev., 1890. He won the championship of the Pacific Coast, played in the East in 1908-09 and in 1909 and 1911 he competed for the Davis cup in Aus¬ tralia, but unsuccessfully. He won the national championship at Newport an 1912; and in 1913 was leader of the American team that captured the Davis cup from

England. He was victor at Longwood and won the New York State championship in 1914. His defeat of Brookes and Wilding in singles made him world cham¬ pion. Author of (Tennis as I Play It) (1915).

McLOUTH, mak-lowth', Lawrence Amos,

American educator and author ; b. Ontonagon, Mich., 19 Jan. 1863. He was educated at the universities of Leipzig, Heidelberg and Munich. He was instructor in German at the University of Michigan in 1892-95 ; and since 1895 has been professor of Germanic language and literature at New York University. He has edited Ger¬ man texts, is author of numerous articles on literature, philology and pedagogy, and of <Verses) (1910).

MACLURE, mak-lur', William, American geologist: b. Ayr, Scotland, 1763; d. San Angel, near the city of Mexico, 23 March 1840. In 1796 he visited the United States, and in 1803 was in Europe as one of the commissioners to settle the claims of American citizens against France for spoliations during the revolution in that country. On returning to America he en¬ gaged with zeal in the extraordinary private undertaking of a geological survey of the whole country. Depending on his own resources and observations at a time when geology was un¬ known as a science, and few could appreciate his motives, he visited almost every State and Territory, crossing and recrossing the Alleghanies no fewer than 50 times. His first communi¬ cation to the public was a memoir entitled Ob¬ servations on the Geology of the United States, explanatory of a Geological Map,* read before the American Philosophical Society, 20 Jan. 1809, and published in Vol. VI of their trans¬ actions.* He still continued his explorations, and on 16 May 1817 presented another memoir to the society, published in their transactions,* and also in a separate volume. The former publication was six years prior to that of the geological map of England prepared by William Smith, a production which gave him the title of father of English geology. To Maclure is equally due the title of father of American geol¬ ogy. His publications attracted much attention to the science. He now settled in Philadelphia and gave his books and collections to the Acad¬ emy of Natural Sciences of which he was presi¬ dent from 1817 till his death. He lived in Spain, 1819-24, where he attempted to found an

agricultural college, and returning in 1824 to the United States

attempted to carry out a simi¬ lar scheme in the New Harmony settlement in Indiana. Several distinguished naturalists from Philadelphia joined him in this enterprise, but the scheme failed. After 1828 he lived in Mex¬ ico, always, however, with the intention of re¬ turning to the United States, and with his in¬ terest in the progress of scientific education there unabated. While in Mexico he wrote (Opinions on Various Subjects,* devoted mainly to political economy (1837).

McMAHON, mak-ma'hon, Sir Arthur Henry, British soldier and administrator: b. 28 Nov. 1862. He was educated at the Royal Military College at Sandhurst, joined the 8th Regiment in 1883 and in 1885 entered the Indian Staff Corps and joined the 1st Sikhs, Punjab Frontier. He became affiliated with the Indian Political Department in 1890 and served as po¬ litical agent on various missions until 1901, when he became Revenue and Judicial Commis¬ sioner at Beluchistan. He was an arbitrator on the boundary between Persia and Afghanistan in Seistan and also served as British Commis¬ sioner to the Seistan Mission in 1903-05. He was Foreign Secretary to the Government of India in 1911-14. In 1914-16 he was High Com¬ missioner of Egypt. He was knighted in 1906.

McMAHON, James, American mathema¬ tician : b. County Armagh, Ireland, 22 April 1856. He was graduated at the University of Dublin in 1881. He was examiner in mathe¬ matics 1883-84, instructor 1884-90, assistant professor 1890-96, and professor since 1904 at Cornell University. In 1891-97 he was asso¬ ciate editor of Annals of Mathematics. Pro¬ fessor McMahon is joint author of (Higher Mathematics* (1896) ; the (Cornell Mathe¬ matical Series,* and (Plane Geometry* (1903).

MacMAHON, Marie Edme Patrick Mau¬ rice de, Duke of Magenta and Marshal of France: b. Sullv. Saone et Loire, 13 June 1808; d. near Montargis, 17 Oct. 1893. He was de¬ scended from an Irish family that went into exile with Tames II, and was educated at the military college of Saint Cyr; served with dis¬ tinction in Algeria; became brigadier-general in 1848; received command of a division during the Crimean War, and assisted in storming the Malakoff; was appointed to the Senate in 1856; took part in the campaign of 1859 against Aus¬ tria, and won the battle of Magenta by his prompt handling of the left wing and was re¬ warded by a marshal's baton and a dukedom; and in 1864 became governor-general of Alge¬ ria. At the outbreak of war between France and Germany (1870) Mac Mahon was placed in command of the First army corps, which was defeated at Weissenburg and Worth, and finally fell back upon Chalons. Here he rallied his

forces, and proceeded northeastward to relieve Bazaine, who was besieged in Metz, but he was pursued by the Germans, shut up by them in the town of Sedan and wounded in the battle be¬ fore the final surrender with 81,000 men. After the armistice with Germany he was employed by the Versailles government in putting down the commune, and in 1873 was elected President of the republic, a position which he occupied until 1879. Consult Daudet, (Souvenirs de la presidence du Marechal de MacMahon* (Paris 1880) ; (Le marechal de MacMahon* (ib. 1883) ;

LaFarge, (Histoire complete de MacMahon, marechal de France, due de magenta5 (ib. 1898).

MacMANUS, mak-man'us, Seumas, Irish novelist and writer of short fiction and verse : b. Donegal, 1868. Fie was educated at a mountain school in Donegal and engaged in teaching. He soon became known for his prose and verse con¬ tributions to periodicals, dealing with the tradi¬ tions and folklore of Ireland. He visited America an 1899 and afterward his contribu¬ tions appeared in many leading American pe¬ riodicals. He has since made frequent lecture tours in America. Author of (Through the Turf Smoke) (1899); (Donegal Fairy Tales) (1900); (Ballads of a Country Boy) (1905); (The Leadin' Road of DonegaP (1900) ; (Irish Nights) ; (Yourself and the Neighbors) (1914) ; (Ireland's Case5 (1917), *etc.* Among his plays are (The Woman of Seven Sorrows 5 ; (Orange and Green5 ; (Rory Wins) ; (Nabby Harren's Matching,5 *etc.*

McMASTER, John Bach, American histo¬ rian : b. Brooklyn, 29 June 1852. He was grad¬ uated from the College of the City of New York in 1872, studied civil engineering, and 1877 became instructor of civil engineering at Prince¬ ton. In 1883 he published the first volume of his (History of the People of the United States,5 and the same year was appointed pro¬ fessor of American history in the University of Pennsylvania. His (History,5 of which eight volumes were published in 1913, has be¬ come a standard work. It covers a period reaching from the close of the Revolution (1783) to the outbreak of the Civil

War, — less than 100 years, but a crucial time for the shap¬ ing of the country. The account of the forma¬ tive time, the day of the pioneer and the settler, engages his particular attention and receives his most careful treatment. He strives to give a picture of social rather than constitutional and political growth; and tells the story of national evolution with admirable lucidity and simplicity of style, and always with an appeal to fact pre¬ cluding the danger of the subjective writing of history to fit a theory. His other works are (Benjamin Franklin as a Man of Letters 5 (1887) ; (With the Fathers, Studies in American History5 (1896) ; (Origin, Meaning and Appli¬ cation of the Monroe Doctrine) (1897); (A School History of the United States5 (1897) ; (A Primary School History of the United States5 (1901); (Daniel Webster5 (1902); (Brief History of the United States5 (1903) ; chapters 9, 11 and 12, Vol. VII, Cambridge Modern History5 (1903); (Struggle for the Social, Political and Industrial Rights of Man in America) (1903); (Life and Times of Stephen Girard5 (1917) ; (The United States in the World War5 (1919).

McMASTER, William, Canadian senator and philanthropist: b. Tyrone, Ireland, 24 Dec. 1811; d. Toronto, Canada, 22 Sept. 1887. When 22 years of age he emigrated to Canada, and after several years' experience in a large whole¬ sale firm in Toronto commenced business on his own account. He was elected a member of the legislative council for the Midland division of Canada in 1862, and held this seat until he was called to the Senate by royal proclamation in 1867. He was prominently identified with many public institutions, notably as president of the Canadian Bank of Commerce, member

of the senate of the University of Toronto, chairman of the Canadian board of the Great YVestern Railway and became widely known by his liberal donations to educational and religious institutions, especially those of the Baptist de¬ nomination. of which sect he was a member. McMaster University, Toronto, is named in his honor.

McMASTER, UNIVERSITY, Toronto,

Canada, is controlled by the Baptist Convention of Ontario and Quebec. It came into existence through the gift of about $1,000,000 by the late Senator William McMaster, of Toronto, but it is really a development of educational work formerly conducted at Woodstock, Ontario. In 1857, under the leadership of the Rev. R. A. Fyfe, D.D., subscribers to the funds of a pro¬ jected college secured from the Canadian Par¬ liament an act to incorporate <(The Canadian Literary

Institute, 55 to be located at Woodstock. This school aimed at coeducation and provided both literary and theological courses. In 1875 it secured affiliation with the University of Toronto. In 1881, through the liberality of Mr. McMaster, the Toronto Baptist College was instituted and to it was transferred the theo¬ logical department of the school at Woodstock. The latter continued its literary work, and, without change of corporation, its name was changed .to Woodstock College. Toronto Bap¬ tist College was affiliated to the University of Toronto in 1885, but as the result of a further donation by Mr. McMaster it was decided to establish a university to grant degrees in the ((several arts, sciences and faculties,55 as well as in theology. A charter was secured from the legislature of Ontario in 1887, and all the prop¬ erty and rights of the two separate corporations were vested in McMaster University and placed under the authority of the board of governors, 16 in number (exclusive of the chancellor), responsible to the Baptist Convention of On¬ tario and Quebec. The control of all that pertains to the courses of study belongs to the university senate, a body made up of the members of the board of governors, a certain number representing the teaching faculties and others chosen by the graduates in arts and theology. The senate also nominates, subject to the approval of the governors, the chancellor and members of the faculties. Woodstock College, now a school for young men alone, and Moulton College, for young women, are academical departments of the university. Note¬ worthy provisions of the act of incorporation are that McMaster University is ((a Christian school pf learning,55 the Bible must be in¬ cluded in the course of study, every member of the teaching staff in theology must be a member of a regular Baptist church in Canada and all other teachers members of some Evan¬ gelical Christian Church.55 The first class in arts was graduated in 1894. The total number of students for the 1914-15 in the three schools of the university was 506.

McMECHEN, mak-mek'en, W. Va., city in Marshall County, five miles south of Wheel¬ ing, on the Baltimore and Ohio Railroad. It is a residential town and practically a suburb of Benwood. Pop. 2,921.

McMICHAEL, Morton, American journal¬ ist, politician and orator : b. Burlington, N. T.. 2 Oct. 1807; d. Philadelphia, Pa., 6 Jan. 1879.

After education in the public schools, he studied law at the University of Pennsylvania and be¬ came a member of the Philadelphia bar in 1827. The year previously he became editor of the Saturday Evening Post, and as an active poli¬ tician served for several years on the aldermanic bench in Philadelphia. From 1831 to 1836 he was editor-in-chief of the Saturday Courier and later was connected with the Satur¬ day News, the Saturday Gazette, the North American and United States Gazette, in 1847 consolidating the last two in one journal, of which he was sole proprietor from 1854 until his death. He was mayor of Philadelphia from 1866 to 1869; president of the park commission from its organization in 1867 until his death ; and in 1873 was appointed a delegate to the Fourth Constitutional Convention of Pennsyl¬ vania. His speeches on public occasions were renowned as models of oratory. A bronze statue was erected to his memory in Fairmount Park.

McMICHAEL, William, American soldier and lawyer : b. Philadelphia, Pa., 4 March 1841 ; d. New York City, 20 April 1893. The third son of Morton McMichael, he graduated at the University of Pennsylvania in 1859, but left his law studies in April 1861, to enlist as a private when President Lincoln issued his first call for troops. He attained rapid promotion to the grade of colonel and served under Generals Thomas, Rosecrans and Grant. He resumed his interrupted law studies after the war and in 1865 became a member of the Philadelphia bar. During General Grant's first tenure of the Presidency he was appointed solicitor of internal revenue of the Treasury Department, but resigned the office in 1871 on his 'appoint¬ ment as United States Assistant Attorney-General. In 1877 he was appointed United States district attorney for the east district of Pennsylvania, but resigned shortly after to go into private practice. President Garfield ap¬ pointed him a member of the United States Board of Indian Commissioners ; in 1882 he was a candidate for Congress on the Independ¬ ent Republican ticket ; and later became a mem¬ ber of the bar of New York City. Like his father, he was renowned for his oratorical gifts.

MACMILLAN, a name for many years prominently identified with English publishing interests. Most important was Daniel Mac¬ millan: b. Upper Corriie, Isle of Arran, 13 Sept. 1813; d. 27 June 1857. He took service with a Cambridge bookseller in 1833, and with Seeley, Fleet street, London, in 1837. He set up in business in London in 1843. but soon removed to Cambridge, and by 1856 had de¬ veloped a very

prosperous trade. He pub¬ lished Hughes' (Tom Brown's School Days5 in 1857; but he was chiefly aided by educational publications, and the works of Kingsley and F. D. Maurice. Associated with him from 1843 was his brother, Alexander Macmillan (b. 1815; d. 1896), previously a school-teacher at Nitshill, not far from Paisley. In 1863 he was made publisher to Oxford University and in the same year removed the business to London. Macmillan's Magazine made its appearance in 1859 and continued publication until 1907. ˆ The firm maintains a branch in New York and pub¬ lishes many university and educational works, as well as considerable fiction, by American authors. They are the publishers of the well-known Golden Treasury and Globe series. Pres¬ ent representatives of the family are Sir Fred¬ erick Macmillan : b. 5 Oct. 1851 (eldest son of Daniel Macmillan). He has been chairman of Macmillan and Company, Ltd., since 1893, is a director of The Macmillan Company, New York, and was president of the Publishers' Association of Great Britain, 1900, 1901, 1911, 1912. George A. Macmillan : b. 1 Aug. 1855 (second son of Alexander Macmillan), is a director of both the English and American establishments of the firm. Maurice Crawford Macmillan: b. 19 April 1853 (second son of Daniel Macmillan) is also a director in both houses of the firm. Consult Hughes, Memo¬ rials of Daniel Macmillan5 (1882) ; (Life and Letters of Alexander Macmillan) (1910).

McMILLAN, Sir Daniel Hunter, Cana¬ dian administrator: b. Whitby, Ontario, January 1846. He was educated in Canada and in 1864 served with the Canadian Volunteers on the Niagara frontier. He afterward took part in the military operations during the Fenian Raid in 1866; the Red River Expedition of 1870; and in the Northwestern Rebellion of 1885 he was awarded a medal. He was elected to the Manitoba legislature from Winnipeg in 1880, and became a member of the Manitoba gov¬ ernment in 1889. Since 1900 he has been lieutenant-governor of Manitoba and Keewatin. He was knighted in 1902, and formerly held the rank of lieutenant-colonel in the Manitoba Grenadiers.

MacMILLAN, Hugh, Scottish Presbyterian clergyman: b. Aberfeldy, Perthshire, Scotland, 17 Sept. 1833; d. 1903. He was minister of the Free West Church, Greenock, N. B., 1878-1901. He was a brilliant writer and preacher, and among his published works may be mentioned (Bible Teachings in Nature5 (1867) ; Hlolidays in High Lands) (1869) ; (The Ministry of Na-ture) (1871); (The True Vine) (1871); (The Mystery of Grace5 (1893) ; (The Daisies of Nazareth5 (1894) ; (The Clock of Nature5 (1896); (The Touch of God5 (1903); <The Isles and the Gospel5 (1907) ; several of which have been

translated into German, Norwegian, Swedish, French, Italian, *etc.*

McMILLAN, James, American capitalist and senator: b. Hamilton, Ontario, 12 March 1838; d. Manchester, Mass., 1902. He entered business at Detroit, Mich., in 1855, since which he enjoyed a prosnerous career as organizer of the Michigan Car Company, and general manu¬ facturer in the railroad business. He was elected to the United States Senate as a Repub¬ lican in 1889, and reelected in 1895 and 1901. He was active in many commercial enterprises and was president of the Detroit Iron Furnace Company, which employed more than 3,000 men. He gave the city of Detroit a thoroughly equipped hospital, costing $250,000, and endowed it with $300,000; to the University of Michigan a fine Shakespearean library, and added to the college buildings McMillan Hall. He bestowed substantial benefactions on several other institu¬ tions.

McMILLAN, James William, American solider : b. Clark County, western Virginia, 1826; d. 10 March 1903. At the time of his death he was a member of the board of review of the Pension Bureau. He was hrevetted major-general in March 1865, commanded the

1st and 2d brigades of the Nineteenth Army corps, served with Butler in the Gulf campaign, and captured the blockade runner Fox, one of the richest prizes of the Civil War.

McMILLAN, Thomas, American Roman Catholic priest of the Missionary Society of Saint Paul the Apostle : b. Ayr, Scotland, 13 June 1851. He is of Irish descent, and when three years old came with his parents to America. In 1874 he entered the Missionary Society of Saint Paul the Apostle. His chief work has been in Sunday schools. In 1886 he instituted a ˆreading circle® movement, which has extended over all the country. In 1889 he was largely instrumental in bringing together, at New York, a large number of editors, jour¬ nalists and authors from different parts of the United States to discuss ways and means of making the press more effective in uplifting humanity. This meeting was known as that for the promotion of the ((Apostolate of

the Press.® In 1892 he was made chairman of the board of studies of the Catholic Summer School of America. In 1897 he was the prime mover in the organization of the (CChild Study Congress® held in New York City.

MACMILLANITES. See Macmillan, John, and Cameronians.

MACMILLEN, Francis, American vio¬ linist: b. Marietta, Ohio, 14 Oct. 1885. He en¬ tered the Chicago College of Music at the age of seven, afterward studying at Berlin, Brus¬ sels and Saint Petersburg, under Joachim, Cesar Thomson, Flesch, Auer and others. He re¬ ceived first prize and the Van Hal cash prize at the Brussels Royal Conservatorv when 16 years of age. He made his first public appear¬ ance in Brussels in 1903, afterward touring England, Belgium. France and Germany. He made his American debut at Carnegie Hall, 7 Dec. 1906, and made concert tours of the prin¬ cipal cities of the United States in 1906-07,

1907-08, 1910-11, 1914-15, 1915-16.

McMINNVILLE, mak-‘min’vil, Ore., city, county-seat of Yamhill County, on the Yamhill River, and on the Southern Pacific Railroad, about 55 miles southwest of Portland. It is situated in an agricultural region, in which hops, wheat and fruit are raised extensively. The city has considerable trade in agricultural products, livestock, lumber, wool and some dairy products. The electric-light plant and the waterworks are owned and operated by the city. Pop. 2,767.

McMinnville, Tenn., town, county-seat of .Warren County, on the Nashville, Cincin¬ nati and Saint Louis Railroad, about 80 miles southeast of Nashville. It is in the midst of an agricultural region, and in the vicinity is found excellent building stone. Its manufac¬ tures are cotton and woolen goods, flour and lumber, foundry and machine-shop products, furniture and dairy products. It is the seat of the Cumberland University Training School. Pop. 2,814.

MACMONNIES, mak-mun’Tz, Frederick William, American sculptor: b. Brooklyn, N. Y., 20 Sept. 1863. In his 1 7th year he became pupil and assistant to Augustus Saint Gaudens, and going to Europe in 1884 he studied at Munich, and later was admitted to the studio of Falguiere at the Lcole des Beaux-Arts, and

also studied with Antonin Mercie. In 1887 there opened a studio of his own. In 1889 his statue of (Diana) was honorably mentioned in the Salon, and his (Nathan Hale* in City Hall Park, New York, and (James S. T. Stranahan> in Prospect Park, Brooklyn, were much ad¬ mired in the Salon 1891. His <Bacchante) (Salon 1894) was purchased for the Luxem¬ bourg. He has been prolific in the creations of the chisel, and his work is to be seen in Wash¬ ington Memorial Arch, New York City, the Sol¬ diers and Sailors' Monument in Indianapolis, in the statues of Prospect Park, Brooklyn, and the Battle Monument at West Point. He exe¬ cuted a number of statues for the Columbian Exposition in the Court of Honor (Chicago 1893). Since 1900 he has devoted himself more and more to painting, in which he exhibits delicacy, freshness of design and a brilliant technique. In 1913 he resumed his work in sculpture. He has received numerous medals. In 1898 he was elected Chevalier of the Legion of Honor, and two years later won the grand prize at the Paris Exposition. He is a member of various national art associations. Consult Taft, L., (H;story of American Sculpture) (New York 1903).

MACMULLEN, Wallace, American Metho¬ dist Episcopal clergyman: b. Dublin, Ireland, 31 Aug. 1860. He came to the United States with his parents in 1862 and was graduated from the Drew Theological Seminary in 1888, enter¬ ing the Methodist ministry in that year. He was pastor at Springfield, Mass., in 1888-93; at Grace Church, Philadelphia, in 1893-98; at Park Avenue Church, Philadelphia, in 1898-1902; and at the Madison Avenue Church in 1902-13. Since 1913 he has been professor of homiletics at the Drew Theological Seminary. He is president of the board of managers of foreign missions. Author of (Captain of Our Faith > (1904).

McMURRICH, James Playfair, Canadian

scientist: b. Toronto, Ontario, 16 Oct. 1859. He was graduated from the University of Toronto in 1879, and received his Ph.D. from Johns Hopkins in 1885. From 1884-86 he instructed at that institution in mammalian anatomy. He held a professorship in biology at Ontario Agri¬ cultural College (1882-84); at Haverford (1886-89); at Cincinnati (1892-94). From 1889-92 he was docent and assistant professor of morphology at Clark University; professor of anatomy in the University of Michigan (1894-1907), and since then has been at Toronto University. He 'has published Unvertebrate Morphology* (1894) ; (The Development of the Human Body> (1902), and has edited Sobotta's (Atlas and Textbook of Human Anatomy > (1906-07); Morris, (Human Anatomy * (4th ed.,

1906).

McMURRY, Charles Alexander, American

educator: b. Crawfordsville, Ind., 18 Feb. 1857. He was graduated at the Illinois Normal Uni¬ versity in 1876, at the University of Michigan in 1880 and at the University of Halle in 1887. He was principal of the Practice School at the Illinois State Normal University and lecturer at Teachers' College of Chicago in 1899-1900; principal of the Practice School at the Northern Illinois Normal School in 1900-01; and since 1915 he has been professor of elementary education at the George Peabody

College for Teachers, Nashville, Tenn. Author 'Method of Recitation* with his brother, F. M. McMurry (1898) ; 'Special Method in Read¬ ing* (1898) ; and a series of 'Special Method) textbooks including 'Literature and History) (1898) ; (Geography > (1898) ; 'Natural Science) (2d ed., 1899) ; 'Manual Arts* ; 'Arithmetic (1906) ; 'Course of Study in the Eighth Grades) (1906) ; 'Teacher's Manual in Geography* (1904); 'Pioneer History Stories) (3 vols.) ; 'Conflicting Principles in Education (1914) ; 'Handbook of Practice for Teachers) (1914), *etc.* He has edited the 'Year Books) of the Herbart Society.

McMURRY, Frank Morton, American educator, brother of Charles Alexander Mc¬ Murry (q.v.) : b. near Crawfordsville, Ind., 2 July 1862. He studied at the universities of Michigan, Halle, Jena, Geneva and Paris. He was professor of pedagogy at the State Nor¬ mal School, Normal, Ill., in 1891-92; and at the University of Illinois in 1893-94. He was principal of the Franklin School, Buffalo, N. Y., in 1894-95, and was professor of pedagogics and dean of Teachers' College, University of Buffalo, in 1895-98. Since 1898 he has been professor of elementary education at Teachers' College, Columbia University. He was asso¬ ciate editor of the 'Student's Reference Work) (1909). Author of 'Tarr and McMurry Com¬ mon School Geographies,* with

Ralph S. Tarr (1900) ; ‘Method of Recitation, > with C. A. McMurry (1898); ‘How to Study and Teach¬ ing How to Study > (1909) ; ‘Elementary School Standards) (1913).

McMURTRY, Lewis S., American sur¬ geon : b. Harrodsburg, Ky., 14 Sept. 1850. He was educated at Centre College, Kentucky, and at Tulane University. He specialized in gyne¬ cology and abdominal surgery, becoming pro¬ fessor of those subjects in the medical depart¬ ment of the University of Louisville, where he afterward became president of the medical fac¬ ulty. He is surgeon at the Louisville City Hos¬ pital. He is a member of various foreign and American scientific societies and was president of the American Medical Association in 1906-07. He is a contributor to medical journals and also contributed to the ‘International Text Book of Surgery.*

McNAB, Sir Allan Napier, Canadian statesman : b. Niagara, Ontario, 19 Feb. 1798; d. 8 Auer. 1862. He entered the navy as midshipman in 1813, but soon abandoned the navy for the army; was present at the capture of Fort Ni¬ agara, and commanded the advance guard at the battle of Plattsburg. At the close of the war he studied law and practised in Hamilton, and in 1829 was elected a member of the assem¬ bly, and speaker 1837-41. During the insurrec¬ tion of 1837-38 he commanded the militia on the Niagara frontier, routed the insurgents near Toronto 7 Dec. 1837, and a party of American sympathizers having occupied Navy Island in the Niagara River, whence they were cannonad¬ ing the village of Chippewa on the Canadian side, he sent a party to seize the steamer Caro¬ line, employed to convey them supplies, and having driven the crew ashore, set fire to it and sent it over the Falls. Although the seizure was made on the American side of the river, the act was approved by the British govern¬ ment, and for his services to the Crown during

this insurrection McNab was knighted. In 1854 he was Prime Minister under the Earl of Elgin, retaining office for a few months under his suc¬ cessor, Sir Edmund Head. On retiring from the premiership in 1856 he was made a baronet.

McNAIR, mak-nar’, Frederick Vallette,

American naval officer: b. Jenkintown, Pa., 13 Tan. 1839; d. 1900. He was educated at the United States Naval Academy and served in the Minnesota 1857-59. In 1861 he became lieu¬ tenant, and during the Civil War took part in the bombardment of Forts Jackson and Saint

Philip, the capture of New Orleans and the destruction of the Confederate ram Arkansas. He was instructor at the naval academy 1867-68, in 1872 became commander and in 1887 was placed in command of the Omaha in the Asiatic squadron. In 1890 he became superintendent of the Naval Observatory. In 1895 he was made admiral, a member of the lighthouse board in 1898, and in July of the last-named year was appointed to take charge of Admiral Cervera and other Spanish prisoners of war. Upon their return to Spain he was appointed superin¬ tendent of the naval academy.

MACNAMARA, mak'na-ma'ra, Thomas James, British statesman, educator and author: b. Montreal, Canada, 23 Aug. 1861. He went to England at an early age and was educated at Saint Thomas School, Exeter, and at the Bor¬ ough Road Training College for Teachers. He was engaged in teaching in 1876-92 and was president of the National Union of Teachers in 1896. He was elected to Parliament for North Camberwell in 1900; served as Parliamentary Secretary of the Local Government Board in 1907-08 and to the Admiralty in 1908-15, when he was appointed Financial Secretary to the Admiralty. He has contributed extensively to the periodical press, is author of numerous text¬ books and of 'Schoolmaster Sketches) (1896) ; 'Schoolroom Humor * (1905) ; 'The Gentle

Golfer) (1906) ; 'Tariff Reform and the Work¬ ing Man) (1910), *etc.*

MacNEIL, Carol Brooks, American sculptor, wife of Hermon Atkins MacNeil (q.v.) : b. Chicago, Ill., 15 Jan. 1871. She studied at the Art Institute and under Lorado Taft, Chicago, and under MacMonnies and Injalbert, Paris. She exhibited at the Chicago Exposition, 1893; at the Paris salons in 1894, 1895 and 1900; re¬ ceived honorable mention at the Paris Exposi¬ tion of 1900; and the bronze medal at Saint Louis in 1904.

MacNEIL, Hermon Atkins, American sculptor : b. Chelsea, Mass., 1866. He was graduated at the Massachusetts State Normal School in 1886; and later spent two years in study under Chapu at Julien Academy, and two years under Falguiere at the Lcole des Beaux Arts in Paris. He afterward taught for three years at Cornell, and three years also at the Art Institute, Chicago. He won the Roman Rhine-hart scholarship in sculpture for 1896-1900. He was awarded the medal in design at the Chicago Exposition in 1893; received the silver medal at the Paris Exposition in 1900 ; the gold medal at the Buffalo Exposition in 1901 ; silver medal at the Charleston Exposition in 1902; commemo¬ rative medal at Saint Louis in 1904; and the gold medal at the Panama Exposition in 1915. He was engaged in important

decorative work for

the expositions at Chicago, Paris, Buffalo and Panama. He executed the spandrels on the portico of the National pavilion at the Paris Exposition, where he exhibited the groups (The Sun Vow) and the East Act of the Moqui Snake Dance. } The main cascade fountain at the Saint Louis Exposition was his work, and he served on the jury of awards. He is a teacher of modeling at the National Academy of Design, New York. Among his other work may be mentioned (The Coming of the White Man> (Citv Park, Portland, Ore.) ; (McKinley MemoriaP (Columbus, Ohio) ; (Soldiers and Sailors MemoriaP (Whittinsville, Mass.) ; Or¬ ville Hitchcock Platt MemoriaP (State Capitol, Hartford, Conn.) ; (General Washington (Washington Arch, New York), *etc.* He was elected to the National Academy in 1906. His work is represented at the Art Institute, Chi¬ cago; Peabody Institute, Baltimore; Cornell University; the Metropolitan Museum, New York; and the Johns Hopkins University.

MacNEVIN, or MACNEVEN, William James, American physician : b. Ballynahowne, County Galway, Ireland, 21 March 1763; d. New York, 12 July 1841. When 12 years old he was placed in the care of his uncle, Baron O'Kelly MacNevin, court physician in Austria, and he received his education at the universities of Prague and Vienna, taking his medical degree at Vienna in 1784. He then returned to Ire¬ land and engaged in practice at Dublin. He was a member of the secret society of United Irishmen and his activities in this connection caused his arrest with Thomas Addis Emmet in 1798, and for four years thereafter he was im¬ prisoned. He then joined the Irish Legion under Napoleon in the hope of French inter¬ vention in Ireland. After three years he aban¬ doned this hope and emigrated to the United States, establishing himself in practice in New York. He became professor of obstetrics in the College of Physicians and Surgeons in 1808, and was professor of chemistry and materia medica there in 1811. He established in con¬ nection with his work as a teacher the first chemical laboratory in New York. He resigned in 1826 and together

with several leading nhysi-cians founded a new medical school on Duane street, in which he held the chairs of materia medica and therapeutics until the school closed in 1830. He was president of the <(Friends of Ireland‘0 and belonged to most of the Irish societies in New York. He was coeditor and contributor to the New York Medical and Philosophical Journal. He edited (Brande’s Chemistry) (1831); and was author of Gam¬ bles through Switzerland> (1803); (Chemical Examination of the Mineral Waters of Schooley’s Mountains) (1815) ; Exposition of the Atomic Theory of Chemistry) (1819), *etc.*

McNICHOLAS, (Rt. Rev.) John T., O.P.,

American Catholic prelate : b. County Mayo, Ireland, 1877. He came to the United States when a child ; began his studies in the Gesu, Philadelphia, continued them in the Dominican establishments of Kentucky and Ohio and completed them in the University of Minerva, Rome, where, specializing in canon law, he at¬ tained the degree of D.D. Returning to America, he became master of novices in the Dominican novitiate, Somerset, Ohio, acting also as professor of philosophy, canon law and

homiletics. After holding this office for five years, he became director of the Bureau of the Holy Name in New York City and editor of the Holy Name Journal, for eight years devoting himself energetically to the . organization of branches of the Holy Name Society in every State of the Union. He is an accomplished linguist, and authoritatively has contributed much to the literature of canon law. In 1916 Dr. McNicholas became assistant to the Dominican General in Rome, where, 18 July 1918, he received the appointment as second bishop of Duluth, Minn.

MACOMB, Alexander, American general; b. Detroit, Mich., 3 April 1782; d. Washington, D. C., 25 June 1841. He entered the United States army in 1799 as a cornet of cavalry, and at the commencement of the war with Great Britain in 1812 held the rank of lieutenant-colonel of engineers and adjutant-general of the army. In January 1814 he was promoted to be a brigadier-general and placed in com¬ mand of that part of the northern frontier bor¬ dering on Lake Champlain. At Plattsburg, on 11 Sept. 1814, he sustained the attack of a greatly superior British force under Sir George Prevost, which, after the defeat of the British squadron on Lake Champlain on the same day, retreated to Canada. For his firmness and cour¬ age on this

occasion he was commissioned a major-general, and received the thanks of Con¬ gress and a gold medal. In 1835 he succeeded to the office of commander-in-chief of the army, which he held until his death. He wrote a ‘Treatise on Martial Law and Courts Martial, as Practised in the United States) (1809). Con¬ sult Richards, (Memoir of Alexander Macomb) (New York 1833).

MACOMB, Ill., city, county-seat of Mc¬ Donough County, on the Chicago, Burlington and Quincy Railroad, about 65 miles northwest of Springfield. It is situated in an agricul¬ tural region and in the vicinity are extensive deposits of fireclay. The first permanent set¬ tlement was made about 1841, and the place was incorporated in 1857. The chief manufac¬ tures are sewer-pipe, stoneware and pottery. There is considerable trade in farm products, coal and lumber. The Western Illinois State Normal School is located here, and the free public library contains about 10,000 volumes. The government is administered, under a char¬ ter of 1872, by a mayor, who holds office two years, and a council. The city owns and operates ‘the waterworks. Pop. (1920) 6,714.

MACON, ma’kon, Nathaniel, American

statesman: b. Warren County, N. C., 17 Dec. 1758; d. there, 29 June 1837. He was educated at the College of New Jersey, now Princeton; in 1776 he left college and served during the summer in the New Jersey militia. During the following three years he studied law ; then from 1780 he served as a common soldier in the Continental army till the provisional treaty of peace in 1782, refusing anv pav or military dis¬ tinction. When the Constitution of ‘the United States was^submitted to the vote of the people of North Carolina, he firmly opposed it, on the ground that it bestowed too much power on the government, and made it in effect independent of the State. He never lost -this dislike of the (onstitution, and had unlimited confidence in the canacity of the people for self-govenment ;

his favorite saying being that (<if left alone they would always do what was right.® He was a member of the United States House of Representatives 1791-1815, and in 1816 was elected to the Senate, where he served till 1828, when he resigned his seat, having been then a member of Congress for 37 successive years.

MACON, France, capital city of the depart¬ ment of Saone-et-Loire, on the Saone River, 45 miles north of Lyons on the Paris-Lyons Rail¬ way. A bridge of 12 arches crosses the river to the opposite suburb, Saint Laurent. The cathe¬ dral of Saint Vincent, built in the 12th and 13th centuries, was destroyed at the time of the Revolution, but a portion of it is still used as a chapel and the faqade and towers remain. There is the modern church of Saint Pierre, a Romanesque structure with two fine spires and a three-naved basilica. Macon was the Roman Matisco Aiduorum and in the 16th century was a stronghold of ‘the Huguenots. It suffered severely in different invasions. It is the seat of a prefecture, and has tribunals of the first instance and of commerce. It has excellent schools and training colleges, and important commercial and manufacturing interests, as well as being a railway centre. It has a large trade in wine, and manufactures supplies for the wine trade as well as being engaged in copper-founding, and making machinery, tools and paper. A statue in the town com¬ memorates the birth there of Alphonse Lamar¬ tine, the poet. Pop. about 19,059.

MACON, Ga., city and county-seat of Bibb County, popularly known as the “Heart of Georgia,® 86 miles by rail from Atlanta, 191 from Savannah and 125 from Augusta.

It lies on the southeastern edge of the Ap¬ palachian mountain wall, on both sides of the Ocmulgee River which pours from the upper plateau with a fall of 90 feet in seven miles above the city. An immense concrete dam 103 feet high spans the river 36 miles up, furnish¬ ing hydro-electric current for power and light, operating street cars and factories and lighting the city. An auxiliary steam plant is located in the city for emergency use. The Ocmulgee is spanned by four steel bridges. The river is navigable to the ocean, is open all ‘the

year round, and even at low water steamers of three feet draught operate to Brunswick and Savannah, making connection at those points with coastwise and ocean shipping. Macon is the most important railroad centre in the State;, six trunk lines with radiating lines give 14 outlets, north, east, south and west ; it is the concentration point for tourist trains during the winter season enroute to Florida. A new union passenger station, opened October 1916, cost over a million dollars; it faces Cherry street, the principal thoroughfare of the city.

Macon is in the midst of the cotton section of the State and is the fourth inland cotton market in the United States, well equipped with warehouses and compress, annual receipts, over 200,000 bales, a considerable portion of which is manufactured by the numerous. cotton mills into cloth, yarns, twine, duck, knitted underwear, hosiery, automobile tire fabrics.

Macon is also the clearing-house for the great fruit belt in central Georgia, within 30 miles of the great peach orchards ; an annual average of 4,000 carloads of peaches, plums,

pears, cantaloupes and other fruits pass through the city. Three large factories furnish the ice for refrigeration. Within a radius of 50 miles, lies inexhaustible supplies of kaolin, feldspar, fire clays and clays for making brick and terra cotta. The largest brick manufacturing plant in the southeast is located in Macon ; every style of brick, tile, sewer pipe and terra cotta is produced here. The Central of Georgia Rail¬ way maintains a $2,000,000 shop at Macon where cars are built and locomotives for 2,000 miles of line are maintained. The Georgia, Southern and Florida Railway also has ex¬ tensive shops at their headquarters of 300 miles of main line. Other railroads also have shops here. The Census Bureau's summary concern¬ ing the city, period 1909-14, gives the number of manufacturing establishments in 1914 as 70; persons engaged in manufactures, 4,491 ; wage earners, 4,047; primary horse power (local) used, 15,883; capital invested, $11,552,000; serv¬ ices, $2,395,000; salaries, $594,000; wages, $1,801-000; materials, $14,025,000; value of products, $18,867,000; value added by manufacture,

$4,842,000.

The actual number is greater than stated one owner is reported for several establish¬ ments owned or controlled by one concern. There are a number of establishments manu¬ facturing fertilizer, hardwood, agricultural im¬ plements, located outside the city limits which are not included in the foregoing, which are properly Macon investments. The principal manufactures are cotton goods, cloth, yarns, underwear, hosiery, duck, twine and automo¬ bile tire fabrics. Cottonseed oil, cake, meal, etc., for food and provender, the seed netting the planter nearly as much as the cotton fibre. Brick, sewer pipe, tile, terra cotta, granite pav¬ ing block, foundry and machine shops, railroad shops, products, harness, saddlery, agricultural implements, carriages, wagons, furniture, office fixtures, confectionery, barrels, handles, four ice factories, one of them capacity of 500 tons per day.

Macon has eight banks and trust companies with a total capital of $1,695,000; surplus. $958,- 500. The annual deposits reach $7,495,000. The largest annual clearings reached in 1912 ($193,000,000), show a slight decrease on ac¬ count of general depression and European War. Average deposits per capita, $170; average for the United States is only $35.

No city in the country has wider or better parked streets and it is noted for having been the first city in the United States to employ an all auto-fire department. The National and Dixie highways, eastern, western and central routes, all centre in Macon and is the grand central point for State and Interstate tours. Her up-to-date hotels and splendid roads are fast making Macon the mecca of the tourists traveling North and South in summer and winter.

There are two public libraries; Mercer Uni¬ versity (for men, Baptist, 1831); Wesleyan Female College (1836, the oldest chartered fe¬ male college in the world) ; Saint Stanislau (Roman Catholic, preparatory for the priest¬ hood) ; Mount DeSales (Roman Catholic) ; Masonic Home (widows and orphans) ; State Academy for the Blind (1852), with a valuable library of several thousand volumes; and a

modern granite public building. Macon is the home of the Masonic Order in Georgia and maintains a handsome home for widows and orphans on a 100-acre farm one mile from the city. All other orders are represented: Knights of Pythias Castle is valued at $50,000-Elks Hall, $20,000 ; Odd Fellows, $25,000.

Recreation facilities include the home of the Georgia State Fair, located in Central City Park, good buildings for agricultural and in¬ dustrial exhibits, cattle, swine and poultry. Annual attendance, 125,000; Idle Hour Country Club with modern club house and golf links; several resorts for swimming and dancing; four playgrounds with up-to-date apparatus ; splen¬ did mile-track; half-mile jog track and winter quarters for circuses and racing stock; the Y. M. C. A. building, four stories, with gym¬ nasium, dormitories and swimming pool; Grand Opera House and four splendid moving picture theatres. All of the principal resorts are reached by street cars and taxi Lnes. One park is maintained for colored people exclu¬ sively.

Tatnall Park, with playground, covers 18 acres. There are numerous street parks all over the city, with shade trees, cement walks and seats. The city has been the recipient of 200 acres of beautiful woodland on the bank of the river two miles out, reached by a boule¬ vard, where a tourist hotel and golf links are to be built. This gift is a part of the late Senator Bacon's estate. There are 29 churches for white people with 14,000 members ; many of them handsome buildings, with annexes for Sunday schools, and homes for widows and orphans. The colored population is also well represented in church work and have substantial churches.

The cemeteries include Rose Hill, 150 acres, established in 1840; Riverside, and other smaller ones located on the river bank and famed for their natural beauty, handsome monuments and mausoleums.

The city is governed by a mayor and council of 12 aldermen, with separate commissions of three each in charge of police and fire depart¬ ments, and a water commission of three. Ma¬ con has a modern water plant valued at over $1,000,000, supplying water from the Ocmulgee River, above navigation, on one side, and Tuft Springs on the other. Macon was settled in 1822, incorporated in 1823 and received a city charter in 1832 and was named after Nathaniel Macon, a patriot and statesman of North Caro¬ lina. Macon's population in 1900 was 23,000; in 1910, 42,000, and in 1920, 52,995, but this does not include at least 5,000 people who live in the immediate vicinity, enjoying street car, electric light and water service, while within a 50-mile radius of Macon there is a popula¬ tion of nearly 800,000 people

who reach the city over a system of the best roads in the county.

MACON, Miss., city, county-seat of Nox¬ ubee County, on the Noxubee River, and on the Mobile and Ohio Railroad, about 108 miles east by north of Jackson. The agricultural lands surrounding the city are almost wholly used for the cultivation of cotton. It has cot¬ tonseed-oil mills, cotton gins and cotton compress. Its trade is chiefly in cotton. Pop.

2,024.

MACON, Mo., city, county-seat of Macon County, on the Wabash and the Chicago, Bur¬ lington and Quincy railroads, about 70 miles west of the Mississippi River and 60 miles south of the Iowa line. Surrounding the city is a fertile agricultural region, well watered and well wooded; and in the vicinity are the largest producing coal fields in Missouri. The industrial establishments are foundries, machine shops, flour mills, wagon and automobile fac¬ tories, brick yards, cigar factories and works where agricultural implements are made. Here is located the Still-Hildreth Osteopathic Sani-torium, the only institution of its kind in the world, where nervous and mental diseases are treated by osteopathy. Some of its public buildings are the courthouse, the county insane asylum, public and private school buildings, the public library, Federal building, hospital and 10 churches. The oity owns and operates the electric-light plant and the waterworks and filtration plant. Pop. 3,584.

MACORIS, ma'ko'res', Santo Domingo, seaport on the southern shore of the island of Haiti on Macoris Bay, about 40 miles east of Santo Domingo. The manufacture of sugar and a considerable import and export trade con¬ stitute the town's chief activities. A United States consular agent is located here. Pop. about 7,000. Macoris is also the name of a smaller town in northern Santo Domingo, near Santiago.

MACOUN, ma-koon', John, Canadian bota¬ nist: b. Ireland, 1832. He removed to Canada at 18 and from 1868 to 1879 was professor of botany and geology in Albert College, Belle¬ ville, Ontario. In 1882 he became botanist to the Geological and Natural History Survey of Can¬ ada and was appointed in 1887 assistant director of the survey. He has published (Manitoba and the Great Northwest (1882) ; <The Forests of Canada and their Distribution (1895) ; an ex¬ haustive report on the Yukon country; and catalogues of Canadian plants and birds.

MACPHAIL, mak'far, Andrew, Cana¬ dian physician, author and editor : b. Orwell, Prince Edward Island, 24 Nov. 1864. He was educated at the Prince of Wales College, Mc¬ Gill University and at the London Hospital. He was principal of the Fanning Grammar School in 1882-85; was engaged in journalism in 1889-93; afterward traveling in the East. In 1895-1906 he was pathologist to the Western Hospital and Verdun Hospital for Insane. In 1906 he became professor of the history of medicine at McGill University. Author of <Essays in Puritanism5 (1905); (The Vine of Sibmah5 (1906); (Essays in Politics) (1909);

(Essays in Fallacy5 (1910) ; (The Book of Sor¬ row5 (1916).

MACPHEE, John Joseph, American neu¬ rologist : b. Prince Edward Island, Canada, 8 July 1860. He was educated at the Prince of Wales College and at the University of Ver¬ mont where he took his M.D. ip 1890. He was pathologist at the Post-Graduate Medical Col¬ lege of New York in 1891-94; after which he became professor of nervous and mental dis¬ eases at the New York Polyclinic Medical School and Hospital. He is also consulting neurologist at Saint John's Hospital, Brook-

lyn ; Beth Israel Hospital, New York; and at Saint Francis' Hospital, New York.

MACPHERSON, mak-fer'son, Sir David Lewis, Canadian statesman : b. Inverness, Scot¬ land, 12 Sept. 1818; d. 16 Aug. 1896. He was educated at the Royal Academy in his native town, removed to Canada in 1835 and after be¬ coming in 1842 a partner in a forwarding firm in Montreal secured in 1851, with others, a char¬ ter for a railway from Montreal to Kingston, the beginning of the Grand Trunk Railway. In 1872 he became president of the Interoceanic Railway Company, the rival to the Canadian Pacific, in competing for the transcontinental railway charter. He sat in the Legislative Counoil of Canada 1864—67, and in the last-named year entered the Dominion Senate and was eleoted its speaker in 1880. He was Min¬

ister of the Interior 1883-85 and was created K.C.M.G. in 1884.

McPHERSON, Edward, American journal¬ ist : b. Gettysburg, Pa., 31 July 1830; d. there, 14 Dec. 1895. Iu 1848 he was graduated from the University of Pennsylvania, and although he studied law soon gave it up for journalism. He sat in Congress 1858-66, was clerk of the House of Representatives 1868-73, 1881-83, and 1889-91, in 1876 permanent president of the National Republican Convention, and was chief of the Bureau of Engraving and Printing in Washing¬ ton 1877-88. He edited the Philadelphia Press 1877-80. was for some years the American edi¬ tor of the (Almanach de Gotha* ; edited from 1872 a biennial (Handbook of Politics* ; and the (New York Tribune Almanac* from 1877 till his death. He was the author of a (Political History of the United States during the Great Rebellion > (1865) ; and (The Political History of the United States during Reconstruction*

(1870).

MACPHERSON, James, Scottish author and translator: b. Inverness-shire, 1736; d. 1796. He studied at Aberdeen and Edinburgh. Having published (Fragments of Ancient Poetry, *translated from the Gaelic or Erse language, a subscription was raised to enable him to collect additional specimens of national poetry. He produced, as the fruit of his re¬ searches, (Fingal, an Ancient Epic Poem,* translated from the Gaelic (1762, quarto) ; (Temora and other Poems) (1763), professedly translated from originals by Ossian, the son of Fingal, a Gaelic prince of the 3d century, and his contemporaries. The question of the poem's authenticity gave occasion for violent contro¬ versy. It may be concluded that Macpherson's prose epics were founded on traditional narra¬ tives current in the Highlands; but the date of the oldest of the lays is comparatively modern, and it is now impossible to ascertain the pre¬ cise extent of his obligations to Gaelic bards. Macpherson himself never made any serious attempt to vindicate himself against the charge of forgery. He had a life allowance from the government, and was agent to the Nabob of Arcot, having also a seat in the House of Com¬ mons, 1780-96. He was also the author of a very inadequate prose translation of Homer's Uliad* and of some other works.

McPHERSON, James Birdseye, American soldier: b. Sandusky, Ohio, 14 Nov. 1828; d. Atlanta, Ga., 22 July 1864. He was graduated

from West Point in 1853. Appointed brevet 2d lieutenant of engineers, he was assistant in¬ structor of practical engineering at West Point, 1853-54, and after serving on fortifications and construction duty on the defenses of the harbor of New York and the improvement of the Hud¬ son River (1854—57), was given charge of the construction of Fort Delaware (1857-61) and of the defenses of Alcatraz Island, San Fran¬ cisco, Cal. He applied for aotive employment in the field at the opening of the Civil War. In May 1862 he was appointed brigadier-general of volunteers and was with Halleck at the siege of Corinth. For his services on this occasion he was made major-general of volunteers in the following October. He took an important part in the siege and capture of Vicksburg and was in consequence promoted to brigadier-gen¬ eral in the regular army, 1 Aug. 1863. In March 1864 he was made commander of the Depart¬ ment and Army of the Tennessee and performed distinguished services in the campaign of Geor¬ gia. In the following July he commanded in the engagement around Atlanta and was killed during a reconnaissance. A statue has been erected in his honor at Washington, D. C., by the men who fought with him in the Army of the Tennessee.

McPHERSON, Kan., city, county-seat of McPherson County, on the Union Pacific, the Atchison, Topeka and Santa Fe, the Missouri Pacific and the Chicago, Rock Island and Pacific railroads, about 150 miles west by south of Topeka. The city is the trade centre of an extensive agricultural region in which the chief products are wheat and corn. It has flour-mills, creameries, grain-elevators, brick and lumber yards. Its trade is chiefly in farm and dairy products and in livestock. Its principal build¬ ings are a courthouse, high school and opera-house. It is the seat of the McPherson Col¬ lege. under the auspices of the German Baptists. The city owns and operates its waterworks and electric-light plant. Pop. 4,595.

McPHERSON COLLEGE. This institu¬ tion was established at McPherson, Kan., in 1887, and opened its doors for the first time 5 Sept. 1888. Dr. S. Z. Sharp, then a professor in Mount Morris College, Illinois, was the chief promoter. The college is the property of the Church of the Brethren (sometimes called the Dunkers) and the control is exercised by a board of trustees representing the 11 church dis¬ tricts which make up Kansas, Nebraska. Mis¬ souri, Oklahoma, Colorado, Utah and Idaho. A local committee of five, in connection with the president of the college, actively supervise the work of the college. While the college is denominational, there are no religious tenets required for admission. The number of stu¬ dents usually ranges from 300 to 400. There are the following departments : college, acad¬ emy, bible, expression, business, agriculture, domestic science,

music, manual arts. The alumni number about 600. There are -22 faculty members. The endowment of the school was small until in 1916, when largely through the efforts of President Kurtz it was raised to over $225,000. This sum is productive. Other gifts are contingent. Each year the contribu¬ tory congregations observe an educational day on which offerings are raised to sustain scholar¬ ships in McPherson College for prospective

ministers and missionaries. There are already some 14 alumni on the mission fields of China and India. The material equipment consists of six buildings, a 10-acre campus and two farms which have been secured for agricultural pur¬ poses. On the campus there are Sharp Ad¬ ministration Building, Fahnestock Hall, Arnold Hall, Carnegie library, alumni gymnasium and central heating plant.

McQUAID, m'kwad', Bernard John, Amer¬ ican Roman Catholic prelate: b. New York City, 15 Dec. 1823; d. Rochester, N. Y., 18 Jan. 1909. After studying in Canada, he com¬ pleted his course at Saint John's College, Fordham, N. Y., where he was graduated in 1843, and for the next three years held the position of tutor. He studied theology first with the Lazarists of New York City and later at Saint John's College, Fordham, being ordained priest January 1848. Having built churches at Morris¬ town and Springfield, N. J., he was engaged upon one at Mendham when summoned to the newly created diocese of Newark, N. J., 1853. In 1856 Father McQuaid founded Seton Hall College at Madison, N. J., and was its first presi¬ dent, retaining the office for 10 years, and its subsequent . success has been eminently due to his indefatigable efforts. He was consecrated first bishop of the diocese of Rochester, N. Y., by Archbishop McCloskey in New York City, 12 July 1868. With characteristic energy he discharged his episcopal duties, the cause of Catholic education ever appealing to him as one of paramount importance. With a view to advancing it he invited the Sisters of Saint Joseph to conduct new parochial schools in his diocese and likewise founded Saint Andrew's Preparatory Seminary.

MACQUARIE (ma-kwar'i) ISLAND, British island; the largest of a small group of islands off the south coast of New Zealand and belonging to that country. It is about 4 by 20 miles in extent, is well covered with grassy vegetation and has trees and shrubs in sheltered sections. It was formerly a good seal-hunting ground but the seals were practically exterminated through lack of restrictions in hunting them. Penguins and other sea fowl abound and there are large herds of sea ele¬ phants. The island was discovered in 1810 and until the destruction of the seals was visited by numerous sealers. Its only inhabitants at the time it was made a base of the Mawson Expedition of 1911-14 were a few men sta¬ tioned by a New Zealander for the purpose of rendering sea elephant and penguin blubber. The island is the crest of a submarine mountain, soundings taken 10j4 miles east of its shore recording 2,745 fathoms and no bottom. There are several anchorages, but no harbor. There is now a permanent weather and relief station on the island, equipped with a wireless appa¬ ratus. Consult Mawson, Sir Douglas, (The Home of the Blizzard) (2 vols., 1914).

MacQUEARY, ma-kwe'ri, Thomas How¬ ard, American educator: b. Charlottesville, Va., 27 May 1861. He was graduated from the Episcopal Theological School at Alexandria, Va., in 1886, took orders in the Episcopal Church and in 1887 became rector at Canton, Ohio. His religious views having undergone a radical change he was tried by an ecclesi¬ astical council for denial of miracles and sus¬

pended from the ministry for six months. He accordingly resigned from it in September 1891, and was for some time in the Universalist ministry. He returned to college for special work and in 1898 took his M.A. degree at the University of Minnesota, later (1901) finishing the work for the Ph.D. degree in history and economics at the University of Chicago, al¬ though he did not publish his thesis and take the degree. He founded Unity House Social Settlement in Minneapolis; from 1900-06 was superintendent of the Parental School in Chi¬ cago, and since 1906 has been head of the department of historv and head assistant in Soldan High School, Saint Louis, Mo., and teacher of political science in Benton College of Law. He is the author of (The Evolution of Man and Christianity* (1889); 'Topics of the Times) (1890). He has done considerable lec¬ ture work for Chautauquas and other societies.

McQUILLEN, John Hugh, American dentist: b. Philadelphia, Pa., 12 Feb. 1826; d. there, 3 March 1879. He began the study of medicine and dentistry in 1847, engaged in the practice of dentistry in 1849,

took his M.D. at Jefferson Medical College in 1852 and his D.D.S. at the Philadelphia College of Dental Surgery in 1853. He became professor of operative dentistry and dental physiology at the Pennsylvania College of Dental Surgery in 1857. In 1863 he was instrumental in securing a charter for the Philadelphia Dental College and he was from that time until his death its dean and professor of physiology. He was president of the American Dental Association, the Pennsylvania Dental Society, the State Odontographic Society. He edited Dental Cos¬ mos in 1859-71.

MACRAUCHENIA, mak-ra-ke'm-a, a three-toed genus of fossil South American herbivorous animals, forming a connecting link between the palaeotherium and the camel family; in form they nearly resemble the llama, but were as large as a hippopotamus. Their re¬ mains have been gathered nearly completely from the pampas formation of Argentina and Bolivia.

MACREADY, ma-kre'di, William Charles,

English tragedian: b. London, 3 March 1793; d. Cheltenham, 27 April 1873. ' He received his education at Rugby, and originally had the in¬ tention of adopting one of the learned profes¬ sions. The change in his career was brought about by his father, a theatrical manager, hav¬ ing fallen into embarrassed circumstances, to relieve which he joined his father's troupe, then acting at Birmingham. He appeared there for the first time in 1810 in the character of Romeo, in which he was successful. On 16 Sent. 1816 he made his first appearance on the London boards, acting Orestes in (The Distressed Mother,* at Covent Garden Theatre. He did not achieve an immediate triumph in London, but gradually rose in popular favor. His Virginius was the first of his London successes. From the time when he appeared in this part he continued steadily to improve as an actor, and his successes were no longer confined to the lower walks of the profession. In 1826-27 he made his first tour in the United States, making his debut at New York on 2 Oct. 1826 as Virginius, and again visited America in 1843.

In 1841 he became a theatre manager of Drury Lane, but met with no success, so that he re¬ signed at the end of the second season. His managership at Drury Lane had brought upon him considerable financial loss, to repair which he made his third visit to America (1848-49). There he was involved in an unfortunate quar¬ rel with the American actor, Forrest, which in May 1849 culminated in a riot at the Astor Place Opera House, New York, at which Ma-cready was appearing as Macbeth, and in con¬ sequence was obliged to leave the country. On his return to London he gave some farewell performances, and then retired from the stage in 1851.

McREYNOLDS, mak-ren'oldz, James Clark, American lawyer, cabinet officer and jurist: b. Elktown, Ky., 3 Feb. 1862. He was graduated at Vanderbilt University in 1882 and from the law department of the University of Virginia in 1884. He engaged in law prac¬ tice at Nashville, Tenn., attaining a distin¬ guished reputation ; and in 1900-03, without relinquishing his practice, he was professor at the Law School of Vanderbilt University. While of Democratic party affiliations he was appointed Assistant Attorney-General under the Roosevelt administration in 1903-07, after which he engaged in law practice in New York. He was on several occasions retained as counsel by 'the United States in service connected with the application of the anti-trust laws, his part in dealing with the tobacco trust and with the anthracite coal dealers and the railroads being especially prominent. In 1913 he was appointed United States Attorney-General by President Wilson, succeeding Attorney-General Wicker-sham. While in office the cases of the Union and Southern Pacific Railroad merger, the In¬ ternational Harvester Company, the American Telephone and Telegraph Company, the Reading Company and the New York, New Haven and Hartford, under the Sherman Anti-Trust Law, came under his direction. He was appointed associate justice of the Supreme Court of the United States in August 1914 and took his seat in October.

MACROBIUS, ma-kro'bl-us, Ambrosius Aurelius Theodosius, Latin author of the 5th century A.n. The country of his birth is uncer¬ tain, but it is inferred from the fact that he speaks of Latin as a foreign tongue to him that he was probably a Greek. He was the author of a miscellaneous work entitled 'ˆSatur¬ naliaˆ curious for its criticisms, and valuable for the light it throws upon the manners and customs of antiquity; a commentary on Cicero's (Somnium Scipionis,5 in two books, valuable for the exposition it affords of the doctrines of Pythagoras with respect to the harmony of the spheres; and a treatise, (De Differentiis et So-cietatibus Graeci Latinique Verbi.5 Consult Von Jan, (Macrobius) ; and Eyssenhardt, (Ma: crobi Opera5 ; also Wissowa, G., (De Macrobii Saturnaliorum Fontibus) (Breslau 1880).

MACROCOSM. See Microcosm.

MACROCYSTIS, mak'ro-sls'tis, a genus of brown seaweed of the family Laminariacea , generally known as giant kelp. It is common throughout the southern temperate zone and along the Pacific Coast of the United States. It has a much-branched root from which rises

many filiform simple or branched stems without leaves below, but bearing numerous lance-like leaves above. The stems reach the greatest length known in the vegetable kingdom. Ob¬ servations by Hooker near the Crozet Islands report specimens fully 700 feet long; and other authorities state that a length of 900 feet is sometimes attained.

MACROTHERIUM, a genus of extinct ungulate mammals, in some cases of gigantic size, found most completely in the Miocene deposits of Europe, but also known from China and western North America. It represents the primitive group Ancylopoda, which had a wide geographical range in the Miocene and Pliocene epochs when it became extinct. The structure of the curiously twisted feet so much resembles that of the ground-sloth that for a long time the macrotheres, as well as their companion, but more generalized, genus H omalodontotheriiim, were regarded as edentates. Consult Wood¬ ward, (Vertebrate Palaeontology5 (1898).

MACRURA. See Decapoda.

McTYEIRE, mak-tar', Holland Nimmons,

American Methodist Episcopal bishop : b. Barn¬ well County, S. C, 28 July 1824; d. Nashville, Tenn., 15 Feb. 1889. He was graduated at the Randolph-Macon College, Virginia, in 1844, and in 1845 entered the ministry, joining the Vir¬ ginia Conference. In 1846 he was assigned to Saint Francis Street Church, Mobile, Ala., and after serving in the churches at Demopolis, Ala., and Columbus, Miss., he was transferred to the Louisiana Conference. He was editor of the New Orleans Christian Advocate in 1851-58, and from 1858 until its publication was interrupted by the Civil War he edited the Nashville Christian Advocate. During the war he served as pastor of the church at Montgomery, Ala. He was elected bishop in 1866, and in 1873 he became president of the board of the newly-founded Vanderbilt University. He was senior bishop for some time before his death. Author of (Duties of Christian Masters) (1851) ;

(Catechism on Church Government) (1869) ; (Manual of Discipline5 (1870); (History of Methodism5 (1884) ; (Passing Through the Gates5 (1889), *etc.*

MACU, ma'koo, a nomadic Indian tribe of the Amazon region. They range through northwestern Brazil, more particularly along the Rio Negro. They are of the lowest type of savages of South America, provide neither shelter nor clothing and plant no crops. They live by hunting and fishing, are hostile and ap¬ parently have no connection with other tribes. A report of their condition was made by Theo¬ dor Koch-Grunberg in (Anthropos5 (Vol. I, pp.

877-906, 1906).

MacVEAGH, mak'va, Franklin, American

cabinet officer, brother of Wayne MacVeagh (q.v.) : b. near Phoenixville, Chester County, Pa., 1837. He was graduated at Yale in 1862 and 'took his LL.B. at Columbia University in 1864. He was admitted to the bar in 1864; and in 1864-66 was engaged in practice in New York. His health failing he went to Chicago in 1866 and there .engaged in the wholesale grocery business. After the great fire in 1871 he established the firm of Franklin MacVeagh and Company, wholesale grocers, and he also became connected with various banking and

manufacturing interests. He became president of the Citizens' Association of Chicago in 1874 and was largely responsible for many import¬ ant reforms. He was Democratic candidate for United States senator against Senator Cul-lom in 1894 but was defeated. From 1896 he was associated with the Republican party, and in 1909 he was appointed Secretary of the Treasury by President Taft, serving throughout the Taft administration. He was vice-presi¬ dent of the American Civic Association in 1905; served as president of the Chicago bureau of charities and of the Municipal Art League; and was a founder and member of the executive committee of the National Civic Federation.

MacVEAGH, Wayne, American lawyer and diplomat : b. Phoenixville, Pa., 19 April 1833; d. 11 Jan. 1917. He was graduated from Yale in 1853 and was admitted to the bar in 1856. He was district attorney of Chester County 1859-64, became prominent as a Repub¬ lican leader, and conspicuous in his profession, and in 1870-71 was Minister to Turkey. He was an active opponent of <(machine politics® and in 1872 led the Republican opposition to Simon Cameron, his father-in-law. He was chairman of the (<MacVeagh Commission® sent by President Hayes to Louisiana in 1877 to act as the President's unofficial representative and aid in adjusting political differences there. He was Attorney-General of the United States, March to September 1881, and was Ambassador to Italy 1893-97. In 1903 he was chief counsel of the United States in the Venezuela arbitra¬ tion before The Hague Tribunal.

McVICKAR, William Neilson, American Protestant Episcopal bishop: b. New York, 19 Oct. 1843; d. 28 June 1910. He was graduated at Columbia College (1865) ; and at the General Theological Seminary (1868). He was ordained deacon (1867) and priest (1868). Being elected coadjutor bishop of Rhode Island, 19 Oct. 1897, he was consecrated 27 Jan. 1898, and on the death of Bishop Clark, September 1903, suc¬ ceeded to the see.

MACWHIRTER, mak -wer'ter, John, Scottish landscape painter : b. Slateford, near Edinburgh, 27 March 1839; d. London, 28 Jan. 1911. He entered the Trustees' Academy, con¬ ducted by Robert Scott Lauder at Edinburgh, when 13 years of age, and at 15 made his first exhibition, (01d Cottage at Braid, > at the Royal Scottish Academy.

At 16 he began his annual tours of Europe in search of material for his canvases, his travels eventually covering all parts of Europe and the United States as well. In 1867 he exhibited six pictures at Edinburgh and was elected to the Roval Scottish Academy. He made his first exhibition at the Royal Academy, London, in 1865, and in 1869 he settled permanently in London. He painted some effective landscapes in California in 1877 ; was elected associate of the Royal Academy in 1879 and Academician in 1893. His landscapes are naturalistic and their popularity doubtless was enhanced by the tinge of literary signifi¬ cance he succeeded in giving them, together with a certain felicity in the selection of their titles. Among his work are (The Lady of the Woods) (1876) ; (The Three Graces' (1878) ; (The Lord of the Glen) (1880); (The Three Witches* (1886); (Crabbed Age and Youth)

(1899) ; (The Fallen Giant) (1901). His work is represented in the Royal Academy diploma gallery; the Walker Art Gallery, Liverpool; and in the municipal galleries at Manchester, Dun¬ dee, Aberdeen and Hull. Author of land¬ scape Painting in Water Colors) (1901). Con¬ sult Spielmann, H. M., (The Art of John Mac-Whirter* ; Sinclair, W. M., (John MacWhir-ter, R.A.* (Art Journal Annual, Christmas,

1903).

MACY, Jesse, American historian : b. Henry County, Ind., 21 June 1842; d. 2 Nov. 1919. He was graduated from Iowa College in 1870. From 1871 to 1885 he was principal of the academy of Iowa College; in 1883-85 was acting professor of history and political science; in 1885-1912 professor of political sci¬ ence, and professor emeritus since 1912. In 1913 he was Harvard Foundation lecturer in French provincial universities. He received the degree of LL.D. from Browm University in 1898, from Grinnell in 1911 and from Oberlin in 1915. He has written (Civil Government in Iowa) (1881); /Institutional Beginnings in a Western State) (1883); (Our Government* (1886) ; (A Government Textbook for Iowa Schools* (1887) ; (The English Constitution (1897) ; (Political Parties in the United States, 1846-61 * (1900) ; (Party Organization and Ma¬ chinery' (1904); Comparative Free Govern¬ ment/ with J. W. Gannaway (1915).

MAD ANTHONY, a nickname given to the Revolutionary general, Anthony Wayne (q.v.), on account of the seeming recklessness of his brilliant military feats.

MAD APPLE, the fruit of an American nightshade, especially that called Sodom apple (Solatium sodomies) , the eating of which pro¬ duces poisonous intoxication. i

MAD MULLAH, term applied to Moham¬ med Ali, the Mandi, or Moslem Messiah : b. Somaliland, 1843; d. Omdurman, 22 June 1885. In his youth Mohammed was initiated into the mysteries of the occult sciences and sorcery. A study of the Koran and the Arab writings followed in the Marabout school. When quite young the future Mullah was taken with the idea of making the pilgrimage to Mecca, and not content with one journey made the sacred visit three or four times. After his last pil¬ grimage Mohammed returned to Berbera, but met with small success. Establishing himself in a powerful inland tribe, his ascetic practices and bold demeanor gained for him a reputation for sanctity and spiritual gifts. In 1880 he proclaimed himself Mahdi (((the guide,® i.e., in the way of salvation), and in 1881 he pro¬ claimed a Jehad or holy war against the infidel and speedily aroused all the latent fanaticism of the fierce Sudanese tribesmen. From 1881-83 he destroyed nearly every force sent against him; and so threatening did his power become that the evacuation of the Sudan was ordered by the Egyptian government, Wolseley's ex¬ pedition for the relief of Khartum was too late to effect its purpose, the city was stormed in January 1885 and General Gordon murdered. His death is said to have occurred through poison administered at the hands of a woman he had outraged. His successor, Abd-Allah, carried on the struggle, until the power of Mahdism was finally broken at the battle of

Omdurman in 1898. Consult Darmesteter, (The Mahcli) (London 1885) ; Hoffmann, (Mahdi-thunC (Kiel 1899); Muller, E., (Beitrage zur Mahdilehre des Islams) (Heidelberg 1901) ; Wingate, (Mahdism and the Sudan } (London

1901).

MAD TOM, local name in eastern United States for any of several types of small catfish native to fresh waters. They are long and slender, with mottled skin entirely naked, and have sharp pectoral spines with which a wound about as painful as a bee-sting may be inflicted. There are several varieties, ranging from a few inches to nearly a ‘foot in length. They are known also as stone-cat, owing to their resem¬ blance to the rocky or pebbly bottoms they frequent.

*

MADACH, mo’dach, Emerich, or Imre,

Hungarian poet: b. Also-Sztregova, 21 Jan. 1823 ; d. there, 5 Oct. 1864. He studied law, was a notary in his native country and was also active as an orator and journalist. He wrote on archaeology and aesthetics ; and both lyric and dramatic verse. His princioal works are the two dramatic poems <Moses) (1860); and (The Tragedy of Man> (1860V The lat¬ ter owes much to (Paradise Lostˆ and to (Faust, > but is yet a remarkable performance. Though strongly contemplative in character, it was successfully presented. There is an ex¬ cellent rendering in German by von der Lech (1888). Consult Fischer in (Auf der Hohe* (Vol. XVI, 1885).

MADAGASCAR, mad-a-gas’kar, an island in the Indian Ocean, since 1896 a French colony. It is separated by the Mozambique Channel from the southeast coast of Africa, the nearest point being 240 miles distant. It is 975 miles long from Cape Saint Mary in the south to Cape Amber in the north, has an average breadth of 250 miles, greatest breadth 360 miles, and an estimated area of 227,750 square miles, being after Greenland, New Guinea, Baf¬ fin Land and Borneo, the fifth largest island in the world. The Comoro Archipelago (1,357 square miles) was attached to the island as a province for administrative purposes in 1914.

Topography. — Madagascar consists of an elevated region with an average height of from 3,000 to 5,000 feet overlooked by mountains rising in some cases to nearly 9,000 feet above the sea-level. This plateau occupies a much larger proportion of the surface in the north and east than in the west and south, and the greater portion of the island south of lat. 23° S. belongs to a much lower region which does not consist entirely of plains, but is interrupted toward the west by three prominent chains of hills stretching from north to south, one of them apparently in a continuous line about 600 miles in length. The coast exhibits a number of indentations, mostly small, but few good harbors, being in great part rock, though in some places low and

sandy.

Hydrography. — The rivers are numerous ; few of them offer the advantages of internal navigation. The chief rivers have their courses on the west and northwest side of the island. The Betsiboka with its affluent, the Ikiopa, unitedly measuring 300 miles, may be ascended by light steamers for 100 miles; the Tsiribihina has a somewhat shorter course, but drains by

its numerous tributaries a much larger area. The eastern rivers descend from the high land through magnificent gorges, forming a succes¬ sion of rapids and cascades, the falls in some instances having a descent of 500 feet. There are few lakes of any size as yet known to explorers ; one of the largest is Alaotra Lake, measuring 25 miles long; the others do not reach a length of 10 miles. A long chain of lagoons having very short distances between each and often expanding into wide sheets of water stretches for nearly 300 miles along the coast.

Geology. — Geologically the elevated region consists almost entirely of granite and other igneous rocks, while the lower region is com¬ posed chiefly of secondary formations. The former region is traversed by a line of extinct volcanic craters, some of which show signs of comparatively recent activity. Among the more remarkable fossils are remains of a huge stru-thious bird, the Epiornis, whose egg, measuring 12 by 9 inches, is larger than that of any other known bird. The minerals include iron in abun¬ dance, gold, lead and copper, all more or less worked, while in the northwest coal is found.

Climate. — The climate is varied ; the heat on the coast is often very intense, but on the high lands of the interior the temperature is moderate. On the coast the rains are nearly constant, beginning in the evening and some¬ times lasting all night ; in the interior the winter is dry and agreeable. The greatest amount of rainfall takes place on the east coast, and especially on the northeast, the part directly exposed to the summer monsoon. The elevated region of the interior and the districts on the west coast are tolerably healthy for Europeans, but owing to the large extent of marsh and lagoon on the east, malaria fever prevails, and is frequently fatal to natives from the interior as well as to Europeans. Snow is never found on even the loftiest mountains.

Ethnology. — The inhabitants, known by the name of Malagasy, belong to the Malayo-Poly- nesian stock and speak a Malayan

language. They appear to form substantially a single race, though they have received a considerable inter¬ mixture of African blood and a certain amount of Arab intermixture. They are divided into numerous tribes, each having a distinctive name and customs. The Hovas are the predominant tribe; their proper country is the elevated region of the interior, but they extended their sway over nearly the whole island. Among the other chief tribes are the Betsimasaraka on the east coast, the Betsileo in the south central region and the Sakalava on the west and north. The people were socially divided into three classes : Adrians or nobles, Hovas (in a special and re¬ stricted use of the word) or free commoners, and Andevos or slaves : the nobles and slave classes have been abolished by the French. In the coast districts the houses of the better class are built of framed timber with lofty roofs covered with shingles or tiles; the dwellings of the lower classes are constructed of bamboo or rushes, or even of clay. In former and more unsettled times the villages were almost always built on the tops of hills, but during the 19th century this precaution has not been deemed so indispensable.

Flora. — The most striking feature in the

vegetation is a belt of dense forest with an average breadth of 15 to 20 miles passing round the whole island, and broken only by a gap in the northwest, where the two ends of the forest overlap. It is found at all levels from 6,000 feet to the water's edge, which it touches on the northeast, where it reaches its greatest breadth of 40 miles. The trees of this forest include many species of lofty palms, hardwooded exogens supplying a great variety of beautifully veined and durable timber and a large number of trees remarkable for the splen¬ did character of their blossoms. Of all the trees of Madagascar the most striking is the ravinala or traveler's tree (Urania speciosa) ; it resembles a palm, its stem being crowned by a semi-circle of oblong leaves spread out verti¬ cally in a fan shape. It owes its name to the fact that the traveler may supply himself with water from it by piercing or breaking the lower ends of the leaf-stalks.

Fauna. — Madagascar has a singularly local fauna which, although upon the whole related to Africa, is so peculiar to itself that, with a few neighboring islets, it forms a very distinct sub¬ province of the African region. Its characteris¬ tics show plainly that the separation of the island from the continent occurred at a very ancient time. Another singular feature is the presence of various forms of animal life repre¬ sented elsewhere only in Oriental Australian regions, with a marked resemblance in a few animals, for example, the boas, to South Amer¬ ica. From this it is plausibly argued that in early Tertiary times there was a land connection between Madagascar and India and the region thence to Australia, now presented only by the islands of the Malayan Archipelago. (See Lemuria). In its mammals Madagascar is singular in what it lacks, as well as in what it possesses. It has none of the cattle, equine animals, elephants, rhinoceroses, hogs or even rodents of Africa, except a mouse or two; no lion or true cat or dog of any kind; and no monkeys. On the other hand it has sev¬ eral small insectivora, closely allied to tropical American species; the great majority of all the lemurs, the few outsiders being in Africa and the Orient ; and several viverrine quadrupeds, which there takes the place of the predatory cats. The modern birds are less striking in their peculiarities, but in the zoological era immediately preceding the present the island possessed those huge ratite birds, the epiornis. and its relatives, which gave rise to the story of the roc. Many forms of huge land tortoises were also members of this singular fauna. The fishes, amphibians, reptiles and lower forms are largely peculiar.

Crocodiles are numerous in the rivers and lakes, and many species of lizards, chameleons and tree-frogs abound in the forests. Among the insects are numerous brilliantly colored beetles, butterflies, moths, flies, locusts and spiders, venomous species of the latter as well as scorpions and centipedes being present. See Zoogeography.

Agriculture. — Of the vegetable products grown for food by far the most important is rice, the staple food of the inhabitants; next in importance came manioc or cassava, sweet-potatoes, beans, tomatoes, ground-nuts and yams. Ginger, pepper and indigo grow wild in

the woods ; cotton, sugarcane, coffee, tobacco and hemp are cultivated. Humped cattle are found in immense herds, and form a large part of the wealth of the inhabitants; they appear to have been introduced from Africa at a re¬ mote period, as the fat-tailed sheep, goats, swine and horses have been more recently. Under French administration agriculture and cattle¬ raising are undergoing considerable extension. A considerable part has been played in the settle¬ ment of the island by colonists from France. Cattle-breeding is especially important: there were 6,606,336 in 1916 on the island, exclusive of wild herds. In 1915 there, were 2,290,046 acres under cultivation by natives, and 1,868,354 by Europeans.

Commerce and Industries. — Rice, cattle, hides, gum, india-rubber, wax, cotton, sugar, vanilla, lard, coffee, gold, gum-copal and dyewoods are exported. The chief imports are cotton goods, wines and spirits, metals, rice and flour. The imports in 1915 were valued at £1,750,694, the chief items for that year being cottons, £531,629; beverages, £134,807; and cloth £48,639. The exports for that year were valued at £2,642 644; the chief values being hides, £515,739; gold dust, £242,368; and rice, £148,196. In 1915, 4,050 vessels entered, totaling 1,706,293 tons, of which 2,971 were French (1,617,479 tons), and 666 (66,426 tons) British. In general the Malagasy show much aptitude for the manual arts. As silversmiths, gun¬ smiths and ’carpenters, they rapidly acquire the skill of Europeans; and with hand looms of the rudest construction, the only ones as yet in use, they make excellent and handsome cloths. The principal article of native dress with both sexes is the lamba, a piece of cloth about three yards long and two broad, which is folded round the body above the arms, one end being thrown over the shoulder.

The island is being rapidly opened up by the building of highways and carriage roads. A railroad has been completed between Tamatave, the

chief port and capital, and Antananarivo the ancient capital (229 miles long) and branch lines are under construction. Automobile serv¬ ices have been established on the 1,000 miles of tolerable road.

Government. — Prior to 1895 the govern¬ ment was a native absolute monarchy. A French resident, however, with a military es¬ cort, resided at the court and controlled foreign relations, so that the country was virtually a French protectorate. Much friction prevailed in 1893-94, between the government and the French authorities, and finally France decided to make her protectorate of the island effective. An expedition easily overcome the resistance of the Hova troops, and after some changes in the formation of the administration the island was made a French colony, and General Gallieni was appointed first governor-general (1896-1905). His vigorous and determined policy made a great improvement in the condition of the country. The governor is assisted by an administrative council, and natives are largely employed in the civil and military administra¬ tion. Forced labor was abolished in the public service in 1901. Education is free and com¬ pulsory, and instruction in French is obligatory. In the primary schools in 1916 there were 105,- 108 pupils. Instruction is also given in higher

schools in practical agriculture, industries and medicine. Numerous Catholic and Protestant missions and mission schools have long been established : in 1895 it was estimated that there were 450,000 Protestants and 50,000 Catholics in Madagascar. The army of occupation is composed of 2,411 French soldiers and 6,376 natives. The religion of the great bulk of the people is a kind of fetishism or worship of charms. A Court of Appeal and tribunals throughout the provinces provide for native justice, while there are special courts for the administration of French justice. The local revenue is derived chiefly from direct taxation, from customs and other indirect taxes, from colonial lands, posts and telegraphs, markets, etc., and from subventions granted by France. The local budget for 1916 balanced at £1,284,928, and there is a standing debt of £4,200,000.

Population. — According to the census of 1911 the population amounted to 3,153,511, of whom 2,690,381 were natives, 9,694 European, 1,000 Asiatic and African; 1916 estimate, 3,512,- 690 (14,390 French, and 2,710 foreigners). The Hovas, the chief native tribe, numbered 847,480 ; the Betsileo, 408,024, the Betsimasaraka, 288,159.

History. — Madagascar was known to the traveler Marco Polo at the end of the 13th cen¬ tury and had been visited for several centuries by the Arabs. In 1506 it was visited by the Portuguese, who gave it the name of Saint Lorenzo. Toward the end of the 1 7 th and dur¬ ing the most of the 18th century the French endeavored to form military stations on the east coast, but with no lasting results. A settlement was established at Fort Dauphin in the south¬ east and held for some time, but in consequence of the tyrannical behavior of the French set¬ tlers they were massacred by the natives and the place destroyed. The French, however, . strug¬ gled hard and successfully to retain the islands of Sainte Marie on the east coast and Nossi-be on the northwest. Previous to 1810 Mada¬ gascar might be said to have been divided among numerous petty chiefs, almost constantly at war with each other. In that year, however, Radama I, a prince of remarkable intelligence, became king of the Hovas, and began to enforce a claim

by right of conquest to the sovereignty of the whole island. He saw that if his people were to be prosperous they must first be edu¬ cated and civilized. In return for the promise of cooperation in putting dovn the slave-trade on the coast of Mozambique, he received arms and other assistance from the British, by which he was enabled to carry on his conquests. Chris¬ tian missionaries began to teach in the capital in 1820, many converts were made, the Bible was translated into the Malagasy tongue, the language was first reduced to a systematic writ¬ ten form and printing was introduced. Great improvements had taken olace in the manners of the people when Radama died in 1828, and was succeeded by his chief wife, Ranavalona, a woman of cruel disposition, and opposed to all innovation. The native converts were perse¬ cuted, many of them being put to death, and the island was closed to Europeans. This reign of terror ended at last in 1861, when the queen died, and was suceeded by her son, Radama TI, who, himself a Christian, reopened the is¬ land to European missionaries and traders, and proclaimed the emancipation of the African

slaves. He appears, however, to have been a weak prince easily swayed by native and foreign favorites, and he unwisely granted extensive territories and privileges to an enterprising French company, an act which lost him the affection of his nobles, and led to his assassina¬ tion in 1863. His wife Rasoherina was placed on the throne, and the government repudiated the concessions made to the French, offering 1,000,000 francs as compensation. After a quiet and prosperous reign of five years this queen died, and was succeeeded by Ranavalona II in 1868. After she had been elected queen she and a great number of her courtiers became Christians, and many reforms favorable to en¬ lightenment and humanity were perseveringly carried out. She was succeeded in 1882 by Ranavalona III, when the French brought for¬ ward their claims on the Malagasy territory, which, being refused, led to hostilities in 1883-85. This war was terminated by a treaty, under which France acquired protectorate rights over Madagascar; but hostile feeling toward the French again led to war in 1895, with the result that the queen was deposed and exiled first to the island of Reunion, and thence in 1899 to Algiers, while Madagascar became a French colony.

Bibliography. — Dawson, Madagascar: its Capabilities and Resources) (London 1895) ; Foucart, (Madagascar : Commerce, colonisa-tion> (Paris 1899); Gallieni, A La pacifocation de Madagascar > (ib. 1900) ; (Madagascar de 1896 a 1905) (Antananarivo 1905) ; Grandidier, A., (Histoire physique, naturelle et politique de Madagascar > (50 vols.

in progress since 1876) ; Gravier, G., Madagascar* (Paris 1904) ; John¬ ston, Sir H., (The Colonies of Africa) (Cam¬ bridge 1899) ; Keller, (Madagascar, Mauritius and Other East African Islands) (London 1900) ; Marcuse, W. M., (Through Western Madagascar (London 1914) ; Sibree, Jas., Madagascar and its People) (London 1870) ; id., (The Great African Island) (ib. 1880) ; id., (A Naturalist in Madagascar (ib. 1915) ; Vassiere, (Histoire de Madagascar: ses habit¬ ants et ses missionaires) (Paris 1884) ; You A., Madagascar: histoire, organization, coloni¬ sation } (ib. 1905).

MADAME BOVARY. (Madame Bovary, * the first and best-known novel of Flaubert, a type and model for the fiction of the next gen¬ eration, was the first and is probably still the best of minute reproductions of the platitudes of modern life. It was published in 1856 when Flaubert was already 35, the fully matured and laboriously executed expression of his effort to make writing a means of emancipation from self. The French literary historian Lanson thinks it may well prove ((the masterpiece of contemporary fiction.® Flaubert's own educa¬ tion had been out of key with his provincial surroundings, and he chose natures similarly out of tune with their environment for the first object of his study, with a painstaking ac¬ cumulation of "significant little facts® quite in the spirit of Taine's psychology and literary criticism. Flaubert had worked on Madame Bovarv > at least since 1852, "eighteen hours out of the twenty-four,® he tells George Sand, and adds, "I seek something better than success, I seek to please myself.® The novel attracted immediate and wide attention, presently stimu-96

lated by a prosecution of the author for alleged immorality, a celebrated case, ending in a curiously qualified acquittal. The court plead¬ ings and judgment, printed at Flaubert's in¬ sistence with subsequent French editions of the novel, throw strange light on the moral ideas of the last decade of the Second Empire.

(Madame Bovary } marks the transition from the fiction of romantic fancy to that of close realistic observation, preferably of the petty, the puerile and the commonplace. The theme is the banality of provincial life, as Flaubert saw and felt it; the lesson is the futility and danger of a sentimental revolt from the com¬ monplace when vulgar souls

indulge in roman¬ tic aspirations. Briefly the story is this : Charles Bovary, a <(medical man,9 though not an M.D., fatuously good, timidly banal, is shown us first as a dull pupil, then unsympathetically married, then a widower attracted to a farmer's daughter, Emma, the book's chief subject, whom he marries, apparently the less initiated of the two. Emma's convent education beyond her station had been supplemented by romantic poetry and fiction, in Flaubert's opinion a de¬ liberate perversion, whose degrading and im¬ moral results he proposes to show. Charles was happy; Emma ever restlessly reaching out toward a fulfilment of her romantic aspira¬ tions. Chance brought her to an aristocratic ball. Dormant emotions were awakened. <(She desired at the same moment to die and to live in Paris.® Leon, a law student, served her for a platonic attachment, presently to be suc¬ ceeded by Rodolphe, after Emma had sought sentimental consolation in religion, quite in vain. Rodolphe's carnally-minded courtship, a bitterly ironically parody of romanticism, is successful; but from dreams of bliss Emma is relentlessly drawn down to and below the com¬ monplace. Both weary, Emma again seeks refuge in religion, but meeting the now more sophisticated Leon yields once more, and plunges Charles into debt while still seeming to him more charming than ever, as she descends the last steps of dissimulated corruption. Abandoned by Leon, once more rejected by Rodolphe, she escapes life by poison, holding even beyond death the infatuated love of Charles, who, even though at last undeceived, dies with a lock of her hair in his hand.

Incidental to the story are some admirable character studies of provincial types, notably M. Homais. druggist-demagogue and material¬ ist, incarnation for Flaubert of ((triumphant democracy,® a by-word for the narrow, provin¬ cial philistine, who has given his name to a social species. His counterfoil is the parish priest, Bourrisien, whose cure of souls is a perfunctory, well-meaning, uncomprehending fatuity. More subordinate but strongly individ¬ ual are the sacristan Lestiboudois, the notary Guillaumin. and the merchant-money-lender Lhereux.

Apart from its subtle psychology (Madame Bovarv) won and holds admiration for its phrases of flashing irony, its vivid narration and fine descriptive passages, but no less for its linguistic euphony, a matter to which Flaubert gave untiring and at times almost morbid at¬ tention. Ethically it reflects its author's sombre pessimism. To Flaubert all spiritual aspiration seems foredoomed to failure. For himself he sought forgetfulness in the pursuit

of art for art's sake. In this book he presents neither a character to imitate nor an act to ad¬ mire. Yet (Madame Bovary) is, in Bourget's phrase, (<the very ideal of the literary artist.® There are translations by W. Walton and others. Consult Whitehouse, H. R., (The Life of Lamartine) (2 vols., New York 1919).

Benjamin W. Wells, Author of (Modern French Literature. y

MADDEN, Frederic William, English numismatist: b. London, 9 April 1839; d. Brighton, 20 Tune 1904. He is a son of Sir Frederic Madden, a noted antiquary, and was chief librarian of the Brighton Public Library, 1888-1902. He published (Handbook of Roman Numismatics) (1861) ; (Hisrory of Jewish Coinage) (1864), republished in enlarged form as _(The Coins of the Jews) (1881), and (jointly with S. W. Stevenson) dictionary of Roman Coins) (1889).

MADDER, (1) in botany, the English name of the plants of the genus Rubia, espe¬ cially R. tinctorum. It is a trailing or climbing annual, supporting itself by its leaves and prickles. It is supplied chiefly from Holland, France, Italy and Turkey. The roots are kiln-dried and then threshed ; they are then dried a second time, and afterward pounded and stamped in a mill. Indian madder, called also madder of Bengal, is R. cordifolia. (2) In chemistry, the root of R. tinctorum is exten¬ sively used in dyeing for the production of a variety of colors, namely, red, pink, purple, black and chocolate. Other species of Rubia are also used. It would appear that madder contains a colorific principle — rubian — which, under the influence of a peculiar ferment, termed erythrozym, breaks up into alizarin, pur-purin, *etc.* The colors produced from madder are very stable, the well-known Turkey-red be¬ ing one of them. Madder also contains certain yellow coloring matters, but they are useless, if not iniurious, in the process of dyeing. (See Dyes; Dyeing). (3) In pharmacy, madder is a tonic, diuretic and an emmenagogue. Brown madder, a rich red-brown pigment, prepared from the roots of R. tinctorum.

MADDOX, Richard Leach, English phy¬ sician and chemist: b. Bath, England, 4 Aug. 1816: d. Portswood, Southampton, 11 May 1902. He studied medicine at University College, Lon¬ don, but was graduated M.D. at Edinburgh. In early life he settled and practised his pro¬ fession in Constantinople, and here first took up the study of photography. He subsequently left the Bosphorus for Smyrna and was a civil surgeon in the military hospitals at Scutari dur¬ ing the Crimean War, and finally settled at Woolston, near Southampton, England. It was during his residence at Woolston, which lasted until 1874, that he worked out the process which has revolutionized the art

of photogra¬ phy, by substituting the gelatino-‘bromide for the collodion plate. With him originated the gelatino-bromide dry plates to take the place of the wet collodion plates which, besides other inconveniences, sometimes produce an atmos¬ phere which is dangerous to the operator’s health. There have been more than one claim¬ ant to the credit of this discovery, but it has been decided by the Scientific American that Dr. Maddox is entitled to all the honor of the invention.

MADEIRA, ma-de’ra (Port, ma-da’e-ra), a group of Atlantic islands belonging to Portugal, opposite to and about 360 miles dis¬ tant from Morocco, on .the west coast of Africa and about 535 miles southwest of Lisbon. Madeira, the principal island, and the islets of Porto Santo, Dezerta Grande and Bugio, com¬ prise the group with an area of 314 square miles, and a population of about 169,783. The main island (area, 300 square miles) consists of a collection of mountains of volcanic origin, the most elevated of which is upward of 6,000 feet high. Through the west half of the island runs a central ridge about 5,000 feet high, on which is an extensive plain called Paul de Serra. The east portion of the island, though elevated, is less so than the west. From the central mass steep ridges extend to the coast, where they form perpendicular precipices of from 1,000 to 2,000 feet high. These cliffs are indented by a few small bays, where a richly cultivated valley approaches the water between abrupt precipices or surrounded by an amphi¬ theatre of rugged hills. These narrow bays are the sites of the villages of Madeira. The most striking peculiarity in the mountain scenery of the island is the jagged outline of the ridges and the deep precipitous gorges which cut through the highest mountains almost to their very base. The road round the island is in many places exceedingly picturesque, being led often between lofty cliffs or along the front of precipices overhanging the sea. The Madieras were known to the Romans under the name of Purpurarice Insulce. They were rediscovered by the Portuguese in 1420, and the name Madeira was given to the principal island from the mag¬ nificent forests of building timber (in Portu¬ guese madeira) which

then covered it. It was settled by the Portuguese in 1431. From 1580 to 1640 the islands, with Portugal itself, were under Spanish rule, and have twice (1801, 1807-14) been under the British flag. Funchal, the capital (pop. 24,687), is an episcopal see. The inhabitants are devout Roman Catholics. The mean annual temperature of Madeira is 65° and the climate, from its constant and temperate warmth, is well known for its favorable effects on those suffering from pulmonary and other complaints, which renders the island a favorite resort of invalids from Great Britain and else¬ where. Large and well-appointed hotels exist at Funchal. The islands are connected with Great Britain, France and Belgium, and with the United States, by steamship lines. The staple product of Madeira is wine, the quantity of which in good years prior to the appearance of the vfne disease in 1852 amounted to 2,750,- 000 gallons. The annual export is now about 700,000 gallons. Sugarcane, and the cactus for the rearing of cochineal, are cultivated, fruit and vegetables are grown, fisheries are actively engaged in, linen, woolens, leather, straw hats, baskets, soap, sugar, spirits, butter, etc., are manufactured. The chief import is coal, the most important of the others being wheat, rice, Indian corn and dry goods.

MADEIRA, or CAYARI, Brazil, a large navigable affluent of the Amazon, about 800 miles long, formed by the united streams Beni and Mamore on the frontiers of Brazil and Bolivia. The length from the source, of the Mamore is 2,000 miles.

MADELEINE, Marie Angelique, de

Sainte, French abbess, prioress of the convent of Port Royal, Paris. See under baptismal name, Arnauld, Jacqueline Marie.

MADELEINE, mad'lan', La, France, a prehistoric station in the valley of the Vezere, midway between Moustier and Les Eyzies. The Madelenian, or Magdalenian, Epoch was named from this cave by the French anthropologist, Gabriel de Mortillet.

MADELEINE, mad-lan, La, a church in Paris, in a square of the same name, commenced in 1764. It was remodeled and changed after the Revolution, and in 1832 was completed at a cost of $3,000,000. The church is built in the form of a Roman temple and is 100 feet high, 354 feet long and 141 feet wide. The bronze doors by Triqueti are 35 feet high and 16 feet in width. The building, which has no windows, is

lighted from above.

MADEMOISELLE DE MAUPIN, mo—

pan’. (Mademoiselle de MaupinP a novel writ¬ ten by Theophile Gautier when he was only 24 years of age (1835), expresses the most salient features of romanticism. In the somewhat long preface is found the key to the interpretation of this highly imaginative work. Gautier cries out against the shammed respectability of that pe¬ riod and condemns the prudish stand of literary critics who according to him are merely hypo¬ crites actuated by envy. Violently opposed to classical traditions and ideas, Gautier, who had been trained as a painter, keeps in this work the painter’s vision, and emphasizes primarily form and color, while defending art for art’s sake. Digressions on the supreme value of beauty are found frequently throughout the pages, and the vivid imagination of the author is fruitful to the point of exaggeration. The heroine, brought up according to tradition, rebels against it, and, disguised as a man, like the Amazons of old, resolves to study life at first hand. After many unusual adventures she becomes for one day the long-sought ideal of a romantic poet who had searched in vain until then for the “woman® of his dreams and who found her only to lose her immediately. As a novel the work is crude both in subject matter and in development, showing that it comes from a young man whose passions were not yet calm. It is, however, essentially artistic; the style is full of color and abounds in beautiful descrip¬ tions and lyric passages. While the novel did succeed in amazing placid citizens and is still classed as dangerous reading, it must not be considered as a study of any type of French character, but as a flight of imagination, a de¬ scriptive fantasy artistically worked out by a talented writer of the Romantic school.

Louis A. Loiseaux.

MADEMOISELLE DE LA’ SEI-GLIERE, sa’glyar, novel by Jules Sandeau (q.v.), published in 1848 and dramatized in

1851.

MADERO, ma-da’ro, Francisco Indalecio,

President of Mexico : b. San Pedro, Coahuila, 18 Oct. 1873: d. Mexico City, 23 Feb. 1913. He came of a wealthy family and was a grandson of a former governor of Coahuila. He was educated at a Jesuit college

in Mexico and at the University of California and spent the years

1889-95 in France. He returned to Mexico, engaged in cotton-planting and in banking and materially increased his fortune. He took up his residence in Mexico ‘City in 1900 and be¬ came keenly interested in political reform. Of a naturally retiring disposition, he displayed an initiative that surprised his most intimate friends, and by 1905 he was the unquestioned leader of the reform element. He actively op¬ posed the rule of Diaz, and in 1908 he published his (La Sucesion Presidencial en 1910, } a strik¬ ingly well-balanced attack on the evils existing in the political and social life of Mexico. He advocated suffrage reforms, a single term for the Presidency and opposed the absolutism which characterized the rule of Diaz, while crediting him with the many achievements of his administration. The book caused a sensa¬ tion and was promptly suppressed by the gov¬ ernment. However, Madero was nominated for the Presidency in 1910, running against Diaz on a platform advocating a single term for the Presidency. He was arrested on a fabricated charge in July 1910 and imprisoned until it was too late for him to interfere with the re-election of Diaz. Madero then headed a plot fpr a revolution against the government, advocating reforms in suffrage, land distribution, freedom of the press and the single presidential term among other measures. The uprising began at Puebla, 20 Nov. 1910, spread through Sonora and Sinaloa, and upon capturing Juarez, Ma¬ dero set up his government and appointed a cabinet, 11 May 1911. The Diaz government then entered into a conference with the revolu¬ tionists and peace was declared 21 May. Ma¬ dero was elected President 1 October. Temper¬ amentally a dreamer and idealist, Madero found himself checked upon every hand in his at¬ tempts to carry his projected reforms into effect. He was unable to manage the politicians of the old regime, or the insurgent element, and in 1912 revolts broke out under Zapata in the south and under Felix Diaz, nephew of ex-P resident Diaz, in the north. He was charged with being slow and irresolute in his adminis¬ tration of public affairs, of favoring his rela¬ tives and of personal peculation from the public treasury. The

Diaz revolution was suppressed and General Diaz was imprisoned. Madero, however, was of a forbearing disposition and suspended the death sentence pronounced against the revolutionist. An uprising among the soldiers in Mexico City took place 9 Feb. 1913 and released Diaz and another enemy of Madero, General Bernardo Reyes. The Federal troops for a time resisted the revolutionists but on 17 February General Blanquet with a force of 1,200 arrived in the city and joined General Huerta, Madero's commander-in-chief, in over¬ throwing the government. Madero was ar¬ rested and imprisoned 19 February and plans for his exlile were under way when it was decided to bring him to trial. Together with the Vice-President, Pino Suarez, Madero was being con¬ ducted from the National Palace to the peni¬ tentiary when both were shot. No reports ex¬ cept those of the government were available and the official version was that an intervention in behalf of the prisoners was made by Madero sympathizers, whereupon the prisoners at¬ tempted to escape and were shot. Huerta was generally held responsible for their deaths and was eventually forced from office because of

them although he persistently denied complicity in the affair.

MADHAVA, ma'dha-va, another name of the Hindu god Vishnu (q.v).

MADIA OIL, oil expressed without heat from the seeds of Madia sativa. It is trans¬ parent, yellow, odorless and may be used on the table as a substitute for olive oil or for oil¬ cake for cattle. The plant is a composite, na¬ tive to southern South America, (but has long been cultivated in Europe for its oil-bearing seeds.

MADISON, James, American Protestant Episcopal bishop: b. Rockingham County, Va., 27 Aug. 1749 ; d. 6 March 1812. He was grad¬ uated at William and Mary College in 1772, studied law and was admitted to the bar, but soon after abandoned law for divinity. In 1773 he was chosen professor of mathematics in William and Mary College, and in 1775 went to England and was admitted to orders by the bishop of London. In 1777 he was elected president of the college, and during the Ameri¬ can Revolution succeeded in keeping the college in active operation. Having been chosen as bishop of Virginia he was consecrated by the archbishop of Canterbury, in Lambeth Palace, 19 Sept. 1790. He continued to discharge the duties of president of the college and professor of natural and moral philosophy, international law, etc., with those of the episcopate, until his death. His only publications were several occa¬ sional discourses

and a (Eulogy on Washing¬ ton) (1800).

MADISON, James, fourth President of the United States: b. Port Conway, Va., 1751; d. Montpelier, Va., 28 June 1836. Madison was the eldest son of James Madison, a Virginia planter, and of Nelly Conway, daughter of Francis Conway, of King George County, Va. His father, a man of independent means, lived on an estate now known as Montpelier in Orange ‘County. James was born at Francis Conway’s home on the Rappahannock while his mother was on a visit to her parents. His edu¬ cational advantages were excellent for the times; he attended the school of a Scotchman, Donald Robertson, was well prepared for col¬ lege by the clergyman of the parish, the Rev. Thomas Martin, and entered Princeton in 1769. His application to his studies was excessive, and was in part the cause of later ill health ; he suc¬ ceeded, however, in taking the studies of the last two years in one year and took his B.A. degree in 1771. He remained at Princeton for another year doing special work in Hebrew under Dr. Witherspoon, the president. After his return home he tutored his younger brothers and began a systematic course of reading in theology, philosophy and law. At this time his study of Hebrew and theology seem to indicate a desire to enter the ministry, but he soon aban¬ doned this and prepared himself for the legal profession and for public service. His theolog¬ ical studies bore good fruit later as is evidenced by the stand he took for religious liberty.

Madison was by instinct a politician and not a soldier; he took no active part in the Revo¬ lutionary War, but as early as 1774 he was ap¬ pointed a member of the Committee of Public Safety for Orange County, and in 1776 was elected delegate to the convention which framed the constitution of Virginia. From that time

JAMES MADISON

Fourth President of the United States

■ II

…

ur.‘dl ‘he retired from the Presidency he was honored with high public offices by his State and by the nation. In the Virginia Convention Madison succeeded in substituting for a clause in the Bill of Rights permitting the (<fullest tol¬ eration® in religion, a clause allowing the (<free exercise of religion.® This was a distinct blow to religious intolerance for, as he said, tolera¬ tion implies jurisdiction, and the State should have no coercive power over religious thought. He was a member of the first Virginia assem¬ bly but failed of re-election because, as his biographer Rives tells us, he refused to conform to the universal custom of his day and ((treat® his constituents ; he was, however, made a mem¬ ber of the governor’s council and so distin¬ guished himself that in 1780 while still under 30 he was chosen as delegate to the Consti-nental ‘Congress. In this Congress he was con¬ spicuous for his opposition to the issuance of paper money by the ‘States ; for his efforts to secure for Congress the right of taxing im¬ ports, and for his determined stand to retain for the States the right of navigation on the Mississippi. Madison saw clearly that a govˆ ernment so organically weak that it could not enforce its requisitions and could pay its debts only Iby increasing its debt could never bb ef¬ fective; hence he labored unceasingly to en¬ large the power of the central government. The office of delegate was limited to one term, so Madison was not returned to Congress in 1784, but the high esteem in which he was held was shown by his immediate election to the State assembly. Virginia was a very influential State and her attitude toward national ques¬ tions was of great importance. In the assem¬ bly Madison tried to indoctrinate the people of Virginia with his ideas concerning the Federal power. His bill to regulate trade in Virginia and to provide ports of entry led first to the conference between Virginia and Maryland with reference to trade on the Potomac and later to the Annapolis Convention which met in 1786 to consider the trade and commerce of the United States. This Convention at Annapolis urged upon the States the appointment of commis¬ sioners to meet in convention at Philadelphia <(to devise such further government as shall appear to them necessary to render the Consti¬ tution of the Federal Government adequate, to the exigencies of the Union.® The summoning of the Philadelphia Convention was largely

due to the wise bills introduced by Madison in the Virginia assembly and to his direction of pub¬ lic sentiment, and it was eminently fitting that he should be. one of the delegates of the Vir¬ ginia Commission at whose head was George Washington. Madison's views on government are clearly defined in his ((outline system® which formed the basis of the Virginia plan proposed to the Convention. His system demanded, that there should be a due supremacy of national authority without the exclusion of local author¬ ity, that the national authority should extend to the judiciary and to the militia; that the national legislature should be composed of two bodies, the larger elected for a short, the smaller for. a longer term; that Congress should have certain coercive powers ; that a national executive should be provided and that the basis of repre¬ sentation in Congress should be changed from States to population. The ((Virginia plan® was the germ of the Constitution and Madison is

rightly called the <(Father of the Constitution.® His arguments in favor of the proposed govern¬ ment were exhaustive and convincing, and his private notes of the work of the Convention and of his debates purchased from his widow and published by Congress form a valuable addition to our knowledge of this stormy period. While the Constitution was before the people for con¬ sideration Madison, Hamilton and Jay wrote a series of papers called in collected form The Federalist , in which they discussed govern¬ ment in general, defined the character of the proposed union, met objections and proved the advantages to be derived from effective central government. Madison was a member of the Virginia Convention which met to consider the ratification of the Constitution and by his keen analysis and clear-cut argument contributed more than any other man to secure its adoption. His chief opponent was Patrick Henry; his ablest ally, John Marshall. Owing to Henry's antagonism, Madison was defeated as candidate for the Senate, but was elected as representative to Congress and took his seat in April 1789. During* this session of Congress, Hamilton and Madison, who had hitherto been as one in their efforts to centralize power, drifted apart, and Madison gradually began to endorse Jefferson's position as to certain inalienable States' rights. There is no reason to accuse him of bad faith; his statesmanship was never overbold, and Hamilton's commercial system, his extensive financial schemes, especially the funding of the national debt and the assumption of State debts by the general government, gave so much power to Congress that Madison withdrew his support from the Secretary of the Treasury and vigor¬ ously opposed his measures. Although Madison had now definitely cast in his fortunes with the

Republican opposition his moderation and good sense enabled him-to retain the friendship of most of his political opponents.

From 1793 to 1796 the country was greatly agitated over the relation of the United States toward France, and on the outbreak of war be¬ tween France and England the President issued a neutrality proclamation to the great disgust of the French, who had expected active friendship from the United States. Although both coun¬ tries interfered shamefully with American com¬ merce, popular sentiment anl the Republican party sided with France. In 1794 Madison, sup¬ ported by Jefferson, introduced a bill demanding retaliatory measures against Great Britain, and a temporary embargo was laid on British com¬ merce. The signing of the Jay treaty by the President was a signal for an outburst of popu¬ lar indignation, and Madison, as leader of the opposition in Congress, opposed the appropria¬ tion of money to carry out the terms of the treaty. In 1797 Madison retired and enjoyed for a short while the pleasures of private life. A year later he was aroused to activity by the passage of the unpopular Alien and Sedition Acts. The Virginia resolutions written by Madison denounced these laws and declared that in case of a dangerous exercise by the Federal government of powers not granted by the com¬ pact the States had the right to interfere. These resolutions still further emphasized the position of the Republican party and pledged it to the support of States' rights. The year 1801 brought an overwhelming defeat to the Federal¬ ists; Jefferson was inaugurated President and

Madison became Secretary of State. He was thoroughly in sympathy with the President's views and shared the popularity of that brilliant administration. The last years of Jefferson's second term were clouded by the insulting ac¬ tions of England and France with reference to the American navy. The orders of the British and the decrees of Napoleon concerning the seizure of neutral vessels were ruining Amer¬ ican commerce. Vessels were seized by the English and by the French, American seamen were impressed and ports blockaded. Jefferson was opposed to war and in his efforts to coerce France and England by commercial restrictions he induced Congress to lay an embargo on Brit¬ ish trade. Instead of injuring England this seriously crippled American commerce and was soon repealed. In this troubled condition of affairs Madison became President in 1809. Like Jefferson he was opposed to war and tried di¬ plomacy. He attempted through Erskine, the British envoy, to have the British Orders in Council withdrawn. Erskine agreed, but the British government repudiated the action of its envoy. Negotiations with another British Min¬ ister, James Jackson, were also fruitless. Con¬ tinued insults were heaped upon American ships and men ; the country demanded definite action against the aggressors; even the peace-loving President, weary of the offensive attitude of England, at last gave his consent to war. On the 18th of June 1812 war was declared and continued with varying success until the Peace of Ghent in 1814. After nearly three years of fighting, after ruinous loss of money and prop¬ erty, the country was practically just where it stood in 1812, <(its boundary unchanged, its international rights still undefined, the people still divided.® Madison lacked vigor as a war President, nor had he sufficient determination to secure advantageous terms of peace. He was far greater as a framer of the Constitution than as an executive.

In 1817 Madison retired from office and set¬ tled on his estates of Montpelier. He had mar¬ ried in 1796 Mrs. Todd, afterward the cele¬ brated Dolly Madison, and with her he enjoyed 20 peaceful years in his country home. He was interested in farming, he thought and wrote much on all topics of public interest. He dis¬ cussed social and moral questions, slavery and education. ((Education,® he maintained, <(was the true foundation of civil liberty.® The last public appearance of the venerable statesman was in the Virginia Convention of 1829 which met to amend the State constitution. In char¬ acter Madison was thoughtful, reserved and cautious ; in a time of hard

drinkers he was notably abstemious. Moderation characterized all his habits. Dignified and kindly and an excellent conversationalist among those he knew well, he made and retained warm friends. His knowledge was profound and accurate, and he was considered an authority on all constitutional matters. His literary style was labored, but his arguments were keen, comprehensive and con¬ vincing.

Consult Lives of Madison by J. Q. Adams (1850); Rives (1859-68); Gay (1884); also (Letters and Writings of Madison > edited by Hunt (9 vols., New York 1900-10) ; Adams, Henry, (History of the United States from 1801 to 181 7) (1889-90). Consult also Hunt G., (Life of James Madison* (New York 1902) ;

Taylor, H., (The Real Authorship of the Con¬ stitution of the United States Explained > (Washington 1912); Wilson, J. .G., Presidents of the United States' (Vol. I, New York

1914).

Emilie McVea,

Of the University of Tennessee.

MADISON, Lucy Foster, American nov¬ elist : b. Kirksville, Mo., 8 April 1865. She was educated at the high school in Louisiana, Mo., and was married in 1890 to W. S. Madison. She has published (A Maid of the First Cen¬ tury *(1899) ; (A Maid at King Alfred's Court* (1900) ; (A Colonial Maid> (1902) ; fA Daugh¬ ter of the Union* (1903) ; (A Maid of Salem Towne) (1906) ; Peggy Owen* (1908) ; Peggy Owen at Yorktown) (1911); (Time's Follower) (1914); (A Life of Joan of Arc)

(1918).

MADISON, Ga., city, county-seat of Mor¬ gan County, on the Central of Georgia and the Georgia railroads, about 70 miles east by south of Atlanta. It is situated in an agricultural region largely devoted to the cultivation of cot¬ ton. Its manufactures are cottonseed oil, furni¬ ture, chairs, baled cotton and dairy products. Madison has a large cotton trade. Pop. 2,412.

MADISON, Ill., village in Madison County, on the Mississippi River, at the end of Mer¬ chant's Bridge from Saint Louis, and at a junc¬ tion of 11 railroad lines, among them the Illi¬ nois Central. It has car-shops, steel-mills and other manufacturing industries and a growing population. Pop. 5,046.

MADISON, Ind., city, county-seat of Jef¬ ferson County, on the Ohio River, and on the Pittsburgh, Cincinnati, Cleveland and Saint Louis Railroad, about 85 miles southeast of Indianapolis. Steamers ply regularly connecting Madison with river ports on the Ohio and Mississippi rivers. The city was founded in 1808 and was incorporated in 1824. Its prin¬ cipal industrial establishments are foundries and machine-shops, lumber yards, cotton and woolen mills, flour and lumber mills and furni¬ ture and tack factories. Madison is now a large loose-leaf tobacco market. Madison is the trade centre for quite an extent of territory in Indiana and Kentucky. Its educational in¬ stitutions are public and parish schools. Han¬ over Collegers located in its environs. Because of the historic importance and the beauty of its hills and villages Madison has many visitors. A steam ferry across the Ohio is located here. The waterworks plant is owned and operated by the city. Pop. 6,934.

MADISON, Me., village in Somerset County, on the Kennebec River, 27 miles north¬ west of Waterville, and on the Maine Central Railroad. The first settlers came here about 1730 and the village was incorporated in 1804. There is abundant water power, an electric-light plant, and manufactures include lumber, woolens, paper, paper-pulp and sash and blinds! Pop. 2,408.

MADISON, N. J., borough, in Morris County, on the Delaware, Lackawanna and Western Railroad, about 25 miles west of New York. It is a residential borough where a num¬ ber of New York and Newark business men have their homes. It is one of the oldest places in the State, having been settled before the

Revolution, but was not incorporated until 1889. The principal

industry is floriculture, especially the cultivation of roses. Madison is the seat of the Drew Theological Seminary; and Convent Station nearby is the seat of Saint Elizabeth's College. The borough has an excellent public library and a splendid public park, well laid out and kept in good order. It is governed by a mayor and council. The term of office of the mayor is two years. The electric-light plant and the waterworks are owned and operated by the borough. Pop. (1920) 5,523.

MADISON, S. Dak., city, county-seat of Lake County, on the Chicago, Milwaukee and Saint Paul Railroad, about 400 miles northwest of Sioux Falls. The surrounding region has good farming land, wheat and corn being the principal crops. Considerable attention is given to stock raising. Madison is an important divi¬ sion point on the Milwaukee system, and has flouring mill and large poultry and egg houses. The trade is chiefly in grain and livestock, but there are also a gasoline engine factory, a large creamery and marble works. Madison is the seat of a State Normal College and also has a Carnegie library. It also has an excellent sys¬ tem of public schools fashioned largely after the Gary plan yet not so exclusively material in all respects. The electric-light plant and the waterworks are owned and operated by the city. The city is under the commission form of gov¬ ernment. Pop. 4,300.

MADISON, Wis., city, capital of the State, county-seat of Dane County, on the Chicago, Milwaukee and Saint Paul, the Illinois Central and the Chicago and North Western railroads, about 80 miles west of Milwaukee and 139 miles northwest of Chicago. It is between Lakes Monona and Mendota and near two other beau¬ tiful lakes, Kegonsa and Waubesa; it is 974 feet above the sea and 210 feet above Lake Michigan. The place was named in honor of James Madison. The first house was erected in 1837 ; and after Wisconsin, in 1836, had been organized as a Territory, this site was chosen for the capital, and work on the Capitol was begun in 1837. The place was chartered as a city in 1856. Madison is situated in an agri¬ cultural region and has commercial interests with a number of the larger cities, also with the small towns and villages in Dane and adjoining counties. Its chief manufactures are boots and shoes, agricultural implements and tools, flour, electrical machinery, wagons and car¬ riages, blank books and law books, hospital fur¬ niture and fixtures, horse collar pads, dry bat¬ teries, cement stave silos, rennet extract, art glass, relief maps and models, boats, candy, cigars, beverages, lantern slides. It is a famous summer resort because of its climate, lakes and scenery. The drives are remarkable — about 30 miles of road in the vicinity are macadamized, kept in repair and beautified by popular sub¬ scription. Madison is noted for its educational institutions, chief of which is the

University of Wisconsin. Opposite the university is the State Historical Society headquarters, the most beautiful building in the city next to the Capitol. It is Renaissance-Ionic, of Bedford limestone, and the original cost was $1,000,000. It contains a valuable collection of historical mementos and the famous reference library of the society, about 245,000 volumes. It is considered one of

the best historical libraries in the United States. The libraries of the Wisconsin Academy of Sci¬ ences, Arts and Letters and of the State Univer¬ sity are also in this building. The city free public library is housed in a building of its own, a gift from Andrew Carnegie. Just outside the city limits are the Sacred Heart Academy (a boardng school for girls), a branch of the Battle Creek Sanitarium, the State Fish Hatch¬ ery and the State Hospital for the Insane. The public and parish schools maintain a high stand¬ ard. Some of the other prominent buildings are the new State Capitol, just being completed at a cost of between $6,000,000 and $7,000,000, which is surrounded by a beautiful 14-acre park, a building of Bethel granite, in the Italian-Renaissance style, with the second highest dome in the United States; the county courthouse and jail, a government building, soon to be replaced by a new one, for which Congress has appro¬ priated $550,000; and some 24 churches. It is a favorite educational convention city. The uni¬ versity summer school, held each year, attracts a number of students. The government is vested in a mayor, whose term is two years, and a council. The city owns and operates the waterworks. Pop. (1920) 38,378.

MADISON BARRACKS, N. Y, United States military post in Jefferson County, on Black River Bay, near Sackett's Harbor, and 10 miles from Lake Ontario. The post occupies about 108 acres and possesses in addition a rifle range of 868 acres at Stony Point. It was es¬ tablished in 1813.

MADISiON RIVER, a stream in Montana which has its rise in the Rocky Mountains, at an elevation of 8,300 feet. It flows north through Madison County and unites with the Jefferson Fork of the Missouri, at Three Forks. It flows through several picturesque valleys and deep canons ; its whole course is about 230 miles.

MADISQN SQUARE GARDEN, a large building in New York City, occupying a block or square between Madison avenue and 4th avenue, and 25th and 26th streets. It contains an amphitheatre seating 20,000 people, and is popular for horse shows, dog shows, circuses and

political and religious meetings. The build¬ ing also contains a theatre, concert hall, restau¬ rant and roof-garden. It is built of buff brick and terra-cotta and is surmounted by a great tower 300 feet in height, modeled after the Giralda at Seville. It is one of the largest buildings in the city devoted to amusement.

MADISONVILLE, Ky., city, county-seat of Hopkins County, on the Louisville and Nashville and the Kentucky Midland railroads, about 125 miles southwest of Louisville. It is in a rich agricultural region, tobacco being one of the principal productions. Coal and natural gas are in the near vicinity. The chief manu¬ facturing establishments are a tobacco factory, tobacco stemmeries, lumber and planing mills and flour mills. A coal mine nearby and the natural gas contribute to the prosperity of the city. The city owns the electric-light plant, the waterworks and the sewage system. Pop. 4,966.

MADISONVILLE, Ohio, former village in Hamilton County, now absorbed by Cincin¬ nati, and forming a residential suburb of that city.

MADLER, ma'dler, Johann Heinrich,

German astronomer: b. Berlin, 29 May 1794; d. Hanover, 14 March 1874. He was educated at the University of Berlin. He became a pro¬ fessor and one of the governing faculty at the Berlin Normal School and was associated with William Beer in an extended series of lunar observations. He was professor at the Ob¬ servatory of Berlin in 1836-40, and from 1840-65 he was professor and director of the observa¬ tory at Dorpat, Russia. The superb equip¬ ment of the observatory enabled him to make observations with an accuracy never before at¬ tained and he now devoted himself principally to the fixed stars. He published a map of the moon in four sheets which surpassed anything then published, and which still retains a high reputation, in 1834—36. Author of (Populare Astronomie* (1841) ; (Die Centralsonne) (1846); (Die Eigenbewegungen der Fixsterne) (1856) ; (Allgemeine Selenography (1857); (Geschichte der Himmelskunde* (2

vols., 1872-73), *etc.*

MADNESS. See Insanity.

MADOC, mad'ok, Welsh prince, who, in consequence of some civil dissensions, went to sea with 10 ships, and 300 men, in 1170, and discovered America. He made a second voyage to and from this unknown land, but finally was lost to the knowledge of his countrymen. The story is to be found in Lloyd and Powell's (Cambria) (1584), and Hakluyt gives an account of the voyages in his collection. In Owen's c Brit¬ ish Remains) the legend is referred to. Later travelers have imagined that they had dis¬ covered traces of these early immigrants in different parts of the country, and we have had stories of white Indians and Welsh Indians, *etc.* (Consult Humboldt's (Personal Narra¬ tiveˆ Book IX, note A). Southey made Madoc the subject of an epic poem. Stephens, in (Madoc, an Essay on the Discovery of Amer¬ ica in the 12th Century* (1893), asserts that the story of Madoc is a baseless fable.

MADONNA IN ART, The. In the early days of Christianity the teaching of the Church was largely carried on by the medium of pic¬ tures; statuary was added later. The trans¬ lation of the Bible was in Latin and examples of the book were produced in parchment manu¬ scripts emanating from the monastery scrip¬ toria. They were very few and therefore costly. Hence it is not surprising that the clergy utilized the graphic abilities of their more talented members and other available artistic sources to portray biblical scenes in mosaics and wall paintings to impress on the minds of the populace (practically all illiter¬ ates) the teachings of their creed. The sub¬ jects to be treated were largely selected by the patrons (the clergy), and those subjects natu¬ rally were the ones most likely to appeal to the masses. The relation of Mother and Child viewed from the aspect of Divine Inspiration could not but be foremost of the subjects selected as most certain to gain popular atten¬ tion and to reach the innermost sentiments of humanity. And, from the limner's standpoint, no theme could better enthuse and inspire genius to perfection of execution and the bringing forth of ecstatic pictorial expression. Again, admiration of a master's presentment of the subject obviously was cause of emulation

of contemporaries and future artists to pro¬ duce, if possible, more inspired conceptions of the subject. A natural sequence of these ac¬ cumulated impulses was the prolific production and reproduction of the Madonna in as many aspects and forms as the differences in genius

itself. Hence the innumerable examples of the lovely theme which have present existence. No single subject has been treated so prolifically and from so many viewpoints as this of the divine Madonna. In order to bring within a limited space some intelligible review of such a vast and profound subject the examples are usually divided into different classifications according to the method of treatment of the theme, the different episodes of the entrancing story, *etc.* Thus we get the Madonna “en¬ throned,® the Madonna “in Gloria,® and the “Annunciation,® the “Nativity,® “Adoration of the Magi,® “Flight into Egypt,® *etc.* The ear¬ liest depiction of the Madonna is a subject of controversy. Legend tells us Saint Luke, Evan¬ gelist, painted pictures of the Holy Virgin, and there are several extant drawings which are claimed to be from his pencil. The Virgin as orante, usually termed the “Intercessor,® with arms outstretched in Oriental form of supplication, is most generally accepted as the first method of treatment as found in mosaics and on glasses of the 4th or early 5th century, some with the name “Maria® inscribed. An early Assyrian manuscript of the 7th century in the chapel of Venantius has such an orante depiction. On ancient Christian sarcophagi the representation of the Holy Virgin is very rare, but in the mosaics of Santa Maria Maggiore (middle of the 5th century) we have the Vir¬ gin and Child in medallions on the triumphal arch, and on the spandrils of the arch are the Annunciation, Presentation in the Temple, Adoration of the Magi, Journey of Christ with Mary and Joseph to Jerusalem. Of about the same date is a painting seen in Saint Agnes catacomb, in which the Holy Virgin seated stretches forth her hands in prayer. By 736 the Iconoclasts created much destruction of all kinds of biblical depiction from Byzantine artists, but by 787 comes the revival’ and the Virgin again appears as orante, veiled and aged. In the early representations of the Virgin ap¬ pears a golden background representing glory and majesty; this gives way later to back¬ grounds of the angelic host. With the advance or development of the Madonna theme Cimabue (13th century) produced the “enthroned® Ma¬ donna, and this great early Florentine master was soon followed with Guido’s Siena picture of the subject. And with the arrival of these talented masters the Byzantine stiffness and prescribed rigid rulings of the Greek Church forbidding natural depiction disappears and the human form and garb take on the supple¬ ness of flesh and clothing. It is the beginning of free and highly-developed art, and as such is usually the phase chosen as the first classi¬ fication with which to deal with detailed de¬ scriptions of the theme of the Madonna in Art.

The Madonna Enthroned. — In its early conception the subject depicts

the “Queen of Heaven® (Regina Cceli), seated in the sky, surrounded by the saints and angels. An early example is Simone’s picture in the Siena Coun¬ cil Hall; the Virgin in Campo Santo, Pisa, is another. As Queen of Heaven, having homage

MADONNA IN ART

1 Madonna and Child by Bellini 2 Sistine Madonna by Raphael

Photographs from Underwood & Underwood

1 La Pieta by Michelangelo 2 Virgin and Child with Saint Jerome by Correggio

MADONNA IN ART

- i _

paid her, she is crowned first then veiled. In this conception of the subject the throne is supposed to be a heavenly throne and symbolic of dignity and divinity. Mary is usually garbed in a red tunic as symbol of love and with a blue mantle signifying Heaven. The Child is vested in a tunic till the 15th century, but then generally appears undraped. The Babe generally holds up a hand in blessing, but in the 6th century mosaic of the enthroned Ma¬ donna in the Basilica of San Apollinare Nuovo, Ravenna, Mary raises her hand in blessing. The first human figures we see around the throne are the saints, especially John Baptist, the Apostles and the patrons of the particular church to which the work of art is dedicated. Saint John is represented as a child generally bearing a reed cross ; at times, as messenger, he has wings. Later patriarchs, prophets, sibyl's are in attendance about the throne. Well-known examples are very many and but few can be mentioned. That of Fra Bartolommeo (Baccio della Porta, 1469-1570) is in the Pitti Gallery, Florence; Andrea del Sarto's Madonna di San Francesco in the Uffizi Gallery there stands on a pedestal throne with harpies at its corners (hence sometimes termed (<Madonna of the Harpies®). Luini's Madonna in the Brera, Milan, is seated on a coping. Perugino's Madonna (Vatican, Rome) is one of this master's best works and depicts the Virgin seated on a carved and inlaid architectural marble throne. Pinturiccio's Madonna in the chapel of Saint Andrea, Perugia, has the child Saint John standing at the throne's foot. Raphael's Ansidei Madonna (London National Gallery) is reading a book while Saint Nicholas and Saint John Baptist are in attendance at the two sides. The English government paid £72,000 in 1885 for this wonderful painting. Other enthroned Madonnas of Raphael are the Madonna of Saint Anthony (owned privately) and the Baldacchino Madonna (Pitti Gallery, Florence). Among the early exponents of the enthroned depiction were Vivarini, Bellini and Cima ; Girolamo dai Libri's altarpiece in San Giorgio Maggiore, Verona, is noteworthy, and Venice is perhaps richest in Madonna creations. Later masters to paint this subject were Titian, Tintoretto and Veronese. Of the early type Cima's picture in the Venice Academy takes about first position; the Madonna is seated on a marble throne having -a pillared portico. Palma's beautiful altarpiece in Vicenza is note¬ worthy among

enthroned Madonnas. Bellini excelled in this style and the examples deserve their renown. Ruskin calls his painting in the Venice Academy <(One of the greatest pictures ever painted in Christendom in her central art power.® The Virgin is accompanied by three saints on each side and three choristers below. His Frari Madonna (Venice) has three com¬ partments, the Virgin occupying the central one. His San Zaccaria Madonna, in spite of its fine execution and beauty of conception and group¬ ing, was created when the artist was over 80 years old. Next we come (late in the 1 5th century) to Giorgione (who lived only 34 years) who has two Madonnas, one in the Madrid Gallery, the other in Castel Franco. In the latter the throne is exceptionally high, the upper step being above the heads of the ac¬ companying Saints Liberale and Francis. This shows great depth and refinement of feeling

in the drooping head and dreaming eyes. While the queenly aspect of these Italian pic¬ tures is never displayed with a crown as is frequent on the mosaics dating from the 8th to the 11th century, except in the pictures by Giovanni da Murano and Carlo Crivelli (Vene¬ tian school), the Holy Virgin in German art is frequently crowned when enthroned, as in Holbein's Madonna at Darmstadt, that by Van Eyck at Frankfort and that by Memling at Bruges, and Schongauer's at Munich. In the enthroned Madonna of Quintin Matsys in the Berlin Gallery the Virgin is kissing the Child and the northern tendency is vividly displayed in the accessory of the stand containing food. Of modern artists whose enthroned Madonna creations are worthy of mention should be cited Bouguereau, Ittenbach, *etc.*

The Annunciation. — The angel's announce¬ ment to the Spiritual Bride is a subject as prolifically depicted in Christian art as any other. It was a theme displayed everywhere, in every village, street, church or dwelling, in painting or carving. Early we find it in the mosaics, as on the arch of the Santa Maria Maggiore. The attitudes of the Virgin differ in periods or in accordance with the individual conception of the artists. In some the angel stands before the young virgin who kneels in pious submission, or the angel kneels in some ; or again, as in Giotto's work, in Padua, both kneel. Later artists picture Our Lady in the Annunciation often as a crowned queen, be-jeweled, but in modern work the Virgin and surroundings are treated with simplicity and mystic symbolism is given to the subject. While it is usual that but one announcing angel appears on the scene, Andrea del Sarto, Tin¬ toretto, Francia and Fra Bartolommeo give an angelic choir. Usually the Holy Dove is seen flying toward Mary from the Father. Pisa-nello's

Annunciation in Verona pictures the most beautiful innocence in girlish beauty. Beautiful purity is expressed in the works of Fra Angelico; that in the Oratorio del Gesu, at Cortona, accompanied by the colonnade and scene of Eve's expulsion as accessories, is ex¬ tremely impressive. In the Uffizi Gallery is a Boticelli Annunciation depicting the angel pay¬ ing the deepest obeisance at Mary's feet while the Holy Maid stretches out her hands in sur¬ prised humility. Other well-known Annuncia¬ tions are by Simone Martin in the Uffizi, Fra Filippo Lippi, Carlo Crivelli (National Gallery, London), where the scene is produced in a surrounding of magnificent architectural deco¬ ration, while Perugino (in Montefalco picture) shows utter simplicity. Paolo Veronese depicts fear as the Virgin shrinks back at the message. Northern creations reveal their source by bringing in such accessories as a spinning wheel, couches, *etc.* Jan van Eyck places the Holy Virgin by an altar in an alcove with an open book to rest her arm on, her face averted toward the heavenly messenger, who is in a cope and carries a sceptre. Albert Diirer's series of the life of the Virgin depicts in the Annunciation Mary as a German Hausfrau, surrounded by many architectural accessories. In the National Gallery, London, we find Rosetti's work affording very simple treatment in modern depiction, and Burne-Jones gives the scene in a finely constructed painting.

The Nativity. — In the works of the masters

on this subject we find Mary beside her Son's cradle in the act of adoration. Even the early pictures show angels attendant but the veil found in earlier depiction is discarded later. The scene is cast in a cave or cleft in a rock generally transformed into a stable, but there are variations to suit the conceptions of the different masters. In Santa Maria, Trastevere, is a mosaic displaying Mary reposing on a couch in the cleft of a rock. Giotto's school makes the scene a stable of wooden construc¬ tion ; some place the theme in the open with perhaps a ruin or fragment of some structure as accessory. The swaddled Babe of the Italian school is, of course, the bambino of that country. Orcagna (church of Assisi) places Mary sitting beside the cradle arranging the covering, while Giotto has the Child before her while she is seated on the ground. Perugino's Nativities (in Perugia and Rome) dis¬ play Mary and Joseph kneeling in adoration of the Babe with angels present. Well known is the Nativity in the London National Gallery by Piero della Francesca (unfinished) in which the Child is lying on the ground with the mother kneeling beside while angels are play¬ ing on lutes and singing. That depiction by Luca Signorelli in the same place also shows the Infant on the ground, Mary kneeling heside Him. In the same gallery we have Botticelli's depiction of the scene enacted in a shed, and Carlo Crivelli uses the same surroundings. In Luini's picture an angel holds the Child while Mary kneels with folded arms, her face one of the most beautiful of any of the Madonnas. In most of the above and in others shepherds are portrayed in more or less prox¬ imity. In some cases the painting is properly called ˆAdoration of the Shepherds® on account of their close presence to the Virgin and Child, but later works generally place them in the background. The illumination of the scene fre¬ quently (with Rembrandt, Correggio, etc.) emanates from the glowing rays passing from the Holy Babe.

Adoration of the Magi. — This was a favor¬ ite subject with the Catacomb dwellers and we find over 20 depictions of the scene in these subterranean galleries. Mary is seated on a throne and the Magi in their tunics and Phrygian caps bring gifts of dishes and bas¬ kets. Their number runs from three to six. The early method of treatment makes the Babe rest in the mother's arms, but in the Santa Maria Maggiore (Rome) mosaic the Child is seated on a pedestal with hand upraised in benediction. Usually we find Him in His mother's lap. The emanating glory of the Babe frequently is the source of light and the bene¬ diction act is frequently His pose. An Adora¬ tion of the Magi

mosaic (about 6th century)

is in the chapel of San Apollinare Nuovo at Ravenna, in which the Magi lead a procession of female martyrs bringing their crowns as votive offerings to the Madonna. Giotto's painting in Padua places the scene in a stable while Fra Angelico (National Gallery, Lon¬ don) chooses the entrance of a cave as the scene of the King's devotions. In Filippo Lippi s (Adoration of the Kings) in the Uffizi Florence, Mary is located in a wide landscape in which figure a host of persons surrounding her. Other noted Adorations are by Baldassare

Peruzzi (London National Gallery), Pinturicchio, Mehling (Bruges), Rogier van Wey¬ den (Munich), Rembrandt; Rubens painted 15. of which one is in Madrid, another in the pos¬ session of the Duke of Westminster.

Flight into Egypt. — In pictures brought under this title Mary is sometimes seen seated on an ass with Joseph walking beside; the ox which tradition says accompanied them rarely appears in the paintings. Sometimes an angel leads the ass. Well-known depictions of this scene are by Giotto (Padua), Fra Angelico (Florence), Pinturicchio, Memling (Munich).

Riposo. — This phase of the Madonna series is more popular with artists of the past than the (Flight. } It depicts the Holy Family after the tedious journey through the desert resting in a fertile country surrounded by fruit trees, Mary bathing the Child, *etc.* It was greatly favored by German and Flemish masters (Albrecht Altdorfer's in Berlin, Lucas Cranach, Martin Schongauer's in Vienna, etc.).

Pastoral Madonnas.— From the 15th cen¬ tury a new style of treatment of the Madonna theme arrives. It is the placing of the Virgin in a landscape surrounding. There are but few, such as Raphael's earliest Madonnas. Three most noted are La Belle Jardiniere (Beautiful Gardener) in the Louvre; Madonna in the Meadow (Madonna in Griinen) in Belvedere Gallery, Vienna; and the Cardellino Madonna (Madonna of the Goldfinch) in the Uffizi, Florence. All three among the most prized paintings in the world and too popularly multi¬ plied to need description. Raphael's later work, the Casa Alba Madonna, is less well known with its turbaned Roman patrician depiction of the Virgin. Leonardo da Vinci's Madonna of the Rocks gives the Holy Virgin, in the fore¬ ground of a grotto, grouped with the Child and the infant John. Luini painted a pastoral Ma¬ donna (in the Brera, Milan),

but very noted is Correggio's <La ZingarelkC (Gipsy) or Ma¬ donna del Corniglio) (Naples) which is posed in a lovely landscape as is also his kneeling Madonna in the Uffizi, both of which always call forth admiration. Palma Vecchio's (Santa Conversaziones* in Naples, Dresden, Munich and Vienna are public favorites. In the pas¬ toral class of Madonnas must be included the three <(enclosed garden® examples by Francia (Munich), Filippino Lippi (Florence) and by Schongauer, in which the Virgin and Child are surrounded by a hedge of roses with a landscape in the rear perspective.

Domestic Grpups.— This method of depic¬ tion of the biblical scene was vogue among painters of the middle 15th century. They consisted of the Holy Virgin and Child asso¬ ciated with Saint Joseph, Saint Elisabeth and her son, and frequently other attendants. A number depict Saint John Baptist child playing with the Holy Infant; Saint Ann, mother of the Holy Virgin, appears in some; da Vinci even depicts (in a cartoon) Our Lady seated on Saint Ann's knees. Girolamo dai Libri (London National Gallery) painted such a group, and Perugino has a work in which Saint Ann rests her hand on the Virgin's shoulders while boys and women relatives are grouped about. Very popular are the groups that include the infant Saint John Baptist play¬ ing with the Child (as Raphael's in National

Gallery, London). Both Botticelli and da Vinci created pictures of Saint John adoring the Infant. In the same inspiration is Luini's (Madonna dell' Agnello) at Lugano. Another popular group subject adopted in pictures by Titian, Perugino, Correggio, Parmigiano, Bor-gognone, Mending, etc., is the (Marriage of Saint Catherine,* in which the Child is placing a ring on the finger of the saint. Good modern representations of such groups are by P. A. J. Dagnan-Bouveret in the New Pinakothek, Mu¬ nich, in which the holy mother, depicted as a peasant, is seated on a bench in the carpenter's shop and the Child at her breast, under her mantle, illuminates and pierces with rays of glory the coarse textile. But, though numer¬ ous, both French and German modern paintings of the Madonna lack the devotion or even in¬ spirational features which give such glory and beauty of conception to the early Italian mas¬ ters and those of the Renaissance.

Madonnas in Domestic Surroundings. — These include the (Holy Family) series. The worldly environment in depiction of this mystic religious subject has found few exponents, and those confined largely to northern artists. To the German and Dutch the maternal dignity of the Hausfrau appeals so strongly as to call from their limners' hands sacred Madonnas in everyday household surroundings. Of such we have pictures by Quintin Matsys (Munich) with its Flemish sleeping apartment, having the Virgin and Child as occupants; the 15th century German artist Schongauer (Belvedere Gallery, Vienna) gives Joseph feeding the cat¬ tle from hay in his arms looking with fondness in the doorway at the Virgin holding a bunch of grapes while the Child nestles in her lap. But in Italy, Giulio Romano in his Madonna della Catina (Dresden) portrays the Divine Babe in a basin (catina), ready for the bath, while the infant Saint John pours water from a ewer. The Madonna dell' Impannata (of the papered window), formerly considered as Raphael's and later ascribed to Romano, pic¬ tures Elisabeth, Mary Magdalen and the child Saint John beautifully grouped with the Virgin and Child. The picture of the French artist Mignard (Louvre) called (La Vierge a la Grappe > is well known. Salembini's Holy Family (Pitti Palace) depicts the gambols of the Child Jesus and Saint John with puppies. Rembrandt's two (Menage du

Menuisier) (car¬ penter's home), in the Louvre and Petrograd, picture a combined living and workroom with Joseph at his bench and Mother and Child as central subjects; his painting in the Munich Gallery also brings Saint Joseph as carpenter into the scene.

Mater Amabilis. — The Madonna of Love. Some consider this the most popular type of the Madonna in Art. The depiction of a mother's love is one of the most endearing themes of the artist for all humanity. Raphael's sublime depictions, of course, lead in this type with his Madonna Tempi (Munich), in which the Virgin Mother presses her lips to the Child's cheek. His Conestabile (Petrograd) and Ansedei Madonnas and Babe peering in companionship into the Book of Wisdom be¬ long here, also the Holy Family of Francis I, in which she stoops to lift the Child from the cradle and the Madonna della Sedia (chair

Madonna) in the Pitti Gallery, Florence, em¬ bracing the Infant. Correggio's painting in the Uffizi really belongs to this series with the Virgin stooping over the Babe, and his Madonna del Cesta (of the basket) in the Lon¬ don National Gallery, named after the basket (cesta) lying on the floor; and his Madonna del Latte (Petrograd), also his Madonna della Scala (of the Staircase) in Parma are surely of this category. Titian sometimes created such a Mother of Love as in his (Vierge au Lapin* (Louvre) in which she is calming a rabbit for her Child to play with, also the Madonna with Saints Ulfo and Brigida (Madrid) in which the Child is accepting a gift of flowers from the latter saint, and another in the Uffizi Gal¬ lery. Of pictures portraying the Holy Mother suckling her Babe there are a number, best known perhaps being the Madonna of the Green Cushion (Louvre) by Andrea Solario. And the Mother watching the sleeping Babe is another phase of the theme treated by masters of art, such as Raphael's Madonna of the Diadem (Louvre), others by Guido Reni (Rome), Sassoferrato, Carlo Dolce, *etc.* And among northern artists the Mater Amabilis has beeh pictured by Diirer, Holbein (Meyer Madonna), Rembrandt, Rubens, van Eyck, Schongauer. Among modern artists who have created fine pictures of this theme are Gabriel Max, Bouguereau, Carl Muller, N. Barabino, Dagnan-Bouveret, Guay, Macomber, Bodenhausen.

Madonna in Gloria. — The Madonna in the Sky. These usually represent a landscape be¬ low and the Madonna in the upper sky. In the Madonna dell Stella by Fra Angelico, in San Marco, Venice, a star is located over the head posed on the veil, the figure is full length sur¬

rounded by a mandorla of golden rays. The Madonna of Saint Sebastian (Dresden) has a surrounding of cherubs and clouds with saints below. Moretto (Brescian school) treated the theme traditionally, but very lovely is his Ma¬ donna of San Giorgio Maggiore, Verona, which shows very naturalistic effects in atmosphere above and depicts Saints Cecilia, Lucia, Cather¬ ine, Agnes and Barbara beneath ; another of his is in the Berlin Gallery, a mandorla encompass¬ ing Mother and Child. Three paintings on this subject are in Venice by Gianfrancesco Caroto, also one by Cavazolla (Morando) ; these all are of the Brescia school. Tintoretto and Titian produced creations of this theme. Raphael gave us the Foligno Madonna (Vatican), which is greatly admired, but his Sistine Madonna (Dresden) brings us to the apex of highest inspiration with its majestic full-length figure in perfect poise and the charm of the cherubs surpasses all found in other depictions. Later came the selection of the crescent moon on which artists posed the Madonna in Glory; the exponents of this style are Albrecht Diirer, Sassoferrato (Vatican), Tintoretto (Berlin). Modern painters of the theme are Bouguereau, Bodenhausen, Defregger, *etc.*

Pieta. — This is probably the most popular and touching conception of the Madonna in Art. Every Roman Catholic church has one. It is the representation of ‘the Virgin display¬ ing the complete sacrifice. Francia’s beautiful conception of the theme is shown in his paint¬ ing in the London National Gallery, in which the outstretched limp body of the Crucified

One lies across the lap of the Holy Virgiil while an angel on either side attends. Luini portrays the Head, crowned with thorns, falling back on the Mother’s brow while she supports Him. The same scene with Saint John and Mary Magdalen attending is often termed a Pieta but correctly the groups should consist of Mother and the lifeless Savior, perhaps with angel or angels attending. Giovanni Bellini’s painting in the Ducal Palace, Venice, shows the Crucified One being raised from the tomb by Mary, His head resting on her face, Saint John holds up

His arm; another by this master is in the Uffizi Gallery. Crivelli painted two very pathetic Pietas, one of which is in the Vatican. In the Pitti Palace is a Pieta by Fra Bartolommeo of most touching aspect. But Michelangelo's great group in the Vatican is said by many to be unsurpassed in its sublimity.

Mater Dolorosa. — The Divine Mother in anguish. This theme has called forth from the great painters facial expression of excruciating human agony of the most touching and pathetic depiction ever accomplished. The true pathos of sorrow displayed by the Spanish school is very prominent, Murillo's depictions excelling in their pictured anguish and tears. Tradition poses the hands clasped, the veil casting a shadow on the Virgin's head, the face, with its welling tears, glancing upward. At times the Madonna is placed at the foot of the Cross. For the most part the face is of middle age, except as with Michelangelo, who depicts youth and to a critic declared ((Purity enjoys eternal youth® ; Reni and later artists frequently depict a young maiden. Many of the paintings of the Mater Dolorosa type are but the head, others half-length figures. A beautiful ex¬ ample of Quintin Matsys' is in the London Na¬ tional Gallery. Many of the creations are dis¬ figured by the unnecessary swords depicted as piercing the Virgin's bosom, referring, of course, to Simeon's prophesy. They are sup¬ posed to emphasize the pathetic subject — Vandyck uses the weapons.

Other phases of the Madonna theme pic¬ tured by masters are many but space forbids further description. Of such are the subjects known in the art world under the titles : ˆPurification,® ˆPresentation to the Temple,® ((Assumption,® wLast Judgment,® (<Seven Joys and Seven Sorrows of the Virgin,® *etc.*

Bibliography.— Clay, Rev. J. G., (The Virgin Mary and the Traditions of the Paint¬ ers* (London 1873) ; Eckl, B., (Die Madonna als Gegenstand christlicher Malerei und Skulp-tur> (Brixen 1883) ; Gruyer, F. A., (Les Vierges de Raphael et l'iconographie de la Vierge> (3 vols., Paris 1869) ; Hurll, E. M., (The Madonna in Art* (Boston 1897) ; Jame¬ son, Mrs. Anna, (The Legends of the Madonna* (Boston 1896) ; Jenner, Mrs. Henry, (Our Lady in Art* (Chicago 1910) ; Schults, A.„ (Die Legende vom Leben der Jungfrau Maria und ihre Darstellung in der bildenden Kunst des Mittelalters) (Leipzig 1879) ; Van Dycke, J. C., (The Madonna in Art) (New York 1917).

Clement W. Coumbe.

MADOQUA, mad'6-kwa, a diminutive an¬ telope (Cephalolophus

abyssinicus) , one of the duiker-boks (q.v.), common in Abyssinia. The fore-parts are rufous, but gray is the prevail¬ ing hue. The same name is sometimes applied

to other very small north African antelopes, as the Beni Israel.

MADRAS, British India, the capital of the presidency of Madras, on the Coromandel coast, lies on an open, sandy shore, exposed to the swell of the Bay of Bengal, which breaks upon the beach with great violence. It is 835 miles southwest of Calcutta. A modern harbor formed by two piers obviates the former dan¬ gerous passage through the surf. The city is built on level ground and with its nine suburbs occupies 27 square miles. The chief commer¬ cial portion is Black Town, about a mile square, closely and irregularly built, containing the native and East Indian (or mixed) population, with a few European merchants and their families. On the south is the ancient Portu¬ guese settlement Saint Thome founded in 1504, with a Roman Catholic cathedral. One of the chief objects of interest is Fort Saint George, which commands the Black Town and the net¬ work of roads, and may be considered the nucleus of the city. It was built in 1639, and is admirably situated for the defense of the town and shipping. It contains a church, the bar¬ racks, and an arsenal. The government-house, the cathedral of Saint George and some of the other churches and public buildings, are handsome structures. Besides the university, the Presidential College and a medical college, supported by government, there are large mis¬ sionary institutions. The public park, contain¬ ing a small zoological collection, is the chief recreation ground of the city. From the meridian of the observatory connected with the university all India takes its time. Madras is the chief seat of the provincial government offices, of the Supreme Court, a board of revenue, marine board, *etc.* Notwithstanding the disadvantages of its position it is a place of great trade, and a new harbor has greatly tended to increase traffic. The landing and shipping of goods is effected partly by lighters to the pier-head inside the harbor, and partly by the old massula or surf-boats, which land their cargoes on the beach. The imports are chiefly manufactured goods from the United Kingdom, especially cottons, wines, spirits, metals, stationery, *etc.* Among the principal exports are cotton, grain, indigo, coffee, tea, hides, oil-seeds, dyestuffs, pepper, *etc.* The chief industries are connected with the preparation of goods for export, such as coffee pressing and cotton cleaning. Cotton¬ spinning factories have been established at Madras. The country at a short distance from the city presents a remarkable contrast to its barren sandy shore, having the

appearance of a fine park. The mean annual temperature is 82°, which rises in the hot weather to 96° in the shade. The city has railway communication with all the principal places of India, has good water supply and sewerage systems, is lighted by electricity and gas and is administered by a body of 32 commissioners.

Madras was founded in 1639 bv the English, who obtained the grant of a piece of ground for the erection of a town and fort (Fort Saint George) from the Rajah of Chandgherry. It soon became a flourishing city and the chief station of the English on the Coromandel coast. In 1746 it was taken by the French, who kept it until 1749, when peace was made and the place was restored to the English by the Treaty of

Aix-la-Chapelle. In 1758 it was again besieged by the French under the celebrated Lally, who was obliged to retreat after a siege of two months. Pop. about 518,660, of whom 79 per cent are Hindoos, 11 per cent Mohammedans and 8 per cent Christians.

MADRAS, ma-dras', British India, a presi¬ dency occupying the southern portion of the Indian Peninsula. It stretches from the Bay of Bengal to the Arabian Sea, almost enclosing Travancore and Mysore, while a long, narrow portion extends along the west side of the Bay of Bengal till it meets the Bengal province about 70 miles from the mouth of the Mahanadi. It has a total area, excluding native states, of 141,075 square miles, the area of the native states being 10,087 square miles. Jaipur and Haidarabad bound it on the northwest, while the west borders for a short distance with Bombay. The chief mountain ranges are the Western Ghats, the Eastern Ghats and the Nilgiri Mountains. The principal rivers are the Godaveri and Kistna, with their tributaries ; and the North Penner, South Penner, Palar, Kaveri, Coleroon and Vaiga. There are no lakes of any importance, but many salt lagoons or inlets of the sea. Extensive forests yield teak, ebony and other valuable timber trees. The wild animals are those common to other parts of India, the elephant, tiger, chetah, bear, bison, elk, spotted deer, antelope, jackal, wild hog, jungle sheep, *etc.* The climate generally is reckoned the hottest in India, but differs

wildly in different localities according to ele¬ vation. Of the population, 68 per cent is en¬ gaged in agriculture, and 86 per cent of the cultivated area is under food crops. The soil along the coasts, particularly that of the Carnatic, is for the most part light and sandy; inland it consists of a decomposed syenite im¬ pregnated with salt, which in dry weather covers the ground with a saline efflorescence. The district of Tanjore on the banks of the Coleroon is esteemed the granary of southern India. The principal vegetable productions are rice, wheat, barley, maize and all the other grains common in India ; sugarcane, areca, yam, plantain, tamarind, jack-fruit, mango, melons, cocoanuts and a variety of other fruits; gin¬ ger, turmeric, pepper, tobacco, hemp and cotton, for the growth of which the soil seems to be particularly well adapted. Tea is grown to some extent. Weaving is the only indigenous art of any consequence, and cotton cloth, mus¬ lins, carpets and silks are manufactured to a limited extent. The grand total of seaborne trade for 1913-14 was rupees 581,593,000. Of external trade 63 per cent is with the British Empire, and 42 per cent with the United King¬ dom. The government of the presidency is vested in a governor subordinate to the gover¬ nor-general of India. The revenue usually ex¬ ceeds the expenditure, but the apparently healthy condition of the finances is largely illusory, as the presidency has been living on windfalls in the shape of grants from the Indian government. At the head of the edu¬ cational institutions is the Madras University, an examining body, granting degrees in arts, law, medicine and engineering. About 600 students annually graduate in arts. There are various schools and colleges affiliated to the university.

The province is divided into 22 districts with a population of about 41,402,000. The native feudatory states of Travancore, Cochin, Banganapalle, Puddakotai and Sandur, had a total population of about 4,813,000. The languages are Tamil, Telugu (which are spoken by the great majority of the inhabitants), Canarese and Malayalam, with some lesser dialects spoken by the more barbaric tribes on the mountains ; Mahrathi and Gujerathi prevail in the northern and northwestern parts of the presidency; Uriya in the northeast; while Hindustani is the language spoken everywhere by the Mohamme¬ dans. Capital, Madras (q.v.). See also India.

MADRAS HOUSE, The, is not only an admirable example of the work of Granville Barker as a dramatist but also of the modern type of play written by, and for, those who con¬ ceive of the theatre as a place where it is per¬ missible, even enjoyable, to think as well as to feel. It does not depend for its effect on thrill¬ ing situations, violent

emotions or cunningly devised mystery but depicts the dramatic in¬ terplay of character and circumstance under normal conditions with a skill, insight and humor which afford even more pleasure, per¬ haps, to the reader than to the spectator. Of all the wide variety of human relations in¬ volved in the play, none are dealt with, so to speak, in actual crisis and there is a resulting lack of dramatic tension, but the author suc¬ ceeds, nevertheless, in making one acutely con¬ scious of the intensity and force of the emo¬ tions that underlie the surface not only of the play but of life. The two main themes are business and sex. The particular aspect of business which is presented is one that is un¬ familiar in America, namely, the ((living-in® system, inherited from the days of guilds and apprentices in England, under which clerks and other employees receive board and lodging as part of their wages. It is obvious that in a large ((drapery establishment® employing both men and women, like the Madras House, such an arrangement would be likely to give rise to social complications. The business theme, therefore, although open to the reproach of be¬ ing local in its application, may boast the charm of novelty for Americans. The sex interest, on the contrary, is of the familiar, universal, all-pervading variety. It interpenetrates the life of the conventional suburban family, into which we are introduced in the first act ; it comes frankly to the fore in the second, in the case of Mr. Brigstock, ((third man in the hosiery,® and one of the (<lady shop assistants;® it pulls the strings during the sale of Madras House to an American millionaire in the third act; and it looms largest of all in the last act, in which that unconscionable old lady-killer, Constantine Madras, finally renounces his family and the trammels of conventional morality and turns Mohammedan. In this, as in his other plays, Barker, following Bernard Shaw's lead, omits the customary list of dramatis personce and in¬ troduces his characters in a sort of literary preface to each act which is no less interesting and illuminating than the dialogue. (<The Madras House® was written in 1910 and was first produced at the Duke of York's Theatre in London on 9 March of the same year under the direction of the author.

MADRAZO, ma-dra'tho, Raimundo de,

Spanish painter: b. Rome, Italy, 24 July 1841. He studied art under his father, Federigo de Madrazo, and Leon Cogniet in Paris. He has been very successful in portrait and genre and numbered many prominent Americans among his sitters. He is equally happy in pastel and oils, and his (Fete during the Carnival } in Mrs. W. K. Vanderbilt's collection is as brilliant in conception as in technique. Among his most celebrated portraits are those of the Queen Regent of Spain; the Countess Pillet-Will; Mrs. Cornelius Vanderbilt; Mrs. Whitney; Miss Anne Morgan; Madame Madrazo; Samuel P. Avery. (The End of a Masked BalP was awarded a first class medal at Paris in 1878 and was subsequently purchased by W. K. Vander¬ bilt. Other genre works all of a high order are (Fete during the Carnival) ; (Girls at a Window* (both in Metropolitan Museum, New York) ; (Lady with a Parrot* (purchased by W. A. Clark, New York) ; (Lady with Guitar* ;

(Dejeuner of the Infanta) ; (Pierrette.' Madrazo was made commander of the Legion of Honor. His brother, Ricardo (b. 1852), was also a pupil of his father and achieved some success as a portrait and genre painter.

MADRAZO Y KUNT, Federigo de,

Spanish painter: b. Rome, 12 Feb. 1815; d. Madrid, 11 June 1894. His father, Jose de Madrazo y Agudo (1781-1859), was a painter of note and from him Federigo received his early instruction. Subsequently he studied under Winterhalter at Paris. His early works are (The Resurrection of Christ* (1829);

(Achilles in his Tent) ; (The Continence of Scipio) and portraits of Baron Taylor and Ingres; ˆGodfrey Proclaimed King of Jerusa¬ lem } (1837). Thereafter he went to Rome and while there painted (Maria Christina) (1843) ;

(Queen Isabella) ; (The Duchess of Medina-CcelP ; (Countess de Vilches* (1847), and sev¬ eral portraits. In 1873 he was elected foreign member of the Paris Academy of Fine Arts. After his father's death he became director of the Prado Gallery and director of the Academy of San Fernando. He founded El Artista, the pioneer of Spanish art journals; it was followed by El Renacimiento and El Semanario pin-toresco. Of his later works the best known are the genre pieces, (The New 3ong) ; (The Cigarette) ; (The Musical Matinee, > *etc.* His brother, Louis de Madrazo, was also a painter. His best work is (The Burial of Saint Cecilia)

(1855).

MADRE DE DIOS, ma'dre de de'oos, or AMARU-MAYU, Bolivia, a river, the chief affluent of the Beni, rising in the Carabaya Mountains, Peru, about 50 miles east of Cuzco, and after an easterly course, south by north, of 900 miles, chiefly through the Bolivian depart¬ ment of La Paz, uniting with the Beni at Rivera Alta, where it is 1,500 yards wide. It was explored in 1865 under the auspices of the London Geographical Society, and since 1881 has been the highway for the exploitation of the rubber forests along its course.

MADREPORE, a genus of coral-forming polyps (see Coral and Coral Islands) con¬ taining numerous species from the warmer and tropical seas of all parts of the earth. The true Madrepores increase by budding, the re¬

sult being usually large branching colonies in which the coral between the cups containing the polyps is perforate and spiny. The differ¬ ent species frequently attain large dimensions and constitute one of the most important ele¬ ments in the formation of coral reefs. The polyps have 12 septa and 12 tentacles, 6 being large, the other 6 smaller, while a peculiar feature is the presence of 6 U-shaped tubes connected with the oesophagus at either end. The term Madreporaria is sometimes used to include all polyps in which the parts are ar¬ ranged in multiples of six, and which secrete coral on the external surface of the body.

MADRID, ma-drid' (Sp. ma-dred'), Spain, the capital of the kingdom and of the province of Madrid, a part of New Castile, situated near the centre of the country, on the left bank of the Manzanares, a sub-affluent of the Tagus. It is built on several low and irregular sand¬ hills on a plateau 2,140 feet above sea-level, and is surrounded by a barren and extensive plain, treeless save in the vicinity of the city, and stretching northward to the snow-capped Sierra de Guadarrama. In winter the climate is ex¬ ceedingly severe, and even in summer, when the heat is excessive, piercingly cold blasts descend from the mountains. The prevailing winds are the parching southeast Solano, and the icy north wind from the Guadarrama. The climate is de¬ scribed in a Spanish proverb as "three months of winter and nine months of hell.® The tem¬ perature ranges from 18° to 105° F. ; is subject to frequent and sudden changes; and between the sunny and

shady sides of a street the dif¬ ference of temperature is sometimes as great as 20°. Madrid was until recently surrounded by a wall 20 feet high, pierced by 5 large and 11 small gates ; of these gates 3 remain : the Puerta de Alcala on the east, the Puerta de Toledo on the south, and the Portillo de San Vicente on the west. The streets are dis¬ tributed somewhat irregularly around the Puerta del Sol, which is in the centre of the capital. The principal streets are broad, long and airy; and the houses are in general well constructed, substantial and of good appearance.

In common with most European capitals, Madrid has undergone much modern improve¬ ment; the streets are traversed by electric and horse car lines; are lighted by gas and elec¬ tricity; the telephone system is efficient; and sanitation has been much improved. The former abundant and pure water supply, is, however, inadequate to the demands of the growing popu¬ lation. Madrid has no edifices of great antiq¬ uity. The royal palace, situated at the western extremity of Madrid, is one of the most mag¬ nificent in the world. It occupies the site of the original Alcazar (castle) of the Moors, and is of enormous extent, being 470 feet each way, and 100 feet high. The architecture is a com¬ bination of Ionic and Doric. It contains a small but splendid Corinthian chapel, and a library of nearly 100,000 volumes, and the armory is one of the finest in the world. The Chamber of Deputies, which occupies an area of 42,700 square feet, has a hexastyle Corinthian portico on the grand faqade, destined for the entrance of royalty on state occasions. On the two lateral faqades are the entrances for the mem¬ bers. The Royal Exchange and the Bank of Spain are tw'o modern imposing buildings.

Madrid stands far behind many provincial towns as regards its churches, which are, with exception of a few attached to conventual es¬ tablishments, poor and of indifferent artistic merit. The church of San Jeronimo el Grande is probably the most distinctive. The most im¬ portant of the charitable institutions are the military hospital, an extensive building in the northwestern corner of the city; and the Hos-

picio of San Fernando, with schools for both sexes, the pupils being taught various handi¬ crafts. At the southeastern corner of the city stands the general hospital. There are also hospitals for orphans and for foundlings, and numerous charities, mainly of a religious kind.

Madrid has 72 public squares, which are generally irregular both as regards their form and their edifices, as well as deficient in decor¬ ative monuments. Of these the Plaza Mayor is one of the largest and most regular. The Plaza de Oriente is adorned with 40 statues of Gothic kings, as well as those of the Asturias, Leon, Castile and Aragon. In the centre is a fine equestrian statue of Philip IV. Among places of amusement the most popular is the Plaza de Toros (bullring), a building which is about 1,100 feet in circumference, and capable of con¬ taining 12,000 spectators. The Prado, a sort of wide boulevard, about two miles long, run¬ ning north and south on the east of the city, is the chief promenade, and beyond it is the chief public park, including the Buen Retiro gardens, near which are the new handsome building for various ministerial departments and the new station of the Southern Railway Company. The Royal Picture Gallery which stands in the Pra¬ do contains more than 2,000 pictures, including a great many by all the best masters, especially those of Spain. There are also good pictures in the Academy of Fine Arts. The National Library, founded by Philip V, contains 650,000 volumes. The Library of San Isidoro consists of 66,000 volumes. The University of Madrid (the most important in Spain) which arose out of that of Alcala de Henares, founded in the 15th century, has an average attendance of 5,000 students. There are besides numerous other schools, academies and colleges, public and private, including a normal school, a deaf and dumb institution, a normal school for the blind, a commercial school, schools for engineers, a conservatory of music, an academy for the fine arts with a picture gallery, a veterinary college, an academy of medicine and surgery, *etc.* The famous monastical and palatial Escorial (q.v.) is 27 miles northwest of the city.

The industries have shown a remarkable de¬ velopment during the last decade, the chief manufactures being tobacco, leather goods, chocolate, beer, shoes, boots, plated ware, coaches, gloves and fans. There is a royal car¬ pet and tapestry factory in the Pacifico suburb. The commerce is important, as Madrid is the entrepot for all the interior provinces. Retail business is mainly in the hands of foreigners, mostly French, but most of the wholesale trade is carried on by native houses.. Madrid has railway communication with Paris and Lisbon, and the chief cities of the Peninsula.

Madrid in the Roman period probably was the insignificant hamlet

Majoritum. Under the name Majorit it appears as a Moorish outpost of Toledo when captured in 932 by Ramiro II

of Leon. Henry IV about 1461 made some additions to the older town, which was placed on the western eminence over the river. Ma¬ drid only began to be a place of importance under Charles V. Declared the seat of the court by Philip II in 1560 the city rapidly grew up at the expense of the older and better situated capitals. It was the creation of a century, and its increase was very slow after the age of Philip IV. The gross mistake of a position which has no single advantage except the fan¬ cied geographical merit of being in the centre of Spain was soon felt, and on Philip IPs death his son, in 1601, endeavored to move the court again to Valladolid, which, however, was found to be impracticable, such had been the creation of new interests during the outlay in the pre¬ ceding reign. Madrid was entered by the French under Murat, 23 March 1808, but they were soon obliged to evacuate it. It was again held by the French from 1809 to 1812, when the Duke of Wellington entered it and re¬ stored it to the Spaniards. After the deposition of the crown by King Amadeus in 1873, Madrid, along with the rest of Spain, suffered greatly from the anarchy caused by the struggles be¬ tween the Republicans, Carlists and Socialists. Pop. about 599,807. The province of Madrid covers an area of 3,084 square miles, and has a population of about 920,493.

MADRIGAL, a short lyric poem generally on amatory subjects. Those of Tasso represent the finest specimens of Italian poetry.

MADRONA, a large and ornamental tree of California (Arbutus menziesii) , of the heath family, which often grows nearly 100 feet in height. It has a widespreading head, small evergreen leaves and the limbs and large parts of the trunk, where the thin outer bark easily peels off, are bright red. It grows in the foot¬ hills, and up to a moderate elevation, but not naturally in the valleys. It is a near relative of the strawberry tree of Europe.

MADSTONE, a vegetable substance or stone which when applied to a wound caused by the bite of a mad dog is said to prevent hydro¬ phobia. The most famous one in the United States is owned by the descendants of a family named Fred, in Virginia. This stone was brought over from Scotland in 1776. It is said to be the one spoken of by Sir Walter Scott in (The Talisman) and has been religiously pre¬ served as one of the most valuable relics of the age. It is about two inches long by one inch broad, and about half an inch thick, and is of

a chocolate color. When applied to the wound it adheres till all the poison is absorbed, when it drops off. It is then soaked in warm milk or water for a time, and when removed the liquid is found to be full of a greenish-yellow scum. It is said that of the 130 cases in which it has been applied for the bite of a mad dog, none ever suffered from hydrophobia. There -are said to be three authenticated madstones in the United States.

The belief in a madstone was common hun¬ dreds of years ago in the East, and travelers in. India in 1677 and 1685 make mention of it. Tradition said it grew on the head of certain snakes. George F. Kunz, a New York expert in gems, identifies the madstone, or snakestone, of the East, with the stone known as tabersheer, which is a variety of opal found in the joints

of the bamboo in Hindustan and Burma. This stone is formed of juice which by evaporation becomes mucilaginous, then a solid substance, and when placed in the mouth will adhere to the palate or cause water to boil. Sir David Brewster says it is found in the joints of dis¬ eased cornstalks and is formed by sap depos¬ iting silica.

MADURA, ma-doo'ra, southeastern Asia, an island of the Malay Archipelago, Dutch East Indies, off the east end of Java, from which it is separated by the Strait of Madura. The island is about 105 miles long east to west, and 30 miles broad, with an area of 1,770 square miles. Madura forms one of the 17 Dutch residences or provinces into which Java and Madura are divided, and is administered by a governor or resident. The Dutch first landed in Madura in 1747. It is undulating but not mountainous, and though in general well wa¬ tered, in some places, especiallv on the coast, there is a want of water, and the soil is unfer¬ tile. The interior, however, is fertile, though not so productive as Java. Maize, cocoanuts, tobacco, Jamaica pepper, tamarinds and salt are the chief products ; stock-raising is an im¬ portant industry; and the exports include also birds'-nests, country cloths, white and striped, poppy-oil, rattan-mats and baskets, *etc.* The chief towns are Bangkalang, Pamekasan (the capital, pop. 8,407), and

Sumanap (pop. 22,110). Pop. 1,843,601, of whom 4,734 were Chinese and 621 Europeans.

MADURA, southern India, the capital of a district of Madras, 344 miles by rail south¬ west of Madras. It was the capital of the an¬ cient Pandhyan kingdom, for over 2,000 years was the political and religious capital of south¬ ern India, and is noted for its interesting archi¬ tectural monuments, chief of which is the Tem¬ ple of Minarchi, dating from almost prehistoric times, restored and added to by Tirumulla Nayak (1622-62). It ranks fourth among the seven strongholds of Hinduism, and occupies a paral¬ lelogram of 56,000 square feet containing 50 buildings. The city was known to the Greeks and Romans. Cotton and tobacco manufac¬ tures and coffee mills, are the principal indus¬ tries. Madura is the seat of Catholic and American Protestant and other missions, and has several high-grade educational institutions. Pop. 134,130.

MADVIG, mad'vig, Johan Nikolai, Danish scholar : b. Svanike, island of Bornholm, 7 Aug. 1804; d. Copenhagen, 13 Dec. 1886. Educated at Frederiksborg and Copenhagen, he was from 1829 till 1879 professor of Latin in the Univer¬ sity of Copenhagen. He took a profound inter¬ est in the politics of his country, and from 1848 till 1851 was Minister of Education and Reli¬ gion. He is best known by critical editions of Latin classics and by his Latin grammar trans¬ lated into English and most European tongues. His chief works are (Emendationes in Cfberonis Libros Philosophicos) (1828) ; (Cicero's De Finibus Bonorum et MalorunP (1839, amended .1876); (Ciceronis Orationes Selectae DuodecinP (1830) ; (Cicero's Cato Major and Laelius) (1835); (Opuscula Academica) (1834-42; new ed;, 1887) ; (Emendationes Livianse) (1860); (Livii Opera* (with Ussing, 1861-66); Ad¬ versaria Critica) (1871-84); <Latin Grammar' (1841); (Greek Syntax* (1846); Con¬

stitution and Administration of the Roman State* (1881-82) ; Autobiography* (published posthumously, 1887). Consult Sandys, J. R., (A History of Classical Scholarship* (Cam¬ bridge 1908).

MˆEANDER, me-an'der, now MEN-DERES, a river of Asia which arises in Phrygia not far from Cekenae. It forms the boundary between Caria and Lydia, and flows into the Icarian Sea between Priene and Myus, opposite Miletus. It covers a course about 200 miles long, is deep and narrow, and navigable only for small vessels. It was celebrated among the ancients for its winding course, and gave its name to the

intertwined purple borders on man¬ tles and other dresses, as well as upon urns and vases.

M.7EANDRINA, me-an-dri'na, one of sev¬ eral genera of brain corals, so called from the elongate and meandering cups containing the polyps, which give a spherical mass of these corals an appearance strikingly like the human brain with its convolutions. This appearance is due to the fact that the poUps in their growth do not completely divide, but stretch out into long bands, frequently branching, with many mouths and tentacles, and a common body and digestive cavity. Brain corals occur in all trop¬ ical seas, several species being found in Florida and the West Indies. Their solid masses make them important factors in the formation of coral reefs.

MAECENAS, me-se'nas, Gaius Cilnius,

Roman nobleman : b. between 73 and 63 b.c. ; d. 8 b.c. He was the friend of Augustus, and patron of Virgil and Horace. It is unknown where he received his education, but he was intimate with the literatures both of Greece and Rome, and was himself an occasional writer in prose and verse. We first hear of him authen¬ tically (40 b.c.) as negotiating a marriage be¬ tween Octavianus and Scribonia ; and in the same year he contributed materially to bring about the Peace of Brundisium, by-which Octavian and Antony were reconciled. Two years later he was again employed in reconciling these self-willed potentates ; and 36 b.c. he was twice dispatched by Octavian from Sicily to Rome to quell disturbances which had broken out there. He was for these services entrusted with the administration not only of Rome, but of all Italy, when Octavian became emperor with the title of Augustus. His palatial residence and gardens on the Esquiline were the rendezvous of all the literati of Rome, and of numerous parasites. But those admitted to his intimacy were the greatest geniuses and scholars of Rome, among them being Virgil and Horace. To the intercession of Maecenas, Virgil was in¬ debted for the recovery of his farm, and Horace also owed to him many favors. 'Consult Baeh-rens, (Fragmenta Poetarum Romanorum* (Leipzig 1886) ; Harder, F., (Fragmenta des Macenas* (Berlin 1899).

MAELAR, Lake of. See Malar.

MAELSTROM, mal' strom, or MOSKOE-STROM, Norway, a rapid current or tidal whirlpool off the northwest coast immediately southwest of Moskenesoe, the southernmost of the Lofoten Isles. The current runs with the tides alternately, six hours from north to south and six hours from south to north, producing

immense whirls. The depth of the water around, supposed at one time to be too great to admit of soundings, has been ascertained not to exceed 20 fathoms, with a bottom of rocks and white sand. Immediately to the west the sound¬ ings are from 100 to 200 fathoms. The whirl¬ pool, idealized by mediaeval and later writers, including Edgar Allan Poe, is greatest at high or low water. When the wind is northwest and opposed to the reflux of the waves it at¬ tains its greatest fury, and becomes extremely dangerous, but in ordinary circumstances it may be traversed without difficulty.

MAES, or MAAS, mas, Nicolas, Dutch painter: b. Dordrecht, 1632; d. Amsterdam, December 1693. He entered the studio of Rem¬ brandt at Amsterdam about 1650 and studied there about four years, attaining a style of exe¬ cution and coloring so similar to that of his master that many of his paintings were for a long time believed to be Rembrandt's work. He returned to Dortrecht in 1654 and in the succeeding 10 years did his best work, which retained the influence of Rembrandt, particularly in coloring. From the time of his going to Antwerp in 1665 his style changed and he abandoned the domestic genre type of work for that of portraiture, and his subsequent pictures show the influence of Van Dyck. So different were the character¬ istics of the two periods that at one time it was believed that there were two artists of the same name. Of his earlier and better period notable examples are (The Reverie) (Ryks Museum, Amsterdam) ; (Card Players) (National Gal¬ lery, London) ; (The Eavesdropped (Six Gal¬ lery, Amsterdam) ; (Young Girl Peeling an Apple-* (Metropolitan Museum, New York) ; (Hagar's Departure,* long believed to be a Rembrandt (Earl of Denbigh's Collection) ; (The Listening GirP (Buckingham Palace). Numerous other examples exist in the galleries of Berlin, Brussels, Munich, The Hague, Frank¬ fort, Hanover and Petrograd.

MAESTRICHT, mas'tnht, Netherlands, the capital of the province of Limburg, on the left bank of the Maas, at the confluence of the Geer, lies on the Belgian frontier, 19 miles north-northeast of Liege, 56 miles east of Brus¬ sels and 52 miles west by south of Cologne. Among the chief buildings are the church of Saint Servais, partly Romanesque and partly Gothic, dating from the 10th century, the town-hall, the courts and general prison and the ar¬ senal. The fortifications were

dismantled be¬ tween 1871 and 1878; it it, however, still a con¬ siderable garrison town. Maestricht carries on an active transit trade with Belgium, and has manufactures of glass and earthenware, fire¬ arms, shot, cloth and paper-hangings ; also iron-foundries, beet-root sugar refineries, tobacco and cigar factories, tan-pits, distilleries and brew¬ eries, the latter producing very noted beer. About three miles from the town is the Pieters-berg (Peters Hill), on which stands the fort of Saint Pierre, and under which are extensive subterranean quarries of extraordinary inter¬ est, the excavation of which is supposed to have been begun by the Romans. Maestricht was besieged and taken and 8,000 of its inhabitants were massacred in 1579 by the Spaniards under the Duke of Parma; in 1673 it was taken by Louis XIV, and again by the French in 1748 and 1794. William III of England failed to

capture it and in 1830 its garrison resisted suc¬ cessfully the attacks of insurgent Belgians. Pop. 38,611.

MAESTRICHT BEDS, in geology, a series of calcareous beds 100 feet thick, on the banks of the Meuse, near the Dutch city of Maes¬ tricht. The Maestricht calcareous rock con¬ tains Bclemnitella, mucronata, Pecten quadricos-tatus, etc., also the genera Braculites, Hamites, etc., which are only Mesozoic. It is a con¬ necting link between the Secondary and the Tertiary rocks, but in all essential respects be¬ longs to the former.

MAETERLINCK, met'er-link, Maurice

(Gallicized from the original Mooris Mater-linck), Belgian author: b. Ghent, 29 Aug. 1862. He was educated in a Jesuit school in Belgium, then studied law, was admitted to the bar in 1887, but was from the first more interested in letters, and in 1896 settled in Paris as an au¬ thor. His work may be divided into three parts, — his lyric verse, his dramas and his philosophical essays. Of the first the two vol¬ umes (Serres Chaudes* (1889) and (Douze Chansons5 (1896) are representative. Maeter¬ linck's verse is imaginative, but lacks in any strong degree the melodic quality. His dramas are (La Princesse Maleine* (1889) ; (Les Aveugles* (1890); (L'Intruse) (1890); des Sept Princesses5 (1891) ; (Pelleas et Meli-sande5 (1892) ; (Alladine et Palamides5 (1894) ; (La Mort de Tintagilles* (1894) ; Aglavaine et Selysette* (1896) ; (Ariadne et Barbeblue) (1899); (Sceur Beatrice5 (1899); and (Monna Vanna* (1902); <Javzelle5 (1903); <The Blue Bird,5 a sublimated Fairy Tale (1909) ; (Mary Magdalene5 (1910) ;

(The Death of Tintagiles5 (1913). Several of these were translated into English by Richard Hovey (q.v.), and (Monna Vanna5 was rendered by Alexis I. du P. Cole¬ man. The dramas are Maeterlinck's most strik¬ ing work. Their eery symbolisrn can hardly be explained, but must be appreciated at first hand. Though they inaugurated a new theatric school — the (Drame Intime5 — they are prop¬ erly reading plays, and lose their subtlety, mys¬ tic qualities and impressiveness in presentation. (Pelleas et Melisande was given in the United States by Mrs. Patrick Campbell. To many the essays are his ultimate test as a force in litera¬ ture, the most interesting things that Maeterlinck has done. The volumes are (Le Tresor des Humbles5 (1896) ; (La Sagesse et la Destinee* (1898), and (La Vie des Abeilles* (1902) ; (Le double jardin5 (1904); (Mon chien5 (1906); (L'Intelligence des Fleurs5 (1907) ; (La Mort5 (1913) ; (The Unknown Guest* (1914). The first is somewhat mystical, all are somewhat dif¬ fuse; but he has been called by virtue of them a true successor of Swedenborg and Bohme. See Blue Bird, The; Monna Vanna; Pelleas and Melisande Consult Courtnev, develop¬ ment of Maurice Maeterlinck5 (1904) ; Harry, Maurice Maeterlinck; a Biographical Study* (1910); Thomas, (Maurice Maeterlinck* (1911); Sturgis, (The Philosophy of Maeterlinck* (1914) ; Clark, (Maurice Maeterlinck: Poet and Philosopher* (1915) ; (The Wrack of the Storm* (1916).

MAEVIAD AND BAVIAD. See Baviad.

MAFEKING, ma-fa-king' or maf'e-king, Cape Colony, a former Bechuana settlement, now a town, the administrative seat of the

Bechuanaland protectorate, close to the borders of the Transvaal, 870 miles by rail northeast of Cape Town and about 200 miles west-southwest of Pretoria. The town stands near the upper Malopo River, is 4,194 feet above sea-level and contains several substantial buildings, including a Masonic temple, a town-hall and a hospital and there is a good water-supply and a race¬ course. Mafeking sustained a protracted siege during the South African War of 1899-1901. It was isolated in October of the former year and was brilliantly defended by

a small force under Colonel (now General) Baden-Powell, until relieved by Colonel Mahon in May 1900.

MAFFEI, Francesco Scipione, Marchese di, Italian dramatist and scientist: b. Verona, 1 June 1675; d. there, 11 Feb. 1755. He studied at the Jesuit College, Parma, for five years and from 1698 at Rome. He was present at the battle of Hochstadt in 1704, taking part in the Bavarian campaign as a volunteer under his brother, Gen. Alessandro Maffei. He com¬ menced a literary career in 1710 by the publica¬ tion of (Della scienza cavalleresca,* poted for a censure of duelling; became associated in founding the Giornale dei litterati; and edited with introductions some of the best plays of the Cinque cento. In 1713 appeared his own play <Merope,) since frequently reprinted, one of the most brilliant successes achieved in the history of dramatic literature. While it lacks a love motif, it is considered a masterpiece of Italian tragedy. Voltaire adapted it for the French stage, declaring it ((worthv of the most glorious days of Athens, w and it inspired Home's celebrated English drama (Douglas. y His versatility and scientific attainments are shown in subsequent work which include (Teatro italiana) (1723-25) ; Hstoria diplo-matica) (Mantua 1727) ; (Le Ceremonie) a comedy (1728) ; and (Verona illustrata) (1732). From 1732 he spent four years in travel in France and England, returning by way of Hol¬ land and Germany, and wrote (Galliae Antiqui-tates) (Paris 1733) ; Hstoria teologica) (Trent 1742) ; (Dell impiego del denaro) (1746), jus¬ tifying loans on interest; and (Arte magica) (1749-54). He was also associated with Maratori in the great collection of the (Rerum italicarum scriptores) which occupied 15 years and were published in 25 folio volumes (1723-38). A complete edition of Maffei's works were published in 21 volumes (Venice 1790) ; and selected (Opusculi litterarP (Venice 1829; Milan 1844). See Merofe.

MAFFITT, John Newland, American

clergyman : b. Dublin, Ireland, 28 Dec. 1794; d. Mobile, Ala., 28 May 1850. He was a Wes¬ leyan preacher in Ireland and in 1819 emi¬ grated to the United States, where he became a member of the New England Methodist Epis¬ copal conference. He founded the (Western Methodist* in Nashville in 1833 and conducted revivalist meetings throughout the South and West. In 1837 he became professor of elocution and belles-lettres at La Grange College, Louisi¬ ana, and in 1841 he was elected chaplain to Congress. He published several religious works, also an autobiography.

MAFFITT, John Newland, American naval officer: b. at sea, 1819; d.

Wilmington, N. C., 1866. He enlisted in the United States navy in 1832 and in 1861 entered the service of

the Confederacy where he took rank as com¬ modore. In command of the Florida he ren¬ dered himself valuable to the Confederate cause, taking many prizes and damaging seriously United States commerce. Owing to ill-health he resigned before the end of the war.

MAFIA, ma-fe'a, a Sicilian secret society similar to the Camorra (q.v.), which has long existed in Naples, but much more powerful. The Mafia is essentially a form of organized lawlessness, but its organization is sufficiently elastic to baffle all the attempts of the govern¬ ment to suppress it. It is generally said to have had its origin in the compagni d'armi, a kind of police organized in Sicily early in the 19th century and dissolved by Garibaldi in 1860. Its members, who are required to prove their daring in a knife duel, are bound never to carry their suits to the regular courts or to give evidence before them. Murder and robbery are discountenanced under ordinary circum¬ stances, but they are resorted to without hesita¬ tion in the case of informers or specially ob¬ noxious persons. Blackmail is levied from land-owners, who are required to employ only mafiosi in certain occupations. Criminals are protected and elections controlled by this in¬ famous society, whose authority is greater than that of the law among the lower classes in Sicily. The Chinese highbinder societies are similar to the Mafia. Within recent years these murderous organizations have secured a footing in the United States and murders directly chargeable to the Mafia have been committed in New York, New Orleans, Chicago and other large cities. Consult Alongi, G., (La Mafia) (Turin 1886 ; 2d ed., Palermo 1904) ; Calou, E. G, (La Mafia1 (Madrid 1905) ; Paton, W. A., < Picturesque Sicily > (1898); Vizzini, A., (La Mafia1 (Rome 1880).

MAGALHAES, ma-ga-lya'ensh, Domingos Jose Gongalves de, Visconde de Araguaya, Brazilian poet and diplomat : b. Rio de Taniero! 13 Aug. 1811 ; d. Rome, Italy, 10 July 1882. He was educated in medicine ; but entered upon a diplomatic career in 1836, when he became an attache at the Brazilian embassy at Paris. He was Minister to Austria in 1859ˆ67, and Ambas¬ sador to the United States in 1867-71. At the time of his death he was Ambassador at Rome. He began the writing of verse at an early age and attained a considerable reputation, being regarded as the leader of the romantic school of Brazilian poetry. Among his more im¬ portant works are (Suspiros poeticas) (1836) ; and (A confederagao dos Tamoyos1 (1857). His (Obras completas*

were published (Paris

1864).

MAGALHAES, Fernao de. See Magel¬ lan, Ferdinand.

MAGALLANES, ma-gal-ya'nes, Chile, a territory lying south of the department of Chiloe, and including the many islands, large and small, along the western and southern coasts of Chile. Its entire area is about 65,355 square miles. Among the more prominent islands in the territory are the Wellington group, Hanover group, Queen Adelaide Archi¬ pelago, Madre de Dios and a part of Tierra del Fuego. _ The mainland is a narrow strip of mountainous sea-coast. The islands are barren; there are extensive forests on the mainland, but very little agricultural land. The climate

is disagreeable and stormy. The animal life is not abundant ; the seal and sea-otter fre¬ quent the coast and in the sheltered regions east of the Andes cattle, horses and sheep are raised. Coal has been found in the southern part and there are also copper and gold mines. The capital is Punta Arenas. Pop. 30,623.

MAGDA. Sudermann's <Heimat) GHome®) was the sensation of the theatrical season 1889— 90 in Berlin, and the play, either in the original German or in translations commonly bearing the title <Magda) — the name of the heroine — is probably to be regarded as the most widely known and the most successful drama of the end of the century. Its success is traceable to at least four causes : its theme of revolt against paternal tyranny is one to which the times were sympathetic, its construction is skilful and in every sense theatrical, it contains a number of picturesque episodes and amusing characters, and is distinguished for animated dialogue; but most of all, its heroine is an unconventional, self-assertive, and emotional (<new woman® who affords an actress an unusual opportunity for temperamental

display. The technique is a clever combination of the naturalism of Ibsen and the methods of the drame d these familiar in the works of Dumas fils. The conventional raisonneur — in the person of the Pastor Heff-terdingk — mediates between Magda and her father, and debates with each the problems presented by the situation of a prodigal daughter who returns home after a life of moral irregu¬ larity but operatic success. We are bidden to despise respectability and admire independence. But the representative of each side is far from being an acceptable champion. Magda's father fails to recognize the difference between a child with duties and a human being with rights, and Magda reveals no conception of the fact that duty is only in part a social obli¬ gation and is in its innermost essence an obliga¬ tion of self-respect. Translated by C. E. A. Winslow (Boston 1896) ; edited by F. G. G. Schmidt (Boston 1909).

William G. Howard,

Assistant Professor of German, Harvard

University.

MAGDALA, mag'da-la, or MAKDALA,

Abyssinia, fortified town on the plateau of Talanto in Shoa, 72 miles northeast of Debra Tabor. The original fort was built on an isolated rock 3,300 feet above the Beshilo, and was stormed and wholly destroyed by the British troops under Sir Robert Napier 13 April 1868, Sir Robert becoming Baron Napier of Magdala in recognition of the achievement. The natural strategic advantages of the posi¬ tion, however, caused the fort to be rebuilt and the town has acquired considerable im¬ portance. Altitude, 9,110 feet. Pop. about

4,000.

MAGDALEN, mag'da-len, a name applied to one of the Marys in the Gospels, derived from her place of birth, or former residence, in order to distinguish her from other women of that name (Matt, xxvii, 56, 61 ; Mark xv, 40, 47; Luke viii, 2; John xix, 25).

MAGDALEN /mod'lln) COLLEGE, Ox¬ ford, England, originated in Magdalen Hall, founded in 1448 by William Patten, commonly called William of Waynflete, from the place of vol. 18 — 8

his birth, bishop of Winchester and Lord High-chancellor of England, who 10 years later added the College of Saint Mary Magdalen. In some respects Magdalen is the most noteworthy col¬ lege of the university. Five of the fellowships are attached to five Waynflete professorships, of moral philosophy, chemistry, mineralogy, physiology and pure mathematics, established in lieu of the three former lectureships of divinity, moral philosophy and natural philos¬ ophy. There is also a professorship of botany. The buildings are noted for their beauty and occupy extensive grounds. Among Magdalen's celebrated alumni are Addison, Camden, Foxe, Gibbon, Hampden, John Lylv, Sacheverell, Sel-borne, Tyndale and Cardinal Wolsey. Consult Wilson, (Magdalen College> (1899) ; Glasgow, Sketches of Magdalen College > (1901).

MAGDALEN (mag'da-len) ISLANDS, Quebec, Canada, near the centre of the Gulf of Saint Lawrence, 54 miles northwest of Cape Breton, Nova Scotia, and 100 miles southwest of Newfoundland. Amherst, Alright, Coffin, Wolf, Grindstone, Deadman, Entry and B3T011 islands compose the group which are politically attached to the district of Gaspe, Quebec. The inhabitants exist chiefly by the fisheries of the adjacent waters; gypsum which is found in veins and hollows, and grindstones from Grind¬ stone Island, are exported. House Harbor on Alright Island, and Amherst where there is a custom house, are the chief settlements. Pop. about 5,000.

MAGDALENA, mag-da-la'na, a river of Colombia, South America, which has its rise in the Andes Mountains in the southwestern part of Colombia, and flows north to the Caribbean Sea. A short distance from the sea, at the city of Barranquilla, the river divides and dis¬ charges its waters through two channels. It is about 1,000 miles in length. It is navigable for ocean steamers to La Dorada, 592 miles from Barranquilla, and for small steamers to about 900 miles from its mouth. Magdalena River is the principal route from the sea to the in¬ terior of the country, and the work of clearing and canalizing both the upper and lower parts of the stream has greatly increased its import¬ ance and value as a means of communication and transportation. Bogota (q.v.), the capital is largely dependent upon this river for means of communication with places on the coast. The largest tributary is Cauca, whose source is near that of the Magdalena, and part of its course is almost parallel with the main river. Short railroads connect some of the interior towns with the river and its tributaries.

MAGDALENA (mag-da-le'na) BAY, an inlet on the west coast of Lower California, in Mexico, one of the best harbors on the Pacific Coast. The inlet or arm of the sea is about 40 miles long and 12 miles wide and is

protected by a long, low sand-bar. A town of the same name is situated on the harbor.

MAGDALENE (mag'da-len) COLLEGE, Cambridge, England, was founded in 1542 by Thomas, Baron Audley of Walden, in place of Buckingham College, established by Edward, Duke of Buckingham, in 1519, which had suc¬ ceeded a monks' hostel for students founded in 1428. There are seven open fellowships on the foundation, and 12 open scholarships. There

are also several exhibitions. The annual Pepysian benefaction, value £50, is in the master's gift, and is usually bestowed upon poor and deserving students. The buildings consist of two courts, restored and altered in 1880, a chapel and hall dating from the 15th century and the Pepysian Library, built in 1688. Samuel Pepys, Charles Kingsley and Charles Stewart Parnell were educated at Magdalene College.

MAGDALENIAN STAGE, a period in the history of Paleolithic man in southwestern Eu¬ rope when humanity lived largely in caves (wherefore these people are called (<cave men8). They had attained a remarkably high degree of skill in the graphic arts, and adorned the interior of caverns with paintings and many objects with engravings of animals and other subjects. See Stone Age.

MAGDEBURG, mag'de-boorg, Germany, city, capital of the Prussian province of Saxony, on the Elbe, about 88 miles southwest of Ber¬ lin. The manufacturing and trade of Magde¬ burg are extensive, , and its facilities for trans¬ portation by water and railroad are excellent. Among its industrial establishments are the Gruson Works, noted for their connection with the Krupp Works, the beet-sugar factories and a number of other establishments. It has a large number of excellent schools, gymnasia, a pedagogical seminary, art schools, industrial schools, *etc.* _ Magdeburg is a place of great antiquity, being a trading centre in the 9th century. It early distinguished itself in the Reformation. During the Thirty Years' War the town was besieged, stormed and sacked by Tilly, when 20,000 persons are said to have

been murdered. Pop. about 279,685. Consult Wol-ter, ‘Geschichte der Stadt Magdeburg> (3d ed Magdeburg 1901); Dodge, (Gustavus Adolphus > (New York 1906).

MAGDEBURG CENTURIES, a Prot¬ estant history of the Christian Church by cen¬ turies, written in Latin in 1562 by Matthias Fla¬ tus of Magdeburg and other Lutheran theolo¬ gians. It first appeared as (Historia ecclesiae ChnstP (7 vols., Basel 1559-74); a German translation of˜ the earlier part also appearing (Jena 1560-65). German Protestant princes bore the cost of publication. The ‘Ecclesiasti¬ cal Annals > of Baronius (q.v.) were a Catholic reply to the Magdeburg Centuries. See Prot¬ estantism.

MAGDEBURG HEMISPHERES, a cele¬ brated invention of two hollow hemispheres, made of copper or brass, with their edges accu¬ rately fitted to each other, and one of them furnished with a stopcock. When the edges are rubbed over with grease, pressed tightly to¬ gether and the globe thus formed exhausted of air through the cock, the hemispheres, which fell asunder before exhaustion, are now pressed together with immense force. If they are one foot in diameter they will, after exhaustion, be pressed together with a force of nearly a ton.

I his experiment was first performed by Otto von Guericke of Magdeburg, in 1654, at the im¬ perial Diet at Ratisbon, to the astonishment of the < Emperor Ferdinand III and the royal family.

MAGELLAN, ma-jel’an, Ferdinand (Port. Fernao de Magalhaes; Sp. Fernando Magal-lanes), Portuguese navigator: b. probably at

Villa de Sabroza, Trazos-Montes, about 1480; d. Philippine Islands, 27 April 1521. He served in the Indies with distinction, especially at Malacca, and in 1514 saw service in Morocco. In resentment at his treatment by the king, who had not, he thought, duly rewarded his services, he, with Ruy Falero, a geographer and astron¬ omer, renounced his nationality and offered his services to Spain. Magellan’s proposal to seek a western route to the Moluccas was ac¬ cepted by Charles V, and on 20 Sept. 1519 he set sail from San Lucar de Barrameda in com¬ mand of five vessels. He passed through the strait which bears his name (see Magellan, Strait of), and on 28 Nov. 1520, reached the great ocean which he called the Pacific from its calmness. With his three remaining ves¬ sels he sailed by way of the Ladrones Islands to the Philippines, discovering Samar on 16 March 1521. He caused the king of Zebu to swear allegiance to Spain, but was killed in

a fight with the natives of Matan. His vessel, the Victoria, under Sebastian del Cano, com¬ pleted this, the first circumnavigation of the globe. The chief authority for the voyage is a work oy Pigafetta, an Italian who accom¬ panied Magellan. Consult Lord Stanley, ‘The First Voyage Round the World> (1875); and Guillemard, ‘Ferdinand Magellan) (1891).

MAGELLAN, Strait of, the channel which separates the continent of South America from Tierra del Fuego and thus forms a communica¬ tion between the south Atlantic and the south Pacific oceans. It is upward of 360 miles long, and is of difficult navigation. Its breadth varies exceedingly, the maximum being somewhat over 70 miles. There are a number of bays along the shore and at the southwestern end a group of several small islands. Punta Arenas is the best harbor. The strait was discovered in 1520 by Fernao de Magalhaes or Magellan.

MAGELLANIC CLOUDS, in astronomy, called the Nubecula?, Major and Minor, from their cloud-like appearance, two oval masses of light in the southern hemisphere near the pole; often both visible to the naked eye. Sir j! Herschel describes them as consisting of swarms of stars, clusters and nebulae of every description.

, ˆMAGENDra, Frangois, fran-swa ma-zhon-de, french physician and physiologist: b Bordeaux 15 Oct. 1783; d. Paris, 8 Oct. 1855! He was the pupil of the celebrated surgeon, Boyer, and at 20 was appointed successively aide a anatomic in the faculty of medicine, and dem¬ onstrator. _ He, however, subsequently devoted himself principally to the practice of medicine, was m 1819 elected a member of the Academy Sciences and in 1831 succeeded Recamier in the chair of anatomy in the College of France, which he retained until his death. As an ex¬ perimenter in physiology he occupied a high position and his experiments on living animals were at one time so numerous and involved so much suffering to the animals that the French government deemed it necessary to interfere. The results obtained, however, were of great importance, if they do not absolve him from the charge of cruelty. Among them may be named an original demonstration that the two roots of the spinal nerves are devoted to two separate functions; that the veins are organs of absorption ; that strychnine acts upon the

I

*

MAGENTA

spinal cord and contracts by tetanic spasm the nerves of respiration, thus inducing asphixia; that food destitute of nitrogen is not nutritious, and that prussic acid is a valuable remedy in certain forms of cough arising from irritation in the lungs. He was a prolific author of med¬ ical works, the most important of which are (Formulaire pour la preparation et emploi de plusieurs nouveaux medicaments > (1821), con¬ taining an account of the effects of certain plants then recently introduced into the materia medica, and which has been translated into all the languages of Europe; (Precis elementaire de physiologie) (1816-17), for many years an important manual for students; (Leqons sur les phenomenes physiques de la vie> (1836-42) ; (Legons sur les fonctions et les maladies du systeme nerveux) (1839) ; (Leqons sur le Sang* (1839) ; (Recherches philosophiques et cliniques sur le liquide cephalorachidien ou cerebro¬ spinal* (1842).

MAGENTA, ma-jen'ta, Italy, town in the province of Milan, 16 miles west of Milan, is situated in a grape region, in which the cultiva¬ tion of grapes and mulberries and the manu¬ facture of wine are the principal industries. Considerable raw silk is exported. It was the scene of a famous engagement 4 June 1859 be¬ tween the French and Sardinian forces and the Austrians. The Austrians were defeated, largely through the superior tactics of General MacMahon of the French army. Pop. about 10,137.

MAGENTA, or ANILINE RED, a coal—

tar dye, which consists of a mixture of the hydrochlorides of rosaniline and para-rosani- line. (See Rosaniline). It may be prepared from aniline oil by digesting the aniline with arsenic acid or with nitrobenzene and ferrous chloride. When the oxidation is complete the rosaniline hydrochloride is precipitated by the addition of common salt in large excess, the hydrochloride being formed by double decom¬ position and thrown down because it is but sparingly soluble in salt solutions. Consult Benedikt, (Chemistry of the Coal-Tar Colors.*

MAGGIORE, mad'jo're, Lake, one of the largest lakes in Italy, the

Lacus V erbanus of the Romans, is situated for the most part in Italy, but also partly in the Swiss canton of Ticino. It is 39 miles in length and varies in breadth from one-half mile to five and one-half miles. It is 646 feet above the level of the sea and has a maximum depth of 1,158 feet. The river Ticino flows through it. In the ‘ south¬ western expansion of the lake are the Bor-romean Isles (q.v.). On the north and west it is surrounded by granitic mountains, 7,000 feet high, on the south and east by vineyard-covered hills. On its shore are a large number of villages and cities noted for beautiful scenery and historic connections.

MAGGOT, the larva of a fly. (See Flies).

MAGI, ma’ji (Lat. Magus, Gr. Mayoe), an Accadian term recently brought to light by Assyrian scholars ; Accadian being the lan¬ guage of the people of Babylon and. Media. The word signifies <(august,** ˆreverend,® and was the title of their learned and priestly caste. The ‘Semitic nations afterward dominant in Babylonia and Assyria adopted the learning and many of the religious observances of the early inhabitants, as also the name for the learned caste; and out of the Semitic form the Greeks

made magos. Under the Persian Empire the magi were not only the ((keepers of the sacred things, the learned of the people, the philoso¬ phers and servants of God,® but also diviners and mantics, augurs and astrologers. They were held in the highest reverence, and no transaction of importance took place without or against their advice. Hence their almost un¬ bounded influence in both private and public life. Apart from the education of the young princes being in their hands, they were the constant companions of the ruling monarch. Zoroaster, in the course of his great religious reform, reorganized the body of the magi, chiefly by reinforcing the ancient laws as to their manner and mode of life, which was to be one of the simplest and severest, befitting their sacred station, but which had become one of luxury and indolence, and by reinstituting the original distinction of the three classes of herbeds (((disciples®) , mobeds (((masters**) and destur mobeds (<(complete masters®). The food, especially of the lower class, was to consist only of flour and vegetables ; they Avore white gar¬ ments, slept on the ground and were altogether subjected to the most rigorous discipline. The initiation consisted of the most awful and mysterious ceremonies, and was preceded by purification of several months’ duration. As far as we can learn the principle of good and evil, as represented by Ormazd and Ahriman, was recognized, and

belief in the coming of a savior, in the resurrection and in a future life was held. Gradually, however, their influence, which was all-powerful during the epoch of the Sassanian kings of Persia, began to wane, and, from being the highest caste, they fell to the rank of wandering jugglers, fortune-tellers and quacks, and gave their name to sleight-of-hand and conjuring tricks. But the name seems to have been also current as a generic term for astrologers in the East, as is evidenced by the New Testament narrative of the homage of the Magi to the Infant Christ. According to the narrative (Matt, ii, 1-12) the. three wise men came from the East to Jerusalem, led by a star, which at length guided them safely to the place of the Natmty at Bethlehem, where they offered their gifts of gold, frankincense and myrrh. As the <(Three Kings® their names be¬ came celebrated in the Middle Ages, and Bede distinguishes them as Kaspar, Melchior and Balthasar. (See also Parsees; Zoroaster). Consult Cumont, F. V. M., Oriental Religions in Roman Paganism* (Chicago 1911) ; id., (Les mysteres de Mithra) (3d ed., Brussels 1913) ; Moulton, J. H., (Early Zoroastrianism* (Lon¬ don 1913).

MAGIC, or BLACK ART, was formerly the means of producing supernatural effects with the assistance of evil spirits. Doubtless in very remote time magic and religion were practically one, but the development of mental¬ ity brought about a differentiation. The funda¬ mental fact was a strong belief in what was considered supernatural. Magic is of a more positive nature, but it carries with it the idea of taboo (q.v.). Supernatural effects were at an early period naturally associated with the exercise of the healing art. In the rudest stage of society this was confined to the women, and naturally arrived at the dignity of a profession in the hands of the older, whom

experience had gifted with superior skill. As their art was for the most part a mystery to themselves, they gradually came to be regarded as objects of fear as much as of hope, and magic medicines became synonymous with poison. The sorceress, poisoner and witch were in time reck¬ oned identical. (See Witchcraft). Mediea, Persia and the

neighboring countries, famous tor their knowledge of astronomy and astrol¬ ogy, are described as the chief seats of the ancient Magi, whose doctrine seems to be, in part, of great antiquity. This doctrine repre¬ sented opposition or strife as the parent and original cause of all things. After the opposi¬ tion between light and darkness, Ormuzd and Ahriman, was established, the whole series of finite beings, the whole sensual world, pro¬ ceeded from this constant struggle of light and darkness, good and evil. The change of day and night, light and darkness, the whole series of ages, time itself, is only a consequence of this struggle, in which sometimes light, some¬ times darkness, appears victorious, until finally light shall conquer for ever. If all finite things stand under the influence of preserving and de¬ stroying powers in nature, it is clear that he who could master these powers could dispose at his pleasure of the things subject to them; and the doctrine of the Magians was that by prayer and a true knowledge of those laws of opposition, love and hatred, light and darkness, such power could be obtained; and that thus also it was possible to pry into futurity. But it was believed that as the world became sinful , the light of the ancient doctrine of the Magi was obscured, and those who bore the name be¬ came at last only evil-disposed sorcerers. One important branch of their art was now the ex¬ citement of love by potions and enchantments. Their love-potions consisted partly of ingre¬ dients which are still known to the physicians as stimulants, partly of parts of animals who had died longing for food or air, or the saliva of hungry dogs, and other still more disgust¬ ing substances. Magic at this period also oc¬ cupied itself with fortune-telling, calling up the dead and bewitching by the look — a super¬ stition which we find existing in the processes against witches in modern times. It can hardly be doubted that the art of the ancient magicians was founded to a considerable degree upon a knowledge of the powers of nature superior to that of the general public. At one time magic was greatly studied in Europe, and many dis¬ tinguished namêˆ are found among its students and professors. The most famous of these are Albertus Magnus, Roger Bacon, Cornelius Agnppa, Michael Nostradamus, John Dee, Wil¬ liam Lilly, *etc.* While magic is a thing of the past there are still many survivals to be found to-day among the superstitions held by a large number of individuals. Consult Constant, A L (History of Magic> (trans. by Waite, Phila¬ delphia 1914) ; Ennemoser, <History of Magic* ; Lang, A., (Magic and Religion > (New York 1901); Scott, (Demonology and Witchcraft*; Mackay, (Memoirs of Extraordinary Popular Delusions) ; Regnault, (La Sorcellerie, ses Rap¬ ports avec les Sciences biologiques* (1897) *Lehmann, <Aberglaube und Zauberei* (1898). ’

MAGIC CIRCLE. See Circle, Magic.

MAGIC LANTERN, an optical instru¬ ment for the projecting of enlarged images upon a screen or other adapted surface. This

title is commonly given to the type of instru¬ ment employed for home amusement, the more elaborate types used for public exhibition and educational work being known as stereopticons or optical lanterns (q.v.). In its simplest form the instrument consists of a lantern, generally of tin, and cubical in form, having in the in¬ terior a powerful Argand lamp, the pencils of light issuing from which pass through a con¬ vex lens to a screen or a white wall a few feet away. It is most commonly used as a toy. The principle of its construction is very simple. A lamp is placed within the closed lantern with its burner in the focus of a con¬ cave parabolic mirror, the reflected light from which passes through a horizontal tube on a level with the flame. This tube contains two lenses, the one a hemispherical illuminating lens, of short focus, to condense a strong light on the picture, and the other a double convex lens, which receives the rays after they have passed through the picture, and throws them on the screen. The picture, known as the lan¬ tern slide, is inserted through a transverse slit into the tube between the lenses. The screen must not be too far removed from the lantern, otherwise the image will become indistinct and distorted. The tube is made to slide in and out, so that the distance of the lens from the slide being capable of being increased or dimim ished, an image of any moderate size, larger or smaller, may be focused after the desired s*ze ?s secured by increasing or diminishing the distance between the lantern and the screen.

Where an electric lighting current is avail¬ able the pictures may be much improved in illumination by the use of a 60-watt Mazda lamp in place of the Argand lamp (which is often dangerous from overheating if run too long without cooling down). A still more bril¬ liant illumination may be had with the nitrogen amp. Further improvement may be secured by using a regular condenser, formed of two plano-convex lenses of four or five inches diameter, set with the convex sides toward each other and quite close together. Far better re¬ sults as to sharpness and clearness on the screen will be secured by the use of a lens of the standard “portrait** type as the projector. For a small house picture, say from six to nine feet in diameter, the lens known as “quarter-size will give very satisfactory results. The accompanying diagram represents convention-V

ally a longitudinal section through a magic lan¬ tern fitted with a nitrogen lamp (N), attached to the house lighting wires (E), and provided yif*1 a Palr °* plano-convex condensing lenses SL >■ reflector is indicated at R; the slot

in which the slides are inserted at S ; the double-

convex projecting lens at P ; and the ventilating chimney, to carry off excessive heat, at V.

The objects exhibited with the magic lan¬ tern are usually pictures drawn, painted or photographed on glass strips or plates of appro¬ priate size, the light passing through them from the condenser and thence through the project¬ ing lens. The size of the image upon the screen depends chiefly upon the brilliancy of the light, and hence the circle which it is capable of illuminating. Secondarily the size will depend upon the distance of the lantern from# the screen, and the ability to focus the image thereon. These three conditions must be skil¬ fully adjusted to secure the best results. See Stereopticon.

Bibliography. — Elmendorf, D. L., (Lantern Slides: How to Make and Color Them5 (New York 1900) ; Fraprie, F. R., (How to Make Lantern Slides5 (Boston 1918) ; Gage,

S. H. and Gage, H. P.. (Optical Projection: The Principles, Installation and Use of the Magic Lantern5 (Ithaca, N. Y., 1914) ; Wil¬ liams, Brown and Earle, (The Magic Lantern in College Work5 (Philadelphia 1908).

MAGIC MIRROR OF JAPAN, some few specimens of the small, round bronze mirrors made in Japan which differ from others by reflecting upon a white screen the raised figures on the back of the mirror when a strong beam of light is thrown upon the polished convex surface. The mirrors are made of bronze with a polished, slightly convex face

and the backs are decorated with raised ornaments. The characteristics of the magic mirrors was long a mystery, as much to the makers as to others, the peculiarity being apparently accidental. The Japanese themselves, while possessing a rever¬ ence for all mirrors, placed no undue value upon the magic mirrors. The Chinese noticed the phenomenon as early as the 11th century and gladly paid fabulous prices for such as possessed the trait. The physical nature of the mystery was first revealed by the French physi¬ cist, Charles Cleophas Person, in 1847. He ob¬ served that the convex surface of the magic mirrors was not uniform, the portions in front of the ornamental figures being plane, and therefore reflecting direct rays while the con¬ vex portions gave divergent rays and so made the reflection of the images indistinct. The theory was worked out by W. E. Ayrton and J. Perry, who discovered the phenomenon to

affect the reflection under ordinary light, but plainly apparent when thrown on a screen by a bright light. Consult Proceedings of the Royal Society of London5 (Vol. XXVIII, 1878).

MAGIC SKIN, The, or (WILD ASS' SKIN,5 as the French title (Peau de chagrin5 is_ also translated, is one of the most famous of the novels making up the imposing series of the (Human Comedy5 of Balzac, where it may be found in the group of Philosophical Studies.5 It was also one of the earliest (1831). While it offers abundantly that penetrating ob¬ servation of human conduct and character, and that minute record of the myriad little con¬ crete details of circumstance and environment that condition and explain them, that mark the realism of Balzac and make his work so full of what Taine has called ((human documents,55 it is essentially an allegory and enforces, un¬ der the form of a marie symbol, a profoundly moral truth. The magic skin is a piece of shagreen bearing this inscription : Possessing me thou shalt possess all things, but thy life is mine, for God hath so willed it. Wish and thy wishes shall be fulfilled; but measure thy desires, according to the life that is in thee. This is thy life, with each wish I must shrink even as thy own days. Wilt thou have me? Take me. God will hearken unto thee. So be it.55 The young man who becomes the pos¬ sessor of this talisman in a moment of suicidal desperation demands of it a princely fortune, and sees himself with the power to have every wish gratified. But with each exercise of his power he observes with horror that the magic skin shrinks and shrinks; and less and less do his demands on its power bring with them satisfaction. The story is not of even interest throughout, and the narrative of the youth of the hero, which takes up a half of the book, may seem somewhat long drawn out. But it is one of the best examples of Balzac's peculiar power of seeing facts and illuminating them with ideas. There are English translations by Ellen Marriage, with a preface by George Saintsbury (Philadelphia 1897), and by Kathe¬ rine P. Wormeley (Boston 1896).

Arthur G. Canfield.

MAGIC SQUARES. A magic square is a square divided into equal smaller squares, each containing a term of a series of integers, the sums of the numbers in any horizontal, vertical and diagonal line being the same.

c

/s

0

ZO

s

10

0

s

/o

/3

s

/o

/s

0

3

/O

/s

o

ZO

/o

/3

0

ZO

s

/s

4

z/

10

/z

z

Z5

9

//

ZO

zs

1

/3

/9

/

6

/S

/7

3

Z4

/4

/6

/S

ZZ

8

3

4

/

3

Z

Z

3

4

/

3

5

Z

3

4

/

/

3

Z

3

4

4

/

3

Z

3

be due to peculiarities in the composition of The construction of such squares is an

the metal in some of the mirrors, the pressure amusement of great antiquity. They were used in polishing the thicker portions contain-known m India and China before the Christ an ing the raised ornaments resulting in a differ-Era, and a knowledge of them was introduced ence on the reflecting surface too minute to into Europe by Moschopulus who flourished in

Constantinople early in the 15th century. Talismanic virtues and occult properties were ascribed to them by the ancients. They were engraved on metal and stone and worn as amulets, as in India at the present day. A magic square of the fourth order is engraved on the gate of the fort at Gwalior in that country. Mediaeval astrologers and physicians were filled with superstitions in regard to magic squares. They associated the squares of the orders 3, 4, 5, 6, 7, 8 and 9 with the astrological planets Saturn, Jupiter, Mars, the Sun, Venus, Mercury and the Moon. A square containing one cell symbolized the unity of the Deity; one of the second order, not being possible, signified the imperfection of the elements air, earth, fire and water. Albert Durer's well-known paint¬ ing, (Melancholy, } contains a magic square of the fourth order, doubtless because of its sup¬ posed mystical significance. They have been made the subject of elaborate research bv vari¬ ous investigators but the world is indebted chiefly to the French mathematicians for the de¬ velopment of the theory of magic squares.

. In this article general rules for the construc¬ tion of magic squares of any order will be given, illustrated by particular examples. The squares produced by these methods by no means exhaust all possible arrangements, but the rules furnish squares in great number and variet}ˆ.

Magic squares are divided into two general classes according as the numbers of cells on a. side is odd or even. Even squares are sub¬ divided into doubly even, i.e., when the root is divisible by 4, and singly even, when the root is divisible by 2 but not by 4. A horizontal line of cells is called a row, and a vertical line acolumn. Two cells in a row equidistant from the ends are termed a horizontal pair, and two cells in a column equidistant from the ends are termed a vertical pair. In a series of natural numbers any two equidistant from the ends are said to be complementary.

Magic Squares of an Odd Order.— La

Hire s method for constructing odd magic squares requires the formation of two auxiliary squares A and B. For a square of the fifth order diagram A is formed with the series of natural numbers 1, 2, 3, 4 and 5 as follows: First, put 3 (the mean of the numbers) in the top

left-hand corner cell, and the numbers 1, 2, 4 and 5 in the cells of the top row in any order. Next, the number in each cell of the top row. is repeated in the cells of a diagonal sloping downward to the right. The cells filled by the same number form a broken diagonal.

Form a new square by making the left-hand column of A (beginning with its bottom num¬ ber) the first row in the new square, and so on. Next, instead of the numbers 1, 2, 3, 4 and 5, substitute respectively the numbers 0, 5, 10, 15 and 20, thus producing square B. In each cell of square C place the sum of the numbers in similarly situated cells of squares A and B. The result is a magic square of the fifth order. Any magic . square of an odd order can be constructed in a similar manner.

Va Loubere's Method. — In order to con¬ struct a magic square of an odd order by this method, place 1 in the middle cell of the upper row, and using the series of natural numbers (any arithmetical series will answer) proceed always diagonally upward to the right, except when the edge of the square or a cell already filled is reached. When a number would fall

D

SO

39

48

/

/O

/9

Z8

58

47

7

9

18

Z7

Z9

46

6

8

17

Z6

55

51

S

/4

16

Z5

34

36

45

/3

15

Z4

33

4Z

44

4

Zl

Z3

3Z

4 /

43

3

IZ

zz

5!

40

49

Z

outside the square, carry it to the extreme cell m that row or column in which the cell outside would fall. When a cell is reached that is al¬ ready filled or when the righthand upper corner ce 1 is reached, place the number in the cell just be low. The magic square D is formed by this rule.. It may be remarked here that from any magic square, whether odd or even, a number of other magic squares can be formed by the mere interchange of the row and column which intersect in a diagonal with the row and column which intersect in some other cell in the same diagonal In this way from each magic square of the fifth order 48 other magic squares can be formed.

Magic Squares of an Even Order.— To

construct a magic of the sixth order proceed according to the following rule which is a modified form of a method due to La Hire

F G

/

5

4

3

Z

6

6

Z

4

3

5

/

6

5

3

4

Z

/

/

5

3

4

Z

6

6

Z

3

4

5

/

/

Z

4

3

S

6

0

30

30

0

30

0

Z4

6

Z4

Z4

6

6

IQ

18

IZ

/z

/z

13

/Z

IZ

18

18

IS

IZ

6

Z4

6

6

Z4

Z4

30

0

0

30

0

30

/

35

34

3

3Z

6

30

8

Z8

Z7

//

7

Z4

Z3

IS

16

74

/9

13

n

Z /

ZZ

ZO

18

/z

Z6

9

/O

Z9

Z5

31

z

4

33

5

36

119

As in his rule for odd squares two auxiliary squares are employed. For a square of the sixth order the first auxiliary square E is con¬ structed as follows: First, fill the cells of the

two diagonals with the numbers 1, 2, 3, 4, 5 and 6, beginning on the left-hand side. Second, fill each of the remaining cells of the first column with the same number as that already in two of them or with the complementary number, i.e., with al or a6 in any way, provided that there are the same number of these num¬ bers in the column. Third, cells horizontally paired with those in the first column are filled with the complementary numbers. Fourth, the remaining cells in the second and third columns are filled in an analogous way to that in which the cells in the first column were filled; and then the cells horizontally paired with them are filled with the complementary numbers. Ob¬ serve that in the case of a singly even magic square it will be necessary in constructing E to take care in the second step that in every row at least one cell which is not in a diagonal shall have its vertically paired cell filled with the same number as itself.

The second of the auxiliary squares F is constructed as follows : Rewrite square E, making another square F in which the left-hand column of E (beginning with its top number) becomes the top row of the _new

K

//

64

69

3

I

6

S3

46

5/

66

63

70

3

s

7

43

SO

SZ

67

7Z

65

4

9

Z

49

S4

47

Z6

19

Z4

44

37

4Z

6Z

55

60

Zl

Z3

Z5

39

4/

43

57

59

61

zz

Z7

zo

40

45

33

S3

63

S6

35

23

S3

30

73

73

n

/O

/S

30

3Z

34

7s

77

79

/z

/4

/6

3/

36

Z9

76

3/

7 *

/ 3

/3

//

square, the second column of E becomes the second row of the new square, and so on. Then instead of each of the numbers 1, 2, 3, 4, 5 and 6, substitute the corresponding number

from the series 0, 6, 12, 18, 24 and 30. The result is square F. Next, if

in each cell of G the sum of the numbers in the corresponding cells of squares E and F be placed, the required magic square is formed.

The following method is applicable to the construction of doubly e en magic squares only. Imagine the square to be divided into squarelets of four cells each, the four central cells com¬ prising one; and conceive these squarelets to be of two kinds, alternating with each other. Place 1 in the left-hand upper corner cell, and proceed horizontally to the right counting a number to each cell, but filling successively the squarelets of one kind only. When the end of one row is reached turn to the left-hand cell of the next row and again advance, filling cells of one kind as before, and so on. For the

L

/

63

62

4

5

59

58

Q

56

15

49

48

19

44

20

9

55

47

25

39

38

28

Id

10

II

22

36

30

3/

33

43

54

53

42

3Z

34

35

29

23

12

13

24

37

27

26

40

4/

52

14

45

16

17

46

2/

SO

5/

57

2

3

6/

60

6

7

64

4-square the result of this operation is seen in diagram H.

Next, begin with the righthand lower corner cell, considering 1 as falling on it but not writing the number, and proceed regularly to the left, row after row, filling the empty cells with the numbers belonging to them but not writing numbers in the cells already filled. The result of the two operations is the magic square I. This is the most perfect magic square of the fourth order. Not only do the horizontal, vertical and diagonal lines of num¬ bers sum up 34, but there are 33 other ways in which sets of four numbers may be selected whose sum is 34, making 48 ways in all. By the interchange of rows and columns according to the rule enunciated above, other squares may be formed, but none so ‘perfect as this.

The above methods for the construction of magic squares are, in the writer’- opinion, the simplest of all those proposed. Limited space permits only two other methods to be noticed, which, however, are applicable to only a limited class of cases. The first relates to the con¬ struction of composite magic squares. For ex¬ ample a square of 81 cells may be considered as made up of 9 smaller squares each containing 9 cells. The magic square in diagram K is built up by this method.

The other method consists in surrounding a magic square with a border of cells, consti¬ tuting what is termed a concentric square. In

I

4

6

7

10

//

13

16

/

/S

74

4

/Z

6

7

9

8

/o

il

5

IS

3

Z

16

120

this way from the magic square of the third order can be built up squares of any odd order; and similarly even magic squares of any order may be built up from the magic square of the

M

To Dr. Franklin is due the construction of

diagram M which he called The Magic Circle of Circles. (See the illustration herewith). It is composed of a series of numbers from 12 to 75, inclusive, placed in eight concentric circular spaces and arranged in eight radii, with the number 12 in the centre. Like the centre this number is common to all the circular spaces and to all the radii. The numbers are so placed that the sum of all those in any of the circular, spaces, together with the central num¬ ber 12, is 360, the number of degrees in a cir¬ cle. The numbers in each radius together with the central number make 360. The numbers in half of any of the circular spaces taken above or below the horizontal diameter, with half the central number, make 180, the number of de¬ grees in a semi-circle. If any four adjoining numbers be taken, as if in a square, in the ra¬ dial division of the circular spaces, the sum of these with half the central number is 180. There are, moreover, included five sets of other circular spaces bounded by circles which are eccentric with respect to the common centre. The centres of the circles which bound them are at A, B, C and D. The numbers in these eccentric circular spaces possess the same magic properties as the numbers in the first-mentioned circular spaces.

Magic squares have been developed into fig¬ ures of three dimensions termed magic cubes. Diagram N is a magic cube of the fourth order.

1, 2, 3 and 4 are horizontal sections of N

N“

numbered from the top down. There are 52 ranks of numbers in this cube which sum up 130, namely, 16 vertical columns, 16 horizontal rows from front to back, 16 horizontal rows from left to right, and four diagonal lines unit¬ ing four pairs of opposite corners. The sum of any two numbers which are diametrically opposite each other and equidistant from the

O

30

Z/

6

/S

Z8

/9

7

/ 6

Z9

s

/4

zz

3/

6

35

/&

ZJ

9

36

! 7

Z6

/$

4

3Z

Z3

Z

//

34

ZJ

/

/O

33

Z4

3

/Z

centre of the cube equals 65 ; and the sum of the numbers in the 48 sub-squares of four cells each is 130.

Among curiosities in magic construction may be mentioned the following: The square in diagram O is filled with the natural numbers in the path of a knight returning to its starting cell, and possesses the property that the differ¬ ence of any two numbers equidistant from and on opposite sides of the centre is 18. It is due to Euler, the famous mathematician.

W. S. Andrews in his Magic Squares and Cubes gives a magic cross filled with 145 numbers, with the statement that it contains the almost incredible number of 160,144 different columns of 21 numbers whose sum is 1,471.

A certain class of magic squares has re¬ ceived much attention in recent years. They are called Nosik squares in England, and in France diabolic squares. They are formed so that the sums along certain lines, such as all the rows, columns, diagonals and broken di¬ agonals are the same. Diagram P is a unique example, as it is composed entirely of prime

P

1013

25/

44p

9/t

88 1

B3 9

1301

94/

1/3

3(t

At

173

70/

1229

/361

/op/

1289

46/

101

563

52 /

Apt

953

1151

389

numbers. It is due to the ingenuity of C. D. Schuldham and appeared in a recent number of The New York Sun.

This square possesses the Nasik properties above mentioned, and in addition the sum of any two ‘numbers equidistant from the centre and opposite each other is 1,402, or twice the central number.

Magic rectangles, crosses, stars, cylinders, etc., have been constructed, but want of space forbids any further notice of them.

Varying estimates as to the possible number of magic squares of a given order have been made by different investigators. W. W. Rouse Ball in his Mathematical Recreations thinks that those of the fifth order probably exceed half a million. Theodor Hugel in his Die Magischen Quadrate has calculated that the paper required to contain all the magic squares of the 13th order would cover the whole sur¬ face of the earth about 348 times.

As to the scientific value of magic squares the following paragraph is quoted from a paper by Maj. P. A. McMahon, F.R.S., published in Proceedings of the Royal Institution of Great Britain, 1892. ((What was at first merely a practice of magicians and talisman makers has now for a long time become the serious study of mathematicians. … It was con¬ sidered possible that some new properties of numbers might be discovered… . This has

i’n fact proved to be the case, for from a cer¬ tain point of view the subject has been found to be intimately connected with great depart¬ ments of science such as the Infinitesimal Cal¬ culus, the Calculus of Operations, and the The¬ ory of Groups.

A. B. Nelson.

MAGIC WOOD, a wood used in cups which were sent to Spain in the 16th century as presents to princes, and were highly valued first as curiosities and later as a means of health. The ˆmagic® consisted in the fact that water put into the cup speedily turned a rich blue. Although it has been a subject of in¬ quiry ever since it is not until lately that the wood has been identified botanically, and the cause of its effect on water is still unknown. The identification was made by William E. Safford, of the United States Department of Agri¬ culture, who described the result of his investi¬ gation in The American Museum Journal (New York, Vol. XVIII, p. 48, 1918) witn a colored illustration. He has discovered that two sepa¬ rate kinds of wood are involved in the history of this matter. The description of the early writers mostly refer to a shrub of Mexico called sweet-wood (Eysenhardtia polystacha) ; but the cups were made of wood of the gigan¬ tic narra tree (Pterocarpus indicus) of the Philippines. Although very different botani¬ cally, both produce effects on water virtually indistinguishable ; and as in early times most of the communication between Spain and the Philippines was by way of Mexico, the double confusion as to origin easily arose. When water was poured into the narra cups, or chips of the Mexican sweet-wood were infused in a glass, the water became fluorescent in beautiful colors. In the early accounts of the cups (Pterocar¬ pus) it was said that the water at once turned blue, which deepened if left to stand for some time. When this water was poured into a flask and held to the light it appeared perfectly clear, ffbut if you move this glass phial toward a more shady place the liquid will assume a most delightful greenness, and if to a still more shady place, a reddish color. … In the dark, however, or in an opaque vase, it will once more assume its blue colors As was cus¬ tomary in those days this changeably tinted

water was regarded as having medicinal value, especially in any disorder of the kidneys, and was carried to Europe in great quantities and thus used under the name lignum nepliriticum. Mr. Safford got similar colors from the Mexi¬ can shrub. A few small chips in ordinary tap-water tinged it a golden yellow, which soon deepened to orange.

When the glass was held against a dark background the liquid glowed with a beautiful peacock fluorescence very much like that seen in quinine. Placed partly in a sunbeam, half of the liquid appeared yellow and the other half blue; ((and when the sun¬ light was focussed upon it by the lens of a com¬ mon reading-glass the vial seemed to be filled with radiant gold penetrated by a shaft of pure cobalt.® The most ingenious investigation has failed thus far to reveal the cause of this flu¬ orescence.

MAGIE, ma-ge', William Francis, Amer¬ ican physicist: b. Elizabeth, N. J., 14 Dec. 1858. He was graduated at Princeton in 1879 and afterward studied at the University of Berlin. He was instructor in physics at Princeton in 1879-84, became professor in that branch upon his return from Berlin, in 1885, and has been dean of the faculty since 1912. He is a member of the American Philosophical Society, and in 1910 served as president of the American Phys¬ ical Society. Author of (The Second Law of Thermodynamics5 (1899); (A Course of Lec¬ tures on Physics5 (1904) ; Principles of Phys¬ ics5 (1911). He also translated Christiansen's (Elements of Theoretical Physics5 (1896) ; and revised Anthony and Brackett's Physics5

(1896).

MAGINN, ma-gfn', William, Irish author: b. Cork, Ireland, 11 Nov. 1793; d. Walton-on- Thames, 20 Aug. 1842. He was graduated from Trinity College, Dublin, in 1811, and was for some years a schoolmaster. In 1819 he be¬ came a contributor to Blackwood's Magazine and was in turn Paris correspondent of the Representative, junior editor of the Standard and one of the founders of Fraser's Magazine, his contributions to which made it famous. He was a man of superb classical education, ex¬ celled as a critic and his literary work abounded in rich fancy and the genuine Irish wit. Un¬ fortunately he had no financial ability and he died in extreme poverty notwithstanding the large sums his pen had earned. His collected works were published in five volumes in 1855-57. Consult Krans, Urish Life in Irish Fiction5 (New York 1903).

MAGINNIS, Charles Donagh, American architect: b. Londonderry, Ireland, 1867. He was educated at Cusack's Academy, Dublin, and won Queen's prize in mathematics at South Kensington, London, in 1883. He came to the United States in 1885, engaged in practice as an architect at Boston in 1886 and became a member of the firm Maginnis and Walsh. He is especially interested in ecclesiastical archi¬

tecture. He is a member of the Municipal Art Commission, Boston, and of the Massachusetts State Art Commission. He has written and il¬ lustrated articles on architecture for profes¬ sional magazines and is author of Pen Draw¬ ing5 (1898).

MAGISTRATE. See Court.

MAGLIABECCHI, Antonio, an-to'ne-6 mal-ya-bek'e, Italian bibliographer : b. Flor¬

ence, 28 Oct. 1633; d. there, 4 July 1714. In the early part of his life he was engaged in the employment of a goldsmith, which he relin¬ quished to devote himself to literary pursuits. Through unremitting application he acquired a multifarious stock of erudition, which made him the wonder of his age. Duke Cosimo III made Magliabecchi keeper of the library which he had collected and gave him free access to the Laurentian Library and the Oriental MSS., and of the latter collection he published a catalogue. He left no literary Avork, but freely afforded in¬ formation to authors who sought his assistance in their own undertakings, his prodigious mem¬ ory enabling him to furnish the exact reference to any page or paragraph of the numberless volumes he had read. He left his valuable pri¬ vate library of 30,000 volumes to his native city where it now forms part of the National Library.

MAGMA, rock which is in a fluid condi¬ tion due to heat, and commonly said to be mol¬ ten. For a discussion of the modern conception of a magma see the article on Rocks. See also Volcanoes and the section on Volcanism in the article on Geology.

MAGMATIC SEGREGATION, or MAGMATIC DIFFERENTIATION. Due to

processes but little understood, when an igneous rock passes from the molten to the solid state, there is frequently shown a tendency for like particles to segregate in masses. These may form, at the margin of the igneous mass, or constitute irregular bodies within the parent rock itself, or may even force themselves as veins into fractures in the already cooled por¬ tions of the outer part of the magma. The process is known as magmatic segregation, or magmatic differentiation. Large bodes of mag¬ netic iron ore in the Adirondacks and in Swe¬ den, and of nickel-bearing pyrrhotite at Sud¬ bury, Ontario, are believed to be of this origin. See Vein, Mining.

MAGMATIC STOPING, the process by which a fluid rock mass

(magma) heats the overlying rock till it fractures and portions break off and settle into the magma, there to be assimilated or to remain as solid blocks or Xenoliths. The process is believed to be im¬ portant in the mechanics of igneous intrusion. See Assimilation and Xenoliths.

MAGMATIC WATER.

Water.

See Ground

MAGNA CHARTA, mag’na kar’ta, or GREAT CHARTER OF LIBERTIES, a

famous document extorted from King John of England by the confederated barons in 1215. The barons who with their followers com¬ posed <(the Army of . God and the Holy Church55 were the whole nobility of England ; their fol¬ lowers comprehended all the yeomanry and free peasantry, and the accession of the capi¬ tal was a pledge of the adherence of the citizens and burgesses. John had been obliged to yield to this general union, and in June both parties encamped on the plain called Runnymede, be¬ tween Windsor and Staines, on the banks of the Thames, and conferences were opened be¬ tween the king and his barons. The prelimi¬ naries being, agreed upon, the barons presented heads of their grievances and means of redress, in the nature of the bills now offered by both

houses for the royal assent. The king, accord¬ ing to the custom which then and long after prevailed, directed that the articles should be reduced to the form of a charter, in which state it issued as a royal grant. The charter was signed on 15 June. Copies were immedi¬ ately sent to every county or diocese and or¬ dered to be read publicly twice a year. To se¬ cure the execution of the charter John was compelled to surrender the city and Tower of London, to be held by the barons till 15 August, or until he had completely executed the charter. King John, though he signed the charter, had no intention of keeping it; he appealed to the Pope, who in a bull declared Magna Charta ((null and void® and excommunicated the bar¬ ons who had obtained it ; and he was conduct¬ ing a war against his barons when death over¬ took him in May 1216. Many parts of the charter were pointed against the abuses of the power of the king as lord paramount ; the ty¬ rannical exercise of the provisions of the for¬ est laws was

checked, and many grievances in¬ cident to feudal tenures were mitigated or abol¬ ished. But besides these provisions it contains many for the benefit of the people at large, and a few maxims of just government, applicable to all places and times, of which it is hardly possible to overrate the importance of the first promulgation by the supreme authority. One of these provided that taxes should not be im¬ posed without the consent of the Common Council of the realm. The 39th article con¬ tains the celebrated clause which forbids arbi¬ trary imprisonment and punishment without lawful trial. This article contains the writ of habeas corpus and the trial by jury, the most effectual securities against oppression which the wisdom of man has devised, and the prin¬ ciple that justice is the debt of every govern¬ ment, which cannot be paid without rendering law cheap, prompt and equal. The provision which directs that the Supreme Civil Court shall be stationary, instead of following the king's person, was an important safeguard of the regularity, accessibility, independence and dig¬ nity of public justice in Great Britain. Con¬ firmation of the Great Charter was frequently made by English monarchs. Consult Stubbs, Constitutional History of England* (1897).

MAGNA GR2ECIA, gre'shi-a, «Great Greece,® the name commonly given in ancient times to that part of southern Italy which was inhabited by Greek colonists. Apparently the name was in use as early as the time of Py¬ thagoras (586-506 b.c.). Strabo includes the Greek cities of Sicily under the appellation, but the name refers generally only to the Greek cities in the south of Italy, including those on the shores of the Tarentine Gulf and the Bruttian Peninsula, with Velia, Posidonia and Laus, on the west coast of Lucania. The name was not at first territorial or coextensive with any region, but applied merely to the Greek cities on the coasts, Cumse was the most an¬ cient of all the Greek settlements in Italy, but from its remote position it was in a great meas¬ ure isolated from the later Greek settlements. The Achaeans were the real colonizers of south¬ ern Italy, their first settlement being Sybaris (720 b.c). A few years later (708 b.c.) Spar¬ tan colonists founded Tarentum, and to counter¬ act their encroachments the Achaeans founded

Metapontum, on the frontier of the territory of the Tarentines, between 700 and 680 b.c. The Locrians founded further south the city known as Locri Epizephyrii, nearly contemporary with Crotona (710 b.c.). The Chalcidic colony of Rhegium, on the Sicilian Straits, claims to have been more ancient even than Sybaris. The Greek cities on the shores of Bruttium and Lucania were, Velia excepted (540 b.c.), off¬

shoots from the earlier settlements, and not founded by colonists direct from Greece. The arrival of Pythagoras at Crotona (530 b.c.) produced a marked change in the cities of Magna Graecia, and led to the introduction of great political changes. He and his followers were ultimately expelled from Crotona. Very little of the early history is known. The coast cities were essentially mercantile. Trade was well developed, and in the 6th century there was an extensive commerce, especially with Greece. The colonists who pushed to the in¬ terior subdued the opposing natives and devel¬ oped the fertile plains into agricultural settle¬ ments. There was a high development of in¬ tellectual life. At various times there were temporary alliances among the cities, but never a permanent federation. Warfare was common and bitter and to this fact is largely due the decline of the territory. Magna Graecia com¬ prised the provinces of Campania, Apulia, Iapygia, Lucania and Bruttium.

MAG N ALIA CHRISTI AMERICANA,

mag-na'li-a kris'ti a-mer-i-ka'na, an Ecclesias¬ tical History of New England, from 1620 to 1628,) published by Cotton Mather in 1702. It treats more extensively of the early history of the country than its title seems to indicate, and is divided into seven books : the first treating of the early discoveries of America and the voyage to New England; the second is (Lives of the Governors) ; the third, (Lives of many Reverend, Learned and Holy Divines) ; the fourth, (Of Harvard University) ; the fifth, (The Faith and the Order in the Church of New England) ; the sixth, (Discoveries and Demonstrations of the Divine Providence in Remarkable Mercies and Judgments on Many Particular Persons) ; the seventh, disturbances Given to the Churches of New England.* In the sixth book the author gives accounts of the wonders of the invisible world, of worthy peo¬ ple succored when in dire distress, of the sad ending of many wicked ones and of the cases of witchcraft at Salem and other places.

MAGNENTIUS, mag-nen'shi-us, Flavius Popilius, Roman imperial usurper of the West : d. 11 Aug. 353. Having been entrusted by Constans with a high military command he availed himself of his office to plot the emperor's over¬ throw. On 18 Jan. 350, presenting himself in imperial purple at a great banquet given by one of the conspirators at Autun, he was saluted with the title of Augustus; and assassins sent for the purpose having dispatched Constans, Magnentius was acknowledged as emperor by all the western provinces except Illyria. Constantius, on hearing of his brother's murder, hastened from the confines of Persia and de¬ feated Magnentius (351). These disasters led to the . defection of all the countries that had recognized

the usurper, who thereupon com¬ mitted suicide. Constantius then became mas¬ ter of the entire empire.

MAGNESIA, the oxide of magnesium, MgO. See Magnesium.

MAGNESIAN LIMESTONE, a rock con¬ sisting of the mixed carbonates of lime and magnesia. Mineralogically it is known as Dolomite (q.v.).

MAGNESITE, a white, porcelain-like min¬ eral (magnesium carbonate, MgCOs; carbon dioxide 52.4 per cent, magnesium oxide 47.6 per cent), with a hardness of 3.5 to 4.5, and a specific gravity of 3.0-3. 1. It is usually found associated with serpentine, talcose slates and dolomite. The magnesite of commerce comes from several localities, notably, Veitsch in Styria, Austria, where it occurs in conformable beds in a Silurian formation; at Frankenstein in Silesia, where a very pure variety is found ; at Bolton, Canada, there is a ledge 60 feet wide which is tinged with green by chromium. The quality, however, is not good. In the Red Mountain mining district, Santa Clara and Stanislaus counties, Cal., is found the largest known deposit in the world. Here there are several veins from 20 to 60 feet wide and of very pure quality. It is also found in Napa, Sonoma, Fresno, Placer, Mariposa, Monterey and San Luis Obispo counties, Cal. Magnesite is used as a bleaching agent in paper-making and for making an excellent artificial stone for interior decoration. Its chief use, however, is in the manufacture of firebrick. In brick¬ making it is calcined, the gas C02 being col¬ lected and sold for charging mineral water and for use in cold-storage plants, instead of am¬ monia, and the resulting magnesium oxide mixed with a binding material and pressed into brick. From the pure mineral metallic mag¬ nesium and salts, as Epsom salts and mag¬ nesium chloride, are manufactured. See Min¬ eral Production of the United States.

MAGNESIUM, a metallic element whose compounds are abundant and widely distributed, but which does not occur, in nature, in the metallic form. Magnesium resembles calcium in its chemical deportment, and the oxides of the two metals were long confused with each other. Metallic magnesium was first prepared by Davy, in 1808, both by electrolysis and by the reduction of white-hot magnesia in an atmosphere of potassium vapor. In 1830 Bussy obtained a larger and purer yield of the metal, by heating a mixture of potassium and anhy¬ drous magnesium chloride to redness. It is best prepared by the electrolysis of the fused anhydrous chloride or of a mixture of mag¬ nesium chloride with the chlorides of sodium, potassium and

ammonium. Pure magnesium is silvery-white in color, lustrous and moderately hard. It may be hammered, rolled, filed and polished. Its specific gravity is about 1.75 and its specific heat about 0.245. Its melting point is variously given, the estimates ranging from 850° F. to nearly 1,500° F. When raised to a bright-red heat (out of contact with the air) it volatilizes, depositing upon cool surfaces again in the form of lustrous silvery crystals which belong to the hexagonal svstem, and are isomor-phous with those of zinc. It expands by 0.000015 of its own length, per Fahrenheit degree of rise of temperature; and at 32° F. its electrical resistance is 0.0438 of that of mercury.

Chemically, magnesium is a dvad. It has the symbol Mg, and an atomic weight of 24.36 if

0 = 16, or 24.18 if H = l. Its most important compounds are the oxide, MgO, the chloride. MgCb, the sulphate, MgSCL, and the carbonate, MgC'Ch. Metallic magnesium is not altered upon exposure to dry air, but ordinary air oxidizes it superficially. It dissolves readily in dilute acids, with the formation of the corre¬ sponding salts. Chlorine, bromine, iodine, fluorine, sulphur, phosphorus and arsenic com¬ bine with it directly. Red-hot metallic mag¬ nesium also slowly combines with free nitrogen to form a solid nitride. In the isolation of argon, helium and the other rare gases of the atmosphere advantage is taken of this fact for separating these gases from the nitrogen of the air. (See Argon). When strongly heated in the air, metallic magnesium takes fire and burns with an exceedingly brilliant white light that is rich in chemical rays; the product of the com¬ bustion being magnesia, MgO. Advantage is taken of this property in photography, most of the ˆflash-light® powders that are used consist¬ ing essentially of pulverized magnesium, either alone or mixed with a small quantity of some explosive or oxidizing agent. Magnesium will also burn when sufficiently heated in steam, carbon dioxide or sulphur dioxide.

Magnesium oxide, or ((magnesia,® MgO, is usually prepared by heating the nitrate or car¬ bonate of the metal ; and on account of this method of preparation it is commonly known as <(calcined magnesia.® Magnesia is a white sub¬ stance, without taste or odor. It does not have a strongly alkaline reaction, but it acts as a powerful base, reacting with acids to form the magnesium salts. It is scarcely soluble in water, but it slowly absorbs moisture and carbon dioxide from the air, becoming converted into a mixture of the hydrate and carbonate. When made into a paste with water, magnesia sets to a

hard, white mass, consisting partly or wholly of the hydrate, Mg(OH)2; but this action does not occur if the magnesia has been previously heated to whiteness. One of the most distinctive characteristics of magnesia is its infusibility. Even when heated in the flame of the oxyhydrogen blowpipe it does not melt, but gives out a bright white light, somewhat similar to that emitted by lime. (See Calcium Light). In the fiercer heat of the electric fur¬ nace, magnesia has been melted. On account of its infusibility magnesia is used in the manu¬ facture of crucibles and of firebrick. It occurs native as the mineral periclase, which crystal¬ lizes in the isometric system.

Magnesium chloride, MgCl2, is prepared by dissolving magnesia in hydrochloric acid, and evaporating the solution after the addition of a certain quantity of sal ammoniac. LTpon sub¬ sequent fusion the sal ammoniac volatilizes and the magnesium chloride is left behind. This substance is largely used as a preventive of mildew, in the sizing of cotton cloth. The min¬ eral carnallite contains magnesium chloride having the composition MgCl2 + KC1 + 6ˆ0.' Magnesium sulphate occurs native (in combina¬ tion with one molecule of water) as kieserite, and it may also be prepared artificially by dis¬ solving magnesium oxide or carbonate in dilute sulphuric acid. When combined with seven molecules of water, magnesium sulphate consti¬ tutes the familiar substance known as Epsom salts (q.v.), which is larerelv used in medicine Magnesium carbonate, MgCCh, is a white sub-MAGNESIUM

stance,' insoluble in water, but soluble in a solution of ammonium chloride, and also in water that contains carbon dioxide in solution. It occurs in nature as the mineral magnesite, which crystallizes in rhombohedral forms, iso-morphous with calcite. Dolomite, which occurs in nature in enormous quantities, is a carbonate of magnesium and calcium.

Magnesium salts are used to a considerable extent in medicine. The name ˆmagnesium® is derived from ((magnesia,)> which substance is said to have been obtained from the province of Magnesia in Thessaly.

MAGNESIUM, Electric Production of.

See Electrochemical Industries.

MAGNETIC DIP. See Dipping Needle.

MAGNETIC FIELD. See Electrical Terms.

MAGNETIC FLUX. See Electrical Terms.

MAGNETIC MOMENT. See Magnet¬ ism.

MAGNETIC POLE. See Magnetism.

MAGNETIC SEGREGATION, a process or processes in the preparation of ore by which the more valuable minerals are separated from the waste material and from each other by the use of magnets. A usual type of segregator consists of a belt conveyor carrying the ores below the magnet which raises the magnetic ore to another belt traveling at right angles to the .first. As it passes out of the magnetic field the segregated ore drops into a receptacle. By weakening or strengthening the magnetic field it becomes an easy matter to separate the non¬ magnetic from the magnetic, and the weakly magnetic from strongly magnetic.

MAGNETISM, the name applied to a pe¬ culiar force action first observed in connection with certain iron ores. This ore, often called

lodestone, is supposed to have been discovered in Magnesia, a part of Asia Minor. It is not possible to state just when this discovery was made, but certain passages in Lucretius show that something was known concerning it before the beginning of the Christian era. About the year 1200 we have the statement by Neckham that a lodestone free to turn takes up a definite position in space. Some further details were oted by Peregrinus (1269) and Ferrara (1629), it the greatest of the early works is that of Dr. Gilbert, a physician, who published his (De Magnete) in -1600. Those interested in the his¬ tory of the subject may consult the intellectual Rise of Electricity* by Park Benjamin, in which an excellent historical sketch may be found.

The only direct evidence that a body is mag¬ netic is its ability to exert a force on certain substances, which, by reason of their suscepti¬ bility to this action, are called magnetic sub¬ stances. A lodestone brought in contact with several small bodies will select those of iron or steel, if such be present, but show no apprecia¬ ble force on copper, lead, wood or in fact on any except iron, nickel, cobalt, certain rare metals and certain alloys, discovered by Hensler, of relatively non-magnetic metals, and a few others to a lesser degree. Of even greater in¬ terest and importance is the fact that the lode¬ stone is able to endow steel or iron with the ability to exert this force. Soft iron loses its

external magnetic qualities when removed from the immediate neighborhood of the exciting source, but hard steel or iron will retain this property for a long time. If a bar or rod of hard steel is drawn across a piece of lodestone or other permanent magnet and is then sus¬ pended so as to be free to turn about a vertical axis it will take up a definite position, usually its line of greatest length will be approximately north and south. If it be plunged into a box of iron filings, little magnetic action will be mani¬ fest near the middle of the bar, but near the ends considerable quantities of filings will be attracted and may be lifted against the action of gravity. These facts led to the naming of the regions of greatest external action the poles of the magnet and since the lines joining these regions would, in the case of a freely suspended magnet, lie in many places nearly north and south, the pole which seeks the north is often called the north-seeking or positive pole, the other which turns toward the south is corre¬ spondingly named the south-seeking or negative pole. The entire subject was formerly studied with reference to the behavior of like and un¬ like poles, and it was even supposed that these poles consisted of opposite sorts of magnetic matter. Later investigations

have developed methods less directly dependent upon the idea of poles, which are preferable for many purposes.

If we suppose two long magnets placed as shown in Fig. 1 a study of their mutual force

s

A

*

N

-c.

•c!

3*.

Qj

>1’

*

1

s

N

Fig. 1

action would indicate that each is exerting a push tending to increase the distance between them, and that the amount of this repulsion will vary with the distance between the magnets. If one of the bars be replaced by another whose magnetic quality is different the force action will be modified. If one of the magnets be re¬ versed in position a corresponding force tending to reduce the distance between the bars would be observed. It is convenient to use as a pre¬ liminary definition the statement that a unit pole is one which would exert unit force upon a precisely equal pole at a distance of one centi¬ meter. The law of pole action can then be stated by saying that the force is equal to the product of the two poles strengths divided by the square of the distance between the poles.

If a freely suspended magnet is brought into

Fig. 2.

the neighborhood of a large bar magnet as indi¬ cated in Fig. 2 it will be observed to take up a position somewhat as indicated in the lower

part of this diagram, as its point of suspension is moved along the line. The region where this directive force is noticeable is called the field of the magnet. (Gilbert's <(orb of virtue®). If continuous lines are drawn, which at each point have the direction taken by the free magnet, these lines are called lines of magnetic force, and they offer a very convenient method for a general study of magnetic action. While these lines have no objective existence, it is, neverthe¬ less, desirable to imagine that they are real and that they possess certain definite qualities. They should always be considered as being directed away from the north-seeking or positive pole. In the early conception of magnetic action these lines would have been regarded as the lines of flow of the magnetic material, and the word flux, still in use, bears evidence of this concep¬ tion. It is convenient also to regard the lines of force as being under tension and capable of repelling each other. The number of actual lines of force which could be drawn about a magnet is infinite. For purposes of compari¬ son, however, it is customary to represent the force action at a point upon the unit pole placed at that point by the number of lines drawn per square centimeter on a surface per¬ pendicular to the field. A unit field is one in which a force action upon a unit pole is one dyne, about the weight of 1-1000 of a gramme.

In order to compare magnets and to facili¬ tate magnetic computations, certain methods of measurement have been devised. Only a brief sketch can be given here, as full details of these operations may be found in books devoted to this subject, some of which will be men¬ tioned at the end of this article. When a bar magnet is placed at right angles to the lines of a uniform magnetic field it will experience a twist tending to place it along these lines. The amount of this twist will depend upon three things. First : The pole strength of the magnet in question. Second : The distance between the poles. Third: The strength of the field where it is placed. The product of the pole strength by distance between poles is called the mag¬ netic moment of the magnet. When a magnet is suspended freely and slightly displaced from a position parallel to the lines of force it will vibrate about this position. The time required for a complete swing is found to depend upon the magnetic moment, the moment of inertia and the strength of the field where the magnet is placed. The vibration period may be directly observed and the moment of inertia computed from the dimensions and weight of the

magnet. In this way the product of the magnetic mo¬ ment by the field strength may be found. If the same magnet is held with the line joining its poles east and west it will cause a small freely suspended magnet some distance to the east or west to turn slightly from its equilibrium posi¬ tion. The amount of this deflection depends on the distance between the magnets and the ratio of magnetic moment to field strength. If we denote the magnetic moment by ml and the field strength by H, the product of ml times H is found from the time of vibration, and by means of the deflection of the small auxiliary ml

magnet jj may be determined. When ml times

H or ml divided by H is known either ml or H is readily computed. When the field at any point is known, a comparison of the time of

vibration of a magnet at the known point with its period when vibrating at any other point enables us to compare the two fields without further measurement. The law of change being that if periodic time is doubled the field strength would be four times as great ; or the period varies inversely as the square foot of the field in which the magnet vibrates.

The facts mentioned above regarding the ability of a magnet to cause pieces of neutral iron or steel to show magnetic properties is frequently spoken of as magnetic induction. The general phenomena can be readily remem¬ bered if we imagine that it is easier for lines of magnetic force to pass through iron than through air. Small pieces, as shown at P, Fig. 2, would have lines entering at ((S® and leaving at (<N® and would behave as small magnets placed in corresponding positions. Owing to the tension of the lines of force these small pieces would tend to set themselves nearly parallel to the undisturbed direction of the lines. If a sheet of glass or other non-magnetic material is placed over a magnet and iron filings are sprinkled on its surface, a slight tapping, suffi¬ cient to overcome friction, will enable the lines of force to arrange the small temporary mag¬ nets parallel to the field. In this way maps of magnetic fields may be readily found, and their study throws considerable light upon many de-Fig. 3.

tails of these peculiar phenomena. Such fields are shown in Figs. 3 and 4. If a sphere of iron or cobalt is free to move in a magnetic field which is not uniform, a tendency is always ob¬ served for the iron to

place itself in the strong¬ est part of the field, or so that as many of the magnetic lines pass through it as possible. Such a substance is called paramagnetic. Some sub¬ stances, as. for example a sphere of bismuth, will tend to move to the weaker portions of the field, indicating that it is more difficult for magnetic lines to pass through the material than through air. These are called diamagnetic bodies.

The importance of magnetic action in both theoretical and practical affairs iis due largely

to its intimate connection with the phenomena of the electric current. In fact it is absolutely impossible under any conditions to have an electric current flow in a conductor without pro¬ ducing a magnetic field. In the case of a long straight wire carrying current the magnetic lines are circular in form, concentric with the wire, and their planes are perpendicular to its axis. If a wire is wound in a long, straight, cylindrical coil, frequently called a solenoid, and a current be passed through it, the field pro¬ duced will be nearly identical with that of a bar magnet, the difference being that the lines of force are entirely in air and are not modified by the peculiar properties of iron. By increas¬ ing the strength of the current and the number of turns of wire, a comparatively strong mag¬ netic field may be produced at the centre. A piece of soft iron or steel inserted in the coil becomes a powerful temporary magnet, while strips or bars of hardened iron or steel would in the same way become permanent magnets. The requirements of modern electrical processes have led to very careful investigations of the magnetic behavior of iron in connection with the production and the measurement of electric energy. Only a brief sketch of the fundamental features can be given here. If we suppose an electric current flowing in a long solenoid, which does not contain an iron core, the strength of the magnetic field through the in¬ side of the solenoid may be readily computed from a knowledge of the number of turns of wire and the strength of the current. The sym¬ bol H is generally used to indicate the field strength when iron is absent. If now a bar of iron be inserted it will be found that the mag¬ netic field is greatly increased. The new field will depend partly on the original value of H and partly on the quality and previous magnetic history of the iron inserted. The symbol B is generally used to denote the intensity of the field when iron is present. It may then be stated that B equals p H, where p is a variable factor depending on the nature of the iron and the field strength; this factor is called the per¬ meability. The original field H is frequently spoken of as the magnetizing field and the new one as the induction. Or H stands for the number of lines per square centimeter where iron is absent and B stands for the numlber of lines per square centimeter in the iron. If iron, in a neutral magnetic condition, is placed in a solenoid and the

electric current is gradually increased from zero the iron will be subjected to a steadily increasing magnetizing field. A comparison of corresponding values of B and H in such a case leads to very important re¬ sults. The relation between these values is best explained by reference to a curve drawn by using these quantities as co-ordinates. Such curves, usually called the curves of magnetiza¬ tion, are shown in Fig. 5. It should be observed that when H is almost zero, the induction is very small, then B increases more and more rapidly with a rising field until at point two the rate of increase of B with H begins to fall off rapidly, and shortly a value of B is reached which cannot be materially increased no matter how strong a magnetizing field is used. For example in the specimens shown it is useless to extend the value of H much above 70, and in actual practice this limit would be taken much lower. When as many lines as possible are car¬

ried through the iron it is said to be saturated. The exact shape of the magnetization curve will depend upon the nature and previous magnetic history of the specimen, but the ratio B-H at any point gives the ability of the iron to mul¬ tiply magnetic field strength for that particular

field. If, however, any definite state of mag¬ netization is attained as at the point M, Fig. 6, it will be found that upon reducing the field, H, the values of the induction, B, will not agree with those found for the same value of H when the field was increasing. In fact if H be changed to zero and then to negative values and back again to the former condition the value of B will form a loop as indicated. This peculiar lag of the induction when the field is

reduced is called hysteresis, and the hysteresis loop as shown is of practical importance be¬ cause its area enables one to find the work con¬ verted into heat when the magnetization is car¬ ried through one complete cycle. The line ON measured the residual magnetism, which is

semi-permanem, and will be greater in hard than in soft iron or steel. No matter where the process of magnetization is stopped a series of cyclic changes of the magnetic field always gives corresponding loops.

A theory due to Weber and later improved by Maxwell which is useful in the correlation of the various phenomena observed in the magnetic behavior of iron is at once suggested by a sim¬ ple experiment. Take a magnetic steel needle and which shows distinct polarity. Upon being broken into two parts it will be found that in¬ stead of securing two isolated poles, that each piece possesses a plus and a minus pole prac¬ tically identical with the poles of the original needle. Carry this process to any length and each little piece, however small, will be found to possess two poles, one positive and the other negative. If we assume that this process could be carried on to the smallest conceivable particle of the iron we should say that each molecule of the iron is by itself a magnet. We may further suppose that the molecular magnets in a neutral piece of iron are entirely devoid of regular ar¬ rangement as regards position of the poles ; such a chaotic condition may be indicated roughly by Fig. 7. It may be supposed that these molecular

Fig. 7.

magnets are partly held in position by the action of forces analogous to friction, which also tend to hold them in any new position to a greater or less extent in case the original arrangement is disturbed. Under the action of a weak mag¬ netic field these friction forces would prevent the turning of the molecular magnets into paral-. lelism with the field lines. As soon as the field is strong enough to overcome this sort of fric¬ tion we might expect the same tendency to ar¬ rangement of these minute magnets that is ob¬ served in the case of iron filings in the mapping of magnetic fields. As long as a considerable number of the axes of these molecular magnets make fairly large angles with the field lines the leverage by which turning is produced would be considerable ; if however they approach parallel¬ ism with each other and the field lines, the ef¬ fective twisting would be very materially re¬ duced. This would correspond to the approxi¬

mate saturation of the iron and no considerable change in position could be produced by increas¬ ing the field strength. The general arrangement may be indicated approximately in Fig. 8, where

s N

Fig. 8.

it will be observed that there is a tendency for free positive poles to appear at one end, namely, where the field lines leave the iron, and for un¬ compensated negative poles to appear at the other end.

The facts in favor of this sort of explana¬ tion may perhaps be briefly summarized as follows: (1) The general shape of the mag¬

netic curve is explained. (2) As friction or other molecular forces tend to prevent a return to the original chaotic condition after magneti¬ zation this arrangement would in part persist after removal from the field, or permanent mag¬ netism would be explained. (3) Soft iron should be easier to magnetize and less perma¬ nent than hardened iron or steel. (4) Jarring as by blows tends to reduce friction and to as¬ sist in the process of magnetization and also to reduce permanent magnetism. (5) High molec¬ ular activity consequent on rise of temperature decreases magnetic action, in fact, at a dull red heat iron is non-magnetic. (6) Rapid reversals of magnetism involve work against molecular forces and the production of heat, this heat is proportional to the area of the loop. (7) A tube of iron filings or a set of pivoted magnets shows the same behavior in a rising or falling magnetic field as a solid bar. The precise agree¬ ment between experimental facts and the indi¬ cations from theory shown above makes this conception extremely useful. Just why mole¬ cules of iron should be permanently endowed with magnetic properties is a subject for specu¬ lation which has been indulged in by numerous prominent scientists. It has been supposed for example that electrical currents flow around these molecules, that they consist of vortex rings or that small electrically charged parts are in vibration in such a way as to produce the phenomena of permanent molecular magnetism. The general usefulness of .the hypothesis is in no way connected with the truth or falsity of such speculations any more than the facts re¬ garding free fall are dependent on our view of gravitation.

The general statements noted above regard¬ ing magnetism of iron are of importance in the manufacture and utilization of magnets for various purposes. Where a considerable amount of permanent magnetism is undesirable, soft iron or steel is always used. For the

manufac¬ ture of permanent magnets special steel is se¬ lected and hardened and is then magnetized by its insertion into a solenoid carrying a power¬ ful electric current. Severe shocks or blows are frequently given in order to assist in the molecular rearrangement. The interaction of all the elementary magnets together with tem¬ perature changes and mechanical shocks will tend to weaken a magnet. This loss is very considerable at first but finally an almost permanent state is reached. When used in electrical measuring instruments magnets are artificially aged by subjecting them to con¬ siderable changes of temperature and a series of mechanical shocks. It should be noted in this connection that the permanence of the mag¬ net will be somewhat increased by joining its poles, when not in use, by a piece of soft iron. The induced magnetism at the ends of the iron helps to hold the poles of the small molecular magnets in position, and counteracts the tend¬ ency of these poles to demagnetize the bar.

Aside from the extended use of permanent magnets in electrical instruments their practi¬ cable application is comparatively limited. The electromagnet is widely used where it is de¬ sired to cause a temporary force action at a distance from the operator, as for example in the telegraph, *etc.* Powerful electromagnets are now frequently used to lift large masses of iron during manufacturing processes. It may

be noted in this connection that the lifting force of a magnetic piece of iron depends on the square of the number of lines per unit area at the contact face. Only so large an area should be used in contact as can be very highly mag¬ netized by the current available. In the con¬ struction of dynamos, motors and transform¬ ers, the magnetic quality of the iron used is of great importance. The total number of lines set up (flux) must be sufficient for the opera¬ tions involved and saturation should not be approached in any part. Where the cross sec¬ tion may be made large, cast iron can be used, but where the flux must be concentrated, special soft iron or steel L required. All air gaps are made as small as mechanical and electrical con¬ siderations of construction will permit, in order that the required flux may be more easily set up

by the electromagnets. Or as electrical engi¬ neers say, the magnetic <(reluctance ® is made small by use of properly proportioned iron parts and small air gaps in order that the mag¬ neto-motive force required may not be ex¬ cessive.

Terrestrial Magnetism. — The statement usually made that a freely suspended magnet needle, remote from magnetic masses, tends to point north and south is not correct except for a few localities at certain times. The actual nature of the earth's magnetic field must be found by extended experiments which are being carried on by numerous observers largely under the direction of various governments. (See methods of magnetic measurements above). If a steel needle be suspended by a silk fibre and carefully balanced so as to hang horizontal and is then magnetized it will be observed to finally come to rest in a certain vertical plane and to be inclined to the horizontal. The angle be¬ tween a horizontal line and the direction of the needle is called the dip, and the angle between the true north and south plane and that, in which the needle lies is called the declination. The values of the dip, declination and intensity of the earth's field at a point are called the magnetic elements at that point. The use of the compass both by the surveyor and mariner over nearly the entire

surface of the earth makes an accurate knowledge of these elements indispen¬ sable. In order to convey this information, in a practical way, recourse is had to maps on which places having the same declination, for example, are joined by lines. Such maps bring into view many interesting features as regards the earth's magnetism. For example, Fig. 9,

published by the United States Coast and Geo¬ detic Survey for 1900 shows that in northern Oregon, Idaho and Montana the compass pointed approximately 20 degrees east, while in the extreme northeastern part of Maine it pointed about 20 degrees west. Along an irreg¬ ular line crossing Michigan, Ohio, North and South Carolina and passing east of Cuba the declination was 0, or the needle pointed due north. It is evident from an inspection of these maps that the poles of the earth considered as a magnet do not coincide with the geographic poles. The line of no dip follows the equator only approximately. North of this line the north end dips down, while at the south it is reversed. Some of the minor variations are no doubt caused by local causes, such as masses of magnetic material, but it is a general belief among observers that the earth's magnetism is largely due to outside agencies. Another very important point for the mariner, who depends on the compass to find his way in safety across trackless seas or the surveyor anxious to locate landmarks, is that these magnetic elements are continually changing even during the day, as well as month by month and year by year. In London during 232 years the declination changed 35 degrees. (<A street one mile long laid out in London parallel to the compass direction in 1580 would have its terminus seven-tenths of a mile too far east according to the compass in 1812.® Since 1812 the declination at London has changed from about 24 degrees west to 16 degrees west. In 1580 it was 11 degrees east. In fact it would seem that the magnetic poles of the earth are slowly vibrating. The periods of some of the components of this vibration are astronomical in origin — the day, the year, the lunar month, the sun-spot period, *etc.* The variation during the day must be taken into account in accurate work as a mile run in the morning and repeated in the after¬ noon may vary by 5 to 20 feet at its terminus. Sudden changes called magnetic storms also frequently occur, which seem to be associated with atmospheric electrical conditions, sun spots, *etc.* In order to secure data for the study of these complex phenomena, magnetic observa¬ tories are maintained where delicate instruments record, day and night, the countless fluctuations of the

magnetic forces.

The problem of the navigator is still further complicated by the use of iron ships which are always sources of disturbance, both because of their permanent as well as their variable mag¬ netism. The continual jarring and changes of temperature during a voyage enables the earth's field to continually change the distribution of magnetism in the vessel. The means to be used for the correction of this deviation have re¬ ceived the attention of many skilful investi¬ gators. The limits of this article will hardly allow a discussion of the matter which may be found in special books noted at the end.

The contrast between the state of knowledge regarding magnetism before 1600 and its pres¬ ent development is one of the most striking in¬ dications of the growth of scientific investiga¬ tion. Instead of vague speculations, partial truths veiled in mysticism, more or less direct references to dogma and the supernatural, we have organized knowledge based on experience and constantly checked by experiment and ap-

plication. The number of those who believe in magnetic® healing or, that, because an iron pipe driven in the earth shows polarity, the water flowing through it is magnetic and has special medicinal virtues, is constantly on the decrease. The relations between magnetism and other fields of physical research cannot be treated in this article, yet it may be well to mention that SU(~-b ^^^cms are constantly being investigated and no one in touch with present developments believes that the end is at hand. And it may well be that the delicately poised magnetic needle in some future interpretation of its count¬ less movements will give us a knowledge of the invisible yet all-pervading agency which governs its fluctuations and lead us to a broader generalization of physical phenomena than we can formulate at present. (See Electricity, ElectroMagnetism, etc.). For the optical ef¬ fects of magnets in rotating the plane of polari-zatl£\?-f see Light, Polarization

Bibliography.— Crapper, ‘Electric and Magnetic Circuits’ (1903); Du Bois, ‘The Magnetic Circuit in Theory and Practice^ O894) I Ewing, ‘Magnetic Induction in Iron Other Metals> (1892); Fleming, J. A.,

inmPer’ii.an^ Currents (London

1902) ; Gilbert, The Loadstone and Magnetic Bodies, > reprint (1900); Jeans, J. H, ‘Elec¬ tricity and Magnetism-* (Cambridge 1911) ; Kelvin, ‘Reprint of Papers on Electricity and Magnetism) (1892); Lodge, ‘Modern Views of Electricity) (1889); Lyons, ‘A Treatise on ElectroMagnetic Phenomena> (1903)* Von ■?ieofe!?0ltz; <Wissenschaftliche Abhandlungen)

(loo2) , also numerous textbooks on physics electricity, electrical machinery, *etc.* For ter¬ restrial magnetism consult the periodical Ter¬ restrial Magnetism and Atmospheric Electri¬ city, published at Baltimore.

. . _ , John S. Shearer,

Assistant Professor of Physics, Cornell Uni¬ versity.

MAGNETISM, Animal. See Animal Magnetism.

MAGNETITE, or MAGNETIC IRON ORE, native magnetic oxide of iron, Fe304. It sometimes has part of its iron replaced by titanium or magnesium, and occasionally by nickel It is very abundant (the production of-the United States in 1914 being 1,610,203 long tons, or about 3 per cent of the iron ore production of the country). When pure it con¬ stitutes a valuable ore of iron, 72 per cent of its weight consisting of that metal. Magnetite crystalizes in the isometric system, commonly in octahedra, but also in dodecahedra, with striated faces. It also occurs, and very generally, in massive and granular forms. It is black in color, with a metallic or submetallic lustre. It is brittle, and has a hardness of from 5.5 to k ’ c »rystaL having a specific gravity of about 5.17. It may be readily distinguished by the fact that it is stronglv magnetic. Speci¬ mens are found which manifest quite a strong, permanent, magnetic polarity, this variety of the mineral being known as “lodestone.® Magnetite occurs in vast beds in Canada and in the north¬ ern and eastern parts of the United States Abundant deposits of it are also known in California and Washington. It is a common result of segregation in magmas during cooling, bee Iron Ores ; Magnetic Segregation.

MAGNETO, a device, consisting essentially of a magnet and interrupter, for sending sparks into the ignition system of an automobile. The Eisemann, Bosch and Splitdorf are well-known types. See Automobile.

MAGNETO-ELECTRIC MACHINES.

bee Electrotherapeutics.

MAGNETO-ELECTRICITY. See Elec¬ troMagnetism.

MAGNETOMETER, in its customarily re¬ stricted sense, an instrument employed in ob¬ servatories to determine the intensity cf ter¬ restrial magnetism. Essentially the instru¬ ment consists of a magnetic needle free to swing in a horizontal plane within a circular scale. The magnet may be supported on a fine vertical pivot, or by suspension on a fine un¬ twisted silk thread. Bifilar suspension is more to be depended upon; the magnet is supported by two parallel threads and screws enable the tensions in the threads to be equalized and their distance asunder to be adjusted. For delicate 1 eadings the instrument has been highly refined, a mirror being attached to the magnet, reflect¬ ing a beam of light upon a scale. To prevent possible oscillations due to air currents the mag¬ net is enclosed within a box with glass sides, through which it may be observed. A tall tube above the box encloses the suspending thread, f he unifilar magnetometer is set up with its magnet lying in the direction of the magnetic meridian. The bifilar instrument is set with the magnet at right angles to that meridian — a much more sensitive position. To fill the needs of traveling observers, portable magnetometers have been devised. These are more comprehen¬ sive, comprising within a single unit an astro¬ nomical telescope with a magnetometer — for the determination of both the magnetic declination and the horizontal intensity; and also a dip circle for the determination of inclination and tota! intensity. Consult Terrestrial Magnetism, Vol. XVI, page 1, ‘Two New Types of Mag¬ netometers 5 ; and Vol. XVIII, page 105, ‘De-scnption of the CIW (Carnegie Institution, Washington) Combined Magnetometer and Earth Inductor) (September 1913). See Mag¬ netism — T errestrial.

MAGNIFICAT. The words which Mary

pronounced when she visited Elizabeth (Luke i, 4ˆr5/) begm, Magnificat anima mea dominum (My soul doth magnify the Lord®). Hence the whole of her thanksgiving on this occasion has been called

the Magnificat. The present usage of the Roman Catholic Church is to chant or pronounce the Magnificat every day at ves¬ pers.

Ark., town, county-seat of Columbia County, on the Louisiana and North¬ west and the Saint Louis Southwestern rail¬ roads, . about 150 miles southwest of Little Rock It is in an agricultural and lumbering region Considerable cotton and fruit are raised in the vicinity. It has a large trade in lumber, fruit, cotton cottonseed products, corn, oats and pota¬ toes. Its chief buildings are the county build¬ ings, the schools and churches. It is also the

(1920)°f2 158 StatC aefricultura1' c°bege. Pop.

MAGNOLIA, a genus of ornamental, de¬ ciduous or evergreen trees and shrubs of the family Magnoliacece . The 35 species are natives

mostly of the United States, India, China and Japan. They are characterized by large, alter¬ nate entire leaves., large white, purple or pink, sometimes yellowish, solitary, terminal flowers, which are often highly fragrant; and cone-shaped, often red, decorative fruits. They are widely planted for ornament in parks and gar¬ dens ; most of the deciduous species being tolerably hardy as far north as Massachusetts, some even farther north, but the evergreen kinds tender even at Washington, where, how¬ ever, one species (M . grandiflora) can with¬ stand the winters if in protected situations. The wood is close-grained, generally soft, spongy, light and satiny. It is little used be¬ cause it is not durable, but in Japan one species (M . hypoleucci) is used for lacquering. The bark and the fruits of a few species were formerly employed as stimulants and tonics, but have fallen into disuse.

As a rule, magnolias thrive best in rather rich, fairly open, moist, peaty or sandy loams, but generally prove satisfactory upon any garden soil. A few, especially the beaver tree (M . glauca), which is

also popularly known as sweet, swamp or white bay, are natives of very wet grounds and must be naturally well supplied with water, when planted for ornament. They may be propa¬ gated by means of layers, by grafts or by seeds planted as soon as ripe or stratified in sand and kept out of doors where they cannot become dry. The plants should be transplanted when the new growth is commencing, otherwise the operation is frequently unsuccessful.

The following species are among the most generally planted in the United States. The bull bay or big laurel (M . grandiflora) is found naturally from North Carolina to the Gulf States. It is a pyramidal, evergreen tree which often attains heights of 75 feet or more, and is especially conspicuous when in blossom, its fra¬ grant white flowers often attaining a diameter of a foot. The swamp sassafras or sweet bay (M . glauca) ranges from the coast region of Massachusetts to Florida and irregularly south-westward to Texas. It. reaches a height of 20 feet and bears fragrant cream-colored floweirs. The cucumber trees (q.v.) are natives of the southeastern United States and are particularly attractive because of their pink fruits. Of the exotic species the yulan (M. denudata) , a native of China, where it has been cultivated for more than a thousand years, and M. coco, M. liliflora and M. hypoleuca are popular, the first and last particularly. By crossing, hybridizing and selection a large number of choice horticultural varieties have been produced.

MAGOFFIN, ma-gof'in, Beriah, American statesman: b. Harrodsburg, Ky., 18 April 1815; d. there, 28 Feb. 1885. He was graduated from Centre College (Danville, Ky.), in 1835, from the law school of Transylvania University (Lexington, Ky.) in 1838, entered the practice of law at Jackson, Miss., in 1839, but in the same year returned to Harrodsburg. In 1840 he became police judge, in 1848; 1856 and 1860 was a delegate to the Democratic national con¬ ventions, in 1850 was elected to the State senate of Kentucky and in 1859-62 was governor of Kentucky. He refused, 15 April 1861, to com¬ ply with Lincoln's call for 75,000 troops : in May 1861 by proclamation warned both the Con¬ federate and Federal governments against oc¬

cupying Kentucky soil, and the citizens of the State against entering hostilities ; and in Au¬ gust requested Lincoln to withdraw United States troops. He vetoed a resolution of the legislature directing him to proclaim the evacu¬ ation of Kentucky by the Confederates; but the resolution was passed over his veto. In Au¬ gust 1862 he resigned his office and in 1867 was elected to the lower house of the State legisla¬

ture.

MAGOG, ma'gog, Canada, town in Stan-stead County in the province of Quebec, on Lake Memphremagog .at its outlet, and on the Canadian Pacific Railroad, about 19 miles southwrest of Sherbrooke. It has regular daily communications with Newport and other places in Vermont. Its industries include textile prints, lumber and butter and cheese making. Magog is a favorite resort for anglers. Pop. about 4,000.

MAGOG. See Gog and Magog.

MAGOON, ma-goon, Charles E., American lawyer and administrator: b. Steele County, Minn., 5 Dec. 1861 ; d. Washington, D. C., 14 Jan. 1920. He was educated at the Uni¬ versity of Nebraska, was admitted to the bar in 1882 and engaged in the practice of law at Lincoln, Neb., in 1882-99. He was appointed judge-advocate of the Nebraska National Guard, with rank of major, and in 1899-1904 he was law officer of the Bureau of Insular Affairs at the War Office. He served as general counsel for the Isthmian Canal Commission in 1904-05, and was a member of the commission in 1905-06. He was governor of the Canal Zone from 25 May 1905 until 12 Oct 1906. He was also Envoy Extraordinary and Minister Pleni¬ potentiary to Panama from 7 July 1905 until 12 Oct. 1906. He acted as provisional governor of Cuba from 12 Oct. 1906 until 28 Jan. 1909. Author of (The Law of Civil Government Un¬ der Military Occupation (1902).

MAGOT. See Barbary Ape; Macaque.

MAGPIE (originally pie, the pied or varie¬ gated bird, a bird of the genus Pica, closely re¬ lated to the jays. The genus is distinguished by the extremely long wedge-shaped tail, the middle feathers of which equal the entire length of the head and body, while the outer feathers are less than half as long. The no¬ torious magpie of Europe (P . rustica) is repre¬ sented in North America by the variety hud-sonia, which is rather larger but otherwise similar. The color is a lustrous black with a varied and changing iridescence and sharply contrasting white under parts and patches on the shoulders and wings, the latter being con¬ spicuous as the bird flies. The yellow-billed magpie (P. nuttalli) of California is precisely similar except that the bill and a naked area at its base are yellow instead of black. Other species inhabit Asia and Africa. In America the common magpie is confined to the west, its range reaching from Alaska to Arizona and from the plains to the Cascade Mountains, being especially common in the Rocky Mountains. The magpie is a handsome bird of saucy, viva¬

cious habits and is chiefly noted for its thieving habits and general rascality. It is always en¬ gaged in mischief, either in stealing brightly colored or glittering objects from the habita¬ tions of man or in robbing the nests of other birds, but because of its pert, merry manner is

usually forgiven for the former class of offenses. The caged birds seen in the East give but a faint idea of the beauty and activity of these birds in the wild state. Like the jays the magpies are omnivorous, but are less strictly arboreal than they. The nest, which is built in a tree or bush, is very ingeniously and sub¬ stantially constructed. It is a large domed structure protected outwardly by a thick, brist¬ ling layer of thorns and twigs, through which a narrow passage opening on one side leads to a deep cup plastered with mud and lined with fibres. Six to nine greenish drab eggs, much spotted and dashed with various shades of brown, are laid. The American magpie is occa¬ sionally taken young and made a pet, but it has not the reputation for talking and amusing, albeit thievish, manners, which has made the European bird a favorite from ancient times. Descriptions of its many interesting habits will be found in the books of Coues, Ridgway, Merriam, Cooper, Keyser and other writers upon the ornithology of the western United States.

MAGRATH, ma-grath, Andrew Gordon,

American Confederate governor: b. Charleston, S. C. ; d. there, 9 April 1893. Magrath was the son of an Irish revolutionist of 1798 who escaped to South Carolina. He was educated at South Carolina College (1831) and at the Harvard Law School. He served two terms in the State legislature (1840-44), practised law in Charleston and in 1856 was made Federal district judge by President Pierce. In 1861 he resigned, was elected to the South Carolina convention which adopted the ordinance of se¬ cession and was then appointed Confederate judge. In December 1864 he became governor of South Carolina. After the war he was im¬ prisoned for several months. He later resumed the practice of law in Charleston.

MAGRATH, William, American painter: b. Cork, Ireland, 20 March 1838. He emigrated to the United States in 1855, and was elected National Academician in 1876. He has pro¬ duced many excellent landscapes and his genre pictures are full of character. Among them may be mentioned (The Road to Kenmair" (1871) ; (The Reveille5 (1873) ; <Rustic Court¬ shipˆ (1877) ; <On the Old Sod) (1879), which last is in the New York Metropolitan Museum; (Paddy on his own Land) (1900) ; (Sheep Pasture5 (1903); (The Killamey Country5 (1910); (The Bog of Allen, Ireland5 (1911); (Bog Lands5 (1913).

MAGRUDER, ma-groo'der, John Bank—

head, American soldier: b. Winchester, Va., 15 Aug. 1810; d. Houston, Tex., 19 Feb. 1871. He was graduated at West Point in 1830, served for a short time in the 7th Infantry, then in the artillery. In. 1836 he was made first lieutenant, saw service in the Seminole War 1837-38 and became captain in 1846. He took an active part, in the Mexican War, rising to the rank of lieutenant-colonel, 1847. In 1861, while in garrison at Washington, D. C, he resigned from the United States army, accepted a Confederate colonelcy and com¬ manded the artillery at Richmond. In the same year he won the battle of Big Bethel (q.v.), and was made brigadier-general and major-general. Assigned to the Yorktown district, he fortified the Peninsula and with a force of 12,000 held it against the Army of the Poto¬

mac in April 1862. In the Seven Days' Battles (q.v.) he commanded the Confederate left. In October 1862 he was appointed commander of the Department of Texas. He recaptured Gal¬ veston 1 Jan. 1863, and broke the blockade of that port. After the war he served as major-general in the army of Maximilian in Mexico until the end of the empire, but finally in 1869 he settled at Houston for the rest of his life.

MAGRUDER, Julia, American novelist: b. Charlottesville, Va., 14 Sept. 1854; d. Rich¬ mond, Va., 9 June 1907. Her literary career began in 1885 with (Across the Chasm,5 pub¬ lished anonymously. She wrote <A Magnifi¬ cent Plebeian5; (The Violet5; <Miss Ayr of Virginia5; (A Manifest Destiny5; 'Princess Sonia5 (1895), *etc.*

MAGUAGA, Battle of. See Detroit, Siege and Capture of.

MAGUINDANAO, ma-gen-da'now, a tribe of Moros who inhabit the valley of the Rio Palangui, island of Mindanao; the Moros of the

Sarangani Islands, and some of those of Davao Bay belong also to this group. See Philippine Islands.

ivirtVJ I 1V1UOU,. See HUNGARY, Music.

MAGYARS, mo'gyorz, the original name of the Hungarians, which they still use in pref¬ erence to any other. See Hungary.

MAHA-KASYAPA, ma ha' kash'ya pa, Kassappa, one of Buddha's first converts and one of his 80 great disciples who was favored by Buddha as his successor. After the death of Buddha he seems to have taken an active part in the work of organizing and propagating

faijh. It was at his instance that the first Buddhist council of a general nature as¬ sembled. He gave considerable attention, ac¬ cording to tradition, to the organization and arrangement of the canonical books of the Buddhist faith. Playing such a prominent part at the dawn of the Buddhist religion, and being the beloved and trusted disciple of the master and, in a sense, his successor, it is natural that he should enter largely into the legendary and traditional religious lore of the Buddhists, as he does, in fact Consult Bournouf, Hndroduction a 1 histoire du buddhisme indien5 (Paris 1844) • (Le lotus de la bonne loi5 (Paris 1852) ; Kern' lonAˆˆni?ˆ BPndu Buddhism5 (Strassburg loom ' Rhys' Davlds> (Buddhism 5 (London

MAHABHARATA. The name of this, the great national epic of the Hindus, etymo¬ logically considered, consists of the word ™aha' * meaning "great,55 "mighty,55 and bharata, one of the several names of a power¬ ful Indian tribe, but has reference more to the story itself, about ((the great tale of the Bharatas.55 In the shape in which the Mahabharata has come down to us it is enormous in bulk, comprising some 100,000 qloka (couplets), and as its author is cited one Vyasa. But the word "vyasa55 stands for "reviser,55 ((collector,55 "editor,55 and this alone, irrespective of the fact tJiat ,n° description, no biographical detail of this Vyasa hasˆ existed, seems clearly to prove that the Mahabharata represents a gradual growth and gathering of poetic material finally given a collective name and figuring as an en¬ tity. , In the poem itself the number of qlokas (distichs) is given at 24,000, while there is

rather strong literary proof that the original core was even much smaller than that, namely, counting but 7,000 glokas. The total of the colossal remainder represents accretions and superimpositions that were at last included in the whole — many episodes, much legendary lore, lengthy and detailed ethical precepts, such as those addressed to the Kshatrias, the warrior caste, to guide their behavior to the other castes, and other material. Already in the 4th cen¬ tury a.d. the (Mahabharata* was popularly held in the light of a code of laws as well; it was not alone the Hliad* and <Odyssey> of the Hindu people combined, which youth studied and recited and learned by heart, but also a com¬ pendium of morals read aloud by the priests in the temples and shrines, at least fragments and selections from it. Thus we do know that the (Mahabharata* is a work of great antiquity; but the exact period of its birth, the whole story of its genesis, we cannot even guess. It is certain, however, that the kernel of the epic, describing the war between the Kurus (or Bharatas) and the Pandavas, must have ante¬ dated the time of Kalidasa by many centuries. The archaic language shows that. This simple tale gives us as heroes Duryodhana, son of blind King Dhirtarashtra, Drona, Kama, £alya among the Kurus, and among the Pandavas the five sons of Pandu, Ardjuna, Judishthira, Bhima, and the Vishnuic incarnation, their wise counselor, Krishna, the ruler of Yadava, the ((spinner of all ruses* and deceptions.** The circumstance that the five Pandava brothers have jointly but one wife, Draupadi, and the fact that the caste, marriage-and inheritance customs, as exempli¬ fied in the poem, are in strong contrast with later practices, of itself bespeaks great antiquity of this, the core of the epic. Brahmanism had not yet crystallized when it originated. At very different periods extraneous matter has been interpolated and amalgamated with this primary portion of the Mahabharata. In fact, all that ran riot in the earlier Hindu mind in the shape of folklore, legend and myth was, one after the other, added to the first text and gradually coalesced with it. Hence, too, the enormous size of this lay as we have it now. But even as it is, the Mahabharata is by no means a unit accepted by all. We see it sub¬ divided in the north of India into 18 books (Parvans) , sometimes including the 19th, the Harivamga ; in the south it exists in 24 books, and the various chapters differ materially in sun¬ dry versions, both in text and size. The most com¬ prehensive and enlightening critical work in this line has been done by the Danish philologist, Sore Sorensen, in his compendium on Hindu

literature (Copenhagen 1843). A careful ex¬ amination of the whole text unavoidably betrays the mixed origin of the Mahabharata, shows plainly the earmarks of having been worked over, revamped, added to, and that numberless scribes have probably been busy at this task for a period exceeding 10 or 12 centuries. The composite character of the poem is also shown by the different metres, contents and spirit. By some scholars, such as Hopkins and Dahl-mann, the conclusion has been reached that there were earlier portions of the epic than now re¬ main ; perhaps, as Grierson holds, describing an initial struggle for the possession of northern India between the Aryan settlers and their foes. As it stands at present the poem — meaning its

oldest core — is somewhat puerile, since it starts with an account of a gambling match, at which the Kurus cheated the Pandus, robbed them of the kingdom, and exiled them for 12 years. While spending this exile in the forests and groves, tales are told to while away the dreary hours. When the exile draws to a close the Kurus are utterly routed during an 18 days' battle. This story furnishes the backbone ; it is crude and in a literary sense sadly deficient, but it doubtless derives from the hoary past. The 20,000 stanzas of rules and instructions to the warrior caste are jumbled, often contradic¬ tory. From an artistic point of view the best parts of the whole are episodes like that of Damayanti and Nala, of Savitri, etc., which have been successfully dramatized. Like all of Hindu literature, even the best, there is a palpable lack of proportion. But there are eminently strong passages, scattered here and there in the whole and showing pathos, tender¬ ness, descriptive powers. The student may be referred to a good summary of the poem,

(Mahabharata, the Epic of Ancient India,* con¬ densed into English verse by Romesh Dutt (London 1898) , to (Geschichte der indischen Literatur* (Leipzig 1908), by M. Winternitz ; to (Das Mahabharata) (Kiel 1892-95), by Adolf Holtzmann; or to the English transla¬ tion of the original work by a Hindu scholar, Protap Chandra Roy (Calcutta 1883).

Wolf von Schierbrand.

MAHADEVA, ma-ha-da'va, in Hindu mythology, a deity who shares the attributes of Siva in the Indian Trinitv, Mahadeva being re¬ garded as a generator as well as a destroyer.

MAHAFFY, ma-haf'i, John Pentland,

Irish Greek scholar : b. Chapponaire, near Vevay, Lake Geneva, Switzerland, 12 July 1839; d. Dublin, Ireland, 1 May 1919. He was educated in Germany and at Trinity College, Dublin, from which he was graduated in 1859; and became professor of ancient his¬ tory in the college in 1871. In 1873 he was Donnellan lecturer. His first publication was a translation of Kuno Fischer's Commentary on Kant) (1866) ; and on philosophical subjects he has since issued several volumes. The greater number of his works, however, treat of the history, literature and everyday life of an¬ cient Greece, among these being the following:

(Prolegomena to Ancient Historv* (1871) ; Creek Social Life from Homer to Menander) (1874) ; Creek Antiquities *(1876), a work much used in Continental schools; (Rambles and Studies in Greece, > a record of antiquarian research (1876) ; (01d Greek Education1*

(1879) ; (History of Classical Greek Literature) (1880; 3d ed., 1891) ; ' Creek Life and Thought from Alexander to the Roman Conquest* (1887), a continuation of the work of 1874; Che Greek World under Roman Sway1* (1890), a continuation of the preceding; Che Story of Alexander's Empire) (1890) ; Creek Pictures) (1890) ; and ˆProblems in Greek History) (1892) ; Che Progress of Hellenism in Alex¬ ander's Empire) (1905) ; Che Silver Age of the Greek World) (1906) ; (What have the Greeks done for Modern Civilization ?* (1909). He writes with special interest and authority of the post-Alexandrian period; and has discovered interesting parallels be¬ tween that and modern civilization. Among

his other writ'ngs are (Twelve Lectures on Primitive Civilization* (1868); (Report on the Irish Grammar Schools* (1880-81); (The De¬ cay of Modern Preaching* (1882), and (The Art of Conversation* (1889); (An Epoch in Irish History* (1904).

MAHALEB, a kind of European cherry (Cerasus mahaleb), whose fruit affords a violet dye and a fermented liquor. Its flowers and leaves are used by perfumers, and its wood by cabinet-makers. See Cherry.

MAHAN, ma-han', Alfred Thayer, Amer¬ ican naval officer: b. West Point, N. Y., 27 Sept. 1840; d. 1 Dec. 1914. He was graduated from the United States Naval Academy in 1859, and served during the Civil War, rising to the rank of lieutenant-commander in 1865.' In 1885 he was promoted captain, and in 1886 was ap¬ pointed president of the Naval War College at Newport, a position which he held till 1888, and again 1892-93. In 1893-95 he was commander of the Chicago, and in 1896 was retired after 41 years' active service at his own request. In 1898 during the war with Spain he was a member of the Naval Board of Strategy; and in 1899 one of the LInited States delegates to The Hague Peace Conference. In 1906 he was ad¬ vanced to the rank of rear-admiral on the re¬ tired list. In 1890 he published his chief work, Unfluence of Sea Power upon History* ; the continuation, Unfluence of Sea Power upon the French . Revolution and Empire,* appeared in 1892; his other writings include (The Gulf and Inland Waters* (1883) ; Wife of Admiral Farragut* (1892) ; Wife of Nelson* (1897), highly commended by English critics; (The Interest of America in Sea Powder* (1897), a compila¬ tion of his magazine articles; Wessons of the War with Spain* (1899); <The Problem of Asia* (1900) ; (The South African War* (1900); (Types of Naval Officers* (1901) ; ˆRetrospect and Prospect* (1902); (Seapower in its Relations to the War of 1812* (1905); 'Some Neglected Aspects of War* (1907); (From Sail to Steam* (1907); (Naval Admin¬ istration and Warfare* (1908); (The Harvest Within* _ (1909) ; (The Interest of America in International Conditions* (1910); (Armaments and Arbitration* (1912); <Major Operations of the Navies in the War of American Inde¬ pendence* (1913).

As a historian he made a distinct contribu¬ tion to historical science as the first writer to demonstrate the determining force which mari¬ time strength has exercised upon the fortunes of individual nations, and consequently upon the course of general history. Technically, his representative work, the Unfluence of" Sea Power upon History,* is

.but a naval history of Europe from the restoration of the Stuarts to the end of the American Revolution. But the freedom with which it digresses on general questions of naval policy and strategy, the at¬ tention it pays to the relation of cause and effect between maritime events and international politics, and the author's literary method of treatment, place this work outside the class of strictly professional writings and make it a recognized leading authority. His prime ob¬ ject, in establishing the thesis that maritime strength is a determining factor in the pros¬ perity of nations, was to reinforce his argu¬ ment that the future interests of the United

-MAHANADI

States require a departure from the traditional American policy of neglect of naval-military affairs. Captain Mahan was president of the American Historical Association in 1902-03 ; and received honorary degrees from several univer¬ sities, including D.C.L. from Oxford and LL.D. from Cambridge (England), Harvard, Yale, Columbia and McGill universities.

MAHAN, Asa, American Congregational clergyman and educator: b. Vernon, N. Y., 9 Nov. 1800; d. Eastbourne, Sussex, England, 4 April 1889. He was educated at Hamilton Col¬ lege, Clinton, N. Y., and Andover Theological Seminary, and after holding pastorates at Pitts-ford, N. Y., and Cincinnati, Ohio, was president of Oberlin College 1838-50; and also professor of philosophy there. He was president of Cleveland University 1850-56; and of Adrian College, Michigan, 1860-71. After the last-named date he lived mainly in England. Among his works were (Doctrine of Christian Perfection* (1839); (System of Intellectual Philosophy* (1845) ; (The Will* (1846) ; (Science of Logic* (1857) ; (Mental Philosophy* (1882); (History of Philosophy* (1883).

MAHAN, Dennis Hart, American military engineer: b. New York City, 2 April 1802; d. near Stony Point, N. Y., 16 Sept. 1871. He was graduated at West Point in 1824, where in 1825 he was appointed assistant professor of mathe¬ matics and of engineering. He was stationed in Europe four years on professional duty and in 1832 returned to West Point as professor of military engineering, where he remained until his suicide, which was caused by temporary in¬ sanity. . His textbooks are generally recognized authorities and include (Treatise on Field For¬ tifications* (1836); (Descriptive Geometry*

(1864); (Military Engineering* (1865); Per¬ manent Fortifications* (1867); (An Elementary Course of Civil Engineering* (1837, rewritten 1868), *etc.* Consult Abbot, H. L., rin Biograph¬ ical Memoirs of the National Academy of Sci¬ ences* (Vol. II, Washington 1886).

MAHAN, Milo, American Protestant Epis¬ copal clergyman, brother of Dennis Hart Mahan (q.v.) : b. Suffolk, Va., 24 May 1819; d. Baltimore, Md., 3 Sept. 1870. He was edu¬ cated at Saint Paul's College, Flushing, L. I., and in 1845 was ordained in the Protestant Epis¬ copal Church. He was called to the charge of Grace Church, Jersey City, N. J., in 1848, and became assistant at Saint Mark's, Philadelphia, in 1850. In 1857-64 he was professor of eccle¬ siastical history at the General Theological Seminary, New York. He became rector at Saint Paul s, Baltimore, Md., in 1864 and spent the remainder of his life there. Author of (The Exercise of Faith* (1851); (History of the Church During the First Three Centuries* (1860; enlarged to cover seven centuries, 1872) • (Palmoni, a Free Inquiry* (1864); (The Com¬ edy of Canonization* (1868) ; Collected Works* (3 vols., 1872-75).

MAHANADI, ma-ha-nud'i, or MAHA-NUDDY (aThe Great River**), a river in Brit¬ ish India. In the upper part of its course it drains the fertile plain of Chhattisgarh in the Central Provinces; flows southeast and then east through the province of Orissa, past Sam-balpur and Cuttack, into the Bay of Bengal by two mouths, after a course of about 530 miles.

MAHANOY -

During the rains it is navigable 30 miles from its estuary, but a large portion of its channel is dry during five or six months of the year, and since the opening of the Bengal and Nagpur Railroad it has been little used for navigation. It is estimated that the Mahanadi drains an area of nearly 44,000 square miles, and during the rainy season about 1,500,000 cubic feet of water passes every second through the Maraj gorge, which amount decreases in dry weather to 1,125 cubic feet. An extensive system of irrigation canals is connected with it. Dia¬ monds are found in this river and in several of its tributaries.

MAHANOY (ma-ha-noi') CITY, Pa., bor¬ ough, in Schuylkill County, on Mahanoy Creek, and on the Lehigh Valley and the Philadelphia and Reading railroads, about 55 miles north¬ east of Harrisburg. The first settlement was made in 1859, and it was incorporated in 1863. It is in the anthracite region, and in the vicin¬ ity is fireclay and an excellent

building-stone. Its chief manufactures are pottery, foundry products, flour, hosiery and lumber. In the vicinity are many collieries, all of which are operated by residents of Mahanoy City. The trade is principally in coal, pottery and lumber. The city has excellent public and parish schools and a number of fine churches. Pop. 15,936.

MAHARAJAH, ma-ha-ra'ja, a title used in India; applied in courtesy to every rajah, or to any person of high rank or deemed holy.

MAHASEER, ma'ha-ser, a large and rav¬ enous barbel (Barbustor) of India, which reaches six feet in length and in the early part of the rainy season afford the best sport known to the anglers of India and Ceylon, as they take a fly readily, and struggle with the gameness and energy of a salmon to get free, pleasantly taxing the skill of the angler to bring them to land without breaking rod and line. They spawn at the heads of the hill-rivers, and then descend before the young are hatched. The fry then have an opportunity to grow in compara¬ tive safety to a size which enables them, the following season, to descend the rivers and take care of themselves; otherwise they would be de¬ voured in infancy by their elders.

MAHATMA, a Hindu word meaning (<the great-souled one,® and applied among the Brah¬ mans to one who has attained the highest pos¬ sible point of spiritual enlightenment. It is also the name of a high priest or ((wise leader® of the theosophists

MAH A YANA («The Great Vehicle®), the name of one of the principal divisions of Buddhism (q.v.). It originated in northern India about the beginning of the Christian era through a gradual synthesis of tendencies al¬ ready manifest in earlier Buddhism, possibly with some admixture of ideas from the West.

In its philosophy the Mahayana goes beyond primitive Buddhism's denial of the real existence of a soul or ego, and maintains the doctrine of the utter unreality of all experience. This is expressed in the formula ((everything is void,® which is interpreted by the Madhyamaka, or sceptical, school as meaning that it is impos¬ sible either to affirm or to deny anything con¬ cerning reality, whereas the Vijnanavadins, or idealists, declare (<the void® to be pure thought, without distinction of subject or object. Both

schools admit that the illusion of the phenom¬ enal world is

invincible for even the wisest man, and that only the Buddhas are perfectly free from it, so that the practical validity of expe¬ rience is not impaired.

The idea of the Buddha, or <(Enlightened One,® has received a great extension in the Mahayana, and the human traits of the historic Gautama have been lost in the radiance of di¬ vinity. There are countless Buddhas through¬ out the worlds, and they manifest themselves through infinite periods of time in the various heavens, as well as by appearing on earth in the guise of human teachers. In their function of enlightening all creatures they are aided by the celestial Bodhisattvas, or Buddhas-to-be, who are more actively beneficent. Among the Buddhas the most worshiped is Amitabha, ((He of Boundless Light,® the ruler of the Western Paradise called Sukhavatl, ((Happy Land.® This deity, who is quite unknown in the earlier Buddhism, is presumably of solar origin. The merciful Avalokitesvara and Manjusrl, the fount of wisdom, are especially prominent Bodhisattvas. The belief in female Bodhisat¬ tvas, such as Tara and the Chinese Kwan-yin, is a later development, as is also the notion of a (<primordial Buddha,® or First Cause. All this luxuriant polytheism is harmonized with the doctrine of ((the void® through the belief that a Buddha has three ((bodies® or modes of being, the ((body of the Law,® identical with the void, the <(body of bliss,® an appearance manifested to the celestial beings, and the <(body of fabri¬ cation,® the illusory form of an earthly Buddha such as Gautama.

The Mahayanist belief in the powerful and merciful Buddhas and Bodhisattvas is accom¬ panied by a new conception of the religious life. Instead of the older self-centred system of mo¬ nastic discipline, by which the individual was to obtain final deliverance, Nirvana, at the close of his present existence, the Mahayanists made it their goal to become Buddhas themselves, after practising all the virtues through number¬ less existences, for the sake of the salvation of all beings. Everyone who consecrates himself to this aspiration is a Bodhisattva, or potential Buddha, although he will not attain the rank of a celestial Bodhisattva until toward the last of the 10 stages in his career. Self-sacrifice, rather than self-restraint, is therefore the keynote of the ethics of the Mahayana, and though the in¬ stitution of monasticism is preserved, the dis¬ cipline is relaxed, and laymen also may follow the career of a Bodhisattva. Prayer and con¬ fession of sins to the Buddhas are commanded, and forgiveness is believed to be secured through their superabundant merits.

The broadly human quality of the Mahayana religion involved a certain sacrifice of the dis¬ tinctive features of Buddhism, and its later

de¬ velopment, particularly in the form of the Tantra (q.v.) system, shows a gradual approxi¬ mation to the contemporary Hinduism. Hence in India the Mahayana ultimately gave way to the Vedanta philosophy and the popular reli¬ gions of Vishnu and Siva; but it still survives in the countries to the north and east, whither it had been carried by missionary activity. In Tibet and Mongolia it has assumed the form of Lamaism (q.v.), while in China and Japan it shows more of its primitive character, although

in the latter country especially it has split into numerous sects, some of which hold a decidedly theistic belief.

Bibliography. — The satred books of the Mahayana are very numerous and are still im¬ perfectly known. Among those accessible in translations are (The Lotus of the True Law) (trans. by H. Kern in ‘Sacred Books to the East, } Vol. XXI, 1884) ; various shorter texts in the same series (Vol. XLIX, part 2, 1894) ; Santideva’s ‘The Path of Light > (trans. by L. D. Barnett, 1909) ; (The Awakening of Faith, > sometimes ascribed to Asvaghosha (trans. by T. Suzuki, 1900). Consult also Poussin, L. de la Vallee, ‘Bouddhisme: opinions sur J’histoire de la dogmatique> (1909) ; Suzuki, D. T., ‘Out¬ lines of Mahayana Buddhism > (1907).

Charles J. Ogden.

MAHDI, ma’de. See Mad Mullah.

• M,AHE, ma-ha’, Indian Ocean, the largest island of the Seychelles Archipelago, belonging to Great Britain. It is 17 miles long by 4 miles broad, has an area of 55$4 square miles and attains an elevation of 2,000 feet above sea-level, from which it rises in most places nearly per¬ pendicularly. It contains Victoria, the adminis¬ trative seat, and a coaling station with a good harbor. Pop. 20,000. See Seychelles.

MAHHOL. See Machol.

a KANTHA (ma’he kan’tha)

ALiJUML/Y, India, a group of native Gujerat states, administered since 1820 by a British po¬ litical agent of the province of Bombay. The chief state, Idar, occupies about one-half of the combined area of 3,125 square miles. There are 11 other states of much importance. The climate is fair, April and May being the hottest months, and January the coolest. The average annual rainfall at Idar is 34 inches. About one-fourth of the area is capable of cultivation During the famine of 1899-1900 a great number of the people perished. Pop. about 375,000, consisting largely of wild Bhil and Khoil tribes¬ men.

MAHICAN, ma-hik’an (meaning “wolf®), an Algonquin tribe of American Indians for¬ merly occupying the Hudson River Valley. They were closely related to the Delawares and the Mohegans, the collective tribes being known as the Loup or Wolf Indians. At one time there was a settlement of 40 villages near the site of the present city of Albany. The assaults u * • Iroquois and the white settlers diminished the tribe until the remnants of the race became merged with the Delawares. In 1736 those who still remained in Massachusetts, whither they had removed some years before, came together as a unit at Stockbridge and assumed the name of Stockbridge Indians. Later they removed to New York, but now, together with a part of the Munsee, they are located upon a reservation near Green Bay, Wis.

MAHMUD (ma-mood’) I, or MOHAM¬ MED, Turkish sultan: b. Constantinople 1696; d. 1754. He was the son of Mustapha II and succeeded his uncle Achmet ITI in 1730. He was a well-disposed but incapable monarch and his reign is of little importance. See Moham¬ med.

MAHMUD II* Turkish sultan: b. 20 Tulv 1785; d. 1 July 1839. He was the second

son of Abd-ul Hamid I, and under the reign of his uncle Selim III he received an education exceptionally broad for a prince of his station. He succeeded his brother Mustapha in 1808 and organized his government on a reform basis. He conducted a war against Russia and Serbia until 1812, when by the Treaty of Bucharest Moldavia and a greater part of Wallachia were restored to the Ottoman government, even though the Russian frontier was somewhat advanced. He

subjected the Wahabees and quelled the insurrection of Ali Pasha of Jan-nina in 1822. In his war with the Greeks he incurred the intervention of the powers with disastrous results to his forces and by the Treaty of Adrianople (q.v.) he was obliged to yield so much that his power was greatly weakened. Mahmud was a progressive monarch, he intro¬ duced modern ideas of warfare, a regular police system and founded schools. Against serious obstacles he crushed the janissaries, but a second rebellion of Mehemet Ali in 1839 was followed by. a defeat which shortly preceded the broad-minded monarch's death.

MAHMUD, sultan of Ghazni, the founder of the Mohammedan empire in India: b. Ghazni about 970; d. 29 April 1030. His father, Sabuk-tagm, governor. of Ghazni, owed a nominal alle¬ giance to Persia, but was really independent. On his death Mahmud put aside his brother Ismail, whom his father had appointed to succeed him, took the title of sultan, then over¬ threw the Persian monarchy, and laid the foun¬ dation of an extensive empire in central Asia. He then turned his attention to India, which he invaded repeatedly. His earlier expeditions into the country were directed against successive rajahs of Lahore, on whom he inflicted repeated defeats. In 1008 the Rajah of Lahore, Anang-pal, with the assistance of a powerful coalition of rajahs, had assembled one of the largest armies yet seen in the Punjab, but Mahmud was again victorious and carried away enormous spoils from the temple of Nagarcot. On his return he celebrated a triumph at Ghazni. In 1010, after subduing Ghur in the Hindu-Kush, he resumed his conquests in India, captured Multan, plundered the temple of Tanesar and continued for a number of years to extend his conquests in successive expeditions. These for a time were interrupted bv his conquest of Transoxiana, effected in 1016. In 1017 he set outat the head of an army of 100,000 foot and 20,000 horse, passed the Jamna Jummd and turning to the south appeared before Canoj. the largest and. most magnificent Indian citv of the day, the rajah of which took precedence of all . the Indian, rajahs. As the Rajah of Canoj at once submitted it was spared from pillage, a fate to which Mattra, a famous religious city, was subjected without restraint for 20 days.' In 1023 he annexed the territories of Teipai 11 who had revolted and established for the first time a permanent Mohammedan gar-nson in Lahore. His last, which is usually called his 12th, expedition into India (1024-26) was directed against Gujerat. He took the capital and changed the government, but the chief attraction was, Somnath. The magnifi¬ cence of its temple filled him with wonder and the descriptions of it suggest images of the palace of Aladdin. Its #lofty roof was sup¬ ported by 56 pillars carved and glittering with

precious stones. It was lighted by a lamp sus¬ pended from the centre by a gold chain. A huge idol, which Mahmud broke, was found hollow and disclosed immense treasures in diamonds and precious stones. The pieces of the idol were sent to Mecca, Medina and Ghazni. The remainder of his enterprises were confined to western Asia. Mahmud was avari¬ cious and loved to accumulate treasures from his warlike expeditions. Consult Elliot, (His¬ tory of India) ; Lane-Poole, (Mediaeval India under Mohammedan Rule) (London 1903).

MAHMUD, Shevket Pasha, Turkish soldier and statesman: b. Bagdad 1857; d. 11 June 1913. At 24 he came under the influence of the German general von der Goltz, then reorganizing the Turkish army and by whom he was sent to purchase war material in Germany and France. After 10 years' sojourn in west¬ ern Europe, Mahmud Shevket returned home with advanced ideas. As governor of the vilayet of Kossovo he threw in his lot with the Young Turk revolution in 1909. The new ministry placed him in command of an army corps at Salonica. He suppressed the counter¬ revolution in Constantinople and in 1910 be¬ came Minister of War until 1912. In January 1913 he was appointed Grand Vizier and War Minister combined, in which capacity he con¬ cluded peace with the Balkan League (q.v.). He was murdered while motoring to the Porte.

MAHO, or MAHAGUA. The West Indian names of an important fibre nlant, Hibiscus tiliaceus or linden hibiscus, lemon hibiscus or corkwood, a member of the mallow family. It is a handsome woody shrub or small tree with large lemon-yellow flowers and entire broadly cordate leaves like linden. Low banks of tidal rivers is its favorite habitat and it is widely dis¬ tributed over tropical America, Polynesia and the shores of the Indian Ocean. In some of the Pacific islands it grows spontaneously in large areas which have been abandoned after previous cultivation. The bark contains a strong flexible fibre used for many purposes, especially by the aborigines who also used the wood for making fire in the primitive fashion. The dark green heart wood is very tough and durable. The plant has remarkable properties of renewing fertility of soil which has been

exhausted by crops. The maho is considered indigenous to America and apparently on account of its useful character it was distributed widely over the islands and shores of the Pacific and Indian oceans before the arrival of Europeans. The etymology of its names in various regions gives some important clues as to the history of its distribution.

MAHOGANY. A popular name for the timber of several unrelated trees, among which are various species of eucalyptus (q.v.), natives of Australia and members of the family Myrtacece ; two species of Cercocarpus, of the family Rosacecc, C. montanus being known as valley mahogany and C. ledifolius as mountain mahogany in the Rocky Mountain region where they are native and are mainly used for fuel. African mahogany (Khya senegalensis) , East Indian mahogany (Soymida febrifugal , and Cedrela toona, an East Indian tree equally well known also as the toona, all belong to the family Meliacece, but are less important timber trees than the true mahogany (Swietenia

mahagoni) of the same family. This species is a native of tropical America, occasional small specimens being found in extreme southern Florida. It was formerly abundant in the West Indies, reaching altitudes of 1,500 feet or more in Jamaica, but on account of the demand it is now scarce. Cuba and Santo Domingo formerly supplied the choicest; Honduras the low grades ; now practically all comes from Central America. The wood is generally some shade of brown, fine grained, easily polished and durable except under lateral strain. It is highly valued for furniture, musical instru¬ ments, interior house-finishing, etc., and is one of the most popular woods of the world. Formerly it was used for shipbuilding but now very little. The tree, which sometimes attains heights exceeding 100 feet, and diameters of six feet, has abruptly pinnate leaves with usually four pairs of leaflets, and small white or yellow¬ ish flowers in axillary or nearly terminal pani¬ cles. As an ornamental tree it is planted in southern Florida and southern California in rich soil. A few other related species of this genus are occasionally found in commerce.

MAHOMET. See Mohammed.

MAHOMMEDAN LAW. See Moham¬ medanism.

MAHON, ma-hon’, or PORT MAHON

(ancient Portus Magonis), Spain, city and port, on the island of Minorca, of which it is the capital, at the head of a bay which forms

one of the best harbors on the Mediterranean. Fishing, fish-curing, agriculture and stock rais¬ ing are the chief occupations. In the bay are several rocky islets, on one of which stands an arsenal, on a second a lazaretto and on a third a naval hospital. There are also a fine church, the consistorial palace, a theatre, museum and library. The harbor is strongly fortified. The exports are brandy, wine, dried fruits, agricul¬ tural produce, *etc.* ; and the imports, grain, wearing apparel, tobacco, sugar, coffee, cacao, leather, hats and other manufactured goods. Its trade amounts to about $1,000,000 annually. Mahon is believed to have been founded by the Carthaginian general Mago, whence its ancient name. It was occupied by the English in 1708. It was taken from them, after a memorable siege, by the French under Marshal Richelieu on 28 June 1756. Admiral Byng was shot for failing to relieve it. It was restored to -the English in 1763; and taken by the Spaniards in 1782. It was retaken in 1798, and finally given to Spain by the Treaty of Amiens in 1802. Pop.

17,542.

MAHONE, ma-hon', William, American soldier and politician : b. in Southampton County, Va., 1 Dec. 1826; d. Washington, D. C., 8 Oct. 1895. He was graduated at the Virginia Military Institute in 1847, and became a civil engineer and railroad constructor. At the open¬ ing of the Civil War he entered'the-Confederate army; took part in the Peninsular and Rappa¬ hannock campaigns, and by braverv at Peters¬ burg acquired the sobriquet (<The Hero of the Crater.® (See Petersburg, Military Op¬ erations Against). In 1864 he was made brig¬ adier-general and major-general. The war over, he accepted the presidency of the Norfolk and Tennessee Railroad, and also became active in politics. He was the principal organizer (about

1878) and leader of the Readjusters (q.v.), chiefly a faction of the Democratic party in Virginia who favored the forcible readjustment of the State debt on terms involving conditional or partial repudiation.

Mainly by the supporters of this movement, he was elected in 1880 to the United States Senate, where, however, he acted with the Republicans, making the vote of the Senate a tie and disappointing the Demo¬ crats of their expected majority. By this and other acts of his senatorial career he lost favor with his constituents and was not reelected.

MAHONY, mah‘6-m, Francis Sylvester,

ˆFather Prout,» Irish author: b. Cork 1804; d. Paris, 1866. Educated at a Jesuit seminary at Amiens, he studied theology at Paris, was ad¬ mitted into the Order of the Jesuits and taught for some time in a Jesuit college in Ireland, but for some irregularities was deprived of the position of a member of the order. He received clerical ordination and officiated for a short time at Cork and in London, but soon adopted the profession of literature. In 1834-36 he con¬ tributed the (Prout Papers* to Fraser’s Maga¬ zine, published as the (Reliques of Father Prout> in 1836. In 1846 he became Rome correspond¬ ent to the London Daily News, his letters being afterward republished as (Facts and Figures from Italy* (1847). In his later years he was Paris correspondent for the Globe. The ˆcl¬ iques of Father Prom* in a revised and enlarged form were published in 1860, and <Final Reliques> in 1876. In 1881 Charles Kent published a collective edition with a memoir. He will be longest remembered by his poem (The Bells of Shandon.*

MAHRATTAS, ma-rat’az, a native Hindu race, supposed to be descendants of the Per¬ sians, and occupying a large tract of central and western India. They have always been a dis¬ tinct nation or people, and still consider them¬ selves as such, even though now largely under British or Mohammedan jurisdiction. They came into prominence about the middle of the 17th century, when the chief, Sevaji extended his conquests in various directions, had himself crowned king in 1674 and established the Mahratta Empire. After his death long minorities and the incompetency of the sovereigns caused the powers of the state to fall into the hands of the Peshwa or Prime Minister, who became the acknowledged head of a Mahratta confederacy. The first trouble with the British broke out in 1775 and was not settled until 1782. This happened during the admin tration of Warren Hastings (q.v.). The next outbreak came in 1803-05 and resulted not only in the acquisition of territory by the British but also in strengthening their power.

Meanwhile the confederacy had held together till 1795, but internal wars and disturbances re¬ duced the Peshwa to the position of a

British dependent, and Scindia, Holkar and the Rajah of Berar were able to take the position of inde¬ pendent sovereigns. The confederacy came to a final end in 1818, after the third collision wherein the Peshwa himself took up arms against the British, and Scindia, Holkar, the Guicowar of Baroda, and the Rajah of Kolapore became dependent princes under British protec¬ tion. The state of Gwalior came under British control in 1844. Though devout worshipers of Brahma, no distinction of caste exists among

them. Consult Grant-Duff, (History of the Mahrattas* (Bombay 1863) ; Kincaid, C. A. and Parasnis, R., (A History of the Maratha People) (Vol. I, London 1919) ; Ranade, <Rise of the Maratha Power) (ib. 1900) ; Hmperial Gazetteer of India* (Oxford 1909).

MAI, Angelo, an'ja-16 mae or mi, Cardi¬ nal, Italian classical scholar: b. Schilpario, near Bergamo, Italy, 7 March 1782; d. Albano, 8 Sept. 1854. His abilities attracted the notice of Father Mozzi, a Jesuit, who instructed him in Latin, Greek and mathematics. On the estab¬ lishment of a Jesuit college at Colorno, in the duchy of Parma, he accompanied Father Mozzi thither in 1799, and a few years afterward was made professor of Latin and Greek in the Jesuit college at Naples (1804). He was transferred to Milan (1808), where he became an associate of the Ambrosian College, and one of the cur¬ ators of the Ambrosian Library. One special department to which he devoted himself was the examination of the palimpsests (q.v.) and through his industry in deciphering these, two volumes of fragments of Cicero's orations, of Lysimachus and of Isaeus, a fragment of the <Vidularia) (a lost comedy of Plautus), and a collection of the letters and other writings of Cornelius Fronto, the preceptor of Marcus Aurelius, were recovered and given to the world. In 1819 he was appointed chief keeper of the Vatican Library at Rome, and discovered be¬ neath a manuscript of Saint Augustine's (Enar-rationes in Psalmos* obliterated fragments of Cicero's treatise (De Republican amounting to about a fourth of the original, which he pub¬ lished in 1822 with a critical commentary. A colossal work was then undertaken by Mai, the editing of the various unpublished manuscripts in the Vatican, sacred and profane. It com¬ prises 10 quarto volumes, under the title of (Scriptorum Veterum Nova Colleotio e Vati-canis Codicibus Edita) (1828-38), and consists of numerous fragments, previously believed to be lost, of the ancient historians, such as Poly¬ bius, Diodorus Siculus, Dionysius of Halicar¬ nassus, Dion Cassius, Appian and others, be¬ sides the various writings of the Fathers. In 1838 he was created a cardinal. A new collec¬ tion, <Spicilegium RomanumJ was published

in 10 volumes between 1839 and 1844, and a pa¬ tristic series, called <Nova Patrum Bibliotheca, > issued between 1845 and 1853, closed his list of publications. Consult his life by G. Poletto (Siena 1887) ; also Prina, B., <Biografia del car¬ dinal Angelo MaP (Bergamo 1882); Sandys, J. E., (A History of Classical Scholarship) (Vols. I, III, Cambridge 1908).

MAIA, ma'ya, in Greek mythology, the eldest daughter of Atlas and Pleione. She was placed with her six sisters among the stars, where they have the common name of Pleiades. The Romans also worshiped a Maia, who was also called Majesta, and was afterward identi¬ fied with the daughter of Atlas. The Tuscu-lans called their principal deity Majus. The month of May is said to have received its name from them.

MAID OF ATHENS, immortalized by Lord Byron, was Theresa Macri, who 25 years after Byron's poem was written had lost her beauty, lived in a hovel in dire poverty and had reared a large family.

MAID MARIAN, a name given Matilda, daughter of Fitz-Walter, baron of Bayard and Dummow. She eloped with Robert Fitz-Ooth, an outlaw, and lived with him in Sherwood Forest. It is supposed that she was married by Friar Tuck to Fitz-Ooth, who was more com¬ monly called Robin Hood (q.v.).

MAID OF THE MIST, (1) the name of a small steamboat formerly used on the Niagara River below the Falls, to carry passengers close to the cataract. (2) A name 'given to the heroine of Sir Walter Scott's (Anne of Geier-stein.5

MAID OF ORLEANS, a name given Jeanne d'Arc (1412-31) (q.v.).

MAIDEN, or THE WIDOW, an instru¬ ment of capital punishment used

in Scotland during the 16th century, the prototype of the French guillotine (q.v.). It consisted of an up¬ right frame and a broad piece of iron a foot or more wide, sharp on the lower part and loaded above with lead. At the time of execution this was pulled up to the top of the frame, in which was a groove on each side for it to slide in. The prisoner's neck being fastened to a bar underneath, on a sign given the cutting iron was let loose, and the head instantly severed from the body. Its first victim is said to have been Thomas Scott, executed 3 April 1565, one of the agents in the assassination of Rizzio. In 1581 it was used in the execution of the Earl of Morton, the alleged inventor.

MAIDEN QUEEN, in England, a popular title bestowed upon Queen Elizabeth.

MAIDENHAIR FERN. See Ferns and Fern Allies.

MAIDENHEAD, England, market town and municipal borough in Berkshire, on the Thames, 24 miles west of London, on the Great Western Railway. It is an ancient town and was for¬ merly known as Maydenhutt, or Maydenhith, and while its stone bridge which takes the Lon¬ don road over the Thames dates only from 1772 there are records of earlier bridges as early as 1297. It was incorporated as a guild to main¬ tain the bridge by Henry VI, in 1451. It had formerly a large carrying trade in malt, meal and timber but it is now principally a residential town and pleasure resort for boating parties. The Wednesday market is still held under the charter of Queen Elizabeth, dating from 1582. Pop. about 15,219.

MAIDSTONE (Saxon Medwegestun) England, municipal and Parliamentary borough and the county town of Kent, 34 miles east-southeast from London, on the banks of the Medwey. The town consists chiefly of four principal streets, which cross each other at the market-place, with smaller. ones branching off at right angles. Its fine old Collegiate Church of All Saints is supposed to be of the 14th cen¬ tury, and is one of the largest parish churches in England. It has historical associations with the rebellions of Jack Cade and Sir Thomas Wyatt, and was stormed by the Parlia¬ mentarians under Favifase in 1648. It has ex¬ cellent educational institutions ; schools, libra¬ ries, science and art institutions, museums, play grounds and parks. The chief industries are paper-making (for which there are several large mills), brewing, iron founding and the manufac¬ ture of agricultural implements. It is the

centre of a great hop district. The Medway is navigable for 15 miles above the town. Pop. about 34,000. Consult Cave-Browne, (Maidstone* ; Russell, (History of Maidstone> ; Gil¬ bert, (The Collegiate Church of All Saints.) Maidstone returns one member to Parliament. Pop. about 35,475.

MAIDU PEOPLE, an aboriginal Pujunan group of Indians of northern California, of which the chief tribe, the Concow, inhabited the region of the Upper Sacramento River. Their descendants are to be found in the Round Val¬ ley Reservation. Their communities comprised rough dwelling-places or hogans built of boards, large circular halls or town-houses for assemblies and ceremonials and wicker store¬ houses for the winter supply of acorns which with pinons formed their staple food supplies. Their clothing was of the scantiest description ; the chief of their numerous dances was the acorn dance ; and they had a secret male society in which the initiatory age was 12. Con¬ sult Dixon, R. B., <Maidu) (in Boas, hand¬ book of American Indians,5 Washington 1911) ; id., (Maidu Texts5 (in American Ethnological Society Publications, Vol. IV, Leyden 1912).

MAIGNAN, Albert, al-bar ma-nyan, French painter : b. Beaumont, Sarthe, 14 Oct. 1845 ; d. Paris, 29 Sept. 1908. He studied at Paris under Noel and developed a strong and original man¬ ner in historical and landscape painting. At the Salon of 1879 he was awarded a first class medal. Amongst the most striking of his pictures are (Dante's Meeting with the Countess Matilda) (1881) now in the Luxembourg; and (Assault on Pope Boniface VIII at Anagni5 in the New York Metropolitan Museum of Art.

MAIGRE, ma'ger, or MEAGRE, a large

European drum-fish (Sciana aquila), common in the Mediterranean, where it forms one of the most important local food-fishes. It may at¬ tain a length of six feet, and its flesh has always been a favorite with epicures. Yarrell says that anciently on account of its large size it was always sold in pieces, and that the fisher¬ men of Rome were accustomed to present the head, considered the finest part, as a sort of tribute to the three local magistrates who acted for the time as the conservators of the city.

MAIL-SHELL. See Chiton.

MAILDUN, mal'doon, MAELDUIN, or MAELDUNE, hero of Irish romance, (Voy-age of Maildun.5 He was the son of Ailill Ocar Aga, of the tribe of Owenaght of Ninus, in County Clare, and before his birth

his father was killed by pirates. He grew up handsome and accomplished, but had scarce reached man¬ hood before he set sail with1 a crew of 60 men to find his father's murderer. For three years and seven months he voyaged on the Western Ocean seeing marvels such as no eyes had seen before. At length he found the murderer of his father, but pardoned him his wrong in grati¬ tude to the great mercy of God who had de¬ livered him from so many perils. Consult Joyce, P. W., (01d Celtic Romances5 (tr. from Gaelic, 3d ed., New York 1898) ; Tennyson, (The Voy¬ age of MaelduneF

MAILLY, William, American Socialistic journalist: b. Pittsburgh, Pa., 22 Nov. 1871; d. 4 Sept. 1912. He was educated in the common schools of Scotland and. England, and in 1895-

96 was editor of the Birmingham Labor Advo¬ cate. He returned to the United States and in 1898 organized the Social Democratic party of New York. He edited the Social Democrat at Haverhill, Mass., in 1899-1900; was associate editor of The Worker in New York in 1901 and in 1906—07 ; and managing editor of New York Evening Call in 1908-09. he was one of the organizers of Social Democrat, now Social¬ ist, party at Chicago in 1*898 ; organizer and secretary of the Socialist party of Massachu¬ setts in 1902; and in 1905-06 he was a member of the National Executive Committee of the Socialist party.

MAIMON, mi'mon, Salomon, German phi¬ losopher: b. near Mir in Minsk, 1754; d. Sie-gersdorf, Lower Silesia, 22 Nov. 1800. He was trained for a rabbi, but having become ac¬ quainted with the philosophy of Maimonides, he made his way to Berlin, and studied modern philosophy, languages and some science. Be¬ sides cultivating his own mind, and teaching a little, he wrote some philosophical treatises and literary hack-work. Yet he had Mendelssohn, the philosopher, among his friends, was admired by Kant and attracted the attention of Goethe. This he owed to his (Attempt at a Philosophy of Transcendentalism > (1790), in which he set out to supplement Kant's system with truths gleaned for the most part from Spinoza, Leib¬ nitz, Hume, Locke and others. Consult Witte, (S. Maimon)

(Berlin 1876).

MAIMONIDES, ml-mon'i-dez, properly Moses Ben Maimon Ben Joseph (Arabic, Abu Amram Musa ibn Maimun Obeid Allah al Kortobi), Jewish scholar: b. Cordova, Spain, 30 March 1135; d. 13 Dec. 1204. At an early period he developed a taste for the exact sciences and for philosophy. He read with zeal not only the works of the Mohammedan scholastics, but also those of the Greek philosophers in such-dress as they had been made accessible by their Arabian translators. Ip this way his mind, which by nature ran in logical and systematic grooves, was strengthened in its bent; and he acquired that distaste for mysticism and vague¬ ness so characteristic of his literary labors. He went so far as to abhor poetry, the best of which he declared to be false, since it was founded upon pure invention — and this too in a land which had produced such noble expres¬ sions of the Hebrew and Arab muse. It is strange that this man, whose character was that of a sage, and who was revered for his person as well as for his books, should have led such an unquiet life, and have written his works so full of erudition with the staff of the wanderer in his land. For his peaceful studies were rudely disturbed in his 13th vear by the invasion of the Almohades, or Mohammedan Unitarians, from Africa. They not only captured Cordova, but set up a form of religious persecution which happily is not always characteristic of Islamic piety. Maimonides' father wandered to Almeria on the coast; and then 0159) straight into the lion's jaws at Fez in Africa, — a line of conduct hardly intelligible in one who had fled for the better exercise of the dictates of conscience. So pressing d>d the importunities of the Almohad fanatics become, that together with his family Maimonides was compelled to don the turban, and to live for several years the life of an Arabic Marrano. This blot upon his

fair fame — if blot it be — he tried to excuse in two treatises, which may be looked upon as his <(Apologia pro vita sua® : one on the subject of conversion in general (U60), and another addressed to his coreligionists in southern Arabia on the coming of the Messiah. But the position was untenable and in 1165 we find Maimonides again on the road, reaching Accho, Jerusalem, Hebron and finally Egypt. Under the milder rule of the Ayyubite caliphs, no sup¬ pression of his belief was necessary. Maimon¬ ides settled with his brother in old Cairo or Fostat, gaining his daily pittance first as a jeweler, and then in the practice of medicine, the while he continued in the study of philos¬ ophy and the elaboration of the great works upon which his fame reposes. In 1177 he was recognized as the head of the Jewish com¬

munity of Egypt, and soon afterward was placed upon the list of court physicians to Saladin. When he died, his body was taken to Tiberias for burial.

Perhaps no fairer presentation of the prin¬ ciples and practices of rabbinical Judaism can be cited than that contained in the three chief works of Maimonides. His clear-cut mind gathered the various threads which Jewish the¬ ology and life had spun since the closing of the Biblical canon, and wove them into such a fabric that a new period may fitly be said to have been ushered in. The Mishnah had be¬ come the lawbook of the Diaspora ; in it was to be found the system of ordinances and prac¬ tices which had been developed up to the 2d century a.d. In the scholastic discussions in which the Jewish schoolmen had indulged their wit and their ingenuity, much of its plain mean¬ ing had become obscured. At 23 Maimonides commenced to work upon a commentary to this Mishnah, which took him seven years to com¬ plete. It was written in Arabic, and very fitly called (The Illumination ; for here the philo¬ sophic training of its author was brought to bear upon the dry legal mass, and to give it life as well as light. The induction of philos¬ ophy into law is seen to even more peculiar ad¬ vantage in his < Mishnah Torah) (Repeated Law). The scholastic discussions upon the Mishnah had in the 6th century been put into writing, and had become that • vast medley of thought, that kaleidoscope of schoolroom life, known by the name of Talmud. Based upon the slender framework of the Mishnah, the vast edifice had been built up with so little plan and symmetry that its various ramifications could only be followed with the greatest diffi¬ culty and with infinite exertion. In turn, the Talmud had supplanted the Mishnah as the rule of life and the directive of religious observ¬ ance. Even before the time of Maimonides, scholars had tried their hand at putting order into this great chaos; but none of their efforts had proved satisfactorv. For 10 years Mai¬ monides worked and produced this digest, in which he arranged in scientific order all the material which a Jewish jurist and theologian might be called upon to use. Though this di¬ gest was received with delight by the Jews of Spain, many were found who looked upon Maimonides' work as an attempt to crystalize into unchangeable law the . fluctuating streams of tradition. The same objection was made to his attempt to formulate into a creed the purely

theological ideas of the Judaism of his day. His (Thirteen Articles) brought on a war of strong opposition ; and though in the end, the fame of their author conquered a place for them even in the Synagogue Ritual, they were never accepted by the entire Jewry. They re¬ mained the presentation of an individual scholar.

But his chief philosophical work, his (Guide of the Perplexed* (Dalalat al Hairin), carried him still further : and for centuries fairly divided the Jewish camp into two parties. The battle between the Maimonists and anti-Mai- monists waged fiercely in Spain and Provence.

In the (Guide of the Perplexed) Maimonides has also produced a work which was (<epoch-making in Jewish philosophy. It is the best attempt ever made by a Jew to combine philosophy with theology. Aristotle was known to Maimonides through Al-Farabi and Ibn Sina (Avicenna) ; and he is convinced that the Stagyrite is to be followed in certain things, as he is that the Bible must be followed in others. In fact, there can be no divergence be¬ tween the two ; for both have the same end in view, — to prove the existence of God. The aim of metaphysics is to perfect man intellec¬ tually; the same aim is at the core of Talmudic Judaism. Reason and revelation must speak the same language; and by a peculiar kind of subtle exegesis — which provoked much opposi¬ tion, as it seemed to do violence to the plain wording — he is able to find his philosophical ideas in the text of the Bible. But he is care¬ ful to limit his acquiescence in Aristotle's teach¬ ings to things which occur below the sphere of the moon. He was afraid of coming into contact with the foundations of religious belief, and of having to deny the existence of wonders. The Bible teaches that matter was created, and the arguments advanced in favor of both the Platonic and Aristotelian views he looks upon as insufficient. The Jewish belief that God brought into existence not only the form but also the matter of the world, Maimonides looks upon much as an article of faith. The same is true of the belief in resurrection. He ad¬ duces so little proof for this dogma that the people of his day were ready to charge him with heresy.

Maimonides is able to present 25 ontological arguments for his belief

in the existence, unity and incorporeality of God. What strikes one most is the almost colorless conception of the Deity at which he arrives. In his endeavor to remove the slightest shadow of corporeality in this conception, he is finally led to deny that any positive attributes can be posited of God. Such attributes would only be* “accidentia” ; and any such “accidentia” would limit the idea of oneness. Even attributes which would mere¬ ly show the relation of the Divine Being to other beings are excluded; because he is so far removed from things non-Divine, as to make all comparison impossible. Even exist¬ ence, when spoken of in regard to him, is not an attribute. In his school language, the “essential” of God involves his “existentia.” We have therefore to rely entirely upon nega¬ tive attributes in trying to get a clear concept of the Deity.

If the Deity is so far removed, how then is he to act upon the world? Maimonides sup¬ poses that this medium is to be found in the world of the spheres. Of these spheres there

are nine: “the all-encompassing sphere, that of the fixed stars, and those of the seven planets.” Each sphere is presided over by an intelligence which is its motive power. These intelligences are. called angels in the Bible. The highest in¬ telligence is immaterial. It is the nous poietikos, the ever-active intellect. It is the power which gives form to all things and makes that which was potential really existent. “Prophecy is an emanation sent forth by the Divine Being through the medium of the active intellect, in the first instance to man’s rational faculty and then to his imaginative faculty. The lower grade of prophecy comes by means of dreams, the higher through visions accorded the prophet in a waking condition. The symbolical actions of the prophets are nothing more than states of the soul.” High above all the prophets Mai¬ monides places Moses, to whom he attributes a special power, by means of which the active intellect worked upon him without the media¬ tion of the imagination. The psychological parts of the ˆuide* present in a Jewish garb the Peripatetic philosophy as expounded by Alexander of Aphrodisia. Reason exists in the powers of the soul, but only potentially as latent reason (nous hulikos). .It has the power to assimilate immaterial forms which come from the active reason. It thus becomes ac¬ quired or developed reason (nous epiktetos) ; and by still further assimilation it becomes gradually an entity separable from the body, so that at death it can live on unattached to the body: In ethics Maimonides is a strong par¬ tisan of the doctrine of the freedom of the will. No one moves him, no one drives him to cer¬ tain actions. He can choose, according to his own

inner vision, the way on which he wishes to walk. Nor does this doctrine involve any limitation of the Divine power, as this freedom is fully predetermined bv the Deity. But Mai¬ monides must have felt the difficulty of squaring the doctrine of the freedom of the will with that of the omniscience of God; for he entrenches himself behind the statement that the knowledge of God is so far removed from human knowl¬ edge as to make all comparison impossible. Again, in true Aristotelian style, Maimonides holds that those actions are to be considered virtuous which follow the golden mean between the extremes of too much and too little. The really wise man will always choose this road; and such wisdom can be learned ; by continued practice it can become part of man's nature. He is most truly virtuous who has reached this eminence, and who has eliminated from his own being even the desire to do wrong.

The daring with which Maimonides treated many portions of Jewish theology did not fail to show its effect immediately after the publica¬ tion of the <Guide.) His rationalistic notions about revelation, his allegorizing interpretation of Scripture,, his apparent want of complete faith in the doctrine of resurrection, produced among the Jews a violent reaction against all philosophical inquiry, which lasted down to the times of the French Revolution. Even non-Jews looked askance at his system. In Mont¬ pellier and in Paris, his own Jewish opponents, not content with having gotten an edict against the use of the master's writings, obtained the aid of the Church (for the (Guide) had been translated into Latin in the 13th century), and had it publicly consigned to the flames. But all

MAIN

this was only further evidence of the power which Maimonides wielded. The Karaites cop¬ ied it; the Kabbalah even tried to claim it as its own. Many who were not of the house of Israel, as Thomas Aquinas and Albertus Mag¬ nus, acknowledged the debt they owed the Span¬ ish rabbi ; and Spinoza, though in many places an opponent, shows clearly how carefully he had studied the (Guide of the Perplexed.* Consult Yellin and Abrahams, <Maimonides,) and the authorities there mentioned; Neumark, (Geschichte der judischen Philosophic des Mittelalters* (Vols. I— II, Berlin 1907-10).

Gustav Gottheil.

MAIN, man, Hubert Platt, American com¬ poser and editor: b. Ridgefield, Conn., 17 Aug. 1839. He was educated in the public schools and for 59 years has been editor of song collec¬ tions and other publications for church, Sunday school and college use, besides composing many songs and hymns. His latest works include (Gems of Song for the Sunday SchooP (1901) ; (Gloria Deo) (1901) ; (Devotional Songs* (1903); (Hallowed Hymns) (1907); (Bixby's Home Songs* (1909); (Hebrew HymnaP (1910); Ode Book, (Eastern Star* (1911); (Mission HymnaP (1911-14); (Quartettes and Choruses — Male Voices* (1912); (Hamilton College Songs* (1915). He has also in prepa¬ ration (A Dictionary of American Musicians and Poets.*

MAIN, man (Ger. min), or MAYN, a river of Germany, which has its source in the north¬ eastern part of Bavaria, about 13 miles north¬ west of Bayreuth. It flows northwest to the border of Bavaria, and then makes a succession of remarkable zigzags, continuing, however, in a westerly direction, till it reaches the border of the grand-duchy of Hesse, which it enters. It then flows circuitously west, partly forming the boundary between Hesse and the Prussian province of Hesse-Nassau, and joins the Rhine a little above the town of Mainz, after a course of over 300 miles. The principal cities which it passes are Wurzburg, Aschaffenburg and Frank¬ fort. It is navigable for about 200 miles, and by improvements the largest Rhine steamers can ascend to Frankfort. By means of King Lud¬ wig's Canal it affords through navigation to the Danube.

MAINE, man, Sir Henry James Sumner,

English jurist: b. Caverham Grove, Reading, England, 15 Aug. 1822; d.

Cannes, France, 3 Feb. 1888. He was educated at Cambridge, where he was regius professor of civil law 1847-54. He was in India as legal member of the council, 1862-69. On his return, in 1869, he was appointed professor of jurisprudence at Oxford, and held this post till 1878. He was appointed master of Trinity Hall, Cambridge, 1877, and professor of international law at Cambridge, 1887-88. Among his more noted works were (Ancient Law) (1861), an epoch-making book; (Village Communities) (1871) ; (Popular GovernmenP (1885). Consult Duff, (Sir Henry Maine: a Brief Memoir of his Life >

(1892).

MAINE DE BIRAN, man de be-ron, Fran¬ cois Pierre Gonthier, French philosopher: b. Bergerac (Dordogne), 29 Nov. 1766; d. Paris, 16 July 1824. He entered the Life Guards of Louis XVI in 1785, was present at Versailles

on 5-6 Oct. 1789, but was not concerned in the Revolution. He opposed Napoleon in the latter part of his reign, and became a legitimist at the Restoration. His chief philosophical essays are (Influence de l'habitude) (1803) ; (Sur la decomposition de la pensee* ; (Sur l'appercep-tion immediate,* and (Rapports du physique et du moral.* Very little of his writing appeared during his lifetime, but in 1834 some of his essays were published by Victor Cousin who in 1841 published a more complete edition. The publication of his important writings by E. Naville in 1859 made possible the first con¬ nected study of his philosophical development. Maine de Biran's importance as a philosopher is chiefly due to his giving the direction to philo¬ sophic speculation afterward developed in the school founded by Cousin. Consult Naville, E.,

(Maine de Biran* (3d ed., Paris 1874) ; Couaill-hac, M., (Maine de Biran* (Paris 1905).

MAINE, the name given as early as 1622 to distinguish the main land from the islands. It was called in the Mason and Gorges Patent (<the Mayn Land of New England,** and in the great charter <(Province of Maine.® It is one of the New England group of North Atlantic States and the most easterly State of the Union. It is between lat. 43° 4' and 47° 28' N., and be¬ tween long. 66° 57' and 71° T W. It is bounded on the north by Quebec and New Brunswick, provinces of Canada, on the

east by New Brunswick and the Atlantic Ocean, on the south by the Atlantic and on the west by the State of New Hampshire and the prov¬ ince of Quebec. Its greatest extent is from north to south ; its greatest length about 303 miles and its greatest width about 212 miles; area, 33,040 square miles, of which 3,000 square miles are water surface. Maine is as large as all the rest of the New England group lacking 385 square miles, and it is the 37th in size among the States of the Union.

Topography. — While its northeastern and a portion of its southwestern boundary lines are straight, its others are irregular, especially its coast line, which, fringed by islands, is in¬ dented by numerous bays, giving it a shore length of over 2,000 miles, though a direct line drawn from its two extremities would be but about a tenth of its real length. This irregular coast line, bold and rugged from its eastern extremity until it reaches Penobscot Bay, be¬ coming lower as it approaches the south, is most picturesque throughout its entire length, much of it being bordered by sandy beaches and thick forests reaching to the water's edge. There are more good harbors on the coast of Maine than on that of any other State on the Atlantic seaboard.

There are two general mountain slopes in Maine, the highest part extending across the State from north of the source of the Megallo-way River in the west, northeast to Mars Hill. South of the main divide is Mount Katahdin, 5,385 feet in height ; Mount Abraham, 3,387 ; Saddleback, 4,000, and Mount Blue, 3,900 feet in height, all in Franklin County. Green Moun¬ tain on Mount Desert Island is 1,800 feet high, and is one of the numerous peaks more or less conical in form, isolated or in clusters, com¬ paratively bare of soil and densely wooded about their bases. There is no long range of mountains in the State.

MAINE.

Estimated population, 772,489

COUNTIES

Pop.

59,822 Androscoggin ….C 11

74,664 Aroostook . F4

112.014 Cumberland …. B 12

19,119 Franklin . B 8

35,575 Hancock . G 10

62.863 Kennebec . D 10

28,981 Knox . E 11

18.216 Lincoln . Dll

Pop.

36,256 Oxford . B 9

85,285 Penobscot . F8

19,887 Piscataquis . .E5

18,574 Sagadahoc . D 12

36,301 Somerset . C 6

23,383 Waldo . E 10

42,905 Washington . H 8

68,526 York . B 13

Incorporated Cities, Towns, and Villages

16,393 Auburn . Cll

14,170 Augusta . D 11

26,659 Bangor . F 9

9,396 Bath . D 12

4.618 Belfast . F 10

834 Bethel . B 10

17,665 Biddeford . B 13

5,667 Brewer . F9

1,474 Bridgton . B 11

5,341 Brunswick . C 12

357 Buckfleld . B 11

6,116 Calais . 18

5,377 Caribou . G 3

83 East Pittston, Kenne¬ bec . D 10

4,961 Eastport . 19

3,549 Ellsworth . F 10

2,801 Fairfield . D 10

1,240 Farmington . C 10

1,620 Fort Fairfield …. D 10

965 Freeport . C 11

540 Fryeburg . B 7

5,311 Gardiner . Dll

2,864 Hallowell . Dll

5,845 Houlton . H 5

27,809 Lewiston . C 11

1,167 Lincoln . F 8

2,408 Madison . D 9

2,215 Norway . B 10

6,317 Old Town . F 9

473 Oxford . B 11

262 Paris . B 10

823 Phillips . C 9

2,231 Pittsfield . E 9

63,867 Portland . C 13

2,938 Presque Isle . G3

695 Rangeley . B 6

8,186 Rockland . E 11

5,427 Rumford . B10

6,583 Saco . B 13

5,341 Skowhegan . D9

1,542 South Paris . B 11

7,471 South Portland. .C 13

12,702 Waterville . D 10

8,908 Westbrook . B 12

GOUCHE

w’P/7/SiF“‘’

;HAnjˆOIX//®Sggˆ

K’Sf’SUa

TEM1S

N let air

>iette*

oGuerette

CVotfdv

Dickey

PlnlBteai

\ _

Englo Lake*

Hail) Ml

illegaah

[Stockholm

Lake

Truutert Ldl >

Acadia

teitxlervillirUfAOT

‘d3tmanlan < t/*

‘Wokstomˆjj «w V ˆ

_ /VowadeDVO,

Irfluntord/p,, OgrctNs

mtmagny

Wptcrvi or Quimbyp’

Rock.

Plaster

QUEBEC

Nixon

FUth ivivcrl

‘ ‘Lake)

‘roostook J<

Perhˆ mNˆ Maytville

[pˆvWjVaBh buruYXˆ 7

w”r R<

bfeSEate Rood I < | Ilf} .

Z Prewˆuc t/»l* Jc’&AMh

Aiinbard LaArding Vˆ gˆ Tar Mapleton

”“‘“y’T re67 W

4ˆ4-.”? Y»’

.Maaardla / \ Jlame

‘MONTMAGNV \

Big ’Much iaaLakeˆ Munquaqˆ ink Lake ˆ -

Skerry\<

Sheridak’

Ash lap <

‘Easton!

) Umsaakisi

2y Lake

Isidore

ibenakls

Ckendjuatabo m [ficoojfcM

I Bristol

.obinsons

galley or 0 0 v\ Beauoe Jo. P. 0.

.Griswold

.lun*ungun

ˆ\f.Lake

ˆ Bridge wet. r Center

.Prides Mill /

Vsi. Croix J At

‘Oxbow

f ‘ˆPotngoeicahetnW\

■ i \ cSiiˆT

AUagpah

ˆr\Pnnd chZnberlaˆk

ETON

s Hart land

ike

Millnokell

■ˆLake

‘Scboeti 1

Howe Brook”

.Weeksboi

1 don ti cello

Newburg JcJ

Baker L ike\

am

Littleton <

Leadhette 1

>Beauceville‘ i \ / Guest

[Ulman/iO

kneed]

Lake’

s, 0 .Vu,ˆ~vT«ˆ<m’”,4 J Pond

G~\ felon Lake .J Cunabcxin Lake I]jx) Duchpond i,

5oMatngatpon Mon taˆamonL;

‘oodstock

.riloulton

‘rna Mlllsfc sb laud Jc.IV/t

Cardigan

CHesuncook

foebeo

iGukfield

; j rdnanunk 1

L mucus.

-ycrjotol V’ </„>, ‘granch L\

/tr °Goldenridir& ‘

/patten Jc\ 1 -

“V Sherman Mills <3>V > Sherman Wgtopitlock’

Bunnell flm U1 - \ Brail ,

Patten*

St-NSvariste de Fors

Harrim ˆ Lake\

Seboomookl

! . (North

layuesville yLnkt

L“«i. S)

■.Caribou, • Lake ■ f

‘Suvth Branef

Lake George

PonJV* nayvsi L fiokehead Lakjtfft

Z Spencer Pond

Monari

Longfellow* L.’

}£ Grand Lake

iriudstonel

ifarvey

\uadavic\ \ Lake 9

,S. Bancri.

Beni adurn cr > ˆ . ClJJt wtlenJffi! xMimnocket,ˆ —

5)N drcryeeTˆ 1

> r”B”Vv. M\1W

Endleee

\ r\Lake £}

Pemadumoook LI Stand Ii jack — I

lilbcrty

in croft

I River

Ef ‘ J”!”

77 Lower KvadZfZˆ >’>»r ilrnr l9lttnJ’ ˆ

J Middle Upper IX

(lean c’ J

$isr#

Purlin Pont/TJ

Mnrrs Indian Pij/r

Q Indian jt’

Pont i/J Qreerˆ,]ue J c.VJPo Green vil

patta?tt®Vw

/‘MatWwan

?) r f**evt

\rh) ‘-r

t(W Iron Works or’\J Seljouˆs jt P. Katahdin

Irˆi Works P.OJ /

jundary’

Meg anti i

,-Tliree.L

lankehega’i

Lake /«■ =

c Gerard . liSpencer \JPond,

I Carrol

‘^dftki^SC, L

BobKsuNjsS

l Onawa

| U North Blnnd

L - J«ton8on<jˆ

vV’e .. V 11 llaoebariOi Partrot

Vr.lliamsWgTˆ

lirownville Jc-\

j* Brownv.Ulol

t/Zr Hoaston6 7 .7/ Lincoln Centei ˆ/Lincoln (Ciucoln / Crt ‘Pollard Brook,

Cold Stream I

SP° Springs ;ld „ . Junior

Bbnd . , Cr =

Lake f

‘ C7ioi?iN%

••“do Lake?

/ Round M

K_x TV. .ifosi/vankLake

ˆ) WalteStd A

‘j&sWittequej’ga •* gurn\£//\ \f?:L(lkeˆ (-PTltiCtlo&ˆZaZ’

＜P pj’fi1’*!’ kll”V

PoeamZjdalune

‘^&Third Lake .Alexander ˆ Crawford LakcZfl Mcdc

W\ A S H (tˆ§ N <

r.\ T Crawfprd Cedar o Ihain L.n— . Groves \

/H A. R l\0.

B. So. Ry-1

Crossing/y~ˆ\X

BarJˆTo’/ |

View~~i

01041001’

JHerA-F\md ‘ I-»Vˆ 7”i; /*

£bxu«f

ˆoTi“

8 tram

JU?PSˆ

! P”k”>S»a 1 tA w

:o» ‘Wijlio?lo!i_y

Grti i

lead River °

Vf °^r^BrZ'l 1

, 1 North Bradfirt

der _ _ -

^^'CEarleston -

o/SUver Mills!

Y Gkdand]

Lily Pond^N IcMer^Corihtl

Camp Caribou!

■burtJ

S.° La On radford Cb

rad ford P.

i basset

JcAda4

edloSton

cCambri

iSJV-

| P fed sanCTaiahVi:

• . I tfl ujd aiouni] 1 o J3 BarB , I AVTlaonR Mills) \l/Uppor DnAo ! ^ f//>per ‘£HrVh>! tafpegn LakeW

Grove°

Harmony c

kMatnstroami \W,MO«W’ A) Club \

ˆdsonl

!-X< »fPortland Ne«sPortland ˆM-lmbdcn

‘Pines kCiiihance

‘WMleykˆV Cooper I

/ V\‘ p. Pennj

HsSSb tHIX Marion

‘»A Boeky L.ZL NortliHcld McGeorgesl

dfreat Pond ZZˆAlligator L. \ Grgat Pond7 (jl ‘*“7

l Reeds 1C Salem J ■ˆAladrid J|c -Vˆt Madrid \

r \Wv

Neiv Pln)

Ls.ˆJeroMˆBradley! led OroncJOˆli)

Mn MillaWS xˆe*zio/Z/o Eddington 1 J |

ri’*|5ftii8:orcuftoo\ V

*— sJ&VBrewer o ° \ 1

r,. , E. Eddington \c //// Ur?Wcr\F isberfl „ - — I

y fS . Orri oaton’/ fˆ, Phillips Lake’

\is? VˆlnDa Kenduakeˆ, A

Hi piˆr. av

ˆL > rfcon0

o CarmclCSjˆ— Plymouth A) i 7 -7;

- — it-

& felUwj

\ ˆ Sta- °Erimkfor(-

A /id / W ftl Jf\

V-°7r>^*f >< >ks SMnvllleN

7 Y,t/“oA’Wt’(/u’on(‘

o^‘y^Brnclcett J,< ^ GABe&ils1 . AeA^T^r

ASU m tn i 7/

l«rcjaon\

LOU2ht6u|

,Aurora X

Umbcu

Anson

iStrongj Ward °

Maplewood ˆ Mill6.

Madisoi

ˆqrt/ner

W .Lubecˆ

ddledamSˆ;

grille \ SjirrtiXle f E

L,.kt) IV.

.0S AlolanHFs\

ˆJSPond Y”\

‘Abram* Pdni

4£&«r

Webb

iHe66«Y

eblois’

Fairbanks Woldt” Temple

_C5R!ervllle*f’ro

!• UttsWˆI

J llV,\Vdf f <x , ““t

[Inckley

N orth/X

Rox bu r Grafton / p

‘Andoverˆs 0 1 r

_=? F: Audi. rit/ 7rS. Andover jyj,

Mprsˆiimx

JˆpoiltEllˆrt!

Surry 0 ˆ O’T / °Penob60oL >It

A7j (5,0 s. >>v

-Ay V-Penobsoot ˆ *’• ft’lf

NgaSisUi m0

ˆMillTy W.Farmiug^^ ˆi.ˆVV’ilton P. 0.o /^•‘Vl

/P fS, Benton/ //‘llentoij v > ’ A > inslow . .

(S. Albionˆ

. o. anaover f j ‘ .VtˆRumforˆR,

« iˆbmlbril PoliJt

HI

■tegvflie o/

Belcradeˆ

1 ford Point mover o’®

■ olmitir.irdv

iPSteubei

T, RumfordiCorner1

7 21. lJctbc\7” - -

IXndrOKoggin I Jj

1 ˆ«8tingsL°cyT5ftt’\Y

Waldo Staˆˆ V V V.SargentAStA

klermˆ MorriluV

S*ars®ont0 CitypoToTˆ

p “da

o ˆvth I,1]

rrrY—ˆd

Cco. Liin ‘ipvillo o °p Butk.it. illeOˆO j

”°nQ -Caradravl; alonl cE.Cnlon?77?.

Redding. V dfi i

v SumDer0AˆLi,eP®°lfi,o’

v FallsT’BuckrteldW (T/1,rer

b | L Paris nVfD1”y

Pa Vis) “‘fe11 Turner Hebrbu M \

Gorham

*7/ > CbinaJ ^^ennebec •

A’ugusi

syNntiSoldiota

yiinˆr-— M V Chelsea f JRandolphyˆ*’ liar,li™r f / \

ylbl -VNI. \ ■ > ,

-;r-, ii daili.Quajˆ dir.ioklin n)l0 /isV;i I IT W|(WW Harbor ’IˆfoxUicast I d-Tremdny n \g\ < S’s)esf(

1 n sTTi tieˆ,- siffffb u ’ 1 3 inland

1 ‘ SAa.v.; 1 ? AV~n\

North

Lovel!

N.rfj

iardin[cr

Litchfield’

“ANOROoCOGGli

t’K N/f”” !o i:)/a/z>

gSˆtxa” %

‘ //Stˆreorge |VinalIl$\ u.l.lxˆ §I’JlJ1ct ,liead

OV®?1ˆ, (ZafyRrtti *•

Wf/gSK ˆ

rest Duck I.

|sypSci!‘V}..ljˆA]7

WlVB JIl)btn,ond ,v

\$\) Raymond-0 oSKIjW », / Nle« Gloucestei M&SL Oty Mills 3 °-
Bny»iond i

WmB’ e4

^^e&cfijooL. . ‘.7

li VmW N . WbiRhafa

- NV’A.c. WalaiA.

y G orb a

B 1 o« u 1! cˆn, D m ariˆ o wo fly W Yv w

5 TSm > S’

I nirain\lAkˆ

II Brldgton Jc.ˆWˆ

‘ IS Hiram w-BafWwin

‘oodbn Bau. L

Boufhbay

m Point Mon heo a n

0 <— Cornish V

x Kctar fa”4 Steep Falls) > *\j|n . , N.Liiningtuid

O li-ParaonfleldE.Liˆagti T/

Par?onnleld0 Limingtonˆ S?J, S-Parsoufield o S.Limingtojlp |>ee I »
nLiuierick° W.Bustto VMapli.vJbod ˆ\vfiJldˆ/t(I —ˆNeufleM .s

iebaven

ill 1 larpshyMll 0 /

•yA?/i!ailey «/ a&y?Pha0,

mi

r Vdito Bayz-irˆy -

mhegan

‘S8§‘nr

xtsd L

ˆ > ° LTrrVS/A > »rtland tv“r» > oro77 v\rfpe Cottage L yˆZ’*/\9h‘e Cllzabctl

ˆ \ 1 /

;EmerjˆMllR

tr Wells Depot 7/v>AK/

N. Berwick5ˆ7 ˆj/rMˆei,?,

fe.iSi?P=

7jA?amcnti,*‘UfYi rdlJjHp. Berwick VDgunquit, /Jewett

Beach

SˆSiTOˆ®#IJlarbor

j fP- — Yolft ■ Point

STRAFi

Statute Miles. 25.5 = 1 Inch.

10 20 30 40

Rand MoXnllv's New 11 s 11 Map . f Maine Copyright by Rand McNally k Co.

is - - Electric Lines-*-

Hydrography. — That portion of the State north of the main divide is drained almost wholly by the Saint John River and its tribu¬ taries, and the part south of the main divide is drained chiefly by the Androscoggin, Kenne¬ bec, Penobscot and Saint Croix rivers. The basin of Saint John River has an area of about 7,425 square miles. The headwaters of this river are in the northwestern part of Maine and the eastern part of Quebec, and it flows north by east for some distance past Saint Francis on the north to the extreme north¬ eastern boundary, where it makes a turn and flows generally southeast through New Bruns¬ wick to the Bay of Fundy. The largest Maine tributaries of the Saint John are the Aroostook and the Allegash. The waters of a large num¬ ber of the lakes of Maine find their outlet through the Saint John. The rivers south of the main divide flow generally south to the ocean. The source of the Kennebec is about 2,000 feet above the sea, of the Penobscot over 2,300 feet, of the Androscoggin about 3,000 feet and of the Saco in the southwest nearly 2,000 feet. They, together with their tributaries, are swiftly flowing streams, in many places passing over rocky beds which form rapids and falls and furnish extensive water powers. From the report of the Maine State Water and Storage Commission it appears that Maine ranks third among the States of the Union in de¬ veloped horse power which is estimated to be in excess of 400,000 horse power. Its storage facilities are estimated at 400,000 horse power more, which, with over 1,000,000 undeveloped horse power, make a total of over 1,800,000 possible water horse power in the State. It is without doubt among the greatest of the State's assets, and has excited the cupidity of men in and out of the State to exploit it for their own enrichment. The so-called Octopus Bill of 1911 was designed to enable these inter¬ ests to transmit this power by converting it into electricity beyond the State's limits, but at¬ tracting attention aroused so much opposition that it was defeated. It is only by getting con¬ trol of the political machinery of the State that the interests responsible for the measure can accomplish their designs which would result in immense loss to the people of the State. The flow of the tide is so great on the coast that it has been estimated (<that with suitable wheels it can be operated 16 hours out of the 24.)) There are about 1,620 lakes in

Maine, a large number of which are near the sources of the rivers. The surface of the lakes and rivers constitutes nearly one-tenth of the whole area of the State. Moosehead Lake is the largest in the State. (For description of rivers, see sepa¬ rate articles).

Geology. — The nature of the geological formation of Maine shows that it belongs to one of the oldest parts of the United States. The marks of the Glacial period may be plainly traced in several parts of the State; the changes in extent and form of the river beds and lakes are shown by the rock formation of the vicinity and the nature of the deposits which were brought from the mountains to the valleys. The northern portion of the State be¬ longs to the Devonian period and the region about Penobscot Bay to the Silurian. In the southern part of the State are fossiliferous clays. There are a number of low ridges which

evidently were once portions of mountain ranges, but which usually formed angles with the two great ranges that at one time extended across the State. Granite, slate and marble ex¬ ist in large quantities.

Soil. — The soil of the State shows the ef¬ fects of the Glacial period as much as the rocks; the greater part of the surface is till and various forms of glacial debris. The old lake bottoms, now dry land, are largely alluvial and in these places the soil is very fertile. In such localities there are extensive agricultural lands.

Minerals and Mining. — Granite is one of the most ‘important wealth producing minerals of the State. Along the coast and inland for some distance there are large areas of granite outcrop. It is found in such quantities near tide water that quarrying and shipping are com¬ paratively easy and inexpensive. The feldspar and quartz are easily separated. Hallowell, Dix Island, Vinal Haven and Freeport furnish the largest quantity. The capitol at Albany, N. Y., and the Metropolitan Museum of Art, New York City, are built of granite from Hallowell. Crystalline limestone and marble are found in several places; in the southwestern part of the State the deposits are quite extensive. Slate of good quality is found in the central part of the State. It is quarried for table tops, black¬ boards, roofing and for mantels. The slate from Piscataquis County is remarkably pure, capable of being split into thin plates, and in color a deep blue-black. Silica and feldspar of an excellent quality are found in several places. Some of the products made in whole or in part from silica and feldspar are glass, porcelain, scouring soap, sandpaper, earthenware and woodfiller. The silica is

found in vein-quartz in some of the crystalline rocks. Tourmalin is found in Oxford County in large and beautiful crystals. Some of the other minerals are iron, copper, zinc, arsenic, manganese, tin, silver, gold, antimony, pyrites and beryl. The annual value of the mineral output is about: granite, $1,000,000; limestone and marble, $1,000,000; slate, $180,000; silica, $50,000; other mineral products, $60,000, making the total amount for quarry purposes of about $2,600,000. Maine ranks second among the States in the output of granite; fourth in the output of slate and sixth in the output of limestone and marble.

There are in the State nearly 30 mineral springs which are known and used ; 10 of them are in Androscoggin County. The State reports about 30 springs with an output of about 1,850,000 gallons. The most noted of these is the Poland spring situated in the town of that name.

Climate. — The climate is cold a consider¬ able part of the year; snow covers the ground from three to five months. The summers are short; in the southern part of the State there ■is not more, usually less, than five months for the maturing of crops. The extensive forests have been a protection, and with the good river drainage and the sea breezes have tended to make the climate most healthful. A fair aver¬ age of the mean temperature in January is 15° F. ; in May 52° ; in July 68° ; in October 51°; in December 22°. The average tempera¬ ture in the whole State is in summer about 62.5° F. and in winter 20° F.

Flora. — The trees and plants common to the northeastern part of the'United States flourish

here. In the southern part are fine grasses, hardy fruits and a varied shrubbery. The strawberry, blackberry, raspberry, blueberry, thorn-apple and gooseberry grow in all parts of the State. (See Forests and Agriculture) .

Fauna. — Maine has a large number and variety of animals, among which are bear, cari¬ bou, deer, moose, fox, beaver, sable, marten, mink, weasel, squirrel, rabbit, porcupine and wildcat. Wild geese, duck, teal ; plover, gulls and various other sea fowl are found about its lakes and sea coasts; partridges, robins, bobo¬ links, orioles and other birds belonging to the north temperate zone are common. The waters of Maine abound with fish in great variety. (See section Fisheries) .

Forests. — Maine is known as the ((Pine Tree State® because of the large extent of pine forests which once existed within its limits. The majestic <(mast pine,® which the State once fur¬ nished for many ships, has almost become a thing of the past, yielding to the demands of commerce. The greatest part of the State is covered with forests; about 65 per cent of the State's land area is woodland. The northern and central parts are forest; in the southern part along the coast and along the navigable streams the land is cleared and cultivated. Trees grow rapidly. Denuded tracts, unless cultivated soon, send up an undergrowth of seedlings which become trees of fair size in the course of a few years. Most of the lumber of Maine used in the manufacture of pulp and paper has been taken from the drainage of the Androscoggin, Kennebec and Penobscot rivers, in about the following proportions : 42 per cent from the Androscoggin; 25 per cent from the Kennebec and 33 per cent from the Penobscot. The total area from which the whole pulp lumber consumed in the State has been taken has been estimated at 4,741,000 acres, leaving more than one-half the entire region from which no pulp wood of any consequence has ever been removed. There has been estimated standing 21,239,000,000 feet of spruce alone, be¬ sides an almost equal quantity comprising pine, cedar, hemlock, poplar and various species of hard wood. The annual growth is considered sufficient to warrant the cutting of 600,000,000 feet of spruce timber each year, without de¬ pleting the supply. The forest commissioner states that it is safe to reckon that there will be from 11,000,000 to 12,000,000 acres of land in the State that will be lumber producing for all time. There are now being taken annually upwards of 30,000,000 feet of white birch from Maine forests. The

white birch area is a wide belt extending entirely across the State. Though used for many purposes its greatest utilization is by spool factories which produce about 800,- 000,000 spools, valued at more than $1,000,000. Besides being, used in the production of spools a large quantity is shipped to Europe in spool bars. A variety of small articles are also man¬ ufactured from it, as baskets, furniture, office equipments, *etc.* The science of forestry is be¬ ing employed extensively in the preservation of timber by private corporations.

Fisheries. — The rivers and lakes are well stocked with fish ; the .State is considered the sportsman's paradise. Some of the varieties are the speckled trout, sturgeon, pickerel, sal¬ mon, bass and bream. Lobsters, clams and mus¬ sels are in large quantities along the coast, and

in the bays and inlets are bluefish, rock-cod, sculpins, dinners, flounders and others. In the off-shore waters there are cod, herring, mack¬ erel, haddock, hake, porgy, menhaden and pol¬ lock, which are caught in large quantities. One species of herring, the Culpea harengus, fur¬ nishes a large portion of the fish used in the sardine-canning establishments of Lubec, Eastport and other places. The fisheries of Maine rank second in value among the fisheries of New England, but more men are engaged in this industry in Maine than in any other New England State except Massachusetts. The commissioner of sea and shore fisheries for 1914 estimates the number of persons depend¬ ent upon the fisheries at 50,000 and the value of the product at $5,786,000.

In 1892 the lobster fisheries product was $992,855, this amount being greater than for all lobsters in all the other New England States. The law passed in 1895 for the protection of the lobster fisheries greatly curtailed this branch of the fishing industry, as it prohibited the tak¬ ing of lobsters less than 10j/2 inches in extreme length. This caused the removal of canning establishments to Nova Scotia, New Bruns¬ wick and the Magdalen Islands. The govern¬ ment experiment stations plant large quantities of lobster fry along the coast. The value of the catch for the year 1913-14 was $3,277,806. Clam fishing ranks next in importance ; canning clams is a prominent industry, also the prepara¬ tion of smoked herring. Salmon fishing is largely in the Penobscot and Kennebec rivers. The fishery trade is centred chiefly at Portland, Rockland and Vinal Haven. The sardine fish¬ eries are located in Washington, Hancock, Lin¬ coln and Cumberland counties. The following quantity of fish cured and canned was, according to last report, 8,751,392 pounds of sardines and 2,173,277 pounds of clams.

During the 10 years preceding 1909 this industry grew from 74,022,141 pounds to 116,289,900 pounds, and increased in value from $4,753,071 to $5,738,685.

Agriculture and Stock Raising. — The soil of a considerable portion of the State is not adapted to agriculture, owing to the large acre¬ age of forest land. But a little over 33 per cent is farm land and of that nearly one-third is not improved. The most fertile lands are in the river valleys, the largest acreage being in the northeastern part of the State in the Aroos¬ took Basin. The farms average in size about 105 acres, and less than 5 per cent of the farms are occupied by tenants (Government Census Bulletin for 13 Dec. 1910). The owner living on the farm means more intensive methods of cultivation, a systematic enrichment of the soil and a careful rotation of crops. The cereal crops, especially wheat, have decreased in ex¬ tent owing to Western competition, but in Aroos¬ took County they are increasing. The Federal census of 1910 shows that in this county the cereals occupied one-half the total of the cereal acreage of the State. The crop of oats, once large, has also decreased ; yellow corn, for¬ merly cultivated on all the farms, never occu¬ pied much area and is now raised principally for fodder. The finest sweet corn in the world is raised in Maine for canning and goes to all parts of the country.

The green-corn industry originated with Isaac Winslow who invented the process in 1838-39. On 8 March 1853 he applied for a

patent for preserving fresh green corn by her¬ metically sealing process. In suits against in¬ fringers of the patents -it appeared that the canning of corn originated in Maine at the early dates mentioned, and Maine-packed sugar corn still leads in all markets. In 1915 Maine packed 1,959,000 dozen green corn, valued at

$1,470,750.

Buckwheat, which produces excellent flour in a soil and climate like Maine, is still culti¬ vated. The returns from the potato crop are greater than from all the cereals. Hay of an excellent quality is marketed at good prices. Farmers living near markets are giving con¬ siderable attention to market gardening and dairying. . Fine grained vegetables, sweet corn, small fruits and apples flourish and bring ex¬ cellent returns.. Apple orchards are increasing in number and increased attention is being given to their care and cultivation. The raising of horses is increasing, but the number of neat cattle and sheep is decreasing. The number of milch cows is increasing. The statistics of 1900 show that nearly 30 per cent of the farms de¬ rived more income from dairy products than from all other sources. However, such statis¬ tics are sometimes unreliable as a large part of the living of the farmer's family comes from the farm, but that only is reckoned as income which is sold from the farm. The amount re¬ ceived in 1900 for dairy products was about $5,605,000. The Federal Census Reports of 1910 gave the following statistics : 59,773

farms, covering 6,291,000 acres, of which 3,933,- 000 acres were .unimproved. The total value of the farm property of the State was $199,- 271,998. The value of the products for 1899 was $37,104,375. For the year ending 1 June 1910 some of the farm products were as fol¬ lows :

Quantity Value

Hay . 1 , 750,000 tons $22,400,000

Potatoes . 27,940, 000 bushels 11,735, 000

Oats . 5,554,000 bushels 2,666,000

Buckwheat . 748,000 bushels 509,000

Com . 782 ,000 bushels 555,000

Barley . 248 , 000 bushels 188,000

Wheat . 267,000 bushels 272,000

In 1917 the chief crops were oats, 4,930,000 bushels ; corn, 780,000 bushels.

In 1910 the farm animals were:

Number Value

Horses . 107,574 $14,364,756

Sheep . 206,434 813,976

Milch cows . 156,819 5,874,228

Other cattle.. . 99,704 ‘1,910,156

In 1918 the farm animals comprised 109,000 horses, 170,000 milch cows, 127,000 other cat¬ tle, 163,000 sheep and 100, 000ˆ swine. In 1916 the wool clip amounted to 850,000 pounds of wool.

New Sweden. — In 1876 a Swedish colony consisting of 50 persons was located in the northern part of Aroostook County by the Hon. W. W. Thomas, Jr., Commissioner of Immi¬ gration. That portion of Township No. 15 upon which they were located was named New Swe¬ den. Its present number is. 905. It is estimated that there are now in Maine 5,000 Swedes, a large number being descendants of the Thomas colony. The success of the. settlement, owing to the high character for thrift and industry of the colonists, has been so great that Mr. Thomas is planning to establish another colony VOL. 18 — 10

in Aroostook County if the land can be ob¬ tained. Aroostook County leads all others in the value of its potato crop.

Manufactures. — The extensive water power has been a great aid in developing manufactur¬ ing industries. Shipbuilding was among the first manufacturing industries of the State. The first vessel built in Maine was the Virginia. She was built by the Popham colony 1607-08, and under command of Capt. James Davis sailed from Plymouth with the Somers and Gates Colony for Jamestown, 1 June 1609. Bath was the chief shipbuilding centre of the United States for over 100 years and is yet a shipbuilding centre of importance. Prior to the construction of steel vessels, the Maine for¬ ests supplied a large amount of the timber used in ocean vessels built in the United States and nearly half the ocean vessels of the nation, up to 1900, were made in Maine. Bath builds now many steel vessels. The manufacture of

leather is another of the leading, industries. The bark of the hemlock is used in large quantities for tanning. The manufacturing of cotton and woolen goods began the latter part of the 18th century and has been continued. Lewiston is the chief centre of cotton manufacturing. There is a tendency now to remove the cotton manu¬ facturing industry to the Southern States or nearer the supply of raw material. Biddeford and Saco are extensively engaged in manufac¬ turing cotton goods. Woolen mills are scat¬ tered throughout the State. The oil-cloth in¬ dustry was first started in Maine in 1845 by C. M. Bailey of Winthrop. Nearly all the factories are located near the coast, or in locali¬ ties where abundant water power and good transportation lessen the cost of production and shipping. Lime and cement are important manufacturing products : large quantities of lime are made in Knox County.

The Paper Industry. — Samuel Waldo, Thomas Westbrook and Richard Fry were pio¬ neers in the paper industry of Maine, having built a mill at Presumpscot Falls, Falmouth, in 1731, and a second mill at Stroudwater in 1733. At this time there were but three paper mills in the country, two being in Philadelphia and one in Milton, Mass. R. H. Gardiner and John Savels built the third mill about 1810. In 1816 Harris and Cox Brothers built a mill at North Yarmouth, and the same year another mill was built at Union by Josiah Day which was destroyed by fire in 1843. In 1623 George Cox and Company built a mill at Vassalboro which was burned in 1848 and not rebuilt. In 1845 Day and Lyon built a paper mill at ((Con-gin® (now Cumberland Mills, Westbrook) which was burned in 1852, and was rebuilt by the firm of S. D. Warren and Company on the site of the old mill.

The paper industry in Maine received a great impetus by the introduction of wood pulp, and the State now ranks among the first of pulp-producing States. Wood pulp was first produced in this State in 1868-69. The second pulp mill was established in 1872 at Yarmouth. Sulphite pulp was first produced in Maine in 1889. Other sulphite, soda, pulp and ground wood mills have followed in rapid succession since these dates.

The paper pulp industry has increased greatly during the past 10 years. There are now 113 pulp mills in the State, with aggregate

capital of $75,000,000, and an annual product valued at $70,000,000. Their daily output is about 5,000 tons, divided according to return 1916, as follows: For news, 1,319 tons; board wrap, 433 tons ; book writ, 483 tons ; special, 106 tons ; chemical pulp, 980 tons ; mechanical pulp, 1,657 tons.

The last public report gives the value of products of the following industries :

Manufacture of paper and wood pulp

Lumber and timber products .

Cotton goods .

Woolen goods .

Boots and shoes .

Canning and preserving .

Foundry and machinery .

Flour and grist mill .

Printing and publishing… .

Ship and boat building .

Marble and stone work .

Bakery .

Leather .

Wood, turned and carved .

Metal products .

Milk and cream products .

Lime .

Men's clothing .

$33,950,000

26,125,000

21,932,000

18,490,000

15,509,000

7,689,000

5,237,000

4,507,000

3,438,000

3,062,000

2,565,000

2,235,000

1,905,000

1,870,000

1.689.00Q

1,301,000

1,215,000

1,164,000

Political Divisions. — Maine is divided into 16 counties, as follows : Androscoggin, Aroos¬ took, Cumberland, Franklin, Hancock, Kenne¬ bec, Knox, Lincoln, Oxford, Penobscot, Pis¬ cataquis, Sagadahoc, Somerset, Waldo, Wash¬ ington, York. Pop. (1920) 768,014.

The principal cities of Maine are Portland, the metropolis, founded in 1632; Lewiston, Bangor, Bath, Augusta, Saco and Biddeford, each of which is treated in a separate article.

Banking Institutions.— There were in 1915 69 national banks doing business in this State, having capital stock of $7,765,000; surplus fund, $3,879,500; undivided profits, $2,756,231.48; loans and discounts, $39,240,311.42. Forty-eight savings banks, having 238,300 depositors and $97,679,538.74 savings deposits. Forty-six trust companies, having 157,390 depositors; capital stock, $3,690,400; surplus, $2,620,665.56 ; savings deposits, $52,605,216.62; assets, $69,707,- 168.45. Total number of banks in State was 165. Thirty-seven loan and building associa¬ tions; number of loans, 5,814; amount of loans, $5,709,062.59; total assets, $5,957,696.22.

Insurance Companies. — There are 61 in¬ surance companies, with total assets of $22,-

28 1,602.54.

Newspapers.— There are published 136 newspapers; 25 Republican; 8 Democratic; 19 independent; 5 religious; 3 temperance; 7 lit¬ erary and educational; 3 agricultural; 36 local and 30 miscellaneous.

Finances.— On 1 Jan. 1917 the State Treas¬ ury reported a balance of $1,473,118 from 1916. The receipts in 1917 amounted to $8,185,344; payments amounted to $7,796,254, leaving a bal¬ ance on 1 Jan. 1918 of $1,862,208. The bonded debt in 1917 amounted to $3, 021,224.

Government. — The State Constitution, un¬ der which the laws of the State are adminis¬ tered, was adopted by the people in town meet¬ ings held throughout the State December 1819. To amend or change the constitution it is neces¬ sary to have in favor a two-thirds vote of both houses of the legislature and a majority of the votes cast at the next biennial election or meet¬ ing of the people. A voter must be a citizen of the State; that is, no one has the right of suffrage but males, 21 years or over, citizens of

the United States, who have resided in the State, county, town and voting district three months. Men of 21 years and over who are excluded from voting are paupers, Indians who are not taxed and persons under guardianship. Voters who are soldiers in the State militia or regular United States army may vote when serving outside the State. An amendment was made to the Constitution in 1884 to prohibit the manufacture and sale of intoxicating liquors. Severe penalties were attached to the violation of the law. State, city and town officials super¬ vise the sale of liquors and permit such sales only for medicinal, manufacturing and mechan¬ ical purposes. The capital city is Augusta, on the Kennebec River in Kennebec County; its population is about 11,683.

Executive. — A plurality of the votes cast is necessary for the election of the governor, who holds office for a term of two years. His coun¬ cil consists of seven members elected biennially on joint ballot of the legislature, but any dis¬ trict prescribed for the election of senators can furnish only one councillor. The governor and council have power to grant pardons, com¬ mutations and reprieves, and to romit penalties. They also have the appointment of the judges of the Supreme Court. In case of vacancy in the office of governor, the president of the sen¬ ate and speaker of the house are respectively in line of succession. The secretary of state and the treasurer are elected on joint ballot of the legislature and for two years.

Legislature. — The legislature is composed of a senate and house of representatives. There are 31 members of the senate and 151 members of the house, all elected biennially on the second Monday in September. They meet in session on the first Wednesday in Tanuary next following their election. The senators are elected from senatorial districts into which the counties of the State are divided. The repre¬ sentatives are elected from towns. All bills re¬ lating to revenues must originate in the house of representatives. The house has power of impeachment; but the senate conducts the trials of impeachments. The legislature mav over¬ come the governor's veto by a two-thirds vote each of house and senate. The State has four congressmen.

Judiciary. — The eight judges who compose the Supreme Judicial Court are appointed for a term of seven years by the governor and coun¬ cil. The' judge of the Superior Court of Cum¬ berland County, which includes the city of Portland, the judges of the inferior courts, of municipal and police courts, are also appointed by the State executive and his council. The term of appointment of the judges of

the in¬ ferior courts is seven years, and of the judges of municipal and police courts, four years. Probate judges are chosen by the people by election and for a term of four years. The attorney-general is elected on joint ballot of the legislature for a term of two years.

Local Government.— There is a general law providing for the election and duties of State, county, town and city officers, and pen¬ alties for non-fulfilment of their duties. The county officers are trial justices, county attor¬ ney, county commissioners, bail commissioners, judges of probate, sheriff, deputy sheriffs, reg¬ isters of deeds, treasurer, clerk, commissioners

MAINE

State Capitol at Augusta

■

-

,

.

of disclosure, stenographic commissioners and coroners. The town officers are selectmen, clerk, treasurer, collector of taxes, constables, road commissioners, school committees, health officer. Justices of the peace have jurisdiction throughout the State.

Militia. — The National Guard of the State numbers 1,382 organized militia, with 116 com¬ missioned officers and 14 general staff officers. The unorganized reserve militia numbers 103,- 375 men — ■ every able-bodied male citizen, aged 18 to 45, being included. The organized militia is both commissioned and enlisted.

Religion . — The denominations rank in numbers as follows: Baptist, 20,016; Protest¬ ant Episcopal, 4,800; Free Baptist, 12,963; Con¬ gregational, 21,483; Methodist Episcopal, 10,585; Universalist, 3,003 ; Unitarian, 4,500 ; Roman Catholic (population), 106,000; Lutheran, 1,445; Presbyterian, 423; Advent Christian, 5,000; Friends, 1,800; Swedenborgian, 173; Christian, 3,600 ; Disciples, 500 ; Church of God, 250. In 1900 there were 2,020 Evangelical Sunday schools, with 13,600 teachers and officers and 111,290 pupils. Sunday schools are maintained in connection with all the Roman Catholic churches.

Education. — By the last census the school population was 161,600; enrolment in public schools was 132,948; and average daily attend¬ ance, 97,132; enrolment in parish schools, 11,000. There were 4,218 buildings used for public school purposes, 6,447 teachers ; school property valued at $4,699,475 ; receipts for the previous year, $1,507,345, and expenditures, $1,513,125. For the higher education there were 200 public high schools ; 40 private secondary schools ; 5 public and 2 private nor¬ mal schools; Bowdoin College at Brunswick; Bates College at Lewiston; University of Maine at Orono; Colby College at Waterville; Westbrook Seminary at Deering; and Maine Wesleyan Seminary and Female College at Kent's Hill. There are academies at Hebron, Hampden, Lee, Bridgton and other towns. The illiterate of 10 years and over were 5.1 per cent, but this per cent would have been lower if the test had been made from the standpoint of those who could read or write in any language. A law of 1821 required that not less than 40 cents per capita of all inhabitants should

be raised annually for school purposes. A. public school fund was created in 1828 by setting apart 20 townships of lands belonging to the State. Moneys received from the United States for claims for services rendered in the War of 1812 were set apart for educational purposes. The compulsory law which covers the ages from 7 to 15 is strictly enforced. The district system has been abandoned and instead, the town sys¬ tem is in use. Since 1873 the State has aided towns where free academic instruction is given to the pupils. This instruction may be given in a high school within the town, or, since 1889, the town authorities may arrange for the educa¬ tion of its pupils with a high school outside the town. The number of free high schools receiv¬ ing State aid in 1901 was 211. State institutes or summer schools for teachers are maintained by the State under the supervision of the State superintendent. The Indians are well provided with schools. The teachers' examinations and certificates are uniform and are in charge of the State. Strong efforts are made to have all

the teachers normal school graduates. In 1903 about 25 per cent of those teaching in the schools were normal graduates.

Charitable Institutions. — There is a Na¬ tional Soldiers' Home at Togus, a United States Marine Hospital at Portland, State insane asy¬ lums at Augusta and Bangor, military and naval orphan asylum at Bath. There is also a law school at Bangor, a college of pharmacy at Orono, and agricultural experiment station, all connected with the university. There are State normal schools at Farmington, Castine, Gor¬ ham and Presque Isle. The State General Hos¬ pital, State Reform School, School for Deaf-Mutes, Maine Medical School and Eve and Ear Infirmary, Home for Aged and Indigent Wo¬ men, Old Men's Home, two orphan asylums (Protestant and Catholic), Young Men's Chris¬ tian Association and Young Women's Christian Association, located at Portland. City Hos¬ pital at Augusta, Central Maine at Lewiston, Eastern Maine General Hospital at Bangor, also at Bar Harbor, Old Town and Rockland. There are two hospitals, five orphanages and one Home for the Aged under the auspices of the Roman Catholic Church.

Penal Institutions. — The State prison is at Thomaston, the State Industrial School for Girls at Hallowell and the State Reform School about two miles from Portland. Prisoners in the county jails and convicts in the State prison are obliged to work and the products of their labor are sold in the markets. Contracts are sometimes made for the labor of prisoners in the jails of some of the counties. The work of

the inmates of the reform school is usually on the farm and in workshops. The girls at the industrial school are taught domestic work and some trades.

History. — Maine is supposed to have been visited by the earliest explorers : Corte-Real in 1501 and Verrazano in 1524 reported a coast, the description of which corresponds with that of Maine. Gomez in 1525 sailed along the coast and named the Penobscot River, Rio de las Gamas, or Stag River. Sir John Hawkins, the famous Elizabethan seaman, explored the coast in 1565, and Sir Humphrey Gilbert in the voyage which cost his life was on his way to the Penobscot region, then known as Norum-bega, to settle a colony under a patent from Elizabeth. Bartholomew Gosnold, an English¬ man (one of the founders of Jamestown, Va.), explored the coast in 1602, and Maine was vis¬ ited by Martin Pring, in 1603, by De Monts in 1604 and by Weymouth in 1605. The first at¬ tempt to settle on the territory was made by the French under De Monts, who,, having re¬ ceived a patent from the French king, planted a small colony on Neutral Island in the Saint Croix River in 1604. The first colony settle¬ ment attempted by the English was at the mouth of the Sagadahoc by George Popham and Raleigh Gilbert in 1607. A fort was erected and a number of buildings, and here the Vir¬ ginia, the first vessel built in the country, was launched and subsequently formed one of the fleet of the Somers and Gates Colony in 1609. The colony at Sagadahoc was broken up by the death of Popham and great hardships endured by the colonists. They returned to England in the autumn of 1608. In 1613 French Jesuits established a mission on Mount Desert Island, but they were expelled by the English the next

year. In 1614 the coast was visited by John Smith, who found a few scattered settlers around Pemaquid Bay and on the island of Monhegan, off the coast of that part of the State novv included in Lincoln County. In 1616 Sir Ferdinando Gorges, (<The father of Amer¬ ican Colonization," who had sent Pring and Popham to Maine, sent his agent, Richard Vines, to Saco to remain during the winter to explore the country and test the climate. In 1620 the king of Great Britain made a division of the grand charter of 1606 and granted to the Plymouth Company in England the whole coun¬ try lying between 40° and 48° N., and to the Virginia Company the southern portion of the original patent. On 10 Aug. 1622, Gorges re¬ ceived a patent of territory between the Merrimac and Kennebec rivers, and the next year sent his son Robert as governor and lieutenant-general of the country, accompanied by several councillors and a minister of the Church of England to establish worship. In 1629 an¬ other division of lands was made giving to Sir Ferdinando Gorges the country between the Piscataqua and Kennebec rivers, to which he gave the name of New Somersetshire, and the remainder to John Mason. The first court in the province was convened by William Gorges, nephew of Sir Ferdinando, at Saco, 21 March 1636. Charles I granted to Gorges in 1639 a charter under which in 1641 Gorges established the first chartered city in the United States, un¬ der the. name of Gorgeana, and constituted it the capital of the province. What was then Gorgeana is now York. Its original name was Agamenticus. A fort was built here and ef¬ forts made to protect the people against the Indians. From 1630 to 1632 settlements were commenced in Saco, Biddeford, Scarboro, Cape Elizabeth and Portland, all of which continued to prosper till the Indian War of 1675, when they were overthrown. Massachusetts claimed a portion at least of the territory of Maine on the ground that its charter included the lands as far north as three miles above the source of the Merrimac; but those to whom other char¬ ters had been given resented her interference. In 1677 Massachusetts purchased from the heirs of Gorges all their interest in the province of Maine. A new charter, issued by William and Mary, in 1691, combined the provinces of Massachusetts, Plymouth, Acadia, Maine and Sagadahoc into one province, called ((The Royal Province of Massachusetts Bay." Maine was now a part of Massachusetts. Remote from the centre of white settlements of any great size, Maine suffered from attacks by Indians, espe¬ cially during the French and Indian wars. When King Philip's War was ended there were within its

boundaries only five settlements.

Among the first soldiers in active service in the Revolutionary War were men from Maine, who fought as Massachusetts troops. A regi¬ ment from Maine was present at Bunker Hill. The British fleet, in 1775, attacked and de¬ stroyed Portland and Falmouth. Off Machias was fought the battle in which the Margaretta, a British ship, was captured. At the close of the war Massachusetts still retained possession of the country and called it the ((District of Maine." The people of Maine were divided in their allegiance to Massachusetts ; one party de¬ sired to remain a part of the ((Bay State" and another party wanted independent statehood.

The separatist movement gained ground during the War of 1812. Maine was admitted into the Union as a Stale 15 March 1820.

The northeastern boundary continued a source of dissension with Great Britain, or be¬ tween the people of Maine and New Brunswick until after the ratification of the Ashburton Treaty (q.v.), which practically settled the east¬ ern boundary between the United States and Canada.

The legislation of the State has, been usually marked by conservatism and sound judgment. In 1851 Maine adopted a prohibitory liquor law which has since been embodied in the con¬ stitution of the State. During the Civil War Maine furnished 70,107 soldiers, of whom 9,398 died during the war and a large number returned to their homes disabled invalids.

The State went Democratic at State elec¬ tions (except 1840) till 1855, when Anson P. Morrill was elected governor as the candidate of the ˆKnow-Nothing" party and also of those who favored a prohibitory law. From 1856 to 1910 the State has gone Republican except in 1878 and 1880, when the Democrats and Green¬ backs on a fusion ticket elected their candidates. In 1879 a dispute arose as to the legality of the election of some of the members of the legisla¬ ture and of the governor. For a time a dis¬ turbance was feared, but the militia preserved peace until the Supreme Judicial Court ren¬ dered a decision making the Republican candi¬ dates legal members of the legislature. The State has had no serious internal troubles ex¬ cept the <(Know-Nothing" agitation in 1854—56, and the dispute about the legislature in 1879. In 1910 and 1914 the State went Democratic. In 1916 and 1920 it voted Republican. The Australian ballot law was

passed in 1891.

Since Maine became a State there have been 50 different governors, some of whom have held the office for more than one term.

List of Governors.

William King .

William D. Williamson

(acting)* .

Benjamin Ames (acting)* .

Albion K. Parris . .

Enoch Lincoln .

Joshua Hall (acting) f… . Nathan Cutler (acting) J. .

Jonathan G. Hunton .

Samuel E. Smith .

Robert P. Dunlap .

Edward Kent .

John Fairfield .

Edward Kent .

John Fairfield .

Edward Kavanah .

Hugh J. Anderson .

John W. Dana .

John Hubbard .

William G. Crosby .

Anson P. Morrill .

Samuel Wells .

Hannibal Hamlin .

Joseph H. Williams (acting)

Lot M. Morrill .

Isaac Washburn, Jr .

Abner Coburn… .

Samuel Cony .

Joshua L. Chamberlain …

Sidney Perham .

Nelson Dingley, Jr .

Selden Connor …

Alonzo Garcelon .

Daniel F. Davis .

Harris M. Plaisted .

Frederick Robie .

Joseph R. Bodwell .

Sebastian S. Marble (act¬ ing) .

Democrat .

it

il

it

(i

u

u

u

u

u

Whig .

Democrat . .

Whig .

Democrat .

il

il

a

it

Whig and Free-Soil . .

Republican .

Democrat .

Republican .

it

it

it

U

it

a

a

u

u

Democrat-Greenback

Republican .

Democrat-Greenback Republican .

a

it

1820-21

1821

1821

1822-27

1827-29

1829-30

1829-30

1830-31

1831-34 1834-38

1838-39

1839-40

1840-41

1841-43

1843-44

1844-47 1847-50 1850-53 1853-55

1855-56

1856-57 1857

1857-58

1858-60 1861-63

1863-64

1864-67 1867-71 1871-74 1874-76 1876-79

1879-80

1880-81 1881-83 1883-87 1887

1887-89

MAINE — MAINE, UNIVERSITY OF

149

Edwin C. Burleigh . Republican . 1889-93

Henry B. Cleaves . “ . 1893-97

Llewellyn Powers . “ . . 1897-1901

John F. Hill . “ 1901-05

William T. Cobb . “ 1905-09

Bert M. Fernald . “ 1909-11

Frederick W. Plaisted … . Democrat . 1911-13

William T. Haines . Republican . 1913-15

Oakley C. Curtis . Democrat . 1915-17

Carl E, Milliken . Republican . 1917-21

Frederick H. Parkhurst… “ Di sd Jan. 1921

Percival P. Baxter . “ . 1921-

* There were two acting governors, Williamson and Ames.

t Cutler and Joshua Hall, acting: there were two in 1829—

1830.

Bibliography. — Boardman, (The Climate, Soil, Resources, and Agricultural Capabilities of the State of Maine*; Drake, (The Pine Tree

Coast*; Little, (One Hundred Books on Maine,* article in Bowdoin College Bulletin; Brooks, ˆales of the Coast *; Bishop, (Fish and Men in the Islands) ; Thoreau, (Woods of Maine) ; Hub¬ bard, (Woods and Lakes of Maine*; Emerson, (The Latchstring> ; Williamson's (Bibliography. >

History. — Maine Historical Society Collec¬ tions ; Hall, ˆReference List on Maine Local History* ; Chamberlain, (Maine, Her Place in History) ; Sullivan, Williamson and Abbott, (History of Maine) ; Varney, (Brief History of Maine *; McDonald, Government of Maine) ; Swett, (Stories of Maine* ; Baxter, (Sir Ferdinando Gorges and His Province of Maine) (1890) ; George Cleeve and His Times) ; doc¬ umentary History of Maine) ; Levett, (The Pio¬ neer Settler of Portland) ; (Summary History of Maine) ; Thayer, (The Sagadahoc Colony) ; (The Early Settlements in Maine* ; Burrage, (The Beginnings of Colonial Maine,* and (The Northeastern Boundary.*

James Phinney Baxter.

MAINE, France, an old province having Normandy on the north, Brittany on the west and Anjou and Touraine on the south and Orleannais on the east. It corresponded to the modern departments of Sarthe and Mayenne. The ancient capital was Le Mans.

MAINE, The. A battleship of the United States navy, mysteriously destroyed by explo¬ sion in Havana Harbor, Cuba, on the night of 15 Feb. 1898. The revolt of the Cubans in 1895 against Spanish misrule had brought the island in 1897-98 to the verge of ruin. General Wey- ler had been recalled and General Blanco was sent as governor-general to endeavor to bring order out of chaos, but his plans failed and January 1898 witnessed serious disturbances. The American government, believing the lives and property of American citizens in Havana in danger, the Maine, which had been for some time at Key West, was ordered to Havana and arrived at that port 24 Jan. 1898. She was piloted into the harbor by an official pilot of the Spanish government and was moored to a government buoy. The usual official and inter¬ national calls and salutations were exchanged between the Spanish authorities and the com¬ mander of the Maine, Capt. Charles D. Sigsbee, and outwardly there was no evidence of the impending disaster. The Maine carried 26 of¬ ficers and 328 men, all of whom were on board when the explosion took place, except an assist¬ ant engineer, two naval cadets and a gunner. Two officers and 250 men were killed at once and 8 men died afterward in hospital. Only 16 of the crew wholly escaped injury. Of the dead, 166 were buried in Colon Cemetery, and

25 at Key West. In 1899 the dead buried at Colon Cemetery were brought to the United States and buried at Arlington with military and naval ceremonies. A court of inquiry, Capt. W. T. Sampson presiding, was instituted and after a month's investigation expressed the opinion that the vessel was destroyed by the explosion of a submarine mine, but respon¬ sibility could not be fixed upon any person or persons. Shortly afterward war was declared. (See United States — the War with Spain).

There was a very general demand through¬ out the United States that the Maine should be raised, and on 9 May 1910 Congress author¬ ized operations and the matter was placed in charge of the War Department, and assigned specifically to the engineer corps of the army. An elliptical coffer-dam, composed of a series of huge contracted cylinders that were construc¬ ted of interlocking steel piles and filled with mud and stone, was placed around the wreck. It was a wonderful piece of engineering, re¬ flecting great credit on every army engineer connected with its inception and execution. The coffer-dam was completed 5 June 1911, and the entire wreck exposed 2 November following. A joint army and navy board, of which Rear-Admiral Charles E. Vreeland was president, was then sent to Havana to reinvestigate the wreck. It reported 15 Dec. 1911, confirming the verdict of the Sampson court except in the non-essential detail that the centre of the explosion was a little farther aft than was re¬ ported by that court. The after half of the hull, all that was not shattered, was floated 13 Feb. 1912, 14 years, lacking two days, after the Maine's destruction. On 16 March 1912 this relic of the once powerful battleship was towed to sea, with attendant ceremonies, afloat and ashore, and sunk in 600 fathoms of water. Concurrently 34 coffins, estimated to contain the bones of 64 of the Maine's dead, were placed on board an American war vessel and dis¬ patched to Arlington, where, on 23 March, they were buried in the Maine plot.

MAINE, University of, The, a coeduca¬ tional institution, located at Orono, Me., on the Penobscot River, eight miles above Bangor, it is one of the institutions that owes its exist¬ ence to the Act of Congress of 1862, com¬ monly known as the Morrill Act. The 210,000 acres of land which were, by this act, conveyed to the State for the purpose of establishing a college of agriculture and mechanic arts, were sold at a low price, and there resulted an endowment for the college of $118,300. The income of the institution is derived from in¬ terest on this endowment fund and on other bequests of private nature, an annual appropria¬ tion by the State, student fees and the income of

the second Morrill Act of 1890. The total income from all sources for the year 1915, ex¬ clusive of special appropriations for buildings, was about $267,416.78.

From the dav of opening, in 1868, when 12 students enrolled themselves, the institution has prospered. Until 1897 the institution was known by the name ((State College of Agricul¬ ture and Mechanic Arts.® The legislature of 1897 changed the name to the <(University of Maine.® The number of students average 1,250, the faculty about 140. There are 30 departments in which instruction is given.

These departments are divided into colleges of Arts and Sciences, Agriculture, Technology and Law.

In the College of Arts and Sciences instruc¬ tion is given in the departments of Greek and classical archaeology, Latin, French, German, education, English, Spanish and Italian, philos¬ ophy, economics and sociology, history, mathe¬ matics and astronomy, physics, chemistry and biology. In the College of Agriculture instruc¬ tion is given in agriculture, animal, dairy and poultry husbandry, forestry, home economics and horticulture. In the College of Technology instruction is given in chemistry, chemical engi¬ neering, civil engineering, mechanical engineer¬ ing, electrical engineering and pharmacy. The degree of B.A. is given for the completion of courses in the College of Arts and Sciences. The degree of B.S. is given for courses in the colleges of Agriculture and Technology. The degree of LL.B. is given those who graduate from the College of Law.

Great interest is taken by the student body inˆ all branches of athletics. The students main¬ tain an excellent band, an orchestra, glee and instrumental clubs and debating clubs. ‘ Twelve fiateinities maintain houses of their own, in which they live as families and frequently entertain their friends. The College of Law, located in Bangor, was established in 1898. It has an excellent library, maintains a three-year course and has a few more than a hundred students, a large percentage of whom are college graduates.

MAINE BOUNDARY TREATY. The

year 1910 witnessed the final settlement of the long-standing dispute as to the boundary line between Maine and New Brunswick. Secretary of State Knox, acting for the United States, and Ambassador Bryce, on behalf of Great Britain, signed a treatv which establishes the exact boundary of Maine for all time.

At the close of the Revolutionary War in 1783 the first attempt was made to fix a satis¬ factory boundary, but it resulted only in hope¬ less dissatisfaction. Ever since that time the matter has remained one for ceaseless wrang¬ ling and dispute. Scarcely a diplomat has been sent to this country from England but has been called upon to familiarize himself with the Maine-New Brunswick boundary situation; while the State Department of this country has gone over

the ground so many times that that performance had almost come to be regarded as one of the regular duties of the department.

Most boundary lines are fixed by nature ; those which are not do not as a rule amount to a great deal, and an amicable settlement can usually be reached at once. With the Maine-New Brunswick line, however, neither of these conditions have ever applied, particularly in that part which has so long been in dispute.

1 his particular line runs through Passama-quoddy Bay, along the little islands at the mouth of the Samt Croix River. As a result of its indefinite character there has been endless dis¬ pute and stiife among the fishermen who fre¬ quent these parts ; dispute which had had an in¬ dustrial significance since both the Eastport and Lubec canneries have sent their men to this point, and it makes a vast deal of difference whether they are fishing in American or Cana¬ dian waters.
.

The source of all the trouble was the loose¬ ness with which the first treaty, that of 1783, was drawn up. Article II of that document reads: (<And that all disputes which might arise in future on the subject of the boundaries of the said United States may be prevented, it is herein agreed and declared that the following are, and shall be, their boundaries, *viz.* : From the north¬ west angle of Nova Scotia, viz: That angle which is formed by a line drawn due north from the source of the St. Croix River to the Highlands; along the said Highlands which divide those rivers that empty themselves into the river St. Lawrence from these which fall into the Atlantic Ocean, to the northwestermost head of the Connecticut River,® *etc.*

Thus, while the Saint Croix was plainly named as the beginning of the eastern bound¬ ary* the only point mentioned was the source of the river, and not a word was said about its mouth or the numerous islands of the great bay into which it empties. Moreover, there arose at once the questions as to what was the Saint Croix River. The trouble loomed up at the very start. The first action toward a settle¬ ment was taken in 1794 when John Jay was charged to adjust the matter. All he was able to accomplish, however, was a provision in his treaty of that year for the appointment of three commissioners to determine just what was the Saint Croix River. These commissioners rnet at Halifax in 1798 and determined the river, but neglected to mention its source and made no disposition of the islands at its mouth. Subsequently there were treaties, conventions and declarations

between the United States and Great Britain relative to this subject in 1814 1818, 1827, 1842, 1846 and in 1870, but in every instance there was something still left to be adjusted around the mouth of the river.

The Treaty of Ghent in 1814 provided for commissioners to settle the matter and they decided that Moose, Dudley and Frederick is¬ lands belonged to the United States, while all the other islands, including Grand Menan, were the property of Great Britain. This was very good so far as it went, but it left unsettled the status of several small islands in the Saint Crcnx and of the line itself through the bay. the channel thus remained in dispute.

In addition to this, trouble soon arose over the boundary line northward and westward from the source of the Saint Croix. The origi¬ nal treaty had been exceedingly vague on this subject, and finally in 1827 the king of the Netherlands was named as referee to conclude the dispute. After failing for a long time to satisfy either party with any of his suggestions if jˆw a to suit himself, awarding part of the disputed territory to Maine and part to New Brunswick. The United States rejected this arrangement, while in the meantime the disturbances on the border kept becoming more and more serious. Operations of the 1830 cen¬ sus takers in. the contested area created much reeling and eight years later an American lum-ber dealer was thrown into jail by New Bruns¬ wick officials — the act having much to do with the precipitation of the Aroostook war. Al¬ though no blood was spilled in this it came very near to maturing into a third war with England. A joint occupation was agreed upon as a temporary compromise, before Daniel Weffi ster and Lord Ashburton came together in 1842

and drew tip the famous treaty which settled all dispute as to that particular part of the boundary line.

It has been related as an historical fact that in these negotiations both nations withheld maps which were unfavorable to their claims. The Americans had one which had been discovered but a short time before

in Paris, and was sup¬ nosed to have been drawn up by Benjamin Franklin, while in the possession of the English was one made by Richard Oswald, who was one of the commissioners who negotiated in the treaty which gave the United States its independence. Later both nations showed these maps to their own people in evidence of how conclusively they had got the best of the bar¬ gain. Up to the present time, however, the United States has always regarded the signing of this treaty of 1842 as a diplomatic triumph.

The treaty of 1842, however, made no men¬ tion of any part of the boundary south of the monument which had been erected at the source of the Saint Croix, and until Secretary Knox and Ambassador Bryce signed' their treaty of 1910 the lower part of the line in places was still contested. But with the signing of this latest treaty and the final settlement of the whole chaotic matter no point now remains between the United States and Canada which is in the slightest dispute.

MAINS. See Electrical Terms.

MAINTENANCE, in its legal signification, the interference by a person in litigation in which he is not primarily interested, by assist¬ ing either party with money or otherwise. It includes champerty (q.v.), which consists of maintenance for reward or for a share in the proceeds of the litigation promoted. An agree¬ ment of this kind is illegal and void and at common law is punishable as an offense tend¬ ing to obstruct justice. To-day where the com¬ mon law prevails the wrongful intention with which the assistance is given is regarded as the gist of the offense. In many jurisdictions maintenance is no longer recognized as a crimi¬ nal offense and in rhanv States is not regarded as a civil cause of action by the injured party against a maintamor of the suit against him. See Criminal Law and consult the authorities referred to under that title.

MAINTENON, man-te-non, Frangoise d'Aubigne, Marchioness de, French queen: b. Niort, Poitou. 1635; d. Saint-Cyr, 1719. Her birthplace was the prison in which her parents were confined because of religious trouble. Af¬ ter her father's death in her 10th year she became the ward' of her guardian and aunt, Madame de Neuillant, who gave her a some-1 hat limited education and through whose efforts she became converted to the Catholic faith at about the atre of 14. She was then returned to her mother, whose income was "nsufficient for the child's support. Her humili¬ ation did not embitter her bright and cheerful disposition, however, and when at 16 the famous wit and man of letters, Scarron, deformed, old and infirm as

he was, became her husband, and she was soon the centre of the clever literary people who frequented his house. When Scar¬ ron died her good sense and delightful dis¬ position recommended her to many friends, who pointed her out to Louis XIV as a fitting per¬

son to take charge of the education of the children born to him by Madame de Montespan. She undertook the office of governess to the royal children, won their affection and respect as well as that of the king, who married her in 1685 when she was 50 and he 47. There can be no doubt that she exercised a beneficent influence over the king's private life. She was undoubtedly disinterested and charitable, her character above stain in a profligate age, and her mind clear and resolute in pursuing the course she thought to be right. She survived the king four years and died at the nunnery at Saint Cyr which she had changed into a place of education for the poor daughters of families, having enjoyed to the end all the honor and position of a royal widow. Consult Blennerhassett, C. J., (Louis XIV and Madame de Maintenon* (New York 1911) ; Dyson, C. C., (Madame de Maintenon : Pier Life and Times, 1635— 1 719> (London 1910) ; Geffrey, (Mme. de Maintenon d'apres sa correspondence authen-tique) (Paris 1887) ; Noailles, (Histoire de *Mme.* de Maintenon > (ib. 1848-58) ; Pilastre, E., (Vie et caractere de *Mme.* de Maintenon * (ib.

1907).

MAINZ, mints, Germany, a town in the state of Hesse-Darmstadt, on the left bank of the Rhine, opposite the mouth of the Main, 20 miles by rail southwest of Frankfort. It was a fortress of the first rank and is an episcopal see and a river port. The town rises gradually from the Rhine in the form of an amphitheatre. A railway bridge spans the Rhine a little above its junction with the Main, and a stone bridge connects with the opposite suburb of Kastel. A handsome quay, 330 feet wide, extends along the Rhine for a considerable distance, and large modern harbors have been constructed. The principal edifices are the cathedral, recently re¬ stored, a vast building of the 11th century; the former electoral palace, now containing the city library (230,000 vols.), picture gallery, museum of Roman and Roman-German antiquities, etc., the old collegiate church of Saint Stephen, occupying the highest site in the town, the church of Saint Peter, the German House, or grand-ducal palace with the arsenal adjoining, the courts of justice, the government buildings, public hall, two new

concert halls, central rail¬ way station, *etc.* One of the most interesting objects in the town is the house of Gutenberg which contained his first printing office. A bronze statue of Gutenberg, by Thorwaldsen, stands in an open space near the theatre. The great open-air resort is the Neue Anlage, out¬ side the gates, consisting of extensive public gardens, and commanding fine views of the town and surrounding district. The manufac¬ tures consist chiefly of leather, furniture, hard¬ ware, carriages, carpets, tobacco, beer, chem¬ icals, musical instruments, gold and silver wares, machinery, soap, hats, *etc.* The trade, particularly transit, is extensive. The principal articles are Rhenish wine, corn, flour, oil, coal and wood. Mainz owes its foundation to a Roman camp which Drusus pitched here. On the decline of the Roman power it was almost entirely destroyed, but was afterward rebuilt chiefly by Charlemagne, and became the first ecclesiastical city of the German Empire, of which its archbishop-elector ranked as the pre¬ mier prince. Pop. 110,634.

MAIPO, mi'poo, or MAIPU, a river in Chile, haying its rise in the Andes Mountains and Bowing almost due west into the Pacific Ocean. It is 120 miles in length. The falls and rapids furnish valuable water power, which has not been utilized to any great extent. The city of Santiago is a few miles north of the river. On 5 April 1818 was fought on the banks of the Maipo the battle which decided the independence of Chile.

MAIR, mar, Charles, Canadian writer: b. Lanark, Ontario, 21 Sept. 1840; d. 1906. He was educated at Queen's University, Kingston, and entered journalism. He aided in quelling the Riel insurrections and was one of the organizers of the ((Canada First" party. Among his works are Dreamland and Other Poems5 (1868) * (Tecumseh,5 a drama (1886).

MAISON CARREE, ma-zon' kˆriL, Ro* man temple at Nimes, France, the most perfect of its type remaining. It was probably built early in the Christian era, its inscription dedi¬ cating it to the adopted sons of Augustus, ˆ ,a.nd Lucius Caesar, although by some authorities its date

is placed at about the 2d century It is built on the plan of the Parthe¬ non although its dimensions are smaller. It

5S2S5 ?n a P?d.5um feet high, measures 4UX82 feet and is entered by a flight of 15

steps. There are 30 columns, of which 20 are m the side and rear walls while 10 form the portico. The temple now houses collections of antique sculpture and coins.

MAISONNEUVE, ma-zon-nev, Paul de Chomedey, Sieur de, French colonizer: b Champagne, France; d. Paris, 9 Sept. 1676. He enlisted in the French army at 13 and later organized a band of colonists with whom he landed at Quebec in 1641. In 1642 he founded Montreal and was for 22 years its governor but was absent for a time in 1652 when he re¬ turned to France to conduct to America a new party of settlers. He displayed great adminis¬ trative ability, but through the jealousy of De Mesy, governor-general of Canada, was in 1664 recalled to France by De Tracy. Though no charges were made against him he found no possibility of reinstatement in office and re¬ signed in 1669.

MAISTRE, ma'tr, Joseph Marie, Comte de, hrench philosopher and savant: b. Cham¬ berˆ 1 April 1754; d. Turin, 26 Feb. 1821. He was of French extraction and was a senator of

fi15S?!0ntrTat,tIJe,t?me of the. French invasion He left his country in consequence of that event, and afterward followed his king to Sardinia. In 1803 he was sent Ambassador to pamt Petersburg, and returned finally to Turin in 1817. De Maistre was familiar both with Creek and Latin literature, and his writings in rrench have obtained the highest praise of critics. He was a conservative in politics, reli¬ gion and philosophy, a supporter of absolute monarchy and of the infallibility of the Pope His Memoires politiques et correspondance diplomatique5 (published posthumously 1858) however shows him in the light of' a much m<?.r9 . discerning and less uncompromising politician than his formal treatises, and indicates a large and liberal appreciation of the revolu¬ tion which he opposed. As a diplomatist he exerted himself to effect the restoration of all

his former possessions to his master, and to obtain the transfer of Genoa. Among his political writings are his (Eloge de Victor Amadee IIP ; ˆConsiderations sur la France5 (1796); JEssai sur le principe generateur des constitutions politique5 (1810), in which he maintains

the divine origin of sovereignty; (Du FaPe> (1819) ; (Soires de Saint Petersborg5 £J821; new ed., 1888); (De TEglise gallicane5 (1821-22) ; and fDu Congres de RastadP (the last with the Abbe de Padt), (Quatre chapltfeS I*]-6* s SUl* ˆa Rtissie par le comte Joseph de Maistre5 was published by his son in 1859. Consult Descostes, (Joseph de Maistre ayah t la revolution5 (Paris 1893) ; Lescure* Qoseph de Maistre et sa familie* (ib. 1893); Raiilhaii, E, Joseph de Maistre et sa philosophic31 (1893).

MAISTRE, Xavier de, French soldierˆ es¬ sayist and novelist, brother of Joseph de Mais¬ tre (q.v.) : b. Chambery, October 1763; d. Petrograd, 12 June 1852. He served in the Piedmontese army when very young, and his literary career began with his writing, (Voyage autour de ma chambre5 Q Journey Around My Room,5 1794), while in prison at Turin for participation in a duel. When Savoy was an¬ nexed to France he went to Russia ‘and there secured a commission in the army, where he rose to. the. rank of major-general. He lived u JJvtlI?e ln Naples after the restoration of the Piedmontese dynasty, but eventually re¬ turned to his adopted country and died there. Hls sRde was graceful and his work was marked by strong delineation of character and exceptional descriptive power. (See Tourney Around My Room). He also wrote Ee Le-preux de la cite d’Aoste5 (1811); Wes prison-niCrS> d/io(r?VCaSˆ (1815): <La Jeune Siberi-enne (1815); Expedition nocturne5 (1825). His complete works were published in three volumes (Paris 1825).

MAISUR, mi-soor’. See Mysore.

MAITIN, ml’tan, Jose Antonio, Venezue-Ian poet : b. Porto Cabello, 1798-d. Choroni, Venezuela, 1874. In 1824 he returned from Havana to his own country whence he had fled on account of persecution, and made his home in the valley of Choroni. In 1844 his best poems were collected and published with the title Echoes from Choroni,5 and in 1851 a collected edition of all his works appeared.

MAITLAND, Edward, English mvstic and

2Vnlefri807IpSulch’ 27 ?ct 1824 ; d-Tonbridge,,

2 Oct. 1897. He was educated at Caius College,

Cambridge, and was destined for the ministry, but declined to take holy orders because of his-incompatible .rehgious beliefs. He was one of the «Forty-niners5) in California and later went to Australia where he became a commissioner ot Crown lands. He was married and

widowed in Australia and in 1857 returned to England where he . engaged in literary work of an hranitarAlan order. 446 made the acquaintance ot Mrs Anna Kingsford in 1874 and with her crusaded against materialism, vivisection and e of animal food. In 1876 he announced that he had acquired a new sense which enabled him to see the condition of peoples' souls, as well as those of trees and animals, and likewise revived his memory of his own previous in-

ˆVocvi011ˆ j°ined Theosophical Society in 1883, but shortly afterward withdrew from

it and with Mrs. Kingsford founded the Hermetic Society which was of mystic rather than occult character. After the death of Mrs. Kingsford in 1888 he maintained that they re¬ mained in communication. In 1891 he founded the Esoteric Christian Union. He wrote for the Spectator and the Examiner ; reviewed books for the Athenceum; and collaborated with Mrs. Kingsford in writing (The Key of the Creeds5 (1875), and (The Perfect Way; or the Finding of Christ5 (1882), Author of (The Pilgrim and the Shrine5 H867) ; (The Higher Law5 (1869); (By and By: an Historical Romance of the Future5 (1873) ; Clothed with the Sun : Being the Book of the Illuminations of Anna (Bonus) Kingsford5 (1889) ; (The New Gospel of Interpretation5 (1892) ; (Anna Kingsford, Her Life, Letters, Diary and Work, By her Collaborator, with a Supplement of Post-Mortem Communications5 (2 vols., 1896). After the completion of the (Life5 of Mrs. Kingsford, which, like most of his writings, was largely autobiographical, his mental powers failed rapidly.

MAITLAND, Frederic William, English historian: b. London, 28 May 1850; d. 19 Dec. 1906. He was graduated from Trinity College, Cambridge, and studied law ; in 1884 was made reader of English law at Cambridge and from 1888 was professor of the same branch there. He read widely on legal history, founded the Selden Society in 1887 for the study of the his¬ tory of English law and was . a generally recognized authority. Among his works are Gloucester Pleas5 (1884) ; (History of English Law,5 with F. Pollock (1895) ; (Canon Law in

England5 (1898) ; (English Law and the Renais¬ sance5 (1901), *etc.*

MAITLAND, J. A. Fuller. See Fuller-Maitland, J. A.

MAITLAND, Sir Peregrine, British sol¬ dier: b. Hampshire, England, 1777; d. London, 30 May 1854. He enlisted in the army in 1792 and was promoted rapidly, serving in Spain and at the battle of Waterloo, where he was a major-general. In 1818 he was appointed lieu¬ tenant-governor of Upper Canada and in 1828— 34 was governor of Nova Scotia. He was made lieutenant-general in 1830 and commanded the Madras army, 1836-38. From 1843-47 he was governor and commander-in-chief at the Cape of Good Hope.

MAITLAND, Sir Richard, Lord Lething¬ ton, Scottish poet and antiquary: b. Scotland, 1496; d. Edinburgh, 20 March 1586. He was educated at Saint Andrews and was one of the great lawyers of his day, and although he be¬ came blind in 1561 was nevertheless made a member of the Privy Council, and in 1562 keeper of the great seal. His manuscript col¬ lection of early Scottish poetry is preseryed at Magdalene College, Cambridge. A selection from his collection, together with his own poems, was published in 1786, and his poems were reprinted in 1830 by the Maitland Club, a literary organization founded in his honor in Glasgow in 1828.

MAITLAND, William, Scottish statesman: b. Scotland, about 1528; d. Leith, 9 June 1573. He was a son of Sir Richard Maitland, Lord Lethington (q.v.), and was educated at Saint Andrews and on the Continent He early

entered political life and was interested in the Knox reform movement; in 1558 he was ap¬ pointed Secretary of State by Mary of Guise, and is commonly called ((Secretary Lethington. 55 He was one of the commissioners who con¬ cluded the Treaty of Berwick and in 1560 was speaker of the Scottish Parliament. He was one of Mary's ministers on her return from France, but was suspected of having betrayed her to Queen Elizabeth. In 1563 Maitland con¬ ducted a prosecution for treason against Knox whom he had earlier supported, and in 1565 he became lord of the sessions but was removed from office for implication in Rizzio's murder; he was also connected with the murder of Darnley. He contrived Mary's escape from Lochleven but fought against her at Langside. After the assassination of Moray he became the leader of the queen's party and was active in her support. He joined Kirkcaldy at Edin¬ burgh Castle, and encouraged him to

hold out until the last. He was taken prisoner at its surrender and died in prison. Consult Skelton, (Maitland of Lethington and the Scotland of Mary Stuart5 (1887-88).

MAITLAND, Australia, town, in North¬ umberland County, in New South Wales, on the Hunter River, about 119 miles north of Sydney by rail. It is connected by railroad with Newcastle, about 15 miles distant. The Hunter River divides the town into East and West Maitland, two distinct municipalities, West Maitland being the larger. The Hunter River frequently overflows its banks and floods the town and surrounding country. Although serious devastation results, the soil has been enriched by this flooding, and so fertile is this section that Maitland is called the <(garden of New South Wales.55 Grapes, grains, tobacco and vegetables grow in abundance. Large coal fields are near the town. Considerable manufacturing is carried on, especiallv in West Maitland. Pop. of East and West Maitland,

11,313.

MAIZE. See Corn, Indian.

MAIZEROY, Rene, Baron (real name Rene Jules Jean Toussaint), French novelist: b. Metz, 2 May 1856. He was educated at the Jesuit College of Saint Clement, the Toulouse Lycee and the Saint Cyr Military School, be¬ coming second lieutenant in the 53d regiment of Infantry. He resigned from the army in 1881 and entered upon a literary career. He contributed to Le Gaulois, Figaro , Gil Bias , La Vie Moderne and Clarion, and became a voluminous writer of fiction, also producing several pantomimes, ballets and dramas. Author of (Le Capitaine Bric-a-brac5 (1880) ; Souve¬ nirs d'un officier5 (1888); (L'Adoree5 ; (P'ti'- Mi5 ; (Le Reflet5 ; (En Volupte5 ; (Glorita, fille et marquise5 ; (Yetto, mannequin5 ; (Ville d'Amour5 ; (La Mer5 (1895); (La Rem-plaqante5 (1906) ; (L' Amour en danger5 (1912), *etc.*

MAJESTY (Latin, majestas). Majestas, in a collective sense, was used in republican Rome to signify the highest power and dignity, the attribute of the whole community of citi¬ zens, the populus. The majestas was also as¬ cribed to the dictator, consul, and even Senate, though in the case of the last the word auctoritas was used in preference. At a later period.

under the Roman emperors, majestas was the name of the imperial dignity, whilst that of a magisti ate was called dig nit as. To kings the attribute of majesty was given much later. The coui tiers introduced the title into France under Henry II In the Treaty of Crespy (1544) Charles V is styled imperial, Francis I royal majesty; and in the Peace of Cateau-Cambresis the titles of most Christian and Catholic majesty are found for the first time. In Eng¬ land Henry VIII first adopted the title majesty, grace and highness being the titles formerly employed. At present this title is given to all European emperors and kings.

MAJOLICA AND MEZZA-MAJOLICA.

Spelled also maiolica. It is generally claimed that the word was derived from the island of Majorca, whence the first pieces of this ceramic ■ware were imported to Italy. The term majolica has become a very confused and in-defimte expression and used by writers with different meaning. The term, in its first ap¬ plication, referred only to the early Italian lustre-ware made (15th century) with trans¬ parent silicious. glaze and outer surface of metallic sheen in imitation of the lustre-ware ot Hispano-Moresque creation. Later, the early enamel-covered and color-decorated wares of Italy were called majolica regardless of metallic lustre surface, and the lustre-ware having Oriental style of form and decorative treatment was termed mezza-maj olica. But the term majolica has in modern times been vul¬ garized into a broader definition by the public including practically everything in ceramics having glaze coating and painted decoration. Leading experts retain the more distinctive terms. Lustre decoration consists of imparting a metallic or pearl-like (nacreous) sheen to the outer surface of the ceramic ware by coat¬ ing over the already decorated and fired piece with a thin layer of a pigment containing eitner gold silver, copper, etc., and then firing under moderate heat. The effects are very delicate and beautiful and are known, according to the different sheens produced, as ruby (rubino), gold, silver, mother-of-pearl (madre-perla), *etc.*

Mezza-Majolica.— The earliest production ck this \ are was in Persia and Turkey, but it is only in quite recent years that the’ actual iabnques have been located. To this Turkish

Sa.rei lon? Ple.ces heretofore labeled ˆmdos and Rhodesian* ware from the loca¬ tion of the sites where examples had been excavated. The actual sites of production now satisfactorily proven and dates of discovery of these prototypes of mezza-majolica are as fol¬ lows: Rekka (1896), Sultanabad (1905), Khages, quite recently. The ware formerly termed ˆS'culo-Arabian* is now said to have

,7 Syria or Egypt, and the so-called « Rhodesian* ware in Osmanli-Turkey.

I he latter has most brilliant coloring (blue grayish-black, green, etc., and, later, red) and ornamentation as well as most masterly tech¬ nique in execution. At Fostat, 'in Lower ■E'&yptf lusti ed and unlustred ware was pro-tiuced before the 12th century. We find among the Persian examples cylindrical vases, pear-shaped bottles, plates, . tiles, bowls, mosque lamps, *etc.* In the Persian polvchrome enamel¬ decorated ware of the 17th century we find dark

blue, yellow, green, purple, red, black, turquoise, all on very white ground, with typical Persian decoration (arabesques, flowers, turbaned heads, figures, etc.). Such 17th and 18th century ware was produced in northeast Persia Bokhara, Kirman, Kashan, *etc.* Practically all this ware had its body coated (engobe). The Mohammedan tiles (known in Arabic as rojolos) were very beautiful and utilized in covering outside spaces of the mosques as well as the internal wells. Grand effects are those presented in the Blue Mosque, at Tabriz (15th century) and at Khoda Bende Khan shrine at Sultameh (14th century), *etc.* Spain produced glazed ware as early as the 8th century (mosque of Cordova has examples). Through it? Moorish artists Spain produced lustre-ware, an industry doubtless derived from Oriental sources, at an early date, Calatuyad having both domestic and export trade in the 12th cen-t,ury- . ˆls same gold-lustre ware was pro¬ duced in Malaga during the 14th century, and by the end of the 15th century, Manises, near Valencia, was the centre for the gold-lustre vvaie industry, retaining its pottery kilns to the present day. The yellowish tin-glaze on Spanish majolica covers both the inside and outside of vessels. Color is mostly cobalt blue but coats-of-arms show a sparse use of brown and violet. The great Alhambra vase and pieces of a similar character belong to the 14th century and were produced in Granada. This Hispano-Moresque art was continued by the Christians after the Moors were expelled but it soon became decadent in merit. The Spanish colored glazed tiles (azulejos) had the centre ot that industry, in the early period, in Seville but no lustre-ware appears to

have been made there. In the Spanish decoration predominating motifs were plant life, Arab scripts, figures of animals and concentric circles. The frequent display of heraldic coats-of-arms shows Christian tendency later. The ware consisted mostly of dishes, basins, ewers, vases, apothecary pots (albareilos), *etc.* Talavera, in the 16th to 18th centunes, produced tin-enameled ware pro-hfically. For some time, at least, Paterna, Quarte, \ lllelonga, Alaqua, Career, Moncada, etc., produced gold-lustre ware. The quality of the gold-lustre remained good into the 17th century though other ware became inferior long before. And the modern lustre shows coppery effect instead of the earlier pale gold tones. Alcora produced the best pieces. Sicil- ˆ (Siculo-Arabian) mezza-majolica ware dates back to the 9th century.

Majolica.— Italy imported her lustre-ware from Spain and the island of Majorca ao-

ˆa-!ˆnut y,rtl r about the 15th century, but, by the middle of the 14th century she had started her own mezza-majolica fabriques and by the first half of the 16th century the industry was in its zenith to become thoroughly decadent by the end of the 16th century. The recent dis¬ covery in Faenza of the piece decorated with

A IOa Manfredl 0393-1405) coat-of-arms and the documentary statement of the contem¬ porary writer Pietro del Bono (1330) make it appear that Italy was producing opaque under-glaze majolica in the 14th century besides her silicious transparent colored glazes (mezza-majolica). By the .16th century Italian majolica was being made in Pesaro, Urbi.no, Gubbio,

1 The Rape of Proserpine, Urbino Gubbio Lustres (Italy 1544)

2 The Death of Achilles, Urbino (Italy 1540-1545)

3 Coat ef Arms of the Medici of Florence, Hespano Moresque Valencia (1479-1500)

4 Bowl, Rhages, Persia (13th Century)

.

*

.

Caffagiolo, Treviso, Bassano, Nove, Padua, Candiana, Verona, Milan, Venice, Lodi, Turin, Genoa, Savona, Arbisola, Ferrara, Modena Reggio, Scandiana, Sassuolo, Siena, Pisa, Asciano, Monte Lupo, San Querigo, Castel Durante, Citta di Castello, Bagnolo, Faenza, Forli, Rimini, Ravenna, Bologna, Deruta, Fabriano, Spello, Viterbo, Rome, Capo di Monte, Naples, Grotaglia, Castelli in Abruzzo, Palermo and Catala Girone. Lustre-ware was produced only at Pesaro, Deruta, Gubbio, Urbino and Castel Durante; a few pieces made at Caffagiolo and elsewhere were experimental. The body of old Italian majolica is a buff-colored clay.

Gubbio. — This ware is famous for its lus¬ tre pieces. Those emanating from the studio (botega) of c<Maestro Giorgio® (early 16th cen¬ tury) are all elaborately decorated and have a lustre surpassing all other wares. His metallic reflecting surfaces, Solon says,

(<pass from bluish-purple to ruby-red, from golden-yellow to emerald-green,® his madre-perla is absolute perfection. Few Gubbio pieces bear any marks, but besides the before-mentioned Giorgio Andreoli were other Andreolis — Salembini, Giovanni and Vinzentio. The Gubbio fabrique was in decadent condition by 1551. The char¬ acteristic decoration of the ware consists of grotesques (groteschi) , which the contemporary Picolpasso terms <(a candelliere® ; they contain artistically executed large scrolls (in yellow or brown) terminating in the heads of sea-horses, monsters, birds, etc., with cherub heads inter¬ mingling; trophies with mottoes surround busts. As centre-piece appears a genre or other scene. Human figures show weak drawing.

Urbino. — Under the powerful protection of Duke Guid'Ubaldo II this town took a leading position in the second half of the 16th century with its flourishing majolica fabrique and its remarkably artistic creations. As these pieces were produced for presentation to grandees and even sovereigns perfection of detail and talented elaborate composition were under¬ taken. So high is the artistic merit of some of the painting that it is claimed to have been from the designs of the great Raphael himself. Three artists are prominent in this work : Guido Durantino (or Guido Fontana), Francesco Xanto da Rovigo (both of these signed in full), the latter copied, with modifications, engravings after Raphael ; and Orazio Fontana (son of Guido), whose drawings are characterized by a light outline in the blue color that was utilized in the flesh tints. The Fontanas did also peculiar grotesque decorations on a white back¬ ground with very graceful effect, some having medallions of figures as centre-pieces. The Patanazzi family (end of the 16th century) were the last of the majolica painters of Urbino. Amongst Urbino motifs were figures, chimera, etc., also we find ornament in relief on salt boxes, inkstands, vases, coffrets, etc., of very decorative form. But the most remarkable pro¬ duction of Urbino was a series of vases de¬ signed by Battista Franco, 344 lovely specimens of which are in the Santa Casa de Lorette. The general belief in the claim of Vasari that the originator of the opaque tin-glaze in Italv was Luca della Robbia (1399-1482) has been shaken since the discovery of the Manfredi jug (men¬ tioned above), and it is. now supoosed that

Italian tin-glazed majolica was being produced by the 14th century at least.

Mexican Majolica. — Until about 10 years ago the fine specimens of

old opaque tin-glazed majolica found in Mexico and sought for by collectors were supposed to be Spanish crea¬ tions and imported by the colonists. Mrs. Robert W. deForest, with her fine collection of this ware (now donated to the New York Metropolitan Museum of Art), was led to take a generous interest in investigating the source of the product. And the late Dr. Atlee Barber of the Pennsylvania Museum, Philadelphia, by his researches disclosed the following facts : About 1526 the Spanish majolica technique was being taught to the colonists by Dominican friars from the Talavera potteries. In 1531 Pueblo de los Angeles started a pottery with Spanish artisans and! became the centre of a large industry. Mexican-made enamel-glazed tiles were used, instead of the imported articles, to decorate the insides of the walls and also the exteriors of churches, hospitals, convents and even private houses. By 1653, as is shown by documents, the Mexican-made glazed pot¬ tery was equal to the imported and shipments from Spain were no longer in demand, and a potters' guild was established, to protect the in¬ dustry in that year. By 1750 there were 30 prosperous potteries making three qualities of wares that they termed ((fine, common and yellow.® Five colors were used in fine ware, three in common ware. The best period was from 1650 to 1750. Specimens show two kinds of body — the white, soft, porous and the harder-baked red. The process used was that of baking the clay body first, then dipping in the tin enamel engobe and decorating over the enamel. The piece was then subjected to a second firing. The ware has been classified as follows: (1) (<Hispano-Moresque® phase, up to the end of the 17th century. (2) <(Spanish® or <(Talavera® phase, from beginning of the 17th century to about end of the 18th century (showing Talavera influence). (3) ((Chinese taste,® done by copying pieces of imported Chinese porcelain, started 17th century and con¬ tinued to end of 18th century. (4) <(Hispano-Mexican® or ((Puebla® phase, started about 1800 and lasted beyond 1850. Decadence fol¬ lowed, then extinction. The fourth style has green, yellow, purple, brown, red, black and later rose and mauve, in the decoration. Tiles have only three colors, blue, green and yellow, generally. The product consisted of chocolate or vanilla jars, vases, albarelli (drug pots), barrel-shaped flower jars, circular dishes, bowls, saltcellars, inkstands, basins, cup-holders, tiles, *etc.*

Bibliography. — Barber, E. A., (Majolica in America* (New York 1914) ; Beckwith, A , (Majolica and Faience) (New York 1877) ; Brence, G., and Lessing, J., (Majolica Fliesen, aus Siena) (Berlin 1884) ; Casati, C., (Notice sur les Faiences de Diruta) (Paris 1871) ; De-lange, H., (Les Majoliques de Pesaro* (Paris 1853) ; Falke, O. von, ˆajolika1* (Berlin 1896) ; Fortnum, D. E., (Contribution to the History of

Pottery) (London 1868) ; id., (Majolica) (London 1896) ; id., (A Descriptive Catalogue of the Majolica in the South Kensington Museum* (London 1873) ; Hensel, (Essai sur la Maioliqiie) (Paris 1836) ; Jacobsthal, J. E.,

‘Sud-italienische Fliesen> (Berlin 1886) ; Mely, F. de, ‘La Ceramique italienne) (Paris 1884) ; Meurer, M., ‘Italienische Majolika FliesciP (Berlin 1881); Molinier, E., ‘Les Majoliques italiennes) (Paris 1883) ; id., (La Ceramique italienne au 15e Siecle> (Paris 1888) ; Solon, M. L., (A History and Description of Italian Majolica) (London 1907) ; Wallis, H., ‘Italian Ceramic Art> (London 1897) ; id., ‘Notes on some Early Persian Lustre Vases) (London 1885) ; id., ‘The Majolica Pavements of the 15th Century > (London 1902) ; id., (Persian Lustre Vases> (London 1899) ; id., ‘Italian Ceramic Art> (London 1905).

Clement W. Coumbe.

MAJOR, Charles (Edwin Caskoden), American novelist : b. Indianapolis, Ind., 25 July 1856; d. 1913. He was educated in the public scnools and studied law, establishing a practice at Shelbyville. He contributed to various mag¬ azines and published ‘When Knighthood was m Flower > (1898) ; ‘The Bears of Blue River> (1901) ; ‘Uncle Tom Andy Bill> (1908) ; ‘Dor¬ othy Vernon of Haddon HalP (1902); ‘Yo¬ landa, Maid of Burguiidy) (1905); ‘Gentle Knight of Old Brandenburg) (1909); ‘The Little King) (1910); ‘Touchstone of Fortune)

(1912) .

MAJOR, (1) in music, a term applied to imperfect concords, but chiefly to the interval of the third. It also denotes that one of the two modern modes in which the third is four semitones above the tonic or

key note. (2) In military science, the major is a field officer Ranking next below a lieutenant-colonel and above a captain. He has generally the com¬ mand of a battalion, the exercises of which he superintends, and in action or on parade carries into effects the orders of his superior officer. The term in the French service has been super¬ seded by that of chef de bataillon. A brigade major is an officer who performs for a brigade, or in garrison, the duties ordinarily discharged by . a major in a regiment or battalion. A major-general ranks next above a lieutenant-general. In other cases, the term major, when applied as an epithet to the several denomina¬ tions of men in an army, signifies the superior of the department; as sergeant-major, the chief noncommissioned officer in a regiment, who assists the adjutant; drum major, the chief of the drum corps, *etc.*

MAJORCA, mˆ-jor'ka (Spanish Mallorca; Latin, Balcans Major), Spain, an island in the Mediterranean, the largest of the Balearic group; area, 1,330 square miles. It is about 120 miles distant from Spain. It is very irregular in shape, and deeply indented, particularly in the northeast. The scenery is picturesque, the cli¬ mate mild and agreeable, and in many of the valley regions vegetation is luxuriant. There are quarries of marble of various grades; lead and iron have been obtained, and coal to a con¬ siderable amount is mined. The olive and vine are extensively cultivated and there are large orchards of figs and oranges. The principal exports are bricks, lime, plaster, olive oil, light wines, brandy, wool and silk. There is a wire¬ less station with a 500-mile range located at Soller, not only for ship and shore traffic, but also for international service. The capital is Palma. Pop. of island, 264,231.

MAJORITY. See Elections ; Primary, Direct; Primary, Presidential Preference; Vote, Voters, Voting.

MAJUBA (ma-joo'ba) HILL, an eminence in the extreme north of Natal, about 7,000 feet above the sea, the scene of the defeat of 648 British troops, with the loss of their leader, Sir George Colley, by a superior force of Trans¬ vaal Boers, 27 Feb. 1881. The attack was un¬ expected, and the Boers found the British rest¬ ing after a night march and a climb of eight hours. The loss of the Boers was about 130, of the British more than 200 in killed and pris¬ oners, besides many wounded and some miss¬ ing. To the British nation the name Majuba Hill became a synonym for disaster. The anni¬ versary of this fight was marked by the success of Lord Roberts, commander of the British forces in the campaign of 1900, when he re¬ ceived the surrender of the Boer commander, General Cronje.

MAKAROV, Stepan Osipovich, Russian vice-admiral: b. 1848; d. 13 April 1904. He en¬ tered the navy in 1864 and received rapid pro¬ motion for distinguished services. During the Russo-Turkish War 1877-78, he commanded the gunboat Grand Duke Constantine, and for a series of daringly successful attacks upon Turk¬ ish ports, which earned him the title of "the Cossack of the Sea,w he was promoted captain of the second rank, aide-de-camp to the late Tsar Alexander II, was decorated wdth the orders of Saint Vladimir and Saint George and received a golden swˆord of honor. In 1881 he took part with the legion of SkobelefF in the capture of Geok Tepe in which General Kuro-patkin also figured prominently. The same year he commanded the cruiser Taman, the station guardship of the Russian embassy at Constan¬ tinople, and made a careful and complete study of the defenses of the Bosporus. In 1882-83 he was chief of staff of the offensive squadron in the Baltic under Admiral Chihachev, Minis¬ ter of the Navy. From 1891 to 1894 he was engaged in improvements of ordnance; among his inventions were the so-called cap guns pos¬ sessing 20 per cent greater power of penetra¬ tion into the newest superimposed armor; and the Ermak ice-breaker, the first of the ice¬ breaking vessels now used in Baltic and north¬ ern Asiatic waters. After the disastrous attack of the Japanese on the Russian fleet at Port Arthur in February 1904 Vice-Admiral Maka¬ rov was sent to the Far East to direct the Rus¬ sian naval operations, and arrived at Dalny 8 March. He repaired and converted the block¬ aded squadron into an active aggressive naval force, but on 13 April was lured out of harbor by a decoy squadron. Discovering the Jap¬ anese main fleet trying to intercept him he at once returned and was about to enter the harbor, when his flagship, the Petropavlovsk, was destroyed by one of the sunken mines laid by the Japanese across the passageway, and Vice-Admiral Makarov, his guest, Vasili Ve-restchagin (q.v.), the famous war-artist, 16 staff officers and over 800 sailors perished.

MAKART, mak art, Hans, Austrian painter-b- Salzburg, 28 May 1840; d. Vienna, 3 Oct. 1884. . He began his art studies in the Academy of. Vienna. In 1859 he wˆent to Munich, and painted in the studio of Piloty, under whose teaching (1861-65) he developed remarkable tal-

ent as a colorist. His earliest success was a Rembrandtesque picture of (Lavoisier in Jail5 (1862). His first work to gain him wide fame was his three-paneled picture, (The Seven Deadly Sins) or (The Plague in Florence,5 which aroused a storm of adverse criticism, wonder and admiration in Paris and Germany. In 1869 the Emperor Francis Joseph built him a fine studio in Vienna, and he produced his series of (Abundantia5 pictures, (Fruits of the Earth5; (Fruits of the Sea.5 In 1873 followed the picture which attracted so much attention in the Exhibition of Philadelphia (1876), his Ven¬ ice Doing Homage to Caterina Cornaro,5 now in the National Gallery at Berlin. He traveled in the East during the winter (1875-76), and, his Egyptian sketches materialized in his (Cleo¬ patra, J (Antique Hunt on the NileP *etc.* His (Entry of Charles V into Antwerp 5 (1875-78) gained a medal at the Paris Exposition of 1878 and his (Diana's Hunting Party 5 is one of the most successful of his larger paintings, combin¬ ing superb coloring and modeling of the nude with grand landscape effect. It is in the Metro¬ politan Museum of New York and is most char¬ acteristic of the gorgeous sensuousness of a painter who woke the intellectualists of German art to a sense of color, and broke free from the traditions of a somewhat stiff and pedantic method, gaining in life and intensity what he sacrificed of academic correctness. Consult Liitzow, (Hans Makart5 (1886) ; Stiassny, (Hans Makart und seine bleibende Bedeutung)

(1886).

MAKAW, or MACKAH, MACCAW, MACK AW, MI-CAW («Cape People»), Indian tribe of Cape Flattery, Puget Sound, Washington. They are the southernmost tribe of the Wakashan stock and the only one within the boundaries of the United States. They are of the Nootha branch. They claimed a consid¬ erable territory between Flattery Rocks and Hoko, but ceded to the government all these lands except that in the immediate vicinity of Cape Flattery in 1855. The Makaw reservation was defined in 1873, and an added reservation for the use of the tribe w'as established in 1893 and is known as the Ozette. On the two reser¬ vations there were in all 465 Indians in 1905, and their numbers are diminishing. In 1806 Lewis and Clark estimated the tribe to number 2,000. They are of peaceful habits, are skilful fishermen and expert at water craft.

MAKEMIE, Francis, pioneer of the Pres¬ byterian Church in the

United States : b. Rath-melton, County Donegal, Ireland, 1658; d. Acco-mac County, Va., 1708. He was a born missionary and zealot, and on being licensed by the presbytery of Laggan sailed for the British West Indies, and began work in Barbadoes. In 1684 he sought a wider field in Maryland and organized the first Presbyterian congregation at Snow Hill, capital of Worcester County, Md. After 10 years' labor as an itinerant preacher in most of the Southern States he returned to England and induced two other ministers to accompany him back. He was the first moder¬ ator of the presbytery of Philadelphia (1706), which he assisted in forming; and visited New York (1707), where he was imprisoned for preaching, though when brought to trial was acquitted of lawbreaking. Consult Briggs,

(American Presbyterianism5 (1885) ; Sprague,

W. B., (Annals of the American Pulpit5 (Vol. Ill, New York 1858).

MALABAR, mal-a-bar', British India, in the presidency of Madras, in the southwest, bor¬ dering on the Arabian Sea. It occupies an area of 5,795 square miles. A great portion is low land along the coast, rising abruptly at the east where it is bounded by the Western Ghats. The western part is intersected by long, narrow ravines, and the whole is covered writh vegeta¬ tion, in many places large forests. About 38 per cent of the total area is under cultivation and 33 per cent is forest. The average annual rainfall is 116 inches. The climate, though damp, is fairly healthful. There are a number of tea and coffee plantations and a large amount of rice is raised. The principal towns are Cochin, Callicut, Tellicherri, Kananur and Man¬ galore. The name Malabar is often applied to the whole extent of coast country from Cape Comorin as far north as Bombay. Pop. includ¬ ing the Laccadives, 3,015,119, of which 68 per cent is Hindu, 30 per cent Mohammedan and 2 per cent Christian.

MALABAR NIGHTSHADE, a succulent edible vine. See Basella.

MALABON, Santa Cruz de, san'ta crooth da ma-la-bon', Philippines, a pueblo of the prov¬ ince of Rizal, Luzon, also known as Tambobong. See Tambobong.

MALABUYOC, ma-la-boo'yok, Philippines, a pueblo of the province of Cebu, situated at the mouth of the Malutuoc River on the strait of Tanon, 60 miles southwest of Cebu, the provin¬ cial capital. Pop. 13,120.

MALACCA, ma-lak'a. See Straits Settle¬ ments.

MALACCA, Strait of, the channel between the Malay Peninsula and the island of Sumatra, extending from lat. 1° to about 6° N. Entire length, about 520 miles; breadth, varying from 25 miles to 250 miles.

MALACCA CANE, an erect, slender¬ stemmed palm (Calamus scipionum) which, when dressed, is of a brown color, sometimes mottled or clouded. It is used principally for walking-sticks, and is brought from Singapore and Malacca, but is chiefly produced in Sumatra.

MALACHI, mal'a-kl, one of the 12 minor Hebrew prophets, after whom the last canonical book of the Old Testament is named. The date of the book is assigned to 460-450 b.c. Nothing definite is known of the author whose name in Hebrew signifies (<My Messenger.55 Jerome supports a tradition given in the Hebrew tar-gum of Jonathan which identifies Malachi as a pseudonym of Ezra (q.v.) ((The Scribe.55 The general style, the character of the arguments and preachments against the evils of the times, of the book of Malachi (q.v.), are in favor of the tradition.

MALACHI, Book of. The book is per¬ haps actually anonymous. The author's name appears only in i, 1, which is very probably an editorial addition. The word Malachi means <(My messenger,55 and may have been taken from iii, 1.

There is no serious question affecting the authorship of more than a few verses of the book. It has often been thought that ii, Ilf expresses a spirit of narrow Judaism which is

inconsistent with i, 11. This is so upon one in¬ terpretation of the latter passage which makes it refer to the turning of the nations to Yahweh either in the present or the future. That, how¬ ever, is probably not the correct interpretation. The verse in the context, particularly in relation to the following verse, seems to be clearly

pres¬ ent and not future. At present it is not sus¬ ceptible of the broader meaning given; that could not have been true at any probable time of writing. Hence the probable meaning is rather that worship is offered by Jews who are scattered widely among the nations; the refer¬ ence is to the faithfulness of the Jews of the diaspora. . Thus understood it is not inconsist¬ ent with ii, Ilf.

Verses 4-6, chap, iv, are quite certainly a later addition. Verse 4 is a legal gloss, quite different from anything else in the book; verses 5—6 are a gloss upon verses 1—3, a restatement of much the same idea but from a different standpoint, one that is out of harmony with the book.

. The mention of Edom, i, 2—4, gives a general indication concerning the date of the book. These verses indicate some recent crushing dis¬ aster to Edom, which is narrated in a spirit of hatred to Edom. This hatred began, the his¬ tory shows, with the treacherous violence of Edom at the destruction of Jerusalem in 586. The disaster here referred to was doubtless one that came from the invasion of the Nabateans, and might have taken place at any time during a considerable period before 312 b.c. The gen¬ eral time between 586 and 312 is thus indicated. The temple had been rebuilt after the exile,

i, 10; iii, 1, 10, and the enthusiasm of the time of its rebuilding had passed away. This indi¬ cates a time considerably after *516 b.c. The general condition of the people is that of the time of Ezra and Nehemiah, with the temple service in disorder and disrepute, i, 6-8, 12-13 ;

ii, 1, 8, 17; iii, 7-10, 14, see Nehemiah x, 32-39; xiii, 10—13. Also, the divorce of Jewish wives and the marrying of foreign wives were found frequently, ii, 10-16, see Ezra, ix-x; Nehemiah x, 28-30; xiii, 23-31. There is in the book, however, no reference to the work of Ezra and Nehemiah. Hence the book is to be assigned to the period before their activity, and presum¬ ably not long before, perhaps about 460 B.c.

The message of Malachi was intended to be primarily one of encouragement to the discour¬ aged people in Palestine. The principal com¬ prehensive thought of the book is that Yahweh still loves Israel, in spite of appearances to the contrary. . This is stated at the beginning of the book, in i, 2-5. The reason assigned for the adverse conditions from which the people were suffering was the failure of the people to do their duty toward Yahweh. This was particu¬ larly a failure in relation to the outward na¬ tional service. The outlook of the prophet is, therefore, in a considerable measure, formal. Yet this formal side is accompanied by a real ethical interest, as appears in ii,

27. A high standard for priestly activity is set up in ii, 7. The assurance of further prosperity for the peo¬ ple if they amend their ways is in connection with the coming of the day of Yahweh.

Bibliography.— Driver,* S. R., <The Minor Prophets) ((Century Bible, > Edinburgh 1906)* Perowne, T. T., (Malachi > (< Cambridge Bible > Cambridge 1896) ; Smith, G. A., <The Book of

the Twelve Prophets* (Expositor's Bible, > Vol. II, New York 1898); Smith, J. M. P., (Malachi) ((International Critical Commentary* New York 1912).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages , Colgate University.

MALACHITE, a native basic copper car¬ bonate and hydrate, having the composition CuCo3.Cu(OH)2, crystallizing in the mono¬ clinic system, but commonly occurring in mas¬ sive form, or as an incrustation. It is brittle and has a specific gravity of about 4, and a hardness of from 3.5 to 4. Malachite is com¬ monly subtranslucent, with an adamantine lus¬ tre. It is beautifully green in color, often banded with other colors and it occurs in many parts of the world, usually in connection with other ores of copper. Specially fine pieces are found in the Ural district, and at the Nizhne Tagilsk copper mines a deposit is known which contains at least half a million pounds of pure malachite. In the United States, the best-known deposits are those of Arizona. Mal¬ achite has been much prized as a gem stone and it is extensively used for panels, clock cases, table tops and other ornamental work.

MALACHY, Saint, Irish bishop: b. Ar¬ magh about 1094; d. Clairvaux, France, 1148. He belonged to the noble family of O'Morgair, was educated by Iombar, an anchorite, and or¬ dained priest in 1119. He afterward studied at Lismore, and returning to Armagh was chosen bishop of Down and Connor (1125). His subsequent election to Armagh having been disputed (1129) he eventually, after a satisfac¬ tory settlement of the disputed questions and in accordance with his own desire, returned to the less important diocese, where he labored to secure for the Church a stronger foothold. In 1139 he set out on a mission to Rome. On his way thither he visited at Clairvaux and there

began a lifelong friendship with Saint Ber¬ nard. He was commissioned in 1148 to go to Rome a second time, but was stricken on the journey and the last moments of his life were spent with Saint Bernard, at whose monastery he had stopped. He was a zealous reformer and to him is given the distinction of having opened the first Cistercian monastery in Ire¬ land. The document known as (Prophecy of Saint Malachy,* containing a Latin motto for each of the popes, is now considered not to be his production. He was canonized in 1190. Consult O'Hanlon, <Life of Saint Malachy*

CLXxk"rceLxxxnia)tro,ogia Latina> (Vols—

MALACOLOGY. See Conchology.

™^t^9»9^TERYGII, mal-a-kop-te-rij'i-i, or MALACOPTERI, a group of fishes, in ormer systems of classification, including those with jointed and spineless or «soft** fin-rays Compare Acanthopterygii ; and see Ichthy¬ ology.

MALACOSTRACA, one of the two pri¬ mary divisions of the Crustacea to which all of the larger and more highly organized forms be-long. The number of pairs of appendages and of segments is definite, the former being al¬ ways 19 and the latter 19, except in the order Leptostraca which have also two abdominal

segments limbless. The boundary between head and thorax is not always clearly defined but the two always comprise 13 segments, of which five almost always belong to the head ; the abdomen has six limb-bearing segments and is terminated by the telson which is probably a seventh segment. The head bears a pair of eyes, usually stalked, two pairs of antennae, a pair of crushing jaws or mandibles and two pairs of maxillae, to which a pair of maxillipeds is sometimes added (Arthrostraca). Of the typically eight thoracic segments from one to three bear maxillipeds and the remainder walking feet. In most

cases the thorax is more or less completely covered by a carapace. The mode of development is varied, sometimes, as in the crayfish, it is direct, sometimes with a nauplius, but usually through the larval form called zoaea (see Larva), which possesses paired eyes as well as a median eye, a swim¬ ming tail and usually seven pairs of appendages. The subdivisions are :

Order Leptostraca (Nebalia)

Order Arthrostraca

Order Thoracostraca

See Crustacea.

Amphipoda (beach fleas).

Isopoda (wood lice).

Cumacea (Diastylis).

Stomatopoda (Squilla).

Schizopoda (Mysis).

f Macrura (lobsters and Decapoda \ shrimps).

{ Brachyura (crabs).

MALADE IMAGINAIRE, ma-lad e-ma- zhe-nar, Le, a comedy in five acts by Moliere. It was produced in Paris (1673), was the last work of its author and the last in which, as Argan, he appeared on the stage. See Moliere.

MALAGA, mal'a-ga (Sp. mal'a-ga, ancient Malaca), Spain, capital of the province of Malaga, on a small arm of the Mediterranean, about 65 miles northeast of Gibraltar. It was a Phoenician and afterward a Carthaginian colony, was a flourishing city under the Ro¬ mans and its long occupation by the Moors has left distinct marks in the older parts of the town; the Gibralfaro, or Moorish castle, on a hill overlooking the town, and considerable por¬ tions of the ancient fortifications, yet remain. Among the important buildings are the cathe¬ dral, a highly decorated structure in the com¬ posite style with a spire 300 feet high ; the episcopal palace, custom-house and several hos¬ pitals and charitable institutions, *etc.* The manufactures consist chiefly of iron, the ore of which is obtained from rich mines in the vicin¬ ity ; soap, cottons, linens, machinery, *etc.* Won¬ derful gardens lie outside the town, like the Pfaciendas de la Concepcion and De San Jose, where marvelous effects are produced by care¬ fully tended subtropical vegetation. Along the coast in the direction of Velez Malaga are ancient Moorish watch-towers, used, after the fall of

Granada, against the Moors themselves, who often descended upon the coast to plun¬ der and destroy. The harbor is excellent and the trade is of importance, . the principal ex¬ ports being olive oil, lead in bars, wine and fruit, particularly raisins, ‘oranges and al¬ monds. There used to be a great exoort of raisins to the United States, the consumption of which, however, declined in favor of the California product. The climate, mild, dry and equable, makes Malaga one of the finest resorts for invalids in Europe. Pop. 136,365.

MALAGA WINE, a sweet Spanish wine produced in the province of Malaga. It is one of the (<muscatel® wines, and is rich, luscious and full of body. See also Wines.

MALAGASY SUBREGION, a faunal di¬ vision of the Ethiopian Region in Zoogeog¬ raphy which embraces Madagascar and some small neighboring islands. See Madagascar; Zoogeography.

MALAKOFF, ma’la-kof. See Sebastopol.

MALAMPAYA, ma-lam-pa’ya, a sound on the northwest coast of the province of Paragua, island of Palawan, Philippines ; it is an arm of the China Sea, extending 24 miles northwest to southeast, and from three to six miles wide. It is entirely landlocked, Tuluran Island pro¬ tecting it from the China Sea, and is entered by Blockade and Endeavor straits. Its depth varies from 36 to 54 feet, it is free from sun¬ ken dangers to navigation, is one of the finest harbors in the Philippine Archipelago and has been suggested as one of the best locations for a naval station between Balabac and Manila.

MALANAO, ma-la-now’, the name com¬ monly given the Moros, especially llanos, who live on the shores of Lake Malanas, island of Mindanao. See Philippine Islands.

MALAPROP, Mrs., a character in the (Rivals) of Sheridan. Like Shakespeare’s Dog¬ berry she is made to employ words of the same length, accent and more or less similar vowel and consonantal value, interchangeably. Hence her well-known <(Allegory on the Banks of the Nile®; <(Derangement of Epitaphs®; ((A Bar¬ barous Vandyke,® *etc.*

MALAPTERURUS. See Electric Fishes.

MALAR, ma’lar, Lake of, Sweden, a lake running inland from the Baltic about 81 miles, with an average breadth of 13 miles and an

area of 450 square miles. It contains upward of 1,200 islands. Its east end is closed by Stockholm, where its waters are poured into the Baltic by various channels, the difference of level being about six feet. It is surrounded by the populous districts of Stockholm, Nykioping, Upsal and Westeras, and the shores are varied with bays and hills, woods, lawns and cliffs, and are adorned with many castles, country-seats and villas, including the royal palaces of Drottningholm and Gripesholm.

MALARIA, an infectious disease due to animal parasites and which is characterized by intermittent attacks of chills and fever, so-called intermittent fever, or a continued fever with remissions ; or by a chronic malarial ca¬ chexia. Malaria is a disease which is very widely distributed. It is found throughout Eu¬ rope, particularly in the more southerly regions, Italy and Spain, but is absent in the more north¬ erly parts of the Continent, where the tempera¬ ture prohibits the development of the mosquito, the chief carrier of the disease. In Asiatic countries, particularly in India, malaria is very frequent ; and in Africa different types of ma¬ larial fever constitute a feature most obnoxious to colonization. In the United States, particu¬ larly in the Southern States, malaria prevails. Along the New England coast, where it at one time was very common, it has become much diminished in prevalence and in severity. The Pacific Coast region is free from the disease,

and the Northwest States are comparatively free. In the region of the Saint Lawrence River malaria is unknown.

In order to understand clearly the different forms of malarial fever, it is important to bear in mind that the different types are due to mi¬ nute animal parasites which enter the blood, usually by the bite of one of a particular genus of mosquitoes (Anopheles) . (See Mosquitoes and the Propagation of Disease). The para¬ site develops after its introduction into the blood and, according to the individual type that is introduced, certain variations in the develop¬ mental history of the disease result. The para¬ sites themselves, which are thought to be low forms of animal life, protozoa, develop, for the most part, in the red blood-corpuscles and have many allies in the red blood-corpuscles of other animals, as frogs, fish, birds, monkeys, cats, *etc.*

These organisms were first clearly demon¬ strated by Laveran, a French army surgeon, in 1880, and his early observations were enlarged and amended by Golgi, Marchiafava and Celli, Manson and Ross, and a host of others. At the present time at least three forms of the parasite Hcematozoa malarice are known, the parasite of tertian fever, the parasite of quar¬ tan fever and the parasite of aestivo-autumnal fever. These parasites have two cycles of de¬ velopment, one taking place in the body of man and the other in the body of the mosquito. Thus a patient with malarial fever infects a mosquito with a parasite which undergoes cer¬ tain transformations within the body of the mosquito, and is then in turn introduced into the body of another patient, to cause typical attacks of fever according to the type of para¬ site introduced. Occasionally two different parasites are introduced into the patient's body and a mixture of the two forms of the disease results.

The commonest form of malarial fever (the so-called chills and fever, or ague) is due to the tertian and quartan parasites. In these, after an unknown period of incubation, probably from 36 hours to 15 days, the patient has a feel¬ ing as though he were going to be sick, some¬ times with headache, sometimes a feeling of lassitude and a desire to yawn and to stretch. Occasionally the patient has nausea and vomit¬ ing. At the same time the temperature has be¬ gun to rise and a chill commences. He begins to shiver, the face becomes drawn, thin and cold, the body shakes, the teeth chatter and the skin may be cold, and

blue, although the internal temperature is known to be gradually rising. After from 10 to 15 minutes, or perhaps a longer time, the chill is followed by a hot stage. The coldness of the surface disappears and the face becomes congested and flushed, the skin is red, the pulse is full and the patient may have a throbbing headache, with mental excite¬ ment.. Thirst is excessive. Then the period of sweating begins, the whole body being covered with perspiration; the temperature drops, the headache disappears and in an hour or two the paroxysm is over.

A number of variations from this typical form are known. In the tertian type of fever the chill and fever usually occur every other day. This is due to the fact that the cycle of development of the tertian parasite is about 48 hours and that the stage of full development of

the parasite, or sporulation, which is more or less coincident with the attack, occurs at these times. Thus every third day the patient has an attack, hence the term “tertian.® In the mixed infections, when two sets of parasites develop on alternate days, the paroxysms of chills, fever and sweating may occur every day. In the quar¬ tan type of fever the cycle of development of the parasite is completed every fourth day. Mixed infections also occur in this form of the disease. In the northern United States these are the types of malaria which are more com¬ mon, but below Mason and Dixon’s line a much severer form of the disease is present. This is the aestivo-autumnal type, which gives rise t r the so-called bilious remittent fevers and typhe-malarial fevers of the South. In these the symptoms are extremely irregular. The na oxysms occur every 24 or 48 hours, and longer remissions are known. The length of the par¬ oxysms is usually longer, lasting 20 hours, in¬ stead of 10 or 12 as in the tertian form; the onset of the disease is usually slow and gradual ; and there may be no chill. Occasionally there is a continuous fever without much break, the temperature ranging from 102° to 103° F. Jaundice is not infrequent, and this, with the fever and a furred tongue and mental disturb¬ ance, often gives rise to the suspicion of typhoid fever. In the simpler types the patient may get well after 10 days or two weeks without any special medication. The more severe forms may be fatal unless prompt diagnosis and medi¬ cation are instituted. The diagnosis of mala¬ ria should always include an examination of blood and the demonstration of the parasite. In the vast majority of untreated cases the parasite can be found. Occasionally, however, repeated examination fails to show it.

Treatment should be prophylactic as well as actual and attention should be paid to the avoid¬ ance of infection no less than to care of the disease itself. Rigid protection of houses by means of screens to keep out the Anopheles is one of the most important procedures. Further¬ more, it is highly essential that the mosqui¬ toes themselves should be protected from the infection by screening all patients suffering from malarial fever. In order to do this the pa¬ tient's couch should be surrounded by mosquito¬ netting and all mosquitoes in the room of the malarial patient should be killed by means of pyrethrum-powder. Further measures for de¬ stroying malaria should be taken by draining off swamps and employing proper engineering methods in order to get rid of the mosquitoes themselves. The planting of swamps with leafy trees often dries them up and thus pre¬ vents the formation of breeding-places for mosquitoes. Finally the specific, quinine, should be used in all cases. It is a prompt and sure parasiticide and in its varied forms can be used by almost. every patient, despite individual idiosyncrasies.

In the consideration of some of the chronic forms, of the disease a number of perplexing conditions are met. Thus, following constant exposure to malaria and repeated attacks of the disease, symptoms of anaemia, of breathless¬ ness, swelling of the feet and ankles, bleeding m different parts of the body and enlarged spleen may be found. This is a tvpe of infec¬ tion known as malarial cachexia. It is found in southern countries and should be distinguished

MALARIAL CACHEXIA

from the cachexia due to various forms of in¬ testinal parasites. See Mosquito; Miasma; Microscopy, Clinical.

Bibliography.— Henson, G. E., (Malaria) (Saint Louis 1913) ; Herrns, W. B., (Malaria, Cause and Control5 (New York 1913) ; Boyce, R. W., (Mosquito or Man?) (2d ed., ib. 1910) ; Osier, William, Principles and Practice of Medicine> (ib. 1912) ; Ruge, R., introduction to the Study of Malarial Diseases5 (ib. 1905) ; Scheube, (Diseases of Warm Countries5 (Lon¬ don 1903) ; von Ezdorf, R. H., < Malarial

Fevers5 (Washington 1914).

Smith Ely Jelliffe, M.D.

MALARIAL CACHEXIA, or ANAE¬ MIA. See Hookworm Disease.

MALARIAL FEVER. See Malaria.

MALASPINA GLACIER, Alaska, glacier extending from Mount Saint Elias, at an eleva¬ tion of 18,000 feet, to Yakutat Bay, a distance of 90 miles, while its front on the Pacific is between 60 and 70 miles wide. It was named in honor of the Spanish explorer, Alejandro Malaspina, who traversed the region in 1789-94 in search of the Northwest Passage. With its tributaries, the Seward, Agassiz, Tyndall and Guyot, the Malaspina covers some 1,500 square miles of ground, and has a depth of more than 1,000 feet. As it reaches the Pacific it breaks into dangerous icebergs which threaten naviga¬ tion, but leaves a front of great ice palisades.

MALATESTA, a noble Italian family, leaders of the Guelphs in Romagna and rulers in Rimini in 1216-1528. Giovanni and Malatesta of the Malatesta tribe entered Rimini in 1216 and were granted citizenship in con¬ sideration of their aid against Cesena. The family rapidly gained in power and in 1237 Giovanni was named podesta. He was suc¬ ceeded upon his death in 1247 by his son, Malatesta de Verrucchio, who became supreme ruler in 1295 and who steadily increased his power until his death in 1312 at the age of 100 years. He

also increased the power of the Guelphs and enjoyed the favor of Pope Boniface VIII. Of his four sons, two were Giovanni and Paolo, husband and lover of Francesca da Rimini, whose story is told in Dante's Hnferno.5 Malatestino, the eldest son of Malatesta, succeeded him upon his death in 1312, maintained the power of the Guelphs, annexed Cesena and dying without issue in 1317 was succeeded by his youngest and only surviving brother, Pandolfo. The power of the Malatestas was extended over neighboring terri¬ tories in succeeding years and the family be¬ came one of the most influential of the Renais¬ sance. Carlo (b. 1394; d. 1429) was an ardent supporter of the popes, represented Gregory XII at the Council of Constance and was named vicar of the church in Romagna. His nephew, Sigismondo (b. 1417; d. 1468), was a valiant soldier, a patron of arts and letters as well as a poet and renowned antiquarian. He built the church of Saint Francis, . or temple of Malatesta, one of the most beautiful struc¬ tures of the Renaissance. He made war for and against Pope Eugenius IV ; against Venice and Florence with the Aragonese, then against the Aragonese at Piombino. He afterward fought with and against the Sienese, supported the cause of the Angevins and was excom-vol. 18 — ll

municated and burned in effigy by Pope Pius II. He was afterward restored to the Church but before his death he was practically stripped of his powers and possessions. He was suc¬ ceeded by his wife, Isotta, and his son, Salustio, but both were murdered by an illegitimate son, Roberto. Roberto's son, Pandolfo IV, was the last Malatesta to rule Rimini, and he sold his rights to the Venetians in 1503. Thereafter the Malatestas at various times endeavored to regain control of Rimini until 1528 when it was incorporated in the papal states. The Malatestas became citizens of Venice and the Rimini branch became extinct in 1716. Con¬ sult Battaglini, (Memorie Storiche di Rimini e de suoi signori5 (Bologna 1789) ; Fossati, (Le tempi di Malatesti de Rimini5 (Foligno 1794) ; Hutton, Sigismondo Malatesta5 (1906).

MALATIA, MALALIETH, or AZPUZU,

Asiatic Turkey, chief town and military post in a sanjak of the same name in the vilayet of Mamuret el-Aziz, on the Samsun-Sivas-Diarbekr Road, 10 miles southwest of the junc¬ tion of the Tokhma-Su with the Euphrates and 100 miles northeast of Marash. The town is modern, being practically rebuilt since the earthquake of 1893 ; and previous to that dating to the middle of the 19th century when the old Malatia was abandoned after its destruc¬ tion in the military

operations of Hafiz Pasha, the new town being built on the site of the former summer colony Azpuzu. The old town of Malatia (ancient Melitene) lies five miles to the northeast of the present town and is now known as Eskishehr. It has many inhabitants, extensive gardens and interesting ruins. It was the station of the 12th, or (<Thundering Legion,55 under Titus and was raised to a city under Trajan. It was capital of Armenia Tertia under Justinian. It changed hands between the Greeks and Saracens several times, was reputed* to possess 60,000 fighting men at the opening of the 11th century and in 1102 was returned to Saracen control. The modern Ma¬ latia is an important trading centre and the district is famous for its orchards and vine¬ yards. A fine grade of opium is also produced. There are Roman Catholic and Protestant mis¬ sions. The population includes many Christian Armenians besides the Turks and Kurds. There was a massacre of Christians in 1895. Pop. (estimated) 30,000.

MALAUEC, ma-low'ek, a provincial lan¬ guage, used largely in commerce in Luzon, Philippine Islands (q.v.).

MALAY (ma-la) ARCHIPELAGO. See

East Indies or Malay Archipelago.

MALAY PENINSULA (Malay, Tanah Malayu, or Malay Land), a long strip of land extending from Indo-China south and' southeast toward the island-of Sumatra, the most south¬ erly part of the Asiatic continent. The penin¬ sula begins properly at the head of the Gulf of Siam, and would thus include part of Siam proper and the British province of Tenasserim; but it is usual to limit the name to the portion south of the river Pakshan, the frontier of Tenasserim. In the larger sense, the length of the peninsula is about 870 miles long and its area 83,000 square miles; the population is estimated at about 2,000,000. The width varies

from 45 miles to 210. The interior consists mainly of magnificent wooded granite moun¬ tain ranges, some of whose peaks attain a

height of 7,000 feet; while along the coast there is almost everywhere a flat and fertile belt, fringed with numerous islands. There are numerous small rivers. The mean annual temperature near the sea is about 80°. There is no winter, but rains are frequent through the year. T he humidity of the climate renders it very trying to foreigners. Tigers and leo¬ pards are numerous and of great size. The Indian elephant, the rhinoceros and several species of monkeys are found; also the vam¬ pire bat, poisonous snakes and manv beautiful and brilliant birds. Tin abounds and is largely worked. Silver and gold are also found in paying quantities. There are over 40 varieties of palm in the peninsula and the vegetation is that of the luxuriant tropical kind. In physical features the peninsula resembles rather the islands of Sumatra and Java than Indo-China. The inhabitants are mainly Siamese in the north, civilized Malays (q.v.) along the coast and uncivilized Malays, mixed with aboriginal Negrito tribes, in the interior. Politically, the northern part of the peninsula is occupied by small states tributary to Siam (as far south as 5 N.) ; the southern part by Malay states

under British protection (as Perak, Salangor, Negri Sembilan, and Pahang, known as the Federated Malay States) and the British Crown colony of the Straits Settlements, comprising Singapore, Malacca and Penang. (Forthecom- *Pefc.e> industries, education, transportation facilities of the peninsula see articles on the individual states or groups of states, as Feder¬ ated Malay States; Burma; Perak; Pahang; Singapore; Straits Settlement). Consult Bishop, (The Golden Chersonese) (London 1883) ; Clifford, Hugh, (Studies in Brown Hu¬ manity) (ib. 1898) ; id., /In a Corner of Asia> (lb. 1899) ; Lucas, (Historical Geography of the British Colonies) (Oxford 1894) ; Rathbone,

(Camping and Tramping in Malay) (ib. 1898) • Skeat, W. W., < Malay Magic: An Introduc¬ tion to the Folklore and Popular Religion of the Malay Peninsula> (ib. 1900) ; Skeat and Blagden, (Pagan Races of the Malay Peninsula) (New York 1906) : Oldham, W. F., < India Malaysia and the Philippines) (ib. 1914) ’ Wright and Reid, <Malay Peninsula) (ib. 1912)’.

MALAY STATES. See Federated Malay States.

MALAYALAM, an independent Dravidian dialect of southern India, originally allied to Tamil and spoken on the Malabar Coast by be¬ tween six and seven million inhabitants called Malayalim or_ Malabars who form a separate race with distinctive castes, customs, traditions and literature. Malayalam is said to have de¬ veloped from Tamil

since the 9th century and now differs from it in pronunciation and in idiom, and in the retention of old Tamil forms obsolete in the modern languages. Sanskrit words are more numerous in Malayalam, while m Tamil, they are less than in any other Dra—

Tie!?” l011ˆ1?6-. Malayalam appears about a.d. 1150 in inscriptions of the rulers of Kerala from Travancore and has an extensive literature, of \vhich the 13th century epic (Ramacharitam)

r i°A™SlP°,em ln the language, and a collection of 1,000 Malayalam proverbs published in Man¬

galore in 1868 are notable examples. See Dra¬ vidian. Consult Ellis, F. W., (Dissertation on the Malayalam Language); Gundert, (Malay¬ alam Dictionary) (1872); Frohmeyer, Prog¬ ressive Grammar of the Malayalam Language for Europeans) (Mangalore 1889) ; Menon, T. K. K.,/ Notes on Malayalam Literature) in Royal Asiatic Journal (London 1900).

MALAYAN BEAR, or SUN BEAR, a

small bear (Ursus malayanus) , found in the Malayan Archipelago, Borneo, Sumatra and Java. It is about four and a half feet in length ; the fur is black, fading into brown on the nose which is remarkably broad and blunt. The chest bears a crescentic white mark, or an orange-colored, heart-shaped patch.

. MALAYAN SUBREGION, a faunal di¬ vision of the Oriental Region, composed of the southern end of the Malay Peninsula and all the islands of the Malay Archipelago as far as the Philippines and to the Straits of Ma¬ cassar, where this district is separated from the Australian and Papuan subregions by Wallace’s line (q.v.). The fauna of this subregion is composed of animals adapted to a uniform but not extieme heat, coupled with abundant mois¬ ture. The orang-outang and the birds of para¬ dise are its most characteristic groups. See Distribution of Living Mammals ; Zoogeog¬ raphy.

u MALAYS, a race of people inhabiting the Malay Peninsula and the Malay Archipelago, and claiming to have their native country in the highlands of Sumatra. The civilization of In¬ dia appears to have extended itself to the Malays at an early date. In the 13th century the Malays were on the peninsula of Malacca, where they built a city of the same na®ei and founded an empire. The sultans had subdued Sumatra previously to their settling in Malacca. They afterward

possessed them-the rest of the Sunda Isles, of the Philippines, the Moluccas and some of the Australian groups, where Malay tribes are found resembling, in their features, religion and government, the Malays of Malacca. At that time they acted a splendid part in Asia ; they carried on commerce, in part with their own ships, and planted colonies. Great numbers of ships from China, Cochin China, Hindustan and Siam filled the harbors of Malacca. They are now divided into distinct tribes, without any general head. This is partly owing to the supe-nonty which the Europeans, particularly the Dutch, have obtained in the Indian seas, and partly to the feudal system of the Malays, by which the national power has been divide'd and a common spirit prevented by the increasing power of the vassals. The civilized Malays p£° t/s Mohammedan religion. Besides

the Koran, the Malays have various local laws Ihey are fierce and warlike, always bearing arms, and much addicted to the use of force ˆ rJ'aˆherous in their alliances and were formerly addicted to piracy. The Malay language is widely used as the language of commerce throughout the South Seas and in the islands the Philippines. Physically considered the Malays are of low stature, slight in figure and with very small wrists and ankles The face is round the eyes black and somewhat almond-shaped, the nose short and small cheek bones prominent, features flat, the hair straight

and black, the complexion yellowish. In vari¬ ous respects they bear a close resemblance to the Mongolians of eastern Asia, but differ from them radically in language, all their dialects belonging to a distinct Malayo-Polynesian fam¬ ily which is widely distributed throughout the Indian and Pacific oceans. The Malays long pursued a piratical career, darting from hidden streams in their well-manned proas on any vessel that approached too near the coast, or more boldly lying in wait in fleets in the open sea, for any expected rich prize. Of late years the lessons taught them by European and American war vessels have forced the Malays to desist from piracy, their old lawless, roving habits being largely abandoned for their more settled occupations of

trade and agriculture. Among the many Malay tribes are the Sakais, or tree-dwellers, who build their houses in forked trees, 8 to 12 feet above the ground, reached by bamboo ladders which are hoistd at will. The tree-dwellers formerly made use of long blow-guns shooting poisoned arrows. The bamboo furnishes most of their articles of orna¬ ment and utility. The blow-gun was a bam¬ boo about an inch and a half in diameter and six and a half feet in length. The bore, drilled most accurately, was a quarter of an inch, and the darts nine inches in length, about the cir¬ cumference of a heavy darning-needle, sharp¬ ened at one end and poisoned. With these they secured all the meat they eat in the jungle — birds, monkeys, snakes and lizards. They also have knives made of bamboo.

The Malay intellect varies from that of savagery in the uncivilized tribes of the in¬ terior to a rather high degree of culture among the coast tribes. Much of their civilization is due to foreign influences, chiefly Hindu and Arab. The Malay language, which is soft and harmonious and of simple structure, is written in the Arabic character, which is ill suited for the purpose. Lately the Roman system has been largely adopted, especially in the Dutch and English dependencies. The literature, which is copious, comprises poetical composi¬ tions, such as rhyming-proverbs, love-songs and dramas displaying some originality, but little imagination. The prose writings are mostly based on Arab or Persian models.

Bibliography. — • Bastian, Hndonesien' (Ber¬ lin 1884-94) ; Brunmund and Von Hoevell, (Altertumer des ostindischen Archipels) (Ber¬ lin 1865) ; Bickmore, A. S., (East Indian Archi¬ pelago' (New York 1869) ; Buschan, (Illus-trierte Volkerkunde) (Stuttgart 1910) ; Craw-furd, John, (History of the Indian Archipelago) (Edinburgh 1820) ; Forbes, (A Naturalists' Wanderings in the Eastern Archipelago' (Lon¬ don 1878) ; Fraser, J. F., (Quaint Subjects of the King' (London 1909) ; Greentree and Nich¬ olson, (Catalogue of Malay Manuscripts and Manuscripts Relating to the Malay Language in the Bodleian Library) (Oxford 1912) ; Groenvelt, (Notes on the Malay Archipelago and Malacca, Compiled from Chinese Sources) (Batavia 1876) ; Hagen, (Anthropologischer At¬ las ostasiatischer Volker) (Wiesbaden 1898) ; Marsden, <History of Sumatra' (London 1811) ; Martin, (Reisen in den Molukken' (Ley¬ den 1894) ; Meyer, (Bilderschriften des ostin¬ dischen Archipels und der Siidsee' (Leipzig 1881); id., (Alterthiimer des ostindischen Archipels' (Dresden 1884) ; Raffles, (History

of Java' (London 1817) ; Rosenberg, (Der Malayische Archipel'

(Leipzig 1878) ; Skeat, W. W., (Malay Magic' (London 1900) ; id., (Fables and Folk-Tales from an Eastern For¬ est' (Cambridge 1901) ; Steven, (Materialien zur Kenntniss der wilden Stamme auf der Hal-binsel Malakka' (Berlin 1892) ; Van der Lith and Span, (Encyclopadie van Nederlandsche-Indie' (The Hague 1896) ; Wilkinson, (Malay Beliefs' (London 1906) ; Winstedt, R. D., (Malay Grammar' (Oxford 1914).

MALBAIE, Canada. See Murray Bay._

M ALB ONE, mal-bon', Edward Greene,

American painter: b. Newport, R. I., August 1777; d. Savannah, Ga., 7 May 1807. As a boy he was in the habit of frequenting the theatre at Newport to watch the painting of the scenes. At that early age he executed an entire scene, a landscape for the stage, the success of which encouraged him to devote his attention exclu¬ sively to painting. *At 17 he established him¬ self in Providence as a portrait painter. Meet¬ ing with success, he removed in 1796 to Boston, and during the next four years pursued his art in various cities. In 1800 he accompanied Washington Allston (q.v.) to Charleston, and in the succeeding year the two young artists sailed for Europe. Malbone when in London was urged by Benjamin West to take up his permanent residence there with the prospect of ample professional employment ; but he re¬ turned to Charleston in December 1801. For several years he painted miniatures in the chief cities of the United States with great reputa¬ tion. His principal imaginative work is (The Hours,' in which the divisions of the day are personified by female figures.

MALBROUK, mal-bruk', a yellowish, griz¬ zled monkey of West Africa (Cercopithecus cynosurus) , distinguished from other species of the genus (called guenons) by its wide flesh-colored face with a band across the forehead, the bristly whiskers and ventral part white.

MALCOLM, mal'korn or makom, the name of four Scottish kings: Malcolm I reigned from 943 to 954, and during this period occurred the cession of Cumbria to the Scots by Edmund I, the English sovereign. Malcolm II (d. Glams 1034), succeeded Kenneth II in 1005 and in his reign Lothian and Strathclyde were secured to Scotland. Malcolm III, surnamed Canmore (Great Head) ; b. about 1024; d. near Alnwick, Northumberland, 13 Nov. 1093. After the murder of his father, Duncan, by Macbeth, he was assisted by Siward of Northumbria, and Edward, the Confessor. After the death of Macbeth he was crowned at Scone in 1057. In 1067 he granted asylum to Edgar

Atheling, his mother, and two sisters (one of whom, Margaret, he married in 1068), with a number of Saxon exiles. His reign, though largely concerned in warring with Eng¬ land, had nevertheless an important bearing on the civilization and consolidation of Scotland. Malcolm IV (the Maiden), d. Jedburgh, 9 Dec. 1165, succeeded his grandfather, David I, in 1153. He suppressed two rebellions in his realm and surrendered Northumberland and Cumberland to Henry II in 1157.

MALCOLM, Sir John, British adminis¬ trator and diplomatist : b. Burnfoot, Dumfries¬ shire, 2 May 1769; d. London, 30 May 1833.

He entered in 1782 the service of the East India Company, in 1797 was made captain, and till 1799 was engaged in various important services, terminating at the fall of Seringapa-tam. He was three times Ambassador to Persia, and in 1822 was made major-general. He was' governor of Bombay, 1826-30, when he finally returned to Britain. His principal works are (A Sketch of the Sikhs) ; <The History of Persia) (1815); (Sketches of Persiaˆ <Life of Lord Clive> (1836). Consult Kaye, (Life and Correspondence of Sir John Malcolm*

(1856-57).

MALCZEWSKI, mal-chev'ske, Antoni, Polish poet: b. Warsaw, Poland, 3 June 1792; d. there, 2 May 1826. He entered the Polish army in 1811 but resigned in 1816 and traveled on the Continent, where he met Byron. He settled in Warsaw and there wrote <Marja) (1825), an epic poem which after his death was recognized as a literary work of great merit, and has since been translated into several lan¬ guages. None of his work brought him fame or recognition during his life, and he died in wretched poverty. A tomb «To the author of Marja® was erected in Varsovia.

MALDEN, mal'den, Mass., city, in Middle¬ sex County, on the Malden

River, and on the Boston and Maine Railroad, about four miles north of Boston. It is connected by electrical railway with Boston, Lowell, Haverhill, Lynn, Salem and a number of other cities and towns. Malden includes several villages. The first settlement was made in 1641, but the place re¬ mained a part of Charlestown until 1649, when it was made a separate, incorporated municipal¬ ity. It was chartered as a city in 1881. It is a manufacturing city, having over 630 manufac¬ turing establishments, representing nearly 50 different industries. The chief products are rubber boots and shoes, boot and shoe lasts and boot-trees, wire cord, leather, cotton goods, fibre goods, hosiery and hosiery supporters, knit goods, furniture, soap and picture molding. The manufactories have a combined capital of nearly $8,000,000, and the annual output is nearly $21,000,000. The number of employees is about 6,200. The municipal expenditures are annually about $604,520; the principal items of which are for schools, $282,300; for water¬ works, $55,000; charities, $60,000; for fire de¬ partment, $69,000; police, $68,000; for munici¬ pal lighting, $34,000. Metropolitan District water system supplies water to the city, also to Melrose and Medford. Malden has excellent public and parish schools, a number of fine church buildings, a Y. M. C. A. building, four libraries which contain about 65,000 volumes, Malden Public Library, a Home for the Aged and a city home — private hospital. The Con¬ verse Library building, designed by Richardson, is beautiful and commodious. The government is vested in a mayor and a council. The execu¬ tive appoints, subject to the approval of the council, the administrative officials. Pop. 49,103.

MALDIVE (mal'div) ISLANDS (Thou¬ sand Isles), Indian Ocean, a chain of islands at the entrance to the Arabian Sea, 500 miles west of Ceylon, extending from lat. 0° 40' S. to 7° 6' N., nearly on the meridian of 73° 30' E., with a breadth of about 50 miles. The chain is com¬ posed of 17 coral atolls (see Atoll), the larger islands richly clothed with wood, chiefly palm,

fertile in fruit and in various kinds of edible roots. They also produce millet and abound in cocoanuts, fowls and all descriptions of fish. The inhabitants are a civilized race of people of mixed Singhalese and Arab extraction, Mohammedans and speaking a dialect closely allied to the Ceylonese. They carry on a con¬ siderable trade with Bengal, Ceylon and the Malabar coast, as also to the Red Sea and to Sumatra ; exchanging cowries, which are plenti¬ ful in the Moldives, coir, mats, oil, fish, tortoise-shell, etc., for rice, sugar, tobacco and manu¬ factured goods. They are expert navigators and sailors, and have

schools for teaching navi¬ gation on some of the islands; and they make and repair nautical instruments. They are gov¬ erned by a sultan, whose title and rank are hereditary; he resides in the island of Mali and pays annual tribute to the British govern¬ ment in Ceylon. Pop. about 50,000. Consult Gardiner, J. S., (Fauna and Geography of Maldive and Laccadive Archipelagos* (10 vols. Cambridge 1901-06).

MALE FERN. See Ferns and Fern-allies.

MALE PREPONDERANCE. See Pre¬ potency.

MALEBRANCHE, mal'branch', Nicholas, French philosopher: b. Paris, 6 Aug. 1638; d. there, 13 Oct. 1715. He studied philosophy in the College de la Marche, theology in the Sorbonne and entered the congregation of the Oratorians in 1660. In the history of French metaphysical speculation he ranks second only to Descartes, the greatest of French thinkers, and in 1699 was made member of the Academy of Sciences. He was induced to give many years' study to the Cartesian philosophy by the perusal in 1664 of the treatise (De Homine* by Descartes, and the fruit of his investigations appeared in his brilliant and original works !£?e >, Recherche de la Verite* (1674), and Y.raite de 1 Imagination. > The essence of his philosophy is a sort of mystical idealism. Ac¬ cording to him we have cognizance of things, as well objective realities, as subjective thoughts and feelings, through the idea which resides in our souls ; but this idea is in God, so that we perceive everything in God (vision en Dieu) as the primal cause of all existences and things. Hence the famous doctrine of ((Occasionalism» °r /Interference,® in accordance with which the objective thing and the subjective impression are made on every occasion to coincide, by the direct interposition of God, in whom alone we think and feel. In the history of philosophy Malebranche may be styled the connecting link between Descartes and Spinoza, the difference between his philosophy and that of the panthe¬ ist Spinoza consisting in the fact that to him the Universe was in God, and to Spinoza God was, in fact, in the Universe. Among his other works are to be mentioned (Conversa¬ tions chretiennes* (1677) ; <Traite de la nature et dela grace* (1680); <Traite de la morale) (1684) ; 3 Entretiens sur la metaphysique et sur la religion * (1688); (Entretiens d'un philosophe Chretien et d'un philosophe chinois sur l'existence et la nature de Dieu) (1708) Consult Blampignon, <Etude sur Malebranche) (1861);

/ Philosophic de Malebranche*

(1870); Andre, (La vie du Reverend Pere

Malebranche) (1886); Farny, <Etude sur la morale de Malebranche) (1886).

MALESHERBES, Chretien Guillaume de Lamoignon de, kra-te-an ge-yom de la-moin- oh de mal-es-arb, French statesman : b. Paris 6 Dec. 1721; d. there, 22 April 1794. He was educated at the Jesuits' College, entered the legal profession and in 1745 became counsellor of the parlement of France; in 1750 he was president of the Court of Aids. He was broad¬ minded and liberal in his policy, favoring the publication of the (Encyclopedie) and owing to his protestation against different measures of Louis XV was removed from office. Under Louis XVI he was Minister of the Interior, but resigned in 1776 and until the Revolution spent his time upon his estates and in travel, with the exception of 1787-88, when he was again Min¬ ister. At the outbreak of the Revolution he came loyally to the assistance of Louis XVI and was leading counsel in his defense. He re¬ mained with the monarch until almost the last and 11 months later was guillotined for treason. He was the author of essays and pamphlets on financial questions, *etc.*

MALET, Claude Frangois de, klod fran-swa de ma-la, French conspirator: b. Dole, Franche-Comte, France, 28 June 1754; d. Paris, 29 Oct. 1812. He entered the army in 1771 and became a brigadier-general in 1799. Suspected of conspiracy against Napoleon, he was dis¬ missed from the army in 1807 and confined in La Force. While there he laid new plots and was thenceforward confined in a state prison from 1808 till 1812. During Napoleon's cam¬ paign in Russia Malet made his escape from prison on the night of 22-23 October, and by cir¬ culating the false news of Napoleon's death won over some of the National Guards. While the latter secured the principal public offices in his name, Malet liberated his fellow conspira¬ tors, Generals Guidal and Lahorie, from prison. He was, however, himself taken prisoner by Laborde, chief of the military police of Paris, and was shot with his fellow conspirators.

MALET, Lucas. See Harrison, Mary Saint Leger.

MALFATH, Giovanni Francesco Gui-seppe, Italian mathematician: b. Ala di Trento, 1731 ; d. Ferrara, 1807. He wyas educated at the Jesuit College at Verona and later studied un¬ der Riccatti at Bologna. For 30 years from 1771 he was professor of higher mathematics at Ferrara and attained high rank among the mathematicians of his time. He is best re¬ membered for his publication of a mathematical problem known as ((Malfath's problem,® of which he gave the first solution. It was pub¬ lished in a memoir, (Tentativo per la risolu-zione delle equazioni di quinto grado> (Pavia

1772),

MALFORMATION IN PLANTS. See

Plants, Malformation in.

MALHERBE, Frangois de, fran-swa de mal-arb, French poet: b. Caen, France, 1555; d. Paris, 16 Oct. 1628. He was educated in Heidelberg and was engaged in the wars of the League. In 1605 he became court poet under Henry IV, but his work as a critic was of greater value than his poetry, which was lack¬ ing in poetic feeling and originality, though metrically perfect. He was the founder of the French school of classicism and must be cred¬

ited with arousing a critical sense among the thinkers of France. His works consist of translations from the Latin and one volume of original verse. Consult Allais, (Malherbe et la Poesie frangaise a la fin du XVI. Siecle* (1892) ; Brunot, (La Doctrine de Malherbe)

(1891).

MALIBRAN, Maria Felicite, mezzo-so¬ prano singer: b. Paris, 1808; d. Manchester, England, 1836. She was early trained for the operatic stage by her father, Manuel Garcia (q.v.), the Spanish tenor, and made her debut in London (1825). She had lived in that city since.1817 as a teacher of singing, and her suc¬ cess in Rossini's (Barber of Seville) was such that she was induced to follow her father to New York, where he had an engagement to establish grand opera. Here she married a French merchant named Malibran. She re¬ turned to the stage on her husband's failure in business, and in the spring of 1828

appeared on the Parisian boards in Rossini's ˆemiramisP She subsequently was welcomed with great en¬ thusiasm in London, Naples, Vienna, Milan and Venice, and traveled with the violinist de Beriot, whom she married shortly before her early death. She was a great actress as well as a marvelous songstress, and the irresistible charm of her person, added to the generosity of her mind and disposition, made her during her brief career one of the most fascinating operatic singers that had ever won the applause of the European public. In 1838 a statue was erected to her in Brussels, which had been her last place of residence. Consult Nathan, (Life of Madame Maria Malibran de Beriot) (1846) ; Teneo, M., (La Malibran, d'apres des documents inedits* (in (Sammelbande der internationalen Musik-Gesellschaft,* Leipzig 1906).

MALIC ACID, an organic acid discov¬ ered in 1785 by Scheele, and now known to be widely diffused throughout the vegetable king¬ dom, occurring sometimes in the free state, and sometimes in the form of its potassium, magne¬ sium or calcium salts. It occurs abundantly, for example, in the gooseberry, cherry, straw¬ berry and barberry, and also in unripe apples, from which latter fact it derives its name (Latin malum, an apple). It may be conven¬ iently prepared by boiling the juice of moun¬ tain ashberries with enough milk of lime to almost neutralize it, and pouring the precipitate into boiling dilute nitric acid. Acid malate of calcium crystallizes from the nitric acid upon cooling, and this is dissolved in water, and pre¬ cipitated by acetate of lead, the lead malate that is thrown down being subsequently decomposed by sulphuretted hydrogen gas. Malic acid has the formula GHeOs or C2H3 (OH)(COOH)2, is dibasic, and can be obtained in the form of colorless prisms or needles, which are hygro¬ scopic, and dissolve readily in water and in alco¬ hol. Malic acid kills algae, and when present in a solution in any considerable amount it pre¬ vents the precipitation of cupric and ferric salts by the alkalis. With bases it forms compounds known as <(malates,® which are mostly soluble. See Succinic Acid.

MALICE, in law, a premeditated or formed design to do mischief or injury to another, called also <(malice prepense® or (<aforethought.® Blackstone says that malice prepense is not so properly spite or malevolence to the deceased

in particular, as any evil design in general ; the dictate of a wicked, depraved and malignant heart ; and it may be either express or implied in lavv. Express malice is when one, with a sedate, deliberate mind and formed design, doth kill another. In many cases where no malice is ex¬ pressed, the law will imply it; as where a man wilfully poisons another; in such a deliberate act the law presumes malice, though no particu¬ lar enmity can be proved. A spiteful, malig¬ nant, vindictive or revengeful disposition is apt to commit acts of malice both in the ordi¬ nary and the legal sense, and mav be guilty in the former and not in the latter sense. An injurious act emanating from a weak mind, a lack of caution or a sudden, unaccountable impulse, may have all the force of ordinary malice, but in the absence of a designed, in¬ tentional injury, it will not come within the strict limits of criminal malice. The law infers an intent to kill from the deliberate use of a deadly weapon, and it has been held that a bur¬ glar intended murder when he broke into a dwelling because he would commit it if neces¬ sary to escape.

MALICIOUS MISCHIEF, in law, any in¬ jury done to the person or property of another with deliberate malice. This-is an indictable offense both in Great Britain and the United States. The comprehensive English Black Act (so-called from its preamble that ((several ill-designing and disorderly persons have of late associated themselves under the name of blacks®) with others of a like kind were in 1861 codified (24 and 25 Viet., ch. 97) into an act which extends malicious mischief to buildings, fish ponds and other real estate, as well as to most classes of personal property. To constitute this offense, real not merely legal malice must be proved, such as is defined by Blackstone, ((a spirit of wanton cruelty or black and diabolical revenge® ; or, as defined bv the Supreme Court of Massachusetts, «a spirit of cruelty, hostility or revenge.® This spirit must be cherished by the offender not against a third party, but against the party whose person or property has been injured. Some Stales of the Union make secrecy a necessary element in the offense, others generalize the offense as im¬ plying merely the infliction' of unlawful iniury. If the injury was inflicted in the discharge of official duty, or under an honest sense of jus¬ tification, this is sufficient defense to secure ac¬ quittal. The offense may be either a misde¬ meanor (q.v.) or a felony (q.v.) according to its . circumstances. Consult Bishop, Commen¬ taries on the Law of Statutory Crimes5 (3d ed., Chicago 1901) ; McClain, (Treatise on Criminal Law, as Now

Administered in the United States5 (Chicago 1897) ; and Harris, Prin¬ ciples of the Criminal Law5 (London 1899).

MALICIOUS PROSECUTION, prose¬ cution of a person unsuccessfully, maliciously and without cause. To constitute this offense it must be proved (1) That the prosecution averred to be malicious was instituted by the defendant named. (2) That it was decided against prosecutor. (3) That the suit was with¬ out probable cause. (4) That the motive was malice. (5) That the plaintiff was injured by such malicious prosecution.

Quod facit per alium facit per se is fully applicable to the defendant in a suit for mali¬

cious prosecution ; hence a corporation may be liable though they acted through their agent. (See Tort). Consult Newell, M. L.. (Malitious Prosecution, False Imprisonment and Abuse of Process5 (Chicago 1892).

MALIGI, ma-le-he', Philippines, an island lying southeast of Talim Island in the Bay Lagoon (q.v.); it is the seat of the United States military prisons.

MALIGNANT POSTULE. See An¬

thrax.

MALIGNANTS, in English history, a name applied in 1643 by members of Parliament to designate those whom they considered to be the evil advisers of Charles I. Afterward the name was extended to all who sided with the king against the Parliament.

MALINAO, ma-le'now, Philippines, (1) a pueblo of the province of Albay, Luzon, situ¬ ated on the Lagonoy Gulf, 18 miles north by west of Albay, the provincial capital, and three miles north of Tabaco. It is on the main road, and is the shipping point for the large hemp product of the surrounding region. There is an extinct volcano nearby and also mineral springs. Pop. 12,437.

MALINES, ma-len. See Mechlin.

MALINGERING, ma-lmg'gar-ing, a term denoting feigning disease on the part of a sol¬ dier, sailor, prisoner, etc., in order to obtain discharge from service, or escape from duty or labor. It implies some

overt act, such as the previous application of a ligature, or the taking of some drug, which produced the appearance of the disease said to exist. A worse form of the same crime, <(wilfully maiming,® is errone¬ ously called malingering. Consult Callie, John,

(Malingering and Feigned Sickness5 (New York 1913) ; and Smith, W. R., (Medical Jurispru¬ dence5 (London 1913).

MALL, Frankkn Paine, American anato¬ mist: b. Belle Plaine, Iowa, 1862; d. 17 Nov. 1917. He took his M.D. at Michigan in 1883 later studied at Heidelberg and Leipzig and in 1886-88 was a Fellow at Johns Hopkins, acting as instructor in pathology at that institution 1888-89. He was adjunct professor of verte¬ brate anatomy at Clark University in 1889-92, and was professor of anatomy at the Univer¬ sity of Chicago in 1892-93. He was professor of anatomy at Johns Hopkins University after 1893 and after 1915 also served as director of the department of embryology at Carnegie In¬ stitute, V ashington, D. C. He was a trustee of the Marine Biological Laboratory, Woods' Hole, Mass., and wrote extensively for scientific publications.

MALL, mal or mel, The, (1) a promenade in Central Park, New York, regarded as one of the most successful landscape effects in the United States. (2) An avenue in London, on the north of Saint James Park.

MALLALIEU, mal-la-lu', Willard Fran¬ cis, American Methodist bishop : b. Sutton, Mass., 11 Dec. 1828; d. 1911. He was graduated from Wesleyan University in 1857 and became a Methodist Episcopal clergyman in 1858. He held many important charges and in 1872, 1876, 1880 and 1884 was a member of the general conferences. He was presiding elder of the district of Boston in 1882-84 and in 1884 was

elected bishop. He retired in 1904. He pub¬ lished ‘The Why, the When, and How of Revivals’ (1901) ; (The Fullness of the Bless¬ ing of the Gospel of Christ’ (1903); (Words of Cheer and Comfort’ (1907).

MALLARD. See Duck.

MALLARME, Stephane, sta-fan mal-ar- ma, French poet: b. Paris, 18 March 1842; d. Valvins, Fontainebleau, 9 Sept. 1898. Most of his life was passed as an instructor in English at the Lycee Fontanes of Paris. He is known as the founder of the curious poetic school of the “Decadents,” in whose organ, Le Decadent , as well as in Le Parnasse Contemporain, he published much. Incomprehensibility appears to have been the object of his study, and he en¬ tirely attained it in his preface to an edition (1880) of Beckford’s ‘Vathek.’ Others of his works are ‘L’Apres-midi d’un faune’ (1876) ; (Petite Mythologie’ (1878) ; Wes Dieux an¬ tiques’ (1880) ; ‘Poesies’ (1887), a translation of Poe’s poems (1888), perhaps his most satis¬ factory performance; and ‘Vers et prose’

(1893).

MALLEABILITY, in metallurgy, the property of extending under th- blow of a hammer. For every metal there is a tempera¬ ture of greatest malleability. The following is the order of malleability of the metals: Gold, silver, copper, platinum, iron, aluminum, tin, zinc, lead.

MALLEABLE GLASS. See Glass, Mal¬ leable.

MALLECO, mal-ya’kd, Chile, a province bounded by Argentina, Cautin, Bio-bio and Arauco. It has an area of 3,303 square miles. The capital city is Angol. The province is mountainous and well wooded in the eastern and western parts. About one-half of the copu¬ lation is composed of Indians of the Arauco tribe. Wheat is the staple agricultural product of the country. The other industries of im¬ portance are cattle raising and timber cutting. Pop. 133,212.

MALLEE-BIRD, or MALEO, a name for the Australian mound-bird (q.v.), derived from a native language.

MALLERY, Garrick, American ethnolo¬ gist: b. Wilkesbarre, Pa., 23 April 1831; d. Washington, D. C., 24 Oct. 1894. He was graduated from Yale College in 1850 and was admitted to the bar in 1853 ; he practised law in Philadelphia until 1861, when he enlisted and served through the war in the Federal army, attaining the rank of lieutenant-colonel. He was executive officer of the Signal Service Bureau until 1876, when he was engaged in a geological survey in Dakota, and in 1879 was retired from the army and appointed chief of the bureau of ethnology. Among his books are 'A Calendar of the Dakota Nation' (1877) ; Hsraelite and Indian, a Parallel in Planes of Culture' (1889); (Greeting by Gesture' (1891); (Picture Writing of the American Indians' (1893), *etc.*

MALLESON, George Bruce, English sol¬ dier and historical writer : b. London, 8 May 1825 ; d. there, 28 Feb. 1898. He was educated at Winchester College, and from 1842 till 1877 served in India, at first in the army, and subse¬ quently in government posts. His chief work,

'History of the Indian Mutiny' (1878-80) commenced where the second volume of Kaye's 'Sepoy War' left off, and in 1890 there ap¬ peared a joint edition of the two histories in six volumes, the third volume of Kaye's work being omitted and a new sixth one added. Other works by him are (The Mutiny of the Bengal Army' (1857) ; 'History of the French in India' (1868) ; 'Sketch of the Native States of India' (1875) ; 'Final French Struggles in India and Indian Seas' (1878); 'History of Afghanistan' (1879) ; 'The Decisive Battles of India' (1883), and lives of 'Clive' ; 'Eugene of Savoy' ; 'Prince Metternich' ; 'Wellesley' ; 'Dupleix' ; 'Akbar' and 'Warren Hastings.'

MALLET, John William, American chem¬ ist : b. Dublin, Ireland, 10 Oct. 1832; d. 1912. He was educated at Trinity College, Dublin, and at Gottingen, and emigrating to the United States in 1853 became assistant professor in chemistry at Amherst 1854-56 and later chemist to the United States geological survey of Alabama. In 1856-60 he was professor of chemistry at the University of Alabama. He entered the service of the Confederacy and was paroled in 1865 as lieutenant-colonel of artillery. The chair of sciences at the University of Louisiana was occupied by him in 1865-68 and after 1868 he was professor of chemistry in the University of Virginia, becoming professor emeritus in 1908. He contributed valuable scientific articles to the leading

chemical periodi¬ cals and published ‘Cotton’ (1862) ; ‘Chemistry Applied to the Arts’ (1868) ; ‘Syllabus of a Course of Lectures on General Chemistry’ (1890; rev. ed., 1901).

MALLET, a wooden hammer used in car¬ pentry and also in the game of croquet (q.v.). The gavel is a variety of mallet. Various small mallets are used by gold beaters, jewelers, den¬ tists and other artisans.

MALLIAN, ma-yan’, Julien de, West In¬ dian dramatist : b. Le Moule, Guadeloupe, 1805 ; d. Paris, France, 1851. He gained wide reputa¬ tion as a writer of comeaies and dramas, manv of which have been presented on the metropoli¬ tan stage. The most popular are ‘Two Roses’ (1831), a historical drama of the civil wars in England; ‘The Carpenter’ (1831), a comedy; and ‘The Wandering Jew’ (1834).

MALLOCK, William Hurrell, English

author : b. Devonshire, 1849. He was graduated from Balliol College, Oxford, and won the Newdegate prize in 1872. He has never entered a profession but has devoted himself entirely to literary work. His philosophical and sociologi¬ cal writings include ‘Is Life Worth Living?’ (1879) ; ‘Social Equality, a Study in a Missing Science’ (1882) ; ‘Atheism and the Value of Life’ (1884); ‘Property and Progress’ H884) ; ‘Labour and the Popular Welfare’ (1893) ; ‘Studies of Contemporary Superstition’ (1895) ; ‘Classes and Masses’ (1896) ; ‘Aristocracy and Evolution’ (1898) ; ‘Doctrine and Doctrinal Disruption’ (1900) ; ‘Religion as a Credible Doctrine’ (1902) ; ‘The Reconstruction of Beˆ lief’ (1905) ; ‘The Nation as a Business Firm,’ and ‘Social Reform’ (1914). He has also written several works of fiction, most of which deal with the same social and religious problems as the above works, including ‘The New Re¬ public’ (1877), in which he introduces many

well-known contemporaries under thin dis¬ guises; (A Romance of the Nineteenth Cen¬ tury) (1881; new ed., 1894); <The Old Order

Changes) (1886) ; (A Human Document) (1892) ; (The Heart of Life) (1895), and <The Individualist) (1899), and has published two volumes of verse, (The Veil of the Temple) (1904); a translation of Lucretius' (On Life and Death) (1878), and (An Immortal SouP (1908). His philosophical works deal with the fundamentals of religion, arguing for supernat¬ uralism and aiming to show that science alone supplies no basis for religious belief ; in his political and economic writings he has attacked the radical and socialistic theories and tenden¬ cies of the age. In 1916 he was awarded a Civil List pension.

MALLOPHAGA, a name used for an ex¬ tensive and varied assembly of feather-eating and hair-eating bugs, usually called lice. They are very small, oval, delicate and of swift mo¬ tion ; of light-brown color, some with shovel¬ shaped heads, others with horn-like appendages on the head. One delicate kind vexes the ca¬ nary, gluing eggs to its feathers and in the cracks of its perch. Gonvocotes is a large form, a tenth of an inch long, with bristled and shield-like head, and is one of the pests of do¬ mestic fowls. One species, colored with bands of yellow and brown, infests the turkey and the peacock. Another great family, Liotheide, con¬ tains species which resemble white ants and preys upon the feathers of falcons and of wad¬ ing birds. Gyropus infests guinea-pigs, mass-tng thickly about their neck and ears.

MALLORY, Stephen Russell, .American lawyer: b. Trinidad, West Indies, 1813; d. Pen¬ sacola, Fla., 9 Nov. 1873. His parents removed with him to the United States in 1820 and he was educated in Mobile and in Nazareth, Pa. He studied law and was admitted to the bar in 1839; he was United States senator 1851-57 and in 1861 entered the service of the Confederate States as secretary of a navy not in existence. He was arrested at the close of the war and held for 10 months, after which he returned to Pensacola and was until his death engaged in law practice.

MALLOW, a genus of herbs (Malva), of the family Malvacee. The species, of which there are less than a score, are widely scattered and are characterized by angled, lobed or dis¬ sected leaves and solitary or clustered axillary flowers. They include four species cultivated in America and one very well-known weed, M. rotundifolia, popularly known among children as ˆcheese-plant)) because of the shape of the fruits, which also suggested another popular name, r(shirt-button plant.)) The plant is a peren¬ nial, very persistent of life and rather difficult to eradicate except by constant clean cultiva¬ tion. Musk-mallow (M. moschata) is culti¬ vated for its large, showy pink or white flow¬ ers ; M. alcea is also popular. M. crispa fur¬ nishes a use! ul fibre, as probably other species could be made to do. Its leaves are

often used for garnishing but are not eaten. This species' and M. sy lye stris are frequently seen in old gar¬ dens and in their vicinity as escaped plants, but are not offered for sale by seedsmen. The name mallow is loosely applied to many plants of the mallow family, but not of the genus Malva; for instance, marsh-mallow (Althea

officinalis) , rose-mallow (Hibiscus moscheutos) and Indian mallow (Abutilon abutilon) ; also, more loosely still, to unrelated plants, as Jew's mallow (Corchorus olitorius or C. capsularis). See Corchorus; Hollyhock; Hibiscus.

MALMAISON, mal-ma-zon, a celebrated French chateau on the Seine, 10 miles west of Paris. It was the favorite residence of Jose¬ phine, wife of Napoleon I, and here she died. The chateau belonged 'to Richelieu, and was restored in 1861 by Napoleon III. In 1870 a sortie by Ducrot from Paris was repulsed here by the Germans.

MALMESBURY, mamz'ber-T, James Har¬ ris, 1st Earl of, English diplomatist: b. Salis¬ bury, England, 21 April 1746; d. London, 21 Nov. 1820. He was educated at Merton Col¬ lege, Oxford, afterward studied at Leyden and in 1768 became secretary of legation at Madrid. He was Ambassador at Berlin 1772, in 1777 at Saint Petersburg and in 1784 at The Hague. In 1788 he was created Baron and in 1800 Earl of Malmesbury. In 1793, with other Whigs, he deserted Fox for Pitt, and in 1795 was the Prince of Wales' proxy at the marriage cere¬ mony in Germany of the Princess Caroline of Brunswick. Consult (Diaries and Correspond¬ ence) (1845) ; (Lord Malmesbury and his Friends) (1870). (Both works edited by J. H. Harris, his grandson).

MALMESBURY, William of. See Wil¬ liam of Malmsbury.

MALMESBURY, England, market town and municipal borough, Wiltshire, 94 miles west of London, on the Great Western Railway. It is built on a ridge of land almost surrounded by the river Avon and one of its small tributaries. Its site was chosen by a Scottish or Irish monk named Maildulphus for a hermitage in 635. He later gathered a colony of disciples about him °ne of whom, Adhelm, became abbot of the abbey founded there, ruins of which still re¬ main. Athelstan rebuilt the monastery and is buried there. _ The town grew around the abbey, but was not incorporated until 1645, the charter then granted remaining in force until 1885. The rn town has a considerable agricultural trade, manufactures silk and pillow lace, and has tanneries and breweries. Two miles distant is the manor-house of Sir

Lawrence Washing¬ ton, and the church at Gardson where many members of the Washington family are buried Pop. 2,656.

MALMIGNATTE, mal-mi-nyat', a spider.

See Latrodectus.

MALMO, mal me, Sweden, a seaport and the third largest town of the country, on the Sound, almost opposite Copenhagen, 17 miles distant, with which it has steam-ferry communi¬ cation, a channel being maintained in winter by an ice-breaker. Malmo is a busy industrial centre with important manufactures, is the ter¬ minus of several railroads and is 384 miles by rail southwest of Stockholm. The town and its harbor have been considerably improved and modernized, and an extensive export and im¬ port trade is carried on. Malmo dates from the 12th century, but until 1500 it was little more than a poor fishing village. It again suffered a period of decline but revived after the improve¬ ments to the harbor effected in 1775. Pop. 111,823, It has an interesting city hall, Saint

Peter s Gothic Church and an ancient castle. The industries include iron works and foun¬ dries, manufacture of railroad cars, shoes, gloves, tobacco, chocolate, *etc.*

MALMSEY, mam'zi or malm'si, a sweet wine, made from a grape grown on rocky ground, in Madeira, exposed to the full influ¬ ence of the sun, and not gathered until partially withered.

MALOLOS, ma-lo'lo-s, Philippines, a pu¬ eblo and the capital of the province of Bulacan, Luzon, situated at the head of one of the inlets of the Pampanga River delta, five miles north¬ west of Bulacan, the former capital. It is a telegraph and military station, is near a station of the Manila-Dagupan Railroad and is the centre of an important trade. It is in a region which was a stronghold of the insurgents, and immediately after the close of the Spanish war was made the capital of the insurgent govern¬ ment. Rice is extensively cultivated in the vicinity. Pop. 12,575.

MALON, mahon, Benoit, French Socialist: b. near Sainte-Etienne in the department of Loire, 23 June 1841; d. Asnieres, 13 Sept. 1893. He early entered upon a journalistic career and his activities in behalf of Socialistic agitations caused his enforced absence from France for a time preceding 1880. He then founded the Revue Socialiste which he edited until his death. He attained considerable influence through the breadth of his teachings, which ad¬ vocated the necessity for an inclusion of certain high religious, ethical and moral considerations with the sooialistic principles of government. Author of (L'Internationale, son histoire et ses prineipes) (1872) ; (Histoire du Socialisme et des proletaires' (1881-84) ; (Le socialisme inte¬ gral } (1890-91, *etc.*

MALONE, ma-lon', Edmund, Irish Shakes¬ pearean scholar: b. Dublin, 4 Oct. 1741; d. London, 25 April 1812. He was educated at Trinity College, Dublin, and was called to the Irish bar in 1767, but henceforth devoted him¬ self entirely to literary pursuits. His most im¬ portant and permanent critical works are (At-' tempt to Ascertain the Order in Which the Plays of Shakespeare Were Written) (1778),

which still carries authority; his edition of the poet in 10 volumes ; and the edition known as the Third Variorum, which was prepared after his death by James Boswell, the younger, out of material left by the critic, and published in 21 volumes. This last is still the best of all complete critical editions. He also published (Remarks on the Rowley (Chatterton) Con¬ troversy } ; (An Inquiry into the Ireland Shake¬ spearian Forgeries' ; and biographical memoirs of Sir Joshua Reynolds, Dryden, W. Gerard Hamilton, *etc.* Consult Prior, James, (Life of Edmund Malone' (London 1864) ; Leslie and Taylor, (Life of Sir Joshua Reynolds) (ib. 1865) and Boswell, James, (Life of Johnson,' edited by G. B. Hill (Oxford 1887).

MALONE, Walter, American poet and ju¬ rist : b. Desoto County, Miss., 10 Feb. 1866; d. Memphis, 18 May 1915. He was graduated at the University of Mississippi and subsequently engaged in the practice of law and in literary work. He contributed to the periodicals of the day and published ˆClaribel and other poems' (1882); <The Outcast' (1886); {Narcissus) (1893) ; <Dusk and Dawn' (1895) ; 'ˆDe¬

cember and June' (1896) ; (Coming of the King' (1897) ; (Songs of North and South' (1900); (Poems' (1904); (Songs of East and West' (1906); (Hernando DeSoto,' an epic poem highly praised (1914).

On 29 March 1905, on petition of practically all members of the Memphis bar, he was ap¬ pointed judge of the Circuit Court of Shelby County and held the position until his death. An association composed of members of many States has been formed to erect a bronze por¬ trait statue to Walter Malone in the principal park of Memphis; while another association has for its object to have his Opportunity" cast into a bronze tablet to be erected in Court square, in the heart of Memphis.

MALONE, N. Y., village, county-seat of Franklin County, on the Salmon River, and on the New York Central and the Rutland rail¬ roads, about 275 miles north by west of Albany, and 12 miles from the boundary between the United States and Canada. It is situated at the northern foot-hills of the Adirondack Moun¬ tains, in an agricultural region, the chief products of which are hops, hay and potatoes. The dairy products and poultry are important. The chief manufactures are paper, pulp, flour, lumber, leather, woolen goods, foundry and machine-shop products, sash, doors and blinds, men's clothing, cigars and dairy products. The electric-light and gas plants are owned by private companies, the waterworks by the village. The local lighting

companies have harnessed the Salmon River eight miles south of Malone, and furnish an enormous supply of power. Malone is the commercial centre for the greater part of Franklin and parts of the adjacent counties, a section having a population of about 50,000. There are two national banks, six fine churches, a high school building (formerly Franklin Academy), several grammar and primary schools, a new federal post office and customs building, county courthouse, jail, a State armory, good hotels and several wholesale establishments. The educational institutions, besides the public schools, are a State School for Deaf-Mutes and Saint Joseph's Academy. There are three pub¬ lic libraries; the Wead Library, 7,000 volumes, free to the people of the school district, is housed in a beautiful building donated by Mrs. S. C. Wead; the Wadhams Library, 2,000 volumes, established and maintained by a literary society, free to all the people of the town of Malone (several school districts), and the Franklin County Historical Society Library, es¬ tablished in 1902. There is a well-kept park. The place was named in honor of Edmund Malone (q.v.), an Irish barrister and writer, by his friend, William Constable, who, together with his wife, named many of the places located within the limits of the large tract of land in the northern part of New York known as (<The Macomb Purchase." The first settlement was made in 1802, and its first inhabitants were mostly from Vermont and Ireland. In 1829-30 the people began considering the founding of an academy, and a number of the farmers pledged their farms as security for the pay¬ ment of the debt incurred for the erection of the building, and Franklin Academy was es¬ tablished in 1831. The Northern Railroad, now Rutland Railroad, entered the town in 1851, and

the New York Central in 1892. Malone figured prominently in the War of 1812; and furnished a large number of soldiers, privates and officers, in the Civil War. The village was the scene of two Fenian (q.v.) gatherings. Pop. 7,556.

MALOO CLIMBER. See Bauhinia.

MALORY, Sir Thomas, author of the English prose romance (Morte d'

Arthur.) The work was finished in the ninth year of Edward IV's reign, 1470, and published by Caxton in black-letter folio, in 1485. Little is known of the author; he may have been a priest; Caxton calls him ((a servant of Jesus both day and night,® and priests frequently were accorded the title "Sir.® Probably he was a Welshman. See Arthurian Romances; Morte D'Arthur; Grail, The Holy; Lancelot of the Lake; Merlin; Tristan.

MALOT, ma-ld, Hector Henri, French novelist: b. La Bouille, near Rouen, France, 20 May 1830; d. Vincennes, 18 July 1907. He studied law, but abandoned it for a literary career, and in 1859 issued the first of a long series of successful novels. He was for a time newspaper correspondent in London, and literary critic of L* Opinion Nationale. He wrote (Victimes d'amour) (1859); (Sans famille, > published in English as (No Relations) (1878); Conscience) (1888); Complices) (1893); (En famille) (1893); (Amours de jeune ; Amours de vieux) (1896) ; an autobiog¬ raphy, (Le Roman de mes Romans) (1896).

MALPIGHI, mal-pe'ge, Marcello, Italian

anatomist: b. Crevalcuore, Italy, 10 March 1628; d. Rome, 29 Nov. 1694. He received a medical education in Bologna and was granted a doctor's degree in 1653. In 1656 he became professor of medicine at Pisa, where he formed a friendship with the mathematician Borelli, who encouraged him to proceed with researches in anatomy. His health failing he returned to Bologna and continued his investigations, which resulted in discoveries which established facts undisputed in the modern world of science and placed the world's knowledge of physiology on a new footing; his researches in botany and entomology were highly important. In 1691 he was summoned to Rome as first physician to Innocent XII, in which office he died. He pub¬ lished numerous scientific works of great value, a complete edition of which was published in Venice 1743. The principal of these. are Ob¬ servations Anatomicae) (1661) and (Epistolae Anatomicae) (1665).

MALPLAQUET, mal-pla-ka, Battle of,

the bloodiest in the war of the Spanish Succes¬ sion, gained by Marlborough and Eugene, the commanders of the allies, against the French under Villars, 11 Sept. 1709. The French lost 10,000; the allies more than 20,000. Malplaquet is a village in the department of the Nord, near the Belgian frontier, 20 miles east of Valenciennes. After the victory there the allied armies soon took Mons and Douai.

MALSTROM. See Maelstrom.

MALT AND MALTING. See Brewing

and Malting.

MALSTATT-BURBACH, Prussia, town in the Rhine province, on the Saar and opposite Saarbriicken, It is situated in a coal-mining

district and is almost entirely given over to factories and workmen's dwellings. There are manufactories of iron, steel and cement, machinery, boilers and safes. It has a large wharf for handling the exports in coal. Malstatt received municipal rights in 1321, but these were later surrendered. The town began to grow in middle of the 19th century and in 1874 it joined with Burbach to form a city. Pop. about 38,554.

MALT REFUSE, MALT SPROUTS.

See Nutrition of Farm Animals.

MALTA, mal'ta, an island in the Mediter¬ ranean, belonging to Great Britain, with its de¬ pendencies, Gozo, Comino and Cominetto, form¬ ing the elevated portions of the plateau that ex¬ tends northwestward to Sicily, 62 miles, and southward to Africa, 197 miles, and divides the Mediterranean into two basins. The Maltese group has a total area of 118 square miles, of which 91 square miles belong to Malta. Malta is of irregular oval shape, 17 miles long, with a central breadth of nine miles; its greatest eleva¬ tion is over 750 feet. It is of limestone forma¬ tion, and is deeply indented on all sides except the south, where the coast forms a continuous and almost unbroken line. Of great strategical importance, it is very strongly fortified, es¬ pecially Baletta, the capital, which is the head¬ quarters of the British Mediterranean fleet and the principal naval and mercantile coaling sta¬ tion in the Mediterranean. Since the recent regrouping of the British fleet consequent on the rise of Germany as a sea power and the concentration of the main battleship strength in home waters, Malta has declined to a more secondary place. The island is a valuable sanatorium for troops employed in the Orient. The climate is hot in summer, and enervating when under the influence of the humid sirocco blowing from Africa, but generally is mild and healthful. There are only a few small streams, but the springs are so numerous and copious that no deficiency of water is felt, and since 1880 an extensive system of waterworks has greatly im¬ proved sanitary conditions. Malta has a bare, stony appearance owing to the absence of trees. The

soil is thin but remarkably fertile ; and its fertility is increased by the skilful cultivation and the diligent toil of the inhabitants. Large crops of wheat and potatoes are raised, early varieties of the latter being largely exported to England ; maize, barley, cotton, cloves, oranges, figs, grapes, carob beans and peaches and other fruits are also grown. Filigree ornaments and a little cotton are manufactured. Sheep and goats are kept, with smaller numbers of cattle, mules, asses and horses. The language of the people is a dialect of Semitic origin derived from the Carthaginian and Arabic tongues, with a strong admixture of Italian. The native population believe themselves to be of Phoenician descent. Italian is the language of the law courts. Most of the educated Maltese speak Italian, and some speak English; the peasantry as a rule know neither the one nor the other. The Maltese are a sober, industrious race of people, though quick-tempered and ignorant. They are proud of their island home — they love to call it “the flower of the world®— and are devout Roman Catholics. The administra¬ tion is vested. in a governor and an executive council of which the governor is president, and

MALTA

l here is also a legislative council, partly elective. 1 he number of vessels entered in 1914-15 was 2,204, with a tonnage of 3,852,767. The im¬ ports were valued at £2,069,817, and the exports £662,412. Pop. including British troops and their lamilies, 228,534. Malta has great histori¬ cal, archaeological and architectural interest. Saint Paul's Bay is accepted as the scene of the wreck of the Apostle Paul (a.d. 58), as recorded in Acts xxvii, xxviii. It passed successively through the hands of Phoenicians, Greek and Carthaginians, and was finally attached to Rome during the Second Punic War. Relics of these various occupa¬ tions exist throughout the island. After the fall of the Roman Empire it was seized at dif¬ ferent times by Vandals, Goths and Saracens. From the last it passed to Sicily, and followed its fortunes till 1522, when Charles V granted it to the order of Saint John of Jerusalem, the Knights of Saint John of Malta being distin¬ guished during successive centuries for their bold defense of Christianity against Moslem assaults. In 1798 the grand-master surrendered Valetta without defense to Napoleon. Shortly afterward the inhabitants regained it and asked for a British protectorate, which was confirmed in 1814 by the Congress of Vienna. Consult Ballou, 'The Story of Malta) (1893).

MALTA, Knights of. See John, Order of Saint.

MALTA FEVER (also Mediterranean Fever, Neapolitan Fever, Rock Fever, etc.), a disease occurring near the Mediterra¬ nean shores, in which the fever symptoms are accompanied by intense pain, enlargement of the spleen, swelling of the joints, excessive perspiration and other conditions tending to bring about extreme weakness and loss of func¬ tional activity. Its cause is now assigned to Micrococcus meliteusis. Treatment thus far is not specifically determined. Hygienic care, such as is normal in fevers, with special atten¬ tion to diet and bathing, together with ordinary applications for reducing swellings, is all that can be recommended.

MALTBIE, malt'bi, Milo Roy, American municipal and public utility expert : b. Hinck¬ ley, Ill., 3 April 1871. He was graduated from Upper Iowa University in 1892 and took the de¬ gree of Ph.D. at

Columbia in 1897. He was professor of economics and mathematics at Mount Morris College, Illinois, in 1893-95 ; from 1897-1902 was secretary o»f the Reform Club Committee on City Affairs; from 1897-1903 was editor of Municipal Affairs ; from 1902-07, secretary of New York Art Commission. In 1906 he investigated public utilities in Great Britain for the National Civil Federation; from 1907-15, he was member of Public Service Commission for the 1st district, New York; since 1915, public utility expert and member of Advisory Board to the Interstate Commerce Commission on Railroad Valuation. Has de¬ voted himself to the study of municipal and utility questions, going abroad in 1899 to in¬ vestigate foreign cities and their problems. He was lecturer on municipal government at Colum¬ bia University in 1900. He has written 'Eng¬ lish Local Government of To-Dav) (1897) ; 'Municipal Functions5 (1898); 'Street Rail¬ ways of Chicago5 (1901), and numerous le-ports upon various matters.

MALTE-BRUN, mal'te-broon (Fr. malt-bruii), Conrad (properly Malthe Brunn), Danish geographer : b. Thisted, Tutland, 12 Aug. 1775; d. Paris, 14 Dec. 1826. He devoted him¬ self to literature and politics in Copenhagen, but having given offense by writing in favor of the liberty of the press and the enfranchisement of the peasants, was banished to Sweden in 1800. He went later to Paris, where he be¬ came famous as a geographer. He edited the foreign political department of the Journal des Debats, but is best known for his 'Summary of Universal Geography5 (8 vols., 1810-29). The first six volumes only were completed by Malte-Brun. Among his other works are 'Ancient and Modern Poland5 ; 'History of Travel,5 and 'Mathematical, Physical and Political Geography.5

MALTESE (mal-tes' or -tez') CROSS.

See Cross.

MALTESE DOG. See Dog.

MALTHA, (1) according to Pliny, a name used for an inflammable mud which flowed from a pool at Samosata, Commagene, North Syria, and resembled naphtha. (2) A mixture of wax and pitch for caulking ships; mineral tar is another name for maltha, which is found oozing from rocks in certain localities, particu¬ larly in California.

MALTHUS, Thomas Robert, English po¬ litical economist: b. near Guildford. Surrey, 14 Feb. 1766; d. Bath, 29 Dec. 1834. He studied

theology at Cambridge and was ordained in the Church of England, continuing to pursue his profession as a teacher while holding a small living in Surrey. In 1805 he was appointed pro¬ fessor of history and political economy at Haileybury College. In his famous ‘Essay on the Principles of Population5 he propounded (1798) what is known as the Malthusian Doc¬ trine, namely, that the increase of population advances at a geometrical, the increase of the means of life at an arithmetical, ratio that this condition of things renders the condition of the poor more and more hopeless, that unless famine or war interfere to diminish population the means of life will eventually prove inade¬ quate; that discouragement of early and im¬ provident marriages and the cultivation of self-restraint must be employed to avert the danger. These positions have been the subject of long and widespread discussion. His other writings include ‘An Inquiry into the Nature and

Progress of Rent5 (1815) ; ‘Principles of

Political Economy5 (1826) ; ‘Definitions in

Political Economy5 (1827). Consult Bonar,

‘Malthus and His Work5 (1885) ; Soetbeer, ‘Die Stellung der Sozialisten zur malthusischen Bevolkerungslehre5 (1886) ; Molinari, ‘Malthus, Essai sur le Principe de Population5 (1889) ; Cossa, ‘II principio di populazion di T. R. Malthus5 (1895). See Economics.

MALUS, Etienne Louis, a-te-en loo-e ma-liis, French physicist and military engineer: b. Paris, 23 Tune 1775; d. thˆre, 23 Feb. 1812. He was educated at the Lcole Polytechnique, and upon leaving the school received a captain’s commission in the corps of engineers, and served during the campaign of 1797 with the army of the Sambre and Meuse. Subsequently he participated in the campaign in Egypt, and in 1804 superintended the construction of forti-

fications at Antwerp and Strassburg. Whatever time could be spared

from his professional labors was devoted to scientific pursuits. His chief publications consist of a mathematical (Traite d'Optique,* first published in the (Memoires presentes a 1'InstituP in 1810, in which he promulgated some valuable discoveries respecting the refraction of light in transparent media; and the (Theory of Double Refraction) (Memoires presentes a l'lnstitut, Vol. II), con¬ taining an account of his discoveries respecting the polarization of light, which consisted in showing that light may acquire properties identi¬ cal with either of two rays yielded by refraction through Iceland spar by the process of simple reflection at a particular angle from any trans¬ parent body. This discovery gained for its author his election to the Institute and the biennial medal of the Royal Society of London. He also published an (Essay on the Measure¬ ment of the Refractive Force of Opaque Bodies. >

MALVACEAE, a family of flowering plants, the mallows and their allies, in the order Colum-nifercu, with the calyx gamosepalous ; petals contorted in a bud, stamens numerous, mona-delphous ; anthers extrorse, monothecious ; pollen-grains spiny. They are herbaceous or woody plants, mucilaginous in their juices, and usually densely hairy, especially when young. The leaves are palmately nerved and frequently deeply five-lobed. The flowers are large, fun¬ nel-shaped, conspicuously and beautifully col¬ ored, attracting the aid of insects in fertilization. The fruit is schizocarpous. This family con¬ tains many important genera and species of plants elsewhere described, such as the mallows (Malva , Lavatera, etc.), hollyhocks (Althcea), cotton-plants (Gossypium) , the rose-mallows (Hibiscus) , *etc.* About 60 genera and 900 spe¬ cies are accredited to this family by systematic botanists.

MALVERN, mal-vern,- Ark., town, county-seat of Hot Springs County, on the Saint Louis, Iron Mountain and Southern Railroad, about 20 miles southeast of Hot Springs. It is in an agricultural region, in which the principal prod¬ ucts are cotton and fruit. The chief manufac¬ tures are flour, lumber, chairs, doors, windows, ice and bricks. The trade is principally in lum¬ ber, cotton and fruits. Pop. (1920) 3,864.

MALVERN, mal'vern, Great, England, a fashionable inland watering-place in Worcester¬ shire, on the east side of the Malvern Hills, at the foot of the Worcestershire Beacon, 1,395 feet high, the summit of which commands mag¬ nificent views. A restored 11th century priory church and Malvern College are the chief edi¬ fices. Malvern is widely celebrated and greatly frequented owing to its salubrious climate and the efficacy of its mineral springs. Pop. of urban district about 16,513.

MALVERN HILL, Battle of. After the close of the battle of Glendale (q.v.), 30 June 1862, the Army of the Potomac was put in posi¬ tion on Malvern Hill, an elevated open plateau on the left bank of James River, 60 feet high, and about 1 J4 miles by y2 mile in area. On this plateau the army was disposed in a large arc, both flanks resting on the river and pro¬ tected by gunboats. Porter's Fifth corps was on the left, Couch's division of Keyes' corps on the right of Porter, Heintzelman's two

divisions — Kearny and Hooker — on the right of Couch, Sumner's corps on the right of Heintzelman, and Franklin's corps on the right of Sumner. Peck's division of Keyes' corps was on the right of Franklin and was the extreme right of the army, and it and the left of Porter's line stood back to back. There were numerous batteries of artillery along and in rear of the line. The position was a very strong one: the Confederate D. H. Hill says: (<Tier after tier of batteries were grimly visible on the plateau rising in the form of an amphitheatre.® The approach to the position was over 400 to 500 yards of open ground swept by artillery fire. When it was discovered early in the morning of 1 July that McClellan had fallen back from Glendale during the night, Lee gave orders for immediate pursuit. Jackson marched by the Willis road, and when in sight of Malvern Hill he formed line, with Whiting's division on his left and D. H. Hill's on his right, one of Ewell's brigades occupying the interval. The rest of Ewell's division and Jackson's own division were held in reserve. Magruder was directed to take position on Jackson's right, but before his arrival two of Huger's brigades came up and were placed next to Hill. The Confederates felt the Union lines with infantry and artillery, and when Magruder came up, about 2 p.m., Huger's two brigades — Armistead and Wright — with four batteries, were ordered forward. The batteries, as they emerged in succession from the woods, were promptly knocked to pieces by the fire of over 60 guns brought to bear upon them, and the two brigades were repulsed with loss. This attack fell upon the right of Porter and left of Couch, and the latter was now reinforced by Caldwell's brigade of Sumner's corps. No serious advance had been made on other parts of the line, but Hill had suffered severely from artillery fire in getting his troops in position opposite Couch's right. At 5:30 p.m. Magruder assaulted Porter's line and the left of Couch with the five brigades of Armistead. Cobb, Wright, Mahone and Barksdale. All were met by such a terrific fire of artillery and musketry, which swept the slope of the hill, that they could make no headway, though gaining tem¬ porary advantages, and fell back with great loss. Toombs', G. T. Anderson's and Ran¬ som's brigades were now ordered

in; Toombs got lost in the thick woods; Anderson and Ransom shared the fate of those preceding them, and fell back. Magruder's fight ended before dark. While Magruder was thus en¬ gaged with Porter and the left of Couch, D. H. Hill, on his left, advanced against Couch's right, which, as the, action progressed, was reinforced by Caldwell's brigade, three regiments of Hooker's division under Sickles and some of Kearny's division. Hill's five brigades were commanded by Generals Garland and Ripley and Cols. J. B. Gordon, A. H. Colquitt and C. C. Tew. The slope to Couch's line was about 800 yards, without cover, and the advance directly in the face of guns on the slope and bristling on the summit, from which burst forth such a terrific fire of shell and canister that Hill's brigades withered under it. Toombs' bri¬ gade was picked up and sent to their support, but the six brigades were hurled back, some in 'great disorder after the loss of half their men.

MALVERN HILLS— MAMEY SAPOTE

17b

Later in the evening Taylor's brigade of Ewell's division, on Hill's left, moved against the left of Kearny's division, and was repulsed by artillery fire alone. Half an hour after Hill had been disastrously repulsed and his troops scattered, McLaw's division of two brigades — Semmes and Kershaw — came up and assaulted Porter's right. Semmes made some headway up the slope, but was met by the 69th and 88th New York of Meagher's brigade, which Sumner had sent to Porter's assistance, and was repulsed after a hand-to-hand encounter. Kershaw, on Semmes' left, was likewise repulsed, and his repulse at twilight marked the close of the battle, but it was 9 o'clock before the firing ceased and quiet settled down on the bloody field. Sixteen Confederate brigades had heroic¬ ally thrown themselves against the Union left, but were repulsed by the artillery and nine brigades. Advanced regiments were forced back, but generally recovered ground ; batteries or parts of batteries were withdrawn, but again run forward ; yet ((never for an instant was the Union line broken or the guns in danger.® The Confederate loss was over 5,500; Jackson's four divisions had 2,301 killed, wounded and missing; Magruder and Huger about 2,900. The Union loss was less than 2,000. Consult (Official Records' (Vol. XI) ; Webb, <The Peninsula' ; (McClellan's

Own Story' ; Allan, (History of the Army of Northern Virginia' ; The Century Company's (Battles and Leaders of the Civil War' (Vol. II).

E. A. Carman.

MALVERN (mal'vern) HILLS, England, a range of picturesque hills on the borders of Worcester and Hereford shires. It extends north and south for about nine miles, and at¬ tains an altitude of 1,395 feet in the Worcester¬ shire Beacon.

MAMANUA, ma-manoo-a, a Negrito peo¬ ple of the Philippines living in the interior of Surigdo Peninsula, island of Mindanao. Large numbers of them have been converted to Chris¬ tianity by the Jesuit missionaries.

MAMARONECK, ma-mar'6-nek, N. Y., town, in Westchester County, on Long Island Sound, and on the New York, New Haven and Hartford Railroad, about 11 miles east of New York and 21 miles from Grand Central Station, New York City. The town includes the village of Larchmont and part of the village of Mamar-oneck. It is a residential section, in which many New York City people have homes. There are but few industrial establishments; the prin¬ cipal are the National Machine Company, manu¬ facturing sewing machines and sewing machine attachments, rubber goods factory, pumice-stone mill and a gutta-percha plant. It is the head¬ quarters of the Larchmont Yacht Club. Pop. 6,571 The population of Larchmont is about

2.500.

MAMARONECK RIVER. See Bound¬ aries of the United States.

MAMBAJAO, mam-ba'how, a town of the province of Misamis, Mindanao, situated on the northwestern coast of Camiguin Island, which lies off the northeast coast of Mindanao. Pop.

14.500.

MAMBER, a widely diffused colloquial name, for the common wild

goat (Capra cega-grus) of southwestern Asia. See Goat.

MAMBUSAO, mam-boo'sa-6, Philippines, a pueblo of the province of Capiz, island of Panay, on the Capiz River, opposite Ibajay and 17 miles southwest of Capiz, the provincial cap¬ ital. Pop. 8,300.

MAMELUKES, mam'e-luks, MAM-LOUKS, or MAMALUKES (from the Arabic memalik, a slave), in Egypt, slaves from the Caucasian countries, who from menial offices were advanced to dignities of state. When Genghis-Khan made himself master of the greatest part of Asia in the 13th century, and carried vast numbers of the inhabitants into slavery, Nedjmeddin (Malek Salah), sultan of Egypt, bought 12,000 of them, including natives of Circassia, but chiefly Turks, from Capchak (Kipzak), had them instructed in the military exercises and formed a regular corps of them. They soon exhibited a spirit of insubordination and rebellion. Under his successor they inter¬ fered in the government, assassinated the sultan, Turan Shah, and in 1254 appointed Ibegh, one of their own number, sultan of Egypt. The do¬ minion of the Mamelukes in Egypt continued 263 years. During this period they made some important conquests, and in 1291 they drove the Franks entirely out of the East. From the middle of the 18th century the number and wealth of the Mamelukes gave them such a su¬ periority over the Turks in Egypt that the pasha appointed by the Porte was obliged to conform entirely to their wishes. This superi¬ ority was owing, principally, to Ali Bey, who ruled with unlimited power from 1766 to 1773, when he was assassinated. The Mameluke beys, especially Murad Bey, played an import¬ ant part at the time of the French invasion. The Mamelukes, who were scattered throughout Egypt, and estimated at 10,000 or 12,000 men, maintained their numbers, principally by slaves brought to Cairo from the regions lying between the Black and Caspian seas. These were com¬ pelled to embrace the Mohammedan faith, and were all educated as soldiers. After a time they obtained a share in the government, and some of them even became beys, for none but Mame¬ lukes were capable of holding this office. They formed a fine body of cavalry, and attacked the French, when they landed in Egypt, with the greatest fury; but they were unable to with¬ stand the European artillery, and many of them soon joined the French. The pasha of Egypt, Mehemet Ali, destroyed the Mameluke beys 1 March 1811, by a perfidious stratagem, and immediately afterward ordered a general mas¬ sacre of the Mamelukes in every province of Egypt. Some hundreds managed to escape into Lower Nubia, where they built a small town, and endeavored to keep up their force by disci¬ plining negroes in their

peculiar tactics. They did not succeed, however, and shortly afterward dispersed. (See Egypt). Consult Makrizi, (History of the Mameluke Sultans,' translated by Quatremere (3 vols., Paris 1837 — 41) and Muir, William, (The Mameluke or Slave Dy¬ nasty of Egypt, 1260-1517' (New York 1906).

MAMEY, or MAMMEE-APPLE. See

Mammee Apple.

MAMEY SAPOTE, a large tree (Calo-carpurn mammosum) of the family Sapotacece, native of tropical America. The leaves are large, obovate, glabrous, the flowers small and

inconspicuous and the fruit globose or egg-shaped, rusty brown, and three to seven inches long, with a single large seed. The fruit is very popular in the tropics, especially in Cuba, and is sometimes shipped to the United States. It is eaten fresh, or used for sherbets or marmalade. The tree is grown in Florida and California, but so far not very successfully.

MAMMALIA. See Mammals.

MAMMALS, a class of animals, known also as beasts, or quadrupeds, the highest of the vertebrate group in the sense that it comprises forms whose organization is on the whole the most efficient on account of the complexity, or perfection, of the various organs and parts. The diagnostic character of the class is the possession of cutaneous glands, which secrete a complex fluid, called milk, for the nourishment of the young. The lower jaw articulates di¬ rectly with the cranium, without the mediation of a quadrate bone. The occipital condyles, two in number, form part of the exoccipitals. The internal ear contains a series of three or four separate small bones, which are concerned in audition. The heart is four-chambered, with two auricles and two ventricles; a single left aortic arch ; blood warm ; red blood discs, not nucleated. A muscular diaphragm separates the heart and lungs from

the abdominal cavity. With few exceptions, mammals are clothed with hair, a special outgrowth of the epidermis, and even in these exceptional cases isolated hairs are found at some stage of their life.

Mammals as a class are extremely diversi¬ fied in size, appearance and habits. The struc¬ ture of some is modified for a purely aquatic life, of others for burrowing in the earth, for hying, for leaping, for running, *etc.* Some live entirely in the sea, others pass their lives in the treetops and others in subterranean caverns, which they excavate.

All mammals possess limbs, which are nor¬ mally four in number, but the hind pair is sup¬ pressed in the whales and sea-cows. The limbs assume the form of legs for terrestrial progres¬ sion, wings for flight or paddles for swimming. The class includes man, and the majority of the animals most useful to man, such as the horse, ox, sheep, goat, dog, cat, *etc.* It includes also the whales, the largest of existing animals. About 600 genera mid 5,000 species of mammals (exclusive of fossil forms) are known, of which about 200 genera and 1,200 species occur in North America, north of Panama.

Integuments.— The skin of mammals con¬ sists of two principal layers, a superficial one, called the epidermis or cuticle, and a deeper layer, the dermis or corium. The epidermis is again divided into two layers, an external horny layer and a deeper one, called the Malpighian layer. The epidermis is usually quite smooth, and is beset with hairs which are a special out¬ growth of this part of the integument peculiar to the class. The cetacea are without hairs, ex¬ cept a few about the mouth. In the pangolins the epidermis develops large scales which cover the greater part of the body. Epidermic scales of smaller size are found on the tails of various rodents, insectivores and marsupials. The horns of ruminants, the nasal horn of the rhinoceros and all claws, nails and hoofs are also epidermic structures.

The dermis or corium is generally thicker

than the epidermis and contains blood-vessels, tactile nerve endings, sweat glands which open on the surface of the body and fatty tissue. In the whales and seals the fat cells are enor¬ mously developed immediately below the dermis and constitute the ((blubber.)) In the armadillos bony plates occur in the dermis, forming a cara¬ pace or shell. They are covered by horny sheaths. I he presence of small hard tubercles in the skin of certain porpoises gives ground for the belief that the ancestors of the cetacea were covered with a bony armor,

somewhat like that of the armadillos.

Hair. — True hairs are found only on mam¬ mals. They are simple epidermic structures growing from papillae sunk in the dermis. They consist of central cellular pith, encased in a horny sheath. In some mammals the sheath is rough, and the hair is then capable of being matted together to form “felt.® In the major¬ ity of mammals the ha:ry covering consists of coarse long hairs and fine short hairs intermin¬ gled, forming the fur. In the porcupines the coarse hairs assume the form of large stiff spines, or quills; in the hogs they are smaller and more flexible, forming bristles. The hairy covering is usually shed once or twice annually, except in the case of man and of the manes and tails of such ungulates as the horse, the hairs of which may persist throughout life.

The majority of mammals have a number of large, long hairs, or vibrissae, arranged in a definite fashion about the mouth, eyes and ears, which serve to a certain degree as tactile organs. In deer and some other ruminants the hairs consist mainly of the cellular pith and hence are easily broken.

The color of mammals is chiefly due to the pigments contained in the hair, which belong to the class known as melanins. Black, white and brown in various mixtures and shades are the commonest colors. The coloration is chiefly protective, but some such sharp contrasts of black and white as those of the skunks are thought to be warning colors, and the clear white of the under side of the tail of deer certain hares, etc., to be directive, or distin¬ guishing, marks for the young.

Skeleton. — The skeleton consists of an axial portion, comprising the skull, the back¬ bone or vertebral column, the ribs and the sternum; and an appendicular portion or the skeleton of the limbs. In the skull the bones are. bound firmly together by the overlapping or interdigitadon of the edges, except the lower jaw, the ossicles of the internal ear and the hyoid, or tongue, bones. In adults most of the sutures are usually obliterated. The snout or rostrum consists of the premaxillary, maxillary, Palatine and pterygoid bones below and on the sides, and the nasals above, while within are the median vomer and the ethmoid bones. The ˆ rostrum abuts against the brain-case or cianium, which is vaulted, and comprises three segments, _ an anterior one, consisting of the presphenoid, orbito-sphenoids and frontal ; a middle segment, consisting of the basisphenoid, ahsphenoids, squamosals and parietals ■ and a posterior segment, consisting of the basi-occip- ltal, exoccipitals and supra-occipital. The ex¬ occipitals bear the two condyles for articulation

Tii ˆ vertebr1al column. At the base of the skull, between the occipital and souamosal, are

MAMMALIAN TYPES

1 A Whale, Aquatic Type

2 Antelope, Terrestrial Type

3 Bat, Aerial Type

4 Ape, Arboreal Type

the periotic bones, containing the organ of hearing or internal ear, and the tympanies, which form the bony walls of the orifice of the ear. The tympanies are greatly expanded in whales and some other mammals, forming shell-shaped bullae.

The vertebral column comprises five sections, the cervical, dorsal (or thoracic), lumbar, sacral and caudal. The cervical vertebrae are seven in number in all mammals, whatever the length of the neck, the only exceptions being the man¬ atees, which have six, and the sloths, which have six, eight or nine. In certain whales, the majority of porpoises and some rodents, the cervicals are more or less united; in the right whales they form a single bony mass. The dorsals vary in number from 9 to 22. Articu¬ lated with each is a pair of ribs. The ribs terminate below in cartilages, which sometimes ossify, forming what are called (<sternal ribs.® By means of these cartilages the anterior' pairs of ribs are connected with the breastbone or sternum, which may consist of a single piece, as in the whalebone whales, or of several seg¬ ments arranged longitudinally. The posterior pairs of ribs are sometimes called ((floating ribs® because their cartilages do not meet the ster¬ num, but are attached to those of the more anterior pairs, or are quite free. The lumbar vertebrae follow the dorsals and are without ribs. In number they vary from 2 to 30 in different forms. The number of dorsal and lum¬ bar vertebrae combined is quite constantly 23 in the odd-toed ungulates (horse, rhinoceros, tapir, etc.), 19 in eventoed ungulates (deer, ox, sheep, etc.), and 20 or 21 in carnivores and most insectivores. Man, the higher apes and many bats have 17. Following the lumbars is the sacrum, consisting usually of three vertebrae joined to¬ gether and connected with the pelvis. This region is not distinguishable in the whales and sea-cows, which lack hind limbs. The caudals, or tail-vertebrae, complete the column. In man and in certain apes and bats they are three in number and rudimentary, but as many as 46 are present in the long-tailed pangolins. In the intervals between the anterior caudals be¬ low are situated small V-shaped bones, called chevrons, whose chief function is to protect the larger blood-vessels of the tail. They are espe¬ cially well developed in the whales and eden¬ tates.

In many groups of mammals the anterior limbs are connected with the axial portion of the skeleton through the pectoral girdle, consist¬ ing of the shoulder blades, or scapulae, and the collar-bones or clavicles. The scapula is not at¬ tached directly to the vertebral column, but its acromion process is joined to the anterior end of the breastbone, or sternum, by means of the clavicle. Clavicles are wanting in all seals, whales, sea-cows and ungulates, and are rudi¬ mentary or wanting in various representatives of several other groups. They are present in man and, with one or two exceptions, in all monkeys, bats, insectivores and marsupials. The upper-arm bone, or humerus, articulates superiorly with the scapula, and below with the two bones of the forearm, the radius and ulna. In the majority of mammals the radius, or outer bone, is permanently crossed over the ulna at the lower end, as is especially well seen in the elephants. In man and a few

other forms the radius can be rotated. Fol¬ lowing the forearm is the wrist or carpus, consisting of three rows of small bones, which, however, are variously united in different forms ; and finally the digits, which are nor¬ mally five in number, each consisting when fully developed of a metacarpal bone and three other bones, or occasionally more, called pha¬ langes, though the first digit, or thumb, usually has but three in all. In man and apes the thumb is opposable to the other digits. In many mammals this digit and also the fifth are greatly reduced, or entirely wanting. In the ruminants, such as the pig, ox, deer, camel, etc., the first digit is wanting, and the second and fifth are reduced in size, or entirely lack¬ ing, while the third and fourth are equal in length and well developed. In the odd-toed ungulates, such as the horse, rhinoceros, tapir, etc., the third digit is longest, the others being reduced in length, rudimentary or wanting. In ungulates the metacarpals are usually much elongated and in such ruminants as the deer, ox, etc., are united, forming what is known as a ((cannonbone.® The cetacea are peculiar in that the bones of the forelimb are not movably articulated and that the phalanges of the middle digits often greatly exceed three. In bats the phalanges are very greatly elongated to give support to the wing membranes.

The hind-limb is connected with the verte¬ bral column through the pelvic girdle, which is united with the sacrum. The bones of the hind-limb, which are homologous to those of the forelimb, are the femur or upper leg-bone, the tibia and the fibula or lower leg-bone, the tarsal or ankle bones and the metatarsals and phalanges constituting the hind-foot. The peculiarities of the bones of the fore-feet in ungulates,

already mentioned, are found also, with only slight modifications, in the hind-feet.

The terminal phalanges of both fore and hind feet are compressed and pointed in beasts of prey and such as climb or dig, forming claws, which are covered with horny sheaths. In large running mammals, the terminal pha¬ langes are more or less broad and flat and like¬ wise covered with horny sheaths, forming hoofs or nails. Certain bones not connected with the skeleton, such as the os penis, os cordis, etc., are developed in the viscera of various mam¬ mals.

Teeth. — In mammals, unlike the lower ver¬ tebrates, teeth are not produced indefinitely, but in fixed number. At most two visible sets are developed. Traces are found, however, of at least one pre-milk and one post-permanent dentition. The first, called the milk dentition, appears during infancy, being replaced by the second set, called the permanent dentition, as maturity is reached. The milk teeth are less numerous and usually smaller than those of the permanent set. Teeth occur only in the pre¬ maxillary and maxillary bones and the man¬ dibles or lower jaw. The upper teeth are divided into incisors, which are implanted in the premaxillae; canines, which are almost invari¬ ably simple and stand immediately behind the suture between the premaxillae and maxillae; and premolas and molars, which occupy the edges of the maxillae. The premolars have <(milk® predecessors, while the molars have not. The nomenclature of the teeth of the lower

jaw is the same as for those of the upper jaw, their character being determined by their rela¬ tion to the latter and by their form and mode of development. While the greatest diversity exists as to the form of the individual teeth, and the development of the dentition as a whole, there are rarely more than 44 in all. The ex¬ ceptions are among the marsupials, where the number rises to 54 in the marsupial anteater, Myrmecobius, and to 64 in a fossil form Am-phitherium ; also among the cetacea, one species of which has as many as 246 simple teeth. The true anteaters, Myrmecophagidce, and the spiny anteaters of Australia, Echidna, are with¬ out teeth at any time, but many mammals which do not possess them when adult have rudi¬ mentary teeth in the foetal stages. Such is the case with the whalebone whales, and with the platypus, Ornithorhynchus. The rudimen¬ tary teeth in these disappear early and are re¬ placed by whalebone in the case of the whales, and by horny plates resembling teeth in the platypus.

Teeth consists of two portions, the root and the crowm. When most complex they contain three structural elements, the enamel, the den¬ tine and the cement. The enamel is hardest and is restricted to the crown, while the den¬ tine -makes up the mass of the tooth, and the cement usually surrounds the root, or fills spaces between the enamel-folds of the crown. The enamel develops from -the epithelial tissue of the jaws, the dentine from the deeper-lying areolar tissue and the cement from the walls of the tooth-capsule. Some teeth, such as the incisors of rodents, ‘the tusks of the elephant, etc., grow continuously during life; other com¬ plete their growth early. Especially remarkable forms of teeth are the tusks of elephants, which are incisors, and the tusks of the narwhal, the boar and-the babirussa, which are canines. W hen the crowns of the teeth greatly exceed the roots in height, as in the horse, the teeth are said to be hypsidont or hypselodont; when the reverse is the case, the teeth are called brachydont. Teeth having the crown in the form of tubercles, as in the hog. are called bunodont ; those with transverse ridges, as in the ox, many rodents, etc., are called lophodont.

Alimentary Canal.— The mouth, or entrance to the alimentary canal, contains the tongue, which in the majority of mammals-is so at¬ tached below that it can be protruded but a short distance, but is often sufficiently free to be used in grasping food and turning it about in the

mouth during the process of mastication. In those mammals which feed upon ants and termites, such as the anteaters, pangolins, etc., and also in certain fruit-eating bats, the tongue is very long and slender and can be extended far beyond the mouth. On the posterior sur¬ face of the tongue are the organs of taste, and the upper surface is often roughened by horny papillae. A number of large glands, called salivary glands, open into the mouth! Their function is to moisten the food and ini¬ tiate the process of digestion. The glands most constantly present are the parotid, situated at the base of the ear, and opening inside the cheek, and the submaxillary, situated near the angle of the lower jaw, and opening under the apex of the tongue. At the back of the mouth is the entrance to the oesophagus or gullet, usually a simple tube, leading to the

stomach. The stomach is an oblong, curved sac, usually enlarged at the cardiac end where the oesophagus is attached, and smaller at the lower, or pyloric, end, where it joins the intes¬ tines. It is usually simple, but in the ruminants and the cetaceans consists of several cham¬ bers. The intestines join the stomach at the pyloric end. They are usually of great length, and divided into two distinct sections. The portion nearest the stomach, called the small intestine, is joined below by one of larger diameter called the large intestine. The upper end of the latter is frequently dilated, forming a pouch called the caecum, which in herbivorous mammals, and notably in rodents and many ungulates, is greatly enlarged or elongated. In man, the higher apes and the marsupial wombat it terminates in a narrow prolongation called the vermiform appendix. Different sections of the small intestine have received the names duodenum, jejunum and ileum; and of the large intestine, colon and rectum. The inferior orifice of the intestines is the anus or vent. Generally speaking, the intestines and caecum are shortest in carnivorous mammals and long¬ est in such as are vegetable feeders, but the carnivorous whales and seals, which have long intestines, form a conspicuous exception.

Besides the numerous glands situated within the intestine. are two large ones, the liver and the pancreas, whose ducts open into the intes¬ tines near the stomach. The liver is a large, flat, gland, which may be divided nearly into a right and a left lobe as in man, the cetacea and ruminants, or may have these lobes again subdivided into two by a longitudinal fissure. Two smaller lobes, called the Spigelian lobe and the caudate lobe, are commonly added. Attached to the liver is the gall-bladder, which is, however, absent in the cetacea and some other orders.

Kidneys.— The kidneys, whose function is to secrete urine, are situated in the upper part of the abdominal cavity near the vertebral column. They are two in number, oblong and usually simple, but in the cetacea, and also in bears and seals, are divided into separate lob¬ ules. A duct or ureter leads from each kidnev to the urinary bladder, from which in turn a common duct, called the urethra, leads to the exterior of the body. In the monotremes, how¬ ever, the ureters do not enter the bladder, but into a common urnogenital passage or cloaca.

Lungs.— The lungs are situated in the tho¬ rax, which is cut off below from the abdominal cavity by a muscular diaphragm whose action assists in the process of breathing.. The lungs consist of two spongy lobes, a right and a left, which are free below, but attached above to the two principal divisions of the windpipe. In the cetacea and sea-cows, the lobes are sim¬ ple externally, but in other orders are more or less subdivided. A third median lobe, called the azygos lobe, is present in some groups. Air breathed in through the nostrils reaches the lungs through the trachea or windpipe, the upper end of which, the larynx, lies in the throat. Its orifice, the glottis, is protected by a cartilage, called the epiglottis, which prevents Pat tides of food from entering the windpine The larynx is made up of cartilages, of which the largest are the thyroid, the cricoid and the arytenoid. Within the larynx are the vocal cords, two parallel elastic, fibrous bands, whose

vibrations produce the voice. The lower end of the windpipe divides into two smaller tubes, or bronchii, each of which enters a lobe of the lungs and subdivides into numerous smaller branches. A third bronchitis, which enters the right lung, occurs in some cetaceans and rumi¬ nants.

Heart. — The heart in mammals is four-chambered, consisting of two thin-walled auri¬ cles and two ventricles, both with thick walls, but the right, which sunplies only the lungs, thinner than the left. There is no direct com¬ munication between the left and right sides of the heart after birth. The valve between the right auricle and the right ventricle is tendi¬ nous, except in the monotremes.

The aorta, or principal artery, bends toward the left immediately beyond its connection with the heart and gives off the innominate, left common carotid, and subclavian arteries, which, with their branches, supply the head and an¬ terior limbs. The method of branching of these arteries from the aortic arch and from one another varies widely. Blood is carried from the alimentary canal to the liver by a single vein, except in Echidna, in which as in lower vertebrates the abdominal vein is present. The kidneys are supplied with blood only by the renal arteries.

Brain. — Except for certain fossil forms, the brain of mammals is characterized by its relatively larger size as compared with that of lower vertebrates, and especially by the magni¬ tude of the cerebral hemispheres and the per¬ fection of the connections between thern. In most mammals the surface of the brain is divided by numerous irregular fissures and con¬ volutions. They are absent only in small bats, rodents and insectivores, and in Ornithorhy fi¬ chus. The largest forms in each order, gener¬ ally speaking, exhibit the greatest complexity, and there has been a remarkable development in the class in this direction since Tertiary times. The cetacea have very large and com¬ plex brains, though they are small relativelv. when compared with the size of the body.

Sense Organs. — The organs of sense, ex¬ cept that of touch, are

located in the head. The sense of touch is generally distributed over the skin, but is most acute in the snout, and in the extremities, except when used merely in locomotion. The wings of bats and the pre¬ hensile tails of monkeys are also especially sensitive. Some burrowing mammals, such as the mole, have imperfect eyes, the optic nerve being more or less atrophied. The Indian river-dolphin, Platanista, is a blind form, having rudimentary eyes, without crystalline lenses. The mammalian ear is characterized, besides the chain of ossicles, already mentioned, by the complex cochlea, which is usually spirally con¬ voluted. The tympanic membrane, or eardrum, seals the auditory chamber from without. In the majority of mammals the external orifice of the ear is surrounded by a fold of skin, called the pinna or external ear. These are absent in cetaceans, sea-cows, seals, etc., which live in the water, and also in some burrowing mammals.

Reproductive System. — In mammals the

female reproductive organs comprise the ova¬ ries, Fallopian tubes or oviducts, uterus and vagina. The ovaries are two in number, a left and a right. Approximated to. them are the

Fallopian tubes, which widen below and form the uterus. In the lower mammals the uterus of each side is separate, but the two unite below in a common vagina, while in the higher groups, the uterus and vagina are both single. The male organs comprise the testes, spermatic cord and penis. In cetaceans, sea-cows and seals, which are aquatic, and in the elephants, conies and many edentates, the testes are inter¬ nal in position, but in most other forms they de¬ scend periodically, or permanently, into a pouch of the integument, called the scrotum. The structure of the penis in mammals is peculiar to the class. An os penis is present in the majority of bats, insectivores, rodents, carniv¬ ores and primates.

During development the mammalian foetus is nourished through a complex structure, called the placenta, formed in part by the internal wall of the uterus of the mother and in part by the membranes of the foetus itself. The placenta is characteristic of the class as a whole, but is not found in the monotremes, nor in most marsupials. The form and other charac¬ teristics of the placenta differ in the several orders of mammals and are regarded as of importance in classification.

Distribution. — The geographical distribution of existing mammals, as of other animals, is the result of varied conditions and influences,

some transient and others of long continuance, be¬ ginning in the relatively remote geological times when the class first made its appearance. Among the principal factors in the problem of distribution may be included changes in the ex¬ tent and configuration of the land areas of the globe, changes in climate and in food supply, the appearance and disappearance of enemies, and latest, but by no means least, the interfer¬ ence of man. These and other factors in dis¬ tribution are considered under the heading Distribution of Living Mammals. It is only possible here to mention some of the more important facts in the distribution of mammals. Of widest distribution are the purely aquatic orders, the cetacea and pinnipedia, whose range covers all seas and reaches from pole to pole, but it should be noted that no sealions occur in the north Atlantic. Next follow the bats, whose range is nearly world-wide, but they do not enter the Antarctic zone, and only very few species cross the Arctic Circle. On the other hand, they are found in New Zealand and in oceanic islands where no terrestrial indigenous mammals occur. Of the purely terrestrial or¬ ders, the rodents have the widest range, cover¬ ing every continent and reaching from the Arc¬ tic zone to Patagonia and Tasmania. Carniv¬ ores, like rodents, have an almost world-wide distribution, but in Australia only one species of the order occurs, the dog known as the Mingo,® Cams dingo; and it is uncertain whether this may not have been introduced by man at a remote date. The monotremes (com¬ prising only the genera 0 rnithorynchus , Echidna and Proechidna) are limited to Australia, Tas¬ mania and New Guinea. Marsupials occur only in Australia, Tasmania, New Guinea and Amer¬ ica. The American marsupials, with the excep¬ tion of one genus, all belong to the family Didelphiidce , or the opossums. Edentates occur only in America, southern Asia and Africa. They have their greatest development in South America. One genus, Tatu, extends northward

into Texas. Ungulates inhabit all continents ex¬ cept Australia, but only two or three species enter South America. Of the two groups form¬ ing the order Primates, the lemurs and lemuroids occur only in Madagascar, Africa and southern Asia, while monkeys inhabit only Af¬ rica, southern Asia and South and Central America. One ape, Macacns inuus, is found at Gibraltar, but it is only doubtfully in¬ digenous.

Fossil Mammals. — Mammals are believed to have originated as an offshogt from certain Permian and Triassic reptiles called Tlieromor-pha or Anomodontia. The earliest recognizable remains of mammals are certain small teeth and jaw-bones found in the Triassic formations. They belonged to forms resembling monotremes and marsupials in some characters, but are usu¬ ally placed in a separate order, called Allotheria or Multitubercidata. Representatives of the Allotheria continued on through the Jurassic and Cretaceous. The existing orders of mam¬ mals first appear in the Eocene, the lowest for¬ mation of the Tertiary period, being foreshad¬ owed in the lowest beds of that period by cer¬ tain generalized groups such as the Creodonta and Condylarthra. The Eocene also contains re¬ mains of several groups, or suborders, of un¬ gulate mammals, which have no living repre¬ sentatives. These are the Ancylopoda, Typothe-ria and Toxodontia.

The later Tertiary and the Quaternary pe¬ riods show a greatly increased number and di¬ versity of forms. Many of them represent fam¬ ilies which persisted for only a relatively short period and are ‘now extinct ; others have con¬ tinued to the present. Among the oldest of existing genera are Didelphis (opossum), Sciurus (squirrel), Myoxus (dormouse), Sorex (shrew), Vespertilio and Vesperugo (bat) and Viverra (civet), which originated in the Eocene; Tapirus (tapir), Rhinoceros, draff a (giraffe), Elephas (elephant), Sus (pig), Talpa (mole), Erinaceus (hedgehog), Mustela (mar¬ ten), Lutra (otter), Hycena, Felis (cat) and Phoca (seal), which originated in the Miocene.

Classification. - The class Mammalia was divided by Linnaeus into three principal sections, Unguiculata, Ungulata and Mutica. The last comprises the cetaceans, the second all the un¬ gulates except the elephant, and the first, the remainder of the class. This classification was replaced by Blainville, who proposed on embryological grounds to divide the class into Mono-delphia, or mammals with a placenta ;

Didelphia, or mammals without a placenta (the marsupials) and Ornithodelphia, or the mono¬ tremes. Richard Owen combined the last two subclasses under the name of EplacentaHa and gave the placental mammals the name of Pla-centalia. Speculation as to the origin of the class as a whole led Huxley to propose as the source a hypothetical group which ihe named Hypotheria, the characters assigned being the absence of milk glands and of a corpus callo¬ sum in the brain and the presence of a quadrate bone for the articulation of the mandible. Ex¬ isting mammals were divided into Prototheria, comprising the monotremes, Metatheria, the marsupials, and Eutheria, the so-called placen¬ tal mammals. Cope in 1889, while retaining the subclass Prototheria for the monotremes, placed the entire remainder of the class in the subclass Eutheria. Flower and Lydekker

(1891) adopt Huxley's divisions, while Beddard (1902) makes use of those of Cope. Flower and Lydekker's arrangement of families and higher groups is as follows (fossil groups printed in italics) :

Subclass 1. Prototheria.

Order 1. Monotremata (Monotremes).

Families : Ornithorhynchidae, Echidnidae.

(Group, Mu l ti tuber culata or Allotheria.

Families: P lag i aula cidee , Polymastodon-tidce, T ritylodontidce) .

Subclass 2. Metatheria.

Order 2. Marsupilia (Marsupials).

Suborder 1. Polyprotodontia.

Families : Dromatheriidce, Amphitheriidce, Spalacotheriidce, Didelphyidae, Dasyuri-dae, Peramelidae.

Suborder 2. Diprotodontia.

Families : Phascolomyidae, Phalangeridae, Diprotodontidce, N ototheriidce , Macro-podidae.

Subclass 3. Eutheria.

Order 3. Edentata (Edentates).

Families: Bradypodidae, Megatheriidce ,

Myrmecophagidae, Dasypodidae, Glypto-dontidce, Manidae, Orycteropodidae.

Order 4. Sirenia (Sea-cows).

Families : Manatidae, Rhytinidce, Halicori-dae, Halitheriidce.

Order 5. Cetacea (Cetaceans).

Suborder 1. Mystacoceti (Whalebone whales).

Family : Balaenidae.

Suborder 2. Archceoceti.

Family: Zeuglodontidce.

Suborder 3. Odontoceti (Toothed whales).

Families : Physeteridae, Plaatanistidae,

Delphinidae.

Order 6. Ungulata (Hoofed mammals).

Suborder 1. Artiodactyla (Eventoed un¬ gulates).

Families : Hippopotamidae, Suidae, Chcero-potamidee, Anthracotheriidce, Meryco-poiamidce, C otylopidee , Anoplotheriidce , Dichodontidce, Tragulidas, Camelidae. Poebrotheriidce, Cervidae, Giraffidae, Antilocapridae, Bovidae.

Suborder 2. Perissodactyla (Odd-toed un¬ gulates).

Families : Tapirida?, Eophiodontidce , Pal—

eeotheriidoe, Equidae, Rhinocerotidae, Lambdotheriidee, Chalicotheriidce, Ti-tanotheriidce, M acraucheniidce .

Suborder 3. Toxodontia.

Families: T oxodontidce , Typotlieriidce.

Suborder 4. Condylarthra.

Families: Periptychidce, Phenacodontidce, Meniscotheriidce.

Suborder 5. Hyracoidea (Conies).

Family: Hyracidae.

Suborder 6. Amblypoda.

Families : Pantolambdidce ,%C oryphodonti-dce, Uintatheriidce.

Suborder 7. Proboscidea (Elephants).

Families : Dinotheriidce , Elephantidae.

(Group Tillodontia) .

Families: Anchippodontidce, Calamodon-tidee).

Order 7. Rodentia (Rodents).

Suborder 1. Simplicidentata.

Families : Anomaluridae, Sciuridae, Haplo-dotidae. Ischyromyidce , Castoridae, Myoxidae, Lophiomyidae, Muridae, Spa-

lacidae, Geomyidae, Dipodidae, Therido-myidce, Octodontidae, Castoroididce , Hystricidae, Chinchillidae, Dinomydae, Caviidae, Dasyproctidae.

Suborder 2. Duplicidentata.

Families : Lagomyidae, Leporidae.

Order 8. Carnivora (Carnivores).

Suborder 1. Carnivora vera (Fissipeds).

Families : Felidae, Hyaenidae, Protelidae, Viverridae, Canidae, Ursidae, Mustelidae, Procyonidae.

Suborder 2. Pinnipedia (Pinnipeds).

Families: Otariidae, Trichechidae, Phoci-dae.

Suborder 3. Creodontia.

Families : Hycen odontidee , Proviverridce, A rctocynidce , Mesonychxdce.

Order 9. Insectivora (Insectivores) .

Suborder 1. Insectivora vera.

Families : Tupaiidae, Macroscelididae,

Erinaceidae, Soricidae, Talpidae, Pota-mogalidae, Solenodotidae, Centetidae, Chrysochloridae.

Suborder 2. Dermoptera.

Family: Galeopithecidae.

Order 10. Chiroptera (Bats).

Suborder 1. Megachiroptera.

Family: Pteropidae.

Suborder 2. Microchiroptera.

Families: Vespertilionidae, N^cteridae,

Rhinolophidae, Emballonuridae, Phyllo-stomatidae.

Order 11. Primates.

Suborder 1. Lemuroidea (Lemurs and Lemuroids).

Families : Hyopsodontida ?, Chiromyidae,

Tarsiidae, Lemurida?.

Suborder 2. Anthropoidea (Monkeys and Man) .

Families : Hapalidae, Cebidae, Cercopithec-idae, Simiidae, Hominidae.

The groups of existing mammals whose structural peculiarities are such as to entitle them to rank as separate families vary greatly as

regards the number of genera and species they comprise, some being represented by a mul¬ titude of different forms, while others consist only of a single species, or a single genus with but a few species. Families consisting of only a single genus and species are as follows: The Chiromyidas, established for the reception of the Aye-Aye, a singularly modified lemuroid mam¬ mal, confined to Madagascar ; the Dinomvidae, comprising only a large Peruvian rodent, some¬ what like a paca, of which a single specimen is known ; The Antilocapridae, represented only by the Pronghorn of the western plains of North America; the Notoryctidae, comprising only a small mole-like marsupial recently discovered in South Australia; the Ornithorhynchidae, com¬ prising only the Platypus, or Duck-bill, of Aus¬ tralia. These and other restricted families are to be looked upon as fragments of groups of genera and species, of which the greater num¬ ber are extinct, or as branches from main lines of development which have never progressed and ramified.

Bibliography.— Beddard, F. E., (Mammalia) (London 1909) ; Hornadav, W. T., American Natural History* (New York 1910) ; Kingsley, J. L., ˆRiverside Natural Historv) (Vol. V, Boston 1888) ; Lydekker, R., (Mostly Mam¬ mals * (London 1903) ; Wiedersheim, Robert,

(Vergleichende Anatomic der Wirbeltieren*

(7th ed., Jena 1900, tr. and abridged by Par¬ ker, London 1908).

Frederick W. True, United States National Museum.

MAMMARY GLANDS, the milk-glands of mammalian animals (see Breast). They are present in all mammals, in both sexes, but in the male are usually rudimentary, their functional activity being limited to the female, who secretes in these glands the milk for nourishing her young during a natural period after birth. In all mammals they are placed in pairs, but vary much in position and number in different groups. Zoologists give them names according to their position near the armpits (axillary), on the chest (pectoral), on the belly (ventral or abdominal), or near the groin (inguinal). They are never situated on the back. The number in an individual may be from 2 to 12 or more, and is usually even. The structure of the cow’s udder is due to the uniting of the same number of mammae as there are of teats, the number of which, when more than two, usually corresponds to that of the young produced at each birth. The mammary glands of

Marsupialia (q.v.) are contained in the pouch. In monotrames — duck-bills and echidnas — the nipple is not present. (See Prototheria) .

Diseases of the Mammary Glands. — The common inflammation of the glands (mastitis) is often attended by much swelling, with fever and painful tenderness. The formation of pus is apt to result in a slowly pointing abscess. Great care in diet and regulation of the bowels should be observed. Purgatives and fomenta¬ tions may be necessary, also in many oases the placing of the arm on the affected side in a sling. Drawing off the milk and evacuating the pus may be practicable and will afford great relief. Pain in the breasts (mastolynia) may result from many causes, of which sore nipples is one of the most frequent. The nipples are also subject to cracks, ulcerations, etc., which occasion much difficulty and pain to the mother when suckling the child. Lotions of an astrin¬ gent character, as tannin, etc., have a remedial effect in such disorders, as have also collodion and lunar caustic (nitrate of silver), when ap¬ plied to the sore nipple. Metallic shields are used in severe cases for protection of the affected point. Among many specific disorders to which the mammary glands are liable are cancer and galactocele and other forms of tumor. See Milk Fever.

MAMMEE APPLE, or SOUTH AMER¬ ICAN APRICOT, the fruit of a clusiaceous tree, bearing white, showy, fragant flowers, growing naturally in tropical America, but largely cultivated in tropical parts of the Old World. The fruit is several inches in diam¬ eter, with a double rind and a yellowish pulp like that of an apricot, which is sweet and nourishing and is eaten raw or with wine and sugar or is boiled. A spirituous liquor called Eau Creole is distilled from its flowers; and the gum exuding from the bark is used by the Central Americans for destrojdng chigoes in the feet. This gum-resin is similar to the (<gam-boge** derived from a closely related West African tree (Garcinia hamburyi) .

MAMMON, a term popularly held to be a mere personification of riches. It is used in

Matt, vi, 24 and Luke xvi, 9. Milton makes Mammon a fallen angel of sordid character.

MAMMOTH, an elephant (Elephas primi-genius) which inhabited the temperate parts of the northern world during the Glacial period, and at its close spread northward with the re¬ treat of the ice, and survived until the Neolithic period of human history. Some account of the origin and probable wanderings of the species is given in the paragraph relating to fossil ele¬ phants under Elephant. Mammoth remains have been found in intimate association with the handiwork of savage man ; and upon a piece of bone a portrait of this animal was found scratched, the accuracy of which shows a close acquaintance by the Cave-dwellers of France with the animal in life, and much artistic skill. This elephant, although the word “mammoth® has become an expression for hugeness, was little if any larger, on the average, than the modern Asiatic elephant, to which it was nearly related. Its remains are abundant and enable us to reconstruct its form and features com¬ pletely, especially since the remarkable discov¬ ery, first in 1799, of carcasses frozen into the icy cliffs along the Arctic coast of Siberia. One of the most important discoveries of this kind occurred in 1801. Since the earliest known times ivory from buried tusks of these animals has been obtained from northern Siberia and Alaska, and many curious stories were invented to account for its origin, especially among the Chinese, who had never seen an elephant; but the specimens above mentioned contained not only the tusks still in their sockets and every bone in its place throughout the skeleton, but a great part of the flesh was in a condition fit for sledge-dogs to eat and enjoy, and was covered with thick skin still clothed with long dark hair, beneath which was a dense woolly fur, well fitted to protect the animal against arctic cold. The ears were much smaller than those of modern elephants. This specimen of 1801, which is preserved in the Royal Museum at Saint Petersburg in the attitude in which it was found buried, measured 16 feet 4 inches from the fore¬ head to the extremity of the tail; its height was 9 feet 4 inches, and the tusks, along the outer or greater curve, measured 9 feet 6 inches. Of other well-known specimens, that skeleton mounted in Chicago is one of the lar¬ gest known, and its tusks measure 9 feet 8 inches. The largest tusks on record are a pair found in Alaska which measure 12ˆ4 feet in length. All mammoth tusks show an out¬ ward and upward sweep very distinct from the growth of elephant tusks. The mammoth seems to have been extremely numerous all over northern Europe, Asia and North America, especially during postglacial times, when north¬ ern Asia was covered with pine forests to the borders of the Arctic Sea, affording plentiful food in their leaves and twigs upon which these

animals browsed. The disappearance of these forests, due to slow climatic changes, is sup¬ posed to be the principal influence which led to the extermination of the speoies, a fact other¬ wise not easily to be explained. It is probable that human hunting had much to do with the mammoths final disappearance. (See also Ele¬ phants; Fossil). Consult Beddard, F. E.,

(Mammalia > (New York 1902) ; Lucas, F. A.,

(Animals of the Past) (ib. 1901) ; Scott, W. B.,

(History of Land Mammals in the Western Hemisphere* (ib. 1913) ; Herz, O. F., (Frozen Mammoth of Siberia) (Washington 1904). See Mastodon.

MAMMOTH CAVE, Ky., a remarkable American cavern, in Edmondson County, 85 miles southwest of Louisville, reached by a small branch line connecting at Glasgow Junc¬ tion with the Louisville and Nashville Rail¬ road. Its areal diameter is about 10 miles, and about 100 miles of passageway have been ex¬ plored, including avenues, chambers, pits, domes and rivers. What is termed the Main Cave is three miles long, varying in width from 40 to 175 feet and in height from 40 to 125 feet. Its greatest enlargement is known as the Chief City (or Temple), an oval room 541 feet long, 287 feet wide and 125 feet high ; anciently a rendezvous of the Indians, whose torches and other relics have been found in abundance. The Star Chamber mimics the starry heavens by reason of its lofty ceiling of black oxide of manganese flecked by snowy crystals of gypsum. The cavern exists in five successive tiers, through which, at various points, shafts have been cut, which are styled pits or domes, according to the point of view. The largest are the Bottomless Pit, Gorin's Dome, the Mam¬ moth D»me and the Maelstrom, and their aver¬ age depth is about 100 feet. Oval depressions, locally known as "sink-holes,® drain through the pits and chasms and form subterranean lakes and rivers; which finally find an outlet to the neighboring Green River. The largest, the Echo River, gets its name from the wonder¬ ful reverberations of sound along its course. Boats are provided for short voyages. Eyeless fish abound, of which there are three or four species; besides, blind crawfish, blind crickets, flies, beetles and spiders and other abnormal fauna are found on the walls and under the rocks. The structure and habits of these ani¬ mals have been studied with great care.

Beyond River Hall long avenues extend, many adorned by marvelous gypsum rosettes and brilliant arches of crystal efflorescence in the most fantastic diversity. Cleveland's Cab¬ inet (is frequently mentioned as a treasure-house of cave flowers, but some of the smaller rooms, for instance, Charlotte's Grotto, can boast of finer displays. The great cavern is said to end at Croghan's Hall, where is the Maelstrom al¬ ready mentioned, but the few who have dared go to the bottom of this profound abyss report wide and long avenues beyond, which are yet to be explored. Everywhere, even in the deep¬ est pits, the atmosphere is both chemically and optically pure; the temperature is uniformly about 54° F. all the year around, as has been determined by a long series of exact scientific observations, in order to discover the tempera¬ ture of the crust of the earth.

The discovery of the Mammoth Cave is usually credited to a hunter named Hutchins, in 1809; but the present manager of the estate finds that the county records, in 1797, fix the entrance to this cavern as a landmark for a piece of real estate. The locality first gained notoriety by reason of its immense deposits of saltpeter, which were used in the manufacture of gunpowder during the War of 1812. After passing through the hands of several owners the cave was bought by Dr. John Croghan, who

willed it to his nephews and nieces, with in¬ structions that at their death it should be sold at auction. An earnest wish has been expressed by many that the famous cavern should even¬ tually become a State or national park. See also Cave ; Cave Animals.

MAMMOTH HOT SPRINGS. See Yel¬ lowstone National Park.

MAMO, a bird (Drepanis pacifica) of the Hawaiian Islands, related to the creepers, and now nearly extinct because of the great demand in past years for their yellow feathers for making the feather-cloaks formerly worn as insignia of royalty by the chiefs. Other birds supplied certain other required feathers. Very few of these cloaks remain in museums.

MAMORE, ma-mo-ra, a river of Bolivia which has its rise in the Cordillera Real, near Sucre, and flows first east by south, then forms almost a semi-circle toward the north to Trini¬ dad, from where its course is nearly north to where it unites with the Beni and forms the Ma¬ deira River. In the first part of its course it is called Rio Grande. The Mamore is about 1,300 miles long and navigable for about 1,000 miles, With some obstructions. About 40 miles above its junction with the Beni are the Guajara Falls, above which navigation is free for about 400 miles to places where fallen logs have filled in between the banks and formed dams.

MAMPALON, an aquatic animal (Cyno - gale bennetti) of Borneo, of the civet family. It is otter-like in form, is about 18 inches long, has stout webbed plantigrade feet and is thor¬ oughly adapted to an aquatic life while retain¬ ing purely viverrine characteristics of structure.

MAN. See Anthropology; Ape; Arche¬ ology; Ethnology; Primates.

MAN, Christian Anthropology. The thor¬ ough discussion of the theory of evolution for the past two generations has served to make it clear just what contributions to the problems of man's origin and place in the universe have been made by modern science. For a time it was felt that the whole mystery of man's exist¬ ence was to be solved. It is now recognized that in spite of our great advance in knowledge, to use Bryce's expression the "mists that hang around man's origin and man's destiny are so far as scientific knowledge goes just as deep as ever.® Only those who fail to appreciate that science does not solve mysteries, but multi¬ plies them, are of the opinion that biology, not¬ withstanding all its contributions to our knowl¬ edge of man, has furnished the key to the prob¬ lems of anthropology. More now than ever those who know our modern science feel that for any reasonably adequate understanding of man's nature and place in the universe a refer¬ ence to the records of man's religious experi¬ ence must be made. The time for the synthesis of Christian and scientific views with regard to man has oorne to them, not with the purpose of reconciliation, for no reconciliation is needed, but for a proper understanding of the philoso¬ phy of Life that lies behind both science and faith.

The enthusiastic reception which always greets a novelty in thought even in the serious domain of science led many to exaggerate the significance of the theory of evolution (q.v.) through natural selection which came to occupy

so much attention in the biology of the second half of the 19th century. As a result a wide¬ spread impression prevailed that evolution had accounted so completely for the origin of all living beings from the lowest to the highest as they exist around us that the idea of creation and a Creator was no longer tenable. The closing words of Darwin's 'Origin of Species) makes it very clear that the great English scientist himself had not, as a result of his elaboration of the theory of natural selection as an explanation for evolution, given up his belief in creation or the Creator nor felt that his scientific work had any tendency to produce dis¬ belief in religious traditions in this matter. He said : (<There is grandeur in this view of life with its several powers having been originally breathed by the Creator into a few forms or into one; and that, while this planet has gone circling on according to the fixed law of grav¬ ity, from so simple a beginning, endless forms most beautiful and most wonderful have been and are being evolved.®

What Darwin thus brought to be the basic thinking of scientists in the latter half of the 19th century was the theory of descent or derivative creation, that is, creation of one or more simple forms of life to which were given the power of developing with the production of higher forms. This teaching of derivative creation is not modern in origin, but on the contrary very old. Christian philosophers from the earliest times formulated opinions clearly expressive of this view. Saint Augustine sug¬ gested that the original creation was of seniina rerum, "the seeds of things.® These seeds once brought into existence went on developing until the universe of living things which we see around us came into existence. This teaching of Saint Augustine became the Christian tradi¬ tion down the centuries. Saint Thomas Aquinas (13th century), whose writings by the special direction of the Pope are the accepted authority in the Catholic theological schools of the world to-day, was a close disciple of Saint Augustine in this as in most other questions. Cornelius a Lapide (1567-1637), looked up to as an author¬ ity scarcely less than Saint Thomas on biblical matters, followed Augustine's teaching. When St. George Mivart not long after the publica¬ tion of Darwin's 'Origin of Species) pointed out in his 'Genesis of Speoies> that Suarez, the great Spanish theologian, taught this doctrine of derivative creation, it made quite a sensation among those who had been inclined to think of certain narrow literal interpretations of Scrip¬ tural expressions as the constant Church tradi¬ tion. The sensation subsided, however, when it came to be recognized that this teaching of Suarez far from being exceptional represented the most conservative Christian opinions since the time of

the Fathers. Suarez actually wrote “a separate section of his metaphysics in op¬ position to those who maintained the distinct creation of the various kinds — or substantial forms — of organic life.® (Mivart). The crude anthropomorphic notion which had gained popular credence, that the Creator had as it were fashioned each of the species di¬ rectly out of earthly materials, had not been accepted by earlier philosophic thinkers. So far as it came to be the belief of those who gave any attention to the subject, it was a late gloss on the Scriptural account of creation

founded on the narrower views which became common only after Luther’s movement made the literal (interpretation of the Bible the sole rule of faith.

Only the knowledge of the genuine Christian tradition in the matter was needed to dispel the idea of any incompatibility betwen the theory of evolution in the true scientific sense of the term and creation. It is just as much creation, if but a single form of life were evoked from nothing, the great law of evolution being im¬ pressed upon it 60 that it gradually grew more complex until the whole series of living beings that we see around us came into existence, as if each being were created by a special act. ihe creation of species would under that ex¬ planation be the granting of power to any par¬ ticular form of life to lift itself above what it was by inheritance from its progenitors. The special creaition of man would then be the gradual formation of his body from the earth through a long series of ever-developing living beings until the organism had reached a stage of development capable of providing the mechanism . suitable for a rational soul to act in . association with matter. Only when this living matter had become suitable for co-ordi¬ nate activities with man’s spirit was the ra¬ tional soul breathed into the body, which by this inspiration was made like to its Creator.

I he Scriptural description of Creation is summed up in the words «Let the earth bring forth each living creature in its kind, cattle and creeping things, and beasts of the earth accord-their kind, and it was so done.® .

. He said let us make man to our own image and let him have

dominion over the fishes of the seas and the fowls of the air and the beasts and the whole earth and every creep¬ ing creature that moveth upon the earth.®

And God created man to His own image.® It is the rational spirit of man that is Divine and there is no good reason to forbid the thought that God may have created the body to receive that spirit bv a long succession of evolutionary steps. To many there would seem to be more reverence in that idea than if God took red earth (Adam, in Hebrew) and fashioned the body directly and then breathed the spirit into it. Wasmann in his (Modern Biology and the Theory of Evolution > re¬ minded us that the taunt that orthodox be¬ lievers imagined the God of the Bible as a sort of potter in human form fashioning for Adam a body of clay was utterly unjustified by. any real knowledge of Christian tradition, oaint Augustine described any such imagination as minium puerilis cogitatio — <(entirely too puerile for consideration.®

Newman called attention to the Scriptural expression in Genesis (ii, 7) : (<The Lord God formed man of the dust of the ground and breathed into his nostrils the breath of life and man became a living soul,® and comments :

Here are two acts on the part of the Creator — the forming the dust, and the breathing the bfe… Man was made rational after he

was made corporeal.®

Wasmann said, quoting Saint Augustine once more, that. ((It would seem more fitting to believe that in producing the first man as in pro¬ ducing all other creatures, God employed nat¬ ural causes as far as they wrere capable of co¬ operating toward this aim.® Wasmann con¬

tinues, (<We must, therefore, admit that it would, be possible for anyone to account for the origin of the human body by assuming God to have created a primitive cell and to say that the earliest ancestors of man were organ¬ isms living as simple cells; later on as the or¬ gans were differentiated and the nervous sys¬ tem was formed and a sensitive soul came into existence they developed into animals. The or¬ ganism gradually increased in perfection and as the brain developed this soul in course of time prepared a human body suited to be the dwelling of a rational soul and, through pos¬ sessing highly

developed brain cells, able to satisfy the conditions of spiritual activity and its verbal expression. Assuming this theory to be true we may still say that man certainly only . became man at the moment of the creation of his rational soul.® He adds that «any ob¬ jection to this theory (on the score of lack of dignity in the procedure) may be met by a re¬ minder that man s body even now is produced by germinal development from a fertilized ovum.®

The question as to whether man's body cnme by such a process of evolution through the animals still remains open. It is now con¬ fessed by scientists to be quite absurd to sug¬ gest that man is descended from the monkey, and Klaatsch went so far as to say that man is not descended from the monkey because the monkey is degenerate man. The generaily ac¬ cepted idea is that both the monkey and man came from a remote ancestor, one branch of whose progeny continued an upward course in the direction of the human body, while the other degenerated into that of the monkey Ihis is, however, entirely theory. There is no evidence for it and though Zittel gives no fewer than 30 genera of fossil pro-simae and 18 gen¬ era of fossil apes not one connecting link has been found between their hypothetical and ancestral form and man of the present time.

Ihe whole hypothetical pedigree of man is not supported by a single fossil genus or a single fossil species.® (Wasmann). The pithecan¬ thropus erectus or so-called Trinil man of Java has all of his scientific relationship to man in the word anthropus, the name forced upon him at the beginning, for he does not belong to the pedigree of modern man, but to that of the modern apes.

A great many people in our time are of the impression that it was not until the serious dis¬ cussion of the theory of evolution came up that man. s intimate relations to the animals was rec¬ ognized. It has been the teaching of Christian philosophers from the very beginning that man is an animal, and the definition for man adopted from the Greeks by all Christian writers was. that he is a rational animal. As to where his body came from Christians are mani¬ festly free to believe — if they think there is evidence for it — that the animality of man is the result of a process of evolution by which in the course of biogenesis the human body de¬ veloped through the animals and then was raised by special creation to the highest species by the introduction of a soul. Those who ar-gue that there is no need for this special creation of man are as a rule scientists whose inter¬ ests have been largely centred on man's rela¬ tionship to the animals rather than on his su¬ periority to them. The zoologist, intent on the

morphology of the human body and its inti¬ mate relation to animal bodies, easily minimizes the extremely great difference that his mind confers upon man. Zoologists have suggested that man may be defined as <(a tool making and tool using animal.® If that were all that man really is, then there would be no need for the special creation of a soul. Man looked on as merely a higher animal is (<a tool-making, tool-using animal,® but as a rational animal, man is a thought-creating being, and this places an immense gap between him and the other animals. There can be no question of any process of evolution from the animal account¬ ing for the being which produced the c Iliad, > or the (Divine Comedy,* or Shakespeare's 'Hamlet,* or created Hagia Sophia or Saint Peter's, or painted the Sistine Madonna. To comprehend their origin we recur to the in¬ troduction of some great new force from with¬ out. The necessity for a definite series of re¬ newed impulses putting new powers of devel¬ opment into living beings becomes clearer the more biology is studied. That evolution could have occurred by a series of very slight changes for which chance might be appealed to has now been definitely given up. Such genesis of species as science has been able to trace has come by rather large jumps for which there is no sufficient cause in the conditions of preceding life. Manifestly some new force has been introduced into nature and it cannot be thought seeing the results that this occurred without design. As we shall see teleology or the place of design in the world has come back into biology with renewed force in recent years.

Many seem to think that the more careful study of the significance of natural selection in the world of life had entirely done away with any necessity for an appeal to forces outside of nature to account for evolution. Any such thought, however, is due to failure to recognize the real place of natural selection as a factor in evolution and to hand over natural processes to the influence of chance. Almost needless to say chance is only a word used to indicate our lack of knowledge of the factors at work in any problem. Creative direction was the phrase that Lord Kelvin preferred to use as descriptive of the forces at work bringing about whatever development there is in nature. Dar¬ win

himself did not believe that natural selec¬ tion did away with the necessity for creation and expressed himself to this effect in the last sentence of his book. He realized very clearly that though his book was called the ‘Origin of Species) it did not discuss origins, but, on the contrary, preservations. He would have preferred to call it by its secondary title ‘The Preservation of Favored Races in the Struggle for Life.*

The exaggeration of the significance of the phrase ((struggle for life® led manv to the belief that this process of struggle did away with the idea of an overruling Providence, and particu¬ larly of any fostering relationship on the part of a Supreme Being. In this once more as in so many other departments of evolution the Darwinians, so-called, went ever so much far¬ ther than Darwin himself, who recognized very clearly and emphasized the fact that the strug¬ gle for life did not mean any personal con¬ flict between animals to the death, but on the

contrary such reaction of vital forces to the environment in which the animal was placed has brought out all its powers and gave it a higher vitality than it would otherwise have had. As Huxley said, ((Life is a game infi¬ nitely more complicated than chess and the player on the other side is hidden from us.® (<We know that his plays are always fair, just and patient. To the man who plays well the highest stakes are paid with that sort of over¬ flowing generosity with which the strong shows delight in strength.® This is a much better picture of the struggle for life than many of those given by the Darwinians and even by Huxley himself when he was in ultra-Darwinian mood.

Biological developments have served to minimize the place of the struggle for life and to emphasize mutual aid as a factor in the process of evolution. While the idea of the struggle for life dominated biology it seemed to many as though evolution had been handed over to blind forces, largely composed of strength and the advantage which might gave to the stronger animal. An exaggeration of the significance of the struggle for life against which Darwin had warned, but which was taken up by the Darwinians as representing the most important chapter in biology, made a great many people believe that the law of nature was that the stronger survived and that the weakest must go to the wall ; that nature had no care for the individual, but only for the race, and that life was just a huge gory spectacle of death inflicted on living things by other living beings that happened to have secured the advantage over them. Even Hux¬ ley, usually so careful, was carried away by this view and in his essay on “The Struggle for Existence in

Its Bearing upon Man,® suggested that (<From the point of view of the moralist the animal world is about on the same level as a gladiator's show. The creatures are fairly well treated and set to fight ; the strongest, the swiftest and the cunningest live to fight an¬ other day. The spectator has no need to turn his thumb down as no quarter is given.®

Russian biologists, in the face of the im¬ mense difficulties for living things provided by the severe climate of their country, came to recognize early that it was not the individual of greatest strength that always survived, but that nature provided a great law of helpfulness among the animals. They called attention then to the principle of mutual aid as of probably more importance than the struggle for life as a factor in evolution and it has now come to be recognized that practically all living things have instincts of mutual aid that are extremely precious for them. The smallest living beings, the insects, frankly live communitv lives for mutual protection, not only against enemies but against the vicissitudes of climate and for the conservation of food. The smaller mam¬ mals often live in villages, so-called, or groups that prove distinctly helpful. Even the larger mammals possess the same precious instinct, and wild horses herd together for protection against packs of wolves which hunt together because thus they are able to overcome even the very large animals. A drove of wild horses, when attacked by a pack of wolves, gather in a circle, heads toward the centre,

leaving a space on the inside for the foals and presenting on the outside to their enemies only a battery of heels.

Cows herd together and practically all the ungulates and even such huge beasts as the elephants protect the young by traveling in groups sometimes containing as many as 20. When attacked by one of the big cats, the lions and the tigers, which find baby elephants par¬ ticularly a toothsome morsel, the old bull ele¬ phants on the outside of the herd prove finely capable of affording protection. Far from competition within the species being the law of biology, mutual aid is

a deeper instinct in most cases, and very rarely does it happen that animals of the same kind struggle with each other for sustenance, except in cases of famine or when a mother under difficulties is seeking food for her young. Under these conditions the moral law does not bind among men, though the exceptions only prove the rule of the existen(rf. ˆaw' and among animals these rather striking exceptions prove that there is a law or instinct of mutual aid by which the animals help each other very materially.

. Two things are necessary for the preservation of species. One is food provision and the other is propagation of the race. Food pro¬ vision under certain circumstances may necessi¬ tate the struggle for existence, but the propaga¬ tion of the race involving as it does the exist¬ ence of small weak animals necessitates a law of mutual aid and such is actually found to exist. The overemphasis on food provision and the failure to appreciate at their true value the conditions necessarv for raising the young weak animals led to an unfortunate misunder¬ standing in biological science. As Prince Kro¬ potkin suggested "men came to conceive the animal world as a world of perpetual struggle among half starved individuals, thirsting for one another's blood. They made modern litera¬ ture resound with the war cry of (woe to the vanquished! as if it were the last word of modern biology. They raised the c pitiless } struggle for personal advantages to the height of a biological principle which man must sub¬ mit to as well, under the menace of otherwise succumbing in a world based upon mutual ex¬ termination.® What we have found instead of nature red in claw and tooth® is the great principle of charity, or the dearness of fellow-beings existing all over nature. The animals help each other, many of them delight to play with each other and animal sports are common, they care above all for the voting and the weaklings and for whatever of evolution has come this has been a prominent factor. The struggle for existence is incidental to life but the great law of mutual aid is a fundamental instmct in living. beings, a basic anticipation of the law. of charity among men which though often violated remains deep in human hearts as the impress of brotherhood.

The theory of evolution and of descent was very seriously disturbed by Weismann's in¬ jection into the discussion of the princiole of the non-inheritance of acquired characters. It was easy to theorize that anything acquired by an animal in its struggle for existence would make it more likely to be preserved and this ˆˆˆˆˆ next generation a better chance

and would be passed on in ever more favorably modified forms to

succeeding generations until

a new species would result. Once it came to be acknowledged however as it had to be, that acquired characters are not transmitted, or so rarely as to be quite an exception to the order of nature, then this scaffolding of theory col¬ lapsed, leaving some other explanation of the gradual improvement of living things to be evolved. As pointed out by Driesch the only thing that would explain the upward steps in descent is that definite heightening impulses were put into living things from without with the purpose that they should improve in order of being. In this too modern science finds it¬ self under the necessity of recurring to a creative impulse, a creative evolution, such as was included in the explanations of the great philosophic fathers of the Church. Darwin in his (Descent of Man > said «The birth both of the species and of the individual are equally parts of that grand sequence of events which our minds refuse to accept as the result of blind chance® (Vol. II, p. 396).

The argument from design in the world for the existence of a Creator is now actually stronger than ever in scientific minds, and a re¬ view of all the purposes that exist among living things makes it quite impossible to believe that they were developed without a Designer. The telling arguments against ultra-Darwinism, the evidence that . the struggle for existence and natural selection are not only not exclusive factors, but not even important elements in the differentiation of species, have been found in those domains of creation which exhibit the strongest proofs of design. The story of the complex instincts of many animals and particu¬ larly the insects make it very clear that they could not have come into existence by any mere chance, that is, purposeless succession of events, and least of all by any accumulation of minimal fortuitous changes which finally modified func¬ tion and organ to the extent needed for the per¬ fecting of instincts as we know them. Insects would have been handicapped rather than favored in the struggle for life during the in¬ termediate stages of the development of these instincts and the apparatus connected with them They would therefore have perished before the instincts had become useful. Fabre, the great French entomologist whom Darwin proclaimed (an incomparable observer,® has been the strongest opponent of natural selection or chance being in any way responsible for insect instincts. He insists that it is quite impossible to conceive of these instincts coming into exist¬ ence except as the result of design. Fabre discussing the modern theory of instinct, does not hesitate to say that “theories of atavism of natural selection, of the struggle for life cannot

interpret it reasonably.® He even went so far as to add with regard to theoretic ex¬ planations of the life and instincts of the in-SuCtS-_and surely no one had a better right than he to an opinion on this subject — that he saw in them “no more than an ingenious game in which the arm-chair naturalist who shapes

j ,• Trˆd T0001ˆ.111ˆ to his whim is able to take delight but in which the observer, the man grappling .with reality,, fails to find a serious ex¬ planation of anything whatsoever that he sees ® For Fabre every portion of the insect world is a manifestation of design. “The wing of a cricket, that wonderful piece of lace work emerging from a tiny sheath, speaks to us of

another Architect — the Author of the plan ac¬ cording to which life labors.®

Regeneration is the other phase of biology which after instinct has served to make it very clear that any chance result of the struggle for life could not serve as an explanation of biological developments. Professor Thomas Hunt Morgan of Columbia University did not hesitate to say that there are ˆinsurmountable objections to the view that the orocess of re¬ generation can have been produced bv natural selection.® He quotes Driesch that <(We can only reach a satisfactory view of the phenomena (of ontogeny) when we introduce the word purpose. This means that we must look upon ontogeny as a process carried out in its order and quality as though guided by an-intelligence.® Teleology then has come back with redoubled force, and anyone who is not willing to stop short of our ordinary processes of reasoning in matters of science must recognize the exist¬ ence of design and the constant manifestation of purpose in living things around us.

Once this is admitted the reversion to the old Christian doctrine of Creation and of con¬ servation in the sense not only of preservation but of the provision of such additions to energy as may be needed for developmental purposes becomes imperative. These are really succes¬

sive creations beyond nature's unaided powers. It is true that many scientists refuse to take the logical step in this direction, but it seems clear also that their determining reason for doing so is that they cannot bring themselves to revert to the conservative position of the older time. Weismann for instance suggested that if there was no such thing, as spontaneous generation scientists would have to admit crea¬ tion. He confesses frankly that all the scien¬ tific evidence of the present time is distinctly against the occurrence of spontaneous genera¬ tion, yet he insists that it is the duty of scien¬ tists to accept abiogenesis rather than to con¬ cede the necessity for creation. With creation as the beginning of life andi this origin of ((the seeds of .things® with the absolute necessity for some extraordinary intervention to bring about the differentiation of man the thinker from the animals, the necessity for a creator is affirmed by science; hence the declarations to this effect made by many distinguished scientists of the 20th century. Indeed the greater the scientist the more conservative is his position in this matter as a rule. Evolution so far from con¬ tradicting Christian teaching has simply served to make clearer the process by which man's origin was brought about and his relationship to the world around him. Absolute freedom is left for further research in speculation along these lines and Catholic biologists particularly have never felt themselves hampered in the slightest degree by their faith or by the teaching of the Church in the matter.

Many students of science and particularly readers of popular science have become per¬ suaded that the so-called biogenetic law gave absolute assurance not only of man's descent from the animals but of his origin from a sin¬ gle cell being and his progress through the various forms of life up to his present physical status. The human, like other embryos, is supposed to pass through stages which indicate very clearly that it follows the law ˆontogeny recapitulates phyllogeny.® As Koken remarked

very justly, the so-called biogenetic law originated in a superficial view of facts. The more embryology has been studied the less scientists have been willing to accept it. Oscar Hertwig insists that in any statement of the law we must leave out the words ˆrecapitulation of forms of extinot ancestors® and substitute for them (<repetition of forms regularly recur¬ ring in organic development and advancing from the simple to the more complex.® Almost needless to say this destroys the original significance of the law. There is scarcely any question now among biologists that the stages noted in the embryonic

development of man, or of any other animal, are there not because they serve to record a repetition of ancestral forms, but it is definitely taught that they are there because they are needed for the existence and development of the particular individual at that time. It happens that they resemble similar stages in other and sometimes much simpler creatures, but that does not justify the leap to the conclusion that there is any such connection as would be indicated by a law of cause and effect between such similar forms. About all, as pointed out by Weismann, ((the resemblances between the human embryo and that of the other vertebrates are so superficial that His, W. von Bischof, Karl Vogt, and many other recent and thorough students of comparative embryology, have protested against Haeckel's views regarding these resemblances as phylo-ge'netically significant identities.® He concludes ((Nothing but gross want of knowledge can ex¬ cuse a man at the present day in bringing for¬ ward this argnmentiwi ex ignorantia in support of the descent of man from beasts.® The re¬ capitulation theory has been a favorite source of arguments in education, the social sciences and other scientific modes on which the theory of evolution was thought to throw great light. On it has been made to depend many of the un¬ fortunate applications of the evolutionary theory. Professor Kellogg suggests that <(the recapitulation theory of Fritz Muller and Haeckel is chiefly conspicuous now as a skeleton on which to hang innumerable exceptions.® Conservative 'Christian views with regard to the origin of man have been still more strongly confirmed by the recent immense developments of the science of archaeology and the increase of our knowledge of the story of man's existence, not from theory, but from actual remains ob¬ tained in the course of excavation. Under the influence of the theory of evolution as a back¬ ground of their knowledge the last generation df the 19th century were persuaded that human beings were in process of making wonderful progress which could be traced almost from generation to generation and surely from cen¬ tury to century. Scientific archaeology has made it very clear that man at any time in his history when he was interested in any work wras capable of doing wonderful things which stamped him as separated by a very great gap from the animal. Succeeding generations of men have often utterly failed to advance above their forebears as we know them by actual re¬ mains, but on the contrary degeneration has been at least as common a rule in history as progress. The whole question as to whether mankind has ever made any progress has come up and Flinders Petrie, acknowledged as the authority in Egyptology, does not hesitate to

say that (<what strikes us most is how very little man's nature or abilities have changed in 7,000 years, for what he admired we admire; what were his limits in fine handiwork are also ours… . So far as human nature and taste go man is essentially unchanged in this interval.®

If man's origin was an act of creation due to the breathing of something Divine that made him like his Creator into his animal body, we might expect to find in him something like this permanency of status. This rather surprising contradiction of the ordinarily accepted idea of facile progress has been strikingly confirmed by the further advance made in archaeology in the study of the cave man. The excavations in the Dordogne and in western and southern France and northern Spain have completely contra¬ dicted /the idea that man began low down in the scale of being, scarcely above the beasts, and gradually climbed up. They have shown on the contrary that the very first man of whom we have any definite records many thousands of years ago was the intellectual and the spiritual brother of man as we know him now.

The scientific fallacy which has traced man's gradual development from a status just above that of the beast to his present high state of civilization has been due to neglect of the real significance of human life. In the utilities man began low down in the scale and had to develop gradually the things that would help him in his physical life. The notion that this was the only side of man that could possibly have been de¬ veloped in those early days and that his higher aesthetic evolution could only come much later was entirely an assumption. It led scientists to conclude that the history of man as a tool-maker and a tool-user represented the progress of humanity. What was revealed by the dis¬ coveries made in the cave dwellings was that man cultivated first the arts and gave play to his sense of beauty and only later turned to the development of the utilities. Before man was a carpenter and made himself artificial houses to live in, dwelling in the caves that he found so convenient, and before he was a tailor and fash¬ ioned his garments to facilitate his work, or a farmer to till the soil and give himself leisure between sowing and harvest, he was an artist and an

artistic craftsman whose work now revealed to us commands the reverent regard of the modern-world.

When it was first discovered that there were many remains indicating that a number of gen¬ erations of man had dwelt in the caves of what are now France and Spain the conclusion was jumped to at once that the cave man stage of existence must represent a period in which men were just a little higher than the animals. They were crafty enough to displace the beasts from 'their lairs in the hillsides and cunning enough to keep them out. Scientists in their eagerness to confirm the theory of evolution went much farther even in this assumption. They represented the cave man as the lowest of savages, quarrelsome, utterly selfish, with no interests except those of his body, ruthlessly ready to fight with his kind on the slightest provocation or even without provocation if he felt that he had 'the strength or the chance to kill without danger. A favorite theme was that he dragged his female home by violence to keep her as his own, to bear his burdens and

his children, the one saving quality in the pic¬ ture being his care for his children, though even this was supposed to be neither consistent nor continuous.

This was the supposedly scientific picture of the cave man that was popularized and the gen¬ eral public has as yet no idea apparently that the discoveries of actual remains in the caves completely contradict this theory. Three modes of art were found in the caves, the movable art, consisting of various utensils decorated prettily, the mural or parietal art of pictures made on the walls of the caves to which more recent discoveries have added the plastic art of rock sculpture and molded clay. The engrav¬ ings on bones and horns and sometimes on stone implements revealed that a real artist was at work in this olden time. He was a man who saw clearly and could reproduce with fine fidelity often by means of a very few lines what he saw. His work while primitive was not crude, but anticipated in many ways modern impressionistic art, the latest phase of artistic development. There must have been a good many men of the time capable of doing excel¬ lent work in this line for copious remains in many places and even at different horizons, which indicate intervals of generations, have been found.

What is extremely interesting is that the cave man should have tried to make beautiful even the everyday utensils that he handled and that

he was willing to spend a good deal of time and care in their decoration. One suggested criterion of cultural advance among men has been that ((there is no culture in the hearts of a people until the very utensils in the kitchen are beautiful as well as useful.® The cave man judged by this criterion is rather in advance of than behind most of the peoples of history in higher human development. His cave home we have come to recognize especially after trench experience was healthier than the dwellings of the great majority of the human race at the present time, not alone the poor, but even the rich. He tried to make his home a place of beauty for himself and his family. If we are to judge by how such a thing comes about in the history of long after times, we should be forced to the conclusion that it was the cave woman who somehow had succeeded an secur¬ ing the surroundings of artistic quality for her¬ self and the children who had to spend so much more time at home than the cave man himself.

If there had been nothing but the movable art of the caves that in itself when properly appreciated would have completely corrected the notion of the cave man as in any way near to the animals. On the contrary he was a modern man in his interest in beautiful things. The discovery of the parietal or mural art empha¬ sized this very strongly. The walls of the caves were found to be decorated in many places with pictures of the animals which the cave man hunted. The evolution of this art has now been traced and it manifestly began in black and white, that is, the gray wall of the limestone cave as the background for deep lines made with a sharp piece of flint and then filled with lamp black as the outline of the picture. The surprise is to find the boldness and sureness of the drawing, the almost complete absence of corrections and the thoroughgoing confidence with which the cave artist must have made his

pictures. He knew exactly what he wanted to reproduce and there was no halting or hesita¬ tion about his line work. Modern artists have not hesitated to declare that some of this draw¬ ing must be counted among the best that has ever been done, especially when the circum¬

stances in which it was accomplished are con¬ sidered.

The cave man was not satisfied with these line drawings vivid and expressive as they are. He wanted to reproduce the colors of the ani¬ mals as he saw them and succeeded in doing so. At first he used only the reds and browns, but after a while also the yellows and many shades of colors. His color sense was evidently ex¬ actly like ours and he reproduced the animals as he saw them. The reason why his colors lasted so well during all these years is that they were ground in oil. This inventor of oil paint¬ ing has made some of the most vivid pictures of animals that have ever been made. He pic¬ tures them in all positions, standing, lying down, in all kinds of movement and at bay. He even took advantage of certain somewhat rounded projections of the walls of his cave home to fit his pictures of animals to these surfaces in relief in such a way as to give the impression of plastic work. His power to accommodate hits painting to the cramped conditions necessary for this, show what fine command he had over his artistic powers. The men who did this work far from being close to the beasts are quite as high as the men of our time, indeed if anything on the average higher. It is not at all surprising to find that they were magnifi¬ cently developed and had a skull a little larger •than the average of the men of our time.

These pictures were often made on the cave walls at such a distance from the entrance that the darkness was complete. Just what kind of light the cave man used has not been found. It was not torches, for there are no marks of smoke on the walls or ceiling. Sir Arthur Evans, who was president of the British Asso¬ ciation for The Advancement of Science, did not hesitate to say in 1916 in his presidential address that the cave man had probably discov¬ ered some mode of lighting his cave, or other¬ wise he would not have been able to do the painting that is actually found there. It would not be surprising if the inventor of painting in oils should have made other inventions. He used fire in many ways and fire is, after all, one of man's greatest inventions.

The savage cave man of theory then so close to the beasts gives place when his actual re¬ mains are critically appreciated to a man the equal of any in the history of the race. An artist is at all times the flower of our civilization and evidently many of the cave men were ar¬ tists. Further discoveries give indications of rather happy domestic life, his wife being pic¬ tured as rounded and fat though the cave man himself is muscular and athletic, evidently fitted for the difficult task of hunting the animals. Had his wife been the slave that she is pic¬ tured in theory she would not have been any¬ thing like the portraits

that we have of her. There are manifest signs an some of the draw¬ ings of her liking for dress and already in vari¬ ous places there are various fashions with longer and shorter skirts and higher and lower corsages and ribbons and other adjuncts of fashion (Sir Arthur Evans). Above all the

cave man carefully buried his dead with some of their weapons and utensils near them and with other evident indications of his belief that death was not the end of life, but that there was another life. He was perfectly willing .to sacri¬ fice some of the finely decorated and well-fash¬ ioned utensils that had taken a good deal of time in the making, in order that his dead ones might have near them in 'the other world their favorite implements of this. In a word archae¬ ology has shown us the first man of whom we know anything definitely, as a reasoning being with a highly developed sense of beauty, with a belief in/ immortality, with feeling for others, with a compelling tendency to surround himself with beautiful things as far as he could and not with that supposed tendency to occupy him¬ self exclusively with utilities which instead of representing development always indicates a tendency at least to degeneration.

The one question that remains then is whether there is room in Biblical chronology for the record of man as worked out by sci¬ ence. Here once more the conservative views of the early Fathers of the Church are extremely important in enabling us to understand what should be looked upon as the prevailing belief in these matters. The supposed incompatibility of science and faith in the matter is entirely due to a comparatively recent misunderstanding of the Scriptures. Some of the early Fathers of the Church took the days of creation liter¬ ally, but the Alexandrian Fathers who faced these problems in true philosophic temper inter¬ preted the days of creation ideally, taking the words of Genesis as a human mode of speech so that men might understand what was expressed in terms of their previous knowledge. Such distinguished Christian philosophers as Clement, Athanasius, Cyril and Origen, as well as Saint Augustine, taught that creation was a single act. Augustine as we have seen declared that (<the seeds of things® were first created and then went on developing because of the living power put into them.

The Fathers manifestly did not feel that a definite date for the creation of man was set by the account in Genesis. It was Archbishop Usher under post-Reformation influences who first calculated that the creation of Adam was 4004 b.c. Indeed the literal interpretation of the

rather vague wording of Scripture with re¬ gard to many things is quite modern as a rule. As in the question of a universal deluge, which is not Biblical, more careful -study of the scrip¬ tural text shows that there is no good reason for any such limitation of time as Usher sug¬ gested. There is absolute freedom to discuss the age of man on earth as far older than any such date. Rev. Father Obermaier and Abbe Breuil, to whom we owe more of our exact knowledge as to the cave man and our earliest ancestors than any others, have discussed the probable date of this dwelling in caves very fully. Obermaier thinks that 50,000 years might be necessary to include all phases of develop¬ ment that have thus far been unearthed. Abbe Breuil is of the opinion that 20,000 years would be quite sufficient for all that recently discov¬ ered facts as to man's development would de¬ mand. Their opinions deserve the highest con¬ sideration from students of science. The lower figure is confirmed by the conclusions of Prest-wich, a well-known authority on geology, who

limits the time since the.Glacial period to 25,000 years and man is surely postglacial.

Many presume that at least modern science has completely obliterated the old-fashioned notion that man was the centre and the culmi¬ nation of creation for whom other parts were made and to whom their activities were mainly directed. Alfred Russell Wallace, however, in his volume, (Man's Place in The Universe5 has re-established that old idea on the firmest of modern scientific and evolutionary bases. Surely no, one can talk with more authority in the matter than the man who with Darwin dis¬ covered the principle of natural selection. Wallace goes so far as to say ((and is it not in perfect harmony with this grandeur of design (if it be design), this vastness of scale, this marvelous process of development through all the ages, that the material universe needed to produce this cradle of organic life and of being destined to a higher and a permanent existence, should be on a corresponding scale of vastnes'S of complexity and of beauty? During the whole process of the rise and growth and extinction of past forms

the earth has been pre¬ paring for the ultimate man — much of the wealth and luxuriance of living things, the in¬ finite variety of forms and structure, the ex¬ quisite grace and beauty in bird and insect, in foliage and flower, may have been mere by¬ products of the grand mechanism we call na¬ ture— the one and only method of developing humanity.®

Bibliography.— Wallace, A. R., < Man's

Place in The Universe5 (New York 1904) ; id.,

(The World of Life5 (New York 1910) ; Dar¬ win, Charles, (The Origin of Species5 ; id., (The Descent of Man5 ; Mivart, (The Genesis of Species5 (London 1870) ; Leconte, (Evolution and Its Relation to Religious Thought5 (New York 1889) ; Gray, (Natural Science and Reli¬ gion5 (New York 1880) ; Weismann, (Modern Biology and the Theory of Evolution in the Light of Facts5 (London 1913) ; Suarez, <Meta-physica5 (Paris 1868) ; Gerard, (The Oldest Riddle and The Newest Answer5 (London 1904) ; Windle, (The Church and Science,5 (London 1917) ; Eucken, R., (Main Currents of Modern Thought5 (New York 1912) ; id., (Can We still be Christians?5 (New York 1912) ; Muller, Max, (T*he Silesian Horseherd5 (Ques¬ tions . of the Day, London 1903) ; Obermaier-Breuil, <Travaux de lTnstiitut de Paleontologie Humaine5 (1912 et seq.) ; Obermaier, <Der Mensch der Vorzeit5 (Munich 1912) ; Petrie, (The Romance of Early Civilization5 (New York 1909) ; Breuil, (Peintures et Gravures des Cavernes Paleolithiques5 (Monaco 1913; Mor¬ gan, T. H., (Evolution and Adaptation5 (New York 1913) ; Duesch, (The Science and the Philosophy of the Organism5 (Gifford Lectures, London 1908)..

James J. Walsh,

Author of (The Popes and Science Q *etc.*

MAN, Isle of. See Isle of Man.

MAN, Prehistoric Races of. Until nearly the middle of the 19th century, the dawn of human existence was commonly assumed to have been coincident with the beginning of recorded history, roughly some 6,000 or 7,000 years ago. Though even in the preceding cen¬ tury some evidence had been adduced which indicated that a stone-using age had antedated

the use of metals, it was not until 1833 that the discovery in the caves

of Engis, near Liege. Belgium, of human bones mingled with those of mammoth, wooly rhinoceros and cave-bear proved (though the proof was not universally recognized for several years) that man must have been a contemporary of these extinct crea¬ tures of the remote Diluvial epoch, or, as it is called to-day, the Glacial or Pleistocene period. Together with this discovery two others stand out as prominent landmarks in the history of palseoethnology. One was the finding, in 1856, of the famous Neanderthal skeleton, which demonstrated that a low type of mankind, phys¬ ically very different from any modern race, had existed in western Europe in some distant prehistoric time, now known to have been earlier in the Pleistocene than the period of the Engis men. A few years later a fragment of mammoth tusk was found on which was scratched a realistic portrait depicting the hairy mammoth in the flesh, showing that consider¬ able artistic ability had been achieved by man before the extinction of these great Pleistocene elephants, at a time antedating recorded history. Since these pioneer discoveries, evidence has accumulated greatly and we now know that the man who made this engraving some 15,000 or 20,000 years ago was fairly recent in compari¬ son with the low-browed Neanderthal, and that the. latter was antedated in turn by a still more primitive and probably ancestral type, the Heidelberg man, of vastly more remote antiq¬ uity. It may be stated here that our knowledge of Pleistocene ethnography is based very largely on European material with a few excep¬ tionˆ to be mentioned below, but this does not imply that Europe is to be regarded as the cradle of the human family, for the concensus of competent opinion is that the earliest homi-nidae diverged from their simian relatives in central Asia, probably in Miocene times, and that from this centre the family gradually radiated, its branches becoming geographically isolated, some dying out during the Pleistocene, and others finally becoming differentiated into the. several great divisions of mankind — Australian-African, Polynesian-European and Asian-American, and their racial subgroups. See Man.

This is not the place for a discussion of Pleistocene geology or of the much-disputed Ice Age chronologies; it must suffice to say that the duration of the Pleistocene, according to the estimates of Penck, one of the leading authorities, was between 500,000 and 1,500,000 years, and other investigators usually make it near his minimal figure. There is evidence that there were in the northern hemisphere not less than four glaciations, with three warmer interglacial periods, the beginning of the reces¬ sion of the fourth and last ice-sheet dating back perhaps 17,000 to 25,000 years. As to the time of the earliest appearance of actual man, the genus Homo, we are probably well within the limit of

likelihood if we assign to the Heidelberg man, the oldest known type, an antiquity of 250,000 years. Contrasted with such age as this the so-called historic period of some 7,000 years seems a brief span indeed. The comparison becomes most graphic if we represent the duration of man's past by the length of a yard-stick, in which case the extent

MAN, PREHISTORIC RACES OF

Figs. 1, 1A, 2, 2A, 3 and 3A from restorations by J. H. McGregor

Fig. 1 Skull of Pithecanthropus erectus, restored Fig. 1A Head modelled on 1

Fig. 2 Skull of Homo neanderthalensis; specimen from La Chapelle-aux-Saints, restored Fig. 2A Head modelled on 2

Fig. 3 Skull of the "Old Man of Cro-Magnon," restored

Fig. 3A Head modelled on 3

Fig. 4 Jaw of modern man (American Indian) for comparison with

Fig. 5 Jaw of Homo heidelbergensis Fig. 6 the Piltdown Skull, Eoanthropus dawsoni, restored by A. Smith Woodward

Fig. 7 Skull of youth of Grimaldi race. (After Vemeau)

‘ ■

‘ •

man, prehistoric races

of recorded history will be fairly measured by the terminal inch.

Any discussion of the earliest types of man must include some mention of Pithecanthropus, ((the ape-man of Java,® though the relation of this most famous of fossils to mankind is still dubious. In 1891-92, Dr. Eugene Dubois of Holland, while conducting geological explora¬ tions in central Java, unearthed in the dry bed of the Solo or Bengawan River, near Trinil, a fossilized skullcap or calvaria, two molar teeth, and at a distance of some 50 feet from these, a thigh-bone, all clearly of primate character and presumably from a single individual. The thigh-bone was more manlike than that of any ape, its conformation indicated erect gait and its size a creature some five feet six inches tall. The cranium had an extremely narrow, low and retreating forehead with a prominent-transverse ridge above the orbits and a capacity of 850 to 900 cubic centimeters, or about midway between the lowest normal human and the go¬ rilla in bulk of brain, though somewhat nearer the minimal human measure. In 1894 Dubois published a careful study of these remains to which he assigned the name Pithecanthropus erectus (erect-standing ape-man), and which he hailed as the long-hoped-for ((missing link® between ape and man. The exceptional import¬ ance of the fossil was generally recognized at once, but authorities have never unanimously agreed with Dubois' view concerning its inter¬ mediate position. A considerable number of anthropologists place it within the human fam¬ ily, and the literature contains many refer¬ ences to <(Trinil Man.® Elliott Smith, following Dubois, believes that certain brain-impressions in the skull suggest the power of articulate speech. On the other hand, some able anat¬ omists incline to regard the creature as more closely allied to the apes, and it has even been considered a giant gibbon. In view of the incompleteness of the remains and the slightly uncertain association of the femur with the skull, it is perhaps best to regard Pithecanthro¬ pus tentatively, simply as an extinct primate of erect gait, much higher as to brain volume and presumably as to intelligence than any known ape; hence a sort of (<super-ape,® but much lower in mentality than any normal man. In any case the assumption that it is necessarily a direct ancestor of Homo is unwarranted, for it may equally well belong to a collateral branch of the hominid family which became extinct, — ((an uncle instead of a grandfather of man® ; but it must be admitted that Pithecanthropus admirably fills the specifications for a <(missing link.® Unfortunately, its geological age is some¬ what uncertain ; it is either late Pliocene or early Pleistocene. Osborn tentatively estimates its antiquity at 500,000 years. (Figures 1 and 1A.)

The earliest remains which are unquestion¬ ably human consist of a remarkable lower jaw found in 1907 in the Mauer sands, ancient river deposits near Heidelberg, Germany. Proof of the vast antiquity of the specimen is afforded by superjacent strata nearly 80 feet in thickness, and by the associated mammalian fossils, in¬ cluding species of elephant, rhinoceros, etc., which had previously been assigned to the second (by some to the first) warm inter¬ glacial phase. This human relic is not only vastly ancient, but more primitive, in some

respects more ape-like, than any other indu¬ bitable human remains. The jaw is exceedingly massive and large and entirely lacks the chin projection of modern races, which gives it a remarkably ape-like appearance (Fig. 5), but the teeth and the form of the dental arch prove it to be quite human. Professor Schoetensack, who described th- e fossil, makes it the type of a new species, Homo heidelbergensis, the Heidelberg man. It resembles the Neanderthal type somewhat and may be ancestral to it. No cultural remains were found associated with the jaw and opinion is divided as to whether this type had attained even the level of culture represented by the earlier Palaeolithic flints, though some anthropologists place the <(eoliths® still earlier. As the second interglacial period is believed to have extended over some 150,000 years and to have merged into the third glacial some 150,000 or 200,000 years ago, it seems not unlikely that Heidelberg man may have flour¬ ished some 200,000 or 250,000 years ago and for aught we know to the contrary his race may have endured for tens of thousands of years, countless generations passing without leaving a trace save this single fossilized jaw. The in¬ terval which elapsed from the day when this precious relic found its resting-place in the ancient river-sand to the period of Neander¬ thal man was probably, vastly longer than that between Neanderthal times and our own day. Nevertheless it must be understood that esti¬ mates of Pleistocene chronology vary greatly and are all highly conjectural.

Perhaps the greatest event in the history of anthropology was the discovery, in a limestone cave in the Neanderthal, a small gorge near Diisseldorf, Germany, in 1856, of the frag¬ mentary skeleton of a man apparently con¬ temporaneous, like the men of Engis, with the well-known mammoth and wooly rhinoceros, the bones of which were found later in similar caves nearby. Examination of the human bones re¬ vealed surprising differences from modern Euro¬ peans or indeed any race of living man, or even the Engis man. This was especially striking in the calvaria or skullcap, which was marked by an excessively low crown and heavy supra-or- bital ridges extending the

entire width of the forehead. This skull excited great discussion ; Huxley spoke of it as ((the most pithecoid (ape-like) of known human skulls,® and in 1864 King ventured to make it the type of a new species of man, Homo neanderthalensis. The names H. p rimi g e nius and H. mousteriensis have since been applied to this race by certain German and French writers. Since this pioneer discovery numerous remains of the species have come to light and Neanderthal man is known to have ranged from the lower Rhine region to southern Spain and eastward at least to Austria. A nearly complete skull was found at Gibraltar in 1848, thus antedating the Neanderthal discovery by eight years, but it was inadequately described and its significance remained unrecognized for half a century. The more important Neanderthal remains include two skulls from Spy, Belgium, found in 1887, a large number of bones and teeth found in 1899 and later at Krapina, Austria, two nearly complete skeletons in France, namely, the old man of La Chapelle-aux-Saints, Correze (Fig. 2), and a youth from Le Moustier, Dordogne, both discovered in 1908, and three

still more recent discoveries of partial skeletons, not to mention numerous jaws and teeth. The Neanderthal custom of burial in caves is largely responsible for the preservation of some of the finest of these remains. They have been found associated with various culture levels of the Palaeolithic or Old Stone Age, but chiefly identified with the flaked flints of the Mousterian industry. It seems highly probable that a species so widely distributed endured through¬ out a long period, possibly the greater part of the third interglacial and the fourth glacial, upwards of 100,000 years in all, and there is some reason based on differences of cranial form to suspect that the type became split up into sub-species or races. The skeletal anat¬ omy is now well known, and much can be inferred with certainty regarding the muscles and other soft parts. They were a people of rather small stature, the men five feet three or four inches tall, of extremely robust built, with large bones, and heavily muscled. Hands and feet were large, the thighs somewhat curved forward and the knees always slightly bent. The forearm and leg are remarkably short in proportion

to arm and thigh. The skull was characterized by huge size, especially great length, the low-crowned but capacious cranium marked by a projecting transverse ridge above the eyes. The orbits were cavernous, and the eyes probably deeply set, the nose very wide but prominent, not flat as in negroes. The face was of great length with some prognath¬ ism, though the anterior teeth were nearly vertical. The cheeks sloped backward obliquely from the nose, quite unlike any modern race, and there was the merest suggestion of a chin (Fig. 2A). This huge head was supported on a very short neck, directed somewhat for¬ ward. Altogether the appearance of the Neanderthal was such as to suggest the ad¬ jective "bestial® and admirably fulfils the popular conception of a brutal, low-browed cave man. Regarding such superficial features as complexion and hair, of course nothing is known. A few ethnologists regard the Neander¬ thals as a degenerate tvpe. As to culture, we know that he flaked the flint implements of the Mousterian phase (probably also the still earlier Acheulean and even Chellean), of w'hich one characteristic form is the "coup de poing® or fist-hatchet, and others are obviously for cut¬ ting up game, scraping skins, *etc.* The charred bones found about the rock-shelters of the limestone cliffs show that he possessed the art of making fire and that he roasted the flesh of the wild horse, wild ox and reindeer. Several of the skeletons had been carefully buried, to¬ gether with stone implements and parts of game animals, a practice usually considered to indicate some idea of post-mortem existence. As to the origin of the Neanderthals, it has usually been supposed that they migrated into Europe from Asia, but the recent discovery of the earlier and more primitive but somewhat similar Heidelberg man, suggests that the Neanderthals may have evolved in Europe. Before the end of the fourth and last glacial phase, the species seems to have become extinct, and to have been replaced rather suddenly by at least two races of Homo sapiens , early repre¬ sentatives of our own species, but the relation of the Neanderthal to these higher types, and

whether or not he has any share in the ancestry of modern Europeans, is still questionable. The weight of opinion seems to favor the view that he was exterminated by higher immigrant races, but in such cases there is usually some crossing and no less an authority than Hrdlicka believes that slight traces of Neanderthal blood are still discernible in certain regions of Europe.

Among the successors of Neanderthal man, and possibly contemporaneous with him dur¬ ing the later centuries of his epoch, was the highly developed race first known from several skeletons

discovered in 1868 in a grotto at Cro-Magnon, near Les Eyzies, Dordogne, and named from the site of discovery the Cro-Magnon race. The half centurv since has witnessed a considerable accumulation of data relative to the physical features, distribution and culture of this people. In many characters the Cro-Magnon pien closely approximate certain modern types. The head form is dolichoce¬ phalic, with vertical forehead, prominent nar¬ row nose and strong chin (Figs. 3 and 3A). The orbits are low and elongate transversely; the cheek-bones very wide in proportion to the cranial form.. The skeletons from certain sta¬ tions are of great height, over six feet, but others, apparently of the same race, are much shorter, and the women seem to have been much-smaller than the men. In general this race had well-formed heads and fine physiques.. Plainly, the Cro-Magnons are of our own species, Homo sapiens, and their likeness to certain modern types in southwestern Europe suggests that a strong strain of the blood of this ancient race still exists. Verneau has also adduced evidence for the belief that the Guanches, the aborigines of the Canary Islands, were of this stock. One or two recent writers have asserted that the Cro-Magnons show negroid affinities, but ex¬ cept for the relative proportions of the limb bones, the evidence is all opposed to this view. The race appears so suddenly and is so different physically from the Neanderthal as to preclude descent from the latter; hence it is generally believed to have migrated from Asia. In early postglacial time the Cro-Magnons attained a wide distribution in western Europe, their range closely approximating that of their more primitive predecessors. In a number of locali¬ ties remains have been found associated with rich cultural data, and the race is identified with those late phases of the Old Stone, Age known as Aurignacian, Solutrean and Magdalenian, characterized by a great variety of flint im¬ plements, knives, spear-heads, chisels, borers, scrapers, etc., of delicate workmanship, and tools of bone and antler such as needles, spear-throwers and harpoons, as well as incised draw¬ ings on reindeer antler, mammoth tusk and stone depicting the great mammals which still sur¬ vived — the mammoth, wooly rhinoceros, wild horse, reindeer, lion and others. The Cro-Magnons were a race of troglodytes, more truly cave men than were the Neanderthals, and to this race belonged the mural artists whose brilliant polychrome paintings of contemporary animals still adorn the walls and roofs of caverns in southern France and northern Spain. Ceremonial burial of the dead was practised and some of the burials show that ornaments were worn. Clothing, doubtless of skins, is in-MAN, PREHISTORIC RACES

dicated by the bone needles. On the whole, these people had attained a considerable degree of culture, but there is no evidence that they practised agriculture, or kept herds, or that they had achieved the domestic arts of pottery or weaving. They were a race of hunters, ap¬ parently with more or less fixed abodes and some organized social structure. Geological evidence indicates that the early postglacial period, during which the Cro-Magnons flour¬ ished, was some 10,000 to 20,000 vears ago. It seems improbable that this race was extermi¬ nated ; it is more likely that it became inter¬ mingled with other immigrant stocks, progeni¬ tors of Neolithic men, and there are indica¬ tions that a Cro-Magnon strain still persists in the population of certain localities in France.

A considerable number of skeletal remains of late Pleistocene Age have come to light in Europe, some of which are doubtfully to be assigned to the Cro-Magnon race (e.g., those of Engis and Combe-Capelle) while others, not¬ ably the Briinn and Galley Hill crania, seem to belong to a different physical type, but clearly Homo sapiens. In 1906 a surprising discovery was made in one of the caves in southern France which had previously yielded several Cro-Magnon skeletons. This was the disinter¬ ment, from a slightly lower level, of two skeletons, a woman and a youth (Fig. 7T which strikingly resemble certain negroid types, especially the South African Bushmen. The name Grimaldi race has been given to these ancient negroids, but it is impossible, as yet, to account for the origin of the race except to say that they were early postglacial immigrants. It is significant that several small sculptured statuettes from France, and one from Austria, appear to represent female negroid types in whom certain physical features are exaggerated as in Bushmen women. Presumably these are the handiwork of the Grimaldi negroid race. These discoveries are important as demonstrat¬ ing the early diffentiation of a negroid stock, and they suggest interesting questions as to its prehistoric migrations.

The <(Piltdown skull® found in Sussex, Eng¬ land, in 1911-12, has perhaps evoked more vigorous discussion and more divergence of opinion than any similar discovery. The bones were found in a shallow gravel-bed, are un¬ questionably Pleistocene, and probable as early as third interglacial. With them were found teeth of very early types of elephant and hippo¬ potamus, and a few roughly chipped ((eoliths.)) There are several fragments of a human cra¬ nium of great

thickness, but which any anato¬ mist would identify as Homo sapiens. Near one of these was found the right half of a lower jaw containing two molar teeth. This jaw is a veritable ((bone of contention® for a number of able anatomists regard it as belong¬ ing not to the associated human cranium but to a fossil ape, though no such animals are known to have lived in England during the Pleistocene. The chin region is entirely ape-like, the molars somewhat so, and, the same mav be said of a canine tooth, discovered later.

Dr. A. Smith Woodward, in the belief that the discovery represents an exceedingly early hominid, essentially an ape-jawed man, created for it a new genus and species, Eoanthropus dawsoni (the dawn man), the specific name in honor of the discoverer. Dr. Woodward's

restoration is shown in figure 6. The British anatomists generally accept the validity of Eoanthropus, and regard it as a discovery of prime importance in the ancestry of the genus Homo, but outside the British Isles opinion is divided. Those who maintain that the jaw is that of an ape, hold that it, together with the bones and teeth of other animals, became acci¬ dentally washed out of their original resting places and mingled in the river gravels with the human remains. G. S. Miller, as a result of careful comparative studies, regards the jaw as undoubtedly belonging to an extinct species of chimpanzee. Of course if this view is correct, Woodward's genus ((Eoanthropus® is only a figment, and the cranium merely that of an earlv man of our own species. At present it would seem that Eoanthropus can be only tentatively accepted, pending further evidence.

As above stated there are strong reasons for believing that the human family originated in central Asia and thence deployed in various directions. Besides the western migrants who gradually spread over Europe, others worked southward and populated the African continent, and the possible relation of the Grimaldi type to some of these has been mentioned. There is evidence that the Bushmen, at least, have drifted from more northerly parts of Africa, and some reason to suppose that they were preceded in South Africa by a Palaeolithic people of stronger physique. A fragmentary skull of large size found at Boskop, in the Transvaal, in 1915, is believed to be of Pleistocene Age. It is not sufficiently complete to permit certain diagnosis as a negroid type. Broom has named it Homo capensis, but the reasons for erecting the new species seem in¬ adequate to the present writer.

The African, Australian, Papuan and Melanesian peoples, descendants of stocks which spread southward from Asia, have a number of characters in common. Of these races the Austfalian blacks and the recently ex¬ tinct Tasmanians are modern Palaeolithic men and represent a cultural level scarcely higher than that of the Neanderthals. Their early segregation from other races is generally ad¬ mitted, but thus far the only Australian dis¬ covery of great antiquity is a cranium, the Talgai skull, found in a Pleistocene formation in Queensland, and described in 1917, by Dr. Arthur Smith. This skull, though badly crushed, shows the essential features of the very distinctive Australian type, but is remarkably primitive, almost ape-like, in the rectangular form of the palate, and the enlarged canine teeth; just such a skull as one might posit as a Pleistocene progenitor of the Australian race. This discovery is highly significant as proving the early human invasion of the continent, and the differentiation at a time so remote of the Australioid type.

Though actual remains of Pleistocene man in the western hemisphere are extremely rare, and the antiquity of most of these somewhat questionable, there are excellent reasons for believing that a branch of the human species had become established in America before the last glaciation, an offshoot from the same eastern Asian division which gave rise to the Mongolian peoples. These first American im¬ migrants probably entered the continent in the region of Alaska, when that part of the world

enjoyed a more genial climate than was later the case, and spread eastward and southward, finally extending to the southern extremity of South America. This view, however, is not universally held, and some competent ethnol¬ ogists maintain that the migration of the Eskimo has been westward from Greenland. The affinity of American to Mongoloid peoples is generally admitted, as is also the racial unity of all the Americans from the Eskimo to the Fuegians. Prehistoric remains, both skeletal and cultural, are of course extremely abundant, but all of the former, including even those be¬ lieved to be

Pleistocene, exhibit the essential characters of the American Indian type. Among the more important discoveries of possible pre¬ glacial (i.e., before the last ice advance) or glacial age are several fragmentary skeletons from the Trenton gravels of New Jersey, and some bones of two individuals found at Vero, Fla., in 1915-16. A skeleton discovered in the famous asphalt pits of Rancho La Brea near Los Angeles, Cal., in 1914, and at first hailed as a Pleistocene man, is not different from the modern type, and is almost certainly postglacial. Various discoveries in Argentina described by Ameghino as Tertiary (Miocene and Pliocene) prehuman remains, to which he assigned the generic names of Tetraprothomo and Diprotliomo, have been entirely discredited. It may be said in general that the essential Indian character of all the prehistoric remains found in America, and the likeness of this type to the Asian Mongols, indicate that the first American immigrants were already highly developed, and very similar physically to the Indian of to-day.

In this brief review of the ethnology Q,f earliest man, the reader must have observed that the somatic evidence is extremely meagre, except in the cases of the Neanderthal and Cro-Magnon types. In several cases a race or even a species is based on a few bones from a single individual, but it must be understood that a few skeletal fragments, especially of the skull, may convey a great amount of information to the skilled anatomist, also that the location, associated animal remains, and cultural evi¬ dences all aid largely in solving the riddles of mankind's remote past. It has not been possible to make more than a hasty survey of the physi¬ cal characters of the earliest types of the human family. The late Palaeolithic migrants into Europe,— the long-headed Nordic (north¬ ern) and Mediterranean (southern) races, and the broad-headed Alpine race, of great im¬ portance as the chief stocks from which the present peoples of Europe have descended, must perforce be omitted. For the consideration of the cultures of the Palaeolithic, as well as of the Neolithic and Bronze Age, see Archeology.

Bibliography. — Of general works the fol¬ lowing may be especially recommended : Sol-las, W. J., (Ancient Hunters) (2d ed., London 1915) ; Osborn, H. F., (Men of the Old Stone Age5 (2d ed., New York 1918) ; Keith, A., An¬ cient Types of Man5 (New York 1911) ; Hrdlicka, A., (The Most Ancient Skeletal Re¬ mains of Man) (Smithsonian Report for 1913, 2d ed., Washington 1916). On prehistoric man in America consult two critical surveys _ by Hrdlicka, A., (Early Man in South America5 (Bui. 52, Bureau of American Ethnology,

1912), and (Recent Discoveries Attributed to Early Man in America) (Bui. 66, 1918). Ex¬ tensive monographs have been published on most of the important discoveries, somatic and cultural, references to which will be found in the general works named above.

James H. McGregor,

Professor of Zoology, Columbia University. MAN WITHOUT A COUNTRY, The. Few, if any, short stories written with a pur¬ pose have achieved that purpose so completely as did ((The Man Without a Country,® by Edward Everett Hale. Written during the Civil War, it did much to inculcate patriotism at a critical period in the fortunes of the Union. The story centres about Philip Nolan, a lieu¬ tenant in the army of the United States, who came under the influence of Aaron Burr, fore¬ swore his country, and as a punishment was condemned never again to hear its name. To effect this, he is kept prisoner all through his long life, first on one ship, then on another, until at last he dies during the Civil War. Though the idea of lifelong imprisonment on shipboard is in itself novel and striking, and the naval setting is worked out with remarkable attention to detail, the chief interest of the story lies in the development of the character of the hero, who, from hating his country, grows through suffering to love her with passionate devotion. All this is told so convincingly, with such a mingling of fact and fancy and with such a wealth of contemporary allusions, that thousands of readers believed it to be an account of fact. The germ of the plot was suggested to the author through the reading of Scott's (Life of Napoleon.5 It occurred to him that if Napoleon had been passed from ship to ship instead of being confined on Saint Helena, England would have been spared much con¬ tumely and the French would not have turned Saint Helena into a shrine. The "local color,® which adds so much to the story, was gained from reading the records of the navy and the proceedings in the trial of Aaron Burr. Im¬ mediately upon its publication in the Atlantic Monthly of December 1863, (The Man Without a Country5 became famous, was copied every¬ where and was soon translated into foreign languages. It remains one of the most famous of American short stories, and among all the author's voluminous publications is the one most likely to retain its place in literature.

Marion Tucker.

MAN-OF-THE-EARTH, a local name in the Southern States for the wild potato-vine (Ipomcea pandurata). See Ipomcea; Morning-glory.

MAN-EATER, a term applied to any fierce animal which has acquired, or is believed to have acquired, a habit of killing human beings as food. Lions, tigers, leopards and other great cats are accused of it, and undoubtedly many of these beasts, finding how easily a man or woman among East Indian or African villagers may be struck down or seized when sleeping in a flimsy hut, make their lairs near settle¬ ments and for a time regularly subsist upon human victims. Such are sometimes, but not always, old cattle-thieves, whose teeth are worn, and which feel unable or unwilling to undertake the exertion of tracking and pulling down wild animals ; but this is not always the case. When

such a beast has taken his residence in a district no pains must be spared to kill him, for he will not cease his depredations. Horses, elephants camels, etc., sometimes become man-eaters in effect, understanding and exercising their power over him for harm.

A man-eater shark is the great white or blue shark (Carcharodon c archarias) , which is one of the largest and most formidable of fishes. See Sharks.

MAN IN THE IRON MASK, The. See

Iron Mask, the Man with the.

MAN AND NATURE, a work of great research written in 1864 by George Perkins Marsh (q.v.). Its full title was (Man and Nature, or Physical Geography as Modified by Human Action.5 The work became at once a standard with international recognition ; a con¬ siderably enlarged Italian edition was issued at Florence in 1870; and a second American edition, with further changes, appeared in 1874.

MAN AND SUPERMAN. In his sub¬ title Bernard Shaw announces this work as ((A Comedy and a Philosophy® ; he might, with equal pertinence, have added <(A Sermon on the Dangers of Romanticism and a Treatise on Biology, Anthropology and Social Psy¬ cholog}'.® It

is all these and it is, none the less, a successful play which has been greeted with almost continuous explosions of delighted merriment by theatre audiences on both sides of the Atlantic and has entertained still larger audiences in its printed form. The accepted canons of dramatic criticism break down before the audacious genius of a Bernard Shaw; as his American biographer, Archibald Henderson, says, ((He violates all the rules yet turns the trick.®

That (Man and Superman5 is a thesis play goes without saying. The difficulty is that there are so many theses, so brilliantly, keenly and yet paradoxically expounded, that one leaves the playhouse, or lays down the book, in a state of high mental exhilaration tempered with an irritating sense of mental confusion. The main theme is, however, easily distinguish¬ able ; it is the contention, presented also in several other of Shaw's plays (notably (The Philanderer,5 (You Never Can Tell5 and 'Misalliance5), that in the perennial love chase it is woman, driven by the Life Force, who is the pursuer and man, the quarry. This con¬ tention is made to seem more arrestingly un¬ orthodox by associating it with the Don Juan story. In the preface, addressed to the well-known English critic, Mr. A. B. Walk-ley (who figures in the prologue to (Fannie's First Play5 as ((Trotter55), Shaw says, "You once asked me why I did not write a Don Juan play … The day of reckoning

has arrived: here is the play!® The modern Don Juan as represented by the hero, John Tan¬ ner, is, however, no romantic libertine but a social revolutionist, irreproachable in his private conduct, but implacable in his revolt against false and outworn conventions, determined to save himself from the bondage of love and marriage, but succumbing m the end to the in¬ exorable demands of the Life Force as exempli¬ fied by Ann Whitefield. The half dozen other-characters are sharply drawn : Octavius, the lover for love's sake; his sister, Violet, who conducts her love affairs on business principles;

Hector Malone, the straightforward young American who sees only black and white; his millionaire father, hard-headed and soft¬ hearted; Roebuck Ramsden, orthodox Philis¬ tine ; Mrs. Whitefield, the helpless and bewildered mother, and, best of all, 'Enry Straker, chauf¬ feur and <(New Man.® The dialogue is Shaw at his best and there are no long monologues as the strictly philosophical discussion of the theme is segregated in the third act of which Shaw himself says

— again in the preface — <(I have … thrust into my perfectly mod¬

ern three-act play a totally extraneous act in which my hero, enchanted by the air of the Sierra, has a dream in which his Mozartian ancestor appears and philosophizes at great length in a Shavio-Socratic dialogue with the lady, the statue and the devil.®

By many critics ‘Man and Superman5 is re¬ garded as Shaw’s most important play since it combines some of his most cherished phil¬ osophical and social theories with the ele¬ ments of popular success. It has been cus¬ tomary to identify Shaw himself with the character and opinions of Tanner, and Gran¬ ville Barker, who played the part in the original production, was actually made up to resemble Shaw who, however, asserts that he had a certain popular Socialist orator in mind as Tanner’s prototype. The play was first produced in May 1905, under the direction of Vedrenne and Barker, at the Court Theatre, London, where so many other Shaw plays have been introduced to the public. Its first Amer¬ ican production was in September of the same year at the Hudson Theatre in New York with Robert Lorraine as director and also play¬ ing the part of Tanner. In the acting version the Don Juan interlude is always omitted but it has been given separately at the Court Thea¬ tre in London. For critical reference see bibli¬ ography given in article on Candida ; also Dick¬ inson, Thomas H., ‘The Contemporary Drama of England.5

MAN-OF-WAR, an armed naval vessel regularly employed in the service of a govern¬ ment for war purposes.

MAN-OF-WAR HAWK, or FRIGATE-BIRD, a tropical web-footed bird (Fregata aquila), of the family Pelecanidcu. The color of the adult bird is shining black, glossed with green, the female being duller in hue. Includ¬ ing the long tail the male bird reaches three feet in length, but the body is extremely small. The bill is longer than the head, strong, hooked at the point and sharp. In proportion to their size their wings are longer than in any other bird and have an extent of seven feet or more. Their flight is so powerful that they are seen more than a thousand miles from shore. They move with great difficulty on land, and rarely alight on the water. Possessing great strength and superior power of wing, the frigate-bird pursues terns or gulls which have secured a fish, and by beating them with wings and beak forces them to drop or disgorge it ; then seizes the prey before it reaches the water. It also catches flying-fish for itself. Its usual locality for breeding is the summit of some rocky cliff, but breeds among trees where there are no rocky shores, making a rough platform of sticks. There is only one chalky white egg. This species is found throughout

and a second species (F . minor) ranges about the Indian and South Pacific oceans.

MAN-YOSHU, man-yd-shoo', or MANY-OSHIU (Japanese, Collection of One Thou¬ sand Leaves), Japanese anthology, the most ancient in the language. It is believed to have been completed early in the 9th century ; it com¬ prises about 4,000 poems which form a valuable index to the history, customs and literary attain¬ ments of the time. Among its hundreds of authors the most able are Hitomaro and Aka-hito. The poems form a record of about 130 years, covering the latter part of the 7th and the early part of the 8th centuries.

MANACLE ROCKS, England, a danger¬ ous reef on the south coast of Cornwall, not far from Lizard Head and seven and one-half miles from the town of Falmouth. They are barely visible, except at low water, and there is no warning of their presence to the mariner except a bell buoy. Many wrecks have occurred here.

MANAGER, City. See City Manager, Plan of Government.

MANAGUA, ma-na'gwa, Nicaragua, (1) the capital of the state, near the southwest shore of Lake Managua, 32 miles south-south¬ west of Leon, consists of long rows of huts, and a large square lined with houses of two stories. The centre of the square is occupied by a large church, and there is another large church with a conspicuous white arched portal. The inhabitants, chiefly Indians, are industrious. A railway connects Managua with Corinto on the Pacific. Pop. about 30,000; (2) the lake, about 38 miles long, discharges itself into that of Nicaragua, above which it has an elevation of 16 feet, while its elevation above the Pacific is 156 feet. It has attracted a good deal of at¬ tention in connection with a proposed navigable communication between the Atlantic and Pacific.

MANAKINS, a rather undefined group of South American tropical

birds, mostly of the family Pipradcu, related to the North American tyrant-flycatchers. They are small, brightly colored (but the females are usually much plainer than the males), and the wings often bear curiously modified and often highly orna¬ mental feathers. They are of terrestrial habits, staying upon or near the ground in wooded places, clinging to herbs and twigs of bushes like chickadees, and subsisting upon insects largely caught on the wing. Some of the species, called ˆdansadors® in Brazil, gather in little parties in the breeding season, and. go through queer active motions, called dancing. Consult Evans, <Birds) (1900).

MANAOAG, ma-na'wag, Philippines, a pueblo of the province of Pangasinan, Luzon, situated on the Malabolo River, 18 miles east f Lingayen, an important road centre. Pop.

16,700.

MANAOS, ma-na'oos, Brazil, city and capi¬ tal of the state of Amazonas, on the Rio Negro, 12 miles above its confluence with the Amazon. A whitewashed cathedral rises in the centre of the town, which also has a custom-house, a small fort and a military barracks and hospital. The city is a steamboat station, and has a con¬ siderable trade in various forest products, but principally in india-rubber. Pop. about 20,000.

MANAR, ma-nar/ or MANAAR, Gulf of,

southern India, an ocean inlet between Ceylon and the Madras coast with an extreme width of 150 miles. It is almost closed at Palk Strait on the north by Adam's Bridge, a low reef of rocks and islands. The gulf has celebrated pearl fisheries.

MANASAROWAR , ma-na-sa-ro-war', Tibet, a sacred lake and pilgrimage resort north of the main Himalayan range, near Darchan, between the sources of the Brahmaputra and the Indus. It is almost circular in form, about 15 miles in diameter. Another lake in the same locality is the source of the Indus.

MANASSAS, ma-na'as, Va., town and county-seat in Prince William County, near a creek named Bull Run, on the Chesapeake and Ohio and the Southern railroads. It is about 35 miles southwest of Washington. Eastern College and the Manassas Industrial School are

located here. The electric-lighting plant, sewage system and water-supply system are the prop¬ erty of the municipality. Twice during the Civil War Manassas was the scene of engage¬ ments. Pop. 1,217. See Bull Run, Battle of.

MANASSAS, First and Second Battles of.

See Bull Run.

MANASSAS GAP, Engagement of. Gen¬ eral Lee, in retreating from Gettysburg, crossed the Potomac at Williamsport, into the Shenan¬ doah Valley, and 15 July 1863 marched to Bunker Hill, and occupied the gaps of the Blue Ridge. On 19 July he ordered Longstreet to march next morning to Culpeper Court House, by way of Front Royal and Chester Gap. Gen¬ eral Meade crossed the Potomac at Harper's Ferry and Berlin, on the 17th and 18th, and moved up the Loudoun Valley along the eastern side of the Blue Ridge; and on the 21st Mer¬ ritt's brigade of Buford's cavalry division, pushing well up into Manassas Gap, skirmished with the 17th Virginia Infantry, and took 20 prisoners, from whom it was ascertained that Lee was moving up the valley with the evident intention of passing to the east of the Blue Ridge. Meade ordered the Third, Fifth and Second corps to march upon Manassas Gap, directing General French, commanding the Third corps, then guarding Ashby's Gap, to hasten to Buford's support. Before dark of the 22d French reached Piedmont, and Birney's division was pushed forward to Buford's aid followed by the remainder of the corps, and at daylight of the 23d entered the Gap and re¬ lieved Merritt's cavalry, which moved up to Chester's Gap. Meanwhile, at dawn of the 23d Hood's division of Longstreet's corps had marched from Front Royal and, relieving the 17th Virginia, was deployed in the Gap. where it was relieved during the morning by Wright's brigade of about 600 men of R. H. Anderson's division, under orders to hold the Gap until relieved by Ewell, then marching from Win¬ chester. Wright's brigade was deployed at the west end of the Gap, and Rodes' division, with two batteries of artillery, coming to its sup¬ port, drew up about 600 yards in rear, and sent 250 sharpshooters to take position on its left. These dispositions were completed about 2 p.m. Meanwhile Birney's division had ad¬ vanced, steadily driving in the Confederate out¬ posts and from Wapping Heights beyond which

was Wright's line. About 4 p.m. Spinola's Excelsior bigade and two regiments of Ward's went forward at a charge and, sweeping past Wapping Heights, engaged Wright's men in a close and severe fight, driving them back upon Rodes, who stood firm, the artillery checking the Union advance about dark, Rodes' line not being engaged, and losing but 15 killed and wounded. Wright's loss was 19 killed, 83 wounded and 66 missing. French's loss was 21 killed and 84 wounded. Ewell fell back to Front Royal during the night. Next morning the Union advance marched to Front Royal, but all of Lee's army had passed and, marching swiftly through Chester and Thornston's gaps it took position on the south side of the Rappa¬ hannock. Consult (Official Records> (Vol. XXVII) ; Humphreys, (From Gettysburg to the RapidanP

MANASSEH, the older but less important of the two sons of Joseph, whose name is derived from the word <(to forget,® and ex¬ plained as signifying «he who causes one to forget,® that is ((all my toil.® (Gen. xii, 51). Although in Jacob's blessings, he was made subordinate to his younger brother, Ephraim (Gen. xlviii, 14), he was to be protected by the redeeming angel and to become a great people (Gen. xlviii, 16, 19). As the next verse reads, <(in thee shall Israel bless, saying God make thee as Ephraim and Manasseh,® the phrase forms the benediction which Jewish parents utter over their sons on the eves of Sabbaths and holidays. The name is held by one of the tribes of Israel, to which was allotted a posi¬ tion in the land of Canaan. It was the sixth in numerical strength (Num. xxvi, 34). During the journey through the desert of Sinai, its station was with Ephraim and Benjamin west of the Tabernacle, and it took a prominent part in the battle and later Israel's strongest chiefs, Gideon and Jephthah, belonged to Manasseh. Its territory was situated on both sides of the Jordan. With the centuries, the tribe fell be¬ hind Ephraim in power and prominence, and like Reuben and Gad it carried assimilation so far that it lost its identity, as it practised the idolatries of the people among whom it lived.

MANASSEH, king of Judah, Hezekiah's successor, boy of 12 on his father's death (2 Kings, xxi, 1), and reigning 53 years. In the inscriptions of Assyria, he is mentioned as a vassal king during the reigns of Esar-haddon and Assurbanipal, who were aggressive monarchs, plundered Egypt and Phoenicia as well. Further light is thrown on the calami¬ tous rule of Manasseh by the statement (2

Chron. xxxiii, 11) that the Assyrian captains took him in chains to Babylon, as punishment for Judah's disloyalty to God. On his repent¬ ance, however, he regained his throne and showed a genuine religious spirit which gave a new character to his nation. Ezekiel in a memorable chapter (viii) describes the spread of religion during Manasseh's reign and how the popular worship was a shameless blend of foreign idolatries, the influence of which was not quickly overcome, and against which the prophets declaimed at the peril of their lives. A prayer in Greek attributed to Manasseh, when captive in Babylon, is found in the Apoc¬ rypha, but never recognized as canonical by the Church. Jewish tradition makes no reference

to. it. Late critics claim that the prayer was originally in Hebrew.

MANASSEH, son of Johanan, the high priest and brother of Jaddua, and who married Sanballat's daughter. In Nehemiah (xii, 28) he is referred to without name, and he is fur¬ ther declared as having been deposed from the priesthood on account of being Sanballat's son-in-law. In Josephus (Antiq. xi, 8, 2-4), a fuller account is given. Incensed at Manasseh s mar¬ riage with a. foreign woman, his brother Jaddua, the high priest, placed before him the alterna¬ tive of 'divorcing his wife or giving up the priesthood. When he went to Sanballat and frankly declared his preference for the priest¬ hood, despite his love for his wife, his father-in-law assured him if he would retain his wife that the king would give him the rank of high priest. Sanballat added that when he built with the king's approval a temple on Mount Gerizim, Manasseh should be its high priest. Hence he remained with his father-in-law, and became high priest in the Samaritan temple on Gerizim. A conflicting passage in Josephus (Antiq. xii, 4, 1) mentions Manasseh as high priest at Jerusalem between the priesthood of his nephew Eleazar and that of Onias II.

MANASSEH BEN ISRAEL, Hebrew scholar: b. La Rochelle, 1604; d. Middleburg, Netherlands, 26 Nov. 1657. His parents had re¬ sided at Lisbon but persecution rendered it prudent for them to remove to the north, and after a comparatively brief sojourn at La Ro¬ chelle, the family settled in Amsterdam, where the subject of this sketch was educated. In 1620 he became rabbi of the congregation Neveh Shalom of Amsterdam, and soon became a noted preacher. He started the first Hebrew press in Holland in 1627, published a prayer-book, a He¬ brew grammar and an edition of the Mishnah. In 1632 appeared the first volume of his great work, (E1 ConciliadorP a commentary and dis¬ cussion of the discordant passages of the Old Testament. This

work, written in Spanish, brought Manasseh great fame among the learned of his time and he maintained a cor¬ respondence with Grotius, Bartaeus and others. He sought the readmission of Jews to England but although favored by Cromwell his project did not receive the approval of Parliament. Other works from his pen are (Hope of IsraeP (1650); (Pedro Glorioso) (1655); Windioise JudaeorunP (London 1656) ; (De la fragilidad humana) ; (Thesoro dos Dinim,* *etc.*

MANATEE, an aquatic mammal or <(sea-cow® of the order Sirenia (q.v., for general structure), several species of which inhabit the fresh waters along the eastern coasts of trop¬ ical America and of western Africa. The body is somewhat seal-like in shape, reaches a length of 8 or 10 feet, has a large round head with bristly, tumid lips, no apparent neck, no exter¬ nal ears, the forelimbs converted into paddles, no hind limbs, and the tail spade-shaped, like that of a beaver. The thick wrinkled skin is blackish, and almost hairless, but a coat of short, seal-like fur clothes the foetus, indicating descent from furry ancestors. Structurally the manatee differs from other si remans in having only six cervical vertebrae, and in the large num¬ ber of imolar teeth, which apparently go on in¬ creasing indefinitely during the animal's life, — the suggestion being, as Beddard points out, that

MANAYUNK

they are worn away by the attrition resulting from so much sand being mixed with the daily food. The cleft lip to be mentioned hereafter as also a generic peculiarity. The manatees are stupid, gentle, defenseless and harmless crea¬ tures, showing great affection for their young, one or two in number, which are nursed at pec¬ toral udders, often while the mother stands erect upon her tail enfolding the ˆcalves® with her broad arms. They never come ashore, but secrete themselves amid aquatic vegetation, where ‘the only enemies they need fear are the larger alligators and the jaguar. Their food consists of fresh-water weeds and their roots, and these are procured by means of the curious form of the upper lip: <(this is split in two, and the two halves, which are furnished with strong bristles, can play upon each other like the points of a pair of forceps.® This cleft-lip is only suggested in the case of the dugong, but the foetus of that animal shows the structure plainly, indicating that the manatee is the more primitive form of the two. The flesh is excel¬ lent for food. The American manatees have been nearly exterminated. They formerly abounded in the Indian River and other marshy waters about southern Florida, but by the end of the 19th century had been reduced to a small, carefully protected band near Biscayne Bay in the Miami River. They still survive in small numbers along the coast of the Carribean Sea and about the mouths of the Orinocco. The Florida manatee is called by American zoologists Manatus latirostris, and is regarded as different from those of Central and South America, long known as M. americanns. The African species is M. senegalensis. Consult Beddard, _ Mam¬ mals5 (1901) ; Alston, (Biologia Centrali-Amer- ioana) (1875); (Standard Natural History5 (Vol. V, 1885) ; Townsend, C. H., (Notes on the Manatee5 (in New York Zoological Soci¬ ety’s Eighth Annual Report, New York 1904).

MANAYUNK, man-a-yunk’. See Phila¬ delphia.

MANBY, George William, English in¬ ventor: b. Denver, Norfolk, 28 Nov. 1765; d. Southtown, Great Yarmouth, 18 Nov. 1854. He was educated at the military college of Wool¬ wich, and became in 1803 barrack master at Great Yarmouth. His attention having been drawn to calamities resulting in cases of ship¬ wreck, from the difficulty of establishing com¬ munication with the shore, he attempted cast¬ ing a rope from the shore to the wreck by the agency of gunpowder. Chains were unable to stand the shock of the discharge, but stout strips of rawhide closely platted together were found to answer, and

on 12 Feb. 1808 the entire crew of the brig Elizabeth, wrecked within 150 yards of the beach, were rescued by the simple contrivance of Captain Manby. In 1810 his invention was brought before a committee of the House of Commons, and having been favor¬ ably reported on, he received a grant of money, and all the dangerous stations on the British coasts were supplied with his apparatus. He also contrived shells filled with luminous mat¬ ter, to enable the crew to perceive the approach of the rope, in the manufacture of which he suggested sˆrera1 :mr)rovements.

MANCHESTER, Conn., town, in Hartford County, on the Hockanum River, and on the

New York, New Haven and Hartford Railroad (formerly New England Railroad), about eight miles east of Hartford. Until 1823, when it was incorporated as Manchester, it formed a part of East Hartford; it includes the villages of Highland Park, Buckland, Manchester, Man¬ chester Green and South Manchester. The town has extensive manufacturing plants, the most important being the Cheney Silk Mills. It has also cotton and woolen mills, paper mills, needle works, soap works and electrical supply works. A large amount of tinware is made in Manchester. There are two public libraries, one in the village of Manchester and one in South Manchester. The town was reincorporated in 1907 and the government is after the commis¬ sion model, seven men being elected as super¬ visors. Pop. (1920) 18,370.

MANCHESTER, England, an episcopal and university city, inland port and Parliamen¬ tary and county borough of Lancashire, 183 miles north of London and 31 miles east of Liverpool, on the Irwell, an affluent of the Mersey, since 1894 connected with the sea at Eastham, on the Mersey, by the Manchester Ship Canal, 35*4 miles long. It is one of the principal manufacturing cities of the world and the cotton trade centre of Great Britain. It covers over 21,645 acres. Railways and electric street tramways communicate with the sur¬ rounding towns and villages of the most popu¬ lous industrial region of England.

Geology. — Manchester is built on a large plain, within easy distance of breezy hills and moorland, which are clearly visible from the outskirts of the city. The surface of the ground is composed of thick deposits of glaoial drift — boulder clay, sands and gravels — be¬ neath which are Triassic, Permian and Carbon¬ iferous rocks. Rich coal-fields are found in the neighboring parts, some of which extend

under a portion of the city.

Industries and Finances. — Though Man¬ chester is the chief seat of the cotton trade, it is no longer that of its manufacture, much of that industry being carried on in towns and villages beyond its borders. A considerable number, however, remain of cotton mills, print works, dyeing and bleaching concerns and fac¬ tories concerned with other branches of textile manufacture. Engineering and machinery works are exceedingly numerous, as are the manufactories of electrical appliances. It is calculated that there are about 700 different industries carried on here, some of the chief among them, apart from those named above, be¬ ing chemical, India rubber, paper and glass works. The membership of the Royal Ex¬ change is over 7,000 and the Grocery Exchange about 3,000. There are also stock, corn, pro¬ vision, coal and cotton-waste exchanges. The vegetable and fruit market serves for the whole of South Lancashire and part of Cheshire, while the fish market is second only to Billings¬ gate. There are nearly a score of banks, with numerous branches. The business of the post office exceeds that of any other out of London.

Bridges and Railway Terminals. — The bridges are of no engineering importance, as the Irwell is here but a narrow river. The terminal railway stations are six in number. (1) London Road, 18ˆ2, rebuilt 1881; (2) Vic¬ toria, 1844, since greatly enlarged; (3) Oxford

1 West Indian Manatee

2 Short-tailed Indian Manis

Road; (4) Central, 1877, near which the Mid¬ land Railway Company have erected a great hotel; (5) Exchange, 1884; (6) Deansgate, 1898, for the goods traffic of the Great North¬ ern Railway. The oldest railway station in the wTorld is still to be seen in Liverpool Road, though not used for its original purpose. It was opened in 1830.

Buildings. — The principal public budding is the town-hall, commenced in 1868 and com¬ pleted in 1877, at a cost, including land, of up¬ wards of a million pounds. It covers an area of 8,648 square yards. The clock-tower is 286 feet high and contains a peal of 21 bells. In the great hall is a series of frescoes by Ford Madox Brown, illustrating incidents in the history of Manchester. The old town-hall, erected in 1825, is now occupied as a Free Reference Li¬ brary. It is a classical building, and another of the same style and period is the City Art Gallery, formerly known as the Royal Institu¬ tion. The Royal Infirmary, which originated in 1752, is situated in one of the finest positions in the centre of the community, but has been removed to an exclusive new building on a site on the outskirts. The Free Trade Hall (1856), built in the Italian style, will hold 5,000 people and has been the scene of many great political meetings and of the renowned con¬ certs conducted by Sir Charles Halle and Dr. Hans Richter. In <a similar style is the Royal Exchange (1868-74), one of the most spacious erections of its kind. The area of the great hall is 5,170 square yards. The Assize Courts by Alfred Waterhouse, the architect of the town-hall, were built in 1864, at a cost of £100,- 000. Immediately to their rear is the county jail. The university buildings are also by Waterhouse. The John Rylands Library, by Basil Champneys, is perhaps the chief archi¬ tectural gem of the city. Other examples of street architecture worthy of attention are the City Police Courts, the Corn Exchange, the In¬ land Revenue Offices, the Post Office, new Fire Brigade Station, Reform and Conservative clubs, and many of the banks, insurance offices and warehouses. The Municipal School of Technology is one of the most striking examples anywhere of a well-equipped school in an im¬ posing building.

Educational Institutions. — Manchester Uni¬ versity (q.v.) was

reconstructed as an inde¬ pendent corporation in 1903. It was originally founded as the Victoria University in 1880, with a federation of the Owens College, Manchester, and the University College, Liverpool, as its colleges, to which the Yorkshire College at Leeds was afterward added ; but in 1903 a sepa¬ rate university charter was granted to each city. The Qwens College, which has now been incorporated with the university, was founded in 1850 by the aid of nearly £100,000 left by Mr. John Owens. It began work in a large house formerly occupied by Richard Cobden and was removed to the present fine buildings in 1873. Since then the Museum, Christie Li¬ brary, medical school, physiological and other laboratories and the Whitworth Hall have been added and the institution has benefited from many large gifts and bequests. The splendid Municipal School of Technology is affiliated to the university, and the subjects in the faculty of technology are taken there. The faculty of theology was instituted in 1904, and the co¬

operation of the various theological colleges was obtained. These include Baptist, Free Metho¬ dist, Independent, Primitive Methodist, Roman Catholic, Unitarian and Wesleyan colleges. The oldest educational institution in the city is the Grammar School, founded by Bishop Hugh Oldham in 1515. It has now 1,070 scholars. Many distinguished names appear in the records of its alumni. Chetham's Hospital is named below. The following may be added: The Girls' High School, the Hulme Grammar School (founded by the Hulmean trustees), the Nich-olls Hospital, Warehousemen and Clerks' School and the Royal Manchester College of Music, founded in 1893, as well as the numer¬ ous elementary and other schools.

Libraries. — Of libraries, the most recent, the John Rylands Library, is the most widely known, on account of its marvelous collection of rare and costly books and manuscripts. Its 100,000 volumes embrace the Althorp Library, purchased from Earl Spencer, and Lord Craw¬ ford's collection of manuscripts. It was founded and endowed by Mrs. Rylands in mem¬ ory of her husband and was opened in 1899. The Chetham Library dates from 1656, from which time it has been open free to all, and is part of the foundation of Humphrey Chetham, the other part being a hospital or school for poor children. The Public Free libraries were established in 1852 and are supported by a pub¬ lic rate, which now yields over £35,000 a year. The chief or reference library contained (1913) 174,931 volumes and the 24 branch or lending libraries some 253,000 volumes. The Christie Library at the university was built by the late Mr. R. C. Christie, and on its shelves

are the entire libraries of Mr. Christie, of Bishop Prince Lee, Prof. E. A. Freeman, in addition to other special and general collections. The Medical and Law libraries belong to the members of those professions, and there are other public and semi-public libraries of importance.

Art Galleries. — The City Art Gallery has been maintained by the corporation since 1882 and contains many fine examples of the British school, particularly works of Millais, Leighton, Holman Hunt, G. F. Watts and other modern artists. In this gallery, which formerly be¬ longed to the Royal Institution, annual exhibi¬ tions have been held since 1827. The Man¬ chester Academy of Fine Arts also holds its exhibitions here. Attached to the Municipal School of Art is a well-arranged art museum, and in 'the Whitworth Institute galleries in Whitworth Park will be found a rich collec¬ tion of pictures, including a nearly complete series of specimens of the best English water colors, from those of Sandby, Girtin and Tur¬ ner onward. The institute is one of many bene¬ factions enjoyed by Manchester from money left by Sir Joseph Whitworth.

Churches. — When the diocese of Man¬ chester was founded in 1847 the Collegiate Church became the cathedral. It is of un¬ known origin, but the present perpendicular Gothic building was raised, on an earlier foundation, about 1422. A large part has been rebuilt, mainly on the old lines, in recent years, yet many interesting portions of the earlier building remain. The ancient stalls in then* choir have exquisitely carved canopies. The ancient parish consisted of 29 townships, in¬ cluding Salford, and some of them had chapels

of their own. In 1850 (the ancient parish was divided into independent parishes by Act of Parliament. Next to the cathedral the oldest church is Saint Ann's (1712), which contains some beautiful windows by F. G. Shields. Many of the 19th century ohurches are of con¬ siderable pretensions. Besides 91 belonging to the Church of England there are 28 Roman Catholic churches and many others belonging to various sects. The Jews have 11 synagogues, and 'there is a Greek and an Armenian church.

Hospitals. — Hospitals to the number of 17, all maintained by voluntary subscription, are provided for the treatment of nearly every complaint to which the human frame is liable. The Royal Infirmary is the chief one. Saint Mary's Hospital and the Eye Hospital are others of large dimensions, while (to the Hos¬ pital for Consumption is attached a sanatorium at Delamere in Cheshire, which was provided at a cost of £70,000 by a local benefactor (W. J. Crossley). In addition there are several dis¬ pensaries and asylums, and a large number of charitable institutions of various kinds.

Societies. — The literary and scientific so¬ cieties are many in number and of high stand¬ ing. The Chetham Society and the Record So¬ ciety devote themselves to the publication of historical records of Lancashire and Cheshire. The Antiquarian Society (1883) has similar ob¬ jects. The Literary and Philosophical Society was founded in 1781, the Literary Club in 1862, the Statistical Society in 1833, the Geological Society in 1839, the Geographical Society in 1884. These, as well as the Microscopical, and some other societies, all publish their transac¬ tions. Musical 'societies are numerous and vigorous, and the artists, architects, lawyers, doctors, accountants and men of other callings have their own societies.

Public Works, Parks, *Etc.* — The corpo¬ ration is the owner of the waterworks that supply Manchester and Salford and some sur¬ rounding towns and villages. The water comes from Longdendale on the borders of Derby¬ shire and Thi rimer e in Cumberland, and the works have cost over £8,000,000. The average quantity of water supplied per day is 38,000,000 gallons. The gas works have been the property of the corporation since the incorporation of the borough, and have always yielded a profit in aid of the rates. The -supply of electricity is also a municipal undertaking. So also, the fire brigade,

public abattoirs, the foreign animal wharf on the Ship Canal, cold-air stores and the extensive sanitary works. The markets and the electric tramways are under municipal owner¬ ship. The city has many public parks, open spaces and playgrounds. The area of the lar¬ gest (Heaton Park) is 662 acres and its cost was £220,000. The other municipal works in¬ clude baths, cemeteries, workmen's dwellings, infectious diseases hospitals, libraries, art gal¬ leries, technical school and school of arts. The council is also the local education authority for the city. The construction of the Ship Canal involved an outlay of £15,000,000, one-third of which was lent by the corporation, who ap¬ point 11 out of the 21 directors of the Ship Canal Company.

Government. — Since 1838 Manchester has been governed under the .Municipal Corpora¬ tions Acts and a long series of local statutes. The council consists of 144 members, 35 of

whom are aldermen. The head of the council is styled lord mayor, that title being confered in 1893. The administration of the Poor Law is entrusted to three boards of guardians, for the Central and the North and South townships, and there are separate workhouses and other necessary establishments. There is a court of record for the trial of civil actions, established in 1838 and reconstituted in 1858, and now amalgamated with the court of record of the hundred of Salford, and. since 1839 there has been a separate commission of the peace and separate quarter sessions. The Assize, County, Chancery and other law courts held in the city are not under local control.

History. — Manchester was in prehistoric times occupied by the Britons, as proved by urns and implements that have been unearthed, and abundant Roman relics bear evidence to a long period of Roman occupation. Little is known of the rule of the English or Saxons, but among other traditions is that of Queen Ethelbega, wife of Ina, king of Wessex, having lived here in 689, and of the Danes sacking the town in 863. In 923 King Edward the Elder, son of Alfred the Great, rebuilt and fortified Manchester. Manchester is mentioned in the Domesday Book, 1086, as possessing two churches, one of which is now conjectured to have been at Ashton-under-Lyne, originally in the parish. The barony of Manchester was held by (the Gresleys, 1086 to 1313, and the last of that family granted a charter to his burgesses in 1301, and it was by (this charter that the town was governed for over five centuries. The manor was afterward held by the De la Warres and the Wests until 1579, when it was sold to John (Lacye, a London mercer, for £3,000, who in turn disposed of it in 1596 for a profit of

£500 to Sir Nicholas Mosley, a Manchester man, who had become a prosperous London merchant, destined to fill the office of lord mayor three years after his purchase of the manor. In his family the manor remained until 1845, when the whole of the manorial rights were purchased by the corporation for £200,000. One of the lords of Manchester, Thomas la Warre, entered the priesthood, became rector of the parish and in 1421 provided the means for collegiating the church, and gave his manor-house as a resi¬ dence for the clergy of the college. This house, now known as Chetham's Hospital, is, apart from the church, almost the sole architectural relic of feudal Manchester. After the Reforma¬ tion the building was confiscated by the Crown, and in the reign of Edward VI passed by pur¬ chase to the Earl of Derby. In his family it remained until the Commonwealth, when it was sequestered by the Parliament, with other pos¬ sessions of the royalist Earl of Derby. In 1656 it was purchased by the executors of Humphrey Chetham and turned to its present uses. Manchester was visited in 1495 by Henry VII. It is unknown when the town began to be established as a trading and manufacturing centre, but it is clear from the Act of 1541 that a considerable commercial position had by that time been attained. Manchester holds an important position in the earlier history of the civil wars. At the outset the townsmen took the side of -the Parliament, and made an effort to avert the conflict by presenting a petition to King Charles. The town was besieged by Lord Strange, who was repulsed. Prior to the actual

siege he demanded the delivery of the maga¬ zine, and in an affray which ensued a man was killed. This was on 15 July 1642, and the fatality was one of the first that occurred in the wars. The town was represented in Crom¬ well's first and second parliaments. In 1715 there were many Jacobites among the influential townsmen, and in the rising of 1745 the Young Pretender found numerous adherents here. Some of them, on the failure of the rebellion, were executed for their treason. The Duke of Bridgewater opened his canal from Worsley to Manchester in 1761, and the extension to Run¬ corn was completed in 1795. Distress, caused by the wars v and high taxation, was a main cause of the political discontents which marked the first two decades of the 19th century, and are remembered by a weavers' riot in 1808, the "blanketeers® meetings in 1817 and the disas¬ trous Peterloo affair of 1819, when, at a meet¬ ing to petition Parliament for the redress of grievances, several people were killed and many more injured during a charge of the military, after the reading of the Riot Act. The Man¬ chester and Liverpool Railway was opened in 1830, marking a new era in internal communi¬ cation. Manchester was enfranchised by the Reform Act of 1832, - getting two members. (Under the redistribution of 1917, members are allocated to the oity). The Anti-Corn Law League was established in 1839, and prosecuted a vigorous campaign throughout the country, culminating in the repeal of the Corn Laws in 1846. In 1847 the bishopric of Manchester was created and the collegiate church converted into a cathedral. Queen Victoria paid three visits to Manchester, the first in 1851, the second in 1857 and the last in 1894, when she opened the Ship Canal. The great Art Treasures Exhibi¬ tion was held in 1857 and the Jubilee Exhibition in 1887. Both were remarkably successful, the latter yielding a profit of £43,300, which was devoted to public uses. From 1862 to 1865 there was great distress throughout the cotton manufacturing districts, owing to the American War; a relief fund of over $1,000,000 of money was raised on behalf of the operatives. The Ship Canal was projected in 1882 and opened in 1894. In March 1902 the city was visited by the Prince and Princess of Wales, who came to open the Whitworth Hall at Owens College; in July 1905 King Edward VII opened a new dock at the Ship Canal.

Population. — The population of Manchester is about 714,333. In 1841 it was 242,983; in 1871, 351,189; in 1891, 505,368; in 1901, 644,873. The great increase is partially accounted for by the extensions of the city boundaries which took place in 1885, 1890, 1904 and 1909.

Bibliography. — Axon, (Annals of Man¬ chester (1886); Bannerman and Sons, ‘Mer¬ cantile Manchester, Past and Present J (Man¬ chester 1896) ; Darbyshire, (A Booke of Old Manchester and Salford } (ib. 1887) ; Harland, <Mancestre> ; Howells, W. D„ ‘Seven English Cities y (New York 1909) ; Hudson, ‘Manches- • ter Municipal Code) (6 vols.) ; Perkins, ‘Cathedral Church of Manchester } (ib. 1903) ; Proctor, ‘Memorials of Bygone Manchester with Glimpses of the Environs* (Manchester 1879); Boeder, ‘Roman Manchester (1900); Tait, ‘Mediaeval Manchester > (1904); Ware, ‘Foundations in Manchester* (4 vols., 1828) ; Wheeler, ‘ Manchester * (London 1836) ; Whit¬

aker, ‘History of Manchester* (ib. 1773) ; ‘Manchester Official Handbook,* published an¬ nually; ‘Handbook and Guide to Manchester,* edited by J. H. Ray (1902), and the ‘Victoria History of Lancashire* (Vols. II, IV, London

1908, 1911).

Charles W. Sutton,

Chief Librarian, Manchester Public Free Libraries.

MANCHESTER, Iowa, city, county-seat of Delaware County, on the Maquoketa River and on the Illinois Central Railroad, about 130 miles northeast of Des Moines and 45 miles west of Dubuque. It is situated in an agricul¬ tural region and its excellent water power is utilized in manufacturing industries. The chief manufactures are woolen goods, tiles, brick, fencing, flour, wagons, carriages and dairy products. Manchester is the trade centre of a large part of Delaware and the adjoining coun¬ ties, and ships farm produces, dairy products and livestock. A United States fish hatchery is in the vicinity. Pop. (1920) 3,111.

MANCHESTER, Mass., town, in Essex County, on Massachusetts Bay and on the Bos¬ ton and Maine Railroad, about seven miles southwest

of Gloucester. The first settlement was made in 1630, and until 1645 the place was called “Jefrey’s Creek,® when the name was changed to Manchester and the town was in¬ corporated. Since 1845 Manchester has been a favorite summer resort, one of the attractions being a singing beach. In addition to good pub¬ lic schools the town has a free public library in the Coolidge Memorial. Pop. 2,466. Con¬ sult Lamson, ‘History of the Town of Man¬ chester. *

MANCHESTER, N. H., the principal city of the State, one of the county-seats of Hills¬ boro County, on the Merrimac River at the mouth of the Piscataquog, 18 miles south br¬ east of Concord, and on the Boston and Maine Railroad. The first settlement was made in 1722 and for a number of years it was called Amoskeag and Harrytown. ‘In 1 7*5 1 it was in¬ corporated as Derryfield and in 1810 the name was changed to Manchester. It was chartered as a city in 1846. The Amoskeag Falls (55 feet) in the Merrimac, above the city, provides extens¬ ive water-power which, by means of canals, is made available for manufacturing. Cotton goods manufactures and woolen goods manu¬ factures are the city’s largest industries and

rank among the largest in the world. The

Amoskeag Manufacturing Company employs over 16,000 operatives and the Manchester

Mills 3,000. The cotton mills output averages

250,000,000 yards annually. Manchester is also a great shoe manufacturing centre, its annual output valued at $20,000,000, making it rank fifth in the country in this industry. There are numerous other manufactures, representing about 60 different industries. These include brush works, hoisery mills, paper mills, iron works, tanneries, woodenware, furniture, and lumber works, *etc.* The industries employ over 25,000 persons, represent a capital investment approximating $30,000,000, and produce annually goods valued at about $70,000,000. The city commands extensive views of the Merrimac Valley, covers an area of 35 square miles, is well laid out and its residential dis¬ tricts present an attractive appearance. It is

the seat of a Roman Catholic bishop since 1884. The most noteworthy architectural struc¬ ture is the Carpenter Memorial Library, one of the finest in New England. Another prominent building is the Institute of Arts and Sciences. Other structures of note are the Gale. Masonic and Children's homes, Elliott, Notre Dame and Sacred Heart hospitals, Women's Aid Home and Holy Angels' Convent, the Federal Build¬ ing, County Court House, and State Reform School. The city has 200 acres distributed in 15 public parks. In one is a monument to Gen. John Stark, who was born in Manchester. The water-supply system, owned by the city is fed from Lake Massabesic. Educational insti¬ tutions include high schools, elementary public and parish schools, teachers' training school, two academies and St. Anselm's College. Pop. 78,384.

MANCHESTER, Va., a former city of Chesterfield County, on the James River and on the Atlantic Coast Line, the Seaboard Air Line and the Southern railroads. It is opposite Richmond, with which it is connected by sev¬ eral bridges. It is situated in an agricultural and coal region, and its industries are con¬ nected largely with the products of the farms and mines. At Manchester there is a fall in the James River of 100 feet in about six miles. The extensive water power is used for manu¬ facturing in both Richmond and Manchester. Its chief manufacturing establishments are foundries, cotton mills, flour mills, woodenware factories, paper mills, glass works, brick yards and the repair shops of the Southern Railway. The city, with its population of nearly 10,000, was annexed to Richmond in

1906.

MANCHESTER, Vt., town, one of the county-seats of Bennington County, on the Bat-tenkill River and on the Rutland Railroad, 32 miles south by west from Rutland. < Manchester was one of the disputed places in the early days, when what is now Vermont was nearly all owned by New Hampshire, but a part by New York. The town of Manchester was in¬ corporated in 1761 and the village in 1900. It is situated in a beautiful locality at the foot of Mount Equinox, which is 3,847 feet above the sea. The village is in a fertile farming section. An excellent quality of marble is found in the vicinity and the forests furnish a large amount of timber for several lumber mills. The wrater from mineral springs nearby is shipped to many parts of the country. Fish¬ ing-rods and ginger champagne are manufac¬ tured extensively. It is the seat of Burr and Burton Seminary and has the Mark Skinner

Memorial Library, which contains about 21,000 volumes. Manchester has been a favorite sum¬ mer resort for over 125 years, and for the past 60 years this business has been the largest sin¬ gle business in town and is steadily growing. Pop. 2,044. Consult Munson, (The Early His¬ tory of Manchester > (Manchester 1876).

MANCHESTER CANAL, England, a

great ship canal, by which Manchester (q.v.), an inland town, was virtually converted into a seaport. See Ship Canals, under Canals.

MANCHESTER UNIVERSITY. This

university, officially styled the Victoria Univer¬ sity of Manchester, has grown out of the Owens College, which was founded under the will of John Owens, a Manchester merchant

who died in 1846, leaving £96,654 for the foun¬ dation of a college which should be free from religious tests. It was opened on 12 March 1851 in a house in Quay street, formerly the residence of Richard Cobden, with a staff of five professors and two teachers. It was orig¬ inally governed by trustees under the founder's will, but by acts of Parliament, passed in 1870 and 1871, a new governing body was formed. The first principal was Mr. A. J. Scott, who resigned in 1857, and was followed by Dr. J. G. Greenwood, who held the office for 32 years. In 1889 Dr. A. W. Ward was appointed, at the end of 1897 he was succeeded by Dr. (now Sir Alfred) Hopkinson, Prof. F. E. Weiss in 1913 and Sir Henry A. Miers in 1915.

About 1870 a movement was started to pro¬ vide a new site and buildings for the college and a fund of about £100,000 was raised. The new college in Oxford road, built from the de¬ signs of Mr. Alfred Waterhouse, was opened in 1873. Many subsequent additions have been made, including the medical school, the Beyer laboratories (natural history), the museum, the Whitworth engineering laboratory, the Schorlemmer laboratory (organic chemistry), the Christie Library, the physical laboratory, the Schunck chemical laboratory, the Whitworth Hall, the new engineering department, the John Morley chemical laboratories and the bacterio¬ logical laboratory in connection with the de¬ partment of public health.

In 1872 the Manchester Royal School of Medicine was amalgamated wfith the college and has become a most important department, being now one of the greatest medical schools in the country. Frequent

extensions have been made.

The library contains about 143,723 volumes and includes the entire collections of Dr. R. C. Christie, Dr. E. A. Freeman, Prof. Milnes Mar¬ shall and other eminent scholars. The library building was erected by the munificence of Dr. Christie, who had been professor of history in the college.

The museum building was erected in 1884-88. It originated in the gift of the collections of the Manchester Natural History Society and the Manchester Geological Society, together with the proceeds of the sale of their museum building. It is one of the completest and best arranged natural history museums in Great Britain. It is open free to the public and its management is vested in a committee of rep¬ resentatives of the city council and of the sub¬ scribers as well as of the university.

There are five halls of residence, three for men and two for women, for the benefit of stu¬ dents living at a distance from Manchester.

By the generosity of benefactors the stu¬ dents are provided with a gymnasium and a spacious athletic ground.

A striking instance of the popularity of the college was shown in 1902, when its jubilee was commemorated, bv the raising of a fund of £102,500, out of which the debts of the col¬ lege were paid and the general endowment in¬ creased.

The idea of elevating the college to the rank of a university was first broached in 1875 by Professors Greenwood, Morgan, Roscoe and Ward, but when memorials for a charter were in 1877 presented to the Privy Council, opposi¬ tion was made by the Yorkshire College, Leeds,

and by other bodies in order to prevent a uni¬ versity charter being conferred on Owens Col¬ lege alone. It was finally agreed that the new university should bear the title of the Victoria University, and that while Owens College should be the first college of the university, yet provision should be made for the admission from time to time of other colleges. The roval charter creating the university was granted on 20 April 1880. University College, Liverpool, was admitted as the second college on 5 Nov. 1884, and the Yorkshire College as the third college on 3 Oct. 1887. It provided that the university should have its seat in Manchester and that the meetings of the university court and council and of the convocation should be held in that city. A subsequent charter, dated 20 March 1883, gave power to confer degrees in medicine and surgery.

A movement began in 1902 in Liverpool for the foundation of a separate university for that city, and thereupon the Owens College pre¬ sented a petition for the reconstitution of the Victoria University as an independent univer¬ sity for Manchester. Both petitions met with favor by the Privy Council and the new char¬ ter of the Victoria LJniversity of Manchester was granted on 15 July 1903, and on 24 June 1904, an act for the incorporation of the Owens College with the university received the royal assent. Leeds obtained its own university charter on 25 April 1904.

Under the present constitution the authori¬ ties of the university are (1) the chancellor; (2) the vice-chancellor; (3) two pro-vice¬ chancellors; (4) the court of governors, which consists of 89 members; (5) the council, which is an executive body and consists of 24 mem¬ bers, including four representatives of the sen¬ ate ; (6) the senate, 50 members; (7) the board of faculties; (8) convocation, which now con¬ sists of 1,530 members.

The following are the various faculties : Arts (degrees B.A., M.A., Litt.D.) ; science, with a special department of education (de¬ grees B.Sc., M.Sc., D.Sc.) ; law (degrees LL.B. and LL.D) ; music (degrees Mus.B. and Mus.D.) ; commerce (degrees B.Com. and M.Com.) ; theology (degrees B.D. and D.D.) ; technology (degrees B.Sc.Tech. and

M.Sc. Tech.); medicine (degrees M.B., Ch.B. — *i.e.* bachelor of surgery — M.D. and Ch.M.). In the dental department there are degrees of B.D.S. and M.D.S., and in the department of public health diplomas are granted (D.P.H.) as well as D.V.S.M., ie., Diploma in Veterinary State Medicine.

There were 1,415 students in the several faculties of the university in 1914—15, marking a decrease from the previous year, owing to war conditions, of 25 per cent.

The capital of the university amounts to about £1,060,000, including £416,000 value of buildings, etc., and the annual income to over £60,000, derived from endowments, government grants, grants from the city of Manchester and other municipal bodies, and from fees.

MANCHURIA, man-choo'ri-a, China, com¬ prises the northeasternmost portion of the em¬ pire, called by the Chinese Tung San Sheng, (<Three Eastern Provinces." from its adminis¬ trative divisions, Hilling Kiang, the. 'northern province; Kirin, the central province and Sheng-King, the southern province. It lies

mainly between lat. 40° and 53° N. and long. 118° and 135° E., and is separated from Asiatic Russia on the north and northeast by the Amur, on the east by the Usuri and on the northwest by the Argun. On the west it is bounded by Mongolia and China proper, part of the bound¬ ary being the Palisade Barrier, separating it from the province of Pe-chi-li; on the south the boundaries are the Liao-tung Gulf, the Strait of Pe-chi-li, Korea Bay, the Yalu River and Korea. The estimated area is 363,610 square miles. Vast chains of mountains ramify all over the country, one of them forming the south limits of the valley of the Amur. The principal rivers are the Amur; the Argun; the Sungari, the vast basin of which occupies a great part of the territory ; the Usuri, like the Sungari, a tributary of the Amur; and the Liao-ho, flowing south into the Gulf of Liao¬ tung. The Nonni is an important southward¬ flowing tributary of the Sungari and the Hurka or Khurkha joins the same river from the south.. The climate is in most parts health¬ ful and invigorating. In the northern and more elevated parts the cold of winter is in¬ tense, the thermometer sometimes falling to 48° below zero and the snow lying for six months in the year. The summer temperature reaches about 90° in the shade. There are no roads in the modern sense of the word, transportation being best in winter on the frozen rivers.

The vast forests of the north are rich in useful timber of all kinds, such as walnut and cak, together with the soft pine and fir. They abound in wild animals, the tiger, panther, bear, wolf and stag, as well as the eagle and other birds of prey. The rivers abound with fish. The soil is exceedingly fertile, especially in the valleys of the Liao and Nonni rivers. In the summer the southern part looks to an Amer¬ ican much like Illinois, and one may find on. its most northern hills lilies-of-the-valley, pink peonies, white and yellow daisies and the frag¬ ile dog roses, as in Wisconsin and Minnesota. With the exception of four ice-locked months its fields are luxuriant with wheat, barley and millet, so that it has come to be called the (<Gar-den of China."

It has one of the richest soils in the world and with the development of the Loya bean in¬ dustry has grown more rapidly than any other Chinese province. Not one-fifth of the arable land is under cultivation. In the warmer por¬ tions the grape vine, indigo, cotton, opium, to¬ bacco, sorghum, rice, ginseng, etc., are culti¬ vated, the opium poppy being a valuable, crop. The silkworm also is reared. The mineral wealth of Manchuria is great, but as yet is little developed. Iron, gold, silver, coal, peat, etc., occur in abundance. Not more than 10 per cent of the people of Manchuria are Manchus, Chinese forming 90 per cent of the popu¬ lation. The Manchus are a Tungusian race. They are of a lighter complexion and a more powerful build than the Chinese, have the same conformation of the eyelids, but their counte¬ nances are far more expressive and intellectual. In the 1 7th century they invaded China and placed their leader's son upon the throne. From that time to 1911 the Manchu dynasty con¬ tinued to reign in China, the Manchu language being the court and official language. Man¬ churia possesses a probable native population of 20, (XX) ,000, of whom 10,000,000 inhabit the

southern province of Sheng-King, 8,000,000 the central province of Kirin, and 2,000,000 the wild northern province of Hiking Kiang; but esti¬ mates of total population vary from 5,750,000 to 29,400,000. A great immigration from Russia, China, Korea and Japan took place especially after the Russian occupation in 1900. See China.

For a considerable time prior to 1891, when the first sod was turned for the construction of the great Siberian Railroad, the Russian gov¬ ernment was anxious to secure control of this territory. When Japan in 1895 occupied the Liao-Tung Peninsula of Manchuria and began to fortify Port Arthur as its southern tip, Rus¬ sia, with two other powers protested. Weak, though victorious, Japan withdrew, shortly af¬ terward to learn of the secret treaty of Count Cassini, by which Russia leased Port Arthur from China for 26 years. Having obtained this foothold, the Russians cast covetous eyes on the vast territory which lay between, and under the commanding influence of Admiral Alexieff, generalissimo of the Russian military and naval forces in the Far East, who, in 1903, for his services was proclaimed by imperial ukase vice¬ roy of Greater Russia and lord of all the lands which lie between Baikal and the Pacific and •which extend from the Arctic to the Yellow Sea, they accordingly began a pacific conquest by colonization on an unparalleled scale. . The route of the Siberian Railroad was originally surveyed with Vladivostok on the Pacific coast of Russian Asia as the terminus. Port Arthur, however, washed by the warmer waters of the Yellow Sea, now became the coveted goal.

A corporation known as the Russo-Chinese Bank was established, which to all appearances was a mutual combination of Russian and Chi¬ nese capital, but was actually only another name for the Department of Finance of the Russian Empire.

There were times when China was short of ready cash, and the Russo-Chinese Bank each time went to her aid. Therefore, when China was asked to grant a concession for a railroad from the Siberian trunk line to Liao:Tung Bay, to be called the Russo-Chinese Railroad, and the Russo-Chinese Bank offered to furnish the necessary $250,000,000, China could not well re¬ fuse. This railroad penetrated the most fertile as well as the most densely populated districts of Manchuria and had as its terminus the Rus¬ sian fortress of Port Arthur. On the north.it joined with the Siberian trunk line at Harbin, on the mighty Sungara. .

It passed through the cities of Tsitsihar, Kirin and Mukden, capi¬ tals of the three Manchurian provinces. It tapped the Gulf of Liao-Tung, by means of the port of New-Chwang, and skirted the whole eastern coast of this arm of the Yellow Sea.

When the other powers became alarmed at the armies which kept pouring in from Sibe¬ ria and European Russia, the officials of the Tsar pointed to a clause in the railroad's char¬ ter which permitted Russia to guard the rail¬ way with troops, but did not limit their number. There followed a vigorous colonization policy; free transportation (with a land grant of 100 acres to each male of a household, besides agri¬ cultural implements) was offered to Russian immigrants; and families migrated from all parts of the Tsar's western dominions. Not¬ withstanding this influx amounting to 200,000

a year, it did not penetrate far from the rail- ' roads. The region is too vast.

Consequent on the Boxer massacres and troubles of 1900 a Russian military force occu¬ pied the right bank of the Amur River, declared it to be Russian territory and established a pro¬ visional Russian administration. On 8 April 1902, the Manchurian convention between China and Russia was signed, wherein Russia agreed to evacuate Manchurian territory within 18 months. But Russia could not then voluntarily withdraw. The civilization of the Slav had rooted itself too firmly in this soil to be erad¬ icated except by a political cyclone. One could see everywhere, from Port Arthur at its ex¬ treme southern end to the Amur River, the old Russian boundary, on the north, evidences of the Muscovite occupation. Under the direction of Russian engineers native laborers were build¬ ing railroads and military highways, construct¬ ing wharves, marking out vast farms and laying out cities. The Russian fortress was found wherever a strategic site would make Russian cannon still more formidable, and almost in the shadow of these guns rose the peaceful sanc¬ tuaries of the Orthodox Greek, with their white walls and green roofs and cupolas.

For the purpose of supplying her thousands of colonists with a great seaport and commercial outlet, Russia had built the city of Dalny (q.v.), 14 miles from Port Arthur, on the eastern side of the Liao-Tung Peninsula.

The population grew rapidly, and the lines of steamships which load here directly from the cars of the Siberian Railroad increased in

number and in frequency of service, while bids were received at Port Arthur by the Russian authorities for the construction of electric light plants and electric railways for Mukden, Har¬ bin and New-Chwang.

On 8 Oct. 1903 the Russian government was pledged to evacuate Manchuria, yet when that day came she only poured in more soldiers and made a great naval demonstration, her actions creating international uneasiness for Japan and Great Britain from political as well as commer¬ cial motives, and for the United States on ac¬ count of commercial rights obtained by the Shanghai treaty to trade freely with Manchuria, were particularly interested in ensuring the in¬ tegrity of the Chinese Empire, its administra¬ tive control over its Manchurian provinces and the maintenance of the principle of the <(open door.® Furthermore, Russia added to the trou¬ ble which was brewing over her continued oc¬ cupation of Manchuria by opposing Japan in her refusal to allow Korea to open the port of Wi-ju to foreign trade, or to permit Japan to lay a telegraph line from Seoul to Fusan. Rus¬ sia, moreover, obtained from the Korean gov¬ ernment a timber-felling concession south of the Yalu, and also had a telegraph line in work¬ ing order in Korean territory.. Japan had great interests at stake. Russia in Manchuria was a constant menace to the independence of Korea, over the suzerainty of which Japan had successfully fought China in 1894-95. Japan, in assimilating all that was best of Occidental civilization, had learned all that was worth learning of European diplomacy, and by treaty revision and her correct attitude during the Chinese War by the Boxer troubles had raised herself and been admitted to the rank of a civilized world power.

Soon after Russia, with the aid of France and Germany, had secured a diplomatic victory over Japan in obliging her to withdraw from the Liao-Tung Peninsula, which she had occu-pide by right of conquest over China in 1894-95. Japan had effected a defensive and offensive alliance with Great Britain, whereby that power was pledged to intervene in any future conflict, should any third party again interfere

with Japan's political arrangements. In July 1893, Japan had opened negotiations with the Russian government "with a view to a friendly defini¬ tion of the interests of the two countries in Manchuria and Korea where those interests meet, and thereby to remove every cause of conflict between Japan and Russia.® She now redoubled her efforts in that direction. Russia, it is alleged, unduly delayed her replies, or pro¬ posed such amendments as were altogether in¬ consistent with Japan's idea of an amicable set¬ tlement, thus making the situation more and more complicated. Besides, Russia made great naval and military preparations, dispatching all her most powerful war vessels to the extreme Orient and sending military reinforcements to Manchuria and the neighboring regions. Japan, believing further delay would increase her dan¬ ger, broke off negotiations with Russia on 6 Feb. 1904. On the 9th, without any formal dec¬ laration, war was begun by Japan. (See Japan; Russo-Japanese War). By the Treaty of Portsmouth, signed 5 Sept. 1905, which con¬ cluded the war, the Russian lease of Port Ar¬ thur and Talien-wan, and the southern ex¬ tremity of the Liao-Tung Peninsula and the South Manchurian Railway were transferred to Japan 22 Dec. 1905. China gave official sanction to the transfer and granted Japan the right to extend the railway from Mukden to Autung at the mouth of the Yalu River, where it joins with the Korean Railway .. < Since the war there has been noted a disposition on the part of Russia and Japan to work together. A proposal made on behalf of the United States by Philander C. Knox in 1909 for the neutraliza¬ tion of the Manchurian railways was met by cooperation between the old enemies. In 1913 there were 2,102 miles of railway: the Russian lines (Chinese Eastern Railway) extending to 1,075 miles, the Japanese (Southern Manchuria Railway) to 684 miles, and the Chinese (North¬ ern Chinese Railway) to 514 miles. Extensions are being made, the most important being that projected by Russia in 1916, from Harbin di¬ rectly across Manchuria to near the Russian frontier, with a branch to Tsitikar (662 miles). This railway would give control to Russia in northern Manchuria in return for rights al¬ ready secured by Japan in southern Manchuria. Consult Christie, D., (Thirty Years in Mouk-den> (London 1914); Hosie, A., (Manchuria: Its Peoples, Resources and Recent History* (ib. 1901) ; Kemp, E. G., (The Face of Manchu¬ ria, Korea and Russian Turkestan* (ib. 1912) ; Little, A., (The Far East* (Oxford 1905) ; Pozdnuf, (Manchuria) (Saint Petersburg 1897); Ross, J., (The Manchus; or the Reign¬ ing Dynasty of China, their Rise and Progress> (London 1880) ; Weale, (The Reshaping of the Far East) (ib. 1905) ; (The Truce in the East and its Aftermath) (ib. 1907) ; (The Com¬ mercial Struggle in the Far East) (ib. 1908).

MANCHUS, a Tartar people of Tungusic origin, descendants of the Jurchin or Niu-chi,

who overran northern China in the 12th cen¬ tury and established the Kin or Golden dynasty, latter overturned by the Mongols, and of the tribes who followed Nurhachu (1559-1626) and his successors in his conquest of Liao-Tung and Liao-si, in the first half of the 17th century, who aided the Chinese general, Wu-san-kwei, in suppressing the rebel Li-tse-Ching, and who retained the country for themselves, establish¬ ing in 1643 the TaTsing, or ((Great Pure® dynasty which ruled China down to the estab¬ lishment of the republic in 1912. They form a very small minority of the population of China to-day; they are a quiet, inoffensive people noted for their politeness. They now speak the Chinese language, their own tongue being well-nigh extinct. Physically they are rather tall, with mesocephalic head. The famed Chinese queue, but recently abolished, was in¬ troduced by the Manchus and was at first an insignia of the subjection of the Chinese to the Manchus. Buddhism in the Chinese form of to-day also dates from the Manchu con¬ quest. For the history of their conquest and rule in China see China, History. Consult Giles, (China and the Manchus* (Cambridge 1912) ; Kent, P. H. B., (The Passing of the Manchus* (London 1912) ; Ross, (Manchus; or The Reigning Dynasty of China, their Rule and Progress) (London 1891).

MANCINI, man-che'ne, a name borne by the five nieces of Cardinal Mazarin. They were born, in Rome and summoned by their uncle to Paris, where they played a conspicuous part in the court of Louis XIV during the early years of his reign. They were: (1) Laure (b. 1636; d. 1657), the amiable and pious companion of Louis XIV's boyhood. She became the mother of Louis, Duke of Vendome, one of the great¬ est generals of the Grand Monarque. (2) Marie (b. 1639; d. about 1715), for whom the king conceived a violent affection, but in 1661 Mazarin gave her in marriage to Prince Colonna, constable of Naples. (3) Olympe (b. 1640; d. 1708), a witty and attractive woman, who became wife of Eugene de Savoie-Carig- nar, Count of Soisso'ns, and mistress of the queen's household. (4) Hortense (b. 1646; d. 1699), the most attractive and beautiful of the Mancini. In 1666 she left her husband, the Duke de Mazarin, and became one of the chief beauties of King Charles II's court. The king pensioned her, and after the Revolution of 1688 she lived in retirement in Chelsea. (5) Marie Anne (b. 1649; d. 1714) was the wittiest and most vivacious of the sisters. In 1662 she mar¬ ried the Duke de Bouillon, and her salon be¬ came the centre of social and intellectual life at Paris. She patronized La

Fontaine, Cor¬ neille and Moliere. She died in Clichy. Con¬ sult Chatelauze, (Louis XIV et Marie Mancini* (Paris 1880) ; Renee, (Les nieces de Mazarin) (ib. 1856) ; Williams, A. N., (Five Fair Sis¬ ters J (New York 1906).

MANCO INCA I, mg'ka, Peruvian ruler: b. about 1500; d. 1544. He was the second son of the inca Huayna Capac (q.v.), who died about 10 years after the first arrival of the Spaniards, dividing his kingdom between his legitimate successor, Huascar, and a younger son, Atahualpa. The latter, after having made war upon Huascar, and put him to death, was himself captured and executed in 1533 by Pi-

zarro. Shortly afterward Manco appeared in the Spanish camp to announce his pretensions to the throne and claim Pizarro's protection. The conqueror received him cordially, and made it his first care after the taking of Cuzco to place him on the throne. After in vain petitioning for power to exercise the sover¬ eignty, he withdrew secretly from Cuzco, but was brought back and imprisoned. Aˆain es¬ caping, he roused the whole nation to arms against the invaders, and appeared before Cuzco (February 1536) with a countless host of Ind;ans who covered the surrounding hills. He destroyed a large part of the city by fire and reduced the Spaniards to extremities ; but after the siege had lasted over five months, had to withdraw on account of the scarcity of food. Defeated subsequently by Almagro and forsaken by most of his warriors, he fled to the Andes, and for several years maintained his independence, sallying forth as occasion offered at the head of a few brave followers, alwavs eluding -pursuit in the wilds of the Cordilleras, and in the event of civil war among the for¬ eigners throwing his weight into the weaker scale in order to prolong their contests. He was killed by a party of Spaniards belonging to the younger Almagro's faction, who on the defeat of their leader had taken refuge in the Peruvian camp.

MAND2EANS, man'de'anz, an ancient Ori¬ ental religious sect of mixed Christian, Jewish and heathen elements. They are still found1 on the east shore of the Tigris, working as jewel¬ ers, blacksmiths,

carpenters, *etc.* Their religion is a kind of Gnosticism, retaining various Jewish and Parsee elements. They worship a number of personifications, particularly of the attributes or names of God. They publicly call themselves Sabians (Siibba , <(baptists®), thus professing to identify themselves with the Sa-bseans tolerated in the Koran. They were for¬ merly called Christians of Saint John the Bap¬ tist from their habit of baptism or ablution. They have five important sacred books: (Sidra rabba) (((the great book®), called also <(ginza,® ˆtreasure® ; (Sidra de ' Yahya) ((Book of

John}); the ˆolastaP a collection of hymns; 'Diwan,* a ritual; and (Asfar Malwase,* a manual of astrology. The Mandseans had three degrees in the priesthood, with a supreme offi¬ cial (Rish amma) as the source of both civil and ecclesiastical authority. The priests offi¬ ciate in white robes, barefooted, and women may be admitted to their order.

MANDAITES. See Nazarenes.

MANDALAY, man' da-la, East India, capi¬ tal of Upper Burma, two miles from the left bank of the Irawadi, a little north of Amara-pura (q.v.), the former capital, and about 410 miles north of Rangoon. It was founded in 1860, was the capital of independent Burma until its capture by the British \n the end of 1885, and since the treatv by whlich (1886) the king lost his throne it has been the capital of Upper Burma. The area is six square miles. The most famous shrines in Mandalay are the Aracan Pagoda, containing brazen image of Buddha. 12 feet high, and the Kuthodaw Pa¬ goda, 110 feet high, surrounded bv 729 others, each inscribed with a part of the Buddhist scrip¬ tures. In the centre of the town stands what was once King Theebaw's palace. Outside the

enclosures of the city was, until the British con¬ quest, a c-owded, dirty native town, now cleared away to make room for a British cantonment (Fort Dufferin). The present native quarters lie outside the fortified oity. Beyond them, again, on the slooes of the hills that border the valley of the Irawadi, are numerous fine monas¬ teries. The use of machinery is almost un¬ known ; except for some rice and timber mills and brewing the industries are all conducted in the home. Silk weaving is the most im¬ portant; some of the others are gold and silver work, ivory and wood carving, bell and gong casting, and knife and sword making. In 1886 and in March 1892 much damage was done by fire and by an inundation of the river. In 1886 a

meteorological observatory was built. Kipling (q.v.) called special attentlion to this ancient city by his poem ‘Mandalay.* Pop.

138,299.

MANDAMUS, in law, a writ issued by a superior court and directed to some inferior tribunal, or to some corporation or person exercising public authority, commanding the performance of some specified duty. In general practice in the United States a mandamus issues where a party has a right to have a thing done, and has no other remedy, and in some cases where he has another but a tedious and inade¬ quate one ; and must be applied for without delay. It is either in the alternative, ordering the court, corporation or party to which or whom it ‘is directed to do the thing specified, or to appear and show cause why it should not be done ; or absolute, commanding the thing specified to be done without any condition or alternative. The writ is usually first issued in the alternative, and in case of there beiner no appearance, or no sufficient cause to the con¬ trary being shown an absolute mandamus is issued. The cases enumerated for the issuing of this writ are — to compel the party applying to be restored to some office or franchise of a public nature, whether temporal or spiritual ; for the production, inspection or delivery of public books and papers ; to oblige bodies cor¬ porate to affix their common seal ; or to com¬ pel the holding of a court. It may be directed to an inferior court, ordering it to proceed in the hearing of a cause, or to enter up a judg¬ ment. Consult Bailey, W. F., (Treatise on the Law of Habeas Corpus and Special Remedies) (2 vols., Chicago 1913) ; Spelling, T. C., treat¬ ise on Injunctions and Other Extraordinary Remedies) (2d ed., Boston 1901) and Wood H. G., treatise on the Legal Remedies of Mandamus and Prohibition (3d ed., Albany

1896).

MANDAN, a tribe of American Indians of the Siouan family, the remnants of which num¬ ber less than 300, are settled upon the Fort Berthold Reservation in North Dakota. In remote times they are supposed to have mi¬ grated from the lower Missouri but had occu¬ pied the North Dakota region for centuries be¬ fore they were first visited by Verendrye in 1738. In 1804 they were found by the Lewis and Clark Expedition (q.v.) occupying two vil¬ lages at the mouth of the Knife River. In 1837 when a smallpox epidemic de¬ stroyed

thousands of American Indians the Mandans were still further reduced in numbers from 1,700 to less than 400. In

MANDAN

1846 the remaining families of the tribe took up their residence at the Fort Berthold Reser¬ vation. The Mandans were not a nomadic peo¬ ple, but resembled the Pawnees, living in log houses with village administration and local government. They were an agricultural people, raising corn, tobacco and other crops.

MANDAN, N. Dak., city, county-seat of Morton County, on the Missouri River and on the Northern Pacific Railroad, about five miles above Bismarck. In the vicinity are extensive coal mines, and on the large ranches are raised cattle and sheep. Considerable wheat as culti¬ vated on the farming lands. Nearby are a number of the ancient mounds somewhat simi¬ lar to those in Ohio and other parts of the United States. The State Reform School and Indian schools are located here. The city is the headquarters of a railroad division and has large railroad shops. In 1907 the commission form of government was adopted. The water¬ works are the property of the municipality. Pop. (1920) 4,336.

MANDARIN, the term usually applied in China by foreigners to government officials of every grade. It is supposed to be derived from the Portuguese mandar, to command, or from the Sanskrit mantrin, counsellor ; the Chinese equivalent is kwan, which signifies literally a public character. There are nine ranks, distin¬ guished by different buttons.

MANDARIN DUCK, a small Chinese duck (Aix galericuta) closely related to .the American wood-duck (A. sponsa), and dressed in an ex¬ ceedingly beautiful plumage of metallic green, purple, chestnut, white and black. It has long been domesticated by the Chinese, and as it is said to pair for life, is held up by them as a model of marital virtues; and it has been intro¬ duced upon park waters and ornamental grounds in America and Europe.

MANDAT, maii-da, the name given to a kind of paper-money in the French Revolution. After the assignats, which had been kept in circulation by the violence of Robespierre, had lost all credit, a new money was created — the mandats — founded, like the assignats on

the credit derived from the confiscated property, but with the essential difference that specific pieces of property, enumerated in a table, were pledged for the redemption of the bills, while the assignats furnished only a general claim. These mandats were issued in accordance with the law of 1796, to the nominal value of $480 - 000,000. A forced circulation was given to them, by which the government was enabled to defray the expenses of the approaching campaign.

MANDATE, in law, a term derived from the Roman civil law. It may be defined as a bailment (delivery) of a chattel or chattels to a person who is to do something with or about the things bailed, entirely without com¬ pensation. The essential element of the con¬ tract lies in the fact that there is not paid or promised, in law or in fact, any compensation whatever for the service to be rendered. The person delivering the chattels is called a man¬ dator; and the person receiving them and un¬ dertaking the service is called a mandatary. As it must be a service or an act, the whole benefit of which rests with the mandator, this,

by the ordinary principles of bailment, deter¬ mines the amount of care to which the man¬ datary is bound, and the degree of negligence for which he is answerable. For negligence in a bailee has in law three degrees : slight neg¬ ligence, which makes the bailee responsible where the bailment was wholly for his benefit : ordinary negligence, for which he is responsible if the bailment be for the benefit of both parties; and gross negligence, for which only the bailee is responsible where the contract is for the exclusive benefit of the bailor. And as it is not a mandate if the bailee derives any benefit whatever from the service, it follows that a mandatary is responsible for loss of or for injury to the thing delivered to him, only when .it is caused by his gross negligence. There is no especial form for the contract of mandate ; it may be in writing or by word only, and made very solemnly or in the simplest way; in either case the law is the same. No man can be held in the United States for a breach of any promise, whether that breach be partial or total, if the promise rests upon no considera¬ tion. But if he who has made a promise, after¬ ward does some injury to the promisee (and this would be the case if he does something which is positively injurious because it is not completed), he is liable for the injury he has caused, as he would be if there were no prom¬ ise between the parties. Banks and bankers are so far mandataries, that they receive notes for collection, and render, or engage to ren¬ der, by agreement or by mercantile usage, these and similar services without any especial or specific compensation. But it is understood

that they do this as a part of their business, and for the general and indirect benefit they derive from doing it; and this is undoubtedly consideration enough to make them liable for any injury to their customer caused by their negligence; and it is sufficient to make them liable that their negligence was ordinary, or consisted in the want of common care. And a bank has, as bailee, a lien on its deposits for i 3 general balance against the depositor.

MANDAUE, man-da'wa, Philippines, a pueblo of the province of Cebu, situated on the east coast, on the north shore of Cebu Channel, five miles northeast of the town of Cebu; it is on the coast road. Rice-growing is the prin¬ cipal industry. Pop. 11,000.

MANDAYA, man-da'ya, a Philippine tribe of the Malay race living in the commandancia of Bislig, and the district of Davao, island of Mindanao. They are bloodthirsty and head¬ hunters, mostly heathen, though Tesuit mission¬ aries have converted some to Christianity. (See Philippine Islands). Consult Cole, F. C., (Wild Tribes of Davao District, Mindanao) (in (Field Museum Publication 170,) Chicago

1913).

MANDEL, man'del, Eduard, German en¬ graver; b. Berlin, 15 Feb. 1810; d. there, 20 Oct. 1882. He studied in Paris with Henriquel-Dupont, and in 1842 became professor of en¬ graving at the Berlin Academy and director there after 1856. He was one of the greatest of modern German engravers, the most im¬ portant work of his being the plate of Raphael's (Madonna di San Sisto,* his latest effort. Other works are the plate after Hildebrandt's (Warrior and Child > (1835) ; plate of Bega's

Forelei* (1837); Van Dyck's portrait of Himself > (1841) ; (Titian's Portrait of Himself) (1843); Van Dyck's <Charles I> (1850); Raphael's (Madonna Colonna) (1855) ; Fred¬ erick the Great* ; (

Madonna della Sedia* (1865). Consult Pietsch, (Eduard Mandel und seine Werke) (Berlin 1883).

MANDERSON, Charles Frederick, Amer¬ ican lawyer and politician: b. Philadelphia, 9 Feb. 1837; d. 1911. He received his early edu¬ cation in Philadelphia, removed to Canton, Ohio, in 1856, studied law and was admitted to the bar in 1859. He was oity attorney in Can¬ ton, 1860-61; at the outbreak of the Civil War he enlisted as a private in the Union army, served in the campaigns in the Middle West and rose through the intermediate grades to the rank of brigadier-general of volunteers. He was severely wounded at the battle of Lovejoy's Station, Ga., and resigned from the army in 1865 on account of his wounds. He resumed his law practice in Stark County, Ohio, but removed to 'Omaha, Neb., in 1869. Here he soon became prominent in public affairs, was city attorney for more than six years and a member of the Nebraska Constitutional Con¬ ventions (in 1871 and 1874. In 1883 he was elected to the United States Senate, serving until 1895, and being chosen speaker pro tern in two Congresses, 1889-93. After 1895 he was solicitor for the Burlington system of rail¬ roads, west of the Mississippi; and was presi¬ dent of the American Bar Association in 1900-01. He published (The Twin Seven Shooters* (1902), and several addresses on political and legal subjects.

MANDEVILLE, Bernard de, English writer: b. Dort, Holland, c. 1670; d. London, 21 Jan. 1732 or -33. He was educated at the Erasmus School, Rotterdam, and at the Univers¬ ity of Leyden, where, in 1691, he received the de¬ gree of doctor of medicine. The date and occa¬ sion of his removal to England are unknown ; but he appears soon to have settled in London where with but small success he practised his profession. He lived obscurely, with distillers and Dutch merchants as his ordinary acquaint¬ ances. Franklin, in his (Autobiography, > re¬ cords that in 1725, at ((the Horns, a pale-ale house in Lane, Cheapside,** he was intro¬ duced (<to Dr. Mandeville, author of the Fable of the Bees,* who had a club there, of which he was the soul, being a most facetious, enter¬ taining companion.** Franklin at this time was merely a struggling young printer, unknown to fame: Mandeville gained no honor from his acquaintance. Mandeville had, however, a few acquaintances outside his tavern circle. Of these, the most important was Lord Maccles¬ field, the chief justice, at whose. house Mande¬ ville also met Addison. Of their world, how¬ ever, Mandeville was never a real part, socially or intellectually.

Mandeville wrote much both in verse and prose; but his chief claim to notoriety was the authorship of the Fable, of the Bees.* This, in its earliest form, consisted solely of a rude poem, in octo-syllabic couplets

far from Mil¬ tonian, entitled, <The Grumbling Hive, or Knaves turned honest.* In it, he related how, so long as they remained unscrupulous, the bees increased in numbers and prosperity, and how

by their moral reformation the bees gained oniy their material ruin. He concluded that

“ To enjoy the world’s conveniences,

Be famed in war, yet live in ease,

Without great vices is a vain Utopia, seated in the brain.

Fraud, Luxury, and Pride must live,

While we the benefits receive.”

Of this piece, the earliest known edition is that of 1705. Mandeville’s assertion that an earlier edition was printed is unsupported by evidence. In 1714, Mandeville reprinted the poem with prose additions, the whole bearing the new title (The Fable of the Bees, or Private Vices Public Benefits.* This he further enlarged in the edi¬ tion of 1723. ‘ ,,

At this point, the grand jury of Middlesex interfered, and, in July 1723, presented the Fable* as a nuisance. Immediately the book became a subject of general attack. Richard Fiddes and John Dennis in 1724, William Law, Francis Hutcheson in 1725-27, Archibald Camp¬ bell in 1728 and Bishop Berkeley in 1732, all assailed Mandeville in turn. By Law and by Berkeley, Mandeville was intellectually out¬ classed; but he held up his side of the argu¬ ment, adding to his FableP in successive edi¬ tions, tract after tract. That the Fable* should be thus attacked is not surprising. Its funda¬ mental thesis, that private vices are public benefits, was as subversive of morality as its illustrative material was foul and its style plausible and forceful. Whether Mandeville was sincere or ironical in his argument is in dispute. That he thoroughly enjoyed his own foulness cannot be doubted. But at least he ac¬ complished one good thing; he pricked the sham morality of Shaftesbury. Other works by Mandeville are Fsop Dressed, or a Collection of Fables Writ in Familiar Verses) (1704) ; Free Thoughts on ReligioiP (1720) ; Fn-quiry into the Causes of the Frequent Execu¬ tions at Tyburn* (1725). Consult Robertson, J. M., Fioneer Humanists) (London 1907).

author of a mediaeval book of travels which en¬ joyed great popularity. A large number of manuscripts are in existence, the most import¬ ant of which are in Latin, French and Eng¬ lish. The earliest version is in French, dating from the latter part of the 14th century, and upon this all the others appear to be more or less directly based. There is no English manu¬ script antedating the 1 5th century. The state¬ ments in the prologue regarding the translation are to be distrusted, and the autobiographical matter is contradictory. An exaggerated im¬ portance has sometimes been attached to the compiler of the work as the father of English prose, because of the statement in one of the English manuscripts that he had translated it out of French into English in order that every man of his nation might understand it. Errors in the translation prove that the man who wrote the French version and the man who made the English rendering cannot have been one and the same person.

The travels consist, in the main, of an ac¬ count of the Holy Land and the routes thither, followed by a description of various parts of Asia. The narrative is almost wholly spurious, being made up of paraphrases and borrowing from various sources — travel-books, bestiaries, works on Eastern manners, legends, romances,

etc. The first half of the book is chiefly de¬ pendent upon the travels of William of Bolden-sele, a German who flourished in the 14th cen¬ tury, and the second part upon the work of Friar Odoric of Pordenone (about 1330). The only portions which may reflect personal ex¬ perience are those dealing with Jerusalem and Egypt, which it is not impossible that the com¬ piler may have visited. The story abounds in all kinds of adventures and marvels, related with an air of sober truth. There are accounts of monsters and curiously misshapen men, of regions haunted by devils, of the Fountain of Youth, of the Phoenix, of the realm of Prester John, *etc.* The narrator must have been a man of wide reading, and he certainly displays con¬ siderable skill in the selection and arrangement of his materials.

In the prologue the author states that his name is (<John Maundeville, knyght,® b. at Saint Albans, England, and that he (<passed the see,® in 1322 (1332), whereupon he traveled through various countries. The epilogue asserts that the gout forced him to return, and that he occupied his leisure in writing his experi¬ ences. It has been found impossible to identify him with any historical John Mandeville.

The tomb of the reputed author of the (Travels > was long shown at Liege, with an in¬ scription to ((Joannes de Mandeville, alias dic-tus ad barbam.® Important in this connection is the testimony of one Jean d'Outremeuse, in a (Myreur des Histors,* now lost, to the effect that there died in Liege, in 1372, a physician named Jean de Bourgogne, (<dit a la barbe,® who declared himself on his death-bed to be ((Jean de Mandeville, chevalier, comte de Mont-fort en Angleterre,® his real name having been concealed because of a crime committed in Eng¬ land. The veracity of D'Outremeuse is open to suspicion, but it has been thought that this Jean de Bourgogne may have been one John de Burgoyne, who was forced to leave England in 1322, and that he compiled the (Travels,) bor¬ rowing the name of one John de Mandeville, who was concerned in the murder of Gaveston. At all events, Jean de Bourgogne was known in mediaeval times as the author of a treatise on the plague, which is bound up in one instance with a version of the (Travels.) It seems prob¬ able, then, that this man, whatever his past history may have been, was the real author of the latter work, and that he preferred to con¬ ceal his identity under the pseudonym of Mandeville.

Bibliography. — Texts edited by Halliwell and by G. F. Warner (Roxburghe Club) ; articles in dictionary National Biography > by Warner, and in Encyclopaedia Britannica) by Yule and Nicholson.

William Witherle Lawrence, Professor of English, Columbia University.

MANDINGOES, man-deng'goz, a linguistic group of West Africa, remarkable for their intelligence. The original country of this peo¬ ple was the north slope of the high tableland of Senegambia, between the headwaters of the Niger and Senegal. Their language is more widely diffused, and more employed by trans¬ lators than that of any of the other languages of West Africa. They formed at one time a single large empire, but are now widely scat¬ tered. The hair is woolly but other facial

negro characteristics are absent. From the Arabs they have derived a high degree of cul¬ ture and are far removed from savagery. Their religion is Mohammedan. Consult Johnston, Sir H. H., <Liberia) (2 vols., London 1906).

MANDIOCA, the staple food of Brazil. See Cassava.

MANDOLIN, a musical instrument, be¬ longing to the lute species, played with a quill or plectrum as well as with the finger. It is of Italian origin, but latterly has become com¬ mon in all civilized countries. In the usual form it has four pairs of metallic strings and a finger-board or neck with numerous frets across it. Operatic composers have occasion¬ ally employed the mandolin to obtain charac¬ teristic effects. The commonest form of this instrument is the Neapolitan with a range G — E3. Other varieties are the Milanese with six strings, the Spanish with six double strings and the Turkish with seven double strings. There are four double strings in the Neapolitan.

MANDRAGORA. See Mandrake.

MANDRAKE, a genus of perennial herbs (Mandragora) of the order Solanacece. The species, of which only three are described, are almost stemless, thick-rooted and large-leaved, with rather large whitish or bluish bell-shaped flowers, followed by globular berries. The plant is chiefly interesting from the numerous allu¬ sions to it in old writings, the superstitions re¬ lating to it being mainly in connection with its fetid, reputedly poisonous root, which, from a fanciful resemblance of its roots to the human figure, was considered an aphrodisiac.

The May-apple (Podophyllum peltatum), of the order Berberidacece, is often called ((man-drake® in the United States, where it is com¬ mon east of the Mississippi River. It is a perennial herb which sends up umbrella-shaped leaves, usually two at the summit of a stem and bearing one or two creamy, fragrant flowers in the axil. A mawkish yellow fruit about the size of a large cherry develops during early summer. The fruits <(are relished by pigs and boys.® The creeping rootstocks have been used medicinally.

MANDRILL, the largest and one of the most repulsive and savage of the African ba¬ boons. (See Baboon). Consult Drill.

MANED WOLF, a long-legged, slender¬ bodied, long-nosed, brightly reddish wolf (Canis jubatus) of eastern South America, which may be regarded as one of the ((aguaras® or fox-dogs (q.v.). It is a denizen of

forests, not being known south of the northern edge of the Argentine pampas ; and goes about alone at night and secretly, seeking its food, which con¬ sists mainly of small rodents, frogs, insects and the like, and even some fruit. It will some¬ times attack sheep, but is remarkably timid, and no one fears it.

MANES, ma'nez, among the Romans, the souls of the dead. The good spirits were also called lares, and the evil larvce. The manes were reckoned among the infernal gods; but a belief was prevalent that they sometimes ap¬ peared upon the earth in the form of ghosts, particularly on the 30th of August, 4th of Octo¬ ber and 7th of November; whence the Romans considered these unlucky days.

MANES WORSHIP, from Roman Manes (q.v.), a term to denote the worship of the dead, whether of an ancestor of the particular wor¬ shiper or of some deified hero of his race. Herbert Spencer thinks it developed from the belief in an other self, which survived after death, and the manes worship was the outcome of a desire and endeavor to propitiate the ghost. Sir John Lubbock says of manes worship that it "is natural development of the dread of ghosts.®

MANET, ma'na, Edouard, French artist: b. Paris, 23 Jan. 1832; d. Paris, 30 April 1883. Originator of the Impressionist movement, which finds its greatest expression in Claude Monet, Manet worked in an original manner before Impressionism was thought of. He rendered great service to the movement, not solely by his works, but by taking upon him¬ self the criticisms directed upon the whole Impressionist School. Degas, Monet and Re¬ noir, bold in art but timid of nature, resigned themselves to the misunderstanding and hostil¬ ity of the public; but the more courageous Manet defended the movement with a strong controversial pen. He fought valiantly for himself and all the artists associated with his name.

Manet studied with Couture about 18a0 and traveled throughout Europe, growing enthusi¬ astic over Rembrandt, Tintoretto, Velasquez and Goya, painted some fine works such as the (Buveur d'absinthe>

and the (Vieux musicien> and in 1861 exhibited at the Paris Salon por¬ traits of his parents and the ‘GuitereroP His ‘Dejeuner sur l’herbe) attracted much atten¬ tion. (01ympia) (in the Luxembourg) attrac¬ ted more hostile criticism. It was a technical experiment significant for the period of its com¬ position. (Angels at the Tomb of Christ, } (Lola de Valence, 5 ‘Toreador tue/ ‘Acteur tragiqueP ‘Jesus insulted the ‘GitanosP (Rou-viere) and portrait of ‘Eva Gonzales) appeared before 1870. About this time Manet cast his lot with the Impressionists. The ‘Fight of the Kearsarge and the Alabama) announced this transformation of his style and was followed by ‘Musique aux TuileriesP the (Bal de l’Opera,* the (Bon Bock> and the ‘LiseurP (ArgenteniP (1875) shows his atmospheric re¬ searches. Next came a portrait of (Desboutin) and the (Linge) (1876), a portrait of ‘Faure> as “Hamlet® (1877) ; ‘La Serre,> a symphony in blue and white in which George Moore, the author, appears in boating costume (1878) ; the scene in the ‘Pere Lathuile Restaurant* (1880); ‘Portrait of Rochefort> (1881); and the ‘Bar des Folies Bergere* (1882).

“This work of Manet,® writes a French critic, “so much discussed and produced under such tormenting conditions, owes its importance beyond all else to its power and frankness.® Ten years of developing the first manner, tragi¬ cally limited by the war of 1870; 13 years of developing the second evolution, parallel with the efforts of the Impressionists. The period from 1860 to 1870 is logically connected with Hals and Goya; from 1870 to 1883 (when he died) the artist’s work is complicated by the study of light. He had all the pictorial gifts which make the glory of the masters — full, true, broad composition; coloring of great power; blacks and greys, which cannot be found often

elsewhere than in Velasquez and Goya; and a profound knowledge of values. He tried his hand at everything : portraits, landscapes, sea¬ scapes, scenes of modern life, still life and under each in turn served his ardent creative brush. His pictures will always remain docu¬ ments of the greatest importance on the society, the manners and customs of the Second Em¬ pire. A beautiful painter is what he was be¬ fore everything else. It is almost inconceivable that the juries of the Salons failed to under¬ stand him. They waxed indignant oyer his subjects which offer only a restricted interest and they did not see the altogether classic quality of this technique without self-glorification, with¬ out tricks, without bitumen; of this vibrat¬ ing color; of this rich paint; of this passionate design so suitable for expressing movement and gestures true to life; of this simple com¬ position

where the whole picture is based upon two or three values with the straightforward¬ ness one admires in Rubens, Jordaens and Hals. Manet occupies an important place in the French School. He is its most original painter of the second half of the 19th century, the one who has really created a great movement. His work, the fecundity of which is astonishing, is unequalled.

MANETHO, or MANETHO SEBEN-NYTA, Egyptian historian : native of Seben-nytus, in the Delta, and of the priestly order. He is believed to have lived in the reigns of Ptolemy I and II and to have written in the reign of Ptolemy I (323-285 b.c.), or of Ptolemy II (285-247 b.c.). According to some he was priest of Diospolis or Heliopolis ; others contend that he was highpriest of Alexandria. His name has been interpreted variously as “Beloved of Thoth® or “Beloved of Neith.® Scarcely anything is known of the history of Manetho himself, and he is renowned chiefly for his Egyptian annals. On the occasion of Ptolemy I dreaming of the god Serapis at Sinope, Manetho was consulted by the monarch, and in conjunction with Timotheus of Athens, interpreter of the Eleusinian mysteries, de¬ clared the statue of Serapis, brought by orders of the king from Sinope, to be that of the god Serapis or Pluto; whereupon the god had a temple and his worship inaugurated at Alex¬ andria. The fame of Manetho was much in¬ creased by his writing in the Greek language, and so being enabled to communicate from Egyptian sources a more correct knowledge of the history of his native country than the Greek writers who had preceded him. Of this his¬ tory, only extracts given by Josephus in his work against Apion, and an epitome >bv Euse¬ bius and other ecclesiastical writers, remain. It appears ‘to have been written an a compendious annalistic style of narrative, resembling the accounts given by Herodotus. The work of Manetho was in three books, the first began with the mythic reigns of gods and kings and ended with the 11th dynasty of mortals; the second continued the history from the 12th to the 19th dynasty; the third from the 20th to the 30th dynasty, when Egypt fell under the dominion of Alexander the Great. The reigns of the gods are given as amounting to 24,900 years, and the epoch of Menes, founder of the monarchy, commenced 3,555 years before Alex¬ ander (332 b.c.) . The difficulties attending the

reconciliation of this chronology with the synch rones tic history of the Hebrews, Greeks and other nations, have given rise to numerous speculations and chronological systems since the revival of learning. The accession of newer and better information from the original sources of Egyptian monuments, papyri and other documents has considerably enhanced the general value of the history of Manetho, which, prior to their discovery, had fallen into dis¬ credit. But the restoration of the history of Manetho, notwithstanding all these resources and the positive epoch of the monarchy, are still to be sought, though certain dynasties, in the second and third books of his works, can be reconciled with monumental evidence. Besides the true work of Manetho above cited, another work, ˆothisB or the (Dogstar) (in allusion to the cycle of heliacal rising of that star of 1461 years) dedicated to Sebastos or Augustus, the title of the Roman emperors, has been handed down ; but there is considerable support for the opinion that it is spurious, and was added by the epitomizers ; and another work, called the (01d Chronicle,* in which the history was arranged according to cycles, was compiled by them. Besides the history, Manetho wrote (Ton Physikon Epitome, *treating on the origin of gods and the world and the laws of morality; and another work on the preparation of the sacred kyphi, a kind of frankincense. The astronomical work called (Apotelesmata) is a spurious production of the 5th century after Christ. Consult Boekh, (Manetho* (Berlin 1845) ; Bunsen, (Egypt's Place in Universal His¬ tory* (London 1848-67); Muller, C., (His-torici Grseci Minores) (2 vols., Leipzig 1870-71).

MANEY, George, American soldier and diplomat: b. Franklin, Tenn., 24 Aug. 1826; d. Washington, D. C., 9 Feb. 1901. He was edu¬ cated at the University of Nashville, fought in the Mexican War (1846-47), in 1849 was ad¬ mitted to the bar and in 1849-61 practised law. On 1 May 1861 he became colonel of the First Tennessee Infantry, and at Shiloh (6-7 April 1862) he commanded first his regiment and later the 2d brigade of the 2d division. Pro¬ moted brigadier-general for his conduct at Shiloh, he commanded the 3d brigade of Cheatham's division in Bragg's army at Mur¬ freesboro (31 Dec.-3 Jan. 1863) and Chickamauga (19-20 Sept. 1863), subsequently was appointed to the command of Cheatham's di¬ vision and participated in the battle of Atlanta (22 July 1864). In 1876 he was nominated by the Republican party for the governorship of Tennessee, but before the election

retired .from the contest. He was Minister to Colombia in 1881-83, and to Paraguay and Uruguay in 1889-93. In 1884 and 1888 he was a delegate to the Republican National conventions of those years. In 1868-77 he was also president of the Ten¬ nessee and Pacific Railway.

MANFRED, king of Naples and Sicily, 1258-66: 1). about 1231 ; d. 26 Feb. 1266. He was a natural son of the Emperor Frederick II, on whose death, in 1250, he became Prince of Tarentum, and acted as regent in Italy in the absence of Conrad IV, his half-brother. After the death of Conrad he was regent of the kingdom during the minority of his nephew Conradin. At the instigation of Pope Alex-VOL. 18 — 14

ander IV a crusade was preached against him, and Manfred was temporarily driven from his kingdom, which, however, he soon recovered, and on the rumored death of Conradin had himself crowned king of Palermo, 10 Aug. 1258. The Pope at once excommunicated him and his followers, but Manfred marched into the papal territory and compelled acknowledg¬ ment as master of Tuscany. Through matri¬ monial alliances for himself and his daughter he sought to increase his power, and his ad¬ ministration of the government was efficient, benign and for a time prosperous. But the ex¬ communication was renewed by Pope Urban IV, who also bestowed his kingdom on Charles I of Anjou, and a war ensued in which Man¬ fred was finally defeated and killed at Bene-vento. After his death imprisonment and extreme cruelty were visited upon his widow and children.

MANFRED. Lord Byron's powerful and imaginative <(witch-drama,** Manfred5 (1817), was composed under the spell of the awe¬ inspiring scenery of the Alps, which Byron had visited in 1816 on the tour through Germany and Switzerland recorded in the third canto of (Childe Harold. *The hero is a sort of com¬ bination of Faust and of the Byronic type por¬ trayed in the earlier verse tales, a lofty and defiant spirit, dwelling alone in a dark castle among the higher Alps, haunted by remorse for an act the nature of which we are left to guess. Seeking to interview the spirit of the dead Astarte, the victim of his crime, and to obtain her forgiveness, he calls up the spirits over whom he has control and at length resorts to the abode of the evil principle itself. The ghost is evoked, but returns an ambiguous an¬ swer to his question. On the morrow Manfred expires, after resisting a summons to repent from the old abbot of Saint Maurice and de¬ fying the demons who have come to possess his soul. Some biographers have seen in the poem a reflection of its author's relation with his half-sister, Aurora Leigh. In any case Byron has made his*

hero in his own image, infusing into him the characteristic Byronic spirit of proud rebellion and passionate despair. In, style the poet aims at and partly succeeds in achieving an imaginative grandeur commen¬ surate with his superhuman theme. (Manfred attracted the favorable notice of Goethe, to whose (Faust,* translated in his presence by Monk Lewis in 1816, Byron is. indebted for some of the essential elements in his drama. Consult (The Works of Lord Byron > (edited by R. H. Prothero) ; and (Cambridge History of English Literature> (Vol. XII).

James H. Hanford.

MANGABEY, mang'ga-ba, one of the odd West African monkeys of the genus Cercocebus, nearly related to the guenons and to the ma¬ caques. They are distinguished by the white¬ ness of the eyelids and the backward growth of the hair on the crown of the head. Some of the species are well known, especially the sooty mangabey (C. fuliginosus) which always carries its long tail turned over its back. There are three or four species and they make docile pets.

MANGALDAN, man-gal-dan', Philippines, a pueblo of the province of Pangasinan, Luzon, situated 12 miles northeast of Lingayen, the

MANGALORE

provincial capital. It is on the coast road and is the meeting point of several roads extending to towns in ’the interior, and is on the route of the railroad from Dagupan to Manila. Pop.

15,800.

MANGALORE, mang-ga-lor’, India, a sea¬ port town, on the Malabar coast, capital of the district of South Kanara, Madras presidency. It is clean and well built, surrounded by groves of coconut palms and stands on the edge of a fine salt-water lake or back-water formed at the mouths of two rivers. The port will not admit of vessels drawing more than 10 feet of water, except in spring tides; but there is good anchorage off the mouth of the river, in five to seven fathoms. Tile-making is an im¬ portant industry. The exports are principally coffee, rice, sandal-wood, cassia and turmeric; the imports sugar, salt and piece-goods. There is a Roman Catholic college, and the Basel Lutheran mission in India has its headquarters here. The Roman Catholics have a bishop and several churches, a considerable number of the natives belonging to this faith. It was cap¬ tured by the Portuguese in 1596 a.d., and by the English in 1668, finally falling into British pos¬ session in 1799. Pop. about 48,412.

MANGANESE, man-ga-nes’, a metallic element which is widely distributed in nature, though it never occurs except in combination with other elements. The dioxide was believed to be a compound of iron until 1774, when Scheele proved it to be a compound of a pre¬ viously unknown metal ; and in the same year Gahn prepared the element in its metallic form. It was first called “magnesium,® from the fact that it was prepared from a compound then called “magnesia nigra® (and now known as manganese peroxide or dioxide) ; but in 1808 the name was arbitrarily changed to “manganese,® by Buttmann.

Manganese may be prepared in the metallic form by reducing any of its oxides with carbon at a white heat, and this is the method fol¬ lowed commercially. For experimental pur¬ poses, however, it is easier to obtain it by re¬ ducing the chloride with metallic sodium or magnesium. The physical properties of man¬ ganese vary somewhat according to the precise way in which the metal is obtained. Its melt¬

ing-point may be taken as 3500° F., its specific gravity as 7.4 and its specific heat is 0.122. It is a gray, hard, brittle, lustrous metal, suscepti¬ ble of taking a high polish, and resembling iron in most respects, both physically and chem¬ ically. It is not magnetic, however. The pure metal does not appear to be affected by dry air, but moist air oxidizes it, at least super¬ ficially. Some authorities describe it as oxidiz¬ ing readily in common air, and as decomposing water with almost as great a facility as potas¬ sium ; but it appears probable that the specimens from which these results were obtained con¬ tained impurities of some sort. Metallic man¬ ganese is not used in the arts, but some of its alloys with iron, aluminum and copper are valu¬ able. It is particularly valuable, in steel, its presence in small amount increasing the hard¬ ness, tenacity and elasticity of the metal. It is added to the molten steel, in the process of manufacture, in the form of an iron-manganese alloy containing from 10 to 80 per cent of the latter metal, and known in the arts as “spiege¬

leisen® or “ferromanganese.® The “manganese® of commerce is usually not the metal itself, but a mixture of its oxides. Manganese is used in the steel industry almost entirely in the form of two alloys, ferromanganese and spiegeleisen. These are both alloys of iron, manganese and carbon. Ferromanganese may contain as much as 80 per cent of manganese, but averages in this country about 70 per cent. . In spiegeleisen the percentage of manganese is much lower; the standard figure upon which the price is based is 20 per cent. The average manganese content is about 18 per cent. Both alloys are high in combined carbon, the amount of which runs up to 7 per cent. The manganese alloys are added to molten steel from the converter, or open hearth furnace, for the purpose of in¬ troducing both manganese and carbon. The manganese cleanses the steel by combining with the contained oxygen and, to some extent, with the sulphur, and then carries these impurities into the slag. The carbon is for the purpose of giving the steel the required hardness and strength. By adding larger amounts of the alloys, manganese steel is produced, which is noted for its hardness, tenacity and durability. It is much used in the wearing parts of heavy machinery. In recent years the tendency has been to use more ferromanganese and less spiegeleisen, on account of the much smaller amount of ferromanganese that it is necessary to add to the steel. Spiegeleisen usually has to be melted in a cupola furnace before using, but ferromanganese can be added direct. The latter also introduces less carbon, which some¬ times is an advantage. Ferromanganese and spiegeleisen are produced by smelting a mixture of manganese ore and iron ore in an ordinary blast furnace. A high

temperature is required and the amount of fuel used is much greater than in iron smelting. A considerable amount of the manganese goes into the slag. The slag from a ferromanganese furnace may contain as much as 10 per cent of manganese. A con¬ siderable tonnage of the iron manganese alloys is now produced in the electric furnace.

Chemically, manganese is a dyad. It has the symbol Mn, and an atomic w'eight of 55 if 0—16, or 54.6 if H=l. It forms numerous oxides, the best known of which are (1) the monoxide, MnO, from which the manganous salts may be prepared, and which is itself ob¬ tained by heating manganese carbonate out of contact with the air; (2) the sesquioxide, MmOs, which exists in nature as the mineral braunite, and which is also formed when the monoxide is heated in air to a red heat; (3) the red or mangano-manganic oxide, MmCb, which corresponds to the magnetic oxide of iron, does not form salts, and exists in nature as the min¬ eral hausmannite ; (4) the black oxide, or di¬ oxide, Mn02, which occurs in nature as pyrolusite and varvacite, and which is largely used in the arts in the preparation of oxvgen and chlorine; (5) the trioxide, Mn03, which is diffi¬ cult of preparation and very unstable; and (6) the heptoxide, MmCb, a heavy, dark green liquid, prepared by treating potassium permanganate with cold concentrated sulphuric acid. Several of these oxides also occur in a hydrated form, as minerals. Of the soluble manganous salts, the chief representatives are the sulphate and the chloride. Manganous sulphate, MnSO.», is pre¬ pared by treating the dioxide with sulphuric

acid, oxygen being liberated at the same time in accordance with the equation Mn02 + H2S04 = MnS04 + 0 + H20. It crystallizes with five molecules of water, as a pink-colored salt, and is used in dyeing and in medicine. The chloride, MnCl2, crystallizes with four molecules of water, and is obtained as a by-product in the manu¬ facture of chlorine by the action of hydrochloric acid upon manganese dioxide. It is used in cal¬ ico printing. Of the insoluble manganese salts we may specially note the sulphide and the car¬ bonate. The sulphide, MnS, is thrown down as a flesh-colored precipitate, When a soluble man¬ ganous salt is precipitated by an alkaline sul¬ phide. The carbonate, MnC03, occurs native as the mineral rhodochrosite, and it may also be obtained as a white precipitate by adding an alkaline carbonate to a solution of manganeous sulphate or chloride.

Two other important classes of manganese compounds are known, in which the manganese does not act as a base, but as an acid-forming element. These are the manganates and per¬ manganates, which may be regarded as the salts or ˆmanganic acid,® H2Mn04, and ((perman-ganic acid,® HMnCh, respectivelv. The potas¬ sium salts of these acids are ‘by far the most important ones. Potassium manganate, K2MnC > 4, may be prepared by melting manga¬ nese dioxide with caustic potash and a little po¬ tassium chlorate, dissolving the bright green mass so obtained in a small quantity of water, and crystallizing by evaporation in a vacuum. Potassium manganate is used in laboratory operations, but it is very unstable, taking up oxygen with great readiness, and depositing hy¬ drated dioxide of manganese. If the green solu¬ tion containing potassium manganate be allowed to stand in the air, it absorbs oxygen, changes in color to a bright purple and deposits hy¬ drated manganese dioxide. The purple color is due to the presence of potassium permanganate, KM11O4, which may be obtained, by crystalliza¬ tion, in the form of purple prismatic crystals. Potassium permanganate is a powerful oxidiz¬ ing agent, and is extensively used in chemistry, in the arts and in medicine, on account of the facility with which it parts with oxygen, espe¬ cially in the presence of organic matter. It forms the basis of (<Condy’s fluid,® which is largely used as a disinfectant.

The chief ores of manganese are the black oxide pyrolusite (Mn02, 63.2 % Mn) ; psilome-lane (MnO->.H20, 45-60 % Mn) ; braunite (3 Mn203. MnSiOs, 69.7 % Mn) ; wad which is an earthy oxide (Mn 15ˆ40 %) ; manganite (Mn203.H20, 62.4 % Mn) ; rhodochrosite

(MnCOs, 61.7 % MnO) , and franklinite [(Fe3nMn)0(FeMn)203l. The ores are often associated with other metals, particularly with iron oxides, and with silver ores. Like residual limonite (see Iron Ores) manganese ore is usu¬ ally secondary, resulting from the removal of more soluble substances during the weathering of slightly manganiferous rocks. For many years prior to 1914 Russia was by far the great¬ est producer of high grade manganese ores. Most of this output came from one locality near Chiatouri, south of the Caucasus Mountains. Some engineers have estimated the total re¬ serves of high grade manganese ore in this one district to be upward of 100,000,000 tons, although this has been disputed. For some time before the war Russia's production averaged

more than half a million tons yearly. Next in importance to Russia as sources of manganese are Brazil and India. In Brazil there has been a very rapid development of the industry and the production of manganese ore in 1917 is esti¬ mated to have been about 500,000 tons. As the war has practically stopped the exportation of manganese from Russia and India, the de¬ posits in ˆBrazil have assumed very great importance. The United States has never been a large producer of manganese ore. A writer in the Mineral Industry some years ago stated that the manganese output of the country was <(insignificant because of the trifling character of the deposits.® In 1914 the total production in the United States of ore containing 40 per cent or more of manganese was only 2,635 long tons. In the production of ferromanganese and spiegeleisen and in the other arts using man¬ ganese compounds it is desirable to have an ore containing at least 40 per cent of the metal. Before the late war it was almost impossible to find a steel maker willing to buy a lower grade. During the war some steel makers bought ore containing only 28 per cent man¬ ganese and were glad to get it. Most of the manganese bearing ores mined in the United States are classified as manganiferous iron ores, which may or may not contain silver and lead. In these ores the manganese is mainly valuable ai a flux in smelting operations, although it can sometimes be used for making spiegeleisen. The recent high prices have resulted in a ma¬ terial increase in the domestic production of high grade ore and the output for 1917 is esti¬ mated at about 120,000 tons. This amount is still much below the requirements. The United States Geological

Survey has recognized the importance of the manganese situation and has recently issued a bulletin giving a list of all the shippers, prospective shippers and purchasers of manganese ores in the United States, com¬ pleted up to 1 Oct. 1917. This list was re¬ printed in the Engineering and Mining Journal for 26 Jan. 1918. It included the names of 171 individuals and companies producing or about to produce manganese ores, and 117 companies that are listed as purchasers. The shippers are located in 21 different States, of which the most important are Arizona, Arkansas, Cali¬ fornia, Colorado, Georgia, Minnesota, Mon¬ tana, Tennessee, Utah and Virginia. In 1910 the United States Geological Survey issued a very excellent monograph, Bulletin No. 427, entitled (Manganese Deposits of the United States^ by Edmund Cecil Harden, giving very complete data in regard to ores, alloys, produc¬ tion and uses. The same author contributed a paper entitled (Manganese Ores of Russia, In¬ dia, Brazil, and Chile, > to the transactions of the American Institute of Mining Engineers* (Vol. LVI, p. 31). In the same volume there is an article by Joseph T. Singewald, Jr., and Benjamin Leroy Miller on the Manganese Ores of the Lafayette District, Minas Geraes, Brazil.* In the Engineering and Mining Journal (issue of 9 Feb. 1918) is a popular article by Henry V. Maxwell entitled (Prospecting for Manganese.* See Mineral Production of the United States.

MANGANESE BRONZE, a metallic ele¬ ment in which the copper forming the base of the alloy is mixed with a certain proportion of ferromanganese, and which has exceptional

qualities in the way of strength and hardness. Various qualities are manufactured, each suited for certain special purposes. One quality, in which the zinc alloyed with the treated copper is considerably in excess of the tin, is made into rods and plates, and when simply cast is said to have a tensile strength of about 24 tons per square inch. Another quality has all the char¬ acteristics of forged steel without. any of its defects. Another quality is in extensive use for toothed wheels, gearing, brackets and all kinds of machinery supports. From

its non-liability to corrosion it is largely employed in the manu¬ facture of propellers.

MANGANITE, native hydrated oxide of manganese, MnO (OH), or MmOa.HzO. It crystallizes in the orthorhombic system, but also occurs in columnar and stalactitic forms. It is brittle, and has a hardness of 4 and a spe¬ cific gravity of about 4.3. It is steel gray to iron black in color, and opaque with a submetallic lustre. It occurs in the Harz region, in Nor¬ way and Sweden and in the British Isles. In the United States it is found in the Lake Supe¬ rior mining district, and in Douglas County, Colo. It also occurs in Nova Scotia and New Brunswick. Manganite is used as a source of manganese for the preparation of spiegeleisen and other alloys, and also in the manufacture of pigments and dyes.

MANGASARIAN, Mangasar Mugurditch,

American author and lecturer : b. Mashgerd, Armenia, 29 Dec. 1859. He was educated at Robert College, Constantinople, 1872-76 and at Princeton Theological Seminary. He entered the Presbyterian ministry in 1882 and held a pastorate in Philadelphia 1882—85, when he re¬ signed to become an independent preacher and lecturer. In 1900 he organized the Independent Religious Society, Rationalist, at Chicago, and has been its lecturer since that time. He is the author of (A New CatechisnP (1902); (The Truth about Jesus) (1909); (How the Bible was Invented) (1910), and numerous other works.

MANGATAREN, man-ga-ta'ren, Philip¬ pines, a pueblo of the province of Pangasinan, Luzon, 18 miles south of Lingayen ; it is on the Agno River road. Pop. 10,150.

MANGE, a cutaneous disease to which dogs, horses, cattle, etc., are liable. It resem¬ bles in some measure the itch in the human subject, ordinary mange being due to the pres¬ ence of a burrowing parasite. Both local appli¬ cation and internal remedies are used in its cure. Frequent washing of the skin is essential. See Itch.

MANGEL-WURZEL. See Beet.

MANGIN, Joseph, French general : b. 1865. Descended from a distinguished Lorraine fam¬ ily, he served from his 24th year in Tonkin and in every part of Northern Africa, and ac¬ companied Marchand on his ˆ historic journey from the Congo to the Nile in 1898. He first came under public notice in 1911, when, as military instructor to the Moroccan forces of Sultan Mulai Hafid, he defended

Fez against the rebellious Berber tribes. In August 1912 he led a flying column of 4,000 men from Fez to Marakesh, effecting a dramatic rescue of nine French prisoners held by the pretender El Hiba. He received the congratulations of his

government and was made a commander of the Legion of Honor. At the outbreak of the Euro¬ pean War he was given a brigade command in the 5th Army, which took the shock of the first German onset at Charleroi. At the Marne he led a division and was heavily engaged at the battle of the Aisne. After participating in vari¬ ous other battles he arrived at Verdun with his division in March 1916. Here he led his men to the recapture of La Caillette Wood and (22 May) to the brilliant but shortlived reconquest of Douaumont. He was placed in command of the new 3d Colonial Corps in June and given charge of the crucial sector on the right bank of the Meuse. In October his command re¬ captured Douaumont and also Fort Vaux, with nearly 5,000 prisoners. He deprived the Ger¬ mans of a wide sweep of territory around Ver¬ dun in December, and in the spring, conducted a big offensive between Soissons and Rheims, which was suddenly stopped. Mangin was re¬ lieved of his command and relegated to an ob¬ scure post through a cabinet crisis. With the accession of Clemenceau, Mangin was sent back to the field. In the summer of 1918 he com¬ manded the French-American forces operating between the Aisne and the Marne, delivering smashing blows against the German lines which contributed enormously to ultimate victory.

MANGLE, a machine for smoothing linen and cotton goods. See Laundry Machinery.

MANGO, man'gd, a genus of trees (Man-gif era) of the family Anacardiaccce. The 30 species are natives of southeastern Asia, where some of them have been distributed by man throughout the tropics of both hemispheres. The wood of various species is used for boat and canoe making, for house building and for boxes. It is gray, rather soft and easily worked. The trees are valued also for shade, being of large size and attractive form, and very leafy, the leaves large, leathery and evergreen. It is for their fruits, however, that they are most es¬ teemed. These are widely used for human food, especially in the East, either ripe, in which con¬ dition they are eaten raw, with or without wine, sugar and spices, or unripe as preserves, jellies or pickles. They are also used for making wine and glucose. The finer varieties are considered equal to the choicest pineapples and even to the mangosteen.

The most commonly planted and most widely distributed species is the common mango (M. indica), a native of India. It often exceeds 40 feet in height, bears terminal panicles of rather small pinkish or yellow flowers, followed by smooth kidney-shaped yellow or reddish fruits which often weigh more than half a pound. Each fruit contains one large flattened seed, almost as long and often nearly as wide as the fruit, but flattened like the seed of a melon. The kernel is often roasted and eaten like chest¬ nuts. The pulp of the fruit is soft, luscious in the finer varieties but very fibrous in the in¬ ferior sorts. These have a more or less pro¬ nounced flavor, suggestive of turpentine, which is characteristic of all parts of the tree. Since 1782, when the mango was introduced into Jamaica with a lot of other plants taken from a French vessel captured on its way to Haiti, the fruit has spread throughout the West Indies and southern Florida. In Florida, however, the

freeze of 1886 destroyed all trees except those in the extreme southern part, where the mango is now confined. The market, which seems to be growing but is somewhat limited because of the prevailing ignorance regarding the fruit, is supplied mainly from the West Indies. Califor¬ nia supplies little more than its home markets. The trees do best upon well-drained sandy land, and should be well supplied with potassic manures. They quickly fail to bear upon wet soils. They may be propagated by grafting, but since a large proportion of the varieties repro¬ duce practically without change by seed this method is widely employed.

Several other species of mangoes are culti¬ vated. For instance, the horse mango (M. foetida), a native of Malacca, is cultivated in In¬ dia, and M. sylvatica, whose fruits are dried and used like prunes.

MANGO-BIRD. Several birds are called mango-birds in various parts of the world be¬ cause they frequent mango-trees. The East In¬ dian one is an oriole (Oriolus kundoo) ; the West Indian one, so called in Jamaica, is a hum¬ mingbird (Lampornis violacauda) , which may occasionally visit Florida.

MANGO-FISH, one of the threadfins a small perch-like sea-fish (Polynemus plebi-jus) which is numerous along Oriental coasts,' and approaches the shore and is caught at the time when mangoes ripen. The same name is sometimes given to a relative in the West In¬ dies (Polydactylus virginicus) , called barbudo in the Cuban markets.

MANGOSTEEN, a tree (Garcinia man-gostana) of the family Guttiferce, native of the East Indies, sometimes cultivated in tropical America. It is one of the best-known fruits of the East Indies, and by many people is con¬ sidered the finest fruit known. The fruits are about the size of a mandarin orange and of similar shape, with a thick, red-purple rind ; the flesh is snow-white or cream-colored, so deli¬ cate that it melts in the mouth, and of delicious flavor. So far, attempts to grow the tree in Florida have been unsuccessful, and as the fruit does not bear shipping web it is little known outside the regions where it is grown.

MANGROVE, man'grov, a genus of trees and shrubs (Rhizophora) of the family Rhizo-phoraccce. The species, of which there are less than half a dozen, are all natives of the tropics, where they inhabit tidal marshes and the mouths of streams. They are remarkable for their aerial roots, which extend from the branches to the mud and then become trunks for the extension of the trees, which gradually advance even to low tidal mark; and also for their peculiar method of seed germination, the seeds sprouting while still attached to the twigs. The wood, which in some species is close-grained and durable, is used for fuel and to a small extent for other . purposes ; the bark, which is rich in tannic acid, is employed in tan¬ ning; the fruit of some species is edible and is used for wine making. The trees are important soil builders, their numerous roots serving to catch debris and by checking the current en¬ hance the settling of mud from the water. Hundreds of acres of arable land have thus been formed in Florida. The best-known species is R. mangle.

MANGROVE HEN, a West Indian clap¬ per-rail (R alius longirostris) , which seeks its food in the mangrove swamps.

MANGROVE SNAPPER, the gray snap¬ per, an excellent food-fish, which abounds among the mangroves along the coasts of Florida and the Bahamas, and thence to Brazil. See Snapper.

MANGUANGAS, man-gwan'gas, a col¬ lective name for a number of heathen tribes living in the forests of the island of Mindanao,

Philippines. They are of the Malay race. See Philippine Islands.

MANGUIANES, man-ge-anz', the natives of the interior of Mindoro, Romblon and Tablas (qq.v.), Philippines; they are divided into four branches, one of which is of Negrito blood, another is Mongoloid and the other two are of the Malayan race. There are several tribes, including the Bangot, the Buquil, *etc.* The term is also used in the island of Palawan to designate all wild natives of unknown origin. See Philippine Islands.

MANGUM, mang'gum, Willie Person,

American legislator: b. Orange County, N. C., 1792; d. Red Mountain, N. C., 14 Sept. 1861. He was graduated from the University of North Carolina in 1815, was admitted to the bar in 1817, in 1818 was a member from Orange County of the lower house of the State legislature and in 1819 became a judge of the Superior Court. From 1 Dec. 1823 to 18 March 1826 he was a Whig representative in the 18th and 19th Con¬ gresses; but this post he resigned, and again he was elected a judge of the Superior Court. He retired from the court in 1826, but filled the office a third time in 1828-30. He was a United States senator from 5 Dec. 1831 to 1836, when he resigned, and from 9 Dec. 1840 to 3 March 1853 ; and in 1842—45 was president pro tempore of the Senate. Throughout nearly his entire term of service in Congress he was a leader of the Whigs; and in 1837 he received the 11 electoral votes from South Carolina for the Presidency of the United States. _

MANGUM, Okla., village and county-seat of Greer County, on a fork of the Red River, about 150 miles southwest of Oklahoma city at a junction of the Chicago, Rock Island and Pacific, and the Wichita Falls and North¬ western railroads. It is situated in a rich agri¬ cultural district, and has cotton gins, grain elevators and flour and lumber mills. Pop. about 3,667.

MANHATTAN, one of the boroughs com¬ prising the city of New York. See New York City.

MANHATTAN, Kan., city, county-seat of Riley County, on the Kansas River at the junc¬ tion of the Big Blue, and on the Chicago, Rock Island and Pacific and the Union Pacific rail¬ roads, about 50 miles west of Topeka. The surrounding region is mainly agricultural ; lime¬ stone quarries are in the vicinity. The chief industrial establishments are a foundry, machine shops, flour mills, lumber and brick yards. Man¬ hattan is the trade centre for a large section, and ships

livestock, grain and limestone. The city is operated by the commission form of government, and owns and operates the water¬ works. Pop. (1920) 7,989.

MANHATTAN COLLEGE, an institu¬ tion in Manhattan borough of New York City directed by the Christian Brothers. It was opened originally (1849) as an academy for young men, under the name of the Academy of the Holy Name, but the constant increase of the student body and the consequent demand for higher branches of study forced the academy to adopt the college courses, which was done in 1853, the academy being then incorporated under the name of Manhattan College. The courses lead to the degrees of B.A., M.A., B.S. and C.E. The resources of the college are de¬ rived from tuition only, there being no endow¬ ment. The institution reports an average of : professors and instructors, 20; students, 350; volumes in library, 14,000; value of ground and buildings, $625,000; income, $49,000; number of graduates about 1,000.

MANHATTAN ISLAND. See New

York City.

MANI, mane, the founder of the sect of Manichseans. See Manichˆans.

MANI', ma-ne', the indigenous peanut of Cuba, Peru and Chile. In Mexico and Central America it is called cacahuate (q.v.).

MANIA. See Insanity.

MANICALAND, ma-ne'ka-land, South Africa, a former territory of southern Rhodesia, situated on the border of Portuguese East Africa, east of Mashonaland, between the parallels of 18° and 21° S., and the meridians of 30° 30' and 33° E. It is now divided be¬ tween Portuguese East Africa and Rhodesia. Manica is now a small district of the Portu¬ guese territory. See Rhodesia.

MANICHˆANS, man-i-ke'anz, the fol¬ lowers of Manes, Mani or Manichaeus, as he is variously styled, a Gnostic teacher, whose opinions prevailed in western Asia and eastern Europe during the 4th and 5th centuries of our era. Manichseism is generally considered to be the Persian type of gnosis, as it is distinguished by Zoroastrian dualism, and other features of that system. Hebrew elements of religion and Buddhistic doctrines were also found in Manichaeism, which appears to have* been an electic jumble of wild fancies, among which the soberest and strongest dogmas of the Christian creed were sometimes seen to be embedded. The Dualism of Manes was conceived of by him as manifested in two contiguous realms of light and darkness, good and evil. The king¬ dom of light included a heaven and an earth, the latter guarded by aeons, or good spirits, and pre¬ sided over by a spirit of goodness. From the kingdom of darkness sprang Satan and his evil angels. This confusion and mixture, in the uni¬ verse, of light and darkness, originated before the creation of man, a creature of light and darkness combined in proportions varying in each individual. The human race is finally to be purged of darkness and sin. Jesus Christ was looked upon a£ dual in nature ; there was Jesus who did not and could not suffer, Jesus impatibilis, a sort of phantom or immaterial personage, and Jesus patibilis, who suffered death upon the cross.

The practical side of Manichaeism appears in the condemnation of marriage, or sexual in¬ dulgence of any sort, and the ascetic purification of hands, mouth or bosom, which kept the in¬

itiated from eating animal food, contracting ceremonial defilement through the touch and indulging the flame of human passion in the heart. There were two classes of disciples, the initiated, or perfecti, and the auditores, hearers, or novices. Saint Augustine of Hippo was, for nine years before his conversion to Christianity, a Manichaean hearer. These hearers lived a much less strict life than the perfecti, and con¬ sisted by far the majority of the Manichaean sect. The clergy of this sect were organized after the model of the Christian ministry ; their rite of baptism was performed with oil instead of water; they had also a eucharistic meal among their public ceremonies. The system spread rapidly through the Roman Empire and competed with Neo-Platonism in hostility to the Church. Diocletian persecuted the Manichaeans, and under Justinian the profession of Mani¬ chaeism was a capital crime. The system, how¬ ever, flourished in Asia beyond the 10th century and has reappeared in some shape or other, and under different names at different times in sub¬ sequent periods of

European history. Consult Routh, (Acta Disputationis ArchelaP (1848) ; Eusebius, (Ecclesiastical History5 ; De .Beau-sobre, (Histoire critique du Manicheisme5 (1734), and Harnack, (History of Dogma5

(1897).

MANIFEST, in law, a written instrument delivered by the captain of a ship, to the cus¬ toms officials setting forth in detail the goods shipped, the consignors, *etc.* If there are pas¬ sengers on board, this must be stated, and if the ship is about to proceed to a foreign port, the coal or other fuel on board must be set forth.

MANIFESTO, in international law, a dec¬ laration publicly issued at the commencement of a war by a contending power to show the causes which justify such a measure. Manifestoes are in the form of public letters; they commence with a short address to the public in general, and are signed with the name of the person who issues them. See Law, International.

MANIFOLDS, Theory of. See Assem¬ blages. General Theory of.

MANIGAULT, Arthur Middleton, Amer¬ ican soldier: b. Charleston, S. C., October 1824; d. 16 Aug. 1886. In 1846 he was elected first lieutenant of the Charleston company in the <(Palmetto55 regiment for the Mexican War, throughout which he served. In June 1861 he was elected colonel of the 10th regiment, South Carolina infantry, and in 1861-62 was in com¬ mand of the 1st South Carolina military dis¬ trict. From the earlv part of 1862 he served in the army of the West successively under Bragg, Johnston and Hood, in 1862 was placed in command of a brigade, and in 1863 made brigadier-general. At Chickamauga he distin¬ guished himself by his repeated assaults, and in the retreat before Sherman's invasion he did some vigorous fighting. His death was hastened by a wound received in the battle of Franklin, Tenn. (30 Nov. 1864). Subsequent to the war he was elected by the Democrats adjutant-gen¬ eral of South Carolina, serving until his death.

MANIHOT. See Cassava.

MANILA, mq-nil'a or ma-ne'la, the capi¬ tal of the Philippine Islands, the principal city of Luzon as well as of the archipelaero. situated in lat. 14° 35′ 31″ N. by long. 120° 58′ 8″ E,, lies

MANILA

1 Magellan Monument by the Pasag River, Manila

2 A Street of Nipa Huts in Manila

MANILA

1 La Escolta

2 The Bridge of Spain

on both sides of the Pasig River, and has a frontage of four miles on the bay of Manila. The corporate jurisdiction for police pur¬ poses extends three miles from the shore over Manila Bay, making the total area un¬ der the police jurisdiction of the city 32 square miles or 20 square miles on land, and 12 on the bay. The name of the city is a corrupt form of a Tagalog word, originally written ˆMaynila,® and means a species of shrub or brush which formerly grew on the site of the city. It is now applied not merely to ihe town within the walls, but to the whole region and the inhabitants included within the corporate limits. The most important divisions of the city are the walled town, particularly known as Manila, on the left bank of the river and Binondo on the right bank. Other districts, formerly more independ¬ ent than at present, have retained their names and some degree of individuality. Immediately south of the walled town lies Ermita ; farther on along the shore is Malate ; and inland directly east of these lie Paco, Pandacan and Santa Ana. The most northern district on the shore of the bay is Tondo, and between this district and the lower part and mouth of the river lies San Nicolas. The other districts north of the Pasig are Quiapo, San Miguel, Sampaloc, Santa Cruz and Trozo.

The walled town was occupied chiefly by the members of the Spanish colony. Its streets are straight and run at right angles with one another, dividing the area within the wall into 54 blocks. The buildings have usually two stories, and are built like the-houses of Spanish cities. It contains the cathedral, the principal religious houses and churches of the ecclesiasti¬ cal orders, various schools, the University of Saint Thomas, the hospital of San Juan de Dios, the mint and the new city hall. This building was started by the Cosmopolitan Hospital As¬ sociation in 1901 but owing to lack of funds re¬ mained uncompleted and was purchased and completed by the city authorities. The cathe¬ dral is an imposing building.

The north wall of the town extends along the bank of the Pasig. Around the outside of the rest of the wall runs a moat receiving water from the river just east of the town and empty¬ ing into the river just west of it. Until 1852 the drawbridges across the moat at the several

gates were raised every evening at 11 o'clock, and lowered in the morning at 4. Since then it has not been customary to close the gates.

Only a few of the streets of Manila, of which there are about 80 miles, are paved. The rest are macadamized. European and American re¬ tail shops occupy the Escolta, in Binondo. The street called Rosario is almost entirely given up to Chinese shops. The wholesale houses and the banks occupy the district north of the Pasig and west of the Bridge of Spain.

Miguel Lopez de Legaspi established Spanish authority at Manila in 1571, by a treaty with Lacandola, Rajah of Mavnila, which was con¬ firmed by the compact of blood made between the contracting parties. On 3 Tune 1571, he conferred upon Manila the title of ˆdistin¬ guished and ever loyal city.ˆ This title was subsequently confirmed by royal decree. He also gave the city a municipal organization, by appointing two alcaldes, one aguacil mayor and 12 regidores. He also appointed one notary for the cabildo, or corporation, and two notaries

public for the court of the alcaldes. Later there were only eight regidores, but in addition a registrar and a constable. The alcaldes were justices, and were elected annually from the householders by the corporation. The regidores were aldermen and with the registrar and con¬ stable held office permanently as a proprietary right. The permanent positions in the cabildo could be bought and sold or inherited. This form of organization was maintained through¬ out the Spanish period.

In 1578 the church and all the inhabitants of Manila were separated from the jurisdiction of the archbishop of Mexico, and the church was erected into a cathedral, but the new bishop was subject to the archbishop of Mexico. On account of the long time needed to communicate between Spain and the Philippines the king ordered the governor of the islands to fill va¬ cancies in the cathedral whenever they might occur.

As early as the beginning of the 17th cen¬ tury the city. of Manila was surrounded by a wall of hewn stone about three miles in circuit. It contained a college conducted by the Jesuits, a school for girls called the Santa Potenciana, two hospitals, one for Spaniards and one for Filipinos, a house of mercy for receiving sick slaves and furnishing lodgings to poor women and a hospital for Chinese. At this time there were within the walls about 600 houses built of stone and mostly

occupied by Spaniards. There were also about 2,000 Chinese, with 200 shops, and a garrison of 200 soldiers.

In the war between England and Spain, in 1762, Vice-Admiral Samuel Cornish was ordered to proceed against Manila. He carried British and Sepoy forces under Sir William Draper. On 6 Oct. 1762 Archbishop Rajo, as acting governor, surrendered the city, agreeing to pay the British an indemnity of $4,000,000. Only a part of this was paid. The affairs of Manila were administered by the British mili¬ tary authorities until 10 Feb. 1763. After this Manila remained uninterruptedly under the con¬ trol of the Spanish until 13 Aug. 1898, when it was surrendered to the authorities of the United States. On 20 August the military gov¬ ernment opened the custom-house for business, continuing in force the Spanish tariff and cus¬ toms regulations. In 1899 the Filipinos in in¬ surrection made several attempts to destroy the city. The attempts on 4 and 22 February re¬ sulted disastrously to the insurrectos. A similar undertaking was planned for the oc¬ casion of General Lawton's funeral.

The political relation of Manila to the cen¬ tral government of the islands is not greatly unlike that which Washington holds to the Federal government of the United States. The city was incorporated by an act passed by the United States Philippine Commission on 31 July 1901. The government is vested in a municipal board of five, members appointed by the civil government,, with the advice, and con¬ sent of the Commission. The municipal board has1 certain legislative, and executive authority. The organic act provides also for a secretary and other officers, and prescribes their powers and duties. The insular government contrib¬ uted to the municipality 30 per cent of the city's net expenditure, and the balance is met by funds derived from citv taxes. To illustrate: the expenses for the fiscal year 1907 were

$3,871,964.92. Of this sum the insular govern¬ ment contributed 30 per cent, or $1,161,589.48. The total receipts, including this contribution, were $4,103,220.80 leaving $231,255.88 as excess of receipts over expenditures. The population of Manila, reported by the

census published in 1905, was 219,928.

During recent years the city has been in a large measure transformed. An elaborate sys¬ tem of electric street railways has been con¬ structed, and has been in operation for a num¬ ber of years. The waterworks provided by the foundation made by Carriedo had been made inadequate by the growth of the city, and a new system has been constructed. The old sewers, or such as existed, discharged into the moat about the wall or into open estuaries. They furnished a very imperfect means for disposing of the sewage of the city, and have been superseded by a new and elaborate sys¬ tem. The harbor which afforded vessels little or no protection from typhoons has been made safe and convenient. Large ships were obliged to lie in the bay two or three miles from shore, and to transfer passengers and freight to land in lighters. An enclosed harbor has been con¬ structed by building a long breakwater south¬ ward from the mouth of the Pasig River, and by dredging the bottom of the sea in front of it. The material thrown out ha's been deposited behind a bulkhead, making 200 acres of new land. The largest ships can now dock at piers constructed within this secure harbor. The construction of this harbor has cost somewhat more than $4,000,000, and the work was practically finished in 1908. A general plan for the development and improvement of the city was formed by Mr. D. H. Burnham, who was engaged by the? Commission to visit Manila for this purpose.

The Luneta is an elliptical drive and prom¬ enade on the shore of the bay between the city wall and the houses of Ermita. It has been greatly enlarged by the American govern¬ ment, and it has ceased to be a place for public executions. A military band gives a concert here nearly every evening.

Among the statues adorning public places the most noteworthy are that of Charles IV in the square in front of the ˆPalace* or Ayuntamiento building, that of Isabella II in the plaza of Malate and that of Legaspi and Urdaneta near the Luneta. Other monuments are the Magellan column standing on the south bank of the river just below the Bridge of Spain, and the Anda monument on the same bank nearer the mouth of the river. The division of the city into two parts by the Pasig and the presence of numerous estuaries has necessitated the building of a large number of bridges. The most noteworthy of these are the Bridge of Spain and the Ayala Bridge. Among the note¬ worthy establishments or institutions, in the city are the Philippine General Hospital, the university and the special schools, the public library, the government laboratories, the gov¬ ernment printing office and the government cold storage and ice plant.

Vessels approaching Manila by sea from the northwest first sight the Capones Grande light off the southwest coast of Zambales. .Vessels from the ports of Indo-China first sight the Corregidor light. Vessels from Singapore,

Java, India, Borneo, and all the southern ports of the Philippine Islands sight the Cabra Island light. All converge on the Corregidor light at the entrance of the bay.

Bernard Moses, University of California.

MANILA, University of, founded in 1585 by Philip II of Spain. Later branches or affili¬ ated schools were founded in different parts of the island. A seminary for the sons of Span¬ ish nobles was opened in 1601, and 10 years later departments were added for the sons of those not belonging to the nobility and for the natives. The university was reorganized in 1857, and again after the American occupation. The departments are science, classics, law, medicine, theology, philosophy, engineering, pharmacy, arts and music. The usual degrees are granted. In 1918 there were about 800 stu¬ dents in attendance.

MANILA BAY, the largest bay in the Philippine Archipelago, indenting the western central coast of the island of Luzon. Its greatest dimensions are from the minor bay of Pampanga in the northwest to Point Kalumpan on the south, about 38 miles; from the delta of the Grande de la Pampanga River southwest to Corregidor Island is 31 miles; circumference 120 miles. The entrance between Point Kalum¬ pan and Corregidor is about seven miles in width; that between Corregidor and Mariveles about two miles. There are lighthouses on either side of the larger entrance. The bay is surrounded by five provinces, and receives the waters of many rivers, including the Grande de la Pampanga, with its large . delta, and the Pasig at Manila, which communicates with Laguna Bay, to the southeast, and has been dredged for navigation. The lands on both sides of the bay at the entrance are high and covered with vege¬ tation, but the shores at the head of the bay are low and marshy, intersected by numerous small rivers, estuaries and tidal fakes. It is one of the finest harbors in the East, being free of obstructions to navigation, and affording excel¬ lent anchorage. But the water is so rough at times that it was necessary to construct large breakwaters to protect the shipping. Point Luzon is at the mouth. Submarine telegraphs are laid in the bay which run to San Francisco, to Hongkong and to Iloilo. Manila, the capi¬ tal of the archipelago, and Cavite, the United States naval headquarters in

the Philippines, are on its shores; an artificial port is being con¬ structed at Manila. In this bay Admiral Dewey won a victory over the Spanish fleet 1 May

1898.

MANILA BAY, Battle of. See Spanish-American War.

MANILA HEMP, or ABACA, Musa tex¬ tile. This species belongs to the plantain or banana family, the commercial fibre being de¬ rived from the stalk or trunk of the wild plan¬ tain of the Philippine Islands, and is classed as a structural fibre. The strongest and best of our hard cordage fibres, it is. employed in the United States for standard binder twine and for all sizes of rope from the smallest dimen¬ sions to hawsers and cables. The old rope and the waste are employed as paper stock. The fibre is creamy white to reddish white, lustrous, easily separated, stiff and resistant, while its

lightness makes it advantageous for employ¬ ment in cordage for the rigging and running ropes of ships. Structurally the bundles of fibres are very large, but easily separated into fibres of even diameter; the walls .of the cells are of uniform thickness, growing slender to¬ ward the ends gradually and regularly. In breakage tests for textile strength, with Eng¬ lish hemp — made by the British government — Manila stood a strain of 4,669 pounds against 3,885 pounds for hemp, ropes three and one-quarter inches in circumference and two fathoms long being used in each test. In the Philippine Islands the finer grades of the fibre are extensively used for fabric manufacture, the product being worn by the natives of both sexes throughout the archipelago. Mixed with cotton a durable fabric is produced well adapted to the climatic conditions of the islands. According to a recent report of the Philippine Bureau of Agriculture, the manila hemp plant was intro¬ duced into India in 1859 and the Andaman Islands in 1873. The plant is also said to be found in Borneo and Java, and attempts have been

made to introduce it into other countries. It remains a fact, however, that the commercial fibre is produced only in the Philippines. The culture has been attempted without success in the West Indies, and seed was imported for trial in Florida only a few years ago ; it was planted but it failed to germinate. Several species of banana yielding fair fibre are successfully culti¬ vated throughout tropical and subtropical America, and in many other portions of the world. Banana fibre bears no comparison, how¬ ever, with the Manila hemp of commerce, al¬ though the fibre of Mus'd basjos is produced commercially in lapan where it is employed for undergarments for summer wear, as well as for light dresses for the higher classes of Japanese.

Manila hemp first attracted attention com¬ mercially early in the last century, and was im¬ ported into Salem, and Boston, Mass., about 1824; samples of the fibre, however, were brought to this country by naval officers as early as 1820. The production of the textile had reached about 8,000 tons in 1840, 30,000 tons in 1860 and 50,000 tons in 1880. In 1900 the production was nearly 90,000 tons, and at the present time (1918) is in excess of 130,000 tons. The United States in 1916 took 19,000 tons of the value of $14,067,000, and the total export was $24,974,000, or 40 per cent of the total Philippine exports.

Regarding the specific localities of produc¬ tion and details of cultivation, preparation, etc., the student is referred to Bulletin of the Royal Gardens Kew (August 1894), to a Descriptive Catalogue of Useful Fibre Plants of the World (Washington 1897), and to the latest issues of the Farmers Bulletin published by the Philip¬ pine Bureau of Agriculture, Manila.

The extraction of the fibre is a simple propo¬ sition. The abaca is cut near the roots when the plant is two to four years old, and just be¬ fore blossoming; if cut earlier the fibre is finer but shorter. After striking off the leaves the trunk or stem is slit from end to end, and the sheathing layers of cellular matter, which form the petioles of the leaves, are separated, dried a day or two and then cut into strips three inches wide, and finally scraped until the fibre has been cleaned of all extraneous matters, soft cellular tissue, *etc.* The bundles of wet fibre are shaken

into filaments, washed, dried and sorted. This is the export fibre for cordage purposes, the fabric fibre necessitating further treatment by beating, which softens and subdivides the fila¬ ments. The export

fibre is wrought into hanks and made into bales of about 270 pounds, when it is ready for shipment. Attempts to use ma¬ chinery for extracting the fibre have not been successful, partly because the machines have not been adequate, and partly on account of native prejudice. There is a great waste by the hand methods of preparation which it is thought ma¬ chine extension would obviate. See Fibre; Hemp; Jute; Ramie; Sisai Hemp.

MANIN, ma-nen', Daniele, Italian patriot : b. Venice, 13 May 1804; d. Paris, 22 Sept. 1857. He studied at the University of Padua, was ad¬ mitted to the doctorate of laws and practised at the bar. In politics he became the leader of the liberal class, and by 1847 had secured a solid reputation as a political economist. For anti-Austrian utterances made during that year and the next he was twice imprisoned, but while awaiting trial was set free by the populace upon arrival of news of the revolution of 1848 in Italy and France, was made President of the Republic of Saint Mark and given supreme power as head of the patriotic revolt. The Austrians were driven out, and during the siege, which began in the autumn of 1848 and lasted 12 months, Manin was at the head of the civil government, and to his counsels and patriotic spirit it was mainly owing that the Venetians maintained so long and brilliant a defense. After the capitulation Manin retired to Paris, where he maintained himself by giving lessons in Italian, and continued in various pamphlets and through the press to advocate the cause of Italian independence. Consult Martin, (Daniel Manin and Venice in 1848-9) ; Mortinengo, Cesaresco, (Italian Characters) (1901).

MANIOC, or MANDIOC. See Cassava.

MANIPLE, (1) one of the divisions of the ancient Roman army. It consisted of 60 rank and file, two officers called centuriones and one standard-bearer called vexillanius. (2) In the Roman Catholic ritual a sacred vestment at¬ tached to the left arm, to leave the right at lib¬ erty for ministering. See Costume, Ecclesias¬ tical.

MANIPUR, man-I-poor', northeast India, a thinly populated native state now more fre¬ quently called Assam State, which is confusing because there is Assam province (q.v.). It con¬ sists principally of an extensive valley situated in the heart of the mountainous country which lies between Assam, Cachar, Burma and Chitta¬ gong; area, 8,456 square miles. The greater part of the state is covered with forest and jun¬ gle, and the wild animals include the elephant, rhinoceros, tiger, leopard, bear, deer and buffalo. The people belong to the Mongolian race, and are known as Manipuris. They are governed by a rajah, at whose court resides a British po¬ litical agent under the

control of the chief com¬ missioner of Assam. The capital is Manipur, also called Implial, lying in the Namkathay on Manipur River, which is tributary to the Irra¬ waddy, almost 250 miles north by west of Man¬ dalay; pop. about 75,000. Most of the work is done by the Manipuri women, the men being lazy. The chief crop is rice. There is a special breed of ponies in the country, which are much

employed in the game of polo, the national sport of Manipur. There has been a political agent in Manipur since 1835. In 1891, in an outbreak headed by a member of the reigning family, the chief commissioner of Assam and the political agent were murdered ; but the disturbance was soon put down and avenged. Pop. 346,222, of whom 201,369 are Hindus, 130,093 Animistic, and a few Mohammedans. Consult Johnstone,

< Experiences in Manipur* (1896).

MANIS, PANGOLIN, or SCALY ANTEATER, an edentate mammal, belonging to the group Squamata, coextensive with which is the family Manidc p. Ihe body and long, thick tail are covered with horny, imbricated scales. The legs are short and very strong, and the toes are armed with powerful claws, enabling the animals to burrow rapidly. These animals can roll themselves into a ball, and are then pro¬ tected by their scales, and they exhibit remark¬ able strength in holding their bodies in this pro¬ tective attitude. The scales are regaided as formed of agglutinated hairs ; and in the Asiatic species true hairs grow between the scales and extend beyond them. All dwell in burrows, come abroad only at night and subsist almost altogether on ants and termites, which they capture by means of their long, rope-like, sticky tongues. They have no trace of teeth , and in general structure show a close resemblance to the American anteaters. I hey range in size from the African M. Gigantea, six feet, to two and one-half feet. They are comparatively common in some rocky districts of India and China. The latest review of the family shows that it contains seven species.

MANISTEE, man-is-tee’, Mich., city, county-seat of Manistee County, on Lake Michi¬ gan and the Manistee River, and on the Manis¬ tee and NorthEastern and the Pere Marquette railroads. A mission house

is said to have been built here in the year 1826, but not until 1830 have we positive proof of the white man s pres¬ ence when a party of white men landed and proceeded up the river. In 1840 John and Joseph Stronach landed here and selected a site for a saw mill in the dense pine forest and the fol¬ lowing spring John Stronach and his son Adam chartered a schooner, and came here with ma¬ chinery, supplies and about 15 men. They ar¬ rived at the mouth of the river 16 April 1841. From that day dates the first permanent settle¬ ment of Manistee County. In 1848 a mill at the mouth of the river was built by John Canfield, and for several years thereafter business had a tendency to settle west of what is known as «the big sandhill." In 1855, by the passage of a bill in the legislature, Manistee County became organized, having the townships of Stronach, Brown and Manistee, and at the first county election 136 votes were cast. In 1861 Manistee's population numbered but 1,000 per¬ sons, and between the Civil War and a disas¬ trous fire its progress was greatly retarded. After the close of the War things became more prosperous. In 1869 the town outgrew itself and became a city, with 3,343 inhabitants. Manistee was again visited by fire 8 Oct. 1871, and almost entirely destroyed. On the southeast is Lake Manistee, five miles in length and one and one-half miles wide. Passing through the centre of the city, a distance of one and one-half miles and uniting the two lakes, is Manistee River,

175 feet wide with a minimum _ depth of 12V2 feet, and a current running about four miles an hour. Its waters, never closed by ice, are navigable the entire year, making the best winter* harbor on Lake Michigan a ship¬ ping port. Manistee's chief industries are the manufacture of salt and lumber. Underlying here at a depth of more than 1,900 feet is a strata of rock salt 32 feet in depth, and from wells 2,000 feet deep, with an opening of but six inches in diameter, is pumped brine, from which immense quantities of salt are manufactured. About 2,500,000 barrels ot salt are shipped from here annually. Lines of passenger steamers connect the city with Chicago, Milwaukee and points north and south. There are two telegraph lines, a tele¬ phone exchange, a system of waterwoiks, with over 30 miles of mains, an electric street rail¬ way, over 50 miles of streets, daily papers and weeklies, one of which is printed in German. There are six modern and well-equipped pubhc school buildings, and six parish schools, a Carnegie library, 16 churches and one mission. Orchard Beach, situated two and one-half miles north of the city, is one of Manistee's chief beauty spots. Among the attractions of this park is a theatre 70 x 102 feet, which seats com¬ fortably about 700 persons.

Reitz Park as on a high bluff overlooking Lake Manistee.

” Suburbs.— Situated on Lake Manistee are Oak Hill, Filer City, Stronach, Eastlake and Park da lei In 1914 the commission form ot government was put in operation. Population of Manistee is 9,694, not including suburbs.

MANISTIQUE, man-is-tek’, Mich., city, county-seat of Schoolcraft County, at the northern end of Lake Michigan, at the mouth of the Manistique River, and on the Manistique and Northern and the Minneapolis, Saint Paul and Sault Sainte Marie railroads, about 75 miles southeast of Marquette. It is in the vi¬ cinity of the forests which furnish consider¬ able of the marketable lumber. Iron ore and limestone are abundant in this region. The chief manufacturing establishments are foun¬ dries, lime-kilns, lumber mills, chemical works and distilleries. Charcoal is one of the import¬ ant products made just outside the city, and fishing is a prominent industry. Lake West Manistique is near by. The opportunities for trade are excellent, and Manistique is a com¬ mercial centre for a large portion of the Upper Peninsula. The city was incorporated in 1901, has good public and parish schools and a public library established in 1894. Pop. (1920) 6,380.

MANITOBA, man’i-to’ba, Canada, occu¬ pies among the provinces of the Dominion a central position between the Atlantic and Pacific. It extends from the international boundary line on the south to the 60th parallel of north latitude on the north. It is bounded on the west by the province of Saskatchewan and on the east by Hudson Bay and the province of Ontario. It thus lies between the 49th and 60th parallels of north latitude and the 89th and 102d meridians of west longitude. The maxi¬ mum length of the province north and south, 760.65 miles, the maximum breadth east and west, 495 miles. The present area is computed at 251,832 square miles, of which 19,906 are water. Pop. (1870) 11,963; (1881) 62,260;

(1891) 152.506; (1901) 255,211; (1911) 461,630;

ORCl/Pti’c

HBCd

* Vuhta

Pel’SVn ‘£a*(“

Lnkt

,M P.O.

Me Cr euj «•’

riok’U i*U l.jM H«« ;t < tm M»n4*

Rt < t ! > ,-

£vglt ialic

0T-.o

,1’Und*

fSiU.r UL I | Lake

•»tc t.L

fi

Ban

jfflrajji’in’jo*

FjbVj

funW

iTishet

Oa»u > -

roons A’OU}

iStccrRock Jc.

trip 1.1

Kerth lUrcl Loh <

I»«h n_

S’» < «uf

Dauphin

Ft! MCBTON

MjcNu >

HOvVAO Dl/l

&TLR‘08t On Lac

£t\tu*yoU\Qtl a\ V1 ! Lakt\ f’

ID A; 0

Cum

Cuthup

k«A«OSl

J< oj:ev˚a

Uazabe

U’mNifloBiACH

PONt-At

St.Laub

Wu-T >

.msairrii

I Honk. Oci»*S fAˆi’e

WOOO«o > D| cWoooeci*o P.O. V

Ba > »o»a, ./

iSjRtCˆwwo’

IdOinckaM

BXOAlNHtAO]

tl,0u«&

^ijADSTf

Crow 0M

Loattlak*

OtUA

r) O** «•!

“““C

ro*»**^f

1*L ± £’

Op(ua

I YOun^^

jHauqulttj:

Oooahoc

tut rr OWusmtati

ˆIL *wuffig£

VT’KHv d et /n Tˆ

! rm4*

Taimcbm.

_fvtu<

Notpi 0a«

OkvjAm’I

Sui»»»CM

MO R

nwft Jc.

vl .“si:

I$t. ftt»»Uc* J

»OR-

< SniNu

peninsula

v LARot-u.it

P^sWmaao

(kgsut

J1A1 RAATltTt

I «-<».«

HIIUIM/

COuuV

! E**r

(Liri,uiq\ St.JOilPMo i

11 _ T yv1”-?

MOUNTj’lN

IU1ET [

,WrM

D A 21 I 22 23 J 24—

r-f-r-‘V- { !.! l ‘ - T

: to ii : it . » ■ ■* ; 4. : •* i Ll

MANITOBA.

MANITOBA

SCALE

Statute Miles, 30 = 1 Inch.

0 2 4 6 8 10 15 20 25 30 35 40

• Luke

ri < 1

Band McNally's New 11 x 14 Map of Manitoba Copyright by Rand McNally & Co.

lA

r

(1916) 553,860. Winnipeg, the capital (q.v.), has a population (quinquennial census, 1916) of 163,000; Brandon, 15,215; Saint Boniface, 11,021 ; Portage la Prairie, 5,879. Population by religious denominations: Presbyterian, 122,174; Anglican, 107,150; Roman Catholic, 97,005; Methodist, 71,371 ; with the Greek Church, Lutheran, Mennonite, Jewish and Baptist (in the order named) in smaller numbers.

Boundaries. — The district of which the junction of the Red and Assiniboine rivers — now the city of Winnipeg — has always been the nucleus since the period of settlement began in 1812 has been subject to no fewer than six changes of boundary, (a) The grant of Assiniboia made by the Hudson's Bay Company to Lord Selkirk in 1811 comprised 116,000 square miles from 52° 30' N. latitude (passing through Lake Winnipeg) on the north to the "height of land® between the northern and Mississippi watersheds on the south and from Lake Winni¬ peg and the Winnipeg River system on the east to about 102° W. longitude. The southern portion of this was found to be south of the international boundary after the Treaty of Ghent, (b) In 1841 the ((Municipal District of Assiniboia® was declared to extend "in all directions 50 miles from the forks of the Red River and the Assiniboine.® (c) In 1870 at the transfer of the Hudson's Bay territories to Canada, the new province of Manitoba extended from the international boundary to 50° 30' N. latitude and from 96° to 99° W. longitude. From its limited area and shape it was long known as (<the postage stamp province.® (d) In 1877 the eastern and western boundaries were slightly changed from meridians of longitude in order to conform to the system of land sur¬ veys in township, *etc.* (e) In 1881 the prov¬ ince was enlarged westward to the 30th range (nearly 101° 3L W. longitude), northward to the 12th base line (nearly 53° N. latitude) and eastward almost to 95° W. longitude, though this was fixed only after extended litigation with Ontario in 1884. The area was now 73,732 square miles, (f) In 1912 the province was enlarged north and northeast to the present boundaries, including a littoral of 500 miles on Hudson Bay and about 178,000 square miles of new territory. The northern boundary is now 60° N. latitude and Hudson

Bay and the northeastern boundary runs from the northeast angle of the old province to the eastern end of Island Lake, and thence to the shores of Hud¬ son Bay at the 89th meridian of W. longitude.

Geographical Position and Climate. — The importance of this district has been determined throughout its history largely by geographical considerations. For the French fur-trade from Canada and for the British trade from the same source after 1763, the Winnipeg, Red and Sas¬ katchewan river systems formed the links be¬ tween the Great Lakes and the Athabaska fur districts. Meanwhile from 1670, the date of the Hudson's Bay charter, to the transfer of the Hudson's Bay territories to Canada in 1870, the fur-trade by way of Hudson Bay came to follow the Hayes River route to Lake Winni¬ peg, thence the Red and Saskatchewan Rivers to the areas south and west. The intersection of these two channels occasioned the long and bitter conflict between the Hudson's Bay and NorthWest companies. With American ex¬ pansion up the Missouri and Mississippi rivers

a third channel of communication was opened uo from Saint Paul — at first by (<Red River cart® or river-boat down the Red River, and eventually by rail in 1878. With the completion of the Canadian Pacific Railway, traffic reverted to the Canadian route by rail or the Great Lakes. It is seen therefore that the province lies at the headwaters of the three greatest waterways systems of the continent, the eastern by the Great Lakes and the Saint Lawrence, the southern by the Mississippi and the northern to Hudson Bay. This strategic importance was the occasion of Selkirk's choice of this dis¬ trict for colonization in 1811, for the movement in the United States during the sixties for the annexation of the Red River district to the American Union and for the more successful movement in Canada culminating in 1870 in the incorporation of the Hudson's Bay territories into the Canadian Confederation. Recent devel¬ opments tend to confirm these considerations. The resources of water power, the fertility of the prairie and the prospective maritime outlet on Hudson Bay almost from the centre of the continent (see Resources) tend to unite the interests of the factory, the prairie and the sea at a point where the distinctive interests of East and West begin to diverge. On account of "its geographical position and its peculiar characteristics® Lord Dufferin in 1877 referred to the province of Manitoba as the <(keystone of the arch.® The position of Winnipeg (q.v.) as <(the neck of the funnel® for traffic converg¬ ing eastward and diverging westward has made that city the largest cash wheat market on the continent, with bank clearings normally equalled in Canada only by

those of Montreal and Toronto.

The climate exhibits high variability of temperature, both daily and seasonal, together with a good average temperature for the year. The humidity, however, particularly in winter, is low. For the 20-year period, 1888-1907 at Winnipeg the mean daily range of temperature has varied from the maximum of 26.4° for May to the minimum of 18.1° for November. The mean annual range of temperature has been 68°, though the highest absolute range of tem¬ perature recorded has been 153°. The highest mean monthly temperature has been 77. 6° in July, the lowest — 13.4° in February. The annual rainfall has averaged 20.42 inches, but it is a remarkable fact that 10.9 inches of this have fallen during the four months May to August. The percentage of possible sunshine during the same period has averaged about 55.5 per cent — nearly double that of Edinburg. The growth of vegetation is thus remarkably rapid. The climate is healthful and invigor¬ ating, though the winters are severe and the changes from winter to summer and vice-versa are unusually sudden.

Geology and Topography.— The geological formations encountered in Manitoba are Precambrian, Ordovician, Silurian, Devonian, Cre¬ taceous, Pleistocene and Recent. Of these the early formations are found in ascending order from east to west, except that in the north¬ eastern angle of the province adjacent to Hud¬ son Bay there is a belt of Silurian with another of Ordovician adjoining it. The Precambrian area, comprising practically the whole district east and southeast of Lake Winnipeg, extends roughly in a northwesterly direction, including

nearly the whole of the central and northwest¬ ern part of the province. Outcroppings of Huronian and Keewatin are numerous (see Re¬ sources) though but limited areas have been as yet carefully prospected. T.he topography of this Archaean region is very rugged with numer¬ ous lakes and wooded ridges of granites and gneisses largely denuded of soil by glacial action. The term «prairie province® long ap¬ plied to Manitoba thus applies only to the southern and southwestern areas of the prov¬ ince, comprising less than two-fifths of the whole. The Ordovician, Silurian and Devonian belts, extending also in a general northwesterly and southeasterly direction, underlie the great lake districts of Lakes Winnipeg, Manitoba, Dauphin and Winnipegosis. Valuable limestone, gypsum, shale and sandstone deposits outcrop at many points over these areas (see Re¬ sources). The Cretaceous area directly overlying the Devonian in the southwestern district of the province exhibits soft shales and basal sandstone. The escarpment which forms the eastern edge of this area extends froni the Pembina Mountains, near the international boundary, to the Pasquia Hills just south of the Saskatchewan River. The Pleistocene deposits of clay over the older formations, particularly in the south, are due, like the highly com¬ posite nature of the surface soils of this area, to the action of the great glacial lakes Agassiz, Souris and Saskatchewan — probably 110,000 square miles in area (Upham) of which con¬ siderably more than three-quarters lay within the present boundaries of the province. The original outlet of this great lake, the receding shores of which are marked by no fewer than 28 beaches (Upham), was toward the south until the melting of the ice-barriers opened up the natural outlet into Hudson Bay. To the rich composite deposits of surface soils during this process, particularly where the early reces¬ sion of Lake Agassiz permitted adequate ˆweathering® of surface molds, the fertility of southern Manitoba may largely be attributed, though more recent alluvial deposits of both clay and humus are traceable in the Red River Valley. In the northern areas of the Lake Agassiz district the drainage is still very de¬ fective and the <(weathering® of the soil corre¬ spondingly incomplete… ,

Perhaps the most striking topographical feature of the province is the surviving lake area of Lakes Winnipeg, Manitoba, Dauphin and Winnipegosis. Lake Winnipeg particularly (approximately 9,500 square miles) is the re¬ pository of the Winnipeg River system from the southeast, the Red and Assiniboine River systems from the south

and the Saskatchewan River system together with the Winnipegosis, Manitoba and Dauphin Lakes system from the west. The outlet is by Nelson River into Hud¬ son Bay. The Churchill River flowing also into Hudson Bay drains a largely unexplored area in the northwestern part of the province. This variety of surface features is found with a very limited range of altitudes. The highest hills are found in the escarpments of the Cretaceous area — Pembina Mountains, Tiger Hills, Rid¬ ing Mountain, Duck Mountain (2,600 feet) and the Pasquia Hills.

Fauna and Flora. — The wild life was at one time prolific and is still justly famous, though game is now carefully conserved, lne

fur-trade was the first historic industry of the country. The buffalo, once found in almost in¬ credible numbers on the prairie, is now extinct in its wild state, but the wapiti or elk the ante¬ lope and the moose are still plentiful. Among fur-bearing animals are the otter, beaver, mink, fisher, skunk, martin, muskrat, wolf (< timber and «prairie»), bear, fox, lynx, ermine and wolverine, with the rabbit in great abundance as the basis of carnivorous life. Bird life is plentiful, including prairie chicken, wild duck, mallard duck, wild goose and partridge among game birds, and more than 250 other sPe.cies °* wild birds. Among fish the whitefish, pickerel, pike, sturgeon, tullabee and goldeye have con¬ siderable commercial value.

The flora of the province (includes tamarac, spruce (white and black or (<bog®), jack pine, trembling poplar and balsam fir over vast areas of the Precambrian district, with less plentiful growths of oak, elm, cottonwood and c Manitoba maple® (in southern districts of the province. Small fruits such as strawberry, raspberry, blue¬ berry, cranberry ((<high-bush® and low-bush), saskatoon berries, the wild plum, cherry and black currant are indigenous. Wild flowering plants (more than 750 species of Phanerogamia) are remarkable during the summer months tor their profusion of variety and color.

History and Political Development.— Manitoba was admitted as a province to the Canadian Confederation only in 1870, but there is a sense in which the Hudson Bay district is the oldest continuously British territory upon the continent. The charter granted to the Hud¬ son's Bay Company in 1670 formed the basis of the British claims which came to embrace prac¬ tically the whole watershed into Hudson Bay. French counterclaims on behalf of Canada, however, were advanced and in many cases vindicated by force until 1713

when the district became British by the Treaty of Utrecht. Provision W3.S made for a commission to determine the boundaries between Canada and the Hud¬ son's Bay territories, but no settlement vvas ever reached. After Canada also became Brit¬ ish in 1763, traders from Montreal under the name of the NorthWest Company sought to revive the validity of the old French claims in order to vindicate their refusal to recognize the Hudson's Bay charter. This conflict in trade was accentuated rather than assuaged when the fifth Earl of Selkirk obtained control of the Hudson's Bay Company in 1811 in order to carry out his third project of colonization from the Scottish highlands. The company granted him for the purpose the district of Assiiniboia, comprising 116,000 square miles and controlling the most important strategic waterways of the west. The first band of settlers reached (<the Forks® of the Red and Assiniboine rivers, the site of the city of Winnipeg, on 30 Aug. 1812. From the first, however, the NorthWest Com¬ pany 'had determined to disperse or destroy the settlement, and faulty management on the part of the officials of the colony facilitated their purpose. In 1815, 134 of the settlers were in¬ duced to leave the Red River Settlement for Upper Canada. The rest were driven off to¬ ward Hudson Bay. Reinforcements re-estab¬ lished the colony in the autumn, but in the fol¬ lowing spring Governor Semple and 20 of his men were killed at Seven Oaks, near the settle-MANITOBA

ment, by an armed band of ((half-breeds)> or Metis in the employ of the NorthWest Com¬ pany. This act of violence at last aroused the British government from its policy of "salutary neglect,® but Selkirk, who was on his way from Canada to the settlement when he received the news of Seven Oaks, made the fatal mistake of turning aside to retaliate upon the NorthWest partners at Fort William. The rest of his life was filled with bootless litigation ; for though he visited the settlement in 1817 and spent both health and fortune upon it, he died in 1820 without vindicating his cause. Meanwhile the British government had brought pressure to bear in order to bury the blunders of the past by a coalition between the rival companies. This was effected in 1821 under the name of the Hudson's Bay Company, and the old "North¬ westers® became the stunchest exponents of all the rights of the charter.

The Red River Settlement, meanwhile, had suffered a series of natural

as well as deliberate calamities. A plague of grasshoppers in 1818 and finally the great flood of 1826 threatened, as Governor Simpson wrote, to prove “an ex¬ tinguisher to the hope of Red River ever re¬ taining the name of a settlement.® The colony was firmly re-established, however, by a suc¬ cession of prolific harvests and the profusion of natural resources for primitive settlement. (Sheriff Ross records the slaughter of 2,500 buffalo in a single “hunt,® and no fewer than 16,000 whitefish were taken by the settlers on their retreat after Seven Oaks). By 1830 the Red River Settlement bore every appearance of “peace and plenty.® In 1834 it reverted by pur¬ chase from the Selkirk family, in whose posses¬ sion it had remained after the fifth Earl of Sel¬ kirk’s death, to the direct control of the Hud¬ son’s Bay Company.

After the coalition in 1821 the company’s trade in Rupert’s Land, as the “chartered® ter¬ ritory came to be called, had responded rapidly to the enterprising management of Gov. George Simpson. By license issued successively in 1821 and 1838, for periods of 21 years, the company was granted a monopoly of the fur-trade for the whole district westward to the Pacific. A new Fort Garry with walls and bastions of stone was built at “the Forks® (1836-38) but the Red River Settlement re¬ mained for more than a generation a primitive and secluded community. The primitive “coun¬ cil® at the settlement gave place after 1834 to the regularly constituted “Council of Assiniboia.® After 1841 the “Municipal District of Assiniboia® came to include only the area within a radius of 50 miles from “the Forks® of the Red River and the Assiniiboine. Colonization was overshadowed by the opulence and mystery of the fur-trade, and though the company can scarcely be charged with neglect, Selkirk’s orig¬ inal plan of affording a stable and ready market for agricultural produce in the expanding trade of the company was only partially realized. With the advent of the American trader from the south and the enterprise of the “freetrad¬ ers® within the settlement itself, even the com¬ pany’s cherished monopoly of the fur-trade was subject to challenge.

The original Scottish settlers, reinforced by many of the retiring servants of the company, formed a thrifty and contented community. The French Metis, however, though served by

a devoted Roman Catholic priesthood, formed a much less stable element of the population. Accustomed to live by the buffalo chase or by fishing, they were readily susceptible to influen¬ ces with which the primitive patriarchal author¬ ity of the company soon proved

powerless to cope. The process of “smoothing® the mal¬ contents by adroit management postponed the conflict without averting it. In 1849 the primi¬ tive judioiary at the settlement was openly in¬ timidated into acquitting one of the “free¬ traders® in furs. Thereafter the monopoly of the fur-trade was openly contravened. The Red River Settlement began to attract attention in Canada and in the United States. In 1857 the Committee of the British House of Commons drew up its famous (Report y on the Hudson’s Bay Company, and it became apparent that Canada had the ear of the British government in the dream of expansion to the Pacific.

From 1857 to the transfer of the Hudson’s Bay territories to Canada in 1870, the develop¬ ment of the Red River Settlement was rapid and at times turbulent. During 1856 no fewer than 500 Red River carts with produce and furs plied to the American outposts. Three years later two Canadian journalists brought in a printing-press, and the Nor’-Wester advocated insistently a union with Canada. American opinion was scarcely less pronounced; as late as 1869 Governor McTavish of the Hudson’s Bay Company regarded annexation to the United States as the “manifest destiny® of the Red River district. The Canadian party, however, though enterprising and aggressive, bitterly an¬ tagonized the company and many of the older inhabitants. The improvident and credulous French Metis, particularly, were suspicious and resentful. Generous “reserves® of land and scrupulous tact on the part of Canadian officials might have allayed their fears of the impending change. In 1869 the purchase of the Hudson’s Bay territories by Canada for £300,000 ($1,500-000) was arranged under the auspices of the British government. The company had changed hands in 1863, and the resident officials in Ru¬ pert’s Land could not be expected to be enthu¬ siastic either to the new directorate or to Can¬ ada. The Scottish settlers readily acquiesced in the change, but the fears of the French Metis were fomented by a few agitators into open in¬ surrection against the transfer.

The Dominion of Canada had been formed only in 1867, and the Riel Insurrection at Red River reflected largely the attitude of Quebec in the Canadian Confederation. The establish¬ ment of a smaller Quebec on the banks of the Red River had long been the policy of the French clergy. The prospect of union with Canada without guarantees for their race, lan¬ guage and religious control over the Metis oc¬ casioned the bitterest resentment. During Arch¬ bishop’s Tache’s absence from Red River a ris¬ ing of Metis led by Louis Riel received the support and for a time submitted largely to the guidance of French clerical influence in touch with Canadian politics. Riel seized Fort Garry and dominated the settlement for 10 months until the arrival of

a military expedition under Colonel Wolseley on 24 Aug. 1870. “Land scrip® was issued for the Metis, and clauses in¬ tended to safeguard the French language and separate schools found their way into the Mani¬ toba Act by which the province was formally

incorporated into the Dominion ; but the vio¬ lence of Riel and his confederates, and partic¬ ularly the violent death of Thomas Scott, a Canadian, on 4 March 1870, embittered provin¬ cial and even federal politics for many years. The ruthless repeal of these special privileges for the French minority 20 years later was due in no small measure to resentment against the methods employed in seeking to obtain them during the Riel Insurrection. The total popula¬ tion of the new province was less than 12,000, of whom but 1,565 were white. The first pro¬ vincial government consisted of a legislative as¬ sembly of 24 members (with an executive coun¬ cil of five) and a legislative council (abolished in 1876) of seven members. The new province inherited from the past a series of problems which kept public feeling a.t high tension. Cross-currents of race and religion — a Fenian raid in 1871, the ((amnesty question® and the trial of Lepine for the death of Scott — com¬ plicated for many years the work of provincial government. The chrome poverty, moreover, of the “postage stamp province® reduced ad¬ ministration after administration to a degree of economy bordering upon parsimony. The agitation for <(better terms® and “provincial rights® became increasingly insistent with the responsibilities attendant upon rapid immigra¬ tion. Within a decade the population grew from 12,000 to 60,000. The railway from Saint Paul was completed in 1878 ; with the Canadian Pacific Railway in prospect east and west the province began in 1879 to experience a “boom® which added $5,000,000 in buildings and doubled the population of Winnipeg within a single year. After 1882 the return to normal conditions was slow and difficult. Under the Norquay admin¬ istration particularly (1878-87) the provincial government was found to be struggling against intolerable disabilities. The control of natural resources had been retained by the federal gov¬ ernment. The provincial treasury was depend¬ ent chiefly upon meagre grants from the Do¬ minion under the form of direct allowance for government, per capita allowance for institu¬ tions, “debt allowance® for Dominion indebted¬ ness in 1870, subsidy in lieu of public lands, *etc.* The national importance of the Canadian Pacific Railway was held to justify “a monopoly clause® against the granting of provincial char¬ ters to competing railways. The grant of one-twentieth of settled land to the Hudson Bay Company by the terms of the transfer in 1869 and the generous grants of land to the Canadian Pacific Railroad had created a “landlock® which interfered seriously with settlement. An increase of federal subsidy to $227,000 in 1882 and the extension of

the boundaries proved quite inadequate concessions. The Canadian Pacific Railroad was completed in 1885 but the province proceeded to contest the “monopoly clause® by undertaking the Red River Valley Railway as a government work. The new Greenway administration (1888-99) forced the Dominion at last to repeal the objectionable “monopoly clause.® This first substantial vic¬ tory for “provincial rights® was regarded as “the advent of a new era.®

“The Manitoba School Question® which dominated provincial politics and eventually even federal politics in 1896 is dealt with else¬ where. The Roblin administration, from 1900, was marked by few fundamental political issues.

In 1908 the government announced “the first complete system of government-owned tele¬ phones on the continent.® hour years later it was announced that there were nearly 4,000 miles of completed railway lines within the province, of which about 1,600 miles had been built in seven years. Provincial guarantees oi railway bonds ($25,000,000) have since been practically abrogated by the Dominion (1918) in taking over the Canadian Northern Railway. In 1912, almost exactly a century after the be¬ ginning of settlement in Assiniboia, the bound¬ aries of the province were extended northward over a new district estimated at 106,304,000 acres, with a littoral of 500 miles on Hudson Bay (see Boundaries) . The sum of $2,178,- 648 was granted for arrears of claims by the province, and the total federal subsidies were increased from less than $840,000 in 1911 to nearly $1,350,000 pending the control of the natural resources by the province. The Norris administration which was strongly supported at the polls after the resignation of the Roblin government in 1915 is carrying forward a very comprehensive policy of education. The Hud¬ son Bay Railway for which $25,000,000 have been appropriated by the Dominion is now under construction from The Pas to Port Nel¬ son — 410 miles, of which 320 have been com¬ pleted. For the province of Manitoba, the prospect of a shorter water route to the British market, for at least four months of the year, than that from New York, marks a curious re¬ currence to historic conditions. Not less im¬ portant will be the prospect of opening up — eventually under provincial control — the nat¬ ural resources of the vast northern areas of the province. The chief interests of Manitoba, however, remain agricultural. By far the most remarkable development of recent years in western Canada has been agrarian organization — the Manitoba Grain Growers’ Association with similar organizations in other western provinces — for co-operative and educational purposes. The United Grain Growers,

Limited (an analogous commercial organization formed in 1917 by the union of the Grain Growers' Grain Company and the Alberta Co-operative Elevator Company), with headquarters in Win¬ nipeg, has achieved by far the most signal suc¬ cess in Canada both in the marketing of wheat and in the purchasing of agricultural supplies through co-operative agencies;

Natural Resources, Manufactures and Transportation. — The following official sta¬ tistics will indicate the relative returns from natural resources (as tabulated for 1916 by Commissioner Wallace of northern Manitoba), the estimated value of manufactures and the railway mileage within the province :

Natural Resources:

Agriculture: Field Crops….

Live Stock Sold Produce Sold . .

Water Power . .

Mining (non-metallic) .

Forest Products .

Fur and Game .

Fisheries .

Manufactures (Census, 1911):

Capital . .

Output .

$76, 749,000 11 , 326,45 7 13,212,607 5,129,789 1,823,576 1,807,320 1,684,474 1,390,002

47,941,540

53,673,609

Railway mileage (1916, exclusive of Hud¬ son Bay), 4,340 miles.

Agriculture is by far the chief productive

industry of the province, representing 89.5 per cent of total production from natural resources. The wheat of Manitoba, grown chiefly in the southwestern areas of the province (maximum production 96,662,912 bushels in 1915), is justly famous, giving its name (((No. 1 Manitoba

hard®) to the highest “contract® grade of wheat fixed by statute, though the next grade (No. 1 Northern) has now become the standard of value. Oats, barley (maximum production 101,077,991 and 35,423,495 bushels respectively in 1915), potatoes, rye and flax come next in value. It is estimated that only about 7,187,737 acres (census, 1916) or less than one-twentv- second of the total land area of the province have as yet been brought under cultivation. The yield for garden vegetables is prolific. Stock raising and mixed farming are on the increase; the numbers of horses, milch cows, sheep and swine showing an increase of 20.8 per cent, 32 per cent, 105.7 per cent and 17 per cent respectively for 1911-16. Manitoba contains nearly 4,000,000 horse power of available water power (Commission of Conservation) of which 2,904,500 is on the Nelson River and 555,900 on the Winnipeg River. Of this only 76,200 horse power from the Winnipeg River has as yet been developed, chiefly by the Winnipeg Electric Railway Company (Pinawa Channel) and the city light and power (Point du Bois). With the exception of building materials, brick, cement, building stone (Tyndall stone is pre¬ eminent), gypsum, etc., of the southwestern areas of the province, mining, like the water power, is as yet in its infancy. Vast districts of the Precambrian area which comprises three-fifths of the province have yet to be prospected, though deposits of copper and gold in Keewatin-Huronian formations are awaiting facilities for transportation and treatment. Upon conserva¬ tive estimates (Wallace) the Hudson Bay Rail¬ way to Port Nelson following the course of the chief water powers of the province (Nelson River) is opening up a field for metallurgical and other processes such as electric smelting and the manufacture of fertilizers from lime¬ stone and atmospheric nitrogen by the electric process.

The chief manufacturing industries of Mani¬ toba as yet are grain and meat products, electric power and products of lumber, brick and tile. The total output for 1915 was estimated at $61,594,284, an increase of 118 per cent in 10 years. The Dominion now controls more than half the total railway mileage of the province.

Government and Judiciary. — The pro¬ vincial government consists of a legislative as¬ sembly of 49 members with an executive council of seven members directly responsible to the legislature. A lieutenant-governor is appointed by the Dominion for a term of five years. The legislature for which both men and women are eligible is elected for a period of four years unless dissolved in conformity with principles of British parliamentary procedure. The province has a representation of 14 members in the Dominion House of Commons, based pro rata, like that of other Canadian provinces, upon the fixed number of 65 from the province of Quebec.

The judiciary comprises (a) the Court of King's Bench, consisting of a chief justice and five puisne judges with original civil and crimi¬ nal jurisdiction, and until 1906 with jurisdic¬

tion also, when sitting en banc, as the ultimate court of appeal, (b) In 1906 a Court of Ap¬ peals was established, consisting of a chief justice and four (originally three) puisne judges with appellate jurisdiction from other courts of the province, (c) County Courts in the various judicial districts of the province, with jurisdiction over certain civil (in general up to $500) and criminal cases, (d) Surro¬ gate Courts, one in each judicial district of the province. The County Court judge is ex officio judge of the Surrogate Court, with jurisdiction over administrations and probate. Minor courts in the province are presided over by stipendiary magistrates and justices of the peace.

Education. — Manitoba possesses, under the control of a Minister of Education, assisted by an Advisory Council, a comprehensive system of non-sectarian public education from the primary school to the provincial university, including among other progressive features compulsory education, consolidated schools, residences for teachers in 127 outlying dis¬ tricts of the province, special school organiza¬ tion under an official trustee for communities of "new Canadians,® night schools and two well-equipped technical high schools in Winnipeg, *etc.* The total annual expenditure upon public education (Report, 1917) was nearly $6,000,000, of which $1,072,816 was contributed directly by the provincial government. In the public school system in

1917 there were 106,588 pupils enrolled, with an average attendance of 64.93 per cent daily and of 135.05 days during the year. (The average for Wisconsin during 1914 was 123.4 and for the United States 117.8). There were 3,024 teachers and 1,626 school buildings. Of these more than 100 were secon¬ dary, high or collegiate schools.

The University of Manitoba is under the management and control of a board of governors consisting of nine members appointed by the provincial government, three each year for periods of three years. The university gives instruction and grants degrees , in arts, science, agriculture, engineering (civil and electrical), medicine, pharmacy, law, architec¬ ture and home economics. Well-equipped agri¬ cultural and medical colleges are in affiliation with the university, together with four affiliated denominational colleges (Anglican, Roman Catholic, Presbyterian and Methodist) with representatives (two each) upon an academic council of 28 members. A Baptist college at Brandon is not affiliated with the provincial in¬ stitution. At the outbreak of the war there were 917 students registered for instruction at the university.

Bibliography. — Documentary authorities Selkirk Papers) (manuscripts), (Dominion Archives, Ottawa) ; (Papers Relating to the Red River Settlement5 (1819) ; (Report of Select Committee5 (1857) ; (Recent Disturbances5 (1870) ; (The Canadian NorthWest,5 ed. Oliver (Dominion Archives, 1915). Consult also (Canada and Its Provinces5 (Vol. XIX and XX); Ross, (Red River Settlement5 (1856); Hargrave, (Red River5 ; Martin, Chester, Sel¬ kirk's Work in Canada5 ; Begg, (History of the North-West5; Bryce, (Manitoba5 ; Schofield, Story of Manitoba.5

Chester Martin,

Professor of History, University of Manitoba,

MANITOBA — MANITOBA SCHOOL QUESTION

MANITOBA, Canada, a lake situated in Manitoba province, to which it gives its name, about 59 miles southwest of Lake Winnipeg.

It is of irregular shape, 119 miles long, with a maximum breadth of 29 miles, a shore-line of 535 miles, an area of 1,171 square miles and an average depth of 12 feet. It is 810 feet above sea-level, and 40 feet

higher than Lake Winnipeg, into which it drains through the Saskatchewan or Dauphin River.

MANITOBA, University of. The Cana¬ dian province of Manitoba, which was formed out of Rupert's Land in 1870, was the out¬ growth of the Red River Settlement founded by Lord Selkirk and his immigrants under Hud¬ son's Bay Company auspices in 1812-15. The Scottish settlers were joined from time to time by the Metis, the descendants of French-Cana- dian voyageurs, who married Indian women, and also by the children of company officers and Orkney employees of the Hudson's Bay Company who had taken Indian wives. This mixed community in 1870 numbered 12,000 souls.

To the Metis came from Lower Canada Priest (afterward Bishop) Provencher, who in 1818 established a school, which grew in later times into Saint Boniface Roman Catholic Col¬ lege. The English-speaking half-breeds belong¬ ing to the Church of England were educated at Saint John's College, which was reorganized in 1866 by Bishop (afterward Archbishop) Mach ray. Just as the new province of Mani¬ toba was forming there was established during the year 1871 in Kildonan, near Winnipeg, among the Selkirk Scottish settlers, .a Presby¬ terian college, known since as Manitoba Col¬ lege. This last-named college was in 1874 re¬ moved to Winnipeg. These three denomina¬ tional colleges were all in or near the new city. In 1875 an important meeting was held in the courthouse, Winnipeg, by Manitoba College, in which a union of the three colleges under a provincial university was suggested. Governor Morris favored this plan, and in 1877 an act was passed in the legislature of Manitoba estab¬ lishing the University of Manitoba, to which the three colleges, Saint Boniface, Saint John's and Manitoba, were affiliated. The university was at first to be only a'n examining body, the teaching being done, entirely by the colleges.

The new university was unique. It brought together the largest religious bodies of the province and kept up the standard of education, it being the only source of degrees. Its first examinations took place in May 1878, when seven candidates presented themselves. In 1878 application was made to the Dominion govern¬ ment for a land grant, and at length, in 1885, under the (<Better Terms Settlement" of that year, 150, OCX) acres of good agricultural wild land was given to the university. This endow¬ ment is now valued at $1,250,000. . In 1883 a native of Red River Settlement living in Eng¬ land, Mr. A. K. Isbister, who like many others was attracted by the broad and cosmopolitan spirit of the young university, bequeathed $83,- 000 as a scholarship fund to the university.

In 1882 the Manitoba Medical College was founded and became affiliated to the university. In 1888 a new member of the sisterhood of Colleges — Wesley College of the Methodist Church — was affiliated to the university; a college of pharmacy was affiliated in 1902.

In 1893 the University Act was changed to allow teaching to be done by the university in natural science,, mathematics and modern languages, the affiliated colleges taking up the other departments. In 1898 a site of seven acres in the heart of Winnipeg, valued at $120,000, was given by the Dominion govern¬ ment to the university, and in 1900 the first

building was erected. .

In recent years on the erection of new government buildings, two commodious law buildings contiguous to the university grounds have been transferred to the university for its increasing needs. In 1903 the University Act was changed to permit teaching in the classics, natural science, mathematics and modern lan¬ guages, engineering and business training, still depending on the denominational colleges for teaching in the other arts subjects. Degrees are now given by the university in arts, law, med¬ icine and agriculture. The several affiliated denominational colleges have the power to be¬ stow degrees in theology on students who have passed certain arts requirements in the uni¬ versity. These degrees on being reported to the university become as also pharmacy and dentistry ipso-facto degrees of the university. #

In the first decade of this century an agri¬ cultural group of buildings was erected on a site contiguous to Winnipeg costing some $4,000,000. ˆ On a provincial farm this cluster is equipped under a large staff representing the many phases of agriculture. It is said that this complete group is not surpassed by any set of similar buildings on the continent. The Man¬ itoba Agricultural College is affiliated to the university. A university library growing to be worthy of recognition is now established in the university. ‘

In the last decade of its history a very large addition has been made to the work of the arts and sciences in the university, including a law school, to civil, electrical and mechanical engineering departments, and to the branches of pharmacy, commercial education and archi¬ tecture. There are upward of 50 instructors now on the university faculty.

Not only has this great development taken place in the University of Manitoba, but it is to be remembered that in less than two decades three provincial universities of western Can¬ ada, viz., those of Saskatchewan province at Saskatoon, of Alberta at Edmonton and of British Columbia at Vancouver, have been established and are developing greatly, thus cutting off a vast field of supply from Manitoba University. Under the new act of 1917 Mani¬ toba University has become strongly supported by the provincial government, and still retains the support of the denominational colleges, which cling to their former affiliation. Not¬ withstanding the great demands of the Euro¬ pean War, the number of university students in the year 1917-18 reached 932, but during the war the enrollment fell to 500.

George Bryce,

Founder of Manitoba College and a Founder of the Manitoba University.

MANITOBA SCHOOL QUESTION. In 1871, shortly after the colony of Assiniboia had become a province of Canada under the name of Manitoba, a law was passed establishing a dual system of denominational public schools, serving respectively the needs of the French

(Roman Catholic) and English-speaking (Prot¬ estant) population in the province. At this time these racial and religious components were pretty, evenly divided ; but immigration from Ontario speedily gave a marked preponderance in numbers to the English-speaking section, and in 1889 it was reported that of the 618 schools in the province 545 were Protestant and 73 Roman Catholic. An agitation against the sys¬ tem of separate schools had begun to gather volume, and in 1890 under Premier Greenway an act wgis passed in the provincial legislature abolishing all sectarian schools and establishing a common school system, under which all school taxes, whether derived from Protestants or Catholics, were appropriated to the support of the new

public schools. The passing of this act was hotly resented by the French-speaking Catholic population as an attack on their lan¬ guage and religion, and as an invasion of the terms of the British North America Act and the Manitoba Act, which guaranteed minority rights in regard to education. Under the lead¬ ership of Archbishop Tache an agitation for its repeal was engaged in by his coreligionists throughout the Dominion, but the act was per¬ mitted to come into force by the federal gov¬ ernment. A test case, however, was taken to the law courts; the judgment of the Provincial Court sustained the validity of the act, while the Supreme Court of Canada declared it to be ultra vires. The final court of appeal, the Ju¬ dicial Committee of the Privy Council, reversed the decision of the Supreme Court and de¬ clared for the validity of the act. Appeal was then made to the Dominion government to pass a remedial act, which the Prime Minister, Sir Charles Tupper, introduced in 1896; but the measure failed to carry through the diverse sectarian elements in the House of Commons, and the government suffered defeat in the en¬ suing general election. A compromise was then effected under the premiership of Sir Wilfrid Laurier, the most important feature of which was embodied in clause 258 of the School Law of 1897, which provided <(that where 10 of the pupils speak the French language (or any lan¬ guage other than English) as their native lan¬ guage, the teaching of such pupils shall be con¬ ducted in French (or such other language) and English upon the bilingual system.® The clause, it will be observed, is some\Vhat loosely drawn and does not properly define what is meant by the bilingual system. No provision was then (or afterward) made for the adequate staffing of the schools with bilingual teachers. Shortly after the passing of this law a great immigra¬ tion into the Canadian West began and Mani¬ toba became a polyglot province. The result of this influx was seen in the 1911 census, when the total number of persons of foreign birth — Germans, Austrians, Poles, Jews, Russians and Scandinavians stood at 100,000. At the end of 1915 it was reported that there were 126 French schools with 7,393 enrolments ; 61 German schools with 2,814 pupils, and 111 Ruthenian or Polish schools with 6,5 1 3 pupils. One-sixth of the entire school population were being edu¬ cated in bilingual schools. There were five school districts in which bilingual education might have been demanded in three languages other than English and 36 districts in which the same claim might have been made for two languages other than English. Under these VOL. 18 — 15

conditions education remained very backward in the province — a situation that was aggravated by the indifference of communities such

as the Mennonites to education itself as tending to draw its members away from the simplicity of their faith and teaching. It was only after long agitation that in the session of the legis¬ lature of 1916 clause 258 of the School Law quoted above was rescinded and nothing put in its place — a law which left Manitoba, like Prince Edward Island, New Brunswick and British Columbia, without any provision as to language in its schools. Education was at the same time made compulsory on all children between 7 and 14 years.

MANITOU, man'i-too, a name given, among the American Indian tribes, to any spirit or supernatural being, good or evil ; also ap¬ plied to any object of religious awe and rev¬ erence. <(The Illinois,® wrote the Jesuit Marest, ((adore a sort of genius, which they call mani¬ tou; to them it is the master of life, the spirit that rules all things. A bird, a buffalo, a bear, a feather, a skin — that is their manitou.® <(If the Indian word manitou,® says Palfrey, (<appeared to denote something above or beside the common aspects and agencies of nature, it might be natural, but it would be rash and misleading to confound its import with the Christian, Mo¬ hammedan, Jewish, Egyptian or Greek concep¬ tion of Deity, or with any compound of a selection from some or all of those ideas.® The word was applied to any object used as a fetish or an amulet. It was common among all West¬ ern and Mississippi tribes.

MANITOU SPRINGS, Colo., a noted scenic, health and pleasure resort of the Rockies, picturesquely situated at the confluence of Engleman's Canon, Ute Pass and William's Canon, at the foot of Pike's Peak. It is in El Paso County on the Rio Grande and Colorado Midland railways, at an altitude of 6,336 feet, and is famous for its health-giving, highly radioactive mineral springs, wells, geysers and gushers, of soda and iron, 24 in number, satu¬ rated with carbonic acid gas and flowing a quarter million gallons daily. The unique Gar¬ den of the Gods with the colossal Gateway; the Seven Falls ; ancient Cliff Dwellings ; Pike's Peak Cog Road, highest, passenger all-steel cog railroad in the world ; the Pike's Peak auto highway, to the summit of Pike's Peak — eleva¬ tion, 14,109; the wonderful Cave of the Winds; Crystal Park auto highway with its succession of inspiring views at varying elevations; the Mount Manitou scenic incline, the highest, steep¬ est cable line known, are among the many nota¬ ble attractions in the neighborhood. As a health resort Manitou is open the year round, the climate and waters having a wonderfully stimulating effect on blood formation and nutri¬ tion. All modern facilities abound. Resident population, 1,357. During the height of the season, July and August, Manitou is thronged with visitors averaging from 10,000 to 15,000.

MANITOULIN (man-i-too'lin) _ ISLANDS, Canada, a group of islands in the northern part of Lake Huron, partially separat¬ ing the waters of the lake from Georgian Bay, and east of the famous ((Soo® Canal. The name is a corruption of the Indian word Mani-towin, which means divinity. Except Drum¬ mond Isle, about 25 miles long and 9 miles

wide, which belongs to the State of Michigan, the group is a part of the province of Ontario. The largest island of the groun is Grand Mani-tculin, or Sacred Isle; about 80 miles long and 30 miles at the widest. The coast is very irreg¬ ular. Cockburn, or Little Manitoulin, is nearly circular, and about eight miles in diameter. All the islands are well wooded ; Grand Mani¬ toulin and Cockburn have large pine forests. The shore waters abound in fish. Fully half the inhabitants are Indians of the Algonquin race. The cool climate in summer and _ the striking natural features add to the attractions of the islands and make them a favorite sum¬ mer resort. Pop. 2,000.

MANITOWOC, man-I-to-wok', Wis.,city

and county-seat of Manitowoc County, on Lake Michigan, at the mouth of the Manitowoc River and on the Wisconsin Central and the Chicago and Northwestern railroads, about 77 miles north of Milwaukee. The city, picturesquely surrounded by a semi-circle of low hills, was chartered in 1870. It has a good harbor and regular steamer connection with all of the im¬ portant lake ports; large grain elevators, ship¬ building and repair yards, and an extensive export trade in wheat and other grain, lumber, leather, beer, dairy products, etc., and imports of groceries, cloth and clothing. The manufac¬ tures are important, the census of 1909 return¬ ing 80 establishments, with $6,764,000 capital stock, employing 1,824 persons at $1,007,000 annual wages, using materials valued at $3,963,- 000 and with a product valued annually at $5,939,000. These figures are now estimated to be about 15 per cent higher. There are three large breweries; the other industries were brickyards, hay presses, creameries and cheese-factories. saw-and planing-mills, and manufac¬ tories of leather, flour, furniture, foundry prod¬ ucts, machinery,

agricultural implements, edge tools, cigars, canned goods and glue. The city has national, savings and other banks, water¬ works, gas and electric light; and daily and weekly newspapers, several of which are pub¬ lished in the German language. Manitowoc is the seat of the county asylum, Saint Mary's Hospital, Saint Felix Industrial and Reform School, Holy Family Hospital and the James Library, and has' a courthouse, a high school, public and parochial schools and several hand¬ some churches. Pop. (1920) 17,563.

MANIZALES, ma-ne-sa'las, Colombia, town, south of Antioqu'a and capital of Caldas, about 95 miles northwest of Bogota. The alti¬ tude is about 7,000 feet. It was founded in 1848 and its situation at the junction of main passes over the Corderilla Central range of mountains and near valuable gold mines has contributed to its rapid growth. In the vallevs, in the vicinity, stock-raising is an important industry. It has fine churches and schools, a good library and a number of comfortable homes. During the civil war of 1877-78 the town was the headquarters of the rebels. The climate is not severe, although in a high alti¬ tude, as higher mountains in the vicinity are a protection. Pop. about 35,000.

MANKATO, man-ka'to, Minn., city, county-seat of Blue Earth Countv, on the Minnesota River at the mouth of the Blue Earth River and on the Chicago, Milwaukee and Saint Paul,

the Chicago Great Western, the Chicago and Northwestern and the Chicago, Saint Paul, Minneapolis and Omaha railroads, . about 85 miles southwest of Saint Paul. It is situated in an agricultural region and in the vicinity are valuable stone quarries. Minneopa State Park is located four miles from the city. > Nine miles south is the Rapidan dam, furnishing hydro-electric power for numerous southern Minnesota cities and villages. Its chief manu¬ factures are stone, knit goods, lime, cement, beer, butter, candy, flour, brick, concrete cul¬ verts, tile and building blocks, traction engines, trip hammers, shirts and overalls, interior hard¬ wood fixtures, cigars, incubators, brooms, paper boxes, foundry and machine-shop products. There are in manufacturing business about 2,000 employees. The principal buildings are State Normal School, Catholic and Lutheran colleges, a government building, a Carnegie public li¬ brary, Saint Joseph's and Immanuel hospitals. The city has 20 churches, good public and parish schools, a commercial college and the schools mentioned. There are six banks with a com¬ bined capital of $450,000. The deposits amount to over . $6,000,000. The manufactures of the city are about

$4 500,000 annually.

The city was first settled inˆl852 by Eastern people. It was incorporated 15 July 1858, and chartered as a city 6 March 1868. The present, government is by commission, Mankato being the first Minnesota city to adopt this form Mankato was the scene of the hanging, 26 Dec. 1862, of 38 Sioux Indians, having been con¬ victed of murdering white settlers during the massacre of the preceding summer, west of the city. Pop. (1920) 12,469.

MANLEY, man'll, John, American naval commander: b. 1734; d. Boston, 1793. At the outbreak of the Revolutionary War he had command of the armed schooner Lee, with which he cruised along the coast of Massa¬ chusetts Bay, making captures of great value to the American army then investing Boston. In July 1778 his ship, the Hancock, was captured by a British frigate and after a rigorous con¬ finement in Halifax, he was exchanged and in 1782 was put in command of the Hague frigate, which, after lying in a perilous position on a sand bank off Guadeloupe for three days, ex¬ posed to the fire of four British ships of the line, contrived to effect her escape. This exploit closed the regular maritime operations of the United States during the Revolutionary War.

MANLEY, Joseph Homan, Amercan jour¬ nalist and politician: b. Bangor, Me., 13 Oct. 1842; d. Augusta, Me., 7 Feb. 1905. He was graduated from the Little Blue Abbott Academy at Farmington, Me., in 1858 and in 1862 from the Albany Law School. He was admitted to the bar in 1865. In 1866 he was president of the city council of Augusta and in 1881 was ap¬ pointed postmaster of Augusta by President Garfield, which office he held for seven years. Acquiring a half interest in the Maine Farmer he joined hands with James G. Blaine in aggres¬ sive local and national politics, dictating the . editorial policy of that paper for three years. He was a delegate to the Republican National conventions of 1880 and 1888, was for many years chairman of the Maine Republican State Committee and a member of the Republican Na¬ tional Committee, and was a notable figure in

the executive committees of 1896 and 1900, which aided in the election of McKinley.

MANLEY, Mary de la Riviere, English author : b. in the Island of Guernsey about 1663 ; d. London, 11 July 1724. She succeeded Swift as editor of the Examiner in 1711. She is known for her (Secret Memoirs and Manners of Several Persons of Quality of Both Sexes: from the New Atlantis) (1709), a licentious satire reflecting on politicians of the day, that caused the arrest of both the author and the publisher, though they were subsequently dis¬ charged. This work was continued in the (Memoirs of Europe) (1710). She also pub¬ lished (Letters Written by Mrs. Manley) (1696) ; (The Secret History of Queen Zarah and the Zarazians) (1705) ; (The Adventures of Re-vella) (1714) ; (The Power of Love: in Seven Novels) (1720), and other unimportant books.

MANLIUS, man'li-us, Marcus, Roman leg¬ endary hero, of the 4th centurv bc., called Capitolinus because of his successful defense of the Capitoline Hill. Tradition says he was aroused to action by the cackling of Juno's sacred geese just in time to prevent the surprise of the citadel by the Gauls (390 b.c.). Two years before he defeated the Equi; and in six years affer (384 b.c.) was thrown from the Tarpeian rock, having been declared guiltv of plotting to become king or dictator. This judg¬ ment, almost certainly unjust, was due to the envy of the patricians, who distrusted Manlius' philanthropic endeavors to free plebeians sold for debt.

MANLY, Basil, American clergyman and educator : b Pittsborough., Chatham County, N. C., 28 Jan. 1798; d. Charleston, S. C., 25 Jan. 1865. He was graduated at South Carolina College in 1821, and, after filling several charges, in 1837 he became president of the University of Alabama, remaining there nearly 20 years.

MANLY, John Matthews, American edu¬ cator and author: b. Sumter County, Ala., 2 Sept. 1865. He was graduated at Furman Uni¬ versity in 1883 and at Harvard in 1889. He ob¬ tained the degree of D Ph. at Harvard in 1890 and from 1891 to 1898 was associate professor and

professor of English at Brown University and since 1898 has been professor and head of the department of English at the University of Chicago. In 1909 he was Chicago exchange professor at the University of Gottingen. He is a member of the Modern Language Associa¬ tion. He contributed to the Cambridge His¬ tory of English Literature) and to the Ency¬ clopaedia Britannica) and to various periodicals. He edited (Macbeth> (1896) ; specimens of the Pre-Shakespearean Drama > (1897) ; Eng¬ lish Poetry) (1907); English Prose) (1909); Eessons in English, } with E. R. Bailey (1912) ; (A Manual for Writers,* with J. A. Powell (1914) ; English Prose and Poetry) (1916). He is also managing editor of Modern Philology.

MANN, Sir Donald D., Canadian con¬ tractor and financier: b. Acton. Ontario, 23 March 1853. In the later 70's he went West, became manager for a firm of contractors who had a sub-contract on the Canadian Pacific line and thereafter worked continuously as a con¬ tractor until the comnletion of the main railway. Between 1881 and 1883 he completed various contracts for railroads and in the two follow¬

ing years began railroad-building in the moun¬ tains. He also undertook contracts for con¬ struction and tunnels in Columbia Canon and in the Selkirk Range of the Rocky Mountains. Together with Sir William Mackenzie (q.v.) he constructed the Canadian Northern Railway (q.v.). In 1887 and a part of 1888 they con¬ structed the Canadian Pacific short line through Maine. In December 1888 Mr. Mann visited Panama, Ecuador, Peru and Chile with a view of building railways for the Chilean govern¬ ment, but was not satisfied with the prospects there and declined the contract offered. Later he visited China. He was associated with the building of the Qu'Apelle, Long Lake and Saskatchewan Railway, and was one of the original syndicate which built the Winnipeg Electric Street Railway. He is also interested in many other enterprises. He was knighted in

1911.

MANN, Heinrich, German novelist, brother of Thomas Mann (q.v.) : b. Lubeck, 27 March 1871. He attended the Katharineum School in his native city and then entered business. In 1893 he moved to Munich, later changing his abode to Berlin, with frequent sojourns in Italy, particularly Florence. His permanent home he finally fixed at Munich.

Like his brother Thomas, Heinrich is a reserved, unsoci¬ able character, who has developed a feeling al¬ most of hostility for the types of German life with which he is surrounded. His mother was partly of creole origin, and this circumstance is taken by some German critics (e.g., Kurt Martens in his essay in Eiteratur in Deutsch¬ land, > 1910) as explaining Heinrich's predilec¬ tion for the life and literature of the Romance countries as opposed to those of the Germanic countries. His first works were volumes of short stories: (Das Wunderbare) (1897); Ein Verbrechen und andere Geschichten* (1898). Next came novels: (In einer Familie) (1898); (Im Schlaraffenland* (1901); (Die Gottinnen, oder die drei Romane der Herzogin von Assy) (3 vols., 1902-03) ; (Die Jagd nach Liebe) (1904). (Die Gottinnen) represents an ideal of womanhood in three different phases (Diana, Minerva, Venus) and is a brilliantly con¬ structed hymn of joy in the Romance style. Again he turns to the short story: Eloten und Dolche> (1905) ; Erofessor Unrat) (1905) ; Eine Freundschaft* (1906). (Zwischen den Rassen> ((Between the Races,* 1908) is a novel dealing with the affection of a young girl, Lola Gabriel, for a German and an Italian, who are supposed to incorporate the virtues of their respective races. It has met with great popu¬ larity, but the attempt to capitalize racial char¬ acteristics in this way is too great a task for all but the greatest men. Heinrich Mann has also tried his hand at the drama, in (Die Schau-spielerin (1911), but with no particular success.

Jacob Wittmer Hartmann.

MANN, Horace, American educationist : b. Franklin, Mass., 4 May 1796; d. Yellow Springs, Ohio, 2 Aug. 1859. He was graduated from Brown University in 1819, studied law at the Litchfield (Conn.) Law School and in offices at Dedham, Mass.; in 1823 was admitted to the bar, and practised at Dedham from 1827 to 1833, when he removed to Boston. In 1827-33 he was a representative in the State legislature, in 1833-37 State senator and in 1836-37 presi-

dent of the senate. From the first he iden¬ tified himself with philanthropic interests.. His first speech in the assembly was on religious liberty ; and one of his enterprises was the establishment of the State lunatic hospital at Worcester (1833), in connection with which he was chairman of the board of commissioners and later of the board of trustees. In 1837, upon the appointment by the State of a board of education to revise and reorganize the Massa¬ chusetts common-school system, Mann became secetary to the board (19 June). He withdrew from politics and from a lucrative practice at the bar, and devoted himself entirely to a work which proved of the greatest significance not for Massachusetts only but for the entire United States. This work he accomplished largely in spite of opposition often pronounced. For the reform of State education he founded and edited the monthly Common-School J ournal, held teachers' conventions, published 12 most valuable annual reports and established normal schools. In 1843 at his own expense he visited Europe for the study of Continental methods. He was successful in arousing throughout the country an unprecedented interest in educational affairs. In 1848 he was elected to Congress to succeed John Quincy Adams, deceased; and he served until March 1853. He was strongly op¬ posed to slavery, and fearlessly attacked Web¬ ster's course. On 15 Sept. 1852, he declined the nomination for the governorship of Massa¬ chusetts, and on the same day accepted, the presidency of Antioch College, Yellow Springs, Ohio, in which post he served until his death, greatly influencing the educational development of Ohio. He was a Fellow of the American Academy of Arts and Sciences. In addition to his annual reports he published (Reply to 31 Boston Schoolmasters) (1844); 'Report of Educational Tour) (1846) ; 'A Few Thoughts for a Young Man5 (1850); (Slavery: Letters and Speeches) (1852) ; 'Lectures on Intemper¬ ance5 (1852) ; 'Powers and Duties of Woman5 (1853); and 'Sermons) (1861). Consult the 'Life) by Mary P. Mann (1865) ; and Boone, 'Education in the United S.tates.-5 (1890) ; 'Re¬ port5 (United States Commission of Educa¬ tion, 1895-96) ; Hubbell, G. A., 'Life of Horace Mann5 (1910).

MANN, James Robert, American congress¬ man : b. near Bloomington, Ill., 20 Oct. 1856. He was graduated at the University of Illinois in 1876 and at the Union College of Law, Chi¬ cago, in 1881. He was admitted to the bar in 1881 and thereafter practised law at Chi¬ cago. He was attorney for the village of Hyde Park in 1888 and

upon its annexation to Chicago he became alderman of the 32d ward, serving in 1893-96. He was temporary chair¬ man of the Republican State Convention in 1894. He was master in chancery of the Superior Court in Cook County in 1892-96, and general attorney of the South Park Board, Chicago, in 1895. He was elected to Congress in 1896 and has served continuously since. He was leader of the Republican minority in the House during the years 1913-19 of the Wilson Administration.

MANN, Matthew Derbyshire, American

gynecologist : b. Utica, N. Y., 12 July 1845. He was graduated at Yale in 1867, from the College of Physicians and Surgeons, Columbia, in 1871, and later studied in Europe. He prac¬

tised medicine in New York in 1873-79; was established as a specialist in obstetrics at Hart¬ ford, Conn., in 1879-82 ; and in 1880-82 he was clinical lecturer on gynecology at A ale. He was professor of obstetrics and gynecology at the University of Buffalo in 1882-1910, and is now consulting gynecologist and obstetrician at the Buffalo General Hospital. He was presi¬ dent of the American Gynecological Society in 1894. He edited ‘American System of Gyne¬ cology5 (1888). Author of ‘Manual of Pre¬ scription Writing5 (1879).

MANN, Thomas, German writer of novels and short stories: b. Liibeck, 6 June 1875, of a wealthy family of merchants, whose tradi¬ tions of solidity and solvency surrounded him in his youth and gave him the material for his treatment of the family life of the Hanseatic patricians in ‘Buddenbrooks5 and other works. After his father’s death (1893) the family settled in Munich, where Mann joined them later (1894), and where he became an appren¬ tice in the offices of the South German Fire Assurance Bank, a position of which he soon wearied. He attended lectures on aesthetics and literature at the University of Munich, later lived at Rome, returning to Munich in order to join (1899) the staff of Simplicissimus (a.v.), to which he remained attached for a number of years. Mann has a delicacy and refinement of style and observation that are unparalleled in German literature. In his only long novel, ‘Buddenbrooks5 (1901), which established his literary reputation, as well as in his short stories, he captivates by a psychologic naturalism which is enhanced by the fact that the feelings de¬ picted are those of well-to-do middle class persons in comfortable, if not luxuriant, sur¬ roundings. Henry James, whose attention is usually devoted to a higher social class, is the English novelist whom

Mann's delicate and in¬ sinuating treatment most resembles, and the two men are also similar in their scrupulous precision and artistry of language. 'Der Tod in Venedig5 ('A Death in Venice,5 1913), which has the proportions of a German novelle (about 100 pages), describes the last hours of an elderly German writer, who, during a so¬ journ in Venice at a time when that city is visited by a plague, discovers abysses of his sexual life which he has hitherto not suspected, and is carried off by the plague before he is fully ready to accept the implications of his new-found knowledge. Mann's other works in¬ clude short stories: 'Der kleine Herr Friede-mann5 (1898) ; 'Tristan5 (six short stories, 1903) ; 'Fiorenza5 (drama, 1906) ; 'Bilse und ich5 (1906) ; 'Konigliche Hoheit5 (novel, 1909).

Jacob Wittmer Hartmann.

MANN, Tom, English Socialist: b. Foles-hill, Warwickshire, 15 April 1856. His boyhood was spent in farming and mining and from the age of 14 he served an apprenticeship of seven years at engineering in Birmingham ; in 1877 he went to London, where he was prominent in connection with various trade-union affairs, and in 1885 he became, a Socialist. Among his works are 'A Socialist's View of Religion5 (1896) ; 'The Position of the Dockers and Sailors5 (1897) ; 'The International Socialistic Movement,5 *etc.*

MANN, William Julius, American Lu¬ theran clergyman, educator and author : b.

Stuttgart, Germany, 29 May 1819 ; d. Boston, Mass., 20 June 1892. He was educated at Stuttgart and Tubingen and was ordained in the Lutheran ministry in 1841. He came to the United States in 1845 with Dr. Philip Schaff. He was assistant pastor at Saint Michael's and Zion's congregation, Philadelphia, in 1850-63, pastor in 1863-84 and thereafter pastor emeri¬ tus. He was professor of Hebrew ethics and symbolics at the Lutheran Theological Semi¬ nary at Philadelphia from the time of its es¬ tablishment. Author of (Plea for the Augsberg Confession (1856) ; (The Lutheran Church and its Confessions) (1880)

; (Life and Times of Henry Melchoir Miihlenberg) (1887), *etc.*

MANNA, a name for several substances, es¬ pecially a saccharine matter which exudes natu¬ rally or from incisions made in the trunk and branches of a species of ash (Fraxinus ornus). It first appears as a whitish juice, thickens on being exposed to the air and when dried forms a whitish or reddish granular substance, which is the manna of commerce. The tree is a native of Italy and is cultivated extensively in Sicily. June and July are the two months in which the manna is collected. It is detached from the trees with wooden knives and is afterward ex¬ posed to the sun for drying. A little rain, or even a thick fog, will often occasion the loss of the collections of a whole day. The taste is sweet and slightly nauseous. It is a mild pur¬ gative and is principally administered to chil¬ dren. The finest kind of manna is called flake manna ; it is white or yellowish-white in color, light, porous and friable. Sicilian manna is generally found in small, soft, round frag¬ ments; its color is yellowish-brown and it is generally mixed with more or less impurities. The principal constituent is mannite, chemically separable as a white crystalline substance of a sweetish taste, which also appears as a whitish efflorescence on certain edible seaweeds and fungi. To this and the saccharine elements, the nutritiousness of manna is due.

Many other sweet tree-juices go by the name of manna, or false manna, since they contain no mannite, but depend for their peculiar quali¬ ties upon the possession of melitose or meletzi-tose. In many cases the exudation of the sap is due to the irritation produced by insects ˆor is the product of the insects themselves. Thus edible exudations are obtained from the Ori¬ ental teatree, sandal-wood and an Australian grass (Andropogon) ; in Europe from the larch and an oak, and in Persia from the camel's-thorn. American manna is derived in Califor¬ nia from the sugar pine and from a rush (Phragmites) ; while in India a species of bam¬ boo secretes it so copiously as to form an im¬ portant food-resource for the people in periods of famine.

The tamarisk manna, derived from the tam¬ arisk trees about the eastern end of the Medi¬ terranean, is not a direct product of the tree, but of a scale-insect, the manna-insect (Jossy - fraria mannifera), which abounds upon the tamarisk and secretes the substance, which some persons have regarded as the manna of the Bible. In Australia the waxen larval cases of several species of flea-lice (Psyllida ?) that feed upon the gum-trees (Eucalyptus) are gathered and eaten by the natives under the name of ((lerp.w

The Scriptural manna (Heb. Man-hu, what is it?) is described in Exodus (xvi, 15) as cov¬ ering the ground in such quantities as to supply food for the vast multitude of the Israelites. It was small and round like coriander seed, white and tasting like honey and wafer. It was of the color of bdellium (Num. vi, 7). Ac¬ cording to the Biblical narrative it was the food of the Children of Israel for 40 years. They complained of the diet (Num. xi, 6). In Rab¬ binical literature there are a vast number of stories about the manna hard to accept except as myths. It cannot be identified with any of the substances known nowadays as manna ; but is called in the Bible (<bread from heaven, while the Jewish doctors taught that it became to each person who ate it that meat of what¬ ever kind* he liked best.

MANNAIA. See Guillotine.

MANNHEIM, man'him, Germany, a large town of Baden on the Rhine, at the confluence of the Neckar, 45 miles south of Frankfort. It lies in the administrative district of Mannheim, of 1,386 square miles area and 641,545 popula¬ tion. Dikes protect it from inundation and there are extensive harbors and modern docks. A bridge across the Rhine, here 1,200 feet wide, connects with Ludwigshafen, Bavaria, and there is also a bridge across the Neckar. Mann¬ heim is the first commercial town in the Free State and on the upper Rhine. This it owes to its admirable position on two important navi¬ gable rivers and its railway communications. The arrivals of freight here in 1912 were 4,664,- 763 tons, and the departures 729,129 tons. Dur¬ ing the World War it was important as a dis¬ tributing point for the German army. The princi¬ pal articles of trade are corn, flour, wood, petro¬ leum, coal, tobacco, cattle, sugar, iron goods, *etc.* The manufactures consist chiefly of iron-cast¬ ings, machinery, chemicals, cigars, carpets, woolen goods, paper, tiles, celluloid and rubber wares, mirrors, carriages, trinkets, sugar, liqueurs, starch, glue, *etc.* Mannheim was once strongly fortified and lying not far from the French frontier and near the centre of military opera¬ tions, suffered severely during the wars between France and Germany. In a siege by the Aus¬ trians in 1795 only 14 houses remained unin¬ jured. Hence, notwithstanding the antiquity of its foundation, it has become an entirely modern town with regular, straight streets, known, as in America, by numbers, and with fine public squares. The principal buildings are the for¬ mer Palatine palace, with a museum and pic¬ ture gallery in one of its wings, a public library of 75,000 volumes and good gardens behind it ; the Jesuits' church, an imposing edifice, with a profusely decorated interior; the former ob¬ servatory building; the theatre, one of the best in Germany; several gymnasia and schools, conservatory of music, hospitals and orphan¬ age, town-house,

railway station, *etc.* Pop. about 97,980; in 1899 the suburb of Neckaran was incorporated with it. Pop. 150,000.

MANNING, man'Tng, Daniel, American journalist and financier: b. Albany, N. Y., 16 May 1831 ; d. there 24 Dec. 1887. At 10 he en¬ tered the printing office of the Albany Atlas which shortly after was merged in the Argus, upon which paper he became a reporter and in time an authority in State politics. He was as-

sociate editor in 1865 and later was part owner of the paper which in his hands was a strong political power and instrumental in breaking up the Tweed ring. He strongly supported Gov¬ ernor Tilden's administration and through his membership of the New York State committee lie was intimately connected with the leaders of his party. Upon Cleveland's inauguration in 1885 Manning was appointed Secretary of the Treasury, the affairs of which office he con¬ ducted with great ability. He resigned in 1887 as a result of ill health, though he was con¬ nected with several commercial and banking enterprises until his death in the same year.

MANNING, Henry Edward, cardinal of the Roman Catholic Church and archbishop of Westminster: b. Totteridge, Hertfordshire, 15 July 1808; d. Westminster, 14 Tan. 1892. He was educated at Harrow and Balliol College, Oxford, became a Fellow of Merton College in 1832 and in that year he was ordained and ap¬ pointed curate of Woollavington-cum-Graffham in Sussex. In 1833 he became rector of Woollavington and was appointed archdeacon of Chi¬ chester in 1840. In 1842 he was select preacher to the University of Oxford. He took very little part in the tractarian movement and did not write any of the tracts, but he formed friendships with some of the leaders of the movement. In 1851, after the decision in the <(Gorham case,® he joined-the Roman Catholic Church and was-ordained priest. He founded the Congregation of the Oblates of Saint Charles at Bayswater, London, in 1857, and upon the death of Cardinal Wiseman was^ con¬ secrated archbishop of Westminster in 1865. At the (Ecumenical Council in 1870 he was an ar¬ dent supporter of the infallibility doctrine, and in 1875 was made a cardinal by Pius IX. Man¬ ning was a trusted leader of the Ultramontane party in his Church, and he commended himself to the world in general by his zeal on behalf of temperance, education and the betterment of the working-classes. He is the author of four volumes of sermons published before 1850; and among his other writings are (The Tem¬ poral Mission of the Holy Ghost) (1865 and 1875) ; <Petri Privilegium* (1871) ; (The Vati¬ can Decrees* (1875) ; (The Catholic Church and Modern Society) (1880) ; (The Eternal Priesthood) (1883) ; <Characteristics) (-1885) ; Miscellanies* (1877-88) ; <Religio Viatoris* (1889). Consult Lives by Hutton (1892) ; Purcell (1896); Ward (1897) ; De Pressense (1903) ; Fitzgerald, (Fifty Years of Catholic Life and Progress* (1901). Consult his Me¬ morials (1892).

MANNING, James, American Baptist edu¬ cator, first president of Brown University; b. Elizabeth, N. J., 22 Oct. 1738; d. Providence, R. I., 29 July 1791. He was graduated at Princeton College in 1762, in 1763 became pas¬ tor of a Baptist church at Morristown, N. J., and about a year later pastor of a church in Warren, R. I. There he almost immediately commenced a Latin school, which seems to have been in some sense the germ of Rhode Island College. He had previously proposed to several influential men in his denomination, as¬ sembled at Newport, the organization of (<a seminary of polite literature, subject to the gov¬ ernment of the Baptists** and had drawn up a plan for such an institution. In 1764 the legis¬

lature granted them a charter, and in 1765 he was appointed president and professor of lan¬ guages and other branches of learning, with full power to act in these capacities, at Warren or elsewhere.** The college went into opera¬ tion at Warren in 1766, and the first commence¬ ment was held there in 1769, when a class of seven was graduated. In 1770 it was deter¬ mined to remove the college to Providence, and during the Revolution, when the college edi¬ fice was occupied as a military barrack, and afterward as a hospital, he was actively en¬ gaged in clerical duties and also rendered im¬ portant services to the patriotic cause. In 1783 he resumed his duties at the college, and in 1786 represented Rhode Island in Congress, where he exerted himself to secure the adoption of the national Constitution. From 1770 till the year of his death he was also pastor of the first Baptist church in Providence. He resigned the presidency of the college in 1790. Consult Guild, (Life and Times of Tames Manning and the Early History of Brown University* (1894). See Brown University.

MANNING, Robert, American pomologist: b. Salem, Mass., 19 July 1784; d. there, 10 Oct. 1842. He established a pomological garden at Salem in 1823 with the purpose of establishing the identity and classifying the various varie¬ ties of fruit. His efforts accomplished a great public benefit in introducing to general use the best varieties of fruit and in standardizing the nomenclature. At the time of his death his fruit garden contained more than 1,000 varieties of pears and many ‘hundreds of apples, peaches, plums and cherries. He was an uncle of Na¬ thaniel Hawthorne. Largely through his ef¬ forts the Massachusetts Horticultural Society was established and he was a generous con¬ tributor to its support. Author of (Book of Fruits* (1838).

MANNING, Thomas Courtland, American

jurist: b. Edenton, N. C., 1831; d. New York city, 11 Oct. 1887. He was graduated from the University of North Carolina, admitted to the bar and for a time practised law in his native place, but in 1855 he went to Alexandria, La., and there established himself in a large prac¬ tice. He was a delegate to the Secession Con¬ vention and at the outbreak of the war entered the Confederate army as lieutenant. He served as adjutant-general in 1863 and attained the rank of brigadier-general. In 1864 he was associate judge of the Supreme Court of Louis¬ iana. He was a presidential elector in 1872 and 1876, and in 1877 he was chief justice of the State Supreme Court. He was denied admis¬ sion to the Senate upon his appointment to that body in 1880, and in 1882-86 he again filled the office of justice of the Supreme Court. He was appointed Minister to Mexico in 1886 and died in office.

MANNING, William Thomas, American

Protestant Episcopal clergyman : b. 1866. He was graduated at the University of the South in 1893. He was ordained deacon in 1889 and priest in 1891 ; and in 1892 he was rector at Redlands, Cal. He was professor of dogmatic theology at the University of the South in 1893-95 ; and was rector at Landsdowne, Pa., in 1896-98, and at. Nashville, Tenn>, in 1898— 1903. He became vicar of Saint Agnes' Chapel, New York. 1903; was appointed assistant rec-

tor of Trinity Parish, New York, in 1904, and rector in 1908. In 1921 he was made bishop of New York.

MANNING, S. . C., town, county-seat of Clarendon County, on the Atlantic Coast Line Railroad, about 50 miles southeast of Colum¬ bia and 70 miles north of Charleston. It is situ¬ ated in an agricultural region and in the vicin¬ ity are large pine forests. Some of the manu¬ factures are flour, lumber and knit goods. Pop.

(1920) 2.0 22.

MANNING, or MANNYNG, Robert,

English poet: b. 1264; d. 1340?. See Brunne, Robert of.

MANNINGTON, W. Va., village in Mar¬ ion County, 45 miles southeast of Wheeling, on the Baltimore and Ohio Railroad. It is situ¬ ated in a rich coal-mining district and has ex¬ tensive oil and gas interests. There are manu¬ factures of pottery, glassware, tobls, machinery and flour. Pop. 3,673.

MANNITE, or MANNITOL, a singular chemical compound which has the formula C0H*(OH)6 and constitutes from 30 to 60 per cent of the weight of the dried juice which ex¬ udes from the manna ash (Fraxinus ornus), a tree growing in the Mediterranean regions. It occurs also in many other plants and is formed in the lactic fermentation of sugar, and also in the spontaneous fermentation of the juice of the sugarcane, in tropical countries. It may be prepared by boiling manna with dilute alco¬ hol, the mannite crystallizing out upon cooling. The crystals are then purified by recrystalliza¬ tion from water. It is a white compound, crys¬ tallizing in needles or four-sided prisms, and is readily soluble in water, insoluble in ether and but slightly soluble in alcohol. It melts at 329° F. and begins to sublime at about 400° F. Man¬ nite has a pleasant, sweet taste and in some re¬ spects it resembles the sugars. It is not a sugar, however, but a hexatomic alcohol. (See Alcohol). Chemically, it is derived from the hydrocarbon hexane, GHu, by the replacement of six atoms of hydrogen by six molecules of hydroxyl (OH). Sorbite (or sorbitol) and dulcite (or dulcitol) have the same chemical formula as mannite and resemble it very closely. They are, in fact, isomers of mannite. Sorbite is prepared from mountain ashberries, and dul¬ cite from Madagascar manna. See Manna.

MANNLICHER, man'lih-er, Ferdinand,

Ritter von, Austrian engineer and inventor: b. Mainz, 30 Jan. 1848; d. 1904. He was chief en¬ gineer of the Northern Railroad for many years, and after the success of the needle-gun at Sadowa in 1866 began experiments which ulti¬ mately produced a magazine rifle which was adopted by the Austrian army in 1885. He has become famous for his numerous inventions in small arms and was elected to the Upper House of Austria in 1899 in recognition of his distin¬ guished services.

MANNY, Walter Baron de, English sol¬ dier and philanthropist: d. 1372. His memory is perpetuated as the founder of Charterhouse

School (q.v.), and by his military exploits as recorded by his friend Froissart in his Chron¬ icles. J Scion of a noble family of Hainaut, he arrived in England in 1327 in the train of Queen Philippa, rose to high rank in the Scottish wars of Edward III, became a com¬ mander of the English fleet, and of the army in

France, and both in military commands and in diplomatic negotiations received the commenda¬ tion of the king. He was created a baron and knight of the garter and in 1335 married the Countess, later the Duchess of Norfolk. Consult (Froissart's Chronicles* (Globe ed., Eng. trans., London 1895).

MANOBAS, ma-no'bas, a native tribe of the Philippines, living chiefly in the valley of the Rio Agusan, island of Mindanao, and at some places in the district of Davao, Mindanao. They are of Malay race, head-hunters and largely heathen, though the work of the Tesuits among them has resulted in a considerable por¬ tion becoming Roman Catholics. The name in earlier times was olten applied to other heathen tribes of Mindanao.

MANOEUVRES, ma-noo'verz. See Army and Navy Manceuvers.

MANOMETER (Greek, ˆrarefaction meas¬ urer®), an instrument for measuring the pres¬ sure exerted by gas or liquid. It may have many forms, of which the mercurial barometer is one. (See Barometer). One of the com¬ monest designs, for the measurement of pres¬ sures not greatly different from that of the at¬ mosphere, consists of a U-tube, one of whose legs is open to the air, while the other is in communication with the gas or liquid whose pressure is to be measured. The lower part of the U is filled with some non-volatile liquid of known density, and the difference between the pressure of the fluid under examination and that of the atmosphere is found by observing the difference between the levels of the manometric fluid in the two branches of the U-tube. If the absolute pressure of the fluid is desired, it is necessary to add the atmospheric pressure to the differential pressure as read from the ma¬ nometer. In rough work it may be sufficient to assume the atmospheric pressure to be 14.7 pounds per square inch; but in more refined ob¬ servations the atmospheric pressure must be determined by reading the barometer, simul¬ taneously with the manometer. Mercury is commonly the liquid that is used in the U-tube, but when the differences in pressure that are to be read are very small, some less dense liquid may be used with advantage. Sulphuric acid is often employed in such cases; and

where (as in the measurement of chimney draft) a slight amount of evaporation from the mano¬ metric fluid is unimportant, water may be em¬ ployed. When the pressure to be measured materially exceeds one atmosphere, the siphon manometer, as just described, is modified by sealing one of the ends of the U-tube instead of leaving it open to the air. In this case ‘.he pressure is determined by observing the amount of compression that it produces in the air that is confined in the sealed arm of the siphon, by the manometric fluid; for it is known, by Boyle’s law, that the volume of the air in this arm is sensibly proportional to the recip¬ rocal of the absolute pressure, so long as the temperature remains constant. Boyle’s law is not rigorously exact, however, and when a high degree of precision is required from the com¬ pression manometer, it is necessarv to make allowances for its error. Data for this purpose have been given by Amagat, up to 85 atmos¬ pheres, when the temperature of the manome¬ ter is maintained at 16° C. (60.8° F.). Consult

Amagat/Comptes Rendus,5 Vol. XCIX, p. 1153; Preston, (Theory of Heat,5 p. 403). In steam engineering the commonest form of manometer is the (<Bourdon gauge,55 which depends for its action upon the elastic deformation of a flat¬ tened metallic tube when exposed to an internal pressure. In practice the flattened tube is bent into a circular form, one end of it being fixed while the other communicates, by means of a multiplying gear, with an index hand which travels over the face of a. graduated dial. A tube so constructed straightens out slightly when subjected to an internal pressure, return¬ ing again to its original form when the pressure is removed. The deformation is approximately proportional to the magnitude of the pressure (so long as the tube is not strained beyond its elastic limit), and hence the dial may be gradu¬ ated, without difficulty, so as to indicate true pressures, at least to a degree of precision quite sufficient for the purposes of steam engi¬ neering. All such gauges should be carefully compared with a standard mercury column, however, before great reliance is placed upon them; for it is found that they are sometimes seriously in error in some parts of the scale,

even when sensibly correct in other parts. In using them in connection with steam boilers, care should also be taken to prevent steam or highly heated water from coming into direct contact with the curved tube, since the elastic properties of the tube are injured by overheat¬ ing. To ensure the proper protection of the gauge, a siphon, or a complete circular bend, should be placed in the pipe between the gauge and the boiler. The trap so formed will fill with water of condensation the first time the boiler is fired up, and thereafter it will be im¬ possible for steam to enter the gauge directly.

MANON LESCAUT, a short novel of 200 pages, 'the seventh volume of a larger work, (<Memoirs of a Nobleman,55 has sufficed to as¬ sure the reputation of its author, Prevost d'Exiles (1697-1763), better known as L'Abbe Prevost. After a life of adventure in France, England, Holland and Germany when he was in turn soldier, monk, journalist, teacher and later chaplain of the Prince of Conti, Prevost became a professional writer and composed more than 100 volumes. He also translated many English works, and among those, his adaptations rather than translations of (Pantela,5 (Clarissa Harlowe5 and <Grandison) gave to Richardson a great popularity in France during the second half of the 18th century, to the detriment of Prevost's own works. Of all Prevost's novels, critical articles in the period¬ ical Pro and Con and pseudo-scientific travel stories, Manon Lescaut alone survives. Pub¬ lished in Holland in 1731, it (<took like wild fire® according to contemporary testimony and more than 30 editions were printed before the end of the century, that of 1753 revised and corrected by the author being considered as the best. This novel is the story of the passionate love of the young Chevalier des Grieux for the courtesan Manon. It is told in a simple narra¬ tive style and with a sincerity which leads us to believe that Prevost relates at least in part some episodes of his stormy life. The novel presents a realistic and painful picture of the sufferings which uncontrolled passion brings upon those who lack the will power to resist it, and while Prevost does not attempt to excuse

or justify the faults of his heroes, he shows passion as a terrible force whose victims are to be pitied rather than blamed. Prevost had many imitators even in his own time, and the theme of Manon, dealing with rehabilitation through love and sufferings, is found later in < Marion Delorme5 (Hugo), (La Dame aux Camellias5 (Dumas), (Sapho5 (Daudet) and in the works of several Russian novelists.

Louis A. Loiseaux.

MANOR (old French manoir, maneir, from L. manere, to remain, being the residence of the owner), a piece of territory held by a lord or great personage, who occupied a part of it, as much as was necessary for the use of his own household, and granted or leased the re¬ mainder to tenants for stipulated rents or serv¬ ices. No manors, with all their incidents and franchises, have been granted in England since the reign of Edward III. One of the most im¬ portant incidents to these ancient manors was the right to hold a court, called a court-baron , which was held within the manor, and had juris¬ diction of misdemeanors and nuisances within the manor, and disputes about property be¬ tween the tenants. The manor system was in vogue in the United States only during the British occupation, but many old manor names like Briarcliffe manor, Pelham manor, etc., are still retained by the present owners of large estates. See also Tenure.

MANOURY, General. See Maunoury.

MANRIQUE, man-re-ka, Angel, Spanish poet and ecclesiastic: b. Burgos, 1577; d. Badajos, 1649. He rose to high rank in monas¬ tic life, becoming finally head of the Cis-tercienses throughout Spain, and finally bishop of Burgos (1645). He wrote a history of the Cister order which had considerable reputation throughout Europe. He also wrote many de¬ votional and other works of a religious or religio-histordcal nature.

MANRIQUE, Gomez, Spanish poet and dramatist: b. about 1415; d. 1491. He was son of Pedro Lord of Amusco, and a younger brother of Rodrigo Manrique, master of San¬ tiago and one of the troubadours of the court of John II. He became a soldier of some note and took part in wars against the Moors. He sided with the Infante, Don Enrique, against Alvaro de Luna and the royal court. He was very active and seems to have taken part in almost every political disturbance and warlike expedition of Spain in his day. He was very much mixed up in the political move which forced the marriage of Ferdinand of Aragon and Isabel of Castile, which was of great significance since lit ultimately led to the ex¬ pulsion of the Moors from the country and the political and national unity of all Spain. He attained to numerous high offices under the king of Aragon and later under the United crowns of Castile and Aragon, becoming finally a member of the royal council and the confidant of the joint sovereigns. Gomez Manrique, notwithstanding his tempestuous and warlike life, was one of the greatest orators of his age and a talented poet. He was one of the set of writers who sang the glories of the Virgin Mary and their love for and de¬ votion to her. He was a satirist with a keen sense of humor, and he attempted nearly every class of literature known in his day in

Spain.

He played his part in helping to introduce into Spanish poetry the poetical forms of Italian literature. He also wrote religious dramas in the form in which they appeared in his age. For this reason and for the fact that he intro¬ duced more than customary life into these dra¬ matic pieces, his work had considerable in¬ fluence on the development of the drama, both religious and, subsequently, profane, in Spain. The best of his religious dramas, all of which are of a liturgical caste, is (Representacion del naeinuento de Nuestro SenorP He also wrote on political and philosophical subjects and on matters of ethics and vices such as gluttony, envy, laziness, and of virtues, such as reason (in human actions), faith, prudence and hon¬ esty of purpose in government. His poem on the death of the Marques de Santillana became immensely popular and Gomez Manrique rose to be the most quoted writer and most recited lyrical poet of his day. His (Cancionero) has been published several times and poems of Gomez Manrique have appeared in various other cancioneros. Consult Menendez y Pelayo, Marcelino, (Antologia de poetas liricos Castel¬ lanos } (Vol. VI, Madrid 1886) ; Pas y Melia, A., (Cancionero de Gomez Manrique* (Madrid 1885) ; Rios, Amador de los, (Historia critica de la leteratura espanola.*

MANRIQUE, Jorge, Spanish poet : b. about 1440; d. 1479. He was son of Rodrigo Manrique, grand master of Santiago. He early took a prominent part in the troubles of the reign of Henry IV, taking sides with Don Alfonso. Notwithstanding the fact that most his life was passed in active military duty and that he died in battle in the attack on the fortress of Garci-Munoz, he yet attained such an eminence as a poet that he is still classed among the great writers of Spain, and a worthy nephew of Gomez Manrique (q.v.) and heir of his father, Rodrigo Manrique, who was one of the successful troubadours at the court of John II, one of the foremost patrons of lyrical poetry. Jorge Manrique has written satires, love songs and poems of a like nature common to the age in which he lived ; but his most noted poem and

the one to which he owes his lasting fame is (Coplas de Jorge Manrique por la muerte de su padriP This is one of the finest lyrics in the Spanish language, instinct with true poetic form and. thought and sympathy. This poem has been imitated and praised by some of the greatest writers of Spain and it has found universal favor in the eyes of the critics. Longfellow has made a worthy transla¬ tion of it into English ; and it was set to music as far back as the 16th century by Venegas de Henestrosa. (See Coplas De Manrique; Romancero del cid). Consult Longfellow's translation and Fitzmaurice-Kelly, James, <A History of Spanish Literature> (New York 1898) ; Menendez y Pelayo, Marcelino, (Antologia de poetas liricos castellanos) (Vol. VI, Madrid 1896) ; Biblioteca de autores espaholes (Rivadeneira, Vols. XXXII and XXXV) con¬ tains his works and notices thereof.

MANS, man, Le, France, the capital of the department of Sarthe, on a height above the Sarthe, here crossed by three bridges, 115 miles southwest of Paris. It consists of a lower and an upper town. The principal edifice is a fine Gothic cathedral of the 11th century. It has a

seminary, excellent schools, a public library of 60,000 volumes and several museums. The chief manufactures are metal works, railway cars, tobacco, canned goods, chemicals, cordage, leather and woolen and linen goods ; being a railway centre it is a distributing point for farm produce, canned goods, wines, *etc.* Le Mans existed in the time of the Romans under the name of Cenomani, a tribe who inhabited the district. Numerous vestiges of Roman structures (subterranean aqueducts, walls, etc.) still remain. It was long in the possession of the English, and Henry II, the first Plantagenet, was born here. During the Franco-German War (1870— 71) General Chanzy was defeated here by Prince Frederick Charles and the Grand-duke of Mecklenburg. A monument commemorates the battle. Pop about 69,361.

MANSARD, man-sar, or MANSART, Frangois, fran-swa, French architect: b. Paris, 23 Jan. 1598; d. there, 23 Sept. 1666. He de¬ signed many important buildings in Paris, as well as provincial chateaux and country seats. The chateaux at Bolois are partly his work, and he built the church of Val de Grace and the Hotel Carnavalet. The mansard roof is called after him.

MANSARD ROOF, in architecture (so called from Frangois Mansard, or Mansart (q.v.), a French architect to whom the inven¬ tion is attributed), a roof formed of two sets of rafters, of which the upper set are more inclined to the horizon than the lower set, and

form an obtuse angle at the ridge. The trans¬ verse beams connecting the lower ends of the under set of rafters are called as in ordinary roofs tie-beams ; the corresponding beams at the union of the upper and under rafters are called collar-beams.

MANSART, Jules Hardouin, zhul ar-doo- an man-sar, French architect: b. Paris, 16 April 1645; d. Versailles, 11 May 1708. He was a nephew of Frangois Mansart, or Mansard (q.v.). He directed all the great building opera¬ tions of Louis XIV, who heaped favor and wealth upon him. His works include the palace at Versailles; the Maison de Saint-Cyr; the Grand Trianon; the triple dome of the Invalides, and the Chateau de Clagny, the resi¬ dence of Madame de Montespan. He also de¬ signed the Place Vendome and the Place des Victoires.

MANSE, in Scotch law, a name given the dwelling-house of the minister of the Estab¬ lished Church. In popular use the term is often applied generally to the dwelling-house of any minister of a dissenting congregation. In the Established Church every first minister of a rural parish is entitled to a manse, which the heritors or landed proprietors in the parish are bound to build and uphold. When a manse has

been built or repaired by the heritors it becomes a free manse, and all ordinary repairs have to be done at the charges of the minister.

MANSEL, Henry Longueville, English logician and theologian: b. Cosgrove, Northamp¬ tonshire, 6 Oct. 1820; d. London, 31 July 1S7 1. He was educated at Saint John's College, Ox¬ ford, and took orders in the Anglican Church in 1845. He became Wayneflete professor of philosophy at Oxford in 1859; regius professor of ecclesiastical history 1867, and dean of Saint Paul's, London, 1868. He was made a canon of Christ Church, Oxford, in 1867. Among Lis publications are (The Philosophy of Kant' (1856); <The Limits of Religious Thought,' being the Bampton lectures for 1858; Meta¬ physics or the Philosophy of Consciousness' (1860); (The Philosophy of the Conditioned' (1866);

(Letters, Lectures and Reviews'

(1873).

MAN.SFELD, mans'felt, Peter Ernst I,

Count, Austrian general and statesman: b. 15 July 1517; d. Luxemburg, 22 May 1604. He be¬ came governor of the Low Countries after the death of the Duke of Parma.

MANSFELD, Peter Ernst II, Count, German Protestant military leader: b. Luxem¬ burg, 1580; d. Racowitza, Bosnia, 29 Nov. 1626. He was a natural son of the preceding, but, disappointed in regard to the inheritance of his father's lands, joined the Protestant princes and became the bitter enemy of Austria.. He gained a victory over Tilly at Wiesloch in 1622, but was defeated by Wallenstein at Dessau in 1626, and died soon after.

MANSFIELD, manz'feld, Edward Deering, American author: b. New Haven, Conn., 17 Aug. 1801; d. Morrow, Ohio, 27 Oct. 1880. He was graduated at West Point in 1819 and at Princeton in 1822 when he took up the study of law and was admitted to the bar in 1825. He went to Cincinnati and there engaged in practise until 1835 when he accepted the chair of con¬ stitutional law and history in Cincinnati Col¬ lege. This post he resigned to enter the field of journalism and was editor of the Cincinnati Chronicle, the Atlas and the Railroad Record. For many years he was a contributor to the New York newspapers under the title "Veteran Observer." Among his many books are (Polit¬ ical Grammar' (1834); 'History of the Mexi¬ can War' (1848); (American Education'

(1850) ; (Popular Life of U. S. Grant' (1868) ; 'Personal Memoirs' (1879), *etc.*

MANSFIELD, Joseph King Fenno, American soldier: b. New Haven, Conn., 22 Dec. 1803; d. near Sharpsburg, Md., 18 Sept. 1862. He was graduated from West Point in 1822 and was engaged in engineering service under the government until the opening of the Mexican War when he became chief engineer under General Taylor. He took an active part in the engagements at Fort Brown, Monterey and Buena Vista, receiving promotion to . the rank of colonel in recognition of his services. In 1853 he was appointed inspector-general of the United States army and served in that capacity until 1861 when he was made brigadier-general and given command of the Department of

Washington which he fortified; he was after¬ ward in command at Hatteras, Camp Hamilton, Newport News, and after capturing Norfolk

was placed in command at Suffolk, V a., receiv¬ ing the rank of major-general. He was in com¬ mand of a corps of the Army of the I otomac at Antietam and while leading his troops tell fatally wounded.

MANSFIELD, Richard, American actor: b Heligoland, 24 May 1857; d. New London, Conn., 30 Aug. 1907. He first studied art, open¬ ing a studio in Boston for a time, but later returned to England, and entered the theatrical profession. He at first played small parts in comic opera, and first appeared in America as Dromez in (Les Manteaux Noires' at the Standard Theatre, New York. He afterward was very successful in a wide variety of plays, and became the head of his own company. He created such parts as Beau Brummel, Baron Chevrial, Dr. Jekyll and Mr. Hyde and Mon¬ sieur Beaucaire; among his other most suc¬ cessful roles were Cyrano de Bergerac, Shylock in (The Merchant of Venice,' Henry V, Brutus in (Julius Caesar,' Prince Karl in (01d Heidel¬ berg' and Peer Gynt in Ibsen's play. His own acting, as well as the work of his company which he carefully oversaw, was of a high artistic standard, carefully worked out in de¬ tails. Consult Strang. (Famous Actors of To¬ day in America,' and his 'Life' by William Winter.

MANSFIELD, William Murray, Earl of,

British jurist: b. Scone, Scotland, 2 March 1705; d. London, 20 March 1793. One of the youngest sons of Viscount Stormont, he was educated at Christ Church, Oxford; studied law; was called to the bar in 1730; won a large Scottish practice and many literary friends, the foremost being Alexander Pope, and in 1742 was made solicitor-general and entered Parlia¬ ment. Though of Jacobite descent he unfalter¬ ingly upheld the Hanoverian interest in 1745, did special service in 1748 by his defense of the Treaty of Aix-la-Chapelle, and was admitted leader of the House. An attempt to prove him guilty of treason or disloyalty to the Crown was unsuccessful, though often obliquely re¬ peated. He was made Attorney-General in 1754 and Chief Justice and Baron Mansfield in 1756. He was a member of the cabinet, without office, for 15 years, but his part in politics waned after he went on the bench. He was still a typical Tory, however, and in 1770 sided vio¬ lently with the government in the political libel trials and was sharply attacked by Junius. His unpopularity steadily increased because of his opposition to Wilkes, whose -sentence,

however, he greatly lightened because of a technical flaw which he discovered himself, and in general because of his contention in various famous cases of libel that the jury could decide only on the facts and not on any question of law. In 1774 in the case, Campbell v. Hall, he de¬ cided that countries acquired by British con¬ quest were governed by the general principles of the British constitution ; but in regard to the American colonies he insisted that their com¬ plaints could not be considered until they had submitted themselves to Parliament. He be¬ came Earl of Mansfield in 1776; proposed the coalition of 1779, and in 1780 suffered at the hands of the Gordon rioters, because of his sympathy with Catholic emancipation. In 1788 he retired from the bench. Though so. un¬ popular, and though constitutionally a believer

in royal prerogative, Mansfield was a great judge, whose work was not too conservative, and an able, calm, logical debater. Possibly his greatest labor was his revision of the mercan¬ tile law.

MANSFIELD, England, a market town and .municipal borough in Nottinghamshire, 16 miles north by west of Nottingham, in a deep valley, in the midst of a rich coal district, surrounded by vestiges of Sherwood Forest. There are cotton mills, manufactures of silk and cotton hosiery, lace thread-mills, boots and shoes and cigar-making. It is supposed to mark the site of a Roman station. Pop. 36,888.

MANSFIELD, Mass., town in Bristol County, 24 miles southwest of Boston and 20 miles northeast of Providence, on the New York, New Haven and Hartford Railroad. The town has an excellent high school and modern water and lighting systems. Manufactures in¬ clude cutlery, jewelry, straw goods, baskets, electrical supplies and ranges. Pop. (1920) 6,255.

MANSFIELD, Ohio, city and county-seat of Richland County, on the Pennsylvania, the Erie and the Baltimore and Ohio railroads. Situated 1,200 feet above sea-level, it is said to be the highest city in the State. Only a short distance from the coal fields, it is a mod¬ ern business

and residential city; has eight banks with clearings for 1915 amounting to $28,986,256.59; terminal grain elevators, being the distributing centre for a grain-raising re¬ gion, and does a large jobbing business in groceries. It is supplied with natural gas; also artesian well water for both fire and domestic purposes. Among the principal buildings are Municipal Library, opera-house, Y. M. C. A., the County Children's Home and also 27 churches of the various denominations. It is the seat of the Ohio State Reformatory. The fire department is paid by the city, and there is also a complete sewage disposal and garbage crematory plant. The industries include the manufacture of watch cases, mattresses, pack¬ ing boxes, automobile tires and rubber goods, chains, agricultural implements, electrical ma¬ chinery, stoves, electric mine equipment, arti¬ ficial stone products, house furnishings, women's clothing, *etc.* Pop. (1920) 27,824.

MANSFIELD, Pa., borough, in Tioga County, on the Tioga River, and on the Erie Railroad, about 108 miles north by west of Harrisburg and 25 miles southwest of Elmira, N. Y. It is in the midst of an agricultural region and near the coal fields and bituminous coal region. It is the seat of a State Normal School and has two libraries, one of about 6,000 volumes belonging to the Normal School, and a City Library containing 5,000 volumes. Pop.

1,800.

MANSFIELD, Mount, in Vermont, one of the highest elevations of the Green Mountains, 4,405 feet ; in the northwestern part of the State, about 23 miles east of Burlington. The view from its summit includes the Adirondack and White mountains, Lake Champlain, a large portion of the northern part of Vermont and some of New Hampshire. See Green Moun¬ tains.

MANSFIELD COLLEGE, Oxford, Eng¬ land, a theological institution established in 1886 for the education of men for the Noncon¬

formist ministry. It owes its inception chiefly to Congregational support. Its students must be graduates of some recognized university, or undergraduates of Oxford who 'have passed Moderations. The staff consists of a. principal, a vice-principal, three lecturers and a bursar. Mansfield House, at Canning Town (West Ham), is a settlement in connection with the college.

MANSFIELD PARK. This quietly charming novel of manners, published in 1814, is perhaps less popular than some of the other works of Jane Austen, but it is regarded by more than one critic as even superior to them in richness and maturity. As the title implies, the story is built around English country-house life. Fanny Price, an indigent niece, is taken into the family of Sir Thomas Bertram. Overlooked for the most part by Sir Thomas and his wife, subjected to the carping control of the odious Mrs. Norris, Lady Bertram's sister, and neglected or patronized by three of her cousins, Fanny finds her chief consolation in the casual kindness of her remaining cousin, Edmund, whom she grows to love. But Ed¬ mund is attracted by the dashing and sophisti¬ cated Mary Crawford, who with her brother, Henry, is visiting at the neighboring rectory. Henry, in turn, after various flirtations with the Bertram sisters, pays suit to Fanny. The unfolding of these several relationships by means of seemingly insignificant inoidents — dances, excursions, amateur theatricals — consti¬ tutes some of Miss Austen's most skilful work and affords her opportunity for those delicately humorous, mildly ironical accounts of the life she knew best, that have made her immortal. Of course in the end Henry and Mary Craw¬ ford are eliminated and Edmund loves and marries his Cinderella-like cousin. No single character in this novel is as well known as Mr. Collins of (Pride and Prejudice) or Miss Bates of <Emma) ; yet the various personages are excellent examples of the author's nice dis¬ crimination and marvelous insight. Each character is clearly portrayed though not un¬ duly simplified; each exhibits in varying pro¬ portions that mixture of good and evil common to all mankind. In a word, the characters are not types or Elizabethan ˆhumors,® but are richly human. (Mansfield Park) appeals to many classes of readers. It is the best kind of historical novel, for it records vividly the man¬ ners and customs of ordinary folk in the Napoleonic era. It is a superb example of a serene, balanced realism, avoiding alike the rose-pink and the dirty drab that Meredith later reprehended. It is an almost flawless instance of pure comedy in fiction. Consult Howells, W. D., (Heroines of Fiction > ; Cornish, Francis Ware, (Life of Jane Austen* ; Smith, Goldwin, (Life of Jane Austen.*

George B. Dutton.

MANSHIP, Paul, American sculptor: b. Saint Paul, Minn., 25 Dec. 1885. He received his early education at the Saint Paul Institute of Arts, where he evinced marked talent for sculpture, and later studied at the American Academy, in Rome. His first achievement was the winning of the Helen Barnet prize, in the National Academy of Design in 1913, and he won this again in 1917. He was also awarded a gold medal at the San Francisco World's Ex-

position in 1915. His statues are to be seen in the Metropolitan Museum in New York, Pratt Institute, Brooklyn, Art Institute, Chicago, and other leading institutions.

MANSILLA DE GARCIA, Eduarda, a-doo-ar'da man-sel'ya da gar-se'a, Argentine novelist : b. Buenos Aires, 1838. Her maiden name was Mansilla; at 16 she married Manuel R. Garcia, a diplomat, and at 19 published (E1 Medico de San Luis,* possibly her best novel. It was followed by (Lucia Miranda,* a his¬ torical novel on the discovery of La Plata, and by (Pablo, 6 la Vida en las Pampas, * which with its fresh description of Argentine life made a great impression in Paris and was praised by Hugo. She was a musician of much talent and wrote, besides novels, several plays.

MANSION HOUSE, in London, England, the official residence of the lord mayor, built on the site of the Old Stock Market in 1739 from designs by George Dance, at a cost of $213,190. It is an oblong building and contains an Egyptian banquet hall accommodating 400 guests.

MANSLAUGHTER, the killing of a hu¬ man being; in criminal law the second degree of felonious homicide. Murder and manslaughter are distinguished from each other by the intent which causes or accompanies the act. If a homicide be not justifiable nor excusable, and yet be not committed with malice aforethought, it is manslaughter and not murder. It is quite certain that the intent need not be to kill ; for while there must be a criminal intent to make a person amenable to law as a criminal, yet if one crime be intended, and in the act of com¬ mitting it another of a higher character be also committed without intent, the criminal is responsible for this higher crime. The general principle laid down in respect to manslaughter is, that not only a positive intention to commit some crime, but mere negligence, may make one guilty. If any one take upon himself an office or duty requiring care or skill, he is liable for the want of either; and if death be the con¬ sequence of his ignorance or carelessness, he is guilty of manslaughter. So if one driving furiously run over and kill

a person whom he did not see, or if one in command of a steamer or sailing-vessel by reason of gross negligence run down a boat and some one in it be drowned, this would be manslaughter. So, if any one, whether medical by profession or not, deal with another as a physician, and through gross want of care or skill kill him, or if any one charged with building a house of any kind construct it so badly that it fads and kills persons within or near it; or if in building he drop a stone upon some one pass¬ ing below and kill him; in all these cases he would be guilty of manslaughter, provided he were grossly negligent in the act causing the death. This is the essential question.

Blackstone defines manslaughter thus : ((Manslaughter is the unlawful killing of another without malice either express or implied; which may be either voluntarily, upon a sudden heat, or involuntarily, but in the commission of some unlawful act.®

The judicial treatment of this crime, being regulated by statute, varies in the several States. The element of premeditation is not essential to conviction of this crime. There are cases

which the law regards as only manslaughter, without evidence of momentary excitement; partly because the law infers that from such a provocation there must be excitement ; and partly, perhaps, because the party killed brought his death upon himself by his outrageous wrong. Thus, if a husband detects his wife in adultery, and instantly and purposely takes either her life or the adulterer's, it is only manslaughter. Not so, however, if he waits for a subsequent opportunity, for then the first reason wholly fails, and the killing becomes murder.

In New York State four degrees of man¬ slaughter are defined. The first carries a pen¬ alty of not over 20 years' imprisonment, the second degree not over 15 years. The first de¬ gree, briefly stated, consists of killing without the purpose of death, when the deceased was engaged in perpetrating or attempting a crime less than felony, and where such killing would be, at common law, murder. Assisting in self-murder is manslaughter in the first degree, as also wilfully killing an unborn quick child by injury to the mother if it would be murder in case the mother died from the injury. The second degree consists in procuring abortion otherwise ; killing in the heat of passion without the intent of death, but in a cruel and unusual manner; or killing unnecessarily one attempt¬ ing to commit felony. The third degree is kill¬ ing in heat of passion, without intent of death, but with a

dangerous weapon ; involuntary kill¬ ing, by procurement or negligence of another, while the person killed is engaged in committing a trespass on property; suffering an animal known to be mischievous to go abroad without care, or keeping it without care, and thereby causing death; receiving wilfully or negligently so many persons in a boat or vessel as to cause death; racing while in command of a steam¬ boat carrying passengers, bursting the boiler, and so killing; killing by a physician while in a state of intoxication. The fourth degree may be said to include all other modes or forms of manslaughter, known as such at common law, and of a milder kind than the preceding. There is much difference . between the States in the penalties prescribed. Some States, as Loui¬ siana, Maine and Maryland, assign ((not over 20 years® to both first and second degree man¬ slaughter, thus practically leaving the penalty to the judge's discretion; other States, as New Hampshire and South Carolina, call for <(not over 30 years,® while Texas, West Virginia and Delaware place five years as the greatest punish¬ ment. Several States make second degree man¬ slaughter (<not over one year® in prison. See Homicide.

MANSURA, MANSURAH, or MAN-SOURAH, man-soo'ra, Egypt, a town on the Damietta branch of the Nile, 34 miles southwest of Damietta. It has railway connection with Zagazig and Cairo and is the chief depot of the bread-stuffs, cotton, indigo, hemp and flax which this part of the Delta produces. There are also linen and cotton manufactories, *etc.* Mansurah was founded in 1221 and here in 1250, during the Crusades, Louis IX of France was captured and imprisoned. Pop. about 45,294.

MANTA, man'ta, Ecuador, city, port of en¬ try on the Pacific Coast, about 155 miles south¬ west of Quito. It has an excellent harbor and steamer connection with nearly all the Pacific

Coast towns of South America. It was founded as early as 1534-35, and for many years its im¬ portance has been in being the port of Mon-ticristi, which is about 10 miles inland. The chief exports are

coffee and rubber. Pop. 4,000.

MANTALINI, man-ta-le'ne, a low and af¬ fected character in Dickens' (Nicholas Nickleby) who lives on the labors of his wife, mantua-maker.

MANTARO, man-ta'ro, a river in Peru which has its rise in the mountains in the west¬ ern part of the province of Junin. Its source is about 13,000 feet above the sea. It flows south and east to Huanta, near which it breaks through the mountains and turns northwest which course is continued for about 60 miles, when again it changes and flows northeast to Pisquitini, where it joins the Apurimac River and forms the Ene. The Mantaro is nearly 300 miles long and navigable only a short dis¬ tance above the junction with the Apurimac. It has extensive water power which is not used except in a few cities.

MANTEGAZZA, Paolo, pa'6-16 man-ta- gat'sa, Italian author and physiologist : b. Monza, Italy, 1831 ; d. 1910. He was educated at the universities of Pisa and Milan, spent sev¬ eral years in traveling, visiting almost every portion of the globe, after which he returned to Milan and practised medicine there. He was appointed professor of physiology at Pavia in 1860 and in 1870 became professor of anthro¬ pology at Florence, where he founded the Museum of Anthropology, also a society and a review of anthropology. He was a member of the Italian Parliament 1865-76 and then became senator. He is the author of many medical and philosophical books; among them are (Elementi d'igiene' (1875) ; (Fisiologia del piacere) (1881) ; (Le istasi umane) (1887) ; (L'anno 3000) (1897) ; (L'amore' (1898), *etc.* He has also written books of travel and has devoted a share of his attention to political affairs.

MANTEGNA, Andrea, Italian painter: b. Vicenza 1431 ; d. Mantua, 13 Sept. 1506. His master, Squarcione, was induced by the talents which he displayed to adopt him as a son. The youth employed himself principally in drawing from antiques, and at the age of 16 painted a picture for the grand altar in the church of Saint Sophia at Padua. About 1468 Mantegna entered the service of Ludovico Gonzaga, at Mantua, where he opened a school. Here he painted his great picture, the (Triumph of Julius Caesar, > for the tapestry of a palace erected in Mantua. It consists of several cartoons, which have since been transferred to Hampton Court. Gonzaga conferred on him the honor of knight¬ hood in reward for his merit. Innocent VIII invited the artist to Rome to paint in the Belvi-dere. One of the best of this artist's works is the (Madonna della Vittoria,' now in the Louvre at Paris, in

which Giovanni Francesco Gonzaga is seen returning thanks for the vic¬ tory gained by him in 1496 over the forces of Charles VIII. The genuineness of this picture is, however, sometimes doubted. There are several others of his works in the Louvre, and an (Annunciation' in the Dresden Gallery. The New York Historical Society has his (Cru¬ cifixion, ' the Metropolitan Museum (Holy Family,' the Johnson Gallery in Philadelphia

his (Adoration of the Magi.' He was also noted as a line engraver, and left many notable cop¬ per plates of both religious and historical sub¬ jects. Consult Bell, N. R. E., <Mantegna) (New York 1911).

MANTELL, Gideon Algernon, English geologist: b. Lewis, Sussex, 1790; d. London, 10 Nov. 1852. For many years he practised as a medical man, and employed his leisure time in studying the strata and fossil remains of the weald district, by which he was surrounded. Through his investigations the fossilized skele¬ tons of the Iguanodon and Hylaeosaurus were discovered, the fresh-water origin of the wealden beds demonstrated and many other important facts established in regard to the geology of that district. He published (The Fossils of the South Downs' (1822) ; c Illus¬ trations of the Geology of Sussex' (1822), and the very popular (Wonders of Geology' (1838) ; and (Medals of Creation' (1844). His magnifi¬ cent collection of fossils was purchased in 1839 for the British Museum.

MANTELL, Robert Bruce, American actor: b. Irvine, Scotland, 7 Feb. 1854. He made his debut upon the stage at Rochdale, England, in 1876, and in 1878 played in juvenile roles with Modjeska in the United States. He then spent three years in England as leading man, returning to New York to play with Fanny Davenport. He became a star and plays at the head of his own company, presenting the lead¬ ing classical and romantic roles, including Ham¬ let, Macbeth, Romeo, Richelieu, *etc.*

MANTES, mant, France, a town in the de¬ partment of Seine-et-Oise, on the left bank of the Seine, opposite Limay, with which it com¬ municates by two handsome bridges connecting the banks with an island in the river, 29 miles west-northwest of Paris. It contains a fine Gothic church, with two lofty towers; a beauti¬ ful Gothic tower, the only remains of the church of Saint Maclou ; and has manufactures of leather and saltpeter, famous breweries, numerous mills and a trade in leather, corn and wine. William the Conqueror received his death-wound at Mantes. Pop. 8,821.

MANTEUFFEL, man'toif-fel, Edwin Hans Karl, Baron von, German field-marshal : b. Dresden, 24 Feb. 1809; d. Karlsbad, 17 June 1885. He entered the army in 1827 and ad¬ vanced rapidly, becoming lieutenant-general of cavalry 1861. He took part in the Danish War of 1864, and next year was appointed governor of Schleswig. During the war between Prussia and Austria he commanded the army of the Main, and fought at Hemstadt, Vettingen, Rossbrunn and Wurzburg. He served with distinction in the Franco-German War, especially in several actions around Metz, at Amiens, and from June 1871 to July 1873 he commanded the army of occupation in France, and was made field-marshal. In 1879 he was appointed gov¬ ernor-general of Alsace-Lorraine, and in this capacity showed singular want of skill and tact in ruling a conquered people.

MANTI, man'ti, Utah, city, county-seat of Sanpete County, on the Rio Grande, and on the Denver and Rio Grande Railroad, about 105 miles south of Salt Lake City. Manti was set¬ tled in 1849 and incorporated in 1851. It is situated in an agricultural region, where sheep

MANTINEA

raising is one of the principal industries. Large coal mines are in the vicinity. The chief indus¬ trial establishments are creameries, flour mills, lumber mills and machine-shops. The principal buildings are the Mormon temple, which cost $1,500,000, and the public school building. Pop.

2,432.

MANTINEA, man-ti-ne a, Greece, one of the most ancient and important cities of Arcadia, on the frontier of Argolis on the little river Ophis. The site is now known as Palseopoli, and excavations and explorations by the French school at Athens have disclosed the foundations of the walls and buildings of the ancient city. Mantinea was known for its wealth, and famous for the battles fought near it, in 418 b.c., when the Argives, Athenians and. Mantineans were defeated by the Spartans, in 385 b.c., when the city was taken and destroyed by the Spar¬ tans, and in 362 b.c., when the Thebans under Epaminondas defeated the Spartans, although the victory of the Thebans was purchased with the life of their commander. Mantinea was, in 226 b.c., surprised by Aratus ; and in 222 b.c. taken by Antigonus Dosen ; on this occasion the town was sacked, and the inhabitants sold as slaves. Another battle was fought near Man¬ tinea 207 b.c., between Machanidas, tyrant of Lacedaemon, and Philopcemen, general of the Achaean League. The latter was victorious, and slew the tyrant with his own hand. The French school at Athens financed an archeologist, G. Fougeres, in uncovering a large area here in 1888. The ancient city was walled, with towers about 80 feet apart. A large mound-shaped theatre was disclosed, a square market hall and paved roads of different eras. Consult Fou¬ geres, G., (Mantinee et l'Arcadie Orientale) (Paris 1898).

MANTIQUEIRA, man-te-ka'e-ra, Serra Da, Brazil, a mountain range which is in the southeastern part of the republic. It is about 75 miles from the Atlantic and extends nearly parallel with the coast for about 200 miles. The eastern end is near Rio de Janeiro. Ranges connected with the Mantiqueira are often in¬ cluded with this range and the name Mitiqueira applied to the whole. Mount Itatiaia, the high¬ est peak, is 9,700 feet above the sea. Several large rivers have their

sources in this range.

MANTIS, an orthopterous insect, of the family Man tides. These curious insects, allied to grasshoppers, abound in many parts of the world, and have always excited popular notice, and have been endowed with many supernatural qualities by the ignorant and superstitious of all countries. They are slender, with long, locust¬ like legs, oval wings, and a long neck-like pro¬ thorax, terminating in an angular head with large protruding eyes. The front legs are stout, spiny, fitted for grasping their prey., and are held up in front of them in an attitude that to some suggest prayej*. Hence the names praying insect, prophet and the like often given to the more familiar species ; to others they sug¬ gest other ideas, as of a horse pawing the air, whence our common species of the Southern States (Stegamomantis Carolina) is known as the “rear-horse,” and in Europe these insects are called “camel-crickets.” Why it should also be called “mule-killer”, is harder to explain; probably it is by confusion with a scorpion also

so called. These insects in tropical countries have come to assume various forms and hues similar to the flowers near which they lurk to catch the insects visiting the blossoms — a pro¬ tective measure which comes under the head of mimicry. A large proportion of the insects upon which they feed are injurious to crops, so that they may be regarded as beneficial to man. Among the Japanese and Chinese they are made to minister to human amusement also, being kept in cages and made to engage in combats upon which the spectators bet money. The eggs of the mantis are laid in an oval mass upon the stem of a plant, and covered with a tough case of hardened mucus, which shows, a curi¬ ously braided pattern of surface, and is easily recognized.

MANTIS SHRIMP, a large crustacean (Squilla empusa) of the order Stomapoda, which dwells in burrows between tide-marks along our Eastern coast, and seizes marine worms, and the like, that come within its reach. Its general shape is shrimp-like, but it has strong claws on the second pair of legs, which much resemble the forelegs of a mantis (q.v.), are provided with sharp spines, and are so joined that they can be folded back upon themselves like the blade of a clasp-knife, and so take a firm grip upon the struggling captives. It is quite blind, although the eyes appear to be well formed. A well-known European species is gathered for food by the coast people.

MANTLE, (1) a kind of cloak or loose garment to be worn over other

garments. (2) In heraldry the name is given to the cloak or mantle which is often represented behind the es¬ cutcheon. (3) A fabric-like covering of salts easily rendered incandescent, for placing over a gas flame to increase the light diffused. See Gas, Illuminating.

MANTLE ROCK, also called REGO-LITH, the loose unconsolidated debris that results from rock weathering. It includes all soils except those of strictly organic origin. If they have resulted from weathering in place, without removal, the soils are called residual ; if they have been carried from their place of origin by wind, glaciers or running water, they are said to be transported. The mantle rock varies greatly in thickness. In some places it is entirely absent, in others it is hundreds of feet deep. See Soil.

MANTLING, in heraldry , an ornament de¬ picted as hanging down from the helmet, and behind the escutcheon. It is considered to rep¬ resent either the cointise, an ornamental scarf which passed around the body, and over the shoulder; or the military mantle, or robe of estate. When intended for the cointise, it is cut into irregular strips and curls of the most capricious forms, whose contortions are sup¬ posed to indicate that it has been torn into that ragged condition in the field of battle. When the mantling is treated as a robe of estate, the bearings of the shield are sometimes embroi¬ dered on it. A mantling adjusted so as to form a background for the shield and its accessories constitutes an “achievement of arms.”

MANTRAPS, engines for the terrifying of trespassers and poachers (formerly often indicated by the warning notice “man-traps and spring-guns set here”), resembled gigantic rat-

traps several feet long. They may be seen in museums ; it has long been illegal to set them (save indoors between sunset and sunrise), as a defense against burglars.

MANTUA, man’tu-a, Italy, a fortified northern town, capital of the former duchy, and now of the province of Mantua, 80 miles by rail

southeast of Milan, on an almost insular site on the Mincio, which here divides into several arms ending in a marshy and insalubrious lake. Com¬ munication is maintained between the islands and mainland by. several bridges, the chief of which is Ponte di San Giorgio, 800 yards long. Mantua is written Mantova by the Italians; it is the see of a bishop, the seat of a civil, crimi¬ nal and mercantile court, and the residence both of a military governor and of a provincial dele¬ gate. The most remarkable edifices are the cathedral, after an elegant design by Giulio Ro¬ mano ; the church of Saint' Andrea, conspicuous from a distance by its majestic cupola and Gothic tower; the church of Santa Barbara, con¬ taining the mausoleum of Carlo Gonzaga; the church of San Sebastiano ; the Corte Reale, for¬ merly the ducal palace of the Gonzagas, a huge irregular pile, now partly used as barracks ; the Castello di Corte or old castle of the Gonzagas; the Torre della Gabbia, the Torre del Orologio, and the Torre dello Zuccaro; the Beccheria ana Peschiera, or shambles and fish market, both built by Giulio Romano ; the house of Giulio Romano, the Palazzo Colloredo, with enormous caryatides supporting its fagade ; the Palazzo del Te, outside the walls of the town, also built by Giulio Romano, and adorned with some of that master's largest frescoes ; the Accademia Virgiliana di Scienze e Belle Arbi ; the Liceo, the military arsenal, two theatres, one called the Teatro Virgiliano, employed for open-air performances in summer, situated in a fine piazza also named after Virgil, and containing a marble pillar surmounted by a bronze bust of the poet ; the library, containing 80,000 volumes ; the civic and two foundling hospitals ; the Monte di Pieta, the principal house of correc¬ tion for the whole of Lombardy. The manufac¬ tures are increasing. The trade is chiefly in the hands of the Jews, who live in a separate quar¬ ter. The principal article of trade is silk. There are machine works, oil and flour mills, tanneries and breweries ; there is also a considerable trade in timber, which is floated down the Mincio. Mantua was an ancient Etruscan settlement, and in the time of Virgil, a native of the region, was a Roman town. Charlemagne built its first for¬ tifications. Soon after 1115 Mantua succeeded in making itself independent, and continued so till 1276, when it fell under the iron rule of Buonacolsi or Bonacossi. In 1328 it found bet¬ ter masters in the Gonzagas, who, first as cap¬ tains, then (from 1432), as marquises, and finally (from 1530) as dukes of Mantua, gov¬ erned it with great ability, and distinguished themselves by the splendor of their court and their patronage of literature and art. The last of the Gonzaga family who reigned in Mantua was Ferdinando Carlo, or Carlo IV, who, hav¬ ing taken part with the French in the War of Succession, was declared to have incurred a for¬ feiture by withdrawing his allegiance from his liege lord the emperor of

Germany. The Man¬ tuan territory was accordingly annexed to the Austrian possessions in Lombardy, and the re¬

maining part of Montferrat was assigned to Savoy (1708). The fortifications of the town, previously formidable, were completed and put into their modern form by the Austrians and have been kept up to date by the Italian govern¬ ment. In 1796 Napoleon, apparently hopeless of reducing it by any other means, contented him¬ self with keeping it under strict blockade, till famine compelled the garrison to capitulate. After the cession of the western part of Lom¬ bardy to Sardinia in 1859, Mantua, with what else of Lombardy remained to Austria, was united to Venetia, and with it was given up to Italy in 1866. The area of the province is 903 square miles, and the population (1915 est.) 360,409. The communal population is 34,507.

MANU, ma'noo, the reputed author of the most renowned lawbook of the ancient Hindus, and likewise of an ancient Kalpa work on Vedic rites. It is matter, however, of considerable doubt whether both works belong to the same individual, and whether the name Manu, espe¬ cially in the case of the author of the lawbook, was intended to designate a historical person¬ age; for, in several passages of the Vedas (q.v.), as well as the Mahabharata (q.v.), Manu is mentioned as the progenitor of the human race ; and, in the first chapter of the lawbook ascribed to him, he declares himself to have been pro¬ duced by Viraj, an offspring of the Supreme Being, and to have created all this universe. Hindu mythology knows, moreover, a succes¬ sion of Manus, each of whom created, in his own period, the world anew after it had per¬ ished at the end of a mundane age.

According to theosophy, the Manu is a great Being (though once a man) who governs the earth planet ; other Manus govern other planets, while the Logos (q.v.) created the universe. The word Manu is chiefly used with reference to the author of an ancient renowned Hindu lawbook. This work is not merely a lawbook in the European sense of the word, it is likewise a system of cosmogony; it propounds metaphys¬ ical doctrines, teaches the art of government, and, among other things, treats of the state of the soul after death. The chief topics of its 12 books are the following: (1) creation, (2) education and the duties of a pupil, or the first order; (3) marriage and the duties of a house¬ holder, or the second order; (4) means of sub¬ sistence and private morals; (5) diet, purifica¬ tion and the duties of women; (6) the duties of an anchorite and an ascetic, or the duties of the third and fourth orders; (7) government and the duties of a king and the

military caste;

(8) judicature and law, private and criminal;

(9) continuation of the former and the duties of the commercial and servile castes; (10) mixed castes and the duties of the castes in time of distress; (11) penance and expiation; (12) transmigration and final beatitude.

Biihler has proved that Max Muller was right in regarding the extant work as a versified recast of an ancient lawbook, the manual of a particular Ved'ic school, the Manavas; and holds that the work, the date of which used to be given at 1200 b.c., was certainly extant in the 2d century a.d., and seems to have been com¬ posed between that date and the 2d century b.c. There are many remarkable correspondences be¬ tween this work and the Mahabharata, suggest¬ ing the use in both of common materials.

MANUAL ACTS, in ecclesiastical and Church hitsory, acts performed by the hands of the celebrant in the mass, chiefly the fraction of the host, and making the sign of the Cross over it before consecration. Both were ob¬ jected to at the Reformation.

MANUAL ALPHABET, the deaf and dumb alphabet ; the letters made by deaf and dumb persons with their fingers.

MANUAL BLOCKING. See Block Sig¬ nal System.

MANUAL TRAINING. As an educa¬ tional term, manual training 'includes all hand¬ work used as a means an general education. It differs from trade education through the ap¬ prenticeship system in that it emphasizes the educational element rather than the commercial or industrial element. This ˆhand-training,® however, differs from education in its broader meaning, in that it emphasizes manual skill, and makes such by-products as judgment, accuracy, habits of observation, language, etc., more or less important incidents in the

results to be at¬ tained* The more recent development of voca¬ tional training has tended to cast doubt upon the validity of manual training as a part of edu¬ cation, while the advocates of the traditional features of education — literature, history, mathematics, science, philosophy, — have never admitted it to a place in their educational scheme. The term has therefore become re¬ stricted to those forms of handwork which are used as agencies in general education as distinct from vocational, trade and industrial education. The manual training advocates continue to hold that habits of accuracy, judgment and observa¬ tion and sincerity, formed through manual ac¬ tivities, will contribute to these same mental habits as permanent life characteristics. In this they return under peculiar circumstances to the doctrine of formal discipline, approaching the matter in reverse order from the early devotees to this doctrine. Nevertheless it is on ‘this the¬ ory that manual training is now holding its place in American public education. When it surrenders this position it must become prevocational or vocational training.

History of Manual Training.— Finland holds the honor of the earliest use of handwork as an agency in education. Between l858 and 1866 a plan was developed for teaching hand¬ work in the primary schools, and for training handwork teachers for the public schools.

Sweden established handwork as a part of its educational system in 1872. This included carpentry, wood-turning, wood-carving, coopers’ work, bookbinding, etc., activities selected from the Hus Slojd occupations from which we have the well-known «Sloyd Work.® Sweden was concerned with the physical health of its people as well as the passing of the old system of house industries. It was hoped that this manual work would invigorate the physical and moral health of the people who lived under artificial city con¬ ditions; and that industry would be stimulated by a wide diffusion of manual skill. The Swed¬ ish nation has now made handwork an integral part of its public school program and has thus laid a broad and sure foundation for the excel¬ lent technical and trade schools above.

France adopted handwork in 1873 in the Lcole Salicis, and in 1882 made such work com¬ pulsory in all elementary schools. From its

very beginning drawing has been emphasized and mathematics has been a closely related sub¬ ject. Because of this academic work the French have drawn the regular teacher into this handwork movement side by side with a ti adc teacher who gives the practical work. This

re¬ lationship between the academic teacher and the trade-teacher has been adopted by other coun¬ tries and has apparently proved its usefulness.

England opened its first handwork classes in 1886 and to-day all the large centres of popu¬ lation require such work in their schools. The government awards special financial grants to municipalities who give manual training to boys and girls of 11 years and older.

Germany has long emphasized manual in¬ struction for the artisan classes in her popula¬ tion but her emphasis has been on trade or vocational features. Skill of hand has been the purpose, rather than such moral qualities as were sought, for example, by the Swedish sys¬ tem. As a consequence Germany developed trade and occupation schools, rather than man¬ ual training courses in the <(real-schulen .® The Gymnasia of course give no training in hand¬ work. In fact, there has been no general scheme adopted by any considerable portion of Germany. This is probably due to the fact that trade and occupational training were efficiently carried on. Recently, since 1887, some schools have adopted typical manual training courses, and the Manual Training Seminary at Leipzig is the principal source of manual training teach¬ ers within the Empire.

Manual training in the United States has depended on private and local initiative. There had been no national movement prior to 1917. The Ethical Culture Society of New York City made the first step by opening handwork classes for small children in 1878 in connection with its workingmen's school. This was followed in 1880 by Washington University, Saint Louis, Mo., under the direction of Calvin A. Wood¬ ward. This experiment consisted of a fully equipped manual training high school with a variety of shopwork in wood and metal, me¬ chanical drawing, and in such appropriate aca¬ demic work as science and mathematics. It was a pioneer school and its success was noticed by many of the large American cities. By 1900 a majority of American municipalities had adopted some form of manual training. Work for girls as well as boys was included in the program. The courses for girls included sew¬ ing, dressmaking, millinery, burnt wood, leather and art jewelry;, for boys it included joinery, wood-'turning, patternmaking, forging, ma¬ chine-shop, foundry, sheet-metal, printing, elec¬ tric wiring, *etc.* In the elementary school hand¬ work has likewise found a large place on the program, beginning in the kindergarten and con¬ tinuing through the elementary grades. The activities include paper folding and paper cut¬ ting, basketry, clay-modeling, wood-carving, raffia work, *etc.* Correlation with drawing js more and more the rule. The best practice

in the public schools now relates drawing to the experiences of the child. . Design is the basis of the work and the design of the drawing-class frequently becomes the project of the handwork-class in the upper grades. Manual training in the American high school early de¬ veloped into a distinctive institution. Its hand¬ work or shopwork program is only remotely

related to industry. The projects are often im¬ practical because they are chosen, not because of their utility or industrial significance but be¬ cause they illustrate fundamental processes of industry. Type constructions are used as ana¬ lytical studies of various manufacturing proc¬ esses. A complete product is not sought nor are such elements as time, commercial value and shop atmosphere made a part of the instruction. The purpose of this typical Manual Training High School is vaguely educational, remotely industrial. As such, it fails to meet the needs of many industrial communities.

The Vocational Motive. — A change of sen¬ timent became apparent immediately after the Saint Louis Exposition of 1904. Educators who had investigated the subject in Europe and America, who saw the display of the nations' handwork, seemed to feel the need of training that related more closely to life motives. Manufacturers demanded industrial efficiency and appeared to have no confidence in the vague results of the typical Manual Training High School which was a traditional school with shop facilities. A demand arose for ((shops with schools attachedˆ or with school facilities. Manual training was soon modified so as to add the vocational appeal to boys and girls of 14 years of age and upward. The handwork of the seventh and eighth grades has come to be known as ((prevocational)) in the sense that the processes of many vocations are taught with the purpose of giving the child an opportunity to choose wisely with the aid of vocational advisers among teachers, parents and industrial or voca¬ tional experts. The logical step to follow this "prevocationaP* work is the trade school so that the advance of the vocational and industrial motives makes the old manual training ideal recede.

Industrial Education and Manual Train¬ ing. — Industrial education is a more compre¬ hensive term than manual training. It includes all that was at first expected from manual train¬ ing as a stimulus to efficient workmanship; all that vocational and ˆprevocational® training propose ; all that trade education seeks to secure. The emphasis is now on training and the spe¬ cialized education pertaining to special indus¬ tries, while the vague educational results of man¬ ual training which it was claimed would come by transfer of faculties, drop below the horizon.

The great demand for skilled workmen in the army and navy has led to the adoption of a national program of industrial education under the direction of the War Department. Colleges and technical schools in all parts of the country are teaching trades indispensable in warfare, using the equipment of former manual training and industrial schools. Thus is im¬ pressed on men's minds the utility of industrial skill in sharp contrast with the relative inutility for the work in hand of much of the traditional education, including the typical manual training schools. The organization of industrial educa¬ tion on a national basis is thus assured. It supersedes manual training and takes its place side by side with technical education. See 'Edu¬ cation, Industrial; Education, Technical; Vocational Education.

A. R. Brubacher,

President, State College for Teachers, Albany,

N. Y.

MANUCODIA, man-u-co-di-a, in ornithol¬ ogy* a group of birds either belonging or closely allied to the Paradiseidce , and peculiar to the Papuan subregion. The plumage is glossy steel-blue; the outer and middle toes are united for some distance, and there is an extraordinary convolution of the trachea in the males, to which the loud and clear voice of the birds is owing. Mr. Sharpe divides the Manucodia into two genera: Phonygama and Manucodia proper, of which four species are admitted — Manucodia chalybeata (chalybea) , from the northwest, and M. comriei, from the southwest, of New Guinea; M. atra, widely distributed over the Papuan subregion, and M. jobiensis, peculiar to the island whence it derives its specific name.

MANUEL I, Camnenus, man'u-el kom-ne'nus, a Byzantine emperor: b.

about 1120; succeeded his father, Joannes II, in 1143, died in 1180. The valor which he had displayed against the Turks induced his father to bequeath the crown to him rather than to his elder brother Isaac, who was immediately imprisoned by Axuch, the minister of the deceased emperor. Returning from his campaign in Cilicia, Manuel was received with enthusiasm at Constantinople, but was at once involved in wars both in the East and the West, which lasted with brief in¬ termissions through his reign. In 1144 he sub¬ jected Raymond, the rebellious Latin prince of Antioch. In 1145 he defeated the sultan of Iconium in successive pitched battles. In 1147 he promised his aid to the new crusade headed by Louis VII of France and Conrad III of Germany, and though he allowed them a pas¬ sage through his dominions he gave secret in¬ formation to the Turks.

In 1148 he began the most important war of his reign with Roger, the Norman king of Sicily, who had taken Corfu and prepared to invade Greece. He formed an alliance with the Venetians, who within a year joined him before the fortress of Corfu, which was sur¬ rendered after an obstinate siege. He was pre¬ vented from invading Sicily by hostilities of the Serbians and Hungarians, instigated by Roger, the former of whom were vanquished in two campaigns, but the latter protracted the war till 1152. In that year he suffered a reverse from the Turks in Cilicia, but his general, John Ducas, gained so great successes in southern Italy that Manuel conceived the project of re¬ uniting the eastern and western ‘empires.

The defeat of Alexis, the successor of John Ducas, by William, the successor of Roger, soon followed; the Sicilian admiral Maius routed the Greek fleet off Negropont, and advanced toward Constantinople; and Manuel therefore accepted an honorable peace in 1155. Those Greek pris¬ oners who were silk-weavers were retained in Italy, and gave origin to the flourishing Italian silk manufactures. In the following years he waged successful wars with Raymond, Prince of Antioch, and Az-ed-din, the Turkish sultan. A new war soon broke out with Gejza, king of Hungary, which was terminated by a disastrous defeat of the Hungarians near the present Sem-lin. In 1176 he experienced a terrible defeat from Az-ed-din in the mountains of Pisidia, and was obliged to sign a disadvantageous peace. By breaking the treaty and renewing the war he

obtained honorable terms. -This broke his health and he died of a slow fever.

MANUEL II, Palaeologus, pa-le-ol'd-gus, a Byzantine emperor, born in 1350, succeeded his father, Joannes V, in 1391, died in 1425. At the death of his father he fled from the court of the sultan Bajazet, with whom he had been left as a hostage. The consequence was a war with Bajazet, in which Manuel was supported by an army of Hungarians, Germans and French. The allies, under the command of Sigismund, king of Hungary and afterward emperor of Germany, were defeated at Nicopolis in 1396, with the loss of 10,000 men. Constantinople was besieged, and its fall seemed impending, when the conquests of Tamerlane diverted the arms of the sultan. Manuel visited Italy, France and Germany, vainly seeking assistance from the Western princes. In the conflict be¬ tween the Tartars and the Turks, he acted with diplomatic skill, and secured peace to his em¬ pire. He sent ambassadors to the Council of Constance with instructions to urge a union of the Latin and Greek churches ; but his real ob¬ ject was only to obtain aid from the kingdoms of the West, and to alarm the Turks by the negotiations with those kingdoms.

MANUEL II, ex-king of Portugal, younger son of Carlos I: b. Lisbon, 15 Nov. 1889. He was known as the Duke of Beja and scandalous reports of his life in Paris were circulated be¬ fore it was thought he would succeed to the throne. Consequently his accession on the as-assination of his father and the Crown Prince on 1 Feb. 1908 was not the occasion of great popular rejoicing. He took the oath as king on 6 May 1908. His private life continued to alienate the affection of the people and on 5 Oct. 1910 the Republicans overturned his throne and proclaimed a republic. Manuel fled to England where he resided at Twickenham with his uncle, the Duke of Orleans. From there in 1911 he directed uprisings in Portugal with the object of abolishing the republic. These proved unsuccessful as did others in succeeding years and the entrance of Portugal into the war of 1914-18 as a member of the Entente appeared to put an end definitely to Royalist uprisings in that country despite huge sums spent by the Germans in propaganda to that end. Manuel married* Princess Augustine Victoria of Hohenzollern-Sigmaringen in 1913 ; the union proved uphappy and a separation resulted.

MANUEL, Don Juan, Spanish prince and

author: b. Escalona, Spain, 5 May 1282; d. 1349. He was a nephew of Alfonso X, and cousin of Sancho IV. His public life was. a restless and. turbulent one, but his chief claim to remembrance comes from the fact that he was one of the first and one of the best of Spanish prose writers. He wrote in a style of singular simplicity and charm, and few Spanish authors have succeeded so well in giving to their words the calmness, the weight, the rich¬ ness which come only from long experience and reflection. His principal work that remains is (Libro de Patronio,* more commonly known as (E1 Conde Lucanor,> which has been translated into the French and German languages.

MANUFACTURERS, National Associa¬ tion of, an American association organized in Cincinnati in 1895. It had three primary ob¬

jects — increasing the export trade; influencing State and national legislation ; and arbitrating labor disputes. The Association maintains a general office in New York City and issues numerous confidential reports and bulletins for the exclusive use of its members. The Asso¬ ciation is opposed to all boycotts and blacklists, but is not opposed to labor organizations, though it has resisted many of their rulings, and is popularly considered as antagonistic, because of the vigor with which it pushed the now famous suit against the American Federation of Labor, for its boycott of the Bucks Stove and Range Company. This was a long-fought test case, and the manufacturers won, stopping all offi¬ cial boycotting. Since 1913 the Association has directed its attention largely against the Inde¬ pendent Workers of the World, generally with success. The Manufacturers' Association has given considerable effort to promoting con¬ structive legislation to aid manufacturers, and has made some gains in patent law, but signally failed in securing better terms from the Post-Office Department. It publishes American In¬ dustries (monthly), which has 35,000 circula¬ tion, and is edited by F. W. Keough; and The American Trade Index (monthly).

MANUFACTURES IN THE UNITED STATES. See United States, Commercial and Industrial Development of.

MANUL, ma'nul, the common wildcat of Siberia and Tibet. It is smaller than the European wildcat, stockily built, has a mod¬ erately long tail and a coat of long hair. The general color is yellowish white, with a black¬ ish mark on the chest and upper part of the fore legs, and some dark lines across the haunches and ringing the tail. Two black lines on the cheeks and a black spot behind the short ear are

other distinguishing marks. There is a very curious similitude of appearance between this animal and the pampas cat of Patagonia.

MANUMISSION, in Roman law, the solemn ceremony by which a slave was eman¬ cipated. Constantine the Great allowed the Christian masters to emancipate their slaves be¬ fore the altar on festival days, and especially at Easter, by placing the deed of emancipation on the head of the freedman in the presence of the congregation. See Emancipation ; Emancipa¬ tion in Latin America; Emancipation Proclamation.

MANURES AND MANURING. See

Agricultural Chemistry ; Fertilizers.

MANUSCRIPTS (Latin, manuscriptus, written by the hand), are literally writing of any kind, whether on paper or any other ma¬ terial, in contradistinction to printed matter. Previous to the introduction of printing all literature was contained in manuscripts. All the existing ancient manuscripts are written on parchment or on paper. The paper is sometimes Egyptian (prepared from the real papyrus shrub), sometimes cotton or silk paper (charta bombycina), which was invented in the East about the year 706 a.d., and used till the intro¬ duction of linen paper, and in common with this till the middle of the 14th century; some¬ times linen paper, the date of the invention of which, though ascribed to the first half of the 13th century, on the authority of a document of the year 1243, written on such paper, is

nevertheless exceedingly doubtful. The earliest mention of quill pens is in the 7th century. The most common ink is the black, which is' very old. The oldest, however, was not mixed with vitriol, like ours, but generally consisted of soot, lamp-black, burned ivory, pulverized char¬ coal, *etc.* Red ink of a dazzling beauty is also found in ancient times in manuscripts. With it were written the initial letters, the first lines, and the titles, which were thence called rubrics, and the writer

rubricator. More rarely, but still quite frequently, blue ink is found in an¬ cient manuscripts ; yet more rarely green and yellow. Gold and silver were also used for writing either whole manuscripts (which, from their costliness, are great rarities), or for adorning the initial letters of books. With respect to external form, manuscripts are divided into rolls (volumina , the most ancient way, in which the troubadours in France wrote their poems at a much later period) and into stitched books or volumes (properly codices). Among the ancients the writers of manuscripts were mainly freedmen or slaves (scribce librarii). Some of the professional copyists in Rome were women. When Origen undertook the revision of the Old Testament (231 a.d.), Saint Am¬ brose sent to his assistance a number of deacons and virgins skilful in caligraphy. Subsequently the monks, among them the Benedictines in particular, were bound to this employment by the rules of their Order. In all the principal monasteries was a scriptorium, in which the scriptor or scribe could pursue his work in quiet, generally assisted by a dictator, who read aloud the text to be copied ; the manuscript was then revised by a corrector, and afterward handed to the miniator, who added the orna¬ mental capitals and artistic designs.

It is more difficult to form a correct judg¬ ment respecting the age of Greek manuscripts from the character of the writing than it is re¬ specting that of Latin manuscripts. In general it is to be remarked tha* in a Greek manuscript the strokes are lighter, easier and more flow¬ ing the older it is, and that they become stiffer in the progress of time. The absence or pres¬ ence of the Greek accents is in no respect de¬ cisive. Some Greek papyri are earlier than the Christian era, but most are not earlier than about the 6th century. The characters in Latin manuscripts have been classified partly accord¬ ing to their size (majuscula , minuscuta) , partly according to the various shapes and characters which they assumed among different nations or in various periods (scrip tura Romana antiqua, Merovingica, Longobardica, Carolingica, etc., to which has been added since the 12th century the Gothic, so called, which is an artificially pointed and angular character) ; and for all of those species of writing particular rules have been established, affording the means of estimating the age of a manuscript. Before the 8th cen¬ tury punctuation marks rarely occur : even after the introduction of punctuation, manuscripts may be met with destitute of points, but with the words separate. Manuscripts which have no capital or other divisions are always old. The catch-word, as it is termed, or the repetition of the first word of the following page at the end of the preceding, belongs to the 12th or subse¬ quent centuries. The fewer and easier the ab¬ breviations of a

manuscript are the older it is. Finally, in the oldest manuscripts the words

commonly join each other without break or separation. The division of words first became general in the 9th century. The form of the Arabic ciphers, which are seldom found in manuscripts earlier than the first half of the 13th century, also assists in deciding the age of a manuscript. Some manuscripts have at the end a statement when, and commonly also by whom, they were written (dated codices). But this signature often denotes merely the time when the book was composed, or refers merely to a part of the manuscript, or is entirely spuri¬ ous. The most ancient manuscripts still pre¬ served are those written on papyrus which have been found in Egyptian tombs. Next to them in point of age are the Latin manuscripts found at Herculaneum, of which there is a rich col¬ lection in the Naples Museum. Then there are the manuscripts of the imperial era, among which are the Vatican Terence and Septuagint and the Biblical codices in the British Museum. Since the middle of the 19th century many manuscripts of Greek writings have been found in Egypt, among the chief being that containing the orations of Hyperides, several containing parts of the works of Homer, Plato, De¬ mosthenes, etc., that in which occurs a portion of the Antiope of Euripides, and the almost complete text of Aristotle's work on the con¬ stitution of Athens. It was the custom in the Middle Ages to obliterate and erase writings on parchment for the purpose of writing on the materials anew, and these manuscripts, many of them of great value, are known as ((palimpsests.® This custom ceased in the 14th century, probably because paper came then more into use. See Libraries; Manuscripts Illum¬ inated ; Manuscripts of the Bible; Paleog¬ raphy; Papyrus.

ANUSCRIPTS, Il¬ luminated, are those whose text is heightened and brightened by vignettes and other decorations in colors, gold and silver. The verb to illuminate first occurs in the beginning of the 18th century; and means to decorate an initial letter, a word, or a text of a manuscript with gold, silver or brilliant colors, or with elaborate tracery, miniature illustrations and designs. The older verb was to enlumine (Old French enluminer; late Latin, inluminare ; classic Latin, illuminare) . It occurs, a.d. c. 1366, in Chaucer, A. B. C., 73, <(Kalendeeres enlumyned ben® ; a.d. c. 1400, (Roman de la Rose,* 1695, <(For it so welle was enlomyned® ; a.d. 1430, Lydgate, (Chron. Troy,* Prol., ((For he enlumineth by craft and cadence this noble storye with many freshe coloure of Rhetorik.® Illumination dif¬ fers from painting, according to Ruskin, Mod¬ ern Painters) (1856,

Vol. Ill, iv, viii, sec. 9), in that ((illumination admits no shadows, but only gradations of pure colour.® The earliest writing of many peoples was by means of pic¬ tures. Witness the pictographs of Sumeria, that later evolved into Babylonian cuneiform script; the hieroglyphic writing of Egypt; the crude scrawls of our American Indians; and

the Aztec picture-writing, which still defies epigraphists. It was but natural that an art arose of embellishing these pictographs. Fif¬ teen centuries before Christ the papyrus rolls that contain the ritualistic (Book of the Dead* were illuminated with brilliantly colored scenes. In due time the art of illumination passed over to peoples whose script was alphabetic; it always remained an art of beautiful writing. There is truth, though characteristically narrow and dogmatic in expression, in the saying of Ruskin, (Lectures on Art* (1870, v. 138) : ˆPerfect illumination is only writing made lovely; the moment it passes into picture making it has lost its dignity and function.®

I. Illumination in the East. 1. In Egypt. — The earliest specimens of illumination are on Egyptian papyrus rolls. Ritual directions are in red; hence the mediaeval rubric. Profile portraits are inserted into the text Agricul¬ tural and household scenes are interspersed between hieroglyphic signs. From the Egyp¬ tians the art of illumination reached the Hel¬ lenic folk of Alexandria. A 4th century b.c. papyrus manuscript of the poems of Timotheus, found at Abusir, has a bird as a punctuation mark. Not until the Christian era do minia¬ tures adorn the text. A 1st century a.d. Greek papyrus (Bibliotheque Nationale de Paris) shows a text that is adorned with miniatures in bold relief. A Berlin papyrus, Kaiser Fried¬ rich Museum, illustrates the cure of a demoniac by Jesus. While in Hellenic Egypt the art of illumination thus progressed, the Coptic artists carried on a separate tradition from their an¬ cient Egyptian forebears. A Coptic chronicle, dated 392 a.d. (Goleniscey collection) has a wealth of miniatures illustrative of the months, the provinces of Asia, the rulers of Rome, Lydia and Macedonia, together with the destruction of the Serapeum under the direction of the patriarch, Theophilus. The Morgan collection of

Sahidic manuscripts, of the 9th and 10th centuries, contains a dozen manuscripts with miniatures of the Virgin and her Son, angels, martyrs, saints, hermits; and almost all of the 58 manuscript volumes of this remarkable Cop¬ tic library are illuminated with marginal dec¬ orative schemes of animals and plants.

2. In Syria. — The monks of Syria show the traditions of the Semitic orient in the illumina¬ tion of manuscripts. Saint Augustine, (Adv. Faustum* (xiii, 6, 18), refers to the miniature illustration of Persian parchments. From the 5th century, there were monastic schools for illumi¬ nation in Mesopotamia and Syria. The Syriac Evangeliary, 586 a.d., the work of Rabbula at Zagba in Mesopotamia, now in the Laurentian Library, Florence, is an exquisite work of art; the miniatures represent the Crucifixion, *etc.* ; the marginal schemes are geometrical, and contain flowers, birds, *etc.* Some Hellenistic influence is noticeable; but Semitic traditions dominate in the Syriac school of illuminating. To this school belong also the extant Armenian illuminated manuscripts. Three evangeliaries, books of pericopic readings from the Epistles and Gospels, show the most beautiful work of Armenian miniaturists : that of Etschmiadzin, 10th century, copied from a 6th century model; that of Queen Mike, 902 a.d., Monastery of the Mechtarists, Venice; and the Tubingen Evangeliary, 1113 a.d. Mohammedan illumina¬ tion copied Syriac in many Arabic, Turkish

and Persian manuscripts, chiefly of the Quran. The decorative work is often rich in its red, ‘blue and gold cufic characters.

3. The Byzantine School. — In the Hel¬ lenistic speaking parts of the Byzantine Em¬ pire, the traditions of ancient Greece held sway; although iconoclasin interfered for a while with the progress of miniature painting, and Syriac influences were strong. Previous to the destructive vandalism of the iconoclasts, Byzantine miniaturists beautified the great 6th century purple parchment, Biblical codices : L, Vienna Genesis, silver letters; N, Cod. Pur-pnrens, silver letters, Gospels, most of manu¬ script at Petrograd ; 2? Cod. Rossanensis , sil¬ ver letters, Matthew and Mark, at Rossano, in Calabria; 2b, Cod. Sinopensis, gold letters, Matthew, in the Bibliotheque Nationale de Paris; 4>, Cod. Beratinus, Matthew and Mark, at Berat, Albania. These illuminated manu¬ scripts contain Biblical scenes, the bearded face of the Christ, etc., — all in miniature. To this period of Byzantine illumination belongs the (Roll of Joshua,* 11 yards long, at the Vatican, which pictures the story of the great leader; and the manuscript of Dioscorides, at Vienna, 472 a.d., containing portraits of

physicians that were copied from originals. All this early By¬ zantine illumination was along broad lines, free from stereotyped forms, — save the hieratic and fixed faces, — classic in artistic merit, brilliant in coloring, and profusely decorated with gold.

Iconoclasm during the 8th and 9th centuries wrought havoc to the art of illumination in the Byzantine Empire. Precious manuscripts were recklessly destroyed or ruthlessly mutilated. The artists of the iconoclastic period substituted ornamentation for miniature ; flora, fauna and geometric forms for figure-painting. An in¬ stance of their work is the J Evangeliary* at Bibliotheque Nationale de Paris, Gr. 631. The triumph of image-worship, 842 a.d., brought about a return to the painting of figures. The 10th to the 12th centuries were the most glorious period of Byzantine miniaturists. About 40 years after the restoration of image-worship, the (Sermons of Saint Gregory of Nazianzen) (Bibliotheque Nationale de Paris, Gr. 510), 880 c. a.d., were executed, and embellished by a series of large, beautiful miniatures. The <Paris Psalter,* dating from the 10th century (Bibliotheque Nationale de Paris, Gr. 139), has scenes of the life of David, reproduced from 3d or 4th century models, that vie with the frescoes of Pompeii in freshness and brilliancy. The (Homilies of Saint John Chrysostom,* Paris, a manuscript which belonged to Nicephorus III (1078-81 a.d.) is likewise a good example of Byzantine illumination at its maturity. The Psalter and the Menologion, a brief sketch of the lives of the saints for each day, were at this time most frequently decorated. The < Vatican Psalter* (1059 a.d.), in the Barberini Library; and the Menologion of Basil II (976-1025 a.d.) in the Vatican, are rich in minia¬ tures of brilliant coloring. Here should be mentioned the Slavic school of illumination. It was Byzantine at first; and gave us the (Chlondov Psalter,* 9th century, at Moscow. Between the 12th and 16th centuries, a national style appeared, which is characteristic of many of the numerous and richly illumined manu¬ scripts of the libraries and museums of Petro¬ grad and Moscow.

1 Single Leaf, perhaps from a Choir Book, Sienese Style (Early 15th century) 2 Illuminated Page from the ‘ Tres Riches Heures’ of Jean, Due de Berry (1400 A. D.)

ointnimumt

m muis tmitmtn i norrnur

tnimr m nmfprm irgigbm

fcmiuttia: (r ynnax

EXAMPLES OF ILLUMINATION (13th-16th CENTURY), FROM MSS. IN THE BRITISH MUSEUM

1 P«?alterv (about 1470) 2 Gospels (1275 A. D.)

3 Psaltery and office (14th century) 4 Office of the Dead (Early 16th century'

fuor. frmmmiinum oim at mOa; rr rrms 0Kfriftuw.«mi uum mf$ m fins; ft mufimiuai maw nr Ommtonams mis* aiaimm Dm? rrbnfcrmr urn Um. ffinmmim mm mnwijnnjtaa Duivcjrtdma mufnm a& bffuiftlJgFftlilu jmn6 ml ram,

ofnimiiiA tfvirim AlQum tmmbiUfu

mufmmatmhMm

rtnr.

?cfrrmmio;fruiartfm fmi

Oils mmrmrfimim jntu gmni! mulmnrmmafl fumii. rfl-mif fun f«mn$ fnc:to mm i fit b&frmntomn? imi’wii nr fonmirr m nmmbiifirr&HO onus urn mrrtHtn mumtn pfainnˆo famrrfo mmo mnrimiR mnmmn nnrrpfflimr.

pAirmntft’mi

jcpu

DUamu nomine laufctc con a d \dj&om umTia indue tiwmt iˆttrUc ! afo%;’ fsugm* tmtm mm, frfmr amacuuunsmiutt; mtoinofua. franc tudntnuttaptibU mno2?ff au#-qtu ctiintiitsudrdtfql mut5.€rm«mm DAnrpindttfeU5f mikbcmres ad dtf

apul£6 cius.&u&u: mpubUmiwsl|w cntmils mandi tmtw crhilunsfˆTRAKtre*. rfiutadttlee-.jlcm gmrquifam funr

medico:ˆ cj mate

hhr.flonmimucm uomtt uUbs ad ptm rmtmm: fed item

\n, Snf, Ittmm., ft uloE* m ■ Tfe mx

t>»UlK lei mm

muds” muUm* ftiopsk

f

X

hclanttxtlfid.

t InmnfwtmH iiˆauntfr mnHffrA’om-‘i ttoOisumTHrusnirm jiumnrgiiuinOnuin crfnt(uftOi(S no dm xpt -p’Oprcrqttco ma pmm uo&ffmp«fttg H«t iTbns.tr ˆmtrYa fntrsrrrcrtfmuacas uGsuoloptwocrrmp fenn umtatr.tr fame

«’ fs.chjpmr. wflum eftotr affiˆtsuerfu

trnomitrtntmcsr < mm / fnUentts uofwtnd®

*?’ B ˆuaftqwtSiUibttet

•a-

Tniuvie.ixfitx initial): nmutoˆimmisam (gmmtr qut tecta Cum rtttJjnixrfianttfattm faaamus-perAr&mm dr Qttutr ap:cs ptfriurs.

teens (mntimts ‘trlcpifnrr«nirtdu». < }i»

p dfttcffittcnottfamtt | Inctomptrabifurutcr

mvCitxmm mdmm luumttaa&Cuf t qmt An/SEco gs. i. AMgr..?’ Ijpfiq; moCfl impaste A •qmrtf os Homnifntto f [] ; nttn-ftaipimsaiCtt. or ■ f

naametz px *•

I”

< 4

X

Jt-

*

i

Y y ¥

«4 *7 ˆ M

r

X

＜#■- AY

-t ‘£k (*.

X

■■ ** £.’■ x

r

u

x

f/A’V

4{>)ir

atnrnad quotum

t]{id>(«5rmH&eRU?S nns qnco

domtHismltoiitwy ■*4 P9 H#‘j% ‘

r

A

j

®xr

M

> *

p*

-r

A;

A

Himtn iambus ft maveranfa pafnlcnˆ n nr ifinncmom rhy tnmmnnnaiaivirttiOMt apnirp |

In fun nunuln mnnnmnatvUf |

nut |)h > na|

bu peum Qmh diaaf.WX - 1 *’ %

(n (mini jinnr.i nnilt.}. fOnotuo rnltvtr Huifuf

romnutoilt,

ˆ___ !w tnn fn it imigtu(tni| qnft nloslnlmtimmoHflm vr nyfinttf liypiuts imploMinn) iioiimmuntHfiiir.iiritin fms TvnonontSmDtiDiiiE nifigimi1. ,

lUtiiio mm.niuir nnniBtts fttnij |

ˆ • — …

MANUSCRIPTS, ILLUMINATED

245

II. Illumination in the West. 1. Early Italian. — As manuscript writing, so illumina¬ tion began in the East, and was thence taken over by the West. Pliny, (Historia Naturalis) (xxv, 8) is witness to miniature-painting in Rome during the 1st century b.c. Martial (xiv, 1865) speaks of a parchment containing a portrait of Virgil. Varro had some 700 such miniature portraits. The most ancient illumi¬ nated manuscripts probably of western prov¬ enance are: the fragmentary (Iliad, } 3d cen¬ tury, Ambrosian Library, Milan; the Vatican Virgil, the (Schedae Vaticanae/ 4th century, Vat. Lat. 3225, with 50 miniatures; the (Codex Romanus,) another Vatican Virgil. Here be it noted that Latin illuminators gave us the word miniature, — ‘from the Latin

minium, which means red lead or cinnabar, — the vivid-red lead oxide used as a pigment. Hence also is minare, to paint in miniature; together with miniator, the miniature-painter. Early Italian illumination is not very well known to the historian of art. Byzantine art reacted on Italian ; and this reaction is marked in mosaics, early Italian painting, and the earliest illumina¬ tion of manuscripts in southern and central Italy. Through Italy, the East influenced the illuminators of the Frankish Empire.

2. Celtic Illumination. — It was during this period of decline of illumination in the West that the Irish school, as early as the 7th cen¬ tury, broke completely away from the copying of ancient models and inaugurated its own style of book-ornamentation. The individuality of the artists, the civilization and character of their race, were expressed in an art that reached the very height of perfection and made its influence felt in continental Europe. The Celtic initials, margins, and full-page designs are easily recognized by their great intricacy of interlacing spirals, zigzags, and ribbons, that entangle animal and human shaped fancies, knots, and other designs, — all executed with a marvelous precision of mathematical accu¬ racy, graceful delineation, delicate touch, brilliant coloring, and most fecund imagina¬ tion. Irish illumination is decidedly orien¬ tal in conception and execution; and seems to point back to the ancient civilization of the race, before the Celtic migration from the steppes of Asia, across Asia Minor, by way of Austria, Switzerland, Spain and France. No trace is found of classic influ¬ ences. Foliage is absent. Kinship with the sculpture on stone and jewels in barbaric Ire¬ land is marked. The wonderful decorative schemes are more like to the Arabic than to any other; and the human form is depicted with a geometrical symmetry that is charac¬ teristic of Coptic workmanship. The finest ex¬ ample of Celtic illumination is in Q, (Codex Kenanensis, y the Book of Kells, 8th century, Vulgate Gospels, in Trinity College, Dublin. Its pages are replete with brilliant, exquisite designs, testifying to a minuteness and delicacy of precision that are a marvel to art critics. The Celtic art of illumination reached Iona through Saint Columba's foundation there; and the monks of Iona (635 A.n.) brought their faith and their art to Lindisfarne, or Holy Isle, off the Northumbrian coast. Here was executed in Celtic style the (Lindisfarne Gos¬ pels/ 8th century, now in the Cottonian collec¬ tion of the British Museum. Other fine works

of the Celtic school of illuminators are the (Book of DeirJ ; A, Codex Sangallensis, 9th or 10th century, Gospels in Greek and Latin, at Saint Gall, Switzerland. In England, the Celtic school of illumination

dominated, although manuscripts brought by Saint Augustine from Rome introduced a classic influence. The (Utrecht Psalter) (800 a.d.) is representative of the Celtic style in transition. It shows crude attempts at drapery effects. In Anglo-Saxon miniatures, frames of foliage and flut¬ tering draperies become characteristic. The <Benedictionale) of the see of Devonshire is the most elaborate specimen of 10th century Anglo-Saxon miniatures. The Norman Con¬ quest saved Anglo-Saxon illumination from the fantastic exaggerations into which it was sinking.

3. Carlovingian Illumination. — When Charle¬ magne became emperor of the West (800 a.d.) illumination was rapidly revived. The Celtic style provided to this new school its interlace¬ ments; Byzantine art was drawn upon for the painting of the human figure. Gold was used profusely in letters as well as illustrations. Large initials were almost the rule. Orna¬ mentation was luxurious. Miniatures repre¬ sented historical characters, symbolical themes, the arts, signs of the zodiac, virtues, vices, *etc.* Notwithstanding the gorgeous effect of purple vellum, a dazzling abundance of gold, and a brilliance of decoration, the Carlovingian illumi¬ nated manuscripts show a tendency to coarse¬ ness of workmanship and clumsiness of figure¬ painting. This tendency is in part offset by the purer style of the Celtic influence. The best examples of early Carlovingian illumination are: the (Evangeliary, > said to have been illumi: nated by Godescalc for Charlemagne in 787 a.d., whose text is in gold letters on a purple ground, and whose every page is illustrated with a dif¬ ferent decorative scheme; another (Evangeliary> of Charlemagne, at Vienna; the (Bible of Theodulf/ bishop of Orleans, at Paris and Le Puy; the (Sacramentary/ written for Drogon, son of Charlemagne and bishop of Metz; the (Evangeliary of Lothair/ Paris; and the (Bible of Charles the Bald/ presented by Count Vivien, abbott of Saint Martin of Tours. It was about the time of Charles the Bald, second half of the 9th century, that Carlo¬ vingian illumination reached its greatest per¬ fection.

4. Gothic Illumination. — The 10th to the 12th centuries show a decadence of Frankish illumination. After the (Regensburg Gospels) (11th century) miniatures become more coarse and clumsy, colors are dull. Toward the end of the 12th century, a renascence of illumination is visible in both Germany and France. Gold is now laid on in leaf, and not in liquid: bur¬ nishing makes the illumination most brilliant. The old illuminators were monks; now lay¬ men take up the art. The initials are smaller, but more artistic; they often contain miniatures of illustration or interpretation of the Biblical text. Hundreds of miniatures beautify the (Picture Bibles) of the 13th century, or inter¬

pret the (Sermon Bibles* of the period. Gothic features are introduced, — gables, pinnacles, rose and quatrefoil decorations. The human figure is painted with realism ; 13th century costumes are preserved to us in an accuracy of coloring. During the 14th century, there is a departure

from conventional foliage, and a reproduction of garlands and flowers from nature. And with the flowers are intermingled peasants, birds, animals, butterflies, etc., — all true to life. The (Breviary of Belleville,* (Bibliotheque Nationale de Paris, Lat. 10483-4) the work of the famous Parisian illuminator, Jean Pucelle, to¬ gether with Mahiet Ancelet and J. Chevrier; the (Book of the Miracles of Our Lady, *Soissons; (Queen Mary's Psalter* (British Museum), done for Mary Tudor, are all ex¬ quisite works of 14th century craft. The gold¬ en age of illumination continues during the early 15th century. Even at the outset of the Renaissance, the Gothic manner prevails. Books of Hours are the special feature. Such is the (Tres Riches Heures* of the Duke of Berry, Musee Conde, Chantilly, by Pol de Limbourg, containing miniatures of the various chateaux of the duke, and portraying marvelous aerial perspectives in landscape scenery, — the effects of snow, starlight, blazing sunlight and dull autumn shades. Other beautiful Horce are the (Grandes Heures,* by Jacquemart de Hesdin; (Tres Belles Heures,* and (Heures de Turin, * of the same Flemish school; and the (Hours of Anne of Brittany) (1508 a.d.). This last work marks the end of the art of illumination. The Renaissance, together with the invention of printing, were fatal to minia¬ ture painting of books, and to the illumination of their carefully written pages.

Bibliography. — Middleton, Ulluminated Manuscripts in Classical and Mediaeval Times> (1892) ; Bradley, (A Dictionary of Miniaturists, Illumination, Calligraphers and Copyists* (1887) ; Lecoy de la Marche, (Les manuscrits et la miniature> (Paris 1887); Labitte, cLes manuscrits et l'art de les orner) (1893) ˆMar¬ tin, (Les peintres de manuscrits et la miniature en France) (Paris 1910).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College, Maryland.

MANUSCRIPTS OF THE BIBLE are

written as opposed to printed copies of the whole Bible or a part thereof. All these manu¬ scripts, whether of the original text or of an ancient version, so long as they were done be¬ fore the invention of the art of printing, are important in the science of the textual criticism of Holy Writ. This article will contain a brief introduction on Bible manuscripts in general, followed by a summary account of the chief Hebrew, Greek, Latin, Syriac, Armenian and Coptic manuscripts of the Bible. Manuscripts of the Arabic, Ethiopic, Slavic and other early versions of Scripture do not witness to the ear¬ liest type of New Testament text; they are amply treated lin technical dictionaries of the Bible.

I. Bible Manuscripts in General. — There

are three classes of Bible manuscripts — papy¬ rus, vellum and palimpsest — to which attention should be called.

1. Papyrus Manuscripts. — While Babylo¬ nian scribes were impressing upon endurable clay the cuneiform, or wedge-shaped, ideo¬ graphic records of the style, Egyptian reed¬ writing with ink upon papyrus developed almost at the same pace. The name of this primitive paper is that of the plant which provided its raw. material. The papyrus, Trcnrvpof;, probably

an Egyptian loan-word, — was a rush of thick triangular stalk.

Its main root, Theophrastus tells us, was about 15 feet long and as thick as a man's wrist. Likely the bullrush, gomer, the wicker out of which was plaited the ark that contained the in¬ fant Moses, was the Nile papyrus. The outer coat of this Egyptian water-plant was peeled off, the pith was cut into strips and these were glued together transversely to form the first known writing paper. Sheets of papyrus were very fragile, became brittle in air, crumbled with use, could not resist the disintegrating force of moisture and were quite impracticable for book-form. Hence all papyrus manuscripts have been lost to us, save such as were buried in the exceedingly dry soil of Upper and Mid¬ dle Egypt. For many years, the ignorant fellahin wantonly destroyed these precious rec¬ ords of the past. Now scientific excavators are preventing this ruthlessness, and constantly add¬ ing to the world's various collections of papyrus manuscripts. The most ancient papyrus docu¬ ment is a record of the reign of the

Egyptian King Assa, b.c. 3580-3536; and the earliest lit¬ erary papyrus work extant is the Prisse papyrus of Paris, written in the 5th dynasty, c. b.c. 2500. During the first three centuries of Christianity papyrus was the ordinary writing paper of the Roman Empire. It was used by the Arabs until the 8th century, when modern paper was in¬ vented. The sacred writers or their scribes most likely used ink and rolls of fragile papyrus for the autographa of the New Testament (2 Corinthians iii, 8; 2 John, xii). These precious documents seem to have perished during the early 2d century. No trace of them is found in the writings of either the Apostolic or Apolo¬ getic Fathers, — unless we except Tertullian's words, <(the authentic letters of the Apostles themselves,** which are now generally set aside as rhetorical.

Bibliography. — Deissmann, (Bible Studies) (1901), (Light from the Ancient East) (1910) ; Moulton, ˆGrammar of New Testament Greek) (Vol. I, 3d ed., 1908) ; Milligan, (The New Testament Documents) (1913) ; Moulton and Milligan, (Vocabulary of the Greek New Tes¬ tament illustrated from the papyri and other non-literary sources) (parts 1 and 2, 1914-15).

2. Vellum Manuscripts. — Pliny ((Historia Naturalis> xiii, 1) is witness to the use of vel¬ lum for documentary purpose before the time of Christ. Saint Paul (2 Timothy iv, 13) em¬ ployed both papyrus-rolls, ra/L/37ia, and parch¬ ment, gegflpava?. In the 3d century, vellum be¬ gan, outside of Egypt, to supersede papyrus ; and in the early 4th century, the codex or parchment book-form gained complete victory over the papyrus-roll. To this century belong the earli¬ est extant Bible manuscripts of any thing but fragmentary size.

3. Palimpsests. — Some of our most import¬ ant vellum manuscripts are palimpsests (— Lat. palimosestum, iralifitpˆardc ((scraped again" i.e., manuscripts that were scraped a second time with pumice-stone and written upon anew). The reckless charge of wholesale de¬ struction of Biblical manuscripts by the monas¬ tic scribes of palimpsest works has not been substantiated. Wattenbach (cDas Schriftwesen im Mittelalterd 1896, pp. 299 ff), a leading au¬ thority on the subject, notes that a Greek synod, a.d. 691, forbade the use of any but ut-

terly unserviceable Biblical or Patristic manu¬ scripts for palimpsest-writing. According to Wattenbach, ((more precious manuscripts, in proportion to the existing supply, have been de¬ stroyed by the learned experimenters of our time than by the much abused monks of old.® The deciphering of a palimpsest may at times be accomplished by merely soaking it in clear water. The ˆlearned experimenters® use some chemical reagent, in order to bring back the original writing. Such chemical reagents are an infusion of nutgalls, Gioberti's tincture and hydrosulphuret of ammonia ; all do harm to the manuscripts.

II. Hebrew Manuscripts. — Certain parts of the Hebrew Bible, — Daniel ii, 4b-vii, 28, and Ezra iv, 8-vi, 18, together with vii, 12-26, — are not in Hebrew, but in Aramaic. These Biblical Aramaic portions, in the language that the exiled Jews adopted during their Babylonian captivity (b.c. 586-536), are here treated con¬ jointly with the Hebrew text into which they have been received. We shall briefly sum up the age, number and worth of tbe Hebrew man¬ uscripts of the Bible.

1°. Age. — Textual criticism divides the He¬ brew text of the Bible into the Masoretic and pre-Masoretic.

The Masoretic text is that of our complete Hebrew manuscripts. It represents the Masorah. This authoritative textual tradition was begun in the 1st century b c. ; was fixed in its consonantal readings during the Talmudic pe¬ riod (a.d. 300-500) ; and received the vowel points about the 8th century of our era. The pre-Masoretic text includes chiefly the readings that are not witnessed to by Masorah. The ear¬ liest manuscript of the Hebrew Bible, and probably the oldest extant Biblical manuscript, is the Nash papyrus. There are four frag¬ ments, which, when pieced together, give 24 lines of a pre-Masoretic text of the 10 com¬ mandments and of the shemd (Exod. xx, 2-17; Deut. v, 6-19, and vi, 4—5). The writing is without vowels, and seems paleographically to belong to not later than the 2d century. An¬ other witness to the pre-Masoretic text is the Samaritan Pentateuch, which is probably pre-exilic in origin. The earliest Samaritan manu¬ script extant is that of Nablus, once rated very anoient and now assigned to

the 12th or the 13th century. The newly-discovered Hebrew (Eccle - siasticus ,> represented by fragmentary manu¬ scripts of the 10th or 11th century, preserves parts of the pre-Masoretic text of a book until recently thought to have been written in Hel¬ lenistic.

All other Hebrew manuscripts of the Bible are Masoretic, and belong to the 10th century or later. At most 9 or 10 are earlier than the 12th century. The earliest are Codex Pe-tropolitanus, dated a.d 916; the Saint Peters¬ burg Bible, dated a.d. 1009; and Codex Oriental, 4445, British Museum, which Ginsburg assigns to a.d. 820-850.

2°. Number. — Kennicott ((Dissertatio Generalis in Vettis Testamentum Hebrai-cum,) 1780), collated 16 Samaritan and 638 Masoretic manuscripts. De Ross; ((Variae Lectiones,* 1784), brought the number of Maso¬ retic manuscripts up to 1,375. No one has since surpassed this critical work of De Rossi on the Masoretic text. Some 2,000 Masoretic manu¬ scripts gathered in the Crimea by Firkowitsch,

await critical study in the Imperial Library of Petrograd. Consult Strack, (Die biblischen und massoretischen Handschriften zu Tschufut-Kale) (In 'Zeits. fiir luth. Theol. und Kir che,

1875).

3°. Worth. — This rich store of some 3,375 manuscripts promises no very important critical results. For they all depend on an archetype of the 2d century a.d. ; and are singularly alike in accuracy of reproduction. The Masoretes were most detailed in their painstaking efforts to hand down the text of this archetype. The Scribes counted words and consonants of each book ; noted the middle words and middle consonants ; retained pecul¬ iarities of script, — such as broken letters, in¬ versions, consonants that were too small or too large, dots out of place, *etc.* All these oddities were handed down as God intended, and re¬ ceived mystical interpretations. Here is an in¬ stance. In Genesis ii, 4, behibbare' dm, Svhen they were created,® the letter h is unduly small. The rabbis handed down this peculiarity as God inspired; translated the word, (<In the letter h he created them® ; and then disputed what that meant. Hence the importance of manuscripts of the early versions of the Old Testament, so as to reach a pre-Masoretic text.

Bibliography.— Kraft and Deutsch, (Die handschriftl. hebraischen

Werke der k. k. Hof-bibliothek) (1857) ; Strack and Harkavy, Cat¬ alog der hebr. Bibelhandschriften der kaiser-lichen Bibliothek) (1875) ; Schiller-Szinessy, Catalogue of the Hebrew Manuscripts) (pre¬ served in the University Library, 1876) Assemani, (Bibliothecae Apostolicae Vaticanae Codices Orientales* (1756) ; Mai, (Appendix to Assemani J (1831) ; Neubauer, facsimiles of Hebrew Manuscripts* in the Bodleian Library (1886), and (Catalogue of the Hebrew Manuscripts) in the Bodleian Library and in the College Libraries of Oxford (1886).

III. Greek Manuscripts. — Textual critics divide Greek manuscripts of the Bible into uncials and minuscules. Uncial manuscripts are written in large disconnected letters that vary in force so as to indicate the time and place of provenance. Words are not separated ; accents and punctuation marks are not used ; no great variety of script is admitted; ligatures are em¬ ployed for the most ordinary words; paragraphs are marked off by small lacunas. The deca¬ dence of elegant uncial writing begins in the 6th century; twists and turns are given to cer¬ tain letters. In the 7th century manuscripts still greater freedom of flourish is allowed the scribe; accents and breathings are introduced, and the script leans to the right. By the 10th century the writing in Biblical manuscripts be¬ gins to be more or less cursive; these manu¬ scripts are called minuscules. The letters are now small, connected and written with a run¬ ning hand. Cursive writing holds sway in Bib¬ lical manuscripts until the 16th century. In a d. 1514, the Greek New Testament was for the first time printed.

1°. Old Testament Greek Manuscripts. — Traces of the version of Aquila (c. a.d. 130) are found in: (1) fragments of Origen's third columns, written as marginal notes to some manuscripts of the Septuagint ; (2) the Milan palimpsest of the Hexapla, a 10th cen¬ tury copy found by Mercati in 1896, containing about 11 psalms; (3) the Cambridge fragment,

7th century, giving parts of Psalm xxi. — Cf. Taylor, (Cairo Genizah Palimpsests* (1900) ; (4) the Cairo fragments of the 4th and 5th centuries: three palimpsests (containing 1 Kings xx, 7-17, 2 Kings xxviii, 1 1—27) , pub¬ lished by Burkitt in 1897 ; also four portions of <he Psalms (89:17 — 91:10, 95:7 — 96:12, 98:3, 101:16 — 102:13) published by Taylor (op. cit.) ; (5) the 4th century papyrus fragments of Genesis i, 1-5, published by Grenfell and Hunt in 1900. Our few manuscript traces of the ver¬ sions, which Symmachus and Theodotion issued toward the end of the 2d century, may be found in the same Hexaplaric fragments that witness to the text of Aquila. Theodotion's Daniel is preserved in the Septuagint manu¬ scripts.

The Septuagint version of the Old Testa¬ ment is extant in many manuscripts. These represent three textual families, — the Hexa¬ plaric, Hesychian and Lucianic. The Hexapla¬ ric text takes its name from the Hexapla of Origen. This colossal critical work, completed c. a.d. 240, presented in six columns the Hebrew text, the Greek transliteration thereof, Aquila, Symmachus, the Septuagint and Theodotion; and, for certain books, two other Greek trans¬ lations that are named Quinta and Sexta. Pamphilus, a disciple of Origen, preserved manu¬ scripts of the Hexapla at Caesarea. In the 4th century, Pamphilus and his disciple, Euse¬ bius of Caesarea, reproduced the fifth column, — i.e., Origen's Hexaplaric Septuagint text, — to¬ gether with all its critical signs. By these criti¬ cal signs, Origen had marked off passages, which he had found wanting in the Septuagint and had supplied from either Aquila or Theodo¬ tion. Unfortunately the scribes were not faith¬ ful in handing down the critical signs of Origen. In this wise the Caesarean text of the Septuagint was evolved into a hopeless commingling of Origen's Septuagint together with his interpo¬ lations from Aquila and Theodotion. Mean¬ time two other editions of the Septuagint got a vogue, — those of Hesychius at Alexandria and of Lucian at Antioch. From these three editions of the Septuagint text, all of our ex¬ tant manuscripts are descended, but by ways that have not yet been accurately traced. The Hexaplaric, Hesychian and Lucianic texts acted and reacted upon each other. The result is that most of the extant manuscripts of the Septua¬ gint contain readings from each of the three textual families. Criticism is at work to trace the respective influences of each text upon the manuscripts now to hand. Consult Field, (Originis Hexaplorum quae supersunt, sive vete-rum

interpretum Graecorum in totum Vetus Testamentum fragmenta) (1875).

A. Papyrus Manuscripts. — About 40 papyrus manuscripts of parts of the Septuagint have been found in recent years. Of these the most important are (1) Oxyrhyncus Pap. 656, early 3d century, preserving parts of Gen. xiv-xxvii, wherein most of the great vellum manuscripts are defective; (2) British Museum Pap. 73, called U, 7th century, Psalms 10-33; (3) a Leipzig Papyrus, 4th century, Psalms 29-54; (4) a Heidelberg Papyrus, 7th century, Zachary iv, 6 — Malachy iv, 5; (5) a Berlin Papyrus, 4th or 5th century, containing some 30 chapters of Genesis.

B. Vellum Uncial Manuscripts. — Parsons ((Vetus Testamentum Graecum cum Variis Lec-

tionibus,* 1798), designated uncial manuscripts of the Septuagint by Roman numerals, minus¬ cule by Arabic. Lagarde inaugurated the now common usage of Roman and Greek capitals for uncials. Von Soden's system of manuscript symbols, though illuminating, has not been widely adopted. The important vellum uncials of the Septuagint text are here subjoined:

Al'eph, CoL Sinaiticus (c. 350) * 43 leaves at Leipzig, 156 together with New Testament at Petrograd; contains fragments of Genesis and Numbers, I Paral. 9:27 — 19:17, Esdr. 9:9 to end, Esth., Tob., Judith, 1 and 4 Mach., Isa., Jer., Lam. (in part), Joel, Abd.-Mal., the Poetical Books, the entire New Testament, Epistle of Barnabas, and part of (Shepherd of HermasP The text is mixed; in Tobit it widely differs from A and B. Two correctors are of the 7th century. The first writes, at the end of Esther, that he compared the manuscript with a copy of the Hexaplaric text, authenti¬ cated by Pamphilus. , .

A, Cod. Alexandrinus, 5th century, in British Museum, complete Bible (excepting Psalms 50:20 — 80:11 and smaller lacunae); includes deuterocanonical books and fragments, apocry¬ phal 3 and 4 Mach., also 1 and 2 Clement ; of Egyptian provenance, and likely Hesychian in text; differs much from B, especially in Judges.

B, Cod. Vaticanus, c. 350, in Vatican Library, complete Bible; the Old Testament lacks Gen. i-xlvi, 28, 1 and 2 Mach., parts of 2 Kings ii, Psalms 105-137; the New Testament lacks Hebr. 9:14, 1 and 2 Timothy, Titus, Apoc. ; provenance, Lower Egypt ; text deemed by

Hort to be akin to the Hexaplaric.

C, Cod. Ephrcem, 5th century palimpsest, in National Library, Paris; 64 leaves of Old Testament, 145 out of 238 leaves of New Testament.

D, Cotton Genesis, 5th century, British Museum; fragments of Genesis: almost destroyed by fire in 1731, but previously collated.

E, Cod. Bodleianus, 9th or 10th century, Bodleian Library, Oxford, Heptateuch, frag¬ ments.

Q, Cod. Marchalianus, 6th century, Vatican, Prophets complete ; provenance, Egypt ; text, Hesychian; marginal notes from Hexapla con¬ tain Hexaplaric signs.

Theta, Cod. Washington, 5th or 6th century. Smithsonian Institution, Deuteronomy to Joshua.

Among uncial manuscripts of the Septuagint are also listed 17 codices, some of the 5th and 6th century; seven Psalters of the 9th or 10th century; and 18 fragments.

C. Vellum Minuscule Manuscripts. — More than 300 are known but not classified. Few bear witness to the entire Old Testament; the greater part are Psalters. The most critical use of the minuscules of the Septuagint is evidenced bv Brooke and McLean, (The Old Testament in Greek) (Vol. I, The Octateuch,

1906-17).

Bibliography. — Swete, (Introduction to the Old Testament in Greek) (1900), and (The Old Test, in Greek1* (3d ed. of Vols. I and II> 1907; 4th ed. of Vol. Ill, 1912) ; Kenyon, (Our Bible and the Ancient Manuscripts1* (1898); Nestle, (Septuagintastudien > (1886-1907) .

2°. New Testament Greek Manuscripts. — According to Von Soden (<Die Schriften des Neuen Testaments in ihrer altesten erreichbaren

Fextgestalt,' 1902), 2,328 Greek New Testament manuscripts are extant ; only about 40 contain, either entire or in part, all the books; 1,716 are of the Gospels, 531 of Acts, 628 of the Pauline Epistles, 219 of Apocalypse.

A. Papyrus. — About 31 papyrus fragments, of which six belong to the 3d century, bear most important witness to parts of 12 books of the New Testament. Consult Milligan, (Greek Papyri' (1912), and (The New Testament Documents) (1913).

B. Vellum Uncials. — Besides Aleph, A. B. C, already described, there are some 160 vellum uncials of the New Testament; 110 contain the Gospels or a part thereof. The most important of these manuscripts are:

D, Cod. Bezce, 5th or 6th century, Cambridge ; Gospels and Acts in Greek and Latin, except¬ ing Acts xxii, 29 to end; text, Western, i.e., that of Old Latin and Old Syriac.

D3, Cod. Claromontanus, 6th century, Nat. Libr., Paris; Pauline Epistles in Greek and Latin, each independent of the other.

E, Cod. Basileensis, 8th century; Univ. Libr., Basle, Gospels.

E2, Cod.. Laudianus, 6th century, Oxford, in Bodleian Libr., Acts in Greek and Latin, same text as D.

E3, Cod. S anger manensis, 9th century, Imper. Libr., Petrograd, Pauline Epistles in Greek and Latin, same family as D3.

F, Cod. Boreeli, 9th century, Utrecht, Gos¬ pels.

F3, Cod. Augiensis, 9th century, Trinity Col., Cambridge, Pauline Epistles in Greek and Latin, same family as D3, E3, G3.

G, Cod. Wolfii, 9th century, Cambridge and London, Gospels.

G3, Cod. Boernerianus, 9th century, Dresden, Pauline Epistles in Greek

and Latin.

Washington Manuscripts, called W and I by Gregory, giving a 5th or 6th century text of Gospels and Pauline Epistles, Smithsonian In¬ stitution.

C. Vellum Minuscules. — The vast number of minuscule witnesses to the New Testament text would seem to indicate a rich field of re¬ search for the critic. Such is not the case. Ninety-five per cent of these manuscripts are of little moment; they represent an inferior type of text, — that called the textus receptus. Only those minuscules attract attention which approach to one of the great uncials. Thus the (<Ferrar Group® resemble the text of D.

Bibliography. — Kenyon, (Textual Criticism of the New Testament (1912), and Paleog¬ raphy of Greek Papyri' (1899); Warfield, 'Textual Criticism of the New Testament (1886) ; Tischendorf, (Novum Testamentum Grsece) (1869), together with Gregory's Prolegomena thereto (1894); Gregory, 'Canon and Text of the New Testament (1907) ; 'Textkritik des Neuen Testaments) (1909), and 'Die Griechieschen Handschriften des Neuen Testaments) (1908); Von Soden, 'Griechisches Neues Testament (1913), and Pie Schriften des New Testaments' (4 vols., 1911-13) ; Nestle, (Textual Criticism of the Greek Testament (1901); Hutton, 'Atlas of Textual Criticism'

(1911).

IV. Latin Manuscripts.— Epigraphists find far greater variety' of script in Latin than in Greek manuscripts. Hence the former, are di¬

vided into uncials, semi-uncials, capitals, minus¬ cules and cursives: and these divisions are. sub¬ divided. The time, place and even the mon¬ astery of the copyist may often be traced by the very distinct script of the text.

1°. Old Latin Manuscripts. — The origin of the Old Latin text is wrapped in obscurity. Three distinct types are recognized, — the African, European and Italian. The African text is that used by Tertullian (c. 150-220), and Saint Cyprian (c. 200-258) ; it is the crudest in style, and apparently the earliest to be made. The European text is less crude in style and vocabulary; and may be an independent transla¬ tion. The Italian text, probably the Itala which Saint

Augustine preferred to all others, is the version used by Saint Jerome in his revision. About 40 manuscripts preserve this pre-Hieronymian Latin text, — 27 manuscripts of Gospels, seven manuscripts of Acts, six manu¬ scripts of Paul's Epistles, fragments of Catholic Epistles and Apocalypse. All show the in¬ fluence of the Vulgate or of corrections made by scribes. The most important Old Latin manuscripts are the bilinguals already noted : D, D3, E2, E3, F3, G3. Besides there are the codices Vercellensis, 4th century; Veronensis, 5th century; Palatinus, 5th century; Brixianus, 6th century; Corbeiensis, 5th century; Gigas, 13th century; Palimpsest de Fleury, 6th cen¬ tury; Bobiensis, 4th century. Cf. Burkitt, (The Old Latin and the Itala) (1896) ; Wordsworth, Sanday and White, 'Old Latin Biblical Texts> (1883-97) ; Buchanan, (01d Latin Biblical Texts' (1907-11) and (Sacred Latin Texts)

(1912-14).

2°. Vulgate Manuscripts. — More than 8,000 manuscripts of the Vulgate are extant, most of which are later than the 12th century and of little use in the reconstruction of the sacred text. Wordswortl and White, in their critical text (1889-1905), collate 40 of the most import¬ ant Vulgate manuscripts. The Benedictine Commission for the Revision of the Vulgate, established by Pope Pius X, is at work on the collation of this vast store of manuscripts; its task is to reconstruct the various families of the Vulgate text, — the Spanish, Italian, Irish, French, etc., — to sift out the Old Latin read¬ ings and other interpolations, and to reach back as nearly as possible to the text that was issued by Saint Jerome. Chiefest among the Vulgate codices are Amiatinus, 8th century* Cavensis, 9th century ; Fuldensis, a.d. 541-546 ; Kenanensis, Book of Kells, 8th century; Stony-hurstensis, 7th century.

V. Other Versions. — Syriac manuscripts rep¬ resent six distinctive Syriac versions of the New Testament. The Old Syriac version, made about the middle of the 2d century, is repre¬ sented by two important manuscripts of the 5th century. The Curetonian Syriac manuscript was discovered in 1842 among manuscripts brought to the British Museum from the monas¬ tery of S. Maria Deipara. in the Nitrian Desert, Egypt; and was published by Cureton in 1858. The Sinaitic Syriac manuscript was found by Mrs. Lewis and Mrs. Gibson, in 1892, at the monastery of Saint Catherine, on Mount Sinai. Cf. Bensley, Harris and Burkitt, 'The Four Gospels in Syriac transcribed from the Sinaitic Palimpsest' (1894) ; Lewis. 'Light on the Four Gospels from the Sinai

Palimpsest' (1913) ;

Burkitt, <Evangelion da Mepharreshe5

(1904).

The Diatessaron is a Syriac harmony of the Gospels, made about a.d. 170 by Tatian, an Assyrian and disciple of Saint Justin Mar¬ tyr. The only manuscript records thereof are two Arabic versions, discovered one in Rome and the other in Egypt, which were published by Ciasca in 1888.

The Pe shift a, or Syriac Vulgate, was made by Rabbula, a.d. 411-435. The Peshitta Penta¬ teuch, dated a.d. 464, in British Museum, is the earliest dated Biblical manuscript. The Peshitta Gospels number 125, Acts 58, Paul's Epistles, 67; two of these New Testament MSS. are of the 5th century.

The Philoxenian Syriac version has reached us only in a manuscript of Apocalypse at Trin¬ ity College, Dublin, and in the four minor Catholic Epistles. 4

The Harklean Syriac version is witnessed to by 35 manuscripts dating from the 7th century and later; its text is like to that of D.

The Palestinian Syriac version is found in lectionaries and fragmentary manuscripts ; these latter date from the 11th century and later.

2°. Armenian Manuscripts date from a.d. 887, are very numerous and have not yet been accu¬ rately collated.

3°. Coptic Manuscripts. — By the time Egypt became Christian, the 3d or 4th century, its ancient language had been evolved into the fol¬ lowing dialects : Sahidic, or Theban, of Upper Egypt; Akhmimic, a dialect that was later superseded by Sahidic; Fayumic, the dialect of

Fayum ; Middle Egyptian ; Bohairic, or Mem-phitic, the dialect of Bohaireh, — i.e., of the northwestern province of the Delta. The chief Sahidic manuscripts of the Bible, that have been collated, are among the 58 volumes, discovered (1910) in the Fayum and now called the Mor¬ gan Collection, — six books of the Old Testa¬ ment and the entire New Testament except the Apocalpyse. The British Museum also has parts of the Old Testament, Acts and Apoca¬ lypse. Moreover, the bilingual T, Cod. Bor-gianus, 5th century, in the Vatican, preserves fragments of Mark, Luke and John in both Greek and Sahidic. Bohairic is well repre¬ sented by manuscripts of the same character as Aleph-B. The Curzon Catena, dated a.d. 889, is the earliest extant Bohairic manuscript and is in the Parkham Library. Cf. Crum, Cata¬ logue of Coptic Manuscripts in the British Mu¬ seum 5 (1905) ; Wallis Budge, Coptic Biblical Texts of Upper Egypt5 (1912).

Walter Drum, S.J.,

Professor of Scripture, Woodstock College,

Maryland.

MANUTIUS, ma-nu'shi-us, Aldus (Ital. Manuzio, Manuzzi and Manucci), Italian printer : b. Sermonetta, near Belletri, in the neighborhood of Rome (and hence sometimes known as Romanus), 1450; d. 6 Feb. 1515. He began his studies at Ferrara, and continued them at Rome where he was tutor to princely families. He learned Greek in Ferrara under Guarini and at the suggestion of the Prince di Carpi established a printing-press at Venice 1489. He gained the reputation of being learned in Greek, Hebrew and Latin and enter¬ tained in his house many scholars of the day, forming his ((Neacademia)5 or New Academy,

which later was styled ((Academia della Fama.® He was the author of (Dictionarium Graecum5 (1497); Unstitutiones Graeco-Latinae) (1501— 08) ; Crammaticae Institutiones Gnecae* (1514) ; (De Metris Horatianis) (1509). His son Pau-lus (b. 12 June 1512; d. 6 April 1574) continued (1533) to manage the printing-press at Venice, and subsequently (1561) presided over -the papal press, Typographia Vaticana, at Rome. He wrote a commentary to Cicero's Letters, and (Epistolae Selectae.5 Aldus, the younger son of Paulus (b. 13 Feb. 1547; d. Rome, 28 Oct. 1597), was a scholar and author from his ear¬ liest youth. He continued his father's work at Venice and Rome. Consult Renouard, (Annales de rimprimerie des Aldes) (1834) ; Didot,

<Alde Manuce et l'Hennenisme a Venise) (1873); Goldschmid, (A Biographical Sketch of the Aldine Press at Venice) (1887) ;_Omont, Catalogues des Livres Grecs et Latins, imprimes par Aide Manuce a Venise5 (1892). Consult De Vinne, T. L., (Notable Printers of Italy During the Fifteenth Century) (1910). See Aldine Editions.

MANX CAT, a breed of house-cats, origi¬ nating in the Isle of Man, which are character¬ ized by very high hindquarters, and, as a rule, by a very short tail. See Cat.

MANX LITERATURE. The Celtic dia¬ lect of the Isle of Man, one of the three sub¬ divisions of the Gaelic language, is closely re¬ lated to the Irish and the Scottish Gaelic, and nearer to the latter than the former. (See Celtic Languages; Gaelic Literature). The literature of the language consisted mainly of ballads and carvels (or Christmas carols). The earliest monument of the vernacular is (The Book of Common Prayer, 5 translated by Bishop Phillips in 1610 (reprinted in 1895). In later times the orthography closely followed English. In the middle of the 18th century English was a foreign tongue to about two-thirds of the common people, but since that time the decline in the use of Manx has been very rapid, and only two or three thousand of the islanders now speak it. The last edition of the Bible published in Manx was dated 1819, and the last edition of the New Testament was pub¬ lished in 1840. Consult Rhys, (Outlines of the Phonology of Manx5 (1895) ; Kelly, Practical Grammar of Manxs) (1803; reprinted 1859); Goodwin, (First Lessons in Manx) (1866) ; Jenner, (The Manx Language, Its Grammar, Literature and Present State5 (Trans. London Philol. Soc. 1875) ; Moore, Surnames and Place Names of the Isle of Man5 (1890) ;

(Folklore of the Isle of Man5 (1891) ; (Manx Carols5 (1891) ; and History of the Isle of Man5 (1900).

MANZANILLO, man-tha-nel'yo, Cuba, city, port of entry, in the western part of the prov¬ ince of Santiago de Cuba, on the Gulf of Gua-canabo on the southern shore. It has a large harbor which is protected by a number of small islands. The city is the port for Bavamo, an inland city about 40 miles east by north from Manzanillo. The low land and the mangrove swamps around the place make it very un¬ healthy. It is well built and has a number of fine churches, hospitals and schools, — among the schools four are hi erh schools. Urban pop. about 15,115; municipal 62,845.

MANZANILLO, Mexico, seaport, in the state of Colima, on the Pacific at the entrance to the Bay of Cuyuttan, about 40 miles. west of Colima, the capital of the state. A railroad connects Manzanillo and the capital, and the city has steamer connections with the principal ports on the Pacific Coast. In normal times its imports total $1,500,000 annually.

MANZANITA, a popular name for various species of Arctostaphylos of the family Ericacece, especially A. pungens and A. manzanita. They are shrubs or small trees which sometimes exceed 20 feet in height, and often form impenetrable thickets in the region, Pacific Coast of North America from Oregon southwaid. They have alternate, evergreen, entire leaves, usually white or pinkish flowers in pamicled racemes, and gen¬ erally smooth berry-like drupes. Another well-known species often called by this name is the bearberry (q.v.), a trailing evergreen shrub which extends from the Arctic region to the mountains of Mexico, whose red berries form one of the principal foods of ptarmigan and other related birds. The great-berried man¬ zanita (A. glanca), a California species, bears fruit more than half an inch in diameter. Of the 30 species of the genus, probably a dozen are used for ornamental purposes ; some Cen¬ tral American ones in greenhouses where the climate prevents outdoor use; the shrubby west¬ ern kinds in mild climates; and only the trail¬ ing kinds in cold localities. The gnarled roots are an important source of fuel in the untim¬ bered parts of California.

MANZANO, Juan Francisco, hoo-an' fran-thes'ko man tha'no, Cuban poet: b. Havana, August 1797 ; d. there, 1854. A negro slave he wrote and published several volumes of verse before he was manumitted (1837), gaining espe¬ cial fame by (Mis treinta Anos> (1836), trans¬ lated into French, German and English, and by (Apuntes AutobiograficosP which was neyer printed in Spanish, but was published in English by Richard Robert Madden in 1840 under the title < Poems by a Slave in the Island of Cuba recently Liberated. > Manzano's other works include < Cantos a Lesbia> (1821), several ex¬ cellent lyrics reprinted in Calcagno's (Poetas de Color* (1868), and a drama (Zafira) (1842).

MANZANO MOUNTAINS, a range on the east side of the Rio Grande Valley in Bernalillo, Torrence and Valencia counties southeast of Albuquerque, N. Mex. It extends from Tijeras Canyon on the north to Abo Pass on the south, a distanceˆ of 45 miles. . The very steep western front of the mountain is granite and schist, capped by a thick sheet of limestone which dips east and constitutes the long sloping plateau of the summit and east side. The highest summits are Manzano Peak, 10,086 feet; Osha Peak, 10,023 feet, and Mosca Peak, 9,723 feet, which - are about 5,000 feet above the Rio Grande. To the. east is the Estancia Valley, long famous for its salt lakes. Near Bosque Peak is a large spring. The region is forested with yellow pine, pinon and juniper, and is included in the Manzano borest Reserve. Deer, bear and wild turkeys and many minor wild animals remain in these moun¬ tains. Ores of gold, lead and silver are mined on the west slope. Most of the long canyons on the eastern slope contain streams from large springs. The water is utilized by many settlers

mostly Mexicans who have occupied the region for several centures. Their small plazas or settle¬ ments are Chilili, Tejique, Torreon, Escabrosa, Punta del agua and Manzano. The latter has given name to the mountain, the plaza taking its name from a grove of apple trees (Manzano in Spanish) of prehistoric origin. The old ruins of Abo and La Cuara are near the south end of the range.

MANZANOS, man-za'nos, a natural park in Lincoln, Bernalillo and Santa Fe counties in New Mexico, southeast of Albuquerque. The Manzano Range, the highest peak of this sec¬ tion, numerous tablelands and valleys, with many springs and. small streams, are the chief features of this park. The Rio Grande is on the west side; the base of the mountains is about 1,000 feet above the river and about 11,000 feet above the level of the sea. The al¬ most perpendicular, stupendous red cliffs which rise above the plain and form the western face of the mountains are almost unscalable. South of the red-cliff region is the canyon of Las Moyas, and south of this canyon Bosque Peak, the highest point of the range.. Near the sum¬ mit of the peak is a spring which gushes up in a lake about 50 feet wide.

The view from the summit of the range at some points includes the green valley of the Rio Grande, mountains west of Albuquerque and north to the walls of Sante Fe, and intervening valleys and mountains. On the west of the park, or the western border, are the white Man¬ zano salt lands, on the southeast the gypsum desert. On the level mountain tops are stretches of clearing where the grass grows

luxuriantly. Between Hell Canyon and Chilili is a region of immense pine and pinon forest. Some of the animals found here are deer, bear and wild turkey. Grains, vegetables., alfalfa, fruit and other farm products are raised. Sheep, horses and cattle are raised extensively.

MANZONI, man-zo'ne, Alessandro, Ital¬ ian poet and novelist : b. Milan, 7 March 1785 ; d. there, 22 May 1873. He studied at Milan and Pavia, and published in 1806 his poem on the death of his friend Imbonati, which was fol¬ lowed in 1815 by his (Sacred Hymns) ((Inni Sacri*). In 1819 appeared his first tragedy, HI Conte di Carmagnola,* the first drama in which an Italian defied the unities. This play was reviewed and praised by Goethe, who took a warm interest in every subsequent production of Manzoni. The death of Napoleon inspired one of the finest odes of the century, (I1 Cinque Maggio* ((The Fifth of May'). In 1823 his second tragedy, ˆdelchi,* appeared. This, as well as its predecessor, finds more favor in per¬ sonal reading than on the stage. After this Manzoni divided his time between country pur¬ suits at his residence in the neighborhood of Milan and the composition of his romance (I promessi Sposi* ((The Betrothed.*), a Milanese story of the 17th century, published in 1827, and which has been translated into most of the European languages (Eng. in Bohn's Library 1883). He strove earnestly to make Tuscan the universal language in Italy. As a poet he out¬ rivaled all his Italian contemporaries. Verdi's (Manzoni Requiem* is a magnificent musical tribute to his memory. (See Betrothed, The). Consult Sauer, (Alessandro Manzoni* (1872) ; Stoppani, (I primi anni A. Manzoni* (1874) ;

Bersezio, (A. Manzoni, studio biografico. e critico> (1873); Cambu, <A. Manzoni, remin-iscenze) (1885); Waille, (Le romantisme de Manzoni* (Paris 1890; Eng. trans. by Geddes-Wilkins, Boston 1911).

MAORIS, ma'6-riz or mow'riz, native in¬ habitants of New Zealand, a people of Polyne¬ sian race, as is attested not only by ethnological considerations, but by their own legend that they came from Hawaiki (Hawaii or Samoa). Their carefully kept genealogies go. back less than a score of generations, so that it seems probable that their coming to

New Zealand was four or five centuries ago. Remains of a previous pop¬ ulation with Papuan characteristics have been found. The Maoris are well built, with longer bodies and shorter legs than the European type; they have black hair, little whisker on the face, and smooth bodies, wide open, straight black eyes, heads slightly macrocephalic, the index being 77, nose straight and color slightly brown. Their costume, no doubt adopted only upon their coming to a colder country than their early home, was a loose garment, woven from the fibre of Formiuni tenax. Tattooing they brought with them to New Zealand and per¬ fected it. They tattooed the face, decorating in this way the young warrior after his first suc¬ cessful fight, and adding fresh designs for each new exploit. They also knew how to make carvings of great delicacy, and armed them¬ selves with stone weapons. Their religious be¬ liefs were crude, but tinged with animism ; they recognized the soul as distinct from the body and surviving it; but connected an enemy's cun¬ ning and bravery so closely with his dead body that they ate it, thus to win his warlike virtues, locating intelligence in the brain and courage in the heart. Their worship combined ancestral cult with deification of natural forces and some fetishism. They were divided into tribes, six of these representing the divisions among the original settlers. A warlike people, their chief had absolute power and could pronounce "tapu® or taboo (q.v.) at will. Before the coming of the English they were mostly vegetarian, caught some fish, lived in bark or bough huts and made canoes. Polygamy was practised, and the arikis or priest-chieftains acted as physicians, having some knowledge of herbs. Both their numbers and physique have suffered sadly since the in¬ troduction of civilization. For the history of the Maoris since British occupation (see New Zealand, Government and History). Consult Cowan, Janies, (The Maoris of New Zealand (in (Makers of Australasia) Melbourne 1910) ; Beel, J. N., (Wilds of Maoriland) (Lon¬ don 1914).

MAP, or MAPES, maps, Walter, English scholar and poet of the 12t'h century. He was probably a native of Herefordshire. He studied at the University of Paris and became a favor¬ ite at the court of Henry II. He attended the Lateran Council of 1179, and was appointed archdeacon of Oxford in 1197. Map is now generally believed to have been probably author, or in large part, author of "Lancelot* in the Arthurian cycle. It is extremely probable, at any rate, that Map did contribute to the bring¬ ing of the cycle into its present state, but it is uncertain to what extent his work has survived. He is undoubtedly the author of a curious book (De Nugis Curialium,* a notebook of the events

of the day and of court gossip. It was edited for the Camden Society in 1850 by Ihomas Wright. To Map is attributed the famous drinking-song beginning :

‘1 Meum est propositum in taberna mori

MAP. The term map is derived from the Latin word “mappa,® meaning a napkin. Dur¬ ing the Middle Ages the name “mappa mundi ,® signifying world napkin, was applied to geo¬ graphical representations of the world on ac¬ count of the fact that the maps made during that period, at least, were painted on cloth.

The object of maps and charts is to accu¬ rately exhibit to the eye by suitable methods of representation, on a reduced scale, and on a plane surface, the relative position of points, lines and other objects situated on the spherical surface of the earth. As commonly used the term chart is synonymous with map, but the former is usually applied to navigators maps relating to the sea rather than the land ; also to diagrams delineating the positions of the stars in the celestial vault, and to the mapping of hydrographic data; while the term map is almost exclusively applied to representations of the surface of the earth. For example, there are the “star charts® compiled and published by the various observatories, the “maps® of the United States Geological Survey, which repre¬ sent the land areas, and the “charts® of the United States Coast and Geodetic Survey, which show the depths of the waters along the coast line of the United States.

History. — The earliest maps consisted of simple drawings which merely represented the relative positions of a few known points on the earth’s surface and defined in a general way the partly known and partly conjectured limits of the land and water areas. Map-making un¬ doubtedly originated among the wandering tribes of mankind and not among those who inhabited permanent locations such as towns and villages, and were used by those tribes to perpetuate for the benefit of posterity land¬ marks identifying the regions traveled over by them during their wide excursions to unsettled parts of the world. This is evidenced by the well-known fact that the American Indians and the Eskimo and many of the Polynesian tribes, customary wanderers, are very acute in appre¬ hending the meaning of maps, while the ma¬ jority of the settled Negro tribes are absolutely lacking in this respect. It is stated that a map drawn by an Eskimo woman enabled Sir Edward Parry to discover Fury and Hecla Strait, while the experience of many pioneer surveyors and topographers, derived from

their work through the extensive wildernesses of the American continent, will attest to the general accuracy of elementary Indian charts and of the capacity of those Indians to understand the maps made by others.

Among civilized peoples, the earliest exam¬ ples of maps recorded are those of the Egyp¬ tians. According to Apollonius of Rhodes (230 b.c.) the Egyptians of Colchis, a colony which dated from the time of Rameses II (1340 b.c.), possessed maps engraved on wooden tablets which had been handed down to them from a preceding period. These maps defined with considerable accuracy the known limits of land and water areas and the positions of roads and towns. Other ancient Egyptian maps are the

route maps which were prepared under the di¬ rection of King Sesostris, probably during the 12th dynasty; certain old maps in the Alex¬ andrian Library referred to by Strabo and prob¬ ably collected by Eratosthenes, and the map on papyrus in the museum at Turin, which rep¬ resents the topographical features of a gold mining district in Nubia. Maps of equal if not greater antiquity are recorded among the ancient Babylonians, who originated the idea of dividing the ecliptic into the 12 signs of the zodiac and also the sexagesimal system of numeration which led to the custom of dividing the circle into 360 degrees of 60 minutes each, with each minute subdivided into 60 seconds, and also to the corresponding divisions of the hour.

Among the Greeks the first map appears to be that of Anaximander about 560 b.c. His work was followed about 100 years later by that of Democritus of Abdera, whose work appears to have been based upon data obtained by him-

formation prior to the 16th century. In this connection it is well to understand that from the time of Aristotle (384 b.c.) the mathe¬ maticians, astronomers and geographers were well aware of the fact that the earth was a sphere and not the flat disc of the Ionic Greeks in the days of Anaximander, the ancient Egyp¬ tians and the Babylonians. Therefore, the map¬ making problem solved by Hipparchus and the successful solution of which formed the founda¬ tion for Ptolemy's work involved the devising of a projection by means of which the spherical surface of the earth could be represented on a plane surface. Although Ptolemy is credited with being the father of rational cartography, it does not appear that any maps were actually drawn by him. The oldest editions of the Ptolemaic maps on record appear to be the work of Agathodaemon, a mathematician who lived in the 5th century a.d., and constructed maps accurately based upon Ptolemy's data.

— — — — Solid Lines show actual positions op lands and spas. - - — Dotted Lines show the positions Given on Ptolenys MAS

Ptolemy's Map Compared With Actual Positions.

self in his travels, which extended to Persia and perhaps as far as India, and added consid¬ erably to the east and west dimensions of the known world areas. These circumstances prob¬ ably led to the depiction of the world disc in the form of an oval, a distinct departure from the circular form employed by Anaximander and others. About 150 b.c. Hipparchus intro¬ duced among the Greeks the Babylonian system of numeration, and discarding the unreliable geographical data of Erastosthenes and others, which were mainly obtained from travelers, suggested the use of only actual astronomical determinations of the latitudes and longitudes of the various points as the true basis for check¬ ing distances and directions. His suggestions were practically carried out by Marinus of Tyre, whose work was subsequently corrected by Ptolemy about the 2d century a.d., into a map Which is generally considered to be the most complete summary of geographical in-Among the Romans the art of map-making was confined to various kinds of sketch maps valuable for military and political purposes. They did not apply the scientific methods of the Greeks, and although both Cicero and Seneca mention general and topographical maps, and it is a fact that a survey of the whole Roman Empire was made during the reign of Augustus, the grave errors of Ptolemy's maps in all of the Mediterranean countries awaited rectifica¬ tion until the later Middle Ages.

During the earlier Middle Ages cartography, together with all the other branches of scientific culture, took a step backwards. The ban of the Church was laid heavily on the doctrine of the sphericity of the earth and resulted in the resurrection of the ancient Greek idea of a flat circular earth surrounded by an ocean limited by the edge of the celestial vault. In this way the few maps constructed during this period assumed the form shown in the accompanying

figure, and toward the close of the 14th cen¬ tury the entire science of map-making actually fell below the level of that attained by the Ionic Greeks in the days of Anaximander and Democritus. It is a fact worth noting, how¬ ever, that during the 13th century a form of

S.

Outline Sketch of Borgia Map (15th Century).

nautical charts called Hoxodromic® or <(compass» maps made their appearance in Italy and were extensively used for navigating purposes between the ports on the shores of the Mediter¬ ranean Sea. They were constructed with the aid of the compass and consisted of numerous straight lines which radiated from each port to all the other ports shown on the map. These lines marked with bearings and distances gave the ship courses between the various ports, and the maps embodied in a crude way the basic principle of modern map construction fromthe data obtained by the triangulations of trigo¬ nometrical surveys. With the aid of the loxodromic maps a very accurate representation of

I mi

WfV.

gig

1

m

ig

lit

1

M

11

Si

Wm

1

m

Hi

Hi

jj|

SI

£

1

m

lit

Portion of Loxodromic Map (13th Century).

the coasts of the Mediterranean countries was obtained and served admirably to correct the errors of the Ptolemaic maps which the Re¬ naissance had introduced once more into west¬ ern Europe.

The close of the 15th century witnessed a

great revival in the art of map-making, which was materially aided by the newly perfected arts of wood and copper engraving. Further¬ more, Purbach, Regiomontanus and others in¬ troduced trigonometry, and attempts were made to construct maps based on systematic geo¬ graphical triangulations. Map-making became a favorite occupation with the Germans, F rench and Italians, and many valuable editions of maps were produced at Strassburg, Ulm, Basle, Cologne, Paris, Lyons, Vicenza, Venice, Bologna and Rome, representing the work of numerous eminent map-makers, among which those of Joh. Ruysch, Nicolaus Donis and Jacob Angelus de Scarparia were of especial prominence and value.

During the 16th century the number of map-makers increased greatly and brought forward such illustrious cartographers as Johann Werner of Nuremberg, Sebastian Cabot and Gerhard Kramer (more commonly known as Mercator). The general endeavor of the Germans during this period was directed toward the improve¬ ment of the methods of projection originated by the Greeks, and led in the case of Mercator to the development of the projection which bears his name, and which is even at the present time very extensively used in the construction of nautical maps. About the latter part of the century the centre of map-making effort was transferred to Holland, mainly through the in¬ fluence of the collection of maps published by Abraham Ortelius of Antwerp, under the title (Theatrum Orbis Terrarum,* which included new engravings of the best maps from all countries. This great work passed through many editions, each successive edition being characterized by an increased number of maps. The 12th edition contained 92 maps. The earlier editions were printed in Latin, but later, editions in German, French, Dutch, Italian and English were produced and obtained world-wide circulation.

The beginning of the 17th century inaugu¬ rated a still further improvement in the art. The important inventions, such as the telescope, the sextant and the chronometer, provided means for the taking of more accurate observa¬ tions relative to time, latitude and longitude, while the application of trigonometry to geod¬ esy by Snellius and Picard's measurement of a degree of the meridian between Paris and Amiens introduced more precise methods of computation. Some of the most important pro¬ ductions of this epoch are those of Johann Baptist Homann of Nuremberg, and the work of Nicolas Sanson, Guill de l'lsle and Jean Baptiste Bourignon d'Anville and other eminent geographers of France working under the royal patronage, and (Dowets Atlas) published in England under the patronage of the Duke of Argyle.

These important works carry the art of map¬ making through a period of oyer 200 years and bring it to a point where instead of being treated as a matter of private business enter¬ prise it was taken up as a governmental matter, and the original surveys, together with the maps based thereon, were executed at the cost of the state. The first step in this direction was taken by France, the object being the production of a series of maps for military purposes and as a cadastre for the land tax. For this purpose the entire country was covered with a network of

triangles connecting numerous stations, the posi¬ tions of which were astronomically determined. The maps constructed from the data thus ob¬ tained far surpassed in the correctness of detail all those of earlier date. The example set by France has been followed by all of the first-class nations of the world, and by some of lesser importance. In Europe practically the whole continent, with the exception of the Balkan States, have been surveyed and mapped at the expense of the governments of the vari¬ ous countries. Outside of Europe, the principal large areas covered by surveys based on exact triangulations are the United States, a part of the Dominion of Canada, the whole of British India, a portion of Asiatic Russia and small portions of Australia, South Africa, the Dutch East Indies and Algeria.

all practical purposes. Such a system of lines of reference constitutes a projection by means of which any point or line on the surface of the sphere may be plotted on the map from its known co-ordinates, or from which the co-ordinates of any plotted point may be ascer¬ tained.

There are two general classes of such pro¬ jections— the “true® or “perspective® projec¬ tions which depend upon the actual position of the spectator’s eye, and the “developed® projec¬ tions in which the eye is assumed at the centre of the sphere, or else occupies an arbitrary position.

Perspective Projections are of three kinds : (1) the “orthographic,® with the eye supposed at an infinite distance, and the plane of projec¬ tion perpendicular to the line of sight; (2) the

y

pip

Jg*

IS

./• v * j .

m

Sift

§@:

pi

y

Ell

- .-V

n

• _ ■■■

ry-KV—

w rsvV-‘.

Is

m

iliS

P

ft S

s ’■«

P

pi

im

It A

mm.

kg:

i ^

||§

S

m?.

i

3

Sis

II

1

p/pv

im

: : *. * \ ••

V * ••

Wm

pi

1’

|8|jj

PI

p.vvp:

mi

i*‘ N*

TiT:’

is

.**•.*:

*3 ss

yy

i

-*-* < * <

) »

£#

•-S

81

y

»

BH

m

.••/.Tv”.

&.

y

;

ED

»

UATO

* ,

“Pi

:

m

T;?

m

1 1

ill

)L

n

!

t

S

ih.

I

jr

<

P

■

r ^

1 i

sill

V::

SS

. •••

YTT

k

::

:•

(i

y

hy, €

si

; ; -V

.-.■•p-.r-:

;r:::::P5s

‘7:

vyyy

SP/P;

;• v • • • * /

‘4:Uyl

• .•*.• :v..

… .

V.v

Si

.“.*■ •• :.*•

i;

11

•• ••• - -

•v H’: *:•

;*« r

iM

■ •

EpE

• .•.*• -•••

L/nes show actual pos/t/ons of Land and Wa T£P Apt as.

Dot ted Areas show the pos/t/ohs according to Mehcatqps Map Of /SG $ >

Mercator's Map Compared With Actual Positions.

The science and art of modern map-con¬ struction may be considered most conveniently and usefully under three headings — theoretical projections, practical methods of construction and duplication of reproduction.

Theoretical Projections. — Since the object of maps and charts is to accurately represent by suitable symbols on a plane surface the relative position of objects, etc., on the spherical sur¬ face of the earth, the problem requiring solution is one that is geometrically impossible, and therefore any map, no matter how accurately constructed, must necessarily be only an ap¬ proximation to the truth. Yet by the assump¬ tion of certain lines of reference which corre¬ spond to the actual latitudes and longitudes on the surface of the earth according to certain assumed or fixed geometric laws, the approxi¬ mation to the truth may be so nearly attained as to be quite as useful as the truth itself for

"stereographic,® with the eye supposed upon the surface of the sphere and occupying the pole of a great circle, the plane of which js the plane of projection, and (3) the "gnomonic® or "central® projection, with the eye assumed at the centre of the sphere and the plane of projec¬ tion tangent to its surface. To this class be¬ longs also the globular or equidistant projec¬ tion designed to avoid to a certain extent the contraction of the orthographic and the exag¬ geration of the stereographic projections near their respective outer edges. In this projection

the eye is supposed at a distance of % times the radius above the surface of the sphere. The perspective projections, in their astronom¬ ical and geographical application, are generally used for representing

large areas and hemi¬ spheres and are seldom used in the construction of maps of small extent on. large scales, in which case they are too laborious of construe-

tion and cannot be made to satisfy any special conditions not included within the scope ot their inherent characteristics. The three principal perspective projections were known to the andients, the orthographic and the stereographic being accredited to Hipparchus and the gnomonic to Thales. The globular projection was devised by Nicolisi. They served to introduce projection methods, but with the exception ot the gnomonic, which is still used for the con struction of star charts and some classes ot nautical charts, they have been superseded in the construction of modern maps by the de¬ veloped projections. .

Developed Projections are obtained by the substitution of a cylindrical or a conical sur¬ face for the ordinary plane of projection, and that surface, being subsequently developed or rolled out in a plane, gives the projection the application of this results in two general classes

the great obliquity of the intersections of the meridians and the parallels in the higher lati¬ tudes. This projection on account of the close similarity of the figures on the surface of the earth to the corresponding figures on the pio jection, and the uniformity of scale over the whole map is now extensively used for mapping not only areas of comparatively limited extent but also for the representation of continental

areas of ‘large extent… , « .

For the mathematical operations involved in the computation of the elements of these pro¬ jections and for illustrations showing how they are plotted an the actual construction of maps, see article under the title Projection in this

Encyclopedia. .

Practical Methods of Construction.— As

a rule, and with but a few exceptions, the draw ing of an accurate map is necessarily preceded hv an accurate survey of the things to be

Orthographic Projection on the Plane of the Equator.

of developed projections — those employing a cylinder tangent to the sphere, usually at the equator, and those employing a cone tangent, usually at the middle parallel of latitude of the area mapped. Of these, the two most com¬ monly used at the present time are the Mercator and the polyconic projections, the former em¬ ploying a tangent cylinder and the latter an infinite number of tangent cones. The Mercator was purposely designed for the use of nautical maps and is principally employed for that pur¬ pose at the present time. On a map based on this projection the loxodromic curve, that is, the course of a vessel which intersects the suc¬ cessive meridians at a constant angle, is repi esented on the map as a straight line, thus facili¬ tating the plotting of that course from day to day during the progress of the voyage, and ma¬ terially assisting in determining the true dis¬ tance and bearing of the objective point, ihe polyconic projection appears to have been de vised for the purpose of providing a suitable base for the mapping of the Atlantic coast line of the United States by the United States Coast and Geodetic Survey. The direction of this coast line being nearly diagonal to the mend-ians and parallels, and having a great north and south amplitude, required for its representation a projection which avoided the inherent dis¬ tortions of the various conic projections due to

Orthographic Projection on the Plane of a Meridian.

mapped, and the character of those things to¬ gether with the purposes for which the survey is made, not only define the methods of survey¬ ing to be employed, but also the character of the miap and its relative scale. The various methods of surveying are described under the title Surveying in this Encyclopedia. The various kinds of maps may be grouped into the follow¬ ing named general classes : _ ((Geographical, ˆphysiographical,® ˆtopographical® and ((geologi'cal® maps. The representations of astro¬ nomical, hydrographical, nautical and statistical data belong more properly to the category of charts. The various forms of railroad maps are merely

diagrams only useful for consulta¬ tion with the accompanying railroad schedules. The amount of distortion required to fit them for the purposes for which they are used makes them entirely unreliable for any other purpose The military maps are of various types and differ greatly according to the purposes for which they are used. Staff maps usually show every feature, natural and artificial, on the sur¬ face” of the country mapped in the minutest de¬ tail and with the greatest accuracy. The differ¬ ences of elevation of the various points are a matter of the greatest moment, and, therefore, are usually treated in the most complete manner both as to graphic effect and accuracy of in¬ formation. The sketch maps are much simpler

in character and represent in the most elemen¬ tary way the most important features which have a direct bearing on the particular kind of military operations involved.

. In the construction of original maps the principal points to be considered are the <(scale,® the ˆprojection ,® the <ctopographical rep¬ resentation® and the method of ˆduplication or reproduction® for publication.

Scale. — The scale will depend upon the character of the survey and the data obtained thereby; the extent of the area to be repre¬ sented on the map, and the process by which the map is to be reproduced. The original map should always be drawn on a scale sufficiently large to allow the draughtsman to plat the field notes easily and accurately. The difference be¬ tween a large scale and a small scale and their relative effect on maps may be explained as fol-

Orthographic Projection on the Plane of a Plorizon.

lows: Suppose the fractional scale of a map is given as eaieo it indicates that an interval of one inch on the map is equivalent to an interval or distance of 63,360 inches or one mile on the ground. Suppose the map to be 10 inches square, it wTould include an area of 100 square miles. Now suppose that while the size of the map remains the same the scale is reduced to raisVoo) i’t would then include an area of 10,000 square miles. Any map scale which requires that the

platting of measurements be made by the use of a scale with finer divisions than one-hundredths of an inch is about the minimum limit for platting original work, although meas¬ urements requiring an accuracy of one two-hundredths of an inch are commonly made in the construction of accurate projections for the mapping of exact trigonometrical surveys. The scale should be made larger directly in propor¬ tion to the increase in the amount of details to be shown on the map. The scale for maps in railroad work should always be large' — 1 inch to 1, 2 or 300 feet. For the platting of plane table and other triangulations, and for work requiring the filling in of a great amount of topographical detail, the scale should not be less than one inch to one mile. All surveys such as the townships and sections of the Public Land Surveys, in which the measurements are made by chain or by stadia, should not be platted on a scale less than 1 inch to 40 chains or half a mile.

In all cases the original maps may be subse¬ quently reduced to any desired scale by hand, by pantagraph or by photographic methods. Re¬ duction by pantagraph is satisfactory and useful only for the roughest classes of work. Photo¬ graphic reductions of maps of limited size and prepared as copies for engravings may be made with fair accuracy and very slight distortion. Map sheets exceeding 15 to 20 inches square in the size of the final reduction cannot be reduced photographically with sufficient accuracy to satisfy the demands of absolutely accurate cop¬ per, steel and stone engravings. For such en¬ gravings the reductions should always be made by hand. The method of hand reduction usually employed is the simple but effective one of dividing the original and the copy into a system of equivalent squares and then drawing in all the details by hand. The very simplicity of the

Stereographic Projection on the Plane of a Horizon.

method demands the services of the most skil¬ ful and experienced draughtsmen, so that the resulting maps possess a far greater accuracy than any reductions that may be obtained by photo-mechanical methods. There are examples of hand-made maps in the office of the United States Coast and Geodetic Survey which are actually superior

in accuracy, execution and beauty to the prints from the very fine copper engravings for which they served as a copy.

If the maps are to be reproduced by being engraved on copper, steel or stone the reduc¬ tions furnished the engravers should always be upon the ((final scale® or scale of publication. This is also applicable to wax engravings when photographic methods of reduction are not available to the engraver. When the maps rep¬ resent a great diversity of physical character¬ istics it is convenient to avoid confusion of details by using various conventional colors so as to distinguish the land' from the water areas, the rivers and creeks from the roads, railroads, contour 'lines, *etc.* If the maps are to be repro¬ duced by any of the photo-mechanical processes such as photo-engraving,, photo-lithography or the half-tone process, the use of colors should be strictly avoided, and the map made in black and white on a scale that will allow about one-third reduction to the scale of publication.

Projection. — At the present time the con¬ struction of the basic projection for a map is a very simple matter and consists merely in the laying off of the proper tabular values which have been computed for the use of map draughtsmen. The most useful tables of this kind in this country are those published by the United States Coast and Geodetic Survey and the Hydrographic Office of the Navy Depart¬ ment. The Mercator and the polyconic are the two principal projections employed at the present ‘time, but many others are often em¬ ployed where their special characteristics satisfy the particular requirements of the maps. It is in such cases that an intimate knowledge of the various projections is valuable to the map-maker

For information relative to the particular characteristics of the various projections see article under the title Projection.

Stereographic Projection on the Plane of the Equator.

Topographical Representation,— The dif¬ ferences of elevation between the various points on the surface of any region, that is, the hills, mountains and valley formations together with other natural features such as the river sys¬ tems, plains, tablelands, etc., constitute the topography of that region. The term “orogra¬ phy® is applied to the aspect furnished by those • natural features the existence of which are due solely to differences of elevation — the valleys, hills and mountains. These are represented on maps either by a system of horizontal lines drawn at right angles to the slopes called ˆcon¬ tours, }) or by a ‘system of vertical lines called hachures which follow the. directions of the slopes and are drawn at right angles to the “contours? The best idea of the nature of contours may be had by supposing a dam built across a river and flooding the country above it. Suppose the height of the dam to be in¬ creased at uniform intervals of 10 feet. At each increase in the height of the dam the water will reach a new level, and the irregular horizontal line where it intersects the surface of the ground is the contour for that particular height of the dam and connects all the points of the same elevation on the surface of the whole region. In the actual determination of contours the datum, zero, or point of beginning of the vertical intervals is the

level of the sea,

and the value of an interval adopted— 10, 20, 50 or more feet — depends upon the puipose tor which the survey is made, and the scale ot the final map. In surveys for hydraulic purposes such as the construction of dams and reservoirs, the laying of water and sewer systems and the digging of canals, many cases occur which re¬ quire the adoption of a contour interval as small as one or two feet. In such cases the areas surveyed are small and are mapped on a large scale. On the other hand, when the areas are large with great differences of elevation, larger contour intervals are adopted, and the maps are made on a small scale. The maps o the United States Geological Survey are among the best examples of orographic delineation by the method of contours, for detailed informa¬ tion of which see article under the title Geo¬ logical Survey. . , ˆ

The delineation of orograpbical features on

Stereographic Projection on the Plane of a Meridian.

the more accurate and useful classes of maps by the method of hachures is now being rapidly supplanted by that of contours. The only prac¬ tical value of the former lies in its pictorial effect, and that, when viewed from the stand¬ point of usefulness, fails to compensate for the enorrhous expenditure of labor and time in the execution of the maps and the subsequent en¬ gravings. The most beautiful examples of this class of maps in the world are those that have been published from time to time by the United States Coast and Geodetic Survey, but even in the work of that bureau the method of hachures is being slowly supplanted by the method of contours.

Duplication or Reproduction. — Maps are •duplicated or reproduced for publication by be¬ ing engraved by hand on copper, steel, stone, wood and wax. Wood and steel engravings are very rarely made at the present time, wax engraving being the most common process. Maps are also reproduced quite extensively by the photo-engraving and photo-lithographic processes. The finest classes of engraved maps, like those of the United States Coast and Geodotic Survey, are impression prints taken directly from the engraved plate by means of hand presses. In this bureau the engravings are made exclusively on copper plates. The maps of the United States Geological Survey, which

represent the finest class of lithographed maps in this or any other country, are engraved on stone, from which impression prints are taken on hand presses and transferred to smooth stones from which the final prints are made on power-driven cylinder presses. A great many of the maps wfiiich make up the best classes of atlases published for scientific and other pur¬ poses in foreign countries are reproduced in the same manner.

For detailed information relative to the various processes enumerated, see articles under the titles Engravings, Lithography, Photo-Engraving, *etc.*

Consult Craig, (A Treatise on Projections5 (United States Coast and Geodetic Survey, Washington 1882) ; Geleich and Sauter, <Kartenkunde geschichtlich dargestellt5 (Stuttgart 1897) ; Gretschel, (Lehrbuch der Kartenprojektion5 (Weimar 1873) ; Verner, (Map Reading and Elementary Field Sketching5 (London 1893) ; Zondervan, (Allgemeine Kartenkunde5 (Leipzig 1901) ; West, (The Elements of Mili¬ tary Topography5 (London 1894) ; Woodward, (Geographical Tables5 (Washington 1894) ; Steinhauser, (Grundzuge der Mathematischen Geographic und Landkartenprojektion5 (3d ed., Vienna 1887) ; Fiorini, (Le Projezioni delle carte Geografiche5 (Bologna 1881) ; Cebrian and Los Arcos, (Teoria General de las Proyec-ciones Geograficas5 (Madrid 1895) ; Tissot, (Memoire sur la Representation des Surfaces et les Projections des Cartes Geographiques5 (Paris 1881).

MAPES, maps, Victor, American play¬ wright: b. New York, 10 March 1870. He was graduated from Columbia in 1891, was Paris correspondent of the New York Sun 1892-96 and dramatic critic of the New York World 1898-99. He has written (Duseand the French5 (1897) ; and among plays by him may be named (A Flower of Yeddo5 (1898); (The Tory's Guest5 (1900) ; (Don Caesar's Return5 (1901) ; (The Detective5 (1908) ; (The New Henrietta5 (1913) ; (The Lasso5 (1917).

MAPLE, a genus (Acer) of trees, together with a few shrubs of the family Aceracece. The species, of which there are about 100, are indigenous to the north temperate zone, being best represented in China, Japan, United States and Canada. They are characterized by op¬ posite, palmate or lobed, exstipulate leaves ; small polygamo-dicecious flowers in axillary co¬ rymbs or racemes ; and compound, one-or two-seeded, long-winged nuts (samaras). The maples constitute one of the most widely useful genera of trees, being extensively employed, for ornamental and street planting and for wind¬ breaks, while the wood serves well for tool-handles, furniture, flooring and many other purposes. As fuel, they are especially valuable, being considered superior to almost all other woods except hickory. Because of their popu¬ larity for ornamental planting a great number of horticultural varieties have been produced, especially in Japan, and nearly all, but particu¬ larly the Japanese and American species and varieties, are noted for their brilliant autumnal colorings, which in the various shades of yel¬ low and red are unequaled by any other group of northern trees. The flowers are rich in nectar and are* sought by bees. Most of the species thrive best upon rich moist land suitable

for. agricultural purposes and are considered an indication of the type of soil. A few grow in wet land, and many upon mountain sides. They are readily propagated by means of seeds which, in the case of the early maturing kinds, should be sown as soon as ripe, the later ones in autumn or spring, being stratified in sand during the winter. Some choice varieties are grafted or budded and others may be increased by cuttings andj layers.

In America, the best known, most widely planted and otherwise most important species is probably the rock or sugar maple (A. sac-charum), a stately round-headed, gray-barked tree, often attaining heights of 120 feet. It is especially characteristic of rich woods from Maine to Michigan and southward in the moun¬ tains to Georgia, everywhere being noted for the rich colors of its leaves in autumn. Be¬ sides great popularity for all the purposes men¬ tioned above, some of the trees are highly prized for their wavy-grained wood, which, being of satiny appearance and capable of high polish, is used under the name of curly maple often as veneers for choice furniture. It is further the most important of the species which yield a saccharine sap, and is a chief source of maple syrup and sugar, to obtain which the trees are ((tapped,55 the sap caught in buckets and evaporated. A yield of three pounds per tree annually is considered very profitable; six pounds or even more is often obtained from many specimens

whose sap is either especially abundant or particularly rich in sugar. If prop¬ erly done no injury results to the trees. A form of the sugar maple, the black maple (A. saccharinum var. nigrum), so called from its very dark bark, is considered a distinct species (A. nigrum) by some botanists. It has the same range and habitats as the preceding and in nearly every respect the same uses, including sugar production. This form is more abundant than the preceding in the Central States.

The silver maple (A. saccharinum) is a widely spreading tree which attains a height of 120 feet throughout the same range as the above species. Being very ornamental in form and particularly also because of its graceful leaves, which are silvery white beneath, this tree is widely planted where rapid growth and quick effects are desired. Its chief fault is its brit¬ tleness ; it quickly succumbs to high winds. It will succeed upon a wide variety of soils. Its sap, though rather sweet, . is less useful for sugar than the above-mentioned species.

The red, scarlet or swamp maple (A. ru-brum) attains heights similar to the above, has about the same range, but is most frequently found in wet ground. It is named from the brilliant color of its flowers, which are borne profusely in early spring before the leaves ap¬ pear and from its red fruits which appear soon after. Being of nood habit it is widely planted for ornamental purposes upon all kinds of soils. Its wood is used for most of the purposes enumerated above.

The Norway maple. (A. platanoidcs) is somewhat smaller than the preceding species, being more compact and umbrageous. It is widely planted in private grounds and in parks, but is less valuable for street planting than the above because of its shorter trunk. It is a native of Europe. The sycamore maple (A.

pseud o-platanus) , another European species, is smaller still, attaining only about 70 feet. It is also widely planted in America as well as in Europe, being a vigorous, rapid grower and succeeding upon a great variety of soils, The common maple (A. campestre) occasionally at¬ tains 50 feet, but is usually a smaller tree or even a shrub. It is of European origin and is widely planted.

The Japanese maple (A. japonicum, A. pa matum and other species) are small trees or shrubs which because of the great diversity of form

of their leaves and their dainty habit have become widely popular in the parks and gar¬ dens of the United States and Europe. _ Their exceptionally brilliant autumnal coloring is taken advantage of in Japan where in the fall they approach the chrysanthemum in popularity.

The maples furnish food for a large number of insects, some of which live upon the green parts and others upon the wood. Several spe¬ cies of scale insects (q.v.) are often abundant enough to do considerable damage. The cot¬ tony maple scale (Pulvinaria innumerabilis) , Pseudococcus accris, a European insect, and the “gloomy® scale (Aspidiotus tenebricosus) , a southern species, are among the most trouble¬ some. Several caterpillars live upon the leaves, the forest tent caterpillar (Malacosoma dis-stria), the fall web-worm (Hyphantria cunea), and the larvae of the tussock moth (Orgyia leu-costigma), being the most generally important. The maple worm (Anisota rubicunda) is fre¬ quently very destructive. It is the larva of a moth. Of the borers, the larvae of Dicerca divericata and Glycobius speciosus, which are beetles in the adult state, and those of Algeria acerni, a clear-winged moth, are among the best known. The second beetle mentioned is known as the sugar maple borer. ˆ Consult Bailey, < Standard Cyclopaedia of Horticulture) (New York).

MAPLE SUGAR INDUSTRY, a trade

term, in common use, pertaining to the manu¬ facture of sugar and syrup from the sap of rock or sugar maple, Acer saccharinum. This production is classed under “Agriculture® by the United States Census Bureau, and note was made of its importance at a very early day in the history of the government. The product is strictly confined to North America and the

greater part to more or less limited areas in each of the geographical divisions known as New England, Middle Atlantic and Central-Western States, and Canada bordering on the North. Twenty-three States reported maple sugar or syrup in 1900. Of the 11,928,770

pounds of sugar made that year in the United States, 87.8 per cent, or 10.478,240, were pro¬ duced in the North Atlantic States. The three States of Vermont, New York and Penn¬ sylvania reported over 80 per cent of the total. On the other hand, the States of the North Central division were credited, in 1900, with

1,211,334 gallons of syrup, out of a total of

2,056,611 for the entire country. Since 1900 the production has steadily declined, and what is marketed is subject to so much adulteration with ordinary sugar that the real output is un¬ obtainable. It is, however, a decadent industry, as the trees have largely been exterminated.

In Canada the manufacture of maple sugar and syrup assumed a relatively high importance

compared with the production in the United States. The Dominion census of 1901 gives the entire volume as 17,762,636 pounds (syiup being reduced to equivalent pounds of sugar for the purposes of this enumeration) ; and, ot this aggregate, the province of Quebec is ci ed¬ ited with' 13,643,672 pounds of maple sugar, the province of Ontario following with a pro¬ duction of 3,791,598 pounds. Maple sugar _ is reported from other provinces and territories as follows: New Brunswick, 207,450 pounds; Nova Scotia, 112,496 pounds; others light.

History.— Maple sugar and syrup was made at an early day by the pioneers of New England and Canada. It may have been a product of ((necessity, the mother of invention, or an inheritance from the Indians, who had a spring-date of sugar-making moon; but, in either event, the first methods employed were crude, and the article was dark in color and not attractive. Moreover, tapping trees with an axe tended to denude the forest of its maples, and the whole modus operandi was wasteful in the extreme. The sap was caught in troughs, hewed out of logs, thence carried in pails to the boiling place and reduced to syrup in potash kettles. These kettles of the 18th century, or earlier, would be a curiosity at this day. _ They were suspended by chains from a horizontal pole, supported by forked or crossed sticks at each end, and surrounded by a blazing open fire. The camp-kettle, captured from General Burgoyne at the battle of Saratoga, 17 Oct.

1 777, preserved in the Bennington Battle Monu¬ ment, is a fine illustration of what these kettles resembled. Primitive ways, however, did not long continue. Improved methods, both as to tapping the maples, — leading up to the use of metal spouts, — and refining sap, followed one another, until now modern scientific prin¬ ciples prevail; and it is possible to reduce the sap to sugar or syrup, using evaporators, al¬ most immediately, so that its color is nearly white, flavored only with the delightful aroma of the maple.

Production and Adulteration.— The sup¬ ply in the United States, being much below the demand, has led to the “manufacture® of an article of commerce in which the pure maple product plays a very inconsequential part. Good authorities assert that sugar refineries makemuch more sugar and syrup, labeling it “maple,® than the entire natural production; that the refuse sugar of the real maple enters into the artificial combination of glucose, cane or beet sugar, and chemicals — to a very large degree creating a ready market for black American and Canadian sugars and the “late runs® of the maple sugar-producing sections of both countries.

MAPLESON, ma’pl-son, James Henry,

English operatic impresario : b. London, 4 May 1830; d. there, 14 Nov. 1901. He was educated at the Royal Academy of Music, London, and went to Italy for vocal instruction, but was compelled to abandon his career as a singer, owing to throat trouble. He then entered an orchestra, playing the viola, and in 1861 hq be¬ came manager of the Lyceum Theatre. In 1862 he assumed the management of Her Maj¬ esty’s Theatre where he made himself famous. In 1871, after the burning of Her Majestv’s Theatre he managed Drury Lane but returned to the new Her Majesty’s upon its completion.

In 1878 he conducted the tour of an Italian opera in America and subsequently made tours with the greatest singers of the day, including Patti, Nilsson, *etc.*

MAPPA, Adam Gerard, Holland-American soldier and pioneer type founder: b. Delft, Hol¬ land, date unknown ; d. Olden Barneveld, N. Y., April 1828. As a young man he entered the military service of his native country, gaining (<marked distinction as a brave and enterprising officer.” About the time of his marriage (1780) he left the Dutch service and engaged in the business of type founding. This business was interrupted by political storms which disturbed the province of Holland in 1786-87. Colonel Mappa again took up the sword and became ftone of the leaders of the Dutch Patriots, be¬ ing

commander of the armed citizens in the Province of Holland." <(After keeping The Hague in a state of alarm with his small band of patriots alone, he was overwhelmed with numbers." And on 9 Oct. 1787 he was obliged to disband his men. With 14 others he was banished forever from Delft.

At the request of his republican friends he went to the court of Versailles to solicit coun¬ tenance and cooperation. But Louis XVI had troubles enough of his own, and as the pros¬ pects of the civil liberty being established in his own country grew fainter, Colonel Mappa de¬ cided to move with his family to America. On 1 Dec. 1789 they arrived in New York. The time between his expulsion from Holland and his landing in America was spent with other Dutch political refugees at the Chateau de Watte near Saint Omer.

While in Paris, Colonel Mappa became ac¬ quainted with Thomas Jefferson, then American Ambassador to France, who advised him to take to America a type-founding plant, there being then no such industry on the western side of the Atlantic. Accordingly Colonel Mappa brought with him a complete <(letter foundry" embodying not only the <(Western but Oriental languages" as well. The outfit was valued at something like £3,500 New York currency. Up to this time all printers had been obliged to purchase their type in England or Scotland. The following January (1790) Francis Adrian van der Kemp, a fellow refugee, wrote to his friend, John Adams, then a polit¬ ical power and later President, suggesting that the Congress impose a tax on all foreign type to encourage and protect Mappa's infant in¬ dustry.

Where he set up his type foundry at first it is perhaps impossible to say. A New York directory of 1792 makes mention of him as doing business at 22 Greenwich street. The in¬ fant industry was not prosperous as letters from Mrs. Mappa to her friends plainly indi¬ cate. So on 1 Feb. 1794 he advertised his (<type manufactory for sale." In the following summer, 1794, Colonel Mappa moved to Olden Barneveld, later Trenton, now Barneveld, and became the resident agent for the Holland Land Company, for more than 30 years until the time of his death. Here he built the stone mansion which still stands unharmed for the years and which in his day was often the gath¬ ering place of noted pioneer families of central New York.

MAPU, ma'po, Abraham, Hebrew novelist : b. Kovno, 1808; d. 1867. At an early age he became noted as a Talmudist. He studied Latin and

the classics of that language exerted a lasting influence on his literary endeavors. He was also well acquainted with French litera¬ ture and in 1848 was appointed professor in a Jewish school at Kovno. From this time dates his devotion to Hebrew literature. In 1852 appeared his novel (Ahabat Zeyon) (Love of Zion), the forerunner of the romance move¬ ment in 19th century Hebrew literature. It be¬ came very popular although orthodox rabbis assailed it as a profanation of the Leshon Quodesh or Holy Tongue. In 1865 Mapu pub¬ lished another historical novel, (The Trans¬ gression of Samaria.) In 1887 an English translation entitled (Amnon, Prince and Peas¬ ant was published by F. Jaffe. Other works of Mapu are (The Hypocrite) (1859-69) ; He¬ brew manual ; Hebrew grammar, and a Hebrew textbook for the study of French. Consult Slouschz, N., (The Renaiscence of Hebrew Lit¬ erature J (1909).

MAPURITO, ma-poo-re'to, one of the Mexican white-backed skunks. See Skunk.

MAQUI, ma'ke, an evergreen shrub of the family Elceocarpacecc, found in Chile, from the juice of whose acid fruit the Chileans make a wine given to persons ill with a fever. Its wood is employed in making musical instru¬ ments and its bark furnishes strings for them. It is the best-known species of the genus Aristotelia (A. maqui), and is cultivated as an ornamental shrub in Europe.

MAQUOKETA, ma-ko'ke-ta, Iowa, city, county-seat of Jackson County, on the Maquoketa River and on the Chicago, Milwaukee and Saint Paul and the Chicago and Northwestern railroad, about 42 miles north of Davenport. It is in an agricultural section ; valuable lime¬ stone quarries are in the vicinity and not far distant are forests which furnish excellent hard¬ wood timber. Its chief manufactures are flour, lime, woolen goods, brick, tile, foundry and machine-shop products and woodenware. It has an extensive trade in manufactured arti¬ cles, farm products and livestock. It has county buildings, several churches and schools and the Boardman Library Institute. There are two semi-weekly newspapers and good bank¬ ing facilities. The city owns and operates the waterworks. Pop. 4,776.

MARA, ma'ra, in old Runic, a goblin that seized on men asleep in their beds and took from them all speech and motion. In Russian it was called kxki-mora, or ghosts. In Hindu mythology Mara is the ruling spirit of evil; the tempter mentioned by Edwin Arnold in his (Light of Asia.* Mara is also frequently iden¬ tified with the incubus and with nightmare (qq.v.)

MARABOU, mar-a-boo', a large African pink-white pouched stork (Leptoptilus crumeni-fer), which resembles the adjutant (q.v.) of India in appearance and habits. It gives its name to the soft and drooping feathers (coverts) which cover the root of the tail and are prized for millinery and other ornamental purposes; a large part of the <(Marabou feathers" sold, however, a/*e derived from the Indian adjutant.

MARABOUTS, mar'a-boots, MARA-BOOTS, or MARABUTS, Mohammedan Arab hermits or devotees, leading a secluded religious life or occupying a religious station in northern Africa. They have great influence among the Berbers and distribute amulets, af¬ fect to work miracles and are thought by their followers to exercise the gift of prophecy. Throughout the Barbary States the tombs of the Marabouts are conspicuous objects, being generally built in the open country and re¬ garded by the people with much reverence. Some of them have degenerated into religious tramps.

MARACAIBO, ma-ra-ki'bd, Venezuela, capital of the state of Zulia, situated on the strait that connects Lake Maracaibo with the Gulf of Venezuela. It has a large and safe harbor, and maintains commercial relations with foreign markets, with the interior and with Colombia. The Red ((D» Line Steamship Com¬ pany, of New York, sends a vessel on regular trips' to Maracaibo and hundreds of small craft, suitable for shallow waters, carry on the trade of the coast and rivers tributary to the lake. This city is also the starting point for passen¬ ger and freight steamers and the railway lines of sections of the state of Los Andes. The most important buildings are the Executive Mansion, the public market, Legislative Palace, municipal building, Baralt Theatre, university, six churches and the new jail. There are five hotels, two clubs, 24 restaurants, *etc.* The pub¬ lic plazas contain statues of the patriot, Gen. Rafael Urdaneta, and Don Rafael Baralt, author of a history of Venezuela, who was born in Maracaibo and became a member of the Royal Spanish Acadamy. There is a dockyard for the construction of sailing-vessels and the city has electric lighting,

telegraph and telephone service, submarine cable, street railways, *etc.* Coffee, cocoa and hides are the chief exports, which have an average annual value of $2,300,- 000. Maracaibo, at first called Nueva Zamora, was founded in 1571 by Alonzo de Pacheco. Pop. about 50,000.

MARACAIBO, Gulf of. See Venezuela, Gulf of.

MARACAIBO, Lake of, Venezuela, in the northwestern part, connected with the Gulf of Venezuela by a strait about 50 miles long and from 8 to 15 miles wide. The lake lies between 9C and 11° S. lat. and 71° and 72° W. long., and is about 100 miles long from north to south and 80 miles across the widest part. At the mouth it is about 500 feet deep, but at its head it is shallow and the land near the shore is marshy. Large vessels cannot enter because of a bar at its mouth which leaves only from 8 to 13 feet of water. A number of rivers flow into the lake and keep it fresh, but when strong north winds prevail it be¬ comes brackish. The tides do not affect, the lake to any very great extent although it is a marine inlet. It was once much larger than at present, as the shore-marks indicate, but the basin has been filled in, leaving this one large lake and a number of smaller lakes which are connected by creeks. See Venezuela.

MARAJO, ma-ra-zho' (called also Joan¬ nes), Brazil, an island at or between the deltas that form the mouths of the Amazon and Para rivers; area, about 14,000 square miles, From

east to west the greatest dimension is 162 miles and 110 miles north and south. 1 he greater part is low ; in the centre are several lakes. In the north and west are swamp lands and in the east and south forests, the rubber tree predominating. The chief settlement is Saure on the eastern coast. There are not many residents, as in the rainy season nearly the whole island is flooded. Cattle raising and gathering rubber are the chief occupations.

MARAL, the red deer of Persia.

MARANHAM, ma-ran-yan, or MARANHAO, Brazil, a maritime state, just south of the Equator, bounded on the north by the At¬ lantic Ocean; area, 177,566 square miles. The surface is uneven, but there is no range of mountains. There are numerous rivers flow¬ ing into the Atlantic, large forests, extensive plains where cattle are reared; the climate is fine and the soil fertile. _ The Paranhyba . is the principal

river, being 700 miles long, with several large tributaries^ The Gurupy, the Mearim and the Itapicuru are each about 500 miles in length. Agriculture has only begun; the emancipation of the slaves, on whose labor the state had depended, was followed by a per¬ iod of great depression. Cotton, sugar and rubber are the principal products. Coffee, rice, corn, cacao and tropical fruits grow luxuriantly. The population is not great enough to properly develop the rich natural resources, there being only 2.8 persons to the square mile. Efforts are being made to colonize different sections, but the hot climate is not attractive. The present inhabitants are chiefly of Portuguese descent ; but there are about 20,000 Indians and a few hundred negroes and mulattoes. The capital is Maranham. Pop. about 683,645.

MARANHAM, or SAO LUIZ DE MARANHAO, san loo-ezh' do ma-ran-yan', Bra¬ zil, capital of the state of Maranham, on an island on the bay of Sao Marcos and between the mouths of the Itapicuru and Mearim rivers. The first settlements were made by the French in 1612. The ground is low and the climate warm but the place is healthful. The harbor, once good, is filling with sand, and little or nothing is done for its improvement. It has considerable trade, the imports and exports totaling $600,000 annually. The chief exports are cotton, sugar, hides, rubber, cottonseed and the skins of goats. Wool is woven and rugs and felt manufactured. The chief imports are machinery and clothing. The city has many fine buildings, public and private. Pop. including the suburbs, about 45,000.

MARANHAO. See Maranham.

MARASCHINO, mar-as-ke'no, or MAR-ASQUINO, a fine liqueur prepared from the sour cherry of southern Europe (Primus mahaleb). The best-known kinds come from Dal¬ matia and from Corsica. There are other brands that use the name.

MARASMUS, a vague term denoting gen¬ eral emaciation or atrophy with no special cause apparent ; now used in relation to the wasting of infants due to malnutrition combined with unhygienic surroundings. See Children, Dis¬ eases OF.

MARAT, Jean Paul, zhon pol ma-ra,

French revolutionist: b. Boudry, Nenchatel, Swit¬ zerland, 24 may 1744; d. Paris, 13 July 1793 He

studied medicine in Paris, traveled widely and practised in London and later in Paris. The first breath of the Revolution converted the in¬ dustrious doctor into an audacious fanatic and demagogue. He succeeded, by his violence and energy, in commanding attention. Danton in¬ stituted the club of the Cordeliers and collected around him all the fiercest spirits ; among the number, Marat, who became the editor of the Publiciste Parisien, better known under its later title L'Ami dn Peuple, again changed to the Journal de la Republique Frangaise. This sheet was the oracle of the mob. Denounced to the Constitutional Assembly and proceeded against by the municipal authorities of Paris, he contrived to escape to London and was later in hiding in Paris. During the existence of the Legislative Assembly he continued his outrages, figured among the actors of 10 August and in the assassination of September (1792). He was a member of the Committee of Public Safety to the convention and made the Minis¬ ters, General Dumouriez and the Girondists, the objects of his attack. Being charged in the convention with demanding in his journal 270,-000 heads, he openly boasted of that demand and declared that he should call for many more if those were not yielded to him. The estab¬ lishment of the revolutionary tribunal and of the committee for arresting the suspected was adopted on his motions. On the approach of 31 May, as president of the Jacobin Club, he signed an address instigating the people to an insurrection and to massacre all traitors. Even the Mountain party denounced this measure and Marat was delivered over to the revolu¬ tionary tribunal, which acquitted him ; the peo' ole received him in triumph, covered him with civic wreaths and conducted him to the hall of the convention. His bloody career was closed by assassination. (See Corday D' Ar¬ mans, Charlotte). His remains were placed in the Pantheon, whence they were later re¬ moved. Consult Chevremont, (Jean Paul Marat J (1881) ; Bat, (Jean Paul Marat, the People's Friend) (1901); Velay, C., (Correspondance de Marat) (Paris 1908).

MARATHI. See Mahrattas.

MARATHI LANGUAGE AND LITER¬ ATURE. Marathi is one of the principal ver¬ naculars spoken in India. It bears a close af¬ finity to Sindhi and Gujerati and is spoken by about 20,000,000 people. There are several dia¬ lects of it, named, respectively, Konkani and Dakhani.

The latter is the standard dialect and circulates in the Deccan, the former in the coast region of the Mahrattas and shows a large admixture of Dravidian, while in the district around Goa (a Portuguese possession) it also contains many Portuguese expressions and phrases. Besides, Marathi as a whole has a rather strong infusion of both Arabic and Per¬ sian words.' All the same, modern Marathi has departed less from the original Sanskrit than most other Prakrits, being a direct descendant from the Maharastri of the Middle Ages. A stock of its vocables are taken from Sanskrit itself, the so-called tatsamas. There are three genders in Marathi, the only one of the Pra¬ krits that has retained this feature of Sanskrit. Konkani literature was destroyed by the Por¬ tuguese inquisition.

Marathi literature is abundant. It took its

inception with Namdev in the 13th century, who wrote descriptive and didactic poems of a re¬ ligious cast. Tukaram, the most famous of Marathi writers (a.d. 1609), published writings showing Vishnuic convictions. Mayur Pandit in the 18th century also wrote many poems, epic, lyrical and descriptive. Marathi lends itself most readily to rhyme, and there are current among the Marathi people many rhymed prov¬ erbs, both pithy and fanciful. In prose not much of consequence has been produced, but of late, under English influences, much prose has been written by the Marathi in English, as well as in their own vernacular, but all of it is rather commonplace. The Marathis employ the Devanagari alphabet, the same as in Sanskrit.

Bibliography. — Godbole, W., Selections from the Marathi Poets) (Bombay. 5th ed., 1864) ; Joshi, B. Singh., Comprehensive Mara¬ thi Grammar) (Poona 1900) ; Maffei, A. F. Z., (Grammar) (Mangalore 1882) ; Manwaring, F., (Marathi Proverbs Collected and Transcribed* (Oxford 1899) ; Mitchell, J. Murray, Chief Marathi Poets) (London 1892) ; Molesworth, J. T., and Candy, (Marathi and English Dic¬ tionary) (2d ed., Bombay 1857) ; Ranade, M. G., (Rise of the Mahratta Power* (Bombay 1900).

Wolf von Schierbrand, Professor of German Language and Literature ;

Formerly Secretary to American Minister to

Teheran, Persia.

MARATHON, mar'a-thon, Greece, an an¬ cient village in Attica, about 20 miles northeast of Athens. It was situated on a plain which ex¬

tends for about six miles along the sea shore, with a breadth of from one and a half to t'hree miles. The site of the ancient village was not probably that of the present Marathona, but at a place now called Vrana, a little farther south. Through the centre of the plain runs a small brook. Here was fought the great battle be¬ tween the Athenians and Persians, 490 b.c. (See Miltiades). A tumulus or <(soros** on the plain marks the burial-place of the Athenians who died in battle. It was excavated by the Greek Archaeological Society in 1890-91, and yielded many interesting relics.

MARATTI, ma-rat'te, or MARATTA,

ma-rat'ta, Carlo, Italian painter and engraver: b. Camerino, 13 May 1625; d. Rome, 15 Dec. 1713. While a child he amused himself with painting all sorts of figures drawn by himself on the walls of his father's house. In his 11th year he went to Rome, studied the works of Raphael, of the Caracci and of Guido Reni in the school of Sacchi, and formed himself on their manner. His Madonnas were particularly admired. Louis XIV employed him to paint his celebrated picture of Daphne. Clement IX, whose portrait he painted, appointed him over¬ seer of the Vatican Gallery. We are much in¬ debted to him for the preservation of the works of Raphael in the Vatican and of the Caracci in the Farnese Palace. He also erected monu¬ ments to those masters in the church Della Rotonda. As an artist Maratti deserves the title given him by Richardson, of the <(Last Painter of the Roman School.**

MARATTIALES. See Ferns and Fern-allies.

MARAVEDx, mar-a-va'di, the lowest de¬ nomination of old Spanish copper coins in use

from 1474 to 1848, varying in value from one-seventh to one-third of a cent. There were also, at an earlier period, maravedis of gold weighing 60 grains.

MARBEAU, Jean Baptiste Firmin, zhon ba-test fer-man mar-bo, French philanthropist, founder of the day nursery: b. Brives, 18 May 1798; d. Saint Cloud, 10 Oct. 187S. He prac¬ tised law in Paris, and in 1841, being deputed to inspect the charitable institutions of the first arrondissement of the city, planned the creche or day nursery for the care of children of work¬ ing mothers. The first creche was opened 14 Nov. 1844 at Chaillot ; a Societe des Creches was founded in 1846 ; and his -plan was described in his book. (Des Creches* (1845). Marbeau played a less prominent part in other charities and wrote on various problems of pauperism. Consult the (Life) by Roussel (1876).

MARBLE, mar'bl, Manton, American

journalist: b. Worcester, Mass., 16 Nov. 1834; d. Maidstone, England, 24 July 1917. He was educated at the Albany Academy and the Uni¬ versity of Rochester, being graduated from the latter in 1855. After spending seven years in the employ of Boston and New York news¬ papers he bought the New York World, on the staff of which he had been employed from 1858 to 1860. Marble was engaged in a controversy with President Lincoln concerning the publica¬ tion of certain dispatches in the World. The latter journal was temporarily suspended from publication. Marble was one of. the first to recognize and give publicity to the writings of Herbert Spencer. In 1885 President Cleve¬ land sent Marble to the British, French and German governments as special envoy to dis¬ cuss the subject of international bimetallism. On his return, after conferences with various European authorities, he advised the President that upon the cooperation of the United King¬ dom, for which neither Tory nor Liberal lead¬ ers were prepared, depended the German and French resumption of free bimetallic coinage, and advised that United States purchase of sil¬ ver should cease. Marble was one of the founders of the Manhattan Club and at one time the president of that organization. He be¬ longed also to many literary and scientific socie¬ ties, among them the Century Association, the Round Table, the Cobden Club and Metropoli¬ tan Club. He was the author ot (Letter to Abraham Lincoln, > (The Presidential Counts,* (A Secret Chapter of Political History) and a memoir of Alex. G. Mercer, which prefaced his (Notes of an Outlook on Life.*

MARBLE (from the Greek marmairein, to sparkle), a compact rock which, in its pure form, is composed entirely of carbonate of lime or limestone. In its best form it is a variety of calcite, the tiny crystal facets sparkling and flashing in the sun's rays ; hence its ancient name. It is seldom found in perfect purity, the tractable qualities of the limestone allowing the introduction of many foreign substances during

its formation. Thus there will be seen marble with streaks of various colors running through it, caused by the action of oxide of iron or other chemicals. Almost any limestone rock is commonly called marble, even certain varieties of granite, onyx, porphyry and rock largely composed of gneiss and mica-schist. True mar¬ ble is a metamorphic equivalent of limestone,

from which it has been produced by neat or pressure, or both.

Marble has been a favorite stone for form¬ ing into statuary and for decorative work in buildings and monuments, fro/m the very earliest ages. The Greeks, who were the first to. endow this lifeless stone with marvelous genius in their statuary and bas-reliefs, were blessed with an almost inexhaustible supply of the very finest and purest marble yet discovered, on the island of Paros, in the ˆUgean Sea. This marble, so celebrated as “Parian,® possesses a peculiar waxy attribute which gave the statues formed from it a beautiful polish. The (Venus de Med¬ ici } was made from this stone, which is almost perfectly white. The Parthenon was built of marble of Pentelicus, which was a little more finely grained. The marbles of Carrara, were even then known but not generally put in use till later years, being still among the finest mar¬ ble in the world, though having some gray streaks.

In many other parts of Continental Europe and in Great Britain are quarries of fairly pure marble. America has a large supply of this useful stone. Each year new occurrences of it are found in the Rocky Mountains, some of them pure white, others with variegated color¬ ings. Perhaps the finest example of these won¬ derful marbles of the Rockies is found in the new State capitol building of Colorado, at Den¬ ver. In the eastern part of the United States there are many quarries of marble which have been in use for many years. Vermont is prob¬ ably the seat of the largest quarries. Little of this marble is finely grained and white enough to answer for the sculptor’s use, but it is ad¬ mirably adapted for ornamental purposes in architecture and for monuments for the dead. American sculptors still generally use the mar¬ bles from Carrara, though the merits of the American product are becoming known. Ver¬ mont, although one of the smallest States in the Union, exports more stone for commercial purposes than any other State, except one, Pennsylvania standing first. The money value in 1903 of Vermont’s stone product was in ex¬ cess of $6,000,000, a large part of it being in marbles of various grades.

The quarrying of marble is now carried on extensively, the use of

machinery largely taking the place of the ancient hand methods. Fifty years ago the quarries of Rutland, Vt., siill the largest in the world, were operated by ox teams and hand work of the crudest form. To-day, these vast quarries have an extensive outfit of electric cranes and derricks, which move the blocks of marble in any desired direction, easily and quickly, one of these traveling cranes hav¬ ing a carrying capacity for 100,000 pounds. The stone is too easily broken to permit the use of blasting powders of any kind. This method is used in some of the Italian quarries, but causes great waste of material and is most unsatisfac¬ tory. In the Vermont quarries, a machine called a "channeler** has been found the best for eco¬ nomical work and has been exclusively adopted. It consists of a row of long chisels set in a strong, traveling framework This gang of chisels vibrate up and down, cutting a channel in any direction desired in the face of the mar¬ ble ledge. The channel can be made any rea¬ sonable depth, according to the size 'of block desired. When this channel, or groove, is suf-

ficiently long and deep, the machine is reversed and cross channels are cut and the bottom per¬ forated. Then wedges are carefully driven in behind the block of stone and it gently falls over, to be lifted by a crane to the railroad cars or to that part of the quarry devoted to fur¬ ther treatment of the output. As a rule, the stone is sent in its rough state to the purchaser, who dresses it himself. When the order is for monument work or some special design in archi¬ tecture, the marble is treated at or near the quarry. In thus further treating the product, a toothless saw, or gang of saws, is used. The block of stone is placed on a horse, or plat¬ form, and the saws set at work, the size of the cut being gauged by setting the saws close to¬ gether, or far apart, as needed. A stream of water in which is mixed sea sand or other sharp, hard sand, falls upon each saw. The friction of the iron blade, aided by the sand and water, quickly cuts-up the marble into any de¬ sired shape. Some marble cutters use saws of wire, but the best seem to be those made of strips of soft iron one-sixteenth of an inch thick and, when new, four inches wide. The marble wears down one of the saw blades very rapidly. When the blocks are thus sawn into the requisite shapes by the power gang-saws, they are then placed on tables and ground down to size, a small piece of marble being rotated over them by hand or power, water flowing over the surface being ground. With surpris¬ ing facility, the marble yields to this treatment. Polish, in the final stages, is given by rubbing with wood or other soft material, and finally cloth. Much hand work is, of course, neces¬ sary with the mallet and chisel and polisher, but all the rough, heavy work, which formerly made marble so costly and hard to obtain, is now done entirely by electric and steam power. One of the finishing rooms at the Rutland works, located at Proctor, Vt., is 1,000 feet long and contains scores of giant gang saws, cutting up the marble into various shapes. This one plant, the largest in the world, has an output of $3,000,000 annually and employs hundreds of men. Most of this output is of white marble, though brown, gray, green and other shades are found in profusion.

One ancient method of mining this delicate stone, still used entirely by the Mexicans in min¬ ing onyx, is to drill holes in a line, insert plugs

of some porous wood, pour in water and allow the wood to swell. This gently forces the precious stone free, without the least injury.

One quality of marble, not usually recalled, is its ability to withstand great heat safely. In the devastating fire in 1903 at Paterson, N. J., buildings built of granite crumbled and perished. Those of marble still stand, almost as good as ever. Its use is, therefore, becoming more and more general in erecting fireproof buildings in the large cities, the floors and often the entire inside wall and ceiling being overlaid with it. t

Some really fine examples of craftsmanship in this line are found in the public buildings of New York City and elsewhere in America, not¬ ably the new buildings of the Hall of Records and the Appellate Division of the Supreme Court, in New York. In the making of monu¬ ments for the dead, marble is most extensively used. The floors of bathrooms, tops of toilet tables, basins for washing hands and clothes, tiling of various sorts — all these and a thou¬

sand other household purposes find in marble their chief exponent. Probably more than $25,000,000 worth of finished marble products are used in the United States annually, made from domestic quarries entirely. See also Rocks.

MARBLE FAUN, The. The <Marble Faun* was begun by Nathaniel Hawthorne dur¬ ing his visit to Italy in 1858 and was published in 1860. In England it was issued as the transformation. } The scene is laid in Rome, but two of the four chief characters are Amer¬ icans. The most interesting person in the story, however, is Donatello, a young Italian of noble birth who bears a strong resemblance to the statue of a faun by Praxiteles, and who, ac¬ cording to a tradition in his family, numbered a faun among his early progenitors. There are two women characters, of different types. Miriam is of a rich, full-blooded nature, and her past is bound up with some terrible mys¬ tery. Hilda, who is said to have been drawn with the writer's daughter in mind, was evi¬ dently intended as an example of the pure and self-contained New England maiden, but she has been aptly characterized by one critic as an ((admirable little icicle.® The romance is a study of the effects of a great guilt on these persons, and especially on Donatello, in whom it brings about the change referred to in the English title of the book. Hawthorne here seems< to be considering the great question of the mission of sin in the world, but in the end the explanation which he allows one of the characters to suggest he

makes Hilda reject with horror. The romance has serious techni¬ cal defects. It contains an excess of traveler's descriptions, which, however excellent in them¬ selves, have little to do with the story ; and it fails to satisfy the curiosity which the author persistently arouses regarding Miriam's past. Dissatisfaction with the ending was so great that in a later edition the author added a chap¬ ter of explanation, which, however, he justly regarded as no improvement. The chief merits of the book lie in the conception of Donatello, in the elusive symbolism and suggestiveness which characterize all Hawthorne's best work, and in several impressive scenes. Some of these, like the meeting with the model in the cata¬ combs and the visit to the church of the Capu¬ chins where the murdered monk lies, have a more dramatic quality than is usual with Haw¬ thorne.

William B. Cairns.

MARBLED GODWIT. See Godwits.

MARBLED TIGER-CAT. See Tiger-cat.

MARBLEHEAD, mar'bl-hed, Mass., town, in Essex County, on Massachusetts Bay and on the Boston and Maine Railroad, 18 miles north¬ east of Boston. The town is on a peninsula which has Massachusetts Bay on the east and south and Salem harbor on the north, and in¬ cludes the villages of Marblehead, the <(Neck,® Clifton and Devereaux. It was settled bv im¬ migrants from Guernsey and Jersey in 1629, and was a part of Salem until 1649. Its good har¬ bor gave it advantages for fishing and for coast trade that made it for a time the second settle¬ ment in importance in the colony, Salem being the first. The leading industry is shoemaking,

and seed-growing is carried on, but the town is famous as a yachting resort, for its boat-build¬ ing and the excellent fishing grounds. Whit¬ tier immortalized the place in one of his poems. Judge Story and Elbridge Gerry were born here. It is a port of entry. The old form of town meeting government prevails. There are excellent municipal

waterworks, banks and a newspaper. There are still, in a good state of preservation, a number of pre-Revolutionary buildings. The town has three well-kept parks, and Abbott Hall, which contains the town li¬ brary, art gallery and records. Consult Agge,

(Sketches of Marblehead) ; Roads, (The His¬ tory and Traditions of Marblehead. } Pop. about 7,500.

MARBLES AND MARBLE PLAYING.

Marbles are small balls of baked clay, marble, agate or spheres of glass, used as toys and play¬ things for children. They are manufactured in large quantities in Saxony for exportation to the United States and to India and China. They were also largely manufactured in the agate mills at Oberstein on the Nahe, in Germany, for the American market. The material used in Saxony is a hard calcareous stone, which is first broken up into square blocks with a ham¬ mer. These are then thrown 100 to 150 to¬ gether into a mill, ‘which is a stationary flat slab of stone, with a number of concentric fur¬ rows upon its face. Over this a block of oak of the same diameter, partially resting upon the small stones, is kept rotating, while water flows upon the stone slab. In 15 minutes the marbles are worn completely round and are fit for sale. An establishment with three mills will manufacture 60,000 marbles in a week. Agates are made into marbles at Oberstein by first chipping the pieces nearly round with a hammer and then wearing them down upon the face of large grindstones.

The game of marbles is variously played; usually with a circular ring marked on the ground, the player taking one marble between the thumb and forefinger and dexterously shoot¬ ing at other marbles within the circle, striking them with sufficient force to throw them outside the limits of the ring. This form is called ring-taw, and the marbles placed in the ring are apt to be clay ones, called ˆcommys,® which-is prob¬ ably short for Commons.® A larger and better grade of marble is used for the “shooter.® When a player misses a shot, it is then the turn of his opponent. Sometimes he also loses his turn when he drives his shooter outside of the ring. Play is often for “keeps,® each boy win¬ ning what he knocks out. Another game of marbles is called ((nine holes,® though it may be played with a less number of holes. A row of small cup-shaped depressions are made in the ground, and the object is to toss or bowl one’s marble into each hole in succession, the one accomplishing it with the fewest plays winning. Very likely golf had its fundamental idea in this simple game of marbles. In a variant form the boys shoot at other marbles to knock

them into the holes, but their own shooter must not fol¬ low, under forfeit, suggesting the basic princi¬ ple of the game of pool. (<Hit and span® is an¬ other game much played. One player tosses his marble to a distance, and the other player tosses his marble as close to it as he can ; if he hits it, it is keeps; if he comes within a handsbreadth or span he makes a hit and scores one. Then

they reverse, and his opponent tries, the one making the most hits or points winning. This game can be played in walking along a country road, and appears to have been invented by boys who wanted to play on their way to school. In some games of marbles it is fair to toss or bowl the shooter ; and in others the player must touch the large knuckle of his forefinger to the ground when shooting, and this the boys call, “knuckling down fairly.® These games are sub¬ ject to infinite change, according to the whim of the boys of a locality who play them. They make their own rules and pass them along to the smaller boys as they grow up. Girls sel¬ dom play marbles and adults are not supposed to play at all. Marbles can be played indoors in bad weather, one way being for the players to sit on a carpet, with their legs apart, so as to stop the rolling marbles ; one places a mar¬ ble between his feet and the other player shoots at it.

MARBLING, in bookbinding, the process of coloring paper or the edges of books, in imi¬ tation of the veining of variegated marble. In the case of a book, after the volume is formed, but before the cover is put on, the book leaves are trimmed and tied between two boards and taken to a trough or vessel, perhaps two inches deep, which is filled with clean gum water. Va¬ rious colored pigments, ground in spirits of wine and mixed with a small quantity of ox¬ gall, are thrown upon the surface of the gum water, and disposed in various forms with a quill and comb, forming a variegated, marble¬ like pattern. When satisfied with the coloring mixture, the workman dips the edges of the book into the trough, and the colors adhere. Cold water is then dashed over the edges, to set the colors and bring them out clearly. Some¬ times single leaves are marbled and placed just within the book cover, front and back, for orna¬ mentation. Marbling was formerlv quite com¬ mon, but is now seldom used, solid colors, as red edges, being preferred, or gold edges. The deckle-edged book cannot be marbled, owing to its rough edges. See Bookbinding.

MARBURG, mar’boorg, Austria, a town in Styria, 38 miles south of Gratz, on the left bank of the Drave and on the Southern Rail¬ ways, whose repair shops are a leading indus¬ try. Quantities of lumber,

grain, wine and poultry are shipped. There are also shoe fac¬ tories, cement works, flour mills and machine shops. Pop. about 23,000.

MARBURG, Prussia, a town of Hesse-Nassau, on the slopes of an acclivity above the Lahn, 46 miles north of Frankfort. It dates from the 12th century. The principal buildings are the castles of the landgraves of Hesse, now partly used as a prison ; the 13th century church of Saint Elizabeth ; the town house and the celebrated Marburg University, founded in 1527, and having, in 1914, 118 professors and 2,049 students, and a library of 275,000 volumes. Here Luther and Zwingli debated on transubstantiation in 1529. It became a part of a Prussian province in 1866. The town has manu¬ factures of machinery, leather, carpets, tobacco, pottery and toys. Pop. about 22,000.

MARBURY v. MADISON, a well-known decision in law handed down in 1803 by the United States Supreme Court. It is important as affording tlhe earliest instance of the decla-

ration by the court that a Congressional statute is null and void by reason of its repugnance to the Constitution of the United States. Marbury was appointed justice of the peace in the District of Columbia by President Adams, but the commission, though drawn up, signed and sealed, had never been delivered. Madison, when he became Secretary of State, refused to deliver it. An act of Congress empowered the United States Supreme Court to issue to execu¬ tive officers a writ of mandamus to force them to attend to their duties, and on the basis of this act Marbury brought suit. Now the Con¬ stitution nowhere mentions the right to issue a writ of mandamus among the cases of origi¬ nal jurisdiction by the Supreme Court. Chief Justice Marshall therefore decided against Mar¬ bury, and his argument, admittedly the only accurate one, established an important precedent which is found only in the courts of the United States.

MARCABRUN, mar'ka-bren, a French troubadour: b. in Gascony, about 1140; d. toward the end of the 12th century. He was a special

favorite at the court of Alfonso VIII of Castile, where he seems to have been the chief of the royal troubadours. He was an extensive writer of love songs of which quite a number have survived to the present and have been printed.

MARCA.SITE, in mineralogy, an iron di¬ sulphide (FeS2), differing from pyrites in that it crystallizes in the orthorhombic system. It was formerly known as white pyrites, cellular pyrites, cockscomb pyrites, hepatic pyrites or leberkies, *etc.* It is usually a pale yellow, being thus lighter than true pyrites, but it has gray to brown-black streaks. When arsenic is present it is known as kyrosite. It is often found in clays, but is far less common than iron pyrites.

MARCEL, Etienne, a-te-en mar-sel, French political leader: b. Paris, 31 July 1358. From December 1355 he was provost of the Paris merchants and actual ruler of the city. He put to death two officials of the Crown and finally persuaded the Dauphin Charles to act as regent while King John was held by the English. Not finding the Dauphin properly submissive, he obtained assistance from Charles the Bad of Navarre. He was killed during an uprising of the more wealthy and conservative citizens against his power. Consult Lazard, (Un Bourgeois de Paris au XIVth Siecle* (1890).

MARCELINE, mar'se-len', Mo., city, of Linn County, on the Atchison, Topeka and Santa Fe Railroad, 105 miles northeast of Kansas City. The neighboring region is rich in coal, oil and natural gas. The city has ex¬ tensive coal and oil interests, railroad repair shops and artificial stone works. The electric¬ lighting plant and water-supply system are the property of the municipality. Pop. 3,920.

MARCELLINUS, mar-se-li'nus, Saint: d. probably 25 Oct. 304. He was a pope who succeeded Caius in 296. The Donatists alleged that during the Diocletian persecution he sacri¬ ficed to idols. He was, however, vindicated by Augustine from this charge.

MARCELLUS, mar-sel'us, Marcus Clau¬ dius, Roman general : b. before 268 b.c. ; d. near Venusia, 208 b.c. In 222 being consul with Scipio he twice defeated the Insubrians in northern Italy, and with his own hand killed

their king, thus winning the spolia opium. After the disaster of CamicE in the Second Punic War (216), Marcellus took command, gained several slight victories over the Carthaginians and hence was named

(fthe sword of Rome,® Fabius Cunctator being called ((the shield of Rome.® His third consulship (214) was spent in Sicily, where he attacked Syracuse, and after a two years' siege prolonged by the skill of Archi¬ medes captured the city. In his fifth consulate after two years of varying success against Hannibal in Italy he was killed in a skirmish near Venusia.

MARCELLUS I, Saint, Pope: d. 310. He succeeded Marcellinus and did not take office until 308. The Emperor Maxentius banished him from Rome for excommunicating an apos¬ tate and according to some authorities forced him to serve as a slave on the public highway. He suffered martyrdom under Maxentius.

MARCELLUS II (Marcello Cervini, mar-chel'lo cher-ve'ne), Pope: b. in Tuscany, 6 May 1501; d. Rome, 6 May 1555. He was cardinal legate at Trent of Julius III, whom he suc¬ ceeded in the pontifical chair. Although orig¬ inally opposed to polyphonic music, he at once withdrew his opposition to it after listening to Palestrina's famous (Missa Papse MarcelliP His pontificate lasted only 22 days.

MARCELLUS STAGE, in geology, a term introduced by the New York State Geological Survey for the thin rock, mostly shale, which is the lowest group of the Upper Devonian Sys¬ tem, and which is most typically seen in New York State at the little village of Marcellus, whence the stage is named.

MARCH, Alden, American surgeon : b. Sut¬ ton, Mass., 1795; d. 1869. He was educated at Boston and at Brown University, receiving the degree of M.D. from the latter in 1820. From 1825 to 1831 he was a professor in the Vermont Academy of Medicine, from 1831 to 1833 at the Albany Medical Seminary, and in 1833-34 at the Albany Medical School. In the latter year he founded a school of practical anatomy in Albany and in 1839 founded the Albany Medical Col¬ lege, in which he was professor of surgery from the foundation until his death in 1869. Dr. March also founded the Albany City Hospital; was president of the New York State Medical Society in 1857 and founded the American Med¬ ical Association. Dr. March invented several surgical appliances and improved others. He published (Wounds of the Abdomen and Larynx* (1854), and numerous papers in med¬ ical journals.

MARCH, Francis Andrew, American phi¬ lologist : b. Millbury, Mass., 25 Oct. 1825 ; d. 1911. He was graduated from Amherst in 1845, studied law in New York in 1849-50, was admitted to the bar in 1850, in 1856 became ad¬ junct professor of belles-lettres and English

literature in Lafayette College (Easton, Pa.), and in 1857 professor there of the English lan¬ guage and comparative philology. In 1873-74 and 1895-96 he was president of the American Philological Association, in 1876-1903 of the Spelling Reform Association and in 1891-93 of the Modern Language Association. He was among the earliest advocates of a historical study of the English language and of a philo¬ logical study of the classic works of that lan-

guage. His contributions to the transactions and proceedings of the American Philological Association and other learned societies have been very extensive. He was a consulting editor of the Standard Dictionary,* and de¬ cided many spellings and forms for that work. He also edited the Douglass series of Christian Greek and Latin classics (1874-76), was di¬ rector of the American readers for the great historical Dictionary of English * of the Lon¬ don Philological Society, and published (A Method of Philological Study of the English Language > (1865) ; (Parser and Analyzer for Beginners) (1869); an (Anglo-Saxon Gram¬

mar J (1870) ; an (Anglo-Saxon Reader* (1870), and an (Introduction to Anglo-Saxon) (1871). Consult (Publications* (Modern Language Association of America, Vol. XXIX, 1914).

MARCH, Peyton Conway, American sol¬ dier: b. Easton, Pa., about 1862. He is a son of Francis A. March, the philologist. Graduat¬ ing from Lafayette College in 1884, he deter¬ mined upon a military career, and graduated from the military academy in 1888. The same year he entered the army as a lieutenant of ar¬ tillery. Later he graduated from the Fort Monroe Artillery School. When the Spanish War broke out he volunteered, and commanded the Astor Battery in 1898; the following year he was major of the 33d Volunteer Infantry. He served in Luzon, in the Philippine campaign, and received several promotions for gallantry. He obtained the surrender of General Venancio, Aguinaldo's chief of staff. For a time after the close of active hostilities he was a military and later a civil governor in Hocus. In 1911 he was commissary-general in the Philippines ; in 1916 he was a

lieutenant-colonel of field artillery ; the next year he was made a brigadier-general, and 5 Aug. 1917 he was raised to the rank of major-general. In 1918, the active chief of staff of the United States army.

MARCH, marh, Austria-Hungary, the principal river of Moravia, rising on the Sile¬ sian boundary, and flowing 214 miles southward to the Danube, which it joins six miles above Presburg. It is navigable for small boats from Goding, 50 miles from its mouth. In its lower course it forms the boundary between Austria and Hungary. Its chief affluent is the Thaya. .

MARCH, in Europe, a frontier or bound¬ ary of a territory; especially applied to the boundaries or confines of political divisions ; as, for example, the frontiers between England and Scotland, and England and Wales. Geneva is situated in the Marches of France, Savoy and Switzerland. See Marches, The.

MARCH (Latin Martins), (1) the third month of the year, originally the first of the Roman year; so named in honor of the Roman deity Mars. Prior to 1752 the 25th of March was the first day of the legal year; hence, in all records, January, February and the first 24 days of March have frequently two years ap¬ pended, as January 1, 170ˆ2 or 1701-2. (See Calendar). Until late in the 19th century, the custom of leasing dwellings from the 25th of March persisted in some localities. (2) A movement by regular steps in the manner of soldiers; also a journey performed by a body of soldiers either on foot or on horseback. Soldiers on a march are subject to certain rules very necessary to keep them in good order, and

fit to meet the enemy. The march in the first sense of regular step differs on different occa¬ sions. In the parade-march from 75 to 95 steps, each of about 30 inches, differing in different armies, are made in a minute ; in the quick-march from 108 to 115 steps; and in the double quick 150 running paces. This last cannot be sustained for any length of time, and is only used in a charge, or in storming a commanding position, and in a few internal movements of regiments. (3) A musical composition, chiefly for military bands, with wind instruments, pri¬ marily intended to accompany the marching of troops. There are slow and quick marches, and marches peculiar to different countries. Marches are also introduced into oratorios, the best-known examples being the (Dead March* from the oratorio of (Saul* and Mendelssohn’s (Wedding March.) See Music.

MARCH FLIES, small, hairy, scavenging flies of the family Bibionidce , seen numerously in early spring, often before the snow has dis¬ appeared. The species are over 300, and some appear in vast swarms. The maggots hatch in refuse or manure upon the ground, and are be¬ lieved to feed upon grass-roots.

MARCH TO THE SEA. There were two plans for a march to the sea by Sherman's army, the first General Grant's, the second General Sherman's, modifying the first. A campaign to the sea to divide the Confederacy was decided upon by General Grant in January 1864, when he was in coihmand of the Military Division of the Mississippi, with headquarters at Nash¬ ville. His objectives on the coast were first Mobile, second, Savannah, Atlanta being the in¬ termediate objective for both. Sherman's army was then in the vicinity of Chattanooga, Tenn., and Ringgold, Ga.

In a letter to General Halleck, dated at Nashville, 15 Jan. 1864, General Grant wrote: <(I look upon the next line for me to secure, to be that from Chattanooga to Mobile, Montgom¬ ery and Atlanta being the important interme¬ diate points.® This he repeated on 19 January to General Thomas, then in command of the Army of the Cumberland at Chattanooga, and this officer immediately began to gather infor¬ mation, which General Grant desired, of the number of troops necessary to guard the roads and bridges from Nashville to Atlanta. These preparations were entrusted to General Thomas, as General Sherman was engaged with his Meridian campaign. In this connection, Gen¬ eral Thomas expressed his confidence in being able with the Fourteenth and Fourth corps in advance, covered with a strong division of cav¬ alry, and the Eleventh corps in reserve, to over¬ come all opposition as far as Atlanta.

When Grant was made lieutenant-general and ordered east to command all the armies, he called Sherman to Nashville, and they traveled together as far as Cincinnati. General Sher¬ man was then made acquainted with the plans already set forth. As part of these plans, be¬ fore leaving Nashville General Grant ordered Banks to concentrate at least 25,000 men to move against Mobile in the spring in co-oper¬ ation with General Sherman.

In addition to letters to each of the com¬ manders interested — Halleck, Sherman, Thomas and Banks — General Grant, 26 March 1864, sent all army commanders a map upon

which was indicated by red lines the territory occupied by the Union forces at the beginning of the war, and at the opening of the campaign of 1864. The territory which it was proposed to occupy by the campaigns about to begin was indicated by the blue lines. This map reached General Sherman 4 April, and its receipt was acknowledged by him. This map is reproduced in the Atlas of the (Official Records) of the war, being plate 135 A of that publication. For Sherman's proposed campaign the blue lines ex¬ tend from Chattanooga to Atlanta, and from this latter point both to Mobile and Savannah.

General Sherman, in acknowledging the map, said : (tThat map to me contains more information and ideas than a volume of printed matter. Keep your retained copies with infinite care, and if you have occasion to send out to other commanders any more I would advise a special courier. From that map I see all, and glad am I that there are minds now at Wash¬ ington able to devise ; and for my part, if we can keep our counsels, I believe I have the men and ability to march square up to the position assigned me, and to hold it.®

As the result of the campaign for Atlanta General Slocum occupied that city 2 September. Meantime Farragut had taken possession of Mobile Bay 5 August. On 10 September Grant telegraphed Sherman from City Point as fol¬ lows : <(As soon as your men are properly rested, and preparations can be made, it is de¬ sirable that another campaign should be com¬ menced. We want to keep the enemy continu¬ ally pressed to the end of the war. If we give him no peace while the war lasts, the end can not be far distant. Now that we have all of Mobile Bay that is valuable, I do not know, but it will be the best move for Major-General Canby's troops to act upon Savannah, while you move on Augusta. I should like to hear from you, however, on this matter.®

To this Sherman telegraphed in reply: <(If you can manage to take the Savannah River as high as Augusta, or the Chattahoochee as far up as Columbus, I can sweep the whole State of Georgia, otherwise I would risk our whole army by going too far from Atlanta.®

In a letter from Atlanta, dated 20 Septem¬ ber, Sherman gave Grant the conditions under which he could successfully co-operate in a movement on Savannah : <(If you will secure Wilmington and the city of Savannah from your centre, and let General Canby have com¬ mand over the Mississippi River and the coun¬ try west of it, I will send a force to the Ala¬ bama and Appalachicola, provided you give me 100,000 of the drafted men to fill up my old regiments ; and if you will fix a day to be in Savannah I will insure our possession of Macon and a point on the river below Augusta.®

General Grant thereupon conferred by letter with General Halleck in regard to establishing a base on the coast for General Sherman and providing supplies, giving his own opinion that Savannah could be captured by troops from the East assisted by those in the Department of the South, and that the line of Augusta and Savannah would be a better one than Mont¬ gomery, Selma and Mobile. Grant further said in this letter 4 October : <(Whichever way Sher¬ man moves he will undoubtedly encounter Hood's army, and in crossing to the sea-coast

will sever the connection between Lee's army and his section of the country.®

General Sherman fixes the day after his letter of 20 September as the dale when his plan of a march to the sea came first into his mind. It differed from Grant's plan based upon first disposing of Hood's army, in that it in¬ volved leaving Hood in his rear, to be taken care of by Thomas, and marching through to Savannah with no enemy in his front. Upon this plan a discussion arose with Grant, who for some time held to the necessity of first deal¬ ing with Hood. This discussion between Grant and Sherman lasted for several weeks. While it was in progress Hood became active. On 20 September Forrest's cavalry began vigorous operations about Athens and Decatur, Ala., and Pulaski, Tenn. Sherman at once sent troops to Chattanooga and 28 September General Thomas was ordered to proceed to Nashville to or¬ ganize a force to meet a possible northward move of Hood. The first attempt of the latter was to break Sherman's communications by heavy movements upon his railroad. These met with only temporary success, as Sherman promptly pursued. The fighting at Allatoona 5 October was the most prominent affair. Hood then moved to the westward, and occupied Gadsden, Ala. Sherman again followed as far as Gaylesville. Sherman, 10 October, again pro¬ posed to Grant to leave Hood and march to the sea. Grant replied the same day. ((If you are satisfied the trip to the sea-coast can be made, holding the line of

the Tennessee firmly, you may make it, destroying all the railroads south of Dalton or Chattanooga as you think best.® This condition of firmly holding the line of the Tennessee held Sherman for a time. Although this conditional permission had been given by Grant, he telegraphed Sherman 1 Nov¬ ember : <(Do you not think it advisable, now that Hood has gone so far north, to entirely settle with him before starting on your pro¬ posed campaign? With Hood's army destroyed you can go where you please with impunity.® Sherman learned, 26 October, that Hood's army had appeared _ about Decatur. This clearly indicated an invasion of Tennessee. General Sherman then decided to strengthen General Thomas, leave him to take care of Hood, withdraw his own army to Atlanta and prepare for a march to the sea provided General Grant's consent could finally be obtained.- He sent the Fourth and the Twenty-third corps back to Thomas. Thus the discussion with Grant over the question of first destroying Hood continued until 1 November, when, in response to a later telegram on that day from Sherman, which represented that Hood's whole force was only from 37,000 to 40,000, while Thomas would have from 63,000 to 70,000, and that he himself had retained only 50,000 men for his proposed campaign to the coast, General Grant telegraphed, <(With the force, however, that you have left with General Thomas, he must be able to take care of Hood and destroy him. I really do not see that you can withdraw from where you are, without giv¬ ing up all that we have gained in territory. I say then go on as you propose.®

Having obtained this permission Sherman pushed his preparations with the greatest en¬ ergy. The entire population of Atlanta had

already been deported; the various divisions of the army designed for the march were ordered to concentrate at Atlanta; all mills and factories at Rome were burned ; the surplus stores, the sick, convalescent, and many thousands whose terms of service were about to expire were rushed to Chattanooga; the garrisons south of that place were withdrawn, and the railroad destroyed. Every command was carefully in¬ spected, and soldiers found in any degree physi¬ cally unsound were dispatched to Nashville. Care was taken that everv man's accoutrements were complete. In the same way the horses, mules and trains were inspected. Wilson[s cavalry was dismounted to make Kilpatrick's di¬ vision perfect, and the remnants sent with Wil¬ son to Nashville.

The march to the sea began on the morning of 15 November. As General Sherman wrote: ((It surely was a strange event — two armies marching in opposite directions, each in the full belief that it was achieving a final and con¬ clusive result in a great war; — ® Hood's army, which had required the active work of three armies from May until September to push it back to Atlanta, had crossed the Tennessee at Decatur, strengthened by Forrest's cavalry and aiming for Nashville and the Ohio River. The situation at Nashville was thus described by Sherman: ((General Thomas was at Nashville, with Wilson's dismounted cavalry' and a mass of new troops and quartermaster's employees amply sufficient to defend the place. The Fourth and Twenty-third corps, under Gen¬ erals Stanley and Schofield, were posted at Pulaski, Tennessee, and the cavalry of Hatch, Croxton and Capron, were about Florence, watching Hood. Smith's (A.J.) two divisions of the Sixteenth corps were still in Missouri, but were reported as ready to embark at Lex¬ ington for the Cumberland River and Nash¬ ville. Of course, General Thomas saw that on him would likely fall the real blow, and was naturally anxious.®

Sherman started with 62,204 officers and men. Of his army he wrote : ((The most extraordinary efforts had been made to purge this army of non-combatants and of sick men, for we knew well that there was to be no place of safety save with the army itself ; our wagons were loaded with ammunition, provisions and forage, and we could ill afford to haul even sick men in the ambulances, so that all on this ex¬ hibit may be assumed to have been able-bodied, experienced soldiers, well armed, well equipped and provided, as far as human foresight

could, with all the essentials of life, strength and vigorous action.®

The artillery, wagon and ambulance trains were perfect. Each gun, caisson and forge was drawn by eight horses. There were 2,500 wagons with six mules to each, and the am¬ bulances each had two horses. Each soldier carried 40 rounds, and in the ammunition wagons were 200 rounds for men and artillery.

The right wing, Gen. O. O. Howard, was composed of the Fifteenth and Seventeenth corps ; the left wing, Gen. H. ‘ W. Slocum, of the Fourteenth and the Twentieth.

The war had not produced a more thor¬ oughly organized and equipped army, or one in which more men had passed a thorough physical inspection. As it started for the sea, General

Sherman in his (Memoirˆ thus describes the feelings of the men, and his own : (<T here was a devil-may-care feeling pervading officers and men, that made me feel the full load of respon¬ sibility, for success would be accepted as a matter of course, whereas, should we fail, this <march) would be adjudged the wild adventure of a crazy fool.® This question was to be de¬ cided at Nashville, as General Sherman wrote the day after he entered Savannah: ((Thomas’ complete success is necessary to vindicate my plans for this campaign —® The march to the sea cannot, therefore, be fully understood with¬ out considering the Nashville campaign as one of its essential parts. See Nashville, Cam¬ paign and Battle of.

Sherman’s army was composed of 55,329 in¬ fantry, 5,063 cavalry, and 1,812 artillery. There were two corps, 13 infantry divisions, one cav¬ alry division, 36 brigades of infantry, two of cavalry and 16 batteries. There was no Con¬ federate army between Atlanta and Savannah. Wheeler’s cavalry was active on the flanks guarded by Kilpatrick’s cavalry, and a consid¬ erable force of militia was encountered at Griswoldville.

The order for this historic march clearly presents its organization, its order of daily movement, its methods of living upon the coun¬ try, the restrictions placed on its dealings with citizens, in short, the whole military machinery of the campaign. It, therefore, deserves a place in every history of the March to the Sea, General Sherman himself holding that no ac¬ count of that event could be perfect without it. It was as follows :

(Special Field Orders, No. 120).

Headquarters Military Division of the Mississippi. In the

Field, Kingston, Georgia, November 9, 1864.

1. For the purpose of military operations, this army is divided into two wings, viz.:

The right wing, Major-General O. O. Howard command¬ ing, composed of the Fifteenth and Seventeenth corps; the left wing, Major-General H. W. Slocum commanding, com¬ posed of the Fourteenth and Twentieth corps.

2. The habitual order of march will be, wherever practi¬ cable, by four roads, as nearly parallel as possible, and converging at points hereafter to be indicated in orders. The cavalry, Brigadier-General Kilpatrick commanding, will receive special orders from the commander-in-chief.

3. There will be no general train of supplies, but each corps will have its ammunition-train and provision-train, distributed habitually as follows: Behind each regiment should follow one wagon and one ambulance; behind each brigade should follow a due proportion of ammunition-wagons, provision-wagons, and ambulances. In case of danger, each corps commander should change this order of march, by having his advance and rear brigades unencumbered by wheels. The separate columns will start habitually at 7 A. M., and make about fifteen miles per day, unless other¬ wise fixed in orders.

4. The army will forage liberally on the country during the march. To this end, each brigade commander will organize a good and sufficient foraging party, under the command of one or more discreet officers, who will gather, near the route traveled, corn or forage of any kind, meat of any kind, vegetables, corn-meal, or whatever is needed by the command, aiming at all times to keep in the wagons at least ten days' provisions for his command, and three days' forage. Soldiers must not enter the dwellings of the inhabi¬ tants, or commit any trespass; but, during a halt or camp, they may be permitted to gather turnips, potatoes, and other vegetables, and to drive in stock in sight of their camp. To regular foraging-parties must be entrusted the gathering of provisions and forage, at any distance from the road traveled.

5. To corps commanders alone is entrusted the power to destroy mills, houses, cotton-gins, etc.; and for them this general principle is laid down : In districts and neighborhoods where the army is unmolested,

no destruction of such property should be permitted; but should guerillas or bushwhackers molest our march, or should the inhabitants burn bridges, obstruct roads, or otherwise manifest local hostility, then army commanders should order and enforce a devastation more or less relentless, according to the measure of such hostility.

6. As for horses, mules, wagons, etc., belonging to the inhabitants, the cavalry and artillery may appropriate freely and without limit; discriminating, however, between the rich, who are usually hostile, and the poor and industrious, usually neutral or friendly. Foraging parties may also take mules or horses, to replace the jaded animals of their trains, or to serve as pack-mules for the regiments or brigades. In all foraging of whatever kind, the parties engaged will refrain from abusive or threatening language, and may, where the officer in command thinks proper, give written certificates of the facts, but no receipts; and they will endeavor to leave with each family a reasonable portion for their maintenance.

7. Negroes who are able-bodied and can be of service to the several columns may be taken along; but each army commander will bear in mind that the question of supplies is a very important one, and that his first duty is to see to those who bear arms.

8. The organization, at once, of a good pioneer battalion for each army corps, composed if possible of negroes, should be attended to. This battalion should follow the advance-guard, repair roads and double them if possible, so that the columns will not be delayed after reaching bad places. Also, army commanders should practise the habit of giving the artillery and wagons the road, marching their troops on one side, and instruct their troops to assist wagons at steep hills or bad crossings of streams.

IfgN 9. Captain O. M. Poe, chief-engineer, will assign to each wing of the army a pontoon-train, fully equipped and organ¬ ized; and the commanders thereof will see to their being properly protected at all times.

By order of Major-General W. T. Sherman,

L. M. Dayton, Aide-de-Camp.

Leaving Atlanta in ruins, 15 November, the left wing, which General Sherman accompanied, marched by Decatur, Stone Mountain and

Cov¬ ington. At this point it turned toward Milledge-ville, the capital of Georgia, which was the first objective. It was reached on the 22d. Meantime the right wing had marched by Jones¬ boro, McDonough and Monticello, and was in communication with Sherman at Gordon. Kil¬ patrick's cavalry, which was operating on the right of the advance, kept in contact with Wheeler's cavalry, and reached the defenses of Macon, thence retiring to Griswoldville, where Walcutt's brigade of Wood's division was halted as a rear-guard. Gen. G. W. Smith attacked Walcutt, but was repulsed (see Griswoldville, Battle of). Governor Brown, the State offi¬ cers and members of the legislature left the capital on Sherman's approach. The arsenal and various public buildings were destroyed.

The march was resumed 24 November, with Millen as the next objective. The two wings followed the general line of the railroad. Mil¬ len was reached 3 December. From Millen the army proceeded bv the four main roads for Savannah. The effort of the Confederate au¬ thorities to organize a force at Augusta to at¬ tack Sherman in flank failed, and the march to Savannah was only slightly disturbed by the persistent skirmishing of Wheeler's cavalry. McLaw's division of Hardee's force had ad¬ vanced to Ogeechee Church, but fell back to the city upon Sherman's approach. The several corps reached the defenses of Savannah 9 and 10 December, and occupied a line from the Ogeechee River on the right to the Savannah River on the left. Hardee occupied the city with something less than 10,000 'men. Sher¬ man's effective force numbered a little over 60,000. Hood held the Savannah River below Sherman's lines.

The march had cut a swath of many miles in width through the richest part of Georgia. The heads of the columns and the flanks swarmed with foraging parties, and a country which was daily scoured to supply food for a marching column of 60,000 soldiers was of necessity stripped of provisions, and of every¬ thing else that could contribute to the use or

comfort of an army. Railroads had been destroyed for long distances, and all factories and other buildings burned which could con¬ tribute to army purposes. There had been no fighting worth mentioning, Griswoldville ex¬ cepted, and that had only involved one Union brigade.

General Sherman had left Atlanta with 62,- 204 officers and men of all arms. He reached Savannah with 60,057. On the march 103 were

killed, 428 wounded, 278 missing and 1,338 cap¬ tured. Of those captured, a large proportion were foragers, better known in army vernacular as <(bummers.®

The night of 12 December a bridge had been completed over the Ogeechee, and the next morning Hazen's division crossed and marched at once to assault Fort McAllister (q.v.) and open the way to the sea. An hour before sun¬ set the assault was delivered and the fort taken.

This success gave Sherman communication with the fleet which was awaiting him with supplies, and mails for the army.

General Slocum, upon establishing his flank on the Savannah River, had captured two steamboats and sent a force to Hutchinson and Argyle islands just above the city, and sought permission to transfer a corps to the left bank of the river to close Hardee's only line of es¬ cape, General Slocum having already sent a brigade under Col. E. A. Carman to the South Carolina shore. General Sherman did not deem this prudent, and as a result Hardee later with¬ drew his entire force intact and without moles¬ tation.

On 17 December General Sherman sent in a flag of truce demanding Hardee's surrender on the ground that he (Sherman) had received guns that could <(cast heavy and destructive shot as far as the heart of the city® ; that he controlled all avenues by which the city could be supplied with food; that he would grant liberal terms, but if forced to assault he should <(feel justified in resorting to the harshest measures,® and should make little effort to re¬ strain his army.

General Hardee returned a defiant reply, saying he was not shut in, but had free and constant communication with his department. To th.e specific call for surrender he replied: <(Your demand for the surrender of Savannah and its dependent forts is refused.®

General Sherman then proceeded by boat to General Foster's headquarters at Hilton Head to request that a division be sent to occupy the road north of the Savannah River, which line of communication was still open to Hardee. On his return he received the news that during his absence Hardee had put down his bridges and withdrawn with his entire force. The next day General Sherman's forces occupied Savannah.

Bibliography. — (Memoirs Gen. W. T. Sherman} (Vol. II) ; (Personal Memoirs Gen. U. S. Grant) (Vol. II) ; Official Records War of the

Rebellion (Vols. XXXII, parts 2 and 3; XXXIX, parts 2 and 3; and XLIV) ; Cam¬ paigns of the Civil War* (13 vols., New York 1881) ; Draper, (History of the American Civil War* (3 vols., New York 1867-70) ; Johnson and Buel (eds.), (Battles and Leaders of the Civil War* (4 vols., New York 1887-89).

H. V. Boynton.

MARCHAND, mar-shan, Felix Gabriel,

Canadian legislator and author : b. Saint John s, province of Quebec, 9 Jan. 1832; d. 1900. He was educated at Saint Hyacinth College, was admitted a notary public in 1855, entered prac¬ tice at Saint John's, and from 1867 sat for the county of Saint John's in the legislative assem¬ bly of the province of Quebec. From 8 March 1878 to 19 March 1879 he was provincial secre¬ tary, from 19 March to 30 Oct. 1879 was com¬ missioner of Crown lands, and from 29 Jan. 1887 to 1892 speaker of the assembly. In 1897 he became Premier, with the Treasury portfolio. Subsequent to the invasion at Eccles Hill dur¬ ing the Fenian troubles (1870) , he commanded a militia brigade. He did much to improve Canadian journalism, and for many years was proprietor and editor of Le Franco-Canadien. He published a (Manuel et Formulaire du Notarial ; and also the comedies 'Fatenville* and 'Erreur n'est pas Compte) in prose, and (Un Bonheur en Attire un Autre* and (Les Faux Brillants) in verse.

MARCHAND, Jean Baptiste, French of¬ ficer and explorer : b. fboissey, Ain, 1863 ; d. 16 May 1917. He entered the army in 1883 and after gaining a commission three years later won fame as an explorer, particularly in Africa. He sought an improved route from the valley of the Niger to the Gulf of Guinea. He became one of the most notable figures in the French public life because of his clash with Lord Kitchener in 1898. Marchand had estab¬ lished the post of Fashoda on the White Nile and had resisted several attacks of the der¬ vishes, when General Kitchener appeared at the head of a British force and requested Mar¬ chand to withdraw. The latter refused and soon after

departed for France to make his report but the French government receded from its position and the threatened clash be¬ tween England and France was averted. Mar¬ chand was present at the relief of Peking in 1902 and resigned his commission in 1904, when his government refused him permission to en¬ ter the Russian army in the war with Japan. He was made Commander of the Legion of Honor, was again in the French army with rank of general in the Great War and was killed in action on the western front. Consult Murphy, <Le commandant Marchand et ses compagnons d'armes a travers l'Afrique) (Paris 1900).

MARCHANT, mar'chant, James, English

reformer: b. 18 Dec. 1867. He was educated in private and public schools . and for some years was engaged as social writer and worker in East London and the provinces. In 1889-94 he was evidential lecturer to the bishop of Saint Albans; in 1895-97 preacher-in-oharge of the Trinity Presbyterian Church, London; and m 190(M)2 was civil minister of .Saint Andrew's Church, Chatham. From 1903 to 1906 Mr. Marchant was secretary of Dr. Barnardo's Homes and Memorial. In 1905 he traveled on the Continent with Dr. Barnardo's successor investigating conditions of child-life and rescue work. In November 1911 he was dedicated to the work of the National Council of Public Morals in the private chapel of the dean of Westmins¬ ter Abbey by the bishop of Durham and Rev. F. B. Meyer. His writings include (Life of Dr. Paton) (1909); joint-author of 'The Memoirs of Dr. Bernardo* (1907); 'Letters

and Reminiscences of Dr. A. Russel Wallace* (1916) *'History of the House of Cassell (1917)* • *'The Master Problem* (1917) ; 'Coffins or Cradles* (1916); 'Birth-Rate and Empire* (1917) *'The Person of Christ*; 'Theories of the Resurrection* (1899). He is . editor of Prevention, a scientific and religious journal de¬ voted to race culture and public morals.

MARCHES, The, Italy, a territory now in¬ cluded in the kingdom, but formerly consti¬ tuting one of the legations of the Papal States. It comprises the region lying between the Apen¬ nines and the Adriatic, and is divided into the modern four provinces — Urbino and Pesaro, Ancona, Macerata and Ascoli Piceno. See

MARCHESI, mar-ka'se, Mathilde, Ger¬ man singer: b. Frankfort-on-Main, 26 March 1826; d. 17 Nov. 1913. Her maiden name was Graumann; she studied under Nicolai in Vienna, and in Paris under Garcia, whose assistant she became. A splendid mezzo-soprano, she toured Europe for several years, married, in 1852, the Marchese della Rajata Castrone, a political Italian refugee of 1848, also a singer, who had adopted the nom de theatre of Salvatore Marchesi, and in 1854 became professor at the Vienna Conservatory. She removed to Paris in 1861, where she published her "Lcole de Chant.** In 1865 she accepted a professorship in Cologne, but resigned in 1868 and returned to Vienna, staying at the Conservatoire 10 years. She settled in Paris again in .1881, and pre¬ pared many of the greatest, singers of the younger generation, including Melba. Her later years were spent in London, where she conducted a singing academy with her daughter. She was a teacher of rare merit, and author of a method of singing, of two volumes of per¬ sonal recollections in German (1877; 1888), and of 'Marchesi and Music* (1897). She re¬ ceived decorations and medals from the rulers of Italy, Great Britain, Germany and Austria.

MARCHIALI, mar-ke-a'le, or MARCHIALY. See Iron Mask, Man with the.

MARCHING THROUGH GEORGIA, a

popular ballad sung during the American Civil War, and commemorating Sherman's March to the Sea. It was written by H. C. Work (q.v.) 16 Nov. 1864.

MARCIL, mar'sel', Charles, Canadian

statesman and journalist : b. Sainte Scholastique, Quebec, 1 July 1860. He was educated in the common schools and at Ottawa University. In 1879 he became a member of the staff of the Montreal Gazette, and subsequently was suc¬ cessively member of the staffs of the Herald, the Post, La Patrie, and the Star, all of Mont¬ real. In 1897 Mr. Marcil was an unsuccessful candidate for the Quebec legislative assembly for Gaspe County. In 1900 he was elected to the Dominion Parliament as Liberal member for Bonaventure; in 1905 he became deputy speaker and in 1909-11 was speaker of the House of Commons. Mr. Marcil became a member of the Privy Council for Canada in

1911.

MARCION, mar'shi-on, founder of a Gnos¬ tic sect, called Marcionites : b. Sinope about the beginning of the 2d century, a.d. ; d. about 160. He became a wealthy shipowner, was very liberal, and went to Rome about 140 where he

gave generously to the Church but his views were so unusual that he was not warmly re¬ ceived. He attached himself while there to the Gnostic teacher Cerdo of Antioch, and founded a system antagonistic in many respects to Chris¬ tianity. Its principal feature was the irreconcil¬ able opposition which it supposed to exist be- • tween the Creator and the Christian God, and. between the religious systems, the law and the gospel, which it believed they respectively founded The sect held the existence of three original principles — the supreme and invisible, whom Marcion called the Good; the visible God, the Creator ; and the devil, or perhaps matter, the source of evil. Marcion could not perceive in nature, or in the Old Testament, the same love which was in the gospel of Christ. He accordingly made the Creator, the God of the Old Testament, the author of suffering. Jesus was not the Messiah promised by this being, but the son of the unseen God, who took the form but not the substance of man. Marcion denied the resurrection of the body; he condemned marriage, thinking it wrong to increase a race born in subjection to the harsh rule of the Creator. He rejected the whole of the Old Testament, and of the New all except a few epistles and a mutilation of the Gospel of Luke. He led quite a following, which is traced for 500 years, and then disappeared. Consult Tertullian, (Contra Marcionem) ; Harnack, (History of Dogma. >

MARCO BOZZARIS. See Bozzaris,

Marcos.

MARCO POLO. See Polo, Marco.

MARCOMANNI, mark-ko-man'ni (<(men of the marches, ˆborderers®) , ancient German tribe, belonging to the federation of the Suevi. About 10 b.c., under their King Marbod or Maroboduus, they retired from their territory between the Elbe and the Oder before the ad¬ vance of the Romans, settled in Bohemia, and there built up a powerful state, with which Ti¬ berius made a treaty 6 a.d. Thirteen years later Maroboduus was defeated by Hermann, or Arminius, leader of the Cherusci, who also drove from power Catualda, Marbod's succes¬ sor. About the middle of the 2d century the Marcomanni, with other Teutonic tribes, at¬ tempted to make inroads into Pannonia ; they were defeated by Marcus Aurelius in 178; Corn-modus made peace with them in 180; they fur¬ nished Roman troops and were heavily sub¬ sidized till the time of Aurelian, when in 270 they were again rebellious and again driven across the Danube. In the 4th century the Marcomanni drop out of history.

MARCONI, Guglielmo, gool-e-el'mo mar-ko'ne, Italian inventor and electrical engineer: b. Marzabotto, near Bologna, Italy, 23 Sept. 1875. He was educated at the universities of Bologna and Padua, and so early as 1890 under¬ took experiments in demonstration of his theory that the electric current readily passes through any substance, and when started in a given direction follows a direct course without the assistance of any sort of conductor. After various experiments in Italy, he finally in¬ vented an apparatus for wireless telegraphy, which was successfully tested in both Italy and England by Sir William Henry Preece, engi¬ neer and electrician-in-chief of the English postal-telegraph service. Marconi was the first

to perfect the appliances used in space teleg¬ raphy or radiography, and the first to patent the application of the electric waves discovered by Heinrich Hertz to the purposes of actual teleg¬ raphy as distinguished from mere signaling. This remains true in spite of all the discussion respecting the originality of Marconi's work. It was he who combined the important elements of the wireless telegraph that had previously been invented, and to him the scientific triumph of so-called ˆwireless® telegraphy is due. He came to the United States in 1899, there con¬ tinued his experiments, and in 1900 employed his method in reporting the presidential election of that year. He had sent (27 March 1899) messages across the English Channel from the vicinity of Boulogne, France, to the South Fore¬ land, England, 32 miles distant. In December 1901 he began his first experiments in

transat¬ lantic telegraphy without wires at Signal Hill, at the entrance to the harbor of Saint John's, N. F. He succeeded with these because of an exceedingly sensitive-magnetic detector, that was affected by the very faint etheric vibrations. When his success became apparent through his receiving and plainly distinguishing signals from the Poldhu Station, England, the Anglo-American Cable Company, which holds a monop¬ oly from Newfoundland, compelled him to with¬ draw, and he selected another station at Table Head, on the east of Glace Bay, Cape Breton Island. On 25-26 Feb. 1902, Marconi, on his way to the United States on board the steamship Philadelphia, received signals at a distance of 2,099 miles and worded messages at a distance of 1,551.5 miles. On 21 Dec. 1902 the first offi¬ cial transatlantic telegrams were sent from Table Head. Marconi later (18 Jan. 1903) sent from the South Wellfleet station, Cape Cod, Mass., direct to Poldhu (3,000 miles), a mes¬ sage from President Roosevelt to King Edward. In 1910 the Argentina station received messages of 5,600 miles transit, and since then South American stations have sent and received about 7,000 miles. The Italian government early in¬ troduced the Marconi system on its warships, and granted an annual subsidy of $200,000. The English government also paid a royalty for the use of the system on its ships. On 18 Oct. 1907 the Marconi system between Nova Scotia and Ireland was formally opened for commercial service.

He has continued his experiments and in¬ ventions, continually improving radiography and the methods employed. In 1906 his new persistent wave system. was introduced, and devices developed for giving desired forms to the wave energy sent out. In 1910 his detector was radically improved, and he also brought into use a new receiver. A little later he de¬ veloped a duplex by which messages could be sent and received at the same time by the same apparatus, without conflict, as is done in regular wire telegraphy. Mr. Marconi has received numerous honors, in Italy, England, America and also in Continental Europe. He divided the Nobel prize for physics with Ferdinand Braun in 1909. He has been decorated in Britain, Russia and Spain, and received the Grand Cross of the Crown of Italy. The great universities of the world have showered de¬ grees on him ; Edison accepted official position in one of his companies; he was nominated a senator in the kingdom of Italy, and given the

freedom of Rome. When Italy joined in the World War, he hastened to offer his services to his country, and was promptly placed in charge of its wireless service.

MARCOU, mar-koo', Jules, American geol¬ ogist : b. Salins, France, 20 April 1824; d. Cambridge, Mass., 17 April 1898. He studied at Besangon and the College de Saint Louis in Paris; devoted himself to geology after several journeys through Switzerland, in which he made the acquaintance of Jules Thurmann, to whom he owed an introduction to Louis Agas¬ siz. In 1846, after taking part in the geological survey of the Jura Mountains, he was appointed assistant mineralogist in the Sorbonne .; in 1848 having been appointed traveling geologist to the Jardin des Plantes came to America, explored the Lake Superior Country together with Agas¬ siz and made wide and important geological studies in Virginia, Pennsylvania and New Jer¬ sey, and after several trips back to Europe set¬ tled in Cambridge, where he assisted Agassiz in the Museum of Comparative Zoology. From 1853 to 1855 he was in government employ, and from 1875 till shortly before his death was again in the service. Marcou made a section map of the 35th parallel from the Mississippi to the Pacific, and published (Geological Map of the United States and British Provinces of North America) (1853) ; (A Catalogue of Geo¬ logical Maps of America5 (1884) : (Geology of North America5 (1858) ; (Life, Letters and Works of Louis Agassiz5 (1896).

MARCOUX, Joseph, Canadian missionary: b. Canada, about 1770; d. 1855. He was edu¬ cated after the usual manner of the Roman Catholic priesthood of which he became a mem¬ ber. Soon after his ordination his ecclesiastical superiors dispatched him as missionary to the Iroquois. In 1819 he settled among these In¬ dians at Caughnawaga, on the Saint Lawrence, near Montreal. His labors were eminently suc¬ cessful and under his guidance the Indians reached a high degree of civilization. The school and church at Caughnawaga are monu¬ ments to the zeal of this modern apostle Father Marcoux acquired a perfect mastery of the Iroquois tongue, of which he published a grammar and dictionary. Other works by him in Iroquois are (Life of Christ5 ; (Letters to Iroquois Chiefs5 (1848-49); (Prayer Book5 (1852); (Catechism5 (1854).

MARCUS AURELIUS ANTONINUS,

mar'kus a-re'li-us, often called simply Marcus Aurelius, a distinguished Roman, and accord¬ ing to Canon Farrar «the noblest of. pagan era-perors)} i b. Rome, 29 April 121 a.d. *, d. Vindo-bona, — the modern Vienna — 17 March 180 a.d. He was descended from an illustrious

line which tradition declared extended to the good Numa, the second king of Rome. In the de¬ scendant Marcus were certainly to be found, with a great increment of many centuries of noble life, all the virtues of his illustrious an¬ cestor. Doubtless the cruel persecutions, of the infamous emperors who preceded Hadrian ac¬ count for the fact that the ancestors of Aurelius left the imperial city and found safety in Hispania Bsetica, where, in a town called Succubo — not far from the present city of Cordova — the emperor's great-grandfather, Annius Verus, was born. From Spain also came the family of the Emperor Hadrian, who was an intimate friend

of Annius Verus. The death of the fathei of Marcus Aurelius when the lad was of tender years led to his adoption by his grandfathei and subsequently by Antoninus Pius. By Antoninus he was subsequently named as joint heir t° imperial dignity with Commodus, the son o / Elius Caesar, who had previously been adopted by Hadrian. From his earliest youth Marcus • was distinguished for his sincerity and truthful¬ ness. ˆHadrian's bad and sinful habits left him,55 says Niebuhr, <(when he gazed on the sweetness of that innocent child. Punning on the boy's paternal name of Verus, he called him Verissimus, (the most true. 5 55 Among the many statues of Marcus extant is one represent¬ ing him at the tender age of eight years offering sacrifice. He was even then a priest of Mars.

It was the hand of Marcus alone that threw the crown so carefully and skilfully that it invari¬ ably alighted upon the head of the statue of the god. The entire ritual he knew by heart. The great Emperor Antoninus Pius lived in the most simple and unostentatious manner, yet even this did not satisfy the exacting, lofty spirit of Mar¬ cus. At 12 years of age he began to practise all the austerities of Stoicism and became a ver¬ itable ascetic. He ate most sparingly; slept little, and when he did so it was upon a bed of boards. Only the repeated entreaties of his mother induced him to spread a few skins upon his couch. His health was seriously affected for a time; and it was, perhaps, to this extreme privation that his subsequent feebleness was largely due. His education was of the highest order of excellence. His tutors, like Nero's, were the most distinguished teachers of the age; but unlike Nero, the lad was in every way worthy of his instructors. His letters to his dearly beloved teacher, Fronto, are still extant, and in a very striking and charming way they illustrate the extreme simplicity of life in the imperial household in the villa of Antoninus Pius at Lorium by the sea. They also indicate the lad's deep devotion to his studies and the sincerity of his love for his relatives and friends.

When his predecessor and adoptive father, Antoninus, felt the approach of death, he gave to the tribune who asked him for the watchword for the night, the reply ftEquanim-ity,55 directed that the golden statue of (<For-tune55 that always stood in the emperor's cham¬ ber should be transferred to that of Marcus Aurelius, and then turned his face and passed away as peacefully as if he had fallen asleep. The watchword of the father became the life-word of the son, who pronounced upon that father, in the (Meditations, 5 one of the noblest eulogies ever written. It would be impossible here to detail even briefly all the manifold pub¬ lic services rendered by Marcus Aurelius to the empire during his reign of 20 years. Among his good works were these : the establishment, upon eternal foundation, of the noble fabric of the civil law — the prototype and basis of Jus¬ tinian's task; the founding of schools for the education of poor children ; the endowment af hospitals and homes for orphans of both sexes ; the creation of trust companies to receive and distribute legacies and endowments; the just government of the provinces; the complete re¬ form of the system of collecting taxes; the abo¬ lition of the cruelty of the criminal laws and the mitigation of sentences unnecessarily se¬ vere ; the regulation of gladiatorial exhibitions ;

Copyright, 1903, by Scientific American

GUGLIELMO MARCONI

■ II I H Vt II II IP | ? ! :

.

the diminution of the absolute power possessed by fathers over their children and of masters over their slaves; the admission of women to equal rights to succession to property from their children; the rigid suppression of spies and in¬ formers;. and the adoption of the principle that merit, as distinguished from rank or polit-cal friendship, alone justified promotion in the public service. But the greatest reform was the reform in the imperial dignity itself, as exam-plified in the life and character of the emperor. It is this fact which gives to the (Meditations5 their distinctive value. The infinite charm, the tenderness and sweetness of their moral teach¬ ings, and their broad humanity, are chiefly note¬ worthy because the emperor himself practised in his daily life the principles of which he speaks, and because tenderness and sweetness, patience and pity, suffused his daily conduct and perme¬ ated his actions. The horrible cruelties of the reigns of Nero and Domitian seemed only awful dreams under the benignant rule of Marcus Au¬ relius. It is not surprising that the deification of a deceased emperor, usually regarded by Sen¬ ate and people as a hollow mockery, became a veritable fact upon the death of Marcus Aure¬ lius. He was not regarded in any sense as mortal. All men said he had but returned to his heavenly place among the immortal gods. As his body passed, in the pomp of an imperial funeral, to its last resting-place, the tomb of Hadrian, — the modern Castle of Saint Angelo at Rome, — thousands invoked the divine bless¬ ing of Antoninus. His memory was sacredly cherished. His portrait was preserved as an in¬ spiration in innumerable homes. His statue was almost universally given an honored place among the household gods. And all this con¬ tinued during successive generations of men. Marcus Aurelius has been censured for two acts : the first, the massacre of the Christians which took place during his reign ; the second, the selection of his son, Commodus, as his suc¬ cessor. In extenuation of his persecution of the followers of Christianity, it has been alleged in his behalf that he was deceived by evil coun¬ cillors, who misrepresented the conduct of the Christians to him. This excuse impinges upon his wisdom as a ruler and his admittedly wide knowledge of the conditions of the empire. It is further urged that when we take into consid¬ eration the environment

of the emperor, no just cause for condemnation of his course remains. He imbibed a bitter prejudice against the new religion from his beloved friend and instructor, Fronto. In the writings of Epictetus, whom he greatly revered, he found severe condemnation of the Christians as fanatics. With such a pro¬ found natural bias, it is urged, it is no wonder that he was led to regard the new creed with aversion. But the reason of his course is to be found rather in his deep-rooted attachment to the heathen beliefs of his ancestors and of the empire. It was rather his fear that the ancient cult, bound up as it seemed in the character of Roman rule, was seriously menaced by. the prog¬ ress of Christianity, which actuated him to the severe and bloody measures he took to root out a dangerous rival. He regarded Christianity as a ((pernicious sect," a ˆsecret conspiracy® against the empire, an ((immoral superstition,® whose poison was eating into the social life, and him¬ self as the conservator of the empire and its traditions. Therefore some extenuation might

be conceded to such fierce zeal in persecuting the Christians in almost any other emperor than Marcus Aurelius. But there is a glaring incon¬ sistency in his character in the adoption of so cruel and monstrous a course by one who ap¬ pears otherwise so admirable. In this signal instance he is as bloody and heartless as a Domitian, a Nero or a Caligula; in all other things, merciful, in this pitiless; in his' general administration, just and humane; in this, singu¬ larly unjust and even vindictive. Whatsoever may be urged in his defense, this relentless per¬ secution of the Christians is a dark blot on his fame. Whatever extenuating circumstances may seem to condone it, his policy in this in¬ stance was utterly inconsistent with his general character.

His first edict against the Christians was published in 177. Multitudes perished in the fierce persecutions which followed. Notable amongst the victims were Saint Polycarp in Smyrna and Saint Cecilia at Rome. The man¬ ner in which they were tortured before being relieved from sufferings by death was more be¬ fitting a savage chief than a civilized ruler.

Of the appointment of Commodus as his successor, it may be said that the paternal heart hoped against hope for filial excellence. Mar¬ cus Aurelius believed, as clearly appears from many passages in the (Meditations, 5 that men did not do evil willingly, but through ignorance; and that when the exceeding beauty of good¬ ness had been fully disclosed to them, the de¬ pravity of evil conduct would appear no less clearly. The emperor who, when the head of hiis

rebellious general was brought to him, grieved because that general had not lived to be forgiven ; the ruler who burned unread all treasonable correspondence, would not, nay, could not believe in the existence of such an inhuman monster as Commodus proved himself to be. The appointment of Commodus was a calamity of the most terrific character; but it testifies in trumpet tones to the nobility of the emperor's heart, the sincerity of his own belief in the triumph of right and justice. Compare Farrar, (lSeekers after God5 (1868) ; Renan, (Marc Aurele5 (1881) ; Pater, (Marius the Epicurean5 ; Arnold, M., (Essays in Criticism5 (First Series, New York 1883) ; (Marcus Aure¬ lius Antoninus to Himself5 (English tr. by G. H. Randall, London 1910) ; (The Commun-ings with Himself of Marcus Aurelius Antoni¬ nus, Emperor of Rome, together with his Speeches and Sayings5 (tr. C. R. Haines, Lon¬ don 1916) ; (The Thoughts of the Emperor Marcus Aurelius Antoninus5 (tr. George Long, illustr. W. Russell Flint, London 1909). Con¬ sult also Robinson, Ellis, Correspondence of Fronto and Marcus Aurelius5 (Oxford 1904).

MARCUS GRiECUS, gre'kus, alchemist,

who lived not later than the 11th century, since he is cited by an Arabian physician of that date. In the National Library at Paris are two manu¬ script copies of a small treatise, entitled (Liber Ignium ad Comburendos Hostes, Auctore Marco Graeco,5 one of which appears to belong to the 14th and the other to the 1 5th century. The work contains an account of an explosive substance the ingredients of which are the same as those used in making gunpowder, though differently proportioned. It may have been that Schwartz, the reputed inventor of gunpowder,

did nothing more than experiment on the re¬ ceipts of Marcus Graecus. The treatise also contains the first account that has come down to us of the method of making Greek fire.

MARCY, Henry Orlando, American sur¬ geon: b. Otis, Mass., 23 June 1837 He was educated at Wilbraham Academy and Amherst College.

In 1863-64 he was assistant surgeon in the Union armies, was medical director of r lor-ida in 1864-65 and from 1865 to 1869 practised his profession at Cambridge, Mass. In 186V70 he studied abroad at Berlin, London and Edm-burgh, was the first American pupil of Ur. Lis¬ ter, whose methods he introduced to America. After his return to the United States Dr. Marcy devoted his attention to laboratory and practical study of antiseptic methods of wound treatment. Since 1880 he has conducted a private hospital in Cambridge for the treatment of surgical dis¬ eases. In 1892 he was president of the Ameri¬ can Medical Association, of the American Acad¬ emy of Medicine in 1884. Dr. Marcy has pub¬ lished (The Reproductive Process,5 translation from G. B. Ercolane's work (2 vols., 1884) ; <The Anatomy and Surgical Treatment of Her¬ nia5 (1892); (The Radical Cure of Hernia (1889) * (The Perineum, Its Anatomy and Sur¬ gical Treatment5 (1889), also many monographs and papers on medical and other subjects.

MARCY, Randolph Barnes, American general : b. Greenwich, Mass., 9 April 1812 , d. Orange, 22 Nov. 1887. He was educated at West Point in 1832; and served in the Black Hawk War. During the Mexican War he was active at Palo Alto and Resaca de la Palma , and was made inspector-general, United States army, with the rank of colonel, in August 1861, serving as chief of staff to his son-in-law, Gen George B. McClellan throughout the Civil War He was appointed brigadier-general of volunteers, 23 Sept. 1861, was inspector-general, United States army, with rank of brigadier-general from December 1878. He was retired in the year last named. He published (Exploration of the Red River in 1852 (1853) ' (The Prairie Traveler, a Handbook for Overlaid Emigrants' (1859) ; 'Thirty Years of Army Life on the Border (1866) ; Border Remiscences) (1871).

MARCY, William Learned, American statesman: b. Southbridge, Mass., 12 Dec. 1786, d. Ballston Spa, N. Y., 4 July 1857. He studied at Leicester Academy, in Massachusetts, and was graduated at Brown University in 1808.. At Troy, N. Y., he studied law and was admitted to the bar. When the War of 1812 broke out he volunteered as a lieutenant, was sent at once into active service and 22 Oct. 1812 led an attack resulting in the capture of a Canadian post at Saint Regis. He was soon promoted to be captain, and served almost to the end of the war. Returning to Troy, he engaged in news¬ paper work and in politics, opposed Clinton and became prominent in the Albany

Regency (q.v.). He had already held several offices when, in 1823, he was elected comptroller of the State. This position he filled six years, and in 1829 was appointed associate justice of the New York Supreme Court. The Democrats in 1831 elected him to the United States Senate, but the next year he was chosen governor of New York and resigned his senatorship. While in the Senate he was chairman of the Judiciary Com¬

mittee, and in debate with Clay made a mem¬ orable defense of Martin Van Buren. It was during a speech in the Senate vindicating the course of the President in giving offices to his political supporters that Marcy uttered the words associated with the beginning of the spoils system (q.v.) : ((We can see nothing wrong in the maxim that to the victors belong the spoils.® Having served three terms as gov¬ ernor, he was once more nominated, in 1858, out was defeated by W. H. Seward (q.v.). In the following year Marcy was appointed by Presi¬ dent Van Buren a commissioner on Mexican claims, serving till 1842. In 1845. he became Secretary of Whr under Polk, and in that office bore arduous responsibilities created by the Mexican NVar. He also used his official influ¬ ence in the settlement of the momentous Oregon boundary question. In 1848 he supported Cass as presidential candidate, and when Taylor was inaugurated Marcy retired to private life. But during the administration of Pierce he served from 1853 to 1857 as Secretary of State, greatly distinguishing himself at home and abroad by his handling of grave matters the Mexican boundary dispute, the reciprocity treaty with Canada, the British fishery question, the Koszta affair (see Ingraham, Duncan Nathaniel), etc On the inauguration of President Bu¬ chanan in 1857 Marcy finally retired from office, dying four months afterward. Among states¬ men of administrative ability and thorough training, both for domestic and foreign affairs, he holds a high and permanent place. Consult Alexander, Political History of the State of New York) (1906).

MARCY, Mount, N. Y., the highest peak of the Adirondack Mountains, in the northeast¬ ern part of the State, in Essex County, about 28 miles west of Lake Champlain. The altitude is 5,344 feet. Lake Tear of the Clouds, 4,327 feet above sea-level, usually considered the main source of the Hudson River, is just southwest of Mount Marcy. The Indian name for this peak was ((Tahawas,® meaning the (<cloud-divider.®

MARDEN, Orison Swett, American edi¬ tor and author of <(uplift® books: b. Thornton, N. H., about 1850. He was graduated at the

Boston University in 1877 ; at the school of oratory there in 1879; at the law school of the same institution in 1881 ; and in 1882 at the Har¬ vard Medical School. He was founder and edi¬ tor of Success and later of the New Success , and is the author of many works, among which are ‘Pushing to the Front5 (1894); (How to Succeed5 (1896) ; ‘The Secret of Achieve¬ ment5 (1898) ; (Character the Grandest Thing in the World5 (1899) ; ‘The Hour of Opportu¬ nity5 (1900); (Talks with Great Workers5 (1901) ; and Stepping Stones5 (1902) ; ‘Every Man a King5 (1906); ‘The Optimistic Life5 (1907); (Why Grow Old5 (1909); ‘Getting On5 (1910) ; ‘Self Investment5 (1911) ; ‘The Joys of Living5 (1913; The Crime of Si¬ lence5 (1915) ; Everybody Ahead5 (1917).

MARDI GRAS, mar’de gra, Shrove Tues¬ day, the last day before Lent. (See Carnival). In the United States the day is observed in New Orleans and Memphis with processions mas¬ querade balls and other gay entertainments.

MARDONIUS, mar-do’m-us, Persian gen¬ eral, was the son of the Satrap Gobryas, and

son-in-law of Darius Hystaspes. He com¬ manded the first Persian armament sent against Greece, 492 b.c., when a storm at Mount Athos destroyed his fleet, and his army was beaten in Macedonia. He ‘accompanied Xerxes in his in¬ vasion of Greece, of which he had been the chief promoter; and after the battle of Salamis, and the return of Xerxes to Asia, Mar-donius was left in occupation at Athens, which he held for 10 months. According to Herodo¬ tus he was defeated by Pausanias, and probably killed at the battle of Plataea, 479 b.c.

MARDUK. See Merodach.

MARE CLAUSUM, ma’re kla’sum, a Latin phrase meaning closed sea, or that portion of the sea under the jurisdiction of a particular nation or government, as distinguished from the high sea. For many years it

was held that a nation had no authority over waters more than three miles from its shores. But in the great World War these theories were cast to the winds, and each side held what sea it could. See International Law.

MARE ISLAND, Cal., in San Pablo Bay, and a part of Solano County, 28 miles north of San Francisco, and opposite the city of Val¬ lejo. A United States naval station, one of the largest in the country, is on this island. It is two miles long and has wet and dry docks, ord¬ nance yards, marine barracks, a hospital, an observatory, repair shops, and at the southern extremity of the island a lighthouse. See Navy Yard.

MAREE, Loch, loh ma-re', Scotland, a lake in the west of Ross-shire, forming a long and comparatively narrow expanse, stretching south¬ east to northwest for 12^2 miles with a breadth of from one-half to two miles. Its depth in most places is 60 fathoms ; it has never been known to freeze. The scenery along its shores is bold and picturesque, and its surface is studded with 32 wooded islands, on one of which are found the remains of an ancient chapel, with a graveyard. One is Saint Swith-in's Isle, shaped like a doughnut, enclosing a lake 750 feet long. The loch discharges itself into Lock Ewe by a small river of the same name.

MAREIA, ma-ra'a, Lake. See Mareotis, Lake.

MAREMMA, ma-rem'ma, Italy, low swampy tracts extending along the west coast of Tus¬ cany from the mouth of the Cecina to Orbi-tello; length, 92 miles; breadth, from 6 to 20 miles; area, about 1,000 square miles. For¬ merly these regions were fruitful, healthful and populous; but after the 15th century the neglect of the water-courses of the district allowed the formation of marshes and now they generate insects and fevers and present an aspect of dreary desolation during the summer months, when the inhabitants flee from the pestilences. In winter, on the other hand, the Maremma are inhabitable and afford a luxuriant pasturage for cattle, which graze in summer on the Apen¬ nines. The district is gradually being reclaimed and improved.

MARENGO, Iowa, city, county-seat of Iowa County, on the Iowa River, and on the Chicago, Rock Island and Pacific Railroad, about 85 miles east by north of Des Moines. It is in a fertile agricultural and stock-raising

locality. The chief manufactures are dairy products, agricultural implements and flour. It has banks and three newspapers. It is the trade centre for a large part of Iowa County. Pop.

2,037.

MARENGO, ma-reng'go, Italy, a northern village, near the Bormida, three miles southeast of Alessandria. Its name is connected with the defeat of the Austrians by Napoleon 14 June 1800. The Austrians under Melas were at first successful, but French reinforcements arriving, the cavalry charge of the younger Kellermann turned what looked like certain defeat into a decisive victory. The forces engaged were 33,000 French and 30,500 Aus¬ trians; the French loss is variously stated as totaling in killed and wounded 4,000 to 7,000, the Austrians 9,000 to 10,000.

MAREOTIS, ma-re-6'tis, or MARIUT,

ma-re-oot', Egypt, a lake separated from the Mediterranean on the west by the long narrow belt on which Alexandria stands and com¬ municating on the north with Lake Madieh. It is the most westerly of the lakes in the Nile Delta. In the southwest it terminates in a long narrow creek ; the main expanse is about 28 miles long by 20 broad. It was at one time deep enough for inland navigation, and had its shores covered with beautiful gardens and vine¬ yards ; but having been cut off from the Nile, which supplied its water, it became dry and its area was cultivated. During the siege of Alex¬ andria in 1801 the British let the sea into it, and it now yields much salt by evaporation.

MARE'S TAIL, a genus (Hippuris) , of plants with whorled narrow leaves and small inconspicuous flowers set in their axils. They are aquatic or marsh plants. H. vulgaris is very common in Europe and in some parts of North America.

MARETZEK, ma're tsek, Max, American musician: b. Brunn, Austria, 28 Jan. 1821; d. Pleasant Plains, Staten Island, 14 May 1887. He was educated at the University of Vienna, but desirous of a wider field went to London and was connected for a time with its Italian Opera as chorus-master, writing in addition some music. In 1848 he came to New York, where he was appointed leader of the orchestra at the Italian Opera and subsequently at the Ast-or Place Theatre and the Grand Opera House. He wrote the operas of (Hamlet,)

(Sleepy Hollow, J and an interesting book on contemporary life

entitled (Crotchets and Quavers) (1858). Under his management many notable operas and artists, among the latter Adelina Patti and Pauline Lucca, were pre¬ sented to American audiences.

MAREY, ma'ra, Etienne Jules, French physiologist: b. Beaune, Cote-d'or, 1830; d. 1904. In 1850 he removed to the capital and took his degree in medicine there in 1860. In the same year he began his connection with the physiol¬ ogical department of the College de France; founded a physiological laboratory in 1864 and in 1867 became adjunct professor of physiology there. In 1872 he was elected member of the Academy of Medicine and of the Institute six years later. He made important investigations on the physiology of circulation and the heart, on the action of poisons, on animal heat, motion in animals, *etc.* He invented the

sphygmograph in 1863. In addition to numerous treatises concerning his physiological investiga¬ tions he published (Physiologie medicale de la circulation du sang) (1860-64) ; cPhysiologie du systeme circulaire) (1866) ; (La methods graphique dans les sciences experimentales) (1878) ; (Developpement de la methode gra¬ phique par l'emploi de la photographie) (1885) ; (Physiologie du mouvement: le vol des oiseaux> (1890); (Le mouvement5 (1894).

MARFORIO, mar-fa ri-6, the popular name of a colossal statue representing the river Rhine, or Danube, or river god, standing in the court of a wing of the Capitol at Rome. The name Marforio is a corruption of Martis forum (the forum of Mars), in the entrance of which the statue originally stood.

MARGARET, Saint, queen of Scotland, elder sister of Edgar 2£theling, and grand¬ daughter of Edmund Ironside: b. Hungary, about 1045; d. Edinburgh, 16 Nov. 1093. Shortly after William the Conqueror had established himself on the English throne she and her brother Edgar went to Scotland and placed themselves under the protection of Malcolm Canmore, the Scottish king, who in 1070 be¬ came her husband. She was characterized by great devotion to the Church, and it was largely through her influence with the king that the Scottish Church was brought into conformity with those of England and the Continent. She is said, moreover, to have elevated the manners of the

Scottish court, and introduced great im¬ provements in needle-work, embroidery and other similar arts. In her personal life,

and the great care with which she educated her children, she set a noble example to

the people of the somewhat rude and un¬

cultured kingdom. In 1250 she was. canon¬ ized. Her daughter Matilda married the English king, Henry I, and thus the old

Anglo-Saxon line became united with that of the usurping Normans. There is an ancient life of Saint Margaret, written in Latin, it is commonly believed by her confessor, Turgot, bishop of Saint Andrews. The Bodleian Library at Oxford contains a copy of the Gos¬ pels which once belonged to her.

MARGARET, queen of Denmark, Norway and Sweden, daughter of Waldemar III, king of Denmark: b. Copenhagen, 1353; d. 29 Oct. 1412. She was married to Hakon, king of Nor¬ way, in 1363, and the death of her husband in 1380 placed Norway in her hands; that of her son Olaf in 1387 enabled her to secure the throne of Denmark, to which she had previously brought about his election ; and after defeating Albert, the Swedish king, she also obtained pos¬ session of the throne of Sweden. She en¬ deavored to place the union of the three king¬ doms on a permanent basis by the celebrated Act of Union, or Treaty of Calmar (1397). She died after having raised herself to a de¬ gree of power then unequaled in Europe from the time of Charlemagne. She is sometimes styled (<The Semiramis of the North. ˆ

MARGARET OF ANJOU, an'joo, or an-zhoo, queen consort of Henry VI of England: b. probably at Pont-a-Mousson, Lorraine, 23 March 1430; d. near Saumur in Anion, 15 Aug. 1482. She was the daughter of Rene the Good, of Anjou, titular king of Naples, and

was married to Henry in 1445. The imbecility of the king made her practically regent, and her power being contested by the Duke of York, a claimant of the throne by an older line, the protracted Wars of the Roses began. At first victorious, she was afterward compelled to flee to Scotland, but raising an army in the north, she secured, by the battles of Wakefield (1460) and Saint Albans (1461) the death of York, and the release of the king. Her army, how¬ ever, was soon afterward annihilated at Towton (1461), and Edward (IV), the son of

the late Duke of York, was declared king. She suc¬ ceeded in obtaining assistance from Louis XI of France, but was once more defeated, and took refuge in that country. Warwick then be¬ came embroiled with the young king, and de¬ termined to . replace Henry on the throne. Edward was in turn obliged to escape to the Continent, but obtaining assistance from the Duke of Burgundy returned and defeated War¬ wick at Barnet (1471). Margaret, collecting her partisans, fought the battle of Tewkesbury (1471), and was totally defeated. She and her son were made prisoners, and th latter, when led into the presence of the royal victor, was killed. Henry soon after died or was murdered in the Tower, and Margaret remained in prison four years. Louis XI ransomed her for 50,000 crowns. See Henry VI; Roses, Wars of the.

MARGARET OF AUSTRIA, governor-general of the Netherlands, and daughter of Maximilian I of Austria: b. Brussels, 10 Jan. 1480; d. Mechlin, 1 Dec. 1530. She was edu¬ cated at the French court; was betrothed to the Dauphin Charles, who married Anne of Brit¬ tany; married John, the Spanish Crown-Prince, in 1497 ; and, after his death in the same year, married Philibert of Savoy in 1501, only to be widowed again in 1504. Three years after¬ ward her father made her regent of the Nether¬ lands, where she ruled with much ability al¬ though a bitter enemy of the Reformation. She took a prominent part in the peace of Cambrai in 1529, which is called, because negotiated by her and Louise of Savoy, the ((Paix des Dames.®

MARGARET OF FLANDERS, Countess

of Flanders and Hainault, sometimes called Margaret of Constantinople: b. Valenciennes about 1200; d. Lille, 1279. She was a daughter of Baldwin IX of Flanders and Hainault, who was succeeded by Margaret's older sister, Jeanne. Margaret's husband, Bouchard, was seized and killed by Jeanne, upon whose death Margaret came to the crown in 1244. Her reign was peaceable, save for the quarrels be¬ tween her children by Bouchard and those by Guillaume of Dampierre.

MARGARET OF NAVARRE, na-var, or OF VALOIS, or OF FRANCE, French prin¬ cess, daughter of Henry II : b. Saint Germain-en-Laye, France, 14 May 1553; d. Paris, 27 March 1615. She married in 1572 Henry of Navarre, afterward Henry IV of France. It was entirely a marriage of policy, and on Henry's accession to the throne their marriage was dissolved by mutual consent. She resided thereafter in Paris where her house became the rendezvous of the learning and fashion of the time. Some very agreeable poems by her are extant and

her ‘Memoirs* (1842) are ex¬ tremely curious. See Heptameron, The.

MARGARET OF PARMA, regent of the Netherlands, a bastard of Charles V of Spain by a Flemish woman: b. Oudenarde, 1522; d. Ortona, 1586. Brought up in Brussels, she was married to Alessandro de Medici in 1536, and in 1538 to Ottavio Farnese, Duke of Parma, to whom she bore the great general, Alexander Farnese. In 1559 Philip II made her staat-holder of the Netherlands. There she sided with Granvella, introduced the Inquisition and provoked the provinces to revolt by her strong, masculine policy. She resigned in 1567 when Alva was sent to the Netherlands.

MARGARET TUDOR, queen of Scotland, wife of Tames IV and daughter of Henry VII of England: b. Westminster, 29 Nov. 1489; d. Methven Castle, 18 Oct. 1541. She was mar¬ ried to the king of Scotland when 14; bore him three children, of whom two, James, later fifth king of Scotland of that name and father of Mary Stuart, and Margaret, mother of Lord Darnley, survived her : and after the king’s death (1514) married Douglas, Earl of Angus, from whom she was divorced in 1527, to marry soon after Henry Stewart, Lord of Methven. By descent from Margaret Tudor her great-grandson, James VI of Scotland, was Eliza¬ beth’s successor as James I of England.

MARGARET, or MARGUERITE OF VALOIS, val-wa, queen of Navarre: b. Angouleme, 11 April 1492; d. Paris, 27 March 1549. (Variously known as Margaret of Angouleme, of Alenqon and of Navarre). She was the sister of Francis I of France, was brought up at the court of Louis XII, married the Duke of Alengon in 1509, became a widow in 1525 and in 1527 married Henry d’Albret, titular king of Navarre. She never reigned over Navarre, but resided at the French court or kept a court of her own at Nerac and Pau. She was acquainted with the principles of the Protestant reformers, and not only afforded protection to reformed divines, but used her influence with her brother Francis to the same purpose, and was a great patroness of men of letters. In 1533 she pub¬ lished a religious poem, (Le Miroir de l’Ame PecheresseP which incurred the censure of the Sorbonne as

heretical. In 1547 a collection of her poems and other pieces was printed under the title of (Marguerites de la Marguerite des Princesses. } The (Heptameron, ou sept Journees de la Reyne de Navarre, } a famous collection of tales long attributed to her, is at present regarded as of composite authorship. She left one child, Jeanne d'Albret; afterward mother of Henry IV. Her letters have been published in modern times. Consult Comtesse d'Haussonville, (Marguerite de Valois} (1870) ; Lotheissen, (Konigin Margaret von Navarre) (1885) ; Freer, <Life of Marguerite d'Angouleme) (1805).

MARGARET SIDNEY. See Lothrop, Harriet Mulford Stone.

MARGARETTA, The, a British armed schooner, captured by Americans near Machias, Me., 12 June 1775, in the first naval contest of the Revolution. In April 1774 Capt. Ichabod Jones sailed into the harbor of Machias, and there, on account of complications caused by the Boston Port Bill (q.v.), he remained for a year, with his vessel hauled up. When news of the battle of Lexington reached Machias. Jones

was loading two sloops, the Unity and the Polly, for Boston, whither he soon sailed. The whole country was now excited over the Port Bill, and in Boston it had caused much dis¬ tress.

Jones wished to return to Machias with pro¬ visions, of which the people there were in want. Admiral Graves, the British officer in charge of Boston harbor, granted him permis¬ sion to sail on condition of his bringing back lumber for the use of the British troops, and the admiral ordered the Margaretta, a cutter of about 100 tons, carrying about 40 men, to ac¬ company Jones to his destination to see that this condition was fulfilled ; also that the American skipper should convey to Boston the stores of an armed vessel lately cast away. Jones is said to have been favorable to the British, whose protection at this time he may have solicited. His two sloops, convoyed by the Margaretta, arrived at Machias 2 June 1775; but many of the citizens, declaring that he should carry no lumber to Boston, organized for resistance to the enforcement of Graves' order.

The leader of this opposition was Benjamin Foster, a colonial soldier, who had been present at the capture of Louisburg from the French. A secret meeting was called, and on Saturday, 10 June, men of Machias and neighboring settle¬ ments gathered in the woods to consider the advisability of attempting to take the sloops, capture the Margaretta and make prisoners of the cutter's officers and crew. Among those that

assembled was Jeremiah O'Brien, who, with several brothers, participated in the subsequent capture. During the discussion Foster stepped across a small brook running near and called on all in favor of the attempt to follow. The majority followed him, and then (<a unanimous declaration of war® was made.

On Sunday, 11 June, Jones and the principal officers of the Margaretta being at church, Fos¬ ter and others started to take them into custody ; but, getting the alarm, they escaped by jumping from the windows — Jones fleeing to the woods, while the British officers returned to the Mar¬ garetta and weighed anchor, threatening to fire on any who should interfere with Jones' sloops.

In spite of this threat the Americans deter¬ mined to carry out their purpose. When the enemy was sighted, on Monday, the 12th, Jere¬ miah O'Brien was chosen to lead the movement, and while he took 40 men on board the Unity, Foster, with another party, boarded the Fal¬ mouth Packer, a schooner lying at hand. The bold defiers of British force had only ((a few charges of powder and ball for 20 fowling-pieces or muskets, 13 pitchforks and 10 or 12 axes,® the powder and balls being nearly all on O'Brien's vessel. As they approached the Mar¬ garetta she was ready for action, and her com¬ mander, Moore, gave warning that he would fire if they came nearer. O'Brien called upon him to surrender, while Stevens, O'Brien's lieuten¬ ant, told Moore to (<fire and be damned!® To avoid action, Moore crowded all sail and stood out to sea. But the Unity was the better sailer, and as she overhauled them the British opened fire, which the heroes of the <(fowling-pieces® returned with effect. The vessels coming to¬ gether, a short musketry fight ensued. Moore himself threw hand-grenades, but was shot down. The Americans — O'Brien at their head

— boarded the cutter and soon had complete possession of her.

In this plucky exploit one of the American party was killed and four wounded, one mor¬ tally. On the Margaretta four were killed be¬ sides her commander, who died of his wound. Her captors

triumphantly took the Margaretta to Machias the same day, and her crew were held until July as prisoners of war. So ended «one of the most bold, energetic and extraor¬ dinary occurrences of the times.® With the armament of the Margaretta — four 3-pounders and 14 swivels — the Unity was fitted out, and she was thenceforth called the Machias Liberty.

MARGARIC ACID, or HEPTADECOIC ACID, a name now applied to an acid having the formula C17H34O2, which is said to occur in adipocere (q.v.), and which may also be pre¬ pared by boiling cetyl cyanide in alcoholic pot¬ ash.

MARGARIN, or MARGARINE, a fatty substance, obtained from lard and from certain vegetable oils. It was formerly believed to be a distinct fat or compound of glycerin with <(margaric acid® (q.v.) ; but it is now known to be merely a mixture of stearin and palmitin. See Oleomargarine.

MARGARIT, or MARGUERIT, Beren-ger, a Spanish general, who lived in the 12th century. In command of a fleet he was sent by William II, king of Sicily, to succor Tyre, besieged by Saladin in 1188. Margarit, with a fire-ship, burned several of the enemy's ships, while Conrad, governor of Tyre, made a sortie. Attacked on both sides at once, Saladin only just managed to find shelter on an undamaged ship, and escaped. The brilliant conduct of Margarit on this occasion gained for him from Saladin the names of King of the Sea and the New Neptune.

MARGARIT, or MARGUERIT, John, a

Spanish cardinal : b. Gerona, 1415 ; d. Rome, 1484. Successively bishop of Elne, of Gerona and of Patti (Sicily), he received several important missions under Alphonse V, and became Ambas¬ sador to Rome under John II, who appointed him chancellor of Aragon. He quelled the troubles which were disturbing Catalonia, and received the cardinal's hat in 1483. He was the author of ˆaralipomenon Hispanise) (Granada 1545), a history of Spain from the fabulous ar¬ rival of Hercules in the Peninsula, to the reign of Theodosius the Great.

MARGARIT, or MARGUERIT, Peter, a Spanish navigator who lived at the end of the 15th century. He was the nephew of Cardinal Margarit, and left the court of Ferdinand V in 1492 to embark with the fleet of Christopher Columbus, from whom he separated after some dissensions. According to Blasius he discov¬ ered the Marguerite Islands, and gave to them his name. Other authors aver these islands

were named after the pearls which are found on their shores.

MARGARITA, mar-ga-re'ta, Venezuela, an island off the northeast coast, in the Caribbean Sea, about 35 miles north of Cumana. In 1901 it was made a province and is known by the name of Nueva Esparta. Its area is 450 square miles. This island was discovered by Columbus in 1498; it was settled by the Spanish about 1525. The name Margarita, meaning "pearl,®

was given to it because of the pearl fisheries still existing in surrounding waters.

The surface is broken by two mountain chains, the highest point, peak of Macanao, being 4,484 feet. Near the centre is a lagoon, surrounded by low land. Much of the soil is fertile, but the chief industries are fishing, pre¬ paring salt for market and cattle-raising. Th e capital of the province is Asuncion; the chie port Pampatar. The inhabitants are nearly all Indians who have long been civilized. Pop. about 40,000.

MARGARITE, or PEARL MICA, a na¬ tive hydrous silicate of aluminum and calcium, having the formula HzCaALShOi*, and usually occurring in laminated forms, like mica. Its crystals, when they occur, belong to the mono¬ clinic system. Margarite is translucent or subtranslucent, with a vitreous or pearly lustre.

It occurs in various colors, but predominantly in gray, with perhaps a pinkish tint. It has a hardness of from 3.5 to 4.5, and a specific gravity of about 3. Margarite usually occurs in connection with emery or corundum, from which it is obviously often derived.

MARGARITONE, Italian painter, architect and sculptor: b. Arezzo, about 1219; d. 1289. Called Margaritone d' Arezzo after his native place, he attained the first rank as an artist of the Greek school, and was held in high esteem by Pope Urban IV. Jealousy at the success of Cimabue is said to have shortened his days. He painted a great number of frescoes, none of which now exist. Among the few remaining pictures from his brush are Saint Francis in the museum at Siena; a Madonna in the church of Saint Francis at Arezzo; Christ, in the church of San Croce at Florence; the Eternal Father with the angels in the church of Saint Bernar-din at Perugia. Painting and sculpture are mingled in his tomb of Pope Gregory X at Arezzo; his 'sculptured works are chiefly of wood. Among his architectural works are the cathedral of his native city and the governor's palace at

Ancona.

MARGATE, mar'gat, England, a seaport and popular summer watering resort of Lon¬ doners, in Kent, in the Isle of Thanet division, 64 miles by rail east of London. The restored parish church of Saint John the Baptist dates from 1050. It was originally a fishing village, but began to develop as a resort about the year 1800. Margate is patronized annually by about 200,000 visitors. Its sea-walks are continuous with those of Westgate and Broadstairs.

MARGATE-FISH, a handsome, pearly white, brown-striped fish (Hcernulon album) of West Indian waters, important as a food-fish, and ordinarily weighing about five pounds. It is caught about rocky reefs, in deep water, where it spawns in summer; and at night it comes in shore to obtain the small animals which swarm in the shallows. It is called jallao by Spanish-speaking fishermen, and market-fish, margaret-grunt, etc., by the English-speaking fishermen of Key West and the Bahamas.

MARGAY, mar'ga, a small, yellowish, pro¬ fusely and beautifully spotted cat of the Amer¬ ican tropical forests (Felis tigrina), also known in one of its varieties as "chati.®

MARGHERITA, mar-ga-re'ta, queen dow¬ ager of Italy: b. Turin, 20 Nov. 1851. She is

the daughter of Ferdinand, Duke of Genoa. In 1868 she was married to Humbert, then crown prince, of Italy, who ascended the throne of Italy in 1878. In that same year an attempt was made upon the life of the king, and the nervous shock to the queen seriously affected her health for a number of years. Her winning personality and dignified performance of her duty as queen gained her wide popularity in Italy. In 1900 her husband was assassinated and their son, Victor Emmanuel III, succeeded him as king.

MARGHERITA PUSTERLA, for many years the most popular historical

novel in Italy with the exception of Manzoni's masterpiece, (I promessi sposi,* was written between 1833 and 1834 while the author, Cesare Cantu, lay in prison charged with political offenses against the Austrian authorities. Composed under great difficulties, suppressed by the foreign op¬ pressors who felt themselves attacked through this work, the novel was not published till 1838. The theme deals with the period of the Italian despots of the 14th Century, — a period which had already been treated in Tommaso Grossi's (Marco Visconti* (1834), to which novel Cantu alludes in his own work. The scene is laid in Milan in 1340-41 during the reign of Luchino Visconti. The latter attempts to seduce Margherita, the wife of the rich and noble Francis-colo Pusterla. Rebuffed by her, the tyrant seeks revenge by sending to the scaffold hus¬ band, wife and their young son, a mere child, after having had the parents condemned for treason against the state and conspiracy against his life. Vain attempts to save his master and mistress by the devoted young squire, Alpinolo, an effort to deter the vindictive Luchino from his cruel purpose on the part of the good monk Fra Buonvicino (a replica of the famous Fra Cristoforo of (I promessi sposi*), heighten the interest of this sombre tale. With the excep¬ tion of the impulsive and engaging Alpinolo, the sardonic court-jester Grillincervello and the saintly Fra Buonvicino, the characterization is mediocre. The book owes its success to the splendid pictures of mediaeval life and to the pathos and horror of its situations. The exe¬ cution of Margherita Pusterla, a powerful but revolting scene, has been much admired. For a historian of no mean ability, Cantu, as has been justly pointed out by Mazzoni, makes curi¬ ous blunders and takes singular liberties with his sources. Written when Romanticism was supreme in Italy, (Margherita Pusterla-* is an imitation of (I promessi sposi* combined with an attempt to rival the vast panoramas, the highly colored realism and the violent contrasts of (Notre-Dame de Paris.) Consult De Sanc¬ tis, Francesco, (La letteratura italiana del se-colo XIX) (Naples 1902) ; and Mazzoni, Guido, (L'Ottocento* (Milan 1913).

Alfred G. Panaroni.

MARGOLIOUTH, mar-go'H-oot, David Samuel, English Arabic scholar: b. London, 17 Oct. 1858. He was educated at Winchester and Oxford and has been professor of Arabic at Oxford from 1889. Among his published works are (Analecta Orientalia at Poeticam Aristoteleam* (1888); (Chrestomathia Baid-wiana* (1894) ; (Letters of Abul 'Ala* (1898) ; (Lines of Defence of the Biblical Revelation* (1900) ; (Religions of Bible Lands* (1902).

MARGOLIS, Max Leopold, American He¬ brew philologist : b. Merech, Vilna, Russia, 15 Oct. 1866. In 1889 he was graduated at the Leibniz Gymnasium, Berlin, and in 1890 re¬ ceived the degree of A.M. at Columbia Univer¬ sity and the degree of Ph.D. the following year. In 1892 Dr. Margolis was lecturer on Jewish lit¬ erature at the Glenmore School for Culture Sci¬ ences, Keene, N. Y. From 1892 to 1897 he was connected with the Hebrew Union College, Cin¬ cinnati, as assistant professor of Hebrew and Biblical exegesis. In 1897 he became professor of Semitic languages and literatures at the Uni¬ versity of California, where he was associate professor from 1898 to 1905. In 1905-07 he held the chair of Biblical exegesis at Hebrew Union College. In 1907-08 Dr. Margolis visited Euro¬ pean libraries and in the following year was edi¬ tor-in-chief of Bible translation for the Jewish Publication Society of America. Since 1909 he has been professor of Biblical philology at the Dropsie College for Hebrew and Cognate Learning, Philadelphia. He is the author of (Commentarius Isaacidis quatenus ad textum talmudicum investigandum adhibieri possit tractatu Erubhin ostenditur* (1891) ; (The Co¬ lumbia College Manuscript of Meghilla> (1892); (An Elementary TextBook of He¬ brew Accidence* (1893); (The Theological Aspect of Reformed Judaism* (1904) ; (The Holy Scriptures with Commentary on Micah* (1908) ; (A Manual of the Aramaic Language of the Babylonian Talmud* (1910) ; (The Story of Bible Translations* (1917) and contributions to philological and theological publications. Since 1914 Dr. Margolis has served as chairman of the editorial committee of the Journal of Biblical Literature.

MARGRAVE (German, Markgraf), in mediaeval times, in continental Europe, a border count or commander entrusted with the protec¬ tion of a mark , or district on the frontier. As early as the times of Charlemagne marks and margraves appear. The margraves stood im¬ mediately under the German kings and em¬ perors. In the 12th century margraviates be¬ came hereditary and at last the margraves ac¬ quired the rank of princes of the empire, between counts and dukes.

MARGRY, mar'gre', Pierre, French his¬ torian: b. Paris, 1818; d. 1894. He received ! the appointment of adjunct curator of archives j in the Ministry of Marine. He was, in 1842, , appointed to study the history of the French in (America. The result of his labors was included in several volumes, including (La navigation du • Mississippi et les precurseurs de Fulton aux ' Etats-Unis* (1859); (Les Normands dans les i vallees de l'Ohio et du Mississippi (1860) ; (Les navigateurs frangais et la revolution mari¬ time du XlVeme au XVIeme siecle* (1867) ; delations et memoires pour servir a l'histoire de la France

dans les pays d'outre mer) (1867) ; (Les seigneurs de la Martiniques* (1879) ; (Decouvertes et etablissements des Frangais dans l'Amerique septentrionale* (1879-88) ; (Le conquerant des iles Canaries* (1880). Margry also was editor of (Les souvenirs d'un homme de lettres) (1877).

MARGUERITE, mar'ge-ret, a popular name for several flowers of the family Astera-cece. The blue marguerite (Felicia dmelloides) ,

or blue daisy, is a native of southern Africa, and has long been popular in greenhouses and window gardens because of its simple culture and large solitary flower-heads. The Paris daisy or marguerite (Chrysanthemum frutes-cens), a native of the Canary Islands, was in¬ troduced into cultivation in Great Britain about the close of the 18th century and has continued a popular florist's flower ever since. It is the one usually obtainable throughout the year in the stores, but especiallv during the winter. Because of a close resemblance, the name is ap¬ plied to its near relative, the ox-eye daisy (C. leucanthemum) , which is common in mis¬ managed pastures and fields, especially in the New England and adjacent States. The Reine marguerite (Callistephus hortensis) is better known in America as China aster (see Aster) and is one of the most popular out-of-door annuals of the garden, being easily grown from seed and readily adaptable to any garden soil. The English daisy (Beilis perennis) is also called marguerite, but less frequently. See Daisy.

MARIA CHRISTINA, ma-re'a kris-te'na, queen of Spain: b. Naples, 27 April 1806; d. Havre, France, 22 Aug. 1878. She was a daughter of Francis I, king of the Two Sicilies, and was married to Ferdinand VII of Spain in 1829. Upon Ferdinand's death in 1833, Maria Christina by her husband's will became regent until her daughter, Queen Isabella, should be¬ come 18. A civil war which was waged until 1840 ensued, its purpose being to place Don Carlos on the throne, and its outcome was for a long period doubtful, but the queen-regent ap¬ peared1 to care only for her chamberlain, Don Fernando Munoz, with whom she secretly con¬ tracted a morganatic marriage. Her policy as regent was

entirely subject to the will of the minister of the day which naturally resulted in a reign alternately liberal and despotic. When she affixed her signature to the law concerning the Ayuntamientos the public protested so strongly that she was obliged to resign the regency to the Prime Minister, Espartero, in 1840. In 1843, after the fall of Espartero, she returned to Madrid and in 1844 publicly married Munoz, who was made Duke of Rianzares. A revolution in 1854 compelled her > to flee the country and her return to Spain in 1864 was followed by the revolution which dethroned Queen Isabella in 1868 and she was again exiled and though allowed to return to Madrid after the accession of Alfonso XII, she died in exile.

MARIA CHRISTINA, queen of Spain : b. Austria, 21 July 1858. She was an Austrian archduchess, daughter of Archduke Karl Ferdinand of Austria, and was married by proxy to Alfonso XII of Spain in 1879. At the death of Alfonso XII in 1885, she was ap¬ pointed queen-regent during the minority of her daughter, Queen Mercedes, who was succeeded six months later by Alfonso XIII, a posthumous son. The queen-regent faced a difficult problem; she was a foreigner, the people were unsympathetic, and the political and financial condition of the country was in a. precarious state. She formed a new cabinet with Sagasta, the Liberal leader at its head, and soon won the hearts of her people by her wise and able rule. Throughout the time of her regency she com¬ manded the respect and admiration of the world

as well as her own country for her clear, far¬ sighted administration of the affairs of state and her careful training of the young king whom she endeavored to inspire with her own high sense of the responsibilities of his posi¬ tion. Even the disastrous outcome of the Spanish-American War failed to unsettle the stability of her government which on 17 May 1902 she surrendered into the hands of her son, Alfonso XIII.

MARIA II DA GLORIA, da gld’re-a,

queen of Portugal: b. Rio de Janeiro, 4 April 1819; d. Lisbon, 15 Nov. 1853. She was a daughter of Dom Pedro I of Brazil and on the death of her grandfather, John VI of Portugal in 1826, her father ceded to her the succession to the throne. Her uncle, Dom Miguel, to whom she was betrothed was appointed regent, but in 1828 upon the sailing of the young queen for Spain he usurped the throne and barred the landing of the queen. In 1832-33 Dom Pedro instigated a civil war against his brother and, through the intervention of England and

France, Maria was placed on the throne in 1834. She married Duke Ferdinand of Saxe-Coburg and though retaining her throne had a troubled and rather unsuccessful reign. Upon her death her son, Pedro V, ascended the throne.

MARIA LESZCZYNSKA, les-chin'ska,

queen of France: b. Breslau, 23 June 1703: d. Versailles, 24 June 1768. She was a daughter of Stanislas Leszczynska, king of Poland, and shared the obscurity which followed upon his exile. Her marriage to Louis XV in 1725 was arranged by the regent Due de Bourbon and the minister Fleury and was regarded as an intrigue to further their interests since it antagonized Spain by sending back the young infanta with whom an alliance had been pro¬ jected. The queen after a brief period in which she tried to control state matters lived very quietly and was noted for her charities. Con¬ sult d'Armaille, (La Reine Marie Leszczynska> (1870) ; Des Reaux, (Le Roi Stanislas et Marie Leszczynska.)

MARIA LOUISA, loo-e za, second wife of Napoleon I: b. 12 Dec. 1791; d. Vienna, 17 Dec. 1847. She was the eldest daughter of the Em¬ peror Francis I of Austria and Maria Theresa, daughter of Ferdinand, king of Naples. . Her marriage with Napoleon in 1810, after his di¬ vorce from Josephine, seemed to promise per¬ manency to his dynasty and peace to the Con¬ tinent, and her progress toward Paris through the different provinces of the kingdom was carried out like a triumph. In 1811 she bore him a son, to whom was given the title of king of Rome. In 1813, during Napoleon's absence at the war, he named her regent of the kingdom. After his overthrow she returned to V ienna, and remained there during the Hundred Days. In 1816 she received, with the title of Imperial Majesty, the duchies of Parma, Piacenza and Guastalla, and at a later period made a mor¬ ganatic marriage with her chamberlain, Count Neipperg. Upon his dying in 1829, she took another chamberlain, Count Bombelles, and in 1833 secretly married him. She governed her duchies generally with mildness, but the latter part of her reign was much disturbed by revolutionary outbreaks and the very violent means taken to repress them.

MARIA LOUISA, Order of. See Orders and Decorations of Honor.

MARIA MAGDELENA, by C. F. Hebbel. (Maria Magdelena,5 which Hebbel called a (<tragedy of common life,® is more important as the forerunner of the peasant tragedies of Ibsen and Hauptmann than for any outstand¬ ing virtue of its own. It lacks the grandeur, the large stage and large feeling, which give their special quality to (Herod and Mariamne) ; (Judith 5 and (Gyges and his Ring.5 It exag¬ gerates the asides and the soliloquies whose dramatic fitness Hebbel defended; it cannot pass the final test of tragedy, which is inevitability. And yet it is the work of a master-dramatist, and the history of realistic drama is not com¬ plete which does not include it. For it is one of the first dramas in which the tragedy is cen¬ tred, not upon a situation but upon the charac¬ ter of a group; in which the conflict is not be¬ tween the rights of the classes, but between individuals in a family for their personal rights as against (<the crudest of tyrants, the common¬ place man in the home circle.® It has been called a ((tragedy of the fallen woman,® and, as such, its weaknesses are apparent. But it is not that. The name of the play is peculiarly un¬ suitable. It is the tragedy of narrow vision, the tragedy of that fear of what people will say which actuates the life of Master Anton, of Clara, his daughter, and Carl his son, and of their friends and neighbors. (Maria Magdelena,5 was one of the most popular of Hebbel's creations, and is still played in the repertory theatres, 70 years after its writing

Edith J. R. Isaacs.

MARIA PIA, queen of Portugal: b. Turin, 1847; d. Italy, 1911. Her father was Victor Emmanuel II of Italy. At the age of 15 she was married to Luiz I, king of Portugal. She became dowager queen on 9 Oct. 1889, when her son, Carlos I, ascended the Portuguese throne. The latter and his son, Crown Prince Luiz, were assassinated in Lisbon 1 Feb. 1908, and the aged Maria Pia saw her grandson, Manuel II (q.v.), ascend the throne. Maria Pia devoted herself to charitable work and took no part in the public life of the nation. When the republic was proclaimed in 1910 she fled to Italy and sought refuge with her sister, Princess Clotilda.

MARIA THERESA, te-re'sa (Ger. ta-ra'za), German empress, queen of Hungary and Bohemia, Archduchess of Austria: b. Vienna, 13 May 1717; d. there, 29 Nov. 1780. The oldest daughter of the Emperor

Charles VI. she was carefully educated, was named heir to the throne by the Pragmatic Sanction, and in 1736 married Stephen, Duke of Lorraine, who became Grand-Duke of Tuscany in the next year, and who in November 1740, a month after Maria's acces¬ sion to the throne of Hungary, Austria and Bohemia, was named joint regent with her. France and Bavaria invaded Bohemia; and at the same time she was beset byˆ Frederick the Great in Silesia, by Spain and Naples in Italy, and by the counterclaims of Charles Albert, who was proclaimed first Archduke of Austria and then German emperor. She fled from Vienna to Presburg, convoked the Diet, raised a Hungarian army, won the alliance of Eng¬ land, made a secret peace with Prussia, surren¬ dering Silesia and Glatz, and gained peace by the Treaty of Aix-la-Chapelle, October 1748,

securing the election of her husband as German emperor in return for the cession to Spain of Parma, Piacenza and Guastalla. To revenge herself on Frederick she formed an alliance with Russia, and, by the help of her chancellor, Kaunitz, with France. With the further help of Sweden and Saxony she was preparing to strike at Prussia, when Frederick forestalled her by striking the first blow and opening the Seven Years' War (q.v.). This terrible struggle availed Austria nothing and Maria Theresa had to admit Prussia's right to Silesia in the Peace of Hubertsburg 15 Feb. 1763. Francis I, her husband, died 18 Aug. 1765, and Maria associ¬ ated with her as emperor her oldest son, Jo¬ seph II, but kept in her own hands everything save military administration. Seven years afterward, upon the first partition of Poland, she received Galicia and Ludomeria; and in 1775 Bukovina was granted to Austria by Turkey. The Peace of Teschen, closing the War of the Bavarian Succession, brought Austria the Inn Valley in 1779; but the Princes' League (Fiir-stenbund-), under the lead of Frederick II, struck a heavy blow at Austrian supremacy. Though best known for her part in European politics, Maria Theresa was equally great in interior administration ; Austrian finance was revived, agriculture encouraged and higher edu¬ cation fostered. The empress was a strict Catholic and an enemy of the Protestant Refor¬ mation, but in this latter part of her reign under the influence of her freethinking son's poli¬ cies, she was induced to enact some anti-ecclesi¬ astical legislation, which he subsequently devel¬ oped into persecutions. She was a pure and noble woman, strikingly beautiful in her youth. Ten of her 16 children survived her. Monu¬ ments to Maria Theresa are to be found in Klagenfurt, Vienna and Presburg. Her letters to her children and her friends were edited by Arneth (1881), who wrote (Maria Theresa> (1888). Consult also de Broglie, (Marie

Therese5 (1888) ; de Villermont, (Marie The¬ rese5 (1895) ; Wolf and Zwiedineck-Sudenhorst, (Oesterreich unter Maria Theresa) (1884) ; Bright, (Maria Theresa5 (1897).

MARIA THERESA, Order of. See

Orders and Decorations.

MARIAMNE, ma-ri-am'ne, granddaughter of Aristobulus and Hyrcanus, the highpriest, and wife of Herod the Great. Her history is related by Josephus from whom we learn that Herod was devotedly attached to her. She was condemned to death through the machinations of Salome, her husband's sister, on a false charge of adultery, 28 b.c. She met her fate with an intrepidity worthy of her noble ances¬ try, and was bitterly deplored by the king after her decease. Several plays have been based on the story.

MARIANA, Juan, hoo-an' ma-re-a'na, Spanish historian: b. Talavera, 1536; d. Madrid, 17 Feb. 1623. Taking holy orders he entered the Society of Jesus. To his training at the University of Alcala he owes the pure taste and eloquence of his writings. He taught theology for 13 years with distinction in Rome, Sicily and Paris, returning to the Jesuits' College at To¬ ledo in 1574, where he wrote his (Historia de Rebus HispaniaP (1st ed., Toledo, 1592), in elegant Latin, but afterward translated it into Castilian. His tone is impartial, though he

loves Spain and admires Spanish virtue. Though a Jesuit he complains of Pope Alexan¬ der VI. Though a Spaniard he is not blindly prejudiced in favor of his king. He describes with sorrow the conquest of Naples; and his censure of Ferdinand is moderated only by considering his good qualities as personal, his bad ones as common to all princes. He has not, however, much claim to originality and borrows largely from Zurita (q.v.). Four editions of the translation appeared during his lifetime, each with corrections and additions. An Eng¬ lish translation was made by Stephens, the con-tinuator of Dugdale's ˆonasticoiP (London 1609, folio).

MARIANA, ma-re-a'na, in American colo¬ nial history, a name given by John Mason to the tract or territory granted to him between the Salem River and the Merrimac. Here he founded an agricultural settlement and formed the Laconia company in 1629. Mason returned to England in 1633 and died there two years later. In 1691 his heirs sold all his lands and rights in New Hampshire to Governor Allen.

MARIANA (ma-re-a'na), or MARIANNE ISLANDS. See Ladrone Islands.

MARIANNA, ma-ri-an'a, Ark., town, county-seat of Lee County, on L Anguille River, at the head of navigation, and on the Saint Louis, Iron Mountain and Southern rail¬ road, about 25 miles north-northwest of Helena.

It is in a fertile agricultural region in which cotton is one of the principal crops and in the vicinity are large forests. The chief industrial establishments are lumber-mills, cotton-gins, cotton-compresses and cottonseed-oil mills. The town is at the head of navigation and has considerable trade by steamers and railroad. The town owns and operates the waterworks. There are banks and newspapers. Pop. 4,810.

MARIAZELL, ma-re-a-tsel', Austria, a picturesque mountain village in the north of Styria, near the Salza, 60 miles southwest of Vienna. It is a noted pilgrim resort, annually visited by about 200,000 persons, attracted by the celebrated image of the Virgin and Child, enshrined in a handsome church founded in 1363, and rebuilt in 1827. Pop. about 1,500.

MARIBOIS. See Nagrandians.

MARIBOJOC, ma-re-bo-hok', a pueblo of the province of Bohol, situated on the south¬ western coast on Maribojoc Bay, eight miles north of Tagbilaran, two miles from the mouth of the Abalan River. It is an important road centre. Pop. 10,900.

MARICOPA, ma-re-ko'pa, or COCO-MARICOPA, an Arizona tribe of Indians, a branch of the Yumans, formerly inhabiting the region around the confluence of the Gila and Colorado rivers. Their descendants and the Pimas, with whom they subsequently confeder¬ ated, are now to be found in the Gila River Reservation to the number of about 400. In their aboriginal state their dress was of the scantiest description, and their dwellings and storehouses were of woven straw and cornstalks over a pole framework. They were an agri¬ cultural people and raised large crops by irriga¬ tion. Under missionary

influence they have been civilized and are now noted for their in¬ dustry, their efforts at self-improvement and

their manufactures of cotton cloth, baskets and pottery.

MARIE ANTOINETTE, mar'I an-toi-net' (Fr. ma-re an-twa-net), queen of France: b. Vienna, Austria, 2 Nov. 1755; d. Pans, 16 Oct. 1793. She was the daughter of the Emperor Francis I and the celebrated Maria Theresa. She left Vienna for Versailles in 1770, when only 15, to marry the young Due de Bern, after¬ ward Louis XVI of France. When her hus¬ band ascended the throne in 1774, she gained the affections of the people by repeated acts of generosity. It was, however, soon observed that her natural freedom of manner brought on her the criticism of enemies about the court. It was thought, too, as many believe, with reason, that she was to a certain extent controlled by her mother as an Austrian spy. An extraordi¬ nary occurrence added fresh force to calumny and tarnished the fair name of the queen who was not to blame. This was the affair of the <(Diamond Necklace,)} in which the Cardinal Louis de Rohan, the magician Cagliostro and the Countess de Lamotte were the chief actors.

It was certain that Marie Antoinette had great influence over the king, and that she constantly opposed such measures of reform and economy as had been proposed. Her extravagance was regarded by the people as one of the. chief causes of their poverty. Her unpopularity in¬ creased, and the general indignation was raised to the highest pitch by the enthusiastic reception given her at the banquet on 1 Oct. 1789, where the white Bourbon cockades were worn and the national cockade trampled under foot. The in¬ surrection of women, the attack on V ersailles and the transfer of the royal family to Paris followed in a few days. It was the queen who advised the flight of the royal family from Pans to join Bouille's army in June 1791, which ended in their capture at Varennes. From that time they were viewed as traitors. On 10 Aug. 1792, the last day of the royalty, the queen exerted all her power to induce the king to resistance. This he thought was vain, and he was led with his consort before the Legislative Assembly. She heard his deposition announced, and then ac¬ companied him to the prison of the Temple. There, deprived of every semblance of royalty, she displayed magnanimity and patient endu¬ rance. In August 1793, she was removed to the Gonciergerie, and in October was brought be¬ fore the revolutionary tribunal. She was charged with having dissipated the finances, ex¬ hausted the public treasury, corresponded with foreign enemies of

France and favored its do¬ mestic foes. She replied with firmness and de¬ cision, and heard her sentence pronounced with perfect calmness. On the same day she was guillotined. Marie Antoinette's faults were due in great measure to her defective education and difficult position. Her expiation of them made her a general object of pitying interest. Con¬ sult Lescure, (La vraie Marie Antoinette) (1863); Campan, (The Private Life of Mane Antoinette1* (1887); Bicknell, (The Story of Marie Antoinette* (1897); Belloc, H., (Marie Antoinette* (1909) ; Heidenstam, O. G., c Marie Antoinette, Ferson et Bernave: leur Correspondance) (Paris 1913).

MARIE DE FRANCE, ma-re de frans, French poetess of the 12th century, a native of Ile-de-France, whence her surname, who spent

her life in England, where she was well known at the court of Henry II. Her <Lais.) largely based on Breton stories, and full of Celtic spirit and pathos ; fables, a revision under the title <Ilsopet> (that is, 2Esop) of an English collec¬ tion; and a tale, (Le Purgatoire de Saint Patrice,) make up the body of her work. The (.Lais) are edited by Warnke (1900), and the <Purgatoire> by Jenkins (1894) ; each edition has a valuable preface.

MARIE GALANTE, ga-lant, West Indies, an island, one of the Lesser Antilles, belonging to France, about 15 miles southeast from Guade¬ loupe. The area is about 60 square miles. The chief productions are sugar, coffee, tobacco, in¬ digo and cotton. It is a dependency of Guade¬ loupe. Columbus discovered it in 1493, and named it from his vessel, the Santa Marie. The French occupied it in 1647, and lost it several times. In 1825 it suffered severely from the hurricane which desolated Guadeloupe (q.v.). Pop. 14,268, chiefly negroes.

MARIE DE MEDICIS, de ma-de-ses, queen of France: b. Florence, 26 April 1573; d. Cologne, 3 July 1642. She was the daughter of Francis I, Grand-Duke of Tuscany, and was married by proxy, 5 Oct. 1600, to Henry IV of France, with whom she constantly quarreled, partly because of his inconstancy and his open favor to the Marquise de

Verneuil, and partly because of her own haughty, obstinate charac¬ ter, which was not unmixed with ambition. For years she urged him to have her crowned queen ; the ceremony took place 13 May 1610, and on the next day the king was assassinated. Marie was accused of complicity in the plot, but the charge is not proven. For seven years she acted as regent and showed a strong friendship for Spain and the Catholic Church, being ad¬ vised by the nuncio and the Spanish Ambassador as well as by such favorites as the Concinis. She quarreled with her son, later Louis XIII, was reconciled to him by Richelieu, and upon her attempt to displace the latter was forced by that great minister again to leave court in 1630. Her last years were spent in exile in Belgium, England and Cologne. The story of her pov¬ erty during these years is untrue. Consult Miss Pardoe, (Life and Memoirs of Marie de Medici) (1852) : Lord, (The Regency of Marie de Medicis) (1903).

MARIE PAULINE, Princess Borghese.

See Borghese, Marie Pauline.

MARIENBAD, ma-re'en-bad, Czecho-Slova- kia, one of the most frequented and picturesque of the Bohemian watering-places, near the western frontier, in a triangular basin formed by several mountain ranges, about 32 miles northwest of Pilsen. The village, built on a slope, surrounded with woods of pine and fir trees, except in front, has a town-house with assembly-room and reading-rooms; several bathing establishments, theatre, *etc.* The springs utilized are eight in number and are cold; some are alkaline and containing Glauber's salts, others alkaline and chalybeate, *etc.* Seven are used externally and internally, one is used for bathing alone. Great quantities of the water are exported in times of peace. Pop. about 6,500.

MARIETTA, ma-ri-et'a, Ga., city, county-seat of Cobb County, on the Nashville, Chat¬ tanooga and Saint Louis Railroad, about 20 miles

north by west of Atlanta. Kenesaw Mountain (q.v.) is west of the city. It was settled about 1840-41 and incorporated in 1852. A city char¬ ter was granted1 in 1885. It is in a fertile agri¬ cultural region in which stock-raising is one of the prominent occupations. Large marble quar¬ ries are in the vicinity. The chief manufac¬ tures are chairs, dressed marble and machine-shop products. The chief buildings are the churches and schools. The Clarke Library, which contains about 5,500 volumes, is in Marietta. A national cemetery located here

contains the graves of 10,279 soldiers ; the un¬ known dead number 2,967. The mayor and council are chosen at a popular election. Pop.

(1920) 6,190.

Marietta “was an intermediate objective point in General Sherman’s campaign for Atlanta, and’ when he crossed the Etowah 23 May 1864, his columns were headed for that place by way of Dallas and New Hope Church, but Gen. J. E. Johnston threw his army in his front and checked him at New Hope Church and Dallas. After many hard-fought battles and constant severe skimishing, Johnston abandoned his Dallas lines (see Dallas, Ga., Battle Lines at) on 4 June, and took position covering Marietta, his left on Lost Mountain, his right beyond the railroad and behind Noonday Creek, with a strong advanced position on Pine Moun¬ tain. Sherman repaired the railroad, established a secondary, fortified base at Allatoona Pass, and joined by Blair’s Seventeenth corps ad¬ vanced 10 June and confronted Johnson in his new and strong position, and by the 14th was strongly intrenched before it in a continuous line of 10 miles. Johnston abandoned Pine Mountain on the night of the 14th, and Sher¬ man advanced his lines, bringing on the en¬ gagement at Pine Mountain (q.v.) 15 June. The general movement was continued on the 16th and the right thrown forward to threaten the railroad below Marietta. On the 18th Johnston fell back to a new line, including Kenesaw Mountain, which was strongly forti¬ fied, and Sherman pressed in closely on the centre and left, north of Marietta, still con¬ tinuing the extension of his line to the right, south of it. Johnston, making a correspond¬ ing movement by his left, encountered Sher¬ man’s right at Kolb’s Farm (q.v.) on the 22d. Sherman assaulted Kenesaw Mountain (q.v.) on the 27th, and was repulsed. Flanking opera¬ tions were then renewed to the right to reach the railroad, and Johnston, finding it in danger and his communications with Atlanta threatened, after being 26 days under an uninterrupted can¬ nonade and infantry fire, abandoned Marietta on the night of 2 July and fell back to a new line, previously selected and intrenched, 10 miles south of Marietta, and covering the railroad and his pontoon-bridges across the Chattahoochee, with an advanced position at Smyrna Camp¬ ground. Sherman occupied Marietta on the morning of 3 July. The Union loss in the operations around Marietta was 1,790 killed and missing, and 5,740 wounded, an aggregate of 7,530. Johnston reported a Confederate loss of 468 killed and 3,480 wounded. Consult (Official Records) (Vol. XXXVIII); Sherman, (Memoirs) (Vol. II) ; Van Horne, (History of the Army of the Cumberland0 (Vol. II) ; Johnston, (Narrative.)

MARIETTA, Ohio, city, county-scat of Washington County, on the Ohio River at the mouth of the Muskingum, and on the Baltimore and Ohio and Pennsylvania railroads, about 95 miles, in direct line, southeast of Columbus. The city is in a coal, iron, petroleum and gas region with fertile agricultural lands in the valleys. Seven hundred carloads of vegetables and 400 carloads of fruit are shipped from this county annually to other markets. The manu¬ facturing establishments include chair factory , glassworks, oil machinery and tool works, brick plant, foundries, saddle and harness plant, sheet and tin plate mill, five chemical plants, button plant, safe-cabinet works, paint and color plant, automobile devices plant. There are five banks with combined assets of over $8,000,000. The principal buildings are the Marietta College, the public schools, the churches, the county courthouse, the city hall, the post office, the chamber of commerce, the armory, public library, club houses, thiee office buildings, *etc.* The government is vested in a mayor and council and is administered ac¬ cording to the <(Ohio Municipal Code.®

The site of Marietta was once part of a remarkable group of ancient works, which con¬ sisted of two sections, one containing about 40 acres, the other about 30 acres. The remains of mounds, truncated pyramids, walks, walls and other ancient works still exist, although the city covers a large part off the original en¬ closures. The first settlement was made in 1788 by people from New England, under Gen. Rufus Putnam, acting for the ((Ohio Com¬ pany® who had secured a grant of lands on both sides of the Muskingum River. . The place was named in honor of Marie Antoinette. Arthur Saint Clair organized here July 1788 the Northwest Territory. In 1800, Marietta was incorporated' as a town. Fort Harmar, built in 1785, was opposite Marietta, and in 1890 the village of Harmar, once the site of the fort, was annexed to the city. The building used as the land office for the «Ohio Company,® the old Block House, and the mansion of the first governor of Ohio, are still standing here and in good condition. The museum contains many things of historic interest. Many of the pioneers of New England as well as of Ohio, and many of the

Revolutionary soldiers, were buried in the Marietta cemeteiy.. Pop. approxi¬ mately, 16,000. The city limits have been extended and several large plants have been established. Consult King, <Historv of Ohio' ; Hoar, (Oration at the Celebration of the Cen¬ tennial of the Founding of the Northwest at Marietta.'

MARIETTA COLLEGE, in Marietta, Ohio, founded in 1835 for men and women. It has college and preparatory departments; the latter is known as Marietta Academy. The courses lead to the degrees of A.B., Ph.B. and B.L. Courses are provided for work in music, art and military science, and short summer schools are given for work in the arts and sciences. The library, which has about 76,000 volumes and 30,000 pamphlets, is noted for its books on the history of the Northwest. In 1917 there were connected with the college 19 instructors and about 225 students. The grounds and buildings were valued at $300,000,

the productive funds at $587,000, and the total income $49,384.

MARIETTE, ma're'et, Auguste Edouard,

French Egyptologist: b. Boulogne-sur-Mer ,11 Feb. 1821; d. Cairo, 19 Jan. 1881 He was educated at the Boulogne Municipal College and in 1839 went to England as professor of French and drawing. He returned to France in 1840, took his degree at Douai in 1841 and became professor at his alma mater, the Boulogne Municipal College. While so engaged he be¬ came interested in archaeology and in 1847 pub¬ lished (Lettres a M. Bouillet,' an essay on the history of Boulogne. In 1848 he received a posi¬ tion in the Egyptian museum of the Louvre; and in 1850 was sent by the government to gather Coptic, Syriac, Arabic and Ethiopic manuscripts in Egypt. His excavations and dis¬ coveries in connection with his search for the true site of Memphis led to the finding of many important remains, such as the Serapeum, the first Memphian temple discovered, near the three great pyramids. Beginning to excavate four miles west of the accepted site of Memphis, Mariette came first upon an avenue of sphinxes, which led directly up to the magnificent granite and alabaster temple of Serapis mentioned by Strabo, which contained the sarcophagi of the sacred bulls of Apis from the 19th dynasty to the Roman supremacy. Besides these he found no less than 2,000 sphinxes, and over 4,000 statues, bas-reliefs and inscriptions, some evi¬ dently of Greek construction ; and various streets, colonnades, and other structures belong¬ ing to a great city. His excavations around the base of the

sphinx near Gizeh not only disclosed the entrance to it, but proved it to be sculptured out of the solid rock. In 1854 he returned to Pans and was made assistant conservator of the Louvre; and in 1855 was sent to Berlin to study Egyptian remains in the museums there. On his return to Egypt, in 1858, the viceroy made him conservator of the monuments and antiqui¬ ties of the land, with the title of bey. later pro¬ moted to pasha, with an annual appropriation for the prosecution of his researches, and the foundation and maintenance of the museum of Boulak. His discoveries at Tanis revealed the monuments of the Hyksos dynasty, and those at Thebes explain the chronology of the various dynasties. In 1860 he made the important dis¬ covery of the mummy of Queen Aahhotep, of the 18th dynasty, with a wealth of jewels of exquisite workmanship belonging to her. In 1873 the Institute of France awarded him the biennial prize of 20,000. francs. His discoveries have been of utmost importance for the light that they have thrown upon the earliest periods of Egyptian history. His chief published works are (Memoire sur la mere d'Apis' (1856) ; (Apergu de l'Histoire d'Egypte' (1864) ; <Nouvelle table d'Abydos' (1856), account of a second tablet found in Abydos which supplies the vacancies of the first and gives a list of the kings of the first six dynasties, corroborating that of Maneths; (Le Serapeum de Memphis) (1857-64) ; (Fouilles executees en Egypte, en Nubia, et an Soudan d'apres les ordres du vice-roi d'Egypte> (1867); (Notice des prin-cipaux monuments du musee de Boulak' (1870) ; (Les Papyrus egyptiens du musee de Boulak) (1871) ; (Album du musee de Boulak) (1873) ; (Les Mastabas de l'Ancien Empire' (1881-89).

Mariette lies buried in the museum-garden at Boulak, inclosed in an ancient Egyptian sarcophagus. Consult Mariette, Edouard, (Mariette Pacha> (Paris 1904) and Maspero, G. C. C., (Notice biographique sur Auguste Mariette) (ib. 1905).

ˆMARIGNOLLI, ma'ren-ydrie, Giovanni de', Italian traveler: b. Florence, probably about 1290 ; date of death unknown, but subsequent to 1357. Entering the priesthood, he was ap¬ pointed one

of the four legates sent ‘by Bene¬ dict XII to the great Khan of Cathay in 1338. The four legates accompanied bv about 46 fol¬ lowers traveled east via Constantinople, whence in June 1339 they sailed across the Black Sea to Kaffa. They spent the winter of 1339 at Sarai on the Volga, enjoying the hospitality of Mahommed Uzbeg, Khan of the Golden Horde. From his. court the party traversed the steppes to Almalig (Kulja), in the modern Ili. They reached Peking via Kamul about June 1342, and were well received by the Khan. The arrival of this embassy is chronicled in Chinese annals. Marignolli remained three or four years in Peking, after which he wandered through east¬ ern China to Amoy Harbor. In 1348 he reached Kaulam (Columbum) in Malabar, where he founded a Latin church. He stayed 18 months there after which he appears to have visited the coast near Madras, thence journeyed to Java, and on a voyage to Europe was wrecked at Bernwala (Pervily), Ceylon, where he was de¬ tained four months by the native ruler, Khoja Jahan. Marignolli returned via Armuz, Bagdad, Mosul, Aleppo, Damascus and Jerusalem, ar¬ riving at Avignon in 1353 and delivering a letter from the Khan to Pope Innocent VI. In 1354 the emperor, Charles IV, made Marignolli one of his chaplains, and soon afterward he was consecrated bishop of Bisignano. It does not appear, however, that he ever took possession of his see. About 1355 he removed in the ret¬ inue of the emperor to Prague and was papal envoy to Florence in 1356. In 1357 he was at Bologna. The last trace of Marignolli is a letter to him from Richard Fitz Ralph, arch¬ bishop of Armagh, Ireland, in which the writer objects to the sending of Marignolli as papal envoy to Ireland. In 1768 Marignolli’s work appeared in volume II of (Monumenta historiae BohemiaeP edited by Dobner. Modern readers were first attracted by the account published by J. G. Meinert (1820). Consult Beazley, C. R., (Dawn of Modern Geography) (Vol. Ill, 142,

180-181, 184-185, 215, 231, 288-309, 1906).

MARIGOLD, a popular name for several unrelated plants. The pot marigold (Calendula officinalis) is one of the most widely popular of garden plants. It is grown for its brilliant flow¬ ers which range from white to rich orange, and for its flower-heads, which are often used to flavor soups, stews and’ dressings. The African marigold (Tagetes erecta) and the French mari¬ gold (T . patula) are also widely used for orna¬ ment. Their flowers are usually some shade of yellow, but some are brown and some striped. The Cape marigold (Dimorphortheca spp.) is also grown for ornament but is less popular than the above. The corn-marigold (Chrysan¬ themum segetnm) is a

weed especially common in Europe grain-fields, but also cultivated for its flowers, for which the plant is sometimes forced in greenhouses. All these belong to the

family Asteraceoe. The marsh marigold (Caltha palustris) is a member of the family Ranun-culacecc. It is a well-known plant in the marshes and wet meadows of North America. The leaves, gathered before flowering, are widely used as a potherb under the name of ((cowslip greens. }) The name fig marigold is applied to various members of the genus Mesembryanthemum, several of which are cul¬ tivated for their grotesque forms, 'their peculiar foliage, *etc.*

MARIKINA, mar-i-ke'na, a Brazilian name

for a marmoset (q.v.).

MARINDUQUE, ma-ren-doo'ka, Philip¬ pines, an island lying southwest of the province of Tayabas, Luzon, and 30 miles southeast of Lipa ; it is circular in shape, being 24 miles north and south and 23 miles east and west; area, 667 square miles. A mountain range runs from north to south across the island, and near its centre are short spurs running east and west. The staple products are rice, cocoanuts and hemp ; the island is heavily wooded, and fruits are abundant and an important article of food among the natives. The chief industry is the raising of rice, of which large quantities are exported; the hemp of Marinduque is of a peculiar fine quality, and is used for weaving. At the southern end of the island there is ex¬ cellent pasturage, and horses and cattle are raised. It is in the route of steamers in the local trade between Manila and the Visayan Islands and Mindanao, and its two chief towns are ports of call for these steamers. In the winter of 1898-99 Marinduque was occupied by the United States troops, it being the first im¬ portant position in the south taken after leav¬ ing Verde Passage. In 1901, with the small islands adjacent, it was created a province under civil government; 23 June 1902 the pro¬ visions of the Provincial Government Act were extended to the island of Mindoro and the Lubang group by. incorporating them with the province of Marinduque. Pop. about 52,000, mostly Tagalogs.

MARINE ANIMAL OILS. See Oil.

MARINE CITY, Mich., city in Saint Clair County, situated on the Saint Clair River and the Rapid Railroad, 45 miles north of Detroit. It enjoys considerable reputation as a summer resort, but is also a busy

manufacturing centre with salt works, beet sugar factories and ship yards. The city owns the water-supply system. Pop. 3,770.

MARINE CORPS. See Navy of the United States.

MARINE ENGINE. See Internal Com¬ bustion Engine.

MARINE HOSPITAL SERVICE. See

Hospitals, Military ; Hospital Ships.

MARINE INSECTS. Insects have not only invaded rivers and lakes, they have estab¬ lished themselves to some extent at least, along the margin of the sea. On a sunny day by the shore myriads of flies may be seen hovering over the seaweed cast up by the tide. These have been developed from grubs which live and feed in the decaying weed, and are able to bear immersion twice daily. Around the rock-pools many midges may be noticed. Their grubs feed on growing green seaweed, and spend their

whole life in the salt water, breathing the dis¬ solved air, as do their fresh-water relations by means of gill-filaments, or simply through the surface of the skin. Many species of beetles inhabit the shore, and are submerged twice daily, when they lurk under stones or burrow into the sand; their hairy bodies are not easily wetted, and in one of the best-known marine beetles (Aepus) there are paired air-sacs in the hind-body which are believed to act as reser¬ voirs for breathing while the tide is up. Sev¬ eral kinds of very small springtails may be seen on the surface of the rock-pools at low-tide , probably when the water rises they retire into crevices of the rocks. They are covered with a very fine, dense pile, and it seems impossible to

wet them. . t

The absence of wings is a common character

among the seashore insects. The beetles ot t e genus Aepus are

wingless, and so is the small bug Aepophilus often found in their company, as well as the female of the midge Clumo, whose mate, though winged, appears not to fly, but to use his wings as sails as he skims over the surface of the rock-pools. <(The tendency of insects on oceanic isles to lose their wings has often been noticed'* says Carpenter, and the loss of the power of flight explained as an ad¬ vantage, since insects which do not fly cannot be blown out to sea. Possibly the absence ot wings in so many seashore insects can be ex¬ plained in like manner. Several genera of pond-skaters have one or two species which frequent the water of estuaries and harbors; these are in all cases wingless, though their fresh-water relations are, as a rule, winged. _ The extreme of adaptation to marine life is shown by the bugs of the genus Halobates, also belonging to the family Hydrometi idee , with their short anchor-like forelegs and their im¬ mensely long and slender middle and hind-legs, the middle shin and foot being fringed with long hairs. The elongate wingless fore-body ot these insects and the greatly reduced hind-body give them a most peculiar and chaiacteristic appearance, and the dense pile wherewith they are clothed keeps them dry. They have been observed gliding over the calm seas of the tropics, often hundreds of miles from land or clinging to drifting substances whence the> could suck food. Consult Carpenter, G. H., Unsects, their Structure and Lite (lUJJ) , Miall (Natural History of Aquatic Insects

(1895).

MARINE INSURANCE. See Insurance, Marine.

MARINE SEDIMENTS, th se

in the ocean, in contrast to terrestrial deposits laid down on land. . They are usually charac-ized by uniformity, in thickness and character over rather large areas, and commonly contain fossils of animals known to live only in the sea. The common types are conglomerates, sand¬ stones, shales and limestones. See Oceans, sec¬ tion on Ocean in article on Geology, and section on Sedimentary Rocks in article on Rocks.

MARINER'S COMPASS. See Compass, Mariner's.

MARINES. See Marines, United States.

MARINES, United States.— The oldest branch of the United States military service, inaugurated in 1775. While until recent years

the services of this corps did not receive special notice through recent foreign expeditions their conspicuous bravery under the most trying com ditions (Peking, Vera Cruz, etc.) brought them a prominent place in the public eye, a con¬ dition reaching its climax during t e War in 1918 (Belleau Wood, etc.). lhe

marines have had numerous (flSEaS soubriquets conferred on them among them might be mentioned ((Webfoot sol¬ diersˆ; <(Soldiers of the Sea,® while Kipling called them ((Soldier and sailor, too.® The Hon. Josephus Daniels, Secretary of the Navy, prefers to term them «the efficient fighting, build-United States Marine • and landing force of Corps msigma. ˆ Navy,® which title well

defines some of the activities that come within their scope. The Marine Corps is an independ¬ ent branch of the military service under direc¬ tion of the Secretary of the Navy. Iheir home service consists, of protecting government prop¬ erty at naval stations and use m national emergencies (riots, insurrection, etc.) Abroad they are the first line of mobile defense ot naval bases and stations ; they are used for the protection of American lives and interests in foreign countries, besides acting as landing parties with expeditionary forces and on ad¬ vanced base duties.

The equipment of the Marine Corps con¬ tains at present: Infantry, field artillery, ma¬ chine-gun companies, fixed defensive artillery, engineers, signal corps, _ *etc.* An aviation branch used heavier and lighter than air craits in efficient service on the Allies western front in 1918. The corps is then a complete army in itself, lacking only cavalry. And on several recent expeditions horses have been brought into play as mounts for some officers. _ Every man in the ranks obtains a perfect training and practice in marksmanship, and their officers, after the full course at the Annapolis Naval School, which constitutes the naval officers course, have to pass through two years' vigor¬ ous study and drill at the Norfolk School for

Marine Corps Officers.

History.— The first record of ˆ American marines in this country dates back to 1740 when three regiments were organized in New York for service under the flag of Great Britain. On 10 Nov. 1775 a Marine

Corps was organized under a resolution of the Continental Congress with one colonel, two lieutenant-colonels, two majors, etc., to be known as <(First and Second Battalions of American Ma¬ rines.® Already by February 1777 a battalion of 300 marines and landsmen, under Maj. Samuel Nichols, captured the English forts of New Providence, Bahamas — United States marines' first battle. Throughout the Revolutionary War the marines did an appreciable share of the fighting which brought victory and free¬ dom in its train. Conspicuously active were they under John Paul Jones, in the battle be¬ tween the Ranger and the Drake, Lieutenant Wallingford losing his life commanding his marines. Forty-nine out of 137 marines in the great battle between the Bon Homme Richard and the Serapis were killed or wounded. The State of Pennsylvania fitted out the Ryder Ally

with a crew of 110 seamen and marines with Captain Barney in command, in 1782, which fought the hot combat in Delaware Bay, cap¬ turing the British ship General Monk, generally looked upon as one of our most brilliant ac¬ tions. With the Revolution ended, both army and navy were disbanded, the new Navy De¬ partment being created April 1798 and the Marine Corps organized and established 11 July of the same year.

The next noteworthy marine engagement was in 1803 in the War with Tripoli when the Philadelphia's Lieutenant Osborne and guard were taken prisoners <(after the most gallant exertions.® It was the marines who rendered such valuable service to General Eaton (q.v.), consul at Tunis, in his remarkable march of about 600 miles across the desert of North Africa, from Alexandria to Derne, on arriving at which latter place native fortifications were stormed and captured by the marines under Lieutenant O'Bannon. They hauled down the Tripolitan flag and hoisted that of the United States of America, this being the first time the American flag dew on a fortress in the Old World. ˆTripoli® has appeared inscribed on the banners of the Marine Corps ever since. When, in the War with Great Britain (1812), the Constitution defeated the Guerriere, it was the commander of the

marine guard, Lieuten¬ ant Bush, who was the first officer killed, while repelling boarders during a critical phase in the action. In the capture of the frigate Mace¬ donian by the United States (Commodore Deca¬ tur) the marines, under Lieutenants Anderson and Edwards, are cited as fighting with <(utmost steadiness.® Lieutenant Gamble, of the ma¬ rines, was commended for <(skill and efficiency® in commanding in turn his guard, a prize ship and a fort at Nukahiva, Marquesas Islands. In the sanguinary combat between the Shannon and the Chesapeake, so famous in our history, Lieutenant Brown and 11 of his men were killed and 20 wounded. In the battles of Lake Champlain and Lake Erie the marines actively participated, also in the engagement between the Constitution and the Cyane and Levant, in the combat between the President and Endy-mion and in the battle on Lake Ponchartrain. They were with the army under Scott in Can¬ ada, with General Winder at Bladensburg, at New Orleans with General Jackson, at North Point, Baltimore, and in minor actions on Maine's coast and the shores of Chesapeake and Delaware bays. The Indian outbreak in Geor¬ gia (1836) found the army unprepared and Colonel-Commandant Archibald Henderson, of the marines, quickly volunteered the corps' serv¬ ices, and they fought, under General Jessup, through southern Alabama and the Florida Everglades against the guile of the Creeks and Seminoles. Previous to this they had been engaged against Spanish pirates in the West Indies and in Sumatra, and in the great fire in New York (1835) they had guarded private and public property.

In 1845 Mexico declared war against the United States and (to 1848) the marines were active in all sections, making a brilliant record. They were on the Pacific Coast under Commo¬ dores Sloat, Shubrick, Stockton ; on the East Coast they fought under Commodores Connor and Perry; on shore under Generals Scott, Taylor and Worth. At the capture of Monte-

rey, San Francisco and Mazatlan they were present, and their action at Los Angeles, San Diego, San Jose, San Gabriel and Guaymas called forth the complimentary recommendation of Commodore Shubrick that the government should double the force of marines on his sta¬ tion, even if thereby they had to reduce the force of ordinary seamen and landsmen. The captures of Matamoras, Tampico, Frontera, Tabasco, Vera Cruz were aided by marines, and the marines were the first division to enter the Grand Plaza, City of Mexico. Hence the inscription that since is read on the banners of the corps: (<From the Shores of Tripoli to the Halls of the Montezumas.® But the greatest

glory of the marines in this Mexican campaign happened when (13 Sept. 1847) Majors Twiggs and Reynolds, of this corps, were selected to lead a body of men picked from all the differ¬ ent corps to storm the castle of Chapultepec. The brave Twiggs fell early in the advance, but in a hand to hand fierce fight, bayonets crossed, rifles clubbed, the bold assailants gained their objective.

In 1852 and 1853 Commodore Perry had these same heroes, as a part of his expedition to Japan, marching <(to the same music® through the streets of Yeddo, when he opened the doors of the Mikado's realm to civilization and commerce. It was the marines who, 100 strong, were dispatched (1859) to Harper's Ferry to capture John Brown and suppress the rebels. They carried out the commission to the satisfaction of the Secretaries of War and Navy. First work of the marines on the out¬ break of the Civil War (1861) was in re¬ inforcing the troops at Fort Sumter, at Fort Washington, on the Potomac River, Fort Pick¬ ens, Florida, and in destroying the navy yard, ships, etc., at Norfolk, Va. They did their share of fighting at the first battle of Bull Run, in the capture of Hatteras Inlet and in the Dupont expedition as well as in the battle of Port Royal and the expeditions along the coast and rivers of South Carolina, Georgia and Florida. They had an active part in the battle between the Merrimac and the Minnesota, Cumberland, Roanoke and Saint Lawrence. The marines were active in the operations at Roanoke Island, North Carolina Sound, James and Potomac rivers and on the lower Missis¬ sippi. They were the first Federals to re¬ occupy (1862) the Norfolk navy yard, and par¬ ticipated in the night attack on Fort Sumter (1863) as well as in the fight between the Alabama and Kearsarge. In that same year they were besieging the Simonoseki forts at Japan, and taking a part in the battle of Mobile Bay. The marines were in the attack on Fort Fisher. Lieutenant French, of the marines, and two sergeants were commissioned to arrest and deliver Captain Semmes of the Confederate cruiser Alabama and succeeded. In 1867 and 1870 the marines were part of the Formosa expedition against savages, and in 1871 led the advance against the forts in Korea. They were useful during Boston's great fire in 1872 and in the labor riots of 1877. A detachment of marines, in 1882, landed at Alexandria, Egypt, preventing pillage. After numerous minor ac¬ tivities on this continent protecting Americans and property on Nevassa Island (1891), Val¬ paraiso and at Honolulu (1893), Korea and China, etc., we come to the Spanish War when

(1898) Guantanamo, Cuba, was occupied by a detachment of marines and, assisted by the ships, successfully defended the place against 6,000 Spanish soldiers, creating a base for the navy. The marines, at the secondary batteries, are credited with doing more damage to the Spanish cruisers than the other gunners at the battle (3 July 1898) of Santiago, and it was the marines that Dewey in May of that year landed and turned over the occupation of Cavite as fort and naval station after the battle of Manila Bay. In 1900 marines from Manila (later reinforced by marines from the United States) landed in China and did their share in the fighting at Tien Tsin, and on the march to the relief of the besieged American legation at Peking in the Boxer Rebellion. Spectacular was the expedition commanded by Captain Thorpe, in 1903, when, accompanied by a company of marines mounted on camels, they crossed the African deserts into the heart of Abyssinia, as escort of an American repre¬ sentative, and brought about a conference with King Menelik in his capital. In the same year marines were protecting the American lega¬ tion at Seoul, Korea, where insurrection ex¬ isted. Four battalions of marines were sent to Cuba in 1906 and, later in conjunction with the army, became the <(Army of Cuban Pacifica¬ tion,® successfully pacifying the incipient Cuban revolution, with a two-year occupational serv¬ ice. In 1908 the marines were policing at the election polls at Panama, and the next year were protecting American citizens and property against Nicaraguan revolutionists at Corinto, and (1909) in Bluefields, Nicaragua. Back to the same place came the marines in 1912 during another Nicaraguan intense revolutionary spasm;' a battalion, under Major Butler, to Corinto, a regiment, under Colonel Pendleton, followed. The regiment fought several en¬ gagements but pacified the country, with a loss of four lives and several wounded. A regi¬ ment of marines under Colonel Moses, on the Prairie , was dispatched to Port au Prince to protect Americans employed as customs col¬ lectors, border fighting having taken place be¬ tween the negro republics Santo Domingo and Plaiti. In 1914, under the present major-gen¬ eral commandant, George Barnett, marines landed, 22 April, in Vera Cruz, Mexico, and did their active share in the military occupa¬ tion of that place. That day and the next they lost five lives and a number were wounded, facing a desperate resistance. They occupied the town till November. Intermittently the marines were doing duty in Santo Domingo or Haiti in the disturbances of the island repub¬ lics up to

1917.

Marines, Activities in France in 1918 — Belleau Wood, Soissons, *etc.* — On 30 May

1918, the Second Division of the United States Marines was selected under its commander,

; Maj.-Gen. Omar Bundy, # to go to the re¬ lief of the French army in retreat before the German drive. The Fifth and Sixth regiments and the Sixth Machine-Gun Battalion, forming ! the Fourth Brigade of the Second Division, commanded by Brig.-Gen. James G. Harbord (made major-general end of June), were in reserve in a rest area at Montdidier, when the order to the front arrived. Jubilant at the thought of active service they crowded onto their trucks and traveled 30 wearying hours

(72 miles) to the scene of battle. Reaching their destination stiff and sore in the early morning of 2 June, but without delay they moved into line as support division to the rear of the French (Les Mares Farm, Bois de Veuilly, Voie de Chatel, etc.). The Germans renewed their thrust that afternoon pushing the French before them till the poilus filtered through the unwavering line of marines, and the rear had become the front. It was the opening of the battle of Chateau Thierry, and found the ((most vicious wedge of the German advance® facing the Americans. Hill 165 was the objective as the enemy advanced through a wheatfield, but the alert marines as expert riflemen (<calmly set their sights and aimed with the same precision that they had shown upon the rifle ranges at Paris Island, Mare Island and Quantico.® Their machine guns also took up the fire. The accuracy of the rifle fire took heavy toll of the German ranks. The artillery soon backed the staying powers of the riflemen and, with shrapnel, added to the killing power ; the Germans ran to cover raked by the American fire. A French airplane was aiding the artillery aim. The aviator was so astonished at the marines' cool deliberate setting sights and adjusting ranges (the French ranks always emptied their magazines at ran¬ dom without raising their rifles to aim) and seeing each man select his human target, he signaled <(bravo® to the sharpshooters. The German drive for Paris was stayed with this day's resistance. Then followed attacks and short advances and continued fierce counter¬ attacks and heavy bombardments that thinned the marine ranks sadly and forbade either rest or renewing the stock of rations. Cold rations and sleepless nights, shortage of food and ab¬ sence of water often,

for the terrific barrage killed most of the runners. But nothing could dull the courage and fortitude of those two regiments. However, 6 June found them still outside the woods, and with Bois de Belleau in the grip of the Germans it was impossible to recapture Chateau Thierry. The villages of Bouresches, on the right, and Torcy on the left, must also needs be taken to gain Belleau Wood, which was a rocky jungle protected by hundreds of machine guns and considered by the Huns as impregnable. At 5 p.m. the at¬ tack was started in waves, few — sometimes but one of the party — got through the hail of bullets and the bayonet, then the butt of the rifle, was all that was left to capture each machine gun nest. But Lieut. James F. Robertson with 20-odd men of his platoon captured Bouresches. The artillery with 50 batteries pounded the Bois de Belleau for an hour till it was an inferno. The woods had suffered but the ma¬ chine nests were still alive and active as the assailants plunged further into the jungle, and the fighting was done from tree to tree in American style. The loss of life was costly. Individual acts of heroism (young Lieutenant Timmerman, Jr.'s platoon reached the wood, charged a nest, took two guns and 17 prisoners though outnumbered two to one) were very numerous. And thus the Bois (the marines call it ((Hellwood®) was a scene of continuous attacks and counter-attacks, and we read that <(between 30 May and 18 June hardly a man removed his clothes or shoes.® In less than a week the German 197th, 237th and 10th divi-

sions were so exhausted that the crack Fifth Guards Division had to be called in, then 28th had to be called. Thus one American division (the Second) wore out five German di¬ visions. By the 10th the line was ad¬ vanced 900 yards on a front of one and one-half miles and 300 prisoners, 30 machine guns, 4 trench mortars and stores of ammuni¬ tion, etc., were captured. By the 28th the last of the German nests were captured together with guns and prisoners, after the artillery had torn the wood to pieces. Then the attack on Chateau Thierry became practicable. And the French have renamed the Bois de Belleau ((Bois de la Brigade de Marine® (Wood of the Ma¬ rine Brigade).

July brought relief and rest, also replace¬ ment of the depleted ranks. But already on the 18th we find the indomitable marines at the <(grand offensive® in the neighborhood of Soissons, near Tigny and

Vierzy, where they advanced facing a terrific fire from a machine-gun centre. Their losses enforced digging in and holding the ground taken. In the battle for the Saint Mihiel salient the Second Division occupied a line from Remenauville to Limey, night of 11 September, starting an attack of two days' objectives on the night of the 14th. They rushed over the rivulet Rupt de Mad, occupied Thiacourt, scaled its heights beyond and formed a line from Zammes-Joulney Ridges to the Binvaux Forest, finishing the two days' objectives by 2.50 p.m. of the first day. Casualties about 1,000 with 134 killed; partici¬ pating in the capture of 80 German officers, 3,200 men, 90-odd cannon and vast stores. Next came (early October) to the marines the honor of capturing ((the bald, jagged ridge® 20 miles due east of Rheims, known as Blanc Mont Ridge. It was a German ((keystone® position. The commanding officer of the LInited States Marine Corps, Maj.-Gen. John A. Lejeune, considered the victory so valuable as (11 Octo¬ ber) to commend the Second Division and to add : ((As a direct result of your victory, the German armies east and west of Rheims are in full retreat, and by drawing on yourselves sev¬ eral German divisions from other parts of the front you greatly assisted the victorious ad¬ vance of the Allied armies between Cambrai and Saint Quentin.®

And the toll paid for these acts of un¬ paralleled heroism gave the following sad figures: Of 8,000 men engaged in these fierce battles, this Marine Corps had as casualties by the end of June 126 officers and 5,073 en¬ listed men killed or wounded; over half the original quota. And but 57 United States marines were taken prisoner bv the enemy, these wounded far in advance of their lines. As a mark of honor for the many individual acts of heroism of the corps 644 Distinguished Service Crosses were awarded to the members of the Second Di¬ vision, over twice the number awarded any other division. Of this total the marines won as follows up to 17 March: Fifth Regiment Marines, 206; Sixth Regiment, 137.

MARINETTE, mar-i-net', Wis., city, county-seat of Marinette County, at the mouth of the Menominee River, on Green Bay, and on the Chicago and Northwestern, the Wisconsin and Milwaukee, and the Chicago, Milwaukee

and Saint Paul railroads, about 50 miles north by east of Greenbay (city), and opposite Me¬ nominee, Mich. The harbor is large and safe, and the river affords opportunity for bringing logs from the forests along its upper course in both Wisconsin and Michigan. Marinette was settled about 1849-50 and in 1887 was incorpo¬ rated. The water

power is extensive and the lumber industry of Marinette is most important. The large lumber mills are the chief manufac¬ turing establishments of the city. The four largest have a daily output of 1,000,000 feet of lumber. Other industrial establishments are pail factories, paper and pulp mills, box and broom factories, gas and traction engine and iron works, threshing machine factories, knit¬ ting mills, flour mills, furniture factories, cabi¬ net shops and fruit canneries. The city carries on a lake commerce with all the important lake ports. The chief buildings are the city and county buildings, two hospitals, a public library, 20 churches, fine public and parish school build¬ ings and Our Lady of Lourdes' Institute. In the vicinity is large assembly ground where various religious and educational conventions are held each summer. Pop. 14,610.

MARINI, Giambattista, jam-ba-tes'ta ma-re'ne, Italian poet: b. Naples, 18 Oct. 1569; d. there, 25 March 1625. He was assisted by the Cardinal Pietro Aldobrandini at Rome, with whom he went to Turin, where he became secre¬ tary to the Duke of Savoy, Charles Emmanuel, but the envy of his enemies and his satirical humor involved him in various disputes. Marini's most famous work is the long epic <Adone) (1623). His other works include (La Lira) (1602-14) ; and a great collection of mis¬ cellaneous poems. Some of his sonnets are among the most perfect in the Italian language. He is the founder of the Marinist school of poetry, of which false, overstrained imagery, far-fetched metaphors and forced conceits are characteristic features. Consult Menghini, (La vita e le opere di G. B. Marini* (1888).

MARINONI, Hippolyte, e-po-let ma-re- no-ne, French inventor: b. Paris 1825; d. 1904. He has invented many appliances for printing which have been of world-wide adoption; among them are a rotary printing-press which has been much used in France, another which printed in six colors 20,000 copies an hour, and at the Paris Exposition he exhibited a press which printed at a rapid rate two colors on each side of a sheet at one revolution.

MARIO, Giuseppe, joo-sep'pe ma're-6, Marquis di Candt, Italian tenor: b. Cagliari, Sardinia, 18 Oct. 1810; d. Rome, 11 Dec. 1883. After serving in the Sardinian army he went to Paris, where after two years of musical study he was appointed first tenor of the opera, chang¬ ing his name at the same time from De Candia to Mario. He made his debut 2 Dec. 1838 as Robert in (Robert the Devil, > and soon became the leading tenor of the world. His repertoire embraced all the great works of Rossini, Bellini, Donizetti and Verdi. He married the famous singer, Giulia Grisi, in 1854 and together ihey made an operatic tour

of the United States. In his later years after his retirement from the stage in 1871 he lost his fortune through specu¬ lations, and the next year made a concert tour in this country.

MARIOLATRY. See Mary.

MARION, mar'i-on, Francis, American soldier: b. near Georgetown, S. C., in 1732, d. Pond Bluff, 27 Feb. 1795. He was the youngest in a family of six children. His grandfather, Benjamin Marion, was a Huguenot exiled from France in 1690. At 16 Francis showed his ad¬ venturous disposition by embarking on a small vessel bound for the West Indies. It was wrecked and he barely escaped death by starva¬ tion. He returned home and worked several years on a farm. In 1760-61 he served in cam¬ paigns against the Cherokees. Thenceforth until 1775 he lived on his plantation at Pond Bluff in the parish of Saint John.

In 1775 Marion was elected member from Saint John in the South Carolina provincial congress, which adopted the bill of rights and voted money for raising troops. He was chosen captain (21 June 177a) and took the held against the British and the Tories. He took part in the capture of Fort Johnson (14 Sept. 1775), and because of his ability in organizing and discipline was promoted to major. He par¬ ticipated in the patriot victory (28 June 1776) at Charleston, which gave the Southern States respite from active fighting for nearly these years. Appointed lieutenant-colonel, he led his regiment in the unsuccessful attack on Savan¬ nah (September 1779). In 1780 Marion, now a brigadier-general, was obliged to take refuge in forest and swamp. Beginning with a handful of men, less than 20, lie gathered recruits, fear¬ less riders and good marksmen, who formed the famed «Marion's brigade. » At times they numbered several hundred. They came and went at their leader's bidding, providing their own equipment and rations. Part of the time they were at work on their farms, planting crops. These rough and ready troopers became the terror of the British regulars and the Tories, although in justice to Marion's men it should be said that they committed no acts of wanton

cruelty and burned no buildings on Tory home¬ steads. The stories of his adventures read more like fiction than history. His scouts kept close watch of the enemy's movements, and detach¬ ments of the brigade struck blow after blow, surprising and capturing small parties of soldiers. At times they united with larger bodies of troops for important engagements. After a vain pursuit, Tarleton named Marion the <(Swamp Fox.» Failing in his attempt against Georgetown (December 1780), he re¬ tired to Swan Island and prepared for a sec¬ ond attack (13 Jan. 1781), which was also un¬ successful. Then he joined with Col. Henry Lee in reducing Fort Watson (April 1781). After raiding 200 miles of country he com¬ manded the first line in the battle of Eutaw Springs and took many prisoners. For his gal¬ lantry in this engagement he received the thanks of Congress. From 1782 to 1790 Marion served in the State senate and was a member of the State Constitutional Convention in 1790. He opposed harsh treatment of the Tories and con¬ demned the Confiscation Act of 1782. In 1784 he married a wealthy lady, Mary Videau, who survived him with no children. He was a man of attractive personality. Of slight figure, he was capable of great endurance and accustomed to abstinence. As a leader he was admired and beloved. He justly ranks among the heroes of the Revolution. Consult Biography by Horry

and Weems (1815); Simms, 'Life of Francis Marion* (1844); Tarleton, 'History of the Campaigns of 1780-1781 > (1787).

MARION, Ala., town, county-seat of Perry County, on the Southern Railroad, about 60 miles west by north from Montgomery. H.1S situated in a fertile agricultural region, and its industries are connected with cotton pressing, *etc.* It is the seat of the Marion Female Sem¬ inary, established in 1836; the Judson Female Institute (Baptist), established in 1839; Lin¬ coln Normal School for colored pupils (Congregationalist). and the Marion Military In¬ stitute. Pop. (1920) 2,035.

MARION, Ill., city, county-seat of Wil¬ liamson County, on the Illinois Central, Chi cago and Eastern Illinois and Missouri Pacific railroads, about 150 miles south by east of Springfield. It is situated in an agricultural re¬ gion in which are large deposits of coal. The chief industries which contribute to the sup¬ port of the city are coal-mining, fruit-raising, manufacturing, pianos, gloves, flour and raising cattle and mules. Mnrion is the chief trade centre of a large portion of Williamson and adjoining counties. Pop*. (1920) 9,582.

MARION, Ind., city and county-seat of Grant County, situated 73 miles northeast of Indianapolis on the Mississinewa River, in the heart of the Indiana agricultural country. It is served by four railway systems, the Pennsyl¬ vania, Big Four, Clover Leaf and Chesapeake and Ohio, also has three traction lines running north, east, south and west. Marion classes as a manufacturing city, the chief products being flour, paper and pulp, foundry products, bottles, furniture, rolling-mill products, auto trucks, motors, shoes, electric specialties, in¬ sulated wire, druggist wares, gloves, both heat¬ ing stoves and ranges. The exports are ex¬ tensive, about 350,000 tons per year. Marion has 30 churches, Y. M. C. A. and Y. W. C. A. Some of the public buildings are the public li¬ brary, Masonic temple, courthouse, Normal College, new high school, costing $180,000. A National Soldiers' Home is situated at Marion, which cost about $1,500,000. The water plant is owned and operated by the city. Pop. 23,747.

MARION, Iowa, city, county-seat of Linn County, on the Chicago, Milwaukee and Saint Paul Railroad, about 110 miles northeast of Des Moines. It was settled in 1839 and in 1852 was incorporated. It is situated in a rich agricultural region in which the chief products are corn, oats, hay, wheat and vegetables. Con¬ siderable attention is given to stock-raising. Marion is the headquarters of a railroad divi¬ sion and has large railroad repair shops, freight vards and a round-house. Other industrial establishments are greenhouses, flour mills, cigar factory, cement block, and tile factories, whole¬ sale bakery and wholesale produce house. Saint Berchman's Seminary, Catholic boarding school for boys, is located here. Pop. 4,660.

MARION, Kan., city, county-seat of Marion County, on the Cottonwood River, and on the Chicago, Rock Island and Pacific and the At¬ chison, Topeka and Santa Fe railroads, about 85 miles southwest of Topeka. It is. situated in a fertile agricultural region in which consid¬ erable attention is given to stock-raising. The chief manufactures are flour and dairy products. Pop. 1,951.

MARION, Ohio, city and county-seat of Marion County, on the Erie, Cleveland, Cin¬ cinnati, Chicago and Saint Louis, the Hocking Valley and the Pennsylvania railroads, 49 miles north of Columbus and 77 miles from Toledo. Marion was settled in 1815 by people from Rhode Island, and was incorporated in 1820. It is in the centre of a rich agricultural and limestone country. There are five big quarries on the outskirts of the city. There are 39 factories in the city, employing 4,200 people. The products of the main industries are steam shovels, threshing machinery, silk and re-rolled steel. Marion is a division point of the Erie railroad, and the transfer point for all eastern and western shipments ; many employees of this road reside in Marion. There are five banks and four building and loan companies. The government is vested in a mayor and a council, chosen .biennially. The percentage of foreign population is very small. F'op. (1920) 27,891.

MARION, S. C., city, countv-seat of Marion County ; on the Raleigh and Charleston, and the Atlantic Coast Line railroads, about 100 miles west of Columbia. It is surrounded by rich farm lands, the chief products of which are tobacco and cotton. It has large cotton mills, cottonseed-oil mills, lumber and flour mills and foundries. It ships to the large markets con¬ siderable tobacco and cotton products. Pop.

(1920) 3,892.

MARION, Va., town, county-seat of Smyth County, on the Marion and Rye Valley, and the Norfolk and Western railroads, about 140 miles southwest of Lynchburg. Marion wa*s settled in 1832 and in 1871 was incorporated. The chief industrial establishments are flour and lumber mills, wagon and .table factories, foundry and machine works and pulverized limestone plant. Mining and quarrying in the vicinity contribute -to the industrial wealth of the town. It is the seat of the Marion Female College (Lutheran) and the Southwestern State Hos¬ pital for the Insane. The water for drinking and domestic purposes -is brought from springs in the hills about three miles distant, and the waterworks plant is owned and operated by the town. Pop. (1920) 3,253.

MARIOTTE, Edme, ed-me ma-re-ot, . French physicist: d. 12 May 1684. He lived for the most part at Dijon, and was made prior of Saint-Martin-sous-Beaune. He became a mem¬ ber of the Academy of Sciences upon its forma¬ tion, and was one of the founders of experi¬ mental physics. <(It is Mariotte,® said Con-dorcet, ((who first in

France introduced into physics a spirit of observation and of doubt.® He discovered independently the law known by his name — also discovered by Robert Boyle (q.v.) and known as Boyle's law, — that if the temperature remain constant, the volume of a gas will vary inversely as the pressure.

MARIOTTE'S LAW, in physics, the prin¬ ciple that the volume of a gas, under constant, that is, unchanging, temperature and pressure, varies inversely as the pressure. It is identical with Boyle's law, the latter name being applied to it in the United States and England, and the former in continental Europe. See Lique¬ fied and Compressed Gases.

MARIPOSA GROVE, a State park of 2,560 acres, situated in Mariposa County, Cal. It contains about 465 trees of the Sequoia

gigantea, some of which are thousands of years old. The largest specimen is the Grizzly Giant, with a main limb over six feet in diameter at 200 feet above the earth and a circumference of 94 feet. The tallest tree is 272 feet high, and several are over 250 feet. A roadway 9 ˆ feet wide has been cut through the heart of one of the giants.

MARIPOSA LILY, or BUTTERFLY LILY, popular names for various species of Calochortus of the family Liliacece. The numerous species, all of which are natives of western United States and British Columbia, are characterized by coated corms ; rather leafy, generally branched stems; and showy, six-segmented flowers. Almost all the species are in cultivation for ornament, some, natives of the Colorado Desert, being suited to arid con¬ ditions, others to fairly moist soils, still others to very cold localities, as species indigenous to the Sierra Nevada. All will stand extreme cold, but not alternate freezing and thawing, hence their failure under such conditions. The bulbs should be planted in late autumn in any kind of soil. After the tops have become yel¬ low subsequent to flowering in the following year the bulbs should be taken up, divided, and kept dry until planting time. They are often grown in pots under glass.

MARIPOSAN, or YOKUT, a linguistic stock of North American Indians, which once included about 40 tribes in southern California, in the region of Tulare Lake. See Yokuts.

MARIQUINA, P. I., town in the province of Rizal, Luzon, eight miles

northeast of Manila. It is situated at the intersection of several main highways, has shoe and leather factories and medicinal iron springs. Pop.

8,180.

MARIS, ma'ris, Jakob, Dutch painter: b. at The Hague, 25 Aug. 1837 ; d. 8 Oct. 1899. He began his art studies at the local academy, choosing landscape as a specialty, and receiving instruction from Strobel and Van Hove, which latter he followed on his removal to Antwerp. He studied also under Keyser, director of the Antwerp Academy. Going to Paris he came under the influence of the Barbizon school, and reached his full power as a painter of figures and landscape in combination. In 1871 he re¬ turned to his native town. His brush work and use of chiaroscuro are essentially French. Among his numerous works are (View of Schiedam > ; (View of a Town in Holland) ; (On the Sea Shore® ; (Mother and Children. > Examples of his work may be seen at the Metropolitan Museum, New York.

MARIS, Mathew, Dutch painter, brother of Jakob Maris (q.v.): b. The Hague, 1839; d. London, 22 Aug. 1917. In his youth he trav¬ eled and worked with his elder brother ; in 1855 they lived in Antwerp sharing quarters with a young student named Alma-Tadema (q.v.) ; in 1860 the brothers studied and sketched in Germany and Switzerland ; in 1870, in Paris, Mathew was enrolled in the National Guard and performed military service during the siege. Shortly after he settled in London, where he remained till his death. He was a striking example of the so-called ((artistic temperament® ; he painted what he liked and when he liked, with the result that his works

are extremely scarce. His work is charac¬ terized by fine qualities of color and "imaginative wizardry.® At sales his pictures brought very high prices; two of them fetched $33,075 in London in 1906; one produced $17,850.

William Maris, a younger brother, was also a painter of note (b. 1843 ; d. The Hague, 10 Oct. 1910). He received his training from his brothers and was the most truly Dutch in his artistic sympathies. A sunny optimism per¬ vades his work, expressed in wide skies, bril¬ liant sunshine and gay coloring. He spent most of his life at Ryswijk, near The Hague. At the Alexander Young art sale in London in 1910, five of his studies were sold for $12,400; while nine pictures by his eldest brother fetched $51,425, mostly purchased by Dutch collectors.

MARISCAL, Ignacio M., Mexican states¬ man : b. Oaxaca, 5 July 1829; d. Mexico City, 16 April 1910. He received his diploma as a lawyer in 1849, and practised his profession until 1857, when he was elected a member of the Federal Congress. Two years later he was made justice of the Supreme Court of Oaxaca, and in 1860 circuit judge of the states of Oaxaca, Vera Cruz and Puebla. In 1861 he was again elected to the Federal Congress, being assigned the additional duties and responsibilities of government assessor of church properties ; served as justice of the Supreme Court in 1862; as sub-secretary of foreign affairs in 1863, and was appointed first secretary of the Mexican legation at Washington in August of that year ; charge d'affaires 25 Oct. 1867, Secretary of Jus¬ tice and Public Instruction in 1868; Envoy Extraordinary and Minister Plenipotentiary at Washington 1 June 1869; Secretary of Foreign Affairs 10 March 1871 ; Envoy Extraordinary and Minister Plenipotentiary at Washington June 1872; justice of the Supreme Court of the Federal District and director of the National School of Jurisprudence July 1879; Secretary of Foreign Affairs 22 Nov. 1880; special envoy to Great Britain May 1883 and Envoy Extraordi¬ nary and Minister Plenipotentiary October 1884; Secretary of Foreign Affairs June 1885. He was a member of the Geographical and Statistical Society of Mexico. He was closely associated with President Juarez throughout the War of the Reform, was secretary and legal counsel to the Mexico legation at Washington during the War of Intervention, and was the author of several historical and other works.

MARISTS, ma'rists, either of two modern religious congregations in the Roman Catholic Church. The Marist Fathers, or Societv of Fathers of Mary, originated in Lyons (1816), where a number of religious devoted them¬ selves to missionary work, which extended over the Pacific islands and in 1845 passed on. to Australia. The Marist Brothers, whose object was the education of youth, were founded a year later at Marseilles, and chose for its field of labor the south of France. The Marist Fathers have 156 members in the United States which they entered 1849. Their headquarters is at Brookland, D. C. Thev have schools at Manchester, N. H. ; Lowell and Lawrence, Mass.,

and New York.

MARITIME LAW. Broadly speaking, the subject matter of anv action over . which an Admiralty Court could take jurisdiction should

be considered a topic of the Maritime Law. In this definition prize cases would be included , but the right of capture and other belligerent rights on the high seas in time of war, the im¬ munities of neutral shipping and cargoes, con¬ traband traffic, etc., more properly considered, are topics of International Law (q.v.). How¬ ever, oversea commerce being international there is little in the lex maritima vyhich has not an international aspect. The maritime law of Great Britain and the United States is rooted in the usages and customs of merchant seafarers, shipmasters and seamen, which are of remote antiquity and have been preserved in the Code and Digest of Justinian and other compilations hereafter mentioned. The oldest repository in England of this law was the (Black Book of the Admiralty, J written in Norman French and dating partly from the reigns of Edward III and Richard II and partly from the reigns of Henry IV, Henry V and Henry V I, (<long be¬ fore any controversies arose between the Admiralty and King's courts about foreign con¬ tracts, whereof they had been in peaceable pos¬ session time out of minde® (Prynne's '^Animad¬ version on the Fourth Part of Coke's Insti¬ tutes, } 1668). An early record of the adminis¬ tration of maritime law. in England is found in the Domesday of Ipswich, 17 Edward I (a.d. 1289). The (Black Book > has disappeared but an English manuscript, which was in the library of the College of Advocates at Doctors' Com¬ mons until the dispersal of the college in 1858, had in recent years done service for the lost original. The substantive sea law of the 'Black Book) is contained mainly in a transcript of the Laws of Oleron. This last-named compila¬ tion, which takes its name from an island off the west coast of France, near Rochefort, is ex¬ tant in several manuscripts. The oldest of these, written in a mixture of old French and Gascon, and now in the Guildhall at London, where it was brought from the archives of Bordeaux, probably dates from the end of the 13th cen¬ tury. The compilation is much older, no doubt ; for the Laws of Wisby, by which the merchants of the Hansa towns and other German, Scandi¬ navian and Russian trading communities on the Baltic and North Sea regulated their conduct are mere condensations of the Laws of Oleron — and the Hanseatic League was formed in

A more complete code of sea laws than either of those mentioned is the ‘Consolato del Mare,> of uncertain age and pedigree. Grotius asserts that it was compiled at the order of the <(ancient Kings of Arragon,® whereas Azuni and others claim it to have been the work of Pisan lawyers. Both may be right. The Con¬ solato del Mare was evidently not compiled at one sitting; its matter is drawn from many sources, including the Roman corpus juris and the laws and customs of Italian, French and Spanish marts of commerce. While not com¬ pleted until the 14th century, the extant form is apparently the resultant of accretions to a nucleus dating back possibly to the 11th cen¬ tury. Anyhow, a lex maritima had become generally recognized in Europe toward the end of the 12th century and its distinction from the common law of England, as asserted by Prynne, who is quoted above, is testified to by an early rescript of the (Black Book1* providing,

that ((all those who doe sue any merchant, mariner or other person whatsoever at common law of the land for any thing of auntient right belonging to the maritime law … shall be fined to the king for his unlawful and vexatious suite.® The extent to which the ancient com¬ pilations have maintained their authority may be estimated from the fact that a fragment of the law of Rhodes, embodied in the Digest of Jus¬ tinian and transcribed into the Consolato, states as correctly as any recent textbook the modern law of jettison and general average, while the rubric de nantico foenore (Dig. 22, 2; Code 4, 33) gives the present rules on bottomry and respondentia with absolute exactness.

The principal topics of Maritime Law (see articles under separate titles) are : Affreight¬ ment, under which head may be included the law governing contracts of shipmasters to carry freight and their resulting responsibilities as common carriers ; Barratry, a sea crime which is committed when a master or crew do any unlawful acts tending to their advantage and to the detriment of the owner of a vessel — mutiny is an extreme form of barratry; Bill of Lading (q.v. ; also Commercial Law and Negotiable Instruments) ; Bottomry, a form of contract whereby, figuratively, the keel or bottom of a ship, but in reality the entire vessel, is hypothecated to secure the repayment of money loaned, or to pay for repairs done or materials or supplies furnished and neces¬ sary to enable the vessel to complete a voyage; Charter-party, a contract of affreightment whereby the owner agrees, not to carry a par¬ ticular consignment, but to let the whole or part of his ship to a merchant or other person for a particular voyage ; Collision, under which title the rules for the assessment and apportion¬ ment of damage resulting from careless naviga¬ tion are collected; Demurrage, the money re¬ quired to be paid by the charterer for a vessel in compensation to the owner for her detention beyond the time agreed to for the loading or unloading of a cargo; General Average may be defined as contributions to be made by all • parties interested in a ship or her cargo to even up the losses arising in consequence of an extraordinary sacrifice — for example, the jettison of part of her cargo — as the means of preserving from destruction the vessel or the rest of the goods she carries; Marine In¬ surance (q.v.) is

a comparatively recent develop¬ ment of maritime law ; the first policies it is said were issued by the Florentine merchant princes of the house of Medici ; Pilotage, the practice of the pilot's professiion is governed by local usages peculiar to each port and by legislative acts, which, in the United States, may take the form of either Federal or State laws; Registry of vessels and the transfer of ownership or flag, practically all matters under this head being regulated by_ statute in each country; Salvage, a compensation due to a per¬ son through whose gratuitous exertions a ves¬ sel or its cargo had been rescued from the perils of the sea; Wharfingers, properly «wharf-agers,® the owners, occupiers or custodians of a wharf.

All contracts of a maritime character are .cognizable by the maritime law and enforcible by the courts administering the same. In the enforcement of contractual obligations arising

out of the relations between insurer and insured or shipper and carrier or owner and charter-party, the common-law courts as well as the courts of admiralty might take jurisdiction. But in a case of bottomry, collision, general average or salvage, where the common law of the land and the law of the sea widely diverge, the jurisdiction of the maritime tribunals is paramount. Obligations ex delicto are justici¬ able in courts of admiralty when the wrong was committed within their territorial jurisdiction. This jurisdiction extends to the high seas, the national territorial waters where the tide ebbs and flows and other navigable water connects with and leading to tidewater. In the United States admiralty jurisdiction may extend even to navigable waters disconnected from the sea and situated entirely within a single State. The Federal District Courts exclusively have original jurisdiction in admiralty cases. Under the maritime law no more than under the com¬ mon law could there be a recovery of damages for death negligently caused. Such recovery is now permitted by statutory enactment; but the limitation of owner's liability to the value of the salvage from the wreck in which the death occurred and! to the freight money earned makes the statutory relief granted practically valueless. The English law on the subject is more liberal, though, where a calamitous loss occurs and the claimants are many, the total amount of damages recoverable is too small to be compensatory in any proper sense. In fact, it is possible that the limitation by law and distribution by insurance of the risks in¬ cident to maritime commerce may have too thoroughly eliminated the motive of self-interest as a factor in the promotion of efficiency and safety. When a ship is lost its owner may make a profit, receiving more than its value from the

insurer; similarly, the merchant may, and often does, get more from the underwriter than the value of a cargo lost ; the underwriter averages his losses and, on the whole, makes a profit out of his business. _ The laws for the inspection of vessels, the licensing of masters and other officers, the rules of navigation and concerning lights and other signals and the statutes prescribing imprisonment and other heavy penalties for neglect to observe these laws and regulations or supply the minimum life-saving equipment do not seem to provide an incentive equal to that which would be provided by the risk of an uninsurable total loss or unlimited liability for carelessness in the operation of vessels. The statutes, moreover, have been proven deficient in many respects — for instance, it appeared from the inquiry into a recent celebrated case that the inspection of hulls did not include a test of stability.

The rights and duties of masters and sea¬ men toward each other, the vessel owner, the shipper or receiver of cargo and passengers are in part regulated by usage. By far the larger part of this department of the maritime law however is statutory. The administration of ports, the issue of clearance and other papers and similar police regulations affecting shipping are, generally, in the form of prescriptions made by the highest legislative authority, though they may be the subjects of mere municipal ordinances. These regulations have become in¬ ternationalized by commercial treaties on a basis

of reciprocity, foreign shipping at practically all the ports of the world sharing burdens and advantages equally with domestic vessels. Domestic regulations with respect to life-saving equipment also have international scope, because no foreign vessel can leave a port without clearance and ship's papers will not be granted until the local safety rules 'have been complied with. The International Marine Conference held at Washington in 1894 evolved a set of ((Regulations for Preventing Collisions and the first internationally uniform ((Rule of the Road ® Articles 15 and 16 of the convention agreed to this conference, prescribing a system of sound signals and ˆmoderate®

speed in fog or thick weather, were considered the most im¬ portant and innovatory of the regulations then adopted ; but shipmasters have continued to act on the principle, ((when in a place of danger, get out as quickly as possible.® The Seaman s Act of 1914 and the Safety at Sea Conference held in Berlin in the spring of the same year are indicative of progress, though under exist¬ ing world conditions their effect has not been

appreciable. ˆ . .

Proceedings in Admiralty Courts are quite in¬ formal. Usually they are in rent, that is to say, the ship or cargo or some part of either are proceeded against rather than the master or owner in person. The initiation of an action takes the form of posting a libel, i.e., attaching the same to the mast or some conspicuous place on the vessel, or to that part of the caigo against which a claim is made. The attachment of a libel creates a lien which can be discharged only by the entry of a bond, or the deposit in court of adequate security, or the payment of the claim. See Danish Sound Dues.

Bibliography.— The principal modern Codes of Maritime Law are the following: (Belgium Code of Commerce* (Book II) ; Egypt, (Code of Maritime Commerce* ; France (Code of Commerce) ; Germany, < Mercantile Law* (Book IV)- Holland, Commercial Code*; Portugal, Commercial Code,* and Spain, Commercial Code *Dembski, V., (Europe and the New Sea Law> (London 1912) ; Duckworth, Ency¬ clopedia of Marine Law) (London 1907) ; Parsons, Chipping and Admiralty/ (2 vols, Boston 1869); Saunders, ˆMaritime Law* (London 1901); Smith, David Wright, < Rule of the Road at Sea* (Glasgow 1910) ; Twiss, Sir Travers, Clack Book of the Admiralty) (4 vols., London 1871).

Stephen Pfeil.

MARITZA, ma-ret'sa, a river of Adrianople, the ancient Hebrus, rising as the Topol-nitza, near the Bulgarian frontier, in the Ba kan Mountains, and flowing through eastern Rumelia, southeast to Adrianople, where it bends to the southwest and falls into theCgean Sea by the Gulf of Enos. It is over 300 miles long and navigable to Adrianople, about 100 miles from its mouth.

MARIUS, ma'ri-us, Gaius, Roman general: b about 156 b.c., in Cereatae, in the Volscian territory; d. Rome, 13 Jan. 86 b.c. He won his first military repute at Numantia in 134, begin¬ ning his rapid rise from the ranks; was made tribune of the people in 119; increased his polit¬ ical power by marrying Julius Caesar s > aunt ; became

praetor in 115; went to Spain in the next year, suppressing brigandage there; and in

109 accompanied Metallus to ■ Africa. Two

years later he was chosen consul, displaced his superior officer and made a brilliant campaign. His success was so great that he was elected consul four times in succession (104-101 b.c.) — a proceeding counter to law and entirely 1111 paralleled — so as to meet the invasion of Italy by the Cimbri and Teutons. He defeated the latter tribe at Aquae Sextiae m 102, and the Cimbri at the Raudian Fields in 101. In 100 he was again elected consul. He made the fata mistake of plunging into party politics, allied himself with the most disreputable leaders of the popular party, and, in his envy of the rising fame of the patrician Sulla (q.v.), attempted to remove him from his command in the Jugar-thine War. Civil war broke out in 88. bulla was victorious. Marius fled to Africa, whence he returned to Italy on the successful rising in Rome under Cinna. The first great proscrip¬ tion followed and many of Marius opponents were killed. Marius was elected consul for the seventh time for 86 b.c., but died soon after he entered upon - the office. Consult Beesly, Marius and Sulla* (1878).

MARIUS THE EPICUREAN, the chief work in fiction of Walter Pater. It is the story of a young Roman of the days of Marcus Aurelius, but in the problems and experiences of young Marius in ancient Rome, Pater has given also something of the problems and ex¬ periences of a young man at the end of the 19th century. In the days of Marcus Aurelius the ancient world was changing into the mediaeval. Another such period was the Renaissance, in which the mediaeval world was changing to the modern. In our days it may be civilization may be changing to something very different from the last few hundred years. Of the first of these great changes Pater wrote in (Marius the Epicurean.) Of the second he began to give a picture in (Gaston de Latour, 5 a later novel of which he wrote only the first part. _ To the last period, his own, Pater devoted critical rather than creative thought. (Marius the Epicurean, therefore, is deeply informed with ideas; in fact the very titlepage names ((Sensations and Ideas.® Pater became known first as a critic; in this novel he turned to express in the form of life the ideas which he had previously pre¬ sented as matter of thought. A good many of Pater's ideas will be found in (Marius : the fundamental conception of Epicureanism is a restatement of the theory of life which had al¬ ready been presented in the conclusion of the Renaissance and had since been much and some¬

times severely criticised. Flavian s plans for a career in literature have much in common with the ideas of the later essay on style. The work is characteristic of its author not only by its ideas, but by its general form. After this novel Pater published several shorter pieces which he called (Imaginary Portraits. *In each of these he presented a figure which embodies some idea or position in the philosophy of art and life, sometimes an actual character like Watteau, sometimes an ideal figure like Sebas¬ tian von Storck. He subsequently wrote several other things of the same sort which is now generally thought of as very characteristic of his art and thought. (Marius the Epicurean* is an earlier, longer and more fully developed imaginary portrait. Its interest is not in the

story, but in the idea, or in this case in the progress of the idea. Marius grows up in the old pagan world, comes to know all the cultiva¬ tion and refinement of the ancient civilization, weighs the older philosophies of life and art and finally devotes himself to the new and growing religion of Christ. Like all of Pater's fiction the story is most sedulously careful of its surroundings and environment, and the pic¬ tures of life on the great old Roman family estate, the popular festival, the interview with the emperor, the lecture on rhetoric by Fronto are among his best known. In fiction in general there is an especial place for those books which present adventures and experiences of the soul rather than of the man as seen in the every¬ day world. There were a number of such at the end of the 19th century. Among the most famous of these studies of the religious 'life are (John Inglesant5 and (Robert Elsmere.5 (Marius the Epicurean5 is quite as interesting as either of these to those who follow the work¬ ings of the spirit, and quite as characteristic of the time which it presents and of the time in which it was written.

Edward Everett Hale.

MARIUT, ma-re-oot', Lake, Egypt. See Mareotts.

MARIVAUX, Pierre Carlet de Cham-blain de, pe-ar kar-la de sham-blah de ma-re-vo, French dramatist and novelist: b. Paris, 4 Feb. 1688; d.

there, 12 Feb. 1763. He lost his patrimony in the Mississippi scheme, and also a young wife to whom he was deeply attached, and took up literature as a living. He was so suc¬ cessful that he became an Academician in 1742 or 1743. He wrote essays in periodical form, the ˆSpectateur Frangais5 having a hint of English influence in both matter and name. His novels, especially the unfinished (Vie de Marianne) and (Paysan parvenu,5 were a protest against the literary morals of contemporary fiction. But he is best known for such plays as (Les Jeux de 1' Amour et du Hasard) (1730), (Les Fausses Confidences5 (1738), (Le Legs5 (1736) and (La Mere confidente5 (1735), which are marked by a total opposition to the style and manner of Moliere, by much skill in intrigue and in portraying women and by the peculiarly arti¬ ficial and elaborate style, which takes its name (<Marivaudage)5 from the author. Consult Savollee, (Marivaux inconnu5 (1880) ; Fleury, (Marivaux et la Marivaudage5 (1881) Gossot, (Marivaux Moraliste5 (1881); Larroument, (Marivaux, sa Vie et ses CEuvres5 (1894) ; Deschamps, (Marivaux5 (1897).

MARJORAM, a genus of annual or peren¬ nial herbs and a few shrubs (Origanum) of the family Menthaccce. The species of which there are about 25 are most-ly natives o'f the Mediterranean region and southwestern Asia. They have several-flowered whorls of labiate flowers arranged in spikes. Two species are widely cultivated in gardens for culinary pur¬ poses, being used fresh, dried or in decoction for flavoring soups, stews, dressings, sauces and salads. Common or pot marjoram (0 . vulgare) is a hardy perennial with pink or purple flow¬ ers and highly aromatic leaves. It succeeds best upon warm garden soils well exposed to the sun, and may be propagated by seeds, divisions or cuttings. Sweet marjoram (O . marjorana) is also a perennial, but is tender and conse¬ quently treated as an annual, hence the popular name annual marjoram. It is usually raised from seeds sown in a hotbed or greenhouse and transplanted to ground like the above.

MARK. The original Jewish name of Mark was John (Acts xii, 12, 25; xv, 37), and it is not known when he was given or assumed the second, Latin, name by which he has always been known. Of his early life nothing is posi¬ tively known. It cannot be said to be more than an attractive possibility that it was at the house of his mother, Mary, that Jesus met his disciples for their last supper, and that in con¬ sequence this upper room became the permanent meeting place of the Jerusalem disciples, and also that Mark was the youth who followed

the crowd to the arrest of Jesus in Gethsemane. Peter later called him his ((son)5 (1 Peter, v, 13), from which title it is commonly inferred that he began his Christian life under the influence of that apostle. The first distinct appearance of Mark in history is as an attendant of Paul and Barnabas, the latter being his cousin (Col. iv, 10, not (<nephew,55 as the Greek word has been erroneously translated). The party went from Antioch to Cyprus and thence to Perga, on the mainland of Asia, where Mark deserted, returning to Jerusalem. Because he did this Paul refused to take him on his second mis¬ sionary tour and a break with Barnabas re¬ sulted, after which Mark accompanied the lat¬ ter to Cyprus again. A reconciliation with Paul must have later come about, since Mark is favorably spoken of in Paul's letters to the Colossians and to Philemon, as again still later in the second letter to Timothy. More uncer¬ tainty attaches to the mention of Mark in First Peter. Perhaps the most satisfactory conclu¬ sion is to take ((Babylon55 as designating Rome and for this and other reasons (see article Peter, Epistles of) to give to this mention a still later date. On this view, after the death of Paul, Mark would have remained in Rome and have attached himself to Peter. This would be in harmony with the language of Papias who asserted a relation between the two. Any further details rest on more or less uncertain tradition. The reported connection of Mark with Alexandria is in no way improbable, but whether he was a martyr there or died a nat¬ ural death is unknown. The tradition that he was connected with the church at Aquileia, which is the basis of the honor paid in Venice to his memory, is no more to be depended on. It may have been the result of personal reminiscence that the epithet KoloftodaHTvIoq was attached to him. This word means stunted or mutilated in the fingers (((stub-fingered)5 ?), but its applica¬ tion in Mark's case is nowhere defined, and many explanations have been proposed, such as, that his fingers were unnaturally short; or, as the Greek word would equally apply to toes, that they were shortened, perhaps causing lame¬ ness, or that he had mutilated himself to evade priestly service ; or, finally, that the word is used figuratively to suggest the comparative brevity of his gospel and its failure to contain much that is found in Matthew and Luke. For the connection of Mark with the second Gospel and bibliography, see article Mark, Gospel Accord¬ ing to.

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

MARK, Edward Laurens, American anato¬ mist : b. Hamlet, Chautauqua County, N. Y., 4(J May 1847. In 1871 he was graduated at the University of Michigan, and in 1876 took the degree of D.Ph. at the University of Leipzig. Dr. Mark was instructor in mathematics at the University of Michigan in 1871-72 and in the following year was astronomer of the United States Northwest Boundary Survey, From 1877 to 1883 he was instructor in zoology, from 1883 to 1886 assistant professor and since 1883 Hersey professor of anatomy at Harvard Uni¬ versity. Since 1900 Dr. Mark has also served as director of the Harvard Zoological Labora¬ tory. Since 1903 he was director of the Ber¬ muda Biological Station for Research. He was United States delegate to the Fourth Interna¬ tional Zoological Congress at Cambridge, Eng¬ land, in 1898. He has translated from the German, O. Hertwig's (TextBook of the Em¬ bryology of Man and Mammals (189~) , Kor-schelt und Heider's <TextBook of the Em¬ bryology of Invertebrates/ and published con¬ tributions to the Bulletin of Comparative Zool¬ ogy He edited contributions from the Zoolog¬ ical Laboratory, Harvard Museum of Compara¬ tive Zoology, since 1884. Consult Parker (ed), (Mark Anniversary Volume) (New York 1JU4;.

MARK, Gospel According to. Character and Purpose — Of the four little books called "Gospels** the second is the briefest and sim¬ plest. In the most direct fashion possible salient events of the Galilean ministry of Jesus are set forth in the first two-tlnrds of the book, while the last third is mainly occupied with the events of the last week of Christ s life and of his death and resurrection, the second part being given with much more of detail than the first. The book might be analyzed as follows : In¬ troductory, the ministry *of John ˆie Baptizer, the baptism and temptation of Jesus (i, l*t3;.

I The early Galilean ministry of Jesus, marked both by wide attention and by increasing hostil¬ ity which culminated in the charge that Jesus was in league with Satan, this part of Christ s work ending with the choice of. the 12 apostles (i, 14 — iii, 35). II. Later ministry in Galilee and its neighborhood, introducing para¬ bolic teaching and consisting largely of the training of the 12 (iv, 1-x, 52). HI. Tie entry into Jerusalem and the Jerusalem teach¬ ing mainly controversial, in the Temple (xi, — xii 44). IV. The Eschatological Discourse (xlii, 1-37). V. The closing scenes, anointing at Bethany, last supper, agony

in Gethsemane, death and resurrection (xm, 1-xvi, 20 (orj. No purpose appears except to bring the events recorded as clearly before the readers minds as possible, so that they might know thus much, at least, of what Jesus did and said. The book manifestly is not a missionary tract with the intent to persuade the unconvinced but rather one who is himself a disciple tells these things to his fellow-disciples for their instruction. It has often been overlooked that the author presents as himself accepting the stupendous claims of Jesus to be the supreme master of men arid their destiny and his coi i esponding demands for their supreme allegiance. _ But while these are carefully and sympathetically recorded, the main impression gathered from this record of the ministry of Jesus is that of a mighty, unresting, triumphant worker, who

yet evokes the intensest hostility of the re¬ ligious leaders of his nation. But the primary purpose to be recognized throughout is naria —

ll°Authorship and Sources.— No name has ever been connected with this book except that of Mark. Presumably because of its brevity which might seem perhaps to involve incom¬ pleteness, this Gospel was for a long time less quoted than Matthew or Luke. But as it was included in the <Diatessaron* of Tatian it must have been in general acceptance for some time before the year 150; in fact, there is no reason to doubt that from the time of its composition wherever known it was accepted as authorita¬ tive. The earliest tradition which has come down to us, connecting itself with the name ot Papias who was acquainted with a number ot apostles and others who had seen Jesus, mˆkes Mark the author of a narrative which embodied the reminiscences of Peter. The second Gospel answers well to this description. There are many touches which imply the remembrance ot an eyewitness, such as that the grass was green (vi 29); the look of Jesus (in, 5) ; or his turning to look (v, 32). The tradition that this eyewitness was Peter is confirmed by the char¬ acter of many details of events in which Peter had a share or in which he would be specially interested. It is not, however, to be thought that Peter was Mark's sole authority or even that the principal share of the book is due to him. It may well be held that the main source from which Mark drew his material was the common stock of apostolic reminiscence and preaching, what must at first have been an «oral gospel,** which presumably took a some¬ what stereotyped form both in content and in language for catechetical purposes (Luke i, 4), and which may have been committed to writing before Mark used it. It has been held by

some that Mark also shows knowledge of the “Logia” document (also called “Q,** see article Gospels), but in our ignorance of the scope of this docu¬ ment Mark’s knowledge of it cannot safely be asserted.

Date and Place of Composition.— No date

can be positively set for the composition of the Gospel according to Mark. It has been com¬ monly dated immediately before the destruc¬ tion of Jerusalem and thought to have been written at Rome. The latest conclusion of critics, notably of Harnack, based on his view of the early date of Luke’s writings, sets the date decidedly before the year 60 and makes Jerusalem the place of original composition. There, or at Rome later, it might have been seen by Luke in its earliest form, while it is possible that additions were made to it before it was given to the world in its present form, which probably happened at Rome. (The “Latinisms** in its language are, however, no proof of relations to Rome, as they are merely such as had been everywhere in the empire adopted into the “Koine/ the common Greek of the time). It has been suggested that Mark’s repeated revision of his original work resulted in what may be called three editions, the first, Palestinian and used by Luke, the second, made at Alexandria (with which city tradition asso¬ ciates Mark in his work) , and used by the author of the first Gospel, the third, our present Gospel according to Mark, having been com¬ pleted and given to the world at Rome. (See

article Gospels). Much of this theory, how¬ ever, is undemonstrable. But it seems safe to assert that the substance of the book belongs decidedly before the year 60 and was very possibly composed in Palestine, while in its final form it is connected with Rome.

Integrity. — It is the verdict of textual criti¬ cism that the last verses of the Gospel (xvi, 9-20) were not a part of the original work. They are lacking in only two manuscripts, the Vatican and the Sinaitic, but these are the most valued of all. A manuscript of the Old Latin replaces these verses with another, shorter ending for the genuineness of which no one contends, and four Greek uncials, one cursive, and

also manu¬ scripts of early translations into Syriac and other languages give both endings. An Arme¬ nian manuscript gives the name Aristion as the author of the verses in question. There is, further, a notable lack of quotation of these verses by the Fathers, while several Fathers assert that in their time they were not to be found in the best copies of the Gospel. On the basis of the merely textual evidence, however, the genuineness of these verses might be accepted, but there is general agreement among scholars that the internal evidence is decisive against their genuineness. The vocabu¬ lary, the style, the thought of these verses are sufficiently unlike the rest of the Gospel so that the great' majority of competent critics hold that they are not by Mark. Various explanations have been proposed for the abrupt close of the original text at the end of the eighth verse, as that the author might have been interrupted in some wav and never finished his book as he intended,' or that the last leaf was lost from the text which was the source of all our copies, and that some one (Aristion?) later attempted to make good the loss, but while any of the proposed explanations may be possible, it can¬ not be said that any of them are probable.

Authenticity and Value. — While, as has been said, for many centuries both Matthew and Luke were more used and valued than Mark, this judgment has of late been reversed. As it is the oldest of the three Synoptics, or at any rate preserves the original traditions of the Palestinian Church in their most primitive and unmodified form, it is of the highest value as a record. This value is of course enhanced by the fact of Mark's association with so many of the early leaders of the Church, and still more by the contribution which Peter, in particular, is recognized to have made to the materials em¬ ployed. The modern critical estimate may be relatively unfair to the value of the other Svnoptics, but is doubtless absolutely correct in its high estimate of the authenticity and value of this Gospel.

Bibliography.— Gould, E. P., Commentary on the Gospel According to Saint Mark) (Int. Crit. Comm. 1896); Moffatt, James. Hntroduction to the Literature of the New Testament) (1909) ; Swete, H. H., (The Gospel Ac¬ cording to Saint Mark* (1902) ; Zahn, Theo¬ dor, introduction to the New Testament (Eng. trans., 1909).

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

MARK, an old English term for a money of account, and in some other countries for a

coin. The English mark originated in the 12th century and was valued at $3.33, and the Scotch mark, or merk, of the 19th century was $3.42. In the coinage of the German Empire the mark is a coin of nearly the same value as the Eng¬ lish shilling. A mark banco used to be a money of account in Hamburg equal to 37 cents, nearly. The mark was also used as a weight in several parts of Europe, being divided into 24 carats.

MARK, Order of Saint, a Venetian order of knighthood. The doge, as well as the Sen¬ ate, elected knights of Saint Mark, who en¬ joyed a pension. Foreigners also, particularly scholars, were elected. Saint Mark the Evan¬ gelist was the patron saint of the Venetian Republic.

MARK ANTONY. See Antonius, Mar¬ cus.

MARK TWAIN. See Clemens, Samuel Langhorne.

MARKED TREE, Ark., town of Poinsett County, 40 miles northwest of Memphis, Tenn., on the Frisco Lines. It is within a few miles of Saint Francis Lake and is located in a thriv¬ ing lumber district. It contains lumber factories, cooperage works and a handle factory. It has also a district high school and two banks. Pop.

2,500.

MARKETS AND RURAL ORGANIZA¬ TIONS, Office of. See Agriculture, Depart¬ ment of.

MARKHAM, mark'am, Albert Hastings,

English admiral and Arctic explorer, cousin of Sir Clements Markham (q.v.) : b. Bagneres, 11 Nov. 1841. He entered the navy in 1855, saw active service in the China seas for several years, took part in the Polar expeditions of Adams (1873) and of Nares (1875), and in the latter expedition attained what was then the farthest north, 83° 20′ 26″. With Sir Henry Gorn-Booth he attempted to reach Franz Joseph Land in 1879, but was unsuccessful ; in the next year Markham explored the Galapagos Islands. Rear-admiral in 1892 and second in command of the Mediterranean fleet in 1893, he was made a vice-admiral, and later admiral. His last command was at Nore. He retired in 1906. He has written (The Cruise of the Rosaria amongst the New Hebrides) (1873) ; (The Great Frozen Sea* (1878) ; (The Voyages and

Works of John Davis) (1884) ; (A Polar Reconnaissance) (1879) ; and (Life of Sir John Franklin*

(1891).

MARKHAM, Sir Clements Robert, Eng¬ lish geographer and traveler : b. Stillingfleet, Yorkshire, 20 July 1830; d. 30 Jan. 1916. He was educated at Westminster School, entered the navy in 1844, accompanied the Franklin Search Expedition of 1850 and then retired from the service. He traveled in Peru in 1852-54 and 1860-61, the second journey being undertaken to get cinchona seeds for planting in India, an experiment described in his Peru¬ vian Bark; Cinchona Culture in British India, 1860-1880) (1880). After spending 1865-66 in Ceylon and India, he became assistant secre¬ tary in the India Office from 1867-77, and cu¬ rator of its geographical department in 1868. From 1858-87 he was secretary of the Hakluyt Society, of which he became president in 1890. From 1863-88 he was secretary of the Royal

Geographical Society, and in 1893 became its president. His more important works, several of which were translated into German, aic (Cuzco and Lima* (1856) ; ‘Travels in Peru and India> (1862); (The Arctic Navy List > (1875); <Lives) of Columbus, John Davis, Richard Hakluyt, Lord Fairfax, Major Ren-nell and Sir Leopold McClintock; Quichua Dictionary) (1908); (The Incas of Peru) (1910). He rendered distinguished service to the history of geography and discovery by edi¬ torial work for the Hakluyt and other societies. Was created K.C.B. in 1896.

MARKHAM, Edwin, American poet : b. Oregon City, Ore., 23 April 1852. He spent his boyhood on a ranch in central California, herd¬ ing cattle and sheep, and later graduated from the California State Normal School at San Jose and from Santa Rosa College. He studied law, but did not practice ; subsequently took up edu¬ cational work

and was superintendent and head master of schools in California and principal of the Observation School of the University of California in Oakland. He had for some time been an occasional contributor to some of the leading American magazines, but first gained wide reputation through the publication of his poem, ‘The Man with the Hoe,> suggested to him by Millet’s picture of the same name, lhis first appeared in the San Francisco Examiner and was later published in a collection entitled <The Man with the Hoe and Other Poems (1899). This poem, which had a wide influence and caused much discussion, is intended by the author not merely as a picture of the peasant but as “a symbol of the toiler brutalized through long ages of industrial oppression.” His other-publications include ‘Lincoln and Other Poems (1901)- and (Field Folk, Interpretations of Millet” (1901) ; (The Poetry of Jesus’ (1914) ; ‘California the Wonderful’ (1914) ; The Children in Bondage’ (1915); ‘Remarkable Writings of Thomas Lake Harris’ (5 vols.,

1918).

MARKHAM, William, English colonial governor in America’, b. England, about 163 , d. Philadelphia, 12 June 1704. When William Penn obtained a charter for Pennsylvania, he made Markham, a first cousin of his his dep¬ uty. Markham had all rights, granted to t enn save that of convoking a legislative assembly. On 3 Aug. 1681 he established a council later chose the site for Philadelphia and conferred with Lord Baltimore as to the Maryland-Penn- sylvania boundary. Penn himself arrived on 27 Oct. 1682, and Markham, whose commission accordingly lapsed, was elected to the counci . In 1684-99 he was secretary to the province, in 1686 became land commissioner and in 1689 an auditor of accounts. When in 1691 the terri¬ tory now constituting the State of Delaware was detached from the province, he : was ˆap¬ pointed its deputy-governor, and in 1694-99, as lieutenant-governor, administered both this ter¬ ritory and the province.

MARKHOR, mar’kor or -koor, a remark¬ able goat (Capra falconeri) of the mountains of Afghanistan and northwestern India, where it keeps among the highest wooded valleys, as¬ cending and descending only, as compelled to do so by the seasonal changes in the depth of the snow. It is of large size, standing about three feet tall at the shoulders, and is reddish-brown

in summer and light gray in winter The magnificent beard, extending in the adult males on to the chest and shoulders, and sometimes reaching nearly to the knees, is black in Iron and gray behind; in the young bucks and the does at all ages it is confined to the chin I he horns are very different from those of other goats, rising straight up from the forehead, spreading sideways, so as to form a V when seen from in front, and spirally twisted, bpeci-mens have measured 50 inches along the spiral keel. Several distinct local varieties of markhor are known to the Himalayan hunters, who regard this animal as one of the most excellent objects of sport in that region of prime game animals. “Unlike the ibex, which keeps to the rugged crags and steep ravines above the lim¬ its of the forest, the markhor delights in rocky forests, and although it occasionally comes out into the open glades, it seeks concealment as much as possible.” Hence its hunting calls for the greatest skill as well as endurance. I his goat is often captured, tamed and crossed with domestic goats; and it is believed to have had some influence in originating the Angora breed. Consult Lvdekker, ‘Wild Oxen, Sheep and Goats of All Lands’ (1898).

MARKIEWICZ, Countess, Irish artist and revolutionist : b. Lissadel, Sligo, Ireland, about 1876. A daughter of the late Sir Henry Gore-Booth, closely connected with a number of English titled families, she has been de¬ scribed by the Dublin bourgeoisie as the stormy petrel of Dublin life. Her husband, a PMe, was employed in the Russian consular service, and both had been prominent figures in the social life of Dublin. Before the countess be¬ came involved with the Sinn Fein party she had made a name both as an artist and an act¬ ress, and she had frequently acted in her hus¬ band’s plays at the Abbey Theatre. As a young girl the countess, then Miss Constance Gore-Booth, was presented at court and spent several seasons in London, after which she went to Paris as an art student. She came into promi¬ nence during the election in Northwest Man¬ chester in 1908 as an opponent of Mr. Church¬ ill. The Licensing Bill was then the issue and she went to Manchester to plead the cause of the barmaids. Her sister, Miss Eva Gore-Booth (q.v.), a leading English suffragette, was then the secretary of the Barmaids’ Political Defence League. In 1911 the countess was charged in Dublin with assaulting a policeman at the breaking-up of a Socialist meeting. Dur¬ ing the labor troubles in Dublin in 1912 she came into conflict with the police on several oc¬ casions. On the memorable Sunday at the end of August 1912 when Larkin’s dramatic arrest was the prelude to wild disorder in O Connell street, she and her husband came upon, the scene when the excitement was at its height, and as Larkin was being escorted to the

police station by a body of police with drawn batons. The countess stood up on the car she was driv¬ ing and led the cheers of the mob for the cap¬ tured labor leader. For many months after¬ ward, when a large section of the Dublin work¬ ing classes was in dire poverty caused by the protracted strikes, the countess was a constant attendant at Liberty Hall, the headquarters of the Transport Workers' Union.. Here she was engaged in preparing and distributing meals to

the impoverished wives and families of the strikers. A few weeks before the abortive revo¬ lution in April 1916 her house was raided by the police, who found a printing plant there and many documents. At the outbreak of the revolt she apparently accompanied the party who captured Saint Stephen's Green, and when the troops got the upper hand she retired with her detachment into the Royal College of Sur¬ geons, one of the principal buildings on the green. Eventually she hoisted the <(white flag® and intimated that she would surrender at noon. At the appointed hour the countess marched out of the college, followed by 120 rebels walk¬ ing two abreast. She was dressed entirely in green, with green tunic, green hat with green feather, green putties and green shoes. She marched to where the opposing force was wait¬ ing and, going to the officer in command, sa¬ luted, kissed her revolver and handed it over with her bandolier, and announced that she was ready. The men were disarmed and marched off under armed escort to the castle. For com¬ plicity in the uprising the countess wras sen¬ tenced to death by a court-martial, the sen¬ tence being afterward commuted to imprison¬ ment for life. She was liberated with the other Irish prisoners in June 1917. She continued her activity in the Sinn Fein party, however, and at the general elections held in December 1918 was returned member of Parliament for a Dublin constituency, being the first member of her sex to be sent to Westminster and the only successful woman candidate. See under Ire¬ land — Revolution.

MARKING-NUT, an East Indian tree {Seme car pus anacardium) of the cashew family, having a fruit the receptacle of which is roasted

and eaten. The black juice of the unripe fruit serves with quicklime to make an indelible marking-ink.

MARKINGS OF ANIMALS. See Col¬ oration, Protective.

MARKLE, John, American coal operator: b. Hazelton, Pa., 15 Dec. 1858. He was gradu¬ ated in the mining engineering department of Lafayette College in 1880 and in the same year was appointed general superintendent of mines of G. B. Markle and Company, his father's firm. Upon his father's death he suc¬ ceeded him and is now president of the G. B. Markle Company, successor to G. B. Markle and Company, and one of the largest of the independent® companies in the anthracite coal industry. Mr. Markle is also president and chief engineer of the Jeddo Tunnel Company. He was one of the leading figures and rep¬ resented the independent operators in the nego¬ tiations with President Roosevelt and in the inquiry by the President's commission in con¬ nection with the anthracite coal strike of 1902. Mr. Markle is a director of the Industrial Finance Corporation, the Morris Plan Company of New York, member of the American Insti¬ tute of Mining Engineers, the New York Chamber of Commerce and Franklin Institute, Philadelphia, and a trustee of Lafayette Col¬ lege.

MARKOE, Thomas Masters, American surgeon: b. Philadelphia, Pa., 1819; d. 1901. In 1836 he was graduated at Princeton and in 1841 at the New York College of Physicians and

Surgeons. He was appointed to the chair of anatomy in Castleton Medical College, Vermont ; in 1852-54 was professor of pathological anat¬ omy at the medical department of the Univer¬ sity of the City of New York. He was ap¬ pointed adjunct professor of surgery at the New York College of Physicians and Sur¬ geons in 1860; became full professor 10 years later and in 1879 was appointed to the chair of the principles of surgery. He published treat¬ ise on Diseases of the Bone> (1872).

MARKS' MILLS, Engagement at. On

23 April 1864, a train of 240 wagons, escorted by 1,200 infantry, 400 cavalry and five guns, all under command of Lieut. -Col. F. M. Drake, 77th Ohio Infantry, left Camden, Ark., for Pine Bluff, to get supplies for General Steele's army, then co-operating with Banks' Red River ex¬ pedition. At 10 a.m. of the 25th, when at Marks' Mills, on the Camden and Pine Bluff road, about eight miles beyond Saline River,

Drake was attacked, front and rear, by General Fagan's force of 3,000 men — cavalry, mounted infantry and two batteries — and after a hard fight of more than three hours, during which Drake was severely wounded and had lost 250 in killed and wounded, the entire train, guns and the greater part of the cavalry and in¬ fantry were captured. About 300 escaped and made their way to Little Rock and' Pine Bluff. Incomplete Confederate returns show a loss of 41 killed, 108 wounded and 144 missing. Fa¬ gan's entire loss was about 420. When Steele heard of the disaster he immediately aban¬ doned the idea of joining Banks, left Camden on the night of the 26th for Little Rock, was followed by Sterling Price, had a rear-guard fight at Jenkins' Ferry on the 30th and con¬ tinued his retreat to Little Rock. Consult (Official Records> (Vol. XXXIV).

E. A. Carman.

MARL, a mixture of carbonate of lime and clay in various proportions. If the lime pre¬ dominate the marl is called calcareous ; clay marl, or argillaceous marl, has a larger propor¬ tion of clay. As marl is hard or not it is called indurated or earthy. Even the more solid marls crumble soon on exposure to the atmosphere, and form a paste if dipped in water; they effer¬ vesce in acids, because of the presence of car¬ bonate of lime. Marl occurs in masses and beds, is associated with chalk, gypsum, sand, clay or compact limestone and contains import¬ ant fossil remains. To the presence of car¬ bonate of lime in its composition, marl owes its use in the manufacture of Portland cement and as a fertilizer. Many natural mixtures used as manures are called marls, such as the New Jersey green sand-marls, which contain as their principal constituents clay and green¬ sand and usually only 1 or 2 per cent of car¬ bonate of lime. The latter use of the word is scarcely justifiable, especially as it is sometimes applied, notably in England, to substances con¬ taining no lime at all. Marl is accumulating at the present time in many lakes in the glaciated areas of our Northern States, in part as a re¬ sult of the grinding up of small shells, in part as a result of the activity of algae known as chara, which cause the deposition of lime car¬ bonate. Marl may sometimes be a direct chem¬ ical precipitate. See Mineral Production of the United States.

MARLATT, Charles Lester, American

entomologist: b. Atchison, Kan., 26 Sept. 1863.

In 1884 he was graduated at the Agricultural College of Manhattan, Kansas, where he re¬ mained assistant professor for two years. In 1889-94 he was assistant entomologist and since 1894 has been first assistant and assistant chief entomologist of the Bureau of Entomology of the Department of . Agriculture. He made en¬ tomological investigations in _ Japan, China, Java, etc., for the department in 1901-02. He directed the effort to secure a national law to prevent importation of infested and diseased plants into the United States, which resulted in the Plant Quarantine Act of 20 Aug. 1912. Since 1912 he has served as chairman of the Federal Horticultural Board to supervise the enforcement of the act. Marlatthas had charge of tropical and subtropical fruit insect investi¬ gations and of branch stations in Florida, Loui¬ siana, California and Hawaii. His oublications have been confined to papers and bulletins on professional topics.

MARLBORO, marl'bur-6, Mass., city in Middlesex County, on the Boston and Maine and the New York, New Haven and Hartford railroads, about 28 miles west of Boston and 15 miles east of Worcester. Marlboro was settled in 1656 by a colony from Sudbury Mass., and four years after was incorporated as a town In 1890 it wss chartered as a city. Dur-ing King Philip's War (1676) the Indians de¬ stroyed nearly the whole town. The chief manufactures are boots and shoes, shoemaking machinery, automobiles and automobile-tires, bicycles, carriages and wagons, lamps, electrical machines and supplies, boxes, hose-pipe, woodenware, cigars and machine-shop products, lhe principal buildings are the high school, city-hall, Saint Ann's Convent and Academy, a pub¬ lic library, G. A. R. building and a numbei of churches and schools. The mayor is elected an¬ nually and has power to appoint, subject to approval by the council, the police and the members of the street and fire departments. He also appoints the members of the license department. The council elects the members of the health, poor and water departments. The waterworks are owned and operated by the city. Pop. 15,028. Consult Hudson, (History of the Town of Marlboro, Massachusetts.*

MARLBOROUGH, marl'bur-o, or mal'- bur-6, John Churchill, Duke of,

English gen¬ eral and statesman: b. Ashe, Devonshire, 1650; d. Blenheim, 16 June 1722. At 12 he became page to the Duke of York (afterward James II), by whom at 16 he was appointed an ensign. He' was present at the siege of Tangiers and soon after his return rose to the rank of cap¬ tain. In 1672 he accompanied the Duke of Monmouth to assist Turenne against the Dutch At the siege of Maestricht he distinguished himself so highly as to obtain the public thanks of the king of France. On his return to Eng¬ land he was made lieutenant-colonel and his advancement was rapid. He had a regiment of dragoons presented to him and strengthened his influence at court by his marriage with Sarah Jennings, an attendant upon the princess, after¬ ward Queen Anne. In 1682 he obtained the title of Baron of Aymouth and on the acces¬ sion of James II was sen't Ambassador to France and soon after his return created Baron

Churchill of Sandbridge and raised to the rank of general. The same year he suppressed the rebellion of the Duke of Monmouth. On the arrival of the Prince of Orange he joined him at Axminster and was rewarded by the earldom of Marlborough and the appointment ot commander-in-chief of the English army in the Low Countries. The following year he served in Ireland, where he reduced Cork, Kinsale and other places. In 1691 he was suddenly dis¬ missed from all his employments and committed to the Tower on the charge of high treason, but soon obtained' his release ; though it appears that the suspicions against him were not without foundation. On the death of Queen Mary he was made a privy councillor and appointed governor to the young Duke of Gloucester, and in 1701 was created by King William commander-in-chief of the English forces in Holland and Ambassador Plenipotentiary to the States-General. On the accession of Queen Anne in 1702 he was created captain-general of all the forces at home and abroad and sent Plenipotentiary to The Hague. There he was also made captain-general by the States. In the campaign of the same year he drove the French out of Spanish Guelders and took Liege and other towns, for which he was created Duke of Marlborough. In 1704 he stormed the French and Bavarian lines at Donauworth, and in the same year, with Prince Eugene, gained the victory of Blenheim (13 August) over the French and Bavarians, headed by Marshal Tal-lard and the Elector of Bavaria. The nation testified its gratitude by voting him the manor of Woodstock and Blenheim Palace, one of the finest seats in the kingdom. In the campaign of 1707 his antagonist was the famous Due de Vendome, over whom he gained no advantage; and on his return he found that his popularity at court was on the decline, this being said to be due to his avarice. In 1708, with Prince Eugene,

he gained the battle of Oudenarde. In 1709 he defeated Marshal Villars at Malplaquet (11 September) though at a cost ill repaid by the capture of Mons, and in 1710 with Prince Eugene gained another victory over Villars. During his absence a new ministry, hostile to himself, was chosen, and on his re¬ turn his command was taken from him and a prosecution commenced against him for apply¬ ing the public money to private purposes. He went in disgust to the Low Countries in 1712, but returned a short time before the queen's death, and on the accession of George I was reinstated in the supreme military command. Consult Coxe, (Memoirs of the Duke of Marl¬ borough (1847-48) ; Alison, (Military Life of the Duke of Marlborough5 (1879) ; Saintsbury, Marlborough5 (1879).

MARLBOROUGH, N. Y., town of Ulster County, situated on a high bluff on the right bank of the Hudson, 65 miles north of New York. Capt. Annivy Smith, of Revolutionary fame, lived here and his house was shelled by the British in 1777. The region is noted for its small fruits, especially the Marlborough rasp¬ berry. Pop. of the town 2,700; of the borough about 1,000.

MARLBOROUGH, New Zealand, the northeastern provincial district of South Island, bounded by the sea and the provincial district of Nelson. Its extreme length is 130 miles,

breadth 60 miles ; area, 4,753 square miles. The coast is deeply indented by bays and natural harbors, from which the hills rise abruptly, clothed with magnificent forests. The district is generally hilly or mountainous, with splendid scenery. The amount of arable land is re¬ stricted ; in the south are the Wairau Plains, one of the finest sheep tracts in New Zealand. Mining is carried on, gold, copper and coal being found. Blenheim, the capital, is con¬ nected by rail with the seaport of Picton on Queen Charlotte Sound. Pop. 17,612.

MARLIN, Tex., city and county-seat of Falls County, on the Houston and Texas Cen¬ tral and the International and Great Northern railroads, about 150 miles north of Houston and 26 miles southeast of

Waco. It is situated in an agricultural region in which cotton is the chief product. The industrial establishments include a large cottonseed-oil mill, three cotton gins, a cotton compress, a large brick olant, ice and electric-light plant, planing mill and marble works. The trade is in cotton, livestock and various kinds of vegetables and fruits. Marlin has two hot water artesian wells which have an average depth of 3,350 feet, with a temperature of 147° F. The waters possess medicinal prop¬ erties which attract a large number of health seekers to the city. Some of the principal buildings are a central school building, fine hotels, sanatoriums, bathhouses, opera-house, modern business houses and courthouse. Pop.

6,000.

MARLIN, a sportsman's name for the god-wits (q.v.).

MARLINGSPIKE, or MARLINE SPIKE, an iron pin tapering to a point, and principally used by sailors to separate the strands of a rope in splicing or knotting. A large wooden pin used for the same purpose is called a fid. A bird, the jaeger or boatswain, of New England, bears the same name, in allusion to the pointed tail-feathers.

MARLITT, E. See John, Eugenie.

MARLOWE, Christopher, English poet and dramatist: b. 1564; d. 1593. In 1583 he took the A.B. degree at Bene't College, Cambridge, and in 1587 the degree of M.A. Perhaps in the same year, the first part of his (Tamburlaine> was acted in London; and the rest of his life was spent in active connection with the theatres. His life seems to have been somewhat dissi¬ pated and the daring of his theological opin¬ ions gave color to an accusation of atheism. In 1593 he was killed in a tavern broil and was buried at Saint Nicholas, Deptford.

Numerous plays have been assigned to Mar¬ lowe, including a share in the three parts of (Henry VP ; and he may very likely^ have had some part in others besides the following, which can with certainty be ascribed to him: (The Tragedy of Dido,^ of uncertain date of acting, printed 1594 ; <Tamburlaine) (two parts), acted

1587-88, printed 1590; (Dr. Faustus,> acted

1588-89, printed 1594; (The Jew of Malta, * acted about 1590, printed 1594; <Edward IIP acted 1591, printed 1594; (The Massacre of Parish acted after 1591, printed about 1595. His (Hero and LeandeP

was left incomplete at his death and was finished by George Chap¬ man and published in 1598. Marlowe's plays attained a sudden and great popularity and

his poetic reputation is testified to by numerous tributes from his contemporaries. Marlowe's dramatic activity came at a time of great emo¬ tional stir and stress. In England the ideas and ideals of the Renaissance and the Reformation had finally gained the ascendency over those of the Middle Ages. The struggle with Spain, which was just ending in the destruction of the Armada, had brought a triumphant conscious¬ ness of national greatness. From this newly-discovered England as well as from the newly-discovered America and the rediscovered world of Greece and Rome, came countless incentives for multiform activities. In literature as in life opportunity seemed boundless, experiment and innovation easy, voyages of discovery sure of rich reward. The drama had already become in some measure an expression of this national activity, but it still awaited the services of great literary genius. After two generations of precarious struggle, the professional companies had become firmly established in the public theatres and it was already plain that the main development of the drama was henceforth to be popular and professional rather than schol¬ arly and amateur. In comedy, indeed, the plays of Lyly and Peele had already supplied refinement and a literary flavor, but in the popular drama in the main, and in tragedy in particular, there was neither refinement nor poetry.

Marlowe created English tragedy anew. He threw aside Senecan traditions and devoted himself to meeting the demands of the London theatres, but the prologue to his first play was a declaration of reform, announcing the adop¬ tion of blank verse, heroic themes and ((high astounding terms.® His themes were novel, and his treatment of them seems to have been dictated by a conception of tragedy formed independently of his predecessors, — the heroic struggle of a great personality doomed to in¬ evitable defeat. (Tamburlaine> is hardly a tragedy at all but rather a chronicle of the hero's greatness; but in (Dr. Faustus) and (The Jew of Malta, > heroes with ambitions as boundless and passionate as Tamburlaine's are overwhelmed in the end by the limitations that forever bound human aspiration. These plays mark the formation of the Marlowean type of tragedy, often imitated and long influential in the English drama. A protagonist distinguished by great passions and many crimes absorbs the interest of a series of scenes, brutal and sensa¬ tional, full of violent action, ranting declama¬ tion, bloodshed and villainy affording oppor¬ tunity

for elaborate theatrical spectacles and adorned by passages of profound intellectual suggestiveness and extraordinary beautv of dic¬ tion and melody. (Edward II, > the most ma¬ ture of his plavs, illustrates these characteristics and also testifies to his growing power both as a playwright and as a poet. The characteriza¬ tion is less melodramatic, more varied and more human than in the earlie plays; the structure more coherent and organized ; the style less bombastic, more even and more dra¬ matic. Shakespeare, who clearly imitated Mar¬ lowe in (Richard IIP and produced (Richard IP in rivalry of (Edward IP did not in these two plays surely surpass his master.

Marlowe's faults and deficiencies are appar¬ ent and they cannot all be credited to the

immaturity and experimental nature of his ait. The banalities that mar his noblest scenes and the absurdities that appear in every phase of his work, theatrical, dramatic or poetic, would doubtless have disappeared in the rapid develop¬ ment of dramatic art which the next 30 years witnessed. But there are no indications that, had Marlowe's life been prolonged, he would ever have excelled in humor or the individual¬ ization of character. His achievement is, never¬ theless, among the most remarkable and en¬ during' of the Elizabethan era. His poetry re¬ mains forever impressive with its fine impetuos¬ ity, its splendors of diction and melody. His tragedies, of immense influence on the theatre of his day, continue to rank among the greatest of English literature in their expression of passionate ambition and aspiration. He was the first great English dramatist, and he prepared the way for Shakespeare. See Faust, Dr. ;

Jew of Malta, The. .

Bibliography. — The best collected editions of his works are by Rev. Alexander Dyce (1850 and 1870), and by A. H. Bullen (3 vols., 1885). His four tragedies are in one volume of Mer¬ maid Series of Old Dramatists with introduc¬ tion by J. A. Symonds. For biography and criticism: Ward, A. W., (History of Dramatic Literature5 (Vol. I) ;

Fleay, F. G., biographical Chronicle of the Drama5 (Vol. II) ; Ingram,

J H, (Christopher Marlowe and His Asso¬ ciates5 ; Fischer, O., (Zur Charakteristik der Dramen Marlowe's) (Munich). Marlowe s life has been the theme of two modern tragedies,

R H Horne's (The Death of Marlowe5 (1870), and Miss Josephine Peabody's < Marlowe5

(1901).

Ashley H. Thorndike, Professor of English, Columbia University.

MARLOWE, Julia (Mrs. Sothern), American actress: b. (Sarah Frances Frost), Caldbeck, Cumberlandshire, England 17 ' Aug 1870 She came with her parents to the United States in 1875. In 1882 she joined the Juvenile Opera Company, which presented 'Pinafore, *The Chimes of Normandy5 and other light operas, in which she was known as. Frances Brough. Subsequently she took a child's part in (Rip Van Winkle.5 She then retired, studied in New York for three years and then made her metropolitan debut as Parthenia in Ungo-mar.5 Her later roles include Viola in 'Twelfth Night5 ; Rosalind in 'As You Like It5 ; High¬ land Mary in 'For Bonnie Prince Charley5 (1897)- Barbara Frietchie in the play of that name by Clyde Fitch (1899), and Charlotte Durand in Cable's 'Cavalier5 (1902). Other plays in which she has taken the title roles are (Colinet5 and 'When Knighthood was in Flower 5 On 28 May 1894 she was married to Robert Taber, who had been her leading man in her first appearance in (Romeo and Juliet in 1888. They starred together for a season, but owing to a disagreement were later sepa¬ rated and in 1900 Mrs. Taber secured a di¬ vorce. The next great success was as Barbara Frietchie in Clyde Fitch's play. In 1904 she joined E. H. Sothern, and for several years they were joint stars in Shakespearean roles. In 1911 they married, and in 1916 Mrs. Sothern retired from the stage. Their presentations of Shakespearean plays are reckoned as some of the best ever given in America. Consult

Strang, (Famous Actresses of the Day in America5 (Boston 1899); Browne and Austin,

< Who's Who on the Stage5 (New York 1906).

MARMADUKE, John Sappington, Amer¬ ican soldier : b. Saline County, Mo., 14 March 1833; d. Jefferson City, Mo., 28 Dec. 1887. He studied at Yale and Harvard and graduated from West Point in 1857, and served in the United States army in the West. At the out¬ break of the Civil War he entered the service of the Confederate States and rose to the rank of major-general. In 1864 he was captured and was not released until after the close of the war, when he went abroad for a time, and on his return engaged in business and also in journalism. He was defeated for the governor¬ ship of Missouri in 1880, but in 1884 was elected and served until his death.

MARMALADE, a jellied or gelatinous preparation made from quinces, peaches, apri¬ cots or oranges and portions of their rinds, with a mixture of . sugar and spice. It is made like the ordinary jams, poured out warm into pots or jars and sold as a confection. The mar¬ malade tree (Tucuma mammosa) is of the star-apple family, producing a large egg-shaped drupe, tasting like marmalade.

MARMETTE, Joseph, Canadian novelist: b. Montmagny, Quebec, 1844 ; d. 1895. After re¬ ceiving a good general education he determined to devote himself to literature. He wrote sev¬ eral historical novels dealing with the main events in French-Canadian history. These in¬ clude ‘Charles et Eva5 (1867); ‘Franqois de Bienville5 (1870); ‘L’Intendant Bigot5 (1872); <Le Chevalier de Mornac5 (1873), and lLe tomahawk et l’epee5 (1877).

MARMIER, Xavier, French author: b. Pontarlier, Doubs, 24 June 1809; d. Paris, 11 Oct. 1892. He engaged in journalism and later traveled extensively in Switzerland, Holland, Germany, Russia, Algeria, America and the East. In 1835 he accompanied the scientific voyage of the Research to the Arctic regions and then acquired a wide knowledge of the Scandinavian and Finnish languages and cus¬ toms. In 1839 he became professor of foreign literature at Rennes and in 1841 occupied a position under the Minister of Public Instruc¬ tion. In 1846 he was appointed librarian at Saint Genevieve in Paris and in 1870 was elected a member of the Academy. Among his publications are (Histoire de l’lslande5 (1838) ; (Langue et Litterature Islandaises5 (1838) ; ‘Histoire de la litterature en Danemark et en Suede5 (1839); ‘Lettres sur la Russie, la Fin-lande et la Pologne5 (1843) ; (Du Rhin au Nil5 (1846); ‘Lettres sur l’Amenque5 (1852);

(Voyage en Suisse5 (1861); ‘Voyages et Lit¬ terature5 (1888), and the novels cLes fiances du Spitzberg5 (1858); ‘Gazida5 (1860); (Cim-arosa5 (1867); (Les drames du cceur5 (1868); <Une grande dame russe5 (1876), *etc.*

MARMION. Scott's (Marmion,5 pub¬ lished 1805, is the second of his metrical ro¬ mances, and the first — after the preliminary experiment of the (Lay of the Last Minstrel5— in which he developed the full possibilities of the form. Because of the success of the earlier poem, he was offered £1,000 for this one be¬ fore he had begun to write it — a circumstance

which enabled Byron to barb his satire with the taunt :

"And think' st th;u, Scott! by vain conceit perchance, On public taste to foist thy stale romance,

Though Murray with his Miller may combine To yield thy muse just half a crˆ.wn per line?"

Like most of Scott's fiction, in prose or verse, the story of (Marmion) is based on the funda¬ mental impulse to revivify the past, especially in connection with the historic associations of picturesque scenes. Hence he weaves a romance about persons, some historic and some imagina¬ tive, but always with an eye toward the climax, the account of the battle of Flodden Field. It is significant, too, that the famous scene de¬ scribing the quarrel between Marmion and Douglas (canto vi) was an afterthought, due to a suggestion from one of Scott's friends that he should plan Marmion's journey from Eng¬ land to Edinburgh so as to introduce the Doug¬ las castle of Tantallon. Critical opinions have varied concerning the romantic plot of this poem, and Scott himself spoke severely of his having based it in part on the crime of forgery, characteristic <(of a commercial rather than a proud and warlike age.® But there can be no difference of view as to the splendid movement and glow of the more stirring scenes of the story — those of the kind in which Scott's genius was always at its best — especially the account of the battle of Flodden, culminating in the death of Marmion. The work also contains some interesting personal poetry, in the epistles, addressed to different friends, which Scott prefixed to the several cantos, and (in canto v) one of his most popular narrative ballads, <Lochinvar.)

Raymond M. Alden.

MARMOL, Jose, ho-sa' mar-mol', Argen¬ tine author: b. Buenos Aires, 5 Dec. 1818; d. there, 12 Aug. 1871. He was a pronounced Dem¬ ocrat, was banished by Rosas, led the opposition against that dictator and on its successful ter¬ mination became senator and librarian of Buenos Aires. A fervent orator Marmol is better known as the author of (La Amalia) (1866), a historical novel dealing with Rosas' dictatorship, of the popular patriotic poem (E1 25 de Mayo de 1843,) and of the dramas <E1 poeta) (1842) ; (E1 Peregrino> (1846) and (E1 Cruzado } (1851). (La Amalia) has long been familiar to European readers through French and German translations. An English transla¬ tion has appeared recently (New York 1919).

MARMONT, Auguste Frederic Louis Viesse de, o*-gust fra-de-rek loo-e ve-es de mar-mon, Duke of Ragusa and Marshal of France: b. Chatillon-sur-Seine, France, 20 July 1774; d. Venice, 2 March 1852. 'He entered the army as a lieutenant of infantry in his 15th year. In 1792 he changed to the artillery, and at Toulon became acquainted with Bonaparte, who chose him for his aide-de-camp. For sev¬ eral years after 1805 he was military and civil governor of Dalmatia, where he initiated important public works. Being called to aid in the Austrian campaign in 1809 he assisted so efficiently that Napoleon made him a marshal and governor-general of the Illyrian provinces. He was again called upon in the Spanish campaign of 1811, was severely wounded at Salamanca (q.v.) and laid up for some time. In the campaign of 1813 he

held the command of an army corps in Ger¬ many, and fought in the battles of Lutzen, Bautzen and Dresden. In 1814 he fought a final battle under the walls of Paris, but oppo¬ sition appearing fruitless surrendered to the allies. This proceeding was one main cause of Napoleon's immediate abdication, and brought Marmont into favor with the Bourbons. After the Restoration Louis XVIII made him a peer of France, but he was compelled to withdraw from Paris by the Revolution of 1830, and his name was struck off the army list.

MARMONTEL, Jean Francois, zhon fran-swa mar-mon-tel, French writer: b. Bort, Limousin, France, 11 July 1723; d. Abbeville, Eure, 31 Dec. 1799. He was educated for the Church, but turned to letters, and became a journalist and dramatist at Paris. In 1758-59 he edited Le

Mercure, and in 1763 was elected to the Academy. He wrote tragedies, including (Denys le Tyran) (1748) and (Aristomene) (1749) ; (Contes rnoraux) (1761), and the

works of fiction (Behsavie) (1767) and (Les Incas) (1778). His (Poetique Franqaise) (1763) and (Elements de Litterature) (1787) have perhaps a more permanent worth. A collected edition of his writings appeared in 1786-87. In 1771 he was appointed historiogra¬ pher of France, and in 1783 was made secre¬ tary of the French Academy.

MARMORA, mar'mo-ra, or MARMARA,

Sea of (anciently Propontis) , an inland sea, lying between southeastern Europe and the west¬ ernmost part of Asia, communicating with the Mediterranean by the narrow strait called the Dardanelles, and with the Black Sea by the Bosporus. Length from Gallipoli to the head of the Gulf of Izmid, 170 miles; greatest breadth, which is near the centre, about 45 miles; average depth, over 600 feet; maximum depth, 4,000 feet. The gulfs of Izmid and Moudania, on the Asiatic side, are the chief indentations. The largest of several islands is Marmora, famous for its quarries of marble and alabaster, situated near its western end; at the eastern end, on the Asiatic coast, and not far from Constantinople, is a group called the Princes Islands. A current sets from the Black Sea into the Sea of Marmora, which in turn runs into the Archipelago. The tides are hardly perceptible and the navigation is easy.

MARMOSET, a small American monkey of the family Hapalidce. They inhabit the Brazilian forests, possess long, non-prehensile tails, have a thick wooly fur and bear a close resemblance to squirrels in appearance and movements, having long hind legs and penciled ears. They are notable, further, for the rela¬ tively large size of the brain and the few teeth (32), likening the family more to the monkeys of the Old World than to those of the other American family (Cebidce). They are favorite pets, not only on account of their quaint pretti¬ ness, but because of their small size, their gen¬ tleness and intelligence; but they are exceed¬ ingly delicate and rarely survive a change of climate. Their food is varied. The family in¬ cludes many species which fall into two divi¬ sions — the genus Hapale and the genus Midas. The former contains the typical marmosets, or ouistitis, as the French call them, of which one species (H. jacchus) has long been a familiar pet ; and the 'latter, the silky marmo-

sets or tamarins, which are larger and more varied in their colors and in their ornamental tufts and crests. They also differ in their teeth and are without ring-colors on the tail. The best-known species is the marikina (M . rosaha) , The pinche (M. ocdipus) , found at the Isthmus of Panama, has bushy gray hair on the head, giving a quaint ((old manw appearance.

MARMOT, a large ground-squirrel of the genus Afctomys , having terrestrial habits, rathei coarse fur, no cheek-pouches, short limbs and powerful digging claws. In size they vary from about 15 to 25 inches in length, the tail adding from 3 to 12 inches. Several species inhabit the northern parts of the world, in southerly climates keeping themselves mostly upon moun¬ tain heights, but farther north inhabiting lower levels, preferring open or thinly wooded plains. All dig and dwell in burrows, some species gath¬ ering into extensive colonies, the hillocks about the mouths of the burrows forming communi¬ ties similar to the ®towns® of the prairie-dogs ; while other species dwell in families far apart from one another. They feed upon herbage and grow very fat in the autumn preparatory to hibernation during the cold months, when their dormancy is complete. Their underground sleeping-chambers are warmly furnished with dry leaves and hay. The European marmot (A. Alp inns) is found in plenty on the Alpine range, equals a rabbit in size and is light brown in color. It lives immediately below the snow line, and subsists on vegetables, insects and roots. They come forth from their burrows during the month of April, and are said to be readily tamed. The bobac, another European species (A. bobac), inhabits Poland, Russia and all northern Asia. A third species is found in the Himalayan ranges; and a fourth (A. caudatus), the largest and handsomest of the family, dwells in the valleys of their south¬ erly slopes. These little animals are of great value to the wandering natives of northern and central Asia, who utilize both their skins and flesh. America has two marmots, one of which is the siffleur or whistler of the tops of the northern Rocky Mountains, and the other the familiar Eastern woodchuck. The former takes its name from the loud eerie whistle with which it wakes the echoes of the crags about the lone pastures above timber-line, where it makes its home ; it was of great service to

the mountain Indians. Other species or varieties occur in the southern mountains of the Western States. The woodchuck, or ground-hog (A. monax) , is a heavy, broad-headed, grizzled animal of the woods and fields, yellowish to whitish gray in color, blackish on the back and crown and chestnut on the belly; with the feet and tail brownish black. It abounds throughout the whole country east of the dry plains, and flour¬ ishes in spite of civilization, as the farmers' meadows and gardens supply it with an in¬ creased supply of good food, and mankind thins out its worst enemies, such as wildcats, foxes, weasels, the larger serpents and birds of prey; none of these save the first is much to be feared by the full-grown woodchucks, but may kill many of the young. As a result the animals have become unpleasantly numerous in some districts of the Eastern States, where their depredations upon gardens and certain planta¬ tions, as of lettuce and celery, are often serious. Consult Lydekker, (Royal Natural History,*

(Vol. Ill 1895) ; Stone and Cram, 'American Animals) (1902).

MARNE, marn, France, a river, the chief affluent of the Seine, rising in the plateau of Langres, flowing northwest past Chalons to Epernay, thence westward, joining the Seine at Charenton, four miles above Paris. Its length is 326 miles, 126 of which are navigable to Saint Dizier. It is connected by canals with the Rhine, the Aisne and the Seine. The Marne was the crucial fighting line of the Western Front during the Great European War, 1914-18. During a six-days battle from 5 Sept. 1914 the march of the Germans on Paris was checked along its banks. Fighting continued between the Aisne and the Marne until the Germans be¬ gan their fifth drive on 15 July 1918. American troops counter-attacked, drove the German troops back across the rivers, and with the Allied troops continued the onslaughts which led to the German request for the armistice which ended the war 11 Nov. 1918. See War, European.

MARNIAN EPOCH, name given to the period known in France as the Gallic, in Eng¬ land the late Celtic and in Switzerland as La Tene. It extends from about 500 b.c. to the conquest of Gaul by Julius Caesar. It is named Marnian from the French department of the Marne where the richest deposits of the period have been found.

MAROCCO, ma-rok'o. See Morocco.

MARONITES, mar o-nits, a sect of East¬ ern Christians, whose origin was a consequence of the Monothelite controversy. In the 7th cen¬

tury the opinion that Christ, though he united in himself the divine and human natures, had but one will arose among the Eastern nations. But when their last patron, the Emperor Philippi-cus Bardanes, was deposed and exiled in 713, the Monothelites were condemned and banished by his successor, Anastasius. The remnant of this party survived in the Maronites (so named from their founder, Maron) — a society of monks in Syria, about Mount Lebanon, which is mentioned as early as the 6th century. Another monk, John Maro, or Marum, also preached Monothelitism there in the 7th century. Re¬ garded as rebels by the Melchites (q.v.), or Christians who adhered to the opinions of the emperor, they became, in the country of Leba¬ non, which is now called Kesrawan, a warlike mountain people, who defended their political as well as their religious independence boldly against the Mohammedans, and who even now, under the Turkish government, resist the pay¬ ment of a tribute, like the Druses. The political constitution of the Maronites is that of a mili¬ tary commonwealth. Governed by their ancient customary rights, defended from external at¬ tacks, they support themselves among the mountains by husbandry and the produce of their vineyards and mulberry-trees. The reve¬ nues of all their orders of ecclesiastics are very small, but a common spirit unites them, and in simplicity of manners, temperance and hospi¬ tality they resemble the ancient Arabians. Re¬ venge for murder is permitted among them, and as a sign of 'nobility they wear the green turban. Their Church constitution resembles very much that of the old Greek Church. Since the 12th century they have several times submitted to the Pope and joined the Roman Catholic

Church, without giving up their own peculiari¬ ties. At last Clement XII induced them to ac¬ cept the decrees of the Council of Trent at a synod held in 1736 at their convent of Mar-hanna. After this synod their priests still re¬ tained the right to marry, after the manner of the Greek Church ; and they continued to ad¬ minister the sacrament under both forms. The use of the Arabic language was preserved in the church service. Mass was read only in the an¬ cient Syriac. Their head is called the patriarch of Antioch, although his residence is in the

monastery of Kanobin, upon Mount Lebanon ; and he gives an account every 10 years -to the Pope of the condition of the Maronite Church. Under him are the bishops and other clergy¬ men, who form seven degrees of rank. In Kesrawan are over 200 Maronite convents and nun¬ neries, containing in all from 20,000 to 25,000 members who profess the rule of Saint An¬ thony and devote themselves to agriculture and gardening. Since 1584 there has been a Maron¬ ite college established at Rome for the educa¬ tion and training of their clergy. At present the Maronites are supposed to number about 300,000, and these are distributed into 150 par¬ ishes throughout Syria, Palestine, Egypt and Cyprus. In consequence of the sanguinary con¬ flicts between the Maronites and Druses, June 1860, both communities are now subject to one governor appointed by the Porte, with the title of governor of the Lebanon. Consult Bliss, F. J., (Religions of Modern Syria and Palestine) (1912). See Druses.

MAROONS, the name given to runaway negro slaves in Jamaica and in some parts of South America. The name seems to be equiva¬ lent to mountaineers, being derived from Span¬ ish, cimarron, a fugitive negro or maroon, from cima (same as French cime) , a summit or hill¬ top. In many cases runaway negroes, taking to the forests and mountains, rendered themselves formidable to the colonists and sustained a long and brave resistance against the whites. . When Jamaica was conquered by the English in 1655 about 1,500 slaves retreated to the mountains. They continued to harass the island till 1795, when they were finally reduced by the aid of bloodhounds. Some of them were removed to Nova Scotia, and afterward to Sierra Leone. Consult Dallas, ‘History of the Maroons.5

MAROQUIN, mar-6-ken’. See Morocco (leather).

MAROS, mo’rosh, river of Hungary. It rises in eastern Transylvania and flows west¬ ward for about 550 miles, joining the Theiss at Szegedin to form the Danube. Its watershed is about 30,000 square miles. It is navigable to Karlsburg, aboitf 300 miles.

MAROT, Clement, French poet: b. Cahors, Quercy, winter of 1496-97; d. Turin, 1544. His father was escripvain or historiographer to Anne of Brittany. He went to Paris in 1506, was educated at the university there and studied for the bar. Through his father’s interest, he entered the service of Francis I ; and in 1519 was attached to the suite of Margaret d’Angouleme, the king’s sister. In the battle of Pavia he was wounded and taken prisoner, but on his return to Paris became a member of the royal house¬ hold. Imprisoned once as a Protestant heretic, and coming again into serious risk, he fled to Navarre and to

Italy; returning, he had to flee

finally in 1543. Being as much a freethinker as a Calvinist, he found no shelter in Geneva, whither first he betook himself, and went to Turin, where he died. His early poems arc stiff; his later ones are almost unsurpassed for ease and grace, in which qualities his only rival is La Fontaine. He wrote many rondeaux, epi¬ grams, epistles and ballads ; also the poem 'L'Enfer.5 His famous translation of the Psalms in poetry — superior to the inadequate French prose translation of the Scriptures at that time — is said to have promoted the cause of the Reformers and was sung at the court and was widely popular in the country. Con¬ sult Morley, Henry, (Clement Marot, and other Studies> (London 1871) ; Tilley, A. A., litera¬ ture of the French Renaissance5 (Vol. I, New York 1904).

MAROT, Helen, American labor leader: b. Philadelphia, 1865. She became interested in labor problems in her native city and after a few years of activity in labor circles there re¬ moved to New York. In the latter city she became executive secretary of the Woman's Trade Union League. Meanwhile she made important investigations into conditions sur¬ rounding child labor in New York. She has published (Handbook of Labor Literature5 (1889) ; and (American Labor Unions5 (1914).

MAROZIA, ma-ro'zi-a, Roman lady of in¬ famous reputation, known for her influence at the papal court : d. Rome, 938 a.d. She was the daughter of Theodora (q.v.). She deposed Pope John X, and probably caused his death. As mother of John XI and grandmother of John XII and Leo VII, she exercised great influence on the political affairs of 'her time in Italy. She had more ability than character, but repented and die'd in a convent.

MARQUAND, markand', Allan G., Amer¬ ican archaeologist: b. New York, 10 Dec. 1853. In 1874 he was graduated at Princeton Uni¬ versity a-nd studied subsequently at the uni¬ versities of Berlin and Johns Hopkins. In 1881-83 he was engaged as tutor and lecturer and from 1883 to 1905 was professor of archae¬ ology and the history of art at Princeton. Since 1905 he has been professor of art and archae¬ ology at the same institution. Since 1890 Dr. Marquand has also been director of the Prince¬ ton Museum of Historic Art, and in 1896-97 was professor of archaeology at the American School of Classical Studies, Rome. Since 1885 he has been associate editor of the Amer¬ ican Journal of Archceology. Dr. Marquand is the author of 'Greek

Architecture5 (1909) ; (Della Robbias in America5 (1912) ; (Luca Della Robbia5 (1914) ; joint author of 'History of Sculpture5 (1896-99), and archaeological articles in various journals.

MARQUAND, Henry Gurdo.n, American banker and philanthropist: b. New York, 11 April 1819; d. 26 Feb. 1902. He was educated in Pittsfield, Mass., and for 20 years was in the real estate business, afterward becoming a banker and acquiring an interest in various railways and other commercial enterprises. He was a generous patron of the Metropolitan Museum of Art, to which he gave valuable paintings, etc., and among his other benefactions are a pavilion to Bellevue Hospital and a gymnasium and a chapel to Princeton Uni¬ versity.

MARQUE, mark, Letter of, a commission granted to the commander of a merchant ship or privateer to cruise against and make piizes of the enemy's ships and vessels, either at sea or in their harbors, under pretense of making reprisals for injuries received. The ship so commissioned was also called a letter of marque or mart. In the naval history of the 16th and 17th century, privateering was common, but tended to degenerate into piracy, any state at war, when hard pressed, being willing to issue letters of marque to anybody who would prey upon their enemy. The term is in disuse except with historical reference, as no government has issued such licenses since the Declaration of Paris, at the close of the Crimean War in 1856.

MARQUESAS, or MARQUEZ AS (mar-ka'sas), or MENDANA (men-da'na) IS¬ LANDS, or LES MARQUISES, Polynesia, an island group in the south Pacific Ocean, lat. 8° to 11° S; long. 138° 30' .to 141° W., be¬ longing to France since 1842 and composed of 12 islands and islets divided, into two groups, the northern and southern, with a total area of 480 square miles. The largest islands are Nukahiva, or Marchand, and Hivaoa, or Dominica. The coasts are generally inaccessible, rising from water like walls; but in Nukahiva there are some excellent natural harbors. . The is¬ lands are generally high, some of their moun¬ tains reaching an elevation of over 4,000 feet ;

the intervening valleys are fertile, picturesque and copiously watered by streams which form numerous cascades. The principal food produc¬ tions are pulse, yam, cocoanuts, sugarcane, cotton and bamboo ; hogs are also numerous. The men are well-formed, active, powerful and all tattooed. The women have regular features, good complexions, fine teeth and neat hands, and are the finest of the sex to be met with in Polynesia. The people o-f these islands were formerly cannibals and though this practice has been discontinued cruelty and ferocity are pre¬ vailing characteristics, and the efforts of the missionaries have met with but little success. The Marquesas were discovered in 1595 by Alonza Mendana de Neyva. They were sub¬ sequently visited and described by Cook and the Forsters in 1774, when Hood's Island was added to the group. In 1797 three more were discovered by Ingraham, an American captain, and were n-amed Washington Islands. In 1842 they acknowledged the sovereignty of France. The population steadily decreased during the 19th century, in 1876 being 5,420; in 1910, 4,000; in 1915, 3,424.

MARQUETRY, mar'ket-ri (French, mar-queterie), inlaid cabinet-work in which thin slices of different colored wood, sometimes of ivory, pearl, shell or metal, are inlaid on a ground usually of oak or fir, well seasoned to prevent warping. The marquetry of Italy pos¬ sesses much artistic merit. The work of Fou-let, Oeben and Riesener in France during the 18th century was conspicuous and their manu¬ factures are still sought by lovers of antiques. (See Inlaying; Mosaic; Parquetry). Con¬ sult Jackson, F. H., Untarsia and Marquetry)

(1903).

MARQUETTE, Jacques, French Jesuit missionary and explorer: b. Laon, France, 1 • June 1637; d. near site of the present Luding-

ton, Mich., 18 May 1675. His family was of good social position in his native city. It is evident that he must have had the advantages of early education, as he entered the Jesuit College at Nancy, in 1654, with the intention of joining the Society. He studied and taught, as Jesuit scholastics usually do, at Pont-a-Mou-son, Rheims, Charleville and Langres. In 1666 he was to go as a missionary priest to New France. He arrived at Quebec, 20 Sept. 1666.

In the next month he began his preparation for life among the savages

by the study of the Indian languages, at Three Rivers, under the direction of Father Druillettes who knew all the ways of missionary life. He spent two years in the wilderness, with Father Druillettes log house as his “home,® learning the forest and lake and living, as near as possible, the life of the redmen. In 1668, Father Marquette was ready to begin work among the Ottawas. From Montreal, he went to Sault Sainte Marie, known to-day as the “Soo,® then marked in French records “Santa Maria® of the Algonquins. The term “Ottawa,® as used by the Jesuits, included the Sioux, the Miamis, the Sacs, the Winnebagoes, Foxes, Pottawatomies, Chippewas, Beavers, Creeks, Ottawas, Hurons, Menominees and Illinois. From Sault Sainte Marie, he was sent to La Pointe Mission in Lake Superior. The place selected for his

work was at Chequamegon Bay. From 14 Sept. 1669, until 1671, when the mission was given up because of the inability of the Hurons to de¬ fend themselves against the Sioux, he served and learned much. Father Marquette probably did not foresee that this abandonment meant that there would be no Christian mission on Lake Superior “for over a hundred years® ; as the Rev. Samuel Hedges remarks, “There can be little doubt that the Blackrobe sat in their council circle, and took part in their delibera¬ tions, which determined their flight.® He says Marquette joined the Hurons in their rush to the south toward the Island of Mackinac, then Machillimackinac. The little town of Saint Ignace — named in honor of the founder of the Jesuits, Saint Ignatius Loyola, on Moran Bay, — claims the honor of being the spot where Father Marquette built his chapel in 1671. Mackinac Island disputes with Saint Ignace the right of precedure, but there can be no doubt, whether a previous mission existed in Mackinac Island or not, that it was from Saint Ignace, Father Marquette set out in his search for the Mississippi, — of the existence of which tradi¬ tions and rumors lived among the tribes.

The quarrels that had deflected the course of Sieur Rene de la Salle did not, in the end, prevent him from tracing the course of the Mississippi to the sea, and De Soto, earlier, had crossed the valley near its mouth, but it was Marquette who, having equipped himself with the Indian lore, added to such scientific knowledge as he could acquire, actually dis¬ covered the wonderful stream of the Indian legends. Count Frontenac was the devoted friend of La Salle, but he could not overcome the jealousies raised by the clashing of com¬ mercial interests. It has been the fashion to accuse the Jesuits of merely mercenary motives in opposing the opening of the territory of their missions in New France to all trappers and traders. It is plain, human, — putting aside

all imputed motives, — that Jesuits like Jogues, Albourg, Druillettes and a hundred others did not lead lives of unspeakable deprivations and amazing self-sacrifice merely for temporal gain for their Society or their country. When it is known that they were French, it is at once known that they were patriots. And if the Jesuits opposed t'he mercantile designs of the supporter of La Salle, it must be admitted, in t'he light of after events, that they were safeguarding the interests of their charges. The fate of Jogues and of Rene Goupil did not deter men like Marquette. It only made them more anxious to teach Christianity or to die. Marquette, like all the missionary priests of his Society, held that it was his duty to con¬ tribute to the knowledge of the world. Whether it was the analysis of a dialect or the bending of a river, the Jesuit made each his duty, always remembering the motto of his Society, (<To the greater glory of God.® Marquette had kept in mind all the talk about the great river and the natives that dwelt upon its banks. He was sent, he believed, as one who must teach all nations, and he did not disdain any knowledge that might help him to this, valu¬ ing the knowledge itself, for every Jesuit was a student both of nature and of books. Louis Joliet had started to become a Jesuit, but had, instead, become a fur trader. When he was commissioned by the 'governor of New France, to look for the great stream that, it was rumored, opened into the Pacific, Father Mar¬ quette, who earnestly desired it, was sent by his superiors to accompany him. On 8 Dec. 1672 Joliet reached Saint Ignace under his own authorization from De Frontenac and one from Father Marquette's provincial, to claim for God and the king all the land and water they could find.

When the ice broke*, on 17 May 1673, Mar¬ quette and Joliet set forth. Father Pierson took Father Marquette's place at the mission. Father Marquette was something of a surveyor, and his maps are yet in evidence and very valuable. Two birch canoes that could only hug the shore and not dare the open lakes, and seven men, — five voyageurs — made up the expedition. Their stores were barely sufficient, their scien¬ tific instruments were, as one can easily imagine, inadequate. They were hopeful, hardy and they knew every mood of the treacherous . lakes and the meanings of all the changes in

the weatheL Marquette had acquired the quick eye and ear of the Indian, and his mind was supple and well-trained; Joliet was not far be¬ hind him in wood and water craft. Still, they followed dim rumors. The most interesting of Marquette's reports is that of the second halt at the Indian village of Mascouten, on Lake Winnebago. They had reached the ((jumping off® place. Their first halt was at De Pere. the Mission Saint Francis Xavier, to which Father Marquette had been recently assigned. They reached Lake Winnebago by wav of the Fox River. From Green Bay,— the Mission Saint Francis, — they went to Lake Winnebago, and, from thence, accompanied by the Indian guides, they ascended the upper Fox River and entered the Wisconsin, on 10 June 1673. After seven days of hard paddling, they entered the Missis¬ sippi on 17 June. The report of this expedition on which we must rely for information is Marquette's, — Joliet's having been lost in the

upsetting of his canoe at the La Chine Rapids, near Montreal. It is included in the (Jesuit Relations,* and quoted by John Gilmary Shea, Sparks, Parkman, Thwaites, Hedges, and all who have written of the early days of the Northwest. Dr. Shea, in his (Discovery and Exploration of the Mississippi Valley, > esti¬ mates the distance traveled by Marquette and Joliet from Saint Ignace to Green Bay (Mis¬ sion Saint Francis Xavier), at 218 miles. Gen¬ eral Wood, inspector-general United States army, makes the whole distance traveled 2,549 miles, but he omits the distance from Saint Ignace to Green Bay. Marquette and Joliet ex¬ plored the Mississippi for 300 miles in solitude. Marquette describes the river at its junction with the Missouri as turbulent in the extreme. Marquette was pleased by the treatment re¬ ceived at the first village of Illinois Indians. They met Indians who showed some traces of civilization, and at the mouth of the Arkansas, they met with great kindness from the Indians. From the Illinois — believing the route to be shorter — they went, it is asserted, to a point near Chicago. By portage, at Stur¬ geon Bay, they saved time and strength, and from the Green Bay into the Fox River, they reached the Mission Saint Francis — having spent, from the beginning of their ascent of the newly-discovered river, on 17 July, about two months — four months, in all, of almost inces¬ sant hardship since they began their voyage on 17 May 1673. Further journeying was out of the question. Marquette and Joliet had not much strength left. A journey of nearly 3,000 miles, in birch canoes, had told on them, hardy as they were. Marquette spent 13 months at De Pere, endeavoring to regain his health. He knew well the stupendous importance of what he had done for France and for the world; but his

business was with souls. While Joliet went to Montreal to report, Marquette started to found a new mission in Illinois. He left the Mission Saint Francis on 25 Oct. 1674, with 10 canoes ; he arrived at the Chicago River, 4 De¬ cember. The description of the carrying of the canoes through the forests gives a glimpse of the difficulties the missionary expected to en¬ counter. The inundations of 30 March 1675 destroyed their hovel. At Kaskasian Mar¬ quette's heart was filled with gratitude by the kindness he received. His desire for explora¬ tion led him, while using his strength in minis¬ tering to the Indians, to explore Lake Michigan farther.* He grew weaker, and turned to the north. Through the river — now Pere Mar¬ quette — he made his homeward way. On Sat¬ urday, 18 May 1675, he died. The Ottawa — under that name were included the tribes under the Jesuits in the Lake regions — had among them several Hiskakons, to whom Marquette had been much devoted. These, going north¬ ward in the spring, raised his body, reverently prepared it according to the mode of their .tribe, took it to the Mission Saint Ignace, where Fathers Nource and Pierson awaited it. On Tuesday, 9 June 1676, Marquette was buried in the centre of the chapel of Saint Ignace, a building which was destroyed by fire in 1706. In September 1877, Father Edward Jacker, pastor of> Saint Ignace, discovered the grave and remains of the great and good explorer, and they rest under a monument erected by the citizens of Saint Ignace in 1882. Consult

Harvey, M. A., (The Mississippi } (1900) ; F111-ley, J., (Frenchinthe Heart of*America) (1915).

Maurice F. Egan,

Formerly Professor of English Language, and Literature , Catholic University of America.

MARQUETTE, mar-ket', Mich., city, county-seat of Marquette County, on Lake Superior, and on the Duluth, South Shore and Atlantic and the Lake Superior and Ishpeming railroads, 13 miles northeast ot Ishpeming, and about 58 miles north by west of Escanaba, on Lake

Michigan. Lhe first permanent settlement was made about 1845 and a little later it was called Worcester after public accounts had been given of the mineral wealth of the Upper Peninsula. It was incorporated in 1851 and chartered as a city in 1869 It was named after Pere Marquette (qv!) who had visited this section as a mis¬ sionary to the Indians. It has a fine harbor with a breakwater 3,000 feet in length, and the best of facilities for loading steamers with the minerals, especially iron ore, which are shipped from here in large quantities. The ore docks are the largest and best fitted of any in the country. It has steamer communication with all the important lake ports. LI ear the city are large quarries of brownstone which furnish employment to a number of people. The chief industrial establishments are a plamng-mill, two blast furnaces, steam-engine works, and the stone quarries, all employing about 800 men. Other smaller industries are the manufactui ing of furniture, sash, door and blinds, and bricks. The principal buildings are a government build¬ ing which cost $150,000; a county courthouse, cost $250,000; Peter White Library, the building cost $75,000, and the 15,000 volumes are valued at $30,000; a city hall, cost $60 000. The edu¬ cational buildings are a State Normal School, which cost $150,000, eight public schools, cost $500,000, a manual training school and Saint Joseph's Academy. It has Protestant Episcopal and Roman Catholic cathedrals, Saint Marys Hospital, the Upper Peninsula State Prison and a house of correction. The Federal govern¬ ment presented to the city Presque Isle, about 400 acres, a short distance north of the city proper. The place has been improved and made into a beautiful park. A statue of Peie Mar¬ quette is in a city square, near the shore. It is a port of entry, a vast amount of iron ore passing through. The three banks have a com¬ bined capital of $400,000, and the annual busi¬ ness amounts to $7,500,000. The government since 1913 has been of the commission type. The electric-light plant and waterworks are owned and operated by the city. Pop. 12,718.

MARQUETTE RANGE. See Iron Ores

— Iron Ore Districts.

MARQUETTE UNIVERSITY, Milwau¬ kee,. Wis., comprises the following departments : college of arts and sciences ; college of applied science and engineering, school of dentistry; the R. A. Johnston College of Economics; school of journalism; school of law; school of medicine; conservatory of music; school of pharmacy; training school for nurses; and Mar¬ quette Academy, the university

high school. The faculty numbers 240; the average annual attendance of students is over 1,500; tuition fees range from $60 to $170; living expenses

from $128 to $190. The different courses lead to the degrees of bachelor of arts, bachelor o science, doctor of medicine, bachelor of laws, doctor of dental surgery, bachelor of com¬ mercial science, bachelor of journalism, bache¬ lor of literature, pharmaceutical chemist and bachelor of science in pharmacy. The grounds of the university consists of five tracts on which are the buildings housing the various depart¬ ments. Owing to the great increase in enrol¬ ment of students the erection of several new buildings is projected. In March 1916 a build¬ ing and endowment campaign carried on in Milwaukee and in the State of Wisconsin re¬ sulted in a $503,471 fund. The college library contains nearly 13,000 volumes and there are supplemental libraries connected with the de¬ partments of law, medicine, dentistry, engineer¬ ing and economics, while students have access to the neighboring city public library which contains over 340,000 volumes and to the city museum, one of the largest and most complete in the United States, containing hundreds of thousands of zoological, botanical, mineralogical and other specimens. The history of Mar¬ quette University begins with the arrival of Jesuit fathers in 1855 who two years later opened Saint Aloysius Academy. , In 1864 a new building known as Saint Gall's Academy was erected and incorporated as Marquette Col¬ lege. In 1906 it celebrated its silver jubilee with the erection of a new building and a new charter creating Marquette University. Its progress has been one of continuous growth due to administrative economy, encouraging al¬ though inadequate laic support and tutorial service without salary, the Jesuit professors of the faculty giving their time, training and ability to the city with no material recompense beyond personal support

MARQUEZ, Jose Arnaldo, ho'sa' ar-nal'do mar-kath, Peruvian poet: b. Peru, about 1825; d. Lima, 15 Jan. 1881. For participation in civil wars he was several times banished in the earlier part of his career and he lived vari¬ ously in Chile, Cuba and the United States. Among modern Peruvian poets Marquez takes high rank. He published (Lost Notes' (1862) ; (Flor de Abel,* etc., and in prose (E1 Peru y la Espana moderna,' and (Recuerdos de un viage a los Estados Unidos de America.* He lost his life in the defense of Lima against the Chileans.

MARQUEZ, Leonardo, Mexican soldier: b. Mexico, about 1820. In 1849 he appeared as the leader of a movement in support of Santa

Anna, and under Santa Anna's last adminis¬ tration he had important posts in the army (1853-55). He fought against Juarez in the ˆReform** War, and favored the establishment of Maximilian's empire. In October 1866 Maxi¬ milian made Rim a division commander, and in March 1867 sent him to Mexico City to form a cabinet and raise troops for the relief of Queretaro. But he was hemmed in by Diaz, and after Maximilian's execution resigned and went to Havana. He was frequently called «the tiger of Tacubaya,® from his execution there of a large number of prisoners (11 April 1859) ; though he alleged the express order of Miramon as an explanation. He was exempted from the amnesty of 1870.

MARQUEZAS ISLANDS. See French Establishments in Oceania.

MARQUIS, mar'kwis, or MARQUESS

(Italian, marchese; French, marquis; German, markgraf) , a title of honor next in dignity to that of duke. Marquises were not known in England till King Richard II, in the year 1385, created his great favorite, Robert Vere, the Earl of Oxford, Marquis of Dublin. In 1397 the same king raised John de Beaufort, Earl of Somer¬ set, to the rank of marquis, a dignity which he afterward refused to bear from its being an innovation. The title fell into disuse until the reign of Edward VI, who created the mar-quisate of Winchester in 1551. The title given a marquis in the style of the heralds is most noble and potent prince.

MARQUIS, Thomas Guthrie, Canadian author: b. Chatham, New Brunswick, 1864. He received his education at Queen's University, Kingston ; was made English master at the Stratford High School and subsequently at the Kingston Collegiate Institute. Later he became principal of the Collegiate Institute at Brock-ville. After 1901 he devoted his entire time to literature. In 1905 he was chief editorial writer on the Ottawa Free Press. Subsequently he edited (Canada and its Provinces* (22 vols., 1914—15). He also published (Stories of New France) (1890); (Stories from Canadian His¬ tory* (1893) ; (Marguerite de Roberval : A Ro¬ mance of the Days of Jacques

Cartier* (1899) ; (Canada's Sons on Kopje and Veldt) (1900); (Life of Lord Roberts) (1901) ; President of the United States) (1903); (Brock: The Hero of Upper Canada) (1912) ; <The War-Chief of the Ottawas* (1914) ; (The Jesuits Missions) (1915). He edited the Canadian biographical collection entitled, (The Builders of Canada)

(1903).

ˆMARRAKESH. See Morocco.

MARRELLA, a genus of fossil Crustacea found in the Cambrian shales of British Colum¬ bia. See Stephen Formation.

MARRIAGE, History of (Latin, marito, from maritus, husband, from mas , a male). In the natural history sense marriage may be de¬ fined as a more or less durable union between male and female lasting till after the birth and .rearing of offspring. In the ethical and legal sense marriage is a union between man and woman living in complete community of life for the establishment of a family. See article on the Family, History of.

The Origin and Social Function of Mar¬ riage. — In the natural history sense of the word marriage may be said to exist among many of the animals below man. Pair marriage is common among the birds and some of the higher mammals. It especially characterizes the anthropoid apes, the pair marriage of the chimpanzee being monogamous and durable, probably not unlike that of primitive man. The origin of marriage is therefore to be sought in the family, rather than the origin of the family in marriage. See article on family above re¬ ferred to.

The function of marriage in human society is twofold: (1) to regulate the relations be¬ tween the sexes and (2) to determine the rela¬ tion of the child to the community. This latter function is often overlooked, but is quite as

important in any scientific consideration of marriage as the former.

Practically all forms of marriage may be found among human beings if we consider all peoples and all historical ages, although the primitive or original form of marriage seems to have been that of a simple, pairing monogamy, similar to the pair marriage which is common

among the higher animals. The reasons for re¬ jecting the hypothesis of a primitive state of promiscuity have already been given in the arti¬ cle on the family just cited. Whether such a form as communal or group marriage (limited promiscuity) has ever existed among any peo¬ ple has been much debated by anthropologists and sociologists. The nearest approach to this form of marriage is found in certain aborigi¬ nal Australian tribes, where a man who takes a wife from a certain group has sexual access to all the other women of that group, though he lives with only one of them. A similar form is to be seen in the Punaluan family of the Polynesians, the marriage of a group of brothers with a group of sisters, though this form was rare even among the Polynesians. Most anthropologists and sociologists believe that such forms of group marriage were not primitive, but were relatively late historical de¬ velopments. Setting these aside as exceptional forms, the main types of marriage in the human species may be grouped under the heads of polygyny, polyandry and monogamy.

Polygyny (Greek, <(many wives®). — A com¬ mon form of marriage in barbarism and lower civilization is the union of one man with sev¬ eral women, scientifically known as polygyny, but popularly called polygamy. It is possible that this form of marriage existed to some extent in primitive times, as the gorilla among anthropoid apes is said to practise it. In gen¬ eral, however, it presupposes a considerable accumulation of wealth and is therefore among strictly savage peoples very rarely practised. As a human institution it received its chief de¬ velopment in the period of barbarism, and seems to have been an accompaniment of the development of dominantly militant life and of slavery in that period of human culture. Among people who practise polygyny, therefore, the practice is largely confined to the wealthy and ruling classes, as only these can afford the luxury of having more than one wife. In polygynous countries of the present rarely over 5 per cent of the families are of polygynous type. Owing to the fact that the number of males and females in any given population un¬ der normal conditions is relatively equal even in polygynous lands, the mass of the families are necessarily monogamic.

The causes of polygyny are complex. Be¬ side the animal instincts of the male we must place especially the military honor of wife cap¬ ture and the economic value of women (or wives) as laborers. In barbarism the outward and visible sign of a man's wealth and power is frequently the number of his wives. A con¬ tributory cause among some peoples is the high valuation set upon children, especially un¬ der the patriarchal system (q.v.). This seems to have been the main cause in the case of the Hebrew patriarchs.

The practice of polygyny has been wide¬ spread among practically all peoples from the

stage of barbarism up, though limited to the prosperous and well-to-do. Where it failed ot legal sanction it frequently existed in the more or less illegal form of concubinage. It is not surprising, on this account, that in many cases it has received the explicit sanction of re¬ ligion as in the cases of Mohammedanism and Mormonism. But among all peoples it has tended to die out with the coming of higher civilization, for the reason that it obviously in¬ volves the subjection and degradation ot woman, the lack of paternal care of the chil¬ dren and the placing of a premium upon the more brutal instincts of human nature, espe¬ cially in the male.

Polyandry (Greek, <(many husbands”).— The union of one woman with several men is a rare form of marriage found at present prac¬ tically only in Tibet and among some of the mountain tribes of India, though within his¬ toric times it existed in Arabia. Apparently polyandry has never been a widespread form of marriage in the human species, as the in¬ stinctive jealousy of the male works against it; and there is no reason for supposing, as Mc¬ Lennan supposed, that primitively it was uni¬ versal. On the contrary, it seems to exist only under such economic and social conditions as might lead to the suppression of male jealousy. Thus the difficulty of one man supporting a family has in the barren regions of Tibet led to the toleration of polyandry. In the same region there seems to be a scarcity of women, which also favors the practice of polyandry.

The most common form of polyandry is the fraternal or Tibetan form, in which a group of brothers have a common wife, the oldest brother being the head of the household and the puta¬ tive father of all the children. Among the Nairs of India, however, a non-fraternal form of polyandry exists. .

Monogamy (Greek, (<single marriage”).— Polygyny and polyandry, as we have seen, have always been exceptional forms of marriage. The prevalent form of marriage among all peoples and in all ages has been some form of monogamv, the union of one man and one woman. This has been so largely by biological necessity, as under normal conditions the num¬ ber of males and females in any given popu¬ lation is relatively equal. The instincts of man have also to some extent favored monogamy, especially the instinct of sex jealousy. Eco¬ nomic conditions also have rarely made it possible for a man to support more

than one wife and her children. Besides such biological and economic reasons for the existence of monogamy, however, it has manifest social superiorities to any other form of marriage. It is much more favorable to superior care and upbringing of children, as under monogamy both husband and wife commonly unite in the care of the child. It develops affections and emotions of a more altruistic type, and it makes the bonds of the family life more definite and strong. For these reasons monogamy favors the development of higher types of morality and of civilization generally. Its association with higher types of civilization is, therefore, not an accident. At its best, the monogamic family presents such superior unity and har¬ mony that it is best fitted of all the forms of marriage to work in harmony with higher civil¬ ization.

The Marriage Ceremony.— Among all peo¬ ples, savage as well as civilized, legal mamagc is usually accompanied by some form of ceie-mony which expresses the sanction of the group upon the union. This ceremony is usually of a magical or religious character, though in a few peoples it is apparently purely social. Betrothal is also, among the more ad¬ vanced peoples, frequently an occasion for some sort of religious or social ceremony.

The Freedom of Choice in Marriage. Westermarck presents considerable evidence to show that among primitive peoples marriage was originally based on the mutual attraction and consent of the parties. Almost always the male is the wooer. The female accepts or re¬ jects her lover, and thus plays the decisive role in sex selection. The same phenomena of courtship also appear very generally among the animals. There is no reason for supposing that different conditions existed among primitive men. The common practices of wife capture and wife purchase must be regarded as ex¬ ceptional conditions developed in later stages of civilization. Marriage thus began in free choice, but among many peoples passed through stages of wife capture, and of wife purchase, under the dominance of family or tribal inter¬ ests, becoming only gradually in modern times again a matter of free individual choice.

Marriage by Capture and by Purchase. — Among predatory and warlike tribes marriage by capture is often common; indeed, on ac¬ count of the social and military honor at¬ tached to wife capture, it sometimes comes to be the favorite form of marriage. We know of no people, however, among whom wives are regularly captured outside the tribe. Mani¬ festly such a social state would be practically

impossible, even though wife capture was so¬ cially favored. 4 •

Much more common than wife capture, but at a much later stage, of cultural development, was wife purchase. This stage comes in par¬ ticularly in early barbarism with the develop¬ ment of slavery and the idea of property in persons ; and among most peoples it has sur¬ vived until higher civilization has been devel¬ oped. It was particularly instrumental in devel¬ oping polygyny and the patriarchal form of the family. Many survivals of wife purchase exist among even relatively highly civilized peoples.

Child Marriage. — Another result of wife capture and wife purchase among some peoples was the practice which we know as “child mar¬ riage,” that is, the uniting in formal marriage of children under 15 years of age, usually the marriage of a girl under 15 with a much older man. As a custom, child marriage is not un¬ known among warlike savage and barbarous tribes. It developed, especially in India, how¬ ever, under the influence of the caste system and the custom of wife purchase. More than one-half of the total female population of British India are married before 15 years of age, sometimes while they are mere infants. In the western provinces of India the girl re¬ mains at home with her parents until sexual maturity is reached; but in Bengal, girls com¬ mence their married life at the age of nine years. The British government has made in¬ effectual attempts to check child marriage, but the practice continues, as it is supported by the higher as well as by the lower Hindu castes.

Exogamy and Endogamy. — Among practi¬ cally all peoples, custom forbids the marriage of very near kin. A limited number of tribes among savage and barbarous peoples do not forbid the marriage of brothers and sisters, but all view with social disapproval sexual rela¬ tions between -parents and children. Indeed, the larger number of uncivilized peoples not only condemn sexual relations between blood relatives, but forbid marriages between mem¬ bers of the same clan, or totem group. As clans may be metronymic or patronymic, this restriction prevents marriage between maternal or paternal relatives as the case may be, even to the most remote degrees of kinship, but makes it possible for a man to marry a near relative in a clan to which he does not belong, on the ground that no kinship tie exists between them. This custom forbidding marriage within the clan is known as “exogamy.55 It is nearly al¬ ways correlated with “endogamy,55 as respects the tribe.* Thus in the clan or totemic stage of social organization, in which most of the North American Indians were at the time of their discovery, a man must take a wife outside of his clan or totem-kin group, but usually must marry within his tribe or related tribes.

The causes of such customs of exogamy and endogamy have been much debated. McLennan held that exogamy was the outgrowth of the custom of female infanticide, but there is little or no evidence in support of such a theory. Westermarck’s explanation is that exogamy arises from the extension to the whole clan of the natural instinct of aversion to incest. It may be pointed out, however, that exogamy and endogamy are not customs peculiar to uncivil¬ ized peoples. Similar rules are found regard¬ ing forbidden degrees of relationship among civilized peoples. While there is possibly a natural aversion to incest, there is even more pronouncedly instinctive attraction be¬ tween persons of the opposite sex who are rela¬ tively strange and unfamiliar. This leads natu¬ rally among all peoples to marrying outside of the close social group; and among the uncivil¬ ized all members of a clan are regarded prac¬ tically the same as very near relatives. The main* difference in the practice of exogamy among the uncivilized and among the civilized is that in the clan stage of social

organization it is not blood relationship in our sense which counts, but the type of social organization itself.

Marriage Among the European Peoples. — Among the early Aryan peoples of Europe marriage was universally regarded, so far as we can discover, as a religious bond, since their family life was based upon ancestor worship. This early Aryan view of marriage gave way in later Rome to the view that marriage was a private contract, to be made and dissolved by the parties at their pleasure. The early Chris¬ tian Church combatted this view of the mar¬ riage relation and sought to restore the view that marriage was a religious bond, which it finally did by making marriage one of the sacra¬ ments of the Church. It was forced, however, to still recognize that consent or contract was the essential means of entering the marriage relation. <(Consent marriages55 continued to be recognized, therefore, though they could not

*The tribe being a group of related clans speaking the same language.

be broken except through the authority of the Church. The Protestant reformers put forth the idea that marriage was a civil relation, rather than a religious bond or sacrament, to be created by the state and broken by .the state. In reaction to this view the Roman Catholic Council of Trent in 1563 declared that a valid marriage could only be created by the Church and only annulled by the Church. This still remains the Roman Catholic view of marriage. The later Roman view that marriage .is a pri¬ vate contract, to be created and broken by in¬ dividuals as any other contract, has shown a tendency to revive in modern nations among many elements of their population. The present problem of the family, therefore, centres about the question of divorce and the toleration of other forms of marriage than that of permanent monogamy. (See article on Family, History of). The last three theories mentioned are evidently held alongside of one another by dif¬ ferent elements in the populations of modern nations. Which of these competing theories of marriage will become established in the moral standards of the future it is too early yet to say.

Bibliography. — Westermarck, E., (History of Human Marriage) (London 1901) ; Howard, G. E., (History of Matrimonial Institutions) (3 vols., Chicago 1904) ; Goodsell, W., (The Family as a Social and Educational Institution (New York 1915) ; Frazer, J. G., (Totemism and Exogamy) (4 vols., London 1910) ; Mc¬ Lennan, J. F., “Primitive Marriage5 (in (Studies in Ancient History,5 London 1886).

Charles A. Ellwood,

Professor of Sociology, University of Missouri.

MARRIAGE, The Law of. When the cave man wanted a mate he took her, and he was not very particular where he got her. His next neighbor's cave, indeed, would be the most convenient and likely place. It was a mere question of brute strength; the man of greater physical power had his way. As social evolu¬ tion progressed and families were established and organized into clans, the man who pre¬ ferred to gain a wife by capture had to go further afield. To have forcibly taken a woman of an allied family, or from an affiliated clan, would have brought down upon the offender the vengeance of an entire community and, against this, individual force could not prevail. Wife capture had to be practised against hos¬ tile tribes, from whose vengeance the robber would be protected by the whole of his own community. The Roman legend of the rape of the Sabine women points to a time when wife capture from unrelated and, therefore, enemy communities was a common practice. Probably robber-marriages persisted, to some extent, even in the home circle, so to speak. Among a number of semi-barbarous nations marriages still take the outward form of abductions. Before the leveling influences of Russian civili¬ zation had almost completely obliterated their tribal customs, wife captures were regularly staged by the Kirghis of the steppes. The bride, mounted on a swift horse and carrying her dowry, rode furiously out of her father's camp and the bridegroom gave chase. He was expected to catch her before dark, and he al¬ ways did — that was part of the comedy. The whole performance was camouflage for the pur-MARRIAGE

pose of covering up the real transaction, which was nothing else than a bargain and sale. Mar¬ riage by purchase was evolved, almost inevi¬ tably, from marriage by capture; the prospec¬ tive husband paid a price to the family of the prospective wife for the privilege of carrying her off. Sometimes the abduction preceded the payment of the purchase price, the latter being disguised as a fine subsequently amerced to atone the «offense.» In some instances, as under the early Roman law, the woman was adopted; she came under the fatherly power of the husband and, theoretically, became, his daughter. In

other times and places marriage was frankly a sale. In all cases the wiie be¬ came the property of her husband anc., at the worst, she was his drudge or slave. The tute¬ lage, which was exercised over a woman throughout her life (even after her marriage) by the males of the family in which she was born, was intended to be protective of her honor and that of her family, as well a* of her share of the patrimony of family property. An instance in point is the Levitical law, which permitted the father of a bride, put aside by her husband on charge of unchastity, to proceed against the accuser, and, the accusation being disproved, compelled the offender to expiate the wrong by keeping the woman as his wife all the days of his life. The actual condition of the wife was not as hard as might be im¬ plied from her legal status, or lack of legal status. The injunction to obey the father is coupled with the injunction to honor the mother. In the great Oriental monarchies of antiquity marriages were undisguisedly com¬ mercial transactions; the bought wife of a citizen of Babylon, however, was the manager of her husband's house and she was habitually consulted in serious matters of business. She was conferred with even in affairs of state, if her husband happened to be a public official. A free woman, though married, might occupy a public position and hold separate property. Primitive communities do not clearly, distin¬ guish between custom and law or religion and morals ; but in course of time a strictly religious form of marriage might be substituted for con¬ tractual marriage in any given community. The contractual or purchase marriage itself has a tendency to become symbolical ano dramatic. The pledge given . by the wooer to bind the bargain might originally have been a cow (domestic animals were real money, cattle, or chattels and pecunias were words of identical meaning). This was later on represented by a gift to the bride — a bracelet, jewel or other token. The ((giving in marriage, » i.e., the con¬ summation of the sale of the woman, would be accompanied by conventional words and gestures, dancing and music. Sometimes a wooer made payment in personal services, as Jacob tended father Laban's sheep seven years for Rachel; and in this, as in other cases without number, the marriage was a matter of mutual inclination. The bride usually received from her father a dowry or dos, which passed to the husband and remained under his control during the con¬ tinuance of the conjugal relation. Among the Jews and Oriental nations in general mar¬ riages were terminable by divorce at the will of the husband. Among the Romans they were terminable at the will of the wife s father or

by mutual consent of the parties. In either case the bride's dowry was returned. The re¬ marriage of widows was not forbidden, but was

disfavored. Under the Babylonian law the consent of the courts had to be obtained and provision made for the care of the children and household of the deceased husband. Monog¬ amy and polygamy often existed side by side, even in highly developed human societies. Of the two great cultural races, the Semites have given distinct legal sanction to plurality of wives. Polygamy was practised by the He¬ brews in the patriarchial stage, though, the practice fell into abeyance in later times. Aryan institutions seem to be based on monog¬ amous marriages. For obvious reasons monog¬ amy must be the usual state in all communities, whatever may be the law. Relatively few mem¬ bers of a community have the power to gain or the ability to maintain more than one wife. While a man individually might capture a woman of a hostile tribe and make her his lawful wife, captives of war became slaves. Among Oriental nations the children born to free men of their slave women or ahand maidens>} were considered legitimate and free. Among the theoretically monogamous Aryans the opposite was the prevalent rule.

The marriage by appropriation and the result¬ ing guardianship — or, more plainly speaking, ownership — of the wife by the husband, does not comport with the sociological thesis that the institution of the patriarchate was preceded by the matriarchate as a form of family organ¬ ization. The practice of polyandry is rare, even among savages, and where it is observed among people of culturally higher stage it. in¬ dicates degeneracy more probably than primi¬ tiveness. In Tibet polyandry is evidently an outgrowth of the group marriage — the mar¬ riage of all the daughters of one family as a group with all the sons of another family. The plural husbands of polyandrous Tibetan women are invariably brothers. A rather fre¬ quent form of primitive marriage is that where the husband is adopted into the tribe of the wife. That in such case the patriarchal au¬ thority would be less pronounced than other¬ wise is not evident, however. The male adopted into a tribe would assume the tribal name and be on the same footing with the males born therein. Within a clan blood kinship is traced through females ; but it is not necessary to pre¬ sume the matriarchate as an antecedent social order to account for this. The maternity of a child is determinable with so much greater certi¬ tude than its paternity that the tracing of kin¬ ship through the mother would commend itself for its convenience. Moreover, in those clans where this method of reckoning is customary the family and tribal organization is invariably patriarchal. Practically without exception the nations which have become the leaders in cul¬ ture have erected their social structure on a basis of monandrous marriages and agnatic kinship. The wife is taken into the husband's gens, clan or house, and

her children become members thereof and are given the family name of their father. In the matter of inherit¬ ances cognizance was usually taken only of rela¬ tionship in the male line. A daughter might inherit from her father, but if she died before he did her children would take nothing by

representation ; hence the importance of the dos or marriage settlement. By neither the Roman nor Teutonic rule of consanguinity was a man's sister's husband of kin to him and the sugges¬ tion of a prohibited degree of relationship be¬ tween himself and a deceased wife's sister would have sounded queer to Caesar or Cicero. The Levitical law took more account of blood relationship through females and made even a man's stepmother his cognate in blood. Step¬ brothers and stepsisters could not intermarry, though they had no parent in common. It also forbade marital communion between certain other persons whose affinity was merely legal — as between a man and his uncle's widow or with his daughter-in-law. It forbade mar¬ riages of near relations to the third degree of blood kinship on either the maternal or paternal side — and this rule has prevailed throughout the Christian world. According to the Levitical law a man should not bring his sister-in-law into his house as a rival to his wife, but there was no prohibition with a de¬ ceased wife's sister and a man was expected to be a husband to the childless widow of his brother.

In the earlier period of their history the Romans recognized three kinds of formal mar¬ riage. The religious form, confarreatio, or ((marriage with the bread-offering,® had to be solemnized by the Pontifex Maximus in the presence of 10 witnesses and was reserved to themselves by the old patrician families. Among the plebians espousals took the form of a purchase, coemptio, which is defined by Gaius as a mutual mock sale of the parties, whereby the wife was freed from tutela legitima and sacris families — tutelage to her male relatives and contributions for the maintenance of certain religious rites in her husband's house¬ hold. The third form, usus, though held in little respect in the earlier period, ultimately became prevalent in all social ranks. Either by confarreation or coemption the woman given in marriage passed in manum viri, literally into the hands of the man, her husband, who ac¬ quired rights over the person and property of his wife greater, on the whole, than have been, or are, conferred by any modern system of law. He controlled her dos and other pos¬ sessions absolutely during his life and con¬ tinued his wardship after his death through guardians appointed in his will. The

usus ripened into a perfect matrimonial bond only by prescription and after continued cohabita¬ tion for an entire year. In the meanwhile the husband's marital despotism was in abeyance. By simply absenting herself from the matri¬ monial domicile for one day in each year the usus wife could indefinitely postpone and de¬ feat the acquirement of tutelarv and posses¬ sory rights by the husband. On the other hand, the later law reduced the tutelage of the male kin over the women of their family to a mere formality. By contracting a usus marriage, therefore, the women of Rome were enabled to evade both the paternal and matrimonial tyranny, under which they had been placed bv the earlier law. In fact, at the most splendid period of Roman greatness married women enjoyed a freedom with respect to their persons and property such as they have not enjoyed anywhere since then. Most important of all was the establishment of the principle that mar¬

riage rested upon the consent of the parties

— concensus, non concubitas, fecit nuptias — and might, therefore, be dissolved at the pleas¬ ure of either party. While the marital union was admitted to involve a sharing of all for life

— consortium omnis vitce — this was declared to mean a voluntary, not a forced, partnership. To hinder a separation when a consensus had ceased to exist was regarded contra bonos mores, in plain English, ˆimmoral.®

Early Teutonic marriage law did not differ greatly in fundamentals from that of Rome. Though disguised by ceremonials the trans¬ action was essentially a barter. In the original and crudest form the custom was to give the father so much for his daughter, the price being fixed in accordance with the wealth and rank of the families participating in the treaty. The contract was made handfast, just like any other bargain, by a pledge or part payment. In progress of time this pledge, vadium, took the form of an ornament of more or less value presented to the bride at the betrothal — in modern practice an engagement ring. In time also the arrha (purchase money) became a gift to the bride instead of a payment to her father, though the latter retained it in trust for his daughter. The payment of the marriage settlement — and this the arrha was in effect — might be postponed during the life¬ time of the husband, on his giving security for the transfer of an equivalent out of his estate to his widow. The purchase price for the bride thus became dower in form as it had al¬ ways been in essence

and in intent. Some early Teutonic laws distinctly sanctioned the ((robber-marriage,® which was nothing more than an abduction, or, the bride being willing, was simply an elopment. The penalty the abductor was required to pay to the outraged father was usually identical in amount with the prescribed amount of the settlement or dower in the more orderly form of wedding — indicating that barter marriage and robber mar¬ riage stood on about an equal footing of re¬ spectability. The Teutonic maiden when given in marriage was usually provided with an out¬ fit for housekeeping and a dowry. Possibly an abducted bride would receive neither, which may be the reason why abductions were some¬ times accomplished by connivance of the bride's family. In modern days elopments are often similarly motivated. There is nothing new un¬ der the sun, even in marriages. Betrothals in a regularly arranged ancient Teutonic marriage were attended by festivities on a scale compar¬ able with those attending the wedding itself. Indeed, some investigators of primitive law insist that the troth-plighting was. not a mere promise to marry but was, in veritv, the con¬ tract of marriage. The giving of a pledge (vadium) to bind the bargain would indicate to a person exercising ordinary common sense that the betrothal was no more than an execu¬ tory contract. It created an obligation to wed but did not actually establish a marital relation. The disputations on the subject have the ap¬ pearance of mere quibblings with words. To be sure, if one buys a thing to be delivered to-morrow and pays part of the price, a sale has doubtless taken place. Of course, a de¬ livery is necessary to complete the transaction; and, if the thing purchased be a cow, it might be said that she is not under complete dominion

of the new owner until he has put her into his stable and locked the door. Possibly some such mental kinks is responsible for. the sug¬ gestion of other investigators of ancient leu-tonic customs that concubitus was a legal essen¬ tial to the consummation of a tfiarriage. Be that as it may, the idea of a threefold stage in the process of acquiring a wife — the troth-plighting, the wedding and the consummation has persisted in legal phraseology and has colored even very modern legal conceptions. Early Teutonic law permitted a husband to put aside his wife for adultery or barrenness, and it seems to have countenanced dissolution of the matrimonial bond by mutual consent.

From the very outset Christianity set its face against the looseness of the. later Roman law respecting marriage. The legislation of the Christian emperors shows a reaction against the extremely liberal doctrines of the Antomne jurisconsults. The prevalent state of public opinion explains why, in the fusion of patriarchal practices, Roman jurisprudence and bar¬ baric usages, so many retrogressive customs of the latter respecting the position of women should have found their way into the new alloy. The principles of the Roman law prevailed in so far that unmarried women were . relieved of bondage to the family after attaining then majority. But the position of married women became fixed in barbaric archaisms and the fius-band drew to himself all the powers that had belonged to the wife's male kindied. The Church declared marriage to be a sacrament and the consequence was the enunciation of the doctrine of the indissolubility of the matri¬ monial union except by death. Through the decretals, through its influence on the cus¬ tomary law in the matter of dower and through the assumption of jurisdiction by the ecclesi¬ astical courts over matrimonial questions, the Church established a universal marriage law throughout the Christian world. The canonists accepted the principle of the Roman law that the consent of the parties is essential to the making of a legal contract of marriage, just as it is to the making of any other contract. The lack of free consent, because of a material error in fact or because of physical or moral duress, or because of natural or legal incapacity of one or both of the parties (impotency, in¬ sanity or minority) were declared insuperable impediments to the execution of the contract, and grounds for its annulment if executed. From the Roman law also the canonists carried over into their system the age of consent 14 for males and 12 for

females — but they rejected the requirement of parental consent. In seeming contradiction to this, the father still ((gives away® the bride in the marriage service. The Roman idea, that betrothal (sponsalia) was merely a promise to marry, was modified under the influence of Teutonic usage, by which the troth-plight was considered, to have created the relation of husband and wife. Ultimately the canonical law made a distinction between sponsalia de futuro and s pons Glia dc prcesenti. The former was declared a mere promise; but a present agreement (accipio) was held to constitute a valid marriage. . Such a marriage if not consummated was dissoluble, however, either by a vow of celibacy taken by one of the parties, or by special dispensa¬ tion. The troth-plighting in the marriage

service and the wedding of the bride with a ring may be reminiscences of the Teutonic handfasting and the payment of the vadium or pledge, while the marriage settlement looks very much like a modern variation of the transfer to the bride of. the arrha. formi¬ dable impediments to marriages within the fam¬ ily even between very distant relations, were created by the canons of consanguinity and affinity. The degrees of kinship were measured from the common male or female ancestor downward in collateral lines of descent. Each successive generation being but one degree fur¬ ther removed from the source of the blood, Per" sons might stand in close relation to each other, though wide apart collaterally. Second cousins, for instance, were akin in the third degree by the canon, though the Levitical and Roman law would both place them in the seventh degree. The earlier Church canon forbade intermarriage down to the seventh degree, so that sixth cousins could not enter into matiimonial rela¬ tions with one another. In the later Church law the prohibition ended with the third de¬ gree canonical, or with second cousins R tions by affinity or marriage were laid under similar "disabilities as blood relations.. Sisters-in-law and brothers-in-law were as incapable of contracting marriages as natural brothers and sisters; likewise the children of husbands and wives by former marriages. These prohibitions conform to a sense of delicacy and they accord with a not unreasonable inter¬ pretation of the Levitical canon. But a reason for tracing relationship of any person to an uncle by marriage and to his children by a former wife and these children s children. is hard to discover. Nevertheless, these canonical restrictions were not without salutary effect. The practice of intermarriage between kindred, in order to keep property within the family, had become prevalent not only among the nobility but in all ranks. Near relationship in blood or by marriage might exist among the entire population of a small commune, and such cases were

not exceptional under condi¬ tions of life that did not encourage travel or changes of habitation. By compelling men and women to seek mates outside their own little circle, the Church set a wholesome limit to inbreeding. The habitual shifting of popu¬ lation and the great freedom of locomotion in modern times have made the extreme restric¬ tions of the canon law quite dispensable.. The Reformation produced important changes in the law of marriage. The Council of Trent pro¬ nounced clandestine marriages of minors to be nullities and required the presence of two witnesses in all cases. The Protestant ecclesi¬ astical law denied the indissolubility of the matrimonial bond and regarded all betrothals as, presumably, sponsalia de prcesenti. 1 he words, ((I will,® Luther remarked, did not, in the Teutonic language, express a future in¬ tention but a present purpose; unless qualified so as to introduce an element of uncertainty any promise to marry, followed by cohabita¬ tion, was to be considered a valid marriage. Indeed, cohabitation in conjugal relation was quite generally regarded presumptive evidence of a marriage per verba de prcesenti, though the presumption was not conclusive. By acts of Parliament passed in the second half of the 18th and the first part of the 19th centuries,

church weddings were required in all cases and all marriages not thus celebrated were declared void. Informal marriages, however, were still good in Scotland; and this circumstance ex¬ plains how Gretna Green became a Mecca for runaway lovers. The statute of George II also made the parent's or guardian's consent essen¬ tial to a valid marriage; but this requirement was rescinded later on. A statute of Henry VIII had adopted the Levitical canon as the rule for reckoning degrees of consanguinity m England. This permitted marriages between first cousins and persons of more distant rela¬ tionship in blood, and it abolished, or was in¬ tended to abolish, all disabilities growing out of affinity or relationship by marriage. The Church of England, however, continued to the last in opposition to marriage with a deceased wife's sister, and still insists upon the indis¬ solubility of the matrimonial bond except by the death of one of the parties.

. In the eye of the modern law marriage is primarily a civil relation. Most of the Euro¬ pean codes and, with one or two exceptions, even those of Catholic countries, make a civil marriage and the registration thereof in the public records indispensable. A religious cere¬ mony may follow at the option of the contract-ants, but is not legally essential. A relation es¬ tablished by the civil authority can, of course, be dissolved by the same authority. Adherence to the doctrine of the sacramental character of marriage has become a matter of conscience; the law will not force obedience to the same. The modern law has generally raised the age of consent and has made the consent of parents or guardians necessary to the validity of the marriages of minors. All marriages must be publicly contracted. In England the requisite publicity may be obtained either in accordance with the rites of the Established Church or other religious denomination, or in accord with the rules made by the public registrar or by statute. Betrothal almost everywhere is now considered merely a promise to marry, and ac¬ tions to recover damages for a breach of the promise are permitted in only a few countries. The dissolution of marriages by consent of the parties is, generally speaking, disallowed, but almost everywhere divorces may be obtained by process of law — in Austria only between non-Catholics. The powers of married women to deal

with property vary considerably. In some of the French provinces the pre-Revolutionary coutumes gave to married women, below the rank of nobility, nearly all the independence which Roman jurisprudence in its final stages had allowed them. These local customs to¬ gether with parts of the Roman law became the basis of corresponding provisions of the Code Napoleon and through the latter and to some extent the Spanish law have affected the law of Louisiana and a few other States of the Union. Husband and wife by this law acquired no gen¬ eral interest in each other's property on mar¬ riage. The only property the wife brought into the matrimonial pot was her dot , or dowry, which is in the nature of a wedding gift from her family. While the husband did not become the owner of the dot, he had the use of the same during the continuance of the marriage. The husband could even sue the wife if she hindered him in the enjoyment of the usufruct thereof. Every species of property owned by

the wife at the time of marriage or subsequent thereto could become the subject of a dotal gift. The most interesting disposition of prop¬ erty permitted to husbands and wives, however, was the creation of a communio bonorum. The principle of the communio bonorum is that hus¬ band and wife shall have no property apart from one another. All that either of them owned at the time of, or before, their mar¬ riage, and all that either or both together ac¬ quired while living in the marital relation, was included in the communal property. As in the case of a partnership in business, the community property could not be made answerable for the individual obligations of the parties to a communio bonorum until all joint obligations had been satisfied out of the same. The husband became the managing partner or curator, how¬ ever; the wife is excluded from every case in which her acts cannot be referred to an express or implied authority of the husband. The lat¬ ter incurs all debts or charges for the com¬ munity. The community ceases on termination of the marriage relation either by agreement, divorce or death ; in the latter event the rights of the survivor are fixed by law. The com¬ munio bonorum is a form of marital partner¬ ship recognized not only in Louisiana, but in Texas, Florida, Missouri, California and other States carved out of territory once in French or Spanish possession. The principle has been greatly modified under influence of the com¬ mon law and the modern statutes respecting the separate property of married women. The communio bonorum exists by legal presumption only with respect to property acquired during marriage, or in the name of either husband and wife, including the produce of their recip¬ rocal industry and labor. The presumption may be rebutted by proof that any property so

acquired was intended to be acquired as sepa¬ rate estate. Separate property brought into the marriage by either party forms no part of the community, except by express agreement ; nor does property acquired after marriage by gift or inheritance.

In the United States a marriage may be either religious, civil or quite informal. Civil marriage was authorized, or required, in all the New England colonies. Milton's tractate on divorce and his denunciation of ecclesiastical ˆmeddling® with marriage had borne fruit in the Civil Marriage Ordinance of Cromwell, passed in 1653. By this ordinance obligatory celebration before a justice of the peace was instituted, and a system of lay notice, certifica¬ tion and record was established. The action of the Puritans and Independents in England found ready followers in America. The States-General of the United Netherlands in 1656 adopted the principle of an older law of the provinces of Holland and Friesland, which had established a permissive form of civil marriage soon after their independence of Spain was achieved, and this naturally passed over into the law administered in New Amsterdam. For years the celebration of a marriage before a clergyman, as such, was illegal. Religious mar¬ riages were sanctioned later on throughout New England, and long before the close of the colo¬ nial era the dual civil and religious system was established, which has since prevailed. The ˆcommon-law® marriage, still recognized in most of the States, is nothing more than the canonical

sponsalia de prcesenti under another name. Any agreement to marry per verba de prcesenti, which is followed by cohabitation as man and wife, constitutes a legal marriage. A presump¬ tion of marriage is raised when the parties have lived together in marital relations, have ac¬ knowledged themselves (or have been gen¬ erally reputed) to be husband and wife. I “is presumption, of course, is not conclusive and may be rebutted. A relation, originally mere¬ tricious, will not be transformed into a mar¬ riage by a mere informal agreement. I his also is in accord with the canonical law. In all the States formalities attending marriage are pre¬ scribed by statute. Licenses to marry must be obtained, and the publication of the issuing of a license gives some sort of publicity, as does the requirement of the presence of witnesses and the making of marriages matters of public record. The persons who may perform the ceremony, clergymen or civil officials, are desig¬ nated The clerk issuing the license must be satisfied, by affidavit or otherwise, that there are no legal impediments to the mai riage, and, in cases of minors, the consent of parents or guardians is usually required. In most of the States, however, the statutory requirements have been held by the courts to be merely “directory and not mandatory. Non-conformity may in¬ volve the non-conformers, and the officials and ministers concerned, in legal penalties ; but the marriage is not invalidated. In Massachusetts, however, the courts have always insisted upon the observance of the statutory formalities, de¬ claring such observance to be essential to the validity of a marriage. The Massachusetts rule has been followed in some States and in others the statutes are mandatory. For either of these reasons the “common-law* marriage may be deemed to have been abolished in California, Il¬ linois, Kentucky, Massachusetts, Missouri, Mary¬ land, North Carolina, Vermont and West Vir¬ ginia In New York (since 1901) non-ceremo¬ nial marriages must be evidenced by a written agreement, signed in the presence of two wit¬ nesses and acknowledged in the same manner as a conveyance. The effort to secure the adoption by the States of a uniform marriage law has, thus far, been unsuccessful, and the greatest di¬ versity continues to exist Moreover, the general rule, that a marriage which is legal in the place where it is established will be regarded as formally perfect everywhere, permits the parties to evade inconvenient requirements of the laws of the place of their domicile by going out of the State to make the contract. The age of consent varies in the States, ranging from 16 to 21 years for males and from 14 to 18 years for females.

Where the statutes are silent the canonical prescription of a minimum of 12 years for females and 14 for males still holds good. Infant marriages are voidable at the option of parents or guardians, if contracted without their consent. When any of the essen¬ tial ingredients of a contract are lacking the marriage agreement, like any other contract, is a nullity. Consent being an essential, when one party or both have insufficient mental capacity to give intelligent assent no valid marriage can result. A misunderstanding as to a vital fact will avoid the contract, but only if the mistake was of such a character that there could have been no real consent. Duress excludes volition, and there is no such thing in law as involuntary consent. Impossibility of performance avoids the contract. Impotence, meaning want of physical capacity, makes marriage a nullity, but sterility does not. The marriage of a per¬ son having a living and undivorced foimer spouse is a nullity. Null and void also ate marriages between persons in the prohibited d grees of consanguinity. All States forbid mar¬ riages between blood relations in the direct me of descent or ascent and between brothers and sisters of the half blood as well as of the full blood. All States forbid marriage between uncles and nieces or nephews and aunts and in 20 States the prohibition extends to consanguines within the fourth degree, which bars marriage between first cousins. Affinity through marriage among collaterals is usually disre¬ garded, but in the ascending or descending line, as between step-father and step-daughter or be¬ tween father-in-law and daughter-in-law the prohibition is frequent. In 25 States whites and negroes are forbidden to intermarry, the laws often defining to a nicety the fractional part of African blood which vitiates the marriage, in five States the prohibition extends also to the marriage of whites with Chinese or other Mongolians, and in four States marriages be¬ tween whites and Indians are forbidden. In recent years legislation on the subject of mar¬ riage has been affected greatly by eugenic con¬ siderations. In Connecticut and Minnesota epileptics and feeble-minded persons are not permitted to marry and similar statutes have been enacted in other States. Michigan pro¬ hibits the marriage of persons afflicted with venereal diseases and the eugenic marriage law of Wisconsin made a physical examination by, and a certificate of health from, a physician a prerequisite to the obtainance of a license to marry. A woman on marriage acquires the nationality of her husband.

Bibliography.— Besant, W., < Marriage As It Was Is, and Should Be' (London 1888) ; Crawley. E., 'The Mystic Rose: Primitive Marriage) (New York 1902) ; Howard, G. E., (The' Family and Marriage) (Lincoln, Neb., 1914) ; id., 'A History of Matrimonial Institutions'

(Chicago 1904) ; Letourneau, C., (The Evolu¬ tion of Marriage and the Family' (trans. from the French, New York 1911) ; Maine, Sir H. S., (Ancient Law' (New York 1907) ; id.. Early Law and Custom' (New York 1886) ; Maitland, J E., 'Canon Law of England' (London 1904) ; Morgan, L. H., 'Systems of. Consanguinity' (Smithsonian contributions, Vol. XVII, Wash¬ ington 1872); id., 'Ancient Society' (New York 1886); Rivers, W. H. R., 'Kinship and Social Organization' (London 1914) ; Schuster, E. J., 'The Wife in Ancient and Modern Times' (London 1914) ; Snyder, H., 'The Geography of Marriage or Legal Perplexities of Wedlock' (New York 1889) ; Welson, E. L., 'Short History of Marriage' (London 1913); Westermarck, E. A., 'The History of Human Marriage' (3d ed., New York 1902).

Stephen Pfeil.

MARRIAGE OF FIGARO, The ('Le Mariage de Figaro'), Beaumarchais' most pop¬ ular play, possibly the wittiest and politically the most effective of all dramas, was ready for the stage in 1778, three years after the success of 'The Barber of Seville' (q.v.), to which it was a sequel. But even while in manuscript it

became the centre of intensely active and com¬ plicated political intrigue. Louis XVI rightly discerned in it danger to his throne, and it was not publicly presented till 1784, when it achieved a success till then unparalleled, being by strange irony most applauded by the aristo¬ cratic class whose ruin it portended. To Napo¬ leon, after the event, it seemed ((the Revolu¬ tion already in action,® and it certainly con¬ tributed greatly to hasten and provoke by its leveling tendencies the disintegration of the conventions and even the foundations of the old social regime, though this seems the result rather of Beaumarchais' delight in his own wit, of mere wantonness, than of a realization whither his work was tending or of any delib¬ erate revolutionary purpose. Figaro in (The Marriage) is still the light-hearted, versatile, philosophic scapegrace of (The Barber> ; Al-

rnaviva and Rosine are what that play would lead one to expect they would be after some matrimonial disillusion. Of the new characters Suzanne, on whom Almaviva has set his vagrant fancy and Figaro his heart, is genially conceived, and Cherubin, the page and disquiet-ingly precocious gallant, was a really daring creation, .provoking reprobation and inviting controversy. Figaro is successful in defending his beloved from the wiles of Almaviva, but it has been not unjustly said that if the object of comedy is to make vice ridiculous or odious or contemptible (The Marriage) can hardly claim to attain it. Universal mockery, supremely vivacious, a wit whose brilliancy puts morality off its guard, mar ethically a drama whose sustained excellence in dialogue had been hardly attained even by Moliere. The best edition of (Le Mariage de Figaro) is in (Theatre de Beaumarchias,5 edited by d'Heyli and Marescot (Vol. III). For the circumstances of its writ¬ ing, prohibition, reception and contemporary criticism, consult Lomenie, (Beaumarchais and His Times) (Vols. Ill and IV), also (Le Cen-tenaire du Mariage de Figaro,5 edited by A. Paer (Brussels 1884). The play furnished the text for (Le Nozze di Figaro,5 a popular opera by Mozart (1786).

Benjamin W. Wells.

MARRIED WOMEN, Legal Status of.

See Husband and Wife.

MARRIED WOMEN, Right to Conduct Business. See Husband and Wife.

MARROW, a substance of soft vascular tissue filling the cells and cavities of the bones of mammals. It contains fat and both red and white blood corpuscles and is a valuable con¬ stituent of soups. The bone contents of mam¬ mals show wide variation. The largest con¬ stituent is usually water, but some marrows, as of the long bones, are mostly a yellow oil. Traces of albumen, fibrin and salts are also found. Red bone-marrow is highly nutritious and is recommended for anaemia. . (See Bone). The vegetable marrow is a species of squash (Cucurbita ovifera), of oval form, ribbed and greenish-yellow color.

MARRYAT, mar'i-at, Florence, English novelist, daughter of Frederick Marryat (q.v.) : b. Brighton, 9 July 1838; d. London, 27 Oct. 1899. She was successively Mrs. Church (1854-90) and Mrs. Francis Lean. Her many novels, although not at all remarkable, were popular, and were published in various versions through¬

out Europe. They include (Nelly Brooke,5 (Fighting the Air,5 (Facing the Footlights) and more than 80 others, many being devoted largely to spiritualism. She published and edited her father's (Life and Letters) (1872).

MARRYAT, Frederick, English naval of¬ ficer and novelist: b. London, 10 July 1792; d. Langham, Norfolk, 9 Aug. 1848. In 1806 he entered the navy, served on the coast of North America in 1811 in the /. Eolus , and in 1823 was commander of the Larne during the first Burmese War, in 1825 had the naval command of a successful expedition up the Bassein River, and in the same year was made captain of the Tees. From 1828 until his resignation in 1830 he commanded the Ariadne. He received the gold medal of the Royal Humane Society (1818) for saving life at sea; adapted to the mercantile marine Sir Home Popham's system of signaling; was elected Fellow of the Royal Society in 1819, and was also something of a caricature artist. He is best known, however, for his stories of the sea, beginning in 1829 with (The Naval Officer. 5 The most familiar of them is (Midshipman Easy5 (1836), in which his chief characteristics, lifelike and circum¬ stantial narration and a rollicking humor, ap¬ pear perhaps at their best. Others of the series are (The King's Own5 (1830), probably the best constructed of his works; (Newton Forster5 (1832) ; (Peter Simple> (1834) ; (Jacob Faith-fuP (1834) ; (The Pacha of Many Tales) (1835) ; (The Pirate, and the Three Cutters) (1836) ; (Snarleyyow) (1837) ; (The Phantom Ship5 (1839); (Poor Jack5 (1840); (The Privateer'*s Man5 (1846). He wrote also a series of juveniles, chief of them (Masterman Ready5 (1841). He visited Canada and the United States in 1837-38; and recorded his im¬ pressions in (A Diary in America5 (1839), which gave some offense to the people of the nation, then hypersensitive to foreign criticism. In 1832-35 he edited the Metropolitan Magazine, in which he published a review»of N. P. Willis' (Pencilings by the Way,5 which the latter, then in England, considered abusive. Willis chal¬ lenged Marryat, and they exchanged shots at Chatham without injury. (See Midshipman Easy, Mr.). Consult Marryat, F., (Life and Correspondence) (1872); Hannay, (Life5 (in (Great Writers5 series).

MARS, Anne Frangoise Hippolyte Bou-tet Monvel, an fran-swaz e-pd-let boo-ta mon-vel mars, usually called Mademoiselle Mars, French actress: b. Paris, 5 Feb. 1779; d. there, 20 March 1847. As Celimene in Moliere's (Misanthrope,5 and Elmira in (Tartuffe,5 as well as in several similar characters in the plays of Marivaux, she was very great. Louis XVIII settled on her, as well as on Talma, a pension of 30,000

francs. She retired in 1841.

MARS, in astronomy, the outermost of the four earth-like planets revolving about the sun. Its orbit lies completely outside that of the earth, its mean distance from the sun being 141,500,000 miles, and with the single exception of the orbit of Mercury, it has the most eccen¬ tric orbit of the solar system, the greatest dis¬ tance of the planet from the sun exceeding its least distance by 26,400,000 miles. Mars occu¬ pies 687 days in completing the circuit of its path, so that this is the length of the year on this planet. As the orbits of Mars and of the

earth both approximate to circles, having the sun near their centres, it follows that the dis¬ tance apart of these planets varies enormously. When Mars, the earth and the sun are in one straight line, Mars and the earth being on the same side of the sun, this distance may be so little as 35,500,000 miles, while if the former planet is beyond the sun in the most remote part of its orbit, the distance may be so great as 248,600,000 miles. In the former case Mars is more favorably situated for observation from the earth than any other planet in the solar system; the planet Venus when nearest us is, indeed, much less far away, but at this time it is the dark, or night, side of Venus that is turned toward us, while when we are nearest to Mars it is the fully illuminated, day side of the planet upon which we look. On account ot the eccentricity of the orbit of Mars, its dis¬ tances from the earth differ greatly at different oppositions; if an opposition occurs while Mars occupies that part of its orbit which is neares the sun, the distance may be so small as oppuu,- 000 miles, while if at this time Mars is at the point of its orbit most remote from the sun, even at the instant of nearest approach the distance may exceed 61,000,000 miles. The in¬ terval between successive close approaches ot Mars and the earth is 780 days, much the long¬ est synodical period in the planetary system, — while the usually favorable close approaches occur in groups separated by 15 or 17 years. These favorable oppositions always occur dur¬ ing the months of August or September; the date of the last one was 1909, while the three succeeding ones will be seen in the years 1924, 1939 and 1941. It is at these times that very unusually favorable opportunities are afforded for studying the surface of the planet. The day on Mars is 24 hours, 37 minutes 22.67 seconds in length, being thus but little longer than our own; the axis of the planet is inclined at an angle of 24° 0’ to the axis of its orbit, so that spring, summer, autumn and winter succeed one another there in almost precisely the same way as with us, but the Martian seasons are each of nearly twice the duration of ours since the year is nearly two of our years in length. (The inclination of the earth s

axis is 23° 27’).

In 1877, Asaph Hall, of Washington, < dis¬ covered that Mars is attended by two minute satellites to which he gave the names Phobos and Deimos. Both of these bodies are very minute objects, and as may

be seen from the following table their motions are in many re¬ spects unique among the satellites of the solar

system.

The distance away of each of the moons from the planet is remarkably small ; thus, even Deimos is less than one-seventeenth as far away from Mars as our own moon is from the

earth, while Phobos is separated from the planet's surface by less than one diameter o the planet. The latter moon is, in fact, so close to Mars that it would remain forever invisible to any observers on the planet in higher latitudes than 69 degrees, being hidden by the curvature of the planet s surface. But still more striking is the apparent motion ot these bodies as it would be witnessed from the surface of Mars itself. As Phobos completes a revolution in 7 hours 39 minutes which is far less than the time of the rotation of the planet, it follows that this moon would be seen to rise in the west, run rapidly eastward among the stars and finally set in the east. Eleven hours later it would again appear in the west, to repeat the same retrograde motion. Deimos, though rising in the east in the usual way, would mount the sky very slowly: the various constellations would be seen to drift past it and the moon would not finally attain the western horizon until about 66 hours after rising. Both moons would be seen to go through their phases in the course of their peculiar motions. With such minute objects it is impossible for us to discern any measur¬ able discs, but from observations of the amount of light which their surfaces reflect, their diam¬ eters can be, at least approximately, determined. The figures of the above table are those found in this way at the Lowell Observatory. These indicate that Phobos, as seen from the nearest point on Mars, would appear somewhat larger than our moon does to us, though its surface would be but one-half as bright, while the ap¬ parent diameter of Deimos would be but three minutes of arc. This satellite would therefore only be visible as a disc with difficulty to the naked eye; it would have merely the appear¬ ance of a very brilliant star.

In many ways Mars resembles our earth ; it has atmosphere, seasons, storms, clouds and mountains. Vast white patches which have the appearance of snow and ice cover both its poles ; these are found to vary in size with the seasons, being largest during the Martian win¬ ter, and sometimes even completely disappearing during the summer. The <(Canalli,)) or chan¬ nels, which have become known through

the in¬ exact English translation of Canals, were first mapped in large numbers by the Italian astron¬ omer, Schiaparelli, although a few of them had been previously observed by other astron¬ omers. They consist of narrow, dark lines, generally straight, forming a network over the whole surface of the planet. Some of the observers, however, deny the extreme regular¬ ity of these curious features, describing them as of varying widths and of a somewhat irregular appearance. At their junctions we often find small dark areas known as oases. Large dark¬ ish gray and green areas of the planet have

Distance

in

equatorial radii of planet

Distance

in

miles

Time of revolution

Interval

between

meridian

passage

Diameter

in

miles

2.77

5,850

7h 39m 13.85s

10. 9h

1 ‘ll

36

1 0

6.92

14,650

30 17 54.0/

1 3 1 • 3

—

MARS — MARSEILLAISE, LA

321

been named seas, but it is now certain from the amount of permanent detail which is de¬ tected in them that they are not bodies of water. In fact, the course of many of the canals can be traced across these greenish areas. It is, indeed, certain that Mars approxi¬ mates to a desert planet and that there is but little water on its surface. The

greater area of the planet is of a yellowish or orange color and these regions are believed to be true deserts. It is thought by some of the students of the planet that the greenish areas are vegetation, that the canals are strips of irrigated country and that the polar caps are true deposits of snow or ice, the melting water of which is artifi¬ cially led to dryer regions of the planet. To this explanation many astronomers vigorously dis¬ sent, their objections being principallv based on the extremely light atmosphere of the planet, its probable very low temperature, and espe¬ cially upon the uncertainties still remaining in our ideas of the appearance of the Martian surface and in the interpretation of what has been seen. It is to be hoped that at the very favorable oppositions of 1924, 1939 and 1941 a more definite basis mav b.e acquired for ex¬ tending our knowledge in this fascinating field. The reader will find tolerably complete state¬ ment of the known and supposed facts and of the various inferences drawn from them among the titles given below. Consult Flammarion, Camille, (La Planete Mars et ses con¬ ditions d'habitilite) (1892) ; Lowell, Percival, (Mars and its Canals) (1906), and (Mars as the Abode of Life) (1909); Wallace, Alfred Russell, (Is Mars Inhabited ?> (1907).

Eric Doolittle,

Director of Flower Astronomical Observatory, University of Pennsylvania.

MARS, the typical god of war ; in Roman mythology, contracted from Movers or Mavors, in the Sabine or Oscan language Mamers, was at an early period identified by the Romans with the Greek Ares. As the Italian Mars was originally a divinity of a very different nature, the two conceptions must be treated separately. Originally Mars was an agricultural deity surnamed Silvanus, and propitiatory sacrifices were offered to him as the tutelary god of fields and flocks. As the Italian shepherds were familiar with war, the transition from the idea of Mars as an agricultural to that of a warlike deity was natural and easy. He was regarded as the father of the Roman people, for, ac¬ cording to tradition, Romulus and Remus, the founders of Rome, were the fruit of his inter¬ course with Rhea Sylvia. Several temples in Rome and the Campus Martius were dedicated to him, the most important of which was that outside the Porta Capena, on the Appian Road, and that of Mars Ultor, built by Augustus in the forum. His service was celebrated not only by particular flamines devoted to him, but by the College of the Salii, or priests of Mars. The month of March (q.v.), the first month of the Roman year, was sacred to him and his festivals were celebrated every year in the Circus on the 1st of August. The Campus Martius, where the Roman youth engaged in athletic and military

exercises, was named after him. (See Aries). Consult Fairbanks, A., (Mythology of Greece and Rome' (1907).

MARSALA, mar-sa'la, Sicily, a seaport town, near the mouth of a river of the same name, on the low promontory of Cape Boeo, 18 miles southwest of Trapani. It was known as Lilybaeum in the time of the Carthaginian supremacy. It obtained its present name from the Saracens, who valued the port so highly that they called it Marsa Alla, or Port of God. It has now excellent schools of technology and agriculture and a large public librarv. The har¬ bor has been greatly improved. The most im¬ portant export is Marsala wine, which resembles sherry; grain, soda and salt are also exported. Pop. of commune, 65,451.

MARSDEN, marz'den, Samuel, Anglo-Aus- tralasian missionary: b. Horsforth, near Leeds, 28 July 1764; d. Windsor, New South Wales, 12 May 1838. After study at Cambridge and ordi¬ nation in 1793, he went in 1794 as chaplain to the convict settlement at Parramatta, Australia, where his model farm became self-supporting and contributory to the development of local schools and missions. In 1814 he extended his work to New Zealand among the Maoris who through his efforts became Christianized, re¬ ceived a dictionary and grammar of the Maori language and adopted a fixed form of govern¬ ment. Consult Marsden, J. B., (Life of Samuel Marsden J (London 1859).

MARSEILLAISE, La, the French na¬ tional anthem, a revolutionary song, composed by an engineer officer, Rouget de Lisle, during the night of 24-25 April 1792 in Strassburg. The song quickly spread. The people of Mar¬ seilles adopted it to be sung at the meetings of their clubs. It was they who carried it all over France, and hence from them it received its name. De Lisle was a proscribed royalist at the time. His mother wrote to him in alarm, asking, <(What is this revolutionary hymn, sung by bands of brigands who are prowding through France and with which our name is linked ?» He had originally given it the name of (Le chant de guerre pour l'armee du Rhin) ((Battle Song of the Rhine ArmyG-Lamartine wrote that De Lisle himself was terrified at the tre¬ mendous effect of his composition: (<It was the fire-water of the Revolution, which instilled into the senses and soul of the people the in¬ toxication of battle.ˆ Carlyle describes it as ((the luckiest musical composition ever promul¬ gated, the sound of which

will make the blood tingle in men's veins ; and whole armies and assemblages will sing it, with eyes weeping and burning, with hearts defiant of Death, Despot and Devil. w On 8 Jan. 1795 the Directory or¬ dered the air to be played at all theatres. Its inspiring strains are known throughout the world more than perhaps any other melody. During the Empire and the Restoration the Marseillaise was suppressed as a revolutionary demonstration, but was revived with the July Revolution of 1830. The original version con¬ sisted of only six couplets; the seventh was added when it was dramatized for the Fete de la Federation, in order to complete the characters among whom the verses were dis¬ tributed, namely, an old man, a soldier, a wife and a child. The stanza commencing with ((Nous entrerons" is the one added, intended for the child part. It was written by Dubois, editor of the Journal de la Litteraturc. The complete version follows, with a strict translation.

MARSEILLES

LA MARSEILLAISE.

1

Allons, enfants de la Patrie,

Le jour de gloire est arriv6;

Contre nous de la tyrannie,

L’etendard sanglant est leve.

Entendez — vous dans ces campagnes Mugir ces feroces soldats?

Ils viennent jusque dans vos bras Egorger nos fils, nos compagnes !

Aux armes, citoyens ! formez vos bataillons !

Marchons, marchons,

Q’un sang impur abreuve nos sillons !

2

Que veut cette horde d’esclaves,

De traitres, de rois conjur6s?

Pour qui ces ignobles entraves,

Ces fers des longtemps prepares?

Frangais, pour nous, ah ! quel outrage 1 uels transports il doit exciter !

’est nous qu’on ose m6diter De rendre a l’antique esclavage.

Aux armes, *etc.*

3

Quoi ! ces cohortes 6trangeres Feraient la loi dans nos foyers?

Quoi! ces phalanges mercenaires Terrasseraint nos fiers guerriers? ^

Grand Dieu ! par des mains enchainees Nos fronts sous le joug se ploieraient !

De vils despotes deviendraient Les maitres de nos destinees.

Aux armes, *etc.*

)

4

Tremblez, tyrans, et vous perfides, L'opprobre de tous les partis,

Tremblez ! vos projets parricides Vont enfin recevoir leur prix !

Tout est soldat pour vous combattre.

S'ils tombent, nos jeunes heros,

La terre en produit de nouveaux Contre vous tout prets a se battre !

Aux armes, *etc.*

5

Frangais, en guerriers magnanimes,

Portez ou retenez vos coups;

Epargnez ces tristes victimes A regret s’armant contre nous.

Mais ces despotes sanguinaires,

Mais les complices de Bouille,

Tous ces tigres qui sans piti6 Dechirent le sein de leurs meres 1 Aux armes, *etc.*

6

Nous entrerons dans la carriere Quand nos ain6s n’y seront plus;

Nous y trouverons leur poussiere Et la trace de leurs vertus !

Bien mo ins jaloux de leur survivre Que de partager leur cerceuil.

Nous aurons le sublime orgeuil De les venger ou de les suivre 1 Aux armes, *etc.*

Amour sacr6 de la Patrie,

Conduis, soutiens nos braves vengeurs; Liberty, Liberte, cherie,

Combats avec tes defenseurs !

Sous nos drapeaux que la Victoire Accoure a tes m&les accents;

Que tes ennemis expirants Voient ton triomphe et notre gloire ! Aux armes, *etc.*

MARSEILLES, mar-salz, or MAR¬ SEILLE, mar-sa-ye, France, the principal commercial seaport of the country, a first-class military and naval station, the second citv of France as regards population, and the capital of the department of Bouches-du-Rhone, 508 miles southeast of Paris. It stands on the northeastern shore of the Gulf of Lyons, and on a bay containing a group of islets, one of which, the Chateau d’lf, has world-wide celeb¬ rity in connection with the elder Dumas’

THE MARSEILLAISE.

1

Come, children of the fatherland.

The day of glory now is here;

By tyranny against us _

The bloody banner is raised:

Do you hear in the land Those ferocious soldiers roar?

Up to our arms they come,

Strangling our sons, our women !

To arms, citizens, form your battalions.

Let us march, let us march !

That the foul blood may drench our furrows!

2

What seeks this horde pf slaves.

Of traitors and conspiring kings?

For whom these base manacles,

These irons already long prepared?

For us, Frenchmen, ah, such outrage.

What passions it m ust raise !

’Tis us whom they dare purpose To restore to former slavery.

3

What ! shall these foreign cohorts Make the law in our homes?

What ! shall these hireling phalanxes Throw our proud warriors down?

Great God ! with fettered hands,

Our heads bowed down beneath the yoke ! And despots vile become The masters of our destinies.

4

Tremble, ye tyrants and traitors. The shame of every faction, Tremble ! your parricidal projects Shall at last gain their reward ! Each one is soldier to fight you. And if our young heroes fall,

The land shall produce them afresh All ready to struggle against you !

5

Frenchmen, as magnanimous warriors, Restrain or deal your blows;

Spare those sad victims

Who reluctantly armed against us.

But those bloody despots —

Those accomplices of Bouille —

All those tigers who pitilessly Lacerate the bosoms of their mothers !

6

We shall begin our career When our elders are no more; Yet we shall find their ashes And the trace of their virtues 1 Less eager to survive them Than to share their tomb.

It shall be our sublime pride To avenge or follow them !

7

*«

Sacred love of fatherland,

Guide, sustain our brave aveng rs; Liberty, dear Liberty,

Fight with thy defenders!

That victory under our flags Shall hasten to thy noble call;

And may thy dying enemies Behold thy triumph and our glory !

< Monte Cristo.* The city is strongly defended by various works, and lies in the form of an amphitheatre round a natural harbor of mod¬ erate size (about 70 acres), known as the Old Harbor. From the Old Harbor one of the finest of the city thoroughfares, called the Cannebiere, runs inland in a straight line; while at right angles to this another great thoroughfare traverses the city, planted with trees, lined with fine edifices and bearing dif¬ ferent names at different points. In

part of the town the streets are narrow and irregular, but in general the streets are spa¬ cious and regular and lined with handsome houses. Marseilles, however, is not rich in public edifices. The chief are the large cathe¬ dral, in the Byzantine style, consecrated in 1893 ; the church of Notre Dame de la Garde, a modern Romanesque building, on a hill of same name, whence a splendid view is obtained; the church of Saint Victor, a building of great antiquity; the Hotel de Ville ; the Prefecture; the Palais des Arts de Longchainp, contain¬ ing a picture-gallery and natural history mu¬ seum; the exchange; the public library (120,- 000 vols.) ; the palace of justice or law1 courts; the episcopal palace, *etc.* Marseilles is the see of a bishop and possesses a court of first in¬ stance, a mint, an Academy of Sciences, Belles-lettres and Arts, various learned societies and educational institutions.

Marseilles improved greatly in regard to street architecture, sanitary matters, etc., and made great progress in extent, population and commerce, largely owing to the conquest of Algeria and the opening of the Suez Canal. Including Old and New Harbors, the total water area is 414 acres; there are seven wet docks, with depths at ordinary tides ranging from 25 to 66 feet, six dry docks and 13 miles of quayage. Vessels ‘entered in 1913, 4,621, of an aggregate of 8,308,165 tons. The traffic in merchandise has grown from 4,372,000 tons in 1870 to 21,590,000 tons in 1913. From the Durance an abundant water supply has been derived. A canal irrigates the neighboring slopes and plains and has transformed them from arid tracts into fruitful fields. The sur¬ rounding districts are now occupied by new population, employed in raising vegetables, fruit, etc., on the reclaimed and improved lands. The Marseilles-Rhone Canal, intended to open up waterways from Marseilles to the interior of France and central Europe, was authorized in 1903, and is expected to be completed in 1919. The canal, which is 50 miles long,, has no locks and is at sea-level throughout its entire course, and will, with its

tributaries, form a series of waterways 350 miles long, navigable by heavy barges. The most important manu¬ factures are soap, soda and other chemical products; also olive and other oils, sugar, machinery, iron and brass work, matches, can¬ dles, glass, earthenware, Oriental hosiery, *etc.* In the building-docks a great number of war and other vessels are built. The trade consists chiefly of soap, olive-oil, wine, brandy, corn, flour, dried fruits, oranges and other products of the southern departments; salt provisions, tobacco, wool, skins and hides, iron, raw cot¬ ton, cotton twist, dyewoods and American nov¬ elties. Marseilles is the headquarters of the 15th army corps and is the seat of a United States consulate. During the European War 1914-18 it was a center of great naval activity a chief port of debarkation for the world-con¬ verging armies of the Entente Allies.

Marseilles was founded by a colony of Greeks from Asia Minor about 600 vears be¬ fore Christ, the original name being Massalia, and the Greek language is said to have been spoken here for several centuries before Christ. Its progress for centuries was rapid and almost without interruption. Having taken the part of

Pompey in the great contest for supremacy between him and Caesar, it was besieged by the latter and taken in 49 b.c. On the decline of the Roman Empire it became a prey to the Goths, Burgundians and Franks. In 735 it fell into the hands of the Saracens, who completely destroyed all the ancient monuments which the barbarians had spared. In the 10th century it fell under the dominion of the counts of Prov¬ ence and for some centuries after followed the fortunes of that house. Pop. 550,619.

MARSEILLES, Ill., city in La Salle County, situated on the Illinois River and Mich¬ igan Canal and on the Chicago, Rock Island and Pacific and the Chicago, Ottawa and Peoria railroads. It has coal mines and numerous in¬ dustrial establishments, including paper-box factories, roofing material works, paper-board works, agricultural implement works, con¬ crete block yards and cigar factories. The Illinois River is crossed at this point by a great railroad bridge. The commission form of gov¬ ernment was instituted in 1913. Pop. 3,290.

MARSH, George Perkins, American scholar and diplomat: b. Woodstock, Vt., 15 March 1801 ; d. Vallombrosa, Italy, 23 July 1882. He was graduated at Dartmouth in 1820; studied law at Burlington; was elected to the Supreme Executive Council of Vermont in 1834; sat in Congress from 1842 to 1849, when he went to Constantinople as

Minister for four years, and in 1852 was sent on a special mission to Greece. In 1861, after seven years in the United States, he went to Italy as Minister, and held that post until his death. An able English philologist, Marsh wrote (Lectures on the Eng¬ lish Language* (1861); (The Origin and His¬ tory of the English Language* (1862); (Man and Nature,* in which he urged forest planting and forest preservation (1864), *etc.* He edited Wedgewood's (Etymology,* and translated Rask's Ucelandic Grammar.* Consult the (Life and Letters> edited by his widow (1888).

MARSH, Othniel Charles, American palae¬ ontologist: b. Lockport, N. Y., 29 Oct. 1831; d. New; Haven, Conn., 18 March 1899. He was graduated from Yale in 1860, studied in 1860-62 at the Yale (now the Sheffield) Scientific School, in 1862-65 at the German universities of Berlin, Heidelberg and Breslau, and from 1866 until his death was the first professor of palae¬ ontology at Yale. From 1882 he was vertebrate palaeontologist to the United States Geological Survey, his field-work for the survey ceasing in 1892. His investigations in regard to ex¬ tinct vertebrates are very important and were declared by Charles Darwin to furnish some of the most satisfactory evidence of the evolu¬ tionary theory. He made particular study of the Rocky Mountain region, and from 1868 al¬ most annually organized and conducted expedi¬ tions into that district. In these explorations he discovered over 1,000 new fossil vertebrates, of which he classified and described more than one-half. Among his discoveries are those of the Odontornithes, a subclass of Cretaceous birds, with teeth ; the Dinocerata, ungulate ani¬ mals of the Eocene period, elephantine in size ; the first known American pterodactyls, or fly¬ ing lizards, and several new families of dinosaurs. Perhaps he was best known for his study of the primitive horse, the Eohippus, Orohippus and Epihippus. In 1890-99 he made

researches in the geology of the region between the Appalachian range and the Atlantic, lie was curator of the geological collection of the Yale Museum of Natural History in 1867-W, and in 1898

presented to the university his own collections. He was a nephew of George Pea¬ body (q.v.), and it is said to have been at his suggestion that the Peabody Museum at Ya e was established. In 1887 he was made honorary curator of vertebrate palaeontology in the United States National Museum, and in 1898 received the Cuvier medal of the French Acad¬ emy of Sciences. He was president ot the American Association for the Advancement ot Science in 1878 and of the National Academy of Sciences in 1883ˆ95. From a bibliography of 237 titles these works by him may be cited: <Odontornithes: A Monograph of the Extinct Toothed Birds of North America5 (1889) ;

(Dinocerata : A Monograph of an Extinct Order of Gigantic Mammals5 (1884), and The Dinosaurs of North America5 (1896). Consult memoir by C. E. Beecher in the American Jour¬ nal of Science, June 1899.

MARSH, Sylvester, American engineer: b. Campion, N. H,, 30 Sept. 1803 ; d. Concord, N. H,, 30 Dec. 1884. In 1826 he established a provision business in Boston, in 1833 in Chi¬ cago and from 1837 was in the gram trade at Chicago. He originated the meat-packing in¬ dustry and is regarded as one of. the founders of Chicago. From 1864 he resided in New Hampshire. On 25 June 1858, he obtained a charter for a railway to the summit of Mount Washington, a project deemed so impossible that he was called «crazy Marsh.55 The rail¬ way, 2.81 miles long, with an ascent of 3 6Zb feet, was completed in July 1869. The chief feature in the operation of the road is a cen¬ tral cog-rail. The principle proved so prac¬ ticable that literally hundreds of similar rail¬ ways have been constructed on the sides ot famous mountains all over the world.

MARSH CROCODILE, or MUGGER,

the common inland crocodile of India, locally venerated by the Hindus, to whom it is known as ((Mugger.55 It inhabits the tanks . and marshes of India and Ceylon, and suitable places westward almost to the Persian coast and eastward throughout the Malay Peninsula and islands. It is dark, olive-brown in general color above, lighter on the ventral surface; the young are paler, with black spots. A specimen 12 feet long is considered large, but instances of a length of 18 feet have been recorded, I he head is rough-coated, but has no ridges ; the snout is broad and the teeth number 76 Ihese crocodiles swarm in river-marshes, weedy ponds and artificial reservoirs, throughout their range, feeding on fish and small animals and little feared by horses,

cattle or human beings, tor in general they are cowardly and reluctant to attack men or even to resist injury. In case the water of their home dries away, they migrate to other pools, and in seasons ot drought are likely to be met with anywhere wandering in search of water) as a last re¬ sort they will bury themselves in the mud and remain in torpor until revived by the coming of rains. These reptiles display considerable cunning in capturing their food and in avoiding harm, feigning death very cleverly. They are kept in a semi-domesticated condition in many

parts of India by pious Hindus whose priests build temples near the great ponds, protect and feed the reptiles and imagine the service pleasing to the gods as well as piofitab e o themselves. Extensive descriptions of the ani¬ mal and of its worship may be found in the zoological works of Blanford, Jerdon, Tennent, Gadow and others and in such volumes as Adams, < Wanderings of a Naturalist in India (Edinburgh 1867) and Hornaday, (Two Years in the Jungle5 (New York 1885).

MARSH GAS. See Methane.

MARSH HARE. See Hares.

MARSH HAWK, or HARRIER, a mi¬ gratory hawk (Circus cyaneus) of medium size, commonly known in one or another ot its varieties throughout the north temperate zone, which frequents marshy meadows, where it makes its nest upon the ground in a tussock ot grass, and lays five to seven roundish, dirty white eggs. In such places it finds its food, chiefly mice and frogs, and sails slowly back and forth close to the ground watching keenly for movements in the grass and ready to pounce upon its prey. Its wings are long and its flight may be swift and powerful when occasion de¬ mands, but it was accounted “ignoble55 among falconers. It rarely seizes birds or even young poultry, although one of its names is hen¬ harrier,55 and should b’e protected and en¬ couraged by farmers as one of the most useful and persistent mousers. This hawk may be readily recognized by the broad patch of white on the rump displayed by both sexes. I he male is dull grayish-blue, in general tint, and the female rusty brown, both streaked with white. The American harrier (C. hudsomus) is generally brown, though the adult males are blue-gray on the back; the tail-coverts are white. Consult Coues, (Birds of the North¬ west5 (1874).

MARSH-HEN. See Mud-hen.

MARSH MALLOW, a coarse large leaved herb (Althea officinalis) , of the Old World, but naturalized in marshy places along the eastern coast of the United States, which is related to the hollyhocks (q.v.) ; the flowers are pale rose-color, some in a terminal spike and some axillary. Its root is mucilaginous and of service as a demulcent in medicine, but it is mainly used as a basis for the confection called “marsh mallow.55 See Mallow.

MARSH-MARIGOLD. See Cowslip.

MARSH-WREN, either of two species of American wrens that inhabit reedy marshes. They have the diminutive brown bodies short wings and tails, the latter often held cocked .up over the back, awl-like bills and inquisitive activity characteristic of wren (q.v.) generally. One is the long-billed (Cistothorus palustris’), most numerous in the salt-marshes along the Atlantic coast; and the other the short-billed, better known about inland lakes and rivers. The former is somewhat the larger, has a de¬ cidedly longer bill and lays eggs dark chocolate in color, while the eggs of the short-billed species are pure white. Both make elaborate nests in the form of ball-like baskets, with a little entrance at the side, woven of leaves of wild rice or marsh grasses and fastened to the stems of the reeds. A curious habit of the species is that each pair will make several nests

each season, only one of which serves the pur¬ poses of incubation. These wrens give in the spring an exceedingly pretty clattering song and when dozens are singing together in a patch of reeds the’ effect is most pleasing.

MARSHAL, a Federal officer appointed by the President in each judicial district and cor¬ responding to the sheriff of a county. His duty is to execute all precepts directed to him, issued under the authority of the United States, and is under the jurisdiction of the United States Dis¬ trict and Circuit Courts. The United States government maintains marshals in its principal dependencies, as the Philippines, Alaska, Porto Rico, Hawaii, *etc.* They are appointed by the

President for four years, and in addition to serving the courts have certain duties regarding internal revenue, public lands and the postal service. Sometimes the chief of police in American towns is known as marshal. In some European countries the title of marshal confers the highest military distinction, that of Marshal of France being especially prized. The word is derived from the Old High German word ma-rali, a horse ; and scalh, a servant ; hence Marascalh, a man appointed to take care of horses. The marshal of the German Empire derived his origin from the Frankish monarchs and was equivalent to the comes stabuli or con-netable. He was bound to keep order at the coronation of the emperor, and to provide lodgings for the persons connected with the ceremony. He was called arch-marshal, a dig¬ nity belonging to the electorate of Saxony. At the coronation it was his duty to bring oats in a silver vessel from a heap in the open market¬ place, and to present the vessel to the emperor. His duties were discharged by a hereditary marshal (Erbmarschall) . In Prussia general field-marshal is the highest military honor. In England field-marshal is given as an honorary rank to general officers who may have no im¬ mediate command. Marshal also signifies a person who regulates the ceremonies of certain solemn celebrations or, as in the United States, at parades, street processions, *etc.*

MARSHAL, Frank, American chess cham¬ pion : b. Brooklyn, N. Y., 1877. He acquired fame when a mere boy by winning the cham¬ pionship of the famous Brooklyn Chess Club. Next he took the championship of the Man¬ hattan Chess Club. Thereafter he became a professional player and entered in most of the international tournaments. In 1905 he won the International Chess Tourney at Cambridge and challenged Lasher for the World's champion¬ ship, but was defeated. In all he won first prize in seven international tourneys. He won the Pan-American championship by defeating Copablanca in Cuba in 1912, though he lost a set match to Copablanca a year or two previous. He succeeded Showalter as United States champion.

MARSHALL, mar'shal, Alfred, English economist: b. London, 26 July 1842. He was educated at Saint John's College, Cambridge, and in 1877 was principal of University College, Bristol. In 1883-84 he was lecturer at Balliol College, Oxford, from 1885-1908 he was pro¬ fessor of political economy at Cambridge. Uni¬ versity, and a member of the Royal Commission on Labor in 1891. He has published (Economics of Industry) (1879) ; Principles of Economics'

(1890); Plements of Economics' (1891); Piscal Policy of International

Trade' (1903), *etc.*

MARSHALL, (Davis) Edward, Ameri¬ can author and journalist: b. Enfield Centre, Tioga County, N. Y., 31 May 1869. He was educated at Benedict's Preparatory School, Rochester; was news editor of the American Press Association at Buffalo and New York in 1885-89; Sunday editor of the New York Press 1890-95. In 1897 he was Sunday editor of the New York Journal and European correspondent of the New York World 1897-98, and in the latter year served as war correspondent of the New York Journal. He was correspondent of the First Peace Conference at The Hague 1900. In New York he conducted an editorial crusade against the conditions existing in tenement buildings, was secretary of the New York State Tenement-House Commission 1894, and has lectured on the Spanish-American War, the army, the Latin Quarter of Paris, *etc.* ; was correspondent of the Columbian Magazine dur¬ ing the Mexican insurrection of 1911. He has published (Story of the Rough Riders' (1898) ; Pizette' (1902); <The Middle Wall' (1904); (The Writing on the Wall' (1909) ; (In Old Kentucky,' with C. T. Dazey; Pat: An Idyl of New York' (1912), and novel versions from the following plays : (The Family ˆ ; (Master of the House' (1912); Proadway Jones' (1913), and several short stories.

MARSHALL, Emma Martin, English novelist: b. North Repps, near Cromer, Norfolk, 29 Sept. 1830; d. Clifton, near Bristol, 4 May 1899. She was married to H. G. Marshall in

1851, and her life thereafter was mainly spent in the cathedral cities of Wells, Exeter, Glou¬ cester and Bristol. She wrote more than 200 stories, nearly all of them stories intended mainly, though not entirely, for young people. In spite of their number the even excellence of the tales is remarkable ; they possess high moral tone, and they may be called historical pictures rather than historical tales. Her plan was to introduce into each story several historical per¬ sonages, as secondary characters, the principal figures being imaginary. Her books have had a wide reading in the United States and still continue popular. Among them are Pife's Aftermath' (1876) ; (Under Salisbury Spire) (1889); (Haunts of Ancient Peace'; Penshurst Castle' (1894) ; (Under the Dome of St. Paul's' (1898). Consult Marshall, B., Pife of Emma Marshall' (1900).

MARSHALL, Henry Rutgers, American author and architect: b. New York, 22 July

1852. He was graduated at Columbia in 1873, and in 1878 entered practice as an architect. He was lecturer on aesthetics at Columbia in

1894-95 and at Princeton in 1915-16. He was president of the New York Chapter of the American Institute of Architects 1902-04, and president in 1907 of the American Psychologi¬ cal Association. While eminent as an architect he has become more widely known through his psychological writings. In 1902 he was ap¬ pointed a member of the Art Commission of the city of New York. Besides contributions to literary, philosophical and psychological pe¬ riodicals he wrote Pain, Pleasure and ˆEsthetics' (1894) ; (yEsthetic Principles' (1895); Unstinct and Reason' (1898); (Con-

sciousness* (1909), and ‘War and the Ideal of Gene) (1915); (Mind and Conduct) (New York 1919).

MARSHALL, Humphrey, American bot¬ anist1 b West Bradford (the present Marshallton), Pa., 10 Oct. 1722; d. there, 5 Nov. 1801. He followed the stonemason’s trade, but de¬ voted his leisure to astronomy, building a small private observatory, and to natural history. He began the collection and cultivation of the more interesting indigenous plants, and in 1773 estab¬ lished the Marshallton botanical garden, where were assembled trees and herbaceous plants of the United States. For years he was treasurer of Chester County, Pa., and in 1786 he was elected to the American Philosophical Society. His (Arboretum Americanumˆ described as «an Alphabetical Catalogue of Forest Trees and Shrubs, Natives of the American United Statesˆ (1785), was translated into several European languages.

MARSHALL, Humphrey, Americanˆ poli¬ tician : b. Westmoreland County, Va., 1756; d. near Frankfort, Ky., 1 July 1841. He joined the Continental army at the outbreak of the Revolution, became’ captain of Virginia cavalry (1778), in 1780 established himself on a Ken¬ tucky plantation, opposed the separation of Kentucky from Virginia, and as a delegate to the Danville convention of 1787 was prominent in defeating the measure. He was also a delegate to the Virginia convention that ratified the Constitution of the United States, and in 1793 was a representative from Woodford County in the Kentucky legislature, where he declared his opposition to the plans for raising in Kentucky troops under Gen. George Rogers Clark for an attack on the Spanish settlements near the mouth of the Mississippi River. From 7 Dec. 1795 to 3 March 1801 he was a Federalist sena¬ tor in the Congress of the United States, and in 1806 was active in denunciation of Aaron Burr. He represented Franklin County in the Kentucky legislature in 1807-09, and had a dis¬ pute with Henry Clay which resulted in a duel in which Clay received a slight wound. He sat again for Franklin County in 1823. He pub¬ lished the first (History of Kentucky* (1812; rev. ed., 1824).

MARSHALL, Humphrey, American sol¬ dier: b. Frankfort, Ky., 13 Jan. 1812; d. Louis¬ ville Ky., 28 March 1872. He was graduated from the United States Military Academy in

1832, entered the mounted rangers, served in the Black Hawk War (1832) and resigned from the army 30 April 1833. Admitted to the bar in

1833, he practised in Frankfort (1833-34) and Louisville (1834-36) , became a lieutenant-colonel of Kentucky militia in 1841, and raised for the Mexican War the first regiment of Kentucky cavalry, of which he was made colonel 9 June 1846. He fought at Buena Vista (22-23 Feb. 1847). From 3 Dec. 1849 to 4 Aug. 1852 he served as a Whig in the 31st and 32d Congresses, in 1852-54 was Minister Plenipo¬ tentiary to China, and from 3 Dec. 1855 to 3 March 1859 was again in Congress, this time as an American, or Know-Nothing. In 1861 he was commissioned a brigadier-general in the Confederate army, with command of the Army of Eastern Kentucky. On 10 Jan. 1862 he was defeated by General Garfield at Middle Creek (Floyd County) in one of the most important

of the minor battles of the Civil War. In May 1862 he surprised Gen. J. D. Cox at Princeton, Va and was thus of much service to Lee, through the relief of the Lynchburg and Knox¬ ville Railway. Having resigned his commission in 1862 he ‘represented Kentucky in the con¬ gress of the Confederate States (1863— 6a). From 1867 he practised law with much success at Louisville.

MARSHALL, John, chief justice of the United States: b. Germantown (now Midland), Fauquier County, Va., 24 Sept. 1755; d. Phila¬ delphia, 6 July 1835. He was the eldest son of Col. Thomas Marshall of Westmoreland County, Va., a distinguished officer in the French War and in the War of Independence, and of Mary Keith, a member of the well-known Randolph family. Thomas Marshall re¬ moved from Westmoreland County to Fauquier soon after his marriage; this community was sparsely settled and the educational advantages which he could give his children were meagre, consequently he became their earliest teacher and succeeded in imbuing them with his own love of literature and of history. For two years John Marshall had, as tutor, James Thompson of Scotland and he was sent for one year to the academy of the Messrs. Campbell of West¬ moreland County, where James Monroe was also a pupil. He had no college training except a few lectures on law and natural philosophy at William and Mary in 1779. He was always fond of field sports and excelling in running, leaping and quoit throwing. He loved the free natural life of the country, and his long tramps through the woods around his father’s home, Oak Hill, together with his athletic exercises gave him great

strength and agility. At 18 he began the study of law, but soon left his studies to enter the Revolutionary army. He was active in endeavoring to enlist men for the service and helped to form and drill a company of vol¬ unteers. As a member of his father's regiment he took part in the battle of Great Bridge where he displayed signal valor. In 1776 he became a lieutenant in the 11th Virginia, and the next year was made captain. He served in Virginia, New Jersey, Pennsylvania and New York, al¬ ways displaying great courage and valor and a cheerful acceptance of hardships and privations. This experience was of untold value to Marshall, it broadened his views and quickened his insight in governmental questions. As he says, he entered the army a Virginian and left it an American. In 1780 during a period of military inactivity he attended a course of law lectures at William and Mary and in 1781, after leaving the army, was granted a license and be¬ gan the practice of law in Fauquier County. The next year he was elected to the Virginia assembly, and shortly afterward was made a member of the executive council. He served his State as legislator during eight sessions. In 1784, although he had then removed his resi¬ dence to Richmond, he was again elected dele¬ gate from Fauquier County, and in 1 787 served as member from the county of Henrico. When the city of Richmond was granted a representa¬ tive in the legislature Marshall had the honor of this office which he held from 1788 to 1791. He was also a member of the Federal Conven¬ tion which met in 1788 to discuss the ratifica¬ tion of the Constitution of the United States,

JOHN MARSHALL

Chief Justice United States Supreme Court

and it was largely due to his convincing argu¬ ments that ratification was carried, as the ques¬ tion was hotly debated and the anti-Constitu- tion party had able and determined representa¬ tives. For several years he held no public office and devoted himself entirely to his extensive law practice, but in 1795 was again elected to the legislature. During this session he defended the unpopular ((Jay Treaty® with England, and by his overwhelming arguments completely re¬ futed the theory of his opponents that the ex¬ ecutive has no power to negotiate a commercial treaty. Marshall's attitude during his service as legislator toward all questions concerning Federal power demonstrated his increasing be¬ lief that a strong central government is neces¬ sary to real efficiency. In 1783 he had married Mary Ambler, daughter of Jacqueline Ambler, treasurer of the State, and soon after his mar¬ riage made his permanent home in Richmond. The honors bestowed on him testify to the esteem in which he was held by the State and by the nation. He refused the Attorney-Gen¬ eralship and the Ministry to France, but in 1789 accepted the office of Special Envoy to France with Charles Cotesworth Pinckney and Elbridge Gerry. This mission related to the indignities which the French had offered the American navy and attempted to adjust the commercial relations between the two countries. It failed on account of the arrogant attitude of France, but ((Marshall's dignified correspond¬ ence added greatly to the prestige of America,® and on his return he was welcomed with many evidences of approbation from his grateful countrymen. Yielding to the earnest. solicita¬ tion of Washington he became a candidate for Congress and was elected a member of that body in 1798. In Congress he was the leader of the Administration party and the greatest debater in the House on all constitutional mat¬ ters. In one of his most noted speeches he de¬ fended the action of President Adams in the case of Jonathan Robbins and proved conclu¬ sively that this case was a question of execu¬ tive and not of judicial cognizance. In 1800 he was made Secretary of State, and in 1801 ap¬ pointed chief justice of the United States, which office he held until his death in 1835. In 1829 he, like ex-Presidents Madison and James Monroe, was a member of the Virginia conven¬ tion which met to alter the State constitution, and by his

wisdom and moderation did much to prevent radical changes and to thwart the attempts of politicians against the independence of the judiciary. In 1831 his health, hitherto unusually vigorous, began to fail ; he underwent a severe surgical operation in Philadelphia and was seemingly restored, but the death of his wife was a great shock and a return of the disease in 1835 proved fatal. He died in Phila¬ delphia, whither he had gone for medical relief, and was buried by the side of his wife in the New-Burying-Ground, now Shockhoe Hill Cem¬ etery, Richmond. The sorrow over the country was deep and widespread; even his bitterest enemies mourned for the kindly, upright man.

Though somewhat ungainly, Marshall was always dignified in appearance; his tall, loosely-jointed figure gave an impression of freedom, while his finely shaped head and strong, pene¬ trating eyes bespoke intelligence and power. Directness and simplicity were his dominant characteristics. He was free from any display

of pomp, air of office or studied effect. His un¬ failing good humor, his benignity, his respect for women, his devotion to wife and, family and his well-known reverence for religion made him loved and. admired even by those who heartily disliked his political opinions. As chief justice for. more than 30 years he rendered numerous decisions which were of prime importance to a nation in process of formation. The faculty which made Marshall invaluable as a jurist was his power of going directly to the core of any matter. . No . subtleties, no outside issue con¬ fused him, his analysis was unerring, his logic incontrovertible; he cared nothing for the graces of rhetoric and made no appeal to the emotions ; his power lay in his deep conviction and in his illuminating and progressive argu¬ ment. At a period when the powers of the Con¬ stitution were ill-defined, when our government was experimental, Marshall's decisions in con¬ stitutional and international cases were invalu¬ able factors in forming a well-organized Fed¬ eral goyernment. ®He made the Constitution live, he imparted to it the breath of immortality, and its vigorous life at the present hour is due mainly to the wise interpretation he gave to its provisions during his long term of office.® Marshall was the author of numerous reports and papers, of a history of the colonies and of a (Life of Washington, 5 a book of small lit¬ erary merit, but containing a mass of valuable authentic information. Consult Cooley, Con¬ stitutional History of the United States' . (1889) ; Margruder, (John Marshall' (1885) ; Thayer, (John Marshall' (in (Beacon Biogra¬ phies' series, 1901) ; Beveridge, A. J., (Life of John Marshall' (1916).

Emilie W. McVea, President of Sweet Briar College.

MARSHALL, Louis, American lawyer: b. Syracuse, N. Y., 14 Dec. 1856. He was edu¬ cated in the Syracuse public and high schools and at the law school of Columbia University. In 1878 he began practice at Syracuse. He is now member of the firm of Guggenheimer, Untermeyer and Marshall. He has argued many importing causes in the higher courts, special¬ izing especially in constitutional and corporation law. Mr. Marshall was a member of the New York Constitutional conventions of 1890, 1894 and 1915; served on the commission appointed by Mayor Low, in 1902, to investigate East Side conditions ; chairman of the State Immigration Commission appointed by Governor Hughes in 1908 and counsel for William Sulzer in his im¬ peachment trial. Mr. Marshall was also coun¬ sel for Leo M. Frank in the United States Supreme Court. He was prominent in the movement for the abrogation of the treaty of 1832 with Russia. He was mediator in settling the cloakmakers' strike in 1910, and prepared the protocol of settlement which has since been the basis of numerous strike adjustments. He has taken an active part in Jewish charitable work and has lectured before many learned and philanthropic societies. Mr. Marshall has been a trustee of Syracuse University since 1910.

MARSHALL, Orsamus Holmes, Amer¬ ican lawyer and author: b. Franklin, Conn., 1813; d. 1884. In 1831 he was graduated at Union College, studied for the bar, to which he was admitted in 1834. He was one of the founders of the Buffalo Female Academy and

of the Buffalo Historical Society. He also served several years as chancellor of the Uni¬ versity of Buffalo. He wrote much in connec¬ tion with the Iroquois dealings with the whites. Posthumously there appeared a volume entitled historical Writings of Orsamus H. Marshall Relating to the Early History of the West

(1887).

MARSHALL, Thomas Riley, American lawyer and politician: b. North Manchester, Ind., 14 March 1854. He was graduated from Wabash College in 1873 receiving the degree of A.B., and was admitted to the Indiana bar in 1875, practising his profession at Columbia City In 1908 he was elected governor of In¬ diana. His administration was progressive and several laws were sponsored by him,, including an employers' liability law, an anti-gamblmg law and direct nomination of senators. In 191Z he was chosen by the Democratic National Lon-vention at Baltimore as the candidate of the Democratic party for Vice-President of the United States. He was a consistent supporter of the Wilson administration and m 1916 was again nominated and elected Vice-President. Some of his public utterances in 1913, m which he appeared to advocate radical ideas in regard to the inheritance of property, caused much criticism. Wabash, Pennsylvania and Notre Dame universities conferred on him the degree of LL.D.

MARSHALL, William Louis, American soldier: b. Washington, Ky., 11 June 1846; d. 2 Tuly 1920. He studied at Kenyon College in 1859-61 ; served in the Union army in 1862-o3 and in 1868 was graduated at the United States Military Academy. He .was promoted through the various grades, reaching that of brigadier-general, chief of engineers of the United States army, 2 July 1908. In 1870-71 he was_ acting assistant professor of natural and experimental philosophy at West Point and from 187-to 1876 had charge of the Colorado section of the explorations west of the 100th meridian. He discovered Marshall Pass over the Rockies in 1873. also gold placers of Marshall Basin, San Miguel River, Colo., in 1875. < In 1881—84 he was in charge of the construction of levees in Mississippi, Louisiana and Arkansas, and im¬ provement of the Mississippi River, of harbors on Lake Michigan in

1884-1900. He also su¬ perintended the construction of the Hennepin Canal 1890-1900 and subsequently was engineer in charge of the construction of fortifications at eastern and western entrances to New York harbor. He constructed the 40-foot Ambrose Channel entrance to New York harbor. As chief of engineers he had charge of river, har¬ bor and fortification works of the United States from 1908 to 1910. In 1914-15 he had charge of the protection of the Imperial Val-ley, Cal., against the overflow of the Colorado River. General Marshall invented automatic movable dams, lock gates and valves for

canals.

MARSHALL, Ill., city and county-seat of Clark County, on the Vandalia Line and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, 50 miles south of Danville and 17 miles west by south of Terre Haute, Ind. It is in an agricultural and stock-raising region. Pop. 2,569.

MARSHALL, Mich., city and county-seat of Calhoun County, on the Kalamazoo River and on the Michigan Central railroads, about 38 miles southwest of Lansing and 100 miles west of Detroit. The surrounding coun¬ try is devoted chiefly to agriculture. 1 he prin¬ cipal industries are railway shops, school and church furniture, hot-air furnaces, Patent medi¬ cines and foods and stove works. The marble and granite works employ a number of men. There are municipal waterworks and a light¬ ing plant. The grounds of .the County Agricul¬ tural Society are located in Marshall. I here

MARSHALL, Minn., city and county-seat of Lyon County on the Redwood River and on the Chicago and North Western and the Great Northern railroads, about 150 miles west by south of Saint Paul. It is in an agricultural section in which wheat is the principal product. The industrial establishments are a flour mill, grain elevators, sash and door factory and a creamery. Municipally owned electric light and water works are established. Pop. 3,0 92.

MARSHALL, Mo., city and county-seat of Saline County, on the Missouri Pacific and the Chicago and Alton railroads, about 80 miles east of Kansas City and 40 miles west of Shreveport, La. It was settled

in 1839 by peo¬ ple from Virginia and Kentucky, and was in¬ corporated as a city in 1866. It is situated in an agricultural region ; in the vicinity are valu¬ able deposits of coal and salt, and nearby are stone quarries. The manufactures are lumber, tile and brick, flour, canned goods, creamery products, wagons and carriages. It is the seat of the State Institution for Feeble-Minded and Epileptics, the Missouri Valley College (Cum¬ berland Presbyterian), established in 1889, San Saviour Academy (Roman Catholic). There are eight churches and public and parish schools, a Carnegie library and an opera-house. Mar¬ shall has four banks with a combined capital of $300,000. The government is of commission form. It has a daily newspaper and good bank¬ ing facilities. Pop. 5,200.

MARSHALL, Tex., county-seat of Harri¬ son County, is situated about 14 miles north of Sabine River, 40 miles west of Shreveport and 67 miles south of Texarkana. The city was founded in the year 1840. Marshall is situated in the midst of a fertile agricultural region which has heretofore engaged mostly in cotton raising, but recent developments show that this section is well adapted to truck growing and the raising of fruits, especially peaches,, and large orchards are being planted. The city is largely supported also by lumber interests, there being large areas of pine timber contiguous to the city, which is rapidly being marketed. The land from which the timber is taken is quickly occupied for agricultural and orchard purposes, some orchards containing as high as 6,000 acres. Stock raising is also carried on and the city re¬ ceives considerable support from this source. The Texas and Pacific Railroad runs through the city, west to El Paso, north to Texarkana and southeast to Shreveport and New Orleans. The Texas Southern Railroad has its terminus at present at Marshall, but will be pushed far¬ ther south. The shops of the Texas and Paci¬ fic Railroad, located at Marshall, are the finest

to be found anywhere in the Southwest. Loco¬ motives and all kinds of rolling-stock are manu¬ factured. These shops have a local payroll

of $50,000 a month. The local shops and general offices of the Texas Southern Railroad are also located in Marshall. Marshall has also a 50-ton cottonseed-oil mill ; the Marshall car-wheel and foundry plant, employing 325 men ; two wagon factories, a soda-water apparatus fac¬ tory — 22 factories in all, giving employment to 1,200 people, using a capital of $1,700,000 and producing annually $1,800,000 worth of goods. The city has installed complete sewer¬ age and waterworks plants.

There are excellent churches and schools. The total value of the city school property is $100,000. There are, also, a number of private schools. There are three Catholic schools in the city — one for girls and one for boys, and an industrial school for boys. In the city are also located the Wiley University and Bishop Col¬ lege, institutions for the education of the ne¬ groes ; the former with 493, and the latter with 500 students annually. The property of the former is valued at $65,000 and the latter at

$150,000. _

The city has two national banks with a total capital of $200,000, a daily, semi-weekly and weekly newspapers. Marshall and vicinity is noted for the medicinal properties of its many springs and wells, and many people annually, especially during the summer season, visit these places as health resorts. Pop. 14,271.

MARSHALL, College of, Marshall, Tex., The College of Marshall was chartered 22 Oct. 1912 by some citizens of the city of Marshall, whose purpose was to maintain an institution of Christian learning of collegiate grade. There should be 16 trustees, at least 10 of whom should be members of regular Baptist churches. This charter was amended on 14 Nov. 1916, whereby the control and management of the college was transferred to the Baptist General Convention of Texas. It was proposed not to open the institution until an administration building and suitable dormitories could be built. On 4 June 1917 the college opened with a sum¬ mer session and summer normal. The enrol¬ ment before the end of the first year was 553. The College of Marshall meets a long-felt need in East Texas and sections of Oklahoma, Arkansas and Louisiana. There is no educa¬ tional institution of collegiate grade in a dis¬ tance of some 200 miles. It already has the most costly plant between Dallas and New Orleans. Its buildings consist of one three-story and basement fireproof administration building, two three-story brick dormitories^ a dining-

hall, central heating plant and a magnifi¬ cent campus of 55 acres. The whole plant is worth $300,000. The quota for the student's army training corps was 150 men. After de¬ mobilization of the students' army > training corps an officers' reserve camp was installed. The institution is coeducational.

MARSHALL ISLANDS, Polynesia, an archipelago in the western Pacific Ocean, be¬ longing to Germany from 1885 until she lost her colonies in the World War, when the Japanese took control. They are situated eastward of the Carolines and northward of the Gilbert Islands, and lie between 5° and 12° N. lat. and 165° and 171° W. long. The group consists of

two parallel chains, the Ratak group of 15 islands in the east and the Ralik group of 18 islands in the west; total area, 154 square miles. The islands rise nowhere more than 10 feet above the sea and are not very fertile, the chief vegetable productions being the cocoanut palm, the breadfruit and the pandanus. The natives are Micronesians. They are skilful in weaving mats and in the construction of large canoes. Copra is the only commercial product. Pop. about 16,000, including, in 1913, 179 Europeans.

MARSHALLTOWN, Iowa, city and county-seat of Marshall County, on the main lines of the Chicago and North Western and Chicago, Great Western and Minneapolis and Saint Louis railroads, 68 miles northeast of Des Moines. It was settled in 1859, incorporated in 1863 and received a charter as a city of the second class in 1868. It is located in the heart of a rich agricultural and stock-raising district, in which corn and hogs are the chief farm products. The industrial plants include Minneapolis and Saint Louis shops, packers of grocers' sundries, meat¬ packing, furnaces, heating specialties, foundry and machine shops, bottling works, agricul¬ tural implements, as well as large independent oil jobbing. The Iowa State Soldiers' Home, covering 160 acres of ground, is located here. The city is governed on the commission plan. It operates its own waterworks and electric-light plant. Pop. 16,065.

MARSHALSEA, mar'shal-se, a jail in London, attached to the Marshalsea Court, originally established under the earl-marshal of England for the trial of servants of the royal household. Later it was used as a prison for debtors and defaulters, as well as persons con¬ victed of piracy on the high seas. It stood near the church of Saint George, Southwark, and existed in the reign of Edward III. It was

abolished in 1849. The Marshalsea will be long¬ est remembered as the home of (Little DorritP Dickens' father was for some time an inmate of the Marshalsea, and in c Little Dorrit) the novelist has given us a vivid picture of the life of a debtor and his family in this prison.

MARSHBUNKER, M ARSBUNKER, *Etc.* See Mossbunker.

MARSHFIELD, Ore., town in Coos County, on Coos Bay and on the Coos Bay, Roseburg and Eastern Railroad, 10 miles north of Co-quille. It contains a Carnegie library, coal mines, lumber yards, pulp and paper mills, veneered wood works, sash and door factories, Qtc. The harbor has a channel 300 feet wide with a depth of 25 feet. The vessels of the InterOcean Transportation Company, the Northern Pacific Steamship Company and the Southern F'acific Steamship Company call at Marshfield. Pop. (1920) 4,034.

MARSHFIELD, Wis., city of Wood County, on the Chicago, Saint Paul and Milwaukee and the Chicago and North Western railroads, almost in the centre of the State, about 160 miles northwest of Milwaukee. It was settled in 1871 by Louis Rivers and was incorporated as a village in 1875, and chartered as a city in 1883. It is situated in an agricultural region and near extensive forests. The industries of the city are chiefly connected with manufacturing and farming. The chief industrial establish¬ ments are a furniture factory which employs

300 persons; veneer factory, 125; bed and mat¬ tress factory, 40; lumber-mills 50; brick yards,

25; cooperage and excelsior factory, 40; other

establishments employing about 30 persons, i e

city has a fine city-hall, a public library seven churches, four newspapers, a high school, tour public and two parish schools. The two banks have a combined capital of $800,000. The gov¬ ernment is vested in a mayor and 12 aldermen, who are elected every two years.

About two-thirds of the inhabitants are of German descent. Pop. (1920) 7,394.

MARSHMAN, Joshua, English Baptist

missionary and Orientalist: b. Westbury, Lcig , Wiltshire, 20 April 1768; d. Serampore, India,

5 Dec 1837. He was, like his father, a weaver but had an insatiable thirst for learning and always kept a book on his loom. Thus he fitted himself to teach in a Baptist school in Bristol; and thence, in 1799, he went to Serampore as a Baptist missionary, and there founded, in lolu, a missionary college. He was an able linguist, and published (The Works of Con fuciuv con¬ taining the Original Text> (1809) ; Clavis Sinica> (1814) ; a Chinese version of the Bible, *etc.* He cooperated with Carey in the prepara¬ tion of Telegu version of the Bible, a Bengali-English dictionary and a Sanskrit grammar. Consult Carey, (Marshman and Ward' (1864).

MARSILEACEiE, a natural order of

acotyledonous plants, nearly allied to Lycopo-diacese, but differing in the lack of a stem, and in the usually stalked leaves. The species al. are inhabitants of ditches and pools, chiefly in temperate regions. No species was known to be of any importance till the discovery of the Nardoo of Australia.

MARS-LA-TOUR, France, village in the department of Meurthe-et-Moselle, 15 miles west-southwest of Metz, on the • road t0 dun. In the Franco-Prussian War of 1870-71 it was the scene of part of the battle of Grave-lotte. The 38th German brigade was annihi¬ lated here.

MARSTON MOOR, England, in .York¬ shire, is celebrated for the defeat there in 1644 of the royal forces numbering about 18,UUU under Prince Rupert by the Parliamentary troops and Scots, totaling about 27,000 under Fairfax (Earl of Manchester) and Cromwell. Rupert escaped with only 6,000 followers into Lancashire and later rejoined King Charles. As a result, the whole north of England was left to the Parliamentary troops. Consult Kennedy, J. W., (Scottish Borderers at Marston Moor, 1644' (1902).

MARSUPIAL FROG, any of several small tree frogs (Hylida. ?) of the South American genus Nototrema, which incubate their eggs in brood-pouches formed by infoldings of the skin on the back of the female. The eggs are tew, of large size and abundantly provided with food-yolk, and the young sometimes remain in the pouches after hatching

until they, have com¬ pleted their metamorphosis and attained consid¬ erable growth; but the species vary in this re¬ spect. In one case the opening is a longitudinal slit along the middle of the back, with a brood-pouch on each side ; but in the other species the double pouch opens cross-ways, near the caudal extremity of the body and may be closed by a sphincter muscle. About half a dozen species

are catalogued, all natives, of the forests ; of tropical America, and none is common or tho oughly well known. Gadow ((Amphibia and Reptiles, > 1901) concedes that the best account of them is still that of Weinland in 'Archive fur Anatomie und Physiologie for 1834.

MARSUPIAL MOLE, a small burrowing marsupial of southern. Australia (Notoryctes typhlops), called ((urquamata' by the natives, which has a remarkable similarity to a tiue mole in appearance (except its reddish color), adaptations of structure to an underground life and habits. It feeds upon ants and other in¬ sects and often emerges and travels above ground, though-the front feet have been so transformed info digging organs as to make them of little service for walking. It. repre¬ sents a family (N otoryctida) first descnbed by Stirling in the transactions' of the Royal Society of South Australia for 1891.

MARSUPIALIA, the marsupial mammals, a group ranked as an order, yet embracing the whole of the superior group Metathena : or Dt-delphia, as it has been variously named, lhe latest investigations, however, tend to invalidate the distinctions upon which these groups were formerly sharply separated from the higher mammals and to cause the marsupials to be re¬ garded only as an order of Eutheria (q.v.), now distinguished chiefly by their extremely local distribution and degenerate non-placental type of reproduction. Their origin was extremely ancient and its sources are not known; but the group appears to have risen to Mesozoic times among the earliest of mammalian forms and to have begun, even before the advent of the Tertiary period, a course of special modifica¬ tion and degeneration, especially in the line which has survived to the present. . The former belief that the marsupials stood in the direct line of ancestry of mammals generally, which were thus considered as modified and diversi¬ fied offshoots from the stock, is no longer held; on the contrary, the marsupials aie regarded as a branch from some very early generalized stock, if not a group of independent origin. It is noteworthy, according to Woodward ((Verte¬ brate Palaeontology,' 1898), that the earliest known complete mammalian skeletons, which

pass upward by insensible gradations into un¬ doubted Eutheria, are scarcely distinguishable from the skeletons of the more generalized existing marsupials (for example, Thylacinus) . In the later Mesozoic Age the marsupials were apparently scattered over all the land-aiea of that time, as their remains have been discovered in many parts of both hemispheres; but even previous to the Eocene epoch they had disap¬ peared entirely from north of the equator. From the first they are divisible into the two branches or suborders of Polyprotodontia and Diprotodontia. The former,, characterized by numerous small incisor teeth, includes a major¬ ity of the most ancient forms and such modern groups as the opossums and desyures; while the latter, characterized by only abo six upper incisors and two, much enlarged, lower incisors, contain, besides some ancient forms, the major¬ ity of modern representations of the order, as the kangaroos, phalangers, wombats, *etc.*

The marsupials take their name from the ventral pouch of skin, covering the mammary glands, in which the young are nourished or

MARSUPIALS

1 Sugar Squirrel (Belideus sciurues)

2 Mouse-phalanger (Tarsipes rostratus)

3 Wombats (Phascolomys wombat)

4 Tasmanian Wolf (Thylacinus cynocephalus)

5 American Opossum (Didelphys virginiana)

6 Koala (Phascolarctos cinereus)

-

*

■

y

.

protected in most families, and which is indica¬ tive of the peculiar method of reproduction characteristic of the order, and for the support of which two bones (the epipubic bones), not present in higher mammals, project forward from the pelvis. The internal organs of re¬ production are double, the two oviducts not uniting into a single uterus or vagina, although the separation of the two parts is often im¬ perfect; hence the term Didelphia (q.v.). The testes of the male are suspended in a scrotum in front of the penis, the glans of which is often double. As a rule no allantoic placenta is present, but there is reason to suppose that the primitive marsupials were placental, and rudiments of this structure persist in the exist¬ ing Australian bandicoots — a fact which in¬ validates the former prime distinction made between the marsupials and higher Eutheria.

The young are dropped from the mother's womb as minute, undeveloped foetuses, those of the largest kangaroos being not half as large as mice when born. These larvae (for they are that) are then taken by the lips of the mother and placed, one by one, within her ventral pouch, where each is attached to one of her teats, where it clings by means of its temporary sucking-mouth and is nourished by the milk which oozes or is pressed down its throat. They remain there a length of time varying with the size of the species, until they have grown to an advanced stage of development, when they gradually emerge; but for a long time afterward return to the mother's pouch for refreshment, rest or safety when alarmed. The pouch varies in its capacity and complete¬ ness, in some families being quite absent, so that the young are shielded only by the long hair upon the mother's belly.

While this strange method of reproduction is the most prominent peculiarity of the mar¬ supials, they differ from other orders of mam¬ mals in several anatomical features, such as the simplicity of the brain, in which the cerebellum is completely exposed, and the tendency to sepa¬ ration of bones of the skeleton, usually solidly anchylosed in other mammals.

Since early Tertiary times marsupials have been confined to South America and the Aus¬ tralasian region, with the single exception of the few North American opossum (q.v.). This family (Didelphyidcz) is restricted to the western hemisphere and alone remains of the large number of Tertiary forms once prevalent in South America, save a single Patagonian diprotodont, the opossum-rat (q.v.). The home of the group, then, is Australia, Tasmania and the Papuan group, where about 125 species are known; and the race seems to have survived in that insular region owing to the absence of destructive enemies, for most of them are almost defenseless vegetable feeders. They have, however, developed into a great variety of forms under the influence of varying condi¬ tions and long competitions, and present a most curious parallel to the diversities observable among the higher and more widely diffused mammalia. Some have large size, go in herds and occupy grassy plains ; others are smaller, more agile and confined to mountainous dis¬ tricts. Others are still smaller, burrow and feed upon roots or resemble little terrestrial rodents in appearance and habits ; while many forms

dwell altogether in trees and often simulate squirrels of various kinds. In another direction have been evolved a variety of predatory mar¬ supials, whose needs have developed bodies, teeth and powers resembling those of wolves or bears, and which are wholly flesh-eaters. There is, in fact, hardly a group of mammals which does not find a counterpart among the marsupials, — even the moles and shrews.

The classification of the order divides it into 10 or 12 well-defined families, some of which are wholly extinct, as follows ;

POLYPROTODONTIA !

Doubtful primitive forms, — Triconodon, Am-phitherium, *etc.*

Didelphyidce. — Opossum (q.v.).

Dasyuridce. — Dasyures, Thylacines, *etc.*

(qq.v.).

Peramelidcz. — Bandicoots (q.v.).

Notoryctidcz. — Marsupial mole (q.v.).

Diprotodontia :

Epanorthidce ; Abderitida>, *etc.* — Fossil in the Miocene strata of Patagonia; but surviving in Ccenolestes.

Phalangeridtr. — Phalangers # (q.v.).

Diprotodontidce. — Extinct gigantic phalan¬ gers.

Phascolomyidcz. — W ombats (q. v.) .

Macropodidcr. — Kangaroos (q.v.).

Consult Beddard, <Mammalia) (1901); Thomas, (British Museum Catalogue of Marsupialia,) *etc.* (1888) ; Gould, (Mammals of Australia> (1863) ; and scientific works on Aus¬ tralia, especially those of Waterhouse, Aflalo and Lydekker.

MARSYAS, mar'si-as, mythological son of Hyagnis and one of the Sileni of Asia Minor. Athena, having seen the reflection of herself in water, had thrown away the flute which she had invented, displeased because it disfig¬ ured the countenance in playing, and had pro¬ nounced the severest maledictions against any one who should take it up. Marsyas acciden¬ tally found this instrument, on which he soon acquired such skill that he dared to challenge Apollo to a contest, the conditions of which were that the victor should do what he pleased with the vanquished. The Muses, or according to others the Nysaeans, were invited to be the umpires. The Muses decided in favor of Apollo, who put to death his rash competitor by binding him to a tree and Having him alive. In this way was the curse of Athena accom¬ plished. Marsyas' statue was erected in several Roman cities as a symbol of liberty and other statues have been found illustrating his experi¬ ences, one by Praxiteles, which has been pre¬ served in the Athens Museum.

MART, Tex., city in McLennan County, situated on the International and Great North¬ ern Railroad, 20 miles east of Waco. The sur¬ rounding region is devoted to cotton-growing in which the city has extensive interests. It contains cotton gins, compresses and cottonseed-oil mills, railroad repair shops and a high school. The commission

form of government is in operation. The water supply system is owned by the municipality. Poo. (1920) 3,105.

MARTA OF THE LOWLANDS (Terra

baixa), the foremost achievement of the Catalan theatre, was written in Catalan by Angel Guimera for Fernando Diaz de Mendoza and

Maria Guerrero and performed for. the firsf time by these actors in the Spanish trans lion by Jose Echegaray. It is the first Cata an work ‘to obtain general currency beyond the limit of the provincial tongue. During th present century no play has been more popular in the Spanish or Hispano-American countries where it has maintained itself upon the stag without interruption since 1896, enhstiner the talents of all the leading actors. Terra baixa is predominantly social and human in appeal This is its fundamental quality; but in equal degree it possesses high theatric effectiveness, which is not inferior to the best work of its period in this vein, whether produced in Spain or elsewhere. Simple feeling and torrential passion, in conjunction with sensitive insight and unusual grasp of significant situation con¬ vey an impression of elemental forces operat lg behind the broad effects of a carefully elaborated theatrical art, happily employed strictly in subservience to the theme. More than any other play, <Terra baixa5 has contributed to fix the general conception of Iberian peasant drama which prevails in Europe and America. A certain idealization may be noted m the rura characters, a reminiscence of the author s ap¬ prenticeship in the poetic drama. In objective realistic detail Guimera is an unequivocal master. <Terra baixa5 has been translated into more than 20 languages. The English versl(™ by Wallace Gillpatrick (New York 1914) was acted successfully in England and the United States previous to publication. As Uettana, the play is favorably known in operatic form, with music by Eugene d’ Albert.

John Garrett Underhill.

MARTEL, Charles. See Charles Martel.

MARTEL DE JANVILLE, Gabrielle,

Comtesse DE («Gyp»), French author: b . Coet-sal Morbihan, 1850. She is a great grandniece of Mirabeau and at the age of 19 was married to Comte Martel de Janvifle. Her writings deal with types of Parisian life, of which Petit Bob, Loulou and Paulette have become famous. Over 135 volumes in all have issued from her pen. These include < Petit Bob5 (1882) ; Autour du manage5 (1883) ; (Un homme delicat5 (1884) ; 'Elle et lui5 (1885); (Autour du divorce5 (1886) ; <Pour ne pas l'8tre?5 (1887) ; (Pauvres

petit femmes5 (1888); (Bob ait salon5 (1888) ; (Mademoiselle Eve5 (1889) ; Bob a 1 Exposi¬ tion5 (1889); <L'Education d'un prince5 (1890) ;

(Monsieur Fred5 (1891); < Manage civil5

(1892); (Du haut en bas5 0893); Manage de chiffon5 (1894) ; <Le coeur d Anane (1895 L <Le bonheur de Ginette5 0896); > Jimo? . (1897); 'Israel5 (1898); <L Entreyue5 (1899) (La pays des champs5 (1900) ; Le frl9uet (1901); (Soeurette5 (1902; 2d ed., 1910) ; <Un menage dernier cri5 (1903) ; Maman (1904; 2d ed., 1910) ;<Le coeur de Pierrette5 (1905); (Ces bons Normands5 (1907); La paix des champs5 (1908) ; (Joies d amour5 (1909); 'L'Amoureux de Line5 (1910) ; La guingette5 (1911); (Le grand coup5 (1912); 'Napoleonnette5 (21st ed., 1913).

MARTELLO TOWERS, so called by cor¬ ruption from Mortella, in Corsica, where a strong tower maintained a determined resistance to a superior English force in 1794. In conse¬ quence of the great strength exhibited by this

fort the British government erected a number of similar towers round the coast of Great Britain, and especially on the KenUsh coast, a defense against the threatened invasion from France. They are circular, with walls of great

thickness, and roofs bomb-proof, there are two

stories, the lower for the reception of stores and the upper for the casement of troops One traversing gun was mounted upon ea ' 4, working which the men were sec"red lofty parapet. The ordinary

guard was from 6 to 12 men. With improved modern artil¬ lery Martello towers are useless, and in many places were dismantled, but some ha\e received a new and more powerful armament or have been adapted to the use of the coast guard or revenue officers. In some instances they are rented to private individuals Martello towers are still to be found in New Brunswick and Nova Scotia. There are also several on the Gulf of Mexico and one still remains at King¬ ston, Canada.

MARTEN, the name of several fur-bearing animals of the weasel family (Mustelidce) that are mainly arboreal in habits, and do not change their color to white in winter All inhabit the cooler parts of the Northern Hemisphere, ihe beech or stone marten (Mustela foina) is _tc • be found in Europe generally south of the Baltic, although not now a native of Britain, it is about 17 inches long in body, and its tail adds nine inches; its breast is white It is tractable, and is believed by some to be the animal domes¬ ticated by the ancient Greeks as a mouser. ihe pine, or sweet, marten (M . martes) is rather smaller, but with a much longer tail, propor¬ tionally, and is more northerly in its distribu¬ tion, occurring from the British Isles and Nor¬ way eastward to Siberia. It has a finer more valuable fur than the other, and a yellow throat. Very nearly allied to it in size, form and color is the Siberian sable-marten (M. sibellina), noted as furnishing in its coat the finest and most expensive of the furs from ammais of this group. The demand for this fur can be met only by the most difficult, and often dan¬ gerous, exertion in trapping and hunting in re¬ mote Asiatic forests ; and it has resulted in a steady diminution of the supply and very high prices for the pelts. There is also a nati\e marten in India and another in Japan. North America has two species of the genus - the American pine-marten, or Canadian sable (Ju. americana), and the pekan (M. pennanti). Ihe former is hardly distinguishable from the sable of the Old World, and its fur, although re¬ garded as somewhat inferior, is largely used as a substitute for genuine Siberian sable. (See Fur-trade). The pekan is very distinct by its greater size (length, 24 inches, plus tail, 13 inches), its long and very dark coat and its dog-like head. Its fur is of great value.

The body in all these martens is elongated and supple, with a long and somewhat bushy tail; the legs short and the toes separate and flexible with long sharp claws adapted to the life in ’trees that most of them follow. They are fierce and cunning hunters, pouncing suc¬ cessfully on all sorts of small animals and birds, destroying birds’ nets, catching frogs, and in winter pursuing and killing animals as large as hares and porcupines. The pekan, or fisher, is especially bold and voracious, but does not eat fishes in spite of its name. Both the

American species were formerly common in the mountainous parts of the eastern United States, but are now restricted to the remoter woods of Canada. They make their dens, bedded with leaves and grass, in some high hollow of a tree-trunk, as a rule, but frequently choose a crevice among rocks, and there pro¬ duce annually a litter of from one to seven young. The period of gestation is about three months, and the young begin to leave the nest when two months old.

Breeding for Fur.— These bloodthirsty little carnivores are the very type of savagery, and even the kittens are almost untamable. The high value of their fur (about 75,000 pelts of the sable, and 100,000 of the Canadian marten represented the market-supply just before the Great War) has caused much effort to be ex¬ pended, especially in Canada, to breed them in confinement, but thus far the results have been small, although encouraging. The general treat¬ ment and food seem to be like that for minks. A large pen made of inch-mesh wire and floored with this, or in some way so prepared that the animal cannot dig out, should contain stumps and bushes to give the marten accustomed exer¬ cise. Two males cannot be put together. When the female is ready for a mate she is placed in his cage, or vice-versa, and the mating will take place at night, so that the pair must usually be left together several days. Mating occurs naturally in January or February. When the young are about two months old they may be removed from the mother, and should be brought up by hand, if possible, so as to be¬ come more gentle. These general directions ap¬ ply to the pekan, but his quarters should be larger than for the sable.

Consult, besides general natural histories, Coues, (Fur-bearing Animals) (Washington 1877) ; Ingersoll, (Life of Mammals) (New York 1909) ; Seton, (Northern Mammals) (New York 1909) ; Jones, (Fur-Farming in Canada* (Montreal 1913).

MAR.TENSITE, a constituent of steel, ex¬ isting at a high temperature, and which being retained by sudden cooling, confers hardness upon the steel.

MARTHA'S VINEYARD, Mass., an is¬ land off the southern coast, in the county of Dukes, about 25 miles southeast of New Bed¬ ford. It is separated from the mainland by Nantucket and Vineyard sounds, from Nan¬ tucket Island by Hukeget Channel, and from Elizabeth Islands by Vineyard Sound. It is about 21 miles long and 10 miles across the widest part. The northern coast is high and rocky, Prospect Peak being 308 feet: the coast line has few indentations, the largest of which is Vineyard Haven. The southern coast is low and irregular, with sand bars and shallow lagoons. On the southwest is Gay Head, 200 feet above the water. A lighthouse is on Gay Head Point. Edgartown,. the county-seat, is the principal town on the island. Bartholomew Gosnold discovered and named the island in 1602. The Indians, who then occupied the place, were quiet and friendly, and all became Christians. They remained loyal to the whites even during King Philip's War. The island is a favorite summer resort ; annual camp-meet¬ ings and summer schools have been held here for a number of years. Pop. of county 4,504.

MARTI, Jose Julian, ho-s3/ hoo-le-an' mar'te, Cuban author and patriot: b. Havana, 28 Jan. 1853; d. Dos Rios, Cuba, 19 May 1895. He studied in Havana, was sent to the quarries while only a boy as a political suspect, then went to Spain, where in Madrid and Saragossa he studied for the bar and made himself famous for his liberal views, and on his return to Amer¬ ica was professor in the University of Guate¬ mala, whence he came to New York City as con¬ sul for Uruguay, Paraguay and Argentina. In 1894 he attempted to land armed men in Cuba, but was intercepted in Florida; in the next year he succeeded in landing, joined Gomez and was killed in a skirmish with the Spanish at Dos Rios. Marti founded the Cuban organ of inde¬ pendence in New York City, La P atria. He was a poet, and wrote a Spanish translation of Helen Hunt Jackson's (Ramona) (1888).

MARTIAL, mar'chi-al (Marcus Valerius Martialis), the world's greatest early writer of epigrammatic poetry, was born in Bilbilis, Spain, 1 March of one of the years 39 to 41 a.d., and died probably between 102 and 104 A.D. Like his literary friends, the Senecas, Lucan and Quintilian, who also were of Spanish birth, Martial in his writings was thoroughly Roman, and indeed has left us our most valuable picture of contemporary Rome. A Fronto and Flacilla, whom he mentions, may have been his parents, but we know nothing of their origin or station. The grammatical and rhetorical training which his parents secured for him perhaps at Tarraco or Corduba, he half-seriously disnaraged as being of no financial advantage, but it was really to his pen that he

owed, at least indirectly, his support through life. For, although he was apparently fully equipped for practice at the bar, the profession of an advocate was too ex¬ acting to be attractive. On his arrival in Rome, perhaps in 64 a.d., powerful friends launched him on a literary career which rapidly carried his fame even to the limits of the empire. But success as a poet brought him no contentment, since in return for the money, food, clothing, etc., which by flattery and begging he got from imperial courtiers and other men and women of wealth, he had daily to perform social duties that were highly irksome to his indolent na¬ ture. From the patron's reception at dawn to the end of the latest dinner, he had to dance at¬ tendance with wit that should never fail. We find him living at first in humble lodgings on the Quirinal, later in a house of his own on the same hill. A barren farm near Nomentum was his usual refuge from the cares and noises of the capital, but he sometimes made long jour¬ neys in Italy, often visiting the country houses of his friends. To his poetical and social tal¬ ents he also owed political favors from Titus and Domitian. A tribuneship gave him mem¬ bership in the equestrian order, but probablv not the fortune of a. knight. He likewise re¬ ceived the coveted privileges to which a father of three children was entitled, the ins trium liberorum, though unearned; for the references that have given rise to the theories that he was married from one to three times are not of personal application. It is probable that even Marcella was no more than his patroness. When disgust at the client's life in Rome led him in 98 to return to Bilbilis, this Spanish lady gave him a fine estate. A longing soon seized

him, however, to be back in Rome with all its inspirations, a longing never to be gratified; Pliny the Younger, who had helped Martial with a gift of money on his departure from Rome, records the poet's death in Spain. Be¬ sides those already named, Juvenal and Silius Italicus should be mentioned as Martial s friends. Noteworthy among contemporaries whose names do not appear in his poems are Tacitus and Statius. The former could have had little sympathy with his character, the latter was no doubt his rival in literary mendicancy. We have 1,575 of Martial's poems. More than half of these are of four lines or less. His earliest book published in 80 contains epigrams describing shows given by the emperor. Then followed books XIII and XIV made up of two-line inscriptions for presents at the Saturnalia.

The other books (I-XII), containing many poems which we should not call epigrams at all, appeared at varying intervals in the period 85-101. Martial's influence in his chosen field has never ceased. A remarkable number of the best epigrams in modern languages are merely adaptations or translations of his poems. His personal character has received general con¬ demnation. Obscenity and servile flattery ai e the main charges. But in judging even the in¬ sincere language that he uses in speaking of the tyrant Domitian we must remember that it went only a step beyond the requirements of formal court etiquette. Kindly critics find in Martial some good points, his modest valuation of his own work, his freedom from envy, his scorn of all hypocrisy, his steady resistance to all temptations to use his powerful weapon of satire in either an unjust or unkind spirit, his tender love of children, humane treatment of slaves and above all his deeply affectionate at¬ tachment to his friends. See Epigram.

Bibliography— The best text edition of his poems is that of W. M. Lindsay, Oxford, Clar¬ endon Press. The German annotated edition of Friedlaender is invaluable. The only complete translation in English, is in the Bohn series.

Walton Brooks McDaniel, Professor of Latin, University of Pennsylvania.

MARTIAL LAW, government by arbitrary military power; that supersedes municipal law, or State law, yet is not a military law. When in time of extreme peril to the State, either from without or from within, the general safety cannot be trusted to the ordinary administra¬ tion, or the public welfare demands the adop¬ tion' and execution of extraordinary measures, it may become necessary to declare the exist¬ ence of martial law. This is, indeed, no law at all in its ordinary sense; it is in fact the abrogation of it. That which is done under martial law has not an immediate constitutional or legislative sanction, as the military or the statute law, for example, has. Yet remotely and indirectly martial law expresses the will of the people. The Supreme Court of the United States has held that a State legislature may proclaim its existence whenever the . public safety demands it ; and the Constitution, by implication at least, also permits, its proclama¬ tion by that clause which provides that the privileges of the writ of habeas corpus shall not be suspended, unless when, in cases of re¬ bellion or invasion, their suspension is essential to the general welfare. See also Law, Mili¬ tary; Military Courts and Court-Martial.

MARTIAL'S EPIGRAMS. Marcus Va¬ lerius Martialis, the epigrammatist was born about 40 a.d. in Bilbilis, Spain, 20 miles west of the present Aragonese city of Saragossa, fie went to Rome at the age of 23, and after neaily two score years of residence at he capital re¬ turned to his native town, where he died about 104. At the age of 40 he celebrated the dedica¬ tion of the Coliseum and won the favor of the Emperor Titus by composing the (Book of Spectacles, > a collection of epigrams on the incidents of the day's sport. Several years later he published two collections of couplets to be used with dinner favors and with presents at the Saturnalia, which afterward took their places in his works as books XIII and XIV. Books I to XII, his really characteristic work, were published at intervals more or less regular from 86 to 102, the last one having been sent from Spain after his return. The total num¬ ber of pieces in the 15 books is about 1,550, of which three-fourths are in the elegiac couplet, like the verse of Ovid and the great part of Greek epigram.

Though at first glance Martial seems to continue the tradition of the epigram, whidh had already had long life and great fame in the Greek tongue, he is really to a large extent original and creative, and is of the greatest importance in literary history as being the founder of the epigram as it has been popularly conceived ever since ; that is, as a short, highly concentrated poem with a point that is made to appear suddenly or with a surprise.

" Chloe weeps with one eye. Do you ask how it's done? M

The answer is easy: she has only one.

(Dimsdale.)

Whether his influence has been the best is sometimes questioned. Those who are familiar with the calm, sunny, contemplative, tripping genius of the Greek Anthology, which, though its epigrams are always neat and concise, and sometimes stinging, has not as a whole the satiric character, will be likely to think Martial somewhat hard and metallic in both form and content. Those who enjoy "verbal exactness and mechanical ingenuity® (Dimsdale), and look to the epigram for the character of sting¬ ing, satiric pointedness usually associated with it, will agree with Lessing that he is the world's greatest epigrammatist, and under¬ stand his appeal to Dryden, Pope and Johnson.

Martial is not all pungency. A not incon¬ siderable number of his pieces are epigram¬ matic rather than epigrams; a few of them might

be classed as short poems without reference to epigram. They are nevertheless homogeneous. Even more than perfection of form, the characteristic that gives them all a unity, is their quality as a human document. Martial was right when he said, ((My page smacks of human life.® Provincially and sim¬ ply bred, pursuing the existence of a free lance in a great capital in an intense age, gifted with a keen understanding, a quick eye, and a re¬ sponsive pen, he converted into clear, cameo¬ like literary pictures for the amusement of his own time, and for the amusement and instruc¬ tion of all time, innumerable vivid impressions from the fascinating realities among which he moved. To read his epigrams in quantity is like sitting before a cinematograph of the Fla¬ vian era. There flash before us lively scenes

of men and things : numerous faces of the known and the nameless, types of men and women from every sphere, the bawling school¬ master with his noisy pupils, the poetical bore reciting his verses to unwilling ears, the stingy host, the snowstorm in the amphitheatre, the routine of the Roman day, the patron who is never at home, the guest who comes too early, the transparent hypocrite, the slow barber, the waste slopes of recently active Vesuvius, the in¬ cident of the circus or theatre or the dinner or the street. In an age of ennui, the world is fresh and interesting to Martial. Not only men, but things, find him attentive. Thinking of this and of his facility of expression. Verrall says ((Literary Essays, Classical and Modern,* p. 15) that he is <(perhaps the only writer in whom plate and tapestry, earthenware and hardware, beds and sofas, become truly poetic.® Dimsdale ((Latin Lit.,* p. 472), commenting on his method of attaining vividness by the use of realistic detail, says that <che uses no general ex¬ pressions such as rich and poor, but speaks in terms of jewelry, scents, linen, cloaks and boots.®

Martial is a satirist, but only bv accident. He has no moral indignation such as a few years afterward glows from the page of Juve¬ nal. (<A certain intolerance of hypocrisy,® says Mackail (<Latin Lit.,> p

194), is the nearest ap¬ proach Martial ever makes to moral feeling. He does not scold; he does not even preach. He manifests no moral enthusiasms, and almost no malice for anything. He is a wit rather than a humorist, though he is by no means without humor. He merely records, and his quality as a satirist is the outgrowth and accompaniment of epigrammatic expression rather than the result of conscious purpose. To portray freely and realistically was in itself to satirise.

The reader's enjoyment of Martial unex¬ purgated is interfered with by coarseness in about one in 10 of his pieces. This is hardly higher or lower than the modern European average, though his coarseness is not on this account the more welcome. He is also charged with servility in his attitude toward the em¬ peror and other patrons. It should be said in extenuation that literary patronage has until not long ago been a regular and a recognized relation and has always carried with it a certain amount of purely conventional flattery, and that Martial's servility perhaps did not seem so offensive in his own day as it does now, when the servility of the literary art finds expression in other ways. So clean-hearted and clean¬ lipped a man as the younger Pliny, in express¬ ing regret at the poet's death, has left the word candor as descriptive of him : . ((he was a man of talent, penetrating, keen, with exceed¬ ing wit and satire as a writer, and with no less candor.® This is probably a reference to the sincerity and frank straightforwardness of Martial the realist, who saw clearly and took no pains to cover up either other men's failings or his own. Of himself he says, ((My page is free, my life upright.® Of his work he says;

" Good, fair, and bad May here be had.

That's no surprise!

Twere vain to look For any book

That's otherwise."

(Kirby Smith.)

Lovers of Spanish art in general, and of the present day novel in particular, will find them¬ selves wondering whether Martial is not to be explained as merely an ancient example of the truthfulness and directness which so strongly characterize the Spanish genius. Paul Nixon, in ((A Roman Wit,® gives a spirited rendering, in¬ evitably lacking in finish, of about 200 epigrams. The Bohn Library Martial

contains a greater number of translations in both verse and prose. Kirby Smith, in the Sewanee Review, Vol. 26, No. 1, may be consulted for appreciation.

Grant Showerman.

MARTIN, Saint, of Tours: b. about 316; d. about 400. He attended the catechetical school at Pavia. His father was a military tribune, and compelled him in his 16th year to take up arms. He is said to have early escaped from his father and received instruction in a Christian church. He served under Constantius and Julian, and went to Gaul, where he appeared as the model of all virtue. Among other acts he divided his cloak with a poor man whom he met at the gates of Amiens (Am-bianum). The legend says that Christ appeared to him in the following night covered with the half of this cloak. Soon after this vision Martin was baptized, in 337. After living many years in retirement he made a visit to his native place, during which he converted his mother, and opposed with zeal the Arians who prevailed in Illyria. For this he was scourged from the country, on which occasion he manifested the firmness of a martyr. He now established a monastery in Milan, but when he found himself again exposed to persecution took refuge on the island of Gallinaria, in the Ligurian Sea. He next settled at Poitiers, where he assembled a number of monks, and is said to have wrought many miracles. In the year 375 (according to others 371 or 374) the bishopric of Tours was conferred on him against his will. In order to withdraw himself from the world he built the famous convent of Marmontiers, between the river Loire and a steep rock. This is regarded as the oldest abbey of France.

MARTIN, the name of five popes of the Catholic Church, as follows :

MARTIN I, Saint: b. Todi, Tuscany; d. Chersan, Crimea, 16 Sept. 655. He was elected Pope in 649, succeeding Theodore I. He sum¬ moned the first Lateran Council at which he caused the doctrine of two wills and operations in Christ to be affirmed. The Emperor Constans II upholding the doctrine which the Council had condemned, took the Pope prisoner and brought him to Constantinople on a charge of treason and then banished him to the Cri¬ mea. On account of his sufferings he is num¬ bered among the saints. His day is 12 Novem¬ ber.

MARTIN II, or MARINUS I: b. Monte—

fiascone; d. Rome, 14 Feb. 884. He was elected Pope in 882 after the death of John VIII. While bishop of Caere he had been legate for three

popes in their negotiations with the East. To English King Alfred he sent a piece of the wood of the cross.

MARTIN III, or MARINUS II: b. Rome; d. 946. He succeeded Stephen VII in 942 and was greatly esteemed for his learning and nobility of character.

MARTIN IV (Simon de Brion, se-mon de bre-on) : b. France ; d. Perugia, 28 i March 1285. He succeeded Nicholas III in 1-61, Hav¬ ing previously been canon of Tours, and cardi¬ nal from 1262. He owed his election in great

measure to the influence of Charles °f whom he supported thereafter and dm all in his power to enable that monarch to retain pos¬ session of Sicily. In his Pontificate occurred the massacre known as ((The Sicilian Vespers.

MARTIN V (Oddone Colonna, ot-to'na ko-lon'na) : b. Rome 1368; d. there, 20 Feb. 1431. He was elected Pope in 1417, after the abdication of Gregory XII, and the deposition of John XXIII and Benedict XIII, during the Council of Constance. His first act was to promulgate a bull against the Hussites, remarkable from the circumstance that in it the Pope seems to recognize the supreme authority ot the councils. He was one of the ablest of the popes, and through his efforts unity was finally secured to the Church and peace to Itay. n 1413 he dissolved the Council of Constance, though a number of difficulties were not then adjusted, and dissensions continued in the Church. Benedict XIII still lived; and at his death, in 1424, a new anti-pope was elected in Clement VIII, who renounced his pretensions in 1429, when he received the bishopric of Mi¬ norca as an indemnification.

MARTIN, Alexander Carson, American

missionary and educator: b. Livonia, Ind., lu April 1827; d. Peking,

China, 18 Dec. 1916. He was educated at the University of Indiana, from which he was graduated in 1846. He later studied at the New Albany Theological Semi¬ nary (now the McCormick .Theological Semi¬ nary), at Chicago, from which he was gradu¬ ated in 1847. The New York University in¬ ferred the degrees of D.D. and LL.D. upon him.

He was appointed a Presbyterian missionary to China in 1849 and left here on 23 November of that year for Canton. For 67 years he worked among the Chinese.. It was said of him that probably he knew China and the Chinese language as did no other American. Dr. Mar-tin retired from active missionary work in 1663 to enter the Chinese government service. . He was named by the Board of Foreign Missions here as an honorary missionary. He acted as interpreter for the United States Ministei. to China in the negotiations between the Washing¬ ton government and the Imperial Government, at Peking in connection with the United States-Chinese treaty of 1853. He was the organizer and president of the International Law and Lan¬ guage School in Peking which was destroyed in the Boxer rebellion in 1900. He was said to have been the first Western teacher to open the door of English learning to the youth of the Far East. After 30 years as adviser to the Chinese government, Dr. Martin became presi¬ dent of the new Imperial University of China. This movement for the establishment of a great institution of learning there was blighted by the Boxer uprising. Later Dr. Martin took the leadership of the Wu Chany University for a period of three years. He retired from this work in 1905. In the same year, when he was 78” years old, he gave up teaching, but remained in the capacity of adviser for both the govern¬ ment and the Presbyterian mission.

MARTIN, Bradley, American banker, brother of Frederick Townsend Martin: b. A - banv N Y 1841; d. 1913. In 1863 he was graduated at Union University, Schenectady,

N Y He served in the National Guard dur¬ ing the Civil War, attaining the rank of lieu¬ tenant. Subsequently he was admitted to the bar He managed his vast interests in banks, trust companies and the industries, and was one of the most prominent figures in the social h e of the East. In 1893 he went abroad and there¬ after lived in England and Scotland. .

MARTIN, Charles Cyril, American civil engineer: b. SpringfieM, Pa., 30 Aug. 1831, d. Far Rockaway, N. Y., 11 July 1903 He was educated

at Rensselaer Polytechnic, Troy. He was engineer in the Brooklyn navy yard dun g the Civil War; and afterward chief engineer of Prospect Park, Brooklyn; and was appointed John A. Roebling's second assistant in building the Brooklyn Bridge, of which he became chief engineer after Roebling s retirement.

MARTIN, Edward Sanford American author: b. Owasco, N. Y., 2 Jan. .1856. In 18 he was graduated at Harvard University and in 1884 was admitted to the bar at. Rochester, NY He is a writer of editorials in Life and for other weeklies and magazines. His pub¬ lished works are (Sly Ballades in Harvar China' (1882) ; <A Little Brother of the i Rich verses (1890); (Pirated Poems5 0*90), 'Windfalls of Observation5 (1893) ; Cousin Anthony and I5 (1895); (Lucid Intervals5

(1900); 'Poems and Verses5 (1902); The Luxury of Children, and other Luxuries^ (1904); 'The Courtship of a Careful Man (1905); (In a New Century5 (1908); Reflec¬ tions of a Beginning Husband5 (1913) ; Unrest of Women' (1913); < The War Week by Week (1914) ; 'The Diary of a Nation5 (1917).

MARTIN, Felix, French-Canadian clergy¬ man and author: b. Auray, Brittany, . 1804;. d. 1886. He emigrated to Canada in 1842, having previously entered the Society of Jesus. His task in Canada was to aid in re-establishing Tesuit missions. Saint Mary's College, Mont¬ real, was founded by him. Pere Martin made diligent search in French and Canadian archives seeking out information regarding the early Jesuit missionaries in Canada. Hys principal works are (Manuel du pelerin de Notre Dame de Bon)Secours5 (1848); 'Relation des Jesuites,5 an enlarged edition of O Callaghan (1850) ; 'Mission du Canada, relations inedites> (1861) ; 'De Montcalm en Canada5 (1867) ; Le reverend Pere Isaac Jogues5 (1873).

MARTIN, Francois Xavier, American jurist: b. Marseilles, France, 17 March 1764; d. New Orleans, 11 Dec. 1846. He emigrated to Martinique when 18 ; later removed to N ew Berne, N. C. ; taught French there, and became a printer ; studied law, being admitted to the bar about 1789; and in 1792 was requested by the State legislature to compile the British stat¬ utes in force before the Revolution. He was himself a member of the assembly in 1806-07; was judge of the Mississippi. Territory in 1809; went to Louisiana in the same capacity in 1810 ; and in 1813 became attorney-general of the new State of Louisiana. From 1815 until just be¬ fore his death Martin was a member of the Su¬ preme Court of the State. Although blind for the last 10 of these 31 years, his ability was

not impaired, and it is due to him that the law of the State was in some measure evolved from the tangle of French and Spanish statutes in which he found it. He wrote a (History of North Carolina) (1829) ; ‘History of Louisiana) (1827) ; and a version of Pothier on Obli¬ gations.

MARTIN, Frederick Townsend, Ameri¬ can author, brother of Bradley Martin : b. Al¬ bany, N. Y., 1849; d. London, 1914. In 1872 he was graduated at the Albany Law School. He became a member of the New York Na¬ tional Guard, in which he was commissioned colonel and served a period as judge-advocate. For many years previous to his death he had lived in Europe. He was prominent in chari¬ table enterprises and a lavish benefactor of the poor. His writings deal with the doings of the wealthy and the so-called social-elect, of which class Martin was well qualified to speak. His works include ‘The Passing of the Idle Rich5 (1911); (My Personal Experiences of Meeting Snobs5 (1911) ; (Reminiscences of My Life) (1911) ; ‘Things I Remember > (1913).

MARTIN, George Madden (Mrs. Attwood R. Martin), American author: b. Louis¬ ville, Ky., 3 May 1866. She was educated in the public schools of Louisville, finishing at home on account of her health. In 1892 she was married to Attwood R. Martin. She be¬ came a frequent contributor of short stories to magazines and periodicals and is author of (Emmy Lou — Her Book and Heart5 (1902); (The House of Fulfilment (1907) ; ‘Abbie Ann) (1907); ‘Letitia — Nursery Corps, U. S. At (1907); ‘Selina,5 (1914); (Emmy Loirs Road to Grace5 (1916) ; (Warwickshire Lad5

(1916).

MARTIN, Gregory, English translator of the Bible: b. Maxfield, Sussex, date unknown; d. Rheims, France, 28 Oct. 1582. Martin re¬ ceived his education at Saint John’s College, Oxford, where he took the degree of B.A. in 1561 and that of M.A. in 1565. He was very well versed in

Hebrew, Greek and Latin and was made tutor to Philip Howard. Martin op¬ posed the Established Church ; remained a staunch Roman Catholic and exerted a powerful influence on the Howards to remain true to the ancient faith. In 1570 his continued opposition to the new ecclesiastical order of things in Eng¬ land obliged him to seek refuge at Douai, Flan¬ ders, where he became professor of Hebrew in the newly-founded English College. He went to Rome in 1577 to aid in founding the English College there. In 1578 Martin went to Rheims, to which city the English College was moved from Douai, and there spent his remaining years in writing the production of the English version known as the Douai Bible. It is the official Bible for English Catholics, was made from the Vulgate of Saint Jerome and collated with the Greek and Hebrew versions. In 1582 the New Testament was issued but not until 1609-10 did the Old Testament appear. English Protestants criticized Martin's version, vet the commission cf Forty-Seven made extensive use of it in pre¬ paring the Authorized Version in the reign of James I.

MARTIN, Helen Faucit, Lady. See Faucit, Helen.

MARTIN, Helen Reimensnyder, Amer¬ ican author: b. Lancaster, Pa., 18 Oct. 1868. She made a special study of English subjects at Swarthmore College, Pennsylvania, and Radcliffe College, Cambridge, Mass. In 1889 she married Frederic C. Martin. Mrs. Mar¬ tin is a contributor of short stories of Penn¬ sylvania Dutch life to McClure's, Leslie's, the Century, Cosmopolitan and the Ladies' Home Journal. She has published <Tillie, a Mennonite Maid5 (1904) ; 'Cabina, a Story of the Amish5 (1905) ; (The Be¬ trothal of Elypholate5 (1907) ; 'Revolt of Anne Royle5 (1908) ; (The Crossways5 (1910) ; 'When Half-Gods Go5 (1911) ; 'The Fighting Doctor5 (1912) ; 'The Parasite5 (1913) ; 'Bar-nabetta5 (1914) ; 'Martha of the Mennonite Country5 (1915) ; (For a Mess of Pottage5

(1915).

MARTIN, Henry Austin, American sur¬ geon : b. London, 23 July 1824; d. Boston, 7 Dec. 1884. He came to the United States at an early age and was graduated from the medical school at Harvard in 1845, when he established a prac¬ tice in Boston. He served as a surgeon

until nearly the close of the Civil War, when he re¬ signed and was brevetted lieutenant-colonel for gallant service. He devoted his attention prin¬ cipally to surgery and to the treatment of small¬ pox, upon which subject he was a generally rec¬ ognized authority. He was the Originator of many important innovations in the field of sur¬ gery and published valuable professional articles in periodicals.

MARTIN, Henry Newell, American bi¬ ologist: b. Newry, Ireland, 1848; d. 1896. He received his education at University College, London, and at Christ's College, Cambridge, He was appointed to the chair of biology at Johns Hopkins University in 1876 and was also made director of the biological laboratory. Dr. Martin carried out important experiments on respiration. He was chosen president of the American Society of Naturalists in 1890. He published 'The Human Body5 (1881) ; Obser¬ vations in Regard to the Supposed Suction-Pump Action of the Mammalian Heart5 (1887). Professor Martin assisted Huxley in the latter's Practical Biology5 (1876) and ed¬ ited (Studies from the Biological Laboratory of Johns Hopkins5 and the Journal of Physiology.

MARTIN, Homer Dodge, American painter: b. Albany, N. Y., 28 Oct. 1836; d. Saint Paul, Minn., 12 Feb. 1897. He was elected a member of the National Academy of Design in 1875; and resided in France in 1882-86. While he was influenced somewhat by the Barbizon School of painters, he developed a style entirely his own, which placed him among the best known of American landscape painters. His works include landscape on the Seine5 ; (An Equinoctial Day5 ; 'Brook in the Woods5 ; 'In the Adirondacks5 ; (Sand Dunes on Lake On¬ tario5 ; and 'White Mountains, from Randolph Hill.5 Consult for reproductions Carroll, D. H., 'Fifty-Eight Paintings by Homer D. Martin5

(1913).

MARTIN, Joseph, Canadian statesman : b. Milton, Ontario, 24 Sept. 1852. He was edu¬ cated in Canadian and Michigan public schools and at the University of Toronto. He was ad¬ mitted to the bar in 1882 and from 1882 to 1892

was a member of the Manitoba legislature. From 1888 to 1891 he was attorney-general and minister of education of Manitoba. In the lat¬ ter capacity he introduced the bill abolishing the separate school system in Manitoba and thus precipitated a memorable crisis in Manitoba and Dominion politics. Martin failed of election to the House of Commons in 1891, but sat for Winnipeg in 1893-96. He removed to British Columbia in 1897 and in the following year be¬ came a member of the legislature of that prov¬ ince, sitting until' 1903. In 1898-99 he was pro¬ vincial attorney-general and minister of educa¬ tion and in 1900 was premier of British Colum¬ bia. In 1907 Martin was owner and editor of the Vancouver Guardian. In 1908 he removed to England, contested Southwest Warwickshire in the Liberal interest in 1909. In Canada he took an active part against the Canadian Pacific Railway monopoly, in the abolition of French as official language and advocated the introduc¬ tion of the Torrens system of land registry. He is a strong freetrader and advocate of reciproc¬ ity between the United States and Canada.

MARTIN, Josiah, English colonial gov¬ ernor in America : b. probably in Antigua, West Indies, 23 April 1737; d. London, England, July 1786. He rose to the rank of lieutenant-colonel in the British army in 1771, and in the same year was appointed to the royal governor¬ ship of North Carolina. He was successful in pacifying the Regulators,® many of whom re¬ mained zealous Tories; and took a firm .Tv energetic attitude in the maintenance of British authority. But on 24 April 1775 he was com¬ pelled to escape to the sloop Cruiser, from which on 8 August he issued a prodigiously long proclamation which the Whigs ordered burnt by the hangman. He was with Sir Peter Parker at Charleston (June 1776), and accompanied Cornwallis into North Carolina after the Bnt-ish victory over Oates at Camden ; but in March 1781 withdrew to Long Island, and thence went to England.

MARTIN, Luther, American lawyer: b. New Brunswick, N. J., 9 Feb. 1748; d. New York, 10 July 1826. He was graduated from the College- of New Jersey (Princeton) in 1766; studied law at Queenstown, Md. ; was admitted to the Maryland bar in 1771 ; in 1774 was one of the commissioners appointed to oppose the claims of Great Britain; in 1778 became attoY-ney-general of Maryland; and in 1787 was a delegate from Maryland to the convention that framed the Constitution of the United States. His opposition to the instrument was

so strong that, rather than sign it, he left the convention thus earning from Jefferson the sobriquet of «the Federal bull-dog.® In 1804 he defended Samuel Chase (q.v.) in the latter's impeach¬ ment trial before the Senate, and in 1805 re¬ signed his attorney-generalship and resumed private practice. He was counsel for Burr in Burr's trial at Richmond in 1807, in 1814-16 was chief judge of the Baltimore Court of Oyer and Terminer, and in 1818-20 was again> attorney-general of Maryland. Among his writings was the series of pamphlets, (Modern Gratitude! (1801-02). Consult Goddard, 'Luther Martini

(1887).

MARTIN, Percy F., English author and journalist; b. 30 March 1861. He received his education at University College, London, served

as correspondent in Mexico of the Tunes, the Tribune and the Glasgow Herald; and in India of the Times (Engineering Supplement) and the Evening Standard. He also served as special correspondent of the Financial Times and 1 he Engineer in Central and South America and as contributor to the Times Trade Supplement. He has published (Through Five Republics of South America! (1905); ' Mexico s Treasure House> (1906) ; 'Mexico of the Twentieth Cen¬ tury! (1907) ; 'Salvador of the Twentieth Cen¬ tury! (1911) ; 'Peru of the Twentieth Century (1911); 'Greece of the Twentieth Century! (1912) ; 'Maximilian in Mexico} (1913) ; lne Sudan in Evolution! (1916). He is a contrib¬ utor to the Quarterly, Edinburgh, Fortnightly and British Reviews, and other periodicals.

MARTIN, Sir Theodore, English lawyer and author: b. Edinburgh, 16 Sept. 1816; d. 16 Sept. 1906. He was educated at the University of Edinburgh and became a solicitor in Edin¬ burgh in 1840. In 1846 he became a parliamen¬ tary solicitor in London, carried on an import¬ ant and extensive business and varied profes¬ sional cares with literary work. With Aytoun he published the once famous 'Bon Gaultiers Ballads! (1845). He married in 1851 Helen Faucit, the celebrated actress. His translations comprise many of the works of Goethe, Schiller, Horace, Catullus, etc., and he has written 'Essays on the Drama! ; 'Madonna Pia! (1855); 'Life of Lord Lyndhurst! (1884) ; 'Life of the Prince Consort! (1875-80) ; 'Helena Faucit, Lady Martin! (1900). He was

MARTIN, Thomas Commerford, Amer¬ ican electrical engineer and author : b. London, England, 22 July 1856. He was educated in an academy at Gravesend, England, by a private tutor and subsequently studied divinity. He was associated with Thomas A. Edison in labor¬ atory work and electrical development in 1877— 79 since when he has been engaged in editorial work. From 1883 to 1909 he was editor of the Electrical World and since 1909 has been exec¬ utive secretary of the National Electric Light Association. In 1900-15 Mr. Martin was en¬ gaged as special expert of the Census office of the United States. He has lectured at, the Royal Institution of Engineers, La Societe In¬ ternationale des Electricians, Paris, the Univei - sity of Nebraska, Columbia and Lehigh universi¬ ties, Delaware College and for the New York Board of Education. He was a member of the conference committee organized by engineering societies to expend the $1,500,000 given by An¬ drew Carnegie for a united engineering building and the Engineers’ Club of New York. Mr. Mar¬ tin is a member of many scientific societies and has published ‘The Electric Motor and Its Ap¬ plications! (1886) ; ‘Inventions, Researches and Writings of Nikola Tesla!’ (1893); ‘Edison — His Life and Inventions,! with F. L. Dyer (1910), and contributions to reference books, magazines and journals on electrical topics.

MARTIN, Thomas F., Democratic leaded-in New Jersey: b. in New England, about 1868. He came to -Hudson County, N. J., in 1896, and worked as a reporter on the Hudson Dispatch. Later he became business manager, and when the publishing company failed bought in the property at auction, re-established the paper and made it a political power. Entering politics, he

W£s chosen to represent North Hudson in the State legislature. For several terms he was the Democratic leader in the House of Repre¬ sentatives, including the years of Woodrow Wilson’s governorship.

Since 1916 he has been secretary of state of New Jersey.

MARTIN, Thomas Mower, Canadian artist : b. London, England, 1838. He studied art at the South Kensington Art School ; re¬ moved to Canada in 1862 and settled in Toronto, Ontario. His best-known pictures are (The Untamed Wilderness) ; (A Summer Idyl5 ; (Sunrise, Muskoka.5 He was one of the founders of the Royal Canadian Academy, the Ontario Society of Artists, the Art Union of Ontario and the Ontario School of Art. His publications are (An Artist's Letters from the Rockies> (1889) and (Canada from an Artist's Point of View5 (1895).

MARTIN, Thomas Staples, American legislator: b. Scottsville, Va., 29 July 1847; d. Charlottesville, Va., 12 Nov. 1919. After 1853 he resided on a farm not far from his birth¬ place. In 1864-65 he was a cadet at the Vir¬ ginia Military Institute and for much of that period was actually connected with the army of the Confederate States. In 1865-67 he studied at the University of Virginia and in 1869 was admitted to the practice of law'. After 1895 he was United States senator from Virginia.

MARTIN, Victoria Claflin Woodhull,

Anglo-American financier and reformer : b. Homer, Ohio, 23 Sept. 1838. In 1852 she mar¬ ried Canning Woodhull, from whom she later separated. Her second marriage was to John Biddulph Martin who died in 1897. With her sister, in 1870, Mrs. Woodhull founded a stock brokerage house in New York, from which there was issued Woodhull and Claflin s Weekly. For many years she has edited the Humanitarian Magazine. In 1870 Mrs. Woodhull memorial¬ ized Congress for women's suffrage, and lec¬ tured throughout the United States on finance, women's suffrage, religious and scientific im¬ provement of the human race, *etc.* In 1872 she was nominated for the Presidency of the United States by the Equal Rights party. She has organized conventions for the discussion of social reform, carried on a continuous propa¬ ganda work in the interests of the working classes both in America and Europe for over 30 years. Mrs. Martin's publications . include (The Origin, Tendencies, and Principles of Government ; 'Social Freedom5 ; (Garden of Eden Stirpiculture5 ; (Rapid Multiplication of the Unfit ; (The Human Body the Temple of God5 ; 'Argument for Woman's Electoral Rights, 5 *etc.*

MARTIN, William Alexander Parsons,

American educator: b. Livonia, Ind., 10 April 1827; d. 18 Dec. 1916.

He was graduated from the Indiana State University and studied theology. He went to China as a mis¬ sionary in 1850 and has spent the > greater share of his life there engaged in edu¬ cational and missionary work. He assisted in making the treaty between the United States and China in 1858, and was an authority in China on questions of international law. He was professor and president of Tung Wen Col¬ lege 1868-98, and then president of the New Imperial University until 1900, when it was destroyed in the siege of Peking, in which city

he was imprisoned with the American legation. In 1902 he was appointed president of the University of Wuchong. He has edited in Chinese the Peking Scientific Magazine, and the Science Monthly, and has published 'Siege in Peking) (1900); 'Chinese Legends,5 (The Lore of Cathay 5 (1901), *etc.*

MARTIN, Winfred Robert, American li¬ brarian: b. Ningpo, China, 22 March 1852: d. 1915. In 1872 he was graduated at Princeton University and three years later received the degree of M.A. at the same institution. In 1878 he was graduated at the law school of New York University. For several years subse¬ quently he studied in Germany, receiving the de¬ gree of D.Ph. at Tubingen in 1887. He held the chair of Oriental languages and literatures at Trinity College, Hartford, from 1888 to 1907 and from 1902 to 1907 also taught Sanskrit at the Hartford Theological Seminary. In 1907 Dr. Martin was appointed librarian of the Hispanic Society of America. He received the honorary degree of LL.D from Trinity College in 1907 and four years later King Alfonso of Spain created him knight of Isabella the Catholic.

MARTIN DE MOUSSY, Jean Antoine

Victor, French physician: b. Moussy-le-Vieux, 1810; d. 1869. His medical education was ob¬ tained in Paris, where he practised in the mili¬ tary hospitals. He removed to Montevideo, Uruguay, in 1841 and in 1843-52 directed the medical service of the French and Italians en¬ gaged in the siege of the city. In 1852 Dr. Mar¬ tin was engaged bv the Urquiza government to prepare a work on the geography of Uruguay. In order to prepare himself for the task he traveled up and down the country in the years 1855-59. The work appeared in three volumes under the title description geographique et statistique de la confederation argentine) (1860-64). Another volume was his 'Memoire historique sur la decadence et la ruine des missions des jesuites dans le basin de la Plata5 (1865). Dr. Martin presented his

meteorological ob¬ servatory to the city of Montevideo.

MARTIN, a swallow (q.v.). In the United States the name is restricted to the purple mar¬ tin (q.v.), several other species of which (genus Progne) are familiar garden birds in South America. The bank-swallow (q.v.) is some¬ times called sand-martin, especially in England, where the term is more generally used as a synonym of “swallow55 than in America.

MARTINE, James Edgar, American legis¬ lator: b. New York, N. Y., 25 Aug. 1850. He received a public school < ducation. He engaged in farming near Plainfield, N. T.. and also ac¬ quired large real estate and building interests. At various times he was candidate for the New Jersey house of representatives, the senate and other offices. When Woodrow Wilson was governor of New Jersey Martine was one of his most ardent supporters and became United States senator for the term 1911-17. In the Senate of the United States he warmly cham¬ pioned the cause of labor in the discussions in regard to working conditions, wages, etc., in the coal mines of West Virginia and Colorado.

MARTINEAU, mar’ti-no, Harriet, Eng¬ lish author: b. Norwich. 12 June 1802; d. Am-bleside, 27 June 1876. She was a sister of James

Martineau (q.v.). Her first work Devotional Exercises for the Use of Young Persons ap¬ peared in 1823; and in 1830-31 she won three prizes offered by the Central Unitarian Associa¬ tion for as many essays designed to conver] respectively the Catholics, the Jews an

Mohammedans. “The essays,** observes a b ographer, “probably converted nobody, but brought in 45 guineas.® Next came several stories,

mostly intended to inculcate some useful lesson such as those having the title, Illustrations of Political Economy’ > (1831-34), which were fo - lowed by ‘Illustrations of Taxation (1834), and gained an immediate recognition. After a sojourn in the United States (1? Sept. 1834-1 Aug. 1836), she published < Society in Amer¬ ica 5 (1837), intended as a comparison of the existing state of society in America with thp principles on which it is proposedly fpunde, and (A Retrospect of Western Travels; (1838), including some criticisms of slavery that were not well received in this country. Up to about 1851 Miss Martineau had been known as a Unitarian, but she later showed a deaded ean-ing toward Positivism, and in 1853 published a condensation of Comte’s ‘Positive Philos¬ ophy. } Among her other works of importance may be mentioned her ‘History of England during the Thirty Years’ Peace* (1849). Dur¬ ing the last 20 years of her life her writings consisted mainly of pamphlets and contributions to newspapers and periodicals. A remarkably candid autobiography, which had been written for many years, was published after her death (1877). Consult also Miller, Harriet Martineaˆ (1884).

MARTINEAU, James, English Unitarian clergyman and philosopher: b. Norwich, 21 April 1805; d. London, 11 Jan. 1900. His

father, Thomas Martineau, the great-grandson of a Huguenot surgeon who left France after the revocation of the Edict of Nantes, was a manufacturer of bombazines. Harriet Marti¬ neau (q.v.) was an elder sister. He was sent to Derby in 1821 to study civil engineering, but in the following year became a student of Manchester College. In 1827 he took charge for a year of Dr. Lant Carpenters school in Bristol, and in 1828 he accepted a call to the copastorship of Eustace Street Presbyterian Church, Dublin. In 1831 he published ‘Hymns for Christian Worship,* and next year resigned his pastorate, but shortly

afterward accepted the copastorate of Paradise Street Chapel, Liverpool, of which, in 1835, he became sole pastor. In 1836 appeared his first separate original work, ‘The Rationale of Religious Inquiry, > which attracted considerable atten¬ tion. In 1839 he was associated with J. H_ Thom and Henry Giles in the defense of Unitarianism against attacks by orthodox clergy¬ men and of 13 addresses published in Uni¬ tarianism Defended> (1839), five were by Martineau. In 1840 he published his collection of ‘Hymns for the Christian Church and Home,* and in the same year was appointed professor of mental and moral philosophy and of political economy in his old college, now •named Manchester New College. On the removal of the college to London in 1853 he retained his professorship, but did not settle in London till 1857. In 1848-49 lie spent 15 months on the Continent, mostly in Germany,

during which his philosophical opinions were nrofoundly influenced by the study of Gieek and German philosophy under Trendelenbmg. The remaining publications of his first Live nool period are an essay on ‘The Five 1 oints of Christian Faith’ (1841), and the well-known collection of sermons enti nL-ijSK deavors after the Christian Life (184o)■

During the period 1849-57. when lie was pastor of Hope Street Church, Liverpool, he published many articles in reviews, among them that on ‘Mesmeric Atheism,* which finally completed his sister Harriet’s estrangement from him.

In 1859, being now in London, he and . J. Taylor, principal of Manchester New College, were chosen joint ministers of Little Portland Street Chapel, but from 1860 till his resignation in 1872 Martineau alone supplied the pulpit On Taylor’s death in 1§69 he became principa of the college, a post which he held till his resignation in 1885. . In 1866 he was a candi¬ date for the chair of logic and mental philosophy in University College, London, but the united opposition of orthodoxy and secularism led by George Grotte rnan-aged to defeat him by a single vote. His publications include ‘Studies ˆ Christianity (1869), a volume of sermons ; ‘Why Dissent. (1871) • ‘Hymns of Praise and Prayer’ (1873) , ‘Modern Materialism: Its Attitude towards Theology1* (1876), a masterly attack on Tyndall and the scientific materialists; ‘Essays, Theo¬ logical and Philosophical* (1875) \ Hours ; of Thought on Sacred Things > (187,ˆ8°) ˆ \de: l Substitutes for God Considered* (1880), a criticism of Moral Idealism; ‘A Study of Spinoza > (1883), his first great

philosophical work; and ‘Types of Ethical Theory* (1885), the earlier of his two masterpieces. During the remaining years of his life he published his great defense of the essential principles of religion entitled ‘A Study of Religion: Its Source and Contents* (1888) ; and his freey critical ‘Seat of Authority in Religion* (1890). The first academical degree conferred upon him was that of LL.D. by Harvard in 1872, but he received later the degrees of S.1.1J. from Leyden (1875), D.D. Eˆburgh

(1884) D C.L. from Oxford (1888), and Litt D. from Dublin (1892). Martineau was one of the most eminent preachers of bis time but his greatest work was done m the fields ot ethics and philosophical theology. At first a necessarian and utilitarian, he was latterly the great modern champion of free-will and in¬ tuitionalism. In the development of his Chns-tology from a sort of Arianism to. complete Humanitarianism, and in his ever-increasing insistence upon the continuity of revelation and the purely internal character of ultimate reli¬ gious authority, he sums up .more than any other the history of Unitarianism, and indeed of liberal theology generally during the 19th century He was a powerful and eloquent champion of Theism against scientific agnos¬ ticism and materialism. All his works are written in a uniquely rhythmic style, charactei-ized by a profuse and happy use of figurative language. Consult Jackson, ‘James Martineau. A Biography and a Study* (1900); Sidgwick, ‘Lectures on the Ethics of Green, Spencer and Martineau* (1902); Drummond, ‘Life and Letters of James Martineau* ; and Upton, A Survey of Philosophical Work* (1902).

MARTINELLI, mar-te-nel'le, Sebastiano,

Italian prelate: b. Lucca, Tuscany, 20 Aug. 1848; d. 5 July 1918. He was educated at the College of Saint Augustine in Rome, entered the Augustinian Order and was ordained to the priest¬ hood in 1871. He became superior-general of the Augustinian Order throughout the world in 1889 and in 1894 was sent to America to visit the monks of that order and shortly afterward was designated apostolic delegate to the United States. At this time he was consecrated titular bishop of Ephesus. His term as delegate was marked by the statesmanlike solution of several important questions. In 1901 he was made a cardinal, returned to Rome soon afterward and became prefect of the Sacred Congregation of Rites.

MARTINEZ, Enriquez, en-re'keth mar-te- neth, or Enrico, Mexican engineer : b. about 1570; d. in Mexico, 1632. His birthplace is variously given as Germany, Holland, Spain (in Ayamonte, Andalusia) or Mexico. He studied engineering in Spain ; went to Mexico as interpreter to the Inquisition and with the title of cosmographer royal ; and in 1607 under¬ took to drain the valley of Mexico, threatened by lakes Zumpango and San Cristobal. His canal was fairly successful but inadequate, and after various experiments on the part of the other engineers, with whose work Martinez was accused of tampering, he was bidden en¬ large his tunnel and canal. He died before the work was much more than started. Mar¬ tinez established a printing-press in the City of Mexico and wrote on the natural history of Mexico, on astronomy and on trigonometry. His works are (Discurso sobre la magna con-junci6n de los planetas Jupiter y Saturno, acae-cida en 24 Diciembre 1603 en Sagitario) (Mex¬ ico 1604) ; (Repertorio de los tiempos, e historia natural de Nueva Espana) (Mexico 1606) ; (Tratado de TrigonometriaP

MARTINEZ DE CAMPOS, Arsenio. See Campos, Arsenio Martinez de.

MARTINEZ DE ROZAS, Juan, hoo-an mar-te-neth da ro'zas, Chilean statesman: b. Mendoza, Argentina, 1759; d. there, 3 March 1813. He was educated at Cordova; studied law at Santiago; became professor

at San Carlos, Chile, in 1781 ; in 1787 was made assist¬ ant intendant of the province of Concepcion; and in 1796 had risen to the second command in the presidency. He took a prominent part in planning the revolution of 1810; was a member of the governing junta until 1811, when he became its president; and showed himself an able administrator and a brave soldier. Car¬ rera quarreled with him, got the upper hand and banished him to his birthplace, only a few months before his death.

MARTINEZ, mar-te'nez, Cal., town, county-seat of Contra Costa County, on the Strait of Carquines, and on the Southern Pacific Railroad, about 30 miles northeast of San Francisco and 85 miles southwest of Sacra¬ mento. It is near valuable mines and also rich farm lands, on which large quantities of wheat, grapes, pears, etc., ax*e raised. A novitiate of the Christian Brothers is here and the Brothers maintain a library which has about 6,000 vol¬ umes. It has a hie-h school, city hall and court¬ house, oil refineries, copper smelters and ferti¬ lizer works. Pop. (1920) 3,858.

MARTINI, mar-te'ne, Simone, Italian

painter, sometimes mistakenly called Simone Memmi : b. Siena, about 1284; d. Avignon, 1344. He was the founder of the Sienese school of painting and executed frescoes in the churches of Siena, Assisi, Naples and Orvieto. At the invitation of Pope Benedict XII he went to Avignon and in collaboration with his brother, Donato, decorated the papal palace. He seems to have aimed at flat decorative effect rather than artistic boldness and originality in his wall painting and his color is harmonious and fresh, though his faces are conventional. The large painting of the Madonna on the walls of the Palazzo Pubblico is his most important work at Siena (1315); at Florence is to be seen an (Annunciation* of his in the Uffizi, and frag¬ ments of his work also survive at Avignon. His other more important pictures are (The Way to Golgotha) (1333) in the Louvre; <The Blessing of Christ* in the Vatican; (Christ as a Child with His Parents> in the Royal Insti¬ tution, Liverpool; (Saint Louis of Toulouse* in San Lorenzo, Naples; fragments at Pisa, Arvieto. Fenway Court, Boston, contains some examples of his work. Consult Berenson, Bernhard, (Central Italian Painters of the Renaissance) (New York 1897).

MARTINIQUE, mar-tl-nek', West Indies, an island of the Lesser Antilles and, except Guadeloupe, the largest in the Caribbean chain. Area, 381 square miles. It is very mountainous (Mount Pelee, in the northwest,

4,900 feet; Mount Carbet but a little lower, while a peak near the southern coast rises to the height of 3,950 feet. The thermometer ranges between 76° and 88° F., the summers being hot and dry, autumn, and a part of winter hot and rainy, and spring comparatively cool. The inhabitants number about 185,000. About 3 per cent are Caucasians, who reside chiefly in Saint Pierre; the balance of the population — those who, in the main, suffered least from the disaster of 1902 — are described as negroes, mulattoes, ((copre, chabin and mates® — that is, blends of the African, Capb Indian (q.v.), Mongolian and French races. A large part of the surface is covered with forests of silk-cotton, species of mahogany, *etc.* The flora is closely related to that of South America; the fauna abound in minor reptiles and insects. Of the snake kind the most dreaded is the fer-de-lance, whose bite is fatal. The mongoose has practically exter¬ minated this serpent within recent years. Sugar and cocoa are the chief productions, followed by coffee, tobacco and cotton. There are over 40,000 acres under cultivation and tobacco¬ growing is subject to special regulation. There are 45 sugar mills and many distilleries. In 1916 sugar to the value of $5,300,000, rum to the value of $5,600,000 and cocoa to the value of $150,000 were exported. In the same year the total of all imports was $6,770,000 and of exports $12,195,000. There entered that year 557 vessels of 465,502 tons.

Martinique is a colony of France, sending one senator and one deputy (two deputies until 1903) to the French legislature. Its affairs are administered by a governor, general council and elective municipal councils. Educational insti¬ tutions are a law school at Fort-de-France, with 56 students ; several secondary or normal schools and about 100 primary schools with

18,000 pupils. The island was acquired by the French in 1635. Toward the close of the 18th and beginning of the 19th centuries it was temporarily held by the British. In May 1002 volcanic eruptions from Mount Pelee destroyed Saint Pierre, which was the largest city on the island, with a population of 26,011, and the residents of that place

perished, almost without exception; but the statement commonly made, that ((a great part of the island was over¬ whelmed, » is incorrect. The scope of Pelee's work was limited. (See Pelee, Mont). About 10,000 persons besides those in Saint Pierre lost their lives (in all, 20 per cent of the total population) ; the best agricultural regions, how¬ ever, in the south and along the eastern coast were uninjured. The capital, Fort-de-France (pop. 26,399), is situated in the southwest and is important as being the military and naval headquarters and rendezvous in the French Antilles; the terminus of the French trans¬ atlantic steamers and West Indian cable sys¬ tem. For local traffic there are mail coaches and motor-cars, which receive a subsidy • from the government, and subsidized steamers ply on the coast. The Bank of Martinique, situated at Fort-de-France, has a capital of $600,000. A statue of the Empress Josephine, who was born in Martinique, is one of the ornaments of the public gardens of Fort-de-France. In 1918 the military force consisted of 39 officers and 2,255 men. The capital has had its share of misfortunes m the past : it was nearly con¬ sumed by fire in 1890 and partially destroyed by an earthquake in 1839.

MARTIN'S FERRY, Ohio, city, in Bel¬ mont County, on the Ohio River and on the Pennsylvania, the Baltimore and Ohio and the Wheeling and Lake Erie railroads, almost op¬ posite Wheeling, W. Va. The first settlement was made in 1769 and in 1865, nearly a century later, it was incorporated as a village. The charter under which it is now governed was granted in 1885. It is situated in a region noted for its abundance of bituminous coal, iron and limestone. The chief manufactures are iron, steel, stoves, shovels; nails, glass, tin, machine-shop products, lumber, barrels and boxes. The city owns and operates the electric-light plant and the waterworks. Pop. 11,634.

MARTINSBURG, mar'tinz-berg, W. Va., city, county-seat of Berkeley County, on the Cumberland Valley and the Baltimore and Ohio railroads, about 65 miles northwest of Wash¬ ington, D. C. It is in the vicinity of valuable stone quarries and forests which furnish tim¬ ber for many mills. The chief manufactures are hosiery, woolen goods, lime,, wagons, lum¬ ber and canned goods. The repair shops of the Baltimore and Ohio Railroad and slate and limestone quarries furnish employment for a number of people. The chief buildings are the government building, the Berkeley Female Sem¬ inary, the Berkeley Female Institute and the King's Daughters' Hospital. The waterworks are owned and operated by the municipality. The government is vested in a mayor and coun¬ cil, chosen biennially. It was incorporated in 1778. Pop. 12,515. Martinsburg, as the chief city of the lower Shenandoah Valley, on the main road leading across the Potomac, the con¬ verging point of several roads, with the Balti¬

more and Ohio Railroad running through it,

was an important point in the military opera¬ tions of the valley. Early in July 1861 General Patterson, after a slight skirmish, occupied the place, the Confederates falling back to Win¬ chester. Patterson soon abandoned it, and it was reoccupied by the Confederates. Early in March 1862 it was again occupied by the Union forces under General Banks, the Confederates falling back up the valley. It was abandoned 25 May 1862, after Banks' defeat at Winches¬ ter, but soon reoccupied by Banks. On 8 Sept. 1862 Gen. Julius White was in command of the place with about 2,500 men of all arms. At this time General Lee had crossed the Potomac and was at Frederick, Md. On the 10th Jackson led a column from Frederick, crossed the Potomac at Williamsport and moved on Martinsburg. White retreated during the night of the 11th to Harper's Ferry. In June 1863, when Ewell's corps moved down the valley in the Gettysburg campaign the place was held by Col. B. F. Smith with 1,200 infantry and a bat¬ tery. On 13 June, Ewell, at Cedarville,, de¬ tached Jenkins' cavalry brigade and Rodes' in¬ fantry division to surround and capture the Union forces at Berryville and Martinsburg. Both garrisons escaped, Smith, with the greater part of his infantry, crossed the Potomac at Shepherdstown and making his way to Mary¬ land Heights. The battery retreated by the Williamsport road, was pursued and lost five of its six guns, with 200 infantry accompany¬ ing it. On 1 July 1864 the place was held by General Sigd with about 3,200 infantry and dis¬ mounted cavalrv and a battery. On the 2d, Early arrived at Winchester on his campaign to menace Washington and, under General Lee's instructions, to clear out the lower valley and wreck the Baltimore and Ohio Railroad. Parties were sent north and west against the railroad, and on the 3d Bradley T. Johnson, with a cavalry brigade, was ordered to move through Smithfield and Lee Town, cross the railroad at Kearnysville, east of Martinsburg, and, push¬ ing north, unite with McCausland at Hair.esville beyond Martinsburg. Johnson arrived at Lee Town early in the morning, where he was met by Col. J. A. Mulligan with about 2,000 men and a battery, and after a hard fight was driven back on the divisions of Rodes and Ram-seur, which were supporting him. Breckin¬ ridge's division, which marched on the main road to Martinsburg, drove before it Stahel's cavalry, on outpost at Darkesville. Sigel, warned of approaching danger, burned his stores, collected his command, and, leaving Mar¬ tinsburg on the night of the 3d, crossed the Potomac at Shepherdstown and occupied Mary¬ land Heights. Early cleared the valley and ad¬ vanced on Washington, and on the 11th Mar¬ tinsburg was occupied by Sullivan s division of

Hunter's command, and remained in Union oc¬ cupation until the 25th, when Crook, being de¬ feated by Early at Kernstown, was driven through Winchester, made a short stand at Martinsburg and recrossed the Potomac at Williamsport, Early again occupying the town and destroying the railroad on either side of it, and continuing in possession until 10 August, when, upon Sheridan's advance to Halltown, he abandoned Martinsburg and Winchester and fell back to Strasburg. He advanced from Strasburg on the 17th and reoccupied Martinsburg

on the 19th with his cavalry. From this time until 17 September the place was held alter¬ nately by Union and Confederate cavalry, on the 1 7 th by Averell's Union division. On that day_ Early left Winchester with a heavy force of infantry, cavalry and artillery, and on the 18th attacked and drove Averell from Martinsburg across the Opequon. Sheridan defeated Early on the Opequon on the 19th, and drove him up the valley, and Martinsburg was again occupied by Union troops, to remain in their possession until the close of the war.

MARTINSVILLE, Ind., city, of Morgan County, situated on White River, the Cleve¬ land, Cincinnati, Chicago and Saint Louis and the Vandalia railroads, 30 miles southwest of Indianapolis. It enjoys considerable reputation as a health resort, having several artesian min¬ eral wells and modern sanatoria. It contains flour mills, planing and saw mills, brick yards, chair works and a woodenware factory. The city owns the electric-lighting plant and the water-supply system. Pop. (1920) 4,895.

MARTINSVILLE, Va., town and county-seat of Henry County, situated on the Danville and Western and the Norfolk and Western rail¬ roads, 40 miles northwest of Danville. It con¬ tains several fine public buildings, including the town-hall, courthouse, post office and high school. Its industrial establishments include cotton mills, tobacco warehouses, furniture and spoke factories. It has large farming interests, and the Roundabout stock farm is a show place. The electric-lighting, telephone and water-supply plants are the propertv of the

municipal¬ ity. Pop. (1920) 3,746.

MARTINY, Philip, American sculptor: b. Alsace, 19 May 1858. His boyhood was spent in France working in various studios. Early in the 80's he came to America and made further studies under the direction of Saint-Gaudens. Martiny's efforts in decorative sculpture have been conspicuously successful and his work has improved this branch of art in the United States. Among his best-known works are the sculpture on the grand staircase of the Con¬ gressional Library, Washington ; the Carnegie Library, Washington; the New York Hall of Records; Chamber of Commerce groups, New York; bronze doors of Saint Bartholomew's, New York ; a fountain and figures in the Clark residence, New York; Soldiers' and Sailors' Monument, Jersey City; McKinley Monument, Springfield, Mass.; statue of Vice-President Hobart at Paterson, N. J., and the de Gernay Monument at Newport, R. I.

MARTY, Martin, Roman Catholic bishop: b. Schwyz, Switzerland, 12 Jan. 1834; d. Saint Cloud, Minn., 19 Sept. 1896. He received a collegiate education in Switzerland and Austria, was ordained to the priesthood in 1856 and in 1860 came to the United States. He assisted in the founding of a priory at Saint Meinrad's, Ind., and was its first superior; through his efforts the priory became an abbey in 1870 and Marty was raised to the rank of mitred abbot. He resigned his office several years later in order to perform mission work among the In¬ dians of Dakota, over whom he gained a wide influence. He mastered their language and wrote a Sioux grammar and dictionary. In 1880 he became the first bishop of Sioux Falls,

and in 1894 was transferred to Saint Cloud, Minn.

MARTYN, mar'tm, Henry, English mis¬ sionary to India: b. Truro, Cornwall, 18 Feb. 1781 ; d. Tokat, Asia Minor, 16 Oct. 1812. He was graduated from Saint John's College, Cam¬ bridge, in 1801 ; became a Fellow of the same college in the next year, and, turning from the law, took orders, and landed in India in 1806. After three years at Dinapore he was transfered to Cawnpore, where he opened a church in 1810, in spite of violent opposition, and where he completed a Hindustani version of the New Testament. To perfect a translation of the New Testament into Persian and to re¬ cover his health in 1811 he traveled into Persia. In Tabriz he was taken ill with a fever, and on his hurried journey home was compelled to stop at the plague-stricken town of Tokat, where he died. In 1856 a monument to his memory was

erected there. He was the great mission¬ ary hero of the Church of England up to the early part of the 19th century. Martyn's works include Controversial Tracts on Christianity and Mohammedanism* (1824), and versions of various parts of the Bible into Hindustani, Per¬ sian and Judaeo-Persic. Consult Bell, C. D., (Henry Martyn* (New York 1881) ; Smith, George, (Henry Martyn, Saint and Scholar, First Modern Missionary to the Mohammedans, 1 781— 1812 J (London 1892) ; Wilberforce, Sam¬ uel (ed.), (Journals and Letters of the Rev¬ erend Henry Martyn* (2 vols., London 1837).

MARTYN, William Carlos, American Presbyterian clergyman, historical writer and lecturer: b. New York City, 15 Dec. 1841; d. 4 Aug. 1917. He studied law at Columbia under Prof. Theodore Dwight, 1859-60, and was graduated from Union Theological Seminary in 1869 and ordained to the Congrega¬ tional ministry. He held important charges in Saint Louis, Chicago and New York; 1897-1902 was literary director in a New York pub¬ lishing house, and has contributed largely to magazines and periodicals. His historical and biographical works cover a wide circle and in¬ clude (Martin Luther) (1866) ; (J°hn Milton) (1866) ; (Pilgnm Fathers of New England) (1870) ; (The Puritans) (1867) ; (The Huguenots) (1867) ; (The Dutch Reformation) (1868) (John B. Gough) (1893) ; (William E. Dodge* (1891), and (Wendell Phillips* (1890), this last having an enormous circulation. In other veins were a work on (Christian Citizenship) (1896), and a novel, (Sour Saints and Sweet Sinners) (1898). After 1905 Dr. Martyn resided in Noroton, Conn., and served the Presbyterian church there. At various times and places literary honors and dignities came to him.

MARTYNIA, a genus of annual and per¬ ennial herb of the family Martyniacccc. The 10 species have thick sub-erect stems, opposite or alternate heart-shaped leaves, showy catalpa-like flowers in short terminal racemes, and horned capsules which suggest the names uni¬ corn plant and proboscis-flower. When ripe the capsules split and expose numerous black wrinkled seeds. The stems and foliage are clammy and malodorous, but the flowers of some species not unpleasantly perfumed. The species are all natives of warm parts of Amer¬ ica. They are often planted for ornaments, as curiosities and for their capsules, which while

young and tender are used as material for pickles. M. louisiana, to Which the popular names are generally applied, is the most com¬ monly grown.

MARTYR (Greek for «witness»), a desig¬ nation applied by the Christian Church to those persons in particular who, in the early ages oi Christianity, suffered death rather than re¬ nounce their faith, and thus testified their con¬ fidence in the truth of the new doctrines. Martyrs are sometimes classified as of three classes: martyrs in will and deed, like Saint Stephen ; those in will, but not in deed like Saint John, who escaped from the death or¬ dained for him by Domitian ; and those in deed but not in will, like the Holy Innocents. An account of the life, persecutions and death of the Christian martyrs is called a martyrology (q.v.). A tomb or oratory erected on the spot where a martyr suffered was called martyrium, martyry. Festivals in honor of the martyrs seem to have been observed as early as the 2d century. The Christians offered prayers at the martyry and thanked God for the example which they had given to the world. The rite was concluded with the sacrament of the Lord s supper and the distribution of alms. Kulogies were also delivered and accounts of the li\ es and actions of the deceased read. These festi¬ vals were called the birthdays of the martyrs, because on the day of their death they were born to eternal life. There are 14,000 martyrs commemorated in the Roman martyrology. In the early centuries of Christianity the bishop of the locality certified the names of those who were deemed worthy of the title of martyr, but after 1100 this designation became more and more reserved to the Pope, especially since 1 636.

MARTYR, mar’ ter, Peter. See Peter

Martyr.

MARTYRE DE SAINT SEBASTIAN,

Le (The Martyrdom of Saint Sebastian), an oratorio by Debussy which had its first per¬ formance at Paris on 22 May 1911.

MARTYROLOGY, called also calendar

of the saints, the acts of the saints, menolop, anology, synaxary, a list of martyrs and other saints in which was sometimes noted the char¬ acter of their lives, and in the case of a martyr the place and date of

his martyrdom and the nature of the sufferings which he underwent. Baronius, an ecclesiastical historian of the 16th century, attributes to Saint Clement of Rome, almost contemporary with the apostles, the first idea of collecting the acts of the martyrs. In the time of Gregory the Great (end of the 6th century) the Church possessed a general martyrology, the author of which is said to have been Saint Jerome, who made use of ma¬ terials collected by Eusebius of Cassarea. 1 fie only part of it now extant is a catalogue of the martyrs who suffered in Palestine during the last eight years of the persecution of Diocletian. There is a martyrology attributed to Bede (be¬ ginning of 8th century), but if not altogether spurious it is at least interpolated. Numerous martyrologies were produced in the next cen¬ tury and subsequently. In 1586, under the auspices of Sixtus V, a martyrology was printed at Rome, with notes by Baronius, with the title of <Martyrologium Universale/ Ruinarts (Acta Primorum Martyrum Sincera> appeared

at Paris in 1689, and a new edition of it was published in 1859. The < Acta Sanctorum* (q.v.) of the Bollandists comprises over 60 volumes issued at various times from 643, but the work is still incomplete. The well-known English work of John Foxe, 'The Book of Martyrs > (Protestant), may also be mentioned. Consult Achelis, (Die Martyrologien, ihre Geschichte und ihr Wert> (Berlin 1900) ; Lammer, <De Martyrologio Romano, Parergon Historico-criticunP (Regensburg 1878) ; (Martyrologium Sancti Hieronymi> (in <Acta Sanctorum; for November, Paris 1894); Kennck Francis P. (ed.), <The Roman Martyrology) (Baltimore 1907); Delhaye, <Le temoignage des martyrologes) (in (Analecta BollandianaP Vol. AAVl, Paris 1907).

MARULIC, Marko, a Croatian poet and historian: b. Spalato in 1450; d. 1524. Ax ter studying at Padua he entered a monastery in Spalato, where he wrote most of the works which stamped him as the foremost of Croatian authors and rendered his name one of the great¬ est in the literature of Ragusa. Among his works the most noted was (De Institutione Bene Vivendi,* published in 1511. It was trans¬ lated several times. In his native tongue he wrote mystery plays, the first of their kind in the Croatian language, and several poems, best of which is (The History of Judith. His poems were republished with a biography (Agram 1869).

MARVEL, Ik. See Mitchell, Donald

MARVELL, Andrew, English poet and satirist : b. Winestead, Holderness, Yorkshire, 31 March 1621; d. London, 18 Aug 1678 He was graduated trom Trinity College, Cambridge, in 1638; after activity as poet and tutor became colleague of Milton in the Latin secretaryship in 1637; was three times elected to Parliament for Hull, and under the Restoration attacked Charles II and advocated a republic. While a true literary genius most of Marvell's work has little appeal to moderns, because it deals with persons and incidents long since passed away and forgotten. His lyrics, however, are immortal, and through them his place in Eng¬ lish literature is assured for all time. His chief poem is the <Horatian Ode Upon Cromwell's Return from Ireland* (written 1650; first printed 1776). The shorter poem, cThe Ber¬ mudas, *is also well known. Consult his (Works,) edited by T. Cooke (2 vols., London 1726) ; (Works,* edited by E. Thompson (3 vols., London 1776) ; (Poems and Satires * edited by G. A. Aitken (2 vols., ib. 1892) ;

(Poems and Satires,* edited by E. Wright (ib. 1904) ; Birrell, Augustine, (Life of Andrew MarvelP (in (English Men of Letters Senes,) London 1905) ; Brown, John, < Andrew Mar¬ velP (in < Cambridge History of English Liter¬ ature, 5 Vol. VII, Cambridge 1911) ; Dove, (Life of Andrew MarvelP (London 1832).

MARVIN, Charles Frederick, American meteorologist: b. Putnam, Ohio, 7 Oct. 1858. He was graduated as a mechanical engineer from the Ohio State University in 1883, where he had been instructor in mechanical drawing and laboratory practice since 1879. In 1884 he was appointed to the United States Signal Service and later was made professor of me-

teorology in the weather bureau, of which he became chief in 1913.

He has made many im¬ portant investigations and discoveries in con¬ nection with the weather bureau, and has writ¬ ten quite extensively concerning them.

MARVIN, Enoch Mather, American Methodist Episcopal clergyman: b. Warren County, Mo., 1823; d. 1877. He was self-edu¬ cated ; became a minister of the Methodist Epis¬ copal Church in 1841 as member of the Missouri Conference. .Upon the division of the' Metho¬ dist body in 1844 he cast his lot with the Methodist Church South. In the Civil War he was for two years a chaplain in the Confed¬ erate army. He was chosen bishop of his Church in 1866 and at the time of his death had just returned from a missionary tour which took him all around the world. He published (Errors of the Papacy and Transubstantiation* (1860) ; (The Life of William Goff Caples* (1871) ; (Sermons* (1876) ; (The Doctrinal In¬ tegrity of Methodism* (1878) ; (To the East by Way of the West) (1879) ; (The Methodist Episcopal Churches, North and Souths Con¬ sult Finney, T. M., (The Life and Labors of Enoch Mather Marvin) (Saint Louis 1880).

MARVIN, Frederic Rowland, American clergyman, essayist and poet: b. Troy, N. Y., 23 Sept. 1847; d. 22 July 1918. Son of Rev. Uriah and Margaret Jane (Stevens) Marvin; educated at Lafayette and Union colleges, Col¬ lege of Physicians and Surgeons, New Bruns¬ wick Seminary; sometime professor in New York Free Medical College for Women; pastor of Congregational churches in Middletown, N. Y., Portland, Ore., Great Barrington, Mass., retiring in 1895 for study and travel in Europe; settled at Albany, N. Y., after 1900. Among his works are (Literature of the Insane-* ; epi¬ demic Delusions) ; (Last Words of Distin¬ guished Men and Women* ; (Book of Quat¬ rains* ; excursions of a Book-Lover* ; 'Poems and Translations* ; (Companionship of Books* ; (Christ Among the Cattle*; ˆFlowers of Song from Many Lands* ; eove and Letters* ; eireside Papers.* Consult also (The Top of the Wine-Jar,* a volume of selections from the author's 10 works, with a literary estimate by Livingston Stebbins.

MARX, marks, Karl, German Socialist: b. Treves, 5 May 1818; d. London, 14 March 1883. He was educated at the universities of Bonn and Berlin, and in 1842 took up journal¬ ism, becoming editor of the Rheinische Zeitung, a Democratic journal; his socialistic articles in this paper caused its suppression in 1843. Marx then proceeded to Paris, where he became one of the editors of the D eutsch-F ranzdsische J ahrbucher , to which he contributed articles on the (<Hegelian Philosophy of Right.** He was expelled from France in 1845, and retired to Brussels, where he assisted in organizing the German Workingmen's _ Association, was also active in the organization of the

Communist League, and with Engels issued the famous Communist Manifesto in 1847, which was the first public declaration of international Social¬ ism. In 1848 Marx returned to Germany, started the N eue Rheinische Zeitung, and was active in the revolutionary movements of that year. Banished from Germany in 1849, he went first to Paris, then to London, where he lived till the time of his death. He devoted himself

largely to the study of economic questions, and was correspondent of the New York Tribune and other papers. In 1864 he took a leading part in the organization of the International Workingmen's Association (q.v.), was selected to formulate its program and practically shaped its policy for a number of years ; he was also interested in the organization of the German Social Democrats who united with the Interna¬ tional in 1869. After 1873 he took no active part in politics, but devoted his time to the completion of his work on capitalism, has Kapital* ((Capital*), the first volume of which had been published in 1867 (English trans. 1886) ; the second and third volumes were left in manuscripts, and volume II was pub¬ lished in 1885 ; volume III in 1894, under the editorship of Engel. He also wrote (Zur Kritik der Politischen Oekonomie* (1859) ; (Lohnar-beit und Kapital* (English trans., (Wage Labor and Capital*) ; (Misere de la Philoso¬ phic* (1847) ; (The 18th Brumaire of Louis Bonaparte* (1852) ; (Life of Lord Palmerston* (1850), and devolution and Counter-Revolu¬ tion,* a reprint of a series of letters in the New York Tribune, in regard to the Revolution of 1848 in Germany.

Marx was undoubtedly the founder of the modern socialistic school, in that he first gave definite scientific statement to the principles of modern Socialism. His greatest and best-known work, das Kapital,* is a monument of acute reasoning, extensive reading and knowledge, though excessively long, obscure and tortuous in its meanings. In this he analyzes carefully his theory of value, which is that the measure of the value of a commodity is the amount of labor <(socially necessary** to produce it, and shows how under the capitalistic system the laborers are exploited of what they produce over and above their wages (surplus value). These theories were by no means new, though Marx rather confused than elucidated them. He also traces the development of capitalistic production, the growth of the working class or proletariat which is finally to transform or revo¬ lutionize society, and lays down the principle that the fundamental factor in the development of society is the method of production and ex¬ change ; hence the Socialist movement must simply assist and

hasten the changes in progress. Marx was not only a scholar and thinker, but an organizer and agitator of unusual power. (See Socialism). Consult Aveling, (The Stu¬ dent's Marx* (London 1892) ; Deville, (The People's Marx,* for epitomes of (Capital.* Consult also Bohm-Bawerk, (Karl Marx and the Close of His System* (New York 1898) ; Boudin, L. B., (Theoretical System of Karl Marx in Light of Recent Criticism* (Chicago 1907) ; Croce, B., historical Materialism and the Economics of Karl Marx* (New York 1914) ; Spargo, John, (Karl Marx, His Life and Work* (ib. 1910) ; id., (Sidelight on Contempo¬ rary Socialism* (ib. 1911).

MARY, the mother of Jesus, is known in the Catholic Church as the Blessed Virgin Mary. The name is from the Gr. M apia/j, (Mariam) or M ap'ta (Maria), which in turn is from the Heb. Miryam, a word of uncertain meaning. The New Testament narrative is silent as to her parentage and the place and date of her birth. From tradition and other sources we

learn that her father was Joachim and her mother Anne, that by them she was presented in the temple at Jerusalem when she was three years old, and that in the temple she remained until the age of 12 or thereabouts. Her birth¬ place is variously stated as being Nazareth, Sephoris (Diocaesarea), or Jerusalem. In early youth she was betrothed to Joseph a carpenter, a scion of the house of David, bhe probably belonged herself to the same roya lineage. At all events, she was a cousin of Elizabeth, wife of the priest Zachary and mother of John the Baptist. While Mary was betrothed to Joseph, and before her marriage, she was visited at Nazareth, a city of Galilee, by the angel Gabriel, who announced to her that, by the operation of the Holy Ghost, she should conceive and bring forth a son, to whom was to be given the name Jesus, who should be called the son of the Most High, and who should1 reign over the house of Jacob forever. The angel also said that her cousin Elizabeth had conceived a son in her old age, and was then in the sixth month of her pregnancy Mary thereupon visited Elizabeth in the hill country of Judah, and, in response to Elizabeth s salutation, ((Blessed art thou among women, and blessed is the fruit of thy womb," she uttered under divine inspiration the glorious canticle of praise known as the (Magnificat.) The visit lasted about three months. On her return to Nazareth, Mary ((was found with child of the Holy Ghost.» Joseph, however, was in a dream told by an angel of the true condition of affairs, and, instead of putting her away privately, as was his first impulse, he con-eluded the ritual marriage with her. Some few months later, in obedience to a decree of Caesar Augustus prescribing a general enrol¬ ment, Joseph went from Nazareth in Galilee to the city of David, Bethlehem in Judaea, because he was of the house and family of David, to enrol himself with Mary, who was then great with child. There was no room for them in the inn, and so in a grotto, which served as a shelter for animals, Mary gave birth to her son. On the eighth day afterward the child was circumcised, and was called Jesus, in accord¬ ance with the instruction previously given by the angel Gabriel. Thirty-three days later Mary complied with the law of Moses (Lev. xii, 2-8) by offering herself in the temple at Jerusalem for legal purification, and at the same time she presented her child to the Lord in accordance with Ex. xiii, 2, 12 and Num. xviii 15. On this occasion Simeon pro¬ nounced the canticle of joy known as (Nunc diminish He told Mary that her child was set for the fall and for the resurrection of many in Israel and for a sign that should be con¬ tradicted, and that her own soul a

sword should pierce. Anna the prophetess, on the same oc¬ casion, confessed to the Lord, and spoke oi the child to all that looked for the redemption of Israel. A great danger threatened the life of Mary's son. Herod the Great, king of Judaea, having seen and questioned the Wise Men who had come from afar to pay homage to the newly-born King of the Jews, whose star they had seen in the East, concealed the alarm which these strange tidings caused him, directed the strangers to Bethlehem as the city indicated by prophecies for the birth of Christ, and ad¬ jured them to let him know, on their return to

Jerusalem, where the young king was to be found, so that he too might come and pay him homage. The Wise Men, after offering to the infant jesus their gifts of gold, frankincense and myrrh, were warned by God in a dream not to go back to Herod, and accordingly they de¬ parted by another way into their own country. Herod, not hearing from them, was enraged, and issued an order that every male child two years of age and under in Bethlehem and its borders should be put to death. In the meantime, Joseph, being warned by an angel, had taken the child and his mother and fled into Egypt, and thus the infant Jesus escaped the Slaughter of the Innocents. How long the sojourn in Egypt lasted we do not know. What we are told is that Joseph, advised by an angel of the death of Herod, returned to the land of Israel, but, learning that Archelaus was reigning in Judaea in the room of Herod his father, he decided to go, not to Bethlehem, but to Nazareth, and in the latter city the Holy Family took up their abode.

The chronology of Matthew and the chro¬ nology of Luke, the only evangelists who give an account of the events immediately preceding and immediately following the birth of Chiist, are at first sight somewhat confusing, but they are not conflicting, and are quite capable of reconcilement, although in this case, as in so many others, the reconcilement will not wholly square with the popular belief

After the return to Nazareth, Mary makes but few appearances in the Gospel narrative. We learn that she and Joseph went every year to Jerusalem at the solemn day of the pasch, and that on one of those occasions they lost Jesus, who was then 12 years old, and did not find him until after a three days' search. We next find her at the m3.rria.ge feast at Cana in Galilee, where Jesus, at her request, performed his first public miracle by changing water into wine. After' this she accompanied Jesus to Capharnaum. Once the mother and brethren of Jesus sought to speak to him, but could not reach him for the crowd. During the passion, Mary stood by the cross of Jesus on Calvary, and

from the cross Jesus commended her to John, who from that hour took her to his own. The last mention of her in the New Testament occurs in the Acts of the Apostles i, 14, where it is written that, between Ascension and Pente¬ cost, the apostles were in an upper room in Jerusalem persevering with one mind in prayer with the women, and Mary the mother of Jesus, and with his brethren. After that time we have no certain information as to where she lived, nor do we know when and where she died.' One tradition says that she lived with Saint John at Ephesus and died there; another, that she lived and died at Jerusalem. Baronius, in his < Annals, > gives the date of her death as a.d. 48. In fixing that year he relied on a pas¬ sage in the <Chronicon> of Eusebius; but there is grave doubt as to the genuineness of that passage in the ˆhronicon,* and the present tendency is to regard it as a later interpola¬ tion. The general, perhaps even universal, be¬ lief among Catholics is that after her death Mary's body, as well as her soul, was assumed into heaven; but this bodilv assumption has not yet been made a matter of faith. Thy Catholic Church teaches that Mary was conceived with¬ out original, or racial, sin; that she never com-MARY

mitted actual, or personal, sin; that she was truly the mother of God; and that she always remained a virgin. The doctrine of the Im¬ maculate Conception (q.v.) was not explicitly discussed until the 12lh century ; but it is claimed that it is implicitly contained in the teachings of the early Fathers of the Church. The festival of the Conception of the Blessed Virgin was certainly celebrated in the Greek Church in the 7th century. It was possibly kept in Spain in the same century. It was ob¬ served in Ireland as early as 900, in parts of Italy before 1000, and in England, France and Germany in the 12th century. Saint Bernard, himself a devout client of Mary, upbraided the canons of Lyons for instituting (1140) such a festival without the sanction of the Holy See. He himself did not admit that her conception was sinless. Saint Thomas Aquinas, the Dominican, and Saint Bonaventura, the Fran¬ ciscan, hesitated to accept the doctrine of the Immaculate Conception on the ground that, un¬ less Mary had been at some time one of the sinful, she could not truly be said to have been redeemed by Christ. John Duns Scotus, the Franciscan, put forward, on the other hand, the doctrine of preredemption. He held that it was as high a tribute to the merits of Christ to assert that Mary-was by

Him kept free from all taint of original sin, as to say that she first contracted sin and was subsequently delivered from it. This view, at first seriously and even angrily contested, gradually spread, and gathered force and momentum with the progress of time. The Council of Trent de¬ clared that in its decrees on original sin it did not include <(the blessed and immaculate Virgin Mary, Mother of God.® At length Pope Pius IX, on 8 Dec. 1854, promulgated the Bull, Ineffabilis Dens, in which is given the authori¬ tative definition, as follows. ((We define that the doctrine which holds that the Blessed Vir¬ gin Mary, from the first instant of her concep¬ tion, was, by a singular grace and privilege of Almighty God, in view of the merits of Jesus Christ, the Redeemer of the human race, pre¬ served from all stain of original sin, is a doc¬ trine revealed by God, and therefore to be firmly and steadfastly believed by all the faith¬ ful.® The dogma of the Immaculate Concep¬ tion is rejected by the general body of Protes¬ tantism, by many schismatics, and by the sect known as Old Catholics.

Scripture and tradition agree in attributing to Mary the greatest personal sanctity, and there is no dispute that the Church has always held her to be free from the commission of actual, or personal, sin. Saint Augustine crystallizes this view when he says ((De natura et gratia,* c. 36) that, out of honor to the Lord, he wishes no question to be made of the holy Virgin Mary when sin is treated of. Her complete freedom from actual sin is confirmed bv the Council of Trent (Sess. VI, can. 23) : <(If any one say that man, once justified, can during his whole life avoid all sins; even venial sins, unless by a special divine privilege, as the Church holds in regard to the Blessed Virgin, let him be anathema.®

In the New Testament Mary is called <(t'he mother of Jesus® (John ii, 1, xix, 25, 26; Acts i, 14) and ((mother of my Lord® (Luke i, 43), and there are attributed to her the usual functions of motherhood, namely, conception, gestation,

parturition, and giving suck; but she is not specifically designated ((mother of God.® The belief that that title was properly her due pre¬ vailed, however, in the Church from the be¬ ginning. The term Oeordnog (Lat. Deipara — mother of God) was probably first formally ap¬ plied to her toward the end of tie 3d century by theologians of Alexandria. It occurs, for example, in the works of Origen. It came into common use in the 4th century, being found in the writings of Eusebius, Athanasius, Didymus, and Gregory of Nazianzus. As Saint Cyril of Alexandria put it (De Recta Fide ad Regin., c. 9), (<This

name QeoTonog Was perfectly familiar to the ancient Fathers.® Nestorius, however, contended that Mary was not right¬ fully called mother of God, as she was the mother, not of God, but of a mere man. Thereupon the Council of Ephesus (431) laid it down as an article' of faith that Mary is really and truly the mother of God. The words of the decree are: <(If any one does not confess that Emmanuel is truly God and consequently that the holy Virgin is the mother of God (Qeor6novf Dei genitricem) — inasmuch as she gave birth in the flesh to the Word of God made flesh, according to what is written: (The word was made flesh* — let him be anathema.® This decree was confirmed by several later Councils, e.g., Chalcedon (451) and Constanti¬ nople (553). It may be added that this teach¬ ing was sanctioned in the English Church, for in the first Book of Common Prayer (1549) Mary is called C(mother of Thy Son Jesus Christ our Lord and God,® and it is still ac¬ cepted by many, perhaps most, Anglican divines.

The title del napdevog (Lat. semper virgo, ever virgin, always a virgin), which represents a very early belief in the Church, was incor¬ porated in the Creed by the Fifth Ecumenical Council of Constantinople in 553 — (<qui de coelis descendit et incarnatus de sancta gloriosa Dei genitrice et semper virgine Maria (£« rfjg ay lag evdoˆov Q£ot6kov Kai aenrapdevov M apiag)

natus est ex ea.® The doctrine of Mary's perpetual virginity, that is, that she re¬ mained a virgin before, during, and after parturition, was further emphasized by the Lateran Council in 649 and by the Sixth Ecumenical Council of Constantinople in 680. It is indisputably orthodox both in the Eastern and the Western Church. It is not accepted by Protestants in general, and has been the object of severe attack by modern Rationalists and infidel Bible critics.

The principal feasts held in honor of the Blessed Virgin are the Purification, 2 February (14 February in the Armenian Church) ; the Annunciation, 25 March; the Visitation, 2 July; the Assumption, 15 August; the Nativity of Mary, 8 September; the Presentation of Mary in the Temple, 21 November; and the Immacu¬ late Conception, 8 December (9 December in the Eastern Church). There are, besides, many minor feasts, some locally celebrated, and others general.

Devotion to the Blessed Virgin has been prev¬ alent in the Church from very early times. It received a fresh impetus from the above-mentioned decree of the Council of Ephesus. The relationship of motherhood in which Mary had been declared to stand to God, stamping as authoritative the already existing popular

belief, made invocation of her as a powerful intercessor with her divine Son a natura corollary, and devotion to her grew apace In the Middle Ages it was widespread. In England it was so common and entered to such an extent into practical life that that country was long known as Mary's Dowry. The promi¬ nence which Mary had thus attained in Roman Catholic devotions and in popular estimation produced a reaction among the

They believed indeed in the birth of Christ from

a pure virgin, who was consequently to be honored as His mother; but their fundamental position, that the justification and salvation of sinful man are accomplished through faith n Christ alone, caused them to repudiate the idea of a mediator with the mediator, ot any creature coming as intermediary between the soul and Christ. The ineyitable result, among Protestants, was an immediate dethronement ot the mother from her high place as intercessor with her Son, and the immediate or later denial and striking away of some of her proudest prerogatives. This change of attitude is made evident, for example, in the first Book of Com¬ mon Prayer (1549) of the English Church, in which the words of the Sarum rite, glorious and ever Virgin Mary,® are changed to «g onous and most blessed Virgin Mary ® and still more evident in the second Book (1552) and m the 15th and 22d Articles of Religion (1553) In some sections the Puritan element in Protestant¬ ism carried its feeling against Mary so far as to scruple the singing of the 'Magnificat, and to abandon the public use of the Apostles Creed because her name occurs in it. Even as recently as 1898 this spirit of opposition to any honor or invocation of Mary succeeded in securing the rejection of the 'Stabat Mater5 from the < Church Hymnary > and the removal of the words, ((Son of Mary,® from one of the hymns. Such extremes, however, brought about another reaction. In the 18th century even 'he Scottish Church introduced the Virgin into the public services in one of its "Paraphrases,® in another restored the use of the (Magnificat .5 in metre, and in recent years authorized the singing ot it in prose and the recital of the Nicene and Apostles' Creeds. The English liturgy never abandoned these. Further, it retained and still retains, in its Calendar, among the "Feasts to be observed/5 several festivals of the Blessed Virgin. Many Scottish and English divines have written of Mary in terms of great rever¬ ence, tenderness, and beauty.

It may be fairly stated that at no time in the history of the Catholic Church have love of Mary and devotion to her been purer or more extensive and intensive than they are at the present day. The Ave Maria is second only to the Lord's Prayer in frequency of use. The Rosary and the Litany of the Blessed Virgin are recited publicly and privatelv by millions of persons every day. Special hymns composed in her honor, like the 'Ave, mans Stella, > the 'Stabat Mater, > the 'Alma Redemptoris Mater,5 and the English 'Daily, daily sing to Mary,5 are frequently said or sung. .At the end of everv low Mass three Ave Marias and the 'Salve Regina. > as well as other prayers, are publicly recited in the vernacular by the priest and the congregation. The month of May is dedicated to Mary, and devotions in her honor are publiclv conducted every day during

that month. Every day in October the Rosary of the Blessed Virgin is publicly recited. Even Saturday in the year is specially dedicated to her Sodalities established in her honor exist in every land. In all this the Church, following the teaching of the Fathers and the Councils and especially of the Council of Trent (154b 63), always carefully distinguishes between Bie adoration or supreme homage due to God alone and the reverence that mav properly be shown to any of His creatures. Epiphamus long ago laid down the rule: "Let Mary be held m honor.

Let the Father Son, and Holy Ghost be adored,

but let no one adore Mary UaPiav ˆ

irpoaKvvt'iTu) Latvia is the name given to the adoration of God; dulia is the name gi\en to the honor shown to the saints or to angels.

As Mary is above all saints and angels "Queen of angels® and "Queen of all saints she is entitled in her Litany -the degree of veneration shown to her is called hypci dulia, which, while it is greater in degree than dulia, is infinitely below latria and differs in essence from it. Not every Catholic knows those words ; but every Catholic, no matter how ignorant otherwise, feels and knows the dis¬ tinction which they connote. . ,

What Christian art owˆes to Mary it would be well nigh impossible to tell. Painters, sculptors, architects, musicians, and poets have outdone themselves in celebrating, her praise. (See Madonna in Art). Shrines in her honor sprang up everywhere. In pre-Reformation England the

country wˆas studded with suen shrines, the most celebrated being our Ladv of Walsingham, in Norfolk. Among modern shrines the famous ones of the Holy House ot Loreto in Italy, Einsiedeln in Switzerland, Lourdes in France, and Guadalupe in Mexico mav be singled out for special mention.

It is of interest to note that, by decree of the Sixth Provincial Council of Baltimore (1846, confirmed 1847), the Blessed Virgin Mary, conceived without sin, was chosen as the patron of the United States of America.

Bibliography.— The amount of reading matter on this subject is, as might be expected, immense both in quantity and range. The fol¬ lowing books may with advantage be consulted on the points with which they deal : Locnus, ‘Maria augusta Virgo Deipara5 (Atrebati 1608) ; Dudinck, ‘Mundus Marianus5 (Colomae 1644) ; Riccardi, ‘Storia de’ Santuarn piu celebri di Maria Santissima sparsi nel mondo cristiano) (4 vols., Milano 1840—44) ; Newman, ‘Development of Christian Doctrine) (London 1845) ; Passaglia, ‘De immaculato Deiparse semper Virginis conceptu … commentarius (3 vols., Romse 1854-55) ; Gousset, ‘La Croyance generale et constante de 1’Lglise touchant l’immaculee conception de la bienheureuse Vierge Marie> (Paris 1855); Pusey, ‘Eirenicon5 (Oxford 1865-69); Bourasse, ‘Summa Aurea de Laudibus Beat* Mari* Virginis5 (13 vols., Paris 1866 et seq.) ; ‘Hymns to the Virgin and Child5 (E. E. T. S., ed. Furnivall, 1867) ; Northcote, ‘The Celebrated Sanctuaries of the Madonna5 (London 1868) ; ‘Mirror of Our Ladv5 (E. E. T. S. 1873) ; La Fuente, ‘Vida de la Virgen Maria con la historia de su culto en Espana5 (2 vols., Barcelona .1879) ; Water-ton, ‘Pietas Mariana Britannica5 (London 1879) ; Jameson, ‘Legends of the Madonna5 (Boston 1881); Kurz, ‘Mariologie5 (Ratisbon

1<S81) ; Northcote, (Mary in the Gospels) (London 1885) ; Lehner, (Die Marienvereh-rung in den ersten Jahrhunderten) (2d ed., Stuttgart 1886) ; Bridgett, (Our Lady’s Dowry) (4th ed., London n.d.) ; Schaff, (Creeds of Christendom’ (New York 1890) ; Rudniki, (Die

beriihmtesten Wallsfahrtsorte der Erde' (Paderborn 1891) ; Lee, (The Sinless Concep¬ tion of the Mother of God: a Theological Es¬ say' (London 1891) ; Hurll, <The Madonna in Art' (Boston 1897) ; Venturi, (La Madonna' (Milan 1900) ; Pimentel, (Historia do culto de Nossa Senhora em Portugal' (Lisboa 1900) ; Terrien, (La Mere de Dieu et la mere des hommes d'apres les Peres et la theologie' (4 vols., Paris 1900-02) ; Ulla-thorne, (The Immaculate Conception of the Mother of God' (2d ed., London 1904) ; Manresa, (La Virgen Maria en la litteratura Hispana' (Rome 1905) ; Kronenburg, (Maria's Heerlijkheid in Nederland' (Amsterdam 1905— 10) ; Neubert, (Marie dans l'Lglise anteni-ceenne' (Paris 1908) ; Hartwell Jones, (Celtic Britain and the Pilgrim Movement' (London 1912) ; Beissel, (Wallfahrten zu unserer Lieben Frau in Legende und Geschichte' (Freiburg im Bresgau 1913) ; Pohle-Preuss, (Mariology' (Saint Louis 1916).

The principal apocryphal writings relating to Mary are (Evangelium Jacobi' ; (Liber de in-fantia Mariae et Christi Salvatoris' ; (De nativi-tate Mariae'; (Evangelium Ps. — Matthaei' ; (Historia Josephi fabri lignarii' ; <Evangelium Mariae' ; I toavvov tov QtoAoyov ?.oyog rig rr/v Koigr/cuv rrjg deordicov, (Transitus Mariae.'

P. J. Lennox,

Professor of English Language and Literature, The Catholic University of America.

MARY I, queen of England, known popu¬ larly as ((Bloody Queen Mary" : b. London, 18 Feb. 1516; d. there, 17 Nov. 1558. She was a daughter of Henry VIII. After the death of her mother, Catharine of Aragon, she was de¬ clared illegitimate; but was restored to the succession in 1544. She was bred by her mother in the Roman Catholic faith, on which account she was treated with rigor under Edward VI. She ascended the throne 16 July 1553, after an abortive attempt to set her aside in favor of Lady Jane Grey (q.v.). One of her first meas¬ ures was the reinstatement of the Roman Catholic prelates superseded in the late reign. Her marriage to Philip II of Spain, united as it was with a complete restoration of the Catho¬ lic worship, produced much discontent. Insur¬ rections broke out under Cave in Devon¬ shire, and Sir Thomas Wyatt in Kent, which although suppressed, formed sufficient excuses for the imprisonment of the Princess Eliza¬ beth in the Tower and the execution of Lady lane Grey and her husband, Lord Guilford Dudley. England was now formally declared to be reconciled to the Pope; the original laws against heretics were revived, and about 200 perished at the stake, including Cranmer, ˆLatimer and Ridley (qq.v.). Under Philip's in¬ fluence a war

began with France, which ended in the loss of Calais in 1558, after it had been in the hands of the English for above 200 years. This disgrace told acutely upon Mary's already disordered health, and she died after a reign of five years. Consult the (Life' by Strickland in Wives of the Queens of England' (new ed.,

1864-65) ; Lingard, John, (History of England' (6th ed., London 1855) ; Froude, (History of England' ; id., (The Reign of Mary Tudor' (New York 1910) ; Stone, J., (Mary I, Queen of England' ; Mullinger, J. B., (Philip and Mary' (in (Cambridge Modern History,' Vol.

II, Cambridge 1904) ; Hume, Martin, Two English Queens and Philip' (New York 1908).

MARY II, queen of England: b. London, 30 April 1662 ; d. there, 28 Dec. 1694. She was the daughter of James, Duke of York, after¬ ward James II. She was married in 1677 to William, Prince of Orange, and when the Revo¬ lution was effected which dethroned her father, Mary was declared joint-possessor of the throne with her husband, King William, on whom the administration of the government de¬ volved. During the absence of William in Ire¬ land in 1690-91, Mary managed parties at home with extreme prudence, and acted with equal ability as regent in 1693 and 1694. She was strongly attached to the Protestant religion and the Church of England. She endowed William and Mary College, Virginia, originally intended for the training of missionaries. See William

III, and consult Burnet, 1 Gilbert, (Essay upon the Life of Queen Mary' (London 1695) ; Doebner, (Memoirs and Letters of Mary II, Queen of England' (Leipzig 1886) ; Marshall, (Kensington Palace in the Days of Queen Mary' ; Morris, M., (Reign of William and Mary' (New York 1910) ; Grew, E. and M. S., (The Court of William III' (Boston 1910) ; Rait, R. S., (Five Stuart Princesses' (ib. 1908).

MARY OF THE INCARNATION,

French-Canadian Ursuline nun and educator: b. Tours, France, 1599; d. Quebec, 1672. Her maiden name was Guyard and in her 18th year she became the wife of M. Martin, but was left a widow with an infant son at 19. She even¬ tually took the veil in the Ursuline Convent at Tours, and in 1639 went to Canada as superior of the convent established at Quebec by Madame de la Peltrie. She was extremely successful in administering the school for girls which the Ursulines

opened, impressed all with her strong and beautiful personality, which was emphasized by her fine manners and tall stature, and she is one of the most stately and interesting figures in early Canadian his¬ tory. She wrote an autobiography. Consult (Lettres de la venerable Mere Marie de l'lncarnation' (Paris 1681) ; Casgrain, (Life of Mary of the Incarnation' (Montreal 1886) ; Charle¬ voix, (La vie de la Mere Marie de l'lncarnation' (Paris 1724), and her son's life, (La vie de la venerable Mere Marie de l'lncarnation' (Paris 1677).

MARY MAGDALEN. See Magdalen ; also Mary.

MARY STUART (Mary, Queen of Scots), queen of Scotland: b. Linlithgow Pal¬ ace, 8 Dec. 1542; d. 8 Feb. 1587 at Fotheringay Castle. The only child of James V of Scotland and Mary of Guise, she was proclaimed queen upon his death, 14 Dec. 1542, and was crowned 9 Sept. 1543 at Stirling Castle. Negotiations for her hand by the future Edward VI of England came to nothing in spite of the at¬ tempt to effect the betrothal by force of arms. In 1548, having been betrothed to the French Dauphin, she was sent to Paris, where 10 years

later she married the Dauphin, who died in 1560 soon after coming to the throne. Mary r < r' turned to Scotland, where her French Catholic training and the new Sc.ottish Reformation made her position a hard one. She diplomatic¬ ally yielded to the force of circumstances and surrounded herself with Protestant advisers.

A match between the Scottish queen and Don Carlos of Spain, heir of Philip II, was all but arranged when Mary, in 1565, met Lord Dain-ley her cousin, whom she married 29 July 1565. She had hoped to win by this marriage the English Catholics, with whom Darnley had great influence, and to unite all Catholic claims To the English throne, Darnley (see Margaret Tudor) being next in succession to Mary; but her husband's weak ambition made him the tool of the Protestant plot against Rizzio an Italian favorite of the queen, who was killed 9 March 1566, being brutally dragged from Mary's dining-room. Three months

later Mary gave birth to* a son (later James I of England). She was temporarily reconciled to Darnley; but on 10 Feb. 1567, Darnley's house was blown up and he was killed. Mary had been in the house late the evenipg before, and the murder was laid to the Earl of Bothwell, whom Mary married 15 May 1567. This act turned all the nobles against her; she was forced to surrender to her enemies and on 24 July 1567 to abdicate the crown. She was imprisoned in Loch Leven Castle ; escaped thence in May 1568 ; was un¬ successful in her attempt to raise an army , crossed into England, entrusting herself # to Elizabeth; and was almost immediately im¬ prisoned. Elizabeth wished to put Mary out of the way, seeing in her a dangerous rival for the English crown, but fear of France and Spain held her back until 1585, while Mary was imprisoned at Tutbury and entrapped into the Babington conspiracy against Elizabeth. Although her complicity was not clearly proved she was beheaded at Fotheringay. The moot point in Mary's tragic history is whether she was a party to' Bothwell's assassination of Darn¬ ley. That she was is apparently proved by letters from her to Bothwell, which the Scot¬ tish nobles declared they found in Bothwell's jewel-case but the originals of these letters are not to be found, and their authenticity is doubtful The matter-is ablv discussed in Cowan's (Marv, Queen of Scots> (1901) and Lang's (The Mystery of Mary Stuart' (1901). The point at issue is, however, < confused by making it depend on the authenticity of these letters, for Mary's guilty knowledge of the plot against Darnley seems indubitable.ˆ But her career had more than a personal signifi¬ cance since in her person were combined the last hopes of Catholic rule in England and an intense devotion to Catholicism. Personally she was of a dazzling complexion, apparently her main claim to beauty, marvelously winning, as her early career shows, and clever in argu¬ ment, as was evidenced nowhere more plainly than in her trial for treason.

Bibliography. — Bell, H. G., (Life of Mary, Queen of Scots) (2 vols., London 1890) ;

Bresslau, (Die Kassettenbriefe der Konigin Marie Stuart> (in (Historisches Taschenbuch,> 6th ser., Vol. I Leipzig 1882) ; Cowan, Samuel, (Mary, Queen of Scots, and Who Wrote the Casket Letters?' (London 1901) ; id., (Last

Days of Mary Stuart and Journal of Burgoyne, her Physician' (Philadelphia 1907) , Froude I A., (History of England' (London 1881); Henderson, T F., <The i Casket .Letters and Mary, Queen of Scots'

(Edinburgh 1889) , id (Mary, Queen of Scots: Her Environment and Tragedy' (2 vols., New York 1905) ; Lang, Andrew, (The Mystery of Mary Stuart' (Lon¬ don 1904) ; Lloyd, C. E. (ed.), 'State Trials of Mary, Queen of Scots' (Chicago 189y) , Mac-cum, F. A., <Mary Stuart' (2d ed., New York 1907); Mignet, F. A. A., <Histoire de Mane Stuart' (2 vols., Paris 1851); Mumby, F A.,

(Elizabeth and Mary Stuart' (Boston 1914) ; Robertson, William, (History of Scotland dur¬ ing the Reigns of Queen Mary and King James VI' (2 vols., London 1759) ; Shoemaker, M. M.,

< Palaces and Prisons of Mary, Queen of Scots' (New York 1903) ; Strickland, Agnes, (Life of Mary, Queen of Scots' (2 vols., London 1873).

MARYBOROUGH. (1) An Australian town in Talbot County, Victoria, about 100 miles north of Melbourne. It contains several factories, machine works and gold mines. Its railroads are of considerable importance on ac¬ count of its central geographical position. Pop. 5,675. (2) Another Australian town in March

County, Queensland, about 180 miles north of Brisbane. It is also a railroad centre and a gold mining region. The other industries are timber, coal, sugar and sugar refineries, foun¬ dries, boot and shoe factories, soap works, saw mills, fisheries, ship yards, *etc.* Pop. 11,626.

MARYLAND, one of the 13 original States, was seventh to ratify the United States Constitution (25 April 1788). Situated on the Atlantic Coast, it extends from lat. 37 53

to 39° 43' N. and from long. 75° 4' to 79° 33 W.

It is bounded on the north by Pennsylvania and Delaware, on the east by Delaware and the Atlantic Ocean, on the south by Virginia and West Virginia and on the west by West Virginia. The entire course of the Potomac River lies in Maryland. The extreme length of the State from east to west is 240 miles and its extreme width from north to south is 125 miles. At its narrowest point near Han¬ cock, the width is only about three miles. The State's shape is roughly that of two triangles meeting at this narrow point. The total area is 12,210 square miles, of which 2,350 square miles are covered by water, leaving 9,880 square miles of land. Annapolis is the capital and Baltimore is the chief commercial, financial and industrial centre. The State is subdivided into 23 counties, in addition to Baltimore city. For polling purposes the counties are subdivided into election districts, and there

are about 100 incorporated municipalities, the largest of. which are Cumberland, Hagerstown and Frederick.

Topography. — Maryland possesses great varietv of physiographic features. The State is divided by the Chesapeake Bay into two parts, known as the Eastern and Western Shores. The Eastern Shore is the smaller divi¬ sion and is a level region, forming a part of the Coastal Plain, the land rising toward the north, in Cecil County, to the height of about 100 feet, while in Worcester County, at the south, the highest elevation is only about 25 feet. The land is broken by rivers which are navigable, as far as tidewater extends, for they are really tidal estuaries, rather than rivers.

MARYLAND.

“Estimated population, 1,362,807

COUNTIES

Pop. Pop.

62.411 Allegany . A 1 27,965 Harford . B 18

39,553 Anne Arundel …E 15

747,349 Baltimore . C 15

700,000 Baltimore City..D 16

10,325 Calvert . J 16

19,216 Caroline . G 22

33,934 Carroll . A 12

23,759 Cecil . B 21

16,386 Charles . J 13

28,669 Dorchester . K 20

52,673 Frederick . D 9

20,105 Garrett . K2

Incorporated Cities,

616 Aberdeen . B 19

8,760 Annapolis . G 17

9 Arundel-on-the-Bay,

G 17

*700,000 Baltimore . D 16

1,005 Belair . B 18

‘ 1,317 Berlin . L 27

9 |308 Betterton . D 20

■ 262 Bishopville . K 28

,rr 460 Bladensburg, Prince

George . H 14

0 1372 Bloomington . L 5

n 759 Boonsboro . C 7

H’P 19 Bridgetown . .

i«* 835 Brookeville . E 12

3,721 Brunswick . D 8

f 0 228 Burkittsville,

Frederick . C 8

6,407 Cambridge . J 20

-* 518 Cecilton . C 22

1,435 Centerville . F 20

274 Charlestown . B 21

P1.016 Chesapeake City .B 22

2,735 Chestertown . E 20

306 Church Hill . E 21

521 Clear Spring . A 5

3,468 Crisfleld . 0 22

228 Crumpton . E 21

26.074 Cumberland . J 7

170 Damascus .

988 Deer Park . L 2

959 Delmar .

1,481 Denton . G 22

280 East New Market . J 21

3,083 Easton . H 20

2,487 Elkton . B 22

1,151 Ellicott City . D 14

1,054 Emmitsburg . A 11

1,050 Federalsburg . I 22

11,112 Frederick . C 19

466 Friendsville . J 1

6,028 Frostburg . J 5

568 Funkstown . B7

625 Gaithersburg … .E 11

262 Galena . D 21

185 Garrett Park …. F 12

325 Girdletree . N 25

203 Glen Echo . G 11

201 Goldsboro . F 22

248 Grantsville . J 4

609 Greensboro . G 22

25,679 Hagerstown . A 7

555 Hampstead . B 14

893 Hancock . A3

4,212 Havre de Grace . .B 20

209 Hillsboro . G 21

516 Hurlock . I 22

98 Hyattstown,

Montgomery ..D10

1,917 Hyattsvllle . G 14

367 Keedysville . C7

689 Kensington . F 12

865 Kitzmiller . L4

16,106 Howard . E 13

16,957 Kent . E 20

32,089 Montgomery … .E 11 36,147 Prince George….H 14

16.839 Queen Anne . F 20

26,455 Somerset . M 23

17,030 St Marys . L 15

19,620 Talbot . I 20

49,617 Washington . A 7

26,815 Wicomico . L 23

21,841 Worcester . M 26

Towns, and Villages

269 La Plata . J 13

2,415 Laurel . F 14

133 Laytonsville . E 12

526 Leonardtown … .L 15 216 Loch Lynn Heights,

Garrett . K 2

1,553 Lonaconing,

Allegany . K 6

523 Manchester . A 13

692 Middletown . C8

1,173 Midland . J 5

399 Millington . D 22

335 Mountain Lake

Park . L 2

622 Mt. Airy . Dll

1,242 Mount Rainier,

Prince George II 14 320 New Market,

Frederick . D 9

446 New Windsor …B 12

974 North East . B 21

1,366 Oakland . L 2

476 Ocean City . L 28

1,191 Oxford . I 19

635 Perryville . B 20

73 Piscataway . I 13

300 Pittsville . K 25

2,369 Pocomoke City

. N 24

476 Point of Rocks… D 8

175 Poolesville . E 9

1,394 Port Deposit . B 20

288 Preston . 121

1,006 Princess Anne … M 23

279 Queenstown . G 19

943 Ridgely . G 21

416 Rising Sun . A 20

781 Rock Hall . E 19

1.181 Rockville . E 11

6,690 Salisbury . L 24

409 Secretary . J 21

960 Sharpsburg . C 6

722 Sharptown . J 23

481 Smithsburg . A 8

1,844 Snow Hill . M 25

1,517 St. Michaels . H 19

318 Solomans . L 17

173 Somerset,

Montgomery … E 11

247 Sudlersville . E 22

565 Sykesville . D 13

1,242 Tacoma Park … G 13

824 Taneytown . All

903 Thurmont . B 19

273 Trappe . I 19

804 Union Bridge… .B 12

361 Upper Marlboro. .H 14

332 Vienna . K 22

582 Walkers ville . C 10

2,702 Westernport . K 6

3,295 Westminster . ..B13 1,571 Williamsport . B 6

362 Woodsboro . B 10

DISTRICT OF COLUMBIA

Estimated population, 363,980

353,378 The District _ G 12 363,980 Washington - H 12

16,046 Georgetown … .G 11

Stewartstown

＞)r PenngrovA pQˆ‘erPioT

reedoro

Jlueridge Summit \

W‘* m rn -I …» i » ••

Ibfcanatunum ‘or 0 Enranit iStatc Sanatori’uiuP.GL r — \SahilTaityitie0 T~V “

syˆarBftk*0

lOalvort i’ rdvidencˆ

Farmington r Pleasant Hill , roVVX$\ (Child;

reek] \ lˆT/Wv,Ip,ˆˆiSl Oliver run-0*’ ˆˆaelroseyTˆHofFmanvilU

! “T EbbvaUˆUcTBˆˆiaLtofley «r

oM/anchdfeter y P.o.

rjh#»S5?*:

x ˆGre*mnoiptv*/ˆ»I’ /ˆˆuineoatV—o, HumpBtead Mt. C FTrenton-TForeston

I ABlaokr

Bald FPiarSt^Tu£/ vQonowingo gmi/r |

^-^KSg

eld Q Dublin lAdt Sliiiree

ˆ Fllimill ’yleavlLleO

xJCb?pr r, F/arkUia Vmklaud’

SwEseRkH

A L LEG AN

■■tfef :L’p&y : ‘ J? Ojˆ skS.

T/p/* . _SVV?’ Sprlnsrsofeoˆ

M,˚Of’R > -‘G A—7-. /

i Tfuui] .Shane,

Tan cytiur

UmbnMi ˆJzLsˆIˆherry b

t f e Tyrone

ˆ(Mˆnur

ˆifVKefeneT,

®8tl6’

;JMaclchur8e j all ChroraeblHA’l

LUPt Jarfettavillel

■nueft l o

L I Vlanctinrn

‘Cavetc

o lv_”M

rfTfr v. i if—, rmSflgonq ! sZAGar ft c 1 5L I in/ jffstjc’ | Catpctinf Middle plilntyi ‘dlfsy ills’ \

Brum mb l ♦ «r Shiloh | Jranb«r{y 8t£

GlenvilR-

AllownvJt;

&*M8arHF$sS“ 1 ‘

£SfiddkV’u§ˆ

‘ “*L ndiesburj

＞r Hew Midway

i / LeGore I

rGUJfloi

.Forest Hill

|n 0 CWPBtt

V*w£

1»%” rRutl, ‘Pleasant V»<

Salem

Quinton^;

Trona 0 ‘Glencoe

W-W.n. . Faftordf »»g«r W«;

MbS Aht^£ttej§£?”*

water VaIwJlQ.AWrdeeii^e‘7 ■analonCrriwei^gf^ „ \oyr$.

0^5*0° oEmmdrtnn

“Wilna Bolba*p4^2

• ‘FFowblesburjr Bclfakt f JBodn^ WeitMn Ru V /WoodeaeOUrg Qrcgrg k~LOCShawano o

rdlerlitn’

Ransom—

lallwood;

Jobn6vlll^™Sv

leasant

mshGroveJ »

i’Bhmnli Laurel Ashland - Hyg

.Marsh

y BeAkeley^^g

M&rtinsburj

[le Liberty tojrn °Ofidtr

1 ° C/iK°’W

UnlonVUlerpAl eld • t

＞x° AX,’*- Cockcv&vil

U*w°vL

“‘4at ＞-3XK^^V

mnr

Antjetan

Lin£tanore‘2-v

‘ — ^°Cs’ew Lone ＜n\® WBodrille - ^ O\oi

;Donald

Eorlevlllo

nsend1

)5r\xx

iC U M B E\R L A N D

/Tow son

teWbaoh i;

Ijeville^^f

K0 Poplar Sprmrs votv^N

^lJlaokbird ljke\ Forest / V Green A Spring*

/Bcttertor^^j (C if m”

-f Still Pond LdcUBt Groves

LyncW^^T* w. Bia,.

Galena

iranite

rj’A.damltown

＞oubˆ～^^a4

in a v Hook

Maaaevl

Alberton

‘Smyrna

S °Brownln(Purduin Damascu ˆ Etohlson . °Wo

Clarksburg siideO/ Goshen ‘o Burdette / ˆn

Wortoi

CbestervUle

miugt]

Morgnec

Kingsley jpr ° ComusJO’ Barnes villt’ Dickeˆotfˆs o Y. O.oS’

I /ˆSellmanSiˆˆ L UJfBarTiesvnieˆSiOAj

£3rx Buck Lodne°“

J\ a BTartinsburg f fl oolesVjllleoYˆl Dawsonwˆle

fTM O •/N°T

:ˆ/0EdwardB Quince Orcbar

rˆL Fe”J

Leipsicˆ V .CheewoldV Xw Dupont

1 Llch ester

‘Tolchester Beach

‘Cliestertow

‘ DˆE R l ineliesterd!

Grifton

ˆBrooke1

,4 0tt ° ,

J-I nln.

/ Hartly _

Slaughter

ˆPomona’

‘Edeavillet

Wyoming.

Lnnapoli3j

Hazlettville

’ -Ctfmden -Magnolia, ‘Woodsida

nˆDer woody ‘ iwn We at mo re A.

Rockyilley

Autroy Park, Mon t rose J

shore

Leesburj

IdentonlS.

S,’»R«mls

[enderaon

ilBSON I! ilountain Pt.

ft Love ak ‘dim r«j(|N< lSandy IJJj 1

S/Muir@W^^ //km inendaleˆLj

p Belts ville > Su n n y side V! e%Jj .

Bridgetown

**ri

Frederica,

/ Centerville.

Kristi ui Kutbshurg0 ‘

9 ~»^^*^sidrh09tgrfiev

Seabrook lCollinm’n p

^rthani Mu\llikin or Rivcrvle’ ! M Mitchdllvillelk-Xj;’ ,

Greensboro,;

Ahnajiolfa^t^’^O^St^ t

ter#xAi’

l “D-»i1X＝BlMt”bd/E|

1 South ^ivero^

. ＜wIIardcoC’C, j

n,]i / Blrdaville^i-TV＞

Harwood0 o

/° Bayard ^.Lothiano o Drury 0 ChurcmonP^l a Jc_Greeuock [t, Calvert \oTrld’v5idu?

K_ Pindell) lJbnW

Loˆrfˆ/CreMˆ |

‘ˆTq\sC fiancy Jipirba-

f/Walsey

Ridgely

Riverton

[ueen Am

ˆCeors.

iillsboroV

Tuokahoe

Rectortown

Cordˆia DentcfnVˆiiobb

J,A: /‘v’i

ˆClaibor^^ Mi-Iilmcl, Wittman yC

Cape

Benlopen

9rP Chapel / MattbeVs Flemings J

^^.ndersontow] Two. Johns

ifeW’ UPPeˆEeaC

yPxc£-‘ / MdrlborolSO

A,£o, fORG E/sy

,d0A‘-c,”“L/.S3

/ Duley UhelCenham ˆ

Ellendale /

1 (Jr) RpbbmsjSˆj — \j

ˆyoSinitˆˆ-. / Xilllton , . , . ˆ ˆ

. — Redden C/ml Sprlngyˆ-ˆˆ ˆaesauˆyˆ

Broadkill or\Harbeson P-Oˆorfˆˆ ˆffiobotb Beach1!

rT \ _r > veMi.dwt‘y

I eor«;«‘ t ow »irm

I 1/ ˆ Tsv \ E a

-*f* \ *W ooda*Branoh Holljvilleˆˆ,ˆ

[\xov fowling Creek ~1 jo \ )

> Newton q Smith ville.

Xewes’

North

Valliai

d Pt ?^N

Eastonjr 1 5

Preston

Llandal

W IPL-FortT

d— ‘^NVa-Miigton p. R Piscataway

tarshall Hall Osborne o l ‘ 0AccokeekTownshcm

Mt. Vernon

Tilpbuiai

[t.Harmony or Paris P.O.’

ˆyjChe’sapeake Beaoh (/,

° inh lrˆ ~

Northkeysˆˆottingham \ Irandyw i“«MMHlarmoay° > .0. \CedarTllle ˆ ˆ

\ a “Wi \ 0 Uaden Mattawoiliawˆ .

< T\oJo

’-it. Green/ A…

Linchcster-

> \dra Black walnut F

(wer Marlboro 0 Wilburn 111 Willows©

X j vert on;

[KUersljc \o HaAu

’(I ward ˆKeyser

af? = T rmiAfi’ J’M

Bethany Beachˆ” llarksvilit o Ocean ˆ

/°OmLˆ ““‘I?1’

F rankford BayarijAy

ISelbyeport’ ©hearvrP1 lemlsvillcj Hˆpcbaugh / Awhuin

(jFjlum Point

kHuntlifgtown «|l>lumpointSl1

>wrˆ J° l*arrano w|})9un

ADares Wharf

Vi’py Prtnce

luena ©\pVeflerick

llilMft Tlioma.ˆfe Ilud sol

Gallant white Plain { Bryanj

TtkA*

_ i 7 I

/East NewV j ® i J Market \ ,

f`Minkwlo.y’ |

/ Reids JL1 rove]

Salem feu

.Cuiub

!u6bmojxht.

Marbury

Sobrider&yi

Thompson ‘iˆv JChur/h Creek ‘

DagBbort

‘Elder .lloyes0 0Sang Run” J Lewis’ Knol)Sˆ MoHenry

iHugbesvillo \ Benedict ,

\{< -

7 Nu rih JBranQJ

BraiHˆpvdˆSieberf Pi ˆKenziˆˆˆˆriP? ˆ

SpThtptown to“ • o Columbia a } ■■■ ”” Ralph!

Potomat

James P James

iPort Tobacco (P. 0> |

ˆ — McConchie.

> A.Merriir

jbacco

Doncaster

Madison Wool ford’

i ill DentsvUW

ˆVienna’

%l IrlTldM’ > nirt

V(ˆ (Cross RoadJ

ˆ.-7 dm! 0A

®uboiˆyXow Market

o. ˆ”“‘jMSsbtiilcMinˆfeTi

wpoft j I oOravilleˆ

7 o Buuttj 3reek Laurel Sandgr ftci V(/- > Grove ˆ ‘ jX Helen °Morg ChapticoV ° Lot

J§L »B»nl

Maddui

owi\kinsville n®P ˆVlˆMilestoiniˆ

| mtNv?v Bush wood,

Alflajl ‘St °D,i

8T . c a x 1 1

“Mutual

ˆ✓WTUjSto

Blact;fT5b/Sr’r,».ll”!7i /•

thirST-iMf “J’ .#•

iedm$nt jfˆGeratell ‘Q Jy yd Dawspn ˆo’ A (ˆST’Wl .reJˆe ZT r~jf .

sThaverville) (. 3«0iJl

＞cteu/» Frtnkˆ -»ˆF?ni.tt9l qV’ Eatreckerpˆ/ BigˆOLokeff

Taylors

;town

Biehupv 1

l8LAˆV

‘ThieJ

.Dunnoc,

.Island Greek

iBirhop

‘cAi c**’

Hebron

Nanjemoy

Riverside^:

i Golden Hill

Rocka walking

|crs. yv

o /■ rn*i«i . Cv«Ar

Robbins0

lewburg

iden Mt.

[uantico ‘

Salisbury,

Martin

5ˆ -S> /Altamonte t

. ˆ /ˆOˆl /lDeerˆPaikU \A

v«. .T’Deer Par AHotel ˆ ˆ

R J A. «r?Kitzmlller_ 1

jCvdlin- .Mountaln Lake.Park ‘ l-sC/ˆA?”:F Ddd3°n

I /Ulortner oyvˆ->7>ySj

r-J \° ˆ\<>Kˆrney

o V. % M=° ˆ*>ˆr4rScheliyˆ Sunnˆsidˆˆˆ XT’*’ ‘ C ˆ

Wetlpquin

‘W^aylandXy

Barren

Powellville ej

oCrapo ; Win gat*

Fruit;

inardtown

Elliott

KING GEORGE

ˆBivalve o< Westerville lanticoke

Issue

Toddvu

Hoopersvifl^v^ V-Q iM.ANftVuN Applegaj

M^TP.isb- >ps Iliad ,

f^kw/L 1^!

) j. k‘7\#10rocheron^

yVhitehaven

Uarboesville I

Komney

o Hermanvillo -Hall’ll

Lorett*

allman

Great Mills

Baskel

Valley Lee!

T’tJormaniaj Bayard J*

a’(v rnf* Chance Oriole

k5un% S i

, Sidei’e Dˆalfˆslandˆˆ/.VmS Edwin

Bloopsworth L

■SnoWHilf

(Twin Mount

jf Dobbin ‘ Henry Wilson ia /

A ADAM /• mP

ˆHofiandste

Houˆnd lJˆ

Arden

PomtAˆ,ˆ Tolsdaˆm St. George1 AˆSt. Geo

Scar boro

Point

(Qirdletr*

‘oinTXoolc*ˆ

9ˆ Hazari

\ i-owonmv «,

Pocombke City-P .jO> Hurslcy or L

V ˆtockton’PC’O.T”

CornfieldˆS

Harborˆ

Kedge» Strait$p-ˆ

IPoint Lookout

9> \ Bea verdauiW ellbo’

SMITH!

Moorefleld

Rhodes Point

Horntown

Island!

Lruv?/i

;ueen

Railroads

m-H- Steam and Electric Lines • • Electric Lines

/

Iting George®

MARYLAND

AND

DELAWARE

SCALE

Statute Miles, 15-1 Inch.

Rand McNally's 11 x HMap of Maryland and Delaware Copyright by Rand McNally k Co.

17

28 286 0

Steamboats ply upon some of these streams, such as the Elk, the Sassafras, the Chester, the Choptank, the Nanticoke, the Wicomico and the Pocomoke, and the rivers frequently serve as county boundaries.

At the head of the Chesapeake Bay, the Susquehanna River enters it, after draining a large section of New York and Pennsylvania; but owing to rapids, the stream is not navigable. The counties bordering upon the western shore of the bay are also for the most part in the Coastal Plain and have similar characteristics to those of the Eastern Shore, although the river banks are higher and often comprise “cliffs® of earth, and the land is of slightly greater elevation and is more rolling. The average elevation is about 125 feet. The bay exercises a genial influence upon the climate of the surrounding region. The winters are usu¬ ally neither long nor severe. The part of the State lying between the bay and the Potomac River is known as southern Maryland. The Western Shore is also divided by rivers: the Gunpowder, the Patapsco, the Magothy, the South, the Patuxent and the Potomac. These rivers differ from those of the Eastern Shore only in that most of their upper courses run into hilly country. The soil on both sides of the bay is either sandy or a light loam, which is favorable to the production of cereals and tobacco, and in which all kinds of fruits and vegetables thrive.

From the Coastal Plain the land rises into the Piedmont region to a height of from 300 to 700 feet toward the Blue Ridge. This Pied¬ mont region is undulating in its surface and is well watered by streams which provide con¬ siderable water power. Some of these streams empty into the bay, such as the Gunpowder, the Patapsco, the Patuxent; andi some are tributaries of the Potomac, such as the Monocacy, the Great Pipe Creek, the Antietam and the Conococheague.’ Some of the smaller streams, such as Jones’ Falls, were called Falls by the early settlers, because of their rapid descent from the uplands. Several ridges, with an elevation of about 800 feet, cross this sec¬ tion, the most important of these being Parr’s Ridge, and they divide the country into valleys which are rich and fertile. Beyond the Blue Ridge, the western part of Maryland forms a part of

the Appalachian Mountain region, and is traversed by the Allegheny Mountains in Allegany and Garrett counties. Some of the peaks of the Blue Ridge are from 2,000 to 2,400 feet high, and the summits of the Alleghanies vary from 1,500 to 3,500 feet above sea-level. The highest point in the State is Backbone Mountain in Garrett County.

The mean temperature for eastern Mary¬ land for spring is 51.7° F. ; for summer, 74.5°F ; for autumn, 55.8° F ; for winter, 36.1° F. ; for the year, 54.5° F. ; for southern Maryland, 53.1°; 75.5°; 57.2°; 36.9°; 55.6°; for north¬ ern central Maryland, 50.6° ; 73.6° ; 54.3° ; 33.1° ; 53° ; for western Maryland, 49.4° ; 72.7° ;

52.7°; 31.7°; 52°.

Geology. — Maryland displays a remarkably complete sequence of all the geological founda¬ tions. The most ancient rocks are here to be found, as well as those still in the process of deposition, and, between these wide limits, al¬ most every important geological epoch is rep¬ resented. In the Coastal Plain, a predominance

of tertiary foundations is found on the Eastern Shore, and, of Mesozoic and Tertiary beds, on the Western Shore. There are few rocks, the country being overlaid with deposits of sand and gravel. In the Piedmont region, on the eastern side of Parr's Ridge (its central water¬ shed), there is a sequence of highly crystalline rocks, in large part, igneous in their origin. On the western side of the ridge, the rocks are only partly crystalline and represent the early Paleozoic time. The rocks of the Frederick Valley are composed of blue Paleozoic lime¬ stone, in part overlaid by red sandstone. The Blue Ridge is made up of Cambrian and Lower Silurian beds, in places so eroded and displaced as to disclose the Archaean floor upon which they rest. The Appalachians proper are made up of sharply folded Upper Silurian and De¬ vonian strata, and the Allegheny Plateau is mainly composed of late Devonian and Car¬ boniferous deposits, containing the coal seams of the Cumberland Basin.

Mineral Resources. — Maryland is rich in mineral resources. Iron ore is extensively dis¬ tributed throughout the Western Shore and in the northern part of the Eastern Shore, and is of good quality for casting and other purposes. The iron industry is of early origin. Forges and furnaces were in operation in the province as early as 1649, and the industry continued, until a recent date, to be an important factor in the prosperity of the State. Most of the old furnaces now have been

extinguished, being unable to compete with the great iron' and steel plants, using ores produced in foreign countries or in distant parts of the United States. The seat of the steel industry of the State is at Sparrow's Point, in the great works begun in 1887, where Cuban ores are chiefly used, mixed with those from Spain and Al¬ geria. The first Bessemer steel ever produced in Maryland was made there 1 Aug. 1891.

The coal deposits of Maryland belong to the Allegheny field and are semi-bituminous, supe¬ rior to any other for generating steam. The portion of this field lying in Maryland is of comparatively small size, but constitutes by far the most important of the State's mineral re¬ sources. It is called the Cumberland, Frostburg or George's Creek Basin. Situated in an elevated trough, west of the city of Cumberland, and between Dan's and Savage mountains, it is about 20 miles long and 4 miles wide. The principal coal bed is known as the Big, or 14-foot, Vein, and has been the chief one worked. Nearly 100,000,000 tons of coal have been shipped from this vein. The coal contains from 72 to 83 per cent of carbon, and its dis¬ covery, about 1804, gave a strong stimulus .o the movement for the construction of the Chesa¬ peake and Ohio Canal and the Baltimore and Ohio Railroad.

Three veins of copper are found in Mary¬ land and,, before the opening of the Western copper mines, thev made it a copper-producing State. Chrome deposits were discovered in Baltimore Countv in 1827 and have been exten¬ sively worked. Some gold has been mined in Montgomery County.

Extensive areas of granite have been quar¬ ried for building stone, especially at Port De¬ posit, in Cecil County; near Woodstock in Bal¬ timore County, (much used in the public build¬ ings in Washington city) ; and near Ellicott

City in Howard County. Gneiss has been quar¬ ried in Baltimore County. The sandstone quarries at the mouth of Seneca Creek in Mont¬ gomery County are important and their prod¬ uct has been much used in Washington city One of the best-known districts in the United States for the production of roofing slate is the Peach Bottom region in Harford County, near the Pennsylvania line. These slates were worked as early as the American Revolution. The most valuable limestone deposits are the highly crystalline marbles at Baltimore County lyfng in a bed extending from Lake Roland through Texas to Cockeysville. These quarries produce the white steps for which the Balti¬ more houses are noted. The Washington Monument in the District of Columbia was built of stone from the Cockeysville quarries. Some of the Maryland marbles have decorative possibilities, and the «Potomac marble® or Cal¬ ico rock® of Frederick County is used in the old House of Representatives in the National Capitol. Maryland limestone is used as flux for blast furnaces and is largely quarried and burnt to produce quick lime for commercial and agricultural purposes.

Hydraulic cement is manufactured near Cumberland and Hagerstown, and at Union Bridge, in Carroll County. Serpentine stones are quarried on Broad Creek in Harfoid County. Clays constitute an important feature of the economic geology of Maryland and are used in the manufacture of building brick, terra cotta and tile work, fire brick and pottery. The workable areas of clay suitable for build¬ ing brick cover a large area of the State, and the Baltimore pressed bricks have been very ex¬ tensively used. In Harford County there are produced large quantities of flint, which is used in the manufacture of porcelain. Kaolin and feldspar of fine quality are found in Cecil County, and glass sand is used fiom Anne

Arundel County. .

Agriculture. — In the provincial period, after a few years in which the fur trade was important, agriculture became the principal em¬ ployment of the people. The settlers lived on large plantations along the shores of the Chesa¬ peake and its tributary streams and cultivated tobacco, with the assistance of indentured white servants and later with negro slaves. There was an active demand for the staple crop in European markets, and an extensive commerce resulted, which brought wealth to the planters. Tobacco became the currency of the

province, and, for a long time, debts and public dues were paid therein. In the early 18th century, the cultivation of grain gradually supplanted that of tobacco, on the Eastern Shore, and, since that time, tobacco growing lands have been limited to the southern part of the Western Shore below the Severn River. For about 175 years there has been a State inspection pf to¬ bacco, and the hogsheads containing it aie brought to large State warehouses in Baltimore. Indian corn, or maize, was grown by the ab¬ origines and has always been largely produced in the State. Wheat finds a congenial soil and climate, and the grain trade of Baltimore has long been great. The fertile soils of Frederick, Carroll and Washington counties contain some of the best farming land in the United States, and large quantities of grain are also grown in Queen Anne's County on the Eastern Shore.

The sandy soil of Anne Arundel County is well adapted to early vegetables and to small fruits, such as strawberries. Large quantities of tomatoes are grown there, as also in hred" erick and Harford counties. The neighborhood of Baltimore and Washington city has caused large numbers of men to raise vegetables tor market in Prince George's, Montgomery, Anne Arundel, Baltimore and Harford counties. Dairy farming is also widely practised in Carroll Baltimore, Harford and Montgomery counties. There is very little vacant land in the State, except some in the swamps of Dor¬ chester County or in the mountains of Garrett County. The value of farm land has consider¬ ably increased of recent years on account of greater accessibility to markets, and runs now from $20 to $150 per acre. The unoccupied land belongs to the State, which maintains a

land office in Annapolis.

There is an important trade from the East¬ ern Shore in sweet potatoes, melons and small fruits, to the markets of Baltimore, Philadel¬ phia and New York. For nearly 50 years large orchards of peaches have been grown on the Eastern Shore and in southern Maryland, and there are now considerable areas of ground in Carroll, Frederick and Washington counties devoted to similar orchards; while many apple orchards have been planted along the mountain sides in the two latter counties. In 1910 there were 48,719 farms in Maryland, of which 33,408 were cultivated by their owners. The value of the buildings was $72,751,000, of the farm ani¬ mals, $30,649,961, of the grain crops of that year, $21,918,730, of the fruits and vegetables

then raised, $15,195,629…

Forestry.— The forest trees are princi¬ pally pine, chestnut, oak (in three varieties, white, black and red), hickory and walnut A deadly blight has destroyed a large part of the chestnut trees in the past few years. A State department of forestry was organized in 1906, and has done much toward producing proper methods of forest management throughout the State. The trade in lumber for pipe staves was one of the very first industries of the province.

Game and Fisheries.— The Allegheny Moun¬ tains still contain deer; wild geese and ducks may be found on the bay; woodcock, grouse and partridges exist in considerable number. The waters of the Chesapeake Bay and its tributaries abound in fish, crabs and oysters, and terrapin were formerly commonly found. The annual value of the food produced by these waters is very great. Oysters, both fresh and canned, and fish are sent to other States, and Crisfield in Somerset County is one of the greatest crab markets in the world. Of recent years, the State has paid especial attention to the con¬ servation of life in the waters, and has en¬ couraged the cultivation of oysters.

Manufactures.— The first manufactures in Maryland, outside of the products of household industry, were those of iron, and the Principio Furnace in Cecil County has been in operation for over 150 years. The country adjacent to the Chesapeake possesses neither coal nor water power. The central portion of the State is well provided with water power, and the far western portion with coal. Maryland enjoys a strategic position from her nearness. Uso to the sources of production of raw material. From her great facilities in water carriage, and from her good

railroad connection with every part of the con¬ tinent, she possesses a very favorable position in regard to manufactures. The factories are mostly established in Baltimore, Cumberland, Hagerstown and Frederick, and in the vicinity of these cities. Large quantities of flour are ground in mills along the Patapsco River, and in Frederick and Carroll counties, and there is much canning of oysters and fish, fruit and vegetables, in Baltimore, and, indeed, through¬ out the State. Textile fabrics, especially cot¬ ton duck, are manufactured near Baltimore, and ready-made clothing is extensively made in that city. Bricks, lumber, straw hats, shoes, shirts, cement, copper manufactures, glass, etc., are manufactured there. Large quantities of munitions of war have recently been made in Baltimore, in establishments which had previ¬ ously made articles of iron and steel for peace¬ ful purposes. Cigars, smoking tobacco, chew¬ ing gum and snuff are also largely manufac¬ tured in that city. The Bromo Seltzer Com¬ pany and the Crown Cork and Seal Company have large factories in Baltimore. This city is the leading market of the South for the manu¬ facture and distribution of fertilizers, of drugs and of chemicals. Large breweries and pot¬ teries are also located there.

Shipbuilding. — The Marylanders of pro¬ vincial times built small sailing vessels, the most interesting types of which were the bugeye and five log canoes, which are still used in the oyster trade on the Chesapeake. After Baltimore was founded, it became a centre of shipbuilding, and the clipper ships which came from its shipyards were famous around the world for their beauty and speed. They carried on trade with South America, and made voyages to the Pacific, as well as to Europe. When steel ships succeeded wooden, there was estab¬ lished by the Pennsylvania Steel Company, about 1888, an important shipbuilding plant at Sparrow's Point, near the mouth of the Patapsco River, 12 miles below Baltimore. This plant has recently been bought by the Bethlehem Steel Company, and has been verv much en¬ larged during the Great War. Another im¬ portant shipbuilding corporation is the Balti¬ more Dry Dock Company, located at Baltimore, on Whetstone Point near Fort McHenry. There are several lesser shipyards, and the out¬ put of Baltimore in the way

of ships is quite important.

Communication. — The Baltimore and Ohio Railroad, — the oldest one in America, — was chartered in 1827, and is still operated under its original charter. In 1830, the first locomo¬ tive in the United States was run over this road between Baltimore and Ellicott City. Originally intended to extend to the Ohio River, it now runs to Philadelphia, to Chicago and to Saint Louis. A branch line runs from Cumberland to Pittsburgh. The Philadelphia, Wilmington and Baltimore Rail¬ road, chartered in 1836, and the Baltimore and Potomac Railroad, chartered in 1853, now form part of the Pennsylvania Railroad, as dp the Northern Central, running from Baltimore through Harrisburg to Rochester, which was chartered in 1854, and the Frederick and Penn¬ sylvania Line Railroad, chartered in 1867. Another series of branches of the Pennsylvania system permeate the Eastern Shore. A third important railroad, the Western Maryland, was vol. 18 — 23

chartered in 1852, and now runs from Baltimore to Hagerstown, to Cumberland, whence it goes by two branches into West Virginia and to Pittsburgh. The Maryland and Pennsylvania Railroad runs from Baltimore to Delta. Elec¬ tric roads lead from Baltimore to Washington and to Annapolis, and another electric road runs from Frederick to Hagerstown, and also to Thurmont. The city of Baltimore has an extensive trolley system, which also serves the suburbs. The first electric railway in the United States, was constructed in Baltimore in 1885. Horse cars had been introduced there in 1860, and they were superseded by cable cars (be¬ ginning in 1889), and trolley cars beginning in 1892. James Rumsey made experiments in the propulsion of boats by steam, in the latter part of the 18th century, upon the Potomac River. The bay and' its rivers were the first highways, and several lines of steamboats run from Balti¬ more to the heads of navigation of these rivers, while ocean-going vessels ply regularly, north¬ ward and southward, along the coast and to foreign lands. In 1844 the first line of tele¬ graph constructed in the world was operated between Baltimore and Washington, and tel¬ egraph and telephone lines now reach every part of the State. The roads were poor unt'l about 1800, when an era set in of very con¬ siderable construction of macadamized turn¬ pike in the western part of the State. Most of the turnpikes have now become part of an ex¬ cellent system of State roads constructed be¬ tween 1905 and 1915, which links together every county in Maryland. The desire for the im¬ provement of the Potomac River, so as to render it navigable, a project in which George Washington took great interest, led to the be¬

ginning of. the Chesapeake and Ohio Canal in 1826. Designed to cross the Allegheny Moun¬ tains, it was never completed further than from Georgetown, D. C., to Cumberland, and it is now chiefly used for the transportation of coal from the mines to tidewater. A canal along the Susquehanna has long been abandoned, but one for ships across the Eastern Shore, extend¬ ing from the head of the Elk River to the Delaware River, is still used by daily trips of steamboats from Baltimore to Philadelphia, and is expected soon under Federal ownership to be much increased in draft.

Commerce. — Baltimore is practically the only port of entry in the State. In 1916 the imports of merchandise at this port were val¬ ued at $8,414,193 of dutiable articles and at $30,527,473 of articles free of duty, and in 1917 at $7,958,139 of dutiable articles and at $29,005,646 of articles free of duty. The greatest value of any article imported on the free list was manganese ore ($6,910,396), next came wood pulp ($6,834,157), nitrate of soda ($3,180,545), pig iron ($2,192,609), crude min¬ eral oil ($1,887,734), copper ($1,716,672), iron ore ($1,392,559). Molasses came first among dutiable articles, with a value of $2,957,060; corks second, with a value of $923,128. The total value of exports for 1917 was $377,623,- 300, compared with $290,312,216 for 1916, an increase of more than 30 per cent. Copper stood first among exports in 1917, with a value of $84,341,482, and was followed by iron and steel ($73,790,708) , wheat ($45,806,823), Indian corn ($22,047,886), flour ($19,532,954), raw cotton ($17,696,807), rye ($15,961,340), oats

($14,407,329), brass ($14,093,614), tobacco ($12,113,711), chemicals ($9,094,384). During 1917, Canadian articles (valued at $12,992,- 021) were exported from Baltimore, in transit, the chief articles being wheat ($10,903,879), oats ($893,871) and wheat flour ($686,465). The city has an important coastwise trade.

State Finances. — The gross amount of the State's debt is $27,448,880, and after deduct¬ ing productive stocks and the sinking fund, the net debt amounts to $18,655,983. The total assessed value of property in 1916 was $1,182,- 456,531, of which the valuation of Baltimore city property amounts to $646,493,644 and that of the counties to $535,962,867. The city pays 54.67 per cent of the direct State taxes. The real estate in the counties is assessed at $422,- 292,436. The State tax rate in 1910 is 36f| cents on each $100, and the tax is chiefly levied to pay for the public schools and for the State debt. The tax rate in Baltimore city is usu¬ ally in the neighborhood of $2 per $100 of valuation, and the assessment is little below the full value of property. Tax rates in the counties vary from about $0.90 to $1.40, and in the municipalities, from $0.50 to $1.28.

The receipts of the State for the fiscal year ending 30 Sept. 1917, amounted to $1 1,676,471, and the balance in the treasury at the begin¬ ning of the year was $1,624,095. The disburse¬ ments for the year were $11,450,622, leaving a balance of $1,849,904. To this should be added a balance in funds account of $423,715, and de¬ ducted on account of dedicated funds, $1,633,- 200, leaving $640,420 as the balance of general funds. Taxes on gross receipts of corpora¬ tions brought in $1,029,090; on collateral in¬ heritances, $300,254; on insurance companies' licenses, $412,205 ; on motor-vehicle ' licenses, $733,858; on liquor licenses, $1,324,015. For the general government there were expended $499,384; for protection of persons and prop¬ erty, $671,164; for promotion of agriculture, $402,378; for conservation of natural re¬ sources, $156,094; for conservation of health, $132,470; for maintenance of highways, $2,664,- 470; for maintenance of hospitals, homes and asylums, $1,448,274; for maintenance of cor¬ rectional institutions, $157,750; for education, $1,907,025, and for interest on the public debt,

$1,042,195.

Government. — The legislature consists of two houses: a senate of 27 members (one sen¬ ator from each county and from each of four districts into which Baltimore city is divided), and a house of delegates of 101 members (each county sending from two to six delegates, and Baltimore city ranking as four of the largest counties). Regular legislative sessions are held biennially in the even years, beginning on the first Wednesday in January and may not exceed 90 days. Members receive $5 per dav during the session. Extra sessions are held at the call of the governor and may not exceed 30 days. There are six representatives of the State in Congress: one from the Eastern Shore, a second from Harford, Baltimore and Carroll counties and a part of Baltimore city, a third and a fourth from districts entirely in the city, a fifth from southern Maryland and a part of Baltimore city and a sixth from western Maryland. The Democratic party usu¬ ally has a majority in the general assembly. Senators are elected for four and delegates

for two years. The executive department has at its head the governor, elected in 1919 and at four-year intervals thereafter. He receives a salary of $4,500 a year, the use of an executive mansion and an allowance for expenses. The administration is more unified than in many States, as the governor has extensive powers of appointment. His financial control is very great. All bills are submitted to him after passage by the general assembly for approval and veto. For some years he has possessed the power of vetoing separate items of ap¬ propriation bills, and it was even held that this power included that of diminishing the amount of appropriations voted by the legislature. In 1916 the people adopted a constitutional amend¬ ment which has placed an autocratic power of budget making in his hands. He now prepares and submits to the general assembly a pro¬ posed budget of appropriations, which they may diminish, but not increase, from which they may strike out items, but to which they can add none.

The judicial system of the State consists of three parts. The highest tribunal is a Court of Appeals of eight judges, seven of whom are the chief judges of the circuits into which the counties are grouped, and the eighth is chosen from Baltimore city. The governor designates one of these judges as chief judge. A Cir¬ cuit Court is held in each county, and in each circuit there are two judges (in the circuit composed of Baltimore and Harford counties there are three judges), in addition to the chief judge. In Baltimore city there are 10 judges

who sit together as the supreme bench of the city and assign themselves, from time to time, to sit separately in the several city courts. All these previously-named judges are. elected for 15 years by popular vote at elections in odd years. A judge who has reached the age of 70 years may not complete his term, unless a special vote in his behalf is passed by the gen¬ eral assembly. Vacancies in judgeships are filled by the governor, whose appointees hold office until the next election.

Petty cases are heard before justices of the peace, who are appointed by the governor for the term of four years. In the counties, these officers are generally paid by fees. In Balti¬ more, such cases are brought before salaried officials serving in regular tribunals, as police courts (criminal), people's courts (civil) or juvenile courts.

Religion. — The first settlers were Roman Catholics and Anglicans. The first Protestant services were held' by the Rev. Richard James, on Kent Island in 1632, and the first Roman Catholic services, by Rev. Andrew White, S.J., and Rev. John Altham, S.J., at Saint Mary's in 1634. A considerable settlement of Puritans from Virginia came into Anne Arundel County about 1650, and were largely induced to be¬ come Quakers when George Fox came to Maryland about 1670. He also established meetings on the Eastern Shore, one of which Third Haven, near Easton in Talbot County, possesses a house of worship over 200 years old. Presbyterians, under Rev. Francis Makemie, established churches on the lower East¬ ern Shore about 1690. Baptist churches were organized in the 18th century. The German¬ speaking settlers of the years 1730-50 brought the Reformed and Lutheran faiths into the

MARYLAND

Copyright, 1903, by Detroit Photographic Co.

province. Rev. Philip William Otterbein, pas¬ tor of a Reformed church still standing on Sharpe and Conway streets in Baltimore, founded the United Brethren Church in Fred¬ erick County in 1800. Robert Strawbridge, one of Wesley's local preachers, held the first Methodist services in the United States in Carroll County in 1761, and, through the labors of Francis Asbury and other devoted men, the Church spread rapidly. At the Christmas Con¬ ference held on Lovely lane (Redwood street), Baltimore, in 1784, the Methodist Episcopal Church was organized, and its first bishops, Francis Asbury and Thomas Coke, elected. Right Rev. John Carroll, of an old provincial family, was consecrated as bishop of Baltimore in the Roman Catholic Church in 1789, and his see was raised to an archbishopric in 1808. He was the first man to hold episcopal office in that Church in the United States. Right Rev. Samuel Claggett was consecrated bishop of Maryland in the Protestant Episcopal Church in 1789, being the first man to receive such consecration in the United States. In-1830 a desire for a greater participation of the laity in the government of the Methodist de¬ nomination led to a division and to the organ¬ ization in Baltimore of the Methodist Protest¬ ant Church. Colored churches were organized under some of the above-named denomina¬ tions during the 19th century, most of the churches being either Methodist or Baptist. The Roman Catholic Church is the largest de¬ nomination in its membership, and among the Protestant denominations, the Methodist, Epis¬ copalian, Lutheran, Baptist, Reformed, Pres¬ byterian and United Brethren, in the order named, lead in their membership. Sunday schools were first instituted in Baltimore about 1815. There are over 2,500 Sunday schools now in the State.

Charities and Corrections. — A Board of State Aid and Charities was established in 1900. The policy of the State has been to subsidize private institutions more than has been the case in most other portions of the Union. For the insane, there are three State-owned asy¬ lums: for whites at Catonsville (Spring

Grove) in Baltimore County, at Sykesville, in Carroll County at Springfield, and at Cam¬ bridge in Dorchester County, and one for

col¬ ored persons at Crownsville in Anne Arundel County. There are several private hospitals for the insane, the most important of which is the Sheppard and Enoch Pratt Hospital, which has a large endowment and is located near Towson, in Baltimore County. The State penitentiary is located in Baltimore city; the house of correction, for minor offenses, is lo¬ cated near Jessups, in Anne Arundel County. A reformatory school for white boys is found at Loch Raven, in Baltimore County, and one for colored boys at Cheltenham, in Prince George's County. A similar school for white girls is in Baltimore County, and one for col¬ ored girls at Melvale, in Baltimore city. Saint Mary's Industrial School for Boys, in Baltimore city, is an important reformatory for boys un¬ der the control of the Roman Catholic Church. Each county, as well as Baltimore city, pos¬ sesses a jail. There is an almshouse for each county and for Baltimore city. The Baltimore city hospitals are paid to provide beds for the indigent sick. For tubercular patients there is

a private sanitarium at Eudowood, in Balti¬ more County, and one owned by the State at Sabillasville, in Frederick County. The Fed¬ erated Charities of Baltimore city are very ef¬ ficient, and the Henry Watson's Aid Society does an important work. There are also many lesser benevolent institutions.

Education. — During the first 60 years of the history of the province there were almost no schools, because there were no towns, each family living upon its own plantation. Gov¬ ernor Francis Nicholson was an ardent friend of education and under his influence the as¬ sembly, in 1694, passed an act for the mainte¬ nance of free schools by duties laid on ex¬ ported furs, which then formed a large part of Maryland's trade. In 1696, King William School at Annapolis was founded, as the first of these schools, and continued in existence until 1784, when it was merged in Saint John's College. Under Governor Nicholson's admin¬ istration, also, the Anglican Church was es¬ tablished in the province, and the Rev. Thomas Bray, D.D., was sent over as the commissary, or representative, of the bishop of London, within whose diocese the province was con¬ sidered to lie. He wished to induce worthy clergymen to come to Maryland and, as an in¬ ducement to them, set about establishing a paro¬ chial library in each parish for the use of the minister, and a provincial or lending library at Annapolis for the use of the clergy and gen¬ try. He succeeded in this plan and the provin¬ cial library of 1,100 volumes was the largest collection of books then in the English colonies. Dr. Bray came to Maryland in 1700 for a few months and after his return the libraries

lan¬ guished and few books were sent them. The first printing press in the province was estab¬ lished about 1690, and the earliest extant im¬ print is one of Dr. Bray's sermons. The chil¬ dren of the well-to-do planters were often sent to Europe to complete an education begun on the plantation under private tutors, who were often indentured servants — the Protestant children going to Great Britain, the Roman Catholics to institutions on the Continent.

In 1723 an act was passed looking to the es¬ tablishment of a grammar school in each county. These schools were the only ones sup¬ ported by Maryland authorities, until well into the 19th century. Jesuits conducted two schools for boys — one at Whitemarsh, in Charles County, and one at Bohemia Manor in Cecil County. In 1726 the first newspaper in the province was begun, at Annapolis. Negro education and industrial education likewise found their beginning in Rev. Thomas Bacon's charity school in Talbot County about 1750. Toward the end of the provincial period, Char¬ lotte Hall Academy was founded by the union of the county schools in southern Maryland, and Upper Nottingham Academy, in Cecil County, was begun. Rev. Samuel Knox, who was principal of the Frederick County Acad¬ emy, in 1796 published a remarkable book on the Principles of Education,* outlining a complete educational system for the State. Thomas Jefferson derived many of the ideas which he carried out in the University of Vir¬ ginia from this book, and Knox was the first man invited to a professorship there. Through Knox's efforts the State diverted to the county academies the funds it had begun ap-

propriating to the nascent colleges and these appropriations to the academies, lasted on 1 these institutions were absorbed into the pub¬ lic school system, a process not completed until the 20th century. A considerable agita¬ tion for public schools about the year 1825 led to the organization of such schools for Balti¬ more city in 1829. This city has always man¬ aged its schools independently of the. subse¬ quently established State system and in 1917 had 112 schools, with 2,139 teachers and 79,599 ouoils. The expenditures for these schools for 1919 amounted to $3,217,554. In addition to primary and grammar schools,, there are in¬ cluded in the city system for white children a high school for boys (called the Polytechnic Institute), two high schools for girls and a teachers' training school ; and for colored .chil¬ dren a high school and a teachers training school. Although some counties had begun a partial school system, the State had. no uniform public schools until the constitution . of 1854 was adopted which contained a provision for such a State svstem, through the efforts ot Jo-seph M. Cushing, Esq., a member of the constitutional convention, and Rev. Libertus Van Bokkelen, D.D., who was made first State su¬ perintendent of schools. Dr. Van Bokkelen was soon succeeded by M. A. Newell, who con¬ tinued in office, both as superintendent and as principal of the State Normal School, established in Baltimore, for over 20 years. This school has been transferred to fine new build¬ ings near Towson, in Baltimore County. Rev. E. B. Prettyman succeeded Mr. Newell, and was .succeeded nearly 20 years ago by Dr. M. Bates Stephens, during whose incumbency ot the office great advances, have, been made m the county schools. Since his taking of office, there has been a separate principal of the normal school A second normal school has been estab¬ lished at Frostburg in Allegany County. High schools have recently been formed in many ■nlaces.

Teaching colored children was unlawful during the times of slavery. In 1865 a society was formed in Baltimore for negro education. It speedily established schools throughout . the State, supported by the generous contributions of individuals, many of whom were members ot the Society of Friends. When the State as¬ sumed the task of educating negroes, in 18/2, the society closed all its schools, except one in Baltimore, which was incorporated as the Col¬ ored Normal School. In 1908 the State took over this school also and removing it. to Bowie, in Prince George's County, maintained it as Normal School

No. 3, adding certain agricul¬ tural and industrial features to the course ot study. In addition to the expenditure of the State for schools from taxation, the proceeds of which are quarterly distributed to the coun¬ ties and Baltimore city, according to popula¬ tion, each county raises large sums yearly by local taxation for support of sch?ols. lhere are 2,605 schools, 6,560 teachers and 246,045 pu¬ pils recorded in the report for the year 1917. The State school board consists of six mem¬ bers appointed by the governor for a period of six years. The governor also appoints a school board of three members for each county for a like term. The mayor of Baltimore city ap¬ points the school board therefor, composed of nine commissioners, each to serve for six years.

An extensive system of parochial schools is also maintained in connection with the Roman Catholic churches in Baltimore and in some ot the smaller towns in the State.

Mrs. Eliza Seton, foundress of the bisters of Charity in the United States, established a school at Emmitsburg for the education of gir Is in 1809 The Order of the Visitation conducts schools for girls in Baltimore and Frederick the Carmelites in Baltimore and the Sisters ot

Notre Dame also in Baltimore..

Among the important private secondary schools in Maryland are : For boys, the Gil¬ man County School, the Boys Latin School and Marston's School in Baltimore city; the Mc¬ Donough Institute and Farm School for needy orphans in Baltimore County and the Jacob Tome Institute, a largely endowed boarding-school with fine buildings, at Port Deposit in Cecil County. The Hannah More Academy at Reisterstown in Baltimore County, the Fred¬ erick Seminary in Frederick County and Saint Mary's Female Seminary in Saint Mary s County, are the more important boarding-schools for girls, and in Baltimore city the Bryn Mawr School and the Girls Latin School are day schools of high standard.

The Maryland Institute for the Promotion of the Mechanic Arts was established in Balti¬ more, in 1847. It formerly conducted .exhibi¬ tions* and gave courses of lectures in its long building upon Market space, which was the scene of several Presidential nominating con¬ ventions. After this building was consumed in the fire of 1904, a new building was erected on Mount Royal avenue for. the Day Schools ot Art and Design, and a building on the old site is used for the night

school of mechanical drawing. George Peabody spent part of his early life in Baltimore, and in recognition ot that fact he established in 1857 the Peabody Institute, which contains a very fine reference library, a lecture hall, an art gallery and a largely attended conservatory of music. .

A school district library law was passed in 1873 In Baltimore the generous gift of about $1,200,000 to the city by Enoch Pratt in 1882 secured the establishment of the free library which bears his name and which was opened in Tanuary 1886, with Dr. Lewis H. Sterner as its librarian. This institution, the public library of the city, from its inception was planned to contain a central building and branches in dif¬ ferent parts of the city of Baltimore. These branches have increased from 4 to 18 and several more will soon be built. In February 1919 the library possessed 363,646 volumes, and in the previous year it cirulated 586,645 books.

The Washington County Free Library at Hagerstown was established by the generosity of B. F. Newcomer in 1899, and has been con¬ spicuously successful, being one of the first county libraries in the country. The other pub¬ lic libraries are small and are not as numerous as in many other States.. In 1902 the legisla¬ ture passed a law establishing a State Library Commission. The Public Library Commission now has its office at the State Normal School at Towson and receives $2,000 a year from the State. It circulates traveling libraries and gives advice and counsel to public libraries and to places desiring to establish them. In Balti¬ more city, there are also to be found the libra¬ ries of the various educational institutions of

the diocese of Maryland, of the Baltimore bar and of the Maryland Historical Society which are valuable special collections. The New Mer¬ cantile Library, a subscription one, containing about 35,000 volumes, should also be mentioned. In 1854 there was established in Baltimore the Maryland School for the Blind, a private cor¬ poration largely supported by the State. The school has removed, in recent years, to fine new buildings, on the cottage plan, in the suburb of Overlea, where about 100 children are in¬ structed, coming from all parts of Maryland and the District of Columbia. A school for the colored deaf and blind, situated at a little dis¬ tance but on the same grounds and under the same superintendent, instructs about 70 children. The Maryland State School for the Deaf, in¬ corporated, in 1867, is attended by about 120 pupils, and is situated at Frederick City, on the site of the barracks built during the Revolu¬ tionary War and occupied by prisoners from Burgoyne's army.

Higher Education. — The Rev. William Smith, D.D., who had been head of the College of Philadelphia from the beginning, was forced by the British occupation of that city to remove to Chestertown, where he became rector of the Protestant Episcopal church. He also took the principalship of the Kent County school and so developed it that he secured a college charter for the institution under the name of Washington College in 1782. It was the first institution named for General Washington, and the first collegiate institution in Maryland. Its history has been full of vicissitudes, but the college has continued its work with fair measure of success, and is still the only institution con¬ ferring degrees, situated upon the Eastern Shore. Since 1890, women have been admitted to its courses.

The Western Shore obtained its first institu¬ tion of higher learning, when Saint John's Col¬ lege was chartered at Annapolis in 1784. For its site, the State gave the unfinished governor's mansion and its grounds. According to its charter, it was united with the Washington Col¬ lege into a University _ of Maryland, but this union wras merely nominal. The State appro¬ priation was withdrawn in 1805, and the college languished for a time. From 1837, for 20 years, Rev. Hector

Humphreys, the principal, labored faithfully for its interests. The college was suspended and the buildings were used as a hospital during the Civil War. Reorganized by Henry Barnard, LL.D., Saint John's Col¬ lege has been under the principalship of Thomas Fell, LL.D., since 1887. The students are organized in a cadet corps and receive military training. It has been recognized as the faculty of arts of the University of Mary¬ land for the past few years.

The French Revolution drove from Europe a large number of ecclesiastics of the Roman Catholic faith. The Right Rev. John Carroll, in his desire to provide educational opportunities for the youth of Maryland, especially for those of his Church, invited some of these teachers to settle in Maryland. Consequently, the Sulpicians began instruction in Baltimore in 1791. Their institution was called Saint Mary's Col¬ lege, and its title was afterward changed to Saint Mary's University. It gave regular academic instruction until 1852, when the col¬ lege was closed, in order that the clergy might

devote their entire attention to the theological training of young men for the priesthood in Saint Mary's Seminary of Saint Sulpice, which had been maintained by them as a part of their institution from its beginning, and which is the oldest Roman Catholic theological school in the United States. Cardinal Gibbons is its most distinguished graduate. In 1808, near Emmittsburg, in Frederick County, Rev. John Dubois, a Sulpician priest, founded Mount Saint Mary's College. This institution is now governed by the secular clergy, and in addition to the preparatory and collegiate courses, main¬ tains a seminary preparatory to the priesthood. A third institution, which owes its origin to the Sulpicians, and which is still controlled by them, is Saint Charles' College founded in 1830, and endowed by Charles Carroll of Carrollton. It was formerly situated in Howard County, but is now located near Catonsville in Baltimore County. It gives the collegiate courses prepara¬ tory to Saint Mary's Seminary. In 1802 Dr. John B. Davidge opened a medical class in Baltimore, from which developed the Col¬ lege of Medicine of Maryland, chartered in 1807, and the University of Maryland, char¬ tered in 1812. The university was planned to contain four faculties. That of medicine has always been the strongest, and is the only one which has enjoyed a continuous exist¬ ence, always maintaining a course of medical instruction which ranked well among similar institutions. It has recently united to itself the College of Physicians and Surgeons (founded in 1872 and which had itself absorbed the Washington Medical College) and the Baltimore Medical College (founded in 1883) and is ful¬ filling the

instructional requirements of the American Medical Association. The Maryland College of Pharmacy (founded in 1856) has recently been annexed, and the department of dentistry was opened in 1882. No school of divinity was ever organized. The school of arts had a troubled existence, and finally died, but has recently been revived by the union of Saint John's College with the university. The school of law was maintained for a few years, about 1840, with David Hoffman as professor, and was revived in 1869. Since that time, it has maintained high standards, and is the only law school in the State, having absorbed the Baltimore Law School (founded in 1900), and the Baltimore University School of Law (founded in 1890).

Several colleges and professional schools founded in Maryland at different times no longer exist. Among these are Cokesbury College (1784-96) at Abingdon in Harford County, the first Methodist institution of higher education in the world; Baltimore College (1803-30) ; Asbury College (1816-30) in Balti¬ more city; the College of Saint James (1843-63) in Washington County; Newton University in Baltimore city (1844—59) ; New Windsor Col¬ lege (1843-50, 1874-1910) ; and Calvert College (1852-73) ; both at New Windsor, Carroll County; the Baltimore Female College (1849-90) ; and the Mount Washington Female College (1856-61). Loyola College in Baltimore was founded in 1852 by the Jesuits and con¬ tinues to educate boys according to their system, without dormitories. The Maryland Agricul¬ tural College, at College Park in Prince George's County, was chartered in 1856 by a private cor-358

poration, and is in age the second such institu¬ tion in the country. It early recognized agricul¬ tural experimentation as an important part of its operations. The State Agricultural Expei iment Station, conducted in connection with the col¬ lege, was organized in 1887. The students are trained in military drill, and the ownership of the college has lately been transferred to the State, which is largely increasing appropriations to it and widening its currucilum.

The Brothers of Christian Schools, a Roman Catholic fraternity, purchased the Rock Hill Academy at Ellicott City, Howard County, in 1857, and after conducting it for several years procured a charter for Rock Hill College in 1865. The Western Maryland College, a co¬ educational institution, at Westminster, m Carroll County, under the auspices of the Metho¬ dist Protestant denomination was chartered in 1868, and under the long presidency of Rev. Thomas H. Lewis, D.D., has firmly established itself. Goucher College for Women was founded by the Methodist Episcopal Church in 1884, and was opened in 1888, graduating its first class in 1892. It was first called the Woman s Col¬ lege of Baltimore ; but, about 1910, the name was changed, so as to honor Rev. John F. Goucher, D.D., one of its principal founders and long its president. It ranks among the best institutions for the higher instruction of women. Hood College for young women, beautifully situated near Frederick City, has been conducted successfully for 25 years by its president, Dr. Joseph H. Apple, and gives a good course of instruction, emphasizing domestic science. 1 he Maryland College for Women at Lutherville in Baltimore County is a long established institution. Morgan College, in Baltimore city, incorporated in 1889 under the auspices of the Methodist Episcopal Church, is the only colle¬ giate institution for the education of the col¬ ored youth in Maryland. It expects soon to remove to a suburban location. A branch, Princess Anne Academy in Somerset County, is recognized as the State Agricultural College for colored youth.

The Johns Hopkins University at Baltimore city, incorporated in 1867, was founded by a bequest of about $3,500,000 from the man whose name it bears. It was notably a large endow¬ ment, and the trustees had an unusual opportu¬ nity to establish a distinctive institution. They made the best possible use of this opportu¬ nity by calling Daniel C. Gilman, LL.D., to become its first president and giving him free hand as to the places of organization. The university opened its

collegiate and graduate philosophical departments in 1876. President Gilman won an instant success and a world-wide reputation for the institution. Among the lead¬ ing ideas were these: (1) organization of gradu¬ ate study into systematic training for the degree of doctor of philosophy, including a dissertation on some point embraced in the student's major subject and showing evidence of research; (2) provision for a university press to publish the results of the investigations of faculty and students; (3) a great use of popular lecture courses; (4) a body of instructors of originality of mind who were carefully selected, with an unerring view to their future eminence; (5) a body of young men connected with the graduate school, who should receive a stipend from the university, have time for original work and

be known as fellows. (Among the early fellows was President Woodrow Wilson) ; and (6) an undergraduate department, arranged on the group system, with which President Oilman had become acquainted through experiments with it at the Sheffield Scientific School and the University of California, with which institu¬ tions he was formerly connected. The under¬ graduate department was never large, and was largely a local college; but the graduate de¬ partment speedily enrolled an unusually eminent body of men from all parts of the United States, from Canada and from Japan. Many of these graduate students became teachers and spread the influence of the Hopkins far and wide. President Gilman's policy was to spend little money on buildings, and the quarters of the university were inconspicuous throughout the 25 years of his administration. Mr. Hopkins left another bequest, of about the same size as that of the university, to found a hospital which should bear his name, and which should be asso¬ ciated with the medical school of the university. The hospital buildings were completed in 1889, and Steps were immediately taken to organize the medical school, whose first class graduated in 1898. It was the first of American medical schools to require a college degree as a pre¬ requisite for admission, and it has done much to advance medical educational standards. Its reputation has become even greater than that of the philosophical department, and very re¬ cently the Rockefeller Foundation, through the efforts of Prof. William H. Welch, first dean of the medical school, has founded a school of public hygiene in connection with the university.

About the time of the close of President Gilman's administration, the philosophical de¬ partment of the university was given, by public-spirited Baltimoreans, a new site, comprising about 100 acres in the

northern suburbs, . and the work of the institution was removed thither in 1914. The second president of the uni¬ versity was Ira Remsen, a distinguished chemist, and he in turn was succeeded by the present president, Frank J. Goodnow, an eminent stu¬ dent of public law.

Professional schools not previously named are the Woodstock College, in Baltimore County, founded in 1867, by the Society of Jesus, as a theological seminary; the House of Studies of the Congregation of the Most Holy Redeemer, Mount Saint Clement, at Ilchester, Howard County, established also in 1867, as a school to prepare members of the Redeinptorist order for the priesthood; Saint Joseph's Seminary in Baltimore city to educate men for the Roman Catholic priesthood to labor among the colored people of the South; the Westminster (Carroll County) Theological Seminary under the aus¬ pices of the Methodist Protestant Church; and the Baltimore College of Dental Surgery, the old¬ est dental school in the world, chartered in 1839.

Provincial History. — Verazzano in 1524 may have looked into the Chesapeake and landed on the Atlantic seaboard of Maryland, but the continuous history of this territory began, when Capt. John Smith, with 14 men in an open barge of three tons burden, left Jamestown in 1608, and spent several weeks in exploring the bay. On his return he drew a remarkablv good map of the shores, so that they became well known. He found the aborigines of the Al¬ gonquin stock dwelling in small brick-bark

villages in the midst of forest clearings, in which they cultivated maize, potatoes and to¬ bacco. On the Western Shore, the Piscataways and the Nanjemoys were the important tribes, and on the Eastern Shore dwelt the Nanticokes. These Indians possessed stores of furs which they had obtained in hunting and they, willingly, bartered them with the English for manufac¬ tured wares. In general, the Indians of the province received fair treatment from the colo¬ nists. Around the head of the bay, near the Susquehanna River, which bears their name, dwelt the fierce Susquehannocks, of Iroquoian stock, who were subjugated and incorporated with the Five Nations about 1670. After that time, the Senecas frequently came down to raid the frontier settlements, and to despoil the peaceful Patuxents and Piscataways of the Western Shore. Gradually the Indian inhabi¬ tants of Alary land disappeared, and the Nanti¬ cokes, in their migration to the Wyoming Val¬ ley in Pennsylvania about 1750, left but few of their race in the province.

After Smith's expedition, other Virginians sailed into the Chesapeake and the northern fur trade became a well-established enterprise. The Indians also sold maize to the Virginians, and timber was cut for pipe-staves. Chief among these Virginia traders was William Clai¬ borne. He associated himself with the London mercantile firm of Cloberry and Company, and in Alay 1631 obtained, from the Secretary of State for Scotland, a commission, authorizing him and his associates to trade in all parts of New England and Nova Scotia, wherein no trading monopoly had been granted. With this commission, he sailed up the Chesapeake, and in 17 Aug. 1631 established a trading factory on Kent Island, with about 20 or 30 men. From Chisquack in the Northern Neck of Virginia and Kent Island, a delegate sat in the Virginia house of burgesses and Claiborne was a mem¬ ber of the Virginia council.

Sir George Calvert, first Lord Baltimore and formerly Secretary of State for England, re¬ tired from office because he had become a Ro¬ man Catholic. He had long been interested in colonial projects, and had received a grant of land and jurisdiction in Avalon, the southeast¬

ern peninsula of Newfoundland. He went there to live, but found the country so barren and the climate so severe that he determined to settle further to the south. Coming to Virginia, the colonists refused to admit him unless he should take the oaths of allegiance and su¬ premacy, which his religious belief would not permit him to do. He was so delighted with the country, however, that he returned to Eng¬ land and successfully requested from the Crown a grant of the lands about the Chesapeake.. To his possession, which was created a palatinate in which the proprietary should have as wide powers as the bishop of Durham in that county, he gave a name, in the courtier fashion, from that of the queen of Charles I, Henrietta Maria, daughter of Henry IV of Navarre. In the Latin of the Charter, the province was called Terra Marise, or, in English, Alaryland. The limits of the grant were much wider than were ever reduced to possession, chiefly because of encroachments of the . Duke of York on the Delaware and of William Penn on the north. Those limits were from Watkins Point on the Chesapeake, due east to the Atlantic Ocean,

then along the seashore and Delaware Bay to the 40th parallel of north latitude, and along that parallel westward to the meridian of longi¬ tude, which passed through the first fountain of the Potomac River, then along the south, or far bank of that river, the boundary ran to Cinquack, near the river's mouth, whence a straight line should run to Watkins Point. The province was to be held in free and common socage upon a yearly payment of two Indian arrowheads to the Crown. All Englishmen might emigrate to Maryland, and, having ar¬ rived there, they and their descendants should enjoy all of the privileges of Englishmen. The proprietary was given power to make laws, ((with the advice, assent, and approbation of the freemen, or of their delegates." Pie tried to use this power literally at first by submitting the draft of laws to a mass meeting of free¬ men, gathering in person or by proxy; but, gradually, the freemen grew too numerous, too widely dispersed and too powerful for this arrangement to continue. They successfully as¬ serted for themselves the right of initiating laws as early as 1638, and from about 1650 a representative body of freemen sat as a House of Delegates, and there was formed a bicameral legislature, upon whose acts the proprietary had a veto. He was not obliged to submit these acts to the Crown. It is not surprising that the Virginians opposed this charter, which gave a Roman Catholic two-thirds of their noble bay, and cut them off from the profitable north¬ ern fur trade.

Before the charter had passed the seals, the first Lord Baltimore died,

and it was issued, on 20 June 1632, to his son Cecil Calvert, second Lord Baltimore, a namesake of the great Lord Burghley, under whom the father's official career had begun. By the charter this first lord proprietary was granted a large country hitherto uncultivated, in the parts of America partly occupied by savages. He was destined never to see his province, but he took watchful care over it for nearly 45 years. After some months preparation his first colonial expedition sailed from England, on 22 Nov. 1633, under the command of his younger brother, Leonard Calvert, in two vessels of well-omened name — the Ark and the Dove. Leonard Calvert, com¬ missioned as lieutenant-general and governor of the province, was only 28 years old, and was a sincere straightforward man, but had the fatal failing of his family, in being unable to read men and to choose the proper agents to carry out his purposes. With him went several gentlemen, most of whom were Roman Catho¬ lics, while the majority of the yeomen and servants were Protestants. It is probable that from the beginning the majority of the Alaryland settlers paid no religious allegiance to the Pope of Rome. The voyage from England to America consumed from one to three months at that period, and as Leonard Calvert sailed by the southern route, stopping at the West Indies, he did not arrive in Virginia until 24 Feb. 1634.

The governor there was friendly, but the settlers were so hostile that they soon after¬ ward revolted, seized him and sent him to Eng¬ land, largely because of his friendliness to Cal¬ vert. Lord Baltimore had wisely enjoined his brother to have as little to do as possible with the Virginians during the first year, and heed-

ing that advice, the settlers soon sailed uPˆe bay and entered the Potomac RlveP- , .y landed on Saint Clements' (now called Blackiston's) Island on «Our Blessed Lady s Day in Lent,8 25 March 1634, on the first day of the year, according to their calendar, and in the beginning of spring, and "took solemn posses¬ sion of the country, for our Saviour and our Sovereign Lord, the King of England.8 From the enthusiastic reports of the country sent him, Baltimore prepared and printed m England, in 1634 and 1635, two pamphlets called Rela¬ tions, which were in the nature of prospectuses to invite colonists and are the earliest printed accounts of the province. The fears of the ab¬ origines were pacified, and through the advice of Capt. Henry Fleet, an old Indian trader, Calvert bought from them their town of Yao-comico, which was renamed Saint Mary s. Claiborne's factory was the only other settle¬ ment of Europeans within the province at the time. Calvert had instructions. to use Clai¬ borne courteously and permit him to proceed in his plantation if he would acknowledge Balti¬ more as his overlord ; but this acknowledgment was steadily refused, and a petty warfare arose between the settlers on Kent Island and those at Saint Mary's, which led to a naval combat on the Pocomoke River in 1635. Claiborne s difficulties increased, through differences with his London partners, and he went to England in 1637, leaving the factory in charge of Capt. George Evelin, who was friendly, to Balti¬ more He vainly endeavored to induce the settlers on the island to accept Baltimore as their ruler, and finally, in February 1638, Cal¬ vert led an expedition in person against the factory and overcame the opposition there, while Claiborne failed in England in an appeal to the Lords' Commissioners of Plantations. He never lost his animosity toward Lord Lam-more, and continued to the end of a long life his struggle against proprietary rule. Both in England and in America the Virginians tried to prevent Baltimore from taking possession of the province which had been granted him. l he expense of his expeditions and of the litigation in England nearly impoverished, him; but neither then nor, when later deprived of the province by force, did Cecil Calvert deviate from his persistent effort to secure himself and his descendants so valuable a possession Re¬ maining in England, he warded off one threat¬ ened danger after another, and his policy, as his letters disclose it, was that of a calm, shrewd, unenthusiastic, fair-minded, farseeing man He was a faithful member of the Roman Catholic Church, and wished to provide an asylum for his fellow-believers within his palatinate; but he

wisely foresaw that any grant of especial privileges to the Roman Catholics . still more an establishment of that Church in the province — would lead to a speedy for¬ feiture of his patent. He clearly wished the establishment of no other church. Conse¬ quently, from the beginning of his settlement of Maryland, he set an example of a ruler who separated church from state, who directed, his colonists to show toleration to all Christians and who allowed freedom of worship in any Christian form. Jews were tacitly permitted, to dwell in the province. In his first expedition he sent two Jesuit priests, that the colonists might have religious counsel and guidance. One

of the Jesuits, Father Andrew White, a man of marked devotion to his work, wrote an ac¬ count of the voyage, in Latin and in English, to which we owe valuable information ihe Jesuit order continued to be the chief religious agency of the Roman Catholic Church in Mary¬ land throughout the whole of the provincial period, and their conscientious zeal and faith¬ fulness deserve high praise. They reared from the provincial families a good .many J priests who were very influential in the organ¬ ization of their Church in the United States and were largely responsible for its American

Nearly a year after the landing of the colonists, Governor Calvert called an assembly of the people, which met in February 1635, but its proceedings are lost, and the proprietary vetoed its acts. The second assembly, held in January 1638, failed to place any acts upon the statute books, except one for Claiborne s attainder Act ing also as a court of law, the assembly tried and condemned to death for piracy, Thomas Smith, one of Claiborne's followers. During the yeai 1638 Lord Baltimore yielded his claim to the initiation of bills and a representative assetribly of one house, meeting in February 1639, adopted a comprehensive temporary act to endure to the end of the next General Assembly, or for three years, if there be no assembly within that time8 From that date to the present prac¬ tical^ all of the statutes of Maryland are pre¬ served, and have been printed, in the series of the Archives of Maryland. The policy of pass¬ ing temporary statutes, was followed through¬ out the provincial period, and, although it in¬ volved much expenditure of time and produced a bulky statute book, it ensured fairly frequent sessions of the legislature, and also a readjust¬ ment, from time to time, in the rates of fees, in which shape the remuneration of many of the officers was received.

From Saint Mary's the settlers spread out along the rivers, some of the

larger tracts of land being erected into manors. Indentured white servants cultivated most of the land, granted by the conditions of plantation to the settlers, on payment of an annual quitrent. Negro slaves were being introduced, and the colonists gradually ceased to be dependent, u-pon the Indians for maize, which was beginning to be raised in considerable quantity by the Eng¬ lish. The fur trade slowly lost its importance, and the cultivation of tobacco flourished until it became the staple product, of the province and the medium of exchange in all transactions among the planters. The predominance of to¬ bacco lasted throughout the provincial history; but, during the 18th century, the cereals — wheat and corn — were gradually displacing its prom¬ inence in agriculture on the Eastern Shore. The upland country of western Maryland never grew tobacco. A few iron furnaces were established late in the provincial times, but the main industry was agriculture. Transportation was at first by water or along the Indian foot trails. Gradually roads were laid out, along which hogsheads of tobacco, drawn by oxen or horses, were rolled to the water side.

The Jesuits vainly claimed from the proprie¬ tary the same liberty of being governed by canon law only, which they possessed in other lands having Roman Catholic lords, and of be¬ ing freed from taxes. These claims led Balti-

more to send out secular priests for a time and to insist upon the supremacy of common law and of the civil power in the state. Leon¬ ard Calvert returned to England in 1642, leaving Giles Brent as his deputy, and came back two years later with the king's commission empow¬ ering him to seize ships owned by London mer¬ chants who adhered to the Parliamentary side in the English Civil War. He seems not to have used the commission, but it gave an excuse for action to those opposed to proprietary rule. Claiborne came back in the attempt to recover Kent Island. Richard Ingle, a pronounced Parliamentarian, who had previously made sev¬ eral voyages to the province, came to Virginia, with his ship, in February 1645, seized a Dutch merchantman in the Chesapeake, and with the two vessels terrorized the province. Calvert fled to Virginia, and Ingle ranged the province, during this ((plundering year,® seized the Jesuits' property and carried them to England. Cal¬ vert recovered control of Saint Mary's in the autumn of 1646 and of Kent Island in April 1647. Shortly afterward Leonard Calvert died, naming Thomas Greene as governor. A year later, the proprietary substituted William Stone, a Protestant, who brought into Maryland as immigrants a considerable number of Puritans from Virginia, where they had failed to find religious freedom. The Puritans made their settlements about the banks of the Severn, near the site of Annapolis, and a third county was erected for them, bearing the name of Anne Arundel, the wife of Cecil Calvert. With Stone's commission Baltimore sent a draft of a brief code of 16 laws, which he desired the general assembly to enact. The most famous of these, the <(Act concerning religion,0 was amended and passed in April 1649. This notable act was well summarized, in its purpose and content, by Charles, third Lord Baltimore, as passed that the province might <(have a gen¬ eral toleration settled there by a law, by which, all of all sorts, who professed Christian¬ ity in general, might be at liberty to worship God in such manner as was most agreeable to their respective judgments and consciences, with¬ out being subject to any penalties whatsoever for their doing so, provided the civil peace were preserved. And, that for the securing the civil peace and preventing all heats and feuds which were, generally, observed to happen amongst such as differ in opinions upon occasion

of re¬ proachful nicknames and reflecting upon each other's opinions, it might, by the same law, be made penal to give any offense in that kind.10 The credit for this act belongs in the first in¬ stance to Cecil, Lord Baltimore, and, secondly, to the assembly which adopted it. The coming of the Brooke family into Maryland led to the formation, in 1654, of a fourth county, bearing the name of Calvert, and situated on the north side of the Patuxent River.

When the Commonwealth had been estab¬ lished in England, five Parliamentary commis¬ sioners were appointed to reduce Virginia from her allegiance to the Crown and their commis¬ sion, by craft or accident, was extended to aall the plantations within Chesapeake Bay.0 Two of these commissioners were Claiborne and Bennett, the head of the Puritan party in Vir¬ ginia; the other three were Englishmen, but only one of these arrived in America. He acted with the two Virginians, and they seized the

government of Maryland in 1652. Baltimore's hostility to Claiborne had been so great that he had exempted him and Ingle from a general pardon. Claiborne's counter-influence may doubtless be seen in the commissioner's illegal order, that writs should henceforth run in the name of the keepers of the liberty of England, instead of the proprietary, as provided by the provincial charter. Governor Stone refused to obey this order and was removed from office. Three months later he yielded and was re¬ stored, but after two years of compliance he again ordered writs to run in the proprietary's name. The Puritans of Providence, as they called their settlement on the Severn, promptly rose in revolt and compelled (Stone to resign his office. When Baltimore rebuked him for yield¬ ing so easily, Stone gathered an armed force and a battle took place near Annapolis in March 1655 between the two parties, in which conflict the proprietary's party was routed and Stone was taken prisoner. From July 1654 to 1657 the provincial government was in the hands of a body of commissioners, appointed by Bennett and Claiborne, and serving as executive, provin¬ cial court and upper house of assembly. The Toleration Act was repealed. Cromwell, how¬ ever, confirmed Baltimore's title to the province in 1656, and in March 1657 his authority was restored, a general amnesty being proclaimed and the Toleration Act confirmed. So complete was the pacification that some of the Puritan commissioners sat in the General Assembly of

1659.

A new county, Charles, named for the pro¬ prietary's heir, was organized in 1658 from the western part of Saint Mary's County. The re¬ stored proprietary government had as its gov¬ ernor Capt. Josias Fendall, an energetic man, who organized the militia and then came into conflict with the Quakers, a growing body in the province. When Fendall had been governor for two years he proved himself faithless to the proprietary, surrendered his commission as governor and accepted a new one from the as¬ sembly, which claimed the right to make laws without Baltimore's consent. When news of these disloyal acts reached England, Baltimore sent out with an amnesty his half-brother, Philip Calvert, as governor in Fendall's place. As soon as Calvert arrived in Maryland, the rebellion collapsed, and the lenient governor was content with inflicting fines as punishment, together with perpetual disfranchisement for a few leaders. Shortly afterward the proprietor substituted his only son, Charles Calvert, for his brother, Philip, who was given the chancellor¬ ship of Maryland as a solace. . Leonard Cal¬ vert's son was soon made provincial secretary, and for 30 years a period of family government continued.

The Dutch had unsuccessfully attempted a settlement upon the Delaware in 1631, and the Swedes had been more successful in 1638. New Sweden had been reduced by the Dutch of New Netherland in 1655. Maryland's representative was sent to notify the Dutch that they were within the provincial boundaries and must ac¬ knowledge her jurisdiction or depart. Gover¬ nor Stuyvesant, on his part, sent two envoys to Saint Mary's, one of whom was a Bohemian, Augustine Herman, who was so charmed by the land through which he traveled, that he re¬ moved into it and took up a tract in Cecil

County — Bohemia Manor — for which he paid by executing the first good map of Mar > lana.

A brisk trade sprang up between the English settlers on the Chesapeake and the Dutch and Swedes on the Delaware. This lucrative trade was illicit, under the navigation laws which dated from about 1650, and was partly the rea¬ son wThy the provincial authorities hesitated to take decided action against the Dutch, until it was too late to do so; for the Delaware settle¬ ments were seized by the English fleet in 1664, and granted by the king to his brother the L lffie of York, as part of his province of New York. For several years there was friction between the two governments, and Calvert sent officers, from time to time, to summon the Delawareans to admit his overlordship, while he also granted

lands in that region. . ,

Cecil Calvert, first lord proprietary died in 1675, and was succeeded by his son, Charles. During the years preceding this event, the boundary between Maryland and Virginia on the Eastern iShore was run, with some loss to the province through imperfect surveying; the tobacco trade flourished, and the settlements spread down the Eastern Shore, so that lalbot, Somerset and Dorchester counties were organ¬ ized and along the head of the Chesapeake, so that' Baltimore and Cecil counties were estab¬ lished. . ,

The second lord proprietary had as stormy an experience as his father. Indian troubles led to a joint expedition with the Virginians against the Susquehannocks in 1675. In shameful vio¬ lation of a safe conduct, the Maryland com¬ mander weakly yielded to the Virginians clamor, and five of the chiefs were wickedly put to death. After a month s siege of their fort, the Indians fled; some of them fleeing southward began that course of rapine which led to Bacon's Rebellion (q.v.) in Virginia, while others went northward to unite them¬ selves to their Iroquois kindred, bringing down with them, from time to time, Senecas and Onondagas in hostile incursions against the English settlers and the friendly Indian tribes

in Maryland. , , „

In 1680 a disturbance arose, headed by hen-dall and John Goode, a

renegade Anglican clergyman. It failed, and Fendall was banished, but the discontent increased, and the “Popish Plot® in England, with the fear shown there for the overthrow of the Protestant religion, found reflection in Maryland, in the suspicion felt by many toward the Roman Catholic pioprictary.

A worse danger for Maryland arose in 1681, when William Penn obtained a patent from the Crown for a large tract of land, bounded on the south by a “circle drawn at 12 miles distance from New Castle, northward and westward to the beginning of the 40th degree of north lati¬ tude and thence by the straight line westward.® Penn also obtained from the Duke of York a grant of New Castle, with a territory of 12 miles around it, and the lands bounding thence on the Delaware southward to Cape Henlopen. Penn began at once to colonize both his province, which took the name of Pennsylvania, and his territories on the Delaware, and endeavored to gain over the frontier inhabitants of Mary¬ land, his great object being to gain access to the waters of the Upper Chesapeake. Baltimore strove to keep his province and wished to fix the 40th parallel at once. The two proprietors

met several times, but Penn would not make direct observations of latitude. On the othci hand, he suggested that measurement be made from the capes of the Chesapeake, by which means, he said, Baltimore might gam fiom V lr-ginia as much as he would lose to the north.

While Penn delayed the decision as to the location of the 40th parallel, and placed his city of Philadelphia just south of it, so as to obtain the advantage of possession and to manifest his brotherly love for the rightful owner of the land by wresting his territory, from him, he pressed hard for a determination of his claim to Delaware. The death of Charles II placed Penn’s patron, the Duke of York, upon the throne, as James II, so that it is not surprising that the English Privy Council, on 7 Nov. 168b, decided that the peninsula should be divided between the claimants by a meridian line run¬ ning from the latitude of Cape Henlopen noith, until it was tangent to the circumference of the circle with a radius of 12 miles from Newcastle. This decision was based on a mistaken and highly technical application of the clause in the Maryland charter, by which the territory “hith¬ erto uncultivated® was granted Baltimore. These words were, in any case, words of de¬ scription and not limitation. Furthermore, at the time the charter was granted, the only Europeans within the province were fur traders, whose claim had been disallowed.

James II talked of having the Maryland charter forfeited, as a part of his general policy of colonial administration. The proprietary s position was weakened by the unfortunate kill¬ ing of an obnoxious revenue officer, by a hot¬ headed Irish relative of Baltimore, Col. George Talbot. In 1684 Baltimore went to England to look after his affairs there, leaving the council in charge in Maryland. Four years later, he sent out to act as executive, a conceited, wordy lawyer, who was a strong partisan of King James, and who had high notions of pre¬ rogatives. Indian troubles occurred. Rumors arose of strange alliances between the Roman Catholics in Maryland and those in Canada. The messenger sent by Baltimore to order the proclamation of William and Mary died on the way, and the council refused to proclaim the new sovereigns, without orders from the pro¬ prietary. In July 1689, Nehemiah Blackistone, collector of royal customs, and an old enemy of Baltimore, rose in revolt, together with Coode and other Protestants. The agitators were so determined, and Baltimore's supporters were so lukewarm, that their "Protestant Associa¬ tion® was supreme within a month, and the proprietary government was overthrown. The new rulers asked the Crown to administer Maryland as a royal province, and their request was granted, the first royal governor coming m 1692. The charter was not forfeited, however, and the title to land and other private rights was left to Baltimore.

The royal governor brought a greater regu¬ larity and formality into the proceedings of the government. We find the development of a highly trained and able body of lawyers, who gave the Maryland bar its earliest renown. Francis Nicholson, as governor, saw the estab¬ lishment of the Church of England in the prov¬ ince, and a levy made for its support of tobacco from every taxable person, a tax which con¬ tinued until Maryland ceased to be a province.

About this time came the beginning of educa¬ tion and libraries in Maryland, and the first Presbyterian churches on the Eastern Shore were founded by Rev. Francis Makemie. The capital was removed from Saint Mary's City to a site on the Severn River, more centrally lo¬ cated, where the new town of Annapolis was founded, and named in honor of Queen Anne, who, with her husband, Prince George, are com¬ memorated in the names of two counties — the latter being the first inland one on the Western Shore. Annapolis was the first town of any importance to be founded in the province. Nearly every planter's wharf could be reached by shipping, which carried away his tobacco or wheat, so that towns were the less necessary, and the frequent attempts to establish them during the provincial period were almost al¬ ways fruitless. Annapolis, itself, though it boasted of a remarkably cultivated and charm¬ ing society, and possessed some fine town houses of wealthy planters, yet had but little trade. After the Treaty of Utrecht placed an important part of the African slave trade in English vessels, the negro slaves rapidly in¬ creased in numbers throughout Maryland.

Charles, Lord Baltimore, died in 1 7 1 5, and his son and heir, Benedict Leonard Calvert, had become a Protestant, so that the government was restored to him, as there was no longer any pretext remaining that it was unsafe to permit the proprietary to administer it. He did not long enjoy the restored palatinate, but sur¬ vived his father for only two months, and was succeeded by his eldest son, Charles, fifth Lord Baltimore and fourth lord proprietary, who was still a minor. He was a skilful yachtsman, a dissolute, unlovely man, a friend and admirer of Frederick, the Prince of Wales, after whom he named his only son. This son was the last and the worst of the Lords Baltimore, and was proprietary from 1751 to 1771. Charles, Lord Baltimore, was the last one bearing that title to visit the province, where he spent the years 1732-33. While the province was under royal rule, the proprietary had an agent in Maryland to attend to his private affairs, and to watch that the government did not encroach upon his lands and revenues. He sent over from Eu¬ rope, to fill that post, Charles Carroll, an Irish Roman Catholic, and the founder of an

import¬ ant family. At the time of the proprietary's restoration, the governor of Maryland was Capt. John Hart, a hot-blooded, capable Protestant-Irishman, a man of infirm health, who was continued in office by the guardian of the proprietary. Theoretically, the second Charles, Lord Baltimore, had the same position as his grandfather; but, practically, the 25 years of royal rule had made a vast difference. The people seemed to have cared but little for the change, and the proprietary was regarded as an absentee landlord, making little use of his power except as a means of appointing relatives and friends to office. In 1715 a comprehensive code was prepared by a committee of the as¬ sembly whose chairman was Andrew Hamilton. Shortly afterward he removed to Philadelphia where he was the first American lawyer to gain a continental reputation. From Philadelphia he was called to New York to defend John Peter Zenger in a famous libel case, having known Zenger long before, when both were neighbors in Chestertown in Kent County.

The Protestants soon found that there were no grounds for apprehension lest the Calvert family should lean too much toward the adhe¬ rents of their ancestors' religion. The Roman Catholics were soon rudely disillusioned of their hope that they might regain, at least, a part of their old influence and position. They were even disfranchised, as a result of a violent con¬ tention between Carroll, on the one side, and Hart and the assembly on the other. Some little suspicion of Jacobitism made the Roman Catholics still more unpopular, and repressive laws against them continued in force through¬ out the wdiole of the provincial period.

Charles Calvert, a relative of the proprie¬ tary, was governor from 1720 to 1727. During this time the general assembly passed in 1723 a law for the establishment of a free school in each county, and a notable controversy arose between the proprietary and the legislature as to whether the English statutes extended to Maryland. This controversy lasted for several years, before the victory of the provincials whose bold resolutions were long remembered : <(that this Province hath always hitherto had the Common Law, and such general statutes of England, as are not restrained by words of local limitation, and such acts of the Assembly as were made in the Province, to suit its partic¬ ular constitution, as the rule and the standard of its government and judicature.® Those who maintained the contrary, ((intend to infringe our English liberties, and to frustrate the in¬ tent of the Crown® in the original grant of this province.

Benedict Leonard Calvert, younger brother of Lord Baltimore, came out to Maryland as governor in 1727, and died of consumption on his way home, in 1731. The promise of his high-minded, scholarly, lovable nature had not time for fulfilment. He had studied at Ox¬ ford, had made the ((Grand Tour® on the con¬ tinent of Europe and was a friend of Hearne, the antiquary. While he was governor, Wil¬ liam Parks began at Annapolis the first news¬ paper in the province, though there had been a printing press there as early as 1690. Ebenezer Cook, who called himself ((Laureate of Maryland,® in his vigorous Hudibrastic satire, ((The Sot Weed Factor,® gave a lively picture of social life in Maryland and R. Lewis, mas¬ ter in King William's school, wrote poetry and edited a Latin poem, printed in Annapolis. During Calvert's administration occurred two important events which changed Maryland from a rural plantation province to a commer¬ cial and agricultural border state. In 1729 Baltimore town was laid out, at the head of navigation on the Patapsco, and grew to a great city, being near to the fertile western country. About this time, along the valleys of the Blue Ridge, from Pennsylvania down toward Georgia, came the sturdy, God-fearing, hardworking, German-speaking immigrants from the Rhineland, who came to Philadelphia, and so had their ties with the Pennsylvanians, rather than with the Virginians. This opening of the back country started that struggle be¬ tween Philadelphia and Baltimore to obtain trade, which led Braddock, influenced by the colonists in Maryland and Virginia, to make his way westward through Maryland ; but Forbes, influenced by the Pennsylvanians, to make his road toward Fort Du Quesne, through

their colony. The Germans in Maryland were not slaveholders, and devoted their attention to the growth of cereals rather than tobacco. They also began manufactures on a small scale, and thus diversified the industry of the pala¬ tinate. Charles, Lord Baltimore, came to Maryland in 1732, in an attempt to settle the boundary dispute with Penn's sons and heirs. He yielded to them all that they demanded tor some inexplicable reason, and presented them several million acres of land to which they had no right. Pennsylvanians had settled i bna delphia south of the 40th parallel, but they had no settlements west of the Susquehanna River. Beyond it Marylanders were already building their cabins near the north boundary of the province, and, under Capt. Thomas Cresap, they even fought for their rights. Baltimore agreed, nevertheless, to accept a line run due west on a parallel 15 miles south of Philadel¬ phia, so far as the provinces had a comt£0*J boundary. When he realized what he had done he refused to run this boundary and ap¬ plied to the English courts. The case dragged on until 1760, when the line of 1732 was finally accepted, and was surveyed between 1762 and 1767 by Charles Mason and Jeremiah Dixon, two excellent English surveyors. During the long governorships of William . Bladen and Samuel Ogle, the province grew in population and wealth. Worcester County on the Atlan¬ tic seaboard, was organized in 1742, and hred-erick County, in the extreme west, m 1748. The Annapolis Gazette, established in 1/32, published graceful and correct poems written by colonial gentlemen. The English magazines printed the results of the scientific observa¬ tions in southern Maryland of Dr Richard Brooke, physician and politician. In 1/33, Horatio Sharpe came out as governor, and con¬ tinued in that office until relieved in 1768 by the last proprietary governor, Sir Robert Eden, the brother-in-law of the last Lord Baltimore. Sharpe was a wise and popular man, who had a difficult position to fill during the French and Indian War, in which Fort Cumberland and other garrisons were placed m the west ot the province; but in which Maryland played a dis¬ creditable part, owing to a niggardly proprie¬ tary and a narrow-minded, unpatriotic legis-Maryland joined with the other colonies in repudiating the Stamp Act and forced the stamp distributor to resign his office and nee from the province. The general assembly passed bold resolves, refusing to admit taxa¬ tion without representation, and claiming that the provincial legislature had the sole right to lay taxes, or impositions, on the inhabitants of their province, or their property or effects. When the day arrived on which the Stamp Act should go into

operation there was no stamped paper in the province. How could business be transacted, if unstamped paper was illegal? The Frederick County Court took a bold but sensible course, and declared that its business should be carried on without stamps, and the other courts of the province followed it in that course. Maryland was represented in the Continental Stamp Act Congress and took part in the non-importation agreement and in the correspondence with the other colonies, so as to present an united front against the British acts.

The people of Annapolis burnt a vessel, The Peggy Stewart, laden with tea.. Yet the prov¬ ince was conservative, and, in Sharpe and Eden, had two governors of unusual popular¬ ity. In 1774 Eden went to England for a few months. In June, during his absence, there met at Annapolis a <(general congress of deputies from all the counties,® to consider measures ot opposition to England. This body was the first of a series of conventions, which chose ffe*e" gates to continental congresses and appointed a Committee of Safety to act as an executive committee during the intervals between conventions ; which enlisted troops and sent them to fight the British in Massachusetts; which directed the choice by each county of a Com¬ mittee of Observation to care for local matters; and which, by the Association, a document of¬ fered in l77o for subscription by the freemen of the province, expressed approval of the measures adopted by the Continental Congress in opposition to Great Britain, and united the people (<in maintenance of good order and the public peace.®

Eden had not only difficulties to contend with in connection with the British revenue acts, but also had to meet two local troubles.

A strong party declared that the act. which provided for the support of the clergy, had not been properly passed, and so was void. A struggle over officers' fees caused great excite¬ ment. The acts fixing these fees were tem¬ porary, so that the legislature might readjust their rates every few years. The councillors held the chief offices and naturally desired large fees. When the fee act expired in 1770 all attempts to pass a new law failed, because of dissensions between the two houses of the assembly. What should be done in this emer¬ gency? Eden issued a proclamation forbidding any officer to take fees greater than those al¬ lowed in the old law. Of course, he was thereby virtually authorized to take fees at the old rate, and so the proclamation fixed the fees. A fierce controversy followed over the governor's right to do this; in which contro¬ versy, Daniel Dulany, the younger, who had attacked the Stamp Act, defended the governor, and Charles Carroll of

Carrollton, a young Roman Catholic, who was the wealthiest land-owner in the province, attacked him. The ma¬ jority of the people undoubtedly agreed with Carroll, but the governor held the whip hand and fees were collected at the old rate, until British rule was overthrown.

In 1771 Frederick, sixth and last Lord Baltimore, died, and the title became extinct. He left the province to his illegitimate son, Henry Harford, the sixth and last lord proprietary. In his honor, Harford County, on the west side of the Susquehanna, was named, and, at the same time, Caroline County, the only inland one on the Eastern Shore, was created and named in honor of Lady Eden.

Eden's influence . could not prevent acts of lawlessness from time to time, but his tact and good-fellowship with the colonial leaders, and. the conservatism which had always showed itself in Maryland, kept the <(ostensible form of government® intact, so that on 17 Mav 1776, the Provincial Convention denied that it was necessary to suppress the royal government, and, on 21 May, expressed the hope for a ((re-

union with Great Britain on constitutional principles.® Eden saw that the provincials would (<not long be able to stem the torrents which, in several provinces,® ran ((strongly to¬ ward independence.® He declined to accept the proposition of the convention that he remain as governor of Maryland, promising to take ((no active hostile part, nor to correspond with the British government.® Instead, he embarked on a British man-of-war on 23 June 1776, and sailed for England, where, in August, he was created Baronet of Maryland, an honor still worn by his descendants, in return for his skil¬ ful administration of the affairs of the province. Baltimore town and Frederick County eagerly sought independence. Samuel Chase, like a flame of fire, preached it throughout Maryland, Matthew Tilghman, William Paca, Charles Carroll the barrister and Charles Carroll of Car¬ rollton urged it. So the convention voted on 21 June, to allow its deputies in the Continental Congress to unite with delegates from other colonies, in declaring independence and forming a confederation. On 3 July, the convention adopted her own declaration of independence, and, thereafter, began to prepare a permanent written constitution for the new State.

State History. — Maryland was equal to any other of the 13 original States in her zeal and fidelity to the common cause. On 2 Aug. 1776, her delegates to the Continental Congress signed the Declaration of Independence, and, in November, elections were held for officers in the new government, which was finally insti¬ tuted, when the convention adjourned sine die in March 1777, and Thomas Johnson was inaugurated as the first governor. The State constitution was not submitted to the people. It provided for changes by passage of the amend¬ ment at two successive assemblv sessions. The constitution contained a bill of rights and a frame of government, consisting of a governor, chosen annually by the legislature, and a gen¬ eral assembly of two chambers ; a House of Delegates, elected annually, consisting of four Delegates from each of the 19 counties and two each from Annapolis and Baltimore; and a Senate of 15 members, chosen quinquennially by an electoral college, consisting of two members from each county and one from Annapolis and Baltimore. A governor's

council was also pro¬ vided, to be chosen annually by the legislature and to act upon his nominations. The judiciary was to be appointed by the governor. Suffrage was based upon the possession of property, and so there were a few negro voters.

Maryland entered into the Revolutionary War with zeal, and her troops were the only ones which were found in every campaign. At the battle of Long Island, on 27 Aug. 1776, the Maryland line won its first renown, and that renown was heightened in the Southern cam¬ paigns by its bravery in the battles of Camden, 16 Aug. 1780; the Cowpens, 11 Jan. 1781; Guil¬ ford Court House, 15 March 1781 ; and Eutaw Spring, 8 Sept. 1781. General William Small¬ wood, their commander, Gen. Mordecai Gist, and Col. John Eager Howard especially dis¬ tinguished themselves. Tench Tilghman, a Marylander, bore the news of the surrender of Cornwallis and his army at Yorktown, on 19 Oct. 1781, from .General. Washington to the Congress at Philadelphia, and Dr. . James McHenry of Baltimore, afterward Washington's

Secretary of War, was one of the general's aides, or military family.

While Maryland was full of alacrity for the common cause, for a long time she refused to sign the Articles of Confederation, fearing danger from the claims of the great States, notably Virginia, to vast tracts of land west of the Allegheny Mountains. Maryland proposed to the Continental Congress that this far-ex- tending territory be granted to the Union, and held as the common property of all the States, and refused to accede to the articles until this proposal was adopted, and Virginia, the most important of the claimants and the only one who had reduced her claims into possession, had made such a cession. This perseverance won, the desired cessions were made, the Western lands became the nation's domain and Maryland entered the Confederation as the 13th State on 1 March 1781. One of her delegates, John Hanson of Frederick County, was the first presiding officer of Congress under the new government. During the war, the State had confiscated the proprietary's lands and those of some of the Tories, who had among their num¬ ber some men of wealth and some of the yeo¬ men, especially on the lower Eastern Shore. In 1776 Frederick County was divided, the middle portion keeping the old name, the eastern one becoming Montgomery County, named after Gen. Richard Montgomery of the Revolutionary army, who was killed at Quebec, and the western portion becoming Washing¬ ton County.

In November 1783, by invitation of Mary¬ land, the Congress met in her State House at Annapolis, and in the senate chamber there General Washington resigned his commission on 23 Dec. 1783.

Maryland and Virginia had a common inter¬ est in the commerce of the Chesapeake and the Potomac, and, to arrange for its regulation, commissioners were appointed, who met at Alexandria and Mount Vernon in 1785. At that meeting, the desirability of uniform com¬ mercial regulations throughout the Union was considered and a convention for the discussion of such questions was called to meet at An¬ napolis in 1786. Only five States were then represented, and, through dissensions in the Maryland legislature, there were no Maryland delegates. Alexander Hamilton was a delegate, and, through his efforts, a second convention was summoned to meet in Philadelphia in 1787, which gathering drafted the Federal Constitu¬ tion. Maryland's delegation to the convention divided, Luther Martin (an able lawyer and subsequently an ardent Federalist) and John Francis Mercer refusing to sign the document ; while James McHenry, Daniel Carroll and Daniel of Saint Thomas Jenifer, did so. The people of the State elected delegates of strong Federal inclination to the convention called to consider the constitution, which ratified it 28 April 1788, by a large majority, — a vote which was considered to have had a considerable effect in Virginia.

In 1791 Maryland ceded to the Federal government, as a site for the seat of govern¬ ment, about 61 square miles on the north bank of the Potomac River at the head of navigation, and this, with a cession. from Virginia, formed the District of Columbia. The nortion taken from Virginia was later retroceded to her, so

that the territory of the present district was once entirely a part of Maryland. In 1/Jo Allegany County was formed from the western part of Washington County. During the early part of the 19th century, the Jeffersonian party in the State became organized, its leaders being two brothers : Gen. Samuel Smith, who sat in the United States Senate, and Robert Smith, who became Secretary of State. , .

When war was declared between the United States and Great Britain in 1812, Baltimore sent forth about 60 fast sailing vessels, which preyed as privateers on British commerce. In return, Admiral Cockburn sailed into the Chesapeake with a British fleet. He made, a number of landings, and had skirmishes with the people. The Federal authorities were inefficient. Finally, in August 1814, a reinforcement of British troops having arrived under command of Gen¬ eral Ross, ‘the British fleet sailed up the Patuxent River and disembarked a considerable expedition. The British forces were met by the Americans near Bladensburg, and the latter were shamefully defeated. The . British^ ad¬ vanced and took the Federal capital — Wash¬ ington. After a short time, they retired, re¬ embarked on the fleet and sailed up the bay to attack Baltimore. The army under General Ross landed at North Point, and attacked the Maryland militia, driving them back several miles upon the defenses of the city. In the attack, General Ross was killed. A landing party to the southwest of the city was unsuc¬ cessful. Fort McHenry, on the end of a peninsula at the mouth of the harbor, was bom¬ barded by the fleet. During the night of the bombardment, Francis Scott ‘Ivey, a lawyer of fine ability, who was detained on a British ship, whither he had gone to endeavor to effect the release of a prisoner, wrote the ((Star Spangled Banner? Having failed to take the city, the British withdrew. After the conclusion of peace, the farseeing merchants of Baltimore planned Western routes to secure, trade for their city, and the Baltimore and Ohio Railroad

came into being. . ,

Maryland was a close State politically, and was so conservative that the Federalist party lingered there for years after it had gone out of existence elsewhere. In 1806 the property qualification for voters was abolished, a racial one being substituted. The growth of Balti¬ more city and the larger counties rendered the people therein discontented with the constitu¬ tional rules of equality of representation in the

legislature. In 1837 the Democratic electors for the senate of the State, who numbered 19 out of 40 (the quorum being 24), refused, to go into the body, in the hope of. accomplishing constitutional revision. They failed to prevent the election of a senate, and the . party was repudiated by the voters at the ensuing election, but the constitutional amendments desired were speedily achieved, and, in 1838, the gov¬ ernor's council was abolished; the governor's election made by the people for a three-year term ; and the senate made also a body elected by the people, one member coming from each county and one from Baltimore city. An¬ napolis lost its representation in the general assembly. In 1836 Carroll County was estab¬ lished out of parts of Frederick and Baltimore, and took its name from the venerable Charles Carroll of Carrollton, who had been the last

survivor of the signers of the Declaration of Independence, and had died in 1832. .William Wirt, an eminent lawyer and a resident ot Baltimore city, was nominated for the Presi¬ dency by the anti-Masonic party, and received the electoral vote of Vermont at the election of 1832 From that time, for 30 years, Baltimore was the place at which many National political

conventions were held.

At this time, in Maryland, as in other States, large amounts had been borrowed to aid works of communication, such as railroads and canals.

A financial crisis came upon the country, after the failure of the Bank of the United States to obtain a recharter, and Maryland was in danger of bankruptcy. That this, evil was averted and the State's credit maintained was due to the high integrity of Thomas G. Pratt, then gov¬ ernor, and to the great helpfulness of George Peabody, then a London banker, but formerly in business in Baltimore. The failure to. re¬ charter the United States Bank was mainly due to two men, President Andrew Jackson and Roger B. Taney, a Marvland lawyer, who had been calied to the President's Cabinet as At¬ torney-General, and, having already conceived a distrust for that bank, had not only agreed with the President in his opposition to it, but had increased his hostility. Taney was trans¬ ferred to the Treasury Department, so as. to accomplish more against the bank, by removing the Federal government deposits from it. The Senate refused to confirm the appointment — an unprecedented act. Jackson nominated Taney again to a seat on the Supreme Court bench, and the nomination was

rejected. A vacancy in the chief justiceship gave Jackson a third op¬ portunity to honor Taney, and a change in the membership of the Senate secured his confirma¬ tion, so that he presided over that august tribunal from 1838 to 1864. The Maryland bar was a famous bod} of men. William Pinkney, who served as Minister to England and won laurels as an orator in the United States Senate, was considered the leader of the American bar, until he died, and after Daniel Webster died, for ,20 years, Reverdy Johnson was the most prominent American lawyer. Johnson was a Whig, served as Attorney-General in Taylor's administration, was twice senator from Mary¬ land and was Minister to England.

Troops from Maryland played a gallant part in the Mexican War. The agitation for rotation in office and for a greater number of elective offices was so strongly felt in Mary¬ land that a new constitution was adopted in 1851. The term of the governor was increased to four years, at which it has remained. At this time, Howard County was created out of part of Anne Arundel, and Baltimore citv was made independent of Baltimore County. To use the English phrase, it was created a county borough. Maryland had given considerable support to the colonization of negroes in Liberia, and John H. B. Latrobe, an eminent lawyer, was for many years president of the Colonization Society, but there was little abolition sentiment in the State. The Republican party was not organized in Maryland until 1866, but there was very con¬ servative LTnion sentiment in the State, and the Whigs had been powerful there. There was also a strong nativist element, which was brought into politics by a considerable foreign immigration to Baltimore about 1850, and by the

fact that these immigrants usually voted the Democratic ticket. As a result of the com¬ bination of these elements, Fillmore carried the State (the only one he did carry) as the native American (or “Know Nothing®) candidate for the Presidency in 1856, and Thomas H. Hicks, the candidate of the same party, was chosen governor in 1857. Baltimore city, about that time, was characterized by election riots and disturbances between mobs, composed of partisans of “Know-Nothings® and of Demo¬ crats, and also between mobs, composed of ad¬ herents of rival volunteer fire companies. The police force there was inefficient, and, as a re¬ sult, in 1860 it was placed under State control, under which it still remains. When the Presi¬ dential election of 1860 came, Breckcnridge, the candidate of the Southern Democracy, car¬ ried the State by a narrow1 plurality, over Bell, the Conseryative Union candidate, supported by the Old Line Whigs. As soon as Lincoln’s election was announced, the Gulf States began to secede. Maryland was in a difficult situa¬ tion. She was a border State, slaveholding, conservative, Union loving, having ties both to North and to South. Governor Hicks was a Union man, but not a man of strong personality. Lincoln called for troops. On the 19th of April, the Sixth Massachusetts regiment reached Baltimore. Locomotives were not then allowed to draw trains through the city, but mules pulled the cars from one station to the other along Pratt street. The commander of the regiment permitted his men to remain in the cars, and the crowd, seeing them so transported, became menacing. Stones were thrown, shots were fired and several men were killed on either side — the first bloodshed of the Civil War. Governor Hicks promptly called a session of the legislature to meet in Frederick, the centre of the Unionist part of the State, where the local influences overawed the Secessionists in the legislature, so that the question of disunion was never brought to a vote. Later, the Fed¬ eral officers arrested some prominent disunionists and confined them for several months. Baltimore was reduced to quiet and obedience to Federal law, when Gen. Benjamin F. Butler, with Union troops, took post in May on Federal Hill, overlooking the city. There was some friction with Federal authorities during the remainder of the conflict but the question was settled that Maryland would continue loyal to the

National government. The credit for sav¬ ing Maryland to the Union is, in large measure, due to the efforts of Reverdy Johnson and Henry Winter Davis, an eloquent orator and congressman. Some Marylanders crossed the Potomac, and, enlisting in the Confederate army, fought bravely. Gen. Bradlev T. John¬ son was the most important of their officers. The Union army also contained a large number of Maryland soldiers, the chief officers being Gen. John R. Kcnly and Gen. Charles E. Phelps. Union troops were stationed along the Potomac, and three important campaigns took place wholly or partly in the State. In the autumn of 1862, General Lee came into the State with the Army of Northern Virginia, and met Gen¬ eral McClellan and the Army of the Potomac, near the village of Sharpsburg, on Antietam Creek, in Washington County, fighting there a bloody battle, after which Lee was forced to retire into Virginia. This Maryland campaign

had, as one of its incidents, the occupation of Frederick by Stonewall Jackson, which gave rise to the poem of “Barbara Frietchie.® In 1863 Lee crossed the State twice on his way to and from Gettysburg, and, in 1864, Gen. Jubal A. Early entered Maryland, and fought the battle of the Monocacy near Frederick against Union forces under Gen. Lew Wallace. They were defeated, but the delay they caused the Con¬ federate army, together with a second delay, occasioned by Early’s stopping to collect a ran¬ som of $200,000 from Frederick, gave the Fed¬ eral authorities time to bring troops to Wash¬ ington and avert danger of the capital’s falling into the Confederate’s hands. A raiding party came within five miles of Baltimore at this time. During the war, James R. Randall wrote the song, “Maryland, my Maryland,® to encourage the secession element in the State.

Augustus W. Bradford, a Union man, was chosen governor in 1861, and, under his ad¬ ministration, was held the Constitutional Con¬ vention of 1864, the result of whose delibera¬ tions was declared adopted in October, by a very small majority, made up by the soldiers’ vote. This constitution abolished slavery, in¬ creased the representation of Baltimore, mak¬ ing it equivalent to three counties, provided for a lieutenant-governor, instituted registration of voters and established a State system of public education. It also prohibited, in the strictest terms, any persons who had sympathized with the Confederate States from holding office or voting, and provided that all voters must take an oath that they “have been truly and loyally on the side of the United States.®

Thomas Swann was elected governor, and C. C. Cox, lieutenant-

governor, on the Union ticket in November 1864. When the Civil Wa ended in 1865, the Union party, which had been a coalition one, fell into pieces. Governor Swann became a Democrat, while Lieutenant-Governor Cox and Henry Winter Davis organ¬ ized the Republican party, which was a minority one for 30 years. Reaction from the extreme loyal position of the constitution of 1864 led to the assembling of another Constitutional Convention in 1867, which drafted the constitu¬ tion under which the State is still governed, the people having declined in 1887 and 1907 to call a Constitutional Convention — a proposition which the constitution directed to be laid be¬ fore them every 20 years. This constitution abolished the office of lieutenant-governor and the "iron clad oath® of loyalty, and rearranged the judiciary. By this constitution, Wicomico County was established on the Eastern Shore, out of Dorchester and Somerset. In 1872 the western part of Allegany County was created into Garrett County, named for John W. Gar¬ rett, president of the Baltimore and Ohio Rail¬ road. This is the last county to be organized.

Oden Bowie was the first governor under the new constitution, and he was succeeded in 1872 by William Pinkney Whyte, a lawyer of marked ability, who held, at one time or another, nearly every elective office in the gift of the people, and who was the head of the Democratic organization until about 1880. Then Arthur T. Gorman, who had been a prominent member of the legislature, succeeded him as the director of Democratic politics, and continued to keep the organization in the hands of himself and his friends until his death in 1906. During

most of that quarter of a century, he was a member of the United States Senate. Ihe legislatures of 1868 and 1870 were unanimously Democratic, but, in that of 1872, a sniiH ‘U’hin lican minority appeared, under the leadership of Dr. Lewis H. Steiner of Frederick County.

A one-party State is apt to find that abuses creep in, and such became the condition in Maryland. An independent reform movement in the Democratic party led to. refusal on the part of many to accept the nomination of John Lee Carroll of Howard County for governor in 1875 A reform ticket was nominated, headed by J. Morrison Harris, a RePuMican, and containing the name of S. Teackle Vy allis a Democrat and the leader of the Baltimore bar, as candidate for the attorney-generalship. This ticket carried the counties, but gros frauds in Baltimore city were sufficient to show Carroll’s election on the face of the returns. The Court of Appeals, in a decision welcomed as a precedent by Republicans in the Presiden¬ tial contest of the succeeding year, decided that it could not go back of the returns, and Carroll became governor. The reform Democrats an independent Republicans then organized the Baltimore Reform League, and for 30 years waged an unparalleled conflict against the dominant party organization. Gradually, the independent voters came to hold the balance of power, especially in Baltimore. No independ¬ ent ticket was nominated, but the League stead¬ ily continued for good election laws, honestly administered and from time to time supported such Republican candidates as stood for the same purposes as the League. This policy led both parties to nominate better men and much improved political conditions.

In 1877 the most terrible strike of working men occurred, which Maryland has yet known when a reduction in wages of the employees of the Baltimore and Ohio Railroad led to such rioting that the National Guard was insufficient to quell it, and the assistance of Federal soldiers was requested. The efforts of the reform ele¬ ment led to the nomination, by the Democratic party in 1879, of William T. Hamilton of Wash¬ ington County, for the governorship. He was elected by a large majority and, though ham¬ pered by an unfriendly legislature, accomplished some reform. In 1882, the Reform League achieved its first victory in Baltimore, electing «new judges,® in coalition with the Republicans, over the old judges, who had been

renominated by the Democrats.

Robert M. McLane was elected governor, in 1885, but, being appointed Minister to France, he did not complete his term. In 188/ the Baltimore and Ohio Railroad ceased to pay dividends, and many citizens who were stock¬ holders suffered severe losses. .The road strug¬ gled along until 1896, when it went into the hands of the receivers, John K. Cowen and Oscar G. Murray. They were two remarkable men ; the one, an able lawyer ; the other, a skilled railroad operator, and, by the daring issue of receiver's certificates, and by extensive re¬ construction of the road, they were able, after a little more than three years, to return it to its stockholders under the original charter. Cowen became the first president of the reorganized road. A tunnel was dug under Baltimore, in order to secure direct connection between the

lines on the east and those on the west of the

CUyin 1887 Elihu E. Jackson was elected gov¬ ernor. In 1889 disastrous floods m western Maryland so damaged the Chesapeake and O to Canal that it was never afterward successful y operated. Fifteen years later it was sold to the Western Maryland Railroad. In 1890 the financial interests of the State suffered a great shock, by the discovery of the misappropriation of over $100,000 of the State s funds by the State treasurer, a man who had been univer¬ sally trusted. The loss to his bondsmen was heavy, and the incident gave an especial incen¬ tive to the founding of bonding companies in Baltimore. The long-continued complaint of intimidation and fraud at e ections, especially in Baltimore city, led to the passage of an Australian Ballot' Law in. 1890. This statute much improved the conditions, but was a measure which needed much later amendmen .

Frank Brown, o' Carroll County, was chosen governor in 1891, and in 1894 he found it neces¬ sary to call out the National Guard to preserye order in consequence of a miners strike in Allegany County. In that year s Congressiona elections, the Republican party, for the first time, had a majority in the State. This fact gave the party fresh courage, and, in 1895, it nominated a strong candidate for governor, Lloyd Lowndes of Allegany County. Ihe Re¬ form League supported him, as did ex-Governoi Whyte, and many other Democrats, who had become dissatisfied with conditions in their party and in the State..

Especial efforts were exerted to prevent intimidation or fraud in Baltimore city. The election resulted in a Re¬ publican legislature and a large popular majority for Lowndes. For many years one United States senator had been chosen from either shore of the bay, but now that rule was broken, and a Republican, George L. Wellington of Allegany County, was chosen senator, the other senator being Arthur P. Gorman of Howard County The same session saw the passage of an excellent ballot law, prepared by the Re¬ form League (which did away with all riot and intimidation, and almost all fraud at the polls), and the establishment of the State Geological Survey, whose achievements have been very ex¬ tensive, and of a remarkable scientific character.

In 1896 William J. Bryan was nominated for the Presidency, by the Democratic party, and this choice was not received with favor m Maryland, where the sentiment in favor of a gold standard was strong, and where the party had always called itself the Democratic-Con¬ servative party. The Prohibitionists nominated Joshua Levering of Baltimore, but his vote was small. William McKinley, the Republican nominee, carried the State by 32,000 plurality, and every Republican candidate for Congress was elected. President McKinlev called to his Cabinet, as Postmaster-General, James A. Gary, of Baltimore, a prominent manufacturer In 1897 a general assembly was chosen, Republican in both branches, the only time . such has been elected. They adopted a new city charter tor Baltimore, by which a board of estimates was established, and empowered to prepare an an¬ nual budget for the city. Louis E. McComas of Hagerstown, an experienced jurist, was elected to the United States Senate. In the Spanish

W ar, which occurred during that year, Mary¬ land troops did not have the opportunity of service outside of the country, but two natives of the State gained renown : Adm. Winfield Scott Schley and Gen. Harrison G. Otis, both of whom were born in Frederick.

The Democratic party won the gubernato¬ rial election of 1899, owing in part to dissen¬ sions among the Republicans, and John Walter Smith of Worcester County defeated Governor Lowndes, who sought re-election. Governor Smith succeeded to the leadership of the Demo¬ cratic State party organization, when Senator Gorman died. Four years after the close of his term as governor he was elected to the United States Senate. In 1900 the State cast its electoral vote for McKinley, by nearly 14,000 majority. Governor Smith called the legislature in extra session in 1901 to amend the ballot law and to provide for a State cen¬ sus, since certain frauds, which were after¬ ward corrected by the Federal officials, had been discovered in the National Census of 1900. The Democratic party now entered upon a continuous policy for suppressing the votes of negroes and the election law adopted in 1901 abolished party emblems and columns from the ballot, and included other provisions, making it easy for election officials to throw out ballots. The election of 1901 turned upon the question of approving, or condemning, this election law, under which so-called trick ballots, difficult to vote, were used in certain counties. A Demo¬ cratic legislature was chosen, but, of the two State officials elected by small majorities, one was a Republican. In 1902 the Republicans carried the State on the Congressional vote ; but, in 1903, Edwin Warfield of Howard County, head of one of the Baltimore bonding companies, was elected governor on the Demo¬ cratic ticket. About this time, an era of con¬ struction of public buildings occurred at An¬ napolis. The state house, erected in Governor Eden's administration, was enlarged; a build¬ ing was erected for the Court of Appeals and the State Library ; and the United States Naval Academy, established during the administra¬ tion of President Polk, when George Bancroft was Secretary of the Navy, was rebuilt. On 7 Feb. 1904 occurred the great fire in Baltimore, which burnt over about 160 acres of ground in the centre of the city, and destroyed

nearly $100,000,000 worth of property. A Burnt Dis¬ trict Commission with created to deal with the emergency, streets were widened and new piers built. An adequate sewer system, at a cost of about $25,000,000, was installed about the same time, and the city entered upon a new era of progress. In the autumn of 1906 the erec¬ tion of a new Young Men's Christian Association building was made possible in Bal¬ timore, by the raising of over $400,000, through the first of those intensive canvasses which have since been so often resorted to in the city.

The legislature of 1904 proposed to the vot¬ ers a constitutional amendment relating to the suffrage, usually known as the Poe Amend¬ ment, from the name of John P. Poe, Esq., a prominent lawyer who drafted it. It included the so-called ˆgrandfather clause, w and gave officers of registration considerable power, the object being to prevent most of the negroes from voting, and so render the success of that party certain. However, the amendment was

opposed by the governor, the attorney-general and many other prominent Democrats, as well as by the united body of Republicans, and was defeated at the polls in the election of 1905, by a majority of 35,000, although a Democratic majority was chosen in the general assembly then selected. Twice subsequently, a futile at¬ tempt was made to -have a similar amendment incorporated in the State constitution, before the effort was finally relinquished. In the Presidential elections of 1904 and 1908 the elec¬ toral vote of the State was divided, so close was the result.

In President Roosevelt's Cabinet, Charles J. Bonaparte, Esq., of Baltimore, who had been prominent in reform movements, served as Sec¬ retary of the Navy and as Attorney-General. In 1906 the legislature passed the bill for oyster culture, usually known by the name of B. Howard Haman, a Baltimore attorney who drafted it, and this was the commencement of the conservation movement. Shortly after¬ ward a State Forestry Commission was ap¬ pointed, which has done good work.

In 1904 the movement for good roads began, which had such remarkable development dur¬ ing the gubernatorial term of Austin L. Crothers, of Elkton, Cecil County, which lasted from 1908 to 1912. Isidor Rayner, Esq;, an eloquent man, was elected to the United States Senate, in 1904, by the Democrats.

Phillips Lee Goldsborough, of Cambridge, Dorchester County, who was chosen governor in 1911 was the second Republican to attain that office. His administration was efficient and characterized by progress. He was suc¬ ceeded by Governor Emerson C. Harrington, also of Cambridge, a Democrat, who was chosen in a close election. The enactment of the budget amendment to the constitution oc¬ curred during his administration. The first popular election of a United States senator re¬ sulted in the election of Dr. Joseph I. France, the Republican nominee. The electoral vote in 1912 and 1916 was cast for the Democratic can¬ didate. Governor Harrington appointed a Council of Defense which rendered valuable service during the Great War. Maryland con¬ tributed nearly 50,000 soldiers to the United States army, — the 115th and 313th regiments, especially, being almost entirely composed of Maryland men, and they gave a good account of themselves on the battlefield. Several army camps, etc., were located in the State, the most important ones being Camp Meade at Admiral, in Anne Arundel County, Camp Holabird, in Baltimore County, and the Edgewood Proving Grounds in Harford County.

Population. — Maryland had a population in 1790 of 319,728; in 1850, 583,034; in 1870, 780,844; in 1890. 1.042.300; in 1900, 1,188,044: in 1910, 1,295,346; in 1920, 1,449,661. The

principal cities are Baltimore (558,485 in 1910, large district annexed in 1917; 1920, U. S. cen¬ sus, 733,826) ; Cumberland (29,837) ; Hagers¬ town (28,066) ; Frederick (11,066) ; and Annap¬ olis (11,214).

The Press. — There are three morning daily papers published in Baltimore: the Amer¬ ican (Republican), established in 1774, the Sun (Democratic), established in 1837, and the Daily Record (legal) ; and there are two afternoon papers: the News and Evening Sun. Several weekly and monthly religious

and trade magazines are published in Balti¬ more, as are the magazines issued by the Johns Hopkins Press, the oldest of American univer¬ sity presses. In each county-seat there are usually two newspapers printed, and in the smaller cities there is generally found

a daily newspaper.

The following is a list of the governors of the State:

LORDS PROPRIETARY OF MARYLAND.

1632-1675. Cecilius Calvert, Secmid Lord Baltimore. 1675-1715. Charles Calvert, Third Lord Baltimore.

1715. Benedict Leonard Calvert, Fourth Lord Baltimore. 1715-1751. Charles Calvert, Fifth Lord Baltimore.

1751—1771. Frederick Calvert, Sixth Lord Baltimore. 1771-1776. Henry Harford.

PROPRIETARY GOVERNORS OF MARYLAND.

Leonardˆ abgence jn Virginia, in 1638, he left John Lewyer and Thomas Comwalleys in charge of the province. In 1641 he left Comwalleys again in charge for two months. From June 1643, to September 1644, he was m England, leaving Giles Brent as acting governor. In Uctober 1644 William Brainthwayt was acting governor, in February 1645, Edward Ingle usurped the province. Anarchy prevailed from the middle of 1645 to July 1646, when Edward Hill was chosen governor by the council and confirmed by Calvert, from Virginia. Calvert resumed rule in the fall of 1646. i<s47— 40

Thomas Greene . 1649—54

WˆSstˆs absence from the province in 1649 and 1650 Thomas Greene and Thomas Hatton acted as governor. In March 1652, Richard Bennett, Edmund Curtis and William Claiborne took possession of the government. In June, Stone was restored. Commissioners. Settlers appointed by Parliamentary Commissioners or by Provincial Court… . 1654-58

Josias Fendall .

Philip Calvert… •• • • • •••••… • 166(W>1

Charles Calvert (became Lord Baltimore 1675.

1669-1670 Philip Calvert, acting governor)… j 661-76

ˆC1*1U Nomina? governor. Deputy governor jesse Wharton actually carried out duties. ia7a_7q

Thomas Notley . . A7Q-84

Charles, Third Lord Baltimore… 16/y 84

Benedict Leonard Calvert (nominal governor.

Council exercised power. Vincent Lowe, presi-16g4_gg

William Joseph (President of Council) . i6«q_89

Convention of Freemen and John Coode, com-Q

manderin-chief . . ,-on_Q7

Nehemiah Blakistone . iovu-vz

ROYAL GOVERNORS

fir Thomas Lawrence (President of Council) ... 1693ˆ

ColENicholas Greenbury (President of Council) . . 1694 Sir Thomas Lawrence (President of Council) - 1694

Francis Nicholson . 1699-1702

Thomas Tench (President of Council) . \]ol-09

EdwardˆLloyd (President of Council) . 1 709-14

John Hart . 1/14

proprietary governors (restored)

T , „ . 1715-20

John Hart... • . . 1720-27

Charles Calvert. . ... . . 1797—ˆ1

Benedict Leonard Calvert . imi.m

Samuel Ogle . . 1737-33

Charles, Fifth Lord Baltimore . 1733-42

Samuel Ogle . . 1749-47

Thomas Bladen . ; ‘ ‘ ; 1747-52

Samuel Ogle . 1739-33

Benjamin T asker . _ ,Q

Ro’SrtFˆ-T:: t?«*-76 (Richard Lee, President of Council, acting

governor 1774) , _ , x 177/- 77

The Convention and Council of Safety . 17/6 //

STATE GOVERNORS OF MARYLAND.

1 777—70

Thomas J ohnson . } , LL A 7

Thomas Sim Lee . 1 709-83

William Paca .

William Smallwood . 1785 88

John E. Howard . Federalist .

George Plater . „ . 1792

Thomas Sim Lee.’.’.’ - Federalist . 1794I97

John H. Stone . 1797-98

J ohiˆR ‘ Mercer . ’. ’. ’. Democraticˆ Republican 1801-03

Robert Bowie . *03-06

Robert Wright . ((l«09-ll

Edward Lloyd . a

Robert Bowie . 101913

Levin Winder . Federalist . 1812

Charles Ridgely of „ 18i5_i8

Charles Goldsborough . . ;•••■• v.: • • •

Samuel Sprigg . Democratic-Republican 1819-22

Samuel Stevens, Jr . 1093-98

Joseph Kent . . 1 828-29

Daniel Martin . Anti-Jackson … … 1828

Thomas K. Carroll . Jackson-Democrat . 1829-30

Daniel Martin . Anti-Jackson . «

George Howard . Whig . 1k?9_93

James Thomas . . :;L, 9c

Thomas W. Veazey…. .

William Grayson . Democrat . 1838-41

Francis Thomas . .

Thomas G. Pratt . Whig . J844 4/

Philip Francis Thomas. . Democrat . l»4/-3U

Enoch Louis Lowe . “ . ˆ

Thomas Watkins Ligon . . 1833 58

Thomas Holliday Hicks American . 1858 oz

August W. Bradford… . Unionist … … • 1862-65

Thomas Swann . Unionist later Democrat 1865-68

Oden Bowie . Democrat . 1898 u

William Pinkney Whyte . ‘4

James Black Groome… . *8ZA

John Lee Carroll . .

William T. Hamilton… “ . J 880-84

Robert M. McLane. … . }884 85

Henry Lloyd . .

Elihu E. Jackson . . l«o?-96

Lloyd Lownes . Republican . lonfcfS.00

John W. Smith . Democrat . J?99_9*

Edwin W arfield .

Austin L. Crothers .

1904-08

1908-12

Philips L.' Goldsborough. Republican .

Emerson E-Harrington. Democrat . 1916 1920

Albert C. Ritchie . " 1920-1924

Bibliography. — Bozman, McMahon, Mc-Sherry, Scharf's (Histories of Maryland, Browne's "Maryland® in 'American Common¬ wealths, > Hall,' (Lords Baltimore! ; Maryland Archives (Provincial History, 38 volumes have so far appeared), Maryland Historical Society Fund Publications, Maryland Historical Society Magazine, Fiske's 'Old Virginia and her Neigh¬ bors,! numerous mongraphs in Johns Hopkins University Studies in Historical and Political Science, *etc.* Bernard C. Steiner,

Librarian of The Enoch Pratt Free Library,

Baltimore.

MARYLAND AGRICULTURAL COL¬ LEGE, a State institution founded in 1856 at College Park, Md., for education in agriculture and its ancillary sciences. At present it has the following departments: agriculture, horti¬ culture, biology, chemistry, mechanical engi¬ neering, civil engineering, electrical engineer¬ ing, canning and preserving, also training courses in agriculture for teachers and a sum¬ mer school. A great part of the college plant was destroyed by fire 29 Nov. 1912. The col¬ lege was housed for a time in temporary struc¬ tures but new buildings have since been erected of which the principal are Calvert and Morrill Halls. The college plant is valued at $525,000 and the annual income is about $170,- 000. ' There are 10,000 volumes in the library. The faculty numbers 40 and the student body about 500.

MARYLAND CAMPAIGN OF SEP¬ TEMBER 1862. The Union army under Gen¬ eral Pope having been defeated and driven to

the defenses of Washington, General Lee, 3 Sept. 1862, marched from Chantilly for Lees¬ burg. At the end of the first day's march Lee wrote to Jefferson Davis that the time seemed propitious ((for the Confederate army to enter Maryland" and give her material aid in the re¬ covery of her liberties. The next day he reached Leesburg, and again wrote that he was fully persuaded of the benefit that would result from an expedition into Maryland, and should proceed at once to make the movement, unless it was disapproved; also that he proposed to enter Pennsylvania, unless it should be deemed unadvisable upon political or other grounds. Without waiting for a reply to his two com¬ munications he crossed the Potomac at White's Ford, near Leesburg, on the 4th, 5th and 6th, with an army of over 60,000 men, and marched to Frederick, Md., where, on the 8th, he sug¬ gested to President Davis that the position of affairs ((placed it in the power of the govern¬ ment of the Confederate States to propose with propriety to that of the United States the rec¬ ognition of our independence." On the same day he issued an address to the people of Maryland, stating his mission among them and that he was prepared to assist them in regain¬ ing the rights of which they had been despoiled. When Lee entered Maryland east of the Blue Ridge he took it for granted that the Union garrison at Harper's Ferry would be with¬ drawn, thus opening his line of communication through the Shenandoah Valley. This was not done, and it became necessary to dislodge the garrison from that post before concentrating the Confederate army west of the Blue Ridge, and Lee came to the decision to divide his army and capture the Union forces at Martinsburg and Harper's Ferry. On the morning of the 10th his army was put in motion from Fred¬ erick. Walker's division of two brigades crossed the Potomac at Point of Rocks, south of Harper's Ferry, and on the morning of the 13th established itself on Loudoun Heights ; Jackson, with 14 brigades, marched over South Mountain at Turner's Gap, crossed the Poto¬ mac at Williamsport on the 11th, drove General White from Martinsburg into Harper's Ferry (q.v.), and at noon of the 13th appeared before Bolivar Heights and invested Harper's Ferry from the Virginia side of the Potomac. Mc¬ Laws, with 10 brigades, marched over Browns¬ ville Gap of the South Mountain, crossed Pleas¬ ant Valley and on the evening of the 13th was in full possession of Maryland Heights (q.v.), thus completing the investment of Harper's Ferry and its garrison of over 12,000 men. General Lee,

with nine brigades of Longstreet's command and D. H. Hill's division of five brigades, followed Jackson over iSouth Moun¬ tain, leaving Hill near Boonsboro to support Stuart's cavalry, which had been left east of the Blue Ridge. Lee, with Longstreet, moved to Hagerstown, there to await the capture of Harper's Ferry, and then to concentrate his army for a movement into Pennsylvania, the capture of Harrisburg and the destruction of the long railroad bridge over the Susquehanna. Meanwhile General McClellan, who had been placed in command of the Union troops for the defense of Washington, took the field at the head of over 87,000 men, and marched against Lee. His army, spread out like a great fan, its left on the Potomac and its right on the Balti¬ more and Ohio Railroaˆ cautiously advanced

on Frederick, which was occupied on the 12th, and here McClellan found a copy of Lee's orders showing the disposition of his scattered command. Tardy pursuit began ; on the morn¬ ing of the 13th Franklin's Sixth corps and Couch's division were put in motion to carry Crampton's Gap, in South Mountain, and re¬ lieve the garrison in Harper's Ferry, while McClellan, with the rest of the army, marched for Turner's Gap, six miles north of Crampton's, to cross the South Mountain and attack Lee. Franklin defeated the Confederates at Crampton's Gap on the 14th and, passing into Pleasant Valley, interposed between McLaws and Lee. Burnside, with the First and Ninth corps, attacked D. H. Hill at Turner's Gap and Fox's Gap the same day, Lee retraced his steps from Hagerstown to reinforce Hill, but when night came Lee had suffered defeat. He now abandoned his intention of invading Pennsyl¬ vania, ordered McLaws to elude Franklin and recross the Potomac somewhere south of Shepherdstown Ford, and at 10 o'clock that night put his own command in motion to recross the Potomac at Shepherdstown Ford, at the same time sending an order to Jackson to march from his investment of Harper's Ferry up the south side of the Potomac to Shepherdstown and cover the crossing. He crossed the Antietam in the morning of the 1 5th, where he hoped that McLaws might join him, but Frank¬ lin confined McLaws in Pleasant Valley. At noon he heard that Jackson had captured Harper's Ferry, whereupon he concluded not to retreat across the Potomac, but to give battle to McClellan on the heights and banks of the Antietam, and ordered Jackson to join him as soon as possible. McClellan followed Lee on the morning of the 1 5th, defeated Fitzhugh Lee's cavalry brigade in the streets of Boons¬ boro, and in the evening reached the banks of the Antietam to see Lee's army drawn up on the heights beyond. Franklin was left in Pleasant Valley to watch McLaws and relieve Harper's Ferry. Jackson joined Lee on

the morning of the 16th, bringing Walker's division with him; McLaws eluded Franklin, passed out of Pleasant Valley and through Harper's Ferry, and joined Lee very early in the morning of the 17th. The battle of Antietam (q.v.) or Sharpsburg, the bloodiest one-day battle of the war, was fought on the 17th; both armies re¬ mained inactive on the 18th, and that night Lee recrossed the Potomac at Shepherdstown Ford. McClellan followed on the morning of the 19th to the banks of the Potomac. On the 20th a part of Fitz-John Porter's Fifth corps crossed the Potomac at Shepherdstown Ford (q.v.), and was attacked and driven back across the river with great loss. This ended the campaign. From the beginning of the cam¬ paign to its close, 5-20 September, the Union losses, including Harper's Ferry and Maryland Heights, were 2,671 killed, 11,766 wounded and 13,542 captured or missing, an aggregate of 27,979. The Confederate losses were 1,979 killed, 9,607 wounded and 2,336 captured or missing, an aggregate of 13,922. The results of the campaign were momentous and far-reaching; the Confederate cause lost prestige and the National cause brightened. Recogni¬ tion of Confederate independence by Great Britain and France, about to be granted, was withheld, and 22 September Abraham Lincoln issued his preliminary proclamation of emanci-372

nation. Consult (Official Records' (Vol. XIX); (McClellan's Own Story'; Michie, (Life of Gen. McClellan'; Palfrey, (The Antietam and Fredericksburg' ; Allan, His¬ tory of the Army of Northern Virginia ; Walker, (History of the Second Army Corps' ; Long, (Life of General Lee' ; Fitzhugh Lee, (Life of General Lee' ; Cooke, (Life of Stone¬ wall Jackson'; The Century Company s (Bat¬ tles and Leaders of the Civil War' (Vol. 11).

E. A. Carman.

MARYLAND HEIGHTS, a bold, wooded elevation in Maryland, rising 1,000 feet above the Potomac opposite Harper's Ferry, (q.v.), W. Va. In these heights, Elk Ridge, lying west of South Mountain, from which it is separated by the narrow Pleasant Valley, terminates. The heights are almost inaccessible, capable of strong defense, and completely

command Harper's Ferry, which lies below it in the angle formed by the junction of the Potomac and Shenandoah rivers. When Harper's Ferry was seized by the Virginia forces in April lool, Col. T. J. (((Stonewall") Jackson promptly occupied Maryland Heights, and they con¬ tinued in Confederate possession until June of that year, when Gen. J. E. Johnston with¬ drew from the line of the Potomac and fell back to Winchester. The heights were then occupied by Union troops, and 5 Sept. 1*562, when Lee crossed into Maryland, they were held by Col. T. H. Ford with about 2,000 men and some heavy siege and field artillery. When Lee, at Frederick, Md., found that Harper's Ferry and the heights were still held by the Union troops he sent three columns to surround and capture the garrison of more than 12,000 men. Jackson moved from bred-erick on the morning of 10 September, crossed South Mountain and the Potomac, and, driv¬ ing everything before him, bivouacked on the 13th near Bolivar Heights. Walker crossed the Potomac south of Harpers Ferry and seized Loudoun Heights. McLaws, with 10 brigades, marched from Frederick late on the 10th, camped that night near Brownsville Gap, crossed the gap next day, and on the 12th crossed Pleasant Valley, ascended Maryland Heights, with Kershaw's and Barksdale s brigades, at Solomon's Gap, five miles north of Harper's Ferry, drove in some skirmishers and, marching southward on the crest of the mountain, was checked near nightf all by Ford s men behind a barricade of logs. In the morn¬ ing of the 13th he renewed his attack, which was stoutly resisted by Ford's men, who mean¬ while had been reinforced by troops from Harper's Ferry. The Union troops were finally driven from the heights into Harpers Ferry, abandoning four guns, and at 4.30 p.m. MdLaws was in complete possession, and put guns in position commanding Harpers Ferry, whose garrison surrendered on the 15th. The Union loss on Maryland Heights was about 150 killed and wounded; the Confederate loss was 35 killed and 178 wounded. After Lee had been driven across the Potomac the heights were occupied 20 September by troops of .the 12th corps The position was strongly fortified, and when, 15 June 1863, Milroy was defeated and driven from Winchester, General French moved his garrison from Harper's Ferry to the heights. Under General Meade s order French abandoned the position and distributed

his troops at Frederick and on the line of the Baltimore and Ohio Railroad. When Lee was defeated at Gettysburg the heights were re¬ occupied, 7 July, by the Union forces, and con¬ tinued in their possession until the close of the war. On 2 July 1864 General Early reached Winchester on his way to menace Washington ; General Sigel,

who was commanding the Union forces in and around Martinsburg, abandoned his position on the night of the 3d, crossed the Potomac at Shepherdstown, and on the night of the 5th established himself on Maryland Heights, with six regiments of infantry, 2,500 dismounted cavalry, two batteries of heavy artillery and 26 field-guns, while General Stahel was at Weverton and in Pleasant Valley, with 1,200 to 1,500 cavalry and four guns. Early followed Sigel across the river at Shep¬ herdstown Ford, drove Stahel back and con¬ fined Sigel within his works; a heavy can¬ nonade was kept up all night of the 6th, and there was sharp fighting next day; but, making no impression, and unable to manoeuver Sigel out of his position, Early drew off and crossed the South Mountain toward Frederick.

E. A. Carman.

MARYLAND HISTORICAL SOCIETY, The, was first proposed as a project by John H. B. Latrobe in 1835, and was organized in his law office on 27 Jan. 1844, largely <(through the zeal and execution" of Brantz Mayer. It was incorporated in 1845, and, joining with the Baltimore Library Company, a proprietary li¬ brary founded in 1796, solicited gifts for a building to be called the Athenaeum, a solicita¬ tion so successful that the organizations re¬ moved to permanent quarters therein on 23 Oct. 1848. In 1852 the Baltimore Library Com¬ pany disbanded, giving its books and its share in the building to the Society. The Mercantile Library Company occupied a part of the Athenaeum on a lease from the beginning until about 1880. In 1916 Mrs. H. Irvine Keyser gave the Society, as a memorial to her husband, the former residence of the late Enoch Pratt, at the corner of Monument and Park streets in Baltimore, and erected on the rear of the lot a fireproof library and art gallery. The buildings were opened with suitable exercises 18 Feb. 1919. The Society has about 800 mem¬ bers. Its presidents have been Gen. John Spear Smith, 1844 to 1866; Col. Brantz Mayer, 1866 to 1871; John H. B. Latrobe, Esq., 1871 to 1891 ; Severn Teackle Wallis, Esq., 1892 to 1894; Rev. John G. Morris, D.D., 1895; Albert Ritchie, Esq., 1896 to 1904; Mendes Cohen, Esq., 1905 to 1914, and Hon. Edwin Warfield, 1914 to the present. The Society possesses a valuable collection of books and manuscripts, including the Calvert Papers, purchased from a descendant of the last Lord Baltimore. It has published a series of publications from a fund given by George Peabody, and now prints the quarterly Maryland Historical Magazine. As agent for the State it has supervised the print¬ ing of 38 volumes of Maryland archives, deal¬ ing with the Provincial and Revolutionary pe¬ riods of the State's history, most of which volumes were edited by the late Dr. William Hand Browne.

MARYLAND YELLOWTHROAT, one

of the most familiar of North American warb¬ lers (Geothlypis trichas). It is about 5.5 inches

in length, migratory, makes a neatly concealed nest on the ground, almost always in a swamp or near a stream, and lays pink-white eggs deli¬ cately dotted with red. The plumage is bright yellow above, duller toward the tail ; wings and tail greenish ; under parts nearly white ; and a characteristic jet-black mask across the face and on the sides of the head. The summer cry is a sharp questioning “What of it? Where’d ye gel it?)y The genus contains several related and similar species, but the Kentucky warbler (Opornornis) is no longer included.

MARYLEBONE, ma’ri-le-bon or mar’li-bun, a metropolitan borough of London, Eng¬ land, in the northwest quarter. It contains the Coliseum, Middlesex Hospital, University Col¬ lege, Bedford College, Regent’s Park and sev¬ eral railroad terminals. Among its famous residents have been Edward Gibbon, Michael Faraday, Charles Dickens and Turner. Its pop¬ ulation is 117,184. See London.

MARYSVILLE, ma’riz-vil, Cal., city, county-seat of Yuba County, at the junction of the Yuba and the Feather rivers and on the Northern Electric, the Southern Pacific and Western Pacific railroads, 52 miles by rail north of Sacramento.

Charles Covilland, a Frenchman, founded Marysville in 1849, after the discovery of gold in California. A trading-post named New Mecklenburg had been established some years before. Covilland called the place Yubaville, which name it retained until 1850, when Marys¬ ville was adopted, and the following year it was chartered as a city. Its location at the head of navigation and proximity to valuable mines con¬ tributed to its growth, so that in 1860 it was the third city in size in the State. Since 1865 it. has declined in importance and population. The chief manufactures are dried and canned fruits, olive oil, flour,

cigars, woolen goods and foundry products. It has considerable trade in the products of the surrounding farms, espe¬ cially in grains, fruits, olives, rice, prunes, rai¬ sins, sheep, wool and cattle. The mines of the vicinity contribute to its industrial wealth. The city is the seat of the College of Notre Dame (Roman Catholic) for women, public and parish high schools, and it has a fine pub¬ lic library. The city hall and courthouse are handsome, well-built edifices. Levees costing $2,000,000 protect it from floods which occur periodically. Pop. 5,461.

MARYSVILLE, Kan., city, county-seat of Marshall County, on the Big Blue River, and on the Union Pacific, the Saint Joseph and Grand Island and the Topeka and Northwestern rail¬ roads, about 80 miles in direct line northwest of Topeka. The manufactures are flour, cigars, furniture, foundry and machine-shop products. The. city has the largest cigar factory in the State, considerable trade in wheat, corn, fruit and livestock. Pop. (1920) 3,048.

MARYSVILLE, Ohio, village, county-seat of Union County, on Mill Creek, and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Toledo and Ohio Central railroads, about 30 miles northwest of Columbus. It. is situated in an agricultural, livestock and dairy region, in which the farm products are mostly wheat, corn and oats ; also wool, sheep, horses. The chief manufactures are dairy products, wagons, carriages, cooperage products, lumber, plumber's supplies, brass stamping, silos, cigars,

evaporated milk, *etc.* Among the important buildings are the State Reformatory for Women, State Armory and Carnegie Public Library. Pop. 3,576.

MARYVILLE, Mo., city, county-seat of Nodaway County, on the Omaha and Saint Louis line of the Wabash, and Creston and Saint. Joseph line of the Burlington railroads, 46 miles north of Saint Joseph and 90 miles southeast of Omaha. It is in a rich agricul¬ tural region and is an important centre for the raising of fine livestock and poultry. The manufactures are cigars, lightning-rods, acety¬ lene, generators, harness, cement blocks, work garments, sheet metal products. It is in an im¬ portant banking and retail trading centre. There are two daily and two weekly news¬ papers. It is the home of the Fifth District State Normal School and the Maryville Busi¬ ness College. It has an active Commercial Club. There is a well-equipped Catholic hos¬ pital. Other important buildings are post office, high school, county courthouse

and seven churches. Pop. (1920) 4,711.

MARYVILLE, Tenn., village, county-seat of Blount County, on the Knoxville and Ark¬ ansas Railroad, about 16 miles south of Knox¬ ville. It was settled as early at 1795. It is in an agricultural and stock-raising region and near valuable marble quarries. Coal is found in the vicinity. The chief manufactures are flour, lumber, woolen goods and dairy products. It is the seat of the Maryville College (Pres¬ byterian), founded in 1819; the Freedmen's Normal Institute (Friends) ; and a normal school. Maryville has a fine courthouse, and some good church buildings. The Aluminum Company of America has located one of its plants here and employs several hundred men. The present population is about 3,739.

MARYVILLE COLLEGE, an institution in Maryville, Tenn., founded in 1819 under the auspices of the Presbyterian Church. The school is coeducational, and in 1915 had over $900,000 property and endowment, 55 instruc¬ tors, 771 students and about 15,000 volumes in the library. It has a four-year preparatory department and the college course leads to the degree of A.B.

MARZIALS, Theophile, or Theophilus,

English musician: b. Brussels, Belgium, 21 Dec. 1850. He was ,a pupil of music at London of M. L. Lawson and studied also at Paris and Milan. From 1870 he was employed in the British Museum, where he became super¬ intendent of the department of music. He is best known as a vocal composer (Twickenham Ferry) ; Three Sailor Boys) ; (Wait till you Come to Forty Years) ; (Ask Nothing More*) ; and he also published (A Gallery of Pigeons and Other Poems; Tan Pipes) (1904), *etc.*

MASACCIO, ma-sat'cho*, Tommaso, prop¬ erly Guidi, gwe'de, Italian painter : b. San Gio¬ vanni, Tuscany, 24 Dec. 1402 ; d. Rome, about 1428. He went while very young to Rome, where he painted in the church of Saint Cle¬ mente a series of frescoes, the finest of which represents Saint Catherine and the doctors be¬ fore Maxentius. In 1421 he was admitted into the guild of the Speziali at Florence. Among the works of Masaccio are the frescoes in the Brancacci Chapel of the Carmine, the (Expul¬ sion from Paradise) ; (Saint Peter's Sermon) ;

the (Tribute) ; (Saint Peter Baptizing* ; and the (Raising of the King's Son,* the last of which was partly painted by Filippino. Con¬ sult Knudtzon, (Masaccio og den florentimske malerkonst* (Copenhagen 1875) ; Delaborde, <Les oeuvres et la maniere de Masaccio (Paris 1876) ; Schmarsow, (Masaccio Studien* (Cassel

1895).

MASAI, ma-sl, an East African race, speak¬ ing the Hamitic language and occupying the Lake Kenia district. The Masais are men of large stature and magnificent physique. .They are a warlike people and live mostly in military kraals, eating nothing but beef and drinking nothing but milk, d he labor is done by slaves, women and children. They are to a certain degree nomadic, live in huts constructed of boughs and enclose their villages with huge thorn fences. Because of the climate they are better clothed than tribes of the warmer regions. Consult Hollis, A. C., (The Masai: Their Lan¬ guage and Folklore> (Oxford 1905) ; Merker,

M., <Die Masai* (2d ed., Berlin 1910) ; Thom¬ son, < Through Masai Land) (London 1885).

MASAMPO, Korea (Chosen) treaty port on the south coast opened to foreign trade 1 May 1899. It has a good harbor, with steamer connection with Fusan. Since the advent of the Japanese a naval station has been con¬ structed and a Japanese city is being erected The commercial greatness of Fusan has eclipsed somewhat that of Masampo, which, neveithe-less, is forging ahead as the leading commer¬ cial and industrial centre of southern Korea. Pop. about 35,000.

MASANIELLO, ma-sa-ne-ebo, the com¬ monly received name of Tommaso Aniello, Italian revolutionist : b. Amalfi, 1623 *, d. Naples,

16 July 1647. He was a fisherman at Sorrento, and in 1647 roused and led an insurrection against the Spanish viceroy, the Duke of Arcos. He was successful and obtained the abolition of unjust taxes and the revocation of an order to establish the Inquisition at Naples. The fruit

taxes were abolished and ’the old civic rights restored. But the people _ soon rose against him, too, and he was assassinated. An opera, music by Auber, libretto by Scribe and Delavigne, based on his career, was presented in 1828 in Paris as (La Moette di Portici,) and in 1829 in England in English as <Masamello:* Consult Saavedra, (La insurreccion de Napoli en 1647) (Madrid 1849).

MASARYK, Thomas (Tomas) Garrigue, author and first president of the Czecho-Slovak Republic: b. Goding, Moravia, 7 March 1850.

A Slovak by race and the son of poor parents, young Masaryk was apprenticed to a blacksmith after receiving an elementary education. He soon forsook the stithy and studied philosophy at Vienna and Leipzig. Appointed lecturer on that subject at Vienna in 1879, he made his mark by a study on “Suicide® as a pathological symptom of the condition of contemporary Eu¬ rope, attributing its chief cause to the decline of religious sentiment. He became professor of philosophy in 1882 at the new Czech University in Prague, where he distinguished himself as an interpreter of modern political and social tendencies to a growing body of students drawn from all branches of the Slav family. Com¬ menting on the movement for reunion and rec¬ onciliation among the Serbs and Croats al- .

ready in 1909, Hermann Bahr (q.v.) wrote: “So strong has been the influence of the lonely Slovak at Prague® that his pupils had “inspired their shattered country with belief in the fu¬ ture.® Elected to the Austrian Parliament in 1891, Masaryk boldly criticized the bureaucratic policy of Austria in Bosnia-Herzegovina and resigned his seat in 1893 as a protest against the negative policy of Czech Nationalists. For a number of years he edited the critical review Athenaeum, which he founded in 1883, and later Nashe Doha (Our Epoch), dealing with reli¬ gious criticism and Church history. He ex¬ posed as modern forgeries two manuscripts (of Gruenberg and Koniginhof) which had long been treasured as national heirlooms, while later, in a famous “blood ritual® trial, he dem¬ onstrated the absurdity of the ritual muider charge brought against a Jew. Professor Ma-sarvk married an American and as a political economist is well known in the United States through his lectures at the University of Chicago and other American institutions. He himself has been strongly influenced by the teachings of Comte, Spencer, Tolstoy and Dostoyevsky. His works were mostly written in German, but subsequently translated into Czech. He has published (Ueber den Hypnot-ismus) (Vienna 1881) ; (Der Selbstmord als Soziale

Massenerscheinung der niodernen Zivilisation,) the most important of his works (Leipzig 1887) ; <Ueber das Studium der Dichter Werke) (2 vols., Leipzig 1884-86) ; (Grundziige einer konkreten Logik* (1885) ; <Unsere heutige Krisis) (1895) ; (Die Moderne Evolutions — Philosophic) (1896); (La Ques¬ tion bohemienne* (1895); <Die philosophische und sozialistische Grundlagen des Marxismus) (Vienna 1898) ; (Die Stellungnahme der So-zialistenpartei zur Ethik) (1896) ; (Ideale der Humitat* (1902) ; Untelligenz und Religion* (1907) ; (Freie wissenschaftliche und kirchlich — gebundene Weltanschauung* (Vienna 1908); <Russland und Europe: Soziale Skizzen*

(1913)… .

Among these historical and philosophical writings, his powerful criticism of Marxian Socialism and the great work on “Russia and Europe® stand foremost. He rendered great service in spreading translations from English literature in Bohemia, where his influence also permeated the entire younger generation, as it did among the Southern Slavs and among the Ruthenes. In 1907 he was reelected to the Austrian Parliament. During the Friedjung trial in 1909 (see Austria-Hungary and the War, Vol. II, p. 637) he helped to expose the forgeries upon which Count Aehrenthal based his annexation of Bosnia and Herze¬ govina. When the European War broke out he remained in Prague till December 1914, when he escaped to Italy and thence to Eng¬ land in time to avoid arrest. He then became lecturer in the School of Slavonic Studies at the University of London. On 6 Dec. 1916 the Austrian Clerical organ, Reichspost, an¬ nounced that Professor Masaryk had been sentenced to death in contumaciam for high treason. Meanwhile, the “condemned® man was rapidly gaining wide recognition among the Allies as the leader of the national struggle for Czecho-Slovak independence. Together with Dr. Benes and Colonel Stefanik. he formed the triumvirate which was ultimately

recognized by the Allied governments as the trustee for the future government of Bohemia. In the spring of 1917 Professor Masaryk was called to Russia by Professor Milyukoff, but soon realized the hopelessness of the Russian situation and devoted strenuous efforts to or¬ ganize the Czecho-Slovak army. He preceded this force to Vladivostok and went on to Tokio and Washington. He had several audiences of President Wilson and addressed many public meetings. The republic of Czechoslovakia was recognized by Great Britain on 3 Aug. 1918; by the United States on 2 Sept. 1918; by Japan 9 Sept. 1918 and by Italy on 23 April 1918. The Declaration of Independence was formally published in Paris on 18 Oct. 1918 and the republic was formally proclaimed at Prague on 29 October. The Constitution was drafted in Geneva by 2 Nov. 1918, when the government was chosen. On 21 Dec. 1918 President Masaryk made a triumphal entry into Prague and then took oath to the new republic. In his first message to the members of the National Assembly delivered on 26 Dec. 1918 in the presence of representatives of the Allied governments, the President sketched the policies and principles of the two opposing groups in the great conflict and expressed the ((gratitude and unshakable fidelity8 of the republic toward the Allies. See Czecho-Slovaks ; Slavs; War, European.

MASAYA, ma-si'a, Nicaragua, town, in the western part, about 12 miles north of Lake Nicaragua and near Masaya volcano, which is 3,000 feet in height. The town is connected by railroad with the cities of Leon, Managua and Granada. Masaya is situated in an agricultural region, of which tobacco is one of the princi¬ pal productions. Coffee, sugar and rice are also grown in the vicinity. The inhabitants are mostly Indians. Pop. 13,000.

MASBATE, mas-ba'ta, Philippines, an island of the Philippines in the eastern part of the Visayan Sea, south of Luzon and north¬ west of Samar; greatest length, 82 miles north¬ west to southeast; width, 45 miles; area, 1,236 square miles. It is very mountainous, the cen¬ tral chain being semi-circular in shape, extend¬ ing from southwest to southeast, and there are several rivers of considerable size. Communi¬ cation between towns and villages is mostly by water, as there are few roads or even trails. The staple products are sugarcane, cotton, chocolate and hemp ; tobacco of a strong qual¬ ity is also raised. One of the chief industries is that of stock-raising (cattle, horses and hogs) ; over 1,000 head of cattle are ordinarily shipped monthly to other parts of the Philip¬ pines, mostly to Manila. This industry has been menaced in recent years by the rinderpest. Other important industries are the manufac¬ ture of sugar sacks from the buri palm, the manufacture of palm mats of superior work¬ manship and coloring,

weaving, lumbering and fishing; there is also an active trade with Manila. In March 1901 the island was united with Ticao (140 square miles), Burias (258 square miles) and the small adjacent islands, to form the province of Masbate; area of the whole province 1,732 square miles. Civil gov¬ ernment was inaugurated in 1901. The in¬ habitants are nearly all Visayans, but there are over 2,000 Bicols and about 580 Tagalogs. Pop.

of province 43,000; Masbate and Ticao (q.v.)

30,000.

MASBATE, Philippines, a pueblo and the capital of Masbate province, situated in the northeastern part of the island of Masbate on a peninsula dividing Palanog Port from Mobo Bay. It is a port of entry, and has a consider¬ able trade. It has a church, a school and some well-constructed buildings. Pop. 2,900.

MASCAGNI, Pietro, pe'a-tro- mas-kan'ye, Italian composer: b. Leghorn, Tuscany, 7 Dec. 1863. He was educated at the Milan Conserva¬ toire and in 1890 his opera (Cavalleria Rusticana} brought him immediate recognition in the musical world. From 1895 to 1903 he was director of the Rossini Lyceum at Pesaro. His songs and ballads are popular and his suc¬ cessful career as a composer has been further aided by his operas (L'Amico Fritz> (1891) ; (Les Rantzau> (1893); <Iris> (1898); (Le Maschere) (1901) ; <Amica) (1905) ; (IsobeP (1911); <Parisina) (1913); (L'Alodoletta) (1915), *etc.* In 1902 he visited the United States on an operatic tour. Consult Bastianelli, G., (Pietro Mascagni* (Naples 1910), and Pompei, E., 'Mascagni nella vita e nel arte) (Rome

1912).

MASCAGNITE, mas-kan'yit, or MAS-CAGNINE, a native sulphate of ammonium, occurring notably at Sasso in Tuscany, where it was discovered by Mascagni, from whom it was named.

MASCARA, Algeria, fortified town and capital of an arrondissement in the province of Oran, 45 miles southeast of the city of that name, at the base of the Little Atlas Range. The town stands on the site of a

Roman colony, is surrounded by walls, but has few ancient remains. It is purely of the French colonial type. For two centuries down to 1800 it was the capital of a Turkish beylik; in 1832 it be¬ came the capital of Abd-el-Kader; in 1835 it was ravaged by the French, but was reoccu¬ pied by Abd-el-Kader in 1838 only to fall finally to the French in 1841. Wine, cereals and oil are the principal items of trade. Pop. 24,250.

MASCARENE (mas-ka-ren') ISLANDS, a collective name for the islands of Bourbon, Mauritius and Rodriguez, named after Mas-carenhas, a Portuguese navigator, who discov¬ ered Bourbon in 1545.

MASCARON, Jules, French preacher: b. Marseilles, 1634; d. Agen, 1703. He became a member of the Congregation of the Oratory and soon established a great reputation as a preacher in the provincial cities. He preached at court in 1666 and thereafter he was a favor¬ ite of Louis XIV. Mascaron was consecrated bishop of Tulle in 1671 and eight years later was translated to the more important diocese of Agan. He still continued to preach at court and in 1675 delivered his greatest oration at the funeral of Marshal Turenne. His princi¬ pal sermons were edited by a member of the congregation, Father Borde, in 1704. Consult 'CEuvres de Mascaron * (Paris 1828).

MASCART, Eleuthere Elie Nicolas, French physicist: b. Quarouble, Nord, 1837; d. 1908. He received his education at the ficole Normale Superieure and in 1872 became professor at the College de France. From 1878 to 1907 he was director of the Government Central

Meteorological Bureau. He was also mem¬ ber of the International Bureau of Weights and Measures; was elected to the Academy of Sci¬ ences in 1884 and became its president in 19U4 He was made commander of the Legion of Honor in 1889. Mascart's investigations were mainly confined to spectroscopy, electricity and terrestrial magnetism. He published Elements de mecanique) (1866) ; cTraite d elec-tricite statique) (1876) ; cLegons sur 1 eˆctn-cite et le magnetisme,* with Joubert (lg»4) ; LMethode de mesures et applications (185Z) ; (Traite d'optique> (1889); (Traite de magnetisme terrestre) (1900).

MASCHERONIANA. The (Mascheroniana} of Vincenzo Monti

(1754-1826) is an un¬ finished epic “vision® in five cantos of terza rima. It represents the third of four periods into which Monti’s intellectual and artistic life may be divided. The first is the period of the Arcadian lyrics and the tragedies ; the second that of the (Bassvilliana) (1793), a diatribe against the French Terror; the third, that of the Napoleonic poems, the <Prometeo> (1797) the <Mascheroniana) (1801) and the (Bard of the Black Forest* (1806) ; the fourth (1815-19) that of the “ Austrian® poems, the (Mystic May, * the < Return of Astrea\ the < Invitation to Pallas, > the classic translations and the critical works.

Monti’s permanent and most interesting distinction is that, as a man thoroughly per¬ meated with the culture and mental traits of the Old Regime, he lived through the Revolu¬ tionary period without understanding any as-pect of it. In the course of his life he assumed with equal sincerity the position of each dominant party. He assailed the Revolution and then accepted it. He hailed Napoleon the liberator, and then Napoleon the despot. Ital¬ ians like to find in all these gyrations a thread of consistency: the concept of resurrected Italy. Unfortunately, however, Monti also embraced and sang the Austrian restoration.

This mental confusion, not to say moral perversity, has its counterpart in Monti’s poetry. He is fundamentally an Arcadian, who vaguely perceives the emotions and the character of a new age, without visualizing them clearly as an artist and without finding for them an ap¬ propriate formal expression. In a sense this makes his poems extremely interesting; for wholly in the Arcadian manner, they are ad¬ mirably calculated to show the limitations of that manner. The (Mascheroniana,* which owes its popularity in Italy to its nationalistic spirit, aims to project the miserable Italy of the revolution upon the great Italy of the past and a greater Italy of the future, of which to be sure Napoleon is to be the artisan. Here is a trite theme but one of potentiality. Monti, however, being Monti, transports it into the Arcadian world, a world by itself, apart from, perhaps superior’ to, any real world. It becomes “literature® through “plot® and. “form.® As regards plot, Monti invents a vision of the Dante series: to commemorate a friend, he nar¬ rates the passing of the soul of Lorenzo Mascheroni, an eminent mathematician, from earth to heaven, bringing him, en route, in touch with the souls of Parini, Beccaria and others. These great Italians discourse on con¬ temporary and past Italian conditions. Critics who like “literature® find, in the elaborate

descriptions here, distinguished merits of vivacity and coloring. Then, as we pass to “form,® we get a wealth of allusion, classic and Italian; but especially great ingeniousness of metaphor, and a truly remarkable success in epigram and sententiousness. Here, indeed, ye find those traits which give Monti kinship with the greatest writers and which by themselves give the <Mascheroniana) a place in literary history. But that is all. Monti cannot solve the neo-classic paradox: he cannot bring his virtual poetic theme (nationalism or patriotism) into contact with his “plot® and his “form.® The theme remains undeveloped, and the plot and the form without poetic life. When Monti, for instance, wishes to denounce Robespierre, he pictures God shuddering on his throne and the angels gracefully hiding very beautiful heads under very beautiful wings. All this has nothing to do with Robespierre. The vice of neo-classicism is that it works on three parallel lines, one for the “plot,® another for the “form® (figure, allusion, episode, metaphor) ; and another for the animating poetic emotion. And the lines never meet. The (Mascheroniana* is a classic poem; and it died, as a poem, with the school it represents, retaining an his¬ torical interest, for its characteristic defects, and as one of the records of Monti’s intel¬ lectual reversals.

Arthur Livingston.

MASCOTS AND HOODOOS, a mascot is a person or thing supposed to bring good luck, while a hoodoo -is an influence of evil. Another name for the hoodoo is Jonah, a term originating with superstitious sailors. The word mascot was first introduced into literature by means of the comic opera (La Mascotte* writ¬ ten by Audran, but in France it appears to have been in common use for a long time previously among gamesters and sporting characters. It was used to signify some object, animate or in¬ animate, which like the luck-penny brought good fortune to its possessor. The word is traced back to the patois of Provence and Gas¬ cony, where a mascot is something which brings luck to a household. Etymologically the word is derived from masque (masked or concealed), which in provincial French is applied — as ne coiffe is in more polished French — to a child born with a caul. Such a child was believed to be destined, not only to be lucky himself, but to be the source of luck to others. In most European countries there is a large trade in charms and talismans to bring good fortune.

The term hoodoo is a manifest corruption of African voodooism and is a modified supersti¬ tion of the system of terrorism which has been cultivated for years by the voodoo priesthood with remarkable success. There is, however, no scientific foundation for belief in either

hoodoos or mascots, any more than there is in a reliance upon dreams and visions. Natural laws are not to be set aside by touching a hunchback or carrying a rabbit's foot in one's pocket. It is a fact, however, that in every age of the world the goddess of chance has been worshipped un¬ der one name or another, and modern civiliza¬ tion has not destroyed this cult. The belief in the mascot for luck, or the hoodoo for ill-luck, is an indication of weakness and lack of deci¬ sion. In the <Iliad,) when Hector is told that "the birds are against him,® and all the omens unlucky, the Trojan hero makes answer:

((Without a bird his sword the true man draws; and asks no omen but his country's caused See also Omen ; Superstition.

MASCOUTEN, a belligerent tribe of Algonquians, the French Nation du Feu, ((Fire Nation,** dwelling along the Illinois River. They were at constant warfare with their neigh¬ bors, and are first mentioned by the earliest French missionaries as inhabiting southern Michigan, whence, according to the traditions of the Ojibwas and Ottawas, they had been driven by the latter from the region around modern Mackinaw. In 1712, united with the Foxes and Kickapoo, they were almost exter¬ minated, first by the French and afterward by the Pottawattomi and their allies. The rem¬ nants migrated westward and are last men¬ tioned in 1779 as living with the Piankishaws and Kickapoos on the Wabash River. The name is derived from Mashkodainsug, <(little prairie people,** a title now borne by a tribe of Pottawattomi Indians resident in Kansas.

MASEFIELD, John, English poet and dramatist : b. 1875. In his youth he shipped be¬ fore the mast on the Conway, in which he made several voyages. For a time also he was en¬ gaged as a farm laborer and in the 90's spent a short time as attendant in a Sixth avenue sa¬ loon in New York. These early experiences he later turned to account in his literary work. After his wanderings Masefield settled near London and became a regular contributor of prose and verse to the periodicals of the metrop¬ olis. He was awarded the Edmond de Polignac prize for poetry in 1912 by the Royal Society of Literature.

Masefield won literary fame mainly through his sea ballads and the narra¬ tive poems, (The Everlasting Mercy) and (The Widow in the Bye Street.) His verse is in¬ tensely realistic, full of pathos, although the verse form is often crude. His stories for boys represent his best efforts in prose and are reminiscent of Marryat at his best. His plays lack technique and are little suited to stage pre¬ sentation, but give evidence of growing power. His works, in addition to those already men¬ tioned, are (Salt Water Ballads) (1902) ; (A Mainsail Haul* (1905; 1913); (A Tarpaulin Master) ; ˆBallads* ; (Captain Margaret* ; (The Tragedy of Nan and other Plays) (1910) ; (The Tragedy of Pompey the Great-* (1910) ; (Multitude and Solitude* ; (The Street of To-day* ; (Poems and Ballads) ; (William Shakespeare* ; dauber* ; (The Daffodil Fields* ; (Philip the King* (1914) ; (Personal Recollections of John M. Synge* ; (The Faithful* ; (Sonnets and Poems* ; (The Locked Chest* ; (The Sweeps of Ninety-Eight* ; (Good Friday*; 'Gallipoli*; 'Lollingcfon Downs,* *etc.* Masefield. edited (The Voyages of Captain William Dampier* (1906) ; and wrote introductions to (Hakluyt's Voy¬ ages* and 'The Voyages of Marco Polo.* The following plays have been produced: (The Campden Wonder*; (Nan* ; 'Pompey the Great* ; 'Sweeps of Ninety-Eight* ; (Philip the King*; (The Faithful*; (Mrs. Harrison*; 'Good Friday.*

MASHAM, Abigail Hill, Lady, confidante and favorite of Queen Anne of England : b. London, 1670; d. 6 Dec. 1734. A cousin of Sarah Jennings, Duchess of Marlborough, and also re¬ lated to Robert Harley, Earl of Oxford, she passed from the service of Lady Rivers, thanks

to the influence of the Duchess of Marlborough, into that of Queen Anne, in whose favor she soon displaced her cousin, making every effort to turn the queen from the Marlboroughs and Whiggery to Toryism and even Jacobitism. She was married to Samuel Masham in 1707 ; had him made a baron in 1712; brought her kinsman Oxford into power, but soon turned him out; and, in short, was the power behind the throne, succeeding her cousin Marlborough. She re¬ tired after Queen Anne's death. She was a plain, homely, red-nosed woman, much bepraised by Swift and accused of vulgarity, meanness and covetousness by the Whigs. See Anne, Queen of England.

MASHAM, Samuel Cunliffe Lister, 1st

Baron, English inventor : b. Calverly Hall, near Bradford, 1 Jan. 1815; d. Swinton Park, York, 2 Feb. 1906. In 1838 his father started Samuel

and his brother John as worsted manufacturers in a mill at Manningham. About 1845 he per¬ fected a wool-combing machine which revolu¬ tionized textile processes and made, the inventor wealthy. He secured a profit of $5,000 on every machine sold. From 1855 to 1864 he spent huge sums in perfecting a silk-combing machine and at one time was perilously near bankruptcy. The machine was brought out in 1864 and enabled him to produce valuable yarn from the hitherto useless silk waste. Masham also perfected a velvet loom for piled fabrics, and after 1878 his income from his inventions exceeded $1,000,000 annually. He opposed freetrade be¬ cause the American protective tariff seriously limited his business. He was created 1st Baron Masham in 1891. He wrote (Lord Masham's Inventions* (1905).

MASHKODAINSUG. See Mascouten.

MASHONALAND, ma-shd'na-land, South Africa, a province forming the northeastern portion of South Rhodesia, between the Zam¬ besi and Matabeleland. It consists largely of open plains and tablelands, is well watered by the Umniate and other feeders of the Zambesi and is very fertile. The Mashonas belong to the Kaffir race and were formerly masters of the whole territory between the Limpopo and the Zambesi, but were cooped up within their present territory by the powerful Matabele, whom they were unable successfully to resist.. They are a peaceful people, clever as smiths and as weavers of cotton fabrics. The country came under the management of the British South Af¬ rica Company in 1890. It is rich in gold, which has been mined here at some remote and un¬ known period, old workings being still visible, and Mashonaland is with some degree of prob¬ ability identified with the biblical Land of Ophir. Salisbury is the chief town. The population of Mashonaland is estimated at 12,600 whites and 495,450 natives. Other towns are Hartley, Ga-tuma, Umtali and Victoria. Salisbury is con¬ nected with Beira, Portuguese East Africa, by a railroad. From Salisbury north another rail¬ road extends 580 miles through Buluwavo to the Victoria Falls, where there is a new bridge over the Zambesi. This road is a section of the Cape to Cairo Railway. For the antiquities, anthro¬ pology, history, etc., of Mashonaland, consult Bent, J. T., 'Ruined Cities of Mashonaland* (London 1892) ; Hall, R. N., (Prehistoric Rho¬ desia* (Chicago 1910) ; id., 'Great Zimbabwe* (London 1905) ; Darter, A., (Pioneers of Ma-378

shonaland) (ib. 1914) : Randall-Maclver, D., (Mediaeval Rhodesia) (ib. 1906) ; Selous, F. C., (Travel and Adventure in SouthEast Africa* (London 1893) ; Waal, D. C., (With Rhodes in Mashonaland* (Cape Town 1896).

MASHPEE, a New England Indian group, originally located in Barnstable County, Mass. They were placed on a reservation as early as 1660. At present there are about 200 individuals of pure Indian descent and many more of mixed negro, white and Indian blood.

MASINISSA, mas-i-ms'a, or MASSI-NLSSA, king of Numidia: b. 238 b.c. ; d. 148 b.c. He was at first ruler only of the east por¬ tion of the country, but latterly of the whole, having, by the help of the Romans during the Second Punic War, defeated Syphax, king of Western Numidia, taking him prisoner with his wife, Sophonisba, whose hand had formerly been promised to Masinissa. Masinissa now made her his wife, but Scipio Africanus, fear¬ ful of her influence, claimed her as a prisoner of Rome. Unable to resist, Masinissa sent her a poisoned chalice, of which she voluntarily drank. Masinissa commanded the Roman cav¬ alry on the right wing at the battle of Zama, which ended the Second Punic War (201 b.c.). As a reward the Romans gave him the terri¬ tory formerly held by Syphax. In peace he proved himself an efficient administrator and did much to civilize his people. His army and fleet attained large proportions and he made raids into Carthaginian territory. In 150 b.c. Carthage made war on him, but with the Ro¬ mans as his allies, Carthage fell to rise no more. Consult Meltzer-Kahrstedt, (Geschichte der Karthager) (Vol. Ill, Berlin 1913).

MASK, a covering for the face, often shaped so as to form a rude representation of human or animal features. They have been in use from the most ancient times. Among the Greeks they were used, particularly in the pro¬ cessions and ceremonies attending the orgies of Dionysus. Some ancient masks seem to have been, like the modern ones, merely coverings for the face, but it was more usual for them to cover the whole head, and represent, with the features, the head, hair and eyes. They were at first made of the bark of trees, then of leather, afterward of wood, which the artist fashioned according to the design of the poet. The comic masks were distinguished by a grotesque, laughing countenance ; the tragic ones had more dignity, but were sometimes frightful. There were also satyr masks and orchestric, or those with regular features, for dancers. They had mostly very large open mouths, within which were metallic bars or other sounding bodies to strengthen the voice of the speaker — a con¬ trivance which

was required by the construc¬ tion and immense size of the old theatres. The mask used at modern masked balls or masque¬ rades is a covering for the head and face made from a light stuff, with which a person may dis¬ guise himself and remain unknown, or perhaps represent some other character. There are whole and half masks — for example, masks for the nose and the eyes. A death mask is one of plaster made of the face after death. See also Carnival; Masquerade, and consult Dali,

(Masks, Labrets and Certain Aboriginal Cus¬ toms* (Washington 1885) ; Hart, C. H. (ed.), ˆrouwere's Life Masks of Great Americans)

(New York 1899) ; Fichorini, (Le maschere sceniche e le figure comiche d' antichi Romani * (Rome 1736).

MASKEGON (swamp people), a remnant of a tribe of Indians, part of the old Algonquin stock, who formerly lived by hunting and fish¬ ing. They are now in the <(swamp region® of Canada, between Hudson Bay and Lake Winni¬ peg, and are classed with the Cree and Oji'bwa people. To some extent they are now engaged in lumbering and a few do some farming. The estimated number of Maskegons is 2,000.

MASKELL, William, English theologian: b. Bath, about 1814; d. Penzance, 12 April 1890. In 1836 he was graduated at University College, Oxford, and in 1837 took holy orders. He was named rector of Corscombe, Dorset, in 1842. During his five-year incumbency he made researches in Anglican Church history, the results of which he embodied in (Ancient Liturgy of the Church of England* (1844) ; (History of the Martin Marprelate Contro¬ versy } (1845) and (Monumenta Ritualia Ecclesiae Anglicanae* (1846). In 1847 Dr. Mas¬ ked was appointed vicar of Saint Mary's, near Torquay, and domestic chaplain to the bishop of Exeter. About this time appeared his (Holy Baptism > (1848) and (Enquiry into the Doc¬ trine of the Church of England upon Absolu¬ tion (1849). Masked took part with his bishop in the Gorham controversy, and dis¬ gusted at the vacillation of the bishops and their attitude on the question of the sacra¬ mental grace of baptism, with Manning he went over to the Roman Catholic Church. In 1850 he issued two letters to the Privy Council on (The Present Position of the High Church Party.* Other works by him are (Protestant Ritualists) (1872) and Uvories, Ancient and Mediaeval) (1875). He never took orders in the Catholic Church but lived in retirement pur¬ suing his historical researches.

MASKELYNE, mas'ke-Hn, Nevil, English astronomer and mathematician : b. London, 6 Oct. 1732; d. Greenwich, 9 Feb. 1811. He was educated at Westminster School and at Trin¬ ity College, Cambridge; devoted himself to astronomy; and in 1765 was appointed astron¬ omer royal and director of Greenwich Observa¬ tory. He made careful studies of terrestrial density, introduced into navigation the method of taking longitudes by lunar distances and made many improvements in astronomical ap¬ paratus. In 1767 he founded the Nautical Al¬ manac. He wrote (British Mariner's Guide * (1763) and (Astronomical Observations) (1765).

MASKINONGE, or MUSKELLUNGE,

the giant pike (Esox nobilior) belonging to the Esocidae or pike family. It is found in the Saint Lawrence River, Lake Champlain, the Great Lakes and in the waters of western Canada. This fish is the largest of the pike family and, being predaceous, is not favored in most localities, as other fish soon disappear after its introduction. The name is applied to smaller but closely related species, of which the lake pickerel is one of the most common. The maskinonge reaches a length of from four to eight feet and a weight of from 40 to 100 pounds. It is caught with a hook and being swift and strong and a redoubtable fighter it is highly prized bv anglers. Its color is a

dark gray, sides of a silver gray with black spots of unequal size and spotted fins.

MASO Y MARQUEZ, Bartolome, Cuban patriot : b. near Manzanillo, 1834; d. 1907. His education was received in France and on his return to Cuba he became a planter, in which avocation he amassed considerable wealth. In the Ten Years' War (1868-78), he espoused the patriot cause and became colonel in the Cuban patriot army. He was made superin¬ tendent-general of the treasury and rendered efficient-service under the Palma regime. He was imprisoned 'by the Spaniards after the war, but in 1883 returned to his plantation where he remained until the Insurrection of 1895. In September he became vice-

president of the insurrectionary government and two years later became its president. In 1901 he was considered again for the Presidency and opposed Palma. Maso y Marquez opposed the Platt amendment as a denial of Cuban sover¬ eignty and went before the electorate on this platform, but withdrew before the day of elec¬ tion because of alleged fraud in Palma's campaign.

MASOCHISM, a term used in analytic psychology to denote a tendency, usual in in¬ fancy and early childhood but outgrown or sublimated in later life, to take pleasure in having pain inflicted upon oneself. The term is derived from von Sacher -Masoch, an Aus¬ trian novelist, in whose stories many of the main characters exhibited this trait in an ex¬ cessive degree. A mild degree of masochism is evinced by many average men and women, particularly those who spend much of their time complaining about wrones, injuries, pains, etc., suffered by themselves, the inference being that their unconscious masochism drives them to be occupied mentallv with pain and the de¬ tails of its effect upon themselves. Many of the temperamental pessimists of the world af¬ ford examples of an imperfectly sublimated masochism (see Sublimation), and if pre¬ ponderating in the characterological make-up of the individual suggests a certain degree of disease, which it would be most advisable for such persons to get rid of.

MASON, ma'son, Alfred Edward Wood-ley, English novelist : b. 7 May 1865. He was educated at Oxford and among his works, the majority of which have been reprinted in the United States, are (A Romance of Wastdale) (1895) ; (The Courtship of Morrice Buckler) (1896, dramatized 1897) ; (The Philanderers5 (1897) ; (Lawrence Clavering> (1897) ; (Mi¬ randa of the Balcony5 (1899, dramatized in New York 1901); (The Watchers5 (1899); (Clementina) (1901); (The Four Feathers5 (1902) ; (The Truants5 (1904) ; (Running Water5 (1907); (The Broken Road5 (1907); <At the Villa Rose5 (1910) ; (The Turnstile5 (1912). His plays include (Colonel Smith5 (1909) ; (The Witness for the Defense5 (1911) ; (Open Windows5 (1913).

MASON, Charles, English astronomer and surveyor: b. England, about 1730; d. Philadel¬ phia, February 1787. He was for years assist¬ ant astronomer at the Greenwich Observatory and was sent on various expeditions in the service of science. In 1763 he was employed with Jeremiah Dixon to survey the boundary line between Maryland and Pennsylvania and they were engaged in this undertaking until

1767, the line established becoming famous in American history as the

(<Mason and Dixon's Line55. They returned to England and Mason was thereafter engaged in astronomical ob¬ servations and researches until the time, the precise date of which is not known, when he returned to America. His work upon the lunar tables of Tobias Mayer which were pub¬ lished in London in 1787 under the title (Mayer's Lunar Tables Improved by Charles Mason,5 enjoyed a high reputation for reli¬ ability. In 1860 many of his papers were acci¬ dentally discovered at Halifax, N. S. Consult Bliss, Porter C. (in Historical Magazine July

1861).

MASON, Daniel Gregory, American com¬ poser and writer on music: b. Brookline, Mass., 20 Nov. 1873. In 1895 he was graduated at Harvard University; he studied music in Bos¬ ton, New York and Paris. He is assistant professor of music at Columbia University and is well known as a lecturer on music. His compositions include an elegy for piano (1901) ; sonata for violin and piano (1912) ; pastorale for violin, clarinet and piano (1913) ; and (Country Pictures5 for piano (1913) ; quartet for piano and strings (1914) ; symphony (1915). He has published (From Grieg to Brahms5 (1902) ; (Beethoven and his Forerunners5 (1904); (The Romantic Composers5 (1906); (Students' Guide to Music5 (1909) ; (A Neer-lected Sense in Piano Playing5 (1912) ; (Music as an International Language5 (1913) ; (Guide to Music5 (1914).

MASON, Francis, American missionary and Orientalist: b. York, England, 2 April 1799; d. Rangoon, Burma, 3 March 1874. He was the son of a shoemaker; studied by himself; came to the United States in 1818; worked as a shoe¬ maker through Massachusetts; prepared for the ministry at Newton Theological Seminary; joined the Baptist Church in 1825; and in 1827 was licensed to preach ; sailed for Burma in 1830; and settled in Tavoy, where he worked for 22 years. He was a brilliant linguist; re¬ duced two Karen dialects to writing; and in 1853, upon his removal to Toungoo, published a Karen version of the Bible. He made special study of Pali literature and of physical and ethnical peculiarities of Burma, publishing in 1852 (Tenasserim, or the Fauna, Flora, Minerals and Nations of British Burma and Pegu5 (re¬ vised 1860 ; 3d ed., 2 vols., by Theobald 1883). His other works include (Life of the Karen Apostle,5 a memoir of his wife (1847) ; Mem¬ oir of San Quala5 (1850) ; (Pali Grammar5 (1868) ; and (The Story of a Workingman's Life, with Sketches of Travel,5 an autobiog¬ raphy (1870).

MASON, George, American statesman: b. Stafford (now Fairfax) County, in the ((Northern Neck55 of Virginia, 1725; d. 7 Oct. 1792. He spent his early life on a typical plantation. The same region produced his coworkers in the cause of the American Revolution, Richard Henry Lee and George Washington (qq.v.). Mason seems to have been tutored at home, being grounded in a knowledge of the classics, both Latin and English. His younger brother, Thomas, was sent to London to study law at the Middle Temple. George Mason was married in 1750 to Ann Eilbeck, who died in 1773. Of this union there were several chil¬ dren. He was married again in 1780 to Sarah

Brent. The family, after 1758, resided at <(Gunston Hall," in Stafford County, a famous seat still standing on the banks of the Potomac. His energies were given to extensive planting interests.

As a member of the Ohio company, he was identified with his neighbor, George Washing¬ ton, in the initial stages of the French and Indian War, growing out of the concerns of that company. In 1759 he entered the Virginia house of burgesses, at the same time with Washington. He early protested against slav¬ ery. In 1765 he wrote: <(The policy of en¬ couraging the importation of free people and discouraging that of slaves has never been duly considered in this colony, or we should not at this day see one-half of our best lands in most parts of the country remain unsettled and the other cultivated with slaves; not to mention the ill effects such a practice has upon the morals and the manners of our people." He drafted the ((Non-Importation Association," which George Washington presented in 1769 in Williamsburg, and the (<Resolves" adopted at a general meeting of the freeholders of Fair¬ fax County, 18 July 1774. These ((Resolves" urged <(that a Congress should be appointed to consist of deputies from all the colonies, to concert a general and uniform plan for the defense and preservation of our common rights" ; and Uhat during our present diffi¬ culties and distress, no slaves ought to be im¬ ported into any of the British colonies on this continent; and we take this opportunity of declaring our most earnest wishes to see an entire stop forever put to such a wicked, cruel and unnatural trade." Sparks savs of these Fairfax resolves that «they constitute one of the ablest and most luminous expositions of the points at issue between Great Britain and the colonies which are to be found among the public documents of that period. Embracing the great principles and facts, clothed in a nervous and appropriate style, they are equally marked with dignity, firmness, intelligence and wisdom." These "Resolves" served as the basis of the association formed by the Virginia Con¬ vention! of August 1774 and that of the general Congress at its first session the following Sep¬ tember.

He was a member of the Virginia Conven¬ tion held in Richmond, July 1775, which took measures to arm the colony and appointed a committee of safety. He declined appointment in Congress as Virginia's representative in the seat made vacant by Washington's acceptance of the command of the American forces. The mind of

Mason was dominant in the Virginia Convention of 1776, so creative in State and National policies. He was the author of the Virginia Declaration of Rights, adopted by the convention on 12 June 1776. (See Virginia Convention of the Revolution). A copy of the first draft of this historic paper, in the hand¬ writing of George Mason, is to 1 e seen in the Virginia State Library. At the foot of the manuscript the author added these words: “This Declaration of Rights was the first in America; it received few alterations or addi¬ tions in the Virginia Convention (some of them not for the better), and was afterward closely imitated by the other United States.” The small table upon which it is believed Mason wrote this “Declaration” is preserved at the

Virginia Historical Society in Richmond. Mason’s chaste and concise statement of the fundamental principles of free government de¬ serves to rank with the foremost political char¬ ters of the English-speaking world. James Madison styles him ((the master-builder of the Constitution” of Virginia, adopted 29 June 1776, the natal day of the commomvealth.

Mason was a member of the Virginia as¬ sembly from 1776 to 1780, and from 1786 to 1788. He was one of the committee to revise the laws of Virginia, in accordance with the changed political conditions. The other mem¬ bers of this committee were Thomas Jefferson, Edmund Pendleton, George Wythe and Thomas Ludwell Lee. Mason again declined a seat in Congress, to which he was elected by the Vir¬ ginia assembly on 22 May 1777.

Mason took an active part in the Constitu¬ tional Convention of 1787, reaching Philadel¬ phia 17 May. He urged that the President be elected by Congress, and that he be ineligible for a second term; that the States should have equal representation in the Senate; that the Supreme Court should be joined with the Executive in the exercise of the veto power; that Congress be empowered to enact sumptuary laws; ((that no law in the nature of a Naviga¬ tion Act be passed before the year 1808, with¬ out the consent of two-thirds of each branch of the Legislature” ; and, finally, that Congress should be given the control of slavery. Madi¬ son reports Mason’s speech in favor of giving Congress the control of slavery as follows : ((This_ infernal traffic originated in the avarice of British merchants. The British government constantly checked the attempts of Virginia to put a stop to it. The present question concerns not the importing States alone, but the whole Union… . Slavery discourages arts and manufactures. The poor depise labor when performed by slaves. They prevent the emigra¬ tion of

whites, who really enrich and strengthen a country. They produce the most pernicious effect on manners. Every master of slaves is born a petty tyrant. They bring the judgment of heaven on a country. As nations cannot be rewarded or punished in the next world, they must be in this. By an inevitable chain of causes and effects, Providence punishes national sins by national calamities. He lamented that some of our eastern brethren had, from a lust of gain, embarked in this nefarious traffic • . • • He held it essential in every point of

view, that the General Government should have power to prevent the increase of slavery."

It was chiefly the failure to insert his views as to Congressional control of slavery and Navigation Acts which led Mason to reject the Constitution. Shortly before his death he told Thomas Jefferson that "the Constitution as agreed to for a fortnight before the Convention rose was such a one as he would have set his hand and heart to… . With respect to

the importation of slaves, it was left to Con¬ gress. This disturbed the two southernmost States who knew that . Congress would imme¬ diately suppress the importation of slaves. Those two States, therefore, struck up a bargain with the three New England States, that if they would join to admit slaves for some years, the two southernmost States would join in changing the clause which required two-thirds of the Legislature in any vote. It was done.

… Under the coalition, the great prin¬

ciples of the Constitution were changed in the last days of the Convention.® Such was Ma¬ son's own explanation of his refusal to sign the instrument in Philadelphia and for his stalwart opposition to its ratification in the Virginia Convention, which met at Richmond in 1788. Two years later he declined an appointment to a vacancy in the United States Senate. He died at ((Gunston Hall,® where he lies buried. Mason's statue forms one of the circle of the Revolutionary fathers surrounding the eques¬ trian monument of Washington at Richmond.

Thomas Jefferson described George Mason as ((a man of the first order of wisdom among those who acted on the theatre of the Revolu¬ tion, of expansive mind, profound judgment, cogent in argument, learned in the lore of our former Constitution, and earnest for the Re¬ publican change on Democratic principles. His elocution was neither flowing nor smooth, but his language was strong, his manner most im¬ pressive and strengthened by a dash of biting cynicism when provocation made it seasonable.® Consult Rowland, (Life and Writings of George Mason) (2 vols., New York 1892).

MASON, James Murray, American legis¬ lator: b. Mason's Island, Fairfax County, Va., 3 Nov. 1798; d. near Alexandria, Va., 28 April 1871. He was graduated from the University of Pennsylvania in 1818, studied law and upon being admitted to the bar established a practice at Winchester, Va. He was in public office much of the time and in 1847 was elected to the United States Senate, representing Vir¬ ginia, where he proved a consistent and strong adherent to the policies favored by his State. He was the author of the Fugitive Slave Law of 1850 and at the outbreak of the Civil War he resigned his seat in the Senate to enter the service of the Confederacy. He was sent to England with Slidell as Confederate com¬ missioner, but was captured on the steamer Trent (see Trent Affair, the) and taken to Boston where he was confined in Fort War¬ ren until 1862 when he sailed for Europe and until the end of the war endeavored to secure recognition of the Confederacy.. After the war Mason lived in Canada until 1868, being

in fear of the Federal government, but returned to Virginia some years before his death.

MASON, Jeremiah, American lawyer and politician: b. Lebanon, Conn., 27 April 1768; d. Boston, 14 Oct. 1848. He was graduated at Yale in 1788, admitted to the bar in 1791, and began to practise law at Westmoreland, N. H. In 1794 he removed to Walpole, N. H., and in 1797 settled at Portsmouth, where he lived for 35 years. At the New Hampshire bar, then the most famous in the country. Mason soon reached preeminence, among his fellow mem¬ bers being Daniel Webster and Jeremiah Smith. In 1802 Mason was appointed attorney-general of New Hampshire and in 1813 became a United States senator. He was a strong Fed¬ eralist and took a leading part in the senatorial debates on matters relating to the War of 1812, his speech on the Embargo, delivered in 1814, and that on the Conscription Bill, 1815, being notable among public utterances of the time. In 1817 he resigned his seat to resume his prac¬ tice, but afterward served for several terms as a member of the New Hampshire legislature

and rendered great assistance in the codifi¬ cation of the State laws. He removed to Boston in 1832 and practised in the courts until he reached 70, when he retired, with reputation fully maintained, to the more private work of his profession.

MASON, John, American colonist, founder of New Hampshire: b. King's Lynn, Norfolk, England, 1586; d. London, December 1635. In 1610 he served in the navy against insurgents in the Hebrides; in 1616 went as governor to New¬ foundland, of which, in 1620, he published a description and in 1626 a map. In 1617 he explored the coast of New England; obtained in 1622 a grant of region called Mariana (northeastern Massachusetts) ; in the same year, with Sir Ferdinando Gorges, procured a patent for the province of Maine; and in 1623 sent a colony to the Piscataqua River. In 1629. he obtained a patent for the New Hampshire colony, also taking one with Gorges for Laconia, a tract including Lake Champlain. Among various prominent positions which Ma¬ son held in England was that of judge in Hampshire 1635, and in the same year he was appointed vice-admiral of New England. In 1691 his rights in New England were sold to Gov. Samuel Allen. Mason was buried in Westminster Abbey. New Hampshire became a royal province 44 years after Mason's death* Consult Tuttle, (Memoir of Captain John Ma¬ son, the Founder of New Hampshire,* in an edition of Mason's description of Newfound¬ land (Boston 1887).

MASON, John, American colonial com¬ mander: b. in England, about 1600; d. Norwich, Conn., 1672. Under Sir Thomas Fairfax he served in the Netherlands; in 1630 settled at Dorchester, Mass. ; in 1633 was appointed to a military command at Boston ; and two years later joined with others in founding Windsor, Conn. In 1637 he was given command of an expedition of English and Indians against the Pequots (q.v.), whom he almost annihilated, completing their destruction in a second move¬ ment a little later. He removed first to Say-brook, and afterward to Norwich. For 30 years he was a major of the Connecticut forces, was a magistrate for many years and deputy gover¬ nor 1660-70. From 1642 to 1668 he served as judge of the colonial court. His (Brief His¬ tory of the Pequot War,* written at the re¬ quest of the General Court, was reprinted by Increase Mather in his (Relation of Trouble by the Indians *(1677, republished by Prince, Boston 1736). Consult Ellis, G. E., (Life of John Mason of Connecticut (in Sparks' li¬ brary of American Biography,* Vol. XIII, Bos¬ ton 1864).

MASON, John Mitchell, American divine : b. New York, 19 March 1770; d. there, 26 Dec. 1829. His father was pastor of an Associate Reformed Church, and the son was graduated at Columbia College in 1789, and after studying theology under his father's care for one year went in 1791 to the University of Edinburgh. He was recalled in 1792 by intelligence of his father's death, and became his successor in his pastoral charge in 1793. He planned a theologi¬ cal seminary to be under the authority of his denomination, and visited Great Britain for the purpose of obtaining contributions ; his pulpit efforts abroad gaining him repute there as one

of the first preachers of the time. The semi¬ nary being established in New York City in 1804, he was appointed its first professor of theology. In 1806 he projected the Christians Magazine, which he conducted for several years, and in which he carried on a controversy with Bishop Hobart. In 1811 he became provost of Columbia College, and by his talents and energy raised that institution to a higher char¬ acter than it had ever before possessed. In 1821 he exchanged his pastorate for the presi¬ dency of Dickinson College, Carlisle, Pa., and the next year entered the Presbyterian ministry. He was one of the great pulpit orators of his day and his discourses on the deaths of Wash¬ ington (1800) and Hamilton (1804) are mas¬ terpieces of their kind. Consult the <Life,) by Van Vechten (New York 1856).

MASON, John Young, American politi¬ cian: b. Greensville, Sussex County, Va., 18 April 1799; d. Paris, 3 Oct. 1859. He was edu¬ cated at the University of North Carolina; was admitted to the bar in 1819; became a judge in State and Federal courts ; served several terms in the Virginia assembly; and from 1831 to 1837 was a member of Congress. Then till 1844 he was judge of the United States court for the district of Virginia, and in that year became Secretary of the Navy in the Cabinet of Presi¬ dent Tyler. Although he served temporarily as Attorney-General under Polk, he re-entered the Navy Department. President Pierce, in 1853, appointed him Minister to France, and until his death he continued to fill this diplomatic position. With James Buchanan and Pierce Soule (qq.v.) he signed the Ostend Manifesto (q.v.).

MASON, Sir Josiah, English pen manufac¬ turer: b. Kidderminster, 23 Feb. 1795; d. 16 June 1881. He was the son of a carpet-weaver and at an early age began to earn his livelihood by hawking cakes and fruits in the streets. At Kidderminster he successively tried his hand at shoemaking, baking, carpentering, smithing, painting and weaving. In the midst of his avocations he taught himself to read and write. He removed to Birmingham in 1814 where he became a toymaker. He set up a shop of his own in 1824, turning out split key rings by machinery invented by himself ; prospering in this venture he added the manufacture of steel pens in 1829. In the latter branch of industry he became the largest producer in England. In 1874 he transferred his interest to a limited liability company. Mason was also interested in electro-plating, copper smelting and india rubber ring manufacture

with George R. Elk-ington. In 1860 he established a great orphan¬ age at Erdington, upon which he expended $1,500,000. He was knighted in 1872. Mason College, now part of the University of Birming¬ ham, was founded by him with an endowment of $1,000,000. Consult Bunce, J. T., (Sir Josiah Mason: A Biography* (London 1882).

MASON, Lowell, American musician: b. Medfield, Norfolk County, Mass., 8 Jan. 1792; d. Orange, N. J., 11 Aug. 1872. His general education was small; in music he was self-in¬ structed and wonderfully adept even when a boy, being choir leader in Medfield when 16, and a teacher in Savannah, where he removed in 1812. He came to Boston in 1827, was president of the Handel and Haydn Society there, and in

1832 founded the Boston Academy of Music. He visited Germany in 1837 in order to acquaint himself with improved methods in teaching music. In 1821 he published a collection of psalm tunes based on Gardiner's (Sacred Melodies,* but including some of Mason's own compositions. He is best known for his hymn tunes, notably Cowper <(There is a Fountain,® and missionary hymn <(From Greenland's Icy Mountains®. Mason's more important pub¬ lications were: (Juvenile Psalmist > (1829);

(Lyra Sacra) (1837) ; (The Psaltery* (1845) ; ˆCarmina Sacra* (1841; new series 1852); (Musical Letters from Abroad) (1853); Sab¬ bath Hymn and Tune Book) (1859). Mason's musical library is now the property of Yale University.

MASON, Otis Tufton, American ethnolo¬ gist: b. Eastport, Me., 10 April 1838; d. Wash¬ ington, D. C., 5 Nov. 1908. He was graduated from Columbia University in 1861 and from 1861-84 was at the head of its preparatory school. From 1884-1908 he was curator of ethnology at the United States National Mu¬ seum. He was a member of various scientific societies and published (Cradles of the Ameri¬ can Aborigines* (1889) ; (Woman's Share in Primitive Culture) (1894) ; (The Origin of Inventions) (1895) ; (Indian Basketry) (2 vols., 1904). Fie was coeditor of the (Standard Dictionary) and edited the anthropological de¬ partment of the American Naturalist.

MASON, Rufus Ogden, American physi¬ cian : b. Sullivan, N. H., 22 Jan. 1830; d. New York, 1903. He was graduated from Dart¬ mouth College in 1854 and from the College of Physicians and Surgeons in New York in 1859. During the Civil War he was an acting assist¬ ant

surgeon. He was almost as well known as an author as he was a physician and among his books are (Sketches and Impressions, Musi¬ cal, Theatrical and Social, Including a Sketch of the Philharmonic Society of New York) (1887) ; (Telepathy and the Subliminal Self* (1897); (Hypnotism and Suggestion in Therapeutics) (1901).

MASON, Stevens Thomson, American politician: b. Leesburg, Va., 27 Oct. 1811; d. New York City, 4 Jan. 1843. He was the son of Gen. John T. Mason of the noted Mason family of that State. He received his educa¬ tion at Transylvania University, Lexington, Ky., to which place his father had removed in 1814. On 12 July 1831, when not 20 years of age, he was appointed secretary and acting governor of the Territory of Michigan, a position he con¬ tinued to occupy until 8 Sept. 1835. The death of George B. Porter, the territorial governor during his term, left Mason for several years the actual governor. Although vigorously op¬ posed by the people of the Territory at the time of his appointment on account of his mi¬ nority, his stand in the controversy with Ohio, known as the Toledo War, brought him such popularity that he was unanimously chosen gov¬ ernor by the people upqn the adoption of the constitution by the State on 2 Nov. 1835, a no-si tion to which he was reelected in November 1837. In 1840 he removed to New York City to take up the practice of law. On 4 June 1905, under the authoritv of the Michigan legislature, his remains were transported from New York

and reinterred in Capitol Park, Detroit, the site of the first capitol of the State.

He is known in the history of Michigan as the ((Boy Governor,® as he was the youngest per¬ son ever appointed to so important an execu¬ tive position in the history of the nation.

MASON, William, English poet: b. Hull, 12 Feb. 1724; d. York, 7 April 1797. He was educated at Cambridge and his first publication was Usis,* a poem, satirizing the Jacobitism and High Church principles which prevailed in the University of Oxford. In 1752 he published

<Elfrida,) a tragedy, with choral odes, on the ancient Greek model. Having taken orders in the Church he obtained the living of Aston, in Yorkshire, and was appointed one of the royal chaplains. In 1759 appeared ˆaractacus,* a drama. Some years after Mason was made pre¬ centor and residentiary canon at York. One of his principal works, the (English Garden,* a poem, appeared between 1772 and 1782, and was translated into French and German. In 1775 he published the poems of his friend Thomas Gray (q.v.) with memoirs of his life. His principal subsequent publications are <Odes) ; (Life of William Whitehead,* with his poems (1788) ;

(Essay on Church Music) (1795). There is a tablet to his memory in the Poets' Corner, West¬ minster Abbey. In 1811 a complete edition of bis works appeared.

MASON, William, American musician: b. Boston, 24 Jan. 1829; d. New York, 14 July 1908. He studied music in Germany under Moscheles, Hauptmann, Moritz, Dreyschock and Liszt; made tours as a pianist in Europe and the United States. In the year 1855, with Theodore Thomas and others, he established the Mason and Thomas recitals of chamber music, which were continued until 1868. His compositions, many in number, are mainly for the piano. He published (Two Pianoforte Methods* (with E. S. Hoadley) ; 'Pianoforte Technics* (with W. S. B. Matthews) ; Sys¬ tem for Beginners* (1871) ; 'Touch and Technics) (1878); 'Primer of Music) (1894); 'Memories of a Musical Life) (1901), *etc.*

MASON, William Ernest, American legis¬ lator: b. Franklinville, N. Y., 7 July 1850. He removed with his parents to Bentonsport, Iowa, in 1858, and after teaching school, 1866-70, was admitted to the bar and began practice in Chi¬ cago, Ill., in 1872. He was a member of the Illi¬ nois general assembly in-1879, of the State senate in 1881—85 and of Congress 1887-91. In 1897 he was elected United States senator, in which ca¬ pacity he warmly advocated the cause of Cuban independence. He was elected to the 65th, 66th and 67th Congresses (1917-23). He is a mem¬ ber of the law firm of Mason and Mason, Chi¬ cago. He published 'John the UnafrakP (1910).

MASON, Mich., city, county-seat of Ing¬ ham Countv, on the Michigan Central (Sagi¬ naw Branch) Railroad and the Michigan United Interurban, 12 miles south by east of Lansing. It was settled in 1839, in 1865 incorporated as a village and in 1875 chartered as a city. It is a residence city with good streets and pavements, cement walks and curbing, situated in a rich farming region. The grain elevators, cold stor¬ age, beanery, hay barns, cream and poultry stations, stockyards,

lumber-yard and gravel pits are important resources. It is the home of several prize winners in Holstein exhib¬

its and excels in fine horses. The principal buildings are the courthouse, schools with an annex, churches and fine homes. The city owns and operates the electric light and waterworks. Pop. (1920) 1,879.

MASON-BEES, a name given to the small wild bees of the genera Osmia, Ceratosmia and Chalcicloma, which construct their nests with sand or gravel, agglutinated together by means of a viscid saliva, and fix them on the side of walls, under stones, within the hollows of plant stems whence the pith has been removed, or avail themselves of some other cavity for that purpose. The mason-bees, like the carpenter-bees, leaf-cutters and other allied forms of the family Megacliilidce, are solitary in habits, not living in communities, although groups of cells are usually found near together, made by the same mother-bee, and each containing a single egg and food — a mixture of honey and pollen. Consult Howard, L. O., ‘The Insect Book) (latest ed., New York 1914), which contains an extensive bibliography of the subject; id., ‘Standard Natural History) (Vol. II, Boston 1884) ; Fabre, Henri, Unsect Life) (English trans., London 1901); id., ‘Mason Bees) (New York 1914).

MASON CITY, Iowa, city, county-seat of Cerro Gordo County, on the Chicago, Milwau¬ kee and Saint Paul, the Chicago and North¬ western, the Minneapolis and Saint Louis and the Chicago, Rock Island and Pacific, also Ma¬ son City and Clear Lake Railway (Interurban) and the Chicago Greatwestern railroads, about 115 miles in direct line north by east of Des Moines. It was settled in 1855 and its pres¬ ent charter was granted in 1870. It is an agri¬ cultural and stock-raising region ; fireclay and valuable sandstone quarries are in the vicinity. Its chief industrial interests are connected with the manufacturing of sash and doors, brick and tile, cement — two large cement mills with a capacity of 11,000 barrels daily and lime, and the quarrying of sandstone. It has a large foundry and considerable trade in livestock and grain. The city is a trade centre and dis¬ tributing point for a large section of country, and has several wholesale establishments. The government is on the commission plan and con¬ sists of three commissioners. The waterworks are owned and operated by the city. Pop.

(1920) 20,065.

MASON AND DIXON LINE. See

Boundaries of the United States.

MASONIC FRATERNITY, The, an or¬ ganization of associated societies to which, by common consent, has been accorded the primacy among fraternal orders. Divided into groups of degrees, overlying one another like the foun¬ dation and superstructure of a symmetrical building, these constitute the three great rites of universal recognition, namely, English, Amer¬ ican and Scottish Masonry. The first and second are acknowledged to compose the great Masonic institution as it exists in Great Britain and dependencies, and in the United States ; while the elaborate Scottish Rite of 33 degrees, comprising 51 more limited membership therein, is the one most widely disseminated in other portions of the world. Each rite is complex in its inter-dependent system of government, and is essentially cosmopolitan, bearing upon its rolls the names of emperors, kings, princes,

presidents and governors, together with scholars, statesmen and men of affairs, as well as those of lesser stations in church and state. The full legal title is, “The Ancient and Honorable Fra¬ ternity of Free and Accepted Masons and Con¬ cordant Orders.®

The Appeal to Antiquity. — During the 18th and first half of the 19th century Masonic writers laid great stress upon the possible origin of the society in the remote ages of the past. Absolutely without any historical basis of record as were most of these theories,’ yet men of learning loaned their influence to perpetuate the fables extant concerning the fraternity. Some asserted (a) that the history of the race was the story of Masonry, beginning with the migra¬ tion from the Garden of Eden; others (b) that it sprang from the Patriarchal period; and still others contended (c) that the society was the successor of the ancient mysteries of the Orient; (d) that the Temple of Solomon was its cradle; (e) that the Crusaders and the Knights Templars carried it forward from their times; (/) that the Roman colleges of artificers and builders of the Middle Ages handed down the craft to posterity; (g) that the civil strifes in Great Britain of the 15th and 16th centuries, and subsequent political events, made the in¬ stitution possible; (h) and a later class of writers placed its origin to the credit of the Rev. James Anderson, D.D., and the Rev. John Theophilus Desaguliers, LL.D., F.R.S., and their compeers of ((The Revival of 1717 a.d.® Sev¬ eral of these authors changed their views later in life; and, during the past 50 years, the in¬ telligent Masons of Great Britain and the United States have attempted to build up from the broken fragments of the past, — contained in fugitive lodge records extending back nearly three centuries, — a reasonable ‘history of the “operative® Masonry of the British Isles and the continent of Europe, as well as that of the present “speculative craft.® In this effort assist¬ ance has been rendered by scholars not con¬ nected with the fraternity. The critical reader will note, in the enumeration above, that many plausible theories might be founded both on history and legend, but the strongest factor in the appeal to antiquity, nevertheless, is the “Legend of the Third Degree.® In one form or another the allegory of the fall of man, the sacrificial redemption of the race, the doctrines of the resurrection and immortal life, permeated the peoples of every age and became the mo¬ tive of many migrations. This fact is likewise of record, — established by the discoveries made in Bible lands during the 19th century, — dating four millenaries b.c. When, therefore, a

society arose whioh claimed to solve some of these mysteries, — nay, even to have descended from those periods, — it is not singular that the cult should have attracted disciples; especially when shielded from public gaze by a veil of secrecy, the universality of the printed page not having yet been established!

In Great Britain and on the Continent. —

The consensus of reliable historical opinion affirms that the premier Grand Lodge of Eng¬ land, organized 24 June 1717 a.d., is the mother of all regular Masonic lodges of the three craft degrees, and, therefore, peculiar interest centres in the landmarks, legends and authentic narra¬ tives pertaining to the English rite itself, as well as in the American rite, the daughter thereof,

so to speak. The apocryphal history of Masonry recites that it was introduced into England by Prince Edwin, 926 a.d., and that lodges were “warranted at York,® by King Athelstan. This “Legend of the Guild® and much other tra¬ ditional story is based upon curious manuscripts called (<01d Constitutions,® or <(01d Charges of British Freemasons.® The oldest of these is dated, by English antiquaries, 1390 a.d., and is registered as the ((Regius MS., or Halliwell Poem.® The next in age, — beginning of the 15th century, — is called the ((Matthew Cooke MS.® — both in the British Museum. In that century, also, Henry VI asked, “Where did Masonry begin?® On being told that it began in the East, his next inquiry was, (<Who did bring it westerly?® — and he received for answer, “the Phoenicians.® These answers were predicated on the traditions of the order, as they had been transmitted from generation to generation. Many Freemasons believe this to be the true origin of their institution. Within recent years many more documents have been discovered and published in facsimile, so that the catalogue contains about 75 entries. These manuscripts have been grouped into families, because of certain characteristics common to two or more, — the whole forming a valuable collec¬ tion of ancient Masonic remains. Each manu¬ script consists of three parts: (a) the intro¬ ductory prayer, declaration or invocation; (b) the alleged history of the order, or the “Legend of the Guild®; (c) the peculiar statutes and duties, the regulations and observations, which Masons in general, or the craft as a unit, were bound carefully to uphold and inviolably to maintain. The precise value of the <(01d Charges® lies in the fact that they were the formulas used in the ceremonies of initiation by our Masonic ancestors of from two to five centuries antecedent. All known copies are of

English origin, even those used in Scotland; and, being of a distinctly Christian character, it has been thought they indicate ecclesiastical supervision and composition. A manuscript version of 1583 a.d., in possession of the United Grand Lodge of England, has the following “introductory prayer,® and is quoted as an example :

The mighte of the Father of Heaven and y e wysdome of ye glorious Soonne through y« grace & ye goodnes of ye holly ghoste, yt bee three psons & one God, be wh vs at or beginning and give vs grace so to govrne vs here in or lyving that wee maye come to his blisse that nevr shall have ending. Amen.

Signs, tokens and words, by which the Masonic craft became differentiated from all other trades than builders, do not appear in the earlier forms. In time, however, this initiation was exclusively its own; and in the Melrose manuscript 1581 a.d. (known to posterity by the transcript of 1674), reference is made to “Ye privilidge of ye compass, square, levell, and ye plum-rule.® The early records show that the lodge system was used from the first as a bond to preserve the art of building as a monopoly. The secret of the organization was then, — in contradistinction to all others, — “the way to build® ; and tyled lodges contributed best toward this end. But, in spite of every precaution, another body of operatives arose, — called “Cowans® by the regulars, — which in spite of its lack of prestige, not being in possession of “Old

Charges® and the “mason’s word,® contrived to prosper, eventually breaking down the monopoly and prepared the way for the “speculative® soci¬ ety of modern times. The term “speculative® has reference to a class of members who were not operatives and had no intention of becom¬ ing artisans, but were denominated “accepted® Masons. The admission of this element proved the wisdom of the fathers, and to it is probably due the permanency of the institution and its continuity to succeeding ages. By its influences the Masonic fraternity secured governmental favor and became “free of the guilds,® that is, free of the restrictive laws, “\yhich even now, regulate the “Friendly Societies® of the British Empire, — enjoying a liberty which did not in¬ here in the organization of exclusively operative masons who were not PVcc-Masons, the so-called “Cowans.® (Free + Mason, originally written as two words, not mentioned prior to the 14th century). Just what proportion of the mem¬ bership was speculative during the earlier or operative period unfortunately is not known, the first lodge record preserved being of a meet¬ ing held “Vltimo, July 1599,® but of its mixed character there is no doubt. Old records, re¬ cently discovered, and examined in the light of present-day research, have led Masonic writers to revise the usually accepted assertion that the cathedrals and other public edifices in Great Britain, erected during the Middle Ages, were planned by Church dignitaries. The opinion now obtains that the architects thereof were the Master Masons of that period, — the divisions among the builders of the operative era being apprentices, journeymen (Fellow Crafts), and Master Masons. Each man’s work bore a dis¬ tinguishing mark by which the piece could be identified, and the wage scale regulated.

The Masonic “reformation® originated in London. By the dawn of the 18th century the decadence of the society had become so serious that four of the surviving lodges proceeded to a reorganization in 1717, and this movement is known in history as “The Revival.® These four lodges were probably joined by others, though the records do not exist. Two clergymen, James Anderson (b. Edinburgh, 5 Aug. 1684) and John Theophilus Desaguliers (b. France, 12 March 1683) became

the architects and authors of the new regime. A distinguished gentleman named Anthony Sayer was installed as grand master. He was of the “speculative® and “accepted® class. The Grand Lodge insti¬ tuted was a governing body, and in no wise a successor of the “General. Assemblies® of the operative or legendary period. To Dr. Ander¬ son was entrusted the duty of compiling the “general records and faithful traditions from the beginning of time,® and to enable him to do so all the available documents were collected for his use. These were afterward destroyed,— an irreparable loss. In 1723 the “New Constitu¬ tions® were published, when it was discovered that Drs. Anderson and Desaguliers had com¬ pletely changed the theory of the institution, — from Christian to the adoption of a universal creed based on the Fatherhood of God and the Brotherhood of Man, — so as to admit men of all religions, nationalities and stations in life. These authors included likewise all that is now known of the transactions of the craft from 1717 to 1722 a.d., when the official records com¬ mence. The second edition of the “New ConVOL. 18 — 25

stitutions® was published in 1738, with “New Regulations® added, which became the basis of the Freemasonry of the present day. From 1717 the evolution of the society made rapid progress, both as to the increasing area of its operations, and in the multiplicity of its degrees. But the Masons of “the revival® and their immediate suc¬ cessors did not long dwell together in unity. Those at York organized a “Grand Lodge of All England® in 1725, and kept it alive for some 20 years. A reorganization took place in 1761, and the body ceased to exist in 1792, never having chartered lodges outside of Eng¬ land. In 1751 a great schism occurred, whereby a part of the premier Grand Lodge withdrew and instituted a rival. In common parlance the latter body became known as “ancients,® the former as “moderns,® a transposition which is firmly settled in history. A deputation from the Grand Lodge of All England, dated 29 March 1779, created still another body called the “Grand Lodge of England South of the River Trent,® and this survived until 2 May 1790. The two rival Grand Lodges, — “Moderns® and “An¬ cients,® — happily entered into a concordat on Saint John’s Day, 27 Dec. 1813 a.d., constituting the present United Grand Lodge of England, declaring that the English Rite of Freemasonry “Consists of three degrees and no more, namely: those of the Entered Apprentice, the Fellow Craft, and the Master Mason, including the Supreme Order of the Holy Royal Arch.®

Scotland enjoys the honor of “Mother Kil¬ winning Lodge, No. 0,® universally recognized as the oldest in existence. Its records comprise

a minute of 1599, and others ranging from 20 Dec. 1642 to 5 Dec. 1758, a.d., and these com¬ munications were held in Kilwinning. Tradi¬ tional history ascribes to the architects of the abbey of Kilwinning the preeminence which inhered to the Masons of York, in England. A dozen other old lodges are of record, possessing fragmentary minutes and “Old Charges® of rare Masonic value, but the Scottish Craftsmen did not follow the examples set by England and Ireland until Saint Andrew’s Day, 30 Nov. 1736 a.d., when Baron William St. Clair of Roslin (Earl of Orkney and Caithness), was chosen Grand Master. The following year he was succeeded by George, the third and last Earl of Cromarty. It will be noted that in Scotland, as well as in England and Ireland, the craft was patronized by those of exalted civil rank and station, Scotland’s “Masonic gem® is the “Prentice’s Pillar,® stand¬ ing in the chancel of Roslin Chapel, Edinburgh.

In Ireland no Grand Lodge records are extant of date prior to 24 June 1780 a.d. It is known that there was a lodge at Cork, the first minute of which is dated “December ye 8th, 1726.® The city archives refer to a charter for a “Society of Freemasons,® and a “Grand Lodge of Munster® ; and it is known that other lodges existed prior to 1726. There was also a Grand Lodge of Cork, and one at Dublin. The last named was of record in 1728-29; re¬ organized 1731 a.d., electing Lord Kingston, who is described as “Grand Master of all the lodges of Free Masons in the Kingdom of Ire¬ land.® Irish Masons possessed “Old Charges,® and like their English brethern propagated the order far and wide. It was in Lodge No. 44, of Irish register, — warranted in 1735, — that the Hon. Mrs. Richard Aldworth (Eliza-

belh St. Leger), was initiated, and became the celebrated and only <(Female Freemason® of history. She only received the first degree.

An attempt has been made to connect, his¬ torically, the building crafts of Continental Europe with the operative masons of Britain and Scotland. But, in Germany, in pre-Refor- maiion times, the ˆIndependent Stonemasons® arose, coming out from the monastic orders as the zeal for building magnificent edifices, under ecclesiastical patronage, declined. These <(lay brothers® were possessed of ((01d Charges,® but no authentic documents remain which refer to their most flourishing period of existence. Within the short space, however, of from 10 to 20 years, following the revival in England, Ma¬ sonry of the British type had obtained a foot¬ hold in all the countries of Europe. It had crossed the sea to America, and in a list of lodges published in 1734, No. 126, of English legister, is shown as located at <(Boston, in New England,® — known since 5 March 1792 as Saint John's Lodge. ((England became the great central point of Masonry for the whole world,® said Charles W. Moore, Grand Secre¬ tary of the Grand Lodge of Massachusetts, in an oration on 29 Dec. 1856 at Boston: ((From this source have lodges, grand and subordinate, at various times, been established, and still exist and flourish — in France and Switzer¬ land; in all the German states, save Austria (and there … for short seasons) ; all up

and down the shores of the Rhine … Sweden, Denmark, Russia; in Italy and Spain (under cover of secrecy) ; in various parts of Asia; in Turkey; in Syria (as at Aleppo, where an English lodge was established more than a century ago) ; in all the East India set¬ tlements … in China … Africa; … in all the larger islands of the Pacific and Indian Oceans … Saint Helena, Mauritius, … Madagascar … Australia … New Zealand; in Greece … in Algeria, Tunis, Morocco — and wherever else in the Old World the genius of civilization has obtained a standpoint, or Christianity has erected the Banner of the Cross.® The speaker further enumerated the spread of the order in the West Indies, South America, Canada and the United States. In the 63 years which have elapsed since these words were uttered, the growth of Freemasonry has been still more extraordinary.

In France, Masonry has drifted away from the tenets preached and practised among the fraternity in other lands. All Masonic lodges

throughout the world except the Grand Orient of France do homage to a Divine Being, symbo¬ lized as Horani, the Great Architect of the universe, and in the beginning the French lodge also recognized the designer of the Temple. But in 1877 the Grand Orient formally re¬ pudiated the Great Architect and atheism was made a condition of membership. The (<Freres Trois Points,® as they are commonly called in France, the Brothers of the Three Dots (.*.) were credited with all the revolu¬ tions of modern times. Petty ambitions and political intrigues made their homes in the lodges, and gradually it became impossible to succeed in business or public life without being affiliated, and everybody wished to join the omnipotent occult ring. The Grand Orient was threatened with losing its character of

being a (<serious® institution, and it was thor¬ oughly defeated when it massed all its forces to oppose the election of General Boulanger in 1888. The Confederation Generale du Travail, the great Socialist machine, rose up against the Grand Orient, and latterly all the better feeling of France revolted against it. Notwithstand¬ ing the allegations made against French Free¬ masonry, that body includes all shades of po¬ litical and religious opinions. For many years there had been no communication between the Grand Lodge of England and the Grand Orient; British Freemasons were prohibited from entering any lodge under the jurisdiction of the latter. A reconciliation appears to have been effected about five years ago when Lord Ampthill, the English Pro Grand Master under the Duke of Connaught (Grand Master), paid a visit to France. It may be remarked that political and religious topics are strictly pro¬ hibited in all the other Masonic lodges. Consult New York Times on French Masons, 24 Feb., 12 and 14 May 1918).

In Russia Freemasonry first appeared toward the end of the 18th century. Then its activities were mainly of a mystical religious value. The body of its membership was com¬ posed of the leading aristocracy of that time. Its rites and influence are vividly set forth in Tolstoy's famous novel, (War and Peace, > which deals with the War of 1812. It was during the reign of the stern, reactionary Tsar Nicholas I (1825-55) that Masonry began to occupy itself with strictly religious and political questions. After the mutiny in 1825 of the officers of the Guards, known as the Decem¬ brists, in which many prominent Masons took an active part, the lodges of the latter were declared to be political, guilty of political sedi¬ tion against the Tsar and were put under the ban. Hundreds of Masons were sent to Sibe¬ ria, most of them dying there in the convict mines. After this Masonry existed in

Russia as an ˆunderground® organization, in frank re¬ bellion against the secret police. In the ’60’s it succumbed, from lack of fresh recruits to keep the movement going. Since that time no evidence has been obtainable that the organi¬ zation has come to life again anywhere in Rus¬ sia, although government officials have often announced that lodges had been discovered. In 1913 the party of the Extreme Right in the Duma asserted that Masonry had broken out in the empire again and should be ruthlessly exterminated. Among all the real and imagi¬ nary foes of autocracy in Russia none were more feared or more relentlessly suppressed than the so-called <(Massonisti.® In Saint Petersburg (Petrograd) a non-political Amer¬ ican religious society, known as the ((Miyak® or (<Lighthouse Society® was almost suppressed because the young men in its gymnasium had begun to wear the Y. M. C. A. symbol of the triangle on their costumes. They were de¬ clared to be Masons secretly organized.

Introduction and Early History in Amer¬ ica. — It is a well-settled opinion that very early in the settlement of North America Masons of the three classes, — operative, speculative and the irregulars,— met in lodges, without much regard to warrants or charters, and these or¬ ganizations continued until long after the re¬ vival in 1717, especially in the British colonies. Indeed, these assemblies of the craft were

quite apart from regularity and the sanction of Grand. Lodges. This was the fact in Philadel¬ phia, in 1730-31; and, again, in New Hamp¬ shire soon afterward (the last named appar¬ ently having ((01d Charges®), though nothing has yet been discovered to connect such meet¬ ings with the working of the (<historic three degrees® of 18th century notation, and post-Grand Lodge era. This raises the mooted question as to priority in the United States. On 5 June 1730, Daniel Coxe of Burlington, N. J., was appointed Provincial Grand Master of the ((provinces of New York, New Jersey and Pennsylvania, in America,® by the Duke of Norfolk, Grand Master of the Premier Grand Lodge of England. On 30 April 1733, Lord Viscount Montague, Grand Master, issued a like deputation to Henry Price of Boston, ap¬ pointing him ((Provincial Grand Master of the province of New England, the dominions and territories thereto belonging.® Masonic his¬ tory is obscure as to the part Coxe took in establishing the society, but there is a complete record of the acts of Price. Because of this Massachusetts was acknowledged to be the <(mother jurisdiction® for nearly 150 years; while documents now in the archives of the Grand Lodge of Pennsylvania, and <(Libre B,® of the Historical Society of that Common¬ wealth, appear to give the primacy to the Key¬ stone State. In support of this contention evi¬ dence discovered during the last half of the 19th century goes to show that on 29 Jan. 1731, Coxe visited his Grand Lodge at London, and that a toast was there drunk in his honor, as ((Provincial Grand Master of North America®; that from 1732, and for several years, a list of Grand Lodge officers was regularly printed in the P ennsylvania Gazette, published in Phila¬ delphia; that, in 1734, Benjamin Franklin being elected Grand Master thereof, wrote to Provin¬ cial Grand Master Price in Boston, as to the status of Masonry in Pennsylvania; that in June of that year Franklin met Price in Boston and was recognized to the extent of being “further instructed in the Royal Art,® by the Provincial Grand Master; and that Grand Master Frank¬ lin himself visited the Grand Lodge of Eng¬ land, 17 Nov. 1760 a.d.

The rival Grand Lodges in England, to¬ gether with those of Ireland and Scotland, chartered lodges everywhere, at home and abroad.

Patronized by the royal family and nobility of Great Britain the craft acquired greater prestige than history records of any other society, and a system of <(military lodges® fostered expansion. The roll of warrants is¬ sued during the 18th century and subsequent to 1730 would make a large volume. From these beginnings Grand Lodges were formed in America, composed of lodges . of English ("ancients® and "moderns®), Irish, Scottish and <(Army® register, increased in number by those holding Provincial Grand Masters' war¬ rants, together with lodges chartered by the earlier American Grand Lodges in the United States and Canada, until regular governing bodies existed in every State, province and Ter¬ ritory. Thus the craft has ((followed the flag,® wherever unfurled. Unfortunately the early records of many of the lodges existing in the American colonies previous to the Revolution are lost to history. In the royal forces at Louisburg, Crown Point and Lake George were

lodges in which many of the king's soldiers (who were Americans) were initiated. Among the many prominent Americans who belonged to the fraternity besides Franklin were Wash¬ ington, who was made a Mason while in the service of the Crown, under Gen. William Braddock, and became master of a lodge in Alexandria, Va. ; Presidents Jefferson, Mon¬ roe, Adams, Jackson, Polk, Fillmore, Har¬ rison, Buchanan, Johnson, Garfield and Mc¬ Kinley. Jackson was a Grand Master and Mc¬ Kinley a Knight Templar. Some historians claim Presidents Madison. Taylor and Pierce as Freemasons, but owing to the political dis¬ putes of 1826-30 they made no statement as to their connection with the craft. Mr. Taft and Colonel Roosevelt both became Masons after they became President. Other members were Lafayette, Fulton, Montgomery, Sher¬ man, Burr, Rush, Whipple, Paine, Hamilton, Gerry, Steuben, Stark, Livingstone, DeKalb, Warren, Paul Jones, Witherspoon, Revere and Hancock.

Knights Templars and Masonry. — The

tradition that the "Baldwin Encampment,® which, up to the middle of the 19th century, had been conceded to be the witness that Masonic Knights Templars were descendants of the Knights of the Crusades, is not now accepted. Its earliest accredited document bears date 20 Dec. 1780. The first reference to the Knights Templars as allied to Masonry is contained in the (lodge warrant) minutes of Saint An¬ drew's Royal Arch Chapter, Boston, Mass., dated 28 Aug. 1769; the earliest in England is that of Phoenix Lodge, No. 257, Portsmouth, 21 Oct. 1778. Kilwinning Lodge of Scotland, on 8 Oct. 1779, by its master, Earl

Eglinton, warranted the “High Knights Templars of Ireland,® at Dublin. The Grand Lodge at York sanctioned the degree of (<Knight Tem¬ plar® in 1780. Similar references, — at dates between the Saint Andrew’s Chapter’s record and the institution of the Grand Encampment, Knights Templars, U. S. A., 11 June 1816 — may be found scattered throughout the fugitive minutes of lodges and chapters wherever the British army had been stationed. Whence, then, came the modern ((Order of the Tem¬ ple®? An answer, founded upon historical facts, has never been made. Two theories have been advanced; (a) It is within the range of possibility that a connection existed be¬ tween the chivalric order of Knights Templars and the fraternity of Operative Masons of mediaeval times, because bodies of skilled work¬ men erected Templar strongholds in the Holy Land, and built their preceptories, priories and round churches in Europe. The famous Tem¬ ple Church, London, is an example. What, then, was more natural than that the Knights Templars in the 14th century, proscribed, per¬ secuted and despoiled of all things, should seek their perpetuation among the affiliated bodies of mechanics of whose universality and antiquity they had abundant evidence? (b) On the other hand no historical doubt exists that every Freemason living since the revival of 1717 can trace his pedigree only to Great Britain. No other association, guild or other¬ wise ever grew into a society of Freemasons, nor was any connection with the building trades of the Continent ever claimed by the first Freemasons of Europe. The craft there

was a direct importation from England, and in its infancy and for many years was confined to the upper classes, without the least admix¬ ture of the artisan. This was true in Germany, where the French language, that of the court and diplomacy, was the one used in keeping minutes, and the early lodges bore French names. In 1740, however, in contradistinction to English, a Scottish Masonry arose, — re¬ puted to hail from Scotland, but having no real connection with the regular society; and from this source have emanated most of the tradi¬ tions relative to the alleged transmission of the chivalric degrees from the Knights Templars, of whom Jacques de Molai, — executed 11 March 1314 a.d., — was the last Grand Master. In order to prove the Templar succession, and the legend of Scottish Masonry, it becomes necessary to account for an interregnum be¬ tween the year 1309, when Walter de Clifton, Preceptor of the Scottish Knights Templars, admitted the dispersion of his brethren, and the date when modern Templary appears of record, during the 18th century at Boston, manifestly a historical impossibility. Never¬ theless, <(history fails to record much that actu¬ ally occurs*; much that subsequent ages would gladly know.® Notwithstanding, as late as 1854 an authorized edition of <(The Templars' Chart,® by Jeremy L. Cross, published in New York, gave a succession of Grand Masters from Jacques de Molai — based on a clumsy forgery of the Swedish Templars, — to the year 1838 a.d. Like many another ingenious theory framed to connect the <(old® with the <(new® dispensations, tradition may be true, but it is unsupported by documentary evidence.

The Secret Monitor. — In Freemasonry there are, in addition to what is known as Craft Masonry, which in England and Wales and. the Overseas Empire is under the juris¬ diction of the Grand Lodge of England, of which the Duke of Connaught is Grand Mas¬ ter, certain extraneous Masonic associations to which only regularly initiated Freemasons can belong, but which are not recognized by the Grand Lodge. For example, in England Mark Masonry is not recognized by the Grand Lodge of England, although the Duke is also the Grand Master of the Mark Master Masons. Royal Arch Masonry is, however, officially rec¬ ognized by the Grand Lodge of England. The reverse is the case under the Grand Lodge of Scotland, which recognizes the Mark but not the Royal Arch Masonry, while in Ireland both are recognized by the Grand Lodge of Ireland. One of the associations

out¬ side of ((cfficial® Freemasonry is the (<Order of the Secret Monitor.® It is claimed that the <(Brotherhood of David and Jona¬ than,® from which this Order developed, is as old as Freemasonry itself. The earliest exist¬ ing records of an organized system of the Brotherhood are found in Holland, where it is said, to have been founded in 1773. It was carried by Dutch emigrants to America, where it spread rapidly. In 1845 the Order was es¬ tablished in Malta, in the following year in the West Indies, in 1848 in Jerusalem and in 1865 it became known to English Freemasons. It was not till 1887 that a definite attempt was made to organize the Order in England by the Bon Accord Lodge of Mark Master Masons. A Grand Council was formed and four con¬

claves (or lodges) came into being. Seven more conclaves were formed in 1888, and there are now about 45 under the jurisdiction of the Grand Conclave of the United Kingdom. Some of these conclaves are held in India, Burma, South Africa and other parts of the empire.

Masonic Unity. — At the outbreak of the war in 1914 there were six <(foreign® lodges in London under the jurisdiction of the Grand Lodge of England. Two of these — La France and L'Entente Cordiale have only Frenchmen as members; two — Deutschland and Der Pilger were German lodges ; one — Loggia Italia — is composed of Italians; and one — America Lodge — is limited to Freemasons born in the United States. Each year a united festival of these lodges was held. For some years prom¬ inent Masons in Great Britain expressed a de¬ sire that there should be an extension of this international ideal. In March 1913 Lord Ampthill said at Birmingham : <(I may be a dreamer, but I consider that there is great scope in Freemasonry for improving the relationship among nations.® A society was formed in June to advance simple Masonic truths and principles ; to promote the practice of the ritual in English, French, German and Italian ; the study of English, American and European Con¬ tinental Masonic history, so that members might, become more familiarized with the orig¬ inal aims of Freemasonry; and the arrangement of international tours. In short, the object was to weld together into one associated body the Freemasons of the world. The occurrence of the war will undoubtedly retard that move¬ ment for many years. It is a remarkable fact that none of the rulers or statesmen connected with the outbreak of the war was a Freemason. Among, the military there were many, of whom the principal were General Joffre and Lord Kitchener. In February 1919 Grand Master W. S. Farmer of the Grand Lodge of the State of New York issued an edict abolishing the use of

foreign languages in ritual and proceed¬ ings in the lodges of the State from 1 July 1919. This order affected 48 lodges in which languages other than English were spoken.

Organization and Degrees. — Craft Ma¬ sonry was universally organized on the basis that within itself was conserved all the powers of the entire institution. A Grand Lodge once duly established must sui generis be sovereign in its jurisdiction, the bounds of which soon be¬ came restricted to a state, province or other recognized political division. The territorial limits of a Grand Lodge being sacred from in¬ vasion, and this principle enforced, Masonry has escaped, the successful competition of al¬ leged rival rites purporting to be the craft itself, and also has been secure in its privileges from any and all plans to confederate these bodies into one centralized government, — a guaranty of the perpetuation of the democracy inherent therein. But the symbolism of ˆSolomon's Temple® as the most glorious edifice of ancient times, probably introduced by Drs. Anderson and Desaguliers (whether from the lost manu¬ scripts, or otherwise, is not essential), required a more ornate adornment and furniture than a foundation and the bare superstructure upon which Operative Masons had wrought, — hence, naturally, suggested degrees above the original three of the Revival, et seq. For more than a

century men toiled to perfect the society, — often building better than they knew, — until the three Rites became settled as at present es¬ tablished. The best minds contributed toward this end. As in the Old World, so in the New, the institution had attracted to itself men of high character and standing in the governments thereof, and men of letters contributed their full quota to develop the fraternity, which was expected to endure, as these promoters believe it had alreadv existed, for ages. France, in particular, was prolific in the ˆfabrication® of degrees and rites, the great volume of which survive only in the musty tomes of 18th century literature. As before inferred, the so-called Scottish Masonry became the forerunner of a rite that, perfected by scholarly Masons, ulti¬ mately became the Ancient and

Accepted Scot¬ tish Rite. This title is now applied to a system which was first definitely organized at Charles¬ ton, S. C., 31 May 1801. The rite in several of its degrees can boast of a very respectable antiquity, having descended from a ((Council of Emperors of the East and the West,® at Paris in 1758. It is also based on the three craft de¬ grees, and its postulants must be Master Masons in good standing, in whatever other regular rite they may hold membership. The original Supreme Council in America passed through an experience similar to that of the premier Grand Lodge of England before its authority as ((Mother of the Rite® was fully established in the Masonic world ; but peace came finally, and two recognized bodies exist in the United States: the primate, as the “Southern Jurisdic¬ tion,® and the present “Northern Jurisdiction,® established by a concordat, signed at Boston, Mass., by several rival Supreme Councils, 17 May 1867. This rite was introduced into Eng¬ land in 1845; and other Supreme Councils of this obedience exist in Scotland, Ireland, Canada, Egypt and colonies of Great Britain; in France and dependencies, and in other countries of Europe, excepting Russia ; in South and Cen¬ tral America; and in the West Indies. As be¬ fore stated, the Masonic government is complex, no two rites — nor even Grand jurisdictions of the same rite, — being alike, owing to variances in the sequence of their degrees. The English and American are substantially in unison as to chronological order: Craft, Capitular, Cryptic and Chivalric degrees. In the American Rite its degrees follow this notation exactly, being the Royal Arch Chapter, Council and Templar systems, respectively. England, Scotland and Ireland, working the English Rite, are not alto¬ gether in accord, — additional degrees and orders being incorporated, — but eventually all arrive at practical universality, nevertheless. The A.’.A.’.S.’.R is divided into grades or degrees: symbolic (the three Craft degrees, which are not conferred, however, in jurisdic¬ tions of the English and American Rites), In¬ effable, Historical, Philosophical, Historical and Philosophical, Chivalric, Official and Executive, — conferred in lodges, councils, chapters, con¬ sistories and supreme councils.

The Ancient Arabic Order of Nobles of the Mystic Shrine (q.v.) has fostered and de¬ veloped the social side of Freemasonry, in its <(higher degrees,® principally in America.

The Order of the Eastern Star is not a Masonic organization, but a secret sisterhood to

which only Freemasons and certain female rel¬ atives can belong.

It is estimated that there are considerably over 2,000,000 Freemasons in the world, of which by far the majority are in the United States.

Consult Addison, C. G., HCnights Templar History) (New York 1912) ; Bayliss, M. W., (Condensed History of Scottish Rite Masonry in the United States* (Washington 1913) ; Chase, G. W., (Masonic Dictionary and Manual of Masonic Law) (Boston 1864) ; Crawford, G. W., (Prince Hall and his followers: a monograph on the legitimacy of Negro Masonry* (The Crisis, New York 1914) ; Findel, his¬ tory of Freemasonry *(trans. from the German, London 1866-69) ; Fort, G. F., (The Early His¬ tory and Antiquities of Freemasonry,* as con¬ nected with ancient Norse Guilds, *etc.* (Phila¬ delphia 1875) ; Gould, R. F., (History of Freemasonry) (London and New York 1884-89) ; Hyneman, Leon, (Ancient York and London Grand Lodges: A Review of Freemasonry in England from 1567 to 1813) (Philadelphia

1872) ; Johnson, Rev. F. H., (Masonry, Past, Present and Future* (Buffalo 1871) ; Mc-Clenachan, C. T., _(Book of Ancient and Ac¬ cepted Scottish Rite of Freemasonry* (New York 1905) ; Mackey, Dr. A. G., (Lexikon and History of Freemasonry> (New York 1898) ; Macoy, R. (ed.), (General History, Cyclopaedia and Dictionary of Freemasonry* (New York

1873) ; Preuss, A. (ed.), < Study in American Freemasonry) (Saint Louis 1914) ; Robertson, J. R., (History of Freemasonry in Canada* (Toronto 1899) ; Sachse, J. F., (Washington's Masonic Correspondence, etc.* (Philadelphia 1915) ; Stillson, H. L. (ed.), (History of the Ancient and Honorable Fraternity of Free and Accepted Masons, and Concordant Orders) (New York 1896) ; Vernon, W. F., (History of Freemasonry) (1893) ; Wagner, M. L., (Freemasonry : An Interpretation (Dayton, Ohio, 1912).

H. Leonard Stillson, 32°, Masonic Historian.

Henri F. Klein,

Sir Edward Clarke Lodge, London; Editorial Staff of the Americana.

MASONRY (Fraternity). See Masonic Fraternity.

MASONRY AND BUILDING. Masonry, from the French, niagonnerie, meaning stone or brick work, derived from the Latin, maceria, a wall, is the operation of laying up natural or artificial stones, generally held together or made a single mass by mortar, plaster or earth. It is the most important part of stone and brick structures, and a mason frequently becomes the general contractor for a whole building of this

class. The different trades required in mason building begin with building movers or the workmen who raze or demolish old build¬ ings; then come the excavating, dr inage, grad¬ ing, paving, piling, foundations, rubble, cut stone, including cut moldings, modeling and stonecarving, brick masonry, concrete work, fireproofing, terra-cotta work. After this heavier construction follows lighter mason work : plastering on metal or wood lathing, and stucco. The ideal of good masonry is a struc¬ ture of natural or artificial stone that shall stand as the permanent skeleton of the building,

firm and enduring; its great first cost shall mean no further care or expense.

History. — The Egyptian stonework that has survived the centuries is generally of enormous blocks jointed with astonishing accuracy, so as not to mar the effect of the bas-reliefs which covered several courses. Assyrian walls were laid up with bricks forming the exterior surface and the interior was filled with rubble and earth. The Opus reticulatum and opus incertum were later Roman forms where small blocks of tufa or triangular brick were used for the exterior surface and the interior was filled with concrete. The characteristic of Greek masonry was to use local stone, accurately cut and jointed if the stone would bear it ; otherwise covered with stucco. From the lintel or beam architecture of the Greeks to the arch construction of the Romans was an advance in the possibility of size of construction, but a change from a system of making the constructive forms visible and decorative to a custom of covering rough walls with a decorative shell not expressing the sup¬ porting masonry work behind. This method of building gave the Romans an opportunity to make their enormous structures at a low cost, because unskilled labor could be employed to much better advantage, needing only a small number of foremen. Romanesque masonry was very crude and the thrusts of the arches were taken care of by a mass of abutments which were practically monolithic. In Byzantine work the arches and domes were made from small blocks of stone and the thrusts were studied with much greater care. In Gothic work the arch became (<alive,® carrying the weights and thrusts of the upper parts of the building on slender shafts, and through flying buttresses with the utmost skill to the outer walls and buttresses. Modern work has come to partake of the character of the ancient Roman construction, that is, a veneer on interior supporting masonry of a different character. In our time, however, instead of the huge con¬ crete monolithic buildings, an iron skeleton is used, and a thin shell often not more than four inches in thickness covers a frame work of steel beams that in a high building is little more than an iron bridge on end. The old Roman flat arch construction of thin bricks or tiles held together by strong cement forming domes not over six inches

thick and easily spanning 15 feet or 20 feet is also used.

Men and Material. — The workmen em¬ ployed on masonry are stonecutters, who gen¬ erally work in stone yards away from the build¬ ing, except for such trimming as may be neces¬ sary in setting the stone; stonemasons who work on the building, setting the stone; brick¬ layers who work on platforms continually raising and placing the brick accurately; and laborers for delivering the stone, mortar, etc., and for mixing mortar and concrete. The ma¬ terials used are stone, cement blocks, brick, terra-cotta, broken stone, cinders ; and adhesive materials: limes and cements, which are used with sand to make a mortar for binding the materials together. In very crude construction, mud and clay are used for a binding material. Foundation walls may be of stone laid dry; of concrete; of stone laid in Portland cement mortar or half-cement mortar, the latter con¬ sisting of sand, cement, lime, with cement and

lime in equal proportions. In case of the soil under the building not being sufficiently firm, it is necessary either to drive wooden piles or to spread the foundation so far that the pressure per square foot on the soil will not be sufficient to cause the building to settle. In Chicago the footings are very large, of steel beams and concrete, making what is prac¬ tically a raft so that the building really floats on a soft soil. Where the foundations are under water, as under a bridge pier, it is necessary to adopt special methods, generally sinking cais¬ sons so that workmen may go down and work under water.

The outer row of stones of a wall are termed the facing ; those within the filling ; those at the rear the backing. A horizontal laying of either stone or bricks is a course ; a sloped surface of a well is a batter; a protecting often projecting course on top is a coping. A bond is a stone going through two or more courses to bind them together; a quoin is a squared stone at a corner; a stretcher is greatest in horizontal length, a header shortest, the latter being a bond. A cramp is a bar of iron or steel let into a wall to brace it. Ashlar are squared stone ; rubble irregularly shaped stone. A corbel is a stone projecting as a balance-weight ; a sill, a broad stone at the base of an opening; a template, a large stout stone for supporting the end of a girder or beam.

Ashlar Facing. — The stonework of the outer face of a wall when it is cut and differs in character from the back of the wall is called ashlar. The coursing of ashlar is done in dif¬ ferent ways. The simplest form is when it is laid out in continued courses. In this case it is caller

“regular coursed ashlar.® Ashlar is also laid without long horizontal joints. In this case it is called <(broken ashlar.® This is generally used when stone cannot be easily obtained of equal heights. It takes longer to lay this up, which makes it cost more than the regular courses, but makes a very attractive looking wall, having more freedom and texture. It is customary to cut the stone at the stone yard certain heights; for example, two, four, six and eight inches, so that they can be laid up without cutting any joint except the end ioint, at the building. From three ‘to six different heights are generally used, the larger number giving more variety than when the smaller number of sizes is used.

Coursed random ashlar has horizontal joints one-half to two feet apart, continuous. Between these joints the stone is laid up irregularly. The other stone on the walls of a building are called trimmings, which include the molded work, the window sills, jambs and the quoins, which are the cornerstones of the building. The quoins and jamb stones, if of the same material, may be included with the rest of the ashlar. The part of the wall back of the ashlar (called the backing) is of cheaper stone or brick. It is never under eight inches thick when of brick, and if of stone the backing is thicker. This should be built and bonded in at the same time as the ashlar in order to make a solid wall. If the stones are not high, the thickness of the ashlar should vary so that the backing can bond in and it is generally speci¬ fied that the ashlar should include one through bond stone in every 10 square feet of wall. If

the facing is thin (two inches to four inches), the pieces are clamped back into the backing by iron clamps. Random rubble is where un¬ trimmed stones are used, and selected to fit as well as possible.

In public work and important buildings, every stone should be shown on the drawings, except when random ashlar is employed. In this case the arrangement of the stone is made by the foreman on the building, to follow a sample piece of ashlar set up and approved by the architect. Ashlar is usually from four inches to eight inches thick. In

figuring the quantity an average of six inches in thickness is generally taken. The heights vary from 10 inches to 14 inches. For exterior work the ashlar should not be under four inches thick. The ashlar may be laid with V joints, or with rustication. In the latter case the face is gen¬ erally rock-face or pointed and a draftline an inch wide is carried around the edge of the stone.

Bond stones are stones that go into the wall to hold the wall together. If there are many small stones these should be frequent. In lay¬ ing out ashlar the bond should be arranged to give effective stone jointing. Sometimes the Flemish bond arrangement is used as in brick¬ work. Bond stones the full size of a pier are frequently used for caps and also placed at intervals through the pier.

Brickwork. — Bricks are laid so as to dis¬ tribute the load and tie the different portions of _ the wall together. Stretchers are brick which are laid showing their long side. Head¬ ers show the end of the bricks. Common bond is to lay the brick with stretchers for five courses and then lay headers for the sixth course. Face brick bond is as a rule laid of stretchers and bonded either by clipping the corners of the bricks, which tie the face of the wall to the backing, or with metal wall ties, which are made of wire, crimped metal or of tin fastened to steel wire. Flemish bond is the bond which is most frequently used to give an interesting wall surface, more pleasing than what is obtained with common bond. It is laid up with alternate headers and stretchers. The small piece inserted at the corners is called a closer. English bond consists of courses of headers and stretchers alternating. A variety of this, called English cross bond, has the alter¬ nate courses of stretchers arranged with the joints below the middle of the bricks above, making a figure resembling a cross. Some¬ times every fifth course of brick is laid Flem¬ ish bond with the others straight bond. Every fifth course may be set in or back an inch, forming rusticated work. When walls . have hollow or “vaulted® spaces not over two inches wide in the centre the bond is made by bricks laid across the space and cut in diagonally, or by the use of metal ties every four to eight courses. In arches, the face of the arch is made with the same bond as that shown on the wall. Common arches are made with succes¬ sive rings or rowlocks, of headers.

Bricks. — Despite the great increase of con¬ crete and steel construction, brick seems to be used as much as ever, as they are not affected by the weather, fire or city atmosphere, which affects the softer building stones seriously. They are cheaper than stone and can be used with cut stone or terra-cotta trimmings. Hard burned bricks are used for piers, though not so

good for this purpose as stone work, and in very dry soils are sometimes used for founda¬ tion walls. If there is any dampness of the soil, the outside of brick foundation walls is sometimes painted with water-proof paint. Bricks are made from sand and clay, the clay in different localities making bricks of different characteristics. A sandy clay is most desirable. For the better kinds of brick, clay is often chosen from different places and combined with the greatest care. (See Brick-making Ma¬ chinery). Terra-cotta and pottery are burned in kilns which are arranged to let in heat half way up the kiln so that it will be drawn down on to the pile of terra-cotta and through the floor of the kiln into the chimney. This is said to give a more even heat. If there is iron in the clay the color of the brick will be red; the ordinary white bricks are generally due to lime. The proportion of iron makes the red of vari¬ ous shades, according to the amount. Lime and iron make a cream-colored brick. Brown bricks are due to the presence of magnesia; and magnesia and iron make a yellow brick. Dif¬ ferent clays give varying color effects, and the mixture of clays with mortar colors, or paint¬ ing the exposed surfaces, gives desired effects. Bricks should not absorb more than from one-twentieth to one-tenth of their weight of water. This is a test that can be easily applied. Soft bricks may absorb as much as a quarter of their weight. Bricks should ring when struck, as cracked or soft bricks will give a dull sound. They should not have any cracks or large lumps or foreign substance, such as lime or coarse gravel. They should run all the same dimensions with true surfaces, though for rustic work rough bricks are often desired. The approximate size of a brick is 2 inches X 4 inches X 8 inches. In the Eastern States 1Y\ inches X 3ˆ4 inches X 2]/\ inches; but in the Western States the dimensions are slightly larger. In every case where brick work has to be figured for cutting stone trimmings, the brick should be laid up and measured. Pressed brick are generally 8ˆ4 inches X 4l/& inches X 23/s inches in size. Roman brick is 12 inches long and I/2 inches thick. Norman brick is 12 inches long and 2 inches thick. Bricks weigh four or five pounds apiece.

Bibliography. — Anderson, (The Strength of Materials and Structures* (1887) ; Baker, (A Treatise on Masonry Construction (1909) ; Merrill, (Stones for Building and Decoration* (1891) ; Patton, (A Practical Treatise on Foun¬ dations* (1909) ; Mitchell, C. F., (Brickwork and Masonry) ; (Building Code of New York.* See Quarrying; StoneCutting and Dressing.

MASOOLA, ma-soo’la, a boat common on the east coast of India, adapted to be beached on the surf-beaten shore. The planks are sewed

together with coir, over wads of the same material, which press upon the seams. The boats are 30 to 35 feet long, 10 to 11 feet beam, 7 to 8 feet deep, and are rowed by 12 men, oars double banked, and a steersman with an oar at the stern.

MASORA, mas'o-ra, or MASSORAH,

Massoreth, a Hebrew word signifying "tradi¬ tion,® the name of a collection of notes refer¬ ring to the Hebrew text of the Old Testa¬ ment, and written in Chaldee chiefly on the margin of Hebrew manuscript. These notes

are various in their character, critical, gram¬ matical and explanatory. Since in early Hebrew writing no vowel signs appeared, great con¬ fusion arose in time from the many modes of reading and supplying vowels to the consonants. The Masora set a fixed reading to each word and thus put an end to the multiplicity of readings. At what time the accumulation of these notes was commenced cannot be ascer¬ tained. According to some Jewish writers the notes are in some cases as old as the time of Moses; according to others they were begun in the time of Ezra. It is more likely that they are the result not of one period but of many centuries of compilation and emendation. A useful edition of the Masora is the translation of Dr. Ginsburg (3 vols., London 1880-87). See Judaism — - The Massorah. Consult Comely, Hntroductio in V. T. Libros Sacros) (Vol. I, Paris 1894) ; Ginsburg, C. T., (Introduction to the Hebrew Bible* (London 1899) ; Driver, S. R., (Notes on Hebrew Text of the Books of Samuel, with Introduction to Hebrew Palseog-raphy> (2d ed., Oxford 1913) ; Harris, (Rise and Development of the Massorah* (in Jewish Quarterly Review, Vol. I, London 1889).

MASPERO, Sir Gaston Camille Charles,

gas-ton ka-mel sharl mas-pe-ro, French Egyp¬ tologist: b. Paris,. 23 June 1846; d. 30 June 1916. He studied in the Lycee Louis-le-Grand, 1853—65, and before entering the Ecole Normale in 1865 had already made considerable progress in the study of Egyptology. He remained

in the latter college two years and attracted the attention of Mariette, the distinguished Egypt¬ ologist. In 1867 he published in the Revue Archeologique an Egyptian text and transla¬ tion under the title <Stele du Songe,* and in the same year appeared separately his (Memoire sur la grande Inscription d'Abydos et la Jeunesse de Sesostris.* On leaving the Ecole Normale he went to South America to carry out researches in the Quichua language. Further memoirs on ancient Egypt extended his reputation and se¬ cured his appointment in 1869 as professor of the Egyptian language and archaeology at the Ecole des Hautes Etudes. In 1871 he issued an important essay, (Des Formes de la conju-gaison en Egyptien ancien, en demotique et en copte* ; and in 1873 (De Carchemis Oppidi Situ et Historia antiquissima) and (Du genre epis-tolaire chez les anciens Egyptiens.* In 1874 he. succeeded Rouge as professor of Egyptian philology and archaeology at the College de France. Sent to Egypt in 1880 as head of a government archaeological mission, he succeeded Mariette in the following year in the director¬ ship of excavations and antiquities. He founded and directed an archaeological insti¬ tute at Cairo, had charge of the museum at Bulak, now in Gizeh, carried out many excava¬ tions, with important results, and in' 1886 re¬ turned to France to resume his duties at the college. In 1899 he again went to Egypt as director of excavations and antiquities. In 1914 he left Egypt and became permanent secretary of the Academy of Inscriptions and Belles-Lettres. Maspero's great work is his <Histoire ancienne des Peuples de l'Orient* (1875), which has been republished in an en¬ larged and revised form (1894-99). The three volumes of the later edition have been trans¬ lated into English under the titles <The Dawn

of Civilization *(1894), (The Struggle of the Nations) (1896) and (The Passing of the Empires) (1900). His other works comprise the following: (Contes populaires de l'Egypte ancienne* (1883), translated by him; (Etudes Egyptiennes* (1886-91) ; (Archeologie Egyptienne) (1887; Eng. trans. (Egyptian Archaeol¬ ogyˆ 1888) ; (Lectures historiques) (1890; Eng. trans., (Life in Ancient Egypt and As¬ syriaˆ _ 1892) ; (Etudes de Mythologie et

d'Archeologie Egyptiennes) (1893), invaluable to the student of the religion of ancient Egypt; besides contributions to the (Memoires* of the French Archaeological Mission at Cairo ; (Les momies royales de Deir-el- Bahari) (1889); (Causeries d'Egypte* (1907; Eng. trans., as (New Light on Ancient Egypt,* 1909) ; (Egypt, Ancient Sites and Modern

Scenes) (1911); <Art in Egypt* (1912), and text and translations of the inscriptions upon the pyramids of the fifth and sixth dynasties in Recueil de travaux relatifs a la philologie et parcheologie egyptiennes et assyriennes (Vols. I-XIV), *etc.* In 1879 Maspero was made a knight of the Legion of Honor, and in 1895 commander. In 1883 he became a member of the Academie des Inscriptions, and in 1887 an honorary Fellow of Queen's College, Ox¬ ford, and an honorary D.C.L. of that university. In 1909 he was made knight commander of Saints Michael and George. See Egyptology.

MASQUERADE, mas-ke-rad', a popular amusement, in which persons of both sexes mask or disguise themsevles and engage in dancing or festivities. Masquerades date from a very early period in which they were con¬ nected with religious ceremonials and ob¬ servances. We find traces of the masque in the Bacchanalia of Greece, the Saturnalia of Rome and in the Purim of the Hebrews. In the Middle Ages they were at times held in the churches, for instance the ceremony of the boy bishop, the feast of fools, *etc.* The clergy succeeded in putting a stop to these relics of paganism in connection with Christian wor¬ ship in the 16th century. Masquerades of the modern purely secular type are said to have been the invention of Granacci, an Italian, who lived in the beginning of the 16th century. See Carnival; Festival.

MASQUERAY, Emmanuel Louis, Amer¬ ican architect: b. Dieppe, France, 10 Sept 1861; d. Saint Paul, Minn., 26 May 1917. He was educated at Rouen and Paris. Having de¬ cided to become an architect he studied at the Ecole des Beaux Arts, Paris, and in 1879 was awarded the Deschaumes prize by the In¬ stitute of France. He also received the Chan-desaigues prize in 1883. While in Paris he wˆas also an attache of the Commission des Monu¬ ments Historiques. Mr. Masqueray came to New York in 1887, and was at first connected wfith the office of Carrere and Hastings and later in the office of William M. Hunt. He opened an office here in 1893 and founded the Atelier Masqueray for the study of architecture according to French methods. This was the first wholly independent atelier opened in this country. His reputation became international in 1901 when the commissioner of architects of the Saint Louis Exposition selected him to be chief of design or consulting architect. This monumental undertaking included the Trans-MASQUES — MASS

portation Palace, the Agricultural, Horticul¬ tural, Fisheries and Forestry buildings, the Cascades, the Colonnade of States, pavilions, the Louisiana Purchase monument, 12 bridges, music stands and all the decorative architecture in the grounds. Mr. Masqueray was the archi¬ tect of the famous cathedral of Saint Paul in Saint Paul, Minn., and the pro-cathedral of the Immaculate Conception in Minneapolis, Minn. He was a charter member of the So¬ ciety of Beaux Arts Architects and the Archi¬ tectural League of New York, the New York Chapter of the American Institute of Arch-tects, as well as the national organization.

MASQUES. The old masques, fashionable in England in the 17th century, were in reality the kind of private theatricals that then gen¬ erally prevailed at the courts of Europe. Their name is understood to have originated from the use of the head masque, representing either romantic, historical or allegorical types on oc¬ casions of festivity or solemnity. The first of these masques (or ballets, as they were called in Italy and France) that we find recorded was that given by Bergonzio di Botta, at Tortona, to celebrate the marriage of the Duke of Milan in 1489. It was the talk of all the elite of the Western World. Originally a parade or fes¬ tival, a form of dramatic masque quickly de¬ veloped in England under the wits of men as deft as Ben Jonson and Fletcher, aided and abetted by the master-designer, Inigo Jones (q.v.), reaching a height of tawdry theatrical beauty that died out almost as quickly as it had flamed. At Versailles and other courts the masque or ballet survived for over a century longer. The masque of to-day is philosophical in character. It is the drama of personified ideas. It is akin to allegory. Its dramatic pur¬ pose is the presentation of universal truths; and in this indirect way to bring their lessons home to the mind and heart alike. The pageant and masque are distinctly antithetical in char¬ acter. The one is essentially concrete, the other is essentially abstract. The one depends on realism to tell its story, the other depends on symbolism, though either may make use of the elements of the other in subordination. Mr. Percy Mackaye's (Masque of St. Louis,* per¬ formed in that city in 1914, was perhaps the soundest achievement of the American poet in this new form which has yet to find its authen¬ tic masters. During the Shakespearean ter¬ centenary celebrations of 1916 many com¬ memorative masques were written and per¬ formed. For these and sundry lists of "Masques and Festivals® lately held in the United States consult the bulletins of the American Pageant Association. See Festival; Pageant. The standard authorities on the English masques are Evans, H. A., (English Masques 5 (London 1898) ; Reyher, Paul, (Les Masques Anglais: etude sur les ballets et, la vie de cour en Angleterre, 1512-1640) (Paris 1909) ;

Brotenak, Rudolf, <Die Englischen Maskenspiele* (Vienna 1902).

MASS, in physics, the quantity of matter in a body. The mass of a body is the same wherever the body may be in the universe. Two bodies have equal masses if the gravi¬ tating forces with which another body acts upon them are exactly equal at equal distances. (See Gravitation). Hence two bodies have equal masses if their weights are the same at

the same place on the earth; so that if the metallic “weight® used by a grocer is carried from place to place, the quantities of sugar and tea balanced by it in a good pair of scales will always be the same, for the mass of tea or sugar is in every case equal to the mass of the metalic “weight.® It is to be clearly understood that as the force of gravity is dif¬ ferent at different places on the earth, the weight of any body is different at different places. To distinguish between the mass (or quantity of matter) and the weight (or force which tends to move it downward) of a body is very important in beginning the study of physics.

MASS, The. According to the teaching of the Catholic Church, the Eucharist is the Sac¬ rament which contains the body and blood, soul and divinity, of Jesus Christ under the appearances of bread and wine. At the Last Supper (see Lord’s Supper), the night before He died, Christ, in the presence of the 12 apostles, instituted the Eucharist (q.v.) by tak¬ ing bread, giving thanks, blessing the bread, breaking it, and giving it to the apostles, saying, “Take ye and eat. This is my body,® and then by taking the cup of wine, giving thanks, bless¬ ing the wine, and giving it to them, saying, “Drink ye all of this. This is my blood which shall be shed for the remission of sins. Do this for a commemoration of me.® The Church teaches that, when Christ said “This is my body,® the substance of the bread was, by His almighty power, changed into the sub¬ stance of His body, and that, when He said “This is my blood,® the substance of the wine was similarly changed into the substance of His blood, while the appearances of bread and wine remained. The Church further teaches that the change of bread and wine into the body and blood of _ Christ, called Transubstantiation (q.v.), continues to be made by Jesus through the ministry of His priests, to whom through the apostles and their successors, He gave this miraculous power when He said, “Do this for a commemoration of me.® The priests exercise this power of Transubstantiation through the words of consecration in the Mass. What, then, is the Mass? The Mass is the solemn memory, with a

narrative, of Christ's passion and death. It is the perpetual sacrifice of the New Covenant. In the catechism it is described as the unbloody sacrifice of the body and blood of Christ. It is, specifically, a sacrifice of adoration, thanksgiving, propitia¬ tion, and impetration. As, in the offering of this sacrifice, certain words and actions in fixed form are used, the Mass may be defined as the aggregate of prayers and ceremonies which constitute the service of the Eucharist in the Latin, that is, the Roman and Gallican, rites.

This service was known at first by many names : E vyapioTia, gratiarum actio, thanks¬ giving; A eiTovpyia, liturgy, rite; Trpoaˆopa, oblatio, offering; aTidatq aprovy fractio panis, breaking of bread; avpianbv deinvov, coena Domini, the Lord's supper ; Koivuvia , communio, communion; ovva£igy ovveTitvcug, meeting; solemnia; dominica solemnia; dominica passio; spirituale ac cceleste sacramentum ; Dominicum; passio ; sacrificium. A eirovpy'ia still survives in the Eastern Church, and "holy liturgy® corre¬ sponds exactly to the word Mass. This latter

term has become the recognized and almost exclusive technical name for the liturgy of the West. Its derivation is even yet not quite cer¬ tain ; but it is generally said to be a late Latin verbal noun for missio (—dimissio), from the verb mitt ere, to send, send away. Primarily, missa was used in the sense of (<dismissal)) with reference to the concluding part of the service, and then, by a gradual process well known to linguists as well as to students of liturgy, it was extended to the whole rite. The first time we know for certain that it was employed in its present sense was in the 4th century, about 385 or 386, in a letter of Saint Ambrose to his sister, in which occurs the state¬ ment, missam facere coepi (=1 begin to say Mass). A 2d century instance of the use of the word missa in this sense is of doubtful authenticity. From the 4th century onward it becomes more and more frequent, until in the (Sacramentarium Leonianum) (Leonine Sacra¬ mentary), of the 5th or 6th century, it is under¬ stood throughout (Item alia— Item alia missa), and in the (Liber Sacramentorum Romanse Ecclesise,* usually known as <(The Gelasian Sacramentary,® of the 6th or 7th century, it is constantly expressed. Thereafter, while Eucharist remains the normal name for the sacrament, Missa, or one of its derivatives in other languages like Mass in English or Messe in French, has been the regular title given to the Eucharistic sacrifice in the Roman and Gallican rites.

So much for the word, which is clearly much later than what it denotes. The history of the Mass itself has its origin in the New Testament in the four accounts of the Last Supper found in Matthew xxvi, 26-28 ; Mark xiv, 22-24; Luke xxii, 19-20; and Paul, 1 Cor. xi, 23-26. What Christ then did is the foun¬ dation of the Mass. It is because He told the apostles to do, in memory of Him, what He him¬ self on that occasion had done, that the liturgy of the Mass came into being and has continued through the ages. That liturgy, fluid and vari¬ able in detail, but uniform in outline and in many formulas, always the same in essentials, and from constant repetition tending ever to become fixed, is traceable with more or less certainty through the 1st century in different parts of the New Testament, in the <Didache) or ((Teaching of the Twelve Apostles® (c. 80-100), in the (First Epistle of Saint Clement of Rome to the Corinthians) (c. 90-100),

in the (Epistle of Barnabas* (c. 96-98), and in the letters of Saint

Ignatius, bishop of Antioch (d. 107). In the 2d century there is very probably an interesting allusion to the Mass from the outside, in a letter written by the pagan, Pliny the Younger (C. Plinius Caecilius), governor of Bithynia, to the Em¬ peror Trajan about 111-113. The eucharistic service, mentioned by Saint Polycarp, bishop of Smyrna (martyred c. 155), by Athenagoras of Athens (c. 177), and by Theophilus, bishop of Antioch (c. 180), is set out in considerable descriptive detail by Saint Justin Martyr (put to death, c. 165) in his (First Apology) addressed to Antoninus Pius (138— 161), and is also treated of by Saint Irenaeus, bishop of Lyons (d. c. 202). In the 3d cen¬ tury we already see traces of those different practices in different countries which led to the different liturgies. For the rite followed in

Alexandria and Egypt, we have as spokesmen Clement of Alexandria (d. c. 215), Origen (d. 251), and Dionysius of Alexandria (d. 264) ; for that of Antioch and Syria we have the fragmentary outline given in the second book of the (Apostolic Constitutions) (which, how¬ ever, was not written down until the 5th cen¬ tury as the Aiarayal tuv aytuv cnroordAuv) , as well as the complete text of a liturgy in the eighth book of the same work; for Rome and the West we have vague allusions in the writ¬ ings of Hippolytus (d. 235) and Novatian (c. 250) ; and for the African Church or Church of Carthage we have Tertullian (d. c. 220) and Saint Cyprian, bishop of Carthage (d. 258). The liturgy given in the eighth book of the (Apostolic Constitutions, , as well as being an early form of the rite of Antioch, is also possibly an example of an early type of the rite of the whole Church. When we reach the 4th century we have much fuller liturgical information, at least for the East, not only in the writings of Saint Athanasius (d. 373), Saint Basil (d. 379), Saint Cyril of Jerusalem (d. 386), and Saint John Chrysostom (d. 407), but also in the evxohdyta, or service books, which from about the end of this period began to be compiled for Church use. From this time, too, we have the specifically different rites which were already foreshadowed in the 3d century. It is generally accepted that the fairly uniform type of liturgy previously used every¬ where developed into four great parent-rites, from which all others now in use in Christen¬ dom are derived. These four are the liturgies of Antioch, Alexandria, Gaul, and Rome.

I. The rite of Antioch, found pure in the Greek (Apostolic Constitutions,* was modified at Jerusalem into the Liturgy of Saint James, which itself took the place of the older liturgy at Antioch, and was used throughout the whole patriarchate, embracing all western Syria. This modified liturgy is found in (1) the Greek Saint James, now

used only once a year at Zacynthus on 23 October, the feast of that saint, and at Jerusalem on 31 December; (2) the Saint James in Syriac, used by the Syrian Jacobites and Uniates; and (3) the Maronite rite, used in Syriac and also in Karshuni, that is, Arabic written in Syrian characters. The second rite derived from the primitive one of Antioch is the East-Syrian or Chaldean, which is found in two forms, (1) that used, in Syriac, by Nestorians and Chaldean Uniates, and (2) the Malabar rite, which is used, also in Syriac, by Malabar Uniates. The third derivative of Antioch is the Byzantine rite, used in Greek, Arabic, Old Slavonic, Rumanian, and many other languages, by all the Orthodox and by Melchites and other Byzantine Uniates. Next to the Roman Mass, this is the most wide¬ spread Christian liturgy. The fourth and last rite derived from Antioch is the Armenian, which is used, in classical Armenian, by Arme¬ nians, whether Gregorian (i.e., schismatical) or Uniate. II. The second eastern rite, the Alex¬ andrian, gives us (1) the Greek Liturgy of Saint Mark, which is now no longer used; (2) the Saint Mark in Coptic, used by the Copts, both Monophysite and Uniate; and (3) the Ethiopic liturgy, used by the Monophysite Church of Abyssinia. The two great western parent liturgies are the Gallican and the Roman. III. The Gallican rite, in Latin, was used in

North Italy, Gaul, Germany, Spain, Britain, and Ireland. It was imported about the 4th cen¬ tury from the East, probably from Antioch. From about the 8th century it began to be grad¬ ually supplanted by the Roman rite, which be¬ came itself considerably Gallicanized in the process. By the 10th or 11th century the Gal¬ ilean had entirely given way to the Roman rite, except in one or two places. It still survives under the title Ambrosian at Milan, in Italy, and under the title Mozarabic at Toledo, in Spain. In each case it is greatly Romanized, particularly so at Milan. IV. Finally, we have the liturgy of Rome. The original pure Roman rite is now no longer used, nor is the African rite, which belonged to the same family and had many features in common with the present Roman Mass, not the least being that its lan¬ guage was Latin even at a time when Greek was still employed at Rome and elsewhere. The present Roman rite, by far the most wide¬ spread of all, is used, in Latin, by nearly the whole Roman patriarchate. It occurs, however, in a Slav dialect in parts of Dalmatia and occa¬ sionally in Greek at Rome. In parts of south¬ ern Italy, Sicily, and Corsica, although they be¬ long to the Roman patriarchate, the Byzantine rite is used. There are various mediaeval modi¬ fications of the Roman rite peculiar to the reli¬ gious orders of the Dominicans, Carthusians, and Carmelites. There were also modifications adopted in certain dioceses, and a few of them, Lyons for example, still keep these local forms; but in most cases the local usage has been abolished.

In the early period the liturgical language used at Rome was Greek, for Greek was spoken by the Roman Christians as well as by those of other centres of Christianity, such as Alexan¬ dria, Antioch, and Jerusalem. For example, Pope Clement I (c. 91-104) uses Greek in that famous (First Epistle to the Corinthians, J to which reference has been already made, and the earliest inscriptions in the Roman cata¬ combs are certainly in Greek. As far as is known, the first Christians to use Latin were those of Africa (Carthage). Pope Victor I (190-202), who was born in Africa, is often said to have been the first Roman pontiff to use it ; but this has been disputed. . The ques¬ tion turns on whether Victor or Saint Cyprian was the author of the treatise (De

AleatoribusP The 3d century popes, Cornelius (251-53) and Stephen (254-57), write in Latin. It may per¬ haps be fairly said that from about the 3d cen¬ tury Latin became the customary language spoken by Christians at Rome, and gradually from that time onward the only one. It is difficult to say when Latin replaced Greek for Church use. Some authorities place the change at as early a date as the second half of the 3d century; others are of opinion that Greek re¬ mained the liturgical language until, the end of the 4th century. At all events, in Pseudo-Ambrose (De Sacramentis) (c. 400) and in a letter of Pope Innocent I (401-17) to Decen-tius of Eugubium (c. 416) we find that the Mass was then said in Latin. It is. probable that there was a transition period, during which the two languages were employed side by side. We know from the first Roman Ordo (c. 770) that as late as the 8th century lessons were read and psalms were sung in Greek. ‘ As a matter of fact, Greek has not, even now, entirely dis¬

appeared. We still have the Kyrie Eleison in every Mass and the Trisagion, Agios O Theos (O Holy God), Agios ischyros (O Holy Strong One), Agios athanatos, eleison imas (O Holy Immortal One, have mercy on us), in the Mass of the Presanctified on Good Friday.

The development of the Roman Mass into its present form is also difficult to trace, at least in some of its earlier stages. Clement I of Rome, Justin Martyr, Hippolytus, and Novatian are in substantial agreement as to the liturgies which they describe or mention ; but our in¬ formation as to the developments of the Roman rite during the latter half of the 3d and nearly the whole of the 4th century is extremely scanty. What we find is that between the 2d and the 5th century certain important changes were made. When we reach the 5th century we are on surer ground, for the (De Sacramentis) and Innocent the First’s letter to De-centius prove not only that the Mass was then said in Latin but also that it is in essence the rite still in use. In the (Gelasian Sacramentary, > of the 6th or 7th century, showing the service considerably shortened, we have what is prac¬ tically the present Roman Mass. Pope Saint Gregory I (590-604) made certain modifica¬ tions, and left the Roman liturgy largely in the state in which it exists to-day. He it was, in particular, who gave the final touches to the Canon. (<No pope,® says Benedict XIV (1740-58), <(has added to or changed the Canon since Saint Gregory.® The Council of Trent (1545-63), wishing uniformity everywhere in the celebration of the Roman Mass, appointed a commission to examine , and revise the Missal and restore it to its earlier form, ˆaccording to the custom and rite of the holy Fathers.® This commission, named on

16 Feb. 1562, had not finished its labors at the close of the Council, 4 Dec. 1563, and its authority was continued and action on its report left to the Pope, Pius IV (1559-65). It was not, however, until the reign of his successor, Pius V (1566-72), that the revision was completed. On 14 July 1570 the reformed Missal — (Missale Romanum ex decreto ss. Concilii Tridentini restitutunP — was published by the Bull, Quo Primum, com¬ manding that that Missal alone should be used wherever the Roman rite is followed. That command put an end to most of the mediaeval derived rites. There was, however, an excep¬ tion. Any liturgy that could prove a prescrip¬ tive right by an existence of not less than two centuries was allowed. It is by virtue of this exception that the independent Gallican liturgies at Milan and Toledo, as well as the modified rites of certain religious orders and the local usages of some dioceses, were preserved. This Missal of Pius V is the one still in use. It has, however, since undergone various corrections in non-essentials. A second revised Missal was published by Clement VIII (1592-1605) by the Bull, Cum Sanctissimum, of 7 July 1604. Again on 2 Sept. 1634 Urban VIII (1623-44) by the Bull, Si quid est, published yet another revision. The last revision of the text, with a correction of the rubrics, was made by Leo XIII (1878— 1903). His missal — (Missale Romanum ex decreto ss. Concilii Tridentini restitutum, S. Pii V Pont. Max. iussu editum, dementis VIII, Urbani VIII et Leonis XIII auctoritate recognitunP — was published in 1884. The

changes effected by Pius X (1903-14) have reference to the music.

Of the Mass, so instituted, developed, re¬ formed, authorized, and promulgated, it remains to say a few words. It is, indeed, not within the scope of the present article to give in detail the many complicated rules and the mi¬ nute rubrics that are to be observed in the cele¬ bration of Mass. These things, which must be mastered before ordination by every aspirant to the priesthood, are to be found fully set forth in books on ceremonial. All that can be given here is a general outline of the pray¬ ers and of some of the ceremonies used. The norm is Missa Solemnis, or High Mass, sung by celebrant, deacon, subdeacon, and choir. The following sketch therefore refers to High Mass and, further, to High Mass as celebrated on an ordinary Sunday. The procession, con¬ sisting of thurifer, acolytes, master of cere¬ monies, . subdeacon, deacon, and celebrant, all appropriately vested in accordance with the rubrics, having reached the foot of the altar, the celebrant makes the sign of the cross, and he and his assistants say certain preparatory prayers, including the 42d [43d in Rev. vers.] Psalm and the Confiteor or General Confes¬ sion. Going up to the altar, the celebrant says silently two short prayers asking forgiveness of his sins. Then, having blessed the incense and incensed the altar, he reads the Introit, consisting of an antiphon, a verse of a psalm, and the little doxology, Gloria Patri, *etc.* The Introit has previously been sung by the choir. The Kyrie Eleison follows, said by the cele¬ brant and the assistant ministers, and sung by the choir. The celebrant then intones the first words of the great doxology, Gloria in Excelsis Deo, and he and the ministers say the re¬ mainder of it together, while the choir sings it. Turning to the congregation, the celebrant greets them, in his singing voice, with the salutation, Dominus vobiscum (The Lord be with you), to which the choir answers, Et cum spiritu tuo (And with thy spirit). He then sings the word, Oremus (Let us pray), and, turning his face to the altar, he sings the prayers known as the Collects, which are dif¬ ferent every day. These are followed by the Epistle, which the celebrant reads while the subdeacon chants it. After the Epistle comes the Gradual, consisting of two separate chants, of which the first is the Gradual proper and the second is the Alleluia or, in Lent and on certain fast days, the Tract. Five times in the year, as well as in all Requiem Masses, the Gradual chants are followed by a canticle known as the Sequence. The celebrant then says silently the prayers, Munda cor meum, *etc.* (Cleanse my heart, etc.), and Dominus

sit, *etc.* (May the Lord be in my heart and on my lips, etc.), reads a selection from one of the four Gospels, and blesses the incense. The sub¬ deacon then holds the Gospel-book and the deacon incenses it, and then sings the Gospel as previously read by the celebrant. At the end the response, Laus tibi, Christe (Praise to thee, Christ), is said. At this point, a sermon, if there is one, is preached, in the vernacular of course. After the sermon, the celebrant intones the first words of the Nicene Creed, Credo in unum Deum (I believe in one God), and says the remainder, which is sung by the choir. When the singing of the Creed is fin¬

ished, the celebrant sings Dominus vobiscum and, after the response as before, he sings the word Oremus (Let us pray). Then follow in order the three principal parts of the Mass, namely, the Offertory, the Consecration, and the Communion. The Offertory is the begin¬ ning of the action of sacrifice. While the choir sings the Offertory antiphon, the cele¬ brant offers the bread, wheaten and unleavened, with the prayer, Suscipe, sancte pater, *etc.* (Accept, holy father, etc.). Then, blessing the water and mixing a little of the water with the wine in the chalice, he says the prayer, Dcus, qui humanae, *etc.* (God, who didst wonderfully create, and still more wonderfully renew, the dignity of man's nature, etc.). Next, offering the chalice, he and the deacon say, Offerimus tibi, Domine, calicem salutaris, *etc.* (We offer unto thee, Lord, the chalice of salvation, etc.). Bowing before the altar, the celebrant says the prayer, In spiritu humilitatis, *etc.* (In the spirit of humility, etc.), and then blesses the bread and wine with the prayer, Veni, sanctificator, *etc.* (Come, Sanctifier, etc.). He then blesses the incense and incenses first the bread and wine with the prayer, Incensum istud, *etc.* (May this incense, etc.), and then the altar with the prayer, Dirigatur, Domine, oratio mea, *etc.* (Let my prayer, Lord, be di¬ rected, etc.). Handing back the censer to the deacon, he says, Accendat in nobis Dominus, *etc.* (May the Lord enkindle in us, etc.). Here the celebrant, the ministers, the clergy present, and the congregation are all incensed. Wash¬ ing his fingers at the side of the altar, the cele¬ brant recites the Lavabo, that is, the last seven verses of Psalm 25 [26], concluding with the little doxology. Then, bowing before the mid¬ dle of the altar, he says the prayer, Suscipe, Sancta Trinitas, hanc oblationem, *etc.* (Re¬ ceive, holy Trinity, this oblation, etc.). He then turns to the congregation and gives the exhortation, Orate, fratres, *etc.* (Pray, brethren, etc.), to which the ministers make answer, Suscipiat Dominus sacrificium, *etc.* (May the Lord receive the sacrifice, etc.). Next follow the Secreta, or secret prayers, which, like the Collects, vary every day, but are said, not sung, by the celebrant.

The last Secret, which ends the Offertory act, he brings to a close with the Ecphonesis, Per omnia ssecula sseculorum, sung aloud, to which the choir responds, Amen. There follow three short chants sung dialogue-wise by the celebrant and the choir. The cele¬ brant then sings the Preface, which ends with the Sanctus, etc., said by him and sung by the choir. At the Sanctus a bell is rung thrice. The Canon, which is the fundamental part of the Mass, follows. Its form never varies, except for slight changes (1) when the Roman See is vacant, (2) when the Episcopal See is vacant, (3) when the Mass is celebrated (a) in Rome and (b) in some French churches, (4) when it is celebrated by (a) a Pope or (b) a bishop, (5) when a bishop is being conse¬ crated, (6) on Maundy Thursday, and (7) at the time of the five chief feasts of the year, namely, Christmas, Epiphany, Easter, Ascension, and Pentecost. The Canon is said in a low tone (secreto) by the celebrant. He beseeches God to accept and bless the sacrifice, and to guard and protect the Church, the Pope, and the bishop; he prays for the living, present and absent; he commemorates the saints; he again

begs the acceptance of the sacrifice ; he asks for peace and for deliverance from eternal damna¬ tion ; he once more implores God to bless, ap¬ prove, and ratify the oblation, so that it may become the body and blood of Jesus Christ. Then, reciting what Christ did with the bread the day before He suffered, he consecrates the Host by saying, secretly, plainly, and attentively, the words, Hoc est enim corpus meum (For this is my body). Immediately he genuflects on one knee and adores and elevates the Host, to show it to the people. Next, reciting what Christ did with the cup of wane, he consecrates the wine by saying the words, Hie est enim calix sanguinis mei, novi et aeterni testamenti : mysterium fidei : qui pro vobis et pro multis effundetur in remissionem peccatorum (For this is the chalice of my Blood, of the new and eternal testament : the mystery of faith : which shall be shed for you and for many, for the remission of sins). Adding the words, Haec quotiescumque feceritis, in mei memoriam facietis (As often as ye do these things, ye shall do them in remembrance of me), he again genuflects on one knee and adores the precious Blood and elevates the chalice containing it. During each elevation, a bell is rung thrice, additional lighted candles are borne by the acolytes, and the thurifer incenses thrice the consecrated bread and thrice the consecrated wine. Proceeding with the Canon, the cele¬ brant says the Anamnesis prayer, in which a solemn commemoration is made of Christ's passion, resurrection, and ascension, and offers to the Lord the victim now on the altar, asking the Almighty Father to accept the offerings, and to command them to be carried by the hands of the holy angel to the altar on high, so that those wdio receive the most sacred Body and Blood of His Son may be filled with all heavenly blessing and grace. He next prays for the dead, prays again for the living, and makes a further commemoration of the saints, closing with the second Ecphonesis, Per omnia saecula sseculorum. The answer, Amen, sung by the choir, brings the Canon to an end. Here follows that part of the Mass known as the Communion. The celebrant sings a short exhortation and clause, and then sings the Pater Noster as far as the word, tentationem. The choir sings the last petition, Sed libera nos a malo (But deliver us from evil). After this comes an Embolism, containing a further prayer for deliverance from evil and for peace,

said by the celebrant, and ended by the third Ecphonesis, the words of which are the same as those of the two former ones. During the last part of the Embolism, he breaks the Host in the middle, over the chalice. Following the Ecphonesis and its response, he sings the greet¬ ing, Pax Domini sit semper vobiscum (May the peace of the Lord be always with you), to which the choir replies, Et cum spiritu tuo. Putting a particle of the Host into the chalice, with the prayer, Haec commixtio et consecratio, *etc.* (May this mingling and consecration, etc.), he genuflects, bows down, strikes his breast thrice, and says the Agnus Dei, *etc.* (Lamb of God, etc.), which contains two petitions for mercy and one for peace. The choir sings the Agnus Dei. The celebrant, having made a further prayer for the peace and unity of the Church, gives the kiss of peace to the deacon,

who in turn gives it to the subdeacon, and he in turn to the clergy present. The celebrant then prays for deliverance from his iniquities and from all evils, and asks that the participa¬ tion of Christ's body may not turn to his judg¬ ment and condemnation, but may profit him to the safety and health of soul and body. Hav¬ ing said the words, Panem coelestem accipiam, et nomen Domini invocabo (I will take the Bread of heaven, and will call upon the name of the Lord), he recites three times the Domine, non sum dignus, *etc.* (Lord, I am not worthy, etc.), a bell being rung each time, and, with specified and appropriate short prayers, he eats the consecrated bread and drinks the conse¬ crated wine. .During the two ablutions, that is, of the chalice and of his fingers, which follow, he says two other short prayers. While the choir sings the antiphon known as the Commun¬ ion, the celebrant reads it, and this ends the Communion act. The last division of the Mass now begins. The celebrant, having sung the Post-Communion prayers, sings also the Dominus vobiscum, to which the choir gives the customary response. Then the deacon sings, Ite, missa est (Go, the Mass is ended), or, in peni¬ tential seasons, Benedicamus Domino (Let us bless the Lord), and the choir answers, Deo gratias (Thanks be to God). The celebrant says a final prayer, Placeat tibi, Sancta Trinitas, obsequium servitutis meae, *etc.* (Holy Trinity, may the performance of my homage be pleasing to thee, etc.), and blesses the congrega¬ tion. He then reads the last Gospel, which is normally the beginning of the first chapter of the Gospel of Saint John (vv. 1-14), and, when he finishes, the ministers respond, Deo gratias. So ends the Mass.

Low Mass (Missa privata), in which the celebrant supplies the part of the absent ministers and uses the speaking instead of the singing

voice, is a late abridgment. It became a necessity when, in the early Middle Ages, the pious custom grew up for practically every priest to say Mass once a day. By the 9th century we find that many priests were in the habit of saying Mass several times the same day. By the 13th century this multiplication of Masses began to be forbidden. By special indult (1746) of Pope Benedict XIV, priests in Spain and Portugal were permitted to celebrate three Masses on All Souls' Day (2 November), a privilege extended quite recently to all other countries. The rule now is that, except on that day and on the feast of Christmas (25 Decem¬ ber), when three Masses are also allowed, and on Sundays and certain holy days when, in case of necessity, authorization for two Masses is given, a priest may say only one Mass a day. Pius the Fifth's Missal (1570) recognized Low Mass and specifically arranged its order. By direction of Pope Leo XIII certain prayers in the vernacular, in which the congregation par¬ ticipates with the celebrant, are recited after everv Low Mass. In some countries (e.g., Ireland) the 129th [130th] Psalm (De Pro-fundis) is said after the Low Mass and before the vernacular prayers. There are special rites for a Pontifical Mass, high or low, and addi¬ tional special rites for a Papal Mass. A Missa Cantata, without deacon and subdeacon, but with celebrant, choir, and singing as at High Mass, is a compromise. The Mass of the

Presanctified (Missa praesanctificatorum, I.etTovpyia t<jv irporjyiaopevuv)t which is really not a Mass at all but a service of Com¬ munion from an oblation consecrated and re¬ served at a previous celebration, was once com¬ mon in both the Eastern and the Western Church. In the Byzantine rite such a service still occurs several times in the year, but in the Romap rite it is now used only on Good Friday. Conventual or Chapter Mass (Missa conventualis or capitularis) is an official Mass celebrated in such churches as are bound to have the whole office every day. A Missa soli-taria is a Mass said without an assistant. Such Masses, forbidden by many synods, may never¬ theless be celebrated by dispensation given under special circumstances. Missa sicca, or dry Mass, was used on occasions when a real Mass could not be said, as, for example, at a wedding or a funeral in the afternoon. It consisted of the prayers of the Mass with the essential parts — offertory, consecration, com¬ munion — omitted. Varieties of the dry Mass were Missa nautica, said at sea when the roll¬ ing of the ship rendered a real Mass dangerous or impossible, and Missa venatoria, said for hunters. The drv Mass was in vogue from at least the 14th century, but by the end of the 17th century it was nearly entirely abolished. Requiem Mass is said for the dead, and Nuptial Mass (pro sponso et sponsa) for a marriage.

In the early ages the Mass was divided into two distinct parts, the Mass of the Cate¬ chumens (Missa catechumenorum) and the Mass of the Faithful (Missa fidelium). This distinction, at one time fundamental, gradually disappeared as the discipline of the cate-chumenate fell into disuse. It has now long been lost, and the division is so hidden in the present rite that but few people advert to it. The Dominus vobiscum and the Oremus, fol¬ lowing the Gospel (or the Creed, when it is said) and preceding the Offertory Act, show the line of demarcation.

The celebrant of Mass must be in priest's orders and free of irregularity and censure. He must also be in the state of grace, and be fasting from at least the previous mid¬ night. He is bound to observe the rubrics and the laws concerning the matter (azyme bread and pure wine), the vestments, the ves¬ sels, and the ceremonies. Mass should be cele¬ brated in a consecrated or blessed church and on a consecrated altar or altar-stone. In spe¬ cial cases, however, it may be said in a private oratory or even in an ordinary room. It is offered in

the morning, though, for good and sufficient cause, the time may be extended to a limited period after mid-day.

The two great distinguishing marks of the Roman Mass are (1) that it is a sacrifice and (2) that it supposes Transubstantiation. These were the two features to which the Reformers particularly objected. They took the position that ((the Eucharist and Holy Supper of the Lord® was a remembrance of Christ and a solemn setting forth of his death, and not a sacrifice, and that Transubstantiation did not take place. They were anxious, indeed, to re¬ tain a Eucharistic service, but one stripped of what to them appeared to be its objectionable parts. They were also insistent that the serv¬ ice should be in the vernacular, and that com¬ munion, when administered to the faithful,

should be administered under both kinds, that is, in the form of bread and wine, and not of bread alone as was the practice of the Catholic Church. At first they repelled the charge that they were opposed to the Mass, and the Augs¬ burg Confession "protests against any notion that it abolishes Mass® ; but the logic of events was too strong for this contention, and ulti¬ mately the Reformation, as far as it could, did away with the Mass. In his Latin Mass (1523) and his German Mass (1526) Luther put forth the basis of the numerous liturgies promulgated by his followers in the 16th century. In the former he laid down the principle that <(we cannot deny that Mass and the communion of bread and wine is a rite divinely instituted by Christ.® He therefore allows the Mass, as it stood in the ancient missals, to be consonant with primitive purity, except the Offertory and the Canon, that is, everything that savored of oblation. He did not recognize Transubstan¬ tiation. He developed instead the theory of Con-substantiation, according to which Christ's body and blood are really and corporeally present, during the celebration of the Lord's Supper, in, with, and under the substance of bread and wine, in a union not hypostatic, not of mixture, not of local inclusion, but wholly transcendent and mysterious, so that the elements may with propriety be termed either bread and wine or the body and blood of Christ. Zwinglius and Oecolampadius, and with them the main body of Helvetian Protestantism, went farther. They rejected all notion of a real presence, and recognized only figurative symbols in the ele¬ ments which Christ had appointed as a com¬ memoration of his death. Bullinger modified Zwinglius's doctrine without changing its es¬ sentials, and, by divesting it of its merely com¬ memorative character and admitting the pres¬ ence in the communion, gave it the form in which it was adopted by the Helvetic churches. Bucer did not

acknowledge the local or real presence of Christ's body and blood in the bread and wine after consecration, but con¬ tended that the body and blood were really, and without figure, received by the worthy com¬ municant, through faith. Calvin taught that the body of Christ is present in the Eucharist, but "dynamically,® not objectively; that the be¬ liever partakes of it, but spiritually and by faith; that the elements are unchanged; and that therefore the Catholic Mass is idolatry. In England the Reformers maintained that in the Lord's Supper there is no Transubstantia¬ tion and no other oblation than a giving of thanks and a commemoration of the death of the Lord: in other words, that, as Cranmer phrased it, the Roman Mass is "heinous and abominable idolatry.® These views found practical expression in the Book of Common Prayer, the first vernacular liturgy of the Church of England, published in the reign of Edward VI, and effective on Whitsunday, 9 June 1549. The Eucharistic part of the service was indeed named "The Supper of the Lorde and holy Communion, commonly called the Masse,® but the whole of the oblation and offertory prayers were swept away and the former Canon changed in many of its most material parts. In the second Book of Edward VI, which went into force on 1 Nov. 1552, the word Mass was omitted, and any language in the Canon that might imply either the doctrine

of Transubstantiation or of sacrifice also dis¬ appeared. The attitude of the Anglican Church on this subject is crystallized in the 31st of the Articles of Religion: "Wherefore the sacrifices of the Masses, in which it was com¬ monly said, that the Priest did offer Christ for the quick and the dead, to have remission of pain or guilt, were blasphemous fables, and dangerous deceits.® Laws were enacted con¬ taining severe penalties for saying or hearing Mass. So important did it seem to condemn the Roman sacrifice that, for centuries, the occu¬ pant of the English throne was bound by the oath taken at coronation to repudiate the doc¬ trine of Transubstantiation and of the Mass. It was not until 1910 that, by the Accession Declaration Act, the oath was purged of its objectionable clauses.

Modern unbelief, which denies the divinity of Christ and rejects every supernatural insti¬ tution, does not of course recognize the sacred character of the Mass. Using the so-called historico-religious method, it accounts for the Eucharist and the Eucharistic sacrifice as a result of a spontaneous development in the re¬ ligion founded by Christ ; but this line of argumentation neither explains nor explains away the Mass, and succeeds only in raising still more difficult problems for solution.

Despite all the attacks to which it has been subjected, the Mass remains the great central act of sacrifice in the Catholic Church, the distinctive feature of the Catholic religion, the everlasting witness and guarantee of the bond which unites all Catholics with the Roman See. Catholics are required, under pain of grievous sin, to attend Mass on Sundays and holy days of obligation, unless prevented from doing so on reasonable grounds, such as sickness or too great distance from a church. Some lax Catholics, it is true, shirk their duty in this re¬ spect; but the crowded condition of the churches both in town and country in every land during the hours of celebration shows how generally and how generously the law is ob¬ served. In practice, multitudes of Catholics hear Mass and receive holy Communion every day.

Bibliography. — The bibliography on this subject is enormous. The following books are tentatively suggested for further study: Bona, (Rerum liturgicarum libri duo* (Paris 1672); Martene, (De antiquis ecclesiae ritibus) (3 vols., Rouen 1700-02) ; Lebrun, (L' Explication litterale, histonque et dogmatique des prieres et des ceremonies de la messe* (Paris 1716-26) ; Pope Benedict XIV (1740-58), <De sacrosancto sacrificio missae libri tres> (ed. Schneider, Mainz 1879) ; Rock, (Hierurgia, or the Holy Sacrifice of the Mass* (2 vols., London 1840) ; Daniel, < Codex liturgicus ecclesiae umversae) (4 vols., Leipzig 1847) ; Probst, (Liturgie der drei ersten christlichen Jahrhunderte) (Tubin¬ gen 1870); (Die altesten romischen Sacramentarien und Ordines erklart* (Munster 1892); (Die Liturgie des vierten Jahrhunderts und deren Reform* (Munster 1893) ; (Die abendlandische Messe vom fiinften bis zum achten Jahrhundert* (Munster 1896) ; de Fleury, (La Messe: etudes archeologiques sur ses monu¬ ments* (8 vols., Paris 1884-89) ; Gasquet and Bishop, (Edward VI and the Book of Common Prayer > (London 1890) ; Gihr, (Das heilige Mes-sopfer dogmatisch, liturgisch und ascetisch

erklart* (6th ed., Freiburg i. Br. 1897) ; Magani, "L'antica liturgia romana> (3 vols., Milan 1897— 99) ; Rietschel, (Lehrbuch der

Liturgik) (2 vols., Berlin 1900) ; Gee, (The Elizabethan Prayer-book and Ornaments) (London 1902) ; Duchesne, (Origines du Culte chretien* (3d ed., Paris 1903) ; Bishop, (Genius of the Roman Rite) (London 1904) ; Baumstark, (Liturgia romana e liturgia dell' Esarcato) (Rome 1904) ; Warren, (Liturgy of the Ante-Nicene Church* (New York 1906) ; Cabrol, (Les origines litur-giques> (Paris 1906) ; Y'orke, (The Roman Liturgy) (San Francisco 1906) ; Nieuwbarn, (The Holy Sacrifice and Its Ceremonies) (trans. from the Dutch by Bouman, New York 1909) ; Le Vavasseur, (Manuel de Liturgie) (10th ed., 2 vols., Paris 1910) ; Fortescue, (The Mass: A Study of the Roman Liturgy) (New York 1912).

P. J. Lennox,

Professor of English Language and Literature, The Catholic University of America.

MASSA, mas'sa, or MASSA DI CAR¬ RARA, Italy, the Capital of the province of Massa e Carrara, situated on a hill three miles from the Gulf of Genoa, 25 miles north of Pisa and 20 miles by rail southeast of Spezia. It is an episcopal see, has a cathedral, public library, and academy of arts and sciences, and an ancient ducal palace now used as the prefectual building. The chief industry is the quarrying of the superior white marble in the vicinity; tobacco, silk, cotton, paper and oil are manufactured. Massa was once the capital of the principality of Massa and later capital of the duchy of the same name. In 1829 it was annexed to Modena. Pop. 30,830.

MASSACHUSET, mas-a-choo'set, a tribe of North American Indians of the Algonquian stock, formerly living in the neighborhood of Massachusetts Bay, between Salem and Ply¬ mouth. Their capital, Massachuset, was where Quincy now stands. A pestilence in

1617 greatly reduced their number and on the arrival of the white settlers the tribe numbered but a fraction of its former hosts, about 500. In 1633 this number was further depleted by the ravages of smallpox. They were placed bv the whites in the missions of Natick, Nonantum and Ponkapog in 1646 and gradually disap¬ peared. See Algonquin; Indians.

MASSACHUSETTS, one of the 13 original

States of the Union, and the most populous of the New England States; between lat. 41° 14' and 42° 53' N., and between long. 69° 55' and 73° 32' W. from Greenwich. Its greatest length is 184 miles and greatest

breadth 113ˆ4 miles, the average breadth being 47ˆ4 miles. Capital, Boston. Population U. S. census, 1920, 3,852,356, as compared with 3,666,416 shown in the National census of 1910. Its familiar name “The Old Bay State® is due to its location upon Massachusetts Bay, an inlet of the Atlantic Ocean which forms the eastern boundary of the State. It is bounded on the north bv the States of New Hampshire and Vermont; on the west by the State of New York; on the south by the States of Rhode Island and Connecticut, to¬ gether with the Atlantic which, skirting the southeastern coast, forms between the outlying islands of Martha’s Vineyard and Nantucket, belonging to the State, a broad waterway known

as Nantucket Sound and an inlet called Buz¬ zard's Bay, beyond the eastern extremity of Long Island Sound. The name ˆMassachusetts® is compounded from Indian words meaning "Great Hills Place,® alluding probably to heights of land near the coast in the vicinity of Bos¬ ton. The present State seal, adopted in 1780 in place of other devices previously in use, shows an Indian holding in his right hand a bow and in his left an arrow pointing down¬ ward, all of gold, displayed upon a blue shield, and in the upper corner, above the right arm of the Indian, a silver star having five points. The motto, adopted for Massachusetts by the Provincial Congress in 1775, is, in Latin, aEnse petit placidom sub libertate quietem ,® or in English. "With the sword she seeks quiet peace under liberty.®

Topography. — The area of the State com¬ prises 8,315 square miles, 8,040 square miles be¬ ing land surface, and 275 water. A portion of the Appalachian Mountain system forms two distinct ranges crossing the western part of the State from north to south. Of these, the Ta-conic range on the extreme western border has as its highest elevation Mount Greylock (3,535 feet) in the northwestern corner of the State, which is also the highest elevation found within Massachusetts. Thence the range falls to an elevation of 2,624 feet near the southwestern corner. The other or Hoosac range farther east has, as its highest peak, Spruce Hill (2,588 feet), its general height ranging, however, from 1,200 to 1,600 feet. Mount Tom (1,214 feet) and Mount Holyoke (955 feet) are conspicuous elevations rising above the valley of the Con¬ necticut River. Mount Wachusett (2,108 feet) and Mount Watatic (1,847 feet) in the north central part of the State are also noteworthy. An elevated plateau, 1,100 feet high at its great¬ est elevation, forms the central portion of the State and slopes gradually toward the east, the highest point near the coast being the Great Blue Hill of Milton (620 feet). The sandy peninsula or arm of land known as Cape Cod is a distinguishing feature of the topography of the State, enclosing between the bend and the main coast the considerable body of water known as Cape Cod Bay. The arm of the cape is now penetrated by a ship canal shortening the route between the port of Boston and southern waters. The main coast line of the State, some 300 miles in extent, affords excel¬ lent harbors, especially at Boston, New Bed¬ ford, Gloucester and Salem. See Boundaries of the United States.

Rivers and Lakes. — The principal rivers are the Connecticut, crossing the State from north to south, approximately 40 miles east from the western boundary; the Housatonic, flowing south, and the Hoosac, north, between the Ta-conic and Hoosac ranges; and the Merrimac, in the northeastern part of the State, having its source in New Hampshire and flowing into the Atlantic on the eastern coast. These rivers, ex¬ cept the Merrimac for some 15 miles from its mouth, are not navigable for shipping; but to¬ gether with the Deerfield, Westfield, Chicopee and Miller's River, branches of the Connecticut, the Nashua and Concord, branches of the Mer¬ rimac, the Blackstone flowing from the centre of the State southerly across the Rhode Island boundary, and numerous other small streams, afford water power of the highest efficiency

which has been fully utilized in the industrial development of the State and contributed largely to the extension and growth of manu¬ facturing, the chief source of the wealth of its people. The Mystic and Charles rivers, flow¬ ing into Boston Harbor, and the Taunton, en¬ tering the bay at Fall River, are tidal streams each navigable for a short distance inland. There are numerous small lakes or ponds throughout the State, adding much to the beauty of the landscape, and, in many cases, utilized as sources of water supply for the in¬ habitants.

Geology. — The rocks are principally metamorphic of the Archaean and Palaeozoic systems. In the river valleys and elsewhere there are masses of glacial drift, including sand and boulders, some of the latter being of large size. No mineral deposits of great value exist, ex¬ cept stone for building purposes, limestone and sandstone of the highest quality being quarried in the Connecticut Valley and west of the Connecticut, and granite of several varieties and superior character at Cape Ann, Quincy, and to a lesser extent in other eastern sections. The elevations of the lower Connecticut Valley are composed of bolerites, feldspathic and cal¬ careous gneiss. There are extensive Mesozoic sandstone beds and shales in the Connecticut Valley, with small areas of syenite on each side, and an area of gneiss extending easterly from the Connecticut to the central part of the State. Syenite and porphyry are found in the east ; feldspathic gneiss and granite in Plymouth and Bristol counties ; gneiss and hornblende schist in Middlesex County; syenite in Essex and Norfolk counties; carboniferous deposits in Bristol and Plymouth counties, and Cambrian, Silurian and Devonian limestones, quartzites, schists and slates west of the Connecticut.

Climate and Scenery. — The temperature is variable and, especially in the eastern parts of the State, subject to frequent and wide fluctua¬ tions. In the early spring easterly winds pre¬ vail upon the coast, which are peculiarly trying to persons of delicate constitution. The winters are moderately severe, although near the sea there is much milder weather, during the winter months, and the fall of snow is not excessive. The summers are frequently marked by periods of excessive heat and sometimes by prolonged drought. The mean average rainfall for the State is about 48 inches. The normal tempera¬ ture rises above the freezing point at Boston about 7 March and the normal temperature of 60° for the day reaches Boston about 24 May. It falls to 60° about 25 September. Observa¬ tions extending over 25 years show that upon the average experience the warmest week at Boston follows 13 July. On the other hand, the coldest week follows 24 February.

The scenery in the western counties is ex¬ ceedingly picturesque, notably in the valleys of the Connecticut, Hoosac, Deerfield and Housa¬ tonic rivers. Here are found the noted Berk¬ shire Hills. The northeastern coast line extend¬ ing southerly from Cape Ann is bold and rocky, while the southern and southeastern shores of Cape Cod and Buzzard's Bav are low and sandy. The islands of Martha's Vineyard and Nan¬ tucket and the group known as the Elizabeth Islands partake of the characteristics of the neighboring mainland.

MASSACHUSETTS.

Established population, 3,719,156

COUNTIES

Pop.

Pop.

28,818

Barnstable … .

.F 13

69,549 Hampshire ….

. .C 4

114,709

Berkshire .

. .C 2

733,624 Middlesex .

• C 6

346,964

Bristol .

.E 10

3,166 Nantucket ….

G 14

4,904

Dukes .

.G 12

201,907 Norfolk .

D 10

463,662

Essex .

.B 11

157,303 Plymouth .

.E 11

48,256

Franklin .

. .B 4

826,801 Suffolk .

.C 10

‘ 262,944

Hampden .

. .D 4

430,703 Worcester .

. .C 7

Incorporated

Cities,

Towns, and Villages

5.646

Abington .

.D 11

17.445 Melrose .

■ C 10

14,214

Adams .

. .B 2

13,921 Methuen .

.B 10

10,157

Amesbury .

.A 11

9,048 Middleboro .

E 11

5,558

Amherst .

. .C 4

14,110 Milford .

7,987

Andover .

.B 10

8,600 Milton .

.C 10

12.S11

Arlington .

. .F 2

7,925 Montague .

• B 4

9,461

Athol .

. .B 5

10,102 Natick .

i 19,282

Attleboro .

.E 10

6,542 Needham .

.C 10

8,081

Belmont .

. .F 2

118.158 New Bedford . .

.F 11

21,645

Beverly .

B 11

15,243 Newburyport .

.A 11

5,689

Blackstone .

. .D 8

43,715 Newton .

.C 10

756,476

Boston .

. ,F4

22,035 North Adams …

. .B 2

9,376

Braintree .

,.H4

, 5,956 North Andover.

.B 10

9,381

Bridgewater … .

.E 11

19,926 Northampton…

. ,C 4

67,449

Brockton .

.D 10

11,014 North Attleboro

.D 9

32,730

Brookline .

. .G 3

9,918 Northbridge… .

..D 8

112,981

Cambridge …

.C 10

9,605 Norwood .

D 9

5,182

Chelmsford .

. .B 9

5,379 Orange .

. . B 5

46,192

Chelsea .

.C 11

9,119 Palmer .

.D 5

29,319 Chicopee . D4

13,075 Clinton . C8

6,681 Concord . C 9

9,949 Danvers . B 11

10,433 Dedham . D 10

10,360 Easthampton . C 3

5,064 Easton . D 10

39.233 Everett . CIO

6,277 Fairhaven . F 11

128,366 Fall River . F 10

41,781 Fitchburg . B 8

13,982 Framingham . C 9

6,440 Franklin . D 9

17,140 Gardner . B 7

24,478 Gloucester . B 12

6,250 Grafton . D 8

6,627 Great Barrington. D 1

11,998 Greenfield . B4

48,477 Haverhill . A 10

65,286 Holyoke . D 4

6,758 Hudson . C 8

15,507 Hyde Park . D10

6,272 Ipswich . B 11

100.560 Lawrence . B 10

20,839 Leominster . C7

113,245 Lowell . B 9

102,425 Lynn . C 11

51,155 Malden . C 10

5,772 Mansfield . D 10

7,606 Marblehead . C 11

15.187 Marlboro . C8

6,770 Maynard . C 9

26.234 Medford . C9

18,360 Peabody . Cll

38.629 Pittsfield . Cl

13,743 Plymouth . E 12

38.136 Quincy . Cll

6,805 Reading . B 10

23.136 Revere . F4

7,074 Rockland . D 11

48,562 Salem . B 11

9,910 Saugus . E 5

87,039 Somerville . C 10

14,205 Southbridge . D 6

5,994 Spencer . C 4

105,942 Springfield . D 6

7,489 Stoneham . C 10

6,982 Stoughton . D 10

7,345 Swampscot . Cll

36,283 Taunton . E 10

12,733 Wakefield . B 10

30,570 Waltham . C 9

9,094 Ware . C 5

14,867 Watertown . F 2

13,210 Webster . D7

6,439 Wellesley . D 9

5,925 Westboro . C 8

18,391 Westfield . D 3

10,555 West Springfield. . D 4

13,882 Weymouth . H 5

7,520 Whitman . D 11

5,908 Winchendon . B 6

10,603 Winchester . E3

12.692 Winthrop . F 5

15,969 Woburn . C 10

163,314 Worcester . C 7

“eat from (Greenwich.

raaaabesic Zake

v/fExeter

IBedfor 1

MASSACHUSETTS

North

innii^gton

Glaste

Hoosac

Jc.

ˆNewton Jc, 7 Island J

Pond

Thorndikf Pond \

Teterboro

Petersburg Jc,

‘*SWAsr J\ nd

%

l* Rea Isboro

ˆ(Newbury-. oJU port y

fWˆXqwburtj/ˆ

Greenvill?

Nashua.

South

.•MonroeRridge””””>

>0 fe’ forth Heath

‘Wictlm

■usiown’oˆi

Bow 1, j

Monomonac*

LjVest Townaeoˆ S \l Pepperoll ’?T ^^gTokusend

s Jpsvrj E Boxford

»rtnor ,

meftendnnXcw

‘Moors

• ˆ A *AndovcrVSox*o

* 3 >i Ballard T JlM

v>rtV>Lˆ’ MiddBtonˆ

i rvoir

‘ i attack vVˆv/

°ˆW«l,elb“ra’ ixV/4

ˆoHawley JU AXGreeriflel y

<* iw.Ayjrviˆ

‘Clubaccoˆ

L+y

ffcfoucesler^

jRarborr^.

s

irˆaua,.,i.

/3*no»ll!Hi / Billeriqd JVrwhoba T

Oielbu:

.Pleasˆt

tPMlUpst

jyjwJarb 1 e he

r . — m&k/7//fp

ilos ter

[N.ˆActon

:huse’tt]

lJ»cA« Jbnd erfand S/iutesbury i LM-erett;

c4 Wo-o’

ˆ/jrvburnN ■•xiagtouSaWincheX

E.LexJngtNˆg

iury

, ActonQv C#W0;

V ° \

Vebˆo°

Atnrf

\ o CooTey*? iˆ.u zVcscoft

rincetoi

> epot

JjiUW

[Medford ,

iˆbudbui7 ilottoodalo l

mi lUainsbuˆ -V &«o Y

°CTrsaˆ rficlPS$*\ • 2i

) p ‘Al;o

fessp

j/Wd/.Ui’v,

rketˆˆˆU’bJlf field sra. oU

/sjynjiirt I’o.

＞P R ˆSC2!# E,

rjftwIKˆintia Livr,(

ˆSoutobor

ˆe»tborof

ft rtorthbfcjrt Shrewsbury Z.˚

‘utnsigomonp

gftjpsCfa

Uttlcl

Eastldiroj

i..y I //No^’.‘IJuntine N. ^KBoiItl^ f /gf-^BIandford ^*>r

r&ohoP RussjJlUJc v

^-Baahj/ ivj

l Hayden’; i v nC .

frW,

a ‘v_.tL. r ^) RX1 jT^C x= = = =\0rea(7>,4nd

*+W5BS\ 4/f0rc,‘ir?fatn V 2?rT’/f,’^o f <

Wilbratfam J^_ ^fe.Brjiiitield^ IMonsoni

N. /If el<l S. Monsoni

M z

** v oXong >ic ailowˆˆˆHeadow . •’!

Brewers Pˆ Interej 10

[f”-o Highlapd* Y t/~AR8H>l| VWih Weytni r,lT oHatherljr

ˆSˆtendolpliˆ/” iKfi**”*10’ A.-

V/°i\ N- *■/ 2.

(KoYigshton/v J _7 h \ˆ-/Avod> r?ii«tui;)oYy’ *r*

Ton.i.-‘I’e’Y !<

bmrilb

rfi/otr

’✓ˆ6 Caotol HjTffhiahd »A

Oxfor3v

1/ancAauj

ramfll

joSryantTlirA

V Uurrdff* »U

Easton’

‘Mansfield

VibE. Pouglact*. a* \j <

!**• (AˆSVU,. V

ic)z < n afljf ngamavg — •ˆcfv irdKlim-Millville’

Plbllaj

Tojnt > r <

Vrenthai

fampu®*

, State Xine

-Doolittle Jt

j£2

[y^^ithvivVs

^^Eiishas.

North f

“r-JlrowrheJ

llˆomo I.ˆL Wjomag ttrch R,j} rtedi

Crystal , >. Palccfj

py>rinˆ l*ond (Jlenmore /

. r LK II E M>

Neck. US

‘Woburn’ i

I* Hill V U« 3Iont-’ \ ˆ.rale

✓7 N. MikdhboroX

ˆW/hitteDloo’jP i’

OˆTaumow A$f JICfcrfAv.Y.

Smithˆ

Poneg onset , OiJes. ˆ IKUlmgly £

Waterman |

‘ Melrose rS{i

[»ghlandUV7r

3lelrose^}/”

‘ v. * Jtfbswd J\md

3»RCVID|:

Jlouse^

Winchestf

“Wedtremere ° es

2T°*r -Lakes’ll

‘■‘S/DKMjr.rkˆ i’rV w8j«n＜(/

uingtoa

ˆUlˆNAh\fii:

’ierces Bridge\ ! E. Lexington

‘Free towi

w#y L

ˆy’Bourne

dale

X Bourne

1 Monument [< e Beach ,1’ocassetA .

yo4 Pie,

rirmoufA J;

-Arlingtoi

Bell Rock f

VJ .Eˆcretf S \ Evcr!&ˆ

IVIRONS OF

OSTON.

Bamauble

Hardys , Pond (g\

Barnstable

hvvoX

Rut’ E. Greenv Carr Pond

SMhjhqnt:

fnemossett ~§J ’ Amd/^S J j W.FnJiaouth

Scale of Miles.

Cambridge

1LAN1

;t. W’intliroji

iKNolO

“arpauhn. ve *„;*

Beacon.

Riversidj

%/G008EJItlllt1

. •;’/, .\ ECK. J

rS;ik on n eUPtˆ

c, «°xburyA ˆBrp/kllne h

• Jamaica,, ofi

vW < \oaianˆXU

, X. < N ewfon Cenˆ

[gttnLUi

X/n’ordq l\md4 Pt. Judith, Alibi

/AVooˆ

River Jc.

\vi EOllGi

tSArragansett-

dˆKunk:

yp a o,v a W jIsCand ^

*’• RAi > srojab

•’ ‘A _. .

S’/uanfum-K’ IU.vauns

lamaicai

Westerly

£/f*s~rjrxˆfoorcYc*tcr

ˆ f/Wt. Hope/ Ced&rV? A Gr°vc ‘</’

P

-

[siUJU > =

/ Needbaul ■ I Heights ‘ [Needham

Gcdale

•SuKEfjrt

^/Roxjiury

Mulldikp.j

;TjS1-V IT r

River

ˆ . v* /». VA n \ -“• \

y sTVlilton’ / /yPMil ton rCrct *A

4y AV.QuincyVjˆ

˚Jiiuo wn, yv

Cohasset

S»od 3lcN »lljr’ g Now lLxH Mop of UiuuduinttU CopyrjgljL.br Band. AlgJj’ ally A.Co*

Longitude ˆWealofroaˆGgˆhwh

eymouth

2820

History. — The native inhabitants of Massa¬ chusetts were Algonquins of various tribes, each having its distinguishing name. The In¬ dian nomenclature of hills, rivers, lakes and local districts is still preserved in many cases. The first fully authenticated visit of a Euro¬ pean explorer is that of Bartholomew Gosnold in 1602, although there are traditional accounts of the visits of others, particularly of North¬ men under Lief Erikson, some 600 years earlier, with subsequent settlements maintained during three centuries, _ of which, however, no undis¬ puted traces exist, although a commemorative tovyer erected on the Charles near Boston is claimed to mark the site of a Norwegian settlement named Norembega. Gosnold skirted the coast from Salem southward, named Cape Cod and discovered the neighboring islands. A settlement made upon one of these was soon abandoned. Subsequent attempts at settlement by Prynne (1603) and Waymouth (1605) also failed. The Pilgrim Fathers, so-called, a com¬ pany of English separatists who, seeking reli¬ gious freedom, had, under the guidance of their pastor, John Robinson, left England for Leyden in Holland in 1607-08, sailed from Delfthaven in 1620, and soon afterward, 102 in number, from Plymouth, England, in the Mayflower (q.v.), with the intention of form¬ ing a settlement south of the Hudson River. Under stress of weather, however, they were forced to land in Provincetown Harbor 11 Nov. 1620, and finally upon the mainland at Plymouth 11 December (old style), where a settlement was established under a constitution or compact signed by all before leaving the ship, John Carver being chosen governor for one year. Despite much hardship this settlement was never abandoned and formed the basis of the Plymouth Colony.

A settlement made at Cape Ann in 1623 by English fishermen was in 1626 abandoned in favor of a location at Salem. A company of English Puritans under John Endicott, having obtained a grant of land on Massachusetts Bay, joined them in 1628. Under a charter granted the following year the colony of Massachusetts Bay was firmly established. In 1630 the colony received large accessions under John Winthrop, and the seat of administration was soon trans¬ ferred, first to Charlestown and finally to Bos¬ ton. These two colonies, Plymouth

and Massa¬ chusetts Bay, advanced side by side, the last named growing in importance by constant ac¬ cessions, although less tolerant than the former in religious matters. The original government was indeed theocratic, based upon the Con¬ gregational form of church government, which was established by law in 1651. A confederacy including the two colonies and that of Connec¬ ticut was formed in 1643, followed by one upon a somewhat broader basis in 1663.

In the Massachusetts Bay Colony religious intolerance was frequently exhibited during the early years. Roger Williams and others whose opinions were thought to be dangerous to the community were banished.

Troubles with the Indians, the original in¬ habitants of the country, involved both colonies, the more important being the Pequot W ar (1636-37). and the war with King Philip (1675— 76). Gradually relations with the mother coun¬ try became strained. After the restoration of Charles II a royal commission was appointed VOL. 18 — 26

to administer the government, but was pre¬ vented from exercising its powers by the colo¬ nial authorities. The English High Court of Chancery in 1684 declared the charter of Massa¬ chusetts forfeited; and a succession of govern¬ ors appointed by the Crown administered the colonial government, generally with much fric¬ tion engendered by an adverse public opinion. Plymouth and Massachusetts Bay colonies were consolidated under a new charter in 1692. The territory of Maine, New Hampshire and Ver¬ mont formed part of the original province, sepa¬ ration being progressively accomplished and finally completed by the creation of the inde¬ pendent State of Maine in 1820.

In the colonial wars between France and England, and in difficulties with the Indians prompted by French influence adverse to the English colonies, Massachusetts was largely in¬ volved. Especially in the French and English wars (1744-48 and 1758), the colony took an important part, contributing in great measure to the success of the expedition against Louisburg and other Canadian campaigns. In these military operations, the colonists learned to estimate their strength justly and acquired ex¬ perience wThich was of great value in the final struggle which resulted in independence.

Measures of taxation devised by the home government and restrictions

upon the growing commerce of the colony led to a constantly in¬ creasing spirit of resistance and, finally, to riots in Boston (1765-68) against the enforcement of the Stamp Act (q.v.). In 1770 three citizens of Boston were shot by British soldiers, part of a garrison quartered upon the towm without consent of the people. In December 1773 a cargo of tea, subject to a duty disliked by the colonists, was destroyed by being thrown into the harbor of Boston by a company of towns¬ people disguised as Indians. This episode is now widely known as ((The Boston Tea Party® (q.v.). The port of Boston was closed in retaliation. The meeting of the General Court at Boston being postponed indefinitely, its mem¬ bers assembled at Salem. On 19 April 1775 the first blood of the Revolution was shed at Lexington not far from Boston, followed by the fight at Concord Bridge. On 17 June oc¬ curred the battle of Bunker Hill at Charles¬ town, which, although counted as a British vic¬ tory, exhibited the effective strength and stub¬ born power of resistance of the colonial forces, who, about 1,200 in number, resisted more than 3,000 British regulars, only giving way when after the third assault their ammunition failed. Throughout the war Massachusetts took a prominent part, notwithstanding the emigration of a considerable number of loyalists to the eastern British provinces. She provided 67,-907 troops and $820,000 in revenue. At the close of the war, Massachusetts entered the Union, its State constitution being adopted in 1780 and the Constitution of the United States ratified January 1788. In the naval operations incident to the war with England in 1812, the seamen from Massachusetts won especial credit.

The State was closely identified with the anti-slavery movement by the growth within her borders of a strong popular sentiment in favor of abolition. William Lloyd Garrison (q.v.), Wendell Phillips and manv other prom¬ inent men were influential in this movement.

In the War of the Rebellion the State fur¬ nished 159,165 men to the Union army and navy, paying in bounties and interest on bounty loans more than $26,000,000, besides large sums in State and military aid. At the close of the war, the war debt of the State approximated $15,000,000. In the late war with Spain also, the quota from Massachusetts was promptly furnished, the men being among those first in the field. And in the great European conflict the State acted in conformity with its honorable traditions.

Population. — The yearly rate of increase in the population of the State is about 2 per cent. The industrial development of the last 40 years has stimulated the growth of factory towns and the population is now more than three-fourths urban, that is, concentrated in cities and towns having 8,000 population or more. Since there were, in 1910-, upon the average, 418.8 per¬ sons per square mile of land surface the popu¬ lation is more dense than in any other State except Rhode Island. Although many persons born in Massachusetts have emigrated to other States, 356,337 such persons having been found in other parts of the country in 1910, neverthe¬ less the loss has ‘been more than compensated by accessions from abroad, from Canada and indeed from adjacent States of the Union. By the State census of 1915, the native born in the population numbered 2,541,265, and of for¬ eign born, 1,152,045. The increase in the native born in 1915 as compared with 1905 amounted to 21.4 per cent as against 26.4 per cent increase in the foreign born.

The number of foreign born does not of itself fully indicate the effect of immigration upon the population. This is more clearly shown by the number of persons of foreign parentage, which in 1910 aggregated 2,221,497, white persons only being considered. Less than a half of the inhabitants therefore are now of wholly native parentage.

The following table (derived from the United States census of 1910, the latest date for which such a comparison is possible) shows the place of nativity of the more numerous classes among the foreign born, and also the number of persons in the population having one or both parents born in the countries named :

U. S. Census — 1910

PLACE OF BIRTH

Foreign

born

persons

Persons having one or both parents foreign bom

All countries .

1,051,050

2,221,497

Ireland .

222,862

633,022

Canada (French) …

134,659

295,282

Canada (other than French) …

160,972

308,487

England .

92,465

184,347

Sweden . .

39,560

68,468

Germany .

30,554

77,728

Italy .

85,056

130,577

Russia .

117,260

176,499

Scotland .

28,411

55,482

Portugal .

25 , 445

41,431

Of the entire population 98.8 per cent was white in 1910, the remainder being persons of

negro descent, Chinese, Japanese and Indians. The growth of population and its concentra¬ tion have led to the incorporation of numerous cities, of which there are now 37 as against 317 towns. Although the towns numerically preponderate, nevertheless more than 70 per cent of the entire population is now under city government. Dense as the population is when considered in the aggregate this density is con¬ fined to the cities and towns engaged in manu¬ facturing, or which share in the residential growth promoted by the metropolitan city of Boston, which of itself has extensive miscel¬ laneous industries. The area of the cities and towns having a population in excess of 2,500 is, approximately, 3,395 square miles, and the population within such places shows a density of about 756.14 persons per square mile. Out¬ side of these places there is in the Common¬ wealth an aggregate area of approximately 4,645 square miles of land surface, more than a half of the entire area of the State, contain¬ ing a population of but 238,248, or an average of about 51.29 persons per square mile. Every census since 1875 has shown a considerable increase in population upon the territory oc¬ cupied by towns above the 2,500 limit in 1900, and, conversely, an almost constant decline in the towns outside this area. The towns which have lost are the smaller agricultural towns of the State, and while the increase in the per¬ centage of foreign born, proportionately to the total population, has been greater in these places than in the

other cities and towns, nevertheless the population in them remains to-dav as in 1875 largely native born. The persons of foreign birth rapidly become assimilated and take their place in the social and political as well as in the industrial life of the State. The presence of this element has been due very largely to the industrial development of the Common¬ wealth, but that part of it which appears in the smaller towns is due to the taking up of agri¬ cultural land by persons of foreign birth.

Incorporated Cities. — The table (page 403) shows the cities of the State, arranged in order of size, with the population, from the censuses of 1900 and 1910, and the Federal census of 1920. Boston, the capital, is the chief city of the Com¬ monwealth and in the census of 1920 ranked seventh among the great cities of the Union. Identified with the growth of the State from its beginning its historical landmarks are of profound interest to the visitor, and the tradi¬ tions of the city, its development in modern times, its unrivaled suburbs distinguished by large numbers of tasteful and well-kept resi¬ dences, its beautiful parks, public buildings and points of literary and artistic interest, give it an important and in many respects a unique place among American cities. Other cities closely connected with the early history of the Commonwealth are Salem and Newburyport, located on the eastern coast in Essex County. Cambridge, near Boston, with which it is con¬ nected by several bridges spanning the Charles River, is the seat of Harvard University, and the former home of Longfellow and Lowell. Lowell and Lawrence upon the Merrimac, Fall River and New Bedford in Bristol County, and Holyoke in Hampden County, are all exten¬ sively engaged in textile manufacturing. Hol¬ yoke also, with Springfield, is especially inter-MASSACHUSETTS

Population

1920

1910

1900

Boston .

748 , 060

670,585

560,892

Worcester .

179,754

145,986

118,421

Pall River .

120,485

119,295

104,863

New Bedford .

121,217

96,652

62 , 442

Cambridge .

109,694

104,839

91,886

Lowell .

112,759

106,294

94,969

Springfield .

129,614

88,926

62,059

Lynn .

99,148

89,336

68,513

Lawrence .

94,270

85,892

62,559

Somerville .

93,091

77,236

61 ,643

Brockton .

66,254

56,878

40,063

Holyoke .

60,203

57,730

45,712

Haverhill .

53,884

44,115

37,175

Malden .

49 , 103

44,404

33,664

Chelsea .

43,184

32,452

34,072

Newton .

46,054

39 , 806

33,587

Quincy .

47,876

32,642

23 , 899

Fitchburg .

41,029

37,826

31,531

Pittsfield .

41,763

32,121

21,766

Everett .

40,019

33,484

24,336

Salem .

42,529

43,697

35,956

Taunton .

37,137

34,259

31,036

Medford .

39,038

23,150

18,244

Waltham .

30,915

27,834

23,481

Chicopee .

36,214

25,401

19,167

Revere .

28,823

18,219

10,395

G lo rcester .

22,947

24,398

26,121

Beverly .

22,561

18,650

13,884

North Adams .

22,282

22,019

24,200

Northampton .

21,951

19,431

18,643

Peabody .

19,552

15,721

11,523

Attleborough .

19,731

16,215

11,335

Leominster .

19,745

17,580

12,392

Melrose .

18,204

15,715

12,962

Woburn .

16,574

15,308

14,254

Newburyport .

15,618

14,949

14,478

Marlborough .

15,028

14,579

13,609

Methuen .

15,189

11,448

7,512

ested in the production of paper of all grades. New Bedford was formerly the seat of the whaling industry now almost entirely aban¬ doned. Lynn and Haverhill in Essex County and Brockton, in Plymouth, are the centres of the boot and shoe industry. Worcester, the second city in point of size, well located near the centre of the State, is an educational cen¬ tre as well, the seat of Clarke University and Holy Cross College, and is largely interested in high-class metal industries and the manufacture of machinery. Waltham, in Middlesex County, is the site of a large watchmaking establish¬ ment and has extensive textile factories. North¬ ampton, in Hampshire, is the seat of Smith College for women. Woburn, in Middlesex, has large

establishments for the production of leather. Gloucester, a seaport upon Cape Ann, is largely engaged in the fisheries. Quincy, in Norfolk County near Boston, has noted granite quarries. Fitchburg in Worcester County, Taunton in Bristol, North Adams and Pittsfield in Berkshire, Chicopee in Hampden, Beverly in Essex, and Marlborough in Middlesex, are all thriving cities with important industries; and Chelsea and Revere in Suffolk County, Everett, Somerville, Newton, Melrose, Medford and Malden in Middlesex, are rapidly growing municipalities, largely residential and closely connected with Boston within the metropolitan district.

Religion. — Originally, as elsewhere stated, Orthodox Congregationalism was the form of Church polity recognized ‘by law. To-day all the principal denominations are represented. In respect to population, the Roman Catholics lead

all others, more than 900,000 persons in the Commonwealth being of that faith. In church membership, the Orthodox Congregationalists rank next to the Roman Catholics, with ap¬ proximately 115,000 members; followed by the Baptists (of whom there are several different bodies), with about 70,000; the Methodists (o-f different bodies), with about 60,000; the Uni¬ tarians, about 35,000; the Protestant Episco¬ palians, 30,000; and many other lesser bodies, of whom few, if any, exceed the limit of 10,000 in membership. These figures must all be re¬ garded as below the actual, although relatively the bodies stand as stated. In the value of church property, although recent exact statistics are not available, and conclusions must there¬ fore ‘be based upon estimates, the rank of the several denominations is the same except that possibly the Roman Catholics change place with the Orthodox Congregationalists.

Government. — Originally based upon church membership, the conditions surrounding the suffrage have been subject to successive modifi¬ cations. Dissenters from the Established Church were released from paying taxes for church purposes in 1815, and in 1833 all denominations were given equal standing before the law. Since the adoption of the original State consti¬ tution (1780) it has been three times revised by constitutional conventions held in 1820, 1853 and 1917-19. Numerous amendments to the origi¬ nal articles have been made and new articles adopted from time to time. All male persons, 21 years of age and upward, able to read and write in . the English language, and neither paupers, imbeciles or convicts are entitled to vote. The State legislature, called the General Court, consists of the

senate, 40 members, and the house of representatives, 240 members, elected in senatorial and representative dis¬ tricts respectively. Annual sessions are held beginning on the first Wednesday of January and continuing until prorogation after the com¬ pletion of the business of the session. One of the most important articles in the recently revised Constitution provides for legislation subject to popular initiative and referendum, so that a specified number of voters by petition may initiate constitutional amendments and laws, or may require laws enacted by the General Court to be referred to the people for ratifi¬ cation or rejection.

The executive branch of the State govern¬ ment consists of a governor, lieutenant-gov¬ ernor, eight councillors who are the governor's constitutional advisers in the matter of appoint¬ ments and other minor executive duties, and who are chosen in councillor districts, a secre¬ tary of the Commonwealth, treasurer and re¬ ceiver-general, auditor of accounts and attor¬ ney-general. Beginning with the election held November 1920 these state officers and the members of the legislature, all of whom had heretofore been elected annually, are chosen biennially ; but annual sessions of the legislature are continued as in the past. The governor is by virtue of his office commander-in-chief of the military forces of the State. He has a constitutional power of veta over the aeL passed by the legislature, but, notwithstanding this, vetoed bills may be passed over the veto by a two-thirds vote of both branches. Important executive functions are

exercised by commissions of from one to three or more members, appointed by the governor, including among others the boards of agricul¬ ture; education; charity; conciliation and arbi¬ tration (dealing with labor disputes) ; the in¬ dustrial accident board; the board of labor and industry; the commissioners of insurance; banks ; waterways and public lands ; the public service commissioners; the commission on men¬ tal diseases (lunacy); the 'bureau of prisons; the department of health; and the director of the bureau of statistics (controlling the census, social and industrial statistics), *etc.* The re¬ cently revised Constitution requires that on or before 1 Jan. 1921, these commissions and boards, and all other executive and adminis¬ trative work of the Commonwealth shall be organized in not more than 20 departments in which every executive and administrative office shall be placed, except those directly con¬ trolled by the governor and council. All judges are appointed by the governor and hold offices during good behavior. The judicial system comprises police, district and municipal courts, having original jurisdiction in minor civil and criminal cases, sometimes exclusive of the Su¬ perior Court and sometimes concurrent there¬ with; a Superior Court with original jurisdic¬ tion in higher cases, and original and concur¬ rent jurisdiction with the Supreme Judicial Court; and a Supreme Judicial Court, which has general supervision over all courts of in¬ ferior jurisdiction, hears appeals, decides ques¬ tions of law, *etc.* This court has also original jurisdiction in certain cases, and original and concurrent jurisdiction with the Superior Court in others. The Superior and Supreme Judicial Courts hold regular term sittings in the several counties. The judicial system, also includes courts of probate and insolvency in each county, and there are trial justices and justices of the peace, with limited jurisdiction.-

Cities are incorporated by special legislative charter, the minimum population required be¬ ing 12,000. City governments are administered by a mayor and city council. Towns are, inde¬ pendent municipal bodies other than cities, the chief executive officers being the board of select¬ men, elected in town meeting by those entitled to vote. The town meetings also make appro¬ priations and decide, by vote, other important matters relating to the affairs of the towns.

The cities and towns are grouped into coun¬ ties, 14 in number, namely, Barnstable, Berk¬ shire, Bristol, Dukes, Essex, Franklin,

Hamp¬ den, Hampshire, Middlesex, Nantucket, Nor¬ folk, Plymouth, Suffolk and Worcester. The chief executive officers in the counties are county commissioners, elected annually.

Militia. — All able-bodied male citizens be¬ tween the ages of 18 and 45 are in emergency liable to perform military duty. The ordinary State militia force consisted in 1916 (including officers) of land forces numbering 9,649 men, and a naval force of 842 men. These were organized in five regiments of infantry (in two brigades), one squadron of cavalry, one regi¬ ment of field artillery, one corps of coast artil¬ lery, one field battalion of signal troops, one corps of cadets, one naval brigade and a depart¬ ment of sanitary troops comprising one am¬ bulance company, one field hospital company and sanitary detachments for the various regi¬ ments. During the late war, by special legis¬

lation, the land forces were much enlarged by a so-called home guard, recruited by volun¬ tary enlistment.

Wealth, Debt and Taxation. — Massachu¬ setts is one of the wealthiest States of the Union. Much of the capital of its citizens is invested in enterprises out of the State. The value of real estate as fixed by the assessors of the various cities and towns for purposes of taxation was for the year 1918, $3,884,193,442. The total personal estate returned from the same sources was $850,260,497, bringing the aggregate to $4,734,453,939, and even this is probably an underestimate.

The aggregated tax levy for State, county and municipal purposes, for the year covered by the latest report, amounts to $95,138,742. Of this $2,087,046 is a poll tax assessed under a provision of law requiring the payment of such a tax, limited to $2 per capita, by every male inhabitant of the Commonwealth above the age of 20 years, whether a citizen of the United States or an alien. The rate of local taxation in the different cities and towns, per $1,000 of valuation, real and personal, varies from $2.50 to $42; rates from $2.50 to $9.80 being assessed in 11 towns; $10 to $14.60 in 52 towns; $15 to $19.80 in 6 cities and 122 towns; $20 to $24.70 in 26 cities and 107 towns; and $25 to $42 in 6 cities and 24 towns.

Under the tax system of the State real estate is taxed to the owner wherever re¬ siding, the tax being payable in the city or town where the estate is located. Taxes on tangible personal property are payable

in the city or town where the holder resides, but a new statute in operation since 1917 taxes the in¬ come only of intangible personalty, and also income in excess of $2,000 from business, trade or profession, through the office of the State commissioner of taxation, the proceeds being distributed to the municipalities wherein the person taxed resides. Sworn returns are re¬ quired under penalty.

Corporations are subject to a tax upon their capital stock, assessed and payable through the office of the State commissioner of taxation, the proceeds being distributed to the municipal¬ ities wherein the stockholders reside, in pro¬ portion to the amount of shares held by them • respectively. Shares in such corporations are therefore exempted from local taxation. Real estate and tangible personal property in general is, on the other hand, subject entirely to local assessment, and, theoretically, at its full value. Property held solely for religious, charitable or educational purposes is exempt from taxa¬ tion.

The State's bonded debt, less the amount of sinking fund applicable to its reduction, con¬ tracted for State purposes only, namely, loans for the construction of hospitals and other pub¬ lic buildings, the abolition of railway grade crossings, unpaid remainders of war debt, etc., amounted to $32,058,102 as reported 30 Nov. 1918. The Commonwealth carries temporarily an indirect indebtedness which, less sinking fund accumulation, amounted at the same date to $53,001,804, this representing loans contracted for the benefit of certain municinalities and metropolitan districts, within which the credit of the State was pledged to aid the develop¬ ment of parks, water systems, sewerage con¬ struction and armory construction, the com-

MASSACHUSETTS

State House at Boston

munities benefited being assessed annually for the payment of interest, and finally for the payment of the principal. The net debt of the State, direct and contingent, was then $85,- 059,906, although, as will be seen, the larger part of this was contingent municipal indebted¬ ness supported by the State credit.

Banks. — The report of the Comptroller of the Currency to September 1916 reports the number of national banks in the State as 155; 12 being in Boston. The total capital of the national banks in the State was $52,143,000, with $40,361,000 surplus, $707,- 823,000 total assets and $432,333,000 deposits. The total capital of the Boston national banks was $25,300,000, the surplus $23,950,000 and the deposits $199,095,000. This is a leading (<reserye city.® Trust companies doing a banking business in the State numbered 91, with $30,- 575,000 aggregate capital and $436,031,581 in deposits.

The banks for savings are governed by a carefully guarded statute, and these institutions as well as co-operative banks (co-operative savings and loan associations) and trust com¬ panies are under the ‘supervision of the State commissioner of savings banks. The savings banks, at the close of the year covered by the latest published return (1917), numbered 196, the number of deposit accounts being 2,491,646; the amount of deposits, $1,022,342,583; the in¬ crease over the previous year being $24,647,765. The average amount to each account was $410.31, the deposits amounting on the average to about $263 to each person of the population. The savings banks throughout the State have been managed conservatively and very few losses have occurred ; but the expense of management is remarkably low, the percentage of expense to total assets being but .287. The co-operative savings banks, which are really building asso¬ ciations, receiving deposits from their members in regular monthly payments, accumulating in¬ terest thereon, and loaning the amounts re¬ ceived to members only, principally upon first mortgages on real estate, have been uniformly successful and numbered (in 1917) 184, the shareholders numbering 247,725 and the assets amounting to $126,695,037.

The Massachusetts statute governing these institutions is a model in legislation of this kind, carefully protecting the interests of the members, who, by the method of regular sav¬ ings inherent in the system, are gradually ac¬ cumulating considerable sums in cash, or ac¬ quiring home ownership.

In their relation to commerce the financial interests of the State are largely centred in Boston. The first bank in this city, one of the earliest institutions of the kind in the country, was established in 1784 and still continues. Banking operations here have generally been conducted with conservatism and prudence. Since 1898 the aggregate banking capital in¬ vested in the city has been much reduced, and weak banks eliminated or strengthened by con¬ solidation.

Education. — From the earliest years the education of the people has been a vital sub¬ ject of public concern. Harvard College at Cambridge was founded in 1636, and as early as 1647 it was provided in the colonial laws ffto the end that learning may not be buried in the graves of our forefathers® … wthat every

township after the Lord hath increased them to the number of fifty households, shall appoint one to teach all children to write and read; and when any town shall increase to the num¬ ber of one hundred families they shall set up a grammar school, the master thereof to be able to instruct youth so far as they may be fitted for the University; provided that if any town neglect the performance hereof above one year, that every such town shall pay five pounds to the next school, till they shall per¬ form the order.® The spirit of this early law still continues. It has always been the policy of the Commonwealth to preserve the principle of local control of the schools, thus promoting the direct interest of the taxpayers in the sev¬ eral municipalities. Hence while the State law provides under penalty that schools shall be maintained in every city and town, these are administered by local boards termed school committees, elected by the people and clothed with broad general authority. Women, as well as male voters, may vote for the election of these officers. The State Board of Education, appointed by the governor, has advisory powers, intended to foster and promote the highest efficiency of the public schools, but no direct control of local schools, except in certain mat¬ ters of general concern, such as the distribu¬ tion of the income of the State school fund in aid of the schools in the poorer towns. This board through its agents exercises limited su¬ pervisory authority wherever aid is thus fur¬ nished. The board also directly administers the State normal

schools established for train¬ ing teachers. Such schools exist at Framing¬ ham, Westfield, Bridgewater, Salem, Worces¬ ter, Fitchburg, North Adams, Hyannis and Lowell, besides a State Normal Art School at Boston, expressly devoted to the training of teachers in drawing and the arts of design. The buildings provided by the State for normal instruction are of the highest character, of modern construction and all fully equipped. The number of pupils in attendance approxi¬ mates 2,900.

School attendance is compulsory, between the ages of 7 and 14, or if under 16 if certain educational standards have not been reached and specified requirements concerning educa¬ tion complied with. Public schools must be maintained at least 30 weeks in each year, pro¬ viding instruction in specified subjects, except that in towns in which the taxable valuation of property is under $200,000, the time may be reduced to 28 weeks. Cities and towns con¬ taining 500 families must maintain high schools for at least 40 weeks annually, unless exempted by the State Board of Education for valid rea¬ sons, and under conditions fixed by the board. Towns not subject to this must pay for tuition of their children in the high school of some other municipality, but sums so paid are re¬ imbursed by the State to towns wherein the valuation does not exceed $1,000,000, or if the valuation exceeds this amount but if the town contains less than 500 families, 50 per cent is re¬ imbursed. If a town containing less than 500 families, nevertheless, maintains a high school of its own, the State grants to it $500 an¬ nually under certain conditions. Cities having 20,000 inhabitants must provide manual train¬ ing. Cities and towns may establish industrial schools, and any city or town may, or under

certain industrial conditions affecting illiteracy, must maintain evening schools for instruction of persons over 14 years of age, and cities of 50,000 inhabitants must maintain evening high schools. Cities and towns may provide free lecture courses of educational value, and vaca¬ tion schools are authorized, also nautical schools on shore or shipboard, and provision is made for State-aid vocational instruction, in¬ cluding agriculture, trades, crafts and manu¬ facturing industries. A system of continuation schools provides for the education of illiterate minors between the ages of 14 and 16 who are at work. Municipalities must employ superin¬ tendents of schools, and provision is made for the joint employment of such superintendents by the smaller towns grouped in superintend-entcy unions, aided by the State under certain conditions.

Children under 14 are not to be employed for wages while the public schools are in ses¬ sion, and unless certain educational require¬ ments are complied with employment under 16 is prohibited in factories, workshops or mer¬ cantile establishments. There are also strin¬ gent provisions as to the employment of minors between 16 and 21, intended to prevent illiter¬ acy. Indeed the educational requirements are so correlated with provisions as to employment and such effective means are provided for en¬ forcement of the laws that the intellectual, moral and physical status of minors of either sex is carefully guarded. In every respect the legislation of Massachusetts of this character is upon a high plane.

There is a provision for the certification of the qualifications of high school teachers by the board of education, and a State-wide retire¬ ment system for teachers in the public schools, with annuities and pensions.

A department of university extension, under direction of the State Board of Education, organizes and maintains a comprehensive sys¬ tem of extension teaching designed to supple¬ ment, or to fill gaps in, other established edu¬ cational agencies, by means of vocational and cultural classes conducted by part-time teachers or by correspondence courses. Many such courses are offered for classes when they do not duplicate educational opportunities given at nominal fees by other institutions. There are no fees for instruction in such classes. Twenty students must enroll in order to form a class.

The number of children attending the pub¬ lic schools during the year ending 30 June 1918, covered by the latest published returns, was 604,023 ; the average membership, 547,288, and the average attendance, 506,474, or 93 per cent of the average membership. At the same time there were 464,621 children in the State between the ages of 7 and 14. The law requir¬ ing school attendance is well enforced.

The total annual expenditure for public school support and outlay for the same year was $30,600,088, of which $3,929,213 was for new buildings, alterations and permanent re¬ pairs. Of the whole amount required for an¬ nual support about 97 per cent was derived from local taxation. The average cost to the towns in taxation was $48.73 for the school support of each child in the average member¬ ship, (not including outlay for new buildings) requiring an expenditure of $5.45 for each

$1,000 of the State's valuation, or about 27 per cent of the average tax for all purposes.

The effective ventilation of school buildings is required under definite provisions of law en¬ forced by the State inspector of factories and public buildings, and in the larger towns and cities these buildings are generally of the high¬ est types of such edifices in this and in all other respects, large numbers having been erected within recent years.

The higher educational institutions within the State include the following: Harvard Col¬ lege (q.v.) at Cambridge, founded 1636; Wil¬ liams College (q.v.) at Williamstown, 1793; Amherst College (q.v.) at Amherst, 1825; Mount Holyoke College (q.v.), for women, at South Hadley, 1837 ; College of the Holy Cross at Worcester, 1843; Tufts College (q.v.) at Medford, 1850; Massachusetts Institute of Technology at Boston, 1861 ; Boston College at Boston, 1863 ; Massachusetts Agricultural Col¬ lege at Amherst, 1863; Worcester Polytechnic Institute at Worcester, 1865 ; Boston Univer¬ sity at Boston, 1869; Wellesley College (q.v.), for women, at Wellesley, 1870 ; Smith College (q.v.), for women, at Northampton, 1871; Clark University and Clark College at Wor¬ cester, 1887-1902; Simmons College at Bos¬ ton, 1899; Massachusett College of Pharmacy at Boston, founded 1823, incorporated 1852 ; Middlesex College of Medicine and Surgery at Cambridge, founded 1846, incorporated 1850; Massachusetts College of Osteopathy at Cam¬ bridge, established 1897, incorporated 1898; Wheaton College at Norton, founded 1834, in¬ corporated

1912, and Northeastern College at Boston, 1916. Radcliffe College at Cambridge and Jackson College at Medford having certain affiliations with Harvard and Tufts, respec¬ tively, but no legal connection with them, are devoted to the collegiate education of women, and there are also many seminaries and pri¬ vate schools of various grades in the State.

Libraries. — Free public libraries form an important element in the educational equipment of the State. These institutions, free to all the citizens in the various cities and towns, are practically universal, only a fractional percent¬ age of the population being without such privi¬ leges. The establishment of such libraries has in recent years been fostered by grants of money from the State treasury, and by the creation of a Free Public Library commission, appointed by the governor, established to pro¬ mote public library usefulness and to aid in founding such institutions where not then exist¬ ing. This commission makes annual reports to the legislature upon matters within its jurisdic¬ tion. There are also numerous circulating and association libraries, not free to the public. The latest returns from the public libraries within the State show more than 400 such libraries, containing about 6,700,000 bound volumes and having a circulation for home use of more than 14,033,000 volumes. The annual appropriation from taxes for such libraries by the various cities and towns totaled about $1,355,600. The Boston Public Library, housed in a building which is one of the most noteworthy archi¬ tectural monuments in the United States, is (except New York) the largest free public circulating library in the country, and contains about 1,175,000 volumes; the Harvard Univer¬ sity Library has more than 1,230,000; the Bos-MASSACHUSETTS

ton Athenaeum, 265,000; and the public libraries at Springfield and Worcester; the State Li¬ brary in the State House at Boston, and that of the American Antiquarian Society at Wor¬ cester, each exceed 200,000 volumes. (See Libraries).

Charitable and Penal Institutions. — The

State institutions dealing with the defective classes include hospitals for the insane at Wor¬ cester, Taunton, Northampton, Danvers,

Westborough, Medfield, Monson, Boston, Foxbor-ough and Grafton ; a State colony at Gardner, the Massachusetts School for Feeble-Minded at Waltham and the State school at Wrentham. These institutions are under the general super¬ vision of the State Board of Insanity and di¬ rectly controlled in each case by a board of seven trustees, of whom five must be men and two women, one to be appointed annually by the governor and council, the place of the senior member being vacated each year.

General remedial institutions include a State hospital at Pondville for inebriates and victims of drug habits, seven trustees ; the hos¬ pital cottages for children at Baldwinsville, with five trustees ; the Massachusetts Charitable Eye and Ear Infirmary at Boston, two trustees on behalf of the State; the Massachusetts Gen¬ eral Hospital, four trustees on behalf of the State; the Massachusetts Homoeopathic Hospital at Boston, five trustees on behalf of the State ; the Peter Bent Brigham Hospital at Boston, two trustees on behalf of the State. There are several sanitariums for consumptives under a State board of seven trustees. All the State trustees are appointed for fixed terms by the governor. The Perkins Institution and Massa¬ chusetts School for the Blind at Watertown has four trustees on behalf of the State, sim¬ ilarly appointed; and the Soldiers' Home at Chelsea, three. There are special educational institutions for the deaf in which the State is interested and to which educable children of this class may be sent, in accordance with the policy of the Commonwealth which makes schooling free for all its children even when physical defects of this nature forbid their at¬ tendance upon the public day school. These comprise the American School for the Deaf at Hartford, Conn. ; the Clarke School for the Deaf, Northampton; the Horace Mann School for the Deaf, Boston; the Sarah Fuller Home for Little Deaf Children, Medford; the New England Industrial School for Deaf Mutes, Beverly, and the Boston School for the Deaf. The Massachusetts Hospital School at Canton provides for the care and education of crippled and deformed children. The penal and reforma¬ tory institutions include the Lyman School for Boys at Westborough ; the State Industrial School for Girls at Lancaster, and an Industrial School for Boys at Shirley, all controlled by the trustees of training schools, appointed by the governor; the State Prison at Boston (Charlestown district) ; the Massachusetts Re¬ formatory at Concord; the Reformatory Prison for Women at Sherborn, and a prison camp and hospital at Rutland, all under the general supervision of the State director of prisons.

The State institutions for paupers include the State Infirmary at Tewksbury and the State Farm at Bridgewater.

The local poor, having settlements under the law in the cities and towns, are cared for

in local almshouses maintained by the munici¬ palities. There are jails, houses of correction and truant schools in the counties. The chari¬ table institutions established and maintained by religious bodies or other private agencies are widely distributed ; and, especially, hospitals for the treatment of accidents and disease, and homes for the aged have, in recent years, been numerously established throughout the Com¬ monwealth.

By the latest returns covering the year end¬ ing April 1918, the total number of persons receiving public charity relief, of all grades (i.e., supported or relieved in institutions, in families or in their own homes, but not includ¬ ing vagrants and wayfarers), was 83,562. The paupers in State institutions numbered 10,626, and the city and town poor in local almshouses, 7,451. The total net cost of pauper relief for the year was $5,168,294, or about $1.34 to each inhabitant of the State. For the year ending 1 Feb. 1919 the whole number of insane per¬ sons in the State in care of the State Commis¬ sion on Mental Diseases was 15,231, besides 3,953 other mental defectives, chiefly feeble¬ minded. (See Pauperism).

The total prison population 1 March 1919 aggregated 4,031 ; of whom about one-half were confined in county jails and houses of correction and the rest in the State prisons.

Vital Statistics. — Upon the estimated popu¬ lation of the State, the birth rate per 1 ,000 of persons living, for the year 1916 the latest for which complete figures are available, was 24.8; the marriage rate 18.2, and the death rate 14.9, the excess of births over deaths per 1,000 of persons living being 9.9. The death rate is slightly higher in the cities than in the towns. The total number of deaths for the year was 56,366, the number under each of the principal classified causes being as follows : From general diseases, 14,111; diseases of the nervous system and organs of special sense, 5,774 ; of the respiratory system, 7,859, and of the digestive system, 5,071.

Manufactures. — The State is largely de¬ voted to manufacturing, the energies of its people having been early turned in this direc¬ tion, and developed by more than a century of industrial training. No special advantages ex¬ ist based upon the possession of raw material, or due to natural resources, except water power, which, although changes in

the methods of developing power render this less essential than formerly, is still an important factor. The climate of the southeastern part of the State is especially favorable to cotton spinning. In colonial days much was done to foster manu¬ factures, invention has been promoted and im¬ proved craftsmanship stimulated, and the effect has been significant throughout the industrial history of the State. _ The power loom, first constructed by Francis C. Lowell of Boston and Paul Moody of Amesbury, and put in operation at Waltham in 1814, revolutionized the cotton industry in the United States. The first cotton mill in the country was built at Beverly in 1788. As early as 1815 there were 57 cotton mills in the State with 46,650 spindles. The first attempt at woolen goods manufacture was at Rowley, in Essex County, in 1643, fol¬ lowed by more or less successful efforts in the same direction elsewhere in the State in the 1 7th and 18th centuries. The industrial his-408

tory of Lowell, Lawrence and Fall River is, in effect, the history of the growth of the fac¬ tory system as applied to textiles in America. The boot and shoe industry, developing from crude hand process of early times to the per¬ fected factory operations of to-day, is inter¬ woven with the story of the growth of Lynn, Haverhill, Brockton and many smaller mu¬ nicipalities. The first printing done in the American colonies was at Cambridge in 1639 ; and from this small beginning onward the printing and publishing business has been im¬ portant in the State. Much of the history of paper-making in the United States is the his¬ tory of the industry of Massachusetts. The manufacture of india rubber goods in this country originated at Roxbury, now part of Boston, in 1833. Manufactures of metal, ma¬ chinery of all kinds, wooden goods, jewelry, clothing, cordage, rattan and other furniture have always been important.

The following table shows the returns, ac¬ cording to the census of 1915, covering the re¬ turns of the previous year, of all industries in the aggregate and of the principal industries in detail :

fourths of the total produced in the United States. The paper used by the national gov¬ ernment for currency and bonds is produced within the borders of Pittsfield, but near the Dalton line, in a mill especially devoted to its manufacture. In the production of rubber boots and shoes the State ranks first, and in the manufacture of jewelry is preceded only by Rhode Island and New York. The labor em¬ ployed in the factories of the State is highly skilled, its operations well organized and its productive capacity correspondingly high. La¬ bor difficulties have not been numerous nor protracted. The factory legislation, as a whole, is in advance of other States, and is well en¬ forced, being supported by an effective public opinion. The laws against the employment of children (referred to under Education) are especially stringent, and such employment is reduced to small proportions. There is pro¬ vision for efficient factory inspection under the State Board of Labor and Industries, with a corps of inspectors covering all parts of the Commonwealth.

Agriculture.— The agriculture of the State, as compared with that of the great farming

INDUSTRIES

All industries . .

Boots and shoes, including cut stock and findings

Boots and shoes (rubber) .

Carriages and wagons .

Clothing . _. .

Confectionery (and ice cream) .

Cordage and twine (and jute goods) .

Electrical apparatus and supplies .

Foundry and machine shop products .

Furniture …

Iron and steel .

Jewelry .

Leather .

Liquors, malt .

Lumber, including planing mill products .

Paper and pulp .

Printing and publishing . .

Rubber goods, not otherwise specified .

Slaughtering and meat packing .

Textiles* .

Number of estab¬ lish¬ ments

Capital

Wage

Average

number

earners

Total wages

Value of product

12,013

$1,548,960,733

606 , 698

$341,309,517

$1,641,373,047

884

116,037,821

85,114

51 ,006,829

255,188,013

9

23,027,061

8,087

4,468,411

23,788,788

149

2,866,562

1,245

709,379

2,627,575

418

12,141,437

11,840

16,697,908

30,206,346

276

11,640,834

7,262

3,041,509

22,934,744

13

18,780,156

6,073

2,455.637

20,229,992

91

45,067,320

17,125

10,651 , 133

43 , 869 , 294

724

99,707,910

34,398

23,497,652

70,974,440

134

18,970,795

6,813

3,960,588

13,826,765

57

20,095,865

6,097

3,888,253

18,565,912

202

14,521,053

6,505

3,888,999

14,175,857

126

47,418,119

10,164

5,918,205

45,265,434

26

22,373,787

2,106

1 ,992,322

15,608,044

475

12,433,568

5,048

3,367,568

15,029,841

86

47,979,966

13,401

7,548,620

43,352,545

1,206

37,264,950

13,214

10,278,542

47,574,600

42

17,345,185

4,743

2,845, 043

23,011,349

46

18,470,685

3,233

1,893, 645

51,724,520

537

487,043,677

201,939

94,225,03 3

394,525,236

* Embracing the following with product as specified: Cotton goods, $195,481,626; woolen and worsted goods $127-351,434; wool scouring, $1,406,674; hosiery and knit goods, $17,357,319; silk and silk goods, $10,676,681; wool shoddy $1,903,016; dyeing and finishing textiles, $22,455,086; hats, fur, felt, $864,722; carpets, other than rag $10 981 344-linen goods, $3,050,254; felt goods, $2,997,080.

In textiles, the most important industrial group shown in this table, the cotton industry leads with a product value of $195,481,626. The spindles employed in this industry numbered, in 1900, 7,784,687, increasing 1,960,169, or 33.7 per cent since 1890, being 40.6 per cent of the total increase in the country. In 1910 Massachusetts had 9,375,004 cotton spindles, and its spindles and looms in the industry approximated one-half of those in the country, and the State is first in rank among the States in the manu¬ facture of cotton goods. The State led all others in the manufacture of woolen and worsted goods, the annual product in 1915 reaching $127,351,434. It also holds first place in the boot and shoe industry, the figures be¬ ing shown in the table. It has long been first in the manufacture of fine writing papers, the value of this product approximating three-States of the West, is not important. The in¬ dustry has always been secondary to manufac¬ turing. Following the lines of least resistance, it has turned chiefly to the production of milk, eggs, poultry and such vegetables as find a ready market in the growing factory towns and cities almost at the farmer's door. Considered from this standpoint and measured by the value of the product annually sold, no decline is shown in recent as compared with earlier years. For example, the total value of product for the year covered by the United States census of 1910 was $42,298,274 as against $28,072,900 re¬ turned 10 years previously.

The returns in the State census are more favorable than those secured in the national enumeration, since taken in the autumn and possibly with greater care; but inasmuch as comparisons with other States can only be made by using the national figures,

they will be relied on heie The total number of farms (1910) was 36,917; and the total acre¬ age, 2,875,941, of which 1,164,501 was improved. The farm property was valued as follows : Land and improvements, except buildings, $105,- 532,216; buildings, $88,636,149; implements and machinery, $11,563,894; livestock, $20,741,366. The animals upon the farms in the State, 15 April 1910, included 252,416 neat cattle; 64,283 horses; 10,009 lambs (under one year) ; 32,708 sheep (one year and over) ; 103,018 swine, and poultry valued at $1,492,961. The total value of domestic animals on farms was $19,208,712. The persons, 10 years of age and over, engaged in agriculture, forestry and animal husbandry numbered 74,666, and the agricultural laborers (working out) 4,515. The farms operated by owners, part owners or managers constituted 91.9 per cent of the whole number, only 8.1 per cent being carried on by tenant farmers. The State ranked twelfth among the States with respect to the number of farms which derive their principal income from dairy produce, and the total dairy product for the year amounted to $1 5, 187,774, the amount sold-being $14,840,927, the remainder being consumed on the farms. The value of milk sold was $13,297,634; cream, $475,824; butter and butter fat, $1 ,063,859 ; and of cheese, $3,610. The total value of poultry raised and sold during the year was $1,287,829; and the egg product aggregated 13,305,540 dozen. About 55,000 acres were devoted to cereals, the product in 1910 being valued at but $1,617,131, only a small per cent of the total crop value. Of the principal cereals the acreage and bushels produced in 1910 are corn, 41,755 acres, 2,029,381 bushels; oats, 7,927 acres, 268,500 bushels; rye, 3,474 acres, 59,183 bushels; barley, 349 acres, 9,021 bushels; buckwheat, 1,630 acres, 32,926 bushels; wheat, 109 acres, 2,404 bushels. The acreage devoted to hay and forage crops, exclusive of cornstalks, was 519,- 503, and the value of the crop, $11,280,989. Cer¬ tain sections of the State are devoted to special products of considerable importance. Among these are tobacco raised in the Connecticut Valley, cranberries in Barnstable County and general market produce in parts of Middlesex County near Boston.

The Fisheries. — The fishing industry has, from the earliest years,

been an important ele¬ ment in the prosperity of the coast towns and the hardy seamen of Gloucester and Marble¬ head, engaged in this industry in timps of peace, have won renown in the naval operations of the country in times of war. The latest complete returns relating to the fisheries of the State show 8,780 vessels engaged valued at $3,680,163, with apparatus valued at $891,213, and the fol¬ lowing annual product: Food fish, $7,580,789; mollusks, $1,509,200; crustaceans, $447,167; ag¬ gregating $9,537,156. The total number of per¬ sons engaged in the fisheries was 11,814. Of the value of the vessels, 39.51 per cent; of ap¬ paratus, 27.21 per cent; and of food fish prod¬ uct, 44.69 per cent are credited to the city of Gloucester; New Bedford having 8.42 per cent of the value of vessels, 7.06 per cent of the value of apparatus and 2.35 per cent of the food fish product, besides $217,987 product of the whale fishery. Provincetown had 5.41 per cent of the value of vessels, 13.07 per cent of ap¬ paratus and 8.96 per cent of food fish, besides $4,500 product of the whale fishery. Boston

had 24.11 per cent of the value of vessels, 13.67 per cent of apparatus and 33.88 per cent of the food fish product.

Commerce. — By the statistics of 1916, fairly reflecting normal conditions preceding the late war, the total imports of the Massa¬ chusetts Customs District amounted to $210,- 900,943, or 9.60 per cent of all imports to the country. The exports amounted to $131,221,- 946, or 3.03 per cent of all exports. There were entered during the year 146 sailing and 240 steam vessels (American), having 439,484 total tonnage ; and 269 sailing and 839 steam vessels (foreign), having 1,981,163 total ton¬ nage. The vessels cleared numbered 129 sail¬ ing, 175 steam (American), total tonnage 322,- 085; and 272 sailing, 561 steam (foreign), total tonnage, 1,267,436.

Boston, of course, is the chief port of entry, and in the aggregate value of investments and earnings derived from ocean commerce exceeds all others. The city is extensively engaged in European commerce, much of which is con¬ ducted under foreign flags. Lines of passenger and freight steamers regularly ply between Bos¬ ton and European ports, and the coastwise passenger and freight traffic to the east and south is important.

Railroads. — Transportation facilities have kept pace with the industrial development of the State. Boston, the metropolis, is connected with the West by two railway systems, and these

communicate either directly or hy branches with all the leading industrial centres. One general system, with its various divisions, communicates , with the South by way of New York, uniting important manufacturing cities and towns, while a network of main and branch lines connects the northern and eastern factory centres of the State with each other, with the seaboard and with the railway systems leading south and west. There are in the State 2,141 miles of main and branch railroad line, besides 1,072 miles of sec¬ ond, third and fourth main track, and 1,755 miles of side track, making the total length of railroad track within the State 4,968.

Various companies as originally chartered are now operated (under leases) in three gen¬ eral systems, the Boston and Albany, Boston and Maine and the New York, New Haven and Hartford. The Boston and Maine system, after receivership, has recently undergone re¬ organization. The gross assets of the com¬ panies, 31 Dec. 1916, aggregated $863,525,164, and the gross liabilities $833,908,990. The total gross revenue from operation for the year was $163,463,010; and the total expense of operation, $110,802,255; yielding $52,660,755 net. Electrical street railways have multiplied until they now connect all of the principal cities and towns. In the city of Boston subway and elevated railway construction of the highest class, completed and in process, has already transformed tl-3 methods of street transit, and will finally solve the problem of rapid communication between dif¬ ferent parts of the city and its suburbs. The Massachusetts street railway companies now own, according to the returns, year ending 31 Dec. 1916, 2,357 miles of main track, 529 miles of second main track and 196 miles of side track, these aggregating 3,082 miles. The gross assets of these companies aggregate $229,308,549. The total operating revenue for the year amounted to $43,150,201, and the total expense

of operation to $30,753,333. In recent years the prosperity of both steam and street railroads has been curtailed by causes which it is hoped are temporary. The street railways have espe¬ cially felt the increase in operating expenses due to advancing wages and cost of supplies, without proportionate increase in revenue, since to a large extend they have been confined to fixed rates of fare. And the principal systems are now (1919) operating under remedial legis¬ lation, involving the principal of service at cost, with State control and, to a certain extent, guaranteed returns upon invested capital.

Governors of Massachusetts.

GOVERNORS OF PLYMOUTH COLONY

Chosen annually by the People

1620 Nov. 11, John Carver.

1621 April — , William Bradford.

1633 Jan. 1, Edward Winslow.

1634 Mar. 27, Thomas Prence.

1635 Mar. 3, William Bradford.

1636 Mar. 1, Edward Winslow.

1637 Mar. 7, William Bradford.

1638 June 5, Thomas Prence.

1639 June 3, William Bradford.

1644 June 5, Edward Winslow.

1645 June 4, William Bradford.

1657 June 3, Thomas Prence.

1673 June 3, Josiah Winslow.

1680 Dec. 18, Thomas Hinckley. * §

GOVERNORS OF MASSACHUSETTS BAY COLONY Chosen annually under the First Charter

1629 Mar. 4, Matthew Cradock. t 1629 April 30, John Endicott. t 1629 Oct. 20, John Winthrop.j

1634 May 14, Thomas Dudley.

1635 May 6, John Haynes.

1636 May 25, Henry Vane.

1637 May 17, John Winthrop.

1640 May 13, Thomas Dudley.

1641 June 2, Richard Bellingham.

1642 May 18, John Winthrop.

1644 May 29, John Endicott.

1645 May 14, Thomas Dudley.

1646 May 6, John Winthrop.

1649 May 2, John Endicott.

1650 May 22, Thomas Dudley.

1651 May 7, John Endicott.

1654 May 3, Richard Bellingham.

1655 May 23, John Endicott.

1665 May 3, Richard Bellingham.

1672 Dec. 12, John Leverett (acting).

1673 May 7, John Leverett.

1679 May 28, Simon Bradstreet (to May 20, 1686).

The Inter-Charter Period.

May 25, 1686, Joseph Dudley became presi¬ dent of New England under royal commission, holding the office until 20 December, the same year, when Sir Edmund Andros became gov¬ ernor of New England, appointed by King James II. On 18 April 1689, Governor Andros was deposed by a revolution of the people. After the dissolution of the first charter, Simon

Bradstreet was governor from 7 June 1689 to 16 May 1692.

GOVERNORS OF THE PROVINCE OF MASSACHUSETTS BAY

Appointed by the King under the Second Charter

1692 May 16, Sir William Phips.

1694 Dec. 4, William Stoughton (acting).

1699 May 26, Richard Coote (Earl of Bellomont).

1700 July 17, William Stoughton (acting).

1701 July 7, The Council.

1702 June 11, Joseph Dudley.

1715 Feb. 4, The Council.

1715 Mar. 21, Joseph Dudley.

1715 Nov. 9, William Tailer (acting J).

1716 Oct. 5, Samuel Shute.

1723 Jan. 1, William Dummer (acting).

1728 July 19, William Burnett.

1729 Sept. 7, William Dummer (acting).

1730 June 11, William Tailer (acting).

1730 Aug. 10, Jonathan Belcher.

1741 Aug. 14, William Shirley.

1749 Sept. 11, Spencer Phips (acting).

1753 Aug. 7, William Shirley.

1756 Sept. 25, Spencer Phips (acting).

1757 April 4, The Council.

1757 Aug. 3, Thomas Pownal.

1760 June 3, Thomas Hutchinson (acting).

1760 Aug. 2, Francis Bernard.

1769 Aug. 2, Thomas Hutchinson (acting).

1771 Mar. 14, Thomas Hutchinson.

1774 May 17, Thomas Gage.

UNTIL THE CONSTITUTION

1774 Oct., A Provincial Congress.

1775 July, The Council

Governors elected annually

1780-85, John Hancock.

1785-87, James Bowdoin.

1787 (to Oct. 8, 1793), John Hancock. §

1793 (from Oct. 8), Samuel Adams (acting)*!!.

1794-97, Samuel Adams.

1797 (to June 7, 1799), Increase Sumnerˆf (Federalist).

1799 (from June 7 to May 20, 1800), Moses Gill (acting), If (Federalist)

1800-07, Caleb Strong (Federalist).

1807 (to Dec. 10, 1808), James Sullivan, § (Dem.-Rep.).

1808 (from Dec. 10), Levi Lincoln (acting), If (Dem.-Rep.).

1809-10, Christopher Gore (Federalist).

1810-12, Elbridge Gerry (Democratic-Republican).

1812-16, Caleb Strong (Federalist).

1816-23, John Brooks (Federalist).

1823 (to Feb. 6, 1825), William Eustis,§ (Dem. -Repub.). 1825 (from Feb. 6), Marcus Morton (acting)lf (Dem. -Repub.). 1825-34, Levi Lincoln (Democrat-Federalist).

1834 (to Mar. 1, 1835), John Davis, [[(Whig).

1835 (from Mar. 1), Samuel T. Armstrong (acting) ,Tf (Whig)
1836-40, Edward Everett (Whig).

1840-41, Marcus Morton (Democrat).

1841-43, John Davis (Whig).

1843-44, Marcus Morton (Democrat).

1844-51, George N. Briggs (Whig).

1851-53, George S. Boutwell (Democrat and Free-Soil).

1853-54, John H. Clifford (Whig).

1854-55, Emory Washburn (Whig).

1855-58, Henry J. Gardner (American).

1858-61, Nathaniel P. Banks (Republican).

1861-66, John A. Andrew (Republican).

1866-69, Alex: H. Bullock (Republican).

1869-72, William Claflin (Republican).

1872 (to May 1, 1874), Wm. B. Washburn, || (Republican). 1874 (from May 1), Thomas Talbot (acting), If (Republican). 1875-76, William Gaston (Democrat).

* Mr. Hinckley was governor till the union of the colonies in 1692, except during the administration of Sir Edmund Andros.

t A royal patent (3 Nov. 1620) created the Council for New England with definitions of territory. 19 March 1628, the council granted to Sir Henry Rosewell and others the territory afterward confirmed by royal charter to the " Governor and Company of the Mattachusetts Bay in Newe England." This charter which passed the seals 4 March 1629, designated Matthew Cradock as the first governor of the company. On 13 May 1629, Cradock was rechosen by the company, but never came to New England. 20 Oct. 1629, John Winthrop was chosen governor by the company. John Endicott had been sent over as their agent by the grantees under the instrument of 19 March 1628. While Cradock was the nominal governor a commission was sent out, dated 30 April 1629, to Endicott at Salem appointing him " Governor of London's Plantation in the Mattachusetts Bay in Newe England." In the exercise of his duties he was subordinate to the governor in London. Cradock and Endicott were thus chief governor and local governor, respectively, until 20 Oct. 1629, the date of the commission of Winthrop (who had not then arrived); and Winthrop and Endicott were chief and local gov¬ ernors, respectively, until the arrival of Winthrop at Salem, with charter, 12, June 1630; when Endicott 's powers were merged in the general authority of Winthrop.

t On 9 Nov. 1715, Elizeus Burgess was proclaimed governor, he having been commissioned 17 March 1715, but he never carae over to perform his duties, and resigned in April 1716.

§ Died in office.

1 Lieutenant-governor, acting governor during a vacancy. One of these, Moses Gill, died while so acting, 20 May 1800, and the Commonwealth, for the only time under the constitution, was without a governor or lieutenant-governor .j The council, Hon. Thomas Dawes, president, officiated until the 30th of the month, when Caleb Strong was inaugurated! governor.

|| Resigned upon election to the Senate of the United States.

1876-79, Alex. H. Rice (Republican).

1879-80, Thomas Talbot (Republican).

1880-83, John D. Long (Republican).

1883-84, Benjamin F. Butler (Democrat and Independent).

1884-87, George D. Robinson (Republican).

1887—90, Oliver Ames (Republican).

1890-91, John Q. A. Brackett (Republican).

1891-94, William E. Russell (Democrat).

1894 (to Mar. 5, 1896), Frederic T. Greenhalge* (Republican). 1896 (from Mar. 5), Roger Wolcott (acting), t (Republican). 1897-1900, Roger Wolcott (Republican).

1900-03, W. Murray Crane (Republican).

1903-05, John L. Bates (Republican).

1905-06, William L. Douglas (Democrat).

1906-09, Curtis Guild, Jr. (Republican).

1909-11, Eben S. Draper (Republican).

1911-14, Eugene N. Foss (Progressive-Democrat).

1914—16, David I. Walsh (Democrat).

1916-18, Samuel W. McCall (Republican).

1919-20, Calvin Coolidpe (Republican).

1920-Channing H. Cox (Republican).

Bibliography. — Historical : Hutchinson, ‘His¬ tory of Massachusetts* (1764-67) ; Savage, ‘Winthrop’s History of New England) (1825— 26) ; Young, ‘ Chronicles of the Pilgrim Fathers) (1841), and ‘Chronicles of Massachusetts,* (1846) ; Schouler, ‘Massachusetts in the Civil War* (1868-71); Drake, ‘The French and In¬ dian War* (1870) ; Adams, ‘The Emancipa¬ tion of Massachusetts* (1887); Goodwin, ‘The Pilgrim Republic* (1888) ; Ellis, ‘The Puritan Age and Rule in the Colony of the Massachu¬ setts Bay* (1888) ; Fiske, ‘The Beginnings of New England* (1889) ; Adams, ‘Three Epi¬ sodes of Massachusetts History* (1892), and ‘Massachusetts : Its Historians and Its History* (1893) ; Byington, ‘The Puritan in England and New England* (1896) ; Howe, ‘The Puritan Republic (1899). There are numerous local, town and county histories, among them, Hol¬ land, ‘The History of Western Massachusetts* (1855), and Winsor, ed., ‘The Memorial His¬ tory of Boston* (1880). Among popular com¬ pendium’s consult Powell, ‘Historic Towns of New England* (1901), and Bacon, ‘HEtoric Pilgrimages in New England* (1898). The pub¬ lished collections of the Massachusetts Histori¬ cal Society contain invaluable material not otherwise readily accessible, relating to the early history of the Commonwealth. Scientific: Hitch¬ cock, ‘Report on the Geology, Mineralogy, Botany and Zoology of Massachusetts* (1833) ; ‘Final Report on the Geology of Massachusetts* (1841) ; ‘Ichnology of New England* (1858) ; and supplement to the same (1865). The fol¬ lowing are official reports: ‘Fishes, Reptiles and Birds of Massachusetts* (1839); ‘Herba¬ ceous Flowering Plants of Massachusetts* (1840) ; ‘Invertebrata of Massachusetts* (1841), and Emerson, ‘Trees and Shrubs of Massachusetts* (1875). Public Documents: The census reports of the United States; reports of the decennial State census; annual State re¬ ports on the statistics of manufactures and on the statistics of labor bulletins, etc., issued by the State Bureau of Statistics; annual State reports of the board of

education on railroads, savings banks, lunacy, charity, prisons, agricul¬ ture, *etc.* ; reports of the treasurer and receiver-general, the auditor and reports upon vital statistics, and upon polls, property and taxes, issued by the secretary of the Commonwealth.

Horace G. Wadlin,

Librarian Emeritus, Boston Public Library.

MASSACHUSETTS AGRICULTURAL COLLEGE, at Amherst, Mass., a coeducational institution, chartered in 1863 and opened in 1867 by the State. The college farm is 660 acres in extent, about 175 acres of which are devoted to the campus, 75 to the experiment station, 100 to horticulture and 250 to farming. The work is experimental on the part of the students. The regular course extends over four years, but special courses are given for women desiring to study dairying, market gardening and some other subjects. Winter courses are provided for those unable to take the four years' work. The regular courses lead to the degrees B.S., M.S., M.Agr. and Ph.D. In 1918 the number of instructors was 60 and the students in attendance about 570. The li¬ brary had about 45,000 volumes; the buildings and grounds were valued at $850,000 and the equipment at $450,000.

MASSACHUSETTS BALLOT. See

Ballot.

MASSACHUSETTS BAY, an arm of the

Atlantic indenting the eastern shore of Massa¬ chusetts and extending from Plymouth Harbor on the south to Cape Ann on the north, a dis¬ tance of 42 miles. It is triangular in shape, the north and south shores inclining toward each other until at the entrance to Boston Harbor they are about five miles apart. The depth from the base of the triangle to Boston Harbor is about 21 miles. The northern shore is rocky and irregular, the southern low and sandy. The principal inlets are : on the north coast, Gloucester and Nahant bays and Salem, Marblehead and Lynn harbors, and on the west Boston Harbor. Along the shores are a num¬ ber of capes and headlands, and off the coast a number of small islands. At the entrance to Boston Harbor there are several islands, on some of which are fortifications. Cape Cod . Bay on the southeast is sometimes included in Massachusetts Bay.

MASSACHUSETTS BAY COLONY.

See Massachusetts, History.

MASSACHUSETTS HISTORICAL SO¬ CIETY. An association founded at Boston in 1791 and incorporated three years later, for the purpose of collecting and preserving early Americana and documents relative to the early history of the Massachusetts Bay Colony. Since 1792, 70 volumes of 'Collections* and 50 volumes of 'Proceedings* have been printed. It supports a museum of relics and a library containing 60,000 volumes and over 120 bro¬ chures, *etc.* Its prize collections are the Winthrop manuscripts on the early settlement of New England and the Parkman manuscripts dealing with French Canada.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, The, was founded in 1865, at the close of the Civil War, when the need was beginning to be felt for schools which should train men to deal with the new indus¬ trial problems. It was the plan of President Rogers, and of his coworkers, to establish a school which should give a thoroughly practical training in the application of scientific princi-

* Died in office.

t Lieutenant-governor, acting governor during a vacancy. One of these, Moses Gill, died while so acting, 20 May 1800, and the Commonwealth, for the only time under the constitution, was without a governor or lieutenant-governor. The council, Hon. Thomas Dawes, president, officiated until the 30th of the month, when Caleb Strong was inaugurated governor.

pies to practice in the arts, but not primarily training in mere technics, in the narrow sense. Accordingly they planned that each of its courses should embrace enough general studies to impart the elements, at least, of a liberal education ; and, above all, they laid down that the most truly practical training, even in an industrial sense, must be grounded in a thor¬ ough knowledge of scientific laws.

Founded on these principles, the Institute of Technology began a career of steady develop¬ ment. To-day it is the largest school of its class in the United States, the widest in scope of instruction and in many respects the best equipped. The total number of its students in 1916 was 1,900, the total number of instructors 300. The number of volumes in the library was 100,000. Though 60 per cent of the stu¬ dents come from Massachusetts, among the remainder are found residents of 46 States of the Union, and of 28 foreign countries. In all 48 classes have graduated, aggregating over 6,000 persons. Except in seasons of financial depression, the demand for these graduates is always in excess of the supply.

The undergraduate studies of the school are divided into 15 distinct courses, each of four years' duration, and leading to the degree of bachelor of science. These courses are as fol¬ lows : Civil engineering, mechanical engineer¬ ing, mining engineering and metallurgy, elec¬ trical engineering, chemical engineering, sani¬ tary engineering, naval architecture and marine engineering, engineering administration, chem¬ istry, electrochemistry, biology and public health, physics, geology, general science and architecture. Between the departments which maintain these several courses there is the closest connection and mutual support. Conse¬ quently the instruction is specialized to a de¬ gree which would be impossible in a smaller college, with a less numerous staff of instruct¬ ors. Again, the instructors, though connected in a special sense with one department, are giving instruction, it may be, to students from many others. . This mutual helpfulness of the departments is seen first in the fundamental subjects, such as chemistry in the first year and physics in the second, which are given to sev¬ eral courses or to all. It is seen again in the large number of optional lines of work offered. Within most of the regular courses the student is allowed considerable latitude of choice, in the later years of his study, and many thus select that group of studies which is best adapted to the particular branch of his pro¬

fession for which he is preparing.

For 50 years from its establishment the in¬ stitute occupied buildings on or near Boylston street in Boston. From the first structure built by President Rogers the number increased to nine, eight of which were devoted to technical instruction. The most interesting aspect of the equipment were the extensive laboratories-Many of them when first instituted represented an attempt to apply the laboratory method in a way up to that time unknown in the history of scientific instruction in this country. The laboratories of physics and of chemistry were the first to offer laboratory instruction in these subjects to students in large classes ; and the mining and metallurgical laboratories, the steam laboratory and the laboratory for testing the strength of materials also represent a marked

advance over previous methods, either in the subjects taught or in the scale on which the work is done.

Lack of space in which to expand in the congested business and residential section which grew up around it forced the Institute to seek a location adequate to its needs for con¬ stantly growing activities. It purchased in 1912 a plot of 50 acres in Cambridge, on the bank of the Charles River Basin facing Boston, and on 14 June 1916 the new Technology was dedi¬ cated. Ten acres are devoted to the educa¬ tional buildings with an available floor space of 730,000 square feet. This easily doubles the area of the old buildings and still leaves room for growth to twice the present size.

The laboratories which were so excellent have been rearranged with greater space and some of them are the most remarkable in the country.

The boiler plant is itself a laboratory, with a capacity of 2,000 horse power, the boilers being of standard type with newest appliances. They are especially adapted to experiment. This powerhouse will care for the heating, lighting and motor force of the great buildings and is built on the lines of a big central sta¬ tion.

Steam is conveyed from the boilers to the steam laboratory in mechanical engineering through a subway seven feet square in section and the supply is carried in 20 and 10-inch pipes. The electrical equipment at the boilers includes three turbines directly connected to generators of 750 kilowatts, 500 kilowatts and 150 kilowatts,

respectively, furnishing three phase current at 2,300 volts. In addition there are one 150-kilowatt turbine, two 150-kilowatt motor-generators furnishing direct current at 110 and 220 volts and two 35-kilowatt exciters.

The steam laboratory equipment includes a Curtis turbine of about 75 kilowatts capacity, a 38 horse-power Corliss with dynamometer, a 225 horse-power McEwan tandem compound, a compound and generator of the same make of 250 horse power, and a triple expansion Cor¬ liss, especially adapted for experimental pur¬ poses.

In the same laboratory there is a Brown en¬ gine driving a three-stage compressor which will work up to 2,500 pounds per square inch. There are other compressors and a great many small engines and models of different types.

The hydraulic laboratory is fitted with 700 feet of canals, some of them 40 feet cross sec¬ tion, with reservoirs, weirs, tanks and all kinds of measuring devices. Two pump wells 26 feet deep will serve for the testing of large pumps on a commercial scale. A pump of the capac¬ ity of 22,000 gallons a minute lifts water to the second floor above which is discharged through a canal of 25 feet cross section into a penstock for the testing of water wheels. Nat¬ ural heads up to 35 feet and artificial heads of some hundreds of feet may here be used. The battery of pumps includes a Douglass triplex, a Gould triplex and a Davis triplex, a 150 horse¬ power turbine with direct connected centrif¬ ugal pump, a 100 horse-power Terry turbine, a three-phase Jeansville pump, two duplex pumps each of the capacity of an ordinary steam fire engine, and the great pump which is

driven by an angle compound engine of 325 horse power.

T he chemical laboratory is fitted with a cen¬ tral storage for rarer substances, special ele¬ vators for quick service within the depart¬ ment, electrical heating devices for the various processes and three systems of ventilation, the regular house system, the hood and a

mush¬ room ventilator applied to every table. The laboratory has its electrical supply independent of. the lighting or power systems of the buildings.

The aerodynamical laboratory is equipped with a four-foot blowing tunnel and an aero¬ dynamical balance, a replica of that at Teddington, England. The electrical laboratory is somewhat better than the old Lowell labora¬ tory,. but the improvement has been of neces¬ sity in details and convenience.

The transmission laboratory is of unusual excellence. The equipment includes a 2,500 nau¬ tical mile, artificial cable, corresponding to a regular ocean cable; a 2,500-mile long-distance artificial aerial line corresponding to a long¬ distance transcontinental telephone line, two artificial power transmission lines of 800 miles and an artificial telephone subterranean line of 35 miles. Besides these items there is a span of power transmission, 150,000-volt capacity. For experiments with this a special laboratory has been built at the foot of one of the towers.

These are some of the new special equip¬ ments, but the other laboratories, notably those for testing materials, for industrial chemistry, for biology, etc., find themselves newly placed in improved surroundings with increased facil¬ ities and apparatus. The sewage laboratory, being located near one of the great outlets of the principal drainage of the metropolis, will not be moved.

With this unusual laboratory equipment, it has been possible for the Institute to do much of its experimental work on a scale approach¬ ing that of industrial operations. The labora¬ tories of mining and metallurgy, for instance, are designed to treat ores in quantities approx¬ imating those used in actual practice, and rang¬ ing from 500 pounds to 3 tons, and the con¬ tributions to the literature of ore-dressing and metallurgy from this laboratory are well known. In the laboratory for testing the strength of materials, again, were conducted the first systematic and extended tests of beams of commercial size.

Throughout all the. work of the Institute the aim of instruction is so to adjust the theo¬ retical and experimental work that the acquire¬ ment of principles in the classroom shall pre¬ pare the student for his laboratory exercises, and that these in turn shall fix methods and results in his memory, and give him capacity for new experimentation. Throughout it is in¬ tended to guide the student, rather than to instruct him, and, whether in the four-year courses above described or in the graduate courses with which these may be supplemented, he is

trained to work with less and less de¬ pendence upon his teachers. This training should result in a considerable increase in his powers of ascertaining facts and overcoming difficulties, and so should increase his capacity for research.

MASSACHUSETTS MEDICAL SO¬ CIETY, an association incorporated at Boston,

Mass., 1 Nov. 1781, and holding regular ses¬ sions from that date to the present. Its char¬ ter was signed by John Hancock, first State governor of Massachusetts. Physicians and surgeons, who have made their medical studies in colleges approved by the society and who have been examined by its censors and are of known probity, are eligible to membership. Women were first admitted in 1884. Since I790.it has regularly issued its (Medical Com¬ munications.) It also issues a (Pharmaco-poeia) and Publications, > various reports and essays, an annual directory, and, since 1789, a triennial catalogue. The society is a potent force in maintaining a high standard in the medical profession. It has about 3,500 members.

MASSACRE (French, massacre, slaughter, probably connected with Latin, macellum, a meat-market), the indiscriminate and unneces¬ sary slaughter of human beings, and, in a transferred sense, of animals. In the case of human beings it implies the absence of all forms of law or of sufficient grounds.

MASSACRE OF THE INNOCENTS,

the slaughter of the children in and about Bethlehem by the soldiers of Herod, whose superstitious fears caused him to see a rival in the babe of whose birth he was apprised by the wise men (Matthew II, 1-16). The story has been for centuries a favorite subject with artists, especially those of the Flemish and Italian schools. Intense realism is usually injected into the scene and also a wealth of detail. Among the greatest examples are those by Tintoretto in the Scuola di San Rocco, Venice; Reni in the Gallery, of Bologna ; Daniele da Volterra in the Uffizi Gallery, Florence ; Rubens in the Pinakothek of Munich and Breughel in the Gallery of Vienna.

MASSAGE, a procedure, usually performed by the hands, such as friction, kneading, roll¬ ing and percussion of the external tissues of the body, either to relieve pain or to assist a cure, or with some hygienic object in view. A male massagist is known as a masseur, a

fe¬ male as a masseuse. Massage in some crude form has always been used by savages as well as by the civilized. It was mentioned by Homer and Hippocrates, having been one of the luxuries of the ancient Greeks and, among the Romans, was largely used by gladiators, and to make slaves more comely by filling out their tissues. Sometimes it was done by medi¬ cal practitioners, often by slaves and priests and those appointed to anoint the wrestlers be¬ fore and after they exercised. Hippocrates says that <(rubbing can bind and loosen, can make flesh and cause parts to waste; hard rub¬ bing binds; soft rubbing loosens; much rub¬ bing causes parts to waste ; moderate rubbing makes them grow.® Manual treatment of the body was long ago practised by the Chinese, and the Japanese, Turks, Egyptians and people of various nationalities have employed it in some form from early times.

Often the use of massage is associated with that of certain active and passive move¬ ments known as the Swedish movement-cure (q.v.), established by Pehr Henrik Ling. His system of gymnastics became popular in spite of opposition and of the fact that it was largely a revival of old methods of treat-

ment. In 1873 Mezger, of Amsterdam, and in 1877 S. Weir Mitchell of Philadelphia pushed forward the cause of massage. To-day it is considered by physicians as a branch of medi¬ cal treatment, useful in certain cases if rightly administered, but capable of doing harm when improperly applied. Unfortunately the laity frequently look upon it as a sole means of re¬ lief or cure. Much depends upon the judgment and skill of the masseur, as the special reaction of the individual patient has to be considered and, on the other hand, a skilful operator can accomplish more in a quarter of an hour than an ignorant one can in an hour. The proced¬ ures in massage may be placed under four heads: stroking (the effleiirage of the French), kneading (malaxation), friction and percus¬ sion. Stroking is performed over surfaces with the palm of the hand or its radial border, or with the pulps of the fingers, or the sides of the knuckles. Kneading is the grasping of muscles, etc., with both hands or between the thumb and fingers of one hand, and rolling and squeezing them. Friction is a peculiar and forcible cir¬ cular rubbing. Percussion is the striking or beating of a part, either with the hand or an instrument called a percussor or muscle-beater. A

special technique of massaging the face, and particularly the ears and eyes, has had surpris¬ ingly gratifying results in preventing deafness and curing certain types of blindness, for in¬ stance, where an embolism of a central artery of the retina has been removed by massage. It is claimed that the modern system of mas¬ sage makes the blood circulate more freely, strengthens muscle-fibres, causes effusions and exudations to be absorbed, improves secretory and excretory action, and invigorates the whole system. It is frequently used with good re¬ sults to stimulate assimilation and invigorate digestion, to soothe nervous irritability, relieve pain and arouse nerve-force, to equalize the circulation, to remove morbid deposits from around joints, to restore mobility, and for the correction of obstinate constipation and other disordered conditions.

From the point of view of the modern study of unconscious mentality it will be seen that those persons who are the greatest advocates of massage will be the ones who are uncon¬ sciously satisfying a desire for stroking, knead¬ ing, friction and percussion. Such a method of curing their ills will make an immediate and a strong appeal to their instincts. This pre¬ supposes a physical and mental make up, pre¬ disposed by early development, to seek and get satisfactions from the skin and muscle sensa¬ tions derived from manipulation at the hands of another. This mental disposition is in mod¬ ern times well recognized in psychoanalysis (q.v.), which, however, goes at the treatment in another way. For any diseases which may be helped by massage, there is a cause in the way in which the mind unconsciously regards the pleasures derived from the manipulation of the skin and muscles. If, for instance, the individual is of such a mental constitution that, because of early environment, he has been led to derive more than ordinary pleasure from being stroked, kneaded, rubbed or even beaten (and the history of the development of massage shows that such persons are quite numerous) ; such an individual will be the more likely to contract diseases of the type which are on rec¬

ord as having been remedied or cured by mas¬ sage. He will develop those diseases instinct¬ ively without knowing the connection between them and the unconscious wish which is the cause of the specific incidence of the symp¬ toms. This practically amounts to saying that the diseases which are enumerated as having been cured by massage are diseases which are virtually selected by the unconscious because of the fact that their treatment will involve the gratification of wishes for just such specific stimulation of the muscular, tendonous and cutaneous end organs. The patient will do

well under such a treatment, at least, partly be¬ cause a source of unconscious gratification closed to him possibly since early childhood has been through massage reopened to him.

MASSAGETzE, ma-saj'e-te, in ancient his¬ tory, a name given to nomadic tribes of north¬ ern Asia who dwelt to the east and south of the Caspian Sea. Herodotus says they wor¬ shiped and offered horses to the sun, had a community of wives, killed and ate their aged people, lived chiefly on the milk and flesh of their herds and on fisfi, and fought on foot and on horseback with lance, bow and double-edged axe. They are chiefly mentioned in connection with Persian history. Cyrus the Great perished in war with the Massagetae, 529 b.c. Accord¬ ing to some they belonged to the Mongolian stock, according to others to the Aryan.

MASSASOIT, mas'a-soit, American Indian chief, sachem of the Wampanoags: b. Massa¬ chusetts, 1580; d. 1661. His dominion extended over nearly all the southern part of Massachu¬ setts, from Cape Cod to Narragansett Bay; but his tribe, once estimated at 30,000 in number, had shortly before the landing of the Pilgrims at Plymouth been reduced by a disease, sup¬ posed to have been yellow fever, to barely 300. On 22 March 1621, a little more than three months after the founding of Plymouth, he appeared before the infant settlement with 60 of his warriors, armed and painted, for the purpose of forming a friendly league with the white men. Although the tribe were reputed to be cruel and treacherous, the open and friendly greeting of Massasoit so favorably impressed Governor Carver, that after the necessary for¬ malities were concluded, he formed in behalf of the colony a treaty of peace and mutual protection with the Wampanoags, which for 50 years was sacredly kept by both parties. The friendly disposition of Massasoit toward the colonists never relaxed. He lived within the limits of what is now the town of Warren, R. I., near an abundant spring which yet bears his name, where he often entertained wander¬ ing pilgrims or administered to their necessi¬ ties. Roger Williams, while on his way to Providence, was for several weeks his guest at this place. Massasoit was just, humane and honest, never violating his word and constantly endeavoring to imbue his people with a love of peace. In person, Morton says, in his (Memorial? he was ((a portly man in his best years, grave of countenance, spare of speech? His second son, Pometacom, called by the col¬ onists King Philip, who ultimately became sachem of the Wampanoags, was of a less plac¬ able disposition, and allowed the encroachments of the colonists to hurrv him into the bloody contest known as King Philip's War. Consult

Baker, Virginia, (Massasoits' Town Sowams in Pokanoket) (Warren, R. I., 1904).

MASSASSAUGA, mas-a-sa'ga, the ground rattlesnake of the central United States. See Rattlesnake.

MASSENA, Andre, an-dra ma-sa-na, mar¬ shal of France: b. Leven near Nice, France, 6 May 1758; d. 4 April 1817. In 1775 he en¬ tered the French army and after 14 years' serv¬ ice left the army and returned to Nice, where he married. During the Revolution he entered a battalion of volunteers, and in 1793 was made general of brigade. In 1794 he took command of the right wing of the French army in Italy, where, at Rivoli and elsewhere, he highly dis¬ tinguished himself. In 1799 he defeated the Austrian and Russian forces at Zurich, and in 1800, by his defense of Genoa for three months, gave Bonaparte time to strike successfully at Marengo. In 1804 he was created marshal of the empire. In 1805 he received the chief com¬ mand in Italy, where after the Peace of Presburg he occupied the kingdom of Naples. In 1807 he was given the command of the right wing of the French army in Poland, and soon after received the title of Duke of Rivoli. In 1809 he distinguished himself against the Aus¬ trians, and at Esslingen his constancy and firm¬ ness saved the French army from total de¬ struction. Napoleon rewarded him with the dignity of Prince of Esslingen. In 1810 he took command of the army in Portugal, and forced Wellington within the lines of Torres Vedras, till want of provisions compelled Mas¬ sena to retire. In 1814 he was made a peer by Louis XVIII, and though on the return of the emperor he acknowledged his authority, took no active part in the events of the Hundred Days. Consult his (MemoiresP edited by Koch (7 vols., Paris 1848-50) ; Fitzmaurice, G., (Massena) (in Royal United Service Association Journal, Vol. LVII, London 1913) ; Gachat, Edouard, (Histoire militaire de Massena* (Paris 1908); Toselli, (Notice biographique stir Massena* (Nice 1869).

MASSENA, ma-se'na, N. Y., village, in Saint Lawrence County, on the Grasse River, and on the New York Central and Hudson River and the

Grand Trunk railroads, about 35 miles northeast of Ogdensburg. It was set¬ tled by people from Vermont, about 1802, and was incorporated as a village in 1886. It is situated in a rich agricultural region, in which the chief products are hay, potatoes, dairy prod¬ ucts and apples. Massena Springs, just outside the village limits, is one with the village in commercial and industrial interests, and is a famous resort on account of its medicinal springs. Great opportunities for manufactur¬ ing are afforded by the plant of the Saint Law¬ rence River Power Company, which has a capacity of 40,000 horse power, and which can easily be increased. This power has been se¬ cured by diverting a small portion of the waters of the Saint Lawrence River through a canal, three miles long, into turbines, which have di¬ rect connection with electric generators, and thence into the Grasse River. The canal starts at the head of the Long Sault rapids in the Saint Lawrence, and is 200 feet wide and 18 feet in depth. Owing to the peculiar forma¬ tion of the country here, the point at the head of the rapids is 45 feet higher than the point

where the canal enters the Grasse River, which is a tributary of the Saint Lawrence. The Grasse acts as a tail race, carrying the water back into the Saint Lawrence. Two bridges span the canal. By using the Grasse River and the canal there is now a passage wholly within the United States for steamers around the un-navigable rapids. The power plant at Massena is second only to Niagara as a centralized power supply station. The chief industrial es¬ tablishments are reduction works, veneering works, mineral filler works, sash and door works, aluminum factory and dairies. There are several churches, banks, a high school and public schools. Massena is the business centre for a population of 60,000. Pop. (1920) 5,993.

MASSENET, Jules Emile Frederic, zhiil

a-mel fra-da-rek mas-na', French composer: b. Montaud, France, 12 May 1842; d. Paris, 13 Aug. 1912. He was the youngest of 21 chil¬ dren ; his father, a blacksmith, had served in the engineers under Napoleon. After studying at the Paris Conservatoire under Reber, Lau¬ rent, Thomas and Savard, he gained the first prize for pianoforte in 1859, the first for fugue, and the Prix de Rome for his cantata, (David Rizzio,* in 1863. He had done some traveling in Italy and Germany before he made his debut in Paris at the Opera Comique in 1868 with (La Grand-TanteP He was appointed profes¬ sor of composition at the Conservatoire in 1878 and made a member of the Academie des Beaux Arts. Among his earlier works are (Poeme du Souvenir) (1860) ;

(Poeme d'AvriP and (Suite d'Orchestre) (1868). His first im¬ portant work was the opera, (Don Cesar de Bazan) (1872), followed in the same year by (Les Erinnyes) (a tragedy by Leconte de Lisle) and a sacred drama, (Marie-MadeleineP An oratorio, (Eve,* was performed in 1874; the opera, (Le Roi de Lahore* in 1877; a sacred legend, (The Virgin) in 1880; (Herodiade* (an opera) in Brussels, 1881. (Manon) appeared in 1883; (Le Cid* in 1885; ˆsclarmonde,* a romantic opera in 1889 ; also a large number of popular melodies, pianoforte pieces, and a series of seven (Suites d'Orchestre,* including (Scenes Pittoresques,* (Scenes AlsaciennesP (Scenes HongroisesP (Scenes Napolitaines* and (Scenes de Feerie,* as well as two can¬ tatas, <Narcisse> and (BiblisP He also wrote some entr'actes and stage music for Sardou's dramas the (Crocodile* and (TheodoraP His opera (Le Mage* (words by Jean Richepin) and a drame lyrique, adapted from Goethe's (WertherP were performed in 1891. <Tha'is) was first produced at the Paris Opera 16 March 1894, the libretto having been adapted from the novel by Anatole France; a short one-act piece, (Le Portrait de ManonP was performed at the Opera Comique in the same year, and in 1895 he wrote the music for Jules Claretie's (La NavarraiseP Of his latest works, the opera <Don Quichotte) was produced in London in May 1912, and his last opera, (Panurge,* was completed just before his death. His music, always melodious, has been described by critics as being excessively "sugary.®

MASSEY, mas'i, Gerald, English poet: b. Gamble Wharf, near Tring, Hertfordshire, 29 May 1828; d. 29 Oct. 1907. He received but little education, and at eight was employed in a silk factory. Going to London about 1843, he

became an errand boy, and in 1849 editor of The Spirit of Freedom, a Radical paper, be¬ coming at the same time associated with Kings¬ ley, Maurice and other Christian Socialists. In 1854 he published (Ballad of Babe Chris-tabel,5 and other poems. The volume attracted the notice of Landor, and the poems issued, in succession to it met with no little popularity. Other books of his are (The Secret Drama of

Shakspere's Sonnets> (1864-72) ; 'Havelock's March, and Other Poems) (1861) ; 'A Tale of Eternity and other Poems> (1869) ; Concern¬ ing Spiritualism5 (1872) ; (A Book of the Beginnings) (1882) ; 'The Natural Genesis) (1883) ; (My Lyrical Life,5 a collection of poems (1889). For some years he lectured at home and in the United States and Australia on spiritualism and various social and socialis¬ tic subjects.

MASSEY, Hart Almerni, Canadian inven¬ tor : b. Haldimand, Northumberland County, Ontario, 1823; d. 1897. He received his educa¬ tion at Watertown, N. Y., and Victoria College, Cobourg, Ontario. He assisted in managing his father's farms and while thus engaged set about improving the agricultural implements then in use. His father established a factory at Newcastle of which Hart became sole owner in 1855. He perfected mowing and reaping machines, the first of their kind in Canada, and introduced improvements in many other farm implements. In 1879 the factory was removed to Toronto. Massey received awards at Paris in 1878, Philadelphia 1876 and at Antwerp in 1885. He was also a noted philanthropist.

MASSICOT. A mineral consisting of monoxide of lead, PbO, containing about 92.8 per cent of that metal and an ore in many mines in Colorado and Idaho.

MASSILLON, Jean Baptiste, zhon ba-test ma-se-yoii, French preacher: b. Hyeres, Provence, 24 June 1663; d. Clermont, 18 Sept. 1742. In 1681 he entered the Congregation of the Oratory ; then taught theology at Montbrison and Vienne; went to Paris in 1696 as director of the Seminary of Saint Magloire, and won great favor, even at court, by his eloquent and searching sermons. His funeral orations are particularly famous. In 1718 he was appointed preacher to Louis XV, then only nine years old, and for him composed the 'Petite Careme,5 a notable series of sermons. Massillon was elected to the French Academy in 1719; in the same year he retired from Paris to Clermont, where he died of apoplexy. His works were edited in 1828 by Guillon and in 1886 by Blam-piguan, whose biographical sketch, 'Massillon d'apres des Documents inedits5 (Paris 1879), should be consulted. Consult also de Julleville, Louis Petit, (Histoire de la langue et de la litterature franchise5 (Paris 1898).

MASSILLON, mas'il-on, Ohio, city, in Stark County, on the Tuscarawas River, the Ohio Canal, and on the Wheeling and Lake Erie, the Pennsylvania and the Baltimore and Ohio railroads, about 100 miles in direct line northeast of Columbus and eight miles west of Canton. Massillon was established in 1825, and in 1853 was incorporated as a

village; the city charter was granted in 1868. It is situated in the Tuscarawas Valley, noted for its large bituminous coal fields and for its excellent

farm lands. In the vicinity of the city are quarries of white sandstone. Some of the in¬ dustrial establishments are foundries, rolling-mills, machine-shops, bridge works, potteries, fire brick, enameled ware, paper, glassworks, steel tubing, furnaces, flour-mills and cream¬ eries. In addition to the manufactures of the city there is a large trade in coal, sandstone, grain and livestock. The State Hospital and Asylum for the Insane is in Massillon. The city has a number of fine buildings; chief among them are the churches and schools. The gov¬ ernment is administered under the charter of 1868, its first charter, and is vested in a mayor, who holds office two years, and a coun¬ cil. The board of education is chosen by popu¬ lar vote; the boards of health and equalization are elected by the council. Other administrative officials are appointed by the board subject to the approval of the council. Pop. (1920) 17,428.

MASSINGBERD, Francis Charles, Eng¬ lish clergyman: b. Lincolnshire, 1800; d. 1872. He received his education at Rugby and at Ox¬ ford; took orders, and was appointed rector of South Ormsby in 1825. In 1847 he became preb¬ endary of Lincoln Cathedral, , and was made chancellor in 1862. He published ‘Reasons for a Session of Convocation5 (1833) ; ‘Church Reform5 (1837) ; ‘The Educational and Mis¬ sionary Work of the Church in the Eighteenth Century5 (1857) ; ‘History of the Leaders of the English Reformation5 (4th ed., 1866) ; ‘The Law of the Church and the Law of the State5 (1859) ; ‘Lectures on the Prayer-Book5 (1864) ; Sermons on Unity, with an Essay on Religious Societies5 (1868).

MASSINGER, mas’in-jer, Philip, English dramatist: b. Salisbury, November 1583; d. Southwark, London, March 1640. He studied at Saint Alban Hall, Oxford, went to London in 1606, and soon became a well-known play¬ wright. He collaborated with Nathaniel pield, Thomas Dekker, Cyril Tourneur and Robert Daborne, and regularly with Fletcher in 1613-25. Independently, he wrote 15 plavs, including comedies, tragedies and tragi-comedies. They are frequently based closely on Italian and Spanish originals, but show much skilfulness in the development of plot, and a knowledge of the requirements imposed by stage presentation. (Henry VIII5 in its present form was probably written by him with Fletcher. Among the plays wholly by him are (The Bondman5 (1624); ‘The Roman Actor5 (1629); ‘A New

Way to Pay Old Debts5 (1632); ‘The Guard¬ ian5 (1655). ‘A New Way to Pay Old Debts5 kept the stage in England to the end of the 19th century. There is an edition of his plays bv Cunningham (1867) ; and of Selections5 by Symon (1887-89). (See New Way to Pay Old Debts). Consult Coleridge, Hartlev, ‘Dramatic Works of Massinger and Ford5 (rev. ed., 1883) ; Symons, A. (ed.), Selected Plays5 (London 1887-89) ; transactions of the New Shakespeare Society5 (ib. 1880-86) ; Fleay. ‘Biographical History of the English Drama5 (London 1891) ; (Cambridge History of Eng¬ lish Literature5 (Vol. VI, Cambridge 1910) ; Ward, A. W., ‘History of English Dramatic Literature to the Death of Queen Anne5 (New York 1899).

MASSON, mas’on, David, Scottish critic: b. Aberdeen, 2 Dec. 1822; d. Edinburgh, 7 Oct.

1907. He was educated at Marischal College and Edinburgh University; in 1852 was ap¬ pointed to succeed Clough in the chair of Eng¬ lish language and literature at University Col¬ lege, London. He was editor of Macmillan’s Magazine 1859-68, and was professor of rhetoric and English literature in the University of Edinburgh 1865-95. He is best known for his elaborate and comprehensive study of Milton’s life and times (3 vols., 1858—80) — a work valuable alike as a contribution to English his¬ tory and to the history of English literature. Other works by him are ‘British Novelists and their Styles’ (1859) ; ‘Recent British Philoso¬ phy J (1865) ; ‘Drummond of Hawthornden) (1873); ‘The Three Devils — Luther’s, Mil¬ ton’s and Goethe’s’ (1874). He also published the Cambridge edition of Milton’s Poems with introductions, notes, and an essay on Milton’s English (3 vols., 1877) ; the Golden Treasury edition (2 vols., 1874) ; the Cabinet edition (1890) and the Globe edition (1871) ; ‘De Quincey’ in ‘English Men of Letters’ series (1878) ; an edition of De Quincey’s works (14 vols., 1889-91). and ‘Edinburgh Sketches and Memories’ (1892). In 1893 he was appointed Historiographer-Royal for Scotland. He also wrote ‘Carlyle Personally and in his Writings’ (1885); ‘Edinburgh Sketches and Memories’

(1892).

MASSON, Frederic, fra-da-rek ma-son, French historian: b. Asnieres, 1847. He was librarian in the archives of the Foreign Office, and after the overthrow of the empire became secretary to Prince Napoleon, and was entrusted with the arrangement of the Prince's papers and collections. He is known as the author of nearly 20 volumes in a still incomplete series of works on Napoleon I. His method is anecdotic, and he has based his statements on original documents, — correspondence, account-and notebooks, and the like, many of which he himself owns in his large collection of Napo¬ leonic material. Among the titles of his studies are 'La Revoke de Toulon en prairial an IIP (1875) ; 'L'lmperatrice' (1877) ; 'Le Marquis de Grignan' (1881; 3d ed., 1908): 'Les diplomates de la Revolution' (1884) ; 'Napoleon et les femmes) (21st ed., 1897) ; 'Napoleon chez lui' (1894); 'Les cavaliers de Napoleon'; 'Napoleon inconnu' (1895) ; 'Marie Walewska' (1897) ; 'Josephine de Beauharnais, 1763-96' (1899) ; 'Josephine, imperatrice et reine' (1898); 'Josephine repudiee 1809-14) (1901); 'L'lmperatrice Marie-Louise' (1902) ; 'Napo¬ leon et son fils' (1904) ; 'Napoleon et sa famille' (9 vols., 1897-1907) ; 'Le sacre et le couronnement de Napoleon' ; 'Autour de Sainte-Helene' (1908); 'Sur Napoleon' (1909) ; 'Napoleon a Sainte-Helene, 1815-21' (1912) ; 'L'Academie-Frangaise, 1629-1793' (1912); 'Pour l'Empereur' (1913). In 1903 he was elected to the Academie Franqaise to succeed Gaston Paris.

MASSON, Louis Frangois Rodrigue, Ca¬ nadian statesman: b. Terrebonne, Ouebec, 1833; d. 1903. He received his education at the Col¬ lege of Saint Hyacinthe, province of Quebec, and at Georgetown College, District of Colum¬ bia. He was admitted to practise law in 1859. In 1867 Mr. Masson was elected to Parliament as a Conservative member from Terrebonne and continued to hold his seat until 1882. He

served as Minister of Militia and Defense in 1878-80; became president of the council in the latter year ; and in 1884-87 served as lieu¬ tenant-governor of Quebec province. He was called to the Senate in 1882 and a second time in 1892. He published 'Le bourgeois de la com-pagnie du Nord-Ouest' (1889).

MASSON, Thomas Lansing, (Tom Mas¬ son), American editor: b. Essex, Conn., 21 July 1866. He received his education in the New Haven public schools; entered journalism in New York and since 1893 has been literary and managing editor of Life. He published 'Yankee Navy' (1899) ; 'A Corner in Women' (1905); 'The Von Blumers' (1906); 'A Bachelor's Baby and Some Grown-Ups' (1907) ; 'Best Stories in the World' (1914). He edited 'Humorous Masterpieces of American Litera¬ ture' (1904) ; 'In Merry Measure' (1905") : 'Humor of Love in Verse and Prose' (1907).

MASSOWAH, mas-sow'a, or MAS-SAWA, northeast Africa, a seaport and the principal town of the Italian colony of Eritrea, on a small coral island in the Red Sea, at the northern end of Arkeeko Bay, connected with the mainland by a causeway. The town is built of stone, is defended by several forts, and is supplied with water from the neighboring M'Kulu heights. The town is hot and unheallh-ful, but the M'Kulu hills have a much better climate. A railway 17 miles long connects with Saati inland and continues to Asmara, the capital 60 miles further inland. The chief im¬ ports are grain and flour, cotton manufactures, glasswares, arms, cutlery, spices, wines and spirits principal exports, rhinoceros-horns, gold, ivory, honey, pearls, gums, ostrich feathers, skins and wax, brought by caravans from the interior. In normal years the total commerce is valued at about $3,750,000. Formerly dependent on Egvpt, the town and strip of coast were ceded to Italy in 1885. Pop. about 2,275, including 524 Europeans and about 500 Asiatics.

MASSYS, mas-sis'. See Matsys, Quentin.

MASTABA, an Arabic word meaning bench, applied by Egyptologists to certain Egyptian tombs which were common under the Memphite dynasties. Remains of hundreds of these tombs still exist. They are in size from 18 by 26 feet to 85 by 172 feet. They are oblong, bench-like structures, with flat roofs of stone slabs. Con¬ sult 'Bulletin of the Metropolitan Museum of Art' (Vol. VIII, New York 1913) ; Erman, Adolph, 'Life in Ancient Egypt' (New York 1894) and Mariette, A. E., 'Les mastabas de l'ancien empire' (Paris 1881-87).

MASTER OF ARTS (M.A. or A.M.,

artium magister) , an academical honor con¬ ferred by universities of the United States, Great Britain and other countries, upon students after a course of study and a previous examination in the chief branches of a liberal education, particularly philosophy, philology, mathematics, physics and history. The word magister, connected with

a qualifying phrase, was used among the Romans as a title of honor; but its present meaning must be traced to the time of the establishment of the oldest universities. Regularly organized faculties were not then known as they now exist in the univer¬ sities. The whole circle of academic activity

was limited to the seven liberal arts (see Art) ; and they who received public honors on the completion of their course of studies, for their diligence and knowledge, and had already re¬ ceived the degree of baccalanreus (bachelor), were called magistri arthim (masters of the liberal arts). In American and English uni¬ versities this degree follows that of bachelor. The degree of master of arts is inferior to that of doctor of letters (D.Litt.). In the German universities the title was formerly con¬ ferred, but has been superseded by that of doctor of philosophy (Ph.D.), which prac¬ tically corresponds to the degree of M.A. in other universities. This title is an indispensa¬ ble preliminary to the attainment of the posi¬ tion of docent in the German universities, that is, one who has obtained the right to deliver academical lectures. See cademio Degrees; Costume, Academic; University.

MASTER OF BALLANTRAE, bal-an- tra, The, a novel by Robert Louis Stevenson, published in 1889. It is a Scottish romance of tho 18th century, beginning with the Stuart up¬ rising of 1745. It is a sombre tragedy of the enmity of two brothers, of whom the elder, James Durrie the Master, takes the side of the Stuarts, the younger, Henry, that of King George.

MASTER BUILDER, The. The tendency toward symbolism, to be observed in the early romantic works of Ibsen, and occasionally in his dramas of social awakening, becomes dominant in (The Master Builder J ((Byg-mester Solness)), published in 1892 and played the next season. Already in (The Wild Duck) and (The Lady from the Sea,) Ibsen had mingled symbolism with naturalism ; but. only in (The Master Builder) does the hidden allegory threaten to warp , his surface story out of consistency. The piece, which begins with matter-of-fact

scenes and situations from middle-class life, ere long develops into a tenuous fable that suggests much more than it presents.

As a drama of ideas (The Master Builder) emphasizes two notions : the peril of selfish individualism, already shown in <Rosmersholm) and (Hedda Gabler) ; and the struggle of age against youth. Ibsen, conscious of his advanc¬ ing years, felt the inevitable passing of power from the older to the younger generation. He felt, also, not only the fear of youth, but its fascination, especially in his innocent affair with Emilie Bardach, a girl of 18 whom he, at the age of 61, had met in the Tyrol during the summer of 1889, and with whom he later corresponded. He has universalized these merely personal sentiments, setting forth the problem of every man who lives long enough to regret what is gone and to strive desperately to hold what is slipping from him. This partic¬ ular conflict Ibsen associates .with the still larger conflict between individualism and altruism.

Solness, the master builder, has achieved success at the expense of his wife and his business associates. He has checked the rise of old Knut Brovik, and refused to young Ragnar Brovik permission to build independ¬ ently. He has employed the latter's sweetheart and captured her affections only as a ruse by which to retain Ragnar's services. Obsessed,

as he admits, with dread of the younger genera¬ tion, yet thinking himself at last secure from it, he succumbs when the younger generation knocks at his door in the person of Hilda Wan-gel. Hilda, who had already appeared in a minor role in (The Lady from the Sea,* is a strange and wilful maiden who induces Solness to relax his selfish schemes, and, at the same time, to attempt to mount, as he once was wont, to the top of a lofty tower. He can no longer safely climb to such heights, and yet, inspired by Hilda's faith, he makes the at¬ tempt, only to fall. Though he forfeits life, Hilda professes satisfaction, inasmuch as, when he stood at the dizzy summit, she has heard (harps in the air.* Hilda is the puzzle of the play, an influence for both good and evil, a symbol of youthful aspiration, or perhaps of youth as the enemy of age and of woman as the enemy of man. The charm of the drama lies in its tantalizing hints of concealed signif¬ icances; its defect lies in its lack of proper correspondence between the human action and the allegory. Much in the later portions of the work is scarcely intelligible as a natural repre¬ sentation of life. (The Master Builder* has been translated by Edmund Gosse and William Archer (1893). It is discussed in the mon¬ ographs on Ibsen by Otto Heller

(1912), Jen-nette B. Lee (1907), M. J. Mose; (1908), and Henry Rose (1908), and, by P. H. Grummann, in (Nebraska University Studies* (1910).

Frank W. Chandler.

MASTER OF THE HORSE, an official

having charge of the horses, hounds, etc., of a sovereign, as of England. He is there a mem¬ ber of the ministry and the third dignitary of the court. The office is appointive, and he has the use of the royal horses and servants. The office exists to-day in Germany and formerly also in France.

MASTER OF THE ROLLS, a member of the Supreme Court of Judicature in England, who presides with the lords justices in the Court of Appeals, and ranks next to the Lord Chief Justice, he is the keeper of all records of the Court of Chancery and of the rolls of all grants and patents that pass under the Great Seal. By the Supreme Court of Judica¬ ture Act of 1873, he was denied the privilege he formerly had of a seat in the House of Commons.

MASTER AND SERVANT. See Family

Law.

MASTER SINGERS. See Meistersingers.

MASTERS, Edgar Lee, American lawyer and writer : b. Garnett, Kan., 23 Aug. 1868. He studied at Knox College, Illinois, and was ad¬ mitted to the bar in 1891. His publications in¬ clude (A Book of Verses) (1898) ; Maxi¬ milianˆ a drama in blank verse (1902) ; (The New Star Chamber and Other Essays) (1904) ; (Blood of the Prophets) (1905); (Althea,* a play (1907) ; <The Trifler,) a play (1908) ; <The Spoon River Anthology) (1915) ; (The Great Valley* (1916). Mr. Masters writes his poems both in vers fibre and in rhymed verse. His (Spoon River Anthology) is the best known of his works. It is a unique collection of truthful epitaphs on the inhabitants of a middle Western village. It is marked by a biting vigorous satirical style, and is pervaded by a materialism

that shocks and surprises. Despite its obvious limitations, its naive force has won many readers and much favorable comment. Consult Lowell, Amy, tendencies in Modern Ameri¬ can Poetry) (New York 1917).

MASTERWORT, the rustic name of sev¬ eral umbelliferous plants, as those of the genus Anethum (see Dill), formerly much cultivated as potherbs, and held in great repute as a stom¬ achic, sudorific, diuretic, *etc.*

MASTIC GUM, or MASTICHE, a resin¬ ous substance flowing from deep incisions made in the branches of the Pistachia lentiscas, a shrub of the terebinth family growing in the countries ‘bordering on the eastern Mediterranean. This tree at¬ tains the height of 15 or 20 feet; the leaves are alternate and pinnate ; the flowers are small, inconspicuous, disposed in axillary racemes, and are succeeded by an ovoid drupe containing an osseous nut. It forms one of the most important products of Scio, and other JEgean islands, where it has been cultivated from remote antiquity. Heat seems to exer¬ cise a great influence on the resinous product. Mastic is consumed as a chewing-gum in vast quantities throughout the Turkish Empire by women of all classes, for the purpose of cleans¬ ing the teeth and imparting an agreeable odor to the breath. It is related to myrrh, frankin¬ cense, etc., and was formely in repute as a medicine throughout Europe, but at the present time is chiefly useful in the arts as a varnish for maps, drawings, *etc.* Dentists employ it as a filler for cavities.

MASTICATION, or CHEWING, the

thorough subdivision of food in the mouth so that it can be readily acted upon by the gastric juice and other digestive secretions. The tongue, cheeks and lips push the food material between the teeth, and by the lateral and up-and-down motions of the lower jaw it is cut and torn by the incisor, canine and bicuspid teeth and bruised by the molar or grinding teeth. During these actions the food is sof¬ tened by the saliva (insalivation), which exudes abundantly from the salivary glands by the act of mastication. Typical mastication is seen only in the higher vertebra. <(The am¬ phibian bolts its fly, the bird its grain, and the fish its brother without the ceremony of chew¬ ing, w but in man and the higher animals masti¬ cation is necessary for

complete and comfort¬ able digestion. Thorough comminution of food by mastication is analogous to the pulverizing process employed by the chemist, but associated with mastication is insalivation, as it is almost impossible to swallow substances which are very dry. Imperfect mastication of food, either by reason of rapid swallowing (bolting), or because of the absence of sound and service¬ able teeth, is very frequently the cause of the numerous ailments classified under the term indigestion. Exaggerated mastication which has been so highly recommended by certain per¬ sons as almost to constitute a panacea or com¬ plete prophylaxis is known to lessen the secre¬ tion of gastric juices which is started by sen¬ sations of taste, to protract beyond desirable limits the time required for proper gastric di¬ gestion, to develop the salivary deposit in a proportion relatively too great when compared with the secretion of the pancreas. It is more¬

over known that the teeth are likely to wear out too soon, if mastication is carried beyond a reasonable time.

Exaggerated “mastication and the fancied ad¬ vantages accruing from it are an illustration of an indulgence in a form of securing the grati¬ fication of an unconscious desire. In infancy a great pleasure is derived merely from mouth¬ ing different objects, a pleasure originating in the mode of absorbing the early meals at the mother’s breast. It has been discovered by studying the unconscious wishes of mankind that the sexual desire in the adult is a syn¬ thesis of different partial desires which in the infant are satisfied in different parts of the body, now here, now there, but which in the adult are assembled in the genital organs or are at least unified under the supremacy of the genitals. But it has been definitely proven that in some individuals this synthesis has never been successfully accomplished. Either the mouth pleasure zones or the anal or the skin or some other zone which gave in infancy a quite absorbing sense of gratification has failed of appropriate subordination, and has persisted into adult life, with some individuals, as a source of extraordinary pleasure. To this class of partially undeveloped minds belong not only the advocates of exaggerated mastication but all other persons who develop any other form of activity as a fad such that they are noticeably peculiar in that respect.

MASTIFF, a breed of dogs of great size, recognized by the large head, the dependent lips, the broad, hanging ears, and by the gen¬ eral muscularity of the form. The mastiff in general disposition is affectionate and gentle, extremely faithful and vigilant. In Rome and

in classical ages these dogs were held in high estimation for their strength and courage. The most valued breeds were obtained from Great Britain, where these dogs originated, and were used to guard flocks and herds ; and watching has become instinctive with them. Roman offi¬ cers were appointed to breed them and to trans¬ mit them periodically to Rome, where they fought lions, etc., in the arenas of the Roman amphitheatres and were otherwise favorites. The dog now is highly valued, both as a watch¬ dog, and as a domestic companion. Fawn is the prevalent color, and the weight should be about 165 pounds.

MASTIGOPHORA, a class of Protozoa ((in which the flagellate form is prominent al¬ though the amoeboid and encysted conditions frequently occurA Typical forms are con¬ tained in the order Flagellata (q.v.).

MASTODON, a genus of fossil probo¬ scidians of the elephant family, whose remains are found in all parts of the world in Tertiary formations from Miocene time onward to the dawn of the present era. Although in size and external appearance the larger mastodons much resembled modern elephants, save that, like the mammoths, the northern species were probably clothed with long hair, they differed widely from other genera of the family in details of structure, especially those affecting dentition. Thus milk-molars were present, and some¬ times were persistent; and in their structure the fossil molar teeth are not penetrated by deep partitions of cement, and their crowns are marked by few (3 to 5) transverse ridges,

which are often broken into nipple-like pro¬ tuberances. This is, in short, the simplest form of tooth-structure in the family, of which the mastodons are the oldest* and most primi¬ tive type, and nearest to the earlier Dinotheria. The tusks curved upward only slightly; and their length in Mastodon americanus, whose re¬ mains have been obtained nearly entire from bog-deposits in various parts of the United States, was about nine feet, indicating:, as do the measurements of the skeleton, an animal about equal in average height to the modern

Indian elephant, but with a rather more bulky body and a flatter forehead. Of this species, which was a belated survival of an ancient Old World type that became extinct in the Pliocene, sev¬ eral good skeletons are preserved in the muse¬ ums of the United States and Canada, and cer¬ tain European species are also well known. About 30 different kinds of mastodons have been described from bones found in almost every country in the world. In the Pliocene works of Texas, Nebraska and Idaho are found remains of a proboscidian (Stegodon) which was a connecting link between the mastodons and the elephants. What brought this wide¬ spread group to an end is not clear. There was no diminution in their food, which con¬ sisted of herbage, bark and leaves, as is known from undigested stomach-contents found within the skeletons ; and they survived the historic vicissitudes of climates until subsequently the present settled conditions arrived. There is good reason to believe that they lasted in Amer¬ ica, at least, until after the advent of mankind, but indisputable evidence of this is lacking. See Elephants; Fossil.

Consult Woodward, (Vertebrate Palaeontology) (1898) ; Lucas, (Animals before Man in North America> (1902) ; Scott, (Land Mam¬ mals of the Western Hemisphere) (New York

1913).

MASTODONSAURUS, a fossil labyrintho-dont batrachian found in the Triassic forma¬ tions of England, Wurttemberg and India. It is the largest type known, the head having a length of four feet with a body extending to a length of 10 feet.

MASTURBATION. The limited, restricted dictionary definition is self-abuse, that is, gen¬ ital manipulation by the hands, clothing, bed clothes, by riding, by hard objects and by pres¬ sure of things against the genitals, *etc.* Re¬ garded in its broader aspect of an autoerotic reaction to external reality it covers a multi¬ tude of activities not ordinarily realized as masturbatory in nature and is one of the most important topics in the whole realm of psycho¬ pathology. Thus broadly defined it is any erogenous satisfaction through any and all modes of gratification carried on for their own pleasure and includes both somatic and psychic masturbation. Not regarded in antiquity as of very vital importance it was brought into prominence and called deleterious principally by Tissot, who wrote early in the 19th cen¬ tury, and is the sponsor of all the lurid liter¬ ature which has spread over two continents since his time. He taught that masturbation was a

very serious weakness and that it led to various forms of illness and insanity, state¬ ments for which modern medical science can find no satisfactory proofs. The most modern

attitude toward masturbation is that the dele¬ terious effects so often observed in those who practise it come not from any injury to the body but from the guilty feelings of those who abuse themselves and from the tendency it has to remove them from the true relations with their fellows. That is, when the individual satisfies his fantasy sense of potency by any form of masturbation, the personality will re¬ gress to more and more infantile levels and the discrepancy between the social value of the autoerotic behavior and the true adult behavior which is called for by the environment will result in some form of mental or bodily illness. The fate of Sodom and Gomorrah revealed its dangers, and the Greeks gave it a poetical con¬ ception in the myth of Narcissus (see Narcis¬ sism), the youth who fell in love with his image in a pool, a story which represents ex¬ ternal reality reduced by autoerotism to a mere reflection of self. Thus the forms of physical activity which may be regarded as essentially masturbatory in character are very numerous.

Any act which satisfies the unconscious de¬ sires through producing an effect upon the body instead of on the world of external reality is of this nature. And the body has various zones other than the genital in which this self-grati¬ fication is practised unconsciously through mul¬ tifarious forms of activity, the most prominent being the mouth, the intestines and different parts of the skin. The infant naturally puts everything into its mouth, and this habit is con¬ tinued into adult life by persons who put things into their mouths for other reasons than merely masticating them and swallowing them as food. In fact all objects, not food, that are mouthed serve this purpose, including tobacco, chewing gum, toothpicks, etc., and therefore are sub¬ ject to the same reproach as any other use of any part of the body through which no change, having a social value, is effected upon external reality. The skin as well as the muscles are used as sources of self-gratification, too, in massage ; and such acts a-s stroking the skin, running fingers through the hair, scratching, tickling, etc., are other examples.

Constipation of the spastic type is the most common form of unconscious masturbation of the anal-erotic zone. Bodily masturbation, conscious as well as unconscious, is paralleled by a form of thinking that may be called men¬ tal masturbation, in which

the individual, male or female, has acquired the habit, whether or not from practising physical masturbation, of seeking pleasure from his own states of mind. Excessive day-dreaming, reading of light liter¬ ature and attendance on light drama or moving picture shows, aimless driving about in automo¬ biles and most other forms of solitary or un¬ productive mental activity may be classed as types of mental masturbation, and when car¬ ried beyond a certain degree generally result in a species of mental impotence, in which the individual is unable to carry out any activity to a productive conclusion. The treatment of both mental and physical masturbation is men¬ tal. The patient is to be shown through self-analysis just what he is doing, both in its phys¬ ical and psychical aspects, and that his action ;s essentially infantile, representing an arrest of development at a very early level, which thus never permits him to act the true adult part in

lite. Various wholesome and truly social activ¬ ities should be encouraged, and the patient in¬ structed how to enlist his entire libido (q.v.) in them, and the desire for solitary pleasure will gradually disappear.

Smith Ely Jelliffe.

MASUDI (Abu-1 Hasan ‘Ali ibn Husain ibn ‘Ali ul-Mas‘udi), Arabic geographer and historian : b. Bagdad, near the close of the 9th century; d. Fostat, about 956 a.d. Receiving a good education he set out to study the history, manner of life, customs, etc., of every land at first hand. This quest took him to Persia and Kerman, in 915 to Istakhr, to Multan and Mansura in 916. From there he journeyed to Cam-bay, Saimur and Ceylon, to Madagascar and back via Oman. He also visited the shores of the Caspian ; j ourneyed to Tiberias in Pales¬ tine. He visited Antioch in 943 and Damascus in 945. The last decade of his life was spent in Egypt and Syria. Of the Mo’tazilite sect, he was free from bigotry, studied Christianity and Judaism and was well versed in the history of the principal nations of both Orient and Occi¬ dent. He wrote a universal history in 30 v61-umes, entitled (Kitab akhbar uz-Zaman,> fol¬ lowed by a supplement in (Kitab ul-Ausat,* a chronology of general history. The two works were combined by the author in (Muruj udh-Dhahab wa ma’adin ul-Jawahir) ((Meadows of Gold and Mines of Precious StonesO in 947. Editions have been published at Bulak (1866) and at Cairo (1886). The original with French translation by C. B. de Maynard and P. de Courteille has appeared (9 vols., Paris 1861— 77; Vol. I, in English by A. Sprenger, London 1841). An enlarged edition of this work fin¬ ished by Masudi in 956 appears to be now lost. Another work, written in 956, is _(Kitab ut-Tanbih wal IshraP ((Book of Indication and Revisionˆ is a summary with corrections of his other writings. It was edited by M. J. de Goeje (Leyden 1894) and there is a French translation by Carra de Vaux (Paris 1896) and a partial translation in De Saaj’s memoir to Meynard’s edition of (MurujP Consult Brockelmann, Karl, (Geschichte der arabischen Literatur) (Vol. I, Weimar 1899) ; Field, C., ‘Tales of the Caliphs* (1909); Nicholson, R. A., (Literary History of the Arabs)

(Cam¬ bridge 1907).

MASULIPATAM, or BANDAR, British India, capital of the district of Kistna, Madras, situated at the mouth of the Kistna, on the Bay of Bengal. It was the earliest English settlement on the Coromandel coast, an agency being established there in 1611. Subsequently the town was held for some years by the French; it was taken by storm by Forde in 1759. A storm-wave inundated the town in 1864, and about 30,000 lives were lost. Weav¬ ing, bleaching and cloth printing are the prin¬ cipal industries, but do not enjoy their former importance. Noble College is the chief educa¬ tional institution. The port is merely a road¬ stead in which vessels anchor five miles off shore. Masulipatam is reached by a branch of the Southern Mahratta Railway from Bezwada. Pop. 42,100.

MASURENLAND, East Russia, a lake-dotted district around Lyck, Lotzen, Sensburg, Ortelsburg, Neidenburg, Oletzka, Osterode, Rossel and Allenstein. It is marked by rolling

hills, divided by hundreds of lakes, many of which are joined together by long narrow chan¬ nels. Mauer and Spirding are the most im¬ portant and largest of these bodies of water. A few years ago the imperial government en¬ tered into negotiations with a company which proposed to drain the greater part of the Masu-ren region and sell the reclaimed land to set¬ tlers. Negotiations were proceeding apace when von Hindenburg heard of the project. For many years he had studied the region and was convinced that the lakes and surrounding marshes were the equivalent of several army corps in defending Germany against an in¬ vasion by Russia. He opposed the drainage scheme, went to Berlin, interviewed the em¬ peror and as a result the project was aban¬ doned. The view of Hindenburg was vindi¬ cated in 1914-15 after the battle of Tannen-berg, when the aged general partly encircled the Russians with the lakes in their rear. Whole regiments were lost in the quagmires, and great quantities of stores fell to the Ger¬ mans. See War, European — Eastern Front.

MAT, the Egyptian goddess of justice and truth. She was usually represented as wear¬ ing an ostrich feather on her head, with eyes bandaged as a sign of her impartiality. Judges and kings were at all periods her pro¬ fessed worshippers. The father of the god¬ dess was Re, the sun god. Her Greek com¬ peer was Themis. Consult Budge, A. E. T. W., (The Gods of the Egyptians) (Vol. I, London 1904) and Wiedemann, Alfred, ‘Religion of the Ancient Egyptians) (New York

1897).

MATABELELAND, ma-ta-be'le-land, South Africa, the southeastern district of Rho¬ desia (q.v.) between the Limpopo and Zambesi, north of the Transvaal. In 1889 it came under the administration of the British South Africa Company, against whom the natives unsuccess¬ fully rebelled in 1893 and 1896. The Matabeli are a warlike Kaffir race, who migrated from Natal in 1827 under their chief, Umsilikatse. The country is traversed by ranges of hills, — the Matoppo Hills being the chief — is watered by numerous streams, has good pasture and is believed to be rich in gold. It is now being rapidly settled and developed. Buluwayo is the capital. Other towns are Girelo and Selukwe. There are 11,000 whites and 249,000 natives. The Cape to Cairo Railroad passes through Buluwayo, which is 1,360 miles distant from Cape Town. Consult Baden-Powell, 'The Matabele Campaign* (2d ed., London 1901) ; Montague, (Interior of Central Africa) (ib. 1886) ; Norris, <Matabeleland) (ib. 1895) ; Oates, Frank, (Matabele Land and the Victoria Falls) (ib. 1881) ; Wills and Collingridge, 'The Downfall of Lobengula> (ib. 1894).

MATACHIN, mat a chen', or MATA-CHINE, ((the dance of fools,** a former well-known comic dance performed by maskers in mock-military guise. It was common in France and Italy. The dance itself was merely a display of tumbling or acrobatic feats.

MATACO, a South American Indian stock, including several tribes, whose habitat is in the Vermejo River Valley in the Gran Chaco, in northern Argentina. They are of medium size with wavy hair and subsist by hunting, fishing and cattle-raising. Their dress is made

of skins and they dwell in huts of brush. Con¬ sult (Anales de la Sociedad Cientifica Argentina> (Buenos Aires 1904) ; Brinton, D. G., (Linguistic Cartography of the Chaco Region) (Philadelphia 1898) ; Schuller/ Sobre el origen de los charruas5 (Santiago 1906).

MATADOR, in Spanish bullfights the man appointed to administer the

fatal stroke to the bull. See BullFight.

MATAGALPA, ma-ta-gal'pa, Nicaragua, town, capital of the department of Matagalpa, north of the central part of Nicaragua. It is situated in a fertile agricultural region, in which the chief products are tobacco, coffee and sugar. The lack of railroads has been a hindrance to the growth of the town, but plans are formed for connecting it with the Pacific and with Managua, the capital, and other cities. The inhabitants are mostly Indians. Pop. about 15,000.

MATAMATA, a large fresh-water turtle (Chelys fimbriata) of the Amazon and Orinoco valleys, which has a flat, weak, but heavily em¬ bossed shell, and lies in concealment among the weeds. Its neck is very long, the head is small, the nose is extended into a flat tubular proboscis and the jaws are so weak and soft that it is evident nothing can be forcibly seized with them. Hence it is believed that the frogs, small fishes and the like, upon which this turtle feeds, are sucked into the throat rather than bitten. To facilitate its concealment against both enemies and expected prey, the head and neck of this remarkable creature are covered with an outgrowth of fleshy fringes, which float about in the water, like tangled weeds, hiding its identity most effectively. Consult Gadow, Hans, (Amphibia and Reptiles> (London 1901).

MATAMOROS, Mariano, ma-re-a'no ma-ta-mo'ro-s, Mexican patriot : b. Mexico, about 1770; d. Valladolid, 3 Feb. 1814. He first ap¬ pears in 1810 as substitute priest of the parish in Jantelolco, a village south of Mexico City. In 1811 he identified himself with the revolt of Hidalgo (q.v.), and became the principal commander under Morelos (q.v.). He at¬ tained the rank of lieutenant-general on 19 April 1813. On 14 Oct. 1813 he gained the vic¬ tory of San Agustin del Palmar, and on 5 Jan. 1814 was captured at the defeat of Puruaran. He was executed in Valladolid market-place. The town of Matamoros, on the United States frontier, was named in mem¬ ory of this sterling patriot.

MATAMOROS, Mexico, a frontier town and river port opposite Brownsville, Tex., in Tamaulipas, on the right bank of the Rio Grande del Norte, about 30 miles above its mouth in the Gulf of Mexico. It consists chiefly of brick houses; around the public square stand the church, town-house, custom¬ house and a number of elegant private dwell¬ ings. A considerable trade is carried on with the United States ; horses, hides, wool, cotton¬ seeds, etc., are exported, and manufactured goods imported. In normal years its com¬ merce is valued at about $4,000,000. During the Mexican War in 1846 the town was occu¬ pied by American troops under General Taylor, on 18

May. Pop. 10,000.

MATANE, ma’tan, Canada, town in Ri-mouski County, province of Quebec, on the Canada and Gulf Terminal and the Intercolo¬ nial railroads. Steamers ply between it and Montreal and Gaspe. The town has large saw mills and extensive lumber interests. Pop.

2,056.

MATANUSKA RIVER, an affluent of Knik Arm, Cook Inlet, Alaska. The valley of this stream has extensive coal deposits which have been the subject of Federal legislation in recent years. See Alaska, and consult Martin, (Matanuska Coal Field> (in (United States Geo¬ logical Survey, Bulletin 239-*), and (Railway Routes in Alaska) (in (Document 1346, House of Representatives, 62d Congress, 3d Session5).

MATANZAS, ma-tan’zas (Sp. ma-tan’thas). Cuba, a seaport city on the north coast, capi¬ tal of Matanzas province, 52 miles by rail east of Havana. It is situated on Matanzas Bay, one of the largest, safest and most con¬ venient harbors of the western hemisphere. The city is well-built with wide, regular and paved streets, handsome plazas and public buildings and good railway communications. The caves of Bellamar and Yumuri Valley, in the neighborhood, are two popular natural re¬ sorts. Matanzas ranks in importance next to Havana in the export of sugar, molasses, rum and coffee, the exports of sugar alone aver¬ aging annually about $15,000,000. It has sugar mills, distilleries, oil refineries, tanneries, shoe factories, machine shops, *etc.* It was founded in 1693, and suffered from piractical incursions during the first century of its existence. The city was bombarded by the United States war¬ ships during the Spanish-American War in 1898, the only casualty, widely telegraphed, be¬ ing an injury to a ((Matanzas mule/ which made the animal famous. Pop. 39,000.

MATAPAN, ma-ta-pan’, Cape. See Cape

Matapan.

MATAS, Rudolph, American surgeon : b. Bonne Carre, near New Orleans, La., 12 Sept. 1860. He was educated at Barcelona, Spain;

Paris, France; Brownville, Tex.; Soule's Col¬ lege, New Orleans; Saint John's Literary In¬ stitute, Matamoros, Mex., and at Tulane Uni¬ versity. Since his graduation he has practised in New Orleans, where since 1895 he has special¬ ized in surgery. In the latter year also he was appointed to the chair of surgery at Tulane University. Dr. Matas is senior surgeon of Touro Infirmary and senior visiting surgeon at the Charity Hospital. In 1917 he was com¬ missioned major in the medical reserve corps of the United States army, was president of the American Surgical Association in 1910; of the Southern Surgical and Gynecological Associa¬ tion in 1911, and vice-president of the American Society of Clinical Surgery in 1908-10 and of the American College of Surgeons in 1913. From 1883 to 1895 he edited the New Orleans Medi¬ cal and Surgical Journal. He is the author of many treatises and monographs on surgical sub¬ jects and a frequent contributor to medical journals and textbooks.

MATCH INDUSTRY. It was nearly 800 years after the discovery of phosphorus by an Arab, named Bechel, that it was found possible to obtain a light in a short time by the friction of phosphorus and sulohur. This disco verv was

made and first applied commercially in the lat¬ ter part of the 17th century by Godfrey Haukwitz, of London, and, although the feasibility of producing a substance which, with a little rub¬ bing, would ignite, was at once demonstrated, and, although it was proven that such a sub¬ stance would be of immense commercial value, yet it was nearly a century and a quarter before a friction match was invented and successfully put on the market. The method employed by Haukwitz consisted of rubbing small particles of phosphorus between folds of brown paper and the flame produced lighted a sulphur match, but, as the phosphorus at that time was costly and considered dangerous, the match was not a suc¬ cess.

Among the earliest inventions was the <(phosphorus bottle,® containing a piece of phos¬ phorus, stirred about by a hot wire, in order to coat the bottle with oxide of phosphorus, and when a light was desired a sulphur match was thrust into the bottle and thus ignited. This ˆphosphorus bottle® was followed in 1805 by the (<oxymuriate match,® the invention of Chan¬ cel, of Paris. These matches were, however, considered dangerous, and in 1809 a mixture of phosphorus and magnesia was invented by Derepos, which was designed to do away with the danger attendant upon the use of the others.

One of the first forms of matches used was the brimstone match, and this consisted of small strips of resinous or very dry pine wood dipped in melted sulphur and lighted by means of a spark dropped from a flint and steel. This brimstone match was in almost universal use, ‘despite the fact of later inventions, till the first part of the 19th century, and even as late as 1825, but with the general awakening at that time in all branches of industry the same progress was manifest in the invention of matches and of more ingenious machinery for making them. The first invention along this line came in shape of the (<Instantaneous-Light Boxes,® called the Eupyrions and Prometheans, the invention of a Mr. Jones of London. These light boxes retailed at a very high price and were made of small sticks of dry wood tipped with a mixture of chlorate of potash and sul¬ phur,

which, when dipped into sulphuric acid, ignited. These were dangerous because of the acid and because of the liability of harm from the explosion when ignited and the cost was prohibitive to general use. This was followed in 1827 by the Congreve match, invented by a chemist, named Walker, of Stockton-on-Tees. This match was similar to the <(Instantaneous-Light Box,® but the mixture on the end con¬ sisted of gum, chlorate of potash and sulphide of antimony, placed over a coat of sulphur. They were drawn between a fold of sandpaper to ignite them. These sold for a shilling per box, containing 84 matches. They did not be¬ come generally used because they did not readily ignite and the fumes created by the burning substances were very offensive.

In 1833 the lucifer friction match, the pro¬ genitor of the modern match, was put on the market and this differed materially from the (<Instantaneous-Light Box,® at first being tipped substantially the same as the Congreve, but later having phosphorus as one of the ingre¬ dients of the mixture. The manufacture of these phosphorus matches was commenced on a large scale in 1833 at Vienna, by an Austrian named

Treschel, and gradually several factories began to produce matches of various kinds, Austria and southern Germany taking the lead in pro¬ duction. Red or amorphous phosphorus was discovered by Prof. Anton von Schrotter, a German, in 1845, and was used as early as 1855 by Lundstrom, of Jonkoping, the first manufacturer of the well-known (<safety-match.® In these matches the phosphorus is omitted from the composition placed on the tip of the match, but is placed on the side of the box, and thus the match will only ignite when rubbed on the box. On 24 Oct. 1836, Alonzo D. Phil¬ lips, of Springfield, Mass., was granted the first patent on friction matches given in the United States.

In the early days the greater portion of the matches made came from the poorer sections of London and various other large cities, and of course were made for the greater oart in cellars and badly ventilated places. This often led to disease called necrosis of the bone, caused by the handling of phosphorus, or by inhaling its fumes. This disease in time became so preva¬ lent among the match-makers that, for fear it would be carried along and spread by the manu¬ factured articles itself, the local governments took a hand in the matter and forced the owners of these ((cellars® to provide well-aired, venti¬ lated and well-lighted places for the employees. With the improvement in

surroundings also came improvements in the methods of manu¬ facture. Until about 1842 the splints or sticks of wood used were whittled out by hand en¬ tirely, but in that year a machine for cutting these splints was invented by Reuben Partridge and this practically revolutionized the trade by reducing the number of employees, producing a much better article in a shorter time and ma¬ terially reducing the cost of manufacture. This will be seen to be true when it is stated that in the year 1856 there were but 40,000,000 matches made in England, while at the present time one factory alone in this country has facilities for making 100,000,000 matches per day.

The general size of the match now made is from one and seven-eighths to two and a half inches in length, the wood used being pine, thoroughly dried. After discarding the knots and cross-grained parts, the blocks of pine are placed in the automatic feeder of a machine, run through and cut into splints. These splints are cut by knives or dies so arranged that when cut they are separated about a quarter of an inch and then set into cast-iron plates made into an endless chain by link attachments. The speed of this machine may be set accord¬ ing to the needs, from 175 to 250 revolutions per minute and as it cuts 44 matches at each revolution it is very rapid. After the splints have been cut the endless chain attachment carries them from the cutting end of the machine over a block which heats the heads to a tempera¬ ture great enough to melt paraffine. After they have passed over the heating block the chain carries them along to the receptacle containing the paraffine and composition forming the head. The reason why the match is heated before reaching these composition rollers is that the paraffine may not be chilled by coming into contact with a cold substance and also the match takes more readily to the composition when heated. Having passed the composition rollers and received its head, the match is cooled off

by blasts of cold dry air for an hour and a half and then pushed off the iron plates or endless chain by a mechanical device into small paper or strawboard boxes. These boxes, containing 65 to 500 matches, are

automatically fed into the machine and, after having received their quota of matches, are placed on a rotary

of automatic machines, that cut the wood into combs, which are dipped, dried, packed and marketed in that form, for convenient carrying in the pocket. In the number of establishments making matches the effect of the modern ma¬ chinery has made itself apparent also.

The statistics of the industry follows :

	1880	1890	1905	1909	1914
Number of establishments .	37				
Capital .	$2,714,850				
Wage earners .	2,219				
Wages .	$535,910				
Cost of materials used .					
Value of product .					

$3,298,562

$4,668,446

27

$1,941,092

1,696

$473,556

$935,008

$2,193,638

23

$5,334,035

3,185

$1,100,890

$3,284,855

$5,646,741

26

$11,953,000

3,631

$1,389,719

$4,598,878

$11,353,138

20

$11,736,000

3,800

$1,758,000

$5,202,000

$12,556,000

table, covered and packed into cases. The greater portion of the material used for the composition placed on the head of the match is imported from foreign countries, due prob¬ ably to the fact that the articles may be more cheaply produced in foreign countries owing to the cheapness of labor.

With the advances made in the methods of manufacturing matches, of necessity the ma¬ chinery for making the boxes made a corre¬ sponding advance, and has practically kept astride of the times. The majority of the in¬ ventions made in the strawboard box machinery were made by Mr. E. B. Beecher, of Westville, Conn., while the improvement of the match¬ making machinery is mainly due to McClintock Young, of Frederick, Md., J. P. Wright, of New Haven, Conn.; Charles Palmer, John W. Denmead and Joseph Baughman, of Akron, Ohio. The operation of the machinery for making the paper and strawboard boxes used in the match business is as follows : After having placed a roll of strawboard, cut to the proper width and lined either with oink or white paper, in the machine, the board is scored for the corners ; it is then glued by an auto¬ matic device, folded into an endless tube and passed on through the printing presses in that form and are printed on three sides. After being cut into proper sizes, the boxes are passed further along by the machine to a com¬ partment where they receive a coat of sand on the fourth side, thus making a striking or rubbing surface for the ignition of the match. Thus the cover is completed and the box proper is made in substantially the same way, with the exception of the printing and sanding, and the entire box is turned out from the machine at the rate of over 400 per minute.

The immense saving accruing from these im¬ proved devices has steadily reduced the cost of manufacture, and the rapidity with which the entire operation of match-making is conducted has tended to reduce the number of companies operating factories, and also to greatly reduce the number of people employed in the industry.

The effect of the automatic boxmakers on the number of people employed has been won¬ derful. To have constructed the 2,000,000 boxes now made in a single day, 40 years ago, would have taken the combined labor of 1,500 persons, whereas it now takes but 75 people

to operate the machines which turn out the same work in a more satisfactory manner. Books or cards of matches are formed by another class

The importation is about 10 per cent of the manufacture, adding that much to the United States consumption. The match-making indus¬ try has assumed considerable proportions in Norway, Sweden, Germany, France and the United States; in France the industry being a government monopoly, in the United States being largely controlled by one corporation, the Diamond Match Company, which is credited with over 75 per cent of the production, having four very large factories. It is also an inter¬ esting fact for sociologists that in this industry the wage earners receive less than one-fourth of the value of the goods they produce, first deducting the cost of materials.

MATE, an officer in the mercantile marine who acts as the assistant of the captain or master. There are four grades — first, second, third and fourth mate. The junior mate has usually the superintendence of the stowing of the vessel. The law recognizes only two classes of persons in charge of a trading vessel — the master and the mariners, the mates being in¬ cluded in the latter. In the navy, the term mate is now limited to the assistants of certain warrant officers, as boatswain's mate, gunner's mate, *etc.* See Petty Officer.

MAT# (Port., herva matte ; Sp., yerba mate), or PARAGUAY TEA, a beverage in general use in Brazil and also in general favor throughout South America, prepared from the leaves and shoots of Ilex Paraguay ensis. The chief mate-producing state is that of Parana, from which are exported many million pounds of this Brazilian ˆtea® annually. The mate tree (in appearance not unlike a small evergreen oak or ilex with a heavy and fleshy leaf) grows freely in the forest, entirely without cultiva¬ tion ; and in the forest the leaves undergo, as soon as they are plucked, a first preparation which both diminishes their weight before transportation and also keeps them from fer¬ menting.. They are dried at a fire, and then packed in sacks which are sent to the mills at Curitiba which reduce the leaves to powder and separate the various qualities. Aromatic properties retained in the dried and powdered leaves are extracted by means of infusion. As a stimulating and wholesome beverage habitu¬ ally used throughout a large part — especially the southern part of the continent, mate might well be called, not by the competing names Brazilian or Paraguayan, but more simply the South American tea. The exportation of mate

is to Parana what the exportation of coffee is to the neighbor state of Sao Paulo : the basis, practically, of economic achievement. In a re¬ cent year mate was exported to the extent of 75,885 metric tons.

MATEHUALA, ma-ta-wa'la, Mexico, a southern town of the state of Nuevo Leon, with silver-melting establishments and import¬ ant silver mines in the vicinity. Gold and copper are also found nearby in paying quan¬ tities. The city is well built, has several plazas and wide streets. Pop. 12,000.

MATERIA MEDICA (Lat. ((medical mat¬ ter®), that division or branch of medical sci¬ ence which treats of drugs, their origin, classifi¬ cation as natural products, preparation, purifi¬ cation, action on the animal economy, together with the mode of administering them for the relief and cure of disease. The action of the various agents in the materia medica upon the human family has been ascertained by experi¬ ence, sometimes by experiment, especially by administering various drugs to some of the lower order of animals such as dogs, cats, rabbits, guinea pigs, rats and mice. Perhaps the best general classification of medicine is as stimulants, sedatives, narcotics, emetics, altera¬ tives, tonics, anaesthetics, antispasmodics, as¬ tringents, spinants, cathartics, diaphoretics, diuretics, blennorrhetics, emmenagogues, haema-tinics, antacids, irritants, demulcents, coloring agents and anthelmintics. This classification is based upon the direct effect of the different drugs upon the tissues of the human economv under the various headlings which drugs may be conveniently grouped under four general sections, namely: 1. Those . which have a special action on the brain, spinal cord and the general nervous system. 2. Those which have a special action on the secretions. 3. Those which change the blood. 4. Those which act locally, when applied to the surface of the body. Section (1) includes antispasmodics, anaesthet¬ ics, astringents, narcotics, tonics, sedatives, spinants and stimulants. Section (2) includes the emetics, emmenagogues, blennorrhetics, diuretics, diaphoretics and cathartics. Section (3) includes alteratives, antacids and haematin-ics. Section (4)

includes anthelmintics, color¬ ing agents, demulcents and irritants. See Pharmacopceia ; Therapeutics.

MATERIALISM, the philosophical theory that everything which exists is ultimately mate' rial in nature, or that whatever is real can be' derived and explained in accordance with the/ laws of material phenomena. This, of course, carries with it a denial of the reality. of any finite or infinite spirit as an immaterial sub¬ stance and a repudiation of all forms of ideal¬ ism, which uses thought or intelligence as a principle of explanation. Materialism, however, may be more or less explicit and may maintain either absolutely, or with various modifications, the primary and all-embracing character of mat¬ ter. Thoroughgoing materialism asserts that nothing exists but physical bodies and physical processes. What are called immaterial sub¬ stances and processes it either declares to be unreal, or explains away as ultimately not dif¬ ferent in nature from physical substances and processes. Moreover, for materialism of this consistent and uncompromising type, matter is

dead and moved only by mechanical forces. It has no <(psychic side,® and the laws which it obeys are the expressions of a blind physical necessity. This extreme view is perhaps no longer maintained by any philosophical thinker of reputation, but in various modified forms it still exists as a tendency to subordinate mental phenomena to physical processes. The more important of these modifications and limitations may be brought under the following heads. (1) The subordination of mental phenomena, while still acknowledging more or less explicitly their distinctive character, to physical, and especially to physiological processes as their determining causes. This position does not usually avoid any of the practical consequences of mate¬ rialism, and always tends, when thought out, to revert to the strict ontological form of the theory. For it is an easy transition from the view that physical processes are able to cause mental modifications to the opinion that the mind is not fundamentally different in char¬ acter from the matter which affects it. (2) The view that matter is not a dead lump or mass that moves only when acted upon by some external body, as the older theories as¬ sumed, but that every particle of matter — every atom, or it may be every cell — is (<con-joined with a soul,® or has a <(psychical side,® or ((contains a certain element of mind-stuff.® By thus introducing an element which is dif¬ ferent in character and in mode of operation from matter, this theory seems to differentiate itself in principle from materialism. Never¬ theless, it is usually assumed tacitly by repre¬ sentatives of this

modern Hylozoism that within the atom or cell the material side is the primary and determining element, while the physical is secondary and subordinate. More¬ over, the whole mode of conception usually remains at the mechanical stage, since the im¬ material element never comes to its rights as an ideal principle, but is conceived as a mere moving force or instinct, and also since it is assumed that the complex mental life can be built up by the composition of psychic elements just as a material body is constituted by the combination of its parts. (3) The position of energism. Recently an attempt has been made to find in energy an ultimate reality in terms of which both mental and material phenomena may be expressed. It cannot be maintained, however, that the conception of energy has yet been clearly defined, nor is everyone prepared to accept the assurance of Professor Ostwald, the chief representative of the theory, that energy is the concrete reality which we directly experience. To many it may appear to be merely an abstract conception built out of the data of experience. Apart from this difficulty, however, energism does not avoid materialism merely by dematerializing its fundamental principle. In Professor Ostwald's hands, it ap¬ pears to remain essentially materialistic; since the conceptions employed and the laws which the transformations of energy obey are those of physical science.

If the period of the Middle Ages is excepted, when philosophical thought was determined mainly by theological conceptions, materialism may be said to have held a place throughout the whole history of philosophy. We have al¬ ready noticed some of the forms in which this

mode of thought continues to appear at the present day, and may now refer briefly to its more important historical representatives. The systems of the early Greek philosophers who found the fundamental principle of things in some physical substance, such as water, air or fire, cannot properly be classed as materialism. For as yet there was no opposition between the material and the spiritual. Neither the concep¬ tion of matter as lifeless and unintelligent sub¬ stance, nor of

mind as an immaterial directing principle, had yet been formed. Atomism, as developed by Democritus of Abdera, is the first thoroughgoing system of materialism. Democritus taught that the soul, like everything else, is an aggregate composed of atoms. The soul-atoms differ from all the others in being the finest, smoothest and most mobile. When they are in isolation, they are insensible, but from their union sensation arises. From sensa¬ tion all the other processes of the mental life originate. The same conclusions were main¬ tained by the Epicureans, who adopted with¬ out any essential modification the theory of atomism. In spite of the statement of the Stoics that whatever exists is corporeal, their system cannot properly be described as materialism. For the human soul and God, the all-embracing Logos of which the human reason is a spark of emanation, though constantly de¬ scribed in materialistic terms, yet function ideally as rational directing forces.

Materialism was revived in modern times by Gassendi (1592-1655) (q.v.) under the form of atomism. Modern materialism was, however, first worked out by Thomas Hobbes (q.v.), who baˆed it upon the mechanical conceptions which in his day were being made the basis of all physical science. He did not deny the existence of immaterial things — God, angels, pure spirits — but shrewdly contented himself with showing that only that which is composed of parts, that is, bodies, can be the object of thought and so be known. All real phenomena must therefore be explained in accordance with the mechanical theory and in terms of the move¬ ment of bodies. Under the influence of the de¬ veloping physical sciences and especially of the dominant conception of mechanism, material¬ istic tendencies played an important part in the thought of the 18th century. David Hartley (1704-57) and Joseph Priestley (1733-1804) (q.v.) definitely subordinated the mental life to the bodily processes, though the latter at¬ tempts to reconcile his materialism with Chris¬ tianity and even to support it by appealing to the Bible. It is in France, however, in the systems of La Mettrie (1709-51), Baron d'Hol-bach (1723-89), and Cabanis (1757-1808) (q.v.) that we find in this century representa¬ tives of materialism who do not hesitate to draw the most extreme consequences of their doctrine, to deny the existence of God and to reduce man to a mere piece of physical mechanism. Again, in the middle of the 19th century, a revival of materialism occurred in Germany which had an important popular influence. The most important names connected with this movement are Carl Vogt, J. Moleschott, H. Czolbe and Louis Buchner (whose book, (Kraft und StofP — (Force and Matter) — has been called the Bible of German materialism, and has passed through numerous editions in its English

translation). The general adoption of

the evolutionary point of view was in the beginning at least favorable to materialism. The philosophical problem seemed to be to derive from some primitive form of matter all the various modes of existence in accordance with the established laws of physical evolution. To this task Herbert Spencer (q.v.) devoted his life with a result that is variously estimated in different quarters. It can at least be said that at present thinkers are more inclined than formerly to question the adequacy of physical science to furnish a complete and final explana¬ tion of the nature of the evolutionary process.

Bibliography. — Lange, (Geschichte des Ma-terialismus) (Eng. trans., 3 vols., London 1878— 81) ; Buchner, (Force and Matter* (London 1864) ; Haeckel, (The Riddle of the Universe* (New York 1899) ; Paulsen, Untroduction to Philosophy* (New York 1895).

James E. Creighton,

Professor of Logic and Metaphysics, Cornell University.

MATHEMATICAL INDUCTION. See

Induction, Mathematical.

MATHEMATICAL SIGNS AND SYM¬ BOLS, in mathematics, a symbol employed to denote an operation to be performed, to show the nature of a result of some previous opera¬ tion, or to indicate the sense in which an indicated quantity is to be considered. The present mathematical symbolism is due to the labors of many men — men having different habits of thought, men living in different ages, men speaking different languages. A physicist will employ sine a and sine b to calculate the angle of refraction of light. Now certainly there is neither sine a nor sine b in reality; yet there are most certainly relations of reality which are accurately described in these ex¬ pressions, sine a and sine b. Such is the func¬ tion of all signs, symbols or characters. When¬ ever the eye can be brought to the aid of one’s imaging faculty, a success in grasping a thought may often be gained which would otherwise be a failure. This is in particular true in mathematics where the subject matter, while objective, is non-sensible. In this way signs, and symbols, stand for the emphatic presenta¬ tion of mathematical ideas, often very subtle even when symbolized ; and with such signs these ideas become, as it were, easy to exhibit, that is, in thought ; and the relations of these ideas become

thinkable, even very often to the whole complex train of ideas in which they occur.

One very important property for symbolism to possess is that it should be concise, so as to be visible at a glance of the eye and to be rapidly written. A sign should if possible al¬ ways represent the same object, and the same object should always be represented by the same sign. If a new sign be advisable, per¬ manently or even temporarily, it should carry with it always some mark of distinction from that which is already in use, unless it be a demonstrable extension of the latter (De Mor¬ gan). The importance of notation is recog¬ nized when it is remembered, for example, how great an advance toward the solution of the famous problem of the three bodies was made when special attention was given to it, and a special symbolism chosen for it. And the invention of the symbol = = by Gauss affords

a fine example of the advantage which may be derived from a good notation; it, without ex¬ aggeration, marks an epoch in the development of the science of arithmetic. The language of analysis, says Laplace, being in itself a power¬ ful instrument of discoveries, its notations, especially when they are necessarily and happily conceived, are so many germs of new calculi.

Nowadays we have a symbol for each mathe¬ matical operation. Sometimes, even a choice of symbols. And most of the letters of the Eng¬ lish alphabet are now engaged for special mathe¬ matical purposes. Thus :

a signifies sometimes a finite quantity; at other times a known number, the side of a triangle opposite A; also an intercept on the axis of x, and, finally, altitude.

b like a signifies a known number, and also a side of a triangle, the one opposite B ; it also stands for base; and lastly, for an inter¬ cept on the axis of y.

c signifies constant.

e signifies the base of the Napierian loga¬ rithms.

A considerable inroad has been made, also, into the Greek alphabet :

y signifies the inclination of the axis of x;

7T stands for the ratio 3.14159;

£ is used for sum of tens similarly obtained;

and

o indicates the standard deviation in the theory of measurements.

Some examples of reading notation may be given :

a + b, a — b, a -j-b, a X b, and a ~ b are read a plus b, a minus b, a divided by b, a multiplied by by and the difference between a and b.

Further: — aˆ > b,a < b, a— by aˆb, and a = ˆb are to be read a greater than by a less than b, a approximating to b, and (Gauss' symbol) a identi¬ cal with b.

Our present day symbols of operation, + (plus) and — (minus), appear to be among the oldest. Both are found in Widmann's arithmetic published in 1489, at Leipzig. In the time of Widmann, the symbols ( ), X, -f, "> and <" were unknown. Rudolff had already begun to employ the radical sign. But = had not yet appeared. In those days almost every¬ thing was expressed by words, or mere abbrevi¬ ations. Yet even then -both cubic and biquad¬ ratic equations had already been solved; the methods even were published. Oughtred used the term ˆseparatrix** in sense of a mark be¬ tween the integral and fractional parts of a number written decimally. His symbol for a separatrix was L • Stevens had already used a figure a circle over or under each decimal place to indicate its order. And of the various separatrixes that have been em¬ ployed by mathematicians, four are still em¬ ployed: (a) A vertical line is still employed to separate cents from dollars in ledgers, *etc.* Such a separatrix appears already in 1613, em¬ ployed in a work by Richard Witt. Napier also used a vertical line for the same purpose in his (Rabdologia,* in 1617; (b) a period, still employed as a separatrix, is so used as early as 1612 in the trigonometry of Pitiscus, a Ger¬ man. Napier, in his (Rabdologia,* speaks of so employing a period or comma. The period has always been the prevailing form of the decimal point in America; (c) the Greek colon, * crot above the line, was advocated as a

separatrix by no one less than Sir Isaac New¬ ton. His desire was to prevent it from being confounded with a period used as a mark of punctuation. This form of the decimal point is now commonly used in England; (d) Pi¬ tiscus is the author of an Italian work oil trigonometry. He, in this work, published in 1608, uses a comma as a decimal point. Kep¬ ler, in 1616, seems to have introduced this mark,

the comma, into Germany for the same purpose. Briggs likewise used a comma in his loga¬ rithmic tables, in 1624; and several other early English writers generally employed the comma as a decimal point. But to-day the comma is customary form of the decimal point, not in England, but in countries upon the mainland of the European continent.

For example : li£f would in America be written decimally as 1.50; in England as 1-50; and in Germany, France and in Italy as 1,50.

Symbols in general may now be mentioned: The sign of cancellation is simply drawn across the factors cancelled, like the one drawn across the zeros above. These with the ordinary Arabic and Roman numerals and the abbrevi¬ ations for the names of things, like £, s, d, $, °* \ ” ‘» constitute the main symbols of

ordinary arithmetic. In algebra there are four kinds of symbols: symbols of quantity, of operation, of relation and of abbreviation. Known quantities are represented by the first letters of the alphabet ; or by the final letters with one or more accents, as x’ , y”, 2”’. Be¬ sides letters of Greek and even of tihe Hebrew alphabet are employed. Thus M stands for ((modulus** of any system of logarithms. n has been spoken of.

Of symbols of operation, multiplication may be indicated by placing a point between the factors when both are expressed by letters, as a . b. In a series multiplication between fac¬ tors expressed even by numbers, may be ex¬ pressed by a point between such factors. When ~ is used between two quantities, it denotes difference, but not which quantity is to be sub¬ tracted from the other. Division has been sometimes indicated thus : a \ b. The radical

sign, V, when placed over a quantity_indicates

that its root is to be taken. Thus Va denotes

the square root of a. In the same manner Va

n

and Va are read the cube root and the nth root of a, respectively. Here 3 and n give the index

of the radical. A vinculum, - , a bar |,

brackets [ ], and parentheses ( ) all indicate that the quantities enclosed by them are to be regarded together as wholes. In algebra, 2 denotes that the algebraic sum of several quan¬ tities of the same nature as that to which the sign is prefixed is to be taken. The letter f, F and 0, written before any quantity, or quan¬ tities, separated by commas, as

F(x), f(x, y), $(x,y,z), et cetera,

denote quantities depending upon the quantities, or the quantity, within the parenthesis, without designating the nature of the relation. The signs of proportion, : : : :, when placed be¬

tween quantities show them to be in proportion. R, r and P, and other symbols, denote radii of circles. L, l and ˆ may denote latitude. The leading letters of the Greek alphabet are also

sometimes used to denote known angles ; and the final letters of the same alphabet to denote unknown angles. And when several quantities of the same kind are involved in an investiga¬ tion, they may be designated by the same letter differently accented; thus: a a" a" ; (h a2 and a3. An older usage of o denotes an infinitely small quantity; and only sometimes absolute zero. Clearer thinking has impelled moderns to use « (iota) or i foh an infinitesimal, and to denote by o, absolute zero, and that only. The symbol first employed by Wallis in the 17th century, has long been used both for a variable increasing without limit and for absolute infinity. Taylor, in 1898, introduced the symbol a/>, a contraction of % for an in¬ finite, the reciprocal of an infinitesimal. The sign .'. denotes then or therefore; and the sign V, since or because. The y~f(x) is a general sign, indicating that there is a general relation between y and x — that is, y and x are so con¬ nected that x cannot change without y changing at the same time. The symbol F (x , y, z,) =0 implies that there is a general relation between x, y and z, without specifying the relation. The symbols sin, cos, tan, co-tan, sec, co-sec, ver-sin, co-ver-sin, are abbreviations used, re¬ spectively, for the words "sine," "cosine," "tan¬ gent," "cotangent," "secant," "co-secant," "versed-sine" and "coversed-sine." When the arc is supposed, as in trigonometry, to depend for its value upon any of the trigonometric lines, the function is called the inverse tri¬ gonometric function. The following symbols are used to denote this kind of a relation:

sin — 1y, cos — 1y, tan — 1y, cot — 1y, sec — *y, co-

$ec — ay, ver-sin — 1y, co-ver-sin — 1y.

These stand, respectively, for the arc upon the sine, cosine, tangent, cotangent, _ secant, co¬ secant, versed-sine and coversed-sine, — is y. The principle of notation has been extended to all inverse functions ; thus :

log 1y, d — 1 (x d x), *etc.*

These stand, respectively, for the quantity whose logarithm is y\ and the quantity whose differen¬ tial is x d x, *etc.* The differential of a func¬ tion, or independent variable, is denoted by d, thus :

d (y2) 6=3 2ydy .

If we suppose the form of a function to vary, the symbol employed to denote the variable is <5, thus :

6u, Ty, <be.

If both the form of the function and the inde¬ pendent variable of the function vary together, the resulting variation is denoted by the symbol D, thus :

D f (x,y) .

The differential is the difference between two consecutive states of the quantity differentiated. If it is desired to represent the difference be¬ tween two states of a function which are not consecutive, the symbol A is emplo3ˆed. Succes¬ sive finite differences are represented by the symbols :

A u, A2m, A 3m, A 4u, *etc.*

We have already spoken of 2 as used in algebra, where it denotes an algebraical sum. Its use in the calculus is principally restricted to the denotation of the sum of the finite dif¬ ferences of a function. The symbol / denotes

an integration to be performed; while the

symbol fb is used to denote a definite integral

taken between the limits a and b. The symbol T (jr+l) stands for the integral fe — vv x~1dv The vector sign is U. TP, in quaternions, should be read tensor of B.

In the foregoing list nearly all the symbols, commonly employed by American mathe¬ maticians, have been enumerated ; as well as some used abroad.

MATHEMATICAL SOCIETIES AND JOURNALS. The oldest of the sciences, mathematics has always been cultivated and fostered, often with a degree of preferment over the later branches of the tree of knowl¬ edge, by the universities, the great academies and the other scientific bodies of a general scope throughout the civilized world. The in¬ dispensable condition for satisfactory progress, facility of publication, has been provided for mathematicians in a very large degree by the transactions* and (Proceedings) of learned societies

representing a wide scientific field. The specialist will usually prefer the mathe¬ matical journals proper, which indeed send out in a steady flow the finest product of the mathematical genius of the age. Theirs is the post* of honor; it lies with them, by critical en¬ couragement or repression, to maintain the standard of excellence of a great profession.

But there remains another set of functions, which to-day are more and more efficiently per¬ formed by the mathematical societies. These include in their membership nearly every mathematician of standing in the four quarters of the globe. They provide a professional forum for the discussion of mathematical ques¬ tions and of mathematical interests, and fur¬ nish the powerful stimulus of association and solidarity. Their activities cover a wide range, including the presentation and publication of papers and memoirs, the encouragement of bibliographic and encyclopedic undertakings, the organization of international congresses, special conferences and lectures, the exercise of a beneficial advisory influence on the mathe¬ matical curricula and equipment of the schools and universities, the diffusion of a better under¬ standing of the science in the educated world, the formation of libraries, collections of models, etc., and the promotion of agreeable social and personal relations among mathe¬ maticians.

The following list comprises the principal mathematical societies of the world, arranged in chronological order of foundation, with men¬ tion of their several publications :

1690. Mathematische Gesellschaft in Hamburg. Mitteil un¬ gen, 1881 — .

1778. Wiskundig Genootschap te Amsterdam. Wiskundige Opgaven mit de Oplossingen, 1855 — ; Nieuw Archief voor Wiskunde, 1875 — ; Revue Semestrielle des Publications Math6matiques, 1892 — .

1866. London Mathematical Society, Proceedings, 1865—. 1866. Moscow Mathematical Society, Transactions, 1869 — . 1873. Soci6t6 Mathematique de France, Bulletin, 1873 — .

1883. Mathematical Society of Edinburgh, Proceedings,

1884 — .

1884. Circolo Matematico di Palermo, Rendiconti, 1884 — . 1886. Mathematical Society of Charkow, Bulletin, 1879. 1888. American Mathematical Society, Bulletin, 1891 — ;

Transactions, 1900 — ; Mathematical Papers of the Chicago Congress, 1896; Colloquium Lectures on Mathematics, 1905, 1910, 1913, 1914.

1890. Deutsche Mathematiker-Vereinigung, Jahresbericht, 1892—

1395. British Mathematical Association, Mathematical Ga¬ zette, 1894 — .

1909. Indian Mathematical Society, Journal, 1909 — .

1909. Calcutta Mathematical Society, Bulletin, 1909 — .

1911. Sociedad Matematica Espanola, Re vista, 1911 — .

1915. Mathematical Association of America, American Mathematical Monthly, 1894 — .

A history of the Hamburg Society, pre¬ pared in connection with the celebration in 1890 of its 200th anniversary, may be found in vol¬ ume II of the Elitteilungen.0

The (Wiskundig Genootschap) renders an especially valuable service in the mathematical world by the publication of the (Revue Semestrielle, } a condensed abstract of all the mathe¬ matical papers published in the various journals, constantly brought up to within a few months of the current date. The value to a productive mathematician of this great labor-saving device is quite inestimable.

The first president of the London Mathe¬ matical Society was the illustrious De Morgan, and the roll of members has included the names of Cayley, Sylvester, H. J. S. Smith, Clifford, Salmon, Stokes, Kelvin and most of the other eminent British mathematicians of the time. The secretary's office was efficiently filled for the long period of 34 years (1867-1901) by the late Robert Tucker. The ˆProceedings,0 which is the leading British mathematical journal, has recently been enlarged in size. The member¬ ship of the society is about 300.

The Societe Mathematique de France has about the same membership. The meetings are held twice a month at the Sorbonne. The presi¬ dent of the society for 1916 is M. Fouche, the secretaries are MM. Levy and Montel. The council includes Appell, Borel, Jordan, Pain-leve and Picard. The (Bulletin) is issued quarterly.

The Deutsche Mathematiker-Vereinigung represents in full measure the fruitfulness and vigor of German mathematics. Its organization had been foreshadowed for many years, but was actually brought about in 1890 by the initiative of members of the mathematical-astronomical section of the older Society of German Natural Scientists and Physicians, in affiliation with which the Vereinigung still con¬ tinues to hold its annual _ meetings. The ap¬ pearance of the (Jahresbericht,) whose volumes were originally issued in parts of book form, signalized the beginning of a series of invalu¬ able reports on various branches of mathe¬ matics, beginning with the celebrated report by W. F. Meyer on (The Present Status of the Theory of Invariants) (Vol. I, 1892). These reports and other undertakings of a bibliograph¬ ical, critical and statistical character ultimately led to the plan of the Encyclopedia of Mathe¬ maticsˆ now in course of publication byTeub-ner, under the auspices of academies of science of Munich, Vienna and Gottingen. The Vereinigung has also played an active part in the organization of the international congresses of mathematicians, notably those of Zurich (1897) and Heidelberg (1904). It has interested itself effectively in the questions concerning . the teaching of mathematics in the schools, univer¬ sities and technical institutes, the training of teachers, the correlation of instruction in pure and applied mathematics and other matters of reorganization and progress in education, some of which are phases of an international reform

movement. A history of the Vereinigung by the former secretary and present editor of the (Jahresbericht,° Prof. A. Gutzmer of Jena, was issued on the occasion of the Heidelberg con¬ gress. The society has at present about 650 members. Meetings are held annually. It re¬ cently received from B. G. Teubner the gift of a complete set of his extensive mathematical publications as the nucleus of a library. The (Jahresbericht,° now published monthly with occasional double bimonthly numbers, contains, beside the earlier reports mentioned above and a record of the society's activities, addresses, biographies and necrologies, original papers, criticisms, discussions and reviews and notes on current events. More extensive papers are pub¬ lished as separate volumes.

The American Mathematical Society was originally organized as the New York Mathe¬ matical Society in 1888 and was reorganized under its present national title in 1894. Syl¬ vester's work at Baltimore (1877-84) and the influence of young mathematicians returning from study in Germany had produced a tidal movement of which the

society has since its early days been the forefront and exemplar. Its membership, now about 740, includes prac¬ tically every mathematician in the United States, and a considerable number of foreign representatives. The (Bulletin,0 published since 1891 in monthly numbers from October to July, is of the type later adopted by the <Jahresbericht,0 but contains also the official reports of the frequent meetings of -the society, with abstracts of the papers presented and a com¬ plete bibliography of recent mathematical publi¬ cations. Another special feature of the (Bulle¬ tin) is the extensive <(Notes10 on current events in the mathematical world. The transac¬ tions,0 founded in 1900, is the official organ of the society for the publication of the more im¬ portant papers read before it. The library of the society, now including 5,000 bound volumes, is deposited in the Columbia University Li¬ brary.

Regular meetings are held four times a year in New York and twice a year in Chicago. Officers are elected at the annual meeting in December. A summer meeting is also held each year at some specially chosen place. At intervals of two or three years the summer meetings are reinforced by colloquia, or courses of lectures by specialists on recent ad¬ vances in their particular lines of-work. The rapid growth of mathematical interest in the Central and Western sections of the country have led to the organization of a Chicago Sec¬ tion (1898), a San Francisco Section (1902) and a Southwestern Section (1907). The sec¬ tions meet once or twice each year.

The presidents of the society have been J. H. Van Amringe, 1888-90; Emory McClintock, 1890-94; G. W. Hill, 1894-96; Simon Newcomb, 1896-98; R. S. Woodward, 1898-1900; E. H. Moore, 1900-02; Thomas S. Fiske, 1902-04; W. F. Osgood, 1904-06; Henry S. White, 1906-OS; Maxime Bocher, 1908-10; H. B. Fine, 1910-12; E. B. Van Vleck, 1912-14; E. W. Brown, 1914—16; L. E. Dickson, 1916—. The secretaries have been Thomas S. Fiske, 1888-95, and F. N. Cole, 1895- The business of the society is transacted by a council composed of the officers, ex-presidents, editorial committee of the

transactions,* secretary of the Chicago Sec¬ tion and 12 other members elected for a term of three years.

While the society is more especially devoted to the advancement of the higher branches of mathematics, it exerts a considerable influence both directly and through its members on the teaching of the subject in the schools and uni¬ versities. The report of a committee of the society on college entrance requirements in mathematics has been adopted by the College Entrance Examination Board. A report on the requirements for the master's degree, pre¬ sented to the Chicago Section, has been favor¬ ably recognized by several of the Western uni¬ versities. The society has also contributed materially to bring about the organization of associations of teachers of mathematics throughout the country, a movement especially stimulated by Professor Moore's presidential address in 1902.

Historical notices of the society may be found in the presidential addresses of Dr. McClintock (ˆBulletin,* January 1895) and Profes¬ sor Fiske (ib., February 1905). Other notices are scattered through the secretary's reports. The society, which has increased its member¬ ship by 50 per cent in the last 12 years, serves to-day to bring together in a harmonious whole all the mathematical activities of America. It is a centre not only of scientific activity but also of professional good feeling and agree¬ able personal relations.

The British Mathematical Association, for¬ merly known as the Association for the Im¬ provement of Geometrical Teaching, is devoted to improved instruction in elementary mathe¬ matics.

The Mathematical Association of America, organized in 1915 to represent the field of col¬ legiate mathematics, has now over 1,100 mem¬ bers. It has adopted as its official organ the American Mathematical Monthly . The presi¬ dents of the Association have been E. R. Hedrick, 1915-17, and Florian Cajori, 1917-). The secretary-treasurer is W. D. Cairns. Meet¬ ings are held twice a year, usually in connec¬ tion with those of the American Mathematical Society. Nine local societies have thus far been organized, holding meetings usually twice a year.

The international congresses of mathema¬ ticians have been mentioned above. While these are individually but temporary gather¬

ings, they had come, before the war, to be an established institution of great and permanent value. Their sequence of time and place is : Paris, 1889; Chicago, 1893; Zurich, 1897; Paris, 1900; Heidelberg, 1904; Rome, 1908; Cam¬ bridge, 1912.

The exchanges of the American Mathemat¬ ical Society include about 140 journals which regularly publish mathematical papers of ap¬ preciable value. In the notices appended to his collection of abbreviated titles of journals ((Jahresbericht der Deutschen Mathematiker-Vereinigung,* Vol. XII, 1903, pp. 426-444) Felix Muller sets the grand total ever published of all journals of a fairly mathematical complexion at about 1,200, of which over 600 now survive. More than 300 journals are cited in the refer¬ ences of the early numbers of the Encyclopedia of Mathematics.* The (Revue Semestrielle>

reports the contents of some 250 journals; the (Fortschritte* list is about 170.

The oldest journals in Muller's list are the Philosophical Transactions) and the (Journal des Savants, *both dating from the year 1665. Following these are the publications of the academies of Paris (1666) and Bologna (1690). From the 18th century there still survive, be¬ side the journals of the academies (Berlin 1700; Petersburg, 1724; Gottingen, 1751; and others), also the (Memorie di Matematica e di Fisica) (1782) of the Societa Italiana, the <Bulletin) (1789) of the Societa Philomatioue of Paris, and the journal de l'Ecole Polytechnique> (1794). Among the extinct jour¬ nals may be mentioned the (Ladies' Diary* (1704), (Gentlemen's Diary> (1741), these two uniting in the (Lady's and Gentlemens Diary) (1841-71) ; the (Cambridge Mathematical JournaP (1839-45), the forerunner of (Sylvester's Quarterly JournaP ; Gergonne's (Annales de Mathematique* (1810-31) ; Tortolini's (Annali* (1850-57), superseded by the present (Annali di Mathematical and the various journals (1786-1825) of Hindenburg, Breithaupt, Bessel, Kretschmar. In America the ephemeral exist¬ ences are chronicled of the Mathematical Cor¬ respondent* (1804-06), (Adrain's Analyst* (1808) and Mathematical Diary* (1825-32), Mathe¬ matical Companion > (1828-31), Mathematical Miscellany* (1836-39), (Cambridge Miscellany of Mathematics, Physics and Astronomy) (1842-43), (Runkle's Mathematical Monthly* (1858-61). The publication of the (Analyst) (1874-83) marked a substantial advance. Mar¬ tin's Mathematical Visitor* (1877) and Mathematical Magazine) (1882), the Mathe¬ matical Magazine) (1882) and <

Mathematical Messenger* (1884) are extinct.

The following list gives the date of founda¬ tion, the title and the present place of publica¬ tion of the strictly mathematical journals now in existence and not already cited in connec¬ tion with the list of mathematical societies above :

1826. ‘ Crelles Journal fur die reine und angewandte Mathematik,’ Berlin.

1836. ‘ Liouville’s Journal de Math6matiques pures et ap-pliqu6es,’ Paris.

1842. ‘ Nouvelles Annales de Math6matiques.’

1855. ‘ Quarterly Journal of Pure an4 Applied Mathematics.’ London.

1858. * Annali di Matematica pure ed applicata,’ Milan.

1863. ‘ Giornale di Matematiche di Battaglini,’ Naples.

1868. ‘ Mathematische Annalen,’ Leipsic.

1870. ‘ Bulletin des Sciences Math6matiques,’ Paris.

1871. * Jahrbuch viber die Fortschritte der Mathematik,’

Berlin.

1872. ‘ Messenger of Mathematics,’ London.

1878. ‘ American Journal of Mathematics,’ Baltimore.

1881. 4 Mathesis,’ Ghent.

1882. 4 Acta Mathematica,’ Stockholm.

1884. ‘ Annals of Mathematics,’ Cambridge, Mass.

1884. ‘ Bibliotheca Mathematica,’ Leipsic.

1886. ‘ Periodico di Mathematica ’ (Supplemento 1898), Leghorn.

1890. | Nyt Tidsskrift for Matematik,’ Copenhagen.

1891. ‘ Revue de Math6matiques speciales,’ Paris.

1894. j American Mathematical Monthly,’ Springfield, Mo.

1894. | LTnterm6diaire des Math6maticiens,' Paris.

1895. ' Gazeta Matematica,' Bucharest.

1896. * II Pitagora,' Palermo.

1896. ' Revue de Math6matiques,' Turin.

18ˆ7. ' Wiadomosci Matematyczne,' Warsaw.

1898. 4 Formulaire Math6matique,' Turin.

1898. * L' Education Mathdmatique,' Paris.

1898. 4 Bolletino di Bibliografia e Storia delle Scienze Mate¬

matiche,' Turin.

1899. 4 L' Enseignment Mathematique,' Paris.

1900. ' Bolletino di Matematica,' Bologna.

1906. Sphinx Oedipe, Nancy.

1909. Mathematics Teacher, Syracuse, N. Y.

1912. Tohokn Mathematical Journal, Sondai, Japan.

MATHEMATICAL SOCIETY, The

American. See American Mathematical Society, The.

MATHEMATICAL SOCIETY, The Lon¬ don, an association formed in the English capi¬ tal in 1865 by a number of English professors of mathematics for the promotion of that sci¬ ence. It was incorporated in 1894. Since its formation it has regularly published (Proceedings) and papers on mathematical subjects. It has an excellent library of scientific works. The Society meets monthly from November to June,

the anniversary meeting being held in November.

MATHEMATICS. The science of mathe¬ matics — what shall it be said to be? A ques¬ tion much discussed by philosophers and mathe¬ maticians in the course of more than 2,000 years, and especially with deepened interest and insight in our own times. Many have been the answers, but none has approved itself as final. All of them, by nature belonging to the (<literature of knowledge,® fall under its law and tend to ((perish by supersession.® Naturally enough conception of the science has had to grow with the growth of the science itself. For it must not be inferred that mathematics, because it is so old, is dead. Old it is indeed, classic already in Euclid's day, being surpassed in point of antiquity by but one of the fine arts and by none of the <(natural® sciences; but it is not only the oldest science, it is also as new as any, living and flourishing to-day as never before, advancing in a 'thousand directions by leaps and bounds. It is not merely as a giant tree throwing out and aloft myriad branching arms in the upper regions of clearer light and plunging deeper an-d deeper root in the darker soil beneath. Rather is it an immense forest of such oaks, which, however, literally grow into each other, so that, by the junction and intercrescence of limb with limb and root with root and trunk with trunk, the manifold wood becomes a single living organic growing whole. A vast complex of interpenetrating theories — such the science now actually is, but it is more wondrous still potentially, component theories continuing more and more to grow and multiply beyond all imagination and beyond the com¬ pass of any single genius, however gifted. What is this thing so marvelously vital? What does it undertake? What is its motive? How is it related to other modes and interests of the human spirit?

One of the oldest, at the same time the most familiar, of the definitions conceived mathe¬ matics to be the science of magnitude, where magnitude, including multitude as a special kind, signified whatever was <(capable of in¬ crease and decrease and measurement.® Capa¬ bility of measurement was the essential thing. That was a most natural definition of the science, for magnitude is a singularly funda¬ mental notion, not only inviting but demand¬ ing consideration at every stage and turn of life. The necessity of finding out how many and how much was the mother of counting and measurement and mathematics, first from ne¬ cessity and then from joy, so busied itself with these things that they came to seem its whole employment. But now the ordinary notion of measurement as the repeated application of a constant finite unit has been so refined and gen¬

eralized, on the one hand through the creation of the so-called irrational and imaginary num¬ bers (see Algebra; Complex Variable), and on the other by use of a scale, as in non-Euclidean geometry (see Non-Euclidean Geometry; Analytical Metrics), where the unit appears to suffer lawful change from step to step of its application, that to retain the old words and call mathematics the science of measurement seems quite inept as no longer telling either what the science has actually be¬ come or what its spirit is bent upon.

Moreover, the most striking measurements, as of the volume of a planet, the valency of atoms, the velocity of light or the distance of star from star, are not done by direct repeated application of a unit. They are all accom¬ plished by indirection. Perception of this fact it was which led to the famous definition by the philosopher and mathematician, Auguste Comte, that mathematics is the ((science of indirect measurement.® Here doubtless we are in presence of a finer insight and a larger view, but the thought is not yet either wide enough or deep enough.

For it is obvious that there is much admit¬ tedly mathematical activity that-is not in the least concerned with measurement whether direct or indirect. In projective geometry (which see), for example, it was observed that metric considerations were either absent or subordinate. The fact, to take a simplest example, that the two points determine a line uniquely, or that the intersection of a sphere and a plane is a circle, is not a metric fact : it is not a fact about size or quantity or magni¬ tude. In this field it was position rather than size that to some seemed the centre of interest, and so it was proposed to call mathematics the science of magnitude or measurement and posi¬ tion.

Even as thus expanded, the definition yet excludes many a mathematical realm of vast, nay, infinite extent. Consider, for example, that immense class of things known as opera¬ tions. These are limitless alike in number and in kind. Now it so happens that there are systems of operations such that any two opera¬ tions of a given system, if thought as follow¬ ing one another, together thus produce the same effect as some other single operation of the system. For an illustration, think of all possible straight motions in space. The oper¬ ation of going from a point A to a point B, followed by the operation of going from B to a point C, is equivalent to the single operation of going from A to C. Thus the system of such operations is a closed system : combina¬ tion of any two operations yields a third not

without but within the system. Now the theory of such closed systems — called groups (see Groups) of operations — is a mathematical theory of colossal proportions. But it is obvi¬ ous that an abstract operation, though a very real thing, is neither a position nor a magnitude.

This way of trying to come at an adequate conception of mathematics, viz., by attempt¬ ing to characterize in succession its distinct domains, or varieties of content, or modes of activity, is not likely to prove successful. For it demands an exhaustive enumeration, not only of the fields now occupied by the science, but also of those destined to be conquered by

it in the future, and such an achievement would require a prevision that none may claim.

Fortunately there are other paths of ap¬ proach that seem more promising. Every one has observed that mathematics, whatever it may be, possesses a certain mark, namely, a de¬ gree of certainty not found elsewhere. So it is, proverbially, the exact science par excel¬ lence. Exact, no doubt, but in what sense? To this an excellent answer is found in a defi¬ nition of the science given about one gener¬ ation ago by a distinguished American mathe¬ matician, Prof. Benjamin Pierce: mathematics is the science which draws necessary conclu¬ sions — a formulation of like significance with the fine mot by Prof. William Benjamin Smith, to wit : mathematics is the universal art apo-dictic. These statements, though neither of them may be entirely adequate, are, both of

them, telling approximations, at once foreshad¬ owing and neatly summarizing for popular use the conclusion reached by the creators of mod¬ ern logic (see Symbolic Logic), that mathe¬ matics is included in, and, in a profound sense, may be said to be identical with, symbolic logic. Observe that the emphasis falls on the equality of being ˆnecessary,® or logically correct. Naught is said about the conclusions being true. That is another matter for subsequent consideration.

But why are mathematical conclusions cor¬ rect? Is it that the mathematician has a rea¬ soning faculty essentially different in kind from that of other men? By no means. What,

then, is the secret? Reflect that conclusion im¬ plies premises, that premises involve terms, that terms stand for ideas or concepts or no¬ tions, and that these latter are the ultimate material with which the spiritual architect, called the reason, designs and builds. Here, then, one may expect to find light. The apo-dictic quality of mathematical thought, the cor¬ rectness of its conclusions, are due, not to any special mode of ratiocination, but to the char¬ acter of the concepts with which it deals. What is that distinctive characteristic? The answer is : precision, sharpness, completeness of determination. But how comes the mathe¬ matician by such completeness? There is no mysterious trick involved : some ideas admit of such precision and

completeness of deter¬ mination, others do not; and the mathemati¬ cian is one who deals with those that do. Law, says Blackst®ne, is a rule of action pre¬ scribed by the supreme power of a state com¬ manding what is right and prohibiting what is wrong. But what are a state, and supreme power, and right and wrong? If all such terms admitted of complete determination as do, for example, such terms as triangle and circle, then the science of law would be a branch of pure mathematics. And such, too, to take another example, would be psychology, were conscious¬ ness, mind, perception, imagination, and all kindred terms, as completely determinable as the notion sphere. It will be asked, does not the lawyer sometimes arrive at correct con¬ clusions? It may be admitted that he does sometimes, and so, too, of the psychologist or historian or sociologist. When this happens, however, when these students arrive, it is not meant at truth, for that may be by happy chance or by intuition, ‘but when, strictly speaking, they arrive at conclusions that are

correct, at conclusions, i.e., that follow log¬ ically from completely ascertained data or premises, then that is because they have been for the time acting in all literalness the part of mathematician. That is not to aggrandize the science of mathematics. Rather is it for credit to all serious thinking that, in any con¬ siderable garment of thought, one may find here and there, rarely enough sometimes, a mathetic fiber, woven in some perhaps excep¬ tional moment of precise conception and rigor¬ ous reason. To think aright is no character¬ istic striving of a class of men. It is a com¬ mon aspiration. Only, as before said, the stuff of thought is mostly intractable, formless, nebu¬ lous, like some milky way awaiting analysis into distinct star forms of completely determi¬ nate ideas.

The mentioned aspiration and the tendence of all thought, of all science, to assume the character of mathematics admit of many illus¬ trations, which at the same time serve to show clearly the ultimate distinction between that thought which is mathematical and that which is not. One or two such illustrations must suffice.

There is no more common or more im¬ portant scientific notion than that of function. The term is applied to either of two variable things (including constants conceived as special variables, whose variation is zero in amount) so related that to any value or state of either there corresponds one (or more) value (values) or state (states) of the other. Any two corresponding values or states are said to constitute a pair of values or states, and any two functionally related variables may be

called a. function-pair. Examples of such func¬ tion-pairs abound on every hand, as the radius and the area of a circle ; the corresponding values of x and y in an equation, 2x — elasticity of medium and velocity of sound or other undulation; the amount of sodium chlo¬ ride formed and the time occupied by the reac¬ tion that generates it; the prosperity of a given community and, ceteris paribus , the intelligence of its patriotism. Indeed it may be that there is no thing which is not in some sense a func¬ tion of every other. Be this as it may, one thing is very certain, namely, a very great part, if not the whole, of our thinking is pri¬ marily concerned with functional relationships, deals, that is, immediately or mediately with pairs or systems of corresponding values or states or changes. Behold, for example, how the parallelistic psychology searches for corre¬ lations between psychical and physical phe¬ nomena. Witness, too, the sociologist seeking to determine a law of correspondence between the homogeneity of a population and its peace¬ fulness ; the anthropologist attempting to find a formula correlating mental power and brain-weight; the physicist's determinations of de¬ pendence between pressure and volume of a gas; and so on and so on. It is, then, here, in the immense and wondrously diversified do¬ main of correspondence, the answering of value to value, of change to change, of condition to condition, of state to state, that the knowing activity, the intellect, finds its field.

What is it precisely that we seek to do by means of a correlation? The answer is: when one or more facts are given or known, to pass with absolute certainty to the correlative fact or

facts. For example, if y — sin x, then, if a value be assigned to x or y , the corresponding value or values of y or x are determined by the equation, or definition, of the functional corre¬ spondence between the assemblage of values which x may take and the assemblage that v may assume. To effect the desired transition from the given or known to the dependent ungiven or unknown obviously requires one or more formulae or equations which shall serve to define precisely the manner of corre¬ spondence,- the law of dependence. Where do such defining formulae or equations come from? Strictly speaking, they are never found , they are always assumed, assumed immediately or else mediately, that is, in the latter case, de¬ rived by assumed logical processes from such as belong to the former case. This statement is valid in every field of logical thought. In every field it is true that from nothing assumed nothing can be derived. Now, nothing is easier than to write down a perfectly definite formula that does not tell how cheerfulness depends on climate or retentiveness on interest or the volume of a cube on its dimensions. The men¬ tioned inapplicability or <(inutility® does not, however, at all tend to invalidate the formula regarded as defining a certain law of correla¬ tion. Indeed a given formula may be per¬ fectly intelligible in itself ; it, alone or joined with others in similar case, may state a perfectly intelligible law of correspondence, which, nevertheless, may have no validity whatever in the physical or in the sensuous universe. What is it, then, that guides in the choice of for¬ mulae? For such determination or choice seems hardly referable to chance alone. . The answer is that, broadly speaking, choice is determined by curiositv, and curiosity is itself not determined by choice, but is rather matter of native gift or predilection.

Just here we are in position where we have only to look steadily a little in order to per¬ ceive clearly the sharp and ultimate distinc¬ tion between mathematics, on the one hand, and physical or other science, on the other. These are discriminated according to the kind of curiosity whence they spring. The mathe¬ matician is curious about definite abstract relationships, about logically possible modes of order, about varieties of abstract implica¬ tions, about completely

determined or deter¬ minable functional relationships considered solely in and of themselves, that is. without the slightest concern about the -question whether or no they have external or sensuous or other sort of validity than that of being logically thinkable. It is the aggregate of logically thinkable relationships that consti¬ tutes the mathematician's universe, an in¬ definitely infinite universe, worlds in worlds of worlds in worlds of wonders, inconceivably richer in mathetic content than can be any outer world of sense. Immense indeed and marvelous is our own world of sense with its rolling seas and stellar fields and undulating ether. But compared, one need not say with the entire world of mathesis, but only with the hyperspaces (see Hyperspaces) explored by the geometrician, the whole vast region of the sensuous universe is literally as a merest point of light in a shining skv.

Now this mere speck of a physical universe, in which the chemist, the physicist, the astrono—

mer, the biologist, the sociologist, and the rest of nature students, find their great fields, may be, as it somewhat seems-to be, a realm of invariant uniformities or laws; it may be a mechanically organic aggregate, connected into an order whole by a tissue of completely definable functional relationships ; and it may not. In other words, it may be that the uni¬ verse eternally has been and is a genuine cosmos, that the external sea of things im¬ mersing us, although it is ever changing in¬ finitely, changes only lawfully, in accordance with a system of immutable laws, constituting an invariant (see Invariants and Covariants) at once underived and indestructible and securing everlasting harmony through and through ; and it may not be such. The student of nature assumes, he rightly assumes, that it is, and, moved and sustained by appropriate curiosity, he endeavors to find in the outer world what are the elements and relationships assumed to be valid there. ((Natural science,® said Bernhard Riemann, (<is the attempt to comprehend nature by means of exact con¬ cepts.® The mathematician, as such, does not make that assumption and does not seek for relationships in the outer world.

Is the assumption correct? Undoubtedly it is admissible, and as a working hypothesis it is undoubtedly very useful or even indis¬ pensable to the student of external nature; but is it true? The mathematician, as man, does not know although he greatly cares.

Man, as mathematician, neither knows nor cares. The mathematician does know, how¬ ever, that, if the assumption be correct, every relationship that is valid in nature is, m ab-stractu, an element in his domain, a subject for his study. He knows, too, at least he strongly suspects, that, if the assumption be not correct, his domain remains the same abso¬ lutely. The two realms, of mathematics, of natural science, like the two attitudes, the mathematician's and that of the nature student, are fundamentally distinct and disparate. To think logically the logically thinkable — that is the mathematician's aim. To assume that nature is thus thinkable, an embodied rational logos, and to discover the thought supposed in¬ carnate there — these are at once the principle and the hope of the student of nature.

Suppose the latter student is right, suppose the outer universe really is an embodied logos of reason, an infinitely intricate garment ever weaving and ever woven, warp and weft, of logically determinate relationships, does that imply that all of the logically thinkable is incorporated in it? It seems not. A cosmos, a harmoniously ordered universe, one that through and through is self-compatible, can hardly be the whole of reason materialized and objectified. There appears to be many a ration¬ al logos. At any rate the mathematician has delight in the construction and contemplation of divers systems that are inconsistent with one another, though each is composed of consistent relationships. He constructs in thought, as witness the geometry of hyperspaces, ordered worlds, worlds that are possible and logically actual, and he is content not to know if any of them be otherwise actual or actualized. There is, for example, a Euclidean geometry and there are infinitely many kinds of non-Euclidean (see Non-Euclidean Geometry). These theories

regarded as “applied® mathematics, regarded, that is, as true descriptions of some one actual space, are incompatible. In our universe, to be specific, if it be, as Plato thought and nature science takes for granted, a geometrized or geometrizable affair, then one of these geometries may be objectively valid in it. But in the vaster world of thought, in’ the world of pure mathesis, all of them are valid; there they coexist, and interlace among them¬ selves and others as differing strains of a hyper-cosmic harmony.

A geometry, indeed any mathematical theory, consists of a definite system of deter¬ minate compatible principles or assumptions or hypotheses or postulates (commonly called axioms) together with their implications, their logically deducible consequences. Accordingly, natural science, the term being broadly em¬ ployed to signify knowledge that is ultimately dependent upon “observation and experi¬ ment,® cannot be or become strictly mathe¬ matical. It aspires to the character, and ap¬ proximates and imitates the form, of mathe¬ matics, but it can never really attain either. Mathematics is concerned with implications, not applications. Such terms as “applied mathematics,® “mathematical physics,® and the like, are indeed in common use, but the signification, rightly understood, is always that of a mixed doctrine, a doctrine that is thor¬ oughly analyzable into two disparate parts : one of these consists of determinate concepts formally combined in accordance with the established canons of ratiocination, i.e., it is pure mathematics and not natural science; the other is matter of observation and experi¬ ment, i.e., it is natural science and not mathe¬ matics. No fibre of either component is a filament of the other. Whether the behavior of natural phenomena is or is not exactly descriptible by. mathematical formulae can never be ascertained, for the means to “natural knowledge,® viz., observation and experiment, are fallible by nature, and, however refined or prolonged, are incapable of yielding absolute exactness or certainty. Of any so-called law of nature,, “the most, the last, the best that can be said® is that its agreement with the facts is so nearly perfect that every discrepance, if any there be, has escaped detection.

Cannot the like be said of mathematics? In the foregoing conception of mathematics it has indeed been tactily assumed that some ideas are completely determinable, that there are possible systems of postulates absolutely free alike from obscurity and from interior contra¬ diction,

that the postulates of such a system import a perfectly definite body of ascertain¬ able implications, and that there is a perfect standard of logic quite independent of time and place and of the defects and idiosyncrasies of individual reasoners. May not these assump¬ tions, some or all of them, be incorrect? There are some grounds, historical and biological, for suspecting that such may be the case. Such an admission, however, whether tentative or unconditioned, has by no means the effect of undefining mathematics or of dethroning the science from its commanding position among the knowledges. It would indeed leave man without the possession, even without the hope, of absolute knowledge, but, among all the forms of actual or potential proximate knowledge,

mathematics would still rightly rank as highest. It would indeed be marked by a degree of un¬ certainty or indeterminateness or relativity or * inexactness, viz., that degree of inexactness which by supposition would belong to all mean¬ ings and standards. Hence it would not be peculiar to mathematics, but would be common to it and every other science. But every such “other science® has an additional mark of in¬ determinateness, the characteristic inexactness of all possible observation and experiment. In any case, then, the observational and experi¬ mental sciences are, in respect to certainty and exactness, hopelessly inferior to mathematics.

But in all ages it has been the faith of the mathematician that complete determination of concepts and absolute rigor of demonstration are in fact attainable, not, however, in the realm of observation and experiment, but in the world of pure thought. It is, then, in that world, where all entia dwell, where is every , type of order and every manner of correlation and every variety of relationship and every form of implication, it is in this infinite en¬ semble of eternal verities whence, if there be one cosmos or many of them, each derives its character and mode of being, — it is there that the spirit of mathesis has its home and its life.

Is it a restricted home, a narrow life, static and cold and gray with logic, without artistic interest, devoid of emotion and mood and sentiment ?

That world, it is true, is not a world of solar light, it is not clad in the colors that glorify the things of sense, but it is an illuminated world, and over it all and everywhere through¬ out are hues and tints transcending sense, painted there by radiant pencils of psychic light,

the radiance in which it lies.

It is a silent world. Nevertheless, in respect to the highest principle of art — the inter¬ penetration of content and form, the perfect fusion of mode and meaning — it even rivals music.

In a sense, it is a static world, like those of the sculptor and the architect. The figures, however, which reason constructs and the mathetic vision beholds, transcend the temple and the statue, alike in simplicity and in in¬ tricacy, in delicacy and in grace, in symmetry and in poise.

Not only are this home and this life, thus rich in aesthetic interests, really controlled and sustained by motives of a sublimed and super-sensuous art, but the religious aspiration, too, finds there, especially in the beautiful doctrine of invariants, the most perfect symbols of what it seeks — the changeless in the midst of change, abiding things in a world of flux, configurations that remain the same despite the swirl and stress of countless hosts of curious transformations.

Literature. — The literature having for its object the exposition of the nature and prin¬ ciples of mathematics is extensive. By far the most important recent contribution, which at the same time serves to introduce the reader to the chief memoirs in the field, is B. Russell's (The Principles of Mathematics, > Vol. I. For an excellent critical review of the principal modern attempts to define mathematics, the reader may be referred to Prof. M. Bocher's * The Fundamental Conceptions and Methods of Mathematics) ((Bull. of the American Math. Soc.p Vol. XI). Consult also Whitehead,

A. N., and Russell, B. A. W., (Principia Mathematica> (Cambridge 1910-) ; Whitehead, A. N., (Introduction to Mathematics > (Home Univer¬ sity Library).

Cassius J. Keyser,

Adrain Professor of Mathematics, Columbia University.

MATHER, mat'h'er, Cotton, American colonial clergyman, son of Increase Mather (q.v.) : b. Boston, 12 Feb. 1663; d. there, 13 Feb. 1728. He entered Haryard College at 11, and at his graduation in 1678 President Oakes ex¬ pressed his expectation that he would resemble his venerable grandfathers, John Cotton and Richard Mather, who should be united and flourish again in him. He was early dis¬ tinguished for piety, and in his 14th year began a system of rigid and regular fasting and vigils which he continued through life. He was oc¬ cupied after leaving college with teaching, in 1680 became the assistant of his father in the pastorate of the North Church, Boston, and in 1684 was ordained as his colleague. When, at the report of the landing of the Prince of Orange in England, Governor Andros was seized and imprisoned in Boston, Cotton Mather prepared the public declaration justifying the measure. But it is in connection with proceed¬ ings concerning witchcraft that he is most gen¬ erally known. In 1685 he oublished his (Memo¬ rable Providences relating to Witchcraft and Possessions, 5 narrating cases which had oc¬ curred at intervals in different parts of the country ; and during the witchcraft excitement in Salem in 1692 was a prejudiced investigator in the matter, publishing the next year his WVonders of the Invisible World,5 in order to confirm believers in that kind of demoniac pos¬ session. In 1702 appeared his greatest work, (Magnalia Christi Americana, 5 an ecclesiastical history of New England concerning which he was admitted to know more particulars than any other man. Though strongly marked by his partialities and prejudices, its somewhat quaint and grotesque character, its admixture of superstition, learning and ingenuity, make it still interesting. In 1713 his (Curiosa Ameri¬ cana } was read before the Royal Society of London, and he was elected a member of that body, being the first

American to receive this distinction. In its <Transactions) in 1721 ap¬ peared an account of the practice of inocu¬ lation for the smallpox, introduced by Lady Mary Wortley Montagu; and it was by the efforts of Mather in connection with Dr. Boylston, against both professional and popular prejudice, that the operation was first per¬ formed in Boston. His (Essays to Do Good) (1710) was admitted by Dr. Franklin to have influenced some of the principal events of his life; and his (Christian Philosopher5 and di¬ rections for a Candidate of the Ministry5 en¬ joyed high repute. His (Parentator5 (1724) is a life of his father, Increase. Vain and pedan¬ tic as he was and narrow and credulous as he showed himself to be in regard to witchcraft and other topics of his time, he was in many directions a useful, public-spirited citizen who deserves to be regarded more leniently by pos¬ terity than has sometimes been the case. Con¬ sult (Life5 by Samuel Mather (Boston 1729) ; Pond, Enoch, (The Mather Family5 (ib. 1844) ; Marvin, A. B., Eife and Times of Cotton

Mather5 (ib. 1892) ; Wendell, Barrett, (Cotton Mather5 (1891) ; Tyler, (History of American Literature5 (Vol. II, New York 1881).

MATHER, Frank Jewett, Jr., American professor of art: b. Deep River, Conn., 6 Tuly 1868. In 1889 he was graduated at Williams College, and subsequently studied at Johns Hopkins (Ph.D. 1892), the University of Ber¬ lin and L'Ecole des Hautes Etudes, Paris. From 1893 to 1900 Dr. Mather was instructor and assistant professor of English and Romance languages at Williams College ; was editorial writer on the New York Evening Post, assist¬ ant editor of The Nation in 1901—06 ; art critic of the Evening Post in 1905-06 and again in 1910— 11 and American editor of the Burlington Magazine in 1904-06. In 1910 Dr. Mather be¬ came Marquand professor of art and archaeology at Princeton University. He is the author of (Homer Martin, Poet in Landscape5 (1912) ; (The Collectors,5 short stories (1912); Esti¬ mates in Art5 (1916), also several literary and philological monographs. He is a contributor, chiefly on art, to The Nation, and other period¬ icals. In 1917 he served as chief boatswain's mate in the United States Naval Reserve Fleet (coast patrol).

MATHER, Increase, American colonial

divine, son of Richard Mather (q.v.) : b. Dor¬ chester, Mass., 21 June 1639; d. Boston, 23 Aug. 1723. He was graduated at Harvard College in 1656, and in 1658 at Trinity College, Dublin. He afterward

preached in Devonshire and the island of Guernsey, and on the Restoration was urged to conform and settle in England ; but he refused, and on his return to Boston was in¬ vited to preach to the North Church, of which he was ordained pastor in 1661. This office he held for 62 years. He was a member of the synod of 1679, and drew up the propositions which were adopted concerning the proper sub¬ jects of baptism. In 1681 he was elected presi¬ dent of Harvard College, but the reluctance of his church to relinquish him induced him to de¬ cline the position. In 1684 the office was again offered him, and he accepted it with a stipula¬ tion that the should retain his relation to his people. He continued in this station till 1701, when he retired in consequence of an act of the general court requiring the president to reside in Cambridge. He received the first diploma for the degree of D.D. that was granted in America. When in 1683 Charles II demanded that the charter of Massachusetts should be re¬ signed into his hands, Mather was foremost in opposing the measure ; and when that monarch annulled the charter in 1685, he was sent to Eng¬ land as agent for the colonies. He was in Eng¬ land during the revolution of 1688, and, hav¬ ing found it impossible to obtain a restoration of the old charter, accepted a new one, under which the appointment to all the offices reserved to the Crown was confided to him. He returned in 1692, when the general court appointed a day of thanksgiving for his safety and for the set¬ tlement of the dispute. He is stated to have condemned the violent proceedings which fol¬ lowed relating to witchcraft. He was accus¬ tomed to \spend 16 hours every day in his study, and always committed his sermons to memory. One-tenth part of all his income was devoted to purposes of charity. He was the author of 92 distinct publications. His (Remarkable

Providences5' was republished in the (Library of Old Authors) (1856), and other works by him are (A Brief History of the War with the Indians in New England5 (1676) ; (Relation of Troubles of New England from the Indians) (1677; 1864) ; (Cases of Conscience Concerning Witchcraft5 (1693; 1862); (Cometographia, or a Discourse Concerning Comets5 (1683). Con¬ sult Pond, Enoch, (The Mather

Family) (Bos¬ ton 1844) ; Walker, Williston, (Ten New Eng¬ land Leaders) (New York 1901) ; Tyler, M. C., (History of American Literature) (Vol. II, New York 1881); Sibley, (Harvard Graduates) (Vol. I, Cambridge 1873).

MATHER, Richard, American colonial di¬ vine : b. Lowton, Lancashire, England, 1596; d. Dorchester, Mass., 22 April 1669. He became a schoolmaster at Toxteth Park, near Liverpool, at the age of 15 ; studied at Brazenose College, Oxford, in 1618; was ordained in the English Church soon after, and became the minister of Toxteth, in which position he remained 15 years. He was suspended for non-conformity to the ceremonies of the Established Church in 1633, and though soon restored by the influence of friends was again silenced in the following year. He therefore decided to emigrate to New England, arriving in Boston in August 1635. The next year he became pastor of the church in Dorchester, and held that position till his death. He was one of the compilers of the Ray Psalm Books) and assisted to frame in 1648 a model of discipline known as the Cam¬ bridge Platform. He married for his second wife the widow of John Cotton (q.v.). His journal, Life and Death5 was issued by the Dorchester Historical Society in 1850. See Congregationalism and consult Mather, In¬ crease, Rife and Death of Richard Mather) (Cambridge 1670) ; Tyler, M. C., (History of American Literature) (Vol. II, New York 1881).

MATHER, Robert, American lawyer and railroad offlcial : b. Salt Lake City, 1859; d. 1911. In 1882 he was graduated at Knox Col¬ lege, Illinois, and four years later was admitted to the bar at Chicago. He practised in that city in 1886-89; was local attorney in 1889-94, assistant general and general attorney in 1894 — 1902, and general counsel in 1902-09 of the Chicago, Rock Island and Pacific Railroad. In 1909 he was elected chairman of the board of the Westinghouse Electric Company. Mr. Mather was interested, as officer or director, in several railroad and industrial companies.

MATHER, William Williams, American geologist: b. Brooklyn, Conn., 24 May 1804; d. Columbus, Ohio, 26 Feb. 1859. He was gradu¬ ated from West Point in 1828 and was an assistant professor of chemistry and geology there, 1829-35. After a short period spent as professor of chemistry at the University of Louisiana (1836), he undertook the superin¬ tendence of a geological survey of the 1st dis¬ trict of New York State which included the Hudson River counties, a labor which lasted from 1836 to 1844. He was also State geologist of Ohio 1837-40, and of Kentucky 1838-39, and from 1842-45, and 1847-50, professor of natural science in the Ohio University at Athens. He made a collection of about 22,000 mineralogical specimens. He contributed

frequently to scien¬ tific journals, edited the Western Agriculturist for a time and published (Geology of the 1st

Geological District (in (Natural History of New York,5 1843) ; and (Elements of Geology. >

MATHESON, math'e-son, Arthur James,

Canadian statesman : b. Perth, Ontario, 1842 ; d. 1913. He received his education at Upper Canada College and Trinity College, Toronto; was called to the bar in 1870 and established a practice in his native town of which he was mayor in 1883-84. From 1894 to 1913 he was a member of the Conservative party in the On¬ tario legislature and served as provincial treas¬ urer in 1905—13 under Premier Sir James P. Whitney. In 1906 he was a member of the Ottawa Inter-provincial Conference and in the following year of the National Conference on Taxation. In 1910 he served as vice-president of the International Commission. Mr. Mathe-son was made K.C. in 1908. He served in the militia after 1866, saw service during the Fenian raids and in 1900 attained the rank of brigadier-general.

MATHESON, George, Scottish Pres¬ byterian clergyman: b. Glasgow, 27 March 1842; d. 28 Aug. 1906. He was educated at Glasgow University and although he had lost his sight in boyhood he entered the ministry of the Kirk of Scotland and was ordained in 1868. He was minister of Innellan on the Firth of Clyde 1868-86; and of Saint Bernard's Par¬ ish, Edinburgh (1886-97). He was the author of the famous hymn, (0 Love that Will Not Let Me Go,> which finds a place in nearly every modern hymnal. Among his many pub¬ lished books are Rids to the Study of German Theology) (1874) ; (Natural Elements of Re¬ vealed Theology 5 (1881) ; (The Psalmist and the Scientist5 (1887) ; (Sidelights from Patmos5 (1897) ; (The Sceptre Without a Sword5 (1901) ; Representative Men of the Bible) (three series) ; and Representative Women of the Bible> (1907).

MATHESON, Samuel Pritchard, Cana¬ dian clergyman: b. Manitoba (then the Red River Settlement), 20 Sept. 1852. He received his education at Saint Johns' College School and Saint John's College, Winnipeg. He received deacon's orders in the Anglican Church in 1875 and those of priest in 1876. He became mas¬ ter at Saint John's College School; subsequently served as professor of exegetical theology at Saint John's College, canon and dean of Saint John's Cathedral, deputy headmaster and head¬ master of Saint John's

College School. Subse¬ quently he was warden and chancellor of Saint John's College. He became secretary of the Provincial Synod of Rupert's Land and pro¬ locutor of same and in 1902 became prolocutor of the General Synod of Canada. In 1903 he became coadjutor bishop of Rupert's Land, in 1905 he became archbishop and in 1909 was made Primate of all Canada.

MATHEW, Theobald, known as <(Father Mathew,55 Irish temperance reformer: b. Thomastown Castle, County Tipperary, Ireland, 10 Oct. 1790; d. Queenstown, Ireland, 8 Dec. 1856. He was educated at Maynooth College and the Capuchin Convent, Cork, and was or¬ dained to the Roman Catholic priesthood in 1814. In 1838 he inaugurated a temperance crusade and his labors in Great Britain and Ireland induced hundreds of thousands to sign the total abstinence pledge. The most con¬ clusive evidence of the benefit of his preaching

was the reduction of nearly £600,000 on the duties of spirits imported in Ireland in five ve.trs. He made a tour of the United Slates in 1849-51 and was very successful. Though pensioned by the queen he was never entirely relieved from the burden of debt with which bis extended tours had burdened him, and which caused his imprisonment for a time in 1847. Consult (Life' by J. F. Maguire (Lon¬ don 1863 ; abridged ed., 1890) ; Matthew, F.,

1 father Mathew: his Life and Times) (London 1890) ; Tynan, K., (Father Mathew) (ib. 1908).

MATHEWS, math'uz, Abert, <(Paul Siegvolk," American lawyer and author: b. New York, 8 Sept. 1820; d. there, October 1903. He was graduated from Yale in 1842 and after studying law was admitted to the New York bar in 1845. He soon acquired an extensive practice and was especially skilled in chancery practice. He found time for literary work de¬ spite the claims of his profession, and under the pseudonym ((Paul Siegvolk" published (Walter Ashwood,' a once popular love story (1860); (A Bundle of Papers) (1879); (Thoughts on Codification of the Common Law) (1881) ; (Ruminations : The Ideal Amer¬ ican Lady and Other Essays) (1892) ; (A Few Verses) (1893), *etc.* In the early part of his career he was a close friend of N. P. Willis, whom he aided in establishing The Home Journal.

MATHEWS, Charles, English actor: b. London, 28 June 1776; d. Plymouth, England, 28 June 1835. He made his debut as an actor in Richmond in 1793 and was subsequently en¬ gaged for some years in Dublin and London. In 1818 he made a hit as a professional enter¬ tainer in his (At Home.' He continued in this class of work, making two successful trips to the United States and, returning, presented in England with great success (A Trip to Amer¬ ica. } In 1828 he became joint proprietor of the Adelphi Theatre, London. Consult Baker, (Our Old Actors' (London 1881) ; Mrs. Mathews, (Memoirs of Charles Mathews, Comedian ' (London 1839).

MATHEWS, Charles James, English actor : b. Liverpool, 26 Dec. 1803 ; d. Manches¬ ter, England, 24 June 1878. He was the son of Charles

Mathews (q.v.) and was educated as an architect, but abandoned that calling for the stage. As a light comedian he was very suc¬ cessful, but his attempts at managing Covent Garden and the Lyceum Theatre in London were failures. He made several trips to the United States, Paris and Australia, presenting an entertainment similar to his father's famous (At Home.' Consult Dickens, Charles, (Life of Charles James Mathews' (London 1879).

MATHEWS, Edward Bennett, American geologist: b. Portland, Me., 16 Aug. 1869. In 1891 he was graduated at Colby College and in 1894 received the degree of D.Ph. at the Uni¬ versity of Johns Hopkins. In 1891—94 he was field assistant of the United States Geological Survey; in 1894-95 was instructor in mineral¬ ogy and petrography, in 1895-99 associate, in 1899_1904 associate professor and since 1904 professor of geology at Johns Hopkins. Since 1917 he has served as chairman of the geolog¬ ical department. From 1898 to 1917 Dr. Mathews was assistant State geologist of Mary¬ land and after 1917 was State geologist. He

published (Bibliography and Cartography of Maryland (1897) ; (Maps and Map-Makers of Maryland' (1898) ; (Building Stones of Mary¬ land' (1898) ; (Limestones of Maryland' (1910); (History of the Mason-Dixon Line'; (Physical Features of Maryland' ; (Water Re¬ sources of Maryland,' and numerous geological and historical papers.

MATHEWS, Ferdinand Schuyler, Amer¬ ican artist and author: b. New Brighton, N. Y., 30 May 1854. He was educated at Cooper In¬ stitute, studied art in Italy and has made a spe¬ cialty of decorative designing. He has con¬ tributed extensively to the magazines both as illustrator and writer, in the latter field dealing chiefly with subjects which come within his own profession and also those which belong to nat¬ ural science. He has published (The Writing Table of the 20th Century' (1900) ; (The Field-Book of American Wild Flowers' (1902) ; (Field-Book of Wild Birds and their Music' (1904) ; (Field-Book of American Trees and Shrubs' (1915), *etc.*

MATHEWS, Joseph McDowell, Amer¬ ican surgeon: b. Newcastle, Ky., May 1847. He was educated at the Newcastle Academy and at the University of Louisville. He prac¬ tised in Louisville and was appointed professor of surgery at the Louisville Hospital College of Medicine. He is president of the Kentucky State Board of Health and in 1898-99 was president of the American Medical Association. He published (Diseases of the Rectum, Anus and Sigmoid Flexure' (1893;

3d ed., 1903); and (How to Succeed in the Practice of Medi¬ cine' (1902).

MATHEWS, Shailer, American educator: b. Portland, Me., 26 May 1863. He was grad¬ uated from Newton Theological Institution in 1887 and studied in Berlin. In 1887 he was ap¬ pointed assistant professor of rhetoric at Colby University and in 1889 accepted the chair of history and political economy, which he oc¬ cupied until 1894, when he was made associate professor of New Testament history in the University of Chicago. In 1897 he was made professor, in 1899 junior dean, in 1905 profes¬ sor of systematic theology, in 1906 professor of history and comparative theology and in 1908 dean of the Divinity School. In 1911 he was elected president of the Western Economic Society, in 1908 president of the Co-operative Council of City Missions, in 1910 president of the Chicago Baptist Executive Council, in 1912 president of the Federal Council of the Churches of Christ in America and in 1915 president of the Northern Baptist Convention. He is director of religious work in Chautauqua Institution, New York, and one of the trustees of the Church Peace Union founded by Andrew Carnegie. In 1915 he visited Japan as a rep¬ resentative of the Federal Council of the Churches of Christ in America. He gave the Haverford Library Foundation Lectures in 1907. the Earle Lectures, Berkeley. Cal., in 1913, and the Merriam Lectures, Worcester, Mass., in 1914. He was editor of the World To-day from 1903 to 1911 and has been editor of The BihHcal World since 1913. He is also editor of New Testament handbooks, (The Bible for Home and School,' (Social Betterment,' handbooks of ethics and religion, Women Citizen's Li¬ brary and associate editor of the dictionary

of the Bible, J American Journal of Theology, Constructive Quarterly. He is the author of (Select Mediaeval Documents) (1891; 1900); (The Social Teaching of Jesus) 0897); (A History of New Testament Times in Palestine) (1899); Constructive Studies in the Life of Christ,) with E. D. Burton (1901) ; (The French Revolution — A Sketch) (1901); Prin¬ ciples and Ideals for the Sunday School,* with E. D. Burton (1903);

(The Messianic Hope in the New Testament (1905); (The Church and the Changing Order) (1907) ; (The Social GospeP (1909) ; (The Gospel and the Modern Man} (1909) ; Scientific Management in the Churches) (1911); (The Making of To-morrow) (1913); (The Individual and the So¬ cial GospeP (1915) ; (The Spiritual Interpreta¬ tion of Modern History) (1916).

MATHEWS, William, American author: b. Waterville, Me., 28 July 1818; d. Boston, Mass., 14 Feb. 1909. He studied law at Har¬ vard and was admitted to the bar in 1838, practising for a time in Waterville, but aban¬ doned law for journalism, establishing the Watcrvillonian in 1841, which later he named the Yankee Blade. In 1859-62 he was engaged in journalism in Chicago. In 1862 he was ap¬ pointed professor of English and rhetoric at the University of Chicago, but in 1875 resigned in order to devote himself exclusively to litera¬ ture. Among his books are (Getting on in the World* (1873) ; (The Great Conversers* (1874) ; (Words: Their Use and Abuse) (1876); (Oratory and Orators* (1870); (Literary Style) (1881) ; (Men, Places and Things* (1888) ; (Wit and Humor: Their Use and Abuse) (1888); (Nugae Literariae* (1896) ; Conquering Suc¬ cess * (1903), *etc.*

MATHEWS, William Smythe Babcock,

American musical writer and editor: b. Lou¬ don, N. H., 8 May 1837 ; d. 1912. He obtained his musical education in Boston and became a teacher in 1853 ; he was for a time engaged at the Wesleyan Female Seminary in Georgia, but in 1867 he removed to Chicago, where he was prominent as an organist and engaged in editorial work and criticism of music on the leading Chicago papers. In 1891 he established the magazine, Music, and edited it until 1903, when it became a part of the Philharmonic. He is the author of Cutlines of Musical FortrP (1867); (Emerson Organ Method) (1870); (How to Understand Music) (1880-88); (Mu-sic and Its Ideals) (1897); (Dictionary of Musical Terms) (1895); Popular Historv of Music) (1901) ; (The Great in Music) (1900-03), *etc.*

MATICO (piper angustifolium) , a shrub of the natural order Piperacese, native of Peru; re¬ markable for the styptic property of its leaves and unripe fruit, used for stanching wounds.

MATIN, a large hound-like French dog, resembling the Great Dane, but having a rough coat. The bead is elongated, the forehead flat, the ears pendulous toward the tips; color, yel¬ lowish-fawn or whitish. It is commonly em¬ ployed in France as a sheep-dog and watchdog.

MATINS, the daily office of morning prayer in the Anglican communion. It is com¬ posed in part of the pre-Reformation offices of Matins and Lauds. In the Roman Catholic Church, the first portion of the Divine Office,

with which Lauds are usually associated. On Sundays and double feasts matins have three nocturns; on simple feasts and week-days, one nocturn. Easter and Pentecost have each only one nocturn, with three psalms. After private prayer versicles and responses are recited; the invitatory psalm follows. In the first nocturn are said three psalms on feast days, 12 when the office is of the Sunday and three lessons from Scripture; the second and third nocturns have each three psalms and the lessons are chosen from the patristic writings for the sec¬ ond, and from some commentary on the Gospel of the day of the third nocturn.

MATRIARCHATE, position or power of

a matriarch, a name formerly given to the wife of a patriarch. Among the Indians the mother is considered of superior importance in families, clans or tribes. Job's wife, Xantippe, and others in history have been called matriarchs. In certain primitive tribes the mother, in line of descent and inheritance, takes precedence of the father. Consult Bachofen, J. J., <Das Mutterrecht* (2d ed., Basel 1897) ; Dargan, 'Mutterrecht und Raubehe) (Breslau 1883); Westermarck, E. A., (History of Human Mar¬ riage) (3d ed., London 1903).

MATRIMONY VINE. See Lycium.

MATRONALIA, the 1st of March, the

New Year's day of the Roman religious calen¬ dar, sacred to Juno, the deity of matrons. On this festival day wives expected presents from their husbands, and themselves gave an enter¬ tainment to the household slaves. Consult Fowler, W. W., Toman Festivals) (London

1899).

MATSUDAIRA, mah-tsu-digh'rah, the gen¬ eric name of 52 families of territorial nobles in feudal Japan, mostly, although not all, descended from an ancestor Minamoto Chikauji of the 14th century, 11th in generation from Yoshiiye who, in the village of Matsudaira, in

Mikawa, espoused the daughter of Matsudaira Nobushige and took his wife's name. When, in Yedo in 1604, the Tokugawa line of showguns was established, permission was given to the heads of allied or loyal clans to bear this name. Among the hundreds of feudal barons and others thus favored have been many of the most illustrious in the period 1604-1868. After this date, the name, with the privilege of bear¬ ing the ancestral coat of arms, was restricted to 27 families, which now comprise a mar¬ quis, 3 counts, 22 viscounts and 1 baron. Their heraldic crest consists of three mallow leaves within a circle. With the exception of Fujiyama, this is the most characteristic decora¬ tion seen on the older Japanese art products. It is said to have been selected by Iyeyasu, when by a loyal vassal three cakes, laid over as many mallow leaves, on a plate, were presented for the conqueror's refreshment. Consult Dixon, (Japan) (1869); Griffis, (Th Mikado's Empire) (1912), and La Tourette, (The De¬ velopment of Japan) (1918).

MATSUDAIRA SHUNGAKU, mah-tsu-digh-rah shoon'gah-ku, champion, during Jajan's hermit days, of Western civilization and of friendship with the United States: b. Yedo, 11 Oct. 1828; d. Tokio, 1880. Adopted at 10 years of age by Matsudaira, baron of Echizen, at 21 he began sweeping and con-

structive reforms, introducing modern military, economic and hygienic methods, abolishing archery in favor of fire arms, establishing can¬ non and rifle factories, sending young men as students to the Dutch at Nagasaki, establish¬ ing lectures on the Oyomei (q.v.) philosophy and writing manifestoes. He combatted popu¬ lar prejudices, showed the superiority of Western civilization and the reasonableness of Christianity, compelled the use by doctors of the Western methods of medical practice, opened a dispensary and organized a foreign literature department in the excellent clan school in Fukui. Opposed to opening the coun¬ try prematurely, on unequal terms, as was done by Ii Naosuke, he suffered domiciliary confine¬ ment but was later called to be virtual premier of the empire. With the

assistance of Yokoi Heishiro he abolished the centurv-old custom of compelling the feudal barons to live half the year in Yedo, leaving their families as hostages when away. This made Kioto the centre of affairs. He later brought the first of the yatio in his domain, and here the first public schools beyond the treaty ports were organized, and one of the very first of the new regiments of the peasant national army was raised. Out of this region, chiefly, was raised the famous Ninth Division that took Port Arthur. High posthum¬ ous honors were awarded this pioneer of Western civilization. His biographv and writ¬ ings have been compiled by his son the marquis. Consult Griffis, (The Mikado: Institution and Person* (1915), and (The Mikado's Empire>

(1912).

MATSUKATA, Masayoshi, ma-si-6'she mat-soo-ka'ta, Marquis, Japanese statesman: b. Satsuma 1835. He was son of a Samurai, but fell in with the Radical party; was made head of the prefecture (or ken) of Hida after the revolution; was prominent in the tax reform of 1875; represented Japan in several industrial exhibitions; was a member of the Cabinet, in 1880 as Minister of Commerce, in 1881 as Minister of Finance, and, with the same portfolio, as Prime Minister from 1891 to 1893. His great work was in 1896-97, when he formed a new cabinet, carried through the gold stand¬ ard, set Japanese credit on its feet, but he was forced to retire because of the ill-success of his scheme of taxation. He was Minister of Finance a second time in 1898-1900, became Privy Councillor in 1903, and received the title of marquis in 1906. He was also president of the Japanese section of the Red Cross.

MATSUMOTO, Japan, town, in the dis¬ trict of Nagano, in the island of Hondo, 100 miles north by west of Tokio. The town manu¬ factures baskets, preserved fruits and silks and has an old daimyo castle. Pop. 35,000.

MATSUMURA, Ninzo, Japanese botanist: b. Ibaraki-Ken, 1856. In 1886-88 he studied at the universities of Wurzburg and Heidelberg, meanwhile holding the assistant professorship of botany in the University of Tokio to which he had been appointed in 1883. He became full professor in 1890 and seven years later was appointed director of the Botanical Gardens. He collaborated in Brinkley's (Japanese-English Dictionary) (1896) and published Nomenclature of Japanese Plants in Latin. Japanese and Chinese) (1884) ; Names of Plants and their Products in English, Japanese and Chinese*

(1892); (Conspectus of Leguminosae> (1902) ; (Index Plantarum Japonicarum: Cryptogamae* (1904) ; (Phanerogamse) (1905) ; (Tentamen Florae Lutchuensis,* with Ito (1899) ; (Revisio Alni Specierum JaponicarunP (1902) ; (Enumeratio Plantarum in Insula Formosa Sponte Crescentiunff (1906) ; (Chinese Names of Plants) (1915); Classified Etymological Vocab¬ ulary of the Japanese Language Ancient and Modern> (1915).

MATSUSHIMA, Japan, village on the northeast coast of the island of Hondo, situ¬ ated on the Bay of Sendai. In a lagoon oppo¬ site the village are 808 islets ranging in eleva¬ tion from 30 to 300 feet and covered with pines. This beautiful natural garden is one of the wonders of Japan.

MATSUYAMA, Japan, town and capital of the district of Ehime, on the island of Shikoku, five miles from Mitsu. It contains a great feudal castle, one of the few perfect specimens of its period in modern Japan. Pop. 44,166.

MATSUYE, or MATSUE, Japan, town and capital of the district of Shimane, on the island of Hondo, 140 miles north by west of Kioto. It has large paper manufactories and agate-polishing establishments and has numerous temples. It is well built and is one of the cleanest towns in Japan. Pop. 36,209.

MATSYS, mat-sis', or MASSYS, Quentin,

Flemish painter : b. Antwerp or Louvain, about 1460; d. there, between 13 July and 16 Sept. 1530. A blacksmith until he was 20, legend says that he turned artist to win the love of a painter's daughter. He was acquainted with many of the notables of the day, including Differ, Erasmus and Sir Thomas More. Much of his present fame is due to genre pictures, especially of misers and money-changers, which are not his work, but that of his school, among them his son Jan, whose (Misers) is at Windsor Castle. Matsys' own work is styled a connect¬ ing link between Van Eyck and the latter Dutch realists; apart from such excellent portraits as those of Maximilian of Austria and Petrus Aegidius, it is mostly religious in theme. The <Burial of Christ,* an altarpiece for the Ant¬ werp Cathedral, now in the Antwerp Museum, and the (Story of Saint Anne,* now in the Brussels Gallery, are the best examples of his work. The Metropolitan Museum, New York, contains his (Adoration of the Kings.) Consult Cohen, Walter, (Studien zur Quentin Metsys> (Bonn 1904) and de

Bosschere, Jean, (Quentin Metsys* (Brussels 1907).

MATTAWA, or MATTAWAN, Canada,

town in the Nipissing district of Ontario prov¬ ince, situated at the confluence of the Mattawa and Ottawa rivers at the east end of Lake Timiskaming, on the Canadian Pacific Railroad, 45 miles east of North Bay. Great quantities of mica are obtained in the neighborhood. The town has extensive lumber interests and is a distributing point for several great lumber companies. It is also famous as the starting-point of hunters and anglers. Pop. 1,524.

MATTAWA, a river of Ontario, the source of which is Trout Lake, east of Lake Nipissing. It flows east a distance of about 45 miles and enters the Ottawa River at Mattawa, 308 miles from Montreal. This river forms part of an almost continuous waterway from the Ottawa

River to Lake Huron, and before the Canadian Pacific Railroad was built this water route was much used for transportation and travel.

MATTEAWAN, mat-te-a-won', N. Y. See

Beacon, N. Y.

MATTEI, mat-ta'e, Tito, Italian musician and composer: b. Naples, 1841; d. 30 March 1914. He was educated in Naples. He re¬ ceived the degree of professor in Saint Ce¬ celia's Academy at Rome when he was 11 and was also elected a member of the Philharmonic Society in Florence and other cities. He gave his first concert when 15 and afterward made tours of Europe, but in 1863 settled in London, where he lived for 50 years, confining his concert tours to Great Britain, and in 1870 he conducted an Italian opera at the Lyceum Theatre. He was the composer of hundreds of songs and pianoforte pieces, many of which have become widely popular, and the operas (Maria di GandR (La Prima Donna,) *etc.*

MATTER, in physics, mechanics and chem¬ istry, the tangible substance of which the world external to our minds is composed and which is characterized by the resistance which it opposes to muscular efforts exerted upon it. Since we can know it only through the mediation of our senses, its actual objective reality has often been questioned by philosophers and metaphysicians ; and in order to avoid doubtful points of this sort it is frequently defined merely as a (<physical concept,® without making any hypothesis as to its objective existence. (Consult Pearson, (The Grammar of Science*). In physics and chemistry we think and speak of it as having a real existence, however, just as we do in common life. For scientific purposes it is highly important to be able to accurately com¬ pare the quantities of matter in two bodies; but the phrase (<quantity of matter® is not com¬ monly used in science, the word (<mass® (or inertia) being substituted for it. The term (<mass® is synonymous with ˆquantity of matter® so long as the bodies compared are identical in composition and in physical state ; but by its use we avoid the uncertainty in the meaning of the longer phrase, when it is applied to bodies, of dissimilar composition. Two bodies are said to have ((equal masses® under the fol¬ lowing conditions : Let the two bodies be con¬ ceived to be initially at rest, and free from the action of any external forces whatsoever. Let them then be exposed to the action of equal forces for an equal length of time. If, under these circumstances, the velocities that are produced in the two bodies are equal, the masses of the bodies are also equal, by defini¬ tion. But if the velocities that are produced are unequal, then the masses are also unequal, and are (by definition.) proportional to these velocities; the body which is moving the faster being the one whose mass is the less. It would be impossible to carry out an elaborate ex¬ periment of this kind every time we wished to compare the masses of a pair of bodies, and it fortunately happens that masses can be com-with great accuracy by merelv weighing the bodies against each other in a balance. For equality of weight means that the earth's attrac¬ tive force is the same upon both; and if (as we know to be the case, by experiment.) the two bodies would fall with the same speed in a

vacuum, it follows that equal forces acting upon the two bodies for equal times communicate to them equal velocities ; and hence, by the defini¬ tion of ((mass,® the mass of the two bodies are equal. It will be noted that mass and weight are two essentially different things, although they are very commonly confused, because they are strictly proportional to each other, accord¬ ing to the most accurate experiments that have yet been made. Yet it is not at all impossible to

imagine a state of things in which mass and weight would not be strictly proportional. It is only by experiment, for example, that we know that the earth attracts a body with precisely the same force, whether the body is hot or cold. The attraction between two permanent magnets varies with the temperature, and it may yet be found that gravitative attraction varies in the same way, though to a much smaller extent. Numerous experimenters have in fact fancied that they could detect an effect of this kind, though its reality is not yet admitted. But we can hardly admit that the mass of a body is a function of the temperature; and so we see that the apparently strict proportionality between mass and weight is not at . all a necessity of thought, but merely an experimental fact, wmch may any day be shown to be nothing but a close approximation to the actual truth.

So far as we know, matter can neither be de¬ stroyed nor created by any experimental means at our command, nor by any process now oper¬ ative in nature. This great fact is often called the ((law of the conservation of matter,® and it appears to be rigorously true. As has been pointed out above, future experiment may show that the weight of a body depends to a slight extent upon its temperature, and it may also be found that the weight of a chemical compound is not always precisely equal to the sum of the weights of its constituents; but it is believed that any irregularities of this sort that may be discovered will hold true to the weight only, and will not affect the mass; and that the weight will also return to its original value when the substance that is weighed is brought back to the same chemical and physical condi¬ tion again. The gravitative action of matter is one of its most singular attributes, and one which we are still far from understanding. It is apparently true that every particle of matter attracts every other particle with a force which is directly proportional to the product of the masses of the two particles and inversely proportional to the square of the distance be¬ tween them, and independent of every other circumstance. It is not certain that this law holds true, nor that the attraction exists at all, at distances comparable with the distance from the earth to the fixed stars, but it appears to hold rigorously at distances commensurate with the dimensions of the solar system. Electric and magnetic forces may be either attractive or repulsive; but gravitative action is probably always attractive, the only phenofnena which would countenance the opposite view being the apparent repulsion that the sun exerts upon the tails of comets and upon the coronal streamers that are seen at the time of a total solar eclipse

Matter exists in three (or nerhans four) physical states. All ordinary bodies, for exam¬ ple, may be classified, roughly, either as solids or fluids; fluids being further subdivided into liquids and gases. This

classification is not all

that could be desired, since there are certain bodies (such as wax) which have certain char¬ acteristics of the solids and certain others of the liquids. A more complete and systematic classification is hardly practicable, however, in the present article. A solid body may be de¬ fined as a body capable of resisting a consider¬ able shearing stress. (See Elasticity). Solid bodies usuallyhave a considerable tensile strength also. A solid does not yield continuously to a small deforming force; it resists deformation, and its resistance increases as the deformation increases. A fluid, on the other hand, is a sub¬ stance having almost ho shearing strength, and offering very little resistance to forces that tend to change its shape. A fluid yields continuously to a deforming force, and a force that will deform it at all will deform it indefinitely, so long as it is allowed to act. Considering the subdivision of fluids into gases and liquids, we may say that a gas is a fluid that presses con¬ tinuously and in every direction upon the walls of the vessel containing it and which follows them indefinitely if they retreat. A gas, if left to itself, tends to expand infinitely in all direc¬ tions. A liquid is a fluid which does not follow the walls of the containing vessel if they retreat and which has no tendency to expand indefi¬ nitely if left to itself. (For the prevalent theories regarding the constitution of matter, see Gases, Kinetic Theory of; Molecular Theory).

When a gas is rarefied very highly by a mer¬ cury vacuum pump, it exhibits properties which are different in many respects from those mani¬ fested by gases in the ordinary state of density. The pressure in such a rarefied gas, for exam¬ ple, may be different in different directions; so that in this respect, at least, the rarefied medium resembles a solid rather than a gas or liquid. Mechanical and electrical properties are also ob¬ served at high exhaustions which cannot be re¬ produced at ordinary pressures; and for these and other reasons Crookes considered that a gas, when under only (say) the millionth or ten millionth of an atmosphere of pressure, may be fairly said to constitute a ((fourth state of matter,® which he considered to be as different from the gaseous state as the gaseous state is from the liquid state. At first thought this ap¬ pears to be an extreme and hardly a justifiable view ; but it must be remembered that Andrews showed

that the distinction between a liquid and the gas or vapor obtained from it by evapora¬ tion ceases to exist at temperatures higher than a certain critical value peculiar to each sub¬ stance. (See Critical Point). This tempera¬ ture is about 88° F. for carbon dioxide, and at temperatures progressively higher than this the isothermals of carbon dioxide approximate with increasing closeness to the hyperbolas of a per¬ fect gas. It might be thought that a critical state exists with reference to the solid and liquid states; but this is still somewhr.t doubtful. It appears probable that no such state exists between a solid and its liquid, unless the solid is crystalline; and its existence has not been established even for this case.

See Molecular Theory; Liquefied and Compressed Gases; Electron Theory; Solu¬ tions; Ether; Vacuum, *etc.* Consult, also, Tait, Properties of Matter) ; Kimball, Physical Properties of Gases) ; Poyntjng and Thomson, Properties of Matter } ; Risteen, (Molecules

and the Molecular Theory of Matter } ; Leh¬ mann, Plolekularphysikˆ

MATTERHORN, mat'ter-horn, Mount. See Cervin, Mont.

MATTESON, mat'e-son, Tompkins Har¬ rison, American artist : b. Poughkeepsie, N. Y., 9 May 1813; d. Sherbourne, N. Y., 2 Feb. 1884. His early lessons in art were from an Indian; otherwise he was mostly self-taught until after the success of his (Spirit of 76, > when he settled in New York and studied in the Na¬ tional Academy. From 1851 until his death his home was Sherbourne. For a time he was a member of the New York legislature. His themes were historical or from American country life, and his best-known pictures are (The First Sabbath of the Pilgrims/ (Exami¬ nation of a Witch, } Pliot Preaching to the Indians,) Pip Van Winkle's Return from the Mountains, } (At the Stile) and Poddering Cattle. }

MATTHEW. Matthew, the apostle of Jesus Christ, is with sufficient certainty iden¬ tified with Levi, the son of Alphseus, whose call by Jesus to discipleship is described in Marl: and Luke in terms practically identical with a story of the call of Matthew in Matthew. It was not uncommon among the Jews for a man to have two names and sometimes both names were of Hebrew, or Aramaic origin. The der¬ ivation and consequently the meaning of the name Matthew is

uncertain, though it is com¬ monly interpreted to mean ((Gift of God.® The mere mention of his father's name does not identify his family to us. He is first spoken of as being in his office as a publican,® or col¬ lector of taxes, presumably near Capernaum on the great highway between Damascus and the Mediterranean. While as such officer he would be in the service of the Tetrarch Herod, and not directly in Roman employ, yet he must have shared the obloquy which attached to this office among strict Jews, and it has accordingly been reckoned a mark of his humility that we find him designated as <(the publican® in the Gospel which bears his name. After his call to discipleship he made a great feast of fare¬ well, gathering his former friends and business associates to meet his new-found Master and the disciples attending him. The name of Matthew stands in all the lists of apostles, al¬ ways the seventh or eighth in order, but of his activities as an apostle we have no record. No other name than his has ever been associated with the authorship of the first Gospel, and while this view has been discredited by many critics, because of the difficulty of considering the Gospel in its present form the work of an apostolic eyewitness, it is possible to conserve the historical value of this strongly confirmed tradition by holding that he was the author of the Discourse Document which constitutes such an important and characteristic element in Matthew. (See article Matthew, Gospel Ac¬ cording to). There are many variant tradi¬ tions as to the missionary labors of Matthew, Macedonia, Egypt, Ethiopia and Parthia having been named as places where he worked. There is no sufficient reason for accepting any of these traditions, though perhaps the last is the most probable. Some traditions assert that he died as martyr and this has been accepted in the Western Church, but according to other

traditions perhaps no less reliable he died a natural death.

David Foster Estes,

Professor of New Testament Interpretation , Colgate University.

MATTHEW, George Frederick, Canadian

geologist: b. Saint John, New Brunswick, 1837. He received his education at the Univer¬ sity of New Brunswick; secured a civil service post in 1853 and in 1879 was appointed chief clerk of customs. He was made surveyor of customs in 1893. He collaborated with Bailey, in 1872, in preparing a report on the geology of southern New Brunswick and in the follow¬ ing year prepared a report on the Carboniferous system of that province. Subsequently he made several geological tours of exploration in the Maritime Provinces. He was a Fellow of the Royal Society of Canada and member of the New Brunswick Natural History Society. He published geological papers in various techni¬ cal and scientific periodicals.

MATTHEW, Gospel According to. The

Gospel with which the name of Matthew has uniformly been associated has with almost equal uniformity stood first in the gospel canon. It received this place both because it is the longest of the Gospels and because of the apostolic authority which the name of Matthew gave to it, but the place is fitting also because it relates itself more closely to the Old Testa¬ ment than does any other gospel.

Contents. — As respects the events recorded, they are much the same as those given in Mark and Luke, and are arranged in substantially the same order. The book may be briefly analyzed somewhat as follows : Introductory, genealogy, birth and infancy of Jesus, ministry of John the Baptist, baptism and temptation of Jesus, i, 1-iv, 11. I. Early Galilean ministry (iv. 12-xii, 50). II. Later ministry in Galilee and neighborhood, and the Perean journey (xiii, 1-xx, 34). III. Entry of Jesus into Jerusalem and his teaching there, mainly controversial (xxi, 1-xxiii, 39). IV. Eschatological dis¬ course (xxiv, 1-xxv, 46). V. Closing scenes, anointing at Bethany, last supper, agony in Gethsemane, trial, crucifixion, death and resurrec¬ tion (xxvi, 1-xxviii, 20). In addition to the story of events and many brief reports of say¬ ings of Jesus, this Gospel is marked by a cycle of five long discourses, each followed by a uni¬ form formula, ((It came to pass when Jesus finished.® These discourses are <(The Sermon on the Mount® (v, 1-vii, 27) ; the (<Address to the Apostles® (x, 5-42) ; the collection of ((Kingdom Parables® (xiii, 1-52) ; the ((Discourse on Humility and Forgiveness® (xviii, 1-35) ; and the (< Apocalyptic Discourse® (xxiv, 4-xxv, 46). While it need not be doubted that Jesus spoke at length on each of the occasions with which these discourses are connected, it is commonly held, especially in view of the somewhat parallel reports in Luke, that the author has gathered sayings spoken at various times and grouped them into what may be called ˆbouquets® of discourse, uniting them, not on the ground that all were spoken on the same occasion, but

rather according to a logi¬ cal' association of ideas. This Gospel is also characterized by an arrangement of material in groups of threes, fives or sevens, presumably to aid the memory. Some 40 triplets have been

named, e.g., the genealogy is arranged in three groups of 14 generations each, in chapters viii and ix there are three miracles of power, fol¬ lowed by three of restoration, there are given three prayers in Gethsemane, *etc.* Groupings by five and seven are not so common but occur often enough to deserve note as a striking characteristic of this book.

Purpose. — The purpose of the author plainly was to confirm Jewish Christians in their belief that Jesus of Nazareth was the Messiah long foretold by the prophets and ex¬ pected by his nation. This is strikingly shown by the many references to the Old Testament which is cited no less than 40 times, often with the formal statement <(that it might be ful¬ filled.® The frequent use of the title (<Son of David,® as well as the genealogy which is traced back to Abraham through the royal line of David, the declaration in the Sermon on the Mount of his right to legislate parallel to the original gift of the Divine law through Moses, the assertion that the kingdom would be taken from the Jews and given to others and the grief over Jerusalem, the picture of himself as the judge at the Final Judgment, these claims in addition to the claims of Messiah-ship found in the other Gospels and culminating in the declaration of the Risen Christ that all authority in heaven and earth alike is his, all this abundantly proves that the object of the author was to show that Jesus of Nazareth was the promised Messiah and that all the Divine promises were to be fulfilled, not for the na¬ tion at large which had rejected him, but for his followers, because they had accepted him.

Sources. — Careful comparison of the first Gospel with the second shows that the order of events is substantially the same in both and that almost every paragraph of Mark is re¬ produced in Matthew, the exceptions being only seven brief paragraphs of at most less than 35 verses. As the theory that Mark is an abbreviation of Matthew has proved untenable, it follows that Matthew must be in some way dependent on the material of Mark : the re¬ semblance is too close to permit the supposi¬ tion that both drew from some independent document. But while the source of Matthew must have corresponded in general very closely to. the present form of our Mark, yet this con¬ tains so much of picturesque detail which is not reproduced in Matthew that it cannot rea¬ sonably be held that Mark as we now

have it was the source in question. How to account for this difference is still a problem of criti¬ cism. It is generally held that there may also be traced in Matthew a second main source, sometimes called the tfLogia® document, some¬ times *Q.® (See article Gospels). In addition, there is some material which cannot reason¬ ably be traced to either of the two main sources, as the. genealogy and the infancy narratives, but it is impossible now to trace the origin and extent of these special sources. This fact need not, however, impair our sense of their trust¬ worthiness. It may also be noted that it is not reasonable to hold that the author of this book was a mere copyist who kept slavishly to the exact form of any written sources which lay before him.

Authorship.— The author of this Gospel for Jewish readers must of course have been him¬ self of Jewish descent. Nor is his use of the

Greek language inconsistent with this, since the use of Greek was so widespread that in the 1st century Palestine must have been largely bi¬ lingual. That he was a Palestinian Tew is mani¬ fest from the whole tone of his work. The tone of his work is also such as to make it doubtful whether the author of the book as it now stands was himself an associate of Jesus; in his ministry. While much of the material must go back to eyewitnesses, the author him¬ self seems more remote. Accordingly the dif¬ ficulty in the way of accepting the early and uniform tradition that the. Apostle Matthew was the responsible author is increasingly felt. It is also generally recognized that the book does not have the unavoidable marks of being a translation, but shows that it must have been originally composed in Greek, while the early tradition was that Matthew composed his work in the (<Hebrew language,® by which of course the Aramaic was meant, which had long before replaced Hebrew in common use. It will re¬ tain the substantial value of the tradition if it is held that Matthew was the author of ((Q.® When the Marcan source was reworked to in¬ clude the collection of discourses and other ma¬ terial which was due to Matthew, it would not be surprising to find his name attached to the

whole work. Accordingly, while the direct au¬ thorship by Matthew of the book in its pres¬ ent form is still very commonly held, there is a perhaps increasing tendency among critics to connect only the ((Logia® document with the Apostle himself.

Date and Place of Composition. — There is little dissent at present from the view that this Gospel was composed late in the seventh decade of the 1st century, presumably 65-68. As to the place of composition there is less agree¬ ment. The material is Palestinian, but many feel a certain sense of detachment as if the author was not when he wrote amid the scenes which he describes. Of course this might be true if written in some place in Palestine re¬ mote from both Capernaum and Jerusalem; some Syrian city has been suggested, and even Alexandria has been thought not too remote, especially in view of its large Jewish and Jew-ish-Christian population.

Authenticity and Value. — If the common view of Matthew's direct authorship is still to be accepted, then this Gospel as the work of an apostolic associate of Jesus must be trust¬ worthy and valuable in the highest degree. If, on the other hand, the book is referred to an unnamed author who worked mainly on the basis of the Marcan and Logia documents, its trustworthiness and value will be impaired less than might at first be supposed. We must as¬ sume the honesty of the compiler and editor, which indeed is everywhere manifest, and ac¬ cording to the theory he was working on documents which embodied the common Chris¬ tian tradition approved by the many dis¬ ciples who had seen Jesus face to face or which even had full apostolic authority. Such were presumably the Marcan source and most prob¬ ably the Matthaean Logia, while the genealogy could have been drawn from public sources, and the tone of the infancy narratives is such as conclusively to guarantee their very early date. When all these facts are taken into ac¬ count, it will appear that the latest criticism really confirms the often quoted saying of Re¬

nan : ((The Gospel of Matthew, all things con¬ sidered, is the most important book of Chris¬ tianity — the most important book that has ever been written.®

Bibliography. — McNeile, A. H., (Gospel

According to St. Matthew) (1915) ; Moffatt, James, (Introduction to the Literature of the New Testament (1911) ; Plummer, Alfred, (Exegetical Commentary on the Gospel Ac¬ cording to St. Matthew)

(1910) ; Zahn, Theo¬ dor, ˆIntroduction to the New Testament (E. T., Vol. Ill, 1909).

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

MATTHEW TOWN. See Inagua, Great.

MATTHEWS, (James) Brander, Amer¬ ican author: b. New Orleans, La., 21 Feb. 1852. He was graduated from Columbia in 1871 and from the Columbia Law School in 1873, he was admitted to the New York bar (1873), began to contribute to the magazines in 1873, later turned wholly to literature and in 1892 was ap¬ pointed professor of literature in Columbia. In 1899 he became professor of dramatic literature. He was a founder of The Players and Authors clubs, of the Dunlap Society and the American Copyright League, and of the Columbia Uni¬ versity Press. In 1889-91 he was president of the 19th Century Club. He was appointed to French Legion of Honor in 1907. Elected to American Academy of Arts in 1908. Presi¬ dent of Modern Language Association in 1910 and t>f National Institute of Arts and Let¬ ters in 1913-14. He wrote several dramatic works, among them (This Picture and That5 ; (A Gold Mine) (with G. H. Jessop) ; (On Pro¬ bation (also with Jessop) ; and (Peter Stuyvesant5 (with Bronson Howard). His published volumes include, from an extensive list, the following: (French Dramatists of the Nineteenth Century) (1881) ; (In Partnership) (with H. C. Bunner, 1884) ; (A Secret of the Sea, and Other Stories) (1886) ; (Pen and Ink) (1888) ; (American Literature) (1896) ; (A

Confident To-morrow5 (1898) ; (The Action and the Word5 (1900) ; (Parts of Speech: Es¬ says in English5 (1901) ; (The Development of the Drama5 (1902); (Moliere: His Life and His Works5 (1910) ; (Shakspere as a Play¬ wright5 (1913); (On Acting5 (1914); <The Oxford Book of American Essays5 (1914). He is perhaps best known for his critical papers, marked by keen analysis and a style of much distinction. Some of his earlier writings ap¬ peared over the signature (<Arthur Penn.®

MATTHEWS, Edmund Orville, American naval officer : b. Baltimore, 24 Oct. 1836 ; d. 30 Jan. 1911. He was graduated from the United States Naval Academy in 1855 and served in the navy before the outbreak of the Civil War, in which he served with distinction. In 1869-73 he was in command of the torpedo boat corps at Goat Island, Newport Harbor, and he com¬ manded the Brooklyn in the Asiatic

squadron in 1885-87 ; he was a member of the Board of Inspection and Survev in 1891-94 and in 1897 was raised to the rank of rear-admiral. He was appointed president of the Examining Board in 1898 and served until he was retired in that year.

MATTHEWS, Franklin, American jour¬ nalist: b. Saint Joseph, Mich., 14 May 1858; d

26 Nov. 1917. Graduated from Cornell Univer¬ sity 1883, he was reporter and editor on the Phil¬ adelphia Press, 1886-90, reporter, editor, corre¬ spondent of the New York Sun, 1890-1912. He was assistant Sunday editor and night city editor of the New York Times, 1912-15. He was associate professor of journalism, Columbia University, 1914. He was a trustee of Cornell University, 1913-18, and also president of the Cornellian Council, 1915. He published (Our Navy in Time of War* (1899); (The Newborn Cuba1* (1899) ; (With the Battle Fleet) (1909) ; (Back to Hampton Roads)

(1909).

MATTHEWS, John Hobson, English archivist: b. Croydon, near London, 1858; d. Ealing, 23 Jan. 1914. He was educated at the Proprietary School of Blackheath and at The Leys, Cambridge. In 1877 he entered the Ro¬ man Catholic Church and two years later was made a solicitor. From 1894 to 1903 he was employed as archivist to the corporation of Cardiff, Wales, and was also archivist to the county and urban councils of Monmouthshire. His various avocations included those of ex¬ pert archivist, record searcher, genealogist, journalist and legal antiquary. In 1895 he dis¬ covered the text of the grant of Cardiff lands to Sir William Herbert, in 1550, the document being almost illegible. In the following year he brought to light the text of a charter to the borough of Newport. In 1903 and 1911 he was called as expert before the Royal Historical Manuscripts Commission. He published <History of St. Ives, Cornwall* ; (History of the Hundred of Wormelow) ; (The Vaughans of Courtfield) ; (The Old Faith and the New) ; (Life and Memorials of St. Teilo) ; (The Mass and its Folklore) ; Continuity Reconsidered.* He continued Duncumb's Herefordshire, *ed¬ ited Cardiff Records* (1898-1905) and con¬ tributed to Che Catholic Encyclopedia, * the Tablet, Athenaeum, *etc.*

MATTHEWS, Marmaduke Matthews,

Canadian artist : b. Warwickshire, England, 1839; d. 1913. He received his education in Oxford and London ; removed to Toronto in 1860 and resided in New York from 1864 to 1869. In the latter year he returned to Toronto, was one of the founders of the Ontario Society of Artists, of which he was president in 1894. He excelled in woodland

studies. His best-known works are Che Canadian Wonderland) and Che Conquered Portal.)

MATTHEWS, Paul, American Protestant clergyman : b. Glendale, Ohio, 25 Dec. 1866. In 1887 he was graduated at Princeton University and three years later at the General Theological Seminary, New York. In 1891 he was ordained to the ministry of the Protestant Episcopal Church ; served as assistant at the Church of the Advent, Walnut Hills, Cincinnati, 1890-91 ; entered the Associate Mission, Omaha, and had charge of Saint Paul's and Saint Tohn's churches in 1891-95. From 1896 to 1904 Dr. Matthews was rector of Saint Luke's, Cincin¬ nati, and from 1904 to 1913 was dean of Saint Paul's Cathedral of the same city. In 1913-15 he was dean of the cathedral at Faribault, Minn., and professor at Seabury Divinity School. On 25 Jan. 1915 he was consecrated bishop of New Jersey.

MATTHEWS, Stanley, American jurist: b. Cincinnati, Ohio, 21 July 1824; d. Washing¬ ton, D. C., 22 March 1889. He was graduated from Kenyon College in 1840, studied law and was admitted to the bar in 1842, when he es¬ tablished a practice in Maury County, Tenn.. but returned to Cincinnati in 1844 and engaged in practice there. He was editor of the Cincin¬ nati Herald, an anti-slavery journal, in 1846-49, and held various political offices, and in 1855—56 was a State senator. In 1858 he was appointed United States district attorney for the southern district of Ohio, but at the outbreak of the Civil War in 1861 entered the volunteer serv¬ ice and was commissioned lieutenant-colonel and was a colonel when in 1863 he resigned to accept the seat of judge of the Superior Court of Cincinnati. He was elected United States senator in 1877 after having acted as counsel before the Electoral Commission, and in 1881 he was appointed a justice of the Supreme Court of the United States.

MATTHEWS, Washington, American

physician and ethnologist : b. Killiney, Dublin County, Ireland, 1843 ; d. 1905. In 1864 he was graduated at the medical school of the Univer¬ sity of Iowa. He was commissioned assistant surgeon in the United States army, from which he retired as surgeon in 1895. He made several anthropological studies of the Indians of North America. His published works include dic¬ tionary of the Language of the Hidatsa) (1873) ; (Navaho Silversmiths1* (1883) ; (Navaho Weavers * (1884) ; (The Mountain

Chant, a Navaho Ceremony) (1887) ; (Navaho Legends) (1897) ; (The Mystic Chant, a Navaho Ceremony1* (1902) ; ˆNavaho Myths, Prayers and Songs) (1907).

MATTHIAS, ma-thi'as, a disciple of Jesus, probably one of the 70, who was chosen by lot to take Judas Iscariot's place among the 12. Little is known of him. Even early legend con¬ fused him with Matthew, and an apocryphal gospel was attributed to him. In the Roman Catholic Church 24 February, in the Greek 9 August, is sacred to him. The (Acts of An¬ drew and Matthias *make him a missionary in Africa. Consult Eusebius, Ecclesiastical His¬ tory* (Vol. I, 12; II, 1).

MATTHIAS (Ger. mat-te'as), emperor of Germany: b. Vienna, 24 Feb. 1557 ; d. 20 March 1619. He was a younger son of Maximilian II. He was made governor of Austria in 1593 and two years later became heir to the imperial throne. He fought in the war against the Turks and in 1606 was made head of the House of Hapsburg. He became king of Bo¬ hemia in 1611 and had annexed Hungary and Moravia before the death of Rudolf II. In 1612-19 he was emperor of the Holv Roman Empire, having been elected on the death of his brother, Rudolf II (q.v.). His reign was an unsuccessful one owing to the religious dis¬ sensions among the constituent parts of his em¬ pire. He attempted in vain to suppress bv de¬ cree the Catholic League and Protestant Union. Consult Gindely, A., (Rudolf II und seine Zeit* (Prague 1868) and Heling, T.. Hie Wahl des romischen Konigs Matthias* (Belgrade 1892).

MATTHIAS I, Hunyadi (((Corvinus**) , kor-ve'noos, The Great, king of Hungary: b. Klausenburg, Transylvania, 23 Feb. 1440; d.

Vienna, 4 April 1490. The second son of John Hunyady, he was imprisoned in Bohemia by his father's enemies, who strongly but unsuccess¬ fully opposed his candidacy for the crown of Hungary in 1458. Another party of opposi¬ tion attempted to make the Emperor Frederick III king of Hungary; but Matthias brought them to terms and in 1463 made peace with Frederick. By the Peace of Olmiitz, 22 July 1479, he gained Silesia, Moravia and Lausitz, and the succession to the crown of Bohemia. In his wars with the Turks he was equally successful and a part of Bosnia was ceded to him by the Porte. War broke out again with the Austrian emperor; Matthias invaded his territory and captured and held Vienna. His court was a centre of scholarly men and his library, called the Corvina, a famous collection. The internal administration of Hungary was greatly improved under Matthias. Consult Fraknoi, Vilmos, (King Matthias HunyadP (Budapest 1890 ; German trans., Freiburg 1891) and Galeotti. Marzio, (De egregie sapien-ler et jocose dictis ac factis Matthiae regis) (Vienna 1746).

MATTING. While this term is usually employed to designate floor coverings made from reeds and fibrous grasses, it is a generic term which includes not only the commercial mattings for house floors, which are made in Eastern countries, but a much wider range of articles useful in the domestic economy and in other employments, such as screens and tatties, sleeping mats (used in India and the East), the matting employed by nurserymen for protect¬ ing hotbeds and cold frames, and even some forms of thatch. For the most part mattings are hand-woven, in the finer varieties the warp being cotton or other yarns and the filling the culms of various sedges, reeds and grasses, an example being the familiar Japanese mattings of the house-furnishing stores. In the Russian bast mattings for nurserymen's use, bast of the linden tree is employed for both warp and filling, very coarsely woven or plaited. The roots of the Ivhus-Khus (Andropogon squarro-sus), a perennial grass of India, are woven into fragrant screens for open windows and also made into awnings. The Taika rush mats of Lormosa are famous as sleeping mats, and the best grades are said to be as fine and soft as cloth, resembling the best Panama hat

weaving. Consul Davidson states that a mat of the high¬ est grade, measuring 5x6 feet, requires the labor of a girl weaver 120 days, and such mats have sold for 60 to 70 yen (or about $40). The rush is an unidentified species, _ but sleeping mats are made from several species of Cy perns and Scirpus found in Asia, Africa and other countries.

The commercial mattings used for house decorations are for the most part of Chinese and Japanese manufacture. In Japan two spe¬ cies are employed, Juncus effusus, the Bingo-i mat rush, which is always manufactured into the costly mats used bv the higher classes (and known as Tatamiomote) and Cy perns unitans, which is employed for the cheaper grades. The largest importer of these mats is the United States, England, Austria and Germany, follow¬ ing in the order named. The qualities of the Bingo-i are named as follows : Kinkwanyen, manufactured at Okayama; first quality Aya-

mushiro, second quality Aya-mushiro, Damask Aya-mushiro, common Aya-mushiro, manufac¬ tured at Bittiro. First quality Somewake-mushiro, common Somewake-mushiro, Damask Hana-mushiro, common Hana-mushiro, manu¬ factured at Bingo ; ordinary Hana-mushiro (best quality), manufactured at Chikugo. Cy¬ perus unitans produces the Shichito-i mats which are chiefly manufactured in the Oita pre¬ fecture. The plant is cultivated both upon up¬ land and irrigated lands. The varieties of mats from this species are known by names as follows : Kikaiori Hana-mushiro, Damask

Hana-mushiro, common Hana-mushiro (two forms). Seidaka Hana-mushiro, manufactured at Bungo. Mattings made from the two species above have been exported in a single year to the value of 650,000 yen, or over $400,000.

The Chinese and Korean mat rush is Cyperus tegetiforniis, this species also being used for the manufacture of cuffs and sandals. The India commercial mattings are made chiefly from Cyperus corymbosus and tegetum; the latter being known as the Calcutta mat rush, while the former is used for the Tinnerelly mats which are the finest made in India. They are also made at Palghat, but these are not so fine. In the manufacture of the India mat¬ tings the culms are split into two or three parts and then woven into mats upon a warp of threads previously stretched across the floor of a room. The operator passes the culms with the hand alternately over and under the successive threads of the warp and presses them home.

It would be difficult to enumerate all of the mattings made in different countries, though mention should be made of the fine and highly prized Niihau mats of Hawaii, produced from Cyperus levigatus. Matting is made in Spain and Morocco from Juncus maritimus, and in Italy from Juncus acutus. Two species of sword rush, Lepidosperma gladiatum and L. flexuo-suni, are used by the natives of Australia not only for mats, but for baskets and other articles, and Lepironica mucronata, found in Asia, Africa and Polynesia, supplies the fibre for the mats with which Chinese boatmen cover their cargoes.

In the United States, a handsome and utili¬ tarian form of floor matting is largelv manu¬ factured from Slough grass, Carex filiformis. In normal years the imports of mattings to the United States reach a total of $3,250,000.

The University of California has recently been experimenting with several species of matting rushes, chiefly Juncus effusus, and J. robustus, from which a fine sample of matting has been manufactured at a factory in Maine. There is a possibility therefore that rush mat¬ ting may be produced in the United States, com¬ mercially, in the near future.

For matting fibres consult (Dictionary Eco¬ nomic Products of India,) (Descriptive Cata¬ logue of Useful Fiber Plants of the World, > and (The Island of Formosa,* by Tas. W. Davidson. Consult also (History and Manu¬ facture of Floor Coverings* (New York 1898). The leaves of many species of palm, in different parts of the world, are used for native mats and mattings, though few of these ever reach commercial importance. See Palms.

Charles Richards Dodge.

MATTING FIBRES. See Fibre.

MATTIPI, or FROG SNAKE, serpent (Xenodon severus) of northeastern South America. While a poisonous variety, it is slow to

bite. Its posterior teeth serve as fangs, but it has no venom sacks. The bite causes temporary swelling and soreness, but is seldom fatal.

MATTISON, Hiram, American Methodist Episcopal clergyman: b. Norway, Herkimer County, N. Y., 1811; d. 1868. After holding pastorates at Watertown and Rome, N. Y., he became pastor of the John Street Church, New York, in 1852. Subsequently he was made pastor of Trinity Methodist Episcopal Church in the same city. In the General Conference of 1860 Mattison tried to have action taken against all slaveholding members in the Church, and piqued at his failure he withdrew from the Church in 1861 and was made pastor of Saint John's Independent Methodist Church. Four years later he returned to his old denom¬ ination and was appointed to the pastorate of Trinity Methodist Episcopal Church, Jersey City. In 1868 Mr. Mattison was district secre¬ tary of the American and Foreign Christian Union. His published works include (Tracts for the Times) (1843) ; an edition of Burritt's (Geography of the Heavens 5 (1850) ; Spirit-Rapping Unveiled) (1854) ; Sacred Melodies5 (1859) ; Umpending Crisis) (1859) ; (Immortal¬ ity of the SouP (1866) ; (Resurrection of the Body5 (1866) ; (Defense of American Methodism > (1866) ; (Popular Amusements) (1867). Consult Vansant, (Life of Hiram Mattison 5 (New York 1870).

MATTO GROSSO, ma'to1 gro'so, Brazil, a western central state bordering on Bolivia and Paraguay. It has an area of 532,683 square miles and an estimated population in 1917 of only 142,000 or 143,000, of whom 30,000 were in or near Corumba (q.v.) and 20,000 were citizens of the capital, Cuyaba (q.v.). _ It ap¬ pears, therefore, that in this vast political di¬ vision of Brazil there is an average of only one person to each three and two-thirds square miles, the estimates being based upon those given in the Pan-American Union handbook (Brazil. } The only Brazilian state exceeding this in size is Amazonas (q.v.). The best re¬ cent descriptions of a portion of the interior from Paraguay up to the Amazon River are in the following hooks : Roosevelt, T., (Through the Brazilian Wilderness) (New York 1914) ; Zahn, J. A. (H. J. Mozans), (Through South America's Southland5 (New York and London 1916). The ex-President writes (p. 100) : ((It is certain that this inland region of Brazil, in¬ cluding the state of Matto Grosso, which we were traversing, is a healthy region, excel¬ lently adapted to settlement; .railroads, will speedily penetrate it, and then it will witness an astonishing development.55

MATTOON, ma-toon', Ill., city, in Coles County, on the Illinois Central and the Cleve¬ land, Cincinnati, Chicago and Saint Louis rail¬ roads, about 75 miles east by south of Springfield. It was settled and

incorporated in the year 1855. It is situated in an agricultural re¬ gion in which broom corn is one of the prin¬ cipal products. Grain, fruit and livestock are also produced in large quantities. The chief

manufacturing establishments are broom fac¬ tories, flour mills, grain elevators, wagon and carriage factories, brick and tile yards, found¬ ries, machine shops and repair shops for sev¬ eral railroads. It has a large trade in its man¬ ufactured articles, grain, fruit and livestock. Some of the prominent buildings are the Old Folks' Home (I. O. O. F.), the public and parish schools, the public library and reading-room and the churches. The electric-light plant is owned and operated by the city. The government is vested in a mayor, chosen for two years, and a council. Pop. (1920) 13,449.

MATURIN, Charles Robert, Irish dram¬ atist and novelist: b. Dublin, 1782; d. 30 Oct. 1824. He received his education at Trinity Col¬ lege, Dublin, entered the ministry of the Church of Ireland and served successively as curate at Loughrea, County Galway, and at Saint Peter's, Dublin. He wrote the novels (The Fatal Revenge; or, the Family of Montorio5 (1807); (The Wild Irish Boy5 (1808); <The Milesian Chief5 (1812), under the pseudonym of (<Dennis Jasper Murphy.55 The novels were ridiculed by the critics, but attracted favorable attention from Sir Walter Scott, who intro¬ duced Maturin to Lord Byron. These powerful friends secured the production of Maturin's tragedy (Bertram 5 at Drury Lane in 1816, with Kean in the leading role. It ran for 22 nights, and a French version was produced soon after¬ ward at the Theatre Favart, Paris. His other tragedies Manuel5 (1817) and (Fredolfo5 (1819) failed totally. Among his other works were the novels (Women5 (1818); (Melmoth the Wanderer5 (1820), and (The Albigenses5 (1824). (Melmoth5 is his greatest work and was most successful in its day. Balzac wrote a sequel to it entitled (Melmoth Reconciled to the Church5 (1835). Consult (Melmoth,5 edited with memoir of the author and bibliography (London 1892).

MATURIN, ma-too-ren', Venezuela, a town in the state of Monagas, formerly the capital of the state of Maturin. It is on the Guarapiche branch of the Orinoco Delta, 25 miles by rail above its port, Colorado, and 40 miles from the sea. A considerable trade with the West In¬ dies, principally in cattle and hides, is carried on. In the neighborhood are extensive planta¬ tions of cacao, sugar cane, fruits and cereals. Its industrial establishments turn out cigars, hammocks, boots, shoes and soaps. Pop. 4,400.

MATZOON, a milk food used in Armenia; prepared by exposing milk in open vessels to a heat of 90° F., and when coagulation takes place the curd is broken up by a churning proc¬ ess and a little salt is added. See Kumiss.

MATZOTH, the Hebrew name for a kind of unleavened bread or biscuit eaten by the Jews during the feast of the Passover.

MAUBEUGE, mo'bezh, France, fortress and manufacturing town in the department du Nord, occupying both banks of the Sambre, 140 miles by rail northeast from Paris, within two miles of the Belgian frontier. The origin of Maubeuge was in a double monastery for monks and nuns founded in the 7th century. Destroyed successively by the Normans, by Louis XI, by Francis I and by Henry II, it finally fell to France by the Treaty of Nimeguen in 1678, and was fortified by Vauban. Pre-

vious to 1914 it was defended by nine forts. Besides its arsenal and several old convents Maubeuge has a variety of important industries,

c011 foundries, tanneries and manufactories of firearms and iron and steel goods. It has also an active trade in coal, marble, slate, salt¬ petre, sugar and oil.. In the Great War of 1914— 18 Maubeuge and its forts held out almost a month against a heavy bombardment from Ger¬ man siege artillery. On 9 Sept. 1914 the Ger¬ mans claimed the capture of the town, but the French on the 11th denied that it had fallen. On 18 September it became known that the town and forts had definitely fallen to the Ger¬ mans. Pop. 23,200.

MAUCH CHUNK, mak chunk, Pa., a

town and county-seat of Carbon County, on the. Lehigh River, the Lehigh Coal and Navi¬ gation Company's Canal and on the Central of New Jersey and the Lehigh Valley rail¬ roads, .46 miles west by north of Easton. The town is picturesquely built on the side of a mountain rising 1,500 feet from the river, here winding through a narrow, deep

ravine, and each summer is visited by thousands of tourists, attracted by the beauty of the surrounding nat¬ ural scenery. The town has a county building, Young. Men's Christian Association building, the Dimmick Memorial Library, the Asa Parker Park, is electrically lighted and has electric street railways. It has a number of foundries, shoe factories, car shops, silk mills, etc., but is best known as an important coal centre, marking the extreme boundary of the anthracite coal region of Pennsylvania; it was established by the Lehigh Coal and Nav¬ igation Company in 1818. The Summit Hill coal mines, nine miles southwest of the town, are among the best in the State. The coal is now carried through a tunnel, but was formerly transported to Mauch Chunk by a gravity rail¬ road known as the Switchback, which has be¬ came famous as an exciting pleasure route for tourists. Mounts Pisgah and Jefferson,, the summits of which are reached by the Switchback railroad; Prospect Rock, Flagstaff Peak and Glen Onoko are points of considerable in¬ terest, commanding splendid views of the Le¬ high Valley. The government is vested in a burgess and council, elected for terms of four years. F'op. 3,666.

MAUD. Tennyson called (Maud) a <(monodrama,® a drama told in a series of lyric solilo¬ quies. His explanation of its unique form is this: <(The peculiarity of this poem is that dif¬ ferent phases of passion in one person take the place of different characters.® To tell the story of <Maud) is to follow these phases of passion. The beginning shows the hero cut off from life by his heritage of hate and wrong, crying for war to kill the greed and cruelty of peace. With the. coming of Maud, the child of his enemies, begins his new . life of love that embraces mankind. His joy is shattered at its climax; a hopeless exile, he seeks only escape from the phantoms of the past. From this death in life, he is saved by the outbreak, of war <(in defence of the right.® The ending, written to the sound of cannon booming from British battleships before the Crimean War, is a paean of battle. It was this militant strain in (Maud> that shocked Tennyson's admirers and still provokes criticism. Yet read, not as

a defence of any one war, but as an indict¬ ment of the materialistic peace that is war and that causes war, the poem shows something of that larger vision that is prophetic.

As a monodrama, <Maud) fails to achieve dramatic unity. Many of the separate lyrics are genuine bits of inner action, of soul-drama, set forth with keen psychological analysis, with skilful variation of meter to express fluctuation of feeling. But sequence of action, the law of

drama, is sacrificed to singleness of mood, the essence of the lyric. In <Maud,) as in (The Princess, > Tennyson's attempt to fuse the lyric and the dramatic moods fails. To think of (Maud} is to think first of those songs that have become part of the vocabulary of passion and of longing. Consult Tennyson, Hallam, (Alfred, Lord Tennyson: a Memoir* (2 vols., 1897) ; Grierson, H. (in (Cambridge History of English Literature,* Vol. XIII, ch. 2, and bibliography).

Frances W. Cutler.

MAUD MULLER, a poem by J. G. Whit¬ tier, first published in the National Era, Decem¬ ber 1854. It is a ballad reciting a romantic passage in the lives of a susceptible judge and a country girl.

MAUDE, Sir Stanley, English soldier, commander of the British Expeditionary Force in Mesopotamia 1916-17. He was born in 1864, entered. the army at the age of 20 and saw his first active service in the Egyptian campaign of 1885. He fought in several battles in the South African war and later served as mili¬ tary secretary to the governor-general of Canada, 1901-04. He next became private secretary to the Minister for War in London, and was subsequently connected with the or¬ ganization of the newly-formed Territorial Army. He was on the General Staff of the 5th Division when the European War broke out, and took part in all the early operations of the campaign. While in command of the 14th Infantry Brigade he was severely wounded. On his recovery he was promoted major-general in 1915, and transferred to the Dardanelles, thence to Egypt and afterward to Mesopotamia, where he took over the chief command in succession to General Sir Percy Lake in August 1916. The military situation in that theatre of war was critical. On 29 April General Townshend had been forced to surrender at Kut with 8,000 men owing to lack of resources. It was the task of General Maude to retrieve the disaster. After some months of preparation and reorganization he marched out with all his forces in December and pushed right up to Kut, where the Turks were strongly entrenched on both banks of the Tigris. With hard fighting he dislodged the enemy, drove him back into Kut, and launched his main attack across the river at Shumran. The Turks broke and fled; Kut fell again to the British, and Maude pursued with such vigor that he entered Bagdad on 11 March 1917. Another long period of preparation fol¬ lowed, and on 28 Sept. 1917 General Maude attacked the Turks at Ramadie, carried the advanced positions and encircled them with his cavalry, compelling the whole division to surrender. On 6 November he captured Tek-rit, the riverhead on the Tigris, and the whole of the Turkish forces withdrew from 30 to 50

miles northward. Before he was able to achieve anything further, General Maude died, after a very brief sickness, at Bagdad on 18 Nov. 1917.

MAUDSLEY, madz'H, Henry, English alienist: b. near Settle, Yorkshire, 6 Feb. 1835; d. 23 Jan. 1918. He was graduated in medicine from the University of London in 1857, was editor of the Journal of Mental Science in 1862-78, in 1869-79 was professor of medical juris¬ prudence in University College, London. In 1913 he presented $150,000 to the London County Council for the erection of a Mauds- Iey Hospital for the Insane. His works in¬ clude Responsibility in Mental Disease' (1874); Rhysiology of Mind' (1876); Ra¬ diology of Mind' (1879) ; (Natural Causes and Supernatural Seemings' (1886); Rife in Mind and Conduct' (1902) ; (Heredity, Variation

and Genius' (1908).

MAULE, mow'la, Chile, a maritime prov¬ ince bounded north by the province of Talca, east by Linares and Nuble, south by Concep¬ cion and west by the Pacific Ocean. Area, 2,812 square miles. It takes its name from its principal river. The well-wooded Coast Range, nearly 3,000 feet high, occupies the great por¬ tion of the surface. Agriculture and its allied occupations constitute the principal industries. Cattle, hides, wheat and lumber are exported. The Maule and Stata are navigable and afford good means of communication. There is a branch of the government railroad from Cauquenes to Parral. Another line connects Con¬ stitution with Talca. Capital, Cauquenes (9,895) ; chief port, Constitucion. Pop. of prov¬ ince 122,754.

MAULE, Chile, a river rising in the Andes and after a westerly course of about 150 miles, 52 of which are navigable for small vessels, flowing into the Pacific Ocean near the village of Constitucion, 99 miles northeast of Concepcion. The Maule River is supposed to have been the southern boundary of the empire of the Incas. In its upper courses its waters supply extensive irrigation systems.

MAULMAIN, mal-man', or MOULMEIN,

mowl-min', Burma, the capital of the Tenasserim division, and a seaport near the mouth of the Salwin River, on the Gulf of Martaban

30 miles from the Bay of Bengal. The town, com¬ paratively modern, dating from 1826, is regu¬ larly built on level ground between the river and a range of wooded hills, on whose heights are the gilded spires of numerous pagodas and elegant residences, commanding fine views of beautiful scenery. Maulmain has numerous public buildings, churches, chapels and mission¬ ary establishments, several charitable and edu¬ cational institutions, barracks, a hospital, jail, *etc.* A considerable trade is carried on with Indian ports, the chief exports being teakwood and rice, cotton, hides, horns, gums, ivory, copper, lead, wax, the imports, piece goods, hardware, provisions and general merchandise. Shipbuilding is a thriving industry because of the available supply of teakwood. The water supply system, gas plant and sewage system are the property of the municipality. Pop. about 60,000. besides native Burmese, comprising Hin¬ dus, Eurasians, Armenians, Chinese, Malays, Jews and Europeans.

MAUMEE, ma-me, a river formed by the junction of Saint Mary's and Saint Joseph's rivers at Fort Wayne, Ind. It flows northeast across the northwest corner of the State of Ohio, and enters Lake Erie through Maumee Bay. Its affluents are the Auglaize and the Tiffin. Its basin is 6,700 square miles in extent The river is 150 miles long and navigable 12 miles from its mouth to the Maumee Rapids. The Miami and Erie Canal, which connects Lake Erie with the Ohio River, begins at the head of navigation on the Maumee, and follows the course of the river to Defiance, then turns south. The Maumee Bay, a shallow body of water, has been improved by deepening and straightening the channel. Toledo is at the mouth of the Maumee. The Maumee River was a part of one of the water routes much used by the early missionaries and explorers. The distance from the head waters of the Mau¬ mee to the Wabash River is only about 25 miles.

MAUNA KEA, mow'na ka'a, Hawaii, an extinct volcano, the highest peak in the Pacific, 13,805 feet in altitude. Snow covers its upper slopes for the greater part of the year, and its sides are wooded. Coffee is cultivated on the lower slopes. See Hawaii.

MAUNA LOA, mow'na lo'a, Hawaii, a volcano 13,760 feet high, with a crater nearly five miles in circumference, and vertical preci¬ pices on the inner side 500 to 600 feet high. Mauna Loa is situated in the central southern portion of Hawaii, and on its eastern slope is the still larger crater of Kilauea, about nine miles in circumference, but apparently having no communication with Mauna Loa, their periods of activity being independent of each other. Mauna Loa's last period of

great activity was in 1881. See Hawaii; Kilauea.

MAUNDY (man'di) THURSDAY, is the

Thursday in the Passion week. Another popu¬ lar old name of the day is Shere Thursday, from the custom of shearing the hair which the priesthood used to observe. It used to be the custom in England and other countries, and still is in Austria, for the sovereign to wash the feet of a certain number of poor persons, and to send them away with presents in the shape of food, clothing and money. This cere¬ mony is in commemoration of the act of Christ, who washed his apostles' feet on the occasion of the last supper.

MAUNOURY, Michel Joseph, French

soldier: b. Maintenon, Eure-et-Loir, 17 Dec. 1847. He received his education at the Rcole Polytechnique, Paris ; first saw active service as second lieutenant in the Franco-Prussian War of 1870— 71 . In that conflict he was wounded at Champigny. His professional studies were pur¬ sued at the Rcole Superieure de Guerre. From 1886 to 1888 Maunoury was artillery instructor at the famous military academy of Saint-Cyr. In 1897 he attained the rank of colonel, was made brigadier-general four years later and a general of division in 1905. In 1905 he had charge of the artillery of the Paris forts and soon after was made president of the com¬ mission of military schools. General Mau¬ noury was commandant of the ficole Supe¬ rieure de Guerre in 1907 ; the following year of the 15th Army corps with headquarters at Mar¬ seilles, and in 1909 of the 20th corps at Nancy.

He was made military governor of Paris in 1910 and a member of the Superior Council of War. In the War of 1914-18 Maunoury was placed in charge of the army of manoeuver and was rushed north in an effort to turn the flank of Von Kluck's army then driving toward Paris. When the latter discovered Maunoury on his right the drive was stopped and in the battle of the Marne the invader was driven back. Subsequently after the beginning of trench warfare Maunoury held a command at

Soissons. He was severely wounded in March 1915 and in the same year received at the hands of the President of the Republic the medaille militaire, the highest military honor in the gift of France. He is also an officer of the Legion of Honor. In November 1915 Mau¬ noury succeeded Gallieni as military governor of Paris. Consult Blanchon, G., (Le general Maunoury > (Paris 1916). See War, European.

MAUPASSANT, Henri Rene Albert Guy

de, on-re re-na al-bar ge de mo-pa-san, French novelist : b. Chateau Miromesnil, Seine-Inferi- eure, France, 5 Aug. 1850; d. Paris, 6 July 1893. He began his career as a clerk in the Navv Department in Paris and also served for a time in the French army during the Franco-Prussian War. The novelist Flaubert, a friend of his mother's, was his godfather, and the youth took him as his model in the art of composition. After years of practice, during which he wrote and destroyed a great number of manuscripts, he allowed a short story, (Boule de SuifP to appear in 1880, a work which displayed the greatest finish and at the same time allied him to the naturalistic school of fiction. In the same year he published a book of verse, (Des Vers,> and a drama, (Histoire du vieux TemnsP After this he continued to cultivate the short story and w'as very soon recognized as one of the greatest writers of short stories the 19th century had seen. In spite of the perfection of art displayed in their construction neither his brief tales nor his novels form pleasant reading. They compel admiration, but they are dominated by pessimism and in his later work the traces of an unbalanced mind may be plainly seen. In 1890 De Maupassant's mental malady occa¬ sioned the cessation of literary occupation, two years later he became wdiolly insane and he died the next year in an asylum. His collec¬ tions of short stories include (La Maison Tellier) (1881); (Mlle. Fifi) (1883); (Les Soeurs RondolL (1884) ; (Yvette) (1884) ; (Contes du Jour et de la NuiD (1885) ; (Contes et Nouvelles) (1885) ; (La Horla> (1887) ; (La petite Roque> (1888); (La Main gauche) (1889); (Le Pere Milon) ; (L'inutile BeauteP (1890), *etc.* The finest of his six novels is (Pierre et Jeaffi (1888); the others are (Une Vie) (1883; (Bel Ami> (1885); (Mont Oriol> (1887); <Fort comme la Mort} (1889) ; (Notre Coeur) (1890). He also published several collections of travel sketches, such as (Au SoleiP (1884) ; (Sur 1'EatP (1888); (La Vie errante> (1890). A collection of 13 of his short stories published in English with the title, (The Odd Number,) represents him at his best, both in point of art and as regards the stories themselves. The ab¬ sence of a moral sense is less apparent here than elsewhere and there is less of gloom and animalism perceptible. Consult (CEuvres com¬ pletes de Guv de

1908H0) ; (Works of Guy de Maupassant* (9 vols., New York 1910) ; Brunetiere, Ferdinand, (Le roman naturaliste) (Paris 1883) ; Doumic, Rene, (Ecrivains d'aujourd'hui* (ib. 1894) ; Bashkirtseff, Marie, (Further Memoirs* (Lon¬ don 1901) ; Symons, Arthur, (Studies in Prose and Verse) (New York 1904) ; Mahn, P., (Guy de Maupassant, sein Leben und seine Werke* (Berlin 1908) ; Matthews, Brander, inquiries and Opinions) (New York 1907).

MAUPERTUIS, Pierre Louis Moreau de,

pe-ar loo-e mo-ro de mo-per-tii-e, French mathematician and philosopher : b. Saint Malo, France, 28 Sept. 1698; d. Basel, Switzerland, 27 July 1759. He was educated at the College of La Marche, Paris; entered the army in 1718 and after five years' service resigned in order to become instructor in mathematics in the Academy of Sciences. He went to England in 1728, where he was made a member of the Royal Society and became, a pupil of Newton. In 1736 he conducted a scientific expedition to Lapland for the purpose of measuring an arc of the meridian, the result of which was con¬ firmation of Newton's theory of the flattening of the globe at the poles. In 1743 he was elected to the French Academy, in 1744 was summoned to Prussia by Frederick the Great and in 1746 was declared president of the Academy of Sciences at Berlin. A dispute with the philosopher, Konig, regarding the discovery of the infinitesimal calculus shortened his days. Among his works are (Sur la figure de la terre) (1738) ; (Discours sur la figure des astres* (1742) ; (Lettre sur la comete de 1742) (1742) ; (Astronomie nautique) (1745; 1756); (Essai de cosmologie) (1750) ; Maupertiana ou divers ecrits) (1753). Consult De la Baumelle, (Vie de Maupertuis* (Paris 1856); Damiron, J. P., (Memoires sur Maupertius) (ib. 1858) ; id., (Memoires pour servir a l'histoire de la philosophie du XVIIIe siecle* (Vol. Ill, ib. 1864).

MAUREL, md-rel, Victor, French singer: b. Marseilles, 1848. He was educated at the Paris Conservatoire and made his debut in Paris in 1869. His first appearance in Royal Italian Grand Opera was in 1873 and he achieved a signal success. He created Iago in Verdi's ˆtello,* Falstaff in the opera of that name, and has appeared in many operatic roles in Europe and United States,, being, generally recognized as the leading acting baritone actor on the Italian stage. He has published

(L'Art du chant) ; (Le chant renove par la science) ; (Dix ans de carriere,* *etc.*

MAUREPAS, Jean Frederic, zhon fra-da- rek mo-re-pa, Phelypeaux, Comte de, French statesman: b. Versailles, 9 July 1701; d. there, 21 Nov. 1781. At 14 he succeeded to the office of Minister of State held by his father. In 1725 he became administrator of the navy, in which post he used the best knowledge then available to bring the navy to a high standard of perfection. He became Minister of State under Louis XV in 1738, but in 1749 was ban¬ ished the court for an attack on *Mme.* Pompadour. In 1774 he was made Prime Minister by Louis XVI and became his prin¬ cipal adviser. The chief events of his adminis¬ tration were the restoration of the Parliament of Paris (12 Nov. 1774), and the alliance with and assistance of the American colonies in their struggle against Great Britain. He gathered

to the service of the state such men as Lamoignon-Malesherbes, Vergennes and Turgot. He intrigued against the latter and replaced him as Minister of Finance by Necker in 1776. Five years later Necker experienced the same fate. Consult Guyot, (Eloge historique de M. de Maurepas5 (1782) ; the apocryphal <Memoirs) edited by J. L. C. Soulavie (4 vols., Paris 1792) and (Lettres de M. de Maurepas) (Paris 1896).

MAURICE, ma'ris (John), Frederic Den¬ ison, English Anglican theologian and author, one of the leaders of the Broad Church move¬ ment : b. Normanston, Suffolk, 29 Aug. 1805; d. Cambridge, 1 April 1872. He was son of a Unitarian clergyman; was educated at Trinity Hall, Cambridge; settled in London, where he was editor of the Athenaeum for several years; and having decided to take holy orders entered Exeter College, Oxford. In 1834 he became curate of Bubbenhall, and two years later chap¬ lain to Guy's Hospital. He became professor of history in King's College, London, in 1840, and of divinity as well in 1846, but was deprived of both chairs in 1853 because of the liberal tenor of his (Theological Essays.5 Up to 1860 he was chaplain of Lincoln's Inn, and from 1860 to 1869 incumbent of

Saint Peter's, Vere street, London. In 1866 he was elected pro¬ fessor of moral philosophy at Cambridge. Dur¬ ing his life in London Maurice founded the Working Men's College and Queen's College (for women), took a prominent part in various practical philanthropies and was a leader of the Christian Socialists. He was a man of wonderfully sweet and beautiful character; a fervent preacher, who made much of the father¬ hood of God; and a social reformer, whose lack of success was due to the fact that he was be¬ fore his time. Among Maurice's works are (Eustace Conway, 5 a novel (1834) ; (The Epistle to the Hebrews) ; (Warburtonian Lectures) (1846) ; (The Religions of the World) ; (Boyle Lectures5 (1847) ; (The Lord's Prayer,5 ser¬ mons (1848) ; (History of Moral and Metaphys¬ ical Philosophy5 (1850-60) ; (Ecclesiastical His¬ tory of the First and Second Centuries5 (1854) ; (The World ˆEternal,® 5 urging that <(eternal punishment® is not <(everlasting punishment® (1863); (Casuistry, Moral Philosophy, and Moral Theology5 (1866) ; (The Conscience5 (1868) ; (The Lord's Prayer, A Manual5 (1870). Consult the (Life, chiefly told in his own Letters,5 by his son (2 vols., London 1884) ; Collins, W. E., (Typical English Churchmen5 (London 1902) ; Hughes, T., (The Friendship of Books5 (ib. 1873) ; Rogers, (Men and Move¬ ments in the English Church5 (ib. 1898).

MAURICE, Sir Frederick Barton, Major-General, English soldier: b. 19 Jan. 1871. He entered the army in 1892, rose to captain in 1899 and brevet-major in 1900. He served in the Tirah campaign 1897-98 and in the South African War, 1899-1900. He accompanied the first British Expeditionary Force in the Euro¬ pean War, landing in France on 11 Aug. 1914, was "mentioned in despatches® and created K. C. M. G. During 1915-16 he served as Director of Military Operations on the Imperial General Staff, was awarded the French Croix de Guerre and made a commander of the Legion of Honor. On 7 May 1918 he published a letter in 7 he Times contradicting certain statements made in Parliament by the Premier (Mr. D.

Lloyd George) and other ministers with regard to what had passed at the Allied War Council at Versailles. The matter concerned the disposition of British troops and the strength of the army. The letter caused a great sensation and led to a (<censure debate® in the House of Commons on 9 Mav 1918, in which the House rejected the Premiers motion for the appointment of a select committee to investigate the matter. On 14 May the Army Council placed Major-Gen¬ eral Maurice on ((retired pay.® Though the letter had not been submitted to the Press Bureau before publication, in accordance with war-time

regulations, no further steps were taken by the government. On his retirement General Maurice became military correspondent for the Daily Chronicle. His writings are marked by lucidity and keen penetration. In a remarkable book, (Forty Days in 19145 (Lon¬ don and New York 1919), he traces the com¬ plicated and momentous campaign to the end of the battle of the Marne. His other publica¬ tions include (The Russo-Turkish War 1877— 78, 5 a biography of his father, (Sir Frederick Maurice: A Record,5 and contributions to the (Cambridge Modern History.5

MAURICE OF NASSAU, Prince of

Orange and Count of Nassau: b. Dillenburg, Nassau, 13 Nov. 1567; d. The Hague, 23 April 1625. His father, William the Silent, was assassinated in 1584, and the 18-year-old boy was chosen stadtholder by the provinces of Hol¬ land and Zealand, and later by the other provinces, the command of the army being en¬ trusted to him in 1587 by the States-General. He captured Breda, Zutphen and Nimeguen in 1590-91, and by 1597 had wrested the principal towns of the Netherlands from the Spanish. But Ostend was lost in 1604 and in 1609 a truce was made with Spain for 12 years. In 1618 he became Prince of Orange on the death of his brother Philip William. Internal dissensions followed and Olden Barneveldt, leader of the aristocratic republicans and of the party of re¬ ligious tolerance, was condemned to death (1619) on the charge of high treason, but actually because of his opposition to Maurice. The stadtholder renewed the war with Spain in 1621, immediatelv upon the expiration of the truce, and died at the very time he was negotiat¬ ing an alliance with France and with England. The greatest general of his day he was per¬ sonally cold and unscrupulous. See Holland and consult Kemp, C. M., (Maurits v. Nassau, prins v. Orange in zijn leven en verdiensten5 (4 vols., Rotterdam 1843); Nutting, M. O. (The Days of Prince Maurice5 (Boston 1894) ; van Prinsterer, G. Groen, (Archives ou corre¬ spondence de la maison d'Orange-Nassau5 (1 series, 9 vols., Leiden 1841-61).

MAURICE OF SAXONY, Duke and Elector of Saxony, German soldier: b. Frei¬ berg, 21 March 1521 ; d. near Sievershausen, 11 July 1553. He succeeded his father, Henry the Pious, as Duke of Saxony, in 1541 ; and al¬ though a Protestant refused to join the Schmalkald League. In 1548, two years after a secret treaty with the Emperor Charles, Maurice was made Elector of Saxony. But he soon broke with the emperor, fathoming his purpose of crushing the German princes, and by a sudden show of force made Charles sign the Treaty of Passau, 31 July 1552. On the 9th of

July in the following year he defeated Albert of Brandenburg-Kulmbach, who had refused to accede to the Treaty of Passau, in the battle of Sievershausen, but died two days later of his wounds. Maurice was the foremost general and diplomat of his day in Germany, but he was en¬ tirely without scruple or principle, and played off one party against another until he was little trusted by either. Consult Brandenburg, E. (ed.), (Politische Korrespondenz) of the Elector Maurice (Leipzig 1904) ; id., (Moritz von Sachsen > (Leipzig 1898) ; von Ranke, L., ˆDeutsche Geschichte im Zeitalter der Reformation) (ib. 1882) ; (The Cambridge Modern His¬ tory) (Vol. II, Cambridge 1903).

MAURICIUS, ma-rish'i-us, Flavius Ti¬ berius, emperor of the East, 582-602 a.d. : b. Arabissus, Cappadocia, about 539 a.d. ; d. Chalcedon, 27 Nov. 602 a.d. He served with distinc¬ tion against the Persians, and for his abilities and character was made successor to Tiberius II by that emperor, whose daughter, Constan-tina, he had married. His reign was filled with wars. In 591 he restored Chosroes II to the throne of Persia, thus bringing to a close the long campaign against that country. He was, however, one of the greatest and best of the Eastern emperors, a patron of the arts and sciences, and himself considerably learned. Phocas, one of his generals, commanding the army operating against the Avars, led a revolt against him, and he fled to Chalcedon, where he was murdered by Phocas' order. The ZTpaTr/ yucd, a work on military affairs, published in a Latin version by Scheffer at Upsala in 1664 was long attributed to him, but is really by :ome unknown contemporary. Consult Bury, J. B., (The Later Roman Empire) (London 1889) ; Finlay, G., (History of Greece) (Oxford 1877) ; Gibbon, E., (Decline and Fall of the Roman Empire) (London 1896).

MAURISTS, ma'rists, the members of the Congregation of Saint Maur, to whom litera¬ ture owes the stately tomes known as <(Benedictine Editions.)) The Congregation had its origin in a reform of the Benedictines in the early part of the 17th century; it was supported by De Retz and afterward by Richelieu, and in 1720 possessed in France

six provinces, contain¬ ing 180 abbeys and priories, of which the princi¬ pal was that of Saint-Germain-desPres, Paris. Among the most celebrated of the Maurists are Mabillon, Martene, Montfaugon, the founder of the science of archaeology, Ruinart, Lami, Le Nourri and Martianay. Jansenism seems to have affected some of the convents, and, accord¬ ing to Badiche, a Masonic lodge was established at Glanfeuil in 1755, over which the prior of the monastery in that place presided. The Congre¬ gation was suppressed in 1792. The last superior-general with 40 members of his order perished by the guillotine. In their literary work they produced a great number of works of permanent value. Their complete bibliog¬ raphy comprises over 700 works bv 220 authors. The Revolution put an end to the work, for which hundreds of volumes and literary docu¬ ments had been collected. The Bibliotheque Nationale de Paris contains most of this ma¬ terial. Consult Helyot, (Histoire des ordres religieux) (1718) ; McCarthy. ˆPrincipal Writers of the Congregation of Saint Maur) (1868) ; Tassin, (Histoire litteraire de la con¬

gregation de Saint-Maur) (Paris 1770) ; de Lama, (Bibliotheque des ecrivains de la congre¬ gation de Saint-Maur) (ib. 1882).

MAURITANIA, ma-ri-ta'm-a, West Af¬ rica, colony in the government-general of French West Africa. It consists of the districts of Trarza, Brakna, Gorgol, Guidimaka, Levrier Bay and Tagant. The total area is 344,967 square miles. The population in 1912 was about 222,051, of whom 221,897 were nomad Moors. In 1909 the French protectorate was extended over these districts ; a provisional government with civil and military functionaries was formed under the name of Mauritania. Early in 1916 the region of Tibesti, recently occupied by the French, was attached administratively to French West Africa. The budget of Mauri¬ tania for 1916 was $334,000.

MAURITIUS, ma-rish'i-us, or ISLE OF FRANCE, an island colony of Great Britain, in the Indian Ocean, 500 miles east of Madagascar and 9,500 miles from England. It is of an oval form, about 40 miles in length from northeast to southwest, and 25 miles in breadth; area, 720 square miles. There are numerous capes and bays along the shore and the island is surrounded by coral reefs. It is composed chiefly of rugged and irregular mountains, rising into points of con¬ siderable height; the highest are the Montagne de la Riviere Noire, 2,730 feet, and the singular isolated rock Peter Botte, 2,700 feet. Between the mountains, and along the coast, there are large and fertile plains and valleys, having a rich soil of black vegetable mold or stiff clay,

watered by numerous streamlets, many of which become periodically dry. The climate is pleasant during the cool season, but oppressively hot in summer, and the island is occasionally visited by severe epidemics of fever. The rainy season is from January to April; between December and March the island is subject to hurricanes, occasionally of extraordinary violence. When discovered in 1505 the island was almost en¬ tirely covered with wood, the greater part of which has now been cut down, although some extensive forests still remain. The fauna then included the dodo, but otherwise was in no way remarkable. Some of the trees are valu¬ able, particularly the black ebony. The in¬ digenous vegetation includes orchids, screw-pines, the traveler's-tree, bamboo, *etc.* Many plants introduced from Europe, Africa, Mada¬ gascar and India thrive well, and nearly every beautiful tropical tree or delicious fruit is met with. The principal item of cultivation is sugar¬ cane, and to a limited extent rice, maize, manioc, vanilla, coffee, spices, fruits and tea, the last introduced recently. The value of the exports of unrefined sugar, which is the staple, amounted in 1916 to $23,103,320. Other exports are rum, vanilla, cocoanut oil, aloe-fibre, spice. The total value of exports in 1916 was $24,770,- 015; of imports, $17,988,970. The imports con¬ sist of rice, wheat, cottons, haberdashery, ma¬ chinery, manures, carriages and parts, coal, iron and steel, *etc.* Letters patent of 1885, 1901, 1904 and 1912 have established a partially repre¬ sentative form of government. The govern¬ ment of the island, with its dependencies, Diego Garcia, Rodrigues, etc., is vested in a governor, an executive council, comprising the commander of the forces, the colonial secretary, orocurator-452

general, receiver-general and other persons in the public service, whom the governor may designate as members of the council. The council of government consists of the governor and 27 members, nine of whom are named by the governor, eight are ex officio members and 10 are elected under a restricted franchise. The Indians are nearly all Hindus. The churches receive government aid — $50,880 in

1915-16.

The shipping on 1 Jan. 1916 comprised three steamers aggregating 1,080 tons and 28 sailing vessels aggregating 4,440 tons. In 1916 199 vessels of 438,960 tons entered and 197 ves¬ sels of 418,898 tons cleared the harbors of Mauritius. About 76 per cent of this tonnage was of British register. There are 621 miles of telegraph and 140 miles of telephone wires in¬ stalled. Mauritius has cable connection with Australia, Madagascar, Reunion and Zanzibar. Consult the (Mauritius Blue Book5 (annual) ; Anderson, J. F., (The Sugar Industry of Mauritius5 (London 1899) ; Decotter, N., (Geographie de Maurice et de ses Dependances5 (Mauritius 1891); Keller, C., /Madagascar, Mauritius and other East African Islands5 (London 1900) ; (Oxford Survey of the British Empire5 .(Vol. Ill, London 1914); Rae, W. C., (Handbook on the Constitution, Practice and Proceedings of the Council of Government5 (Mauritius 1901) ; Walter, A., (The Sugar In¬ dustry of Mauritius5 (London 1909). The revenue for 1915-16 was $4,325,015, and the ex¬ penditure $3,830,315. The chief sources of revenue are the customs, licenses and permits, and the railways ; the expenditure is chiefly on the civil service and on the railways, which have a total length of 120 miles. The currency is in rupees and cents. Schools are kept up partly by government, partly by private agencies. In 1917 there were 49 government and 91 aided schools. The average attendance at govern¬ ment schools was 6,670 and 8,991 in aided schools. The highest institution is the Royal College, a school affiliated to London Univer¬ sity. In 1915-16 the government expended $209,-765 on education. The French language and French law prevail in the colony, and the majority of the white inhabitants are of French origin. Mauritius was discovered in 1505 by the Portuguese. The Dutch took possession of it in 1598, and named it Mauritius in honor of Prince Maurice. It eventually fell into the hands of the French, from whom it was cap¬ tured by the British in 1810, and it was definitely ceded to them in 1815. Principal towns, Port Louis, the capital, Curepipe and Mahebourg. Rodrigues, Diego Garcia, the Seychelles and some other islands of the Indian O can are de¬ pendencies of Mauritius. The scene of Bernar-din de. Saint Pierre's celebrated Waul et Vir-ginie5 is laid in.this island. In 1911 the popula¬ tion of the island, including dependencies (6,690) and military (1,602),. was 377,083, con¬ sisting of the general population of 115,146, the Indian population of 258,251, and 3.686 Chinese. There , were in the same year 122,424 Roman Catholics and 6,946 Protestants.

MAURITIUS HEMP. See Fibre.

MAUROCORDATOS. See Mavrocorda—

TOS.

MAURY, ma'ri, Dabney Herndon, Amer¬ ican military officer and engineer: b. Fredericks¬

burg, Va., 21 May 1822; d. Peoria, Ill., 11 Jan. 1900. He was graduated from West Point in 1846 and served in the Mexican War. He was brevetted 1st lieutenant in 1847 for Gallant and meritorious conduct55 at Cerro Gordo, and served in the United States Military Academy as instructor, 1847-52. In 1858 he was engaged as superintendent of cavalry instruction at Carlisle Barracks. At the beginning of the Civil War he was brevet-captain, but resigned to enter the Confederate army, where he at¬ tained the rank of department commander of the Army of the Gulf. At Vicksburg in 1862 he was Sherman's opponent and subsequently had charge of the Department of Tennessee with the rank of major-general. He again served the United States government when under President Cleveland's first administration he was Minister to Colombia. He published (Skirmish Drill for Mounted Troops5 (1859) ; (Recollections of a Virginian in the Mexican, Indian and Civil Wars5 (1894) ; (Young Peo¬ ple's History of Virginia and Virginians5

(1904).

MAURY, Matthew Fontaine, American

naval officer and hydrographer : b. in Spottsyl-vania County, Va., 14 Jan. 1806; d. Lexington, Va., 1 Feb. 1873. He studied at the Harpeth Academy in Tennessee, and entered the United States navy in 1825. During a voyage around the world in the Vincennes he began a treatise on navigation, long used as a textbook in the navy. He was made lieutenant in 1836. In 1839, when he was lamed by an accident, he quitted active sea-service for scientific work at the Naval Observatory. His powers of applica¬ tion were combined with rare gifts of imagina¬ tion, and an elevated style. His (Phvsical Geography of the Sea and Its Meteorology5 (1855) has been considered a book of fascinat¬ ing interest. In 1844 he published his views on the Gulf Stream, ocean currents and great-circle sailing. His (Wind and Current Charts5 have been of immense benefit to navigation. In 1853 he reached the rank of commander, and in that year projected the maritime conference at Brussels, and also published 'Letters on the Amazon and the Atlantic Slopes of South America.5 In 1861, when the Southern States seceded, he gave his services to the Confederate

cause. For some time he attached himself to the fortunes of the Emperor Maximilian in Mexico; but for the last few years of his life was professor of physics at the Virginia Mili¬ tary Institute. He was among the first to turn fresh attention to a branch of scientific inquiry which had been previously much neglected, the investigation of the depths of the sea, its currents, temperature, *etc.* He also published ‘Lanes for Steamers Crossing the Atlantic5 (1854). Consult Corbin, Wife of Matthew Fontaine Maury5 (London 1888).

MAUSER, Paul von, powl mow’zer, Ger¬ man inventor and gun-maker: b. 1838; d. 29 May 1914. He worked as a boy in the royal armory at Oberndorf, and there with his brother Wilhelm (d. 13 Jan. 1882) patented several improvements on the small arms then in use, both new needle-guns and a model replac¬ ing the /needle55 powerful percussion-pin. The introduction of the Prussian needle-gun into Wiirtemberg after the Austro-Prussian War deprived the brothers of the patronage of the

is

r >;<- . . -.’ .

Courtesy, The Gorham Company’

MAUSOLEUM DOORS

1 By Cass Gilbert, architect

2 By Carrere & Hastings, architects

3 By Dehli & Howard, architects

4 By Shiekel & Ditmars, architects

r’

.• -

A*.

tel

I te

■ ‘

s

41

wart ism

r*

si

-

mm

>• W ˆ f 5fv syj

‘ - t ”” “i’s ‘ i’

ˆ -% .* %il ,) .j tWfl’K If ■;

iftAA* .UMl!

mn « *mi*

5 > 1 ss

:*Hr* H

mil nr ilftn

*

MftJM imjMi?!

j m* •>

r z*** ., ‘ ‘faSVKa

; v t ; s-W- Hi

i ;! ! ˆ

V :jl V>

.WffetWsIS-* #&!#■ .1

«*■(‘, t-w .Jj #

(

government, and in 1867 he settled in Liege, where he was financed by an American capital¬ ist. Paul invented the Mauser revolver in 1879 and the “Mauser® in 1882. He made the Turkish model in 1887, the Belgian repeating rifle in 1889, the Argentine model in 1891, the Spanish model in 1893 (adopted with slight change throughout South and Central America), and in 1896 a rifle for the Swedish army. Typical of his rifles are the Belgian model of 1889 and the Argentine of 1891, both magazine rifles with no cut-off, but capable of single fire by replacing the top cartridge in the magazine after each discharge. The magazine holds five cartridges, lies in front of the trigger guard

and under the receiver, is fixed in type but easily cleaned. See Small Arms.

MAUSOLEUM (Greek, mans ole ion) , a tomb or burial place, the name of which is de¬ rived from Mausolus, a king of Caria, to whom a sumptuous sepulchre was raised by his wife, Artemisia, at Halicarnassus. King Mausolus died 353 b.c. ; and his wife was so disconsolate that she perpetuated his memory by the erection of this magnificent monument which became so famous as to be esteemed the seventh wonder of the world, and to give a generic name to all superb sepulchres. Its entire height was 140 feet, and the entire circuit 411 feet. It was overthrown, probably by an earthquake, be¬ tween the 12th and 1 5th centuries; and when the Knights of Rhodes took possession of Halicarnassus in 1404 they availed themselves of the materials of the mausoleum to erect the fortress of San Pietro. Parts of the. frieze were transported to the British Museum in 1846. Other famous mausoleums are that erected at Babylon by Alexander the Great in honor of Hephaestion, equally magnificent with that of Mausolus, though less refined ; and the mauso¬ leum of Augustus, built by him in the sixth con¬ sulate on the Campus Martius, between the Via Flaminia and the Tiber, the ruins of which are still seen near the church of Saint Roque. One of the obelisks which stood before this superb building was found in the reign of Pope Sixtus V. This mausoleum contained the ashes of Augustus, Marcellus, Agrippa, Germanicus and of some later emperors. The mausoleum of Hadrian at Rome is now the Castle of San Angelo. Consult Adler, (Das Mausoleum zu Halikarnas) (Berlin 1900) ; Newton, ‘History of Discoveries at Halicarnassus, Cnidus and Branchidse) (London 1863) ; id., ‘Travels and Discoveries in the Levant> (ib. 1865) ; Smith, A. H., ‘Catalogue of Sculptures in the British Museum* (Vol. II, ib. 1900).

MAUSTON, mas’ton, Wis., city, county-seat of Juneau County, on the Lemonweir River, and on the Chicago, Milwaukee and Saint Paul Railroad, about 130 miles northwest of Milwaukee. The chief manufacturing estab¬ lishments are lumber mills, machine shops and flour, mills. Pop. 1,966.

MAUTHNER, mout’ner, Fritz, German novelist and philologist: b. Horzitz, Bohemia, 29 Nov. 1849 of well-to-do Jewish family; went to Prague at an early age, studied law there and became a contributor (1876) of the Berliner Tageblatt for which he continued writ¬ ing in various departments (particularly dra¬ matic criticism) until 1905, when he retired from newspaper work and moved from Berlin

(where most of his active life was spent) to Freiburg im Breisgau; he lived at Meersburg on Lake Constance from 1909. While he has written novels and satiric romances, his greatest work is in the field of philosophical criticism of language as a means of expression;, his position on this matter is best expressed in a large book: ‘Beitrage zu einer Kritik der Sprache) (Vol. I, ‘Sprache und Psychologies 1901; Vol. II, (Zur Sprachwissenschaftg 1901; Vol. Ill, ‘Zur Grammatilc und Logik,* 1902) ; and in an alphabetically arranged summary of the contents of this work, in dictionary form : ‘Worterbuch der Philosophy (Munich and Leipzig 1910). His criticism is poetic and de¬ structive rather than social in its import; his style smooth and brilliant. His most famous work before he undertook scholarly production was ‘Nach veriihmten Mustern* (Stuttgart 1878; 30th ed., 1902), a set of parodies of well-known German and foreign writers, in the manner of Bret Harte. In 1914 he published a collection of newspaper articles that had appeared in previous years, under the title, ‘Gesprache im Himmel,* and in 1918 began the publication of an autobiographical work, the first volume of which deals with his school¬ days in Bohemia and is a rather bitter attack upon ‘the educational system of the time. Among other works are (Vom armen Fran-ischko) (Dresden 1879) ; ‘Die Sonntage der Baronin* (Dresden 1881) ; ‘Der neue Ahasver) (Dresden 1881) ; ‘Xanthippe) (Dresden 1884) ; ‘Aturenbriefe) (Dresden 1885) ; ‘Berlin WP (a cycle of three novels, Dresden 1886-90) ; ‘Die bunte Reihe* (Munich 1896). There may be had, in English translation, ‘Aristotle, an Unhistorical Essay) (New York 1906). On Mauthner’s philosophical doctrine, consult Wells, H. G., ‘A Criticism of the Instrument (appendix to ‘A Modern Utopia* 1905).

MAUVAISES TERRES, mo-vaz ter. See

Bad Lands.

MAUVE, mov, an aniline purple coloring matter. See Dyes.

MAVERICK, Peter, American engraver; b. New York, 22 Oct. 1780; d. there, 7 June 1831. He studied engraving under his father, worked especially on banknote designs and made famous engravings of Charles King’s por¬ trait of Henry Clay, of Waldo’s portrait of Andrew Jackson and of Dunlap’s portrait of Benjamin Moore. Maverick was one of the founders of the National Academy of Design in 1826. His most celebrated pupil was Asher B. Durand.

MAVERICK, an unbranded steer, espe¬ cially one appropriated by a chance finder. This term, in common use in the cattle gountry of the United States, is said to be derived from the name of Samuel

Maverick, a Texas lawyer and politician, who, having accepted a herd of 400 head of cattle in payment of a debt, left them in charge of one of his men. They were neglected and allowed to run wild and when the calves were born they were of course appro¬ priated by other ranchers and branded with their marks, and so passed to their undisputable ownership. As the ownership of the cattle was determined by the brand, it may easily be seen why the name “Maverick’s® was given to all calves caught straying from the herd. From

this use of the word grew a wider application to anything dishonestly come by.

MAVIS, the Scottish name for the British songthrush or throstle (q.v.), one of the favor¬ ite song-birds of western Europe.

MAVOR, James, English political econo¬ mist : b. Stranraer, Scotland, 8 Dec. 1854. He was graduated from the University of Glasgow. He was for a time editor of the Scottish Art Review; in 1888 became professor of political economy at Saint Mungo’s College, Glasgow, and. in 1892 professor of political economy at the University of Toronto, Canada. He has written (Wages Theories and Statistics) (1888) ; (Economic Theory and History Tables and Diagrams> (1890); (Currency Reform) (1891); (Economic Study and Public and Private Charity) (1892); (English Railway Rate Ques¬ tion) ‘ (1894) ; (Railway Transportation in

America) (1909) ; (Economic Survey of Can¬ ada) (1914); (Applied Economics) (1914); (A Short Economic History of Canada) (1915).

MAVROCORDATOS, mav”-r6-kor-da’- tos, or MAUROCORDATOS, Alexander,

modern Greek soldier and statesman : b. Con¬ stantinople, Turkey, 15 Feb. 1791 ; d. 2Egina, 18 Aug. 1865. He was a skilful linguist and early schooled in diplomacy. On the outbreak of the Greek war for

independence (1821), he devoted his entire fortune to the equipment of a ship and the arming of volunteers. He or¬ ganized the insurrection in 2Etolia and Acar-nania, was made president of the National As¬ sembly at Epidaurus, drew up the orovisional constitution and signed the proclamation of independence (January 1822). He also became president of the executive council, but resigned in what he believed to be the interests of har¬ mony. In 1833-34, 1841-43, 1844 and 1854-56, he was at the head of the Cabinet and in 1850-54 was Ambassador at Paris. He promoted public education and was a Liberal in politics, being of the British party and opposed to the Russian policy of Giovanni and Augustin Capo d'lstria. He is generally considered the most important leader in the Greek Revolution. Consult Browning, Oscar, (History of the Mod¬ ern World) (Vol. I, New York 1912).

MAWSON, Sir Douglas, Australian geog¬ rapher: b. Bradford, Yorkshire, 1882. He was educated at Sydney University, where he was graduated bachelor of mining engineer in 1901. In the following year he was demonstrator in chemistry there. In 1903 he made a geological exploration of the New Hebrides and lectured at Adelaide University in 1905. In 1908 he became a member of the scientific staff of Sir Ernest Shackleton's Antarctic Expedition and determined the position of the south mag¬ netic pole on Victoria Land. In 1911-14 he was leader of the Australasian Antarctic Ex¬ pedition to explore Antarctic lands and estab¬ lish stations for scientific purposes. His dis¬ coveries were among the most important made so far in the 20th century. In 1915 he was awarded the 'founder's medal of the Royal Geographical Societv and was knighted in 1914. He has published (The Home of the Blizzard) (2 vols., Philadelphia 1915) and scientific papers in the transactions of learned societies. For a detailed account of the explorations di¬ rected by Mawson see Antarctic Regions.

MAX, maks, Gabriel von, German painter • b. Prague, 23 Aug. 1840. The son of a sculptor, with whom he studied for a time, he soon de¬ voted himself to painting, then went to the Prague Academy under Engerth's teaching, and, after several years at Vienna, became a pupil of Piloty in Munich, where he was professor in the Academy from 1879 to 1883. His work is largely fantastic; he aims to interpret music, especially that of Beethoven, Mendelssohn and Liszt ; and is fond of psychic themes, although occasionally, as in his famous pictures of monkeys, going to an extreme of realism, ex¬ plained by his earnest belief in Darwin and Haeckel. But he is best known for his his¬ torical and figure paintings, which usually show a female figure of some

beauty and ethereal charm, with dreamy, longing, sentimental eyes. In such pictures as these the flesh tones are par¬ ticularly remarkable, being sometimes styled marble-like and due to his earlv training as a sculptor and again described as a twilight of sentiment, typifying the spiritual. To this class belong (Spirit Greetings) (1879) ; <The Last Token,) now in the Metropolitan Museum, New York (1874); <Nydia> (1874); <Veil of Saint Veronica) (1874); (The Lion's Bride,) in the Museum of Manchester (1875), and many book illustrations, notably those for Schiller's and for Lenau's poems, for Goethe's <Faust) (the (Marguerite before the Mater Dolorosa) being especially well known), for Wieland's (Oberon) and for Uhland's works. Max was ennobled in 1900. Consult Klemt, (Gabriel Max und seine Werke) (Vienna 1887) ; Mann, N., 'Gabriel Max, Kunst und seine Werke) (Leipzig 1888) ; and Meissner (in (Die Kunst unserer Zeit,) Munich 1899).

MAXENTIUS, mak-sen'shi-us, Marcus Aurelius Valerius, Roman emperor: d. 27 Oct. 312. He was the son of Maximianus, and in 306 a.d. was proclaimed Augustus by the prae¬ torians and acknowledged by the people and Senate of Rome, to whom Galerius had become hateful. Severus, sent by Galerius against him and his father, was compelled by Maximianus to retreat to Ravenna and was put to death in 307. Galerius was likewise compelled to re¬ treat and Maxentius, availing himself of an in¬ surrection of the Africans under a certain Alexander, in 311 declared war against Con¬ stantine the Great. While Constantine pressed forward into Italy, Maxentius himself remained inactive at Rome and did not go out to meet Constantine till he had passed unopposed across the Apennines. At the great battle fought shortly after, at Saxa Rubra near Rome, Max¬ entius was defeated and perished in the Tiber as he tried to escape over the Mulvian Bridge. See Constantine; Rome — History.

MAXEY, Samuel Bell, American soldier; b. Tompkinsville, Ky., 30 March 1825; d. Texas, 16 Aug. 1895. When Maxey was a child his parents removed to Paris, Tex., where the son was educated until prepared to enter West Point, from which he was graduated in 1846. assigned to the infantry and at once sent to Mexico. He took part in the campaign from Vera Cruz to the City of Mexico and was brevetted for bravery at Contreras. As soon as the war was ended Maxey resigned to begin the practice of law. For 12 years he practised

in Kentucky and Texas. He entered the Con¬ federate service as colonel of the 9th Texas Infantry and was engaged in the campaigns east of the Mississippi River under A. S. John¬ ston, Bragg and Joseph E. Johnston. In 1862 he was made brigadier-general. In 1863 he was sent to command the Indian Territory. He raised and equipped numbers of troops, kept the Indians friendly to the Confederacy and in 1864 he drove back the Federal general, Steele, who was endeavoring to effect a junc¬ tion with Banks in the Red River Valley. For this he was made major-general. After the war he was offered a Supreme Court judgeship in Texas but declined. From 1875 to 1887 he was in the United States Senate. Maxey was an able senator, a member of the prominent committees and an efficient advocate of Western interests.

MAXIM, Sir Hiram Stevens, Anglo-American inventor : b. Sangerville, Me., 5 Feb. 1840; d. London, England, 24 Nov. 1916. As a boy lie received his early education in the country schools of Maine. What little spare time he had after attending to his work on the farm and in his father's workshop was spent in the pursuit of scientific knowledge. When he was 14 years old he was sent as an appren¬ tice to a carriage builder at East Corinth, Me. Later, while employed in a laboratory in Bos* ton, he perfected his first invention, a method of carbureting air and gas for lighting pur¬ poses. His invention was used in many New York hotels. Others of his inventions included electrical devices, improvements on incandescent lamps, self-registering current machines and other similar contrivances. When he was 28 years old he was employed as a draughtsman in a shipbuilding firm in New York City. While there he invented a locomotive head¬ light, which was used generally. In 1884 Maxim perfected the automatic rifle, or machine gun, in which the recoil due to the explosion of one cartridge was utilized to eject the empty shell and at the same time reload the weapon. The inventor was then in England. The gov¬ ernment, interested at once in the possibilities presented by the rifle, adopted it. It was the Maxim gun that was an important factor in winning the Egyptian campaign for the Eng¬ lish. It is now used by the armies throughout the world. Closely following came the ((disappearing gun,® cordite and other smokeless powders, a gun for hurling aerial torpedoes and the ((delayed action® fuse. For many years Sir Hiram experimented with aeronautics. In 1894 he succeeded in building a heavier-than-air machine. At that time when aeroplanes were only

thought possible, Sir Hiram Maxim criti¬ cised the British nation for lack of interest in aeronautics and predicted that a bombardment of the island from airships was possible. Sir Hiram held membership in the American So¬ ciety of Civil Engineers, the Royal Society of Arts, the British Association for the Advance¬ ment of Science and many other bodies. He became a naturalized citizen of Great Britain because of alleged unfair treatment of his in¬ ventions by the American government. Sir Hiram Stevens Maxim will be remembered as one of the foremost inventors of his day. In 1881 President Grevy of France made him a Chevalier of the Legion of Honor. This deco¬ ration was followed in 1901 by recognition by

the British government, Queen Victoria elevat¬ ing him to the knighthood.

MAXIM, Hudson, American inventor and engineer: b. Orneville, Me., 3 Feb. 1853. He received an academic education with especial reference to the natural sciences and engineer¬ ing, then took up the study of medicine; en¬ tered the printing and subscription book pub¬ lishing business at Pittsfield, Mass., in 1883, but gave up the publishing business in 1888 to take up business of ordnance and explosives. He was the first to make smokeless gunpowder in the United States and was the first to sub¬ mit samples to the government for trial. In 1890 he built a dynamite factory and smoke¬ less powder mill at Maxim, N. J., named for him. It was there that the multi-perforated smokeless powder was developed and perfected under his inventions and patents, which was adopted by the United States government. These patents were purchased by the E. I. du Pont de Nemours Powder Company, of Wilmington, Del., in 1897. He invented the process of making calcium carbide by incan¬ descence of molten carbide conductor, now in general use. In 1901 he sold United States government the secret of the high explosive Maximite invented by him (see Explosives) ; invented United States service detonating fuse for high explosive projectiles. He invented the system of driving torpedoes by steam and products of combustion of a self-combustive compound called motorite, the steam being gen¬ erated by the motorite. This system was pur¬ chased by the United States navy. Since 1898 he has been consulting engineer for E. I. du Pont de Nemours Powder Company. He in¬ vented stabillite (q.v.), a smokeless powder made without volatile solvent, which con¬ sequently requires no drying. He received the degree of D.Sc. from Heidelberg University, Ohio, in

1913. He is member of consulting board of United States navy; of Albany Bur¬ gesses Corps (rank, captain) ; of Military Serv¬ ice Institution ; of Society of Chemical Indus¬ try; of Chemists Club; of Aeronautical Society; Fellow A. A. A. S., of Society of Applied Psychology. He is author of (The Science of Poetry and the Philosophy of Language) (1910); (Defenseless America) (1915).

MAXIMA AND MINIMA. The maxima and minima of a function f(x) are the points of the curve y^fix) where y is larger or smaller, respectively, than for any yalue of x differing from the value at that point by less than some finite number. According to this definition, a curve may have several maxima or minima, and a maximum or minimum need not be a point where y assumes the greatest or least value, respectively, throughout the entire curve. It is easy to see that a maximum is a point where the curve ceases to go up and begins to go down. At such a point, the slope

dy

of the curve, or the differential coefficient »

changes sign.

T r dy .

If 3-is continuous at a maxi-ax

mum, it can only be 0, and at any rate, on an algebraic curve, it can only be 0 or 00. Thus the maxima — likewise the minima — are all to

d*y d2y

If -7— > 0, we have a minimum, of < 0, a maxi-dx 2 dx *

mum. However out their being the point. In

ˆ may be 0 or 00 witha maximum or minimum at

d2y

thi ; case -7ˆ will be 0. To dx 2

determine whether we have a maximum, a mini-

• 1 d2y

mum or neither when ˆ = 0, higher deriva¬ tives must be considered.

The definition of the maxima and minima of a function of two variables is obvious. It is clear that a necessary condition for a maximum or minimum of f(x, y) , at a point where its partial derivatives are continuous,

is that|/ = |/ = 0. ox oy

maximum is

A sufficient condition for a

is ® ®) © and

dx2

< 0.

A sufficient condition for a minimum is

Some important theorems in plane geometry having to do with maxima and minima are that of all polygons having a given perimeter and a given number of sides the regular one has the greatest area; that a circle has a greater area than any other figure with the same peri¬ meter; that a right triangle is larger than any other with two sides equal to its legs, and that of all triangles with a given perimeter and a given base, the isosceles is the greatest. See Calculus, the Infinitesimal; Calculus of Variations.

MAXIMALISTS, or BOLSHEVIKI, the

name applied to the adherents of the extreme Socialist party which, headed by Lenine and Trotzky, overthrew the provisional government and the Soviet leaders in Russia on 7 Nov. 1917. The words (<Bolshevik® (sing.), <(Bolsheviki® (plural) and ((Bolshevism)) are not explanatory terms and have nothing to do with the policy or aims of the party. Their origin dates from the second conference of the Rus¬ sian Social-Democratic party in 1903, at which the methods to be adopted in regard to revolu¬ tionary activity were under discussion. A sharp line of cleavage made itself evident; and when voting on the resolutions took place there was naturally a majority (bolshinstvo) and a minority (menshinstvo). From that moment the groups were called Bolsheviki and Menshiviki (maximalists and minimalists). The majority represented the extremists, the ˆwhole-

hoggers® of Socialism (bolshe — more), or those who go for the biggest things; while the minority represented the ˆmoderates® or ((thin-end-of-wedge® theorists (menshi — less, smaller), or those whose aims are of smaller intent. There appears to be no evidence that the terms ex¬ isted or were current before 1903, though the Russian Social-Democratic party was founded by Plekhanov and others in Switzerland in 1884. The abortive revolutionary movement of 1905-06 which opened with the Putilov ironworks strike and the Father Gapon episode, served to widen the breach between the two factions to the extent that in 1907 the party was def¬

initely split into two independent groups — Bolsheviki and Menshiviki. The former, fol¬ lowing in part the teachings of Karl Marx, were led by Lenine. The Marxian revolution was essentially a class revolution, to the real¬ ization of which nationalism was regarded as an obstacle. The European War and the after-math of the Revolution of March 1917 revealed the wide divergence existing between the aims and methods of the two groups. The Bolshe¬ viki contracted the class distinction to nar¬ rower dimensions and looked upon the edu¬ cated classes, the bourgeoisie, and even the peasants as enemies. Their aim was radical internationalism; they sought not the re-crea¬ tion of Russia, but the triumph of one class throughout the world — the proletariat; in other words, mob-rule. For the most part they were bitter and arid doctrinaires, reeling off strings of long, high-sounding words and phrases which few understood, and clinging to a vague and abstract creed with fanatical de¬ votion. Every problem was met by a reference to the letter of their law and interpreted ac¬ cordingly. But whatever political, social or economic creed the Bolsheviki professed on paper, their activity — and by that alone can they be judged — consisted merely of a wild orgy of crime, plunder and treason. No trace of practical ability was revealed by any of their leaders, but they had the driving force which even the shallowest fanaticism can give. They were opposed to the war, which they de¬ clared to be ˆimperialistic® and <(bourgeoise.® They were opposed (on principle) as much to a German peace as to a peace dictated by the Allies: . ((No indemnity, no reparation and no annexation® became their ideal. The Menshi¬ viki were of a saner type; while claiming for the working classes the importance due to their numbers, they did not ignore other classes. Holding in view definite practical reforms, they were willing to utilize the existing machinery of the state for their purpose. They accepted the war and its vigorous prosecution as a part of their program and realized that nation¬ alism must precede internationalism. They recognized that the cause of the

Allies was also their cause, and in this belief they were undoubtedly supported by the more intelligent Russian Social-Democrats. To the Bolsheviki the fate of their country mattered nothing, provided only that their own crude ideas of social reconstruction survived the ordeal. They were eager for peace on anv terms in order that they might proceed with their own pro¬ gram, that class war which recognized no polit¬ ical frontiers nor national consciousness. After the fall of Kerensky the Bolsheviki began their career as rulers by the wilful and systematic destruction of the Russian army and navy. Their leaders posed before the world as the elect champions of a new idealism which was to redeem mankind. They proposed to teach, other democracies the true and saving doctrine of the real revolutionary creed. Of exercising government, as that term is under¬ stood among civilized peoples, they proved themselves utterly incapable; government, in fact, holds no place in their system, of which the sole principle is civil .war or, as they term it, “class war.® Though it owes its genesis to Socialism (from which it is really far re¬ moved), Bolshevism may be described as a com-MAXIMALISTS

pound of anarchism, syndicalism, hatred and blind fanaticism. Needless to say, ingredients of this type cannot fail to attract all the purely criminal elements which, in normal times, are held in check by the forces of law and order. With the removal or breakdown of that salutary check and the absence of an efficient substitute, a free rein is given to unbridled passions by which a political movement is converted into a mere carnival of terrorism. This was what happened in Russia in 1917. The Bolsheviki had nothing whatever to do with bringing about the revolution which swept away the autoc¬ racy in March of that year. That revolution was neither engineered nor organized; it sprang not from the burning inspiration of a new faith, but succeeded almost automatically from sheer weariness : tired in mind and body, Rus¬ sia had lost nerve and heart. The provisional government that was formed on 16 March con¬ sisted of honest, patriotic and intelligent men — Prince Lvov, Guchkov. Milyukov, Terestchenko, Nekrasov, Shingarev and Kerensky, who was the only Socialist in the group. Of all these, Kerensky proved to be the only ((man of des¬ tiny® with sufficient magnetism to compel a following. Their first energies were devoted to maintaining discipline in the army and to carry the war to a successful conclusion. But already in

September 1915 Lenine had issued the Zimmerwald manifesto, signed by himself and the Swiss Socialist, Robert Grimm, call¬ ing for ((peace without annexations or indem¬ nities.® German agents had sedulously spread this doctrine among the Russian rank and file, with the result that the idea of a peace so easily to be gained soon won a large number of converts. It was easy for German propa¬ gandists to convert the working classes to this view. The people were told what they wanted to hear — that it was folly to fight longer and that their Western Allies were the true foes of Russia, since they sought to force her to re¬ main in the war. Not only did demoralization of the army set in, but there also grew up a spirit of hostility against the Allies, espe¬ cially Great Britain. Thus, while the provi¬ sional government and later Kerensky alone struggled to maintain order and national unity, Bolsheviki and German agents were undermin¬ ing the structure with glowing promises and sedition. On 16 July 1917 the Bolsheviki in Petrograd, led by Lenine and Trotzky, at¬ tempted to seize the reins of government and failed. Lenine disappeared when warrants were issued for the arrest of the Bolshevist leaders. At the last moment Kerensky weakened ; re¬ garding the Bolsheviki as apolitical opponents,® he countermanded the order for their arrest.

Up to this time the Russian armies were still fighting in the field; their offensive in Galicia was nearing its disastrous climax and Bolshevism — the foe of the revolution and an enemy of the people — was growing in mo¬ mentum. Confusion spread; Kerensky de¬ nounced the counter-revolutionists and those who unwittingly encouraged anarchy (Moscow, 25 Aug. 1917), which caused a wider split among his uneasy team. General Korniloff ar¬ rived from the front and stated that the mili¬ tary disasters were due not to the revolution but to the follies of the revolutionaries ; that discipline must be maintained both at the front and in the rear. His gloomy picture of a de¬

graded and defeated Russia had no terrors for the Bolsheviki. After three days of palaver the conference talked itself to a standstill with no result. Meanwhile, the German armies found no difficulties in overrunning northern Russia and seizing Riga. Kerensky again wavered. His fatal error in the Korniloff affair drove the few remaining moderates out of his Cabinet and gave the Bolsheviki their oppor¬ tunity. The retreating Russian armies gave themselves up to pillaging their own people and the sailors of the Baltic fleet murdered their own officers. Lenine crept out of hiding and raised his voice afresh in Kronstadt — the worst nest of anarchy. Kerensky once more fulminated against the Bolsheviki and then in¬ formed the United

States that Russia was worn out. The dark forces waiting in the shadows quickly observed the change and made their preparations. The apathy and despair of Russia made her an easy victim to a body of determined men. Trotzkv, then president of the Petrograd Soviet, summoned the proletariat of all nations to do what had been done in Russia; he decided to make peace with a will¬ ing Germany and to raise his party to the su¬ preme power. On 5 Nov. 1917 the Military Revolutionary Committee ordered the Petrograd garrison to place itself under their instructions. Kerensky suppressed the chief Bolshevist paper and called on the loyal troops to defend the government. On the 6th the military cadets occupied stations, bridges and telegraph offices and threw a cordon around Kerensky's resi¬ dence, the Winter Palace. Lenine arrived the following day with'his leading spirits and made the Smolny Institute (a girls' school) the Bol¬ shevist headquarters. He issued a proclama¬ tion announcing the fall of the government. The majority of the troops went over to the Bolsheviki. Kerensky fled on the 7th, leaving a guard of cadets and some women at the Palace. The Bolshevist troops (Red Guards) captured the palace, committed many brutalities on the inmates and in a few hours the whole of Petrograd was in their hands. The <(new government® was placed in the control of a <(Council of People's Commissioners,® of which Lenine was appointed president, Trotzky For¬ eign Minister and Ensign Krylenko as com¬ manderin-chief of what was left of the army.

The comparative ease with which the Bol¬ sheviki overturned the provisional government was due mainly to the passive attitude of the troops. Had Kerensky had at his disposal a few brigades of reliable troops he might as easily have crushed Bolshevism on the same day. On 8 November Lenine telegraphed to all the belligerent governments a proposal for a three months' armistice. On the 10th a series of decrees began to emanate from the Smolny Institute, their principal features being the spoliation of one class and the transference of its property to another. Municipalities were empowered to sequestrate all houses, whether inhabited or not, and to instal in them citizens possessing no abode or occupying crowded or insanitary dwellings. All factories were passed to the possession of the operatives (syndical¬ ism), and a moratorium was proclaimed for the payment of rent for small houses and lodgings. The most important decree threatened civil war in the rural districts by declaring all private ownership in land to be annulled without com-458

pensation to the owners. The land was to be nationalized and handed over to the cultivators, while for the present all lands belonging to the state, to the Church and to monasteries, etc., with all appurtenances — flocks, herds, ma¬ chines, etc., were to be placed at the disposal of the ‘local agrarian committees until the meeting of the Constituent Assembly. The local soviets were authorized to preserve order dur¬ ing the process of confiscation. All mines, forests and waterways were acquired by the state, and the smaller woods, rivers and lakes were to be the property of the village com¬ munes. The gloom of Bolshevism had settled oyer Russia. Missionaries of that cult were dispatched to all European countries and to the United States to spread the faith and incite proletariat uprisings, though with negligible success. During 191 8—2 1 the dread of <(Bolshe-vism8 became a haunting spectre to not a few governments. Everywhere outside of Russia it was denounced by public men and its slightest symptoms rigorously suppressed. It is a re¬ markable fact that, while Jews formed a large percentage of the leading Bolsheviki, over 90 per cent of Russian Jews were hostile to them. Many of them had lived in America, Switzer¬ land, Great Britain, France, Germany and the Scandinavian countries. They returned to Rus¬ sia after the Revolution, where their ranks were swelled by large numbers of exiles from Si¬ beria — not all political offenders, but also some of the most dangerous criminals. (The further adventures of the Bolsheviki regime are told under Russia — History; see also Russian Revolution of 1917; War, European; Keren¬ sky; Korniloff; Trotzky; Lenine). Consult Trotzky, L., (The Bolsheviki and World Peace) (New York 1918) ; The World’s Work (New York, October 1918) ; Current History (New York, November-December 1918).

MAXIMIANUS I, mak-slm-i-a’nus, Mar¬ cus Aurelius Valerius, Roman emperor: d. February 310 a. d. He so approved himself by his services in the army that Diocletian selected him for his colleague, creating him first Caesar (285), then Augustus (286) and at the same time conferred on him’the honorary appellation of Herculius. Maximianus had the care of the Western Empire, while Diocletian undertook that of the Eastern. In 287 he was consul with Diocletian, and in the same year conducted a campaign in Gaul. After conducting several wars, in 303-304 he was for the seventh time made consul, having for his colleague Diocle¬ tian for the fifth time, with whom he abdicated 1 May 305. In the following year he was again invested with the imperial title by his son Maxentius, to whom his services against Severus and Galerius were of the most important kind. His son shortly after expelled him from Rome, and repairing to Gaul, in 308 caused

himself to be proclaimed Augustus at Mar¬ seilles, but Constantine easily deposed him. See Constantine; Diocletian.

MAXIMILIAN I, mak-si-mfi'i-an (Ger. maks-e-me'le-an), emperor of Germany: b. Neu-stadt, near Vienna, 22 March 1459; d. Weis, in Upper Austria, 12 Jan. 1519. He first be¬ came an independent prince by his mar¬ riage with Mary of Burgundy, the daughter of Charles the Bold, who died in 1477. This match involved him in a war with Louis XI,

King of France, in which he was successful, though he was defeated at a later period by the Milanese. At Frankfort in 1486 he was chosen king of the Romans and two years later was imprisoned by the Flemings at Bruges. He secured the Tyrol in 1490 and in the same year made war against Charles VIII of France. In 1493 he became Holy Roman emperor on the death of his father. He was involved in war with Venice, France and Switzerland for the greater part of his reign. He was succeeded by his grandson, Charles V. Consult Cambridge Modern History) (Vol. I, 1903), and Heyck, (Kaiser Maximilian D (Bielefeld 1898).

MAXIMILIAN, emperor of Mexico, known in earlier life as Ferdinand Maximilian Joseph, Archduke of Austria: b. Vienna, 6 July 1832; d. Queretaro, Mexico, 19 June 1867. He was the younger brother of Francis Joseph I, emperor of Austria (q.v.). He entered the Austrian navy in 1846, and in 1854 obtained the rank of rear-admiral and was placed at the head of the Austrian marine. He was viceroy of the Lombardo-Venetian kingdom in 1857-59, and in 1857 married Princess Charlotte of Bel¬ gium, daughter of King Leopold I. On his return from a voyage made to Brazil for scien¬ tific purposes he fixed his residence at Miramar in the vicinity of Trieste, and there, 3 Oct. 1863, received a deputation from the Mexican Assembly of Notables, who offered him the crown of their country. He officially announced his acceptance 10 April 1864. He landed at Vera Cruz on 28 May and entered Mexico on 12 June. He set himself energetically to con¬ solidate and develop his dominions, granted an amnesty to political offenders and exhibited great interest in religious worship and educa¬ tion. But he failed to conciliate the Republi¬ can party, and as he did not restore to the clergy their confiscated estates they pronounced him a traitor. Meanwhile there were incessant conflicts between the partisans of President Juarez and the allied French and imperial troops; and the decree of 2 Oct. 1865, by which the members of the Juarist bands and those who abetted them were to be regarded as

bandits and shot, alienated the party of the Liberals. Juarez raised the standard of inde¬ pendence. Complications and misfortunes thickening around Maximilian rendered his position critical in the extreme. The empress in vain undertook a mission to Europe to en¬ list support for her husband, and grief and dis¬ appointment overthrew her reason. The French troops, largely by reason of the repre¬ sentations of the United States government, were withdrawn by Napoleon in March 1867 ; but Maximilian decided to remain in the hope of being able to maintain the empire. While bravely defending Queretaro against a Liberal force under Escobedo, he was betrayed by General Lopez on the night of 14 May 1867. Tried by court-martial, he was sentenced, with his principal officers, to be shot. The sen¬ tence was carried into effect on the morning of 19 June. Maximilian's body was after some delay surrendered to his relatives, and his funeral was celebrated with great pomp in the cathedral of Vienna on 18 Jan. 1868. Maxi¬ milian was a man of eminent abilities and high and varied culture. His collected writings are contained in a posthumous publication entitled

(Aus meinem Leben : Reiseskizzen, Aphorismen, Marinebilder) (1867), which gives ample testi¬ mony to the vigor of his intellect and the variety of his attainments. (See Mexico, His¬ tory). Consult Bancroft, H. H., (History of Mexico* (6 vols., San Francisco 1883-&8) ; (Cambridge Modern History> (Vol. II, New York 1909) ; Kemper, J., (Maximilian in Mexico* (Chicago 1911) ; Martin, P. F., (Max¬ imilian in Mexico) (London 1914).

MAXIMILIAN, Joseph, 1st king of Bava¬ ria : b. Schwetzingen, Baden, 27 May 1756; d. Nymprenburg, near Munich, 13 Oct. 1825. He succeeded his uncle, Charles Theodore, as elector in 1799. He was a supporter of Napo¬ leon, and gave his daughter in marriage to Eugene Beauharnais in 1806. In the same year his duchy was erected into a kingdom. In 1813, however, he was member of the league against the emperor, and thus retained his throne after the fall of Napoleon. His reign was distin¬ guished by the introduction of many adminis¬

trative reforms, especially the constitution of

1818.

MAXIMINUS, mak-si-mi'nus, Caius Ju¬ lius Verus, Roman emperor: d. Aquileia, 238 a.d He was at first a shepherd in Thrace and when about 20 years of age became a soldier in the Roman armies, where he was distinguished by his gigantic stature. His capacity for fight¬ ing procured him rapid advancement, and under Alexander Severus he had the command of a legion on the Rhine. In 235 a.d. he took part in a conspiracy against Alexander, and after his murder of the latter by the soldiers was proclaimed emperor. The Gordiani having been proclaimed in Africa, Maximinus hastened to Italy and laid siege to Aquileia. He was there murdered by his soldiers.

MAXIMITE, a high explosive employed as a bursting charge for projectiles, invented by Hudson Maxim (q.v.) of New York City. The secret of the invention and the exclusive right to the use of the explosive was purchased by the United States government in 1901, after very exhaustive trials at Sandy Hook proving grounds. Maximite was the first high explosive to be successfully employed as a bursting charge for armor-piercing projectiles. This explosive, while it is claimed to be 50 per cent more pow¬ erful than ordinary dynamite, is so insensitive that it will not only safely withstand the shock of discharge from the gun, but will also stand the far greater shock of penetrating armor-plate as thick as the projectile containing it is capable of passing through, the projectile being then exploded immediately behind the plate with a delay action detonating fuse.

Ignited in the open, maximite simply burns like pitch. Projectiles are charged with it by the simple process of melting and pouring, the explosive solidifying on cooling, and adhering firmly to the walls of the shell. Maximite is known to be a picric acid compound. See Ex¬ plosives ; Projectiles.

MAXIMS. The <Maxims* of La Roche¬ foucauld furnish the most famous body of ex¬ amples of that polished and studied condensa¬ tion of expression to epigrammatic sparkle and brilliance in which the French so delight and so excel, and of which the (Pensees* of Pascal, the (Caracteres* of La Bruyere and the (Reflexions) of Vauvenargues are other specimens.

They are precisely what their fuller official title proclaims them : Reflections, or Sentences and Moral Maxims ((Reflexions, ou Sentences et Maximes morales*). They are moral in the sense that they are concerned with the facts of human conduct and motive, but not at all in the sense of serving a didactic purpose or in proposing an incentive or a guide to virtuous living; and they are reflections rather than maxims in the ordinary meaning of the word, since what they give us is not practical precept and counsel, but an analysis of moral facts. In this analysis the sharp distinction and opposi¬ tion between vice and virtue disappears. His moral philosophy is summed up in the maxim that stands as epigraph at the head of the col¬ lection: (<Our virtues are most frequently but vices disguised.® The idea is restated a little more specifically in the first reflection : <(What we term virtue is often but a mass of various actions and divers interests which fortune, or our own industry, manage to arrange, and it is not always from valor or from chastity that men are brave, and women chaste.® The root of all our actions, mask it as we will, is selfishness. This view of virtue and vice may owe some¬ thing of its bitterness and pessimism to the personal temper of La Rochefoucauld, soured by disappointment after playing a restless and unsuccessful part in political and private in¬ trigue. But it owed much also to his pene¬ trating observation of the life of court and salon, and even those who wanted to think more generously of human nature admitted sadly the accuracy of his analysis, while all were captivated by the concision and elegance of his style. To this he gave unending care, polishing and refining his sentences, rejecting some and adding others in successive editions (1665, 1666, 1675, 1678). The standard edition is that prepared by M. Gilbert (Paris 1868). The Maxims have had many admirers among English writers, as Addison, Swift, Dr. John¬ son and Lord Chesterfield. They have often tempted to translation. A late and complete English version is by J. W. Willis Bund and J. Hain Friswell (London 1871).

Arthur G. Canfield.

MAXIMS, Legal, epigrammatic statements of established principles in law, as <(Ignorance of the law excuses no one® (Ignorantia legis n eminent excusat). They are of historic and practical value, and are common in both law and equity. Usually they are given in Latin or in English, but occasionally they appear in French. The following are some of the most important which appear generally in English : <(Equity treats that as done which ought to be done® ; (He who comes into equity must come with clean hands® ; <(Who seeks equity must do equity®; (Acts indicate the intention®; (<Where there is equal equity, the law must pre¬ vail.® The following usually

appear in Latin : Qui facit per alium facit per se ((<He who acts through another acts himself® — important in the law of agency) ; Affirmantis est probare (((He who affirms must prove®) ; Causa prox¬ imo non remota spectatur (<(The immediate and not the remote cause is to be considered® — important in the law of torts). While maxims are of importance in the law to-day, it is nevertheless true that some of them, through legal changes, are practically obsolete. Due

allowance also must be made for the fact that they do not contain exceptions and amplifica¬ tions of the principles they state; otherwise they are very likely at times to be misleading.

MAXIMUM DUTIES. See Duty.

MAXIMUS MAGNUS, Roman emperor: b. in Spain; d. 388. In 383, while commanding the Roman army in Britain, he proclaimed him¬ self emperor. Gratian marched against him, but was defeated and assassinated, and Max¬ imus, having made himself master of Gaul, Britain and Spain, fixed the seat of his em¬ pire at Treves. He then advanced into Italy and was besieged in Aquileia by the Emperor Theodosius, who caused him to be beheaded.

MAXWELL, Sir Herbert Eustace, 7th

Baronet of Monreith, Scottish author: b. Edin¬ burgh, 8 Jan. 1845. He was educated at Ox¬ ford, was Conservative member of Parlia¬ ment for Wigtownshire, 1880-1906, and presi¬ dent of the Society of Antiquaries of Scotland, 1900ˆ13. Among his many publications are (Noontide Essays) (1892); (Scottish Land Names) (1894) ; (Rainy Days in a Library> (1896) ; (Life of the Duke of Wellington (1899) ; (Memories of the Month's* five series (1900-09) ; (The House of Douglas* (1901) ; (Memoirs of George Romney* (1902) ; (The Creevy Papers) (1903) ; (A Century of Em¬ pire* (1909-11) ; (The Making of Scotland* (1911) ; (Fishing at Home and Abroad* (1914) ; (Trees, A Woodland Notebook* (1914).

MAXWELL, James Clerk-, Scottish natu¬ ral philosopher: b. Edinburgh, 13 Nov. 1831; d. Cambridge, England, 5 Nov. 1879. He was edu¬ cated at Edinburgh and at Trinity College, Cam¬ bridge, and in 1856 was appointed professor of natural philosophy in the Marischal College, Aberdeen, and held that office till its amalgama¬ tion with King's College to form the University of Aberdeen in 1860, when he was appointed to a similar chair in King's College, London. In 1857 he obtained the Adams prize at Cambridge for an essay (On the Stability of Motion of Saturn's Rings.* From 1855 to 1872 he pub¬ lished his investigations on Perception of Color, and Color Blindness,* which obtained for him the Rumford medal and his election as F.R.S. He resigned his chair in 1865 and in 1871 was elected unopposed to the newly-founded chair of experimental physics at Cam¬ bridge. He directed the formation of the Cavendish laboratory founded by the Duke of Devonshire and opened in 1874. In 1871 he published his (Theory of Heat,* which has gone through several editions. In 1873 appeared his great work, (Electricity and Magnetism.* Max¬ well's fame will rest on his being the one who took the first grand step toward the discovery of the true nature of electrical phenomena. He rejected the theory of electrical <(action at a distance,** and sought to explain all electrical and magnetic phenomena as the results of local strains and motions in a medium whose con¬ tiguous parts only act on one another by pres¬ sure and tension. His scientific papers have been collected by W. D. Niven (1890). Con¬ sult Campbell and Garnett, (James Clerk Max¬ well* (London 1882) ; Glazebrook, R. T., (James Clerk Maxwell and Modern Physics* (ib. 1896).

MAXWELL, William Henry, Iris'h-American educator: b. Stewartstown, Tyrone, Ire¬

land, 5 March 1852; d. 3 May 1920. Ik was graduated at Galway Queen's College in 1872, and in 1874 received the degree of A.M. In 1874 he came to the United States. After eight years as teacher in Brooklyn he became assistant superintendent of schools in that city in 1882 and superintendent from 1887 to 1898. After 1898 Dr. Miaxwell was superintendent of public schools of Greater New York. In this position he often came into conflict with members of the board of education. He advocated a college training for teachers and raised the require¬ ments for teachers' examinations in New York. He was president of the National Education Association in 1905. Dr. Maxwell was always very deeply interested in the promotion of the study of English. He published < Elementary English Grammar*; School Grammar* and other educational works.

MAY, Phil, English illustrator: b. L.eeds, 22 April 1864; d. Saint John's Wood, London, 5 Aug. 1903. He was son of an engineer; had his schooling in Leeds; was apprenticed there to a lawyer, whom he soon left to join a com¬ pany of players ; for them he designed posters ; married at the age of 19 ; and in 1884 and 1885 began drawing for Society and Saint Stephen's Review. He went out to Sydney, Australia, in 1885, where he gained some fame as artist of the Bulletin, and was forced by the exigencies of newspaper illustration to a very scanty use of line and a complete omission of anything else ; went to Paris ; returned to his work on Saint Stephen's Review; then began to draw for the Daily Graphic ; in 1888 returned to Eng¬ land; thereafter traveling through America; and shortly after Du Maurier's death was taken on the staff of Punch. He must rank with Leech, Tenniel and the other great British cari¬ caturists. His art was remarkably simple and telling, his method, it is said, being to reduce an elaborate and detailed drawing to the fewest possible lines. He was particularly happy in his portrayals of London street-life, which are full of humor and sympathy; his Parliament sketches are less felicitous and a misapplication of his talent. His own hatchet face, <(banged** hair and ever-present cigar figure in many of his sketches. From 1892 to his death he published (Phil May's Annual.* His other collections of drawings are (Parson and Painter* (1891) ; (Phil May's Sketch Book* (1895) and c Phil May's Gutter-Snipes* (1896) ; (Phil May's Graphic Pictures* (1897).

MAY, Samuel Joseph, American reformer and abolitionist: b. Boston, Mass., 12 Sept. 1797; d. Syracuse, N. Y., 1 July 1871. He was graduated at Harvard in the class of 1817, and after studying theology under Dr. Ware at the Harvard Divinity School became a Unitarian clergyman and in 1822 accepted a call to a church at Brooklyn, Conn. He was interested in the anti-slavery cause and preached as well as wrote in favor of it, advocating immediate emancipation, for which he was mobbed and burned in effigy at Syracuse in 1830. He was a member of the first New England Anti-Slavery Society, formed in Boston in 1832, and eagerly championed Prudence Crandall, when she was persecuted and arrested for receiving colored girls into her school at Canterbury, Conn. Mr. May was also a member of the Philadelphia convention of 1833 which formed the American

Anti-Slavery Society, and was one of the signers of the ˆDeclaration of Sentiments, M the author of which was William Lloyd Garrison. For 18 years he was the general agent of the Massachusetts Anti-Slavery Society, and as such lectured and traveled extensively. He was five times mobbed while on a lecture tour in Vermont, in 1835, once while lecturing in the capitol at Montpelier. He had charge of the Unitarian church at South Scituate, Mass., from 1836 to 1842, becoming in the latter year, at the request of Horace Mann, the principal of the Girls' Normal School at Lexington, Mass. In 1845 he became pastor of the Unitarian Society at Syracuse, N. Y., which position he retained until 1868. Mr. May assisted in the rescue of Jerry, the slave, in 1851, and with several others was arrested for this offense against the Fugi¬ tive Slave Law. May and his associates issued a declaration in which they admitted the fact of their being implicated in the rescue, but claimed that the Fugitive Slave Law was un¬ constitutional and wicked. Realizing the changing sentiment in the North the authorities never brought the case to trial. May's life, like that of many another Abolitionist, was often in danger. He was among the most conservative anti-slavery leaders in his methods and was prominent also in many educational and chari¬ table enterprises, and did a great deal toward improving the public-school system of Syracuse. By his associates May was termed the Saint John Apostle of the Gospel of Freedom, on ac¬ count of his gentle voice and manner. He was both gentle and firm, courageous, unwearied and unselfish in the anti-slavery cause. He pub¬ lished (Education of the Faculties> (1846); (Revival of Education> (1855) ; (Recollections of the Anti-Slavery Conflict > (1868). Consult Mulford, (Memoir of Samuel Joseph May> (Boston 1873; new ed., 1882).

MAY, Thomas, English dramatist and his¬ torian : b. Mayfield, Sussex, 1594; d. London, 13 Nov. 1650. He was educated at Cambridge, be¬ came a member of Gray's Inn, but never prac¬ tised, and figured brilliantly at court. He pub¬ lished <Antigone,) Cleopatra,* (Agrippina) and other dramas and translations of the (Geor¬ gies } and Lucan's ˆharsaliaF He was an intimate of Charles I and at the latter's behest wrote histories of Edward III and Henry II in verse. He espoused the cause of Parliament in the Civil War, was made secretary and his¬ toriographer to Parliament and wrote his¬ tory of the Parliament of England, 1640-43 > (1650; several times republished), and a bre¬ viary* of the same history (1650). Until the Restoration his body reposed in Westminster Abbey, but as in the case of other

Parliament¬ arians, it was then dishonored and thrown into a neighboring pit.

MAY, Thomas Erskine, Baron Farnbor-ough, English historian : b. London, 8 Feb. 1815; d. Westminster, 17 May 1886. He was educated at Bedford Grammar School, became assistant librarian to the House of Commons in 1831 and was called to the bar in 1838. He was appointed examiner of petitions for private bills in 1846 and clerk to the House of Commons in 1871. He was knighted in 1866, and just prior to his retirement from office in 1886 was raised to the peerage. He is best known as an anti¬ quarian and historian. His chief works are (A

Practical Treatise on the Law, Privileges, Pro¬ ceedings, and Usages of Parliament* (1844; 10th ed., much enlarged, 1893), a model of its kind, which has been translated into most mod¬ ern languages; Constitutional History of Eng¬ land since the Accession of George III, 1760-1860* (1861-63; republished with supplementary chapter, 1871); (Democracy in Europe: a His¬ tory } (1877). In 1854 he collected and re¬ duced to writing the (Rules, Orders, and Forms of Procedure of the House of Commons.)

MAY, the fifth month of the year, having 31 days. It was second in the old Alban calen¬ dar, third in that of Romulus and fifth in that of Numa Pompilius. The etymology of the word is doubtful. It was called Maius bv Rom¬ ulus, in respect to the senators and nobles of his city, who were called Majores, as the month following was called Junius, in honor of the youth of Rome who served him in war and were named Juniares. Some etvmologists are of opinion that it was called Maia, from the goddess of that name, the mother of Mercury, to whom they offered sacrifices on the first day of the month. The sun enters Gemini during May and the plants of the earth generally begin to flower. See Calendar.

MAY APPLE. See Mandrake.

MAY BEETLE, or JUNE BUG, popular

names for the clumsy brown beetles of the genus Lachnosterna (family Scarabceidce) com¬ mon throughout the United States. The adults fly by night during late spring and often are troublesome upon the young foliage of trees and shrubs. They are attracted by light and may be trapped in this way. The larvte are large, brow-n-headed, white-

bodied grubs which feed upon the roots of grass, etc., passing one or more years in the ground. For this reason strawberries and other crops which they attack should not be planted upon freshly-turned sod land. Late fall plowing is often practised to destroy them.

MAY-BIRD, a gunner's name for various shore birds which return from the South in the month of May, especially the knot (q.v.). In New England the black-bellied plover, and in the South a curlew, are called May-birds or May-cocks.

MAY CHERRY, a local name for the service-berry bush. See Amelanchier.

MAY DAY, popular name of the first day of the month of May, on which from a very early period general festivities took place. May has generally been regarded as a time for glad¬ ness. The outbreak into new life and beauty which marks nature instinctively excites. The first emotion is a desire to seize some part of that profusion of flower or blossom which spreads around, to set it up in decorative fash¬ ion and to let the pleasure which it excites find expression in dance and song; and among pa¬ gans the tendency has been to render to this vegetative trophy a sort of homage. Among the Romans, the feeling of the time found vent in fheir Floralia, or Floral Games, which began on 28 April and lasted to 3 May. Among the old Celtic peoples, a festival called Beltein (Baal's fire) also was held on this dav. but it does not seem to have been connected with flowers, but rather with sun-worship. In Chris¬ tian times in the Celtic countries the Church

Christianized this celebration by transferring it to 24 June, the feast of Saint John, which is still celebrated with bonfires. In England, as we learn from Chaucer and other writers, it was customary, during the Middle Ages, for all, both high and low — even the court itself — to go on the first May morning at an early hour ((to fetch the flowers fresh.® Hawthorn branches also were gathered; these were brought home about sunrise, with accompaniments of horn and tabor, and all possible signs of joy and merriment. The people then proceeded to

dec¬ orate the doors and windows of their houses with the spoils. By a natural transition of ideas, they gave the hawthorn bloom the name (<the May®; they called the ceremony <(the bringing home the May® ; they spoke of the ex¬ pedition to the woods as ((going aMaying.® The fairest maid of the village was crowned with flowers as the ((Queen of the May® ; placed in a little bower or arbor, where she sat in state, receiving the homage and admiration of the youthful revellers, who danced and sang around her. This custom of having a May queen seems a relic of the old Roman celebration of the day when the goddess Flora was specially wor¬ shiped. How thoroughly recognized the cus¬ tom had become in England may be illustrated by the fact that in the reign of Henry VIII the heads of the corporation of London went out into the high grounds of Kent to gather the May — the king and his queen, Catharine of Aragon, coming from their palace of Green¬ wich, and meeting these respected dignitaries on Shooter's Hill. But perhaps the most con¬ spicuous feature of these festive proceedings was the erection in every town and village of a fixed pole — the May-pole — as high as the mast of a vessel of 100 tons, on which, on May morning, they suspended wreaths of flowers, and round which the people danced in rings nearly the whole day. A severe blow was given to these merry and often wild revels, by the Puritans, who, in their campaign of taking the joy out of life, caused May-poles to be up¬ rooted and a stop put to all their jollities. They were, however, revived after the Restoration and long held their ground, but the celebration is now confined to school children, their elders not taking part, so much has our modern indus¬ trial feudalism absorbed the leisure time of all but the parasite classes. In France, Germany and other countries, May-poles were common and festive sports are even yet observed. The Roman Catholic Church, in order tq counteract the evils too often incident to the celebration of May Day, appears to have instituted the feast known in France as La Fete-Dieu, celebrated with processions and flowers. In America May Day celebrations have come into favor in the present century and in nearly all public parks of great cities games and processions are held. Consult Strutt, J., < Sports and Pastimes of the People of England) (London 1801).

MAY-FLY, SHAD-FLY, or DAY-FLY,

members of the order Ephemerida. The spe¬ cies, of which about 300 have been described nearly one-third of which are North American, are fragile insects with large fore-wings, small or wanting hind-wings, short antennae, atrophied mouth parts and two or three thread-like ab¬ dominal filaments. Being greatly attracted to lights, the adults are often a source of annoy¬

ance in lakeside and riverside towns, and are sometimes especially troublesome in obscuring the lights from lighthouses. The eggs are laid in fresh water either upon the surface or upon the bottom, the female diving for this purpose. The larvae, which feed mainly upon vegetable matter, are active creatures with strong legs, abdominal tracheal gills and anal appendages. They live upon the bottom, under stones, cov¬ ered with mud, or in burrows. After moulting about 10 times wing pads appear, and these in¬ crease with each moult until the last, which may be number 20. This occurs in the open air, the one previous to which occurs at the surface of the water, the insect escaping from its sub¬ imago skin rather suddenly. One striking dif¬ ference the adults exhibit is the development of paired sexual organs, which do not appear in other orders of insects. The larvae may take three years to develop; the adults live only a few days, lay their eggs and die. Both adults and larvae are important food for fishes, and consequently they form a favorite bait with anglers, and are imitated in making artificial flies.

MAYA, ma' ya", the ruling race of Yucatan at the time of the discovery of America and for many years previous. Where they came from is uncertain; but that they invaded the peninsula from two different directions is as¬ serted in various of their traditions. This probably means that the people are of distinct races, one of which came by way of the Gulf of Mexico and the other from the west or southwest by land. The first influx of in¬ habitants to Yucatan recorded in the traditions was led by the great culture hero Zamna (q.v.) who became the first temporal and ecclesiastical ruler of the land, a sort of Moses, a giver of laws and a solidifier of traditions. Tradition says he lived to be quite old and that he di¬ vided the country into districts which he gave to his followers of noble birth. At the time of his death the Mayas were in secure and peaceable possession of the peninsula of Yuca¬ tan, throughout the length and breadth of which they had extended their culture. These early Mayas seem to have been closely connected with the other great cultured peoples of Chiapas, Honduras and Guatemala, in lan¬ guage, customs and religious institutions.

The second inroad of foreigners into Yuca¬ tan was, according to traditions, headed bv Quetzalcoatl. This probably means that the newcomers were followers of the Toltec re¬ ligion and probably possessors of Nahuan cul¬ ture. Whether, on their arrival in Yucatan, they spoke the same language as the first Mayas is not known; but it seems probable that they did, since they are called, by various early writers, «the Itzas,® a name generally con¬ ceded to mean the

followers of Zamna or Itzamna, the culture god of the early Mavas. Yucatan now had two governing races which seem to have lived on more or less friendly terms with one another, and to have had no trouble in communicating with one another. It is certain that, at the time of the conquest of Yucatan, which took place about 500 years later, only one language existed in the country. Yet the style of the various ruins of Yucatan show that there must have been a blending of cultures and religious ideas, and indicates the

MAYAGUEZ

influence of Nahuan civilization in the penin¬ sula. It is probable and there are intimations in the Maya and Quiche traditions, that not only one but numerous migrations took place over considerable periods of time from the southwest into Yucatan.

Both the original followers of Zamna and the immigrants from the southwest, Chiapas and Guatemala, must have been, as tradition pic¬ tures them, great builders for Yucatan is literally covered with ruins whose forms, decorations and peculiar characteristics show that at least two races of considerably different cultures built them. Yet however different may have been the cultures of these two peoples they appear to have become pretty well blended by the time of the conquest, and the two races had merged into one, which the Spaniard named Maya or sometimes Itza. Under the Tutul Xius at Uxmal (q.v.) the Mayas built a civilization noted for its splendor among all the neighbor¬ ing nations. Uxmal became the greatest, most powerful, wealthy and artistic city in Yucatan and as such flourished for many years; but it was finally conquered; and Maya power was transferred to Mayapan, which in its turn fell into the hands of people from the mountains near the end of the 13th-century. This was followed by a century and a half of civil war in the peninsula, which led finally to the destruction of Mayapan (q.v.) about 1460. In this war the Tutul Xius found their power greatly reduced and themselves driven to take refuge in Mani, a city which they still inhabited at the time of the Spanish conquest during the first half of the 16th century. With all these influxes of foreigners who evidently remained in the country, into which they appear to have continued to flood up to the time of the dis¬ covery of America, the language of Yucatan remained a unit, in which the dialects were so slightly marked that the people of the whole peninsula conversed with one another without any difficulty. This would seem to indicate that the Maya race was fundamentally the same as that which erected the great historic buildings now in ruins throughout the Quiche country, part of Honduras and the Mexican state of Chiapas. Their culture seems also to have been related to that of Oaxaca, Tabasco, Cam¬ peche and Guerrero. The territory of the Maya race proper stretched southward covering all the

peninsula of Yucatan and reaching to the Pacific Ocean.

The Mayas had made a very great advance in civilization at the time of the discovery of America ; though, owing to the long and bloody civil wars through which they had just passed, this civilization had lost much of its splendor. This was completely destroyed during the Spanish conquest, which lasted 16 years. Then many of the Mayas retreated to the hilly coun¬ try and the deeply-wooded coast-land to the west where they continued to maintain their independence during the 300 years of Spanish rule. Numerous military expeditions were sent against them and it was not until the adminis¬ tration of Porfirio Diaz that they were reduced to comparative quiet, from which they have again more or less freed themselves. The Mava tongue is still spoken by about 300,000 persons, of whom about 100,000 are of mixed descent. See Mexican Mythology and Ethnology,

Chjchen-Itza. See also bibliography under Yucatan.

MAYAGUEZ, ma-ya-gwas', Porto Rico, a seaport city on the Mayaguez River near the west coast, the capital of Mayaguez department and third city of the island in size, 72 miles southwest of San Juan. The city was founded in 1752 and has a modern appearance, with wide streets, public plazas, fine buildings, elec¬ tric lights and a street railway. A railway brings it into communication with the interior. It has a large but shallow harbor, and its port is three miles distant at Mayaguez Playa, where a considerable export trade in coffee, sugar and oranges is carried on chiefly with the United States. In the vicinity is the Porto Rico Agri¬ cultural Experiment Station, which dates from 1902. Pop. about 20,000.

MAYAPAN, the ancient capital of the Maya kingdom in Yucatan. According to tradi¬ tion it was founded by Zamna, the ancient highpriest, ruler and culture deity of the Mayas. Zamna divided the Maya kingdom among his leaders whose descendants formed the Maya nobility of Yucatan. In later days the Tutul Xiu, high nobles, became the ruling power under the sovereign, who was chosen from among them. Many years later Kukulcan, another traditional demigod, according to traditional history, became king and high priest of Maya¬ pan. As this name is a literal translation of the word Quetzalcoatl (q.v.), the name of the Nahuatl god of culture, and as the story of the latter and that told of Kukulcan are almost identical, it is probable that this tradition re¬ cords the conquest of Mayapan by the Toltecs or some Nahuatl race who introduced into Yucatan the

worship of Quetzalcoatl. Accord¬ ing to the Maya traditional history this Kukul¬ can formed a confederacy of the rulers of Mayapan and Chichen Itza, the latter the ruling party among the Itzas. Of this confederacy he seems to have been the pontifical head and the ruling spirit, though with him the other two sovereigns were legally joint rulers with equal powers. On his departure from Mayapan, which seems to. be mythical, Kukulcan left the kingdom to princes known afterward as the Cocomes, under whose seven successive rulers Mayapan enjoyed a period of wonderful pros¬ perity during which many cities throughout the country subject to this capital are supposed to have been built. The ruins of these ancient cities are still found in the vicinity of Mayapan.

In the meantime, the city of Uxmal (q.v.) rose to power in another part of the isthmus. In a sanguinary war with this latter Mayapan was finally defeated and destroyed. Uxmal became the head of a new confederacy, with the Tutul Xiu the ruling royal family. The latter ruled wisely and well at first and rebuilt Mayapan, which continued to flourish for sev¬ eral centuries. It was, however, finally razed to the ground about the middle of the 15th century, or shortly before the discovery of America, in a civil war in which the vassal lords fought against and finally overthrew the power of the Tutul Xiu dynasty. Thus finally disappeared Mayapan, the first of the known great and populous cities of ancient Yucatan.

The ruins of the city of Mayapan are situ¬ ated about 25 miles south of Merida. The condition of these ruins to-day seems to bear

out the traditional history that this old capital of the Mayas was completely destroyed, for little of its past magnificence now remains standing. But numerous mounds, terraces and pyramids, badly ruined edifices and huge quan¬ tities of stone, sculptured blocks and founda¬ tions of buildings scattered over a considerable extent of territory are evidence of the existence of a great centre of population and a place of some magnificence. One great mound or py¬ ramid over 69 feet high has a stairway 20 feet wide on each of its sides leading from the

ground to the truncated summit, a stone-paved platform considerably wider than the stairway. Sculptured stone blocks lie scattered over an area of three miles, attesting the great extent of this ancient Maya capital which tradition says was once surrounded by a thick and high stone wall, but that this wall was razed to the ground at the time of the final destruc¬ tion of the city about 100 years before the conquest of Yucatan by the Spaniards. Along the line of . this wall runs an old ditch, now filled up with debris, and on both sides of this are vast quantities of stone, supposed to have once formed part of this ancient rampart. See Uxmal; Chichen Itza ; Yuca¬ tan.

Bibliography. — Baldwin, J., ‘Ancient America) ; Benzoni, G., (Historia del Mondo Nuovo) ; Bradford, A. W., ‘American Antiquities) ; Brasseur de Bourbourg, ‘Quatre Lettres sur le Mexique) ; Carbajal Espinosa, F., ‘Historia de Mexico* ; Cogolludo, (Historia de Yucatan* ; Herrera, (Historia General* ; Landa, ‘Relacion de la cosas de Yucatan* ; Morelet, ‘Voyage dans l’Amerique Central* ; Norman, ‘Rambles in Yucatan* ; Ordonez, (Historia del cielo y de la tierra> ; Oviedo, ‘Historia de las Indias) ; Remesal, ‘Historia de Chyapa) ; Stephens, J. L., ‘Incidents of Travel in Yucatan* ; Torquemada, ‘Monarquia Indiana) ; Villagutierre, ‘Historia de la Conquista de el Itza* ; Waldeck, F. de, ‘Palenque et autres Ruines) ; Ximenez, F., ‘Historia de Guatemala.*

John Hubert Cornyn.

MAYBRICK, Michael (“Stephen Ad¬ ams®), English composer: b. Liverpool, about 1845; d. 26 Aug. 1913. He studied music in Italy and Germany and was for many years a leading baritone vocalist in concerts and Eng¬ lish opera. As a writer of songs over the sig¬ nature “Stephen Adams,® he was widely popular in this country and England. Among the best known of his many songs are ‘The Midship-mite^ ‘Nancy Lee) ; ‘Alsatian Mountains) ; ‘The Holy City1* ; ‘A Warrior Bold.*

MAYENCE, ma-yons. See Mainz.

MAYER, Alfred Goldsborough, American zoologist: b. Frederick, Md., 16 April 1868. In 1889 he was graduated at the Stevens Insti¬ tute of Technologv and at Harvard in 1897. From 1892 to 1900 he was assistant to Dr. Alexander Agassiz and had charge of radiates in the Harvard Museum of Comparative Zo¬ ology from 1895 to 1900. In 1900-04 Dr. Mayer was curator of natural sciences and curator-in¬ chief of the Brooklyn Institute Museum ; in 1904-05 he was director of the marine labor¬ atory of the Carnegie Institution, Tortugas, Fla., and

since 1905 has been director of the department of marine biology at the Carnfcgie

Institution, Washington. Dr. Mayer took part in several scientific expeditions in many parts of the world. Since 1913 he has been lecturer in biology at Princeton. He has published ‘Medusae of the World* (3 vols., 1910) ; and contributions to zoological publications, espe¬ cially on the insects and medusae and on chemi¬ cal causes of animal movements; effects of ions upon rate of nerve conduction ; studies of coral reefs of Samoa, *etc.*

MAYER, ma’er, Alfred Marshall, Amer¬ ican physicist: b. Baltimore, 13 Nov. 1836; d. Maplewood, N. J., 13 July 1897. He studied at Saint Mary’s College, Baltimore; spent twro years in a machine-shop and draughting-room ; specialized in chemistry and physics ; became professor of these branches in the University of Maryland (1856) and in Westminster Col¬ lege, Fulton, Mo. (1859) ; after two years of study in Paris was appointed to a chair in Pennsylvania College, Gettysburg (1865) ; went thence to Lehigh University in 1867 ; and from 1871 to his death wras professor of physics in Stevens Institute, Hoboken, N. J. There he made important researches in acoustics ; in¬ vented the topophone, an apparatus to detect the phases of sound vibration; discovered five methods of analysis of compound sounds into their elementary tones; and stated the law of tuning-fork vibration. He became a member of the National Academy of Sciences in 1872. He wrote many papers for the American Journal of Science, notably a series entitled ‘Researches in Acoustics) and was at one time a member of the editorial staff; several contributions to the Scientific American Supplement ; ‘Lecture Notes on Phvsics) (1868) ; .‘The Earth a Great Magnet) (1872) ; ‘Light* (1877) ; and ‘Sound* (1878). Consult Science (issue of 20 Aug. 1897),

MAYER, Brantz, American author : b. Baltimore, 27 Sept. 1809 ; d. there, 21 March 1879. He was educated at Saint Mary’s Col¬ lege, Baltimore, studied law by himself during an Oriental voyage in 1827-28 and then at the University of Maryland; was admitted to the bar in 1829; and after a year in Mexico as secretary of legation wrote ‘Mexico as it Was, and as it Is> (1844). In the same year he founded the Maryland Historical Society. In the Civil War he sympathized with the Union was president of the Union State General Com¬ mittee, and from 1863 to 1871 paymaster in the United States army. His best book was ‘Cap¬ tain Canot,* a story of the slave trade founded on fact. He wrote also ‘Mexico, Aztec, Spanish, and Republican (1851) ; ‘Observa¬

tions of Mexican History and Archaeology1* (1856) ; ‘Mexican Antiquities* (1858) ; ‘Me¬ moir of Jared Sparks* (1867) ; and ‘Baltimore as it Was, and as it Is> (1871).

MAYER, Constant, American artist: b. Besangon, France, 4 Oct. 1832; d. 1901. A student at the School of Fine Arts in Paris, he left his studies in 1857 and settled in New York, where his sketches and portraits wron immediate success. His portraits of Grant and Sherman and his life-sized genre paintings, such as ‘Maud Muller* ; ‘The Song of the Shirt) ; ‘Evangeline,* gained favor. From 1866 he was an associate of the National Acad¬ emy of Design and exhibited frequently at the Salon.

MAYER, Frank Blackwell, American artist, brother of Alfred Marshall Mayer (q.v.) and nephew of Brantz Mayer (q.v.) : b. Balti¬ more, 27 Dec. 1827 ; d. 1908. He studied art there under A. J. Muller, and under Gleyre and Brion in Paris and then settled in Annapolis. He made a special study of Dakota Indian types; contributed to Harper’s and Century various articles with his own illustrations ; and exhibited in the Paris Salon and at the Cen¬ tennial Exhibition of 1876, where he received a medal for two pictures, (The Continentals* and (Attic Philosopher.). Among his other canvases are (Feast of Mondawmin) ; (The King’s FooP ; (The Trappist* ; (Maryland in 1750) ; (Crowning a Troubadour,* (The Treaty of Traverse des Sioux,* (Minnesota* (1886) ; (The Washington Cockade,* (Founders of the Baltimore and Ohio Railroad) (1891; and (The Burning of the Peggy Stuart.*

MAYER, Henry, American caricaturist: b. Worms, Germany, 18 July 1868. Educated in Germany and England, he at first followed a business career in the latter country, but emi¬ grating to the United States in 1887 soon won for himself a distinct place as caricaturist, by his designs and illustrations for American and European papers. Since 1893 he has resided in New York. His works are (Autobiography of a Monkey) (1896); (In Laughland) (1899); (Fantasies in Ha-Ha) (1899) ; (A Trip to Tov-land) (1900) ; (Adventures of a Japanese Doll* (1901) ; (Alphabet of Little People) (1901). He is the creator of Umpressions

of the Pass¬ ing Show) for 10 years in the New York Times. He received a personal gift of two cloissonne vases with imperial crest from the late Mikado for his cartoons during the Russo-Japanese War. He is editor of Puck since

1914.

MAYER, mi'er, J[ulius Robert von, Ger¬ man physicist: b. Heilbronn, Wiirtemberg, 25 Nov. 1814; d. there, 20 March 1878. He was educated at the gymnasium in Heilbronn, studied medicine at Tubingen and finished his university studies at Munich and Paris. In 1840 he went to Java as a ship's surgeon, and while there turned his attention to studies of the blood, extending his work to exhaustive in¬ vestigations of animal heat, to which he applied the mechanical theory. Returning-in 1841 to Heilbronn, where for some years he practised his profession, he became deeply engrossed with his scientific labors, and in 1842 published in Liebig's Annalen der Chemie und Pharmacie a preliminary statement of his revolutionary theory of heat, together with his views on the conservation and correlation of energy.. Three years later he restated his results in (Die organische Bewegung in ihrem Zusammenhange mit dem Stoffwechsel,* at the same time giving a forecast of his theorv of the meteoric origin of the sun's heat. Contemporaneously with Mayer the mechanical theory of heat was.worked out independently by J. P. Joule (q.v.) in Eng¬ land, and a controversv arose regarding the priority of discovery. The Royal Society gave Mayer the Copley medal in 1871, and two years before his death he was ennobled by the king of Wiirtemberg. His collected works appeared in 1867 under the title (Die Mechanik der Warme) (3d ed., by J. S. Weyrauch 1893). Consult vol. 18 — 30

Weyrauch, (Robert Mayer *(Stuttgart 1890) ; id., (Kleinere Schriften und Briefe von Robert Mayer* (Stuttgart 1893) ; Gross, (Robert Mayer and Hermann von Helmholtz > (Berlin 1898) ; Jeutsch, E., (Julius Robert Mayer; seine Krank-heitgeschichte und die Geschichte seiner Ent-deckung* (Berlin 1914).

MAYFAIR, London, England, a fashion¬ able neighborhood in the (<West End® adjoining Belgravia, east of Hyde Park, and bounded by Park lane and Bond street. See London.

MAYFIELD, Ky., city, county-seat of Graves County, on the Illinois Central Rail¬ road, about 30 miles from the Mississippi River and 25 miles from the Ohio at the mouth of the Tennessee. It was settled about 1820 and incorporated in 1850. It is in a fertile agricul¬ tural region in which fhe chief product is tobacco and in which the city has extensive interests. Mayfield has large tobacco ware¬ houses and factories, clothing factories, woolen mills, fireclay works, flour and lumber mills. It has an extensive trade in tobacco. The mayor is elected once in four years ; the council acts upon the appointments of the executive. Pop. (1920) 6,583.

MAYFIELD, Pa., borough of Lacka¬ wanna County, 15 miles northeast of Scranton, on the New York, Ontario and Western and the Delaware and. Hudson railroads. It has extensive interests in coal, the mining of which is the leading industry. There is also a silk mill. Pop. 3,660.

MAYFLOWER, The, the name of the vessel in which the Pilgrim Fathers, or first colonists in New England, sailed to this country in 1620. The Mayflower was a vessel of 180 tons. She set sail from Southampton, England, on 5 Aug. 1620, in company with her sister ship, the Speedwell, but the courage of the captain and the crew of the latter vessel failing, both ships put back to port. Finally on 6/17 September the Mayflower again spread her sails from Plymouth, having on board as passengers 41 men and their families, 102 persons in all. They succeeded in crossing the Atlantic after a stormy voyage of 63 days. They intended to go to the mouth of the Hudson River but the captain of the Mayflower took them to Cape Cod. They landed at Plymouth, Mass., at a point where Plymouth Rock, a huge granite boulder, stands at the water's edge. A complete and authentic list of the male passengers who landed from the Mayflower is as follows:

The Mayflower Passengers.

Allerton, Isaac Allerton, John Billington, Tohn Bradford, Wm. Brewster, Wm. Britterage, Richard Brown, Peter Carver, John Chilton, James Clarke, Richard Cook, Francis Crackston, John Dotey, Edward Eaton, Francis English, Thos. Fletcher. Moses Fuller, Edward Fuller, Samuel Gardiner, Richard Goodman, John

Hopkins, Stephen Howland, Tohn Leister, Edward Margeson, Edward

Martin, Christopher Mullins. William Priest, Degony Rigdale, John Rogers, Thomas Soule, George Standish, Miles Tilly, Edward Tilly, John Tinker, Thomas Turner, John Warren, Richard White, William Williams, Thomas Winslow, Edward Winslow, Gilbert

With these 41 male passengers and heads of families came 15 male servants, whose names were as follows :

Carter,

Coper,

Ely,

Holbeek,

Hooke,

Servants on the Mayflower.

Langemore,

Latham,

Minter,

Moore,

Prower,

Sampson,

Story,

Thompson,

Trevore,

Wilder.

The following is a copy of the covenant agreed upon by these first settlers of Massa¬ chusetts, signed and subscribed on board the Mayflower at Cape Cod, 10/21 Nov. 1620, two days after the ship came to anchor.

The Mayflower Compact.

In the name of God Amen! We whose names are under¬ written, the loyal subjects of our dread sovereign Lord, King James, by the grace of God, of Great Britain, France and Ireland, King, Defender of the Faith, etc., have under¬ taken for the glory of God and the advancement of the Christian faith, and honor of our King and Country, a voyage to plant the first colony in the northern parts of Virginia; do by these presents, solemnly and mutually, in the presence of God and of one another covenant and com¬ bine ourselves together into a civil body politic for our better ordering and preservation, and furthermore of the ends aforesaid; and by virtue hereof to enact, constitute and frame just and equal laws, ordinances, acts, constitu¬ tions, and offices from time to time, as shall be thought most mete and convenient for the general good of the colony; unto which we promise all due submission and obedience. In witness whereof we have hereunto subscribed our names, at Cape Cod, the 11th of November, in the year of the reign of our sovereign Lord, King James of England, France and Ireland, the Eighteenth, and of Scotland the Fifty-fourth, Anno Domini 1620.

Whittier, Lowell, Holmes and other poets have immortalized the Mayflower in well-known poems. Consult Carpenter, E. J., <The Mayflower Pilgrims5 (New York 1918) ; Usher, R. G., (The Pilgrims and Their History) (New York 1918).

MAYFLOWER. See Arbutus, Trailing.

MAYFLOWER DESCENDANTS, Soci¬ ety of, an American patriotic society founded in New York City, 22 Dec. 1894. Its member¬ ship is confined to lineal descendants of any passengers on the Mayflower , the voyage of which terminated at Plymouth Rock, Mass., in November 1620. There are also numerous State societies of a similar character. There are more than 2,000 members of the society.

MAYHEM, in law, the maiming of one person by another, the destroying or disabling of an arm, leg, hand or foot, putting out an eye, *etc.* Mayhem renders the perpetrator liable to a civil action for damages, and also to a crim¬ inal prosecution.

MAYHEW, ma'hu, Experience, American

missionary: b. Martha's Vineyard, Mass., 27 Jan. 1673; d. there, 29 Nov. 1758. He took charge of a half-dozen congregations of In¬ dians, and in 1709 executed for the Society for the Propagation of the Gospel in New England a translation of the Psalms and of the Gospel according to Saint John into the Indian tongue. His principal writing is (Indian Converts) (1727), containing accounts o i 30 Indian minis¬ ters and 80 other Indian Christians.

MAYHEW, Henry, English journalist and

author: b. London, 25 Nov. 1812; d. 25 Tuly 1887. In 1831 he started, with Gilbert A'Beckett, a periodical called Figaro in Lon¬ don; in 1841 produced, with A'Beckett, the farce of the (Wondering MinstreP ; and not long after formed a literary partnershin with

his brother Augustus, the <(Brothers Mayhew,55 as they came to be familiarly known, turning out a number of most successful works of amusing fiction. Among these may be men¬ tioned (The Greatest Plague of Life, or the Adventures of a Lady in Search of a Good Servant5 (1847) ; (The Image of His Father, or One Boy is More Trouble than a Dozen Girls) (1850) ; (Living for Appearances) (1855). In 1851 appeared the first volume of his most important work, (London Labor and the London Poor.5 He was one of the founders of Punch (1841) and its first editor. Other works of his are (The Wonders of Science, or Young Humphry Davy5 ; (Young Benjamin

Franklin5 ; (The Boyhood of Martin Luther5 ; (German Life and Manners, as Seen in Saxony at the Present Day5 ; (The Criminal Prisons of London and Scenes of Prison Life5 with Binny. His brothers Horace, Thomas and Edward also assisted Henry and Augustus in their

enter¬ prises, beside publishing independently.

MAYHEW, Jonathan, American clergy¬ man: b. Martha's Vineyard, Mass., 8 Oct. 1720; d. Boston, 9 July 1766. He was graduated from Harvard in 1744, and from 1747 until his death was minister of the West Church in Boston. In a day of theological controversy he was prominent for his tracts. His views were so liberal as to exclude him from the Boston Asso¬ ciation of Congregational Ministers. He op¬ posed the measures of the British society for the propagation of the Gospel in foreign parts, and got into a dispute about it with Seeker, archbishop of Canterbury. In both pulpit and press he was an earnest patriot, being of much assistance to Otis and other early leaders. By the Tories he was considered to have brought about the Stamp Act riots because of a sermon in which he pleaded for the repeal of the act. From him came the suggestion of uniting the colonies in opposition to England. Among his writings are (Seven Sermons5 (1749); (Discourse concerning Unlimited Sub¬ mission and Non-resistance to the Higher Pow¬ ers5 (1750), and (Sermons5 (1756). Consult the (Memoir5 by Bradford (Boston 1838) ; Tyler, (History of American Literature.5

MAYHEW, Thomas, American colonial governor: b. England, 1592; d. Martha's Vine¬ yard, Mass., 25 March 1682. Prior to his emigration to New England in 1631 he had been a merchant in Southampton. He settled first at Watertown, Mass., and in 1641 secured from the agent of Lord Stirling a grant of the larger part of the island of Martha's Vineyard and the title of governor. With his son Thomas he labored to convert the Indians of the island so successfully that during King Philip's War the island Indians protected the white settlers. He founded Edgartown in 1647, and after the death of his son and grandson continued their minis¬ try and organized an Indian church. Consult Banks, C. E., (The History of Martha's Vine¬ yard5 (Boston 1911).

MAYNARD, ma'nard, Charles Johnson,

American naturalist: b. West Newton. Mass., 6 May 1845. He had a common school educa¬ tion, worked on a farm and devoted himself to natural history as a boy. He is well known as an ornithologist, discovered the bittern's vocal organs and in 1875 was elected vice-president of the Nuttall Ornithological Club, in connec-

tion with which he founded and edited The A uttall Bulletin. As a conchologist he studied the genus Cerion of West Indian shells. He also made important additions to the knowledge of American butterflies. Maynard wrote Nat¬ uralists' Guide) ; (Butterflies of New England) ; (Birds of Eastern North America*; Nutter-flies of New England* ; (Eggs of North Ameri¬ can Birds* ; Contributions to Science* (3 v°ls.) ; Sahama Fruit Finch*; (Manual of North American Butterflies* ; Sparrows and Finches of New England* ; Nature Studies* (No. 2, (< Sponges**) ; (Warblers of New Eng¬ land* ; (Monograph of the Genus Cerion*; (Manual of Taxidermy*; 'Methods in Moss Study*; /Birds of Eastern Massachusetts* ; (Field Dictionary to the Birds of Eastern North America* ; (Atlas to the Directory of the Birds of Eastern North America* ; 'Dawn in New England*; (Records of Walks and Talks with Nature* (8 vols.) ; (Field Ornithology* ; 'Plates to Field Ornithology* ; 'Migration of Birds and other Animals,* and scattering arti¬ cles in various magazines, *etc.*

MAYNARD, Edward, American inventor : b. Madison, N. J., 26 April 1813; d. Washing¬ ton, D. C., 4 May 1891. He entered West Point in 1831; resigned because of ill-health in 1832; studied dentistry and practised in Washington from 1836 to 1890. He invented new dental tools, discovered in 1846 the diversity of the maxillary antra, introduced the method of fill¬ ing cavities with gold foil, taught dentistry in the Baltimore College of Dental Surgery and in the National University at Washington, and practised successfully in Europe. His great fame was due to his invention of small arms and new priming methods which superseded percussion caps. He patented a breech-loading rifle in 1851; a method of converting muzzle-loaders to breech-loaders in 1860; a plan to join two barrels so that contraction and ex¬ pansion in either would be independent of the other, in 1868, and in 1886 a registering de¬ vice showing the number of cartridges in a magazine rifle. His rifle was adopted by the United States, and brought him decorations from the governments of Belgium, Prussia and Sweden.

MAYNARD, George Willoughby, Amer¬ ican artist: b. Washington, D. C., 5 March 1843. He studied at the New York Academy of Design and later became a pupil of Van Terins and De Keyser at the Belgian Royal Academy, Antwerp. He had a studio in Paris in 1878, but later located

in New York. He is a National Academician and librarian of the National Academy of Design, member of the Society of American Artists, the American Water Color Society and ex-president and hon¬ orary member .of the Salmagundi Club. May¬ nard's decorative work may be seen in the Con¬ gressional Library, Washington, D. C., the Bijou Theatre, Boston, the ceiling of the Met¬ ropolitan Opera House, New York, the Essex County Courthouse, Newark, N. j., and the Appellate Court, New York. His principal canvases are (Vespers at Antwerp*; (1776*; 'Venetian Court* ; (Ancient Mariner* (1883) ; 'Strange Gpds* (1904) ; (01d and Rare* ; 'Grandfatherly Advice* ; (A Musician* ; Nocks at Ogunquit* (1912) ; (Flood Tide* (1912). He is represented in the Metropolitan Museum, New York; the Providence Museum,

the Corcoran Gallery, Washington, and the Pennsylvania Academy.

MAYNARD, Horace, American politician : b. Westboro, Mass, 30 Aug. 1815; d. Knox¬ ville, Tenn., 3 May 1882. He was graduated from Amherst College in 1838; and became in¬ structor, and later professor, in East Tennes¬ see College, Knoxville, Tenn. He studied law, was admitted to the bar in 1844 and built up a successful practice. In 1857 he was nomi¬ nated for member of Congress by the Know-Nothing party, and elected. On the outbreak of the Civil War he declared his loyalty to the Union and took an active part in the unsuc¬ cessful attempt to keep Tennessee from seced¬ ing; on this account he suffered persecution and heavy loss of property during the war. When the Union forces occupied his State in 1864 he was made attorney-general. In 1866-75 he was again member of Congress, being representative-at-large for his State in the last two years. In 1875-80 he was appointed Min¬ ister to Turkey, and in 1880 Postmaster-Gen¬ eral in President Hayes' Cabinet, holding the office till 4 March 1881.

MAYNARD, Mass., town of Middlesex County, 25 miles northwest of Boston, on the Boston and Maine Railroad and the Assabet River. It contains woolen mills. The town owns the -water-supply system. Pop. (1920) 7,086.

MAYNOOTH, ma-nooth', Ireland, a mar¬ ket-town of County Kildare, 15 miles west by north of Dublin. Its modern celebrity is de¬ rived from the well-known Roman Catholic college of Saint Patrick (q.v.). Maynooth is of historic interest as the seat of the powerful Geraldines, and has ruins of their castle, built 1176 and enlarged in 1426. Several battles with the English occurred here, including the re¬ bellion of

Silken Thomas in the reign of Henry VIII, and the war of the Confederates (1641— 50). Pop. about 886.

MAYNOOTH COLLEGE. See Saint Patrick's College.

MAYO, mao, Amory Dwight, American Unitarian clergyman and educator: b. Warwick, Franklin County, Mass., 31 Jan. 1823; d. 8 April 1907. He was graduated from Amherst, and taught in the public schools in Massachusetts 1839-44. In 1846 he became the minister of the Universalist Church at Gloucester, Mass., and later held Universalist pastorates at Cleveland, Ohio (1854—56), and at Albany, N. Y. (1856-63). He then entered the Unitarian ministry, and was pastor at Cincinnati, Ohio (1863-72), and at Springfield, Mass. (1872-80). He was long prominent as an educator, was an efficient and active member of the boards of education, in Cincinnati and Springfield, and was connected with the Meadville (Pa.) Theological School as lecturer and professor from 1868-98. After 1880 he devoted his attention chiefly to the ad¬ vancement of education in the South, lectur¬ ing frequently in many different States. He was the chief editorial writer for the New England and National Journal of Education, and published 'The Moral Argument for Universalism* ; (Graces and Powers of the Chris¬ tian Life) (1852) ; Niographv and Collected Writings of Mrs. S. C. E. Mayo* ; (Symbols of the Capitol, of Civilization in New York* (1859) ; 'Talks with Teachers* (1885) ; South¬ ern Women in the Recent Educational Move-468

ment in the South) (1892), and (Histofy of the American Common School. >

MAYO, Charles Horace, American sur¬ geon: b. Rochester, Minn., 19 July 1865. He was educated at the Rochester High School, Northwestern University, and in 1888 was grad¬ uated in medicine at the Chicago Medical Col¬ lege. In the same year he entered on the prac¬ tice of medicine at Rochester, where he has since resided. He has received the following honorary degrees: A.M., Northwestern Univer¬ sity, 1902; LL.D., University of Maryland, 1909; F.A.C.S., American College of Surgeons, 1913; LL.D., Kenyon College, 1916; D.Sc., Princeton University, 1917. Dr. Mayo is surgeon to the Mayo Clinic of Saint Mary's Hospital, Roches¬ ter, Minn. ; to the Mayo Foundation, University of Minnesota, where he has been professor of surgery since 1915. In 1913 he was commis¬ sioned first lieutenant in the Medical Reserve Corps, United States Army; was appointed major in 1917, and colonel in the same corps in 1918. In the same year he was made asso¬ ciate chief consultant of the United States Army Medical Department for Surgical Services. He is also consulting surgeon of the Chicago and Northwestern Railway and of the Chicago Great Western Railway. Dr. Mayo is a member of the American Medical Association, of which he was president in 1916-17 and chairman of the section on surgery in 1910; of the American Surgical Association; of the Association of Military Surgeons of the United States; of the Clinical Congress of the American College of Surgeons (president in 1914-15) ; of the Minne¬ sota State Medical Society, of which he was president in 1905 ; of the Society of Clinical Surgery; of the Southern Surgical and Gyne¬ cological Society; of the Western Surgical and Gynecological Society, of which he was presi¬ dent in 1904-05; of the Council of National Defense Medical Board; of the National Medi¬ cal Museum; of the. Minnesota Pathological Society; of the American Association of Rail¬ way Surgeons ; of the American Association for the Advancement of Science; etc.; *etc.* In 1908-09 he was president of the section on surgery of the International Congress on Tuber¬ culosis. In 1915, with his brother, W. J. Mayo (q.v.), he donated $1,500,000 to establish the Mayo Foundation for Medical Education and Research at Rochester, in affiliation with the University of Minnesota.

MAYO, Frank, American actor: b. Boston, 19 April 1839; d. 8 June

1896. His first ap¬ pearance on the stage was at the American Theatre in San Francisco, and he was for sev¬ eral years the leading actor on the Pacific coast. In August 1865 he appeared in Boston as Badger in (The Streets of New York) with great success, and though he played Shake¬ spearian and other roles acceptably, notably Othello, Hamlet and Ferdinand, became best known in his character of Davy Crockett, first played by him in Rochester, N. Y., in 1872, and thereafter almost exclusively by him till 1884. In later years he played in his own drama of ˆordeclO and in a stage version of (Pudd'n-head Wilson. >

MAYO, Henry Thomas, American naval officer: b. Burlington, Vt., 8 Dec. 1856. In 1876 he was graduated at the United States Naval Academy; was advanced through various grades

and promoted rear-admiral 15 June 1913. In 1915 he was made vice-admiral and in 1917 was promoted admiral. He served on various ves¬ sels of the United States navy, also on both naval and coast survey; was commandant of the Mare Island navy yard in 1911-13; served as aide for personnel at the Navy Department, Washington, in 1913, and on 18 December of that year was made commander of the fourth division of the Atlantic fleet. In 1915 he com¬ manded the battleship squadrons of the Atlan¬ tic fleet and two years later became commander-in-chief of that fleet and hoisted his flag on the Pennsylvania. Admiral Mayo demanded an apology from the Mexican commander at Tam¬ pico and the firing of a national salute of 21 guns to the United States flag, to make amends for arrest of paymaster and crew of the dis¬ patch boat Dolphin at a wharf while loading gasoline into whaleboat on 9 April 1914. The admiral's action was commended and approved by the government at Washington, and the occupation of Vera Cruz later in the same month was one result of the flag incident. See Mexico, Diplomatic Relations with.

MAYO, William James, American sur¬ geon : b. Le Sueur, Minn., 29 June 1861. He is a brother of Charles Horace Mayo (q.v.), was educated at Rochester High School and Niles Academy and received his professional training at the University of Michigan, where he was graduated in 1883. Thereafter he prac¬ tised in Rochester, Minn., as surgeon to Saint Mary's Hospital. He became first lieutenant of the Medical Reserve Corps of the United States army in 1913. With his brother he established the Mayo Foundation for Medical Education and Research at Rochester in 1915. He is regent to the University of Minnesota, was president of the State Medical Society in 1895-96, of the American Medical Association in 1905-06, of the American

Surgical Associa¬ tion in 1913-14, and of the Society of Clinical Surgery, 1911-12. He is also a member of the American College of Surgeons, of the Clinical Congress of Surgeons of North America, of the Academie de Medicine de Paris (corre¬ sponding secretary), of the Societe de Chirurgie de Paris, of the Royal College of England and Scotland. He has received honors from all the principal universities as follows: M.D., University of Michigan, 1883; A.M., University of Michigan, 1889; LL.D., University of To¬ ronto (1906), LTniversity of Maryland (1907), University of Pennsylvania (1912) ; D.Sc., Uni¬ versity of Michigan (1908) and Columbia Uni¬ versity (1910). He is a Fellow of the Royal College of Surgeons of England since 1913, of Scotland since 1905 and of the American Col¬ lege of Surgeons since 1913. He is widely known for his numerous successful operations in cases of gallstones, cancer and diseases of the intestinal tract.

MAYO, William Starbuck, American nov¬ elist : b. Ogdensburg, N. Y., 20 April 1812 ; d. New York. 22 Nov. 1895. His parents had removed to Ogdensburg in the year of his birth. He studied in his native place and in Potsdam Academy and in 1833 was graduated at the College of Physicians and Surgeons, New York. After practising his profession for sev¬ eral years in Ogdensburg he was forced to abandon it owing to ill health. He visited Spain, made a tour in the Barbary States and

then took up his residence in New York City, where he gave his entire attention to literature. He is the author of (Flood and Field, or Tales of Battles on Sea and Land5 (1844) ; (Kaloolah, or Journeys to the Djebel Kumri,5 purporting to be the autobiography of Jonathan Romer and describing his marvelous adventures in Africa (1849); (The Berber, or the Moun¬ taineer of the Atlas, 5 similar to the preceding (1850) ; (Romance Dust from the Historic

Places,5 a collection of short tales, founded on historical incidents (1851); (Never Again,5 a novel (1872).

MAYO, mi'o, a tribe of Mexican Indians of the Piman family, located on the banks of the Mayo River in southern Sonora. Their allies and

northern neighbors are the Yaquis and their habits and language, the latter known as Cahita, are almost identical. They are a peaceful, agricultural people and are thoroughly Mexicanized. They number perhaps 6,000.

MAYO-SMITH, ma‘6-smith’, Richmond, American political economist: b. Troy, Ohio, 9 Feb. 1854; d. New York City, 11 Nov. 1901. He was graduated from Amherst College in 1875 and studied in Germany for two years at the universities of Berlin and Heidelberg. From 1877 he was connected with Columbia University, first as assistant in-history and political science, then as adjunct professor (1878-83) and professor of political economy and social science (1883-1901) . He was also one of the faculty of the graduate School of Political Science, established in 1880, and his chief work as teacher was done in this school. His specialty was statistics, on which he was a recognized authority. He was an honorary Fellow of the Royal Statistical So¬ ciety of Great Britain, a member of the Inter¬ national Statistical Institution and of the Amer¬ ican Statistical Association, being vice-president of the latter; he was also a member of the National Academy of Science and of the Amer¬ ican Economic Association, of which he was one of the founders. He was editor of the Political Science Quarterly from 1886, and pub¬ lished Emigration and Immigration5 (1890) ; Statistics and Sociology5 (1895) ; and Statis¬ tics and Economics5 (1899).

MAYON, ma-yon’, a volcano of the Philip¬ pines situated in the northern part of the prov¬ ince of Albay, Luzon, height, 8,274. feet. It rises from a broad plain about six miles from Albay Gulf and forms a perfect cone; its sum¬ mit is surrounded by vapor, which at night has a fiery glow. Its sides, almost at the top, are covered with grass or moss, and the ascent, though it has been made, is difficult. Near the summit there are fissures which emit sulphurous gases and steam, and there were several erup¬ tions during the 19th century, the town of Cagsaua at the foot of the mountain being en¬ tirely destroyed in 1814. Great quantities of lava and ashes were belched forth in the last eruption (1897).

MAYONNAISE, ma-6n-az’, a thick cold dressing for salads, cold meat, poultry, fish, vegetables, etc., made of the yolks of eggs, salad oil and vinegar, with a little salt and pepper; it is sometimes colored red with powdered lobster shell or green with spinach or parsley.

MAYOR. See Cities, American, Govern¬ ment of; City Manager Plan of

Govern¬ ment; Executive.

MAYOR OF ZALAMEA, The UEl Al¬ calde de Zalamea5). Two Spanish plays bear this title, the first by Lope de Vega (1562-1635), the second, an adaptation, by Calderon de la Barca (1600-81). The superiority of the adaptation over the original is admitted by all critics. A comparison of the two works is somewhat unfair to Lope de Vega, because his play is one of his least worthy productions. He reveals, indeed, his characteristic spontane¬ ity, but fails to seize resolutely upon the dramatic possibilities of his story, preferring for some reason to narrate events in their chrono¬ logical sequence. Calderon studies the dramatic situations more carefully and by discarding ir-relevancies, reducing the number of personages and sharpening the features of those retained, produces a masterpiece. To his predecessor he owes his plot, the dramatic conflict, the prin¬ cipal personages and a few lines which he transfers to his play unaltered. The most striking difference between the two pieces is the character of Isabella, daughter of the mayor (or magistrate). In Lope's play there are two daughters, both flirtatious to the last degree. So little control has the father over them, that when he is appointed magistrate, he asks pa¬ thetically, ((How can a father who fails to rule at home, govern a town?55 The fate of the daughters at the hands of dissolute soldiers does not surprise the spectator, and the penalty of death imposed upon the seducers hardly seems justified. Calderon corrects this defect, and in Isabella, who replaces Leonora and Agnes, he presents a modest young woman, the unhappy victim of a crime which she strives in vain to prevent. Her soliloquy after she has been wronged is pathetic and poignant, and is one of the best passages in the play (Act II, scene i). Among other excellent scenes may be noted the magistrate's farewell to his son, in which shrewd advice and good feeling are happily blended (Act II, scene xxi), and the prolonged struggle between the magistrate and the gouty, blustering, irascible, old soldier, Lope de Figueroa (Act III, scene xv). King Philip II, who appears suddenly at the close of the play, sets his seal of approval upon the action of the father-magistrate in avenging the wrong done to his daughter and thus vindicates the triumph of justice and local autonomy (a pre¬ cious privilege to Spaniards) over the lawless¬ ness of undisciplined soldiery. The events nar¬ rated by the two dramatists are so circumstan¬ tial that it is assumed that they are based on a real incident in the march of Philip II into Portugal (1580), when the Tercio de Flandes, a famous regiment commanded by Lope de Figueroa, passed through Zalamea, a small town in Estremadura. Krenkel published both plays with valuable notes in (Klassische Biihnen-dichtungen der Spanier5 (Vol. Ill, Leipzig 1887). Consult also

Menendez y Pelayo's edi¬ tion in (Obras de Lope de Vega5 (Vol. XII, 1902), and (Select Plavs of Calderon5 (ed. Maccoll, London and New York 1888).

Milton A. Buchanan.

MAYORUNA, South American Indian tribe of Panoan stock. Their country lies south of the Maranon and between the Ucoyali and

Javari rivers, in eastern Peru. They are no¬ madic, are tall and well formed, go entirely naked and live by hunting. The hair is cut away from the forehead but is allowed to fall down the back. Some have fair skin and beard attributed with some degree of probability to an admixture of white blood through Spanish captives. The tribe is savage and wages con¬ stant war with the whites and with other In¬ dian tribes. Spears, clubs and blowpipes are their war weapons. The blowpipe, from which a poisoned dart is thrown a considerable dis¬ tance, is their most formidable and dangerous weapons.

MAYOTTA, ma-yot'ta, or MAYOTTE,

ma-yot'. See Comoro Islands.

MAYOW, mao, or MAYO, John, English

physiologist and chemist, the first to attack the theory of phlogiston : b. London, May 1643 ; d. there, October 1679. He was of a Cornish fam¬ ily; entered Wadham College, Oxford, in 1658; became a scholar there in 1659; and was elected a Fellow of All Souls in 1660. He was gradu¬ ated in 1665; studied medicine; practised in Bath ; and in 1678 was elected to the Royal Society. His Latin tract on the respiration appeared in 1668 ; it urged that the heart was a mere muscle, that breathing is simply to give the nitroaerian constituent (oxygen) to the blood and that this constituent is necessary to life. In 1674 he published (Tractatus Quinque,* summarizing and completing his theory; in this work he showed that ˆfire-air,® (<nitre air® or

ˆaerial spirit,® as he styled oxygen, is contained in all acids and is necessary to combustion and respiration, which are therefore analogous. The (Tractatus Quinque) was republished in 1681 as (Opera Omnia Medica Physical In 1684 a Dutch translation appeared; in 1799 a German, and French and English translations in 1840 and 1907, respectively.

MAYOYAOS, ma-yo-ya'c, a native tribe of the island of Luzon, Philippines, living in the southwestern part of the province of Isabela and in the northwestern angle of the province of Nueva Vizcaya. They are a head-hunting tribe of Malay race; and of the Ifugao linguistic stock.

MAY.SVILLE, maz'vil, Ky., city and county-seat of Mason County, on the Ohio River and on the Louisville and Nashville and the Chesapeake and Ohio railroads, about 63 miles southeast of Cincinnati. The first settle¬ ment was made about 1782, and in 1787 it was incorporated by the legislature of Virginia. In 1833 it was granted a city charter ard in 1848 became the. county-seat. It is in a rich agri¬ cultural region and its facilities for transporta¬ tion give it considerable commercial import¬ ance. Its chief manufacturing establishments are flour and lumber mills, foundries, distilleries, cotton mills, plow and pulley works, boot and shoe factories, tobacco, furniture and pressed brick. Some of the prominent buildings are the Masonic Temple, the Odd Fellows' Temple, the post office,. Wilson Memorial Hospital, the County Historical Association Building and the Maysville and Mason County Public Library. The library organization was established in 1878. The government of the city is vested in a mayor, who holds office four years, and a council. Pop. 6,141.

MAYWOOD, Ill., village in Cook County, 10 miles west of Chicago, situated on the Des Plaines River and on the Chicago Great West¬ ern, the Chicago and Northwestern and other railroads. It is the seat of the Chicago Theo¬ logical Seminary, the German Lutheran Theo¬ logical Seminary, the Logan Home, the Baptist Old People's Home, the Kittie Smith Home for Crippled Children and Library Hall. May-wood's industrial establishments manufacture tin plate, cans, etc., and lithograph products. The village owns the water-supplv system. Pop, (1920) 12,072.

MAZARIN, Jules, or GIULIO MAZA-RINI, French cardinal and minister of Louis XIII, Anne of Austria and Louis XIV : b. Pis¬ cina, in the Abruzzi, Italy, 14 July 1602; d. Vincennes, 9 March 1661. He came of

a Si¬ cilian family, his father being intendant of Philip Colonna. The first part of his life was spent in reaching out for power and the second part in maintaining that power. Young Mazarin first attempted fortune in a military career. After brilliant studies under the direc¬ tion of the Jesuits at Rome and afterward at the universities of Alcala and Madrid, he en¬ tered the papal military service as captain of infantry in 1625. His talents, however, lay in diplomacy to which he soon turned and wherein he distinguished himself by his ability. He was rewarded for his servic.es by being made vice¬ legate to Avignon, in 1634, and as nuncio at Paris, in 1634-36. At Paris he gained the favor of Richelieu, who persuaded him to enter the service of France, which he did in 1640. He became a naturalized citizen of France; was made a cardinal (although not a priest) in recognition of his diplomatic services in Savoy ; and in 1642 was designated by Richelieu as his successor. On the death of Louis XIII the queen, Anne of Austria, became regent for her young son, Louis XIV, and it was thought that Mazarin would be dismissed, but instead he gained over the queen-regent, to whom he be¬ came bound by mutual ties of affection, and perhaps by a secret marriage. By her he was confirmed in the office of Prime Minister, in May 1643, and this office he continued to oc¬ cupy, with the exception of two brief periods of exile, until his death. His activities were first directed toward the Cabale des Importants, which he soon suppressed, and to the prosecution of the Thirty Years' War. The war was carried on with success due mostly to the soldierly qualities and ability of Turenne and Conde. The victories of Rocroi, Fribourg, Nordlingen and Lens and the revolt at Naples forced the German emperor to terms and obliged him to cede Alsace to France by the Treaty of Westphalia, in 1648. While prose¬ cuting these enterprises abroad, Mazarin had unfortunately neglected home affairs and finan¬ cial embarrassments resulted in a general revolt and civil war known to history as the Fronde. The Parliament of Paris denounced the increas¬ ing taxation, while the nobility dreaded the su¬ premacy of Mazarin. . As the immediate result of the conflict Mazarin quitted Paris with the court and' took up his residence at Saint-Ger¬ main, in January 1649. In April he concluded an amnesty with the Parliament, but further opposition developed from the younger mem¬ bers of the aristocracy (petits-maitres) and in

particular from Conde, who had hitherto re¬ mained faithful to the royal authority. With the support of the parliamentarians, Mazarin was enabled to put down the Fronde des princes, imprisoned Conde at Vincennes and crushed the revolt of the latter's friends at Rethel and Guyenne, in 1650. Mazarin's ingratitude to his late allies, the parliamentarians, caused all his adversaries to unite against him and in Feb¬ ruary 1851 he was obliged to go into exile near Cologne. His activity, however, was nowise at an end. He continued to direct the policy of Anne of Austria from his exile and, in Septem¬ ber, rejoined the court at Poitiers, and soon afterward was about to enter Paris with it when he saw that his presence was an obstacle to the young king's entry to the capital. He again went into exile, in October 1652, but returned to Paris on 13 Feb. 1653, and through means of intrigue formed a powerful royal party in the state, gained General Turenne to his cause and returned to his position at court.

Untroubled now with troubles from within, Mazarin set about winding up the war with Spain. The outcome of this conflict remained in doubt until 1655, when French victory be¬ came assured through the alliance with Crom¬ well and the help of English soldiers. The Spaniards, beaten at the Dunes, at Dunkirk, threatened in the Netherlands and menaced at home by the capture of Barcelona, were obliged to sue for peace. By the Treaty of the Py¬ renees (1658) the Spaniards lost to France, Roussillon, Artois and parts of the duchy of Luxembourg and of Hainaut. Not satisfied with this splendid result, Mazarin formed, in 1658, the League of the Rhine against Austria and diverted the succession to the throne of Spain by bringing about the marriage of Louis XIV with the Infanta Maria Theresa. With the completion of these projects his career ended. Mazarin was very avaricious, and through every kind of financial dealing amassed the huge fortune of over 50000,000 livres. To the Royal Library he bequeathed his magnifi¬ cent collection of books. He founded the Col¬ lege de Quatre-Nations, later known by his name as the College Mazarin. He has been blamed for the favors shown his family and the project, once entertained by him, of marry¬ ing his niece, Maria Mancini, to Louis XIV. These, however, are but the smaller side of a great character. They cannot make one for¬ get the great political genius who extended the territory of France from the Pyrenees to the Rhine and which extricated her from a danger¬ ous internal crisis. Consult Cheruel, _(Lettres du cardinal Mazarin pendant, son ministere5 (in (Collection de documents inedits sur l'histoire de

France, > Paris 1872-94) : id., (.Histoire de France pendant la minorite de Louis XIV5 (1879-80); id., (Histoire de France sous le ministere de Mazarin) (1883) ; Chantelauze, Portraits historiques5 (1886) ; Cousin, V., (La jeunesse de Mazarin) (1865) ; Hassell, A., Ka¬ zarin5 (1903); Perkins. T. B., 'France under Mazarin5 (New York 1915).

MAZARRON, Spain, town, in the prov¬ ince of Murcia, 18 miles west of Cartagena and about three miles from the Mediterranean coast, with which it is connected by rail. It has flouring mills, soap works and metallurgic factories, and there are copper, iron and lead mines in the nearby mountains. A custom¬

house, barracks, lighthouse and lead works are situated on the coast. The town has a large trade in coal, lead and other ores. Pop. 22,660.

MAZATLAN, ma-sat-lan', Mexico, a town and seaport of Sinaloa, about 183 miles south¬ east of the city of Sinaloa, at the entrance to the Gulf of California, on the Mexican South¬ ern Pacific Railroad. It is built on a hilly crest and has a pleasing appearance. It has a mu¬ nicipal gas system and a street railway. Mazatlan is the chief Pacific port of Mexico and the outlet for the products of the mining dis¬ trict of Saint Sebastian ; it has a considerable import and export trade. Silver, copper, lead, pearls and hides are exported. In 1914 the town was besieged by the Constitutionalists and taken after many months. A consul of the United States is located here. In normal times the exports amount annually to about $4,250,000 and the imports to $2,500,000.

M AZD AK, maz'dak, Persian religious leader: b. Persepolis, about 470 a.d. ; d. Nahr-van, between 530 and 540. He was a chief priest at Nishapur, and in 500 proclaimed him¬ self a prophet. He preached the equality of man, the abolition of property rights and free love, abstinence from animal foods and the simple life generally. He converted King Kobad to his views, which forthwith became law, but a rising of the nobles ousted Kobad for three years, and on his return he abjured Mazdak and his doctrine. Khosru Nashirvan put him to death. Consult Browne, E. G., 'Literary History of Persia5 (London 1909).

MAZE, Hippolyte, e-po-let maz, French historian: b. Arras, 5 Nov. 1839; d. Paris, 25 Oct. 1891. He studied at the Ecole Normale Superieure; taught there and at the Lycee Fontanes; was elected prefect of Landes in 1870, deputy in 1879 and 1881 and senator in

1886. He wrote (The Republic of the United States: Its Foundation5 (1869) ; (The End of the Rev¬ olution5 (1872) ; ‘Hoche in Vendee5 (1882) ; (The Struggle against Want5 (1883) ; (Gen¬ eral Marceau5 (1889), and ‘The Generals of the Republic5 (1889).

MAZEPPA, ma-zep’a, Ivan Stepanovitch,

or John, hetman of the Cossacks : b. Podolia, about 1645; d. Bender, Bessarabia, 1710. He was page to John Casimir, king of Poland, who was a patron of the arts and of literature, and he had therefore an opportunity of ac¬ quiring various useful accomplishments. A Polish nobleman having surprised Mazeppa with his wife bound him naked upon his own horse and committed him to his fate. The horse carried him to his own residence. Shame made him flee to the Ukraine and join the Cossacks, whose warlike roving life suited his disposition. He made himself conspicuous by his dexterity, bodily strength and courage. His knowledge and sagacity procured him the post of secretary to the hetman Samilovitch, and in 1689 he overthrew Samilovitch and himself became hetman. He gained the confidence of Peter the Great, who loaded him with honors and he was finally made Prince of the Ukraine. In 1706 he opened negotiations with Charles XII (q.v.) of Sweden for the purpose of free¬ ing himself from Russian dominion, but his treachery was finally revealed to Peter, and he was obliged openly to declare for Charles. After the defeat of Pultowa in 1709 Mazeppa

fled to Bender. Peter tried to have the sultan extradite him, but failed despite an offer of 300,000 ducats for the favor. Lord Byron has made Mazeppa the hero of a poem (1818) and Liszt of a symphony.

MAZURKA, a lively Polish national dance, popular also in the United States. The move¬ ments are of a grotesque character. The term is also applied to the music which accompanies the dance, sometimes in three-eighths time, but for the most part in three-fourths. The mazurka is danced by four or eight couples. Augustus III brought the mazurka to Germany, whence it was learned by the French and finally about

the middle of the 19th century it ac¬ quired considerable popularity in England. The music of the dance has taken its modern form from Chopin.

MAZZINI, Giuseppe, Italian patriot: b. Genoa, 22 June 1805; d. Pisa, 10 March 1872. He studied law at the University of Genoa and practised his profession for a time, but the strong Liberal opinions he had imbibed as a child and his conviction that the oppressed con¬ dition of his country under Austrian rule called for men of action and public spirit, and that a noble course lay open before anyone who would give himself up, heart and soul, to the work of reforming her, led him to devote him¬ self to a political career. In his ardent aspira¬ tions for the national unity of Italy, it seemed to him that her deliverance from foreign tyranny was to be achieved only by a return to the republican glories of ancient times. His pa¬ triotic enthusiasm in this direction was fostered by his early studies, which developed in him a passionate idea of the glories of a republic, and by the success which he had achieved in literature while still little more than a youth. In 1827 appeared his maiden essay, <Dell' Amor Patrio di Dante, > which was published in a Liberal journal, the Subalpino. This led him to contribute under the mask of literary crit¬ iques other historical, philosophical and critical papers to the Antologia of Florence and the Indicatore Genovese. But the authorities, per¬ ceiving that the periodical literature of Italy was becoming far too strongly tainted with ad¬ vanced Liberal opinions, suppressed these jour¬ nals, and hoped, no doubt, thereby to have silenced their writers also. About 1830 Mazzini became an active member of the Carbonari, and this affiliation was the introductory step to his subsequent political life; he was active, able, bold and impetuous, and he soon rose into a position which gave him great influence in the councils of that secret society. While on a mission for the society he was betrayed by a Piedmontese spy, arrested and detained for six months as a prisoner in the fortress of Savona. On his release he went to Marseilles, France, to escape the police surveillance imposed on him in Italy. Here he organized the society of La Giovine Italia (Young Italy), and estab¬ lished under that same title a journal to advo¬ cate his views ; the purpose of the society was to liberate Italy and establish a national gov¬ ernment, Mazzini desiring a republic. It was about this time, too, t-hat he addressed to Charles Albert of Sardinia the celebrated letter which drew down on him a sentence of perpetual banishment from his native country. He took active part in the organization of an

insurrection of which Genoa was to be the centre, but the plot was discovered and failed. For his share in it Mazzini was sentenced to death in the Sardinian courts. He then went to Switzerland, where he organized another conspiracy for the invasion of Savoy (1834), which also failed. In 1837 he quitted Switzer¬ land and took up his abode in London, where he kept in correspondence with the revolution¬ ary leaders on the Continent, was recognized as the head of the Young Italy party, and in¬ stigated several insurrections, which were un¬ successful. t After the insurrection in Milan in 1848 he again Went to Italy, was chosen a mem¬ ber of the Tuscan provisional government in February 1849, and in the following month, when Rome was proclaimed a republic, he was chosen first of the triumvirs. He was the main¬ spring of the defense of Rome against the French, and on the surrender of that city in June Mazzini escaped to Lausanne, Switzer¬ land. At this time he addressed to M. de Tocqueville and other French statesmen some most bitter and reproachful letters on the high¬ handed policy pursued by France. Finding his continental residence too hot for him he re¬ turned to London, not, however, with any idea of abandoning his long-cherished hopes for Italian unity. Later he had a hand in the un¬ successful uprisings at Mantua (1852), in Milan (1853) and in Piedmont (1857), being in Italy for a short time in 1857. He assisted also in organizing the expeditions led by Garibaldi in 1860, 1862 and 1867. An ardent Republican, he refused to take his seat in the Italian Parlia¬ ment under the monarchy, though repeatedly elected from Messina, as a protest against the uncanceled sentence of death against him. In 1866 this sentence was formally rescinded ; in 1868 he suffered from a serious illness, the effects of which left him in impaired health. In 1870 he was arrested at Gaeta under charge of conspiracy with Garibaldi and imprisoned for two months, being released after the occu¬ pation of Rome by the Italians. He was ac¬ corded a public funeral by the Italian govern¬ ment.

Mazzini was a copious writer. A perfect master not only of Italian, but of French and of English literature; he was an able com¬ mentator of Dante, the author of works on philosophy and a constant contributor to some of the most delightful periodical literature in Paris and in London. He would turn from the warfare of politics to write in his Apos-tolato Popolari for the benefit of Italian work¬ men sermons (On the Duties of Man.> He analyzed in masterly fashion the faults and shortcomings of the economic and socialist schools. Though his actions were some¬ times politically indiscreet, he was a man of attractive character and strong personal magnetism, distinguished throughout his career for disinterested, patriotism and the highest moral standards of conduct. He was interested in the labor movement,

organized a workingmen's association in London in 1840 and was for a time connected with the International Working¬ men's Association (q.v.), but withdrew from that society when it declared for Socialism. During his later life especially his efforts were directed toward separating republicanism from both Socialism and atheism. No man won so many admirers as Mazzini and yet secured so

few friends. There was hardly a human being whom long familiarity had not estranged from Mazzini. With manners consummately affable and courteous he combined an over¬ weening conceit and a narrowness and bigotry of view which hardly tolerated independent minds. He was a lonely genius, all apart from the common ways of other mortals, spurning the suggestions of the plainest common sense, professing to do all for his fellow-beings, yet nothing with them or by their aid. He gave up the idea of ever being a prophet in his own country in his own age ; his only trust was in a coming generation, where the germ of his idea could alone attain full development. The best edition of his works' is < Scritti Editi ed Inediti5 (18 vols., Milan 1861-91) ; a partial collection is published under the title (Life and Writings of Joseph Mazzini 5 (1891). His letters have been published in English (6 vols., London 1890-91). Consult (Memoir of Joseph Mazzini5 (1877), containing his two essays (Thoughts on Democracy in Europe, 5 and (On the Duties of Man5 ; Linton, W. J., (Recollections of Maz¬ zini5 (1892) ; Marriott, (Makers of Modern Italy) (1889) ; MacCunn, J., (Six Radical Thinkers5 (London 1907) ; Holland, R. S., (Builders of United Italy5 (New York 1908) ; Cambridge Modern History5 (Vol. XI, ib. 1909) ; King, Bolton, (Life of Mazzini5 (new ed., ib. 1912) ; King, H. E. B., (Letters and Recollections of Mazzini5 (London 1912) ; Thayer, (The Dawn of Italian Independence5 (1893) ; Martinengo-Cesaresco, (Italian Char¬ acters.5

MAZZOLA, mat-so'la, or MAZZUOLI, mat-soo-6'la, Francesco, Italian painter, known from his birthplace as II Parmigiano: b. Parma, 11 Jan. 1503; d. Casalmaggiore, 24 Aug. 1540. His father and two uncles were painters, and to them and to Correggio, who was in Parma in 1521, he

owed his earlier training. Correggio's manner he caught so well that his (Cupid Fashioning a Bow5 was long and gen¬ erally attributed to Correggio. When 20 he went to Rome and there imitated Raphael and Michelangelo. In 1527, upon the capture of Rome by Charles V, his losses were great and he had to escape from the city. He returned to Parma, lost his health, was imprisoned by the city authorities for failure to complete a commission which had been paid for in ad¬ vance, and upon his release fled to Casalmag¬ giore, failing to live up to his promise to re¬ pay. His paintings are to be found in most of the galleries of Europe; mention should be made of the (Madonna with St. Margaret,5 in the Bologna Gallery; (Madonna del Coho Lungo,5 Pitti Palace, Florence; Annunci¬ ation,5 Ambrosian Library, Milan; various por¬ traits in the Naples Museum; several sacred subjects, notably <Madonne5 in the Dresden Gallery and in the Louvre ; and the great fres¬ coes in the church of Saint John, Parma. More important, though less well known, are Mazzola's etchings, since he introduced etching into Italy. His drawing is correct, and his work bold, fiery and graceful.

MAZZONI, Guido, gwe'dd mat-so'ne, Italian scholar and poet: b. Florence, 12 June 1859. He was educated at Florence, Leghorn and Bologna, in 1881 became instructor in Italian literature in secondary schools and in

1887 professor of Italian literature at Padua. After 1894 he was professor of the Italian lan¬ guage and literature at the Institute of Flor¬ ence. His poetic work has been to some ex¬ tent influenced by his familiarity with English literature and largely by his countryman Car-ducci. Besides contributions to reviews, he wrote (Epigrammi di Meleagro da Cadora5 (1880); (In Biblioteca5 (1882) ; (Esperimenti metrici5 (1882) ; (Un Ritratto di Gesu5 (1887) ; (Rassegne litterarie5 (1887) ; (Fra Libri et Carte5 (1887), and other works, including a scholarly history of Italian literature in the last century.

MEAD, Edwin Doak, American author and lecturer: b. Chesterfield, N. H., 29 Sept. 1849. His early life was spent on his father's farm, and in 1866 he entered the publishing house of Ticknor and Fields, Boston. He studied in English and German universities 1875-79, and has since engaged in lecturing and writing. In 1889 he was associate editor of the New England Magazine with Edward Everett Hale, the chief editor, 1890-1901. He is connected with numerous historical and so¬ cial clubs. For 25 years he was director of The Old South Historical Works ; edited 200 Old South leaflets widely used in schools and

colleges, and annually arranged courses of lec¬ tures. For several years he was president of the Massachusetts Good Citizenship Associa¬ tion and Free Religious Association, and for 10 years president of the Twentieth Century Club. He has labored earnestly in the cause of international peace. He is a trustee of the Church Peace Union, endowed by Mr. Carnegie, and was delegate to international peace con¬ gresses at Glasgow, Rouen, Lucerne, Munich and London. He has published (The Philoso¬ phy of Carlyle5 (1881); (Martin Luther: A Study of the Reformation5 (1884) ; (A More Beautiful Public Life5 ; (Organize the World5 ; (The Principles of the Founders5 ; (The In¬ fluence of Emerson.5

MEAD, Larkin Goldsmith, American sculptor: b. Chesterfield, N. H., 3 Jan. 1835; d. 15 Oct. 1910. He was educated in the public schools and studied art in Italy, where in Venice he was a member of the United States consulate. His first work was an ideal figure, (The Recording Angel,5 executed in 1855. He served for a time in the Civil War as illustrator for Harper's Weekly, and after the war his work as a sculptor gave him national prom¬ inence. The statue of Lincoln on the monu¬ ment at Springfield, Ill., is his work, as are the bronze statues of Ethan Allen at the Capitol at Washington and in Montpelier, Vt. The latter city has also his heroic figure (Vermont5 on the State Capitol. He also executed the sol¬ diers' monument at Saint Johnsbury, Vt. ; the Stanford family group for Stanford Univer¬ sity; (The Mississippi River,5 Minneapolis; portraits of W. D Howells, John Hay and Henry James. His work includes many ideal pieces: (The Returned Soldier5; (The Return of Proserpine from the Realm of Pluto5 (ex¬ hibited at the World's Columbian Exposition), *etc.*

MEAD, William Rutherford, American architect: b. Brattleboro, Vt., 20 Aug. 1846. He was graduated from Amherst College in 1867, studied architecture in New York under Rus-

sell Sturgis and in Europe, and upon his re¬ turn to the United States became a member of the prominent New York firm of McKim, Mead and White, which has had charge of many of the most important

public and private buildings in the country. In 1902 he was made a Fellow of the American Institute of Architects, and is a member of the American Academy of Arts and Letters and president of the American Academy, Rome. In 1910 he was chosen mem¬ ber of the National Academy of Design and was awarded a gold medal of honor by the National Institute of Arts and Letters. He is a brother of L. G. Mead (q.v.).

MEAD, or METH, a vinous liquor, used in northern Europe and made of honey and water by means of digestion and fermentation. It also receives an addition of fruit, spices and simples to give it a richer flavor. When new, mead has always a strong taste of honey, but this diminishes as it becomes older. Mead is mixed with the must of apples or with wine, beer and even vinegar, and then takes the name of wine-mead, beer-mead, *etc.* It is one of the oldest of beverages, being known all over Europe within historic times.

MEADE, George Gordon, American sol¬ dier : b. Cadiz, Spain, 31 Dec. 1815; d. Phila¬ delphia, 6 Nov. 1872. In 1835 he was gradu¬ ated from the United States Military Academy and assigned to the 3d Artillery, ‘in 1835-36 served in the Seminole War in Florida, on 26 Oct. 1836 resigned from the army, and in 1836-37 was assistant engineer in the construction of the Alabama, Florida and Georgia Railway. He was later employed in various works of engineering, including surveys of the mouths of the Mississippi and of the northeast boundary between the United States and British North America. On 19 May 1842 re-entered the army as second lieutenant of topographical engineers. He joined Scott’s staff at Corpus Christi, Tex., 14 Sept. 1845, and during the Mexican War participated in the battles of Palo Alto, Mon¬ terey, Resaca de la Palma and the siege of Vera Cruz. After the war he was occupied in light¬ house construction and in the geodetic survey of the Great Lakes (1857-61). He became captain in the corps of engineers in 1856. On 31 Aug. 1861 he was commissioner brigadier-general of volunteers and assigned to the com¬ mand of the 2d brigade of the Pennsylvania reserve corps of the Army of the Potomac, stationed on the right of the lines before Wash¬ ington. He served in the Virginia peninsula campaign and took part in the actions at Mechanicsville (26 June), Gaines’ Mill (27 June) and Frayser’s Farm (30 June). On 18 June he was promoted major of engineers. At Manassas . (second Bull Run) he commanded the 1st brigade of Reynold’s division, and later he took a distinguished part at South Moun¬ tain (14 September) and Antietam (17 Septem¬ ber). In the latter battle, when Hooker was wounded, he was placed in command of the First Corps. For his services he was promoted major-general of volunteers 29 Nov. 1862; and at Fredericksburg (13 December)

commanded the 3d division of the First Corps, with which he broke through Lee's right and pene¬ trated to the position occupied by the Con¬ federate reserves, but for want of support was i compelled to fall back. At Chancellorsville

(2-4 May 1863) he commanded the Fifth Corps. On 28 June 1863 he was appointed commander of the Army of the Potomac, to succeed Hooker. His command was then scat¬ tered, and on the march through Pennsylvania in pursuit of the Confederate invaders. Meade had everything yet to learn of both his own force and the enefny. At Gettysburg on 1-3 July he won the great and decisive battle with which his name is generally associated. (See Gettysburg, Battle of). He received the thanks of Congress and was made brigadier-general, United States army, 3 July 1863. Dur¬ ing the remainder of the war he commanded the Army of the Potomac with conspicuous ability, and on 18 Aug. '1864 became major-general in the regular army. From 1 July 1865 until his death he was commander of the mili¬ tary division of the Atlantic, with the excep¬ tion of the period January 1868-March 1869, when he was in command successively of the Third Military District and the Department of the South. He was a Fellow of the American Academy of Arts and Sciences. A residence was purchased for him by the citizens of Phila¬ delphia, and after his death $100,000 were col¬ lected and given to his heirs. There is an equestrian statue of him by Calden in Fairmount Park, Philadelphia, and one by Bush-Brown on the field of Gettysburg. Consult Bache, R. M., (Life of General G. G. Meade5 (Philadelphia 1897) ; Pennypacker, I. R., Gen¬ eral Meade5 (New York 1901).

MEADE, Richard Kidder, American sol¬ dier: b. Nansemond County, Va., 14 July 1746; d. Frederic, now Clarke, County, after 1800. He was educated in England at Harrow and in private schools. He had returned from Eng¬ land some years before the outbreak of the Revolution, and in 1775 entered the service of the struggling colonies, and distinguished him¬ self in his first battle, that of Great Ridge. Recognition came speedily with an appointment to the staff of General Washington, with whom he remained until the close of the war. The supervision of the execution of Major Andre fell to his lot, a duty which while recognizing the necessity for it, he performed with deep re¬ gret. At the conclusion of the war he re¬ turned to Virginia to engage in the quiet life of the plantation.

MEADE, Richard Worsam, American na¬ val officer: b. New York, 9 Oct. 1837; d. Wash¬ ington, D. C., 4 May 1897. He was a nephew of

Gen. G. G. Meade (q.v.). He entered the navy as midshipman 2 Oct. 1850. His promo¬ tions were lieutenant, 23 Jan. 1858; lieutenant-commander, 16 July 1862; commander, 20 Sept. 1868; captain, 13 March 1880; commodore, 5 May 1892, and rear-admiral, 7 Sept. 1894. On 20 May 1895 he was retired from the service. In 1862-63 as commander of a division he co¬ operated with the land forces of Sherman in subduing the Confederates on the Mississippi. In 1863 he was in command of the marines dur¬ ing the Draft Riots in New York. For a time he was in charge of a department at the naval academy; in 1868 was sent to Alaska and in 1871-73 commanded the Narragansett on the Pacific station. In 1894 he was placed in com¬ mand of the North Atlantic squadron. He was naval representative of the LTnited States at the World's Columbian Exposition, Chicago,

1893. He published (A Treatise on Naval Architecture and Shipbuilding) (1869).

MEADE, William, American Protestant Episcopal bishop: b. near Millwood, Va., 11 Nov. 1789; d. Richmond, Va., 14 March 1862. He was a son of R. K. Meade (q.v.), and was graduated from Princeton College in 1808, studied theology and took orders in the Epis¬ copal ministry in 1811. His first charge was his home parish, which he served gratuitously, and in 1829 he was elected assistant to Bishop Moore. He was in charge of Christ Church in Norfolk, Va., in 1834—36, and in 1841 suc¬ ceeded Bishop Moore as head of the diocese of Virginia. He was one of the founders in 1847 of the (Evangelical Knowledge Society.) He tried to keep Virginia in the Union in 1861, but later entered into the spirit and aims of the Confederacy. He was the author of several works, among which are (Family Prayers) (1834) ; (Reasons for Loving the Episcopal Church } (1852) ; (01d Churches, Ministers and Families of Virginia) (1857) ; (The Bible and the Classics? (1861). Consult the memoir by his coadjutor, John Johns (Baltimore 1867).

MEADOW, Making and Care of. Mead¬ ows may be divided into general groups which will depend upon location, duration and pur¬

pose, and their treatment will vary with each of these factors. Meadows located upon low ground, which may be inundated, or which is constantly moist, usually consist of grasses and other plants which do not thrive so well upon upland fields. Because of their dampness they cannot be treated like dry soils and they are therefore more frequently permanent than tem¬ porary. Further, they are generally better adapted for haying than for grazing, because the grasses that naturally grow upon them are ranker, taller growing species and generally have grown to a considerable height before the land becomes dry enough to turn stock upon it. Except as to season the preparation of lowland meadows is not necessarily different from that of upland.

For best results the land should be deeply plowed as early in the season as soil conditions will permit, and harrowed at intervals of 10 days and after each rain that forms a crust until late summer. The practice will not only destroy weeds and weed seeds, but ensure the quick germination of grass seed sown even in dry weather, the soil being moist close to the surface. The soil may be anything, but prefer¬ ably not sand or clay. If mucky, as in a reclaimed swamp, rolling is frequently ad¬ visable, otherwise generally not. Prior to plow¬ ing liberal applications of good manure or com¬ mercial fertilizers should be made and light annual dressings should also be given, prefer¬ ably in autumn or early spring. Temporary pastures which are intended to last only three or four years should constitute part of a gen¬ eral rotation scheme (see Rotation of Crops) and should be followed by some crop such as corn or potatoes, which can best utilize their products of decomposition. Permanent mead¬ ows should be inspected each spring and the spots which appear to be failing given special attention, such as fertilizing, liming, seeding, etc., to maintain a general good average. When the annual yield of hay falls below two tons the meadow may be considered unprofitable and

should be plowed up and given a change of crop for three or four years. •

In general, timothy or (<herd's-grass® is the most popular grass in America, because it is hardy, long-lived, large, easily cured and its seed inexpensive and likely to be free from weed seed. Orchard grass, tall meadow fescue, red-top, rye-grass and cat-grass are also often used, but are secondary. Blue-grass, which generally appears as a volunteer grass in per¬ manent meadows, is rarely profitable as a hay grass, but is unequaled in the north as a pasture grass. These grasses

may all be sown with a sparsely planted cereal which acts as a ((nurse crop.® But this practice is generally consid¬ ered inexpedient. The admixture of clover, however, is generally highly desirable, since the clovers supply nitrogenous food to the grasses. Alsike clover is considered best for mixing with timothy since it is somewhat later in ripening than the other large clovers, which mature before the timothy can be profitably cut. Consult Wing, Joseph E., (Meadows and Pastures^* (Chicago 1911).

MEADOW-BEAUTY. See Deer-Grass.

MEADOW FESCUE, a fescue-grass (Festuca). See Grasses in the United States.

MEADOW-GRASS. See Blue-Grass.

MEADOW-HEN, the American coot. See Coot.

MEADOW-LARK, or MEDLARK, a

beautiful American starling (Sturnella magna), numerous in eastern United States as far west as the high central plains, where it is replaced by a variety (.S', neglecta) remarkably different in song and some habits. It is about 11 inches long and tail five inches. The body is thick and stout, the legs large, the bill long and straight and the flight powerful. The upper parts are brown, marked with brownish-white, and the exposed portions of the wings and tail with transverse dark-brown bars; the under parts yellow, with a black crescent upon the breast, which is very distinctive as well as a handsome ornament. These birds receive their popular name (<lark® from their terrestrial habits and way of singing in the air, uttering a loud sweet double call while circling upon flut¬ tering wings above the meadow or grain-field where the nest is carefully concealed among the roots of the grasses. The eggs are white, profusely speckled with light red. The western variety has a longer, more vivacious and tune¬ ful song than the eastern bird, and is justly accounted the finest songster of the open re¬ gions of the interior. These birds are migra¬ tory in the northern parts of their range, but most of them remain during the winter in the middle parts of the United States and south¬ ward, and in the autumn are often shot for market, although in most States such shooting is now prohibited by law. In the Southern States it is commonly called ((old-field lark.® The meadow-lark subsists both on insects and on seeds. In winter they often form groups, but in the fine seasons seldom more than two are seen together. Consult Coues, (Birds of the Northwest > (Washington 1874).

MEADOW-MOUSE. See Field-mice,

MEADOW-PINK, or MEADOW-CAM¬ PION, the common cuckoo-flower (q.v.), or ragged robin (Lychnis flos-cuculi). See Lychnis.

MEADOW-RUE, a plant of the crowfoot family and of the genus Thalictrum. These rues are erect perennial herbs, with much di¬ vided leaves and small flowers, usually in loose panicles. The genus contains about 75 species, scattered about the north temperate zone, of which the United States and Canada possess about 15 species. The early meadow-rue (T. dioicum) is a slender, leafy species, of rocky woods, a foot or two in height, whose flowers, purplish and greenish with yellowish anthers, appear in April or May. The purple meadow-rue (T. dasycarpum), common in New Eng¬ land woods, is distinguishable by its size (two to four feet tall), large bright-green, waxy leaves and purplish stem; the flowers form a greenish fleecy bloom. A third large species is the thick-leaved (T. coriaceum) of the South¬ ern States, whose flowers are of different hues, the staminate flowers being white and showy, while the pistillate flowers, borne on separate plants, are purplish. The tall meadow-rue (T . polygamum) towers to a height of 10 feet in favorable situations. All are fertilized mainly by the wind.

MEADOW-SNIPE. See Jack-snipes.

MEADOWSWEET, a well-known hand¬ some European plant (Ulmaria ulmaria) of the rose family. It grows by the sides of streams and in damp places, has pinnate leaves and stems two feet high bearing corymbs of white fragrant flowers. A decoction of it with cop¬ peras is used for dyeing black, and the root has been used as a tonic. It is also called queen of the meadow.

MEADVILLE, med'vil, Pa., city and county-seat of Crawford County, on French Creek and on the Erie and a branch of the Pittsburgh, Bessemer and Lake Erie railroads, about 90 miles north of Pittsburgh and 30 miles south of Erie. The first settlement was made in May 1788 by David Mead and others. It became a borough in 1823 and in 1866

was chartered as a city. It is in a fertile agricul¬ tural region, in the vicinity of extensive oil fields and in the part of the State noted for its iron and steel industries. The chief manu¬ facturing establishments are the Erie Railroad shops, the Phoenix iron works and the Meadville malleable iron works, the Keystone vise works, chocolate chips factory, Barbour silk mills, shoe-button fastener works, silk mills, printing works, confectionery factories, engine works, tool, casting and brass works, chemical works, corset factories and other manufactories. The city has many churches, an academy of music, courthouse, three parks, the county fair grounds, a race-track, iron bridges and several fine wholesale and retail buildings. Its educa¬ tional institutions are the public and parish schools, a high school, the Meadville Theo¬ logical School, opened in 1844 by the Uni¬ tarians; Allegheny College, opened in 1815 by the Methodist Episcopals ; Pennsylvania College of Music, Meadville Business College and a public library. There are the City Hospital and Saint Joseph's Hospital. The three banks have a combined capital of over $350,000. The

government, according to the commission plan adopted in 1913, is vested in a mayor and four councilmen. The electric-light plant and the waterworks are owned and operated by the city. Fop. (1920) 14,568.

MEAFORD, Canada, lake port in Gray County, Ontario, situated on an inlet of Geor¬ gian Bay, Lake Huron, on the Grand Trunk Railway, 20 miles west-northwest of Colling-wood. It has brick yards, grain elevators, fruit evaporating works, flouring mills, tannery, fur¬ niture factory, textile works, foundries, box works, *etc.* It has a good harbor with a depth of 20 /eet. Pop. 3,200.

MEAGHER, ma'her, Thomas Francis,

Irish-American soldier : b. Waterford, Ireland, 3 Aug. 1823; d. near Fort Benton, Mont., 1 July 1867. He was educated at the Jesuit College, Clongowes Wood, Kildare, and at Stonyhurst College (near Preston), England; became one of the principal orators of the Young Ireland party, which aimed at independence through armed revolution ; in 1848 was sent on a mission by the Irish Confederation to the French pro¬ visional government; and on 21 March was ar¬ rested on a charge of sedition. He was bailed, but on the passage of the Treason-Felony Act rearrested; and in October sentenced to death for treason. The sentence having been com¬ muted to life banishment, he was removed to Tasmania (9 July 1849) ; but in 1852 escaped to the

United States, where he was admitted to the bar in 1856 and practised in New York in 1856-61. For some time also after 1856 he edited the Irish News, of New York. In 1861 he organized a company of zouaves for the Federal army, with which he joined the 69th New York Volunteers, under command of Col. Michael Corcoran. After three months' service, he recruited the (<Irish brigade® (1861-62), and was elected colonel of the 1st regiment. On 3 Feb. 1862 he became brigadier-general and took command of the brigade. He fought bravely at Richmond, the second Bull Run, Fredericksburg and Antietam and after Chancellorsville found his command so reduced in numbers that he re¬ signed. Early in 1864 he was reappointed briga¬ dier-general of volunteers and was assigned to the command of the military district of Etowah. He resigned 15 May 1865, was appointed secre¬ tary of Montana Territory and in the following year acted at one time as governor pro tern. At Fort Benton, Mont., on 1 July 1867 he boarded a steamer for a trip down the Missouri and thereafter was never seen. It is supposed that he fell overboard unperceived during the night. He wrote (Speeches on the Legislative Inde¬ pendence of Ireland) (1852). Consult Cava-nagh, (Life, Writings and Speeches) (Worces¬ ter, Mass., 1892).

MEAGRE. A fish. See Maigre.

MEAKIN, me'kin, Budgett, English au¬ thor and writer : b. Ealing Park, England, 8 Aug. 1866; d. London, 26 June 1906. He was educated at the Reigate Grammar School, be¬ came associate editor of Times of Morocco and was editor 1884-93. He lectured extensively on industrial questions and on Oriental subjects. Among his works are (The Moorish Empire* (1899); (The Land of the Moors> (1901); (The Moors* (1902) ; (Model Factories and Villages, > *etc.*

MEAL-MOTH, or MEAL-WORM. See

Flour and Meal Insects.

MEAL-TUB PLOT, in English history , an alleged conspiracy, concocted

in 1679 by an informer, Dangerfield, with the view of cutting off those who were opposed to the succession of James II after he had embraced Roman Catholicism. The false charges to which Dan¬ gerfield was prepared to swear were found in the meal-tub belonging to a Mrs. Cellier, one of his friends. Ultimately he confessed his crime, was whipped and condemned to stand in the pillory.

MEALY-BUG, a scaleless scale insect of the genus Dactylopius and family Coccidce. These insects are covered with a mealy or waxy substance which thev secrete for protec¬ tive purposes. Like their relatives, the true scale insects, they also secrete honey-dew and are attended and transported by ants; unlike these relatives they do not lose the power of locomotion. The species are most numerous in tropical and subtropical countries ; one species (D . citri) being the best-known outdoor species in the United States, feeding upon citrus trees in Florida. In greenhouses another species (D . destructor) is often troublesome. Owing to the protective covering difficulty has been met in ridding plants of these creatures, but fumiga¬ tion and caustic solutions have been tried with most satisfactory results, a kerosene and soap emulsion being particularlv effective in destroy¬ ing them. (See Insecticide). Consult Com¬ stock, J. H. and A. B., (Manual for the Study of Insects> (8th ed., New York 1909) ; Com¬ stock, J. H., (Report of the United States De¬ partment of Agriculture) (Washington 1880).

MEALY WING, a minute bug of the fam¬ ily Aleyrodidce, whose species (about 150 in number) have the wings covered with a white meal-like secretion. Thev are allied to the coc-cids but differ in development and structural peculiarities; and throng upon the leaves of plants which they injure by sucking away the sap and also by attracting a growth of smut-fungus by their secretion of honev-dew. In this manner they blacken and harm orange and lemon trees in parts of Florida and Louisiana, where they are prevalent. Consult Howard, Unsect Book1* (1901).

MEAN VALUE. If n quantities are com¬ mensurable, the sum of their units divided by n, the number of the quantities, is the arith¬ metical mean and is the mean value of the n quantities when their number is finite. For example, if the number of units in three quan¬ tities are respectively 4, 8 and 15, the mean

value is ˆˆ =9; and in general, if the

number of units in n quantities is denoted by Xi, X2, X3, … . Xn, the mean value is

M = - (X, + X2 + X, +

n

+ Xn).

But if a quantity vary continuously in ac¬ cordance with some law, thereby assuming every possible value between two extremes, the number of different quantities is infinite, and the mean value in such a case requires a new defi¬ nition. For example, assume that at every point in the diameter of a semi-circle a perpen¬ dicular to the diameter is drawn to meet the

semi-circle. The lengths of these lines form a continuous series of values represented by every number from zero to r, where r is the length of the radius. In such a case if n values of the perpendiculars are obtained and their sum is divided by n, the ratio should approximate to the mean value. It is easy to see, however,

2

that this ratio will approximate to — of the radius of the circle if the n perpendiculars are

evenly spaced on the circle, to — of the radius

if they are evenly spaced on the diameter. It follows that the mean value of a continuously varying quantity is not definite until the law is known by which the ˆweight® of each portion of the scope of variation is determined.

The several forms of the theorem that pass under the name of the mean value theorem involve the principles of the infinitesimal cal¬ culus. The first theorem of the mean value is the following: Let f(x) denote any finite and continuous function of x in the interval between x — Xo and x — X; let dx denote the increment and retain the same sign in this interval ; and assume that m and M are respectively the least and the greatest values of f(x) in this interval:

then the definite integral \ f {x)dx has a defi—

J Xo

•nite value that is greater than m(X — ,r0) and less than M (X — x0) ; that is,

» fxdx < fx

J Xo J *o“

f{x)dx < M I dx

fX

J Xo

Since f(x) is continuous in the interval X — xo, there must be a value where

Xo < H < X such that j f(x)dx — (X — xa) /(D >

J Xo

’ X

m < /(f) < M. The value, /(£):

Xo—,

— cx

<—Xj Xo

f{x)dx ,

is called the mean value of fix) in the interval X — Xo. If we assume F (x) to be the primitive or indefinite integral of fix’), then F (X) — F(x o) = (X — xo)/(£) = (X — Xo)F(f) which is the familiar form of the law of the mean in the differential calculus.

The theorem of mean value is of importance in establishing Taylor’s series. It follows im¬ mediately from the theorem of mean value that if F(X) = F(xo) = 0, for some f between X and xo. F’(£) = 0, if F is continuous between X and Xo. Let ˆ be a function of X with derivatives of every order at every point between x = a and x = b. Construct the function

y(a) = ♦(*) — #(*)— (X — z)f(z) -

a ,

(x—z)n

n !

0(n)(z)-

(x— z)n+1 n + 1

P,

where X is of the form xo + h, and X and Xo lie between a and b. ip’ will be of the form — f(z)drf(*)— {X— z)f’(z)+(Z—)“(*) — …—

(X— z)” … .

n\

(X—z)

n\

n

P >

or

n\

Furthermore, ipiX) is identically 0, and by properly choosing P, ˆ(xo) can be made 0.

Therefore, by the theorem just stated i>'(z) =

vanishes for some value

of z between x 0 and x. As it can be shown that this value need not be X itself, we have p — <ˆ(n-t-i)(2)— o for some value of z between Xo and X, and since i>(X)—0, if we let X=xo --h, we

have<t>(x0+h)—<t>(x0) + <t>'(xo)h+ -

n\

tˆq±mh ”+\ where 0<* <1. Therefore,

if - + can ˆe ma(ˆe as smah as

you please by increasing n, we have <p(x0 + h)=

2 0(_Hxo)/z ˆ is Taylor’s theorem. See

0 nl

Series. Consult Osgood, differential and In¬ tegral Calculus* (rev. ed., New York 1914).

MEANDER, me-an’der, in art, an orna¬ mental design, in which the lines interlace ; it is often used in decorating vases. The lines usually advance in one direction and pass one another at right angles. The design is so named from the river Meander, well known for its numerous windings.

MEANDERS, broad swinging curves made by a river on its flood plain. A river in its early history may have accidental curves, but it is only when it has cut its course as deeply as it can, and has begun to widen its valley notably, in other words when it has passed its maturity and is progressing toward old age, that it char¬ acteristically develops meanders. These fre¬ quently become almost perfect loops many miles around and but a few rods across the neck. When a meander cuts off and is occupied by stagnant water only, ox-bow lakes are formed. If a region in this stage is uplifted the river will again begin to deepen its valley, and the meander curves will cut down anew, forming deep valleys or gorges. They are then said to be entrenched or incised meanders. Sometimes the neck of an incised meander may be cut through at river level, by undermining the rock, leaving a natural

bridge. See Natural Bridges, and the section on Work of Running Water in the article on Geology.

MEANING, the object of a symbolization, considered from the standpoint of the symbol. Thus the meaning of the figure 2 is the number two, the meaning of the formula (.r + :y)l = x 2 + 2xy + y2 is the law that formula represents, and so on indefinitely. The experiences which we undergo possess* besides their presented con¬ tent a represented content, and this represented content bears toward them the relation of mean¬ ing. One of the cardinal problems of modern psychology is the determination of the psychical concomitants of this meaning. In accordance with the general nominalistic and associational-istic trend of experimental psychology, those who approach the question of meaning from this angle have usuallv considered that the meaning of an image is conveyed in conscious¬ ness by a group of such accompanying sub¬ stantive states as images, sensations and feel¬ ings. They held, that is, that the meaning of <(bear® read into a noise in the woods is <(carried by a verbal image and an organic shudder,®

and that every experience is surrounded by a fringe of vaguer meaningful states. They would consider that the vehicle of the law of universal gravitation is a visual or auditory verbal image, together with certain organic and kinaesthetic sensations.

All this psychology of meaning suffers from the lack of an antecedent logical analysis. The logical situation best adapted to this analysis is that of the relation of a set of mathematical symbols to the theory they represent. The theory is obviously the meaning of the symbols, but it is only to the very slightest extent car¬ ried by the individual symbols themselves. Only the elementary constituents of the system, together with certain of the simpler general notions, are represented by special characters. The structural relations are signified, and must be signified, by the arrangement — that is, the structural relations of the symbolism on the paper. The essence of the conventional system of algebraic notation lies, not in the use of let¬ ters for numbers, not in the symbolizing of ad¬ dition by + and of multiplication by X, but in the agreement between the laws of the manipu¬ lation of the symbols and the laws of number. Symbolization is primarily the relation toward a system of entities of a similarly order system of arbitrary marks, and only in a derived sense the relation between a mark and the correspond¬ ing entity. The symbol is a symbol only within a symbolism. It is precisely as a symbolism that our verbal

images, kinaesthetic sensations and other mental states convey a meaning. When the mathematician is developing a new theorem, his mental content may be inventoried as a verbal image or two, his sensation of the paper and pencil in front of him, and a few organic sensations. Somehow or other he puts these into an entirely extraneous correlation with the entities which he is examining. This strain behind the eyeballs acquires a temporary association with the unknown function for which he is seeking; that fragmentary visual image of a formula represents a mathematical law; and so on. In his trained mind, the symbolism of his states shapes itself into the de¬ sired conclusion, which he symbolizes anew in the conventional algebraic notation on the paper lying before him. No enumeration of his sub¬ stantive states can ever disclose how the mean¬ ing of the conclusion and the premises is car¬ ried in his mind, for it is not these states them¬ selves, but their arrangements, that are the vehicles of meaning.

This structural nature of the vehicle of meaning is intimately connected with our power to communicate with others. My sensation of red is something that as far as I know may be peculiarly mine. If there were a man 'who from his birth had seen red where I see green and green where I see red, it would be a matter of the utmost difficulty for me to detect his anomaly. He would learn the name ((red® from hearing it applied to the things which appear red to me but green to him, so that his speech would not dis¬ close his peculiarˆ. It is onlv by observing. that green objects excite in him the expression of the emotions which we consider appropriate to red, or by some similar peculiarity in the associations of his experience of red and green objects, that the interchange of his red and green sensations could even be sus-

pected. If the interchange were his sole peculiarity, he would always consider himself, and be considered by others, in the light of a normal human being. Accordingly, we have no reason to believe that the sensory qualities or sense-data of normal human beings agree with our

own sensory qualities and sense-data, and there is no way of conveying these qualities and data by language. On the other hand, lan¬ guage is the vehicle of meaning and of nothing else. . This alone is enough to prove that the meanings do not reside in any special data or qualities in our minds. What language does is to order the mind of the hearer or reader in a manner similar to that of the speaker or writer. In reading a story we pass through a sequence of mental states which has been designed for us by the author, though our individual states are beyond his knowledge. When he uses the ‘ word ˆgreen,® we interpret it in our own way, but we put it in the same sort of relational con¬ text — complementary color of red, intermediate between yellow and blue, *etc.* — as that which it occupies in his mind. It, therefore, follows that this relational context, which is all that language can convey, is identically the meaning conveyed by language.

The situation when we hear a noise in the bushes and interpret it as <(bear® can now be analyzed. The meaning is not carried in the first instance by the verbal image and the shudder. It is true that there is a possible state of consciousness in which the rustle in the bushes, the verbal image, and the shudder are all that is present, but at this stage meaning has not yet appeared. Meaning first appears when we think, not <(bear,® but <(That’s a bear.® In this case, the rustle in the bushes stands for <(lhat,® the shudder or verbal image for ((bear® and the juxtaposition of the shudder or image with the sound impression for the rela¬ tion expressed in the sentence. The meaning of ((bear® is derived from the meaning of the sentence. In other words, the meaning of the sound in the bushes resides, not in its correlates, but in its correlation. (See Thought). Con¬ sult James, W., Principles of Psychology* (New York 1899) ; Stout, G. R, (Manual of Psychology1* (London 1913) ; Titchener, E. B., Experimental Psychology of the Thought Processes> (New York 1909).

Norbert Wiener.

MEANS, menz, David MacGregor, Amer¬ ican lawyer and author : b. Groton, Mass.,

1 May 1847. He was graduated from Yale in 1868, studied theology at Andover and New Haven, was professor of economics in Middlebury (Vt.) College in 1877-80, and in 1881 was admitted to the bar and entered the practice of law. He contributed to periodicals, and wrote (The Boss> (1894) ; Hndustrial Freedom* (1897) ; (The Methods of Taxation* (1909).

MEANS GRASS. See Grasses in the United States.

MEANTONE, or MESOTONIC TEM¬ PERAMENT, in music, the system or princi¬ ple of tuning voices or instruments in vogue up to the middle of the 19th century, when it was superseded by the system of equal or even tem¬ perament. In the meantone temperament, tun¬ ing was based on the use of a standard whole step or mean tone, which is an interval between

a greater and a less major second. See Mode; Well-Tempered Clavier.

MEARES, merz, John, English navigator: b. England, 1756; d. London, 1809. He entered upon a seafaring life at an early age and in 1771 he entered the navy and served in the war with the French until peace was declared in 1783, when he became a captain in the mer¬ chant service. In 1786 he explored the coast of Alaska and made in 1789 a second tour of ex¬ ploration on the discoveries of which the Brit¬ ish government based its claim to the possession of British Columbia and Oregon. Three ships sent by him to Nootka Sound in 1789 were cap¬ tured by the Spaniards and this act caused Eng¬ land to fit out an expedition in the following year, upon which reparation was made by Spain. He was the author of (Voyages in the Years 1788-89, from China to the Northwest Coast of America) (1790).

MEARIM RIVER, Brazil, rises in the Sierra do Negro, and after a northerly course of about 360 miles in the state of Maranhao flows into the Bay of Sao Marcos near the city of Maranhao. It has numerous affluents and is navigable, but the sudden tidal bores are dan¬ gerous.

MEARS, Helen Farnsworth, American sculptor: b. Oshkosh, Wis., 1878; d. 17 Feb. 1916. Her early years were passed in Oshkosh, Wis., where she began her art work as a child by carving a life-size portrait of her sister from a block of solid plaster. She studied under Saint-Gaudens, who recommended her as one of the strongest pupils he ever had when he sent her to Frederick Macmonnies in Paris. She was particularly known for her portrait busts. Her memorial statue to Frances E. Wil¬ lard in the capitol at Washington (1905) was the first statue of a woman by a woman placed in that building. In 1911 her design was ac¬ cepted for a statue for the new Wisconsin State house. Before that she had done much work of note, including the MacDowell bas-reliefs, familiar to visitors at the Metropolitan Museum, New York, and at the MacDowell Club; a (Fountain of Life,* which won a prize at the Saint Louis exposition. Other works are the portrait relief of

Augustus Saint-Gau¬ dens and the portrait busts of George Rogers Clark and William L. G. Morton, M.D., in the Smithsonian Institution, Washington.

MEARS, James Ewing, American sur¬ geon : b. Indianapolis, Ind., 1838. He was graduated at Trinity College, Conn., in 1864, and at Jefferson Medical College, Philadelphia, in 1865. He served in the Civil War and in 1865 established his practice in Philadelphia. He held the chair of anatomy and surgery at the Pennsylvania College of Dental Surgery from 1870 to 1898 and for many years was sur¬ geon-in-chief of the Pennsylvania National Guard. He published (Practical Surgery1* (1878; 2d ed., 1885), and numerous contribu¬ tions to surgical journals.

MEASLES (also called Rubeola and Mor-billi) , a highly, contagious eruptive disease, fre¬ quently epidemic, and sometimes dangerous be¬ cause of its debilitating effects and tendency to end in inflammation of mucous membranes, such as pneumonia and enteritis. So-called black or malignant measles, occurring mostly in persons

of very poor health, is usually fatal. Where frequently epidemic it is less likely to be severe, and where it attacks a community for the first time it has a high mortality. For instance, it was taken to the Fiji Islands by a British ship from Australia and swept away 40,000 out of 150,000 inhabitants. Although measles is a disease of childhood, adults are not exempt from it. As a rule it attacks an individual but once. The contagious principle exists in the breath and in exhalations from the skin, the tears, the nasal and bronchial secretions and the excretions. Clothing which has been in an infected atmosphere is liable to spread the dis¬ ease. How long the contagium remains in in¬ fected articles is not known. The disease may be divided into four stages, beginning with the stage of incubation, or the interval (varying from 7 to 21 days) between the date of infec¬ tion and the outbreak of symptoms, that is, the stage of invasion. The symptoms are chilli¬ ness, fever, pain in head, back and limbs, blood¬ shot eyes, with intolerance of light, running of the eyes and nose, sneezing and a

troublesome cough. About the fourth day an eruption or rash appears (stage of eruption), first in the throat, then upon the face, trunk and extremi¬ ties, as minute pinkish red spots, which coalesce into blotches more or less crescentic in shape, raised above the surface of the skin. The erup¬ tion usually last about three or four days. Gradually disappearing (stage of decline), fever and catarrhal symptoms abate, and appetite re¬ turns. The cough may remain for days. The patient should be kept in a warm, well-venti¬ lated and fairly lighted room, should be given easily digested food and plenty of water. Treat¬ ment should also regulate the bowels with saline medicines, and allay the severity of the cough with simple remedies. Severe symptoms re¬ quire the attendance of the physician. Com¬ plications may ensue in the shape of chronic inflammation of the tonsils, of laryngitis, of chronic Bright's disease and of otitis ; but the most serious complication is that of broncho¬ pneumonia, which occurs in about 25 per cent of cases of measles. Measles is contagious until the eruption has disappeared and all dead par¬ ticles of skin have come away of themselves or have been washed off by tepid baths.

MEASURE, a definite unit of capacity or extent, fixed by law or custom, by which rela¬ tive sizes and capacities are ascertained and expressed; as, a yard, a measure of length; a gallon, a measure of capacity; a square foot, a measure of area; a cubic foot, a measure of volume, *etc.* See Weights and Measures.

Lineal Measure. — The measure of lines or distances ; the standard unit of lineal measure in the United States is the yard. The system is based on the law of nature that the force of gravity is constant at the same point of the earth's surface, and, consequently, that the length of a pendulum which oscillates a certain number of times in a given period is also constant.

Unit of Measure. — A given quantity, used as a standard of comparison in measuring a quantity of the same kind. Every kind of quan¬ tity has its own unit of measure, and under different circumstances the same kind of quan¬ tity may have different units of measure.

Line of Measures. — The line of intersec¬ tion of the primitive plane, with a plane passing

through the axis of the primitive circle and the axis of the circle to be

projected.

Measure of Angles. — The right angle being taken as the angular unit, its subdivisions are degrees, minutes and seconds. The right angle contains 90 degrees, the degree 60 minutes and the minutes 60 seconds. All smaller fractions are expressed decimally in terms of the second.

Measure of Magnification. — The measure of magnification, or magnifying power of any optical instrument, is the ratio of the magnitude of the image to the . magnitude of the object, or, more precisely, the ratio of the apparent diameter of the image to that of the object.

Measure of a Ratio. — Its logarithm, in any system of logarithms, or the exponent of the power to which the ratio is equal, the exponent of some given ratio being assumed as unity.

In Music. — The quantitv of notes which are placed in the bar, and which is generally called the time, of which there are but two kinds, namely, common time, containing an equal quan¬ tity of notes in the bar, and triple time, contain¬ ing an unequal quantity. Common time is gen¬ erally marked with a C at the beginning, which means that every bar contains four crotchets, or their value in other notes. There are also other kinds of common time which are marked f, f, Triple time is marked f, f, f, f, f.

MEASURE FOR MEASURE is the most characteristic of the group of so-called Mark comedies® produced in Shakespeare's middle period. Modern critics are agreed that Meas¬ ure for Measure,5 first printed in the 1623 folio, must have been composed about 1603 ; and the critics' opinion, based almost solely upon evidence of style, can now be confidently supported by a piece of external evidence lately redeemed from suspicion of forgery; namely, a memorandum in the accounts of the royal Revels Office which records that 'Measure for Measure1* by "Shaxberd® was performed before King James by His Majesty's Players on Saint Stephen's night, 26 Dec. 1604. Few of Shakespeare's greater works are so unequal in quality or have evoked such diverse opinions. In certain details of form it is one of the most careless of the plays. The subject is intrin¬ sically displeasing to modern taste (though vastly more refined here than in the original story) ; several of the characters (notably the goody-goody Duke and the unmanly Claudio) repel the reader; and many of the devices of plot, especially in the perfunctory closing act, are frank clap-trap. On the other hand, Shake¬ speare's moral beauty and dramatic brilliance

are nowhere more loftily exemplified than in the best scenes — those, namely, in which Isa¬ bella's gracious figure appears. In a word, this play marks, and is the first to mark, the com¬ plete ascendency of spirit over form so notable in the last plays of 8 or 10 years later; it is the earliest to make conspicuous Shakespeare's utter heedlessness of rules and details and his uncanny splendor in silhouetting moral beauty against an all-encompassing mundane vileness. "This is a play as full of genius as it is of wisdom,® says Hazlitt, and Masefield in a notable appreciation calls it (<one of the greatest works of the greatest English mind.® There is no evidence that 'Measure for Measure5 has ever been much performed (except in Ger¬ many), though an injudicious attempt to blend it with 'Much Ado about Nothing5 ('The

Law against Lovers, > by Sir William Davenant) was popular in the latter half of the 1 7th cen¬ tury. Yet two English revivals in 1907 and 1908 (one by the company of Oscar Ashe and Lily Brayton, the other by the Oxford University Dramatic Society, supported by actresses) proved marvelously impressive. They fully established both the serene morality of the piece when honestly presented and also the genuine effectiveness of the usually slighted comic scenes. Shakespeare's source was a long, flashy play in two parts (10 acts), (Promos and Cassandra, > by George Whetstone (1578), which in its turn is derived from an Italian tale in Cinthio's 'HecatommithiP

Tucker Brooke.

MEASUREMENT OF SHIPS FOR TONNAGE, or BUILDER'S MEASURE¬ MENT, a method of computing the tonnage of merchant vessels, in use among shipbuilders. Its results are nearly double the legal or regis¬ tered tonnage. See Tonnage.

MEASUREMENT OF STREAMS. One

of the many useful classes of work conducted by the United States Geological Survey; the measurement of streams having an industrial

value. Wherever water is likely to be employed for power or irrigation the amount available is ascertained by that bureau. The volume varies greatly from season to season, and sometimes from year to year. Any calculation by the man¬ ufacturer or farmer which does not take this variability into account would be misleading. Moreover, streams differ among themselves in straightness, the character of their beds and other particulars. Accurate measurement is still further complicated by the lack of uniformity in the movement in a given cross section. What might be true for one point would not be true for other points to the right or left of it, or at a higher or lower level.

The first step in the work is to place a gauge in a permanent position, and employ a suitable observer to read it every day. The gauge is graduated to feet and tenths. Usually it is up¬ right. It may be laid over ‘slanting, however. In that case, the spacing is widened, so as to give accurate results. One observation a day is made, and its results transmitted on a postal card to Washington. The second factor in the hydrographer’s computation is the velocity of the stream, at different heights. To ascertain this only occasional measurements are neces¬ sary. These are made by experts, but with their aid it is possible to prepare tables showing the total discharge of that particular stream for all the different gauge readings. After such tabu¬ lation is effected the maximum, minimum and mean flow for any month in the year can be told at a glance.

Velocity is ascertained with a meter lowered into the water. The instrument contains a tiny screw propeller, the number of whose rotations under the pressure of the fluid is automatically registered. Many types of meter have been de¬ vised. The kind which the bureau prefers has an electric wire leading up to a buzzer in the operator’s pocket. There a click or other audi¬ ble sound indicates to him the speed of the screw. He counts the number of revolutions for some definite period, usually fifty seconds, records it in his notebook and moves along a short distance to make another observation. vol. 18 — 31

If measurements are made at various depths along a vertical line, the results will not be equal. For this reason hydrographers have studied to find, if possible, a level that would fairly represent the average velocity for any vertical. In this way they can simplify the labor. It has been found that such an average can be secured by taking the speed at a depth of from six-tenths to two-thirds of the way down from the surface. To obtain a correct idea for the whole stream, though, these

tests must be made at a number of places between one shore and the other. No measurement at a single point can be trusted to be fairly repre¬ sentative.

MEASURING WORM, INCH WORM, LOOPER, or SPAN-WORM, a caterpillar of any species of moth of the superfamily Geometridce. The creatures are characterized by the presence of only two pairs of abdominal legs, one upon the ninth, the other upon the anal segment, and by their peculiar form of loco¬ motion, the rear of the body being brought forward toward the front legs and the body forming a loop at right angles to the surface upon which the insects walk. Nearly all the numerous species feed upon foliage, a few upon seeds in which they bore. Some are considered serious pests in orchards and upon shade trees; for instance, the canker worms (see Apple, Insects), the lime-tree moth (Hybernia tiliaria), and Cymatophora pampinaria , which sometimes devastates cranberry plantations. The duration of the larva state is variable; from their great voracity they grow rapidly and shed their skins several times before attaining maturity; when arrived at this state they seek some sheltered spot in which to undergo the change to pupa form, some clinging to the lower surfaces of leaves while others bury themselves in the earth, those remaining in the air suspending them¬ selves in various ways by means of their silky secretions, others enclosing themselves in silky cocoons. Those burying themselves also build cocoons around them, but many of these only line their cavity with enough silken threads to keep the wall from falling in. One of the Euro¬ pean species, Fidonia Plumistaria, is distin¬ guished by curious feathery antennae. The cater¬ pillars of this species are very injurious to fruit trees, especially those of the European magpie moth, Abraxas grossulariata, which inhabit gooseberry bushes, often entirely stripping them of their foliage. The caterpillar of the Ameri¬ can canker worm moth, A. nisopteryx pome-tana, also belongs to this species of worm, the eggs being hatched in the spring; when grown they are about an inch long and of various colors, and are also dangerous to orchards. Most of the species, however, are of small economic importance. The caterpillars usually resemble twigs when at rest, their protective coloring and their attitudes serving to deceive their enemies. The caterpillars of a few species of the owlet moths, family Noctuidce, walk in this way, since they also lack prolegs upon the middle abdominal segments. They are not, how¬ ever, considered true measuring worms. The geometrid moths are usually of small size and inconspicuous but delicate and beautiful colora¬ tion. Consult Holland, (The Moth Book) (New York 1903) ; and Packard's (Monograph of the Geometridae,* with colored plates, published by the United States Geological Survey

ton 1876) ; Cambridge Natural History0 (Vol. VI, London 1899) ; Comstock, J. H. and A. B., (Manual for the Study of Insects* (8th ed., Ithaca, N. Y, 1909).

MEAT, Inspection of. The purpose of meat inspection is to eliminate diseased or otherwise bad meat from the general food sup¬ ply, to see that the preparation of the meats and products passed for human consumption is cleanly; to guard against the use of harmful dyes, preservatives, chemicals or other delete¬ rious ingredients ; and to prevent the use of false or misleading names or statements on labels, in short to protect the rights and health of the consumers of meat and meat food prod¬ ucts to the fullest extent possible. In the United States the meat inspection service is administered through the Bureau of Animal .Industry of the Department of Agriculture.

In 1890, 1891 and 1895 Congress passed leg¬ islation empowering the Secretary of Agricul¬ ture to take measures to ensure a wholesome quality in all meats in the export trade and to protect the home consumer against diseased of unsound meat. Under the provisions of these laws great dependence was placed on the ante¬ mortem examination of all animals for export or for interstate commerce, but the provisions for the post-mortem examination of carcasses were inadequate. The great defect of this early legislation was that it did not make a ruling for the disposal of carcasses and animal products which upon examination had been found unfit for use as food. During the war with Spain in 1898 the prevalence of sickness among the enlisted men drew the attention of the public to the laws relating to meat inspec¬ tion. A report was made that ˆembalmed beef0 was being supplied the army by the great pack¬ inghouses. Investigation failed to establish this, however, and the public was apathetic in the matter until the publication of Sinclair's (The Jungle,* in 1906, in which it was charged that the condition of the slaughter-houses in Chicago, the packing centre of the country, was filthy and that the menace to the public health as a result was very great. The nation was aroused and the Pure Food and Drugs Act of 30 June 1906 was enacted after the investiga¬ tions of government and other committees had disclosed the astonishing fact that a large part of the

meat placed upon the market was far from clean; and that, in fact, the methods of handling and preparing these food products were dangerous to health.

Federal inspection is now maintained under the act of 30 June 1906, and supplementary leg¬ islation in the Tariff Act of 3 Oct. 1913. The food animals to which the act refers are cattle, sheep, swine and goats. The ’slaughtering, packing, rendering and meat-preparing estab¬ lishments to which it applies are those which sell or ship their products in whole or in part in interstate or foreign commerce. The Meat-Inspection Law does not apply to those estab¬ lishments the meats and products of which are neither sold nor shipped outside the confines of the State in which the plant is operated. A qualified exemption from inspection is granted under the law to retail dealers supplying their customers, and a similar exemption is granted in the case of meat from farm-slaughtered ani¬ mals. The legislation of 1913 provided for the inspection of imported meats and products.

The requirements as to sanitation in the es¬ tablishments that operate under inspection oc¬ cupy an important place in the meat-inspection regulations. Prior to 1906 the Secretary of Agriculture was without authority to fix and enforce such requirements but when it was con¬ ferred-in the act of that year the department proceeded to enforce sanitation in all establish¬ ments operated under Federal inspection. The first step taken was to require strict cleanliness as regards the rooms and equipment and in respect to the conduct of operations and the handling of products, and the second was to adopt rules governing plant and equipment con¬ struction.

In new plants the use of non-absorbent materials was demanded and natural light sup¬ planted artificial as far as possible. Improved drainage, plumbing and sanitation were de¬ manded as also proper facilities for the con¬ duct of inspection.

Each establishment is given an official num¬ ber, which must appear in every instance as a part of the mark of inspection, that is, the mark or statement used on meats and products or the containers thereof, to show that they have been inspected and passed under the Federal regu¬ lations.

Ante-Mortem Inspection. — Under the

Federal system not less than two examinations are made of the

animals slaughtered in official establishments. The first is the ante-mortem inspection or examination of the live animal, the second the post-mortem examination of the carcass and the various organs and parts at the time of slaughter. The post-mortem is the more valuable of the two inspections, but both are necessary if it is to be determined with cer¬ tainty in every instance that the flesh of the animal is sound, wholesome and fit for human food. The ante-mortem examination is per¬ formed in the pens and alleys of the establish¬ ments, except that at most of the large slaugh¬ tering centres it is found more convenient to conduct it in the public stockyards. The ani¬ mals are carefully observed for evidence of disease or abnormal condition while at rest in the pens or as they move from the scales after weighing. If any of a lot show symptoms, then the entire lot is subjected to further and individual inspection. If the animals are swine and the symptoms indicate cholera, they are driven to a special pen for further examination and in certain cases to ascertain their temper¬ atures and to make a record of the same. Other diseases or conditions in which the ques¬ tion of temperature is important are Texas fever, anthrax, blackleg, pneumonia, septicemia and severe injuries. When its appearance is such as to lead the inspector to suspect that an animal is affected with a disease or condition that may cause its condemnation in whole or in part on the post-mortem inspection, it is marked for identification by means of a seri¬ ally numbered metal tag bearing the phrase (<U. S. Suspect0 affixed to the ear. A record of the case is made and sent to the inspector who is to conduct the post-mortem examina¬ tion. Such suspect animals are kept apart and slaughtered separately from those which were passed on the ante-mortem inspection.

Animals which show symptoms of rabies, tetanus, milk fever or railroad sickness, and hogs which are plainly sick with hog cholera,

INSPECTION OF MEAT

1 Ante-Mortem Inspection of Sheep 2 Post-Mortem Inspection of Cattle 3 Post-Mortem Inspection of Swine

1 Products Inspection

2 Dry Salt Curing Cellar

3 Sealed Rendering Tank

are condemned on the ante-mortem inspection. Such animals are marked by means of a serially numbered (<U. S. Condemned® metal tag affixed to the ear. Animals so tagged may not be taken into the slaughter-room, but must be destroyed and disposed of as required for con¬ demned carcasses to prevent their use for food. Animals found dead or in a dying condition on the premises are condemned and disposed of in the same manner.

Post-Mortem Inspection. — The post-mor¬ tem inspection is made at the time of slaughter and includes a careful examination of the car¬ cass and all its parts. Where the number of animals dressed per hour does not exceed a cer- . tain general limit, one inspector, constantly present, performs all the inspections. Where the number of inspections per hour exceeds cer¬ tain general limits, the inspectors are increased accordingly and the work so arranged and co¬ ordinated that each inspector gives his entire attention to some particular part of it. Thus the work is in a sense specialized with the re¬ sult that a high individual and collective pro¬ ficiency is attained and efficient inspection as¬ sured regardless of the rate of slaughter. An important requirement in the conduct of this inspection is that the identity of the carcass and of each of its severed parts be carefully maintained until the inspection is completed, so that if there is a disease in any one

organ or part, all the other parts and the carcass may be brought together for additional examination. Facilities for maintaining such identity are pro¬ vided in the slaughter departments.

The different steps of the post-mortem in¬ spection are : Head inspection, viscera inspectin, carcass inspection, final inspection, disposi¬ tion and marking. In cattle heads the different pairs of lymphatic glands are cut into and ex¬ amined, particularly for tuberculosis. The tongue is also examined. The presence in the flesh of cattle of a certain cyst capable of pro¬ ducing tapeworm in man can usually be deter¬ mined by examining the inner and outer cheek muscles. A careful survey is made of the head as a whole for actinomycosis, deformities, *etc.* In the heads of swine certain lymphatic glands, which are favorite seats of tuberculosis, are incised and examined.

In the inspection of viscera, the several or¬ gans as they are removed from the carcass are placed before the inspector, on a table, in pans or other suitable metal receptacles for examina¬ tion. Facilities for promptly cleansing such equipment in the event of contamination through the contact of diseased viscera are at hand. The various organs and parts are care¬ fully viewed and certain of them cut into while others are subjected to manual as well as visual examination.

The carcass inspection embraces a careful viewing of all surfaces and parts of the carcass, with particular attention given to the condition of the serous membranes of the thoracic and abdominal cavities. Further, certain parts which more frequently than others are seats of disease are subjected to a manual as well as a visual examination. The head, viscera and car¬ cass examinations together constitute the regu¬ lar post-mortem inspection. The animals found to be free from disease or any doubtful condi¬ tion are marked ˆInspected and Passed,® while those in which any disease or doubtful condi¬

tion is found are retained for the final inspec¬ tion, which takes place in a special room, where another inspector with special facilities at his command subjects them to a searching exami¬ nation. Since the animals held for final inspec¬ tion are tagged or retained for cause, only veterinary inspectors who have become skilled through training and experience in the work are detailed to make such examinations and to determine the final dispositions.

As soon as the several examinations have been made and the

dispositions determined, there remain two important acts to complete the post-mortem inspection. They are the marking of each carcass to show plainly to every beholder the disposition made of it and to see that those carcasses and parts which are condemned are disposed of as required by the regulations to prevent the sale or use of the same as human food. In regard to the dis¬ posal of condemned articles it is required that every condemned carcass, part of carcass, meat or product be plainly marked to show that it is condemned, and that parts or products too small to be so marked be placed in appropri¬ ately marked containers. All condemned arti¬ cles remain in the custody of an inspector from the time they are condemned until properly dis¬ posed of, and if not disposed of on the day they are condemned they are locked in the <(U. S. Condemned® compartments, the locks of which are selected and supplied by the de¬ partment and the keys of which remain in the custody of the inspector. The required de¬ struction or denaturing of the condemned arti¬ cles must be done in the presence of an inspec¬ tor, who renders a report on the transaction. The usual method is to convert condemned parts into grease and fertilizer by rendering in a steam-pressure tank.

Inspection of Products. — Because meat or other edible portion of an animal which was entirely sound at the time of slaughter may become unsound or contaminated through im¬ proper care or handling, and because healthful products may be made unwholesome through adulteration or the addition of deleterious in¬ gredients, and for the purpose of protecting the purchaser against false and misleading labels, a proper measure of control of the various operations of processing, preparing and label¬ ing meats and products becomes necessary and such control is exercised by the Federal Inspec¬ tion Service. All meats and products, there¬ fore, notwithstanding that they were previously inspected and passed, are reinspected as often as may be necessary to ascertain whether they remain sound and wholesome. The materials added to products are examined to see that the regulations relating to prohibited ingredients are absorbed and that the requirements as to correctness of labeling are complied with. Samples of the different kinds of products are taken and referred to the meat inspection laboratories for chemical or other technical examination. If upon reinspection of an arti¬ cle it is found to have become unfit for food from any cause, the original inspection mark or label thereon is removed or defaced and the article condemned.

Imported Meats and Meat Food Products. — The regulations governing the admission of meat and meat food products from foreign countries require that every importation shall

be accompanied by a certificate signed by an official of the national government of the coun¬ try of origin ; stating that the animals from which the meat or meat food product was de¬ rived received an ante-mortem and a post¬ mortem veterinary inspection, and that at the time of slaughter the meats and products were sound, healthful, wholesome and otherwise fit for human food. Further, that they had not been treated with and contain no ingredient prohibited by the regulations of the United States Department of Agriculture. Meat or meat food product not accompanied by the required certificate is refused entry, and that from a country which does not maintain a sys¬ tem of meat inspection satisfactory to the Sec¬ retary of Agriculture is also refused.

Upon arrival every consignment of im¬ ported meat or product is checked with the for¬ eign inspection certificate and is subjected to a thorough physical examination, and in most cases samples thereof undergo a laboratory ex¬ amination. The meat or product is then ad¬ mitted, refused entry or condemned according to the findings.

Statistics. — The Federal system of meat in¬ spection reaches about 60 per cent of the ani¬ mals slaughtered in the United States and all imported meats. This leaves approximately 40 per cent of the domestic meat supply outside of Federal control. Much of the latter, it is known, receives no adequate inspection. The number of establishments at which inspection is regularly maintained varies somewhat ; however, for several years it has approximated 850. The total of cattle, sheep, swine and goats given both the ante-mortem and post-mortem inspections is in excess of an average of 58,- 500,000 per year. The average number of whole carcasses of such animals condemned during that period was more than 262,000 per year, while the number of parts of carcasses con¬ demned per year was very much greater. The records of the inspection and reinspections of meats and products subsequent to the slaughter inspection show totals running into billions of pounds annually, while the amount condemned on reinspection on account of having become tainted,

rancid or otherwise unfit for human food approximates 18,000,000 pounds per year. In 1915 Congress appropriated $3,375,000 for meat inspection. Thus the cost was less than six cents for each of the 58,500,000 animals slaughtered. Consult. Ditewig, George, (The Meat-Inspection Service of the United States Department of Agriculture) (in the 'Yearbook for 1916) of the Department, Washington

1917).

MEAT, Market Classes and Grades. — The

kinds of meat considered in this article are beef, veal, pork, mutton and lamb. Each kind is classified according to certain general dis¬ tinctions, such as the sex. of the carcass or the part from which the cut is taken. The classes, in turn, are graded with respect to quality, cov¬ ering, weight or other factors which determine the value of the individual cut or carcass.

Beef.

Beef products are marketed either chilled, frozen or cured. Fresh chilled and fresh frozen beef include the carcasses, quarters and the various commercial cuts of beef. Cured beef includes pickled or corned beef, dried or

smoked beef and canned beef. About one-half of the fresh beef sold on wholesale markets consists of carcass beef. (The carcass is split into halves or sides ; each side in turn is di¬ vided into fore and hind quarters). The rest is sold in the form of commercial cuts such as ribs, loins, rounds, chucks, plates, briskets, flanks, shanks and suet. "Block® beef refers to all side beef which is sufficiently thick fleshed and fat to be sold readily over the butcher s block. "Cutters® are . the carcasses of thinly fleshed or poorly finished cattle from which only certain commercial cuts such as loins and ribs are suitable for block purposes, the other portions being adapted only to conversion into boneless cuts and cured meat products. ."Can¬ ners® are those carcasses of beef no portion of which is suitable for block purposes. Such car¬ casses generally are divided into smaller cuts, such as boneless fresh meats, sausage trim¬ mings, canned and cured beef products.

Classes and Grades of Carcass Beef. — The classes of carcass beef are

steers, heifers, cows, bulls and stags. This classification is based not merely upon difference in sex, but also upon the general uses to which the dif¬ ferent classes are adapted. Steer carcasses are identified by the cod fat and generally by their full, fleshy rounds and loins, heavier, coarser bones and short, thick necks as com¬ pared with cows. They show more quality and finish and are sold as carcass beef more exten¬ sively than any other class. The grades are prime, choice, good, medium and common. Heifer carcasses are distinguished from steers by the udder which also should show no evi¬ dence of lactation or a development of the sinuses usual in the udders of cows. As a rule they have smaller bones, slightly more angular rumps, less development of lean flesh and are of an average lighter weight than steers. The grades are prime, choice, good, medium and common. The angular form,, long neck, hard white bones, more cavernous interior and lack of thickness of the flesh of the majority of cow carcasses make them easy to distinguish from other classes of beef. The vertebrae do not split as smoothly as in heifers or young steers. The flesh is seldom as well marbled by fat deposits between the muscle structure as in heifer or steer carcasses. A large percentage of the carcasses of this class are cutters and canners with a correspondingly smaller propor¬ tion suitable for ((block beef.® The grades are choice, good, medium, common and canners.

Dressed bulls are easily recognized by the short and thickly muscled, prominent neck, heavy shoulders, thick rounds, dark and coarse¬ grained flesh and the absence of cod fat. Rough conformation and hard bones are also common characteristics of bull sides. Many stags approach steers in form, quality and fin¬ ish, while others are difficult to distinguish from bulls. <(Yearlings® are carcasses of young steers and heifers with sufficient quality and finish to be used as block beef. ((Butcher® cattle, as the term is applied to carcass beef, are those which are suited to the cheaper <(butcher shop® trade. They include the me¬ dium and common grades of all classes of beef cattles. “Kosher® cattle are dressed beeves that have been slaughtered, inspected, cleansed and labeled in accordance with Jewish rites; “Kosher® being the Hebrew word for “clean.®

MEAT, MARKET CLASSES AND GRADES

They include all classes and grades of beef cattle. ˆDistillers® are steers, bulls and stags that have been fed on distillery wastes and have soft, ((puffy,® <(washy® flesh together with the ((high color® that is characteristic of cattle fattened on such feed.

Beef Cuts. — Beef cuts are sold both as ((straight cuts® and as subdivisions thereof. The method of dividing carcasses into cuts dif¬ fers, in the various cities and sections of the country. The straight cuts handled in Chicago markets are loins, ribs, rounds, chucks, plates, flanks and shanks. The standard grades of straight cuts are No. 1, No. 2 and No. 3, accord¬ ing to their weight, quality and thickness. Cuts that are too deficient in thickness and quality to be used on the butcher's block, and which consequently are made into boneless cuts, cured beef products, sausage, etc., are called <(strip-pers.®

Cured Beef Products. — The plates, flanks and rumps of all grades of cattle are, at times, used in making cured beef, and in the lower grades of beef the rounds and chucks are quite commonly cut up and cured before marketing. Barreled or corned beef is packed in brine. The standard barreled beef products are extra India mess beef, extra plate or extra family beef, regular plate or family beef, packet beef, common plate beef, rolled boneless beef, prime mess beef, extra mess beef, rump butt beef, mess chuck beef, beef hams and Scotch but¬ tocks. Smoked or dried beef consists almost entirely of beef hams, made from the rounds which, after curing in sweet pickle, are dried and smoked. Canned beef is hermetically sealed in tins or glass jars, usually after curing and processing. It consists principally of chipped beef, beef loaf, corned beef and roast beef. Roast beef is not cured but is cooked and processed in about the same manner as corned beef products.

Factors in Grading Beef. — The grade to which a carcass, side or quarter belongs de¬ pends upon its form, thickness, finish, quality, soundness and weight. The factors that deter¬ mine the grade of a wholesale cut of beef are its thickness, covering, quality and weight. By <(form® is meant the shape or (<build® of the side, its general outlines and the proportions of its different parts. Thickness of a carcass or cut refers to the amount and depth of lean flesh it carries. It is a factor of self-evident importance in selecting wholesale cuts. ((Fin-ish® refers to the amount and distribution of fat with reference to the covering of the car¬ cass or cut, to the fat deposits around the muscle structure and to the quality of the flesh in so far as it depends upon the degree of fat¬ ness. Quality in beef is so closely associated with

form, thickness and finish that the term often is used loosely to cover all three points. It refers more particularly to size, color and softness of bone, smoothness and grain of flesh, color and general appearance of the carcass or cut and an absence of coarseness in general. Soundness refers to freedom from disease and bruises, and from any other conditions which injure the appearance or keeping qualities of the meat. Weight is of importance in grading beef to the extent that the heavier carcasses generally are better in form, thickness, finish and quality than lighter ones ; but weight has lost much of its former significance as a grade

factor owing to the development of earlier maturing beef types, the increasing practice of finishing and marketing beef cattle as year¬ lings and two-year olds, and the growing tend¬ ency of the consumer to prefer steaks, roasts and other cuts from relatively lighter weight carcasses of good quality and finish.

Veal.

Calf carcasses weighing less than 300 pounds with comparatively light-colored, fine grained flesh are classed as veal, and the trade is es¬ sentially a fresh meat trade. In dressing calves the skin generally is left on in order to preserve the color and moisture of the flesh. The car¬ casses from heavy or yearling calves are skinned and split and are known as ((split veal.®

Carcass Veal. — The grade and value of a calf carcass depend upon its form, quality, finish and weight. The weights of dressed veal, vary greatly with the season, being light¬ est in April and May and gradually becoming heavier until the next annual veal season. The grades of carcass veal, the extreme weights and the usual weights of each grade are as follows :

Extreme Weight of

Grades Weights Bulk

Choice . 80-120 lbs. 90-100 lbs.

Good . 70-130 “ 75-95 “

Medium . 60-160 “ 65-80 “

Light and Common . 40-75 “ 50-65 “

Heavy and Split . 150-350 “ 160-200 “

Veal Cuts. — Only 10 to 20 per cent of the supply of dressed calves are cut up in the whole¬ sale trade, and this is done largely to supply a few retail markets with choice cuts and to take care of the Kosher trade which uses only the forequarters. The cuts usually made are saddles and racks, both of which grade choice, good, medium and common.

Pork Products.

Hog products may be described under two heads : dressed hogs and pork cuts.

Dressed Hogs. — The classification of hog carcasses is based on the uses to which they are adapted, or the products into which they may be converted. Smooth heavy or heavy loin hogs are prime smooth hogs, either barrows or good, clear (not seedy) sows, weighing 240 to 400 pounds dressed. Butcher or light loin hogs are composed of barrows and smooth, clear sows, weighing from 200 to 220 pounds dressed. Packing hogs include mixed hogs of all weights which are too coarse in quality, rough in shape or soft and uneven in finish to be suitable primarily for fresh pork products or smoked meats, and which therefore are packed prin¬ cipally in such forms as barreled and dry-salt pork. The grading of this class of hogs is based on weight, the grades being heavy, medium and light. Bacon hogs are those which are suitable primarily for sugar-cured breakfast bacon and <(English® meats. The hams from this class of hogs are preferred by the trade to the heavier varieties. The grades are choice, good and common and are determined by the degree of quality and finish. ((Shippers® are similar to butcher hogs in shape and quality but are lighter in weight and generally are not as highly finished, having only a moderate covering of fat and a comparatively small amount of leaf

fat. Pigs are carcasses of light, voung swine that are comparatively lean and light-colored in

flesh, with thin, soft skin, soft, red bones, weighing from 20 to 100 pounds.

Pork Cuts. — The various cuts made from dressed hogs may be divided into the following general classes : hams, sides, bellies, backs, loins, shoulders, butts, plates and miscellaneous. These products are referred to according to the manner in which they are handled, prepared or packed; viz., fresh pork cuts, dry-salt and bacon meats, barreled or plain-pickled pork, sweet-pickled meats, smoked meats, “English® meats and boiled meats. Fresh pork cuts are sold either chilled or frozen. The bulk of the uncured product is disposed of within a few days after slaughter, during which time it is chilled at temperatures slightly above the freez¬ ing point. Fresh pork cuts are taken more or less from all classes of hogs, but light loin hogs are used more extensively for fresh pork than any other class. The loin is the leading fresh pork cut. Tenderloins and spareribs also are used primarilv as fresh cuts. Shoulders, plain and skinned, shoulder butts, hams, bellies, fat backs and raw leaf fat are sold fresh to a small extent.

Dry salt meats are domestic cuts made from heavy, fat packing and loin hogs, cured and shipped in coarse salt. They generally are pumped with a strong brine to hasten the cure and make it more certain. The cuts which are sold in this form are heavy sides, bellies, shoulders, fat backs, plates and jowls. Barreled or plain pickled pork is packed in plain salt brine in tight barrels, and is made largely from sides of packing and heavy loin hogs. It con¬ sists principally of mess, fat back and belly pork of various grades. A much smaller pro¬ portion of the pork supply is barreled than formerly. Sweet-pickled meats are cured in brine, to which sugar or molasses has been added to aid in curing, to improve the taste and to give the product a better color effect when smoked. Most of these products are smoked before they reach the consumer. The cuts which are quoted as sweet-pickled

meats are hams, picnics, New York style and skinned shoulders, boneless butts and light bellies. This class of meats is cut principally from butcher hogs and from medium and light packing hogs. Hams and picnics from all classes of hogs gen¬ erally are sweet-pickled. Smoked meats are pork products which have been cured in brine, sweet pickle or dry salt before smoking. “Eng¬ lish® meats is a term applied to cuts that are dry-cured in English salt and saltpetre; borax being added when required by the foreign pur¬ chaser. They are primarily adapted to English trade, being given a milder cure than domestic meats. The leading cuts of this class are “English® bacon sides, long-cut hams, clear backs and bellies and square-cut shoulders. Boiled and cooked meats consist of boneless hams, picnic shoulders and loins which have been cured in sweet pickle and cooked by steam or in water. They sometimes are given a light smoke.

Hams are of two general kinds, short-cut and long-cut. The former are made from com¬ paratively fat, plump hams, trimmed short and round at the butt, with the foot cut off gen¬ erally above the hock joint. Long-cut hams are lean, long hams, with the butt left full and the foot taken off at the first joint below the hook. Sides include various grades and cuts of short

ribs, short clears and “English® bacon sides. Short rib sides include regular short ribs, job¬ bing or rough short ribs, hard short ribs, extra short ribs or “extra ribs,® and square cut or “English® short ribs. Short clear sides include regular short clear sides and extra short clear sides or “extra clears.® “English® bacon sides, comprising both the side and shoulder, and in one instance the ham also, include Wiltshire, Cumberland, Dublin, long rib, long clear, York¬ shire and Staffordshire sides.

Bellies include dry-salt, sweet-pickle, break¬ fast bacon and English bellies. Backs include the short rib backs, short clear backs, short fat backs and long fat backs. Loins consisting of the back with the fat trimmed off are sold either as regular pork loins or as loin rolls.

The standard grades of shoulders are rough, regular, picnic, New York style, skinned, square, New Orleans style and boneless rolled shoulders. Shoulder butts are cut from muscular parts of the ends of tops of the shoulders. Jowl butts are made from the jowl (neck and face). The various grades of shoulder butts are boneless Boston style, Mil¬ waukee style, Buffalo style, New York style, picnic, dry-salt and square-cut butts. Plates are made from the heavy fat which covers the

ends or tops of the shoulders. They are known to the trade as regular plates and clear plates. The so-called back plates are made from fat backs.

Miscellaneous Cuts. — The miscellaneous

cuts of pork may be grouped as mess pork, belly pork, shoulder pork, spareribs and trim¬ mings. Mess pork includes regular mess pork, light mess pork, prime mess pork, extra clear pork and loin clear pork. Belly oork includes regular belly pork, brisket pork and rib and lean belly pork. Back pork includes regular back pork (short cut mess or family back pork), clear back pork, fat back and short cut clear pork and ham butt pork (loin end or rump pork).

Shoulder pork consists of extra prime pork and Boston style butt pork. Bean pork or clear-butt pork is made from the jowl. Spareribs are termed “full-sheet,® “half-sheet® and “back¬ bone® spare ribs. Neck bones including the shoulder ribs come within this general class. Trimmings are of two grades: special lean or “A® and regular or “B® grade. The standard grades of lard are kettle rendered, neutral, prime steam, refined and compound lard. They differ as to the kinds of fats from which they are made, methods of rendering, color, flavor and grain. Lard compounds are composed of a mixture of pork fats with other animal or vege¬ table fats or oils. Lard substitutes or vege¬ table shortening contain no pork fats or oils, being composed wholly of vegetable fats, or of vegetable fats with beef fats added.

Mutton and Lamb.

Mutton and lamb are sold almost entirely in a fresh or frozen state. The bulk of supplies, except those frozen, are disposed of within a week or 10 days after slaughter. Approximately two-thirds to three-fourths of the wholesale supply of mutton and lamb consists of lamb.

Classes and Grades of Carcass Mutton and Lamb. — The classes of dressed sheep and lamb are wethers, ewes, bucks, yearlings and lambs. This classification is based on differences

in sex and degree of maturity. The grades of carcasses in the different classes are designated by the terms choice, good, medium, common and culls or canners. The grade and value of a lamb or mutton carcass depend chiefly upon its form, quality, covering and weight. The method of grading is the same in principle as the grading of beef.

Wether carcasses are distinguished from ewes by the cod fat ; from bucks bv their smaller necks and shoulders and finer quality, and from yearlings and wether lambs by “round® joints on the forelegs. The “bag® (udder) and a comparatively large “bung® (pelvic cavity) are characteristic of ewe car¬ casses. They also are distinguished from wethers as a rule by their more angular forms, longer necks, smaller bones and less abundant flesh, especially over the loin, back and ribs. Bucks constitute only a very small percentage of the dressed mutton supply. They may be identified by their thick, heavy necks, shoulders and briskets, large bones, coarse, dark colored fles’h and fat and thick, oily “skin® or “fell.® Yearlings may be defined as carcasses that show by their general development and by the “break-joint® that they are not mature sheep, but are too old and generally too heavy to be classed as lambs. Carcasses of sheep that are more im¬ mature than yearlings are classed as lambs. Like yearlings, they have the forelegs removed at the “break-joint® or “lamb-joint,® which has a tooth-shaped surface.

Mutton Cuts. — About one-half the supply of dressed wethers, ewes and yearlings in large wholesale markets is sold as mutton cuts. The two major cuts are known as racks or fores and saddles or hinds. The racks are made into stews and short racks. The short rack includes two-fifths and the stew three-fifths the weight of the rack. The cuts derived from the saddle are the leg and the loin.

The grades of mutton cuts are choice, good, medium and common. Cuts of these grades correspond in shape, quality, covering ana rela¬ tive weight to the same grades of carcass mutton.

Lamb Cuts. — Lambs are more largely sold in the carcass than sheep. It is estimated that one-fourth to one-third of the wholesale lamb trade consists of cuts. The methods of cutting and the proportions of the various cuts are identical with those of mutton. The grading of lamb cuts also is similar in general to that of mutton cuts.

Retail Cuts of Meat.

Retail cuts of meat are classified according to several different standards. Some are satis¬ fied to group them simply as tender and tough meats. Others grade the different cuts as first, second, third and fourth quality, according, to their degree of general excellence. Likewise, taking the market orice as a basis, the classes may be designated as high, medium or low priced, as the case may be. The location of the cuts in the carcass is another means . of fix¬ ing their names in mind, learning them in con¬ secutive order from neck to hind shank. Aside from the quality consideration involved in selecting retail cuts of meats, the selections are influenced chieflv by the following:

1 . The cuts which are best suited to one's cooking facilities.

2. The time and trouble which one desires to take in pre¬ paring the meats for the table.

3. The amount of meat required for the meal or meals in question.

Classifying retail cuts according to the methods of preparation, we have the following general division :

1. Frying or sauteing.

2. Roasting.

3. Boiling.

4. Stewing.

5. Soups and broth.

The purpose for which each retail cut from beef, veal, lamb and mutton, and pork may be used is indicated below. The number of pounds usually found in such cuts is shown by the figures opposite the cuts named.

Frying: Pounds

Porterhouse steak . 1J to 3

Club steak . 1 to 2

Sirloin steak . 2 to 5

Round steak . 2 to 5

Top round steak . to 3

Chuck steak . 2 to 4

Flank steak . 1 to 2

Veal steak . 1 to 2

Pork steak . 1 to 1 ˆ

Mutton chops . | to J

Lamb chops . \ to £

Veal chops . J to f

Veal cutlets . | to 1§

Pork chops . | to £

Salt pork . 1 to 3

Fancy breakfast bacon . i\ to £

Medium to fat bacon . f to f

Roasting :

Prime ribs of beef (first cut) . 4 to 12

Prime ribs of beef (last cut) . 4 to 12

Shoulder block roast . 4 to 8

Chuck rib roast . 4 to 10

Beef rump… . 4 to 12

Beef tenderloin (fillet) . 2 to 6

Leg of mutton . 6 to 9

Loin of mutton . 3 to 6

Shoulder of mutton . 3 to 6

Leg of lamb . 3£ to 6

Loin of lamb . 2 to 4

Shoulder of lamb . 3 to 4

Crown lamb roast . 3£ to 6

Hindquarter (spring lamb) . 5 to 8

Forequarter (spring lamb) . 5 to 8

Pork loin . 2 to 8

Leg of pork . 3 to 12

Ham (smoked) … 3 to 12

Pork tenderloin . ˆ to f

Pork shoulder . 2 to 5

Spare ribs . $ to 1

Veal loin . 3 to 6

Veal leg (fillet) . 3 to 12

Veal shoulder . 3 to 8

Boiling :

Beef horseshoe piece (end round) . 4 to 8

Beef shoulder clod . 3 to 6

Rib end of beef . 2 to 6

Cross-ribs of beef . 2 to 5

Beef brisket . 3 to 8

Corned beef, rump, flank, plate or brisket… 2 to 8

Beef tongue, fresh . 3 to 5

Beef tongue, smoked . 2 to 3

Leg of mutton . 6 to 9

Shoulder of mutton . 3 to 6

Shoulder of lamb . 3 to 4

Leg of pork . 3 to 1 2

Ham, smoked . 3 to 12

Pork, shoulder, fresh . 3 to 8

Pork hocks . 1ˆ to 2 4

Backbones and neck bones . 2 to 8

Stewing:

Beef plate . 3 to 6

Beef flank . 2 to 6

Drop tenderloin . 1 to 2

Beef skirts . 1 to 2

Beef neck . 1 to 3

Beef skin . 2 to 5

Breast of mutton . 2 to 4

Breast of lamb . 1 to 2\

Veal breast . 2 to 5

Veal neck . 1 to 2

Weight —

Soup and broth : Pounds

Shin soup bones . 1 to 4

Hind shank soup bones . 1 to 5

Knuckle soup bones . 3 to 7

Ox tail . 1 to 2

Beef neck . 1 to 3

Beef shoulder clod . 1 to 2

Beef round . 1 to 2

Mutton shoulder . 1 to 2

Mutton neck . 1 to 2

Mutton shanks . 1 to 1ˆ

Bibliography. — (<Market Classes and Grades of Meat,® by Louis D. Hall, Bulletin 147 (Illustrated), University of Illinois Agricultural Experiment Station (Urbana, Ill., 1910) ; ((Relative Economy Composition and Nutritive Value of the Various Cuts of Beef,® by Louis D. Hall and A. D. Emmett, Bulletin 158 (Illustrated), University of Illinois Agricultural Experiment Station (Urbana, Ill., 1912) ; <(Better Meat for Less Money,® by Louis D. Hall; Good House¬ keeping Magazine (illustrated), Vol. 55, Nos. 4, 5 and 6; Vol. 56, No. 1 (New York 1912-13) ; <(Meat on the Farm,® by Andrew Boss, Farmers' Bulletin 183 (Illustrated), U. S. De¬ partment of Agriculture (1903); ((Meat: Com¬ position and Cooking,® by Charles D. Woods, Farmers' Bulletin 34, U. S. Department of Agriculture (1896).

Louis D. Hall,

Specialist in Marketing Livestock and Meats , Bureau of Markets, United States Department of Agriculture.

MEAT EXTRACT, or juice of meat, has become since its introduction by Liebig (q.v.), a subject of great importance in medicine, dietetics and commerce. The chemical con¬ stituents of meat juice are not clearly estab¬ lished, although creatine, sarcine and inosinic acid are among the substances intelligently in¬ vestigated. Phosphoric and hydrochloric acids and inorganic salts, with some coagulable in¬ gredients are among the constituents. Beef tea while of value does not furnish complete food either for sickness or health. Other prepara¬ tions under this name are now on the market. Some are merely the juice of meat pressed out or dried pulverized meat ; others are the so-called predigested foods. In the true extract of meat fats and albumens are absent ; there¬ fore, while of use as a stimulant, such a prepara¬ tion is not a true food and cannot take the place of meat in this respect.

MEAT INSPECTION ACTS. See Pure Food Acts.

MEAT-PACKING. Meat-packing may ap¬ propriately be considered under three heads, namely, preparation and disposal of fresh (un¬ salted) meats ; curing and preservation of meats by salting, smoking and the like, as is usually practised with hog hams, bacon, etc., and pres¬ ervation of meats by hermetically sealing in tin cans, glass jars, etc., including the final sterili¬ zation necessary to complete the process.

Fresh Meats. — The preparation and disposal of fresh meats is perhaps the most important branch of the packing industry and in its development is the newest. Fresh meat has been, of course, an article of commerce from the earliest times ; but it is only within recent years that the art of refrigeration has been per¬ fected to an extent enabling fresh meat to be

shipped thousands of miles and its condition and quality so conserved that it is more desirable and palatable after arrival at destination than when first slaughtered. Fresh beef, particularly, is much more juicy and tender if well refriger¬ ated and kept two weeks or more after slaugh¬ ter. Fresh meats will keep best if held in a temperature slightly above the freezing point, but in practice a temperature of 35°

F. gives good results, except for long shipments such as from United States ports to Europe, in which cases approximately the freezing point should be maintained ; and it may here be observed that lean meat freezes at about 1E>° lower tem¬ perature than water.

Freezing is slightly injurious to the palatable quality of fresh meat, but by freezing hard and holding at a temperature of 10° F. it may be kept without taint for many months. When beeves are in good supply and cheap, the choice cuts, such as ribs and loins, are frozen and held in large quantities until the winter and spring season, when they usually meet with a more favorable market. Fresh pork and mutton are sometimes frozen and carried from season of surplus to season of scarcity, but the volume of this trade in the United States is not great, comparatively. This carrying from the season of oversupply to the season of undersupply by means of freezing has a doubly beneficial effect on the market, increasing the demand for live stock during time of glut, and increasing the supply during the time of scarcity.

The dressed carcasses are, immediately after slaughter, still being suspended from the trol¬ ley hooks on which the latter part of the dressing operation is done, run into refrigerated rooms and chilled, usually for two days. The cattle carcasses, and usually the hog carcasses, are split through the back bone into <(sides.® After chill¬ ing, the sides are cut, the beef usually into quarters and the pork into smaller pieces. The quarters of beef are shipped hanging on hooks in refrigerator cars, and the smaller pieces intended for sale fresh are usually boxed and shipped also in refrigerator cars. Mutton and lamb are shipped in the same way, usually in whole car¬ casses. The refrigerator cars used depend upon ice for their temperatures, and the most success¬ ful cars use the ice crushed and with from 6 to 12 per cent of rock salt intermingled.

The development of the fresh meat branch of the packing industry received its first important impulse from George H. Hammond, who, in the summer of 1869, began at Hammond, Ind. (a suburb of Chicago), the business of shipping fresh beef in refrigerator cars to Boston. The first year the business was not successful, but it was courageously continued, the difficulties were gradually overcome, and the second year found it more satisfactory, and the volume amounted to about 600 quarters per week. During the fol¬ lowing two years this volume was doubled and it continued to grow moderately until, in 1877, Gustavus F. Swift established at the Union Stock Yards, Chicago, a similar business. Under the stimulus of this competition the trade in¬ creased rapidly, consignments were made to other cities in New England and New York, other houses entered the trade, and by 1885 it

became apparent that this new method of slaugh- . tering cattle near their native pastures and ship¬ ping the fresh meat was destined to supersede, largely, the older method of shipping them on

the hoof and slaughtering near the place of consumption. To-day a large portion of the fresh beef used in the principal cities east of Chicago, and out of the cattle raising belt, arrives at destination in refrigerator cars. What is true of fresh beef is true also of fresh mut¬ ton and pork.

In the early days of the fresh meat branch of the packing industry, it became apparent that new methods of handling and disposal at destination were necessary ; obviously, fresh meat could not be received in carloads and dis¬ tributed to the retail dealer, through an ordinary, unrefrigerated warehouse, as had been the cus¬ tom with cured meats. To meet the necessities of the case, refrigerated rooms were built, with systems of overhead tracking, on which quarters of beef and carcasses of small stock were stored and handled, suspended from trolley hooks. In connection with these refrigerated rooms, or beef coolers, as they came to be known in the trade, there were built suitable shipping rooms, offices, *etc.* These distributing houses were, as a rule, built adjacent to railroad tracks, enabling the direct discharge of meats from the cars. As the business began to assume some magnitude, it became evident to the packers that great care in the construction, maintenance and operation of these distributing houses was of the utmost importance ; it was therefore desirable that a packer own houses for distributing his fresh meat, thus being in position to control, absolutely, conditions of cleanliness and temperature. The earliest fresh-meat packers did not engage in the other branches of meat-packing; but as soon as it became apparent to the older packers, who had previously confined their fresh-meat business to the locality of their packing houses, that the new method of distribution was successful, they began to enter the fresh-meat business aggres¬ sively, which in turn forced the pioneers of fresh-meat packing to add the other branches to their business, because a

packer having all kinds of meat product to offer to the retailer had an obvious advantage. This diversification caused, in turn, the development of the distributing house, the addition of smoke-houses for smoking hams and bacon, storerooms for canned meats, lard, etc., until to-day the leading packers own, in the principal cities of the country, their dis¬ tributing houses, where the retailer may obtain any form of animal food-product, including many by-products. There are more than two thousand such houses scattered throughout the United States. This branch house system of distribution, by its economy and thoroughness, and its adaptability to supply a wide variety suited to all the local needs, has been one of the prime factors in the growth of the meat-packing industry.

The beginning of this branch of the packing industry was coincident with the successful ap¬ plication in a large way of refrigeration to railroad cars. The first cars were, however, comparatively crude, and the modern refriger¬ ator car, as used to-day by practically all of the packing companies, has reached its present state of development by a steady growth of improvements made from time to time. This matter of perfection of the refrigerator car has been one in which there has been great rivalry among the various packers, and to this com¬ petition is due the high efficiency of the present refrigerator car for carrying fresh meat. The

building, maintenance and care of these refrig¬ erator cars is the ‘field of one of the most im¬ portant departments in connection with the vari¬ ous packing companies. The cars must not only be kept in first-class running order so as to make them suitable for operating on fast trains, but they must be kept in a high state of clean¬ liness. The icing of the cars is also a very important feature and has to be done with the utmost care. Before loading, the cars must be iced at least 24 hours in advance, so as to be thoroughly cooled. They are then re-iced at the time of shipment and are re-iced in transit as necessary, depending upon the length of the journey. Immediately after unloading, the car is scrubbed with soap and hot water, all hooks are wiped clean and the car is ventilated so that it will return home in a sweet, clean con¬ dition.

Curing and Preservation by Salting, Smoking, *etc.* — The preservation of meat by saltmg, smoking, etc., was the first method ex¬ tensively practised, and the term ((packing,® now applied to the whole business, formerly had a narrower meaning and was used in connection with this branch exclusively. In fact this was, in the early

days, the only branch.

From the earliest times meats have been cured by salting and smoking and in principle there is nothing essentially different in the prac¬ tice of the modern packing plant from the curing processes used by the packers of earliest days. The business is now conducted on a much larger scale, and with more care as to conditions, particularly as to refrigeration and sterilization, so that meats are now cured with less salt than formerly, or to use the trade expression, mild cured.

The two methods of curing with salt are known as <(pickling® and ((dry salting,® and these terms are relatively descriptive. In pick¬ ling, the meat, after being cut into hams, shoulders, etc., is submerged in pickle or brine and kept under the surface with weights or other devices, so the salt in the pickle is diffused through the meat. This causes the strength of the pickle to decline and the meat must occasionally be removed, and placed in a fresh hogshead with restrengthened pickle. The usual time of cure varies with the size of the joints or pieces of meat, but ranges usually between 30 and 45 days. The pickle is made of various strengths for various cuts of meats, but is generally 40° to 50° salometer, and for hams, bacon and the finer cuts of meat contains sugar as well as salt and a small percentage of saltpetre. Meats for con¬ sumption in the United States are generally cured in sweet pickle.

The process of dry-ˆsalting is to pile the joints or cuts of meat closely in layers on the curing floor, first rubbing them thoroughly with salt, and sprinkling salt freely between the layers and on top. The piles are made three or more feet in height, and the meat is left for 10 days, when it is overhauled, rubbed again with salt and re¬ piled ; and this overhauling is repeated again in another 10 days. The time necessary for the curing by the dry-sajt method is substantially the same as by the pickling method. The dry¬ salting method is used; for most meats for ex¬ portation to Great Britain, and the method is frequently spoken of as <(English cure,® being the standard method in England.

Hams, shoulders, bacon and side meats are, after curing, generally smoked. The process of smoking is also quite old and1 its origin un¬ known. The meats are hung in brick houses or compartments in tiers, as closely together as practicable without touching, a slow fire of wood is built beneath, and the meats kept in the result¬ ing smoke for 12 to 48 hours. They are then cooled, wrapped, boxed and made ready for shipment. Hams and bacon, also shoulders, generally have a ‘brand burned in the skin be¬ fore wrapping. For shipment to hot climates the pieces, after wrapping in paper, are also ((canvased,® or sewn up in cotton sheeting, and coated with a thick pasty solution of China clay, barytes or the like, and then dried: This forms an air-tight, vermin-proof covering. Hickory and sugar maple are the best woods for smoking.

The preceding paragraphs relating to the curing of meats by salting, smoking, etc., describe the process as applied to meats of the hog. Beef is cured in like manner by pickling and’ is generally shipped to destination and kept in the pickle until removed for consumption. An exception is “dried beef,® being the suitable lean pieces, which, after curing in pickle, are smoked slowly for several days so as to dry them to a firm condition.

Preservation by Hermetically Sealed Cans, *etc.* — The method of preserving meat by pack¬ ing in hermetically sealed tin cans and the like was introduced commercially into the United States about the year 1873 at Chicago, Ill., by William Wilson and John Wilson. In the following year Libby, McNeil and Libby also en¬ tered this trade, and during succeeding years other houses followed. The business grew rap¬ idly from the beginning, and has reached great magnitude.

The process in brief is as follows : The meat after being trimmed from the bones and cut into small pieces is put into a curing pickle composed of common salt and a little sugar in solution. It is left in this pickle any length of time from a few days to 20 days, depending upon the degree of saltiness desired. It is then taken out of the pickle and cooked in hot water until thoroughly done. After this the gristle is trimmed out, the surplus fat is removed, and the pieces are cut into small and comparatively even sized bits, usually not exceeding four cubic inches. In this condition, and while still hot, it is stuffed by an automatic machine into tin cans which have previously been prepared and thoroughly washed. Each can is then weighed so as to get the correct quantity of meat in it, and is “capped,® that is, a small tin disc is soldered over the hole through which the meat is introduced into the can. The further steps of the process embrace the sterilization, or so-called “processing,® which consists in heating the cans for a

number of hours up to a tempera¬ ture of 250° to 350° F., depending upon the size of the can and the kind of meat. The object in heating is sterilization, being the same process as is pursued by the housewife in canning fruit, *etc.* The cans are then washed, cooled, labeled and the exposed surfaces are coated with a varnish to prevent rust. They are then ready to be packed and shipped to all parts of the world, and will keep for years without deterioration.

By-products. — The business of meat pack¬ ing as practised in Chicago and the other large

\

packing centres of the United States involves not alone meat preserving, but the entire range of slaughtering, preparation of the fleshy and other edible parts, and preparation of the by¬ products, such as hides, hoofs, horns, bones, hair, fats, intestines, blood and viscera. In many of the most prominent establishments these by-products are manufactured into glue, buttons, combs, curled hair, soap, candles, oils, glycerin, *etc.* All the modern establishments manufacture the blood and residual solids from their fat rendering apparatus into fertilizers, in some cases the blood-albumen being first separated and dried independently.

The accompanying diagram will illustrate graphically the disposition usually made of the different parts of beef cattle.

Corresponding parts of other animals are put to similar uses. 1 he stomachs of hogs are utilized for pepsin manufacture. Some of the glands of hogs, sheep and cattle, notably the thyroid and pancreatic, are used in the produc¬ tion of pharmaceutical preparations. Sheep skins first have the wool pulled from them and are then utilized for leather, the cuttings being made into glue. Hog hair and bristles are made into curled hair and brushes. Curled hair is sold for mattress making. All scraps and parts, not put to some other important use, are cooked, desiccated and used in many valuable products and as fertilizing material, the chief property of which is nitrogen.

General. — By the careful study of economy in utilization of by-products large values are now derived from parts formerly wasted. To¬ day there is practically nothing wasted. This close study of economy in saving everything enables the packing business to be done on an unprecedently small margin of profit. For a series of years, including 1915, the fiscal re¬ ports, made by some of the largest and most successful packing corporations to their stock¬ holders, show

that their profits ranged from 2 to 2j4 per cent of their distributive sales.

It must occur to all thoughtful persons that in a business of such large volume the securing of steady and sufficient supplies of fat animals is of prime importance, and the query naturally comes as to how this is done. Almost the en¬ tire supply of live stock is purchased1 from day to day, as needed by the various packing com¬ panies, at central markets in the large cities, such as the Union Stock Yards of Chicago, Kansas City Stock Yards of Kansas City, Na¬ tional Stock Yards of East Saint Louis, South Omaha, Neb., South Saint Joseph, Mo., South Saint Paul, Minn., National Stock Yards, Ill., Fort Worth, Tex., Sioux City, Iowa, Oklahoma City, Okla., Denver, Colo., Milwaukee, Wis. These stock yards are equipped to receive live stock in train loads — unload, pen, feed, water, and otherwise care for the comfort and health of the animals.

Live stock raisers most frequently sell their animals at home to a dealer, who, in turn, con¬ signs to a commission salesman at some central market, where the buyers for the various pack¬ ing companies meet in competition and bid1 for each lot or carload. The bidding is not by pub¬ lic outcry or auction, but by each buyer inde¬ pendently. There is no public system of grad¬ ing, but each purchase is made on individual in¬ spection and judgment of the buyer and salesman.

The development of these stock yards has

BOVINE

Beef

Tail

Sweetbread

Kidneys

f Hindquarters \ Forequarters

Not separated from hindquarters

Edible

Head

Feet

(Including 1 e g from knee down- • ward)

Hide

Tongue

Meat

Brain

Bones

Horns

Horn piths Tallow

Hoofs

Neatsfoot Oil Bones

Sinews

Leather

Hair

Pate

Leg and Tail Trimmings

Edible

{

Glue

Phosphatic fertilizing material

{

or raw bone meal

(Combs, Buttons, Ornaments, etc., r'li + tincrc / Potassium, ferrocyanide or

“ \ Nitrogenous fertilizing material

{

Glue

Steamed bone

White and striped Black and inferior

Shin

Joint and Toe

Combs, Buttons, *etc.*

[Potassium ferrocyanide or Cuttings j Nitrogenous fertilizing ma- { terial

f Potassium ferrocyanide or \ Nitrogenous fertilizing material Buttons, Handles, *etc.*

Cuttings Glue

f Gelatine

\ Phosphatic fertilizing material

Glue Grease

, Nitrogenous fertilizing material

f / Plasterers’ hair

] Body hair (Hair {dt

(Long hair of the tail — curled hair

Glue

Grease

Nitrogenous fertilizing material

Phosphatic fertilizing material < bone meaj

Blood

Viscera

Blood Albumen

Food for animals, particularly for calves Nitrogenous fertilizing material

Heart

Liver

Stomach

Edible

1 Tallow \ Tripe

Respiratory Organs Melt

I Desiccated animal food Nitrogenous fertilizing ma¬ terial

Entrails

Bladder

Caul and Interior ■ Fat

Gall

Weasand

Oleo Oil

Oleo-Stearine

f Grease

\ Sausage casings

(Is inflated with compressed air, dried and is used for containing paints, putty, *etc.*

(Sac — Fertilizing material •j Fluid — Desiccated for medicinal (purposes

f Meat dried for poultry food \ Sausage casing

Combined with other ingredients into butter substitute

Combined with other ingredients into lard substitute

Oil

Glycerin

Soap

kept pace with the growth of the packing in¬ dustry. Indeed, these large central markets for live stock and the packing plants are interde¬ pendent and mutually helpful. Together they constitute one of the modern wonders of our commercial development. The benefits to the raiser of live stock, the live stock dealer, the transportation companies, the retail dealer, and to the consumer, of an organized business that affords the producer an everyday cash market for any number of animals, the carrier a reliable and steady freight volume, and the retailer — and through ‘ him the consumer — a constant supply of the widest variety of kind and qual¬ ity of animal food products, can hardly be ex¬ aggerated. To appreciate these benefits, let the reader try to imagine a return to the conditions of a generation ago. Within the memory of many still engaged in the business, the farmer had only a local and very uncertain market for his live stock. He could sell in limited num¬ bers, must find his customer by inquiry and frequently had to wait for weeks after his stock was ready and ripe for slaughter. The butcher also depended on local supply, and must needs ride through the countryside and inquire, and frequently felt compelled to buy and use stock of a quality not suited to the demands of his business. He had to drive the animals to his little, unsanitary abattoir, slaughter them him¬ self in the cool hours of the night, and hurry the sale of the fresh meat before incipient de¬ composition. He was constantly oversupplied or undersupplied, had too much of one grade and too little of another, and so frequently met with losses that his margin of profit must needs be large. The consumer, of course, could fare but ill under these conditions. He might whet his appetite with the thoughts of a juicy porter¬ house or a prime rib roast, and find his butcher could furnish only veal or pork chops, and was compelled constantly to choose from a narrow and unattractive variety, and to pay an excessive price. Values were unstable and varied’ greatly, and producer, dealer and consumer alike suf¬ fered.

To-day the modern packing-house, with the central market for live stock which it has built upon one hand, and1 its system of refrigerrtion and distribution on the other hand, brings the producer and consumer into such near^ touch that the one can market his animals m any numbers any day, and the other can buy in any town or village of the country having railroad connections, any desired quantity and quality o so wide a variety of animal food products that his slightest whim or necessity can be satisfied.

This bringing together of the producer and the consumer the modern packer, with the aid of our railroads, stock yards and refrigeration, has accomplished, to the enormous benefit of both; and to-day the actual producer gets < a much larger part of the total price paid by the actual consumer than ever before. Investiga¬ tion by the United States Department of Agri¬ culture showed that the producer received about two-thirds of the price paid by the con¬ sumer for meat and by-products…

In this age of engineering and mechanical advancement, the use of machinery has, of course, played a prominent part in the develop¬ ment of the business of meat-packing. 1 tie modern packing plant is divided into many de¬ partments, so related with reference to each

other that the whole, in reality, constitutes a vast machine. The invention and perfection of machines to do the various kinds of work has been given a great deal of attention, and the practical men in connection with the different packing companies have vied with each other so that improvement has followed improvement, in many cases one machine being improved by another before fairly having the newness worn off. To-day, in the most up-to-date packing plants, the vast majority of the operations car¬ ried on are done by machines. Such plants are operated entirely by electric power, are lighted by electricity, supplied with water by electric pumps, refrigerated with cold brine circulated by electric pumps, and in some cases even the live animals themselves are hoisted from the ground to the top floor of the slaughter-house by enormous electric elevators, carrying a car¬ load at a time. They are hoisted by means of electrically-driven hoists. Hogs are scalded, scraped, cleaned and delivered to the chill-rooms by machinery, hand work being reduced to less than half what it formerly was. The meats are cut by machinery, also sprinkled and rubbed with salt and packed. Hams are branded by machinery, and are carried by me¬ chanical means to the loading platforms, ready to go into the cars.

In the handling of by-products, various ma¬ chines do all of the most important work. Fer¬ tilizing materials are cooked, pressed, dried, ground, sifted and packed in bags and weighed by machines. Bones are dried, sawn, made into knife handles, buttons, crochet hooks, etc., largely by automatic machinery. Glue is evap¬ orated, jelly sliced, jarred, broken, ground, bolted and packed into barrels by machinery. Soap is cut into bars, stamped, wrapped, packed into boxes, and the boxes nailed and printed by machinery. Soap powder is mixed, ground, sifted, packed into cartons, labeled, pasted and delivered to the boxes by machinery. So on, throughout the various departments, great at¬ tention has been given to the introduction and perfection of machines, so that the modern packing plant, volume considered, uses no more than half the hand labor that would have been required 20 years ago to do the same amount and variety of work.

The packing business is one of the largest industries of the country in the value of its output. For 1910 the census report shows 1,641 establishments employing 108,716 persons, with a capital of $383,249,000; value of output $1,370,- 568,101. This industry returns to the producers of the raw material 87.8 per cent of the total value of the products. Statistics of slaughter for the year 1909, are as follows :

Animals Slaughtered for Food.

In slaughter¬ ing and meat¬ packing In retail establish-slaughter—

Kind Total ments houses On farms

Beeves . 13,611,422 8,114,860 4,087,922 1,408,640

Calves . 6,515,976 2,504,728 2,879,648 1,131,600

Sheep and

lambs . 14,724,699 12,255,501 1,939,672 529,526

Hogs . 53,219,568 33,870,616 3,970,435 15,378,517

Goats and kids 285,553 33,224 133.340 118,989

All other ani¬ mals . 1,597 1,597 .

Total number. 88,358,815 56,778,929 13,012,614 18,567,272

The packing business is notable for furnish¬ ing a spot cash market for any quantity of live stock that the producer chooses to send to the market. It is notable for its ability to distribute products of live stock throughout the world, where the demand is greatest, for the enormous volume of business done by the large firms and for their very small margin of profit per cent of sales.

Louis F. Swift, President, Swift and Company, Chicago.

MEATS AND MEAT PRODUCTION.

The discussion of the subject will be confined to a consideration of the properties, use and production of the flesh of cattle, sheep and swine for human food. All animal tissues are made up of dry substance, or solid material, and water. The per cent of water in meats varies from 10 to 78. The two things which appear to have tlhe greatest influence upon the per¬ centage of water in meat are the age and con¬ dition, or degree of fatness, of the animal. Other things being equal, the younger the ani¬ mal the more water its flesh as well as other tissues contains, while the higher the percentage of fat in meat the lower the percentage of water. The extreme variation in the water content of different cuts and varieties of meats is due largely to an extreme variation in fat content. Thus all lean meat consists approximately of 75 per cent of water and 25 per cent of solid material. While the water in meats aids in their digestion and absorption in the alimentary tract, the nutritive value of meats rests largely on the quantity and character of the dry sub¬ stance or solid material they contain. From 50 to 65 per cent of the fat steer is meat. In other words, the dressed carcass of a steer rep¬ resents from 50 to 65 per cent of the weight of the live animal. The remainder is made up of by-products, in general, such as hides, fat, offal, etc., less valuable than beef. A physical exami¬ nation of meats shows them to be made up of muscular tissue or lean meat, fatty tissue or fats, cartilaginous tissue or the gristle, and bone. From the standpoint of the nutritive value of meat, gristle and bone are practically refuse.

Composition. — Chemically, meat is com¬ posed of protein, fats,

water, ash and carbo¬ hydrates, which are the necessary food constitu¬ ents for the production of energy and repair of the animal body. The amount of carbo¬ hydrates is so small as to make it almost a negligible factor. Extractives are also present in meats which are believed to be responsible for meat flavors. While differences in the chemical composition of two cuts of meat are not necessarily an indication of their relative food value, yet the composition of meats in gen¬ eral is important as indicating their place in the diet of man. Lean meat contains from 15 to 21 per cent protein ; whole eggs, 12.5 per cent ; fresh, whole milk, 3.4, and cheese from 25 to 30 per cent. Fresh vegetables, other than peas and beans, contain 0.5 to 3 per cent protein ; fresh peas and beans, 2 to 7 per cent; wheat flour, 10 to 12 per cent; and dry peas and beans, 18 to 25 per cent.

Thus it will be seen that meat contains a relatively high per cent of protein as compared with other staple foods. The mineral matter comprising the ash of meats is made up chiefly

of potassium phosphate, with small amounts of magnesium, sodium, calcium, phosphates and chlorides. The percentage of ash in fresh edible meats varies from 0.5 to 1.5 per cent. The organic extractives of meat consist mainlv of creatine, certain basic nitrogenous sub¬ stances including the purine bases, and small amounts of lactic acid, glycogen or animal starch and glucose in traces. Glycogen and glucose are the only carbohydrates in meat and occur normally in very small quanti¬ ties. The percentage of organic extractives in meat varies widely with the kind of meat and the location of the cut, from 0.7 to 2 or 3 per cent.

Dietetic Value. — Meat is a staple food in the American dietary, chiefly as a source of protein and fat. In the average American dietary, 28 per cent of the protein and 58 per cent of the fat is represented by the consump¬ tion of meat from cattle, sheep and swine. Pro¬ tein is essential for the growth and repair of body tissue, and while the actual bodily re¬ quirement for protein may be relatively small, it seems probable that a fairly liberal protein intake is essential for optimum conditions of health and vigor. Meat is an especially satis¬ factory source of protein in the diet, first, be¬ cause it is so readily and completely digestible as compared with the vegetable proteins, and, second, because it is better adapted to the body's requirements and thus possesses a higher physio¬ logical value. Illustrative of the latter point, in a recent experiment on a human subject it was shown that the following minimal amounts of the various proteins indicated were

required to cover the protein requirements of the body and to protect body protein from loss :

Meat protein . 30 grams per day.

Milk “ 31 “

Rice “ 34 “

Potato “ 38 “ “

Bean “ 54 “

Bread ” 76 “

Corn “ 102 “

The value of meat as a food is also enhanced by its content of organic extractives. These substances are among the water-soluble con¬ stituents of meat and give to meat its charac¬ teristic flavor. Thus, it may be shown that the greater palatability of the higher priced cuts of beef is associated with a higher percentage of organic extractives in the lean meat. While the organic extractives have practically no food value, as the term is ordinarily used, yielding but little energy or structural material to the body, they are known to be potent in stimulating the digestive glands, especially the gastric glands, and thus probably play an important role in digestion.

From one-tenth to one-third the cost of food in the average family is paid out for meats. Some facts are given therefore which throw some light on the question as to the desirable qualities of beef. Beef is used to illustrate the matter of quality because it is pre-eminently the most popular flesh food and because quality means more in beef than in mutton or pork, especially the latter. If all the desirable quali¬ ties of beef could be secured in one cut it would be palatable, nutritious and economical. This is practically impossible, however; there are wider differences in cuts of meat as to palatability and cost than as to food value, while the less ex-

pensive cuts may be rendered more palatable by proper methods of cooking. Palatability of beef depends upon tenderness, juiciness, quality and flavor. Tenderness, juiciness, quality and flavor depend upon the age of the animal, the location of the cut, the condition of the animal as to ripeness, the degree of ripeness of the meat and the method of cooking. As a rule the younger the animal the more tender the meat. Perhaps nothing, however, has more influence upon ten¬ derness than cooking, — different cuts requiring different treatment. The flesh of young animals invariably lacks that fine marbled appearance, or distribution of fat throughout the muscular tissue that is so characteristic of beef of high quality taken from mature bullocks that are in a finished or well-fatted condition. The beef of young cattle is also more or less lacking in flavor. Satisfactory flavor in beef is of course largely a matter of individual preference, but a reasonable state of maturity and development is required to give beef its most characteristic flavor. It is significant that the more tender cuts of beef, such as the tenderloin, lack notice¬ ably in flavor. Good judges agree that the best flavored beef comes from muscles which are frequently used during the life of the animal. This exercise renders these muscles tougher, but of distinctly higher flavor. Beef cut from cattle of rather advanced age, or for that matter from cattle of any age, is rendered relatively more tender by the ripening process, bresh beef that has not hung in the cooler for 10 days to two weeks lacks both in tenderness and flavor. Even a longer time in cold storage is desirable with the highest grade of beef. The beef cut from well-fattened steers of good quality or containing a high percentage of beef blood can be much more satisfactorily ripened in cold storage than that cut from mongrel bred steers which have been slaughtered in an indif¬ ferent condition. Carcasses of prime steers pos¬ sess a characteristic coating of surface fat which protects the lean beef from too much exposure and gives it an opportunity to fully ripen. In the case of the carcass from the medium and common grades the beef frequently lacks that surface fat which seems to serve such a useful office during the ripening process. Low grade beef will literally rot before it will ripen. Juici¬ ness in beef is largely dependent upon the percentage and distribution of fat, and the method of cooking. While an abundance of fat anywhere on a cut of beef adds materially to its apparent juiciness, an even distribution of fat throughout the muscular tissue, a condition which gives to the meat when carved (espe¬ cially when cold) that beautifully marbled ap¬ pearance, is the leading factor in contributing

ideal juiciness to the beef. Juiciness may be easily destroyed by too prolonged roasting or broiling. The marbled quality in beef is seldom seen except in reasonably mature well-fatted cattle.

Prime condition in the live animal is essen¬ tial for producing high quality in beef and other meats as well. In order to secure the highest quality in meats the consumer must pay a rela¬ tively high price for the cuts of meat or buy considerably more fat than can be agreeably eaten along with the lean of the cut, thus mak¬ ing it necessary to utilize the superfluous fat for other purposes or consider it as waste or refuse. In either instance it renders the edible

meat of high quality relatively high priced as compared with low grade meat. On the other hand, meat of high quality need not necessarily be the most expensive for the consumer to pur¬ chase, for, when properly cooked, it is so de¬ lightfully tender and juicy that all of it is edible, save possibly a small amount of superfluous fat. However, this extra fat is of such quality that it can be readily rendered and used for cooking purposes to supplement or in some instances satisfactorily take the place of more expensive shortening. . Another fact which should not be overlooked is that the cheaper, and as generally considered, less palatable cuts taken from a carcass of beef possessing high quality are often fully as desirable as the best cuts from low grade carcasses.

Packing.— The packer or slaughterer of meats is willing to pay a premium for animals in prime or well-fatted condition because when slaughtered they yield a higher percentage of dressed meat, fat,, and, in the case of cattle, hides. Not only is this true, but the packer understands that prime condition in the live animal is a strong indication of high quality in the carcass. In fact, it may be said that con¬ dition is a prime requisite for producing high quality. It has a greater influence undoubtedly than high breeding. Again, the packer pays a premium for cattle prime in condition and prime in quality, or good breeding, because in well-bred animals the percentage of high priced cuts is greater than in mongrel or indifferently bred stock. Undoubtedly, the tendency of the meat trade for several years has been to concentrate a large part of the slaughtering of the country at leading market centres like Chicago. In other words, gigantic and powerful packing companies have developed from small begin¬ nings until they have within their combined power the ability to practically regulate the market for live cattle, hogs and sheep and meats the world over. Chicago is the greatest live stock and meat market in the

world. A large majority of local meat markets in the cities and visages throughout the United States are sup¬ plied through the medium of the packing-houses located at our leading livestock markets. Backing-houses can furnish any grade of meat desired For example, in beef they can supply all grades from No. 1 to canning stock at prices corresponding with the quality. So econom¬ ically is the business of the packing-houses ad¬ ministered and so well organized are the various industries growing out of the wholesale slaughter of meats that it is possible for them to sell practically all grades of beef in cities and vil¬ lages remote from their central plant at prices which successfully compete with local competi¬ tion. The local purveyor of meats can buy Whatever grade of meat he can dispose of to advantage. As a rule in the smaller cities and villages the retailer buys a medium to low grade carcass, because his trade is not willing to pay prices which of necessity must be paid to secur.e meat of high quality. It is safe to say that the beef offered at such markets is seldom above No. 2 in grade, no matter whether the market is supplied by packers or local slaughterers.

It is impossible to predict the ultimate effect upon the meat trade of the change from local to packing-house slaughtering. On the one hand a packing-house trust can control the price of

live cattle, sheep and swine in such a manner as to reduce, temporarily if not permanently, or in some instances, destroy entirely the profits of the meat producing industry; on the other hand, such a trust can control the price of meat in the carcass to such an extent as seriously to discourage the consumption of meat by raising the price to such a degree that it will become one of the most expensive articles of diet. This power is not likely to be permanently exercised to the disadvantage of the public good, for it should be borne in mind that the very life of the packing business depends upon an active de¬ mand for meats by the consuming public. This demand will not exist when prices of meats are too high as compared with other food¬ stuffs. Producers will cease to prepare live¬ stock for the block when the business becomes clearly unprofitable. In other words meat is not an absolutely necessary part of the diet of the masses, nor is the permanency of agricul¬ ture dependent upon continuous livestock production.

Consumption and Production. — Notwith¬ standing improved methods for meat produc¬ tion the actual cost of cattle, sheep and swine as put upon the market by producers the world over is steadily on the increase. Nowhere is this increased cost any more manifest than in the United States. Changes already referred to in the methods of slaughtering and increased cost of production of meats have not lessened the gross or even the per capita consumption of meats in the United States or Great Britain. The per capita consumption of beef in the United States has increased in the last few years, while it is probable, although statistics are wanting to substantiate the statement, that the per capita consumption of other meats has increased still more.

The following table shows the annual per capita consumption of meat, including beef, mutton and pork, for different countries :

Annual Per Capita Consumption of Meats.

COUNTRY

Bureau

of

Statis¬

tics

and

other

authori¬

ties

Royal

Statis¬

tical

Society,

1902

Oster—

tag

for

1890

Mul—

hall

pub¬

lished

in

1899

Argentina .

140

Austria-Hungary .

64

Australian Commonwealth

262.6

246

208i

Belgium .

70

Belgium and the Netherlands .

69

Canada .

129

Cuba .

124

Denmark .

76

France .

78.9

80

74

75

Germany .

117.1

99

70

(74 2

\ 66 3

Great Britain .

105

115 4

Greece .

58

Italy .

46.5

23

27

Netherlands .

48

New Zealand .

212.5

Poland (Russian) .

62

Portugal .

44

Russia .

48

50 5

Spain .

49

Sweden .

62

Sweden and Norway .

87

74

Switzerland .

75

United Kingdom .

121 . 3 6

/ 108

United States:

\ 93 7

Dressed .

185.8

150 8

120

141

Dressed and extra edible

parts .

220 5

Edible dressed and extra

edible parts .

182.6

1 Including New Zealand. 2 1899. 3 1883. 4 1895.

s Excluding Poland. 6 1898-1902. 2 1875. 8 1885.

* Crop Reporter, February 1912.

Meat Animals of the Principal Countries of the World.

COUNTRY

United States (1917) .

Argentine (1916) .

Australia (1916) .

Austria-Hungary:

Austria (1910) .

Hungary (1913) .

Belgium (1913) .

Brazil (1916) .

Bulgaria (1910) .

Canada (1917) .

Denmark (1917) .

France (1917) .

Finland (1914) .

Germany (1917) .

mdia, British (1914) .

ndia, Native Stock .

Italy (1914) .

. apan (1915) .

vlexico (1902) .

Netherland (1917) .

New Zealand (1917) .

Norway (1916) .

Rumania (1917) .

Russia (1914), incl. Poland, Caucasus, Siberia, Central

Spaing i9 16) .’ .’!.’!!.’”!!!.’!!!!!! 1 ! ! ! ! ! ’ ! .

Sweden (19i 7) .

Switzerland (1916) .

Union of South Africa (1911) .

Great Britain …

Ireland .

Uruguay (1908) .

Other countries (1911-1915) .

Cattle

Swine

Sheep

Goats

63,617,000

67,453,000

48,483,000

25,866,76 3

3, 197,337

43,225,452

4,563,808

9,979,000

880,000

72,866,000

9,160,009

6,432,080

2,428,101

1,256,778

6,206,867

1,849,484

28,962,180

6,824,657

1,412,293

17,329,210

6,659,858

268,752

7,204,920

‘ 6,919,550

1,606,363

527,311

8,669, 260

1,464,719

*3,202,283

3,619,382

2,369,358

14,718,657

2,458,158

1,650,623

480 , 007

12,443,304

4,202,280

10,586,594

1,167,112

§418,000

1,309, 000

13,000

21,462,371

2,763,610

6,167,469

1125,042,000

J12,236,000

23,092,000

H8,306,0C0

30,673,000

6,646,000

2,722,000

113,824,000

1,387,922

333,276

2,768

97,396

5,142,000

616,000

3,424, 000

4,206,000

2,301,532

2,502,700

1,185,438

278,186

520,275

25,270,386

1,119,875

221,146

1,282,271

229,981

1,049,702

371,205

1,655,110

84,197

52,052,000

14,995,000

1172,273,000

3,070,903

2,814,465

16,012,277

3,207,360

3,202,381

1,029,976

1,344,202

1,615,645

544,021

171,635

358,993

5,796,949

1,081 ,600

30,656,659

11,762,979

12,342,268

2,998,657

27,770,555

3,744,453

4,907, 466

947,572

268,853

8,192,602

180,099

26,286,296

19,951

6,400,000

6,100,000

48,150,000

29,400,000

* Includes milch cows.

t Other cattle.

t Includes small buffaloes.

§ 1910.

1 Includes goats.

Per capita consumption of meat in all coun¬ tries for which the information is obtainable, probably of dressed weight is expressed in pounds, unless otherwise stated. For Germany, some parts are included in addition to dressed weight in the preceding table.

From this table it is evident that the per capita meat consumption for the different coun¬ tries reported varies within wide limits, Italy ranking lowest and the Australian Common¬ wealth highest. The high figure for the latter country is largely fictitious, due to the excessive waste of meat and meat products for which the Australian is noted. The low figure of 46.5 pounds of meat as the per capita consump¬ tion in Italy is the result of a thorough inves¬ tigation of the slaughter of meat animals in every commune in Italy, made by the Director-General of Public Health. The per capita figure for the United States ranks third in the list. Of the estimates given in the table of the meat consumption in this country, those of the Bureau of Statistics are undoubtedly the most accurate ; and of the three figures given, the last, representing the per capita consumption of edible dressed meat and of other edible por¬ tions of the carcass, is undoubtedly the most significant as indicative of the actual consump¬ tion of meat.

As a nation the United States leads all others in the production of meat. The table presented on p. 495 shows that the United States produces one-third of the world's supply of beef. The United States also produces more than one-half the pork and one-seventh of the mutton of the world.

The accompanying tables are interesting as showing the relative amounts of beef, mutton and pork consumed in a few of the principal countries :

Average Per Capita and Per Family Con¬ sumption of Meat Per Year in the United

States.*

CLASS OF MEAT

Veal .

Beef, except veal -

Total beef .

Lamb .

Mutton, except lamb Total mutton…

Pork, including lard. Total .

Consumption of edible dressed meat and of extra edible parts combined

/• - - -

Per

private

family

In

per cent of total

Per

of 4.6

consump—

capita

persons

tion

pounds

pounds

per cent

7.7

35

4.20

75.3

346

41.23

83.0

382

45.43

5.0

23

2.72

6.3

29

3.46

11.3

52

6.18

88.4

407

48.39

182.7

841

100.00

♦Bulletin 55, U. S. Dept. Agr. Bur. of Stat. “Meat Supply and Surplus, with Consideration of Consumption and Exports.” 1907.

The table clearly indicates the preponderate and almost equal importance of beef and pork in the American dietary. Of beef, mutton and pork alone, the estimates point to a yearly con¬ sumption, by the average American family of 4.6 persons, of a little over half a ton of dressed meat (1,014 pounds) or of a little over two-fifths of a ton of edible meat.

Consumption of Meat in Germany for 1904-06, Inclusive.

(Bulletin 55 Bureau of Statistics)

Results expressed in pounds per capita per annum and in per cent of total meat consumption.

1904 1905 1906

KIND OF MEAT

Beef, incl. veal. . M uttonandlamb Pork, incl. lard.

Goat meat .

Horse meat …. Other meat*… .

Pounds

Per

Pounds

Per

Pounds

per

capita

cent

per

cent

per

of

total

capita

of

total

capita

38.4

35.4

34.6

34.2

33.7

2. 1

2.0

2.2

2.2

2.1

66.0

60.8

62.2

61.5

60.8

0.9

0.8

0.9

0.9

0.9

1.1

1.0

1.2

1.2

1.2

·····

108.5

100.0

101.0

100.0

98.7

Per

cent

of

total

34.1

2.1

61.7

0.9

1.2

100.0

* Too small for expression.

Per Capita Consumption of Meat Per Annum in the United Kingdom, Average for 1898—

1902*

Results expressed in pounds

KIND OF MEAT

Beef and veal .

Mutton and lamb Pork .

Domestic

Imported

Total

35.9

20.9

56.9

17.0

10.5

27.5

14.6

22.2

36.8

Total

67.5 54.3 121.8

* Vols. 65 and 67, Royal Statistical Society.

Williams has conclusively shown that the importation of American and other foreign beef and mutton has materially reduced the Lon¬ don wholesale price of these meats. His state¬ ment is here reproduced :

Average wholesale price of beef in Londor

markets :

1876-80 from 5id. to 8 d. per pound.

1895 from 2fd. to 6*d. per pound.

Average wholesale price of mutton in Lon¬ don markets :

1876-80 from 7fd. to 9 d. per pound.

1895 from 2fd. to 7fd. per pound.

The total amount of meat products exported from the United States in 1915 was 75,243,690 pounds, valued at over $900,000,000. In 1916 50,416,690 pounds valued at $780,000,000 were exported. Meat production is one of the leading industries of the farms in Iowa, Illinois, Mis¬ souri, Indiana and Ohio. In fact wherever corn thrives there we find meat production an important industry. Corn is undoubtedly more largely used in meat production than any other feed. The problem of economic meat produc¬ tion in the United States is largely a question of the best method of utilizing corn and its by¬ products. There is a gradual and apparently •necessary and certain change, just beginning, which will have an important bearing upon beef production in the United States. With the closing of many ranges in the range country which have hitherto furnished a high percent¬ age of stockers and feeders which have been finished on the corn belt, or at any rate upon corn grown in the corn belt, the problem pre¬

sents itself, where are cattle feeders to look for their future supply of feeding cattle? Every¬ thing points to the conclusion that ultimately more of the cattle fatted for the market on the high-priced lands in the corn belt will be bred and reared there. In other words the entire process of beef production will necessarily be

carried on by the majority of cattle men. As it is, about 85 per cent of the native beef cattle marketed in Chicago have been previously bought as feeders and finished by cattle feeders who do not breed or rear the cattle they feed. The tendency in meat production at present is to put livestock in marketable condition and market them at an earlier age. This system in¬ volves better bred animals, more liberal feeding and a large use of nitrogenous feeds.

Bibliography. — Douglas, Encyclopaedia of Meats'; 'Meats: Composition and Cooking' (U. S. Dept, of Agriculture, Farmers' Bulletin No. 34) ; Distribution of the Agricultural Ex¬ ports of the United States 1897-1901 (U. S. Dept, of Agriculture, Section of Foreign Mar¬ kets, Bulletin No. 29) ; Henry, 'Feeds and Feeding' ; Parloa, 'Home Economics) ; 'Mar¬ ket Classes and Grades of Cattle) (University of Illinois Agricultural Experiment Station, Bui" letins Nos. 78 and 90).

Herbert W. Mumford,

Professor of Animal Husbandry , University of

Illinois.

MECCA, mek'a, or MAKKA, Arabia, the

holiest city of Islam, the capital of the kingdom of Hedjaz, about 49 miles due east of Jiddah, its port on the Red Sea, with which it has tele¬ graphic communication. The Mohammedans call it Umm-al-Kora, "Mother of Cities,® and it derives its sanctity from having been the birthplace of Mohammed. The city stands in a narrow, sandy

valley, enclosed by barren hills from 200 to 500 feet high, and is supplied with water from the mountains to the east by an aqueduct built in the 9th century, by Zu-baidah, wife of Haroun-al-Raschid. The great mosque Beitu ’llah (House of God) or El-Haram (The Inviolable), enclosing the Kaaba (q.v.), the Moslem “holy of holies,® occupies a central square which divides the city into the northern upper and the southern lower towns. The unpaved streets are wider than is usual in Oriental towns, and the houses of stone, often three stories high, are lighted with win¬ dows looking on the street, giving them an Oc¬ cidental appearance. The stationary population is about 60,000, but the city is large enough for more than three times that number, and is an¬ nually filled at the time of the Hadj or pil¬ grimage to the Kaaba, when apartments in al¬ most every house are rented to strangers. This pilgrimage customary among the Arabs in early and idolatrous ages, and subsequently enjoined by Mohammed on all his followers, is the foundation of Mecca’s fame, and the only source of the inhabitants’ wealth and occupa¬ tion.

The Meccawi, or inhabitants of Mecca, are, with the exception of a few Hedjazi Bedouins, all strangers by birth or parentage. They are, in fact, settlers or children of settlers, attracted hither by the love of gain, and as they care nothing for learning, the colleges of Mecca have fallen to decay, and the libraries, once rich, have disappeared. Mecca during the pil¬ grimage becomes for three or four months in the year the greatest market in the East.

The pilgrims converge upon the holy city from three directions; those coming from the south are Mohammedans from Oceanica, Java, Sumatra, Indo-China, India, Turkestan and southern Persia, who pass into the Red Sea

through the Strait of Bab-el-Mandeb and on to Jiddah, the port of Mecca; the northern branch of the pilgrims, north Persians, Turcomans and people from Asia Minor and European Turkey, go southward to the holy city both by the land and sea routes; the third stream is from the west, Egyptians, Moroccans, Algerians, Tunis¬ ians and Turks, who reach Jiddah through the Suez Canal. For years past the average num¬ ber of pilgrims passing through the Suez Canal to Jiddah has been 16,000, but this number is sometimes greatly exceeded; the number in 1901 was 26,000, and in 1902 was over 40,000. The northern pilgrims, however, are only a small part of those who annually convene at Mecca. The total number every year exceeds 100,000, practically all of whom are present at the fete of Bairam. The

Sherifs of Mecca, direct de¬ scendants of Mohammed, are now a numerous and widely spread body. They all wear the same costume, priding themselves on the green robe which marks their descent. These nobles, as they may be called, elect the Sherif of Mecca, and their choice is formally confirmed by the Ottoman sultan. Ptolemy mentions Mecca un¬ der the designation of Macoraba. Mecca has had a chequered history. According to Arab legend Ishmael dwelt there, and his descend¬ ants were driven out by the Banu Jurhum, who were themselves ousted in turn by the Khuza'a about 210 a.d. Mohammed was born here, bur for eight years was opposed by the city's nobles. In 692 A1 Hajjaj laid siege to the city and on taking it slew the pretender Abdullah Ben Zobeir. From 1517 to 1916 the Sherifs of Mecca derived their authority from the Sultan of Turkey. The Wahabees took it in 1803; but in 1833 it was given up to Mehemet Ali, whose son Ibrahim was made Sheik el Haram. Upon the establishment of the kingdom of Hedjaz in 1916 Mecca came under the new regime. Con¬ sult Kahn and Sparroy, 'With the Pilgrims to Mecca' (New York 1905) and Wavell, A. J. B., 'Modern Pilgrim in Mecca' (1912).

MECHAIN, Pierre Francois Andre, pe-ar fraii swa, ma-shan, French astronomer: b. Laon, France, 16 Aug. 1744; d. Castellon, Spain, 20 Sept. 1805. He became a mathematical tutor and devoted himself to the study of astronomy in his spare moments. In Paris he gained the interest of the astronomer Lalande who as¬ sisted him to a governmental position, in which he was engaged in the survey of the French coast and in astronomical observations. The Academy of Sciences elected him a member in 1782, and in 1785 he was editor of Connaissances des Temps, in which appear some of his most valuable scientific papers. He was com¬ missioned by the National Convention in 1791, in company with Delambre, to measure the arc of the meridian between Dunkirk and Barce¬ lona. The results of the calculations made failed to satisfy him because of a slight dis¬ crepancy and though now appointed a director of the conservatory at Paris he persuaded the board of longitude to commission him to meas¬ ure the arc between Dunkirk and the Balearic Isles, but died of fever in Spain while on his mission. Consult Delambre, 'Histoire de l'Astronomie au dix-huitieme Siecle.'

MECHANICAL DRAWING. See Draw¬ ing, Mechanical.

MECHANICAL ENGINEERING

MECHANICAL ENGINEERING is that branch of the science and art of engineering which relates specially to machinery. It is closely allied to all other classes of engineering, inasmuch as there is hardly an occupation or industry in which machines of some sort are not directly or indirectly concerned, and it is often, for this reason, difficult to draw the line clearly between one class and the other. The civil engineer who plans and supervises the building of a railroad calls to his aid the machinery used in excavating, blasting, building masonry and numberless other mechanical processes required in the work, all of which are the result of mechanical engineering. Electri¬ cal engineering would accomplish comparatively little in the production of light and transmission of power were it not for the dynamo and other machinery on which dependence is placed for the manufacture and use of electric current. Mining engineering would be of little use in devising means for extracting the coal and mineral treasures buried in the earth if suitable machinery planned by mechanical engineers could not be employed to assist the labor of men. In marine engineering it is the mechani¬ cal engineer who designs the steam plant which produces the motive power for the propulsion of the steamship, and without his assistance there would be no such a thing as a steamship. In dealing with problems relating to water¬ works, the hydraulic engineer would be power¬ less if he could not make use of the pumps and hydraulic machinery which the mechanical engi¬ neer has devised. In every kind of industry where power is required, whether it be con¬ nected with engineering, architecture, chemis¬ try, agriculture or any other subject, the me¬ chanical operations involved are based on the continuous operation of the machine constitut¬ ing the motive power, whether it be a steam engine or water wheel or other motor, and these are the products of mechanical engineer¬ ing. When we come to fully analyze the sub¬ ject, therefore, it appears that mechanical engineering so far underlies engineering of every class, and all kinds of industrial oper¬ ations, that it can almost be said to sustain the whole fabric of modern civilization.

Mechanical engineering, in its strictest sense, relates simply to the design of machines. In its broad sense it covers not only their design but all matters relating to their proper construction and operation. In its common application it has for its scope both the design and construc¬ tion of machines required for performing cer¬ tain desired

operations, and in addition the de¬ sign and operation of the complete industrial plant, of which the individual machines form a part, and the construction of the plant in such a manner as to secure a successfully working whole for whatever purposes the plant is built. A large part of the mechanical engineering re¬ quired at the present day consists in the as¬ sembling of machinery to produce pertain de¬ sired ends, rather than in the design of the machinery itself. In many cases, the machinery has already been designed and constructed by engineers of the past and the perfected ma¬ chines can be had by purchase in the market. This class of mechanical engineering covers a wide field. Perhaps its scope in this field can best be shown by referring in some detail to a

familiar example. Take the case of the engi¬ neering required in a large modern hotel. The mechanical plant of such an establishment em¬ braces a great variety of machinery, among the most important of which are the machines and appliances required for power, heating, ventila¬ tion, lighting, elevator service, distribution of hot and cold water, fire protection, refrigera¬ tion, ice-making, laundry work and cooking. The work of the engineer, although confined mainly to the mechanical plant, must, at the very outset, be directed to the building itself. The building, no doubt, accords with the mod¬ ern ideas of construction which call for a framework made of iron, in the design and construction of which the architect must have the assistance of the mechanical engineer. Not only this, but there must be, at the outset, a careful consideration of the required location of the various mechanical appliances, so that in working out the details of design relating to the building the architect may provide the necessary amount of room. He must leave a place for the boilers, engines, steam turbines, dynamos, pumps, etc., which make up the steam plant, and room also for the supply and storage of fuel. Provision must be made for the re¬ ception of flues, ducts, pipes and wiring, which pass up through the building and which are dis¬ tributed here and there to the different rooms. The character of the structures which may be needed for supporting the machinery, and the location of such structures, must also be planned at the outset so that the building may be prepared for them before it is too late. In the design of the mechanical apparatus, one of the first questions for the engineer to con¬ sider is the size and character of the steam plant. In dealing with this matter he ascer¬ tains all the uses to which steam is applied, embracing the generation of power, the pump¬ ing of water, the supply of steam for all kinds of heating and cooking, and that required for ventilation. With the data thus obtained he determines the total amount of steam

required for all purposes and then calculates the boiler capacity needed to furnish the steam. For the next step he decides upon the type of boiler best suited for the purpose, whether fire-tube or water-tube, horizontal or vertical, or whether internally or externally fired, and fixes upon the number and size of the units as well as their location. He then makes a plan showing the location of the boilers in the building; the style of the brick setting, if externally fired; the arrangement and location of the smoke flues and of the stack or chimney to which they connect. Having done this and settled all matters relating to the accessories which form a part of the boiler plant, he takes up, in due course of time, the remaining portion of the work relating to the boiler plant, which may be described at this point because it is representa¬ tive of much of the work which requires to be done in relation to the other departments of the plant. He draws up specifications describ¬ ing in full detail the character of the boiler plant desired and what is expected of it as regards capacity and economy. These specifi¬ cations are submitted to boiler manufacturers who are asked to furnish proposals for the construction of the plant in the manner de¬ scribed. When the proposals of the different

bidders have all oeen received, the engineer examines them, and after consulting with the owner of the property, selects one of the par¬ ties with whom to contract for doing the work. Next follows the inspection of the boilers in process of construction in the shop and erection in the building, the object in view being to de¬ termine if all the terms of the specifications are complied with. Finally, when the plant is com¬ pleted and the contractor sets it to work, the engineer submits it to whatever tests may be required, and thereby determines whether the guarantees which have been made regarding the capacity and economy are fulfilled, and whether the plant performs its work with that degree of success and satisfaction that is called for by the specifications. Referring now to the con¬ struction of the remaining departments of the mechanical plant, the next thing considered is the motive power. The greater part of the power in such a plant is likely to be transmitted by electricity, and, consequently, the motive power is that required for generating electric¬ ity. (See Electrical Engineering). After aeciding on the number, size and type of the generator units, he must then locate them, and make a plan showing their respective locations with reference to the boiler plant and other parts of the building. At the same time there must be laid out on the plan a system of steam¬ piping connecting the boiler to the engines or turbines, and this must be arranged with a view to supplying steam to all other points of use, including the heating of the building. Next in order, the pumping machinery re¬ quires attention. This embraces the boiler feed pump, the various pumps used for the differ¬ ent classes of hotel work, the elevator pump, if the hydraulic system is employed, and the fire pump. Tne engineer must determine the proper size of each one according to the amount of water to be pumped, and he must select the type of pump, fix its location, show it on the plan and extend the system of steam¬ piping to furnish each with the proper supply. He must also plan the exhaust piping re¬ quired for each engine, turbine and pump, the necessary vent pipe for carrying the waste steam to the atmosphere, and, if exhaust steam is used for heating, the required connection of the exhaust pipe to the main supply of the building. There must be a heater provided in the exhaust pipe system for heating the feed water before it is pumped to the

boilers, and another heater for the supply of hot water to the building, and both of these, in their selec¬ tion, location and connection, require the care¬ ful attention of the engineer. They must be properly laid out and shown on the plan. A complete system of water piping is required, connecting boilers, pumps, hydrants and ele¬ vators, to say nothing of the hot and cold water supply pipes which extend to the various rooms of the hotel, and the location of these must likewise be shown by means of a suitable plan. Not the least important part of the me¬ chanical engineering for the building is the design and construction of the heating and ventilating apparatus. Calculations of the amount of heat and radiating surface needed, the quantity of air required to be changed in a given time and the sizes of the mains and returns are involved in this work. Here, also, the kind of the system to be employed, the

location and type of the heating and ventilat¬ ing apparatus, including all the necessary de¬ tails, are questions which the engineer must consider and decide, and the results must be indicated by proper plans. These various parrs of the work are made the subject of detailed specifications, in the manner already referred to, and, likewise, proposals for the installation of the work are obtained, contracts awarded, inspection carried on during construction and the work tested for acceptance when it is completed, all of which is done under the jurisdiction of the mechanical engineer. In much the same manner, the selection, location, construction and installation of the remaining parts of the mechanical plant, embracing ele¬ vator machinery, laundry machinery, refriger¬ ating machinery, ice-making machines and the many other appliances concerned in the work of the hotel are carried out under his super¬ vision.

The same class of mechanical engineering as that referred to in the above example is that involved in the design and construction of in¬ dustrial plants of various kinds, such as cot¬ ton-and woolen-mills, bleacheries, paper-mills, rubber-mills, machinery and other manufac¬ tories, this branch of the profession being com¬ monly known as mill engineering. In all of these cases the elementary parts consist of the power plant, which is sometimes operated by steam, sometimes by water and often by both, the machines in the mill or manufactory and the pulleys, shafting and belting required to transmit the power from the one to the other. The work of the mechanical engineer in these plants consists in properly assembling the vari¬ ous machines so as to perform their functions, the selection of an appropriate power plant and the proper design and arrangement of the transmitting apparatus

required for operating them.

The work of the mechanical engineer is of paramount importance in the construction of steamships. Not only does the design of the boilers and engines on which the whole opera¬ tion of the ship depends originate with him, but he is also concerned in the design, loca¬ tion and connection of the multitude of auxil¬ iary steam appliances which abound through¬ out the vessel and which contribute so much to the comfort of the passengers. The mod¬ ern steamship is required to contain all the appointments of a first-class hotel. The serv¬ ices of a mechanical engineer are many times more needed in its design and construction than in that of a hotel, for the reason of the con¬ tracted space in which the machinery is neces¬ sarily enclosed.

One of the most important industries in which the mechanical engineer is a leading figure is that of the steel-rail-mill. Here the plant, which is distributed over many acres of land, embraces immense blast furnaces where the pig iron is made, elevators by which the raw material is lifted to the top of the fur¬ naces, blowing engines which produce the air-blast required at the base of the furnace, con¬ verters in which the iron is changed to steel, hydraulic lifts by which the converters are manipulated and the steel blooms moved to cars, trains of rolls with their powerful direct-connected driving engines where the rails are rolled from the masses of white-hot metal,

together with their reheating furnaces and, in addition to all these, the extensive boiler plants and the system of piping and other apparatus required for conveying and supplying the boilers with waste furnace gases, on which they largely depend for fuel. The mechanical engineer who lays out and assembles the parts of which such a plant is composed has a task the magnitude of which is commensurate only with the importance of the interests

involved… .

Since mechanical engineering includes in its scope not only the proper design and con¬ struction of machinery, but also its satisfactory performance, one branch of the profession re¬ lates to the determination, by means of suit¬ able ‘tests, whether the desired performance has been realized. This has especially to do with boilers, engines, turbo-generators and other apparatus using steam, which the engi¬ neer requires to be installed under specific guarantees of performance. The performance of boilers in the matter of economy may be specified in terms of the number of pounds of water evaporated per pound of coal, and, in that of capacity, in terms of the number of horse power developed, while that of the en¬ gine or turbo-generator may be specified as the number of pounds of feed water or dry steam consumed per unit of power per hour.. The performance tests require the determination of the quantities stipulated, by actual measurement of the coal, water, steam and power under working conditions. Another branch of me¬ chanical engineering, in a similar line, relates to the testing of materials used in construc¬ tion, the object being to determine whether they have the requisite strength and physical char¬ acteristics. A sample or specimen of the ma¬ terial is placed in a testing machine and sub¬ mitted to an actual breaking force and the amount of strain ascertained by measurement.

Having now given some explanation re¬ garding the character of the profession of me¬ chanical engineering, the question naturally arises as to the qualifications needed to make a success of such a profession. It hardly needs to be said of this profession more than of another that the one who adopts it should do so not merely as a means of livelihood, but be¬ cause his tastes lie in the direction of mechan¬ ical pursuits, if, indeed, he does not love the profession for its own sake.

No one should enter the profession who is not fond of machinery, who is not a ®born mechanic as the saying is, or who is not deeply interested, to say the least, in every kind of machine. But apart from natural inclinations there are quali¬ fications that especially fit one for the work of a mechanical engineer. He should have a technical education so as to be thoroughly grounded in the principles of mechanics. He should not only understand these principles but he should know them by heart. He may or he may not remember the formula derived from the principle, but the principle itself should ever be at his finger's end. He should be familiar with mathematics, geometry and trigonometry. He should know the strength of materials and be able to calculate the strains occurring in structures and in machines, both at rest and in motion, so that he may design them with the proper amount of strength, or, if already designed, that he may be able to

prove that they are of sufficient strength for any purpose he may desire to use them, should know their behavior under varying con¬ ditions and should be able to detect their points of weakness and know the best methods of strengthening them when they fail. He should be a draughtsman and, what is the draughts¬ man's next neighbor, an inventor. He should know the processes involved in the work of the patternmaker, founder, blacksmith and machinist. He should know how to erect machinery and how to operate it after erection. He should know the practices of the trade and he should know the various articles concerned in mechanical operations which can be bought in the market, and, in a general way, their cost. He should be familiar with the dif¬ ferent kinds of boilers, engines, turbines pumps, water wheels, etc., in the market and their relative advantages. Not the least in im¬ portance should he be grounded in the prin¬ ciples of steam engineering and the laws which pertain to the generation and use of steam, not only for the operation of engines of various kinds, but for the various kinds of steam heat¬ ing. He should be familiar with the steam engine indicator and be able to test a boiler or engine for capacity and economy. He should be well versed in hydraulic, pneumatic and elec¬ trical machinery. He should know about the construction and operation of the various ma¬ chines of the plant he has assembled, so as to be able to judge of the correctness of their de¬ sign and construction and whether they per¬ form their functions in a proper manner and according to the specified requirements. He should be able to prepare detailed specifica¬ tions of the work he plans, and he should pos¬ sess sufficient literary ability to .draw up a suit¬ able report upon any question that may arise

regarding the work he is called upon to per¬ form and pass judgment upon the comparative merits of different makes of machines required for a given purpose or of the different modes of carrying on given processes. In a word, the mechanical engineer must be skilled by observa¬ tion, by study and by experience in the science and art of the profession from beginning to end.

One of the leading problems confronting the mechanical engineer, whatever the special line in which he is engaged, is the re luction in the cost of production, and, what is allied to it, the attainment of the maximum result from machin¬ ery with the least expenditure of money, time and labor. As machines and processes are in a continual state of improvement, and almost all lines of business are in a continual state of growth, it does not require many years to elapse after a piece of engineering work has been com¬ pleted before it must be remodeled or enlarged to meet the demands of the times. This problem of reducing the cost of production is, therefore, one which is continually before him. In the de¬ sign of an individual machine, the highest aim is to reduce the qumber of parts and quantity of material used to the smallest amount consistent with proper operation, and to run it at the high¬ est speed which can be safely and successfully maintained. In arranging a plant for carrving on some industrial process, the aim must be to employ machinery wherever it is possible to save the labor of men, and assemble the machines so that the least number of hands and

the least expense is required to change the raw material into the finished product. Following in the same direction is the aim to save all un¬ necessary waste of fuel or energy required in operating the machinery, whatever the class of work and in whatever department of the work such waste may occur.

There are many notable problems of a more specific nature than the one just named which absorb the attention of mechanical engineers and await their solution. One of these is the reduction in cost of steam power. Owing to the great amount of heat which passes to waste through the escape of exhaust steam to the atmosphere or to the condenser, amounting in the most economical engines to some three-fourths of that required in the original genera¬ tion of the steam, there is a wide field for im¬ provement in steam engine economy. Efforts have been made to reduce this waste by employ¬ ing a part of the heat thus lost for evaporating some other liquid having a sufficiently low tem¬ perature of evaporation, and using the vapor thus formed to generate power in an auxiliary cylinder, thereby adding to the total power de¬ veloped by the engine, and reducing in a corre¬ sponding degree the cost of the power per horse power. Another problem of the same kind is the substitution of some other motive power for the steam plant with the object of reducing its cost. Gas, oil and other forms of internal combustion engines are being widely developed for this purpose. In the conversion of coal into gas by the employment of a gas producer, and the subsequent use of the gas in the cylinder for developing power, the cost has already been reduced below that of steam power, and even better results may be expected.

The development of the steam turbine and its substitution for reciprocating engines is one of the recent problems which mechanical engi¬ neers have worked out with most efficient re¬ sults. One of the most notable features in this work has been the enormous capacity of single units which have been installed in electric power plants, which would be practically im¬ possible if reciprocating engines were used.

Another problem of mechanical engineering which is important to all

business interests is that of rapid transportation by railroad. The great increase in speed on street car lines which has been produced by the adoption of electric¬ ity for driving power and the results obtained by the introduction of electric locomotives for hauling trains on certain railroads of consider¬ able length are familiar to eyery one. The success already obtained makes it seem probable that the further adaptation of electricity in railroad work, not only on short lines, but on trunk lines, will meet all the requirements.

The great problem of aerial navigation, which naturally lies in the domain of mechanical engineering, seems in a fair way to be solved. Aeroplanes of sufficient power to carry the operator and one or two passengers are in suc¬ cessful use by expert aviators, and long flights are made with aeroplane in the air a number of hours at a stretch. The utility of the aero¬ plane in connection with operations of war has been demonstrated beyond question, and gov¬ ernment provision of aeroplane fleets has be¬ come a recognized necessity the same as that of armies and navies. That part of the problem which remains to be solved is the adaptation of

the aeroplane, and of the airship as well, to the transportation of passengers and freight on a commercial scale and in such a manner as to be safe and reliable, whatever the condition of air currents or state of weather.

There are other great problems of mechan¬ ical engineering, yet unsolved, which relate to the production of power by the employment of the forces of nature not heretofore utilized. One of these has for its object the utilization of the sun's heat. It has been worked out in a small way in California. A concave mirror having 1,000 square feet of surface has been employed for converging the rays of the sun upon a steam boiler which lies at its focus, and suitable mechanism is arranged for keeping the mirror always turned in the proper direction toward the sun. It is said that in full sunshine this apparatus has developed 10 horse power. Wind power is widely and successfully em¬ ployed on a small scale, but there remains the problem of overcoming its variable nature by providing means for storing it, and of applying the power thus obtained without limitations. The development of tidal power, like that of wind power, is largely a problem of the storage of energy, and no success in this field has been realized.

What the future offers to a young man choosing the profession of

mechanical engi¬ neering depends very much upon the ability of the man himself. The broad scope of the pro¬ fession, already referred to, furnishes ample indication that there is a wide field of work for him. That there are positions awaiting the young engineer may be seen by examining the catalogues of prominent technical colleges, which record the names of graduates and their occupations. For example, in one of these catalogues the class graduated last had a total of 44 men in the department of mechanical engineering. Of this number only three are put down without employment, and one of the three is in reality employed, being a graduate student. Of the 41 holding positions, 18 are en¬ gaged in various engineering occupations con¬ nected with the manufacture of machinery, three are employed in textile mills, eight are en¬ gaged in steel works, three are connected with railroads and the remaining nine are variously occupied in engineering pursuits. If the young engineer becomes connected with an industrial business of sufficient size and importance to warrant t'he steady employment of a mechanical engineer, and he shows the necessary ability, the prospect is that he will in time push forward to a position of responsibility which will command a good salary and satisfy any ordinary ambition. If his desire is to establish an engineering busi¬ ness of his own, he can make the emoluments greater than in a salaried position, provided he is able to secure the necessary clientage, and conduct such a business to advantage. If this is his choice, the most promising course for him to pursue is to first enter the office of a success¬ ful engineer, and spend a few years in learning the business. Then, if he has the acquaintance and aptitude necessary for attracting business for himself, he can set up his own establish¬ ment, and by careful attention to the execution of his work strive for the success he seeks. In mechanical engineering, as in other professions, large emoluments await the men who rise to the top, for these are the engineers who are called

upon by individuals and corporations for con¬ sultation.

The profession of mechanical engineer¬ ing offers as many attractions

to those en¬ tering it as any other profession, for in this, as in others, there is always room for those who excel, and no professional man meets with suc¬ cess unless his work commands it.

Bibliography. — Barr, ‘Pumping Machinery5 ; Billings, ‘Ventilating and Heating5 ; Clark, ‘The Steam Engine5 ; Clark, (The Gas Engine5 ; Donkin, ‘Gas, Oil and Air Engines5 (1896); Durley, ‘Kinematics of Machines5 ; Forney, ‘Catechism of the Locomotive5 ; Grimshaw, ‘Steam Engine Catechism5 ; Hiscox, (Gas, Gasoline and Oil Engines5 (1898) ; Hutton, (Steam Boiler Construction5 ; Isherwood, Ex¬ perimental Researches in Steam Engineering5 ; Johnson, ‘The Strength of Materials5 ; Kem nedy, (The Mechanics of Machinery5 ; Kerr, ‘Power and Power Transmission5 ; Meyer, ‘Steam Power Plants5 ; Thurston, ‘The Mate¬ rials of Engineering5 ; Weisbach, ‘Theoretical Mechanics5 (1889) ; Zeuner, ‘A Treatise on Valve Gears5 (1884) ; transactions,5 American Society Mechanical Engineers ; Kent, Mechan¬ ical Engineers’ Pocket Book5 ; Thurston, (A Manual of the Steam Engine5 ; Peabody and Miller, ‘Steam Boilers5 ; Porter, the Richards Steam Engine Indicator5 ; Gustave, the Ele¬ ments of Mechanism5 ; Lanza, ‘Applied Me¬ chanics5 ; Hutton, the Mechanical Engineer¬ ing of Power Plants5 ; Unwin, the Elements of Machine Design5 ; Monroe, ‘Steam Heating and Ventilation5 ; Baldwin, (Steam Heating for Buildings5 ; Carpenter, ‘A Textbook of Ex¬ perimental Engineering.5

George H. Barrus,

Expert and Consulting Steam Engineer, Boston.

MECHANICAL MOVEMENTS, POW¬ ERS AND APPLIANCES. The primary, fundamental mechanical contrivances are termed the mechanical powers, seven in number and all based on the principles of either the lever or the inclined plane. The common classifi¬ cation is the lever, wheel and axle, cord and pulley, toothed wheels (these four operating on the lever principle), and the inclined plane, wedge and screw (operating on the principle of the inclined plane). What are known as the mechanical movements (sometimes called mechanical motions) include about 750 of the more or less simple and common combinations, covering practically all the fundamental arrange¬ ments of the mechanical powers for machine building and engineering work. They consti¬ tute the groundwork which the machinist or student of engineering must master before he can make much headway in understanding the complex problems which arise in practice.

Taking first the simple lever, it is found to be of three classes: (1) those in which the fulcrum is situated between the power and the weight ; (2) those in which the fulcrum is at one end of the lever arm with the weight nearer to it than the power; and (3) those in which the fulcrum is at the end with the power nearer to it than the weight.

In the first, if the weight W is nearer to the fulcrum, there is a mechanical advantage — illustrated by the crowbar, which on account of the great difference an the length of its

arms is advantageously used to overcome great resistance. Scissors and nippers are double levers of this class. If the power P is nearer to the fulcrum, there is a mechanical disadvantage, and if the weight and the power are at an equal distance on either side of the fulcrum, the power is equal to the weight and gives an arrangement similar to the ordinary balance.

The distinction between the gain of power

> - *• . x .

and the loss of velocity, and the reverse of these conditions, as depending upon the position of the fulcrum, is1 exemplified by the shears used for cutting metal and those used for cut¬ ting cloth, respectively. In the former, short blades with long handles overcome a great resistance slowly; while in the latter, long blades operated by short handles, move quickly.

In the second class there is always a mechan¬ ical advantage. The wheelbarrow is an ex¬ ample of the simple lever. The fulcrum is at

the centre of the wheel, the weight acts down¬ ward at the centre of gravity of the load and the power is applied at the ends of the handles. A hinged nut-cracker is an example of a double level of this kind.

In the third class there is always a mechani¬ cal disadvantage; but great rapidity of move¬ ment is obtained. The human forearm is an ex¬ ample of a simple lever of this class. The ful¬ crum is at the

elbow-joint, the weight acts down¬ ward at the hand and the power is applied

obliquely by a tendon from the biceps muscle at¬ tached near the elbow. A pair of tongs is an example of a double lever of this class.

The wheel and axle consists of two cylinders of different sizes rigidly connected together and turning about a common axis. The larger cyl¬ inder is called the wheel and the smaller the axle. The power is applied to the end of a rope wound around the wheel and the weight is raised by a rope wound around the axle;

see Fig. 4. The diameter of the larger cylin¬ der or wheel being twice that of the smaller cylinder, or axle, a power of one pound at P will balance a weight of two pounds at W. This is essentially a form of lever, and <(the power is to the weight lifted as the radius of the axle is to the radius of the wheels The principle is applicable to all forms of hoisting machines, steering gear of ships, fusee clock

and watch movements, *etc.* If the axle be fixed and. the wheel be loosely mounted to revolve on it, we have the ordinary machinist's loose pulley and a variety of uses suggest them¬ selves. If the axle be fixed to the body of a carriage and the wheel allowed to rest on level ground, we find that the carriage can be drawn along with slight effort, requiring a push or pull representing only a small fraction of its weight.

The cord and pulley shows the further uses of the wheel as a lever. In the arrangement shown in Fig. 5 the upper points F are fixed, being virtually fulcrums ; a downward pull of one pound one foot on the cord P will raise the weight W , which may weigh nearly two pounds, a half foot; it would balance two pounds but for the loss by friction.

effort on the crank can raise nearly 400 pounds at every turn, and in eight turns he will raise it six feet, the distance of travel of the crank at one turn.

A very common arrangement of pulleys, called stepped pulleys, is shown in Fig. 7, as positioned for driving a lathe. The steps of the pulleys on the lathe are supposed to be 3, 6, 9 and 12 inches diameter, respectively. The belt is shown on the 12-inch power pulley and 3-inch lathe pulley, and obviously, if the power shaft is making 100 revolutions per minute, the lathe-shaft will make 400. If the belt be shifted to the next step, where the proportions are 9 to 6, the 100 revolutions of the power shaft will give 150 revolutions of the lathe shaft. On the third step 6 to 9 is the propor¬ tion and the lathe will rotate at a speed of 66ˆ3 revolutions; on the fourth step it is 3 to 12, and the 100 revolutions of the power shaft will give but 25 of the lathe shaft. See Pulley.

Toothed wheels, now commonly called gear¬ wheels, illustrate another type of wheel lever¬ age. Spur gears are shown in Fig. 8; here the smaller gear-wheel rotates twice to cause one revolution of the large wheel ; thus a small wheel secures increased power at reduced speed.

In Fig. 9, the large wheel, being the driver, turns both the small wheels in the same direc¬ tion, but oppositely to itself, and gives the shafts of the small wheels two revolutions to one of the large wheel. In Fig. 10 are shown bevel gears, which coact at right angles. It is apparent that almost infinite combinations of such gears are possible.. See Wheel Gearing.

The inclined plane is simply a rigid fixed

Fig. 5.

Fig. 6.

Fig. 7.

In Fig. 6 a movable pulley is shown in com¬ bination with the wheel a and axle b and a crank R is added. If the crank is one foot long, the wheel one foot in diameter and the axle six inches in diameter, one turn of the crank may draw up the right hand cord about three feet, and lengthen the left hand cord about 18 inches, resulting in raising the pulley and attached weight W 9 inches. As the crank handle has traveled about six feet, or eight times as far as the weight is raised, the leverage is 8 to 1, and a boy who can put 50 pounds of

plane inclined to the horizon at an angle, and upon which a weight tends to slide down by gravity, or up the slope of which a weight may be pushed or rolled by a force usually horizon¬ tal in its action. In Fig. 11 the sliding weight would fall back if the power was withdrawn ; it also shows power applied horizontally to move a rolling weight up the plane. In this latter case a continuing power of less than a pound will push a pound roller up the incline because the power has a distance greater than the height overcome in which to exert itself.

The inclined plane principle is used in roll¬ ing barrels up on a wagon, in loading logs on a sled, in the operation of a mountain railway and in the cam, which is described later. The employment of the principle does not reduce the work of lifting to the top of the plane, but extends the time of the lift, so that a smaller force used for a longer time does the work.

The screw is essentially an inclined plane wound spirally around a cylinder, in the form, of an advancing groove, known as the screw-thread. A cylinder having such grooves cut interiorly like the inside of a nut is termed a female screw. The screw shown in Fig. 12 has two grooves spiraling around and is therefore double-threaded. There

being eight threads to

The wedge (Fig. 11a) is a double plane and gives power at the expense of speed. It is sometimes considered as a combination of two inclined planes placed base to base. The me¬ chanical advantage increases as the angle of the wedge decreases — (<the power being equal to twice the resistance into the sine of the angle of the wedge. }) The relation, however,

Rolling Weight.

Fig. 11.

has but little practical value since the resistance due to the friction is very great. The principle is used in many forms of cutting tools such as the knife, the chisel, axe and plane. For work¬ ing in comparatively soft materials, the angle is kept small and the edge sharp; but for harder materials the angle is increased. Metal planing tools have very large angles, ranging from 60

Fig. 11a.

degrees to 80 degrees. When the wedge is em¬ ployed for cleaving wood, the cohesion and friction combined produces so great a resistance that the force is applied in the form of a blow from a heavy body, and the resulting strain is equal to the force of the blow multiplied by the length of the wedge divided by its width. See Wedge.

Sliding Weight.

the inch, the pitch of this screw may be re¬ garded as one-eighth of an inch, the distance between threads; or as one-fourth of an inch, the distance between one spiral and the next turn of the same spiral. The principle of the screw is used in the screw propeller (q.v.), and the lifting jack or jackscrew. See Screw.

A mechanical movement is some simple com¬ bination of the elementary powers described above. Perhaps the simplest are the familiar crank (q.v.), cam (q.v.) and cylinder and pis¬ ton. (See Steam and Steam-Engines). A

Fig. 12.

few of the more familiar movements are here grouped and illustrated. If fully mastered and understood they will be of great assistance to the student of mechanics in understanding the more difficult and complicated descriptions and drawings of modern machinery.

Fig. 13 is a rack and pinion, for converting rotary motion into linear motion, or the re¬ verse, according to whether the rack or pinion is the driver.

Fig. 14 shows a pinion between two racks. If the lower rack be fixed and the pinion rolled one foot the upper rack will move two feet. In this way the stroke of a piston can be doubled.

Hg. 15 is a gear-wheel and worm, for chang¬ ing a rapid rotary motion into a very slow rotary motion. One rotation of the worm turns the gear-wheel the distance of one tooth.

Fig. 16 is a group of bevel gears, positioned as in the differential on the rear axle of an automobile. Either of the large bevel-gears may drive the other through the small bevel-gear.

Fig. 17 is a mangle wheel and pinion. The pinion P drives, traveling around the long C-shaped rack, rotating the mangle first into one direction then in the reverse direction.

Fig. 18 is a pair of eccentric gear-wheels, either of which may be the driver. The rota¬ tion of the driven wheel is alternately slow and rapid.

Fig. 19 shows a couple of pump-cams. As they touch at every point of their rotation they

travels in the. slot it raises and lowers the rod r, rapidly in one direction, more slowly in the other.

Fig. 23 is a parallel motion. To whatever distance the bars are moved they are held parallel by the slanting connections.

Fig. 24 is a shears for cutting metal. The wheel w and pin operate the upper blade, giving a long leverage for increased shearing power.

Fig. 15. Fig. 16.

Fig. 25 is a toggle joint. Onlv a slight force is required to throw the two levers into line exerting a vastly multiplied energy over a short distance. It is used in many machines to apply a: sudden pressure.

Fig. 26 is a universal joint, permitting a rotating shaft to be bent to a slight angle as necessary, without interfering with its working.

.Fig. 27 is a three-throw cam. The three-pointed wheel measures the same at every point

Fig. 19.

Fig. 20.

may be used to raise a column of water by lifting. . ,

Fig. 20 is a diagram of a crank and piston movement. It will be noticed that the spot j on the centre of the piston rod describes an oval. The nearer this spot is placed to the piston the more elongated is the oval. If the student will make a pattern of this in card¬ board and test it in various positions he will get a far better understanding of why a crank motion is so generally preferred in machinery

of its diameter, and as it rotates gives a recip¬ rocating motion to the rod, moving it back and forth three times to each revolution.

Fig. 28 is a heart-cam for giving irregular reciprocation to the rod.

Fig. 29 is an ore-stamp. The cam shaped like a long ˆ raises the stamp twice during each revolution and leaves it free to drop by gravity.

Fig. 30 shows a drum-shaped cam C whose groove moves the shaft .9 of the large wheel W alternately to the right and left.

for altering rotary into reciprocating motion — the change is so gradual that jar is obviated.

Fig. 21 is a lazy tongs or combination of levers which support each other and permit rapid change of position.

Fig. 22 is a combined bell-crank and wheel-crank for altering rotary motion into recipro¬ cating. The wheel drives and as the pin p

Fig. 31 is an eccentric, or wheel mounted out of centre, so that through the encircling straps it gives a reciprocating motion to the rod. It is much used on steam-engines.

Fig. 32 is a pair of pulleys connected by a twisted belt for reversing the direction of rotation of one of the shafts.

Fig. 33 is a two-speed gear. The pulley a

being the driver, the upper large pulley is driven on one speed; when the belt is shifted to b, which is a loose pulley there is no driving; when the belt is shifted to c the other drive at a different speed is effective.

Fig. 34 is the steering gear of a sailing ves¬ sel, showing how the turning of the hand-wheel •w is made to shift the ropes rr and throw the tiller t of the rudder to right or left.

Fig. 35 is a positive ((silent)) chain drive. Either the chain or gear-wheel may drive. It is used on auto-trucks and a variety of heavy machinery where belts are inadequate.

Fig. 36 is an intermittent motion given the

is constant, as in the case of clock devices, the times of vibration are equal ; (2) that when the force of gravity is constant, as is the case of any given point on the surface of the earth, the time of vibration varies directly as the square root of the length of the pendulum, so that, if a pendulum of a given length vibrates in one second, a pendulum one-quarter as long will vibrate in one-half of a second, and one four times as long will vibrate in two seconds; (3) that when the length of the pendulum is con¬ stant, the time of a vibration varies inversely as the square root of the force of gravity; and (4) that when the time of vibration of two

Fig. 26.

Fig. 27.

Fig. 28.

toothed wheel by the rotation of the notched pinion. Every time the notch comes around it advances the wheel one tooth.

Fig. 37 is an escapement. The levers are connected with a pendulum or the like and at every swing allow the wheel to turn one notch.

Fig. 38 is a ball governor as used on steam-engines. When a certain speed is exceeded the balls are thrown out by centrifugal force, and rise, opening a valve or adjusting a cut-off and thus reducing the speed back to the normal.

((Compound motions® are obtained by com¬ bining any two or more of the simple, motions, and machines are built up by combining the simple motions harmoniously.

pendulums at different points on the surface of the earth is equal, their lengths vary directly as the force of gravity. See Pendulum.

((Perpetual motion® is a continuous or inces¬ sant motion supposed to be attainable by a me¬ chanical device with inherent motive energy, and, therefore, which when once set in motion is capable of continuing that motion indefinitely or perpetually. Such a device or machine, if prac¬ ticable, might be termed a ((perpetual move¬ ment.®

The various forms of mechanical movements embodying the principles of one or more of the mechanical powers already described are so in¬ numerable that a detailed description of them

Fig. 30.

(<Pendulum motion® is the oscillatory motion of a body in the arc of a circle, the body being attached to a rod which vibrates to and fro from a fixed axis. In the ideal simple pen¬ dulum, consisting of a body attached to a string without weight and vibrating from the point of suspension without resistance of any kind whatever, a material body once set in motion would continue to swing to and fro forever.

Under these conditions it has been noted (T) that the iime of vibrations of a pendulum through short arcs is independent of the

lengths of the arcs and that when the length of the arc

is impracticable within the scope of this article ; but they are classified as follows into several important groups according to the general pur¬ poses for which they are used.

ˆTransmission of power appliances,® consist¬ ing of ropes, belts and various forms of gears, pulleys, *etc.*

ˆMeasurement of power appliances and de¬ vices,® used for determining velocities, pres¬ sures, weights, number and quantities, such as brakes, counters, dynamometers, gauges, indica¬ tors, meters, planimeters, testing machines and weighting machines.

(< Steam power appliances,® comprising boil¬ ers, . locomotives, locomotive engines, oscillating engines, rotary engines, steam-engines, steam turbines, valves and valve-gears, parallel motion gears, governors and other engine devices.

((Steam appliances,® such as injectors, steam pumps, condensers, separators, traps and valves.

“Motive power machines,® such as gas-en¬ gines, internal-combustion engines, heat-en¬ gines, solar engines, *etc.*

“Hydraulic power appliances and devices,® consisting of various forms of waterwheels, water-motors, turbines, pumps, syphons, water-lifts, ejectors, hydraulic or water rams, meters, indicators, pressure regulators, valves, pipe joints, filters, hydraulic presses and hydraulic

stop motions, wipers, shafts, couplings and gyro¬ scopes.

<(Horological apparatus and devices,® mainly used for measuring

time, such as spring and pendulum clocks, watch and chronometer move¬ ments, electric clocks and sundials.

“Mining machinery and appliances,® such as quarrying and cutting machines, borers, drills, valves, blowers, ventilators, safety lamps, hoist¬ ing drums, conveyors, crushers, pulverizers, hy¬ draulic nozzles, presses, air-blast and magnetic separators, steam shovels, dredges, haulage ap¬ pliances, furnaces and automatic dumps.

(<Mill and factory appliances,® such as hang¬ ers, shaft bearings, ball bearings, steps, coup¬ lings, universal and flexible couplings, speed

metal-working machinery such as riveters, rail-benders and punches.

((Air power appliances,® devices and appara¬ tus consisting of air compressors, air pumps, air water-lifts, barometers, bellows, blowers, blow¬ pipes and compressed-air tools such as pneu¬ matic drills, hammers, riveters and shearing ma¬ chines. Also, gauges, ventilators and musical instruments.

((Electrical power and construction appli¬ ances® such as generators, motors, wiring de¬ vices, controlling and measuring devices, light¬ ing arrangements, electric furnaces, heaters, fans, searchlights and drilling machines.

<(Navigation appliances® used for operating

steamships, sailing vessels and yachts, such as sails, rope knots, block and tackle, paddle wheels, screw propellers, steering gear, anchors, windlasses, capstans, cranes, *etc.*

((Road appliances,® used in the construction of roads, highways and railroads, such as scrapers, rollers, excavators, vehicles, automo¬ biles, bicycles, motor adjuncts, wheels, road gates, lamps, *etc.*

“Gearing,® consisting of rack and pinion de¬ vices, spiral, elliptical and worm gears, . differ¬ ential and stop-motion gears, and epicyclical and planetary trains.

((Motion and controlling devices,® consisting of rachets and pawls, cams and volute cams, cranks and variable cranks, intermittent and

gears, shop tools, screw threads, hoists, stamp-mills, saws, punches, shears, bending machines, grinding machine, cotton presses, looms, knit¬ ting machines, *etc.*

“Engineering construction appliances,® such as mixing machines, testing machines, stump and pile pulling machines, blocks and tackle, hoisting machines, tackles hooks, pile drivers, automatic dumps and dumping cars, stone grips, derricks, conveyors, timber splicers, metal weld¬ ing devices, tools, wood-preserving apparatus, cable carriers, dams and embankment escala¬ tors and moving platforms, <(Ferris® wheels, high structures and buildings, roof and bridge trusses, trestles and bridges.

(< Agricultural machines and implements,® such as plows, tethering hooks, wash boilers, washing machines, mowers, grain harvesters, threshing machines, cream separators, refriger¬ ating machinery, cold storage houses, refuse crematories, silos, kilns, ovens and furnaces.

((Draughting devices,® such as dividers, dot¬ ting pens, parallel rules, curve delineators, trammels, ellipsographs, pantographs, *etc.*

(<Tools,® hand and machine, such as saws, chisels, mallets, planes, borers, *etc.*

“Perpetual motion devices,® consisting of various forms of hydraulic, hydrostatic and magneto-electric apparatus.

Bibliography. — For descriptions of a great variety of special movements, appliances and

devices, consult the works on the subject by Hiscox, Rheile, Ruleau and Spon, also the special articles on the various forms of appli¬ ances enumerated under the general classes stated in this article.

Charles H. Cochrane, Author of c Wonders of Modern Mechanism?

MECHANICAL SIZING. Classification of Dry Granular Material.— The mechanical classification of dry granular material is the re¬ sult of the action of several natural laws operating in conjunction with a mechanical device so arranged as to permit the balanc¬ ing of the action of one law with another. The combined motion places the relative action of the dry granular material completely under con¬ trol of the mechanical device. The first active law in mechanical sizing is termed the laws of selectiveness. When mixed particles of various sizes of granular material are under. agitation upon a level plane, the finer particles sink to the bottom and engage the surface while the coarser particles rise to the top without regard to the specific gravity of such particles. The second active law is called the law of displacement or the displacement of the centres of gravity of particles upon an inclined plane. The relative difference in the tendency of coarse and fine material of granular shape to mpve down an inclined plane is due to the difference in the displacement of their centres of gravity upon the same angle of plane. The third active law is the law of friction of mass or the (<coefficient of friction.ˆ

Close observation of the action of these laws as well as the influence of other forces led to the design of a <(mechanical sizerˆ simply ar¬ ranged to best meet the requirements of these laws. In order to assist the law of selective ac¬ tion on an inclined plane, a series of several hundred tapered riffles or grooves are placed on the inclined surface of what is termed the deck of the device. This permits the <(fines» to sink to the bottom of these grooves and forces the discharge of larger particles over the top of the riffle, in accordance with the ac¬ tion of the law of displacement of centres of gravity. This is accomplished by the feeding of dry material to the inclined deck while the same is being agitated forward and backward by a specially designed head motion, which pushes the deck forward at one speed and causes it to return at a higher speed. This sets up what is termed a progressive action of ma¬ terial on the deck or causes the granular parti¬ cles to travel in a forward direction, under the government, however, of the law of selective action and the law of displacement aided by the law of friction of mass. Under operation, the device is fed with dry ore, sand, grain or the like, the feed engaging a feed board where a preliminary rough separation is accomplished by a modified application of tapered riffles. The feed then engages the table deck at the head of its proper zone and here, because of the length and the great number of riffles, almost any esired number of carefully sized products may be taken off by placing receptacles at the bottom and far edges of the deck, from which falls, when in action, a constant sheet

of granu¬ lar material graded carefully from coarse par¬ ticles to fine dust.

Mechanical sizing is applicable to every form

of dry granular material such as crushed oic, salt, coal, sand, emery, cereals, unbroken or crushed, or, in fact, there is no field in dry siz¬ ing now filled by metallic screen devices that cannot be filled by a mechanical sizer and often with greater economy and efficiency. This, is proved by the fact that metallic screens bund and lose their efficiency while the mechanical device cannot clog or blind and automatically cleans itself. Specific gravity has practically no effect upon mechanical sizing for the reason that granular particles of the same contour and volume, when placed upon an inclined plane, have the same displacement of their centres of gravity with the result that a particle of lead a particle of sawdust of the same size and shape will discharge from the table at the same point, although the specific gravity of the one is many times that of the other.

MECHANICAL TERMS. Wprds, com¬ pound words and short phrases, having definite meanings other than those of ordinary usage and specifically applicable to the use of tools and other mechanical appliances; to the con¬ struction and operation of machines, and to the methods employed and the manipulations required in the working End manufacture of^ the various kinds of materials used and the articles employed for engineering, structural and other industrial purposes.

A great many of these terms have been in use from the very beginning of the present period of industrial and manufacturing de¬ velopment, and are satisfactorily employed at the present time according to their original significance; but the creative mechanical effort of the last 40 years has either developed or produced so great a variety of mechanical de¬ vices and machines that the mechanical ter¬ minology has been expanded to include a much greater number of terms, which are more or less familiar to every one excepting those by whom they are habitually used in the execution of the particular line of work to which they are applicable.

Furthermore, the specializing methods of modern manufacturing systems, involving the restricted use of special terms, has not only tended to develop a class of one-sided work¬ men who are unquestionably skilful in their special lines of work and deplorably

poor if not absolutely deficient in all other lines ; but, the use of such methods has tended to increase the ever-widening gulf which separates any one class of workmen from the rest, by eliminating the necessity of a mutual knowledge of the special terms used in allied processes, by the special classes of workmen employed therein.

At the present time the number of mechan¬ ical terms amounts to several thousands. Eliminating those of a more or less fanciful character, and also those employed in individ¬ ual shops, the terms having definite meanings capable of universal or wide application prob¬ ably exceed 12,000 in number, the great major¬ ity of which are employed in the metal manu¬ facturing and metal working industries.

A superficial examination of this terminol¬ ogy conveys the impression that a definite classification of the various terms would be either impossible or quite difficult, but a closer inspection shows that they may be very con¬ veniently divided into several general classes

according to the character of the work, ma¬ chines and structures to which they are ap¬ plicable, as follows: (1) Terms applicable to the processes and methods employed in the pro¬ duction of raw materials and rough work, and in the preparation of rough work for subse¬ quent finishing operations; (2) terms applicable to the methods, processes and machines em¬ ployed in the working of suitably prepared raw material into the form of simple articles, into the parts of complex machines and into struc¬ tural shapes in general; (3) terms employed in the work connected with the preliminary and final erection of machines, engines and struc¬ tures; (4) terms used for the purpose of de¬ scribing special forms of mechanical appliances and mechanical movements according to. their field of application; (5) terms employed in operating the various classes of engines and machines ; (6) general terms employed in con¬ nection with the execution of mechanical and structural engineering work; and (7) terms employed in connection with the use of the tools and appliances, and the application of the various methods and processes, in the reproduc¬ tive arts.

In considering the matter of the application of technical terminology it is well to prescribe marked lines of demarcation between the terms employed in connection with the different kinds of work, as for example — between the terms applicable to mechanical work and those em¬ ployed in connection with electrical work. As a rule, the distinction is quite clear, but when the terms are used for the purpose of describ¬ ing appliances, devices and apparatus the line of demarcation becomes somewhat indistinct, and the precise meanings of the terms require careful consideration.

One of the most interesting examples of the varied technical application of a common term is that afforded by the use of the word ˆdamper.® It is familiarly known as a plate, valve, cover or other suitable contrivance for regulating the amount of draught in the flues of a furnace or boiler. As a specific mechanical term it is applied to the (<dash-pot® or small cylinder which forms a portion of the engines of the Corliss type, in which they act as a ˆbuffer-case® and

prevent the too sudden closing of the steam and exhaust valves. As an electrical term it is applied to a metallic cylinder which is placed in such a manner that it nearly or entirely encompasses the iron core of an induction coil for the purpose of effecting a variation in the intensity of the current pro¬ duced in the secondary battery. As a term employed in musical construction and operation it is applied to the strip of felt or other soft material employed in a pianoforte for the pur¬ pose of modulating the vibration of the strings.

A more varied technical application obtains in the case of the common word r(pitch.® As used in connection with mechanical work it re¬ fers to the distance between the centres of two adjacent teeth on a gear-wheel, to the distances between bolts, rivets and boiler stays or sim¬ ilar parts arranged equidistantly. Also to the inclination or rake of the teeth of saws, to the angle at which a plane-iron is set on its stock and to the height or angle of a roof-truss. As an electrical term it refers to the successive corresponding conductors on the armature of a dynamo and the number of coils advanced in

making end-connections between the coils of an armature winding divided into segments. It is also applied to designate the frequency of a tone vibration produced electrically. As a musical term it refers to a succession of tone vibrations.

The character of a technical term or the class of work to which it belongs is usually very clearly indicated by the textual matter on any particular subject, but in the case of me¬ chanical and electrical terms when the distinc¬ tion is not obvious, the special character of a term may be ascertained only by the nature of the power generated, controlled or applied.

For further information see articles un¬ der the titles Aeronautical Nomenclature; Boiler Shop Terms ; Foundry and Forge Shop Terms; Engineering Terms; Electrical Terms ; Locomotive, Principal Parts of ; Tools ; Valve and Valve Terms, and Work¬ shop Terms, in this Encyclopedia.

MECHANICS (MXavV, a machine), or Dynamics, the science that treats of forces (Svvafiiq , force), and of the motions produced by them. The notion of a force, as evinced to the senses as a push or pull, is common to all, but the notion of force as that which produces or destroys motion, which is the proper defini¬ tion of force, is modern, and is to be ascribed to Newton, the chief founder of the science. It is

a familiar fact that two opposite pushes or pulls may neutralize each other's effects, and thus fail to produce motion ; we then speak of them as forces in equilibrium. The portion of Mechanics that treats of forces in equilibrium is denoted by the term Statics (rootˆra, stand), contrasted with which we have the subject of Kinetics (Kiveu, to set moving), which deals with the. effects of forces in acting to produce motion in bodies. Since we can distinguish motion only in matter, the laws of motion in¬ volve the essential properties of matter, so that Dynamics is a branch of Physics — indeed, its most fundamental branch, for, until recently, it was the effort of physicists to reduce all ex¬ planations of physical phenomena to descrip¬ tions of matter in motion. Nowadays the tend¬ ency of interpreting mechanics in electromag¬ netic terms is making itself felt. As in geom¬ etry, instead of dealing with actual substance, we make abstraction and conceive of points, lines and surfaces apart from the substance in which they lie, so we may make abstraction and consider the motion of points, lines or geomet¬ rical configurations, quite apart from any matter or physical properties. This geometry of moving configurations or geometry of space and time is generally distinguished by the name of Kine¬ matics (KLVTjfia, motion), and is included under treatments of Dynamics only for convenience, as it is impossible to make dynamical investi¬ gations except in kinematical terms.

The ancients knew but little of Mechanics, and what they did know belonged exclusively to Statics. Archimedes was familiar with the principles of the lever and of the pulley. Leo¬ nardo da Vinci generalized the principle of the lever, and Stevinus (1548-1620) demonstrated the principle of the inclined plane and of the composition of. forces. Varignon clearly enun¬ ciated the principle of moments, and also of the

* Utimrn ccetera nature phenomena ex principiis mecha-nicis eodem ar gumentandi genere derivare liceret. Newton

* Preface to Principia.'

composition of forces. Galileo, in the course of his investigations on the inclined plane, came to a recognition of a particular case of the Principle of Virtual Work, which was made general by Daniel Bernoulli. These are the chief names in the development of Statics. The beginnings of Kinematics were made by Galileo, who determined the laws of falling bodies, and introduced the fundamental idea of acceleration. Huygens, in his (Horologium Oscillatoriump published in 1673, examined in detail the laws of the pendulum, introduced the ideas of moment of inertia, of the centre of oscillation and of kinetic energy. Most im¬ portant of all was the work of Newton, who in his (Principia Philosophise Naturalis) (1687), not only universalized the idea of force, and" introduced the notion of mass, but laid down the exact definitions and principles from which it has never been necessary to depart. Since the w'ork of Newton the chief names have been d'Alembert, Lagrange and Hamilton, who have given us methods of great generality and convenience, but without changing in any essential the principles laid down by Newton.

1. Statics. — Although the principles of Statics may be logically deduced from those of Kinetics by assuming all velocities to be zero, it is simpler to follow the historical method and treat statics first, since we may dispense with the idea of time, and thus with the preliminary study of kinematics. We begin by assuming the identical nature of all forces. For instance, the effect of any force may be neutralized by a pull on a string fastened to the point at which the force is applied. The tension on a string is produced by equal and opposite pulls on its two ends, and it may be cut anywhere, if at the cut end is applied a force equal to the one previously applied to the end. Such a force may be produced by the weight of any body hanging from the end of the string. But as a weight always acts vertically downward, while forces may act in any direction, we may suppose the string carried over a smooth pulley with horizontal axis, whose effect is assumed to be merely to change the direction of the string without changing its tension. Thus any force in any direction may be equilibrated by the tension of a string produced by a certain weight. Two forces are equal when they are equilibrated by the same weight. Two weights found to be equal (by equilibration), when hung from the same string, produce double the tension produced by one, and thus forces may be measured in terms of a single weight. A force having magnitude and direction may be geometrically represented by a line parallel to it, and of a

length proportional to its magni¬ tude. To this line an arrowhead may be at¬ tached to indicate the sense of the direction of

the force. We mav now enunciate the prin¬ ciple, capable of experimental verification, that when two forces, represented by AB , AC, Fig. 1, are applied at the same material point A, they may be replaced by a single force whose

direction and magnitude are represented by the diagonal AD of the parallelogram formed on the sides AB, AC. (The direction of the arrows must be observed). This is the princi¬ ple of the Parallelogram of Forces. Obviously it may be replaced by the equivalent statement that if we form a triangle by placing at the extremity B of one of the lines representing the forces the initial point of the line repre¬ senting the other force, BD, and complete the triangle, the line drawn from the initial point of the first to the terminal point of the second line will represent the resultant of the two forces, that being the term applied to the single force which replaces their effect. The original forces AB, AC, are said to be the components of AD. From the properties of the parallelo¬ gram, AB sin (BAD) — AC sin (CAD), so that the magnitudes of the components are in¬ versely proportional to the sines of the angles they make with the resultant. Obviously the two forces may be equilibrated by a force equal but opposite to the resultant, so that if we draw AE equal and opposite to AD (Fig. 2) the three

forces AB, AC, AE will be in equilibrium. As the angles BAD and BAE are supplemen¬ tary, their sines are equal, similarly DAC

and CAE ; consequently we have .

sin (CAE)

AC

— • /-o and in turn considering each of

sin (BAE)

the three forces as equilibrating the other twro we get the theorem that the magnitudes of three forces in equilibrium are proportional to the sines of the angles lying opposite them re¬ spectively. This may be experimentally veri¬ fied as in Fig. 3, where weights P, Q are hung

from strings passing over pulleys, and united at O to a string carrying a weight R. If a parallelo¬ gram be drawn on lengths proportional to P, Q, its diagonal will be vertical, and proportional to the weight R. A convenient form of the experiment is one in which the three strings are horizontal, and O is the centre of a hori¬ zontal circular table, on whose rim the three pulleys may be placed, their relative positions being read off on a graduation of the edge of the table.

Obviously, by a reversal of the previous process, a given force may be resolved into components in any two given directions, as only one parallelogram can be drawn on a given diagonal, whose sides have given directions. If these directions are at right angles to each

other, as in Fig. 4, OP is the component of OF in the direction OA and OQ the component in the direction perpendicular thereto. The length OP is called the projection of OF in the direction OA, and we have OP — OF cos (POF). Having found the resultant of two forces applied at a common point, we may compound this resultant with another force, and so on, the simplest rule of procedure being by an extension of the triangle method above, . that is, apply the initial point of each line representing a force to the terminal point of the preceding line; then the line drawn from the first initial point to the last terminal point will represent the resultant. The slight¬ est. consideration will show that the resultant is independent of the order in which the forces are compounded. This construction is known as the polygon of forces (Fig. 5). It is ob¬

viously not restricted to forces lying in the same plane.

In order to deal analytically with the com¬ position of forces, it is convenient to assume three rectangular axes of co-ordinates, OX, OY, OZ (Fig. 6), and to resolve every force

into three components along each. Thus OF may be resolved into the mutually perpendic¬ ular components OY and OP, and OP may be resolved into OX and OZ. Calling the result¬

ant F, the components respectively X, Y, Z, we have

X = F cos (Fx),

(1) Y = F cos (Fy),

Z = F cos (Fz) ;

(2) X2 + F2 -h Z2

=F2[cos2(Fx) +cos2(Fy) +cos2(Fˆ)]—F2, since the sum of the squares of the direction cosines of any line is identically equal to unity. Since the projection in any direction of any broken line is the same as that of a straight line with the same ends, it is evident that the projection of any resultant is the same as the algebraic sum of the projections of all its com¬ ponents. Thus the analytical expression of the principle of the parallelogram or polygon of forces is, if F is the resultant, X, Y, Z its components along the axes,

X = Xx + X2+...Xn=2X,

(3) F=Fx+ F2+...Fn=2F,

Z = Zt + Z2+...Zn= 2Z.

Any geometrical or physical quantity which possesses direction as well as magnitude, and is compounded according to the parallelogram law, and to which the whole of the above ex¬ position applies, is called a vector, and the preceding process is called the composition of vectors.

2. A body so small that we may neglect the differences of position of its different points is called a material particle. The only principle necessary for the treatment of forces acting on such a particle is that for equilibrium the resultant of all the forces applied to it must vanish. The particle may be free or it may be subject to certain geometrical constraints, for instance, it may be obliged to move on a certain surface. Then there will be certain forces acting between the particle and the bodies causing the constraint, these forces being known as reactions due to the constraint. A surface is said to be smooth if the reaction between it and a particle at rest is normal to the surface. Thus let F, Fig. 7, represent a

force applied to a particle of weight W , resting on an inclined plane making an angle a with the horizontal. Let F be parallel to the inclined plane. Then the three forces, W. F. and K, the reaction, normal to the plane, are. in equilib¬ rium. Writing these proportional to the op¬ posite angles, as above, we obtain

(4) JL=ˆ = A

w sin a cos a i

which determine F and R in terms of W. The same equations are obtained by resolving in the direction of the tangent and of the normal to the plane. The equation F∼W sin a shows that the force required to sustain a particle on a smooth plane is to the weight of the particle in the same ratio as the height of the plane to its length, as was shown by Stevinus and Galileo.

In the problem just treated, it is evident that the resultant of the applied forces W and F is opposite to R, that is, is normal to the plane. Similarly for equilibrium on any smooth surface, it is necessary that the re¬ sultant of all the applied forces shall be normal to the surface, for if it had any component parallel to the tangent plane this component would move the particle along the surface. Since the particle is constrained to move on a surface, there will be a relation between x, y, z, the co-ordinates of the particles, <}> (x, y, z)—0, which is the equation of the surface ; and since the direction cosines of the normal n are given by the equations

, x , v (. _ d<t> . 0</> . 30

cos (nx) :cos (ny) :cos {ns) — ˆ ˆ • dz >

if X, Y, Z are the components of the resultant of the applied forces, we have as the condition for equilibrium

X

cos (Fx) =-p = cos (»*), etc., or

X _ Y__ Z

(5) frp 00 00 •

dx dy dz

If the surface is not smooth, the reaction between the particle and the surface is not normal, but there is a tangential component which is called friction. The force of friction is peculiar in that it cannot produce but onlv hinder motion, and in having its direction de¬ termined as opposite to the direction in which the other forces tend to make the particle move. The law usually assumed governing friction is that when motion is just about to take place the friction, or tangential component of the re¬ action, is proportional to the normal component, the factor of proportionality being a constant for two given substances, such as those com¬ posing the particle and plane, as above. Sup¬ pose that in the problem of the inclined plane the force F is the force of friction. Then we have F = *fiR, where H is a constant for the given particle and plane called the coefficient of friction. Equations (4) then give

F = R tan a = fiR, fi = tan a,

when the particle is just about to slide down. If the plane is any steeper than the value of a thus given, equilibrium is not possible. This angle is called the angle of friction.

3. Let us now consider a rigid body, that is, one composed of a continuous distribution of matter having the property that, the distance between any two of its points is invariable, no matter to what forces it is subjected. It is evident that if equal and opposite forces, P and Q, Fig. 8, be applied to such a body at

two points A and B such that the line AB has the direction of the forces, no motion will be produced, for reasons of symmetry .with respect to AB. Equilibrium is also inde¬ pendent of the position of B on the line AB.

Consequently the force Q might be applied at A , where it might be compounded with P, giving a vanishing resultant. The principle that any force applied to a rigid body may be considered as applied at any other point in its line of direction is known as that of the trans-missibility of force. As an application, if the lines of direction of three forces., P, Q, R (Fig. 9), intersect in a common point 0, they

may be transferred to that point, and if tney satisfy the conditions for the equilibrium of forces applied to a material particle, they will produce equilibrium of the rigid body.

Suppose we have two parallel forces P and Q applied at any points A, B, of a rigid body, (Fig. 10). If we apply at A and B any two

equal and opposite forces AR, BS, in the direc¬ tion of AB, equilibrium will not be affected. Compound these respectively with AP, BQ, and transfer the resultants AC, BD, to the intersection of their lines of direction E and there resolve them into components in the original directions. From the equality of the parallelograms EKFH and APCR, ELGJ and BQDS, the components EJ and EH are equal and opposite, so that there remain only the components EK and EL, in the same direc¬ tion, equal to the given forces AP, BQ, re¬ spectively. Thus the resultant of two parallel forces in the same direction applied to a rigid body is a force in the same direction equal to their sum. Obviously it may be considered as applied at any point O in the line EK. Suppose O to lie on AB. By similar triangles

AR = AO'BS = Bd ' and by dmS1°n' SmCe

AR = BS,

AP BO

Thus the distance of the

BQ AO’

intersection of the line of direction of the re-

sultant with AB from A and B is inversely proportional to the forces applied at those points. This is the principle of the lever, as known to Archimedes.

If the forces P and Q are the weights wi, zv2, of two particles, placed at AB, the point O is called the centre of gravity of the two particles. It is also called the weighted mean point of points AB with the weights Wi, w2. If we project the points A, B, O upon the co¬ ordinate axes, the projections of AO, BO, are in the same ratios as the lengths themselves; consequently if their co-ordinates are respec¬ tively xi, yJf a, xa, y2, 22, x, y, 2,

x #1 y — y\ z — Z\ m2

X2 — x y2 ,y Z2 — z mi

or

f/rs - miXi -f-VI2X1 - miyi + W2V2

(6) m: + rZT'y = nn + nn '

nuzi + m;Z2

Z — ' j •

nti + w2

By a generalization, we obtain for the centre of gravity of any number of points, or the resultant of any number of parallel forces,

- Smx - Swy - 'Zmz

(7) Yfff ' y~ 1m ' '

If the two forces AP, BQ, are in opposite directions, instead of Fig. 10 we have the con¬ struction of Fig. 11, and the resultant is evi¬

dently equal to the difference of the two com¬ ponents, while the point O lies outside the segment AB. We may say that in general the resultant is equal to the algebraic sum of the components. In Fig. 11, if AP and BQ are made more nearly equal, the point O re¬ cedes to a greater distance, and in the case of equality, when we have AC parallel to BD, O must be infinitely distant. The same result is given by the formulae (6), putting nh + miˆO. In other words, two equal, parallel and oppo¬ sitely directed forces applied to a rigid body cannot be replaced by a single resultant. Such a pair of forces is called a couple. The per¬ pendicular distance between the two lines of direction of the members of the couple is called its arm. The product of the magnitude of either force by the arm of the couple is called the moment of the couple. The plane of the couple is the plane containing both

forces. We have shown that a couple cannot be equilibrated by any single force, but it may be by another couple. This couple may be chosen in an infinite variety of ways. It may easily be shown by

drawing the members of the second couple as about to be prescribed, and compounding the forces two and two, by the rules already given, that the equilibrat¬ ing couple may be equilibrated by any of the following, and that the given couple may accordingly be replaced by: 1° An equal and parallel couple in any plane parallel to its own ; 2° An equal couple in its plane turned about its point of symmetry; 3° A couple in the same place having different arm and forces but the same moment. Thus all that characterizes a couple is the magnitude of its moment and the direction of the normal to the plane of the couple. The couple then behaves like a directed quantity, and may be symbolized by a line in the direction . of the normal to its plane, whose length gives the magnitude of the moment. That couples are also compounded by the vector law is easily seen, for consider for forces of the two couples to be applied at two points AB in the line of intersection of their two planes. This can be done by bringing the couples to have the same arm. Let Pi P2 (Fig. 12) be the members of one couple, Q1Q2 those

R,

of the other. Compound P1Q1 by the parallelo¬ gram law to Ri, P2Q2 to R2. These being equal, parallel and oppositely directed, form a couple which, having the same arm as the original couples, has its moment proportional to R, that is, found by the parallelogram construc¬ tion. If lines are laid off perpendicular to the three planes of AB and P, Q, R, respect¬ ively, and proportional to the three moments, they will also follow the parallelogram law. Thus a couple may be represented by a vector perpendicular to its plane. This vector we shall speak of as the couple, and shall disregard the resolution into two separate forces.

Let us now consider the effect of any num¬ ber of forces applied at various points of a rigid body. At any point O (Fig. 13) apply two equal and opposite forces P'P" equal and parallel to a force P applied at A. We thus have the force P' equal to P applied at 0 in¬ stead of at A, together with the couple PP" . Similarly all the forces applied at other points may be considered applied at O, by introducing in each case a couple. All the forces at O may be compounded into a single resultant, and all the couples into a single couple. Thus the re¬ sultant of any number of forces applied to a rigid body is a single force together with a single couple. Evidently the resultant force does not

depend upon the position of the

point 0, while the resultant couple does. In order to have equilibrium, both the resultant force and the resultant couple must vanish.

Fig. 13.

In order to express these conditions analyti¬ cally, we must find an expression for the moment of a vector about a given point, that is, the product of the magnitude of the vector by the length of the perpendicular dropped upon it from the given point. This moment is thus numerically equal to the area of the parallelogram formed with the given point as one corner and the given vector as one side. As plane areas may be projected on other planes by multiplying by the cosine, of the dihedral angle between , them, which, is equal to the angle between their normals, it is evident that the area of the parallelogram, and hence the moment, may be represented by a vector perpendicular to its plane, as already shown for the moment of a couple. Thus it is only neces¬ sary to find expressions for the three projec¬ tions of a moment. Let the vector F (Fig.

14) , wfith components X, Y , be applied at a point having the co-ordinates x, y. Its moment about the origin is equal to the area of a parallelo¬ gram having as adjacent sides lines drawn from the origin to points x , y and X, Y. This area is equal to xY-yX. But this is the projection in the XT-plane of the area of the parallelogram on the lines from O to points x, y, Z, and X, Y, Z. It therefore represents the Z-component of the required moment. Similarly the three com¬ ponents are obtained.

(8) L = yZ—zY, M = zX—xZ, N = xY—yX. The moment of a couple is the sum oi the moments of its two members, and if X, Y is applied at Xi, yh—X—Y at x2, y2, we obtain for the moment of the couple

x1Y—y1X-rx2Y + y2X = (x1—x2) Y— (yh—y2) X, which evidently does not depend on the choice of the origin, but only on the vector F and the relative position of the two points of applica¬ tion, since only differences of xiX2, yiy2 appear.

The analytical statement of the conditions for equilibrium of a rigid body is then

(9) 2X=0, 2 7=0, 2Z=0;

2(yZ — 2 7) =0, 2 (zX—xZ) =0,

2 (# 7 — yX) — 0,

the first three expressing the vanishing of the resultant force, the last three the vanishing of the resultant couple. These principles suffice for the treatment of all problems con¬ cerning the equilibrium of a rigid body. Foi example, the extended principle of the lever follows from the theory of moments. Con¬ sider now the problem of a ladder standing on a smooth floor and leaning against a smooth wall (Fig. 15). The resultant of the weights

of all the parts of the ladder is a single force W applied at the centre of gravity G. Besides this we have to consider the normal reactions R and X. Resolving vertically we find for equi¬ librium W — R= 0. Resolving horizontally there must be a force to balance S. Let this be P, applied at the lower end of the ladder. Then p — X=0. This does not determine the value of P or S, but we may do this by taking moments about any point in the plane of the figure. If we choose the lower end of the ladder, P and R will have zero moment, and if / is the length of the ladder, a the inclination,

5/ sin a — (Wl cos a)/2 = 0, X=|J7cota.

If the floor is rough, and P the friction, P=pR =znW=S—%Wcot a, yU = ˆcot a, and if a is less than the angle determined by this equation, the ladder will slip down.

4. All the principles of statics are comprised in the Principle of Virtual Work. The con¬ ception of work is equally important with that of force. Work is done when the point of application of a force moves, the amount of work being defined as the product of the mag¬ nitudes of the force and the distance moved by the cosine of the angle included by them. If F denote the force, D the displacement, the work is FD cos (FD). This geometric or scalar product of two vectors (not a vector, since it is not associated with direction, but merely with a number, or scalar) defined as the product of either by the projection

on it of the other, is of much importance in our whole subject. The cosine of the angle between two directions is given by the symmetric func¬ tion of their direction cosines

cos (FD)— cos (Fx) cos (Dx)

-fcos (Fy) cos (Dy) +cos (Fz) cos (Dz).

Now if the projections on the axes of co-ordi¬ nates of the two vectors are

(10) Fx=P cos (Fx) , Fy=F cos (Fy) ,

FZ=F cos (Fz),

Dx=D cos (Dx), Dy=D cos (Dy), Dz=ˆD cos (Dz),

we have

(11) FD cos (FD) —FxDx--FyDy--FzDz

as the analytic expression for the scalar product. If one of the vectors is taken as of unit length,

the expression (11) gives us the value of the projection Fs of any vector F on any direction s,

(12) FS = F cos (Fs) —Fx cos (sx)

■j-Fy cos (5y) + Fz cos (52).

It is easily proved that the work of the re¬ sultant of two forces in a displacement is the sum of the works of the components.

In the case of an infinitely small displace¬ ment dx, dy, dz, the work is

(13) dW = Fxdx -f Fydy + Fzdz,

and if the point is moved along a curve the whole work is

(14)

(Fxdx + Fydy + Fzdz),

where x, y, 2, Fx, Fy, Fz, are supposed given in terms of some parameter, so that the integra¬ tion along the curve can be performed.

If some of the points of a system are not free, but constrained, a virtual displacement is one that is consistent with the constraints. Virtual work is work done in a virtual dis¬ placement. The Principle of Virtual Work states that in a system of forces in equilibrium the work done in an infinitesimal arbitrary virtual displacement vanishes. Let us apply this principle to a number of simple cases. First, two equal weights P hanging from a string over a fixed pulley are in equilibrium. If the system is displaced one weight falls as much as the other rises. For the one that falls the displacement is in the direction

of the force, and the work is positive and equal to PD. For the one that rises the displacement is opposite to the direction of the force, and the work is negative and equal to — PD. The sum of these two quantities thus vanishes. In the case of a weight hanging from a movable pulley (Fig. 16), if the string on the left is

Fig. 16.

pulled up a distance D, the force Ti does the positive work TiD) but from the geometry of the case the weight P rises a distance of D/2 and the weight W accordingly does the nega¬ tive work — PD/2. The whole work is zero, if T = P/2. But this is the condition of equi¬

ty

Fig. 17.

librium as found by resolution, since the ten¬ sions Ti and T2 are equal and we must have TiPT-> — P=0. Consider a lever (Fig. 17)

carrying the weights P, Q at distances L, I2 from the fulcrum. Then for equilibrium the principle of moments gives Ph=QU. But if the lever be turned through an infinitesimal angle a, the end A moves a distance downward Di~ha and the weight does the positive work PI 1 a, while the end B rises a distance Dzˆ La, and Q does the negative work — Ql2a. The whole work is zero if Ph—Qh, which is the condition for equilibrium In the case of the inclined plane (Fig. 7), if the particle is dis¬ placed a small distance d up the plane, the force F does the work Fd. The weight W does the negative work — Wd sin af since its direction makes an obtuse angle with the dis¬ placement. The reaction does no work, since it is perpendicular to the displacement. The whole work is therefore zero if F=W sin a. But this is the condition of equilibrium. The principle of virtual work is particularly con¬ venient, since it enables us to leave the reac¬ tions out of account, since they do no work when the displacements are virtual. As a further example let us consider the equilibrium of a particle whose co-ordinates are x, y, z on a surface <P(x, y, z)= 0, under the action of forces whose resultant is X, Y, Z, omitting the reaction. Since the displacement is virtual, we must have <p— 0 during the displacement, so that

(15) d<f> = —dx H- ~dy + ˆ-dz — O.

dx dy dz

The principle of virtual work says that for equilibrium

(16) Xdx~hYdy~hZdz= =0

for any virtual displacement, that is, one in which dx, dy, dz are not independent, but satisfy (15). Multiplying (15) by an undeter¬ mined faotor 7 and adding to (16), we have

(17) (x+lg)dx+ (K +*§)<»,

+ (Z +

Both conditions are satisfied if we determine 7 so that

(18) X + $=Y + $ = Z + X^= 0, v dz dy dz

or eliminating 7,

(19)

X=Y= Z d<f> d<p d<f>

dx dy dz

But this is the condition (5) that the resultant is normal to the surface, and in fact only in this way can there be equilibrium, according to the definition of a smooth surface.

For a rigid body, a possible displacement is one in which all the points receive equal and parallel displacements, so that dx, dy, dz are the same for all. We then have

(20) Z(Xdx-f- Ydy +Zdz)

=dx2X + dyX Y -f dz2Z = 0.

If this is to be true for arbitrary values of which is satisfied for all virtual values of dx, dy, dz we must have dxi, … dzn, if we take

(21) 2X = 2F = =SZ = 0,

which are three of the conditions for equilib¬ rium already found. A second possible dis¬ placement of a rigid body is one in which it is turned through an angle dd about the Z-axis. Let us introduce polar co-ordinates, so that

X = r cos 6, y = r sin 6. Then in the rotation, r being constant,

dx = — r sin 6 dd— — y dd, dy = r cos d dd = x dd,

dz = 6.

Consequently the virtual work is

(22) Ydy + Zdz) = ddZ(xY—yX).

If this is to vanish whatever dd we must have

(23) 2(xF— yX) = 0.

But this is one of the conditions for equilibrium (9) already found, and the two others are similarly found by rotating about the other axes.

Suppose now that we have any number of points Xi, yi, zi, … xn, yn , zn, acted on by any forces, Xi, Yi, Zh … Xn ,e Yn, Zn, and subject to any number of constraints,

(24) Mxi, yi, Zi, … Xn, yn, Zn)—0,

ˆj(Xi, yi, Zi, … Xn, yn, Zn) ‘0,

<f>/c(Xi, yi, Zi, … Xn, yn, Zn) = 0.

Then the equation of virtual work,

r = n

(25) 2 (Xrdxr Yrdyr Zrdzr) — 0,

r = 1

must hold for any changes of the co-ordinates which satisfy the conditions,

Multiplying these equations in turn by mul¬ tipliers K . • • ˆk, and adding to (25),

s = k

From these equations, eliminating the k multi¬ pliers ˆ1, … ˆk, we have 3n — k equations of equilibrium.

5. Kinematics. — Let us now consider ques¬ tions of motion. The velocity of a point is defined as the limit of the space As described by it to the time of description At, when both decrease indefinitely.

(29)

lim As *ds*

At = oJt ~~ dt’

Since displacements are compounded as vec¬ tors, the resultant of a displacement AB (Fig. 1), and another BD being AD, if the two displacements take place in the same time, the velocities are also proportional to the three lines, so that velocities are vectors, com¬ pounded by the parallelogram. Accordingly a velocity may be represented by its compo¬ nents along the co-ordinates axes. Its direc¬ tion being that of the tangent to the path, its direction cosines are those of the tangent,

— , ~ , — . Consequently, its components are ds ds ds

(30)

dx

ds dx

dx

,

Vx =

Vd~s~

dt ds

∼ dt ’

dy

ds dy

dy

dz

ds

dz

dz

v’l = vts =

dt ds

“ ~dty

Vz =

Vds~

dt

ds

dt

Also,

\ |

\

(31) v* = Vx 2 T Vy2 + vz2

Similarly, the projection of a velocity in any direction is the velocity of the projection of the point on a line having that direction.

If a point moves in a plane it may be con¬ venient to introduce polar co-ordinates r, <p.

If the point moves from A to B (Fig. 19), a distance As in the time At, dropping a perpen¬ dicular AC upon the radius OB, the displace-

ment may be resolved into AC and CD, equal to rJ(j > and Ar respectively, and accordingly the velocity may be resolved into the compo¬ nents in those directions.

7™\ lim rA < p

(32) v < f > =jt—0 ~jj

Also,

d(f > _ lim Ar dr

r dt' Vr dt—0 At dt'

(33) m-wt > + g) '+ (|) = (~)

as may also be seen from the expression for the arc in polar co-ordinates. The components vr and vtft are called the radial and tangential components of the velocity respectively, while

d < p

jj-is called the angular velocity of the radius. The area of the triangle OAB being ˆ r-d < t >,

the radius vector sweeps over area at the

dS , d < J > . , ,

rate = » but since the area is also equal

to one-half the product of AB by the perpen¬ dicular on it from O , then we find this rate of area description to be equal to one-half the moment of the velocity about O. Using the formula (8) for moment of a vector we have

which may be easily verified by passing directly from . rectangular to polar co-ordinates.

6. If the velocity of a point varies we define the acceleration as the limit of the increment of velocity to the time in which it takes place. We may consider the numerical change,

lim Av _ dv _ (Bs

(35) At = 0 j~t ~dt dt2'

or the vector change. If AB (Fig. 20) denote the velocity at a time t, AC the velocity at

C

the time t + At, the vector increase of velocity is BC, and the acceleration is the limit of the ratio of BC to At. Obviously it may be re¬ solved into any component's, which are the corresponding components of BC each divided by At. In the triangle ABC, since the veloci¬ ties AB and AC have the directions of the tangents to the path at the respective instants the angle between them is the angle dT be¬ tween. the two consecutive tangents. _ It is obvious that the direction of the infinitesimal side BC may be anything whatever, and that accordingly the direction of the acceleration is totally unrelated to that of the velocity, that is of the tangent to the path. Resolving

along the axes, we find for the components of the accelerations

(36)

dvx d2x _ dvy d2y

" dt~~dt •» Gy ~dt 'dt*

_ dvz _ dn-z

az~~dt ~Tb'

from which

«” -©■+©•+ O’

Since the direction cosines of the tangent are the same as those of the velocity, vx/v, vy/v, vz/v, we may use the formula (12) to resolve the acceleration along the tangent.

(38) aT =(axvx + ayvy + azvz)/v

_ iˆx

\dt 2

doc iy dz

dt dt 2 dt dt 2 dt

;)/

ds

dt’

But differentiating equation (31) and comparing with (38), we find

(39)

Thus the rate of increase of the numerical velocity is equal, not to the whole accelera¬ tion, but to its tangential component. This we call the tangential acceleration, and it is equal to the limit of DC (Fig. 20), divided by At. The normal acceleration is easily obtained from the figure as the limit of BD divided by At. But in the figure we have BD — AB-dr = vdr , so that the normal acceleration,

(40)

Also, if P is the radius of curvature of the path,

ds — pdr.

(41)

av v ds v*

p dt p ‘

The normal acceleration is always directed toward the concave side of the path, and is called the centripetal acceleration.

We will now consider some of the most im¬ portant cases of acceleration. If the motion is rectilinear, the velocity and the acceleration have always the same direction, but may vary in magnitude and in sign. After uniform motion, in which the velocity is constant and the acceleration zero, so that equal spaces are described in equal times, the ‘simplest case is that of constant acceleration,

d*s

-r- = a = const. dt 2

Integrating we obtain

(43)

Jt = al + b ’

where b is a constant representing the velocity when f = 0. Integrating again,

(44) s = iaf + bt,

where s denotes the space described since / = 0. Thus if the particle start from rest (b — 0), it describes spaces proportional to the squares of the times of description. It was found by Galileo that bodies fall toward the earth according to such a law, and that in a given locality the value of the acceleration is the same for all bodies. The value of this acceleration of gravity is generally denoted by g. Comparing the velocity attained by a body

falling from rest with the height, we obtain, by (43) and (44),

(45) v = gt, h = ˆgt2, v2 = 2gh.

Conversely, if a body be thrown upwards with a velocity v, it will reach the height h.

If we consider the motion of a body under gravity, but possessing a horizontal velocity as well as a vertical component, since there is no horizontal acceleration the horizontal veloc¬ ity Vx is constant. Calling the vertical dis¬ tance fallen z, the horizontal distance traversed x, we have

z = Igt2, x — vxt,

and eliminating t we have the equation of the path, s~~2~r;> representing a parabola with

the axis vertical. The velocity at any point and its inclination to the horizontal are found from

Vz=gt=\/ 2gz, vi—Vx1 + vz\ tan cl — vz/vx—

If, on the other hand, the particle be pro¬ jected upward with velocity v at an angle a. with the horizontal, it will describe the same parabola, rising to the vertex in the time t and falling on the symmetrical half. This problem was also solved by Galileo.

Consider a particle revolving with constant velocity v in a circular path of radius r. Then since s~vt, by (39) we find that the tangential component of the acceleration vanishes. The normal component is given by (41) as iffr. Thus the acceleration is constant in amount and always directed toward the centre. It is to be observed that although the numerical velocity is constant, the vector velocity is con¬ stants changing its direction, hence the ac¬ celeration is not zero, but is perpendicular to the velocity. If we resolve the uniform circu¬

lar motion into components parallel to given directions, for instance, if P (Fig. 21) is pro¬ jected into Q and R lying on the axes OX, QY, and if P revolves with constant angular

velocity w = we have (j > = ut , OQ = r cos ˆ = r cos ut, OR = r sin < p = r sin o > t. The recti¬ linear motion of either Q or R is called simple harmonic motion, or a simple vibration. It is evidently periodic, that is, it repeats after the

O 7T •

interval T— — . The number of vibrations in

0)

1 (j

unit of time, or the frequency , is -yr = ˆ • Since the acceleration of P is constant in magnitude,

and always in the direction PO, its component along OX varies as cos < t >, that is, as the dis¬ tance OQ. In other words, a point describing a simple harmonic motion has an acceleration proportional to its displacement from the centre of symmetry, and directed toward it. We may also consider harmonic motion analyti¬ cally. If the acceleration is proportional to the displacement but opposite in direction, we shall have

(46)

where w is a constant. The integral of this differential equation is

(47) s = A cos ut + B sin ut = a cos (ut — a),

where A and B are arbitrary constants and A —a cos a, B— a sin a. The constant a is called the amplitude, while the angle called the phase, depends simply upon the instant adopted from which to count

the time. By taking for a the values 0° or 90° we obtain either a cos ut or a sin o>t.

If we compound two simple harmonic mo¬ tions in lines at right angles to each other, if the amplitudes and periods are the same and the phases differ by a right angle, the previous construction shows that we obtain uniform circular motion. If the amplitudes and phases do not have this relation, we have

(48) x=a sin (<4 — a)

=a(sin o)t cos a — cos of sin a),

y=b sin {y>t — /3)

— b (sin ot cos /? — cos sin /?).

solving for sin ot and cos ot sin ot = (^- sin /?— y sin aj f sin (/3 — a),

cos cos/3 — ~ cosej y sin (/3 — a).

iriv-io- anrl sirlHincr w p pliminntp t and obtain

(50) - +£~2£

v 7 <12 a b

which represents an ellipse. The motion is called elliptic harmonic motion. The ellipse is evidently inscribed in a rectangle of sides 2a, 2b (Fig. 22), and according to the values of a — *3 may have any shape, reducing to a straight line when a* — 3 is zero or 180°. If the two harmonic vibrations are not of the same period, the resulting path belongs to a system of curves associated with the name of Lissa-jous. They may be easily constructed point by point, but the elimination of t will be possible only if the periods have a common measure.

Suppose a particle subject to the constant acceleration of gravity to be constrained to

move in a vertical circle of radius / (Fig. 23). The component of the acceleration g in the direction of the tangent is — g sin 0, while the distance moved from the bottom of the circle

9

Fig. 23.

is Id. We thus have the differential equa¬ tion

(51)

d-s dt 2

d2d dt 2

— g sin0.

The solution of this equation requires elliptic functions, but if 6 is small enough we may neglect the difference between the angle d and its sine, so that the equation of motion is

(52)

d2d dt 2

1

which is the same as the equation (46) of har¬ monic motion with u2= =g/l. Accordingly the small vibrations of a pendulum are harmonic,

of the period T= 2tt j Z_, which is independent

N/ S

of the amplitude of oscillation. The fact of this isochronism of the pendulum, or inde¬ pendence of the period from the amplitude, was discovered by Galileo, while the laws of uniform circular and of harmonic motion, and of the pendulum, were found by Huygens.

The latter also used the formula

4tt2/

s=T T to

determine the value of g.

Let us now examine the consequences of the celebrated laws discovered by Kepler as govern¬ ing the motion of the planets about the sun. The first law states that the areas swept over by the radius vector from the sun to a planet in equal times are equal. Calling the area S,

dS

— = const. But differentiating the value of dt

ˆ given in (34) , we find dt

<s3>

d-y dt 2

x— - y

dr-x dt 2

—xay — yax.

But this is the moment of the acceleration with respect to the origin, and if it vanishes, the acceleration must be directed toward the origin. The kinematical interpretation of the first law is then that the planets are accelerated toward the sun. The second law states that the planets describe ellipses about the sun as a focus. The equation of a conic section re¬ ferred to its focus is

p = a(l — e 2),

1 + e cos 0’

where a is the major axis, e the eccentricity. Now to resolve the acceleration along the

radius vector, we multiply its components a.r, ay, respectively, by the direction cosines of the radius vector, which are cos 0, sin 0. Differ¬ entiating the equations for change of co-ordinates

x—r cos 0 , y—r sin 0, twice, we have

d2x d'-r , . . ˆd<p dr

Ox = j- =— 77 cos <p — 2 sin 0 ~r -j-dt- * dt2 dt dt

d-y

ay=dH=

' . . d°-<l>

— r sin <j> — — r cos 0

d2r . d<p dr

:*»sm* +2 cosˆtjt

d'-<}> . / d<p\ 2

+ rcos't,7i~rsm'pydi) '

• ”” ' -•? - '

from which

(54) Or = Ox cos <p -f-ay sin <P— ˆ — r

dt2

Now by Kepler’s first law,

dS dfi

-j- —r2 37 = const. = dt dt

ˆ0 _ h

dt r 2 ‘

Changing the variable from t to 0,

dr dr_d§ hˆdr ,d (l\

dt d(f> dt r2 d<}> d<j> \ r) *

Differentiating by t,

d2r _ hi §* /1N)

dt2 d(p2 \ rj dt r2 d<P2 \ r)

From the equation of the path we obtain

1 1 ,e .

- = 7 + TCOS 0, r p p

from which

d2r fc_ h2 _ hl~

dt2 pr2 r3’ dr pr2 ‘

Thus the fact that the path is a conic section shows that the acceleration is inversely as the square of the distance from the focus. The negative sign shows that it is toward the sun.

The third law states that for different plan¬ ets the squares of the times of description of the orbits are proportional to the cubes of the major axes. Since 2dS/ dt = h, if T is the time of a complete period hT is twice the area of the orbit.

- 4tT2/i4

1 — e2, h2— -(1 — e2),

* 1 2

(55)

k2 1 4 THfl3 1

(1 — e2) r2 T2 r2’

Now since a3/T 2 is the same for all the planets, we see that the factor of l/r2 in the accelera¬ tion is the same for all the planets. These kine¬ matical interpretations of Kepler’s laws in terms of acceleration were given by Newton.

6. Kinetics. — The whole of our experience of dynamical phenomena was summed up by Newton in his Axioms or Laws of Motion, which are as follows :

I. Every body persists in its state of rest or of uniform motion in a straight line, except in so far as it is compelled by impressed forces to change that state.

The property of persistence thus defined is called Inertia. The law of inertia was rec¬ ognized in a less definite way by Galileo, but Newton makes of it a criterion for the existence of force, and in fact implies that if a body is moving in any other way than uniformly in a

straight line, that is, without acceleration, it is acted on by a force. The second law gives a positive definition of force.

II. Change of motion is proportional to the

moving force applied, and takes place in the direction of the straight line in which the force acts. .

In the explanation of this law, and in a corollary appended, Newton makes clear that it is intended to include the independence of effect of two simultaneous forces, and their composition by the parallelogram.

In his introductory definitions, Newton states what he means by quantity of motion, to which force is proportional, namely, the product of velocity by mass, or what is now-called momentum , but the motion of mass is best introduced by the third law, which is perhaps the most important, as well as original, of the three.

III. To every action there is always an equal and contrary reaction ; or, the mutual actions of any two bodies are always equal and oppo¬ sitely directed.

If the force were measured by the accelera¬ tion alone, the accelerations of the two inter¬ acting bodies would be equal and opposite; that is not the case, but they are found to be proportional, with a factor of proportionality which is found to be always the same for two given bodies, no matter how they act on each other. For example, let them be connected by a string, and act on each other through its tension, or by an elastic cord whose length may vary. If for symmetry we write a factor for each acceleration,

d2Xl

(56) m, =

d-X2

— ~rr > dt 2

d2vi d*y2

m’-cU

d2z\

mi- =

dt 2

— mr

d2Zt

~dP ’

the factors mi, m2 are called the masses of the bodies, and their ratio is determined by the ratio of the accelerations. Thus we may com¬ pare the mass of any body with that of a given body taken as a unit. The usual unit of mass is the pound or the gram.

By the introduction of the conception of mass and of momentum we pass from kine¬ matics to kinetics, or dynamics proper. As long as we were concerned with one body at a time, like Galileo and Huygens, the notion of acceleration was sufficient, but when we deal with a number of bodies with mutual actions, the notion of force is necessary. The terms on either side of equations (56) repre¬ sent the forces, and the equations express the third law. The second law may now be stated by saying that force is the rate of change of momentum. The forces generally are known in terms of the positions of the bodies, and per¬ haps of their velocities, and when given by their components X, Y, Z as functions of these quantities, the equations

d’-x „ d*y ,7 d>z 7 (5?) m-=X,

are called the differential equations of motion.

Our kinematical examples of the previous section may now be dynamically interpreted. The fact that bodies fall with a common acceler¬ ation g shows that the forces with which they are moved toward the earth, or their weights,

W~mg, are proportional to their masses. The unit of force, namely, that force which pro¬ duces in a pound an acceleration correspond¬ ing to an increase of velocity of one foot per second in each second, has received the name of poundal. The weight of each pound is accordingly g poundals. The unit generally used by scientists is the force which produces in a gram the acceleration corresponding to an increase of velocity of one centimeter per second in each second. This force is called a dyne, and the weight of a gram is g dynes. These units are called absolute units, as they do not depend on accidental circumstances of time or place, but are referred to three funda¬ mental units, of time, length and mass, the latter two of which are preserved in concrete standards, the former is preserved in the rota¬ tion of the earth. The more familiar gravita¬ tion unit, which we have used in the section on statics, and which is the weight of the pound or gram, is not absolute, since g varies at differ¬ ent parts of the earth, according to the formula

(58) g = 980.62 — 2.6 cos.2ˆ — .000003/*,

where A is the latitude, h the height above sea-level, and the units are the centimeter and the second. The weight of a body is accordingly variable, but its mass is invariable. For A = 45°, at sea-level we have

Weight of pound — 32.17 poundtils,

Weight of gram — 980.62 dynes.

The popular usage of the term pound or gram to denote both a mass and a force is unfortu¬ nate, and should be avoided.

The fact that the weights of bodies are pro¬ portional to their masses was carefully tested by Newton by constructing pendulums of different materials, and finding that the acceleration, as determined by the time of oscillation, was independent of the substance.

The fact that a body moving uniformly in a circle has a centripetal acceleration iT/r shows that it is acted on by a force toward the centre

(centripetal force) equal to mzZ/r. If the body, for instance, be revolved in a hori¬ zontal orbit on a whirling machine, and be held in place by a string, this string may be passed over a pulley and support a weight, so that we may thus make a comparison between the absolute dynamical measure of force and the gravitational statical one previously used. By repeating the experiment with another revolv¬ ing mass, we may compare the masses of two bodies, by the process of comparing both with the same weight. This illustrates the dynamical comparison of masses. The usual statical method of comparison by a balance is actually a comparison of weights, and gives a correct comparison of masses because the value of g is the same at each pan. If we used a balance-beam so long that g differed sensibly at its two ends, equality of weights would not mean equality of masses.

Another simple illustration of the dynamical method of comparison of masses is furnished by Atwood's machine, by which the laws of falling bodies may be studied. Two masses, Wi, m2, Fig. 24, are hung from a string passage over a frictionless pulley. Since the distance moved up by one mass is equal to that moved down by the other, the velocities and accelera¬ tions of the two are equal and opposite. Each

521

mass is acted upon by two forces, the tension of the string upwards and its own weight down¬ wards. The tension is the same for both. Cont

i \

T

TO3

Fig. 24.

sequently we have for the acceleration a,

nua 1 = nua ~T — vug, m2a2 — — m2a — T — m2g,

from which we obtain

m2 — nu

a — ■ - - — -p ;

m2 + m 1

that is, the acceleration is to that of a body falling freely as the difference to the sum of the masses. Thus by observing the acceleration the masses may be compared. In the usual use of Atwood's machine that difference of masses is produced by an extra weight, which is taken off. at a certain height by a fixed ring, after which the two remaining equal masses travel with uniform velocity, and by the velocity gen¬ erated the acceleration is determined.

The properties of harmonic motion show that a body acted upon by a force proportional to its displacement from a fixed point will execute a harmonic vibration. When a point has a position of equilibrium and is displaced therefrom, forces will in general be brought into play tending to restore it to its position, and these forces will depend upon the displace¬ ment. If the displacement be small enough, the forces will be approximately proportional to the displacement, hence the frequency of har¬ monic vibrations in nature. The vibration of the pendulum or of a tuning-fork are examples.

From the generalization that all the planets are accelerated toward the sun with an accelera¬ tion a — c/r 2, where c is constant for all, New¬ ton, putting the force equal to cm/ r 2, and seeing that the masses of the two interacting bodies, the sun and planet, must enter symmetrically, was led to assume F =7 Mm/F, and from the law of reaction this would also be the force urging the sun toward the earth. Thus he was led to the generalization of universal gravita¬ tion, namely, the statement that every .mass in the universe attracts every other with a force proportional to the product of both their masses, and inversely to the square of the distance apart. (The number 7 is the same for all, depending only on the units used).

Newton tested this by comparing the acceler¬ ation of the moon due to the earth's attraction with the acceleration of a body at the earth's surface. Supposing the moon's orbit to be circular, of radius r and period T, its accelera¬ tion will be by (55) am—ˆr/Tˆ. If the accel¬

eration varies inversely as the square of the dis¬ tance, at the surface of the earth, it will be

r 2

47T2ˆS

R/f/

where R is the earth's radius. Now we have

i — m. = 59,343 m.,27r/? = 4 X 10T meters,

from which r = 60/?'

2ˆ*60* '4* 1 07 meters

(39,343*60 sec)2

= = 974 — eterˆ _ 974 TZk .

sec2 sec2 *

This agrees well with the value of g from terrestrial observations, while more exact cal¬ culations give a still better agreement.

The value of the Newtonian constant, 7, or the number of dynes of attraction of two masses each of one gram, one centimeter apart, isy = 6.6576. 10— «. '

A highly important contribution was made by d Alembert, who made it possible to reduce every problem of dynamics to one of statics. If a system of particles be not free, they cannot move under the influence of given applied forces as they would if not constrained, but the reactions will cause them to move other¬ wise,. as in the case of the

masses in Atwood's machine. For another instance, consider two bullets fastened together by a string and thrown at random into the air. If free each would describe plane curves, namely, vertical parabolas. Under the influence of the tensions of the string which causes the constraint, they describe looped or tortuous paths. If we knew the actual paths and motions, we could find forces which would produce the same motions if the particles were free. These d'Alembert calls the effective forces and they are given by

(Fx

X'—m-j— t dt 2 7

d7y

- — — ri

Y, = m

dt 2

z-md*-

D Alembert's principle states that the actual applied forces, together with the reversed ef¬ fective sources, would form a system in equi¬ librium. If we express the equilibrium by means of the equation of virtual work, (25), we obtain

ˆ { (Xr—X'rˆXr + (Fr— Y'r)tyr

-(-(Zr* — -Z/Uzr — 0 > or

(58) 2,1 Vr) hr

+ Klr-ˆW = a

This equation, given by Lagrange, was made by him the basis of all dynamics. Since the reactions would of themselves form a system of forces in equilibrium, they may be left out of the equation (58) of d'Alembert's Principle.

From the equation (58) we can deduce all the principles of dynamics. Suppose every particle is free, then all the virtual displace¬ ments, dxr, Ayr, dzr, are independent, and in

order that the equation may hold for arbitrary displacements, we must have

(59)

mr-

d2Xr

—X

dti—r > “T dfi

for every t. But these are Newton s equations

of motion…

If the particles be free or form a rigid sys¬ tem, a virtual displacement will be given when dXr, dyr, dZr, have the same values for all the particles. We may then remove these factors from the summation.

mr

d2yr

Y\

Ty

d2Zr ~

mr—r~ =ˆr dt 2

(60)

+ ‘y{ˆrmrji~ˆlrYr)

+ r-DrZr) = 0’

and if dx, dyy dZy are arbitrary, this requires

<«> 2>&-5>

Now we have d2xr dt2

(62)

2,

V d2Zr 7

Xrmrlf = XrZr-

d2yr

dt 2

where x, y, z are the co-ordinates of the centre of mass, which obviously coincides with what in the treatment of statics has been called the centre of gravity. We thus find that the cen¬ tre of mass of a free system, or of a rigid body, moves as if all the forces of the system were applied at that point and all the mass were concentrated there. In particular if the system is exposed to no external forces, but only to its mutual actions, since these are equal and opposite in pairs, they destroy each other. Consequently the centre of mass of such a system moves uniformly in a straight line. This applies to the solar system.

Under the same conditions, a rotation about an axis is a virtual displacement. Putting as in (22) dx = — ydS > 6y = xd0,dz = 0, and dividing out de we have

moment of momentum of all of the particles of which the system is composed. We thus have the principle that if we construct a vector H having* the components Hxy Hy, 7/z, where

(64)

Hx = ˆy ˆ {yrMrVzr — ZrmrVyr)y Hy = r(ZrmrVxr — XrmrVzr)y

Hz = *y ˆ yi-XrMrVyr — yrmrVxr),

in virtue of the equations

(65)

dHx *T dHy* , j dHz _

dt *L' dt* ' dt

the velocity of the extremity of the vector H, representing the moment of momentum of the system, is equal and parallel to the resultant moment of the impressed forces about the same point. This principle, with that of equations (61), suffices for the treatment of the motion of a rigid body. By putting all velocities equal to zero we obtain the conditions of equilibrium as in (9).

If in equation (58) we put for dxr, dyr, dZr, the distance actually traversed by the various points in the actual motion in the interval dt,

ixr = Ttdt' 6yr = Ttdu dzr = Ttdt'

we obtain

(66)

d2xr dxr d2yrdyr . dt 2 dt dt 2 dt

d2Zr dzr\ *dt2*dt)

dt

-Xr(Xˆ + Yrt + Zj > z)dt-0’

and we may write the sum of terms containing the accelerations as an exact derivative,

dT

dt

d 1 f *dxr\ 2 , l dyr\ 2 ,* dzr\

dt 2 2-,rmr[Xdi) + \Tt) + (dt)

The quantity T whose derivative appears, which is one-half the sum of the products of the mass of each particle by the square of its velocity, is the very important quantity called the kinetic energy. Integrating equation (66) between the limits to and ti,

(67)

(Xrdxr -f* Yrdyr~\~ Zrdzr)y

v Vs / d2y i2x\ (63) XrmT\Xrdtˆ*rW

{Xr Yr — yrXr) •

where To and Ti denote the values of T at the respective instants to and ti.

The integral on the right is the work (14) done by all the applied forces during the motion. We thus obtain the principle that the increase of kinetic energy of a system is equal to the work done by the forces. Suppose now that the system be taken from one given configura¬ tion, where all the co-ordinates have given values, to a second, where they have other given values, the particles describing given paths, and they then be taken from the same initial configuration to the same terminal one, but by other paths. Two cases are to be con¬ sidered. Either the work done by the forces depends upon the paths, or it is independent of the paths, depending only on the terminal con¬ figurations. If the integral

‘h

(. Xrdxr -f Yrdyr + Zrdzr)

to

is evidently the ˆ-component of the resultant does not depend upon the path, it can be shown

The quantity on the right is the xr-component of the resultant moment of all the impressed forces, as in (9), (23), which will be denoted by the components L, M, N.

The quantity on the left may be written

/ dyr dxr\

ltXrmr\XrlU~yrlt)-

dt ” dt The quantity whose derivative appears,

(64) Hx = ˆPr (xrmd-Jt - yrtnrjf)

— ˆ ˆ JyXrmrVyr — yrWrVxr),

f

that every component of every force is the partial derivative of a single function — W of all the co-ordinates, by the corresponding co-ordinates.

(68)

dW

dxr *

dW dW

dyr dzr

We then have

(A rdXr Yrdyr + Zrdzr) = Wo — Wiy

2-/;:

and the equation (67) becomes

Ti—T0 = Wo—Wi,

or

(69) T1 + W1 = To + Wo.

The sum of the two functions T + W is then constant during the motion. As T is called the kinetic, W is called the potenial energy of the system. Such systems are called conserva¬ tive systems, and the above principle is called the principle of the Conservation of Energy. The motion of energy is of the greatest import¬ ance in dynamics. The principle was first used by Huygens and was generally stated by John and Daniel Bernoulli.

As an example of a conservative force we may take gravity. For a single particle we have W — mgz (z being measured upward), so that the equation of energy is

imv2 + mgz — const. — \mv o2 + mgzo, v* — Vo— 2g(zo — z)— 2gh.

Accordingly the velocity attained by a falling particle does not depend on the form of the path, but only on the height fallen. This was known to Galileo, for bodies falling along the inclined plane or the arc of a circle. All forces acting according to the Newtonian law are also conservative.

We have now stated in summary fashion the principal theorems of Mechanics. The scope of this article does not permit us to enter into the details of the various methods which arise for treating the more compli¬ cated problems, say of the motion of a rigid body. By means of the equations (65), however, we may form an idea of some of the properties of such motions. We have seen that the centre of mass moves as if the whole body were concentrated and all the forces ap¬ plied there. To find the motion of rotation we have to investigate the moment of momentum of a rigid body. If the body rotate about an axis with angular velocity dd, we obtain the ve¬ locity of a point at a distance r from the axis by differentiating the equations x = r cos 0, y — r sin 0,

. dd do add do

sin 9ir~yle Vv = r cos =

and the moment of momentum is

II z — ˆ mT(xrvyr — yrVxf) — ˆ mr(xˆ + yr2) .

The quantity K — Zrmr (xr2 + yr2) = = Zrmrfr*

is called the moment of inertia of the body with respect to the axis. Suppose the axis is horizontal, and the body influenced only by gravity. The resultant of the weights of all the particles of the body is a force W — Mg applied at the centre of mass, which is, say, at a dis¬ tance h from the axis, the plane through it and the axis making an angle 0 with the vertical.

Then the moment of all these forces about the axis is N — Mgh sin 0, and we have the equa¬ tion of motion

(7°) _r=K_= =_ Mghsme.

This is the same as that of a simple pendulum of length l — K/Mh, which is called the length of the equivalent simple pendulum. A point at a distance / from the axis and in line with it and the centre of mass is called the centre of oscillation. This problem of the so-called compound pendulum was solved by Huygens, who also showed that if the body be suspended from a parallel axis through the centre of os¬ cillation the period would be the same.

If a rigid body move in any manner with one point fixed, it may be shown that its mo¬ tion at any instant may be described as a rota¬ tion with a certain angular velocity about a certain axis. All the particles of the body are then moving in various directions tangent to circles with planes parallel to each other, but owing to lack of symmetry the direction of the resultant moment of momentum has no simple relation to the direction of the axis.

As the motion goes on the direction of the axis changes in the body, and so does the direction of the moment of momentum. Thus the phenomenon is a complicated one, and can be dealt with only by lengthy analysis. If, how¬ ever, the axis of rotation is an axis of sym¬ metry, as in the case of the axis of a symmetri¬ cal top, Fig. 25, it is evident that the particles may be grouped in symmetrical pairs, m i, m2, Fig. 26, so that the moments of momentum Hi, Hi about the fixed point 0 will be symmet¬ rical with respect to the axis, and the resultant moment will be in the direction of the axis. If then we apply to the axis a force F (Fig. 25),

Fig. 26.

it will have a moment M (Fig. 27), perpen¬ dicular to the plane of F and the fixed point, and according to equations (65) this will be the direction in which the vector H will move toward H' . The end of the axis will, therefore, move at right angles to the direction in which it is pulled. This is the basis of the explanation of the curious phenomena of all tops and gyroscopes. In the ordinary top, the weight

acting downwards at the centre of mass pro¬ duces a horizontal moment ; the point of the top accordingly begins to move horizontally, causing a movement of precession. When the precession begins, the rotation is no longer

about the axis of symmetry, and the vector H no longer coincides with the geometrical axis of the top, but the end of the vector H always travels in a horizontal plane, and the axis of the top moves about it in a motion of so-called nutation. The rotary motions of the planets are explained in a similar manner. _ It has re¬ cently been demonstrated by Einstein that the classical, Newtonian mechanics presented here is only a first approximation to the facts. The discrepancies between the Newtonian and the Einsteinian mechanics are due to the fact that time and space, as ordinarily conceived, are not independent dimensions of being. See Relativity, Principle of.

Bibliography. — The following treatises may be consulted for a more detailed treat¬ ment. For the whole subject: Love, the¬ oretical Mechanics) ; Thomson and Tait, treat¬ ise on Natural Philosophy) ; Tait, <Dynamics) ; Webster, (Dynamics 5 ; Williamson and Tarleton, <Dynamics) ; Ziwet, theoretical Mechan¬ icsˆ For various parts: Mach, the Princi¬ ples of Mechanics } ; Minchin, treatise on Statics* ; Routh, Analytical Statics* ; Routh,

(Dynamics of a Particle*; Routh, dynamics of a System of Rigid

Bodies) ; Tait and Steele,

(Dynamics of a Particle.*

Arthur Gordon Webster, Professor of Physics, Clark University.

MECHANICS OF DEVELOPMENT OR EVOLUTION. A term applied by Ger¬ man embryologists and biologists to the changes coincident with the reproduction, fertilization and later growth of organisms. In the organic world, living bodies are constantly undergoing changes of state, these changes being most con¬ spicuous during the period of embryonic de¬ velopment. The changes in the conditions of life together with heredity and selection have caused the evolution of the world of plants and animals. These changes have been com¬ plex, and yet in every way have been made with exactness, order and regularity, and the larger knowledge of development mechanics has in a great measure been due to the researches of Pander, Lotz, Born, Wilson, Loew, Ryder, Wyman, Driesch and others. Probably the most noteworthy treatments, though of op¬ posing schools, are those of Von Wilhelm Roux, (Programm und Forschungsmethoden der Entwichlungsmechanik der Organismen leichverstandlich dargestellt* (Leipzig 1897), and of Dr. Oscar Hertwig, (Zeit-und Streit-fragen der Biologie : Mechanik und Biologie* (Jena 1897). Nature does for man in the organic what he has to effect in the inorganic world, and it is only necessary that he observe

these changes to be able to state a series of re lations of antecedent and consequent, bee Life; Growth; Kinetogenesis.

MECHANICS' INSTITUTES. The es¬ tablishment of mechanics institutes marks the struggle of the artisan to provide for his own education. Denied a technical education,, un¬ able to take advantage of college and univer¬ sity education because of financial and economic stress, the artisan nevertheless demands for himself such educational opportunities as he can use during his free hours. His needs are pe¬ culiar. His range of interests is prescribed by his trade or vocation, his time is limited, his preparation is likewise limited and variable. His demands cannot be satisfied, therefore, by conventional methods and equipments. . A special organization must be set up. Mechanics institutes are a distinctive product of England, no other country having developed an equal number of such organizations. Nor are such institutions characteristic of any other national educational scheme. The reason for this is the conservatism of English universities

and higher educational institutions generally. The artisan was not provided with a systematic training beyond the fundamentals of his trade as given by a more or less definite apprentice system. Industrial education and manual training were not made a part of public education until late in the 19th century. Hence the necessity for the artisan to devise a scheme for educational extension into his adult years, an education that would meet his specific needs. Birming¬ ham and Glasgow were the pioneers in de¬ veloping educational opportunities for me¬ chanics. In Birmingham Sunday lectures in mechanics and in the physical sciences were given as early as 1789. An « Artisan Library* was maintained. Glasgow organized its Me¬ chanics' Institute in 1823. This is probably the first use of the term. The London Mechanics' Institution was founded in the same year and was under the leadership of Dr. Birkbeck, who had been instrumental in the maintenance of the work in Birmingham. Liverpool followed with its Mechanics' and Apprentices' Library in 1825. Other cities followed and in 1839 a Met¬ ropolitan Association of Mechanic's Institu¬ tions were formed; in 1848 a similar associa¬ tion known as the Yorkshire Union was formed, with 86 institutions as members.

The range of work became wider as the movement grew. The Manchester Mechanics' Institute announced its purpose to be ((to enable artisans of whatever trade to become ac¬ quainted with such branches of science and art as are of practical application in their trade.* The subjects offered either by lecture or class instruction were as follows: natural philoso¬ phy, science, natural history, literature, writing, grammar, composition, algebra, geometry, drawing, music, French, German, Latin. This is indicative of the scope of the work at¬ tempted.

The aim of the mechanics' institutes was to bring education within reach of the middle and lower classes in England. The programs show that it was an effort to give as much of the traditional content of education as these classes could assimilate. It was education given to mechanics, but much of it was not about me¬ chanics nor yet about industry or closely re-

lated matters. Herein lies the explanation for the decline of the movement. The institutes failed to hold their clientele as the artisans lacked the necessary educational background. But out of and on these foundations have grown the highly efficient technical schools which are in successful operation to-day.

Mechanics' institutes were also established in the United States, notably in Boston, Phila¬ delphia, New York and Rochester, N. Y. A few are still in successful operation. It is notable that they are taking an important part in the development of vocational and industrial education (q.v.) in the United States. With free public schools, especially free State col¬ leges and State universities, giving extensive courses in the mechanic arts and in the sci¬ ences, there is less demand for these private institutions . with their special appeal to the mechanics' interests. Their function has been that of the pioneer. They have blazed the way for engineering and technical schools and are now doing the same for vocational and trade schools. See Education, Industrial; Educa¬ tion, Technical; Manual Training; Cooper Union; Vocational Education.

A. R. Brubacher,

President , State College for Teachers, Albany,

n. y.

MECHANICS' LIENS, in statute law, a lien or claim upon real estate to secure pay¬ ment for work or labor performed on, or ma¬ terials furnished for, buildings or other im¬ provements thereon ; which labor or material has been furnished at the request or with the consent, express or implied, of the owner of such real estate or other property. In early English law lands were charged with liens by express agreement of the owner and were gen¬ erally covered by mortgages. Courts of equity also recognized mortgage agreements. By statute other liens were created, including judg¬ ment liens and liens for taxes and assessments. In the United States the increasing number of independent contractors who constructed build¬ ings on contract, and of dealers in building ma¬ terial, resulted in the enactment of numerous mechanic lien laws. Such laws have also been enacted in Canada, but not in Great Britain. The statutes hold that the value of real estate is increased by the addition of improvements and that the property should accordingly be held subject to such claims. Mechanics' liens are valid prior liens over all other claims, such as

mortgages, judgments or taxes, and the term covers all claims for labor, whether skilled or unskilled, and for all building materials fur¬ nished. But liens are held against the property and not personally against the owner. The lien only attaches to the very property upon which the work was done, and has no effect on other pieces of real estate of the owner. In mpst States the law provides that the work to which the owner is entitled under a contract must be entirely performed before the contractor can file a lien, but where owners' payments are made in instalments, some codes permit the filing of a lien when the owner defaults in the payment of an instalment. Liens usually take precedence according to the time of their filing in the county clerk's office. In some States subcon¬ tractors, who have not had direct dealings with the owner, may nevertheless file liens against the property for the work performed by them.

The statutes of mechanics' liens vary in the different States in the manner of details, time of filing, method of procedure, etc., and State statutes should be consulted. See Lien; Mortgages.

MECHANICSBURG, me-kan'iks-berg, Pa., borough, in Cumberland County, on the Cum¬ berland Valley Railroad, eight miles west by south of Harrisburg. It was settled in 1806 and in 1828 was incorporated as a borough. It is situated in a rich agricultural region. The chief manufactures are drop forgings for auto¬ mobiles and carriage hardware, spokes, wheels and wheel materials. The borough is a dis¬ tributing centre for the surrounding region and a shipping point for a large quantity of agri¬ cultural products. Irving College for Young Women is located here. Pop. (1920) 4,688.

MECHANICSVILLE, Battle of (also

called battle of Beaver Dam Creek). After the battle of Oak Grove (q.v.), 25 June 1862, the Army of the Potomac was thrown upon the defensive by the sudden appearance of <(Stonewall® Jackson on its right. North of the Chickahominy McClellan had but one corps in posi¬ tion, that of Fitz-John Porter, temporarily strengthened by McCall's division of Pennsyl¬ vania reserves. McCall held the extreme right of the line at Mechanicsville and Beaver Dam Creek, with three brigades and five batteries of 26 guns. His main position was along the east bank of the creek, a tributary of the Chickahominy, and was very strong, his left resting on the Chickahominy, his right and advance extending to a body of woods near and over¬ looking Mechanicsville, held by a regiment and a battery. Rifle-pits had been

constructed for the infantry, epaulments had been thrown up to cover the guns and a strong picket-line was in front from Mechanicsville Bridge to Meadow Bridge along the Chickahominy. A. P. Hill's Confederate division and Cobb's Legion were in plain view from the left, intrenched on the opposite side of the Chickahominy. About noon of the 26th Hill's men were seen in mo¬ tion. At 12.30 the Union pickets at Meadow Bridge were driven in, and McCall formed line; Reynolds' brigade on the right, covering the crossing of the road from Mechanicsville to Bethesda Church ; Seymour on the left, cover¬ ing at Ellerson's Mill the crossing of the road from Mechanicsville to Gaines' Mill; and Meade's brigade, with two batteries, in reserve. A. P. Hill had 14,000 men in his division, which he had concentrated near Meadow Bridge, un¬ der orders from General Lee to co-operate with Jackson, who was marching from Ashland to turn McClellan's right. Hill sent Branch's brigade and a battery to cross the Chickahom¬ iny seven miles above Meadow Bridge and communicate with Jackson's advance, and when Jackson had crossed the Virginia Central Rail¬ road, Branch was to cross the Chickahominy, push down the river and uncover Meadow Bridge, which Hill was to cross at once and then sweep down to Mechanicsville, uncovering in turn the Mechanicsville Bridge, which Longstreet's and D. H. Hill's divisions were to cross, when all were to push down the left bank of the Chickahominy and cut off Mc¬ Clellan's communications with his base at White House on the Pamunkey, and thus force him to abandon his operations against Richmond and

retreat down the Peninsula. Jackson was be¬ hind his appointed time, and it was 10 o'clock before Branch opened communication with him. Hill grew impatient as the hours went by and nothing was heard from Branch or Jackson, and at 3 p.m. put his five brigades and six bat¬ teries in motion. Field's brigade seized Meadow Bridge and crossed, closely followed by the brigades of J. R. Anderson and Archer. The brigades of Gregg and Pender then crossed and marched across the country to support the right of the attacking column. Field's advance was met by a severe artillery fire ; but, form¬ ing line, with Pegram's

battery in the centre, it forced the Union advance of a regiment and battery from Mechanicsville back to the main line beyond Beaver Dam Creek. It had not been General Lee's intention to attack McCall in position, but to have Jackson turn it. Jackson was not up in time ; McClellan would doubtless penetrate his design and make a counter-attack against Richmond ; time was everything; the day was declining, and Lee ordered A. P. Hill to attack. The brigades of Field, Archer and Anderson were ordered to advance on the Mechanicsville road against Reynolds. They were met by a withering fire of artillery and musketry and were bloodily re¬ pulsed, though one of Anderson's regiments on the left succeeded in making a temporary lodg¬ ment beyond the creek. Parts of Porter's corps now came up and strengthened Reynolds' right. Following the repulse on the left, Pender's brigade and Ripley's of D. H. Hill's division made a most determined attack upon Seymour at Ellerson's Mill, but a mill-race, swampy ground and other obstacles were in their way, and Seymour's direct and Reynolds' flank fire checked and then repulsed them with great loss. The attack was renewed, and a still more bloody repulse was the result, some of the regi¬ ments losing all their field officers and half their men. It was now sunset, and no further effort was made to assault the position, but the firing was kept up until 9 p.m. On the next morning McCall was ordered to fall back to Gaines' Mill (q.v.). The Union loss was 49 killed, 207 wounded and 105 missing. The Con¬ federate loss, killed and wounded, was over 1,500; Longstreet says between 3,000 and 4,000 killed, wounded and missing, which is probably excessive. Longstreet further says: <(Next to Malvern Hill, the [Confederate! sacrifice at Beaver Dam was unequaled in demoralization during the entire summer,® Consult Alexander, (Memoirs of a Confederate' (New York 1907) ; Ropes, (Story of the Civil War) (ib. 1907) ; Steele, American Campaigns> (Wash¬ ington 1909) ; (Official Records' (Vol. XI) ; (McClellan's Own Story'; Webb, (The Penin¬ sula' ; Allan, (History of the Army of North¬ ern Virginia' ; The Century Company's bat¬ tles and Leaders of the Civil War' (Vol. II).

E. A. Carman.

MECHANIC VILLE, me-kan'ik-vil, N. Y., village, in Saratoga County, on the Hud¬ son River and the Champlain Canal, and on the Delaware and Hudson and Boston and Maine railroads, about 20 miles north of Albany. The water power is extensive. Power is trans¬ mitted from Mechanicville to manufacturing establishments in Schenectady. Some of the manufacturing establishments of Mechanic¬ ville are knitting mills, collar and shirt fac¬

tories, mattress factories, iron bed works, sash and blind factories, paper and pulp mills and machine shops. It contains a fine city hall, a new high school and a public school library. The village owns and operates the waterworks. The commission form of government is in operation. Pop. 6,634.

MECHANISM, or the MECHANICAL THEORY, in its most general significance, means the relation of a limited number of in¬ variable substances to each other in such a way that they vary in their relations according to invariable laws. More specifically it means the explanation of phenomena by the universal laws of matter in motion. It is closely connected with the attempt to resolve bodies into their simplest elements and to explain their qualities as due to uniform laws of connection and inter¬ action among these elements. The mechanical theory has usually been held in connection with some form of atomism. Since the aim of this kind of explanation is to reduce qualita¬ tive determinations to quantitative and me¬ chanical relations of elements, these elements have usually been conceived to possess only such qualities as were necessary Jo explain the empirical qualities, the ideal being to find a single homogeneous element possessing only the characteristics essential to corporeity. The term mechanical is also used in a looser sense, though still within the limits of the general definition given above, to describe any explana¬ tion which regards all the qualities of a body as due to the mere summation of the qualities of its parts ; e.g., a mechanical theory of society.

Mechanism as a Theory of the World. — As a philosophical theory, mechanism is the at¬ tempt to regard the entire universe as a closed system of causes and effects in which every change is ultimately reducible to a change of motion. In this sense, therefore, it is prac¬ tically synonymous with materialism (q.v.).

Mechanism as a Method of Explanation. — After the Middle Ages the development of the new science, at the hands of Copernicus, Kepler and Galileo (qq.v.), and many of their contemporaries, depended very largely on the application to nature of the method of mechan¬ ical explanation. Francis Bacon (1561-1626) (q.v.), by his opposition to the use of teleology in scientific explanation, did much to bring about the acceptance of mechanism, and it was firmly established as the true scientific method of dealing with nature by Descartes (1596-1650) (q.v.), who, though not an atomist, still denied to matter all but quantitative character¬ istics and defined the method of science as strictly mechanical. Even the physical phe¬ nomena of living bodies (everything in the world, in fact, except the res cogitans in man) he

regarded as capable of a purely mechanical explanation. From this time on mechanism be¬ came the recognized method for natural science, and consequently it soon became an urgent philosophical problem to discover a satisfactory way of reconciling the mechanical conception of nature with a teleological and idealistic con¬ ception of the universe. Thus Leibniz (1646-1716) (q.v.), while admitting the necessity of reducing all natural phenomena to motion, held that ultimate reality consists of an infinity of centres of force (monads), which he conceives as in some sense analogous to minds. Accord-

ingly, metaphysical explanation must be in terms of teleology, though mechanism is the sole valid explanation of the phenomenal mani¬ festation of reality in nature. A similar con¬ ception, having its historical origin in Leibniz, was held in the 19th century by Lotze (1817— 81) (q.v.), who proclaims the purpose of his philosophy to be ((to show how absolutely uni¬ versal is the range of mechanism, and at the same time how completely subordinate the significance of the function which it has to ful¬ fil in the structure of the world8 ((Microcos-mus) Introduction). Kant also regards the mechanical categories as the sole valid means of scientific explanation. The causal category is, for him, rigorously constitutive of our ex¬ perience and hence is determinant of our con¬ ception of all objects in the world of experi¬ ence ; teleology, on the other hand, though, a necessary means of regulating our investiga¬ tions of organized matter, remains a merely subjective principle which can give no insight into the origin of any being. When we deal with objects which ((cannot be thought by us, as_ regards their possibility, according to the principle of mechanism,8 we may treat them <(as if8 they were teleologically ordered ; but ((nothing is gained for the theory of nature or the mechanical explanation of its phenomena by means of its effective causes, by considering them as connected according to the relation of purposes.8 The phenomena of the moral life, according to Kant, lie outside the realm of sci¬ entific experience and hence are not subject to mechanical explanation. Since Kant's time, many thinkers, perhaps the majority, have fol¬ lowed him in regarding mechanism as the ulti¬ mate principle of explanation for science ; thus Helmholtz, F. A. Lange, Dubois-Reymond, Clausius, Thomson, Maxwell, *etc.* Wundt at¬ tempts to find for it a logical justification as the only theory which can

afford an adequate conception of natural causality. On the other hand, more recent writers, especially among physicists, have taken the opposite view. Ac¬ cording to them, the preeminence of mechan¬ ical explanation is merely a dogma based on its successful use in science. E. Mach, Stallo, Helm and H. Cornelius take this position. These thinkers maintain that the purpose of scientific explanation is to condense into a single compact statement (e.g., a mathematical formula) a large mass of empirical data. A scientific law is merely a short-hand statement of the facts, and its value is purely economic. So long as the mechanical theory affords useful analogues for the formulation of other phe¬ nomena, it is a valid scientific method. When¬ ever this ceases to be the case, mechanism must be superseded by a more economical theory. Kant's conception of mechanism as a mode of dealing with experience has been developed by contemporary English idealism. The general problem of all rational knowledge is conceived to be the construction and maintenance of a coherent and systematic experience. In all thought, therefore, there is implied a totality which constitutes the truth. But this totality manifests itself in different categories of thought and in varying degrees of perfection. ((Matter and motion are the abstractions in which the sensuous world is reduced to homo¬ geneity in order to be susceptible of quantita¬ tive treatment, and in this treatment they are

able to a large extent to represent genuine and actual relations of that world8 (Bosanquet, (Logic, J Vol. I, p. 200). Mechanical explana¬ tion, therefore, is one form in which the unity of thought may be manifested; it is <(that form of identity and difference in which an identity is regarded as the sum of the difference in which it is presented8 (ib., p. 201). Its value for knowledge is therefore said to be instru¬ mental or methodological, because it is a method which thought uses in its effort to con¬ struct a rational experience. It possesses ulti¬ mate truth just in proportion to the degree of rational unity which it achieves in experience as a whole.

In psychology the term mechanism is some¬ times used to describe a theory which seeks to explain mental phenomena as due to the com¬ bination or interaction of simply psychic ele¬ ments. This usage is an analogy with the atomic theory of matter. The classical example is Herbart (q.v.), who gave the term currency. According to his theory every representation has a constant quality and a variable force. These forces stand in relations of greater or less opposition and the whole state of con¬ sciousness is conceived as a resultant of all the forces involved in it. Consult Th. Ribot's (German Psychology of To-day5

(Eng. trans. by J. M. Baldwin, pp. 24 ff.). For mechanism in biology see Mechanism and Vitalism.

Bibliography. — Lange, F. A., (Historv of Materialism5 (Eng. trans., London 1879-81, 3 vols.) ; Kurt, Lasswitz, (Geschichte der Atomis-tik vom Mittelalter bis Newton5 (Hamburg 1890, 2 vols.) ; Lotze, (Metaphysic, 5 Book II (Eng. trans., Oxford 1887, 2 vols.) ; Sigwart, C., (Logic, § 100 (Eng. trans., London 1895, 2 vols.) ; Ward, James, (Naturalism and Ag¬ nosticism,5 Part I (2d ed., London 1903, 2 vols.) ; Mach, E., (Popular Scientific Lectures5 (Eng. trans., Chicago 1895).

George H. Sabine, Leland Stanford University.

MECHANISM AND VITALISM. The

Newtonian mechanics has long constituted an ideal for all the natural sciences on account of the elegance of its form and the clearness of its definitions. There has consequently been a tend¬ ency to reduce biology as well as chemistry, astronomy, optics, etc., to a mechanical basis and to explain all biological phenomena in terms of motions of particles. This tendency is known as mechanism, and those who follow it are called mechanists. Now, a living ogan-ism, even from the purely mechanical side, is of the greatest complexity and intricacy of structure. Practically all organic tissues are colloidal in nature, and the physics and chemis¬ try of even a simple colloid are as yet very im¬ perfectly understood. Furthermore, the most minute observable portion of living tissue is far from being a simple colloid, but manifests a dis¬ tinct and highly complicated structure. As a consequence, all mechanical explanations of liv¬ ing processes are bound to be of an extremely sketchy nature. Now, the actions of animals and plants are subject to fairly simple descrip¬ tions in terms derived from our own conscious¬ ness. When a spider catches a fly, we seem to render that fact intelligible to ourselves by say¬ ing that it wants to eat the fly. As a conse¬ quence, our biology as it exists is permeated through and through by anthropomorphic con-

cepts, such as purpose, desire, sensation, *etc.* While the mechanists claim that, as far as the scientist is concerned, all the facts ordinarily described through the mediation of these con¬ cepts are susceptible to a correlation in a fash¬ ion which, though purely mechanical, is too

complicated for our own human faculties to grasp, there are others, the so-called vitalists, who deny this possibility.

The vitalists may either discover a peculiar purposive, anthropomorphic force active in bio¬ logical matters alone, as does Driesch, or they may, like Bergson, regard the purposive ac¬ count of the world as everywhere prior to the mechanical account. They draw their arguments from certain processes which, like the regenera¬ tion of lost parts, or the adaptation of the indi¬ vidual to the environment by mutation, appear peculiarly fitted for purposive explanations in¬ volving some prevision of the future. These processes they regard as not merely non-me¬ chanical, but counter to the current of mechan¬ ism, involving either indeterminism, or deter¬ mination through factors which have no me¬ chanical correlates.

The paucity of the fruits of purely mechan¬ ical research in biology is obvious ; on the other hand, the methods of the vitalist are generally so crude and his definitions so vague that there is no great body of biological knowledge which has been gained from the vitalistic standpoint. The terminology of vitalism abounds in such expressions as elan vital, or . ˆentelechny,® which are only defined per ignotius. In short, whether a complete mechanization of biology' be possible or not, biological investigation has been fertile precisely in so far as it has sub¬ jected itself to the norms, if not to the con¬ cepts, of physical science. It would conse¬ quently seem that mechanism is methodologically correct, even if it be metaphysically wrong. See also Materialism ; Mechanism.

Consult Bergson, Henri, (Creative Evolu¬ tion J (New York 1911) ; Driesch, Hans, (The History and Theory of VitalisrrL (London 1914) ; Mack, Ernst, (Popular Scientific Lec¬ tures } (Eng. trans., Chicago 1895).

Norbert Wiener.

MECHANISMS, Mental, are modes of thought obtaining both in the unconscious and in conscious mental activity, the most important of which are identification, com¬ pensation, projection, introjection and ra¬ tionalization. In the earliest infancy the indi¬ vidual gradually makes a distinction between self and external reality, tending to regard as himself those parts of his experience which give him pleasure and as external those parts which give him pain. He thus very early un¬ consciously identifies himself with certain por¬ tions of his environment. This unconscious habit of thought continues throughout life. All persons constantly identify themselves with persons and

things surrounding them or which come within their mental purview. This has the very important result of making them re¬ gard those external persons or things as having an influence over themselves and their acts and their emotions. Thus a man who defended the actions of a celebrated physician who was con¬ demned and executed for murdering his wife was giving, in his defense, an illustration of identification of himself with the murderer, as

was shown later to some extent by his con¬ fession that he lived very unhapr>dv with his wife and sympathized with the criminal who had succeeded in getting rid of his partner in that way. Two varieties of identification are distinguished, namely, the subjective form or introjection, and the objective or projection. In introjection the subject accepts an idea which really has an external origin, and identi¬ fies it with some portion of his own mind, as for instance when one reads a description of some disease and infers that one has that dis¬ ease oneself. This is a characteristic of im¬ pressionable and hypersensitive natures who feel an excessive sympathy for other people. It leads to various forms of introversion in which the individual tends more and more to live a life within himself and to become more and more unable to achieve objective success in the world. Projection, on the other hand, is that objective form of identification which takes an idea which has had actually an internal origin and believes that it has an external origin. Ex¬ amples of this mechanism in an excessive degree are found in the mental malady known as para¬ noia (q.v.), in which the suspicions of the indi¬ vidual, having a purely subjective origin, are projected upon the external social environment. The paranoiac believes that he is a great man, taking his belief from the grandiose thoughts which occur to him as a compensation [see be¬ low] for an unconscious feeling of inferiority, and he views external reality more and more as conspiring against him to prevent the realiza¬ tion of his wishes for superiority. It is true that all individuals give evidence in thought and act of both introjection and projection, but it is only when these mechanisms are unduly de¬ veloped that the discrepancy between the un¬ conscious wish and the actuality become such as to render the individual obnoxious. All nor¬ mal adults identify themselves with parts of their environment to some extent, as with their possessions and with the members of their fam¬ ily and of their social milieu, but such identi¬ fication is productive of good both in action and in thought. It should not, however, be allowed to go too far, and a rigorous critique should be exercised by comparison with real things in order to prevent excess.

Compensation is that mechanism of the unconscious wdiich secures an activity some¬ times quite the opposite from that found to be the goal of the unconscious wish. For exam¬ ple when a person shows an extraordinary in¬ terest in antivivisectionism or the prevention of cruelty to children or to animals, it is fre¬ quently discovered upon analysis that this form of activity is a compensation for an unconscious sadism “or desire to inflict cruelty. Lynch¬ ing, which ostensibly aims at the punishment of an offender, is in reality mediated through an unconscious desire to inflict cruelty or to see it inflicted. Much of the action of extravagant chivalry is also an illustration of an unconscious desire to indulge in acts of cruelty. This is an apparent contradiction, but numerous analyses have shown the truth of this statement. The fact that a conscious and an opposing uncon¬ scious wish are satisfied both at the same time makes the compensation all the more ambigu¬ ous. That is, the individual consciously be¬ lieves that he is satisfying only the wish to right a wrong, not being conscious of the fact

that in taking especial pleasure in righting a wrong, he is unconsciously satisfying a wish to occupy his mind with the wrong itself. It is not known to the militant suffragette that her conscious desire to arrogate to herself the privileges of men is a compensation for an un¬ conscious desire to be dominated by a man. Compensation is a physiological mechanism, too, by virtue of which the function of one or¬ gan, say the kidneys, is taken over at times by that of another, for instance the skin, in ex¬ creting certain waste products. An aim is sought by nature and failing in attaining this aim through one avenue, she tries another. Similarly in the mental processes, the psyche is aiming constantly at the satisfaction of desire, and if it fails to get it consciously, it will get it unconsciously by compensation, that is, the desire of which the individual is not aware, though it may be fundamental in his psyche, will nevertheless gain its satisfaction in some substitutive form, through something which symbolizes in conscious life the object of the unconscious craving. A very infantile partial trend (q.v.) of the libido, namely, the child’s desire to be

looked at, is gratified by the actor in a domestic performance where he may be ut¬ terly unconscious of the fact that his primary desire is to exhibit his body but unconscious only of the fact that he wishes to represent a character for the edification of the public.

Rationalization is the constant tendency on the part of all people to give an ex post facto reason for their thoughts or acts. This is why ((a man convinced against his will is of the same opinion still.® The term rationalization was in¬ troduced into analytic psychology by Dr. Ernest Jones. If a person is hypnotized and during the hypnotic sleep is told by the hypnotizer to do something when he wakes up, such for in¬ stance as putting a chair on a table, he will do so, and when he is asked to give a reason for this act, he will fabricate a wrong one, because he does not know the right cause. The cause of his act was the hypnotic suggestion, and is perfectly well known to the hypnotizer. But to ihe hypnotized subject the cause is unknown as it is contained in his unconscious, and, having been given to him in his unconscious state, it does not emerge into consciousness. This is paralleled by almost every instance in which a reason is given for doing anything. The entire cause in the case of some persons is, as with the hypnotized person, in the unconscious, while with the majority of people a large pro¬ portion of the causes of all their actions is in their unconscious and is unknown to them. The reasons which people then give for their actions are termed rationalizations and the tendency of all persons to feel that they have to give reasons when they are asked for them is what is meant by rationalization. See also Symbolism and consult Frink, H. W., (Morbid Fears and Compulsions) (1918) and Jones, Ernest, (Papers on Psychoanalysis y (2d ed.,

1918).

Smith Ely Jelliffe, M.D.

MECHANOTHERAPY, the healing of disease by mechanical means, which includes all systems of physical theraupeutics, such as mas¬ sage, baths, electricity, vibration. It is really nothing more than forms of exercise adapted to the special needs of the patient. See Massage

and consult Grafstrom, (Mechano-Therapy) (2d ed., Philadelphia 1904).

MECHITARISTS, mek-i -tar'ists, a sect of Armenian Christians acknowledging the author¬ ity of the Pope, but retaining their own ritual. The name originated from Mechitar Da Petro (1676-1749), who in 1701 founded a religious society at Constantinople for disseminating a knowledge of Armenian literature. They soon removed to the Morea, whence in 1715 they went to Venice, and later to the island of San Lazzaro. There are branches of the sect in Vienna and elsewhere. At Venice its printing presses have turned out the best works in Ar¬ menian literature, and a periodical which has a large circulation. Consult Bore, (Le couvent de Saint Lazare a Venise, etcP (Paris 1837) ; Scherer, (Die Mechitaristen in Wien* (5th ed., Vienna 1892) ; and (La vie du serviteur de Dieu, Mechitar) (Venice 1901).

MECHLIN, mek'lin (Dutch, meh'lin), or MALINES, ma-len, Belgium, a city on the Dyle, 14 miles southeast of Antwerp. The an¬ cient walls and moat have been replaced by a wide boulevard and canal, the streets are wide and regular and it has fine squares and public buildings. It is the see of the primate of Bel¬ gium and has numerous churches. The present primate is the illustrious Cardinal Mercier (q.v.). Saint Rombold's Cathedral, a vast building covering nearly two acres, was built in 1437-52 ; the clock-tower, however, 324 feet high, remains unfinished ; the cathedral con¬ tains Van Dyck's (Crucifixion. > The churches of Saint John and Our Lady contain works by Rubens ; the town hall dates from the 15th cen¬ tury; the Cloth Hall, now used as a guard¬ house, from 1340, while also noteworthy are the modern archiepiscopal palace, the Beguinage and the Salm Inn (1534). The manufacture of pillow lace and of cloth, so famous in the 15th, 16th and 1 7 th centuries, has been largely trans¬ ferred to Brussels ; the chief industries now are carpentry, caps and woolens, candles, starch, bells, tobacco, cabinet-making, brewing, horti¬ culture and agriculture ; extensive railway works have been established here. In 1914 the city was occupied by the Germans, who were later driven out by the garrison troops of Ant¬ werp. The Germans retook the city after a vio¬ lent bombardment, during which most of the city was laid in ruins. Pop. 59,000.

MECKLENBURG, mekJen-boorg, Ger¬ many, a territory on the Baltic Sea, a former Saxon province, now divided into the repub¬ lics of Mecklenburg-Schwerin and Mecklenburg-Strelitz.

(1) Mecklenburg-Schwerin, bounded on the north by the Baltic Sea, elsewhere chiefly by Prussia and Mecklenburg-Strelitz, has an area of 5,135 square miles. The capital is Schwerin. Mecklenburg-Schwerin is watered by several rivers, most important of which are the Elbe and its tributaries, the New Elde and the Sude, on the southern border, the

Warnow, the Recknitz and the Stepenitz, which flow toward the Bal¬ tic. There are many lakes and ponds, the larg¬ est, of which are the Miiritz See (51 square miles), the Sc'hweriner See (23 square miles), the Kolpiner and the Plauer See. The country is generally flat, though here and there inter¬ sected by low ranges of hills, and its surface is extensively covered with wood. Near the sea

are large tracts of sand and morass. The cli¬ mate, though raw, is mild and healthful; the average temperature throughout the year is 46° and the precipitation is 21 inches.

The principal industries are agriculture, dairying and stock-raising. About 50 per cent of the population are tillers of the soil. The landholders are hereditary tenants of the peas¬ ant class, title being vested in the upper classes, as the emperor, the aristocracy, clergy, *etc.* The chief crops are wheat, rye, oats, barley, corn, pease, beans, beets, turnips and potatoes, and tobacco is cultivated to some extent. The principal manufacturing industries are foun¬ dries, machine shops, brick yards, tanneries, paper mills, sugar refineries, breweries, distil¬ leries, tobacco factories, *etc.* There is consid¬ erable commerce through Warnemiinde (Ros¬ tock) and Wismar. The railway mileage is 1,094 miles. The predominating form of reli¬ gion is the Lutheran. Besides the university at Rostock there are several gymnasia and numer¬ ous burgher, parochial and other schools. Under the Empire the two Mecklenburg duchies had a common assembly or Landesunion, consisting of the representatives of the landed aristocracy or Ritterschaft and the burgomasters of 49 towns, the tenants of the royal domains had no repre¬ sentation. The assembly met once a year, alter¬ nately at Malchin and Sternberg. The execu¬ tive authority in Mecklenburg-Schwerin was vested in a cabinet of four ministers ; there were also a permanent committee consisting of nine members at Rostock, who represented the two estates when the assembly was not in session, and deputation and" convocation diets, which might be assembled upon special occasions and for special purposes. Mecklenburg-Schwerin had two votes in the federal council

and six representatives in the Reichstag, the only elec¬ tive offices. Each duchy had a separate system of lower courts but they had a Supreme Court at Rostock in common. There was no general financial budget for Mecklenburg-Schwerin; there were .three entirely distinct systems of finance. The budget of the first system was called the administration of the sovereign ; the second, the states administration and the third, the ordinary budget of the common administra¬ tion. In 1913 the public debt amounted to $32,- 717,025. Technical education is well advanced and higher education is provided for by the Uni¬ versity of Rostock. Pop. (1919) 658,943.

(2) Mecklenburg-Strelitz, divided by Meck¬ lenburg-Schwerin into two large districts, the province under the empire of Stargard, and the province of Ratzeburg, both on the east, and on the west in several smaller districts, existing in separate patches, has an area of 1,131 square miles. Pop. 106,347, capital Neustrelitz. The country is flat and similar in physical character¬ istics to Schwerin. Under the Empire Strelitz had one joint representative chamber with Schwerin, but Ratzeburg was not included in these estates and was governed directly by the grand duke. The grand duke gave Ratzeburg a representative constitution 1869. Mecklenburg-Strelitz had one vote in the federal council of the empire and one representative in the Diet. Consult Raabe, W., (Mecklenburgische Vater-landskunde) (3 vols., Wismar 1896).

MECKLENBURG (mek'lenberg) DEC¬ LARATION, in American history, a series of

rebellious resolutions adopted 20 May 1775, at Charlotte, Mecklenburg County, N. C., by a con¬ vention held at midnight and representing each militia company in the county. The resolutions declared that the people of Mecklenburg County were free and independent of the Brit¬ ish Crown, and not only was the general tenor that of the Declaration of Independence, but many phrases in the resolutions are word for word as they appear in that document. The minutes of the midnight meeting are said to have been destroyed by fire in 1800. Whether the Declaration of Independence followed the words of the Mecklenburg Declaration, or whether the latter, having probably been re¬ placed from memory, was tinctured with the former, is a disputed question. In 1831, the day of 20 May was made a legal holiday in North Carolina. Consult Cooke, Revolutionary History of North Carolina } (1853) ; Draper, (The Mecklenburg Declaration > (1874) ; Gra¬ ham, G. W., (The Mecklenburg

Declaration of Independence, May 20 1 775, } and Rives of its Signers) (New York 1905) ; Hoyt, W. M., cThe Mecklenburg Declaration of Independence) (ib.,

1907) ; Moore, J. H., (Defense of the Mecklen¬ burg Declaration of Independence) (Raleigh

1908) .

MECONIC ACID, an organic acid occur¬ ring in opium and having the formula C5HO2 (OH)(COOH)2. In preparing it, the opium is exhausted with water at 100” F., the infusion is neutralized with calcium carbonate and evap¬ orated to a syrup, and calcium meconate is pre¬ cipitated by adding a concentrated solution of calcium chloride. Two crystallizations from hot dilute hydrochloric acid follow, and the free acid is then deposited in the form of small scales, containing three molecules of water. Upon heating to 212° F. the hydrated crystals lose their water, and become white. Meconic acid is readily soluble in alcohol, but only slightly so in ether and in cold water. It has a sour taste and a pronounced acid reaction, and its solutions are turned red by ferric chloride, FeCh. Meconic acid forms numerous salts (ˆmeconates®), as well as various organic de¬ rivatives ; but none of these is of importance in the arts.

MEDAL, a piece of metal in the form of a coin, stamped with a figure or device to preserve the portrait of some eminent person, or the memory of some illustrious action or event, and not to be circulated as money. Medals be¬ long to two periods, ancient and modern, sep¬ arated by a wide interval. Early Greek and Roman medals were struck for prizes in athletic games, or in commemoration of great events. The Roman series of medals or medallions is very extensive in gold, silver and brass or cop¬ per. The gold medals begin with Constantine and continue to the fall of the empire ; the silver begin under Gallienus and continue as long; the copper from Augustus to Alexander Severus.

In more modern times the art of medal-mak¬ ing has been brought to great perfection, and most of the principal nations have adopted the plan of preserving their history by these durable monuments. The French series is deserving of special mention as the most perfect and com¬ plete in the world. It commences under Louis XI and continues to the present date, illustrat-

ing every important event in the history of France. The English series commences under Henry VIII, but as works of art the medals have not high rank. The British battle medals, however, form an admirable series.. The Italian and German medals of modern date are very fine. The mediaeval are interesting and bold in design, but rude in execution. The papal series, commencing with Paul II, are worthy of atten¬ tion.

One of the earliest American medals is that presented to Gen. John Armstrong for his successful attack in 1756 on the Indians at Kit¬ tanning. Most of those struck during the Rev¬ olution were made in France. The next Amer¬ ican medal of which there appears to be any record is that which was presented to General Gates after the surrender of Burgoyne, 17 Oct. 1777. On 25 March 1776, when news of the British evacuation of Boston reached Congress, that body resolved that its thanks be presented to the Commander-in-Chief, and that a gold medal be struck in commemoration of the event. This medal was nearly two and three-quarters inches in diameter. On one side was a profile head of Washington, with the legend in Latin: ((The American Congress to George Washing¬ ton, the Commander-in-Chief of its armies, the asserter of freedom.® On the reverse the de¬ vice showed troops advancing toward a town, others marching toward the water, ships in view, General Washington in front, mounted, with his staff, whose attention he is directing to the em¬ barking enemy. The legend is : <(The enemy for the first time put to flight.® Then, too, at the time of his death, among minor honors paid to the great general's memory, was the publish¬ ing of a silver commemorative medal.

There is the record of one medal only granted by Congress in commemoration of any naval victory during the War of the Revolution, and that was a gold one presented to Paul Jones for his defeat of the British frigate Serapis when commanding the Bonhommc Richard, 23 Sept. 1779. Other gold medals were those presented to Commodore Perry and Lieutenant Jesse D. Elliot for the part which they took in the battle of Lake Erie, 8 Oct. 1812; to Captain Lawrence,

who, in command of the Hornet, 24 Feb. 1813, captured the British brig Peacock ; to Captain Warrington of the Peacock — then under the Stars and Stripes — for the capture of the Epervier, 20 April 1814; to Capt. Thomas Macdonough, who commanded the American squadron in Plattsburg Bay, August 1814; to Captain Decatur, who, in command of the United States, captured the British frigate Macedonian, 25 Oct. 1812; and to Captain Jones and Captain Blakely, who, when commanding the Wasp — the one, 12 Oct. 1812, and the other 28 June 1814 — captured respectively the Frolic and the Reindeer from the British navy.

The giving of medals went out of fashion after the second war with Great Britain, and but little was done by the government during the War of the Rebellion. Maj. Robert Ander¬ son received two medals for his gallant defense of Fort Sumter, but one was presented by the citizens of New York and the second by the Chamber of Commerce of the same city. After the successful operations by Grant in East Ten¬ nessee and at Chattanooga, Congress voted him thanks and a gold medal with suitable emblems, devices and inscriptions. It is worthy of re¬

mark that no less than 189 medals were struck in honor of Abraham Lincoln, and later medals have been issued in memory of Garfield and McKinley, and in honor of Sampson, Schley, Dewey and others in the Spanish-American War. (See also Coinage ; Numismatics; Token Money). Consult Hawkins, (Medallic Illus¬ tration of the History of Great Britain and Ireland> (London 1885) ; Loubat, J. F., (Medal-lie History of the United States5 (New York 1878) ; Leduc, (Histoire des decorations en France5 (Le Mans 1890) ; Hill, G. F., Por¬ trait Medals of Italian Artists of the Renais¬ sance5 (New York 1912).

MEDAL OF HONOR, United States Military, an honor bestowed upon army and navy officers and men for specific services ; regarded as a higher token of the war hero than the Victoria Cross of England, the medal of the Legion of Honor of France, or the Iron Cross of Germany. It is given not for the sheer performance of duty, no matter how hazardous that duty may be, but for some voluntary act of valor, beyond the bounds of mere obedience to orders. Out of the millions of men who have battled for the United States in the different wars, this country has had, the vast majority, as history shows, performed their duty. Of these, however, have been about 2,000 men who have done more, who have braved dangers when they were not expected to brave them, over¬ come difficulties that were regarded by the rest as

insurmountable, and faced death when it seemed it meant the sacrifice of their own lives. Many are the ways these medals have been won. By the Act of 12 July 1862 the United States government authorized the striking of 2,000 medals to be given to noncommissioned officers and privates for gallantry in action and soldier¬ like qualities. On 3 March 1863 the sum of $20,000 was appropriated for making the med¬ als, and officers were made eligible to receive them. Medals were also authorized by Con¬ gress in recognition of acts of bravery per¬ formed (during the war with Spain in 1898) in the naval battles of Manila and Santiago, the Manila medals bearing the portrait of Admiral Dewey, and the Santiago medals a portrait of Rear-Admiral Sampson. The medal is a bronze five-pointed star within a circle suspended from a cross bar inscribed with the word ((Valor® and surmounted by an eagle, united by a ribbon of 13 stripes of red, white and blue. Consult Roden-bough, Pncle Sam's Medal of Honor5 (New York 1886), and (United States Army Regula¬ tions5 (latest issue).

MEDAL OF HONOR LEGION, an as¬ sociation of officers and enlisted men of the United States army, who were awarded medals of honor for special acts of bravery and devo¬ tion. At first limited to participants in the Civil War, it was subsequently extended to all medal holders. The association has altogether about 400 members among the army veterans and among naval veterans. The meetings are held annually.

MEDALLION, me-dal'yon. (1) The term medallion in numismatics is applied to those productions of the mint of ancient Rome, or struck in the provinces under the empire, which, if gold, exceed the aureus in size; if silver, the denarius ; and if copper, the first or large brass. Medallions are not numerous. Those struck in

the Greek provinces are more common than the Roman, but of inferior workmanship. A beauti¬ ful and famous gold medallion exists of Augus¬ tus, and one of Domitian, but few, in any metal, are found prior to the reigns of Hadrian and Antoninus; those in brass are the largest, many of them being several inches in diameter, and for the

most part of admirable workman¬ ship. (See Medal).

(2) In architecture, an oval panel carved in bas-relief, usually carrying a head or figure. The same term is used for a color design.

MEDANO, ma-da'nd, the Spanish name for peculiar moving sandhills in Peru. They are seen on the plain of Islay near Arequipa, and are crescent-shaped 'bodies of white sand, which move across the desert in the direction of the winds which blow from sunrise to sunset. The sand composing the medano seems different from the desert sands over which the moving mass is blown or carried.

MEDARY, Samuel, American editor and

politician : b. Montgomery Square, Montgomery County, Pa., 25 Feb. 1801 ; d. Columbus, Ohio,

7 Nov. 1864. In 1825 he settled at Batavia, Clermont County, Ohio, and in 1828 established the Ohio Sun in support of Jackson's candi¬ dacy for the presidency. He sat for Clermont County in the State house of representatives in 1834-35 and was a member of the State senate in 1835-37. In 1837 he purchased at Columbus the Western Hemisphere, later the Ohio Statesman, which he edited until 1857. In 1857-58 he was governor of Minnesota Terri¬ tory and in 1858-59 of Kansas Territory. He was named Minister to Chile in 1853 but de¬ clined. He established the Crisis at Columbus in 1860, and was its editor until his death. He gave active aid to Morse in the promotion of the electric telegraph, was a firm supporter of the measures of Jackson and Douglas; is said to have originated the battle-cry «Fifty-four forty, or fight!® in connection with the Oregon boundary dispute, and was often called the (<old wheel-horse of Democracy.® There is a monu¬ ment to his memory at Columbus, Ohio.

MEDEA, me-de'a, a powerful sorceress of the Greek heroic age, daughter of 2£etes, king of Colchis. By some her mother is said to have been Idvia, daughter of Oceanus; by others Hecate or Neaera. By her profound knowledge of the magical virtues of plants she practised witchcraft. She became the wife of Jason (q.v.), the leader of the Argonauts. . For 10 years she lived with him after having sup¬ ported him in every danger, till the charms of Glauce, or Creusa, the daughter of King Creon, kindled a new passion in him, and he discarded Medea, who brooded on revenge. With this purpose she sent the bride, as a wedding gift, a poisoned garment, also a poisoned crown of gold, which Glauce put on and died in agony. The sorceress reduced Creon's palace to ashes by a shower of fire, murdered her two children by

Jason and then mounted her dragon chariot and escaped. Some say. that she went to Her¬ cules, others to Athens, to King vEgeus, by whom she had Medus. From Athens also she was banished as a sorceress. She finally re¬ turned to her home, where her son Medus re¬ instated her father, who had been dethroned by his brother Perses, after which she died. The storv of Medea has often been a subject of

tragic poetry ancient and modern. The trage¬ dies of this name, by 2Eschylus and Ennius have perished, as well as the Colchides of Sophocles. The Medeas of Euripides and Sen¬ eca are alone extant. The story has also been dramatized by Corneille and Grillparzer. Cheru¬ bini made this myth the subject of an opera. Consult Liibker, F., (Reallex.ikon des plas—

sischen Altertums) (8th ed., Leipzig 1914), and Mallinger, Leon, (Medee etude sur la litera¬ ture comparee) (Paris 1898).

MEDEA, The, a play of jealousy and re¬ venge, in which the interest is sustained from the beginning to the very end, and is artistically almost without a flaw, was brought out. by Euripides in 431 b.c. Few tragedies of ancient or modern times are more dramatic. None ex¬ hibit the working of a fiercer and rnore'intense passion. With the (Hippolytus) it forms the double summit of the poet's works, and prob¬ ably no Greek tragedy has been more famous in the modern world. The great enchantress, who fell in love with Jason when he came to Colchis in quest of the Golden Fleece, escapes with Jason to Greece, and lives happily with him for many years. Later Jason and his bar¬ barian princess are obliged to flee to Corinth. In this city the scene of our play is laid. The old nurse speaks the prologue: Jason has de¬ serted his wife for the daughter of Creon, king of Corinth. Dishonored, forsaken, the hapless woman sits brooding. The paedagogus enters and reports a conversation he has just over¬ heard : Creon proposes to banish Medea. Medea is heard bemoaning her fate.: oh, that she had never listened to the smoothing words of the deceitful Greek. Embittered, she im¬ precates curses on Jason and her children and prays that the whole' house may be blasted to naught. Then-she comes out and explains her position to the Corinthian women, who form the chorus. Creon enters and orders Medea to get her gone. She dissembles : the king is mistaken in believing that she is dangerous — she is simply, hot with hate against Jason. «Let me remain — I shall yield to the stronger hand and hold my peace.® The king reluctantly consents for her to remain one day. A great change comes over the woman scorned after Creon's departure : ftI would not have groveled so before him except to get revenge. I shall bide my time, find first a safe refuge, then compass their destruction in secrecy by craft. Till then, my soul, sit still. By the Queen of Night that habits my hearth's dark shrine, no one shall ever vex my soul with

impunity.®

The chorus sing: (<the. old order is up¬ turned; piety and fear, religion, justice, truth, loyalty all decline to their contraries, and naught but confusion lives.® Jason appears and upbraids his wife for her froward spirit; she may rail at him, but not against the king. He had tried to appease the incensed ruler, but she persisted in her folly. But he will not desert her even in this dire extremity. ((0 most per¬ nicious and perfidious man! You front me, you, the most hateful, insolent wretch on earth? But I am glad you came, for I shall tell you what you are, that you may chafe and wince. — I saved you, slaying the dragon and delivering you from death. I abandoned my home and followed you. Yet now you forsake me, the mother of your children. A loyal

spouse I have in you ! I, a poor lorn woman, with her two babes, a fine reproach for our newly wedded prince!® Jason feels that he must be a skilful pilot to run before the wind of her loud words ; but he declares that she received more than she gave, for she lives in a good Greek land, where law and justice reign — she is no longer an obscure barbarian. He had her welfare at heart when he contracted the new alliance. Women are so unreasoning that they know not where their fortunes lie. Jason withdraws and the chorus sing a song on the power of love. King yEgeus of Athens enters. He promises to protect Medea, if she comes to his city seeking refuge. Then she sends for Jason and asks his forgiveness for the rash words spoken in angry mood: ((Ho, children, come forth and welcome your father with me.® But the thought of their impending death, when she beholds her babes, is too much even for Medea's iron courage. The tears force themselves to her pitying eyes. In explanation of her weakness she tells Jason that she is a woman, naturally born to tears, prone to weep, subject to fears: her heart melted at the thought of reconciliation. Jason has naught but praise for her altered mood; may his chil¬ dren grow to manhood triumphant o'er his foes. Medea weeps. Jason asks her why she turns her face away and hears not with joy his beni-sons. <('Tis nothing — I bare them, bred them, loved them, and when you prayed that they might live, I wonderfed whether this would come to pass.® She begs Jason to intercede for her children and allow them to remain in Corinth — she will send his bride royal gifts. The children carry the presents in a casket to the palace. The chorus sing an ode and the paedagogus enters to inform Medea that the children may remain. ((Be of good comfort, thy children will yet bring thee back home.® (fNay, I shall first send others home. Alas! O children, you have a home, but I go to another land, just when I begin to feel that I am blest in you. Out upon my daring! 'Twas all for naught I toiled for you, my children. Ah, the fond hopes that your dear hands would minister to my wants and when I die put the shroud around me. Oh, why do you look at me thus? My heart is unequal to the task. My babes' bright morning faces unnerve my arm. I cannot do it. I will take my children with me. Why, to wring their father's heart, give my own a double pain? But am I to be mocked? Shall I let my foes go

unpunished? I must do it. Out upon my cowardice ! Go in, chil¬ dren. Nay, my heart, let them live; spare the tender babes, my unblown flowers, my life, my joy, my all the world. No, by the avenging deities, I will not give up my children to my foes. But I must see them before I go. O my darlings ! O sweet mouth and form and face, sweet kiss, sweet embrace ! O balmy breath and tender touch of your delicate cheeks! Go in, go in. I can look no longer, I faint.® The chorus sing an ode on the comparative benefits of having children and having no children. A messenger enters : <(when your children entered the palace we were all glad. The rumor spread that you were reconciled.® One kissed the hands of the children, the other their flaxen hair. The princess sat with fond look on Jason; but when she espied the pair, she pulled down her veil and turned away in

scorn. Jason entreated her to allay her wrath: <(Accept these gifts and ask your father to remit the doom of exile, for my sake.® And when she saw the splendid gifts, she granted her lord's desire. Then she took up the robe — after they had gone — and tried it on. The golden crown she placed upon her head and arranged her hair before a mirror. Then she rose and walked about the room, stepping lightly with delicate foot and glancing oft toward the lowest folds around her ankle. Suddenly a ghastly spectacle presented itself. A pallor spread o'er her face. Back she tot¬ tered all atremble, and barely reached her couch before she fell, frothing foam around her lips, her eyeballs rolling wildly. One serv¬ ant darted to her father's chamber, another flew to call the bridegroom. The hapless girl lay full a minute speechless. Then she roused and gave forth a scream, for a double agony had charged upon her: from the inclusive verge of golden metal around her brow a marvelous stream of fire shot forth, while the robes began to eat her delicate flesh. Up she started and sped across the room, a pillar of fire, shaking hair and head in vain endeavor to cast off the crown. But firm it held. Whene'er she shook her locks the flames started up twice as high and fierce. O'erwhelmed she sank upon the floor, past recognition save to a parent's eye: the clear calm look was gone, the comely fea¬ tures marred, drops of intermingling fire and blood dripped from her head, while gobbets and flakes of flesh dropped from her bones, like tears of resin from the pine, as those unseen jaws of the poisonous drug fed on her form. All feared to touch the corpse. Suddenly her father entered. He knelt and clasped her in his arms : <(Oh, my poor child, what god

brought thee to this cruel death?® At last he stayed his tears and tried to raise his old bent form, but the robes did cling to him as the ivy to

the laurel. He writhed upon his knees and tried to wrench himself away, but only pulled the flesh from off his bones. At last the ill-starred sire gave up the ghost. Now their corpses lie side by side, a spectacle to draw tears of pity from the eye. Medea informs the chorus that she must slay her children and hasten away: ((Now, my heart, put on thy armor for the deed. Shrink not. Think not on the happy days agone. For this one brief day forget thy children — e'en if thou dost slay them, they are most dear, and I the most unhappy woman in the world.® Medea enters the house and soon the screams of the children are heard within. Jason enters and asks for Medea; he feels anxious for his children — the king's relatives may do them hurt._ <(Wretched man, your chil¬ dren are dead, slain by their mother's hand.® Jason is overwhelmed. He orders the gates to be unbarred. Medea appears aloft in a chariot. Jason asks for the bodies; but she refuses to give them up: she will take them and bury them herself, that her foes may not demolish the grave. She intends to go to the land of Erechtheus to live with ZEgeus. She prophe¬ sies that Jason will die most miserably, struck on the head by a piece of fallen timber from the Argo. She soars away, and Jason calls on Zeus to witness the treatment he has received at the hands of the tigress. Thus the play, in which we see the perfection of Euripides' art,

ends. The fury of her vengeance is as the love of Phaedra in the <Hippolytus) ; but instead of overwhelming her soul, it excites to action, arms it against the deepest instincts of mother-love and makes it triumph over everything in a kind of grandiose and savage egoism. The more impetuous the fury, the more pathetic the struggle of feminine instincts. In no other play is there anything more characteristically Euripidean than Medea's celebrated mono¬ logue. Next to the human passions it is the natural affections, the tenderness of parents for their children, the love of brothers and sisters, of husband and wife, that Euripides portrays best.

Joseph E. Harry,

Author of (The Greek Tragic PoetsT *etc.*

MEDELLIN, ma-del-yen', Colombia, a city, the capital of the department of Antioquia, and an episcopal see, picturesquely situated in a mountain valley 4,850 feet above sea-level on the Porce, an affluent of the Canca, 150 miles northwest of Bogota. It was founded in 1674 and has a cathedral, college, seminary, technical school, mint, hospital and other public build¬ ings. The development of the gold and silver mines in the region has contributed largely to its modern progress. It has manufactures of pottery, porcelain ware, cloth, candies, ciga¬ rettes, clocks, shoes, paper and jewelry and has a considerable trade, exporting gold, silver, cof¬ fee and hides. Pop. 70,547. Consult (Censo general de la republica de Colombia5 (Bogota

1912).

MEDFIELD, Mass., town, in Norfolk

County, 20 miles south cf Boston; on the New York, New Haven and Hartford Railroad. The town is the seat of Medford State Hospital. Bricks and straw hats are manufactured. Han¬ nah Adams, the historian, was born in Medfield. Pop. 3,466.

MEDFORD, med'ford, Mass., city, in Mid¬ dlesex County; on the Mystic River and on the Boston and Maine Railroad, five miles north¬ west of Boston. The area is about 10 square miles. It was founded in 1630 bv people from Salem who called the place Meadford. In 1892 it was chartered as a city, having within its limits the villages of South Medford, West Medford, Hillside, Glenwood and Wellington. It is a. residential suburb of Boston, but it has some important industrial interests, chief of which are the manufacturing of machinery, cot¬ ton goods, dyes, chemicals, carriages, brick and novelties. It is the seat of Tufts College (q.v.), and has the city and the college libraries. The Cradock House, built in 1634, is one of the old¬ est, if not the oldest building in the United States which retains its original form. The city has four large and several small parks, many miles of boulevard (Metropolitan Park¬ ways) and includes many acres of State reserva¬ tion (called Middlesex Falls) where game is protected and the public allowed to enjov the natural beauties of the country. <(The Royal House® is also located in this city and is of historic (Colonial) interest and is preserved by the Royal House Association, it is of the finest type of Colonial design. Oak Grove, the largest of its three cemeteries, has an area of 34 acres. The charter granted in 1892 is still in force and provides for the administration of the municipality by a mayor, who holds of¬

fice two years, and a board of aldermen com¬ posed of 21 members. The administrative of¬ ficials are appointed by the mayor or elected by the council. The board of education is chosen by popular vote. Pop. 39,038. Consult Usher, (History of the Town of Medford, Mass.5

MEDFORD, Ore., city, in Jackson County; on the Pacific and Eastern, the Southern Pacific and the Rogue River Valley railroads, five miles east of Jacksonville. In the neighborhood are Crater Lake, National Park and Sugar Pine forests. The city has a high school, post-office building, Carnegie Library, Sacred Heart Hos¬ pital, Saint Mary's Academy and a station of the United States Weather Bureau. It has a large trade in apples and pears, for which it is an important shipping point. The municipality owns the water-supply system which was con¬ structed at an expenditure of $350,000. Pop.

(1920) 5,756.

MEDFORD, Wis., city, county-seat of Tay¬ lor County; on the Black River and on the Wisconsin Central Railroad ; about 60 miles northeast of Eau Claire. It is in an agricul¬ tural and lumbering region. The chief manu¬ factures are cheese, foundry products, lumber and leather. It has considerable trade in lum¬ ber, leather and cheese. Pop. 1,846.

MEDHURST, med'herst, Walter Henry,

English oriental scholar and missionary: b. Lon¬ don, 1796; d. there, 24 Jan. 1857. He was edu¬ cated for the ministry and in 1816 made a missionary tour through India and Malacca, establishing himself in 1822 in the island of Java, where he remained eight vears. During this interval and for several years afterward he pursued his missionary labors also in Borneo and on the coasts of China. In 1843 he settled in Shanghai and subsequently passed six years in the interior of China. He was an intelligent student of the languages and literatures of eastern Asia, being well versed in the Chinese, Japanese, Javanese and other dialects, besides Dutch, French and English, in all of which he wrote. Beside a Chinese version of the Bible, he published Chinese Repository5 (20 vols., 1838—51) ; Chinese and English Dictionary5 (1 842 — 43) ; (English and Chinese Dictionary5 (1847—48) ; ˆEnglish and Japanese Vocabulary* (1830); (Dictionary of the Hokkien Dialect5 (1832-39); translation of a Comparative Vocabulary

of the Languages of China, Corea and Japan5 (1835) ; (Notes on Chinese Gram¬ mar5 (1842); (Chinese Dialogues5 (1844);

(China in its State and Prospects5 0838); dissertation on the Theology of the Chinese5 (1847) ; *etc.*

MEDIA, me'di-a, Asia, an ancient king¬ dom and country of considerable extent, now comprised in the provinces of northwest Persia. It was originally inhabited by a Turanian race, who are called Medes by ancient writers; but this name properlv belongs to an Aryan race, who had spread themselves widely in the high regions of Western Asia and ultimately estab¬ lished their ascendency in Media. They have been traced both by Persian and Indian tradi¬ tions to the countries beyond the Indus. The history of Media is involved in considerable obscurity, but careful modern investigations have made the main outlines fairly clear. The Medes are first mentioned in connection with some of the kings of Assyria from the 9th

century b.c. Ramman-nirari II of Assyria, who reigned about 810 b.c., led expeditions into Media and in 713 the great King Sargon con¬ quered the country and made the Median princes tributary to the Assyrian monarchy. According to the Assyrian inscriptions, one of the Median rulers named Dajaukku was carried off as a prisoner in 715 b.c.; this Dajaukku is the same as the Deioces who, according to Herodotus, founded the Median kingdom on an independent basis and fixed his capital at Ecbatana (now Hamadan). Deioces was fol¬ lowed by three kings in succession, bearing the names (in Greek) of Phraortes, Cyaxares and Astyages. Phraortes, to whom the Greek his¬ torian assigns a reign of 22 years (647-625 b.c.) , began the extension of the Median empire by the subjugation of the mountainous region of Persis, to the southeast of Media. He then conquered other parts of Asia, and at length ventured to take the aggressive against the Assyrians and attack Nineveh. In this attempt he failed and lost his life. Cyaxares succeeded him on the Median throne, and during a reign of 40 years raised his kingdom to the greatest power and importance it was destined to achieve. He thoroughly reorganized the

army and advanced against Nineveh. He gained several successes, but before he could take the Assyrian capital he had to return to defend his kingdom against the inroads of Scythians. At first the Scythians carried all before them and became virtually masters of Media, but Cyaxares temporarily secured his position by negotiating with them, and finally slew all their chiefs when they were overpowered by wine at a feast. Thus rid of Scythian authority, Cyaxares again advanced against the Assyrians. In conjunction with Nabopolassar, founder of the Neo-Babylonian empire, he captured Nineveh about the year 606 b.c. After this event the Assyrian dominions were partitioned between the two conquerors, the northern parts falling to Media and the southern portions to Nabopolassar. Nebuchadnezzar, son and suc¬ cessor of Nabopolassar, married a daughter of Cyaxares. Cyaxares carried his arms into Asia Minor and waged war for five years against Alyattes, king of Lydia. On 28 May 585, the Median and Lydian forces were engaged in battle when a total eclipse of the sun took place and struck terror into the soldiers on both sides. This event disposed both sides to enter into peace negotiations, which were successfully car¬ ried through by the agency of Nebuchadnezzar and Syennesis, prince of Cilicia. Cyaxares probably died very shortly after this event, and left to his successor a greatly extended empire. Astyages was the last independent king of Media, and from 550 b.c., when he was con¬ quered by Cyrus the Persian, Media formed part of the Persian empire. See Persia and consult Delattre, A. L., (Le peuple et l'empire des medes jusqu'a la fin du regne de Cyaxare* (Brussels 1883) ; Oppert, Jules, (Le peuple et la langue des Medes) (Paris 1879) ; Prasek, (Medien und das Haus des Kyaxares* (Berlin 1890) ; id., (Geschichte der meder und Perser bis zur makedonischen Eroberung) (Gotha 1906) ; Ragozin, Z. A., < Media, Babylon and Persia* (New York 1888).

MEDIA, Pa., borough, county-seat of Delaware County; on the Philadelphia. Balti¬ more and Washington Railroad, about 15 miles

west of Philadelphia. It is a well-built, well-kept residential suburb of Philadelphia, and is situated in a fertile agricultural region. It is the headquarters for the Delaware County In¬ stitute of Science, established in 1833. The Institute has a library of about 5,500 volumes, and the borough library has about 3,500 volumes. The street-lighting plant and the waterworks are owned and operated by the borough. The borough was incorporated in 1850; its govern¬ ment is vested in a burgess and council. Pop.

3,562.

MEDIAL MORAINE, See Moraine.

MEDIATION, in international law, is the friendly intercession of a third power or powers with a view to bringing about the settlement of a controversy between two or more states, to avert threatened hostilities between them or to bring to a close a war in which they are en¬ gaged. Most writers on international law make a distinction between (<good offices8 and (<mediation.8 The employment of good offices by a third power consists in the tendering of friendly advice or the offering of suggestions to the disputing parties with a view to bringing about the settlement of a dispute or the conclusion of peace, if they are engaged in war. A govern¬ ment which tenders its good offices is under¬ stood to be willing to suggest a compromise as a common basis of agreement between the con¬ tending parties, to arrange preliminaries for the negotiation of a treaty of peace and to do anything else that may serve the parties in set¬ tling their controversy or in ending their hostili¬ ties.

Mediation, on the other hand, has more of the character of friendly intervention. A mediator assumes the role not merely of adviser or conciliator but takes the part of a middle¬ man, — usually the leading part, — in the con¬ duct of the negotiations between the disputants. He is not, however, a judge, for mediation is not arbitration, nor is he an advocate for either side but, to use the language of Sir James Mackintosh, he is <(a common friend, who coun¬ sels both parties with a weight proportioned to their belief in his integrity and their respect for his power.8 With a view to encouraging a more frequent recourse to mediation as a means of settling international controversies and in order to define the role of the mediator the Hague Peace Conferences of 1899 and 1907 adopted the following rules which were em¬ bodied in a convention which was ratified by practically all the powers of the world.

<(In case of serious disagreement or dispute, before an appeal to arms, the Contracting Powers agree to have recourse, as far as cir¬ cumstances allow, to the good offices or media¬ tion of one or more friendly Powers (Art. 2).

ˆIndependently of this recourse, the Con¬ tracting Powers deem it expedient and desir¬ able (the italicized words were added in 1907) that one or more Powers, strangers to the dis¬ pute, should, on their own initiative and as far as circumstances may allow, offer their good offices or mediation to the States at variance.

<(Powers, strangers to the dispute, have the right to offer good offices or mediation, even during the course of hostilities.

(<The exercise of this right can never be re¬ garded by either of the parties a-t variance as an unfriendly act (Art. 3).

<(The part of the mediator consists in recon¬ ciling the opposing claims and appeasing the feelings of resentment which may have arisen between the States at variance (Art. 4).

((The duties of the mediator are at an end when once it is declared, either by one of the contending parties, or by the mediator himself, that the means of reconciliation proposed by him are not accepted (Art. 5).

((Good offices and mediation, undertaken at the request of the contending parties or on the initiative of Powers strangers to the dispute, have exclusively the character of advice, and never have binding force (Art. 6).

((The acceptance of mediation cannot, in de¬ fault of agreement to the contrary, have the effect of interrupting, delaying or hindering mobilization or other measures of preparation for war.

((If mediation takes place after the com¬ mencement of hostilities, the military operations in progress are not interrupted, in default of agreement to the contrary (Art. 7).))

It will be seen that the tender of good offices or mediation by third powers prior to or during hostilities is declared to be a legal right, though not an obligation. The Convention, however, imposes on the disputants an obligation to have recourse to this mode of settling their con¬ troversies so far as circumstances allow. Each disputant is therefore the judge as to whether the circumstances in a particular case create an obligation to accept the offer tendered. At the outbreak of the European War the Presi¬ dent of the United States made known his will¬ ingness to serve as a mediator whenever he should receive assurances that an offer would be acceptable by the warring powers. Again in 1916 when war between the United States and Mexico seemed imminent the governments of several of the Latin American republics made known their willingness to offer their good offices in bringing about a settlement of the dispute but the American government declared that the circumstances were not such as to make recourse to this form of sentiment expedi¬ ent. The express declaration of The Hague Convention that the exercise of the right of mediation by third powers shall never be re¬ garded by either of the disputing parties as an unfriendly act was designed to remove all pos¬

sibility that an offer of mediation might be construed as an act of gratuitous interference rather than the act of a disinterested friend of both parties. The role of the mediator is de¬ fined in article 4 as that of reconciliation and article 5 lays down the circumstances when h's mission is terminated. Article 6 which declared that mediation has no binding effect on the parties but is entirely advisory in character re¬ moves the possibility of further misunderstand¬ ing concerning its purpose and effect.

The historical instances of recourse to good offices and mediation are numerous. A few of these may be mentioned as illustrations. Dur¬ ing the war of 1812 between Great Britain and the United States, the Tsar of Russia offered to act as a mediator with a view to bringing about a termination of hostilities. The offer was accepted by the government of the United States and to avoid delays plenipotentiaries were at once appointed by the President to con¬ clude a treaty of peace blit the offer was re¬

fused by the British government and nothing further came of the Russian proposal.

Early in 1861 several Latin American re¬ publics tendered their good offices to avert the civil war then imminent; after the outbreak of hostilities the British and French governments through their ministers at Washington ex¬ pressed a willingness (<to undertake the kindly duty of mediation® if the President should de¬ sire it. President Lincoln expressed apprecia¬ tion for (<this generous and friendly demonstra¬ tion® but stated ((that we cannot solicit or ac¬ cept mediation from any, even the most friendly quarter.® On various occasions during wars in South and Central America the President of the United States tendered his good offices to bring about the adjustment of difficulties or to terminate hostilities already existing. One of the most remarkable of such examples of mediation on the part of the United States was that which was begun in 1866 and concluded in 1872 for the purpose of terminating the war be¬ tween Spain on the one hand, and the allied republics of Peru, Chili, Bolivia and Ecuador on the other. During the Franco-German War of 1870-71 France requested the United States <(to join other powers® in an effort to bring about peace. President Grant replied that he anxiously desired to see the war ended and peace restored and that he would be glad to use his efforts in bringing about peace if Ger¬ many also desired the employment of his good offices. At the same time the French govern¬ ment was informed that it was the uniform policy of

the United States not to act jointly with European powers in interference in European questions. During the Chino-Japan- ese War of 1894 the government of the United States made known to both belligerents its will¬ ingness (<to contribute its kindly offices toward the restoration of peace® but when an inquiry was made asking whether the United States would be willing to join England, Germany, France and Russia in an intervention between China and Japan the President replied that the United States could not ioin the powers men¬ tioned in such an intervention. During the Boer War of 1899-1902 the government of the United States alone of all the governments ap¬ proached by the South African republics tendered its good offices but the offer was not acceptable to the government of Great Britain.

A remarkable recent example of the em¬ ployment of good offices by the President of the United States to bring about the termination of war was the intervention of President Roose¬ velt in 1905 which resulted in the conclusion of peace between Japan and Russia. On 8 June 1905 the President caused identical notes to be sent to the governments of both belligerents ex¬ pressing his wish that «the terrible and lament¬ able conflict now being waged® might be brought to an end and urging them <(not only for their own sakes but in the interest of the whole civilized world to open direct negotiations with one another.® He also expressed his entire willingness to do what he properly could if the two powers felt that his services would be of any aid in arranging the preliminaries as to the time and place of meeting of the plenipoten¬ tiaries which they might appoint. The sugges¬ tion of the President was promptly acted upon and plenipotentiaries were appointed to negotiate

a treaty of peace. They met at Portsmouth, New Hampshire, and a treaty of peace was signed on 23 Sept. 1905.

A still more recent example of successful mediation was that of 1914, which resulted in the temporary termination of an existing con¬ flict between the United States and Mexico. On 25 April, the diplomatic

representatives of Brazil, Argentina and Chile addressed a com¬ munication to the Secretary of State tendering the good offices of their governments for ((the peaceful and friendly settlement® of the con¬ troversy. The offer was promptly accepted both by the President of the United States and General Huerta, President of Mexico, and both parties agreed to a mutual suspension of hostil¬ ities at the request of the mediators.

At the suggestion of the mediators commis¬ sioners representing both parties were appointed and they met at Niagara Falls, Ontario, in May 1914. The mediating plenipotentiaries in turn presided over the conferences. On 24 June a protocol embodying the terms of agreement was signed and it was duly ratified by both governments. See also Arbitration, Inter¬ national.

Bibliography. — In addition to the general treatises on International Law (bibliography q.v.) see especially Hershey, (Essentials of In¬ ternational Public Law* (pp. 322-324: excellent bibliography on p. 342; New York 1912); Holls, (The Peace Conference at The Hague) (pp. 176-203; New York 1900) ; Higgins, (The Two Hague Peace Conferences) (pp. 167 ff; Cambridge 1909) ; Hull, (The Two Hague Conferences) (pp. 267-276; Boston 1908); Moore, (Digest of International Law) (Vol. VII, Secs. 1065-1068; Washington 1906).

James W. Garner,

Professor of Political Science, University of Illinois.

MEDICAGO, genus of leguminous plants common throughout the greater part of the globe and including such forage plants as al¬ falfa, medic and bur and mail clovers. Some species are annual, others perennial. In all there are about 50 species, of which about six are native to the United States. These include M. sativa, M. lupulina, M. denticulata, M. Ara-bica. In general the perennial species have vio¬ let flowers, the annuals small bright yellow flowers. The pods are single-seeded, ; curved and spineless in some, while in others it is spi¬ rally twisted, has spines on the edges and con¬ tains several seeds. Medicago. sativa is the most important species, since it includes the valuable alfalfa and lucerne.

MEDICAL ASSOCIATION, American.

See American Medical Association.

MEDICAL CODE, a set of regulations adopted by a medical association outlining the conduct of members of the profession. The various codes

prohibit advertising in public prints, as well as the endorsement of proprie¬ tary or secret remedies. .The ethics of both ˆregular® and homoeopathic schools define the relations of patient and physician and of at¬ tending and consulting physician, and provide that a physician shall attend the immediate family of a brother physician without charge, except when unusual labor, expense or ex¬ posure is involved. The medical code in this country was founded on the English, code .of

medical ethics prepared by Thomas Percival in 1803. In 1847 the American Medical Asso¬ ciation adopted a general code which super¬ seded codes existing in several States, and which was unopposed till 1882. In the latter year a majority of the members of the New York County Medical Society voted to dis¬ obey the provision of the code which forbade them to consult with any but (<regular® physi¬ cians, claiming the right to consult with any physicians that the legislature of each State decided to be legally qualified. Similar action was taken by a majority of the members of the New York Academy of Medicine. This an¬ tagonism affected the whole profession in this country, and the immediate result was the for¬ mation of New York County and State associa¬ tions, whose delegates were received by the American Medical Association to the exclusion of those from the old societies. In 1903 steps were taken to heal their differences and unite the rivals into one body, with the code so modified in effect as to allow individual liberty in the matter of consultation. Consult Flint, (Medical Ethics and Etiquette) (New York 1883) and Principles of Medical Ethics) (Chi¬ cago 1912), the official work of the American Medical Association.

MEDICAL COLLEGES FOR WOMEN.

See Education, Professional; Medical Edu¬ cation in the United States.

MEDICAL CORPS. The Medical De¬ partment includes the Medical Corps, Dental Corps, Medical Reserve Corps, Hospital Corps and Nurse Corps. The Medical Corps consists of one surgeon-general, with rank of brigadier-general, who is chief of the medical depart¬ ment, 14 colonels, 24 lieutenant-colonels, 105 majors and 300 captains or first lieutenants, who have rank, pay and allowances of officers of corresponding grades in the cavalry and of the service. An applicant for appointment in the medical corps of the army must be between 22 and 30 years of age, at the time of taking the preliminary examination, must be a citizen of the United States, must have a

satisfactory general education, must be a graduate of a reputable medical school legally authorized to confer the degree of doctor of medicine, and must have had at least one year's hospital training, in¬ cluding practical experience in the practice of medicine, surgery and obstetrics. The appoint¬ ments are made by the President, upon the rec¬ ommendation of the surgeon-general, after, the applicants have passed the prescribed examina¬ tion, consisting of two parts — a preliminary examination, and a final or qualifying examina¬ tion, with a course of instruction at the Army Medical School intervening. Qualified appli¬ cants are appointed to the medical reserve corps with the rank of first lieutenant, and upon pledging themselves to accept a commission in the medical corps, if found qualified in the final examination, and to serve at least five years thereunder, unless sooner discharged, are ordered to the Army Medical School, Washing¬ ton, D. C., for instruction as candidates for admission to the medical corps of the army; if, however, a greater number of applicants qualify than can be accommodated at the School, the requisite number are selected ac¬ cording to their relative standing as marked by the.. Army Medical Board. Graduate, candi-538

dates who are found physically qualified and who obtain a general average of 80 per cent in their preliminary professional examination, in their course at the Army Medical School, in their clinical examination and in their general aptitude, are eligible for appointment in the medical corps. Eligible candidates may, if they so desire, take a special examination in ancient or modern languages, higher mathematics, or scientific branches other than medical. Pro¬ ficiency therein is rated by the board conform¬ ably to instructions from the surgeon-general. The relative standing for appointment of eligi¬ ble candidates is determined by the total num¬ ber of points obtained in the preliminary pro¬ fessional examination, in the School, in the clinical examination, in general aptitude, and in tbe special examination, if one is taken. See Army Medical School; Hospital Corps; Medical Organization in the Army.

MEDICAL EDUCATION, Colleges and Schools, Legal Supervision, *etc.* Before the establishment of medical schools in this coun¬ try medical students either went abroad to study or served an apprenticeship with some practising physician. The latter custom was common in view of the expense incident to work abroad, and continued till very recently. As a rule the apprentice had little opportunity for study, but was forced to depend on what he could absorb by contact with his preceptor. The physicians of the 1 7 th and 18th centuries who had studied abroad were usually classical students and in their preliminary training set an example that it would have been wise to fol¬ low. The first public lectures on anatomy be¬ fore a class of students in this country are said to have been delivered by Dr. William Hunter of Newport, R. I., in 1752. It seems, however, that Dr. Giles Firmin as early as 1647 delivered readings on human osteology in New England; that Dr. Thomas Cadwallader of Philadelphia gave instruction to students in anatomy be¬ tween 1745 and 1751 ; and that Drs, John Bard and Peter Middleton dissected the human body in New York City in 1750 for purposes of medi¬ cal instruction. 1762 Dr. William Shippen of Philadelphia gave a course of lectures on anatomy, illustrated by actual dissections. These lectures were continued till the organization of the Medical College of Philadelphia (now the medical department of the University of Penn¬ sylvania) in 1765. Dissections were rarely per¬ formed prior to 1760 and even autopsies were seldom permitted. At the time of the Ameri¬ can Revolution, with a population of 3,000,000, there were probably about 3,500 physicians

in the colonies, of whom it is estimated that not more than 400 had received medical degrees. In New England the clergyman was often the only available physician. Two medical schools were organized in the colonies, the Medical College of Philadelphia (now a department of the University of Pennsylvania) in 1765, and the medical department of King's (now Colum¬ bia) College, in 1768. The first medical degree conferred in this country, that of bachelor of medicine, was granted to 10 men by the Medi¬ cal College of Philadelphia in 1768. The de¬ gree of doctor of medicine was first conferred in 1770 by the medical school of King's College on two students who had taken the bachelor's degree in 1769. Fifty-one medical degrees had been conferred by these institutions before

1776, when operations were suspended by the war. In the colonial period two medical soci¬ eties (the State Medical Society of New Jer¬ sey, in 1766, and the Delaware State Medical Society, in 1776) and one permanent general hospital were organized. Harvard University Medical School was organized in 1782, Dart¬ mouth Medical College in 1797, the School of Medicine of the University of Maryland and the College of Physicians and Surgeons of New York in 1807. In 1813 the medical department of Columbia College was finally discontinued; the College of Physicians and Surgeons took its place in 1860. Of the 148 medical schools now existing in the United States and regis¬ tered by the University of the State of New York three were established between 1765 and 1800, 12 between 1801 and 1825, 19 between 1826 and 1850, 29 between 1851 and 1875, 80 between 1876 and 1900, 5 between 1901 and 1904.

At the time of the organization of the early medical schools the practice of obstetrics was relegated as a rule to ignorant midwives ; physi¬ ology, histology, organic chemistry, pathology, and surgery, as now recognized, were hardly known. The schools at first conferred the de¬ gree of bachelor of medicine on those who had studied two years with a preceptor and attended one course of lectures, the degree of doctor of medicine after three years of study and two courses of lectures. The bachelor's degree was abandoned in 1813. At first the Medical Col¬ lege of Philadelphia required for admission some knowledge of Greek and Latin, physics, natural history and botany, but the require¬ ment was abandoned about the time of the reor¬ ganization of the University of Pennsylvania in 1792. For a century there were as a rule practically no requirements in preliminary gen¬ eral education for admission to medical schools, and even to-day this is their greatest defect.

In 1839 the New York State Medical Soci¬ ety resolved that teaching and licensing ought to be separated as far as possible. Further dis¬ cussion of this question led to a convention of delegates from all medical schools and societies in the United States, held in New York in 18J6; from it sprang the American Medical Association. This national organization, thor¬ oughly representative in character, gave a new impetus to medical societies. The following societies have exercised an important influence in promoting higher standards : Association of American Medical Colleges (1890) ; American Institute of Homoeopathy (1844) ; National Confederation of Eclectic Medical Colleges (1871) ; Southern Medical College Association (1892). These prescribe for admission to med¬ ical schools a preliminary general education equivalent to one year in a high school. All prescribe four courses of lectures in different years as a condition for an M.D. degree, though they give an allowance of one year to graduates of reputable literary colleges and of other pro¬ fessional schools. All tend to improve facili¬ ties for teaching, dissections and clinics. The schools registered by these societies are 72, 19, 7 and 13 respectively.

In 1859 the Chicago Medical College, now the medical department of Northwestern Uni¬ versity, was established to test the practicability of a thorough graded system of instruction. Students were divided into three classes, and each class was examined at the close of the

year. Each of the three courses was six months in duration. Attendance on hospital clinical in¬ struction and practical work in the chemical, anatomic and microscopic, or histologic labora¬ tories were required for graduation. In 1871 the Harvard Medical School adopted a similar plan. The Syracuse Medical School followed, and to-day the graded system of consecutive lectures is the rule. In 1896 President Eliot wrote substantially as follows : Within 25 years the whole method of teaching medicine has been revolutionized throughout the United States. The old medical teaching was largely exposi¬ tion; it gave information at long range about things and processes which were not within reach or sight at the moment. The main means of instruction were lectures, surgical exhibitions in large rooms, appropriately called theatres, rude dissecting rooms with scanty supervision, and clinical visits in large groups. The lectures were repeated year after year with little change, and no graded course was laid down. There was little opportunity for laboratory work. The new medical education aims at imparting manual and ocular skill, and cultivating the mental powers of close attention through pro¬ longed investigations at close quarters with the facts and of just reasoning on the evidence. The subjects of instruction are arranged, as at the Harvard Medical School, in a carefully graded course, which carries the student for¬ ward in an orderly and logical way from year to year. Laboratory work in anatomy, medi¬ cal chemistry, physiology, histology, embryology, pathology and bacteriology demands a large part of the student's attention. In clinical teaching, also, the change is great. Formerly a large group of students accompanied a visiting physi¬ cian on his rounds, and saw what they could under very disadvantageous conditions. Now instruction has become, in many clinical depart¬ ments, absolutely individual, the instructor deal¬ ing with one student at a time, and personally showing him how to see, hear and touch for himself in all sorts of difficult observation and manipulation. Much instruction is given to small groups of students, three or four at a time — no more than can actually see and touch for themselves.

In 1918 there were, excluding _ graduate schools, 95 medical schools

in the United States with 13,630 students. The growth in medical students in 32 years up to 1910 was 333 per cent. In the last 15 years, however, there has been a radical change in medical education in the United States which has had the effect, as will be shown in the following table, of improv¬ ing the quality of the education, while at the same time reducing the number of those granted medical degrees. Acting upon the rec¬ ommendation of the American Medical Asso¬ ciation, a committee has made a division of medical schools into three classes, A, B and C, the first containing those medical schools which fulfilled the highest requirements. The an¬ nexed table shows the results of the reconstruc¬ tion which followed the classification :

Year Colleges Students Women Graduates Women

1904 .

160

28,142

1,129

5,747

1914 .

102

16,502

631

3,594

1915 .

96

14,891

592

3,536

1916 .

95

14,022

566

3,578

1917 .

96

13,764

610

3,379

1918 .

95

13,630

581

2.807

While the actual number of physicians graduated is half that of 1904, the number per thousand of population is still twice as great as it is in Europe. The diminution in number of medical students was not affected by the European War nor was the actual number of medical students and teachers affected by the selective draft, for the Medical Officers' Re¬ serve Corps and the Enlisted Medical Reserve Corps provided against that contingency.

Class A colleges require a four-year high school course and two years of work in a col¬ lege of arts and sciences approved by the council on education of the American Medical Association. The council also specifies what is required in the studies both in high school and college, and also what is to be expected of the medical schools themselves, both in supervision, equipment, teachers, clinical facilities [includ¬ ing, for instance, daily dispensary cases, at least six maternity cases for each senior stu¬ dent and 30 necropsies for each senior class of 100 students or less], medical library, museum, dissect

material, *etc.* In 1918 there were 69 medical colleges of Class A in the United States and two in Canada.

Medical schools of Class B are those which under the present organization give promise of being made acceptable by general improve¬ ments. Of these there are 14 in the United States and six in Canada. Class C contains those which require complete reorganization, do not keep satisfactory records, or enforce entrance requirements or give a major portion of. their instruction after 4 p.m., or are privately owned and conducted for profit. Of these there are 12 in the United States.

The comparative value of the work done now and 14 years ago is realized when it is known that in 1904 only 2.5 per cent of medi¬ cal schools required college work as an en¬ trance requirement, while in 1918 92.2 per cent did, and that in 1904 only 6.2 per cent of the medical students of the country were in the high grade medical schools, while in 1918 there were 95.3 per cent in the better schools, and that in 1904 but 6.4 per cent of the graduates in medicine came from the high grade colleges, while in 1918 the latter graduated 90.3 per cent.

In 1915 a national board of medical examin¬ ers was inaugurated with funds from the Car¬ negie Foundation. The board consists of six representatives from the government [two from the army, two from the navy and two from the public health service], three members of State licensing boards and seven other physi¬ cians appointed at large.

Of the 82 medical colleges in the United States in 1914-15 the most highly endowed had an income of $411,570, and the lowest $6,080.

About 1903 a rapid improvement in medical education began in the United States, result¬ ing in a very great decrease in the number of medical colleges and it was thought that a dearth of physicians would follow. Fears were also expressed that the medical education, the cost of which . was thus greatly increased, would be the privilege of the rich, and that it would undemocratically exclude the poor boy, a fear which has not been justified. Appre¬ hensions were also felt that the raising of the standard of medical education would have the effect of decreasing the supply of physicians for

rural communities. This, however, has been obviated by the improvement of facilities in communication — automobiles, better roads, *etc.*

Out of 90 medical schools, 60 are now coedu¬ cational, although 16 out of the medical col¬ leges admitting women have no women stu¬ dents. Out of seven medical schools for ne¬ groes, in 1910 only two were efficient.

More attention should be paid in the United States to instruction in hygiene and state medi¬ cine. In Great Britain no one can be appointed a medical officer unless he has a special diploma in public health. In this country little oppor¬ tunity is afforded for general or special sanitary work on broad lines. This subject is now under discussion and doubtless progressive States will soon provide places where medical officers of health or other persons engaged in sanitary work can obtain practical and scientific training. The scientific investigations which would be made in the laboratories of such schools would be of great value to the public.

The earliest law relating exclusively to physicians was passed by Virginia in 1639, but like the later act of 1736 it was designed mainly to regulate their fees. The act of 1736 made concessions to physicians who held university degrees. In only two of the 13 colonies were well-considered laws enacted to define the quali¬ fications of physicians. The general assembly of New York in 1760 decreed that no person should practise as physician or surgeon in the city of New York till examined in physic and surgery and admitted by one of his majesty s council, the judges of the supreme court, the king's attorney-general and the mayor of the city of New York. Such candidates as were approved received certificates conferring . the right to practise throughout the whole province, and a penalty of £5 was prescribed for all vio¬ lations of this law. A similar act was. passed by the general assembly of New Jersey in 1772. In 1840 laws had been enacted by the legisla¬ tures of nearly all the States to protect citizens from the impositions of quacks. Between 1840 and 1850, however, most of these laws were either repealed or not enforced as a result of the cry that restrictions against unlicensed prac¬ titioners were designed only to create a monopoly.

State Supervision. — Careful attention needs to be given to the difference between a license and a degree, the one carrying with it the right to assume a title which is evidence of scho¬ lastic ability, the other the right to enter on the practice of a profession or a pursuit, both ema¬ nating from the same authority, the State, either directly or through intervening mediums. As foreigners are often puzzled to account for the diversity in our legislation, the fact is again emohasized that all matters of internal police control are left exclusively to the several States, and that national laws regulating professional practice cannot be enacted. Hence the laws, of the United States will be silent concerning licenses and degrees except in so far as they may apply to the District of Columbia and cer¬ tain recent political dependencies.

Licensing. — The requirements for admis¬ sion to practise a profession in the 54 political divisions of the United States vary as greatly in the various professions as the political divi¬ sions differ in area, extent, population and im¬ portance. However, two general items appear

in full or in part in the various statutory re¬ quirements for licensing; namely, (1) the gen¬ eral preliminary education requirements; (2) the professional preparation. The general preliminary are given uniformly under the synopsis of requirements.

Supervision. — In medicine all political di¬ visions except Alaska now have examining and licensing boards. In some States the stringent laws against non-medical practitioners are en¬ forced; in others quackery receives such legal protection that any person may treat ((the sick or suffering by mental or spiritual means with¬ out the use of any drug or material remedy.” This is due largely to the fact that so many statutes lack specific definitions as to what con¬ stitutes the practice of medicine, and without these definitions the conviction of such practi¬ tioners cannot be secured through the courts. There is much misunderstanding in this coun¬ try regarding the duty of the State in relation to the health of the people. It does not con¬ sist in discriminating between schools or sys¬ tems of medicine, but in requiring without prejudice or partiality of all who seek a license to practise for gain on the lives of fellow be¬ ings a minimum preliminary and professional training.

Medical Sects. — As commonly understood,

regular physicians have no distinctive theory or practice ; homoeopaths treat diseases with drugs that excite in healthy persons symptoms similar to the morbid condition treated; eclectics make use of what they regard as specific remedies, chiefly botanic; physiomedicalists use only bo¬ tanical remedies, discarding those which are poisonous. In practice these distinctions are not always observed. The following political divisions specify homoeopaths, eclectics or osteo¬ paths as constituting part of their examining boards or have other than regulars on them. Arizona, Arkansas, California, Colorado, Geor¬ gia, Hawaii, Idaho, Illinois, Indian Territory, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, Nevada, New Jersey, North Dakota, Ohio, Oklahoma, Ore¬ gon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, Wisconsin, Wyoming.

Philippines and Porto Rico have examining boards, the former of three appointed by the director of health for the Philippines, the lat¬ ter of five appointed by the governor.

The following have separate examining boards for each recognized school of medicine : Arkansas, Connecticut, Delaware, District of Columbia, Florida, Louisiana, Maryland.

Midwifery. — Special fees for certificates of registration as midwives are required in Cali¬ fornia, Illinois, Iowa and Texas. In the fol¬ lowing political divisions the provisions of the medical practice acts do not apply to women engaged in the practice of midwifery: Ar¬ kansas, Colorado, Florida, Georgia, Idaho, Ken¬ tucky, Louisiana, Maryland, Mississippi. Mon¬ tana, New Mexico, North Carolina, South Caro¬ lina, Tennessee, Washington. In other political divisions, though there are some special provi¬ sions for certain localities, the general acts regulating the practice of medicine make no reference whatever to the practice of midwifery by women. It would seem, therefore, that these laws restrict the practice of midwifery to licensed physicians. Practically the conditions

in political divisions where the laws seem to restrict the practice of midwifery to licensed physicians are little better than in political divi¬ sions where the practice of midwifery by women without a license is authorized by stat¬ ute. There will probably be little change for the better till the midwife receives legal recog¬ nition, and the practice of midwifery is regu¬ lated by definite statutory provisions.

The . following States have reciprocity clauses in the law, but they are operative in few cases only, namely: Alabama, Arizona, Arkansas, California, Delaware, District of Columbia, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, West Virginia, Wisconsin, Wyoming.

The law provides for a preliminary educa¬ tion in all the political divisions except the Canal Zone, the District of Columbia, Hawaii, Massachusetts, Porto Rico and Wyoming.

The law provides for four years of high school in all political divisions except the Canal Zone, the District of Columbia, Idaho, Illinois, Massachusetts, Nebraska, Philippine Islands, Porto Rico, South Carolina and Wyoming, and for an academic college course in the following States, the number of years of such course re¬ quired being given in parentheses after each : Alabama (2), Alaska (2), Arizona (2), Ar¬ kansas (2), California (1), Colorado (2), Con¬ necticut (1), Florida (2), Illinois (1), Indiana (2), Iowa (2), Kansas (2), Kentucky (1), Louisiana (2), Maryland (2), Michigan (2), Minnesota (2), Mississippi (2), Montana (2), New Hampshire (2), New Jersey (2), New Mexico (2), New York (2), North Carolina

(1) , North Dakota (2), Oklahoma (2), Penn¬ sylvania (1), Rhode Island (2), South Carolina

(2) , South Dakota (2), Tennessee (1), Texas (1), Utah (1), Vermont (2)_, Virginia. (2), Washington (2), West Virginia (1), Wiscon¬ sin (2). A four years medical course is re¬ quired in all the political divisions except the Canal Zone, the District of Columbia, Idaho, Massachusetts, the Philippines, Porto Rico, West Virginia and Wyoming. The number of hours of the medical course is specified as 3,000 in Colorado, and in Indiana and New Mexico, 3,200 in Illinois, 3,600 in Michigan, North Dakota, Texas and Vermont, 3,744 in Connec¬ ticut and 4,000 in California and 5,120 in Georgia.

Registration of Nurses. — See Nurse, Trained.

Dentistry. — See Dentistry.

Revised by Smith Ely Jelliffe, M.D.

MEDICAL EDUCATION IN THE UNITED .STATES. In the colonies until about the middle of the 18th century there was no formal medical teaching. The apprentice system prevailed and young men took service with a physician and after some years went into practice for themselves. Usually this was not far from their preceptor and they could recur to him for consultation. Sons of the better-to-do colonists desirous of studying medi¬ cine crossed to Europe and received the ad¬ vantage of medical training in Edinburgh,

London, Paris or the Netherlands. Consider¬ ing the long, difficult, dangerous voyage, the surprise is how many young Colonials secured a European medical education. Manifestly medicine was taken very seriously. The pre¬ liminary education was excellent and the medical training thorough. Dr. Morton ˆHistory of Pennsylvania Hospital 0 does not hesitate to say: (<We find that the professional men of the seventeenth and eighteenth centuries were generally much better educated than most of their successors of the present time. Almost without exception they were classical scholars, their graduating theses must be written in Latin.1*

The ideals in medical education were high. Dr. Thomas Bond's essay on (The Utility of Clinical Lectures) (Philadelphia 1766) insists that the student ((must Join Examples with Study before he can be sufficiently qualified to prescribe for the sick, for Language and Books alone can never give him Adequate Ideas of Diseases, and the best methods of Treating them.* Bond argued that clinical teaching was absolutely necessary and even suggested that the teaching should be by what we call the ward class method with questions to bring out the knowledge of the disease and parts affected. He even recognized and proclaimed that the only policy that would lead to real advance in medicine was to follow up clinical observation in fatal cases by a post mortem and acknowledge mistakes in the hope to be able to avoid them in other cases. His words deserve to be pub¬ licly posted in every hospital and medical school of the country. ((If the Disease baffles the power of Art and the Patient falls a Sacrifice to it, he then brings his Knowledge to the Test, and fixes Honour or discredit on his Reputation by exposing all the Morbid parts to View, and

Demonstrates by what means it produced Death, and if perchance he finds something unexpected, which Betrays an Error in Judgment, he like a great and good man immediately acknowl¬ edges the mistake, and, for the benefit of sur¬ vivors, points out other methods by which it might have been more happily treated.*

About 1750 there are indications of waking up to the need of formal medical teaching. William Hunter, a relative of John Hunter of London in Rhode Island, Cadwalader in Phila¬ delphia, and John Bard and Peter Middleton in New York did some anatomical teaching with dissections in this decade. In 1762 Dr. William Shippen, Jr.) recently returned from London and Edinburgh, commenced a course of anatomical lectures with dissections at his father's residence in Philadelphia and this was attended by 12 students. This led to the organization of our first medical school as the Medical Department of the Philadelphia College in 1765. Shippen's principal auxiliary was Dr. John Morgan, who had been with him in London and Edinburgh, where they agreed to found a medical school in America. The second medical school was the Medical Department of King's College, New York, established in 1768. New York antici¬ pated Philadelphia in the giving of the degree of Doctor in Medicine, the first being conferred on Robert Tucker in 1770. Philadelphia gave the first Bachelor in Medicine in 1768, but did not confer its first degree of Doctor in Medicine until June 1771. Though medical teaching had not been organized physicians abounded. It was

calculated just before the Revolution that there were some 3,500 physicians practising in the Colonies, of whom less than 400 had degrees. New York City, containing about 10,000 inhabit¬ ants, <(could boast of more than forty gentlemen of the faculty, the greatest part of whom were mere pretenders to a profession of which they were entirely ignorant.® (Independent Re¬ flector, New York 1753).

Medical education received an almost com¬ plete setback everywhere throughout the Colo¬ nies by the Revolution, though in New York the

practice of the surgeons who accompanied the British army proved instructive for the physicians who remained in the city, and courses in anatomy and some other medical subjects were given. Immediately after the Revolution steps were taken to restore the medical schools, Philadelphia indeed granting degrees at a com¬ mencement held June 1780, but personal and professional jealousies led to trouble about the charter of the college of Philadelphia and it was not until this was reorganized that the medical schools settled to work. Over 100 medical students were in attendance there in 1790. Medical teaching in New York suffered from a similar friction of personalities, but it lasted much longer. The Medical Department of King's College, changed after the Revolution to Columbia, was reorganized, but there was a hitch with the educational authorities of the State. An independent medical school was or¬ ganized mainly through the influence of Dr. Nicholas Romayne and when this was refused recognition by the Regents he appealed to Queen's College (now Rutgers), at New Brunswick, N. J., for authority to confer de¬ grees. This appeal to outside institutions came to be a favorite device of medical faculties throughout the country who had severed their connection with regularly incorporated medical institutions. No less than three times in the first half century Rutgers was thus appealed to, again in 1811 and 1826, and then a Geneva Medical Faculty was organized in New York City, until the practice was declared illegal.

After the Revolution other medical schools soon began to make their appearance. Harvard organized its medical faculty in 1783. ■ Dart¬ mouth established a medical department in 1797. The medical department of the University of Maryland in Baltimore was founded in 1807 and continued under that name though there was no university, and that of Yale University in 1810. Unfortunately anatomical leaching was very much hampered by popular prejudice. There was no legislation permitting the use of or providing bodies for dissection purposes. The bodies of those killed in duels were by law devoted to anatomical purposes, but resurrectionism had to supply the rest. As a result of popular suspicions there were attacks on dis¬ secting rooms in many places. New York had its Doctors' Riot in 1789, Philadelphia, Balti¬ more, New Haven and Saint Louis had theirs much later, well on in the 19th century, the last actually as late as 1844. This was not a mediae¬ val reversion as it is often called, for dissection had been very freely permitted in many places, in the Middle Ages, but a modern intolerance not unlike that which now hampers animal ex¬ perimentation in this country.

The early medical schools in this country, as pointed out by Dr. Nathan S. Davis, although

originating in different States wholly independ¬ ent of each other and in direct rivalry for patronage, were remarkably similar in their organization and requirements. At first the number of professors in each school was small and the college term eight or nine months. The bachelor's degree in medicine was conferred after three years of study with a preceptor fol¬ lowed by one college term, and the doctor s degree after one or two added years of prac¬ tice and a second course of college attendance. The degree of Bachelor of Medicine was aban¬ doned by the College of Philadelphia in 1789, by the University of Pennsylvania in 1791 and by all the medical colleges in this country in

1813.

Medical schools soon began to multiply. In 1810 there were the six schools already men¬ tioned. In the 30 years down to 1840, 26 medi¬ cal colleges were added. They were in the order of their foundation. The College of Physicians and Surgeons of the Western Dis¬ trict of the State of New York at Fairfield, Herkimer County, founded in 1812. Though in rural surroundings this did excellent work, had some noteworthy men on its faculty and up to 1840 about 3,000 students on its rolls. In 1817 Transylvania University, Lexington, Ky., finally succeeded in organizing a medical department. There had been chairs of medicine before. Samuel Brown, M.D., was appointed in 1799 to the professorship of anatomy, surgery and chemistry. In 1801 Frederick Ridgley, M.D., was elected professor of medicine. In 1805 James Fis'hback, M.D., was appointed to the chair of theory and practice. Twenty students attended the first full course of medical lectures in 1817-18. One of them received the degree of M.D., the first degree conferred west of the mountains. In 1818 the Castleton Medical School, afterward named the Vermont Academy of Medicine, was founded, the degree of Doc¬ tor of Medicine being conferred under the authority of Middlebury College until 1827, after which it was conferred directly by the medical faculty under its amended charter.

Dr. Daniel Drake resigned from Transyl¬ vania University in 1818 and organized the Medical College of Ohio at Cincinnati which held its first course of lectures in 1820. Alto¬ gether he held 11 chairs at six different medi¬ cal schools at various times. The Medical School of Maine was organized in 1820 also as a department of Bowdoin College

at Bruns¬ wick with Dr. Nathan Smith as the faculty. In 1821 a medical school developed at Brown University, Providence, but did not continue long. The Medical School of the University of Vermont was organized at Burlington in 1822. In 1823 The Berkshire Medical Institu¬ tion was organized at Pittsfield, Mass., under the charter of Williams College. In 1824 the Medical College of South Carolina was organ¬ ized at Charleston. In 1825 the medical depart¬ ment of Columbian College, District of Colum¬ bia, was organized. This school suspended 1834-35 but resumed in the latter year under the name of the National Medical College, now as the medical department of Columbian Univer¬ sity. In 1825 Jefferson Medical College, Phila¬ delphia, was chartered. The charter was granted to Dr. Barton in 1819 after an unsuccessful attempt, in 1816. Jefferson owes its name to its connection with Jefferson College, Cannons-MEDICAL EDUCATION IN THE UNITED STATES

burg, Pa., through which its degrees were granted. In 182b the medical department of the University of Virginia, charter 1819, was organized. In 1826 the Medical School of the Valley of Virginia, familiarly called The Win¬ chester Medical College, was organized at Win¬ chester, Va. Both of these Virginia colleges prosposed to have terms of nine months instead of the shorter terms in vogue and the method of teaching was by recitations and demonstra¬ tions as in other departments of scientific and literary study and not merely by lectures. About the middle of the 19th century the University of Virginia was graduating men after two courses of four and a half months each given in the same calendar year, but its examination standards were high and its graduates were taking the best places in the army and navy service. In 1827 the Washington Medical Col¬ lege, so-called because its degrees for the first six years were conferred by Washington Col¬ lege, Pennsylvania, was organized in Baltimore. Afterward a charter was granted by Maryland. In 1831 the Medical College of Georgia was chartered and the first course of instruction given the following year. An Academy of Medicine preliminary to this had been organ¬ ized in 1827 at Augusta by Dr. Milton M. Anthony, the founder of the Southern Medical and Surgical Journal, the first medical periodical published in the South. It was from him that came the suggestion of a convention of the faculties of the medical colleges of the United States for the regulation of medical education and the

improvement of the professional status of physicians. The movement thus initiated ripened into the organization of the American Medical Association. After this the medical schools multiplied rapidly. In 1834 the Medical School of Willoughby University, Willoughby, Lake County, Ohio, was chartered and its first course of instruction commenced in 1835. In 1835 the medical institute at Geneva College at Geneva, N. Y., the medical department of Cin¬ cinnati College at Cincinnati, Ohio; the Ver¬ mont Medical School at Woodstock, Vt., and the medical department of the University of Louisiana at New Orleans were chartered by the respective legislatures. In 1837 the medical departments of the University of Louisville, Ky., and of the University of the City of New York were organized, and in 1838 the medical department of Hampden Sydney College . at Richmond and in 1839 the Albany Medical College at Albany, N. Y., and the medical de¬ partment of the Pennsylvania College at Philadelphia. Philadelphia continued to be for long as it had been from the beginning of the nation's history the principal centre for medical education. It was our largest city in the early days and New York's development was ham¬ pered by professional bickerings.

In the 35 years following down to the com¬ pletion of the first hundred years of our his¬ tory in 1876, 47 new medical schools were created, not including five or six abortive at¬ tempts so transient as to leave a record diffi¬ cult to trace. This made 80 altogether estab¬ lished during the first 100 years, 16 of \Vhich had been discontinued, leaving 64 medical col¬ leges in active operation in the United States. Of these Maine had two; New Hampshire one; Vermont three; Massachusetts one; Connecti¬ cut one; New York nine; Pennsylvania four;

Maryland three; Virginia two; South Carolina one ; Georgia three ; Alabama one ; Louisiana two; Texas one; Tennessee one; Kentucky three; Missouri three; California two; Oregon one ; Iowa two ; Illinois three ; Indiana three ; Ohio seven ; Michigan two ; and the District of Columbia three ; leaving 13 States without any medical college. Of these, four, two in New York City, one in Philadelphia and one in Chicago, were devoted to the education of women in medicine. The whole number of students attending the five medical colleges in 1810, for Yale though chartered was not yet receiving students, was about 650, of whom about 100 were graduated that year. The population of the United States was about 7,250,000. In 1840, with the population two and a half times as numerous the medical students numbered 2,500, nearly four times as many, and about 800 graduated that year,

eight times as many. In 1875-76 the population of the United States was over 40,000,000. It had mul¬ tiplied once more two and a half times, but the medical students now numbered 6,650, having again increased faster than the population, and that year 2,200 were graduated. With this great increase of medical colleges far beyond the medical needs of the population, the inevitable struggle for existence led to the lowering of standards. The temptation to concentrate the teaching into as brief a space as possible, partly because of competition for students but mainly to secure more profit for and less call upon the time of professors who were engaged in active practice, gradually compressed the time re¬ quired for study. At the same time preliminary requirements lessened and anyone who could write his name, and he did not have to write it very plainly, could take up the study of medi¬ cine. The preceptor was practically superseded and the college terms shortened to four months each with the lectures not graded, the students listening to the same course two years in suc¬ cession. The degeneration of medical education was brought about by the faculty using the medical schools for money-making purposes, neglecting scientific development. Even when the medical schools bore the names of well-known universities, as Harvard, Pennsylvania or Columbia, the university administration had practically nothing to do with the medical school curriculum or management and the fees were di¬ vided among the historic septenate of pro¬ fessors who became firmly entrenched every¬ where and refused to permit of reforms until their hands were actually forced by certain reforming elements, mainly younger members of the medical profession.

There were vigorous protests against this unfortunate degradation of medical education which all could not but acknowledge and the American Medical Association was organized on the initiative of the New York State Medi¬ cal Society with one of its main purposes the reform of medical education. An attemnt was made to sidetrack the organizing convention by the delegates from the faculty of the Medical Department of New York University in whose halls the preliminary meeting was held. This failed and the national organization became a fact, but was able to accomplish little in the reform of medical education for a generation. Numerous discussions were of no avail. All were ready to admit that medical students should

have better preliminary education and that the lecture courses should be graded and that there should be a systematic division of the branches taught into groups appropriate for each year of study, and that there should be at least three terms of six or better still eight or nine months, each year. The faculty of each school frankly acknowledged the defects of the system in vogue, but ((each waited for the other to move first lest by placing higher requirements upon the time and resources of the student it should cause its own halls to be deserted for those of its less exacting neighborˆ (Davis). Some very praiseworthy attempts were made, how¬ ever, to get away from the current unfortunate state of affairs. The New York Medical Col¬ lege was established in 1850 with a three-year graded course and the beginnings of clinical in¬ struction. Unfortunately the Civil War proved fatal to it, but not before it had demonstrated the possibility of raising standards in medical education. In 1859 the Chicago Medical Col¬ lege was organized for the express purpose of testing the practicability of establishing a school with a thoroughly graded and consecutive sys¬ tem of instruction. In 1871. Harvard -through the influence of President Eliot adopted a fully graded system of instruction, dividing her classes and extending the courses throughout the collegiate year. The new medical school of Syracuse University adopted the same policy about the same time.

In the 35 years after 1876 the number of medical schools doubled. The great majority of the new schools were of the same low stand¬ ards as so many of their precedessors and in¬ deed were founded with the idea not of foster¬ ing medicine but of producing revenue for the professors directly or indirectly. In the mean¬ time in 1878 Dr. Francis Delafield established the first laboratory in this country in connection with the College of Physicians and Surgeons in New York. Later that same vear Dr. Wil¬ liam H. Welch opened the pathological labora¬ tory of Bellevue. By degrees the better schools followed -these examples and many other schools found themselves compelled to take up this de¬ velopment of medical education or lose in at¬ tendance. It was not until 1893 that a definite advance in medical education was made by the foundation of Johns Hopkins Medical School, Baltimore. This required a bachelor’s degree from every student and required four years medical study. The better known schools were now stimulated to follow the example of Hop¬ kins. Above all the special feature of clinical instruction worked out there gradually spread to the great benefit of medical education.

At the beginning of the 20th century the Council on Education of the American Medi¬ cal Association began its work of registering medical schools after examination according to the grades which they deserved.. In order to secure a class A rating the medical school had to have six full time professors, at least $100,- 000 investment, be provided with laboratories properly equipped, require four years of medi¬ cal study and at least one year of preliminary college work. It was not long then before the number of medical colleges began to drop off. At the end of the first decade of the century the investigation of medical education in the United States by the Carnegie Foundation for the Advancement of Teaching revealed the de¬

fects in many existing schools and called at¬ tention to what should be -the absolute require¬ ments for medical teaching in our day.

As a result we have nearly 100 fewer medical schools, but most of them doing serious work and 10,000 fewer medical students getting a better education. The medical schools which bear the names of universities are now actually under a university administration as a rule. In¬ creased interest in medical education has brought about the enactment of a legal regula¬ tion in many States requiring a fifth year of preparation for the practice of medicine which is to be passed in a hospital. The entrance re¬ quirements are constantly growing higher and now two years of college work are required as a preliminary to medical study in most places and a number of schools have adopted or are about to adopt the bachelor's degree as a pre¬ requisite. Curiously enough this modern stand¬ ard is nearly a replica of the old mediaeval re¬ quirement that there should be three years of preliminary study at the university before tak¬ ing up medicine, four years at medicine and then a year of practice with a physician before the medical neophyte might practice for himself. Fortunately our scientific developments in medi¬ cal education were completed just in time to enable us to be independent of foreign medical teaching during the war and the magnificent de¬ velopment of American surgery put us in a position to offer excellent opportunities for the higher study of medical and surgical problems from a thoroughly scientific standpoint to students from Europe who after the war will find it impossible to go on with university studies under favorable circumstances over there because of the destruction wrought by the war and the sad gaps in teaching staffs due to war losses involving so many of the progressive younger men.

Medical Education of Women. — The de¬ velopment of medical

education for women in America gave back to the world the opportunity for feminine medical study which had been freely granted in the Middle Ages and then with so many other privileges was denied in modern times. The first woman student of medicine was Dr. Elizabeth Blackwell who after being refused permission to study at most of the medical colleges in the country finally secured the privilege at Geneva. N. Y., when the faculty feeling sure that her application would be rejected put it before the students and they voted unanimously to allow it. She was grad¬ uated in 1849. Her sister Emily was refused two years later at Geneva and Rush Medical College, Chicago, was censured by the State Medical Society for receiving her for a term. She was graduated at Western Reserve, Cleve¬ land. The women resolved to found medical colleges of their own. The first of these the Women's Medical College of Pennsylvania was founded in 1850. It had a quasi predecessor in the. Gregory School of Medicine established to train women as midwives, founded in Boston in 1848 and lasting until 1874. The Woman's College of the New York Infirmary was opened in 1865 and closed in 1899 when Cornell opened its medical course to women students. The Women's Medical College of Baltimore was founded in 1882, that of Cincinnati in 1886 and that of Kansas City in 1895.

The University of California was a pioneer

in opening its courses to women in 1869 and was followed in this policy by all the universi¬ ties of Western States. This development also included medicine so that the special need of medical colleges for women ceased in the West. When Johns Hopkins, Baltimore, opened its medical school in 1893 women were accorded the same privileges as men. Gradually preju¬ dices disappeared and other medical schools opened their doors to women, but it was not until the great war brought home the need for physicians during and after the war that Har¬ vard and Columbia removed the restrictions against women in their medical schools. No barriers to the medical education of women in the United States either in undergraduate or post-graduate work

will remain after the war.

Bibliography. — Beck, Statistics of the Medical Colleges of the United States' (in Transactions of the Medical Society. N. Y., Vol. IV, Albany 1839) ; Davis, Nathan, his¬ tory of Medical Education ' (Chicago 1851) ; (Medical Education in the United States) (Special Report, United States Bureau of Edu¬ cation, Washington 1877) ; Bigelow, (Medical Education in America ' (Cambridge University Press , 1871) ; Packard, { History of Medicine in the United States) (Philadelphia 1902) ; Toner, (History of Medical Education to The Revolu¬ tion ' (Bureau of Education, Washington 1874) ; Walsh, (Hisitory of the Medical Society of The State of New York' (New York 1907) ; his¬ tory of Medicine in New York State) (New York 1919) ; (The Medicine of Our Fore¬ fathers } (in Journal of the American Med¬ ical Association 1913) ; Flexner, (Report to the Carnegie Foundation for the Advance¬ ment of Teaching) (New York 1910) ; Gar¬ rison, (An Introduction to the History of Medicine) (Philadelphia 1913). For the ed¬ ucation of women in medical science con¬ sult Blackwell, Elizabeth, (Pioneer Work in Opening The Medical Profession to Women) (New York 1895) ; Marshall, Clara, (The Woman's Medical College of Pennsylvania) (Philadelphia 1894) : Wolls < tein, (The History of Women in Medicine) (Woman's Medical Journal, April 1908) ; Macy, (Medical Women' (New York Medical Journal, 1916).

James J. Walsh, M.D.

MEDICAL ELECTRICITY. See Elec¬

trotherapeutics.

MEDICAL JOURNALISM. One of the

earliest newspapers on record, the Gazette de France, was issued by a physician, Renaudot (Paris 1631). He had been appointed Com¬ missioner-General of the Poor of France when poverty was rife, just after the religious wars, and created a Bureau of Addresses where those out of work might learn of chances for employment. He established the Gazette to give publicity to his scheme for bringing em¬ ployers and employees together. The Gazette was a quarto sheet, printed in four columns on one side. Medical matters were not treated directly, in the Gazette, but its purpose was the prevention of disease and suffering bv lessening poverty. With the origin of scientific societies in Italy at the time of the Renaissance, these published journals which sometimes contained articles of medical interest. The first. journal paying considerable attention to medicine, was Le

Journal des Scavans. This was published vol. 18 — 35

every Monday for three months at Paris, at the beginning of 1665, the next year it continued longer, and then every two weeks rather regu¬ larly. It lasted some 10 years, and altogether some 700 pages were printed. Early issues, contained reviews of Willis' (Cerebri Anatome,' and Steno's (De Musculis et Glandulis,' and other medical reviews of current interest. The German Society of Naturalist Physicians (Gesellschaft Naturforschender Aerzte), founded in 1652, began to publish in 1670, after coming under Imperial protection, its transac¬ tions' monthly under the name Ephemeridce. A more purely medical periodical was the Acta Medica Hafiensia, edited by Thomas Bartholin at Copenhagen in 1671. The Royal Society chartered by Charles II began to publish its well-known philosophical transactions' in 1665. Included among its publications were the works of Malpighi and Leeuwenhoek in the 17th century and those of Galvani in the 18th.

All these were in Latin. The first medical periodical in the vernacular was the Nouvelles Decouvertes sur toutes les Parties de la Medecine, issued monthly (Paris 1679-81). It was published by Nicholas de Blagny, a somewhat irregular medical practitioner of the time who realized the value of publicity. He met with decided opposition from the medical profession, who deprecated not only his methods but above all the publication of medical matters in the lan¬ guage of the people. He waked the French medical profession, however, to the value of a medical publication and not long after, a Jour¬ nal de Medecine was published by the Abbe de la Roque and continued by Claude Brunet, who established a monthly, Progres de la Medecine (1695-1709). French medical journalism then went to sleep, to use the expressive phrase of Siidhoff, for some 50 years. Formal German medical journalism began with the Acta Medi-corum Berolinensium, founded in 1717. This appeared twice a year at first, and then annually until 1730. In 1717, there began at Leipzig a quarterly publication called the Collection of Natural History and Medical Information. This continued for many years. The second half of the 18th century saw a thorough waking up to the advantage of medical journalism. At Ham¬ burg in 1759 the weekly, Der Artz, began. In various German cities, a series of medical Bibliotheks, that is, regularly issued reviews of medical books, made their appearance. In 1767, the German medical journal, Neue Arzneien (New Remedies) was founded. Most of these journals lasted only a few years until their founder became occupied with other things or his enthusiasm evaporated.

Eighteenth century medical journalism or its equivalent, at the time, consisted to a great extent of the transactions of various medical societies. A number of very important . con¬ tributions to medicine were published originally in these and they have a distinct bibliographic value. Siidhoff suggests that the material for the cultural history of medicine in this century lies buried in the files of its forgotten medical periodicals. These were very numerous and Garrison has given a check list in chronological order of some hundred of them.

Toward the end of the 18th century, the special journals of the scientific departments of medicine began to make their appearance. Probably the most important of these was

Reil's Archiv fiir die Physiologie (1795), which was the incentive for the foundation of Johannes Muller's Archiv fiir Anatomie, Phys¬ iologic und wissenschaftliche medicin (Berlin and Leipzig, 1834—57), continued by Reichert and Du Bois Reymond and still published at the present time. Siebold's Lucina (Leipzig 1802-11), Langenbeck's Bibliothek fiir die Chirurgie (Gottingen 1805-13), Grafe's and Walther's Journal der Chirurgie und Augen-Heilkunde (Berlin 1820-50), Magendie's Journal de physiologie experimental (Paris 1821-31), Mal-gaigne's Journal de Chirurgie (Paris 1843-46), Bulletin de la Societe anatomique de Paris (founded in 1826 and still current), and the Memoires and Bulletin de I'Academie de tnedecine are typical examples.

About the middle of the 19th century, year¬ books began to be regularly published. About the same time Virchow's Archiv fiir Pathol-ogiscihe Anatomie and the Comptes rendus of the Societe de Biologic of Paris began publica¬ tion. There are now literally hundreds of such journals published in the various countries and languages. The tendency to extreme specializa¬ tion in medical journalism became marked in the last quarter of the century when special journals for narrow interests were published. Mind (1876), Brain (1879), and La Cellule (1884), are typical examples. Garrison notes that the contribution of the 20th century to medical journalism is the large number of recent periodicals devoted to the psychological and sociological aspects of the sexual instinct.

In Italy medical journalism developed rather slowly, Italian professors being inclined rather to write books than the shorter articles. Cer¬ tain special subjects like electrotherapeutics, because of Galvani's and Volta's discoveries, were covered early. II Galvani, with the sub¬ title Giornale di Elettro-Idro-ed Aero-Terapia, was published at Milan at the beginning of the 19th century. All medical therapeutics was re¬ duced to electrical terms by it. Since then the Italians have the habit of calling their medical journals after their great physicians, and have had journals named for Cesalpino, Malpighi, Spallanzani and a number of other distin¬ guished medical discoverers.

A very early attempt at the publication of a medical journal in America was made through a translation of the French Journal of the Mili¬ tary Hospitals, under the title of A Journal of the Practice of

Medicine, Surgery and Phar¬ macy in the Military Hospitals of France (Vol. I, No. 1, New York 1790). This contained some 120 pages but is the only number that has come down to us.

The first medical journal published in America was the Medical Repository, a quar¬ terly, under the editorship of Samuel L. Mitchill, Edward Miller and Elihu Smith. It was founded in 1797, and the interest which it aroused can be best appreciated from tKe fact that of volumes I and II, a second edition was printed in 1800 and exhausted, and a third edition issued in 1804. This is the only time in the history of American medical journalism that this has happened. The Medical Repository continued publication until 1824. Its success led after a few years to the almost simultaneous foundation at Philadelphia of two medical journals, The Medical Museum (1804-11) and the Philadelphia Medical and Physical Journal

(1804-09). Though neither of these lasted long, the establishment of other medical jour¬ nals went on apace. In Boston, the Medical and Agricultural Register was published for two years (1806-07), the Baltimore Medical and Physical Recorder for a similar period (1808-09). An effort was made to attract ad¬ ditional readers in these journals by including subjects of cognate interest. This was also the case with regard to the American Medical and Philosophical Register (New York),, which lasted, however, only some five years (1810-14). The New England Journal of Medicine and Surgery had a happier fate, enduring some 15 years (Boston 1812-28). Philadelphia had by this time, owing to professional jealousies and politics and the mismanagement of medical schools in New York, come to be the centre of medical education in the United States and the medical journalism of the country focussed there. The American Medical Recorder (1813) lasted more than 10 years and was followed by the Philadelphia Journal of the Medical and Physical Sciences, founded in 1820 by Nathaniel Chapman. In 1825, the title of this journal be¬ came the American Journal of the Medical Sciences, still with us. Under the editorship of Dr. Isaac Hays and his son, this came to be the representative American medical journal long known as Hays' Journal. The oldest American medical weekly in existence is the Boston Medical and Surgical Journal, founded in 1828, whose editors have been some of the most distinguished physicians of Boston. The Medical News, founded in Philadelphia by the younger Dr. Hays in 1843, was transferred to New York (1896) and combined with the New York Medical Journal (1905). This latter was founded in 1865, followed almost immediately bv the Medical Record (1866), both still

in existence.

The first medical journal issued west of the Alleghanies was the quarterly Reporter of Medicine, Surgery and Natter al Sciences, issued at Cincinnati, 1822. The first Canadian medical periodical was the Journal de Medecine de Quebec, issued in 1826.

The founder of medical journalism in its modern sense, as not only a carrier of news and information for physicians but also as a force for the uplift of the profession, the regu¬ lation of the practice of medicine, the direction of medical legislation, and the exposure of abuses, was Thomas Wakley, an Englishman, who in 1823 founded The Lancet in London. When this appeared there were a great many abuses, especially in hospital practice and medi¬ cal education needing correction. Hospital posts and even sometimes medical professor¬ ships had become family matters, subjects of inheritance. Hospital instruction was so given that it reached but a very limited number. Wakley began by publishing the hospital lec¬ tures of professors for the benefit of the profes¬ sion. When Abernethy, the distinguished Lon¬ don surgeon of the time, applied for an injunc¬ tion against the publication of his lectures with¬ out his permission, Lord Eldon decided that lectures delivered in hospitals were public property. The trial proved a good advertise¬ ment for Wakley and his work, and after a time he was elected to Parliament and he became the most important factor in England for the cor¬ rection of social abuses by legislation. The

Lancet has always continued the work of its founder in this regard, and has been noted for its crusades against food and drug adultera¬ tions, its campaigns for the correction of medi¬ cal abuses, and its leadership of the medical profession of England generally for the amelioration of medical social conditions. The work of The Lancet was not only supplemented but extended in England, when the British Medical Journal , representing the British Medi¬ cal Association, was founded in 1857. The association, organized in 1832, published yearly (Transactions) until 1853. and then the Association Medical Journal, which was suc¬ ceeded by the British Medical Journal after some five years. The British Medical Journal has come to be a most powerful factor for the correction of medical abuses and the exposition of impositions of various kinds upon the pro¬ fession as well as the public. . The American Medical Association, founded in 1847, did not establish its journal until 1883. This was scarcely more than a weekly (Transactions) until under the management of Dr. George Simmons, at the beginning of the present century, it began to be thoroughly representative of the best interests of the medical profession in America and of the genuine medical interests of the public, taking its place worthily beside the British Medical Journal. The Journal A. M. A. initiated the reform of medical edu¬ cation by securing four-year courses and full¬ time professorships in the medical schools, and thus has secured a noteworthy reduction in the number of schools of medicine in the country, decidedly to the advantage of medical teaching generally. It was enabled to do this through its reorganization of the American Medical Asso¬ ciation which strengthened State and county medical organizations and brought a reform of their medical journals. The advertising abuses of medical journals were emphatically pointed out and an initiation of reform secured. The Journal A. M. A. has done extremely valu¬ able work for the medical profession and the public in the exposure of quacks, the regula¬ tion of physicians' registration and, above all, the analysis and exposure of so-called patent medicines, many of which selling in very large quantities, at expensive prices and bought par¬ ticularly by the poor, were, shown to contain either such harmful materials as alcohol or cocaine as their chief ingredient, or else to be made up of

absolutely inert materials like salt or sugar and water, slightly colored.

The success of the London Lancet led to the foundation of the Lancette Francaise in 1828, which followed the plan of reporting hos¬ pital lectures and afterward became the Gazette des Hopitaux, which still continues. The Gazette Medicale de Paris was founded in 1830. Other French journals in large numbers were founded in the second half of the 19th century and the weekly newspapers were supplemented by the Progrh Medicale, paying attention par¬ ticularly to current medical items, Paris, 1873. In the last quarter of the 19th century a whole series of such weekly journals meant to carry medical news and represent the medical profes¬ sion as well as organize the correction of abuses, were founded in various parts of the world. The Deutsche Medizin, Wochenschrift in 1875, Vrach in Saint Petersburg in. 1880, and Geneva, Munich, Prague, Rome, Vienna and

many other cities came to be represented in this way.

At the beginning of the European War, there were some 1,700 medical journals pub¬ lished in the various languages. Their dis¬ tribution was as follows: the United States had 630; Germany, that is, the German-speaking countries, 451; the French, 268 ; the British, 152 ; the Italian, 75; the Spanish, 29. This was entirely too many for the maintenance of such proper standards as would make them seriously valuable and prevent abuses. Many of them were published almost entirely as a means of propagating information for business purposes with regard to various drugs and preparations, the journals being established for this purpose, or the proprietors allowing their columns to be used for such exploitation because of the money paid for advertising. The more medical journals the lower the standards. The war, with its scarcity of paper, has brought an end to a great many of the proprietory medical journals and undoubtedly will in its course do much to purify the field of medical journalism.

Bibliography. — Chereau, (Journalisme Med¬ icale Frangais) (L'Union Medicale, 1867) ; Garrison, (Medical Journalism) (article in Ref¬ erence Handbook of the Medical Sciences,* New York 1918), and (History of Medicine) (New York 1918, 2d ed.) ; Siidhoff, (Das Mediz, Zeitschrift-Wesen im Deutschland) (Munich Med. Wochenschrift, 1903).

James J. Walsh, M.D.

MEDICAL JURISPRUDENCE, the sci¬ ence of applying medical knowledge to the pur¬ poses of legal investigation; the application of the principles and practice of various branches of medicine in judicial proceedings requiring the explanation of doubtful questions, such as those relating to conception and birth, time and cause of death, physical and mental diseases, *etc.* Medical jurisprudence is often spoken of as forensic medicine, that is, the medicine of the forum. It embraces subjects both purely medical and purely legal, and covers a very wide range. These questions have usually been considered under five divisions: (1) Such, as arise out of the relation of sex, including impotency, pregnancy, legitimacy and rape; (2) injuries to persons, as wounds, death from vio¬ lence, poisoning and abortion; (3) disqualifi¬ cation by different forms, of mental diseases; (4) feigned disability or disease; (5) questions as to age, identity and life insurance. The major part of what is known as medical juris¬ prudence relates to evidence given in courts, even if the whole subject is not properly em¬ braced within the subject of judicial. evidence. As medical books, can be used only in a very restricted sense in judicial proceedings, the testimony of medical experts has become very important. Our laws do not give recognized preference to any particular class or school of medical practitioners as qualified for expert witnesses. Knowledge is the test of qualifica¬ tion to give such evidence. The presiding judge passes, as a preliminary, upon the question of qualification and determines whether the witness shall be permitted to testify. The opinion, of a medical expert is never conclusive but is simply to be regarded by the judge. or jury in. the. same manner as other evidence given to assist in es¬ tablishing a fact. The medical expert is fre-548

quently called upon to state facts, as well as to give his opinion based upon facts shown by-other testimony to exist. He may testify as to the health of a patient whom he had treated, of his habits and mental traits. He may testify that he found poison in the stomach of a person found dead and give an opinion as to whether the poison caused death. He may give an opin¬ ion as to how long a person has been dead, from the condition of the body when found; whether a certain wound would produce death; and his opinion as to the instrument used to inflict the wound.

In all of these subjects of investigation the evidence of a medical expert is almost indis¬ pensable. In matters of life insurance, where the insured dies shortly after a policy has been issued to him, medical expert examination and evidence are often of great importance, bearing upon the condition of the insured at the time of insurance and upon the question of representa¬ tions. In suits for injuries to persons through the fault of others the question of the extent and probable continuance of disability are to be investigated with the aid of expert evidence. Many questions of supposed crime could not be properly determined without the knowledge and skill of the physician, applied as science directs. In cases involving sanity and mental capacity medical jurisprudence reaches the zenith of its importance. The untrained non-scientific mind cannot measure the status and capacity of other minds. If it is difficult, sometimes nearly im¬ possible, for the best informed to determine accurately the physical condition of a person, none but those eminent for knowledge of and experience in matters of the mind ought to judge of its condition and hazard opinions as to its peculiarities and capacity. Insanity is a disease of the mind which assumes many forms — almost as many as there are different phases in the human mind. Many definitions are given of insanity, one of which is that it is a physical disease located in the brain, which de¬ ranges the mental and moral faculties . to a greater or less degree. This definition is not quoted in preference to any other for the pur¬ pose of approval, but because it differs so rad¬ ically from others, and to show the difficulty of comprehending the nature of this dread malady. The general term insanity comprehends all shades of mental diseases, from the slightest abnormal condition to that of the wildest ma¬ niac. The expert alienist is called upon to testify as to a person's ability to make a will, a contract or to transact any kind of business. He is asked to decide whether a person is bereft of his normal reason to the extent that prudence requires his confinement; and when he has been confined, whether it would be safe or prudent to let him have his liberty. The questions upon which the expert's opinion with regard to the insane, or those supposed to be insane, are asked can hardly be enumerated. The importance of the subject cannot be over¬ estimated, and new and earnest efforts are be¬ ing constantly exerted by the medical profes¬ sion to render its information upon this dif¬ ficult subject as full and complete as possible. Many works upon medical jurisprudence have been published and in all of them insanity, in its various forms, has had a prominent place, while quite a number of authors have produced commendable works devoted entirely to the sub¬

ject of the medical jurisprudence of insanity. Consult Brothers, (A Statement of the Law of Forensic Medicine) (Saint Louis 1914) ; Reese, J. J., (Textbook of Medical Jurisprudence and Toxicology) (8th ed., Philadelphia 1911); Robertson, (Manual of Medical Jurisprudence, Toxicology and Public HealtlP (2d ed., London 1913), and (Medical Serials, with Bibliography of Medical Jurisprudence) (2d ed., New York State Library, Albany 1910).

MEDICAL ORGANIZATION IN THE UNITED STATES ARMY. The Medical

Department of the Army, of which the surgeon-general is chief, aims: 1. To conserve the strength of men and officers — (a) Through prompt attention to disease and disabilities re¬ vealed by physical examination; (b) through supervision of sanitary conditions.

2. To move non-effectives to the rear with¬ out using effective fighting men for such service and without in any way obstructing military operations.

3. To provide medical and surgical care for the sick and wounded (including control and management of military hospitals), restoring the disabled to active military service or to useful and remunerative places in civil life.

The service of the medical man is constant. Every recruit must be examined, because the army must be without weaklings and without disease. Health must be maintained. Prophy¬ lactic measures must be instituted and insisted upon and remedial measures applied both for illnesses in camp and as a result of battle casu¬ alties. It is the doctor's job to make and keep the soldier fit to fight. His. work is to a tre¬ mendous degree effective in preserving the morale of the army. It is the task of the medical department to succor the wounded so swiftly that their comrades may know that, should their turn come, they will be cared for as expeditiously and efficiently as is possible. Thus the medical men directly heighten the morale of troops.

The army doctor used to be one who could do a little of everything in an emergency — he was pretty much in the same class with the country doctor of 30 years ago. Major-Gen¬ eral Gorgas once said : <(I do not think we

have a more useful man in the army than the medical man who can pull a tooth, bind a fin¬ ger, or take charge of the casualties that occur in a moving command, and do all these things equally well.®

The medical department consists of the medical corps, medical reserve corps, contract surgeons, dental corps, dental reserve corps, veterinary corps, veterinary reserve corps, nurse corps, sanitary corps, ambulance corps and enlisted (formerly hospital corps) men.

The insignia of the med¬ ical department is a caduceus of bronze metal one inch high ; the letters D., S. A., and C.S. in gilt metal super¬ imposed, designating, re¬ spectively, Dental, Sanitary and Ambulance Corps and Contract Surgeons. Also, all persons belonging to the sani¬ tary service, and chaplains, wear on the left arm a brassard bearing a red cross on white ground — the emblem of the sanitary service

of armies — and all sanitary formations dis¬ play the Red Cross flag with the National flag. All sanitary service material is marked with the Red Cross emblem. Green lanterns dis¬ tinguish sanitary units at night.

Expansion of the Medical Organization during the Great War. — In the Army Appro¬ priation Bill of 29 June 1918 (H. R. 12281), provision for an increase in the number of offi¬ cers in the higher commissioned grades of the medical department was made as follows :

((Increase in medical department. — That the medical department of the regular army be, and is hereby, increased by one assistant surgeon-general, for service abroad during the present

eral grades as now provided by law for the Medical Corps of the regular army: Provided, That nothing in this act shall be held or con¬ strued so as to discharge any officer of the regular army or deprive him of a commission which he now holds therein.®

The proportion of commissioned medical officers in the regular army is not to exceed seven for every thousand of the total enlisted strength of the regular army. They must be citizens of the United States. The

relative rank percentages of the commissioned officers below brigadier-general is as follows : colonel, 3.16; lieutenant-colonel, 5.42; major, 23.70; captain and lieutenant, 67.72.

ch«n sho'ing. Organisation of tv Office of the Surgeon General

Surgeon General*! Office by

Units of Activities •« of

— — 1 Control

— - Communication without Control

war, who shall have the rank of major-general, and two assistant surgeons-general, who shall have the rank of brigadier-general, all of whom shall be appointed from the Medical Corps of the regular army.

<(That the President may nominate and ap¬ point in the medical department of the National army, by and with the advice and consent of the Senate, from the Medical Reserve Corps of the regular army not to exceed two major-gen¬ erals and four brigadier-generals.

((That the commissioned officers of the Medical Corps of the regular army, none of whom shall have rank above that of colonel, shall be proportionately distributed in the sev¬ eral grades as now provided by law.

(<That the commissioned officers of the Medi¬ cal Reserve Corps of the regular army, none of whom shall have rank above that of colonel, shall be proportionately distributed in the sev-

At the entrance of the United States into the World War (April 1917) the Medical Corps comprised 452 officers, and there were 2,600 members of the Medical Reserve Corps enrolled but inactive. Officers commissioned in the medical department for the week ended 4 Oct. 1918 totaled 35,374, the distribution being as shown in table on following page.

An applicant for appointment in the Medical Reserve Corps was required to be between 22 and 55 years of age, and to be qualified to

prac¬ tise medicine in the State or Territory in which he resided. In general, the personnel of the Medical Reserve Corps were successful physi¬ cians and surgeons in private practice. To join, one had to apply to the adjutant-general of the army for examination ; then followed successively, preliminary examination, physical and mental. After qualifying as to physical stamina, clinical skill and aptitude for the tnili-

tary service, the applicant was recommended for a commission by the surgeon-general, and appointment by the President followed.

The provision that a major might not be appointed after 45 was changed when the need for medical officers for the Great War became acute.

boards consisted of an officer from the Medical Corps and two officers from the Dental Corps. Mobile operating dental units in the shape of motors equipped as dental offices on wheels were in use at camps in the United States and with the army in France. Dental officers were assigned to base and general hospitals, and the dental

MEDICAL CORPS .

DENTAL CORPS .

SANITARY CORPS .

VETERINARY CORPS… .

AMERICAN AMBULANCE SERVICE.

TOTAL .

Maj.

Gen.

In corps .

In active service

In corps .

In active service

In corps .

In active service

In corps .

In active service

In corps .

In active service

In corps .

In active service

2

2

2

2

Brig.

Gen.

7

7

7

7

Col.

Lt.

Col.

Major

160

159

12

12

1

1

1

1

174

173

427

403

19

19

2

2

3

3

2

2

453

429

2,229

2,132

84

84

61

61

59

59

1

1

2,434

2,337

Capt.

8,266

7,913

284

284

426

426

119

119

29

29

9,124

8,771

First

Lieut.

16,743

16,196

5,546

3,736

945

945

505

505

151

151

23,890

21,533

Second

Lieut.

874

874

1,631

1,248

2,505

2,122

Total

27,834 26,812 5 , 945 4,135 2,309 2,309 2,317 1,934 184 184 38,589 35,374

Of the 10 per cent sanitary personnel, 4 per cent or 5 per cent were allotted to the Zone of the Advance and the balance to the Line of Communication or to home territory, or wher¬ ever sick or wounded sent to the rear were to be cared for. War experience had shown the necessity in the sanitary service of one individ¬ ual for every man sick or wounded, because more than one-half of the personnel was held ready to render first aid and transport the dis¬ abled to the rear, and consequently not avail¬ able for their care thereafter.

For an army of 2,000,000 the National army organization provided for 20,000 medical offi¬ cers and 200,000 enlisted men of the medical personnel — one officer and 10 enlisted men for every 100 enlisted men of the combatant forces. Thirty per cent of the entire authorized strength of the medical department was made up as follows: Master hospital sergeants, ˆ4 per cent; hospital sergeants, per cent; ser¬ geants first-class, 7 per cent; sergeants, 11 per cent; corporals, 5 per cent and cooks, 6 per cent. Each authorized horsedrawn ambulance company, or similar organization, had a horseshoer, saddler, farrier and mechanic. Privates first-class were eligible for ratings for addi¬ tional monthly pay as follows : As dispensary assistant, $2; as nurse, $3; as surgical assistant,

$5.

Dental Corps — The Dental Corps com¬ prised commissioned officers of the same grades and proportionately distributed among such grades as were provided for the Medical Corps. There was one dental officer for every thousand of the total strength of the army. The dentists of the country were particularly alert, during the war with Germany, and the profession was mobilized to such a degree that there were suffi¬ cient dentists available for an army of 5,000,000 men. In the examination of recruits dental defects were remedied by the gratuitous per¬ formance of hundreds of thousands of oper¬ ations. The Dental Corps division of the sur¬ geon-general's staff enrolled

dental officers, recommended them for assignment and promo¬ tion, appointed examining and review boards and developed plans for service in the United States and abroad. The examining and review

surgeons showed special skill in dealing with new problems.

Veterinary Corps. — The Veterinarv Corps of the regular army consisted of 62 com¬ missioned officers at the outbreak of the World War and was expanded to 2,100 officers and over 20,000 enlisted men. Veterinarians from civil life were commissioned in the grade of second lieutenant and by promotion might reach any grade to include that of colonel. Candidates were required to be graduates of recognized veterinary schools, between the ages of 22 and 55, and to pass a satisfactory mental and physical examination. The enlisted men assisted the veterinary officers and were not required to be veterinary graduates. They were enlisted in the grade of private and might be promoted to privates first class, farriers, horseshoers, wagoners, cooks, corporals, ser¬ geants and sergeants first class, for aptitude in the duties required in these various grades.

The Veterinary Corps organized and oper¬ ated veterinary hospitals at all camps and can¬ tonments possessing public animals. Each regiment of cavalry, field artillery and engi¬ neers had two veterinary officers and six en¬ listed men attached to it for the care of sick and the preservation of the health of well ani¬ mals. Each division had a division veterinarian who supervised the veterinary service of the division. All animals purchased by the govern¬ ment had first to be passed on, as to soundness, by an army veterinarian. Shipments of ani¬ mals by rail and all boats for transporting them overseas were accompanied by veterinary officers and enlisted men. Veterinary laborato¬ ries were maintained to aid in the detection and elimination of communicable animal dis¬ eases. The Veterinary Corps was also respon¬ sible for recommendations pertaining to veteri¬ nary sanitation wherever there were public animals. The meat inspection, service of the Veterinary Corps covered the inspection of all meats and meat food products used by the en¬ tire army at the time of purchase and when issued to troops. All meats bought for ship¬ ment overseas were inspected by veterinary offi¬ cers to make sure they were fit for human con¬ sumption and that they complied with govern-MEDICAL ORGANIZATION IN THE UNITED STATES ARMY

ment specifications. Animals slaughtered in the field for food purposes were also subject to inspection as were dairies and milk herds supplying milk to the army.

Veterinary hospital units were organized and operated by the Veterinary Corps for use in the theatre of operations. Some of these were established as hospitals on the line of communi¬ cation and at the base, and others operated from the front to collect sick and injured animals and evacuate them to these hospitals in the rear. Animals able to walk were led to the point where they could be loaded into railroad cars, while the more seriously injured ones were conveyed in motor ambulances. The hospitals were equipped with operating tables and com¬ plete outfits of instruments so that any neces¬ sary surgical measure might be carried out. Special hospitals for communicable diseases were also established where infected animals . were isolated for the protection of others. By these means it was possible to restore to use¬ fulness many thousands of animals which would otherwise have been lost.

Army Nurse Corps. — The Army Nurse Corps recruits nurses for the service, enrolls them and controls their movements. There is one superintendent appointed by the Secretary of War, and chief nurses and reserve nurses are appointed and removed by the surgeon-general with the approval of the Secretary of War. The Army Nurse Corps consists of trained nurses. The Red Cross as the reserve of the Army and Navy Nurse Corps has sup¬ plied many nurses for the Army Nurse Corps. When once assigned to the Army Nurse Corps the nurse is subject to the rules of the army as administered by the surgeon-general's office.

At the entrance of the United States into the war with Germany there were about 400 nurses and 7,000 enlisted men in the medical department. Less than a year later there were 7,000 nurses, and in September 1918 there were more than 16,000 on the rolls of the Army Nurse Corps, of which number (from April 1917 to 1 Aug. 1918) the Red Cross had placed 13,111 nurses, the rate of assignment of nurses to the military authorities by the Red Cross having been 55 per day from the be¬ ginning of 1918. The total Red Cross enroll¬ ment of graduate nurses eligible for the Army Nurse Corps (as of 2 July 1918) was 22,736, including those serving in the Army Nurse Corps. It was estimated that 50,000 nurses would be required for an ˆrmy of

2,000,000 (one nurse for 10 beds if 25 per cent were hospitalized, the maximum provided for, based on British experience, or with a minimum hos¬ pitalization of 17 per cent, 51,000 nurses for an army of 3,000,000). Emphasizing the need for nurses, the acting surgeon-general of the army stated on 17 Sept. 1918 that not only must 25,000 nurses be obtained before 1 Jan. 1919 (9,000 in addition to the 16,000 then in service), but (if the war continued) that by 1 July 1919, 50,000 would be required — thus indicating that in less than a year 34,000 would have to come forward to meet the need. To increase the number of nurses there was estab¬ lished on 25 May 1918, under the surgeon-gen¬ eral, an Army School of Nursing, which gave immediate opportunity for service, providing an adequate course of training for young women between the ages of 21 and 35, who

had a high school education or its equivalent; it at the same time made possible the release of a large number of graduate nurses eligible for service in the Army Nurse Corps. Under date of 13 Sept. 1918, the surgeon-general an¬ nounced that the 50 American hospitals which organized base hospital units for service in France had been notified that they might in¬ vite a limited number of their student nurses to go to France, where they would have the privilege of rendering service and, at the same time, complete their training under representa¬ tives of their own schools in base hospitals abroad. These were mostly seniors, and those who went across included the young women who were first to be enrolled in the Army School of Nursing. Each unit of 25 was in charge of a graduate nurse. Student nurses not so far advanced were placed in base hos¬ pitals . in the United States. Women called ((hospital assistants® — a position created by the surgeon-general for women offering to nurse wounded soldiers — were enrolled through the Red Cross and assigned to convalescent hos¬ pitals in the United States, where training units were not established. These hospital as¬ sistants were married women between 21 and 40, whose husbands were overseas, and single women between the ages of 35 and 45. They were high school graduates or had present educational equivalents.

. At the request of the surgeon-general cer¬ tain well-known medical colleges allied with hospitals gave special three months' courses for nurses' aids. These young women were to serve as anesthetists, laboratory assistants, nurses' helpers and, in emergency, ward nurses. There were, on 1 July 1918, 48,000 in training schools for nurses, and a campaign to recruit 25,000 student nurses was launched (July 1918), conducted under the auspices of the com¬ mittee on nursing

and women's committee of the Council of National Defense, with the co¬ operation of the surgeon-general's office and the American Red Cross.

Ambulance Corps. — The Ambulance Corps, which had in August 1918, 9,000 or 10,000 men with 80 sections serving behind the French, English and Belgian lines and 30 sections be¬ hind the Italian trenches, with additional units in training at Allentown, Pa., was started at Allentown in May 1917, to meet the emergency needs of the French in response to an appeal by Marshal Joffre. One hundred sections were trained in driving ambulances, carrying litters and in first-aid treatment. Forty colleges sent men, and there were soon 4,500 on hand. The service abroad absorbed the privately raised and financed automobile ambulance units manned by American volunteers. An ambulance section consisted of a captain or lieutenant command¬ ing and 45 enlisted men. An officer of the Motor Transport Corps checked up on opera¬ tion and maintenance. Hospital units of vari¬ ous kinds came to Allentown for training prior to departure abroad. The camp became strictly medical, with men in training for all branches in this service, the men for the laboratory units, field hospital units and organization to conduct base hospitals being obtained princi¬ pally from the medical training camps at Fort Oglethorpe and Fort Riley.

Hospital Corps. — The men of the Hos¬ pital Corps available for service with line

organizations and with the sanitary train are designated in time of peace, and at the time of mobilization for war they are ready to join their respective commands. Each has the proper personal equipment and has been in¬ structed as to first-aid treatment. Field equip¬ ment is maintained at designated stations ready for use.

Sanitary Officers. — Medical officers in command of sanitary units attached to units of the line smaller than a division (the sanitary units being temporarily separated from direct headquarters control) report

these units to the senior line officer in command.

The department surgeon is chiefly an ad¬ visory officer, but in matters relating to activi¬ ties of the sanitary service within his depart¬ ment he acts in an administrative capacity, supervising the work of the department and examining and passing on reports. His watch¬ fulness over sanitary conditions is constant and he immediately reports orally to the command¬ ing officer as to remediable defects, with recom¬ mendations. In mobilization camps physical examinations are made and recorded by the de¬ partment surgeon and sanitary inspector and their assistants, who also vaccinate against smallpox and typhoid fever, and report the sick list to the company commander, making ap¬ propriate records. Each mobilization camp for State National Guard troops was in charge of an officer of the regular army. He had on his staff a camp surgeon, usually a medical officer of the regular army. Surgeons at ports of embarkation and at rest stations were the sani¬ tary advisers of the commanding line officers in all matters pertaining to the Medical De¬ partment. The Medical Department sees to it that all individuals and organizations in the army are furnished such equipment as pertains to the Medical Department, and such training in sanitary matters is given to both line troops and sanitary troops as is possible and as is ap¬ propriate to each.

The regulations defining duties of medical officers contain the following: ((While officers acting as technical advisers of their com¬ manders are responsible for pointing out in¬ sanitary conditions and making proper recom¬ mendations for their correction, the direct re¬ sponsibility rests with the commander. If, how¬ ever, the commander authorizes the medical adviser to give orders in his name for the cor¬ rection of defects, then the duties and respon¬ sibilities of the latter are correspondingly in¬ creased.®

Contract Surgeons. — Contract surgeons

are not given commissions, but they wear the uniform when on active duty. They are ex¬ pected to give their entire time to the public service. Short-term contracts are made with graduates of reputable medical schools and long-term contracts with graduates and quali¬ fied practitioners after examination. There are two forms of contract: standard, $1,800 a year, and substandard, $75 a month with subsistence, mileage, *etc.* Of the 151 contract surgeons in the service (in September 1918) 34 were

women.

Ciyilian Personnel. — In administrative of¬ fices, supply depots and hospitals, there are civilian employees including clerks, messengers, watchmen, contract nurses, cooks, packers and Jaborers, those other than unskilled laborers be¬

ing subject to civil service rules. Service vol¬ unteered in emergency by individual civilian physicians, nurses, litter bearers, cooks et al., is often accepted by the surgeon of any organiza¬ tion operating independently, or by the com¬ manding officer of a general hospital, with the consent of his commanding officer and under the authority of the surgeon-general.

The personnel of the Medical Department, and all other persons assigned to duty with that department, are collectively called sani¬ tary troops. In time of war the Sanitary Serv¬ ice includes (a) all persons serving in or em¬ ployed by the Medical Department, including officers and men temporarily or permanently de¬ tailed therein; (b) individuals whose voluntary service with the Medical Department is duly authorized, and (c) members of the Red Cross assigned to duty in the Medical Department. The American Red Cross, of which the Presi¬ dent of the United States is head, aids under an act of Congress, approved 24 April 1912. This organization is, as per its charter (Act of 5 April 1905), <(a medium of communication between the people of the United States and their Army.® The Red Cross has its own organization, acting under the direction of the ranking medical officer of the unit.

Co-operating Agencies. — Other auxiliary and co-operative aids of the Medical Depart¬ ment, with which the office of the surgeon-general is in communication but does not con¬ trol, include the War Department and Navy Department Commissions on Training Camp Activities (having supervision of regulations dealing with the suppression of the sale of alcoholic liquors within the five-mile zones around camps and cantonments and of prosti¬ tution within 10 miles), United States Public Health Service of the Treasury Department (which has recently taken over the work for civilian cooperation in combating venereal dis¬ eases), the Chemical Warfare Service of the War Department (which now has charge of gas defense activities), and the General Medical Board of the Council of National Defense.

General Medical Board. — :The last-named body worked in close cooperation, and aided in the expansion of the nation’s medical program during the war through co-ordinating the civil¬ ian resources

with those of the government. It stimulated enrollment of physicians in the Medical Reserve Corps, and organized the Vol¬ unteer Medical Service Corps, aimed to enlist the services of all physicians, both men and women, during the emergency, who were not already in the government service. In Novem¬ ber 1917 the provost marshal-general requested the Council of National Defense to nominate a man in each State as medical aide to advise the governor as to medical questions which would arise in connection with the operation of the Selective Service Law. The chairman of the General Medical Board appointed a committee on medical advisory boards, which met and selected a representative from each State. These were called to Washington and received their instructions. The committee on medical advisory boards formulated a plan, outlining the duties of these aides, in the selection of the personnel of medical advisory and local boards and organization of medical activities under the Selective Service Act. Rules of procedure were prepared and approved by the provost

marshal-general. It was announced, 28 Sept. 1918, that medical aides in States having a population of more than 500,000 had been com¬ missioned in the army with the rank of major, and in other States with the grade of captain!

The General Medical Board has committees on child welfare, civilian cooperation for com¬ bating venereal diseases, dentistry, editorial, hospitals, hygiene and sanitation, industrial medicine and surgery, legislation, medical ad¬ visory boards, medical schools, nursing, pub¬ licity, research, States' activities, surgery, volun¬ teer medical service corps and women physi¬ cians.

Surgeon-General's Office — The office of surgeon-general, as the heart of the Medical Department of the army, during the war had a great administrative group, with the immediate office management in charge of chief clerk and civilian employees, the several divisions being in charge of army officers of special experience and qualifications.

The enormous expansion in the work of the surgeon-general's office is indicated by a few comparisons. Just prior to the declaration by the United States (6 April 1917) that a state of war existed between the United States and Germany, the surgeon-general's office staff comprised six officers, including Surgeon-Gen¬ eral Gorgas, and 20 clerks, and occupied three rooms in the State, War and Navy Building. By 1 Dec. 1917, 165 officers were detailed here, there were 535 clerks, 300 office rooms were required, five whole buildings and parts of 20 others were being occupied, and more space was needed. There were 14 divisions and 13 special sections comprising 27 units of activity. Within a year after the war began the whole administrative force comprised 359 officers and 1,008 clerical employees, including enlisted men, and 150,000 mail items and 9,500 telegrams were being handled monthly. These figures do not include the gas defense service, which later be¬ came the Chemical Warfare Service of the War Department, and attached to which there were 2,364 commissioned officers and 20,344 enlisted men. In the year ended 31 March 1918, the department personnel increased from 8,000 to 106,000 ; 900 officers to 18,000 ; 375 nurses to 7,000, and an ambulance service of 6,000 men was entirely created. The seven hospitals in the United States were increased to 63, with more to come; their bed capacity of 5,000 was increased to 58,400, and provision of bed ca¬ pacity in France was made for 20 to 25 per cent of the strength of the American Expedi¬ tionary Forces. Whereas the appropriation for the Medical Department in peace times was about $1,000,000 a year, appropriations for the fiscal year ended 30 June 1918, totaled $130,-000,000, of which there had been expended up to 1 April 1918, $95,000,000, and the current annual outlay was at the rate of $160,000,000.

The Finance and Supply Division, in charge of medical supply and disbursing officers, pur¬ chases, stores and transports all supplies and material for the Medical Department and dis¬ burses and accounts for its moneys. Medical supplies are issued in definite units and amounts, the supplies to the various units of the medical service and the sizes of original packages being fixed by definite supply tables.

In addition to vehicular units for the trans¬ portation of supplies, other units of transpor¬

tation in the Medical Department during the war included mobile hospitals, wards and oper¬ ating rooms, motor dental units which were offices on wheels, x-ray motor outfits — the modern substitute

for the probing methods of oldtime military surgery — lorries bearing steam delousing apparatus or disinfectors and laundries. Each regiment had three medical carts. Pack mules carry fixed quantities of supplies. An officer of the newly-created Motor Transport Corps was stationed with each com¬ mand to check up on operation and mainte¬ nance.

As the functions of the department were and are preventive and curative, the Division of Field Sanitation was of great importance, for it recommended sites for camps, looked after mosquito prevention, drainage, water sup¬ ply, ventilation, the disposal of waste and the elimination of flies. Spots near camps where mosquitoes and flies breed were cleaned up. Each camp had a division or camp surgeon, and, as assistant, a sanitary inspector who had the assistance of a sanitary engineer and from 100 to 200 enlisted men employed in work de¬ signed to protect the health of soldiers. The sanitary engineering section of the surgeon-general's office and sanitary engineers of the construction division of the army cooperated in inspections as to the need of increased sani¬ tary facilities and sewage disposal plants. Ditching and oiling still bodies of water and daily spraying with oil of breeding spots were among the duties performed. Much of this work was done in cooperation with the United States Public Health Service within a radius of a mile outside the camps. Buildings where food was prepared or stored were screened, and a report in the late summer of 1918 stated that 22,7 00,000 square feet of screen had been placed in all the camps and 6,000 fly-traps placed in each camp. This work was largely responsible for the prevention and control of epidemic diseases.

Hygienic standards, collective and individ¬ ual, of troops in camp and in transport on land and sea, were being constantly improved. Hygiene is taught West Point cadets and all commissioned officers, so that they were en¬ abled to teach the enlisted men ; moreover, the latter were given instruction by their company officers in first-aid hospital train¬ ing and field hospital work, this instruc¬ tion being supplemented by drills of sanitary units in the presence of the enlisted men. Pamphlets and moving pictures were further aids in instructing in hygiene and in the re¬ duction of venereal diseases. In addition to thor¬ ough physical examination, all officers and en¬ listed men of the army under 45 years of age were required to be immunized against typhoid fever. All recruits and all the personnel of a military command were vaccinated against smallpox when the surgeon responsible deemed it necessary. Special units were provided for men with remediable physical defects, special¬ ists aiding the surgeons in charge. Tests also were made to detect malingering.

The precautions and supervision in the camps for the young men taken from civil life into the army resulted in the showing for the week ended 9 March 1918 of an annual death rate from disease of 6.6 per 1,000, a figure be¬ low that of men in civil life ranging from 20

to 39 years of age, the census bureau giving the rate for this class as 6.7. Steady reduction of the disease rate continued in the succeeding months and for the week ended 26 July it was reported that the annual death rate from dis¬ ease, based on combined reports of the Amer¬ ican Expeditionary Forces and of troops sta¬ tioned in the United States, was 1.9 per 1,000 — less than two men per 1,000 per year. The average annual death rate from disease during the two months ending 26 July was 2.8 per 1,000. For the sake of comparison, in the Crimean War the English and French lost 350 of every 1,000 men through disease; in the Mexican War in the 40's the annual death rate from disease of United States troops was 100 per 1,000; in the Civil War, 40 per 1,000 in 1862 and 60 per 1,000 in 1863; in the Spanish War, 25 per 1,000; and in the Russo-Japanese War, 20 per 1,000, this being the lowest previous annual death rate from disease. From statis¬ tics of the executive division of the general staff of the army, it appears that, in the Mexi¬ can War, seven men died from disease to one killed in battle; in the Civil War the dis¬ ease mortality, though greatly reduced, was still nearly double the battle mortality; and in the Spanish War there were more than five deaths from disease to one in battle ; and in the first 10 months of American participation in the World War the records of the American Ex¬ peditionary Forces show an exact parity be¬ tween battle mortality and disease mortality, but this is little more than half of the battle mortality and less than a third the disease mortality of the Civil War.

Particular attention was paid to empyema and to pneumonia epidemics. A special com¬ mission of physicians and pathologists studied the problem, aided by special teams of physi¬ cians and pathologists in each camp. The divi¬ sion of surgery perfected arrangements, in ac¬ cordance with the system recommended by the

commission, for quarantine and isolation and prophylaxis. The methods employed were necessary on account of the gatherings of large bodies of recruits. If, despite precautions, em¬ pyema did result, the surgeons adopted the policy of treating by operation for drainage of the chest.

The division of food and nutrition placed nutrition officers in every camp and cantonment where at least 10,000 were in training, in the United States and abroad. Nutritional surveys were conducted for the purpose of investigating food in storage, in transit and in preparation; cooking and wastage were studied in all the camps, methods improved, economies instituted, and dietetics taught. Studies as to the exact amount of food consumed and percentage of waste in more than 100 messes in 40 camps were made and instructions given to mess officers. The bill of fare was carefully balanced for wheat, starch, fat, protein, minerals and vitamine, and for sugar. The soldiers under General Pershing received 3,500 to 4,200 calo¬ ries of heat units daily as comoared with the 2,500 calories deemed sufficient for the ordinary citizen. All nutrition officers were food spe¬ cialists, mainly men and women who had been connected with colleges and public bodies as physiologists, chemists and food inspectors. As a concrete result of a two-day survey of seven companies (1,135 men), the average edible

waste was found to be 1.12 pounds per man per day. Appropriate instructions as to food and mess economy were given to mess ser¬ geants and cooks, and a second survey of the same companies showed waste of .43 pounds per man per day — • a saving of .69 pounds, which was equal to $61.75 per day for the seven messes, $22,542 per year. If this ratio prevailed throughout the camp of 15,000 men, the total saving would be about $300,000 per year.

A statistical bureau attended to the collec¬ tion and co-ordination of memoranda and rec¬ ords of sick and wounded, from the time of injury until discharge from the hospital. These records were kept in the most approved way in the surgeon-general's office with the aid of punching, tabulating and sorting machines.

Deaths of officers and men of the military personnel were immediately reported in writing by the senior medical officer present to the commanding officer. Deaths of medical officers were reported by the attending surgeon or the nearest medical officer to the department sur¬ geon, a duplicate being sent to the surgeon-general.

Medical and dental students in civil life, whose age placed them within the jurisdiction of the selective service law, were permitted to enlist in the Enlisted Reserve Corps and placed on inactive duty so that they might continue their college courses while subject to call to active service. The Army Medical School in Washington gave instruction to junior medical officers who had passed their examinations for entrance into the regular army. The faculty, comprising commandant, professor and assist¬ ant professors, were detailed by the War De¬ partment from among the officers of the Medi¬ cal Corps. Special professors were nominated by the faculty with the approval of the surgeon-general from among distinguished members of the Medical Reserve Corps. As instructors, there were officers of other branches of the army detailed by the War Department to give special courses. Officers of the Medical Reserve Corps who were candidates for appointment in the Medical Corps attended as students; also, such officers of the army and organized militia as might have been ordered or authorized to attend; also enlisted men of the Hospital Corps. The equipment included library, laboratories and all the other usual appointments of a medi¬ cal college. Important in the system of train¬ ing was the training school at Camp Greenleaf, Fort Oglethorpe, Georgia, where 2,500 physi¬ cians from civil life entering the Medical Re¬ serve Corps as officers and 6,000 enlisted men of the medical department (Hospital Corps-men) were constanly undergoing an intensive three months' course in training for all phases and branches of military medicine and sanita¬ tion, including physical instruction and adminis¬ trative duties. The physicians could here study branches for which they might never have opportunity in their civilian practice. Special opportunity for instruction in surgery was af¬ forded by three schools in New York City, and one each in Philadelphia, Rochester, Minn., New Orleans, Chicago, Saint Louis and Cleve¬ land. A medical and surgical school in Paris for surgeons of the American Expeditionary Forces afforded an intensive course of one month in administration, surgery and sanitation,

with lectures by experienced surgeons ; and young American surgeons

had an opportunity of observing methods at French and British casualty clearing stations before being placed in base hospitals for their initial war work. The next step of the young surgeon was as head of an operating surgical <(team® manning an evacuation hospital.

The Division of Internal Medicine, Tuber¬ culosis and Cardio-Vascular Diseases selected expert examiners to eliminate the physically unfit and to guide defective men to treatment calculated to restore them to future efficiency in military and civil life. Hundreds of thousands of examinations for tuberculosis and diseases of the heart were made. This division provided hospitals for incipient cases of tuberculosis as well as for advanced cases. It also provided for examinations of gastro-intestinal diseases.

The Division of Infectious Diseases co¬ operated with the Division of Sanitation by selecting bacteriologists, pathologists and other laboratory men, establishing and fitting out laboratories for army posts and mobile units for general, special and research work, a labor¬ atory being attached to every army post, mobil¬ izedˆ division and army corps. Tests of blood specimens and analyses of stomach contents and water analyses were made in these laboratories. The medical officer is held responsible for the application of approved methods for preventing the spread of infectious diseases, the three infectious most dangerous to armies being venereal, the pneumonias and cerebrospinal meningitis. Typhoid and paratyphoid are con¬ trolled at the start by vaccines, the efficacy of which was first developed by Sir Almroth Wright. Quarantine guards against measles, diphtheria and influenza ; diarrhoea and dysen¬ tery are kept to the minimum by pure water, pure food and reduction of the fly nuisance. Modern medical science keeps away, the old plagues of army camps — cholera by isolation, disinfection and vaccine; and spotted typhus by delousing and hot shower baths. Such cases of gout, rheumatism and Bright's disease as occur were brought into the army when the patient enlisted.

In the early stages of the World War, tetanus was common in the European armies, but it was later practicallv eliminated. Re¬ search into causes of trench fever and tests in which the famous 66 volunteers from among the Americal soldiers played an . important, part, have led to the discovery that its transmission was due to the bites of body lice. . An appro¬ priation of $100,000 and cooperation and re¬ search with French and British surgeons are to be credited for this achievement. Trench fever had been incapacitating 8 to 10 per cent of the British troops during 1916-17 for periods of from two to three months. The importance of eliminating body-lice or «cooties®.

led to provision for delousing apparatus, with twin disinfecting chambers mounted on. a five-ton lorry so that operation could be carried on near the trenches. Steam at five pounds pressure was passed through the air-tight chamber . con¬ taining clothing to be treated, killing all living matter. Eggs remaining in seams after the disinfecting operation were removed by stiff wire brushes.

The Division of Urology (genito-urinary dis¬ eases) looked after the prevention of venereal

diseases by employing prophylactic, sociological and educational measures — through the en¬ forcement of public health and vice laws, rec¬ reation for the soldier, educational measures such as lectures, moving pictures, exhibits and literature, and also through thorough prophy¬ lactic treatment and segregation. It published a manual on venereal disease, in cooperation with the Council of National Defense Com¬ mittee for Civilian Cooperation in Combating Venereal Diseases, and with the War Depart¬ ment and Navy Department Commissions on Training Camp Activities. There was strict en¬ forcement of the provisions against alcohol in the five-mile zones surrounding camps and can¬ tonments and against prostitution within ten-mile zones. This work in the civilian territory adjacent to the camps and cantonments was placed under the United States Public Health Service of the Treasury Department in the summer of 1918.

The Division of Psychology sought to elimi¬ nate the mentally unfit and to make possible the placing of men according to ability. All company officers and enlisted men were ex¬ amined and the mentally superior encouraged by assignment to duties for which they were evidently fitted. Of the 150,000 examined by this division, more than 1 per cent were rejected as mentally unfit for military service. The ‘ Division of Neurology and Psychiatry was or¬ ganized because it was the experience in the Allied armies that a large number of neurotic, mental and other defectives were found, who soon became useless for field, service. While physically sound, they were incapable of be¬ coming soldiers because of insanity, mental de¬ fect, epilepsy, drug habit or other nervous dis¬ orders. This division took special charge of victims of the varieties of <(shell shock,® who are cared for in a base hospital specially set aside for such cases, and it also had charge of asylums for insane and. of the men in the nervous and mental wards in the military hos¬ pitals.

The Division of Surgery classified the sur¬ geons in the Medical

Reserve Corps — continu¬ ing the code card system begun by the General Medical Board of the Council of National De¬ fense — trained them in special schools, assigned them to posts and distributed instruments and supplies at such posts. Military surgery was largely revolutionized during the war. Wounds were thoroughly operated upon as soon as pos¬ sible after a man was hit, all lacerations and surrounding flesh being cut away and the dan¬ ger of infection by tetanus or gas gangrene bacilli reduced to a minimum. Owing to mod¬ ern methods of sterilizing infected wounds, of the wounded who survived six hours, 90 per cent recovered ; of those who reached field hospitals 95 per cent recovered; and of those who arrived at base hospitals 98 per cent re¬ covered. Paraffin compounds found favor with many surgeons as. dressings, for burns and scalds. The subdivision of military orthopedic surgery dealt with the correction of deformities resulting from wounds and injuries, and sup¬ plied standardized splints, artificial limbs and similar appliances. This section paid particular attention to soldiers' feet and the shoes they wore and took measures to prevent and cure (<trench feet,® insisting upon properly drained trenches and prescribing loose, comfortable foot

and leg wear and nightly washing and greasing the feet (clean socks in abundance). Under its supervision were orthopedic workshops for making plaster casts, artificial limbs, splints and other supplies incident to the correction of de¬ formities.

The Division of Special Hospitals and Phys¬ ical Reconstruction became of greater and greater importance as the war progressed. In addition to the separate hospitals for the tuber¬ culous and insane, special provision was made for groups of medical and surgical injuries, the blind and the deaf.

The Division of Surgery of the Head included four sections : ophthalmology, otolaryngology, plastic and oral surgery, and brain surgery. This division supervised the selection, classifi¬ cation and intensive training of medical re¬ serve officers in brain surgery,

specialized sur¬ gery of the mouth and jaw, and eye and throat. It standardized instruments and material and selected optical equipment for use at the front. Those in charge of this division were instru¬ mental in perfecting methods for making artifi¬ cial eyes to take the place of those previously made in Germany and were also responsible for devising excellent types of goggles for aviators. This division published a monthly magazine, Survey of Head Surgery, containing . articles and abstracts of articles calculated to be of value and interest to military surgeons. Through the close teamwork of the oral sur¬ geon, dental surgeon and dentist comprising each unit at the front, many unusual operations were performed during the war, in the repair¬ ing of portions of the face and jaw of men injured in battle, new features and jaws being supplied by the experts in plastic and dental surgery.

In general, the purpose of reconstruction was to return the injured man to complete or partial military duty or to his former occupa¬ tion in civil life, or to train him anew in a cura¬ tive workshop. This work of reconstruction in the American army was on a comprehensive scale. Individual study of each injured soldier was made and his repair attempted according to his best ((social worth.® No man was dis¬ charged from the army until every possibility had been exhausted to put him back in the best physical condition. Massage and various elec¬ trical appliances and mechanical devices were used in convalescence, to restore muscular movement in limbs and extremities, and artifi¬ cial limbs were employed enabling the mutilated man to use all manner of tools and implements and to perform the dailv functions of civilized life. The Division of Physical Reconstruction edited and the American Red Cross published a monthly magazine, Carry On, relating to phases of this important work.

The Division of Hospitals planned and or¬ ganized all army hospitals, convalescent camps, depots and hospital trains, supplying all their personnel including specialists in surgery, medi¬ cine, bacteriology, epidemics, heart, head, nerves, feet and the more prevalent and dangerous diseases. Up to the entrance of the United States into the war, there were only seven army hospitals aside from post hospitals, these seven having a bed capacity of 3,843. Including the army post hospitals, the bed capacity was about 5,000. A survey of prospective needs led to requests for 86,472 beds and of these there

were ready in March 1918, 48,632, and hospitals with capacity of

29,140 were under construction. Hospital requirements in the United States when 4,000,000 soldiers were expected in France were estimated at 200,000 beds by then Brig. Gen. Robert E. Noble of the surgeon-general's staff in late September.

The hospitals in the United States were of three types: (a) receiving hospitals at ports of debarkation, which are filled and emptied rap¬ idly; (b) base hospitals, of which there were 44, including 32 at National Army and National Guard camps; and (c) general hospitals. Of the total of 79 hospitals established, 29 were equipped to care for more than 1,000 patients each, and 17 to accommodate 2,000 each.

The sending of large forces to France neces¬ sitated the establishment of a great medical and hospital organization under the medical of¬ ficer on the staff of the general commanding the port of embarkation. . This medical department, with headquarters in Hoboken. N. J., had jurisdiction over operations on the Atlantic coast from Canada to Florida and had on 31 July 1918, 33 medical department organizations, with 529 officers, 110 contract surgeons, 342 nurses, 2,649 enlisted men and 65 civilians. The divisions included those on personnel, corre¬ spondence, dental service, history and statis¬ tics, sanitary inspection, property, *finance, transport supply, transport, transportation (with seven hospital trains and 23 ambulances), trans¬ atlantic transport service, medical detachment, overseas casualty camp, sick and wounded, medical supply depots, nurses' mobilizing sta¬ tions, attending surgeons, laboratory (for pathological, bacteriological, chemical and mi¬ croscopical examinations and analyses), hos¬ pital building and domiciliary hospital (in charge of convalescent hospitals in private homes, with capacity of from two to 50 pa¬ tients each and a total of 1,200 patients) in addition to the hospitals. The 13 hospitals had 12,500 beds, of which 11,000 were ready for occupancy on 1 Oct. 1918. A man found sick in a unit about to go across was quickly sent to an embarkation hospital ; when he re¬ covered he went as a casual and probably was placed in a unit other than that to which he originally belonged. Embarkation Hospital No. 1, at Hoboken, had 763 bed capacity; No. 2, for scarlet fever, • mumps and measles, was at Secaucus, N. J. ; and No. 3, for communicable diseases, off Hoffman's Island, had 694 beds. On the Columbia University oval, Williams-bridge, New York City, was General Hospital No. 1, with 1,100 bed capacity; United States Auxiliary Hospital No. 1 (Rockefeller Demon¬ stration Hospital, for demonstrations and carry¬ ing on scientific investigations), was at 66th street and Avenue A, New York City, and it had 150 beds; Port Newark Terminal, N. J., had a post hospital with 30 beds ; the base hos¬ pital at Camp Merritt, Tenafly, N. J., had 1,846 beds; the base hospital at Camp Mills, Long Island, had 1,506 beds, and the hospital at Schiitzen Park,* N. J., was planned for

400. At the debarkation hospitals the patients were sorted and sent to various special hospitals, sanatoria, restoration clinics or convalescent homes, throughout the United States. The de¬ barkation hospitals were: No. 1, Ellis Island, 1,075 beds; No. 2, Fox Hills, Staten Island, 1,762 beds; No. 3 (Greenhut Department Store)

■ :

mmmm.

m I ‘ *

* , J

<-, . ■ •■ .■ ■■

Sixth avenue and 18th street, New York City, 2,814 beds; No. 4, Long Beach, L. I., 1,800 beds, and No. 5, the Grand Central Palace, Lexington avenue, 46th and 47th streets, New York City, rented for $385,000 yearly, with 3,300 beds.

The general hospitals, of which there were 27, were the only ones for troops returning from Europe. Twenty-two were in September 1918 completed, or nearly so. The total bed capacity in these general hospitals was about 20,000. It was planned to have one general hos¬ pital for each of the 16 draft districts of the country, distributed so that sick and wounded soldiers could recover near home. Orthopedic hospitals were established at Washington, D. C., Baltimore, Md., and Colonia, N. J. There were neuropathic hospitals at Fort Porter, N. Y., and New York City.

The surgeon-general designated the follow¬ ing 15 general military hospitals for the work of physical reconstruction: Walter Reed Gen¬ eral Hospital, Washington, D. C. ; General Hos¬ pital No. 2, Fort Henry, Md. ; General Hospital No. 3, Colonia, N. J. ; General Hospital No. 6, Fort McPherson, Ga. ; General Hospital No. 7, Roland Park, Baltimore (for the blind) ; Gen¬ eral Hospital No. 8, Otisville, N. Y. ; General Hospital No. 4, Fort Porter, N. Y. ; General Hospital No. 9,

Lakewood, N. J. ; General Hos¬ pital No. 11, Cape May, N. J. ; General Hos¬ pital No. 16, New Haven, Conn.; General Hos¬ pital No. 17, Markleton, Pa.; Letterman Gen¬ eral Hospital, San Francisco, Cal.; United States Army Hospital, Fort Des Moines, Iowa; Plattsburg Barracks Hospital, Plattsburg Bar¬ racks, N. Y. ; General Hospital, Fort Bayard, N. M.

No man was brought to this side as long as there was a reasonable chance of his being able to return to the firing line. Eighty-five per cent of all wounded were returned to the firing line in a comparatively short time. Fifteen per cent of the total sick and wounded were not able to return to the firing line within six months and they were classified and tagged in France according to wounds, sickness and dis¬ ease, all located on arrival on this side and sent by train to the various general hospitals. Of the 15 per cent brought to the United States, one-third were later capable of some kind of military service. Of these, some were sent back to the firing line or trained for limited military service.

Those disabled to the extent that they were unfitted for further military service, if it was deemed desirable, were fitted again for their former employment; or if their injury pre¬ cluded or circumstances indicated that change of occupation would be to their advantage, they were encouraged to take advantage after dis¬ charge of the benefits afforded for vocational training by the Federal Board for Vocational Education, which had charge of the rehabilita¬ tion, generally, of this class of ex-soldiers and sailors. It was recognized that a small group was and will be unfit for any work.

It was estimated that about 1 per cent of the men mobilized would be subjects for voca¬ tion training; as the United States mobilized 4,000,000 men, there are 40,000 to retrain. Half of the men susceptible of recuperation need medical rather than surgical care. Of the 20,000 surgical cases, about 2,000 are <(dismem-bermenU cases, where there has been actual

loss of arm, leg, hand or foot. Of the 2,000, about 250 have lost legs, and about 175 an arm or arms.

There were seven hospital trains in the United States. Each train was in charge of a transportation officer. In each train there was a convalescent capacity for 250 patients, and a bed patient capacity of 30. The trains were provided with every convenience and there were

several types of coaches, kitchen cars, din¬ ing cars and unit car for the staff. On occasion, special coaches were provided for disabled re¬ turning soldiers to be attached to passenger trains. There were six hospital boats, ready with picked crews and nurses.

Staffs of hospitals were administrative and professional. The commanding officer in charge of a general hospital was a colonel or lieutenant-colonel of the Medical Corps. He had, as adjutant, a major of the Medical Corps whose staff of 17 includes sergeant, privates and civilian employees. The registrar was a major or captain of the Medical Corps; he had a staff of nine sergeants and privates. The quartermaster was a major or captain of the Medical Corps ; his staff of 61 included a cap¬ tain or lieutenant of the Medical Corps (who was in charge of the hospital mess) and 60 sergeants, corporals and privates, and civilian employees. Officer of the day, officer of the guard and chaplain completed the administra¬ tive staff. Professional division — the chief of the medical service was a major and serving under him were two sergeants and two privates. The surgical service consisted of one major, one captain or lieutenant, one sergeant, four privates and five army nurses. In the wards there were 12 captains or lieutenants of the Medical Corps, 6 sergeants of the Hospital Corps, 70 privates, Hospital Corps, and 53 nurses of the Army Nurse Corps. In the lab¬ oratory there was a captain or lieutenant of the Medical Corps, a sergeant first-class, two ser¬ geants and four privates, all of the Hospital Corps. The dental service was in charge of one lieutenant of the Dental Corps, who had one private of the Hospital Corps as assistant. The nursing service comprised one Chief nurse, nine assistants and 53 nurses. One head ’nurse in each ward served eight hours daily and was on night duty one month in three. In each convalescent camp there was a captain or lieu¬ tenant of the Medical Corps and one sergeant first-class, one sergeant and six privates, all of the Hospital Corps.

The grade classification of the personnel of a general hospital was as follows: Twenty medical officers (1 colonel commanding, 1 major, operating surgeon; 18 captains and lieu¬ tenants, including quartermaster, pathologist, eye, ear, nose and throat specialist, 2 assistant operating surgeons, 12 ward surgeons, dental surgeon) ; 8 sergeants first-class (1 general su¬ pervisor, 1 each in charge of office, quartermas¬ ter supplies and records, kitchen mess, detach¬ ment and detachment accounts, patients’ cloth¬ ing and effects, medical property and records, dispensary); 16 sergeants (1 in dispensary, 2 in storerooms, 1 in mess and kitchen, 4 in of¬ fice, 2 in charge of police, 6 in charge of wards); 14 acting cooks; 115 privates first-class and privates (68 ward attendants, 3 in dispensary, 5 in operating-room, 1

in laboratory, 14 in kitchen and mess, 6 in storerooms, 4 or-556

derlies, 5 in office, 4 outside police, 1 assistant to dentist, 4 supernumeraries) ; 46 nurses, fe¬ male (1 chief ‘nurse, 1 assistant to chief nurse,

41 in wards, 2 in operating-room, 1 dietician).

A subsequent development necessitated by the war was the creation of mobile hospitals compactly contained in motors and susceptible of rapid setting up and, if emergency dictated, removal. A mobile hospital section, consisting of 14 motor trucks in charge of a chief sur¬ geon and an assistant, with 20 to 40 enlisted men and 10 army nurses, remained near a base hospital about 15 miles back of the battle front. Summoned by telephone, the section proceeded forward with doctors and set up its operating tent, the construction of the motor trucks being readily adaptable to the formation of a compact hospital unit with electrically lighted plant sterilizing outfit, X-ray apparatus and small frame operating pavilion. Two of the trucks carried tents and hospital supplies, the whole plant when erected making a temporary field hospital with 120 beds. Each mobile hospital had its own headquarters and staff — lieutenant-colonel, 2 captains, lieutenant and 3 enlisted men — in addition to the surgeons and men on call service. The main headquarters of the mo¬ bile hospital branch was in charge of a colonel and 5 chiefs of the surgical staff for 5 sections.

Hospital trains specially fitted and arranged for the comfort of the wounded were used in the theatre of operations to convey the wounded from the evacuation hospitals to the base hospitals. One of the American hospital trains in operation in France was 930 feet long and consisted of 16 coaches. There was a fracture ward and an infectious diesease ward, and the train accommodated 360 patients in cots,, or 480 sitting down and at the same time 120 in cots, making 600. Each ward had 36 cots hung in tiers of three. The equipment was as complete as that of any hospital in the United States. The staff of the train included 3 medical officers, a manager, 2 lieutenants, a sergeant first-class, 2 sergeants, 2 cooks and 31 enlisted men. Oper¬ ating-room, kitchen, pharmacy, stores and staff carriages were also

provided.

Hospitals for prisoners of war were located adjacent to prison camps and stockades.

The three hospital ships, the Solace, Mercy and Comfort , placed in commission, were orig¬ inally 10,000-ton merchant ships. The Mercy, a typical hospital ship, carried 321 bunks for the sick, and it was possible to use space for 100 to 200 more by use of cots and Gosso beds Every department found in a well-equipped hospital was provided and there were surgical, medical, genito-urinary, eye, ear, nose and throat, contagious and convalescent wards. Each department was presided over by a special¬ ist with an assistant, regular or reserve force officers of the navy. There also , were roent¬ genologists, laboratory men, dentists, 3 phar¬ macists, 8 pharmacists' mates and 3 trained male nurses. There was a library, and as recre¬ ation for convalescents, music was provided by a band and victrolas, and there were facilities for moving pictures. The ship was provided with 2 large ambulance motor boats, each accommodating about 16 stretchers.

Regulations provided that military hospital ships might not be captured while hostilities lasted, their names having been communicated to the belligerent powers before their use, but

they might in no wise hamper the movements of the combatants. They were constructed or adapted specially and solely with the view to aiding the wounded, sick and shipwrecked. Each was painted white with a broad horizontal

band of green. …… 9nn

The personnel of a hospital ship having 2UU bed capacity consisted of 5 medical officers (1 lieutenant-colonel or major, 4 captains and lieu¬ tenants, 1 sergeant first-class, 4 sergeants, 5 acting cooks, 30 privates first-class, of whom 29 were nurses and 1 an orderly).

The Division of Roentgenology provided X-ray apparatus and trained specialists to co¬ operate with surgical units. The importance of the X-ray as the modern substitute for the probe was recognized and X-ray laboratories were established in hospitals in the . United States and France. Mobile X-ray units also came into use. Each vehicle was a standard army ambulance with a few modifications, hav¬ ing complete X-ray equipment including a dark¬ room in which plates and films could be devel¬ oped. It had its own power-plant distinct

from the propelling engine of the vehicle. An X-ray ambulance in a road test traveled 900 miles to Hamilton, Ontario, for the meeting of the British Medical Association, averaging 24 miles an hour for the journey. About 50 such units were sent to France. The crew of each con¬ sisted of 1 officer and 3 enlisted men, all of whom had comfortable sleeping accommoda¬ tions.

In the Air-Service Division, flight surgeons and physical directors were appointed, the corps being large enough to equip each train¬ ing field and camp for fliers in the United States and in France, with a proper organiza¬ tion. The medical branch of the air service se¬ lected the fliers and looked after their care and condition, so as to reduce to the minimum accidents due to physical unfitness. The flight surgeon at a camp prescribed rest, recreation or temporary relief from duty, as the case re¬ quired. He made sick calls on aviators, visited cases in hospitals and consulted attending phy¬ sicians regarding these cases. Tests were con¬ ducted to determine effects of rarefied air upon aviators. The flight surgeon and the physical director, who is his assistant, lived in close touch with the fliers. The physical director su¬ pervised the recreation and physical training. For use in emergency at flying fields, there were ambulance air planes or flying ambulances — standard training planes with the rear cock¬ pit cleared and enlarged sufficiently to permit of a combination stretcher seat to enable the injured man to be propped up and rest easily. These air ambulances were of value because of their speed, ability to reach places not readily accessible by automobile ambulance, and be¬ cause they assured a gentle and comfortable journey. The flight surgeon and a skilled pilot went in the flying ambulance when emergency arose, the surgeon taking necessaries for first-aid and minor operations. Flight surgeons qualified as pilots whenever possible.

Army medical men used the results of chemists' research and modern invention to combat and overcome poison ˆmustard® gas and the various other scientific diabolical methods of warfare in which Germany set the pace. The Division on Gas Mask Defense (later placed under the Chemical Warfare Service,

a separate branch of the War Department) established schools in each camp, in which every officer and man was instructed in gas defense. A gas mask giving far greater protection than the German mask and at least equal to that used by any other army was devised and sup¬ plied to both the men and horses in the Ameri¬ can forces. Special sections provided the masks, instructed in their use in daily drills and attended to repairs overseas. Soldiers were required to adjust masks in six seconds.

The Army Medical Museum and Library of the surgeon-general's office are important aids in the work of the Medical Department and instruction in military medical matters. The Museum, of which Col. William O. Owen was for many years the officer in charge, is operated for medical and scientific research and is a central clearing-house for pathological speci¬ mens. It contains the most remarkable collec¬ tion of gunshot fractures in existence (from the Civil War), also laboratory workshops, art department, complete motion picture depart¬ ment. Pathological specimens from the front were assembled and exhibited here, and cata¬ logued and co-ordinated with the corresponding clinical histories for investigation purposes. The library, which is really the National Medical Library, is a source of medical information to the Medical Corps and to the medical public in general. It is second only to that of the Paris Medical Faculty in number of volumes and is the most useful and valuable of all medi¬ cal libraries in that it has the finest collection of medical periodicals in the world.

Here the Military Surgeon, the literary organ of the Medical Corps and of the Association of Military Surgeons, is edited and published, the surgeon-general passes on medical articles for publication by medical officers through the board of publications. Much valuable material bearing upon the Great War has already been issued with his sanction.

Records of health conditions, reports and statements of sick and wounded, and all manner of other data will be here available for the (Medical and Surgical History of the War,5 which is being compiled, to be published within five years after peace is declared. Medical and surgical material of value bearing on epidemics, group diseases or unusual surgical cases, were sent in by the base hospitals.. The division after September, 1917, made tabular statements concerning the movement of preventable dis¬ eases, based upon periodic telegraphic reports made to the Division of Sanitation from the 31 separate cantonments. This compilation will be made a first installment of the history of the mobilization of the United States

army.

The senior medical officer on the staff of the commander of a field army is a chief surgeon; the senior medical officer of the line of com¬ munication is a surgeon, base group ; the sur¬ geon in charge of the zone of the advance is a division surgeon, with the grade of colonel; of a brigade operating independently, brigade sur¬ geon; of a detachment (regiment or small com¬ mand), the surgeon. When guards from the line are detailed to sanitary formations and the commander of the guard is a commissioned officer, he confers with the medical commander as to the character of guard duty desired, but exercises no control over the sanitary forma¬ tion. Guards may use their arms in self-defense

or in defense of the sick and wounded. Field hospitals when not parked with divisional trains are ordinarily guarded by ambulance companies. All sanitary troops and armed detachments or sentinels detailed to guard sanitary formations, falling into the hands of the enemy do not become prisoners of war, but are disposed of under Article 12 of the Geneva Convention,

1906.

The mobility of an army is essential ; there¬ fore the Sanitary Service must operate effi¬ ciently, in such a manner as not to obstruct military operations, and with a minimum amount of transportation and personnel. In the Zone of the Advance the medical administra¬ tion provides only emergency treatment and prompt transportation of the wounded to the rear, always with such disposition that men fit for duty are retained at the front and the fight¬ ing force relieved of the impediment incident to the presence of men incapacitated for duty. When battle impends, the resources of the San¬ itary Service behind the Zone of the Advance are placed in readiness to meet the demands for the care and transportation of the wounded which may reasonably be expected, and per¬ sonnel and supplies are advanced as near the seat of operations as practicable, reaching for¬ ward into the Zone of the Advance if condi¬ tions warrant it. The Sanitary Service of the Line of Communication (1) provides such facilities that the wounded may return to the front without delay; (2) furnishes prompt evacuation service so that the fighting forces will be promptly relieved of wounded and the Sanitary Service of the Zone of the Advance can

keep in touch with their combatant organiza¬ tions ; (3) furnishes a system of supply to enable the sanitary troops in the Theatre of Operations to replenish equipment and supplies by direct method and without delay; and (4) maintains satisfactory sanitary conditions among the troops on the Line of Communica¬ tion and, if necessary, takes charge of sanitation among the inhabitants of occupied territory.

The Ambulance Service supervises trans¬ portation of wounded from the first-aid sta¬ tions to the base hospitals. On the march not in the immediate presence of the enemy an entire ambulance company may be placed with the advance guard. Ambulances of one or more companies may be distributed through the main body, an ambulance following each regiment or independent battalion; later, these join their companies. An ambulance company operates in two parts, with personnel at war strength as follows: (a) With the dressing station, includ¬ ing the litter bearers, with equipment on pack mules; four officers, one sergeant first-class, six sergeants, one acting cook, 40 privates first-class and privates — all of the Medical De¬ partment — and (b) with the wheeled trans¬ portation ; one officer, one sergeant first-class, one sergeant, one acting cook, 28 privates first-class and privates (one as farrier, one as saddler, 20 musicians, 12 as ambulance drivers and 12 as ambulance orderlies) — all of the Medical Depaftment ; also, one sergeant (black¬ smith) and three privates (drivers) of the Quartermaster Corps. Regulations provide that all ambulances, wagons, animals, hospital trains, ships and boats, with their personnel assigned to the Medical Department, shall not be diverted from the medical service. Supplies for the sick

and wounded are transported so far as possible by the medical superintendents of the Trans¬ port Service. For evacuation of the wounded to the rear, all transport available is pressed into service, including combat wagons,, held train wagons, automobiles and other civilian transportation of all kinds.

While the organization of the Medical De¬ partment may logically be treated first with a general consideration of the various branches of the service and divisions of the surgeon-general’s office, and with the successive stens taken in building the service from the interior to the battlefield, in considering the Theatre ot Operations one must visualize the entire cone above the base, through the Line of Communica¬ tion and Zone of the Advance to the very fore¬ front of

battle. And as casualties regularly pur¬ sue a course backward from the active front, consideration of medical activities in the Theatre of Operations may well be in this order.

The wounded man applies a dressing from his own first-aid or converts his belt or shoe lace into a tourniquet if able — or a comrade does it for him if he is incapacitated — when medical aid by a regimental medical orderly is not available. As the engagement develops, an Aid Station is established for each regiment as the number of wounded brought in by the field ambulance bearers warrant. (In many cases bandsmen are assigned to duty as stretcher bearers for first aid). The time and place for opening an aid station are determined by the organization commander, unless he has author¬ ized the surgeon to use his discretion in the matter. In this case, the surgeon of each regi¬ ment, with the necessary equipment carried on a pack mule, establishes the station. The Aid Station is always in immediate touch with the combatant unit. The requirement that the sani¬ tary personnel with combatant organizations keep in touch with those organizations may make it necessary for them to leave the wounded where they fall, pausing only to administer such aid as may be absolutely essential. In the case of mounted troops, the sanitary detachment accompanies troops during the whole course of the engagement, pausing only long enough to render first aid and to collect the wounded at a place where they can be turned over to an inhabitant to be cared for. Cases left behind will be collected and cared for by the dressing station party as it advances. In some cases dressing station and aid station are located to¬ gether. Treatment at the Aid Station at which the wounded are originally assembled by the Sanitary Service is usually limited to first-aid and to readjustment of dressings, with some¬ times an emergency operation. During and after an engagement diagnosis tags are attached to all wounded (and also the dead) as soon as practicable ; they are made out in duplicate. At these stations the Sanitary Service with the troops connects with the service of the sani¬ tary train. Men with trivial wounds are sent back to their commands when the wounds are dressed. Those slightly wounde^d but able to walk are directed to the station for slightly wounded, several miles in the rear, so that dressing stations and field hospitals may not be congested unnecessarily. If time has permitted the installation of a more elaborate system, the wounded may be taken by trolley from the trench first-aid station through a communicating

trench to the Advance Dressing Station ; other¬ wise they are taken on hand-stretcher or

perambulator. .

Each ambulance company establishes a dress¬ ing station (or field ambulance) in a protected location, usually some distance in the real o the aid station (in trench warfare about 4U0 yards from the front trench) and an advanced surgical post adjacent, where urgent operations under bomb-proof are performed. The number and location of dressing stations are determined by the division surgeon, acting under instruc¬ tions of the division commander, and the di¬ rector of ambulance companies supervises their opening. At these dressing stations light nour¬ ishment is provided, dressings are examined and adjusted, splints applied, antitetanus seium injected, morphia tablet given if the man is suffering acutelv, and an iodine cross maiked on the forehead to show that this attention has been given. Patients requiring transportation are made as comfortable as possible until it is practicable to transport them by horse litter to the advanced surgical aid post, or . by am¬ bulance — possibly by motorcycle with two-story side car — to the field hospitals. The site for a dressing station should have the advan¬ tages of protection from rifle fire and from di¬ rect artillery fire, accessibility for wheeled transportation (motor transport if possible) and a supply of water. There are five depart¬ ments : dispensary, kitchen, receiving and for¬ warding, slightly wounded, seriously wounded. As soon as a dressing station is opened, bearers proceed under the direction of a medical officer to the front as far as the enemy fire permits. Ordinarily they will be divided into as many sections as there are aid stations, and each sec¬ tion under a noncommissioned officer will pro¬ ceed toward an aid station. These men direct wounded able to walk to the station for slightly wounded, and they transport other wounded from the aid station to the dressing station. As soon as the line of evacuation of the wounded is determined, ambulances are brought to the dressing station; they must arrive as early as possible, even at the risk of losses. Quickly loaded, they carry wounded from the dressing station to the nearest field hospital. The system may also include transportation by narrow-gauge railroad from the advanced surgical post to the field hospital, man-power push-carts being used.

If the wounded man arrives at the field hospital in good condition, he is not unloaded, but is sent on to the evacuation hospital. The field

hospitals generally have only a limited equipment, no beds or cots, but straw oyer which blankets are spread, and aim to provide shelter, nourishment and emergency treatment. The mobile hospitals coming into use are fully equipped. Field hospitals are placed one to three miles in the rear of dressing stations, and care for the sick and wounded of the division until the sanitary service of the line of com¬ munication takes charge of them. The stopping of hemorrhages, cleansing of wounds and such emergency operations as will permit the re¬ moval of the wounded to the rear are per¬ formed here. The field hospitals are in charge of a medical officer with the rank of major, designated as director of field hospitals. The field hospital personnel includes a major (com¬ manding) ; five captains and lieutenants (one

of whom is an adjutant arid quartermaster and four are ward surgeons) ; three sergeants first-class (one acting first sergeant in general super¬ vision of the hospital and in charge of medical property and records ; one in charge of trans¬ portation and quartermaster property and rec¬ ords ; one in charge of mess supplies and cook¬ ing) ; six sergeants (one in charge of dis¬ pensary, one in charge of operating equipment, one in charge of patients' clothing and effects, three in charge of wards) ; three acting cooks;

55 privates first-class and privates (45 attend¬ ants, one dispensary assistant, one artificer, four orderlies, three supernumeraries), and of the Quartermaster Corps, one sergeant (wagon-master) and seven privates (drivers).

The regimental camp infirmaries and the four ambulance companies are all in charge of one major, designated as director of ambulance companies. He makes frequent inspections, supervises the removal of wounded and directs the opening of dressing stations and advanced surgical posts. He is assisted by a sergeant and a private first-class or private, hospital corps, both mounted.

The evacuation hospital (casualty clearing station) has been styled the keystone of the military hospital system. It is the first sanitary unit in which provision is made to retain patients for any length of time, and it is in the evacuation hospital that the great mass of rapid war surgery is done. Evacuation hos- ' pitals are often located in pairs and occasionally with special hospitals for shock and head cases in connection. They are from 5 to 10 miles from the front, but as near up as possible and on good roads, often on railroads. But all their equipment is light and mobile, so that it can be quickly removed if the exigencies of the conflict require. They have facilities for X-raying, the location of the foreign body be¬ ing indicated by an indelible cross on the patient's skin. Teams of expert young surgeons perform the operations in these units, and these surgeons get 90 per cent primary healings in war surgery. It is a rule that no war wound that is to pass out of the control of the operat¬ ing surgeon before it is healed is to be closed primarily. If operation is deferred, wounds are thoroughly

cleansed and packed with gauze soaked in Carrel solution, the entire area is wrapped in compresses, solidly bandaged, strapped or splinted, and the patient is ready to be shipped 100 miles. In some cases an evacuation hospital is pushed forward and takes charge of the patients in the location of the field hospital. In other cases vehicles from the advance section of the line of communica¬ tion are sent forward to the field hospital to receive the patients, and in many cases the trucks going to the rear for supplies will trans¬ port the patients back to the refilling point, where they will be turned over to the vehicles sent forward from the advance section. The evacuation hospital is equipped with cots, blankets and comforts, but ordinarily it will be cleared of patients as early as practicable in order that it may be ready to receive others

from the front. #

Between the evacuation hospitals and the base group there are rest stations and Red Cross units comprising an intermediate group, the medical officer in charge being known as surgeon, intermediate group.

Patients usually are brought back by trains or vol. 18 — 36

boats to the base hospitals, where all possible comfort and facilities for their care are pro¬ vided. The sick and wounded who will be able to return soon for duty will be retained in these hospitals rather than turned over to _ the service of the interior. These base hospitals are operated with methodical regime and have all facilities for substantial surgical work and to expedite convalescence. By far the greater proportion of the operations here are <(civil surgery® as distinguished from ((war surgery.® The bed capacity in .the rear of the zone of the advance is aimed to be adequate to care for 10 per cent of the total forces when troops take the field, with facilities for rapid expan¬ sion. One base or general hospital is estab¬ lished for each 500 beds to be provided. The base hospitals are centres of great medical ac¬ tivity. Often there are contagious disease hos¬ pitals in connection. Here are located medical supply depots, materials being accumulated here and sent forward as required. Here also are field laboratories and casual camps for sanitary troops. There are also Red Cross units. Sani¬ tary inspectors having the rank of lieutenanl-colonel, and who are assistants to the division surgeon, supervise the medical operations, with the surgeon, base group, in immediate charge.

Franklin Martin, M.D., Chairman Committee on Medicine and Sanita¬ tion, Advisory Commission , Council of National Defense.

MEDICAL PEDAGOGY. The theory of education in its application to medicine still is mostly traditional, like many of the subjects it includes, for the pedagogy of the great num¬ ber of medical schools has no steady, carefully arranged and planned-for, fought-for, curric¬ ulum based on personal and educational psychology and knowledge of the modes in which a young (or old) person learns. Both the method and the curriculum at present are largely traditional, like much of medicine in general.

The origin of this method has a certain amount of historic interest. As every one knows, a century ago and less the becoming <(doctor® received all that he knew of medicine before approaching his victims from long and intimate attendance on one or more, usually one, more or less successful practitioners. It was the same condition as obtained and is still in use in the study of the law, only here the young man was more dependent on his (<preceptor® than in the case of the ((reader® and the old judge in his law office. The remnants of this old preceptor-system, as late as the year 1900, say, were to be seen in the medical schools even in New York City.

Some of the more ambitious and some also of the more lazy students joined a tutoring or <(quiz® class in each of the important subjects of the curriculum; they were vigorously quizzed once or twice per week and enthusiastically (<crammed® before the carefully 'Calculated ex¬ aminations. Some students took in small classes, as many as six or eight of these pri¬ vate courses, and the cost of each ranged from $5 to $25 for a year's quizzing. The preceptor, usually a college-bred, successful, wide-awake practitioner, was often young, always energetic, was called a (<quiz-master,® and, much admired by his students (to whom often he gave much personal and social care and help), he was at

least tolerated by the colleges, already aware that their course was in a sad lackof recita-tional reviews. Not infrequently the instructors held private quizzes.

When systematic laboratory work developed, largely in the richer medical schools, and reci¬ tations began to be systematically held, this preceptor-system — employing a practitioner to be guide, philosopher and friend, as well as tutor — gradually disappeared, except as still maintained in or about all institutions of learn¬ ing in some form or other. In this pedagogic respect, then, the medical school tends con¬ tinually to imitate more and more successfully the didactic methods of the university, which, of course, are ancient.

«The requirements for admission to and graduation from colleges holding membership in the Association of American Medical Col¬ leges are 14 units of high school work and two years (60 semester hours) of college work.

The High School Requirement.

(A) Required, 7 units. . Units

Mathematics (minimum 2 years, maximum 3 years),

algebra and plane geometry … 2

English (minimum 2 years, maximum 4 years) . 2

One foreign language (minimum 2 years, maximum

4 years) … … ˆ

History and civics . 1

Total number of required units . 7

(B) Elective, 7 units.

To be selected from the following: .

English language and literature (in addition

to the required work) … 1 to 2

Foreign languages, additional, Latin, German,

Italian, French, Spanish or Greek (not less

than 1 year in any one) . 1 to 4

Advanced mathematics, advanced algebra, solid geometry and trigonometry (£ year

each) … I

Natural science, chemistry 1 year, physics 1 year, and biology, botany, physiology and

zoology (i to 1 year each) . . h to 2

Earth science, physical geography, geology

and agriculture (£ year to 1 year each) … 5 to 1

Astronomy (£ year) . • • |

Drawing (| to 1 year) . • • • • … a to 1

History, ancient, medieval and modern, and

English (1 year each) . 1 to 3

Economics (£ year) . 2

Manual training (1 year) . 1

Bookkeeping (§ to 1 year) . a to 1

One unit in any subject is the equivalent of work in that subject for four or five periods per week for a year of at least 36 weeks, pe¬ riods to be not less than 45 minutes in length. One unit is equivalent to two semester credits or two points.

Premedical College Course.

SCHEDULE OF SUBJECTS OF THE TWO-YEAR PRE-MEDICAc, COLLEGE COURSE.

Sixty Semester Hours* Required

Semester

Required Subjects: Hours ˆ

Physics (b) . °

Biology (c)…… . . • . . °

English composition and literature (d) . o

Other nonscience subjects (e) . 12

Subjects Strongly Urged:

French or German (f) . 6-12

Advanced botany or advanced zoology . 3-6

Psychology … . . ; . . 3 “6

Advanced mathematics, including algebra and

trigonometry . . 3-6

Additional courses in chemistry . 3-6

Other Suggested Electives:

English (additional) , economics, history, sociology, political science, logic, mathematics, Latin,

Greek, drawing.

* A semester hour is the credit value of sixteen weeks’ work consisting of one lecture or recitation period per week, each period to be not less than 50 minutes net, at least two hours of laboratory work to be considered as the equivalent of one lecture or recitation period.

Medical Curriculum.

DIVISION 1. — ANATOMY, 720 HOURS (18 PER

cent).

(a) Gross anatomy (including ap¬

plied anatomy) . ._ . .

(b) Histologic and microscopic

anatomy .

(c) Embryology .

DIVISION 2. — PHYSIOLOGY j

(c)

Lect.

Rec.

Lab.

Hours

Dem.

Wk.

510

120

390

135

30

105

75

30

45

-ID CHEMISTRY,

600

cent).

Lect.

Rec.

Lab.

Hours

Dem.

Wk.

180

60

120

75

30

45

104

30

75

240

140

100

AND

DIVISION 3. — PATHOLOGY,

HYGIENE, 450 HOURS (11.25 PER CENT).

(b) Hygiene and general dietetics

Hours

Lect.

Rec.

Dem.

Lab.

Wk.

135

30

105

45

45

, .

270

60

210

, MATERIA

MEDICA

AND THERAPEUTICS, 240 HOURS (6 PER CENT)

Lect.

Rec.

Lab.

Hours

Dem.

Wk.

105

40

65

80

55

. ,

• .

(a) Pharmacology .

(b) Materia medica and pharma¬

cology .

(c) Therapeutics .

DIVISION 5. — MEDICINE AND MEDICAL SPECIALTIES,

970 hours (24.25 per cent).

(a) General medicine (including

clinical microscopy) .

(b) Pediatrics …

(c) Nervous and mental diseases

(d) Jurisprudence, ethics and

economics . .

(e) Dermatology and syphilis …

Hours

Lect.

Rec.

Dem.

640

150

105

30

45

SURGICAL i

Lab.

Wk.

DIVISION 6. — SURGERY AND

TIES, 720 HOURS (18 PER CENT).

Lect.

Rec.

Lab.

(b) Orthopedic surgery

(c) Genito-urinary diseases.

(d) Eye .

(e) Ear, nose and throat. .

Hours

Dem.

Wk.

510

. .

45

• •

45

a •

60

60

• •

AND GYNECOLOGY,

300

PER CENT).

Lect.

Rec.

Lab.

Hours

Dem.

Wk.

(a) Obstetrics . 195

(b) Gynecology (including some

abdominal surgery) . 105

Colleges may reduce the number of hours in any subject not more than 20 per cent, provided that the total number of hours in a division is not reduced. Where the teaching conditions in a college are best subserved, the subject may be, for teaching purposes, transferred from one division to another. When didactic and labora¬ tory hours are specified in any subject, labora¬ tory hours may be substituted for didactic hours.

Note. — At the 1916 meeting the Committee on Educa¬ tion and Pedagogics was instructed to revise this curriculum to meet the present requirements.

Women in Medicine.— During the year 1918 there were 581 women studying medicine, or 29 less than last year, but 15 more than in 1916. The percentage of women to all medical students is 4.3, a percentage approximating those of previous years. This is true also in regard to women graduates. There were 106 women graduates in 1918, 47 less than in 1917 and 28 less than in 1916. Of all the women matriculants, a smaller percentage were in at¬ tendance at the two medical colleges for women, while 511 (87.9 per cent) were matricu¬ lated in the sixty coeducational colleges. From the two women's colleges there were 12 gradu¬ ates while 94 secured their degrees from co¬ educational colleges. This increase of women students in coeducational colleges is not sur¬ prising, since in recent years some of the lar¬ gest and oldest medical schools, as Columbia, Tulane, the University of Pennsylvania and Harvard (and McGill University in Canada), have thrown open their doors to women,® (Journal American Medical Association, Vol. 7, No. 7, 17 Aug. 1918).

but they seldom have any knowledge worth while concerning educational theory. An as¬ sistant or teaching fellow in almost any univer¬ sity department of education would be of more use in a really conscientious medical school than the wealthiest and most dignified of these committees.

The principles of pedagogic fatigue, of over¬ work, and of under-recreation are ignored in most medical schools, with a consequent great waste of mental energy. As has already been hinted, the medical student needs normal recre¬ ation as much as any other student, if not more. A course in the economics of learning should be given in the first semester of every medical freshman year.

This suggests medical psychology in general. The everyday psychology of the emotions, for example, especially in relation to the functions of the body and its growth, should be studied and even understood by every medical man while yet a student. The present writer hap¬ pens to be one of the early ones to say this, namely in Science in July 1901.

Medical psy-

Women in Medicine.

YEAR

Total women students

Percentage of all stu¬ dents, both sexes

Total women gradu ates

Percentage of gradu¬ ates, both sexes

Women’s colleges

Students

Percentage of all

women students

Graduates

Percentage of all

women graduates

Co-ed. schools

| Students

Percentage of all

women students

j Graduates

Percentage of all

women graduates

1904 .

1,129

4.3

244

4.0

3

183

16.2

56

23.0

97

946

83.8

198

77.0

1905 .

1,073

4.1

219

4.0

3

221

20.6

54

24.5

96

852

79.4

165

75.5

1906 .

895

3.5

233

4.3

3

189

21.0

33

14. 1

90

706

79.0

200

85.9

1907 .

928

3.8

211

4.2

3

210

22.6

39

18.5

86

718

77.4

172

81.5

1908 .

835

3.7

185

3.9

3

186

22.3

46

24.9

88

649

77.7

139

75.1

1909 .

921

4.2

162

3.7

3

169

18.4

33

20.3

91

752

81.6

129

79.7

1910 .

907

4.2

157

3.5

3

155

17.1

41

26.1

82

752

82.9

116

73.9

1911 .

680

3.4

159

3.7

2

134

19.7

36

22.6

74

546

80.3

123

77.4

1912 .

679

3.2

142

3.2

2

143

21.1

32

22.5

64

536

78.9

110

77.5

1913 .

640

3.8

154

3.8

2

138

21.6

33

21.4

55

502

78.6

121

78.6

1914 .

631

3.8

121

3.4

2

135

21.4

25

20.7

54

496

78.6

96

79.3

1915 .

592

4.0

130

3.7

2

116

19.6

38

29.2

53

462

80.4

92

70.8

1916 .

566

4.0

134

3.8

2

102

18.0

28

20.0

51

464

82.0

106

80.0

1917 .

610

4.5

153

4.5

2

81

13.3

29

18.9

56

529

86.7

124

81.1

1918 .

581

4.3

106

4.0

2

70

12.0

12

11.3

60

511

87.9

94

88.7

It is distinctly disclaimed that in the fol¬ lowing remarks there is any intention of find¬ ing ® fault® with the present and bettering methods of medical education. This mode of discussion is the most convenient one, that is all, for pointing out the present pedagogic status of ((studyin' to be a doctor.® It would be invidious to find fault with so good a sys¬ tem without offering something to replace it; ideally to destroy without immediately after¬ ward reconstructing the plan in a better form; and it may frankly be said that no such recon¬ struction is contemplated in this little article, or even hinted at.

Many medical schools need, and as much as anything else at all, except it be finances, an adequate survey by some wise and practical professional educator — one who would point out, for example, some of the inconsistencies and the lack of co-ordination between the dif¬ ferent courses. ˆVisiting® committees fre¬ quently try to demonstrate to chance readers of their reports their own personal importance.

chology was offered year after year, the Tufts College 1901-62 catalogue-announcement of this pioneer course being as follows : <(Normal

medical psychology — An optional course in normal medical psychology will be given to the fourth-year class in weekly lectures during the first half-year. Its aim is to discuss in their more general relations certain topics of great practical importance to the medical practi¬ tioner: such topics for example as suggesta-bility and hypnosis, temperament, mood, the numerous habits, sexual mental differences, will-power, the emotions, pain and pleasure. Knowledge of subjects such as these prepares the student better to understand his patient as an individual and so better to treat his disease. But, in addition to this, the chief value perhaps of such information, the lectures will afford a brief basis of general psychology, which will tend to make the mental phenomena of the dis¬ eases of the mind and nervous system more easily understood® (Professor Dearborn).

In nearly a score of years the curiously in-

herent materialism of the medical schools has begun to soften, without a doubt, and to-day some of the very best medical colleges realize practically that education, any kind of educa¬ tion, that has ignored the study of mind and motive and behavior is incomplete and false in quite the most fundamental kind of way. This common lack of adequate psychology, however, seems still to be the chief pedagogical defect of medical education — man is both mind and body.

Whatever just criticism may be made of American medical education, it still remains the best in the world, its monetary wealth having put it practically ahead even of the famous old schools of England.

George Van Ness Dearborn, M.D., Medical Corps, United States Army.

MEDICAL SCIENCE AND THE WORLD WAR. Army medical departments everywhere had, before the war, prepared for the treatment of surgically clean wounds made by modern firearms in distance engagements. The soldiers <(First Aid® kit, with its sterilized dressings sealed from contamination, was ex¬ pected to maintain this freedom of wounds from infection almost without

exception. Aseptic wounds assure prompt and uncompli¬ cated recovery. Serious injuries of important organs would still often be fatal, but all others, as a rule, would be followed by convalescence without delay or complication. These anticipa¬ tions were sadly disappointed by the immediate recourse to trench warfare as almost the sole mode of conflict. In trenches recently dug in fields which had been under cultivation for hun¬ dreds of years, bacteria abounded and infec¬ tions inevitably occurred. Two extremely fatal forms of infection, tetanus and gas gangrene, raged among the troops. Both of these were often fatal and the gas bacillus caused long illness and often extensive mutilation, even when recovery took place. Tetanus, after the early sad war experience, was prevented by injections of antitetanus serum as soon as the wounded came under observation, the injections being repeated at regular intervals if convales¬ cence from the wound was prolonged, for it was found that delayed infections occurred. The gas bacillus proved a much more difficult problem because of the utter unfamiliaritv with it at first. It vcas unknown in Great Britain before the war, was not seen during our Civil War, and is very rare in civil life. Some 70 per cent of the wounds received in the trenches during the first year of the war were infected by it. It was never noted in wounds of the face or neck where the blood supply is abund¬ ant and the tissues well oxygenated, for the bacillus of it, discovered by Welch at Johns Hopkins, like the tetanus bacillus, is anerobic, that is, grows best out of the presence of the air. The successful methods of treatment in¬ cluded thorough opening up of wounds, the use of hydrogen peroxide, so as to provide addi¬ tional oxygen for the tissues, and after careful investigation, the use of serums for curative and prophylactic purposes, elaborated by vari¬ ous agencies.

The large number of badly infected wounds to come under treatment proved very discour¬ aging to the surgeons at first and iodine was found so valuable that it was used in large

quantities until it was suggested that this would be known in medical history as <(the Iodine War.® The noteworthy difference be¬ tween the healing of the wounds of soldiers and sailors led to an important development in the treatment of large shell wounds and penetrat¬ ing wounds of various kinds in which foreign particles were carried deeply into the tissues. Soldiers thus wounded in the trenches suffered almost invariably from septic developments, often fatal and always with a protracted con¬ valescence. Months after a bad shell wound, a soldier, if he recovered, would only be past the border line of danger,

while sailors with similar wounds would usually be entirely well at the end of a month. The sailors had often been subjected to exposure to cold sea water, sometimes for an hour or more after the re¬ ception of their wounds. The influence of salt water as an application to the surfaces of large wounds was studied and it was found that when of about the specific gravity of sea water, it caused a pouring out of serum and a conse¬ quent cleansing of the wound by the discharges. Besides, the blood serum was dictinctly bac¬ tericidal and the outward current set up car¬ ried off septic materials which would have been serious if allowed to remain. Mainly through the observations of Sir Almroth Wright, salt water was used extensively as a dressing for wounds, with some excellent results, and the principle is evidently to be of service after the war.

The important development in the treatment of wounds came when Dr. Alexis Carrel of the Rockefeller Institute was put in charge of a French hospital in Compiegne during the sec¬ ond year of the war. He set about the prac¬ tical application of Lister's principles. Ordi¬ nary surgical antiseptics were too poisonous to be used for the flushing out of large wounds. A solution of hypochlorites proved to be bac¬ tericidal, yet non-toxic and non-corrosive to tissues. After experiment, Dakin's fluid, so called from the inventor of it who had been the director of the Herter Chemical Institute, New York, was found -the most efficient solution of the hypochlorites. The important part of this treatment was the bacteriological control. After removal of all foreign particles and all injured tissues, wounds were thoroughly flushed with Dakin's fluid many times a day, until it was found by careful microscopic examination that the secretions contained very few bacteria and none to be feared. The wound was then closed up and permitted to heal without further interference. The results were excellent. Healing took place rapidly as a rule, convales¬ cence was brief and absorption of septic mate¬ rial so as to produce constitutional disturbance rare and without danger. The after result was better than that produced by any other method and the hospitals where it was employed took on a new aspect from that which had been seen in the war hospitals before.

The most important development of the sur¬ gical treatment of war wounds has been what is called by the French debridement, that is the thorough excision of all injured portions of tissue. The extent to which this clearing out of the wound was carried in war practice would have seemed utterly unjustified in civil surgery before the war. Where a penetrating bullet wound shows signs of infection, a cylindrical

portion of the tissue around it is removed. In larger shell wounds, a layer of injured tissue is, as far as possible, removed from every portion of the wound so as to present perfectly fresh vital surfaces for healing purposes. Large amounts of tissue are thus often removed, for experience has shown that it is in the end ever so much better for the patient. Any injured cells allowed to remain are of low resistive vi¬ tality, have a tendency to die and then break down into material which forms an excellent culture medium for microbes. Where drainage is instituted, most of this will come away, but that is a much slower process and much more exhausting to the patient, and lowers the heal¬ ing qualities of the part. It has been found by actual bacteriological observations that while very few bacteria are present shortly after the wound is infected, these multiply rapidly in the brood chamber created for them in the tissues, on the good medium for growth, while the healthy cells are handicapped by the presence of injured cells in their struggle against bacteria.

The war's experience with head injuries developed a mode of treatment quite different from that in common use before. The surprise for military surgeons was the wonderful tol¬ erance of the brain to injuries. It was not an unusual thing to have wounded soldiers come into dressing stations as ((walking cases/' who were suffering from fracture of the skull, even complicated by other injuries. The best surgery for these cases proved the greatest possible limitation of intervention. Depressed bone fractures must, of course, be lifted, but missiles should not be searched for. There is least danger for the patient when the missile is left in situ , unless symptoms directly trace¬ able to its presence develop. As a rule, anti¬ septic rather than aseptic precautions are most valuable in saving lives in these cases. The experience of four years seems to indicate that the after effects of the retention of foreign bodies within the skull does not justify manipu¬ lations in reaching them.

The use of poison gas gave rise to the most unsatisfactory medical feature of the war. In spite of the German signature to The Hague Convention article condemning the use of gas, the Germans proceeded to employ this mode of attack and found the Allies and the medical

departments unprepared for it. At first heavy gases containing mainly bromine were used, favoring winds carrying them. Later gas hand grenades were employed. These gases had an intensely irritant effect and produced suffoca¬ tion or were followed by severe purulent bron¬ chitis. Pulmonary edema often proved fatal. Gas masks overcame this mode of attack. Then long range gas shells were employed, sometimes with delayed action, so as to lull against precautions. At times, shells containing ˆsneezing® or <(vomiting® gases were used for the displacement of masks. In the last phase of the war, ((mustard gas,® said to be chemi¬ cally dichlorethylsulphide, was employed. It was persistent and would hang about for hours and make dugouts perilous for days. It burned the skin, and clothes moistened with it produced escharotic effects. Many of the most important German advances were made by means of these gases as a preliminary. The

Allies learned to neutralize and reply effectively to all of them.

When the gas was not concentrated enough to produce suffocation or set up fatal pulmo¬ nary edema, the men usually recovered, though many of them went through a period of awful discomfort which was, of course, the reason why the use of gas was forbidden at The Hague. Comparatively few of these who sur¬ vived presented serious lung lesions, though they had to be treated by the open air method, as for tuberculosis, as much as possible. We have learned from tuberculosis how tolerant the lungs are of even severe pathological con¬ ditions and how readily, after a time, compen¬ sation is secured. The question whether gas-ing predisposes to tuberculosis has been settled in the negative, though undoubtedly in certain cases latent foci of tuberculosis were made ac¬ tive by the process.

Comparative mortalities from wounds and disease in modern war show what a great gain was made by surgery and sanitary science in the war. In the Russian campaign against Tur¬ key in 1828, some 80,000 died of disease and about 20,000 of wounds. In General Scott's campaign in Mexico the deaths from disease were over 33 per cent of the effective strength. In the Crimean War, out of a total force of 300,900, the French lost by disease 75,000 and by wounds 20,000. In the Prussian war against Austria, of but seven week's duration, the losses by disease were 6,427 and by wounds 4,450 in an army of 437,000. In the Spanish-American War 2,565 deaths were from disease and 345 deaths from wounds, in an army of 274,- 717. In the South African War the deaths from disease were 69 per thousand

strength; from wounds, 42 per thousand. In the Russo-Japanese War the deaths from disease were

41.8 per thousand strength and from wounds

72.9 per thousand strength, the ratio for the first time reversed. Out of 300,000 dead in the Civil War, in the armies of the North over 200,000 were from disease. In the Confederate armies, of 200,000 deaths, three-fourths were estimated as due to disease and one-fourth to the casual¬ ties. (Figures furnished by the United States Surgeon-General's Office).

According to the (Medical and Surgical His¬ tory of the Rebellion) (Medical volume, part 1, pages xxv and xxvi), there were in the Northern armies altogether 235,583 gunshot wounds with a resulting mortality of 33,653 or 14.2 per cent. These figures represent the total returns from about nine-tenths of the mean strength of the Union army and exclusive of the injuries of those killed in action. In the late war, so far as the figures are available from the beginning, the deaths from wounds, that is of all those who came to the surgeons alive, no matter how badly wounded, have been calculated to be less than 5 per cent. This is, of course, merely an approximation but made on reasonable grounds. Exact figures will not be available probably for some time. The seri¬ ous infections with tetanus and the gas bacillus at the beginning of the war make the available statistics much worse than would otherwise be the case. With the control of these the mor¬ tality among the wounded in the closing phase of the war was probably below 3 per cent.

The health of army camps at the beginning of the war was most satisfactory. As Doc-

tors Vaughan and Palmer said in their article on ((Communicable Diseases in the National Guard and National Army of the United Slates® (Journal of Laboratory and Clinical Medicine, August 1918), <(Preventive medicine has made it possible to prevent half a million

cases of disease and save the lives of ten thou¬ sand soldiers,® and they give the figures from the Civil War and the recent war for corre¬ sponding six months to show the truth of this. The improvement has affected every form of infectious disease. There has been only about one-tenth as much mouth and throat inflamma¬ tion, less than one twenty-fifth as much intes¬ tinal trouble, not one-hundredth as much fever. Malaria, which even in the Northern army was extremely common, has now become a negligible morbidity factor and the mortality from tuber¬ culosis and pneumonia is more than cut in two.

The sad epidemic of influenza proved that it was not the general hygienic conditions that brought improvement but the specific sanitary precautions against particular diseases. Un¬ prepared for influenza in this virulent form, it raged very seriously, while the well-known camp diseases were kept entirely under control.

Typhoid or enteric fever which has played such a fatal part in all previous wars, carrying off in the Spanish-American War more than five times as many as the bullets of the enemy and in the Boer War causing ever so much more havoc among the British than the Boers did, had almost no place in the late war. The reason was better sanitation and careful pro¬ vision of uncontaminated water with the guard¬ ing of latrines from flies and other insects that might find their way afterward to food, but above all, the typhoid immunity of the armies was due to typhoid vaccination, that is the inoculation of the soldiers with cultures of typhoid germs prepared under conditions that produced immunizing results. There is no doubt at all that this is the genuine source of the great saving of life that was effected. The inoculations cause almost no disturbance of the general health, — soldiers have gone into battle the same day, — ‘and only rarely have any serious effect. It is evident that in civil life travelers in distant countries or to parts of the country of whose sanitation they are not sure, will take such vaccinations against typhoid as a protective.

Trench fever was an affection peculiar to the great war and replacing typhoid fever some¬ what in its ravages among the soldiers. The men came down rather suddenly with a con¬ siderable degree of temperature lasting for from three to seven days, gradually disappearing and causing a great deal of prostration. After some days of normal or subnormal temper¬ ature, the fever occurs again and the relapsing character of the affection has been quite marked. Careful investigation has shown that the disease was distributed through the body lice which proved such a pest to the soldiers under the very difficult conditions as regards cleanli¬ ness to which they were subjected. The discovery made possible the prevention of the spread of

the disease to a great extent, while the segregation of the relapsing and chronic cases in camps by themselves under favorable conditions of health brought x about such a reaction as enabled the patients to throw off the disease. The study of trench fever, its

etiology and its successful treatment as wcl1 as prevention, was one of the triumphs of the war.

The great medical surprise of the war was the development of a large number of cases of a very severe form of functional nervous dis¬ ease. Men lost control of themselves com¬ pletely, very often had disturbances of the special senses, — deafness was rather common, blindness not so frequent, — and sensory dis¬ turbances of other kinds, with mutism and tre¬ mor or paralyses of various kinds, were noted. At first a great many of the cases were set down as forms of insanity and the patients were sent to insane asylums, but after careful study the purely neurotic character of the af¬ fection was determined. The cases were called ((shell shock® and unfortunately, early in the war were grouped under this term, besides the neurotic cases, a number of latent injuries to the central nervous system, as from actual wounds by minute particles of shells at high velocity, severe concussions and the like. It was thought for a time that the intense com¬ pression of the air with immediate release near an exploding shell caused air at high pressure to be given off from the blood, leading to rup¬ ture of capillary arteries of the central system or other definite physical lesions resembling those of caisson disease. The prompt and complete recovery of many serious cases under proper treatment contradicted this theory and made it clear that there .must be no organic basis. The term shell shock was suggestive of something much more than a psycho-neurosis, which the affection really was, and the term nervousness, the word sick or wounded in pa¬ rentheses being added to the diagnosis <(according to the external conditions to which the man was exposed at the time of breakdown,® was suggested for it. This would have been a much better term but the original name maintained itself, as so often happens. The condition was entirely due to an emotional storm with loss of control over nerves, and nothing else. Its im¬ portance will be readily appreciated from the fact that during the first half of the war, one-seventh of all the discharges from the British army, or one-third of the discharges if those from wounds were not included, were for (<shell shock.® It was four times as prevalent among officers as among men. Cowardice was excluded as the basis and there was no malin¬ gering, except in cases readily recognizable. The study of the affection has thrown great

light on the psychoneuroses of civil life and above all has been valuable in the matter of treatment.

These patients need special treatment in spe¬ cial hospitals. In ordinary military hospitals, surrounded by sufferers from actual physical conditions, they are the subject of unfavorable suggestion and little incentive to get well. They must not be kept under circumstances, either at home or in hospital, where much sym¬ pathy is afforded them and their stories must not be listened to sympathetically, for they have the tendency of all neurotics to assimilate as their own, experiences gleaned from various sources. The first requisite of successful treat¬ ment is a careful examination which determines absolutely that no organic morbid condition is present. Then the patient must be given the feeling that his case is of no special signifi-

cance, but, on the contrary, is well understood and above all, has nothing exceptional in it. He must be made to understand that just as soon as the attending physician has the time to give to him, he will be able to remove his symp¬ toms without delay. Three principles are in¬ sisted on in the methods of treatment. (1) suggestion, (2) re-education, (3) discipline. The aim of suggestion is to make the patient believe firmly that he will be cured and then after treatment that he is cured to stay so. Re¬ education overcomes the bad habit of lack of confidence that has been formed and discipline breaks down the psychic-resistance of the pa¬ tient to the idea of recovery. For such symp¬ toms as mutism or deafness, the patient is told that electricity will cure him and that as soon as he feels the current when the electrode is applied, his power of speech or hearing will be restored pari passu, with sensation. The same method is used for blindness and other sensory symptoms. Paralyses are favorably affected the same way, though tremors are harder to deal with. A cure in a single treatment is the best method, for the patient readily relapses un¬ less he has been made to feel that he has re¬ covered his powers completely and that it would be his own fault to permit his symptoms to recur. The cases partake of the nature of hysteria, though typical hysterical symptoms, crying, the making of curious noises, hysterical convulsions, are rarely seen at the front. The experience has made it clear that rest is nearly always an abuse in the treatment of such cases and inveterates the symptoms. The physical condition must be improved but the state of mind must be changed completely at once, if cure is to be effected.

A very interesting development of the treat¬ ment of these affections among the French, who had large experience, requiring over 20,000 places in their hospitals for the cases, was with regard to the value of severe discipline. In re¬ fractory cases, patients were put in solitary confinement without reading or writing mate¬ rials or tobacco. This changed the mental atti¬ tude and helped to make counter-suggestion ef¬ fective. In certain cases, strong Faradic cur¬ rents were used which caused severe pain, so that patients who were mute had to scream out and those who could not use muscles were com¬ pelled to

move them. Once it became known that treatment of this kind was being used, symptoms were much less persistent. The rea¬ son why the neuroses in officers were more dif¬ ficult of treatment was that these measures were seldom employed on them. It became clear that the infliction of pain on a neurotic patient up to the point where he yields up his pathological suggestion is effective therapeu¬ tics. Some older severe methods of dealing with these cases which were condemned in our milder day are now justified by war discipline.

The surgical feature for which the late war was noted is the definite reconstruction work for the wounded which was organized for the first time in history. Not only artificial limbs and helpful apparatus of various kinds were pro¬ vided, but the crippled were trained to do the work they are particularly suited for in their maimed condition. It was found that some 95 per cent of those who lost an arm or hand could go back to their old occupations, while a very large proportion of those who lost a leg could

be trained to bench trades or given clerical or similar occupations which made them thoroughly independent of assistance. Even with the loss of both legs, a man can be self-supporting. In¬ deed, the care exercised in training the crippled resulted in a great many cases in giving them a better occupation in life than they had before. The temper of this aid has been such as to give men a hearty spirit of courage in facing life, so that they do not feel their handicap as an incubus, but on the contrary, are ready to do their bit in civil life as well as they did in war. The idea that they are crippled is not allowed to overcome them and the old cus¬ tom of having begging cripples after the war is not to be allowed. Even the blind and the deaf are made self-supporting and at the same time given such occupation of mind as keeps them from being depressed. The effect of example on the part of some of the more cour¬ ageous proved a wonderful stimulus, so that though the war left many maimed men, it did not tend to create many helpless and the spirit of helpfulness does not provide useless sympathy and paralyzing charity, but just such encourage¬ ment as enables the men to help themselves.

■Chronic affections of various kinds which developed as a consequence of the war were treated by the same farseeing after-treatment that was given to the maimed. In a word, the soldier taken in health was either dismissed, after thorough examination, in as good health as before,— or usually much better, — or else he was given the advantage of scientific thoughtfulness and prevision in regard to his

case, so as to restore him just as far as possible to his former lsefulness as a member of the community. In the years following the war these phases of rehabili¬ tation received the closest attention from medi* cal authorities in the former belligerent count~ie!.

Bibliography. — <The Military Manuals5

(London 1917) ; Bailey, Pearce, (War Neuro¬ ses5 (Journal American Medical Association, 28 Dec. 1918) ; Carrel-Dehelly, (The Treatment of Infected Wounds5 (London 1917) ; Fox, (Physical Remedies for Disabled Soldiers5 (London 1917) ; Hutchinson, Woods, (The Doctor in the War5 (New York 1918) ; Hutt, (Future of the Disabled Soldier5 (New York

1917) ; Moor, (Field Sanitation5 (London

1918) ; Salmon, (Care and Treatment of Men¬ tal Diseases and War Neuroses in the British Army5 (New York 1917; National Committee for Mental Hygiene) ; Smith and Pear, (Shell Shock and Its Lessons5 (New York 1917) ; Yealland, (Hysterical Disorders of Warfare5 (London 1918).

James J. Walsh, M.D., Author of (The Thirteenth Greatest of Centu¬ ries.'*

MEDICI, med'e-che or ma'de-che, a Flor¬ entine family who rose to wealth through com¬ merce, became prominent in the affairs of the state, gained supreme power and were in gen¬ eral known as patrons of literature and art. Giovanni (1360-1429) rendered important serv¬ ice to Florence and became gonfalonier in 1421. His son, Cosmo, jhe Elder (1389-1464), was called J(Pater Patriae,55 gained vast wealth, was a munificent patron of art and letters and com¬ bined statecraft with commercial enterprise. He was for 34 years the sole arbitrator of the republic and the adviser of the sovereign houses

of Italy. His grandson, Lorenzo the Mag¬ nificent (1449-92) governed

the state in con¬ junction with his brother Giuliano (1453-78) till the latter was assassinated by the Pazzi, a rival Florentine family. Escaping from this massacre he conducted a war with Ferdinand of Naples, with whom he signed a definitive peace in 1480. The rest of Lorenzo's reign was passed in peace and in those acts of profuse liberality and magnificent patronage of arts and sciences, in which he rivaled or excelled his grandfather. He left three sons — Pietro (1471-1503), Gio¬ vanni (afterward Pope Leo X), and Giu¬ liano, Duke of Nemours. Pietro succeeded his father, but was deprived of his estates when the French invaded Italy in 1494. He finished his career in the service of France. His eldest son Lorenzo came to power by the abdication of his uncle Giuliano, who became Duke of Urbino. He died in 1519, leaving a daughter, the famous Catharine de' Medici (q.v.), queen of France. After several reverses in the family, Alessandro, an illegitimate son of the last-named Lorenzo, was restored to Florence by the troops of Charles V, and by an imperial decree was declared head of the repub¬ lic, and afterward Duke of Florence. _ The next name of importance in the family is that of Cosmo <(the Great® (1519-74), in 1537 pro¬ claimed Duke of Florence and afterward Grand Duke of Tuscany. A learned man him¬ self, he was a great patron of learning and art, a collector of paintings and antiquities. Fran¬ cisco Maria I, his son, obtained from the Em¬ peror Maximilian II, whose daughter Joanna he had married, the confirmation of his title of grand duke in 1575, which continued in his family until it became extinct in 1737 on the death of Giovanni Gasto, who was succeeded by Francis, Duke of Lorraine. Marie de Medicis (q.v.) (1573-1642), queen of France, was daughter of Francisco I. See Florence; Italy — History; Leo X, and consult Arm¬ strong, Edward, (Lorenzo de' Medici5 (London

1896) ; (Cambridge Modern History) (Vols. I and II, New York 1903-04) ; Fabroni, Angelo, (Magni Cosmi Medicei Vita5 (Pisa 1789)_; Heyck, Eduard, (Die Mediceer> (Bielefeld

1897) ; Hyett, F. A., <Florence) (London 1903) ; Horsburgh, E. L. S., (Lorenzo the Magnificent5 (London 1908) ; Meltzing, Otto, (Das Bank-haus der Medici und seine Vorlaufer5 (Jena 1906) ; Roscoe, W., (Life of Leo X5 (5th ed., London 1846) ; id., (Life of Lorenzo de' Medici5 (10th ed., 1872) ; Ross, Janet, (Lives of the Early Medici5 (London 1910) ; Vaughan, H. M., (Medici Popes, Leo X and Clement VII5 (New York 1908).

MEDICI, Banks of the.. The opulent house of Medici owed its origin, like that of the scarcely less wealthy house of Fuggers (q.v.), to the profits of the woolens trade, the progenitors of both houses having

been weavers and dyers of woolen cloths, in their time the principal constituent of European garments; the cultivation of cotton and manufacture of cotton cloths being as yet monopolized by the Saracens. Schoenhof informs us that in 1422 Florence (under the Medici) had more than 70 banks, which by the year 1472 were merged or consolidated into 33. So important were these institutions to the Florentine republic, that they earned the sobriquet of the (<Fifth Es¬

tate.® The Medici had 16 banking houses in different European cities. (Journal American Bankers Association , September 1916). In the 15th century one of the Medicis was appointed treasurer to the Papal See ; in the 16th century one of the Fuggers held the same high office. It is an interesting circumstance that the former became a Platonist, while the latter joined the Reformation. Lorenzo de Medici's appoint¬ ment as treasurer was made by Sixtus IV in 1471; Huldric Fugger's, by Paul III about 1549. Both of these popes afterward assailed their appointees; but the banks they controlled and the important trades they financed rendered them too powerful to be easily overthrown. The Medicean banks received deposits of money for safekeeping, loaned the same out upon col¬ lateral, discounted commercial paper, issued bills of exchange, and traded in foreign coins and bullion. They possessed mints in Florence, Urbino, Barile, Pezza and other places, in which they struck their own coins, the series beginning in 1204, upon the fall of the Greek Empire, the dates in the old calendar being 10 years earlier. These coinages enabled the Medicean banks to make highly profitable ex¬ changes of old coins and bullion at the various emporia in Europe and Asia which were brought within the circle of their commercial influence. Their earliest gold coin (the Florin) wras struck in 1252, the series being issued by the gonfal-ionere (Standard-bearers) of the Republic of Florence until 1533, when they were struck by the Medici as dukes of Florence, afterward as dukes of Etruria. Maintained at their full legal weight (56 English grains, fine gold) the florins continued to be current in all the ports of Europe for centuries, their onlv rivals be¬ ing the sequins or ducats of Venice. For the history of other ancient banks. See Barcelona, Bank of; Byzantium, Bank of; Fuggers, Bank of the; Genoa, Bank of; Tyre, Bank of; Venice, Bank of.

MEDICINE, American Academy of. See

American Academy of Medicine.

MEDICINE, Eclectic, embodies the prin¬ ciples and practice of the onlv established American school of medicine. The term Eclectic was not the most fortunate, for at no> time has it adequately defined the school's posi¬ tion. When chosen, the term was very popular and was borne by several education systems and books, and was moreover well known to the laity. The name American School of Medi¬ cine, as proposed by Dr. A. H. Baldridge, one of its pioneers, would have been more express¬ ive, would have avoided misunderstandings and would have saved the school much criticism regarding its position among the existing sys¬ tems of medicine. Eclecticism is the direct successor of the American Reformed System of Medicine originated by Dr. Wooster Beach of New York City in 1825. It should not be con¬ founded with Thomsonism (Thomsonianism) , or the doctrines of the steam and herb doctors, promulgated and practised in the early part of the 19th century bv Samuel Thomson of New Hampshire, the peculiar theories of which the Eclectic school never adopted; the majority of the followers of Thomson being among their most bitter antagonists. In later years, how¬ ever, many of the Thomsonians joined the Eclectic school and creditably assisted in up-MEDICINE, ECLECTIC

building it. The most successful organizer of the Eclectic school was Dr. Thomas Vaughan Morrow of Kentucky. The investigations in medical botany and materia medica by Schoepf, Benjamin Smith Barton, W. C. P. Barton, Constantine Rafinesque, William Tully and others gave an impetus to the movement which resulted in the establishment of the new school. The Reformed School of Medicine, by which name what was later denominated Eclecticism was first known, was organized in opposition to the drastic practice of the dominant school of medicine, — bleeding, blistering, and the abuse of the salts of mercury and antimony, — against which Eclectics, as well as the followers of Thomson and Hahnemann, protested. Instead of these barbarous remedies the reformer sought to substitute milder measures and to employ vegetable medicines whenever possible. Yet, in the light of the present the substituted practice of the early reformers would be re¬ garded as but little less barbaric than that which they sought to supplant. The basis of Eclectic philosophy was the sustenance of the vital forces, the avoidance of depleting remedies, and the selection, as with the ancient Eclectics, of the best of remedies and means _ from all sources, even despising not the primitive medi¬

cines of the untutored American Indians. They did not rest contented, however, with merely ˆselecting the best® ; they endeavored to im¬ prove on such selections. To the reformer the practice of the dominant school was cruel and inhuman, the remedies barbaric. Out of the common stock of remedies he chose those best suited to his purpose in what he believed to be a more humane practice. He looked for¬ ward to certain ideals and objects not in accord with the views and practice of the dominant school. For his presumption in thus opposing the authorities in medicine and by inaugurating unwelcome innovations he was branded an irregular; was ostracised by the self-styled regular physicians. An outcast, he was thus forced to organize a school in accord with his theories and practice.

There are three epochs in the history of Ec¬ lectic medicine, — the period of reformed medi¬ cine, from 1825 to 1845; the formative period, from 1845 to 1869, which was largely concerned in organization, and study of plant remedies; and the period of specific medication, from 1869 to the present, in which the best work of the school has been accomplished, and during which the theory of specific medication was promulgated and has been most largely prac¬ tised.

The educational history of Eclecticism dates from 1825, when Dr. Beach privately instructed students at his clinic in New York, where, in 1827, he established an Infirmary, which in 1829, he expanded into the Reformed Medical Academy. In 1830 it assumed the more digni¬ fied title of the Reformed Medical College of the City of New York. It was well equipped and continued in operation until about 1838. Textbooks of a high order were prepared by Dr. Beach. A national society was formed and from this body an expansion movement was begun by the selection, in 1830, of Dr. John J. Steele as an agent to proceed westward, and explore the towns on the Ohio River with a view to selecting an eligible site for a branch of the New York College, A circular of the

society having reached Worthington, Ohio, Col. James Kilbourne, president of Worthington College, invited the promoters to establish their school in that town. Dr. Steele accepted and Drs. Thomas Vaughan Morrow and Ichabod Gibson Jones were sent to perfect the organiza¬ tion. The Reformed Medical Department of Worthington College, as this school was called, entered upon a successful career in 1830, with Dr. Morrow as the leading spirit, but lack of proper facilities, the machinations of enemies, internal dissensions, and the financial crisis of 1837 caused it to be suspended in 1842. Dr. Morrow

next removed to Cincinnati, Ohio, and assisted by Drs. Lorenzo Elbridge Jones and Alexander Holmes Baldridge, at once organized the Reformed Medical School of Cincinnati. In 1845 this college was chartered by the State of Ohio as the Eclectic Medical Institute. From this time the term Eclectic has been employed to designate the system and its physicians.

The formative period of Eclecticism began with the chartering of the Eclectic Medical In¬ stitute in 1845 and ended with the introduction of specific medication in 1869. During this period large classes .attended the Institute. The Western Medical Reformer, begun in Worth¬ ington in 1836 and suspended in 1838, was now revived and published as the Eclectic Medical Journal .. Barring a brief half year suspension this periodical has continued to be published to the present time. In this period, Dr. John King, justly styled the father of modern materia med¬ ica, began the publication of his numerous text¬ books, among which the (American Dispensatory) gave the school an enduring and monu¬ mental work on materia medica. The pharmacy of the school advanced from crude drugs in powder, infusion and decoction past the resinoid and alkaloid distraction to improved galenicals. In this connection be it recorded that Professor King discovered and introduced the resins of podophyllum and macrotys, which together with the alkaloids of hydrastis and sanguinaria, were afterward prepared by Dr. William Stanley Merrell. These valuable agents together with the oleoresins of iris and capsicum attracted the attention of pharmacists. A host of indefinite compounds was added by others and the market was flooded with what purported to be Eclectic resinoids or concentrations. This heterogeneous class of pharmacals was denounced by Professor King and others who had sought to introduce only elegant and definite compounds. This much abused class of resinoids served, however, a temporarily useful purpose in the evolution of a more perfect materia medica. Of these prepa¬ rations, only those made after the methods of Dr. King, and the alkaloids of hydrastis and sanguinaria have survived and singularly are now mostly employed by practitioners of the dominant school. During this period Eclectic colleges were established at Rochester and Syra¬ cuse, Louisville, Philadelphia, New York and Cincinnati. The majority of these were short lived and some of them had a strong lean¬ ing toward the system of botanic medicine now represented by the physiomedicalist. The Eclectic Medical College of Pennsylvania for many years in good repute, finally drifted away and during the later years (since 1871) was neither recognized by Eclecticism nor others. In 1856, a portion of the faculty of the Eclectic Medical Institute formed a rival college in Cin-570

cinnati which had a large following. This school was absorbed by the Institute in 1859. The Civil War seriously threatened the educa¬ tional progress of the cause and the withdrawal of a large quota of Southern students caused a marked shrinkage in the attendance at the Northern schools. Times were hard and the outlook gloomy. Dr. John Milton Scudder, a graduate of the Eclectic Medical Institute in 1856, now became the head of that institution. By strict business management he inaugurated a period of renaissance and Eclecticism soon be¬ came a recognized force in medicine in America. Specific medication, introduced by Dr. John M. Scudder in 1869, though at first vigorously opposed, is at present the basis of practice of fully three-fourths of the Eclectic physicians and is the leading therapeutic doc¬ trine taught in all the Eclectic colleges. In fact modern Eclecticism is the practice of specific medication. Its theory is as follows: — -Disease is a wrong or impairment of life. It is mani¬ fested clinically by certain well-defined symp¬ toms. The totality of symptoms express a condition, to which, in the usual nosological classification, a special name is given. This disease name is of value only in the study of the natural history of diseases, . for statistical data, for the purpose of recognizing contagious and infectious diseases, and for establishing a prognosis, certain necessarily fatal diseases al¬ lowing only of palliative treatment. The specific medicationist, like practitioners of other schools, pursues such a method of nosological diagnosis for the purposes named, but not as a guide to treatment, in which to him it is of little or no value. For therapeutic purposes he reverses this process and studies his case by analysis, not by synthesis, to discover, if possible, the varying conditions which make up the disease, as evidenced by specific and well-defined symp¬ toms revealing disease expressions. Remedies have a certain force, and are definite in action. Like effects follow like causes. Hence, having found, by repeated experimentation, the oppos¬ ing action of a drug in a certain condition of disease, as expressed by certain specific symp¬ toms, objective or subjective, the same remedy will always relieve or cure like abnormal condi¬ tions. The believer in specific medication holds that there is a fixed relationship between drug force and disease expression.

The Eclectic has no specifics for diseases but specific remedies for specific, conditions of such diseases. Specific diagnosis implies

diagnosis to discover the condition curable bv a certain rem¬ edy, as established by previous experimentation, and specific medication means the application of the known remedv for the pathological condi¬ tion so found. Specific diagnosis is therapeutic, not nosological diagnosis. In practice the spe¬ cific medicationist is guided in the selection of his remedy by ((specific indications,® as illus¬ trated by the few following examples: The strong, excited, bounding pulse indicates vera-trum viride; sharp, cutting or lancinating pain in serous tissues bryonia; the full, oppressed pulse with a sensation of praecordial fulness and dyspnoea, lobelia ; marked periodicity, with moist tongue, open pulse and freedom from nervous excitement, quinine ; cadaverous odor of the secretions, potassium chlorate, *etc.*

The modern Eclectic recognizes no law of cure, and does not accept a remedy as a specific

until the extended successful employment of it in some particular condition has given it the right to be so called. Empiricism and experi¬ mentation are the foundations of knowledge concerning each remedy denominated a specific medicine. The havoc wrought Eclectic phar¬ macy at the close of the formative period had now to be remedied. The school had been nearly shipwrecked on the shoals of commercial selfishness, as seen in the. instance of the resinoids. Calamities often bring about future good, so in this instance the commercial mistakes of a few gave a renewed impetus to better the condi¬ tions of Eclectic pharmacy. Uncertain. prepara¬ tions were supplanted by definite medicines. As a result the school has now a materia medica and system of therapeutics much sought by the descendants of those who endeavored to block the efforts of the pioneer Eclectic, in his zealous contention for pure and representative medi¬ cines. Dr. Scudder, supported by Dr. King and others, advocated office pharmacy as a step toward a better knowledge of drugs and to secure definite remedies. Special attention was given green and freshly dried products. Formulas were published for the. preparation of specific medicines. Finally, in order to secure the integrity of these medicines and pro¬ tect them from conscienceless manufacturers, Dr. Scudder copyrighted the labels. These bore the title <(Specific Medicines® and gave the specific indications for their use. The manufac¬ ture of medicines bearing these labels was en¬ trusted to competent pharmacists and from that time the school has been free from objectionable pharmacy. Dr. Scudder advocated the use of specific medicines in the study of the relation¬ ship of medicine to disease expressions. The Eclectic of the formative period selected from

other schools, but endeavored to improve. He substituted milder for harsher methods; he opposed the use of the lancet and blister, and the abuse of mercury and antimony salts. The modern American Eclectic advocates the use of kindly curative remedies, and the avoidance of depressing or depletive medication. He has been the pioneer in the study of the indigenous materia medica, with special reference to specific indications and specific uses of medi¬ cines employed. He contends for the best pos¬ sible pharmacy so that the minimum amount of medicine may accomplish maximum results. Harmful medication as exemplified in excessive drugging he has consistently opposed, heroic over-drugging having been one of the most potent causes leading to the necessity for the establishment of an Eclectic school. He ad¬ vocates liberality of thought, the highest medical education, the cultivation of professional dignity, and the ethics that govern gentlemen.

The position of the Eclectic school of medi¬ cine is now well established, and the attitude of malice and persecution formerly shown it by rival schools is fast becoming a memory. The school numbers uowards of 8,000 Eclectic phvsi-cians. For a period of about 10 vears this numerical relation has remained nearly station¬ ary, but because of better .facilities for teaching, enlarged literature, and harmony in the ranks of the school it has never occupied so favorable a position nor had a better outlook for the future than it has to-day. Never before in its history has it been so free from internecine bickerings, attacks by rival schools, and unpleasant entangle-

merits and alliances. It challenges all ages in the wealth and completeness of its materia med¬ ica. Recognizing the merit of the work accom¬ plished the regular profession in many localities now invites Eclectics to join its associations providing they drop their distinctive title. This the Eclectic is unwilling to do, believing that the school has earned the right to be regarded and recognized as a distinct sect in medicine. Its work in the special fields of materia medica and specific diagnosis and specific medication entitle it to this right. The

Eclectic school has a strong national organization and numerous State and local societies. A national reform as¬ sociation was founded in 1829, and a second at Worthington, Ohio, in 1836. In 1848 the first National Eclectic Medical Association was or¬ ganized in Cincinnati, Ohio, with Dr. T. V. Morrow as president, and it held annual ses¬ sions until 1858. The present National Eclectic Medical Association was organized at Chicago, Ill., in 1870, with Dr. John W. Johnson, of Connecticut, as president. It holds annual ses¬ sions, meeting in various cities throughout the United States. Eclectic practitioners now hold positions as examiners in the more important life insurance companies, and are not now de¬ barred from the army and navy medical service as in the earlier days of medical ostracism. No discrimination is now made against them as surgeons for the great railway systems. These recognitions have been earned in the face of vigorous medical opposition, by the consistent and honorable course pursued by the Eclectic school as a whole. The Eclectic Medical Col¬ lege of Cincinnati, Ohio, the parent school of medical Eclecticism, chartered in 1845 as the Eclectic Medical Institute, is the leading college of this American system of medicine.

Harvey Wickes Felter, M.D., Prof, of Materia Medica and Therapeutics, and Medical History, Eclectic Medical Col¬ lege, Cincinnati, Ohio.

MEDICINE, History of. Within the past three centuries the average working life of Eng¬ lish-speaking men has doubled. A few lived as long as now, and some strong or favored ones had efficient working powers as long; but the common life was worn out in what is now mid¬ dle age. In Shakespeare's time the 50's were venerable: <(01d John of Gaunt, time-honored Lancaster, w was 58 when supposably so ad¬ dressed; and Admiral Coligny, murdered at 53, is described by his contemporary biographer as a very old man. Now, when we hear of a death in the 60's we instinctively feel it an untimely cutting off in what should be still fresh and vigorous age, and even at 80 it seems but just fair ripeness for the sickle. The three factors which have wrought this change are advanced physical comfort, medicine and its handmaid hygiene, and surgery. And in the mitigation of the frightful mass of actual pain, of physical torment which has racked every age down to the present, and which has scarcely even been alleviated till the past century, medicine stands incomparably first.

Some good foundations had been laid, it is true, in the centurv previous, and men were at work in the true scientific spirit. Great masters had stimulated their successors to study in the essential preliminary subjects, the constitution and functions of the body. The miehty Boerhaave of Holland (1668-1738) had revolution¬

ized clinical observation; Morgagni of Italy (1682-1771) had ˆintroduced anatomical think¬ ing into medicineˆ (Virchow), and had done something the same service for pathology which Haller of Germany (1708-77) did a generation later for physiology; while John Hunter (1 728— 93) had not only introduced capital improve¬ ments into operative surgery, but had set the pace in research into anatomical and physiologi¬ cal problems. But the influence of old theories, founded on guesses and imperfectly interpreted observation, still lay heavy on the body of practitioners. The chief general theories in the 18th century were those of William Cullen (1710-90) and his pupil and assistant, John Brown (1736-88), of the Universitv of Edin¬ burgh; the former — a great advance on the older theory of ˆhumors,® and on the right track — -made the nervous system the seat of diseases ; the latter divided all diseases into two classes, — the sthenic, resulting from over-excita¬ tion and treated by depletion, and the asthenic, resulting from under-excitation and treated by stimulation. On the Continent, Hahnemann (1755-1843), his great theory propounded at Leipzig (1796-1810) soon after took adverse ground in his ˆhomoeopathyˆ — a very different thing from what later passed under the name, though the latter retained the underlying basis. Besides his ((law of ‘similars,)} which Hippo¬ crates had formulated before him, he rejected theory utterly, declaring that it was impossible to know anything about pathological changes out of sight; that we can only know symp¬ toms, and if those are removed it indicates of necessity that the disease which produced them must be gone also. He also alleged that the fact of a given dose causing certain symptoms in a healthy person was obvious proof that it must be too large for a sick, one; further, that to possess healing power the dose must be too small for recognition by the senses or chemical analysis ; and that trituration, or dilution and shaking, of minute doses caused molecular changes which infinitely increased their power — Mynamization,® he termed it. The exaggera¬ tion of symptomatics and empirics was a reac¬ tion against the current reliance on unbased theories ; the paradox of infinitesimal doses, against the monstrous boluses and draughts with which patients were often gravely injured; there was usefulness in both reactions, but he went so far as to declare that a child could be cured while asleep by holding the pellets near it.

But the reign both of guesswork theorizing and of groping empirics, as exclusive methods, was coming to an end, and the first great blow was delivered in the first year of the century. France now came to the front where other countries had thronged. Bichat, a genius who wore himself out at 31, as did Clifford at 34, published the year before his

death (1801) a work on general anatomy, in which he remade the entire science by showing that the different organs have membranes and tissues in common, and therefore that the seat of disease was in the constituent tissues and not in the organs as such. This not only simplified anatomy and physiology in much the same way that the alphabet simplified hieroglyphics, but threw the investigation of pathological changes into an entirely new channel. Parallel with this work, the followers in the footsteps of Morgagni were carrying on his work in studying morbid anat-572

omy, the appearances of diseased organs ; this, too, was remodeled on Bichat's discoveries. In 1808 and 1816 Broussais of Paris (1772-1838) published valuable works whose theory is merely the sthenic and asthenic idea of Brown, but which led to renewed research in pathological anatomy and local ailments. Percussion had been devised by Auenbrugger of Vienna (1772— 1809) in 1761, and Corvisart of Paris (1755-1821) revived it; but a greater effect was cre¬ ated by the introduction of auscultation 1816—19 by the Breton Laennec (1781-1826) at Paris, where he was Corvisart's pupil. He invented the stethoscope to diagnose diseases of the lungs, heart and abdominal organs, by means of alteration in the normal sounds of their ac¬ tion ; and his own use of it, and observations on the diseases of these organs, were the great¬ est advance made in clinics since Boerhaave, and may be said to have founded modern clinical science. In 1827, Richard Bright at London (1789-1858) first published his recog¬ nition of the true nature of the kidney disease since called by his name, and of the general characteristics of renal complaints, the founda¬ tion of our knowledge of them.

A special branch of investigation and analysis in the first half of the century was in discrimi¬ nating the continued fevers; one of the most active and anxious battle-grounds for practition¬ ers and theorists since modern medicine took its rise; though eruptive and malarial fevers were well differentiated. The first to be dis¬ criminated was typhoid, by Louis of Paris (1787-1872). His American pupils, W. W. Gerhard (1809-72) and Alfred Stille (1803), with C. W. Pennock (1799-1867), all of Phila¬ delphia, and George B. Shattuck of Boston, proved that typhoid and typhus, theretofore loosely classed together, were independent dis¬ eases, though generated by similar causes. This

was confirmed by the work of A. P. Stewart at Glasgow and Sir William Jenner at London. Dengue or break-bone fever, yellow and re¬ lapsing fevers, and their kind, were carefully studied. Among the other names associated with this labor are R. J. Graves (1797-1853) and William Stokes (1804-78) of Dublin, George Budd (1808-82) of London, and Daniel Drake (1785-1852), S. H. Dickson (1798-1872) and Austin Flint (1812-86) in America. This work was soundly based by 1860 in regard to fever clinics.

Development in the United States. — When the 19th century opened there were only three medical schools in the United States, and only two of importance, — those connected with Har¬ vard College and the University of Pennsyl¬ vania, — and only two general hospitals. Medical education was somewhat on a footing with divinity education: physicians took apprentices for some years and clergymen took private pupils in divinity. Those who wished and could afford a more systematic medical education went to London or Edinburgh. The literature of the profession was English and (translated) French almost wholly; Rush and a few others had published books, but not of moment, and there were only two or three medical journals. There were but two medical libraries except in private hands, those at the New York and the Pennsylvania hospitals. The physicians of most reputation were Benjamin Rush and Philip S. Physick of Philadelphia, David Hosack and

Samuel L. Mitchill of New York, and James Jackson and John C. Warren of Boston. I he smaller places did not lack for able men, though of less widespread repute : such as Daniel Drake of Cincinnati, and Nathan Smith, founder of the medical schools both of Dartmouth and of Yale. But the great repute of the French medi¬ cal investigators in the first quarter of the cen¬ tury — Bichat, Corvisart, Laennec, Louis, *etc.* took an increasing number of American students there, and the new spirit they brought back rev¬ olutionized American practice for a time. The enormous increase in American population, how¬ ever, enlarged the demand upon its stock of medical knowledge far faster than that could be legitimately developed : educated physicians could not be turned out so fast as the thronging populace needed them, and it was the golden age of the half-educated. Perhaps, too, the masses had the same ideas of the needlessness of training in medicine as in public life. The machinery was multiplied indefinitely, and the product turned out depreciated in proportion. Up to about 1870 the medical schools sprung up everywhere, both public and private, and their competition for pupils degraded the stand¬ ard very low indeed.

Diplomas were given for two years' work, and short sessions at that ; and the instructors were sometimes as incapable of giving competent education as the authorities were unwilling to enforce severe study or care¬ ful experiment. The first place to exact a new and much higher standard was Harvard, about 1870. The rapidity with which the rest of the country, in the better institutions, followed its lead, showed that there was a large instructed upper class which appreciated the need of thorough education in this as in other depart¬ ments of knowledge, and understood that medi¬ cine was a great science as well as a delicate craft. As always, the rich were glad to give when they knew where to give intelligently, and endowed generously both study laboratories and general and special hospitals. It would be a grateful task to enumerate these, did space per¬ mit; here can be mentioned only such names as Pierpont Morgan and Andrew Carnegie, Johns Hopkins and Vanderbilt, Sims, Strathcona, Mount-Stephen, Payne and Lane.

Methods of Investigation. — The last cen¬ tury of course did not invent experiment in medicine or psychology : the method was recog¬ nized by the great Greek and Latin physicians, used by the two great Bacons, Roger and Fran¬ cis, fully developed by Harvey, and utilized with superb skill by Hunter. But though these great men did not lack sound ideas, they lacked tools and the mass of laboratory facilities gradually built up in our age. The research laboratory is the development of the 19th century, and well along toward the middle of it. The workers in it experiment along three main lines,— the con¬ dition and functions of the organs in a state of health ; the nature of the functional changes produced by disease, and the causes of the changes ; and the prophylactic or curative agen¬ cies which can neutralize the disturbing agents. The results of these studies have created a new knowledge, which is to that of even 1800 like the relation of an adult to a baby. The physio¬ logical and pathological revelations have not merely left the knowledge accumulated in the previous centuries possessed of a merely archaeo¬ logical interest, but they have weaned us from

the sway of any authority whatever; recognizing that even the seemingly soundest conclusions of the present are but working hypotheses, which may have to be abandoned at any time on fresh evidence, — the true scientific spirit. No part of life has been left as it was, the digestive and assimilative, circulatory, respiratory and excre¬ tory, reproductive and directive functions have all been illuminated by a flood of light. Espe¬ cially has this been wonderful in the study of the brain, whose functions not only are so intangible and elusive, but apparently so impos¬ sible of experimentation without destroying the subject of experiment. Not only have we pene¬ trated deep into the secrets of the paths and operations of sensory and motor impulses, the localizations of functions and the mechanical implements of thought and memory, but we have been enabled to apply with preat success a number of curative measures not before dreamed of, or even if so, not deemed possible of use.

Another marked feature of the age is the development of specialism, in which we have to set off a lack ot co-ordination and breadth of knowledge or judgment against an extension of knowledge not possible by any other method. Scientifically, no other means has been so potent in extending and deepening the realm of demon¬ strated fact. Practically, no other has been so effective in developing curative processes. This specialism must not be confounded with that of the (<lung doctors® and (<fever doctors® of former days, mere guesswork empiricism of un¬ educated practitioners; it rests on a basis of competent general medical knowledge and thor¬ ough education in the specialty besides. The physicians who give their time and thought to one limited field — diseases of women, of chil¬ dren, of eyes and ears, of throat, of teeth, of the brain, or who, though less exclusively, choose diseases of the heart or the liver or other organs for their preferred field — have won for the profession some of its most signal triumphs. American physicians especially have stood at the very head of those who have per¬ fected dentistry and ophthalmology, as well as gynaecology or diseases of women. In this branch the blessings they have conferred not only on women in ordinary disease, but on both them, their male relatives, and their chil¬ dren, by the saving of life and health, in the special crises of the sex, cannot be estimated.

One of the finest branches of this specializ¬ ing is that of alienism : and the change in the mental attitude of the public toward it in conse¬ quence of that study has been most remarkable and gratifying. From a matter of derision, as it was largely in the Middle Ages, or ineffectual commiseration as an act of God, or mere terror and aversion, it has come to be sympathetically studied, often relieved, and always recognized as a mere functional disease. Starting from the

labors of our own Rush, of the English Tuke, of the German Jacobi and Hasse, and the French Pinel and Esquirol, this reform has built up a body of physicians in every civilized country not only to study mental aberration scientifically, but to introduce humane and rational methods into its care, and cure. America is not behind any other in the treat¬ ment of the insane; but the curse of so many good causes in America — politics — is a blight upon this science still in too many States.

Prophylactics. — (<Prevention is better than cure® has reached its most brilliant exemplifica¬ tion in the 19th century. It is true that nations far back in antiquity have grasped some of the chief conditions under which diseases most prevail, and have even carried systems of public hygiene much farther than even yet we have re-attained to. The law of Moses furnishes a remarkable example, in its insistence on cleanli¬ ness, isolation and diet ; the Greeks systematized diet and exercise and general physical training thoroughly, their ideal being ((the fair mind in the fair body® (and had discovered that pro¬ fessional athletes do not make good soldiers, from lack of endurance) ; the Romans and Greeks made the bath almost a fetish, far be¬ yond even the English, and the public bene¬ factor of the day gave his city baths, not libraries. But modern science goes much far¬ ther : it discerns the causes which create the disease itself, and removes or neutralizes them. In the 18th century some light had been thrown on this : Howard had seen that typhus was in direct ratio to the crowded condition of jails. Captain Cook and Sir Gilbert Blaine had per¬ ceived and removed the conditions that generate scurvy. Jenner had gone still farther and anticipated the methods of modern preventive medicine by vaccination. But all these could only be feeble and groping attempts until there was a scientific basis for them. This was fur¬ nished by bacteriology, and a few words upon that are needed to make later explanations in¬ telligible.

The Bacteriological Basis of Preventive Medicine. — The ancients speculated with great eagerness and sometimes acuteness on the origin of life, and had guessed that disease and living germs were in some way related ; and the re¬ lation of disease and putrefaction was not doubted. As soon as the first weak crude microscope was invented, it was used to investi¬ gate the organisms of decay. The Jesuit Kircher in 1671 examined the ((minute worms® in putrid milk and cheese and meat; in 1675 a Dutch merchant named Leeuwenhoek improved his lenses and studied the ((animalcula® in rain¬ water, saliva, intestinal fluids and putrid sub¬ stances ; and the physicians of his day

were quick to suspect and suggest -that these organ¬ isms might be the cause of all diseases. In 1762 the Viennese Pleincz, who had studied fluids in all conditions, gave his firm adhesion to this belief. But this was not the whole; whence came these organisms — were they self-gener¬ ated, or simply transmitted from other bodies and multiplied? Despite even the microscope, the theory of spontaneous generation main¬ tained itself tenaciously far past the middle of the century. A distinguished chemist main¬ tained as the result of careful experiment that germs were so generated, and even the proof that the organisms were forms already existent did not convince him or his followers. It was reserved for Pasteur in 1861, and finally (with Koch and Cohn) in 1876, to crush this theory forever. Following quickly on the first came the discovery of the anthrax germ by Pollender and Davaine in 1863 ; shortly afterward Lister's epoch-making researches into wound infection, making possible the triumphs of antiseptic surgery; then swifly followed the isolation of the germs of relapsing fever, leprosy, and typhoid. But towering above all, from the

enormous difficulties overcome, were Robert Koch's isolations of the tuberculosis perm in 1882, and of that of Asiatic cholera in 1884. Thence on, a crowd of discoveries of the germs of other diseases have left but few — unfor¬ tunately, some of the worst — unrevealed, dis¬ eases of animals and insects having been investigated as well as those of men.

Thus much for the history of discovery; but what are these germs? The popular mind is very confused on the subject. Bacteria are generally thought of as a sort of worm. In fact, they are not members of the animal but the vegetable kingdom; the smallest organisms known. They are protoplasm, a jelly-like sub¬ stance, enclosed in a hard membrane exactly like wood fibre. They are classified by shape in three groups: cocci (spherical), bacilli (rod¬ like), and spirilla (corkscrew or undulatory shape). The cocci are found in pairs, fours, clusters, or chains ; they include the smallest known organisms, some of them being as small as 1/150,000 of an inch in diameter. The

bacilli are larger but vary much, from 1/25,000 to 1/4,000 of an inch in length, and 1/125,000 to 1/16,000 in diameter; some of them have organs of locomotion, called flagella. The spirilla are longest of all, sometimes 1/600 of an inch. They all increase either by fission into two, or by developing a spore or seed. Their rate of multiplication does not seem rapid, but that is because we forget our old arithmetical "catches.® A bacterium dividing each hour, and each division thus dividing, would obviously have increased to 8,388,608 in 24 hours ; and in three days to a number beyond all verbal ex¬ pression, weighing nearly 7,500 tons. Of course this is a reductio ad absurdum, as the body they feed on would be exhausted early in the series; but outside of starvation,. nature has other ways of arresting their multiplication.

Before discussing this point, let us look at the nature of bacteria as a whole. It is a mis¬ apprehension to think of them simply as a prin¬ ciple of disease and death. They are a univer¬ sal principle of life as well, and the few species which cause harm are lost in the myriads which do good. But for them, organic existence would perish; it has been suggested that the first organic things on earth were bacteria, — organisms needing only nitrogen for support, — and life means their . multiplication. They abound in air and water, in the soil to nine feet deep or so, and in the outsides and insides of all organisms ; but naturally their, number varies with the conditions for sustaining exist¬ ence, and there are none at extreme altitudes or in glacier ice, and few in the polar regions or the deep seas. Those conditions are (1) moisture, without which all die; (2) air, as. to which there are three classes, — aerobes which must have it, anaerobes which must not have it, and facultative anaerobes which care, nothing either way; (3) food, which must be living tis¬ sues for a few, mav be dead ones for most, and can be mineral salts or atmospheric nitrogen for some: (4) temperathre, which has for pos¬ sibilities of their multiplication, though not of their life, extremes of 32 and 170° F. ; for an average most favorable tract 60 to 104° ; and for disease germs (as evolution would imply) 98.4°, or blood heat is most favorable: (5) light, of which direct sunlight is death to all, and

common daylight, of no importance either way to most.

Their enormous number gives them a power of accomplishment seemingly almost miraculous, and certainly far superhuman. The quality of farm products and dairy products, of fatted stock or wool, of hides or horn, and many other familiar articles, is due to them; and

they are the scavengers of our water supply from pollu¬ tion, as well as some of them deriving powers for harm from it. Still more to our surprise, peas and beans certainly, and all plants prob¬ ably, gain their life from the soil through the medium of bacteria which live in their roots, decompose nitrogenous minerals and feed on atmospheric nitrogen also, turning both kinds over to the plant for its nourishment.

Hence the processes of health and disease alike are functions of bacteria. What medical science has specially to do is to trace the prog¬ ress and manifestations of that spread of harm¬ ful bacteria commonly called “infection,® and the methods by which the system’s natural tend¬ ency to starve or poison them can be rein¬ forced. Before entering upon the phases of prevention and cure, we must indicate briefly how they obtain entrance, how they produce their effects, and what is the reaction of the body ‘thereupon.

The first is naturally limited in variety: they enter by being injected from the bites of animals or insects, from wounds or abrasions, from inhaling infected air, from eating or drinking substances containing them. Specific cases will be considered later. The action of the microbes is by generating a set of poisons known as toxins, which produce either languor, loss of appetite and vague general discomfort, or more active pains, headaches, fever, inflam¬ mations of the tissues, perhaps entire stupor. The action of the body is complex and difficult, and not thoroughly worked out ; but some things are known. The normal blood and tissues have a germicidal power, varying in different bodies even of full health, and varying still more as to specific germs, each body having its own set of germs to which it is congenial or maleficent. The struggle of the body against their multipli¬ cation, dependent on this unfavorableness of soil for their propagation, is called “general re¬ sistance,® and on its strength depends the im¬ munity against ordinary disease ; and the secret of inoculation is, that if the soil favorable to the propagation of a specific bacterium is eaten up, it is usually very slow in fresh growth. The disease microbe gains no lodgment because there is nothing to live on. But in addition to this passive resistance, an active one is carried on by the white cells or “leucocvtes,® — the wandering cells, and those of the tissues chiefly invaded, as well as those of the spleen and lymphatic glands; these and others seem to work among the toxins and produce a change in their chemical constitution, at last elaborating counter-poison or antitoxins which neutralize the first, and enable the cells to carry on the war against the disease microbes till one or other is overcome; and as said, if there is re¬ covery, a partial or complete immunity is afforded against further ravages of the same class of microbe.

But it is evident that if this orocess can be shortened and made more certain, so that the antitoxins can perform their work before the

disease microbes arrive at all, a great system of prophylactic or preventive medication can be had ; and if the antitoxins are used in a case of similar disease, they will strengthen the nat¬ ural power of the body to develop them, and greatly aid it in throwing off the disease. This is the new system of serum-therapy, begun by Pasteur in 1877, and continued by a set of brilliant experimenters since. The serum of the infected blood is chosen as a medium for injec¬ tion into the blood of the patient. Pasteur with fowl cholera, Raynaud with cowpox, Salmon and Smith in this country in 1886 with hog cholera, fully proved the possibility of the treat¬ ment, curing animals previously inoculated with the most virulent disease poisons, and render¬ ing healthy animals immune; but these excited but languid interest till Behring's announce¬ ment in 1892 of a diphtheria antitoxin, with incontestable proof of its value. Oddly, not only laymen but physicians in many cases op¬ posed it; partly from misunderstanding, partly from humanitarianism as involving experiments on animals. Most of its opponents have now been won over, from the crushing weight of evidence, and the brilliant work of its sup¬ porters. Diphtheria alone has reduced its mortality one-half since the introduction of the serum treatment little more than a decade ago.

To illustrate the general methods of prepar¬ ing all the serums for infectious diseases, that of diphtheria will serve as a model. The bacilli are cultivated for 8 or 10 days in alkaline beef broth, found to develop a peculiarly viru¬ lent poison under its work; the toxin is then isolated and its strength precisely estimated, then set aside in sterilized vessels. A healthy horse, found by experiment the most suitable animal, has injected under the skin of its neck or forequarters 20 cubic centimeters of toxin and perhaps half that of antitoxin, three times five days apart ; then it is given heavier and heavier doses of toxin alone, a week apart, till it can endure doses speedily fatal at the outset. After two

months it is bled and its serum tested; if satisfactory, it is dosed as before for another month, when the maximum qualitv of serum is usually reached. The animal is then bled suf¬ ficiently, the blood being caught in a sterilized vessel and placed in a refrigerator. The coagu¬ lation finished, the serum is drawn off from the clot and its strength accurately determined in the laboratory, an antiseptic is added to keep it, and it is bottled for use. Antitoxins for tetanus and snake bite have been similarly prepared, and the present century will see probably every infectious disease and every venom with its bacterial antidote.

Specific Results of Preventive Treatment.

— An abstract of the work already done in pre¬ ventive medicine can best be given by a note of the great maladies of men and animals more or less controlled by it, with their bacteria. But it must be noted that ©f the ones cited, the bacteria of smallpox and hydrophobia (though the former has been almost exterminated by vaccination), as well as scarlet fever and measles, have not yet been isolated. The rea¬ son may be excessively small size, since that of cattle pleuro-pneumonia is barely visible under the microscope; or it may be that the organisms are not bacteria but unknown beings..

The diseases may be classified variously, and

some admit no special classification, but we will begin with the great scourges which have desolated the world in the past, and which have owed their virulence and destructiveness, though not their direct origin, to filth and overcrowd¬ ing and general unsanitary conditions.

(1) The Great Plague, or Bubonic Plague. The frightful devastations of this in the past need not be recited ; it will be remembered that it was the ((Black Death, }) which swept off from a third to a half the population of Europe in the latter part of the 13th century. Long thought almost extinct, it reappeared with fear¬ ful intensity at Hongkong in 1894, spread to India, and had several occasions of violent out¬ break, raged in Turkey and on some parts of the Mediterranean coast, and in small volume has shown itself in Glasgow, South American ports, New York and San Francisco. But in western Europe and America it has been easily put down, and serum inoculation has been fairly successful in India. Its bacillus is known to enter the body by wounds of the skin, and very largely by bites of fleas from infected rats.

(2) Asiatic Cholera. This terrible plague even in the middle of the 19th century swept away thousands of lives in America;, now it has been so thoroughly controlled that it is not feared even to the extent of disturbing com¬ merce when it appears. It originated on the banks of the Ganges in India, where Koch found its spirillum and the means of its spread, — almost entirely through drinking infected water, though very slightly by contact, — so little that since 1873 the disease in Great Britain and the United States has never got farther than the port of entry. How thoroughly a city's immunity depends on its water supply is strikingly shown by the twin city on the Elbe in 1892; Hamburg, using the unfiltered river water, had about 18,000 cases and 8,000 deaths; Altona, with a filtration plant, had 516 cases, largely refugees from Hamburg.

(3) Typhus Fever. It is hard to believe that this was once so steady and frightful a curse in the West that one investigator says its history would be that of Europe. In all the large cities, in camps and ships, hospitals and jails, it was almost permanent and its rate of mortality appalling. It depended so entirely on filth and overcrowding that mere city sanita¬ tion and cessation of packing, sewers and a good water supply, have practically extermi¬ nated it except in a few slums. The rate has been reduced in England from 1,228 per 1,000,- 000 in 1838 (typhus and typhoid together, not then discriminated) to 137 typhoid and 3 typhus at the present time. In 1915 announcement was made that the bacterial origin of typhus fever had been established..

(4) Typhoid Fever. This disease, long iden¬ tified with typhus, is now not only known to be separate, but dependent on somewhat different generating conditions. It depends not so much on dirt and crowding as on sewer gases and contaminated water and milk.. Given pure water and perfect drainage, a city practically has no typhoid, — except when its milk supply is drawn from infected sources, as often hap¬ pens; while seaside resorts are notorious gener¬ ators of the disease, from the sand-driven wells and the crowded privies draining into them. The germ was discovered by Eberth in 1880,

and called bacillus typhosus. The continued prevalence of the disease in our cities is due partly to the great hardiness of the bacillus, which can exist in the body of a patient long after recovery and be a means of contamina¬ tion. The outbreak in the Spanish-American War seemed due to overcrowding, but more likely to the contaminations caused byt it, as in the seaside cases. In the country districts there is no mystery about it : often there is no rural sanitation and even the wells are grossly neglected, sometimes on a slope below a barn. In the typical example at Plymouth, Pa. (about 8,000 people), the evacuations of a typhoid patient were thrown out during the winter on the banks of a stream which fed the town reservoir; the spring thaw carried them into it and the town had a typhoid epidemic which struck down 1,200 people. The people precau¬ tions are the use of boiled water and of distilled-water ice, the thorough inspection of dairy surroundings and water sources and great care" on the part of physicians and nurses to disinfect discharges, are the true prophy¬ lactics.

(5) Diphtheria. This bacillus was discov¬ ered in 1883-84 by Klebs and Loeffler, and has been given their joint names; it enters either by inhalation or the stomach. The antitoxins thus made possible of preparation have re¬ duced the mortality one-half ; the hygienic pre¬ cautions have greatly reduced the primary prevalence. The latter are isolation and dis¬ infection, watchfulness during convalescence, careful examination of the least throat disorder and — since the mild and often unsuspected cases where the children go about and to school freely are the worst in spreading the disease, because not guarded against — regular inspec¬ tion of school children's throats. Children's teeth and mouths should also be carefully at¬ tended to and the tonsils removed where ton-silitis is frequent.

(6) Yellow Fever. The germ of this has not yet been isolated. Its dependence on dirt, however, would seem almost as close as typhus, thorough sanitation having practically eradicated it in its favorite tropic home, Havana, and in the Southern cities once ravaged by it. Jamaica has been almost freed from it in the same way.

(7) Smallpox. This once widespread and sometimes destructive scourge, almost more dreaded for life than for death, has been so nearly eradicated by vaccination, and vaccination alone, that the persistence of a strong section of the community opposed to it is one. of the strangest of phenomena. The evidence is over¬ whelming. Wherever smallpox breaks out, it is in an unvaccinated district, country or body of people, and the fatalities are almost all among the unvaccinated and never among the re-vac¬ cinated; where two bodies

of men lie side by side under the same conditions, as the French and German armies in 1871, the vaccinated body scarcely suffers, the unvaccinated one is deci¬ mated; and in Egypt, where the natives are compulsorily vaccinated and the foreigners escape it, the fatalities are five foreigners to three natives, though the latter are far poorer, worse housed and fed and medically cared for, and would naturally be supposed the chief vic¬ tims. If all the people of a country were vac¬ cinated and re-vaccinated at fair intervals, the disease would absolutely disappear, as it has in

the German army: it is the ones who escape vaccination that maintain its existence. lhe ravages still among the unvaccinated French Canadians are a constant example of what it has been. For instance, on 1 April 1885 there was a smallpox death in the Montreal hospital the Hotel Dieu; the patients who had not had it were sent home ; the disease spread like wild¬ fire, and by the end of the year 3,164 persons died of it, the city's business for the winter was destroyed, and the loss was millions. It has been proved that not above one in 100 of the vaccinated takes the disease when exposed and almost none die ; of the unvaccinated, fully 99 per cent take it and 25 to 30 die. It must be remembered, however, that there cannot be perfect security without frequent re-vaccina¬ tion, as the power of the cowpox varies with different persons and is rarely permanent, some¬ times not over a year or two. With animal lymph there is no danger of the introduction of other diseases, the fear of which is made an excuse for refusal.

(8) Tuberculosis (including "consumption® of the lungs), called by Holmes the (<white plague® ; the most destructive single agency of death, and responsible for 120,000 deaths a year in the United States, more than all other infec¬ tious diseases together, except pneumonia. For¬ merly believed hereditary (the truth in a very slight degree), it is now known to be the prod¬ uct of a bacillus, isolated by Koch in 1880 —82 ; and the hereditary conditions are mainly en¬ vironment, with some tendency to anaemia. The communication, though in a few cases by in¬ fected milk, in the overwhelming mass proceeds by inhalation of the particles of dried sputum from other consumptives' lungs, blown about in the dust of streets or houses, or even wards of hospitals. Naturally, the greatest mortality is in places where free circulation of air is not possible, as jails and "institutions.® Na¬ ture seems to have provided for the largest possible distribution of them : one patient not in extremes has been known to give off from two to four thousand millions of germs in 24 hours ; they are shaken from

handkerchiefs, from the beard or mustache, from the furniture and other things handled by consumptives, beaten up from contaminated floors. So uni¬ versally diffused are they that it seems probable there are few persons who have not some tuberculous lesion of some organ, for it is not confined to the lungs. The great weapons against it are, first, maintaining the standard of nutrition and cleanliness as high as possible ; with careful protection of the chest ; second, the education of the public in the dangers of the dried sputa; third, enforcement of notifica¬ tion and registration of cases ; fourth, public sanatoriums for treatment of early cases ; fifth, special hospitals for incurables. Immense progress has already been made: the rate in Massachusetts, one of the chief seats of the disease, has fallen from 42 to under 21 per 1,000 since 1853; and in New York, Glasgow and other great cities the drop has been similar.

(9) Pneumonia. Frankel in 1886 isolated this germ, a coccus growing in pairs and chains and entering by inhalation ; and with one-fifth of healthy persons, present in the saliva. This is almost the one disease which has not diminished under medical and hygienic science, and has apparently increased, ranking

next to consumption in deadliness. It is especi¬ ally a disease of languid circulation, as in the aged (their typical disease) and invalid and the intemperate ; but it lays low vast numbers of the strong as well. The treatment has been revolutionized from the bottom, but still from one-fifth to one-fourth of all attacks are fatal. Thus far the most valuable novelties have been measures to prevent sudden heart failure.

(10) Malaria. Till a generation ago, this was one of the obscurest diseases on our list ; it still remains one of the worst drawbacks to civilization, preventing general Caucasian set¬ tlement in the tropics. It was known to have an intimate connection with wet ground, marshes or the building up and sewering of new districts ; to prevail chiefly in the fall, and be caught chiefly from dusk to dawn ; and to be noncontagious. But nothing more was known till M. Charles Laveran,

a French sur¬ geon who had gone to Algeria specially to study the disease, discovered the germs in the red blood-corpuscles of patients ; not bacteria, but small protoplasmic bodies which begin as transparent rings inside the corpuscle, feed and enlarge on its coloring matter and form black¬ ish grains from it, and on attaining a certain size divide and redivide in vast multitude, giv¬ ing off a toxin which causes the acute spasm of fever, and apparently of chill also. Each variety of the fever is caused by a special form of the parasite. It was suggested by Dr. Patrick Manson of London that the com¬ municating agent might be mosquitoes, also products of wet ground and active after dusk; and an army surgeon of India, Ross, found that mosquitoes did transmit similar parasites be¬ tween birds, — developing them in their stomach cells into filary bodies, which pass into the saliva and so through bites into the bodies of others. It is now thoroughly established that this is the chief means of transmission among human beings. The mosquito is not the com¬ mon culex of the northern United States, but chiefly the anopheles, which develops and trans¬ fers the parasites as just described. The crucial experiments are, that these mosquitoes, allowed to bite malarial patients and subse¬ quently healthy persons in nonmalarious re¬ gions, infect the latter, and that in th-e deadly campagna around Rome, two persons during the worst season, from 1 June to 1 Sept. 1900, lived entirely immune by simply keeping be¬ hind tight netting after dusk, while exposing themselves freely during the daytime. The net result is that swamps and stagnant pools should be drained, that persons having malaria should be thoroughly treated with quinine so that they may not transmit the disease if bitten by mosquitoes, and that Europeans can live in the worst districts by not being out after dusk and by thoroughly wiring their houses.

(11) Venereal Diseases. These are in one respect by far the worst of all we have to mention; for they are the only ones trans¬ mitted in full virulence to innocent children, to fill their lives with suffering and which in¬ volve equally innocent wives in the misery and shame. In the victim the infection does not stop with the parts originally affected ; and it has not been seriously checked, from the nature of its causes making it impossible for society to stamp out or much diminish the ac —

tions which involve it. Physicians and the public have each solemn duties in this matter ; the former to act as apostles of continence,

especially with the bachelors who pretend to believe that their health needs the indulgence and will not marry, and to use every effort to prevent the disease being carried to others ; the latter to let no scruples of delicacy or affected ignorance stand in the way of thor¬ ough public supervision. The opposition to this is natural : women feel it adding an un¬ fair stigma to an already shameful load of in¬ justice; decent people feel that legal recog¬ nition is legal palliation and defense, and there is the real danger shown by experience, that if it is once shielded by the law the weight of the police force will be thrown on the side of protecting instead of abating houses of ill-fame, as with liquor saloons, but with far more disastrous results. But any risk is preferable to the present shocking conditions, which make city brothels a stream of contamination to what should be the purest of homes.

(12) Puerperal Fever. Remembering not merely the former fatality of this disease — terribly frequent in private practise, and in maternity institutions rising from 5 even to 10 per cent — but the double bereavement it usually involves, the almost entire extermina¬ tion of this disease is one of the grandest triumphs of modern medicine. Its contagious¬ ness had long been suspected, when Oliver Wendell Holmes in 1843 published a full and clear statement of the facts leading to the belief ; but for many years the profession gen¬ erally scouted it — a wit and poet could be no authority in medical science. Others gradually took his view, but it was the Lister antiseptic treatment which enabled it to be fully tested. Now the mortality is but about one-third of one per cent.

(13) Hydrophobia. This disease, though widely distributed among animals, is not very common among human beings in America, but excites a widespread horror from the multitude of pets, any one of which may chance to be stricken and to communicate it ; in Europe it is less rare. The germ has not been isolated, but Pasteur ascertained its calculable effects on the nervous system, and that certain inocu¬ lations could render healthy animals immune and neutralize a powerful dose of the virus. He founded an institution in Paris for its treat¬ ment, and the mortality among those bitten by certainly rabid animals was reduced to less than one-half of one per cent. In dogs, quaran¬ tine and muzzling are the only precautions.

(14) Leprosy. This is caused by a bacillus which probably enters the body through abra¬ sions of the skin, and probably only from con¬ tact with another person ; even so, it is but slightly contagious, contrary to the popular notion. It was discovered by Hansen in 1879, and since then an active and very hopeful in¬ vestigation into

prophylactic conditions has been carried on. Known to be old and wide¬ spread in Asia, it is not generally known that it came into San Francisco with the Chinese, that the Norwegians have given it a consider¬ able foothold in the Northwest and that in Louisiana there is an endemic condition of it, and slightly in some other southern States. It exists in New Brunswick likewise. Still more important for the United States is its great

abundance in Hawaii and the Philippines. It can be readily kept in check by segregation and inspection.

Some other bacilli may be mentioned, of which the discovery has not as yet been fol¬ lowed by large results in prevention. The deadliest known is that of lockjaw or tetanus, discovered by Nicolaier in 1884; it enters by wounds, and in some tropic parts all lesions tend to develop tetanus as surely as other sections do gangrene. Influenza, or <(the grip/ has one of the smallest bacilli known; it is spread by dried nasal discharges and en¬ ters by the nasal tracts. Anthrax is a disease mainly of cattle and sheep. Its bacilli were the first micro-organisms of disease to be iso¬ lated and can enter either by inhalation, in¬ fected food or abrasions.

Changes in Therapeutic Method. — It is only restating the same fact to say that new practice has followed on new theory, or rather new scientific knowledge of the nature of diseases. The only object of acquiring the knowledge was to embody it in practice. With the discovery of the zymotic principle in dis¬ ease, traced finally to bacterial action, there could not be the same or like treatment as when the body was supposed to be possessed by con¬ flicting “humors® ; or when a fever was sup¬ posed to be an abnormal increase of vital fluids needing to be drained off; or when dis¬ eases were supposed to have no relation to any function of the body except the organs furnish¬ ing the dominant symptoms ; or when one school supposed them waves of some sort, to be over¬ borne by more powerful waves of the same class, and another school refused to entertain any theoretical suppositions at all, but relied on the history of cases,

printed or traditional or experimental. But it may be said that the greatest revolution in the century, or at any rate the last half of it, is in the position as¬ signed to drugs. At the outset the old faith in bleeding still held great sway: Boerhaave him¬ self had made almost the whole art of medi¬ cine consist in its proper application, and at the end of the 18th century Washington had been sacrificed to it. But by the middle of the century it began to diminish. Both the homoeo¬ pathic and the regular schools based their prac¬ tice, and many still base it, on the study and administration of drugs. They differed in the size and strength of doses, from huge boluses or powders or draughts whose efficacy was sup¬ posed to be in proportion to their nauseous¬ ness, to small bland ..triturations or dilutions ; but not in the assumption that in them lay the one efficient method of dealing with disease.

The advanced school of the present does not discard medicines; so far from it, it studies them with more care than ever, and values a few, well tried and certain of quality and action, as highly as ever. It knows the mass of current medicines to be inert or worse, un¬ certain of action and applied to human func¬ tions of still more uncertain action; but it seeks to study thoroughly and apply scien¬ tifically the few real medicines or healing agents which must be used — quinine and digitalis and opium, iron and mercury and iodide of potas¬ sium, *etc.* — instead of a swarm of dubious and varying materials. It is significant that some of the stand-bys are extremely old; iodine, as ashes of burnt sponge, was known in classic

times, and ergot impressed its peculiar action on stock-raisers' minds from very early ages; even Peruvian bark is nothing new. We have not as yet made as many additions to the stock of panaceas as we might. But chemistry has done vast services for us, and will probably do far more. Aside from the discovery of new substances like cocaine, it has given us the active principles, of calculable strength and purity, in place of crude drugs of varying strength at best, and of varying purity and age, and there is no reason why we may not have new specifics as sure (and for as import¬ ant diseases) as quinine.

But the new school does not feel itself under obligation to give any medicines what¬ ever, while a generation ago not only could few physicians have held their practice unless they did, but few would have thought it safe or scientific. Of course there are still many cases where the patient or the patient's friends must be humored by administering medicine or al¬ leged medicine where it is not really

needed, and indeed often where the buoyancy of mind which is the real curative agent can only be created by making him wait hopefully for the expected action of medicine, and some physi¬ cians still cannot unlearn their old training. But the change is great. The modern treatment of disease relies very greatly on the old so-called “natural® methods, diet and exercise, bathing and massage — in other words, giving the nat¬ ural forces the fullest scope by easy and thor¬ ough nutrition, increased flow of blood and re¬ moval of obstructions to the excretory systems or the circulation in the tissues. One notable example is typhoid fever. At the outset of the 19th century it was treated with “remedies® of the extremest violence — bleeding and blister¬ ing, vomiting and purging, and the administra¬ tion of antimony and mercury and plenty of other heroic remedies. Now the patient is bathed and nursed and carefully tended, but rarely given medicine. This is the result partly of the remarkable experiments of the Paris and Vienna schools into the action of drugs, which have shaken the stoutest faiths; and partly of the constant and reproachful object lesson of homceapathy. No regular physician would ever admit that the homoeopathic preparations, “infinitesimals,® could do any good as direct curative agents, and yet it was perfectly certain that homoeopaths lost no more of their patients than others. There was but one conclusion to draw — that most drugs had no effect whatever on the diseases for which they were adminis¬ tered.

These “natural methods® have been indicated above, but some further analysis of the indi¬ vidual elements is worth while. It will be noted that this is not, as a hasty reader might assume, the discarding of all the results of civilization and a return to barbarism. That the natural methods are efficient is precisely because scien¬ tific knowledge and modern improvements in appliances, as well as the thousand civilized devices for comfort and cleanliness, unattain¬ able even a generation ago, have raised them to the level of first-rate therapeutic agents.

Perhaps foremost in the rank is the trained nurse, who is not only a greater agent of philanthropy than many professed altruists, but sets free the physician from a load of care and anxiety. In place of ignorant and stubborn,

usually conceited and often superstitious women, who pride themselves on defying all the doc¬ tor's commands, these intelligent and loyal women can be relied on to carry out all his injunctions, to watch carefully for indications of danger and to furnish notes enabling him to view the progress and hourly changes of a crit¬ ical case.

The importance of diet in therapy, and in¬ deed in the preservation of health before the system becomes a subject for the physician, has never been wholly lost sight of, but at no time has it been so thoroughly recognized, so firmly insisted on, raised to so high a place in therapeutic agencies. Too much food, improper or ill-prepared food, over-haste in eating, all have their part in the dyspepsia which is a by¬ word among foreigners as the national malady, and though much lessened, is still most formid¬ able. Over-eating, too, is largely responsible for the prevalent Bright's disease and degen¬ eration of the arteries. Sweetmeats and the mixtures of the drug-stores, ice-cream soda and artificial flavors, are other potent causes; especially among girls is the eating of candies between meals. The business man's five-minute meal at the lunch counter saves his business time often to the permanent ruin of his health. The question of alcoholic drinks is usually left to the forum of morals or politics, but it has a serious bearing on health, though not nearly so much as one or two generations ago. The introduction of light beers has not only lessened drunkenness, but organic diseases of the liver, stomach, heart and arteries.

Few influences on general health have been greater or more beneficial than the enormous multiplication of the means of cheap enjoyable outdoor exercise in America within the past generation. Owing to the climate it is much harder to keep up habits of steady exercise here than in Europe, and unless there can be so¬ ciability with it, most people will not put them¬ selves under the stress. We have not been a people addicted to sport or play, and formerly there were not sufficient means provided for us. Now tennis and golf and the bicycle and their kind are improving the constitutions, especially the nervous condition, of vast numbers. Of course there must be judgment in these mat¬ ters, and probably some elderly people injure themselves by indulging in severe athletic sport only fit for young people with sounder tissues.

Massage need only be mentioned; its aim is primarily to remove

obstructions to circulation. The normal blood should be sufficient to estab¬ lish normal bacterial and other conditions, and massage gives it the freest play. The essence of bathing, called when practised scientifically hydrotherapy,® is the same, save that its spe¬ cial function is to free the obstructed perspira¬ tory system.

To these might be added a fourth, which in some sense is the most natural of all ; for it has been practised in ages more remote by many thousands of years than the suspicion of either of the others', and by savages almost at the bottom of the human scale; that is, some form of suggestion or hypnosia. The main difficulty of this sort of treatment is that so little has been done to make it utilizable in practice, or to provide any certain means of assuring a definite result. Another is, that as with all the forms of mental science, its vagueness, its

mystery, the impossibility of regulating its manifestations, surround it with so hopeless an atmosphere of fraud and of that open-mouthed credulity which irresistibly invites fraud. Yet after all, the psychical method has always played an important though largely unrecognized part in therapeutics. It is from faith, which buoys up the spirits, sets the blood flowing more freely and the nerves playing their parts with¬ out disturbance, that a large part of all cures arises. Despondency or lack of faith will often sink the stoutest constitution almost to death's door; faith will enable a bread pill or a spoon¬ ful of clear water to do almost miracles of healing, when the best medicines have been given over in despair. The basis of the entire profession of medicine is faith in the doctor and his drugs and his methods. This is no new discovery: it was said by Galen that (<he works the most cures in whom most have faith,® and the doctor-chemist-charlatan Paracelsus, who died of taking a universal panacea too poison¬ ous even for his confidence, told his patients to have full faith and a srrong imagination and they would see the effects of it.

The subject of hypnotism, originally called mesmerism from its 18th century describer and practiser, can only be touched upon. Different practitioners have had such varying results from its use as to suggest that here too the personal equation is very important. Braid of Manchester, England, who first made a scien¬ tific study and attempt at utilizing it, was not successful ; while an English surgeon in India, Esdaile, was highly successful, performing 268 operations on patients with all the effect of anaesthetics, not then introduced. Its possibili¬ ties have been greatly exaggerated, not so much by the claims of the persons using it (except impostors) as by the eager credulity of the

pub¬ lic. It seems not so much to create a new con¬ dition of sensitiveness to suggestion as to in¬ crease what normally exists. In organic dis¬ ease it is practically useless. Its great service has been found to be in various affections which may all be classed as of the nervous system: hysteria, spasmodic functional complaints, chil¬ dren's vicious habits, and the victims of the drug and alcohol habits ; occasionally in childbirth and surgery, but it is precarious and not free from serious dangers. It should no more be practised without witnesses present than den¬ tists give nitrous oxide, and the law should re¬ strict its practice to special licensees or physi¬ cians of a certain grade.

William Osler, M.D.,

Late Regius Professor of Medicine , Oxford Uni¬ versity.

MEDICINE, Preventive. See Preventive Medicine.

MEDICINE, Recent Progress in. Of

none of the departments of human knowledge can it be said that it is thoroughly and posi¬ tively progressive more than of the science of medicine. The new birth of medicine may be said to be associated with the names of three men, Virchow, Pasteur and Lister (qq.v.), all of them men of the 19th century.

Virchow, while not the discoverer of the different cells of the body, determined that its tissues were entirely composed of cells of vari¬ ous kinds, and he particularly identified the different types of diseased structure of the

tissues by the form of cell which predominated in each of them. Pasteur opened to the vision of the world the vast field of the infinitely small, discovered and described many varieties of bacteria, separated them from one another, cultivated them on artificial media and demon¬ strated their enormous significance for good or evil. As

the father of the science of bac¬ teriology (q.v.) he was one of the greatest benefactors the world has ever had. Lister, who died in 1912, may justly be called the apostle of cleanliness. To him more than to anybody else is due the demonstration that cleanliness is really next to godliness. By avoiding dirt of all kinds, by the use of chem¬ icals to destroy germ life and finally by the simple practice of absolute cleanliness in every department of surgery he revolutionized that art, and made possible, as matters of every¬ day occurrence and of comparative safety, procedures which before his time were considered extra hazardous and which in the great ma¬ jority of cases resulted fatally. .

The stimulus produced by investigation of Lister in the realm of antisepsis during the seventh decade of the last century was quickly responded to by surgery. The chief points in Lister's recommendations consisted in cleanli¬ ness of wounds and all their surroundings; cleanliness of the surgeon, especially of his hands and finger-nails ; the use of carbolic acid, particularly in the form of spray in the operating room during an operation, to destroy the disease germs in the atmosphere, and the use of antiseptic dressings or coverings upon wounds.

The older surgeons smiled at all these de¬ tails which seemed to them foolish and unneces¬ sary. After 25 years practically all opposition had been overcome. The results compared with the results under the old system simply com¬ pelled the adoption of the new principles. But experience also showed that the use of power¬ ful chemicals was unnecessary in the treatment of wounds, and that often it was really in¬ jurious. It was then determined that the steril¬ ization of every thing which had any relation to a wound could be accomplished quite as effectu¬ ally through heat and moisture as with chemi¬ cals and with a greater degree of comfort and safety. Consequently the instruments, the dressings and all the apparatus connected with an operation were subjected to a high tempera¬ ture sufficiently long to destroy all germ life, and the surgeon himself and all his assistants put on freshly laundered white clothing, and washed and scrubbed their hands, face and arms with soap and water sufficiently long to ensure relatively complete cleanliness. Then rubber gloves were put on as an additional safe¬ guard against the contamination of the wound which was about to be made.

This is practically the procedure which is now carried out at a surgical operation in every modern hospital throughout the world. Such precautions enable surgeons to penetrate any portion of the body with absolute fearlessness, and with the confidence that in the great ma¬

jority of cases in which proper judgment has been shown in selecting the case, and proper skill possessed by the surgeon, the patient will recover. It will not bring the dead to life, but it will often restore those whose lives hang by a mere thread. Thus surgeons are able to per¬

form operations within the skull, within the cavity of the chest, within the cavity of the abdomen, and within the joints and upon the brain, the heart and lungs, the stomach, h\er, spleen, intestines, pancreas, ovaries and uteius and the kidneys, ureters and bladder, which were impossible before the time of Lister, or if they were performed the patients almost in¬ variably died.

One of the most recent developments in surgery consists in the transfer of blood from the arm of a healthy person directly into the circulation of one who is almost at death s door either from loss of blood, from the shock of a surgical operation or from some other cause. An attachment is made between an artery in the arm of the healthy person and a vein in the arm of the sick person by means of a suitable tube which is carefully adjusted into openings made in the vessels above mentioned of the two persons, the outflow being so gauged that it will be known when the proper quantity has been withdrawn. The method has proved life-saving in a number of instances, but it is not without danger, for should a clot or clots form in the outflowing blood it would quickly check the circulation in the receiving person or might quickly cause death by interference with the heart action.

Another important procedure which has been perfected during the past 25 years is what is known as the Caesarean section, which con¬ sists in removing a child from the womb of its mother through incisions in the abdominal wall and the womb. This is a very ancient opera¬ tion and is attempted when it is believed that the child cannot be born by the ordinary chan¬ nel. The result was formerly fatal in the great majority of cases to the mother if not to the child. Under the modern methods of surgical procedure it is now done with great frequency, sometimes even by doctors of in¬ ferior surgical skill and experience, and in most of the cases both the mother and the child re¬ cover.

Under the influence of the reforms instituted by Lister the practice of obstetrics is far safer, both for the mother and for the child than ever before. Fifty years ago a maternity hospital was little better than a graveyard. If a mother survived the immediate danger of parturition

she was very likely to die from the blood-poisoning or septicaemia which followed. Now, thanks to the influence of Semmelweiss, Holmes, Lister and those who have followed them, a maternity hospital is the safest place in the world for a woman to give birth to her child, not alone because the doctors in such hospitals have more skill than formerly, but because they are clean themselves, and every¬ thing around them is clean.

In the treatment of disease great advances have been made. There are many more drugs upon the market than formerly and doctors seldom write out a surgical prescription now¬ adays. The medicine makers have forced their wares upon the profession, and for every dis¬ ease it would seem as if there were a hundred remedies. Some of these remedies are valuable, but the greater number are valuable chiefly in the eyes of those who make and sell them and who can induce the public to use them and have faith in them.

But there is one marvelous remedy which

has been brought torward within the past few years which is known as ˆSalvarsan,® or popu¬ larly as (<606)> because its discoverer, Professor Ehrlich, made 605 chemical combinations be¬ fore he hit upon this one. (This number has since been increased to 914, the new compound being called (<Neosalvarsan®). This substance is a compound of arsenic and is used in the treatment of syphilis, which is one of the most deadly diseases, in the wide extent of its rami¬ fications, of all the diseases of which human beings are victims. A single injection of this substance into the tissues will sometimes cure a case of many years' duration. But it is not infallible, it sometimes is followed by bad re¬ sults, it must sometimes be used during a con¬ siderable period of time and its best effects are sometimes obtained when it is combined with a suitable preparation of mercury, which hereto¬ fore has been the mainstay in the treatment of syphilis.

Investigations have been constantly proceed¬ ing to endeavor to find a cure for that greatest scourge of the human race — cancer. Many so-

called remedies have been discovered and an¬ nounced, only to be quickly abandoned. As cancer is known to be a local disease in its incipiency, it is often cured by the surgeon's knife when attacked sufficiently early and with sufficient thoroughness.

The recent studies of Wassermann and Ehr¬ lich in the endeavor to find a substance, syn¬ thetically composed, which shall have a selective action for the cells of cancerous tissues and be inactive upon other tissues seems to have been successful in cancer in mice, which form one of the few species of animals, if not the only one, in which the disease may be transmitted from human beings. If the result should prove what there is great reason to believe it will prove, it would be one of the greatest victories in all the annals of medicine.

Tuberculosis is yielding to the steady at¬ tacks which are being made upon it in city and country. It has long been known that it was curable, all that it has needed has been a con¬ certed attack upon it, and now by means of a few drugs, a proper diet, plenty of pure air and an out-of-door life, the conquest of this terrible enemy is almost in sight. Sanitariums and open air institutions of treatment, public and private, for men, women and children are being established in all suitable parts of the country, and the number who are being rad¬ ically cured of the disease is increasing enor¬ mously every year. What is really better is the intelligent perception and comprehension of the disease which will prevent people from con¬ tracting it, and in course of time we may ex¬ pect it will occur with comparative infrequency.

There is no disease into the study of which mofe enthusiasm has been thrown in recent years than that of tuberculosis and many sanatoria have been established in various parts of the country for the care of the tuberculous.

One of the most important aspects in the treatment of this disease consists in the care of the children of tuberculous parents. It has led to the organization of open-air homes for their treatment. One of the most useful of this class of institutions is the Preventorium, as it is called, which has an estate of 170 acres at Farmingdale, N. J., with suitable buildings and equipment. It takes selected children of

tuberculous parents, debilitated and susceptible to disease, between the ages of 4 and 14, to a comfortable place where they will have plenty of wholesome food, 12 hours of rest in bed at night and an

additional hour after the midday meal. It gives them two and a half hours of school instruction and requires a few trifling household duties. The remaining eight and a half hours are devoted to play in the woods and fields.

One of the great discoveries of the past 20 years was what is known as the X or Rontgen rays. Their power of making invisible things visible is well known and their application to the photography of the interior of the body has been of priceless value. They have also been used in the treatment of certain diseases, some¬ times with alleged success, but often with posi¬ tive harm. Their influence in producing severe burns, which it is almost impossible to cure, is well known. In not a few cases their use has led to the development of cancer in those who worked with them. Quite a number of physi¬ cians have lost their lives as the result of malig¬ nant disease produced by their influence.

The influence of serums, vaccines and cul¬ tures of bacteria and their products in the treatment of disease is a subject which is now absorbing a vast amount of attention both in the laboratory and in the treatment at the bed¬ side. It would seem as if we were at the threshold of an entirely new order of things in this respect. Fever which has long been con¬ sidered baneful is now regarded as frequently beneficial.

The bacteria which are constantly in the body are found to be harmful, or beneficial or indifferent according to the conditions of the body. Harmful bacteria when killed and in¬ jected into the body may sometimes cure dis¬ eases which at other times they would cause. The constituent elements of the blood are in¬ gredients in a great reservoir, some good and some bad, and good or bad according to cer¬ tain conditions.

The statements which have been made in the last few paragraphs will indicate the trend of thought at the present time, which is largely in the direction of preventive medicine (q.v.). Prevention is, of course, better than cure, and the great object now seems to be to find sub¬ stances which will make one immune or proof against the attacks of various forms of disease. In pusuance of this doctrine inoculations with properly prepared germs or their products are now made for smallpox, diphtheria, typhoid-fever, lockjaw, pneumonia and various other diseases. It is a field which is full of promise and of hope.

This article should not be concluded without a word in regard to the great triumphs which have been achieved by the development of sanitary measures. It is known that certain diseases are propagated by

insects. Malaria is propagated by a particular species of mosquito and the same is true of yellow fever. It is known that the mosquito breeds in stagnant water. The elimination of these diseases from the places where they abound would seem therefore to be dependent upon the elimination of the mosquito. This has been tried on a grand scale in the building of the Panama Canal (q.v.) and in the cleaning up of the city of Havana. The drainage and sanitation of

the Canal Zone are the work of an army doctor, Colonel Gorgas. Without this work the canal could not have been built. By doing this work the Canal Zone has been transformed into an agreeable health resort.

The recent history of medicine has also been marked by the establishment of sana¬ toria for the treatment of particular forms of disease and of various institutions and laboratories for special investigation and re¬ search. Fifty years ago none of these were in existence. The plan of these institutions is to study exhaustively a single disease or group of diseases, experimenting patiently and continu¬ ously upon human beings and animals by means of chemical and biological procedures, by me¬ chanical measures and by means of every other form of assistance which human ingenuity can devise.

This work is prosecuted unceasingly until the cause of the disease is ascertained, and when that point has been reached the study is continued for the removal of the cause or for its effective overcoming. In other words, a life and death struggle is going on between the forces of disease and the intelligence of man as never before, and one after another of the strongholds of disease is being battered down. Not only in this counto*-, but in all the countries of the civilized world has this spirit of inquiry into the cause and treatment of disease infected men as with a consuming fire.

The institutions of investigation and re¬ search may be devoted to the study of a single disease, like cancer with its wide ramifications, an illustration of which is the laboratory for the study of cancer at

Buffalo, N. Y., or they may take up a single disease, study it until all possible information has been gained, and then take up another disease and treat it in a similar manner.

This is the method of the Rockefeller In¬ stitute (q.v.) in New York.

One of the best illustrations of progress in medicine from an institutional point of view is seen in the development of our boards of health and sanitary organizations, municipal, State and national. In many of our cities, especially in those of the first class, they are very highly organized.

Besides the usual care for infectious dis¬ eases they have the responsibility for the purity and healthfulness of the water supply, for the quality of the milk supply, including the con¬ dition of the dairies from which it is derived, or the quality of the food supply in general, for the ventilation and safety of public build¬ ings, for the sanitary condition of tenement houses, for the inspection of school children and the general supervision of their health, and for a great many other functions which have a bearing upon the public sanitary condition.

One of the most important departments of their work concerns their laboratories where evidences of suspected disease are investigated, diagnoses of physicians confirmed or negatived, inoculation material prepared for the treatment of infectious disease among the poor and a great deal of very useful additional work done of which the public at large knows little or nothing.

Hospitals for certain diseases, especially those which are highly infectious, like diph¬ theria and scarlet fever, are also under their

care in some of the cities, and are means for obtaining valuable data concerning the history of such diseases. Of the sanatoria, public and private, which have been established in recent years for the care and investigation of disease, those which are of a public or semi-public char¬ acter are, as a rule, the ones which have ac¬ complished most in throwing light upon the problems which relate to disease.

It is impossible here adequately to represent the wealth of contributions to medical science which have been literally pouring in in recent years, both in medicine and surgery (see War Surgery), but a few instances of recent ad¬ vance will be mentioned. The establishment of the bacterial origin of typhus fever was an¬ nounced in 1915, and the fact that it is trans¬ mitted by lice and other body

insects. The worst epidemic of typhus in modern times be¬ gan in Serbia and was combated successfully by American physicians under the direction of Richard P. Strong of Harvard University, after it had reached a stage where, in April, 9,000 new cases were reported daily. In the same year an epidemic of the plague started in New Orleans and was successfully confined to a narrow compass by the United States Public Health Service. This included the spraying ot buildings, the fumigation of vessels with hydro¬ cyanic acid gas and the extermination of a half a million of rats. This is a highly gratify¬ ing result of the improved state of medical education which quickly senses the advantages of public health work. Efforts to improve the knowledge of physicians who have taken their degrees, but who are too much occupied with their work to be able to go to a distant med¬ ical School for post-graduate work, are now be¬ ing made through a system of post-graduate work at home, a plan originating with the Medical Society of the State of Pennsylvania, in a series of clinics and discussions before county medical societies. This plan was also adopted in North Carolina. The Great War in Europe has brought out extraordinary re¬ sources in medicine with the result that while the conditions known to former warfare have been repeated on a scale of unexampled magni¬ tude, there have been new elements, such as the intensity of the explosives, causing “shell¬ shock, » and the new features such as poisonous gas. Poison gas, “mustard gasw (dichlorethvl-sulphid) was hurled in shells in liquid form and resulted in burns of various severity. When inhaled it caused inflammation of eyes, nose, throat and lungs. As its poisonous effects are produced only in moist conditions and as it has itself very little odor, the results are not manifest for some time. Distress in the stom¬ ach and vomiting ensue after several hours, accompanied with acute conjunctivitis, running of the eyes and photophobia, or oversensitive-ness to light, frequently complicated with laryngitis and bronchitis. If the skin is touched by the liquid, burns result producing blistering and desquamation. In spite of the much more deadly methods used in modern de¬ structive warfare, the deaths due to disease have been reduced from 97 per cent of all deaths in the Napoleonic wars, where only 3 per cent died in battle, and in the Boer War, where the deaths from disease were 67 per cent to 4 per cent in the late war.

A tendency to develop research in medical

fields solely through laboratories in which the intimate structure of the body was studied and the influence of the chemical constituents of the various organs upon each other, and that of the pathogenic elements, both endogenous and exogenous, resulted in a high degree of specialization in which the general practitioner found himself at a loss to keep up with the advances in knowledge. He was therefore more and more in the habit of referring his patients to specialists who confined their re¬ searches to the physiology and pathology of a single organ, such as the eye, the ear, the stomach, the intestines, etc., and the interrela¬ tion of the exceedingly complicated details of physiological process was almost impossible adequately to realize. The weakness of the laboratory and specialist method of treat¬ ing disease was felt mainly because of the fact that only the advanced or at least well devel¬ oped stages of the disease came to the labora¬ tories. This procedure failed utterly to take into consideration the registration of the dis¬ ease in its early stages, a physical condition which is of course actually present, though not visible. These methods, too, relied exclusively on what are known as “physical signs.® These, which are but a limited portion of the true symptoms of disease, are among the last to appear as evidence of the presence of a dis¬ eased condition. It has therefore been realized that there are symptoms of great importance in certain conditions which may be but premoni¬ tory of a later organic disease, and that these symptoms are not physical signs but are mental. This enlarges the function of the general prac¬ titioner, whose knowledge of the lives of his patients and of their antecedents is much more valuable for the treatment than any amount of such knowledge collected by ‘laboratory methods could be. It is also in line with a tendency which is most prominent to-day in practical medicine, namely that which has developed the subject of preventive medicine (q.v.) to its pres¬ ent proportions. This recognition of the men¬ tal registration of disease antecedent to its physical registration as a physical sign is sup¬ plemented by the introduction into psychother¬ apy of psychoanalysis (q.v.), a procedure which originally included only the mental treatment of mental diseases. But it is now recognized that many physical diseases as well as giving mental signs of their onset before the physical signs have a mental origin, are in other words psychogenic, a point of view which opens a new field not only to medicine but also to edu¬ cation. Indeed it is now seen that much, of what was formerly attributed to purely physical causes must now be assigned to faulty or in¬ complete mental processes. Therefore the modern physician needs to know all

he can pos¬ sibly learn of human psychology and its ad¬ vances into the knowledge both of conscious life and of the unconscious; and the old materialistic attitude of the physician who thought that the physical signs and the drugs or operation “indicated® constituted the whole of therapeusis, is giving way to that of the modern practitioner who finds that almost noth¬ ing is irrelevant to the total situation as pre¬ sented to him, and that he cannot treat the body exclusively. If he thinks he is doing that, he is shutting his eyes to the very patent fact that by his authoritative position he is producing a

mental effect upon the patient which in turn has a secondary physical effect which he cannot afford to ignore. In short it may be said that the field of medicine has in recent years both widened enormously and has at the same time deepened, including as it does not merely the mental signs of approaching illness, as well as the formerly recognized physical signs of its later and well developed stages, but also the unconscious as well as the conscious element in the mental factor, a condition which has quadrupled the sphere of usefulness of the physician of to-day as compared with that of the specialist of yesterday.

Bibliography. — Ditman, W. E., Education and Preventive Medicine) (1911); Evans, W. H., (Medical Science of To-day) (1912) ; Hare, H. A., (Modern Treatment: the Management of Disease with Medicinal and Non-Medicinal Remedies) (1912) ; Hillier, S., (Medical and Surgical Science) (1912) ; Kelynack, T. N., (Medical Examination of Schools and Scholars) (1912) ; Lee, F. S., Scientific Features of Modern Medicine) (1911) ; Rockefeller Insti¬ tute for Medical Research, <Studies> (1911) ; Cabot, R. C., (The Layman’s Handbook of Medicine> (1916); Osier, Sir W., Principles and Practice of Medicine* (1916).

Smith Ely Jeli.iffe.

MEDICINE BOW MOUNTAINS, a

range of the Rocky Mountains on the west side of Laramie Basin in central Wyoming. Medi¬ cine Bow Peak, the highest summit, is 12,005 feet above sea level. Most of the area is a high plateau covered with pine forest and in¬ cluded in the Medicine Bow forest reservation.

MEDICINE DANCE, a common practice among the American Indians;

dances being conducted by the medicine men of the tribe for various purposes, and in preparation for differ¬ ent events, like warfare, the hunt, *etc.* Both in the dance before a battle and in the conflict itself the medicine chief is the one man most worthy of consideration. If war takes place he courts the thick of the fight if for no other reason than to show his immunity from danger. The funeral dance of the Yaqui tribe is a rep¬ resentative example of the medicine dance; the chief medicine man arranging the ceremony, which ensures the safe passage of the dead to the spirit world. The dancers to the number of half a hundred appear in the centre of the assembled tribal gathering, naked except for a cloth about the loins. Their bodies are painted in imitation of skeletons. Over their heads they wear masks fringed with long horse-hair, dyed in many hues, eyelashes and eyebrows hang over the rudely designed faces, and beards reach nearly to the waist. On their legs they fasten strings of rattles cut from rattlesnakes, and the sound of these is most grewsome to the spectators. Each dancer carries two knives, one in each hand, with which he gesticulates violently in imitation of the act of slaving imaginary enemies. Every man dances after his own ideas, each seeming to outdo the other in the violence of the motion. Music for the dance is furnished by tomtoms. . After the dance a great feast follows, continuing until midnight.

MEDICINE HAT, Canada, a city in the

southeast corner of Alberta, 600 miles west of Winnipeg and 167 miles southeast of Calgary,

in lat. 50° 2’ N., and long. 110° 40’ W., and is 2,181 feet above sea-level. It is situated on the slope of the South Saskatchewan River which gives it a drainage much superior to towns on the open prairie. The city took its rise in 1883 from the advent of the Canadian Pacific Railway. It is on the main line of the railway and is the terminus of the Crow’s Nest Line. For many years it remained a centre for the cattle ranching industry for which the sur¬ rounding country was excellently suited, the chinook winds which prevail in this part of the

country enabling the horse and cattle to range in the open throughout the winter as during the summer. But the large ranches are rapidly disappearing as the land is being brought under cultivation by the homesteaders. In 1899 Medicine Hat was incorporated as a town and in 1907 as a city. As its earlier de¬ velopment was due to ranching and then farm¬ ing its late development is due to the rise of manufactures. Like Lethbridge it is one of the four principal coal mining centres oQthe prov¬ ince but its most valuable resource is gas. It lies in the centre of one of the largest fields of natural gas on the continent. The gas was first discovered about 1885 when the Canadian Pacific Railway bored on the banks of the river to find coal deposits. The first gas well was drilled in 1890 by a company of local citizens. For many years the gas was gradually developed for domestic consumers but from 1909 it has been more extensively developed as a cheap and excellent fuel for manufacturing purposes. Both gas engines and steam boilers heated by gas are used. The analysis of the gas is as follows: methane 99.49 per cent; hydrogen .51 per cent; B.T.U.s per cubic foot 1,100. The city has 17 gas wells with an aver¬ age daily open flow of two million cubic feet and distributes this to domestic consumers at 15 cents and to manufacturers at 5 cents per 1,000 cubic feet. The city owns and operates its own utilities. The electric plant and the water plant are operated in conjunction, the same boilers producing the power for operating the pumps and the dynamos. The city water supply, taken from the Saskatchewan River, is passed through a sedimentation basin and filter beds and is pumped to a reservoir on a hill overlooking the city from which it is carried by gravity pressure. There is also a sanitary sewage system, the sewage being deposited in the river some distance below the city. The streets are all 66 feet wide, are all macadam¬ ized and have been well planted with trees. The sidewalks are of cement. The manufac¬ turing and business section is built of brick while the private residences are mostly of wood construction. There is a dry-farming demonstration farm, also a business college, a general hospital, a grain elevator, flour, lin¬ seed-oil, rolling and planing mills, brick works, a steel plant, lumber, glass works, foundries and machine shops. Pop. 9,272.

MEDICINE MAN, among the American

Indians, South Sea Island tribes and other sav¬ ages, a man supposed to possess mysterious healing powers. Among most savages the medi¬ cine man occupies much the same position as that held in civilized communities by two of the learned professions — medical and clerical. The medicine man is both priest and physician,

and is at once the repository of all that a tribe knows, fears and believes. In very low stages of human development, however, he is at best only a magician, dealing in terrors, possessed of occult powers, but laying claim to no special medical knowledge. Thus, among the aborig¬ ines of North Queensland, the tribal doctors do not attend on the sick — an invalid being cared for by wife or mother. They are not ostenta¬ tious, a medicine man being distinguished by no insignia save a small bag for his talismans, death charms and1 other “credentials.® Among the North American Indians medicine men are treated with great respect, and form a secret society with exclusive privileges and “exercise a terrible influence in degrading the people.® It is curious to find that, as in Australia, the Indian medicine men are chiefly concerned to do positive harm. In cooperation with good and bad spirits, they bring about the deaths of men or dogs at a distance. Among the Ojibways they are a kind of brokers in vengeance, and a coward or a hypocrite who wishes to be covertly avenged upon an enemy will bribe his tribal medicine man to employ the medical attendant of his victim. Then, if the victim dies, the instigators remain, unsuspected, and the actual perpetrator of the crime probably goes scot free. Indian medicine men affect to suck out poison from a patient’s body, or they cough up an arrow point or small, sharp piece of stone or bone which they suppose has been transferred from him to them by the evil spirit of another sorcerer. The medicine men of the Eskimos are even more extravagant in their pretensions. They profess themselves able to change into wood, stone or animal, or even to walk on the water, or to fly, but they make a condition, which is that “no one must see them.® See Indians.

MEDICINE AND PSYCHIATRY, Psy¬ chology in. Although the great power of sug¬ gestion has been recognized from the earliest human times and the powerful influence of the mind on the body somewhat understood for centuries, the medical schools obviously have in general belied their high privilege of first studying and then teaching the relations and mutual dependence of body and mind. The}r have neglected psychology. It has been a char¬ acteristic of modern scientific medicine that it has integrated inadequately, and therefore been unduly narrow (in this respect) in its range, — these two facts indeed being but natu¬ ral results of the plain over-guidance by the tradition of materialism. And this is strange to the average man and unaccountable to a degree, for the best English and, to a less ex¬ tent, French attitude was one of adequate and practical realization of the health’s frequent dominance by the mind, and the width and depth and misunderstood complexity of the in¬ fluence of that which we designate as mental. John Locke influenced the experience of early

English medicine more than did the materialist Thomas Hobbes ; but America somehow nar¬ rowed if it did not “harden® its medical heart.

The practical result of this trend has been a regrettable, not to say surprising, slowness in medical education’s recognition that the practi¬ tioner invariably should know the broader rudi¬ ments at least of psychology; have systematic, however brief, acquaintance with the founda-

tion-principles of the relation of body and mind ; and above all be forced to realize, against the old traditional materialistic prejudice, that every patient is mind quite as importantly as body. Every reader knows this for himself.

Because, in part, of his varied education, the present writer was almost a pioneer in prac¬ tical attempts to correct this particular narrow¬ ness of American medical education, although laboring meanwhile under quite characteristic difficulties, such as the tradition of the schools and lack of time and of funds. To repeat part of an article in Science , 18 years ago (26 July

1901):

The education given to the medical student seems in general too grossly materialistic, too somatic. He learns but one side of this two-sided story; from the first year to the fourth, from the dissecting room to the gynecological or otological clinic the routine student sees and hears of muscles and bones, and viscera, sense-organs, nerves and vital fluids, but little, unac¬ countably little, of that other aspect of men and women which to these very men and women is their life, while these other, these organs, are but needful instruments of that life's attainment. And their point of view, it need not be said, is also that of philosophy; shift it, and illogical confusion follows. The layman cares little or nothing for his stomach's condition so long as it gives him no pain and takes good care of what his will and his ap¬ petite lead him to supply to it. The woman in search of a happy family life thinks seldom of her reproductive mechanism so long as it gives her healthy children whom she can love. There is something beside cell-built tissue for the gynecologist in charge of an operative case to consider when of two women, alike in vigor, who undergo identical ovariotomies, for ex¬ ample, one goes in three weeks from the hos¬ pital a new woman, cheerful, capable and happy, while the other becomes an hysteric wreck never perhaps to equal her former self in happiness or in health. As every surgeon knows, such differences are.

met continually and they puzzle him. Why is it that present medical education takes no account of the principles underlying phenomena like this?

So far as the student is concerned, the course, four years or three years long, quite ignores in general the emotional and tempera¬ mental factors which in one way or another, directly or indirectly, less or more, enter into almost every chronic case and into many of the acute cases which the general practitioner is called upon to treat. Instead of striving to teach the student what conditions underlie men¬ tal habits and idiosyncrasies,, medical instruc¬ tors are now content to practically ignore them regardless of possible great benefits to come from their study as psychological data.

Too often is the medical man the most ma¬ terialistic-minded member of a community, when his view should be much deeper, into the controlling forces of life. This is the natural outcome when in a long medical course no part of the individual is shown to the student ex¬ cept what he can feel with his hands or see through the microscope. Yet how commonplace is the assertion that the man, the real man or woman, is not his or her body, but the will, affections, habits, character, of the individual, while (what is more immediate to our argu¬

ment) these same aspects of consciousness are often the direct molders, or destroyers of dis¬ ease and, as one side of an inseparable psycho¬ physical organism, have more control or influ¬ ence over the functions purely somatic than the average practitioner of medicine appreciates. Not mind controlling body nor body controlling mind, but both together always sensitive to the stimuli of a common environment, combined into the actual individual.

The whole trend of modern biologic sci¬ ence is toward the appreciation that neither factor of personality, body or mind, in justice to the medical student and through him to the public may be longer ignored.

Agreeably to such convictions, the catalogue of the Tufts College Medical School of 1900-01 contained announcement of a course in ((Normal Medical Psychology.® This was con¬ tinued for nine years, when by arrangement with Prof. Morton Prince, it was developed into a course termed <(Psychopathology and Psycho¬ therapeutics.® In 1912 (for lack of funds to pay the lecturers) the psychological work

was abandoned. Such a record of pioneer develop¬ ment in medical curriculum is instructive in several respects to all of those who believe that a physician should realize that his patients have minds influential to a degree at present quite indefinable but more and more appreciated. So far as known, the Johns Hopkins medical department alone preceded in the practical and systematic realization of this basal fact.

The slowness with which adequate courses in normal medical psychology are made re¬ quired parts of medical curricula, is another depressing sign of the essential narrowness of the average professional outlook into life and philosophy, just as it is another evidence that medicine is for some of its practitioners still largely a trade wherein no facts are either of interest or desirable, no breadth of view admit-table, that has not a banknote or its equivalent closely attached. Hasten the progressive day when without the broadening education of the college bachelor's course at least no man or woman shall be allowed for gain to take charge of the human personality of a fellow mortal ! For without his psychology he knows only about half of the being whom he pretends thoroughly to understand.

The reasons in particular for this insistent need of psychology in medical education the writer already in part has summarized in an article in the New York Medical Record of 30 Jan., 1909.

The Physician's Need of Psychology. —

The most obvious and immediate need for sys¬ tematic medical psychology comes, of course, from psychiatry and neurology. That the de¬ mand does not come even more insistently than it does from the teachers of these subjects, especially of the former, is one of the anomalies of the whole matter. When one does not ex¬ pect a student to understand the deranged movements of the heart who has never seen a healthy heart or a representation of one, why should the multitude of third-and fourth-year men who know nothing of the processes of perception and imagination be expected to com¬ prehend an hallucination? Or those who have never been told of the mechanism of the emo¬ tion of fear to understand the depression and misery of melancholia? One asks too much in

expecting any man to really comprehend a case of paranoia who has no notion of the processes of ideation. And neurasthenia, the bread-and- butter malady to practitioners of nervous dis¬ ease, does any suppose it is not so intertwined with mental relationships that to unravel it in full is to make use inevitablv of no little various and intricate psychology ? The modern variants of the ((rest cure® require a knowledge of the motor relationships of the mind, and else this valuable system of retraining the mind back to health through controlled voluntary use of the muscles would lose much of its precision and basal usefulness.

In a less technical way, perhaps, but quite as importantly in the long run, the surgeon as a surgeon needs to be familiar with mental processes. It is especially important that he should realize the often surprising life-length¬ ening support and stimulation, technically called dynamogeny, that belongs to the joyful emotions. Scarcely less useful oftentimes, ex¬ plain it as one may, is the vitalizing influence of determination, of vigorously expressed will to thrive and to live. Aristotle and John Hun¬ ter down to the latest of them all agree in ad¬ mitting these facts, however the future science of normal medical psychology shall in detail interpret and explain them. Does the sceptic (if such, perchance, persist into these ((latter days®) know of a single really great surgeon who does not inevitably inspire the almost per¬ fect confidence of every patient under his care? Can the master-surgeon actually cut us up .in¬ variably so much better than his struggling neighbor in the next block uptown? Or is his far greater success due in part to his exaction of confidence in his knowledge of human nature as really it is — mind as well as body, — giving us confidence and so inspiring hope and all the guarding and reparative powers of pleasant and stimulating emotion? The physiology and psychology of this important influence we now fairly well understand.

In a still more general way, the successful practitioner in medical cases as distinct from surgical, consciously or otherwise, uses the prin¬ ciples of psychology in a very large proportion of his practice. One need not attempt the laborious task of specification here, for every practitioner must nowadays realize to some ex¬ tent the mental factors in every complex disease.

The Need of Psychological Instruction for Breadth. — In all

departments of the sci¬ ence of medicine there is always an urgent demand for a broader outlook than the average medical student can obtain without a prelimi¬ nary college course. It is easy to underesti¬ mate the influence and the importance to human¬ ity of the profession of medicine.

Medical philosophy reaches out. into almost every aspect of human relationship, and thus it pervades, and in considerable part directs, every phase of modern human society. That it does not do so to even a greater extent than it does is largely because the nature of person¬ ality is not adequately studied in the medical school. Many phases of the individual are of¬ ten exhaustively considered, but at present it is no one's business to combine these scattered parts into the wholeness of the individual child or man or woman. And yet everv patient is an individual, a personality, and has a heart

and kidneys and nervous system and all the rest only as parts ministering to this personality.

It is one of the important tasks of the medical psychologist to weave these scattered threads of organic knowledge into this actual personality. Then at last the average physician will know, in some measure at least, how to follow the sound advice of the numerous orators at com¬ mencement who advise the graduates *'to treat not the disease but the individual suffering from the disease.® The somatic aspects of the man are adequately treated in many, and perhaps in most essential, respects, but of the inner side of the ((arc of personality® one hears but little as yet from the teaching faculties of medicine. The tide, however, is coming in !

The psychology of sex is a phase of educa¬ tion for which there is continually a more ob¬ vious demand from a grossly wronged and de¬ graded society, and consequently from edu¬ cators.

The course in legal medicine in the medical schools demands for its greatest usefulness the basis of psychological knowledge which should precede it in the curriculum. Human misery and crime often depend on motives more psych¬ ical than physiologic.

Psychology's Influence on the Physician Personally. — Medical instruction in psychology undoubtedly would make the physician more sympathetic with his patients than sometimes he now is. With this added sympathy he would serve them better because more

understand¬ ingˆ. He would tend to approach then the ideal of the oldtime family practitioner, “guide, philosopher and friend.® Knowledge of the processes and relations of mind would be to the physician himself a source of great and unending satisfaction. Related to it is not onlv the knowledge of human nature, that never tiring source of interest and delight, but psy¬ chology leads outward in all directions into the true wisdom of divine philosophy.

In 1913 the American Psychological Asso¬ ciation, by a committee, investigated the status of psychology in American medical schools. One of the questions asked the deans related to the advisability of special instruction in psy¬ chology. Of the 71 schools (only 71) answer¬ ing this question, 73 per cent replied in the affirmative, 12 per cent in the negative, while 15 per cent gave a qualified answer one way or the other. How slow is the recognition that emotions and ideas control the bodv !

Psychology in Relation to Psychiatry. — It is obvious that the medical care of insanity cases, if more than <(asylum® is to be offered these “unhappy® souls, must depend as much on the physician’s knowledge of psychology as on somatic medicine. At present it is in a widespread area of our country nothing less than a reproach that so few professional psy¬ chologists are trying to relieve and to cure the insane. In every case, from the irrational paranoiac to the terminal dement, much knowledge of the normal mind would seem to be a not wholly unreasonable requirement in an attending physician ! As yet the percentage who have such knowledge is so small as to con¬ stitute a reproach to organized medical effi¬ ciency and nothing less than that. Even the superintendents of these institutions conducted for the cure or the care of diseased minds are seldom or never psychologists. And still many

of the hospitals have no such modern improve¬ ment about the place.

George Van Ness Dearborn, Medical Corps, United States Army.

MEDICINES. See Chemistry, Progress of.

MEDICK, a plant genus of the natural order Leguminosae, native of the temperate and warm belts of the Old World. The pods have spiral twists and the genus includes very many species, both annual and perennial, with trifoli¬ ate leaves closely resembling the clovers. Some species have been introduced into the United States, of which lucerne and alfalfa are eco¬ nomically the most important. Several Rus¬ sian species which require little moisture have recently been introduced in the arid and semi-arid regions of the West and have been proved a success. See Medicago, and consult bulletin 108) of the Texas Agricultural Experiment Sta¬ tion (1908) and (Bulletin 165 } of the Alabama Agricultural Experiment Station (1912).

MEDILL, me-dir, Joseph, American jour¬ nalist: b. New Brunswick, Canada, 6 April 1823; d. San Antonio, Tex., 16 March 1899. Having early removed to Massillon, Stark Countv, Ohio, he was admitted to the bar in 1846, practised at New Philadelphia, and in 1849-51 published at Coshocton the Republican, a Free-Soil paper. In 1852 he established at Cleveland the Forest City, a Whig organ, which in 1853 was united with the Free Democrat and called the Leader. In 1855 he sold his interest in the Leader, re¬ moved to Chicago, with two partners purchased the Tribune, advocated radical anti-slavery measures and supported Lincoln in 1860. He was a member of the Illinois constitutional con¬ vention of 1870; United States civil service commissioner in 1871 and in that year was elected mayor of Chicago. In 1874 became edi¬ tor-in-chief of the Chicago Tribune, in which relation he remained until his death. It was largely due to his individual efforts that the city of Chicago was selected for the World's Fair of 1893.

MEDINA, Jose Maria, hd-sa' ma-re'a ma-de'na, Central American politician : b. Hon¬ duras, about 1815; d. Santa Rosa, 8 Feb. 1878. He was president of Honduras in 1862-63 and was reelected in 1864-66 and in 1870. The war with Salvador in 1871 disturbed his hitherto successful administration and at the next elec¬ tion he was defeated by the Liberal party who elected their candidate Arias. Defeated again by Leiva in 1874 Medina raised an unsuccessful revolt in 1875-76 and in 1877 a second revolt was punished with death by court-martial.

MEDINA, Jose Toribio, Chilean bibliog¬ rapher: b. Santiago de Chile, 1852. He received his education at the National Institute and the University of Santiago, being graduated in law at the latter institution in 1873. At the age of 22 he was appointed secretary of legation at Lima. In that city he made investigations in the archives and in 1878

after his return to Chile he published a history of Chilean litera¬ ture. Already in 1874 he had published a metri¬ cal translation of Longfellow's (Evangeline^ In the war with Peru, Medina served in the army and at the close of the war was made judge in the provinces ceded by Peru. He was made secretary of legation at Madrid in 1884 and here also he delved into the Spanish ar¬

chives dealing with the Spanish in America and especially the history of Chile. He returned to his native country after several years' residence in Europe. He went abroad again in 1902 and also visited the United States to make further historical studies. Medina's great work is the (Biblioteca hispano-americana, 1493— 1810> (7

vols., 1898-1907), which contains notices of 10,000 works. Other bibliographical works are (Historia y bibliografia de la imprenta en el antiguo virreinato del rio de la Plata) (1892) ; (La imprenta en Manila desde sus origenes hasta 1810 } (1896) ; (Biblioteca hispano-ameri¬ cana septentrionaP (1897); (Biblioteca hispano-chilena, 1523-1817> (3 vols., 1897-99) ; <La im¬ prenta en Bogota, 1739-182U (1904); <La im¬ prenta en Guadalajara de Mexico, 1793-1821 > (1904) ; (La imprenta en Guatemala, 1660-1821 > (1910) ; (La imprenta en la Habana, 1707-1810) (1904) ; (La imprenta en Lima,

1 584-^ 1 824 } (4 vols., 1904-07) ; (La imprenta en Mexico > (1907 —) ; (La imprenta en puebla de los Angeles, 1640-1821 > (1908); etc., *etc.* Me¬ dina's historical works are also important since they are based on manuscript sources. They in¬ clude (Historia de la Inquisicion en Lima* (1887) ; (E1 Tribunal del Santo Oficio de la Inquisicion en Chile) (2 vols., 1890) ; (Juan Diaz de Solis) (2 vols., 1897) ; (La Inquisicion en las Islas Filipinas) (1899) ; (La Inquisicion en Mexico* (1905); (E1 Portugues Esteban Gomez> (1908) ; (E1 veneciano Sebastian Ca-boto) (2 vols., 1908) ; (Medallas coloniales hispano-americanas) (1900) ; (La instruccion publica en Chile> (2 vols., 1905) ; (Diccionario biografico colonial de Chile) (1906). He edited 30 volumes of (Colecci6n de documentos ineditos para la historia de Chile.* Consult Chiappa, V. M., ^oticias acerca de la vida y obras de Don Jose Toribio Medina) (Santiago 1907).

MEDINA, or MEDINEH, me-de'na, Ara¬ bia, the native Medinah-al-Nabi or City of the Prophet (also Medinat Rasul Allah, City of the Apostle of God), 500 miles southeast of Pales¬ tine, 250 miles north of Mecca and about 110 miles east of Yembu on the Red Sea. It is reached from Damascus by an 820-mile railway journey. The city is

celebrated for containing the tomb of Mohammed, whence it ranks sec¬ ond to Mecca as a pilgrimage resort of Islam. It is situated in the most fertile spot of all He-jaz, the streams of the vicinity tending to con¬ verge in this locality. An immense plain ex¬ tends south from it; in every direction the view is bounded by hills and mountains. The town forms an oval, surrounded by a strong stone wall, 30 to 40 feet high, that dates from the 12th century, and is flanked with towers, while on a rock, at its northwest side, stands the cas¬ tle. Of its four gates, the east Bab-el-Misri, or Egyptian gate, is remarkable for its beauty. Medina has no large buildings except the great mosque, two smaller ones, a college and public baths. The houses are of stone, two stories high. Beyond the walls of the city, west and south, are suburbs consisting of low houses, yards, gardens and plantations. These suburbs have also their walls and gates. The mosque of the Prophet stands at the east side of the city and resembles that at Mecca on a smaller scale. Its court is almost 500 feet in length, the dome is high and the three minarets pic¬ turesque. The tomb of the Prophet, who died and was buried here in 632, is enclosed with a

screen of iron filigree, at the south side of which the pilgrim goes through his devotions, for all of which he pays, but is consoled with the assurance that one prayer here is as good as a thousand elsewhere. The tombs of Fatima (Mohammed's daughter) and Abu Bekr (father of his wife Ayesha), and of Omar, the first calif, are also here. The mosque dates from the period of Mohammed, but has been twice burned and reconstructed. Omar and Othman both enlarged the original simple brick structure. It was again enlarged by the Calif Walid, so that it enclosed the three tombs. It was destroyed by lightning, probably about 850, and the graves almost forgotten. In 892 the place was cleared up, the tombs located and a fine mosque built, which was destroyed by fire in 1257 and almost immediately rebuilt. It was restored by Khaid Bey, the Egyptian ruler, in 1487. It is estimated that one-third of the pilgrims to Mecca go on to Medina, the pil¬ grimage to which may be performed at any time of the year. In the time of Ptolemy the town was known as Lathrippa. There never

was much population until the place acquired fame as a resort for pilgrims. The city has been built up by acquisitions from visiting pil¬ grims, who recognized the opportunities for making money here by catering to visitors. For this reason the local people are heterogeneous and stand for nothing but keeping up the crowd of pilgrims. Since 1814 Medina has been the capital of the north pashalic of Arabia. Pop. 40,000. In June 1916 the Grand Shereef of Mecca proclaimed his independence of Turkey. Mecca thus, with the founding of the new king¬ dom of Hejaz, was lost to the Turks; Medina held out, however, until 13 Tan. 1919, when the Turkish garrison under Fakhri Pasha sur¬ rendered to the Emir Abdullah, the representa¬ tive of King Hussein of Hejaz. Consult Bur¬ ton, Sir Richard Francis, <The Pilgrimage to Al-Medinah and Meccah) (London 1855). See Mohammed.

MEDINA, me-di'na, N. Y., village, in Or¬ leans County, on Oak Orchard Creek and on the Erie Canal, and on the New York Central and Hudson River Railroad, about 35 miles northeast of Buffalo and 12 miles from Lake Ontario. The first settlement was made about 1830. In 1832 it was incorporated as a village. It is in a fertile agricultural region in which the chief products are grapes, apples, straw¬ berries and other fruits and dairy prod¬ ucts. In the vicinity are valuable sandstone quarries from which is obtained excellent build¬ ing stone. The water-power is excellent and has been increased by a storage dam. _ Elec¬ tricity is used as a power in manufacturing as well as for light. The chief manufactures are pumps, iron, foundry products, shirts, shoes, vinegar, flour and furniture. It has a large trade in fruit and sandstone. The Medina Falls are visited annually by a number of tour¬ ists. The government is vested in a president and board of trustees. Pop. (1920) 6,011.

MEDINA, Ohio, village and county-seat of Medina County, on the Baltimore and Ohio and Northern Ohio railroads, 30 miles southwest of Cleveland. Here are located the Sylvester Li¬ brary, the Pythian Sisters' Home and Spring Grove Cemetery. Its industrial establishments comprise bee-supplv works, foundries md bend¬ ing works. Pop. (1920) 3,430.

MEDINA SERIES, in geology, a term fn—

troduuced by the New York Geological Survey for a subdivision of the Upper Silurian series, apparently the base of that system. It is named from Medina, N. Y. ; occurs throughout the At¬ lantic States ; and

includes shales, conglomer¬ ates and sandstones. For the Medina sand¬ stone see Levant.

MEDINA SIDONIA, ma-de'na se-do'ne-a, Spain, a city in the province of Cadiz, 20 miles southeast of Cadiz and 55 miles northwest of Gibraltar, built in the form of an amphitheatre on a broad eminence, in the middle of an ex¬ tensive plain, noted for its agricultural prod¬ ucts and cattle rearing, which constitute the chief occupations of the population. A fine Gothic church, a town hall and the ancestral palace of the famous dukes of Medina Sidonia are the principal buildings. Pop. about 11,000.

MEDINET EL FAYUM, Egypt, capital of the province of Fayum, on the Bahr-Yusuf, 155 miles south of Cairo. It contains a fine bazar and a mosque. It has an extensive trade in grain, woolens and roses. Woolens are man¬ ufactured. An American mission is established here. Pop. 37,320.

MEDITATIONS OF LAMARTINE.

The (Meditations5 (1820) and '-Nouvelles Meditations5 (1823) of Lamartine should be counted rather as heralds of the Romantic School of French poetry than as products of it. The former, its author's first publication — he was then 30 — appeared five years after Water¬ loo. Its sentimentalized melancholy voiced so admirably the temper of that period of political reaction and moral exhaustion that it achieved a success in its day hardly paralleled. Its appeal was to the cultured only, but 40,000 copies of the ˆMeditations5 were sold in four months. The modern reader must strive to realize the temper of 1820 if he would comprehend how these rather thin and always superficial reflec¬ tions on the relations of man to (<Nature55 — a creation of the poet's morbidity, with little rela¬ tion to reality — rather than to his fellowmen, found admiration so ardent, that successive volumes of verses, in his own phrase, ((fell from my pen like drops of evening dew,55 while the poet found himself ((incapable of the exacting labor of the file and of criticism.55 ((The soul of the poet,55 he writes in a volume of Con¬ fidences,5 <(is a running brook which writes its murmurs and sings them, but we write them with human notes and Nature with the notes of God.55

The (Meditations5 were the work of an army officer, but it was the army of the Res¬ toration, more responsive to Rousseau's call for a return to nature and to Chateaubriand's for a return to religious emotionalism than it was to any summons to action. When that mood passed and France recovered the energy that showed itself in politics

by the Revolution of 1830 and in literature by the Romantic School, the (Meditations5 soon came to be little read, though still conventionally admired. Unques¬ tionably, however, they were the most complete literary reflection of the sentiments and aspira¬ tions, the self-deceptions and illusions of the generation of 1820. This gives them a last¬ ing value, greater than their merit of content or of form.

Lamartine's verses preserve much of the

verbal mannerisms of the earlier period. They are harmonious, refined, delicate, graceful, sin¬ cere, spontaneous, <(the indolent pleasure of a too-richly gifted mind.® On the other side they are conventional in expression, monoto¬ nous in feeling, elusive in development. The themes are throughout those of the true lyric — nature, love, death. The essence of all La¬ martine's voluminous poetic effusion can be seen in its full potency in some of the very earliest of the Meditations,' for instance, in The Lake (Le Lac), accounted by some to be La¬ martine's best poem, in Loneliness (L'lsole-ment), and in the vague pantheistic melancholy of Prayer (La Priere). In the (Nouyelles Meditations' the poet's congenial marriage is re¬ flected in the happier vein of the Love Song (Chant d' Amour), Wisdom (La Sagesse), Is¬ chia and The Preludes (Les Preludes), but the poet soon resumes the melancholy pose. The Ode on Bonaparte in this collection goes deeper and rises higher than is usual in La¬ martine ; as indeed there is unwonted grace in Ischia and force in The Crucifix. Never so popular as the earlier book, (Nouvelles Meditations) are preferred by many critics, and Brunetiere even pronounced them ((at once the noblest and the most voluptueux in French po¬ etry.® It is juster to say, with Lanson, that if, and so far as, poetry is essentially sentiment, disengaged from the ideas and facts that pro¬ duce or accompany sentiment, the (Meditations' are great poetry and Lamartine is among the most poetic of poets. Consult (Life of Lamartine) by H. R. Whitehouse (New York 1919).

Benjamin W. Wells, Author of (Modern French Literature .'

MEDITATIONS OF MARCUS AURE¬ LIUS, The. There is probably no more ro¬ mantic story of a book in the history of litera¬ ture than that of the volume known as the Meditations of Marcus Aurelius.' It is merely the commonplace book or diary of a Roman emperor (121-180 a.d.), who at the end of a very busy and troublous reign, just when worries were thickest, jotted down all the seri¬ ous thoughts that came to him with regard to the meaning of life and the wav it should be lived. He called his little book simplv ((To Himself.® It was probably, meant only for his own perusal when he was in meditative mood. He so loved the Greek Stoic philosophers whose writings had been his inspiration and consola¬ tion that he wrote in Greek. It is not good Greek any more than the ˆImitation of Christ' is good Latin. He paid little attention to the style of it, and yet Headmaster Rendall of Charterhouse in his Introduction to the ˆMu¬ tations' does not hesitate to say that ((in the whole range of Greek literature, no work (ex¬ cepting the New Testament) has wider vogue and currency than these untutored meditations of the imperial moralist.®

The book created a furore in the Renais¬ sance when it was first edited and printed, but it has never ceased to be the favorite reading of thoughtful scholars. John Stuart Mill de¬ clared the (Meditations' as ((almost equal in ethical elevation to the Sermon on the Mount." Matthew Arnold went so far as to. sav that Marcus Aurelius remains the especial friend and comforter of all clearheaded and . scrupu¬ lous, yet pure hearted and upward striving men

in those ages most especially that walk by sight, not by faith, but yet have no open vision." Americans will be interested to know that the (Meditations' of Marcus Aurelius were with Machiavelli's (Art of War' the daily study of Capt. John Smith, the Virginia pioneer whose romantic history might seem to indicate some less stern and stoic reading. The Roman em¬ peror's little book has often since been the daily resource or even the boon companion of men of action in the field as well as of statesmen wor¬ ried over matters of politics, and of scholars with time on their hands.

It has been suggested that perhaps this last of those Spanish Cresars, under whose rule for 80 years Gibbon thinks that the world was hap¬ pier than it has ever been before or since, had the idea while he was jotting down these scat¬ tered thoughts on life that some time or other they might be of service to his son Commodus. If that were so, the book might serve as the contrast to Chesterfield's letters. The modern English nobleman wrote an epitome of worldli¬ ness ; the

ancient emperor a manual of other¬ worldliness. But if Marcus Aurelius wrote for the eye for his son, he was sadly disappointed, for Commodus was probably one of the worst rulers of history. For his weak selfishness no advice would have availed.

The 12 books treat of : I, The debts that he owes for all that has come to him in life — (here are tributes to his grandfather — his father died when he was very young — to his wife <(so docile, so affectionate, so simple," and to many dear friends) ; II, On doing what you do; III, That to obey God is liberty; IV, That there is no such thing as chance; V, On the real goods of life; VI, That the inner life is all that counts; VII, On repressing impulse and find¬ ing self-content; VIII, On equanimity; IX, Fate leads the willing man, but drags the un¬ willing; X, Look around you, look behind you, look ahead of you; XI, Unselfishness; XII, (In conclusion) (<Depart then satisfied for he who also releases thee is satisfied."

When the Emperor Julian whom the modern world knows as the Apostate would sum up the life of Marcus Aurelius in a single phrase he gave an excerpt from a dialogue supposed to take place not long before his predecessor's death : ((Then Hermes, looking at Marcus, said, (And to you, Verus [Marcus' family name], what seemed the noblest end of life?' Quietly and gravely he replied, (The imitation of God.' "

Consult Watson, (Life of Marcus Aurelius' (New York 1884) ; (Marcus Aurelius,' in

Matthew Arnold's (Essays in Criticism' ; Ren¬ dall, (Marcus Aurelius Antoninus' (London 1901) ; Long, (The Meditations of the Emperor Marcus Aurelius Antoninus' (London 1862) ; Canon Farrar, (Marcus Aurelius,' in (Seekers After God.'

James J. Walsh.

MEDITERRANEAN (med"i-te-ra'ne-an) SEA, the great inland sea between the conti¬ nents of Europe, Africa and Asia, the remnant — 'according to Professor Suess — ((of a great ocean which at an early geological epoch, be¬ fore the formation of the Atlantic, encircled half the globe along a line of latitude." From its eastern extremity in Syria to the Strait of Gibraltar it is about 2,300 miles long; its maxi¬ mum width from Venice to the Bay of Sidra

is 1,200 miles; its average width 300 miles. Its area is variously estimated as from 815,000 square miles to 1,145,000 square miles. The shores of Europe are on the north and northwest, those of Africa on the south and those of Asia on the east. The Mediterranean is connected with the Atlantic by the. Strait of Gibraltar, and on the northeast with the Black Sea through the Dardanelles, Sea of Marmora and the Bosphorus, which form a continuous waterway. It is irregular in shape and by the projection of the south part of Italy, and of Cape Bon in Africa and the in¬ terposition of the island of Sicily, is divided, near its centre, into two distinct portions, an east and a west. In addition to these, the other important subdivisions are the Tyrrhenian or Tuscan Sea, between the west coast of Italy and the islands of Sardinia and Corsica; the Adriatic Sea or Gulf of Venice, between the east coast of Italy and the west coast of Jugo-Slavia and Dalmatia; the Ionian Sea, between the west coasts of Albania and Greece, and the south part of Italy and the island of Sicily; the zEgean Sea or Archi¬ pelago, between Greece on the west and Turkey in Asia on the east; and the Levant, which is usually understood to include the whole sea east of the island of Crete. The largest gulfs are, on the shores of Eu¬ rope, those of Lion or Lyons, Genoa, Taranto, Lepanto, Koron, Kolokythia and Salonica ; 911 the shores of Asia, Adrymiti, Smyrna, Adalia, and Skanderoon; and on the shores of .Africa, Sidra and Cabes. The largest and most import¬ ant islands are Sicily, Sardinia, Gprsica and the Balearic Isles, in the west division; and Cyprus, Rhodes, Crete, the Ionian Isles and Malta, in the east division. The principal rivers which discharge themselves into the Mediterranean are the Ebro, Rhone, Po and Nile; but its communication with the Black Sea entitles it to claim it as part of its basin, and, consequently, also the great rivers Don, Dnie¬ per, Dniester and Danube. Between Cape Bon and the Sicilian coast, where the sea is shal¬ lowest, the depth varies from 30 to 250 fath¬ oms; but in almost all other places, particu¬ larly at a distance from the shores and islands, the depth is very much greater, the maximum depth in the eastern division being 2,150 fath¬ oms, in the western division, 2,040 fathoms. The mean depth is practically equal in the east and west divisions, about 883 fathoms. However, half the area is less than 500 fathoms deep. The depth temperatures are very much warmer than in the Atlantic. Owing to the very narrow channel which connects the. Medi¬ terranean with the main ocean, there is very little tide ; though in some places, as in the Ionian Sea, the Adriatic, on parts of the Afri¬ can coast, etc., a rise of more than six feet sometimes occurs. The prevailing winds are the southeast and southwest in spring, and the northeast and northwest during the rest

of the year. They often rise suddenly and with, great violence. The most remarkable are the historic Euroclydon or Levanter, mentioned in Acts xxvii, 14, a northeast wind of dangerous whirl¬ wind characteristics; the Bora in the Adriatic; the Etesian and Tramantona in the ZEgean ; and the burning Sirocco from the African desert. The Mediterranean abounds with fish, some 400 species having been noted, and also

furnishes the finest coral and sponge. The evidences of volcanic action along its shares are present in the active volcanoes of Vesuvius, Etna and Stromboli (qq.v.). Consult Playfair (The Mediterranean, Physical and Historical (1890) ; Cook, J., (The Mediterranean and Its Borderlands> (Philadelphia 1910).

MEDITERRANEAN SUBREGION, a zoogeographical district of the Nearctic Region, embracing the basin of the Mediterranean and the plains of Syria. Faunistically this region is allied to Europe rather than Africa or Asia, from which it is separated by deserts. It in¬ cludes many subtropical forms, rarely or never seen north of the Alps or south of the Atlas Mountains. See Zoogeography.

MEDJIDIE, me-jede, a Turkish order equivalent to knighthood, instituted by the Sul¬ tan in 1852. It has been conferred on numer¬ ous foreign officers, soldiers and seamen, who have taken part in wars on behalf of Turkey. It is divided into five classes, indicated by the difference in size of the decoration. Recipients of the first order, in addition to the large gold and red decoration, receive a star to be worn on the left breast. The accompanying ribbon is red and green. The name is also given to a modern Turkish silver coin, value about 85 cents.

MEDLAR, a small tree or shrub (Mes - pilus germanica) of the apple family and a native of southern Europe where in the wild state it has thorns, but in cultivation it is thorn¬ less. It differs from various near relatives, such as apple and pear, in bearing solitary, large, white, terminal flowers upon leafy growths of the current season, and, like the quince, in having no detachable peduncle to the fruit in which the receptacles do not completely overgrow the ovaries. It is widely grown in Europe but much less in America. In Central New York it is fully hardy and produces well with no special care. The top-shaped fruit, which is about the size of a small pear, should be allowed to hang until after a frost, which mellows its austerity and assists the process of ˆbletting,® as ripening in cool dry rooms is called. When in a state

of incipient decay the softened fruits are eaten by those who enjoy tart flavors, or are made into preserves.

MEDOC, ma-dok, a wine which derives its name from a district of France, in the ancient province of Gascony. The modern locality is termed Charente-Inferieure ; it is mostly covered with vineyards, which are cultivated with great care,, and the wines produced from which have a high reputation. They are dry, still and delicate, resembling Bordeaux wines, which territory is immediately south of Medoc. See Wine and Wine-making.

MEDULLA, in botany, the pith of a plant-stem. See Pith.

MEDULLA OBLONGATA, the brain¬ stem, or that part of the nervous system that lies between the pons, or pons Varolii, at the upper end, and the spinal cord proper, with which it is continuous, at its lower end. It is a very old part of the nervous system, judged from the standpoint of evolution, and in it are located the important centres of most of the cranial nerves, including the centres that govern the nerves of the heart and of respiration. It

is a triangular cone-like portion of the nerve-axis, about an inch in length and one-half to three-quarters of an inch thick, being tubular below ana battened above. Below, it closely resembles the cervical cord in its internal con¬ struction, but above great changes take place to accommodate important new structures. One of the most conspicuous features of the medulla consists in a triangular enlargement of the cen¬ tral canal of the cerebrospinal axis, constitut¬ ing what is known as the fourth ventricle. The lower seven cranial nerves have their apparent origin in the medulla, and the first spinal nerve also originates in the medulla proper. The internal anatomy of the medulla is complicated. At the lower end the chief motor tracts, the pyramidal tracts that come from the motor area (q.v.) in the brain cross one another to pass down on opposite sides of the spinal cord. It is because of this decussation that a hem¬ orrhage of the brain of the right side causes a paralysis of the muscles of the

left side of the body, and vice versa. Just above the decussa¬ tion of the pyramids the end-stations (nuclei) of the two chief sensory tracts of the body are located. It is into these nuclei — the gracilis and the cuneatus — that all of the sense-im¬ pressions from the body below the head are collected, to be passed to higher cerebral centres through the lemniscus or sensory fillet. The chief gray masses in this part of the brain are the nuclei of the cranial nerves referred to, and of the olives, two structures of undetermined function. The best description of the oblongata at present is that of the model of the medulla and pons by Dr. Florence Sabin, which is figured in Barker's (Nervous System.* Con¬ sult also Buck, (Reference Handbook of the Medical Sciences,) article ˆBrain,® and Johns Hopkins Hospital Reports, Welch Memorial Volume. See Brain.

MEDUM, Egypt, village on the Nile, 40 miles south of Cairo, near the Pyramid of Snefru. See Pyramid.

MEDUSA, me-doo'sa. See Gorgo.

MEDUSA, a disk-bearing jellyfish (q.v.).

MEDWAY, England, a river which rises in the county of Sussex and flows northeast in a winding course across Kent, past Tunbridge and Maidstone, to Rochester and Chatham. Below Chatham it spreads out into a broad tidal estuary, in which are several islets, and joins the Thames at Sheerness. It is 70 miles long and is navigable to Penshurst, 20 miles above Chatham.

MEEHAN, me'an, Thomas, American botanist : b. Potter's Bar, near London, England, 21 March 1826; d. Philadelphia, 19 Nov. 1901. From his father, a gardener, he learned facts of natural history when a child; at eight made and recorded an original discovery in herpetol¬ ogy; taught himself from books read at night after daily tasks; at 12 began to publish scien¬ tific papers ; soon after produced the first hy¬ brid fuchsia; and was nominated to membership in the Royal Wernerian Society. For two years he held a position at Kew Gardens. In 1848 he came to America and took charge of Bar-tram's Gardens in Philadelphia. In 1854 he es¬ tablished the Germantown Nurseries, which he conducted until the end of his life. For 30 years (1859-89) he edited the Gardeners '

Monthly, and contributed papers to many other periodicals and to scientific societies. For 23 years he was senior vice-president of the

Phila¬ delphia Academy of Natural Sciences, in whose proceedings were published his important Contributions to the Life History of Plants.* In 1875 he was elected a fellow of the Ameri¬ can Academy for the Advancement of Science, before which, among other noteworthy papers, he read (A Contribution to the Doctrine of Evolution and the Theory of Natural Selec¬ tion, J which showed him as a coworker with Darwin and other evolutionary scientists, in whose field he also was a discoverer. From the creation of the office until his death he served as State botanist of Pennsylvania, at one time was a member of the board of visitors of Har¬ vard, and was one of the American editors of the Encyclopaedia Britannica.* His travels and researches extended throughout the coun¬ try, including Alaska. In 1878 he began the publication of (Native Flowers and Ferns of the United States,* an illustrated serial cover¬ ing a wide field of floral distribution, the main features of which he continued in Meehan's Monthly, founded in 1891. Many learned societies abroad enrolled him, and he held inti¬ mate relations with nearly all the leading scientists of his time. Among his closest friends was the Comte de Paris, a devotee of plant-study. Meehan was the third American to receive the Veitch medal, awarded to him for ˆdistinguished services in botany and horti¬ culture.® Apart from scientific work he de¬ voted himself to public labors; was a member of the Philadelphia common councils from 1882 until his death; during the same period served on the local school board ; in both capacities in¬ troduced many reforms ; and chiefly through his efforts nearly 30 small parks were added to the city. A work of permanent value is his (American Handbook of Ornamental Trees)

(1853).

MEEK, mek, Alexander Beaufort, Amer¬ ican jurist: b. Columbia, S. C., 17 Tuly 1814; d. Columbus, Miss., 30 Nov. 1865. He was grad¬ uated from the University of Alabama in 1833 and admitted to the bar two years after. He served in the Seminole War 1836; was attorney-general of Alabama 1836; judge of Tuscaloosa County 1842-44; and member of the legislature in 1853. While there he established the free-school system of Alabama. In addition to a legal digest (1842) he wrote: (The Red Eagle) (1855) ; (Songs and Poems of the South) (1857); (Romantic Passages in Southwestern History* (1857), *etc.* His best-known poem is (The Charge at Balaklava.*

MEEK, Fielding Bradford, American pa¬ laeontologist: b. Madison, Ind., 10 Dec. 1817; d. Washington, D. C., 28 Dec. 1876. His educa¬

tional advantages were limited, but his interest in natural history made study imperative to him, and in 1848 he became assistant to David D. Owen in a geological survey of Iowa, Minne¬ sota and Wisconsin. He assisted James Hall at Albany in 1852—58, spending several summers in a geological survey of Missouri and Nebraska, and in 1858 went to Washington, where he devoted the remainder of his life to palaeontologic investigations under the govern¬ ment. He was elected in 1870 to the National Academy of Sciences, and was a member of

other scientific organizations. Among his writings are (Check List of the Invertebrate Fossils of North America ' (1864) ; c Report on Invertebrate Cretaceous and Tertiary Fossils* (1876), *etc.* For a complete list of his works, see bibliography published by the Smithsonian Institution.

MEEKER, Royal, American statistician : b. Silver Lake, Susquehanna County, Pa., 23 Feb. 1873. In 1898 he was graduated at Iowa State College and in 1906 took the degree of D.Ph. at Columbia University. He also studied at Leipzig. In 1904-05 he was professor of history, politics and economics at Ursinus College, Collegeville, Pa. In 1905 he became preceptor at Princeton and from 1908 to 1913 was assistant professor of political economy there. On 12 Aug. 1913 Dr. Meeker was ap¬ pointed commissioner of labor statistics by President Wilson. In 1918 he was appointed member of the United States meat commission. He published (History and Theory of Shipping Subsidies) (1905).

MEEKINS, me'kinz, Lynn Roby, Amer¬ ican journalist: b. Salem, Md., 14 Nov. 1862. He was graduated from Western Maryland College, Westminster, Md., in 1882, and devoted himself to journalism. He was literary editor of the Baltimore American 1882-89, when he became managing editor of the Philadelphia Saturday Evening Post, and since 1903 has been editor of the Baltimore Herald. He has pub¬ lished (The Robb's Island Wreck1* (1894) ; (Adam Rush) (1902), *etc.*

MEERANE, Saxony, town, 10 miles north of Zwickau and 36 miles south of Leipzig. It contains a mediaeval church. Meerane is one of the largest textile-producing centres of Ger¬ many, turning out vast quantities of woolen and mixed cloths. It has also extensive dyeing es¬ tablishments, machine works, tanneries, boiler works, motor factories, button, paper box and cement works. The town has a Realschule, a textile school and a school of commerce. Pop. 26,005. Consult Leopold, (Chronik und Beschreibung der Fabrik-und Handelstadt Meerane) (1863).

MEERKAT. See Suricate.

MEERSCHAUM (Sepiolite), mer'sham or -shum, a name given to one of the silicates of magnesium; it is a mineral of a whitish or creamy color, and received, its name from its appearance and the position in which it is some¬ times found suggesting that it was petrified foam of the sea. It is obtained from various places, but the best quality comes from Asia Minor, rich deposits of it existing about 20 miles southeast of Eskichehir, at a place called Sepetdje. Here are some 20,000 pits in a space of six miles, of which only 150 are. worked, all the others being exhausted. It is said that. these mines were opened. 1,000 years ago, which is not incredible, as it is well known that magnesia was formerlv used for many purposes, other than the fabrication of pipes ; moreover, fuller's earth was once worked on a vast scale by the ancients. The meerschaum mines are worked by some 500 miners, who live in the surround¬ ing villages. At Gheikli, in the neighborhood of Sepetdje, there are. 3,000 nits, of which only 100 are worked, giving employment to 400 miners. The mineral is mined in blocks, which

are taken to Eskichehir, where the blocks are cleaned, the operation consisting of scraping and cutting the blocks with a sharp instrument or knife, the meerschaum being still soft and easily cut into any shape or form. Over 1,100 persons are occupied in cleaning and shaping these blocks, which, after being thoroughly cleaned, are separated into four glasses, accord¬ ing to size and quality. These blocks being ready for sale, a bargain is struck between the pipe manufacturers and the commission agents and merchants at Eskichehir, of whom there are about a dozen. The latter then pack the blocks of these four classes with very great care into boxes of equal size, each block being wrapped in cotton to avoid any friction or shock between the pieces. . The actual annual output of these mines varies from 120 to 150 tons. It is soft when dug up, but becomes hard when dry. Most of it is sent

to Vienna, where it is chiefly made into tobacco-pipes, many of them highly artistic. Similar pipes are also made in Paris, London and elsewhere.

MEERUT, India, the capital of the dis¬ trict and division of the same name, in the United Provinces, situated 40 miles northeast of Delhi on the Northwestern Railway. The city is irregularly built, with narrow, filthy streets. It contains several mosques, a fine town hall, a college, normal school and church schools. At Meerut is one of the largest can¬ tonments in India. Flour and soap are the principal manufactures. The first outbreak of the Indian Mutiny of 1857 occurred at Meerut. The city, has a good water supply and an excel¬ lent drainage system. Pop. 116,227.

MEES, Arthur, American musical di¬ rector: b. Columbus, Ohio, 13. Feb. 1850. He was graduated from Concordia . College, Fort Wayne, Ind., and studied music in Berlin. He has been assistant director, and later director, of some of the leading operas and musical as¬ sociations, and has published, in addition to his annotated programs for the New York Philharmonic Society and the Chicago Orches¬ tra, (Chorus and Choral Music.)

MEGACLES. The most illustrious Greek of this name was the head of the family of the Alcmaeonidae at Athens in the time of Solon. After twice expelling Pisistratus, who in 560 B.C., had made himself ˆTyrant** of Athens, he was himself exiled by the latter together with all his family.

MEGALENSIA, or MEGALESIA, an

annual festival at Rome (4-10 April) in con¬ nection with the foreign cult of Cybele, the Magna Mater or Great Mother of the Gods, celebrated by a procession of her eunuch-priests, by circensian and theatrical shows, and at the close a carnival.

MEGALITHIC MONUMENTS. See

Dolmen; Menhir; Stones, Standing; Stone Circles.

MEGALONYX. See Ground-Sloths.

MEGALOPOLIS, meg-ˆ-lop’o-lis, or SI-NANON, Greece, a ruined city on the ancient Helisson, in the nomarchy of Gortynia, 5 miles north of Leondari. It was founded 370 b.c. by Epaminondas (q.v.) as the federal capital of Arcadia and was a magnificent walled city, five and one-half miles in circumference; it was frequently but unsuccessfully

attacked by the

Spartans. In 222 b.c. it was captured and par¬ tially destroyed by Cleomenes III. From 1890-93 the British School at Athens excavated the site and revealed the Precinct of Zeus Soter, the Agora, the Stoa of Philip and the Stoa of Myropolis on the right bank of the river, and on the left bank, the hemispherical Theatre 400 feet in diameter, and the Scanotheca, the Ther-sileon or great assembly hall, altars and re¬ mains of other buildings described by Pausanias. Consult Schultz and Loring, Excava¬ tions at Megalopolis) (1892) ; Haigh, A. E., (The Attic Theatre) (Oxford 1907).

MEGALOSAURUS, meg”a-16-sa’rus, a genus of huge carnivorous dinosaurs of the group Theropoda. Their remains occur fre¬ quently in the European oolitic rocks. The ex¬ treme length was about 50 feet. They were covered with scales and built like lizards, but with proportionally longer, heavier legs. See Dinosauria.

MEGAPHONE (a Greek word meaning ■‘great sound®), an instrument magnifv-ing the sound of the voice many times, so that one can be heard at a con¬ siderable distance. In its simplest form it is a cone-shaped trumpet, and the speaker shouts into the small end, the instrument directing the sound waves wherever it is aimed. This form is used by announcers at base ball games, *etc.* The form invented by Thomas A. Edison con¬ sists of two large funnel-shaped receivers in which the waves of sound are collected and concentrated and carried by means of flexible tubes held to the ears of the person using the instrument. In the instrument called telephone-megaphone, the mouthpiece of the telephone is connected with four transmitters which multi¬ ply the usual telephone sound of the voice by four, and it is sent by wire, so increased, into the megaphone, which sends it forth into space with sufficient intensity to carry it with perfect distinctness throughout a large church or hall. One form of megaphone is largely used by deaf persons.

MEGAPODES, a general name for the brush-turkeys or mound-birds of

Australia con¬ stituting the gallinaceous family Megapodiida?, so named in reference to the disproportionately large size of the feet; and remarkable for their breeding habits. The family, although mainly Australian, is represented in many of the South Sea Islands and in the Philippines, replacing the pheasants, which are absent from that re¬ gion. There are 7 genera and 20 or more spe¬ cies, mostly with restricted individual ranges, and varying in size from that of a turkey to that of a large pigeon, the sexes being always alike in plumage. The general colors are browns and yellows with the naked wattled parts brightly colored. They have a short, strong bill; the head and neck almost naked and wattled; the wings short and round, the tail large; the legs and feet large, strong and provided with great claws. Megapodes are ter¬ restrial birds found in hill-valleys, among thick¬ ets or along river and sea beaches. They run well, but if hard pressed will take to trees where they hop about awkwardly; their flight is heavy, but may be long sustained. Hoarse, chuckling, cackling or mewing cries express the utterances of the different species, which are often heard at night. The food consists of

fallen fruit, seeds, berries, worms, snails, in¬ sects and even small crabs. The flesh is dark-colored and not good, though palatable to the Australian aborigines.

One of the best known species is the brush-turkey or mound-turkey (Catheturus lathami), also known as the wattled talegalla and the New Holland vulture, the latter name being given to it on account of its yellow, naked head and neck, covered in part with fleshy wattles. It is rather common in New South Wales, inhabit¬ ing the most thickly wooded parts. It is a large bird, about the size of a turkey, with blackish-brown plumage. It is shy, and when pursued, endeavors to escape by running through the thickest brush, or by leaping to the lowest branches of a tree, and thus avoids the dingoes or native dogs, which, however, often hunt it down on open ground. It is easy game to the sportsman, who finds it roosting under shelter of the branches of trees during the heat of the day, and although several of a flock are shot, the rest keep their place undisturbed. They are generally seen in small flocks, and make their nests together, the females heaping up, by means of their feet, mounds of several cart¬ loads of earth and decayed leaves, which are used from year to year, new materials being added every year. The eggs are separately buried, often by several females, within the mass, where they are hatched by the heat of the

fermenting mound. The parent birds par¬ tially uncover them during the day. Nearly a bushel of eggs may sometimes be found in a single heap. The male bird pays great atten¬ tion to the young after they are hatched, cover¬ ing them up partially in the mound at night for warmth. The flesh of the talegalla is excel¬ lent, and the eggs are also very delicate and eagerly sought after. Two other species occur in New Guinea.

South and West Australia have another familiar megapode in the mallee-hen or <(native pheasant® (Lipoa occellata) — a large gray-brown bird with eye-like markings on the wings and back, and the naked neck and wattles blue; its mounds are comparatively small and often made individually. A bird often confounded with this in books because of similarity of name is the maleo (Mcgacepalon maleo) of North Celebes, which has the singular habit of mak¬ ing a general migration in the breeding season to the sea-beach, where small groups of females dig large holes in the sand just above high-water mark, and day by day bury eggs there until the quota of each is laid; these gradually hatch under the influence of the hot sand. The largest genus is Mcgapodius, whose 15 species are scattered over all the island region between Samoa, the Philippines and the Micobars, each group having a distinct species. . The most widely distributed and best known is M. tumu¬ lus, the common mound-bird or scrub-turkey of Northern Australia and the Papuan archi¬ pelago, which fashions mounds 10 or 11 feet high in the densest woods, continues to use them year after year, and lays pale, coffee-col¬ ored, thin-shelled eggs in straight burrows penetrating the mound. In some islands the eggs of these birds are an important food re¬ source. The young are well fledged when they emerge from the egg and scramble out of the mound, but are attended to by their parents for some time. Consult Newton, ˆDictionary of

Birds) (1869); (Proceedings, J Zoological Soci¬ ety of London, 1876, 1888, etc., and works on the ornithology of Australia and Oceanica.

MEGAPOLENSIS, Joannes, Dutch Prot¬ estant missionary to the North

American Indians: b. Koedyck, Holland, 1603; d. New York, 24 Jan. 1670. His family name, van Mekelenburg, he Hellenized to Megapolensis. In 1642 Van Rensselaer, the first Patroon, brought him to New York from Holland, and he soon learned the Mohawk tongue and preached successfully among the Indians near Albany, several years before John Eliot's mis¬ sion or any other Protestant preaching to the Indians. From 1649 until his death he was pastor of the Dutch church in New York, where he showed little tolerance to Lutherans and Independents. He' advised peaceable sur¬ render to the English in 1664. His account of the Mohawks is published in the third volume of the New York Historical Society's (Collections >

(1870).

MEGARA, Greece, the capital of ancient Megaris (q.v.), between Attica and Corinth; also a modern town in the eparchy of Megaris, of 6,500 population.

MEGARION SCHOOL OF PHILOS¬ OPHY, a Greek school of philosophy based on and developed from a part of the Socratic system. Euclid of Megara was the first to give definite form to its teaching. Eubulius was also a prominent member of this school, which con¬ fined itself mainly to dialectic methods, and sought to unite the Socratic ethical principle and the Eleatic theory of the One, to whom only true being might be attributed.

MEGARIS, meg'a-ris, Greece, the name of an ancient state or small district bounded north by Bceotia, east by Attica, south by the Saronic Gulf and the territory of Corinth, west by the Corinthian territory and the Corinthian Gulf ; area, about 143 square miles. It is a mountain¬ ous country, the only plain being that on which the capital was situated. Mount Cithseron was on the north boundary, separating it from Bceotia. The people were traders and sold their textiles over a large area. The only important town was Megara, situated a mile from the sea, opposite the. island of Salamis. It contained a Pelasgian citadel, called Caria, on a hill northwest of the city, with a temple to Demeter called Megaron, from which the name of the town is supposed to be derived. It had flourishing colonies at an early period, and its navy was so powerful that it was only after a long struggle with it that Athens obtained pos¬ session of Salamis. It afterward became an¬ nexed to Attica, of which Megaris formed one of the four ancient divisions. It was succes¬ sively conquered by the Dorians and the Corin¬ thians, but afterward asserted its independence, and

became wealthy and powerful.

MEGASTHENES, a Greek historian, who about the year 300 b.c., as ambassador of King Seleucus Nicator at the court of the Indian king Sandracottos, gathered the material for a geographical and historical account of India that, reaching us in the form of fragments and worked over in Strabo, Diodorus and Arrian, is our chief source of knowledge, of that country in antiquity. There is an edition of the frag¬ ments by E. A. Schwanbeck (Bonn 1846) ; also

a translation by McCrindle, (Ancient India as Described by Megasthenes and Arrian* (Cal¬ cutta 1877).

MEGATHERIUM, a gigantic fossil ground-sloth, the largest known edentate, representing the familv Megatheriidce , and especially the species Megatherium americanum, whose re¬ mains are found plentifully in the Pleistocene strata of Argentina and Patagonia. These early edentates were so generalized, that, as compared with modern forms, they exhibit the head and teeth of a sloth, associated with the vertebrae, limbs and tail of the anteater. Some of them attain a gigantic size, at least as large as an elephant, but with shorter limbs and a bigger tail, and the latest species are the most bulky. Megatherium, according to Woodward, seems to have been entirely destitute of dermal armor. The only one of its allies in which bony plates have been discovered is Mylodon, and they are very small and not fused together. The pelvis and hind limbs are heavily formed, showing that the animal was in the habit of standing on them, steadied by the powerful tail, like a kan¬ garoo. They fed on the branches of trees. The mylodons were somewhat smaller than the megatheria, with a skull and teeth more, like those of the modern sloths, and the three inner digits of the forefoot bear claws, about equal in size, instead of the huge middle-finger claw of the Megatherium. In both animals the hind foot lacks digit I, but II and III bear claws. The typical species of mylodon (M. harlani) was about as large and of much the same form as a rhinoceros, and inhabited the southwestern United States, while various other species lived in South America. The long-headed South American genera, Scelidotherium and Mega-lonyx, are other forms of the same family. See Ground-Sloths. Consult the palaeontological writings of Leidy, Lydekker and Woodward; also Scott, G. B., (History of Land Mammals)

(1913).

MEGIDDO, an important fortress city of ancient Canaan. Thothmes III captured it in the 23d year of his reign, and took therefrom magnificent spoils. The city is mentioned several times in the Tel-el-Amarna correspond¬ ence. Though nominally in the territory of Manasseh (Jos. xvii, 12, 13; Judg. i, 27, 28) it remained in possession of the Canaanites. Near the <(waters of Megiddo® Barak and Deborah defeated the Canaanites under Sisera (Judges . v, 19-21). Solomon restored the fortifications (1 Kings ix, 15) and Ahaziah is said to have died there (2 Kings ix, 27). Finally.it was at Armageddon (Har-Magedon , mountains of Megiddo) that the great conflict of Revelations xvi, 16, was to take place. The site of Megiddo may now be considered as proved to be Tel-el-Mutesellim. a great mound four miles northwest of Tel Taanach. It was evidently of great strategic importance since it commanded the pass from the Plains of Sharon to the. Plain of Esdraelon, which in all the centuries from Thothmes III to Allenbv in 1917-18 has been the route of armies. Fortifica¬ tions preceding 2000 b.c. have been uncovered on. the site, together with the remains of several cities which rose here successively and vanished. Here too was found the seal of Shama, serv¬ ant of Jeroboam (II?). In Roman times the place was a fortified post — the Legio of

Eusebius, the modern el Lejjun. Consult Schumacher, <Tell el Mutesellim: Bericht i-iber die 1903 bis 1905 veranstalteten Ausgra-bungen P (Leipzig-1908).

MEGNA, meg'na, or MEGHNA, India, the estuarine outlet of the Ganges and Brahmaputra (qq.v.), in Bengal. There are four princi¬ pal mouths, producing three islands. The tidal bore is characterized by its velocity, which endangers navigation, advancing at the rate of 15 miles an hour, and frequentlv attaining a height of nearly 20 feet. As the bottom is loose sand; it shifts continually, making naviga¬ tion difficult.

MEGRIM. See Migraine.

MEHEMET (mahe-met), or MOHAM¬ MED (mo-ham'ed) , ALI, viceroy of Egypt: b. Kavala, Macedonia, 1769; d. Cairo, 2 Aug. 1849. An orphan, he was brought up by a jani¬ zary captain, governor of Kavala, who married him to a kinswoman and made him a militia officer. When the French invaded Egypt he was sent there, rose rapidly, became the con¬ fidant of Koshrew, pasha of Egypt, and, by treachery both to the pashas and the Mamelukes and by a liberal use of his wealth, in July 1805 became pasha of Cairo, whence his power quickly spread over the rest of Egypt. His utterly unscrupulous policy was shown by his massacre of nearly 1,700 Mamelukes in 1811. He extended the limits of Egypt by wars on the Arabian Wahabees, by the possession of Nubia and Kordofan, and by the treacherous conquest of Syria, in which he aimed at inde¬ pendence of the Porte. This first break with Turkey was settled by the Powers; and in 1839 the Sultan was forced to call on the Powers to help him turn Mehemet out of Syria: by the treaty then concluded he surrendered Syria, Candia and Hejaz: but was made hereditary pasha. His internal administration was vigor¬ ous; both agriculture and manufactures flour¬ ished, thanks to French capital solicited by Mehemet, who also introduced European methods into his army, and established a sys¬ tem of education. He was insane during the latter part of his life, and was succeeded by his grandson ; his son, who took his place as regent in September 1848, died in November of that year. Consult Murray, C. A., (Memoir of Me¬ hemet Ali) (London 1898).

MEHRING, Franz, German historian, critic and socialist philosopher: b. Schlawe, Pomerania, 27 Feb. 1846; d. Berlin, 29 Jan. 1919. He was of middle-class Pomeranian origin, but became interested early in life in the struggles of the poor. His life is an interesting example of the career of a political thinker who passes out of the organizations of his own class and into those of the lower classes, by natural sympathy, although in Mehring's case this process took a long time. He attended the University of Berlin, where he obtained the Ph.D. degree, simultan¬ eously working for a democratic newspaper, Zukunft, under the direction of Johann Jacoby and Dr. Guido Weiss. After this paper was suppressed (1871), he became a member of the staff of Die Wage, a weekly edited by Dr. Weiss. In 1873 appeared Mehring's first social¬ istic pamphlet, ((Herr von Treitschke, der Sozialistentoter, und die Enziele des Liberal-ismus,® which, as its title indicates, is an attack

upon Treitschke (q.v.). When the two chief socialistic bodies in

Germany united at Gotha in 1875, Mehring was sympathetic to the new party but did not become a member, and a rather personal controversy which he had with Leopold Sonnemann editor of the Frankfurter Zeitung, for which Mehring had been Berlin correspondent, removed him more and more from the activities of the Social-Democratic party. From 1877 to 1882, Mehring was un¬ favorably disposed toward the leaders of the party, and in his (Geschichte der deutschen Sozialdemokratie,* which he began writing in those years, he made many attacks upon them, for which he was seriously taken to task at the Dresden Party Congress. He defended him¬ self in a little book (Meine Rechtfertigung> ((My Justification }) , in which he asks forgive¬ ness for having been so foolish as to believe that the monarchic regime might develop into an honest democratic republic, which idea, he explains, has been completelv corrected by the anti-socialistic laws as administered by the Prus¬ sian government. Yet Mehring still hoped that it might be possible to found a bourgeois demo¬ cratic party in Germany, in which work, which was foredoomed to failure, he was associated with Lenzmann (1884). He was editor-in-chief of the Berliner V olkszeitung (1885-89), but was forced to resign from that paper because of a controversy with Paul Lindau (q.v.), arising out of the latter's maltreatment of the actress Elsa von Schabelski (by a curious coincidence, Paul Lindau's death in January 1919, coincided almost to a day with that of Mehring). Mehring has written profound historical analyses, among which the best are (Die Lessing-Legende> (1893) and (Gustavus Adolphus) (1894). As a man of 70 his hostility to the German Imperial government was still un¬ broken, and together with Rosa Luxemburg and Karl Liebknecht he wrote, in January 1915, a pamphlet attacking the militaristic system that had plunged Europe into war, known as the (<Junius>) pamphlet. This appeared in Switzerland and was secretly circulated in Germany (English translation: (The Crisis in the German Social-Democracy,* New York

1918) . He spent considerable parts of 1916 and 1917 in jail, under ˆpreventive detention,® but had to be released because of his failing health. In January 1918 he was elected a member of the Prussian Landtag, on the social¬ ist ticket, and distinguished himself in that body by his biting comments on the inability of the Prussian military leaders ; Mehring had always had a sort of amateur interest in military affairs; a number of his pamphlets deal ably with questions of this kind. Shortly before (September 1918) the final defeat of the Ger¬ man armies (October) on the western front, Mehring predicted that the hope of the militar¬ ists in the inability of the United States to land sufficient troops in Europe would be dis¬ appointed. His death

was due to pneumonia, and coming, as it did, close upon the murder of Liebknecht and Rosa Luxemburg (15 Jan.

1919) , it considerably depressed the hopes of the radical element ((<The Reds®) of the Ger¬ man Social-Democracy. Of the four chief leaders of the so-called ((Spartacus® group, three had therefore met death in one month, and only one, Klara Zetkin (q.v.), an old woman, herself seriously ill, was still alive

in April 1919. Consult also Die Neue Zeit (1882 et sequitur, Stuttgart) ; The Class Strug¬ gle (New York 1917 et sequitur).

Jacob Wittmer Hartmann.

MEHUL, Etienne Henri, a-te-en on-re ma-iil, French musical composer: b. Givet (Ardennes), 22 June 1763; d. Paris, 18 Oct. 1817. For some years he substituted the name Nicholas for Henri. He studied at Paris under Gluck; and after the departure of the latter for Vienna, Mehul presented to the Royal Academy of Music the opera of (Cora and Alonzo,* the representation of which was delayed for six years. He then turned to the Opera Comique, which gladly received his (Euphrosine and Coradin* in 1790. His patriotic hymns, (Chant du Depart,* (Chant de Victoire,* and ‘Chant Retour,) greatly increased his fame. He was chosen a member of the Institute in 1796, of the Academy of Fine Arts in 1816, and a knight of the Legion of Honor in 1802. His chief operatic work is ‘Joseph* (1807). His style as a com¬ poser is remarkable for dramatic force and coloring. There is a (Life) by Pougin (1889). His statue was erected in his native town in

1892.

MEIBOMIA, a genus of erect perennial herbs of the pea family, of which about 150 species are natives of warm and temperate America, Africa and Australia. More than 40 species belong to the LTnited

States, some of the more familiar of which are called Hick-seeds.®

MEIDERICH, Prussia, town of the Rhine province, 15 miles northeast of Krefeld. It contains several large iron and steel mills, machine shops, brickyards, phosphate works and saw mills. Coal deposits are worked in the vicinity and there is a large cattle trade. Its history as an industrial centre began in 1850. It was annexed to Duisburg in 1905. Pop. 40,000. Consult Graeber, 'Tausendjahrige Geschichte von Meiderich) (1893).

MEIER, Edward Daniel, American me¬ chanical engineer : b. Saint Louis, Mo., 1841 ; d. 1914. In 1858 he was graduated at Wash¬ ington University and subsequently studied four years at the Royal Polytechnic College at Hanover, Germany. In 1863 he enlisted in the 32d Pennsylvania Volunteers; served later in the artillery and in the engineers and was a cavalry lieutenant at the close of the war. He entered locomotive works at Paterson, N. J., after the war, became superintendent of machinery of the Kansas Pacific Railroad in 1867 ; chief engineer of the Illinois Coke Com¬ pany in 1870; and two years later constructing engineer of the Meier Iron Company. He founded the Heine Safety Boiler Company of St. Louis in 1884, of which he was president in 1914. For many years Mr. Meier was president of the American Diesel Engine Company. In 1908-14 he was president of the American Asso¬ ciation of Boiler Manufacturers and of the Machinery and Metal Trades Association. In 1911 he was president of the American Society of Mechanical Engineers.

MEIGGS, megz, Henry, American contrac¬ tor: b. Catskill, N. Y., 7 July 1811; d. Lima, Peru, September 1877. He was engaged in the lumber business in New York and other places but met with financial reverses and in 1848 went to California, where he again took to the lumber

business and gained an immense fortune. Re¬ verses, however, once more swept away his wealth, leaving him with an indebtedness of more than $1,000,000. He fled with his .family to Peru, where he soon embarked upon a series of bridge-and railway-building enterprises, which won for him immense wealth and a world-wide fame as a railway contractor. His engineering achievements in South America comprise some of the most daring feats in the history of the profession. The construction of the Callao, Lima and Oroya road, which crosses the Andes and ascends to a height only 136 feet lower than the summit of Mount Blanc, was his crowning achievement, and

was practically com¬ pleted at his death. He paid in full the enor¬ mous obligations incurred by his failure in San Francisco, contributed generously to charities in the United States and Peru, and by the laying out of a beautiful park, which he presented to the city of Lima, materially changed for the better the appearance of the city.

MEIGS, Charles Delucena, American

physician: b. Saint George, Bermuda, 1792; d. 1869. In 1809 he was graduated at the Uni¬ versity of Georgia, and in 1817 at the medical college of the University of Pennsylvania. In the same year he established his practice in Philadelphia and became prominent as an ob¬ stetrician. He was professor of obstetrics and diseases of women and children at the Jefferson Medical College from 1841 to 1861. He was one of the first editors of the North American Medical and Surgical Journal, which he helped to found in 1826. Dr. Meigs published 'The Philadelphia Practice of Midwifery* (1838; 2d ed., 1842) ; (Lectures on Some of the Distinc¬ tive Characteristics of the Female) (1847); (Females and their Diseases) (1848; 2d ed., with title 'Woman; Pier Diseases and Reme¬ dies, } 1851 ; 3d ed., 1854) ; 'Remarks on Spas¬ modic Cholera) (1849); (Obstetrics) (1849; 3d ed., 1856) ; 'Observations on Certain Diseases of ChildreiP (1850) ; 'Treatise on Acute and Chronic Diseases of the Neck of the Uterus) (1854) ; 'On the Nature, Signs and Treatment of Childbed Fevers) (1854) ; translations of Hufeland's 'Treatise on the Scrofulous Dis¬ ease* (1829); Velpeau's 'Elementary Treatise on Midwifery* (1831) ; Colombat de L'lsere's, 'Treatise on the Diseases and Special Hygiene of Females> (1845). Consult Meigs, John F., 'Memoir of Charles D. Meigs) (Philadelphia

1872).

MEIGS, Montgomery, American civil en¬ gineer: b. Detroit, Mich., 27 Feb. 1847. He was educated at Harvard and in Germany, and was for several years in the employ of the Northern Pacific Railroad. Since 1882 he has had charge of the Des Moines Rapids Canal under the gov¬ ernment. He is the inventor of a "canvas coffer-dam.® He also constructed the United States dry dock at Keokuk. In 1898 he pro¬ posed a new method of improving country roads by using oil with a sprinkler to make a water¬ tight surface and lay dust, which attracted wide attention and has since been generally adopted. He built and designed many steamboats and steam dredge tenders for the United States. In 1910-13 he was the government local inspecting engineer in

the construction of the great lock, dry dock and power developments in the Mis¬ sissippi River at Keokuk, Iowa.

MEIGS, Montgomery Cunningham,

American military officer : b. Augusta, Ga.. 3 May 1816; d. Washington, D. C., 2 Jan. 1892. He was graduated from West Point in 1836 and entering the engineering corps the next year was engaged in the construction of forts Delaware, Wayne, Porter, Niagara, Ontario and Mont¬ gomery until 1852, when he took charge of the building of the great Potomac aqueduct. In

1860 he built Fort Pickens in Florida, and in

1861 was appointed quartermaster-general of the United States army and given rank as brigadier-general. He was promoted major-general in 1864, and in 1875-76 he was sent by the govern¬ ment to Europe to make an inspection of various staff-departments, the quartermaster's in par¬ ticular. After his retirement in 1882 he was engaged in preparing plans for various public buildings in Washington. He was a regent of the Smithsonian Institution and of many scien¬ tific societies, and was at his death architect of the Pension building.

MEIGS, Return Jonathan, American soldier and pioneer : b. Middletown, Conn., December 1734; d. at the Cherokee agency, Ga., 28 Jan. 1823. At the commencement of the Revolutionary War he raised a company of men and marched to the American camp at Cambridge, subsequently accompanied Arnold on his expedition against Quebec, where he was taken prisoner, and after his release was com¬ missioned a colonel in the Continental army. He signalized himself by a brilliant expedition against a British post at Sag Harbor on Long Island, for which he received the thanks of Congress and a sword, and took a distinguished part in the capture of Stony Point under General Wayne, and elsewhere in the course of the war. In 1788 he emigrated to Ohio, and established himself at Marietta. In 1801 he

was appointed by President Jefferson Indian agent of the Cherokees, among whom he passed the re¬ mainder of his life.

MEIGS, Return Jonathan, American soldier and politician, son of the preceding: b. Middletown, Conn., November 1765; d. 29 March 1824. He was graduated from Yale in 1788, went to Marietta, Ohio, with his father in 1788 and rose to prominence there as a lawyer. He was chief justice of the Ohio supreme court 1803-04; served in the army as a brevet colonel 1804-06; was a judge in Louisiana 1805-06; and in Michigan for the two years following. After being senator from Ohio 1808-10 he was governor of that State for the next four years, in which period he was an active supporter of the war measures of 1812-14. He was postmaster-general of the United States

1814-23.

MEIGS, William Montgomery, American lawyer and biographer : b. Philadelphia, 12 Aug. 1852. He was graduated from the University of Pennsylvania in 1872, studied law and was ad¬ mitted to the bar in 1879. In addition to his law practice he has devoted much time to liter¬ ary work and is author of (Life of Joseph Meigs) (1887); (Life of Charles Jared Inger-solP (1897) ; (The Growth of the Constitution (1900); (The Life of Thomas Hart Benton* (1904), *etc.*

MEIJI, may-ee-jee, the name of the most famous era in the history of Japan (1868-1912). From the introduction of almanacs and chronol¬

ogy from China, 645 a.d., it has been customary to select a nengo, or year-period, from certain words, mostly of bappy augury, contained in ‘the Chinese cycle of 60 years (a <(cycle of Cathay®). The two words united in Meiji mean En¬ lightened Government. Of old, it was customary to change the nengo for arbitrary reasons, but from 1868 the rule was fixed to have each year-period begin and end with the emperor’s reign. Succeeding the Meiji era, in 1912, was that of Tai-sho, or Great Righteousness. All. the dates in Japanese historical records, before 1868, are given in year-periods and the months and days according to the lunar calendar. In 1880, Mr. William Bransen, in Tokio, after elaborate . investigation, published his great work, which enables one to express all the Japanese dates, of the 243 year-periods, from 645 A.n., in terms of the Gregorian or European calendar,, which in 1875 was adopted in Japan. Consult Clement, (Handbook of

Modern Japan* (1913), and Bransen, Japanese Chronological Tables* (Tokio 1880).

MEIKLEJOHN, ml'k'l-jon, Alexander,

American educator : b. Rochdale, England, 3 Feb. 1872. He came to America in 1880; was graduated from Brown University in 1893 and from Cornell in 1897. In 1897-99 he was in¬ structor in philosophy at Brown University; was associate professor 1899-1903. In 1906-12 he was professor of logic and metaphysics there, and in the latter year was called to Amherst as president and professor of logic and meta¬ physics.

MEIKLEJOHN, mi'k'l-jon, George D.,

American lawyer: b. Weyanwega, Wis., 22 Aug. 1857. He was graduated from the University of Michigan in 1880 and established himself in a law practice at Fullerton, Neb., in that year. He held several public offices and in 1884 and 1886 was elected State senator. In 1889 he was elected lieutenant-governor of Nebraska and in 1893-97 served as member of Congress. He was appointed Assistant Secretary of War in 1897 and filled that post through the war with Spain, retaining his office after the resignation of Secretary Alger, until 1901, since which time he has been engaged in his law practice at Fullerton.

MEILHAC, Henri, on-re ma-yak, French playwright: b. Paris, 25 Feb. 1831; d. there, 6 July 1897. His work as a dramatist, begun in 1855, was attended at first by scant success, but he finally became a favorite nlavwright. Much of his work was done with Halevy (q.v.). He furnished the book for Offenbach's (Grande Duchesse,* (La Perichole,* and (Les Brigands,* and other works of that composer. Among his independent plays are (Petite Marquise) and (Decore. * In 1888 he was elected to the Academie Frangaise.

MEILLEUR, Jean Baptiste, Canadian author and educator : b. Saint Laurent, near Montreal, 1795; d. 1878. He received his educa¬ tion at the College Saint Sulpice de Montreal ; studied for the bar, but later took up the study of medicine at the Carleton Medical College, Vermont, where he was graduated in 1825. He became editorial writer on the Tessier Journal and was elected to the Legislative Assembly of Lower Canada in 1834. In 1842 he became superintendent of public instruction and retained this post until 1857. Several educational in-

stitutions were founded during his administra¬ tion which was eminently successful. Meilleur became postmaster of Montreal in 1862. He was a founder of the College de l'Assomption. His published works included textbooks on chemistry, education and grammar, all in French.

MEININGEN, mi'nmg-en, Germany, the capital of the state of Saxe-Meiningen, in a narrow, well-wooded valley, on the Werra, 40 miles southeast of Erfurt. It is an attractive modern town with regular and handsome streets, having been practically rebuilt since the disas¬ trous fire in 1874 which destroyed the old town. The principal buildings are the new town-house and the ducal palace with a church, private and public library of 55,000 volumes, picture gallery, museum, etc., attached. The stock company of the local theatre which for 16 years en¬ joyed a European reputation for the excellence of its acting and staging, was dissolved in 1890. The industries are only of domestic importance and include brewing, woolen and cotton-weav¬ ing. Pop. 17,186.

MEISSEN, mi'sen, Germany, a town of Saxony, founded by Henry I in 922-33, 14 miles northwest of Dresden, on the left bank of the Elbe, at the confluence of the Meisse and Trie-bisch. It has a noble old castle originally built in the 10th century and rebuilt in the 15th century on a precipitous rock above the town, recently restored. There is a fine old Gothic cathedral, 500 to 600 years old. Also the Franciscan church, a large and magnificent edifice, used as the custom-house; the church of Our Lady, or city church ; the ancient church of Saint Nicholas; and other public buildings. The royal porcelain factory, first established by Boettcher (q.v.), and now at some distance from the town, is the great industrial establish¬ ment of the place ; there are also manufactures of matches, stoves, iron foundries and ma¬ chine-works, a jute-mill, breweries, *etc.* Meis¬ sen is the see of an archbishop. Pop. about

35,865.

MEISSONIER, Jean Louis Ernest, zhon loo-e er-na ma-so-nya, French painter: b. Lyons, France, 21 Feb. 1815; d. Paris, 31 Jan. 1891. He came to Paris in early youth and entered the studio of Cogniet, meanwhile form¬ ing his style on the Dutch masters as repre¬ sented in the Louvre. He first attracted atten¬ tion by his illustrations of the Bible, Bossuet's (Universal History,5 (Orlando Furioso,5 (Paul and Virginia,5 *etc.* His earliest paintings in genre to be exhibited in the Salon were (The Little Messenger) and *The Chess Player) (1836). His reputation grew rapidly on the successive appearance of (The Monk5 (1838) ; (The English Doctor5 (1839) ; (The Chess Party) (1841). The times of Louis XIV and Louis XV with all the accessory richness and variety of costumes, weapons and domestic lux¬ ury, began to find in him their most successful delineator. In the many canvases which he produced in this narrow department of genre he showed a keen and strong, but not too florid, power of characterization, which was accom¬ panied with a marvelous technique in the hand¬ ling of stuffs, metals, *etc.* But modern his¬ tory eventually claimed his attention and he found a congenial field for the exercise of his special gifts in the campaigns of Napoleon. His

pictures were often small, but finished with mi¬ nute and delicate virtuosity, a good example of which may be seen in his (Cuirassiers of 1805 5 ; but he is perhaps less successful in large can¬ vases and elaborate figure compositions than in his small paintings. Among his most^ famous pictures of the Napoleonic cycle are (Napoleon I with his Staff5 and (Napoleon III at Sol-ferino) (1864); (Napoleon I at Friedland) (1875), now in the Metropolitan Museum of New York. In his latter days he painted Vene¬ tian scenery and architectural views with his usual dash, thoroughness and originality. In his works he shows the best qualities of the Dutch school with all its lifelike expression, truthfulness and spirit combined with the deli¬ cacy of French sentiment and abandon. His water colors, etchings and lithographs bear ad¬ mirable witness to his versatility and vigorous industry. His pictures have always fetched a high price, ^Friedland or 1807) having been sold for $60,000, a sum scarcely disproportionate to that given for smaller canvases. He is to be looked upon as the founder of the new school of military painters represented by his son Jean Charles Meissonier and Edouard De-taille, his most illustrious pupil. Consult Claretie, (Meissonier5 (1881) ; Larroumet, (Meisso¬ nier } (1893).

MEISTERMANN, Barnabas Francis Joseph, German archaeologist and missionary: b. Pfaffenheim, Alsace, 27 March 1850. He re¬ ceived his

education in the seminary of Strassburg and in 1873 was ordained to the priest¬ hood of the Roman Catholic Church. In 1875 he joined the Franciscan Order, was sent to France and England for a time, and from 1887 to 1893 labored as a missionary among the Chi¬ nese. Since 1893 he has resided in Jerusalem, engaged in teaching, writing and research work. His works include (La Portioncule) (1884) ; (Le Mont Thabor) (1900) ; (La Montagne de la Galilee ou le Seigneur apparut aux Apotres> (1901); (Deux questions d'archeologie palestinienne> (1902) ; (Le pretoire de Pilate et la forteresse Antonia5 (1902) ; Questions de topographie palestinienne5 (1903) ; (Le tom-beau de la Sainte Vierge a Jerusalem5 (1903) ; (La ville de David5 (1903) ; (La patrie de Saint Jean-Baptiste5 (1904) ; (New Guide to the Holy Land5 (London 1907) ; (Guide du Nil au Jourdain par le Sinai et Petra5 (1909). He contributed to the (Catholic Encyclopedia.5

MEISTERSINGERS, mis'tersing-erz, or MASTER-SINGERS (Ger., Meister singer) , a society of German singers formed in the 14th century. During the long evenings of winter the worthy burghers of the German cities as¬ sembled to read the poems of the minstrels. Some of the hearers were naturally led to try their own skill in verse ; others followed, and the spirit of the age soon embodied these vota¬ ries of the muse into societies after the fashion of corporations. Charles IV gave them a char¬ ter and a coat of arms. They met on certain days and criticized each other's productions, in which external correctness seems to have ap¬ peared to them the chief object; few, indeed, had an idea of the difference between poetical and prosaical ideas or expressions. Their at¬ tempts in the lyric style were chiefly limited to spiritual songs; in the epic to rhymed versions of the scriptural narratives. They were also

fond of the didactic style. The rules by which the members of the societies were to be guided as to the metre, etc., of their compositions were written on a table, and called tabulatur, for the sake of enforcing a strict observance of purity in language and prosody. The chief faults to be avoided were collected ; they were 32 in num¬ ber, and

distinguished by particular names. He who invented a new metre, invented also a new tune, the names of which were the drollest and sometimes the most senseless imaginable. Be¬ sides their stated meetings they held public meetings, generally on Sundays and festivals in the afternoon in churches. In Nuremberg, where the master-singers flourished particu¬ larly, such meetings were opened with free singing, in which anybody might sing, though not belonging to the corporation. In this the choice of the subjects was left comparatively uncontrolled ; then followed the chief singing, when only those who belonged to the corpora¬ tion were allowed to sing, and only on scrip¬ tural subjects. The judges were called Merker, and sat behind a curtain. There were four : one watched whether the song was according to the text of the Bible, which lay open before him ; the second whether the prosody was cor¬ rect ; the third criticized the rhymes ; the fourth the tunes. Every fault was marked, and he who had fewest received the prize, a chain with medals. Whoever had won a chain was al¬ lowed to take apprentices, to have many of whom was a great honor. Money was never taken from apprentices. After the expiration of his poetical apprenticeship the young poet was admitted to the corporation, and declared a master after having sung for some time with acceptation. These strange societies originated toward the end of the 14th century at Mainz, Strassburg, Augsburg and continued in several free cities of the empire until the 17th, in Nu¬ remberg to the 18th century, where probably the renown of Hans Sachs (q.v.), the famous shoemaker and poet, kept them longer in exist¬ ence. The last society of the kind was that of Ulm, which was dissolved in 1839. Richard Wagner, in his musical drama, (Die Meistersinger) satirized the art of these early masters. Consult Mey, K., (Der Meistergesang in Geschicht und Kunst) (1892) ; Nagel, W., (Studien zur Geschicht der Meistersanger5 (1909).

MEJERDA, or MEJIRDA, me-yer'da, the ancient Bagradas, a river of North Africa, formed by the union of several head-streams rising in the Atlas Mountains in Algeria, and flowing through Tunis to its outlet in the Med¬ iterranean, 24 miles north of the city of Tunis. The mass of sediment which it brings down has enlarged its delta and changed the coast line, its mouth formerly being at Bu-Chateur, seven miles southward. Its whole course is about 200 miles.

MEKONG, ma-kong , or CAMBODIA, a

river of Indo-China. See Cambodia.

MELA, me'la, Pomponius, a geographer who flourished during the 1st century of the Christian era, probably under the Emperor Claudius.

Little more is known of him than that he was a native of Spain, and the author of a treatise in three books in the Latin lan¬ guage, <De Situ Orbis,5 containing a concise view of the state of the world so far as it was known to the ancient Romans. Mela is edited

by Tzschucke (1807), Parthey (1867), and Frick (1880).

MELACONITE. A black copper ore con¬ sisting of oxide carrying 79.7 per cent of cop¬ per. Occurs in many mines.

MELAMPUS, in Greek mythology, son of Amythaon, who was the first mortal endowed with the gift of prophecy, and who first prac¬ tised the medical art. He is said to have intro¬ duced the worship of Bacchus into Greece. According to the legend, he could converse with animals, and was favored by Apollo, who taught him divination. His powers saved his life when he was imprisoned in Thessaly. The worms in the wall informed him that the struc¬ ture would soon fall, and he told his jailers, who withdrew, taking him with them. They informed the king and Melampus was at once in demand, courted and feted. He married one of the king's daughters and was given large estates. In ancient Megaris he was wor¬ shipped and a temple erected in his honor.

MELANCHOLIA. See Insanity.

MELANCHTHON, Hellenized name of Philipp Schwarzerd (Eng. ((black earth55), Ger¬ man reformer: b. Bretten, in the Palatinate, 16 Feb. 1497; d. Wittenberg, 19 April 1560. Lie was left an orphan in his 10th year and taken into the house of his grandmother, a sister of Reuchlin (see Reuchlin, Johann), the great German humanist, by whom he was affection¬ ately treated and encouraged in his studies. In his 12th year he entered the University of Heidelberg and two years later was graduated bachelor. While he was occupied as tutor to the son of Count von Lowenstein, he continued to give attention to his own progress in Greek; in 1514 was made master of arts at Tubingen and thenceforth devoted himself to humanism, lec¬ turing on Cicero, Terence and Greek grammar. He also gave much time to the study of theol¬ ogy. jurisprudence and medicine. Here he first became acquainted with Erasmus' edition of the New Testament, and was through the influence of Reuchlin elected professor of Greek in the newly founded University of Wittenberg. He delivered an inaugural address (29 Aug. 1518), (De Corrigendis Adolescentiae Studiis,5 which produced a revolution in German educational methods and above all

met with the approba¬ tion of Luther, professor of philosophy at Wit¬ tenberg. From this time Melanchthon became (Preceptor Germanise5 (The Schoolmaster of Germany), and the (Ally of Luther.5 These two champions of the Reformation were brought still closer together by their union at the (Leipzig Disputation5 (1519), in which they were confronted by Dr. Eck (see Eck, Johann von) the great opponent of Luther and the movement he was inspiring. In his handling of this adversary, both orally and by his writings, Melanchthon showed himself to be the leader of Protestant controversialists and the most learned, judicious and ready of Protestant dis¬ putants.

In 1520 he married Katharina Krapp, daugh¬ ter of the burgomaster of Wittenberg, and <(Master Philip,55 as he was familiarly called, as he settled down to domestic life, was placed on the theological faculty of the university, and the first fruit of his increased application to the theological study and teaching was his (Loci Communes Rerum Theologicarum,5 which was

the first declaration of the Protestant position delivered in formal terms of dogmatic theology. The volume ran through 60 editions in his life¬ time, and established its author's position as Luther's complement — in some respects the lesser spirit of the Reformation movement, but the scientific talent which supported on the in¬ tellectual side the genius and the faith of Luther. Melanchthon, by his historic learning, by his power over the classic languages, was enabled to communicate to the learned world the real principles of the new movement and the facts of the past on which it was founded. He brought to bear his deep knowledge of theological philosophy, his acquaintance with the precise terms in Greek and Latin of scrip¬ tural, patristic and scholastic statement on the main question of the dispute, and he had the calmness of the well-balanced humanist which enabled him to direct with cool and even mind the movements of his party and to keep it as free as possible from the fury and blindness of intolerance. His knowledge of Greek made him as useful to Luther in translating the Bible as Parnell was to Pope in the production of his c Iliad. } His pen had an immense influence in securing the after success of the initiative taken by bolder but less cautious and reasonable spir¬ its, and left a mark on the German Reforma¬ tion deeper, more permanent and characteristic than that of any among his most enthusiastic contemporaries. His (Epitome Doctrinae Chris-tianae) became from the first an influence which establishes its claim to be called the pandect and code of European Protestantism.

The spirit of Melanchthon was distinctly irenic. The Reformation had resulted not only in a German revolt from the papacy, but in the creation of a host of jarring Protestant sects. Melanchthon's broad and farseeing spirit was averse to division of any kind. The Augsburg Confession which was presented to the diet in 1530 surprised even the Roman Catholics by its moderate tone. It was drawn up by Melanch¬ thon in accordance with memoranda supplied by Luther and it has all the breadth, calmness and judicial cautiousness of Luther's friend and good genius. But this spirit of compromise, hopefulness and patience was out of harmony with the passion for controversy which made Wittenberg a centre of storm and strife. Me¬ lanchthon, however, stuck to his post at Wit¬ tenberg long after the great power and influ¬ ence he once wielded had passed from him into the hands of more positive, violent and aggres¬ sive leaders. There occurred a breach between the Philippists, the followers of Melanchthon and the

Lutherans, who adhered to the extreme views of his friend on the subject of free will and irresistible grace, on the doctrine of the Lord's Supper, and on the ((adiaphora® indiffer¬ ent matters, as the former was inclined to term the ceremonies of the Roman Catholic Church. He and his followers were assailed as ((rogues® and ˆworshippers of Baal.® Luther stated his own views on the sacrament with such violence that the recollection of his (Short Confession respecting the Lord's Supper) filled him with remorse on his death bed, where he acknowl¬ edged to his friend ((Dear Philip, I confess to have gone too far in the affair of the Sacra¬ ment.® The death of Luther left Melanchthon to the mercy of such zealous and fiery secta¬ ries as had been engendered in that teeming

period of intellectual and theological moye-ment, which the monk of Wittenberg had in¬ augurated. He survived Luther four years, waiting for death, he said ((as a refuge from the phrenzy of theologians,® and praying that the Protestant world might find its way at last to reunion, a prayer which as yet remains un¬ fulfilled.

Melanchthon's important part in the Ref¬ ormation movement has often been lost sight of in the blaze of Luther's more striking and popu¬ lar personality. Yet he may with some reason be called the brains of the Reformation. More than that, he was a man who, while he stood for progress, was averse to revolutionary change. In one sense he was the Mirabeau of a religious revolution, a constructive rather than a destructive reformer, a man born in a generation, which he could only affect by pre¬ senting an example of intellectual refinement, moderation, tolerance and conservation, which the warring giants of the Reformation refused to follow. In 1865 a statue was raised to him at Wittenberg and in 1883 a group comprising Melanchthon and Luther at Leipzig. His works are found complete in (Corpus Refor-matorum, > 28 vols. (1834-60). Consult Schmidt, (Philipp Melanchthons Leben und ausgewahlte Schriften) (1861); Richards, <Philipp Me¬ lanchthon (1898) ; Neander, (Vita Quattuor ReformatorunP (1846) ; Hartf elder, Karl,

< Philipp Melanchthon als Praeceptor Germanise* (Berlin 1899).

MELANESIA. (Greek, melas, black ; nesos, island), in which the reference is to the extreme blackness of the people rather than of the islands themselves, is the designation ap¬ plied to the islands of the western region of Oceanica. They extend northwestward in three interlacing chains, from New Caledonia on the south to the Bismarck

Archipelago on the north. East of New Caledonia lie the Loyalty Islands, northeast of the Loyalty Islands begin the New Hebrides, and theSe are suc¬ ceeded by the Santa Cruz, the Banks and Swallow groups. A little to the west of these begin the Solomon Islands, and considerably east of this archipelago lies a chain of small islands which are geographically to be classed in Melanesia, but ethnologically are distinctly Polynesian. In the partition of the Pacific among the European powers New Caledonia and the Loyalty Islands belong to France, the New Hebrides are held jointly by France and Great Britain, the Santa Cruz and the Solomon Islands form a British protectorate. Bougain¬ ville and Buka, the northernmost of the Solo¬ mon Islands, joined for purposes of adminis¬ tration with the Bismarck Archipelago, formed a part of the German colony of Kaiserwilhelms-land; this colony was captured in September and October 1914, by the Australian contin¬ gent, on its way to the World War. Econom¬ ically, Melanesia has been but little exploited. The French in New Caledonia have worked with considerable success extensive mineral operations, the . garnierite being the richest known ore of nickel and being found in beds which in general may be worked as open quar¬ ries. In the New. Hebrides the French have established extensive plantations with every promise of future industrial success. The other islands of Melanesia remain in almost unmodi¬ fied savagery, and only within the last few

years has any considerable attempt been made to utilize their extensive groves of coconut. Missionary effort in Melanesia has for the most part followed the flag; Catholic missionaries are engaged upon the conversion of the New Caledonians, Presbyterian missions have en¬ gaged with the southern New Hebrides, the Melanesian Mission of the Church of England is active in the New Hebrides and the Solo¬ mons, and in the Bismarck Archipelago the Australian Wesleyan Connection had a flourish¬ ing mission at Mioko before the German an¬ nexation, after which they were paralleled by the efforts of German, missions, both Catholic and Protestant. The inhabitants of Melanesia vary so considerably in form and language as to lead to the conclusion that probably three dis¬ tinct racial types are to be found within the area, in addition to a certain admixture of Papuan characters which have filtered into the northern areas of the region. Between island and island, even between village and vil¬ lage on the same small island, the difference of speech amounts to complete incomprehensibility. In general it is to be said that the Melanesians are very close to the lowest level of savagery; polygamy, infanticide and cannibalism are constantly practised, yet the people are of an agreeable disposition and very attractive to all such as are brought into contact with them. The cultural position of the Melane¬ sians is markedly distinct from that of the Polynesians in several important particulars : The bow is in use the art of pottery is very generally practised, the loom is found in one area, the taboo does not exist in any sense of moral control, the authority of chiefs is very limited and scantily invested with the idea of hereditary succession, shell money is used as a circulating medium, and over a large and in¬ creasing area of Melanesia sirih (betel) chew¬ ing is extensively practised. Consult Codring-ton, R. H., (Melanesian Languages) (Oxford 1885); id., (The Melanesians: Studies in their Anthropology and FolkLore) (Oxford 1891) ; Haddon, A. C, (Head-Hunters, Black, White and Brown* (London 1902) ;. Guppy, (Solomon Islands and their Natives* (ib. 1887) ; Imhans, (Les Nouvelles-Hebrides* (Nancv 1890) ; Seligmann, (The Melanesians of British New Guinea* (Cambridge 1910).

MELANESIANS. See Melanesia.

MELANISM, an excess of pigment in the skin and its appendages, producing real or com¬ parative blackness; the opposite of albinism (q.v.). Melanism is less frequent than albinism, but more inclined to affect large numbers of individuals of a species, forming melanistic va¬ rieties and is seen not only in man but in other mammals and in birds, reptiles, fishes, and in insects as, for example, certain moths which are found in Labrador and in the .White Moun¬ tains of New Hampshire, showing a possible connection between melanism and cold or high altitudes. Moisture is also considered to be a determining factor, as is indicated by the fact that the darkest races of men inhabit the warm¬ est and dampest regions of the earth. A con¬ spicuous example of melanism is afforded by the American <(black** squirrels, which are mel¬ anistic varieties of various species, especially the fox-squirrel (Sciurus niqer) and the gray squirrel (N. carolinensis) , These varieties pre¬

vail in certain parts of the country, as the region of the Great Lakes and upper Mississippi Valley, and rarely occur elsewhere. Thus a black squirrel is almost unknown in New Eng¬ land or the Hudson Valley. Another familiar example is found in the black leopards, which in a direct light seem absolutely black, but under reflected light betray a pattern of spots similar to those of the ordinary leopard. Such ex¬ amples, as is the case with other melanistic animals, often occur in the same litter of young with normal forms. In many of the lower animals, as butterflies, melanistic tendencies are developed under certain conditions, especially of excessive moisture. The pigments in the skin are mainly of the class called Melanins, which produce dark hues. Total abnormal melanism in man is unknown, but cases of partial melanism are on record. In one in¬ stance one-half of the face was white, the other black. A case is on record of a 16-year-old girl, a laundress, whose neck, face and upper chest became blue on certain occasions. She was otherwise apparently normal but the skin was so pigmented that when she blushed her color was blue instead of red, the change ap¬ pearing with chameleonic rapidity and being associated with the accession of blood to the skin. A white towel was stained blue by being rubbed over her skin. Other cases of skin discoloration are that of a man who became black in places and yellowish brown in others, and that of an unmarried woman white until she was 21 and thereafter black as a negro. The cause of this condition is unknown. Melano¬ derma, chloasma, and liver-spots are terms ap¬ plied to irregularly shaped yellow, brown and black colorations of the skin. Some of these spots are due to scratching following the bites of body-vermin, to prolonged pressure upon a

portion of the skin, prolonged use internally of preparations of silver, to racial admixture, gen¬ eral diseases, such as cancer or tuberculosis, *etc.* See Coloring Matters ; Coloration, Pro¬ tective.

MELANITE (Gr. ((black**), a very black variety of garnet, especially the lime-iron va¬ riety, in which lime largely preponderates in the protoxides. Melanite occupies a place mid¬ way between schorlomite and the garnets pure, and simple ; this is notably true of the sort con¬ taining the rare element titanite (q.v.). The group includes all the darkish garnets, with the exception (made by Dana) of the precious garnet, technically the pyrolite, which varies from red to black. With the green demantoids the blackish melanites make up the greater part of Dana's second class of garnets, the iron garnets.

MELANORRHCEA, mel"a-no-re'a. See

Varnish Tree.

MELANOSIS. See Tumor.

MELANTERITE (Gr./ˆavrepocˆblacker®) in mineralogy, the natiye hydrous sulphate of iron; iron vitriol. It is the native form in which copperas occurs, is green in color and has a glassy lustre.

MELASMA (Gr. <(black spot®), a disease marked by discoloration of the skin. The term is rightly used in connection with a pigmenta¬ tion of the skin, sometimes diffuse (color vary¬ ing — dusky yellow, greenish brown, or even

black), and believed to be dependent upon de¬ generation of the suprarenal capsules or the semilunar ganglia. (See Addison's Disease). Sometimes the term is applied to the conditions known as liver-spots and ˆmoth-patches.®

MELASTOMACEiE. See Deer Grass.

MELBA, Nellie, Australian prima donna: b. Melbourne, about 1860.

She studied there in the Presbyterian Ladies' College; then took up music under Marchesi in Paris. On 15 Oct. 1887 she made her debut in Brussels in <Rigoletto) ; at that time gave up her family name Mitchell and took the stage name Melba, which is said to have been suggested by the name of her native city; in 1889 she appeared in Paris at the opera, where she stayed for three years, during which she appeared in London in Italian repertoire ; and after 1892 toured Europe and America. Her best roles are Ophelia, Juliette, Lucia and Nedda in (I Pagliacci.* She was married to Charles Arm¬ strong in 1882. Consult Murphy, G. A., (Nellie Melba > (London 1909).

MELBOURNE, mel'bern, William Lamb, Viscount, English statesman: b. 15 March 1779; d. 24 Nov. 1848. Carefully trained by his mother, he entered Eton in 1790, Trinity Col¬ lege, Cambridge, in 1796, and Lincoln's Inn in 1797; studied law in Glasgow; was called to the bar in 1804; and in 1805 was elected to the House of Commons, where he followed Fox, leader of the opposition. He lost his seat in 1812 because of his vote for Catholic emancipa¬ tion; was returned, in 1816; served as chief secretary in Ireland in 1827 ; and in 1828 entered the House of Lords, upon his father's, death. Only then did he begin to figure in politics, and that only because of his popularity, for he had no official ability, being neither diligent nor brilliant. As home secretary, under Grey in 1830 he was a failure; but in July. 1834 the king induced him to form a ministry, and again in 1835, in spite of the king's effort to foist Peel on the country in Noyember 1834, he became Premier. He remained in office until August 1841, thus covering the early years of the reign of Victoria, whom Melbourne ably instructed in the duties of her position. His tuition of the young queen seems, however, the only event of his long administration, and he must be classed rather as a politician than as a great statesman, since he was scarcely more than indifferent to the reform measures of the day. He was a man of much learning, of a rather attractive, though coarse and habitually profane, wit and of a strange admixture of con¬ stitutional conservatism and political liberalism. His wife, Lady Caroline Ponsonby, whom he married in 1805, was separated from him in 1825 ; she wrote several novels and was a friend of Lord Byron. See Norton, Caroline Eliza¬ beth ; and consult Torrens, W. M., (Memoirs.5

MELBOURNE, Australia, the capital of the state . of Victoria, and the largest city of Australasia, situated around Hobson's Bay, at the northern extremity of Port Phillip, 40 miles north of its entrance from the ocean between Points Lonsdale and Nepean. The city and its numerous suburbs occupy an extensive undulat¬ ing area, with the Yarra River, a stream of no great size, winding through it. The central

and most important business part of the city is on the north bank of the Yarra, two miles by a

direct railway line from the river s outlet in Hobson's Bay, but nine miles by the meandering water route. The city is built on a rectangular plan with fine wide streets lined with handsome and substantial public buildings and residences. Numerous lines of railway connect with the interior and the extensive suburban districts, which include such important places as Colling-wood, North Melbourne, Fitzroy, Carlton, Brunswick, South Melbourne, Richmond, Prah-ran, Saint Kilda, Port Melbourne, *etc.* The city is well lighted, and paved, and is abundantly supplied with water, but the drainage, although much has been done toward its improvement, is still defective. Street railways traverse all the principal city and suburban thoroughfares.

The public buildings of Melbourne are note¬ worthy. The Houses of Parliament form a re¬ markable pile with a splendid west facade. Gov¬ ernment House is a palatial building conspicuous from every part of the city, with a tower 145 feet high. Other public buildings include the law courts, forming an extensive square, the post-office, the custom-house., the treasury, the land and mining offices, the mint, the free library with some 300,000 volumes ; the university, with an admirable museum belonging to it and a splendid hall (the Wilson Hall) in the Gothic style; the Ormond Presbyterian College; the town hall, with a large assembly room contain¬ ing a splendid organ ; the exchange, observatory, meteorological station, and athenaeum. The ecclesiastical buildings include an Anglican Cathedral, a Roman Catholic Cathedral and the Scots church, with a fine steeple. There are several ˆsky-scraper® office and store buildings ; many banks and business premises are attract¬ ive; and the Exhibition building deserves notice. At the head of the educational institu¬ tions is Melbourne University (about 930 male, 320 female students annually), with which are affiliated the three denominational colleges, Trin¬ ity (Episcopal), Ormond (Presbyterian), and Queen's (Methodist). Charitable and benevo¬ lent institutions are numerous. There are sev¬ eral parks and other grounds for public recrea¬ tion, and among these the Botanic Garden deserves special notice on account of its extent (100 acres), its beauty, and the value of its col¬ lection of trees and plants. The beautiful Fitz¬ roy Gardens also deserve special mention. Mel¬ bourne is the see of a Roman Catholic archi-episcopate and of an Anglican bishopric. The United States is represented by a consul-general. The chief industrial products of Melbourne are leather, furniture, clothing, flour, ales, cigars,

ironware, woolen, *etc.* The shipping trade is large both in exports and imports, the chief of the former being wool and gold, of the latter manufactured goods. Most imports are sub¬ ject to a heavy duty. Vessels of 26 feet draught can ascend the Yarra. Its navigation has been much improved, and the Coode canal shortens the passage. The largest vessels are accommodated at Port Melbourne and Williamstown, with depths of about 30 feet, both on Hobson's Bay; Port Phillip Bav af¬ fords unlimited anchorage for the largest ves¬ sels. The tonnage of vessels entered 1915-16 was 5,290,318. Pop. of Melbourne, including the suburban municipalities, 684,000, nearly half the population of the state.

The first settlements on the site of Mel¬ bourne were made in 1835, and a year or two,

■Yfjfm

MELBOURNE, AUSTRALIA

Photos Copyright 1908 by Underwood & Underwood

1 Parliament Building, Melbourne

2 Public Library, Melbourne

after it received its present name, being so called after Lord Melbourne, who was then British prime minister. It was incorporated

in 1842 and became a bishop's See in 1849. In 1851 it became capital of Victoria (then estab¬ lished as a separate colony), and received an immense impetus from the discovery of gold fields.

A centennial exhibition was held in 1888 in celebration of the founding (in 1788) of the Australian colonies. A great conflict between labor and capital took place in 1890, and a strike by the labor-unionists took place on a very extensive scale both in Victoria and New South Wales. In 1892-93 Melbourne suffered severely from commercial depression, financial crises and banking disasters. The first Parlia¬ ment of the Commonwealth of Australia was opened in the Exhibition Building on 9 May 1901 by the Duke of Cornwall and York (after¬ ward George V). Consult (Victoria and its Metropolis, Past and Present* (1889) ; Gordon and Gotch, (Australian Handbook (1906).

MELCHERS, Paulus, German cardinal : b.

Munster, Westphalia, 6 Jan. 1813; d. Rome, 14 Dec. 1895. He studied law at Bonn and the¬ ology at Munich and Munster ; was ordained priest in 1841 ; in 1857 became bishop of Osna-briick, and in 1865 Pope Pius IX nominated him archbishop of Cologne. At first opposing the doctrine of papal infallibility at the Vatican Council, Melchers afterward accepted it, in agreement with the majority, and dealt severely with professors who sought to prevent its dec¬ laration. In the Kulturkampf (q.v.) his con¬ spicuous activity brought him into collision with the representatives of government, and in 1876 he was removed from his archbishopric. His writings include (Eine Unterweisung fur das heilige Altarsakrament* (1878) ; (Die katholische Lehre des Herrn* (1883), and (Das Leben der allerseligsten Jungfrau und Gottes-mutter) (1884).

MELCHITES, mel'kits, those Christians of western Asia and of the Levant who acknowl¬ edge the supremacy of the Roman Pontiff and accept the dogmas of the Roman Catholic Church. The Syriac and Egyptian congrega¬ tions of this name in the main belong to the Greek Church though in some unimportant matters of ceremony and discipline they take an independent course. They are, however, under a chief bishop of their own, who is styled patriarch of Antioch. The term Melchites is a nickname. It means ((Royalists® and was given to them by the orthodox Greeks with the implication that they accepted the decrees of the Council of Chalcedon merely at the dic¬ tation or in conformity with the example of the emperor. Celibacy is imposed upon their bishops, but their priests are at liberty to marry. Their liturgy is in the Arabic language; they use unleavened bread in the

Eucharist and in their monastic houses they follow the Basilian rule. There are said to be 100,000 of them. Consult Neale, (History of the Eastern Church. *

MELCHIZEDEK, mel-kiYe-dek («king of righteousness,® that is, righteous king), in the story of Genesis, king of Salem and priest of ((Supreme God.® He met Abram on his re¬ turn from the victorious expedition against Chedorlaomer, gave him his blessing and re¬

ceived tithes from him. The antelegal king-priest stands in Psalm cx as a figure typical of the Messiah the vicegerent of Jehovah, and in Hebrews vii, 3, of the kingly priesthood of Jesus. There are various views as to the identity of Melchizedek, as he is named in many ancient writings. Rabbi Kaufmann Kohler of the Hebrew Union College, Cin¬ cinnati, states in the (Jewish Encyclopedia) that the personality of Melchizedek rests upon ancient Jewish tradition, and identifies him with Malki-Zedek, first king of Zedek, the an¬ cient name of Jerusalem. Philo speaks of him as the (<Logos® ; others believe he was Shem, ancestor of Abraham. The chapter in Genesis containing his story is a unique passage of the Pentateuch, and according to Wellhausen is one of its latest additions. Ewald counts it the earliest portion of the history and based on old Canaanitish records; others, as Noldeke, explain it as utterly unhistorical.

MELCHTHAL, melH'tal, Arnold von

(Arnold an der Halden), Swiss patriot. He is considered by some authorities to be a mythical character, but was supposed to have lived in the 14th century. He incurred the wrath of the governor and was compelled to flee to escape punishment, whereupon the gov¬ ernor seized Arnold's aged father and had his eyes put out. The son, enraged at this bar¬ barity, with two friends planned a revolt against the Austrian power which they suc¬ cessfully conducted. Consult Hˆgidius Tschudi, ˆhronicon Helveticum* (1505-72).

MELDOMETER. See Melting Point.

MELEAGER, according to Greek legend, the hero of the Calydonian boar hunt. The earliest form of the story is found in the (Iliad, } according to which Meleager is son of Sineus, a king of ZEtolia, and Althaea, daughter of Thestius. When the boar had devastated the land Meleager gathered a band about him and after a great struggle and with considerable loss of life slew the monster. A quarrel over the

spoils arose between the ZEtolians and the Curetes, the latter being un¬ der the leadership of Meleager's maternal uncles. In the quarrel the latter were killed by Meleager, who was now cursed by his mother, who prayed the Furies and gods of the nether world to destroy him. The hero with¬ drew from the fight until the Curetes stormed the town when he launched forth to save his people and was slain, according to some, by the Furies, according to others by the hand' of Apollo. Other versions of the story were cur¬ rent in later times, one of which is preserved in an ode of Bacchylides. The Calydonian Hunt was a favorite subject with artists from early times, and a copy of a work by Scopas, executed originally for one of the pediments of the temple of Athena Alea at Tegea, is now in the Vatican, Rome. . In the Fogg Art Mu¬ seum of Harvard University is an excellent replica of the Vatican copy.

MELEDA, Austria, an island off the southern coast of Dalmatia in the Adriatic. It is about 25 miles long and the Austrian name is Babinopolie. It is believed by some to be identical with Melita on which Saint Paul was stranded.

MELENDEZ VALDES, Juan, hoo-an ma'len'deth val-das'. Don, Spanish poet: b. Ribera del Fresno, Badajoz, 11 March 1754; d Montpellier, France, 24 May 1817. He studied law at Salamanca, where he attracted atten¬ tion by his poems in the old ballad manner and was taken up by the poet Cadalso. In 1780 he received the first prize in a competition under the control of the Spanish Academy for his pastoral 'Batilo,5 and, in 1784, his comedy, "Las Bodas de Camacho, > won a prize from the city of Madrid, although unsuccessful on the stage.

In Madrid he won the favor of Jovellanos, who appointed him professor of the classics in the University of Salamanca and urged him to enter upon an unfortunate political career; he became judge in 1789, a judicial chancellor at Valladolid in 1791, and fiscal in the Supreme Court in Madrid in 1797. He suffered brief exile after the fall of Jovellanos (q.v.) in 1798; but in 1802 returned to Salamanca. His sympa¬ thy with France, however, made him more than ever

unpopular, and after the expulsion of Joseph Bonaparte, he went into exile in France. He was one of the most prominent figures in Spanish literary life during the 18th century.

MELETIUS, (1) founder of the sect of Meletians. He was bishop of Lycopolis in the 4th century, and antagonized Peter, patriarch of Alexandria, by refusing absolution and com¬ munion to the lapsed, that is, those who under the stress of persecution had renounced their faith. A schism resulted from the dispute and Meletius traveled through Egypt and Syria gathering thousands of followers, . until the Council of Nicaea, 325, deprived him of au¬ thority and he died soon after, a merely titular bishop. (2) Another Greek ecclesiastic of the same name and century, who was made bishop of Antioch in 360, when the Arian controversy was at its height.

MELGAREJO, Mariano, ma-re-a'no malga-ra'ho, Bolivian soldier: b. Cochabamba, Bolivia, 18 April 1818; d. Lima, Peru, 23 Nov. 1872. He entered the army at an early age and by his courageous though somewhat unprin¬ cipled conduct in the many resolutions in his country, rose to be chief adviser of General Acha in 1862 and was made a general. In 1864 he turned against Acha who was then Presi¬ dent, instigated a revolution and seated himself in the presidential chair. During a brief ab¬ sence of Melgarejo the ex-President Belzu re¬ turned and reinstated himself in the.presidency only to be shot by Melgarejo himself, who 'then became dictator. He crushed a revo¬ lution in 1866 and in that year formed an alliance with Spain against Peru and Chile. Revolutions followed and he was compelled to flee the country in 1871 and was killed in a quarrel at Lima.

MELIC GRASS (mel, honey), delicate genus of grasses growing. in the shade* of woods, of the order Graminese, having a lax panicle and spikelets of 2—5 awnless florets, of which one generally is imperfect. M. uniflora is of graceful and delicate appearance; cattle are fond of it. This species is common in Europe. M. nutans is common in the United States west of the Rockies. M. . altissima, a Siberian species, growing to the height of three or four feet, has been introduced in parts of

Europe, and yields a considerable bulk of herbage. It is perennial.

MELICERTES, son of Athamas and Ino. In fear of Athamas, whose children by Nephele, Phrixus and Helle, she had tried to kill, Ino jumped into the sea with Melicertes. She became the sea divinity Leucothea, e Palsemon, whom the Romans identified with their god of

harbors, Portunus. Some identi y him with Moloch. It is recorded that children were sacrificed to him at Tenedos.

MELICOCCA (honey —kdiatoc, berry) , genus of trees or shrubs of the natural order Sapindaceae, comprising about six species, one of which M. bijuga, native of the West Indies is there universally cultivated for its fruit. t is called the honeyberry and the Jamaica ‘jufface plum; by the Spaniards, Monos; by the Dutch, Knipnee. It is 16 to 20 feet high. The fruit has an agreeable flavor and varies in color Hom yellow to jet black. It is now grown in Cali¬ fornia and Florida. When roasted the seeds mav be eaten after the manner of chestnuts. Some other species also yield edible fruits.

MELIHAH, the salting of meat according to Jewish ceremonial, that it may be without blood and ritually fit for eating, thus comply—

fL th o lour (\ -,

MELIKOFF. See Loris-Melikoff.

MELILITE, or MELLILITE, ‘a native

silicate of sodium, calcium, magnesium, alu¬ minum and iron. Potassium is also commonly present to some extent. Melilite crystallizes in the tetragonal system and has a vitreous or resinous lustre ’and usually a honey-yellow color from which circumstance it derives its name (Greek, «honey»). It is brittle, trans¬ lucent (at least in thin layers), and distinctly pleochroic. It has a hardness of about 5 and a specific gravity of 3. The mineral occurs m basic eruptive rocks and is also observed, quite frequently, in the slag from furnaces. It is sometimes called mellite.

MELILLA, Africa, a port of Spanish Morocco, about 150 miles east of the Strait of Gibraltar. The exports in 1915 totaled £168,145. A Spanish military command is located there, a wireless station and an aviation corps, the latter having a range of 320 miles. It has been used by Spain also as a penal settlement. Pop. about 9,000.

MELILOT, a genus (Melilotas) of annual, biennial and perennial herbs of the family F abacecc. The species of which there are about a dozen, are natives of western Asia and the Mediterranean region and have become widely distributed in temperate and subtropical

climates. They are upright, alfalfa-like, plants with small yellow or white flowers which are borne from late spring until frost. The pods are few-seeded and not twisted as in the closely related genus Medicago (q.v.). The two best known species are yellow melilot (M. offici¬ nalis), an annual, and white melilot (M. alba), a perennial, which are' common weeds in waste places, the former especially upon dry, clayey soils, the latter in damp situations. Like other members of the genus they are sweet-scented, particularly while drying, and their flowers are used to some extent for perfumery.

MELINE, James Florant, American law¬ yer and author: b. Sacket's Harbor, N. Y. ; d.

Brooklyn, N. Y., 14 Aug. 1873. He was grad¬ uated at Mount Saint Mary's College, Emmetts-burg, Md., and went to Cincinnati, where he was one of the professors at the Athenaeum, and, while teaching, studied law. He was also one of the editors of the Catholic Tele¬ graph. After spending some time abroad in study and travel he returned to Cincinnati, was admitted to the bar and commenced the practice of law ; later he relinquished his profession and established a banking business, also holding consulates for France and other nations. In 1860 his business failed and shortly afterward he enlisted in the Federal army. He served throughout the Civil War under General Pope, attaining the rank of colonel, and after the war was for two years chief of the Bureau of Civil Affairs in the third military district. At the end of that time he went to New York and devoted himself to literary work, writing for the Galaxy, the Nation and the Catholic World. In the latter periodical he first published the articles controverting Froude's statements and conclusions in regard to Mary Queen of Scots; these articles, which aroused wide interest, were afterward revised and published in book form under the title (Mary Queen of Scots and Her Latest English Historian* (1871). He also wrote (Two Thousand Miles on Horseback) (1867) ; Commercial Traveling) (1869), and 'Life of Sixtus the Fifth > (1871).

MELINITE, ma'lm-it, an explosive em¬ ployed by the French government late in the 19th century, in charging torpedo shells and in the preparation of rupturing charges for the use of the engineer corps and cavalry in effect¬ ing demolitions. As originally used it was com¬ posed of 70 per cent of picric acid mixed with 30 per cent of pyroxylin dissolved in 45 parts of acetone. Later it consisted exclusively of fused picric acid which was poured into the shell when in the molten condition and cast there in such a manner as to leave a central canal in the mass in which the fuse terminated in a mercuric fulminate detonator by which the charge was fired. By the use of this fuse the detonation of the charge was delayed suffi¬ ciently to allow the shell to penetrate armor and reach the farther side of it before the ex¬ plosion. Melinite was very thoroughly tested at Bouchet in 1892 to determine the degree of safety that it possesses when exposed to shocks, fire and the accidental rupture of recep¬ tacles containing it, and' the results were most favorable. The name, like that of other explo¬ sives, is going into disuse because of the prac¬ tice of describing explosives by their principal constituents.

MELIORISM (Lat., melior, better), the belief that the improvement pf the world by human effort is possible, and implying also the further belief that the world is de facto being gradually so improved and that such improve¬ ment is a law of evolution. The term was used first in conversation by the novelist, George Eliot, who desired to formulate a via media between the views of optimism and pessimism so prevalent in her day. Sully adopted the term in his <Pessimism) (1877), since when it has come into general use. Bv Sully meliorism is described as "the faith which affirms not merely our power of lessening evil — this no¬ body questions — but also our ability to in¬

crease the amount of positive good… .

By recognizing the possibility of happiness and the ability of each individual consciously to do something to increase the sum total of human welfare present and future, meliorism gives us a practical creed sufficient to inspire ardent and prolonged endeavor.® The opponents of meli¬ orism have connected it with the theory of evolution. Evolution by them is presented in a semi-religious light, inasmuch as they believe in a gradual abatement of evil through nrogres-sive evolution. This view is not confined to philosophers of this school, however, but is now the view of many agnostics, who unwarily have assumed this unconsciously religious conception of the universe. Consult Fraser, 'Theism. >

MELISSA, a plant. See Balm.

MELISSUS, me'lis-us, Greek philosopher: b. Samos, about 480 b.c. He was the son of Ithagenes, and is said to have been a friend of Heraclitus and to have commanded the fleet opposed to Pericles in 440 b.c. in the Samian War. Some fragments of a prose work of his, written in the Ionic dialect, have come down and have been collected and published by Brandis and by Mullach (1846) . From these he appears to have been a philosopher of the Eleatic school and to have reached more defi¬ niteness and consistency than Parmenides. He reasoned that being was eternal, and could not have a beginning, else it would start with non-being; by like reasoning, there can be no de¬ struction of being, for it would have to become another and opposite thing. Void he holds to be nothing, which is not, and therefore unthink¬ able. He concluded that being was incorporeal, because a body has size and parts.

MELITA, mel'i-ta, the island on which Saint Paul, on his voyage to Rome, was cast away. This has generally been considered to be the Island of Malta, the ancient name of which was Melita, and one of whose bays has from immemorial time borne the name of Saint Paul ; but some critics have attempted to prove that it was an island, the modern Meleda (q.v.), on the coast of Dalmatia, in the Adriatic.

MELKART (Phoenician, "God of the City®), name of the presiding deity of the city of Tyre and of the whole Tyrian nation, namely, Baal (q.v.), the sun god. He is some¬ times identified with the Heracles or Hercules of the Greeks. He was the patron god of mariners and the Phoenician colonies of the West, in Africa and Spain, were under his protection. To him has been ascribed the sub¬ jugation of the savage races who anciently peopled these regions and the building of early Phoenician towns. The institution of order and legislation in these cities was also said to have been his work. Many are the voyages which he is related to have made. One of his ex¬ ploits was the rescue of Astarte from the dark¬ ness in which the moon had imprisoned her in the West; he afterward made her his wife. For an account of the Temples of Melkart at Tyre consult Jeremias, 'Tyrus bis zur Zeit Nebukadnezzar) (1891).

MELKITES. See Melchites.

MELL, Patrick Hues, American educator: b. Walthourville, Ga., 19 July 1814; d. Athens, Ga., 26 Jan. 1888. He was educated at Amherst and after teaching for several years was ap¬ pointed professor of ancient languages at Mer-

cer University in 1842 and was also ordained a Baptist minister in that year. In 1856 he was appointed to the same chair in the Univer¬ sity of Georgia, and in 1870 he became vice-chancellor, which post he resigned in 1872 In 1878 he was appointed chancellor and in 1880 was elected to the chair of metaphysics and ethics, which offices he occupied at his death. He held several pastoral charges and was presi¬ dent of different conventions in addition to his educational work and published (Baptism > (1852); Parliamentary Practice) (1868);

(Church Polity } (1878).

MELL, Patrick Hues, American scientist: b. Penfield, Ga., 24 May 1850; d. 15 Oct. 1918. Son of the preceding, was graduated at the Uni¬ versity of Georgia in 1871 and was State chem¬ ist in 1874-77. In 1878 he was called to the chair of geology and botany at the Alabama Poly¬ technic Institute and continued in that position until 1902, when he accepted the presidency of the South Carolina Agricultural and Mechanical College. In addition to his work in the uni¬ versities he was connected in 1884—1902 with the Alabama Weather Bureau and the Agri¬ cultural Experiment Station and he invented a system of weather bureau signals which has been adopted by the United States Weather Bureau. He published Southern Soapstones and Fireclays) (1882); (Study of Cotton

Plant J (1890) ; <Life of Patrick Hues Mell, SrP (1895); (Biological Laboratorv Methods) (1902) ; *etc.*

MELLEN, Charles Sanger, American rail¬ road president, b. Lowell, Mass., 16 Aug. 1851. He was educated in the public grammar and high school of Concord, N. H. He began his railway service 22 Sept. 1869 as clerk in the cashier's office of the Northern New Hamp¬ shire Railroad. In 1872-73 he was clerk to the chief engineer of the Central Vermont Railroad, in 1873-80 superintendent's clerk to the chief clerk and assistant treasurer of the Northern New Hampshire; assistant to the manager of the Boston and Lowell Railroad in 1880-81; auditor 1881—83 ; superintendent 1883-84; general superintendent 1884-88

of the Boston and Lowell and Concord rail¬ ways. In 1888 Mr. Mellen became general pur¬ chasing agent, in 1889 assistant general man¬ ager, in 1889-92 general traffic manager of the Union Pacific system. In 1892 he became gen¬ eral manager of the New York and New Eng¬ land Railroad at Boston; from 1892 to 1896 was second vice-president of the New York, New Haven and Hartford; from 1896 to 1903 president of the Northern Pacific and from 1903 to 1913 president of the New York, New Haven and Hartford Railroad. From 1910 to 1913 he also served as president of the Boston and Maine Railroad. Mr. Mellen's adminis¬ tration of the New Haven road was severely criticized because of the efforts to secure a monopoly of transportation in New England. Trolley and steamboat lines were bought out and the equipment of the parent road was de¬ preciated to such an extent that numerous wrecks resulted. Mr. Mellen retired from busi¬ ness in 1915.

MELLILITE. See Melilite.

MELLO, Custodio Jose de, koos-to'de-6 ho-sa' da ma'lo, Brazilian admiral : b. about 1845; d. 16 March 1902. In 1889 he took a

prominent part in the revolutffin, was pro¬ moted to be admiral and was appointed Minister of the Navy. Four years later he formed a plot in behalf of the Federal party and the navy, against the party of the army and its candidate for re-election, President Peixoto; bombarded and blockaded Rio de Janeiro; and, when forced out of the harbor by vessels of foreign navies, notably American, occupied Rio Grande do Sul. He could not agree with his lieutenant, Saraiva, however, and so surrendered to the government of Argentina. In 1901 he was accused, in spite of his former republi¬ canism, of plotting to establish an empire and was interned upon the island of Cobras.

MELLONI, Macedonio, ma-cha-do'ne-o mel-lo'ne, Italian physicist: b. Parma, 11 April 1798; d. Portici, near Naples, 11 Aug. 1854. He became professor of natural philosophy at the University of Parma, where between 1824 and 1831 he taught hygrometry. Political events having compelled him in the latter year to ex¬ patriate himself, he went to Geneva, where he made several important discoveries respecting the radiation of heat, which he presented in 1833 to the French Academy of Sciences. Later discoveries won him the Rumford medal from the Royal Society of London. Through the in¬ fluence of his friends, Arag*o and Humboldt, he was enabled to return to Italy, and was ap¬ pointed by the king of Naples director of the

meteorological observatory on Mount Vesuvius. Among the results of his labors at this institu¬ tion was the discovery of heat in lunar light, which led to the determination of the analogy of radiant heat to light. Political troubles again interrupted his labors, and for his presumed sympathy with liberal principles he was in 1849 ejected from his post. In 1850 he published the first volume of a work entitled (La ter-mocrasi, o la colorazione calorifica,* containing an account of his theory of the (<coloration of light,® and of his experiments on the diffusion of heat by radiation, and particularly of its transmission through transparent media. Sub¬ sequently he gave much attention to the study of electricity and combated the conclusions of Faraday with regard to the transmission ’of currents over submarine wires.

MELOCACTUS, a cactus typical of the tropical American melon-cactus family, Mclo-cactidce. It consists of a globose or conical stem, having rows of spines at intervals and flowers at the top on a hemispherical or cylin¬ drical head. There are more than 20 species. M. communis of the West Indies is the Turk’s, Englishman’s or Pope’s-head cactus. The head bearing the flower is red and like a Turkish fez in form.

MELODEON, a musical wind instrument with a row of reeds and operated by keys. The rocking melodeon, known in America since about 1825, was unsightly, tardy in sounding and of harsh tone. Jeremiah Carhart in 1815 conceived the plan of acting on the reeds by suction instead of blowing, and reversed, to this end, the bellows and reeds, inventing the present instrument in 1836. He thus secured prompt sounding and a flute-like quality of tone ; “voiced® the note by curving the reeds, and made many other improvements. In a single year 22,000 of these instruments were manufactured in the United States, and they

were popular until the cheap parlor organ dis¬ placed them.

MELODRAMA (from the Greek melos, song, and drama, action), originally and prop¬ erly a half-musical drama, or that species of drama in which the declamation of certain pas¬ sages is interrupted

by music. It is usually a tragedy of common life, filled with surprises, acts of violence and all that excites and sus¬ tains the attention of the audience, mixed up with dancing" and music and sometimes with scenes of a rudely comic character. Probabil¬ ity is freely sacrificed for the sake of striking situations. The object is to be sensational and to catch the applause of the gallery. See Drama, The.

MELODY, in music, a succession of single tones so arranged as to express a musical thought. A solo for one instrument or voice with or without accompaniment is the most typical example of a melody.

Melody is one of the most comprehensive terms used in music, being properly applicable to as few as two notes or to as many as the entire principal vocal or instrumental part of a composition. An example of the first is the motif of

woe in Wagner's (Der

Ring des NibelungsP ˆ we - He

Examples of the latter are too numerous to require mention.

The term is also appropriately applied to a phrase or portion of a phrase in a part that has been subordinate to the principal one and which for a moment gains importance on account of its greater melodic significance. In concerted music, vocal or instrumental, the highest part is usually the melody, though as stated above an inner. one may temporarily assume it. In polyphonic music all the parts are equally melodic.

Melody is the outgrowth of the improvised recitatif. The early Greek singer standing be¬ fore his audiences holding his four-stringed lyre or chelys, xˆvC plucked a string and re¬ cited his poem on that note until fancy impelled him to change it. From this crude . ancestor has sprung melody as we understand it to-day, which with rhythm and harmony form the great trinity necessary for the complete ex¬ pression of music. Melody is the only one of the three capable of suggesting enough of the other two to be satisfactory by itself. The folk¬ song of old and the popular song of to-day may be sung by a single voice without any

accompaniment and yet convey a very definite idea of the rhythm and something of the har¬ mony that would naturally accompany the tune. Such a performance is, of course, incomplete and only effective

in music of the simplest character. Yet it conveys much more than the mere rhythm of the tune played on a drum would give and still more than the mere har¬ mony played without either the melody or the rhythm. It is curious that the Greeks with all

their extraordinary achievements in all other forms of art should have advanced so little in music. No doubt they used music in their re¬ ligious feasts and the cross flutes rcTiayiavˆog and lyres supplied what they must have thought melody, but they do not seem to have ever dreamed of musical accent or rhythm, without which we cannot to-day call a succession of sounds melody, while harmony was unthought of for many centuries.

Melody is greatly affected by the harmony that the composer has wedded to it, and it is to this fact perhaps more than any other that originality continues possible, for with but 12 different notes from which to form a melody it is evident that even with all the variations that rhythm can add the melodic material is capable of exhaustion in the enormous and growing number of compositions. The follow¬ ing phrases of melody, especially the first, have no particular suggestion played alone:

but with the harmony that the composers have added they have an entirely different signifi¬

Lento

ua — a _ i i » 1 — — n

■4) ˆ o • +T.

A

Vy a JK

» 1

“o’

-9

-er

/\ •

‘■I ♦ fV A

~o -©•

Motif of Fate “ Die Walkuere” — Wagner.

cance, the one of the great solemnity and fore¬ boding, the other of harsh cynicism and sneer¬ ing.

Henry Gordon Thunder,

Conductor Choral Society of Philadelphia.

MELOIDiE. See Blister-beetle.

MELON-CACTUS, or MELON-THIS¬ TLE.’ See Melocactus.

MELON-PEAR, or SHRUB. See Melons.

MELONS, a popular name for several un¬ related plants, but more particularly for two members of the family Cucurhitacece, the muskmelon (Cucumis melo) and the watermelon (Citrullus vulgaris). The more important other fruits similarly known are the Chinese preserv¬ ing melon (Bcnincasa cerifera) of the same family; the melon papaw (Carica papaya) of the family Caricacece, and the melon-shrub or melon-pear (Solanum muricatum) of the family Solanacece.

The muskmelon is an annual trailing herb which has been introduced by man into all tropical, subtropical and many temperate climates

from southern Asia where it is native. It is characterized by long, running, hairy and somewhat prickly vines, roundish heart-shaped leaves, yellow monoecious flowers and usually edible fruits of very various forms and sizes. The following are the principal varieties: Va¬ riety cantaloup ensis, the cantaloupes, or rock-melons, which have hard, warty or scaly rinds more or less furrowed, and flesh of various colors from white to red, green or yellow. In the United States the name ˆcantaloupe® is loosely applied to horticultural varieties of

other groups. Variety reticulatus includes the nutmeg or netted melons which have softer rinds, sometimes smooth, but usually more or less netted. To this group belong the larger part of the so-called cantaloupes in American markets. Variety saccharinus comprises the pineapple-melons which have very sweet flesh, but are not clearly distinct from the preceding group. Variety inodorus, the winter muskmelons, which have less hairy, lighter-colored vines and foliage and whose long-keeping fruits are deficient or entirely lack the characteristic muskmelon odor. This group is less cultivated in the United States than in the Mediterranean region, but because the fruits can be kept until Christmas or later when properly grown, gathered before frost and slowly ripened in a cool, rather dry room, they should become more widely popular where the seasons are long enough to permit their reaching such a stage of maturity. Variety flexuosus, the snake-melons or cucumbers, have very long, narrow, greenish, contorted fruits, prized more as oddi¬ ties than for economic usos, though often used for making preserves. They are distinct from the snake-gourds which belong to the genus Lagcnaria. A variety chito, called orange-melon, melon-apple, garden-lemon and many other popular names, bears orange-or lemon¬ like almost scentless fruits with white or pale yellow flesh, which is grown to some extent for preserving. Variety dudaim, the pomegran¬ ate-melon, Queen Anne's pocket-melon, dudaim melon, etc., has small brown and yellow fruits valued solely for their exquisite perfume.

Melons are propagated wholly by means of seeds, which may be sown directly in the field or started under glass upon inverted sods, in flower-pots, berry-boxes, etc., and transplanted to the field as soon as danger of frost has passed. The former method is practised most extensively in the South and in other warm climates where the seasons are long; the latter in the North because the shortness of the season demands that the plants obtain an early start. The soil best suited to melons is a light sandy loam well drained, well exposed to the sun and well supplied with plant-food. It should be deeply plowed, thoroughly harrowed and kept clean of weeds, especially before the plants are set and until, the vines cover the ground. After harrowing, the ground is marked in checks about five feet square and 10 or 12 seeds, or five or six plants, are set in each <(hill,):) from which all but the two or three strongest vines are removed after the insects have had their share. Often, especially upon rather poor or tenacious soils,

two . or three shovelfuls of well rotted manure is mixed with the earth of the hills to give the plants a little impetus. The fruits are gathered when they will readily separate from the stems, preferably in the early morning.

During the closing decade of the 19th cen¬ tury the demand for highly flavored melons was greatly increased by the apperance in the east¬ ern markets of the Rocky ford melon, a small fruit grown in Colorado. Its appearance in large quantities drew public attention to numer¬ ous other high flavored melons grown in other sections. As a consequence many inferior varie¬ ties have nearly disappeared from cultivation. Besides the Colorado melon fields there are large areas devoted to melon-growing in New

Mexico and California. New Jersey, Mary¬ land and Delaware produce immense quantities, the first-mentioned State especially; and the product is consumed largely in the cities of Pennsylvania and New York. The Mississippi Valley States also send considerable quantities to Northern markets.

The watermelon is an annual trailing herb, a native of tropical and southern Africa, whence it has been introduced by man into all tropical, subtropical and many temperate climates for its watery sweet fruits, which sometimes weigh more than 75 pounds, but usually range between 20 and 50 pounds. The vines are more hairy, lighter green, longer run¬ ning than those of the muskmelon and the leaves are deeply notched, in some cases ap¬ proaching the compound form. Except for a horticultural group of firm-fleshed varieties known as preserving watermelons or more pop¬ ularly as citrons, the watermelon seems to have no varieties worthy the name of sub-species or botanical varieties, and even this group appears not to have received such designation.

In general, the watermelon requires the same treatment as the muskmelon, the soil being, if anything, lighter and more sandy, and the dis¬ tances between hills about double, except for the smaller growing sorts. The principal pro¬ ducing regions are Georgia and Colorado, but the watermelon is grown largely in all the southern States, and some of the short-season varieties as far north as Michigan and Ontario. The watermelon is more easily shipped than the muskmelon, since the tough-rinded kinds may be placed in cars two or more feet deep, the smaller specimens upon the bottom, and shipped long distances. Muskmelons, being more del¬ icate, must be barreled

or crated. The fruits are used exclusively in the raw state and have no by-products such as vinegar, sugar, syrup or brandy. The rinds, however, when deprived of the hard exterior, are often preserved with raisins, *etc.*

Both muskmelons and watermelons are sub¬ ject to the attacks of seyeral insects, among which the small, black, striped cucumber-beetle (Diabritica vittata) , the squash vine-borer (Mellitia ceto), the melon-caterpillar (Mar - garonia hyalinata), the cucumber flea-beetle (Crepidodera cucmncris) , the squash-bug (Anasa tristis) and the melon-louse (Aphis gossipii) are the most important. Tobacco dust and plant protectors are largely used to prevent the attacks of the first, the adults of which feed upon the under sides of the leaves and the larvae upon the roots. The melon-louse is fought with kerosene emulsion sprayed upon the under sides of the leaves or by fumigation with carbon disulphide. No effective remedy has been suggested for the borer. Arsenical sprays have been recommended for the cater¬ pillars and other chewing insects. Since the insects are believed to spread diseases from plant to plant, melon-growers seek to prevent insect injury as far as possible and practicable. The diseases, of which a large number have been described, are much the same as attack cucumbers, and may be similarly controlled where control has been found possible. Some diseases, as wilt, have defied all tried remedies. This disease generally ruins the vines a week or 10 days before the fruits would be ready to harvest. Many of the complaints as to the

poor quality of eastern-grown muskmelons re¬ sult from the sale of melons that have been gathered from blighted fields.

Consult Bailey, Cyclopedia of Standard Horticulture, > (New York 1916).

M. G. Kains, Crop Expert

MELOPIANO, an invention by which sus¬ tained sounds can be produced on a pianoforte. It consists of a series of small hammers set

into very rapid vibration by the winding up of a spring. See Musical Instruments, Mechan¬ ical.

MELOS, me'los, MILO, or MILOS,

Greece, an island in the zEgean Sea, in the southwest portion of the Cyclades, about 65 miles east of the mainland. Its length, east to west, is about 14 miles and it is about eight miles in extreme breadth ; area, 64 square miles. It is mountainous, Mount Ilias rising 2,543 feet, of volcanic formation, has hot mineral springs and mines of sulphur. The island was once fa¬ mous for its riches, fertility and population, and corn, wine, cotton, oranges and other fruits are still grown. Sulphur, manganese ore, mill¬ stone, gypsum, etc., are exported. Plaka is the principal town and nearby are the ruins of Melos, the ancient capital. Kastron is a large village on the north coast. The island of Melos was first colonized by Phoenicians and afterward by Dorians. During the Peloponnesian War it was the faithful ally of Sparta till 416 b.c., when it was taken by the Athenians and its inhabit¬ ants massacred or sold as slaves. From 1204 till 1537 it formed part of the Venetian duchy of the archipelago. At the latter date it was taken by the Turks, with whom it remained till the epoch of Greek independence. Its ancient prosperity is claimed to be due largely to the fact that obsidian was found here, which was quarried and sold for making knives, hatchets and tools, In 1820 a peasant discovered here the celebrated statue known as the Venus of Milo now placed in the Louvre at Paris; the Poseidon in the National Museum at Athens was also discovered here. There are numerous interesting archaeological remains, chief of which are those of the Hall of the Mystoe on the site of the ancient capital near the village of Klima, and those of prehistoric Phylakopi, which were excavated by the British School at Athens from 1896 to 1899.

MELPOMENE, mel-pom'e-ne, one of the Muses, daughter of Zeus and Mnemosyne. She presided over tragedy and was generally repre¬ sented as a young woman with vine leaves sur¬ rounding her head, and a tragic mask covering her face.

MELROSE, Mass., city in Middlesex County, on the Boston and Maine Railroad, about eight miles north of Boston. It was set¬ tled about 1632, and until 1649 it was a part of Charlestown. It remained a part of Malden until the next year (1650), when it became a separate municipality. It was chartered as a city in 1900 and includes the villages of Fells, Wyoming and Melrose Highlands. It is a resi¬ dential suburb of Boston, but has considerable manufacturing. The chief manufactures are rubber boots and shoes. There are 25 factories of all sorts, employing about 1,200 persons, with an invested capital of over

$2,000,000 and annual gross products of $2,825,000. The State

Reservation, Middlesex Fells, 1,800 acres, and Spot ‘Pond, a natural reservoir, are attractive features. It has municipal waterworks and a lighting system. The government is vested in a mayor, elected annually, and a council. The subordinate officials are chosen by the mayor and council ; the school board by election. Pop. 18,204. Consult Drakt, c History of Middlesex County5 ; Goss, E. H., <History of Melrose5

(1902).

MELROSE, Minn., city in Stearns County, on the Great Northern Railroad, 100 miles northwest of Saint Paul. It contains flour mills, granite works, planing and saw mills. The municipality owns and operates the elec¬ tric-lighting plant and the water-supply system. Pop. 2,600.

MELROSE, Scotland, a village of Rox-burgshire, on the south bank of the Tweed at the base of the Eildon Hills, two miles east of Abbotsford, the home of Sir Walter Scott, whose (Lay of the Last Minstrel5 gave Melrose and its ruined abbey world-wide celebrity. The village had a population of 2,166. The famous abbey, now the property of the Buccleuch fam¬ ily, is admitted to be the most beautiful of all the ecclesiastical ruins in Scotland. The archi¬ tecture is in the late flamboyant Gothic style, and the chief remains are part of the nave, the transept, choir and the southern aisle with sev¬ eral chapels, of the abbey church and frag¬ ments of the cloister. The church originally was 258 feet long, with a width at the tran¬ septs of 137 feet. It was founded by King David I in 1136. destroyed by Edward II in 1322 and rebuilt by Bruce in 1326. It is the burial place of the heart of Robert Bruce, the good Lord James Douglas and the Knight of Liddesdale. It was partly demolished by the English in 1545.

MELROSE PARK, Ill., village of Cook County, about 10 miles west of Chicago, on the Chicago and Northwestern and other railroads. It contains iron works, can factories and stone quarries, but is best known as a residential sub¬ urb of the Windy City. The water-supply sys¬ tem is the property of the municipality. Pop.

(1920) 7,147.

MELTING POINT, the temperature at which the solid and liquid states of a body can coexist, without the fluid part of the mixture solidifying, nor the solid part melting. The melting point of a body which is crystalline in nature (like ice) is usually quite definite, and a body of this kind, when it melts, passes at once from a state of perfect solidity into a state of perfect fluidity. The melting point of an amorphous body, such as wax or pitch, is often very indefinite; and when a solid of this sort is gradually heated it grows soft and passes into the fluid state by a process which is practically (or even absolutely) continuous. The phenom¬ ena of the fusion and solidification of amor¬ phous bodies like wax are not yet understood as well as those that attend the change of state of a crystalline body ; and it is to be understood that what follows in the present article is stated with particular reference to the crvstal-line class of substances, in which the melting point is definite.

In general, solid bodies expand upon melt¬ ing, the original solid having a greater density than the liquid that results from its fusion. In

the case of water, as is well known, the reverse is true; the fact that ice floats in water proving that the water is denser. The fact that the density of a substance changes upon fusion im¬ plies (as may be proved by the mechanical the¬ ory of heat) that the melting point of the sub¬ stance cannot be entirely independent of the pressure. This fact was discovered in 1849 by James Thomson, who showed that the melting point of a substance like ice, which contracts upon melting, must be lowered by pressure ; while the melting point of one which expands upon melting must be raised by pressure. These theoretical conclusions have since been abun¬ dantly verified by experiment. In the case of ice, for example, it has been found by Dewar, that the melting point is lowered by 0.0130° F. per atmosphere of increase of pressure, up to 700 atmospheres.

When a substance passes from the solid to the liquid state, it absorbs a very considerable amount of heat, which is known as the ˆlatent heat of liquefaction® ; and the liquid which is formed cannot be all reduced to the solid state again until an exactly equal quantity of heat has been abstracted from it. When heat is added to a mixture composed of a solid and its liquid (pounded ice and water, for example), it does not increase the temperature of the mixture, but merely causes a certain amount of the solid to melt. This continues so long as any of the un¬ melted solid remains; each addition of heat merely bringing about a corresponding amount of liquefaction, while the temperature of the mixture remains unchanged. It is only after all of the solid has melted that the further addition of heat will produce elevation of temperature. The melting points of compounds undoubtedly depend, in some manner, upon their molecular constitutions, but we have, as yet, no definite knowledge of the nature of the dependence. We know that in a homologous series of organic compounds, the melting points show a strong tendency to increase, as the molecular weights of the members of the series increase; but the change in the melting points is irregular as we proceed from member to member, and no law has yet been discovered which takes the changes fully into account. The melting point of a mix¬ ture (such as an alloy) is often lower than that of any one of the constituents, and the effect of the presence of an impurity in a given substance upon the melting point of that substance is often out of all apparent proportion to the quantity of impurity present. This fact implies that in the determination of a melting point it is highly im¬ portant that the substance under examination shall be as nearly pure as possible. The pres¬ ence of slight, unrecognized and apparently neg¬ ligible impurities has sometimes led to entirely erroneous conclusions. In 1860, for example, Kolbe announced the discovery of an acid iso¬ meric with benzoic acid, but having a lower melting point; but Beilstein afterward proved that the substance in question was merelv or¬ dinary benzoic acid contaminated with a quan¬ tity of chlorobenzoic acid so small as to be barely recognizable by analysis.

For determining the melting point of min¬ erals. the instrument devised by Joly and known as the meldometer, is sometimes very con¬ venient. It consists essentially of a strip of platinum foil, upon which small fragments of the minerals are laid. The platinum is then

gradually heated by the passage of an electric current, until the mineral melts ; the tempera¬ ture of the foil being obtained by a calculation based upon the resistance of the platinum, the observed

strength of the current and the rate at which heat is radiated from the foil, as de¬ termined by separate observations. This method is especially useful for minerals which can be had only in small fragments.

The term fusing point is often used instead of melting point, where a high temperature is required to melt. Following are the melting or fusing points of a few familiar elements in degrees F. : Mercury, 38 ; ice, 32 ; potash, 104.5; soda, 204; sulphur, 235; bismuth, 517 ; tin, 551; lead, 850; aluminum, 1,160; flint, 1,600; sil¬ ver, 1,750; gold, 1,913; copper, 1,931; nickel, 2,642; iron, 2,912; platinum, 3,225; carbon, in¬ fusible. Alloys show vastly different melting points ; thus 93 per cent bismuth with 7 per cent zinc melted at 479° F. ; 44 per cent lead and 56 per cent bismuth at 253°. See Freezing Point.

MELTON MOWBRAY, mo'bre, England, an ancient market town in Leicestershire, 14 miles northeast of Leicester, on the right bank of the Wreak, at the junction of the Eye, 105 miles north by west of London. Melton Mow¬ bray is famous for its pork pies and Stilton cheese. It owes its prosperity chiefly to being the seat of the Melton Hunt, which attracts the sporting world in great numbers during the winter months, extensive and luxurious hunt¬ ing establishments being maintained here. Pop. (urban district) about 8,000.

MELTZER, Charles Henry, Anglo-Ameri¬ can playwright and journalist: b. London, Eng¬ land, 7 June 1853. He was educated in London and Paris, where he became correspondent of the Chicago Tribune and later of the New York Herald, for which paper he traveled over Eu¬ rope and Egypt. In 1888 he was appointed dra¬ matic and musical critic of the New York Her¬ ald, holding that position for four seasons. From 1893 to 1896 he was dramatic reviewer of the New York World, also for seven vears New York correspondent of the London Daily Chronicle. His experience was utilized as lit¬ erary associate in connection with a course of modern plays at Carnegie Lyceum, New York, and in Washington, Boston and elsewhere. In 1907 he became musical critic and special writer, in the United States and abroad, of the New York American and the Cosmopolitan Magazine. In 1914 he was appointed dramatic critic, New York American. Among his plavs are (The Story of Rodion the Student* (orig¬ inal, founded on Dostoievsky, novel) ; (Manon Lescaut* (original, founded on the romance of Abbe Prevost) ; (The First Duchess of Marl¬ borough) (original, historic comedy) ; besides English versions of (Hannele) (Hauptmann) ; (Mme. Sans Gene* (Sardou and Moreau) ; (L'Arlesienne* (Daudet) ; (The Sunken Bell* (Hauptmann) ; and a farce, (His Honor the Mayor* (with A. E.

Lancaster). From 1902 to 1907 he was secretary and librettist to the management of the Metropolitan Opera Com¬ pany. He has made English versions of (Das Rheingold* ; (Die Walkiire* ; ˆonigskinder* ; <Les Contes d'Hoffmann* ; (Das Heimehen am Herd* ; and (Orfeo* (Monteverde).

MELTZER, Samuel James, American physiologist: b. Russia, 22 March 1851; d. 7

Nov. 1920. He received a general education at Konigsberg, Prussia; studied philosophy and medicine at the University of Berlin 1875-82 and removed to the United States in 1883, after which he practised his profession in New York. From 1906 Dr. Meltzer was the head of the department of physiology and pharmacology at the Rockefeller Institute for Medical Re¬ search and consulting physician at Harlem Hospital. In 1917 he was commissioned major in the Medical Reserve Corps. Dr. Meltzer was a. member of many medical and surgical socie¬ ties. _ He published over 200 papers on biology, physiology, scientific medicine, *etc.*

MELUSINA, mel-oo-si'na, or MELU-SINE, in French myths, a beautiful nymph or fairy, who is represented as the daughter of Helmas, king of Albania, and the fairy Persine; and as having married Raymond, Count of Toulouse, who built the magnificent castle of Lusignan. Like most of the fairies of that period, she was doomed to a periodical meta¬ morphosis during which the lower part of her body assumed the form of a fish or serpent. On these occasions she exerted all her ingenuity to escape observation ; but having been once accidentally seen by her husband in this con¬ dition, she swooned away, and soon afterward disappeared. Her form is said to be seen from time to time on the tower of Lusignan, clad in mourning and uttering deep lamenta¬ tions. Her appearance was believed to indicate an impending calamity to the royal family.

MELVILLE, mel'vil, or MELVILL, Andrew, Scottish reformer: b. Baldovie, near Montrose, Forfarshire, 1 Aug. 1545; d. 1622. He was

educated at the grammar school of Montrose and the University of Saint An¬ drews; studied two years (1564—66) at the University of Paris; went to Poitiers to pur¬ sue his studies in the law ; there became regent in the College of Saint Marceon ; and through the influence of Beza received an appointment to the chair of humanity in the academy of Geneva. Returning to Scotland in 1574, he was at once appointed principal of the University of Glasgow, and in 1580 was made principal of Saint Mary's College, Saint Andrews. In 1582 he presented a petition to King James against the undue interference of the court in ecclesi¬ astical affairs, for which he escaped imprison¬ ment by going into England. Returning in 1585, he resumed his duties at Saint Andrews, and was moderator of the General Assembly in 1587, 1589, 1594. In 1606 he was summoned to Lon¬ don by the king to confer on Church matters, but because of his outspokenness he was com¬ mitted to the Tower, and there remained until 1611. He was then released upon the solicita¬ tion of the Duke of Bouillon, retired to France and became professor in the university at Sedan, which, according to some accounts (others say London), was the place of his death. Consult <Lives) by McCrie (1819) ; Morrison (1900).

MELVILLE, Sir George, British adminis¬ trator: b. Aberdeen, Scotland, 1 July 1842. He was educated by private tutors and at Edin¬ burgh Academy. He entered the imperial serv¬ ice in 1862; and was employed in the colonial civil service from 1874—1905. Between 1899 and 1903 he acted successively as administra¬ tor of British Honduras, the Falkland, Ba¬

hamas and Leeward islands, Saint Lucia and Windward Islands. He was created K.C.M.G. in 1900.

MELVILLE, George Wallace, American naval engineer: b. New York, 10 Jan. 1841; d. 17 March 1912. Educated Brooklyn Polytech¬ nic; entered the navy as assistant engine'er 1861; served through the war ; and in 1879 ac¬ companied the De Long expedition on the Jean¬ nette to discover the northeast passage. Of this party he was one of the few survivors ; most of the others owed their lives to his in¬ domitable courage and herculean strength — he carried a brother officer, weighing 175 pounds, upon his back, through ice and snow, at the same time superintending all movements of the crew and on occasion helping with the boat. He also commanded the subsequent search expeditions which recovered the Jeannette's records and De Long's body. In 1887 he was made chief engineer of the navy, a post from which he retired in August 1903, having en¬ tirely reformed the

service, put navy engineers on a professional rather than an artisan foot¬ ing, introduced the triple screw on such suc¬ cessful ships as the Columbia and Minneapolis, saved the department a tremendous sum by his refusal to adopt a boiler which had proved unsatisfactory in the British navy and de¬ signed 120 ships of over 700,000 horse power. Melville was made rear-admiral in 1899, and retired in 1903. His book, (In the Lena Delta* (1885), describes his experiences in the Jean¬ nette expedition.

MELVILLE, Herman, American novelist: b. New York, 1 Aug. 1819; d. there, 28 Sept. 1891. His grandfather was the original of Holmes' (Last Leaf.* His father, an import¬ ing merchant, died when Herman was a boy, and in 1837 his education in the Albany Classical School and in New York Citv having been com¬ pleted, he shipped as a cabin boy. Then he taught school for several years, but in 1841 sailed on a New Bedford whaler, from which in 1842 he made his escape with a comrade on one of the Marquesas. His experiences among the warlike natives and his rescue by an Aus¬ tralian whaler are described in (Typee, a Peep at Polynesian Life> (1846), a great success and an excellent portrayal of life in the South Seas. In 1847 he married the daughter of Justice Lemuel Shaw of Massachusetts; from 1850 to 1863 lived in Pittsfield; was employed in the New York custom-house from 1866 to 1885; and then retired because of ill-health. Melville's writings apart from a few small volumes of verse are mostly taken up with the life of the sailor; some of his better known titles are (Omoo, Adventures in the South Seas) (1847) ; (White jacket, or the World in a Man-of-War* (1850), which effected the abolition of flogging in the United States navy; (Moby Dick, or the White Whale* (1851), and (Pierre, or the Ambiguities) (1852). These stories were justly popular. Several <(philosophical romances® met with little success, bat¬ tle Pieces, and Aspects of the War* (1866) is Melville's best verse. His four best romances of the sea were re-edited in 1892. See Moby Dick.

MELVILLE ISLAND, (1) an uninhabited island of the Arctic regions crossed by lat. 75° N., long. 110° W., and separated on the

west by Fitzwilliam Strait from Prince Patrick Island. Its greatest length is 200 miles; great¬ est breadth 130 miles. It lies north of Melville Sound, and was discovered in 1819 by Parry, who gave the island its name and wintered there. The formation is mainly sandstone with lime and coal beds. It was visited by Bernier in 1908. (2) An island at the entrance to Van

Diemen Gulf, off the shore of the Northern Territory of Australia, with an area of about 1,800 square miles. It is hilly and densely wooded, especially with several species of eucalyptus. The earliest British settlement was made in 1824.

MELVILLE PENINSULA, North Amer¬ ica, a northeastern projection of Keewatin in the Northeast Territories of Canada, about 400 miles north of Hudson Bay. Bounded on the north by Fury and Hecla Strait and on the east by Fox Channel. It is about 250 miles long by about 100 miles broad.

MELVILLE SOUND, North America, a channel about 250 miles long by 200 miles broad, extending southeast of Melville Island, and communicating with the Arctic Ocean on the west by Banks' Strait, and with Baffin Bay on the east by Barrow Strait and Lancaster Sound. Much of its contour was measured by Hansen in 1903.

MEMBER, a subdivision of a formation (q.v.) not usually considered of sufficient im¬ portance to map separately, but given a sepa¬ rate description or mention in the text of a report.

MEMBRANE, in anatomy and physiology, a thin sheet-like tissue, more or less elastic, varying in structure and vital properties. Mem¬ branes absorb or secrete fluids, connect certain parts of the body, separate, envelop or form certain organs or act as partitions between two fluids or gases, permitting them to mingle. Mucous membranes line the canals, cavities and hollow organs which communicate externally by different apertures on the skin ; for example, the digestive, respiratory and genito-urinary tracts. These membranes are soft and velvety and have on their free surface cells for ab¬ sorption or motion and in their substance follicles which secrete mucus for lubricating and other purposes. Such secretions are saliva, gastric juice and pancreatic juice. Serous membrances, such as the peritoneum, pleura, the unicae vaginales and pericardium, facilitate the motion of the organs they envelop (ab¬ dominal digestive organs, the lungs and heart) by reason of the serum they secrete, and also maintain the shape of these organs. Allied to the serous membranes are the synovial mem¬ branes lining movable joints. By reason of their smoothness

and by aid of their lubricating serum the ends of bones move readily upon one another. Fibrous membranes (for exam¬ ple, periosteum, dura mater and perimysium), not moistened by any particular fluid, augment the solidity of organs they envelop, retain them in position, favor their motion and form canals and rings for the passage of different organs. The membranes which envelop the brain and are extended to cover the spinal cord are called meninges. (See Meningitis). The membranes enclosing the fetus are called the placenta (q.v.). Other special membranes are Desce-met's membrane, which is the fourth layer of

the cornea of the eye, and Bowman's membrane, which is the second.

MEMBRE, mon-bra, Zenobius, French

missionary in America: b. Bapaume, France, 1645; d. Fort Saint Louis, Tex., 1687. He be¬ came a member of the Recollet Order; was sent as a missionary to Canada in 1675 ; accom¬ panied La Salle in his western expedition ; was with Tonti at Crevecoeur, where he helped bring about peace between the Iroquois and the Illinois ; in 1682 went down the Mississippi with La Salle, and in the same year returned to France. For a time he was warden of a con¬ vent in his birthplace. But in 1684 he set out again with La Salle for the mouth of the Mis¬ sissippi. He was left by La Salle at Fort Saint Louis and there massacred by the Indians. He wrote a description of his trip down the Mississippi, which was incorporated by his cousin, Christian le Clerq, into his (Etablissement de la Foi dans la Nouvelle France) (1691), and which was later unscrupulously copied b_ Hennepin (q.v.). This narrative has sometimes been attributed to La Salle.

MEMEL, ma'mel, an important seaport at the north extremity of the Kurisches Haff, at its opening into the Baltic, 70 miles north by east of Konigsberg. It belonged to Germany but under the Treaty of Versailles was ceded to the League of Nations. It was almost wholly de¬ stroyed by fire in 1854, and was rebuilt in modern style. It has a large harbor, and ex¬ ports from Lithuania and Russia great quanti¬ ties of timber, also flax and linseed, coal, ma¬ nure, grain and herring; has also manufac¬ tures of brandy, soap and chemicals, sawmills, iron foundries, breweries and shipbuilding yards. Memel was founded in 1252 by the Livonian order, who gave it to the Teutonic Knights, by whom it was fortified in 1404. It suffered severely in the Lithuanian wars (13th and 15th centuries). Here in 1807 Frederick William III of Prussia took refuge and a treaty with England was signed'. Seized by

Russia in 1812 and 1914, but on each occasion that country was obliged to give it up. P gives its name locally to the Niemen River (q.v.). Pop. 21,470.

MEMLING, or MEMLINC, Hans, Flem¬ ish painter: b. Mainz, about 1430; d. Bruges, 1495. He settled at Bruges 1478, of which town he was a prosperous citizen until his death. While all that is handed down of his biography is apocryphal, it is evident, from his works, that he was an imitator of Roger Van der Weyden, although he avoided the harshness and ungraceful drawing of that artist's style. He stood alone among the Flemish painters of his day in the religious tenderness of his pictures, their lifelike expression, their ex¬ quisite coloring and modeling. His chief works are to be found in Saint John's Hospital, Bruges, namely, the altarpiece, (Marriage of Saint Catharine* (1479) ; (Portrait of Maria Moreel as Sybilla Persica) (1480), and the 14 scenes illustrating the legend of Saint Ursula and the 11,000 Virgins of Cologne (1589). In the Academy of Bruges is a triptych of his in the central panel of which are Saints Chris¬ topher, Maurus and TEgidius, and on the wings, Burgomaster Moreel (who offered the picture) with his family. In the Royal Gallery at Turin is his (Seven Dolors of Mary* — a passion pic¬ ture; in the Pinakothek at Munich a compan-MEMMI — MEMORIAL ARCH

ion picture, (The Seven Joys of Mary.* Con¬ sult Michiels, (Memlinc, sa Vie et ses CEuv-rages* (1883); Wauters, (Sept Etudes pour Servir a 1'Histo.ire de Hans Memlinc) (1894).

MEMMI, mem'me, Simone, See Martini, Simone.

MEMMINGER, mem'min-jer, Christo¬ pher Gustavus, American politician, secretary of Treasury in the Confederate government: b. Wiirttemberg, Germany, 17 Jan. 1803; d. 7 March 1888. He was brought to America in infancy, and was educated at South Carolina College. He studied law ; began to practise in Charleston in 1825 ; entered politics as a leader of the Union party; attacked the States' Rights party in a satire called (The Book of Nullifica¬ tion* (1832) ; reformed the public school sys¬ tem of the State, and for 20 years was in the State legislature, much of the time acting as head of the finance committee. In 1859, after John Brown's raid, he was commissioned by

South Carolina to consult with other delegates in Virginia as to the best method of warding off attacks of Abolitionists. From the forma¬ tion of the Confederacy until June 1864 he was Secretary of Treasury, and his mistaken policy in that office did much to ruin the Confederacy financially.

MEMNON, in Greek mythology, the son of Eos (Dawn), an Ethiopian prince, nephew of Priam, for whom he fought at Troy. After he had killed Antilochus he was defeated by Achilles. The post-Homeric legend adds that his mother wept bitterly for him, even after he had been made immortal. Memnon's king¬ dom was localized on the west bank of the Nile, and one of the colossal statues of Amen-hotep III, as early as the 1st century a.d., be¬ came connected with the myth. It was said to portray Memnon, and the musical note emitted when the sun's rays struck the statue in the early morning (probably due to the action of sudden heat on the chilled damp stone) were explained as Memnon's greeting to his mother. The statue, rehabilitated by Severus, is still sonorous. The name Memnonium was applied in the Ptolemaic period not only to the west bank of the Nile, as "Memnon's land,®. but to a temple near Abydus, excavated by Mariette in 1859, which contains the famous "gallery of kings.® This has a list of 76 Egyptian kings, and dates from the time of Seti I and his son, Rameses II. This Memnonium contains many other important sculptured documents.

(‘Memoires de Carlo Goldoni*). This work is celebrated among the many of this class in literature, and yet, in a general way, is compar¬ atively little known. The (Memoirs) were written in French, when Goldoni was 80 years old, and first appeared in Paris in 1787 (3 vols.). An excellent edition, reproducing them entire and accurately, was published on the second centenary of the author’s birth 1907, by the Florentine firm Barbera, edited with Italian notes by Guido Mazzoni. It was in 1760, a year before Goldoni was called to Paris, that he con¬ ceived, as he states in the preface to the ‘Memoirs,* the idea of an autobiography. On seeing that the first Florentine edition of his plays had become the subject of universal pil¬ lage, no less than 15 editions having been

published without his knowledge and very in¬ correctly, he resolved to publish a second edi¬ tion at his own expense and insert in each vol¬ ume a part of his life, imagining that in this way the history of his person and his plays might be completed together. Moreover, it oc¬ curred to him that possibly a collection of his works might some day be discovered in a cor¬ ner of some old library and awaken curiosity to know something about the writer who under¬ took to reform the Italian theatre and wrote 150 comedies of character and intrigue. But as the years rolled on and the work which was to extend to 30 volumes and become com¬ pleted in eight years had only reached the seventeenth volume, Goldoni realized that his project would not be completed during his life. So setting to work six years before his death, abridging and translating into French the contents of the historical prefaces of his 17 volumes of the Venice edition of the plays which related mostly his early life, and continuing with an account of the reforma¬ tion of the Italian theatre, due largely to the author’s theatrical genius, he completed the first part of the ‘Memoirs.* The second part gives an account of the composing, construc¬ tion and outcome of his many plays, together with the criticism of them and rivalry excited by them. The third and final part of the ‘Memoirs* relates the author’s personal ex¬ periences in France from 1762 to their close in 1787.

The (Memoirs> of Goldoni have been called his most amusing comedy and pronounced by no less a literary light than Gibbon, ((more truly dramatic than his Italian Comedies.® They have been the subject of admiration of some of the most distinguished of litterateurs

not only in Italy but in England, France and Ger¬ many, is proven by such testimony as that of Byron, Voltaire and Goethe. But to appreciate and enjoy Goldoni's entertaining personal rem¬ iniscences, no such extraordinary literary talent is necessary, — far from it, for the average reader can hardly fail to get enjoyment from them, especially if he be at all interested in 18th century life in Italy. As a faithful picture of the life of this period, especially the life of the humbler classes, the <Memoirs) of Goldoni rival his plays and are unexcelled. The parts that relate to Venice, Chioggia and to life in the Italian cities where Goldoni had his many and varied youthful experiences have that gen¬ uine ring found in his best plays in Italian dia¬ lect depicting life among the common people. The portions relating to the author's, life in France, although far from lacking in interest, have not the charm that the parts of the 'Memoirs1* have which relate to Italy. There is an English translation of the (Memoirs> by John Black (2 vols., London 1827). The same, abridged and edited, together with a luminous introduction by William Dean Howells (Boston 1877). For everything concerning Goldoni and his works, consult H. C. Chatfield-Taylor's masterly work 'Goldoni, a Biography) (New York 1913).

James Geddes, Jr.

MEMORIAL ARCH, an arch usually built across an avenue or street, or at an en¬ trance to a park, garden or other public place, to commemorate some person or event. The

Washington Arch in Washington Square, New York City, is a well-known American example of the memorial arch. It is built of marble and is adorned with elaborately carved figures.

MEMORIAL ARCHITECTURE. See

Sepulchral Architecture.

MEMORIAL DAY. See Decoration Day.

MEMORY IN ANIMALS is to be studied in the light of comparative psychology, as be¬ tween the human and the animal mind. To one class of thinkers this difference seems only one of degree ; the mind of the animal to them is of the same nature as that of man, but is less developed by reason of limited experience, lack of stimulus because of comparatively small means of intercommunication of ideas, and general inferiority in complexity of brain struc¬ ture. To another class of thinkers there is an essential difference — a permanent gulf between the mental processes and powers o-f brute and human beings. Memory is one of the most im¬ portant attributes of mind and must vary with varying mental abilities. Thus it is hardly, if at all, perceivable in animals of low organiza¬ tion, but is more and more recognizable as we ascend the scale of animal organization, until at the top its operation is clearly visible. In studying it as regards animals we are met, however, with this initial and constant diffi¬ culty, that while we are able not only to ques¬ tion ourselves and report what we find for comparison with and discussion of the self-examination by other men, we cannot see into an animal's mind and must judge of its proc¬ esses by their outward signs. Thus we may assure each other that we possess imagination, which is a high function of memory; but how are we to discover whether an animal indulges itself in such a mental exercise? When a horse goes slowly and with hanging head on an outward journey but becomes instantly animated and brisk in his gait when he is turned to¬ ward home, is that because he pictures in his mind the comfortable stable and good food awaiting him? If so, is that not an example of imagination? It has been customary to at¬ tribute all such acts as nest-building and the like to ((instinct,® but innumerable examples of both faulty and beneficial work of this kind discourage faith in so simple a solution ; and when a bee ingeniously stays a falling comb by a new brace or guy of wax, or a beaver over¬

comes a change in his pond by altering the direction of his dam or by building another in a new place, must these creatures not exer¬ cise imagination in order to plan and carry out the new way of meeting an unexpected diffi¬ culty? Each is applying his experience, re¬ called by memory, in the way he pictures (must picture) to himself the result of what he pur¬ poses to do, or he could not carry out his in¬ tention. That the animals we know best, horses, dogs, cats and so forth, have a very retentive memory, at least in certain directions, every one knows. The theory of many students of the matter is that this is purely ˆassociative ,® that something they see or smell or hear recalls a group of facts connected with it; and that it is impossible for them to recall this group without such a concrete suggestion. Much evidence may be produced throwing doubt on this limitation of their power.

Ernest Tngersoll.

MEMORY AND ITS DISORDERS.

Locke has defined memory as (<the power the mind has to revive perceptions which it once had, with the additional perception that it has had them before.® Ribot distinguishes three functions of memory: (1) the preservation of certain states, (2) ‘their reproduction and (3) their recognition. In view of the fact that the collection of gray matter in the cerebrospinal axis below the cortex is capable of storing im¬ pressions and that probably all parts of the sensory nervous system are concerned in mind action and in memory, it will be necessary to speak not merely of memory but of memories, ‘ in the sense of reproductions of like sense quality with the original impressions. Modern psychology accepts the concept of unconscious memory, which would imply that all impres¬ sions upon all sense organs are permanently retained in the organism. In this case the ques¬ tion is not so much how we remember as why we forget. An answer to this question has been found by the present day analytical psy¬ chology of the unconscious. Up to the time of the acceptance of these views the deter¬ minants of memory were considered to be fre¬ quency of repetition of the stimulus, or its intensity, or its interest or a combination of these factors. From a purely mechanical point of view memory is interpretable as a result of a biochemical phenomenon. The sensory nerve cells, being acted on by certain stimuli, whether of touch, taste, hearing or sight, undergo cer¬ tain molecular changes. Repetition of similar impulses induces similar reactions and a habit¬ ual response in the affected cells results. A line of least resistance is established and in these habitual responses the germ of the idea of memory is to be

found.

From this point of view the nerve-cells re¬ tain something as a result of a previous ex¬ perience, and the repetition of the stimulus finds the cells in a receptive state. Continued repetition of the stimuli constitutes a memory, and in this sense the training of a certain mechanism has bound up in it this mechanical theory of memory. Thus a muscular effort, as in tennis, or skating, or piano-playing, be¬ comes by repetition remembered in automatic action, frequently without consciousness. It is the usual rule that many muscular acts which in their acquisition have called for conscious memories soon become automatic, and the effort no longer rises into consciousness, perhaps be¬ cause of its diminished intensity. A similar point of view may be held for sound-impres¬ sions, for taste, for touch, for sight, in each individual case a different series of nerve-cells and nerve-fibres being involved. Thus the memory for a poem may mean a habit-response to a series of sight or sound impressions, or of the muscular memories of the speech mechan¬ ism that has learned to repeat the phrases. The actor who automatically says his lines, often not conscious of what he is saying, the pianist who mechanically plays, or the golfer who un¬ consciously drives true, all show the same class of memory adaptations, involving different nervous chains.

There are thus not only a visual memory, but an auditory memory, or memory for sounds, a gustatory memory for tastes, an olfactory for smeljs, and special memories for the other special classes of sensation. Older psychology

was concerned with the question as to the fidelity and longevity of these special memories or types of memory, as related to each other, and with the discovery of laws according to which they might be revived. (See Mnemonics). But with the introduction of the unconscious as a dynamic factor, the recalling of a previous experience is explained on a new principle. Memories are thus seen in the form of ideas to be reproduced into consciousness by virtue of forces which are mainly unconscious, and over which consciousness has only an indirect control, and the study of memory as such re¬ tires to an importance secondary to the study of the causes why some things tend to be remem¬ bered and others tend to be forgotten. This trend or tendency on the one hand to be for¬ gotten or on the other to be remembered is now known to be determined by the unconscious wish, a force which is termed the libido and which is the prime mover, although uniformly unrecognized, of all the activities of the ego, both conscious and unconscious.

The mental mechanisms by which the un¬ conscious pervades and indirectly controls all the conscious expressions, whether activities or thoughts, will be discussed under the title Psychoanalysis. In connection with mem¬ ory it is necessary here only to point out that what we remember is only the residua after the work accomplished by the processes of repression, during which most of our former experiences are forgotten. On the fundamental principle that what is unpleas¬ ant in experience is from earliest infancy rejected by the individual ego, and regarded as if it did not exist, we may regard, the ego as similarly rejecting or repressing the memories of impressions associated with the unpleasant or painful incidents. This explains why some things are forgotten and others, are remembered. The unconscious, which functions solely on the principle of accepting or striving for the pleasurable and rejecting or repressing the painful, therefore furnishes the motive force for injecting certain ideas into conscious¬ ness, and restraining other ideas from entering. On this fact depends the further phenomenon that the dynamic factor called. the libido, in be¬ coming attached to certain ideas which are thrust out of consciousness, may be converted and its force applied to

vegetative functions of the body producing in many cases certain forms of disease. See Psychotherapy.

Memory, however, does not depend on repeti¬ tion of stimulus alone. There are variations in intensity and duration of stimuli, modifications in plasticity of the nerve-cells themselves, the quality of attention, and above all the native in¬ dividual character of health of the nerve-tissue itself — all of which factors enter into the. every¬ day variations in memory that are familiar to all. The fixity and enduring quality of the memories of childhood are proverbial, and are due to the great plasticity, of the youthful nerve-cells, as well as to the intensitv of the early pictures. That one person should have a good visual memory and a poor auditory memory, and vice-versa, must naturally be interpreted as due to variations in individual capacity. Modern pedagogy has slowly recognized these variations, and the greater prominence given to play, and to methods of precision, be they manual, lingual, auditorial or visual, and less to

distinctly formal methods of memorizing as a purely visual process from a printed page, may be regarded as evidence of this wider recogni¬ tion that memory should be a generalized func¬ tion, and not a pedantic cramming of any sort. A well-trained muscular system may be of far greater use to a man than any of his acquired knowledge. It is impossible to train certain children to do certain things, whereas in other directions training may result in great proficiency.

Disorders of Memory. — The classifications of disorders of memory into those of defect and those of excess is based on the old psychol¬ ogy which laid most of the defects to lesions in the cortex of the brain. The newer view, while admitting the loss of memory evinced by the physical defect in the brain or nerve substance, admits also a purely functional deficiency in various memories which is determined by the unconscious wish and is entirely independent of any organic lesion or defect. It is agreed by most psychologists that the native retentiveness in any given individual does not itself alter, although there may be in one individual a finer nerve and brain structure than in another, enabling one to' perceive and therefore retain finer distinctions. But the ability to recall at will, which is the essential quality of a good memory in the ordinary sense, is dependent solely upon the proper alignment of the un¬ conscious wish with the desires of the conscious life, which are determined by the social en¬ vironment of the individual.

The general term for deficiency or loss of memory is amnesia, although this term fails to express the various distortions of memory, the illusions or slight absences ; and there are no technical words to distinguish temporary or permanent, periodic or progressive stages of the amnesic process. Inasmuch as memory is not one thing, but a great assemblage of processes which reflect a vast variety of psychological functions, situated not in the brain alone, but almost anywhere in the nervous system, a “de¬ fect in memory,® as defined by Jastrow, “is an expression of the incapacity of a group (or of certain groups) of centres to exercise their normal functions ; or a tendency which they show to functionate in an abnormal manner.® Defects of memory may be general or special. General defects may be due to an incapacity on the part of nervous centres to establish residua. This type is found in those people who never remember what they see, and, not¬ withstanding frequent repetition of an aot, never acquire proficiency in it. Occasionally a reverse general condition is manifest wherein the power of memory is unduly exalted and im¬ pressions of past experience reappear with un¬ usual brilliancy. Such states, are known in fevers, in intoxications of various kinds as of alcohol, opium, etc., and in the hypnotic trance. Special defects may arise in which particular iso¬ lated experiences are cut out of the mind. Thus alcoholic amnesia, that may forget even a com¬ mitted crime, is an illustration. Somnambul¬ ism and other hysterical states are characterized by defects of this special type. Another form of defect is observed when associated memory-groups are blotted out, as in the special dis¬ order aphasia. (See Aphasia; Speech, De¬ fects of). Memory may be falsely localized in time, or in order; imaginary additions to

real events may be present ; or illusory remem¬ brances of what has never been experienced occur. Disorders of memory are never primary conditions but depend upon either the physical nerve or brain defect for which there must al¬ ways be a corresponding deficiency in memory or upon the psychological conditions referred to above, where the specific memories are in¬ hibited by associations with unpleasant or pain¬ ful situations. Through the technique of psychoanalysis a great amount of forgotten material can be restored to memory by means of living over again the situations in which occurred the events responsible for the ap¬ parent obliteration of the memory.

Psychologically considered, memory defects may occur either in (the storing or retentive part of the nerve-cells, or they may involve the much more complicated and associated process of reproduction of the retained images. Both processes may be involved at the same time. In imbecility, idiocy, dementia, etc., a born or acquired loss of retentive power is present. In pianists — for example, Paderewski — or chess¬ players — Morphy, Pillsbury, etc., a state of localized hyperamnesia is present. This group would include all such prodigies. Occasionally one sees these two groups represented in one individual, as in an imbecile who has great power for mathematical calculation, *etc.* A case of this kind proves that the old assump¬ tion of closely localized memory-centres is false. Memory may be said to reside in all parts of the sensory nervous system. In another group the ordinary amnesias may be placed. These vary with each individual and depend largely on the healthy tone of the nervous sys¬ tem. A third group would include the paramnesias, or illusions of memory. In this condition (1) there is a loss of distinction be¬ tween memory of ‘things which really did hap¬ pen and an imagination of things which never did or could. The so-called ˆconstitutional liar® is an example of this inability to dis¬ tinguish between real and imaginary, and many types of insane persons are similarly affected in an extreme degree. The reverse of taking an imagination for a real thing is (2) taking a real thing experienced for the first time as a memory of something experienced be¬ fore — thought of having seen, heard or felt <(just that same thing before,® also called (<deja vue.® Such a feeling has nothing to do with native retentiveness, but only with the <(feeling of familiarity,® which is essentially the presence of an organic sensation which is absent in the simple paramnesia. In some in¬ sanities this

form of double memory is very prominent and leadˆ to the belief on the part of the person so affected that he is prophesying when he is only recalling what he experienced before. (3) There is also an associated paramnesia in which ‘things actually experienced suggest ideas falsely taken as memories of other things never experienced. This condition is seen in children and often leads to false testimony. It is also responsible for most (<presentiments® or alleged antecedent knowl¬ edge of what has happened. Examples of such memories of the actually non-existent are seen in the stories of faith cures, where all the heal¬ ing is that of ills that never really existed, save as associated false memories. On these false memories is erected much of the com¬

plicated structure of spiritualism, second sight and other similar phenomena. See Idiocy ; Personality and Its Disorders ; Speech, De¬ fects of; and Retentiveness.

Bibliography. — Baldwin, dictionary of Psychology and Philosophy ; Freud, Psycho¬ pathology of Every Day Life) (chapter in c<Forgetting,® 1917) ; Ribot, diseases of Mem-ory) ; Guillon, des Maladies de la Memoires,* with full consideration of hyperamnesia (1897) ; Sallier, (Troubles de la Memoire) (1892), and Pardo, (I disturbi della memoria) (1899).

Smith Ely Jelliffe, M.D.

MEMPHIS, mem’ f is, Egypt, an ancient city near the apex of the Nile Delta, 12 miles south of Cairo, according to Herodotus, founded by Menes, the first king of Egypt. It was a large, rich and splendid city, and the second capital of Egypt. After the fall of Thebes it became the sole capital. Among its buildings the temples of Ptah, Osiris, Serapis, etc., and its palaces were described as remark¬ able. At the time of the conquest of Egypt by Cambyses (524 b.c.) it was the chief commer¬ cial centre of the country and was connected by canals with the Lakes of Moeris and Mareotis. With the rise of Alexandria the import¬ ance of Memphis declined, and it was finally destroyed by the Arabs in the 7th century. In Strabo’s time (20 a.d.) it was, in population and size, next to Alexandria; in biblical history it is mentioned as Moph and Noph. The name Memphis is a corruption of Men-nofer, ((good abode.® Edrisi, in the 12th century, describes its remains as extant in his time. Among the Works specified by him are a monolithic tem¬ ple of granite 13ˆ4 feet high, 12 long and 7 broad, entirely covered within and without with inscriptions, and statues of great beauty and dimensions, one of which was 45 feet high, of a single block of red

granite. These ruins then extended about nine miles in every direc¬ tion, but the destruction has since been so great, chiefly for the construction of Fostat, an Arabic city on the opposite bank of the Nile, that although Pococke and Bruce fixed upon the village of Mitrahineh as the site (where prone on a mound are two colossal statues of Rameses II), this was not accurately ascer¬ tained until the French expedition to Egypt, when the discoveries of numerous heaps of rubbish, of blocks of granite covered with hier¬ oglyphics and sculpture, and of colossal frag¬ ments scattered over a space of three leagues in circumference, decided the matter. The views of the great temple of Ptah, the palace of Apis, the sepulchre of the Apis bulls, por¬ tions of the White Wall and of pyramids have been identified. Consult Petrie and Walker (in Publications, > Egyptian Research Ac¬ count, London 1908).

MEMPHIS, Mo., city, county-seat of Scot¬ land County, on the Keokuk and Western Rail¬ road, about 160 miles north by west of Saint Louis. It is in an agricultural region, and is the trade centre for a large part of Scotland and adjacent counties. The principal out¬ going shipments are farm products and live¬ stock. There are bituminous coal fields in the vicinity. Pop. 2,400.

MEMPHIS, Tenn., city, county-seat of Shelby County, on the Mississippi River, at the

MEMPHIS, TENN

1 Court Square, showing Exchange Building 2 Down on the Levee n , nnn nnn

3 Memphis Terminal Corporation Plant, covering an area of 170 acres of ground, and handling annually 1,000,000

bales of cotton

head of all-the-year-round navigation, is the largest city in Tennessee, the fifth in size of the cities on the Mississippi River and the most important commercial centre and distributing point between New Orleans and Saint Louis.

Communications. — Steamer transportation on the Mississippi River and its tributaries reaches all the river and gulf ports, connecting with New Orleans, 394 miles; Mobile, 383 miles; Galveston, 661 miles; Savannah, 665 miles; Charleston, 726 miles; Norfolk, 961 miles; New York, 1,158 miles. Ten trunk lines operating 17 railroads, with two bridges over the Mississippi River, include the Illinois Cen¬ tral; Frisco Railroad; Louisville and Nashville; Nashville, Chattanooga and Saint Louis; Yazoo and Mississippi Valley Railroad; Southern Railway; Missouri Pacific Railway; Saint Louis and Southwestern Railway; Mobile and Ohio Railway; and the Rock Island Railway. The principal inland cities reached by direct lines are Birmingham, 251 miles; Saint Louis, 305 miles; Louisville, 380 miles; New Orleans, 394 miles; Atlanta, 417 miles; Kansas City, 484 miles ; Cincinnati, 497 miles ; Chicago, 534 miles; Washington, 931 miles. The Cumber¬ land Telephone and Telegraph Company (Bell System) has 18,547 telephones in Memphis served by three exchanges. There are a total of 133 long distance circuits connected with the Memphis exchange, and subscribers are con¬ nected with the lines of the Bell System, which covers the entire United States and Canada.

Topographical Conditions. — Memphis is located in the most rapidly developing agricul¬ tural section of the country. It is the trade centre from the famous Mississippi Delta, and Saint Francis Basin, the combined area of which is in excess of some of the Eastern States. It is the home of the first successful Farm Development Bureau, which is doing great work in bringing about diversification of crops. The Memphis territory is no longer a one crop country. It now not only grows cot¬ ton successfully as before but most all of the other crops that are grown anywhere in the temperate zone. Suburban truck routes are operated whereby merchandise of various kinds and produce are handled between Memphis and suburban towns and farms

in the Memphis dis¬ trict. This materially simplifies the complex national problem of handling freight on short hauls. The food conservation problem is far better taken care of in this territory, farmers not only feeding themselves but being enabled to make convenient and prompt deliveries of their farm products to the city; this being espe¬ cially true in connection with dairy products, fruits and vegetables.

Industries, Commerce, Banking.— Mem¬ phis is the largest inland cotton market hand¬ ling actual cotton in the world. The receipts run between 700,000 and over a million bales per year, according to the size of the crop. These receipts will be very materially increased when the opening of the 10,000,000 acres of land in the Saint Francis Basin is finished. This basin has been protected by secure levees and is being rapidly developed. As a market for short fibre cotton, such as linters and cot¬ ton hull fibre, there is no market that can com¬ pare with Memphis. There are more fibre mills in Memphis than in any other city and the trade in linters is far above the trade of any other

market. Over one-half of the total crop of the country is sold through Memphis concerns. This city is the greatest centre for the manu¬ facturing of cotton seed products in the coun¬ try, including crude and refined cottonseed oil, meal, hulls and fibre. Memphis also is the largest hardwood producing lumber market. There are in this city 28 hardwood saw mills, with an annual capacity of 370,000,000 feet; 15 lumber yards and 32 woodworking plants. Just outside of the city there are 46 hardwood mills operated by Memphis firms, the capacity of which is 500,000,000 feet. In addition there are many other hardwood mills in the timber districts surrounding Memphis, producing an amount of hardwood lumber equal to the amount manufactured by Memphis firms. Therefore, Memphis may properly be considered as the centre of a production of approximately 2,000,000,000 feet of hardwood annually. A for¬ est products mill has been established in the city, which utilizes slabs, culls and unmerchant¬ able timber into the manufacture of large quantities of wood alcohol and similar prod¬ ucts. Charcoal is also produced in large quan¬ tities by this mill. The manufacture of sweet feeds is becoming an important industry in Memphis. Cottonseed products, alfalfa and molasses are produced abundantly in this terri¬ tory. This industry is being rapidly advanced by the present system of diversified farming. Foreign exports aggregate approximately $100,000,000 yearly, including three-quarter million bales of cotton and 5,000 cars of lumber.

There are 800 manufacturing industries of all kinds in Memphis and its suburbs. These include cottonseed-oil mills, ice factories, grain elevators, wholesale grocery houses, wholesale dry goods houses, wholesale drug houses, fur¬ niture factories, woodworking establishments of all kinds, foundries, machine shops, flour mills, pulp and paper mills, fibre plants, saddlery and harness factories, potteries, car works, pump works, wagon and carriage shops, pure food products, bread, cracker and candy fac¬ tories, patent medicine works, sugar plantation machinery works, barrel and skewer factories, spoke factories, golf stick works, shuttle block works, trunk, screen door and window facto¬ ries, basket and box factories, egg case works, horse collar factories, engine and boiler works, electric supplies, refrigerator and cold storage machinery works, cotton gins, stove and range factories, handle and coffin factories, shaft and pole works, cider presses, distilleries and breweries. Memphis has the largest automobile wheel factory in the world. Memphis also is one of the great horse and mule markets of the world.

There are 18 commercial and savings banks in Memphis; also two industrial loan banks and two private banks. The deposits in the 18 commercial banks at the time of the last report amounted to $75,000,000. The total amount of transactions for the year 1918 amounted to $3,441,112,365. The two largest banks carry deposits of $23,500,000 a*nd $17,000,000 respec¬ tively.

Civic Conditions. — The city is well laid out and well built. The wide, well-shaded and well-paved streets, the fine public and private build¬ ings, the parks with numerous large trees, all make the city most attractive. The streets are paved with asphalt, vitrified brick, macadam

and gravel. There are 1,056 miles of paved roads in Shelby County. The steel cantilever bridge 1,895 feet in length across the Mississippi, costing $3,000,000, opened 12 May 1892, has been supplemented by another bridge costing $5,000,000, which combines an interurban trolley service, double railroad tracks, pedestrians' walks and a free wagon way. Memphis has 160 churches. Its superior educational advantages include three departments of the University of Tennessee, Tennessee State Normal School, Christian Brothers College, business colleges, high schools, 40 public schools, vocational schools, art galleries, libraries and museums, free endowed circulating library (Cossitt) with 15 branches; endowed (Goodwyn) Institute, with auditorium and reference library. Its free lyceum lecture course attracts the world's lead¬ ing artists, thinkers, men and women of letters. Outside of the public schools, there are 19 paro¬ chial and miscellaneous schools and a number of private schools for boys and girls; coeduca¬ tional, such as the University School, The Misses Hutchinson School and others.

The largest hospitals are the Baptist Memo¬ rial, the new Methodist hospital (built in 1919), Saint Joseph's, Presbyterian, Lucy Brinkley, the United States Marine Hospital and numerous small hospitals, sanitaria and homes. The Y.M.C.A. occupies its own building, which is the largest in the central South. This building is equipped with a splendid library, gymnasium, swimming pool, club-rooms, dining¬ rooms and all other features going with the highest class of Y.M.C.A. work. The leading theatres are the Orpheum (capacity 2,250), Lyric (capacity 1,780), Lyceum (capac¬ ity 1,400). There are numerous other show houses and film theatres in the heart of the city and in the suburbs of various capacities from 200 to 900. The leading clubs are the Tennessee, the Chickasaw, the Rex, the old Business Men's Club, which is now the Mem¬ phis Chamber of Commerce — The Memphis Chamber of Commerce continues the club fea¬ tures. The country clubs are The Memphis Country Club, with a membership of 450, and the Colonial Country Club with a membership of 300. The B. P. O. Elks occupy a very fine home here, centrally located. The Khaki Club for the exclusive use of soldiers is located in spacious rooms on Second street in the heart of the city, and there are numerous smaller clubs. The leading hotels in Memphis are Gaysos, 300 rooms ; Peabody, 310 rooms and Chisca, 400 rooms. There are about 50 hotels in all, mostly located in the down town district — a few in the vicinity

of the depots.

Parks, Public Buildings, *Etc.* — Memphis has 1,200 acres in improved parks, and has highly improved fair grounds containing 111 acres. Belting the city on three sides is a mag¬ nificent parkway system — the most extensive in the South. The largest park is Riverside Park on the east bank of the Mississippi River, just south of the city, containing 427 acres highly improved and a splendid specimen of landscape gardener's skill. Next to the largest is Overton Park, the finest park in the South, in the northeastern portion of the city, contain¬ ing 335 acres. Within its boundaries is located the Memphis Zoological Garden which is as complete as that of Chicago, and the largest

free zoological garden in the United States. Both Overton and Riverside parks have free municipal golf links. There are several other parks scattered throughout the city. Memphis has more space in proportion to its total area in parks and parkways than any other city in the South. Adding to> recreation afforded by the parks may be mentioned the Alaskan Roof Garden with a capacity of 1,500 and pleasure excursion boats up and down the Mississippi River. Notable among the city's fine buildings are the union station, the city hall and court¬ house, the police station, the exchange build¬ ing, custom-house and post office, Goodwyn institute, Masonic temple and Scottish rite cathedral.

Modern sanitary methods obtain in Mem¬ phis, the sewer system being the Waring, the same as in New York. The water supply of the city is obtained from 64 artesian wells, the depth of which reaches 600 feet. The present pumping capacity of the water supply is 30,-000,000 gallons per day, and the daily consump¬ tion is 15,000,000 gallons. Among the cities of the United States with a population of 100,000 or over, Memphis ranks second in general healthfulness. The death rate is 13.07.

History. — The history of Memphis begins almost with the history of the LTnited States. It was a landing and tenting place for the early explorers and missionaries. It was the home of the Chickasaw Indians, and the bluffs on which the city is located, 40 feet above high water and 80 feet above low water, have al¬ ways been known as the Chickasaw Bluffs. In 1698 the French built forts on the site of what is now the city, and in 1794 the Spaniards erected forts at a time when Spain was claim¬ ing exclusive right to lower Mississippi. Some of the foremost men in the United States owned lands in this vicinity and

were interested in holding for their own country a right to free navigation on the Mississippi to the Gulf. Andrew Jackson, James Winchester and John Overton sent to Metnphis in 1819 a small colony who established the first permanent settlement. In 1826 there were 500 persons in the settlement which was then incorporated as a town, and in 1849 a city charter was granted. The Union and Confederate forces tried to gain possession of the city at the beginning of the Civil War. On 6 June 1862 a Federal fleet under Commodore Davis conquered a Confederate fleet under Com¬ modore Montgomery, thus placing Memphis in possession of the Union forces. General Forrest in command of Confederate forces entered the city in August 1864 and took sev¬ eral hundred prisoners. Memphis has always progressed commercially except during the Civil War, and when visited formerly by yel¬ low fever epidemics. The great growth indus¬ trially has come within the last three decades. The location has made the city a great railroad centre; the surrounding forests made it a great industrial centre; and the alluvial lands of the Saint Francis Basin, Yazoo Delta and the val¬ ley of the Mississippi River will always make it a great commercial centre. In 1855 yellow fever attacked the city, and again in 1867, 1873,

1878 and 1879. The epidemics of 1878 and 1879 so paralyzed the industries of the city that in

1879 Memphis was unable to liquidate the cur-

rent indebtedness and the charter as a city was revoked. The former city was designated by the State legislature as ((the taxing district of Shelby County.® The control of the dis¬ trict was vested in a board of public works composed of five members, and a governing council composed of three commissioners. The council instituted the sewerage system, which practically eliminated the recurrence of yellow fever, improved civic conditions, liquidated the debts and in 1891 the place was reincorporated and again chartered as a city.

Population. — After the Federal census of 1890 the city limits were

extended; but the pop¬ ulation as given in 1890 included both urban and suburban districts, and the increase from 1890 to 1900 was remarkable. The growth of the city may be seen from the Federal census reports. Pop. (1850) 8,841; (I860 ; 22,623;

(1870) 40,226; (1880) 33,592; (1890) 64,495; (1900) 102,320; (1910) 131,105; (1920) 162,351.

Within a radius of 50 miles of Memphis there is a population of 800,000, according to Dun's report. The foreign born population does not amount to over 1 per cent throughout the whole territorv and a careful estimate of the white race is 54 per cent and of blacks 45 per cent. Consult Davis, (History of the City of Memphis' (1873) ; Keatine and Vedder, ˆHis¬ tory of the City of Memphis' (1888).

George W. Fooshe, Memphis Chamber of Commerce.

MEMPHIS (Tenn.), Capture of. At dusk 5 June 1862 the Union flotilla under command of Com. C. H. Davis appeared near Memphis and anchored two miles above the city. The Confederate flotilla, Com. J. E. Montgomery, commanding, was lying at the Memphis levee. At daylight the Union fleet began to drop down toward the city, and the Confederates advanced to meet it. There were no troops protecting the city. The flotillas were composed of the following vessels :

Union

Guns

Confederate

Guns

Benton .

… 16

Little Rebel .

. 2

Louisville .

… 13

Bragg .

. 3

Carondelet .

… 13

Beauregard .

…. 4

Cairo .

… 13

Price .

. 4

Saint Louis .

… . 13

Sumter .

. 3

Queen of the West . .

… . ram

Lovell .

. 4

Switzerland .

… ram

Thompson .

…. 4

Monarch .

… ram

Van Dorn .

…. 4

Lancaster .

28

68

Besides having more than twice the number of guns, the Union ordnance was much supe¬ rior to that of the Confederates. The latter, however, made a desperate fight, which finally ended 10 miles below the city, with the result that the Lovell, Beauregard and Thompson were destroyed; and the Little Rebel, Price, Sumter and Bragg captured. The Van Dorn escaped. On the Union side only the Queen of the West was disabled.

‘Immediately after the fight the mayor, in reply to a summons to surrender, informed Commodore Davis that there were no troops with which to oppose him. The next morning detachments from troops under Col. C. N. Fitch, which accompanied the fleet, landed and took possession of the city.

General Grant arrived at Memphis 23 June and established the

headquarters of the Dis¬

trict of West Tennessee. He was recalled to Corinth 15 July and General Sherman was or¬ dered to Memphis, reaching the city 21 July. He restored the mayor and the city govern¬ ment, and made them responsible for civil order. He continued in command at Memphis until his forces left to join General Grant in the final campaign for Vicksburg, having pre¬ viously participated in the first move against that city.

The raid of Gen. N. B. Forrest, of Confed¬ erate cavalry fame, into Memphis occurred 21 Aug. 1864. The Union forces and command¬ ing officers were completely surprised and barely escaped capture. Gen. C. C. Washburn, in command of the District of West Tennessee; Gen. R. P. Buckland of the District of Mem¬ phis, and Gen. S. A. Hurlbut were asleep in the city. General Forrest left the vicinity of Oxford 18 August, with three brigades, making a forced march of nearly 100 miles. A strong detachment rode into the city at 4 o'clock in the morning, running over a regiment of 100-days men on picket, and capturing about 250 of them. This force divided into three and at once surrounded the quarters of the three offi¬ cers named. Each, however, escaped. General Buckland succeeded in reaching his troops and promptly directing offensive operations. With the exception of inconsiderable skirmishes in its vicinity, Memphis thereafter remained in undisturbed Union control.

MJEMPHREMAGOG, mem-fre-ma'gog, a lake in the southern part of the province of Quebec, Canada, extending into Orleans County, in Vermont. It is about 30 miles long, north and south, and from three-quarters of a mile to three miles wide. It is irregular in shape, and along its shores are several striking indenta¬ tions, in some places low and in some other parts high and rocky. The land on the west shore is mountainous, the altitude of the high¬ est points being about 2,800 feet. The outlet is the Magog River, which flows into the Saint Francis River. Along the shore are a number of villages, and in summer a steamer plies daily on the lake, connecting the chief towns and villages.

MENA, Juan de, Spanish poet; b. Cordova, Spain, about 1411 ; d. 1456. fie was educated at Salamanca and at Rome and afterward was appQinted secretary and court historian to John II, king of Castile. His allegorical poems, (Coplas de los Siete Pecados Mortales,' (Le Coronacion,' and (E1 Laberinto' (The Laby¬ rinth), a poem founded

on the (Divina Corn-media' and published in the year 1496, all show the influence of Dante, for whom he held great respect and admiration. They were very popu¬ lar, but possessed little literary merit. His col¬ lected works were published in 1528, entitled (Copilacion de todas las obras de Juan de Mena.'

MENA, Ark., city and county-seat of Polk County, 85 miles south of Fort Smith, on the Kansas City Southern Railroad. It is the seat of Saint Joseph's Academy, contains a public library, a splendid park and is also of good repute as a summer resort. The lumber indus¬ try is the city largest interest, although there is a good trade in cotton and fruit. The water-

works are the property of the municipality. Pop. 3,953.

MENABREA, Luigi Federigo, Count, Italian soldier and statesman : b. Chambery, in Savoy, 4 Sept. 1809; d. there, 25 May 1896. After completing a course in mathematics at the University of Turin and joining the engi¬ neers in the Sardinian army, he accepted the professorship of technical science at the mili¬ tary academy and at the University of Turin. Having been promoted to the rank of captain, he was used in the diplomatic corps for some time; was then elected deputy, serving both under the Minister of War and the Minister of the Interior; and upon the outbreak of the war of Sardinia and France against Austria in 1859 he was appointed chief of the engineer corps. After Savoy was ceded to France, Menabrea was made a senator by Victor Em¬ manuel, and chief of the department of engi¬ neers, and as such planned the fortifications of Bologna, Piacenza and Pavia; in 1860 he was created a lieutenant-general, in that vear laying siege to and after three months of fighting taking Gaeta. In 1861 he joined the Cabinet of Ricasoli as Minister of Marine, in 1862 also taking over the portfolio of Minister of Public Works. In 1866 he was Italian ambassador to the council which brought about the Treaty of Prague and ceded Venice to Italy. In 1867, when Rattazzi resigned, he formed a new ministry, himself becoming Minister of Foreign Affairs. As Premier he did much to place Italy in cordial relations with the outside world, and to settle internal dissensions, but his imprisonment of Garibaldi and the prev¬ alent financial straits of the nation lost to him the confidence of the House of Deputies, and on 16 Nov. 1869 he resigned. In 1870 he became Italian Ambassador at Vienna, was ap¬ pointed to the same post at London in 1876 and in 1882 went to Paris, where he was sta¬ tioned for 10 years. The most important of his works are (Etudes sur la serie de Lagrange* (Turin 1844-47) ; (Le genie italian dans la campagne d'Ancone et de la Basse-Italie) (Paris 1866), and (Republique et Monarchic dans l'etat actuel de la France) (1871).

MENAGE, Gilles, French philologist and satirist: b. Angers, 15 Aug. 1613; d. Paris, 23 July 1692. After completing his early studies he became an advocate, practising for some time at Paris, but, having conceived a profound disgust for that profession and all its-ad¬ herents, he became an ecclesiastic, and for some time was a member of the household of the Cardinal de Retz, but subsequently took up his

residence in the cloister of Notre Dame. A witty satire, entitled (Requete des Diction-naires,* published shortly after this time and aimed at the (Dictionary *of the French Acad¬ emy, prevented his becoming a member of that society. His most important works are (Dictionnaire etymologique. ou Origines de la Langue Franqaise* (1650-94) ; (Origines de la Langue Italienne* (1669); <Miscellanea) ; (Remarques sur la Langue Frangaise* ; (Historia Mulierum Philosophorum* ; (Poesies

Latines, Italiennes, Grecques, et Frangaises,* and (Anti-BailletP

MENAGERIE, a collection of wild ani¬ mals, exhibited in. zoological gardens, in museums and by circus companies traveling

from city to city. The term is now confined almost wholly to a collection exhibited in con¬ nection with a traveling circus, a permanent collection being styled a zoological park or “zoo.® The menagerie of the typical circus is usually shown in a separate tent, so arranged that the public can make the round of the cages before taking their seats. The principal ex¬ hibits are usually elephants, a giraffe (when one is to be had), hippopotamus, rhinoceros, tapir, lions, tigers, bears, leopards (and others of the cat family), lynx, kangaroo, varieties of deer, monkeys, a few cages of snakes, and minor animals. See Circus; Zoological Gar¬ dens.

MENAI (men’I) STRAIT, the channel be¬ tween Wales and the island of Anglesey, is 13 miles long, and varies in width from 250 yards to two miles. A suspension bridge and the celebrated Britannia Tubular Bridge connect Anglesey with the mainland. The tides and current are very strong at times, so that large vessels avoid the strait. See Bridge.

MENAM, ma-nam’, or MEINAM, the chief river of Siam, rising in the Laos country, and flowing generally southward to enter the Gulf of Siam below Bangkok. The headwaters are named the Nam Nan. Its length is about 900 miles, and for a considerable portion of its course it is navigable for small craft. It is subject to periodical overflows on which the crops of the rice fields along its banks are de¬ pendent.

MENANDER, the name of two Greek writers, (1) the comic dramatist: b. Athens, 342 b.c. ; d. there, 290 b.c. He was the pupil of Theophratus, himself the pupil and successor of Aristotle as head of the Peripatetics, and author of ˆharacteres,* a somewhat more literary and popular enlargement of some ruling ideas of the Nicomachsean

Ethics; he was by such a teacher well trained for his dramatic vocation. He was, moreover, a friend of Epicurus from early life, and may thus have been imbued with that bonhommie which rendered him so genial an interpreter of manners. He wrote a hun¬ dred comedies which are distinguished from those of Aristophanes by their refinement, their freedom from personal and political virulence, and their graceful, sometimes beautiful, delinea¬ tion. of feminine character. He was, however, outrivaled in popular favor by his contemporary Philemon, whose ribaldry was irresistible to the Athenian playgoers. Only some fragments of his works survive in the original, the most im¬ portant of these relics having come to light in Egypt (1898). He was, however, closely imi¬ tated by Plautus and Terence, and in the (Bacchides,> <Stichus> and (Poenulus) of the former, and the ˆndria,* ˆunuchus,* (Heau-tontimorumenos) and <Adelphi) of the latter we have very good representatives of the Greek dramatist's method and spirit. A fine antique statue of Menander is to be seen in the Vatican. (2) A Greek rhetorician who flourished in the latter half of the 3d century b.c. He has left the rhetorical treatise (De Encomiis,* and from his analyses of the orations of Demosthenes, most of the scholia on that orator have been compiled. Consult (on Menander the drama¬ tist), Guizot, <Menandre) 1855); Horkel, (Lebensweisheit des Komikers Menander* (1857); (on Menander the rhetorician), Ritschl,

(Der Rhetor Menander und die Scholien zu Demosthenes) (1883).

MENARD , ma-nar, Michel Branamour,

American pioneer : b. Laprairie, Lower Canada, 1805; d. 1856. He was of French parentage, and after working some time for a Detroit fur¬ trading company entered the service of his uncle, also a fur-trader, in Missouri. The Shawnees made him their chief, and he ac¬ quired great power among various Indian tribes. Soon after 1830 he went to Texas, where he continued fur-trading with the Indians, and also dealt with Mexicans. When the Texans re¬ volted against Mexico he held the Indians in check and kept them from acting against the in¬ surgents.

As a member of the convention at which the Texans declared their independence, and afterward of the Congress of Texas, he exerted an influence in the formation of that State. The greater part of the site of Galveston was included in a purchase made by him in 1836, and of that city he, more than any other man, is to be considered the founder.

MENASHA, me-nash'a, Wis., city in Win¬ nebago Count}7, at the mouth of the Fox River, on Lake Winnebago, on the government canal of the Fox and Wisconsin River Improvement Company, and on the Chicago, Milwaukee and Saint Paul, the Saint Paul and Sault Sainte Marie, and the Chicago and Northwestern railroads, about 90 miles north by west of Mil¬ waukee. The first permanent settlement was made in 1847 and the incorporation was in 1874. Menasha, like other places on Lake Winnebago, is a favorite summer resort. It is in an agri¬ cultural region in which the lumber interests are prominent. There is abundant water power. The chief manufactures are flour, lumber, paper, brick, machine-shop products, woodenware, furniture, leather and woolen goods. The city has good public and parish schools and a public library. Pop. (1920) 7,214.

MENCIUS, men'shi-us, the Latinized name of Meng-tse, that is, Meng the Teacher, a Chi¬ nese philosopher and recluse: b. province of Shan-Tung, about 372 b.c. ; d. there, about 289 b.c. He was educated by his mother with such success that the approbation contained in the phrase <(the mother of Meng55 has become pro¬ verbial. Mencius was one of the greatest of the early Confucians. During his time the govern¬ ments of China were oppressive, and Mencius for many years wandered about in search of a prince who would consent to govern in accord¬ ance with true and just principles. Failing to find any such, he retired to his former seclusion and spent the rest of his life in perfecting his system and training disciples. His works contain some enlightened views on man and society. He believed in the moral nature of man and had unbounded faith in the possibili¬ ties of progress under a good social and politi¬ cal system. He regarded all governments as from God, but at the same time he believed in the responsibility of rulers to their people and the people's right to depose or even put to death unworthy rulers. In a nation the people are the most important element, second comes the government and third the monarch. The aim of a government, according to him, should be the happiness and education of the people, and any ruler who was content to leave his sub¬ jects in ignorance and misery deserved to be

deposed. The teachings of Mencius were written out by his disciples in dialogue form, under the title (The Book of Mencius,5 which has been translated into Latin by Julien (1824) and into English by Collin (1828). Consult Legge, <Life and Works of Mencius5 (1875) ; Faber, Pehrbergriff des Philosophen Mencius5 (1877) ; Watters, (A Guide to the Tablets in a Temple of Confucius5 (1879).

MENCKEN, Henry Louis. American critic and editor, of German, Irish and English extraction : b. Baltimore, Md., 12 Sept, 1880. He was educated at the Baltimore Polytechnic Institute, and entered daily journalism in 1899, remaining in active service until 1917. He be¬ came literary critic for The Smart S.et in 1908 and since 1914 has been a part owner of the magazine and joint editor with George Jean Nathan (q.v.). His publications include a great many magazine articles and the following books: (Ventures into Verse5 (1901); (George Bernard Shaw: His Plays5 (1905) ; (The Philos¬ ophy of Friedrich Nietzsche5 (1908); (Men vs. the Man,5 with R. R. LaMonte (1910) ; (The Artist5 (1912) ; (Europe After 8.15, 5 with George Jean Nathan and W. H. Wright (1914) ; (A Book of Burlesques5 (1916); (A Little Book in C Major5 (1916) ; (A Book of Pref¬ aces5 (1917); (In Defense of Woman5 (1918); (Damn: a Book of Calumny5 (1918); (The American Language5 (1918) ; Prejudices: First Series5 (1919); Peliogabalus,5 with Nathan (1920) ; (The American Credo,5 with Nathan (1920) ; (On Democracy5 (1920). He is the editor of ((The Free Lance Books55 (1919-), a series of heretical philosophies. He has also edited, with critical prefaces, books by Ibsen, Nietzsche, Brieux and Wilde. Mencken repre¬ sents in extreme wing of anti-aca emic criticism in America. He is a critic of life rather than of books, and his burlesques, plays and epigrams are parts of his criticism. He is still opposed somewhat vigorously at home, but has begun to gain recognition abroad.

MENDAITES. See Nazarenes.

MENDEANS. See Nazarenes.

MENDEL, Johann Gregory, abbot of

Briinn, now known as the discoverer of the law named after him (see Heredity) : b. Hein-zendorf bei Adrau, Austrian Silesia, 22 July 1822, of peasant parents; d. 6 Jan. 1884. In 1843 he entered the Koniginkloster, an Augustinian foundation in Altbriinn, as a novice ; and was ordained priest in 1847. From 1851-53 he studied natural science at Vienna ; and, on his return to the cloister, taught in the Realschule. About 1869 he became abbot of Briinn ; and later took

part in the Ultramontane movement. It was in 1854 that he began those experiments, on Pisum, in the cloister gardens, that, after the lapse of half a century, have brought him posthumous fame. In 1865 he contributed his now memorable paper, (Versuche fiber Pflanzenhydriden,5 to the Society of Naturalists of Briinn; and, in 1869, another, on Hieracium hybrids. After 1869 he seems to have discon¬ tinued his work in hybridizing, and died un¬ recognized by science. This seems inexplica¬ ble, as his researches were of a nature to com¬ mend them to his studious contemporaries, among them Darwin, who entirely missed his

contribution, even though the Briinn society exchanged with the Royal Society of London. But Mendel had the satisfaction of realizing that he had established a law in heredity as to the numerical ratios of the types developed in hybridizing — the grand fact for which we now prize his unobtrusive labors. His theories have given us the word Mendelism. He called himself a student of Kollar; and for some time he was president of the Briinn society. Since the verification of his experiments, simultane¬ ously, in 1900, by De Vries, in Holland, Correns, in Germany, and Tschermak, in Austria, and of the translation of his paper appearing in the (Journal of the Royal Horticultural Soci¬ ety of England* (1901), the literature has been full of ((Mendel's Law.® Consult Bateson, W., < Mendel's Principles of Heredity* (Cam¬ bridge 1902).

MENDELEEFF, Dimitri Ivanovitch,

Russian chemist: b. Tobolsk, Siberia, 7 Feb. 1834; d. Saint Petersburg, 2 Feb. 1907. He studied at the Institute of Pedagogy, Saint Petersburg, where he gave special attention to natural science ; in 1856 became docent at the University of Saint Petersburg; was at Heidel¬ berg in 1859-61, where he published his mono¬ graph (On the Capillarity of Gases,* soon fol¬ lowed by (Organic Chemistry.* In 1863 he be¬ came professor of chemistry at the Saint Petersburg Institute of Technology, and in 1866 was appointed to a similar professorship in the University of Saint Petersburg. > The results of his researches on the

compression of gases, which he closely pursued from 1871 to 1875, were set forth in his work (On the Elasticity of Gases. *He was commissioned in 1876 to report upon the petroleum industry _ in the Caucasus regions and in Pennsylvania. His (Aqueous Solutions* (1886), a work on experi¬ mental chemistry, has taken its place among the most important contributions to that branch of science. In 1890 his ˆTariff Eluci¬ dated* presented the protectionist views of which he had already become a well-known ad¬ vocate, and which, as a member of the Council of Commerce and Industries, he actively prop¬ agated. When the Chamber of Weights and Measures was established by the Department of Finance, in 1893, he was appointed conserv¬ ator of the weights and measures. His proof of the periodic law (q.v.), first presented in (Elements of Chemistry* (1868-70), is his crowning achievement in pure science. Consult Thorpe, (Essays in Historical Chemistry >

(1894).

MENDEL'S LAW, the law of heredity dis¬ covered by Johann Gregor Mendel (q.v.) and first published in 1865 under the title "Versuche fiber Pflanzenhydriden® in the Proceedings of the Society of Natural History of Briinn, Aus¬ tria. Mendel made prolonged experiments in crossing varieties of the pea (Pisum sativum). His paper was overlooked until attention to his remarkable results was called by De Vries in 1900; he and also Correns and Tschermak at the same time independently rediscovered Men¬ del's law. Mendel selected seven pairs of characters, such as the shape of the ripe seed, of the cotyledons, of the seed-pod, color of the seed-skin, length of stem, *etc.* Large numbers of crosses were made between peas differing in respect of one of each of these pairs of

characters. It was found, says Bateson, that in each case the offspring of the cross exhibited the character of one of the parents in almost undiminished intensity, and intermediates which could not be at once referred to one or other of the parental forms were not found. "In the case of each pair of characters there is thus one which in the first cross prevails to the exclusion of the other.® This prevailing char¬ acter Mendel called the dominant character, and to the other he gave the name of recessive character.

This law of dominance has been found by Bateson and by Castle to

apply to animals as well as plants, and thus is a most important biological law. Thus when mating occurs be¬ tween two organisms, whether vegetable or ani¬ mal, differing in some character, the offspring frequently all exhibit the character of one parent only, in which case that character is said to be “dominant.® For example, on crossing white mice with gray mice, Castle found that the offspring are gray, that color-character be¬ ing dominant. The character which is not seen in the immediate offspring is called recessive, for though unseen it is still present in the young, white in the experiment being the re¬ cessive color.

The law of dominance has its exceptions ; the hybrid often possesses a character of its own, instead of the pure character of one parent, as is true in cases of complete domi¬ nance. The hybrid form often resembles a supposed ancestral condition, when it is usually regarded as a reversion. Examples are the gray hybrid mice, which are indistinguishable in appearance from the house mouse; also slate-colored pigeons resulting from crossing white with buff pigeons.

One result of Mendel’s discovery is the purity of the germ-cells. As stated by Castle : “The hybrid, whatever its own character, pro¬ duces ripe germ-cells which bear only the pure character of one parent or the other.® To breeders Mendel’s law is of great importance because, as remarked by Castle, it reduces to an exact science the art of breeding in the case most carefully studied by him, that of en¬ tire dominance. “No animal or plant is (pure) simply because it is descended from a long line of ancestors possessing a desired combination of characters, but any animal is pure if it pro¬ duces gametes (germ-cells) of only one sort, even though its grandparents may among them¬ selves have possessed opposite characters.®

The bearings of Mendel’s discovery, con¬ firmed by De Vries’ experiments, on the origin of species are most important. The problem is whether aberrations, sports or discontinuous variations may not sometimes result in the formation of new species and types, or whether species are all the result of slow, continuous variations. As stated by Castle, “A sport hav¬ ing once arisen affecting some one character of a species, may by crossing with the parent form be the cause of no end of disintegration on the part of any or all of the characters of the species, and the disintegrated characters may, indeed must, form a great variety of new combinations of characters, some of which will prove stable and self-perpetuating.

Mendel’s discoveries also explain the prin¬ ciple that new types of organisms are extremely

variable, whereas old types are subject to little variation. A new type which has arisen as a sport will cross with the parent form. The off¬ spring, says Castle, will then inherit some dom¬ inant character, others latent, and this will re¬ sult in polymorphism of the race. Thus the suggestion of Galton that species may arise from sports is confirmed, while added cases are afforded by the recent remarkable experiments of De Vries, resulting in the origination of seven new species of primrose by sudden vari¬ ations, or what he calls ˆmutations.® Consult Bateson, W., c Mendel's Principles of Heredity) (Cambridge 1913); Castle, W. E., (Mendel's Law of Heredity5 (Cambridge 1903) ; Morgan, T. H., (The Mechanism of Mendelian Heredity) (New York 1915). See Heredity; Sex.

MENDELSSOHN, men'dels-son, Moses, German Jewish philosopher: b. Dessau, Ger¬ many, 6 Sept. 1729; d. Berlin, 4 Jan. 1786. His father, Mendel, a schoolmaster, though very poor, gave him a careful education. He lived several years on the charity of persons of his own religion, devoting his time to study, chiefly in Hebrew and Hebrew literature, but also in mathematics and modern languages. In 1750 he was appointed by a silk manufacturer named Bernhard, a Jew, tutor of his children. At a later period Bernhard took him as a part¬ ner in his business. In 1754 he became ac¬ quainted with Lessing, with whom he con¬ tracted a close intimacy, which had a great influence on his mind. Intellectual philosophy now became his chief study. His (Brief e fiber die Empfindungen) were the first-fruit of his labors in this branch. Mendelssohn contributed to several of the first periodicals, and now and then appeared before the public with philosoph¬ ical works, which brought him fame, not only in Germany, but also in foreign countries. The most celebrated of these is (Phaedon,5 a treatise on the immortality of the soul, first published in 1767. It has been translated into most Euro¬ pean languages. He established no new sys¬ tem, but was, nevertheless, one of the most profound and patient thinkers of his age, and the excellence of his character was

enhanced by his modesty, uprightness and amiable dis¬ position. He knew how to elude with delicacy the zealous efforts of Lavater to induce him to declare himself a Christian. To this encounter between Lavater and Mendelssohn German lit¬ erature owes one of its greatest dramas, Les¬ sing's (Nathan der Weise,5 in which the author, in the person of the hero, commemorates the virtues, the tolerant spirit and comprehensive mind of his friend Mendelssohn. His Jerusa¬ lem, oder fiber religiose Macht und Judenthum) (1783) was much misunderstood, partly be¬ cause he attacked many deep-rooted prejudices of his race. (Morning Hours5 (Morgenstun-den) was published in 1785. The last work of Mendelssohn was in defense of his friend Lessing, of whom Jacobi had asserted that he was a Spinozist, was entitled (Moses Mendels¬ sohn und die Freunde Lessings > (1786). Con¬ sult Kayserling, (Moses Mendelssohn5 (1882).

MENDELSSOHN-BARTHOLDY, Jakob Ludwig Felix, German composer: b. Hamburg, 5 Feb. 1809; d. Leipzig, 4 Nov. 1847. The kindly influences which, like a halo, encircled the life of the illustrious man, are reflected in many of his best compositions. He was born

in prosperity, reared in plenty and at nearly all times was surrounded by conditions con¬ ducive to success. It has been said that in no way was Mendelssohn's naturalness and naivete more evident than in his constant refer¬ ence to his own foibles ; and further, that the hearty way in which he enjoyed idleness and boasted of it were delightful in a man who got through so much work, who was singularly temperate and whose only weakness for the products of the kitchen was for rice, milk and cherry pie. ((I do not in the least concern my¬ self,55 said he, <(as to what people wish or praise or pay for; but solely as to what I my¬ self consider good.55

It is doubtful whether the history of any other great musician discloses so wide a com¬ bination of qualities. Some of his biographers have expressed the thought that his happy dis¬ position prevented his work from attaining that degree of depth which it might have done had his genius been subjected to fiery trials. Be this as it may, the fact remains that among all the German composers there is not one who has enjoyed such universal popularity, cer¬ tainly in America and England, as Mendels¬ sohn. His oratorios, (Saint PauP and (Elijah, 5 are sung 'everywhere, while his (Hymn of Praise,5 the (Overture to the Hebrides, > his symphonies, sonatas, concert-overtures, settings for certain Psalms and (Songs without Words5 are familiar to all.

Seventy-two of Mendelssohn's numbered works were published before his death and 47 later, while 23 of his compositions, many of them including two or more pieces, had no <(opus55 numbers assigned to them. Six other of his published compositions have been re¬ corded, while his unpublished pieces, mostly in autograph and principally composed before he was of age, are quite numerous, including 12 symphonies, several fugues, concertos, sonatas, studies, fantasias, *etc.*

Felix was the second child and eldest son of Abraham Mendelssohn, a Jewish banker of Hamburg, and Lea (or Leah) Salomon, a resi¬ dent of Berlin, and a Jewish lady of consider¬ able property and attainments, to whom he was married on 26 Dec. 1804. The grandfather of Felix was Moses Mendelssohn (q.v.), who settled in Berlin in 1762 and married Fromet, daughter of Abraham Gugenheim, of Hamburg. Moses' father was named Mendel, a poor Jew¬ ish schoolmaster of Dessau, on the Elbe. Thus the name Mendelssohn (son of Mendel) simply perpetuates the Oriental method of name¬ making.

When not three years old Felix was taken to Berlin, and five years later (1816) his father took him and his sister Fanny, four years the senior of Felix, to Paris on a business trip. While there they both received lessons on the piano from Madame Bigot, but it was not till after their return to Berlin that their sys¬ tematic education commenced. Ludwig Berger became their piano instructor and Zelter taught them thorough-bass and composition. In 1824 Moscheles became acquainted with the family, and while he declined to accept Felix as a pupil consented to offer him suggestions and advice. In the same year Spohr visited Berlin and renewed his friendship with the family, which had been formed at Cassel in the sum¬ mer of 1822 where the family had gone for

the purpose of introducing Felix to him. In his eighth year Felix played the piano with re¬ markable ability, and about a year later (1818) he made his first formal public appearance. This was at a concert given by Joseph Gugel, a virtuoso on the horn. At 11 he joined the Singakademie as an alto. In 1820 Felix com¬ menced systematic

work as a composer, al¬ though before that time he had written from 50 to 60 complete movements. The earliest date of which a dated autograph is preserved was attached to a cantata entitled <In riihrend feierlichen TonenP which he completed on 13 January of that year.

The following year was eventful. He com¬ posed five symphonies, nine fugues, several pieces for the piano, two operettas and a num¬ ber of songs. It was in this year, too, that he visited Goethe at Weimar. The poet was delighted with his talent. While at Weimar he played before the Grand Duke and Duchess and improvised before the court and also be¬ fore Hummel. His compositions in 1822 were very numerous, and during this and the follow¬ ing year he wrote six symphonies, five con¬ certos, a piano quartet, a violin sonata, a Mag¬ nificat and Gloria, and an opera in three acts, entitled <Die beiden Neffen, oder der Onkel aus Boston.ˆ On 31 March he played for the second time in public, at Aloys Schmitt's con¬ cert, taking part in a duo for two pianos, and again, on 5 December, he played at a concert given by Madame Milder-Hauptmann, when he gave one of his own concertos. It. was prob¬ ably in this year, too, that the practice of hav¬ ing informal musical performances on alternate Sunday mornings at the Mendelssohn home was begun. Felix directed, his sister Fanny pre¬ sided at the piano, his younger brother, Paul, played on the cello, and his second sister, Re¬ becca, sang.

In 1824 his musical genius showed marked advance, as evidenced in his symphony in C minor, composed between 3 and 31 March. In the summer he was taken to Doberan on the Baltic, a seaside resort, and there received the impressions which later found expression in his (Meeresstille OuvertureP His wonderful power of extemporizing and his readiness to play the music of other composers are noteworthy feat¬ ures, and Hiller, who was with him in Frank¬ fort in 1825, was carried away with his per¬ formances. In this year he met Cherubini in Paris, whither he accompanied his father on a visit. Toward the end of 1825 Mendelssohn's father purchased a large mansion, surrounded by spacious grounds, and under the influence of this charming home he became more and more devoted to his work. The beauties of Shakespeare were here unfolded to him. Felix was especially charmed with the (Midsummer Night's Dream,) and probably then conceived the idea of the exquisite composition bearing that name which forms opus 61 and was first produced in Potsdam 14 Oct. 1843. The over¬ ture to a (Midsummer Night's DreanP appeared earlier, and as a piano duet, its first public per¬ formance being given at Stettin in February 1827. Either during this or the previous year, Felix entered the University of Berlin, where he showed evidences of decided literary powers. On his return from Stettin he made prepara¬ tions for his

opera (Die Hochzeit des Camacho,* but owing to the opposition of the director,

Spontini, it was performed only once at that time, although, strange to relate, a complete performance of it wTas given at Boston, Mass., on 19 March 1855.

The principal compositions during 1828 were a cantata for the Tercentenary Festival of Al¬ brecht Diirer, a cantata for a Congress of Science, an antiphona for four voices, and a concert overture. He also completed his over¬ ture to Goethe's (Calm Sea and Prosperous Voyaged During this year he organized a choir of 16 voices for practising Bach's Passi music. The year 1829 was an important one ft Felix. Hitherto his father had not permitte him to regard himself as a professional musi cian, but this now being determined on, arrange¬ ments were made for him to visit some of the great capitals, with a view of gaining material for his greatest works. His first journey was to England, where he arrived on 21 April 1829. He was received with much enthusiasm and also scored a success in society. His delight¬ ful manners and unfailing animation charmed every one. In November he was again in Ber¬ lin, and during the winter he completed the Reformation Symphony* for the Tercentenary Festival of the Augsburg Confession. He de¬ clined the professorship of music in the uni¬ versity, preferring to carry out the program which his father had mapped out for him. In May 1830 he visited Weimar, where he again met Goethe, afterward going to Munich, and later to Italy. Preparations for his return be¬ gan in June 1831, and after visiting many cities he arrived in Munich where his concerto in G minor was performed for the first time on 17 October.

Another visit to London was made in the spring of 1832, during which he composed with unabated vigor. Among the more important productions of this time were his musical repre¬ sentation of Goethe's (Walpurgis Night, > and the (Fingal Overture,* which was finished in Rome. Again in Berlin in July 1832, he gave several concerts, producing the (Walpurgis Night* at one of them. His time was fully oc¬ cupied in composing, playing and conducting. His (Italian * symphony was completed in March 1833, and sent to London where it was produced on 13 May under his personal direc¬ tion. Later in the month, we find him conduct¬ ing the Lower Rhine festival in Diisseldorf, where, as a result of his success, he was en¬ gaged as director of <(all the public and private establishments of the town® for three years with a salary of 600 thalers. He resigned, how¬ ever,

during the second year to accept the posi¬ tion of conductor of the famous Gewandhaus Concerts at Leipzig, then considered the highest position in the musical world of Germany. Thither he proceeded in August 1835, to make arrangements for the season which began on the 4th of October following. Seven concerts were given between that date and 20 November, when he was shocked by the news of his father's death which had occurred the day be¬ fore. For the first time his radiant disposition forsook him and he fell into a despondent mood. During this season of sadness, however, he was able to finish the oratorio of (Saint PauP while he also maintained the excellence of the concerts for which he was responsible. The great oratorio was first produced at the Lower Rhine Festival at Diisseldorf 22 May

1836. About this time he took charge of the Frankfort Cacilien-Verein during the illness of the director, and there made the friendship of Madame Jean-Renaud and her family. He be¬ came devotedly attached to her youngest daugh¬ ter, Cecile, to whom he was married on 28 March 1837. Returning to Leipzig he con¬ ducted another successful season, closing with a performance of (Saint Paul,) for the first time produced in that city. In August 1837, he left his bride for the purpose of conducting (Saint PauP at the Birmingham Festival. This was his fifth journey to England, and before he returned he held conferences with his friend, Klingermann, over the plan of a new oratorio having the prophet Elijah as the central figure. He reached Leipzig on 1 Octo¬ ber in time to conduct the first concert of the Gewandhaus on the same evening.

The year 1839 was notable for the composi¬ tion of the (Ruy Blas) overture for the Leipzig Theatre and the setting of the 114th Psalm to music. In the following year the invention of printing was celebrated in Leipzig by a festival, and the ˆestgesangP for men's voices, and ˆobgesangP or (Hymn of Praise, } were com¬ posed for the occasion. During this year Men¬ delssohn accepted the direction of the musical department of the Berlin National Academy of Arts, but before entering his duties he made another visit to Birmingham to conduct a

per¬ formance of the (Hymn of Praise. > On his return he was installed as General-Musik- Di¬ rector in Berlin, but having the privilege of liv¬ ing where he pleased, he returned to Leipzig. About this time he composed the music for the <Antigone) and (CEdipus Coloneus) of Sopho¬ cles, Racine's <Athalie) and Shakespeare's (Tempest) and (Midsummer Night's Dream.)

Another sad trial now befell him in the death of his mother, 12 Dec. 1842, and in No¬ vember of the following year he removed to Berlin. The king of Saxony had recently established a conservatory of music, a plan which Mendelssohn had long cherished, and he and Schumann were appointed professors or composition and the piano. Meanwhile the Gewandhaus concerts were left in charge of Hiller. In 1844 he visited London for the eighth time in response to an invitation to direct several concerts of the London Phil¬ harmonic Society. In October he resigned his position as General-Musik-Director in Berlin and took a much-needed rest until the autumn of 1845 when he again assumed charge of the Gewandhaus orchestra.

Early in 1846 he was back in Leipzig where he took charge of two classes in piano and com¬ position, and among his pupils were Gold¬ schmidt, De Sentis, Tausch and others. The season of 1845-46 was unusually brilliant in con¬ cert work and the program showed a great breadth of selection. At the eighth concert he brought with him Jenny Lind, who was then heard for the first time in Leipzig. On 5 Aug. 1846, a preliminary rehearsal of (Elijah) was held in Leipzig and soon after he started for England on his ninth visit, the complete score having been sent over a month earlier for trans¬ lation. First there was a rehearsal with piano accompaniment at Moscheles' house, followed by two full rehearsals at the Hanover Square Rooms, and later by rehearsals in Birmingham, where on 26 August the oratorio was per-vol. 18 — 40

formed for the first time in public. One of his biographers states that ((there was a mad rush at the close of the performance to grasp the hand of the hero of the day, who thanked all present for their share in the performance with which he was so deeply gratified.® Returning to Leipzig he remodeled the oratorio, however, making so many changes that scarcely a move¬ ment stands to-day as it was originally written. The complete edition was published in July 1847. The Sacred Harmonic Society of Lon¬ don now invited Mendelssohn to give a pro¬ duction of < Elijah* in its revised form in Exeter Hall, and for the tenth and last time he visited London in April 1847. Four per¬

formances were given, Queen Victoria and the Prince Consort being present at the second of the series. After giving other productions of the <Elijah) in Manchester and Birmingham, followed by a performance with the Philhar¬ monic Society, he returned to Frankfort, weary and utterly worn out. To add to his now un¬ happy condition, his sister Fanny, whom he had loved devotedly, was stricken with paralysis and died 14 May 1847. On hearing the sad news he fell fainting and for several weeks was utterly prostrated. Seeking diversion, he re¬ visited Switzerland during the summer, where, it is said, he applied himself to water-color painting and made excellent progress in that direction. Later he resumed composition, num¬ bering among his productions at that time the beautiful quartet in F minor (Opus 80), and he also wrote some parts of a newly com¬ menced oratorio, ˆChristus,* which he left un¬ finished. He returned to Leipzig in September, but attempted nothing serious in a musical way. His spirit was broken and he dreaded to appear in public. The beginning of the end came on 9 October while calling on Madame Frege, whom he was accompanying in his last set of songs. She left the room to order lights, says one of his biographers, and on her return found him shivering and suffering violent pains in the head. He rallied somewhat, but another relapse occurred on 3 November and he never spoke again. He died the following day and on Sun¬ day, the 7th, was borne to the Paulinen-Kirche, preceded by a band playing one of his (Lieder ohne Worte) (Book V, No. 3), which Mosch¬ eles had scored for the occasion. Thence the coffin was taken to the Alte Dreifaltigkeijs-Kirchhof in Berlin, where it was deposited in its last resting place.

A cross on the grave bears this inscription : <(Jakob Ludwig Felix Mendelssohn-Bartholdy: geboren zu Hamburg, am 3 Feb. 1809; ge-storben zu Leipzig am 4 Nov. 1847.®

Bibliography. — Mendelssohn’s (Letters from Italy and Switzerland,* translated by Lady Wal¬ lace (2d ed., 1862) ; (Letters from 1833 to 1847, } with catalogue of all musical compositions, translated by Lady Wallace (1863) ; (Letters of Mendelssohn to Ignatz and Charlotte Mosche¬ les, } translated by Felix Moscheles (1888) ; (Reisebriefe von Felix Mendelssohn-Bar¬ tholdy, J edited by Paul Mendelssohn-Bartholdy (1862) ; also Benedict, (Sketch of Life and Works of Felix Mendelssohn-Bartholdy) (1850) ; Hogarth, (The Philharmonic Society of London* (1862) ; Lampadius, (Life of Felix Mendelssohn-Bartholdy,* translated by W. L. Gage (1865) ; Devrient, (My Recollections of Felix Mendelssohn-Bartholdy, * translated by

Natalia Macfarren (1869); Polko, (Remi¬ niscences of Felix Mendelssohn-BartholdyP translated by Lady Wallace (1869) ; (Aus Moscheles LebenP translated by A. D. Cole¬ ridge (1873) ; Hiller, (Mendelssohn : Letters and Recollections,) translated by M. E. von Glehn (1874); Karl Mendelssohn-Bartholdy, (Goethe and Mendelssohn 1821— 31, > translated by M. E. von Glehn (1872) ; Horsley, Reminis¬ cences of Mendelssohn (in Dwight's jour¬ nal of Music1*); Dorn, Recollections of Felix Mendelssohn and his Friends* (Temple Bar for February 1872) ; Hensel, (Die Familie Men¬ delssohn 1729— 1847) (1879); <Thematisches

Verzeichniss der in Druck erschienenen Com-positionen von Felix Mendelssohn-Bartholdy* (1882) ; Eckhardt, (Ferdinand David und die Familie Mendelssohn-Bartholdy) (1888) ; Little, (Mendelssohn's Music to the Antigone of Sophocles) (1893) ; Grove, dictionary of Mu¬ sic and Musicians> ; Elson, (Great Composers and their Work) (1898) ; Ryan, Recollections of an old Musician (1899) ; Hubbard, (Little Journeys to the Homes of Great Musicians* (1901); Stratton, (Mendelssohn* (1901); Pearce, (Mendelssohn's Organ Sonatas Tech¬ nically and Critically Discussed1* (1902)

R. I. Geare,

United States National Museum.

MENDENHALL, men'den-hal, Thomas Corwin, American physicist : b. near Hanover-town, Ohio, 4 Oct. 1841. He was educated in the public schools and by his own efforts ob¬ tained a knowledge of physics and higher mathematics. In 1873 he became professor of physics and mechanics in the Ohio Uni¬ versity, where he remained until 1878, when he accepted a call to the chair of physics at the Imperial University in Tokio, Japan. There he founded a laboratory, an observatory, a scientific society, inaugurated a system of lectures, which work was highly approved by the Japanese government. In 1881 he returned to the Ohio University, and in 1884 accepted a position in the Signal Service at Washington. In 1886 he was elected president of the Rose Polytechnic Institute, but resigned in 1889 to become superintendent of the United States Coast and Geodetic

Survey, and from 1894-1901 was president of the Worcester Poly¬ technic Institute. He has published several scientific papers and a book entitled (A Century of Electricity) (1887).

MENDENHALL, Walter Curran, Amer¬ ican geologist: b. Marlboro, Stark County, Ohio, 20 Feb. 1871. In 1895 he was graduated at Ohio Normal University; studied at Harvard in 1896-97 and at Heidelberg, Germany, in 1899-1900. In 1894-96 he was geologic aid, in 1896-1901 assistant geologist and since 1901 geologist on the United States Geological Sur¬ vey. He had charge of the ground-water in¬ vestigations of the survey in 1907—10 and since the latter year has served as chief of the Land Classification Board. He is the author of various memoirs and articles on professional topics.

MENDES, Catulle, ka-tiil mon-das, French writer : b. Bordeaux, 22 May 1841 ; d. Paris 8 Feb. 1909. His verse is marked by extreme de¬ votion to form. He also wrote a great deal of prose — short stories, longer works of fiction, dramas. There is much affectation about them

all. Among his books are (Poesies > (1878) ; (Monstres Parisiens) (1882) ; (La Rose et le Noir> (1885); <Grande Maguet* (1888). Of his plays may be cited (Le Capitaine Fracasse* (1872) and <Fiamette* (1889).

MENDES LEAL DA SILVA, Jose, ho sa' man'dash la-al' da selva, Portuguese states¬ man and poet: b. Lisbon, 18 Oct. 1818; d. Cintra, 14 Aug. 1886. He was Minister of the Navy and of Foreign Affairs ; Ambassador to France, 1874-83 ; and to Spain, 1883-86. His vogue as a poet has been very great in his own country and his (Songs* (<Canticos)) were first collected in 1858. He wrote also a large number of plays, some of them very popular on the Portuguese stage, as (Uncle Andrew from BraziP ; and (The Sportsman) : and also several romances. He became a member of the Portuguese Academy in 1845.

MENDEZ-PINTO, man'dash pen'too, Fer-nao, or Fernam, Portuguese traveler: b. Montemor-o-Velho, 'near *Coimbra, Portugal, about 1510; d. Almada, near Lisbon, Portugal, 8 July 1583. He departed for the Indies in 1537, returning in 1558, and after his death a very curious relation of his voyages, (Peri-grinacao de Fernam Mendez-Pinto) was pub¬ lished, which has been translated into French, English and other European tongues. Con¬ greve, in his Rove for Love,* called him <(a liar of the first magnitude,** and from that time his narrative was considered as a romance ; but his

good faith and veracity are now generally admitted.

MENDIBURU, man-de-boo'roo, Manuel de, Peruvian soldier and historian : b. Lima, 1805; d. there, 21 Jan. 1885. _ While a student he joined the patriot forces in 1821, was cap¬ tured by the Spanish and held prisoner till the close of the war. Among various civil and military posts afterward held by him were those of Minister of War and Finance. He published a (Diccionario historico-geografico del Peru,* a work of great value and highly prized by scholars. The first part, in eight vol¬ umes, deals with the Inca and colonial periods, and its publication, begun in 1874, was con¬ cluded after General Mendiburu's death. The second part was not published.

MENDICANCY, a condition of permanent pauperism, where professional beggars are so numerous that government laws are necessary to remove or control them. A population of mendicants naturally results in a criminal com¬ munity and all countries containing this ele¬ ment have endeavored to' remove this evil by legislation. There were beggars in biblical times. As early as 1351 France was compelled to pass laws against <(Lazy persons, truants, and able-bodied beggars.® Laws were passed in England on this subject as early as the time of Henry VIII. Mendicity has been found to ex¬ ist to a greater extent in South European coun¬ tries than elsewhere, and in Spain and Italy the professional beggar has been one of the great¬ est evils, the standard of prosperity, morality and intelligence declining as mendicity in¬ creased.

According to the census statistics of 1900 there were 91,227 professional beggars in Spain, of whom 51,948 were women. In some of the cities beggars are licensed to carry on their trade. Seeking alms is recognized as a legiti-

mate business, and the municipality demands a percentage, upon the collections. Seville is the only city in the kingdom which forbids beg¬ ging upon the streets. In some of the other towns beggars are allowed to come out and ply their trade one day in the week, perhaps Friday

or Sunday, when the streets swarm with them as they go from house to house, sometimes on horseback, and it is said sometimes in carriages also. In Madrid there is no restriction and no license, and the streets are lined with them.

The United States gathers no figures of beggars as their existence is illegal. If paupers, they are supposed to go to the almshouses. The 1910 census showed 73,645 so cared for, 9,500 in New England, 10,272 in New York, 8,653 in Pennsylvania, 7,400 in Ohio, 5,395 in Illinois, 2,927 in Indiana, 2,641 in Wisconsin, 2,600 in California, *etc.*

In Mexico, both Indians and native Mexi¬ cans to the number of thousands make up the army of professional beggars, and Mexico ap¬ pears to have no laws to regulate them. In the Mexican cities and at fairs and festivals the mendicants are to be seen in astonishing vari¬ ety; some maimed, some blind and able-bodied fellows with most artistic “make-ups® of tat¬ tered garments and unkempt hair and beards. Some of these stand before one silently with a dumb appealing look in their eyes. Others kneel in the midst of the way and fill the air with their doleful stereotyped appeals for char¬ ity. These beggars are humbugs after the man¬ ner of their kind the world over.

In the United States, where labor is in greater demand and better paid than abroad, there seems to be no excuse for mendicity, and yet there are many professional beggars here, largely able-bodied foreigners. The laws of Massachusetts, New York , and some other States make vagrancy a crime and authorize the commitment of tramps to the workhouse, house of correction and common jail for vary¬ ing periods. In the Atlantic Coast States the evil is a serious one.

New York City is a beggars’ paradise.. Be¬ tween 6,000 and 8,000 professional mendicants make that city their home. Every other city in the United States suffers from the professional beggar, but not to the same extent as New York. The outdoor officer of the Charity Or¬ ganization Society says that mendicants from all parts of the country flock to New. York be¬ cause the indiscriminate giving there is so com¬ mon. Cities and States ship their beggar popu¬ lation to New York. About 10 per cent of these beggars are women.

MENDICANT ORDERS. See Monach—

ISM.

MENDIVE, man-de’va, Rafael Maria de,

Cuban poet : b. Havana, Cuba, 24 Oct. 1821 ; d. Matanzas, Cuba,

1886. His first collection of poems (1847), entitled ‘Passion-Flowers,* is widely popular. Banished in 1869, he lived al¬ ternately in New York and Nassau, writing legends and stories in verse. He was one of the most notable of Spanish-American poets ; and many of his verses received English, French and Italian translations.

MENDOCINO. See Cape Mendocino.

MENDOTA, Ill., city of La Salle County, 80 miles west of Chicago, on the Chicago, Mil¬ waukee and Saint Paul, the Illinois Central and

the Chicago, Burlington and Quincy railroads. The city contains the Blackstone School, Lin¬ coln School, a public library, agricultural im¬ plement works, machine works, water-tank heater works, *etc.* The municipality owns the water-supply system and the sewage system. Pop. 3,934.

MENDOTA LAKE. See Four Lakes.

MENDOZA, men-dd’tha, Antonio de,

Spanish administrator : b. about 1485 ; d. Lima, Peru, 21 July 1552. In 1535 he was appointed by the Emperor Charles V, with whom he was in great personal favor, viceroy of New Spain (Mexico), being the first of 64 viceroys, with the longest administration and that which shows the best record in the history of that provincial government. He made many re¬ forms, especially in relieving the oppressed na¬ tives ; developed agriculture and mining; es¬ tablished the first Mexican mint; founded the first college ; and introduced the first printing press. In 1551 he became viceroy of Peru, where he caused to be prepared a code of laws that has been the basis of the colonial and, to a large extent, of the present legal system of the republic. It was under Mendoza’s admin¬ istration in Mexico that Francisco Vasquez de Coronado (q.v.) undertook his famous explor¬ ing expedition.

, MENDOZA, Diego Hurtado, de-a’go hoor-ta’do, Spanish author and statesman, great-grandson of the Marques de Santillana (q.v.) : b. Granada, 1503; d. Madrid, 15 April 1575. He was educated, as a younger son, for the Church, but, after studying Arabic at Granada and the humanities at Salamanca, entered the army and in 1525 fought at Pavia. He acted as Charles V’s Ambassador to England in 1537, to Venice in 1538, to the Council of Trent in 1545 and to the Papal See in 1547, when he be¬ came governor of Siena. With Philip II he quarreled and in 1564 was interned in Granada, only returning

to court in 1574, soon before his death. To his stay in Italy was due his in¬ fluence in making the Spanish lyric thoroughly Italianate; and from Italy he brought an un¬ usual knowledge of the classics as well as a fine collection of Greek manuscripts. . Mendoza also perfected the Spanish poetic epistle. The fa¬ mous romance, 'Lazarillo de Tormes,* has been ascribed to him. But his greatest work is his history of the Moorish insurrection, 'Guerra de Granada,* a model of historical im¬ partiality and on a theme forˆ which knowledge of Arabic peculiarly fitted him. So impartial was this work that it was not published com¬ plete for many years, and even now a good edition is a desideratum. Consult the biog¬ raphy in German by Fesenmair (1882).

MENDOZA, Pedro de, Spanish explorer in America, founder of Buenos Aires : b. Guadix, Granada, about 1487 ; d. at sea, 1537. He was a favorite of Charles V ; fought bravely in Italy; and in April 1535 left Spain with 12 ships and 800 men, sailed up the Plata River and founded the city then called "Nuestra Senora de Buenos Ayres.® His further movements were unfortunate ; Indians and dis¬ ease attacked his men, three-fourths of whom, including his own brother, were lost. The na¬ tives captured and burned the city, and Men¬ doza, rescued none too soon by his brother, who came with reinforcements, set sail for

home. But his health and reason were under¬ mined and he died on board ship.

MENDOZA, Argentina, a province in the western part, on the eastern slope of the Andes Mountains ; area, 56,502. square miles. Mount Aconcagua, 22,427 feet, is on the northwestern boundary. The western part of the province is mountainous, the eastern part pampa land and fertile where watered by the streams or by irrigation, but the climate is hot and dry. There are four important rivers, the Mendoza, Atuel, Diamante and Tunuyan. The Transandea.n Railway from Valparaiso to Buenos Aires di¬ vides the territory. There is also a railway to San Juan and San Carlos, and . a southern line from San Rafael east. It is rich in min¬ erals, especially silver and copper. Coal

and petroleum abound. Grapes grow luxuriantly and a large quantity of wine is shipped to the other provinces. Cattle, hides and wool are the chief exports. Wheat and corn are in¬ creasing in importance. Pop. 277,535.

MENDOZA, Argentina, city, capital of the province of Mendoza, at the base of the Andes, on the eastern side of the mountains, on the railroad which extends from Buenos Aires to Valparaiso, Chile, about 600 miles west by north from Buenos Aires and 165 miles east of Valparaiso. It is about 2,400. feet above the sea. The city was founded in 1559. It be¬ longed to Chile previous to 1776. In 1861 it suffered from an earthquake which killed about 10,000 people and destroyed a great part of the city. The Transandean Railway connects the city via Villa Mercedes with all the large cities of the eastern coast, also with Santa Fe and Corrientes. It has. eight banks, seven de¬ partment stores and is an important trade centre. It is the seat of two national, normal schools, a national college and an agricultural institute. Pop. about 58,790.

MENE, me'ne (numbered) ; TEKEL weighed); UPHARSIN (divided), the Chal-ee words traced on the wall at Belshazzar's feast and significant of his impending doom (Dan. v). The astrologers could, not read them, because they were written in antique Hebrew characters, but Daniel understood their awful meaning; and the same night wit¬ nessed their fulfilment.

MENEDEMUS, founder of the school of philosophy called Eretrian from his native city Eretria: b. about 351; d. about 277 b.c. Tradi¬ tions vary as to whether he turned to philoso¬ phy under the influence of Plato, or under that of Stilpo of Megara, but his tenets seem to have most resembled those of the Megarian school.

MENELAUS, men-e-la'us, in Greek legen¬ dary history, the son or grandson of Atreus and brother of Agamemnon (q.v.). From his father-in-law, . Tyndareus, whose . daughter Helen he married, he received the kingdom of Sparta or Lacedaemon. Paris, son of Priam, king of Troy, having carried off his wife, Helen, with a part of his treasures and some female slaves, and conveyed them to Troy (q.v.), Menelaus, accompanied by Ulysses (q.v.), went thither to demand the restitution of his wife and property, and this being re¬ fused, he summoned the Greek princes to re¬ venge the affront according to their promise.

After the conquest of Troy, Menelaus took Helen to return with her to

his native land. Eight years he wandered before he reached home. On the island of Pharos (q.v.) he sur¬ prised Proteus asleep and compelled him to disclose the means which he must take to reach home. See Trojan War.

MENELEK, emperor (negus) of Abys¬ sinia: b. 1842; d. December 1913. He was the son of a king of Shoa and secured the throne with some fighting in 1889, in which year he signed the Treaty of Uccialli with Italy. He discovered some years later that by the Italian text of the treaty he was bound to conduct his foreign affairs through the Italian govern¬ ment, while the Amharic text made this op¬ tional. He accordingly wrote to Queen Vic¬ toria in 1893 and protested against the treaty as infringing upon his sovereign rights. In 1896 he fought a war with the Italians and severely defeated them in the battle of Adowa. His complete independence was then recog¬ nized by Italy and the other European powers. He concluded treaties of commerce with Great Britain and other countries and cooperated with the British army against the Sudan der¬ vishes. A humane and just ruler, he endeay-ored to apply the arts of civilization to his backward country. He was succeeded by Lidj Yassu, who was dethroned in 1917.

MENENDEZ DE AVILES Y MARQUEZ, ma-nen'deth da a-ve-las' e mar'keth, Pedro, Spanish captain, founder of the city of Saint Augustine, Fla.: b. Aviles, Austria, 1519; d. Santander, 17 Sept. 1574. In June 1565 he sailed with 1,500 men in 19 vessels to dislodge the French in Florida; landed there 28 August; and 6 September began a fort, the nucleus of the present town. He attacked the French garrison at Fort Caroline, during the absence of part of the force, which had set out to at¬ tack him but was storm-stayed and finally wrecked. Menendez slaughtered the remnant at the fort and those saved from shipwreck. He returned to Spain in 1567 ; visited America twice again, strengthening Saint Augustine in 1568, and in 1570 sending a party of colonists to the Chesapeake and up the Rappahannock, where they were massacred by the natives ; and was recalled to Spain shortly before his death. During the last two years of his life he was governor of Cuba. Consult Winsor, J., Nar¬ rative and Critical History of America) (New York 1886).

MENENDEZ Y PELAYO, e pa-la'yo, Marcelino, Spanish critic: b. Santander, 3 Nov. 1856; d. there, 19 May 1912. He was educated at Madrid and Paris; in 1878 became professor of philosophy and letters in Madrid ; three years later was elected to the Spanish Acad¬ emy; and in the late nineties became director of the Biblioteca Nacional. He lectured often, especially at the Athenaeum in Madrid. For several years he was dean of the faculty of letters at the University of Madrid,

he served a term as senator, was counsellor of public in¬ struction and chief of the board of archivists. He received manv honors, including the grand cross of the Order of Alfonso XII. His lit¬ erary style was finished and elegant and he was ever a staunch defender of Catholicism. He wrote Nstudios criticos sobre Escritores Montaneses> (1876) ; (Horacio en Espana>

(1877) ; (Historia de los Heterodoxos Espanoles> (1880-81); <Calderon y su Teatro> (1881) ; (Odas, Epistolas y Tragedias) (1883) ; (Historia de las Ideas esteticas en Espana)

(1884-91).

MENENDEZ PIDAL, Ramon, Spanish critic, philologist, educationalist and general literary man : b. Corunna, 13 March 1869. Edu¬ cated at the universities of Madrid and Tou-lause he became professor of Romanic philology at the former (1899). See Pidal, Ramon Menendez.

MENEPTAH, or MERNEPTAH, king of Egypt about 1250 b.c. He succeeded his father, Rameses II, and reigned for a period of 20 years. His reign was troubled by an invasion from Libya, but he succeeded in crushing it and thereafter set about the construction of numerous buildings and monuments, especially at Tanis. In 1898 his mummy was discovered at Thebes and now reposes in the Cairo Mu¬ seum. Previous to 1896 it was thought that Meneptah was identical with the Pharaoh of the Exodus, but in that year an inscription was uncovered in which it was stated that Israel was settled in Palestine in the fifth year of Meneptah. This inscription is of prime his¬ toric interest as fixing the period of the set¬ tlement of Israel in Palestine and as the only mention of Israel on Egyptian monuments. For the inscription consult (Der Sieges-hym- nus des Meneptah auf der Flinders Petrie Stele > (in Zeitschrift fiir dgyptische Sprache, Vol. XXXIV, Leipzig

1896). Consult also Breasted, J. H., (History of Egypt* (2d ed., New York 1909) and Budge, E. A. T. W., (History of Egypt) (New York 1902).

MENES, me'nez, according to Egyptian traditions, the first king of Egypt. Herodotus relates that he was the founder of Memphis, which he built on a piece of ground which he had recovered from the Nile by altering the river's course. According to Diodorus, Menes introduced into Egypt the worship of the gods, as well as a more elegant style of living. He has been identified by some with the Mizraim mentioned in Gen. x, 6. A tomb supposed to be that of Menes was discovered near Naka-deh by De Morgan in 1897. Consult Sethe, K„ (Menes und Grundung von Memphis) ; Breas¬ ted, J. H., (History of the Ancient Egyptians* (New York 1908). See Egypt.

‚MENG-TSE, meng-tse'. See Mencius.

MENGER, Karl, Austrian political econ¬ omist: b. Neu-Sandez, Galicia, 1840; d. 27 Feb. 1921. He studied at the universities of Vienna and Prague, giving special attention to law and political economy. In 1872 he began his long connection with the University of Vienna, being appointed full professor of political economy in 1879. He was created life mem¬ ber of the Austrian House of Peers in 1900. As an economist he was undisputed leader of the new school of economics in his country and was opposed to the traditional system hitherto followed. He published several important works, including (Grundsatze der Volkswirt-schaftslehre) (1871) ; 'Untersuchungen fiber die Methode der Sozialwissenschaften und der politischen Oekonomie insbesondere) (1883) ; (Die Irrtfimer des Historismus in der deutschen Nationalokonomie) (1884) ; (Bei-

trage zur Wahrungsfrage in Oesterreich-Un- garn* (1892) and the article "Geld® (in (Hand-worterbuch der Staatswissenschaften,* 3d ed.,

1909).

MENGS, Anton Raphael, German painter: b. Aussig, Bohemia, 12 March 1728; d. Rome, 29 June 1779. In early childhood his father, Ismail Mengs, a miniature painter of little tal¬ ent, who was settled at Dresden, took him in hand to make a painter of him, and in 1741 carried him to Rome and set him to study the antique and to copy

Michaelangelo and Raphael. He was compelled to do a certain task in paint¬ ing every day; his day's work subjected to Severe criticism ; and he was even punished if it was not satisfactory. From this constant practice he early gained skill as an artist, and when he returned to Dresden his talent and proficiency were at once recognized by August III, who appointed him court painter and gave him permission to return to Rome. At Rome he attended the Academy and in 1748 produced a large and elaborate composition, (The Holy Family,* taking as model for the Mother of Jesus a beautiful peasant girl, whom he after¬ ward married. On his return to Dresden he was commissioned to paint an altarpiece, (The Ascension of Christ,* for the high altar of the Chapel Royal, and was given permission to re¬ turn to Rome for the purpose of doing so. A new academy of painting having been opened in the capitol he was appointed director and painted for the Celestines the ceiling of their church, San Eusebio, for Cardinal Albani the <Parnassus> in the ceiling of his villa, and sev¬ eral oil paintings, including (Cleopatra,* (The Holy Family) and (The Magdalen *for private persons. When King Charles III of Spain summoned him to Madrid he executed for him in fresco there (The Assembly of the Gods) and (The Descent from the Cross* ; he also completed the altarpiece for Dresden. He re¬ turned to Italy in 1769, stayed eight months at Florence and painted for the Pope a ceiling fresco for the Vatican Library. In 1772 he went to Spain and produced for the king the fresco (Apotheosis of Trajan,* his finest work, but returned to Rome in 1775. On his death the Cavalier d'Azara set up a statue to him and Catherine II of Russia raised a splendid tomb for him in Saint Peter's. He was certainly one of the most important painters of his day, and if he possessed none of the free and living originality of genius he was a master of noble composition and design. He was catholic in taste and eclectic in style, drawing inspiration from the antique, as well as imitating Raphael, Titian and Correggio, whose styles he tried to blend. Consult Woermann, (Ismail und Raphael Mengs) (in the Zeitschrift fiir bildende Kunst, No. 5, 1893).

MENHADEN, a species of fish (Brevoortia tyrannus) of the herring family (Clupeidce) , appearing in vast schools along the Atlantic Coast of America. Owing to the large number of local names applied to this species much con¬ fusion concerning its identity and distribution exists in the minds of fishermen and others. The name "menhaden® (Indian) is used chieflv in southern New England. North of Cape Cod the fish is called pogy, or occasionally hard¬ head; in New York and New Jersey, bunker or marshbunker; the fishermen of Delaware

and Chesapeake bays know it as bay alewife, and in the latter region and southward also as bug-fish or bug-head ; still farther south it be¬ comes the fat-back, and so on. From the other herrings the menhaden is readily distinguished by its very large head, large mouth, complex gill strainers and crenulated scales. The body is deep, the fins small, the mouth toothless and the color bluish and silvery, with one large and several small black spots.

Like some other pelagic and migratory fishes the menhaden is exceedingly irregular in its movements and variable in abundance and distribution from year to year, but its general range is from Nova Scotia to Brazil and oceanward, so far as observed, to the Gulf Stream. In spring it approaches the coasts and extends northward with the alewives and other species, probably for the purpose of spawning in brackish water, though little is actually known of its spawning habits. In winter Cape Hatteras marks the northern limit of its abundance. The menhaden swims in compact schools of large size, the movements of which at the surface, or sunken to a greater depth, are extremely irregular.

These irregularities are owing, ‘no doubt, to corresponding variation in its food-supply, which consists wholly of the minute organisms, both vegetable and animal (plankton), that are caught as the fish swims with open mouth, straining the water through its lips and gill-arches as it goes. Owing to its strong oily taste and extreme bonyness its value as human food is very slight, but as furnishing food for other fishes, as bait, and for the manufacture of oil, fertilizer and other products, it has a very great economic importance. Large com¬ panies.. control its capture for the latter pur¬ poses and, besides pound nets, _ utilize many steamers provided with purse seines and der¬ ricks, by means of which entire schools are taken at a haul and lifted on deck. The oil is extracted and the solid parts ground up for fertilizer at factories on shores. The product varies from year to year, but the total weight of fish taken runs into the hundreds of million pounds. The catch of fish and industries in¬ volved reached their highest level of import¬ ance in the latter part of the last century, since which both have much diminished, whether by reason of over-

fishing or because the menhaden no longer come to the northern part of the coast in so great abundance, is not determined. Consult Goode, (History of the Menhaden,* Report United States Fish Commission, 1879, and recent reports of the United States Bureau of Fisheries.

MENHIRS, elongated, rough-hewn mon¬ oliths standing with one end in the ground. They are found of various sizes, from about 6 to as much as 67 feet high, the latter being the height of that at Locmariaquer in Brittany. Singular superstitions naturally attach to some of them. See Stones, Standing.

MENIERE'S DISEASE, a disease of the ear first described by the French physician, Emile Antoine Meniere, in 1861. It is one form of auditory vertigo and usually attacks persons of middle age. The principal causes are sunstroke, influenza, rheumatism, anaemia and venereal diseases. The attack is usually very sudden and appears to be due to haemor¬

rhage into the labyrinth. The seizures may occur at irregular intervals of days or even weeks. While the symptoms of dizziness, ver¬ tigo, nausea, etc., gradually disappear the deaf¬ ness is generally permanent. Potassium iodide is most serviceable in reducing the dizziness. See Ear.

MENIN, Belgium, town in the province of West Flanders, on the Lys and on the Belgo-French frontier here demarcated by the river, seven miles southwest of Courtrai, and 30 miles southwest of Ghent. It contains lace and cotton mills, tobacco factories, *etc.* In the neighbor¬ hood there were extensive tobacco plantations previous to the war of 1914-18, in which Menin suffered severely. It fell to the Germans during the great rush of both armies north¬ ward to the sea ; was taken by the British in a spirited attack, but was subsequently evacuated by them for strategic reasons. The British hav¬ ing noted a German concentration of troops and materiel in Menin made an aerial attack upon it which brought damage to a great num¬ ber of buildings. Pop. 18,600.

MENINGITIS* The brain is enveloped by three membranes called the meninges. Next to the skull comes the dura mater, then the arachnoid and innermost is the pia mater. These three membranes are prolonged from the brain in three envelopes of the spinal cord. Meningitis is an inflammation of the meninges of the brain or of the spinal cord. It is very rarely a primary condition, but is usually sec¬ ondary to

infection from micro-organisms of many types, or results from chronic poisonings such as lead, alcohol, *etc.* Hence modern medi¬ cine speaks of various meningitides rather than one meningitis. When the surface of the brain is wounded by some object breaking through the skull, or a piece of broken bone of the skull, thrust inward by some blow, an artery is ruptured and the blood flows between the membranes. Such a condition is called traumatic meningeal haemorrhage. When the dura mater becomes inflamed after a wound, or after inflammation of other parts of the head, as the ears, teeth, etc., there results a condition called pachymeningitis externa. In¬ flammation of the meninges, however, is gen¬ erally confined to the pia mater and the arach¬ noid and is then called leptomeningitis. Pachymeningitis, inflammation alone or chiefly of the dura mater, may extend to the other membranes. Inflammation of the cerebral meninges is cerebral meningitis ; of the spinal meninges, spinal meningitis ; of those of the brain and spinal cord together, cerebrospinal meningitis. Ascending meningitis is a menin¬ gitis ascending from the lower part of the spinal cord.

Pachymeningitis has one form involving the external surface of the dura mater and result¬ ing from blows or other injuries, and from osseous growths. There mav be no well-de¬ fined symptoms, but usually is local headache and tenderness on pressure. The onset is usu¬ ally sudden. Many cases of meningitis of the type called ˆserous® are not other than pachy¬ meningitis. If the dura mater, which is nor¬ mally free, is bound to the skull by fibrous exudation, and especially if pus forms and haemorrhages occur, there are symptoms of pressure. Inflammation of the internal portion

of the dura mater may result from the exten¬ sion of inflammation from adjacent Darts, such as the ear, the frontal or the ethmoidal sinus; or it may attend cases of pernicious anaemia, chronic syphilis, tuberculosis and chronic wast¬ ing diseases. It occurs chiefly in old age, but has been seen in children. There are fibrinous deposits and extravasation of blood in cvsts (hoematoma), and occasionally pus forms. The brain is anaemic, sometimes softened. The symptoms are those of irritation — convulsions, vomiting, dilated pupils which are not affected by exposure to light, a slow irregular pulse, *etc.* — and those of compression or pressure — coma, *etc.* Pachymeningitis is usually fatal.

Cerebral meningitis (simple or cerebral meningitis), in the acute form, is not common, and is most apt to occur in men engaged in hard mental pursuits. It may be caused by injuries, by sunstroke, by spirituous liquors, etc., and is very dangerous, death usually occurring in from three to eight days. The brain is reddened and covered more or less with pus and coagulated fibrin or lymph, and its superficial layer is soft¬ ened. There is almost always watery effusion into the brain-cavities. The symptoms are those of three stages: (1) Headache; (2) de¬ lirium; (3) coma. At first there may be slight fever, some photophobia, frequency and irregu¬ larity of the pulse and some contraction of the pupils. There is a disposition to vomit, a slowness in movements of the bowels and often hyperaesthesia. Then comes delirium, which may or may not be active ; the patient talks much and tries to get out of bed ; does not obey readily. There is more or less trembling of the limbs,, with difficulty in moving them. One pupil is likely to be dilated. Sometimes strabismus occurs ; the pulse is very irregular ; and paralysis begins. Then follows coma, loss of sense, sensation and of voluntary motion ; there is sighing, the pulse is frequent and weak, the pupils do not respond readily to light and the capillaries of the skin and eye are con¬ gested. Recovery from this disease cannot oc¬ cur after the period of coma begins.

Sub-acute or chronic cerebral meningitis . is a secondary disease, sometimes associated with chronic syphilis, Bright’s disease,

alcoholism, etc., though the cause is not always ascertained. The lesions are similar to those of acute menin¬ gitis, but less pronounced. There is less of serum and pus, and the exudated fibrin is more circumscribed. The symptoms are insidious and vague. Headache, vomiting and photophobia are rare. The slight delirium is followed, it may be, by somnolency, irregular pulse, stra¬ bismus and sighing respiration. With coma the pulse is rapid, 120 or more, and the patient dies as in acute meningitis.

Tubercular meningistis, also known as acute hydrocephalous granular meningitis and basilar meningitis, is an acute tuberculous in¬ flammation of the pia mater, caused by a de¬ posit of miliary granules over the surface of the brain, but most numerous at the base, in the track of the cerebral vessels, and in their sheaths. There is a noticeable vascularity, es¬ pecially in the ventricles. The pia mater is thickened and opaque and covered with a semi-purulent exudation. Serum fille the ventricles and formina, pressing upon the convolutions, and assists in softening portions of the brain The lesions in this disease are rarely limited

to the brain ; tubercles are found in other or¬ gans, especially the lungs. The disease is a phase of that protean malady, tuberculosis, though the cerebral lesions may first be no¬ ticed. The primary causes are a hereditary diathesis (scrofulous or tuberculous), foci of caseous degeneration in some organ, a suppu¬ rating joint, or a scrofulous inflammation of bone. The physically weak children of tuber¬ culous parents are most subject to this disease, and in cases where strong children are at¬ tacked there is generally found a tubercular relative. Though the disease is essen¬ tially a disease of early life (from nine months to 10 years), it also attacks adults. Most of those affected die in from two to six weeks. The symptoms may be classed under three heads; (1) Obscure symptoms; (2) those of rapid development; (3) those of coma. There are seen listlessness, loss of ap¬ petite, occasional vomiting, slowness of the bowels and somewhat frequent pulse. Some¬ times there is headache, a remittent form of fever and then rapid development of diagnos¬ tic symptoms. The patient talks a good deal. One of the most important symptoms is a change in the disposition through which the child, although bright and lively before, sud-. denly becomes listless, or excessively emo¬ tional, a condition which may continue for several weeks. There are irregularity of the pupils and pulse, a sharp ˆcephalic® cry, se¬ vere headache, insensibility to light and sound, grinding of teeth, a flushed face in paroxysms, usually before convulsions, rolling and drawing back of

head, urine scanty and high-colored, oscillation of the eyes, obstinate constipation, *etc.* With coma comes strabismus ; the pupils do not contract under the influence ofi light, but will contract and expand when the bowels rumble or the patient is moved. There are convulsions, paralysis and automatic move¬ ments of the feet and hands, it may be for hours. The thumb may be turned in. There is a hollowed abdomen (boat-shaped) and congestion of the eyes, a puri form secretion sticking the eyelids together; involuntary dis¬ charge of bowels and bladder, are common. For treatment of this affection place patient in bed, in a quiet room ; give easily digested food ; apply an ice-cap to the head and warmth to the feet. Further treatment should be in the hands of a physician. Much can be done by parents and guardians to prevent the onset, by not developing the nervous svstem at the ex¬ pense of the muscular and digestive systems. Precocious children are to be judiciouslv re¬ strained, and outdoor life encouraged. Tuber¬ culous meningitis in adults is commoner in men than in women, and most frequently oc¬ curs between 17 and 30. It is generally fatal in 2 to 14 days, about one in 200 cases recov¬ ering.

Spinal meningitis is not common; it is usu¬ ally caused by injuries, is liable to occur in children with spina bifida and is rarely ame¬ nable to treatment. Death occurs usuallv in from 8 to 10 days, either from extension of inflammation to the brain and pressure there bv fluid, or from asphxyia due to spasms of the respiratory muscles. The le¬ sions are similar to those of cerebral menin¬ gitis. The chief symptoms are pain in the spine and extremities, increased by movements

of the body, great sensibility of the surface of the body, spasms of muscles, opisthotonos and dyspnoea.

Epidemic cerebrospinal .meningitis, or spotted fever, is due to a special micro-organ¬ ism, the diplococcus intra-cellularis. Death fre¬ quently occurs in a few hours ; recovery usu¬ ally requires 30 or more days. The disease has spread over sections of this country two or three times, mainly in the winter and spring. The exact manner of its transmission is not known. One form is characterized by fever with no

eruption ; the other by fever and an eruption. The symptoms are a chill or chilli¬ ness, followed by nausea and vomiting, fever, violent headache, sometimes with pain down the spinal column, general hyperaesthesia, great prostration, vertigo, tetanic rigidity of muscles, irritability or apathy, delirium and other symp¬ toms of meningeal irritation, followed more or less rapidly by those of coma. In -the ma¬ jority of patients if the head is raised when the patient is lying on his back, the knees are involuntarily flexed. When there is an erup¬ tion it usually appears early and consists of dark blotches, from the size of a pinhead to that of a nickel, and is not marked on the ex¬ tremities.

Where death occurs within 12 hours from the time of attack only a congestion of blood¬ vessels of the brain and, it may be, of the spinal cord, is generally found. Almost always there is lymph or pus beneath the nia mater,- and sometimes serous effusion in the pleura, pericardium or peritoneum. The blood under¬ goes a change, ecchymoses are found some¬ times in the muscles, or in connection with ‘the pericardium or pleura. This disease is best treated with a serum, which was first produced in the monkey but now is successfully derived from the horse. The serum is given in fre¬ quent doses depending on the severity of the case, from 12 to 24 hours apart; this treat¬ ment has reduced the mortality to 30 per cent. In the chronic variety serum therapy is of no avail ; the application of cold to the head should depend upon the desires of the patient. Pain has to be reduced by morphine. Consult Tel-liffe and White, (Diseases of the Nervous Sys-tem) (3d ed., 1917).

Smith Ely Jelliffe, M.D.

MENIPPUS, me-mp’us, Greek cynic phi¬ losopher, a native of Gadara in Palestine, and supposed to have flourished about 260 b.c. His writings were chiefly of a satirical kind. Lucian styles him ((the most snarling of cynics,® and in two or three of his dialogues introduces him as the vehicle of his own sarcasms. It appears that his satires were composed in verse and prose, on which account those of Varro were denominated Menippean, and for the same rea¬ son the name of Satire Menippee was given in France to the celebrated piece written against the League and Philip II of Spain, its head. His writings are lost.

MENKEN, Adah Isaacs (originally Do¬ lores Adios Fuertes), American actress: b. near New Orleans, La., 15 June 1835; d. Paris, France, 10 Aug. 1868. Making her debut with her sister as danseuses, at the New Orleans French Opera House, she was received with marked favor and visited Cuba, Texas and Mexico. On her return to New Orleans,

she published a volume of verse and taught French and Latin at a girls' academy in that city. In 1858 she appeared in <Fazio) in New Orleans, and went to England in 1863-64, as¬ suming the role of Mazeppa at Astley's which won her popularity. On 30 Dec. 1866 she played in Paris for 100 nights, and later in Vienna and London. Her last appearance was in Paris in May 1868. She was famous for her fine form, and many marriages and divorces ; Alexander I. Menken, John C. Heenan, J. H. Newell and James Barcley being her successive husbands. Her mind seems to have been as winning as her physical beauty, for among her friends were numbered Charles Reade, Dickens, Swinburne and the elder Dumas.

MENNO SIMONS, Dutch religious re¬ former: b. Witmarsum, Friesland, 1492; d. Oldesloe, Holstein, 19 Jan. 1559. He was or¬ dained priest in the Roman Catholic Church and took pastoral work in the village of Pingium (1524), and from a study of the New Testament, undertaken (1530) to solve his doubts about transubstantiation, he was induced to become an evangelical preacher and finally left the church of his ordination. The martyr¬ dom of Sicke Snyder at Leeuwarden for Anabaptism impelled him to consider the Scriptural grounds for infant baptism. He was finally converted to the cause of the Anabaptists, but never sympathized with the excesses of Miinzer and wrote a diatribe against John of Leyden (1535). In 1537 at the request of a num¬ ber of Anabaptists of Groningen he as¬ sumed the functions of an Anabaptist preacher and exercised, by his moderation, a most salu¬ tary influence on his fellow-ministers. He now married, his change in faith having super¬ seded his vow of celibacy, and began to travel as an evangelist not only in Friesland but throughout Holland and Germany as far as to Livonia. Being persecuted from place to place he finally settled in Oldesloe in Holstein, where he closed his ministry with the consciousness of having founded a large and flourishing sect, whose subsequent history is related under the title Mennonites (q.v.)

Views of Menno Simons. — Menno was rather a preacher of a system of personal sanctity than either a dogmatist or a violent fanatic like some of the Anabaptists. He was a man of pure moral and devotional enthusiasm, whose account of his own conversion reads like a passage from the (Confessions) of Augustine. He sums up the results of his labors as consist¬ ing in the conversion and recovery of the wicked. Yet he formulated a somewhat vague profession of faith. He believed in the divinity of Christ, who was born on earth in Mary, that is without taking upon him human flesh and blood. He rejected infant

baptism, and baptized those only who made a personal pro¬ fession of faith in Christ. He particularly emphasized the power of excommunication possessed by the Church, without which ((the spiritual Kingdom of God on earth cannot,® he said, ((exist in purity and piety.® He be¬ lieved in the coming millennium (q.v.) ; he ex¬ cluded civil magistrates from church member¬ ship on the ground that the church was a theocracy whose magistrates were the ministers. He declared that war and all taking and ad¬ ministering of oaths were unlawful, and re-MENNONITES

garded human science as useless, even per¬ nicious to a Christian. These decrees, how¬ ever, as modified by the explanations of Menno, differed little from those generally promulgated by the Reformed bodies of his day. His prin¬ cipal teaching was of amoral and practical char¬ acter. He was a meek, humble, noble-minded man, carried away with the spirit of his times, encouraging all that was good and pure among his followers, and sternly rebuking the guilty. The best edition of his work is (Opera Omnia Theologica of al de Godgeleerde werken vann Menno Simonis) (1681). Consult Harder, (Leben Menno Simons) (1846) ; Roosen, (Men-no Simons den evangelischen Mennonitenge-meinden geschilderO (1848).

MENNONITES, a body consisting of a dozen or more branches of followers of Menno Simons, akin to Baptists in faith and practice: Menno Simons (1492-1559), a Holland Ana¬ baptist, was not the founder of the body that bears his name, but was a convert to it several years after it began, and became its chief leader and author. He early left the priest¬ hood of the Roman Catholic Church, espousing the views of the Anabaptists, but opposing the fanatical extremists of Munster. His books were his chief contribution to the movement, which really grew out of the division of Prot¬ estantism which is called by the name Ana¬ baptist. The Anabaptists were opposed to the baptism of infants, baptizing only on confession of faith. The followers of Menno Simons be¬ came numerous in Holland, Germany and Switzerland, and thousands were persecuted to death, particularly in Holland, because of their views in regard to the temporal power. Rising in the first half of the 16th century (they were first called Mennonites in 1550, though the name was never generally adopted in Europe as it was in America) they increased under

persecution and emigrated to Russia and the United States to escape it — to the former country near the close of the 18th century and to the latter from 1640 on, coming from Hol¬ land, and Germany to New York and New Jerse3r. They were drawn to Pennsylvania by William Penn's announcement that those set¬ tling in that colony would enjoy freedom in the practice of their religious faith. The So¬ ciety of Friends in England assisted the Men¬ nonites of Holland to emigrate. The first Mennonite colony was formed at Germantown, near Philadelphia, in 1683. Thence they spread to Lancaster, Bucks, Berks and other counties in Pennsylvania and from that State to other States and to the Canadian provinces. They came in constant contact, in colonial and post¬ colonial days, with the Indians, but like the Friends, being opposed to bearing arms and inclined to peace they suffered little from at¬ tacks by the savages. It is worthy of note that a Mennonite meeting at Germantown as early as 1688 adopted a protest against the traffic in slaves, saying that those <(who steal or rob men and those who buy or purchase them® are all

alike. < .

Though Mennonites are widely divided among themselves on questions of practice and principle, they are in substantial agreement in holding doctrines of the evangelical type, as expressed in a declaration of faith adopted at Dort, Holland, in 1632, which confes¬

sion is generally accepted by the Mennonites of America. They adhere to the principles of autonomy of the churches, freedom of con¬ science, separation of church and state, adult baptism, non-resistance and practical piety. Baptism is administered on confession of faith, not by immersion, but by pouring, the candi¬ date either kneeling or standing in water and the minister taking up water in both hands and pouring it upon the head, using the scriptural formula. In the ministry there are bishops, or elders, ministers, who are pastors or evangel¬ ists, and deacons, who are almoners and assist in administering the ordinances and take charge of congregations in the absence of bishop or minister. Ministers are selected by members of the church, who go one by one to a private room for the purpose. If more than one are thus selected choice between them is made by lot. A bishop has charge of all the churches in his particular district and ordains the min¬ isters and deacons. He is selected in like man¬ ner as ministers and deacons. The Lord's Supper is observed twice a year, in the spring and in the fall, preceded by an examination of each member in faith and standing, and fol¬ lowed by the ceremony of feet-washing and the kiss

of peace, the sexes separating for this purpose.

Mennonites are opposed to the judicial oath and many practise non-conformity to the world. Their polity provides for the autonomy of tne churches, but appeals are taken to the conference. Decisions of conference are sub¬ mitted to the churches for approval..

The 12 or more branches in America differ so little in some instances that it is difficult to distinguish between them except by name. The census of 1916 reports three bodies in the group not in existence, or not known, in 1906. The distinctive bodies are: (1) Mennonite Church; (2) Conservative Amish; (3) Old Order Amish; (4) Church of God in Christ; (5) Old Order Mennonite (Wisler) ; (6) Re¬ formed Mennonite; (7) General Conference of Mennonites; (8) Defenceless Mennonites; (9) Mennonite Brethren in Christ; (10) Mennonite Brethren Church; (11) Krimmer Brueder Gemeinde; (12) Hutterian Brethren. There are besides small unattached bodies which may be grouped as miscellaneous, including the Kleine Gemeinde, Stauffer Mennonites, *etc.*

A historical distinction, which also marks a difference in doctrinal position, may be traced between two European groups and through their descendants in America: (1) Those of Holland, Switzerland and northwestern Ger¬ many, and (2) those of Prussia, North Ger¬ many and Russia. These emigrated from Hol¬ land and used the Dutch tongue until after the middle of the 18th century, when they adopted the German which they still employ. They are of the orthodox type. The first group became liberal or rationalistic and are not in fellow¬ ship with the representatives of the second group.

1. Mennonite Church.— This is the largest and oldest body of this faith in America. It is descended from the colony which settled in Germantown. In tendency it occupies middle ground between the stricter and the more liberal schools. Since 1896 it has had a bi¬ ennial General Conference, composed of dele-

gates elected by the State conferences. The Amish body is represented in this conference — the two churches are practically one — and co¬ operates in the conduct of the general mission¬ ary, educational and benevolent work. The board of missions has missionaries in India and in America, with a department of city missions. The chief educational institution is at Goshen, Ind. Two unincorporated organizations help members who sustain losses by fire, storm, etc., one for Mennonites and Amish, the other for Mennonites and Old Mennonites. The property listed for this purpose aggregates more than $12,000,000. The Mennonite Church is growing in numbers. In 1906 it returned, according to the government census, 18,674 members; in 1916 that number had almost doubled — 34,965. There are 509 ministers and 307 churches in the Middle Western and a few of the Southern States, by far the larger num¬ ber being in Pennsylvania. The Mennonite, of Berne, Ind., is the weekly organ of the denomi¬ nation in English. There is also a German weekly at the same place.

2. Conservative Amish Mennonite Church.

— This is a small body of the Amish type, with only one conference, 14 churches, 30 ministers and 1,066 members, census of 1916. The Amish Mennonites date from 1690, separating from the Mennonites in Switzerland and Alsace on account of their laxness of discipline. The name is derived from Jacob Ammon or Amen, who insisted that the doctrines set forth in the Dort Confession of Faith should be inter¬ preted literally and accepted strictly. In late years this strictness has been relaxed and the main body of Amish is practically reunited with the Old Mennonites in the Mennonite Church.

3. Old Order Amish Mennonite Church.

— This body represents the stricter descend¬ ants of Jacob Amen and the Swiss Amish of the 18th century. While the main body of Amish were approaching agreement with the main body of Mennonites, the stricter wing were holding the older position resulting in the organization in 1865 of the Old Order Church. This body is opposed to building churches, holding that one place is as sacred as any other and that separate church buildings savor of rit¬ ualism. They therefore hold their meetings in private houses, which necessarily makes their congregations small. A Sunday service usually continues about four

hours, and is exclusively in German. They use the old hymnal, Ausbund, first published for the Swiss brethren in 1571 and reprinted many times in America. The tunes supposed to be the original have never been committed to musical notation and of course never printed. The sermon is with¬ out text, and traces God's dealing with the race from Adam down, setting forth the sinfulness of sin and God's love and care for his obedient children. On communion Sundays services are continued from morning till night without in¬ termission, several ministers being in attend¬ ance to keep them going. There is no church property, except hymnbooks, plain benches and utensils necessary to the preparation of a plain dinner. Houses and clothing of families, who observe a sort of community life, are very plain, carpets, curtains and wall pictures being forbidden. They have a few Sunday schools and no missionary or benevolent societies,

schools or periodicals. They use the ban in discipline, following the example of the origi¬ nal Amish, who in some cases use the extreme penalty of separation of husband and wife. The person against whom the ban was pro¬ nounced was cut off from social and family intercourse with all members of the church and was treated as an outcast. The census of 1916 credits the Old Order Amish Church with 7,893 members, an increase of nearly 3,000 in 10 years, 90 churches and 253 Ministers.

4. Church of God in Christ. — A small bodv of reformers, led by John Holdeman who in¬ sisted that the Mennonite Church had forsaken its original foundations. It originated in Ohio in 1859. Holdeman revived the ban as for¬ merly observed in Europe. The body had sub¬ sequently considerable accessions of Russian Mennonites, under whose influence the stricter views were gradually relaxed. The census of 1916 credits this body with 17 ministers, 21 churches, and 1,125 members. There has been little change in the first two items since 1906, but the number of members was doubled.

5. Old Order Mennonite Church (Wisler). — Jacob Wisler led a movement in opposition to innovations, such as revival meetings, Sun¬ day schools, etc., which resulted in the organi¬ zation, in 1870, of the Old Order Church. Other small bodies in Canada, Virginia and elsewhere, which occupied a similar position, joined with the Wisler movement, which holds strictly to the Dort Confession of Faith. The Church has 32 ministers, 22 churches and 1,608 members (census of 1916), each item indicat¬ ing an advance since 1906.

6. Reformed Mennonite Church. — This branch is also the result of a reform move¬ ment toward stricter regard for doctrine and discipline, led by Francis Herr and his son John. The Herrites have no fellowship what¬ ever with other churches, and conduct no Sun¬ day schools or missions. They are decreasing in number. In 1916 they had 26 ministers, 25 churches and 1,281 members, mostly in Pennsyl¬ vania.

7. General Conference of Mennonites in North America. — An attempt to unite various Mennonite bodies holding practically the same doctrinal views and observing the same prac¬ tices, resulted in a general conference in Iowa, in 1860, and the organization of this body. Groups of Russian and German churches sub¬ sequently joined with it. It is active in mis¬ sionary and educational work. There are boards of home missions, of foreign missions, of publication, of education and of emergency relief. Three colleges are maintained at New¬ ton, Kan., Bluffton, Ohio, and Freeman, S. D. Several periodicals, including The Mennonite, weekly, are published at Berne, Ind. The General Conference accepts the Dort Confes¬ sion, but does not observe the foot-washing ceremony in connection with the Lord's Sup¬ per, nor does it require the women to have a head covering during prayers and worship. Its plajform of union is acceptance of the Dort Confession, salvation by grace through faith in Christ, baptism on confession of faith, refusal to take oaths, peace, non-resistance and practice of scriptural discipline. The General Conference, which is gaining in numbers, has, according to the census of 1916, 194 ministers, 117 churches and 15,407 members.

8. Mennonite Brethren in Christ. — This branch grew out of an evangelistic effort in Pennsylvania, in 1853. The first conference was formed in 1858. The movement spread and three groups came into existence, which united in 1879 ; subsequently other groups joined the body which took its present form and name in 1883. There is a general con¬ ference which meets every four years, and five district conferences in the United States and two in Canada. A weekly newspaper, The Gospel Banner, is published in New Carlisle, Ohio.

The General Conference has 95 min¬ isters, 110 churches and 4,737 members.

9. Defenceless Mennonite Church. — A small body of 854 members, which insists upon a definite experience of conversion, organized under the leadership of Henry Egli, in 1860, an offshoot of the Amish branch. It has a mission in Africa and is akin to the conference of Defenceless Mennonites known, until re¬ cently, as the Minnesota and Nebraska Confer¬ ence of Mennonites and now affiliating with the Mennonite Church. (See 1. Mennonite Church, supra.)

10. Mennonite Brethren Church. — This body, which was not reported by the census of 1906, has three district conferences in the United States and one in Canada. It conducts home and foreign missions and has a college at Hillsboro, Kan., where it publishes the Zion's Bote. The census of 1916 gives this church 81 ministers, 53 churches and 5,127 members.

11. Krimmer Brueder Gemeinde. — A union of two bodies of Brueder Gemeinde, which came originally from Russia, where they sepa¬ rated from the main body of Mennonites, be- ' cause they were thought to be lax in religious life and discipline. They differ from other Mennonites in baptizing by immersion and not by pouring, and they formerly differed among themselves as to the mode, one group baptizing with a forward, the other with a backward movement. There are 894 members, with 34 ministers and 13 churches.

12. Hutterian Brethren. — These are de¬ scendants of the Hutter Brethren of South Rus¬ sia. Their leader was Jacob Hutter who was burned at the stake at Innsbruck, in the Tyrol, in 1536. The Hutterian Brethren are not strictly Mennonites, but agree with them and are so classed. They formerly observed com¬ munity life in South Dakota, and have some¬ times been called Bruederhoef Mennonites. They have (census of 1916) 982 members, with 32 ministers and 17 churches.

The Kleine Gemeinde, the Stauffer Mennon¬ ites and the Central Conference are small groups, differing in minor particulars among themselves and from other Mennonite bodies. They aggregate about 2,500 members. The grand total of Mennonite bodies, according to the census of 1916, is as follows: 1,398 ministers, 840 churches and 79,591 members. The increase in 10 years was nearly 25,000 members.

Bibliography. — Funk, (Mennonite Church and her Accusers)

(Elkhart, Ind.) ; Krebiel, H. P., (History of the General Conference of the Mennonites of North America) (Canton, Ohio, 1898) ; Wedel, C. H., (Geschichte der Mennoniten> (4 vols., Newton, Kan. 1900-04) j

Smith, (Mennonites of America) (Goshen, Ind.).

Henry K. Carroll,

Author of (Religious Forces in the United States P *etc.*

MENOBRANCHUS, an alternative desig¬ nation of Necturus. See Proteidˆ:.

MENOCAL, Aniceto Garcia, American civil engineer: b. Cuba, 1 Sept. 1836; d. 20 July 1908. He was educated in Havana and was graduated from the Rensselaer Polytech¬ nic Institute in 1862. In 1863-69 he was en¬ gaged as sub-chief engineer of the Havana waterworks and in 1870 returned to New York, where he was two years in the engineering of the waterworks department. He was chief en¬ gineer of all the surveys made for the Isthmian Canal by the United States government and was sent to Paris in 1879 as member of the Canal Congress. He furnished the estimates of the cost of the canal and was a member of the boards for selecting coaling stations in the Philippines, Porto Rico and on the coast of Liberia, Africa. He was a member of several scientific societies and published many of his official reports, *etc.*

MENOMINEE, the French Folles Avoi-nes, a tribe of North American Indians of Algonquian stock, formerly known in upper Michigan and Wisconsin, along the Menom¬ inee River and Green Bay, and ranging west to the Mississippi and south to the Fox River. Their name signifying ((wild-rice men,® hence the French translation is derived from their use as a staple food of the abundant wild rice of the region. Their descendants numbering about 1,400, civilized and Roman Catholics, in¬ habit Green Bay Reservation, Wisconsin. Con¬ sult Hoffman, J. W., (The Menominee) (in Bureau of American Ethnology, 14th Annual Report, Washington, 1896).

MENOMINEE, me nom'i-ne, Mich., city, county-seat of Menominee County, at the mouth of Menominee River, on Green Bay, and on the Chicago, Milwaukee and Saint Paul, the Wisconsin and Missouri and the Chicago and Northwestern railroads, opposite Marinette (q.v.), at the southern point of the Northern Peninsula, and about 46 miles northeast of the city of Green Bay, Wis. The first settlement was made

in 1799 by Louis Chappieu, a French fur trader. The first lumber mill was built in 1832, but the town was not incorporated until 1883. It is situated in an extensive lumbering region, and it is one of the largest lumber¬ shipping ports on the Great Lakes. Its chief industries are connected with the lumbering in¬ terests, and its great sawmills have an annual capacity of 275,000,000 feet. The principal man¬ ufactures are lumber in all forms, paper, shoes, boxes, machinery, telephones, steam-boilers, beet-sugar, electrical machinery, auto trucks and lumbering camp outfits. The city has an agricultural college, a fine high school, public and parish schools and a public library which contains about 5,000 volumes. It has Saint Joseph's Hospital, the county buildings and several fine churches. The government is vested in a mayor and council elected annually. The city treasurer and the justice of the peace are elected by the people; the other adminis-

trative officers are chosen by the mayor and council. Pop. 10,507.

MENOMINEE RANGE. See Iron Ore,

Iron Ore Districts.

MENOMONIE, Wis., city, county-seat of Dunn County, on the Red Cedar River, and on the Chicago, Saint Paul, Missouri and Ohio and the Chicago, Milwaukee and Saint Paul railroads, about 65 miles east of Saint Paul, Minn. It is in an agricultural region and near the lumber section of the State. The chief manufactures are lumber, wagons, carriages, machinery, foundry products, bricks, pianos and flour. The trade is principally in lumber, pianos, flour, brick, Menomonie is the seat of the Stout Institute, a State institution for the teaching of trades and for the preparation of teachers of industrial arts and household arts. It has a county training school for the prepara¬ tion of rural school teachers, and a County Agricultural School. It has the Mabel Tainter Memorial Library, which contains about 18,000 volumes. The Dunn County Asylum is near, but just outside the city limits. Pop. 5,104.

MENOPAUSE, the cessation of menstrual flow in women ; climacteric. This epoch is reached generally between the 45th and 52d years, and is frequently marked by nervous dis¬ turbances. The power of child-bearing ter¬ minates at the menopause. It is popularly termed the

((change of life.® A woman who begins child-bearing early and gives birth to a large family usually has her menopause earlier than a childless woman. The approach of the menopause is marked by irregular — usually delayed — menstruation, and sometimes the latter flows are very profuse and weakening. See Climacteric; Menstruation, Disorders of.

MENOPOME, a giant salamander of the genus Cryptobranchus (formerly (Menopoma) . See Hellbender.

MENPES, Mortimer, English artist: b. Adelaide, South Australia, 1859. He went to London when 19, studied at South Kensington; spent three years in Brittany at Pont Aven ; traveled in Japan, where he learned something from Kyosai, in India, Burma and Cashmere, then through southern Europe and Mexico; and wherever he went continued his early ex¬ periments in color and his attempts to repro¬ duce the atmosphere of various localities. Originally he used the color as dry as possible, then mixed it with petroleum and finally used poppy-oil as a medium. He revived the lost art of printing in color from etched plates; made some excellent dry paint etchings, notably one of Hals' < Archers of Sain't Adrian,5 and pub¬ lished several volumes of pictures. His Eng¬ lish house was made in the East, and is a wonderful piece of Oriental workmanship in gold and black. He has published (World Pic¬ tures5 (1902) ; (Whistler as I Knew Him > (1904) ; (India) (1905) ; (Sir Henry Irving5

(1906).

MENSA, or MONS, in astronomy, one of the 14 constellations which Lacaille discovered at the Cape of Good Hope. It is named from the mountain which is a conspicuous feature of the landscape at the Cape. The constella¬ tion is a very inconspicuous one near the South

Pole, its brightest star being only of 5.3 magni¬ tude.

MENSTRUATION, the periodical dis¬ charge of the menses or bloody fluid from the female generative organs. In women it nor¬ mally occurs at intervals of one lunar month, or 13 times a year (hence the use of the term menses, Latin plural of mensis, month). Its first appearance marks the stage of puberty, and is usually attended by definite changes — enlargement of the breasts, showing develop¬ ment of ' the mammary glands, growth of the ovaries, of the uterus

and external genital organs, etc., and by other signs, physical and mental, of approaching womanhood and ma¬ turity. It usually begins in temperate climes between the 13th and 15th year; in hot climates it is apt to commence as young as 12 years, and in very cold climates as late as 17 years; its periodic recurrences continue until the meno¬ pause (q.v.) or final cessation of the discharge, which ordinarily arrives somewhere between the 45th and 52d years. The recurrent periods of its appearance, as well as their duration, vary with different females, and not infre¬ quently in the same individual; the variations, however, not always indicating abnormal or pathological cau-ses. The immediate cause of menstruation is the breaking away of an ova or egg from one of the ovaries. (See Ovary). Menstruation is often at first, and in many per¬ sons throughout the catamenial age, attended by characteristic pains and symptoms, with physiological and psychological conditions of disturbance or depression, which sometimes call for special hygienic treatment. During preg¬ nancy (with exceptional cases) there is no menstrual flow, its cessation being one of the earliest signs of conception. Observance of' wholesome rules of exercise, rest, etc., helps to maintain normal conditions of body and mind, the reverse of which, owing to neglect of such rules, so often makes the menstrual function a visitation of dread and distress.

Disorders of Menstruation. — These in¬ clude amenorrhcea, dysmenorrhcea, menorrhagia and metrorrhagia. Amenorrhea is an absence of the menstrual flow from some cause other than pregnancy or the approach of the menopause (q.v.) or tardy establishment of the menstrual function. It is a symptom of anaemia (q.v.), or may be due to a constitutional condition such as profound nerve-fag or tuberculosis. Strychnine, iron and ergot may be administered internally or the physician may apply local treatment. (See Dysmenorrhcea). Menorrhagia is an ab¬ normally profuse flow during the menstrual period, due to one of several conditions. If not checked by rest, a physician is necessary, as also in metrorrhagia, which is a sanguineous flow between the menstrual periods.

MENSURAL MUSIC. Mensural or measured music is a term applied to a historical style of composition in which the tones bore exact relations to each other in regard to length or time. Such a designation and the occasion for it may appear strange, as precise rhythm seems to belong to the essence of music. This, however, is not the case: there wras a period when notes were not exactly measured, and mensural music is a subsequent development from this early practice'.

All European music of a higher character

was originally cultivated in connection with speech or poetry. This is true of the music of the Greeks as well as the early Christians. But speech is not necessarily rhythmical. Ordinary speech is not so at all, and even poetry is not always characterized by the exact time relations typical of strictly measured music. A trochee can be delivered either in two or three part time, the accented syllable matching the un¬ accented in duration or requiring double as much time. And in impassioned utterance rhythmical relations are apt to be lost sight of altogether. Moreover, any rhythm which the accompanying tones may possess would be theirs only by virtue of the words to which they are added : it would be a rhythm of the poetry, not of the music.

Such was the case in Greek music. Al¬ though instrumental performances were also in vogue among the Greeks, music with them, as we have said, was primarily vocal. We know little of its exact character, but are probably justified in regarding it as a species of recita¬ tive, the words guiding the course of the tones. In Christian times the earliest fixed type of the art was the Ambrosian chant, formulated by Saint Ambrose of Milan in the 4th century. This, too, was similar to Greek music in its adherence to the rhythm of the words. A change was wrought by Pope Gregory the Great, two centuries later. What distinguishes his chant from the Ambrosian is supposed to be the uniform length of its tones, giving it a character similar to that of our choral. How¬ ever, this is probably true only in part. Ac¬ cording to the historian Ambros, the sections of the chant which were sung by many voices may have been measured and regular, but the utter¬ ances of the priest must have retained much rhythmical variety. The real difference is formulated by him as follows : (<The Ambrosian chant was based essentially on the poetical metre, the Gregorian on the musical.® What¬ ever the exact nature of the difference, how¬ ever, there is no doubt that Gregory effected a liberation of the tones from the rhythmical shackles of the words. And this was a gain of far-reaching importance. Music had now won its independence, and the way was prepared for the development of mensural composition.

The more immediate occasion for this de¬ velopment was the introduction of harmony, just as music had primarily been vocal, so also it had been unisonal in character. Though a second tone may occasionally have been added to the principal part, nothing like the later polyphony was attempted. In the 9th century, however, the so-called Organum of Hucbald makes its appearance. In this the theme is systematically accompanied by one, two or three other voices, singing intervals of a fourth, fifth and octave in parallel motion. The point was now reached beyond which no further ad¬ vance was possible without an exact designa¬ tion of the length of the notes. As long as the singing had been confined to a single person this was not necessary. Nor was it necessary in the case of several persons chanting in unison, if the length of the notes was regu¬ lated by the natural accent of the words, or if all the tones were of equal length. In the Organum, however, a certain care was already required. The singers had to stand so that they could see as well as hear each other, and one

among them acted as leader, introducing the new notes at the proper moment. The Or¬ ganum now developed in various directions. There was a more independent progression of parts, contrary alternating with parallel mo¬ tion, and the tones no longer coincided with each other note for note, but one voice sang two or more tones while the other sang one. Manifestly this required an understanding as to the relative duration of the tones, and a method of designating the differences graphically. The first person to formulate the solution of this problem was Franco of Cologne, who lived about the year 1200. Previous to him tones of two lengths, the longa and brevis, had already been recognized. He also admitted the duplex longa or maxima, — twice as long as the longa, and the semi-brevis, — half as long as the brevis. The notes in question were represented as follows :

maxima longa brevis seftii-brevis

Rests were also indicated by Franco, by means of appropriate signs. The bar-line was not yet in use, but measure was recognized, being at first confined to triple or (cperfect® time. Duple or ((imperfect® time was only permitted at a later date.

There were many complexities in the sys¬ tem as promulgated by Franco and his follow¬ ers. Thus the length of the notes was not only determined by their own character and appear¬ ance, but also

depended on the neighboring notes. There were ˆalterations® and <(imperfections,® ((prolations® and (<ligatures,® but space will not permit us to enter into all these involved details, which have only a remote his¬ torical interest. The rules governing mensural music were further elaborated — among other writers — by Marchettus of Padua, who lived about a century after Franco; and Jean de Muris, a celebrated theoretician of the 14th century. Notes of shorter duration were grad¬ ually introduced, such as the minima, semi¬ minima, fusa and semi-fusa. And the notation too was modified, until it finally assumed the appearance to which we are accustomed to-day. Together with the Organum, mensural music furnished the basis for all subsequent advances in the art. It was the indispensable prerequisite for the growth of rhythmical and contrapuntal variety. It made possible the wonderful de¬ velopment in part writing which was soon to take place in the Netherlands, and which was eventually to lead to the glories of modern instrumental and choral music. In fine, it may be regarded as one of the two or three great elementary contributions to the art, on which the dazzling superstructure of modern beauty and inspiration has been erected.

Albert Gehring,

Author of {The Basis of Musical Pleasure? *etc.*

MENSURATION. Mensuration is that branch of applied mathematics which treats of the metrical relations of geometric figures, in particular of the length of lines, the magnitude of plane and solid angles, the area of surfaces and the volume of solids. The term is used both for the act and for the art o i measuring geometric magnitudes. Mensuration is not usually treated as a separate branch of mathe-

matics, but occurs as an integral part of various subjects, such as plane geometry, solid geometry, trigonometry and integral calculus. For a dis¬ cussion of the measurement of plane, diedral, spherical and solid angles and of the relations between the sides and angles of a triangle (plane or spherical) the reader is referred to the article on Trigonometry. The present arti¬ cle will give formulas for lengths, areas and volumes of the simpler and the regular figures and methods of approximation for the more complex or irregular figures.

The measure of a geometric magnitude is its ratio to a fixed magnitude of the same kind selected as the unit of measurement. Through¬ out this article the unit of area is assumed to be a square each side of which is equal to. the unit of length, and the unit of volume is a cube whose edges are likewise of unit length. The purpose of a formula is ‘to show how one of these numbers (ratios) may be found from certain others which are supposed to be known or obtainable. Thus formula. (XIX) says that the ratio of the area of a. circle to that of a square each side of which is a foot long (that is, the area of the circle measured in square feet) may be obtained by multiplying together the ratio of the circumference, to the unit of length known as a foot, the ratio of the radius to the same unit of length, and the . number y2. It is important, to recognize that in using any formula the units must all be of the same system. The number of acres in a field can¬ not be found directly from formula (X) by multiplying together the number of rods in two adjacent sides: this would give the number of square rods in the field. Nor is the number of gallons in a barrel given by formula (LXV) when the radii are measured, in feet or in inches, but the number of cubic feet or cubic inches, as the case may be. In order to change any measure from one system of units to an¬ other the following table may be found useful :

To change

Multiply by

Inverse

in.

to cm .

2.53998

.393704

ft.

to m .

.304797

3.28087

miles

to km .

1 . 60933

.621377

sq. in.

to sq. cm…

6.45148

.155003

sq. ft.

to sq. m … .

.0929013

10.7641

sq. ft.

to acres ….

.0000229568

43560.

sq. yds.

to acres ….

.000206612

4840.

sq. miles to acres ….

640.

.0015625

cu. in.

to cu. cm…

16.3866

.0610254

cu. ft.

to litres ….

28.3161

.0353156

cu. in.

to gallons…

.004329

231.

cu. cm.

to gallons …

.000264184

3785.238

[in. = inches, ft. = feet, yds. = yards, sq. = square, cu. = cubic, m. = meters, cm. = centimeters, km. = kilometers].

(For other multipliers see Weights and Measures). The second column of figures serves to change the unit in the opposite way to that indicated by the rest of the table : thus to change meters to feet multiply the number of meters by 3.28087 ; for instance, 10 meters is equal to 32.8087 feet.

In many cases the computation of area or of volume may be accomplished most easily by mechanical means. For the measurement of the area of plane figures ingenious and effective

instruments known as planimeters have been invented. Two historic instances are the find¬ ing by Galileo of an approximate value for the area of a cycloid by cutting it out of" a sheet of copper and weighing the model, and the dis¬ covery by Archimedes of a fraud in Hiero's new crown through measuring its volume by submersing it in water and measuring the water displaced. To apply this last method, multiply the number of ounces of water by 1.73, or less accurately by j, and the result will be the num¬ ber of cubic inches in the object; or,

measure directly the volume of the water displaced.

Length of Lines.

Circle. — The circumference of a circle is equal to the diameter multiplied by

3.14159265358979323846264338328 .

This constant is usually denoted by the Greek letter tt (pi) and is approximately equal to

34, fff, or 3.1416.

Use the first if an error of one two-thou¬ sandth of the final result may be neglected, and the last if an error of one four-hundred-thou¬ sandth is negligible.

The above theorem may be written

l — Tzd,

= 2 Tr, (I)

where / = length of circumference, d — diam¬ eter and r— radius.

The length l of the arc AMB in Fig. 1, in which MD is the perpendicular at the middle point of the chord AB, AE is tangent to the circle at A or perpendicular to the radius OA, OE is perpendicular to AM, the chord of half the arc or the angle A OE is one-fourth of the angle AOB, may be found by any one of the formulas

-7T TT 1

180 ’ 180 “57

(error about 5Jo) (II)

8 b

l~c + 17’

(HI)

1 = 2k + K2 k—c),

(IV)

l = t “H s, ,

(V)

in which d = .number of degrees in the angle AOB, r — radius OA, c — chord AB, h — height MD, k = chord of half the arc AM, t~ length

of AE, and s — length of BE. Formulas (III), (IV) and (V) are only approximate, the error being small only if the angle AOB or the ratio of h to c be small. Thus for an angle of d = 90° the arc is 1.5708 … , whereas formulas (III), (IV) and (y) give 1.576 . . , 1.5696 . . , 1.5732 . . , respectively.

Parabola. — The length / of the arc AVB of the parabola in Fig. 2 is

1 = V;FHS + j 5 (logˆ + Vy + ˆi) …. (VI)

where x~VD, y~AD, and the logarithm is taken to the base e.

Ellipse. — • The length / of the circumfer¬ ence ABA'B' of ellipse in the next figure (Fie. 3), in which F and F' are the foci (BF — BF ' = OA), is

l = 2ˆa{\ — \e2 — -gje* — • • •), (VII)

or approximately

l — n’sf 2(a2 + b2) (VIII)

= 4.443d;

where e is the eccentricity (oF/OA = “ V cl2 — b*J ;

a~ OA, one-half the longest diameter ; b = OB, one-half the shortest diameter; d = AB—’/a?A-b2.

i _ -a. _

B

Fig. 3.

General Methods of Approximating the Length of Any Curved Line. — Divide the line into parts each of which differs but little

from a small circular arc. Then each portion may be found by any one of the formulas (III), (IV) or (V). A convenient method for the

use of formula (IV) is indicated by the diagram herewith (Fig. 4) and formula (IX). The only restrictions upon the location of the points 1, 2, 3, 4, … in addition to that given above is that the odd-numbered ones must be half-way between the others and that there should be an odd number of points in all.

/= =(JI +12 +23+ …)+J[(Zl_+ 12+23+ …)

— (A 2 +24+46 + …)]. (IX)

Area of Plane Figures.

Rectangle. — The area a of a rectangle, the lengths of two adjacent sides of which are b and c respectively, is

a = bc. (X)

Triangle. — The area a of the triangle

ABC (Fig. 5) is

a = \hb, (XI)

a= ±bc sin A, (XII)

a = V s(s-a') (s—b) (s—c), (XIII)

or

sin A -sin C sin (A +C)

(XIV)

where a! , b, c are the lengths of the sides BC, CA, AB, respectively; h is the perpendicular distance (height) of B from AC; s is one-half of the sum of the sides : j=j= i (a' + b + c) .

If one angle of the triangle (say d) is a right angle, both formulas (XI) and (XII) simplify: namely, the era is one-half the prod¬ uct of the two sides which enclose the right angle (a—bbc). For a simple method of find¬ ing the area of an equilateral triangle (a' — b — c) multiply the square on one side by I3 (a— £b2, approximately), see formula (XVIII).

Parallelogram. — The area a of the paral¬ lelogram ABED (Fig. 5) is

a = d.h, (XV)

or a — cd sin D, (XVI)

where c and d are the lengths of two adjacent sides, D is the angle between them, and h is the perpendicular distance, between the two parallel sides whose length is d.

Trapezoid. — The area a of the trapezoid CBED (Fig. 5), any four-sided figure with two of the opposite sides (BE and DC) par¬ allel, is

a = lh(d+e), (XVII)

where h is the perpendicular distance between the two parallel sides and d and e are the lengths of the parallel sides (d~BE, e — DC).

Regular Polygon. — The area a of a poly¬ gon bounded by n equal sides each of length s and having its n angles all equal is

n cot

a — s2X ■

180e

n

4

(XVIII)

640

The following table gives (approximately) the value of the multiplier in the simpler cases:

Name

n

. 180°

tt cot

n

4

Triangle .

3

.433013

Square .

4

1.

Pentagon .

5

1 . 72048

Hexagon .

6

2 . 59808

Heptagon .

7

3.63391

Octagon .

8

4.82843

Nonagon .

9

6. 18182

Decagon .

10

7.69421

Undecagon .

11

9.36564

Dodecagon .

12

11.19615

Thus, for instance, if the side of a regular hexagon be 9 feet, its area is 81X2.59808 =

210.4445.

Irregular Polygon. — The area of an ir¬ regular polygon may be found by dividing it into parts each of which is a triangle, paral¬ lelogram, rectangle or trapezoid. Thus if we draw a system of parallel lines across the poly¬ gon, one through each vertex, each part will be a triangle or trapezoid and its area may be found by formulas (XI) or (XVI).

Circle. — The area a of a circle, whose ra¬ dius is r and whose circumference is l, is

a = i/r, (XIX)

or a = = 7rr2. 7T = 3.1416 = ˆ (nearly). (XX)

The area a of the sector OAMB (Fig. 1), in which / is the length of the arc AMB and d is number of degrees in the angle AOB, is

a = \lr, (XXI)

or a = ~ˆdr, ˆ = .034906585 = ■& (nearly).

The area a of the segment AMBD (Fig. 1) is a = \r(l — r sin d°), (XXII)

h3

U = \ch -f- — (approximately), (XXIII) or

& = f ch (approximately), (XXIV)

where r, l, c, h, d have the same meanings as in formulas (II), (III), (IV) and (V).

Parabola. — In Fig. 2 the area a of ■ the segment VABD with base AB~2y and height VD = x is

a = ixy. (XXV)

Ellipse. — In Fig. 3 the total area a' of the ellipse ABA'B', of which the length of the longest diameter A' A is 2 a and the length of the shortest diameter BB' is 2b, is

a,' — nab, tt = 3. 1416 (XXVI)

General Methods of Approximation. —

Any plane area can be divided into parts each of which is a rectangle or differs from a rectangle in that one side is a simple curve as in Fig. 6. It is therefore sufficient to give methods by which an area, such as ABB' A' following, may be measured.

1. The Trapezoidal Method. — Divide the base line AB into any number of equal parts, AP, PQ, QR… . , TB and erect the perpen¬ diculars PP', QQ', …. TV. Then if each portion A'P , P'Q', . T'B' of the curve

A'B' is nearly coincident with its chord, the area a is

a = AP[(AA' + PP' + QQˆ~ + TV)

— HAA' + BB')}. (XXVII)

2. Simpson's Rule. — Divide the base line into any even number of parts (in Fig. 6 it is

divided into six parts) ; erect the perpendiculars as before. *Then*

aˆ\AP[AA' + BP' + 2(LQQ' + SS' + …)

+ 4 (PP' + RR' + TT' + …)]. (XXVIII)

3. Weddle's Rule. — Divide the base into exactly six equal parts (as in Fig. 6), then

a = AB [5 (PP’+ RR’+ TV) +RR’ + AA1

+ QQ’+SS’+BB’]. (XXIX)

Surface and Volume of Solids.

Prism. — This includes any solid two of whose faces, known as the bases, are equal polygons situated in parallel planes and all the other faces, the lateral faces, are parallelograms. Thus in the following diagram (Fig. 7) the polygons ABC … and A’B’C’ … are the bases and the parallelograms AA’B’B, BB’C’C, … are the lateral faces. The edges AA’, BB’, CC’, … are the lateral edges. The polygon UVW … lying in a plane perpendicular to one, and so to all, of the lateral edges is called a right section. The right section is equal to the base if and only if the lateral edges are per¬ pendicular to the base.

o

For the lateral area a which is the sum of the lateral faces AA’B’B, BB’C’C … , and the volume v of a prism we have the formulas

a = e(UV + VW + …), (XXX) v = es, (XXXI)

v = hb, (XXXII)

in which e — length of a lateral edge (AA’ or BB’ …), ˆ = area of a right section (UVW …), h = height, i.e., distance between bases, b — area of a base.

The volume v of a truncated triangular prism, that is one with three lateral faces and

whose bases are not parallel (therefore the lengths ex, e3, e3 of the lateral edges not equal) is

v~hs(e i+ˆ2+ˆ3). (XXXIII)

Any truncated prism may be divided into truncated triangular prisms and its volume thus found. For a four-sided prism whose opposite lateral faces are parallel this gives

v = Hei+e*)s, (XXXIV)

where ei, e% are a pair of opposite edges.

Cylinder.— This includes any solid having two bases which are equal plane figures bounded by curved lines (such as circles, ellipses or irregular figures), and situated in parallel planes, and the rest of 'the surface of the solid such that it may be thought of as consisting of an infinite number of parallel straight lines. If we call the length of each of these (equal) parallel lines e, the formulas for the prism given above (XXX, XXXI, XXXII) apply also to the cylinder, namely, the lateral area a and the volume v are

a = ep, (XXXV)

v=es, (XXXVI)

v = hb, (XXXVII)

•or

where p is the length of the boundary, and ˆ is the area of the section of the cylinder by a plane perpendicular to one of the lines lying on the lateral surface.

If the right section of a cylinder be a circle, the base, unless a circle, is an ellipse and its area is found by formula (XXVI). If in such a circular cylinder the bases are not parallel and the distance between the centres of the bases is l, then the area a and the volume v are

a — Ip, (XXXVIII)

= 2 rvrl, (XXXIX)

v — Is, (XL)

= 7 rrdy 7r =3.1416, (XLI)

where r is the radius of the right section. These formulas are equivalent to (XXXV) and (XXXVI) when the bases are parallel, since then /— e.

Pyramid and Cone — The volume v of any solid, such as those in Fig. 8, whose sur¬

face consists of a base, which is a plane figure of any kind, triangle, polygon, circle, _ ellipse, etc., and of triangles or curved areas which may be thought of as composed wholly of straight lines, joining the boundary of the base to some point (the vertex) not in the same plane as the base, is

vˆhbh, (XLII)

where b is the area of the base and h is the perpendicular distance (height) of the vertex from the plane of the base.

For a right circular cone, that is one in

which the base is a circle and the line joining the vertex to the centre of the base is perpen¬ dicular to the plane of the base, the area a of the curved (lateral) surface is

a=nre, tt=3.1416. (XLIII)

where r is the radius of the base and e is the

distance from the vertex to any point in the

circumference of the base.

Prismatoid. — The volume v of any solid, whose total surface consists of two plane figures (the bases), of any character whatever, lying in parallel planes, and a lateral surface made up of _ triangles, trapezoids, or curved portions which may be thought as made up of straight lines joining the boundaries of the bases, is

v = M (bt + b* + 4m) , (XLIV)

where h is perpendicular distance (height) be¬ tween the bases, bi and b2 are the areas of the bases, and m is the area of a section of the solid by a plane parallel to and half-way between the planes of the bases; or

v = ih(b + 3q), (XLV)

where b is one of the bases and q is the area of a section parallel to and two-thirds of the way from, that base to the other.

Solids of Revolution. Sphere. — The area s of the surface and the volume v of a sphere of radius r are

5 = 4*t*, 4ˆ = 12.56637 … (XLVI)

v y = 4.18879 … (XLVII)

The volume v and lateral area a of a seg¬ ment of a sphere (that is the part lying be¬ tween two parallel planes) are

v = zh[h* + 3(ri* + r*)], 5 = .5236… (XLVIII) o o

a = 2Khr, (XLIX)

where h is the height of the zone (perpendicular distance between the parallel planes of the bases), n and r2 are the radii of the bases re¬ spectively, r is the radius of the sphere.

Spheroid. — - For a prolate spheroid, that is the solid formed by revolving an ellipse about its longest diameter (in Fig. 3, about AA’), the area s of the surface and the volume v are

s = 2ˆ (b2 + — sin— lej , (L)

or S = 2nb{b --fa)y (approximately) (LI)

where a, b and e have the same significance as in (VII) and (VIII) and

/=! + 6c+TVc2+TTJc*+TTf‘3’c4+irlf?c5+ •••» b i

in which c— 1 — — . Or less accurately

= *j 4 [7b* +■(«-!)

-=1.0472; (LII)

Z- =4.18879 … (LIII)

O O

The volume v of a segment of a prolate spheroid (part cut off by a plane perpendicular to the axis of revolution) the height of which is h, is

v = ~h*—(3a — h)y 7-r = 1.047198 … (LIV) 3 a 1 3

For an oblate spheroid, that is the solid formed by revolving an ellipse about its short-

est diameter (in Fig. 3, about BB ‘) the corre¬ sponding formulas are

L’(

= 2tt (a2 + g&2),

n, „ , 1 1 + £

2a! + _logT—

)

or where

$= 1 + id + \mathrm{id}^* + {}^{**} + {}^{**} +$

6*

(LV)

(LVI)

in which

d = 1 - ;

a*

47T 4 7T

v—~z, ba*, — =4. 18879…

J O

(LVII)

The volume v of a segment of an oblate spheroid is

v-

71 7 a*riu

–z-Jr- -7- (3b-3 b *

•A).

(LVIII)

Paraboloid. — The volume v of the solid formed by revolving V AD in Fig. 2 about VD as an axis is

7T

7T

2 *y* >

- = 1.5708

(LIX)

which is just one-half the volume of the cir¬ cumscribing cylinder.

The General Solid of Revolution. — The

volume of the solid formed by revolving any curve about a line lying in the same plane and not intersecting it, for instance by revolving A’B’BA in Fig. 6 about AB as an axis, is

IT

F = - .AP[AA’*A-BB’* + 2(QQ’ + *SS’* + …)

o

+ 4(+ RR’* -F _)] . (LX)

Or, as it is perhaps usually easier to measure the circumferences of the circles generated by PP’, etc., than their diameters, if we denote the circumferences generated by A’, P’, Q’ … ., B’ by a, />, q,…, b, respectively, the above formula may be written

i/= r~ .A P[a2-F6* + 2(52-F52 + …)-F4(/>2+r2-|-.-.)L

12 7T

_1_

12 7T

= .0265258 … (LXI)

The Regular Solids. — The area of the sur¬ face and the volume of the five regular solids may be found by means of the multipliers given in the following table :

NAME

Area = (edge)2X

Volume = (edge)* X

Tetrahedron .

1.7320508

.1178511

Cube .

6.

1.

Octahedron .

3.4641016

.4714043

Dodecahedron .

20.6457788

7.6631189

Icosahedron .

8.6602540

2.1816950

(LXII)

General Method. — • The volume of solids which do not come under any of the types treated above may be measured by an applica¬ tion of the prismatoidal formula (XLIV). Let ai, a2, a3, … , a2n, chn + 1 be the areas of a set of plane sections parallel to a suitably chosen base and dividing the solid into an even number (2w) of portions; a\, a2n-H being the end sec¬ tions (that is, the solid lies wholly between Oi and a2n + i). The distance between consecutive cutting planes is to be the same throughout and to be taken so small that between the odd-numbered sections the solid is approximately a prismatoid. The area of a section may be

found by surrounding it by a rectangle and measuring (by XXVII, XXVIII or XXIX) the portion of the rectangle outside of the sec¬ tion. If the distance between the sections be h, then

V = … -\~am— i)

-j-4(u2-f-ˆi-f_ˆ6 • • • “Fflfen)]’ (LXIII)

Barrel. — If d be the inside diameter of the end of a barrel, c the inside diameter at the middle, and / the length (or height) of the bar¬ rel, then the prismatoidal formula (XLIV) gives as the volume v

v = p (f + cj , ~ = .5236. (LXIV)

The following is said to be a better approxi¬ mation ;

£ = .349…. (LXV)

The volume v of the smaller portion of a partly filled barrel, that is, of the contents if the barrel is less than half full and of the empty portion if it is more than half full, is

v— .000472&(d2-{-a2-j-4&2), (LXVI)

where li is the distance of the surface of the contents from the nearest end, a is the diame¬ ter at the surface of the contents, and b is the diameter half-way between the surface and the nearest end.

William Findlay.

MENTAL DEFECTIVES. See Children,

Defective; Education of Feeble-Minded or Mental Defectives.

MENTAL DISEASES. These are dis¬ eases which show themselves in alteration of conduct or behavior. They are faulty adjust¬ ments within the individual which, due to faulty mental functioning, interfere with social values mutually agreed upon by particular groups, large or small. Such faulty mental functioning may be brought about by a vast variety of causes and be contributed to by a variety of defects or disturbances in many parts of the body. Mental disease may come and go, just as any other type of disease, and mental dis¬ ease may be due, most frequently is due, to disorders primarily located in other parts of the body than the brain, although a mental disease means that the guiding function of the body as a whole, i.e., the mental function¬ ing, is disturbed by faulty brain functioning.

A mental disease, therefore, only means that the adjustment of the individual as a whole, — the personality, — to his social environment is sufficiently disturbed to interfere with the well¬ being of that personality. It is primarily be¬ cause such faulty adjustment tends to exclude the sick individual from his fellowmen, — the group or socius, — that mental disease is so much feared by the individual and is looked upon with dread and superstitious awe by the folk in general. In general it may be said that there are two aspects or trends of behavior ex¬ hibited by the individual in his reactions to his environment, conscious and the unconscious, and so there are two attitudes to be reckoned with in problems of mental disorders. If a man’s tongue is cut out he cannot speak, and there are times when he apparently cannot speak, even though he has a whole tongue. Maybe his muscles are paralyzed. That may be

due to some change either in the nerve path¬ ways leading to or from the brain which per¬ mit speech, or in the part of the brain to which these nerve pathways lead or in some other part. An attempt has been made to locate the part of the nervous system affected by means of the behavior of the man who cannot speak, both his actions in the use of his voice and his other actions. For, because of the close inter¬ relation of all parts of the human being, cer¬ tain types and groups of behavior will generally be found connected, as for instance if a man's inability to speak is due to some affection of the nerves between tongue and brain, there will be certain other physical symptoms, but if it is due to an improperly functioning centre in the brain, some other anatomically more distant activity will be affected. Thus a morbid area at the periphery might affect only one nerve, but if nearer to the centre it might affect two or more nerves, while directly at the centre it might affect all the nerves emanating from that centre and the activies regulated by them.

Human behavior is not merely physical, but is also mental, while the means we have of per¬ ceiving that behavior are exclusively physical. That is, the expression of some other person's mind can be reported to me only through the physical actions of other person as perceived by me. From this it appears that the diseases known as mental may be the beginning of a process which starts in purely mental conditions or the end of one which starts in purely somatic conditions. Physical traumata may indeed be the result of a lack of co-ordination due to de¬ fects of nerve function which in turn may be due to a mental conflict. Adler has brought out the fact that a very unfortunate series of physical injuries to the eye of one patient were the result of a maladaptation in co-ordination of such a nature that the reflex actions that generally operate to protect the eye did not work in this case. From this he deduces his theory of organ inferiority , an interesting corollary to some of the theories of the analytic psychology. For if the nervous consti¬ tution of this patient did not permit the usual reactions he would not necessarily be awkward because of an unconscious wish, as is the sup¬ position of the majority of psychoanalysts. If a mental disease is an end product of a chain of

bodily causes, which have been acting for some time, it is most likely that some or all of them will have manifested themselves be¬ fore the time of the manifestation of the men¬ tal disease, and that the presence of these somatic symptoms will be associated with the mental disease and regarded as its causes. But if, on the other hand, the mental disease is itself the beginning and not the end of the process, it will require much more subtle tests to discover it, particularly in its earlier stages. It will be, too, of the utmost importance to detect, as early as possible, these beginnings which are manifested both in mental and in physical behavior, in order that remedial or preventive measures may be adopted at the earliest possible moment. In mental as in dis¬ eases of other bodily functions it is the pre¬ ventive measures that are the most productive of good results. The greatest strides in making a decrease in mental diseases, as well as in those disorders thought of as bodily not greatly affecting the mental functions, come from

taking the disorder in hand as soon as possi¬ ble. Thus it would be most desirable to have teachers in all schools equipped with a means of detecting very early those early signs of later mental disorders which, although at present extremely elusive, are yet gradually, day by day, becoming clearer through analysis. Those in charge of the young should be the first to observe signs of a possible subsequent mental weakness, even in children apparently normal, and should be in a position to advise parents and guardians how to offset the dele¬ terious factors in the child's environment. It is furthermore increasingly clear in what man¬ ner the overloading of the nervous system can produce not only mental disease, but, through the effect of the conflict between psychical re¬ quirements and physical constitution (an effect which is believed to take place in the nerve cells themselves), this overloading of the nervous system produces disorders in the physiological processes, and may therefore in the end pro¬ duce what has been called an organic disease, namely, an alteration in the mode of working of one or more organs of the body, a condi¬ tion which sooner or later undermines the gen¬ eral health.

It is noteworthy that a classification of men¬ tal diseases based on their relation to physical factors is not satisfactory, for the reason that the disturbances in mentality are not always found associated with lesion or degeneration of any or all parts of the brain and nervous sys¬ tem. In other words, a brain and nervous system which to all tests now applicable proves perfect in every respect may be found in the case of a person whose reactions to environ¬ ment have been so

unsatisfactory in adaptabil¬ ity that he has not been able to act his part in society, which has had either to support him as an otherwise harmless dependent or con¬ fine him as a destructive element. From this point of view the modern attitude toward men¬ tal disease is that it is a regression, whether from physical or psychical causes, to the con¬ dition of a more infantile or a more archaic type of mentality. It is recognized that the actions of the child resemble those of an earlier grade of human society, such as was the maxi¬ mum of development in prehistoric ages; furthermore, that the responses of the modern individual to an environment which is daily becoming more and more complex are demand¬ ing of the individual a much more delicate ad¬ justment and adaptation. Whether the failure to adapt is caused solely by a physical lack in the make-up of the cerebral and neural con¬ stitution is beyond the present power of physi¬ ology and histology to determine. It is there¬ fore quite as useful to classify mental diseases purely from the mental standard, providing, however, the already ascertained connections between certain types of reaction and the dis¬ coverable lesions in the neural substance be not ignored. Therefore the present tendency in neurology is to make an analysis upon a purely psychical basis, namely, the mental mechanisms (q.v.) which have been observed to obtain both in the unconscious and in conscious life. It is now known that a phobia, or sudden un¬ reasonable and excessive fear of some definite thing such as snakes, thunderstorms, knives, dogs, horses or what not, is neither to be ex¬ plained on any conscious basis nor to be re-644

moved by an appeal to reason or to conscious¬ ness alone. Similarly the habits of mind named obsessions or compulsions are amenable neither to drugs nor to the conscious adjurations to forget them or avoid them, but only to the education of the character through the freeing of the fixated libido.

Classification. — Almost every alienist of re¬ pute has attempted a classification of the forms of insanity. The subject is one of peculiar dif¬ ficulty, owing largely to the fact that our inti¬ mate knowledge of many of these various forms is far from complete.

A scheme of classification adopted by Jelliffe and White regards the diseases of the nervous system as falling into three general classes : (1) Those of the physico-chemical systems, affecting the neurology of metabolism, and ex¬ pressed in visceral neuropathology and diseases of the glands with internal secretions; (2) those of the sensory-motor systems, including affections of the cranial nerves, the peripheral neurons, the spinal cord, medulla, cerebrum and cerebellum and the meninges, with syphilis of the nervous system, and (3) those of the psychical or symbolic systems (neuroses, psy¬ choneuroses and psychoses). The last contains the manic-depressive group, the paranoia group, epilepsy, dementia precox, exhaustion and toxic psychoses and those associated with organic diseases, with senility, arteriosclerosis, and finally idiocy, imbecility and feeble-mindedness.

A more detailed elaboration of this ap¬ pears as the 1918 classification of the American Medico-Psychological Association. The meth¬ ods of examination of the nervous system in¬ clude a questionnaire covering the family his¬ tory of the patient and his illnesses, and an elaborate physical examination of the vegeta¬ tive nervous system, of the sensory and motor systems, followed by a thorough mental ex¬ amination which in many respects is somewhat similar to the questions of the “intelligence tests® and qualification tests of the army. The alienist comes in contact with a great many diseases whose mental element is very small, no greater in fact than that of the so-called physical diseases. The disorders in the physico¬ chemical systems produce diseases with mental aspects, but aspects no more mental than those of the diseases affecting the organs, muscles, glands, etc., to which those nerves go. It is only when we come to what are called the neu¬ roses that we find mental behavior alone or

predominantly disordered. These affections were called neuroses or ((nerve troubles® on the supposition once accepted that the mental behavior was caused exclusively by some pe¬ culiarity, whether called abnormality or merely variation, in the structure of the nerve cells themselves. At the present time, however, sci¬ entific thought tends toward the theory that mental disease is determined by the loss of balance between the organism and its physical and psychical environment. Thus there are nervous systems congenitally so weak that they are practically disintegrated by the conflict of the individual and society, a conflict which is, as often as not, absolutely unconscious, and which occurs in the simplest and least com¬ plicated social environment. In such natures mental disease at once appears because of the individual's inability to adapt himself to the rudimentary requirements imposed upon him

from without. On the other hand, there are neural constitutions so strong or elastic that they are equal to a very severe strain of adaptation even to extraordinarily complicated environment. Such constitutions will naturally adapt themselves, retaining their own personal equilibrium and health, to conditions which would completely upset a weaker (that is, less adaptable) constitution. It may be here noted that the European War 'brought out many such diversities of neural constitution in those sub¬ ject to (<shell shock® or other war psychoses, together with improved methods of testing for congenital neural weakness. These tests have resulted in putting in positions of less nervous strain those who are unable to stand the greater. A similar allotment of individuals to the various tasks of life would naturally result in less nervous disease. For it is evident, when both factors are taken into consideration, the constitutional factor and that supplied by the environment, that mental disease is largely a matter of proportion between the nervous sys¬ tem and the load which is placed upon it. For example, a person who is not obliged to strug¬ gle for existence may never develop a mental disease which he would have developed, had he been subjected to the stress of adverse circum¬ stances, while, on the other hand, his affluence may make him introversional, and, after the age of puberty, cause him rapidly to run counter to the demands of a true social exist¬ ence.

The role of the unconscious in the etiology of mental diseases is a dominant one, and the comparative indefiniteness of the de¬ limitations of the various types of mental dis¬ orders is due to the newness of any -scientific knowledge concerning the unconscious portion of mental functioning. The neurologist should have, though

unfortunately comparatively few do, as thorough a knowledge of the unconscious mental mechanisms as can be acquired, in addi¬ tion to the medical specialist's knowledge of anatomy, physiology and histology. Recogni¬ tion of the unconscious as a factor in the causes of mental disease requires the understanding that the present day unconscious is the direct descendant of the prehistoric consciousness. It is as if the human psyche were like the earth's surface constructed in strata, the lowest of which was the earliest deposited; much, too, as if the conscious life of successive genera¬ tions from the earliest human and animal life were retained in the psyche of the present day as are the annual rings of growth in the stems of trees. The part played by the conscious or unconscious mental factor in the vegetative or visceral physiology is less evident to the general student than that played by them in the sensori¬ motor systems or in the psychical or symbolic systems. Yet there are good reasons to sup¬ pose that even so serious a disease as pulmo¬ nary tuberculosis may be helped, if not cured, by the patient's being taught how to secure con¬ trol of the unconscious portion of his ego. The exciting causes for this disease, as well as of hysterical coughing and asthmatic attacks, may lie either in the physico-chemical, the sensori¬ motor or the psychical level. The connection between the diseases of the glands of internal secretion, the thyroid, parathyroid, hypophysis, pineal gland, etc., and the manifest mental con¬ dition is shown in the case of cretinism and of

exophthalmic goitre. In these diseases it is quite as likely that the cause is mental as that it is physical, and in such event, we should have to regard exophthalmic goitre as a symp¬ tom of a mental disease rather than the mental factors accompanying it as symptoms of the physical disease. Similarly the very widespread disorder, migraine, is possibly to be regarded as the projection upon a vegetative system, the vaso-motor, of a conflict which originates in the psychical level. Conflicts at the psychical level, which are usually caused by the lack of adap¬ tation to social environment referred to above, may be projected upon the sensori-motor sys¬ tems and produce retinitis, progressive facial hemiatrophy, various facial palsies, vertigoes, auditory and visual aphasia, tic douloureux, sciatica, shingles and peripheral palsies, and other diseases, many of which were considered up to recent times to have only physical causes.* But the conflict, conscious or unconscious, which occurs at the psychical or symbolic level of the ego is manifested in predominantly men¬ tal modes in the so-called neuroses, psycho¬ neuroses and psychoses. Of the psychoneuroses the commonest are hysteria, compulsion neuro¬ sis and anxiety hysteria. Of the actual neuro¬ ses there are anxiety neurosis and neurasthenia, while special cases present mixtures of these neuroses. As a mental disease, and not as popularly used to denote an uncontrolled emo¬ tional state, hysteria is now regarded as a par¬ tial dissociation of the personality, in which certain mental elements, namely, emotions and ideas, have been rejected from consciousness into the unconscious where they have an exist¬ ence which is at least partly independent — an existence which is of vital importance to the welfare of the individual because it is an ex¬ istence in which the split-off ideas and emo¬ tions have a growth or development of their own. This development is different in hysteria and in compulsion neurosis. In hysteria the mental elements, which are repressed from con¬ sciousness into the unconscious, direct or con¬ trol a portion of the libido in such a way that its force has an incidence not upon the world of external reality, as is the case with the average person, but in the shape of work done in some shape or other. On the contrary the incidence of the libido falls upon the physi¬ ological functions themselves or upon certain of

them through a variety of symbolic selec¬ tion. This process, which is known as hys¬ terical conversion, produces very many so-called symptoms, mostly of a bodily nature. There results from this a large number of dis¬ orders which the general practitioner is prone to regard as having only a physical cause, and he prescribes drugs, which rarely have the de¬ sired effect. Possibly the commonest form of this is the hysterical headache, which is rarely recognized of psychogenic origin, although it is so completely analogous to the wnine o clock illness® of school children, who use this gentle form of unconscious malingering as a means for escaping their responsibilities. ((An adult ought to make a call upon a recently bereaved friend.® This is recognized as a distinct obli¬

* Hawthorne had an inkling of this when, in his 'Scarlet Letter', he wrote: "physical disease, which looks like a thing in itself, and separate, may be only a symptom of a distur¬ bance in the spiritual (mental) part of our being.

gation but the patient's infantile necessity of escaping reality and seeking pleasure makes the duty seem a very onerous affair. Thus arises a conflict between duty, born of conscious ap¬ preciation of the social obligation, and desire, born of the childish inability to make the neces¬ sary sacrifice of personal comfort. As a result the patient develops a headache and so, being ill, does not have to go. While the mechanism in other hysteric conversions is more compli¬ cated, it is no less clearly proved, so that the , number of what are ordinarily taken as symp¬ toms having a merely somatic cause, and which are through analysis seen to be merely hysteri¬ cal conversions, is augmented daily. Disturb¬ ances of sensibility, such as hemianaesthesia or insensibility to touch and pain on one side of the body Only, disturbances of motility such as choreiform movements, tics and certain occupa¬ tion spasms, disturbances of speech, sometimes including stuttering, visceral disturbances show¬ ing vomiting and diarrhoea, vaso-motor disturb¬ ances and emotional disturbances, particularly in cases of .great exaltation or depression, are all likely to be caused by the hysterical dissocia¬ tion before mentioned, in which some mental factor is repressed and therefore driven with¬ out the pale of conscious control.

In compulsion neurosis there is no conver¬ sion, which implies a shifting of the incidence of the libido power from the external world,

which is its natural goal, to the physiological processes of the individual ; but there is an¬ other kind of shift, namely, from the external world to the mental states themselves. In this condition the numerous physical symptoms mentioned as being found in hysteria are gen¬ erally absent, but their place is taken by varia¬ tion from the conventional modes of thinking. Such variations to be sure are far from un¬ pleasant, if they do not become too great, for they add much of piquancy and interest to a person's character. But when the departure from the conventional is excessive and both compulsive and unaccountable, the condition merits the term neurosis and requires treatment from . the analyst. There are compulsive thoughts, compulsive doubts, fears, acts, rituals of dressing and undressing or eating for which this kind of neurotic can give no reason. He generally does not attempt to rationalize them but admits he does not know why he always has to act or think in his own peculiar way. Analysis has convinced Freud that <(obsessions are always transformed reproaches, returning from repression, which always refer to a pleasurably accomplished sexual action of child¬ hood® and that ((the compulsive ways of think¬ ing and acting are only substitutes for the reproaches which are symbolical distortions formed in order to prevent a recognition on the part of the patient of the real meaning, so as to keep from his consciousness a realiza¬ tion of the circumstances of his guilty conduct.® Paranoia is a group of mental diseases con¬ taining the paranoia as defined by Kraepelin, and various mixed aberrant forms, some of which are called paraphrenias. In general it is a disease in which there are delusions of perse¬ cution that have been pretty well systematized. The disease progresses usually through four rather well-defined stages. In the first the patient is unduly concerned about his health,

and particularly about what goes on around him in relation to himself. That is, he con¬ siders more things are said and done with reference to himself than does the ordinary person, and he begins to reason it all out that there must be some agreement in the actions of persons or things around him, usually for his discomfiture or ruin. Hallucinations of hearing are common. The result of his think¬ ing himself to be the victim of persecution is that he sometimes becomes very dangerous,

‘ and attacks the persons whom he regards as his persecutors. In advanced cases the system of ideas worked out in justification of the sus¬ picions of persecution or conspiracy is very elaborate, and includes frequently falsifications of early memories, which contribute the grain of truth in some of the projected reproaches. Another classification of the paranoia group of mental diseases is that into two divisions, the original and the acquired, the first being the inevitable development of a character which was of such a constitution as to develop into exactly this form of mental disease, in spite of an environment even partly favorable to a wholesome life, and the second, the effect of an untoward environment upon a neural con¬ stitution which might in more favorable cir¬ cumstances have escaped this fate. According as hallucinations are or are not present, these groups are further divided respectively into paranoia hallucinatoria and paranoia conibina-toria. Furthermore the individual cases are described as persecutory, expansive, querulous, litigious, inventive, reformatory, religious and erotic, according to the forms which the more prominent mental symptoms show. A third division of the paranoia group is into delirium of interpretation and delirium of revindication. In the first the erratic element is in the in¬ terpretation of the factors of the environment of the patient, who remains otherwise quite clear minded, and in the second there is a tendency toward the formation of a fixed idea, either egocentric or altruistic. As paranoia wras considered an incurable, progressive and chronic disease, those cases which through analysis have been shown to have at the basis of them an idea that could be traced out and corrected, and which therefore have been called acute paranoias, necessitated a further recon¬ struction of the concepts underlying the classi¬ fication. The result of this is that the content of the mental states in this form of disease is not now considered so indicative as the mental mechanisms involved. This implies again that it is not so much the delusion, or the suspicion itself, or any other of the symptoms, which

used to be considered characteristic of the dis¬ ease, but it is the inability on the part of the patient to adapt his ego to those ideas which form the so-called content of the paranoid state. The delusion, for example, is found to have been made by the patient for the pur¬ pose of making a certain emotion tolerable which he could not get rid of. The removal of the delusion would not in such a case help, for another would have to be supplied in its place, to explain the original emotion, which would itself remain. The emotion or a lack of control over the emotions is thus seen to be the most fundamental cause of the disease. The explanation of paranoia consists, there¬ fore, in the emotional lack of control, which

fixes upon certain ideas and is unable to change them, and furthermore in an exaggeration of the mechanism of projection. (See Mechan¬ isms, Mental). Finally Sigmund Freud states that paranoia is dependent upon a homosexual fixation in the psychosexual development of the individual. Treatment of paranoia has been more earnest and determined of late, as more and more cases have been handled with greater success, but it is to be remembered that the curable ‘cases are now by many regarded as only paranoid forms of other mental diseases, and that the true paranoiac is known as par¬ anoiac virtually only by the failure of all efforts to improve him. Psychoanalysis is the only means by which any satisfactory knowledge can be gained of the unconscious mechanisms dominating any given case, and only by a thorough study can it positively be determined how much or how little can be accomplished in the way of therapeusis.

Epilepsy and various convulsive types of reaction including the classical epilepsy, some attenuated forms such as affect epilepsies, and those of gross brain disease, constitute a class of mental disease in which there is well-known physiological and anatomical change in the brain itself. The disease is apparently heredi¬ tary, in the sense that in the history of all epi¬ leptics there is usually to be found some taint in the family or in collateral branches. The epileptic convulsion of the classical type is a spasm with unconsciousness, preceded by a warning called the aura, and followed by a gradual wakening or a deep sleep. The vari¬ ations are exceedingly numerous. Modern in¬ vestigation has shown that there is some asso¬ ciation between the epileptic fit and the grati¬ fication of an unconscious wish. Epileptics are likely to be of a low order of intelligence and their reactions to be analogous to those of chil¬ dren or infants. Some cases indeed do turn out later to be imbeciles. Treatment is not generally considered to be of avail,

except pos¬ sibly in psychogenic cases, where analysis can sometimes straighten out the complexes of the patient. The best care is secured in the colony plan where training in healthful outdoor occu¬ pation is possible.

The Dementia Precox (Schizophrenia) group of mental diseases contains the so-called dementia simplex, hebephrenia, catatonia, some paranoid forms and certain mixed or atypical states. The mental symptoms of the dementia precox group include an emotional dullness, which is thought to be due to the fact that in this disease the patient shuts himself into his own thoughts and is therefore less moved by external occurrences than are ordinary persons. That is, his thoughts lose their reference to external reality and the result in the worst cases is that nothing in external reality can move or arouse the confirmed dementia precox patient. Another feature which is an outcome of this segregation from external interests is his so-called negativism, which is shown in his either refusing entirely to do what he is told or doing it as negatively as possible. Thus, if he is told to hold out his hand, he puts it be¬ hind his back; if told to stick out his tongue, he shuts his mouth tight. This segregation of the behavior from all relations with external reality (and in the last analysis reality amounts to little more than the relations of the indi-MENTAL DISEASES

vidual with other persons), is a splitting of the personality, which is the reason for the alter¬ nate name of dementia precox: schizophrenia or (<split mind.® The detailed features of this separation of the behavior from all that in the average man is in close connection with his behavior are as numerous as all the possible types of relation of the individual with his environment. Some of these are suggestibility, failure of voluntary .attention, disturbance of orientation, disorders of memory. The delu¬ sions have been shown in many cases to be svmbolisms of the conflict going on in the unconscious. The fact that the conflict is un¬ conscious accounts for the difficulty of getting at it and of re-establishing satisfactory relations with the patient. Other symptoms are physical such as the mannerisms, stereotyped modes of action, unusual words or expressions so fre¬ quent in dementia precox, and the rigidity and stupor which characterize some of the patients.

Whatever reactions to the environment re¬ main in the patient are marked by an archaic or primeval character, such that in the evolu¬ tion of human behavior the highest, most com¬ plicated and latest acquired types are those first to be lost. In the disease the individual reverts or regresses to a form of behavior which may possibly be supposed to have been valid and current in prehistoric ages. As be¬ havior may be regarded as built outward from a central core, this form of psychosis is what is known as an mtroversional one, that is, one in which the libido introverts or regresses to a more fundamental and therefore more archaic form of gratification. There are other physi¬ cal concomitants sometimes noticed, such as an unusually small heart or a tendency to pulmo¬ nary tuberculosis. The onset of the disease is either gradual or sudden. If gradual it may be mistaken at the beginning for other types of mental disease, such as the manic-depressive, hysteria, compulsion neurosis, *etc.* It is in this disease more difficult than in most others to make any satisfactory statement as to whether it has a physical or a mental origin. As the bodily changes so far discovered have been so few and their bearing so uncertain, it is more advantageous at the present time to explain the disorder on a purely psychological basis. The patient is faced with a situation in which the balance between environment and congen¬ ital ability to adapt to it is inevitably lost, whether because of the disproportionate burden placed upon him by his environment or because of his innate weakness rendering him unable to support the average load. In this connection it is to be remembered that many ordinary persons declare their burden is too heavy for them to bear, and that few ever know their extreme abilities; consequently the loss of bal¬ ance may have a purely psychical cause lying within the unconscious desire of the particular person. When a person says that something will drive him crazy, he is unwittingly express¬ ing an unconscious desire, not to become ill mentally, but to receive the care and symbolic homage which is given to the mentally ill. The severity of the mental symptoms may be re¬ garded as a measure of how far the. unfavor¬ ableness of the environment has driven back the individual patient .from reality. There are cases of moderate confusion which appear in almost all respects perfectly natural persons,

and only later develop a disorder great enough to dissociate them from their fellows; while in the so-called catatonic cases the inability is gen¬ erally complete. The cases which have subse¬ quently become well have gradually made an adjustment to reality in some form, either indirectly through the formation of delusions, or directly by a final domination of the reality motive. Cases that do not get well tend

to sink to lower levels till they reach one on which they can succeed in maintaining themselves with comparative steadiness. This is notably the case in institutions, while in the world of life such persons join the ranks of tramps, prostitutes and petty criminals, thus finding their appropriate level.

The treatment of the physical condition is always according to the nature of the bodily symptoms, and the treatment of the mental con¬ dition must take into consideration the involve¬ ment of the higher or psychological levels of the personality and give as much analysis as pos¬ sible, in order to reconstruct the social relations if that can in any way be done. Prevention of this disease is one of the most important ends that could be achieved by civilization, and is primarily attained through eugenic methods, lacking which the only means at present known lie in the correction of all irregularities of char¬ acter as early as they may be observed in child¬ hood and an absolutely frank and scientific handling of the question of sex, the source of much that is anomalous in human character.

A division of infection and exhaustion psychoses comprises those resultant upon fever, exhaustion or collapse and upon typhoid fever. While all these diseases have mental aspects, the treatment of them is so essentially in ac¬ cordance with the disease of which they are themselves virtually only the symptoms that they need not be described here in detail. There is a special form of mental reaction following the over-indulgence in alcohol, in opium, cocaine, bromides, carbon monoxide, lead, mercury or from uremia, diabetes mellius, pellagra and certain gastro-intestinal diseases. In none of the mental diseases is the matter of individual psychology more important than in alcoholism, as the reasons for drinking which are assigned by people in general are merely rationalizations. (See Mechanisms, Mental). The real cause why people drink to an extent which harms them is that their neural constitution craves the gratification which they get from this source alone. The very fact that a man or woman cannot stop drinking therefore stamps them at once as having a weakness in their nervous constitution. The alcoholic takes his peculiar way in creating an artificial balance, so to speak, in order to make up for the loss of bal¬ ance between his neural constitution and the demands made upon it by his environment. It is his way of taking the cash and letting the credit go. Alcohol is the quickest path for some persons to shut out the world of reality, which has been found too arduous, and to open up the world of fantasy, the fact that the individual is unable to face reality being the really important point. Accordingly it is ‘not surprising to find that ordinarily the alcoholic is in other respects, aside from his alcoholism, an example of general inefficiency. His

uncon¬ scious appreciation of his essential inferiority is partly what leads him to flee from the world

of reality to the world of intoxication fan¬ tasy. That alcoholism is an indication of a deep physiological weakness, too, is to be in¬ ferred from the high mortality in pneumonia and other diseases among alcoholics.

The same remarks could be made about the mental, aspects of over-indulgence in opium, morphine, cocaine and other poisonings. The amount that any given individual can stand de¬ pends, as is well known, on the individual's constitution. The more he can stand, the stronger the constitution; but from another point of view, the greater need he has for some drug to change, through its effect upon himself, the nature of his relations with the external world, the weaker he is as a mechanism and the less suited he is for the field of activity in which he finds himself. In all of these drug indulgences the treatment of the patient by means of other drugs is merely palliative and does not go to the root of the matter. The only hope of doing this is through psycho¬ analysis, after the acute disturbance has ceased. There are psychoses, too, associated with or¬ ganic diseases such as apoplexy, chorea, paral¬ ysis, multiple sclerosis, polyneuritis and heart disease ; also with presenile, senile and arterio¬ sclerotic conditions.

Finally feeble-mindedness, idiocy, imbecil¬ ity, regarded as defects in personal endowment or development, have the mental aspect that they cannot live in society acceptably to the degree of being either self-supporting, or of supporting anyone else. The economic im¬ portance of these defective classes is being recognized and the more as psychological methods have been devised for grading all individuals into the classes which show char¬ acteristic differences parallel with the differen¬ ces between children of ages between 1 and 14 years of age. Very extensive researches by Binet, Simon, Goddard and Terman have shown that the general intelligence grows steadily up to age 14, while above that age there are roughly three groups, the low, average and high adult intelligence. What is meant by feeble-mindedness, imbecility and idiocy can be given a very exact form in a table like the following:

Mental age Capabilities Class

Under 1 year. Helpless . Low class idiot

1 year . Feeds self. Eats every¬

thing . . Middle class idiot

2 years… . Eats discriminatingly… . High class idiot

3 years …. No work. Plays little … Low class imbecile

4 years… . Tries to help . Low class imbecile

5 years …. Only simplest tasks . Middle class im¬

becile

6 years …. Tasks of short duration.

Washes dishes . Middle class im¬

becile.

7 years …. Little errands in house.

Dusts . High class imbecile

8 years …. Errands, light work;

makes beds . Low class moron

9 years …. Heavier work. Scrubs,

mends, lays bricks, cares

for room . Low class moron

10 years…. Good institution helpers.

Routine work . Middle class moron

1 1 years …. Fairly complicated work

with only occasional

oversight. . Middle class moron

12 years… . Uses machinery. Cares

for animals. No super¬ vision. Cannot plan… High class moron

The advantages of these so-called intelligence tests, so clearly shown in the organization of the national army, are of further advantage in

finding out whether a mental defect is inherited or acquired, because in the inherited mental defects a termination of the individual's ability to go through the tests is quite even. He can do all of the tests of ages one to seven, for example, but cannot do any of those above that age. On the other hand the case is not so clean cut with acquired defects, the individual being able to do some but not all of those tests several years above his mental age and not all of them below it.

In conclusion it should be emphasized that the mind and the body are one unity and what¬ ever affects the one is not without effect upon the other, that it is almost if not quite impos¬ sible to draw the line between mental and bod¬ ily disorders, and that the ultimate truth will be found in the statement that mind is but the function of body and body but the perceptible expression of mind. Therefore few diseases can be regarded as exclusively mental and but few as exclusively physical. Consult Jelliffe and White, (Diseases of the Nervous System > (3d ed., 1919); and White and Jelliffe, (Modern Treatment of Nervous and Mental Disease) (Vol. II, 1915).

Smith Ely Jelliffe, M.D.

MENTAL HYGIENE. Hygiene has usu¬ ally been conceived of as a system of measures for the creation of conditions without for the maintenance of the bodily health. Mental hygiene is an effort to create favorable condi¬ tions within which will make for mental health. Whereas hygiene heretofore has dealt with external conditions which are favorable to health, such as fresh air, sunshine, pure food, exercise, etc., mental hygiene deals with the principles of right living as they apply to the regulation of our thoughts, our feelings, our activities. In its practical applications mental hygiene attempts to deal

with the problem pre¬ sented by the tremendous demands of our fundamental instincts for adequate expression. It sees in human failures inability to adequately harness these instincts, while in success it sees them adequately expressed in activities that are at once creative and socially acceptable and valuable. The principles of mental hygiene re¬ ceive their formulation as a result of an under¬ standing of the development of the human mind from earliest infancy to adulthood expressed in terms of a constant interplay and compromise between instinctive desires and social repres¬ sions. These principles will receive their ap¬ plication along two main lines of endeavor. One by applying them to the scheme of educa¬ tion, modifying it and minimizing the severity of these conflicts, and secondly, in individual instances by an examination of the particular situations under which difficulties have pro¬ duced disturbing symptoms in the individual.

As soon as the difficulties of the individual are seen as evidences of his endeavor to make his particular instinct-constellation fit in with the social requirements, it is seen that a vast amount of convention, particularly the criminal law, is the reaction of society against instinc¬ tive manifestions by an effort at forcible re¬ pression, and just as education would not be complete if it stopped wholly at efforts of re¬ pression just so mental hygiene points out that society's methods of dealing with its delinquents are not complete when measures of repression, censure and condemnation alone are used. As

in dealing with the child it is necessary to search for and help to develop all the positive characters of value, so in dealing with the de¬ linquent it should be society's effort to search for and develop to their fullest extent all those strivings for better things which no one is with¬ out.

This new point of view is applicable to every relation which involves the individual and so¬ ciety, and its ideal must be to bring about a state of understanding rather than a blind clash¬ ing of instincts between these two. When this is done individual instinctive indulgence, in¬ stead of being met by blind social condemna¬ tion,

will be met by an intelligent vision which sees the indulgence as a relatively infantile, undeveloped type of reaction and which sets about to bring to pass a different reaction formula by methods of repression where neces¬ sary and to the extent necessary carefully checked by adequate controls but which does not neglect those educational procedures with¬ out which no repression is safe.

The practical application of the principles of mental hygiene must come about as a result of a more complete understanding of the de¬ velopmental stages of the human individual and this means specifically a more complete under¬ standing of the development of the child. This is the (<century of the child** and in many ways the advances that have been made in child study point the way toward an adequate hygiene of mind. This is so because in all of the defective and delinquent conditions, as we find them either in children or adults, we see evidences of defective psychological development either gross or in detail. In other words, the adult delinquent, or the mentally ill adult, presents distinct evidences of having been arrested at some point in his psychological development, so that in that portion of his behavior which is circumscribed by this limitation there are the outward appearances of infantilism or childish¬ ness. The moods, the grouches, the irritabili¬ ties, the petty dishonesties, lying and pilfering, the subtle cruelties and deceptions, selfishness, over-conscientiousness, prudery, emotionalism and a thousand other traits of character are all the better understood when they are seen to be childish types of reaction, and are almost im¬ mediately appreciated as such as soon as the analogy is suggested.

The immediate problem of mental hygiene as addressed to such character traits as have been enumerated above is to approach their study in the individual case with a view to unfolding the causative factors which have, within these cer¬ tain areas of conduct, prevented the individual from progressing along the usual lines of de¬ velopment and having succeeded in this en¬ deavor, helping the individual to find avenues of expression for this pent-up energy in more useful ways.

All these results have been made possible by a study of the development of the child and realization for the first time that the child is not simply a small adult, but has standards of con¬ duct, points of view, attitudes of mind which it is extremely difficult, if not impossible, for the adult to feel himself into. An appreciation of these facts, together with an attitude . toward the individual which is truly constructive, the parental attitude in the best sense, is what, is needed. So that in the treatment of these sick

individuals there is arising in society an atti¬ tude which is a development of the parental in¬ stinct as a result of better understanding.

The defects in the parental instinct have been that children have been considered the property of the parents, existing only for their use and satisfaction. This has been the history of the child throughout the ages. Now it must be appreciated that a greater sacrifice is de¬ manded of the parent if the child is to grow up to successful adulthood. Only the interests of the child should be considered by the parent, and not the parent's personal desires.. On the other hand the child should be weaned from considering that the parents belong to it and exist for its pleasure, otherwise a dependent at¬ titude upon the love of the parents will persist into adult life. The basic necessity, therefore, for the healthy adult is a healthy relationship between parent and child which results finally in a normal, healthy emancipation of the latter, resulting in the greatest possible attainment of individual efficiency.

William A. White, M.D. Superintendent Saint Elizabeth's Hospital, Washington, D. C., Professor of Psychiatry, George Washington and Georgetown Univer¬ sities.

MENTAL PROCESS. A term used in psychology to denote the phenomena of mind viewed as changing rather than as timeless sub¬ stances. One of the great changes which has come over philosophy in the past century or so is the obsolescence of the notion of substance. It is realized more and more that the unity of phenomena is to. be explained, not by the fixity and homogeneity of a stuff behind them (see Panpsychism), but as the persistence of a cer¬ tain type of change or process. Just as the physicist has ceased to worry much about the nature of matter or the ether and has given himself wholeheartedly over to the study of their laws of change, the psychologist has come to see the utter barrenness of the substantial conception of mind, and now interprets the mind and all phenomena pertaining to it under the category of process. The mind itself is often treated as the stream of its states, while these are no longer regarded as instantaneous, but rather as undergoing a temporal waxing and waning of their own. Consult Tames, W., Principles of Psychology> (New York 1890) ; Stout, G. F., (Analytic Psychology) (London 1896) ; Titchener, G. B., (Textbook of Psychol¬ ogy0 (New York 1910) ; Wundt, W., cGrund-ziige der physiologischen Psychology (6th ed., Leipzig 1908-11).

MENTAL SCIENCE, the science of mind: (a) properly, a synonymous term for psychol¬ ogy, or that branch of metaphysics which treats of the aggregate of knowledge concerning the mind and mental operations. (See Psychology; Individual Psychology ; Social Psychology ; and related references), (b) A term also ap¬ plied to various empirical systems of religious and philosophical thought, which propound the doctrine that most physical ailments are curable by faith, or rational exertion of the mind, with¬ out the aid of medicine. See Christian Science; Emmanual Movement; Faith; New Thought; Soul.

MENTAL TESTS. In the early eighties the experimental method was ‘developed in the

study of mental life through the establishment of various psychological laboratories. Certain aspects of this work, though not originally aimed at any practical application, did attract the attention of those interested in abnormal minds, the psychiatrists, and to a lesser extent the attention of those interested in controlling the development of minds, the educators. Gradu¬ ally there came to be developed in this way methods of investigation somewhat more direct and somewhat simpler than the typical labora¬ tory experiment — methods aimed at probing or measuring mental capacities for diagnostic purposes' — and these methods became known as (<mental tests.®

The things tested were at first mainly sensory vacuity and sensory discrimination, like keenness of vision and ability to notice small differences of pitch; motor ability, like speed of tapping, accuracy of aiming and steadiness ; memory in its varied aspects, like memory for nonsense syllables, recognition of forms and colors and capacity to commit to memory ; imagination, both passive and active ; and especially quickness of association, that is, the speed with which a person, on being given a word, can respond to it with another word related to the first in some prescribed manner. There were also many attempts at measuring capacity to attend, as by the various "cancellation® tests in which the examinee had to cross out, or cancel, designated materials, e.g., every a in a page of print ; and again by tests in which words, pic¬ tures, diagrams, etc., were exposed to view for a very brief time by specially devised in¬ struments. Much was expected, too, from the development in the laboratory of very elaborate apparatus and technique for measuring reaction time, i.e., the speed with which a person could respond by a designated movement to a given signal, e.g., by pressing a telegraph key on seeing a flash of red light — a type of work evidently closely connected with that just mentioned in the measurement of speed of asso¬ ciation.

Now, with a few exceptions, these attempts to develop a series of mental tests from the experimental methods of the laboratory psychol¬ ogist have been worth while, but the progress thus made in measuring special aspects of mental life has been entirely overshadowed in the mind of the lay public by developments in another direction — namely, in the determina¬ tion by mental tests of

levels of general in¬ telligence.

About 1905 the French psychologist, Alfred Binet, reported the result of an attempt made by him in conjunction with a physician, Dr. Simon, to devise a system of tests that would serve to select children of subnormal mentality for segregation for special instruction in special classes. In 1908 and again in 1911 the same authors published improved editions of what is now generally referred to as the “Binet-Simon Scale for Intelligence Testing,® or, more briefly, as the “Binet Tests.®

The root idea of the Binet scale is to as¬ semble a considerable number of relatively simple short tasks of varied character and to classify these into groups which correspond with the average or “normal® performance of children of a given age. Each “age® is repre¬ sented by five or six tests. Thus, in the recent “Stanford Revision® of the Binet tests, pre¬

pared by Dr. L. M. Terman of Stanford Uni¬ versity, an eight-year-old child is given these tasks: counting backwards from 20 to 1; draw¬ ing a simple plan for finding a ball lost in a field; answering certain simple inquiries like, “What should you do if a playmate should hit you accidentally?®; stating the similarities be¬ tween things like wood and coal ; defining words like balloon, tiger; knowing the meaning of at least 20 of a set of prepared terms.

Others of these mental tasks, to name a few at random, are the counting of pennies, the naming of colors, memory for digits, the inter¬ pretation of fables, the detection of absurdities in statements, *etc.*

In addition to the Terman arrangement American examiners are wont to use editions of the Binet tests prepared bv Dr. Goddard, till recently of the Vineland Training School, by Dr. Kuhlmann, of Faribault, Minn., by the late Dr. Huey, formerly of Johns Hopkins Uni¬ versity, or by Dr. Wallin of the Saint Louis public schools. Whatever be the precise form employed, the Binet tests yield results, known as the “mental age.® If this coincides with the chronological age the child is said to be “normal® or “at age® ; if the mental age be higher the child is “mentally advanced,® “accel¬ erated,® “superior® or “gifted® ; if the mental age be lower the child is “mentally retarded,® “inferior,® “dull® or “subnormal.® It is cus¬ tomary to indicate the degree of deviation relatively, by multiplying the mental age bv 100

and dividing by the chronological, or life, age: then, as will be understood, the “intelligence quotient,® or “I. Q.,® is 100 or thereabouts for the average or so-called “normal® child, runs below 100 for those below average mentally and above 100 for those above average mentally. Roughly speaking, a child with an I. Q. below 80 may be termed mentally subnormal and above 120 may be termed gifted. About five children in 100 are as inferior and about five are as superior as indicated by I. Q.’s of 80 and 120, respectively.

The amount of activity stimulated by the work of Binet has been truly surprising. Bib¬ liographies prepared by Dr. Kohs list 711 books and articles dealing with the Binet tests up to 1917. Practical application has been most common in the direction of Binet’ s original aim, i.e., in detecting subnormal mentality and in measuring its degree. Thus, special classes for backward or for subnormal or for actually feeble-minded children are now commonly recruited with the aid of these tests. Similarly, in juvenile courts the tests have proved valuable in showing the presence of arrested mental development or low’ degrees of general intelli¬ gence in a large proportion of the delinquents brought to trial.

Among other developments from the original Binet scale should be mentioned the Yerkes-Bridges “Point Scale® in which many of the Binet tests are used, but a method of scoring by points is substituted for the Binet age-level principle.

The usefulness of the Binet method, great as it undeniably is, is purchased at the expense of certain limitations: finer differences in degree or type of intelligence are not well revealed ; adults cannot be so successfully tested as children ; it cannot be administered simultane¬ ously to a group of persons.

The sporadic efforts of various psychologists to overcome these limitations, to develop a series of group tests to measure the general mental ability of adults, have been powerfullv stimu¬ lated and co-ordinated by the advent of the war. As a result of preliminary trials in

1.917 there has been developed and put into wholesale operation in the army cantonments a system of mental testing that virtually affords a ((mental survey® of the distribution of intelligence in all the various groups of men composing a modern army. The system includes, beside the regular group tests, special tests for men who do not speak or write English well, and also various supplementary individual tests for the exami¬ nation of men who fail to do well in the regular group tests.

It is clear already that the successful use of mental tests in the army, following the success obtained in educational and correctional institu¬ tions, will contribute much to the spread of the idea that a measurement of mental ability is as important and as feasible (even if not always as precise) as a measurement of physical ability. The idea that applicants for positions in com¬ mercial and industrial organizations — salesmen, clerks, skilled workers, executives — should demonstrate their mental ability by passing suitable mental tests is bound to make rapid headway ; similarly, the idea that in our public schools the most efficient instruction demands the segregation of children into groups of approximately like native ability as well as of approximately like school attainments.

These rapid developments in the use of mental tests will mean the creation of a new profession — that of the consulting or the applied psychologist. We may expect that in the not distant future persons of varying de¬ grees of expertness will proffer their services in applying mental tests to the solution of vari¬ ous educational, sociological, medical, industrial and commercial problems. It will become neces¬ sary for the sake of this new profession of (<human engineering® to warn the public against the charlatans who are already trading on the name of ((psychologist.® In essence, the situa¬ tion would appear to be this : the mere quasi¬ mechanical administering of well-known tests, like the Binet tests, may be entrusted to a person of comparatively meagre professional training; the interpretation of the results of tests demands a fair working knowledge of psychology, a good college training and perhaps a year of special drill in the handling of tests under direction; the devising of tests to meet special needs, the prescription of educational, sociological, peno¬ logical and other treatment for the modification of human behavior demands not merely these qualifications but also a well-rounded and in¬ tensive knowledge of mental life and a system¬ atic knowledge of psychology, in other words, demands the psychologist as well as the f(mental tester.® We may expect that eventually some sort of public if not legal recognition will be given to these different uses of mental tests and to the qualifications necessary for under¬ taking them.

Bibliography. — Binet, Alfred, development of Intelligence in Children) (trans. by E. S. Kite, 1906, Training School, Vineland, N. J., Research Department, Publication 11) ; and (Mentally Defective Children* (trans. bv Drum¬ mond, with appendix containing Binet-Simon

tests 1914); Pinter, R., and Patterson, D. G., (A Scale of Performance Tests* (New York 1916) ; Pyle, W. H., (The Examination of School Chil¬ dren* (New York 1913) ; Stern, W., (The Psv-chological Methods of Testing Intelligence* (Eng. trans., Baltimore 1914) ; Terman, L. M., ˆhe Measurement of Intelligence* (Boston 1916) ; Whipple, G. M., (Manual of Mental and Physical Tests* 2d ed., Baltimore 1914 and 1915) ; Yerkes, R. M., Bridges, J. W., and Hardwick, Rose, (A Point Scale for Measuring Mental Ability* (Baltimore 1915).

Guy M. Whipple,

Author of (Manual of Mental and Physical T ests. *

MENTCHIKOF, or MENSHIKOV, Alex¬ ander Danielovitch, Russian soldier and states¬ man : b. Moscow, 6 Nov. 1672; d. Berezov, Si¬ beria, between November 1729 and February 1730. He was of obscure parentage, but suc¬ ceeded in entering the service of Prince Lefort, the favorite of Peter the Great, later discover¬ ing and thwarting a conspiracy against his patron's life. After serving in the campaign of Azof, he accompanied the Tsar on his trip through Holland and England, and on the death of Lefort became his chief > adviser. He was created field-marshal and prince by Peter, and prince of the German Empire by Leopold I, and during the absences of the Tsar acted as regent. During the campaign of 1706 he de¬ feated the Swedes at Kalish, and in 1709 was largely instrumental in securing the victory over Charles XII at Pultowa. In 1710, as com¬ mander of the Russian forces in the north, he took Riga, occupied Pomerania and Holstein, and conquered Stettin. His arbitrary acts, how¬ ever, finally resulted in, his court-martial by Peter, though the death sentence was com¬ muted to fine. He was one of the principal factors in the accession of Catharine I to the throne (1725-27), and till her death was all-pow¬ erful, and even after Peter II succeeded to the throne he had absolute control of the govern¬ ment. He was about to marry his daughter to the young Tsar when he was suddenly over¬ thrown by Dolgoruki (September 1727) and banished to Siberia.

MENTHACE.®, sometimes known as La-hiatce, a famly of dicotyledonous herbs or shrubs distributed mainly in temperate climates. The species, of which there are more than 3,000 grouped in about 150 genera, are characterized by four-cornered stems ; opposite, exstipulate leaves ; mostly two-lipped flowers generally in whorls, cymes or heads ; and one to four achenes in a persistent calyx. They are noted for their volatile oils, which in many instances are of economic importance either as perfumes or as flavorings. Some species are cultivated for ornament, but probably the best known are those which have been used for centuries for flavoring food, such as sage, thyme, savory, marjoram, mint, balm and basil (qq.v.). The kinds used most frequently in perfumery are probably lavender, rosemary and patchouli. One species, variously known as Chinese or Japanese artichoke, chorogi and knotroot, Stachys sieholdi, yields edible tubers which are eaten raw or cooked in Asia, France, and to a small extent in the United States. Many labiates have at some time been reputed medici¬ nal but are now rarely used except to disguise

the taste of disagreeably flavored drugs. The best-known genera represented in the United States are Nepeta (catnip), Mentha (mint), Origanum (marjoram), Salvia (sage), Thymus (thyme), Marrubium (horehound), Satureia (savory), Lavandula (lavender), Monarda (horsemfnt), Ocimum (basil), Melissa (balm), Scutellaria (skullcap), Lamium (dead nettle), Calamintha (calaminth), T eucrium (german¬ der), and Trichostema (blue curls).

MENTHENE. See Methane.

MENTHOL, peppermint camphor, C10H19OH,

CH2 CHa

or CHa CH CH-CH(CHs)*,

XCHaCHOH/

is the chief solid constituent of the Japanese and Chinese peppermint oil (from Mentha piperita Linne, or Mentha Arvensis) . Ameri¬ can and English oils contain menthol in much smaller quantities, and the menthol obtained from these sources is said to differ from Chinese or Japanese menthol in its crystalline structure.

The commercial product is chiefly obtained from the Japanese oil of peppermint, which sometimes contains from 70 to 90 per cent of menthol. For the extraction of menthol the oil is cooled to a very low temperature, when prismatic crystals separate out. The yield is considerably increased by subjecting the pepper¬ mint oil to fractional distillation and then cool¬ ing the residue. A number of substances are sometimes used to adulterate the commercial product ; among these may be mentioned hydrated magnesium sulphate, paraffin, wax, thymol and various inorganic compounds. The pure substance should possess a sharp melting point and should completely volatilize when heated on a water-bath in an open vessel. Men¬ thol separates in long prismatic crystals. It melts at 43° C., and boils at 212° C. The crys¬ tals possess a strong peppermint odor and a cooling taste. It dissolves readily in alcohol, ether, chloroform, carbon bisulphide, strong acetic acid and in a number of oils. Its solu¬ bility in water is very slight but the water solu¬ tion possesses the odor and taste of the sub¬ stance.

The molecule of menthol contains three asymmetric carbon atoms, and a number of stereo-isomerides are possible ; the commercial product consists mainly of the laevo modifica¬ tion. Menthol exhibits the properties of a saturated secondary alcohol. Careful oxidation with chromium trioxide converts it into the corresponding ketone, menthone. With acids it yields esters. With phosphorus pentachloride it forms menthyl chloride. Heated with phos¬ phoric anhydride or zinc chloride it forms menthene, CioHis. With copper sulphate it yields cymene, and with hydriodic acid, in the presence of phosphorus, it forms hexahydrocymene.

Menthol acts as a mild local anaesthetic. In the form of cones or in solution in various solvents it has been used as a remedy for neuralgic headache, toothache, catarrh of the nose, asthma, diphtheria, diarrhoea, sciatica and tuberculosis of the bone. Sometimes it is also employed as the chief ingredient in atomizers, inhalers, toothpastes, ointments, liniments, and in a number of preparations for internal use.

V. S. Babasinian,

Professor of Chemistry, Lehigh University.

MENTONE, men-td'ne (Fr. Menton, mon-toii), France, a seaport town and health resort on the Mediterranean, in the department of Alpes-Maritimes, near the Italian frontier, and 15 miles northeast of Nice. It is charmingly situated on a promontory about the middle of a bay five miles in circuit, encircled bv abruptly rising hills. The ancient walls of the feudal town are still standing, and there the streets are dark and crooked. The new part of the town, with numerous fine villas, stretches along the base of the hill on which the old part is situated, parallel to the sea. The climate of Mentone is mild and equable ; it is rare that the thermometer descends as low as the freezing point, or rises higher than 86 J F., hence making Mentone a favorite resort for persons in deli¬ cate health. There is a considerable trade in fruit, in flowers and leaves used in the manu¬ facture of perfumes, and in olive-oil. The town of Mentone belonged to the principality of Monaco from 1346 to 1860, but in the latter year was ceded to France. In the vicinity, but on Italian territory, are the grottoes of Baousse Rousse, popularly known as the Caves of Men¬ tone, famous for the valuable evidences of pre¬ historic man that they have yielded. Pop. (of commune) 18,000.

MENTOR, according to Greek legend, the faithful friend of Ulysses, who entrusted to him the care of his domestic affairs during his ab¬ sence in the war against Troy. The education of the young Telemachus fell to his charge, and when the latter set out on his voyage in search of his father Minerva accompanied him under the form of Mentor (Odyssey, ii, 390; iii, 12, etc.), acting the part of a prudent and experi¬ enced counsellor to the young hero. This char¬ acter of a sage adviser is more fully developed in the Telemaque of Fenelon, in which Mentor plays a conspicuous part.

MENZALEH, men-za'le, or MENZALA,

Egypt, a large lake or lagoon (one of several at the Nile delta), extending from Damietta to the Suez Canal, and running parallel with the Mediterranean, from which it is divided by a narrow slip of land, from 2 to 12 miles in breadth. Length of the lake from northwest to southeast, about 50 miles ; average breadth, about 20 miles. It receives the Pelusiac and Tanitic branches of the Nile, and communi¬ cates with the sea by three openings called Dibeh, Gemileh and Om

Farejeh. The lake is of comparatively recent origin, and covers what was a fruitful district of the delta, hav¬ ing formed through neglect of the dams. There is a small town of the same name on the south side of the lake. The Suez Canal cuts into its eastern edge from north to south.

MENZEL, men'zel, Adolf Friedrich Erd¬ mann von, German artist : b. Breslau, 8 Dec. 1815; d. Berlin, 9 Feb. 1905. In 1830 his parents settled in Berlin, where his father had a litho¬ graphic studio, and where the son studied a little in the academy and more by himself. At 18 he published a cycle of lithographs called (An Artist's Wanderings,* which immediately attracted attention ; four years later he had be¬ gun to draw historical scenes from the past of Brandenburg and had commenced painting in oils with Checker-Players* (1836) and (Judg¬ ment (1837). About the same time his work as an illustrator opened up with the 400 pictures

for Kugler's (Frederick the Great' (1840), in which Menzel showed himself original, dramatic and historically correct. This vein he followed out in his 200 illustrations for the <Works> of Frederick the Great, and in 600 more accom¬ panying a work on the army of Frederick the Great (1856) ; as well in his oil paintings, a dozen or more, of various scenes in Frederick's life. A trip to Paris in 1867, so the French critics claim, worked a change in Menzel's methods, so that he applied himself more to problems of light and shade. After 1890 he used color less and less and in his pencil draw¬ ing broke away from mere line to the use of a cloudy treatment. He was one of the greatest of German artists of his dav; and in 1899 he received the Order of the Black Eagle, con¬ ferring hereditary nobility. Apart from his historical pictures, mention should be made of the (Modern Cyclops' (1875), the interior of a Silesian rolling mill, with excellent lights, and of social satires like (Carnival Morning' (1885). Consult Jordan, (Das Werk Adolf Menzels' (1895); and lives by Sondermann (1895), and Knackfuss (1897) ; Singer, draw¬ ings of Adolf von Menzel' (London 1908).

MENZEL, Wolfgang, German author: b. Waldenburg, Silesia, 21 June 1798; d. Stuttgart, 23 April 1873. He studied at Jena and Bonn, became a follower of F. L. Jahn and the Turne-rei, and was for four years schoolmaster at Aarau in Switzerland. In 1825 he returned to Germany, having already made himself known to the literary world by his (Elastic Verses' (1823). He edited and contributed to maga¬ zines, and wrote a very great number of works, poems, romances, histories, criticisms, political polemics and Christian theology. From 1826 to 1848, and again later, he was editor of the Litteraturblatt in Stuttgart. His chief writings include histories of Germany (1825), German literature (1827), German poetry (1858) Europe (1853-57), and the world (Universal History' 1862-72). He also produced a work of mytho¬ logical research (1842), a book on the pre-Christian doctrine of immortality (1869), and autobiographical memoirs (1876). He was often involved in controversy, assailing with equal zeal theological rationalists and political radicals. His attacks upon Goethe and other authors were fully equaled for virulence by the criticisms upon Menzel himself, made by Heine and some of the younger German writers.

MEQUINEZ, or MEKINEZ, Africa, a town of Morocco, 40 miles southwest of Fez. It is one of the capitals and the sultan main¬ tains there a palace. There is a historic mosque and many other fine buildings, ecnecially those of the 18th century, when the town was the preferred residence of Sultan Muley Ismail. There is an ancient city wall with nine gates. There are tanneries and potteries. Pop. 30,380.

MEPHISTOPHELE.S, mef-is-tof'e-lez, a name for the devil, which has been made popular by Goethe's (Faust.' He was also a chief character in Marlowe's (Dr. Faustus.' Goethe derived it from an old popular legend, in which it is spelled Mephistophiles or Mephis-tophilis. The etymologies of the word are as various as the* spelling. Some suppose it to be an irregularly formed Greek compound from the negative me; phos, light; and philos, loving, thus signifying ((not loving the light." Others

surmise that it may be derived from the Latin mephitis and the Greek philos, in which case it will signify literally Hoving the mephitic vapors of hell." The Mephistopheles of Goethe has little in common with the devil of the popular imagination. He appears, especially in the original form of the drama of Faust, as a real man of flesh and blood, who only preserves those traits of the popular devil of the Middle Ages which are compatible with a true human individuality — as ithe companion of Faust, as a selfish and malevolent votary of

pleasure, al¬ ways looking to the real, and bringing back Faust by cold and heartless irony, from barren speculation to the enjoyment of the present life.

MER DE GLACE, mar de glas, France, an Alpine glacier on the northern slope of Mont Blanc, with an area of 16 square miles and an extreme length of about nine miles. It is formed by the confluence of three branches called the Glacier du Geant, the Glacier du Lechaud and the Glacier du Talefre and is noted for its beautiful scenery. It ends as the Glacier des Bois whence flows the Arveyron River, in the valley of Chamouni. From the village of Chamouni the Mer de Glace is easiest visited and Mont Blanc ascended. The glacier has an average flow of two feet a day during summer and autumn.

MERAMEC SPRING, an unusually large spring in Phelps County, Mo., about seven miles south of Saint James. The water flows as an underground stream in limestone and emerges as a great spring with a flow averaging 125 cubic feet per second.

MERAN, ma-ran', Italy, a celebrated health resort in Tyrol, charmingly situated on the river Passer, near its entrance into the Adige, at the foot of a hill called the Iviichel-berg. It is the chief town of a small district of the same name. It consists of an old and a new town, the latter with handsome villas and hotels, and numerous fine residences and old castles in the neighborhood. The old town is mainly on the Laubengasse, which is a long, narrow, winding street. The Polish church and other buildings date from the 14th and 15th centuries. It is believed to have been settled originally in the 9th century. Lying in a sheltered situation on the southern slone of the Alps, it possesses a mild and equable climate, and is much frequented in winter by invalids with pulmonary affections. Permanent popula¬ tion 11,570.

MERCADANTE, Saverio, sa-va're-5 mer-ka-dan'ta, Italian composer: b. Albamura, 26 June 1797; d. Naples, 17 Dec. 1870. He studied music at the college of S. Sebastiano in Naples under Zingarelli. From flute and violin he turned to vocal music; won great success with a cantata (L'Unione delle Belle Arti' in 1818, and with an opera (L'Apoteosi d'Ercole' in 1819; was made dhapel-master of the Novara Cathedral (1833) and director of the Naples Conservatory (1840) ; and in 1862 became totally blind. He wrote many masses and other ecclesiastical music, such as (The Seven Last Words' ; but is best known for his operas, of which the following, out of a total of 50, should be mentioned: (Elisa e Claudio,' (I1 Bravo,' HI Giuramento,' H Briganti,' and (Le due illustri Rivasli.'

MERCANTILE AGENCY, a business enterprise, usually an incorporated company, whidh agrees to furnish subscribers who pay a yearly fee, with information as to the business responsibility, financial standing and credit rat¬ ing of business houses, whether conducted by private individuals, firms or corporations. They also sometimes have a department for the col¬ lection of debts, and sometimes they sell two or three different _ services, at different prices. The business originated in the United States in 1837, following a financial panic, it being recognized that it was necessary for business houses to obtain better information in the giving of credits. Lewis Tappan was the founder of the first mercantile agency in New York City. The most conspicuous concerns now in the business are R. G. Dun and Com¬ pany and the Bradstreet Company of New York; a good rating by either is highly prized by merchants. They issue large books, usually once a year, and loan them ito subscribers for their own use; in these books appear lists of addresses and the kind of business, followed by letters or signs indicating their financial responsibility, their promptness in paying bills, *etc.* Subscribers are also entitled to send in for special reports, giving more detailed or later information. The agencies obtain their information — (1) direct from the parties in question, sending a representative to interview them, and asking for a statement, but in no case indicating who wants to know their stand¬ ing; (2) by inquiry of the concerns from whom the party buys goods; (3) by exchange of in¬ formation between other agencies or people likely to know their reputation. Concerns that are noted in the agency books as prompt pay, or as being worth $5,000 or more, are usually spoken of as Waited® houses. The highest rat¬ ing is usually worth $1,000,000 or more, and prompt pay.

In addition to agencies doing a general confidential reporting business on all classes of business houses all over the country, there are others that confine themselves to a particular in¬ dustry, as Typo, which reports on the houses engaged in printing, publishing and allied in¬ dustries. The laws recognize that such ex¬ change of information is legitimate, and es¬ sential to the conduct of business on a credit basis,

and an action for libel in sending out a bad report will not hold against an agency that conducts its business in a fair manner. How¬ ever, the reports have to be made confidential ; if promiscuously circulated, they might become libelous. For it unquestionably happens that at times ‘the agencies report concerns as hav¬ ing less money and less standing than they are entitled to, and they can make mistakes. But as long as they try to be fair, and send out their reports under the seal of confidence, the law protects them. Abuse of the system, to revenge, spite or for blackmail, is practically unknown. The agencies are more apt to err in the matter of continuing to rate concerns, too high when their financial standing is impaired. When large concerns have failed it has fre¬ quently happened that the mercantile agencies had continued to report them in good standing up to the last. Therefore the credit men of the large houses do not pin their faith entirely to commercial ratings, but use other means where¬ with to know the truth. In the very large cities

there are credit men’s associations, where they confer as to ways and means of keeping credits safe. While there is opportunity for better and more accurate reporting-as to credits, it is true that the mercantile agencies of America handle their business extremely well, and con¬ stitute one of the most important links in the artificial chain between the industries of the nation. Consult Errant, (The Law Relating to Mercantile Agencies) (1889); Reinhard, (A Treatise on the Law of Agency* (1902).

MERCANTILE LAW. See Law, Mer¬

cantile.

MERCANTILISM. See Economics.

MERCANTINI, Luigi, Italian poet: b. Ripatransone, in the Marches, 20 Sept. 1821 ; d. Palermo, 18 Nov. 1872. Against his inclina¬ tions he was intended by his father for the priesthood, but he deserted that vocation before taking orders and turned to school teaching. For a time he was professor of Italian and Latin literatures in Sinigaglia. He wrote a number of patriotic songs, including H tre Colori,® but gained his greatest popularity by the song which is now the Italian national anthem or <(Inno di Garibaldi.® See Garibaldi Hymn.

MERCAPTANS (Latin, <(taking up mer¬ cury®) or THIO-ALCOHOLS, in chemistry, a large class of substances having the same constitution

as the alcohols, but differing from them by having the oxygen atom in the hy¬ droxyl replaced by sulphur. They are oily liquids or crystalline solids having an offensive, garlic-like odor, and are all insoluble in water. They possess acid tendencies that are more marked than those of the alcohols, and com¬ bine with metallic oxides to form salts which are known as ((mercaptides.® They combine with especial facility with mercuric oxide and take their name from this circumstance. Ethyl mercaptan is the best-known members of the series, and it is this substance that is under¬ stood when <(mercaptan® is spoken of, without further qualification. Ethyl mercaptan, C2H5.SH, is prepared by acting upon ethyl chloride, C2H6CL, with potassium hydrosulphide, HKS ; the potassium atom and the ethyl radi¬ cal changing places as indicated by the equa¬ tion C2H5CI + HKS = C2H5SH + KC1. Ethyl mercaptan is a colorless, mobile liquid, boiling at 99° F. It is very inflammable, burning with a blue flame, and it mixes readily with alcohol and ether, though only to a very slight extent with water. Like the other mercaptans, it forms salts with the oxides of the metals, the hydrogen atom that is asspciated with the sul¬ phur being the one that is replaced by the metal. The mercury salt, Hg(S. C2H1O2, may be prepared very readily by agitating the mer¬ captan (or its alcoholic solution) with red oxide of mercury, HgO. Its formation is at¬ tended by the liberation of considerable quan¬ tities of heat, and the mercaptide itself is ob¬ tained in the form of soapy white scales. All of the metallic mercaptides are decomposed by hydrochloric acid. The mercaptans of fatty radicals all give a fine green color when treated with a solution of isatin in strong sul¬ phuric acid and this reaction (as well as their insufferable smell) is used as a test for their presence.

MERCATOR, mer-ka’tor, Gerardus (Lat¬ inized form of Gerhard Kremer), Flemish mathematician and geographer : b. Rupelmonde, Flanders, 5 March 1512; d. Duisburg, 2 Dec. 1594. He studied at Louvain, and became a lecturer on geography and astronomy, making his instruments with his own hands. In 1544 he was arrested for heresy, being liberal in his views. He escaped, but 42 of those arrested

with him were burnt alive. Recommended to Charles V, Mercator entered into the emper¬ or's service, and executed for him a celestial globe of crystal, and a terrestrial globe of wood. In 1559 he retired to Duisburg and re¬ ceived the title of cosmographer to the Duke of Juliers. His last years were devoted to theological studies. He is known as the in¬ ventor of a method of projection called by his name, in which meridians and parallels of lati¬ tude cut each other at right angles, and are both represented by straight lines, which has the effect of enlarging the degrees of latitude as they recede from the equator. The method is convenient in mapping small areas. His first maps on this projection were published in 1569; the principles were first explained by Edward Wright, in 1599, in his Corrections of Errors in Navigation,* whence the discovery has sometimes been attributed to him. His tabu¬ lae Geographies* (1578) is the best edition of the maps of Ptolemy. See Map.

MERCATOR'S CHART, or PROJEC¬ TION. See Chart.

MERCED, Cal., city and county-seat of Merced County, on the Atchison, Topeka and Santa Fe, the Southern Pacific and the Yosemite Valley railroads, 150 miles southeast of San Francisco. It lies in the valley of the Joaquin and Merced rivers, has a library, sani¬ tarium, county hospital and courthouse. It has extensive farming, dairying, fruit growing and livestock interests. Pop. 3,974.

MERCEDES, mer-sa'das, Argentina, town in the province of Buenos Aires, on the Pacific Railroad, about 50 miles west of the city of Buenos Aires. In 1779 it was founded as a military station. An Irish colony settled here about 1800. Mercedes is in a region where the chief occupation is raising sheep and cattle. It has several manufacturing establishments, among which are flour-mills, soap factories and cattleyards. The shipments are principally wool, hides and flour. The town has a public library and a college. Pop. about 22,782.

MERCEDES, Uruguay, a town in the dis¬ trict of Soriano, on the Rio Negro, about 10 miles from where it empties into La Plata, and about 75 miles north of Buenos Aires. Pop.

15,667.

MERCENARIES, or STIPENDIARIES,

foreigners or others who received pay. for their services as soldiers,

especially as distinguished from government soldiers or those owing mili¬ tary service to the crown or nation. Hired professional soldiers appear, very early in the fiistory of military organization. Foreign mer¬ cenaries appear in the armies of Alexander the Great and the Romans. They were common in all armies, but generally engaged for a single campaign only. In England, Harold had a body of Danes in his army when he defeated the Norwegian king — the hus-carls, a body originally established by Canute. William III

had for some time a body of Dutch troops in his pay after he became king of England; and throughout the 18th century Hessian and Hano¬ verian regiments were constantly in the pay of the British government for temporary purposes. Hessians fought for Great Britain in the Revo¬ lutionary War; and the landgrave of Hesse, who sold his troops at so much a head, received upward of $2,500,000 for Hessian soldiers lost in ‘that struggle. Americans have fought as hired soldiers in China, South Africa and in nearly all the countries of Central and South America. They are generally known as ((soldiers of fortune.® Most of the officerˆ in the regular Chinese army are either Englishmen or Americans. But most famous of all mercena¬ ries were the Swiss soldiers, who were hired, sometimes by the cantons themselves, over all Europe, and formed many famous body guards. They were long employed by the French monarchs; and the Vatican at Rome still has its Swiss guards.

MERCER, mer’ser, Henry Chapman,

American anthropologist : b. Doylestown, Pa., 24 June 1856. He was graduated from Harvard in 1879; was curator from 1894 to 1897 of American and prehistoric archaeology at the University of Pennsylvania; honorary member of the United States Archaeological Commis¬ sion, Madrid, 1893. He was editor for anthro¬ pology in American Naturalist, 1893 to 1897; made extensive investigations and studies in anthropology in America, discovering several unknown extinct species, and 1897 to 1917, made and presented to the Historical Society of Bucks County, Pa., an extensive collection of objects illustrating the Colonial and early history of the United States by means of the implements and handiwork of the pioneer set¬ tlers. In 1916 he built and presented to the society a fireproof museum for preserving the above collection. He established a pottery at Doylestown, Pa., in 1898, experimented upon and developed the processes of the Pennsyl¬ vania Germans for making and decorating pot¬ tery, inventing in 1899 a new method of manu¬ facturing tiles

for mural decoration and in 1902 a new process for making mosaics ; was awarded the Grand Prize, Saint Louis Exposi¬ tion, 1904, and bronze medal for archaeological work, Madrid, 1893; also bronze medal for tile work, Massachusetts Society of Arts and Crafts. He is a Fellow American Association for the Advancement of Science and member of the American Philosophical Society, the Academy of Natural Sciences of Philadelphia, the Numismatic and Antiquarian Society of Philadelphia, Geographical Society of Philadel¬ phia. He has published Renape Stone) (1885); (Hill Caves of Yucatan* (1896);

Researches upon the Antiquity of Man in the Delaware Valley and Eastern United States) (1897); (Tools of the Nation Maker-‘ (1897); (The Bible in Iron or the Pictured Stoves and Stoveplates of the Colonial United States)

(1915).

MERCER, Hugh, American general : b. Aberdeen, Scotland, about 1720; d. near Prince¬ ton, N. J., 12 Jan. 1777. Educated as a physi¬ cian, he served as surgeon’s assistant in the army of the Young Pretender at the battle of Culloden. Emigrating in 1747 to America, he settled in Virginia, and resided there, in the

practice of his profession, until 1755, when he volunteered in the expedition led by Braddock to Fort Duquesne. At the outbreak of the Revolution he promptly joined the Continental army, and obtained the rank of brigadier-gen¬ eral. He subsequently accompanied Washing¬ ton on his retreat through New Jersey, and rendered valuable assistance at the battle of Trenton. In the succeeding action at Princeton he was mortally wounded and died a week later. Mercer County, N. J., was named in his honor.

MERCER UNIVERSITY, Macon, Ga., is an institution having its genesis at a meeting of the Baptist Associations of Georgia, at Powelton, 27

June 1822, held to discuss, , among other matters, the question of ministerial edu¬ cation. In 1827. at a similar meeting, held in Washington, Ga., the project was further dis¬ cussed, and in 1829 Josiah Penfield, of Savan¬ nah, bequeathed $2,500 as a fund for education,

. on condition that the Baptists should raise an equal amount. This was promptly done, and two years later it was resolved to establish ((a Classical and Theological School … open

only for those preparing for the ministry.® It was soon seen, however, that the school could not be so restricted, and in 1832 this bar was removed. Mercer Institute was established on a site of 450 acres, at Penfield, in January 1833, with 39 students— “Penfield® in memory of Josiah Penfield, and “Mercer,® after Dr. Jesse Mercer, early conceiver and patron of the school. In 1837 a charter was obtained giving the institution collegiate rank and chang¬ ing its name to ((Mercer University.® There¬ after it grew steadily. The successive presi¬ dents were B. M. Sanders; Otis Smith; John L. Dagg; N. M. Crawford; H. H. Tucker; A. J. Battle; G. A. Nunnally: J. B. Gambrell and P. D. Pollock. President P. D. Pollock was a most efficient president for seven years, and after a lingering illness died in office. Follow¬ ing him, Prof. Charles Lee Smith, of Missouri, was elected president, served one year and then resigned. Following him, Dr. S. Y. Jameson, of Georgia, was elected president and served efficiently for seven years, resigning June 1913. Prof. J. F. Sellers of the department of chem¬ istry of Mercer University was appointed acting president for one year. June 1914 the board of trustees elected Dr. W. L. Pickard president.

The registration of Mercer University is now over 400; the departments are col¬ lege of arts and sciences, law, pharmacy, edu¬ cation and a pre-medical course. The uni¬ versity gives the degrees of bachelor of sci¬ ence, bachelor of arts, master of arts, bachelor of law, pharmaceutical chemist and graduate of pharmacy, accredited certificates in educa¬ tion, receives and gives credit on the premedi¬ cal course for a medical degree, and a B.S. degree. The university has the same require¬ ments for entrance and graduation as all the State universities of the South. The campus has in it about 60 acres and nine large build¬ ings, besides a number of cottages. The work¬ ing plant is valued at $250,000, and the endow¬ ment in round numbers is about one million dol¬ lars. The work done in Mercer University is fully accredited at such institutions as the Uni¬ versity of Michigan, Columbia University, New York, and leading institutions in America and

Europe. It is justly regarded as one of the most potent factors in the educational life of Georgia and the South, and is increasing in the number of students and material equipment from year to year. The faculty in 1918 num¬ bered 23.

MERCERIZING AND MERCERIZED COTTON. — A process invented by John Mer¬ cer, of Lancashire, England, for treating cot¬ ton fibre or fabrics. The system was first patented in 1851. The process consists of steeping the cloth in a solution of caustic alkali. The cloth shrinks about one-fourth and takes more brilliant colors in dyeing than unmercer¬ ized cotton goods. Cotton may be mercerized either in the yarn or in the cloth, and a variety of machines are made for this purpose. Some of these machines operating on the cloth em¬ ploy a tension to obviate same after shrinkage. This gives a greater yardage, but it reduces the gloss. The name has sometimes been incor¬ rectly extended to sizing of cloth to give it a better sheen. True mercerizing gives a lustre to the cotton cloth, because the fibres are drawn closer and flattened, presenting a smooth sur¬ face that reflects the light. A variation in the caustic soda process is employed to give the modern crimped or crepe effects. Consult Murphy, (The Textile lndvstnes5 (London

1912).

MERCERSBURG, mer'se. /-berg, Pa., bor¬ ough, in Franklin County; at Lhe terminus cf a branch of the Cumberland V alley Railroad, about 70 miles southwest of Harrisburg. It was settled in 1730 and was originally called Black Town. It was incorporated in 1831. The borough was enlarged in 1901. It is in a farming section of the county, but has some coal and iron interests. It was formerly noted for its educational institutions, which were under the auspices of the German Reformed Church in America. It is the seat of the Mercersburg Academy, and was the home of James Buchanan (q.v.). Pop. (1920) 1.663.

MERCERSBURG THEOLOGY, a school of religious philosophy founded by F. A. Rauch of the German Reformed Church in 1836, his work being taken up by John W. Nevin (q.v.) and Philip Schaff (q.v.). The name comes from the Mercersburg (Pa.) Theological Semi¬ nary of the German Reformed Church, whence the teaching of this system spread. The Mer¬ cersburg theology urged that the Church was not a

voluntary society of believers but a his¬ toric and spiritual growth — an attitude show¬ ing markedly less hostility to the Roman Cath¬ olic Church; that old confessions cannot ex¬ press the modern faith of the Church ; that the sacraments are more than symbols ; that church worship should be orderly — hence the lit¬ urgy5 (1858) and <Order of Worship5 (1866) ; and that religious education is of prime im¬ portance. The Mercersburg movement infused new life into the German Reformed Church. Consult Appel, (Life of John Williamson Nevin > (1889).

MERCHANT, Francis Walter, Canadian educator: b. Oil Springs, Ontario, 1855. He received his education at Toronto University; taught for many years in high schools and col¬ legiate institutes. In 1900-08 he was principal

of the London (Ontario) Normal School; from 1908 to 1911 was chief inspector of schools in Ontario and in 1911 became director of in¬ dustrial and technical education in the province of Ontario. He is a senator of Knox College, Toronto.

MERCHANT MARINE OF THE UNITED STATES. The merchant marine of the United States — that is to say, the ship¬ ping on ocean, lake and river engaged in the carrying of merchandise, mail and passengers — is the second largest shipping in the world, only the fleet of Great Britain exceeding it. By far the larger part of this American ship¬ ping has long been employed in domestic navi¬ gation between one American port and another. But the shipping registered for foreign com¬ merce, which after a splendid growth began to decline before the Civil War, began again to increase in 1914 with the Great War in Europe.

America throughout most of its history has been distinctively an adventurous and success¬ ful maritime country. For many years after the founding of Jamestown and Plymouth the construction of ships for coastwise and over¬ seas trade was the chief manufacturing indus¬ try pursued upon this continent. There was an abundance of stout

timber near the water's edge, and the pioneers brought a love of the sea from Great Britain, Sweden and Holland.

Maritime spirit, stirred by necessity, was es¬ pecially active in the northern colonies. Lord Bellamont, colonial governor, declared in 1698: ((I believe I may venture to say there are more good vessels belonging to the town of Boston than to all Scotland and Ireland, unless one should reckon the small craft, such as herring boats.® In the colonial era the sea was the easiest highway connecting the long range of settlements that clung to the Atlantic Coast. Small craft — ketches and schooners — ran along shore and to the West Indies, and brigs and ships to the British Isles, France, Spain, Portugal and the Mediterranean. Colonial shipyards made swift improvement in rigs and models, and found a market for their craft abroad. Out of 1,332 vessels built in Massa¬ chusetts between 1674 and 1714, 239 were sold for British or foreign registry. In 1724 Thames builders complained that their trade was being destroyed by the emigration of their best mechanics to America.

Shipbuilding and navigation were the most energetic and profitable of vocations, and were particularly encouraged by colonial govern¬ ments. Bounties were granted for the con¬ struction of ships, and shipwrights were ex¬ empted from compulsory military service. To spirited youth the sea made irresistible appeal. Sir Joshua Child, chairman of the British East India Company, in his discourse on trade lamented that there were ((none so apt as the North American colonies for the building of ships ; nor none comparably so qualified for the breeding of seamen, not only by reason of the natural industry of the people, but principally by reason of their cod and mackerel fisheries, and in my opinion there is nothing more prej¬ udicial and in prospect more dangerous to any mother kingdom than the increase of shipping in her colonies, plantations, or provinces.®

In response, the British Parliament pro¬

hibited the importation of Continental products into the colonies except in English-built ships, and even sought to destroy the colonial trade with the West Indies. The colonists retaliated by forming associations to boycott British manufactures. Against such resistance the re¬ pressive British laws failed, and the merchant ships and sailors of America so steadily in¬ creased that at the outbreak of the Revolution there were more people in northern New Eng¬ land engaged in shipbuilding and navigation than there were in

agriculture.

These merchant ships and sailors proved a powerful resource in the war for independence. The Continental navy as a whole was weak and unsuccessful. In 1781, the seventh year of the war, there survived only nine Continental cruisers carrying 164 guns, while American privateers, converted from merchant ships and owned and managed by merchants, numbered 449, carrying 6,735 guns. These private-armed ships, with merchant officers and crews, in the course of the Revolution seized or destroyed three times as many British vessels as did the regular Continental sloops and frigates. And in the year 1777, when the battles of Bennington and Saratoga were fought, the American merchant seamen afloat in private-anned ships nearly equalled the strength of the army under the immediate command of Washington. These swarming American privateers cruised not only in mid-Atlantic but in the British Channel, the Irish Sea and all around the coasts of the United Kingdom. Their harrying of British commerce brought a stream of arms and sup¬ plies to the Continental government and did more than Paul Jones' victories in the Ranger and the Bon Homme Richard to impress the governments of France and Holland with the vigor and audacity of the American people and the probable success of the American cause.

From dread of the maritime strength of the new republic the British government made war on the American merchant marine as soon as the Revolution itself had ended. An Order in Council barred American ships from the British West Indies, and forbade the importation into the United Kingdom of all but a few products if conveyed in American vessels — it being in¬ sisted further that these American vessels should bring only the products of the particular States in which they belonged. British ship¬ owners were forbidden to purchase American-built vessels, which in 1775 were supposed to constitute one-third of the British mercantile marine. <(The ministry,® it was declared, <(suppose they have now put a finishing stroke to the building and increase of American ves¬ sels.® Lord Sheffield argued that the Barbary pirates of North Africa, preying on defenseless American merchant craft, were really a blessing to Great Britain, and London merchants told Franklin that ((if there were no Algiers it would be worth England's while to build one.®

Until the new Federal government was es¬ tablished in 1789, British shipowners dominated American ocean commerce. Our merchant shipping registered for foreign voyages amounted to only 123,893 tons in this year 1789, and 76 per cent of our own imports were con¬ veyed beneath foreign colors.

Striking Early Growth of American Ton¬ nage. — Washington and his colleagues felt that this condition was perilous and intolerable, and

Adams, Jefferson and Madison prevailed upon the first Congress under the new Constitution to embody in its very first act, passed on 4 July 1789, <(for the support of the government, the discharge of the debts of the United States and the encouragement and protection of manu¬ factures,)} an important clause allowing a dis¬ count of 10 per cent of the tariff duties on all goods imported in ships built and owned by American citizens. Further and heavier re¬ bates were allowed on teas imported direct from the East Indies in American vessels — for the purpose of encouraging an American East India fleet — and, moreover, a sharp pref¬ erence in tonnage duties was granted to all American vessels, which practically barred foreign vessels from the coastwise carrying trade.

Five years later, in 1794, the discount of 10 per cent of the tariff duties on goods imported in American vessels was changed to an addition of 10 per cent to the duties on goods imported in foreign vessels. For many years thereafter this powerful government preference for Amer¬ ican shipping remained the distinctive national policy of the United States. This was justified not only by commercial considerations but by patriotic regard for the national defense. Jef¬ ferson, as Secretary of State, wrote in 1794: <(To force shipbuilding is to establish ship¬ yards; is to form magazines; to multiply use¬ ful hands ; to produce artists and workmen of every kind who may be found at once for the peaceful speculations of commerce and for the terrible wants of war.®

What followed this vigorous maritime pro¬ tectionism of the fathers of the republic was a growth of American shipping well described by a historian of the period as ((without parallel in the history of the commercial world.® American merchant tonnage registered for overseas voyages rapidly advanced from 123,- 893 in 1789 to 411,438 in 1792, and to 667,107 in 1800, while the proportion of American im¬ ports and exports conveyed in American vessels rose from 23.6

per cent in 1789 to 76.4 per cent in 1792 and to 89 per cent in 1800.

The Napoleonic wars had a double effect upon American shipping. In the first place, these wars gave a great opportunity to Amer¬ ica, the chief of neutral carriers. But, on the other hand, and offsetting this advantage, both the British and the French governments began an unscrupulous war of seizure and spoliation on American ships wherever bound, while Great Britain ruthlessly impressed American seamen, native and naturalized, into her naval service. Yet American shipping, in spite of all difficulty and danger, grew and prospered until in 1810 the fleet registered for foreign com¬ merce amounted to 981,019 tons, conveying 91.5 per cent of our imports and exports. New York, Philadelphia, Boston and Salem were sending ships to the East Indies. In 1789-90 the Columbia made her famous voyage to the Northwest coast and the Orient — the first American merchantman to circumnavigate the globe.

When, tardily, in 1812 the American govern¬ ment declared war on Great Britain, principally to revenge the wrongs of our sailor-citizens, the merchant ships and seamen proved again a tremendously effective weapon, as they had in the first war for independence. The United

States navy in the War of 1812 comprised on the ocean only 23 vessels of all classes, mount¬ ing 556 guns. These 23 men-of-war captured 254 naval and merchant craft of the enemy. But American merchantmen armed and con¬ verted into privateers in 1812-15 numbered 517, mounting 2,893 guns. These privateers, with their merchant crews, took 1,300 prizes, valued with their freights at nearly $40,000,000, or five times the number of the prizes of our regular ships-of-war. Again Yankee shipowners and sailors carried the conflict right to the coasts of the United Kingdom, and attacked rich con¬ voys wherever they could be found. The mer¬ chants of Glasgow in September 1814 pro¬ tested to the Admiralty that ((a horde of Ameri¬ can cruisers should be allowed, unresisted and unmolested, to take, burn or sink our own ves¬ sels in our own inlets and almost in sight of our own harbors.® It was the exploits of the privateers chiefly, and not the loss of a dozen frigates and sloops in single-ship duels, that quickly made the British mercantile community thoroughly weary of this second war with the Americans.

British diplomacy at the close of the War of 1812 proved more successful than British armed strength. In a commercial convention framed after the Treaty of Ghent, the United States was persuaded to

embark upon a plan of mis¬ called reciprocity in which both governments bound themselves to grant no more preference to their own ships in the direct trade between American ports and the United Kingdom. At the same time, however, the British government craftily reserved to itself the West India trade and barred American ships out of all but direct trade with British East India possessions. This costly defeat of American diplomacy was sharply resisted by national lawmakers, but the plea prevailed that the terms of the convention really bound the United States and must be con¬ firmed by Congress. Immediatelv there came a decline in the American merchant marine, and an increase in British maritime prosperity. Con¬ ditions were nominally equal but actually unequal, for British vessels could make tri¬ angular voyages to the United States, to the West Indies and back to Europe, while A.merican ships could not. American tonnage suffered further by the conclusion of so-called reciproc¬ ity agreements with other maritime states of Europe, whose participation in our own carry¬ ing trade greatly increased, and whose vessels, it was discovered, could be operated at a lower cost because of the lower range of European wages.

But American shipowners did not abandon the uneven struggle. When they lost trade in the north Atlantic they turned to the North¬ west coast, to the East Indies and to the mid-Pacific archipelagoes. They built larger and swifter ships which could make three voyages while dull Europeans were making two. Amer¬ ican registered shipping, which had fallen since the War of 1812 to 581,230 tons in 1819, rose steadily to 701,517 tons in 1827. In that year the London Times said:

“It is not our habit to sound the tocsin on tight occasions, but we conceive it to be impossible to view the existing state of things in this country without more than apprehension and alarm. Twelve years of peace, and what is the situation of Great Britain? The shipping interest, the cradle of our navy, is half ruined. Our commercial monopoly exists no longer; and thousands of our manufacturers are starving, or seeking

redemption in distant lands. We have closed the WTestern Indies against America from feelings of commercial rivalry. Its active seamen have already engrossed an important branch pf our carrying trade to the Eastern Indies. Her starred flag is now conspicuous on every sea, and will soon defy our thunder."

Of this era Prof. J. R. Soley, the historian, has written :

"In every respect we may say that this period (1820-28) represents the most flourishing condition of shipping in Ameri¬ can history. Although since that time commerce has increased twelve-fold, and although in the year preceding the Civil War our registered tonnage was three times as large, yet we have. never since 1830 reached the position in respect to the carrying trade to and from American ports that was maintained during this decade, but, on the contrary, have receded from it further and further."

Success had made our national lawmakers too confident, for in 1828 Congress took another step in miscalled reciprocity by offering to abandon the preferential duty system, under which American shipping had grown so wonderfully, if competing foreign nations would do the same. This change resulted un¬ fortunately, American registered tonnage fall¬ ing off from 757,998 in 1828 to 537,563 in 1830. Inland States, or those having no large owner¬ ship of ocean carriers, had now come to dominate the policy of the American govern¬ ment. British vessels, of which in 1830 only 78,947 tons had entered the United States, now rapidly increased to an average of 212,661 tons. While in the decade 1830 to 1840 American tonnage gained but 40 per cent in all the ports of the world, British tonnage in American ports increased nearly 300 per cent. In 1840 the proportion of American imports carried in American vessels had fallen to 82.9 per cent. Yet ship for ship American wooden vessels were still preeminent. Says the British histo¬ rian, Grantham :

" Previous to the development of steamships, the pre¬ ponderance of shipping was falling rapidly into the hands of American shipowners. Thirty years ago one of the great objects of interest at the docks in Liverpool was the American sailing packet, and it was considered that a stranger had missed one of the lions of the port who had not visited these celebrated ships. The same prestige was felt everywhere: on the Atlantic and Pacific oceans, in India, China, and in all the best trades American ships were most in demand."

Errors of national policy in the too early reduction and abandonment of the preferential or protective policy of Washington, Adams,

Jefferson and Madison had hurt American shipping and checked its normal growth. But, on the other hand, the blunders of the law¬ makers had been to a great extent retrieved by the persevering and progressive spirit of the shipbuilders, shipowners and seamen of the United States.

Steamers, Packets and Clippers. — Steam shipbuilding and navigation were first made practicable in America. The Clermont of Rob¬ ert Fulton in 1807 was the first successful steam-driven craft. The Savannah in 1819 had made the first steam transatlantic passage. In 1823, when the steam merchant fleet of the United States was first enumerated, it had a total tonnage of 24,879 — engaged almost en¬ tirely in coast and river voyages. By 1833 our steam fleet had advanced to 101,306 tons, and by 1840 to 198,184 tons, of which only 4,155 tons were registered for foreign commerce. Moreover, American shipbuilders, contrary to frequent assertions, were quick to recognize the value of iron, and the first iron seagoing steamer, the Bangor, was built at Wilmington,

Del., in 1844. Nevertheless, with all this spirit of energy and progress, American shipping faltered when it ceased to receive some degree of preference from its own government. Our shipping, still nearly all wood-built and sail, registered for foreign commerce stood at a tonnage of 904,476 in 1845 — a handsome total but less than the 981,019 tons of 1810. The growth of our merchant shipping had fallen behind the growth of population. In 1810 the United States had owned 13.43 cubic feet of registered tonnage per capita. In 1845 it owned only 4.54 cubic feet per capita.

In 1840 British steamships launched and driven by subsidies — a subject considered else¬ where — had appeared on the route between America and Europe, and also in British trade with the West Indies, South America and the East Indies. Up to that time the transatlantic fast freight, passenger and mail service had been dominated by the American flag. Nearly all of the lines of sail packets were of United States ownership and construction. The Black Ball line, the Swallowtail line, the Dramatic line, the Red Star line, the Williams and Guion line and others employed vessels comparable in size with the East Indiamen of Great Britain and far superior in speed and handiness. These packets should be carefully distinguished from the clippers which came afterward. Packets were swift but capacious vessels, large carriers for their tonnage, with accommodations in the cabin for first-class and between decks for steerage passengers. They

were strongly built of wood, many in New York yards along the East River and others on the Delaware and in New England. Their passenger traffic was carefully regulated by Federal laws. The packets carried the higher cost freight, and their rates were above those of ordinary mer¬ chantmen. But they were profitable ships be¬ cause of the swiftness and regularity of their voyages, the best of which were from 14 to 20 days from New York to Liverpool. The packet era began in the early years of the last century and practically ended by 1860, when steam became supreme — though a few sail packet ships remained in transatlantic passen¬ ger and freight service long afterward.

The first real clipper ships of a sharper model, loftier spars and relatively less freight space appeared in 1843, the result of an inten¬ sifying rivalry of steam and canvas. Some of these clippers were employed on the New York packet lines, but most of them were engaged in the long-voyage trade to China and India, and particularly in the Argonaut trade to California. It was the California trade pre¬ eminently that created the greatest and most famous of American clipper ships from 1850 onward. For this trade the Sovereign of the Seas , the Flying Cloud and other stately exam¬ ples of the genius of Donald McKay were constructed. This California trade under his¬ toric American laws was American domestic commerce, in which only American vessels could participate. These ships sailed under register as if for foreign trade and indeed often en¬ gaged in world-round carrying — proceeding from California across the Pacific to the Orient and loading there for the Atlantic coast of the United States or for Europe. American reg¬ istered tonnage rose rapidly from 1,258,756 in 1849 to 2,379,396 in 1860. This extraordinary

increase was principally due to the California trade and its demand for ships of high speed and large dimensions. It does not represent any proportionate increase in American overseas carrying, for the 75.2 per cent of our imports and exports conveyed in 1849 in American ves¬ sels had shrunk in 1860 to 66.5 per cent. Under miscalled reciprocity

the American flag in the decade “before the Civil War was not holding its own in the overseas commerce of the United States, though its tonnage was apparently mounting. Moreover, this decade before the war was characterized by the sharpest and most disastrous decrease of American shipbuilding in all our national history.

Decline before the Civil War. — In the year 1855 a total of 583,450 tons of shipping had been launched in the United States, but this had fallen off to 156,602 tons in 1859 and stood at only 214,797 tons in 1860. This decline is all the more significant when it is added that the 381 square-rigged ships and barks built for foreign commerce in 1855 had decreased to 89 in 1859 and to 110 in 1860. Revolutionary movements in Europe in 1848, the Irish famine of 1847 and the Crimean War of 1854-56 had given a temporary impetus to American ship¬ building and navigation because of an excep¬ tional demand for ships for the export of foodstuffs and for immigration and transport service. But when these passing factors had lost their force, an alarming decline set in in our ocean tonnage, in years of peace, under a low tariff policy, before the firing of the first gun of the Civil War.

This decade before the war had witnessed a momentous change from sail to steam and from wood to iron. But, contrary to frequent assertions, it had not found American ship¬ builders and shipowners unprepared. The first British Cunard steamships had appeared in 1840 on the route from Liverpool to Halifax and Boston. They were wooden side-wheel craft, with a speed of from 9 to 10 knots and a ton¬ nage of about 1,200. In fresh breezes they were often beaten by the powerful American packet ships, but they had an advantage in light or contrary weather. These Cunard steamers received at first a British mail subsidy of $425,000 a year, which was subsequently doubled. It was _ manifestly impossible for American steamships of like cost to compete with them without government encouragement. The subject was actively taken up in Congress, and in 1845 and 1847 laws were enacted provid¬ ing mail subsidies for American lines. The first United States service was from New York to Havre and Bremen, with $200,000 a year for 20 voyages. Other lines were estab¬ lished from New York to the West Indies, to the Isthmus of Panama and in 1848 north¬ ward from the Isthmus to California and Ore¬ gon. Like the Cunard ships, the vessels em¬ ployed were wooden side-wheel steamers, of from 1,000 to 2,400 tons. They were designed and built principally in New York by skilful builders, who had created the famous packet and clipper fleet. In 1847 a contract was con¬ cluded with Edward K. Collins and his associ¬ ates for a first-class steamship line from New York to Liverpool, with a subsidy of $385,000 a year, subsequently increased to $858,000. The Collins steamers were much

larger than the Cunard ships, or of 2,800 tons. Under such

government encouragement ocean steamship building rapidly increased in the United States. In 1849 our deep-sea steam fleet had amounted to 20,870 tons, but in 1855 had grown to 115,045 tons — so that our ocean steam fleet and Brit¬ ain's were practically equal, though America's represented by far the more rapid and success¬ ful development. The Collins liners uniformly beat their British rivals on the route to Liver¬ pool and secured the bulk of the first-class passenger and freight traffic.

For reasons set forth in detail elsewhere in the article on steamship subsidies, the mail subventions were taken away from the Ameri¬ can lines in the crisis of their rivalry with their British competitors, when every advan¬ tage seemed to favor the flag of the United States. One by one the American lines suc¬ cumbed — except those to the West Indies and the Isthmus of Panama, which came partly within the protection of the coastwise service. The Stars and Stripes had vanished from the regular year-round steam trade of the north Atlantic before the Civil War began. The blow which Congress struck against American steam¬ ship lines was in part responsible for the sinister decrease in American shipbuilding that marked the half-decade from 1855 to 1860.

The Civil War did not destroy the Amer¬ ican merchant marine. That war found our merchant marine already decreasing. What the war did do was to accelerate a tendency that had already developed. Anglo-Confed¬ erate cruisers like the Alabama and the Florida destroyed only 110,000 tons of Amer¬ ican shipping all told, but created, as it was intended that they should do, such an extraor¬ dinary insurance hazard for other American ships that they could not profitably be sailed beneath the Stars and Stripes — so that in the four years of the war 751,595 tons of ship¬ ping, or about one-third of our entire fleet registered for deep sea carrying, was sold to European shipowners. In 1861 our shipping registered for foreign commerce amounted to 2,496,894 tons and in 1866 there remained only 1,387,756 tons. Wreck and wear and tear ac¬ counted for part of the loss, and many Amer¬ ican shipyards had been forced to abandon mer¬ chant work for naval construction.

The Geneva award of $15,500,000 against the British government for British complicity in the work of commerce-destroying probably cov¬ ered the actual value of the ships and cargoes seized by the Alabama

and her consorts, but did not make good the vastly larger sums of money lost by those American shipowners who were forced by these depredations to pay excessive insurance rates or accept unremunerative freight rates or lay their ships up in idleness or sell them at one-half or one-third of their cost to foreigners. That award did not make good what American shipowners suffered from the diversion of their accustomed trade to Euro¬ pean carriers.

The disastrous consequences of active British sympathy with the Confederacy and British raiding of our maritime commerce far outlasted the Civil War. Not only were the Alabama, Florida, Shenandoah, etc., British-built, but they were armed with British guns and partly officered and almost altogether manned from the British naval and mercantile service.

In the Civil War it was the American mer-

chant marine that enabled the United States government to maintain that close blockade of Southern ports which was so strong a factor in the final defeat of the Confederacy. More than one-half of the steamships, four-fifths of the officers and five-sixths of the men engaged in this vital work came directly from the mer¬ chant service. Masters and mates of Amer¬ ican steamships and sail ships gave the navy 7,500 volunteers officers, the best educated and most skilful men of their calling in the world, and these officers were followed into the war fleet by more than 50,000 merchant seamen. Without the great resources of the American merchant marine of 1861, the quick and sus¬ tained expansioin of the United States navy would have been impossible. Until new cruisers were built, the fastest and the most efficient steamers of the blockade fleet were vessels from the coastwise and West India lines, and these lines supplied besides an adequate fleet of supply craft and transports.

Stagnation after the ˆVar. — For a few years after the Civil War, American ocean shipping seemed to gain new headway, though between 1861 and 1865 European shipowners utilized the opportunity

to strengthen their grip on the chief trade routes of the world. American merchants and shipbuilders fought with energy and courage, and our registered tonnage rose in 1867 to 1,515,648, and remained at or near that figure for a decade thereafter. In 1878 the total registered tonnage was 1,589,348. American steamships without government aid could not compete on the great mail lines with British or French steamships subsidized by their govern¬ ments. In the case of Great Britain these sub¬ sidies, liberally continued for many years, had given a powerful stimulus to iron shipbuilding and engine and boiler construction, and yards which were originally developed by the de¬ mands of the mail contracts had turned to building steam freighters of the slow but use¬ ful and familiar ((tramp® type.

Following the apparent line of least resist¬ ance, American shipowners and builders swung from the extreme clippers of the decade before the Civil War to so-called medium clippers, particularly for the Cape Horn and other long-voyage trades. These medium clippers were not so fast as their racing predecessors, but had a greater capacity for cargo, with more strength and seaworthiness. For a long time these large American wooden sail ships success¬ fully competed with British iron sail ships, but were finally driven from the seas, first by in¬ surance discriminations enforced against wooden hulls by the British. Lloyd's, and then bv the liberal subsidies provided for sail ships by the French government. Except for a few inadequate and shortlived mail subsidies like those to the Brazil line and the Oriental serv¬ ice of the Pacific Mail, no national aid .what¬ ever was given to American ocean shipping from 1865 until 1891. A subsidy system similar to Great Britain's was strongly urged by the maritime and commercial States, but was regu¬ larly defeated by the influence of European steamship interests and the opposition of the agricultural South and West in Congress.

But in 1891 both the Senate and the House passed a cautious mail subsidy measure grant¬ ing subsidies for postal lines of steamers. This legislation, however, was so seriously crip¬

pled by the insistence of Western* lawmakers on reducing the original rates in the House of Representatives that though the measure has maintained a fast American mail line to Europe and several other lines to the West Indies and to Australasia, it has failed of any more ex¬ tended purpose. This is the legislation which, coupled with the admission of the British-built New York and Paris to American registry, made it possible for the International Naviga¬ tion Company

to undertake in 1895-96 a weekly American mail service from New York to England and France. The Ocean Mail Act of 1891 maintains also the Ward line of American steamers from New York to Cuba and Mexico, the Red D line from New York to Venezuela and the Oceanic line from San Francisco to Australasia. Total expenditures under this act in recent fiscal years have been from $1,000,000 to $1,200,000 a year, or less than half of the amount expended for like purposes by the government of Canada, and one-fifth or one-sixth of the total mail subsidy payments to the 30 lines of British postal steamers which constitute the backbone of the British mercan¬ tile marine.

President Roosevelt in 1904 earnestly recom¬ mended an investigation by Congress of the causes of the decline of the American merchant marine, with a view to recommending remedial legislation. A Merchant Marine Commission of five senators and five representatives, of which Senator J. H. Gallinger of New Hamp¬ shire was chairman, was authorized by Con¬ gress and published its report in 1905, urging national encouragement to regular steamship services to the West Indies, South America, South Africa, Australasia and the Orient, and the granting of tonnage bounties to cargo ves¬ sels. A bill carrying these provisions passed the Senate, but the bounty to cargo ships was eliminated in the House, and every subsequent effort to enact even legislation for mail lines was defeated in the House, though by the slenderest of majorities. Again, as before the Civil War, a large part of the agricultural South and West resisted any and every form of na¬ tional aid to the ocean shipping industry, and again this opposition was reinforced by the formidable influence of the European steamship organizations which were now monopolizing nine-tenths of the ocean carrying trade of the United States.

A Trial of <(Free Ships.f — A policy of ((free ships,® or the free admission of foreign-built vessels to American registry for at least the overseas trade, had found some advocacy for many years in the press and in Congress, and on 24 Aug. 1912, in connection with the Panama Canal Act, the Senate and House changed the traditional policy of the nation by offering free registry for the overseas trade to foreign-built vessels of American ownership not more than five years old, and capable of carrying dry and perishable cargoes. The new expedient abso¬ lutely failed. Up to the outbreak of the war in Europe on 1 Aug. 1914, not one foreign-built ship had sought and secured register under this legislation. The reason assigned Was the higher cost of operation that would have to be assumed under American laws and regulations. About 1,000,000 tons of ocean shipping, it is estimated, were owned and controlled in 1912 by American capital, but navigated under for-662

eign flags to take advantage of foreign mail subsidies or of the lower range of foreign ship¬ board wages.

But when the European War broke out, many of the American owners of this foreign tonnage, particularly of that part of it under British or German colors, sought the protection of the flag of the United States in order to escape capture by the enemy. Therefore, Con¬ gress, on 18 Aug. 1914, passed as an emergency measure an act amending the previous act, broadening its provisions and authorizing the President to suspend the requirement of law that the officers of these foreign-built ships should be American citizens. These foreign-built ships admitted to American registry were further exempted from compliance with our inspection and measurement laws and regula¬ tions.

A great many foreign-built craft sought American registration under this measure. It was discovered that the hoisting of the Ameri¬ can flag was the signal for a demand from foreign officers and crews for the wage scale and food scale of Americans. The result was an immediate and large increase in the cost of manning and maintaining these foreign-built ships, so that they came upon the same basis as American ships of native construction. It was demonstrated, therefore, that a free-ship policy in itself could not suffice to solve the problem of the American merchant marine in overseas trade. Though nearly all maritime governments, as the great war drew on and as the need of ships became more pressing, en¬ acted laws forbidding the transfer of vessels to foreign purchasers, yet before this action was taken a considerable fleet of foreign-built vessels had been naturalized under the Stars and Stripes. This reinforcement from foreign fleets and the diversion of large coastwise car¬ riers from domestic trade to overseas naviga¬ tion, due to the high freight rates that had prevailed since the war began, suddenly and greatly increased the amount of American ton¬ nage registered for foreign carrying from 1,066,288 on 30 June 1914, to 2,185,008 on 30 June 1916. In these same two years the pro¬ portion of American imports and experts car¬ ried under the American flag had risen from 9.7 per cent to 16.3 per cent.

A Swift War Growth. — The European War brought to the United States such a sharp real¬ ization of the need of a greatly increased

fleet of American ships as the <(delivery wagons® of American commerce, that immediate and posi¬ tive action was demanded from Congress. This took the form at first of a proposal for am¬ bitious government ownership and operation of merchant vessels, for the purchase or construc¬ tion of which it was provided that $50,000,000 should be at once appropriated. But the prin¬ ciple of government participation in the mer¬ chant shipping business was so earnestly op¬ posed in Congress and by the mercantile com¬ munity that the law finally passed on 7 Sept. 1916 contained as its main feature authority for the appointment of a United States Ship¬ ping Board, which should have the power to supervise ocean freight rates for the purpose of preventing unjust combinations of ocean carriers or the exaction of excessive charges.

This Federal Shipping Board was given,

moreover, general authority over the merchant marine, and was authorized to devise the best methods to increase it. Government ownership and operation of merchant tonnage was reduced to a minimum, with the stipulation that no ship should be purchased by the government unless it were about to be withdrawn from American commerce without an intention on the part of the owner to return it within a reasonable time, and that no ship controlled by the government should be operated by the government unless private capital could not be persuaded to em¬ ploy it. Moreover, the operation of any vessel on the part of the United States must cease at the end of five years from the conclusion of the European War. The government, how¬ ever, was authorized by the new law to con¬ tinue indefinitely to purchase, lease, charter or transfer vessels to be employed by private ship¬ owners, and was even authorized to secure foreign-built vessels for operation in the coast¬ wise trade of the United States.

When on 6 April 1917, the United States itself entered the war, it was recognized that an extraordinary effort must be made to sup¬ port our Allies with food and munitions, and also to transport our American army to Europe and to sustain our troops with their essential equipment and supplies after they had landed. Therefore, the new Shipping Board, on 16 April 1917, organized the Emergency Fleet Cor¬ poration for the carrying out of the vast pro¬ gram of ship construction that had become im¬ perative. There were at that time 37 shipyards building steel vessels and 24 yards building wooden seagoing vessels in the United States. In these yards were 235

shipways. In the presence of war, the previous reluctance to give national aid to maritime industry suddenly vanished. The Emergency Fleet Corporation advanced generous funds for the expansion of existing shipyards and the creation of new yards, and enormous contracts for new tonnage were distributed to builders on the Atlantic and Pacific coasts, the Great Lakes and the Gulf of Mexico. The major part of these con¬ tracts called, of course, for steel-hulled ships, but after some hesitation the building of sev¬ eral hundred wooden steamers was also author¬ ized, in the full understanding that steam-driven wooden craft of large dimensions were inferior to steel ships for overseas service, but in the conviction that Lloyd George's call for ffships, ships and yet more ships® for the des¬ perate need of the Allies justified the unusual expedient.

Though unforeseen difficulties delayed the work on both steel vessels and wooden vessels, yet the extension of old and the creation of new yards, the launching of hulls and the fabricating of machinery were forced with such zeal that at the signing of the armistice on 11 Nov. 1918 there were 341 shipyards and 1,284 launching ways in the United States. The num¬ ber of workmen in American shipyards had increased from 45,000 to 380,000. The ship¬ building capacity of the United States had be¬ come far greater than that of the United King¬ dom. On 31 Oct. 1918 no fewer than 106 steel steamers of 6,000 gross tons or over were under construction in American yards as compared with 66 of 6,000 gross tons or over in British yards.

The total construction added to the Ameri¬ can merchant marine during the 19 months of America's participation in the war comprised 875 vessels of 2,941,845 gross tons. In addition, the United States possessed at the end of the war 88 vessels of 562,005 gross tons which had been taken over from enemy nations. Con¬ gress had made available for the work of the Shipping Board and the Emergency Fleet Cor¬ poration about $4,000,000,000 of national funds, to be expended in the purchase and building of ships, the extension or creation of shipyards, the operation of ships and the training of

American officers and seamen. In part the rapidly increased fleet was manned from the Navy and the Naval Reserve.

Record of Registered and Enrolled and Licensed American Tonnage With Propor¬ tion of Foreign Trade Carried in American Vessels.

Tonnage registered for foreign trade

Tonnage enrolled and licensed for coastwise trade

Proportion of American imports and exports carried in American vessels

Year

Tons

Year

Tons

Year

Per cent

1789…

123,893

1789

68,607

1789

23.6

1800…

667,107

1800

272,492

1800

89.0

1810…

981,019

1810

405,347

1810

91.5

1820…

583,657

1820

588,025

1820

89.5

1830…

537,563

1830

516,979

1830

89.8

1840…

762,838

1840

1,176,694

1840

82.9

1850…

1,439,694

1850

1,797,825

1850

72.5

1860…

2,379,396

1860

2,644,867

1860

66.5

1870. ..

1,448, 846

1870

2,638,247

1870

35.6

1880…

1,314,402

1880

2,637,686

1880

17.6

1890…

928,062

1890

3,409, 435

1890

12.8

1900…

816,795

1900

4,286,516

1900

9.3

1910…

782,517

1910

6,668,966

1910

8.7

1914…

1,066,288

1914

6,818,363

1914

9.7

1915…

1,862,714

1915

6,486,384

1915

14.3

1916…

2,185,008

1916

6,244,550

1916

16.3

1917…

2,440,776

1917

6,392,583

1917

18.6

1918…

3,599,213

1918

6,282,474

1918

21.9

Before the war, in 1914, good steel cargo steamers could have been built in America for about $65 per deadweight ton. Because of the war increase in materials and wages, the rela¬ tive inefficiency of many of the new shipyards and their workmen due to inexperience, and the pressure of the war emergency, the Emergency Fleet Corporation was compelled to pay from $150 to $200 per deadweight ton, and even more, for the construction of steel cargo steam¬ ers of the same general character. It was very clearly demonstrated that allowing foreign ship¬ owners to carry our imports and exports for so many years had proved in the end not an economy but an extravagance.

On 27 March 1919 Chairman Edward N. Hurley of the United States Shipping Board formally proposed a plan for the future opera¬ tion of the new government-owned American merchant fleet, which by 1921, including ships bought, built and contracted for, would amount to 2,000 vessels of about 10,000,000 tons gross register. Mr. Hurley urged that the ships should be sold at the world-price to private

shipowning companies in which the government should be represented by one director, that 25 per cent of the purchase price should be paid down, and the remainder paid in instalment through a 10-year period — the government meanwhile to be protected by a mortgage which

should have priority above all other liens. Chairman Hurley further recommended a method by which a merchant marine develop¬ ment fund could be provided for, to assist American shipping on routes where the serv¬ ice might at first be unprofitable.

It is in the deep sea or registered tonnage that is embodied the real problem of our mer¬ chant marine. The coastwise or enrolled and licensed shipping of the country, as distinguished from the foreign-going or registered shipping, has had a steady, constant growth under the national policy which from 1789 onward had reserved domestic carrying on ocean, lake or river between American ports to ships of the American flag and of American construction. In spite of the unparalleled railroad develop¬ ment of the United States, American domestic shipping had grown from 68,607 tons in 1789 to 6,818,863 tons in 1914 — incomparably the greatest coastwise shipping in the world, greater than the entire coastwise and overseas tonnage of the German Empire in 1914, or equivalent to threefold the entire tonnage of France or Norway and fourfold the tonnage of Japan before the war. The progress of this immense domestic shipping has been singularly uneventful, and more than one-third of its ton¬ nage is to be found on the great northern lakes, where an enormous movement of iron ore, coal and grain has demanded carriers of the heaviest dimensions.

Many of the present coastwise steamers on the Atlantic and Pacific have been employed in naval auxiliary service as ammunition ships, fuel ships, general supply ships and transports, and the specific requirement is made in the Ocean Mail Law of 1891 that all subsidized American steamers in the foreign trade shall be built on designs approved by the Navy De¬ partment, and be turned over to the govern¬ ment in war.

The new shipping law of 7 Sept. 1916 pro¬ vides that vessels built, purchased, leased or chartered under this legislation shall be so far as possible adapted ((for use as naval auxili¬ aries or army transports or for other military or naval purposes.®

Bibliography. — Adams, H. C., (Taxation in the United States ‘ (Baltimore 1884) ; Bates, Capt. William W., (American Marine) (Boston 1893) ; (American Navigation (Boston 1902) ; Chamberlain, E. T., (Reports of Commissioner of Navigation (Washington 1900-18) ; Delano, Amasa, (Voyages and Travels) (Boston 1817) ; Eiske, John (The American Revolution’ (Bos¬ ton 1891) ; Hall, Henry, (American Navigation’ (New York 1878) ; Johnson, Prof. Emory R., (Ocean and Inland Water Transportation’ (New York 1906) ; Lindsay, William Schaw, (History of Merchant Shipping’ (London 1874— 76) ; Maclay, Edgar Stanton, (A History of American Privateers,’ (A History of the United States Navy’ (New York 1898) ; Mar¬ vin, Winthrop L., (The American Merchant Marine; Its History and Romance’ (New York

1902) ; McMaster, John Bach, (A History of the People of the United States’ (New York 1883-1913) ; Morrison, John H., (History of American Steam Navigation’ (New York

1903) ; Soley, Prof. James Russell, (The Mari¬ time Interests of America’ (in (The United

States of America,* edited by Prof. Nathaniel S. Shaler (New York 1894).

Winthrop L. Marvin,

Author of (The American Merchant Marine; Its History and Romance’* ; secretary of the United States Merchant Marine Commission of 1904-05 ; associate member of the Society of Naval Architects and Marine Engineers, and associate editor of the Marine Journal, New York.

MERCHANT MARKS. See Monogram ;

Trademark.

MERCHANT OF VENICE, The. <The

Merchant of Venice,* entered in the stationer’s register in 1598, and

published in quarto form in 1600, was written about 1594 or 1595. Several stories that had long had currency in the world — notably the story of the caskets as a device for the choice of suitors by a wealthy heiress, and the bond story of the rich Jew and his debtor — are happily blended in this play, and thereto are added the story of the rings, the romantic minor plot of Lorenzo and Jessica, and the comic character of Launce-lot Gobbo. Shakespeare never constructed a better plot, or one better calculated to win popular approval. It meets every demand of stage-management. Although the two main incidents — the choice of the caskets and the pound of flesh — are almost childishly absurd, they are made to seem probable and even natural by the romantic atmosphere in which the characters move. Whether walking the streets of Venice or watching the moonlight sleep sweetly upon the banks of fair Belmont we breathe the air of the Renaissance in Italy. All the characters fit in perfectly with this background except Shylock. Unquestionably to an Elizabethean audience the impression made by him was partly humorous and not at all typical. With his huge nose and the red wig of the traditional Judas he was fair game, not only for the characters in the play, but for those in the pit. His practice of usury and his Jewish qualities rendered him the legitimate object of hatred and ridicule — his passionate words of rage only increased the laughter of an Elizabethean audience. While Shakespeare gave sufficient ground for this interpretation of the character, he has so humanized him as to produce a different effect on a modern audience. His famous words, (<Hath not a Jew eyes, etc.,® are an instinctive protest against race hatred and in favor of social sympathy. Whatever may be doubtful in the interpretation of Shylock, there is none in the interpretation of Portia. There is no better illustration of the power with which Shakespeare transformed his material than in the change of Portia from <(a piratical and widowed siren, who persuades merchants to stake their all against her hand that they will possess her person, and who then drugs them at supper® into one of the most charming characters of all times. Her beauty of person, brilliancy of intellect, nobility of soul, and gift of poetical expression, all com¬ bine to produce an effect not surpassed by any other creation of the dramatist. She is the bond of union between the casket story and the pound of flesh story, and all the other characters group themselves naturally about her. The concluding scene of the play at Belmont, after the excitement of the trial scene

•

and the disappearance of the sinister character Shylock, is one of the supreme passages of poetry in the language — almost magical in its beauty of background and expression.

Edwin Mims.

MERCHANT VESSELS, Neutral, Rights

of. In time of war neutral merchant vessels are entitled to navigate the high seas as in time of peace although in the interest of belligerents they are subjected to certain restrictions such as the liability to search by belligerent cruisers for the purpose of ascertaining whether they are carrying contraband to the enemy or seek¬ ing to run a blockade. See Blockade; Right of Search.

No belligerent may lawfully declare a por¬ tion of the high seas to be a war zone within which neutrals shall be excluded from navi¬ gating, although he may warn them that a cer¬ tain. portion of the high seas is to be a theater of naval operations and that they will be ex¬ posed while traversing it to the dangers inci¬ dent to the conduct of such operations therein. Within such area belligerents have no greater right of visit, search or capture in respect to neutral vessels than they have anywhere else on the high seas. It is also doubtful whether belligerents have a lawful right to plant mines in the open seas in such a way as to expose neutral vessels to the danger of destruction while innocently navigating the waters thereof, although it is to be regretted that the Second Hague Conference declined to adopt a pro¬ posal of the British delegation prohibiting the laying of mines in the open seas. See Submarine Mines.

Neutral vessels have a right to enter the ports of a belligerent so long as they are not blockaded and they may transport supplies to and trade with such ports, subject to the rules governing traffic in contraband goods. (See Contraband). Whether neutral vessels may in any circumstances be destroyed by a belligerent was much discussed during the World War. The question was first raised during the Russo-Japanese War of 1904—05 on account of the sinking by a Russian cruiser of the Knight Commander, a British merchant vessel, a por¬ tion of whose cargo consisted of contraband goods consigned to ports in Japan. The Rus¬ sian commander justified his act on the ground that on account of lack of coal and inability to spare a prize crew he

could not send the ship into a home port for adjudication by a prize court, hence his only alternative was to allow the prize to go free or destroy it. The act aroused intense indignation in England and was denounced by Lord Lansdowne as <(a very serious breach of international law.® The Rus¬ sian contention, he asserted, would justify the wholesale destruction of neutral ships taken by a cruiser at a distance from her base for the reason that she could not spare a prize crew or lacked a sufficient supply of coal. Seven other neutral merchantmen were destroyed by the Russians during their war with Japan. During the recent war German naval com¬ manders have acted on the Russian theory and have generally destroyed their prizes, neutral as well as enemy vessels, because it was im¬ possible to take them in for adjudication. (See the article on Contraband for a discussion of the cases of the Frye and the Maria),

In no war of the past have neutral merchant vessels suffered so heavily as in the late war. More than 800 neutral ships, American, Danish, Dutch, Greek, Italian, Norwegian, Portuguese and Swedish, were sunk while peacefully navigating the high seas — in most cases by Ger¬ man submarines or cruisers. In a few cases the destruction was due to error but in the majority of cases the reason alleged was that the vessels were carrying contraband. The naval regulations of most states authorize the destruction of prizes under certain circum¬ stances and some of them make no distinction between enemy and neutral vessels. Thus the American instructions for blockading vessels and cruisers in 1898 (Art. 28) authorized de¬ struction of prizes which for ˆcontrolling reasonsˆ such as unseaworthiness, existence of infectious diseases, and lack of a prize crew could not be sent in for adjudication. Like¬ wise, if there was imminent danger of re¬ capture the prizes might be destroyed. The prize regulations of many other states contain somewhat similar provisions. The German prize code authorizes destruction of neutral vessels for carrying contraband, for breach of blockade or other unneutral service, if the tak¬ ing of the ship in would expose the captor to danger or impede the success of his operations; if, for example, the captured vessel is unsea¬ worthy or is unable to follow the captor, or in case the captor cannot spare a prize crew or has an insufficient supply of coal or is near the enemy's coast (Art. 113). Many writers on international law however deny the right of belligerents to destroy neutral prizes. The question was discussed at length at the Second Hague Copjerence but on account of the di¬ vergence of views there expressed, no agree¬ ment was reached. It was again discussed at the London Naval Conference in 1908-09. The British delegation proposed as it had done at The Hague in 1907 that the right of belligerents to destroy neutral merchant vessels be pro¬ hibited in all cases whatsoever and it was sup¬ ported by the Japanese delegation. The pro¬ posals of most of the other powers, however, recognized the right to destroy in certain excep¬ tional cases and this view finally prevailed. The rule adopted affirmed the general principle that a neutral vessel cannot be destroyed but must be taken into a prize court for adjudica¬ tion. Nevertheless, by way of exception, the right to destroy was admitted in cases, where conveyance of the prize

to port would involve danger to the captor or to the success of the military operations in which he was at the time engaged (Art. 49). The effort of the. British delegation to obtain an express affirmation that inability to spare a prize crew should not con¬ stitute a sufficient justification for destruction failed to receive the approval of the Confer¬ ence. By article 40 of the Declaration it was provided that a vessel ‘ carrying contraband is liable to condemnation, and consequently to destruction, when more than half its cargo consists of contraband goods. Not all vessels carrying contraband therefore may lawfully be destroyed. The rules adopted by the Confer¬ ence, although representing a compromise be¬ tween two conflicting views, undoubtedly pro¬ vided some safeguards against arbitrary de¬ struction of neutral vessels. While the Declara¬ tion has never been ratified by any government

represented at the Conference the various bellig¬ erents put it into effect at the outbreak of the late war with certain modifications, none of which, it appears, altered the rules re¬ garding destruction of neutral vessels. See Mines, Submarine; Contraband; Right of Search; War Zones.

James W. Garner.

MERCHANT VESSELS, Transfer of from Belligerent to Neutral Flags. On ac¬ count of the liability of enemy merchant ves¬ sels to capture, their owners frequently at the outbreak of war or when war becomes immi¬ nent between their own country and a foreign power seek to withdraw them from the risk of capture by transferring them by sale or otherwise to neutral registry. Are belligerents bound to recognize the lawfulness of such transfers and refrain from capturing enemy vessels so transferred?

The practice of states has not been uniform in respect to such transactions. British and American practice has heretofore admitted the validity of such transfers, made during or in contemplation of war provided they were bona-fide, that is, if the transfer was a fully per¬ fected transaction, in which the purchase price had passed from the purchaser to the former owner, the ship being actually delivered and duly registered in accordance with the registry laws of the state whose flag it was to fly, the former owner reserving no interests or title in the vessel so transferred. Consult the cases of the Benito Estengcr, 176 U. S. 568 (1899); the Seeks Geschwe stern, 4 c. Rob. (1801) ; the Baltica, Spinks Prize Cases, 98 (1856) ; and the Ariel, Moore’s Privy

Council Cases IX, 128

(1857)..

During the American Civil War large num¬ bers of vessels under American registry were transferred to neutral flags in order to avoid capture by Confederate cruisers. During the war between Chile and Peru in 1879 and the conflict between France and China in 1883 many vessels were transferred to American registry for similar reasons. During the Crimean War a number of Russian vessels were transferred to the American flag and the validity of the transfers were generally sustained by the Brit¬ ish prize court.

The French and Russian rules, however, have heretofore denied the legality of all such transfers made after the outbreak of hostil¬ ities. At the London Naval Conference of 1908-09 an attempt was made to harmonize the conflicting views and certain rules governing the validity of such transfers were agreed upon and adopted by the conference. By article 55 of the Declaration of London transfers to neu¬ tral flags before the outbreak of war was recog¬ nized to be valid unless it was proved that the transfer was made in order to evade the con¬ sequences to which an enemy vessel, as such, is exposed. The Declaration laid down certain presumptions of intent to evade the conse¬ quences of capture, as where the bill of sale is not on board in case the transfer has been made less than 60 days before the outbreak of war. But these presumptions were declared to be rebuttable by evidence showing the con¬ trary intent. The onus of proving that the transfer was made for the purpose of avoiding capture was placed on the captor, not on the owner. To be valid in any case the sale must be

unconditional, complete and in conformity with the laws of the countries concerned.

By article 56 of the Declaration transfers made after the outbreak of war were declared to be void unless it was proved that they were not made to evade the consequences of cap¬ ture. Certain absolute and irrebuttable pre¬ sumptions of invalidity were laid down, such as where the transfer was made in a blockaded port or during the course of a voyage or where the right to repurchase the vessel was reseryed by the vendor. Unlike the rule governing transfers before the outbreak of war, the rule as to transfers made during the war is based on the presumption that the transfer is void and the onus of proving the contrary is on the owner rather than on the captor.

The Declaration of London, however, never having been ratified, its rules relating to trans¬ fers were not legally binding on the belligerents during the World War. There being no gen¬ eral rule as to the right of transfer from belligerent to neutral flags, each belligerent was free to apply its own rule.

The question of the validity of transfers made during the World War was raised in the case of the Dacia in 1915. This vessel was a Hamburg-American liner which, while lying in an American port, after the outbreak of the war, was purchased by an American citizen and admitted to American registry in pursu¬ ance of a recent act of Congress authorizing the admission to American registry of foreign-built ships. Subsequently while on a voyage from New York to Rotterdam the Dacia was captured by a French cruiser and placed in the. custody of a prize court which condemned it and ordered it to be sold. The prize court applied the old French rule which denies the legality of transfers made during war. It might, however, have treated the Declaration of London as binding and then condemned the ship on the ground that the transfer was made with a view to evading the consequences of capture. Had the Dacia been captured »by a British cruiser the British prize court could hardly have condemned it without departing from the precedents set by Lord Stowell and Dr. Lushington in the earlier cases. It was doubtless owing to this fact that the Dacia was by prearrangement between the British and French authorities captured by a French cruiser and sent to a French prize court for trial, thus ensuring it certain condemnation.

The Administration Ship Purchase Bill which was before Congress in 1915 raised the ques¬ tion whether the purchase after the outbreak of the war of belligerent merchant vessels by a corporation, a majority of the stock of which was owned by a neutral government, would.be an unneutral act and whether the opposing belligerent would be bound to recognize the validity of such transfers. It was the avowed intention of the supporters of the bill that in case it became law purchases of

German mer¬ chant vessels then laid up in American ports should be made and the vessels so purchased should be admitted to American registry.

The view was expressed by Mr. Lansing, then counsellor of the Department of State, and by Senators Lodge, Root, McCumber, Burton and others that such transfers would not have been in accord with the principles of neutrality since neutral governments are forbidden to do

many acts which it is permissible for neutral individuals to do. It was unofikially announced in England and France that the British and French governments would not recognize the validity of such transfers and that in case any enemy merchant vessel were purchased by the proposed corporation and appeared on the high seas under the American flag they would be captured and put into a prize court for the purpose of testing the validity of the transfers. The failure of the bill to become law removed what would doubtless have become a source of controversy between the United States and Great Britain and France. Tested by the rules of strict neutrality the proposed purchase by a corporation, controlled by the government, of enemy ships which had been driven from the high seas to take refuge in neutral ports to avoid capture and the sending of those ves¬ sels on the high seas under the protection of a neutral flag would undoubtedly have been an unneutral act against which injured belligerents could justly have complained.

Bibliography. — Bentwich, (The Declara¬ tion of London* (Chap. 5) ; Cohen, (The Declaration of London) (pp. 133-138) ; (Inter¬ national Law Situations) (Naval War College Publications, 1910, pp. 108-128) ; Garner, in American Law Review , May-June 1915, pp.

321-348.

James W. Garner.

MERCIA, mer’shi-a, England, the largest kingdom of the Saxon heptarchy, now com¬ prised in the Midland counties on both sides of the Trent from the North Sea to Wales. Mer¬ cia was founded by Crida in 585. Like the other Anglo-Saxon kingdoms it had a stormy history, being almost continually at war with some of its neighbors. In 827 it was conquered by Egbert, who united the different kingdoms of England into one. As its frontiers extended to those of the other

kingdoms, as well as to Wales, it derived its name from that circum¬ stance (Anglo-Saxon mearc, march or bound¬ ary. See England, Geographical History.

MERCIE, Antonin, an-to-nan mer-se-a, French sculptor and painter: b. Toulouse, 30 Oct. 1845. He studied under Jouffroy and Falguiere; won the first Prix de Rome in 1868; and in 1872 obtained a medal of the first class for his bronze statue of the young David, now in the Luxembourg. His masterpiece was (Gloria victis) (1874), followed by a nude throned Juno (1877) ; a marble statue of (Painting) (1890) ; (William Tell,* now in Lausanne; monuments to Thiers, Meissonnier (in front of the Louvre), and Jules Ferry, and Napo¬ leon* on the Vendome Column. He painted a Venus, now in the Luxembourg. In 1891 he was elected an Academician.

MERCIER, Desire Joseph, Belgian cardi¬ nal, archbishop of Malines and primate of Belgium: b. 21 Nov. 1851 at Braine-l'Alleud, province of Brabant. Educated at Louvain, Paris and Leipzig, he was ordained priest in 1874 and became professor of philosophy at the University of Louvain. Here he organized the Institute Superieujre de Philosophic, based on the teaching of Saint Thomas Aquinas and founded under the auspices of Pope Leo XTIT. As a distinguished lecturer Professor Merrier — as he then was — earned a high reputation for literary and scientific abilities, united with

Archbishop of Malines, Belgium

.

MERCIER -

zeal, leadership and exalted purpose. He wrote several volumes of note, e.g., (Les Origines de la Psychologie Contemporaine) (1897), (Meta¬ physique Generate* and (Criteriologie,) which passed through numerous editions, as well as others of a less didactic character. He was also the founder of the Revue Nco-Scholastique when officiating as head of the school of neo¬ scholastic philosophy. On 8 Feb. 1906 it .was announced that ((Dr. Mercier, president of the Institute of Advanced Philosophy at Louvain,® had been appointed archbishop of Malines. Though at first a general surprise, the appro¬ priateness of

selecting him to the episcopal bench soon became apparent. With energy and amiability he devoted himself to the adminis¬ tration of his diocese, and on 15 April 1907 was created and proclaimed cardinal and pri- , mate of Belgium. The German conquest of Belgium in the early stages of the European War brought him into world-wide prominence by the fearless and determined attitude he adopted toward the ravagers of his country. In the papal conclave of September 1914, after the death of Pope Pius X, a number of the assem¬ bled cardinals decided to give Mercier their vote in the election for a new pope as a dem¬ onstration of sympathy with Catholic Belgium. He was supported by the French and English cardinals, while the Germans and Austrians protested against what they called undue inter¬ ference of politics in the highest spiritual func¬ tions of the Church, and Cardinal Della Chiesa was ultimately elected. Cardinal Mercier ar¬ rived in London 12 Sept. 1914, and on the following day (Sunday), accompanied by the late Duke of Norfolk, was received in audience by the king and queen. In the afternoon he witnessed a remarkable and enthusiastic dem¬ onstration in Westminster, organized by Irish members, of Parliament and attended by many thousands of people. He returned to Belgium the same night and exerted himself during the long period of the German occupation to ameli¬ orate the sufferings of his compatriots. He came into frequent collision with the German authorities, notably von Bissing (q.v.). The cardinal's pastoral letters, collected and pub¬ lished by Burns and Oates (London 1918), form a series of earnest exhortations to the practice of Christian fortitude and hope amid the horrors and afflictions of war.

MERCIER, Honore, Canadian lawyer, journalist and politician: b. Iberville, Quebec, 15 Oct.* 1840; d. Montreal, 30 Oct. 1894. He was educated at Saint Mary's (Jesuit) College in Montreal and afterward studied law at Saint Hyacinthe, being admitted to the bar in 1865. During his legal studies (1862-64) he was editor of the Courier de Saint Hyacinthe, the Conservative organ of the district; but as a journalist he was among those who opposed Canadian Confederation. This led him to aban¬ don his editorship and to sever his connection with the Conservative party. During the years immediately following the confederation of 1867 Mercier devoted himself to his profession, but in 1871 he reappeared in politics as the leader of the National party (also called the Parti noir), whose leading aim was to curtail the power of the Dominion government in favor of provincial rights. On this platform he was elected to the federal Parliament for Rouville in 1872, but did not stand for re-election to

. «

the Parliament of 1873. After some four years deyoted to the successful practice of law at Saint Hyacinthe, Mercier was elected (1879) to the legislative assembly of Quebec, being appointed solicitor-general of the province in the ministry of M. Joly. On the defeat of the Joly administration in the same year, Mercier passed into the opposition, of which he pres¬ ently became leader. In 1881 he left Saint Hyacinthe to practise law in Montreal. In 1885 the French Canadian population was thrown into a ferment by the trial and execu¬ tion of Louis Riel, the leader of the North West Rebellion (q.v.). Mercier, heading the agitation thus occasioned, declared Riel to have been a ((victim of the fanaticism of Sir John A. Macdonald.® On the strength of the feeling thus aroused, the Conservative party was de¬ feated in the provincial elections of 1886 and Mercier found himself at the head of the ad¬ ministration. In this capacity he carried through the legislature the famous Jesuit Es¬ tates Act, a measure intended to compen¬ sate the Jesuits for the property confiscated by the Crown at the time of the papal dissolu¬ tion of the order. In spite of the agitation throughout Canada against the act the Mercier government, was upheld in the election of 1890. In the same year grave charges of peculation were brought against the Premier and his col¬ leagues on the ground that a subsidy of $100,- 000, intended for the Baie des Chaleurs Railway, had been diverted to political uses. Investiga¬ tion resulted in the dismissal of the ministry (15 Dec. 1891), action wfflich was ratified by the overwffielming defeat of the Mercier party in the election which ensued. The criminal charges brought against Mercier, as a result of this and a second official investigation, ended in a verdict of not guilty. Mercier remained a member of the assembly but with diminished influence and shattered health.

MERCUR, mer'ker, James, American sol¬ dier: b. Towanda, Pa., 25 Nov. 1842; d. West Point, N. Y., 22 April 1896. He was graduated from West Point in 1866 and commissioned in the engineering corps. He was engaged in sur¬ veys made under the government and in 1867-72 was assistant professor of natural and ex¬ perimental philosophy at West Point, after which he was in command of an engineering corps and in 1876-81 assisted in clearing the New York harbor of the obstructions at Hell Gate. He was professor of civil and military engineering at West Point from 1884 until his death. He published a revised edition of Mahan's Permanent Fortification) (1887) and the original works, (Elements of the Art of War* (1888);

and (Military Mines, Blasting and Demolitions) (1892).

MERCURIC CHLORIDE. See Corro¬ sive Sublimate.

MERCURIC CYANIDE. See Hydrocy¬ anic Acid.

MERCURY, mer'ku-ri, the Roman god Mercurius who presided over commerce and gain.' See Hermes.

MERCURY, the planet of the solar sys¬ tem which is nearest to the sun. Owing to the position of its orbit, far inside of that of the earth, it is never seen by us at any great dis¬ tance from the sun, but seems to swing back and forth, first on one side of the central lumi-

nary and then to the other. (See Solar Sys¬ tem). Its time of revolution is a little less than three months and therefore less than one-fourth that of the earth. When, starting from a point between the earth and the sun, it has completed a revolution, the earth has moved forward in its orbit, and, in consequence, nearly 30 days more are required to catch up with the earth and again come into conjunction with it. Consequently the time of one synodic or ap¬ parent revolution is nearly four months. It follows that its greatest elongations from the sun occur at intervals of nearly 60 days, alter¬ nately to the east and to the west. When near its greatest eastern elongations it may be seen in the west toward the close of twilight. When west of the sun it may be seen in the morning before daybreak. To the naked eye it seems to shine as a star of the first magnitude. But as it is never seen in a perfectly dark sky except when very near the horizon, it is not readily observable in high northern latitudes. It is said, in fact, that Copernicus died without ever seeing this planet.

With the aid of a telescope, Mercury may be seen the greater part of the time — in the afternoon when it is east of the sun; in the morning when it is west of it. But it is never seen fully illuminated unless near the farther part of its orbit, beyond the sun, when it may be lost in the effulgence of the sun's rays. When it approaches nearest to us, only a

small portion of the hemisphere presented to us is illuminated. Owing to these unfavorable con¬ ditions observations on it are extremely diffi¬ cult, and it cannot be said that anything is certainly known of its physical constitution. The difficulty is increased by its being much the smallest of all the major planets. The result is that nothing is positively known as to the time of the rotation on its axis. About 1800, Schroe-ter, a celebrated observer of the planets, thought it rotated in a little more than 24 hours. But Herschel found no foundation for this belief, and could see no evidence whatever of a rotation. About 1889 Schiaparelli, the celebrated Italian astronomer, making a very careful study of the planet, under the favoring sky of Milan, was led to the conclusion that, like the moon, Mercury's time of rotation was the same as its time of revolution in its orbit, so that it always presented the same face to the sun. A similar conclusion was reached by Lowell at the Flagstaff Observatory. But the difficulty of seeing any well-defined features on the planet is such that conservative astron¬ omers are still in doubt on the subject, and regard the time of rotation as still unknown and not likely soon to be determined.

The most remarkable feature presented by the motion of Mercury is that the perihelion of its orbit is found to move forward considerably faster than it ought to by virtue of the attrac¬ tion of the known bodies of the solar system. The cause of this motion has perplexed astron¬ omers for half a century; it was at first sup¬ posed by Leverrier to be due to the attraction of one or more unknown planets between Mercury and the sun. Another explanation was sought in the assumption that the sun's gravitation diminishes somewhat more rapidly than it would according to the law of the inverse square. If this were so, the perihelion of all the other planets

ought to be effected by a similar motion, and in particular there should result disturb¬ ances in the motion of our moon which, now that the extremely abstruse mathematical theory of that body (based upon the law of gravita¬ tion), has been so perfected, it is certain do not exist. Similar discrepancies have been de¬ tected in the motions of some of the other planets, notably in the node of Venus and in the perihelion of Mars. When the disturbing pull of the exceedingly tenuous, lens-shaped, cloud of particles known as the Zodiacal Light is computed and allowed for, it is found that not only these, but also the historic discrepancy in the motion of the perihelion of Mercury, disappear. It is very . probable that the true explanation of them is to be found in this source.

At varying intervals the motion of Mercury in its orbit causes the planet to pass between the earth and the sun; it is then seen as an intensely black, round dot crossing the sun's disc. The next four transits will occur on 7 May 1924, 8 Nov. 1927, 10 May 1937 and 12 Nov. 1940. None of these will be visible, however, from the United States. The first transit which will be completely visible here will occur on 13 Nov. 1953 and 6 Nov. 1960. But little use is made of transits of Mercury. Attempts have been made to detect traces of an atmospheric ring about the planet during the transit, as may be done during a transit of Venus (q.v.), but these have not been certainly successful. Newcomb subjected 21 transits from 1677 to 1881 to a critical discussion to ascertain whether there might be found from them any indication that the time of rotation of the earth on its axis, — the unit of time throughout astronomy, — had changed during this interval. There was found no conclusive evidence in any appreciable change in the length of the day. It has certainly not increased or diminished by so much as 0.01 second in the course of the past 2,000 years.

Eric Doolittle,

Director Flower Astronomical Observatory,

University of Pennsylvania.

MERCURY, Fulminate of. See Fulmi¬ nates. ,

MERCURY, or MARKERY, a perennial

herb (Cheno podium bonus-henricus) of the natural order Clienopodiacece. Like other members of its genus, it has mealy foliage and inconspicuous greenish flowers. The tender shoots which appear in early spring are valued as a substitute for spinach, for which purpose the plant is frequently cultivated. In Europe it is better known as Good King Henry. It will grow in any garden soil with practically no attention.

MERCURY, Medical Uses of. Mercury uncombined is used only for its bulk. As it is without medicinal effect, at one time as much as two pounds of uncombined mercury would be given for the purpose of mechanically dis¬ lodging some obstruction in the intestines. Trit¬ urated with some other substance it is valuable medicinally and produces specific mercurial ef¬ fects, local and constitutional. Such com¬ pounds are ((blue mass® (blue pill), mercury with chalk (gray powder), mercurial ointment and mercurial, plaster. All mercurial

compounds entering the circulation have a peculiar influence

o\er nutrition. This is especially true of salts of mercury, such as mercurous chloride or calo¬ mel, mercuric chloride or corrosive sublimate and mercurous iodide or the green iodide of mercury. Jn small doses, especially in syphilis, mercury has a definite toxic action on the spirochete which is the known parasite which causes syphilis. In large doses mercury acts as a corrosive poison and tends to inflame the mucous membrane of the mouth, stomach and intestines. Calomel and blue pill are largely used for their laxative effects. Mercury in the various forms of powder, ointment, lotion and plaster is used to remove body-vermin, relieve itching and as a remedy in certain skin affec¬ tions. Mercuric chloride, known as corrosive sublimate, is a powerful antiseptic and is taken internally in very minute doses. See Toxi¬ cology.

MERCURY, or QUICKSILVER, a me¬ tallic element which has been known for many centuries and which is distinguished from the other metallic elements by the fact that it is liquid at ordinary temperatures. Mercury oc¬ curs native in the metallic form, but by far the larger part of it is obtained by distilling the native sulphide, cinnabar (Hgs), in a current of air which is regulated so. as to burn the sul¬ phur of the sulphide, while leaving the mer¬ cury in the metallic state. Cinnabar occurs abundantly at Idria, Austria, at Almaden, Spain, and at New Almaden, near San Fran¬ cisco Bay, and it is from these sources that the mercury of commerce is chiefly obtained. It occurs as veins and disseminated deposits, the ores of which are believed to have been intro¬ duced by hot waters of magmatic (q.v.) origin. Spain is the largest producer and the chief out¬ put in the United States comes from Califor¬ nia, though deposits are known in Texas and Oregon. Mercury freezes at 37.9° F. below zero and boils, at the ordinary atmospheric pressure (760 mm.), at 675° F. Its specific gravity at 32° F., when compared with water at 39° F., is 13.596. Its specific heat at ordinary temperatures is about 0.0331, and its average co¬ efficient of expansion between 32° F. and 212° F. is 0.00010085 (Fahrenheit scale). The ratio of the specific heat of the vapor at constant pressure to its specific heat at constant volume has been found, experimentally, to be 1.666, which indicates that the molecules

of the vapor are monatomic and that they behave, so far as their collisions among themselves. are con¬ cerned, as though they were elastic spheres. (See Gases, Kinetic Theory of). Mercury may be freed from dust and dirt by filtering it through leather. To remove tin, lead and other dissolved metals, the mercury may be left for some weeks in contact with concentrated sul¬ phuric acid and subsequently digested with di¬ lute nitric acid ; or it may be several times dis¬ tilled. Various other modes of purification are also known.

The metal is chiefly used, in the arts, for the extraction of gold from crushed ore or fine gravel, the ore being washed by a gentle stream of water over a copner plate which is amalgamated with mercury. The gold particles, being heavy, sink through the water so as to come into contact with the copper plate, where they are held by the mercury in the form of a golii amalgam. (See Gold and Amalgam). In physics, mercury is also greatly used for filling

thermometers and barometers, and for many other purposes. It is likewise used in medicine, both in the metallic form and in its compounds with other elements. Metallic mercury, when rubbed up in a mortar with confection of roses until its globules are so fine as to be indistin¬ guishable to the eye, is known as (<blue mass® and is administered in the form of pills, as a cholagogue.

Mercury has the chemical symbol Hg (from ˆhydrargyrum,® its Latin name), and an atomic weight of 200.3 if O = 16, or 198.8 if H = 1. It forms two oxides, each of which give rise to a series of stable salts. The metal does not oxi¬ dize upon exposure to air at ordinary tempera¬ tures, but when heated nearly to its boiling point in air or in oxygen it slowly oxidizes, with the formation of mercury monoxide (or mercuric oxide), HgO. When prepared in this manner the monoxide is crystalline and red, and for this reason it is familiarly known as the <(red oxide.® The same substance may be pre¬ pared in an allotropic form by precipitating a solution of mercuric nitrate by the addition of caustic potash, the monoxide then coming down as an amorphous yellow powder. The red oxide turns black when strongly heated, but re¬ covers its color upon cooling. When heated to redness the monoxide decomposes into metallic mercury and free oxygen. It can, therefore, be used as a source of oxygen ; and it was in fact by heating this substance that oxygen was first discovered by Priestley. By acting upon the red oxide or upon metallic mercury by excess of nitric acid, mercuric nitrate, Hg(NOa)2, is formed; while if nitric acid is allowed to act upon excess of mercury, mercurous nitrate, HgNOs, is

obtained. The corresponding sul¬ phates of the metal are obtained by acting upon metallic mercury with sulphuric acid, mercuric sulphate (HgSCh) or mercurous sulphate (Hg2S04) being obtained, according to the conditions of the experiment. Mercuric sul¬ phide, HgS, which occurs native as the mineral cinnabar, and which is also known as vermil¬ ion, is bright red in color and may be prepared artificially by heating mercury with sulphur, or by passing sulphuretted hydrogen gas through a solution of mercuric salt. When obtained in the latter way it comes down as a black amor¬ phous powder, which may be brought into the normal red crystalline form by sublimation. Mercury forms two chlorides which are exten¬ sively used, especially in medicine. Mercuric chloride (also known as ((bichloride of mer¬ cury® or <(corrosive sublimate®), HgCh, is pre¬ pared by heating a mixture of equal parts of mercuric sulphate, HgSCh, and common salt, NaCl; the reaction being HgS04 + 2NaCl — HgCl. + NaoSCh. The bichloride is fairly solu¬ ble in water and dissolves readily in a solution of sal ammoniac. It is also quite soluble in alcohol. It crystallizes in the trimetric system, melts at 509° F. and boils at 563° F. It is in¬ tensely poisonous and is one of the most power¬ ful germicides known. It is used in surgery and medicine as an antiseptic and disinfectant, and is occasionally administered internally in very small doses. Mercurous chloride, HgCl (more familiarlv known as <(calomel,® or as the fmild chloride®), is a white powder, insoluble in water and is greatly used in medicine, both as a cholagogue and otherwise. It may be pre¬ pared in various ways, but the usual method is

by heating four parts of corrosive sublimate with three parts of metallic mercury; the mer¬ cury combining with half of the chlorine of the corrosive sublimate, as indicated by the equa¬ tion HgCh + Hg — 2HgCl. The calomel sub¬ limes and must then be ground to a fine powder and thoroughly washed, in order to remove any free soluble corrosive sublimate that may not have been decomposed. The so-called (<white precipitate,® which is obtained when ammonia is added to a solution of corrosive sublimate, has the composition

NHaHgCl. Mercurous oxide, or <(black oxide of mercury,® Hg20, maybe obtained as a black powder by digesting calomel with excess of caustic potash. It decomposes into the red oxide and metallic mercury upon expo¬ sure to light, or upon being heated to the boil¬ ing point of water. Many other compounds of mercury are known, but they are of less im¬ portance than the ones here given.

MERCURY VAPOR LAMP. See Vapor Mercury Lamp, The Hewitt.

MERCY, Fathers of, Roman Catholic re¬ ligious congregation founded on the restoration of Louis XVIII, 1814, and approved of by the Pope (1834) under the title (Society of the Priests of Mercy. The object of the society is the conversion of sinners by mission preaching and the practice of the corporal works of mercy. In 1839 the order founded houses in New York and Saint Augustine, Fla., and the fathers have churches for the French popula¬ tion in Brooklyn and Manhattan. The mother house was originally at Paris, but was removed to Rome in 1903 as a result of the Association Law. Consult Delaporte, (Vie de Jean-Bap- tiste Rauzan) (1857).

MERCY, Sisters of, a name given to mem¬ bers of several religious communities founded for the purpose of nursing the sick at their own homes, visiting prisoners, attending lying-in-hospitals, superintending the education of fe¬ males and the performance of similar works of charity and mercy. Communities of Sisters of Mercy are now widely distributed over Europe and America. There are also religious orders under the same name connected with the Angli¬ can Church. The term is applied more specific¬ ally to the Order of Our Lady of Mercy, a Roman Catholic order founded for the objects above enumerated in Dublin 1827. The first house in America was established in Pittsburgh, Pa., 1843, and from it have sprung 65 convents. Consult (Leaves from the Annals of the Sisters of Mercy) (1881). See McAuley, Catherine.

MERCY-SEAT (Heb. Kappo'reth, cover¬ ing or lid, that is, of the sacred ark in the an¬ cient Jewish tabernacle), an unfortunate and inappropriate term as applied to the cover of the chest or ark containing the two tables of the law and overspread by the wings of the Cherubim. Between these wings appeared the Shekinah or fiery symbol of the divine presence hovering over the mercy-seat, which consisted most probably of a sheet of the finest gold (Ex. xxv, 17, etc.; xxx, 6; xxxi, 7, etc.). The New Testament writers seem to hold that the term contains by implication the idea of the propitia¬ tion (q.v.) (Heb. ix, 5; Rom. iii, 24). The high priest sprinkled on it the blood of the yearly atonement, and some writers think that the term covering as applied to it refers more to tjie covering of or atonement for sins than

to its use in covering the treasures of the ark. In any case the idea of a seat, as if the expres¬ sion in Psalms xeix, 1, (<he sitteth between the cherubims® referred to the earthly tabernacle, is inappropriate. Consult Pratenias, (De Ju¬ daea Area* (1727); Werner, (De Propitiatorˆ (1695). See Shekinah.

MEREDITH, George, English poet and novelist: b. Hampshire, 12 Feb. 1828; d. Lon¬ don, 18 May 1909. Details of Meredith's life are meagre; little is known of his parentage or of his education except that he was sent to school in Germany and later studied law, which he gave up for literature. For a time he was a pupil of T. L. Peacock (q.v.), whose daughter became his first wife. His residence was for some years at Box Hill in Surrey.

His first work in literature was a volume of poems published in 1851. This wras followed, in 1856, by (The Shaving of ShagpatP a brilliant, fantastic Oriental tale in which some inter¬ preters have professed to see a political satire. In (The Ordeal of Richard FevereP (1859), however, he began the course of studies in hu¬ man temperament which have made his name famous. The novel, unquestionably one of the most powerful in the language, deals with the ordeal of adjustment to the world of a high-spirited youth ; it is the conflict between tem¬ perament and desire, represented in the hero, and a variety of conventions, most rigidly typi¬ fied in the ˆsystem® of his father, Sir Austin Feverel. The effect of the book is chiefly tragic. (Evan Harrington) (1861), the next novel, is wholly comic in idea ; the characters are embodiments of various ˆhumors,® most strikingly represented in the intriguing Count¬ ess ; the plot, as in all of Meredith's novels, is quite secondary in interest and springs from the characters. (Modern Love,* a sequence of brilliantly phrased, intricate, 16-lined sonnets, was published in 1861. (Emilia in England, *now called (Sandra Belloni,* appeared in 1864, and its sequel <Vittoria) three years later. The story is that of a young Italian girl of unaf¬ fected manners and character and her life among people of very diverse temperaments and social ideas ; the theme of the novel may be regarded as the conflict, among very real people, of the genuine with the sentimental character. Between the two novels appeared, in 1865, (Rhoda Fleming,* perhaps the simplest of all Meredith's novels in style and a power¬ ful study in character. It deals, on the whole, with a conventionally more humble order of society than is usually found in Meredith's nov¬ els, and is rather more direct, but few things in fiction are more impressive than the almost instinctive steadfastness of the heroine or more gloomy than the spiritual confusion that she tries

to set in order. In (The Adventures of Harry Richmond* the note is again chiefly comic. Much of Meredith's best work lies in the freshness of the varied scenes of this book, and in the hero's father is perhaps as typical a character of the novelist as can be found, a man whose adventurous fancy and devotion to his son ˆinforms® numberless odd and extravagant acts. Another excellent study of a different sort is Beauchamp's Career* (1876). It is the analytical, yet lively, story of a young man whose earnestness of character and whose ac¬ tivity caused him, from a conventional point of

view, to fail in life. Like other of Meredith's novels it is a great contribution to our under¬ standing of the varieties of human temperament and to our sympathy with them.

In (Beauchamp's Career) perhaps more than in any of his preceding novels Meredith directly explained his aim in drawing character ; it was to present a type of motive and to show how it dominates and gives unity to a series of acts. The motive which causes action is, so to speak, temperamental rather than deliberate ; in typical examples like the Countess in (Evan Harring¬ ton, 5 or Beauchamp, for instance, Meredith is interested in the expression of temperament rather than a story. The Countess, on the face of the matter, wished for the social advance¬ ment of her family; what she really wanted was scheming for the sake of scheming and her social ambitions were but the medium of ex¬ pression. This manner of approaching charac¬ ter, indeed, dominated all the character draw¬ ing in Meredith's novels, but it was not ex¬ pressed as a deliberate theory until the publi¬ cation, in 1877, of (0n the Idea of Comedy and the Uses of the Comic Spirit. > The es¬ sence of this essay is that comedy is one of the most wholesome and effectual ways of prob¬ ing and purifying the ills of the world, that good comedy, as in the plays of Moliere, really enables the reader to recognize what is genu¬ ine and discard what is sentimental ; unfortu¬ nately, instead of good comedy we often are treated, in most literature, to painful moraliz-ings. Meredith's fullest and finest expression of this idea is in his (The Egoist5 (1879), un¬ questionably his masterpiece and one of the chief glories of English fiction. Egoism, that love of self which prevents men from seeing things in their true relations, is one of the fundamental failings of mankind and Mere¬ dith has drawn it, in the inimitable Sir Wil¬ loughby Patterne, as a figure of colossal pro¬ portions. The novelist's skill and dispassion¬ ateness as an artist was never better shown than in the fact that he refuses to give conven¬ tional rewards and punishments ; for the hero's, unfailing egoism permits him in the end to turn to the flattering of his vanity what would ordinarily be regarded as humiliation.

Pursuing his end, an analysis and a synthe¬ sis of the springs which govern action, Mere¬ dith in his next novel, (The Tragic Comedians) (1880) took a story from contemporary Euro¬ pean court life and explained it as a piece of dramatic psychology. The comparative short¬ ness of the novel makes it a good study of the author's method. This novel, too, indicated a tendency on his part to depict the motives and the psychology of people actually in existence rather than, as in (The Egoist5 and its prede: cessors, to draw the embodiment of a type of "humor.® This tendency was certainly evident in his next novel, (Diana of the Crossways5 (1885), his greatest popular success, and is shown in the fact that certain of the incidents and characters excited curiosity as, to their originals. It is manifest also in his last three books, (One of Our Conquerors5 (1890), (Lord Ormont and His Aminta) (1894) and (The Amazing Marriage) (1895), which are perhaps less broadly representative and more particular than his earlier novels. Meredith's writings also include four short stories, (The Tale of Chloe,5 (The House on the Beach,5 <Farina)

and (The Case of General Ople and Lady Camper.5

Meredith, who was one of the last great-novelists to hold over, as it were, from the age of Victorian literature, belongs to the so-called psychological school, of which the great popu¬ lar representative is George Eliot, with whom he is practically contemporary. He differs from her in several important respects : The comedy of character (as the term is under¬ stood with Cervantes and Moliere) as well as the tragic side of life, is reflected in his pages. His attitude is detached and impersonal and he never allows his sympathies to intrude upon his study of the type he is treating, a characteristic which accounts for the criticism sometimes made that he lacks temperament and which is doubtless one of the reasons for his compara¬ tive unpopularity. He is more interested in his characters as types of temperament than as in¬ dividuals, and in this field he has perhaps rep¬ resented the greatest range and variety of hu¬ man motive that is to be found in English fic¬ tion. Taking strata of society, on the whole, conventionally above those treated by George Eliot, he has made them representative of a great variety of "comic® motives. As a moral¬ ist, his attack has been upon those types which are broadly termed sentimental, and in this re¬ spect his pictures of such men as Wilfred Pole and Willoughby Patterne are inimitable. The person that he most approves is the simple, con¬ siderate, intelligent being, well represented in such minor heroes as Merthyr Powys, Vernon Whitford, Dartrey Fennellan and Tom Red-worth, and pictured to the height of brilliancy in his real

heroines. In no other novelist, in no English writer except Shakespeare, can be found so splendid a galaxy of women : Rose Jocelyn, Janet Ilchester, Renee, Cecilia Hilkett, Jenny Denham, Clara Middleton, Emilia, Carin-thia Jane and many others, as well as such older ladies as Lady Jocelyn and Lady Char¬ lotte Eglett, are the best tribute to womankind that English literature possesses, and the crea¬ tion of them is an achievement of the very first rank. His style is frequently criticized as in¬ volved and epigrammatic, but no novel con¬ tains passages of greater poetical charm. See Diana of the Crossways; Egoist, The; Mod¬ ern Love; Ordeal of Richard Feverel, The.

Bibliography. — 'The best complete Amer¬ ican edition of the poems and novels is by Messrs. Scribner, in 16 volumes. Commentary is scattering and appears chiefly in the form of contemporary reviews. Consult Brownell, (Vic¬ torian Prose Masters5 (1901) ; Lynch, Han¬ nah, (George Meredith5 (1891) ; and, for a varied symposium, LeGallienne, (George Mere¬ dith, Some Characteristics ; with a Bibliog¬ raphy by John Lane5 ; and for his place in the history of the novel, Cross, (The Development of the English Novel5 (1899). Consult also Ellis, S. M., (George Meredith: His Life' and Friends5 (London 1919).

W. T. Brewster,

Professor of English, Columbia University.

MEREDITH, Louisa Anne Twamly, Aus¬ tralian author and artist : b. Birmingham, Eng¬ land, 20 July 1812; d. Hobart Town, Tasmania, 21 Oct. 1895. She had already published a vol¬ ume of verse (1835) ; and (The Romance of Nature,5 illustrated by herself (1836), before

she married her cousin Charles Meredith (1839) and removed to Australia, whence they went to Tasmania five years later. She contin¬ ued her literary activity till the end of her long life and for many years before her death had been the most prominent Tasmanian author.

Among her books, many illustrated by herself, are (My Home in Tasmania* (1852) ; cOver the Straits) (1860); ˆTasmania: Friends and Foes, Feathered and Furred) (1880). Her prose works were popular in Australia and had also a circulation in England and this country ; and her verse, of which she published several collections, was at once pleasing and unpreten¬ tious.

MEREDITH, Owen, the pseudonym of Bulwer-Lytton. See Lytton, Edward Robert Bulwer.

MEREDITH, Samuel, American patriot and first Treasurer of the United States: b. Philadelphia, Pa., 1740; d. 10 March 1817. His father was a Welshman and a friend of George Washington. Meredith became a member of the Pennsylvania colonial legislature, and when the American Revolution broke out he entered the Colonial army as major, took part in several battles and was made brigadier-gen¬ eral for gallant services. He gave £10,000 in silver for carrying on the war, and was exiled from Philadelphia when the British occupied it. Meredith served in Congress in 1787-88 and in 1789 became the first Treasurer of the United States, advancing to the government, on taking the office, $20,000 and later $120,000, for which he was never reimbursed. He remained in the office of Treasurer until 1801.

MEREDITH, Sir William Ralph, Cana¬ dian jurist: b. Westminster, Ontario, 31 March 1840. He was educated in the University of Toronto and was admitted to the bar in 1861, when he established a law practice in London, Ontario. He became queen's counsel in 1876 and in 1881 removed to Toronto. In 1872 he en¬ tered the provincial legislature of Ontario as member for London, and for 16 years he was leader of the Conservative opposition during the long reign of Mowat as Premier. In that position he showed a disposition to subordinate provincial rights to those of the Dominion ; and he was an advocate of manhood suffrage, secret ballot, the enlargement of powers to mu¬ nicipalities and workmen's compensation. In 1894 he was appointed chief justice of the Court of Common Pleas and in 1912 chief jus¬ tice of Ontario. In 1896 he was appointed a commissioner for the revision of the provincial statutes, and in 1905 he was one of the com¬ mission that investigated the affairs of Toronto. He was knighted in 1896, and has been chan¬ cellor of the University of Toronto since 1900.

MEREZHKOVSKI, Dmitri Sergeyevich, Russian critic and novelist: b.. Saint Petersburg, 1865. He was educated in his native city and published his first volume of verse at the age of 23. In 1893 he published an essay on the decadence of Russian literature which attracted general attention. In 1901-02 appeared his . (Critical Studies

of Tolstoy and Dostoyevsky as Men and as Artists* and (The Religion of Tolstoy and Dostoyevsky,* which proved him a critic of high order. Next there appeared his trilogy of historical novels dealing with the perennial conflict between Christianity and

paganism. Collectively known as (Christ and Antichrist,* this work has appeared in most modern languages. It includes (Smert Bogo\r> (Eng. trans., (The Death of the Gods, *London 1901), in which the chief character is Julian the Apostate; Woskresenie Bogi* (Eng. trans., (The Forerunner, *ib. 1902) with Leonardo da Vinci as chief character; and (Antikhrist: Petr i Aleksyey) (Eng. trans., (Peter and Alexis,* London 1905). He also wrote the dramas (Paul I> (1908) and Alexander I* (2 vols., 1913). Consult collected edition of his works (15 vols., Saint Petersburg 1911-12) and Phelps, W. L., (Contemporary Russian Novelists> (Boston

1913).

MERGANSER, or FISH-DUCK, a duck

of the genus Mergus, distinguished by the slender cylindrical bill, the upper mandible ter¬ minating in a strong hooked “nail,® and the margins presenting the appearance of rows of tooth-like processes. The most widely distrib¬ uted is the red-breasted (Mergus serrator), known as sheldrake in America where it is less numerous than in the Old World. The goosander (M. merganser) and the nun or smew (M. albellus) are familiar European and Asiatic species, while the hooded merganser (Lophodytes cucullatus) or sawbill is familiar in North America. The mergansers feed chiefly upon fishes and swim and dive after their prey with great ease and dexterity. They are essentially northern in their distribution, breed in the far north and migrate southward on the approach of the colder season. The nest is built of grass and roots and is lined with down. It is usually placed in a hollow of the bank near water, but some species prefer the greater security of a hollow tree. The flesh is coarse and rank. Eight or 10 species are known in various parts of the world. The fe¬ male alone incubates, but the male watches near the nest. From 8 to 14 eggs are laid and the young enter the water as soon as they are hatched.

MERGENTHALER, mer’gan-ta-ler, Ott-roar, American inventor: b. Wurttemberg, Ger¬ many, 10 May 1854; d. Baltimore, 28 Oct. 1899.

He was a watchmaker by trade ; came to the United States at 18, entered the employ of the United States government at Washington, where he kept clocks and electrical bells throughout government buildings in order ; im¬ proved apparatus used in the signal service, and in 1876 removed to Baltimore, where he de¬ voted himself to perfecting a type-setting ma¬ chine. On this he spent several years, his scheme going through four stages, the last of which was the linotype (q.v.). When he had patented this machine he had much difficulty in introducing it. It was perfected by the addi¬ tion of the Rogers spacer and numerous minor inventions by Philip T. Dodge and others, brought its inventor large profits and is now in very common use in large printing establish¬ ments. Mergenthaler also invented a machine for making fruit gift-baskets of veneered wood.

MERGER, in law, the sinking or oblitera¬ tion in conveyancing of lesser estates or prop¬ erty into greater ones, or the consolidation of two or more estates ; a term used in financial or business circles, meaning the consolidation or combination of a particular class of manu¬ factories, railroads or other business interests;

generally in the nature of a trust. Late in the 19th century it became common in the United States for a group of corporations, which it was desired to bring together for monopolizing an industry, to ˆmerge® by forming a holding company, which took over the majority stock of each subsidiary company in the merger and gave in exchange the stock of the holding com¬ pany. To test the validity of such mergers a suit was brought against the Northern Securi¬ ties Company, and after exhaustive arguments and much delay the United States Supreme Court declared that the procedure was (<in re¬ straint of traded Since then corporation mergers have ceased. The principle still holds good, however, in both civil and criminal law, that the lesser may merge into the greater. In contracts the acceptance of a high grade of security is held to extinguish the lower grade. When a bond is given for the performance of a contract the obligation to fulfil the contract is merged in the bond as the higher obligation. See Trusts.

MERGUI (mer-ge') ARCHIPELAGO, a

chain af islands in the Bay of Bengal, off the coast of Tenasserim in Burma, the more north¬ ern ones forming a part of the British district of Mergui ; area, 10,000 square miles. They are generally covered with trees and pre¬ sent many picturesque features, rising at some points to the height of 3,000 feet. The largest island is Kings Island, some 25 miles long. Some tin is found here. The chief town is Mergui, with a population of about 15,000. The locality is one of the dampest on the globe, the rainfall exceeding 100 inches an¬ nually. The inhabitants belong to a race called Selungo. They give little attention to agri¬ culture, obtaining a sustenance mainly by fish¬ ing, pearl gathering and selling edible birds' nests. The Selungs are peaceful and indus¬ trious, but few in number. The adjoining seas abound in fish and excellent oysters; pearls of good quality are found. Pop. about 115,000.

MERIDA, Mexico, the capital city of Yu¬ catan. The city was founded in 1542 and is situated on a plain. There are railway con¬ nections with all important points in the in¬ terior and several lines of steamers ply be¬ tween its port, Progreso, 25 miles distant,, and Vera Cruz, New York and other prominent commercial ports. The surrounding country is almost entirely devoted to the sisal hemp in¬ dustry, which has reached enormous . propor¬ tions in the state. Hides, sugar, chicle and indigo are also exported. There are manufac¬ tories of cotton goods, cigars, panama hats, leather, soap, *etc.* The principal buildings are the government palace, the municipal palace, the Casa del Conquistador Montejo (the first Spanish house built in the city), the old cathe¬ dral, the School of Arts, the Penitentiary, Lit¬ erary Institute or State College, Normal School for Teachers, Meteorological and Astronomical Observatory, Yucatan Museum, Catholic Col¬ lege of San Ildefonso, schools of medicine, surgery, pharmacy, jurisprudence ana notarial instruction, the Literary Institute for Girls, the College for Girls, the Catholic School for Girls, the Tereseano College, the Primary School of Arts and Works and the Institucion de Beneficiencia Privado, founded by Leandro L. Ayala at an outlay of $1,000,000. There are vol. 18 — 4 3

an asylum for maniacs, a lazareto, a mater¬ nity hospital, three other hospitals, an asylum for mendigos, two theatres and an arena for bull fights. The Hidalgo Park contains a statue of Gen. Cepeda Peraza, and one symbolizing the peace of the state. Near the great cathe¬ dral are also large statues of Saint Peter and Saint Paul. A body of public

security, a jefe politico and an inspector-general preserve order and ensure safety to all. The streets are paved with asphalt. Merida contains two local financial institutions — the Banco Yucateca, with a capital of $8,000,000, and the Banco Mercantil de Yucatan, with a capital of $6,000,- 000, and a branch of the National Bank and an agency of the Bank of London and Mexico. Pop. about 50,000.

MERIDA, Spain (the Roman Augusta Emerita) , a small decayed town of the province of Estremadura, on the Guadiana, 32 miles east of Badajoz. It is unique in Spain, and is in some points a rival of Rome itself on ac¬ count of the number and magnitude of its re¬ mains of Roman antiquity. The Guadiana is here crossed by a Roman bridge of 64 arches (originally 81 ; 17 destroyed in 1812) and with a length of 2,575 feet and a breadth of 26 feet; it was erected by Trajan. There is another Roman bridge over the Albarregas, 450 feet long, 25 feet wide, still quite perfect, in spite of the traffic of 18 centuries since its erection. There are also remains of a castle built by the Romans, and among other most noteworthy monuments of antiquity are an old half-Roman, half-Moorish palace, the Casa de los Corvos, constructed out of a temple dedicated to Diana, several aqueducts, an ancient amphitheatre and a circus. Merida was founded in 23 b.c., and flourished in great splendor under Roman and Moor until 1228, when it was taken from the Moors, after which it began to decline. Pop.

7,390.

MERIDA, Venezuela, town, capital of the state of Los Andes, 5,290 feet above sea-level, 60 miles south of Lake Maracaibo, at the foot of the Sierra Nevada de Merida, which tower to a height of about 15,000 feet. It was founded in 1558 by Juan Rodriguez Saurez. It was al¬ most wholly destroyed by an earthquake in 1812 and again seriously damaged in 1894. It is the seat of a bishop, contains a fine cathe^ dral, one of the two national universities of Venezuela, and has several high schools. Its manufactures are carpets, woolen and cotton goods. Pop. about 15,000.

MERIDEN, Conn., city, in New Haven County, on branches of the New York, New Haven and Hartford Railroad, about midway between Hartford and New Haven. Originally the town of Meriden was a part of Walling¬ ford until 1806, when the town of Meriden was incorporated. In 1867 it was granted a city charter. It is situated in an agricultural region, but the city is noted for its large number of manufactories. Some of the principal manu¬ factures are cutlery,

silver and plated ware, steel pens, hardware, machinery, screws, vises, glassware, cut glass, malleable iron, bronzes, firearms, brass castings, curtain fixtures, gas and kerosene fixtures, self-playing attachments for pianos and organs, woodenware, tinware, granite, agateware, lamp trimmings, *etc.* The shipments are principally manufactured arti-

cles, fruit, vegetables and tobacco. The educa¬ tional institutions are the public and parish schools, a high school and the Curtis Memorial Library. It has the Curtis Home for Orphan Children and Aged Women, the Connecticut School for Boys and the Meriden Hospital. The government is administered under a char¬ ter of 1897. The mayor, who holds office two years, appoints fire and park commissioners, board of taxation and apportionment, police and board of public works. The council elects the health officer, board of compensation, tax collector, plumbing inspector, boiler inspector and fire marshal. The treasurer, sheriff, clerk and auditor are chosen by popular vote. Pop.

(1920) 29,867.

MERIDIAN, Miss., city, county-seat of Lauderdale County, on Alabama and Vicksburg, Alabama Great Southern, Meridian and Mem¬ phis, Mobile and Ohio, New Orleans, and Northeastern and Southern railroads. It is the largest city in Mississippi in population, manu-ufactures and commerce, surrounded by fertile farm land of which cotton and vegetables are the chief agricultural products. Among numer¬ ous industrial establishments qre lumber mills, fertilizer factories, cottonseed-oil mills, cotton mills, cotton compresses and railroad shops. The annual wholesale trade is $20,000,000; the average annual bank clearings approximate $17,000,000. Meridian is the seat of the East Mississippi Female College (M. E.), founded in 1867 and opened in 1869, the Lincoln School (Congregational), the Meridian Academy (Methodist Episcopal South), both for colored students, a Catholic high school and Saint Aloysius Academy for Girls. Among promi¬ nent features are the municipal building, county courthouse, public library, Scottish Rite Cathe¬ dral, Stonewall Club, handsome churches and fine business and banking buildings. The Mis¬ sissippi-Alabama Fair, held annually at Merid¬ ian, is the second largest agricultural and stock exhibition in the South in number of exhibits and attendance. Since .1912 the. commission form of government is in operation; the city owns the waterworks and has a modern equipped and salaried fire department. Elec¬ tric car service, electric and gas lighting are furnished by a company with a plant of. suffi¬ cient capacity for a city of 100,000 inhabitants. During the Civil

War, Meridian was devas¬ tated by General Sherman, 14-20 Feb. 1864, and in March 1906 a large portion of the city was destroyed by a tornado. Pop. (1920) 23,399.

MERIDIAN (Miss.), Expedition to. In

January 1864 General Sherman concentrated two divisions of 10,000 each at Vicksburg under Generals McPherson and Hurlbut, and 3 Feb¬ ruary marched eastward with the purpose of destroying Meridian, 150 miles distant, as a rail¬ road centre, and possibly penetrating to Selma, Ala., or, if the opposing forces did not seem too strong at Mobile, to turn southward from Meridian and attempt the capture of that. city. Gen. Sooy Smith was to co-operate with a cavalry force from Memphis; General Dodge, in command at Pulaski, Tenn., was to hold Logan at Bellefonte, Ala., for a diversion toward Rome, Ga. ; and General Thomas was to demonstrate toward Dalton to prevent troops being sent by General Johnston to Sherman's front. Sherman entered Jackson on the 6th,

after heavy skirmishing with cavalry. Decatur was reached on the 12th. Meridian was taken the 14th, the Confederate force, under Gen. Leonidas Polk, being much less than Sherman's, withdrawing toward Demopolis. The arsenal, extensive storehouses and cantonments were burned. The work of destroying the railroads centring at Meridian began on the 16th, 60 miles being rendered utterly useless to the north and east and 55 miles toward Mobile. This destruction was of the most systematic and thorough character; 10,000 men worked at it. for five days ; 61 bridges and culverts and more than a mile of trestles over swamps were burned; all rails were renderd useless. This object of the expedition was fully gained, as Meridian was not wholly restored as a railroad centre during the war. Thereafter, the trans¬ porting of supplies eastward from the State of Mississippi was seriously interrupted for a long time and was greatly impeded up to the close of the war, while all military operations which required railroad facilities were rendered extremely difficult.

The expedition, however, was not as suc¬ cessful as had been hoped. The Confederates, by the exercise of great energy in the face of many difficulties, so strengthened Mobile as Jo forbid an advance in that direction. Sherman, not receiving the cavalry support under Gen. Sooy Smith which he had reason to expect from Memphis, was unable to push on to Selma, Ala., one of the great manufacturing cities and storehouses for military supplies of the Con¬ federacy. Smith, in turn,

had been unavoidably detained, and Sherman returned to Vicksburg, reaching its vicinity 26 February. His com¬ mand had marched between 300 and 400 miles, had crossed Mississippi and inflicted well-nigh irreparable military damage ; but had been pre¬ vented from carrying out his full program by Confederate activity in assembling forces in his extreme front.

MERIDIAN, one of the imaginary north and south lines on the surface of the earth that may be conceived of as passing through both poles and serving to indicate the longitude of places, and with a parallel of latitude mark their exact position. If one conceive the earth sliced into on one of these lines, the resulting surface is the plane of the meridian. There are also corresponding lines called astronomical or celestial meridian, which are imaginary circles of the celestial sphere passing through the poles of the heavens and the zenith of any place on the earth's surface. These correspond exactly to the geographical meridians, that is, the celestial is exactly above the geographical meridian of any place. Every place on the globe has its meridian, and when the sun ar¬ rives at this line it is noon or midday, whence the name (Latin, meridianus — medius, middle, and dies, day). (See Longitude). The incon¬ venience arising from having a fixed meridian in different countries is sufficiently obvious, and geographers, navigators and astronomers have all found it frequently a source of confusion. After years of fruitless discussion the question of a reference or first meridian for the world came before an international conference held at Washington, 1 to 22 Oct. 1884. There, al¬ though the representatives of France and Brazil dissented, it was agreed to recommend

the meridian of Greenwich both as the astro¬ nomical and as the geographical reference meridian of the world, longitude to be reck¬ oned east and west from this up to 180°. At the same time it was advised that the astro¬ nomical day should begin at midnight, mean Greenwich time, the hours for astronomical purposes being reckoned as before from 0 to 24. This arrangement began on 1 Jan. 1885.

Previously many foreign map-makers had ac¬ cepted the meridian of Greenwich as first meridian, Germans and Americans apparently having no jealousy of Great Britain in regard to the matter. The change of time has had some importance for astronomers, but ordinary civil time is still computed much as before. The zone system of reckoning standard time was adopted in the United States in 1883 and in Australia in 1895. In the former country there are four zones : the Eastern, taking time from the meridian of 75° W. (5 hrs. slow on Greenwich time) ; the Central, with standard meridian 90° W. (6 hrs. slow) ; the Mountain, 105° W. (7 hrs. slow) ; and the Pacific, 120° W. (8 hrs. slow). There are three Australian zones: Queensland, New South Wales, Victo¬ ria and Tasmania, with 150° E. (10 hrs. fast) as standard; South Australia, with 135° E. (9 hrs. fast) ; and Western Australia, with 120° E. (8 hrs. fast). Other standards adopted with reference to Greenwich are: 15° E. (1 hr. fast) for Mid-Europe; 22ˆ2° E. (\l/2 hrs. fast) for Cape Colony; 30° E. (2 hrs. fast) for Natal; 135° E. (9 hrs. fast) for Japan; and \72]/2° E. (\iy2 hrs. fast) for New Zealand. The merid¬ ian is also applied to the laying out of the earth, magnetism on a chart, north and south line cutting the magnetic pole, or the vertical plane formed by such line is a magnetic merid¬ ian. Consult any map for the meridian lines.

MERIDIAN CIRCLE, in astronomy, an instrument used in observatories to combine the functions of a transit instrument and of the old mural circle. It has a telescope mounted to turn in a circle, always in the plane of a merid¬ ian. Of course the axis must be accurately laid east and west, and for this purpose solid ma¬ sonry piers are commonly provided. A vertical circle is carried on the axis of the transit in¬ strument and revolves with it, its divisions being read by micrometer microscopes mounted solidly on one of the piers. In this way both co¬ ordinates of the position of a heavenly body, its right ascension and declination, are deter¬ mined at the same meridian passage — a great saving of time over the old method with the instruments. See Telescope.

MERIMEE, ma-re-ma, Prosper, French author: b. Paris, 28 Sept. 1803; d. Cannes, 23 Sept. 1870. He was educated at the College Henri IV and studied law though he never practised it. Under the _ pseudonym «Joseph Lestrange® he published in 1825 (Theatre de Clara Gozul, Comedienne Espagnole, > an as¬ sumed translation from the Spanish of eight prose comedies, but in reality his own work. From that time onward he continued to pub¬ lish works at frequent intervals and at the same time had an official career of importance. Following the revolution of July 1830, he was made secretary to the ministers of commerce and marine, in 1831 was appointed inspectoi of ancient

monuments, in 1844 became a member

of the Academy, and senator of France in 1853. He was a commander of the Legion of Honor in 1860. Beside publishing several important works connected with his duties as inspector of ancient monuments he was the author of <Colomba) (1840), a very popular novel of the Corsican vendetta; <Carmen) (1847), a ro¬ mance upon which the famous opera (Carmen *by Bizet is founded; (Lettres a une Inconnue,* his most famous work (1873) ; (Lettres a une autre Inconnue) (1875) ; (Lettres a PanizzP (1881); (Une Correspondance Inedite) (1896). The four works last named are Merimee's most characteristic writings revealing him as a most loyal devoted friend. They differ widely from his other works, which though often brilliant are hard and unsympathetic, while these are tender and romantic. As a master of style Merimee had few equals in his day. (See Car¬ men; Colomba). Consult Filon. (Merimee et ses Amis) (1894) ; Haussonville, Merimee (1888) ; Tourneux, (Prosper Merimee, ses Por¬ traits, ses Dessins, etcP (1879).

MERINO, a woolen or worsted fabric, introduced about 1826, and so named because made from the wool of merino sheep. The word is originally the title of an inspector of sheep pastures in Spain, and became attached to the short-wool Spanish sheep. The breed did not originate there, however, being im¬ ported from Africa by the Moors and bred by the Spanish. The wool was so highly regarded that they have been exported for breeding all over the world, but especially to Australia See Wool, Manufacture of.

MERINO SHEEP. See Sheep.

MERIT, Order of, a British order insti¬ tuted by King Edward VII, 26 June 1902, to confer distinction on persons in military, scien¬ tific, artistic and professional circles. The number is limited to 24. In 1917 there were 17 members, and three honorary members (four military).

MERIT SYSTEM, The. See Civil Serv¬ ice Reform.

MERIVALE, mer'i-val, Charles, English historian and ecclesiastic: b. Barton Place, Dev¬ onshire, 8 March 1808; d. Ely, 27 Dec. 1893. He was educated at Cambridge, took orders in the English Church, was rector of Lawford, Essex, 1848-69, and dean of Ely from 1869. He published (The Fall of the Roman Repub¬ lic (1853), which forms the first part of his popular (History of the Romans under the Empire*

(latest ed., 1890) ; (General History of Rome) (1875) ; (Lectures on Early Church History) (1879) ; *etc.* Consult (Autobiography and Letters) edited by his daughter (1899).

MERIVALE, Herman, English statesman and political economist; brother of Charles; b. Dawlish, Devonshire, 8 Nov. 1806; d. London, 9 Feb. 1874. He was educated at Oxford, where he was professor of political economy 1837-42. He was under-secretary for the colo¬ nies, 1848-59, becoming perpetual under-secre¬ tary for India in 1859. He wrote Colonization and Colonies> (1841), a much valued work; historical Studies1* (1865) ; (Memoirs of Sir Philip Francis) (1867).

MERIVALE, Herman Charles, English author; b. London, 1839; d. 15 Jan. 1906. He

was educated at Harrow and Oxford, became a barrister of the Inner Temple in 1864 and edited the (Annual Register) 1870-80. Among his publications are (The White Pilgrim and Other Poems) (1875) ; <The Cynic) (1882) ; several plays; (The Whip Hand* (1884) ; (The Dove) (1888). He was a son of J. H. Meri-vale.

MERIWETHER, Lee, American law¬ yer, social reformer and author; b. Columbus, Miss., 25 Dec. 1862. Having obtained a second¬ ary education at Memphis, Tenn., he there pub¬ lished the Free Trader with a brother, Avery, in 1881-83, and in 1885-86 toured Europe afoot from Gibraltar to the Bosporus for study of the condition of Continental workingmen and of the protective tariff. In 1910, on the 25th anniversary of this ((Tramp** trip through Europe, he covered the same route in an auto¬ mobile; the contrast between walking and motoring abroad, and the changes that had taken place in the manners and customs of the peoples of Europe between 1885 and 1910 were interestingly set forth in a book entitled See¬ ing Europe By-Automobile) (New York 1911). He was appointed by the Secretary of the In¬ terior to write for the United States Labor Bureau a report on the (Condition of European Labor,* published in the annual report of the bureau for 1886. In 1886-89 he was employed as a special agent

of the Department of the Interior for which he made investigations of labor in the United States and the Hawaiian Islands, and in 1891 visited the island prisons of the Mediterranean. Pie was admitted to the bar in 1892, and in 1893 entered practice at Saint Louis. In 1889-90 and 1895-96 he was labor commissioner of Missouri. His reports on municipal government and street-railway franchises led to his nomination in 1897 for the mayoralty of Saint Louis on the Democratic ticket. He was defeated at that time and also in 1901, when he was candidate of the Public Ownership party. Besides his various reports, he has published (A Tramp Trip: How to See Europe on Fifty Cents a Day* (1887) ; (The Tramp at Home) (1890) ; (Afloat and Ashore on the Mediterranean* (1892); (Miss Chunk) (1899); (A Lord's Courtship) (1900); (Seeing Europe by Automobile) (1911) ; and other works.

MERLE D'AUBIGNtf, Jean Henri. See

D'Aubigne, Jean Henri Merle.

MERLIN, merlin, a semi-legendary Brit¬ ish prophet and magician, supposed to have flourished toward the end of the 5th century. The accounts of him are hopelessly mixed with fiction. He was said to be the son of a demon and the daughter of a British prince, and was brought up at Caer-Merlin, a city supposed to be the modern Carmarthen. He received from his father the power of working miracles and was the greatest sage of his time, the counsellor and friend of English kings. Vortigen, accord¬ ing to the legend, on the advice of his magi¬ cians, had resolved to build an impregnable tower for security against the Saxons but the foundation was scarcely laid when the earth opened by night and swallowed it up. The magicians informed the king that to give firm¬ ness to the foundation he must wet it with the blood of a child born without a father. After much search the young Merlin was brought to

the king. Merlin disputed with the magicians and showed them that under the foundation of the tower was a great lake, and under the lake two great raging dragons, one red, represent¬ ing the British, one white, representing the Saxons. The earth was dug open, and the dragons began a furious battle; whereupon Merlin wept, and uttered prophecies respecting the future state of England. Merlin is a char¬ acter in Tennyson's (Idylls of the King.-* A collection of the prophecies attributed to him appeared in Paris in 1498, at London in 1529 and 1533, at Venice, 1554. They can be traced back to about

1360. His prophecies were pub¬ lished at Edinburgh in 1615 and contain also those ascribed to the Cambrian or Welsh Mer¬ lin. Consult Child, (Her Book of Merlin* (New York 1904) ; Tennyson, Alfred, Udylls of the King.*

MERLIN. This dramatic narrative poem by Edwin Arlington Robinson is among the most distinguished and significant products of recent American literature, and bids fair to take its place beside the best of its very admi¬ rable kind. It is entirely modern in its spirit and treatment, with lines like these that mark its date:

“Time swings

“ A mighty scythe, and some day all your peace

“ Goes down before its edge like so much clover.”

In Mr. Robinson’s poem King Arthur and his knights are not romantic heroes, as other poets have made them, not <(our conception of what knighthood should be** ; they are a modern poet’s conception of what leaders of men always and universally are, — king, warrior, lover, fool ; Arthur, Gawaine, Lancelot, Dago-net. Nor is Mr. Robinson’s Merlin like Tenny¬ son’s — a magician in his dotage falling a victim to the wiles of a false woman. He is a prophet whose ((memories go forward** ; he is a man <(Who saw himself, A sight no other man has ever seen,** and he follows Vivian, <(a woman who is worth a grave,** because Fate wills it so. It is not the age of chivalry but our own time, our own double world of hope and of reality, with its loves, faith, fears, wars and failures that Mr. Robinson revivifies in (Mer¬ lin.* The philosophy of the poem, that faith and creative love will someday save the world, is a lustrous background for the story: <(The torch of woman, who, together with the light That Galahad found, is yet to light the world.** As a tale Merlin is vivid and compelling, with scenes, like that of Merlin’s first meeting with Vivian and his final parting, which rival the best in drama for beauty and intensity.

Edith J. R. Isaacs.

MERLIN, or STONE-FALCON, a small

and handsome European falcon (FEsalon reau-lus) prevailingly blue, known throughout the temperate parts of the old world, and very similar to the American pigeon-hawk (q.v) It is fierce and courageous, and is trained in falcony for the pursuit of the birds that form its natural prey.

MERMAID, a mythical being living within and under the sea, having the form of a woman above the waist and that of a fish below it. They are usually described as having great per¬ sonal charms, and as using these for the pur¬ pose of luring imaginative and amorous men to

destruction by enticing them into the depths of the sea ; and, as a correlative, they are some¬ times represented as securing their own destruc¬ tion by quitting the sea, through marriage with some favored human husband by which they magically obtain temporarily a complete human form and soul, but always end in bringing disaster to one or both of the sacrilegious pair. Mermen are also occasionally heard of, but take an unimportant part in the legendary lore of the sea.

This mediaeval notion is doubtless a survival of the primitive fancies, half fearful, half poetic, which created the classic conceptions of tritons, nereids, and the like. Shakespeare wrote (Ant. and Cleop., II, 2, 211) :

"Her gentlewomen, like the Nereides,

So many mermaids, tended her."

All of these ideas probably arose from a mixture of observed human resemblances in certain marine animals with purely mystical fancies which peopled the ocean with similitudes to terrestrial creatures. Primitive men have everywhere derived a large part of their sus¬ tenance from the natural products of the waters ; and always the vastness and mystery of the sea, full of strange creatures and incom¬ prehensible phenomena, have powerfully affect¬ ed the imagination of the ignorant and super¬ stitious. To this day the ocean is more familiar and more important in the life of many isolated peoples, who dwell upon its margin and derive their support almost exclusively from it, than is the land; and they invest it and everything it contains with a wondering regard which the inlander can neither share nor understand. To these, even in civilized regions (as on the coast of

Ireland or the Hebrides) mermaids remain only one of many present realities, herd¬ ing sea-cattle and lying in wait for unwary humanity as surely as when sea-horses raced over the Hfgean waves with the car of Poseidon or the Sirens tempted the mariners of ancient Greece. In one form or another such stories have been rife in the folklore of all maritime peoples since prehistoric times; and, although not so widespread, the belief in mermaids, and their kith and kin, is still a matter of firm faith with hosts of persons in all parts of the world. Folklore abounds in evidence of this.

The physical basis for these notions rests upon the resemblance which some marine ani¬ mals bear to human beings when seen at a dis¬ tance and in certain attitudes. Such, in north¬ ern countries, are various seals, which formerly abounded upon the coasts of western Europe, and still are to be seen in the less frequented spots. They have a way of lifting their round heads and shoulders from the water, . with a queer human intelligent look upon their faces, and hugging their young to their bosoms with motherly affection. Impressed with this re¬ semblance, easily turned into a story to beguile a long winter evening or to amuse a child, and growing with imaginative repetitions, the north¬ ern peoples were quick to believe the similar and more elaborate stories brought to them by early voyagers from the Mediterranean, and so the tales grew and changed into the rich folk¬ lore of the coasts of the North Sea.

The southern stories, embellished by classic culture into the sea-myths of Neptune, Pro¬ teus and the sea-nymphs of old, and descend¬ ing into the mermaids and mermen of mediaeval

folklore, yet alive around the Mediterranean and Oriental seas, and among sailors generally, probably have their root in the aspect of the East Indian and African dugongs (q.v.). Near at hand these uncouth monsters would never Le mistaken for human beings ; but seen at a dis¬ tance, by fearful and wondering voyages along the coast, such an error might easily happen, for they frequentlv stand upright among the weedy shallows of the coasts, perhaps draped with loosened vegetation like long hair, and holding to their breasts a young one who nurses from pectoral mammae much as a human baby would do. Such reports, brought back to the enquir¬ ing poetic minds of Greece, might easily blos¬ som into the tales of sea-mythology which formed so large and real a part of the popular belief as well as of the legendary lore of the classic age of India, Persia and the Mediter¬ ranean peoples. The fish-gods of the Phoeni¬ cians and other idolaters

are closely related.

From this has come down to us the exten¬ sive and varied use of mermaids and mermen in heraldry. ((In French heraldry,® says Rob¬ inson, (<the mermaid is called the Siren; in Ger¬ man she has two tails; in the Italian she car¬ ries a harp; and in many cases in each country she is crowned. In England it is a very ancient crest, and among others the lords Byron, the earls of Portsmouth … and many others

display the sea-maiden in their armorial bear¬ ing. With her comb and looking-glass she smiles at us from the shields of the Holmes, Ellises, Lapps; and as a supporter holds up the arms of the Viscounts Boyne and Hood, the earls of Howth and Caledon, and is borne by the heads of the families of Sinclair of Rosslyn, and Scott of Harden. Two mermaids crowned are the supporters of the Boston arms.®

Artificial mermaids, claiming to be preserved realities, have formed a part of the stock of curiosities of wonder-shows since time imme¬ morial ; and most of those exhibited since the days of Barnum have been the products of Jap¬ anese ingenuity.

Ernest Ingersoll.

MERMAID'S HEAD, a globose sea-urchin, as one of the heart-urchins.

MERMAID'S PURSE, the egg-case of the skate (or shark), which is often cast up empty on the shore.

MERMAN. See Mermaid.

MERO, or MEROU, a West Indian name for a jewfish (q.v.).

MEROBAUDES, Flavkis, a Spanish rhetorician and poet of the first half of the 5th century a.d., eminent also as a general, has left us a short hymn in honor of Christ and fragments of five historical poems. L. Jeep in his edition of Claudian (Leipzig 1876-79) pub¬ lishes four of these poems.

MERODACH, mer'o-dak, or BEL—

MERODACH. See Bel.

MERO&, mer'6-e, Egyptian Sudan, a city and state of ancient Ethiopia, in the northeast¬ ern part of Africa. The city is still represented by ruins and pyramids near Kabati on the Nile north of Khartum and the

state forms the dis¬ trict often spoken of as the Isle of Meroe, ex¬ tending southeast to Abyssinia, and in the

northwest forming a part of Nubia. It was distinguished for its mineral and cereal wealth and at an early dale was the centre of an active and varied commerce including the great cara¬ van trade between Ethiopia, Egypt, Arabia, northern Africa and India. The government was in the hands of a caste of priests, who chose a king who was obliged to live and act according to certain prescribed rules. The priests could sentence the king to death in the name of the gods, and he was forced to sub¬ mit. The priests were of a lighter complexion than the other inhabitants and may have come from India. Ergamenes, king of Meroe in the 3d century b.c., during the reign of Ptolemy II in Egypt, first made himself independent of this oppressive priesthood by murdering the priests in the golden temple. Meroe and Axum (in Abyssinia), which aopears to have been a colony of Meroe, remained the centre of the southern commerce till the time of the Arabians. The existing monuments of their architecture, and many other vestiges, exhibit an advanced religious and social cultivation. The Univer¬ sity of Liverpool in 1910-11 financed excava¬ tions here, interesting ruins were uncovered and, many valued relics obtained. Consult Budge, (The Egyptian Sudan) (London 1907).

MEROPE, the title of an Italian tragedy in blank verse by the Marquis Francisco Scipione Maffei (1675-1755), first performed at Modena in 1713. Appearing just after the dreary period of 17th century stagnation in Italian letters, it obtained a European reputa¬ tion. More than 60 editions were published and it was widely translated. It attained in Italy an unprecedented success on the stage and is important also for its influence upon the devel¬ opment of the Italian theatre, whose standard Mallei raised perceptibly.

The subject of the play is taken from Greek mythology as related by Apollodoro (II, 8-5) and Pausanias (IV, 3-6). Merope is the queen of Messena whose husband, Cresfonte, and two children have been murdered by her brother-in-law, Polifonte, who then usurps the royal

power and attempts to force the queen to marry him. On this tragic story Euripides wrote his (Cresfonte, } which is not extant. Maffei was the first modern dramatist to handle the material and reveal its superb possibilities. He dispenses with the love element so prev¬ alent at that time in the French theatre and proves that without it a play can retain the in¬ terest of the spectator. His idea is that such a play shall depict but a single passion, in this case a mother's love for her son.. The scene (III, 4) in which Merope, believing that she has in her grasp her son's slayer, discovers in him her own son, the transition from anger and vengeance to surprise and then to the motherly love, is profoundly impressive. The denoue¬ ment, the death of the tyrant (V, 6), at the foot of the altar, is equally effective. Notable as are the tragedies of Voltaire and of Alfieri dealing with the same subject with the power characteristic of each of these master minds, nevertheless in intensity of plot interest and in dramatic treatment, Maffei's (Merope5 remains unsurpassed. Consult (Opuscoli e lettere di Maffei) (Milan 1844), for the text and inter¬ esting material. A school edition, edited by A. C. Clapin was published in London in 1890. The text, with variations and introduction, ap¬

peared later in No. 108 of the (Bibliotheca Romanica.5

James Geddes, Jr.

MEROSTOMATA, a subclass of arthro¬ pods, allied to the Crustacea, and represented by only a single survivor (the horsefoot crab), but including a large series of fossil forms which flourished in the Palaeozoic Age from mid-Cambrian onward. They were somewhat scorpion-like in form, although sometimes of gigantic size, and ranked between the superior trilobites and inferior arachnids. The Merosto-mata are characterized by having six pairs of ambulatory limbs about the mouth, the first of which terminate in some, if not in all, cases in chilicerae. The others serve as organs of loco¬ motion, and their coxal joints for nrehension • and mastication. The prevailing opinion is that the body is divided into two parts (cephalo-thorax and abdomen) instead of three (head-shield, thorax and abdomen) has been changed by recent discoveries that make the trilobate character of the structure indubitable, and es¬ tablish a close relationship with the trilobites. The subclass comprises three orders, Xiphosura, the horsefoot crabs (q.v.), several species of which still exist ; the Synxiphosura, Silurian and Cambrian fossil forms; and Eurypterida (see Eurypterus). Consult Packard, (Zoology) (1897), and Zittel-Eastman, (Textbook of Paleontology5. (Vol. 1, 1900), which contains an extensive

bibliography.

MEROVINGIANS, mer-6-vin'ji-anz, the first dynasty of Frankish kings which ruled in the northern part of Gaul, since called France. They derived their name from Merowig (Merovaeus), the grandfather of Clovis. They ruled from 496 till 752, when they were sup¬ planted by the Carlovingians. Pepin the Short caused the overthrow by deposing Childeric III, and sending him to a monastery. See France.

MERRELL, John Porter, American naval officer: b. Auburn, N. Y., 7 Sept. 1846; d. New London, Conn., 8 Dec. 1916. He was graduated at the United States Naval Academy in 1867, served with the European fleet 1867-70; was on signal duty on the Washington and Darien ex¬ pedition of 1870-71, was in charge of the naval ordnance proving grounds 1877-79. He was also for a time an instructor at Annapolis and had command of the Atlantic fleet. He also did active work in the Department at Washing¬ ton. He was retired by operation of law 7 Sept. 1908. In 1895-96 he was a member of the State Department. Commission to investigate anti-foreign riots in the province of Szechuen, China.

MERRIAM, Augustus Chapman, Amer¬ ican classical scholar : b. Locust Grove, N. Y., 1843 ; d. Athens, Greece, 1895. He was grad¬ uated at Columbia University in 1866 and after 1868 was connected with that institution suc¬ cessively as tutor, adjunct professor of Greek, and professor of Greek archaeology and epi¬ graphy. Dr. Merriam did much to promote the study of classical archaeology in the United States. In 1887-88 he was director of the American School at Athens. He published (The Phaeacians of Homer5 (1880) ; (The Greek and Latin Inscriptions on the Obelisk Crab in Central Park) (1883) ; (The Sixth and Seventh Books of Herodotus5 (1885) ; (The

merriam

Law Code of Gortyna in Crete) (1886); (Telegraphy among the Ancients* (in Papers of the Archaeological Institute of America: Classical Series III, Cambridge 1890).

MERRIAM, mer'i-am, Clinton Hart,

American biologist and author: b. New York City, 5 Dec. 1855. He was graduated from Yale in 1877 and from the College of Physicians and Surgeons in New York in 1879, and prac¬ tised medicine 1878-85. He was United States Bering Sea commissioner in 1891 and visited Alaska in the interest of fur seal investigations. He has held various commissions from the gov¬ ernment in the field of biology and has made explorations in its interest in the far West. In 1910 he was placed in charge of the biological and ethnological investigations carried on under the fund established by Mrs. Harriman. He has written (Birds of Connecticut (1877); (Mammals of the Adirondacks* (1882-84) ; (Results of Biological Survey of San Francisco Mountain Region and Desert of Little Colorado in Arizona) (1890) ; (Flora and Fauna of the Death Valley Expedition* (1893) ; (Life Zones and Crop Zones of the United States* (1898) ; (Indian Population of California) (1905) ; (Totemism in California) (1908) ; (The Dawn of the. World* (1910), and about 400 papers on zoological, botanical and ethnological subjects.

MERRIAM, Henry Clay, American sol¬ dier: b. Houlton, Me., 13 Nov. 1837; d. 1912. He was graduated from Colby University, and began the study of law; but in 1862 entered the Union army as captain in a Maine regiment. He was at the battle of Antietam in 1862, and organized the colored troops in 1863, being lieu¬ tenant-colonel of the Louisiana Native Guard (a negro regiment) at the close of the war; he led the assault on Fort Blakely 9 April 1865, and obtained a medal of honor from Congress for gallant conduct. In 1866 he was appointed major in the regular United States army, and rose to the rank of brigadier-general in 1897 and major-general of volunteers in the Spanish War, 1898. He served in many expeditions against the Indians, and protected American citizens in the valley of the Rio Grande in the revolutionary troubles (1873-76). In 1898 he was

commander of the departments of the Columbia and California, and organized, equipped and forwarded the troops to the Philippines ; and in 1899 was sent to the Philip¬ pines in command of the army of occupation. In January 1900 he was placed in command of the Department of the Colorado, and in 1901 was retired from active service. He is the in¬ ventor of the Merriam infantry pack.

MERRIAM, John Campbell, American educator and paleontologist : b. Hopkinton, Iowa, 20 Oct. 1869. In 1887 he was graduated at Lenox College, Iowa, and in 1893 received the degree of Ph.D. at the University of Munich. In 1894-99 he was instructor in paleontology and historical geology; in 1899— 1905 assistant professor; in 1905-12 associate professor, and after 1912 professor of paleontol¬ ogy at the University of California. Professor Merriam is a Fellow of the American Associa¬ tion for the Advancement of Science, of the American Palaeontological Society, and other learned bodies. He is the author of numerous papers on fossil reptiles and fossil mammals of western North America, and on the general historical geology of the Pacific Coast region.

MERRIAM, William Rush, American financier: b. Wadham's Mills, N. Y., July 1849. He was graduated from Racine College, Wis¬ consin, in 1871 and entered the First National Bank of Saint Paul where he was cashier in 1873. In 1880 he was president of the Mer¬ chants' National Bank there and in 1882 became a member of the State legislature of Minnesota and was speaker in 1886. He was elected governor of Minnesota in 1889 and was director of the United States census in 1898—1903.

MERRICK, Frederick, American educa¬ tor b. Wilbraham, Mass., 1810; d. 1894. He received his education at the Wilbraham Wesleyan Academy and at Wesleyan University. He was made principal of Amenia Seminary at Amenia, N. Y., and held the chair of natural science at Ohio University, Athens, Ohio, from 1838 to. 1843. In the latter year he began his connection, with Ohio Wesleyan University which continued until his death. For 13 years he was president of that institution. Merrick was a supporter of the Underground Railway and otherwise an active Abolitionist. He was ordained to the ministry of the Methodist Episcopal Church and took part in the General Conferences of 1860, 1864 and 1876. He en¬ dowed the . Merrick lectureship at Ohio Wesleyan University. He published poems and contributions in religious journals and the volume, formalism* (1865).

MERRICK, mer'ik, Leonard, English nov¬ elist : b. Belsize Park, London, 21 Feb. 1864. He was. educated at Brighton College, and among his novels, several of which have been reprinted in this country, are: (Mr. Bazalgette's Agent* ; (The Man Who WasGood) ; (Cynthia: a Daughter of the Philistines* ; (When Love Flies Out of the Window. > He is also the author of several plays.

MERRIFIELD, mer'i-feld, Webster, Amer¬ ican educator: b. Williamsville, Vt., 27 July 1854; d. 22 Jan. 1916. He was graduated from Yale in 1877 and was an instructor there 1879-83. From 1884 to 1891 he was professor of Greek in the University of North Dakota, pro¬ fessor of political economy, 1891-1903, and president of the institution since 1891.

MERRILL, Elmer Truesdell, American university professor: b. Millville, Mass., 1 Jan. 1860. In 1881 he was graduated at Wesleyan University and subsequently studied at Yale, 1885-86, the Universitv of Berlin, 1886-87, Rome 1892, 1895, 1898-99, 1903, and in England. In 1882-83 he was instructor in classics at the Massachusetts State Normal School, Westfield; in 1883-86 tutor in Latin at Wesleyan; in 1887— 88 professor of Latin at the University of Southern California; in 1888-1905 Robert Rich professor of Latin language and literature at Wesleyan University. In 1905 he became pro¬ fessor of Latin language and literature at Trin¬ ity College, Hartford, and in 1908 was ap¬ pointed professor of Latin at the University of Chicago. Dr. Merrill was chairman of the American School of Classical Studies in Rome in 1900-01 and professor there in 1898-99. Since 1906 he has been associate editor of Classical Philology. He has edited (Poems of Catullus) (1893) ; ˆFragments of Roman Satire1* (1897) ; (Selected Letters of the Younger Pliny* (1903) ; (C. Plini Caecili Secundi Epistularum Libri NovetrP (1914).

MERRILL, Frederick James Hamilton,

American geologist: b. New York, 30 April 1861. In 1885 he was graduated at the Colum¬ bia School of Mines, received the degree of

D.Ph. there in 1890 and was assistant in the New Jersey Geological Survey 1885-89. In 1890-93 Dr. Merrill was assistant State Geolo¬ gist of New York. In 1890-94 he was assistant director, in 1894-1904 director of the New York State Museum. He had charge of the New York exhibits at the expositions, Chicago 1893, Buffalo 1901 and Saint Louis 1904. Since 1904 he has been in private practice as mining geol¬ ogist. He published (Salt and Gypsum Indus¬ tries in New York5 (1893); (Mineral Re¬ sources of NewYork> (1896) ; (Road Materials and Road Building in New York) (1897) ; (Natural History Museums of the United States and Canada5 (1903).

MERRILL, mer'il, George Edmands,

American Baptist clergyman and educator: b. Charlestown, Mass., 19 Dec. 1846; d. Hamilton, N. Y., 11 June 1908. He was graduated from Harvard in 1869, and from the Newton Theo¬ logical Seminary in 1872. Entering the Bap¬ tist ministry, he was pastor at Springfield, Mass. (1872-77) ; at Salem, Mass. (1877-85) ; at Colorado Springs (1885-87) ; and at Newton, Mass. (1890-99). In 1899 he was called to the presidency of Colgate University, Hamilton, N. Y., where his administration improved the standard and awakened interest in many new lines of college activity. He wrote (Story of the Manuscripts) (1881) ; (Crusaders and Captives> (1890) ; (The Reasonable Christ5 (1893) ; (The Parchments of Faith> (1895).

MERRILL, George Perkins, American geologist : b. Auburn, Me., 31 _ May 1854. He was graduated at the University of Maine in 1879. He has been head curator of the de¬ partment of geology in the United States Na¬ tional Museum since 1897, and professor of geology and mineralogy in George Washington University since 1893. He was special agent for the 12th census. He has published (Stone for Building and Decoration5 (1891-1903) ; (Rocks, rock-weathering and Soils) (1897-1907) ; (Handbook of the Department of Geol¬ ogy United States National Museum5 (1892) ; <Non-Metallic Minerals) (1901-04-10) ; his¬ tory of North American Geology> (1905) ; Catalogue of Meteorite Collection in United States National Museum5 (1915), and many papers to scientific societies. Dr. Merrill is a member of the Geological Society of America, of the Washington Academy of Science and of other learned bodies.

MERRILL, Lewis, American soldier: b. New Berlin, Pa., 28 Oct. 1834; d. Philadelphia, 27 Feb. 1896. He was graduated from West Point in 1855, and at the outbreak of the Civil War was appointed colonel of a volunteer cav¬ alry regiment and served with distinction through the war. He was active in warfare with the Indians and performed the

notable service of breaking up the Kuklux Klan in 1868, which was recognized by Congress after some delay by promotion to the rank of lieutenant-colonel of cavalry. He retired from active service in 1891.

MERRILL, Selah, American Congregationalist clergyman and archaeologist: b. Can¬ ton Centre, Conn., 2 May 1837; d. 1909. He

was educated at Yale and at the New Haven Theological Seminary and was ordained to the ministry in 1864 when he entered the Federal army as chaplain. He held pastorates in Leroy, N. Y., and in San Francisco, and was for a time professor of Hebrew at Andover Theolog¬ ical Seminary. In 1882-86, 1891-94 and after 1898 he served as United States consul at Jeru¬ salem and made valuable archaeological re¬ searches and discoveries there. In 1907 he became consul at Georgetown, Guiana. He wrote (East of the Jordan5 (1881) ; (Galilee in the Time of Christ5 (1881) ; ˆThe Site of Calvary5 (1885) ; *etc.*

MERRILL, Stephen Mason, American Methodist bishop: b. Jefferson County, Ohio, 16 Sept. 1825; d. Keyport, N. J., 12 Nov. 1905. He studied for the ministry and was ordained by the Ohio Conference in 1846, and in 1868-72 was editor of the (Western Christian Advo¬ cated In 1872 was appointed bishop. He pub¬ lished ˆChristian Baptism5 ; (Union of Amer¬ ican Methodism5; <Sanctification) (1901); 'Miracles5 (1902).

MERRILL, William Emery, American military engineer: b. Fort Howard, Wis., 11 Oct. 1837 ; d. near Edgefield, Ill., 14 Dec. 1891. He was graduated from West Point in 1859 and for a year prior to the outbreak of the Civil War was assistant professor in engineering at West Point. He went to the front in 1861, and served with distinction at Yorktown, Chickamauga, Missionary Ridge and other famous battles and in 1864-65 had charge of the railroad v/hich supplied the armies in Georgia and Ten¬ nessee and was brevetted colonel for his serv¬ ices. After the war he served as chief engi¬ neer on the staff of General Sherman and was engaged in western surveys and the improve¬ ment of rivers. He was in charge of the im¬ provement of the Ohio River at the time of his death which occurred on a railroad train. He wrote (Iron Truss Bridges for Railroads5 (1870) and 'Improvement of Non-Tidal Rivers5 (1881).

MERRILL, Wis., city, county-seat of Lincoln County; on the Wisconsin River, and on the Chicago, Milwaukee and Saint Paul Railroad; about

145 miles north of Madison. It was settled in 1875 and incorporated in 1880. It is in a part of the State where the chief industries are connected with lumbering. Mer¬ rill has manufacturing establishments for shin¬ gles, laths, planed lumber, sawed lumber, sash, doors and blinds, clapboards, lumber for inte¬ rior finish, flooring, *etc.* It has a high school, a daily newspaper, an opera house, a court¬ house which cost about $100,000, and the T. B. Scott Public Library. Pop. 8,689.

MERRIMAC, mer'i-mak, a river of New Hampshire, which has its source at Franklin where the Pemigewasset and Winnipisaukie riv¬ ers unite. The Winnipisaukie is the outlet for the lake of the same name ; the Pemigewasset has its rise in the northern part of Grafton County, in the White Mountains. The Merrimac flows nearly due south into the State of Massachusetts when it turns, continuing its course east, then northeast to the Atlantic Ocean. The mouth of the river is a tidal estu¬ ary which is navigable for steamers of good size. At the entrance is a sand bar which is constantly changing, and which is a hindrance

to navigation. The river is navigable for small steamers as far as Haverhill. The extensive water-power of the Merrimac has been the nain cause of the development and prosperity of the entire region. Some of the largest cot-ton-mills of the country were erected on its banks, and many woolen mills, carpet mills and other manufactories. Newburyport is at the mouth of the river. Other important places on its banks are Haverhill, Lawrence and Lowell, in Massachusetts, and Nashua, Manchester and Concord in New Hampshire. The length from the source of the Pemigewasset to the ocean is 183 miles; its drainage area 5,000 miles.

MERRIMAC, The, a frigate of the United States navy. See Monitor and Merrimac, The.

MERRIMAN, mer'i-man, Henry Seton.

See Scott, Hugh Stowell.

MERRIMAN, Mansfield, American engi¬ neer and author : b. Southington, Conn., 1848. He graduated from the scientific department at Yale in 1871, was with the United States Corps of Engineers for two years, and in 1875 be¬ came instructor in civil engineering at the Shef¬ field Scientific School (Yale). In 1878 he re¬ signed to accept a position as professor of civil engineering at Lehigh University, which he oc¬ cupied for 29 years. During a part of this period he was also called upon to assist the United States Coast and Geodetic Survey. Since 1907 he has devoted most of his time to consultation on important works, mainly in hydraulics. He has written many textbooks, widely used by the colleges. Among them are (Method of Least Squares) ; (Mechanics of Materials) ; (A Text Book on Roofs and Bridges) (4 vols., Jacob coeditor) ; (Treatise on Hydraulicsˆ ; (Handbook for Surveyors*; (Strength of Materials; (Precise Surveying) ; (Elements of Sanitary Engineering) ; (Ele¬

ments of Hydraulics.* Every one of these has passed through several editions. He was also chief editor of the (American Engineers' Pocket Book,* and has contributed to numerous techni¬ cal and scientific papers.

MERRITT, Ernest George, American physicist : b. Indianapolis, Ind., 28 April 1865. In 1881-82 he studied at Purdue University and in 1886 was graduated M.E. at Cornell. He made graduate studies at Cornell in 1887-88 and at the University of Berlin in 1893-94. In 1 888—9 1 he was instructor in physics, in 1892-1903 assistant professor, and after 1903 profes¬ sor at Cornell. From 1909 to 1914 he was dean of the Graduate School. Dr. Merritt is a con¬ tributor to scintific journals on investigations in physics.

MERRITT, mer'it, Wesley, American soldier: b. New York, 16 June 1836; d. Wash¬ ington, D. C., 3 Dec. 1910. He was gradu¬ ated from West Point in 1860 and served with honor through the Civil War and for bravery at Gettysburg was brevetted major. His services at the battles of Yellow Tavern and Winches¬ ter gained for him the rank of brigadier-gen¬ eral and major-general. He was assigned chiefly to frontier duty from the close of the Civil War until 1882 when he was made super¬ intendent of West Point and in 1887 placed on duty at Fort Leavenworth, Kan. He com¬ manded the Department of the East, 1897-98 and

in May 1898 was put in command of the United States troops in the Philippines and conducted the campaign to a successful termi¬ nation.

After the close of the Spanish-Amer- ican War he was ordered to Paris in order to assist the work of the American peace com¬ missioners. He was retired in June 1900.

MERRITT, William Hamilton, Canadian mining engineer : b. Saint Catherines, Ontario, 1855. He received his education at Upper Can¬ ada College, the Royal Military School, and the Royal School of Mines, London. Returning to Canada he practised his profession in Toronto; was a member of the Canadian commission to the Paris Exposition of 1878 and subsequently was made lecturer in mining engineering in the Kingston School of Mining. He became a cornet in the governor-general's body-guard in

1884, took part in suppressing Riel's rebellion in

1885, in the Boer War in 1899-1902. Mr. Mer¬ ritt was also chosen president of the Ontario Mining Institute. He contributed to the (Proceedings) of the London Geological Society, the (Proceedings) of the American Institute of Mining Engineers; the (Proceedings) of the Canadian Institute and is author of (Economic Minerals of Ontario) (1896) and (Field Test¬ ing for Gold and Silver) (1900).

MERRY, William Walter, English An¬ glican clergyman and classical scholar: b. Wor¬ cestershire, 6 Sept. 1835. He was educated at Balliol College, Oxford, and has been rector of Lincoln College there from 1884. He is widely known for his editions of the classics published by the Clarendon Press and including the (Odyssey* (Books I to XII, 66th thou¬ sand; XIII to XXIV, 16th thousand; and the plays of Aristophanes. He is the author of (The Greek Dialects) (1875).

MERRY DEL VAL, Rafael, cardinal of the Roman Catholic Church : b. London, 10 Oct. 1865. His father, Don Marquis Merry del Val, was partly of Irish ancestry, being descended from the Irish family Merry established in Spain ; and his mother, daughter of Don Pedro Jose de Zulueta, Count de Torre Diaz, although of Spanish origin, was English by education. At the time of Rafael's birth his father was secre¬ tary to the Spanish embassy, London, the boy's early studies being pursued in the English metropolis. Later he attended the Jesuit Col¬ lege of Saint Michael, Brussels, afterward taking a course at Ushaw, and was subsequentlv chosen private tutor to Alfonso XIII. When his father was appointed Spanish Ambassador to the Vatican young Rafael accompanied him to Rome and entered the Gregorian University where, in preparation for the priesthood, he studied philosophy and theology, receiving the degree of doctor of philosophy and theology conferred by this institution. At the age of 24 he was ordained a priest

and, although intended for the diocese of Westminster, was retained in Rome and soon became cameriere participante to Pope Leo XIII. Four years later he was appointed master of the robes and privy cham¬ berlain to Leo XIII, taking up his residence in the Vatican. Despite Monsignor Merry del Val's youth his linguistic knowledge, which in¬ cluded a fine command of English, French, Spanish and Italian, and his cosmopolitan train¬ ing qualified him admirably for the fulfilment of various important missions. In 1887 he accom-682

panied the papal envoy, Monsignor Scilla, to Queen Victoria's jubilee and in 1896 went as papal delegate to Canada to investigate the question of separate Catholic schools in Mani¬ toba, his report to the Holy See calling forth the Affari vos, Leo XIII's famous letter to the Catholics of Canada. It was likewise in 1896 that Monsignor Merry del Val was made secre¬ tary to the commission appointed to determine the validity of Anglican orders. In 1899-1901 he was president of the College for Noble Ecclesiastics, in 1900 was consecrated titular bishop of Nicsea and in 1902 made titular arch¬ bishop of Nicocia. The same year he was appointed papal envoy to the coronation of King Edward VII and his book on the (Truths of the Papal Claims) was given to the public. In the interregnum following the death of Leo XIII, Cardinal Oreglia, dean of the College of Cardinals, named Archbishop Merry del Val secretary to the conclave of cardinals that elected Pius X. This pontiff appointed the young archbishop Papal Secretary of State and on 9 Nov. 1903, elevated him to the cardmalate. Cardinal Merry del Val is secretary of the Congregation of the Venerable Fabric of Saint Peter's ; archpriest of the Vatican Basilica and also a member of the Commission for the Codification of Canon Law. His term of office as Papal Secretary of State expired at the death of Pius X.

MERRY ENGLAND, a popular name for England. The word merry is used, not in the sense of gaiety, but according to its earlier meaning, that is, agreeable, or pleasant; as in the phrase, ((merry month of May.®

MERRY MOUNT, a district near the present town of Quincy, Mass., which in the early colonial days of New England was occu¬ pied by a party of men belonging to the Church of England. They paid little respect to the rigid and austere habits of the Puritans whom they

greatly offended by the laxity of their manners. An attack was made upon this settle¬ ment by the forces of the Plymouth colony in 1630. John Lothrop Motley, the historian, pro¬ duced in 1849 a romance entitled (Merry Mount. }

MERRY WIVES OF WINDSOR, The, Shakespeare's greatest prose play. It contains only about 15 per cent of verse lines, and in the spirit of its scenes is equally subdued, save for a flash of the old fire in the fairy poetry at the close. Dennis and Rowe report a story, cur¬ rent at the opening of the 18th century and inherently plausible, to the effect that this play was written within two weeks to the special order of Queen Elizabeth, who desired to see Falstaff in love. The wish is worthy of the Queen's taste and the manner in which it was satisfied indicates that Shakespeare did not work spontaneously. In point of time the play belongs with the greatest comedies — with (Much Ado about Nothing, > (Twelfth Night,) and (As You Like it. > It was licensed for publication in January 1602 and most likely composed shortly before, for it is hard to be¬ lieve that the Falstaff of this play can have been created while recollection of the great Falstaff of (Henry IV* (1597, 1598) was very fresh in the author's mind. There is a radical difference between the two characters. In the (Merry Wives> Falstaff loses most of his peculiar wit and all the graver, pathetic side of his char¬

acter. He loses his charm, not only for the spectator but for his companions. I here is a sense of positive disaster in seeing the invincibly lovable knight of (Henry IW and 'Henry V} betrayed by his own creatures, Nym and Pistol (II, i), just as there is in hearing the Titanic liar of the Gadshill episode ignominiously re¬ lating to Brook-Ford (in III, v) the whole sorry truth of his discomfiture. (<I do begin to perceive that I am made an ass,® he is forced to say in the final scene, and Shakespeare must have felt as keenly as his readers the pity of thus reducing Falstaff to the level of Dog¬ berry and Bottom. The play is brisk and en¬ tertaining, and is constructed with masterly technique, but it deals wholly with the externals of character and with unlikely incidents. Its type-figures — Slender, Sir Hugh, Dr. Caius, the Plost, — when compared with Mercutio, Sir Toby, or the old Falstaff, are like pygmies after giants. There is no reason to believe that (The Merry Wives of Windsor* was regarded with special favor by the Elizabethans. After the Restoration it seems to have become one of the most popular of Shakespeare's comedies, though Samuel Pepys registers emphatic dissent when noting in -his diary that on 15 Aug. 1667 he saw (The Merry Wives of Windsor, *(<which did not please me*

at all, in no part of it.® Pre¬ cisely a century after its first publication, in 1702, a revised version by Dennis was brought out with the title, (The Comical Gallant, or The Amours of Sir John Falstaffe. Since the rise of the romantic movement, it has been one of the least liked of Shakespeare's comedies.

Tucker Brooke.

MERSEN, Treaty of, effected 8 Aug. 870 at Mersen, Holland, between Charles the Bald of France and his half brother Louis of Ger¬ many by which Lotharingia or Lorraine, the kingdom of their nephew Lothair II (d. 869), was divided between the east and west Frankish realms — France and Germany. From this date the history of the two national divisions and of the European state system begins.

MERSEY, mer'zi, England, a river formed at Stockport by the union of the rivers Goyle and Tame. It flows in a general southwest di¬ rection to Runcorn, where it expands into an estuary two to three miles broad, near the mouth of which, on the north side, is Liverpool, with Birkenhead opposite, and below which it joins the Irish Sea. Since 1886 a railway tun¬ nel under the Mersey has afforded communica¬ tion between Liverpool and Birkenhead. The entire length of the river, including the estuary, is 70 miles. Principal affluent, the Irwell, to which it is navigable. The Bollin and the Weaver are affluents from Cheshire. With the Mersey and Irwell is now closely connected the great Manchester shipcanal (q.v.) which opens into it.

MERSPION, Ralph Davenport, American electrical engineer and inventor : b. Zanesville, Ohio, 14 July 1868. In 1890 he was graduated at Ohio State University; from 1891 to 1900 was connected with the Westinghouse Company at Pittsburgh and New York, and thereafter entered private practice as consulting engineer. He installed several important high voltage transmission systems in Colorado, Montreal, Tokio, Japan and in South Africa. He in¬ vented the six-phase rotary converter, a com-

pounded rotary converter, a system of lightning protection for electric apparatus and a com¬ pensating voltmeter. In 1912—13 he was presi¬ dent of the American Institute of Electrical Engineers and is a member or Fellow of several scientific societies. He is the author of numer¬ ous technical papers.

MERSINA, Asia Minor, town on the south¬ east coast of Asia Minor, five miles south by west of Adana. It is the principal seaport of the south coast. The climate is unhealthful in summer. The harbor is an ooen roadstead. An American mission is located here and there is also a consular agent of the United States. Pop. 15,000, half of whom are Christians, Armenian, Greek and European.

MERSON, Luc Oliver, French painter: b. Paris, 21 May 1846; d. 14 Nov. 1920. He studied at the Ecole des Beaux Arts and under G. Chassevent and of Pils. His first picture ex¬ hibited in the Salon was (Leucothea and An-axandrosˆ (1867). In 1869 he carried off the Grand Prix de Rome, the supreme ambition of art students, by his painting (The Soldier of Marathon.) He produced the same year (Apollo the Destroyerˆ now in the Museum of Castres. In 1872 he painted (The Martyrdom of Saint Edmund of England) (Museum of Troyes). Thereafter he devoted his pencil to the portrayal of legendary and mythological scenes and in¬ cidents. His chief works in this class are (The Vision, a Legend of the 14th Century > (1873) ; (A Patriot Sacrifice* (1874) ; (Saint MichaeP (1875); (Saint Francis and the Wolf of Agubbio* (1878) ; (Saint Isidore) (a triptych) (1879) ; (The Judgment of Paris witnessed by Eros* (1884) ; (Mankind and Fortune) (1892) ; (The Annunciation (1903). He also frescoed with scenes from the life of Louis IX the walls of the Saint Louis gallery in the Palais de Jus¬ tice at Paris.

MERTHYR TYDFIL, mer'ther tid'vil, or TYDVIL, Wales, a market and manufacturing borough of Glamorganshire, 24 miles by rail northwest of Cardiff, on the Taff, at the north¬ ern end of Taff Vale. It is the third largest place in Wales, and with the suburbs is 27 square miles in area. From an unimportant village in 1780, Merthyr Tydfil has become a prosperous centre of steel and iron manufac¬ tures, owing to its situation near the valuable coal and mineral fields of South . Wales. Bessemer steel was first rolled into rails here. Since the local iron became reduced, the pig is mainly imported from Spain. The town has undergone much modern improvement and is noted for its municipal enterprises, one of its investments being the purchase of the historic Cyfarthfa Castle, with a small lake and 62 acres of ground, and converting them into a public park. Public baths and two sewage farms are maintained. Pop. about 83,946.

MERTON, Walter de, English bishop: d. about 27 Oct. 1277. He was graduated at Oxford University, of which he was appointed chancel¬ lor by Henry III in 1261, and three years later instituted the collegiate, or separate house sys¬ tem of the English University, by establishing the college which is called after his name. Here the secular clergy were to be educated in philosophy, the liberal arts and theology. The system he thus introduced has been the secret of success both to Oxford and Cambridge, and

was originated chiefly with the object of rais¬ ing up secular schools which might check the power of the monasteries and eventually super¬ sede them as centres of education. He was ap¬ pointed bishop of Rochester in 1274.

MERTON COLLEGE, Oxford, England, was originally founded in 1264 at Malden, Sur¬ rey, by Walter de Merton (q.v.), and removed to Oxford in 1274, where its collegiate buildings are among the oldest and most interesting in the city, the chapel especially being noted for its proportions and beauty. The foundation consists of a warden, 19 fellows, 18 postmasters or scholars, 34 exhibitioners, four lecturers, two chaplains, and in 1912, 150 under¬ graduates. Among its famous alumni are Har¬ vey, the demonstrator of the circulation of the blood. Anthony Wood, Sir Thomas Bodley and Sir Richard Steele.

MERU, mer'oo, in Hindu mythology, the sacred mountain at the earth's centre on whose summit resides Siva, sustaining and uniting earth, heaven and hell. It contained the cities of the Hindu gods, and was the abode of the celestial beings. It was believed that the plan¬ ets revolved around it.

MERV, merv (sometimes written Meru), Russia, an oasis in Central Asia, in the south of Western Turkestan, and about 120 miles north of the frontier of Afghanistan, now tra¬ versed by the railroad from the Caspian to Samarkand. It has an area of 1,900 square miles, and is crossed by the 37th meridian and 62d parallel. One-fourth of this area is arti¬ ficially irrigated. It is watered by the Murghab and produces wheat, cotton, sugar, silk, *etc.* In the midst of the oasis are the ruins of the ancient town of Merv, founded by Alex¬ ander the Great, and subsequently held by Syri¬ ans, Arabs, Mongols and Persians. A new town New Merv, has grown up on the Murghab, where the Trans-Caspian Railway crosses the river, with a citadel ; it has been made the capi¬ tal and its population is about 15,000. The oasis generally is the principal seat of the Tekke Turcomans, who from this centre used

to make predatory incursions into Persia and Afghanistan. In 1815 the oasis was subjugated by the Khan of Khiva, to whom it remained tributary for about 20 years. Subsequently Persia attempted to make good the claims which it had long made to this district, and in 1860 fitted out an expedition for the purpose, which, however, miscarried completely, as did another expedition in 1876. In 1881 General Skobeleff led a Russian expedition against the Tekke Turcomans, captured their stronghold of Geok-Tepe, and received the submission of their principal leader. The district of Merv subsequently came under the power of Russia. Merv is of great strategical importance, and considerable interest was attached to it in con¬ nection with the advances made by Russia in the direction of India. Pop. 250,000.

MERWIN, Henry Childs, American law¬ yer: b. Pittsfield, Mass., 5 Aug. 1853. He was graduated from Harvard in 1874 and was for some years lecturer in the law school of Boston University. Has been employed by the Massachusetts legislature since 1900 to write and revise statutes. Beside editing several legal works he is the author of Patentability of Inventions> (1884) ; (Road, Track and Stable)

(1893); <Life of Aaron Burr> (1899); (Life of Thomas Jefferson> (1901) ; (Life of Bret Harte> (1910).

MERYCODUS, or COSORYX, a small antlered antelope fossil in the Miocene forma¬ tions of the western United States. It was about the size of a dorcas gazelle, but with shorter limbs and neck and belonged to the family Antilocapridce, now represented only by the pronghorn ; but it bore relatively tall three-tined antlers, which were deciduous and precisely like those of deer. Minute lateral toe-rudiments hung high above all the hoofs, but these were relatively smaller than in deer ; in the modern pronghorn no trace of these re¬ mains. It was probably a collateral ancestor of the antelopes. Blastomcryx is a closely re¬ lated genus somewhat more primitive. A very complete skeleton, collected by W. D. Matthew, is exhibited in the American Museum of Nat¬ ural History at New York.

MˆRYON, Charles, sharl ma-re-on, French etcher: b. Paris, 23 Nov. 1821; d. Charenton, 14 Feb. 1868. He entered the navy, after studying at Brest, but failing health, forced his resignation, and he settled in Paris, studying etching there. His chief works were pic¬ turesque spots in old Paris, many since de¬ stroyed. A series of 23 plates by him appeared 1850-54. His last years were spent in an insane asylum at Charenton. Consult Wedmore, (Meryon and Meryon's Paris) (1879) ; Burty, (L'CEuvre de Charles Meryon, > translated by Huish (1879) ; Bouvenne, (Notes et Souvenirs sur Charles Meryon) (1883).

MESA, Ariz., town in Maricopa County, on the Arizona Eastern Railroad, 20 miles south¬ east of Phoenix. It contains numerous Toltec remains, a government experimental farm and power plant, the 'Granite Reef Dam, a public library and fine school buildings. It has ex¬ tensive agricultural, fruit-growing and stock-raising interests. The town grew from a Mor¬ mon colony established here in 1879. The

municipality owns the water supply system.

Pop. (1920) 3,036.

MˆSA, or TABLE MOUNTAIN, any flat topped hill which stands out prominently above the surrounding area. The flatness is usually due to a horizontal layer of hard rock cappmg the hill. Many of our most noted mesa areas are the result of lava flows that cap and protect softer layers beneath. Butte is sometimes used in a similar sense, though it is more often applied to steep-sided prominent hills that are not notably flat-topped.

MESA VERDE NATIONAL PARK,

Colo., a reservation of 48,966 acres in Monte¬ zuma County, southwestern Colorado. Within its area, in canyons of the Mancos River, are the most remarkable of the many ruins of pre¬ historic cliff dwellings in the southwestern United States. The Mesa Verde (Sp. (<green-table® so named from its vegetation) is a high tableland, dividing the Mancos and Monte¬ zuma valleys. This mesa is elevated above the valleys some 2,000 feet, and rises abruptly from tbeir floors, with precipitous sides, like the walls of a canyon. The northern extremity of this great mesa terminates in Point Lookout, which juts out between the two valleys, a land¬ mark for miles in all directions. The highest

part of the Mesa Verde National Park, Park Point, near the northern

boundary, is 8,574 feet above sea-level, while Point Lookout has an elevation of 8,428 feet above sea-level. The northern edge of the mesa terminates in a pre¬ cipitous bluff, averaging 2,000 feet above the floor of the Montezuma Valley. The general slope of the mesa is to the south, so that a per¬ son on the northern rim has a view in ail direc¬ tions. The surface of this tableland is broken by innumerable canyons, which start from the very edge of the mesa on the northern and west¬ ern sides, and, growing deeper and more rugged as they descend, finally open out into the Man¬ cos Canyon. These canyons have many great caverns in their side walls, with the overhang¬ ing rock for roofs, and in these caverns are found the ruins of the cliff dwellings. The principal ruins are found in Navajo, Cliff, Soda, Long and Rock Canyons, though there are hun¬ dreds of lesser ruins in all the canyons in the park. Spruce Tree House is in Spruce Canyon, a branch of Navajo; Cliff Palace is in Cliff Canyon ; Balcony House is in Soda ; Peabody House and Inaccessible are in Navajo; Long House is in Rock Canyon. A ruin in Long Canyon was entered by one of the rangers in 1914 for the first time since it was abandoned by its original tenants. Its difficult approach had protected it from all vandalism, and it was found just as it had been left, no one knows how long ago. One sealed room contained a fine collection of jars and implements. It was reached by swinging a ladder over the cliff, anchoring it at the top, and letting it swing. Down this swinging ladder the ranger went and then anchored it at the bottom. Now tourists make the descent. These ruined houses, or villages, are found in the recesses of the can¬ yon walls and, protected from the weather, are remarkably well preserved. Some of them are small, with only a few rooms, while others are large and must have accommodated a large population. The ruins found on the mesas, with¬ out the protection of the overhanging cliffs, have not withstood the ravages of time and are now but mounds of stone and earth.

While the ruins in the Mancos Canyon were explored as early as 1874, the most important escaped discovery until 1888, when R. Wetherill and C. Mason of Mancos, in search of a stray herd one day in December, penetrated a pinyon wood to the edge of a deep-side canyon. ((In the opposite cliff, sheltered by a huge, massive vault of rock, there lay before their astonished eyes a whole town, with towers and walls, ris¬ ing out of a heap of ruins.® They named the place <cCliff Palace,® and the same day discov¬ ered nearby, in another canyon, another large cliff dwelling to which they gave the name of Spruce Tree House, from a great spruce grow¬ ing among the ruins. The word dwelling is misleading, for most of these buildings were villages. Spruce Tree House, for instance, was undoubtedly a town of

importance, harboring at least 350 inhabitants.

The arrangement of houses in a cliff dwell¬ ing of the size of Cliff Palace, for example, is characteristic and intimately associated with the distribution of the social divisions of the inhabitants. The population was composed of a number of units, possibly clans, each of which had its own social organization more or less

I SUN TEMPLE, MESA VERDE NATIONAL PARK, SOUTHWESTERN COLORADO

This ruin, in “The Land of the Cliff Dwellers,” was excavated in 1915 by Dr. J. Walter Fewkes, of the Smithsonian Institution, Washington, D. C. It is 131 feet long. Dr. Fewkes is of the opinion that the structure was intended for religious and not domiciliary purposes

2 BALCONY HOUSE, MESA VERDE NATIONAL PARK, SOUTHWESTERN COLORADO

This ruin is the third in size of the numerous prehistoric ruins on the Mesa, and one of the most interest’ng and most spectacularly situated. Two kivas, or underground ceremonial chambers, are shown in the foreground

distinct from others, a condition that appears in the arrangement of rooms. The rooms oc¬ cupied by a clan were not necessarily connected, although generally neighboring rooms were dis¬ tinguished from one another by their uses. Thus, each clan had its men’s rooms, which was ceremonially called the <(kiva.® Here the men of the clan practically lived, engaged in their occupations. Each clan had also one or more rooms, which may be styled the living rooms, and other enclosures, for granaries or storage of corn. The corn was ground into meal in another room containing the metate set in a bin or stone box, and in some instances in fire¬ places, although these

were generally placed in the plazas or on the housetops. All these dif¬ ferent rooms, taken together, constitute the houses that belonged to one clan.

The conviction that each kiva denotes a dis¬ tinct social unit, as a clan or a family, is sup¬ ported by a general similarity in the masonry of the kiva walls and that of adjacent houses ascribed to the same clan. From the number of these rooms it would appear that there were at least 23 social units or clans in Cliff Palace. The kivas were the rooms where the men spent most of the time devoted to ceremonies, coun¬ cils and other gatherings. In the social condi¬ tions prevalent at Cliff Palace the religious fra¬ ternity was limited to the men of the clan.

Apparently there is no uniformity in the distribution of the kivas. As it was prescribed that these rooms should be subterranean, the greatest number were placed in front of the rectangular buildings, where it was easiest to excavate them. But when necessary these structures were built far back in the cave and enclosed by a double wall, the intervals between whose sections were filled with earth or rubble to raise it to the level of the kiva roof. In that way they were artificially made subterranean, as the ritual required. Easily reached from Denver and Colorado Springs, Mancos on the Rio Grande Southern Railroad is the preferable starting point by stage or automobile to explore the mesa. Consult United States Department of Interior Bulletins (The Mesa Verde Na¬ tional Park) (Washington, D. C., 1915) ; Nordenskjold, B., (The Cliff Dwellers of the Mesa Verde) (Stockholm 1893).

MESABI RANGE. See Iron Ore — Iron Ore Districts.

MESCAL, a fiery liquor produced in Mexico from several species of Agave (q.v.). The most famous liquor, however, is made from the ˆhearts® of the species Agave tequileana. The city of Tequila, in the state of Jalisco, is the centre of this particular industry. The Tequila Agave resembles in the appearance of its stiff lance-like leaves the sisal hemp plant, though it sends out its leaves from a great bulb-like cellu¬ lar mass which forms the heart of the plant. This heart, when denuded from its leaves and detached from the root, is cleft in two, and a dozen of these pieces make a fair load for a mule, for they must be transported from the fields where grown to the city, sometimes a journey of several miles. These hearts are roasted in pits, within the distillery enclosures, dug four or five feet deep and considerably wider. A hot fire is built of mesquite wood, and large stones distributed through the fuel. The “heads® are then heaped over the burning

mass until a huge mound is formed, which is covered first with grass and then with earth, and the mass left several days to cook. When the mound is opened the raw product is found to have changed to a dull brown in color, and the juices to have been converted into sugar. White hot and steaming, the mass is taken to another pit, stone-paved, on the bottom of which revolves a heavy stone crusher, really an arrester operated by mule power. Here it is ground into pulp and the semi-liquid mass carried in deep trays on the heads of Indians to the vats where it remains to ferment. Then it goes to the rude stills, and is run off as mes¬ cal. The commercial mescal is a colorless liquor sometimes with a slight amber tint, though much of it is like alcohol. Some of the higher grades are given fancy names which serve as trademarks. It is far too strong a liquor to be drunk with impunity, though its fiery quality seems to suit the Mexican taste for hot things. Zotol is another liquor, made in the same way from the bulb-like heart of a species of Dasylirion, which is said to be as strong as 95 per cent alcohol. These liquors should not be confounded with aguardiente, which is made from sugarcane. The Mexican name means burning water.

MESCALA. See Mexcala.

MESCALEROS (Spanish, mescal, a native drink used in Mexico, Guatemala, and along the southern boundary of the United States), an Apache tribe so called because of their love of mescal. Somewhat of a nomadic character, they covered territory, at times, between the Rio Grande and the Pecos in New Mexico and southward into Mexico. They gave the gov¬ ernments of the United States and Mexico trouble, from time to time, but not so much as their relatives in Arizona and northern Mexico. In 1873 a reservation of 475,000 acres was set apart for the use of the Mescaleros in South¬ ern New Mexico. The tribe now numbers about

500.

MESDAG, mes’dag, Hendrik Willem,

Dutch marine painter : b. Groningen, 23 Feb. 1831. He was a banker, following in his fath¬ er’s footsteps, until his 36th year, when he devoted himself to art, studied under Alma Tadema, who was a relative, and under Roe-lofs, and lived at The Hague, with a studio at

Scheveningen. He takes a foremost rank among modern painters of the sea, and conveys the idea of water-masses and motions very felicitously. The report circulated in American newspapers of his death 4 Aug. 1902 was false. Mesdag's pictures include (Fishing Boats at Scheveningenˆ (Strand of Scheveningenˆ (Morning on the Scheldt,* (In Perils and many other views of the North Sea. Consult Zilken, (H. W. Mesdag) (English version by Bell, 1896) ; and Marius, < Dutch Painting of the Nineteenth Century) (1908).

MESENTERY, a double fold of the peritoneum which attaches the small intestine to the spinal column, but in such a manner as to permit great freedom of motion. The cor¬ responding support of the large intestine is the mesocolon, with the mesorectum. The mesen¬ tery contains between its folds several blood¬ vessels, lacteals, lymphatics, nerves, and the ganglia called mesenteric glands, which are connected with the lymphatico-lacteal system.

It is about four inches wide, and extends nearly the whole length of the intestine. It is subject to several diseases, the most frequent of which is tubercular degeneration of some of its nu¬ merous glands. For this and other diseases of the mesentery, see Peritonitis.

MESHA, king of Moab mentioned in II Kings iii, 2-27. This monarch threw off the yoke of Israel, then ruled by Ahab and the lat¬ ter's sons, Ahaziah and Jehoram. Later Jehoram, with the aid of the kings of Judah and Edom, defeated Mesha and his hosts. Mesha was defeated and besieged in Kir-hareseth, but managed to hold out against his enemies al¬ though his country was overrun. See Moabite Stone.

MESHED, mesh'ed, or MESHHED, rnesh'- hed, Persia, capital of the province of Khora-san, in an extensive valley 500 miles northeast of Ispahan. It is surrounded by walls, and has many ruinous houses, but its principal street is spacious and handsome, having a water-course, the banks of which are shaded by trees, passing through it, while at its extremity are seen the splendid cupola and gilded minarets of the

mosque containing the shrine of Iman Riza, the son of Ali, the founder of the Shiites. This tomb has a gorgeous interior, a vast hall, like the central nave of a cathedral, rising loftily into a central dome ornamented with the rich¬ est colors and a profusion of gilding. This shrine attracts a vast number of pilgrims. Here also is the mosque of Gohur Shah, considered one of the most beautiful and splendid in Persia. The chief manufactures are velvets, sword-blades and some silk and cotton goods. A considerable number of the inhabitants are employed in cutting the turquoises obtained in the vicinity. The situation of Meshed on sev¬ eral great caravan routes makes it an important entrepot for the produce of surrounding coun¬ tries. The customs receipts for the territory approximated $250,000 annually up to 1914, but fell off nearly one-half during the World War. Pop. about 61,500.

MESHTROVITCH, Ivan, Jugoslav sculp¬ tor: b. Otavice, Northern Dalmatia, 1883, the son of a Croat. He was educated at the Vienna Academy of Arts and first exhibited his work in that city in 1902, and in 1911 his studies for the Serbian National Temple at Kossovo were shown in Rome. An artist of the highest type, endowed with astonishing ability, he is regarded in Europe — especially in England — as one of the greatest sculptors that ever lived. In 1915 a representative committee brought him to Lon¬ don and organized an exhibition of his works at the Victoria and Albert Museum. Art, politi¬ cal idealism, mythology and religious mysticism are inseparably bound up in his creations. His remarkable talent is expressed in the eclectic variety of styles of which he is master; it would seem that all known styles culminate in Mesh-trovitch : Egyptian, Greek, Baroque, Byzantine, Assyrian and the most violentˆ'- realistic mod¬ ernism. Consult (Ivan Mestrovic : A Mono¬ graph) (London 1919), by Sir John Lavery, Dr. Seton-Watson and others, with 68 photo¬ graphic plates.

MESMER, Friedrich (or Franz) Anton,

fred'riQ an'ton mes'mer, German physician: b. Itzmang, near Constance, Baden, 23 May

1733; d. Meersburg, Baden. 5 March 1815. He was educated in medicine by Van Swieten and De Haen of the Universitv of Vienna, made some study of astrology, came to believe in the influence of the stars, and attributed this sup¬ posed influence to magnetism. Having at first believed in the cure of diseased bodies by the use of magnets,

he came wholly to discard the magnets and declared that an occult force, which he called animal magnetism, pervading the uni¬ verse, resided in himself and afforded him an influence over others. In 1778 he went to Paris and set the town astir. He had undoubtedly an honest belief in the efficacy of his discoveries; but he took advantage of popular interest to en¬ shroud his methods with mystery. Finally the government appointed a committee of noted physicians and members of the Academy of Sciences, including Benjamin Franklin,. to in¬ vestigate the matter ; and the committee in a re¬ port, admitting many facts but attributing them to physiological causes and not to any such sup¬ posed agency as animal magnetism, so dis¬ credited Mesmer that he went to London, and later to Germany. The name mesmerism was formerly applied to the entire class of phenom¬ ena now known as hypnotism (q.v.). It is now claimed that there is a force in the human body generally called magnetiscor, which is under the control of the human will, and that when the control of this force passes to another hypnotism occurs. Among his writings . are <Memoires sur la Decouverte du Magnetisme Animal > (1779) ; (Histoire Abregee du Mag¬ netisme AnimaP (1783) ; and the (Memoire de F. A. Mesmer sur ses Decouvertes) (1799). See Animal Magnetism ; Hypnotism.

MESMERISM. See Hypnotism.

MESNE (men) PROCESS, in law, an in¬ termediate process which . issues pending the suit upon some collateral interlocutory matter. Sometimes it is put in contradistinction to pri¬ mary and final process, or process of execution, and then it signifies all such processes as inter¬ vene between the beginning and end of a suit.

MESODERM. See Anatomy, Compara¬ tive; Embryology.

MESOHIPPUS. See Horse, Evolution of the.

MESONERO ROMANOS, ma-sc>-na'rd ro-ma'nos, Ramon, Spanish writer : b. Madrid, 1803 ; d. 1882. After a short time spent in mercantile life he turned to journalism, and after some time spent* on the Madrid Press he founded the Semanario Pintoresco Espanol which he continued to edit and manage until 1842. Mesonero was a great lover of his native city which, in his youth, was still the old-fashioned Spanish capital teeming with true native life, before it had begun to reflect the fashions, customs and manners of Paris. He rubbed elbows with his fellow city-dwellers everywhere and on every occasion; and out of this intimacy sprang interesting and well-written sketches of popular types, manners and customs. His comprehensive knowledge of

his native city appears in (Manual de Madrid) : cEscenas Matritenses* (2 vols., 1836) ; (Memorias de tin setenton) (1880), and (E1 Antigno Madrid. > Mesonero is one of the masters of modern Spanish. His language is ever graceful, tending Jo a slight diffuseness; but always preserving its purity and idiomatic

MESON YCHID2E

complexion and force. A collected edition of his works was published in Madrid in 1881 under the title (Obras completas de Ramon Mesonero Romanos.5 In 1903-05 two volumes more of his hitherto unpublished writings also appeared in Madrid. Consult for biographical sketch, Northup, G. T., Selections from Mesonero Romanos) (New York 1913).

MESONYCHIDiE, a family of Creodonts, prevailingly .Nprth American, which were more highly specialized than any other. They ac¬ quired a wolf-like form, with a very long slender tail, and legs and feet digitigrade gait indicating powers of speed beyond those of any other creodont. Their heads, however, were disproportionately large and bear-like. The general structure, nevertheless, shows that they could not have been rapid and aggressive in their habits, and their teeth suggest that they lived principally on vegetable diet. Their de¬ velopment into hyenalike creatures may be traced to nearly the close of the Eocene.

ME.SONYX, a primitive carnivorous animal of the group Crcodonta (q.v.), which must have resembled in external aspects, when alive, the modern Tasmanian wolf of Australia. Its remains are found fossil in the fresh-water for¬ mations of Eocene Age along the eastern base of the Rocky Mountains, and a complete skele¬ ton is mounted in the museum of Princeton University, and a restoration is exhibited in the American Museum of Natural History in New York. This specimen (Mesonyx obtusidens) indicates an animal as large as a Saint Bernard dog, with its hindquarters drooped somewhat, like those of a hyena and a very long, slender tail. It is the type of a large family (Mesony chides) of wolf-like beasts widely dis¬ tributed in Eocene time. Consult Woodward, (Vertebrate Palaeontology5 (London 1898) ; Osborn, (Age of Mammals5 (New York 1910).

MESOPHYTE (Gr. «mid-grower»), in botany and forestry, a term used of plants which grow naturally in soil of moderate moist¬ ure. Thus the term is contrasted on the one hand with xerophyte, ˆdry-grower,55 and hydro¬ phyte, ((wet-grower,55 these latter terms being applied to plants requiring very little or very ‘ much moisture. Since soil of

moderate moist¬ ure varies from moist to dry, whereas both the dryer and wetter soils are comparatively in¬ variable in this respect, it naturally follows that Mesophytic plants show more. adaptability to conditions of moisture than either hydro¬ phytes or xerophytes. For the same reason, no doubt, the mesophytic flora, being comparatively stronger, is denser and marked by much wider variations of species, than the scanty and monotonous growths of poorer, because of wetter or dryer, soils.

MESOPOTAMIA, from Greek mesos, middle, and potamos, river: a geographical term applied to the territory lying between the Euphrates and Tigris in Western Asia. The Arabs call those rivers El-Frat and Shatt respectively; the latter is also called Ed-Dijleh in its lower course. The boundaries of this region (which forms no single political division) are not very definite; roughly speaking, it includes all territory south of Diarbekr and running parallel with the Persian frontier down to the gulf. As regarded by geographers, it is bounded on the north by

the Armenian Taurus, on the east by the Iranian frontier mountains, on the south and west by the Syrian Steppes, and the Persian Gulf on the southeast. The territory is di¬ vided into the three vilayets of Mosul, 35,130 square miles; Bagdad, 54,540 square miles; and Basra, 53,580 square miles ; total, 143,250 square miles. The population of Mesopotamia is gen¬ erally stated to be about 2,000,000, but com¬ petent observers consider 1,300,000 to be nearer the mark. The country to which the name properly applies as extending between the two rivers has a gradual fall of nearly 1,000 feet from the spurs of the Taurus range to an old coastline south of Hit, whence an almost un¬ broken plain stretches to the Persian Gulf. The natives give the name of El Jezireh (the island) to the upper or northwestern portion, and that of Irak Arabi (the ancient Babylon) to the lower or southeastern section. This lat¬ ter, indeed, is often excluded as being beyond the confines of Mesopotamia proper. Low ranges of hills break the great plain of Upper Mesopotamia; between them the Khabur and its tributaries flow to the Euphrates, through a desolate region that was once thickly popu¬ lated. The mountain district bordering the plain and stretching to the Persian frontier forms part of “Kurdistan,55 a mere name that has no concrete geographical existence, being mostly comprised in the vilayet of Diarbekr and belonging mainly to Mesopotamia. Ethni¬ cally it includes the Kurdish and the Arab nomad tribes — respectively of Iranian and Semitic stock. Upper Mesopotamia is rich in grain, wine and pasturage ; the lower is flat,

dry and unfruitful. Between the Khabur and the Euphrates lies the Biblical Aram-Naha- raim, or Syria of the Two Waters, also called Padan-Aram, or Syria of the Plain. It is mentioned in the Old Testament in connection with Isaac and Jacob (Gen. 24 and 27). The Greek title was probably not in use till after Alexander the Great invaded the East. The soil consists of a sandy clay of excellent agri¬ cultural properties; only where water fails is it incapable of cultivation. Its remarkable fertil¬ ity is shown by the fact that it still remains unexhausted after having supported through many centuries the Assyrian, Babylonian and Persian empires. The number and vastness of the ruins that lie scattered over this region from Babylon to Nineveh still bear silent testi¬ mony to its former flourishing condition. Since the cuneiform inscriptions gathered from these ruins have yielded up their secret to the re¬ searches of modern science, we have learnt with certainty that the plains of Mesopotamia were the scenes of successive civilizations, rivaled in splendor and antiquity only by those of ancient Egypt. To-day, in certain localities, may be found lions, leopards, wild asses, boars and gazelles.

Mesopotamia is essentially a land of origins; so far as we know it cradled the human race and nurtured it for centuries until a new era was introduced by the Flood incidents, which are recorded not only in the Hebrew Scrip¬ tures, but also in the cuneiform inscriptions. Its early history is one of constant struggles for supremacy between contending nations. Meso¬ potamia and its adjacent plains have been asso¬ ciated with some of the most important turn¬ ing-points of human history; for milleniums

these lands contained the capitals of great world-empires and have been closely connected with the most thrilling epochs of history. Even in the World War of 1914-18, Mesopo¬ tamia — by reason of the Bagdad Railway schemes — played a role the importance of which is as yet but inadequately recognized, for that railroad was the keystone in the Ger¬ man aspirations toward a world-empire. The Mesopotamians sprang from the Chaldaeans, the primitive inhabitants; from the Cushites, who in the reign of Nimrod built the cities of Edessa and Nisibis; and from the descendants of Shem, of the tribe of Thara. The Hebrew race took its rise from this land when Abraham came from. Ur of the Chaldees and settled in Canaan. It was also in this plain of Shinar that the confusion of tongues occurred. Baby¬ lonia was the mother of astronomy, and the 12 divisions on the dials of our clocks originated there, while the influence of Hammurabi's famous laws has penetrated down the ages into the legal codes of modern times through the intricate systems of Greek and. Roman legislators. Mesopotamia was originally a part of Nimrod's dominions, the founder of Calneh or Nippur. After an interval of more than 700 years (2000 b.c.) Cushan Rishathaim reigned in Mesopotamia, who extended his ter¬ ritory over the Euphrates. The Israelites, who then possessed Palestine, were compelled to pay him tribute for the space of eight years. In the Golden Age of the Assyrian power (790 b.c.) Mesopotamia was entirely subjected to that empire, and suffered the fate of its subse¬ quent conquerors. Trajan brought it under Roman dominion in 106 a.d., but the Persians did not permit the Romans to remain long in undisturbed possession, for it was a constant cause of war between the Roman and Persian empires, and at last Jovian surrendered it to the Persians in 363 a.d. When the Arabs in 651 established a new empire upon the ruins of the Sassanide kingdom, Mesopotamia was. also obliged to submit to the storm. In 1040 it fell into the hands of the Seljuks. From that time it had many rulers in rapid succession. Genghiz Khan made himself master of it in 1218, but in 1360 it fell into the hands of Tur Ali Bey. Timur conquered it 40 years later, and in 1514 it was incorporated in the Persian Empire under Ismael Sophi. In 1554, however, the Persians were compelled to surrender more than half of it to the Turks ; and. though they again recovered the lost portion in 1613, they were unable to withstand the attacks of Amurath IV, who united this in 1637, with many other provinces, to his empire. Despite its vicissitudes and the wars fought on its soil, the country remained rich and prosperous until the battle

of Kadisia (635 a.d.) placed it at the mercy of the Arabs. Assyria and Babylonia were the wealthiest countries of antiquity, and Mesopotamia was the richest part of the great Persian Empire. In olden times Babylonia was perfectly irrigated, but the wonderfuUsystem of canals fell into ruins under the Turks. As the nomads pressed forward the peasants were driven from their lands, and the great irriga¬ tion works were neglected, and the Euphrates, no longer, controlled, spread out into wide fever-bearing marshes. The work of devasta¬ tion commenced1 by the Arabs was completed by Tartars, Mongols and Turks, with the result

that one of the most fertile regions in the world became practicallv a desert abandoned to nomads. Arabs now form the majority of the population, though the original inhabitants are still represented by Kurds, Yezidis or ((devil worshipers, Nestorians, Chaldaeans or Roman Catholic Aramceans and Jacobites in the north; and by Salians in the south. There are about 80,000 Arabic-speaking Jews resident in Mesopotamia who guard with reverence the traditional tombs of Joshua near Bagdad, of the prophet Ezekiel near the banks of the Euphrates, and of Ezra the Scribe on the Tigris near Kurnah. Besides its wealth of biblical associations, Mesopotamia is a land of sacred memories to hundreds of millions of Mohammedans. Two gilded domes on the splendid mosque at Kazmain cover the tombs of eminent teachers ; this and the mosque at Samarra are Shiah shrines. A mile away, on the left bank of the Tigris, is the statelv Hanifi mosque of the Sunnis at Muaththam, and the famous mosque of Abd ul Kadir is in Bagdad. The tomb of Mohammed's barber, Salman Pak, is near the ruined arch of Ctesiphon. The holy Mohammedan cities of Kerbela and Nejif are near the banks of the Euphrates, to which thousands of embalmed corpses are brought by pilgrims every year from India and Persia for interment. Under the blighting misrule of the Turk Mesopotamia became one of the most desolate countries on earth, swarming with vermin and insects. What little manufac¬ ture is carried on is used for home consumption. Sugar, cloth, coffee, iron, indigo and copper are imported ; the chief exports are dates, wool, cereals, gum, rice and hides. The foreign trade is mainly with Great Britain, India and Persia. Passengers and merchandise are carried down the Tigris from Diarbekr to Bagdad on rafts of inflated sheepskins. Sailing boats are used below Samara, while from Bagdad to Basra on the gulf river steamers ply. Steamers can navigate the Euphrates as far up as Meskmeh. The principal towns are Diarbekr, Urfa (Edessa), Harran, Mosul and Bagdad. Basra, on the Shatt el-Arab (the confluence of the Tigris and Euphrates from Kurna) is the port of

transhipment from river to ocean craft. Mesopotamia has the evil reputation of being the home of the bubonic plague, and British mission doctors have labored there for many years to grapple with that disease and the deadly cholera.

Mesopotamia and the War.— It has alreadv been mentioned that Mesopotamia was the keystone of the Pan-German scheme by reason o the Bagdad Railway. According to German authorities on the subject, there were three alternative plans to promote the expansion of Germany into a great world-empire. In the early stages of the Pan-German movement, the vision of its advocates was fixed upon South America as the most promising territory upon which a Greater Germanv might be built. Here, however, the Monroe Doctrine stood in the wav. The British Empire, as the largest landholder in the world, then became the focus of the Pan-Germanists, and here, again, a formidable barrier stood in the path — the British navv Two avenues being thus barred bv obstacles which could only be removed bv an over¬ whelmingly powerful fleet, a third plan pre¬ sented itself, a plan which provided for an

overland expansion where no Monroe Doctrine existed and no British navy could intervene. The scheme was to gain control of the Balkan peninsula by the elimination of Serbia, the only hostile barrier separating the Central Powers from a friendly power, Bulgaria. This accom¬ plished, the road lay open to Constantinople, a junction which, in its turn, opened the door to Asia, via the Persian Gulf; to East Africa and Australia. The principal artery of communica¬ tion lay in Mesopotamia — the Bagdad Railway. It was calculated that this project could be carried out without coming into physical con¬ tact with either British territory or navy, and would place Germany in a position eventually to strike both at India and Egypt, a variation of Napoleon's plan of campaign for breaking the power of Britain. According to Prince Billow, former German chancellor, this undertaking ((threw open to German influence and German enterprise a field of activity between the Medi¬ terranean Sea and the Persian Gulf, on the rivers Euphrates and Tigris, and along their banks. If one can speak of boundless pros¬ pects anywhere, it is in Mesopotamia® (im¬ perial Germany,* p. 116). These words were no exaggeration, for Sir William Willcocks, an English engineer who had' surveyed the country and planned a gigantic system of irrigation, part of which he had carried out before the war, had said, in 1903, that (<Of all the regions of the earth, no region is more favored by nature for the production of cereals than the lands on the Tigris.® This authority stated that the irrigable area of Mesopotamia was from two to three times as large as that of Egypt, which leads to the presumption that the country could support some 30,000,000 people. Persia and Turkey being decrepit and moribund states, the Pan-Germanists saw in Mesopotamia a field for exploitation which would make it for Ger¬ many what Egypt was to Great Britain or Morocco to France. German professors had painted the possibilities of this region to en¬ thusiastic audiences in glowing colors, and had not omitted to point out that a German foothold on the Persian Gulf would imperil the position of Great Britain in India and Egypt. Now the most important route of the British Empire is the sea-route from England to India and Aus¬ tralia via the Suez Canal. # The value of the Persian Gulf as a strategical British position has been pointed out by Admiral Mahan, on ac¬ count

of the Red Sea being merely a continua¬ tion of the Suez Canal, both of which could be dominated by a hostile power holding the gulf. The British, however, have not awakened to the importance of the gulf only in recent years, for already in the days of Queen Elizabeth it was visited by English vessels ; before ever the Turkish crescent appeared on the shore of Ara¬ bia the English flag was known and respected in the Persian Gulf. The East India Company planted a depot at Bandar Abbas in its early days and for nearly two centuries fought with Dutch and Portuguese rivals. The Anglo-In¬ dian navy first surveyed the gulf and provided for its lighting to guide navigation. For 50 years the British hunted the pirates in the gulf and destroyed their strongholds. Altogether, for 300 vears the British have been the guard¬ ians of the gulf, by protecting Persia, sup¬ pressing gun-running and slavery, fighting the plague and introducing the elements of sanita-VOL. 18 — 44

tion among the natives on the coastline. All that Great Britain took in return was a spot on an island for a telegraph station; but she al¬ lowed no compromise on one point — that no power should be permitted to seize territory and no other flag should dominate those waters : The future of India and of the empire was bound up with British prestige in the Persian Gulf. These considerations explain the sus¬ picion and mistrust of Great Britain regarding the absorption of Mesopotamia by Germany — an avowedly hostile power. In 1899 a German company obtained a concession from the Sul¬ tan to build a railroad from Konieh — the ter¬ minal of the Anatolian Railway — to Bagdad and Basra on the Persian Gulf, and from that year dates the German penetration of Mesopo¬ tamia. On realizing the political objects under¬ lying the scheme, Great Britain protested and a diplomatic conflict began which was still in progress when the war broke out. During 1913-14 a strange medley of diplomatic nego¬ tiations were being held on the question of Mesopotamia and the railway, in which Eng¬ land, France, Russia, Germany and Turkey were involved, with the result that Germany obtained the acquiescence of the powers to be the sole concessionnaire of the railroad, though England forced Germany and Turkey to fix the terminal well inland at Basra. The lighting, marking and policing of the gulf by England was confirmed by Turkey. Meanwhile, Rus¬ sian diplomacy had succeeded in creating in¬ tangible (<spheres of influence® in Turkish terri¬ tory by which the German railroad through Mesopotamia was hemmed in on either side, while Great Britain held the key of the exit. As compensation for being restricted at that exit, Germany received a concession to build a line from the

Bagdad Railway to Alexandretta on the Mediterranean. At a later date Great Britain was apparently willing to grant an ex¬ tension of the German sphere, for Prince Lich-nowsky (q.v.) records in his famous Memoran¬ dum that ((the greatest concession Sir Edward Grey made to me personally was the continua¬ tion of the line to Basra. We had not insisted on this terminus in order to establish connection with Alexandretta. Hitherto Bagdad had been the terminus of the line. The shipping on the Shattel-Arab was to be in the hands of an in¬ ternational commission. We also obtained a share in the harbor works at Basra and even acquired shipping rights on the Tigris, hith¬ erto the monopoly of the firm of Lynch.® He goes on to say that ((by this treaty the whole of Mesopotamia became our zone of interest. . > . .® This treaty, of course, was neither

signed nor published owing to the outbreak of the war, otherwise the ex-ambassador remarks, <(an agreement would have been reached with England which would have finally ended all doubt of the possibility of an Anglo-German cooperation.® See War, European: Turk¬ ish Campaign.

Bibliography.— Barker, J. E., <The Great Problems of British Statesmanship) (London 1917) ; Blunt, Lady, (The Bedouin Tribes of the Euphrates) (London 1880) ; Fraser, D., ‘The Short Cut to India> (Edinburgh 1909) ; Fullerton, W. M., ‘Problems of Power) (Lon¬ don 1914) ; Hogarth, D. G., ‘The Nearer East) (London 1902) ; Le Strange, G., (Lands of the Eastern Caliphate) (London 1905) ; Oppenheim,

M. von, (Vom Mittelmeer zum persischen Golf) (1889) ; Oppert, Expedition scientifique en Mesopotamie) (Paris 1856-59) ; Parfit, J. T., ‘Mesopotamia, the Key to the Future } (pam¬ phlet, London 1917), also ‘Twenty Years in Bagdad and Syria* (London) ; Parker, Sir G., ‘The World in the Crucible) (New York 1915) ; Sachau, E., ‘Reise in Syrien und Meso-potamien) (1883) ; Schmidt, H., ‘Das Eisen-bahnwesen in der Asiatischen Tiirkei* (Berlin 1914) ; Soane, E. B., ‘To Mesopotamia and Kurdistan* (London 1912) ; Sykes, Sir M., ‘The Caliph’s Lost Heritage) (London 1915) ; Tozer, H. F., ‘Turkish Armenia

and Eastern Asia Minor* (London 1881) ; Usher, Roland G., ‘Pan-Germanism* (New York 1914) ; Warfield, W., ‘The Gate of Asia* (London 1916).

Henri F. Klein,

Editorial Staff of The Americana.

MESOZOIC ERA, in geology, the mid¬ period of life in geologic time, also called the Secondary Period. Paleozoic precedes and Cen-ozoic follows this era, these two terms refer¬ ring respectively to “older® and “newer,® or “earlier® and “later,® forms of prehistoric life. The subdivisions of the Mesozoic are the Triassic, Jurassic and Cretaceous periods (qq.v.).

The Life of the Mesozoic. — The life history of the era can be best understood, by first re¬ ferring to the life of the Paleozoic (q.v.). That era was closed under conditions (aridity, gla-c’ation and mountain making) unfavorable to plant and animal life, and as a result many unfit genera failed to live from Paleozoic on into Mesozoic. The long-hinged brachiopods, so characteristic of the earlier era, became ex¬ tinct early in the latter. A few of the more primitive types persisted, but brachiopods be¬ came relatively unimportant. The old straight cephalopods practically became extinct with the passing of the Paleozoic. The nautilus type lived on through, even to the present time, but the era was characterized particularly by the dominance of a type called the ammonites, which appeared in late Paleozoic and died out at the close of the Cretaceous. They evolved rapidly and are valuable time markers. The Mesozoic has often been called the age of rep¬ tiles. This group of vertebrates, which ap¬ peared toward the close of the Paleozoic, in primitive form, developed rapidly into a num¬ ber of highly specialized types. The Dinosaurs (terrible reptiles) developed along several lines. The carnivorous group walked on two legs, the two front limbs being very short. It was this reptile that made the famous three-toed tracks of the Connecticut Valley. Some of these Idinosaurs got to be as long as 40 feet. Her¬ bivorous types also developed, great awkward beasts, some of them 80 feet long, 16 feet high and weighing probably 30 tons or more. This type were the largest land animals that ever lived. Late in the era peculiar armored Dino¬ saurs also appeared, with great horns on their heads and spikes on their tails. The Ichthyo¬ saurs (fish reptiles) took to the sea and de¬ veloped fins, much after the manner of modern fish. The Pterosaur (wing reptiles) developed the power of flight, some of them having a wing spread of 20 feet. These unusual reptiles all died off suddenly at the close of the Cre¬ taceous, and in the following era

reptiles took on a modern aspect. Peculiar birds with teeth,

the first known representatives of the feathered world, are found fossil in Jurassic and Cre¬ taceous rocks. A few primitive mammals, mostly of very small size, are known in the Mesozoic, but the group did not develop rapidly until after the close of this era. Among plants, the common groups of flowering plants did not appear until Cretaceous times.

Paleogeography of the Mesozoic in United States. — During Triassic and Jurassic times practically all of the United States east of the Mississippi was land. During Cretaceous the sea encroached on the coastal plain but did not reach the eastern interior region. The history of the west was more complex. During the Triassic a considerable part of the Pacific Coast region was under water but most of the in¬ terior was land. Similar conditions prevailed during early Jurassic, but late in the period a great arm of the sea encroached from the Arctic, reaching as far south as northern Colo¬ rado. The great differences in fossils seem to indicate that this bay was not connected with the Pacific directly. This arm of the sea withdrew before the end of the period which was marked in California and Oregon by great folding and intrusipns of igneous rocks, making the mountain ranges known as the Sierra Nevada and Cascades. In the west the Upper Cretaceous was marked by a great in¬ land sea, over the site of the Great Plains and Rocky Mountains, reaching from the Gulf of Mexico to the Arctic Ocean. Toward the close of the period this sea retreated, leaving great swamps in which coal was formed. The Era was brought to a close by a great period of folding known as the Lanamide Revolution which uplifted the Rocky Mountain Range.

MESQUITA, mas-ke’ta, Salvador de,

Brazilian poet: b. Rio de Janeiro, 1646; d. Rome, in the early 18th century. He went to Rome, where he entered holy orders and was well known for his Latin scholarship. His ‘Sacrificium Jephthae* (1680), a sacred drama, established his poetic fame among contempo¬ raries. His tragedies from profane history, ‘Demetrius,* ‘Perseus) and ‘Prasias Bithyni,* all appearing at Rome between 1690 and 1700, also had once high rank.

MESQUITE, a tree or shrub (Prosopis glandnlosa and P. juli flora) of the family Mimosacece. Several species of mesquite are very common in the southwestern United States from Texas to California, extending

southward through Mexico and tropical America. In the United States they are usually shrubs, but farther south large trees. The branches are armed with spine, the leaves compound, of numerous leaflets, the flowers small and greenish, in spikes, and the fruit of long inde-hiscent pods. In the arid southwest the mes¬ quite is often the only source of firewood, which is not obtained from the branches, but from the very large roots. The pods are eaten by cattle, and sometimes by people, for their sweet pulp and seeds. The screw-pod mesquite or tornillo is Prosopis puhescens, another south¬ western plant, whose pods are coiled in a tight spiral, resembling a screw.

MESS, in the army and navy, and particu¬ larly the latter, a company of officers, or crew of a ship, who eat, drink and associate to¬ gether; in military language, a sort of military

ordinary, established and regulated by the rules of the service, for all the officers in a regi¬ ment, and supported by their joint subscrip¬ tions, supplemented by a small government al¬ lowance. Similar institutions are extended to the noncommissioned officers of a regiment. The enlisted men mess by companies as a rule, but often it is desirable to cut the company into squads for mess purposes. The post com¬ mander usually appoints some officer to take charge of mess arrangements. In active serv¬ ice the officers are apt to mess with their own troops, but in camps they have their separate mess. In the navy it is usually convenient to have a captain's mess, another for the ward¬ room officers, another for the junior officers, another for the warrant officers, *etc.* The men's mess for the sailors or marines is styled the ˆgeneral mess,® but this is usually divided into sections, as a matter of convenience. It has be¬ come common to employ ammunition passers as mess attendants.

MESSAGER, Andre Charles, French com¬ poser : b. Montlugon, 30 Dec. 1853. He received his musical education at ficole Niedermeyer, Paris, and subsequently studied under Saint-Saens in the same city. He was appointed organist at Saint Sulpice in 1874. A symphony of his won the gold medal of the Societe des Compositeurs in 1876. In 1880 Messager be¬ came music director at Sainte Marie-des-Batig-nolles. Three years later he completed the comic opera by Bernicat, (Frangois des has bleus,* and in 1885 produced his own operettas, (La Fauvette du temple* and (La Bearnaise.* The following year saw the production of his ballet, (Les deux pigeons1* at the Ouera. Messager's reputation, however, was most enhanced by the comic opera (La Basoche,* produced at the Opera Comique in 1890 and in English in London in 1891. It was followed by the operas (Madame Chrysantheme* (1893) ; (Mirette* (1894); (Les petites Michus* (1897) and (Veronique* (1898) ; (Les dragons de l'imperatrice* (1905) ; (Fortunio* (1907) ; Bea¬ trice* (1914). Messager became conductor at the Opera Comique in 1898; was one of the di¬ rectors of the Covent Garden Opera, in 1901— 07, and first conductor at the Paris Grand Opera after 1907. From 1907 to 1914 he was also joint director with Broussan of the Grand Opera and after 1908 .was conductor of the Concerts du

Conservatoire.

MESSALA (me-sa la) CORVINUS, Mar¬ cus Valerius, Roman soldier, orator and writer; b. about 65 b.c. ; d. about 2 b.c. He re¬ ceived a part of his education in Athens, re¬ turned to Rome before the second triumvirate and joined the Senatorial party. _ He fought with Brutus and Cassius at Philippi, 42 b.c., and afterward attached himself successively to Antony and Octavius, served at the battle of Actium, 31 b.c., and the same year was chosen consul. He subdued Aquitania, of which he was made proconsul and was honored with a triumph. For a time he was a prefect of Rome and held the office of augur. .Messala was the friend of Horace and other distinguished men of the age, a zealous patron of literature and art, notably of the poet Tibullus, and one of the most eminent of Roman orators.

MESSALINA, mes:a-li'na, Valeria, Ro¬ man empress. She married Claudius (later em¬

peror) in 38 a.d. ; bore him a daughter, Octavia, and a son, Britannicus; proved herself vicious, licentious and vulgar by her many open amours ; and in her husband's absence formally married Gaius Silius, whom she attempted to make emperor. Claudius refused or delayed to punish her, and Narcissus, the emperor's favorite, had her put to death (whether with Claudius' knowledge or not is not known) in 48 a.d. Her reputation was whitewashed in Stahr's (Agrippina, die Mutter Neros* (1880).

ME.SSENE, me-se'ne, the capital of Messenia in Peloponnesus, founded by Epaminondas (369 b.c.) after his victory of Leuctra over the Lacedaemonians, and situated at the foot of the hill of Ithome, the fortress of which formed the acropolis of the new capital. The latter was surrounded by massive stone walls, flanked with towers, of which there are still consider¬ able remains at the modern village of Mavromati. The Greek Archaeological Society, in 1895, excavated a colonnade and other parts of the ancient agora. Messene with its acrop¬ olis was, next to Corinth, the strongest city of Peloponnesus. It was supplied with water from a fountain called Clepsydra, the spring of which still exists.

MESSENIA, me'se'm-a, Greece, a nomarchy in the western part of Morea (Pelopon¬ nesus), bounded on the north by Elis and Achaia and Arcadia, on the east by Arcadia and Laconia, on the south and west by the Ionian Sea. The greater part of the surface is a fertile plain, but

there are mountainous lands in the east and northeast. Kalamata, the capital, is in the southeast on the Gulf of Koron (Messenian Gulf). When Messenia was a state of ancient -Greece its chief cities were Methone and Pylos (Navarino). Later Mes¬ sene (Mavromati) was the capital, and the strong mountain fortress was Ithome. A ridge of Mount Taygetus separated Messenia from Sparta. Messenia is celebrated for the long struggle of the inhabitants with the Lace¬ daemonians in defense of their liberty. In the first Messenian War (743-723 b.c.) the Lace¬ daemonians, with the Athenians, invaded Mes¬ senia. For 20 years the Messenians defended themselves valiantly under their king Aristodemus, who in consequence of an answer of the Delphic oracle which promised them the victory on condition of the sacrifice of a virgin of the royal family, offered his own daughter as the victim. Her lover, to save her life, de¬ clared her to be pregnant by himself ; and Aristodemus, to prove her innocence, stabbed her with his own hand, and caused her to be opened and sacrificed. The Messenians, though for some time successful, were finally obliged to submit by the loss of Ithome. About 40 years after they again rose, and thus com¬ menced the second Messenian War (685 b.c.), which ended in their entire subjugation. A part of the Messenians emigrated to Sicily, and there founded Messana (see Mf.sstna) on the site of the ancient Zancle (668 b.c). Those who remained were reduced to the state of helots. After 200 years of servitude they again took up arms. This third Messenian War lasted 10 years (465-455 b.c.), and resulted in the expulsion of the Messenians from the Pelo¬ ponnesus. Epaminondas restored them, gather¬ ing together the exiles from the various lands

in which they were scattered. Within the space of 85 days they completed and fortified Messene (369 b.c.) and maintained their independ¬ ence till the country was conquered by the Romans (146 b.c.). The Messenians remained true to their customs, manners and language through all changes of fortune.

MESSHED. See Meshed.

MESSIAH, The, is a term which is, in John i, 41, and, in John iv, 25, but without the article, applied to Jesus of Nazareth, as the ap¬ pointed king of the Kingdom of God. The Greek word which is the translation of the Aramaic term meaning Messiah, namely, XpicrSq, in English Christ, is used of Jesu in this same sense throughout the New

Testa¬ ment. The word Messiah itself is a modified transcription of the Greek word M eaoiaq.

The extract transcription would be Messias, as the word appears in the Authorized Version in both the passages cited above, and the form Messiah is due to the influence of the form of the original Aramaic and Hebrew word. For the word which appears in Greek as M eooia was, in Aramaic and Hebrew, g-V All the forms of the term Messiah, as well as the Greek equivalent, XPiar°C , and the English Christ, mean Anointed One, and refer to Jesus, when applied to him, as God's Anointed King.

In the Old Testament, n ˆ rp (Ma TT-I?) (English Messiah) is used, in a few. cases, without the article, and as an adjective, of priests, who were anointed to their office (Lev. iv, 5 and 16, vi, 22). But, in the definite sense of the Anointed One, or the Messiah of Jehovah (the Lord's Anointed), it is used,. with a very few possible exceptions, only of kings. Thus, in 1 Sam. ii, 35, it is used of the kings of Israel in general. In 1 Sam. xii, 3 and 5, xxiv, 6 and 10, it is used, of Saul; and, in 2 Sam. xiv, 21, xxiii, 1, it is applied to David. In Lam. iv, 20, it denotes Zedekiah, King of Judah; and, in Isa, xlv, 1, it is applied to Cyrus, King of Persia. Two possible exceptions to its use to denote kings may be found in Psa. cv, 15 (quoted in 1 Chron. xvi, 22) and Hab. iii, 13, where it seems to be used to mean the nation of Israel as the priest people of Jehovah, al¬ though, even in these cases, it may refer only to the king. In Daniel ix, 25 and 26, it is very difficult to decide the true meaning of this word, because of the great uncertainty in rela¬ tion to the correct interpretation of these verses. According to the various interpretations which have been given to them this word would mean a high priest, a royal ruler, or that great king of the kingdom of God known to us as Jesus of Nazareth. It is not certain, however, that both times it is used in these verses it has the same meaning. In Psalm ii, 2, the best and most probable interpretation would make the term denote the great coming king known to us as Jesus the Christ. This is the only pas¬ sage in the Old Testament in which this term can be taken with any reasonable degree of probability to refer to our Saviour.

In the post-canonical literature, the first clear application of the term Messiah to the great coming king of Israel is found in the Psalter of Solomon, dating from about 63 b.c. In this poetical collection we have a full and clear description of this king and his work

under this title. There are, indeed, in the Sibylline Oracles and the Book of Enoch, ex¬ pressions and terms which must be supposed to refer to the coming and expected king of Israel, but the name Messiah is not used in these writings.

While the pre-Christian use of the term Messiah to denote the divinely appointed and eternal king of the Kingdom of God is thus limited, the Old Testament abounds in state¬ ments and teachings relating to this king, and that form of the Kingdom of God in which he is to be ruler and sovereign. In some of the passages relating to this final form of the Kingdom of God it is said that Jehovah him¬ self will be the king, as he was, in reality, in all the history of the kindom of Israel. Consult as examples of passages of this kind, Isa. ii, 2-4, Isa. xxxiii, 22, Ezek. xx, 33, Ezek. xxxiv, 15, Zeph. iii, 15, Zech. xiv, 16. In other pas¬ sages, in harmony with the idea that, while Jehovah was always the real king of Israel, he was represented in the government by a vicegerent king, his anointed on the throne of •avid at Jerusalem, it is declared that a great and eternal coming king, who, in some of the passages, is stated to be of the line of David, shall reign as king in the final form of the Kingdom of God. Among the passages of this kind may be cited Psa. cx, Isa. ix, 6 and 7, Jer. xxiii, 5ˆ8, Jer. xxx, 8 and 9, Ezek. xxxiv, 23 and 24, Ezek. xxxvii, 24 Hosea iii, 4, Micah v, 2-5, Zech. ix, 9. Just what will be the relation, in person and in nature, between Jehovah and this Davidic king, is not made clear, or even asserted, in the Old Testament.

Independently, therefore, of the use of the term Messiah, there was a natural and suffi¬ cient basis in the Old Testament for the widely-spread belief in regard to the coming of a fu¬ ture Davidic king called the Messiah, which appears to have existed in the time of Jesus. In this belief Jesus himself shared, and this king Messiah, or Christ, he both virtually and formally claimed that he himself was. A vir¬ tual claim of this kind is found in Matt, xvi, 13-20, and in the parallel passages, Mark viii, 27-30, and Luke ix, 18-21, and also in the act done by Jesus, of which we have the record in Matt, xxi, 1-11, and the parallel passages, Mark xi, 1-10, and Luke xix, 29~40. A formal claim of Jesus to be the Messiah is found in John iv, 25 and 26.

The rejection of the claims of Jesus by the Jewish nation, and the continuation in that na¬ tion of the belief in a coming Messiah, were the occasion of the appearance in Jewish his¬ tory of several who claimed to be the Messiah after the time of Jesus. Of all these the one who was most generally received as the Messiah by the nation, and

who accomplished the most for his people, was Simon bar Cochba (or bar Kozeba), who flourished 130-35 a.d., in the reign of the Emperor Hadrian. For two years and a half, bar Cochba reigned as king, and, at the head of an army of 200,000 men, defied the might of Rome. But, in the end, he and his nation were both crushed beneath the power of Rome.

The Jews of the present day are not all of the same opinion in regard to the Messianic hope. The conservative, or Orthodox, Jews are still looking: for the coming of the Messiah, the

great king of the line of David. With the lib¬ eral, or Reformed, Jews, so far as the term Messiah is used at all, it is made to stand for a personification of a system of ideas and doctrines, and the coming of the Messiah will be the universal acceptance and the world¬ wide domination of Jewish ideas and the Jewish religion.

Bibliography. — Bacher, (Die Agada der Tannaiten) (Strassburg 1884-90) ; id., <Die Agada der palestinensischen Amoraer) (ib. 1890-99) ; Baldenspreger, (Die messianisch apokalyptischen Hoffnungen des Judentums) (3d ed., Leipzig 1903) ; Bertholdt, (Christologia JudcTorum) (Erlangen 1811); Bousset, Eie Religion des Judentumsˆ (2d ed., Berlin 1906) ; Briggs, C. A., (Messianic Prophecy > (lat. ed.. New York 1902) ; Castelli, David, <11 Messia secondoˆ gli Ebrei> _ (Milan 1874) ; Colani, Timothee (Jesus Christ et les croyances Messianiques de son temps* (2d ed., Strassburg 1864) ; Dalman, G., (Der leidende und der sterbende Messias> (Leipzig 1888) ; Delitsch, F., (Messianische Weissagungen) (ib. 1890) ; Drummond, James, (The Jewish Messiah* (London 1877) ; Graetz, (Geschichte der Juden> (Leipzig 1888-1902) ; Huhn, E., (Die messian-ischen Weissagung) (Freiburg 1899); Lehz-mann, (Der Menschensohn) (Berlin 1896) ; id., (Der Weltheiland) (Berlin 1909) ; Orelli, (Die ajttestamentliche Weissagung) (Vienna 1882) ; Riehm, (Die messianische Weissagung) (Gotha, 2d ed., 1883; (Eng. trans., London 1891); Schmidt, Nathaniel, <Son of Man* and (Son of God11 in Encyclopedia Biblica* (London 1903) ; Sellin, E., (Die israelitisch-

jiidische Heilandserwartung) (Leipzig 1909) ; Stanton, W. V., (The Jewish and the Christian Messiah) (Edinburgh 1886) ; Vernes, Maurice, (Histoire des idees messianiques) (Paris 1874) ; Volz, (Die vorexilische Yahwe-Prophetic und der Messias) (Gottingen 1877) ; Weber, (Judische Theologie) (2d ed. (Leipzig 1897) ; Westcott, B. F., introduction to the Study of the Gospels) (Cambridge 1860) ; Wiinsche, (Die Lei¬ den des Messias) (Leipzig 1870).

MESSIAH, The ((Der Messias*). Klopstock's <Messiah) is German Pietism's most important contribution to literature and mod¬ ern Germany's most pretentious epic poem, con¬ sisting of 19,458 dactylic hexameters as com¬ pared with the 12,310 of Homer's (Odyssey.* When the first three cantos appeared in 1748 in the Eremer Beitrage ((Bremen Contribu¬ tionsˆ it took the public a year to get ac¬ customed to the novelty of its form and con¬ tent, after which its success was unprecedented, its readers awaiting with impatience the next two cantos, which appeared in 1750, and the next five, which appeared in 1755. On these 10 the fame of the work must rest; for the following cantos, appearing five in 1768 and five in 1773, were probably as disappointing then as tiresome now.

The theme is the redemption of mankind, and the poem starts with Christ's entry into Jerusalem on Palm Sunday, the most exalted subject at hand for the young Jena student of theology, who at the academy of Pforta had come under the influence of Milton through the writings of Bodmer. On going to Leipzig in 1747 Klopstock recast the prose beginnings into hexameters, thus breaking with the tradi¬

tional Alexandrines and loosing a storm of criticism on his head from the school of Gott-sched, while that of Bodmer applauded. It has been said that the work of no German poet before Richard Wagner aroused such contro¬ versy. Goethe's Autobiography tells us that his father banished the book from the house because of its blank verse. However, Klop¬ stock broke the sway of the French in epic verse as Lessing did later in the drama, demonstrating the nearer affinity of German to English. He learned a great deal from Milton, but his nature was essentially lyrical, contem¬ plative, mystic, and he often smothers the epic possibilities of his subject in a flood of fervent, more or less seraphic, religious ecstasy, which exhausts the reader. Instead of strong con¬ trasts, going from darkness to light, from misery to bliss, he attempts to portray a mental state of continuous, dazzling brilliancy. In¬ stead of an alternation of clashes there is a contemplative passivity, from which result end¬ less repetitions and

long drawn out speeches ; so to speak, a massive elaboration of the text of Handel's oratorio, which was but seven years older. Certain descriptions, however, are very successful, such as those of hell, the coun¬ cil of the devils, their punishment through transformation, the trips through the universe made by angels and devils, and especially the vision of the last judgment. Klopstock's tak¬ ing over of the Miltonic cosmography gave him the opportunity of portraying a great struggle between the powers of light and darkness for the soul of Christ and therefore of man, but instead his angels paralyze their adversaries with a look, which method of warfare is not epic, though perhaps pietistic.

His forte is to excite feeling and to lend ex¬ pression to the inexpressible even when his characters become speechless. No German poet before him had so mastered the capacities of the language, whether in choice of words or in rhythmic cadence. In a sense he became the creator of modern poetic diction. A flood of epic imitations on various biblical subjects attested his contemporary influence, and all the younger poets of his day learned from him, but the 19th century admired him from an ever increasing distance. Edition: <Werke,) Franz Muncker (Vols. I and II, Stuttgart 1893) ; (Messias und Oden> (Halle 1910). Critical: Wilhelm Scherer, (Geschichte der deutschen Literatur) (12th ed., 1910) ; Franz Muncker, (Klopstocks Leben> (Chap. 4, Stuttgart 1893); G. E. Lessing Eriefe,* XV, Erief: Ueber das Heldengedicht : Der Messias* (1753).

Carl E. Eggert,

Assistant Professor German, University of Michigan.

MESSINA, mes-se'na, Sicily, town and sea¬ port, capital of the province and on the strait of the same name. Messina is walled, flanked by bastions and defended by a citadel on the south and several forts both on the east and west. The harbor is one of the best in the Mediter¬ ranean and so much resembles a sickle that the town took its original Greek name from that implement, called zancle. Fronting the harbor is a broad quay called the Marina, adorned with statues and fountains and forming a favorite promenade. The streets of the old town are narrow and dirty, but the modern town, built

since the earthquake of 1783, is generally com¬ posed of houses of two stories and has spacious streets, well paved with blocks of lava. Among the public edifices are included nearly 50 churches, many of them of great beauty and adorned with fine sculptures and paintings. The cathedral is a Gothic structure, with a some¬ what heavy exterior, but supported within by vast pillars of granite, supposed to have be¬ longed to a temple of Neptune. The viceroy's palace, the archiepiscopal palace, the senate house, grand seminary, college, large and well-endowed hospital, numerous convents, two theatres, lazaretto and arsenals are some of the other buildings worthy of notice. The manu¬ factures consist chiefly of silk goods. The trade, both transit and general, is extensive. The principal exports are silks, olive oil, linseed and other seeds, oranges, lemons and other fruits; corn, wine and spirits; salted fish, licorice, lemon-juice, shumac, essences, rags, brimstone, *etc.* The tunny and other fisheries are carried on to a considerable extent. A de¬ structive earthquake visited the locality 28 Dec. 1908 destroying about half of the buildings and causing the loss of more than 77,000 lives, prob¬ ably more than half of them residents of Mes¬ sina. The principal shock was at 5.21 a.m., and the tidal wave that followed, 10 feet in height, swept all before it on the low shore. Notwithstanding this frightful casualty, the city so far recovered that in 1910 the exports were $11,000,000 and the imports about $5,000, - 000. Messina has a government university, founded in 1549, which had 692 students in 1901. It has departments of law, medicine, science and classics. It has also a naval seminary and a number of elementary schools. Messina, un¬ der the name of Zancle, is said to have been founded 1004 B.c. ; the Messenians obtained possession 668 b.c. ; it became a free city of Rome 241 b.c. ; the Saracens captured it in 831 ; Richard I of England with his crusaders spent six months there in 1191, sacking the town on leaving; from 1282 to 1713 the Spaniards ruled, though the French held it briefly 1676-78; in 1743 a plague killed 40,000 of the inhabitants; in 1783 an earthquake caused large loss of life; in 1854, 15,000 died of the cholera; in 1860 the city came under Italian rule, and was peaceful and prosperous until the 1908 tragedy. The population before the earthquake was 150,000, but in 1911 was reduced to 126,557.

MESSINA, Strait of (Italian, Faro di Mes¬ sina; Latin, F return Siculum), a channel which separates Sicily from Italy and connects the Tyrrhenian and the Ionian Sea. It has a length of about 20 miles, and gradually widening toward the south, attains, on the parallel of 38°, a

width of 11 miles; but in the north, where it is narrowest, does not exceed two miles. The depth is great, in some parts over 4,000 feet, and a strong current continually running with the tide makes the navigation somewhat diffi¬ cult, but by no means so formidable as was fabled by the ancients, to whom the rock of Scylla, and the whirlpool of Charybdis, on the opposite side, but at some distance to the south, seemed so dangerous that it was generally be¬ lieved to be almost impossible to avoid the one without being dashed upon the other.

MESSMATES, Animal. See Commensal¬ ism.

MESSMER, Sebastian Gebhard, Catholic archbishop of Milwaukee : b. Goldach, Canton Saint Gall, Switzerland, 29 Aug. 1847. Having passed the eight grades of the common school of his home village, he spent three years at the high school in the neighboring town of Rorschach on the Lake of Constance. In 1861 he went to the ecclesiastical preparatory col¬ lege of Saint George's near the city of Saint Gall, where he finished his classical studies. In 1866 he proceeded to the University of Inns¬ bruck in Tirol to study philosophy and theology and there was ordained to the priesthood, 23 July 1871. In October of the same year he came to Seton Hall College, the diocesan sem¬ inary of Newark, N. J., where he taught vari¬ ous theological branches until 1889, when he was called to the chair of canon law at the newly-founded Catholic University at Wash¬ ington. Before going there he spent the winter of 1889 at Rome, where he attended the lec¬ tures of the late Cardinal Giustini on the Jus¬ tinian or Roman Law, and in June 1890 took the degree of doctor of canon law in the Collegio Appollinare. In November 1891 Dr. Messmer was by the Holy See appointed bishop of Green Bay, Wis. He was conse¬ crated bishop on 27 March 1892, by his lifelong friend, Bishop Zardetti, of Saint Cloud, Minn., later Archbishop of Bucharest in Rumania. After the death of Archbishop Katzer of Mil¬ waukee in 1903 Bishop Messmer was appointed Archbishop of Milwaukee where he was in¬ stalled on 10 Feb. 1904. Dr. Messmer has been a constant contributor of articles to various ecclesiastical periodicals, and has edited a num¬ ber of smaller works on canon law, catechetics, liturgy and the Bible; also the (Works of Bishop England D.DP (7 vols.). With Bishop McFaul of Trenton, N. J., Dr. Messmer, then Bishop of Green Bay, became one of the found¬ ers of the Catholic Federation of America in 1901. Since 1916 he has been honorary presi¬ dent of the Catholic Hospital Association of the United States.

MESTIZOS, mes-te'zos, or METIS (Span¬ ish, mixed), half-breeds; those of mixed blood, especially those descended from Indian and Spanish or Indian and Portuguese. In Mexico the European Spaniards are called Chapetones or Gachupines. See Creole.

MˆSZAROS, Lazar, Hungarian revolu¬ tionary soldier and patriot: b. Baja, County of Bacs, 20 Feb. 1796; d. Eywood, Herefordshire, England, 16 Nov. 1858. He was first educated for the Church, but subsequently studied law at Pesth. In 1813 he was summoned to join the Hungarian army by the Emperor Francis I ; later entered the Austrian army, taking part in the campaigns of 1814-15 against Napoleon, and subsequently in Italy; and several years later was appointed colonel. He was in Italy in 1848, serving as a colonel in an Hussar regi¬ ment, when he was chosen by Count Batthyani, who had formed a new Cabinet, for the port¬ folio of Minister of War. Acting in this capacity he was largely instrumental in bring¬ ing the Hungarian army to a high degree of efficiency. In September of that year, having gone to the scene of war in the south, he was defeated before the Rascian ramparts of Szent Tamas. When Austria purposed the subjuga¬ tion of Hungary, Meszaros took command of

the Hungarian forces in the north, but on 4 January his army was routed at Kaschu. In April 1849. after the declaration of independence he again took command of the Hungarian forces, but after the defeats at Szoreg and Temesvar in August he fled to Turkey. He subsequently lived in England, France, the island of Jersey, and in 1853 came to the United States.

META, ma'ta, a river of South America, which has its rise on the eastern slope of the Andes Mountains near Bogota in Colombia. It is formed by the junction of two small moun¬ tain streams, which unite about 40 miles south¬ east of. Bogota; then flows east-northeast into the Orinoco; a course of about 650 miles.

METABETCHOUAN, meUa-bet-choo-an', Canada, a river of Quebec flowing into Lake Saint John from the south. It is a broad stream, 90

miles long, and navigable for a con¬ siderable distance. The celebrated Falls of Metabetchouan over 230 feet high are near its mouth.

METABOLISM (Greek fitTafioTii] a change), the whole series of physico-chemical pro¬ cesses connected with the manufacture of protoplasm and with nutrition and growth. Under , the term is included all those changes by which various energy transformations are made possible in the human body. It has been divided into constructive metabolism (anabo¬ lism), and destructive metabolism (katabolism). The former comprises the processes by which the substances taken as food are converted into protoplasm, while katabolism is the means by vyhich the protoplasm is broken down into simpler products, such as the excretory or waste matters. Metabolism thus comprises the ele¬ mentary vital phenomena of plant and animal life. These are the occurrences associated with changes of substance, of form and of energy. All organisms undergo continual changes of their substance or protoplasm, etc., alterations of their form and transformations of the energy which they get from the environment. The human body is essentially an energy trans¬ former. Thus as regards food, since all living matter is continually undergoing decomposition, it must take in substances that contain all the chemical elements of which it is constructed, but the food differs with every form of cell. Plants live chiefly on inorganic substances and animals on organic, that is, material already prepared; no animal being able to live on simple inorganic compounds. Among animals there is a remarkable adaptation to a single kind of food. For example the larva of the fur-moth lives exclusively upon the hairs of fur, which consist of pure keratin ; this substance, which is closely allied to proteid, is therefore capable of furnishing all the elements necessary for the formation of the protoplasm of this caterpillar. Dogs when worked hard have been found to be able to live on pure proteid food. On the other hand, according to Verworn, it is im¬ possible for an animal to live solely on carbo¬ hydrates or fats, or even on the two together, since there is no nitrogen in these substances.

Vital motion or metabolism is a complex sharply characterizing living organisms, and the taking in of food and the excretion of waste products give to the organism the material with which to regenerate itself and to grow. Metab¬

olism is increased by heat, the consumption of oxygen being increased in cold-blooded animals, but warm-blooded animals undergo a

decrease under heat. Thus man in winter has a much more active metabolism than in summer, since he consumes more food at low temperatures.

It is claimed by Verworn that every species of animal possesses a specific metabolism, and that under certain conditions products of metab¬ olism may stimulate an animal to increased growth, while under other circumstances they may retard growth. Thus the usually deadly uric acid in moderate amounts exerts a favor¬ able influence on. the size of larvae of sea-urchins. Illustrations are afforded by experi¬ ments. in raising snails and water-fleas (Daph - nia) in small volumes of water; besides the diminished volume, the water fouled by their excretions may not only dwarf but gradually kill them, or produce changes of form. Metab¬ olism is more active in the young than in the adult. Between 9 and 14 a boy requires as much food as a full-grown man, and during the next five years more than a man. The same is not true of girls who increase the amount of metabolism up to the 11th year.

Consult Verworn, (General Physiology* (New York 1899) ; Vernon, (Variation in Ani¬ mals and Plants) (New York 1903) ; Starling, (Human Physiology) (Philadelphia 1915) ; Bayliss, Principles of General Physiology) (New York 1915).

METACENTRE, in hydrostatics, the point of intersection of a vertical line passing through the centre of gravity of a floating body as a ship in eqailihrio, and a vertical line through the centre of gravity of the fluid displaced, if the body be turned through a small angle, so that the axis takes a position inclined to the vertical. If the metacentre is above the centre of gravity, the position of the body is stable; if below it, it is unstable. In shipbuilding a vessel must be so designed that its metacentre (its changing centre of buoyancy) is not likely to oscillate so as to permit capsizing.

METACHROSIS, the change of color brought about in the surface of certain animals, either voluntarily or involuntarily, to make them conform to their surroundings. It is ex¬ hibited in many of the lower animals as a pro¬ tective device, especially in cuttlefishes, cater¬ pillars, various amphibians, especially frogs and certain lizards, notably the chameleons. The dark pigment to which the brown or gray colors of metachroic caterpillars are due is de¬ posited in the cells of the outer skin, while the green coloring matter is found in the underly¬ ing fat; and, as Carpenter says, experiments have shown that the presence or absence of both kinds of pigment is determined by the sur¬ rounding objects through the quality of the light reflected from

them, the suppression of the superficial dark pigment allowing the deeper green to show through the skin, and thus give its hue to the caterpillar. It has been shown that the formation of the dark pigment is hin¬ dered by the action of certain yellow rays which are absorbed by dark objects, but re¬ flected from green leaves and shoots. The process of change in squids, frogs, etc., through nervous and muscular control of pigment sacs, called chromatophores, is somewhat different, and is explained in the article Chameleon.

The power possessed by these animals of adapt¬ ing their color to their surroundings must be of great value in ensuring preservation from enemies. Consult Beddard, (Animal Coloration) (1892).

METACINNABARITE, a native sulphid of mercury, occurring amorphously, when it is black or dark gray, or in tetrahedral crystals. To its black color it owes its early popular name, .Ethiops mineral. Metacinnabarite is found in California.

METAGENESIS, or HET£ROGONY, a

term proposed by Owen for a form of par¬ thenogenesis. It is that form of alternation of generations (q.v.) of which one generation reproduces only asexually, by division or bud¬ ding, the other exclusively by laying eggs. A good example is the mode of reproduction of hydromedusse in which the hydra-like stage gives rise to medusae, the latter laying eggs. Another case is that of the aphides, whose asexual individuals produce multitudes of young by budding, the next generation consist¬ ing of males and females, the latter laying fertilized eggs. An individual of the first gen¬ eration is called the nurse; one of the second generation the sexual animal.

Another term for this phase of reproduction is. heterogony (or heterogenesis), which Hertwig defines as ˆregressive alternation of gen¬ erations.® He mentions another form of heter¬ ogony where two generations with different forms and structure alternate. For example, a hermaphroditic thread-worm (Ascans nigrove-rtosa) lives

in the lungs of frogs ; it produces a form (Rhabdonema nigrovenosum). which lives in mud, and which lays eggs giving rise to the ascaris of the frog.

METAHEWETTITE, a dark red mineral consisting of hydrous calcium vanadinite oc¬ curring in microscopic crystals with uraninite and carnotite at several localities in Utah. Probable composition CaO.3V2Oa.9H2O ; a source of vanadium.

METAL WORK, any work done in metals, but especially handwork practised as a decora¬ tive art, in which the materials are metal and the designs are executed in repousse or relief. This may be accomplished either by carving or expert hammering as of thin sheet metal. The term includes jewelry (q.v.) and goldsmith's work; hence its materials are often the precious metals and its end personal adornment. But it is often applied to larger work and especially to metal decoration in architecture, apparently a later development in the arts than was the jeweler's trade, which flourished in classical antiquity, and everywhere seems to have quickly followed the most primary knowledge of metallurgy in industrial evolution. The Middle Ages were the great period of metal work, notably in connection with Gothic art. Even the more valuable metals were lavishly used in this epoch, as before in the Byzantine period, and since in the architecture of the Greek Church, above all in Russia. One of the foremost instances of Italian metal work is to be found in the altars of Saint James at Pis-toria and of the baptistery of Saint John in Florence. Each of these was the work of a line of great artists, whose elaborate work upon them covered more than a century. Cellini

(q.v.) was the greatest metal worker of the 16th century. Even more important than this work in silver and gold are the great bronze doors in the Florence baptistery, one by Ghi¬ berti and another by Pisano, each the product of a score of years of labor, and both dating from the 15th century. Wrought iron work began to be used in the 12th century; between the 13th and the 18th centuries in the shape of gates, grilles and screens in ecclesiastical art, and in German locks and hinges of great beauty, it came to its most perfect form. The sepulchral brasses of German, French and Eng¬ lish churches should also be mentioned. See Brasses.

METAL WORKING MACHINERY, a

term including practically all machines by which metals are converted

into shapes required by modern structural work and the industrial trades. They may be conveniently arranged under the following named classes : Lathes ; borers or drills; punches; shears; milling machines; grinders; riveters; drop hammers; bending rolls; rolling machines; presses; planers ; saws and special machines.

Lathes are turning machines used to ob¬ tain cylindrical surfaces by rotating a bar of metal against a fixed cutting tool. They are also used for spinning sheet metal into form. The principal parts are the head stock holding the driving cone and revolving spindle; the tail stock, supporting the back centre, and capable of being clamped at any point on the centre line of the bed or frame, and the rest or carriage bearing the tool head. The bar of metal to be worked is fastened to the head and tail stocks and rotated or turned by belts from shafting or by electric motors, while the rest carrying the cutting tool is moved parallel with the axis of the bar from the surface of which a spiral shaving is removed. By suitable attachments the lathe may be used for tooling flat surfaces, sawing or grooving and cutting gear wheels. These machines are made in a great number of sizes, of which the principal forms may be designated as follows: (1) The hand lathe; driven by. hand power, usually by a drill-bow, but sometimes by an assistant at the crank. It is without self-acting feeding devices for regu¬ lating the cutting tool. (2) The foot lathe; small and light, worked by the operator's foot and adaptable to work as delicate as that of the watchmaker and jeweler. (3) The self-acting lathe; in which the cutting tool is held in a carriage which is moved by mechanical means, causing it to traverse automatically the object being turned — these lathes are adapted for screw cutting and are often so designated. (4) The chucking or face lathe; for turning cylinders several feet in diameter and many feet in length, such as engine cylinders and the tubing and jackets of large ordnance. The turret lathe belongs to chucking class, but the face of the chuck is horizontal, the revolving spindle being vertical. (5) The boring lathe, used for working on internal cylindrical sur¬ faces. A bench lathe is a small model of any of the several types so arranged that it may be bolted to a work bench. An automatic lathe is one of the larger types fitted with mechan¬ ism by which it stops itself when the work it is set to do has been completed. Any lathe may belong to the single geared or back geared

METAL WORKING MACHINERY

1 Verticle Spindle Milling Machine 3 Automatic Screw Machine

2 Automatic Gear Cutting Machine 4 Surface Grinding Machine

1 Plain Radial Brill 2 Steam Drop Hammer 3 Horizontal Milling Mach

i CO

rfjW* >

V

C°ld Saw Cutting-off Machine 2 Rotary Planing Machine

Combination Cold Saw Cutting-off Machine 4 Horizontal Milling Machine

48-inch Engine Lathe 2 Straightening Rolls

Reversing Motor Planer 4 Die Grinding Machine

CO H*

type. In the latter a set of gear wheels operates a back shaft, by which the speed of the work may be greatly reduced. Overhead shafting on the lathe standards or on the ceiling provides means for giving a revolving motion to the tools at work, thus affording a combined mo¬ tion of great variety and intricacy for involved work.

150-Ton Fixed Riveter.

Borers or Drills. — Boring machines, if op¬ erated by hand power, are called ˆhand-drills,® otherwise, ((power drills.® They are of two types, the horizontal and the vertical. The cutting tool is formed upon an axially rotating spindle designed to bore or drill cylindrical holes. They vary greatly in size and pattern ; in the number of spindles employed and the man¬ ner of their arrangement. Large holes, either horizontal, vertical or inclined, such as engine cylinders, tubing for ordnance and hollow shafting, are worked on a boring lathe, carrying usually two or more separate spindles clamped in a cylindrical tool head. Drills are especially useful as reamers to finish holes made by punches, and also to give exact cylindrical forms to the internal surfaces of hollow cast¬ ings of any kind.

Punches. — Punching machines are of the single or multiple type, capable of punching one or several holes at a time. They are used for punching rivet holes in boiler and armor plates, plates for girders and other structural metal work. The perforation is accomplished by the thrust of a cylindrical punch under great pressure. Though usually made to punch round holes they are also worked with <(drifters® which square up the round holes. The power employed is steam or hydraulic, generated by individual engines for large and belt-driven ma¬ chinery for small work.

Shears. — Shearing machines and punches are similar in general construction and opera¬ tion, excepting that in the former cutting

edges which pass each other like the blades of a pair of scissors take the place of the punching tool. Their name and action sufficiently describe the purposes for which they are used.

Milling Machines. — Are. of great import¬ ance in the manufacture of iron work of mod¬ erate dimensions such as parts of sewing ma¬ chines, automobiles, rifles and pistols. In gen¬ eral construction a framework carries a spindle

actuated by a pulley, and a table upon which chucks or holding devices are arranged. Gear¬ wheel attachments to the cone pulley provide for changes of speed or greater driving power at the cutters. The advantages gained by their use are as follows : The rotary cutters insure a continuous cutting operation, with a con¬ stantly changing cutting edge; the outlines of the work and the form of the cutting edges are exactly similar; once adjusted, all work is turned out uniform in size and shape, and any unlimited variety of shapes may be obtained by simply varying the form of the cutters, while the only special operating skill required is to maintain the form of the cutters and set the work.

The modern milling machines have been brought to a high degree of perfection and pro¬ duce work in a truly wonderful variety. The milling cutters are worked singly or in <(gangs® of many. forms on the same shaft. The tables are provided with longitudinal feed and cross feed, and the tools with vertical feed as well. Some of the numerous operations performed are planing of plain and curved surfaces, grooving, slotting, dovetailing, cam cutting, ratchet wheel and gear cutting — spur, spiral and helical, as well as bevel and worm gearing, sawing, slitting, making of taps and reamers, *etc.* The automatic milling machines reproduce with great accuracy the form of any pattern in¬ serted as a control, practically without atten¬ tion.

Grinders. — The recent development of grinding machines has placed them in the front rank of metal working machinery as the fin¬ ishers. They take work rough finished from the lathe and the milling machines and bring it to the finest degree of perfection. Not only do they finish the work of the other machines, but they also grind to exquisite form the tools with which the other machines do their work. In the automatic section the work is ground accurately to size regardless of the wear of the wheels during the process, beginning the grind¬ ing with a coarse feed and throwing in the fine feed automatically as the piece approaches its true size. The machine once

set, piece after piece is automatically machined to pattern size without attention except the removal of the finished work and the placing of another rough piece. A great deal of work formerly turned to extreme accuracy on lathes is now finished direct from the forging on the supersensitive automatic grinder and with a very considerable saving of time. See Grinding.

Riveters. — Riveting machines are made in two forms, stationary and portable; the former used in heavy work are operated by pressure generated by steam or hydraulic power, while in the portable form the moving die is actuated by steam or compressed air, with hammer-like blows. They are employed to drive and head hot rivets in boiler work, bridge building and other structural work with results far superior to hand work in rapidity and efficiency. The usual form of the stationary type is a U-shaped frame or yoke. The ends of the arms are pro¬ vided with dies projecting inwardly, one being fixed while the other has a reciprocating mo¬ tion. The rivet being placed in the hole is compressed endwise between the dies; the pres¬ sure forces the metal of the rivet into the ir-

regular edge of the hole, clamps the plates to¬ gether and forms the rivet head.

Drop Hammers. — Heavy drop hammers are used for forging and also for welding, and are operated by hydraulic or steam power. They consist of an anvil upon a solid base of steel blocks laid over oak timbers to give elasticity to the machine. Above the anvil vertical housings capped by steel arches sup¬ port the hammering ram and the platforms upon which the piston cylinder and other actu¬ ating machinery is placed. By the use of swages, fullers and flatters, hot metal is ham¬ mered into forms, often by the use of a pro¬ gressive series of dies. The largest hammer of this kind was erected in 1891 at Bethlehem (Pa.) Steel Works. Its general dimensions and weight are as follows: Height, 90 feet; width, 42 feet ; weight of anvil and foundation, 1,800 tons; weight of housings, steam chests, pressure cylinders and piston, about 1,000 tons. Ram 19 feet long, 10 feet wide and 4 feet thick,

Light Drop-Hammer.

weighing 100 tons. Lighter forms of drop ham¬ mers are actuated by compressed air and are called pneumatic hammers. They are used principally as cornice bending machines.

Bending Rolls and Benders are used gen¬ erally in boiler and tank work; the metal plates being drawn by rotation between three rolls so arranged that their axes form the edges of a triangular prism, their relative adjustment de¬ termining the curve to which the plate is bent.

Rolling Machines are used to flatten out metal bars into plates and commercial shapes, such as I-beams, railroad rails, *etc.* As de¬ signed at present they accomplish in a short space of time a great variety of work which in times past was turned out by the more labori¬ ous and expensive processes of lathe turning and forging. One class is used to manufac¬

ture boiler and armor plate and the general run of heavy sheet metal ; while another class produces the thin sheet metal down to the finest grades such as tinfoil.

Tinfoil Rolling Mill.

Presses. — By the use of presses sheet or plate metal is converted into utensils of any desired form. They are usually operated by hydraulic power; are provided with dies be¬ tween which the metal is pressed into the re¬ quired form, and are capable of being con¬ structed to exert an unlimited amount of pres¬ sure. Forging presses are made in all sizes adapted for uses ranging from the pressing of watch-cases to the forging of steamship shafts and of armor plates weighing up to 14,000 pounds. Forgings thus made are superior to hammered forgings. They are designed for working metals either hot or cold.

Planers. — • Planing machines are used to ob¬ tain flat surfaces on metal. There are two types ; those in which the motion of the table relative to the cutting tool is rectilinear and those in which that motion is rotary. In gen¬ eral construction a planer consists of a travers¬ ing table on which the work is fastened ; a bed to receive the table and guide it in a right line ; a cross slide to support the slide rest carrying the tool ; standards bolted to the bed and sup¬ porting the cross slide, and the mechanical de¬ vices for feeding and regulating purposes. The power supplied from shafting by belts is trans¬ formed by gear-wheel attachments into the re¬ ciprocating motion of the table, causing it to slide back and forth between the vertical guides, thus bringing the work against the cut¬ ting tool which shaves off successively, side by side, narrow thin strips of metal until a per¬ fectly flat surface is produced. Planers are built in various sizes, the larger machines being equipped with tables 7 to 8 feet in width and 20 feet long.

Saws. — In metal working, saws belong to the class commonly termed finishing machinery. For cutting plates and bars into shorter lengths they are in extensive use, affording a great economy of time. They are built in a great many sizes and forms, both stationary and port¬ able, equipped with single cutters or cutters ar¬ ranged in gangs. For cutting off large bars such as steel beams, rails and similar shapes,

saws with single cutters are generally used, the object being fastened to a carriage and moved into contact with the edge of the circular cut¬ ter. Some machines used for lighter work are so arranged that the circular saws are moved

into contact with the bars. The cutters are of two kinds. The friction discs made of soft mild steel, without teeth, measuring about 44 inches in diameter and three-sixteenths of an inch in thickness, are used for cutting off either hot or cold metal. They are run at a high rate of speed, about 15,000 feet per minute, rim ve¬ locity. The toothed cutters vary greatly in diameter and thickness ; are made of highly-tempered steel, and are used for clean cutting in cold metal. They are usually run at a low rate of speed, the rim velocity varying from 130 to 150 feet per minute. Friction discs run at rim velocities between 20,000 and 25,000 feet per minute are called fusion discs, from the fact that the intense heat generated by the friction actually melts the metallic dust ground off by the cutter.

Special Machines. — This term includes an almost endless variety of metal-working ma¬ chinery, capable of enumeration only in a very general way. They are used for special pur¬ poses such as making pins, nails, rivets and pens ; the tapping of nuts and the threading of bolts. Although often of very complex con¬ struction they turn out work with great rapidity and precision. In its special field metal-working machinery has not only displaced hand labor in all countries, and especially in the United States, but by its use structural work such as the building of magnificent buildings and bridges, powerful engines and mammoth ships have been produced far beyond the capabilities of that which is known industrially as hand labor. Consult Adam, H. M., and Evans, J. H., (Metal Work* (London 1914) ; Colvin, F. H., and Stanley, F. A., (American Machinist Grind¬ ing Book* (New York 1912) ; De Vries, D., (Milling Machines and Milling Practice) (Lon¬ don 1916) ; Hasluck, P. N., (Metal Working> (London 1904) ; Horner, J. G., (Modern Mill¬ ing Machines * (London 1906) ; Pull, E., Mod¬ ern Milling) (New York 1917).

METALLIC CURRENCY. See Cur¬ rency.

METALLOGRAPHY. See Iron and

Steel, Metallography of.

METALLOID (Gr. “metal-like”), in chemistry , any non-metallic element. These are 13, namely, sulphur, phosphorous, fluorin, chlorin, iodine, bromine, silicon, boron, carbon, nitrogen, hydrogen, oxygen and selenium. The distinction between the metalloids and the met¬ als is slight. The former, excepting selenium and phosphorus, do not have a “metallic” lus¬ tre; they are poor conductors of heat and elec¬ tricity, are generally not reflectors of light and not electropositive ; that is, no metalloid fails of all these tests. The term seems to have been introduced into modern usage instead of non-metals for the very reason that there is no hard and fast line between metals and non-metals, so that “metal-like” or “resembling metals” is a better description of the class than the purely negative “non-metals.” Originally it was ap¬ plied to the non-metals which are solid at ordi¬ nary temperatures.

METALLURGY, the extraction of metals from their ores and so refining and fashioning them as to fit them for use in the metal indus¬ tries, is the most ancient of arts. The annals of history show that the degree of civilization attained by a race was directly proportional to

the extent to which they made use of metallur¬ gical processes. In fact, a prominent metal¬ lurgist of the 19th century when delivering an introductory address to students of metallurgy was accustomed to charge them that “in propor¬ tion to the success with which the metallurgic art is practised in this country, will the inter¬ ests of the whole population directly or indi¬ rectly in no inconsiderable degree be pro¬ moted.”

As an industry, it requires a wide knowledge of the sciences, embracing chemistry, physics and mineralogy, as well as the professions of mechanical and electrical engineering. As some of the oldest historical works make reference to metallurgical processes, the actual practice of the art must go much farther back into pre¬ historic ages. It had its inception at the time when men, ever advancing, replaced their stone implements by others of greater usefulness made from metals. Their methods of extract¬ ing and refining were in many respects com¬ parable with those used to-day except in the

introduction of mechanical improvements. The early development of chemistry was very closely allied with metallurgy. Many of the older treatises on theories of chemistry are attempts to explain metallurgical reactions. Prominent among these was the separation of lead from the precious metals, gold and silver, by its combination with oxygen, a process prac¬ tised and much speculated upon bv the ancients. Gold was probably the first metal known as it occurs naturally in the metallic state, is bright, heavy and easily worked. Iron, copper, silver, tin and lead were other metals known to pre¬ historic men. Quicksilver is mentioned in the times of the Greeks and Romans. In the 15th and 16th centuries we hear of antimony, bis¬ muth and zinc, with arsenic added at the close of the 1 7th century. Nickel, cobalt, manganese and platinum came in the 18th century, the re¬ mainder belonging to the 19th and 20th.

There are four great periods in the annals of metallurgy. The first extended from pre¬ historic times to the 1st century a.d., when Pliny, the Elder, in his work, (Naturalis His¬ torian collected all existing knowledge con¬ cerning metals to his day. The second period ending with the 1 5th century had as its chroni¬ cler Agricola, in (De Re Metallica.* Next came a period of comparative stagnation with rela¬ tively few important advances until the 19th century ushered in the fourth, our present period, one filled with development.

Properties of Metals. — All metals are dis¬ tinguished by numerous characteristic proper¬ ties which fit them for their various industrial applications. A brief outline of these follows: Density. — All common metals except aluminum are relatively heavy, specific gravities ranging from 6 to 22ˆ2. The density of metals varies, within moderate limits, due to methods of cast¬ ing, rates of cooling and subsequent mechanical treatments. All metals except bismuth are lighter when liquid than when solid; i.e., they contract on solidification. Color and Lustre. — The metals vary considerably in color and lus¬ tre and many industrial uses depend upon these differences, particularly in reference to the use of metals for ornamentation. Opacity. — This is a property of all metals under normal conditions. Crystallization. — All metals crys¬ tallize in definite geometrical forms on free

solidification. Structure. — This is revealed in fractures examined by the eye and in polished and etched sections examined under the all-powerful eye of the microscope. Unmistakable evidence of the thermal and mechanical treat¬ ment which the metal has undergone is. fur¬ nished the expert by such examination. Such a study often serves to distinguish one metal from another, making unnecessary the resort to chemical analysis. Hardness. — There are sev¬ eral methods of determining this property: scratch hardness, or resistance to abrasion; in¬ dentation hardness, or the resistance offered to penetration by a body of greater hardness, as in the familiar Brinell method where a hard¬ ened steel ball is used for this purpose ; re¬ bound hardness, measured by the height to which a hard body will rebound when allowed to fall upon the metal being tested as typified by the Shore sclerescope method; cutting hard¬ ness, or the resistance offered to cutting by a hard tool. This is usually measured by deter¬ mining the number of revolutions of a standard drill to produce a given penetration. Strength.

— This property is measured by resistance to rupture ; by slow direct pull, bend, compression or twist ; by sudden blow ; by repeated bending or blows or a combination of both. Brittleness and Toughness. — These two, opposing proper¬ ties, are indicated by the way . in which the meial behaves when subjected to strength tests. The same metal may appear as brittle or tough, depending on the conditions of test. Plasticity.

— This property accounting for malleability and ductility, is the ability of the metal to flow under pressure in the hot arid in the cold state. It is all important in the working of metals in the industries. If metals did not possess this property, the operations of hammering, rolling, drawing, spinning, etc., through which all metal articles must pass, during fabrication, would be impossible. Weldability. — This is the ca¬ pacity of pieces of metal to unite into one con¬ tinuous metal when heated and brought into intimate contact. Fusibility. — All metals ex¬ cept mercury are solid at ordinary tempera¬ tures, yet they can be melted — brought into a state of fusion — by application of sufficient heat. Volatility— All metals may be vapor¬ ized at high temperatures. Diffusion. — This is the property of molecules of one metal to mi¬ grate into another when brought into intimate contact, either in the liquid or solid states. Occlusion. — The rapidity and ease

with which metals dissolve gases is augmented by high temperatures. Expansion and contraction with changes in temperature ; thermal and electrical conductivity; magnetic permeability, or ability to conduct lines of magnetic force, are all prop¬ erties which find great application in the in¬ dustrial use of metals. _

Although metallurgy is concerned with the extraction and purification of metals, few of them are used in the pure state. Practically all of the metal produced finds its way into alloys before it comes to the con¬ sumer's hands. Alloys, from the Latin, alligo, <(to bind to,® were defined by Birminguccio as <(amicable associations of metals with each other.® Alloys may be formed by fusion, com¬ pression or electro-deposition. By far the most of them are formed by fusion. By the alloying of metals new properties result which increase their suitability for commercial uses; for in¬

stance, an alloy is produced with a coefficient of expansion of zero to make possible the manu¬ facture of clocks which will be accurate at all temperatures. Wire is produced with the same coefficient of expansion as glass for use in elec¬ tric light bulbs. Before the metallurgist gave us this alloy we used the rare metal platinum for this purpose. Alloy steels of unheard-of strength and anti-fatigue properties are pro¬ duced for use in automobiles and aeroplanes. Innumerable articles of common and special use show that most metallic objects are alloys possessing special properties to meet special needs. Frequently the change of a few tenths of a per cent of the amount of a constituent present in an alloy will cause the most startling changes in the properties of the resultant metal. Of all the innumerable operations of metal¬ lurgy there is hardly one which does not re¬ quire the application of heat for its successful promotion. Heat is usually supplied by the combustion of a fuel and must be applied in many different ways and under various condi¬ tions to suit the metallurgical process to be carried out. Therefore, knowing the metallur¬ gical requirements we must know the character¬ istics of the available fuels in order to deter¬ mine which are to be used and the methods of using them to produce desired results.

Fuels. — Although fuels are complex chem¬ ical combinations, the main heat-producing ele¬ ments of all are carbon and hydrogen. When a fuel is once kindled the combustion will con¬ tinue as long as the heat evolved is sufficient to keep the temperature above the ignition point. Essential conditions for perfect com¬ bustion are: first, sufficient air brought into in¬ timate contact with the fuel ; second,

sufficient time in which it may act ; third, temperature suitable for combustion must be maintained throughout. From these considerations it is evident that less excess air need be used with gaseous than solid fuels to get an intimate mix¬ ture. Mechanical methods of producing mix¬ tures are frequently employed. The form of solid fuel affects combustion, porous fuels tak¬ ing more air, caking fuels causing imperfect combustion, *etc.* With perfect combustion, the products are carbon dioxide and water. The atmosphere in the furnace resulting from the products of combustion may be either neutral, oxidizing or reducing. A neutral atmosphere which results from perfect combustion is very difficult to maintain. Under ordinary condi¬ tions we either supply an excess of air which results in an oxidizing atmosphere, or wTe do not furnish enough air for perfect combustion and this results in a reducing atmosphere. There are long and short flame fuels depending upon the amount of combustible gases evolved and the facilities existing for mixing air and gas. All these are important considerations in the use of fuel and design of combustion chambers. Fuels are rated by their calorific values. There are three classes : solid, liquid and gaseous. The solid are classified as nat¬ ural (wood, peat, lignite, coal) and prepared (charcoal, coke, begasse, etc.). The liquid fuels are natural, as petroleum ; and artificial, as distilled oils, tars, *etc.* The gaseous fuels may be divided as natural gas, or artificial (manu¬ factured gas, oil, water, coal, blast furnaces, producer gas, etc., etc.). Each of these differ¬ ent classes of fuels presents its own problem in

combustion and its characteristics must be known and considered in designing the fur¬ nace in which it burns. A furnace which burns coke well, will not burn tar at all. In blast-furnace work the compressive strength of the fuel must be considered as that determines the weight of charge it can support.

Apparatus. — Having determined the con¬ ditions and methods by which the heat is to be generated and applied to the metallurgical process, we must consider the requirements of a containing vessel which will stand the often¬ times intense heats employed, have a certain amount of strength and at the same time exert beneficial, not harmful, chemical effects on the charge. The materials to which we turn to play this part in our sequence of processes are known as refractories. An ideal refractory not only should be a poor heat and electrical conductor, but must also resist the action of the high temperature causing it to melt away, resist the effects of sudden temperature changes, have mechanical strength and resist chemical changes. As no single material having all these qualities exists, metallurgical furnaces must be constructed in parts, i.e., a refractory inner lining, an intermediate insulating section and an outer wall for strength and protection. The principal constituents of refractory ma¬ terials are aluminum silicates or clays, silica, alumina, lime, magnesium, chromite. These materials, though relatively infusible in them¬ selves at the temperatures of metallurgical proc¬ esses, must in order to be in shape to be used as furnace walls, be mixed with other ingre¬ dients which increase their mechanical strength at the expense of refractoriness. The common forms in which refractories are used, are as follows : Fireclay, composed of hydro-silicate of alumina combined with fragments of other materials. It is plastic when wet, becomes brick-like when burned at red heat. It is used as clay for binder and in making fire¬ bricks. Silica, mostly used as silica bricks, is made from quartzite, sandstone, ganister, etc., all consisting principally of silicon dioxide. Bauxite clay, principally an oxide of alumina is combined with a little silica and made into bricks. Lime pure is not much used as a re¬ fractory. Limestone mixed with fireclay is used in lining the test of a cupelling furnace. Cal¬ cined magnesite,

containing a high per cent of magnesium oxide, is used either in the granular or brick form. Dolomite, a magnesium calcium carbonate, is not much used in brick form but is usually, after calcining and crushing to small size, mixed with dehydrated tar and rammed in to make a furnace bottom. Chromite, a compound principally of the oxides of chro¬ mium and iron, is used in the brick form and as a cement. Carbon bricks also find a use where a reducing atmosphere is required.

Refractories are classed chemically, as acid, basic or neutral ; and by this arrangement, silica is the principal acid refractory. Bauxite, lime magnesite and dolomite are basic, while fireclay and chromite are neutral. Acid and basic materials in contact with each other readily slag and melt away. They cannot be used in contact with each other but may be used in the same furnace with a separating layer of neutral material.

Furnaces. — Metallurgical furnaces are di¬ vided into two broad classes : first, those in

which the heat comes directly from the combus¬ tion of fuel ; second, those in which electrical energy supplies the heat. Under class one fall the hearth furnaces, as the smith's forge; and the shaft furnace, as the blast furnace and the cupola. In these the fuel and charge to be heated are in direct contact. Then there are the reverbatory furnaces for roasting and smelting, where combustion takes place in a separate chamber and the charge is heated by the flame, also the closed vessel type of fur¬ nace, as crucible, retort, muffle, etc., where the charge is inside sealed off from the source of heat which plays on the outside. Under this class also, come those furnaces which are merely containers, using no outside fuel, the heat coming from the charge itself, as the roasting kiln, bessemer convertor, *etc.* The electrical furnaces are classed as: direct re¬ sistance, the charge itself being a part of the electrical circuit or resistor; indirect resistance where the charge is surrounded by an electri¬ cally heated resistor ; direct arc furnaces, the charge forming one or both poles of an arc; indirect arc, the charge being in a space heated by an arc; arc resistance, where the charge is one pole of an arc and also a part of the elec¬ trical circuit.

Ores. — The metals occur in nature either as pure native metal or in combination with other materials in an ore. Ore is defined as a metal bearing substance from which a metal, alloy or metallic compound can be extracted at a profit. It usually consists of one or more

economic minerals and a waste, product or gangue. Ores are named according to their leading useful metal and are classified by the gangue as siliceous, calcareous, ferrugeneous ; or broadly speaking, as acid and basic fluxing ores. Another classification refers to treat¬ ment, as smelting or milling ores. The metals occur in nature as native metals, gold, silver, copper, mercury; as oxides, iron, tin; as sul¬ phides, and under this class come selenides, tellurides, arsenides, antimonides ; as halides, silver, mercury; salts of acids, carbonates, sili¬ cates, *etc.* The largest number of commonly worked ores are in the oxide and sulphide classes.

Methods of Treatment. — It is here, by the treatment of the ores that we can divide metal¬ lurgical methods into two broad classes : wet metallurgy and dry metallurgy. The wet method of treating an ore involves a leeching by a chemical solvent, followed by a means of separation of the required metal from solution. The dry method involves smelting and subse¬ quent purifying methods by means of high temperatures. Considering dry metallurgy, the ore as it is dug out of the ground is seldom in a condition fit for smelting. Some ores may only require to be crushed to a uniform size, as the oxide ore of iron, haemitite; others must be heated to drive off moisture and volatile mat¬ ter, called calcining; others must be roasted; still others are weathered. Calcination, or the driving off of volatile matter, at a low temperature is usually carried out in heaps, stalls or kilns. . Calcining in heaps consists of building up a pile of alternate layers of wood or coal and ore to the height of five or six feet, then igniting at the bottom and letting it burn itself out. This process is usuallv carried on in yards where protection from the winds

which will cause uneven burning, is afforded. The stall is the first improvement on the heap and consists of a four-walled enclosure, three permanent and the fourth built in after charg¬ ing with fuel and ore. After the material is ignited the heat set free is sufficient to keep the process going. The process must be con¬ tinuous and the losses of heat be kept at a minimum. This process is suitable only in ores which are rich in sulphur. A very large num¬ ber of ores require a roasting preliminary to smelting. Roasting consists of heating the ore in contact with oxygen, chlorine, carbon, water vapor or sulphur, to a temperature below fusion or at most to incipient fusion with the purpose of driving off a volatile component. Roasts may be oxidizing, reducing, chloridizing or sulphating, according to the ore and the product desired. The most common form of roast is the oxidizing roast of sulphide ores to eliminate the sulphur and if carried to completion leaves a metallic oxide of the metal for smelting. This is called dead or sweet roasting and re¬ quires prolonged heating and much stirring. Otherwise, the sulphite is converted partially into oxide and partially into sulphates with some remaining sulphide. The chloridizing roast is used as a preliminary to a wet metallurgical process whereby a chloride is produced which is amenable to solvents. Roasting may be car¬ ried out in heaps, stalls, shaft furnaces or reverbatory furnaces.

The smelting for which the calcination, roasting, crushing, etc., are preliminary prepara¬ tions processes, consists in separating the metal and gangue by their difference in specific gravities after fusion. A necessary adjunct of the smelting operation is a flux which renders the naturally infusible gangue readily fusible by the formation of a slag with it which is easily separated from the heavy metal. The fluxes . are earthy materials and may be acid or basic, depending on the character of the ore used. Acid gangue in the ore requires basic flux and vice versa. Lime, a basic flux, is usually used in the carbonate form or limestone. Fluorspar, calcium fluoride, is used only in small amounts to increase the fluidity of the slag. Barytes, strongly basic, also reacts as a desulphurizing agent. Silicious or acid fluxes are sand, quartz, *etc.* Smelting is usually either oxidizing, or reducing. The reducing smelting in treating oxide ores has for a reduc¬ ing agent carbon monoxide formed from coke which is a part of the furnace charge. Oxidiz¬ ing smelting, is practised mainly with the pur¬ pose of refining a crude metal as many metallic impurities can be removed in this way. Other metallurgical processes are liquation, where

advantage is taken of the difference of melting points of easily fusible compounds from infus¬ ible ones, when the. combination is heated to the lower melting point the more easily fusible runs out leaving the highly infusible gangue; distillation and sublimation, where the metal is driven off as a vapor, then condensed as a liquid or solid; scorification, or the roasting of an alloy with the object of removing the more oxidizable metal as a slag. This process is used practically only for separation of silver and lead. Other processes are cupellation, similar to scorification where the oxidizing is carried out on a hearth or cupel which is of a material to absorb the fused oxide.

Wet metallurgy in general involves the

separation of a metal in the form of a soluble salt from the insoluble gangue by means of a solvent followed by the recovery of the dis¬ solved substance, by evaporation or precipita¬ tion. Amalgamation is a process in which the ore, usually gold or silver, is treated with mer¬ cury which dissolves the metal, and on subse¬ quent heating the mercury distilled off, leaving the metal. The ores need to be in a finely divided state and in such form as to be readily amenable to solvents which frequently means preliminary treatment, as roasting, weathering, *etc.* The solvents in common use are water ; aqueous solutions of gases; acids; bases, salt solutions. These solvents are used diluted and are warmed. Ores for leeching are classed as sands and slimes, the sands being coarse enough to permit the leeching by percolation. The slimes are so fine as to prohibit this method and require an agitation of slime with solvent. This gives a colloidal solution which must be coagulated, then separated by filtration or decantation. The solution is then concentrated by evaporation and the salt crystallized out. In dealing with precipitates they are usually dried in muffle, or reverbatory furnaces. The modern and most efficient method of treating slimes is by the flotation process of separation. The slime or pulp is fed into the bottom of a tank and agitated with oil and compressed air. Under this treatment the metal particles float on the surface while the gangue particles sink.

Metals produced by the above methods are rather impure. For final refinement of a metal and its production in the purest possible form electrolysis is resorted to. Reduced to its sim¬ plest form electrolysis consists of a solution of a salt of the metal to be purified in which two electrodes are dipped, one being of the impure metal, and the other of the pure. When the electric current is passed through this bath the electrode of impure metal is dissolved away and chemically pure

metal is deposited on the other electrode. After the metal is produced by some of the above processes it is usually made into some alloy by fusion with other metals, and elements, then cast from the molten state into the finished shape or into ingots which must be forged by hammering, rolling, pressing, . etc., into, the desired form. These hot working operations are frequently followed by cold rolling as strips, sheets, spinning or pressing for shapes, cold drawing for wire. All these operations require careful and frequent heating and cooling. The metal must be an¬ nealed to remove strains and make it soft. In the case of steel produced by alloying carbon and iron it may be used for tools which re¬ quire. hardening and tempering by heating to a definite temperature, quenching in water or oil, then reheating to some lower temperature.

All of these processes fall under the metal¬ lurgist's care as surely as the original extrac¬ tion and refining. See Aluminum; Copper; Copper, Discovery and Development; Copper and Brass Industry; Electrochemical Indus¬ tries; Iron and Steel Industry and articles on the other metals.

Bibliography.— Babu, L., <Traite the-oretique et pratique de metallurgie generale* ; Fulton, C. H., Principles of Metallurgy> (New York 1910) ; Gruner, L., <Traite de metal¬ lurgy ; Hofman, FT. O., ˆGeneral Metallurgy* (New York 1913) ; Roberts-Austen, W. C., (An Introduction to the Study of Metallurgy* (6th

ed., Philadelphia 1910) ; Sexton, A. H„ < Ele¬ mentary Textbook of Metallurgy \

S. C. Spalding,

Halcomb Steel Company, Syracuse, N. V.

METALS. The elements which compose all natural objects are divided by chemists into two classes, metals and non-metals. Formerly the classification was based on physical prop¬ erties, and the metals were then defined as those elements which were opaque, had a metal¬ lic lustre and were good conductors of heat and electricity; now the division is made on chemical properties, upon the foundational prin¬ ciple that the hydroxides of metals are bases, while the hydroxides of non-metals are acids. However, no sharp line can be drawn between the metals and non-metals, since a few of the elements will classify as either. Some metals have a high specific gravity, but lithium, sodium, potassium, etc., float on water, and in general the metals of highest specific gravity are least active chemically. Of the 83 recognized ele¬ ments, 64 are regarded as metals.

The following classification of the elements usually placed in the group metals is that aris¬ ing from the application of the periodic law (q.v.).

Class I. Two subclasses: (1) Lithium, so¬ dium, potassium, rubidium and caesium; (2) copper, silver and gold.

Class II. Two subclasses: (1) Calcium, strontium, barium and radium; (2) glucmum (or beryllium), magnesium, zinc, cadmium and mercury.

Class III. Three subclasses: (1) Aluminum, gallium, indium and thallium; (2) cerium, lanthanum, neodymium, praseodymium, samar¬ ium, europium and gadolinium; (3) terbium, dysprosium, holmium, yttrium, erbium, thulium, ytterbium, scandium, lutecium and celtium.

Class IV. Two subclasses: (1) Titanium, zirconium and thorium ; (2)

germanium, tin and lead.

Class V. Two subclasses: (1) Vanadium, niobium (or columbium) and tantalum; (2) arsenic, antimony and bismuth.

Class VI. Chromium, molybdenum, tungsten and uranium.

Class VII. Manganese.

Class VIII. Three subclasses: (1) Iron, nickel and cobalt ; (2) rhodium, ruthenium and palladium; (3) osmium, iridium and platinum.

A mass of any metal is considered to be composed of atoms arranged in molecules, and any change in the arrangement of the molecule means a change in physical characteristics. Thus crystalline structure may be obliterated by roll¬ ing or hammering a metal and by the same means the specific gravity may be increased, since the molecules are forced nearer together.

All metals with the exception of bismuth are lighter when molten than when cold. Bismuth, like water, reaches its greatest density just before solidifying. The relative specific gravi¬ ties of some common metals in the solid and in the liquid state are shown by the following table, compiled by Sir Roberts-Austen.

The fracture of a metal is not a distinguish¬ ing property but an evidential feature which gives much information about the manner in which it cooled, the presence of impurities, etc., and is of great practical value. Thus foundry iron is in many instances still graded and sold by its fracture, and in smelting copper and re¬ fining lead the decisive points in the processes

are determined by the fracture of test samples. Slow cooling, as with chemical solutions, tends toward the formation of large crystals, giving a

METAL

Sp. g. of solid

Sp. g. of liquid

Iron (pier) .

6.95

6.880

Zinc .

7.20

6.480

Tin .

7.50

7.025

Copper .

8.80

8.217

Bismuth .

9.82

10.550

Silver .

10.57

9.510

Lead .

11.40

10.370

coarse fracture, while a sudden cooling may prevent the formation of crystals and thus give a fracture of fine texture. Crystalline structure, which determines fracture, may be affected by repeated shocks or vibrations. In this way the wrought-iron chains on railroad cars to brevent accident in case of a coupler breaking may by the jolting of ordinary service become so crys¬ talline as to break when needed. Very low temperatures, as shown by the experiments of Dewar, also affect in a marked manner the crystalline structure of some metals. Any metal is fusible : though arsenic sublimes at 356° F., it may be fused under the pressure of its own vapor. When heated, metals show a red and finally a clear white color. The tem¬ peratures corresponding to these colors are approximately: incipient red, 975° F. ; dark red, 1290° ; incipient cherry red, 1470° ; clear cherry red, 1830° ; white, 2370° ; dazzling white, 2730°.

The color of a metal depends on its selective absorption of light waves of different wave lengths. Unless the light penetrates the metal, it is all reflected and the metal looks white. The selection of light rays may ‘be from several parts of the spectrum; this is the case with copper

which has a reddish hue. Anything which increases the absorption deepens the color. This can be done by reflecting a ray of light many times from two or more surfaces made of a given metal. Silversmiths and gold¬ smiths accomplish the same result by finely grooving a metal surface. Owing to this ab¬ sorption of light by a metal the color of the light reflected differs from that transmitted. Thus gold can be made so thin that some light will get through. This light is bluish green, while in reflected light, gold appears yellow. Silver is white by reflected light, while the transmitted light through silver foil is blue.

Malleability is the property that permits a metal to be hammered or rolled into sheets. Ductility that which permits it to be drawn into wire. Both are dependent on the tenacity of the metal, the latter more than the former. The relative malleability and ductility of the principal metals is as follows:

Order

Malleability

Ductility

1 .

Gold

Gold

r 2

Silver

Silver

1 . .

3 .

Copper

Platinum

Platinum

4 .

Iron

5 .

Palladium

Nickel

6 .

Iron

Copper

Palladium

7 .

Aluminum

8 .

Tin

Aluminum

9 .

Zinc

Zinc

10 .

Lead

Tin*

11 .

Nickel

Lead

704

METAMERISM — METAMORPHIC ROCKS

Certain physical constants of some of the metals are shown in the following table:

METAL

Symbol

Aluminum .

A1

Antimony .

Sb

Arsenic .

As

Barium .

Ba

Bismuth .

Bi

Cadmium .

Cd

Caesium .

Cs

Calcium .

Ca

Celtium .

Ct

Cerium .

Ce

Chromium .

Cr

Cobalt .

Co

Copper .

Cu

Dysprosium .

Dy

Er

Erbium .

Europium .

Eu

Cadolinium .

Gd

Gallium .

Ga

Germanium .

Ge

Glncinum .

G1

Gold .

Au

J-Tolmium .

Ho

Tndium .

In

Tridium .

Ir

Iron .

Fe

Lanthanum .

La

Lead .

Pb

Lithium .

Li

Lutecium .

Lu

Magnesium .

Mg

Mn

Manganese .

Mercury .

Hg

Mo

M ol yhd en um .

Neodymium .

Nd

N ickel .

Ni

Niobium .

Nb

Osmium .

Os

Palladium .

Pd

Platinum .

Pt

Potassium .

K

Praseodymium .

Pr

Radium .

Ra

R h odium .

Rh

Rubidium .

Rb

Ruthenium .

Ru

Samarium .

Sa

Scandium .

Sc

Silver .

Ag

Na

Sodium .

Strontium .

Sr

Tantalum .

Ta

Terbium .

Tb

Thallium .

T1

Thorium .

Th

Thulium .

Tm

Tin .

Sn

Titanium .

Ti

Tungsten .

W

Uranium .

U

Vanadium .

V

Ytterbium .

Yb

Y ttrium .

Y

Zinc .

Zn

Zirconium .

Zr

Atomic

weight

Specific

gravity

Melting point, ˚F

27.

10

2.

6

1217

120.

10

6.

7

1166

74.

96

5.

7

1.5 60?

137.

37

3.

7

• 887

208.

00

9.

8

520

112.

40

8.

6

610

132.

81

1.

8

79

40.

07

1.

6

1490

*

*

*

140.

25

6.

7

1184

52.

00

7.

0

2768

58.

97

8.

5

2690

63.

57

8.

9

1981

162.

50

*

*

167.

70

4.

7

2282?

152.

00

*

*

157.

30

*

*

69.

90

5

9

86

72.

50

5

5

1756

9.

10

1

8

2370?

197.

20

19

26

1945

163

50

*

*

114

80

7

4

310

193

10

22

5

4170?

55

84

7

9

2800

139

00

6

2

1490?

207

10

11

4

621

6

94

0

6

367

175

00

*

*

24

32

1

7

1204

54

93

7

5

2300

200

60

13

5

—37

96

00

9

0

4530?

144

30

6

9

1544?

58

68

8

8

1645?

93

50

7

4

3990?

190

90

22

5

4100?

106

70

11

9

2690

195

20

21

4

3190

39

10

0

.86

144

140

90

*

1725?

226

40

*

1292

102

90

12

.6

3520

85

45

1

.5

80

101

.70

12

.2

4170

150

40

7

.7

2460?

44

10

*

*

107

.88

10

.5

1760

23

.00

0

.97

207

87

.63

2

.5

1110

181

.50

16

.5

5160

159

.20

*

*

204

.00

11

.8

576

232

.40

11

.0

3150

168

.50

*

*

119

.00

7

.3

389

48

.10

3

.55

3250

184

.00

18

.64

5430

238

.50

18

.69

2730

51

.20

5

.5

3130

173

.50

*

*

88

.70

*

2930?

65

.37

6

.9

787

90

.60

4

. 15

3090?

* Not yet (1917) determined. The interrogation point indicates that the figure quoted is approximate.

The mobility of the molecules of a metal is increased by temperature. Thus a coiled nickel wire may be made absolutely straight by sus¬ pending a weight from one end and heating the wire to white heat by the flame from an alcohol lamp or Bunsen burner. Zinc at its melting point is brittle, but at a temperature of 150° is quite malleable.

Metals can occlude gases. Thus a given vol¬ ume of palladium cooled from red heat in hy¬ drogen absorbs 900 times its volume of that gas. Hydrogen passes through red hot iron or platinum, and nascent hydrogen, assisted by atmospheric pressure will pass through a thin

plate of cold iron as shown by Deville. A liquid metal can penetrate a solid; a bar of tin rubbed with mercury absorbs enough in a very short time to become brittle. A solid metal may penetrate another when both are cold. This can be shown with plates of gold and lead rolled together and allowed to stand.

For further information about the different metals, see special article under the title of each; as Aluminum; Antimony; Iron; Lead; Silver, *etc.* Consult Friend, J. N. (editor), (Textbook of Inorganic Chemistry' (9 vols., London 1914—17).

Richard Ferris,

Editorial Staff of The Americana.

METAMERISM, in chemistry, that vari¬ ety of isomerism in which chemical compounds have identical percentages of composition and also like molecular weight. When two or more chemical compounds have the same empirical formula, but consist of different radicals united by an element (or a radical) that is common to them all, the compounds are said to be ((metameric," and the property itself is called ˆmeta¬ merism." The common element that unites the radicals

is usually oxygen or nitrogen. Good examples of metamerism are afforded by the compound ethers and amines. Dipropyl ether, methyl-amyl ether, and ethyl-butyl ether, for example, all have the empirical formula CeHiX) ; but dipropyl ether contains two propyl radicals (C3H7), methyl-amyl ether contains one radical of methyl (CH3), and one of amyl (C5Hu), and ethyl-butyl ether contains one radical of ethyl (C2H5) and one of butyl (C+Hs.) ; the two rad¬ icals being connected, in each case, by an oxygen atom. The structural formulae of these respec¬ tive compounds are therefore as follows:

Dipropyl ether.

C3H7

C3H7

>0

Methyl-amyl

ether.

CH3

CaHu

>0

Ethyl-butyl

ether.

The following amines, which all have the empirical formula C3H9N, illustrate metamerism in which nitrogen is the connecting element:

Propylamine Methylethylamine Trimethylamine

fC3H7 fCH3 f CH3

N 4 H N -I C2H5 N4CH3

Metamerism may be regarded as a species of accidental isomerism. When metameric com¬ pounds are treated with reagents which destroy the bonds between the constituent radicals and the atoms (of oxygen or nitrogen) by which they are united, the several members of the metameric group that is so treated yield totally different products, because they contain totally different radicals.

In zoology, metamerism signifies the repeti¬ tion of parts in an organized body, as in seg¬ mented worms, certain vertebrates, orthropods and lobsters. The meres or segments fall into two classes, those in which the meres repeat with no apparent change and those in which there is modification as the series progresses.

METAMORPHIC GEOLOGY, that

branch of geology that deals with the causes and results of metamorphism (q.v.).

METAMORPHIC ROCKS, those rocks of either igneous or sedimentary origin which

have undergone sufficient heat and pressure to be altered into a different kind of rock. In this way limestone becomes marble, sandstone is changed to quartzite, and shale passes over into slate or schist. Metamorphic rocks are usu¬ ally most abundant in regions of mountains where the rocks have undergone much folding and compression. See Marble; Quartzite, Metamorphism, and the section on Metamor¬ phic Rocks in the article on Rocks.

METAMORPHISM. When rocks of either igneous or sedimentary origin undergo sufficient change so that they largely develop new minerals, and become other types of rocks, they are said to be metamorphosed, and the process is called metamorphism. Such changes may be brought about in many ways. One of the most familiar is the process of weather¬ ing (q.v.) by which the minerals of a granite, for example, undergo alteration, the quartz remaining behind as quartz, the feldspar alter¬ ing chiefly to clay, and the soluble lime, mag¬ nesia, potash and soda going to the sea, the first two to form limestone, the latter to produce the salt of ocean water. Thus the complete weathering of a granite and the sorting of the products finally results in the formation of shale, sandstone and limestone. This phase of metamorphism is called katamorphism. It is produced by the atmospheric agencies and results in simpler mineral compounds and rocks.

If on the other hand, a sedimentary rock be subjected to intense heat or pressure, or both, the minerals present recombine to form new minerals, usually more complex, which are bet¬ ter suited to conditions of heat and pressure. This phase of metamorphism is usually called anamorphism. In general usage, the term metamorphism is commonly restricted to what is here termed anamorphism, that is, to those changes due to heat and pressure. The term metamorphic rocks (q.v.) is wholly restricted to rocks which have undergone changes of anamorphic nature. Thus, for example, a shale which has resulted from the weathering of a granite, though it has undergone metamorphism in the broadest sense, is not considered a meta¬ morphic rock.

The heat and pressure which cause meta¬ morphism may be produced by compression and folding over large areas, in which case there is said to be dynamic or regional metamorphis; or they may be due to the intrusion of large masses of highly heated igneous rock (magma), in which case there is said to be contact meta¬ morphism.

Regional metamorphism results largely from pressure, heat is only incidental. The most common minerals to result are those which are flat like mica (q.v.), or elongated like horn¬ blende (q.v.). These naturally develop in paral¬ lel arrangement with their smallest dimension opposed to the pressure, that is their larger dimension is at right angles to the compres¬ sion. This seems to be the easiest way in which such minerals can develop. As a result of this arrangement, such rocks split more easily in certain directions, just as wood splits parallel to the grain. This is called cleavage and is best manifested in slates (q.v.) and

schists (q.v.). . ,111

Contact metamorphism, on the other hand,

is due largely to heat ; pressure plays a less im¬ portant part. The changes at a contact may be

of several types. The rocks may be simply baked or they may be actually fused. The minerals present may recombine to form new minerals. There may be much new mineral matter actually added from the igneous mass, as in the case of contact ore deposits, where ore minerals make up a large part of the con¬ tact rock. Or the heat of the igneous mass may drive off substances already present, espe¬ cially water and carbon dioxide. At most con¬ tacts these processes have probablv all played a part. The intensity of the metamorphism and the width of the altered zone depends on sev¬ eral factors, such as the size and temperature of the igneous body, the amount of the water or steam present, and the resistance of the enclos¬ ing wall rock. A quartzite (q.v.) wall rock may be little changed, while a limestone (q.v.), because of its greater solubility, may be pro¬ foundly altered. An abundance of steam aids in producing a marked effect, since it readily works its way out through pores in the rock, carrying much mineral matter. Alteration pro¬ duced largely by steam or hot water is termed hydrothermal metamorphism. Changes pro¬ duced by

ordinary circulating waters are some¬ times termed hydrometamorphism. See Cleav¬ age; Geology; Metamorphic Rocks; Ore Deposits. Consult Van Hise, C. R., ‘A Treat¬ ise on Metamorphism, > (U. S. Geological Sur¬ vey, Mon. XLVII, Washington 1904); Leith, C. K., and Mead, W. J., ‘ Metamorphic Geology) (New York 1915) ; Leith, C. K., (Rock Cleavage) (U. S. Geological Survey, Bull. 239 Washington 1905) ; Grubenmann, U., ‘Die Crystallinen SchieferP

METAMORPHOSES. Ovid’s ‘Meta¬ morphoseˆ or ‘Transformations, } were pub¬ lished in the year 8 a.d., when the poet was 50 years old. They were finished just before the issue of the imperial order which consigned Ovid to banishment at Tomi on the Black Sea for the remaining eight years of his life. In consternation at the punishment which had overtaken him, he elsewhere tells us that he consigned to the flames his own copy of the poem. But other copies were already in the hands of his friends; it is to these that we are indebted for the preservation of the work.

The poem consists of 15 books in hexa¬ meter verse descriptive of the various transfor¬ mations through which various men and women were conceived to have gone. In the conception of the Greeks almost every river, rock, spring, tree and mountain had attached to it the legend of some such wonderful meta¬ morphosis. Thus the poplar trees are the weeping sisters of Phaethon; the laurel is Daphne ; a spring is Arethusa ; *etc.* The source of this multitude of transformations found in ancient legends is doubtless to be sought in the ancient conception of inanimate objects as ani¬ mate. Each rock and tree and hill with the Greeks and Romans was a personal being en¬ dowed with a spirit. Thus the poplar trees and the fountain and the laurel were regarded as animate to start with ; they had not merely become so by receiving the souls of certain men and women. To the vivid imagination of the Greek the waving form of rustling tree or shrub, the moving mass of bubbling or falling water suggested life and individual spirit. The problem was to account for the present form. The inanimate objects represented as the result

of transformations had, accordingly, been con¬ ceived as animate from the outset, and the sto¬ ries of their transformations are merely later inventions devised to account for their primi¬ tive conception as personal beings.

Some 250 of the stories belonging to the body of Greek and Roman legend and mythol¬ ogy receive treatment in Ovid's work, which thus becomes a fairly complete treatise on the classic myths. Among the most important of these are the stories of Deucalion and Pyrrha, Daphne, Phaethon, Cadmus, Semele, Echo, Narcissus, Pentheus, Pyramus and Thisbe, Ino, Perseus and Andromeda, Niobe, Procne and Philomela, Medea, Theseus, Scylla, Daedalus, Philemon and Baucis, Hercules, Orpheus, Adonis, Thetis.

Relatively little space is devoted to the ac¬ tual metamorphosis in Ovid's poem. The transformation is simply the culmination of a story, generally one of some length. Thus after detailing with great fullness the adven¬ tures of the ill-fated Phaethon with the horses of Phoebus, the poet finally concludes by briefly recounting the transformation of Phaethon's mourning sisters into poplar trees. So with the other stories ; the transformation holds an in¬ conspicuous place, being simply the feature common to all. The different narratives are woven together most ingeniously. There is no break. Each is connected with the preceding and following by some natural link, so that we have one continuous narration from the trans¬ formation of the stones of Deucalion and Pyrrha into men to the transformation of Julius Caesar into the comet which appeared after his death. By the poet's fiction, therefore, the treatment is made to assume the illusion of chronological sequence. In the last books Ovid approaches the legends of the Trojan cycle and of early Roman history, gradually bringing the reader to the events of his own day.

With great artistic skill the poet varies the manner of presentation. The larger part of the stories are his own narration, but monotony is avoided by resort to other devices. Thus a number of legends are put in the mouth of Orpheus. Others are recounted by the three daughters of Minyas to while away the time as they sit at their spinning.

The ˆfetamorphoses5 is Ovid's masterpiece and has always enjoyed high favor. The poet's own faith in his work is indicated by the con¬

cluding verses of the final book, in which he gives free expression to his confidence in the immortality which he feels it has won for him: <(Over the stars his name shall soar; as far as the Roman dominion reaches his work shall be read, and it shall live for all eternity.®

The most recent translation is by F. J. Mil¬ ler in the Loeb Library.

Charles E. Bennett.

METAMORPHOSIS IN ANIMALS, the

changes which in many animals take place be¬ tween the time of birth and maturity. The causes are most probably changes of habitat, of seasons, of food and the acceleration in growth resulting from the approach of sexual maturity. Familiar examples are the change of the cater¬ pillar into the butterfly, of the tadpole into the toad or frog.

In the frog and toad, metamorphosis is com¬ plete and thoroughgoing. The embryo on hatch¬ ing from the egg has a large head and body,

but no tail; in a few days its tail grows out and it becomes a tadpole, when it is fish-like, but without fins or limbs. With the growth of the tail, the external gills appear, and the mouth is formed, while the intestine becomes very long and closely coiled. The mouth is armed with horny, comb-like plates, on which develop great numbers of microscopic teeth, which are shed continuously. In changing from the tadpole to the toad or frog, the body, in¬ cluding the skull and rest of the skeleton, and the viscera are made over anew ; the external gills disappear as the lungs develop, the true teeth appear in the jaw, the intestine becomes short and straight, and the creature instead of nibbling decaying leaves or dead animals feeds on living snails and insects. Soon the tail be¬ comes absorbed, finally the hind legs grow out, the gills disappear, the front legs bud out and the adult form is attained. While most am¬ phibia pass through such a metamorphosis, in a few forms, owing to the absence of water or other changes in the environment, development is direct, the metamorphosis being suppressed. Metamorphosis may be retarded by cold and shortened by hunger, and in the amphibians or in insects the changes are greatest in modern and specialized forms, as frogs and toads.

The metamorphosis of the butterfly is the most complete of those of all insects. The life of the insects is divided into four stages, that is, the egg, larva, pupa and imago or adult. Dur¬ ing the larval and pupal periods the insect is, so to speak, a different animal from the adult.

The caterpillar is provided with big jaws and eats voraciously; in shape and structure it differs widely from the winged adult. The pupa or chrysalis is also different from the larva, and also from the imago; it takes no food and rests almost motionless. On the other hand, the butterfly has no jaws, while its maxillae form a long coiled-up tongue, beauti¬ fully adapted for probing the corollas of flowers. Though these changes appear to be sudden, the internal alterations of cells and tissue which lead to them are gradual. From one to three days before assuming the pupa state the caterpillar becomes restless and stops eating. If a spinner it spins a cocoon, or if not it enters the earth to undergo its transforma¬ tion into a chrysalis, or if a larval butterfly it attaches itself to some fixed object, as a tree or fence. Profound changes now take place in the mouth-parts as well as the nervous, mus¬ cular and other systems of internal organs.

But the changes are most marked in the flesh flies and their allies. At the end of the mag¬ got stage, the internal organs are destroyed, breaking up and forming a creamy mass, and the appendages and wings arise from minute internal masses of cells galled ftimaginal buds® which are present in the maggot. The body is thus entirely made over anew. But while the process of destruction of the larval organs and appendages goes on, there is also a constructive process, during which the organs of the adult state are being built up. It is thus evident that the sharp division of the life-history of the insect into larval, pupal and imaginal stages only applies to the. external surface of the body. The internal processes of development, on the other hand, form a continuous series of trans¬ formations between which is no sharp line of demarcation. Yet a = - a whole the form of the

larva, pupa and imago are kept distinct in adaptation to their separate environments and habits.

Hypermetamorphosis. — This name is ap¬ plied to the changes undergone by certain beetles (Meloe , Stylops, etc.), in which there are more than the usual number of larval and resting or pupal stages. Thus, in the common oil-beetle {Meloe) and in the blister-beetles

(Epicauta) , the larva hatches as a minute, ac¬ tive, triungulin creature which is a parasite in bees' nests, feeding on their eggs; it passes into a second larval stage, when it is grub-like, in¬ active, the body being thick, cylindrical, soft and fleshy; this passes into a motionless semi¬ pupa, and thus after molting assumes a footless larval form ; it then transforms into a true pupa like other beetles. There are thus four distinct larval stages, besides the pupa and beetle. Now these stages correspond to the habits and food of the young beetle, and these supernumerary stages and marked changes of form are evidently due to changes of environ¬ ment, of habits and of food, resulting in the atrophy of limbs in certain stages. This throws light on the causes of metamorphism in general.

No Distinct Metamorphosis in the Primi¬ tive Insects. — The wingless insects {Synap-tera) do not pass through a metamorphosis. And it appears, as first suggested by Fritz Muller, that the habit of metamorphosing is an acquired one. Thus in the more primitive winged insects, such as the cockroach, grass¬ hopper, bugs, etc., metamorphosis is incomplete, the young differing mainly from the adult in not having wings. Also the most primitive arthropod animals, such as the horsefoot crab (q.v.), the spiders and myriapods, pass through no metamorphosis.

Metamorphosis in the Lower Animals. —

The more specialized ccelenterates (Mednsce) , the echinoderms, mollusks and crustaceans, as well as many worms, undergo remarkable changes of form. (See Larva). The larva of the marine annelids is a top-shaped ciliated creature (trocho sphere) entirely different from its parent. The marine mollusks pass through a larval condition (religes). The young of the sea-urchin, star-fish and holothurians differ re¬ markably from their parents in being bilaterally symmetrical, transparent and free-swimming; they serve as scaffoldings from which the body of the adult is developed. The shrimps, etc., are hatched in a nauplius or six-legged form, and crabs in a zoea form.

METAPHOR, a figure of speech expressed in a single leading word ; a similitude — for example, ((The man is a lion,® is a metaphor; ((The man is as bold as a lion,® is a simile. Metaphor is an ideal characterization or illus¬ tration which may be affirmed by one mind and denied by another, or affirmed and denied by the same mind at different times; it is a kind of comparison in which the speaker or writer rejects the circumlocution of the simfle and attains his end immediately by establishing the identity of his illustration with the

thing spoken of. It is thus of necessity, when well conceived and expressed, graphic and striking in the highest degree, and has been a favorite figure with poets and orators and makers of proverbs in all ages. Even in ordinary language the meanings of words are in great part metaphors ; as when we speak of an acute intellect or a

bold promontory: all such words are in metaphor, and the language may be called metaphorical.

METAPHOSPHORIC ACID. See Phos¬

phoric Acid.

METAPHYSICAL DETERMINISM.

See Determinism.

METAPHYSICS (from Gr. Meta ta phu-sika, <(after physics,® alluding to the position of Aristotle's treatise on metaphysics in his works). Metaphysics and epistemology (q.v.) are the twin sciences of the nature of reality and of our knowledge thereof. Metaphysics seeks for the criteria of being, epistemology for those of truth. As the truth is generally conceded to possess some peculiarly intimate relation to reality which is not found in the case of error, and as our sole avenues of access to reality are those of experience, be it sensory, rational, emotional or volitional, the boundary line between epistemological and metaphysical opinions is of the most obscure and wavering nature, so that a separate study of the two dis¬ ciplines is exceedingly unprofitable. We shall accordingly shift our standpoint continually from that of one science to that of the other.

Metaphysics is not a subject which one can study or refuse to study at will; whether it is explicit or not, there is always some criterion of truth, of reality, that permeates our barest common sense. This may be metaphysically inadequate, but must be metaphysical. When I draw a distinction between a dream and an experience of waking life, between a truth and a lie, between a fact and an error, I am draw¬ ing a metaphysical distinction. When a physi¬ cist reduces the table before him to a vast aggregate of electric charges, or asserts the basic identity of time and space, or interprets light a transverse electromagnetic vibration, he is nothing if not metaphysical, for he is drawing a distinction between the appearance of things and their underlying reality. Even those who claim to be agnostics or sceptics in the pro¬ fessor's chair are tainted with metaphysics in their daily life,

for the only agnosticism, the only scepticism which can free itself from all blemish of metaphysics is an agnosticism, a scepticism so complete that it does not even tentatively maintain any criterion of reality or unreality, of truth or falsity.

We have accordingly three stages of meta¬ physics to discuss: (1) the metaphysics of com¬ mon sense ; (2) the metaphysics of the natural scientist; (3) the metaphysics of the technically trained philosopher.

(1) The Metaphysics of Common Sense.

— The average philosophical layman, be he edu¬ cated or not, believes that the wall he sees in front of him, the cane that he holds, the song that he hears are real, with an immediate and underived reality. He is confident that the wall, the cane, even the song would be the same with nobody to experience them. He is also confi¬ dent that he exists, and that his existence is utterly independent of any experience he may have. Now, this view that the object is out there and I am in here, and that seeing is something which needs no analysis (for so the layman believes), works remarkably well pro¬ viding I only see things that are so. It is, however, clear that in my dreams and other illusions I frequently see things that in some

manner are not so. If seeing is an immediate relation between me and my object, what is my object when I dream of something which, in every common-sense interpretation of the words, does not exist?

This is obviously the highest common factor of metaphysics and epistemology, for it unites the fundamental questions of the two sciences, the question of truth and that of reality. What is more, it is in essence the one cardinal prob¬ lem of both sciences, the great problem of error. The problem of error may be ap¬ proached from two different angles, according as there are supposed to be real entities which form the objects of erroneous experience, or no such entities at all. In the latter case, ex¬ perience must be interpreted as not essentially a subject-object relation. As we shall see, practically all the earlier modern philosophers hold that erroneous experiences have objects. The second alternative is indicated in Spinoza and appears in the philosophies of Kant and Hegel.

(2) The Metaphysics of Natural Science.

— Of course, science as such can have no peculiar metaphysics, for the truth is essentially one — unless we adopt the pragmatist attitude

— and cannot be changed into a falsehood merely by looking at it through the spectacles of a particular discipline. Nevertheless, there is a certain conventional metaphysics which may be read between the lines of the majority of scientific textbooks, the habitat of which is the laboratory and the specimen-box. Though this may be traced to the Greeks, it owes its incar¬ nation in its present avatar to Descartes and Locke. Both these writers, who are conven¬ tionally called dualists, since they believe in the essential distinctness of mind and matter, are really rather what one might name ternarists, inasmuch as they posit between the self and its objects a third class of entities, the ideas, by the mediation of which the mind or self is aware of the outer world. Dreams differ from true waking experiences in that the ideas they contain have no realities corresponding to them. Modern science has turned the real universe into a world of movements of material par¬ ticles, or of electric charges, without any in¬ trinsic color or sound, and has relegated these latter qualities to the realm of ideas. The physical correlates of these ideas are, of course, particles or charges in motion. By the media¬ tion of the nervous system these particles or

charges and their movements are supposed to produce certain alterations in the brain — Des¬ cartes considered that they were in the pineal body, while the advance of modern science has placed them in the cerebral cortex — which have as invariable concomitants certain ideas or ideational processes. It is these that form the sole direct object of human inspection.

This theory is perfectly successful in ex¬ plaining error, but remarkably inadequate in accounting for anything else — any knowledge, that is, which is not a mere accidental blunder¬ ing belief. The situation is quite analogous to that of a man gazing at the cover of a book and trying to know what is inside. This knot or rib in the cloth may cover an exposition of this or that theory, but if the book is per¬ manently locked up, and is opaque, we can never know this. We consequently find that at the very beginning additions and modifica¬

tions were made in the theory. These, how¬ ever, belong to

(3) The Metaphysics of the Technical Philosopher. — Modern philosophical tradition may be said to commence with Descartes. Ac¬ cordingly, he is the first man with whom the metaphysical issues of the present day receive the division and treatment with which we are familiar. We have seen that he divided the world into separate realms, apparently of mind and matter, but really of soul, matter and ideas. Nevertheless, he saw the difficulties of the problem of error and tried to give it a more adequate solution than that pertaining to the conventional philosophy of natural science. As the founder of modern mathematics he tried to introduce mathematical criteria of truth into metaphysics, and so he starts with the proposi¬ tion, ((I think, therefore, I am,® the denial of which he regards as self-contradictory in the same sense in which <(2 has a rational square root® is self-contradictory. Having thus ob¬ tained the existence of the self, he goes on to demonstrate that God exists : ®I have an idea of a most perfect Being, and this idea can only come from the Being with the one perfection my idea lacks, that of existence.® Once he has got this Being, Descartes asserts that our knowledge of matter receives its guarantee in the honesty of God. This relieves the difficulty we encountered in the metaphysics of the scien¬ tist, the difficulty of bringing ideas and their objects into relation, but it is not by any means completely satisfactory. If God is honest, how can we make blunders? By failing to have our ideas clear and distinct, says Descartes. But how can an honest God permit vague ideas? This involves us in the interminable and fruit¬ less controversies

concerning the relative power and goodness of God which were so character¬ istic of the mediaeval schoolmen at their worst.

Descartes' philosophy thus involves a Deus ex machina. His followers, without exception, laid far more emphasis on this phase of his philosophy than he himself. In the systems of Geulincx and Malebranche, God becomes the agent causing every change in mind and mat¬ ter, who for each change in the one wills that there shall be a corresponding change in the other. From this Occasionalism it is but a step to the monism of Spinoza, for whom mind and matter are but two among an infinite number of aspects of the one reality, God. From an¬ other standpoint, the entire world is the content of intellection, without the mediation of the Cartesian and Lockean <(ideas.® Spinoza re¬ tains the logical, mathematical, intellectualistic standards of truth and knowledge which were set up by Descartes, but he has also a mystical, emotionalistic view of the nature of reality, in that he believes that this is most truly perceived through the Intellectual Love of God.

The Deus ex machina survives in the views of the next great continental philosopher, Leib¬ nitz. Instead of the two substances, mind and matter, of the Cartesian tradition, he supposes an infinity of substances, the monads, all par¬ taking to some extent of a mental nature. In place of calling upon God's continual interven¬ tion to keep these experiences in accord with the facts, Leibnitz supposes that at the Creation the Lord foreordained that all these many ex¬ periences should keep time, just as two perfect clocks, wound up and set together, will agree

on all subsequent occasions until they run down. It will be seen that the problem of error ap¬ pears in the philosophy of Leibnitz almost in its Cartesian form.

. Leibnitz regarded the monads as possessing ideas of various grades of clearness and dis¬ tinctness, and believed that matter was made up of those with the vaguest ideas. Because he considered matter to be of the nature of mind, Leibnitz is called an idealist, and is classed to¬ gether with Berkeley, whom we shall next con¬ sider. By observing the vast distance that separates the philosophies of these two men, it will be possible to see how little content inheres in this term, which, with its contradictory real¬ ism, has been singled out by a certain American philosophical school as the index of a grand dichotomy of all philosophical systems.

Berkeley belongs to the British empiricistic tradition. His immediate philosophical ances¬ tor is Locke. Unlike Locke, however, Berkeley saw that no object not directly given can fur¬ nish a test of empirical reality, nor an aid in its explanation. Accordingly, his world con¬ sists of selves and their ideas or sense-data. This does not mean that he rejected natural sci¬ ence, but that he insisted that all its proposi¬ tions were capable of expression in terms of ideas. Such ideas as are not immediately given to any person he considered to reside in the mind of God, one of whose functions it be¬ comes, to put it crudely, to watch things when nobody is looking and to see that they do not vanish away. However, it will be noticed that an idea in the mind of God which is not ex¬ perienced by us is as inert, remote and useless from an explanatory point of view as a bit of matter. Furthermore, the self apart from its ideas does not appear to play any great part in knowledge. Given an experience, nothing more seems to be added by the adjunction of the self. For these reasons, the next successor to the British tradition, David Hume, rejected both the Berkeleyan matter — thinking God and the soul as a specific entity, and interpreted the world purely and simply as an aggregate of sense-data.

We thus see the contrast between the nat¬ ural-scientific and the Humian view of the uni¬ verse ; for the naive scientist, a bit of

experience is really an aggregate of atoms in motion, whereas for Hume an atom in motion would have to be interpreted in terms of bits of ex¬ perience. Unfortunately, Hume possessed neither the scientific knowledge nor the logical mechanism to carry out this process in any but the crudest and most schematic way, and his philosophy of space, time and causality is in detail as bare and inadequate and unsatisfac¬ tory as any yet devised. Recently, however, Bertrand Russell, who is essentially a Humian in spirit, though he adopts the independent nature of the soul as at any rate a plausible hypothesis, has developed a treatment of these subjects, and of many other allied ones, which is at once scientific and at bottom after the manner of Hume. Matter, for instance, is treated as the system (Hume would have erred by saying "the sum®) of its appearances; an atom or electron becomes a class of sense-data or a relation between them, or something of this general nature. The scientific analysis in terms of atoms and electrons is recognized as valid, but as based on a deeper analysis into

the experiences out of which atoms and elec¬ trons are artefacts.

This recrudescence of British empiricism, however valid its opinions and valuable its re¬ sults. may be, is off the main stream of philo¬ sophical development during the latter part of the. 18th century and the entire 19th. This main stream has its source in Kant, who, to continue the metaphor, marks the junction of the currents of British and of Continental thought. What is most distinctive in the thought of Kant is his definite and final occu¬ pation of the standpoint of epistemology, as the true ground for the determination of the prob¬ lems of metaphysics. Now in so doing, Kant is . making thought the measure of reality, and this seems to be only repeating the judgment of Spinoza. But there is a great difference. Kant declines to accept Spinoza's doctrine of thought and reality. The real is more than the con¬ tent of .thought. In fact Kant returns to the ancient intuition of thought as formal, and the real as in some sense its correspondent. This was also the tradition of Locke and his school, from which Hume departed, as we have seen, with a result that is often called scepticism. Now the history of Kant's thought shows that, while he clung to the belief in the mere formal character, of thought, his tendency was also strongly in the direction of scepticism. More¬ over it was on account of his failure to com¬ pletely achieve what he calls his Copernican revolution, and. which was in fact a reaction toward a constitutive doctrine of thought, that he was never able, during the whole of his crit¬ ical period, to reach a satisfactory conception of the relation of thought to reality. Had Kant completely achieved the mental

revolution he proposed, the result would have been, that in epistemology he would have asserted the doc¬ trine of Spinoza, the identity of the real with the content of thought.. The knowable world would thus have been identical with the real world and Kant would have escaped the dual¬ ism between knowledge and reality into which he. actually fell. Kant also denies the univer¬ sality of thought ; at least in the ontological sense. The thought that functions epistemo¬ logically is my human relative thought which can only pronounce judgments that are sub¬ jectively valid for me, but have no ontological value for reality. The Kantian metaphysics is a corollary from his epistemology. What Kant calls critical idealism is first an epistemology, secondly a metaphysic. As an epistemology it teaches that my thought is constitutive for me; that is, that its content is valid for my sub¬ jective connation. It gives me a world, in other words, in which I can work out the prac¬ tical issues of my life, but it does not give me the world of real things in themselves with respect to which my attitude must be one of renunciation. As a metaphysic critical idealism simply carries its program out in the field of ontology. The presumption of the identity of what is thought with the real cannot be carried out objectively. Kant's metaphysics is there¬ fore necessarily negative.- Thought is able to complete itself ontologically, it is true, but the ideals it reaches have no other than subjective value. Their hypothetical content can never be identified with the real, and the Kantian is per force obliged to represent the whole ontological region as an indeterminate X and to look for

the satisfaction of his wants to extra-metaphysi¬ cal forces. These he finds in the domain of ethics.

In Hegel we have also an example of a thinker who approaches metaphysics along the epistemological way. But Hegel is a much more thoroughgoing thinker than Kant. He starts no doubt with the Kantian traditions in mind and his first great task, the development of his logic, is formal. But Hegel is not a formal thinker, in the sense that he divorces content and form. Thought is formal. This Hegel is not afraid to confess, but it is also ontological. At the same time there are no outlying realities, like the Kantian things in themselves. How is this? Are we to have the spectacle of a lapse into Spinoza? Our appre¬ hensions are ungrounded, for Hegel asserts calmly that the form creates the content. Hegel asserts the identity of thought and real¬ ity in the sense that the real is, and is only, what the thought thinks it to be. It is the real by virtue of the thought thinking it to be. This sounds like a dangerous kind of subjectivity, till we learn that by thought Hegel means, not my thought or yours, as simply my or your intellectual function, but the thought that is universal and that thinks the universal. So much for Hegel's epistemology. . In Hegel's system epistemology and metaphysics are sim¬ ply two aspects of the same thing. In episte¬ mology we have the system logically conceived ; that is in view of the process which the finite thought of the individual must pass through in order to apprehend it; whereas in the meta¬ physics we have the system presented in its unity as a self-completing whole. Epistemolog¬ ically the dialectic is the movement by which results are achieved; metaphysically it is the Divine Spirit of the system as a whole. . Error is accounted for precisely by the disparity be¬ tween individual and universal thought.

One of the most remarkable aspects of the metaphysics of the past century is the strong voluntaristic or emotionalistic trend which is to be observed among writers of the most dif¬ ferent philosophical ancestry. Schopenhauer, though in many ways a follower of the Kantian tradition, interpreted the course of events as the manifestation of a world-will, which per¬ forms the functions of the Kantian thing-in- itself. This will manifests itself in man as will in the ordinary sense, while in matter it is seen as force. A view which displays an analogous voluntaristic or rather activistic trend, though in every other respect most unlike, that of Schopenhauer, is pragmatism, the chief expo¬

nent of which was the American philosopher, William James. This view states that the truth of a theory or the reality of a system is not merely determined but constituted by what is in some sense the ease with which it can be ap¬ plied and the value of the results of this appli¬ cation. A similar position is that of Henri Bergson, who maintains that the analysis of science yields us only half-truths, while the real nature of the world is shown to us by in¬ tuition, which exhibits it to us as the working of a certain vital impulse.

There is no metaphysics at the nresent time which can lay claim to a general acceptance. The 19th century domination of all philosophy by the memories of Hegel and Kant is passing away, and the tendency of worshiping these

great men as philosophical demigods is well-nigh extinct. Their followers, numerous though they are, must dispute their realm with the modern critical adherents of the British tradition, armed with modern logic, mathemat¬ ics and science, and with the pragmatisto-Berg- sonian tendency.

Before closing this article, let there be a word of caution to the reader against that facile metaphysical criticism which depends on labels. We have already seen that the line of cleavage between idealism, or the view that all things are either thoughts or their thinker, and realism, which asserts the existence of other entities, doeb not of itself mark one of the great philosophical dichotomies ; Berkeley, the first typical British idealist, and Leibnitz, the idealist of the Continent, both, fall into the epistemological difficulties which are generally accepted as characteristic of realism, in that the problem of the relation between the knower and the known remains in what is essentially the Lockean or Cartesian stage. The distinc¬ tion between spiritualism, which is almost a synonym of idealism, is that it regards matter as constituted of psychical material, and mate¬ rialism, which analyzes mind in terms of mat¬ ter, is similarly not a touchstone to the real nature of the views which it denies. The only really satisfactory method of metaphysical criti¬ cism is by the careful individual analysis of each philosophical system according to its own concepts. See Epistemology; Philosophy; Philosophy, History of; and the articles on the individual philosophers mentioned.

Bibliography. — Aristotle, (First Philosophy5 ; Bergson, Henri, (Matter and Memory) (Paris 1896; tr. 1911) ; Berkeley, (Treatise Concern¬ ing the Principles of Human Knowledge5 (1710)’;

Bosanquet, B., (Logic) (1895); Bradley, (Appearance and Reality1* (2d ed., New York 1902) ; Descartes, R., Principia Philosophiae) (1644) ; Deussen, Plemente der Metaphysik) (2d ed., 1890; tr. 1894); Dietrich, K., (Grundzuge der Metaphysik) (Freiburg 1885) ; Fullerton, G. S., (A System of Metaphysics) (New York 1904) ; Hegel, G. W. F., <Logik5 (1812-16; tr. 1892); Herbart, J. F., <Lehrbuch zur Einleitung in die Philosophic5 (1813) ; Hoffding, H., Problems of Philoso¬ phy5 (tr. New York 1905) ; Hume, D., treat¬ ise of Human Nature5 (1739-40) ; James, W., Pragmatism* (Boston 1907) ; Kant, (Critique of Pure Reason5 (tran. by Max Miller; 2d ed., London 1896) ; Leibnitz, G. W., (Monadology5 (1714); Locke, J., (Essay concerning Human Understanding5 (London 1687) ; Lotze, <Meta-physik5 (Leipzig 1879; tr. Oxford 1884—87) ; Natorp, P. G., Philosophic: ihr Problem und ihre Probleme5 (1911) ; Paulsen, F., Hntroduc-tion to Philosophy5 (tr. New York 1895) ; Perry, R. B., Present Philosophical Tenden¬ cies5 (1912) ; Royce, J., the World and the Individual5 (London 1900) ; Russell, B., Prob¬ lems of Philosophy5 (London 1911) ; Spinoza, Benedictus, Pthics5 (1675); Taylor, A. E., Plements of Metaphysics5 (London 1903).

Norbert Wiener.

METASOMATISM. According to the United States Geological Survey, ((Metasomatism may be defined as the process by which, through chemical interchange, a mineral or aggregate of minerals undergoes partial or

METASTASIO

complete change in chemical constitution.® More simply stated, metasomatic ore bodies are formed when the ore substance replaces the rock particle by particle, instead of filling already existing cavities. Replacement is fre¬ quently used as a synonym for metasomatism, and ore bodies so formed are usually called replacement bodies. Replacement, unfortu¬ nately, is used loosely by some writers, to indi¬ cate cavity filling, and these authors use the term metasomatic replacement in the same sense in which others use the term metasoma¬ tism. According to the most careful usage metasomatism and replacement are synonyms, and apply to ore bodies replacing the wall rock particle by particle. “Metasomatic replacement® is then pleonastic.

METASTASIO, Pietro, pe-a’tro ma-tas-ta’- ze-o (properly Pietro Trapassi), Italian poet: b. Rome, 13 Jan. 1698; d. Vienna, 12 April 1782. His poetical talents were early displayed in im¬ provisations, and often he drew about him a crowd to listen to some versified narrative. The jurist Gravina, who thus accidentally became acquainted with his talents, took him under his protection, called him (by an Italianized trans¬ lation of his name into Greek) Metastasio , paid great attention to his education, and on dying in 1717 left him an estate of $20,000. On 15 April 1718 he was received into the Arcadian Academy with the name of Artino Corasio, and in 1720 entered at Naples the office of the at¬ torney Castagnola, who discountenanced liter¬ ary work, and kept him severely to the law. He wrote anonymously (Gli Orti EsperidP (1722), but the authorship was soon revealed, and Metastasio left the lawyer’s office, studied fur¬ ther, and wrote a series of musical dramas, or melodramas in the true sense, which were set by leading composers and given with great suc¬ cess. In 1730 he settled in Vienna as court poet, and there in 1730ˆ10 wrote his best works, <Demetrio,) Hssipile,* ˆDemofoonte,* (La Clemenza di Tito,* c Attilio RegoloP In the consideration of Metastasio’s rank as a poet, his work must be viewed not absolutely, but with regard to its original environment, as done in collaboration with a composer, and rendered by great artists. He wrote, too, for the pre¬ dominantly vocal system of Italian musical drama; and with this his poetry fell into

com¬ parative neglect. His writings have been praised by so good a critic as Symonds for ex¬ cellent versification, ease of diction, effective simplicity of construction and frequent imagery of the highest rank. His lyrical verse and criti¬ cisms are also of value. The best collected edition of his works is that of 1780-82 (Paris). Consult Massafia, (Pietro Metastasio) (1882) ; also Lee, (Studies of the 18th Century in Italy* (new ed., 1908).

METASTASIS (1) in medicine, a change in the seat of a disease, attributed to the trans¬ lation of morbific matter to a part different from that which it had previously occupied, or to the displacement of the irritation. Mumps is a disease peculiarly liable to induce metastasis. In adult males the inflammation often goes to the testicles, producing orchitis, and in adult females to the breasts or ovaries, in the latter case ovaritis. Mastoiditis often results in similar shifting of the inflammation by the travel of blood clots, and the inflamma¬

tion may reappear in any of a dozen places. (2) In botany, a change produced upon a sub¬ stance designed for the nutriment of a plant, to make its assimilation more easy. Thus, when the starch formed in the leaf of a potato has to be transferred to the tubers as a depot of nutritial material, it is first changed into a soluble substance — glucose. See Metabolism.

METATE, the stone implement on which grain and other substances, more especially corn, were ground before the discovery of America and are still ground throughout the territory of the United States occupied by the Pueblo Indians, and in Mexico, Central America and much of South America, more especially the west coast. See Mortar.

METAURUS, me-ta'rus, or METAURO,

ma-tow'ro, Italy, a river in the Marches, which flows northeast past Saint Angelo in Vado, and falls into the Adriatic, southeast of Fano; total course, about 50 miles. It is noted for the vic¬ tory gained by the Romans under the consuls Claudius Nero and Livius Salimator near its banks over the Carthaginians under Hasdrubal 207 b.c.

METAVOLTINE. A sulphur-yellow min¬ eral occurring in aggregates of hexagonal scales at Madeni Zakh, Persia. Dichroic. Hardness, 2.5 ; specific gravity, 2.53 ; composition : Sul¬ phuric acid, 46.90; sesquioxide of iron, 21.20; protoxide of iron, 2.92 ; potash, 9.87 ; soda, 4.65 ; water, 14.58. Much. of the mineral called misy belongs to

this species.

METAYER, me-ta'yer, Fr. ma-ta-ya (L. Latin, medietarius) , a name given in France to the cultivator of a metairie or farm who reserves for himself one portion of the produce as the price of his labor and gives the proprietor the other, which represents the rent of the land after deducting what is necessary to keep up the stock. The greater part of the centre and south of France, and almost the whole of Italy, is cultivated by metayers, who are in general upright, economical and industrious. This sys¬ tem of farming on shares, usually half and half, has been tried to some extent in the southern United States, but has never been popular either with farmer or tenant. The tenant is inclined to let the farm run down, because of uncer¬ tainty that he will have it in following years. The system also seems to work against the in¬ troduction of improved machinery. See Agri¬ culture in the United States.

METAZOA, one of the two great sections into which Huxley divides the animal kingdom, the other being the Protozoa. The Metazoa embrace all animals composed of more than a single cell, that is all that develop through eggs or ovum. The Porifera or sponges are the low¬ est of the Metazoa. See Anatomy, Compara¬ tive; Protozoa.

METCALF, William, American steel manu¬ facturer: b. Pittsburgh, Pa., 1838; d. 1909. In 1858 he was graduated at the Rensselaer Polv-technic Institute, Troy, N. Y., and from 1860 to 1865 supervised the manufacture of Rodman and Dahlgren guns at Fort Pitt, Pittsburgh. In 1868 he entered the steel manufacturing field and in 1898 organized the Braeburn Steel Com¬ pany, of which he was president for 11 years. It is said that Metcalf made the first crucible steel in America. He was president of the

American Institute of Mining Engineers in 1881 and of the American Society of Civil Engineers in 1893. He published (Steel — A Manual for Steel-Users) (1896).

METCALFE, Samuel L., American phy¬ sician and scientist: b. near Winchester, Va., 1798 ; d. 1856. In 1823 he was graduated in the medical department of Transylvania University ; established a medical practice at New Albany, Ind., and visited England in 1831. Upon his return to his native country he made a geologi¬ cal tour in Tennessee, North Carolina and Vir¬ ginia. Later he settled in New York where he took up scientific work. He published Narra¬ tives of Indian Warfare in the West) (1821) ; (A New Theory of Terrestrial Magnetism > (1833) ; (Caloric: Its Mechanical, Chemical and Vital Agencies in the Phenomena of Nature) (2 vols., 1843; 2d ed,, 1859).

METCHNIKOFF, Elie, Russian bacteri¬ ologist: b. Kharkoff, Little Russia, 15 May 1845; d. Paris, France, 15 July 1916. Following his education at Kharkoff, Metchnikoff studied at Giessen and Munich, and in 1870 he was ap¬ pointed professor of zoology at Odessa. He held this post until 1882, when he resigned to devote himself to private researches into the anatomy of invertebrates. It was while work¬ ing at lowly organized forms of life such as sponges that he first made the observations which constituted the basis of all his subsequent work. In 1888 he had attracted the notice of Louis Pasteur, the founder of the famous Pasteur Institute for the treatment of rabies, in Paris, and he was invited to become one of Pasteur's associates. In 1895 he succeeded as the director of the institute, a post which he held to the time of his death. In his study of longevity, Metchnikoff came to the belief that it should not be uncommon for persons to live to the age of 150 years. He found every indi¬ cation that the human mechanism was calcu¬ lated to last far longer than it actually does. His researches showed amone other things that animals which had no large intestines lived to an advanced age, particularly birds, which pre¬ serve their youthful agility and spryness to the end of their long span. In the case of human beings he found that even among those whose sufferings were terrible, there were few who wanted to be put out of their agony by death. They all wanted to live. If the normal specific longevity were attained by human be¬ ings he believed that old and not degenerate individuals would lose the instinct for life and acquire an instinct for death and that as they had fulfilled the normal cycle of life, they would accept death with the same relieved ac¬ quiescence as they now accept sleep. On his seventieth birthday, in 1915, Professor Metchnikoff received a present of a golden book, forming a unique record of the latest scientific researches, signed by men of science of the day. Although there was much con¬ troversy in the scientific world regarding his original ideas, he was fully recognized as one of the most eminent bacteriologists. In 1908 the Nobel prize for medical research was di¬ vided between the late Dr.

Paul Ehrlich, of Ber¬ lin, . and Professor . Metchnikoff. The $20,000 which he thus received he devoted entirelv to the furtherance of his scientific researches. Personally he was not well off, and throughout his long life sacrificed all but the plainest liv¬

ing necessities to the cause of science. He was the author of a number of books including (Lectures on the Comparative Pathology of Inflammation (London 1893) ; Ummunity in Infective Diseases) (New York 1905) ; (Etude sur le nature humaine; essai de philosophic optimiste) (1903). English translations of his lectures are (The New Hygiene) (Chicago 1907) ; (The Nature of Man* (New York 1910). He edited, with Sacquepee and others, (Medicaments microbiens, etc.* (1909). Consult (Annales de l'lnstitut Pasteur) (Paris), and Slosson, E. E., (Major Prophets of Today* (Boston 1914).

METELLA, Caecilia, daughter of Metellus Creticus. Her tomb is the best known of the many that once lined the Appian Way for some miles beyond the walls of Rome, because of the law which forbade burial within the city limits.

METELLI, me-tel'i, a Roman family of the gens Ccecilia. Quintus Cˆecilius Metellus Macedonicus defeated the Achaeans, took Thebes and invaded Macedonia, etc., and re¬ ceived a triumph 146 b.c. Quintus Cˆecilius Metellus Numidicus rendered himself illus¬ trious by his successes against Jugurtha, the Numidian king. He took, in this expedition, the celebrated Marius (q.v.) as his lieutenant; was soon recalled to Rome, and accused of ex¬ tortion and ill-management, but was acquitted of these charges. He celebrated a triumph at Rome 107 b.c. His son, Quintus Cˆecilius Metellus received the surname of Pius on ac¬ count of the love which he displayed for his father when he besought the people to recall him from banishment in 99 b.c. In 83 b.c. he joined Sulla, with whom, three years later, he was united in the consulship. Quintus Cˆecilius Metellus Creticus conquered Crete, and re¬ duced it to a Roman province in 67 b.c. Quin¬ tus Cˆecilius Metellus Pius Scipio, the adopted son of Metellus Pius, in 52 b.c. was colleague in the consulship with Pompey, who had married his daughter Cornelia. Hence he exerted himself to the utmost to destroy the power of Caesar and strengthen that of his son-in-law. He commanded the centre of Pom¬ pey 's army at the battle of Pharsalia, and there¬ after -fleeing to Africa was defeated by Caesar at Thapsus 46 b.c. He died by his own hand.

METEMPSYCHOSIS. This ancient theory has at times been confounded

with reincarna¬ tion. While both imply that man lives again, the propositions present radical differences. See Reincarnation ; Transmigration.

METEORIC WATER. See Ground Water.

METEORITES, also called Aerolites, Meteors and Meteoric Stones, are bodies that enter the earth's atmosphere from without and, being intensely heated by impact with the air, are partially consumed before reaching the ground. If the fall occurs at night, the meteorite is seen as a ball of fire passing over the heavens and frequently leaving a brilliant train of material behind it; usually sparks and fragments are thrown off from the head, and sometimes this bursts in pieces with a loud explosion and finally reaches the ground in hundreds, or even thousands, of pieces. If not too far away from the observer, its passage through the air may be heard as a continuous

roaring sound accompanied by frequent de¬ tonations of great volume; if a final, louder explosion is both seen and heard, the distance from the observer to the meteorite at the time may be very accurately determined bv the con¬ sideration that sound travels but 1,040 feet a second while the transmission of light is practically instantaneous. The reader who is fortunate enough to witness a meteoric fall should therefore take means to estimate the number of seconds which elapse between when the explosion is seen and when the sound reaches him. This is usually done by beginning to count, or to repeat the letters of the alphabet, or some piece of doggerel at the first instant and breaking off at the second. By a repeti¬ tion immediately afterward, which is timed by a watch, a quite accurate approximation will be obtained. If in addition the apparent position of the meteor among the stars is noticed at the beginning and end. of its appearance or (if the phenomenon is witnessed in the daytime) if the approximate bearing and elevation above the ground are noted at the two instants, the time being also stated, at least approximately, the observer will have secured a record which will be of real scientific value.

Meteorites are of two classes — the stony meteorites and the iron meteorites. The former are about 10 times more numerous than the latter. In the iron meteorites iron usually forms more than 90 per cent of the entire mass, but it is almost invariably alloyed with nickel. In the stony meteorites mineral combinations occur which are peculiar to these bodies, and serve as one of the ear marks by which they may be recognized when they were not seen at the time of their fall.

Other distinguishing marks of meteorites are found in their physical appearance and struc¬ ture. They are covered with a blackish crust formed by surface melting during their passage through the air. This crust consists mainly of oxide of iron, and is magnetic. Pits and hollows are formed in the surface of a mete¬ orite by the fusing of the less refractory min¬ erals and these are a characteristic feature.

When a portion of the surface of an iron meteorite is polished and then etched with acid peculiar markings, called from the name of their

discoverer Widmannstatten figures, make their appearance. These are amongthe most trust-worthv criteria of the meteoritic origin of sus¬ pected masses of native iron.

About one-third of the chemical elements known in the laboratory have been found in meteorites. But no new element has ever yet been discovered in them. The following ele¬ ments occur, in gready varying quantity, some¬ times a mere trace being present :

Iron

Nickel

Cobalt

Copper

Aluminum

Tin

Magnesium

Carbon

Sulphur

Phosphorus

Silicon

Sodium

Calcium

Potassium

Manganese

Oxygen

Hydrogen

Nitrogen

Chlorine

Chromium

Titanium

Lithium

As the true nature of shooting stars was not understood until after the investigation that fol¬ lowed the great shower of 1833, so the true nature of meteorites was recognized only after a remarkable fall of those bodies which oc¬ curred at L'Aigle in France about noon on 26 April 1803. Nine years before, in 1794, Chladni,

a German physicist, had formulated the theory that meteorites before encountering the earth traveled in independent orbits in space, but his conclusions were not generally accepted until the occurrence at L'Aigle had focused the atten¬ tion of men of science. On that occasion be¬ tween 2,000 and 3,000 meteoric stones were scattered over an area about nine miles long by three miles wide. The French astronomer, J. B. Biot, visited L'Aigle, carefully examined the fallen stones and collected and discussed the evidence of eye witnesses. Thereafter the old idea that meteors and meteorites were sim¬ ply atmospheric phenomena was abandoned, and the fact of their extra-terrestrial origin was generally recognized. It is now perfectly cer¬ tain that meteorites cannot have originated in volcanic eruptions on the earth or on the moon, as some have supposed, but that they came from remote parts of our solar system, or, more probably, from beyond its borders, or even from the. region of the stars. That this is so is definitely proved from the velocities (many times observed), with which they encounter the earth. It is found that before the collision they must have been falling toward the sun along such elongated paths that upon reaching the earth's orbit their velocity of motion was very approximately 26 miles a second. This is the velocity which a body would acquire in falling to this distance from the sun from an infinitely great distance away, and leaves no room for doubt that each of these bodies was pursuing its own independent orbit about the sun before it suffered collision with the earth.

Many records of the fall of meteorites have been found in ancient annals, and in modern times, with so many observers continually watching the sky, the number of meteorites seen in flight is annually quite large, although the actual falls observed are always compara¬ tively rare. The number entering the earth's atmosphere in a year has been estimated all the way from 70 up to 3,000 or 4,000. In 1879, on 10 May, there was a shower of meteoric stones in Iowa, the largest

mass weighing more than 400 pounds. The last considerable fall in this country was recorded on 19 July 1912, when a remarkable detonating meteorite fell near Holbrook, Ariz. In this case the explosion so completely shattered the mass that the largest fragment found weighed but 14 pounds. Upward of 14,000 separate stones were gathered, their total weight being 481 pounds.

Perhaps the most famous meteorite of an¬ tiquity was the so-called stone of Egos-Pota- mos, which fell in Thrace in 466 b.c., and which was described as equaling two millstones in size. Plutarch speaks of it in his life of Lysander. In the Middle Ages the Stone of Eusisheim was very celebrated and became the object of superstitious reverence. It fell at Eusisheim in Alsace on 7 Nov. 1492, when the Emperor Maximilian was at that place. Frag¬ ments of this body were taken to Paris and London, but the principal mass, weighing more than 200 pounds, was suspended in the choir of the church of Eusisheim.

Almost every large meteorological museum contains specimens of meteoric stones and meteoric irons. There are some remarkable ex¬ amples in the National Museum at Washington. An iron mass, supposed to be of meteoric iron, discovered at Canon Diablo, Arizona, proved,

on examination a few years ago, to contain minute black crystals resembling the diamond, and a meteorite which fell in Russia contained similar black crystals of carbon.

It is yet a disputed question whether the huge masses of iron, weighing many tons, which were brought from Greenland to Stock¬ holm by Baron Nordenskjold, are really of meteoric origin. The same question attaches to a similar mass which Rear Admiral Peary trans¬ ported from Greenland to New York. Other masses of this kind exist in various parts of the world. There is no recordi of their having fallen from the sky. A complete catalogue of all the meteorites of North America, together with a description of their falls, an analysis and a detailed description of the structure in each of them, and also a very

complete bibliography was published in 1915 by O. C. Farrington. This work forms volume XIII of the (Memoirs of the National Academy of Sciences) (Wash¬ ington).

METEORITIC HYPOTHESIS, the theory of cosmogony profounded by Sir Norman Lockyer, to the effect that all astronomical sys¬ tems, including the nebulae themselves, and in particular those consisting of a central body and satellites result, not from the condensation of a nebula, but from the interferences and collisions of meteors more or less fortuitously grouped in space and with more or less fortui¬ tous velocities. The structure of Saturn's rings and the behavior of the outermost planets seem to be susceptible of a better explanation on this theory than on the nebular hypothesis (q.v.), but certain difficulties have been met in connection with a peculiar line in the spectrum of the nebulae, for the nebulae, which according to the meteoritic hypothesis are formed from the substance of meteorites, contain an element, nebulium, found nowhere else in the universe.

METEOROLOGICAL SOCIETY, The Royal, a scientific body with headquarters in London. Its organization dates from 1850, and in 1866 it was incorporated. All theories and facts pertaining to meteorology are sought for in its records, the development of that science in all departments being the object of the associa¬ tion. Besides fellows, the Society consists of honorary members, this membership being be¬ stowed upon distinguished persons of other than English nationality. The Society publishes the Meteorological Record and the Quarterly Journal.

METEOROLOGY, fi£Tt:upov--?i£y£iv, lit¬ erally the science of the things in the air. Meteorology has come to mean that part of natural philosophy that treats of the physics of the air and the mechanics of its motions. It includes climate (q.v.) and weather. The dis¬ tinction in the meaning of the two terms is apparent when it is stated that one may well speak of the weather of to-day, or last month, or some past year, but not of the climate of a day, a month or a year, which is determined by finding the averages and the extremes of all the weather conditions for a long series of years : of the temperature, precipitation, hu¬ midity, sunshine, cloudiness and wind velocity and direction.

Theoretical Meteorology aims to trace out the workings of definite laws to explain the various atmospheric phenomena, and properly

may include a study of variations in solar radi¬ ation, as effecting the earth's temperatures, or as the primary causation of terrestrial storms.

Applied Meteorology strives to apply the theory of meteorology to the art of weather forecasting, which, so far, has not passed be¬ yond the empirical stage, and in various ways to utilize knowledge of the physics of the air in the commercial industries.

History. — The term science was not appli¬ cable to man's knowledge of the atmosphere at the time Virgil, Cicero and Aristotle wrote of the weather. As late as the time of the found¬ ing of the first of the 13 original colonies at Jamestown, Va., in 1607, practically nothing was known of the properties of the air or of methods for the measuring of its phenomena. The development of the thermometer and Tor¬ ricelli's invention of the barometer in 1643 made study and investigation possible.

American scientists may well be proud of the services rendered by their countrymen to humanity in adding to our knowledge of the atmosphere. The act of the great Franklin in drawing down the lightning of the clouds and identifying it with the electricity of the labora¬ tory was but one of his important contributions to meteorological science. In 1747, while tak¬ ing observations at Philadelphia of a lunar eclipse, in cooperation with his brother at Boston, he learned that storms moving from the west, as all storms of the middle latitudes do, first begin with easterly winds, and as they approach a place of observation become westerly, and he came near discovering the cyclonic sys¬ tem of storms. Following the winter of 1783, famous in history for the phenomenal severity of its cold, and its long duration, Franklin, in a letter to a correspondent in Europe, called attention to the violent eruption of Mount Hecla the preceding year, and suggested that the dust therefrom may have been carried into the high strata of the atmosphere and spread around the earth by the winds. His idea was that this dust would screen off some of the sun's rays and add to the cold of winter. As in many other things, he had a prophetic vision, for there no longer is doubt that violent vol¬ canic eruptions throw into the upper air large quantities of dust particles which, by swiftly moving easterly currents in the middle latitudes and westerly currents in the tropics, are soon so distributed around the earth as not only to effect the colors of the sky for two or three years after, but to modify the weather. Doubt¬ less the earth in this year of 1919 still is feel¬ ing the cooling effects of the explosion of Katmai, in the Alaskan Peninsula, in 1912, augmented by volcanic explosions in Japan in

1913.

The author of the Declaration of Independ¬ ence, Thomas Jefferson, took daily observations of the weather. He even carried his ther¬ mometer to Philadelphia and twice recorded the temperature of Independence Hall on 4 July 1776. He owned one of the only two barometers then in the colonies. In coopera¬ tion with James Madison (after bishop), who lived at Williamsburg, some 200 miles east of Monticello, he determined that changes in the barometer first begin several hours earlier at the westernmost station. The British ransacked his home and broke his barometer. It is said

that he berated them more for the destruction of his cherished instrument of the weather than he did for their burning of the National Capi¬ tol. As early as 1735 Hadley, an Englishman, had published an article explanatory of the trade winds, and Dalton, another Englishman, in 1793, made the first attempt to explain the phenomena of the atmosphere through the prin¬ ciples of philosophy. It was then believed that storms were straight-line gales. It remained for Redfield, an American, in 1831 to publish an epoch-making essay, in which storms were described as progressive whirlwinds, turning counter clockwise, with an easterly movement of translation for the whole system of spirally inflowing air. Espy followed, in 1841, and showed that rainfall is caused by ascending cur¬ rents, cooling by expansion as they rise until the water vapor becomes saturated. By the same line of reasoning he explained how de¬ scending air must heat by compression. In 1843 Tracy made an important contribution to the subject. Redfield had claimed that the air in storm-whirls neither moves in concentric curves nor along radical lines into the interior of the storm, but spirally inward. Tracy proved that Redfield was right, for he showed that the rotation of the earth must deflect all air cur¬ rents to the right of the initial direction in the northern hemisphere, whether in storm-whirls or out of them. From 1840 to 1860 the other Americans who added most to our knowledge of meteorology were Maury, Coffin, Henry, Lapham and Loomis. Mathew Fontaine Maury, of the United States navy, was the pioneer in marine meteorology. He mapped the oceans and determined the direction and force of winds and water currents. In 1855 he published his (Physical Geography of the Sea and its Meteor¬ ology. > See Weather Bureau.

Source of the Atmosphere. — The larger planets of the solar system are believed by many scientists to have hot atmospheres still in violent agitation. According to the La Placion hypothesis of the origin of the earth, millions of years ago it also had a similar atmosphere. Much of the hot vapors which largely composed the earth's atmosphere during the early period of its existence, have been absorbed by its rocks or filtered away into space. The residual is supposed to constitute our present atmosphere. The moon shows no refraction or diffusion of

light, such as would occur with an atmospheric envelope. It is dead. It died young because it is too small to have sufficient attraction of gravitation to long retain a life-sustaining atmosphere, or in fact, any atmosphere, the darting molecules of which have high velocities, and are captured by larger celestial bpdies. Before the sun can have an atmosphere suitable for life an incomprehensible period will have elapsed, its light will have gone out, its heat will have ceased to reach the earth and the other planets in appreciable quantities, the earth will have been dead millions of years, and the sun itself will only receive heat and light from the feeble rays of the stars which, unlike itself, have not ceased to shine. Even though it have a suitable atmosphere, it must remain dead, for there is no external source whence it can re¬ ceive appreciable heat.

Those who follow the Planetesimal hypothe¬ sis are required to believe that the earth's atmos¬ phere has never been hot and has grown denser,

rather than rarer, with the growth in size of the earth.

How Atmospheres are Lost. — Gases that cannot be held by the moon may be held by the earth and those that can escape from the earth may be held by the larger planets. An under¬ standing of how gases are lost through the kinetic energy of molecules requires that care¬ ful account be taken of the relations that exist between the attraction of gravitation of planets, their temperatures, and the weight of the mole¬ cules of the different gases that compose their atmospheres. The speed of the molecule de¬ pends on its temperature and its mass, being less at low temperatures and greater at high temperatures, and light molecules moving more swiftly than heavy ones. A gas is composed of molecules that dart about at velocities which, in connection with numerous collisions (seven or eight millions for each molecule near the earth in ufos of a second) and the energy of each molecule, may allow a certain proportion of them at any one time, to reach velocities so great that, if they pass into the outer layers of the air, where collisions are infrequent, they escape from the attraction of the planet and pass away never to return. According to the kinetic theory it would appear that the earth's gravitation and the temperature of its outer air are such as to retain without appreciable loss argon, carbon dioxide, oxygen, nitrogen, vapor of water, and ammonia, but that helium and hydrogen, because of their lesser specific gravity, escape from the top of the atmosphere about as fast as they are supplied from hot springs and other sources at the bottom.

Proportion of Gases Aloft. — Samples of air taken at various elevations up to nine miles show the atmosphere to be a homogeneous mixture, with the proportions the same at all elevations ; but this is what one would expect from the mixing of the air by the ascending and descending whirls of cyclonic storms. Storms operate only in the lower air and all ascending and descending currents practically cease below the 10-mile level. Above this alti¬ tude it reasonably may be assumed that the heavier gases steadily lose in proportion to the lighter ones until at about 60 miles nothing but hydrogen and helium remain.

Atmospheric Air. — The earth is surrounded by four important atmospheres — nitrogen, oxy¬ gen, vapor of water and carbon dioxide — and others of less importance, each comporting itself, in accordance with Dalton's law, practi¬ cally as it would do if the others were not pres¬ ent, except that its rate of diffusion is retarded by their presence. This composition is atmos¬ pheric air — usually called air. Both by vol¬ ume and by mass oxygen and nitrogen are the principal atmospheres. • They, like the others, are in mechanical mixture and not in chemical combination. Because of their relatively greater importance separate articles are devoted to nitrogen and oxygen (qq.v.). But it should not be thought that because some of the other con¬ stituent gases are relatively small in amount they are not vitally important in carrying on of the functions that nature seems to have assigned to the air.

As well as germs, dust and cloud particles, air, over land, contains sulphates in minute quantities, and over the sea and near the sea-

shore salt left from the evaporated spray can always be detected:

Carbon Dioxide. — In cities the amount of carbon dioxide is considerably greater than in the country, frequently rising to 0.07 per cent by volume, and even to 0.10 per cent when there is but little wind to scatter what accumulates near the ground. In crowded theatres Angus Smith found as much as 0.32 per cent and in mines 2.5 per cent. The latter amount would soon be destructive to animal life. This gas is 1.50 times as dense as an equal volume of air. Its densit}' causes it to collect in mines, sewers, cellars and other low and confined places, un¬ less there is forced ventilation. The sweep of the American cold wave, with its heavy air mov¬ ing at a high velocity, is highly beneficial. It searches into cracks, crevices and into enclo¬ sures that are not hermetically sealed and ex¬ pels the foul air. All nature feels the revivify¬ ing effects of rain and high wind ; one washes out the carbonic-acid gas (carbon dioxide) from the air, with the dust and other particles in suspension; the other enters our habitations and drives out the poisonous atmospheric ac¬ cumulations. It cannot be too strongly im¬ pressed upon the reader's mind that oxygen, the life-sustaining principle of the air, decreases, and carbon dioxide, a poison, increases in air that is breathed, or in air in which candles, oil-lamps or gas are burning; and that all places of habitation, especiallv those that are used for sleeping-rooms, should have a continuous sup¬ ply of fresh air.

Water vapor is another of the four im¬ portant atmospheres. It may vary in amount from a fraction of 1 per cent for the arid re¬ gions to 5 per cent of the weight of the air for the warm humid regions. It is a little over one-half as dense as atmospheric air. When the air has taken up all the water vapor that it can contain at a given temperature it is said to be saturated. Saturation seldom occurs in free air, except inside of a dense fog or cloud, or within the thin stratum of air that by contact with a cold surface has had its temperature low¬ ered to the point of condensation. Even during heavy downpours of rain the air near the earth is usually capable of evaporating some of the rain that is falling through it. In fact light precipitation may be entirely taken un by the lower air and never reach the earth. The dew point is the temperature of saturation. The relative humidity is expressed in percentages of the amount necessary to saturate. At a tem¬ perature of 32° F., air resting over a moist sur¬ face may continue to increase

fhe amount of its vapor of water until it contains 2.11 grains per cubic foot, which amount is sufficient to ex¬ ert a pressure in all directions equal to the downward pressure of 0.18 inch of mercury; it will then be saturated ’and its relative humid¬ ity be 100 per cent. The point to which atten¬ tion is especially directed is that the pressure of 0.18 inch indicates the maximum pressure of water vapor at 32° temperature, and any fur¬ ther evaporation must be accompanied by an equal amount of precipitation. Now, if this air be suddenly raised in temperature to 51° its capacity per cubic foot will be increased to twice what it was at 32°, the 2.11 grains will only be equal to one-half the number necessary to saturate and the relative humidity be ex¬ pressed by 50 per cent instead of 100 per cent.

The absolute humidity is expressed in grains per cubic foot, or by the pressure in inches of mercury. The hygrometer measures the amount of water vapor… .

Ozone has powerful bleaching and disin¬ fecting properties. By reason of the unstable condition of the molecular structure it is a much more active oxidizing agent than oxvgen ; and this fact in part accounts for the less amount observed in the air near the ground, and for the almost total absence of ozone from the air over large cities, where decaying organic matter exists at all times in comparatively large quantities, the ozone rapidly entering into chemical union with whatever is in the process of decay. Ozone in the minute quantities found in nature is healthful, but the quantity is not large that will cause the death of any animal confined in the air containing it. It may be that the invigorating effects of the crisp air of a frosty morning, and of the dry air of the cold waves of winter, are due, in part at least, to the ozone and electricitv in the air; and may not the healthfulness of moun¬ tain air be due to the increase with elevation in the quantity of ozone and electricity, as well as to the less quantity of dust and disease germs? Sea air also is rich in ozone and de¬ ficient in dust and noxious germs. The maxi¬ mum daily amount greets the early riser, for ozone is present in greatest quantity between 4 and 9 a.m., and in winter the amount is greater than in summer.

Dust in the Air. — Dust rains into the atmos¬ phere from outer space, and meteors that are consumed through the heat generated by strik¬ ing into our air contribute to the supply. Other sources are volcanoes, combustion, salts from the spray of the ocean and small particles of matter lifted up by the winds.

A recent research by Humphrey shows that each of the important volcanic eruptions since 1750 have effected a cooling of the earth's tem¬ peratures through the action of dust shot into the upper air and wafted about the earth. It is shown that the ratio subsisting between the size of the dust motes and the wave lengths of solar and terrestrial radiations is such as to reflect back into space more of incoming heat than there is intercepted outgoing heat from the earth. Each important eruption has af¬ fected the temperature of the earth and the color of the sky for from one to three years.

Heat of Interstellar Space. — Although the ether transmits through all space the various forms of solar energy, none of this energy be¬ comes thermal until it is intercepted by the atmosphere of our earth or by the gaseous envelope of some other planet, or by the body of some meteor or comet or by cosmic dust. Objects or planets without atmospheres like our moon are, therefore, nearly devoid of tem¬ perature, approaching absolute zero, which, theoretically, is — 450° F.

Earth's Heat. — It is believed that the in¬ terior of the earth still retains an intensely high temperature, and that this hot mass is sur¬ rounded by a cool crust that is a poor conduc¬ tor; so that only a small amount escapes to the atmosphere. The innumerable stars, though their average temperature probably is equal to that of our sun, are too distant to have an appreciable effect in heating the ex¬ terior of the earth. It is apparent, therefore,

that the sun, with an absolute temperature over 20 times as high as the absolute tempera¬ ture of the earth, controls the surface tempera¬ ture of our planet and its atmosphere.

Sun s Heat Variable. — The number of gram-calories received per minute on a square centi¬ meter of normal surface outside the earth's atmosphere is called the solar constant. In Abbot's refined measurements at Mount Whit¬ ney he obtained values of the solar constant varying from 1.93 to 2.14, the mean for the first two years being 2.022.

Variable Quantity of Heat Received Each Day. — The quantity of heat that falls upon a horizontal area at the top of the earth's atmos¬ phere during any consecutive 24 hours depends upon four conditions: (1) The altitude that the sun attains when it crosses the meridian at noon, (2) the length of the day time, (3) the distance of the earth from the sun, and (4) constancy of solar radiation; these are in a perpetual state of variation, except that near the equator the day and the night are always equal.

Quantity of Solar Rays Absorbed by the Atmosphere. — On the average the atmosphere of the earth absorbs about 76 per cent of the total incident solar energy. About one-half is absorbed by a cloudless atmosphere, and nearly all absorbed or reflected away by a cloudy air. On the average 52 per cent of the earth's sur¬ face is obscured by clouds all the time which, according to Abbot, reduces the total amount of insolation that reaches the earth to but 24 per cent.

Terrestrial Radiation. — When solar radia¬ tion is absorbed either by the gases of the air or by dust in suspension in it, or by the earth itself, the energy of the ether is transmuted into molecular vibrations of the matter that absorbed it. The temperature of the matter is raised and it itself sends out radiations in the form of heat-waves, which readily escape through the atmosphere unless intercepted in their passage by cloud or water vapor. There is no permanent increase in the temperature of the earth or atmosphere, therefore there must be a continual loss of heat in some way, and this is brought about by the

outward radiation of earth and air toward interplanetary space. During the spring and summer the gain of heat by the atmosphere is greater than the loss ; during the autumn and winter these con¬ ditions are reversed.

Why Mountain Peaks are Cold. — The

absorption of solar and of terrestrial radia¬ tion by the air is greater in its lower levels, where dust, water vapor and clouds are densest, while the transmission of both incom¬ ing and outgoing radiation is more rapid through the pure air aloft. Thus we account for the coolness of all mountain peaks.

Nocturnal Cooling of Earth and Air. — Terrestrial radiation goes on day and night, winter and summer. During daylight the gain of heat is greater than the loss, while at night the reverse is true. After the sun has passed below the horizon both the earth and the air continue to cool by radiation, unretarded by the counteracting effect of insolation. The earth loses heat, even under a clear sky, more freely than the air, with the result that the surface of the ground and of vegetation and the air in close proximity thereto may sink to a tem¬ perature 10° or 15° lower than that of the air

at considerable elevations. This condition is called temperature reversion. It occurs both winter and summer. The greater difference will occur when there is but little wind to mix the air. On a clear night in summer there may occur an increase in temperature up to a height of 200 to 600 feet, and then a steady fall, reaching the surface temperature at about 2,000 feet elevation, unless radiation be dimin¬ ished by saturation of the soil or the location be adjacent to a considerable body of water.

Unequal Heating of Land and Water. — The thermal effect of a given quantity of heat falling upon various forms of matter differs with the substance; this is notably apparent when the matter is land, water or air. The same amount of heat will raise the tempera¬ ture of a water surface only about one-fourth as much as it will raise the temperature of a land surface. Water rejects by reflection a considerable amount of the solar radiation that reaches it, while land reflects but a small part, and of that which falls upon the top layer of water much is expended in the process of evaporation and does not impart warmth to the water. Solar radiation also penetrates water to a considerable depth and is quite uniformly absorbed by the whole stratum penetrated.

These conditions give to large water surfaces and the air immediately over them a much lower temperature during the day and a much higher temperature during the night, and also lower temperatures during summe. and higher temperatures during winter, than occur over a land surface of the same latitude and approxi¬ mate elevation.

Ocean Temperatures. — Because of the dis¬ placement of oceanic isothermals by ocean cur¬ rents it is impossible to name a definite tem¬ perature as prevailing over oceans at all places on a given parallel of latitude. But in a gen¬ eral way it may be stated that at the equator there is a surface temperature of 82° to 84° F., which changes less than a degree between day and night, and not over 5° between winter and summer; at a depth of 400 fathoms the tem¬ perature is 44° and unchangeable, and below 1,000 fathoms it is but little above the freezing point of fresh water — namely, 34° to 36°. At latitude 70° north the temperature has but little diurnal variation, and a yearly range of from 35° in winter to 45° for summer; at a depth of 400 fathoms it remains steady at 32°. From this level there is a gradual decrease to a depth of 1,000 fathoms, where a constant temperature of 28° exists, and below this to the bottom there is no change.

Vertical Decrease of Temperature. — From the Paris records the mean fall in temperature per 1,000 feet up to a height of 20,000 feet is 2.4 in winter, 2.8 in spring, 2.6 in summer, 2.5 in autumn and 2.6 for the year. From the Berlin records it is 3.1 winter and spring and 3.0 in summer and autumn. It should be noted that the decrease is greater at Berlin, which is farther from the influence of the ocean than is Paris. In the interior of the United States it is still greater.

Isothermal Layer. — During the past 15 years the atmosphere has been explored to altitudeˆ of from 15 to .30 kilometers by the sending up of sounding balloons equipned with suitable instruments. We find that there are two distinct strata in our atmosphere that inter-

mingle but slightly: a lower turbulent one, in which all of the ascending and the descending whirls that constitute storms and cold waves operate, and in which the temperature decreases rapidly with elevation; and an upper or outer one, in which there is such small change of temperature with elevation, so far as observa¬ tions have reached, that it is called the isother¬ mal layer. The lower stratum is about 12 kilo¬ meters in depth ; the upper one extends to limits unknown. The average temperature for summer at the top of the storm stratum is

— 52° C., and 8 kilometers higher in the iso¬ thermal stratum, — 51°. In winter the tem¬ peratures at these two places are — 58° and

— 57° C. Note that the temperature slightly increases with elevation in the region above storms; although we feel justified in assuming that farther out the temperature must lose with altitude until at the outer limits of the atmos¬ phere it approaches absolute zero. The greatest altitudes reached showed about one-half the difference in the temperature between winter and summer that is found at the earth's surface.

Diurnal Range of Temperature. — The average difference between the temperatures of day and those of night diminishes with ascent in the free air until at only a few thousand feet from the surface of the earth (3,000 to 5,000) there is no difference between the heat of midday and that of midnight. The diurnal range of temperature is greatest at the equator and diminishes irregularly with latitude, being greater over land than over water on the same parallel.

Annual Range of Temperature. — The an¬ nual range of temperature increases with lati¬ tude, being the greatest for the interior of continents and least for islands and near the oceans. It decreases with gain in elevation in free air, being about 7° C. at 18 kilometers about the earth.

Frosts. — As previously explained, a given quantity of heat being absorbed by different substances of unequal specific heats will pro¬ duce a different temperature in each; the lower the specific heat of a substance the higher will be its temperature ; and besides different sub¬ stances have different coefficients of absorption and reflection. Therefore , under the same inso¬ lation rocks, clay, vegetation and

other sub¬ stances come to temperatures that differ by many degrees. The air next to earth largely partakes of the temperature of the surface, and in consequence when the sky is clear so that incoming and outgoing radiations may progress freely and the air is little disturbed by wind, wide variations in the temperature of a thin stratum of lower air may occur over adjacent plots of ground of precisely the same elevation, but different covering, and frost form. Differ¬ ence in elevation may also cause marked differ¬ ences in minimum air temperatures where the surface covering is uniform and frosts of vary¬ ing degrees of intensity occur. During clear, cool nights with light winds, frosts will occur in bogs or on low, damp ground, while in the surrounding uplands the temperature may be 10° to 20° higher.

Atmospheric Pressure. — The attraction of gravity on the gases of the atmosphere causes them to exert a pressure on the surface of the earth. The average pressure at sea-level is about 14.7 pounds per square inch. If we re¬

move the air from the inside of a vessel by means of the air pump or otherwise, then the external pressure becomes at once apparent. This pressure is in all directions, upward as well as downward; it is measured by the mer¬ curial barometer. See Barometer.

To get the true pressure of the air it is necessary to apply corrections for temperature (32° F. is the standard), gravity, which varies with latitude, and instrumental error; and when barometer readings from several stations are to be compared it is required to reduce them to what they would be if the stations all had a common level. Usually they are reduced to sea-level by adding to each the inches of mer¬ cury equivalent in weight to the column of air between the barometer cistern and sea-level. This is the pressure usually entered on weather charts.

Isobars. — In order to present graphically the distribution of atmospheric pressure over the earth's surface it is customary to draw lines through points having the same sea-level pres¬ sure. These lines are called isobars.

Barometric Gradient. — The distance be¬ tween isobars shows the steepness of the barometric gradient. The unit of horizontal distance usually employed is the distance of 1° on a meridian. Thus, if the difference in pres¬ sure between two points is one inch and the

distance between them is equal to the length of 10° on a meridian the barometric gradient is 0.1 of an inch.

Distribution of Pressure. — The average of all the pressures of the year show belts of high pressure at about latitude 35° north and south, and a belt of low pressure at the equator, all of which move north and south appreciably with the annual march of the sun.

W. J. Humphreys computes the vertical tem¬ perature gradient to be as follows:

Height

Pressure

Kilometers

Miles

Millimeters

Inches

0

0

760

29.92

11

6

168

6.61

20

12.4

39.6

1.56

30

18.6

8.04

0.33

40

24.9

1.65

0.065

50

31.1

0.466

0.018

100

61.1

0.0076

0.0003

150

93.2

0.0043

0.00017

There is a close relation between tempera¬ ture and pressure. If one takes the average pressures for all the warm months and those of all the cold months it will be found that continents have low pressures in summer and high pressures in winter, and that the intensity of the lows and of the highs will bear a definite relation to the size of the continental area and its distance from the equator. These conditions are reversed on the oceans, the lows occurring in winter and the highs in summer. The heat of summer raises the land to a higher temperature than it does the water. The air expands, rises and overflows to the oceans, leaving a deficient pressure on the continents and an excess on the seas. In winter the land loses heat much more rapidly by radiation

COPYRIGHT, IQI2, BY F. E. WRIGHT

f

than does the water. It contracts, and in the higher levels flows back from the water.

The average hourly pressure for a consider¬ able period will show the barometer rises from 4 a.m. to 10 a.m. ; then falls to 4 p.m., and rises to a second daily maximum at 10 p.m.; when it slowly falls to a secondary minimum at 4 a.m. These variations are greatest at the equator, diminishing with latitude until they are hardly distinguishable at the poles.

General Circulation — In the tropics the winds blow almost continuously from the northeast in the northern hemisphere and from the southeast in the southern hemisphere, with irregular winds, mostly from the west in extra-tropical regions. The explanation of the trade winds is that the heat of the sun raises the temperature and expands the air most where its rays fall nearly perpendicularly. This causes the air to ascend in the region of the equator and to flow in along the surface from either side. Since, however, air moving from higher to lower latitudes passes successively over parallels having greater easterly motion than its own, or rather greater than the parallel whence it started, it would, on account of its momentum, fall behind the diurnal motion of the earth and be deflected more and more to the west. Over the warmest belt it would rise. In rising it would cool by expansion, so that in flowing away from the equator, as it must do to make room for the air continually flow¬ ing in at the surface, its tendency would be to gradually fall, reaching the surface in tem¬ perate latitudes and contributing to create the belt of high pressure existing at latitude 35° each side of the equator.

The air aloft in going from low to high lati¬ tudes passes successively over parallels of lati¬ tude having less and less easterly motion, so that it runs ahead of the diurnal rotation of the earth or is deflected more and more to the east, giving us the prevailing westerly winds of the temperate zones when this air comes to earth.

From the isothermal level downward to the surface, between latitudes 30° and the poles, there are cyclonic circulations, central at the poles.

The centrifugal force of these winds, because they run ahead of the earth, is greater than it would be if they ran with it, and con¬ sequently the air of high latitudes, as it en¬ circles the globe, tends to pile up over latitudes farther south.

Local Circulation. — As previously indicated, the permanent circulations are due to equatorial heating and polar cooling and to the great sub¬ permanent high pressure and low pressure sys¬ tems created by the different heating effects of continents and oceans. Recently these systems have been called Great Centres of Action. They are built up and disintegrated and change their geographical positions slowly. While they do not have a velocity of translation, like the ordi¬ nary cyclones and anti-cyclones that move across continents and oceans and cause the changes of weather that occur from day to day, they do profoundly influence the intensity of storms and the path along which they may move. They, therefore, determine, in a general way, whether the character of the weather for weeks at a time shall be wetter or drier, colder or warmer, than the seasonal average.

Cyclones. — The cyclone, or low pressure, is a system of spirally inflowing winds which ascend in the region of the centre, cool by ex¬ pansion with gain in altitude and usually cause precipitation in the form of rain or snow. At or below the heights of the wispy cirrus clouds the air flows outward, and at some more or less remote place moves downward in the form of an anti-cyclone. Storms move eastward in the middle latitudes and westward in the tropics, and rotate counter-clockwise in the northern hemisphere and in the opposite di¬ rection in the southern hemisphere. While the velocity of gyration may be anywhere from zero to 100 miles per hour, depending upon the steepness of the barometric gradient toward the centre, the . velocity of translation of the whole whirling mass usually varies from 20 miles per hour in summer to 40 miles in winter.

Anti-cyclone. — In the anti-cyclone all the movements of the cyclone are reversed except the direction of translation. The air flows downward near the centre and spirally out¬ ward along the surface of the earth. It usually is accompanied by clear, cool and settled weather, and this notwithstanding the fact that the air heats by compression as it descends, which apparent inconsistency will be explained in the paragraph on Cold Waves.

Origin of Storms. — Any flowing together of the air between two anti-cyclones must produce a cyclone, and it has been shown that the un¬

equal heating effects of land and water sur¬ faces may be sufficient to initiate cyclonic and anti-cyclonic action.

A hypothesis to account for the beginning of storms that is attracting the attention of meteor¬ ologists, assumes that the earth, at times, passes through shafts of extra solar heat, which ex¬ pand the air at the equator more than they do at higher latitudes, causing the atmosphere at the equator to bulge up until masses at high levels gravitate toward the poles. ‘ These masses cool by expansion and by radiation, gain in specific gravity and sink to the earth in the middle latitudes or the north part of the tem¬ perate zone. As they come down they rotate in an anti-cyclonic manner and constitute cold waves. Each descending mass forces the ascent of cyclonic whirls or storms on either side. The storms thus formed may move east¬ ward for great distances, crossing continents and oceans before being disintegrated. Accord¬ ing to theory these extra heat shafts from the sun may persist for months and return to affect our weather with each 25-day rotation of the luminary. An allowance of 18 days is made for the air to perform the overhead circula¬ tion from the equator after each heat impulse before the cold wave appears on our western border. According to this hypothesis these cold masses should settle over land in winter and over oceans in summer, which agrees with ob¬ served fact.

Abbot’s researches have shown much of the varied character of solar radiation. With a continuation of his work and of that of Kim¬ ball, of the Weather Bureau, whose investiga¬ tions were begun and continued for many years under the direction of the author, the time may come when the general character of seasons may be foretold.

Temperatures of Cyclones and Anti¬ cyclones. — According to Ferrel and other early

students temperature is supposed to be arranged systematically about the centres of cyclones and anti-cyclones. We now know that such is not the case, that the cyclone as a whole is not a warm area, nor is the anti-cyclone a cold area, but that the rising temperature occurs on the

western side of the high area and on the eastern side of the low area, and that the falling tem¬ perature is on the western side of the low area and on the eastern side of the high area.

Hurricanes. — The hurricane of the West Indies is the same as the typhoon of the Philip¬ pines and the China coast. The ordinary cyclonic storm that crosses the United States is about 1,000 miles in diameter. The hurricane is a cyclone usually of only about 100 to 300 miles in diameter, but with a gyratory velocity far in excess of the storms of the temperate latitudes. It occurs in the tropics, moves west¬ ward and northward at the rate of only 7 to 12 miles per hour, while the air inside of the storm may be whirling at the rate of over 100 miles. At latitude 26° its path recurves in the form of a parabola, and the storm passes to the northeast. They occur mainly in the four months July to October.

Tornadoes. — The tornado also is cyclonic in its movements, but instead of being 1,000 miles in diameter like the continental cyclone, or 100 miles like the tropical hurricane, it usually has a diameter of gyration of only about 100 to 300 yards, and its speed of rota¬ tion is so terrific that no instruments have ever held together long enough to measure its veloc¬ ity, which must equal or exceed that of a rifle bullet, as the writer has seen wheat straws that were shot by the wind of a tornado one-half inch into the tough body of an oak tree, and a two by four pine scantling driven through five-eighths of an inch of solid iron. As a rule they occur in the spring of the year, in the southeast quadrant of a cyclone, when the tem¬ perature and humidity are high. Their direc¬ tion nearly always is toward the northeast. They occur with the greatest frequency in the States bordering on the Mississippi River.

Thunderstorms. — The thunder storm turns about a horizontal axis instead of a vertical one, as in the case of the tornado. On land thunderstorms occur most frequently at speci¬ fied hours of the day or night, such as 3 to 5 in the afternoon or 9 to 10 in the evening, and sometimes even at 2 or 3 in the morning, but no such periods are observed over the ocean. They occur at any hour of the day or night with equal frequency. In regard to the electrical phenomena of the atmosphere it is not safe to hazard definite statements, but pos¬ sibly auroras are due to earth-captured solar electrons, while the lightning of a thunder¬ storm owes its origin, chiefly at least, to the electrical separation produced by the action of wind on raindrops.

Cold Waves. — The area and intensity of cold waves depends upon the size of the con¬ tinents and their distance from the equator. The

interiors of North America and of Siberia experience more severe cold than occurs at either pole. Departures from the normal tem¬ perature of a time and place are due to the dynamic heating and cooling of the air through its upward and downward motions below the six or seven-mile level. Air heats by com¬

pression at the rate of about 1° for each 200 feet of descent in the anti-cyclone, but this heating induces clearness through the evapora¬ tion of clouds and allows a rapid loss of heat by radiation. And then the temperature of the air before it starts on its downward journey is so low that notwithstanding the heat of com¬ pression, it may be extremely cold when it reaches the earth. However, it is difficult to formulate any hypothesis that will fully ac¬ count for the cold of the east side of the anti¬ cyclone being so much greater than that of the west side, or for the heat of the east side of the cyclone being so in excess of that of the west side.

Warm Waves. — In summer there come periods of stagnation in the drift of the highs and the lows. At such times if a high slug¬ gishly rests over the south Atlantic Ocean be¬ tween Bermuda and the coast of the United States and a low over the northern Rocky Mountain region, there will result what is popularly known as a warm wave, for the air will slowly and steadily flow from the south¬ east, where the pressure is greater, toward the northwest, where the pressure is less, and, re¬ ceiving constant accretions of heat from the hot, radiating surface of the earth, finally be¬ come abnormally heated. This superheated condition continues until the high over the ocean dies out or drifts away. Consult Davis ‘Elementary Meteorology) (Boston 1894) ; Fer-rel, William, ‘Treatise on the Winds) (New York 1893) ; Flammarion, ‘Thunder and Lightning) (Boston 1906) ; Hann, ‘Lehrbuch der Meteorologie) (3d ed., Leipzig 1914) ; Milham, (Meteorology> (New York 1912) ; Moore, (Descriptive Meteorology > (ib., 1910) ; Ward Practical Exercises in Elementary Meteor- °logy) (Boston 1899).

Willis Luther Moore, Professor of Meteorology, George Washington

University.

METEOROLOGY, Marine, differs from that of land areas chiefly from the fact that the rays of the sun penetrate more deeply into the ocean substance than into the land and that the diffusion of this heat through the water body is practically uniform. The ocean thus

becomes a vast storage reservoir of heat which is but slowly returned to the atmosphere. The effect upon the ocean climate is to render it more equable. An example of this is seen in the cli¬ mate of the British Isles, Ireland particularly, where the prevalent west winds coming from the great ocean area temper the climate to a remarkable degree. It is a fact notable in this connection that in the approach of winter in the northern hemisphere, when the frost line on the land areas has reached as far south as the parallel of 38° N., on the ocean areas it is still at 65° N. Ocean storms are generally more severe than land storms, but exhibit a close ap¬ proximation to theoretical form and their progress can be much more accurately foretold. Consult McAdie, A. G., Principles of Aero¬ graphˆ (Chicago 1917) ; Moore, Sir J. W., ‘Meterology Practical and Applied> (London

1910).

METEORS. See Shooting Stars.

METH. See Mead.

METHANE, CH4, also known in the im¬ pure state as Marsh Gas, or Firedamp, is found in large quantities in the gases evolved from petroleum wells, oil springs and mud volcanoes. It. is present in stagnant pools (hence the name marsh gas) and in certain localities where or¬ ganic matter is allowed to decay in a limited supply of air. The firedamp of coal mines is methane mixed with a small percentage of car¬ bon dioxide, nitrogen and oxygen. Enormous quantities of methane are present in the burn¬ ing gases that constitute the <(Holy Fire® at Baku in the neighborhood of the Caspian Sea. Methane is formed in the fermentation of com¬ pounds like cellulose, milk sugar or calcium butyrate, in the thermal decomposition of al¬ cohol, ethane, ethylene or acetylene and in the dry distillation of vegetable matter. Illumi¬ nating gas, produced by the destructive distil¬ lation of coal, may contain as much as 40 per cent of methane by volume.

The compound may be prepared in a fairly pure state, (1) by treating commercial alumi¬ num carbide with water; (2) by the interaction of hydrogen and an oxide of carbon at 250° C., in the presence of finely-divided catalyzers like cobalt, nickel or iron; (3) by heating a mix¬ ture of fused sodium acetate and dry soda-lime ; (4) by the interaction of carbon bisulphide, me¬ tallic copper and hydrogen sulphide at an ele¬ vated temperature; (5) by maintaining charcoal from sugar in a stream of pure, dry hydrogen at 1.150° C. Chemically pure methane has been prepared by the reduction of methyl iodide. In this process the iodine is mixed with equal vol¬ ume' of alcohol and treated with the <(zinc-cop- per® couple.

Methane is a colorless inodorous gas with a density =7 0.559 (air=l). It burns with a faintly luminous flame and with the evolution of much heat. Mixed with air or oxygen in certain proportions and then ignited it explodes violently, one volume of methane forming with 9.5 volumes of air an extremely explosive mix¬ ture. On account of its low boiling point meth¬ ane was for a long time known as one of the permanent gases. It was liquefied by Cailletet in 1877. The liquid is colorless, boils at — 164° C. and solidifies at — 185.5° C. when the pres¬ sure is diminished to 80 millimeters.

Methane is a saturated compound and is ex¬ tremely stable. Reagents like fuming nitric acid, strong sulphuric acid or phosphoric anhy¬ dride have practically no action upon it even at elevated temperatures. In the presence of chlorine, bromine or fluorine, methane under¬ goes a chemical change by substitution, i.e., by the replacement of one or more hydrogen atoms by equivalent atoms of the halogen. Long contact with chlorine, for example, even in dif¬ fused daylight and at ordinary temperatures, will convert methane into CH3C1 (methyl chlor¬ ide), CH2CI2 (methylene chloride), CHCI3 (chloroform) and CCU (carbon tetrachlor¬ ide), a molecule of hydrochloric acid being evolved with the introduction of each atom of halogen. At temperatures not lower than 1.300° C. methane has been completely decom¬ posed into carbon and hydrogen. . With a mix¬ ture of nitrogen and hydrogen in the. electric arc it has been successfully converted into hy¬ drocyanic acid. Patents have also been taken for the oxidation of methane (under the cata¬ lytic action of tan bark) into formic acid, vol. 18 — 46

methyl alcohol and formaldehyde. See Gases in Mines and Coal.

V. S. Babasinian,

Professor of Chemistry, Lehigh University.

METHODIST BOOK CONCERN. See

Methodist Episcopal Church.

METHODIST CHURCH (SOUTH).

See Methodist Churches of the World.

METHODIST CHURCH UNION. The

Methodist Episcopal Church was divided in 1844 by the subject of slavery. This led to the formation of the Methodist Episcopal Church, South. Beginning with a conference at Cape May, in 1876, several attempts have been made looking toward union. The General Conference of. the Methodist Episcopal Church, South, ap¬ pointed a commission in 1914. The next Gen¬ eral Conference of the Methodist Episcopal Church which met at Saratoga, N. Y., in 1916, also appointed a commission. The commis¬ sions have held several meetings together but have not yet arrived at conclusions. The bond between the two denominations is very close. They have already united in some of their mis¬ sion work, especially in education and publica¬ tion. Many leaders of the Methodist Protest¬ ant Church look forward to the time when their body will also be included in the union. The combined membership would be in excess of 6,000,000. In the meantime the three largest groups of Colored Methodists including the African Methodist Episcopal Church, the Afri¬ can Methodist Episcopal Zion Church and the Colored Methodist Episcopal Church, have taken the preliminary steps looking toward union in 1924. They hope that the negro mem¬ bers of the Methodist Episcopal Church will unite with them. The total combined member¬ ship of the four groups would be more than

3,000,000.

METHODIST CHURCHES OF THE WORLD. A group of 25 organized bodies which represent an evangelical type of the Christian religion, and which, rising under the Wesleys in England, in the 18th century, has been spread to all countries and has become one of the great Christian Communions.

History of English Methodism. — The rise of Methodism was on this wise. John and Charles Wesley, clergymen of the Church of England,

as their father was before them, formed, 1729, at Oxford University, with oth¬ ers, a club for the promotion of personal reli¬ gion. Being very earnest young men, they pro¬ ceeded to draw a series of rules of conduct, which were somewhat strict for the times, and observed so carefully that they were called in derision, <(Methodists,® and their little company was termed the <(Holy Club.® They prayed much, read devotional books and visited the sick and unfortunate. The age was one of lax¬ ness in religious observance and of indulgence in gambling, drinking and other vices and im¬ moralities, which invaded church circles. This tended to deepen the earnestness and enthu¬ siasm of the young reformers and a revival was the natural outcome, the sweep and influ¬ ence of which no one of them could have im¬ agined. Three men of remarkable power were at the head of the movement, John Wesley (born in 1703), preacher, leader, organizer, au¬ thor, indefatigable worker: Charles Wesley

(born in 1707), pupit orator, unequaled hymn writer; George Whitefield (born in 1714), evangelist, whose fiery zeal and persuasive elo¬ quence won tens of thousands on both sides of the ocean. All of them great preachers, John was pre-eminently the organizer. His reli¬ gious experience passed through several stages, the last of which was in 1738, when at a Mo¬ ravian meeting in London, he ((felt his heart strangely warmed.® The next year he began to organize converts into societies, which was the actual epoch of Methodism. Opposi¬ tion in the Church of England, which closed its churches to him, compelled him to resort to open-air preaching which multiplied his hear¬ ers and made the movement a people's move¬ ment. The preaching was clear, direct, simple, setting forth the doctrine of a free, full, pres¬ ent salvation from sin by faith, and presenting religion of the heart rather than of the head. The Wesleys never severed their relation with the Church of England, nor abandoned its doc¬ trinal and ecclesiastical systems. Methodism in England was a movement within the Church, to which the societies looked for the sacraments until after the death of the founder.

The Methodist system was a gradual de¬ velopment out of the conditions which forced Wesley to take steps contrary to his High Church ideas. Consecrated places being shut to Methodist meetings, he had to build chapels and hold services in schools, private houses and barns, and in the open air ; ministers being too few to do the preaching, he called to his aid laymen ; societies increased so rapidly that it was necessary to plan for their care, hence the annual conference; changes in appointments be¬ ing necessary, the itinerancy was developed to regulate them. Other distinctive features of Methodism, the class meeting for testimony and prayer; bookrooms for the publishing and sale of a growing body of denominational literature, and the conference study for the training of preachers not college bred, were likewise in answer to the demand of a rapidly expanding propaganda.

British Methodism did not, after the death of John Wesley, escape the fate of division. Indeed, radical doctrinal differences developed between him and Whitefield, and a separation took place, the latter being a pronounced Cal¬ vinist and the former a strong Arminian. One cause or another brought a number of separa¬ tions, with 9 or 10 different branches. By the process of union several of these have

disap¬ peared and there are now five distinct bodies, not including the Welsh Calvinistic Methodist Church which affiliates with the Presbyterian churches.

1. Wesleyan Methodist Church. — John Wesley dominated in absolute fashion the or¬ ganization he had created, until the success of the American Revolution compelled recognition of the independence of the societies in the United States and in England, as long as he lived. He held both property and patronage; but in anticipation of his death (1791), he pre¬ pared a ((Deed of Declaration® which consti¬ tuted 100 preachers, selected by himself, a Legal Conference to hold the Church property and provide for the annual appointment of the preachers. _ Thus was distributed the large powers which he had held in his own hands

and which he was apparently unwilling to en¬ trust to any individual as his successor.

The first Wesleyan Methodist Conference was held in 1744, when Wesley counseled with his preachers and a few clergymen who favored his work, and rules were adopted for the bene¬ fit of the societies and the preachers. Later on, separate conferences were held in Ireland, which Wesley had first visited in 1747, and in America, in 1773, whither two preachers had been sent in 1769. In 1770 there were upward of 29,000 members and probationers in the Brit¬ ish societies, and at the time of Wesley's death, 71,568. This success had not been obtained without a great deal of hard labor, in which Wesley himself was the chief, continually trav¬ eling, preaching at all hours of the day and night, and enduring besides the natural dis¬ comforts of his journeys and exposures, oblo¬ quy, abuse and even mob and individual vio¬ lence.

After his death the Conference was at odds on the question of the administration of the sac¬ raments. At its session in '1792, it prohibited them, removing the prohibition in 1793 and sub¬ sequently providing for them, and later still for the ordination of ministers. In the 19th cen¬ tury, Home and Foreign Missionary societies were formed and other denominational enter¬ prises instituted. There are two colleges, Wes¬ ley, at Sheffield, and Queen's, at Taunton, and a theological college in four places. Lay mem¬ bers were admitted to the Conference in 1878. Beside the annual Conference in England there are conferences in Ireland, France and South Africa. The Church has in Great Britain (1917) nearly 492,000

members and probation¬ ers, and in other conferences and its foreign missions, 361,398; in all, 853,398. Methodism is intensely missionary in its spirit, by which it has been carried to the ends of the earth. Wes¬ ley's first missionaries were sent to the Amer¬ ican colonies and next to the West Indies, 1786. Missions in Africa and Ceylon were begun in 1811 and 1813, respectively. Now the missions of the Methodist bodies of Great Britain, Ire¬ land and Australasia are in all the continents, some of the earlier and most notable successes being in Fiji and other South Sea islands, from which savagery was banished long ago. The various Methodist bodies reported to the Ecu¬ menical Methodist Conference in 1911 an ag¬ gregate of $2,540,000 in income for foreign missions which are in the countries of Europe, Asia, Africa, South America and the West Indies.

2. .Primitive Methodist Church. — The rise of this body in 1810 was due to the condemna¬ tion by the Wesleyan Conference of camp meetings which Lorenzo Dow, an American preacher, had introduced in England, and to the exclusion of Hugh Bourne and other ministers for promoting them. The Primitive Church is the largest of the branches which have sepa¬ rated from the original body, having (1917) 205,217 members. It gives a large place to lay¬ men in its government. Hartley College, Man¬ chester, belongs to it.

3. United Methodist Church. — The result of a union of the Methodist New Connection, formed in 1796 by Alexander Kilham, who was excluded from the Conference for determined opposition to what he called the despotism of

the Conference; the Bible Christians, formed in 1810 by William O'Bryan (who had been ex¬ cluded as a layman) to give more power and opportunity to laymen ; and the United Method¬ ist Free Churches, which was itself an organ¬ ization into which had been merged (1857) sev¬ eral bodies known as ((Protestant Methodists,® <(Wesleyan Methodist Association,® ((Wesley an Reformers® and others, all arising out of dis¬ ciplinary processes by the original body. The Church resulting from the union of 1907 num¬ bered, in 1917, 182,624 members.

4. Wesleyan Reform Union. — A small body of 8,770 members, continuing the organ¬ ization which refused to enter the union of

1857.

5. Independent Methodist Churches. —

There are 146 of these churches, which are con¬ gregational, or independent, with 391 ministers and 9,298 members.

These four bodies have in all 405,949 mem¬ bers. Adding the 853,398 Wesleyan Methodists gives a grand total of 1,259,307 members for the British group, with 6,263 ministers and 16,955 churches. The British group, together with the Australasian, constitutes the Eastern Section of the Ecumenical Methodist Conference, the Western Section consisting of the American churches and the Methodist Church of Japan, which was organized of mission churches of the Methodist Episcopal Church, the Methodist Church of Canada and the Methodist Episcopal Church, South. The Conference meets decen¬ nially and is represented in the intervals by an Ecumenical Commission.

Methodism in Australasia. — British Meth¬ odism was early planted in the Australasian colonies, the first church in that continent hav¬ ing been formed in 1816. Most of the British branches came in process of time to be repre¬ sented there, but a union movement which be¬

gan in 1896 in New Zealand and spread to Aus¬ tralia resulted in a merging of all branches in 1902, save the Primitive Methodists of New Zealand, who maintained a separate existence. There are two bodies :

1. Australian Methodist Church, a body of 149,878 members, with 985 itinerant ministers (1917). It has a General Conference, and prosecutes vigorously missions among the na¬ tives and the pagan South Sea Islanders and in India. It is also active in education.

2. New Zealand Methodist Church. — This body has 24,730 members, with 198 ministers. It manifests missionary zeal and promotes edu¬ cation.

Methodism in America.— The largest group of Methodist churches is that of the United States, consisting of 16 bodies, to which must be added two bodies for Canada and one for Japan, all constituting the Western Section of the Ecumenical Methodist Conference — 19 bodies in all, with 8,622,395 members.

1. Methodist Episcopal Church— Immigrants from Ireland and England brought Methodism to the American colonies. The first to land, so far as known, was a company of German Pala¬ tines, who had settled in Ireland, and who came thence to America to engage in linen-weaving. The head of the group was Philip Embury, a local preacher, and their class-leader. They arrived at New York in August 1760, probably held meetings occasionally, but formed no so¬ ciety, so far as the record shows, until 1766

when Embury began to preach regularly and formed what was known as the (<first Methodist society in America.® Two years later the ((first Methodist church in America® was built and opened. The third building occupies the origi¬ nal site, and John Street Methodist Church, New York City, is the oldest Methodist society in America. ((About the same time,® as the historical statement of the Methodist Discipline has it, Robert Strawbridge, a local preacher from Ireland began to preach and form societies at Sams Creek and vicinity, in Frederick County, Md. A log chapel was built soon after. Some claim that the Maryland beginning was prior to that of New York. The matter is in contro¬ versy. In response to urgent letters from New York, Wesley sent over (1769) two preachers, Pilmoor and Boardman, to help the <(brethren in America.® These were followed by others, including a young Methodist preacher from England, Francis Asbury, who arrived in Phila¬ delphia in 1771. All the other men sent by

Wesley returned to England before, or at, the outbreak of the Revolutionary War; but Asbury threw in his lot with the Americans and re¬ mained to spread Methodism from Georgia to Canada and to the regions beyond the Alle¬ ghenies. He organized societies, compiled a book of discipline for their regulation, and ad¬ ministered it with fidelity and firmness. The founder of American Methodism had qualities as a leader and organizer as great, in some re¬ spects, as those of Wesley himself, to whom he yielded nothing in zeal, devotion and capacity for work. No man of his time knew the cities, towns and frontier settlements better than Asbury, who held a firm grip of preachers and societies through the formative period, from the time of his arrival in 1771 to the day of his death, 21 March 1816. When he came, 316 Methodists were reported for the American continent ; when he died, the number had reached 214,235, surpassing by several thousand the strength of the mother Church in England.

New York, Philadelphia and Baltimore were the early centres of the new denomination ; but the greater work was done in the country districts, which, covered with a system of circuits, brought groups of small societies under the care of preachers and multiplied the power of the humble itinerant. The first annual conference was held in Philadelphia in 1773, with 10 preachers, all Europeans, all of the lay order, present. It acknowledged the authority of Wesley and his conference, accepted the doctrine and discipline of British Methodism, forbidding, in loyalty to Wesley, the adminis¬ tration of the sacraments, for which Methodists must look to the Episcopal churches. Oppor¬ tunities for this were few, and Asbury's iron hand could not always enforce obedience to this rule. Unordained preachers, selected from among converts who had ((gifts and graces,® served the societies for the next 10 years, there being none others, and none with power to ordain. After the new nation was recognized, the Church was organized. At a general con¬ ference of the preachers in Baltimore late in December 1784, a letter was presented from Wesley saying that as the colonies were now independent, both in civil and ecclesiastical mat¬ ters, he deemed it necessary that the Methodist societies, long deprived of the ordinances, should have them and should have their own

form of government. Having failed to secure ordination for any one from the bishop of London and having for some years been con¬ vinced that presbyters and bishops are of the same order, and therefore have the same right to ordain, he had appointed Thomas Coke and Francis Asbury to be joint superintendents in North America. Upon Coke, already a pres¬ byter of the Church of England, he had laid hands in a ceremony of ordination or consecra¬ tion. The General Conference proceeded to organize the Methodist Episcopal Church, with doctrinal standards, including 25 articles of religion, adopted from the 39 articles of the Church of England, and a discipline. It elected Coke and Asbury as superintendents, or bishops, defining their powers and duties, and Coke or¬ dained Asbury deacon, elder and bishop. This action of the Conference had the effect of set¬ tling the controversies which had distracted the societies over the administration of the sacra¬ ments, and it provided for ordained men, at a time when such were few and far between, even in the older denominations.

From this time on the Church grew in num¬ bers, annual conferences were created, the itiner¬ ancy firmly established, a publishing house set up for denominational literature, schools opened, provision made for training ministers in a course of conference study, and the insti¬ tutions of an aggressive denomination, includ¬ ing a Church press, home and foreign missions, Church extension, a fund for superannuated ministers, etc., gradually developed.

The peculiar features of the Methodism of Wesley were also those of the Methodism of Asbury: itinerant preachers, whose appoint¬ ments were changed every year or oftener, then every two years ; local preachers from whose ranks the itinerants were recruited; class-lead¬ ers for 12 or more members, for prayer, testi¬ mony and advice; probation for six months for new converts ; Gospel preaching of a fervent type designed to convict of sin and bring re¬ pentance and faith in God for salvation and sanctification; a ministry of two orders, deacon and elder, and circuits connecting several socie¬ ties under one preacher. American Methodism differed from English Methodism in its confer¬ ence system — quarterly, for the societies, held by the presiding elder; district, for all the societies under the care of the presiding elder; annual, for the itinerants, and general, for legis¬ lation and administration and judicial decision; bishops for the whole

church, not diocesan, but itinerant. The General Conference, character¬ istic of all branches, meets once in four years. Lay delegates were admitted in 1872. They equal in number the ministerial delegates.

Its missionary enterprise has been wide¬ spread and extensive. It had from 1819 to 1905 one society for home and foreign missions. Since the latter date, it has had a Board of Foreign and a Board of Home missions and Church Extension. The home operations in¬ clude all classes of population, English and foreign-speaking, also Indian and Negro. For this work the expenditure in 1917, including the Woman's Home Society, was more than $2,- 400,000. The Foreign Board, together with the Woman's Foreign Society, expended in 1917 $3,716,000. The foreign work, is in Europe — Russia, Finland, Scandinavia, Germany (two

annual conferences), Austria-Hungary, Bul¬ garia, Switzerland, France and Italy — aggre¬ gating 74,4-88 communicants; in Mexico and South America, 18,422 communicants; in India, Burma, Malaysia and the Philippines, 279,646 communicants; in Japan, China and Korea, 82,424; and in Africa, 20,332.

The grand total of Foreign mission communi¬ cants is 475,212. The growth of the Church in the United States was almost without parallel. At Asbury's death in 1816 it had 214,235 members; at the end of 1916, 100 years later, it had had, including missions on all continents, save Aus¬ tralia, 4,128,064, notwithstanding losses by re¬ peated division, with 20,503 itinerant ministers, 15,239 local preachers and 30,738 chuyhes, with 4,579,029 in its Sunday schools, and 596,629 in its Epworth Leagues, not including junior mem¬ bers. The estimated value of its church and parsonage property was upward of $250,000,000. Its universities, colleges, seminaries, academies, etc., are numerous, strong, well-endowed and prosperous. Its hospitals, homes for aged and children have come into existence in the last half-century, and are found throughout its boundaries. It is a polyglot Church, having services in German, French, Bohemian, Italian, Spanish, Portuguese, Greek, Swedish, Nor¬ wegian, Danish and other European tongues and also in various Indian dialects.

Division has disturbed the Methodist Episco¬ pal Church almost from the first; O'Kelly led out a small company of dissidents in 1793; several organizations were formed before 1820 by withdrawing colored members ; a large num¬ ber were alienated in 1830 as the

result of controversy over what was characterized as autocratic rule ; later the slavery question be¬ came a dividing factor, resulting in a separa¬ tion in 1841-43, and in 1844-45 in the largest division of all, taking away nearly half of the members reported at that time. Some of the divisions have disappeared, but of those remain¬ ing all but one, the Primitive, grew out of differences in government, administration and discipline.

2. Methodist Episcopal Church, South. — The existence of slavery in the South after it had ceased in the rest of the States, the struggle to expand it to the border States, and the enforce¬ ment of the Fugitive Slave Law sharply accen¬ tuated and divided American opinion, and in¬ evitably drew the Churches into the contro¬ versy. Anti-slavery sentiment became vigorous and outspoken in the North and roused strenu¬ ous opposition in the South. The Methodist Church tried to repress abolition agitation in its ranks, on the one side, and to avoid complicity with the institution, on the other. When Bishop Andrew became a slave holder, through inherit¬ ance by his wife, the opposing opinions forced a solution upon the General Conference of 1844. The sentiment of the Northern delegates supported a resolution advising Bishop Andrew to <(desist from the exercise of office® so long as he continued to hold slaves. The other bishops united in suggesting that the matter be postponed to the conference of 1848, and that, meantime, the work of the bishops be so ar¬ ranged that Bishop Andrew be given oversight in that section of the country where his services would not meet with objection. But this and other compromises were put aside, under the

fear that otherwise the Church would be broken up in portions in the North, and the resolution was adopted by a vote of 110 to 68. The next day the General Conference refused to say that the action was simply advisory. Thereupon Southern delegates, who had refused to allow Bishop Andrew to resign, entered a protest, and a special committee was appointed to see what could be done. This committee re¬ ported a plan of separation which was adopted by a large majority. In the event of the forma¬ tion of a separate body in the South, the plan provided for an equitable division of the book concern accounts, stock, funds, etc., if the annual conferences should agree to the neces¬ sary change in the constitution; those in the South did so agree, but the Northern confer¬ ences refused. The General Conference of 1848 declared the ˆplan® null and void ; but meantime the Southern conferences had organ¬ ized the Methodist Episcopal Church, South.

The new body had in 1846 upward of 455,000 members, including 125,000 negroes. It suffered much in common with other churches in the South during the Civil War, which was fought on territory occupied by it, its losses in mem¬ bers, white, being 112,000 in the period 1860~~66; but by 1869 these had more than been made good. Small separations (see Congregational Methodists infra) have occurred since, but growth has been continuous and large, reaching 100 per cent in the 30 years ending with 1917, when there were 2,172,628 members, 7,530 itiner¬ ant ministers, 1,745,233 scholars in Sunday school, 131,129 members of the Epworth League, 17,376 churches, valued at $63,824,000. It has prosperous home and foreign missions, a full equipment of educational institutions and benevolent organizations. Since Vanderbilt University ceased to be accepted as an institu¬ tion of the Church, two universities have been established, Emory, at Atlanta and Southwest¬ ern, at Dallas, Texas. There are also numer¬ ous colleges and other institutions for both sexes. The Methodist Episcopal Church, South, expended in 1917 a total of $1,336,000 on its home and foreign missions which are under one administration. Its foreign missions are in Mexico, Cuba, South America, China, Japan, Korea and Africa.

In doctrine, discipline and government the Church, South, does not differ, except in a few particulars, from the body from which it sepa¬ rated. It gives its bishops a qualified veto over legislation they may deem unconstitutional, there is a limited lay representation in the annual conference, and probation for membership is not required. Appointments of ministers to the same charges is subject to limitation to a term of years, a restriction which the Northern body removed in 1896. A joint commission of 25 from each Church is endeavoring to agree (1918) upon a plan for a reunion of the two Churches, which promises ultimate success. The feeling in the Southern General Confer¬ ence (Atlanta Ga., May 1918) resulted in a nearly unanimous vote to continue the commis¬ sion, but there was nothing in the action to remove the deadlock on the race question be¬ tween the two Churches. The reunited Church would have nearly five and a half million mem¬ bers, with more than 28,000 ministers and 48,000 churches. The plan also provides for a merging of colored bodies in a sectional con¬

ference, with representation in the General Con¬ ference, which is to unite all the sectional or regional conferences.

3. Methodist Protestant Church. — This body was created by a general convention held in No¬ vember 1830, in Baltimore, of Methodist re¬ formers, most of whom had been expelled or had withdrawn from the Methodist Episcopal Church. They had advocated reduction of the power of bishops ; the election of presiding elders, instead of appointment by the bishops ; the admission of laymen to all conferences, and various other reforms. They had distinguished leaders, including Nicholas Snethen and Asa Shinn. The new body began its existence with 83 ministers and about 5,000 members, and grew for a time quite rapidly. It admitted laymen to the general and annual conferences, and sub¬ stituted presidents, elected annually, for bishops, and arranged for the appointment of pastors by a stationing committee. The anti-slavery agita¬ tion resulted in a division of this Church (1858) and the creation by the Northern con¬ ferences of the Methodist Church. After the close of the war the two Churches were re¬ united under the original title, which the South¬ ern branch had retained. At the reunion in 1877 there were 116,542 members. The gains in the last 25 years have not been very large. There were in 1915 about 200,000 members, with 1,410 itinerant ministers, including women, and 2,400 churches. There are publishing houses at Baltimore and Pittsburgh, missionary and other denominational societies and educa¬ tional institutions. Its foreign missions are in

Japan, India and China, on which upward of $59,000 was expended in 1917.

4. W esleyan Methodist Church. — Methodist ministers and members, mostly in the State of New York, who demanded the abolition of slavery and were opposed to secret societies, organized this body in 1843. It refused to ad¬ mit to membership persons connected with slavery or secret societies, and rejected the episcopacy. Within two years after its organi¬ zation it had 15,000 members; but has grown little since, having in 1916 about 20,000, with 600 ministers and about as many churches. It has a publishing house at Syracuse, N. Y.

5. Free Methodist Church. — This body was organized in 1860 by a convention of ministers and laymen, some of whom had been expelled from the Genesee conference of the Methodist Episcopal Church as the result of agitation on subjects of doctrine and practice. Free Metho¬ dists insist on non-conformity to the world, plain and simple living, oppose costly churches and emphasize the doctrine of sanctification. They have bishops, elected every four years. Their publishing house is in Chicago. The Church had in 1917 nearly 35,000 members, with 1,250 itinerant ministers and 1,175 churches. It has missions, home and foreign, and educational institutions. It raises nearly $125,000 a year for its foreign missions in China, India, Japan, Africa, the West Indies and Panama.

6. Primitive Methodist Church, the result of immigration from England and Canada, and not of any division on this side of the sea. It has two annual conferences and 8,600 members.

7. Congregational Methodist Church, the out¬ come (1872) of withdrawals from the Metho¬ dist Episcopal Church, South, on account of ob-

jections to its system of government. A small body known as the New Congregational Methodist Church separated in 1881 from the original body. There was also a colored Con¬ gregational body, which has disappeared. The two which remain have together about 18,000 members, mostly in the South. Independent Methodist churches have dwindled to the point of extinction.

Colored Methodist Churches. — Methodism with its fervent appeals and experiences attracted negroes from the first, both North and South. <(Black Harry® accompanied Bishop Asbury on some of his journeys, and often spoke with moving power to his own people. Asbury's attitude toward slavery was one of opposition, and he had little or no caste prejudice. Ac¬ cordingly many negroes became members of the Methodist Episcopal Church, particularly in the cities of New York, Philadelphia and Baltimore. The service of white ministers was not always obtainable or satisfactory, and as early as 1787 some colored people in Philadel¬ phia withdrew and Bishop White, Protestant Episcopal, ordained one of their number to serve them. Bishop Asbury likewise ordained, 1799, Richard Allen, a slave, who had bought his freedom. Including 341,000 colored mem¬ bers in the Methodist Episcopal Church in 1917, and the various distinct colored branches, there are in all about 1,800,000 negro Metho¬ dists. (The United States census of 1916 con¬ siderably reduces this number, but the Churches say the government figures are too low).

8. African Methodist Episcopal Church, organized in Philadelphia, 1816, with Richard Allen, ex-slave, as its first bishop. In doc¬ trines, discipline and government it does not differ materially from the Methodist Episcopal Church, from which it sprang. It has been very prosperous, and under the leadership of Bishop Daniel A. Payne, who graduated from the Reformed Theological Seminary of Gettys¬ burg, it has taken great interest in education. It has four universities, including Wilberforce University, in Ohio. It began foreign missions early in its history in Africa, the West Indies and elsewhere. It has 16 bishops, 5,000 min¬ isters, 6,000 churches and 620,000 members. United States census figures for 1916 are

552,265.

9. African Methodist Episcopal Zion Church, organized in New York City as a society for separate worship in 1796, formally as a denom¬ ination in 1820. It was the result of a desire of colored members to conduct their own wor¬ ship. They built a church called Zion and occupied it in 1800. For some years white ministers served it as pastors. Then they secured colored ministers. James Varick was their first bishop. Since 1880 their bishops have been elected for life instead of for four years. It has nine bishops and a full list of denominational boards for its missions and benevolences, and several colleges. It carries on foreign missions in Africa, the West Indies and Guiana. Its publishing house is in Char¬ lotte, N. C. The number of its members, 1915, was 569,000, with upward of 3,500 itinerant ministers and 3,200 churches. The United States census of 1916 cuts down the member¬ ship to less than 259,000.

10. Colored Methodist Episcopal Church, organized in 1870, under the auspices of the

Methodist Episcopal Church, South, of minis¬ ters and members connected with the latter body, which reported nearly 208,000 colored members in 1860. Seven years later it had only 54,000, the rest having gone into the various colored churches or into the Methodist Epis¬ copal Church, which created the Freedman's Aid Society after the war. The Colored Methodist Episcopal Church has grown rapidly, reporting in 1900 about 205,000 members. In 1917 it had 251,560 members, with 3,400 itiner¬ ant ministers and 3,285 churches. It has col¬ leges and benevolent societies, eight bishops and a publishing house at Jackson, Tenn.

There are minor colored bodies : (a) Union

American Methodist Episcopal Church, begin¬ ning in Wilmington, Del., in 1813; (b) African Union Methodist Protestant, dating from 1816; (c) Zion Union Apostolic, organized in 1869; Reformed Methodist Union Episcopal Church, with a few members. These bodies have to¬ gether some 35,000 members.

Methodist Church of Canada. — Methodism reached Canada both from the British Isles and the United States. The first preacher to hold services there was Laurence Coghlan, one of Wesley's preachers, who began work in New¬ foundland in 1765. Methodists from John Street Church, New York, arrived in 1783, and Dr. Coke ordained in Baltimore, Md., two men for Nova Scotia. In 1791 the New York con¬

ference sent preachers to Nova Scotia and New Brunswick. Bishop Asbury himself vis¬ ited Canada in 1811. Out of these beginnings came several branches in Canada, the Metho¬ dist Episcopal, the British Wesleyan, the Primi¬ tive, the Bible Christian and others. The first named became an independent body in 1828 and united, excepting a remnant, with the Wes¬ leyan Church in 1833. In 1874 the Methodist Church of Canada was formed by a union of several bodies, which was made complete in 1883 by the merging with it of other bodies. With the exception of a small colored organi¬ zation and of a few churches belonging to Methodist Churches of the United States, the Methodist Church of Canada is the one Metho¬ dist body north of the border. It has an itinerant general superintendent, a quadrennial general conference, numerous annual confer¬ ences, strong educational institutions, home and foreign missions, and a publishing house in Toronto. In 1917. it had 383,103 members, 2,809 itinerant ministers and 3,782 churches. Negotiations have long been pending for a union of this Church with the Presbyterian and Congregational churches. It has been ap¬ proved by the respective Churches, but has been postponed until the end of the war. The Methodist Church of Canada conducts its mis¬ sionary operations through one society, assisted by the Woman's organization. Its foreign missions are in Japan and China, on which it expended in 1917 $850,000.

1. British Methodist Episcopal Church, a small body of colored members in Canada, with one bishop, one annual conference and 700 members.

2. Methodist Church of Japan, an inde¬ pendent Church organized in 1907 of ministers and members of the missions of the Methodist Church of Canada and of the two Methodist Episcopal Churches of the United States. It has a bishop, several annual conferences, 249

ministers, 297 churches and 19,570 members, all Japanese.

Bibliography.— General History: (A

New History of Methodism, ' by several writers (2 vols., London 1909) ; Buckley, J. M., Con¬ stitutional and Parliamentary History of the Methodist Episcopal Church' (New York 1912) ; Crookshank, C. H., (History of Methodism in Ireland) (3 vols., Belfast 1888) ; Faulkner, J. A., (The Methodists in America) (New York 1903; 3d ed., ib. 1913) ; Hurst (ed.) et alii, (History of Methodism' (7 vols., New York 1905) ; McTyeire, H. N., (History of Metho¬ dism' (Nashville 1886) ; Petty, J., (History of Primitive Methodist Connection (new ed., London 1880) ; Sanderson, J. E., (First Century of Methodism in Canada) (Toronto 1908 —) ; Smith, G., (History of Wesleyan Methodism' (3 vols., London 1865) ; Stevens, A., (History of the Religious Movement Called Methodism' (3 vols., New York 1861) ; Sweet, (The Metho¬ dist Episcopal Church and the Civil War' (Cincinnati 1912) ; Tigert, J. J., < Constitutional History of American Episcopal Methodism' (2d ed., Nashville 1904). American Metho¬ dism : Atkinson, John, (Centennial History of American Methodism' (New York 1884) ; id., beginnings of the Wesleyan Movement in America) (ib. 1896) ; Bangs, N., (History of the Methodist Episcopal Church) (4 vols., New York 1860) ; Basset, A. H., (History of the Meth¬ odist Protestant Church' (Pittsburgh 1878) ; 3d ed., 1887) ; Buckley, J. M., (History of Methodism in the United States' (2 vols., New York 1898) ; Drinkhouse, (History of Metho¬ dist Reform' (Baltimore 1900). Doctrinal, etc: — Banks, (Elements of Theology' (London 1887) ; Barclay, W. F. (ed.), Constitution of the Methodist Episcopal Churches in America' (Nashville 1902) ; Burwash, Systematic The¬ ology' (London 1901) ; Curtis, O. A., (The Christian Faith' (New York 1905) ; Gregory, B., (Handbook of Wesleyan Methodist Polity and History' (London 1888) ; Grist, W. A„ (The Historic Christ in the Faith of To-day' (ib. 1911) ; Lidgett, J. S., (The Fatherhood of God' (Edinburgh 1902) ; id., Spiritual Prin¬ ciple of Atonement' (London 1907) ; Lofthouse, W. F., (Ethics and Atonement' (ib. 1906) ; Miley, John, Systematic Theology' (2 vols., New York 1893); Peake, A. S., (The Bible: Its Origin, Significance and Truth' (London 1914) ; Riggs, J. H., Comparative View of Church Organizations' (3d ed., ib. 1900) ; Shel¬ don, Christian Theology' (Boston 1901); Ti¬ gert, J. J. (ed), (Doctrines of the Methodist Episcopal Church in America' (Cincinnati 1902) ; Williams, H. W., Constitution and Polity of Wesleyan Methodism' (London 1882). Missions, Periodicals, etc: — Che Cambridge Modern History' (Vol. VI, New York 1906) ; Crooks, (Life of Dr. McClintock' (New York 1876); id., /Life of Bishop Simp¬ son' (ib. 1890) ; Cummings, (Early Schools of Methodism' (ib. 1886) ; Green, (Mission of Methodism' (London 1890); Neely, T. B., evo¬ lution of Episcopacy and Organic Methodism' New York 1888) ; id., Coverning Conference of Methodism' (ib. 1892) ; North, (Early Methodist Philanthropy' (ib.

1915). The Arminian Magazine (1818-53), changed to London Quarterly Review (1853-58), the Methodist Re¬ view (1858), the Wesleyan Methodist Maga¬

zine (London 1885-). In America, the Chris¬ tian Advocate (New York 1826 et seq.).

H. K. Carroll,

Author of (Religious Forces in the United States ,' *etc.*

METHODIST EPISCOPAL CHURCH, Board of Education of, a body organized by a committee of the General Conference of 1864 to consider the disposition of moneys raised as educational funds.

METHODIST EPISCOPAL CHURCH, The. See Methodist Churches of the World.

METHODIST EPISCOPAL CHURCH SOUTH. See Methodist Churches of the World.

METHODIST NEW CONNECTION.

See New Connection Methodists.

METHODIUS, me-tho'di-us. See Cyril-lus and Methodius.

METHUEN, me-thuen, Paul Sanford,

Baron, English general : b. Corsham Court, Wiltshire, 1 Sept. 1845. He is descended from Sir Paul Methuen who effected the treaty, named after him, between England and Portu¬ gal in 1703. He studied at Eton; entered the Scots Guards in 1864; saw special service on the Gold^ Coast in 1873 ; received a medal for bravery in the Ashanti campaign in 1874; be¬ came attache in Berlin (1877), assistant quar¬ termaster-general Home District (1881) and quartermaster-general in Egyptian War (1882) ; won a C. M. G. in Bechuanaland (1885) ; was in command of the Home District from 1892 to 1897; and commanded one of Buffer's divi¬ sions in the unsuccessful attempt at the be¬ ginning of the South African War to relieve Kimberley. At Magersfontein he was terribly beaten. With Lord Roberts he marched on Pretoria in May 1901. In March 1902 he was captured between Vryburgand Lichtenburg, but immediately released. His iff success in South Africa was attributed to the difficult circum¬ stances, and he

was placed over the Eastern Command after the Boer War. In 1907 he was commander-in-chief in South Africa and in 1909 governor of Natal. He received the Grand Cross VO. in 1910 and was created field-marshal in 1911.

METHUEN, Mass., town, in Essex County, on the Spicket River and on the Bos¬ ton and Maine Railroad, about two miles north of Lawrence. It was settled in 1641 but was a part of Haverhill until 1725 when it became the town of Methuen. The government is ad¬ ministered, as in the early days, by town meet¬ ings. It has a number of manufacturing estab¬ lishments, chief of which are cotton and woolen factories, bell foundry, organ factory, knitting miffs, hat factory, worsted goods and varn fac¬ tories and basket factories. It has good schools and the Nevins Memorial Library. Pop. (1920)

15,189.

METHUEN TREATY, a commercial treaty between Great Britain and Portugal, signed in 1703 and annulled in 1835, having to do with the tariff on wines and wool. It was negotiated by Sir Paul Methuen, the British Ambassador to Portugal.

METHUSELAH, me-thu'se-la (((a man with a dart?"), Hebrew patriarch. The name appears in old manuscripts also as Mathusala

and Mathusale. It has been variously trans¬ lated as wMan of God,® ((Man of the Javelin,® (<Man of Sin,® ((Man of Selah.® Because Selah was a title of the god Sin, these other deriva¬ tions are possible. He is remarkable as the oldest man mentioned in the Bible, his age being stated in Genesis v, 27 as 969 years. Ac¬ cording to Hebrew chronology and to that of the Samaritan version (which, however, re¬ duces his age to 720 years), he died in the year of the Flood; but the Septuagint calculation makes him die six years earlier. Few will be found who believe that a man ever attained such an age. The most

rational conclusion is that the original writer had in mind a period different from the year of 365 days. Consult Langdon, S., in Proceedings of Biblical Archaeology > (London 1914).

METHYL ALCOHOL. See Alcohol

and Methyl.

METHYL AND ITS DERIVATIVES,

in chemistry ; this name is given to the hypo¬ thetical radical CH3, assumed to exist in methylic alcohol and in very many other carbon compounds. Methyl forms the first of the series of alcohol radicals, the general formula of which is CnH2n + 1, and gives rise to an almost innumerable list of compounds. In the year 1848 Frankland and Kolbe, by the action of potassium on ethyl cyanide, obtained a gas the composition of which agreed with the for¬ mula C2H6; now such a body may be regarded either as (1) ethyl hydride C2H5.H, or (2) as two atoms of methyl linked together to form one molecule.

CH3

I

CH3

For a considerable time the new substance was supposed to be free methyl, that is —

CH3

I

CH3

and to be isomeric, but not identical with ethyl hydride C2H5.H.

According to the generally received views concerning atomicity (see Chemistry) such a body' as CH3 could not exist in the free state; it was therefore in keeping with chemical theory to believe that in the moment of its liberation the atoms of this substance should combine together in pairs to form the stable molecule —

CH3

I

CH3

A few years later Frankland succeeded in pre¬ paring the same body by the action of zinc on ethyl iodide, Zn + 2CHJ = Znl2 -f-2CH3. Frankland compared the action of chlorine on this supposed 2CH3 with the action of the same gas on the so-called ethyl hydride (G-Hs.H), and concluded that the two bodies were not identical. Schorlemmer has, however, studied this action of chlorine more carefully, and he finds that the resultant substances are the same in each case. The reactions which take place between equal volumes of chlorine and of the gas C2H6 may he thus formulated :

(1) C2H« + Cl2 = C2Hr>Cl + HC1.

(2) GHsCl + Cl2= C2H4C12 + HC1.

The first reaction is the principal one; small

quantities of the body C2H4C12 (dichloro-ethane) are, however, always formed. The identity of the two substances formerly known as free methyl and ethyl hydride has been thus proved, so that we now know of only one body having the formula C3H6; to this substance the name of ethane is given ; it forms the second hydrocarbon in the marsh-gas, or CnH2n+2 series. From these considerations it is evident that the radical methyl is known only in com¬ bination with other bodies. By the action of chlorine on certain methyl compounds the body CH3C1 is obtained, from which again the bodies CH2C12, CHC13 and CCh may be produced. The oxide of methyl (CH3)20, or methylic ether, is produced by the action of sulphuric acid upon wood spirit ; this ether may be taken as typical of a large series, in which one of the groups CH3 is replaced by another radical (either alcoholic or acid). The hydroxyl deriv¬ ative of methyl, or methylic alcohol, CHˆOH, is prepared in many ways. The most generally employed method consists in rectifying the product obtained by the dry distillation of wood (hence its common name — wood alcohol or wood naphtha) ; but in order to obtain per¬ fectly pure methyl alcohol it is necessary to prepare a methylic ether, generally methyl oxalic ether, decompose this by distillation with water, and dehydrate the alcohol so obtained ■by means of quicklime. Methylic alcohol is a colorless mobile liquid, having a specific gravity of .8142 at 32° F. ; its boiling point lies about 14-0° F. It mixes with water in all proportions

with the evolution of heat. It burns with a clear blue flame. It is a ready solvent for fats, resins, camphors and fatty oils. The presence of a certain amount of methylic alcohol in ordi¬ nary or ethylic alcohol does not interfere with the use of the latter substance in many chemical operations. Such a mixture is known in com¬ merce under the name of methylated spirit. Methylic alcohol yields by oxidation formic acid (CH202), thus CH4O + 02 = CH202 + H20.

Another important series of methyl deriva¬ tives consists of substances known as methylamines; these are strongly basic and are gen¬ erally regarded as ammonia in which one, two or three hydrogen atoms are replaced by one, two. or three atoms of the radicle C H3, thus giving rise to two other groups — the dimethylamines and the trimethylamines. Thus we know of the substances NHz.CfH FtH(CH3)2, and N(CH3)3. Further, as we know of such bodies as ammonium iodide and chloride, so we are acquainted with the corre¬ sponding methyl-ammonium salts N(CH3)4I, *etc.* Methylene is a colorless gas with a strong odor .resembling ammonia. It is highly inflam¬ mable, and burns with a yellow flame. The group CH3 may also be introduced into many of the natural alkaloids (see Strychnine), giv¬ ing rise to methyl derivatives of these bases. Another extensive series of derivatives are the methylenes, of large importance in the manu¬ facture of dyestuffs.

METHYLATED SPIRIT, alcohol or spirit of wine containing 10 per cent of wood naphtha, which contains a large proportion of methylic alcohol (see Methyl). It is much used in the arts as a solvent, for preserving specimens, in the manufacture of varnishes and for burning in spirit and other lamps.

METHYLENE, Bichloride of, an organic compound of great value as an anaesthetic. It is a colorless fluid having an odor like that of chloroform, and is pleasant to inhale.

METHYLENE BLUE, an aniline dye a bluish crystalline powder having a bronze-like lustre. It is used in medicine, and in malaria is given as a

substitute for quinine. See Dyf.s.

METIS, me'tis, in ancient mythology, the first wife of Jupiter, whom he was said to have devoured, after which Minerva (q.v.) was formed within his head.

METLAHKATLA, met-la-ka'tla, or MET-J AHKATLAH, the native name of the oldest and most successful mission among the Indians of British Columbia, founded in 1857, by Wil¬ liam Duncan, an English missionary, who de¬ veloped a model community from a tribe of the lowest cannibals. A government school was opened there in 1913. Consult Arctander, K. J., (Apostle of Alaska) (New York 1909).

METONIC CYCLE, a period of 19 solar years, after which the new and full moon fall on the same days of the year as they did 19 years before. This cycle was the discovery of Meton, a celebrated Athenian mathematician, 432 b c. The Metonic cycle contained 6,940 days, which exceeds the true length of 19 solar years by 9l/2 hours nearly. On the other hand, it exceeds the length of 235 lunations, or synodic revolutions of the moon, by 7ˆ2 hours only. In the ecclesiastical calendar the number of the year in the cycle is called the golden number (q.v.). The cycle is supposed to com¬ mence with the year in which the new moon falls on the 1st of January.

METRE, me'ter, the unit of length in France, =39.37079 English inches, roughly one yard 3 1/3 inches. The metre was intended to be the ten-millionth part of the quadrant of a meridian of the earth. The centimeter, the one-hundredth part of a metre or nearly 4/10ths of an inch, possesses more advantages in physics as a unit of length ; it is also found very convenient for many purposes for which the English yard is employed. See Metric System; Weights and Measures.

In music, the equalization of time in the division of a composition. The measure (q.v.) is the smallest element in metre; two measures make a section, two sections make a phrase and two phrases make a period. See Music.

In poetry, that measure of verse that deter¬ mines the rhythm. It is commonly divided into feet and lines; a series of feet is a colon. See Poetry.

METRIC SYSTEM, The. In the latter

half of the 17th century, the French astronomer, Jean Picard (1671), and the Dutch physicist, Christian Huyghens (1673), proposed as a standard unit of length that of a seconds pendu¬ lum at sea-level on

the 45th degree of latitude. This is only about six millimeters shorter than the meter now in use. Some years earlier, Sir Christopher Wren had advocated that a half-seconds' pendulum should be chosen as such a unit; this would have approximated one-half the length commonly given to the ancient cubit. In 1670 the French mathematician, Abbe Gabriel Mouton, had suggested as a length unit

one minute of the earth's circumference, what is now in use as a geographical mile, and he had divided and subdivided this decimally, giving a good Latin terminology for the various di¬ visions and multiples. However, more than a century was to elapse before, under the inspir¬ ing influence of the spirit of innovation bom of the French Revolution and its precursor, the American War of Independence, a new, scientific and logical system of weights and measures was created, one which has already replaced the old and illogical systems in a great part of the world and is probably destined to become, before many years shall have passed, the universal system. In view of the opposi¬ tion to any change in this direction still shown by many to-day in England and the United States, it is a strange coincidence that in the very year (1790) when the first steps leading to the establishment of the metric system were taken in France, a new system of weights and measures was offered by John Miller to the British House of Commons, and also by Thomas Jefferson, the Secretary of State, to the House of Representatives of the United States. Jeffer¬ son's report formulated a decimal division of the various units. A still closer approximation to the metric system was present in that pro¬ posed by the inventor, James Watt, who selected as the unit of mass a definite volume of water, and provided for a simple interrelation of the units of length, area, volume and mass ; he communicated this to Talleyrand.

As has been stated, it was in 1790 that the project for a new system of weights and meas¬ ures was taken up by the French National As¬ sembly. In March of that year, Talleyrand published a proposition to this effect, which he and Prieur des Vernois submitted to the As¬ sembly. That body after referring the project to the Committee on Agriculture for preliminary consideration took it up on 8 May 1790 and on 22 August, a decree, sanctioned by Louis XVI, provided for the establishment of a new system, invited other nations to participate in the pro¬ ject and entrusted to the Academie des Sciences the task of determining on the unit to be em¬ ployed as a standard. Some representatives from Spain, Italy, Denmark, the Netherlands and Switzerland took part in the discussion of the plan. The Academie des

Sciences, in ac¬ cord with the provisions of the decree, ap¬ pointed a committee composed of the scientists Borda, Lagrange, Lavoisier, Tillet and Con-dorcet, and on 27 Oct. 1790, this committee sub¬ mitted its report to the Assembly. To secure additional data, a second committee was ap¬ pointed, in which Laplace and Monge were sub¬ stituted for Lavoisier and Tillet. This second committee, in its report of 19 March 1791, recommended the adoption of the one ten-mil¬ lionth part of the quadrant of the terrestrial meridian as the standard unit of length. The Assembly accepted this suggestion, and on 26 March 1791 appointed five commissions, each charged with some department of the arduous task. It was decided to make, as an exact basis of calculation, a measurement of an arc of 10 degrees on the meridian of Paris. The com¬ position and attributions of the commissions were as follows:

1. Cassini, Mechain, Legendre; to measure the difference of latitude between Dunkirk and Barcelona, and to compute the triangles.

2. Monge and Meusnier ; to compute the bases.

3. Borda and Coulomb; for the observation of the pendulum.

4. Lavoisier and Hairy; for researches as to the weight of distilled water.

5. Tibet, Brisson and Vandermonde; for comparison of ancient measures.

On 1 Aug. 1793, the Convention passed a decree, on the proposition of Arbogast, to the effect that the use of the new system should be declared obligatory at the end of the year. In this decree the nomenclature of the system was determined. Unavoidable delays in the meas¬ urement of the arc necessitated some successive modifications, and it was rmt until the 11th Ventose, An III (1 March 1795) that an ap¬ proximately definite report was sent in, to be followed by the decree of 18th Germinal, An III (7 April 1795), which finally established the different parts of the metric system. Lavoisier and Haiiy were assisted by Le Fevre-Gireau and Fabbroni in determining the exact weight of a definite volume of water.

The decree of 7 April ordered the continua¬ tion of the operations for the exact determina¬ tion of the units, and to this end provided for 12 commissions to be named by the Committee of Public Instruction. The members chosen were: Berthollet, Borda, Brisson, Coulomb, Delambre, Haiiv, Lagrange, Laplace, Mechain, Monge, Prony and Vandermonde. On 16 July 1795, Borda and Brisson presented their report of the verification of the meter, but the meas¬ urement of the meridian arc, begun by Delambre and Mechain, 25 June 1792, could only be terminated in 1799. It is interesting to learn that, some years later, the work was continued in the Balearic Islands by Biot and Arago.

As a first step in the legislative enforcement of the system, a decree of 23 Sept. 1795 (1st Vendemiaire, An IV) had provided that its use should be obligatory in the commune of Paris, and. in the Constitution de l'An IV (1795-96)) its principle was formally recognized. On 16 Oct. 1798 (25th Vendemiaire, An VII), there assembled in Paris a body composed of the delegates of 10 independent nations, desig¬ nated to establish finally the fundamental units. The report, made in the following year by Van Swinden, of the Batavian Republic, gave the

conclusions arrived at, and determined the length of the meter as 443 296/1000 lines of the old “Toise de Perou,® the latter being approxi¬ mately equivalent to 6.3944 English feet. This report was adopted by the Convention 22 Tune 1799 (4th Messidor, An VII), and the proto¬ types in platinum of the meter and kilogram were presented by the Institute. They were immediately deposited in the Palais des Archives of Paris, copies being placed in the Conserva¬ toire des Arts et . Metiers, and in the Observa¬ tory of Paris, while iron meters were consigned to several foreign countries, including the United States.

It is well worthy of note, in view of the eventual absolute success of the metric system, lhat at first its progress was slow. For quite a time the people continued to cling to the old measures, and this led, under the First Empire lo the promulgation of a ministerial edict, dated 28 March 1812, authorizing the emplov-ment of “transitory measures®; among which

were the use of a toise (fathom) of 2 meters (the actual length of the old toise was 1.949 meters), of an aune (ell) of 1.20 meters, of a boisseau (bushel) of 12.5 liters, *etc.* It was not until the monarchy of Louis Philippe that absolutely final and decisive action was taken in the matter. The Marquis de Laplace pre¬ sented to the Chamber a report, upon which was based the law of 4 July 1837, according to the terms of which (<all weights and measures except those established by the laws of 18th Germinal, An III and of 19th Frimaire, An VIII (7 April 1795 and 10 Dec. 1799)® should be prohibited after 1 Jan. 1840. Belgium, Hol¬ land and Greece were the first countries to adopt the metric system, and before the end of the 19th century, it had become the standard with 40 nations, and had attained world-wide use in science.

Nearly a score of years before the passage of the French law just mentioned, the movement for the adoption of the system in the United States had already found able advocates, one of the most notable being John Quincy Adams, who in a report made to the Senate, on 22 Feb. 1821, proposed that an international conference should be held to study the merits of the metric system and to provide for cooperation with France tending toward its universal adoption. In the same year two metric standards, made of platinum, were sent to the United States by Albert Gallatin (1761-1849), then Minister to France. They were both authenticated by a certificate from the great physicist Arago, stat¬ ing of the kilogram that it differed less than 1 milligram from the original “kilogramme des Archives.® In form it is a cylinder

with flat bases, the edges slightly rounded. Height and diameter are nearly equal, approximately 39.5 millimeters each. The only distinguishing mark is a. faint lathe or tool mark of a point within a circle. The square mahogany box in which it was placed bore the following words engraved on a silver plate, attached to the cover : “Kilogramme compare pour son Poids a l’fitalon Protype des Archives de France, et verifie par M. Arago. Fortin fecit.® Despite the as¬ sertion that its variation from the standard was but 1 milligram, it was found, when com¬ pared in 1879 with the British platinum kilo¬ gram, to be 4.25 milligrams light, and this find¬ ing was confirmed in 1884, when it was taken to the International Bureau of Weights and Measures at Sevres, and compared with two auxiliary kilograms known to have the same values as the kilogram of the Archives. This final determination gave the error as — 4.63 milligrams. The intrinsic worth of this platinum kilogram to-day, with the metal quoted at $105 per ounce Troy, would be $3,375, while at the time it was made the value would hardly have exceeded $300.

. Older than the Arago kilogram is the (<committee meter,® as it has been called, which was given to Mr. F. R. Hassler, later sunerintend- ent of the Coast Survey, by J. F. Tralle the deputy from the Helvetic. Republic in the com¬ mittee charged with providing for the produc¬ tion of the metric standards in 1799 It was

ˆrOUonhct by Mr Hassler Ip the United States in 1805, and was a short time later donated by him to the Philosophical Society of Philadelphia Not long afterward, when Mr. Hassler took

lip the Coast Survey work, the society placed this standard at his disposal, and until 1890 it served as the standard for the determinations made by the survey. This meter is made of iron, and is marked with the stamp of the com¬ mittee, which was a small ellipse, having three quadrants shaded, the remaining one bearing the figures 10,000,000, that of the number of meters in a quadrant of the earth's meridian.

Almost a half century elapsed after the pro¬ posal of a metric conference by John Quincy Adams before this project was realized. On 1 Sept. 1869, a decree of Napoleon III summoned an international conference to provide for the production of new and absolutely exact metric standards of mass and length. Fifteen nations responded to this invitation, and the delegates assembled in Paris, 8 Aug. 1870. In spite of the fearful disasters of the French armies and the consequent rapid invasion of French terri¬ tory by the Germans, five meetings were held before the conference was forced to disband. The following were the 15 countries accepting the invitation of the French government to send representatives to this first Paris con¬ ference, of August 1870: Austria, Ecuador, France, Great Britain. Greece, Italy, Norway, Peru, Portugal, Russia, Spain, Switzerland, Turkey, United States, Colombia.

The project was not abandoned, however, and a second conference was called two years later, under the Third Republic, and repre¬ sentatives of 30 nations assembled in Paris on 24 Sept. 1872, remaining in session until 12 Oc¬ tober of that year. Their deliberations resulted in the adoption of 40 resolutions bearing on the construction of the new standards; of these 21 especially applied to the meter and 12 to the kilogram, the remainder referring to various details of the plan to be pursued, and to the precautions to be taken for the preservation of the standards when produced, as well as for the maintenance of their invariability. A most important point was the exact determination of the alloy to be employed, and the eventual decision was that it should be one of 90 per cent platinum and 10 per cent iridium, a toler¬ ance of 2 per cent in excess or deficiency be¬ ing permitted. This alloy possessed at once a high degree of hardness

and of resistance to chemical action, and also was susceptible of re¬ ceiving an exceedingly fine finish. A main share in the task of ensuring the production of a thoroughly satisfactory amalgamation of the metals was entrusted to the chemist, Henri Sainte-Claire Deville. The first ingot made had a weight of 238 kilograms and is commonly known as the ((alloy of 1874, » from the year in which it was produced. This alloy, however, did not meet with the approval of the commis¬ sion, although several standards were made, out of it to test its qualities. It was now determined to have recourse to the skill and experience of the great London firm of platinum refiners, Messrs. Johnson, Matthey and Company, and as a result of patient effort they were finally able to offer a casting which was found by the chemists of the International Commission, and by those of the French section, to exceed the requirments; from it were made 31 prototype meters and 40 kilogram weights. The meters were sent, early in 1887, to the International Bureau to be compared with the <(metre des Archives® and also with one another. By 1889

this task had been accomplished, and on 26 September of that year the work of the In¬ ternational Committee received the approval of a general conference assembled at Paris. The meter and the kilogram found to be in closest agreement with the meter and kilogram of the Archives were denominated the <(International Meter, }) and the ˆInternational Kilo¬ gram," and were deposited at the International Bureau of Weights and Measures, in a vault provided with three separate locks, the keys to which are in the possession, respectively, of the Custodian of the Archives of France, the presi¬ dent of the International Committee and the director of the International Bureau. This vault must not be opened oftˆner than once in a year, and in the presence of the three officers to whom the keys have been confided. To each of the contributing countries were given two of each of the new standards, which were all accompanied by attested certificates of compari¬ son, two hard glass thermometers, each of which had a table of corrections in terms referring to the hydrogen scale, and a piece of the alloy cut from the end of the bar and destined to be used in testing the coefficient of expansion ; each kilogram had a rock-crystal bedplate and other requisites for its safe conveyance. The meters allotted to the United States, Nos. 21 and 27, bore corrections of +2.5 microns and — 1.6 microns, respectively; the probable error of the determinations being estimated, as a result of 784 individual comparisons, at less than 0.2 microns. The two kilograms assigned were numbered 4 and 20, and had corrections in weight of — 0.075 and 0.039 milligrams, and in volume of 46.418 and 46.402 milliliters,

respect¬ ively. Here from 1,092 individual weighings the error of the determination is less than 0.002 milligrams. Meter No. 27 and Kilogram No. 20 were carefully packed and brought to this country under seal by George Davidson of the Coast and Geodetic Survey. On 2 Jan. 1890, President Harrison received them at the Execu¬ tive Mansion. The seals were broken in his presence, and he gave a certificate to the effect that they had been received in good condition, and that he was fully persuaded they were the standards to which the report referred. The other kilogram and meter were received in July 1890, and were deposited in the Office of Weights and Measures where the meter and kilo¬ gram recognized by the President as national standards had already been placed. By a de¬ cision made by the superintendent of weights and measures, on 5 April 1893, and approved by the Secretary of the Treasury, the interna¬ tional meter and kilogram were made the funda¬ mental standards of length and mass in the United States, this applying to the customary weights and measures as well as to those based on the metric units. The standards passed under the control of the Bureau of Standards on its establishment 1 July 1901, pursuant to the provisions of the act of 3 March 1901.

The International Prototype Meter is an irido-platinum bar, 102 centimeters in length. Three lines are engraved near each end of the bar; they are from six to eight microns wide, and about one-half millimeter apart, and the meter is defined as the distance between the middle line of each group, when the temperature of the bar is at 0° C. The lines used to define

the meter and its subdivisions were traced at the Conservatoire des Arts et Metiers in Paris.

While the preliminary work for the produc¬ tion of the new standards was in progress, in March 1875, another international conference was called by the French government, in which France, the United States and 15 other nations out of the 19 represented signed a convention on 20 May 1875, providing for the establishment and support of a permanent International Bureau of Weights and Measures, the manage¬ ment and control of which should be in the hands of an international committee having 14 members, each from a different country. As a site for this bureau, the French govern¬ ment assigned a piece of ground at Sevres, in the Park of Saint Cloud, declaring it to be neutral territory. It was agreed that the ex¬ penses of the bureau were to be borne by con¬ tributions paid by the contracting governments, the amount being proportionate both to the population of the country and the extent to which the metric system was used there.

The routine work of the bureau is performed under the supervision of a body termed the International Committee of Weights and Measures. This is in turn subject to the control of a general conference to which all the con¬ tracting governments send delegates, and which is to meet at least once every six years. This conference is charged will all questions regard¬ ing the measures to be taken to spread the use of the metric system in the countries which have not yet adopted it, and it is also called upon to pass definitely upon any new funda¬ mental determinations that may be proposed.

The Advantages of the Metric System and its Proposed Adoption by the United States and Great Britain. — The initial diffi¬ culty and expense incident to a substitution of the metric system for that now in use in the United States and Great Britain have been much exaggerated by many writers on the sub¬ ject. There would be no necessity for abso¬ lutely replacing the machinery appliances now in use; all that would be needed in the great majority of cases would be to re-mark them in accordance with the metric scale, and to ad¬ just their operations in accord with metric re¬ quirements. It has indeed been truly said that the only machines that would altogether lose their usefulness would be those for making the old measures. It need never be necessary to change the present lathes, drills, shapers, etc., since

there would be no necessity for the manu¬ factured objects to have a particular metric size; all that would be needed would be to have them marked and listed in the metric designa¬ tions of their actual size. It should be borne in mind, in this connection, that at present the sizes of parts are seldom exact unit sizes, since they are not made to conform to an arithmeti¬ cal rule but to the exigencies of their practical mechanical use.

The metric system finds an earnest advocate in Hon. William C. Redfield, Secretary of the Department of Commerce. In an address at the Fifth Annual Meeting of the Chambers of Commerce of the United States, in Washington, on. 2 Feb. 1917, he said of our present system of weights and measures that it <(stands as a bar across that path to foreign trade which it is necessary that we should tread." In another

address, made before the Philadelphia Cham¬ ber of Commerce, 10 Jan. 1917, he noted that it required four pages of an official publication to describe the various kinds of bushels that exist in America, and that the Philadelphia mint buys all its supplies and common metals by one kind of weights and measures, its precious metals by another, and does all its laboratory work by a third, this latter being, of course, the metric system. As at least a step in the right direc¬ tion, he cites the frequent use in drawings of a decimal division of feet and inches.

As to the best means of generalizing the use of the metric system in the United States, Dr. Samuel W. Stratton, director of the Bureau of Standards, writes : <(Commerce, technology, and science have, on account of their interna¬ tional character, availed themselves of the ad¬ vantages of the metric system more than manu¬ facturing, which is local, and, unlike exporting, not in direct touch with world markets. Hence science and commerce with their world-wide outlook should be the advisers of industry, and their conclusion is that the first principle is to supply what the customer needs, and that inter¬ national business requires international weights and measures."

As to one of the great merits of the system, we have the following emphatic opinion from the late Lord Kelvin (William Thompson, 1824-1907) : <(I believe I am not overstating

the truth when I say that half the time occupied by clerks and draughtsmen in engineers' and surveyors' offices — I am sure at least one-half of it — is work entailed upon them by the in¬ convenience of

the present farrago of weights and measures. The introduction of the French Metrical System will produce an enormous sav¬ ing in business offices of all kinds — engineer¬ ing, commercial, and retail shops.”

The Rt. Hon. Arthur J. Balfour, replying in 1895 to a deputation advocating the intro¬ duction of the system in England, used the fol¬ lowing words : <(Upon the merits of the case ‘I think there can be no doubt whatever that the judgment of the whole civilized world, not excluding countries which still adhere to the antiquated systems under which we suffer, has long decided that the metric system is the only rational system.”

As a step in the direction of the metric sys¬ tem, the decimalization of the coinage has found some favor in England recently, the present florin (a two-shilling piece) being pro¬ posed as a new monetary unit since it is ex¬ actly one-tenth of a pound sterling. As the British farthing is one ninety-sixth of a florin, an exceedingly trifling reduction of its value would make of it a ((cent” repre¬ senting the one-hundredth part of the florin, and worth only a very small fraction less than one-half of the United States or Canadian cent. Another idea has been to add tenpence to the value of the pound, which would then contain 250 pence or 1,000 farthings of un¬ changed value. A new florin, as the tenth of this new pound, would then be worth 100 farthings. It is interesting to note that the proposition to decimalize the British coinage by making the florin, the tenth part of a pound sterling or sovereign, a money of account, and subdividing it into hundredths, has for several years been essentially introduced in Peru, where

the gold libra, coined as an exact equivalent of the British pound sterling, is divided into 10 silver soles , the sol thus being worth exactly $0.48665, or the same as the British florin. The sol is in turn divided into 100 centavos worth 0.48665 cent of our money.

Probably no profession would benefit to a greater extent by the introduction of the metric system in the United States and Great Britain than would that of mining-engineering. This is eminently an international science, and to maintain a place in the first rank of his profes¬ sion the mining engineer must keep himself constantly informed as to the latest methods and improvements introduced in foreign lands. Wherever the metric system is employed, all the data on this profession are expressed in metric weights and measures. When, however, the United States engineer wishes to use these data in connection with his own work, or to compare them with those recording native methods and machinery, he is forced to make a number of very tedious calculations before he can arrive at any exact comparisons. An approximate idea he may indeed quickly gain, but in any exact science all mere approximations are prac¬ tically useless.

The metric system has for some time been in exclusive use in the medical department of the United States army, and with the entry of the United States into the war against the Cen¬ tral empires, it was used in the manufacture of certain sizes of guns, notably in those conform¬ ing to the famous French ((75's,® the 75-milli¬ meter guns that have proved their superiority to the other field artillery of similar size and also of the 105 millimeter and the 155 milli¬ meter guns. The General Chief of Staff wrote in January 1918, that it was followed in the preparation of operation orders and in map construction for the troops in France, as well as for firing data for artillery and machine guns to be used there. The artillery and ma¬ chine gun material intended for service abroad was modified to conform with metric measure¬ ments.

Another step in furtherance of the adoption of the metric system is one that has recently been taken in the gem-dealers' industry. This concerns the adoption, in precious stone com¬ merce, of an

international metric carat of 200 milligrams, to take the place of the various and discrepant national carat-weights that have for so long been sources of serious annoyance, in¬ convenience and loss of time for gem-dealers. In a paper read in Chicago before the Interna¬ tional Congress of Weights and Measures, held in connection with the World's Colum¬ bian Exposition of 1893, the writer suggested dividing the carat into 100 parts, and constitut¬ ing a standard international carat of 200 milli¬ grams, that is. 5 carats, or 20 pearl grains, to a French gram. This represented a deprecia¬ tion in weight of only about 2ˆ2 per cent from the carat-weights most in use. Great credit for having definitely initiated this much-needed re¬ form is unquestionablv due to M. C. E. Guil¬ laume, Director of the Bureau International des Poids et Mesures at Sevres, who energetically and successfully advocated the reform in 1906 before the Commission des Instruments et Travaux, in Paris.*

Simplicity of the Metric System. — There

is only one system of weights and measures in the world by means of which, if a voyager were wrecked on a desert island with only one meas¬ ure, and that so small that it could be put in a lady's thimble, he could reconstruct all the measures for distance, for weight and for capacity, could map out the island, weigh up to tons and know the capacity of any receptacles he might construct. That system is the metric system, and that measure is the cubic centi¬ meter, made hollow, and graduated on the edge in millimeters.

Having this, he could mark a stick up to a meter, dividing it into decimeters, centimeters and millimeters. This meter multiplied a thou¬ sand times would give him the kilometer — the standard measure of distance. It would also enable him to determine how many square meters the island measured, and hence how many ares (100 square meters) and hectares (10,000 square meters) it covered in area. Or, he could fill the cubic centimeter with water, which would weigh one gram, and multiplying this by a thousand would give him a kilogram, the standard measure of weight. The cubic centimeter would hold one milliliter of water and 1,000 milliliters would give him the liter, the standard measure of capacity.

The meter for the unit of length, the liter for the unit of capacity and the gram for the unit of mass or weight is the sum and sub¬ stance of the metric system. These three units (meter, liter, gram) with the following divi¬ sions and multiples are winning their way into general

use because they are best suited for practical purposes.

The prefixes from the Latin, milli; centi ; deci ; representing respectively a thousandth, a hundredth and a tenth, and those from the Greek, deka, hecto and kilo representing respec¬ tively 10, 100 and 1,000 may be used with any of the metric units. Investigation and experience in the United States and in metric countries, however, indicate the desir¬ ability of holding to the metric weights and measures given in the foregoing table, as these are considered sufficient and best for profes¬ sional work, the industries and trade. Ten meters, for instance, is briefer and more read¬ ily understood than one dekameter.

The metric weights and measures were all based on the unit of length. The liter, the unit of capacity, is almost exactly equivalent to a cubic measure 10 centimeters on each edge or 1,000 cubic centimeters (cm3 or cc). As greater accuracy could be obtained by basing the unit of capacity upon the unit of mass, the definition was written as follows : <(A liter is a unit of

capacity equivalent to the volume occupied by the mass of one kilogram of pure water at its maximum density at a temperature of 4° C. (39.2° F.) and under the standard atmospheric pressure of 760 mm.® One milliliter, equiva¬ lent to 1.000027 cub'c centimeters of water, weighs one gram. Technically, however, the gram is one thousandth of the kilogram, which is the standard for mass or weight.

* G. F. Kunz, The International Language of Weiehts and Measures,' The Scientific Monthly, Vol. IV, No. 3, March 1917, pp. 215-219, paper read, as retiring chairman, before Section I (Social and Economic Science) of the American Association for the Advancement of Science, in New York City, 27 December 1916.

Correct English spelling

Standard abbreviations

Length .

f 10 millimeters

(1000 meters

= 1 centimeter = 1 meter = 1 kilometer

10 mm = 1 cm

100 cm = 1 m

1000 m =1 km

Capacity .

= 1 liter

1000 ml =11

Weight .

| 1000 milligrams

1 1000 kilograms

= 1 gram = 1 kilogram = 1 metric ton

1000 mg = 1 g

1000 g = 1 kg

1000 kg = 1 t

Length.

1 centimeter

1 meter

1 meter

1 kilometer

1 kilometer

= 0. 3937 inch = 3.2808 feet = 1 . 0936 yards = 0.6214 statute mile = 0.5396 nautical mile

Capacity.

1 inch = 2 . 5400 centimeters

1 foot = 0 . 3048 meters

1 yard = 0.9144 meters

1 statute mile = 1 . 6093 kilometers

1 nautical mile = 1.8532 kilometers

1 milliliter

= 0.0610 cubic inch

1 cubic inch = 16.3867 milliliters

1 milliliter =0.2705 U. S. fluid drachm 1 milliliter = 0.0338 U. S. fluid ounce

1 liter = 1 . 0567 U. S. liquid quarts

1 liter = 0.9081 U. S. dry quart

1 liter = 0.2642 U. S. gallon

1 milliliter =0.2816 British fluid drachm 1 milliliter = 0.0352 British fluid ounce 1 liter = 0. 8799 British liquid quart

1 liter = 0.2200 British imperial gallon

1 U. S. fluid drachm = 3.6966 milliliters 1 U. S. fluid ounce = 29.5729 milliliters 1 U. S. liquid quart = 0. 9463 liter 1 U. S. dry quart = 1 . 1012 liters 1 U. S. gallon = 3. 7853 liters

1 British fluid drachm = 3.5515 milliliters 1 British fluid ounce = 28.4123 milliliters 1 British liquid quart = 1 . 1365 liters 1 British imperial gallon = 4.5460 liters

Mass or Weight.

1 gram =

1 gram =

1 gram =

1 gram =

1 gram =

1 gram =

1 kilogram =

1 kilogram =

1 metric ton =

(1000 kilograms) 1 metric ton =

15.4324 grains 0.6430 pennyweight 0.7716 apothecaries' scruple 0.2572 apothecaries' drachm 0.0353 avoirdupois ounce 0.0322 troy ounce 2 . 2046 avoirdupois pounds 2 .'6792 troy pounds 0.9842 long tons (2240 lbs.)

1 . 1023 short tons (2000 lbs.)

1 grain = 0 . 0648 gram 1 pennyweight = 1 . 5552 grams 1 apothecaries' scruple = 1 . 2960 grams 1 apothecaries' drachm = 3.8879 grams 1 avoirdupois ounce = 28 . 3495 grams 1 troy ounce = 31 . 1035 grams 1 avoirdupois pound = 0. 4536 kilogram 1 troy pound = 0.3732 kilogram 1 long ton = 1.0160 metric tons (1000 kilograms)

1 short ton = 0.9072 metric ton

The equivalents given in this article are based upon the following fundamental equivalents :

39.370000 United States inches = 1 meter 39.370113 British inches = 1 meter

0.2641776 United States gallon = 1 liter 0.2199753 British Imperial gallon = 1 liter 1 United States avoirdupois pound= 0.4535924277 kilogram 1 British avoirdupois pound = 0. 4535924300 kilogram

A quantity can usually be expressed as a whole number if the proper metric weight or measure is selected. Even when a fraction is needed to express the metric equivalent of another weight or measure, one or two figures to the right of the decimal point generally give sufficient accuracy. Equivalents such as those in the tables here given are intended to be used only to the required degree of accuracy. For example, four inches is equal to about 10 centi¬ meters; if greater accuracy is desired 10.2 centi¬ meters or 102 millimeters may be taken.

Bibliography.— Adams, J. Q., < Report upon Weights and Measures presented to the United States Senate on 21 Feb. 1822) (Washington, D. C., 1822) ; American Metric Association, ‘Metric Weights and Measures) (New York); Bigourdan, (Le systeme Metrique) ; Guillaume, (La Convention du Metre* and ‘Unites et fitalons* ; Hallock and Wade, (Evolution of Weights and Measures and the Metric System) ; Mechain and Delambre, ‘Base du systeme Metrique* ; Morin, (Notice historique sur le systeme Metrique.*

George F. Kunz.

METROPOLIS CITY, Ill., city, county-seat of Massac County, on the Ohio River, here spanned by a fine modern bridge, and on

the Illinois Central and the Chicago, Burlington and Quincy railroads, about 190 miles south by east of Springfield. It is in a healthful locality, built on a high bluff, with an incline toward the river. The site was selected in 1700 by the French, when Fort Massac was erected; but no permanent settlement was made until 1838. It was incorporated in 1843. The city has lumber mills, basket and box factories, flour mills, pot¬ teries, veneer and furniture factories, and municipal electric light and water plant. The city is the trade centre for nearly all of Massac County and is an active shipping point in all directions by rail and water. The form of gov¬ ernment is aldermanic. There are good schools, the R. W. McCartney Public Library, the Odd Fellows’ Temple, a sanatorium, a city hall, courthouse, music-hall,

several fine churches and recreation parks. Pop. 5,000.

METROPOLITAN, the Greek name of an archbishop, whose see is the chief place or me¬ tropolis of a province. The metropolitan is above the bishop, but below the patriarch. The title of patriarch, however, is in use only in the Eastern churches. In Russia the metropolitan is at the head of the hierarchy. In the Roman Catholic Church an archbishop may bear this title even though he does not have a metropolis as a see, thus the archbishop of Westminster is styled metropolitan.

METROPOLITAN MUSEUM OF ART.

See Art, Metropolitan Museum of.

METTERNICH, met'ter-nin, Clemens Wenzel Nepomuk Lothar, Prince, Austrian statesman: b. Coblenz, 15 May 1773; d. Vienna,

11 June 1859. He was educated at Strassburg; when only 17 represented the Westphalian princes at the coronation of Leopold II ; settled in Vienna in 1794; and assured himself a place in diplomacy by marrying the granddaughter of the Austrian chancellor, Kaunitz, in 1795. This marriage not only gave him entry to the best society, but brought wealth, and at the Congress of Rastatt he represented the Westphalian col¬ legium, where he served his apprenticeship in politics. In 1801 he was sent to Dresden by Aus¬ tria; two years later to Berlin; there a part of his mission was to cultivate the friendship of the French Ambassador. He did this so well that that official induced Napoleon to suggest to Austria that Metternich would be a most acceptable representative at the Tuileries; and so in 1806 he was sent to Paris, where he in¬ gratiated himself with Caroline Murat, sister to Napoleon, and with Tallyrand. On the out¬ break of the war between France and Austria, Metternich was put to much personal inconveni¬ ence by Napoleon, who forcibly detained him for some time. Thereafter he entered eagerly into the anti-Napoleonic league; assisted in the formation of the Quadruple Alliance; and as Germany proved

successful, took no part in the national sentiment which arose, but directed himself solely to the aggrandizement of Aus¬ tria, hence doing his best to preserve the French boundaries as they had been and to render Austria the only gainer among the powers by the reapportionment of Europe. He is credited with having planned and brought about the marriage of Napoleon and Maria Louise. In the years that followed he carried things his own way in Austria, planned the Holy Alliance and was extremely reactionary in his internal and foreign policies. In the difficult times of Napoleon's supremacy and his fall Metternich guided Austria policies with a masterly hand. As a diplomatist he was the equal of any of his time. In 1814 he visited England and formed the quadruple alliance. He was the master spirit at the Congress of Vienna and for 15 years thereafter was the leading statesman of Europe. The Revolution of 1830 in France showed the ill-success of his program; and the rising of 1848 and the insurrection in Vi¬ enna itself made it necessary for the Emperor Ferdinand to demand his resignation. He kept some power even then, his counsel being frequently sought. Consult Gross-Hoffinger, (Fiirst Metternich und das osterreichische StaatsystenV (1846) ; Mazade, (Un chancelier d'ancien regime: le regne diplomatique de M. de Metternich> (1889); Malleson, (Life H Prince Metternich) (1888) ; Demelitsch, (Metternich und seine auswartige Politik) (1898); Sandeman, J. • A. C., (Metternich, Life and Career) (New York 1911).

METZ, mets. France, an important forti¬ fied city and episcopal see of Alsace-Lorraine, on the Moselle, which here divides into several arms, 79 miles northwest of Strassburg. It is the third city of Alsace-Lorraine and has several representatives in the French Chamber of Deputies. The major part of the town stands on a height within the fortifications, outside of which there is a series of strong detached forts of excessive strength. Metz is also the centre or seat of control of the group of forts which includes Diedenhofen and Bitsch. In 1912 the German garrison numbered 25,(101). ine

cathedral is a late Gothic structure, surmounted by a spire of open work 397 feet high. There are imposing public buildings. The manufac¬ tures consist of woolens, cottons, hosiery, hats, muslin, glue, leather, *etc.* Several battles were fought in the neighborhood and under its walls between the Germans and French in August

1870. The Germans subsequently invested the town and, being reduced to a state of famine, on 28 October it capitulated with 180,000 of¬ ficers and men under the command of Marshal Bazaine.

The near-by cemetery of Chambiere holds the remains of over 7,000 French soldiers who perished here. It was included in the ces¬ sion of territory to Germany at the Peace of

1871. Metz was anciently known as Divodurum, and later the Romans rechristened it Medio-matrica, of which Metz is a contraction. The Romans built military roads through the terri¬ tory, and a fine aqueduct, of which traces re¬ main. Attila sacked the town in the 5th cen¬ tury. After the retirement of the Huns, the Franks obtained control and made it the capital of Austrasia. In 870 it was included in East Francia, and developed under German influence. Its prosperity increased, and in the 13th cen¬ tury, as a free imperial city, it attained the zenith of its prosperity. It was taken by the French in 1553. This ownership was later con¬ firmed by the Peace of Westphalia in 1648. Thereafter it remained until 1870, with the rest of Alsace-Lorraine, a peaceable French terri¬ tory. For its history in 1870-71, see Franco-German War. Marshal Petain entered the city at the head of the Tenth Army on 19 Nov. 1918 amid great rejoicing. After 47 years of Ger¬ man domination Metz was reunited to France. Pop. 68,598.

MEUDON, me-don, France, a town south¬ west of Paris, near the Seine, on the railway to Versailles, six miles to the west. It had for¬ merly a fine chateau, built by Louis XIV, sur¬ rounded by the Foret de Meudon, still a favorite holiday resort of the Parisians. This chateau was fitted up in 1812 by Napoleon I for Marie Louise, and it was a residence of the Napoleons under the Second Em¬ pire, but was ruined during the siege of Paris in 1870. An astronomical observatory has since been established in the ‘remains of the castle. The Duchess of Galliera established here a home for the aged and for orphans, at a cost of $2,800,000. Meudon has glassworks, bleach-fields, extensive government munition works and other industrial establishments. Rabelais was for a short time cure of Meudon. Pop. of commune about 12,292.

MEULEN, me’len, Adam Frans van der,

Flemish painter: b. Brussels, 11 Jan. 1632; d. Paris, 15 Oct. 1690. He studied under Snayers; removed to Paris ; and there became court painter to Louis XIV, for whom he painted many battle scenes.

MEUNIER, me-ne-a, Constantin, Belgian artist : b. Brussels, 1831 ; d. there, 4 April 1905. He is known as a historical and genre painter as well as a sculptor of considerable power, though his naturalistic pictures are sometimes revolting; and it would seem as if his studies in

Madrid had brought him under the influence of Ribera and his sanguinary school. He has produced some vivid pictures of life in the col¬ liery district amid whose unlovely surround-

ings he has made his home. His (Martyrdom of Saint Stephen ' in the Ghent Museum is quite in the spirit of Ribera and shocks the mind by its brutal literalness. (The Peasants' Rebellion> is an example of his energy and force as a realist in modern life. His statue (The Lost Son) is in the Berlin. National Gal¬ lery.

MEUNIER, fitienne Stanislas, French geologist : b. Paris, 1843. A student of the Paris faculty of sciences, he attained his doc¬ tor's degree in 1869 and was laureate of the Academy of Sciences in 1878. In 1892 he was appointed professor of geology at the National Museum of Natural History. He was made a knight of the Legion of Honor, and has been vice-president of the Geological Society of France. His chief publications are (Le ciel geologique' (1871); Geologie des environs de Paris ' (1875; rev. ed. 1912); (Geologie re¬ gional de France) (1889) ; (La geologie com-peree (1895); (Nos terrains: geologie populaire) (1898); (La geologie generate' (1903); (La geologie experimentale' (1904) ; (Les con¬ vulsions de l'ecorce terrestre> (1910).

MEURICE, Francois Paul, fran-swa p5l me-res, French dramatist: b. Paris, 1820; d. there, 11 Dec. 1905. He was educated at the College Charlemagne and entered upon a literary careen He worked for a time in collaboration with Dumas, with whom he made a translation of Hamlet, and was entrusted by yictpr Hugo,, his brother-in-law, with the pub¬ lication of his complete works. He published (Benvenuto Cellini' (1852) ; (Fanfan la Tulipe' (1858); (Cadio> (1868); <Cesara' (1869), *etc.*

MEURSIUS, mer'si-iis, Johannes Van Meurs, Dutch scholar and historian : b. Lovs-duinen, 1579; d. 1639. Besides (Glossarium Grseco-Barbarum' (1614) ; and (Athenae Bata-vse' (1625) ; for his edition of Greek authors he wrote numerous introductory essays which J. F.

Gronovius reprinted in (Thesaurus Anti-quitatum Graecarum.' His complete works were edited by Lami (12 vols., Florence 1741—

63).

MEUSE, mez, or muz, river which rises in France in the south of the department Haute-Marne, and with a northward trend crosses the northwestern corner of the department Vosges where between Bazielles and Noncourt it has a subterranean course of three and a half miles. It traverses the departments Meuse and Ar¬ dennes, and on reaching Sedan enters Belgium. At Namur where it receives on the left its largest tributary, the Sambre, almost doubling its volume, it changes its course to northeast, and passes Liege, where it is augmented by the Ourthe; it separates Dutch from Belgian Lim¬ burg, passing Maestricht and Roermond, at the latter of which it receives the Roer. In the northern part of Dutch Limburg its course is changed to northwest, and subsequently it be¬ comes west. The whole of its after-course is through the Netherlands, in which it forms for some distance the boundary between North Brabant and Gelderland. It finally joins the left bank of the Waal, one of the arms of the Rhine, and gives its name to the accumulated flood of these streams, which, proceeding west through Holland proper, is divided near Dordrecht into two great rivers, the one of which bends round to the north and reaches Rotterdam; the other

branch continues west; shortly after the two branches again unite and discharge themselves into the North Sea. The direct length of the Meuse is 230 miles; and its length including windings is 580 miles. It is navigable for about 460 miles. A section of the Meuse River was selected by the French government before 1875 as the location for a chain of protective forts, which became known as the Meuse line. These forts extend for 31 miles from Verdun to Toul, being disposed along the eastern banks of the river. The names of the forts are Verdun, Saint Mihiel, Genicourt, Troyon, Lionville, Saint Agnant, Gironville, Jous sous les Cote and Tours. There was also constructed a second line of forts from Pagny to Neufchateau. This region saw some of the heaviest fighting of the Great World War. See War, European.

MEXCALA, mas-ka'la, or MESCALA,

mes-ka'la, a river of Mexico, in the southern part, which has its rise in

the mountains south¬ east of the City of Mexico, and flows generally west for 450 miles to the Pacific. It is called Atoyac in the first part of its course, and on the boundary line between the states of Michoacan and Guerrero, it is called Rio de las Balsas. The port of Zacatula is at its mouth. It is a swift-flowing stream, and has a number of low cascades and rapids.

MEXIA, Tex., city in Limestone County, on the Houston and Texas Central and the Trinity and Brazos Valley railroads, 40 miles northeast of Waco. Natural gas and oil are produced nearby and cotton and corn are exten¬ sively cultivated. The citv has a broom fac¬ tory, cotton mills and oil mills, citv hall, rail¬ road repair shops, and a public library. The commission form of government is in operation. Pop. (1920) 3,482.

MEXICAN ARCHAEOLOGY. See Mex¬ ico — Archaeology.

MEXICAN HAIRLESS DOG, a small terrier-like dog, of uncertain origin, without hair except a tuft on the crown of the head, another on the tail and a few scattering wisps on the body; the skin is grayish black, wrinkled and dry. Clavigero describes a large hairless dog found among the Mexicans by the Spanish conquerors, whose puppies were esteemed as an edible delicacy ; and others are recorded as hav¬ ing occurred in ancient Peru and on various of the West Indian islands.

MEXICAN JUMPING BEAN. See Jump¬ ing Beans.

MEXICAN LITERATURE. See Mexico — Literature.

MEXICAN NUN, The, name given t< Juana Inez de la Cruz, Mexican poet: b. San Miguel de Nepantla, near Mexico, 12 Nov. 1651 ; d. Mexico, 17 April 1695. She was well known in Mexico for her learning, took the veil in the convent of San Jeronimo, after some 27 years abandoned her studies wholly for the duties of the convent, and sold her library in aid of charity. Her death occurred during a severp epidemic. Among her works are <Poesias Sagrades y Profanas' ; (E1 Neptune Alegorico', and the comedy (Los Empenos de Una Casa.'

MEXICAN ONYX, a stained and banded

variety of Calcite. It is not true onyx. See Calcite; Onyx.

MEXICAN SUBREGION, a faunal dis¬ trict of the Neotropical region embracing the low hot coast region of Mexico. See Zoogeog¬ raphy.

MEXICAN TEA, See Goosefoot.

MEXICAN WAR, The. The annexation of Texas in 1845 laid the foundation for the war with Mexico. Although Texas had been for many years practically free, and had been recognized by the United States, England, France and other countries, yet Mexico still re¬ fused to acknowledge its independence. When therefore the United States proposed to admit i exas into the Union, Mexico gave warning that the annexation would be equivalent to a declaration of war, and 6 March 1845 protested, and soon afterward withdrew her Minister and severed diplomatic relations. Her acts, how¬ ever, scarcely justified her threats, as at that time at least little or no preparation was made for war. It has, therefore, been claimed that had the American government used a concilia¬ tory policy peace might have been preserved, and friendly relations re-established.

At the moment, however, the Mexican peo¬ ple and authorities were in a rather belligerent attitude, due in part to pride, and in part to an expectation that the United States would soon be involved in a war with Great Britain over the Oregon boundary, in which case Mexico would have a powerful ally to aid her. Did President Polk at this point seek to strengthen this hope in the minds of the Mexicans, in¬ tending at the proper moment to make a com¬ promise and peace with England, as was done, and thus leave Mexico at the mercy of the United States? Perhaps history can never answer the question, but events at least seemed to march in harmony with the thought. For Mexico soon found herself in the dilemma that she must either sdl California to the United States, receiving in return a goodly sum of money to appease her pride, or engage in a war to sustain her honor and territorial integrity. Mexico bravely, but perhaps not wisely, chose the latter alternative, not fully realizing the inequality of the contestants, nor the depth of the humiliation to which she would be subjected. Doubtless President Polk preferred to acquire California without war; but its acquisition was to be the principal measure of his administra¬ tion. Hence if war was the only means to secure it, war it must be ; at least enough to get possession of the desired territory.

Causes of the War. — The immediate occa¬ sion, however, of the war was the dispute in regard to the western boundary of Texas. Proclaiming her independence in 1836 Texas asserted that her western boundary was the Rio Grande to its source, thence due north to the 42d degree of north latitude. The following year the United States recognized her inde¬ pendence, and in December 1845, by a joint resolution, admitted her into the Union as a State, providing that boundary disputes were to be settled by the United States. President Polk accepted the boundarv line claimed by Texas, and 13 Tan. 1846 ordered Gen. Zachary Taylor to march to the eastern bank of the Rio Grande as the western boundary of the United States. Mexico insisted that the Nueces River

— 100 miles eastward — was the true western boundary of Texas, and therefore that General Taylor was now on Mexican soil. On 25 April 1846, the first blood was shed in a conflict be¬ tween a band of Mexican troops that had crossed to the eastern side of the Rio Grande and a company of American soldiers. The news of this action was immediately com¬ municated by General Taylor to President Polk, who sent his now noted message to Congress, asserting that war was begun by the act of Mexico on American soil. Congress accepted, after a stormy debate in the Senate, the Presi¬ dent's statement, and war was recognized as existing.

Other causes than the two already noted were also at work, and help to make a decision in regard to the justness of the war still more difficult. Mexico for many years had been in a chronic state of revolution. The natural re¬ sult followed. American citizens in Mexico .sustained property losses and doubtless were frequently unjustly arrested and even impris¬ oned. Claims arising from these causes had been in part settled under a convention of 1840; but many of them were still pending. Some were just; more, either unjust or extravagant in amount. President Polk united these unset¬ tled claims with the boundary question, and de¬ manded that Mexico receive an envoy extraor¬ dinary with power to settle both — on its face an eminently fair proposition. On the other hand, Mexico professed to be ready to receive an ambassador to settle the boundary dispute, but declined to receive Mr. Slidell as our minis¬ ter when commissioned to settle all disputes, insisting that the two questions were distinct in kind and origin and should not be united. President Polk in his message asserted that this action of Mexico was in violation of her promise to

receive a minister, and hence justi¬ fied his administration in its measures, and forced him to take possession of the disputed territory.

The need of more slave territory was per¬ haps another factor in causing the war. At least many from the South took an aggressive position on all questions in dispute between the two countries and thus made a peaceable settle¬ ment more difficult. Both the economic and the political reasons for more territory began to be felt by 1846 — the one to have new soil over which to spread the land-exhausting sys¬ tem of slavery; and the other to have new terri¬ tory out of which to carve new slave States that the equilibrium between slave and free States might be maintained. Some other forces tend¬ ing to arouse the war and aggressive spirit may be noted. The cry of <(manifest destiny® played a part. Many, especially in the West, felt that the Pacific Ocean was the natural western boundary of the United States. They also de¬ manded the <(Golden Gate® that commerce might be opened up with the Orient. The two great parties — the Whigs and the Democrats

— divided quite sharply on the question ; in fact so completely that the war became almost a party, instead of a national, issue. The Demo¬ crats, as a rule, supported the administration and its claim that the war was just. The Whigs, on the contrary, asserted that it was a most unholy and unrighteous war, and char¬ acterized it as Polk's war. Lincoln, entering Congress in 1847, became a severe critic of the

policy pursued, while Tom Corwin of Ohio went so far as to use this language: ((If I were a Mexican I would tell you, (Have you not room in your own country to bury your dead men? If you come into mine we will greet you with bloody hands, and welcome you to hospitable gravest ”

President Polk summarized his reasons for recommending that Congress recognize war as existing as follows : ((The grievous wrongs per¬ petrated by Mexico upon our citizens through¬ out a long period of years remain unredressed; and solemn treaties … have been disre¬ garded… . Our commerce with Mexico

has been almost annihilated.” He then adds: (<As war exists, and … exists by the act of Mexico herself, we are called upon, by every consideration of duty and patriotism, to vindi¬ cate, with decision the honor, the rights, and the interests of our country.”

The Campaigns.— The war with Mexico was accepted as a fact by Congress 13 May 1846. . There were four principal fields of ac¬ tion in its prosecution. (1) Along the Rio Grande, under the command of Gen. Zachary Taylor; (2) in California, where Capt. John C. bremont and Admiral Stockton were in com¬ mand; (3) in New Mexico, with Gen. Stephen W. Kearney leading the American forces; and (4) from Vera Cruz to the City of Mexico, under the command of Gen. Winfield S. Scott, the commander-in-chief of the American ar¬ mies. Everywhere success attended the Amer¬ ican arms. Perhaps it was the first war in his¬ tory, lasting two years, in which no defeat was sustained by one party, and no victory won by the other.

General Taylor defeated the Mexican troops at Palo Alto 8 May; at Resaca de la Palma the following day and captured Matamoras on the 18th. He remained near that city for some weeks to recruit his army and prepare to ad¬ vance into the interior. On 24 September he entered Monterey, after a siege of four days, and a gallant resistance by the Mexicans. Tay¬ lor’s most famous victory, however, was won 23 Feb. 1847, at Buena Vista. General Scott gave orders, which unfortunately fell into the hands of Santa Anna, the Mexican general, for General Taylor to send some nine regiments to aid Scott in his proposed attack on Vera Cruz. Santa Anna immediately marched his whole command against Taylor, expecting to crush him in this

weakened condition. It was 20,000 men against about 5,000. . But the skill of Tay¬ lor, the persistence of his army, the organiza¬ tion and equipment of the American troops, won a great victory. Taylor became the hero of the hour, and Buena Vista made him an irresistible Presidential candidate.

Fremont's course in California has been a subject of keen controversy. As leader of an exploring expedition he was already in north¬ ern California, and early in 1846 was recalled to the Sacramento Valley. California was the goal of the political policy of Polk's adminis¬ tration. The means to secure its acquisition were uncertain. It might be gained by war ; or hy filling the territory with American settlers who in course of time might bring it into the Union as Texas had already been annexed; or it might be effected by securing the goodwill of the native Californians who were already jealous of Mexican rule. The latter policy

seems to have been the one adopted by the ad¬ ministration. The American consul at Mon¬ terey, Mr. Larkin, was developing this policy with a good prospect of success, it is claimed, when Fremont appeared on the scene. He seems to have developed a fourth policy, namely, the establishment of an independent government under the control of the American settlers in the Sacramento Valley. This move¬ ment resulted in the ((Bear Flag Republic," and virtual civil war between the native Califor¬ nians and the American settlers. At this mo¬ ment the Mexican War began and the (<Bear Flag" was replaced by the (<Stars and Stripes." It has been claimed by some California histo¬ rians that Fremont's course, had not the Mexi¬ can War come at the moment it did, might have lost California to the United States. The na¬ tive Californians, alienated as they were by his course, might have put themselves under an English protectorate in revenge for the treat¬ ment accorded them. Be this as it may, by the end of the year all California was conquered and held by American troops, and Fremont was regarded as jhe hero who had won the ((Golden Gate" by his energy and decision. Santa Fe was captured by General Kearney, and New Mexico secured with almost no loss of life. By the end of the year, therefore, all the territory that the administration desired was in the pos¬ session of its armies, but Mexico was still un¬ conquered.

Scott had been chafing in Washington dur¬ ing the summer and fall of 1846 while Taylor was winning his brilliant victories. He asked to go to the front to assume chief command, but the administration retained him at the capi¬ tal under the plea of needing his advice. As it

happened this Democratic war was officered by Whig generals. Scott had already been a Whig candidate for President. The charge was now made that Scott was kept from com¬ mand for fear that success might make him a more formidable candidate in 1848. Finally, when he was sent to the front in January 1847, the cry was raised that the purpose was to dim the lustre of Taylor's victories, or at least to divide the popular support between the two generals in such a way as to destroy the polit¬ ical prospects of both.

General Scott invested Vera Cruz in March 1847, and by the 27th had captured the fortress which had been thought to be almost impreg¬ nable, and was ready to enter the city. On 8 April he started into the interior, and on the 18th captured Cerro Gordo; the 19th, Jalapa, and the 22d Perote. On 15 May he entered the important city of Puebla. Remaining here for some weeks he again advanced, in August, toward the capital, and on the 10th came in sight of the city of the Montezumas. Two important victories were won 20 August — at Contreras and at Churubusco. He captured Molina del Rey 8 September, and five days later the victory of Chapultepec gave him the City of Mexico itself which he entered on the fol¬ lowing day with an army of only 6,000 men. The war was practically over, but the victory was so complete that it began to be a question whether there was any government left with sufficient power to negotiate a treaty of peace. An agitation began with friends both in and ?ut of Congress, as well as in the cabinet, look¬ ing to the annexation of the whole of Mexico.

Calhoun ;>n the one hand, Webster and a ma¬ jority of the Whigs on the other, joined hands to defeat this plan. President Polk was finally forced to make the ultimate decision. N. P. Trist was sent in March 1847 to Mexico to make a treaty of peace. Failing he was or¬ dered in the fall to return to Washington; but disobeying instructions he remained in Mexico, and on 2 Feb. 1848 concluded a treaty of peace in harmony with his original instructions. The administration was in a quandary. To ratify meant to condone the disobedience of Trist. To reject meant a prolongation of the war, and time to perfect the intrigue for the annexation of ((A11 Mexico.® President Polk, after some hesitation, decided to send the treaty to the Senate for its consideration. Received 23 Feb¬ ruary, it was ratified, after some amendments, 10 March, by a vote of 38 to 14. On 30 May ratifications were exchanged and the war was at an end.

The Mexicans had fought bravely, even stubbornly and at times skilfully, yet in every contest, even when the odds were greatly in their favor, without a single victory. In part superior leadership and training won for the soldiers of the northern republic; in part their cooler and more persistent character; but in the main it was not bravery, nor generalship, nor even character that won. It was science and education applied in the equipment of the armies, the guns of the soldiers, the cannon on the ramparts and the powder in the arsenals which made the one so much more effective than the other that the most daring bravery was no counterpoise.

The Treaty of Peace. — The treatv of Guadalupe Hidalgo gave to the administration of President Polk the territory that his diary informs us he intended to acquire, California and New Mexico. Mexico in return for the loss of its fairest northern provinces was paid $15,000,000, and released from all claims of all kinds held by citizens of the United States against her, estimated at $3,250,000, which the United States assumed. Boundary lines were drawn, and provision made in regard to other questions at issue between the two countries.

Results. — Usually successfully waged wars redound to the credit of the party in power. In this case, however, the Democratic party, the

author and supporter of the war, was defeated by the Whig party, the party of opposition and criticism, in the Presidential election of 1848. The Whigs made use of the popularity of a successful general to defeat the party that had made his glory possible. Evidently the Amer¬ ican people were ready to accept the fruits of the war, but also ready to punish the party they believed had wrought in a wrong manner. A large number of young officers, destined to re¬ nown in later years proved their worth in this war. U. S. Grant and Wm. T. Sherman, Robt. E. Lee, ((Stonewall® Jackson and Jefferson Davis, in the great Civil War, foreshadowed, in this Mexican struggle, the greatness that was to be theirs in the ((days that tried men's souls® from 1861 to 1865. The acquisition oj 522,568 square miles of territory — an empire four times as large as Great Britain, was the most important immediate as well as remote result It was important in the issues that its acquisi¬ tion precipitated. Should it be slave or free territory? Who should determine its institu¬ tions? Out of this question grew the larger

one, who had the right to control the institu¬ tions of the territories in general? To settle the first question David Wilmot, a Democrat of Pennsylvania, proposed the celebrated (<Wilmot Proviso® (q.v.) which would exclude slavery forever from all territory acquired from Mex¬ ico. Four long years of intense and bitter de¬ bate followed. This question and a series of others were settled temporarily in the Compro¬ mise of 1850. The second question was an¬ swered by the phrase ((Non-intervention,® which meant, or soon came to mean, one thing to Douglas and the Northern Democrats, and an¬ other to Davis and the South. Three main the¬ ories were evolved or defended in answer to the third query. (1) That Congress had the right to control the institutions of the Territo¬ ries and could make them slave or free at its will. (2) The Dickinson-Cass-Douglas doc¬ trine of Popular or ((Squatter® sovereignty: — the doctrine that the people of a territory themselves, while yet in a territorial status, de¬ termined their own institutions. (3) The radi¬ cal Southern view-that slaves were property, and, as property might be taken into any Terri¬ tory, — the common public domain of the States, — with no constitutional power anywhere to hinder or prevent. It was important secondly in its industrial and political effect on the na¬ tion. The United States now had an outlook on the Pacific Ocean comparable to that on the Atlantic. China, Japan and the East were brought within the circle of its influence. Con¬ ditions favorable to further expansion were prepared. In addition to the great effect on commerce thus prefigured, that on wealth and industry was not less. The gold, silver, copper and

other mineral wealth of the Rocky Moun¬ tain region was turned into the pockets of the American people. This vast addition of terri¬ tory and wealth tended also to emphasize na¬ tional pride and ambition ; to arouse a still more intense belief in ((manifest destiny® ; to develop a more optimistic tone, and perhaps also to produce a more materialistic spirit.

Bibliography. — Bancroft, H. H., (History of Mexico5 (San Francisco 1885) ; (History of California5 (San Francisco 1886-90) ; (History of Arizona and New Mexico5 (Boston 1889) ; Benton, (Thirty Years' View5 ; Burgess, (The Middle Period5 ; Connelly, W. E., new edition of (Doniphan's Expedition5 (Kansas City 1907) ; Corwin, (Speeches5 ; Grant, U. S., Per¬ sonal Memoirs5 (2 vols., New York 1885-86) ; Halferkorn, H. E., (War With Mexico5 (Washington 1914) ; Howard, (General Tay¬ lor5 (New York 1892) ; Mansfield, E. D., (T'ne Mexican War5 (New York 1852) ; McElroy, M., (The Winning of the Far West5 (New York 1914) ; Ripley, H. S., (The War with Mexico5 (2 vols., 1849) ; Rives, G. L., (Mexi¬ can Diplomacy on the Eve of the War with the United States5 (American Historical Review, Vol. XVIII, New York 1913) ; (The United States and Mexico 1 82 1 — 48 5 (2 vols., New York 1913) ; Royce, J., California5 (18861 ; Schouler, (History of the United States5 ; Van Holst, Constitutional History of the United States' ; Wilcox, C. M., (History of the Mexican War5 (Washington 1892) ; Wright, Ceneral Scott5 (New York 1894).

Howard W. Caldwell,

Head Professor American History, University of Nebraska.

MEXICO (Sp. Mejico, officially Republica Mexicana and Estados Unidos Mexicanos) , the southernmost country of North America and a federal republic, situated between 14° 30′ 42″ and 32° 42' north latitude, and between 86° 46′ 8″ and 117° 7′ 31″ longitude west of the meridian of Greenwich. Its name is closely allied with the group of tribes who called them¬ selves Mexica or Asteca. The name is derived from the tribal war-god, Mexitl, also called Huitzilopochtli. The

Spaniards gave the name Mexico to all the countries in which they found the Aztecs supreme at the time of the Conquest. Mexico is one of the most interesting of the countries of the Western Hemisphere, because of its aboriginal civilization and social customs, many of which have persisted to our own day. It is also of importance because of its great natural resources, which now bid fair to be utilized for the benefit of her children instead of the predatory foreigner. These topics, to¬ gether with the geography, art, architecture, literary history, commercial life and political history, are here treated under the following heads :

1. Area, Boundaries, *etc.*

2. Minerals and Mineral

Production.

3. Agriculture and Stock-raising.

4. Commerce.

5. Manufactures.

6. Transportation and Com¬

munication.

7. Banking and Finance.

8. Government.

9. Army and Navy.

10. Education.

11. Religion.

12. Mythology.

13. Art.

14. Architecture.

15. Ethnology.

16. Literature.

17. History.

18. Diplomatic Relations of

the United States with.

1. AREA, BOUNDARIES, ETC. Mex¬ ico's total area is 767,326 square miles, and its boundaries are the United States on the north, Guatemala and Belize on the southeast, the Pacific Ocean on the south and west, and the Gulf of Mexico and the Caribbean Sea on the east. Its coast line on the east is 1,772 miles in

length and on the west or Pacific side, 4,594 miles. The northern or United States bound¬ ary was fixed by treaty 2 Feb. 1848 and 30 Dec. 1853, and extends from the mouth of the Rio Grande, on the Gulf of Mexico, following that river a distance of 1,136 miles, beyond El Paso, Texas ; thence to a point on the Pacific Ocean, one marine league due south of the southernmost point on the Bay of San Diego. The total length of the northern bound¬ ary line is 1,833 miles. The Guatemalan bound¬ ary line was fixed by treaty 27 Sept. 1883 and 1 April 1895 ; and the Belize line by treaty signed 8 July 1893 and ratified 19 April 1897. The length of the southern boundary of Mexico is 642 miles.

By the treaty of Guadalupe-Hidalgo, rati¬ fied 2 Feb. 1848, and the Gadsden treaty of 30 Dec. 1853, Mexico ceded to the United States 930,590 square miles of her territory, or 163,264 more than half. The first-named treaty in¬ volved 362,487 square miles of domain, now part and parcel of the United States, as follows: Texas, 265,780 square miles; Colo¬ rado (in part), 18,000; Kansas (in part), 7,766; New Mexico, 65,201; Oklahoma, 5,740. Under the terms of the second or Gadsden treaty the United States acquired 522,568 square miles, which are now held as follows : Ari¬ zona, 82,381; California, 157,801; Colorado (in part), 29,500; Nevada, 112,090; New Mexico, 42,000; Utah, 84,476; Wyoming (in part), 14,- 320. By virtue of the same treaty a later addi¬ tion was ceded, consisting of 31,535 square miles to Arizona and 14,000 to New Mexico.

Political Divisions and Population. — Mex¬ ico is divided politically into 27 states, three territories and a federal district. These with their areas and populations, capitals and popu¬ lations, are as follows :

STATES AND TERRITORIES

Aguascalientes . . Baja California*

Campeche .

Chiapas .

Chihuahua .

Coahuila .

Colima .

Durango .

Federal District . Guanajuato

Guerrero . ,

Hidalgo . .

Jalisco .

Mexico .

Michoacan .

Morelos .

Nayarit .

Neuvo Leon .

Oaxaca .

Puebla .

Queretaro .

Quintana Roo*. . San Luis Potosi.

Sinaloa .

Sonora .

Tabasco .

Tamaulipas .

Tlaxcala .

Vera Cruz . .

Yucatan .

Zacatecas .

Islands .

Total .

Area

(in square miles)

Population

Capital

Population

2,950

120,511

Aguascalientes .

45,198

58,328

52,272

f N. District, Ensenada .

2,170

18,087

86,661

(S. District, La Paz .

5,536

27,222

438 , 843

Campeche .

16,775

87,802

405 , 707

Tuxtla Gutierrez .

10,239

63,569

362,092

Chihuahua .

39 , 709

2,272

77,704

Saltillo .

35,414

38 , 009

483,175

Colima .

25,148

463

720 753

Durango .

32,263

11,370

1,081,651

Mexico City .

Guanajuato .

471,066

35,682

24 , 990

594 , z. / 8

Chilpanzingo .

7,994

8.917

646,551

Pachuca .

39,009

31,846

1,208,855

Guadalajara .

119,469

9,247

989,510

Toluca .

31,247

22,874

991,880

Morelia .

40,042

2,773

175,594

Cuernavaca .

12,776

11,275

171,173

Tepic . .

16,778

23,592

365,150

Monterrev .

73,528

35 , 382

1,040,398

Oaxaca .

38,011

12,204

1,101,600

Puebla .

96,121

3,556

244,663

Oueretaro .

33,062

18,886

9,109

Santa Cruz de Bravo .

2,000

25,316

627,800

San Luis Potosi .

68,022

33,671

323,642

Culiacan .

13,527

76,900

265,383

Hermosillo .

14,578

10,072

187,574

San Juan Bautista .

12,327

32,128

249,641

Ciudad Victoria .

12,103

1 , 595

184,171

Tlaxcala . .

2,812

29,201

1,132,859

Xalapa .

24,816

35,203

339,613

Merida .

62 , 447

24,757

477,556

Zacatecas .

25,900

1 , 560

767,055

15,112,608

♦Territories

Donisoj

Carrizoxo

,i.tSO’ntrl

IHob.

lXri»

deevl’l’T/’

Capitan Kˆi

iPotholeg

Oiirt <

LQrenciˆ

Henrietta

Texarkanaˆ; iMt. Plcaaant_

‘uhbock’

I dorado

Guthrie / i. Elerro J San Jose a|lvoKC!tj^7j

! fxLordsbur

jtW r\ drinenoe

Santa Rljta

VaUej

tARincon

L-‘n Russia [Alamogordo

Mineral’

‘ ‘•,’<0,;.saI,f,v.

SilverbeU0ˆ

e /Bensonjtfˆˆ

S/co\«‹ˆ

Big 8prlng*l

Dublin,

Midland

Cobos .

•bao ,, “So«i1K,r*N. - *

M* Pintaa MlneˆNogafcTf „ . ° CajitoB ˆf1® r S. Hilario TubutanjJf] Mltar i/

*f! -OayJUSl’t „

Kiv S. Felipe ;« Fcftpc G*or < jfH fVˆigga O Mle&j

jjSkw] • ® Fermin Antimor

Wfttfn C, \

m3- /‘ft-

“°™1

Coleman

4 Morgan/

“TˆBrownwood • ’ Gateaville *j

ColnettCˆo

San Ramon *• «A.\ 7i ***Tl*0li

C*8-Quaa tltf

fiomatc

sstvie*.

ˆCiudad

ˆ/fTleVrriv

■/BlanaTˆ — .ˆSierra Blanca

9 Los Madams TV

pCanddaria

i Raneheria * I # r Q-L.di Palot c.ySan Jose pn.

•flCarriral .* f iOjo Cal lent* ‘•*

7* hMoctczuma (obChlvatlto Ai

XGalleao ©Tula

Monterey’

[LeesviUeˆl

Warsaw’

K.entw <

Kington

Lampasas

* San [Guzman jPedroi Ij-rutla

LW — -*‘S/Pedre J< j iT* Corral I tos .<•

,4,m ll Quentinˆ S]

Rviar p Audios

hyv

O’.lmoe 1 3 ?g

nicuto* \ ‘ etuandd

Pb Canoo8~ˆ!ˆ,(w!p P*« Bl»ne])\ %

I £- F/nj(,

I £ *?’

pEs/irp p’ yˆ«<//fVT|

J v <>/

f C*»n0» /[ffebastfan.

vt&An ftˆydufltlo

>Pt Reeakerˆˆ—

-®* •* CW ttobaX Pt-s**» Pablo]

• «SSS*sFEte« ‘aaa

I>‘S. Hip?!!,?5?

A * “/•faW <,

•PL Abraojos bc °l*nt

v v Pi oVˆlimo *l* ˆPommgoˆV,

Pt.San Juanloo

$itch<trir<*,n

•ˆOrleans

G UfC h inerlT ‘fl N

Conroe I

* Marble Fall8Pˆ-ˆ|N

Austi»Vj7. -r.rr,m._ n M.Wrt

. Boerneˆvˆ

San dnr.

‘Beaumont/

ˆ ˆrvTSab inC(Jtul ‘*l*JlaMl

ˆlitˆ/ˆSablne

ˆPort Bolivar

’Galveston

‘Rleanc% IQrand Lake *

Marfa

Houtnj

t Awoel Df.)

A c-Tcpo,„,

ˆ>Mocteruma \ «■

,’rˆr \V »t5, R““ ., U

ˆ. ddamoa % T n«7|ico T*nU(

v “ror\AˆJ

■fviMM « ”“‘ity-Sr

Cumuripaˆ/ /> San ˆ “*» ˆ,08« oAlovae, *Nioolae «Vˆ!*TV Mon „

1-x, 3v, PATO.toWc/.op,

■aorav v ˆv“‘,,Arr\ “o* S.,Andres’ . OM NO

Gert ru <Hˆ~>T ’ S-Wlguil

-7 ¥ CjTrr-rˆ votcan 0Eys *• Trinidad

-ˆosv,n4N&to|>C. W.S.

Shiner’

oCns Cruces

iJavali VV

o S. del Carmen. ˆ

| La Bab la o **** > £

o Garcia „ Roaltaˆe/j

v Roslta Sta. fc P«:

Cuerˆˆv

ˆyictorla

ˆPorJxDav

‘Velasco

Aldima San Antonio *

’N Santa Eulalia iU/VO Of / -\>Maj\ula LOS CRIST IAN

JCCOˆT,.! ,T yKifiTjh - - - ˆ

■Q. B*‘ ˆfeW‘7 Salevo*/ L

!. dwiM* P / 8. PtdroNfeanta Rosali

■W txsj lAf X

. tˆIM»!|inrhohk> °N/i«

[l aca ariso1’ y JU’i !nr Cftnchoa

06 M ‘t ˆMituia \(ffvaj

v.V/ HorciUoaK <1, Rincon

tO/Fuctt, •fv’SM iny

//’X’orotca _ ,b?”*tii4.B.ri,oX

„V«»A0./c,

/Nvki» rbˆ4

; ,2»«#

yPl ay ˆ3ol»rado /o Y aoob l\ D

xj Cyliaoan TalaBuI’””/ 1

fx/£/£Mntn?orda

yffuiyoria Bay

Boevillc yv Skidmore 1 j

Carbon

/ _ \^. vuinui

[p£ LOS QJQANTES Muiqtrhˆ

ˆ //*» ./divi r ,ia ‘e. ,i._V

‘Tarpon it Christ*.

‘Laredo

BOLSONKDE MAPIMI S. IVuHaBarroterat, Slirra Mojada L. de °

»»« 1,0 oe4o«ˆ.,%>X

irrollloa I ˆ ,-VV, … X

Laredi

Mr < n

Dorado

O Falfurrias’

Sag0 °,A H u ls&4

StnfforlhE, < ,‘1“”\ ‘

_ ˆ C oronail/P V

Rosario

j — ‘~Qt‘rp/ˆJ°r’L> Verm

Vsestin _ ˆune‘ vˆ, Descubridoraa ■,) El Oro 1W-T*

auiitr ‘oˆ. \i

Rev noaa°4 — ” NA Llorreraa’s, Canales P* r<?y / Rosita**

/ yt* / Gjito d« Agua

ran / ° atraiore dt ■,,« ˆfeiaMcnJci u/T \C onchai

° Burgos

V’*3‘1»S. Jose 1

XPiedra o ˆ\(Jrandc CrulIUa

T/ilMAULIPAS

ˆsTlnajas

‘ˆrownsville

ˆJatnmoros

«*AGOALE\AyVˆVfo

C. S. Uztro/MUn Bctk‘ a AfarioBTˆ c. Corso >a I w •Magdalena bayˆ\

8. AiargnrilaM C..Tijgoo

/?. 5. Fernando

rSaltilJy’

Cncaiftad

.Corralog^^711* ° JJˆlniulcm. Hoi L Waia- ,c0fnˆo Y\i

VoantiagoycA*” Y I VeUrduMˆS.

XPapaa.iuiu-o .‘[Chup.d.rn. fer. fOvXi’ati’S z| | a r)

ˆjCˆrjn olteroy/rapona V_ C’ ■J > I y Chorrj. ˆSTMiˆuˆ 0La Puntˆ yiercac

fj IloquUlaa Cerradae jD. S. Antonio D. de Jcaus

Linares’

PoWC

Concepcion La Grunldora/

CKEClENTEˆVe *

P.JHar.|ulsˆR

Conhi

Ascension

S. FraVnciaco i° ? X Gusman

La frueba

Coloradc

CojotJtWV “ El Pt. PlaxtlamC *y °(.L Pt CruesaSvyp “Noria j? MazatlanSx«eiydo/^ Co%Ml,fe El RoiriSjt- , Chametlaˆˆ^T r TcaeapnuˆVXc

Boca de 2\ acaj > a n’S ? \

la Marina

MEXICO

pcjrwL/Kl0 Grander Ir ■ Ch.P|,.h.,i»KS5juilta/di

/Z|A CATECfAS

Am1‘1?0 FrcanllJCo JprcM

Xdel T”ul /;«.t5.\cai.

I yZaoutocnsVˆv ,

Guadalupe’

B. Tndioa JJoralnnct

Statute Miles* 155 = 1 Inch.

• B. do Trinulad

LMtainlra \ Tampico

Icotan? %1

Xostlc.

‘«VtuA

Rand McNally’s New 11 x 14 Map of Mexico. Copyright by Rand McNally k Co.

C. Rojo

JUl. BlJlNQUlLLO

/ 0 1. Lonos

iVerdeT«m!

MadreVˆ 8an Bnˆ.

iwauiwO pL0Tˆ°°i

Pt. Razo/

. _ Pt. Mlta /

I. Trfs Mariktas •..* CˆJ7 Bay Banderas) x c. CorrlentosCˆTTT, \ Pt. Ipala\

\ Toinanan°

irnminl

oQtol

dlVtMSl-

‘AbuaUD

Zacualtipan IvERAV \ MA S. Pedro ° ‘tRuj\ \

MeUtlttan X\

Q Q ApulOO i / V ‘

„ mi. * ■ˆSo 5I HuehuctlaV. /\

-wV #ep°noˆ.0s6 .ˆacauco

G A*,

Zlmapan

,Taxco

QUERBTARO

‘Nochlstlanj

Aguas

B. Tanuijo ‘ P. Piedraa

J4nda ˆ Jacaia° Loi0tla > I Taxcoo 0 ˆei

T HIDALGO -M

Vtuicbapan-Yo

iXopsˆ Pachuca//

/Valladolid

%T,r:a

‘Corona,

guanAiuato

Chlconti

Cardonal o o Bonanza

Grioga >

•8ecapa_

\ JTenabo_-

P. MorroBˆganlpˆyW TV O oil ill 1 a . / .‘Ll .lit

Vjˆ Tasqulllo°

) Alfsjayucan Mejia J x ˆ ˆ

Ahorcaac

:mjnuilpan ‘ \ olhtopto 0Chilcuautl*

n.liianMcl Rl < Salvatierrs XXcainija

IfP* «

f’larasoano

Urm. W” o picn

Pustbunloh

Ch’»‘S1 .T.„„„,e

•JrjP

Tepetltli

jT • ^

-TulaW^

•o v 1 xj Zamora 1 - ■■ y — “‘C^— -^^5°”* vjlt 9

iSayula ; , I ■ l.MoreliB/f»rat»iio? ‘SSvOrol’*^“i*,|i |7 >

\0«udad G U7, InanJLos Reyes 1 ox ,. >• 0 n « d a’I u 1 ■« f 7\ „ JJJ/

tfkhF’ xjl®

jE/lonila/ *f 1 7-^R • R > Zltaouari > 4-^G«I.W«*^fc^*

Jollnia//’ MH C HOACAN ICO.

.V 1 1 naoen.”^»’^?,?4;&eo\ W

;u ’rjJ . ^ . _ / ‘V.n °Iur’clto Culraavooa^ J

’onan ua yaha^tFTS^\Churumuco Uuctamo ‘MORE

4% Agn’mii^^ViS^Siw.

>. Uimas~^/y,Z»citu\»|J .Tk6(, »XJS“| “1^. ^

P. TrlneoM/X - |4SbM«^0a „\

B. Wn«oVC< ;’ A “ftep‘1, u I1; A

.Cazadero

r Champ Cbenl Sahcabj Aguada^/

-Ameali

Danu O Maravlllaa’

GUAN/

JUATC

‘TulaRci

xSnntTuJ

Estanclaˆv. San Anto¥4stˆ ‘■do SoTahlpuilpon j Tultv-9 Acubay \

Teiaaxcalcingo

roaUban

iocopa-

Manzanil

0 Mam»ntel

Jjcdro fj:

° Za cat la no •MCh Igriah uapan

,KbmW»*

Cuyutlan*

‘Sperm*™?

SanXeUˆlai Huehuctocn > Zumpa lttTeoldvuoan y Tulte

IO c 8. Andres Cr

X Wa.»ca/> Tuxtla W

yfs’

7 / Hr.o Juno ˆoOcoaUftO’ 7 Et*WI1B7 ˆM\n*l\laa ‘V.tCeft - *Sˆ\e/ Ctynuiueca \ ,

T.ncb\

L Villa A’taM /.Tjfrtugas

“Luc’rˆcˆˆr 1 Huimang’

Uwoctvi, ˆilhlomarca >,

W’-CA’..t irU.e.. *

Teziutlan

-ˆU o7(}pilarofti IslasV’

fhJS <#/ VoJ«lV?V rT ‘”“H/a/bˆa sc; o

7annpa ®*7 Snn .1 uuil . 7* /BoutUta)

ˆepa/ • Teapa /l ˆ

nV’KEmbaˆcadero ˆ®L®’

/A 0stuacan Xmatan

r l

I*01® /° -

t /Zautla . Oton •*Pochintoc*y

Cobceiwlou X [,. Juan / 4T&

‘.fe-f-v-cjS: . Juan / 1 , x

Sˆr ˆMe.etecf UlLˆ

! Puel«e» M4r*p.'i I’t/ˆrooeo L„, V

Vico ““ffl1!

yfSnn VloenteˆMˆ

Us Reyes rwiilovj

luJitJtlan 6. ‘Martin

Comyiab ia’ 7’

‘ Bartol < r„ ˆ Analco’ ejotzingOA Cl.nljji VFrailcBCˆ V’atulina— _

rProgreso iDduiirislˆ/hj \ \La Garltaˆs. Pcl.7S.jX jr-A — Podtogal VX ‘V«nJTl»lnepanll:

Flor de MariaV% lcsc/?GuadnIu| > e \ \o Ixtlshuad\i si znjub station’

ˆ/Culcatmn Parian ˆˆ-x ˆ Villa Juat

Flores “

Sanz

“EflOlf

Vlrreyes lluobaSˆ

•”“‘“‘•uu-x;

-=ˆ05 _

- ˆ ‘CblchlqulHa 3/

; Juan

GalerasX

I?alinl1las\

3 Toluca’

.jryjvEjutla S. Ger..dunO/N Mlabuatlan Teotepec

_ * V

Acapulc Pt. Plain

ixculu

Andres

Santa F«®ˆ Vera Cruz’

P.TVeri-ˆ

. Wrj£- loˆJjc de Agua

‘KfC;.:;:

/Rim’,,\iiada , „v\ ,

AV’OtoA Aca,ahgV ‘“‘“J

aˆTuxiliX/ *|

Huatusci

IxtapayC

l^Xvalle / N. DE TO lemascallepec

Snllna

Cruz-

Patffacolh

Jlˆcos‘41’

1 Puebla

PT \ \Tj A Barstoon

r I..M/

Coban ˆ 1

‘ˆAj-tlpi Tree MarlasiˆP [>\vLa~~Ret‘4rta|

-c-x°no)Q2rTOT5—

Y’ GULF OF B gjc’

: ”ElfUAN T SPEC M.p.e.eiˆJ’

B. S. Simon

Xanlca

Tututepcc

hAriOcjiflmDo „

TSW + VMPi

t-OP*’-

Mixtepeo

yt _ ‘ galam* 1

it*. Crux o’

0Ael Qulohe Zacar’t

krbara

micbioumula

C’hachapa T\T ”AlliMioX Tetela Tecall

Savann ,VO[«ˆtido M»r‘lv

.WSktfS \ u.

San \ Andres

o lGuajabo + ’

> d j \J

.is. .\ntonlor

Tenancin’

STATE OF

MEXICO

AND

SURROUNDING

COUNTRY

Statute Miles, 48 = 1 Inch

3pcrmnzav» - . \

Itamal del Molino

■xSanNicolas n ‘ fly ˆxVCuichapa Cotaato San Juan

\ \Omealnaˆ_ 5ˆ

NˆVPresidlo

- - ˆVNARefuglo Jo.

• *Tˆoamachalco is*Animas\Ei yttiado[/ • j Canada!

‘Tlaeotepec l Morelos A

.7 HONG

jfX-XˆVeGWC

epeˆv/Cuautla ‘ *Z*ˆyV Cuah u,ixrlt ‘VuloninˆX Hiiitchil

_ S. Felipe UUdVˆ’

[Tatctla-

itluatlatlai

Llahqˆrande

*n /sal\ˆdor:

Amur*

Lougitudc West from Greenwich

• •

MEXICO — AREA, BOUNDARIES, ETC. (1)

741

Population. — The official statement of the Mexican government that the population of the country had increased to 8,743,014 in 1869, to 10,791,685 in 1886, to 13,607,259 in 1900 and to 15,063,207 in 1910, does not necessarily mean that the population had increased at the rate this increase in the census enumeration would seem to indicate, but rather that the gradual pacification of the country under the Diaz ad¬ ministration, the extension far and wide throughout the land of the administrative arms of the government, and a certain decrease in illiteracy had made the work of the census taker more effective. A prominent official con¬ nected with the census department in Mexico City expressed it as his opinion, in the pres¬ ence of the writer, in 1910, that the actual popu¬ lation of 'Mexico was at that date nearer 20,000,000 than 15,000,000. Fundamentally the population of Mexico is Indian and mestizo (a mixture of Indian and European). (See Mexico — Ethnology). The official census of 1910 showed about 20 per cent white popula¬ tion ; but it must be remembered that a large percentage of the so-called whites have a cer¬ tain amount of Indian blood in their veins ; in fact there are very few of the older families that have not come under this influence. All children born of Mexican parents, whether in Mexico or in a foreign land, are, in the eyes of the law, Mexican citizens ; and foreigners may become Mexican citizens by naturaliza¬ tion by making application to the department of foreign relations, provided they have re¬ sided five years in the country.

Topography. — In length of coast line the peninsula of Lower California leads with 1,864 miles, Yucatan following with 615, Sonora 524, Sinaloa 317, Vera Cruz and Guerrero 286 each, Oaxaca 255, Tamaulipas 249, Campeche 224, Chiapas 137, Tabasco 119, Colima 99 and Michoacan 81. The greatest length of the republic is from northwest to southeast, 1,942 miles ; and the greatest width, east and west, is from the mouth of the Rio Grande to the United States' western boundary, 1,833 miles; and the narrowest is from the bar at

Coatzacoalcos (Puerto Mexico), on the Atlantic side, to San Francisco del Mar, on the Pacific, 134 miles. Mexico, California and Tehuantepec are the principal gulfs on the Mexican coast, the first named being the largest in the world. In the commercial development of this con¬ tinent they have performed and still perform a most important part. Mexico's great mass is the lofty Rocky Mountain plateau, which fills it almost from ocean to ocean, leaving but a narrow strip of coast. Entering from Guate¬ mala (where a spur connects with the lime¬ stone and coral tableland of Yucatan), the system trends west, forming a tableland 150 miles wide at Oaxaca, with a steep descent and slender coast on the Pacific, but a more grad¬ ual one by terraces to the Gulf of Mexico in Tabasco and Vera Cruz. This spreads out and stretches northward to the vast plateau of Anahuac, 4,000 to 8,000 feet high, where the oceanic relations are reversed, the Atlantic side being precipitous and the Pacific terraced. There is no single range corresponding to the Andes or Northern Rockies. The so-called cordilleras are merely the outer escarpments of the plateau, though often far above its mean level. Loftiest of these is the Sierra Madre

of the Pacific, traceable at a mean elevation of over 10,000 feet from Oaxaca to the United States. It skirts the western coast within from 60 to 70 miles of the entrance to the Gulf of California. Thence onward a far wider coast land has silted up. Along the Gulf of Mexico are the correspondent cordilleras of Tamau¬ lipas and Nuevo Leon, 6,000 feet in mean elevation. The southern central plateau main¬ tains its height of 7,000 to 8,000 feet with great persistency to within 40 miles or less of the Atlantic. Through Lower California is a similar ridge some 3,000 feet high. The plateau is not a level surface. Railroad elevation north from the capital varies by 4,500 feet, declining northward ; while the centre is intersected by short secondary ridges and valleys, mostly with the north-northwest trend. Most important of these is the Anahuac cordillera, surrounding the valleys of Mexico and Puebla ; its cul¬ minating point is the Nevado de Toluca (((snow peak**), 15,163 feet. But across this, and generally confounded with it, is a newer transverse ridge from ocean to ocean, traced by five active or recently quiescent volcanoes and several extinct cones, among which are Popocatepetl, 17,882 feet, and Ixtaccihuatl, 17,338 feet, in the centre, southeast of Mexico City, and Orizaba, eastward bordering Vera Cruz state, 18,696 feet. On the Pacific side is Colima (volcano), 12,989 feet; and the line runs out to the Revillagigedo volcanic islands. The sierras of Guerrero, Oaxaca and Chiapas are nearly parallel to this. The other high mountain peaks of the republic are the Ma-linche, between the

state of Tlaxcala and Puebla, 14,643 feet; the Coffre de Perote, Vera Cruz, 14,042; Ajusco, in the southern part of the Valley of Mexico, 13,075; Tancitaro, 12,661, and Petamban, 12,300, in Michoacan; Derrumbadas, 11,801, Ocelazin, 11,480, and Penal, 10,744, in Puebla; Cempoaltepec, 11,139, Oaxaca; Lanitos, 11,021, Guanjuato; Tzirate, 11,022, Michoacan; Zumate, 10,994, and Nava-jas, 10,289, Hidalgo; and Laurel, 10,138, Aguascalientes. The mountains of Mexico are ex¬ ceptionally picturesque and interesting, afford¬ ing innumerable views beautiful in the extreme.

Rivers. — Mexico possesses comparatively few rivers, and of these few are large and deep enough to be of commercial importance. Many of those marked on the map of the re¬ public are either wholly or practically dry a part of each year. This is especially true of the northern half of the country. The most important rivers are the Rio Grande (Bravo del Norte), which forms the northern bound¬ ary line of the republic for 1,097 miles; the Panuco, which rises in the mountains of the state of Mexico and empties into the Gulf of Mexico at Tampico, after a course of 360 miles; the Papaloapan, the source of which is in the mountains of Oaxaca and which crosses the state of Vera Cruz, emptying into the Gulf of Mexico at Alvarado; the Coatzacoalcos, which also has its source in the state of Oaxaca, and crosses the state of Vera Cruz, emptying into the gulf at Coatzacoalcos, its length being 186 miles; the Grijalva, which rises in Guatemala and crosses the states of Chiapas and Tabasco, to the Gulf of Mexico, 327 miles away from its source; the Usumacinta, which also has its source in Guate¬ mala, crossing the Mexican state of Tabasco

and emptying into the gulf a short distance south of Frontera, its length being 450 miles. Official reports state this to be (<the most navi¬ gable river in Mexico. w

The Tuxpan River, which has its source in the state of Hidalgo, crosses Puebla and Vera Cruz and empties into the gulf at Tuxpan. It is navigable for small boats. The Lerma, 457 miles in length, which rises in the mountains of Tenango, in the state of Mexico, crosses Jalisco

and Tepic and empties into the Pacific at San Bias. The Balsas, 428 miles long, the source of which is in Puebla and which crosses Mexico, Morelos, Guerrero and Michoacan, empties into the Pacific at Zacatula, in the latter state. The Yaqui, 391 miles long, wffiich rises in the Tarahumari Mountains, in the state of Sonora, empties into the Gulf of California a short distance below Guaymas. The Fuerte, 335 miles long, which rises in the state of Chihuahua, crosses the state of Sinaloa and empties into the Gulf of California. Other rivers are the San Pedro, 298 miles; Nazas, 279; Ures, 260, and Sinaloa, 260.

Lakes and Lagoons. — The principal lakes of Mexico, none of which are large, are Cha¬ pala, in Jalisco, a beautiful body of water some 51 miles long and 18 miles wide, the shores of which have become a favorite summer resort for wealthy residents of Mexico City, Guada¬ lajara and other parts of the republic; Patz-cuaro (in Michoacan), around which there clusters a wealth of historic, artistic and poetic interest; Cuitzeo, in the same state; Chaleo, Xochimilco and Texcoco, in the Federal Dis¬ trict and state of Mexico; Tepancuapan, in Chiapas; Tequesquitongo, Coatelolco an < d Hueyapan, in Morelos; Catemaco, in Vera Cruz; Caivel and Carpintero, in Tamaulipas; Encantado, in Tabasco; Bacular, in Yucatan; and Uriria, in Guanajuato. The principal la¬ goons are the Terminos, in Jalisco and Michoa¬ can; Tamiahua, in Vera Cruz; Madre in Ta¬ maulipas; Mezcaltitlan, in Tepic; Coyutlan, in Colima; Tecpan and Coyuya, in Guerrero; Superior and Inferior in Oaxaca ; Paras, Coyote and Agua Verde, in Coahuila; Guzman, Jaco, Patos and Santa Maria in Chihuahua; Xalto-can, San Christobal, Zumpango and Lerma in the state of Mexico; Meztitlan and Apan, in Hidalgo, and Santa Ana, in Tabasco. There are numerous other smaller lakes and lagoons in the republic, which are of much local im¬ portance, but which do not appear on the ordi¬ nary maps.

Valleys. — The principal valleys of the re¬ public are those of Toluca, Mexico, Cuerna¬ vaca, Puebla, Oaxaca, San Francisco and Orizaba, all of which are extremely rich in soil and most favorably situated as to climate and other conditions affecting their products, which include very nearly every article grown in other parts of the American continent.

Climate. — The chief natural glory of Mex¬ ico is its climate, which, though not as invigor¬ ating as that of some other countries, is one of the most delightful in the world. In few localities is there ever intense cold or in¬ tolerable heat. It is seldom that death results from freezing, and sunstroke is practically un¬ known. In the tierra calicnte or hot country, the temperature varies from 77° to 82° Fahr., in the shade, while on the central plateau, which includes the capital city, it

is much cooler in

summer and warmer in winter than in the United States. In Mexico City the maximum summer temperature in the shade is 85°, and winter temperature 72° ; in Puebla, 84° and 75°; in Oaxaca, 94° and 83°; in Jalapa, 89° and 87u ; in Queretaro, 90° and 80° ; in Guana¬ juato, 91° and 82°; in Pachuca, 80° and 77°; in Saltillo, °89 and 76° ; in Merida, 103° and 92°; in Mazatlan 91° and 84°. The average night temperature in Mexico City from June to October is about 55°. The warmest months of the year in that city are April and May, the last two months preceding the beginning of the rainy season, which there extends from June to November. In the regions near the gulfs and the Pacific Ocean, the rains are much heavier and more frequent, and begin earlier and end later. The average rainfall on the coasts is 44 inches and on the tablelands 24 inches. In Mexico there are but two seasons — the rainy, or summer, and the dry, or winter. The tem¬ peratures of the spring and autumn months differ very slightly, and the seasons merge into each other quite imperceptibly. The nights are always cool, except in the hot country, where they are seldom uncomfortable, the gulf and Pacific breezes compensating for the heat of the day. There are no radical or sudden changes of temperature ; no prolonged term of heat or cold or storm ; and on the tablelands all seasons are so nearly alike that most per¬ sons wear clothing of the same weight all the year. Except in the northern states, artificial heat is seldom provided, either in homes or places of business, even in mid-winter.

In few other countries is to be found such diversity of climate as in Mexico, whose west coast extends across 18 parallels of latitude, and where the altitudes of the towns and cities range all the way from 26 feet above the sea at Vera Cruz, to 8,760 at Toluca, each plateau or step in the ascent illustrating in its fruits, foliage and flowers the influence of every climatic phase and condition. The white peaks of Orizaba, Popocatepetl and Ixtaccihuatl look down upon a broad panorama of indescribable beauty to be seen only in this land of perpetual spring. The summer rains on the upper plateaus intensify the green of the verdure, in¬ crease the number and beauty of the flowers, develop the fruits, sweeten the atmosphere, and drive away disease. The sun's rays, being al¬ ways perpendicular, in the middle of the day are very intense. In the shade, however, it is never uncomfortable.

. aiˆ Fauna. — The physical conforma¬

tion of Mexico is most favorable to the develop¬ ment of a wonderfully rich and varied eco¬ nomic flora. In the hot lands or coast regions, from the sea-level to an altitude of 1,500 or 2,000 feet, cocoanuts, cacao, vanilla, peppers, nutmegs, ginger, cloves and other spices and all the fruits of tropical countries are success¬ fully and profitably grown; while sugar cane, coffee, rice, cotton, tobacco, hemp, oranges! lemons, limes, bananas, mangoes, apples,' peaches, papayas, pears, plums, figs, cherries, grapes, zapotes, pineapples, mameys, pome¬ granates, yams, sweet potatoes, Irish potatoes, most of the edible roots, and in fact about ali the varieties of fruits and vegetables grown any¬ where are found and successfully cultivated in altitudes up to and including the valley of Mexico, 7,500 feet above the sea. Wheat, com

CATHEDRAL IN THE CITY OF MEXICO

Photos by Kahlo, Mexico

1 General Postoffice, City of Mexico

2 Corridor in the General Postoffice

and most of the grains of commerce produce crops in some of the states, twice or three times in a year — notably in Vera Cruz, Tabasco, Chiapas, Oaxaca, Guerrero, Michoacan, Jalisco, Mexico, fifty-two species of cereals .and vegetables, 87 of fruits, 100 of odoriferous flowers, 56 of building woods, 21 of cabinet woods, 8 of gums, 3 of resins, 12 of forages and 113 of medicinal plants, reach a high degree of perfection in Mexico. . r lowers of almost innumerable varieties, from the gorgeous orchid of quaint and curious form and wonderful combination of colors, to the modest daisy, violet and tuberose, grow wild, in extravagant profusion, all the year round, the range of altitudes meeting the requirements of all the members of the floral kingdom The flower markets of Mexico City, which are chiefly supplied from the chinampas (gardens in the bed of the half-drained lakes of the neigh¬ borhood), are among the objects of interest most enjoyed by the visiting tourist, and they testify to the beauty and brilliancy of the Mexi¬ can flora. This country has been deservedly named wthe land of flowers, w for everywhere and all the year there are flowers of every hue and color. In the forests of the republic, especially in the tropical lands, are found many varieties of trees the timber of which possesses great value for building or cabinet purposes. Pine of several varieties, balsam, lignum vitse, Spanish cedar,

mahogany, oak, rosewood, mesquite, olive, palm, almond, fir, sesame, cedar, camphor, india rubber, copal, cacao, 12 species of dye woods and numerous varieties of oil¬ bearing trees are among the varied products of the country, the arboreal vegetation of which embraces 114 different species of woods. In¬ cluded in the fauna of Mexico are the Ameri¬ can lion (puma), jaguar, ocelot, wildcat, wolf, coyote, bear, wild boar, sloth, monkey, hare, rabbit, squirrel, armadillo, deer, beaver, otter, mole, marten, leopard, turtle, which are prin¬ cipally found in the sparsely settled mountains and in the forests of the tierra caliente. None of these are much hunted, the inhabitants of the country having little or no taste for this kind of sport. In the tropics there are many varieties of rich plumaged birds, and song birds are found in all altitudes. Parrots and parakeets abound in the coast regions and are highly prized for their talking qualities and brilliant colors of green, yellow and red. Among the many species of song birds are the zenzontla or mocking bird, the clarin and the nightingale. The birds of prey include the eagle, hawk, turkey buzzard and owl. The cotorra, talking loro, humming bird, sparrow, blackbird, turtle dove, woodpecker, swallow, magpie, heron, falcon, kite and great numbers of others, which inhabit the forests or fields where there is abundance of insect and other food for their sustenance, are found in Mexico. In all localities where there are fresh-water lakes, lagoons, ponds or rivers there are great numbers of wild ducks and geese, and in the forests the wild turkey abounds. Wild bees are numerous, and the Indians derive quite an income from securing their honey and market¬ ing it in the cities and towns. Of domestic or barnyard fowls the number and variety are very extensive, and their consumption is enor¬ mous. The waters of the Mexican gulfs, lakes and rivers are well stocked with many varieties

of fish of excellent quality, the most prized being the red snapper. The markets of Vera Cruz, Tampico and other coast cities daily dis¬ play a tempting supply and variety from the gulfs, the Pacific and the accessible rivers; and large quantities are shipped to inland points by railway, in refrigerator cars. In the immediate vicinity of Tampico many tarpon of large size are caught. Of reptiles there are many varie¬ ties, both venomous and harmless, especially in the southern forests. In the first named class are included boas, covals and rattlesnakes. There are many varieties of scorpions, taran¬ tulas and lizards, some of the latter being so large as to be utilized by the natives as an article of food. To the latter class belongs the iguana which often measures over five feet in length.

2. MINERALS AND MINERAL PRO¬ DUCTION. For three centuries Mexico was the greatest of silver producing countries; from the single camp of Guanajuato came one-fifth of the silver mined during that period; and for one straight century the same camp gave to the wrorld two-fifths of its silver. Yet to¬ day, after almost 400 years of exploitation, Guanajuato has still uncounted unexploited wealth. Yet Guanajuato is but one of many great Mexican mining camps, known to the world for centuries. Whether the natives of Mexico prior to the Conquest formally worked gold, silver and copper mines is an open ques¬ tion ; but that they did exploit the placer de¬ posits of the rivers of the country there is no doubt. Placer gold in quills passed as currency in Mexico at the tinr of the discovery and for years afterward. Gold, silver and copper orna¬ ments, idols and other figures beautifully and often elaborately worked, existed in vast quantities at the time of the fall of the capital of the Aztecs. Since then, throughout four centuries, examples of the metal work of the natives of Mexico and Central America have frequently come to light; and still to-day ex¬ plorers find these eloquent witnesses of the cul¬ ture of the Indian empires of America in the graves of their nobles and princes and the ruins of their great cities.

Spanish Colonial Period. — With the fall of the capital of the Aztecs in 1521 there began a period of wonderful mining activity throughout the vast extent of the empire of the Montezumas. From the time of their landing on the shores of Mexico near the side of modern Vera Cruz in 1519, until the conquest of the city of Tenochtitlan two years later, Cortes and his followers were inspired by a dream of great wealth to be amassed from the treasure of the emperor of the Aztecs. This dream was ’made more vivid by the presents in gold with which the unfortunate Indian ruler sought to bribe his unwelcome guests to leave the country. After the fall of the city the Spanish adventurers awoke to find their dream of sudden wealth un¬ realized in so far as the capital of the Aztecs was concerned. But they lived in an age when strange fantasy colored the lives of men. If the much-desired El Dorado was not in Mexico City, then it was somewhere else; and the hunt for the golden treasure was continued. Thou¬ sands of buscones (prospectors) radiated in all directions from the capital in search of the hidden treasure. In this hunt mines of fabulous richness were discovered and towns sprang up

like mushrooms in the almost inaccessible fast¬ nesses of the mountains. By 1537, when the first official report of the vice-regal govern¬ ment was made, the mining industry had be¬ come firmly established in many parts of the colony and was already paying important con¬ tributions into the treasury of the Spanish court. From the establishment, in 1535, of a settled government under the direct representa¬ tive of the Crown, this mining activity increased with great rapidity and continued to extend it¬ self farther and farther from the capital, the centre of colonial life in New Spain; and the dream of finding El Dorado was never alto¬ gether dissipated during the 300 years of Span¬ ish rule in New Spain. While the glitter of gold was always before the eyes of every bus-con the soft, white gleam of silver brought un¬ expected wealth to thousands who often squan¬ dered their newly-acquired fortunes in the search for the elusive yellow metal. How great was this treasure of silver wealth that Spain extracted from the rugged sierras of Mexico may be gleaned from a study of the report of the government mint. From 1537, when the newly-established royal mint issued its first statement of mining activity, to 1821, when Spain withdrew from the colony, the recorded silver production of the mines of Mexico amounted to $2,082,260,657. During the same period the gold output was only $68,778,- 411, or less than one-thirtieth of the silver re¬ turns. Large as these returns are, it must be remembered that probably not more than half the ore mined was ever reported to the govern¬ ment because of the excessively heavy taxes exacted by the Crown, which claimed as its right the royal one-fifth, and frequently, under one pretext or another, succeeded in extorting more from the mine owners. Quicksilver and powder, the most important aids of the miner in Spanish colonial days, were royal monopolies and conse¬ quently were sold in Mexico at from three to five times their market values. These and cer¬ tain local, city and port exactions mulcted the miner of at least another fifth of the output of his mines. Transportation of ore from remote interior points, over almost impassable moun¬ tain trails, occupied from weeks to months in transit between the mines and the capital or the nearest port. Provisions and mining supplies had to be brought to the camp in the same slow and costly manner. All these extraordinary expenses made it possible for the miner to work only the richest ore and forced him to leave untouched veins which, in modern times, have become sensational ore-producers. It forced him also to sort out the richest of his rich ores and t'o leave the poorer on the dump heap. These dump heaps, worked over by modern mining

methods, have produced millions to foreign investors.

During the Spanish colonial period Mexico was literally the silver treasure-house of the world; and most of this wealth went to Spain; and it all, whether it went to the Crown or to Spanish adventurers and capitalists, contributed to make Spain the richest country in the world, thus shaping her destiny and making of her people a nation of adventurers seeking fortune in the vast colonial possessions covering the greater part of two continents, and disdaining the industries, trade and commerce. With her vast wealth Spain purchased from the rising

industrial countries of those days, the Nether¬ lands and England, what she required at home; and the mines of the colonies paid for it all. As a natural result, the national life of Spain was disrupted and the industries languished where wealth came so easily; and she taught the colonies to view life from her own point of view. Mining and the manipulation of vast estates became almost the only occupation of a gentleman. So, from year to year, from every mining centre in Mexico and the other Spanish American colonies, buscones were sent out con¬ stantly in increasing numbers to look for new mines. Men pawned their all to go on the same quest. Every decade witnessed its rush from one promising mining district to another. Taxco, Guerrero, was opened as a mining camp in 1522, the year after the fall of Mexico City; and from there numerous mining expeditions were sent forth to seek for new centres of wealth. One of these reached the far-distant state of Chihuahua in 1544. The discovery of Parral, Santa Barbara and other rich mines, caused a rush of miners from the centre and south of the country toward the north and west. In 1546 Zacatecas became the centre of this mining excitement, which began to shift, in another two years, to Guanajuato. In the same year the Bolanos mines of Jalisco began to attract attention and other centres of rich mineral deposits were discovered in Zacatecas. The following year Hidalgo came into notice through the sensational discoveries of ore at Real del Monte. All these mining districts are still producing ore with no signs of exhaustion and most of them are admittedly but partially exploited. In 1552 Durango was invaded and, three years later, the discovery of bonanza ore in the Sombrerete mines brought the state of Zacatecas into the galaxy of shining silver stars. In 1574 Charcas, San Luis Potosi, opened silver mines destined to make the state famous. About the close of the 16th century, the chief mining interests of Mexico centred about Mapimi, Durango, which promised to become a great gold and silver producer. Scores of other more or less important mines were opened in the following years, among the

most noted be¬ ing Guadalcazar, San Luis Potosi, 1622; Batopilas, Chihuahua, 1632; Candelario, Chihuahua, 1638; Santa Eulalia, Chihuahua, 1700; El Caballo and other mines in the same state, 1703; the famous Magdalena district, Sonora, 1725; Talapujahua, Michoacan, 1740; a new Real del Monte district, 1759; the Valencia, Guanajuato, 1760; Catorce, San Luis Potosi, 1773 and La Purisima in the same state, 1780. All the dis¬ tricts mentioned were wonderful producers. The Mapimi mines, in Spanish times, made numerous owners wealthy, and since the estab¬ lishment of the republic German capitalists have made of them one of the greatest gold and sil¬ ver producing centres of the republic. The Batopilas mines have made the state of Chi¬ huahua famous and attracted foreign capital to themselves and to neighboring mines. The recorded output of the Candelario mine for 100 years was $35,000,000, but so notorious was the avoidance of the payment of the govern¬ ment taxes, that the amount was undoubtedly very much more. At the beginning of the 18th century El Caballo claimed to be the richest mining district in the world. In 55 years its recorded output was over $85,000,000. The

Parrai district, famous in Spanish colonial days for its wonderful richness, has, in modern times, under English, American, German and other foreign management, justified its reputa¬ tion as one of the most extensive and generally mineralized districts in Mexico. The Real del Monte, which also produced wealth in Spanish hands, its output in one year being $15,000,000, has since, under English capitalists, extended its field of operations and has made itself known wherever silver is bought and sold. But the greatest single silver mine in the world is the Valencia, which paid to the govern¬ ment from 1766 to 1826 taxes on $226,000,000. It probably produced over $5,000,000 a year for 60 consecutive years. Vast sums of English and American capital invested in this district have done much to develop it along modern lines and to make it known. In the one year 1713 it is recorded as producing $14,000,000; and so much ore did it yield for a number of years that it made all its owners immensely wealthy. The Talpujahua mine in eight years yielded $18,000,000. The 17th century was one of development for Spanish miners in Mexico and the 18th one of wonderful production. Toward the close of this latter century

the recorded yearly output of the mines of Mexico was $27,000,000.

The Revolutionary Period.— This, begin¬ ning in 1810 and continuing till 1821, disrupted all the affairs of the colony. Mining suffered so severely that it did not recover completely for nearly half a century after the Spaniards had left the country. In 1821 the output of the mines of Mexico had dropped to less than $5,000,000' a year.

From Iturbide to Diaz. — Mexico, under the administration of the emperor Iturbide, through the national congress in 1823, favored the de¬ velopment of the mining interests of the coun¬ try. It abolished most of the exactions im¬ posed upon miners during the 300 years of Spanish rule, and passed mining laws allowing foreigners to enter the mining business in Mexico. Notwithstanding the unsettled state of the country, the inducements offered to forign capital were so great that vast sums of English money poured into the country for investment in mining enternrises. This was the beginning of that great English influence which remained paramount in Mexican mining affairs until the beginning of the Diaz regime in 1876. During this period the records of the mints show silver $797,055,080 ; gold $47,327,383 and copper $5,227,855. Since then copper has be¬ come one of the largest and most important products of the republic. After the departure of the Spaniards from the countrv few people in Mexico were possessed of sufficient capital and knowledge to work the mines abandoned during the revolution, many of which had reached depths requiring powerful pumping and other machinery and exploitation on an ex¬ tensive scale to make the business pay. The English were quick to see the opportunity thus presented; and many companies were formed to acquire and work these old mines and to exploit *new ones. In six years (1822-28) six powerful English companies, with a combina¬ tion capital of 3,000,000 pounds sterling, en¬ tered the Mexican field. Among these com¬ panies were: The United Mexican Mines Asso¬ ciation, owning mines in many states of Mexico ;

the Anglo-Mexican Company, which also ac¬ quired many mines; and the Real del Monte Company. These English companies did what the Spaniards had never been able to do. They transported powerful modern pumping and other machinery over apparentlv insurmount¬ able sierras and made it possible to work the rich ore below the water level of vice-regal days. They thus practically created new mines. Among these British investments are included most of the famous

mines of those days; Valencia, Mellado, Villalpando, La Luz, Charcas, Catorce, Fresnillo, San Udefonso, San Dimas, San Francisco, Guanacevi, Parrai, Santa Eulalia, Batopilas, Real del Monte, Santa Gertrudis, Blanco, El Oro, Temascaltepec, Bolanos, Tezhuitlan (famous copper district), Taxco and Real del Castillo.

From Diaz to Madero. — From 1857 to

1883 the control of the Mexican mining laws was in the hands of the officials of the state governments. This did a great deal of harm to mining interests, created confusion and laid the door wide open for grafting. So in 1883 the Federal government was forced to assume charge of the direction of all mining affairs. At the same time a commission was appointed to consider the mining situation and to reform the mining laws, which it did in such a liberal spirit that mining again took a fresh and vigor¬ ous start. Porfirio Diaz began his adminis¬ tration in 1876 with a broad view of the necessi¬ ties of his country. He extended the hand of welcome to capitalists of all nations who might help him to realize his dream of a greater and more prosperous Mexico. When Diaz returned to power in 1884 after Gonzalez' four years of office, he continued vigorously the policy of encouraging the mining interests of the country, which during his first term of the presidency (1876-80) had reached the value of $103,000,000 gold and silver, with the additional potential energy of hundreds of new mining claims registered, properties opened up and many abandoned mines put into operation once more. About this time American, German and French capitalists appeared upon the scene and began to compete vigorously with English investors for a share in the Mexican mining business. By 1884 this competition had already become strong, and from then on it grew in intensity until, in 1913, when the revolution practically halted mining throughout the republic, it had assumed large proportions. Of the newcomers the Americans were the most aggressive. In

1884 Edwin Ludlow, representing American capitalists, began boring for coal in Mexico; and five years later the great coal deposits of Coahuila, at Sabinas and other points, were in full operation. In the 10 years following 1895 over 6,000,000 tons of coal were mined in Mex¬ ico, and by 1910 the output had reached 1,500,- 000 a year. The discovery and exploitation of coal in the republic gave, great impetus to mining and other industries. Between 1885 and 1910 Lower California, Michoacan, Coa¬ huila, Sonora and Puebla became great copper-producing states and as such attracted large sums of foreign capital, American and French; and the production of copper rose from 11,620 tons in 1895 to 55,000 tons in 1905. Owing to the slump in

the price of this metal, this in¬ crease was not kept up during the next five years. Copper and petroleum and its products

were, however, the only mining interests that continued active throughout the revolution, the output of the former being valued, in 1912, at $38,500,000. Mexico ranks easilv in second place among the great copper-producing coun¬ tries of the world. In 1906 official returns showed in the republic 35,087 copper mines and mines containing copper values. After eight years of exploitation of antimony Mexico had, in 1910, become the world's greatest pro¬ ducer of this metal, with vast deposits still untouched. Two years later her production of antimony had reached almost $2,000,000 per an¬ num. At the beginning of the first Diaz adminis¬ tration capitalists began to pay attention to the gold deposits of the country, with the result that, between that date and 1909, considerably over $1,000,000,000 gold was mined. Even in 1912, notwithstanding the revolution, the gold mined was valued at over $50,000,000, while the fiscal year 1908-09 had produced $62,700,000. In 1894 the introduction of the cyanide process began to replace the old patio process, thus giving an added impetus to the mining of low-grade ores and this helped the mining business very materially. A few years later foreign capitalists began the utilization of water-power for the production of electrical power and elec¬ trical plants appeared in different parts of the republic. Of these the most extensive and im¬ portant is that of Necaxa which supplies the power to light the City of Mexico and to run the tramways and many of the factories of the Federal District. It also furnishes 30,000 horse power to El Oro and electrical energy to other neighboring mining centres, including Pachuca. Mexico, on account of its mountainous nature, possesses a real wealth of water-power, which must soon be brought into use to develop her vast mineral riches, a very considerable part of which, o vying to adverse natural conditions, still remains untouched. The most noteworthy development of the mineral wealth of the re¬ public of recent years is to be found in the vast petroleum fields stretching down the Gulf Coast from Matamoras to Campeche, and probably farther, for the southern end seems to

connect with the oil fields of Colombia. So great are these fields and so vast their wealth that Mexico must soon become the first oil-producing coun¬ try of the world. Although oil was known to exist in Mexico for many years, it was not until 1901 that the Mexican Petroleum Company, a California corporation, began prospecting for oil in the neighborhood of Ebano, near Tam¬ pico. About the same time W. Pearson and Son came into the field, with unlimited Eng¬ lish capital. Then followed a rapid develop¬ ment of the oil fields near Tampico and on the Isthmus of Tehuantepec, Tuxpam, Minatitlan, the Papantla district and other points in the neighborhood. By 1907 the production of oil in the republic had reached 1,000,000 barrels a year and by 1913, 16,746,000. Two vears Tater the output was 35,000,000 of which about 75 per cent was exported and in 1918 it was over 60,000,000. The returns in the near future promise almost double that of 1915 owing to the great well of the Mexican Petroleum Com¬ pany opened in December 1915, which is said to exceed in flow the whole oil output of the State of California. According to the report of the Mexican Secretary of Industry, Com¬ merce and Labor (1918), there are over 600-000 kilometers of oil lands in the republic. These extend along the Gulf Coast, the coast of Lower California and the Pacific coast. Of these only 15,000 have been exploited. See bibliography under article Manufactures.

3. AGRICULTURE AND STOCK RAIS¬ ING. In normal times the chief agricultural product of Mexico is Indian corn, which is val¬ ued at from $80,000,000 to $100,000,000 a year; yet, owing to the unscientific methods of cultiva¬ tion still in use, it often happens that corn enough is not grown in the country for its own needs ; in which case the government is forced to throw off the duty and, in extreme cases, to import corn itself in large quantities and to sell it to the masses at cost. The next most valuable product of Mexico is henequen which is valued annually at over $40,000,000. As the greater part of this product is exported, it constitutes the chief wealth of Yucatan, which has grown to be, for its size and population, the richest state in the republic, though it was once the poorest. Although Mexico has never been looked upon as a wheat-producing country, yet the owners of large estates have latelv come to realize that its capacities in this direction are practicallv unlimited and an annual output of wheat valued at over $20,000,000 is not uncom¬ mon, while this figure is sometimes exceeded. One of the products of Mexico which have be¬ come of national importance within very recent years is rubber (including quayule) , the output of which was over $33,000,000 in 1911, with vast extents of young rubber plantations rap¬ idly coming into bearing. The following statis¬ tics of the growth of this industry

are eloquent:

YEAR Rubber Guayule

1906-07 . $6,679,000 $61,225

1907-08 . 8,892,000 1,233,000

1908-09 . 8,719,000 4,541,000

1909-10 . 16,760,000 9,468,000

1910-11 . 21,188,000 11,797,000

In the fiscal year ending 30 June 1911 the ex¬ ports of henequen were valued at over $25,000,- 000; the cattle exports were $4,438,000, which did not include vast numbers which left Mexico without the knowledge of the government or from those parts of the country under the con¬ trol of rebel factions. Some of these went to Guatemala, but the greater part to the United States. In the same year the value of the hides exported reached nearly $10,000,000 from the territory controlled by the then existing govern¬ ment. In normal times the value of the prod¬ ucts of sugar cane (sugar, alcohol, rum, mo¬ lasses and cognac) is second only to that of corn, reaching, as it does, usually over $40,000,- 000 a. year. This is a branch of the native in¬ dustries which is capable of great expansion, since Mexico possesses vast bodies of land suit¬ able to the cultivation of sugar cane. The first years of the revolution showed a very consid¬ erable increase in the exports of coffee, rubber, chicle, tropical fruits, guayule, henequen, ixtli, dyewoods, cabinet and building woods, tobacco and vanilla. Owing to the fact that the revolu¬ tionists had gotten possession of the great sugar state of Morelos the sugar cane output de¬ creased to less than 1,000,000 pesos and the in¬ dustry became practically paralyzed, from which condition it has not yet recovered, principally because the production of the sugar cane and

its products calls for the investment of heavy capital and the employment of skilled labor in certain departments.

A brief reference to the chief features of the agricultural industry of the country will prove instructive and interesting.

Sugar. — - The greater part of the cane is grown at altitudes above 2,000 feet, but the best results are obtained in the lower country, where it matures sooner and where it may be cut twice annually without necessitating replanting more than once in upward of 10 years. In the Cuernavaca Valley, state of Morelos, the first sugar estates were cultivated by negro slaves, bought at Vera Cruz, at from $300 to $400 each. But the experiment proved unsatisfactory and free labor was soon substituted. Now the plan¬ tations are worked chiefly by Mexican labor and the mills are supplied with modern machinery.

Tobacco. — This industry is also developing great possibilities. The climatic and soil condi¬ tions, especially in the tropics, are very favor¬ able to the best results, and whereas in Cuba the soil, after 400 years of constant use, has be¬ come comparatively unproductive, in Mexico no artificial stimulant is needed and the flavor and aroma of the tobacco are conceded to be equal to those of the Cuban product. The chief to¬ bacco states are Vera Cruz, Oaxaca, Hidalgo, Tabasco and Chiapas. Much of the Mexican tobacco is bought up two or more years in ad¬ vance of production and resold as fine Cuban tobacco.

India Rubber. — While there has been much unsatisfactory experimentation with the rub¬ ber tree, the failures have generally been chargeable to lack of knowledge or experience or to the introduction of illegitimate specula¬ tion at the expense of practical results. There ■now exist in southern Mexico a number of large and very successful rubber plantations, which have already proved that cultivated rubber can be made a paying proposition. These are chiefly in Vera Cruz, Chiapas, Campeche and Oaxaca.

Agave or Maguey. — This plant, from which is extracted the drink known as pulque, which the natives use in immense quantities, is perhaps the most important feature of the agri¬ cultural interest of the central plateau. Al¬ though pulque contains only about 7 per cent of alcohol, it is intoxicating when drunk in large quantities. It possesses important medici¬ nal qualities, is a tonic and very nutritive. From 350 to 700 agaves or magueys to the acre are planted. They mature in eight years and give sap for a period of about five months, produc¬ ing from 125 to 160 gallons of pulque each. The plants cost about $2 each bv the time they have matured, and give a return of from $7 to

$10 each. The pulque is secured by making a cav¬ ity in the centre of the plant, from the top, large enough to hold a few quarts, which are drawn out by rude syphons once a day. The leaves of the plants sometimes grow to be 12 feet long and weigh from 25 pounds to 100 pounds each.

Banana. — This fruit is successfully grown everywhere in Mexico between sea-level and an altitude of 5,000 feet. It is easily cultivated and very profitable. Frequently a return of $1,000 is realized from an outlay of $500 in a single season. A plantation of 1,000 plants, costing $500, will, under favorable conditions, earn this

amount, even though the methods used be faulty, the care exercised insufficient and the variety poor. A favorable feature of banana growing is the fact that the ground occupied by the plants may also be utilized at the same time for the cultivation of coffee or other prof¬ itable products. Few other tropical fruits de¬ velop and become profitable as quickly as does the banana. Especially agreeable are some of the smaller varieties, although they may not be as much sought after as the larger and more pretentious ones. Their flavor possesses quali¬ ties not found in any other known variety.

Orange. — The oranges of Mexico are rap¬ idly and surely winning favor in the markets of the North. Their true worth has only recently come to be understood and appreciated bv con¬ sumers. Although the orange finds favorable conditions in all the tropical and subtropical states, the best results thus far have been at¬ tained on the shores of Lake Chapala, in the state of Talisco and in Vera Cruz, Michoacan, Sonora, Morelos, Durango, Nuevo Leon, Oax¬ aca and Puebla. The leading producers in 1914 were Jalisco, Yucatan, Michoacan, Sonora, Mo¬ relos, Durango, Nuevo Leon, Oaxaca, Puebla, Sinaloa, Hidalgo and Vera Cruz. Although the oranges of La Barea, in the state of Talisco, are considered the best in the republic, thev have al¬ ready found competitors in the products of Mi¬ choacan, V era Cruz, Morelos and other locali¬ ties equally favored by nature. The best results in orange growing are secured at elevations be¬ low 2,500 feet. The trees begin bearing when three or four years old and increase until the 12th or 15th year. Frost never occurs in any of the orange-growing regions of Mexico.

Lemon. — It is doubtful if any product in¬ digenous to the soil of

Mexico has been as sadly ‘neglected as the lemon. So largely has it been relegated toward the lower end of the list of tropical fruits, in favor of the lime, that it can with difficulty be obtained in the markets, and when found is generally unsatisfactory in quality. And this, notwithstanding the existing very favorable conditions of soil and climate and the increasing demand in the world’s mar¬ kets. A very considerable part of the lemon crop of Mexico consists of wild fruit which, in many sections and especially on the Pacific Coast, is large and of excellent quality. It grows in the forests and jungles of the semi-tropical lands, at about the same altitude as the orange.

Lime. — • This successful rival of the lemon, in Mexico, is grown chiefly in the states of Guanajuato, Puebla, Michoacan, Mexico, Ja¬ lisco, Oaxaca, Guerrero and San Luis Potosi. The lime of Mexico is of very excellent quality, but like the lemon and the orange, can be greatly improved by the adoption of proper methods of cultivation and the exercise of rea¬ sonable care.

Pineapple. — In the production of this fruit Mexico excels and is constantly improving her output. The towns of Cordoba and Amatlan, in the state of Vera Cruz, have long been noted for the size and quality of the pineapples grown in the regions round about them. The fruit is also successfully raised in the states of Puebla, Hidalgo, Tabasco, Chiapas, Oaxaca, Morelos, Guerrero, Michoacan, Colima, Jalisco and Nayarit. It thrives best at elevations of 2,000 to 3,000 feet. It was cultivated before the Con-

quest. Its leaves have for centuries been util¬ ized to a greater or less extent in the manufac¬ ture, though by crude methods, of rope, twine, thread, mats, bagging, hammocks, paper and cloth of various colors. The value of pineap¬ ples grown in 1913 is given as $642,382, the chief producers named in the official reports being the states of Nayarit (then territory of Tepic), Hidalgo, Vera Cruz and Tabasco.

Other Products. — -Included in the general category of agricultural products and of the numerous other articles closely allied to them,

which are or can be successfully cultivated in Mexico, may be mentioned the yucca, or starch plant, which is said to contain six times as much nutritive matter as wheat, and which is grown principallv in the states of Vera Cruz, Oaxaca, Chiapas, Tabasco and Yucatan; chicle, or chew¬ ing gum, of which over $4,340,000 worth has been exported to the United States in a single year; the mango, one variety of which (the Manilla) seems to combine about all the more delicate and delicious flavors of the choice fruits of the world. Being very perishable, it cannot be transported a great distance without suffering serious depreciation in value. The apple, peach and pear are all grown in various parts of the republic, but none has vet been brought up to anything like the standard of ex¬ cellence reached in the United States, notwith¬ standing that almost all the natural conditions are exceptionally favorable to their cultivation.

Stock-raising. — The plains of northern Mexico and the valleys of the southern portion offer most favorable opportunity for profitably engaging in the livestock business. The climatic and other conditions are verv favorable, the grasses are most nutritious. The transportation rates and facilities are such that cattle can be raised in Mexico and shipped to the markets of the United States at a good profit. An idea of the increase of this industry in Mexico may be gained from the reports by the government of the number of cattle exported annually. These show a regular and very considerable in¬ crease in normal times. The Para grass of the southern Mexican states is always green, grows luxuriantly and is very nourishing. It is estimated that an acre of this will feed two head of stock the year round, and that three acres in pasture will fatten four head. Because of the great number of flies and ticks in the low country, very young stock thrives better on the higher plains of Durango, Chihuahua, Michoacan, *etc.* Mexico has an abundance of sustenance to provide for an enormous in¬ crease of her present supply of livestock of every kind. The states of Durango, Sonora, Chihuahua, Nuevo Leon, Coahuila, Sinaloa, Tamaulipas, Vera Cruz and Michoacan consti¬ tute an admirable field for the carrying on of the cattle industry. As far back as 1883, there “roamed over an area of 300,000 square miles in the northern part of the country, }) accord¬ ing to a well-known writer, (<1,500,000 cattle, 2,500,000 goats, 1,000,000 sheep, 1,000,000 horses and 500,000 mules, and there were 20,574 cattle ranches in the republic, valued at $515,-000,000.M Between the cities of Jalapa and Vera Cruz, and between Vera Cruz and Cor¬ doba, great numbers of cattle were to be seen from passing railway trains, their sleek and well-rounded sides testifying to the excellence of the indigenous grasses before the revolution

came to partially destroy an industry that prom¬ ised to become very much greater in the near future.

The future of agriculture in Mexico is now apparently brighter than it has ever before been. The government has attempted to settle questions which have long been calling for so¬ lution ; and among these none is of more im¬ portance than that of the division of land. The law of the republic calls for the subdivision of the large estates of the countrv and for the creation out of the Indian and mestizo popula¬ tion of a gradually increasing agricultural class which shall grow into a great middle class in the not distant future. See bibliography under article Manufactures.

4. COMMERCE. The efforts of the vari¬ ous governments of Mexico since 1876 have been steadily directed toward the encourage¬ ment and extension of the commerce and in¬ dustries of the country, external and internal. This has been done in the face of many and great difficulties. At the beginning of the Diaz regime Mexico was overburdened with debt, torn and wasted by revolution and party dis¬ sensions. Railway and other communications were lacking; and ports, harbors and regular coast and ocean routes, both passenger and traffic, in the modern sense of the term, were non-existent. Therefore steady and profitable international relationship had not yet been es¬ tablished. Mexico also lacked the educational knowledge and experience necessary for the building up of these. The third of a century spanning the beginning and the end of the Diaz regime witnessed a complete change in the commercial conditions existing in the republic. During this period harbors were constructed to accommodate great ocean-going vessels ; inter¬ national relations were extended and broad¬ ened ; and the industrial, educational and com¬ mercial life of the nation quickened into nota¬ ble activity. But the revolution of 1910 and the fratricidal strife that accompanied it set back the progress of the republic. Mexican commerce is peculiarly dependent upon the in¬ dustrial and agricultural life of the nation be¬ cause this alone makes possible the purchase of a vast number of foreign products. The dis¬ ruption of the national life through the revo¬ lution vastly decreased the purchasing power of the Mexican people, and this, in its turn, very deeply affected its commercial activity. The almost complete destruction of the cattle business helped to still further intensify this arrested development. Along the old lines of its national life the income of the government declined in sympathy with the anarchical con¬ ditions existing throughout the country, to such an alarming extent that the most primary needs of the nation

would have been lacking were it not for the fact that a new and important fac¬ tor made itself felt strongly in the national life and largely supplied the lack in the national income by filling in the gaps caused by the lack of commercial activity throughout the nation. This was the rise to sudden importance of the mineral oil industry during the war years of 1914-18. But the storm and stress period through which the country passed from 1910 to 1919 is significantly reflected in the almost total lack of industrial and commercial statistics relative to the activities of the national life since the fiscal year 1912-13, when the last official census

was issued. This latter census represents the more or less normal life of the nation, which has been gradually returning to its pre-revolu¬ tionary condition throughout the whole extent of its territory.

hrom 1874 to 1904 the exports of merchan¬ dise from Mexico to the United States in¬ creased from $4,346,334 to $43,633,275 ; and the imports from the United States increased from $5,946,839 to $45,844,720. In the fiscal year 1912-13 the imports from all countries amounted to $195,772,000. Of this sum $16,- 466,000 consisted of animal substances; $31, 285-GOO of vegetable substances; $46,711,978 of mineral substances; $21,281,571 of dry goods; $12,074,088 of chemical and pharmaceutical products ; $6,744,083 of spirituous liquors and other beverages; $5,120,770 of paper and its applications; $23,383,811 of machinery and its parts; $4,600,890 of vehicles; $5,388,344 of arms and explosives, and $9,604,897 of miscellaneous articles. In the same year the exportation totaled $300,405,000, the principal articles being : gold in various forms, $39,591,000; silver in various forms, $91,293,000; copper, $56,522,000; vegetable products, $85,963,000; animal prod¬ ucts, $29,838,000; manufactured products, $3,- 549,000; miscellaneous, $2,917,410. Increase over the previous year, $2,416,000. Of the total importations $97,287,000 were from the United States; $25,220,000 from Germany; $25,900,000 from Great Britain; $18,338,000 from France; and $10,530,000 from Spain. The henequen ex¬ ports, in the

same period, were $30,134,000; uncured hides, $11,170,000; vanilla. $3,315,000; beans, $1,160,000; cattle, $7,552,000; leaf to¬ bacco, $1,003,000; chicle (chewing gum), $4,- 342,000; fresh fruits, $1,019,000; zacate, $1,- 960,000; woods, $3,365,000; sugar, $860,562; Panama hats, $557,423; miscellaneous, $2,471,- 000. Of the total exportations $232,350,000 were to the United States; $31,147,000 to Great Britain; $16,438,000 to Germany; $7,151,000 to France; $2,182,000 to Spain. In the previous fiscal year the importations were $182,866,000, and the exportations $297,989,000. In the fiscal year 1894-95 the imports were only $66,200,000 and the exports $95,000,000, a remarkable rec¬ ord of progress in the brief period of 18 years.

The following table of exports and imports serves to show the progress of Mexican com¬ merce during a very active decade of its history :

year Imports Exports

1903-04 . $177,861,000 $210,312,000

1904-05 178,205,000 208,520,000

1905-06 . 220,005,000 271,139,000

1906-07 . 232,230,000 248,018,000

1907-08 221,757,000 242,740,000

1908-09 . 156,533,000 231,101,000

1909-10 194,866,000 260,046,000

1910-11 205,874,000 293,574,000

1911-12 182,662,000 297,989,000

1912-13 195,772,000 300,405,000

In order to show the relative importance of the Mexican custom houses, both maritime and frontier, the following statement of collections of import duties for the fiscal year 1912-13 is given: Vera Cruz, $81,793,000; Tampico, $45,- 832,000; Laredo, $18,866,000; Juarez, $3,386,- 000; Progreso, $11,248,000; Ciudad Porfirio Diaz, $4,387,000; Nogales, $1,857,000; Mazatlan,' $2,514,000; La Morita, 86,057; Frontera, $1,- 486,000; Agua Prieta, $1,208,000; Soconusco,

$16,061; Guaymas, $2,239,000; Acapulco, $611,- 342; Isla del Carmen, $264,317 ; Ensenada, $383,662; Mexicali, $682,788; Chetumal, $480,- 602; La Paz, $206,722; Tuxpam, $743,322; San Bias, $151,602; Salina Cruz, $624,570; Tijuana, $212,847; Topolobampo, $147,310; La Ascencion, $52,730; Camargo, $5,540; Mier, $9,707; Puerto Angel, $10,827; Manzamillo, $1,486,000; Matamoros, $1,680,000.

In the upbuilding of the foreign commerce of Mexico, the construction of railways made possible the phenomenal results that have been

achieved since 1898. The entire foreign trade of the country, practicallv. has been created since 1876, most of it since 1880. Before com¬ petition in the transportation of freight was provided, the rate from Vera Cruz to Mexico City, 264 miles, ranged around $68 per ton, going as high as $330 during the French inter¬ vention. Formerly almost all the first-class furniture imported by Mexico came from France, but now much of it is supplied by the United States and some of it is made at home. Most of the importations of agricultural machinery and implements are from the United States. The same is true of food stuffs, lum¬ ber, machinery for irrigation works, supplies for mining and for steam and electric railways, unmanufactured leather, vehicles, boots and shoes, canned goods, patent medicines, live¬ stock, cotton, manufactures of steel and iron, sewing machines and typewriters. From Spain and France come most of the wines and cog¬ nacs. In normal times Germany and Belgium had, previous to the European War, a monopoly of the hardware trade, England and France of the dry goods trade, and France of the trade in notions, jewelry and fancy goods. Among the leading articles exported by Mexico are coffee, two-thirds of which goes to the United States and the balance to England, Germany and France; vanilla, sugar, tropical fruits, beans, livestock, precious metals, henequen, leaf tobacco, hides, rubber and ixtli.

Mexico has a ((commercial codeˆ which dates back to 1887 and which, among other things, provides that foreigners shall be free to engage in commerce, subject to the same conditions and requirements that apply to citizens; that all documents referring to matters of public con¬ cern shall be recorded in a public register; that all business correspondence shall ‘be pre¬ served ; that notice by circular or through the press shall be given of the character of any business about to be established and of any modifications or other changes subsequently made; that at least three account books, — a general day book, a book of inventories and balances and a ledger, — shall lie kept in the Spanish language ; that all brokers must be Mexicans by* birth or naturalization, have a mercantile education and possess a diploma from the Minister of Fomento or other proper officer; that an unlawful agreement or contract involves no cause of action at law; that mer¬ cantile companies may consist either of a part¬ nership under a collective name or with special partners, or may be an anonymous (stock) company, a society with special partners or a co-operative society; that all contracts for the formation of companies must be in writing and very full and explicit ; that the consolidation of companies cannot take effect until two months after publication of particulars, except

on payment of all debts; that foreign companies must register in Mexico and publish an annual balance sheet ; that there may be “temporary” or “profit-sharing” mercantile associations, the first being without a firm name and making partners jointly liable to third persons, and the last named implying an association under which two or more persons may become inter¬ ested in operations which one or more may undertake in their own names, but which in¬ volve only one legal entity and no responsi¬ bility on the part of a partner not joining in a contract with a third party; that the principal of any manufacturing or commercial business shall be responsible for the acts of his mana¬ gers or employees; that no institution of credit can be established except by authorization of the Minister of Finance and the approval of Congress ; that every merchant ceasing to make his payments, whose liabilities are more than 25 per cent in excess of his assets, who has made formal assignment of his goods, or who has absented himself without leaving any person in charge of his business who can pay his debts as they become due, shall be considered a bankrupt.

Foreign commerce for year ending 30 June 1914 (estimate of exports) $176,000,000; (esti¬ mate of imports) $65,000,000; total $241,000,000. For the year ending 30 June 1915, the estimate of the value of Mexico’s exports was $150,000,- 000; imports $61,000,000; total foreign com¬ merce $211,000,000. Imoorts from the United States in the year last mentioned (estimated value) $34,200,000, and exports to the United States $115,000,000. The imports into the United States from Mexico in 1916 totaled $105,000,000 and the exports to that country reached $53,000,000 in the same year. In the nine months ending with March 1917, imports from Mexico were $80,692,000 and exports $47,- 501,000. In May 1917 the Mexican government prohibited the exportation of food stuffs and food animals to the United States because of the depleted stocks and herds in the country owing to the revolution. See bibliographv un¬ der article Manufactures.

5. MANUFACTURES. Mexico is a manu¬ facturing country in the very primitive sense of the word; for literally the greater part of her manufactured products are made either wholly by hand, by individual tradesmen each working on his own account, or in small shops where the machinery used is employed simply to aid the cunning of the hand. The field for manufactures of all kinds is most promising, since it offers raw material in great abundance, efficient, intelligent labor and a very consider¬ able home market, with a still larger one in Central and South America.

Manual training has been introduced into the schools of Mexico and several arts and trades colleges are turning out skilled mechanics in all lines of industrial work. Wages are low, much lower even than in.Europe, and the native workman in the factories already established throughout the country gives his employer little or no trouble.

Cotton. — In 1912, the last normal year since the outbreak of the revolutionary war that overthrew the autocratic Diaz regime, there were 148 cotton mills in the republic. Of these the largest and most modern were in Puebla, Orizaba and Mexico City. In these

factories 32,000 workmen were employed to operate 62,000 spindles and 27,000 looms. The cotton goods they produced during the year were valued at over $50,000,000 ; and included sheetings, tickings, lining, drills, shirtings, per¬ cales, quilts, napkins, table-cloths, woolen-cotton goods, knitted garments and fleece-lined under¬ wear. The Atlixco cotton factory, Puebla, em¬ ployed, in the same year, about 2,000 hands and is capitalized at $6,000,000; the Compania In¬ dustrial de Orizaba owns four cotton mills, has 4,000 looms and 10 printing machines in com¬ mission, is capitalized at $15,000,000 and em¬ ploys 6,000 mill-hands. The San Antonio Abad, with an invested capital of $3,500,000, also operates four mills, three in the state of Mexico and one in Mexico City. El Porvenir y Anexas, at Villa Santiago, Nuevo Leon, is capitalized at $2,000,000, and the Veracruzana, of Santa Rosa, in the state of Vera Cruz, near Orizaba, at $3,500,000.

Woolen Goods.— There are a number of woolen factories in Mexico ; but they are of less importance than the cotton mills, for the reason that the great mass of the lower classes wear cotton garments, thus creating a strong and constant demand for the latter goods. There are woolen mills in Durango, Aguascalientes, Guanajuato, Flidalgo and Puebla; but the most important establishment is near Tlalnepantla, in

the state of Mexico and not far from the federal capital. The woolens made in the republic include suitings, kerseymeres, car¬ pets, blankets, rugs and knit goods. The city of Saltillo, Coahuila, is noted for its handsome serapes (native blankets), for which there is a constantly increasing demand. These serapes, which are made on primitive Indian looms, are exceedingly well woven, of fine texture, brilliant colors and pleasing designs. The San Ildefonso factory at Tlalnepantla, with a capital of one and one-half million dollars, is one of the most successful manufacturing enterprises in Mexico and its goods are to be found on sale through¬ out the republic.

Silk. — Few countries have the natural ad¬ vantages for raising and manufacturing silk possessed by Mexico. Throughout the greater part of the republic both white arid black mul¬ berries grow luxuriantly and require practically no care even in those regions less favorable to their cultivation. So even is the climate in most parts of the country that silk worms can be grown out of doors practically all the year round; and they require but a small part of the care they must necessarily receive in Italy. Labor in Mexico is cheap and the masses of the people, once accustomed to cocoon raising and the cultivation of the mulberry tree, might be expected to thrive at the business as their ancestors did in all the industries, before Euro¬ peans came to disturb the current of their na¬ tional life. The Indian is industrious when he works on his own account.

In Mexico City there is one important silk factory, which is engaged in manufacturing rebosos, the light shawls which the Mexican women of all classes Avear almost universalˆ everywhere outside the larger cities. This fac¬ tory received strong encouragement from the Mexican government which has. for some yea-° been anxious to establish the silk industry o a firm basis in the republic. Two great nur¬ series near the capital, one at Coyoacan and

‘.he other at Churubusco, began in 1907 the planting of 6,000,000 mulberry trees, from which it was proposed to send out free propagation slips to all parts of the country wherever peo¬ ple could

be induced to plant trees and to go into the business of silk raising.

Textiles and Fibres.— There is perhaps no industry in Mexico that shows more variety in forms of manufacture than that of fibre-plant products. Rope, cordage, thread, packing, carpets, rugs and practically every form into which linen, hemp, jute, ixtli, henequen and other native fibre plants and textiles are made, are manufactured in Mexico. Among the most important textile and fibre goods factories in the republic are La Aurora of Cuautitlan, near Mexico City, which has an invested capital of $1,300,000 and turns out bags and packing of all kinds; La Industrial Manufacturer Com¬ pany, capitalized at $4,000,000 and operating six factories; the Linera de Mexico Company, capital $600,000 ; Santa Gertrudis Company, near Orizaba, capital $1,000,000, hands employed in normal times from 1,300 to 1,500. All over the republic, wherever the numerous fibre-plants grow, which is almost everywhere, on highlands and lowlands alike, the natives carry on the manufacture of rope, cord, string, thread and coarse wrapping cloth just as their ancestors did before the Conquest. These prod¬ ucts of the country can be found from the Rio Grande to Guatemala. Ixtli (agave rigide), a rather coarse century plant, furnishes a con¬ siderable part of the raw material for this industry. The maguey (agave Americana), from which the native pulque is extracted, also supplies raw material for the coarser kinds of rope, cordage and sacking. Even mats and rugs are made from it. In addition to the large and very general consumption of these goods, the exports to foreign countries amounted, in 1912, to $3,792,678.

Among the other fine fibre plants of Mexico are zapupe and pita, both of which furnish long, silky, strong commercial fibre, which is not exported because the home consumption demands more than the output. The best known, commercially, of all the fibres of Mex¬ ico is henequen grown in Yucatan and the neighboring states of Campeche and Chiapas, and to a small extent, in other parts of the republic. From the finer fibre of this plant there are manufactured in Mexico many vari¬ eties of woven fabric that resemble silk in appearance and softness of texture. In fact there are in Mexico numerous fibre plants that offer more or less acceptable vegetable substi¬ tutes for silk. Since time immemorial hene¬ quen has been manufactured, in Mexico, into rope and cordage of all kinds ; but now it is exported, principally to the United States, for the making of binding twine for reapers. Though no country in the world is richer than Mexico in excellent fibre plants, yet she im¬ ports large quantities of linens, hempen fabrics, yarns, laces, handkerchiefs, trimmings, carpets, rugs, curtains, quilts and almost every kind of goods manufactured from the various fibre products, all of which could be made at home from

native-grown products at a great saving to the nation. Characteristic products are the huge, highly-adorned, sugar-loaf, native felt sombreros and the so-called Mexican Panama and other straw and reed hats. Most of the

latter are made by individuals in their homes. The natives display much taste in this work, which is another of the numerous industries of the country handed down from father to son for hundreds of years. La Abeja (The Bee), in the Federal District, near the capital, with an investment of $500,000, is the most import¬ ant of the hat factories of the country. In Mexico, Guadalajara Puebla, Vera Cruz and Oaxaca there are from one to a score or more smaller hat factories, each of which has its own wholesale and retail store. In addition to these there are little shops that do a purely local business.

Beer, Wines and Liquors. — There is a large

consumption of distilled and fermented liquors in Mexico, a very considerable percentage of which is made in the country. Within the past 10 years beer has come into favor, in the cities and larger towns, and it may be found on sale even in the smaller interior towns and villages, though there the consumption is slight. Its use is confined to the middle and upper classes almost exclusively because its price puts it be¬ yond the use of the laboring class. There are large and well-equipped breweries in Mexico City, Oaxaca. Monterey, Puebla, Vera Cruz, Orizaba, San Luis Potosi and Tampico, while installations of lesser importance exist in sev¬ eral of the smaller cities. In the capital there are several distilleries where whisky, brandies, cognacs and cordials of various kinds are made. In the Parras district of Coahuila and in some other parts of Mexico excellent wines are produced, and wherever sugar is grown, which is pretty general in the low, hot lands of the coast country, aguardiente (native rum) and excellent alcohol are manufactured. Many of the sugar plantations possess the most modern plants for making these products. Much of the Mexican aguardiente is shipped to Europe where it is turned into cognac. Tequila, a strong alcoholic liquor somewhat like Holland gin, is manufactured extensively in Mexico, but most of the output is consumed at home, for its use is general throughout the country. Like pulque, tequila is manufactured from the century plant. The use of pulque is more ex¬ tensive than that of either tequila or aguar¬ diente; but it is confined to the upland plateaux and the country at an elevation of 4,000 feet or more, because there grows the maguey from which it is manufactured. On the uplands it has been, for many years,

the greatest of the industries of the country, after mining, millions of acres being devoted to the growing of the maguey. Another distilled product called mes¬ cal is made from another and smaller species of the agave; and it is extensivelv used in the region where this latter plant thrives.

Soap, Candles and Chemical Products. — A great part of the raw materials used in these industries is still imported though the republic is capable of producing most of them. The Laguna Soap Company, capital $5,000,000, formed by the amalgamation of two large cottonseed-oil companies, produces daily in normal times and conditions, 400 tons of cot¬ tonseed oil, 7,500,000 pounds of soap and 2,000 metric tons of glycerine, together with a vari¬ ety of edible cottonseed-oil products. It em¬ ploys from 800 to 1,000 men. La Union Soap Factory of Torreon, capital $2,000,000, is en¬ gaged principally in the manufacture of soap

and glycerine. The company also has a large refining plant near Torreon. There are a num¬ ber of smaller soap and many candle factories scattered throughout the republic. Chemicals, paints, varnishes and acids are also manufac¬ tured in or near numerous cities and towns. A few years ago all the petroleum and petro¬ leum products used in Mexico were imported and sold in the republic at excessively high prices. Now petroleum, benzine, kerosene, paraffine wax, asphalt and many by-products are manufactured in the country; and native oil has become an important factor in the national life. Whole railway lines use oil burners on their engines and petroleum is employed for producing motive power in many kinds of in¬ dustrial life. Yet but a very small percentage of the possible native oil sources has been ex¬ ploited ; for the oil belt extends all the way from Texas to Guatemala on the Gulf side and large deposits are known to exist on the Pacific Coast. The refining of crude petroleum has become a business of considerable importance in Mexico and the exploitation of the asphalt deposits has already influenced the pavement of the streets of the cities and larger towns of the republic.

Iron and Steel Products. — No other Mexi¬ can industry has grown so fast within the past dozen years as that of the great iron and steel foundries now turning out products equal to those of the steel-producing centres of the world. This output includes smaller agricul¬ tural implements, marketable iron and steel, and a constantly increasing number of finished products such as are turned out from the great American and European steel plants. The Monterey Iron and Steel Company, capital $10,- 000,000, with its great blast furnaces, produces 300 tons of steel per day. It makes steel rails and structural iron and steel in vast quantities and of excellent quality. Monterey is the most important centre of this new industry: and naturally there the business has reached the highest state of perfection in the republic. The steel and iron industries of Richard Honey, in Hidalgo and the Federal District, are next in importance to those of Monterey. Two other important iron foundries in Jalisco rely chiefly upon local trade. One of these at Zapalapa supplieˆ iron to Guadalajara, Aguascalientes, Manzanillo and surrounding country.

Guayule. — In Mexico the production of rubber is a real manufacturing industry in certain parts of the republic where the guayule plant grows in abundance. This plant is a low shrub from two to four feet in height from which crude rubber is extracted bv means of specially constructed machinery. The plant is torn out by the roots, is crushed and the sap extracted from it. It then undergoes certain processes before it becomes commercial rubber. The Guayule Rubber Company produced in this way, in the first seven months of 1912, 1,818,880 pounds of rubber. The International Rubber Company of Torreon, which is capital¬ ized at $37,500,000, possesses 2,000,000 acres of land in the state of Zacatecas, on which wild guayule grows abundantly. The company has an extensive factory at Torreon, in which is installed the most modern rubber machinery. The guayule exported from Mexico in the fiscal year 1912-13 was valued at $7,234,000, which was only about $1,000,000 less than the value

of the tree rubber grown in the country dur¬ ing the same period. In 1911-12 the guayule exports brought $11,798,800.

Tobacco. — There are many cigar and cigar-rette factories in Mexico; but the latter far exceed the former in volume of business. The principal tobacco manufacturing centres are Mexico City, Orizaba, Puebla, Jalapa, Vera Cruz, Cuernavaca and Guadalajara. But there is scarcely a city or town in the republic that does not make either cigars or cigarettes or both for local consumption ; and each manufac¬

turing district has its own favorite local brands. In the city of Mexico an immense number of cigarettes are made, the Buen Tono Company turning out alone daily about 20,000,000; and the Tabacalera makes about 4,000,000. Both these companies are backed by millions of capital. In the Buen Tono's factories (includ¬ ing the Cigarrera Mexicana), 1,700 hands are employed. Certain brands of Mexican cigars are favorably known in Europe and in the United States.

Packing Houses. — There are a number of packing houses in Mexico. Several are on the Pacific Coast where the cattle ranges are more or less isolated from the European and Amer¬ ican markets; but the National Packing Com¬ pany, with a capital of $7,500,000, operating from its headquarters in the capital, is the largest and most important, and does an inter¬ national business.

Paper. — Paper is made (though not enough for local consumption) by the San Rafael and Anexas Company, situated near the capital. This institution, which is capitalized for $7,000,- 000, has two factories, a pulp mill and exten¬ sive forests from which it draws its raw mate¬ rial. Though the output of San Rafael runs to the commoner grades of paper, including large quantities of newspaper print, yet it also makes high-grade paper of numerous styles and de¬ grees of fineness, among these being calender and the finer grades of half-tone paper.

Dynamite and Other Explosives. — These including giant powder, are manufactured in Mexico ; and the government has its own am¬ munition factory at Santa Fe, near the capital. The Mexican National Dynamite and Explo¬ sives Company, at Dinamita, Durango, pro¬ duces over 50,000 pounds of explosives daily. It is capitalized at $3,400,000 and employs from 900 to 1,000 hands.

Flour Mills. — Large flour mills, modern in every respect, and others of smaller capacity and more primitive types, are to be found in Mexico from Monterey to Yucatan. Of these the most modern are : El Hermosillense, Hermosillo ; the Chihuahua Flour Company, Chi¬ huahua; the Goleta Mills, Saltillo and Mon¬ terey; the Phoenix Mills, Saltillo; the Esme¬ ralda Mills, Monterey and Ramos Arizpe : the Alliance Mills, Torreon ; the Diamond Mills, Gomez Palacio; the Gulf Flour Company, San Luis Potosi and Merida; Aurelio Herrera and Company, Irapuato; the Union Mills, Toluca; the National Flour Manufacturing Company, Mexico City; the Bakers' Mutual Association, Guadalajara; and La Perla Mills, Aguascalientes.

Bibliography. — (Anuario estadistico de la republica mexicana) (Mexico annually) ; (Anuario de estadistica fiscal J (Mexico annually) ;

Baker, F. W., (A Naturalist in Mexico) (Chi-

MEXICO

1 Guadalupe, from tower of Cathedral

2 The new harbor, Vera Cruz

One of the peculiar devices by which the ancient

cage 1895) ; Bancroft, H. H., Resources and Development of Mexico* (San Francisco 1894); Cubas, A. Garcia, < Mexico: Its Trade Industries and Resources) (Mexico 1893) ; Duclos Salinas, A., (The Riches of Mexico and its Institutions) (Saint Louis 1893) ; Felix and Lenk, (Beitrage zur Geologie und Pala-ontologie von Mexico) (Leipzig 1892) ; Good¬ rich, J. K., (The Coming Mexico) (Chicago 1913); Howell, E. J., (Mexico: Its Progress and Commercial Possibilities* (London 1892) ; Martin, P. F., (Mexico of the Twentieth Cen¬ tury J (2 vols., New York 1907) ; (Mexican Yearbook* (London, annually); Romero, Ma-tias, (Mexico and the United States) (New York 1898) ; Wells, D. A., (A Study of Mex-ico) (Mexico 1887).

6. TRANSPORTATION AND COM¬ MUNICATION. Before the white man had set foot in Mexico the various nations then occupying What is now the Mexican republic had built many well-paved roads and innumer¬ able mountain trails, in all probability better than the trails of to-day, if we are to judge them by their still existing remains, and by the ruins of the great and populous cities whose arteries they were. Following the Con¬ quests, and as Spain gradually extended her power over her transAtlantic domains and as peace became established upon a firm basis, bringing with it an extension of trade, the neces¬ sity for an extensive system of highways be¬ tween the inland cities and the ports and be¬ tween city and city became apparent. The Spanish government, ever alive to its own in¬ terests, began the construction of the caminos reales, or king's highways, which, a century after the Conquest, had already connected to¬ gether all the centres of commercial importance in New Spain.

Transportation Facilities of the Republic.

— Throughout the revolutionary period (1810— 21) transportation facilities of every kind in Mexico were neglected, on account of the ac¬ tivity of the revolutionists and the exhausted condition of the

Spanish treasury after the Napoleonic wars. From 1821 to 1876, the new republic formed upon the ruins of the govern¬ ment of New Spain was so occupied with its own local dissensions that it found little time to give to upbuilding of highways and byways of communication. Yet it was toward the close of this period of unrest that the first railway was built in the republic. In 1854 a line con¬ necting Mexico City and Guadalupe, a dis¬ tance of three miles, had been constructed; and a year later Vera Cruz was connected with Tejeria (12 miles). These were the two ex¬ treme ends of a railway by means of which it was proposed to give the capital an all-rail route to the first port of the republic. But so slow was the work of construction that it was not until 1873 that this comparatively short line (263 miles) was completed. Practically no other railway construction was undertaken in Mexico until after the election of Porfirio Diaz as president in December 1876. In No¬ vember of the following year, the Secretary of Public Works signed a contract with James Sullivan and his associates for the construction of a railway line from the Uffited States bor¬ der to Mexico City, and from there to the Pa-vol. 18 — 48

cific Ocean. But Sullivan found difficulty in Ret¬ ting the capital necessary to build the proposed lines. In 1880 a strongly-subsidized concession was granted to the Mexican Central Railway Company, organized in Denver to build a wide-gauge railway from El Paso to the Mexican capital; and about the same time the Sullivan concession was extended and rearranged so as to empower the holders thereof to construct a narrow-gauge railway from Mexico City to Laredo, on the Texas border. Both these lines were eventually built. From 1880 to 1898 hun¬ dreds of railway concessions were granted by the Mexican government, most of them ac¬ companied with subventions in cash, govern¬ ment bonds and national lands. Such a very active railway era was inaugurated that, in 1890, the government found it necessary to create the new Department of Communications and Public Works, at the head of which was a minister of the Cabinet. In 1898 Finance Minister Limantour announced that, in the fu¬ ture, the government would give subventions only to roads of great political and financial importance. In the plan for railway exten¬ sion laid down by Mr. Limantour at this time were included a road to connect the centre of the republic with some Pacific Coast port, Guaymas or Topolobampo preferred: a line from the interior to Mazatlan ; another from the interior to Manzanillo and a fourth to Acapulco. The plan also included lines to connect the capital with Acapulco and Tampico. The fol¬ lowing year a new general railway law was issued in order to co-ordinate the work of the Minister of Finance and to govern the roads

in existence and those being built. The most im¬ portant railway lines of the country were con¬ structed between 1880 and 1890; after which very little building was done, until Mr. Liman¬ tour took matters in hand in 1898. By 1902 the following roads had been constructed : The Mexican Railway, connecting Mexico City with Vera Cruz; the Mexican Central, from El Paso to the Capital; the Mexican National, from Laredo to Mexico City; the Sonora Rail¬ way, from Nogales to Guaymas; the Interoceanic, from Mexico City to Vera Cruz; the Tehuantepec National, across the Isthmus of Tehuantepec, from Coatzacoalcos (Puerto Mexico) to Salina Cruz; the Mexican South¬ ern, from Puebla to Oaxaca; the United Rail¬ ways of Yucatan; and the Pan-American, from San Geronimo, on the Tehuantepec road, to a point in Mexico close to the border of Guate¬ mala. In 1906 the Mexican government suc¬ ceeded in uniting the two great railway lines, the Mexican National and the Mexican Central, with the <(National Railways of Mexico.** By 1908 the Mexican International, the Pan-Ameri¬ can, the Vera Cruz and Pacific, the Interoceanic and the Tehuantepec National had been brought under the control of the government and in¬ cluded under the foregoing title of the Na¬ tional Railways of Mexico. During the revolu¬ tionary period from 1910 to 1916 the railroads of Mexico suffered very greatly; much of the rolling stock was destroyed and bridges, stations and other buildings were burned or wrecked. In January 1915, according to a statement of the Mexican Minister of Railways, the total monthly income of the Mexican National lines was only 647,000 pesos (paper currency). But in August 1916 the monthly income of these

roads had risen to 25,000,000 pesos (paper cur¬ rency). At the same time the transportation of freight had become almost normal, not¬ withstanding the fact that the loss of the Na¬ tional Railways for the fiscal year 1913-14 was $28,835,624, and for the following year $28,909,328. When the Carranza government undertook the management of the railways in June 1915, it had to face a deficit of $41,289,609 United States currency. Since then the railway income has steadily improved. In 1916 there were over 16,000 miles of

railway in operation in Mexico. During the fiscal year 1917-18 the votal receipts of the Federal Railway was

$72,000,000.

Postal Service. — In 1913 there were in Mex¬ ico 2,917 post offices, branch post offices and postal agencies. In the postatl service of the re¬ public about 15,260 miles of railway, 300 miles of street railway and 10,000 miles of steamship routes were in use for the distribution of postal matter. During the year domestic postal orders to the amount of $48,771,821, and foreign postal orders valued at $8,886,979 were issued. Dur¬ ing the same period the other income of the postal service was $4,914,640. All the railroads of the country disposable were made use of in the postal service; and they were aided in the work of distribution by messengers, horses, mules and automobiles, on land ; by river boats of the interior navigation service: and bv some 23 steamship companies, arpong which were The Mexican Navigation Company, the Pacific Navigation Company, F. Leyland and Company, Limited ; West Indian and Pacific; Imperial German Mail, the Harrison Line, the New York and Cuban Mail Steamship Com¬ pany, the Munson Steamship Line, the Atlantic and Mexican Gulf, the Southern Steamship and Banana Company the Canadian Mexican At¬ lantic Line, the Kosmos Line, the Chinese Im¬ perial Steamship Companv and the Toyo Kisin Kaisha. There were 158 traveling post offices, principally on trains. During the year 26 new post offices were opened to the public. The parcel post service, which was instituted a few years previous, has proved of great value and is, year by year, securing more patronage. The government proposes to extend the scope of this service and to make it of still greater utility. Consult Halsey, F. M., (Railwavs of South and Central America) (New York 1914).

7. BANKING AND FINANCE. The

Mexican people have long shown a capacity for finance. In pre-Columbian days, the financial arrangements of the Aztec Empire were com¬ plicated and extensive ; and the keeping of the accounts of the tribute rolls was in itself a mat¬ ter that required more than ordinary executive ability, in an age when the whole income of an empire several times larger than modern Ger¬ many, and densely populated, was paid in prod¬ uce of various kinds. This required vast store¬ houses in Mexico City and substations for cus¬ toms receipts in many parts of the land. The Spaniards, too, are keen financiers and the mingling of the two races has produced a blend and a nation which

has made great financial ad¬ vancement during the past quarter of a cen¬ tury. The revolution of 1910 temporarily checked this financial expansion. The first financial establishment in Mexico that may be dignified by the name of bank, was founded, in 1776, in connection with the charitable organ¬

ization still known as the Monte de Piedad (National Pawnshop). It handled mortgages, issued loans on landed and other property and circulated notes in commercial transactions, for more than 100 years. Several times it was in difficulties, but so great was the aid it lent to the community in general, that it succeeded, each time, in getting again on it s feet. The first real bank organized in Mexico to do business in accordance with modern methods was the Bank of London and Mexico, which was estab¬ lished in the City of Mexico in 1864, with a capital of $500,000. Its reserve was finally raised to $30,000,000 shortly before the revolu¬ tion of 1910, but was reduced to $10,000,000 in 1913 on account of the unsettled condition of the country. Previous to this date, the paper currency in circulation in the country had been issued by certain banks which had been granted concessions to this end. At first the National Bank of Mexico had a monopoly of this right, or claimed to have ; but the government, disre¬ garding it, gave concessions of a like nature to other federal and state banks. Finally an ami¬ cable arrangement was made with the National Bank, whereby it waived the rights in this re¬ spect which it had claimed. Then began an era of great prosperity in Mexican banking. Modern methods were introduced in the native institutions and foreign banking houses estab¬ lished important branch houses. These repre¬ sented capital and institutions from nearly every country in Europe and from the United States and Canada. None of these foreign banking houses, however, had concessions to issue paper currency. They formed one of the most power¬ ful factors in the development of the finances and the resources of the country and became the great medium of exchange between Mexico and the outside world.

As the Constitutionalist party began their campaign without money or credit, thev were forced to issue paper money of many different kinds, which went as low as 1 per cent of its face value. As the military campaign became more extended and intensive more arms and ammunition were needed, and more paper cur¬ rency was issued. The Madero revolution had been financed with coin, for Madero, his back¬ ers and his family were wealthy; but Carranza was not in this fortunate condition. It was, therefore, after the disappearance of

Madero from the political scene, that the finances of Mexico began literally to go to pieces. Car¬ ranza had possession, in the beginning of his career, of only two or three minor ports of entry upon which to depend for anv financial assistance from export and import duties. Thus the Constitutionalist party piled up obligations to the extent of 700,000,000 pesos Mexican cur¬ rency back of which there was no assurance of redemption or any substantial backing of any kind. In addition to this, the country was flooded with the currency of other contending parties and with counterfeits of all paper afloat. Thus the amount of paper currency in circu¬ lation in the republic in 1916 when the Car¬ ranza government began to come on top will probably never be known. After the recogni¬ tion of the Carranza provisional government by the United States, considerable attention was paid to the solution of the currency question, which had become of urgent importance. It was finally resolved to make a new issue of

500,000,000 pesos at the rate of 10 cents United States currency for one peso. This value was to be maintained by the sale of gold drafts in New \ ork at the rate specified, in exchange for the new paper. It was to be received, at this rate, for duties, by the government. This was known as the Non-counterfeitable Issue, and was to be issued gradually in payment of salaries and other government expenses at the rate of about 50,000,000 pesos a month. How¬ ever a very considerable part of the taxes im¬ posed by the federal government had to be paid in silver. These included all export and import duties. The greater part of this went to swell the guarantee or reserve fund behind the new paper currency issue. At the same time that this new issue was being put into cir¬ culation steps were being taken to retire all the former issues authorized by the Constitutional¬ ist party, whether estate or federal. To this end all the bills of 20, 50, 100 pesos were de¬ clared (1 June 1916) no longer of compulsory acceptance and the holders thereof were noti¬ fied to turn them in to the government, upon which they would get receipts promising re¬ demption in specie, beginning 1 October, at the rate of five cents United States money (10 cents Mexican silver) for the peso. As the

market value of this currency was only about two cents and as it had previously fallen as low as one-half a cent, the offer was a very liberal one and had the desired effect. In order to further facilitate the retirement of the old paper currency, all railway and telegraph dues were made payable in it up to 1 Jan. 1917. Owing to this clever campaigning on the part of the government, the metal currency, which had gone into hiding shortly after the outbreak of the revolution, began to reappear in 1916, with the increase in confidence in the stability of the Carranza government.

As Mexico had no national paper currency previous to the outbreak of the revolution of 1910, the bills in circulation being all bank is¬ sue, were kept at par value by a reserve of 50 per cent of the amount in circulation, exacted and guaranteed by law. During the revolu¬ tion the banks nearly all violated this provision, issuing notes far in excess of their reserve. The Carranza government, after an investiga¬ tion, gave the offenders a certain time in which to make good the required deposits under pain of being closed. This caused the rapid decline of the value of banknotes throughout the re¬ public, both state and federal. In order to fur¬ ther guarantee the stabilitv of the Non-coun¬ terfeitable Issue, $5,000,000 gold was taken from the national treasury and an additional $5,000,000 gold was obtained as a loan from the Henequen Regulating Committee of Yucatan; and all bank issues of paper currency were or¬ dered withdrawn from circulation, the govern¬ ment thus retaining, in conformity with the pro¬ visions of the constitution, a monopoly of the issuing of all money, whether paper or metal, in the republic (15 Sept. 1916). The income from national lands and forests was also ordered paid in gold; and this too went to back up the new paper issue. Over $10,000,000 gold was also ob¬ tained from uncultivated parts of great estates which had previouslv paid little or nothing in the way of either federal or state taxes. At the same time all the banks in the republic were placed under the strictest government supervi¬

sion, and those which had not. complied with the conditions laid down as to currency re¬ serve were permitted to do business only through a government interventor, who was empowered to see to their liquidation. None of these banks could issue any specie without the consent of the government. At the same time the duties were divided into four classes ; those payable in metal only; those payable in metal or the equivalent thereof in national paper cur¬ rency of the new issue; those payable in the new paper issue ; and those payable in the ‘new issue or the equivalent thereof in the paper is¬ sues of Vera

Cruz and the Constitutionalist Army. The new paper currency issue was dis¬ tributed as follows : 80,000,000 one peso bills,

60,000,000 two peso bills, 75,000,000 five peso bills, 75,000,000 10 peso bills, 70,000,000 20 peso bills, 75,000,000 50 peso bills and 75,000,000 100 peso bills. This work of reorganization of the currency and finances of the nation was placed in the hands of a commission of five members, all of whom had had considerable experience in monetary matters, and who were required to report to the Treasury Department, under whose direction they were working. The principal banks of issue in Mexico had, 30 June 1911, the following paper currency in circulation: Na¬ tional Bank, $54,84 1,000 ; London and Mexico, $19,278,000; other banks, $42,535,000; total, $116,654,000. There were issued by the govern¬ ment, in 1910, 6,206,000 silver coins worth $2,927,000; 6,146,250 nickel coins valued at $307,- 312; and 19,450,000 bronze coins worth $194,- 500. In the fiscal year ending 30 June 1911 the consular fees were $1 , 163,341 ; the general stamp tax amounted to $15,271,000; the taxes on mining land to $1,934,000; on ores and met¬ als, $2,365,000 ; tobacco, $2,760,000 ; alcohol, $870,000; cotton goods, $2,517,000; explosives, $5,334; direct taxes, $6,295,000; municipal taxes, $5,133,000; postal service, $4,775,000; telegraphs, $2,255,000; and lotteries, $1,255,000. During the same period the importations amounted to $47,500,000 ; the exportations to $435,000 and the port duties to $1,985,000, mak¬ ing a total income from foreign commerce of $48,985,000, exclusive of export duties. In 1918 the United States took from Mexico goods to the value of $140,800,000 and sent there goods to the value of $106,893,000, a total business of $247,694,000. Owing to the fact that the revolu¬ tion of 1910 and succeeding years divided the country into several factions, each of which controlled its own section of country and was more interested in maintaining its ground than in furnishing statistics, such as the Mexican gov¬ ernment put forth annually previous to 1912, definite information relative to the financial and other conditions of the country from 1913 to 1919 is not available, except in a general way; and even this covers only that part of the re¬ public under the control of the Constitutional¬ ist party, which was able, largely, to finance the administration through the sudden enon mous increase of the oil interests of the re¬ public and the rise in the price of oil itself on account of the European War. The finances of Mexico, which were in a deplorably bad condition in 1876, when Gen. Porfirio Diaz as¬ sumed the presidency for the first time, con¬ tinued to steadily improve throughout his seven terms of office until, on his re-election for the eighth time in 1910, they had reached such a

position that the Mexican government had se¬ cured a solid standing in the money markets of the world. According to the report of the in¬ ternal revenue tax office for the fiscal year 1917-18 the total revenue collected was $75,496,- 360, distributed as follows : Mining, $2,203,353 ; exportation of metals, $10,003,225; alcohol and other liquors, $4,047,532 ; textile fabrics and thread, $2,304,050; importation of wines and other beverages, $2,330,584; electric light and power, $800,743; telephones, $201,055; bottled liquors, $900,164; matches, $286,842; advertis¬ ing, $93,638 ; pulque, $479,295 ; petroleum, $7,955,- 113; patents, $23,449; inheritance tax, $357,577 ; loans. $92,301; federal taxes, $27,545,390; stamp document tax, $14,376,216. The public debt of Mexico, which has never been large for the po¬ tentialities of the nation, began with a. 5 per cent loan of £3,200,000 contracted in Eng¬ land in 1824, which was increased by a like amount at 6 per cent the following year. The interest on these two loans was not paid from 1827 to 1831 ; and even after this latter date it was met only intermittently and was, therefore, the cause of many disagreeable com¬ plications which have become part of the his¬ tory of the Mexican national debt, which itself became mixed up with political events of pri¬ mary importance. In 1886 these two first for¬ eign debts of the Mexican nation were consoli¬ dated with the national debt. Previous to this, however, they and other loans contracted in 1831 were consolidated into one national debt of £9,247,387, in 1837 ; and this agreement was again ratified in 1839. In 1846, the whole Mexican foreign debt, including ‘interest due and unpaid, together with certain, internal bonds and other unfunded liabilities, were again consolidated into one national debt of £10,241,650 in bonds of the 1846 issue, for the payment of which one-fifth of the cus¬ toms receipts of the ports of Vera Cruz and Tampico, the duty on tobacco in all forms and the silver export duties on ore sent out by way of the Pacific ports were pledged. During the war with the United States the American forces seized and retained Vera Cruz and Tam¬ pico and the Mexican government was thus un¬ able to meet its foreign obligations. In 1850 another attempt was made to meet the foreign indebtedness of the nation through its

conver¬ sion into new bonds bearing 3 per cent and guaranteed by 25 per cent import duties and 5 per cent of the Gulf ports and 75 per cent of the Pacific ports duties, which were to be em¬ ployed for the payment of interest on the bonds and their redemption. In 1864, by a decree of the imperial government of Maximilian, govern¬ ment stock to the amount of £4,864,800 was issued and was accepted by the original bondholders in payment of arrears of interest. The same year the imperial government se¬ cured a second loan of £12,365,000 in Paris and London ; and this loan was practically all converted into the Mexican Imperial Lottery Loan with a face value of £20,000,000. Both these transactions were repudiated by the Re¬ publican party on the overthrow of the empire in 1867. However, a part of the debt of the empire was subsequently recognized during the Diaz administration. In 1888 a 6 per cent loan of £10,500,000 was contracted in Lon¬ don, Berlin and Amsterdam, 20 per cent of the export and import duties and all the

direct taxes on industries and landed prop¬ erty and buildings in the Federal District being pledged to meet the obligation thus contracted. The following year the 1 ehuantepec 5 per cent railway loan of £2,700,000 was made in Lon¬ don and Berlin and a year later silver cur¬ rency bonds to the amount of $6,700,000, bearing interest at 6 per cent, were disposed of in London and Amsterdam to meet certain pressing obligations for railway concessions and construction ; and the same year another loan of £6,000,000 was made in London, Ber¬ lin and Amsterdam for the same purpose. Three years later a 6 per cent loan of £3,000,- 000, secured by 12 per cent of the import and export duties, was contracted in Lon¬ don. In 1894 the government created the 5 per cent Interior Redeemable Debt, with a view to a single new issue in which all future subventions to railways should be paid. This debt consisted of five series of $20,000,000 each. In 1899 the 5 per cent Internal Consolidated Gold Loan of £22,7 00,000, redeemable not later than 46 years, was issued to convert the 1888, 1890, 1893 6 per cent loans and 1889 5 per cent Railway Loan. In 1903 the fed¬ eral government assumed obligation to the extent of £2,400,00 for the payment of the City of Mexico 5 per cent drainage loan, to meet the expenses of the drainage of the capital. The following year a 4 per cent gold bond issue of $40,000,000 was made in Lon¬ don, New York and Amsterdam, partially through banks and partially privately, to meet various pressing obligations of the government. In 1910 the final loan of the Diaz government was made at 4 per cent for £22,200,000, with a view to the conversion of the 5 per cent loan of 1899. Finally, in 1913, a loan of $200,000,000 was authorized, of

which $60,000,- 000 was placed in France, with a guarantee of certain export and import duties. In June 1910, the public debt of Mexico was $300,524,996 (Mexican silver) payable in gold, and $137,- 850,133 payable in Mexican silver, and an addi¬ tional debt of $273,398 (Mexican currency), making a total of $438,648,528 in Mexican sil¬ ver. in 1918 the public debt was over 500,000,- 000 pesos gold (including interest of about 70,000,000 pesos), the gold peso being nomi¬ nally worth 49.846 cents. Consult Conant, C. A., (The Banking System of Mexico* (Washington 1910) and works under section on Manufactures. On the same date there were in Mexico 33 banks, 25 of which were banks of issue ; all of which were then doing business on a gold basis which had been introduced into Mexico in 1905 on the basis of a 50 cent dollar. For the fiscal year ending 30 June 1913 the revenue of the Mexican government was $120,- 958,902, Mexican currency against an expendi¬ ture of $110,781,871, a very considerable in¬ crease having taken place in five years, when the revenue was only $98,775,510 and the ex¬ penditure $92,967,393. It is worthy of note that, even with the revolutionary activity then prevailing, the revenue of the government was, in 1912-13, $15,755,816 greater than that of the preceding year. This income had reached over $150,000,000 (pesos) in 1917. This federal reve¬ nue is, for the most part, derived from stamp taxes, direct taxes and import and export duties. Although the finances of the Constitu¬ tionalist government had improved consider-MEXICO— GOVERNMENT (8)

ably in 1919, yet the disorganized condition of the country and of many of the banks, both state and federal, and the loss of credit brought about by the long revolutionary period, made the task of the Constitutionalist party of straightening out the financial affairs of the country very difficult. Money was badly needed; and this the great money centres seemed unwilling to advance until greater op¬ portunities for the exploitation of Mexico’s natural resources were granted them. Work¬ ing under this handicap, the government stead¬ ily pursued its ends with as much success as could be well expected under the circumstances.

8. GOVERNMENT. The constitution of Mexico is based upon that of the United States which it very much resembles. The republic is formed of free and sovereign states which, for administrative matters

concerning the in¬ terests of the nation as a whole, are united under a federal government. In virtue of the constitution of 5 Feb. 1857 the national power resides in the people, who are the source of all public authority. The administration of the affairs of the country is carried on by the national government, for the federation, and by each state government for its own state. But no state law may conflict with the general good as expressed by. the laws of the federation. Slavery is prohibited by the constitution and all persons born in the republic are free and equal in the eyes of the law, and every one has a right to freedom of thought, profession and occupation. In so far as it is consistent with private rights and the exigencies of state, the press is free. In Mexico one may publish what he pleases, for there is no press censor¬ ship ; but the citizen and the government are protected by libel laws. Newspaper, magazine and other presses cannot now, as formerly, be confiscated as instruments of crime. The right to associate together for any lawful under¬ taking, business or enterprise, and the complete individuality of every law-abiding citizen of the republic or resident therein are recognized and all may leave or enter the country without passport. Mexico being a republic, hereditary honors and titles of nobility are not recognized and no one is permitted to accept or wear them un-less by special act of Congress. Arms may be carried for lawful personal defense tin certain parts of the country, whereas in others a permit to do so must be obtained; for the law recognizes that in mining camps, wild mountainous regions and unsettled parts of the republic, arms are necessary for self-protection, and here a permit is not exacted. Search with¬ out warrant is prohibited, and a policeman may not enter a private house without authorization from the police court, unless it be in pursuit of a well-known criminal or one caught in the act of breaking the law. Privileged tribunals such as were customary during the Spanish occupa¬ tion of the country are strictly prohibited; and every man, be he priest or layman, citizen or administrative officer of the government, is ruled and governed by one common law. The passage of laws contrary to the interests of the nation is prohibited, and no treaties can .be made with foreign countries for the extradition of political offenders. According to the consti¬ tution and the law of the land offenses against law and order are divided into two great classes, civil and criminal. No one may be

imprisoned for offenses coming under the first of these heads. This provision includes debts and other monetary obligations, provided there is nothing criminal about their contraction. A person once arrested must be brought to trial within three days and just cause shown for his detention, or he must be set free. Whipping, torture,

mutilation and other punishments of a like nature, common enough in previous pe¬ riods of the history of the country, are declared contrary to law. All punishments except those of a correctional nature must be administered by judges of the criminal courts. The death penalty is practically never exacted in Mexico in. times of peace. It is stipulated in the con¬ stitution, however, that it may be applied in cases of high treason, premeditated murder, parricide and highway robberies ; but never for political offenses, except in time of war. In practice, however, about the only cases in which it is exacted, in normal times, are those of offenses of a most serious nature against mili¬ tary authority. In all legal actions one may appeal from a lower to a higher court until the Supreme Court of the nation is reached and gives its decision, which is final. But in cases of the death penalty, an appeal may be made to the clemency of the President of the re¬ public. Once a man has been tried and ac¬ quitted he cannot be tried again for the same offense. In conformity with the principles of democratic government no spying upon the privacy of the people of the land is permitted and, on the same principle, all private corre¬ spondence is declared inviolable. The quarter¬ ing of soldiers upon private individuals in time of peace is prohibited, and even in time of war it can be done only in conformity with certain regulations of Congress and through special orders issued to fit the exigencies of the occasion. Patents may be issued for a certain stated time on inventions of use to mankind, although the constitution states that no monopolies shall exist in the country ex¬ cept such as the government may take to itself for the general good of the nation ; as, for instance, the coinage of money and the con¬ trol of the postal system. In the case of seri¬ ous internal disorder of whatever character, which threatens the safety of state or govern¬ ment, the President has the right to suspend the constitutional guarantees ; as he also has in the case of foreign invasion. But this can be done only with the consent of his cabinet and Congress, or of the congressional committee when the Congress is not in session.

All persons acquiring land in Mexico be¬ come by virtue of this acquisition Mexican citi¬ zens, unless they distinctly state in their deed of acquisition that they reserve their right to the citizenship of their native land. One of the radical changes of the Queretaro conven¬ tion (31 Jan. 1917) is the provision that only Mexican citizens, by birth or naturalization, may acquire landed properties or water rights or obtain concessions to exploit mines or com¬ bustibles ; but the state may concede such right to foreigners who appear before the Secretary of Foreign Relations and agree to be consid¬ ered as Mexicans, in so far as the titles in¬ volved are concerned and agree

not to invoke, in regard to the same, the protection of their respective governments, under penalty, for vio¬ lation of these provisions, of losing the titles

thus acquired, which automatically revert to the nation. All Mexican citizens, whether native born or naturalized, are liable to military serv¬ ice. All persons resident within the republic are guaranteed the protection of the laws of the land.

The state government is divided into three branches, executive, legislative and judicial. The chamber of deputies and the senate, con¬ stituting the Congress of the union, are the legislative bodies, and by them alone can laws for the government of the country be enacted. Two sessions of Congress are held each ye&r. The first, which begins on the first day of April, lasts from two to two and a half months, and its primary business is to audit all ac¬ counts of the previous year and to arrange the estimates for the incoming fiscal year. The second, which begins on 16 September, lasts for from three to four months. The law provides for the election of a President of the republic who shall serve for a term of four years and shall not be reelected, and a Cabinet composed of the following departments: Fomento (pro¬ motion), foreign affairs, interior, justice, finance, communications and public works and war and marine. The Constitutional party, recognizing that the constitution of 1857, with the various amendments thereto, was unsuited, in certain important respects, to the conditions under which the Mexican people live, decided to make such changes in it as seemed neces¬ sary for the welfare of the nation. To this end a convention was held in Queretaro (De¬ cember 1916). After two months' deliberation it closed its labors on 31 Jan. 1917, having re¬ formed, in a radical manner, a number of the most important sections of the basic constitu¬ tion. According to these changes the office of Vice-President of the nation is done away with and the filling of that of President, in case of the death or absence of the chief executive of the nation, is left in the hands of Congress. The age of compulsory primary education is raised to 15 years and all

parents or guardians are under obligation to see to it that their children or wards receive primary, secondary and military education. Instruction in all gov¬ ernment schools and in all primary private schools must be laic, and no ministers, priests or officials of religious organizations or socie¬ ties may establish or own schools or teach in Mexican schools. This abolishes the church schools which, before the revolution of 1910, ministered to fully twoffifths of the educational needs of the country. To make up the de¬ ficiencies in educational facilities thus caused the new reforms in the constitution declare it obligatory upon all agricultural, mining and in¬ dustrial companies, resident outside of towns, to establish and maintain schools for the edu¬ cation of the children of the people in their employ or resident on their property. All schools, whether official or private, must sub¬ mit to official inspection and follow the gov¬ ernment program of studies.

The constitutional amendments of 31 Jan. 1917 provide for the subdivision of large landed estates, aiming in this way to solve the land problem, which formed one of the causes of the revolution of 1910. Each state or terri¬ tory is empowered to fix the largest amount of land which any person or company may hold, and all landed properties in excess of this

amount must be subdivided and sold off within a certain stated time, and in accordance with official regulations, otherwise they are subject to confiscation. One of these conditions pro¬ vides that at least 20 years shall be allowed to the purchaser in which to acquire property rights by making stated yearly payments. During this time no mortgage can be placed on the property thus acquired and the interest charged cannot be greater than 5 per cent. No lien of any kind can be placed upon homestead properties nor can they be seized for debt or other causes. In theory all land, minerals and other resources of the country are the property of the nation, and this position is maintained by the constitutional amendments of 1917, and the theory itself is put forward as a justification for the subdivision, by order of the legislature, of large landed estates and the national control of oil, mineral and water rights, with a view to the more equal distribu¬ tion of the wealth of the nation and the en¬ couragement of small landed proprietors. To hold mining properties it is necessary to work them ; and no company may acquire and retain possession of more land than is actually neces¬ sary for the carrying on successfully of the business of the concern, whether it be mining, agricultural or industrial.

As the Constitutionalist party, when it rose in arms against the Diaz government, proclaimed the rights of the Mexican people to govern themselves in a direct and democratic manner and demanded the immediate solution of the agricultural questions facing the nation, pro¬ claiming, at the same time, the rights of the masses, naturally these reforms find a promi¬ nent place in the changes made in the constitu¬ tion by the convention of 1917. These are rad¬ ical and far-reaching. The new labor laws pro¬ vide for an eight-hour day with six days' labor a week; while night work is restricted to seven hours and when it is of a dangerous and un¬ healthy character, it is altogether prohibited for women and children under 16 years of age, while children under 12 may not be em¬ ployed in any contract work. Commercial establishments may not work their employees after 10 p.m. ; and children between 12 and 16 must not be worked for more than six hours a day. Women shall not be required to do hard labor for three months before childbirth, and they may not work for one month after, but they shall be paid for this month and they shall retain their positions and all the rights of their contracts. They shall also be allowed two rest periods each day during the time they are nursing. The minimum salary in every district of the country shall be such as to provide for the necessities of life, the edu¬ cation of children and honest amusements. In all farming, commercial, manufacturing and mining enterprises the employees have the right to participate in the profits of the busi¬ ness, and the percentage of such participation shall be fixed, in each community, by a com¬ mission acting under the central commission of conciliation which, by law, is established in each state. There shall be no distinction in salary by reason of . sex or nationality, for the same work. Farming, mining and industrial companies must provide, outside the cities and larger towns, _ proper sanitary dwellings, markets, hospitals and other conveniences

necessary to the life of the community, and when the employees number 200 municipal buildings and recreation grounds shall be pro¬ vided within which no intoxicating liquors shall be sold nor gambling permitted. Em¬ ployees may lawfully form combinations to protect

their interests and the right to strike and to close down is recognized. The work¬ men must, however, give 10 days' notice to the Commission of Conciliation and Arbitration before striking, and they are not allowed to use violence of any kind in the attempt to enforce their demands. An exception to this rule is, however, made in the case of govern¬ ment employees in ammunition factories, which are under the authority of the army and thus subject to military discipline. A complete close-down shall be legal only wrhen the excess of production makes suspension of work neces¬ sary to maintain prices at a reasonable rate, but approval for such close-down must first be obtained from the Committee on Conciliation and Arbitration, which shall be formed of an equal number of representatives of capital and labor together with one additional member rep¬ resenting the government. Any employer re¬ fusing to submit his case to the commission or to abide by its decision forfeits all right to any contracts already made with his employees and becomes obligated to pay them three months' salary. Should the workmen refuse the offer of the commission their contracts automatically become void. An employer who discharges an employee because he has joined a union or taken part in a legal strike or without any just cause shall be obliged, at the option of the workman, to pay three months' salary or to continue the contract. The law provides for free municipal employment bureaus and stipu¬ lates that, when a Mexican workman contracts to go to work outside Mexico, the contract thus made must be approved by the municipal authorities and viseed by the consul of the country to which he is about to go, and one of its provisions shall be that the employer must provide the means for the return of the workman to his native land. No part of a salary may be retained as a fine, as was for¬ merly the case ; no salaries may be paid in a saloon or place of amusement, and no work¬ man may renounce his rights to indemnity for accident. No labor contract can be for more than one year, and in such contracts the laborer cannot renounce any of the rights guaranteed him by law. The only redress for the viola¬ tion of a contract on the part of the employer or employee is a civil action.

Consult Coronado, M., (Elementos de derecho constitucional mexicano) (2d ed., Guadalajara 1899) ; Dodd, W. E., (Modern

Constitutions) (Chicago 1909) ; Gamboa, J. M., (Leyes constitucionales de Mexico durante el siglo XIX> (Mexico 1901); Granados, R. Garcia, (La constitucion de 1857 y las leyes de reforma en Mexico* (Mexico 1906) ; Pan-American Bulletin (issues of 1917-19, Wash¬ ington, D. C.) ; Wheless, J., Compendium of the Laws of Mexico) (2 vols., Saint Louis

1910).

9. ARMY AND NAVY. Owing to the many revolutions and upheavals through which Mexico has passed since it became an independ¬ ent country in 1821, the armed forces of the republic have been a constantly varying quan¬

tity. At the time of the collapse of the Maxi¬ milian empire in 1867 there were four great military centres, the north, the west, the centre, and the southeast. . When Porfirio Diaz took the city of Mexico in 1867 he had under his command more men than he had in the whole military force of the republic in 1910, when he was faced with an uprising which was destined, in less than a year, to send him into exile from which he never returned. Juarez, who, on the death of Maximilian, was acknowl¬ edged everywhere as the legitimate ruler of Mexico, found one of his greatest problems in the reduction of the armed forces which he had 'inherited from' the prolonged conflict against the French, the clericals and the Re¬ actionary party. He proceeded to solve it by dismissing from service hundreds of soldiers and officers, many of whom, being unfitted for civic life and having no means of making a living, became a constant thorn in the already troubled side of the executive. Bandits roamed the country and made so bold as to even invade the capital itself. Robbers, on a less preten¬ tious scale, were everywhere; and most of them had either been formed from or organ¬ ized by the dismissed soldiers of the republic or the forces of the Reactionary party. Diaz faced the same condition of affairs when he came into power in 1876. But he was wiser in his day than Juarez had been in his, probably because he was a thorough soldier and under¬ stood the soldier's point of view. He saw, in the very restless element that had given the Indian President so much trouble, the raw material out of which to create a rampart against the lawlessness that had overrun the land. In the course of a few years he had organized out of this unpromising material the rurales (rural guard), which became as famous in Mexico as the Northwest Mounted Police is in Canada. These guardians of the peace, which were to be found in organized groups in the towns, cities and villages throughout the coun¬ try, were military in every sense except that they were under the jurisdiction of the Depart¬ ment of the Interior (Gobernacion) instead of that of War. However, in the last few months of the Diaz administration (1911), the rurales were placed under the jurisdiction of the War Department, for strictly military

considerations. Throughout the trouble they remained, for the most part, faithful to the government, but be¬ coming later on disorganized through the many political changes that followed one another in rapid succession, they were finally disbanded. Throughout his long term of office, which ex¬ tended from 1876 to 1880 and from 1884 to 1911, General Diaz gradually reduced the mili¬ tary force of the republic and aimed at increas¬ ing its efficiency. In 1910 the standing army of the republic consisted of less than 1,000 commissioned officers of all grades and less than 25,000 noncommissioned officers and men. Thus the government, which had been lulled into fancied security, through the years of peace which had followed the assumption of the presidency by Diaz, found itself unprepared to deal with a revolution like that of Madero, which affected the greater part of the country. The peace standing of the Mexican army was, in 1914: Commissioned officers, 3,112; non¬ commissioned officers and men, 26,431. The expenses of the maintenance of the armed

forces of the republic, the garrisons, etc., was, in the fiscal year ending 30 June 1914, over $40,000,000 Mexican money, or more than one-third of the whole revenue of the republic. As this amount embraces only the forces of the de facto government, it is probable ‘that nearly as much more was spent in the mainte¬ nance of the revolutionary forces then in the field against the former. On 30 June 1916, A. G. Garcia, Mexican inspector of consulates stationed in the United States, gave the strength of the Constitutionalist army as 175,000 officers and men, all of which he claimed were well armed and uniformed. Other authorities place the Constitutionalist forces at between 85,000 and 100,000. This is considerably above the authorized peace strength which is 43,967, com¬ missioned officers, noncommissioned officers and men. During the Diaz regime many new barracks were built and many old ones were reorganized and made modern. A school of Aspirantes (officers in training) was opened at Tlalpam, in the Federal District a short dis¬ tance from the capital for the military instruc¬ tion of men in all branches of the service who could not afford to go through the longer and more thorough course given in the National

Military School in Chapultepec. Owing to the part the pupils of this Tlalpam school took in the uprising under Generals Mondragon, Felix Diaz and Reyes in February 1913, it was closed. The West Point of Mexico, however, is the Chapultepec school, which occupies a part of the famous Chapultepec building, the official residence of the President of Mexico. There are generally in attendance about 300 students all being trained for officers in the Mexican army at the government expense. The school also offers an excellent post-graduate course in ad¬ vanced engineering, topography, military juris¬ prudence, ordnance, military history, advanced military tactics and an extensive course in the geography of the country which, from the military point of view, is extremely difficult. The present Constitutionalist government, fol¬ lowing in the footsteps of the Diaz administra¬ tion, is attempting to educate the illiterate sol¬ diers in the ranks of the army, or at least to teach them to read and write. According to the recent amendments to the Mexican consti¬ tution, service in the army is obligatory on every citizen of the republic, and in time of war the conscription covers from three to five years; but as a matter of fact only the lower classes are forced into the army. In time of peace the Mexican army now consists of 34 battalions of infantry, 18 regiments of cavalry, one regiment of horse artillery, two regiments of field artillery, one regiment of mountain guns, two battalions of garrison artillery and one battalion of engineers, each battalion con¬ sisting of four batteries. On mobilization each four-company battalion (including the engi¬ neers) forms a regiment of two battalions while the four-battalion regiments are raised to six battalions and the cavalry regiments to six squadrons.

Owing to the difficulty which the Consti¬ tutionalist government has met with in securing arms, the armament of the forces is of differ¬ ent kinds, including various Mauser models for the infantry, and Remington rifles of a date as far back as 1893, the Mauser carbine for the cavalry, and other arms of German and Japan¬

ese make. The field and horse artillery have Q. F. guns on the Schneider-Canat system ; while the coast defense consists, in so far as it is modern, principally of guns of French make.

The Mexican Navy. — The navy consists of the gunboats Vera Crus, Zaragoza, Bravo, Gen¬ eral Guerrero and Morelos, and the transports Progreso and Oaxaca. The Zaragoza is 213 feet in length, has a displacement of 1,226 tons and a speed of 13 knots, is built of steel and its armament consists of six Canat guns, two Nordenfeldt rapid

fire guns and two Hotchkiss revolving guns. The Vera Cruz is 200 feet in length, 1,000 tons displacement, has a speed of 16 knots and is built of steel. It has two Bethlehem rapid fire guns, 6 semi-automatic rapid fire guns and one Whitehead torpedo gun. The Bravo and Morelos are each 252 feet in length, have 2,500 horse power and a speed of 16 knots. They are built of steel, and each carries two Bethlehem rapid fire guns and six Schneider-Canat rapid-fire guns. The Progreso is 230 feet in length, has 1,585 tons displace¬ ment, a speed of 12 miles, is built of steel and will carry 250 tons of cargo and 600 men, with the usual complement of officers. The Oaxaca is 100 feet in length, its tonnage is 979, its speed 7 knots, and it is built of steel and will carry 300 tons of cargo, 200 cattle and 500 men. Reserves are provided for service in the army in case of war, which can, if needed, be made to swell the entire fighting force .to almost 500,000 men.

10. EDUCATION. The early history of education in Mexico is particularly interesting. In 1529, the College of San Juan de Letran was established in the capital and threw its doors open to Spaniards and Indians alike. The first university was opened in 1553 by special permission of the King of Spain. In 1573 two colleges, San Gregorio and San Ildefonso, were opened; and two others and a divinity school were established a few years later. Thus seven institutions of higher educa¬ tion were in operation in Mexico before the close of the 16th century. It was not, however, until 1578 that the science of medicine was recognized as meriting a place among the branches of higher education, the first chair of medicine being established in that year. Twenty-one years later another medical pro¬ fessorship was founded, and in 1681 anatomy and surgery were added. The Royal College of Surgeons, established in the city of Mexico in 1768, still exists as the National School of Medicine, a name adopted in 1845. Its home is the building made famous as the residence of the Spanish Inquisition. The Mining College, or School of Engineering, established in 1793, occupies an edifice built by the famous Spanish architect Manuel Tolsa, at a cost of $3,000,000, and is in a most flourishing condition. AF though the Spanish conquerors of the Aztecs were largely inspired by avarice, cupidity and brutality in their treatment of them, they were sincerely devoted to the cause of higher educa¬ tion and contributed liberally from public reve¬ nues and private fortunes to its advancement In the city of Mexico there was founded, in 1551 by the Spanish Crown, the first university in North America, 200 years before the inde¬ pendency of the United States. The National

Academy of Art occupies a building on the site of which was the home of the first Euro¬ pean school of the new world, a school for Indians. The first normal school for males and its companion school for females occupied his¬ toric buildings completed respectively in 1678 and 1648; the Jesuit College of San Ildefonso, erected in 1749 at a cost of $400,000, is now the home of the National Preparatory School (a part of the National University of Mexico). The National Library, with its more than 400,000 volumes, was formerly the Convent of San Augustin. The building in which is now located the National Museum dates back to 1731 and cost $1,000,000 and The College for Young Women now occupies a roomy struc¬ ture completed in 1734 at a cost of $2,000,000. Thus are education and history closely inter¬ twined in Mexico City. In 1824 Humboldt wrote: ((No other city of the new continent, not excepting those of the United States, pos¬ sesses scientific establishments so great and so solid as those of the capital of Mexico.® In most of the states, schools for the care and instruction of orphans are maintained at the public expense ; in these both sexes are given the advantage of a primary education. Boys are taught the ordinary trades, and girls are instructed in the various occupations pertain¬ ing to the sex. In these, as well as throughout the entire educational machinery of the repub¬ lic, modern methods have been adopted, and system, progress, and thoroughness prevail. Everywhere there is manifested the deepest in¬ terest in the uplifting of the masses through the most effective of all agencies — education. When Gen. Porfirio Diaz was first elected Presi¬ dent in 1876 there were only about 4,000 public schools in the entire republic. From the com¬ ing of the Spaniards the chief interest in edu¬ cation had been confined to the higher branches, to the establishment of seminaries, colleges and universities, and the primary or fundamental branches were neglected. Under Diaz there resulted a noteworthy increase of schools and attendance. In the period between 1876 and 1891 schools of all classes had increased from 4,250 to more than 10,000 and the total attend¬ ance from 160,000 to 649,771. The attend¬ ance of mestizos (half-breeds), from 16,000 to 235,000, and of Indians from about 8,000 to 170,000. In 1891 the entire cost of mainte¬ nance of the educational system was $4,068,200, which sum was paid by the federal and state governments, the average cost per capita being

$5.63. In 1907, the number of primary schools supported by the federal or state governments was 9,710 and by municipalities, 2,230; total, 11,940; and the attendance was 776,622. There were 34 secondary and preparatory schools sup¬ ported by the federal and state governments, with an attendance of 4,231 ; of which 3,793 were males and 438 females. The number of private schools during the same year was 2,499 with 152,917 pupils. In 1913-14, $13,926,000 was spent in education. In 1917 the total school population of the state was 972,600 with a total enrolment of over 700,000, for the teaching of which there were over 22,000 teachers. The number of public libraries in 1913 was 151 ; number of museums 45, of which 11 were archaeological, seven scientific, eight natural his¬ tory, one geological and metallurgical, five agri¬ cultural, one medical and anatomical, one in¬

dustrial, two commercial and nine miscellane¬ ous. There were 164 scientific and literary societies. A law was enacted in 1888, but not put into force until 1896, making elementary education compulsory and compelling the es¬ tablishment and maintenance of at least one public school for every 4,000 inhabitants. Under the provisions of this law the advance in edu¬ cation and educational methods throughout the republic was rapid.

The National Library, which has a large and very convenient building and location in the capital, is a noteworthy institution. In its collec¬ tion of more than 400,000 volumes are many rare books and manuscripts. Among these are works by early Spanish historians and scholars written before the art of printing was known. A very large proportion of the volumes in this library was originally the property of the church or of the priesthood and the books were confiscated by the government during the progress of the war of reform. Naturally many of them deal with religion, literature, language or history. Of similar character are most of the state libraries. While there are some 45 public museums in the republic many of which are quite extensive and all of which are exceedingly interesting and instructive, far greater importance attaches to the National Museum in the city of Mexico, than to all others combined. Although it has occupied its present quarters in the National Palace only since 1865, it was established in 1831, with the collections previously belonging to the Con¬ servatory of Antiquities founded by Emperor Iturbide in 1822, and to the Royal University, to which Viceroy Bucareli y Ursula had in 1775 transferred the remnants of a most valuable collection of maps, hieroglyphs on skins, manu¬ scripts, *etc.* These were consolidated under the name of

the National Museum. Here the student of archaeology, of ethnology or of any other department of the ancient history of the American continent, or of the peoples who have at different periods dwelt upon it, may find greater wealth of material for investigation and study than exists in any similar institution in the western world. While there are also a number of very important art collections in the principal state capitals, the National Gallery, in the city of Mexico, holds unquestioned pre¬ eminence. Of literary and scientific societies there are many in Mexico. Every considerable community is the home of one or more of these associations, some of which have been in exist¬ ence many years.

The Revolutionary party of 1910 was un¬ reservedly committed to the education of the masses ; but the burden was unloaded upon the individual states and communities over which the federal government retained super¬ visory rights but with no central control. The Constitutional party has shown itself strongly opposed to church control of schools of any kind, whether public or private. In Mexico the city schools are fairly good, while those of the towns and villages and the country districts are very elementary and poor. This is due to lack of funds for the maintenance of public schools and the difficulty of getting capable teachers for the salaries paid. The plan of organization of the Mexican schools is more French than American. Primary instruction covers four years and the high school course two. Four

years of preparatory school duties lead to the university, which is much more academic in form than in the United States; so much so, in fact, that the work covered by the National University, as it is now constituted, was known, previous to 1913, as «the course of higher studies. w But the Revolutionary party did

away with the cabinet office of Minister of Public Instruction, giving to the arts depart¬ ment of the university its old name of the National Preparatory School and erecting the post-graduate school into a university. Where¬ as previous to this all education had been with¬

out charge, the new educational law exacts a fee of $5 a month in both the preparatory school and the university, with all their affili¬ ated schools, like those of medicine, law, den¬ tistry, engineering, *etc.* (17 Jan. 1916). For some years past the tendency of Mexican pub¬ lic education has been toward the practical at the expense of the academic; and this tendency has been accentuated by the changes recently made. Military instruction is made obligatory; brench and English have been reduced from a three to a two-year course and much attention is paid to manual training. To the General Direction of Public Instruction of the Depart¬ ment of the Interior, re-established in 1914, is entrusted all educational matters pertaining to the Federation, which were originally handled by the Department of Public Instruction and Fine Arts. The General Direction of Fine Arts of the Department of Fomento (Promotion) has charge of all public libraries, national monuments, historical, archaeological, artistic and other remains; the National University, preparatory, normal and primary instruction, including the teaching of agriculture, com¬ merce, industry, geology and manual training in the Federal District and in the territories. Rudimentary education and state colleges and schools are in the hands of the local authori¬ ties which have their own governing bodies for this purpose. All companies having char¬ ters from either the federal or state authori¬ ties are, by virtue of this concession, obligated to provide schools and teachers for the chil¬ dren of the people in their employ. The same law applies to plantations, ranches and agri¬ cultural enterprises in general. This new law has worked fairly well and has been instru¬ mental in increasing largely the number of schools throughout the republic. In the state of Yucatan alone there were, in 1917, nearly as many school buildings as there were in all the republic in 1876. In others of the states under the control of the Constitutionalist party, theˆnumber had, in 1917, been doubled since

The National Preparatory School in Mexico City (the old arts department of the National University) - is now, what its name indicates, purely a school to prepare pupils to enter upon the study of some one of the professions. It is a little higher than an American college and considerably less than an American university. The National University includes the School of Higher Studies and the institutions of law, medicine, engineering and odontology. It is governed hy a university council at the head of which is the rector. Owing to the unsettled condition of the country due to the revolution, definite educational statistics are not available for the past six years; but the general reports

issued by the Constitutional government show a steady increase in the efficiency of the public school system and an encouraging decrease in illiteracy in about two-thirds of the states of the union. More and better trained teachers, however, are urgently needed to carry on the work of general national instruction and the fight against illiteracy now under way. But the battle is an uphill one; for the illiterates still count about 70 per cent of the total popu¬ lation of the country.

11. RELIGION. There is complete sepa¬ ration of church and state in Mexico (since 1873) ; and the reforms made in the constitu¬ tion in 1917 reaffirm with great emphasis the fact that the church, of whatever creed or denomination, is constantly under the most strict government inspection and that all ecclesiastical buildings, lands and other prop¬ erty belonging to the nation, which extends their use to the church. So, therefore, no religious order or denomination can acquire land or other property or mortgages on the same. This prohibition extends to school and college buildings, asylums, charitable institu¬ tions and residences of ministers and priests and even to the property collected within the walls of the churches and other ecclesiastical buildings. Gifts of movable property may be made to the church; but even these at once automatically become the property of the na¬ tion. Every church or religious society occupy¬ ing property must elect an official head to repre¬ sent it before the government and to become responsible for the national property in its possession. All ministers of whatever cult must be Mexican by birth. The provisions of the reforms made in the Constitution in 1917 shut out of Mexican religious institutions fully 2,500 Spanish priests of the Catholic Church alone, hundreds of French priests, employed principally in schools and colleges, and the Protestant ministers, mostly American, who had established numerous churches and opened many schools throughout the land. While all religions not inimical to the interests of good government and the laws of the land are allowed to exist and to exercise their functions in Mexico, yet all public religious observances and ceremonies must be carried on within the church property and are subject to official in¬ spection and regulation. The law does not recognize the personality of any sect. The legislature of each state is empowered to regu¬ late. the maximum number of churches and ministers within the state. No minister shall have the right to vote, to hold any public office, or to be voted for, nor is he permitted to take part, in any way, in public affairs. The estab¬ lishment of monasteries and nunneries and the taking of monastic vows are prohibited by the Constitution, which asserts that the state may not permit the fulfillment of any contract, pact or agreement the object of which is the’ cur¬ tailment, loss or irrevocable sacrifice of

the liberty of man, whether for the purposes of work, education or religious vows. Mˆarnagc is a civil contract and no other marriage cere¬ mony except the civil one is legal. Therefore there aie geneially two marriage ceremonies performed in Mexico, the civil one by a magis¬ trate appointed for that purpose by the gov¬ ernment, and a second by the priest or minister

of the Church of which the contracting parties are adherents.

12. MYTHOLOGY. Prior to the Euro¬ pean occupation Mexico and Central America were inhabited by races possessing a long his¬ tory and a semi-historical mythology, manifold in its ramifications and rich in its internal de¬ velopment. Within this mythology was the very heart of those nations and peoples, for round it clustered their social and political in¬ stitutions and their industrial life. Though it differed with the different peoples, funda¬ mentally it was everywhere similar. The same thing had taken place in Mexico that had happened to the mythologies of the Indo-European races in Europe. Different tribes of the same great linguistic family had separated from one another and, in their migrations from place to place, during the more or less nomadic stages of their existence, they had, later on, come together again. During these wanderings they had forgotten one another and when they met again it was as alien peoples. Yet so similar were their institutions, languages, re¬ ligious beliefs and the general course of their existence that they frequently blended and be¬ came more or less one people. This happened to the remnant of the Toltecs left on the up¬ land plateaux of Mexico after the overthrow of their empire ; to the Chichimecas and to the various other tribes forming the Aztec Empire at the time of the Conquest.

After their long migrations from their primitive home, migrations which covered cen¬ turies, the Nahuatl races met as strangers ifi the valley of Mexico and surrounding country. The blending to which we have just referred was imperfect. Thus among the Toltecs we find the deity to whom most deference was-paid was Quetzalcoatl ; among the Aztecs it was Huitzilopochtli, god of war; among the Texcocans,

Tezcatlipoca, god of the air; among the Tlaxcalans, Camaxtli ; among the Otomi, Mixcoatl, god of the chase. Like the Romans, the Greeks and many other civilized peoples of pre-Christian times, the Mexicans were accus¬ tomed to adopt the gods of other races with whom they came into contact, more especially if the mythology of these races was closely re¬ lated to their own. The natural result was the very curious mingling of mythologies. Huitzi¬ lopochtli, Quetzalcoatl and Tezcatlipoca were all gods of the air, and they have so many characteristics in common there is little doubt they were originally one tribal divinity com¬ mon to all the people who spoke the Nahuatl tongue at a time prior to the separation of the tribes. In fact, in Mexican mythology, these three gods are represented as brothers, and in every part of the Aztec Empire where Nahuatl was spoken they were the foremost divinities. In Tenochtitlan (Mexico City), where Huitzilopochtli was all powerful, in his great temple, a statue and an altar had been erected to Quetzalcoatl. At Cholula, the heart of the Aztec empire, stood the greatest of the pyramids of Mexico, with its famous shrine, both erected to the worship of the Feathered-Serpent god of the Toltecs. But its worship¬ pers were not confined to the remnants of the Toltecs who had become incorporated into the Mexican nation. Peoples of various races, Aztecs, Colhuas, Zapotecas, Mixtecas, traveled

from the furthest confines of the empire and from beyond it to pay their devotions at the shrine of this once powerful divinity. Yet in Cholula, where the cult of Quetzalcoatl was all powerful, Huitzilopochtli also held a place by the side of the Toltec god himself.

In Texcoco, the reputed centre of the ad¬ vanced culture of the Mexican Empire, while Tezcatlipoca occupied the place of most im¬ portance in the native pantheon, just below him stood Quetzalcoatl and Huitzilopochtli. As the superior culture, refinement and intelligence of the Texcocans gradually came to exert an all-powerful influence over the rest of the Aztec Empire, their chief divinity, little by little, gained more importance in the Nahuatl pan¬ theon, until at last he secured recognition which gave him, among the nobles and cultured class at least, a standing above that of the other tribal gods.

Gods of the Air. — To understand the curi¬ ous relationship of these Mexican divinities it is necessary to remember that they were all gods of the air and that they had, in general., common functions, attributes and powers. Camaxtli, the war god of the Tlaxcalans, was recognized by the Mexicans as being the equiv¬ alent of their own

Huitzilopochtli, while the Tlaxcalans held that he was identical with Mixcoatl, the Otomi god of the chase. Among these three peoples this deity was designated by more or less the same insigniae. But he also wore upon his face and body the colors of the morning star, as did also Quetzalcoatl; he carried the lightning dart, which proclaimed him god of war, and at the same time con¬ nected him with the divinities of the wind, the lightning and the thunder. Mixcoatl, who had two temples in Tenochitlan, also wore the symbols of the god of the air.

The same fate befell the mythology of Yu¬ catan. Itzamna, the older culture god of the peninsula, was the popular culture hero of the Itzaes, the first of the historical races who overran Yucatan and the adjacent territory; while Kukulcan was the tribal god of the Mayas. Yet both divinities were recognized by the Mayas and the Itzaes; the shrines of both were to be found in the centres of the re¬ ligious cult of the peninsula and to them came pilgrims from Chiapas, Guatemala and all southern Mexico, generally over well-paved stone roads which now lie buried in impene¬ trable forests.

The Kiches of Guatemala called their cul¬ ture divinity Gucumatz, ((Green Feathered Serpent,® a name indicative of divine intelli¬ gence; and the Mixtecas, hundreds of miles away on the west coast of Mexico, named theirs Yucano, -the <(Bright Light,® a term having practically the same significance. But everywhere in the south, as among the Toltecs and the Aztecs, the traditions and offices of this great intertribal divinity were the same. He was the god of the winds, the thunder and the lightning, of the morning star, of fire and of light, the apostle of culture, the patron of merchants, the inventor of language, literature and art, the special divinity of athletes and sportsmen, artisans and thieves. To him, un¬ der one name or other, was erected all that was beautiful in the builder's art. He was the terrestrial representative of the great sun sent to teach the people of the earth the arts and

sciences. He was the originator of the Toltec, Aztec, Kiche, Maya, Zapoteca and Mixteca calendars and systems of hieroglyphic writing,

and he is credited with having given names to animals, plants, minerals, places and geograph¬ ical divisions. He was the great physician and the inventor of medicine; music and poetry, too, were his gifts to humanity. In short, he was a universal culture god whose powers and benefactions were bounded only by the ad¬ vancement in civilization and the breadth of imagination of each of the many tribes and nations unto whom tradition represents him as ministering.

Creation Myth. — The Nahuatls believed that before the creation of the universe there existed a region inhabited by the creator, Tona-catecutli (Ometecutli) , and his consort, Tonacacihuatl (Omecihuatl), who had four sons, Tezcatlipoca, Huitzilopochtli, Quetzalcoatl and Yayauqui. When the youngest of these was 600 years old the gods appointed Quetzalcoatl and Huitzilopochtli as their rep¬ resentatives. The two executors created a fire and a demi-sun, and then two human beings, Oxomoco and his wife, Cipactonatl. To the man they gave the art of cultivating the ground and to the woman those of spinning, weaving and prophecy. They then created Mictlan Tecutli and his wife, Mictlan Cihuatl, Lord and Lady of Mictlan. They divided time into days, months and years ; and below the shining residence of Tonaca Tecutli, in the 13th re¬ gion, they created eight heavens, the first of which was inhabited by two stars, male and female; the second by Tetzahua Cihuatl (woman skeletons), whose business is said to have been to devour humanity at the end of the world. In the third heaven were men of all colors; in the fourth birds which descended to the earth. The fifth was the home and birthplace of fiery serpents, comets and falling stars; the sixth the dwelling place of the wind; the seventh that of dust, and the eighth that of the gods. Tlaloc and his consort, Chalchiutlicue, were also created as masters of the waters in the heavens above and upon the earth be¬ low. Tlaloc, in turn, created a great num¬ ber of little servants, all of whom were known as Tlalocs, while he himself bore the title of Tlalocaltecutli, ((Lord of the Tlalocs.® His pigmy servants distributed the water wherever Tlaloc ordered them to, and sent it down upon the earth in the shape of rain, where it was again taken in charge by other little Tlalocs. Whenever one of these was unfortunate enough to break the jar in which he carried the water the crash of the fall produced thunder, and when a flying fragment hit some mortal, men said he had been struck by lightning.

The sun created by the gods went half way across the heavens and then returned upon its tracks or, according to another version, it rose only a short distance above the horizon and stopped there, and its rays were very feeble, consequently the earth was dimly lighted. Both it and the moon were accus¬ tomed to wander about the heavens; so

Tezcat¬ lipoca undertook to create a new sun, and there followed an era of sun-creation resulting in the making of four separate luminaries.

The Deluge. — There are different accounts of the creation of these suns and even the Order in which they were created is disputed;

but that their periods of existence represent four separate ages of the world is agreed by all. When the first sun, Atonatiuh (((water-sun®), was destroyed a great deluge descended upon the earth; when Ehecatonatiuh (((wind-sun®), met with a like fate, an all-devasating wind was created; and when Tletonatiuh (((fire-sun®) ceased to exist, everything upon earth was destroyed by an all-consuming fire. Then followed Tlatonatiuh ((<earth-sun®) , who cre¬ ated all things as they now exist. Thus, ac¬ cording to Nahua tradition, the human race was swept from the earth three separate times, and people were in constant fear that a fourth destruction was to come, for they believed the four elements, earth, air, fire and water, were in constant conflict, and that for this reason they had already caused previous destructions of the world. After each of these destruc¬ tions the earth had been repeopled by those who escaped. After the first inhabitants of the earth had disappeared, Coxcox and his wife, Teocipactli, escaped in a boat and landed on Mount Colhuacan. They were the progenitors of many children who were all dumb ; but one day a bird, from the top of a tree, taught them to speak. They all spoke different languages, however. Hence the diversity of tongues.

Origin of Mankind. — According to one myth, after the destruction of the earth by fire, by Tezcatlipoca, Camaxtli-Huitzilopochtli sat upon a rock and, striking it with his wand, caused the first race — the Chichimeca-Otomi — to come forth and people the earth.

According to an Aztec myth, the first men emerged from a place called Chicomoztoc (Seven-Caves) ; and this mythological starting-point figures in all accounts of their wander¬ ings. It was probably the place from which the seven tribes set out on their migrations southward, and at the end of which they ar¬ rived at the valley of Mexico.

Mexican Religion. — The Mexican had over 300 deities, some of whom had been borrowed from neighboring tribes and all of whom may properly be classed as nature gods. In addi¬ tion to these they acknowledged a supreme being, whom they represented as the Lifegiver, Ipalnemoani, <(He who gives us life,® and Tloquenahuaque, the «All-embracing.» This supreme being was never

represented by pic¬ ture or image and no sacrifices of any kind were offered to him. He was known as <(Teotl,® the god, and seems to have been iden¬ tified with the Sun, and at times with Tez¬ catlipoca. The hieroglyphic by which he is represented is the same as that of the Sun. Tlacatecolotl, <(Reasoning Owl,® the enemy of the human race, seems to have been, in a sense, the force of evil opposed to Teotl.

The Aztecs and Nahuas in general believed in a life hereafter and that the souls of the dead went to one of three regions, the home of the Sun; Tlalocan, the residence of Tlaloc, the god of waters; and the dreary underworld called Mictlan, ruled over bv Mictlantecutli and his consort, Mictlancihuatl. Soldiers killed in battle, prisoners sacrificed by the enemy and women who died in childbirth went to the home of the Sun, the men to wait upon him and to accompany him upon his daily journey to the zenith, where he was met by the women who formed his escort for the rest of the way. Those killed by drowning, lightning or any

Oi the diseases sent upon earth by Tlaloc or his consort, such as tumors and dropsy, and chil¬ dren sacrificed upon the altars of this god were transported, after death, to Tlalocan, a delight¬ ful region of mountains, shady trees and run¬ ning streams. All those not qualified to go to the home of the Sun or the pleasure regions of Tlaloc were sent to Mictlan, situated, accord¬ ing to some authorities, in the cold and dreary north ; according to others, in the gloomy ((navel of the earth,® where they were forced to lead an aimless existence.

By the Nahuas every phase of nature was personified and had its representative guardian spirit to whom offerings and sacrifices of some kind were made daily or periodically. Among these were household duties, of which every home had several, according to its class, condi¬ tion and position in society. The sacrifices to the national and tribal gods were attended to by a numerous and opulent priesthood, who ruled in an autocratic manner and exacted heavy contributions for the maintenance of religious institutions and schools, the latter being also under their complete control. These sacrifices,

generally slaves or captives taken in war, were offered up upon the stone altars of the temples, the victims being thrown upon their backs and held down by*attendants while the officiating priest ripped open the breast and tore out the heart of each and offered it, first to the Sun, and then to the particular divinity to whom the sacrifice had been made. The presentation of fruits, flowers, grain, animals and birds to the family gods was generally made by the head of the family or of the com¬ munity house, when a number of families lived in one large building, as was often the case in Mexico; while sacrifices were made by indi¬ viduals to those divinities who were believed to work in the interest of individuals. Tezcatlipoca, a purely tribal divinity of the Texcocans, the most civilized and cultured of the Nahua people, had continued to gather to him¬ self the powers of most 'of the other divinities, until, at the time of the Conquest, he was looked upon as a great divine ruler and creator and had become identified with the Toltec su¬ preme divinity, the ((Teotl.® But he never ceased to be the tribal deity of the Texcocans. Huitzilopochtli, the tribal deity of the Aztecs, had become the great war-god of all the Nahuas because the military successes of the Aztecs had imposed him upon the other nations forming the confederacy. The large bodies of Toltecs who remained in Mexico after the fall of the Toltec empire formed communities, the principal of which was at Cholula, where the presiding deity was Quetzalcoatl, also the fore¬ most divinity of the Zapotecas and, under the name of Yucano, that of the Mixtecas. The Toltecs who went southward carried the wor¬ ship of this deity into Yucatan and parts of Chiapas, Tabasco and Campeche, where he dis¬ puted sovereignty with the older deities of the native races. In the long ages of mythology, hundreds of races surged to and fro across Mexico and the great isthmus of Central America, leaving behind them remnants of their languages, tribal customs and mythologies. Thus we have a mingling of tongues, creeds and customs which has sorely puzzled the anti¬ quarian, the linguist and the student of mythol¬ ogy. The destruction of the native codexes

and the undecipherable character of the re¬ maining records in stone of the Mayas, Kiches and other highly civilized races of southern and eastern Mexico and Guatemala add greatly to the difficulties of understanding mythologies of the various races of Mexico.

Roughly speaking, the Nahua, Maya and Kiche deities may be classed as gods of the air, to whom belong the culture deities, the lightning, the thunder and the storm gods; the sun, the moon and the planet Venus (the Even¬ ing Star) and the Supreme Creator; gods of rain,

mist, moisture and the running waters of the earth; grain and other plant deities; spe¬ cial patrons of trades, occupations, games, sports, learning of all kinds, including astron¬ omy, astrology, witchcraft, luck in gaming, medicine and the healing art. The functions of many of these seem to be inextricably min¬ gled and confused. This is due partly to our inexact knowledge of the past institutions, his¬ tory and mythology of the various races who mingled and blended on this great bridge of the continents throughout unknown centuries before history began. But remains enough have been left to show the complicated nature of the religious system of the Nahuas and other cognate races and to prove that they had advanced to a stage wherein ethical consider¬ ations played a very considerable part. The prayers addressed to their gods, the speeches to the sovereign and other officials about to take office, the advice of a father to his son and a mother to her daughter; the poetical effusions of the royal poet of Texcoco, Neza-hualcoyotl, and many other like documents which have come down to us, are filled with evidence of the high ethical plane of Nahua religious thought at the time of the Conquest; for every occupation of society, all reasoning, every movement of life had their separate being within the shadow of the Nahua religion.

MYTHOLOGICAL CHARACTERS.

In the following account of the more im¬ portant mythological characters most fre¬ quently met with in literature relating to Mexico, the territory in which each plays his part is, unless otherwise stated, the land of the Nahuas.

Bacabs. — In the mythology of Yucatan the Bacabs, the upholders of the heavens, were supposed to have their stand at the four car¬ dinal points. They were called Muluc, Cauac, Kan and lx, North, South, East and West. They were probably related to the four wind deities and to the four rain Tlalocs. The Bacabs were frequently represented in Maya sculpture.

Bat-God. — The Bat-God, Zotzilaha Chi-malman, the ((Dweller in the Bat's House® ; a primitive divinity of the Mayas, the Zapotecas and the Mixtecas is met with in the Popol-Vuh, under the name of Camazotzo, where he plays a prominent part in the adventures of the hero gods of the underworld. He seems to have been a god of volcanic fire and to have been closely associated with earthquakes and the lower regions.

Centeotl. — A family name given to the maize gods. The female divinity, called Chi-comecohuatl, (<Seven-serpent,® represented

water as a fertilizer and was assisted by Chalchiutlicue, the consort of Tlaloc, in fertilizing

the youngest harvest and looking after it. Under the title of Xilenon, “Green-corn-ear,” she was the spirit of the green corn. As the earth goddess, she was called Tonacayohua, “She-who-nourishes.” In this form she was one of the chief deities of the Totonacas, who erected to her, on the summit of a mountain, a great and imposing temple, to which pilgrims came from far and near. The name Centeotl was also given as a special title to both male and female deities. A summer festival lasting 18 days was held when the maize had attained its full growth. Ceremonial dances formed a part of this celebration at which a female called Xalaquia, who represented Chicomeco-huatl, danced with the rest. Her face was painted yellow and red to represent the ripe corn. On the last night of the festival all the women and the head men of the community joined in the ((dance of death” ; after which the Xalaquia was offered up as a sacrifice to Chi-comecohuatl. Not till the conclusion of this festival and its significant closing ceremony was it lawful to partake of the new corn.

Chac was the rain god of Yucatan. He is represented with a long tapir-like snout through which it was believed he blew the rain out over the earth. He corresponds to the Tlaloc of the Mexicans.

Chalchihuitlicue, “the rain goddess,” wore a dress of nebulous green, a blue crown deco¬ rated with green feathers and a collar of pre¬ cious stones to which was attached a golden pendant, all emblematic of the varying colors of the water. In her left hand she bore a conventional water-plant, and in her right a vase surmounted by a cross, the sign of the four directions or points from which the wind drove the rain.

Cihuapipiltin, “honored-women,” the spirits of women who died in childbirth, were closely related to the Moon Goddess. The moon had two tendencies, one actively beneficent, the other actively malevolent. The Cihuapipiltin partook of this latter tendency. They afflicted infants with certain diseases and they entered the bodies of weakly

people, more especially the insane who were popularly supposed to be governed constantly by their influence. Their temples were built at the crossroads which they were said to haunt.

Citlapol, “the Great Star” (Venus), was the Lord of the Dawn, Tlahuizcalpan Tecutli. This astral deity was thought to influence the events of life very greatly, so whenever the planet was due to rise, the people stopped up their chimneys to prevent the entrance of its harm-bearing light ; whenever it reappeared on its circuit, captives were sacrificed to its image or its representation painted upon a column called Ilhuicatlan, “Place in the Sky” erected in the courtyard of the great temple of Tenochtitlan. Owing to the very special import¬ ance attached to the movements of this planet by both Mexicans and Mayas, its periods of revolution were carefully watched and recorded with great accuracy. As the evening star, this deity was said to follow the sun on his journey to the underworld. He is represented as having a white body, symbolical of light, which was frequently covered with long, narrow, red stripes and over his eyes was a black mask sometimes bordered with small white circles.

Coatlicue (Coatlatona), “She with Dress

of Serpents,” was the Aztec goddess of flowers and probably identical with the fabled mother of the god of war of the Aztecs. She was the patroness of gardeners who, in the early spring-time, offered her garlands of flowers.

Ehchuah, the “Black-God,” was the patron divinity of merchants and cacao planters in Yucatan.

Gucumatz, “Green-feathered-serpent,” the great Maya-Kiche culture deity, the equivalent of Quetzalcoatl, of which the name is a literal translation.

Huechaana, one of the two Zapoteca crea¬ tion deities, was the creator of all men and fishes; Cozaana was the creator of all beasts. As the story relating to these two creator divin¬ ities is also told in another form by the Mixtecas, and as the eagle and the snake play a prominent part in this latter form of the myth, it is probable these two Zapoteca deities were closely related to the culture gods of other Mexican peoples.

Huehueteotl, “Oldest of the Gods,” the fire deity, was also called Xiutecutli, “Lord of the Year,” while he was generally addressed as

“tata” or our father. He was represented with a black face and a red body, typical of fire. He wore a headdress of green feathers, a sign of royalty or divinity in pre-Columbian Mexico, and on his back he bore a yellow serpent, symbolical of his own special functions and of his relationship to the gods of the air. His connection with the sun, the father of all heat, was shown by a golden mirror. As Xiutecutli, he was a very much revered household god to whom an offering of drink and bread was made by every Mexican on rising in the morning. It was before his idol that the new fire was kindled every year. It was thought to be nec¬ essary for the existence of a new-born infant that a fire should be kept burning for four davs in honor of its arrival and as a sign of grati¬ tude to the Lord of the Year.

Huitzilopochtli (Mexilli), “Hummingbird’s Feathers on the Left (leg),” the tribal deity of the Aztecs and their great god of Avar He was the son of the Sun God and of Coatlicue (Coatlatona), “She with dress of serpent,” the Aztec goddess of flowers and the reputed mother of the gods. He was born with a shield in one hand and a blue spear in the other, fully armed for war; and he proceeded at once to the extermination of his sister and his brothers, a fabled tribe of demigods, who had conspired to kill their mother.’ He pursued them four times around a mountain, killing many. Others were drowned in a near-by lake, while a few surrendered and made peace. Huitzilopochtli usually wore a headdress of humming-bird’s feathers; in his left hand he carried a shield and in his right four darts On account of his prowess in war and of the prominence of the Aztecs at the front of the Mexican confederacy, he was the religious head of the Mexican priesthood. He had power over all growmg things; the feather markings of his shield were in the form of a cross com¬ posed of dots, thus connecting him with the Tlalocs his face and his limbs were marked with stripes of blue, and he was seated on a pedestal of blue, at each of the four corners of which was a serpent. Across his face and

i1S ,forˆhcad. > from ear to ear, was an azure band, all typical of his dominion over the sky

where, as a tribal deity, he ruled, as the god of lightning, of thunder and of terrifying winds.

Huistocihuatl was the protecting goddess of salt and salt-makers throughout the Aztec Em¬ pire, where the gathering of salt from the salt deposits along the low coast-lands was a busi¬ ness of great importance.

Hurakan, <(He who hurls below,® the Maya-Kiche god of the storm, of wind in motion, was accompanied in his work by violent mani¬ festations of nature by three assistant deities, Cakulha-Hurakan (Lightning), Raxa-Cakulha (Lightning-track) and Chipi-Cakulha (Light¬ ning-flash). Hurricane, Spanish huracan, is supposed to be derived from the name of this deity.

Itzamna, ((Dew of clouds and heaven,® father of gods and men, the tutelar divinity of Yucatan, and more especially of the Itzaes, was credited with possessing most of the powers of Quetzalcoatl, of ruling over more or less the same phase of human life and of per¬ forming more or less the same acts in behalf of humanity, and all evidence tends to show that he was but an earlier peninsular form of the great American culture myth. He was the universal life-giver and hence the patron divin¬ ity of birth and of growing vegetation. He was also the culture god who was popularly be¬ lieved to have taught the Itzaes the civilization they had acquired. He was the fabled founder of Itzamal ; and in his capital, in semi-histori¬ cal times, was a magnificent temple dedicated to his worship.

Ixtlilton, ((He of the Black Face,® the god of medicine and healing, was also addressed as Tlatetecuin, the <(earth-digger.® He was said to be brother of Macuilxochitl. Sick children were carried to his temple to dance, and recite prayers and incantations, after which the priests gave them a special medicine contained in tlilatl i(black-water jars.® If the patient got better, the image of the god was taken to the house of his residence, where offerings and ceremonial dances were made in his honor.

Kinich-Ahau, ((Lord of the Sun's Face,® the Sun-god of Yucatan, presided over the North. He was also called Kinich-kakmo, (<Sun-bird® and Arara, ((Fire-bird.® The figure of the Sun is frequently represented upon ancient build¬ ings in Chiapas, Yucatan and Guatemala; and in the latter country certain Indian tribes still wear, on festive occasions, a gala dress with a great, yellow sun depicted on

both front and back of the garment. They call themselves (<Children of the Sun.®

Kukulcan, ((Feathered-serpent,® a literal translation of Quetzalcoatl, was the great Maya culture god. He is said to have been the first king of Mayapan, just as tradition makes Quetzalcoatl one of the kings of Tula.

Macuilxochitl, ((Five-flower,® Xochipilli, (<Source-of-flowers,® was the patron of luck in gambling. His worship was general throughout the Aztec Empire and nations to the south of it ; and he was held in high honor among the Zapotecas and Mixtecas. At a yearly festival dedicated to him, offerings of cakes, animals and human beings were made and ceremonial dances performed in which the people, richly dressed, took part.

Metztli, ((the Moon goddess,® Yohualticitl, <(Lady of the night,® was patroness of harvest and fertility. The Zapotecas and Nahuas be¬

lieved that women stood in a very special rela¬ tionship to this deity.

Mixcoatl, ((Cloud-serpent,® the Aztec and Otomi god of the chase, was sometimes repre¬ sented as a deer or a rabbit. He carried a sheaf of arrows to typify his office. On the site of a famous ancient shrine of Mixcoatl stands Mixcoac, the ((city of gardens,® one of the most popular suburbs of the Mexican capi¬ tal.

Nanahuatl, (<Lord of lepers and those af¬ flicted with skin diseases,® is always connected with the moon, and diseased persons under his protection were believed to be sacrifices pecul¬ iarly acceptable to her, for whose service they were set apart. The moon goddess was in¬ timately connected with the art of healing and she also took a special interest in lepers.

Napatecutli, (<Four-times-lord,® protector of mat-makers, one of the numerous rain gods, was one of the ministers of Tlaloc. He pre¬ sided over the low, swampy lands where the reeds grow from which mats are still exten¬ sively made in Mexico.

Omactl, <(Two-reeds,® Nahua god of fes¬ tivities and rejoicing, whose image always pre¬ sided over the feasts of the well-to-do, was cermonially eaten in the form of a great bone of Indian corn meal at every festival. The idol had a recess in the region of the stomach into which provisions were put. The image wore a paper coronet and a

cloak fringed with flowers and carried a sword.

Opochtli, (<Left-handed,® Aztec god of fishing, also called, in Chaleo, Amimitl, was said to be the inventor of the fish-hook, line and spear and other means of catching fish. The similarity of his name with that of the Aztec god of war would seem to connect him with the latter, especially when it is remembered that Huitzilopochtli was the tribal god of the Aztecs when they were mainly fishers.

Sun-god, the supreme deity of the Toltecs, played an important part in the mythologies of the Nahuas, Itzaes, Mayas, Zapotecas, Mix¬ tecas and other races of Mexico and Central America. He was called Ipalnemohuani, (<He-by-whom-we-live.® As the god of warriors the priest and nobles-claimed descent from him. His golden image was hung upon the wall of his court where the first rays of the rising sun fell directly upon it. Human sacrifices were offered to the Sun, whose strength was sustained by the blood of these victims, other¬ wise he would not be able to continue his journey through the sky. Even the hearts of the captives offered to Huitzilopochtli and Tezcatlipoca were first presented to the sun. Some of the most magnificent temples of Mex¬ ico, Central America and Peru were erected to the Sun-god.

Tepeyollotl, ((Heart-of-the-hills,® personifi¬ cation of the echo of the mountains, was one of the nine attendants of the night and lord of the 13 days following the flood, in _ which no sacrifices were good, and during which the feast of the jaguar was held. He was a southern deity highly honored among the Zapotecas and the Mixtecas and bordering tribes.

Tezcatlipoca, ((Fiery-mirror,® the tribal deity of the Colhuas, was a god of the winds and the tempest and the giver of breath and hence of life. In the Nahua legend he is the

opponent of Quetzalcoatl whom he deceived and induced to give up his work upon earth and return to the home of the Sun. In the capacity of doomster he was called Yaotzin, (<The enemy,” and

Nezahual pilli, “Hungry-chief.” As the spirit of the ever-youthful tem¬ pest, he was address d as Telpochtli, “Youth¬ ful-warrior” ; and as the spirit of the night, he was called Yoalli Ehecatl, “Night-wind.” Benches were placed along the highway for him to rest on after his exertions of the night. He was a god of fortune and of fate. As the deity to whom worship was obligatory, he was known as Monenque, “Claimer-of-prayer” and as such he had special power over plague, famine and threatened danger to the people, the state and the human race. He had dominion over life and death. He carried a whistle, symbolical of the noise of the wind; as a warrior god he was armed with dart and shield. To his legs were fastened small bells and in his left hand he held a golden mirror, in which he saw re¬ flected all that passed upon earth.

Tlaelquani, the Mexican deity whose prov¬ ince it was to forgive or eradicate sin pos¬ sessed a dual nature. She was the patroness of desire and luxury; and the confessions made to her were restricted to sins against morality. She was mediator between the penitent and Texcatlipoca, the “Most Powerful God,” the “Protector of All” and the “Searcher-out-of-evil.” The penitent, in the presence of the officiating priest, lighted a sacrificial fire and burned incense to the deity to whom he con¬ fessed his sins and addressed his prayers for forgiveness.

Tlalocs. — The Tlalocs were masters of the liquid element in all its forms. In the dwelling place of the Tlalocatecutli and Chalchiutlicue, Lord and Mistress of the Tlalocs, there were four ponds of water, the first of which aided germination, the second of which withered the seed, the third of which froze it and the fourth of which ripened it. These two deities were, according to the myth, created after the appear¬ ance of the last sun. Tlalocatecutli was called the “Fertilizer of the earth,” and the “Protec¬ tor of Temporal Gods.” He and his consort lived on a high mountain among the eternal clouds; and from there he sent his visitations of water, mist and fog. Hence his images were erected on high elevations such as hill tops and mountain summits. The characteristic sign of Tlaloc was the cross, which represented the four points of the heavens from which the winds drove the rains. The representation of Tlaloc in the Mexican manuscripts, is painted green and azure to depict the different shades of water; and he carries a spiral-shaped wand of gold, typical of the lightning.

Tlapotlazenan, the Aztec goddess of heal¬ ing and the discoverer of turpentine as the base of certain native ointments, popular at the time of the Conquest, is credited with having originated most of the medicines in use through¬ out the Aztec Empire.

Uayayab, “He by whom the Year is Poi¬ soned,” was the Maya deity who presided over the five unlucky days at the end of the year. His image was carried out of every village and town and left outside during the days of his influence in order that he might not poison the new year.

Votan, the fabled civilizer of the ancient

people of Chiapas, was closely related to the culture gods of the other races of Mexico and Central America.

Xipe was the god of vegetation and the sowing time and his general characteristics are those of the culture deities. He was considered a tribal equivalent of Tezcatlipoca and, under somewhat varying forms, he was worshipped throughout the Aztec Empire and among the nations bordering upon it to the south. He was connected with the Moon, and the gold and silversmiths regarded him as their tutelar god. He was called the “flayed-one,” because at his festival the skin was removed from each hu¬ man victim sacrificed to him and worn for 20 days by the devotee furnishing the sacrifice. In Tenochtitlan, where his festival was one of the important religious events of the year, he appears to have been looked upon as the god of human sacrifices. The monarchs and chief warriors of the Aztec Empire, when actively engaged in war, frequently donned the classical costume of Xipe.

Xolotl was a southern deity of lightning; and in the Aztec calendar he ruled over the 15th week and the 17th day sign; but as the Mexican calendar was borrowed from southern nations, and as the nature of this exotic deity was not understood by the Aztecs, he always remained to them a strange, mysterious figure. He was the Lightning Beast of the Mayas and cognate tribes, among whom he was a deity of the air and the cardinal points or the four directions of the winds.

Xpiyacoc and Xmucane, Father-and- Mother gods, are the Maya-Kiche equivalent of the Nahuatl generators, Ometecutli and Omecihuatl. They were endowed with creative power.

Yacatecutli, “He-who-guides,” was the Mexican god of commerce and trade; and the Aztec merchants held in his honor, twice a year, great festivities during which elaborate banquets were held and sacrifices were offered to the god. The traveler’s staff was his par¬ ticular symbol, and to it prayers were made and offerings of flowers and incense proffered.

Bibliography.— Acosta, J. de, (H.istoria de las Indias> (Seville 1880) ; Bancroft, H. H., (Native Races) (San Francisco 1875) ; Ban-delier, A. F., (On the Social Organization and Mode of Government of the Ancient Mexi-cansJ (in (Twelfth Annual Report of the Pea¬ body Museum of American Archaeology and Ethnology, > Cambridge 1880) ; Biart, L., <Th'e Aztecs > (Chicago 1905) ; Boturini Benaducci, L., (idea de una nueva historia general de la America Septentrional > (Madrid 1746) ; Bourbourg, B. de, (Histoire des nations civilisees du Mexique et de l'Amerique Centrale) (Paris 1857-59) ; Charnay, D., (Ancient Cities of the New World) (London 1887) ; Clavigero, (Storia antica del Messico) (Cesena 1780); Diaz, B., (Historia verdadera de la conquista de Nueva Espana' (1837) ; Ixtlixochitl, F. de A., (Historia Chichimeca) (Mexico 1891-92) ; Joyce, T. A., (Mexican Archaeology* (London 1914) ; Nadaillac, Marquis de, Prehistoric America* (London 1885) ; Nuttall, Z., <The Fundamental Principles of Old and New World Civilizations) (1901); Penafiel, (Monu-mentos del arte mexicano antiguo) (Berlin 1890) ; Prescott, W. H., < Conquest of Mexico* ;

Sahagun, B. de, (Historia general de las cosas de Nueva Espana' (Mexico 1829) ; Spence, L., (The Myths of Mexico and Peru' (New York 1913) ; id., (The Civilization of Ancient Mex¬ ico' (ib. 1912) ; Starr, F., (The Indians of Southern Mexico' (1899); Cyrus and Magee, 'The History of North America' (1908) ; Torquemada, J. de, (Monarquia Indiana' (Madrid 1723).

John Hubert Cornyn, National University of Mexico.

13. ART. Pre-Columbian Art. — When Cortes first visited the shores of Mexico in 1519, he was surprised at the skill displayed by the Indian artists, who rapidly drew excellent sketches of his ships, his men, with their cloth¬ ing, their arms and their horses, and forwarded them, by rapid courier service, to Montezuma in Tenochtitlan. This was the first contact of European and Mexican civilizations which was destined, in the near future, to produce the greatest and most characteristic of all the colonial art in the lands under the domination of Spain, during the

16th, 17th and 18th cen¬ turies, an art which is neither native American nor Spanish, but a mingling and blending of both in a way that has made it truly Mexican.

Mexican Indian art before the Spanish Con¬ quest was mechanical, industrial, commercial and graphic. It was pictorial in the sense that all hieroglyphs and pictographs are pictorial ; but it had not advanced beyond that stage in which it was still almost altogether a useful art. Mexican paintings, drawings and sculp¬ ture were the handmaidens of religion, com¬ merce, trade, history, geography, literature and science; and so intimately were they all con¬ nected with one another that it is impossible to understand one without comprehending the others. Yet all had their influence upon the new art that sprang from the meeting of the two currents of thought, from the Old World and from the New.

The pre-Columbian inhabitants of Mexico were artistic in varying degrees ; and the artis¬ tic sense still shows itself strongly in their descendants. Poets, orators, decorators, mu¬ sicians, literary men, artists, penmen, all bring to their work a depth of feeling, a strong sensitiveness, often a strange vagueness, indica¬ tive of the artistic mind. The untutored, un¬ cultured Mexican peasant produces pottery, artistic in form and decorated in pleasing colors and designs. He readily imitates the furniture imported from the best art centres of Europe and the United States ; in many parts of the republic his weaving, his designs on woolen wraps and blankets and his pictorial feather-work are the delight of art collectors, flhis art sense creeps out in the most unexpected places. The rude Indian from the hills sur¬ prises us with the artistic way in which he has arranged the flowers he offers us for a few cents ; he delights us with the baskets of his own manufacture on which he has depicted, in a really graphic manner, scenes from the national customs ; with figures modeled in clay and painted in natural colors, depicting, in a most vivid manner, local types, customs, dress, trades, occupations, sports and pastimes. Gen¬ erally the humble, diffident, barefooted, brown¬ faced figure, dressed in wide-cut, cotton panta¬ loons and shirt of the same material, who

offers his wares for sale, is their creator; for there is little retail business among the Indian population of Mexico outside the towns and villages. All this points to an artistic past; for the condition of a given race at a given time is the result of its ethnic development.

Indian Feather-work. — The most charac¬ teristic of the pre-Columbian Mexican arts was the native feather-work, which called forth the admiration of the art lovers of Europe. The Mexican artists produced wonderful pic¬ tures by matching, with infinite patience and consummate skill, small particles of feathers, which they gummed to a background of woven fabric. An enthusiastic witness, bearing tes¬ timony shortly after the Conquest, says: <(They (the Aztecs) painted in feathers, producing the living colors of nature" ; and one can well believe this statement ; for the untutored, igno¬ rant Mexican Indian still handing down the traditions of his fathers imitates in feather mosaics national scenes, customs, occupations and sports, in so realistic a manner that, at a short distance, his work seems painted.

These feather artists were in all their glory at the time of the Conquest and they continued to flourish in Mexico for almost a century afterward. Their art was known to all the Nahuatl peoples; and centuries before the Norman Conquest of England, the Toltecs had developed it to such an extent that immense pieces of feather draperies representing myth¬ ological and other scenes were used as hang¬ ings with which to cover up completely the walls of certain apartments of the great temple at their capital, Tula, dedicated to Quetzalcoatl, god of the winds. Three different sections of the temple were decorated in this way, in each of which a distinctly different color effect had been produced. Feather tapestries were used as hangings for the palaces of the Aztec emperors and nobles ; and they were, competent witnesses assert, the equal of the best woven or painted wall hangings made in Europe dur¬ ing the 16th century. With the boldness born of long practice and acquired skill, Mexican feather artists attempted successfully to produce in feathers the works of the most famous Italian and Spanish artists of the 16th century. The converted Indians ((painted" in feather mo¬ saics the favorite saints of the Catholic Church ; and their work, which was encour¬ aged by the papal authorities at Rome, became immensely popular in Europe.

The most brilliant plumage of the birds of the tropics were sought out with which to imi¬ tate the colors of nature. Shortly after the Conquest a Great Christian-Pagan feather mo¬ saic was sent to Pope Paul III ; and so excel¬ lent was its workmanship that his Holiness would not believe it had not been painted in oil until he had tested it by examining it closely and carefully. This work so impressed him that he expedited a bull, in 1537, rehabilitating the Indian races of Mexico, the greater part of whom had already been reduced to slavery in the 16 years that had elapsed since the Conquest.

Feather-work mosaics and other forms of ornamentation and

decorative feather art en¬ tered into the very life of the Mexican people prior to the Conquest. All the land of the Aztecs was searched for artists who showed

special talent in this difficult and exacting kind of work. Children were trained from childhood in special schools of art and their masters were themselves the most skilled artists of the land. Picture-making was, however, but a part of their instruction. They were schooled in the art of making princely garments for the em¬ peror, the princes, the nobles and the priests and the noble ladies of the court: so highly was the art esteemed that the sovereigns them¬ selves considered it high honor to be classed as even passably good feather artists. Clazonzi, king of Michoacan, next to Texcoco, the great¬ est centre of feather-work, enjoyed the dis¬ tinction of being the best artist in his kingdom ; and he was inordinately proud of his skill, probably more so than of his royal honors.

The Feather Market. — The work of the feather artists developed a great commercial business for the Aztec merchants. The most highly appreciated feathers were bought and sold daily in the market, where they were so esteemed that they brought literally several times their weight in gold. They passed as currency among the Aztecs and neighboring nations ; and nothing more valuable with which to pay the ransom of captured princes or con¬ quered kingdoms existed than they. Captives who were good feather artists brought high prices in the market and, for this reason, their lives were spared from the sacrificial altar. Merchants devoted themselves especially to the buying and selling of art feathers; and the chief purchaser for the court held the title of purveyor of feathers to the sovereign. Men of fine artistic tastes were trained to sort feathers and to arrange them into classes ac¬ cording to their color, fineness, merit and mar¬ ket value. They held office under the govern¬ ment and were highly paid officials.

Throughout the Aztec Empire, very stringent laws protected the birds from which the most esteemed feathers were obtained for the work of

the artist; and the quetzal, the most highly valued of these favored ones, grew into a sacred bird, and as such his feathers could be worn only by the king and the high priest, both of whom represented their gods upon earth. The Aztec monarchs maintained great aviaries in the capital where birds of rare plumage were reared with the greatest care ; and the stealing of feathers from these royal aviaries was pun¬ ished with death.

Centuries of training in art work of such an exacting nature as feather mosaics developed the artistic sense strongly in the artist caste of the Mexican people ; and it is not at all strange that this ability began to show itself in a new way shortly after the Conquest, when Spanish friars and missionaries, many of them no mean artists themselves, began to teach the prin¬ ciples of European art to the pupils of the Mexican convents and schools, nearly all of whom belonged to the native nobility or to families dedicated to trade, to the arts, the crafts or to literature and music, all of which were held just a little lower than noble rank. The merchants who brought the precious feathers to the capital and distributed the manu¬ factured product to the furthermost confines of the empire and to the countries beyond formed a guild unto themselves, over which presided Quetzalcoatl, the first half of whose

name is formed from the ˆquetzal,® the sacred bird and the symbol of divinity. It is still preserved upon the coat of arms of Guatemala. But the very enthusiasm with which the natives threw themselves into the new learning called for the restraining hand of Spain, which gradu¬ ally shut out from them almost every field of endeavor except that of painting, or so con- ’ trolled the workmen that the Spaniards got the profits and the glory from every accomplish¬ ment.

Hispano-Indian School. — Echoes have come down of a school of Indian painters, who flour¬ ished during the first 50 years following the fall of Tenochtitlan, in Texcoco and Cuautitlan, both towns near the capital. Under their Spanish masters they had learned to paint the saints and to represent graphicallv biblical and religious legendary subjects. They painted the pieces of (<escenario):> necessary for the production of the miracle plays and other dramatic representations by means of which the Christian Church attempted to teach the natives the principles and dogmas of its faith. Little or none of the art of this period has survived, with the exception of one picture of inter¬ national fame which, on account of the material on which it is painted and the artist’s treat¬ ment of his subject, almost certainly belongs to

this early Ibero-Indian school. This is the famous picture of Our Lady of Guadalupe, which made its appearance within eight vears after the fall of the City of Mexico, or before 1530. The religious legend asserts that the picture of the patroness of the Mexican people was miraculously made by the tilma or shoulder¬ covering of a poor Indian named Juan Diego; historical investigation has shown that it was painted for a miracle play given in one of the new convent schools in the City of Mexico very shortly after the Conquest. This picture shows very considerable artistic talent, which is neither Spanish nor Indian, but a blending of the two. The drawing is bold and free and the coloring anticipates, by three-quarters of a cen¬ tury, the soft, pleasing tone of the artists of the first great Mexican school.

The demands of the ever tireless, ever active church upon the Spanish-born and native artists alike were insistent and persistent and many hundreds of canvases belonging to the first three-quarters of a centurv following the Conquest were produced at the wave of her miraculous wand, for the churches, schools, convents, monasteries and episcopal palaces, that sprang up, phantom-like, throughout the land. Spanish artists of note were brought from old Spain to superintend the work of the native artists in New Spain; and they all attested the wonderful aptitude of their pupils.

Early Spanish Masters. — One of the earli¬ est of these masters was Rodrigo de Cifuentes, who arrived in Mexico shortly after the Con¬ quest. Lie appears to have had the patronage of the conqueror, Cortes, of whom he painted several portraits. The picture of the baptism of Magiscatzin in the church of San Fran¬ cisco, Tlaxcala, is said to be his work. He also painted the portraits of the first audencia and also of Dona Marina, the Indian querida of Cortes, about 1536.

Andres de Concha, who arrived in Mexico during the time of the first viceroy, and his

Indian pupils enjoyed a high reputation as interior decorators of churches and convents and they were often called to interior cities to do decorative work. The group of paintings over the high altar of Santo Domingo Church in Yanhuitlan, Oaxaca, is the work of Concha, whom Padre Burgoaque calls the Apeles of the New World.

Arteaga, another master painter, is said to have reached Mexico City three years after the Conquest and to have been very active in build¬ ing up the Indian school. There was one of his pictures, (The Visitation of the Virgin, * in the old church of Santa Teresa about the middle of the 18th century; and it is probably still in existence.

Simon Pereyns, a Flemish artist, painted the pictures for the main altar of La Merced church, and a (Virgin with a Child 5 in the National Academy is supposed to be his work. Fran¬ cisco Zumaya and Francisco Morales were his contemporaries. Alonzo Vazquez, who was somewhat younger than Pereyns,. was also active as an artist and a teacher. The Assump¬ tion } and the Redemption,* in the National Academy are credited to him. Juan de Rua, one of Vazquez' pupils, has left a fairly good series of scenes from the life of the Virgin, in the church of San Francisco, Cuautinchan, Puebla.

Pupils of these masters, also famous in their day, have come down to us. Bernal Diaz del Castillo, the first historian of the Conquest and one of the soldiers who took part in it, praises highly three Indian painters and lapidaries, Andres de Aquino, Juan de la Cruz and El Crespillo wrhom he likens to the best artists of Italy and Spain in his day. Alonzo Vazquez and his pupil Juan de Rua, already mentioned, are credited with having introduced correct European methods of art into Mexico; and they and their school undoubtedly paved the way for the flourishing and excellent school of artists of the 1 7th century. In fact we know, by the results already obtained and by the reports that have come down to us, that there had been a wonderful quickening of life

in all the arts between 1521 and 1600. This was but a re-echo of the animation in art in Spain her¬ self, in Italy, in the Netherlands and throughout the vast Spanish empire in America. Industries, arts, trades, commerce, mining, agriculture took on a new existence, and Mexico Citv became the first metropolis of the New World, and the centre of this new-born progress in America. The genius of the Spaniard for organization laid its hand upon the immense domains of the Moctezumas and that hand was never lifted for 300 years, during all of which time the artistic life of the luxurious capital of New Spain was ever in touch with that of the mother country. With the coming of the first viceroy in 1535, this activity of the favorite colony increased. A year later printing was introduced into Mex¬ ico City; and the court of Spam began to take a peculiar interest in the educational and artistic development of her favorite colony. To this interest and the strong encouragement which accompanied it is due, in part at least, the eagerness with which the native artists worked. The hundreds of Spanish and Flemish paintings and the thousands of art prints that flooded the land, affording means of study and advance¬ ment not before possessed by the natives, made

possible the successful school of native art with which the 1 7 th century opened.

Influence of Spanish Art. — The discovery of America and the sudden vast treasures that poured into Spain from over seas, the long struggle with the Moors, of Christianity against Mohammedanism, the rise of the Catholic Church and the birth of the temporal power of the popes and the consequent wars necessary for the maintenance of the powers and con¬ ditions thereby engendered, were forces that worked inexorably to the shaping of all Spanish art, which had its origin in the Church and received its inspiration and encouragement con¬ stantly from the same source. Italy was the great mistress of Latin art and the teacher of Spain, when she came to lay by her Gothic traditions, but Spanish art traveled a road dis¬ tinctly different from that of Italy. In Spain art was very largely influenced by the traditions and dogma of the Christian Church, which con¬ tinued to shape it to its ends and control its execution. In Italy it was classical and it ran after strange gods which also shaped it to their ends. In Italy art was free, unrestrained, licen¬ tious the more orthodox Christians contended. In Spain it was bound by the canons of Church law, by the restrictions of ecclesiastical councils and by an intense fanaticism and a devotion to the Christine doctrine and legendary lore unknown in other countries. Upon it rested the heavy hand of asceticism and the sombre shadow of

the Inquisition, a peculiarly Spanish institution. Yet the artists of Italy exercised an all-powerful influence upon those of Spain, for more than two centuries of changes vary¬ ing always within a certain defined and re¬ stricted area of activity. The ascetic Spanish taste did not change its Gothic attitude, when under Italian influence it changed its fashion in painting. While the Italian gloried in the nude of Greek and Roman art, the asceticism of Spain -covered up the parts of the human body, wrapping them about with draperies, too often much less artistic than the freer treatment of Italy. While the Italian artist boldly attempted to depict the human anatomy in all its nude or semi-nude and almost wholly Pagan attitudes, the Spanish artist was forced to resort to sug¬ gestion to convey lasting impressions of what his asceticism had forced him to hide from sight. Thus, while the Italian artist, by his free and unconventional use of the nude, ob¬ tained brilliant sculptural effects, the Spanish artist, in his efforts to reach the same ends, while draping his figures, became insensibly a colorist. So Murillo, the greatest of all Spanish colorists, has always been Spain's most popular artist.

It was therefore natural that, of all the Italian schools, the Venetian suited Spanish taste best ; and of all the Venetian artists, Titian appealed most to the Spanish attitude of mind toward art. The brilliant coloring of the Venetians, their indistinct drawing and their neglect of the antique appealed to the re¬ ligious ideas of the Spanish artists. So Titian became the motive spirit in the renaissance movement in Spanish art. A powerful but secondary influence was exercised by the Hol¬ lander, Antoine More, who, as a portrait painter, was little inferior to Titian. Vandyck also contributed to the making of Spanish art tra¬ ditions. But the atmosphere of Spanish life

and the fervid religious spirit of the land twisted all the foreign traditions of art and of schools to their own way of thinking and of viewing life and of acknowledging its obliga¬ tions, with the result that Spanish art grew to be a thing apart from its own Gothic tra¬ ditions, from the classical style which it im¬ ported from Italy and the

rigid Venetian school to which it very strongly inclined. The sombre, ardent, fanatical Spanish mind worked over all these materials and from the working sprang a new art which was peculiarly Spain's. For more than two centuries this strange semi-artis¬ tic, semi-ascetic spirit brooded over Spain, pro¬ ducing the magnificent creations of Vargas, Morales, Sanchez, Coello, Joannes, Becerra (the great teacher), Fernandez el Mudo (the ((Titian of Spain®), Cotan, Zubaran, Pereda, Velazques (the incomparable portrait painter) and Mu¬ rillo, the superb master of color. And they all had, through their art which found its way across the Atlantic, their influence upon the artists of the colonies in America. Yet we look in vain in treatises on art for any adequate presentation of the work of the American artists or of the vast output of excellent palm¬ ing by the Spanish colonies in America, all of whom followed the traditions of the mother country, modifying them more or less according to their several environments and local influ¬ ences. Yet for more than two centuries, the followers of the Spanish masters in America, enthusiastic students of their creations, tireless workers, covered the two continents from San Francisco to Buenos Aires, irom Cuba to Chile. In every provincial capital industrious schools of art existed; and all followed the traditions of Spain. At the exhortation of the Church and the insatiable demands of the dealers who made a business of shipping pictures over seas to the colonies, the Spanish artists at home redoubled their efforts; and a constant stream of canvases poured forth from their hives of art industry. No church, convent, college or university in the vast domains of Spain beyond the sea was so poor as not to possess at least one treasure from the art centres of the mother land. When the ecclesiastic dignitaries of Spain wished to show honor to some institution of the colonies, they forwarded to it a painting or other work of some noted Spanish artist. The king, the em¬ peror and the nobles showed their favors in the same manner. New Spain, the favorite namesake of the mother land, became thus a storehouse of Spanish art. These treasures were to the Mexican artists what the pictures of Italy and Holland were to the artists of Spain. They copied them, they imitated them and they built upon them a Mexican art which, while it followed the traditions of the Spanish school, was yet, in many respects, distinctly Mexican, as the character of the Mexican people and their environments are distinct from those of Spain.

For more than 200 years the Spanish ar¬ tist attended to only one of the manifesta¬ tions of nature, that is, man and his relation to the deity and to heavenly manifestations. Mountains, streams, oceans, the sun, the moon, the beauty of the night and the glory of the day meant nothing to him except when they helped him to depict his deity, his

saints, his religious traditions, his dogmas and his mira¬ cles. In all this the Mexican artist followed

his masters, faithfully, conscientiously, ear¬ nestly. But the spirit with which he executed his tasks was noticeably different from that of his teachers. The stern, harsh character of the Spaniard is depicted in the hard lines of even the best of his artists up to the time he began to leave behind him the vivid memory of his terrific religious wars against the Moors. When the “heathen® of the New World had been conquered and placed beneath his heel and he had filled with churches, shrines and colleges their vast domain; when he had lifted from his shoulders the burden of strife in behalf of altar and hearth, then the Spanish artist began to cover up the harsh lines of Gothic and early Venetian art traditions and feelings, thus engendering an attitude of mind that made possible the wonderful analytical representations of Velazquez and the brilliant coloring and softening effects of Murillo.

But as the Indian character was different from that of the Spaniard, so long before Spain had deserted her ancient Gothic traditions com¬ pletely, the Mexican artists had become* noted for “the gentleness of their art.® More than naif a century before Murillo produced his best work, which marks the middle and last periods in his progressive development, the old Mexi¬ can master, Beltasar de Echave, had painted characteristically native pictures which found their way to the foremost shrines of the coun- , try and to many of the Spanish colonies in America where, not infrequently, they were represented to be the work of noted Spanish artists. His reputation extended even to Spain where he was praised by the foremost painters of the day, a great distinction for a colonial artist, in an age when Spain was very jealous of all honors given outside her own peninsular domain. But greater honors have come to Mexican artists since Echave’s day; for the works of her masters have been gathered up from all over the land and taken to Europe where they have been passed off as original works of Spanish masters of the 16th, 17th and 18th centuries. Thus Mexico has lost count¬ less treasures of native art. Every revolution has helped to deplete her works of her great¬ est artists. The sacking of cities, the plunder¬ ing of churches, convents and private houses, the rapacity of native owners of art treasures and foreign speculators and often the very ignorance of the revolutionary leaders have conspired to deprive her of the living records of her prominence in art over all the other nations of the American continent. Some of the revolutionary leaders have been accused of cutting from their gilded frames the great old

canvases of the churches and convents and turning them with the paint side upward to serve as tents or shelters from the tropical sun for themselves and their brother officers. Valuable pictures of native and foreign artists were not unfrequently slashed with swords or knives or otherwise mutilated or destroyed. But the greatest injury done to native art was the result of the ignorance of the treasures possessed by the nation and the consequent neglect to care for it. Ancient pictures of merit were replaced by others of lesser value or historical interest by some local artist in vogue at the time and the dispossessed pictures were relegated to the garret where they were left to moulder in the damp and darkness and

to become worm-eaten. Guardians of the treasures of the church, tempted by cupidity, often sold their finest pictures, which not in¬ frequently passed to foreign lands there to cease to be Mexican in name at least.

And yet no other country on the American continent continues to possess anything like the amount of really artistic pictures of its ancient artists as that still retained by Mexico. Lovers of art in Mexico have begun to recognize the high standard of excellence attained by their best masters of the 1 7th and 18th centuries; and the market value of these pictures has risen rapidly during the present century. But this is an added danger to the retention of the native art at home.

The School of Echave. — The founder of the first Mexican school was Beltasar de Echave, the elder, whose first existing picture dates back to 1601. He had already become a famous artist by 1609, years before Velazquez and Murillo flourished in Spain. His draw¬ ing and conceptions are very much better than anything produced by his contemporaries; his forms and faces are true to nature and his style is devoid of affectations and conceits. Other Mexican painters have surpassed Echave in execution, in perfection of style, in the observation of the technical laws of art, but rrone have approached him in fertility of in¬ vention and depth of thought. In fact he was philologist, critic and writer as well as artist. His wife, La Sumaya, who was also an artist of no mean merit, is said to have been his leacher in the art of painting; and a meritori¬ ous picture of San Sebastian in the cathedral is said to be from her brush. Echave and his wife both belonged to the Spanish school of Joannes, the best artist of hi£ day and superior to all who preceded him in Spain. The work of Echave is unequal, but the best of it shows a genius superior even to that of his master, whose praise all Spain sang in his day. Though his style was finished and somewhat labored, like that of the artists of his epoch, yet his industry and application were so great that he left very

many pictures varying from huge canvases to small tablets, which, before the amortization of church property, were to be found in many of the churches of the capi¬ tal and in many of. those in the interior. Among his existing pictures are (San Cristo¬ bal J (1601), which stood over the great door of the Franciscan monastery, (San Ignacio > (1610), and the (Martyrdom of the Virgin of Colonial both of which were also in the same edifice; (San Francisco de Paulaˆ in Guada¬ lupe church; (Martyrdom of Santa Catarina* (1640), in Santo Domingo, and (Santa Cecilia,* one of his best, in the Profesa. In 1608 he painted 15 tablets for the altar of the old church of Santiago, Tlaltelolco.

Luis Juarez, a contemporary, of Echave, shows, in all his works, strong individuality. His figures are excellent, his exposition strong and true, but his execution is frequently un¬ equal. Many of the heads of his figures, to which he paid much attention, are as fine as anything produced by the Spanish masters of his day. Juarez' style is free and less labored than that of his master, Echave, to whom he is but slightly inferior. He was very prolific and this, coupled with his popularity, made his execution, like that of Echave, very unequal.

However, his conception is always bold and his coloring good. His work is more realistic than that of Echave. Most of his known pictures are in. the Mexican National Academy.

Jose Juarez, who was active from 1642 to 1698, followed the traditions of Echave and came the nearest of all the Mexican painters to attaining to the excellencies of his master, to whom he was but slightly inferior in ex¬ pression and the depicting of religious feeling. He had exceptional talent but, owing to the speed with which he was forced to do the vast amount of work that came to him, he often be¬ came careless. Rafael Lucio, an excellent critic, says of Juarez: ((I have seen angels of his that seemed to belong to the very best pe¬ riod of Italian art.® His style is elevated and even more realistic than that of Luis Juarez; his drawing and execution are good, and in his grave and harmonious coloring there is a noble severity. His figures are free and flexible and show strong individuality, while his canvases are generally lit with the animation of life, partially due to his masterly grouping of fig¬ ures, his excellent coloring and his decided tendency toward that softness and simplicity which distinguishes the school of Echave. There is a noted depth and contrast in his col¬ oring. A number of his best pictures are in the Mexican National Academy.

Sebastian de Arteaga, a priest and notary for the Inquisition, was another excellent artist belonging to the school of Echave. He dis¬ plays vigor, power, freedom of movement and a boldness unknown up to his time in the Mexi¬ can school. His style is less finished than that of his great contemporaries and his coloring is not so good ; but his figures of the Virgin are graceful and beautiful. He is content, too often with carefully executing his central figures and leaving his accessories but poorly done. His style is truer to nature than that of the elder fechave but he lacks the grace of the old mas¬ ter and that simplicity which distinguishes the early Mexican painters. In his work there is a dash and a freedom with the brush that might have made of him a really great artist had he given his whole attention to art ; but he had too many other occupations to permit him to work out his own salvation. In the Mexican National Academy there are three notable pictures of his: (The Betrothal of the Virgin,* (Saint Thomas Putting his Hand into the Wound of the Christ) and his (Adoration of the Wise Men.*

Beltasar de Echave (1632-82) the younger, son of the elder artist of the same name, de¬ veloped a style very different from that of his father. He was bold and vigorous but too impatient to finish his work well. His draw¬ ing is frequently faulty and his execution re¬ minds one of Arteaga, of whom he was a con¬ temporary. His compositions, however, show plenty of life and a strong sense of the dra¬ matic. Although he was a follower of Arteaga, he foreshadows the new school which distin¬ guished the following century. His (Entomb¬ ment *is one of the most notable works of the old Mexican school. Two other notable pic¬ tures of his, (The Triumph of the Church) and (The Triumph of Faith,* are both in the Puebla Cathedral, which also possesses several other pictures of his. (The Savior, *(The Martyr¬ dom of Saint Peter of Veronica,* (The Four

Evangelists,5 in the Mexican National Acad¬ emy are also good pictures.

The latter part of the 17th century, which Arteaga and Echave the younger influenced strongly, was very active in art. Juan Correa, whose drawing and coloring are excellent, painted much. His work shows freedom of execution, a firm handling of the subject and an easy swing of the brush, but his tone is often oppressive. Six great paintings of his are in the cathedral. With Correa begins a period of decadence in Mexican art. But he was a great teacher and he introduced new ideas into Mexican art which were destined to become the most noticeable motive power of the new school made famous by Ibarra and Cabrera, his two most noted pupils. He was lavish in his employment of figures, loved immense can¬ vases and aimed at grand and imposing scenes. His grouping is artistic and the general tone of his picture is good. His characters show sin¬ cere feeling, and there is a general air of de¬ votedness about his more deeply religious canvases. He has been rather under than over estimated by modern critics. His boldness of conception, freedom of execution and daring inspired to greater attainments his two great pupils. His (Coronation of the Virgin,5 the (Triumph of Saint Michael5 and the (Entrance of Jesus into Jerusalem5 all contain multitudes of figures, but the tone is gloomy and the color¬ ing decidedly opaque.

Nicolas Becerra, who also belongs to the lat¬ ter half of the 17th century, anticipates the characteristics of the painters of the first half of the 18th century, excellent coloring, bold¬ ness of conception and rapidity of execution. Another, Diego de Becerra, a Franciscan monk, of the same period, devoted his energies to de¬ picting scenes and events in the history of the order. Many of his pictures were in the con¬ vents of the Franciscans in Mexico City and , Puebla. Another priest, Nicolas Rodriguez Juarez, shows good coloring, simplicity of style and studied and well-executed drapery, all char¬ acteristically foreshadowing the coming school. He was the best portrait painter of his day. His (Santa Gertrudis Offering her Heart to the Crucified Christ5 (1690) is in the Mexican National Academy. Other pictures of

his are in the Profesa and other churches of the capital.

Juan Rodriguez Juarez (1675-1728), nephew of Jose and brother of Nicolas, enjoyed a very high reputation in his day; and he had a strong influence over the younger artists, who were destined to later establish a new school. He was very prolific and many of his works sur¬ vive. He painted a series of scenes of the Virgin of Tepozotlan, of which the most real¬ istic and best executed represents the flight into Egypt, (San Antonio,) (San Francisco de Queretaro,5 (San Juan de Dios) are in Queretaro; an auto-portrait is in the National Acad¬ emy. His are the decorative pictures for the altar of Los Reyes in the cathedral. Three paintings in the Profesa suggest Murillo. A colossal San Cristobal and the (Vision of Santa Gertrudis5 were in San Agustin Church. The (Judgment of Saint Lawrence5 (1702) is a notable picture. In the Carmelite churches are a number of his pictures and four large canvases are in the National Academy. He has a vision of the loveliness of color that re¬

minds one of Murillo in no uncertain manner. He preached the doctrine of freedom from re¬ straint and he revolted against the carefully-wrought work of the school of the elder Echave. His touch is light, his color brilliant; but his light and shade are weakly defined. He may be said to have been the father .of a school that produced much brilliant work in Mexican art.

Among the other artists of this period are Jose Torres, Manuel Orellano, Diego Casanova, Juan de la Plaza (extravagant in coloring and execution) and Manuel Luna (coloring and drawing good). So brilliant is the coloring of the latter's work that much of it has been passed off as that of Murillo and his pictures have been gathered up and shipped to Europe, where they have been sold as works of the great Spanish master.

Cristobal Villalpando painted from about 1683 to 1710 in a very unequal manner; but few if any Mexican artists have had freer and bolder imagination than he or greater power of execution. In his imagination there was much of the poet, but he was affected with the Gongorism of his age and exaggeration and com¬ plexity mark his best work. His coloring is weak and his larger canvases are in poor taste yet some of his decorative work is excellent.

((Friar Manuel,55 a Jesuit priest, has been called the Murillo of Mexico on account of the brilliancy of his coloring; but his drawing is

careless. His simplicity, boldness and soft¬ ness of coloring leave no doubt that he had studied Murillo.

Jose Ibarra (1688 P—1756) , one of the two best painters of the 18th century, followed Juan Rodriguez Juarez to exaggeration. His figures, perspective and drawing are good and the gen¬ eral tone of his work is pleasing and effective but he shows strongly the mannerisms of his school. He is prodigal of reds and blues, often in masses, in the style of Murillo. He was a finished artist, a tireless worker and possessed of great natural talent. Many of his pictures exist in Mexico though many have been sold abroad. Nicholas Enriquez, an ardent admirer of Ibarra, was a follower of Rodriguez Juarez.

Miguel Cabrera, the close friend and col¬ league of Ibarra, has maintained, for consider¬ ably over a century, his position in the public estimation as the greatest Mexican artist of the 18th century. He was a most prolific worker. Even to-day, after dealers have been collecting his pictures for three-quarters of a century and sending them abroad, there are still scores of Cabreras in Mexico. He lived for his art and he painted pictures as Lope de Vega wrote plays, at a hot heat, with no time to pause. In 14 months (1756-57) he nainted 32 pictures representing scenes from the life of San Ignacio for the Jesuit convent, and another series of like nature for Santo Domingo. His drawing is freer and better than that of most Mexican painters and he improved much on his inspirer, Rodriguez Juarez, softening the cruder tones and shunning exaggeration. His group¬ ing natural and excellent, his invention pleas¬ ing and full of intelligence, his coloring soft yet brilliant cast a certain amount of beauty about all his work. His taste is not so good as that of Echave the elder, his force less than that of Arteaga and his imagination less bold and free than Villalpando's ; yet the general

average of his artistic qualities and the tender¬ ness, devotion and mysticism displayed in his characterizations, easily place him in the front row of Mexican artists. His style is easy, light and comparatively free from mannerisms; and his brilliant coloring lacks the solidity of the previous school. Like Shakespeare he laid tribute upon all who preceded him, but upon all he made use of he placed the stamp of his own individuality, in grouping, painting and coloring and idealization. As he was the official painter of the Jesuits, their institutions were filled with his works. So great was his fame in his day that churches, convents, schools, the university and individuals overwhelmed him with orders and forced him to work to the limit of his capacity. With fame all kinds of honors came to him both at home and abroad. He was made official painter to the archbishop of Mexico and the archiepiscopal palace possessed many of his works. Rich churches paid him large sums to paint series of pictures for them. The min¬ ing town of Taxco engaged him to do all the decoration of the new church in that rich dis¬ trict and the church remains untouched to this day.

The 18th century witnessed the most active period in Mexican art, and more than 200 artists are said to have flourished during th's comparatively short space of time. Francisco Antonio Vallejo, Francisco Leon, Juan Patrico Morlet, Jose Paez, Nicolas Enriquez and Jose Alcibar, all followers of Cabrera, reflect the characteristics of his style. Alcibar carried to exaggeration the softness of stvle of the school. He enjoyed a reputation second only to Cabrera, to whom he was really much in¬ ferior in talent, imagination and' execution.

After Cabrera no passably good artist ap¬ peared for almost 50 years ; for the enthusiasm that had built up the power of the Church in Spain declined rapidly even before the close of the 18th century; and with this decline, the erection and adorning of sacred edifices ceased, and good artists became scarce.

The Academy Artists. — For 50 years after the French Revolution the only artists in Mexico were Spanish professors sent over from Spain to the San Carlos Academy of Art and their pupils. Aguirre, one of these professors, painted the vaulting of the parochial baptistery of the Sagrario ; and Rafael Ximeno did exten¬ sive decorating. His mural work is good but his oil paintings are poor. The (Assumption of the Virgin* in the dome of the cathedral is by his hand. It is highly imaginative and full of action and possesses the true aerial quality necessary for ceiling decorations. Juan Saens and Jose M. Vasques, two of his pupils, helped him constantly in his work. Saens took part in the decoration of the cathedral dome and Vasquez painted the (Annunciation) and (Jesus with the Children* in Loreto church, and (Saint Anthony Sustained by the Angels* in the chapel of the Sagrario. Jose M. Castro, another pupil, has left some fairly good pictures, one of which is in the National Academy. He ex¬ hibits considerable originality in his best work.

Francisco Eduardo Tresguerras, a Queretaro artist and architect of note, did considerable in¬ terior decoration in which he shows creative power that just falls short of being great.

The Puebla School, in the beginning fol¬ lowed Echave the elder, and in general it re¬

flects the influences at work in Mexico City. Its artists are inferior to those of the capital. Garcia Ferrer painted the six large figures that decorate the altar of Los Reyes in the Puebla Cathedral of which he was the architect. Diego Becerra executed a series of pictures for San Francisco Church, Puebla, (Saint Francis in the Desert, > (Saint Francis Accompanied by Angels, *and (Saint Francis in a Chariot of Fire,* all of which are strong, realistic and well executed. Jose del Castillo and Miguel de Mendoza, an Indian prince, are two other well-known Puebla artists. Joaquin Magon painted the large mural pictures in the Puebla Cathe¬ dral sacristy, (The Last Supper,) (The Wash¬ ing of the Feet,* (The Protection of the Vir¬ gin, *and also a series of the <Passion) in the Carmelite convent and another series on the same subject in the sacristy of Ocotlan, Tlaxcala. His coloring is too vivid and his work has an unfinished appearance. Miguel Jeronimo Zendejas (1724-1816) was exceedingly popular. His technique is faulty but his work is pleas¬ ing. His best picture is (Christ Praying in the Garden,* in the Puebla Sagrario. Jose Luis Rodriguez Alconedo, an artist of much talent, a sculptor and a botanist, expelled to Spain for revolutionary intrigue in 1808, acquired there great facility in pastel, which he introduced into

Mexico. Two of his Virgins are in the Puebla Cathedral and two fine portraits are in the Puebla Academy, one of himself and the other of a Spanish lady.

Later Academy School. — Among the paint¬ ers of the latter half of the last century whose works are represented in the National Academy are Jose Obregon, whose large painting (Queen Xochitip the discoverer of pulque, the national drink of Mexico, is one of the most popular and best known in Mexico. Xochitl is repre¬ sented as offering her discovery to King Tecpancaltzin, who is enthroned upon his seat of honor in the midst of his royal attendants. (Hagar and IshmaeP is perhaps a better pic¬ ture, though on account of the subject of which it treats it is not so well or popularly known. Rodrigez Gutierrez' very striking (Senate of Tlaxcala) represents that body deliberating on the course to be pursued toward the invader Cortes. The invention and grouping-are better than the coloring. Pelegrin Clave's (Isabel the Catholic Attending her Sick Mother) is one of the best and most attractive pictures of his epoch. The coloring is rich and harmonious, the drawing good and the scene depicted is spirited. Juan Cordero has two pictures in the Academy, one representing (Columbus and his Little Son at the Gate of Rabida Convent* and the other (Columbus after the Discovery of America. y Juan Ortega's (Meeting of Cortes and Montezuma *is full of imagination and fine coloring and is indicative of what the author might have continued to do. Salome Pina en¬ joyed considerable reputation among his fellow-artists. Two of his pictures in the Academy, (Abraham and Isaac) and (Saint Charles Bor-romeo) are spirited in conception and execu¬ tion. Luis Munrov's (Roman Charity) repre¬ sents a Roman girl conveying food to her im¬ prisoned father. This and the (Prodigal Son* and the (Last Moments of Atala) are good pictures. Manuel Ocaranza has in the Academy two fairly good pictures in the characteristic style of the middle of last century; (Love's

Wiles' and 'The Faded Flower.' Juan Urruchi reverts to the religious school of art of the 1 8th century in style and subject in (Let the Little

ones come unto Me,' 'Sor Juana Inez de la Cruz' and 'San Sebastian.' Gonzalo Carrazco is represented by two pictures, (Job' and 'San Luis Gonzaga. ' The latter scene is during the plague in Rome. Juan Manchola has created two fairly good pictures in (A Miracle of Saint Peter' and the 'Good Samaritan.'

Modern Painters.— There is no school of modern painters in Mexico though there are good artists. This is because the artists have, f<?r the most part, been educated abroad under different influences and environment, and have become neither Mexican nor foreign in senti¬ ment.

Jose Maria Velazco, an excellent landscape artist, painted with great care and detail, pro¬ ducing canvases that won for him renown in Europe. His coloring is delicate and true to nature and his cloud effects are especially happy. Many of his best pictures have found their way to European galleries. France conferred upon him the cross of the Legion of Honor and Austria that of Francis Joseph; and other countries have rendered like tribute to his genius.

Felix Parra, best known of modern Mexican painters, does his work with loving care and in good taste. He shows invention, boldness of imagination and excellent grouping. His coloring, too, is good. Three of his pictures, 'Las Casas,' (Galileo' and the 'Massacre of Cholula' have been photographed times with¬ out number and copies of them may be found in every curio store in Mexico. They are all striking pictures of sterling worth, in which the drawing is good, the conception vivid and the coloring in good taste. A smaller picture, the 'Flower Market,' is of greater artistic worth, but it is almost unknown, because it has always been in private possession. The comparatively small canvas is crowded with figures, all dif¬ ferent and all true to life.

Herman Gedovius, who received his art edu¬ cation in German and who reflects German in¬ fluence, is probably the best portrait painter Mexico has produced. His early work was labored but his latter shows freedom of move¬ ment and mastery of color which reminds one of the old Flemish masters. His auto-portrait in the Academy is excellent.

Leandro Izaguirre, who spent 10 years in study in Europe, is the best known of modern Mexican portrait painters, but his imagination, execution and coloring are inferior to those of Gedovius. Izaguirre once showed signs of possessing daring and inventiveness in his earlier works, especially in his great canvas the 'Torture of Guauhtemoc,' now in the Academy; but his European residence

weaned him of things Mexican to the loss of native art.

Gerardo Murillo is perhaps the most char¬ acteristic of the younger Mexican artists, es¬ pecially in Mexican landscape effects, which, on account of the high elevation of the valley of Mexico are very difficult to analyze and depict.

jyt°ften-kls \vork ls mcEe sketchy than solid and he gains his effects in paint through the methods of the sketch artist. Yet he is generallyˆstrikingly effective.

. Andres Rios delights in painting scenes filled With figures. He inclines to historical char¬

acters and costume effects of which he has made a deep study. He has imagination, originality and daring in conception, execution and grouping. 'The Orator of the Day,' which represents parishioners complimenting the young parish priest on his sermon, dis¬ plays Rios' skill in character painting and effective grouping and his love of detail in cos¬ tumes and salon decorations. 'The Road to the Poor-house' is a powerful picture, well grouped and full of expression in which the same love of carefully-executed details are manifested. Juan M. Pacheco enjoys some reputation as a landscape painter; but his work is uneven, and often descends to 'the common¬ place. Rafael Ponce de Leon, who died in 1908 while little more than a boy, won for himself a high place as a caricaturist in Paris, where the foremost art critics recognized his talent, his daring, his humanity. He is more than a caricaturist; the artist wells out in all his work. Alfredo Ramos Martinez, who received most of his art education in Europe, has had his pictures hung in the National Salon in Paris, where they attracted the attention of the critics and invited a wordy and prolongued discussion as to their merits, which are out of the ordinary. His most characteristic canvas in oil is 'Spring¬ time,' a large picture representing a group of young women dressed in airy, light-colored costumes, and belonging to different national types, has for its scene a spring garden. The execution is daring, the handling of light effects startling and withal pleasing.

Alberto Feuster is also a young artist of much promise. His drawing is good, his con¬ ception bold and his coloring pleasing. He works carefully and loves to make use of all details consistent with his peculiar style of painting. John Hubert Cornyn,

National University of Mexico.

14. ARCHITECTURE. Pre-Columbian Influence. — Mexico was by far the most im¬ portant of the Spanish colonies of the mother country, which lavished upon her all the care a mother bestows upon a favorite daughter. The fabulous wealth poured into Spain from over seas she dispensed with a liberal hand in beautifying the home domain and in covering the new land she had discovered with mag¬ nificent edifices which, to-day, constitute the chief charm of the Spanish-American coun¬ tries. The activity of the arts in Spain was coincident with the duration of that vast treas¬ ure that kept constantly filled to overflowing her coffers for almost three centuries. Mexico, more than any of the other American colonies, reflected the activity of the mother country. Especially was this so in architecture and its allied arts, painting, decorating and sculpture. A famous art critic has justly said that, during the Spanish regime, there were more monu¬ mental buildings erected in Mexico than in all the rest of America. This was due to several causes. The native civilization had already produced magnificent artisans while Europe was still in the dark ages. The existing ruins of the vast, highly ornate edifices erected be-for Spain set foot in America compel the admiration of layman and architect alike. Of the skilled native workmen at the time of the Conquest, thousands had labored under the master builders of Montezuma and of the

sovereigns of Michoacan, of Yucatan of the Zapotecas and the Mixtecas. For untold years Mexican artisans had been accustomed to de¬ pend very greatly upon themselves in working out their plans and ornamental designs, all of which were controlled by partially convention¬ alized mythological ideas and Church polity. I he European architects who arrived in Mexico from Spain almost immediately after the Con¬ quest found these native artisans wonderfully skilful and resourceful; and they soon came to realize that the surest way to get the best re¬ sults was to allow them to work out ideas not trom a detailed plan but from rough sketches. The result was

that, while Mexico adopted Spanish architecture, it did so with modifica¬ tions introduced, consciously or unconsciously, by the native workmen who brought to their task traditions that, from time immemorial, had governed their plans and the manner of execut¬ ing them.

Ibero-Indian Transition Period. — The

Spanish conquistadores were in spirit much like the Crusaders. They fought ‘the races of America in the name of the cross, and they smote the heathen for the greater glory of God. 1 hey demolished temples ; they smashed idols throughout the length and breadth of the land with religious frenzy and they leveled gigantic pyramids that had required centuries for their erection. The priests and monks who followed the soldiers continued the demolition of all evidence of the historic past of the native races. But this work of destruction called for a counter work of construction. Missionaries spread all over the land; architects were brought from Spain to the larger cities and towns ; while native Indian master-builders were employed in the villages and country places under the direction of the Spanish priests who had generally some knowledge of architecture. Soon the passion for building churches, convents, colleges, schools and priestly residences became as great as that for destruc¬ tion during the first quarter of a century fol¬ lowing the Conquest.

The architecture of this first colonial period was largely affected by native Indian ideas, as all the workmen were natives. As they did not know Spanish, and their masters ana overseers were unacquainted with the native tongue, they were left very much to them¬ selves to work out their own ideas of con¬ struction, more or less in conformity with the general plan of the architect or master-builder. In beauty of form and grandeur of concep¬ tion the buildings of this epoch were very much inferior to the native edifices they re¬ placed. But it was an age of reconstruction in which the builders looked more to utilitarian ends than to beauty. While the great, Moorish-like dome was the dominant feature in Spanish architecture, even at this early date, very few churches with handsome domes or vaulted roofs were built in Mexico or in any of the other American colonies in the first half of the 16th century, for these were architectural features unfamiliar to the native artisans. These early Spanish colonial edifices were a curious ad¬ mixture of Gothic, Renaissance, Moorish and native American styles. In general the plan of the building was Spanish, modified by Moor¬ ish. The roof was the flat American structure

in use in Mexico and Yucatan before the Con¬ quest, while the ornamentation was a curious intermingling of Christian and Indian ideog-raphy and conventional European and American mythological conceptions. Compared with those that followed them, these early Spanish colonial edifices were plain and of unprepos¬ sessing appearance. But their study is both interesting and instructive, for they point to the buildings that were to come, with their mingling of the best in the art of Old Spain and of New Spain. Spanish domination brought to Mexico a tranquillity and an undis¬ puted authority lasting three centuries, during which the Spanish court directed the energies of the colony and led the way in that great revival of art such as no other American colony experienced.

Various causes combined to shape the form and character of the public buildings of New Spain. The Aztecs, Mayas and other cultured races, owing to the weakness of their knowl¬ edge of scientific construction, had been forced to erect excessively heavy walls to support massive roofs and high ornamental faqades, and the builders brought to their work, during the Spanish regime, an ingrained belief in the necessity for and the beauty of sheer massive¬ ness in the construction of walls and fagades, a belief which continued throughout the 300 years of Spanish domination. Mexico has always been subject to heavy earthquakes, and these have helped to accentuate this belief in the necessity of massiveness in the construc¬ tion of the main walls of buildings. The monu¬ mental edifices of the country are often more massive in character than those of Spain. The walls of some of the Maya buildings still standing are from 6 to 10 feet thick and these are equalled in massiveness by the walls of the cathedral and other great edifices of the capital.

Building Material. — The more durable building material of Mexico was in no way inferior to that of Spain. A score of different kinds of excellent stone, all workable, much of it handsome and some of it, like the native tezontli (lava-rock), of a character to give a distinctive appearance to edifices constructed of it ; marble of a dozen different varieties ; and onyx as handsome and as varied as any in the world, were all at the command of the Mexican builder. There was in Mexico for dwellings, no light, durable earthquake-resist¬ ing building material such as existed in the forests of the United States and Canada in the early years of colonization and expansion. Adobe (sundried earthen bricks) took the place of lumber in the construction of the houses of the lower and middle classes of the upland plateaux ; and it has kept its place to the present in the public favor. Owing to the fragile nature of this material, walls constructed of it are necessarily very thick. In country places even churches are frequently constructed

of adobe, which, covered with stucco, presents a very pleasing appearance. There are towns of con¬ siderable size in the interior of the table lands where practically all the buildings are con¬ structed of adobe, and the plain mud walls of the Indian pueblos are familiar and picturesque parts of the landscape. These are constructed probably as in pre-Columbian days, and villages

themselves, with their irregular, lane-like streets, are like their Aztec progenitors.

But as adobe is not suitable for the low¬ lands with their torrential rains, it is replaced there by uncut stone, for the town houses ; and in the villages and country by primitive thatched huts with walls of bamboo or other poles, through which the air makes its way at will. Owing to the prevailing mildness of climate all the year and the excessive heat in the hot season, these Indian huts, on the whole, meet the requirements of their occupants, who lead lives very near to nature's heart.

The Dome and the Fagade. — The archi¬ tecture of Spain was influenced by the Romans, (doths and Arabs throughout the periods of Romanesque, Gothic and Renaissance suprem¬ acy. Lhe Greeks, Phoenicians and Cartha¬ ginians, too, have left their impress upon it. It does not, therefore, belong wholly to any one of the recognized styles ; but it is, for this reason, none the less interesting. Mexico fol¬ lowed Spanish models more or less closely; but as the Indian mind is prone to florid orna¬ mentation, her architecture departed, in mat¬ ter of detail, of execution and of adornment, from that of Spain, flhe Moorish dome, with its striking appearance, its handsome tiles and its frequently elaborate adornment, appealed to the Mexicans. It is, in a sense, related to their elaborately adorned aboriginal faqades, tower-mg often from one to two stories above the habitable part of the building. The dome is seen everywhere in Mexico. It peeps out from amid the clumps of trees sheltering the little Indian village; it crowns the summit of a com¬ manding hill; it retreats, almost hidden from sight, to some little valley amid mountain fast¬ nesses. Everywhere

majestic, it lends a touch of Orientalism to a landscape for which it is eminently fitted.

Early Spanish colonial architecture in Mex-1u° S l?r%ely influenced by the Gothic and the Moorish ; but the buildings erected after the close of the 16th century followed some one of the various phases of the Spanish Renaissance. The Mexican and the Spanish mind alike understood the value of contrast and concentration in decoration. In the Maya buildings the elaborate ornamentation which they lavished upon their monumental edifices was confined, for the most part, to the upper stories, the lower having a plain surface of cut stone or stucco. This disposition threw into relief and thus made more effective the ornate superstructure. The Spaniard confined his ornamentation to parts of the fagades, to the doors and windows and the parts of the towers above . the level of the roof. This had a splendid cumulative effect, which can be seen m J the illustration] the fagades of the Sagrario and the cathedral of Mexico City. This ornate style of decoration was especially fortunate in having for its execution such trained work¬ men as the Mexican Indians, artisans with ancient traditions to work by, the initiative to give individuality to their work and the skill to put it into execution. Side by side in Mexi¬ can architecture, often mingling and blending so as to be indistinguishable the one from the other, are evidences of the many-faced tradi¬ tions of the native dynasties and the influences of Spain I he free hand of the native work¬

man is best seen in the earlier buildings of colonial Spain, for later on he conforms in general to the standards set him by more exacting and better trained architects and master-builders. But this conformation is only outward. In the spirit of execution the atti¬ tude of the Indian mind is still strong. He has taken instinctively to the Spanish idea of cumulative effect, which, in another form, was his own; and his inclination in this direction often displays itself in florid ornamentation frequently approaching the uncouth; but it is always effective. In its adherence to Spanish forms, Mexican art is as notorious a disregarder of convention as the Spaniard himself in his adoption of the Renaissance, in building, painting, sculpture and all the arts. It is in this respect that Mexican architecture differs from that of Spain; and it is this very differ¬ ence that makes it specially interesting; for we see within it the activity of the highly-devel¬ oped native races of America, these ’ ancient artist artisans, stonecutters, wood-carvers, metal-workers, tile-makers and designers of all kinds, essentially thinkers, creators, builders, in love with their work of

creation.

Styles of Mexican Colonial Architecture. — Of the early colonial edifices of Mexico, more middle-age than Renaissance, one of the best examples is the church of San Francisco at Cholula, about which there still clings that mysterious atmosphere that the Indian work¬ man lent to all he touched in the years follow¬ ing the Conquest, while his ancient traditions were still vividly alive.

The Renaissance soon made itself felt in Mexico as it had already done in Spain. The Moorish dome was its inseparable attendant, and New Spain, in a few years, became the centre of tireless building activity which was to cease only when the Spaniards withdrew from the country. This movement was at its height when the cathedrals of Mexico and Puebla were begun, in the latter half of the 16th century, when Mexico was under the Baroque influence ; and before they were finished the Churrigueresque had supplanted it.

I he Puebla edifice was built more in accord¬ ance with the original Spanish Renaissance ideas of its architect; but the cathedral of Mexico, especially in its interior decorations, was strongly under the influence of these latter two ornate styles, both of which are character¬ ized by the interruption of straight lines, the breaking of entablatures and pediments and an inclination toward unexpected arches and curves. The Baroque retains the original col¬ umn of the Renaissance, but it takes liberties with it by twisting it out of its primitive shape, running it into panels and stories and decorat-mg it in an unorthodox way.

The Churrigueresque, child of the Baroque, ran to extravagance in its love of the ornate.

It made of the column a thing of decoration; it broke it into all kinds of geometrical forms and transformed it into pillars and pilasters, which became part of the mass-decoration. It laid its hand, too, upon the sculpture, making of it an integral part of the decoration scheme from whose involved mass it peeped forth just as did the curved and broken lines of the columns.

Both Baroque and Churrigueresque are char- ‘

acteristic styles of architecture, developments of the Renaissance, influenced by Moorish and other ideas dominant in Spain at the time of its introduction. Both are splendid in their general effects, in their monumental fagades and in their elaborate stone carving which, at a distance, gives to the fagades the appearance of one huge piece carved from the living stone en bloc. This is the same impression that the great Maya buildings give. The Baroque in Spain was stamped with a strongly individual¬ istic character ; and the Churrigueresque, a very ornate development of it, became in Mex¬ ico the most truly expressive medium of the native mind. In the early part of the 18th century Mexico went mad over Churriguer¬ esque, and all the invention, all the grotesque¬ ness, all the fertility of imagination, all the originality of the native mind, were exercised in creating new forms of ornate and in¬ tricate adornments for church fagades and interiors, which became masses of gold and silver, of richly-adorned columns and pilasters reaching to the lofty ceilings, of elaborate altars, splendid in their intricate carving, their paintings and their dominant tones of the pre¬ cious metals. Intricate scroll work, fruits and shells proclaimed the influence of the native Mexican workman, while strange mythological designs showed that there still reached him echoes of the creed of his ancestors and of his pre-Columbian art. Yet the sense of proportion is ever there, and this strange mingling of various systems of art gives one the impres¬ sion of a magnificent and unified ensemble. The touch of the artist is ever perceived in the best of these old colonial buildings ; for Catholic mysticism, Moorish mysticism and native Indian mysticism seem to feel the bond that binds all mystics together.

Influence of Tolsa. — Manuel Tolsa, a noted Spanish artist and architect, who came to Mexico as a teacher in the National Academy of Art in the latter part of the 18th century, had been trained in a school that disliked in¬ tensely the Churrigueresque and he set about reconstructing the interiors of many of the public buildings of the capital, of Puebla and of other cities of Mexico. Under his direction the magnificent Churrigueresque altars and decorations were torn out of the Mexico City cathedral and replaced by very plain Greco-Roman, so that now only mutilated parts of the grand old decorations remain to give an idea of the magnificence of the interior when the most gorgeous of all the Spanish styles of architecture held supreme rule there. For¬ tunately, however, the north chapel of the building has been left practically untouched ; the colossal fagade of the Sagrario

could not very well have been altered, and its interior has suffered much less than that of the cathe¬ dral. The example set by Tolsa spread rapidly and it became the fashion to decry this most characteristic of Mexican architecture ; and untold harm was done to the unity of the old buildings, very few of which remain intact as their builders left them. The parish church of Taxco, the Sagrario and La, Santisima in Mexico City, and San Martin Seminary, Tepozotlan, are examples of the magnificence of the old Churrigueresque churches in the days of their glory. But even of these only

San Martin and Taxco have escaped the hand of the reformer.

Influence of Puebla.— During the Spanish colonial period there were, in New Spain, two centres of art influence, Puebla and the capital. The former was more directly affected by the spirit of Andalusia and the Moors. Cholula, a suburb of the present city, had been a great centre of art and of building activity prior to the Conquest, and its artisans were noted throughout the Aztec empire. So the Anda¬ lusians, who settled in the valley of Puebla, found cunning workmen there to help build up the semi-Spanish, semi-Moorish industries they began establishing in the country. Excel¬ lent beds of clay in the neighborhood helped the work along; and Cholula continued, after the Conquest, the industries the skilled Toltecs had established there before the Normans had thought of invading England. Tile-making, polished marbles and onyx, handsome pottery and clay figures instinct with life and depict¬ ing the national customs, became characteristic Puebla products. This industry had a strong influence upon the architecture of the city and the surrounding country. Buildings with great Moorish courtyards and exterior and interior decorations in ornate Moresque tile patterns began to make their appearance in Cholula al¬ most immediately after the Conquest and, on the founding of Puebla, the centre of this in¬ fluence shifted gradually to the new city. Puebla at once began to reflect the thought and manner of life of Seville with which it kept ever in close touch. Cholula became a place of Moorish domes elaborately decorated with tiles. To-day the little town is exhibited as a curiosity to the tourist as much on account of its all-prevailing church domes as its famous pyramid. Towers, interiors, altars and the hitherto undecorated bulk of great buildings were covered with tiles. Private residences and government edifices followed the fashion and Puebla came to reflect more and more the in¬ fluence of Seville and of Moorish Spain. As Puebla was the one great town on the high¬ road between the capital and Vera Cruz, it be¬ came an important distributing point; and this helped to extend

her Moorish influence. Even in the capital this influence is seen in existing buildings and many others of the same style have disappeared. The famous Jockey Club of Mexico City, completely covered with bluish tile, reflects strongly this Puebla style. Some of the Churrigueresque churches, whose ornate exteriors are set against a background of Puebla tile, present a gorgeous and fascinating appearance ; but in many others the employment of the Mexican Moresque is not so fortunate, for it was not always applied in good taste. Consult Wilcox, M., (Certain Phases of Span¬ ish Colonial Architecture) (Architectural Rec¬ ord , June 1915).

John Hubert Cornyn, National University of Mexico.

15. ETHNOLOGY. Ethnologically Mex¬ ico is one of the most interesting of the coun¬ tries of the Western world. Within her bound¬ aries are represented all the really great cul¬ tured races of North America. Her territory forms the bridge of the continents over which surged backward and forward for uncounted

centuries untold races, many of whom have disappeared forever, leaving behind them buried remains of their arts, their industries, their tribal customs and remnants of their vari¬ ous languages engrafted upon those of the races who succeeded them.

The historic races of Mexico belong to a score or more of families, which future in¬ tenser study and investigation may or may not show to be related. Many of the languages are divided into subfamilies and these into dialects, some of which are quite separate, while others blend into one another so that it is hard to determine where one begins and the other ends. But all are indicative of the pres¬ ence in Mexico of many races of distinct cus¬ toms, habits and religious beliefs for a long period of time, and of the changes in the dis¬ tribution of these people which had already taken place, and which were continuing to take place at. the time of the Conquest. Mexico, as wfe see it in the first quarter of the 16th century, presents but one of the many ethnological phases, of her kaleidoscopic existence.

. Origin of Races. — Beside tradition, there is no guide pointing the way to the penetration of the cloud that hangs over the past of these mysterious races, other than such aids as are lent by linguistic studies, comparative ethnolog¬ ical investigations, archaeological remains and such echoes of the past as have come down to us in the complicated mythologies of the vari¬ ous families inhabiting the *western hemisphere.

Two great racial traditions in Mexico point to distinctly different origins for the two lead¬ ing races of the country. Nahua tradition would seem to indicate that they came into Mexico from the north, by wa; of the Pacific coast, while Maya tradition as invariably points to the east and more specifically to the coast of the Gulf of Mexico, as the direction from which they worked southward into their pres¬ ent habitat. And yet, when the great Nahua culture god, Quetzalcoatl, arrived in Mexico, it was by way of the Gulf of Mexico, and when he departed from the scene of his labors, for the unknown land from which he had come, it was by way of Coatzacoalcos (Puerto Mex¬ ico) on the Gulf side of the Isthmus of Te¬ huantepec. This and similar traditions have been used to prove that the Nahua tribes must have come from the east. Much is made of the fact that, while thˆ Nahuas are repre¬ sented, in their traditions, as coming from the north and west, Quetzalcoatl is as invariably represented as coming from the east, and that, as mythology is always older than tradition, the Nahuas must have come originally from the east and have afterward wandered north and come south again. There is nothing to support this hypothesis.. It must be kept in mind that, m these traditions of race migration and in that of the movements of. the culture god, there are. wrapped up two distinctly different events, which, in all probability, have no relation to one another. Quetzalcoatl's office as messen¬ ger of the sun god who sent him on his mis¬ sion of culture to Mexico necessarily forced

t!mJ° journey from the direction of

the home of the sun which, according to Nahua tradition, was in the east ; and the same reason made him sail, away again toward the east when his mission on earth had been accom¬

plished. The great prophet who came from the sun and the races that arrived from the west and north are, therefore, distinct in ori¬ gin. The one is the creation of the imagina¬ tion, the others bid us listen to the echoes of migration through several centuries of its semi-historic

existence.

The origin of the Mexican people has been traced, by over-zealous investigators, to almost every race under the sun. Mongolians, Tar¬ tars, Japanese, Hindoos, Malays, Hebrews, Carthaginians, Irish, Welsh, Australasians, Es¬ kimos, Assyrians, Persians, Egyptians and Africans have been successively put forward with elaborate arguments as the original fore¬ fathers of the Mexican people. But it is only within the past half century that serious in¬ vestigation along scientific lines has been undertaken by properly trained workers. The result of this investigation shows conclusively that, whatever may have been the origin of the races of the American continent, that ori¬ gin is to be sought for so far back in the past that races, customs, mythologies and tongues have had time to blend and to create a vast number of sub-tongues and dialects with their corresponding tribal and clan variations. It also shows that Mexico must have been origi¬ nally populated before the domestication of wild animals, and even before many of the ani¬ mals of the present day came into use in the Eastern Hemisphere. The horse, the cow, the sheep, the goat, the elephant, the camel, that had become an integral part of the civilization of. the Old World, were unknown in America prior to the Columbian discovery. In general the animal life of the Western Hemisphere is so different from that of the eastern that a separation of many centuries is necessary to account for this diversity. The difference in the plant life of the Eastern and of the Western Worlds is even more noteworthy.

The uses to which the pyramidal structures were put in Mexico were very different from those to which they were put in Egypt and its neighboring civilized nations. If the buildings of Mexico and Central America have any affinity with those of the Old World it is deci¬ dedly not with those of the civilization of the Mediterranean. So, after reviewing the evi¬ dence which would derive the original races of Mexico from European or African civilizations, we are forced to come back to the native tra¬ ditions, which offer us the only glimmer of light in the darkness. As has already been stated, these traditions point to the north as the original home of the Nahua people; and inves¬ tigators have taken this to mean somewhere in Arizona, New Mexico, Colorado or California. All. these conjectures may be partially true, for it is probable the Nahuas were, at various stages of their exodus, in these several places. But it is still more probable that they came from much farther north and that, in their migrations southward, they followed the Pacific coast for a considerable portion of the way. There is a very suggestive similarity between the customs, culture and mythologies of the Nahuas and those of Kwakiutl people of Brit¬ ish Columbia ; and between those of the latter and those of the races of

northeastern Asia whom they resemble, in appearance. But strik¬ ing though these similarities are, they go to

show, by their several stages of development, that a very considerable space of time must have elapsed since these widely-separated races were in contact with one another.

The similarity of the myths and customs of other western and northern tribes would seem to connect them with the Nahua and with the people of northeastern Asia. As the Nahua and the Maya show affinities in culture, cus¬ toms and traditions sufficient to suggest that they had a common origin, and as the more recent linguistic and ethnological investigations would seem to confirm this suggestion, the latter probably came from the same original habitat as the Nahua; but in their journey southward, instead of keeping to the coast, they made their migration eastward across the con¬ tinent.

There are, in Mexico, races much older than the Nahua and the Maya, races that have, un¬ doubtedly, been profoundly influenced by these latter arrivals, but have retained certain char¬ acteristics which still proclaim their earlier ori¬ gin. Of these the Otomi, cojointly with the Chichimeca, are credited, in Nahua mythology, with being the first races created by Camaxtli, the Tlaxcalteca creator. Primitive though these peoples were, it is almost certain, how¬ ever, that they were not the aboriginal races of Mexico ; for in places we meet with strange tongues, curious wrecks upon the strand of time, that seem to have no affinity with those of the races dominant in the days of Moctezuma.

Distribution of Races. — A glance at an ethnological map of Mexico shows that the country is divided into a great number of race areas. One of these, comprising Lower Cali¬ fornia and a part of Sonora on the Pacific side, was populated, in historical times, by races of a low culture, who had undoubtedly been driven to these confines by the conquering Nahua and other races who swept over the great up¬ land plateaux. Along the Rio ‘Grande, in parts of Sonora, Chihuahua and Coahuila were no¬ madic Athapascans; while east and southeast of

these was a still larger area covered by two great, distantly-related families, the Packawan and the Tamaulipeco, who occupied a part of Coahuila, all of Nuevo Leon and most of Tamaulipas. The country included between these areas already mentioned. Guanajuato, Michoacan and the Pacific Ocean, was held by the Nahua, a part of whom had migrated southward into Colima, Guerrero, Morelos, Mexico, Puebla, Vera Cruz and parts of the Isthmus of Tehuantepec, of which they held both the north and the south sides. In the heart of their territory, however, were the Tarascans, who occupied the state of Michoa¬ can, and the Otomi who held Hidalgo, Queretaro, Guanajuato and parts of San Luis Potosi and Mexico; while on the Gulf coast, stretch¬ ing north from the city of Vera Cruz to Ta¬ maulipas, were the Totonaco and the Huasteca, races distantly related to the Maya of Yucatan, Campeche, Tabasco, Chiapas, Guate¬ mala and British Honduras. Across the southern half of the Isthmus of Tehuantepec, stretching like a great blanket into Oaxaca, Vera Cruz, t Chiapas and Tabasco, lay the Zoque ; and between the latter and the Nahua of Morelos and Guerrero is the home of the great Zapoteca-Mixteca race.

All these separate ethnic divisions show decidedly distinctive racial characteristics. Their languages, industrial arts and mythologies pres¬ ent such variations and dissimilarities as could only come from distinct races or from families separated from one another in the early stages of their tribal life. Therefore Mexican ethnology has to deal with these races as such, and also with their relation to one another and the general influence they have had upon one another ethnically; for the mixing and the blending of the races which have successively appeared in Mexico, have been going on for ages, just as they are going on to-day, with added European and other elements.

But though the native ethnic elements are gradually losing their distinctiveness, or have already lost it, as in Tamaulipas, San Luis Potosi, Nuevo Leon, Coahuila and northern Chihuahua, yet there are many states, like Michoacan, Guerrero, Oaxaca, Chiapas and Yucatan, where the native languages are still spoken with comparative purity. In these parts of the country racial characteristics persist.

The Nahua is the most important of all the races of Mexico, on account of the Vast extent of territory it covered, stretching as it did from the Rio Grande to Guatemala, the number of distinct dialects and tribes included within its racial boundaries, and the influence of its religious, social and industrial customs, its political policy, its vast

trade and commerce and its colonizing propensities. The extent, shape and position of the territory occupied by the Nahua to-day, which is practically the same as at the time of the Conquest, would seem to prove the truth of the tradition that they entered Mexico from the north. They drove, like a gigantic wedge, through the barbarous tribes of the great plateaux lands of northern Mex¬ ico, forcing the Seri to the mountainous parts of the state of Sonora on the west and splitting apart the Apache and Toboso and crowding them back to the Rio Grande on the north, and driving the Tamaulipecos and the uncivilized tribes of southern Coahuila, Nuevo Leon and Tamaulipas also in the direction of the Rio Grande and toward the coast of the Gulf of Mexico. Encountering highly civilized peoples in the mountainous and easily-defended states of Guanajuato, Queretaro, Hidalgo and Michoa¬ can, they skirted the latter on the west, making their way through Guerrero, and, pouring over the mountains to the east, overran Morelos, Mexico, Tlaxcala, Puebla, most of Vera Cruz and a part of Tabasco. A wing of the migra¬ tion, coasting further south along the Pacific, left a strong colony on the southern shore of Guatemala, another in the interior and a third in Salvador, while a fourth settled upon islands in Lake Nicaragua and occupied all the land between that body of water and the south¬ western coast. A fifth crossed the isthmus and took possession of territory on the northwest¬ ern shore of Panama, near the Costarican boundary line. The Nahuatl confederacy, headed by the Aztecs, extended its territorial dominion, though not successful in forcing its language on the conquered races or in assimilat¬ ing them to the customs, the culture, or even to the political system of the Nahua; so that the people over whom it gradually extended its sway remain ethnically distinct to-day.

Linguistically the Nahua are divided into a score or more of distinct tribes, all speaking, with variations, the Nahuatl tongue. The Toltecs, who had disappeared as a political entity several centuries before the Conquest, were the most noted of the Nahua. They occupied a con¬ siderable part of the territory afterward held by the Aztecs at the time of the Conquest. The following tribes are now recognized as belong¬

ing to the Nahua race:

The Acaxee, speaking four closely-related dialects, inhabited the mountainous regions of Durango, between the Tepehuanes and the Aztecs. The Aztecs or Mexicans (including Tlaxcalans) were spread over a vast extent of territory from Tabasco, through southern Vera Cruz and across the state of Puebla, Morelos, Mexico and Guerrero, to the Pacific, and thence up along the coast, through Jalisco and Sinaloa, past the southern end of the Gulf of California. Another group of considerable extent occupies the shores of the Gulf of Tehuantepec. The Yaqui, also known as Hiaqui, Cahita, Cinaloa and Sinaloa, who were divided into three tribes speaking distinct dialects, Yaqui, Mayo and Tehueco, are closely allied to the Aztecs, with whom they have been classed. At one time they occupied considerably more territory than they do to-day. They extended over the middle and lower Yaqui, the Mavo and the Fuerte districts of Sonora. Now, so far as language is concerned at least, they are confined to the Yaqui River district. All the Yaqui tribes were energetic, patriotic and intelligent and they were one of the foremost factors in building up the civilization of Mexico. The Cazcanes occupied the mountainous districts of Jalisco about mid¬ way between Guadalajara and Zacatecas. The Conchos, now extinct, but at one time an im¬ portant tribe, occupied a considerable extent of territory, lying between that of the Tarahumare cn the west, the Apache on the east, the Tepehuan on the south and the Rio Grande or the north, their habitat being almost entirelv within the boundaries of Chihuahua. The Cora, be¬ longing to the northern or Sonora group of Nahua-speaking tribes, live along the Jesus Maria River in the state of Talisco. The Huicholes (Guachichiles, Cuachichiles), accord¬ ing to Orozco y Berra, occupied parts of Coc-huila, Nuevo Leon, San Luis Potosi and Zacat¬ ecas. They were between the Laguneros on the north, the Otomi to the southeast and south and the Zapoteca to the west. Catholic missions were early established among them ; they were brought under the domination of the Spaniards and their language finally disappeared as a tribal institution. In the heart of the Yaqui country were the Nio, who lived south of the Fuerte River. The Niquiran, one of the Nahua settlements furthest south, form a small com¬ munity occupying the land between Lake Nica¬ ragua and the Pacific Ocean and also the neigh¬ boring islands in the lake. About the head¬ waters of the Hermosillo and Yaqui rivers, between the Seri on the west, the Apache on the northeast, the Pima on the northwest and south, was the important Opata tribe, which consisted of two sub-tribes speaking distinct dialects, Eudeve (Heve, Dohema) and Joval (Ova). The most northern Nahua familv, the Pima, was divided into the following scattered

groups: Pima Alta (Upper Pima), situated

principally in the United States, but occupying a small part of northern Sonora; Pima Baia (Lower Pima), who lived around the middle part of the Yaqui River, between the Tarahu¬ mare to the east, the Yaqui to the south, the Seri to the west and the Opata to the north ; Potlapigua, near Babispe, northwest of the Opata country, Pima de Bamoa (Sinaloa), in and around Bamoa, on the lower Sinaloa River, south of the Mayo; Tepehuan Pimas, a small group in the western part of the Tepehuan country. In southwestern Salvador are three settlements of Nahua known as Pipil and closely related to the Aztecs, while the Sigua (Segua, Xicagua, Shelaba, Chicagua, Chichagua), a small Aztec colony on the northwestern side of Pan¬ ama, marks the southermost limit of the Nahua extension. South of the Apache, east of the Concho and north of the Tepehuan, lived the Tarahumare, an extensive division of the Nahua family, covering parts of the states of Sonora, Chihuahua and Durango. They spoke a number of distinct dialects and their territory was divided into Tarahumare Alta and Tarahumare Baja. Tarahumare proper was spoken in the upper country while the tongue of the lower land was known as Chinipa. The Tepecano, closely related to the Tepehuan, occupy the territory between that of the Cazcan and the Guachichil in modern Tepic. The Tepehuan live principally in the state of Durango, south of the Tarahumare, where they are confined, for the most part, to the mountainous regions for a distance of about 250 miles.

The Olive (Olivean), a race of lighter-colored people than the tribes surrounding them, occupy territory southeast of the Pisone and Janambre, in the state of Tamaulipas. Tra¬ dition says they came from Florida, which may medn o'nly the Gulf coast. They were superior in culture to their neighbors, but nevertheless their language has become extinct.

The Pakawan or Coahuilteco is the name given to a number of cognate tribes of southern Texas and northern Mexico. They covered con¬ siderable territory east of that occupied by the Toboso. This included, in Mexico, the eastern side of Coahuila, most of Nuevo Leon and the northern part of Tamaulipas. As these tribes were inclined to be nomadic and were but partially civilized, they ranidly lost their lan¬ guage after their conquest by the Spaniards.

Otomi (Hia-hiu). — The word Otomi is used in two senses. It signifies the race of people speaking the Otomi language ; and it was ex¬

tended to include, in a general way, those races which from time to time formed loose alliances with the Otomi for war or defense. They have been confounded with the so-called Chichimeca, and some authorities claim that they form one of the ethnic divisions of the latter very indefinite tribal designation. The Otomi, who had distinct customs and a complicated my¬ thology, but were less civilized than the Nahua, occupied a large, somewhat irregular, yet com¬ pact portion of central Mexico, where many of their descendants may be found to-day still speaking their ancient tongue. Their territory extended over part of San Luis Potosi, all of Queretaro and most of Guanajuato, reaching into the state of Mexico, a short distance south of. Mexico City, and from there westward to Michoacan. On the east were the Huasteca, on

the southeast the Tarascans and along the north¬ west the Nahua. They were divided into four tribes : Otomi proper, Pirinda, Paine (north¬ west of the Otomi) and the Mazahua (east of the Tarascan, in the southwestern part of the state of Mexico). In the time of the later Aztec empire the Mazahua occupied the prov¬ ince of Mazahuacan situated in the western mountains of the valley of Mexico. They were subject to Tacuba. The Pirinda territory was principally in the valley of Toluca, and some descendants still live in villages in the land of the Mexicans, others in Tarascan territory. The Otomi were a numerous, industrious and fairly intelligent race.

Under the heading of ((Rio Grande tribes, Orozco y Berra groups a number of native com¬ munities occupying territory in the state of Tamaulipas at or near the mouth of the Rio Grande River; but he furnishes no further data respecting them with which to classify them; but as the Indians of this district no longer retain their tribal organizations, and as their languages have also disappeared, little is known of their pre-Columbian culture.

The Seri, who occupied a considerable ex¬ tent of territory on the mainland opposite the peninsula of Lower California, where their language is still spoken to some extent, are classed among thi less

civilized of the Mexican races. Their territory stretches inland into the mountain region for 150 miles or more from the coast, and includes the island of Tiburon (shark) in the gulf.

Under the head of Tamaulipeco, Orozco y Berra, who has paid more attention than any other investigator to the races of Tamaulipas, where the native languages have all practically disappeared, gives the following tribes: Tamaulipeco proper, Canaynes, Quinicuanes, Borrados, Tedexenos, Pasitas, Tagualilos, Caribayes, Mariguanes, Panguayes, Anacana, Cadinia, Guixolotes, Pintos, Comecrudos, Malinchenos, Ancasiguais and Aretines.

The Tarasco (Michoacano) , occupying ap¬ proximately the state of Mic'hoacan, speaking a distinct language and having customs, myths and traditions different from those of the other races of Mexico, form one of the important racial divisions of the republic. They are a highly cultured people and, in the time of the Aztec empire, they maintained a separate, inde¬ pendent government.

From the city of Vera Cruz northward to the Huasteca and inland to Tlaxcala, lie the Totonaca, almost completely surrounded by. the Nahua. They were a cultured race at the time of the Conquest, and it was among them that the conqueror, Cortes, established the first Spanish government and colony on the main¬ land of the American continent.

Two cognate tribes, the Waicuri and the Pericu, occupy the southern end of the Isthmus of Lower California. Their languages, which are still spoken, are verv badly corrupted.

The Yuma family is represented in Mexico by the Cocopa (Cucapa) and the Cochifni, who occupied all but the southern one-fourth of Lower California. The native tongue is al¬ ready badly corrupted and is fast disappearing.

The Zoque, stretching over four and one-half degrees of longitude, across the Isthmus of Tehuantepec, from east to west, and occupy¬ ing parts of the states of Oaxaca, Chiapas and

Tabasco, are surrounded by Zapoteca, Chinan-leca, Maya and other races. The Zoque family is divided into four branches, Mixe to the north and west of the main territory, Zoque proper, to the south and east, Tapachula, in the southeastern corner of the state of Chiapas, on the Guatemala boundary line, and the Popoloco in the state of Puebla.

1 he great Athapascan family is represented in Mexico by the Toboso and the Apache. The area and location of land occupied by these two nomad, warlike tribes changed from time to time; but, roughly speaking, the Apache oc¬ cupied an irregular territory, stretching south¬ ward from the Rio Grande and the American boundary line for a distance of five degrees of latitude, from about 105° westward, cover¬ ing parts of Chihuahua and Sonora. But they often raided over the northern part of the latter state far into the interior. The Toboso also occupied territory stretching from the Rio Grande southward, but their general habitat reached eastward from the western boundary line of Coahuila, within which state they lived in normal times.. They often joined hands with the Apache in raids on the more civilized parts of the surrounding country; and they frequently gave the United States and the Mexican governments considerable trouble. Sometimes the depredators took refuge on the American side after a raid on Mexican citizens and vice-versa when they had raided American territory.

In and around the town of Chinantla, south of Vera Cruz, occupying territory about 100 miles in extent, are the Chinanteco, who are probably a survival of one of the ancient races who populated the country before the arrival of the Nahua. The Huave (Huabi, Guavi, Juave, Wabi), another primitive race, occupy the marshes around the great lagoon which forms the northern inlet of the Gulf of Tehuantepec. Tradition says ‘they once possessed all the isthmus country and that they came from the south. The Janambre, a third primitive tribe of a very warlike disposition, who occupied the rugged southwest of Tamaulipas, from a short distance north of Victoria to the southern boundary of the state, about 100 miles, gave the Spaniards much trouble before they were finally conquered toward the close of the 18th century.

To the south and east of the southern Nahua and stretching from Guerrero to the Isthmus of Tehuantepec was the home of the great Mixteca-Zapoteca family, which in culture, intel¬ ligence, enterprise and achievement was scarcely inferior to the Nahua and the Maya, between whom they seem to have been the medium of communication and of the distribu¬ tion of the arts and sciences. Thev possessed a culture which, while it resembled that of the Maya and Nahua, was nevertheless distinct. The Mixteca whose territory extended into parts of Puebla, Guerrero and a considerable portion of Oaxaca, were surrounded on the north and west by the Nahua, while the Zapot¬ eca were their neighbors on the east. They had an outlet on the Pacific Ocean to the south¬ west, which they may have possessed for a long time, since it is the boast of one of their oldest legends, that their

great culture hero, Yucano, defied the Sun, engaged him in combat and drove him into the ocean. The Mixteca lan-784

guage is still spoken over most of the Mixteca country. The traditions of the Mixteca make them an alien race fighting desperately for years for their existence, in the mountains, a part of which they were forced to abandon. The rugged nature of the country in which they lived created, in time, numerous dialects of the Mixteca. To the east and partly to the south of the Mixteca country lav that of the Zapoteca, stretching for a considerable distance along the Pacific Coast and occupying the southern side of the Isthmus of Tehuantepec, reaching north and west of the city of Oaxaca and including the famous valley of Oaxaca, in the moun¬ tainous districts of which the native tongue is still spoken with comparative purity. The pot¬ tery and the metal work of the Mixteca and *the Zapoteca were sought by the Mexican mer¬ chants, who distributed them over a wide area of country.

The Maya family, the most highly civilized of all the native races of America, is divided into two great groups, the Maya and the Kiche, to which may be added the Huasteca. The Maya proper, within whose territory were con¬ tained most of the semi-historical cities of the more advanced culture of Mexico, were spread over all the peninsula of Yucatan, eastern Tabasco, British Honduras and the island of Carmen. They were divided into Lacandon, Mopan and Itzae or Peten, three tribes speak¬ ing slightly different dialects. The Lacandon still inhabit a region near the headwaters of the Usumacinta River, in eastern Chiapas and northern Guatemala. They were once a very extensive and important people; but their an¬ cient greatness has disappeared. They still speak their native tongue. The territory of the Itzae occupied a part of northern Guatemala and eastern Yucatan stretching westward probably to Campeche and southward to Chia¬ pas. The Mopan occupied an undefined terri¬ tory partially in southern British Honduras, Guatemala and Chiapas. To the south of them were the Choi, also a JMaya tribe, to the west the Lacandon and to the east and north the Itzae.

The Huasteca, a tribe situated far from the parent stock, and extending from Tampico southward and westward is wedged in between the Otomi on the west, the Nahua, Totonac and Tamaulipas tribes on the

north. It was once a powerful nation and the people of to-day still bear all the racial characteristics of the Mayas.

Bibliography. — Bancroft, H. H., '"The

Native Races of the Pacific States* (San Fran¬ cisco 1875-76) ; Belmar, F., (Ensayo sobre la lengua trike* (Oaxaca 1897) ; (La lengua mazateca) (Oaxaca 1892) ; Brendt, C. H., (Ex¬ plorations in Central America) (Washington 1872) ; Brasseur de Bourbourg, (Histoire des nations civilisees de Mexicpie et de l'Amerique Centrale* (Paris 1857-59) ; (Popol Vuh) (Paris 1861) ; Brinton, D. G., (The American Race) (New York 1891) ; Charnay, D., (The Ancient Cities of the New World) (New York 1887) ; Clavigerio, (History of Mexico) (London 1787) ; Gomara, F. L. de, ˆHistoire generale des Indes Occidentales* (Paris 1616) ; Herrera, A. de, (Historia generaP (Madrid 1726-30); Icazbalceta, J. G., (Documentos para la historia de Mexico* (Mexico 1858-66) ; Landa, D. de, (Relation des choses de Yucatan > (Paris 1864) ;

Lumholtz, C, (Huichol Indians of Mexico) (New York 1898) ; Orozco y Berra, M., 'Geografia de las lenguas y carta etnografica de Mexico* (Mexico 1864) ; Pimentel, F., 'Cuadro descriptivo y comparative de las lenguas indigenas de Mexico* (Mexico 1862-65) ; Reclus, E.,(The Earth and its Inhabitants* (New York 1892) ; Ribas, A. P. de, (Historia de los triumphos de nuestra Santa Fee* (Mad¬ rid 1645) ; Sahagun, B. de, (Historia general de las cosas de Nueva Espana* (Paris 1880) ; Seler, E., in (Mexican Antiquities) (various articles, Washington 1904) ; (Notice sur les langues Zapoteque et Mixteque) (Paris 1890) ; Starr, F., (Ethnography of Southern Mexico) (1900); Thomas, C, Hndian Languages of Mexico) (Washington 1911); Uhde, A., (Die Lander am untern Rio Bravo del Norte* (Heidelberg 1861); Villagutierre Soto-Mayor, J. de, (Historia de la conquista de la provincia de el Itza> (Madrid 1701); Williams, J. J., (The Isthmus of Tehuantepec) (New York

1852).

John Hubert Cornyn, National University of Mexico.

16. LITERATURE. All the cultured and most of the semi-cultured races of America, in¬ cluding the warlike red-man of the north, had a passion for oratory and storv-telling, fore¬ bearers of formal

literature. The Aztecs, the Mayas and other more civilized nations of Mex¬ ico had, years before the Conquest: evolved literatures which had already begun to break down the barriers of conventionality. That these literatures were noble in sentiment, pas¬ sionate in utterance and beautiful in form the fragments that have come down to us, prin¬ cipally in the shape of translations or transcrip¬ tions into some one of the native languages, leave no doubt. Mistrust has been cast upon the legitimacy of these fragments by recent critics; but. the fact that, after 400 years, they represent, in their utterance, form and spirit, the soul of the Indian mind to-day, so distinctly different from the Latin and the Saxon, places upon them the stamp of genuineness. Altamirano, 'the greatest, the most passionate, the most subtly poetical, the most oratorical of Mexican literary men, was a full-blooded Indian. In him we see reproduced, in the 19th century, the pro¬ totype of his Indian forebearers, who were the literary glory of the courts of Netzahualcoyotl and Montezuma II, where oratory and other literary efforts were sedulously cultivated and the successful public speaker was honored al¬ most as a prophet and as the bearer of a mes¬ sage akin to that of the divine oracles.

To the intolerance and unfortunate policy of Spain, who waged a relentless war of destruction upon these written records which kept alive the memory of the past greatness of the native races of Mexico, we owe the an¬ nihilation of this literature and the enslavement and debasement of the cultured nations who created it.

According to native Indian writers, the reign of Netzahualcoyotl, king of Texcoco, was the Golden Age of Mexican literature in the pre-Conquest days. The monarch himself, who was the leading spirit in the literary movement of his reign, gave much of his time to litera¬ ture and the sciences known to his people. Round his romantic career cluster many a legend and story. Early Spanish writers on

Mexican subjects and native Indian literary men represent him as a great and inspired poet, which he may well have been, for poetry is the gift of the Mexican people; and the stories and legends still current

among the ignorant In¬ dians are often strikingly imaginative, poetical and beautiful. To the literary men of Indian race who learned Spanish shortly after the Con¬ quest and1 wrote in it, we owe much of the information we possess of the culture and his¬ tory of the native races of pre-Columbian days. The best of these Indian writers was a direct descendant of the famous Netzahualcoyotl. 1 hese Indian literary men of the eailv days of New Spain formed a promising literary school ; but the policy of Spain, which had al¬ ready led her to destroy the pre-Conquest litera¬ ture and records of the native races, soon be¬ gan to show itself in the oppression of the Indians, their nobles and their princes; and the most active and aggressive members of the native literary school, on account of the pres¬ tige they had won and the influence they re¬ tained, were among those most fiercely per¬ secuted. Broken in spirit, they soon ceased to be active figures in the national life.

Of the post-Conquest literature of the 16th century but a very small part has come down to us ; and this is principally in the form of letters, grammars of the native languages, chronicles of the religious orders and informa¬ tion of a like nature. The letters of Cortes, the (History of the Conquest of New Spain) by Bernal Diaz del Castillo, the works of Las Casas and de Sahagun are invaluable on ac¬ count of the information they furnis'h and the light they shed on the customs, habits, govern¬ ment, industries, religion and superstitions of the native races prior to the Conquest. Fer¬ nando de Alva Ixtlixochitl, a lineal descendant of the royal house of Texcoco, in 'his (History of the ChichimecaP gives a most intimate picture of the life of the court of Netzahual¬ coyotl and extensive and interesting informa¬ tion concerning the Nahuatl race at the height of its glory. Acosta's (History of the Indies) furnishes valuable data about the Spanish col¬ onies at a time when the writer was still in touch with men who had known intimately Cortes, the conquistadores and many of the Indian princes. Toribio de Benevente Moto-linia, Geronimo de Mendieta, Agustin Davila Padilla, Francisco de Aguilar, Juan B. Pomar, Gil Gonzalez de Avila, Alonzo de Zurita, Fran¬ cisco Cervantes de Salazar, Francisco Lopez de Gomara, Fernando Alvarado Tezozomoc, Bel-tazar Dorantes de Carranza, Juan de Cardenas, Pietro Martire d'Anghiera, Pedro de Alvarado, Diego de Godoy, Juan de Zumarraga, Antonio de Mendoza, Fernando Alarcon and Antonio Villa-Senor have left us full or partial pictures of life before, during or immediately after the Conquest, or throughout the 16th century, which make our knowledge of early Mexican history more complete than that of any other part of the American continents during this period.

The. enthusiasm for literature and, more especially, for poetry in the

latter half of the 16th century was one of the distinguishing features of the life of New Spain. For the most part the writers were native-born Mexi¬ cans, some of Spanish, others of Mestizo or Indian blood; Balbuena, the garrulous old priestly chronicler, tells us that, during the last vox,. 18 — 50

quarter of the 16th century, there were numer¬ ous literary contests held under different aus¬ pices and that, at some of these, so numerous were the candidates, 300 contestants entered for poetic honors alone. He also asserts that as poets they might have compared with the most flowery in the world. It is more than probable that the foremost Mexican critic of his day was mistaken in his estimate of the literary excellence of these contestants, the very names of most of whom have disappeared.

Good poetical form, correct language and the sparing use of poetic adornment charac¬ terize this period which is, however, inclined to prosiness and the imitation of Spanish litera¬ ture. Yet it shows originality enough to re¬ deem it from being the work of pure imitators. Tones of expression, development of subject and the handling of the matters treated of dis¬ tinguish the Mexican literature of this period, in an interesting manner, from that of Spain. This is all that could be reasonably expected of it in an age when the whole American world, south of Virginia, rotated about the Spanish court.

Among the Mexican literary men of the latter part of the 16th century who have been praised by Lope de Vega and other noted Spanish writers of that age, is Antonio de Saavedra Guzman, author of (E1 Peregrino Indiano) (1599), a 20-canto poem, in which a bold attempt _ is made to sing the deeds of Cortes and his conquistadores. This poem is true to historical fact, displays careful investi¬ gation and reveals a wide knowledge of the subject and close intimacy with Aztec customs; but it is monotonous and prosy. Guzman was a mestizo whose father was one of the con¬ quistadores and his mother an Indian princess of the royal house of Mexico. He spent seven years in collecting the material for the (Peregrino) whose dominant characteristics are sim¬ plicity and naturalness.

Of the writers of this period, a portion of whose works have come down to us, Fernan Gonzalez de Eslava is one of the most inter¬ esting. He was wonderfully popular in his day as a writer of autos sacramentales, a kind of religious drama in high favor for over a century in New Spain. He was so notable a poet as to attract attention

in Spain itself. His dramas were long performed and read and they have been presented to appreciative audiences in Mexico within the past 50 years. Francisco Terrazas, who belongs to the same period as Eslava, had the honor of being warmly praised by the great Cervantes. Juan Arista, Pedro Flores, Bernardo Llanos, Fran¬ cisco Placido, Eugenio Salazar, Carlos Samano and Juan Perez Ramirez, were all poets highly esteemed by their contemporaries. To these we must add the name of Bernardo Balbueno, to whom we are indebted for our information concerning the literary activity of the latter part of the 16th century. Balbueno was a great lover of Mexico whose praises he constantly sings. He branched out into all kinds of liter¬ ary endeavor and proved himself an excellent and interesting critic. He wrote with great facility and elegance in both Spanish and Latin and is said to have been a master of Aztec. (Mexican Greatness, > (The Golden Age in Erifile) and the (Bernardo) are his best-known works. Juan Perez Ramirez was a poet of

international reputation and wonderful popu¬ larity in his own day, and he and Alarcon, another Mexican writer, have been much writ¬ ten about and praised in Spain. Placido was a full-blooded Indian of noble Mexican family who first sang the praises of the Virgin of Guadalupe, the patroness of Mexico, who, her critics say, is the ancient mother of the Aztec gods transformed into a Christian saint. How¬ ever that may be, the Indians of Mexico have shown a wonderful devotion to her ; and it was fitting that Placido, a lineal descendant of the Aztec priests, should have been the first to sing her praises. As the cult of this saint grew in popularity and spread to the ends of the re¬ public, numerous Mexican poets, from time to time, recounted her glories, in from fairly good to indifferent verse.

This cult of the Virgin of Guadalupe by Mexican literary men during the latter part of the 16th and all of the 17th centuries presents two interesting phases. In Guadalupe there was, in pre-Columbian days, one of the most popular of native shrines. This shrine, a few years after the Conquest, was suddenly changed into a Christian sanctuary,

on account of the reputed miraculous appearance, near the sacred well of the Aztecs, of the Virgin herself, to Juan Diego, an Indian, whom she commis¬ sioned to bear a message to the archbishop of Mexico, stating that she desired erected, on the hill top, above the well, a chapel dedicated to her worship. This chapel was duly built; and, since that day, the thousands of Indians who flock to it annually have made of it a most interesting depository of the mingled faiths of the aboriginal races and their Spanish conquerors. The literature that grew up around this historic shrine was, therefore, further re¬ moved in form, spirit and execution from that of Spain than any other class of writing ema¬ nating from Mexican sources. Yet whatever may have been the spirit and the influence of this distinctly national literature, its expression and the peculiar form it assumed were di¬ rectly dependent upon the popular autos sacrc-mentales and the encouragement given to them by both church and state and by people other¬ wise exercising authority throughout the land, all of whom were encouraged to extend their patronage and support, by the court of Spain itself and by the home church.

The autos were performed in the presence of vast multitudes, in the day time. They be¬ gan as a species of miracle play intended to teach the natives what it was considered neces¬ sary they should know of the dogmas and his¬ tory of the Catholic Church. Naturally the priests were the first writers of autos ; and they continued to be their most prolific produ¬ cers. But the call for new autos daily and their immense popularity with all classes, from courtier to peasant, made the demand much greater than the Church could satisfy; so lay writers soon found a paying field for their liter¬ ary activities in the production of these primi¬ tive religious dramas. Thus the Church be¬ came the patron of literature as she became that of art in Mexico. The simple primitive autos, intended for the edification of the In¬ dians, with a small admixture of mestizos, were often written in Aztec, and were almost always performed by Indians. Occasionally one may still come across one of these curious

old dramas presented by Indians in some little interior Mexican town during Holy Week, and at the beginning of the present century they were still features of the celebration of this festival in many parts of the republic. But the Church authorities set their stamp of disap¬ proval upon them and they rapidly disappeared.

The autos intended for the edification of the vice-regal court and the Spaniards resident in the capital of New Spain, who disdained the

amusements of the masses, were of a distinctly higher literary value. For the encouragement of these latter dramas the ecclesiastical cabildo and the city council of the capital offered prizes for the best literary compositions, and more especially for those of a religio-dramatic nature. The coming of a new viceroy, the dedication of a church, the consecration of a bishop, the crowning of a Spanish monarch were taken advantage of for the holding of a literary contest at which, as we have seen, hun¬ dreds of candidates for literary honors pre¬ sented themselves. The plays of the successful competitors were honored by being first pre¬ sented before the archbishop of Mexico or the viceroy, or both, in the presence of a chosen audience consisting of the notables of church and state of the capital. From the blending of the simple native Indian plays and the efforts of the literary purveyors of the court of the viceroy came the noteworthy dramatic activity which has distinguished Mexican literature al¬ most continuously from the Conquest to the present day.

Another class of early post-Conquest Mexi¬ can literature was the canciones divinas or sacred songs, which were distinguished for their chaste language, simplicity, naturalness, grace and excellency of metrical form. The best of the Mexican writers in this literary field fell very little below the mystic Spanish poets of their day, if we except the two great leaders of the movement on the peninsula.

17th Century. — With the encouragement given by the ecclesiastical and state authorities in both Mexico and Spain, the 17th century began with a very notable literary activity, which continued on into the following century. The names and all or part of the works of scores of writers of this period have come down to us and enable us to judge pretty accurately the literary activity of more than a century of intense devotion to literature in the Aztec cap¬ ital. Latin verse was sedulously cultivated and its influence upon the literature written in Spanish was very considerable; it helped largely to stamp the characteristics of the pe¬ riod which were marked by increased literary activity in a much broader field than that occu¬ pied by the writers of the preceding century, and by a tendency away from the naturalness which distinguishes the early Mexican literary school. This indicates a certain degeneracy which becomes more marked toward the end of the century. But it is a degeneracy which the Mexican writers share with those of the mother country. Yet the period is character¬ ized by strong intellectual activity expressed in an exaggerated style known as Gongorism, or culturism, whose distinguishing features are pomposity, grandeur of language and stateli¬ ness of versification marching along a broad highway leading directly to extravagance, ex¬ aggeration and obscurity of diction. Of

the

more than 100 writers who, in a century and a half of activity, attained to more or less literary prominence, there are very few who rise above mediocre. They all worship at the shrine of Gongorism and lay upon its altar involved, obscure constructions and ornate de¬ scriptions overloaded with classical references. The literary spirit was all-pervading, far-reach¬ ing, yet the age has produced comparatively little that is worthy of preservation for its literary merits alone. <(Poets were as plentiful as dirt,® one of the critics of that day tells us; they turned their hand to everything; and they treated every subject in very much the same way, religious poetry, lyrical, heroic, amatory, dramatic, epic. Even the prose works, which are the best of the period, are marred by Gongorism.

Among the poets of this period who, fol¬ lowing in the footsteps of Placido, made a lit¬ erary cult of the Virgin of Guadalupe, were Carlos de Segiienza y Gongora, who published three volumes of poems devoted to singing the glories of the Indian saint in excellent verse and lyrical metre; Francisco Bramon, (Songs of the Virgin) (1620) ; Luis Sandoval y Zapata, many high-sounding devotional poems in a decidedly Gongoristic vein; Jose Lopez Avilez, stately Latin poems recounting the glo¬ ries of Our Lady of Guadalupe ; and Antonio Morales Pastrina, fervid religious poems in praise of the patroness of the Mexican people. All these poems, a small part of a somewhat extensive literature, are touched with the strange, passionate longing of the Indian for his vanished past ; and one feels in them, at times, the presence of that ancient mother of the gods whose spirit, for the Mexican Indian at least, still hovers about the rocky heights of Guadalupe.

Most of the Mexican poetry of the 1 7th and 18th centuries is touched with the religious spirit of the age and many poets were profess¬ edly devoutly religious. To this class belong Pedro Munoz de Castro, Juan de Guevara, who wrote religious poems and cvwtos which were wonderfully popular; Francisco Ayerra, Juana Inez de la Cruz and

Francisco Cochero Carreno. During the 1 7th century, however, the drama, which, as we have seen, was purely religious, turned to profane subjects, without deserting the autos and miracle plays. Agustin Salazar, who died at the age of 33, had already won for himself the foremost place in Mexico as a dramatist and writer of comedies and autos. Eusebio Vela, a very prolific writer, . was con¬ sidered the equal of most of the Spanish writers of his day in conception, execution and man¬ agement of his plots and characters. Alonzo Ramirez Vargas also wrote a number of ex¬ cellent dramas, the best of which is (The Triumph of Diana. y

A favorite occupation of the poets of the 17th century was the writing of history in verse. Of these historical poets Gaspar Vil-lagra and Pedro Arias Villalobos are the most worthy of note. The former wrote (The His¬ tory of New Mexico* and the latter (History of Mexico, > both of which are prosy and tire¬ some.

Of the prose writers of this period one of the most noted is Pedro Avendano, who was one of the first of a long line of illustrious priests to take up the cause of the criollos

(people of white blood born in Mexico). In 1692 he preached several sermons in Mexico City in which he warmly expressed the feel¬ ings of the oppressed criollos and criticized the pro-Spanish attitude and addresses from the pulpit of the archdeacon of the capital. For this and other similar acts he was ex¬ pelled from the Jesuit order; but this only in¬ creased his popularity with the masses to whom he continued to preach and over whom he ex¬ ercised a strong influence. He possessed a withering sarcasm, powerful invective and great facility of expression. His keen reason¬ ing powers and his command of imagery make his writings and sermons always vivid and effective.

The 18th Century continued to manifest the same strong interest in literature that distin¬ guished the two preceding centuries, but cer¬ tain changes had taken place that showed the old influences were passing away. Jose Abad (1727-79) was the last of the great Latin scholars of Mexico who made a pastime of writing in the cultured tongue of the Caesars. Francisco Ruis de Leon goes back to the age of the Conquest for his inspiration in his (La Hernandia,* a long poem containing many ex¬ cellent passages and pictures of the various characters who play their several parts therein. Although falling below the level of a great epic, the (Hernandia) is superior to all previ¬ ous attempts made to evolve a great poem out of the events of the

conquest.

Of the many religious writers of the period Jose Manuel Sartorio and Francisco Soria are the best. Sartorio, a priest, strongly in favor of the independence of Mexico, was one of the most noted orators of his time; and, like Avendano, he wielded a powerful influence over all classes. He was a tireless and prolific writer and has left 23 volumes of miscellaneous and devotional works and sermons and seven volumes of sacred and profane poetry. His religious poems, which constitute his best work, are often animated, natural, easy in style and filled with fine imagery.

The most popular dramatist of the 18th century was Arriola, whose best play is (There's nothing Worse than Jealousy) ; but Cayetano Cabrera Quintero was more prolific and possessed of more talent than Arriola. Among his comedies are (A Disappointed Hope) and (Iris of Salamanca.* (A Study of the Coat of Arms of Mexico* is his most noted work. Manuel Soria disputed with Arriola the claim to be the most popular dramatist of the century. One of the best writers of the Cal¬ deron school he has left, among others, the following dramas: (William Duke of Aqui¬ taine,) (Mexican Magic,) (The Genoese) and (Love and Jealousy.* Though strongly Gon¬ goristic, his dramatic situations are excellent, his verse free and natural, the development of his plots always interesting and he is never at a loss to express passion and sentiment in a pleasing and effective manner. Manuel Zumaya was the author of (Parten6pe,* a very success¬ ful opera, and (E1 Rodrigo, * a popular drama first produced in 1708. He translated into Spanish a number of the most popular Italian operas of his time for the Spanish stage. An¬ other translator of note was Jose Rafael Lar-ranaga, who was the first to turn the works of Virgil into excellent Spanish. This translation

is faithful to the text and the spirit of the original.

The greatest poetical genius of the 17th cen¬ tum in Mexico was Sister Juana Inez de la Cruz (1651-94), whose name is a household word in

her native land, where every Mexican holds her up as the perfection of literary art. She plays upon all the passions of the human heart and she wanders into many bypaths of literature. Lyrical, amatory and descriptive poetry and the drama she manages with equal skill and facil¬ ity. In her own day she was looked upon as a paragon of learning and was credited with such superior poetic genius that she was and is still called the 10th muse. Yet she had the defects of her age; and modern literary stand¬ ards, while admitting her superior talent, find her guilty of Gongorism.

The next most important figure in the lit¬ erary life of Mexico, after Sister Juana Inez de la Cruz, is Manuel Navarrete (1768-1809), who may be said to have restored lyric and de¬ scriptive poetry to his native land. Natural¬ ness and a keen appreciation of the beauties of nature distinguish his work, which is dominated by deep philosophic thought and pitched in an elevated style uncommon in his day. His verse is strong and sonorous and his subjects are presented in a masterly manner. The religious feeling of primitive peoples is strong in him. His god is the god of the storms and winds, the all-powerful, the maker and unmaker of men and nations, who wipes from the earth, when He wills, the mightiest of the works of men. He is the Divine Providence of the world, and all that He does is good because He does it. Through and behind Navarrete's undoubted Christian faith there appears the ever-present glory of his strong conception of ancient paganism. His god is the divinity of the ancient Greeks, Romans and Hebrews who rides upon the clouds and plants His footsteps on the storm. His faith is the simple faith of a primitive age; and his poetry, true to this at¬ titude, creeps ever close to the heart of nature. His language is always simple, clear and -cor¬ rect, his lines -harmonious, his taste good and his moderation in the use of poetical and ora¬ torical adornment noticeable in his age. He rose above the prosiness and mediocrity of his time. Zorilla, the Spanish poet, has said of him : <(The defects of his works are those of his age ; their beauty and excellence are his own.® Navarrete was a close student and a great lover of Greek and Roman mythology; yet such was his natural genius that he was able to hold a steady midway course between the excesses of Gongorism and the barrenness of prosism in an age when both were rampant in Spain and Mexico. His odes and religious poems are his best work. Of the latter his (Divine Providence) is one of his most char¬ acteristic compositions.

Mexican literature has always been noted for the number and excellence of its historians, and three, Gama, Veytia and Clavijero, add lustre to the 18th century. To their industry, clearsightedness, power of discrimination and perspicuity of style we owe much of our knowl¬

edge of the history of New Spain.

Nineteenth Century. — Jose Joaquin Fernan¬ dez de Lizardi (1771-1817) forms the bridge between the last of the schools that grew up, flourished and declined under the patronage of

the Spanish Crown and the new school which came into being with the success of the revo¬ lution which made of Mexico an independent nation. He is the most pronounced herald of independence and the keenest thinker of his day. For this reason he is universally known wherever the Spanish language is spoken as ((E1 Pensador Mexicano® (The Mexican Thinker). (E1 Periquillo Sarmiento,5 his most famous work, is as well known in Spain as in Mexico. It has been published many times and is now looked upon as a classic in the Spanish tongue. In vain the critics have pointed out its many faults in style, its Meˆicanisms and its careless use of words. It is so true to nature, so full of compassion and understanding, yet withal so humorous, so sprightly, so convincing, that it appeals directly to the universal human heart. The (Periquillo) analyzes character and actions and presents the reader with innumer¬ able charming pictures which he instinctively feels are true. Lizardi was a publicist in the broad sense of the word, and he has left in¬ numerable articles of all kinds and treating of a great variety of subjects. Next to (Periquillo) his most popular works are his (Fables5 and his (Sad Nights.5

Among the successors of Lizardi are Man¬ uel Carpio (1791-1860) and Manuel Eduardo de Gorostiza (1789-1851), two names which have shed lustre on Mexican literature. Car¬ pio displays a wide range of sympathies ; and his descriptive poetry is considered the equal of any written in Mexico. He is the first and best epic poet of his country and his lyrics have the true lyrical swing. Gorostiza led the way to the production of modern drama in Mexico. He was the first to enter the field which was so successfully filled, later on, by the many dra¬ matists who have won laurels for Mexican lit¬ erature since the overthrow of Spanish domi¬ nation in 1821. His subjects are always full of interest and wide in range ; his plots are skil¬ fully constructed and his dramas have that broad human sympathy which ever appeals to mankind. He has successfully blended popu¬ larity of style with depth of thought and keen analysis. Three other dramatists belong to this period, Juan Menceslao Barquera (1779-1840), Anastacio Ochoa (1783-1833) and Francisco Ortega (1793-1849). Of these Ortega is the best. Both he and Barquera were journalists of note and saw many sides of life, which they both reflect in their dramas. Being journalists,

they were also naturally political writers, both of great power and influence. Ortega wrote heroic odes, love poems, sacred songs, sonnets, fables, epigrams and stories of a political cast. His dramatic works are <Camatzin,) a drama; (The Mysteries of the Print-shop,5 a comedy, a'nd (Freedom of Mexico,5 a melodrama. Among Barquera's successful dramas, all of which were produced in the capital, are (Polly Baker,5 (The Seducer,5 (Triumph of Educa¬ tion,5 (The Proxy's Love,5 (The Orphan Girl of Tlalnepantla5 and (Don Alfonso.5

Manuel Sanchez de Tagle (1782-1847) shares with Lizardi the honor of forming the connecting link between Mexican literary activ¬ ity under Spanish rule and the revolutionary literature that followed. He is noted for nat¬ uralness, simplicity and regularity of metric forms. He is fond of the ideal, the mystical ; he is poetically religious and he looks upon the

actions of men and the deity alike as ruled by an inexorable destiny, which recalls the Latin fates. His plots are simple in construction and development and he is free from affectation and the excessive poetical adornment which dis¬ tinguish the preceding age. Jose Joaquin Pesado (1801-61), Jose M. Heredia (1803-39) and Manuel Alpuche (1804—41), contemporaries of Tagle, and very active during the stirring years that followed the establishment of the re¬ public, paved the way for singers more dis¬ tinctively Mexican in sentiment, subject and treatment. Of these the greatest is Pesado, who, in his day, enjoyed, in the mother country, the reputation of being «a new star on the horizon of Mexican literature.® Among his admirers were the Spanish poets Zorilla, Martinez de la Rosa and Herreras. Puritv of language, care¬ ful choice of words and expressions, vividness of thought and classical restraint are character¬ istics of Pesado's work. But it is with Jesus Diaz (1809ˆ46) and Fernando Calderon (1809-45) that the real spirit of Mexico, as a new na¬ tion, begins to manifest itself. To Calderon is due the honor of creating for Mexico a na¬ tional drama. He often went afield for his subjects when he might have found better at home ; yet, inasmuch as he pointed out the way which

others subsequently followed, his work is of great importance in any review of Mexican literature. Among his dramas are (Reinaldo and Elina, } (Zadig-Zeila,> (Arman-dinaP (Modern Politics, } (Ramiro Count of Lu-cenaP HnfigeniaP <Hersilia and VirginiaP (None of the ThreeP (The TournamentP (Anne BoleyiP and (HermanP Ignacio Rodri¬ guez Galvan (1816-42), a lvric and dramatic poet of great power, imagination and passion¬ ate utterance, has left two dramas distinctly Mexican, (Muhoz) and (The Private Secretary to the ViceroyP

From the days of the revolution against Spain to the present, the literary life of Mex¬ ico has been wonderfully active and varied. To the vanguard who breathed the breath of life into this national literary activity belong Jose M. Esteva (1818-98), Ignacio Ramirez (1818-79), Guillermo Prieto (1818—94) , Manuel Payno (1822-89), Jose T. Cuellar (1823-93). Augus¬ tin Rivera (1824-1913), Joaquin Garcia Icazbalceta (1825-94), Antonio Garcia Cubas (1832-96), Jose M. Vigil (1829-1908), Jose M. Roa Barcena (1827-1906), Isabel Prieto de Lan-dazuri (1833-76), Ramon Aldama (1832-92) , Ig¬ nacio M. Altamirano (1834-93), Eduardo Ruiz (1832-1906), Vicente Riva Palacio (1832-96), Luis G. Ortiz (1&35-94), Melisio Morales (1838 —) and Rosas Moreno (1838-83). Es¬ teva gave a distinctly national note to his work and painted truthfully and with consid¬ erable humor, pathos and vividness, the cus¬ toms, habits and peculiarities of the Mexican people, with whom he was very popular. Ramirez and Prieto, though very far apart in many respects, may be classed together on ac¬ count of the unity of their aims and the strong influence they had over the Republican party and democratic Mexico. They were both fire¬ brands of the revolution that finally swept away all the privileges of the Catholic Church, confiscated and nationalized its property and drove the French out of Mexico. Both were noted orators and their poetry takes a decidedlv oratorical caste. Ramirez plays so successfully

upon all the strings of the human heart that his admiring countrymen call him (<The Necro¬ mancer.® Prieto is the master spirit of re¬ publicanism in Mexico. His is the loudest, sur¬ est, most-compelling voice crying out in be¬ half of the people during the long struggle-against privileges, entrenched abuses and foreign intervention. He had a way of going right to the hearts of the people whose idol he was ; and for whom he was the first to form tradi¬ tions of national glory. He summoned them out of the darkness of their internecine strug¬ gle and bade them listen to the voice of their mother-land. He called up

the Mexican heroes of the past and crowned those of his own age with laurels of glory. Possessed of the true poetical fires, he set the nation aflame in an age when the passions of men were easily stirred. He was lyrical poet, romancer, politi¬ cal writer and chronicler. His best-known work is (E1 Romancero NacionalP Payno was political writer, biographer, historian and novel¬ ist. He was very prolific. His best novel is (The Devil's Scarf Pin) and his history* of the war between Mexico and the United States is a good presentation of the Mexican side of the question. Cuellar, an excellent comedy writer and novelist, was very successful on the stage. Among his dramatic pieces are (The Art of LoveP (01d Man Chacon, > (Poor Boys,* (Griefs and Sacrifices) and (Natural and FiguraP Among his novels and stories are (Salad and Chicken, > (Chuchu,} (GobinaP (01d MaidsP (People who are Just so5 and (Gabriel the LocksmithP Many of his most successful stories appeared in the (Magic Lantern SeriesP Isabel Prieto and Aldema were also successful and popular dramatists. The latter, who was poet, journalist and political writer, and in¬ clined strongly to the melodramatic, has left numerous dramas, of which the most popular are (A Noble Heart,) (Pledged to Vengeance) and (Head and HeartP Isabel Prieto is the most noted woman dramatist of Mexico ; she is • also an excellent lyrical poet. Among her dramas are (Both are the Worsts (Two Flow¬ ers, > (Abnegatio-nP (A School for Sisters-in- law, } (Gold and Tinsel,) (A Type of the DayP (Thorns of SinP (A Woman's HeartP (Fairv and Seraphim, } (Carnival Night, > (Sin and PenitenceP (A Lily Among Thorns) and (The Angel of the HearthP

Jose M. Roa Barcena is the best short-story writer of Mexico and much of his work has been translated into French, Italian and Eng¬ lish. He also wrote several novels. His leg¬ ends of Mexico) and his (Recollection of the American Invasion } are well and carefully written. His short stories display a saving sense of humor, keen analysis of character and excellent constructive ability.

Altamirano and Riva Palacio stood beside Prieto and Ramirez in their glorification of re¬ publican Mexico. The most popular work of the former, who was a full-blooded Indian, is landscapes and LegendsP Palacio, who was a noted republican general, filled many high public offices. He was a successful dramatist, poet, novelist, critic and writer of short stories, legends and political articles. With Palacio and Altamirano may be classed Peon y Contre¬ ras and Juan A. Mateos, who both dug deeply into the rich mine of national life and re-co.unted the glories of Mexico. Novels, lyrics,

narrative poems, dramas poured from the pen of Peon y Contreras as if by magic; for sev¬ eral years he held the centre of the stage in the national capital where his dramas were wonder¬ fully popular; while at the same time his met¬ rical romances were read with avidity through¬ out the length and breadth of the land. <Unto Heaven,* a drama produced in 1876, may be said to have made him famous over night. 1 his was followed by many other dramas, which were produced in the capital as fast as the author could turn them out. Several of these were also successfully presented on the Madrid stage. Mateos, who has strong imagi¬ nation, intensely oratorical, form and wonder¬ ful facility of expression, naturally turned to the drama ; and the capital welcomed him as it had already welcomed Peon y Contreras; and he wrote at the bidding of the public drama after drama, most of which were successful. Ireneo Paz also wrote successful dramas and comedies and the Mexican capital welcomed him too; and when Chavero came along and repeated the act, he also was received with open arms. Thus Mexico City became the cen¬ tre of a strong dramatic movement, in some ways superior to the great dramatic movement that produced the autos and religious and other dramas of the previous centuries. These 19th century Mexican dramatists were all men of many parts. Mateos was his country's great¬ est romancer and historical novelist, Chavero was archaeologist, epic poet, historian and critic of the first rank, while Paz was journalist, po-httcal writer, novelist, historian and humorist. Mehseo Morales wrote good Ivrical dramas which were staged in Italy; and he translated popular Italian operas into Spanish for Span¬ ish playhouses. Icazbalceta and Pimentel worked together. The former dug into the countless records of the past of America hid¬ den in the many libraries of the republic and gave to light a long list of valuable documents for the history of Mexico. He also wrote much good original matter along the same line,* a_ Political History of the Indies,* (Mexico in 1554,) (Mexican Biography of the Sixteenth Century, > /Zumarraga,* a < Dictionary of Mex¬ ican Provincialisms' *and (Mexican Physicians of the Sixteenth Century.* Pimentel worked in the same library and produced, among other works, the best (History of Mexican Literature) extant.

Rosas Moreno disputes with Lizardi the honor of being the most successful Mexican wnter of fables. His work has become a classic in Spain. Ruiz, an excellent raconteur oi legends; Ortiz, a fair poet and novelist, and Rivera, a voluminous historian, may be said to complete this period, though the latter lived on into the 20th century and was the nation's hon¬ ored guest at the opening of the National Uni¬ versity in 1910. His long life of tireless and ceaseless literary activity enabled Rivera to produce overˆ 100 histories, critical works and booklets. Ruiz is best known by his (Legends of Mic.hoacan) and (Traditions and Legends. * The connecting link between the literary ac¬ tivity of the Diaz regime (1876-1910) and that of the preceding years of the life of the repub¬ lic is Manuel Acuna (1849-73) who, notwith¬ standing his short life and tragic death, ex¬ ercised a wonderful influence upon the poets ho followed him. He was endowed with vivid

imagination and a strong literary and poetic sense which reminds one somewhat of Poe. Ignacio Montes de Oca (1840 —), Manuel Gu¬ tierrez Najara (1850-95), Salvador Diaz Miron (1853 —), Juan de Dios Peza (1852— 1909), Manuel Jose Othon (1851-1908), Luis G. Urbina (1868 —) and Justo Sierra (1848-1911) are all names that shed lustre on Mexi¬ can literature. Flores is an epic bard with strong histrionic and dramatic talent. Gutier¬ rez, Najara and Sierra are both excellent poets and writers of talent in other fields, and Othon and Urbina are among the most popu¬ lar singers of the present century in Mexico. But of the writers of the: Diaz regime, Peza is by far the best and most popular. He pub¬ lished three dramas, (A Love Affair,* (A Real Homp and (Columbus *which became popular. But it is his simple, heartfelt, almost homely poems that made him the literary lion of the Mexican capital. Among these are < Songs of the Hearthstone,* (The Arrow of Love,* 'Home and Country,* (Flowers of the Soul,*

(Memories and Hopes, > (Monologues and Songs of Heroes,* Mexican Traditions, *(The Mexican Lyre,* (The Harp of our Native Land* and (Legends of the Streets of Mex¬ ico. } Miron, who is called the poet of poets, has great breadth of imagination, a deep sense of the beauty of rhythm and imagery and de¬ cided lyrical talent. Carlos H. Seran made comedy and native vaudeville popular in Mexico.

Modern Literature.— The period of the Diaz administration was prolific in writers of talent in every line of literary endeavor, to such an extent that even a cursory review of their activities would far overpass the limits of this article. Antonio Zaragoza is the author of

several volumes of fervid lyrical poetry. Fran¬ cisco F. Icaza, whose work is chaste and clas¬ sical in form, has been welcomed in Spain, as at home. Jose M. Bustillos has taken up the song of the glories of the Mexican race and has gone back to the days of the Indian em¬ pires for many of his subjects, plots and char¬ acters. (Rocks of the Lake* is his best work. Zayas Enriquez, biographer, historian, poet and essayist, is a talented but not over-conscientious writer. Enrique Fernandez Granados, correct m style, artistic in temperament and classical in aims, has published two volumes of excellent poetry, 'Myrtles* and 'Daisies* and made ex¬ cellent translations of Italian poetry into Span¬ ish. Joaquin D. Casasus (1858-1916) and lulio Guerrero are distinguished writers on political and social subjects. Casasps also did other good literary work and translated Longfellow's 'Evangeline* and Horace's 'Odes* into Span-lsh verse. Guerrero's (Genesis of Crime in Mexico* is an illuminating analysis of Mexican ciaractei, conditions, customs and tendencies, luan Jose Tablado, Oriental in the richness of his imagination and the depth of coloring he imparts to his images, has the true lvric ring He and Jesus Valenzuela and Amado Nervo form a trio of brilliant young newspaper men vvho have found warm welcome in all Latin-Amencan countries and in Spain herself Bal-bmo Davalos has published a book of poems and made excellent translations into Spanish from English and French; but his work has less imagination than that of the trio above mentioned.

Fiancisco Bulnes and Luis Gonzalez Obre-

gon are both historical investigators of note and brilliancy. Bulnes is oratorical, passionate, picturesque, vivid. Obregon is cool, collected and severely impartial. He lacks the warmth of imagination of Bulnes and the passion which produces highly-colored pictures ; but he sees clearly and illuminatingly into the past and lays it before us in all its nakedness. His pub¬ lished works make a long list, the best known of which is (01d Mexico.5 Bulnes' (The True Juarez, 5 convincing though it is, raises a storm of protest from Mexicans all over the land.

The Ishmael of Mexican literature is An¬ tonio Plaza. He has been damned bv the edu¬ cated as vulgar and unchaste ; the Church has accused him of paganism and blasphemy and the critics have taken delight in stabbing him; yet, next to Juan de Dios Peza, he has long been the most popular poet of the Mexican middle class. Plaza is a soul in revolt against the world as he found it. He has a wonderful power of invective and the language to fittingly express it ; and yet, at times, he reveals a ten¬ derness through which shows the tortured soul behind all his railings.

Among the talented women writers of Mex¬ ico are Heraclia Badillio Dolores Guerrero, Teresa Vera and Josefina Letechipia, who have covered practically the whole field of Mexican literature.

Historical investigation has always at¬ tracted Mexican literary men. This is due to the romantic interest of the country and its great wealth of material relating to the native races, to the Conquest and to the period of Spanish occupation immediately following. The most noted historical writers of the 17th cen¬ tury are Francisco de Burgoa, (Account of the Dominicans) (1597) ; Alonzo Franco y Ortega, Fernando de Alva Ixtlixochitl, Augustin de Vetancurt, (Teatro Mexicano) ; Antonio Tello,

(History of New Galicia) (1650) ; Antonio de Solis (161 0—86) , (History of Mexico) ; and J. Villagutierrez Soto-Mayor, (History of the Conquest of the Mavas.5

The historians of the 18th century have left more pretentious, better arranged and more philosophical histories and pictures of Mexican life than their predecessors. Of these histo¬ rians the most trustworthy are Francisco Javier Alegre (1729-88), (History of the Tesuits in New' Spain5 ; Lorenzo Boturini Benaducci (1702-50), (General History) ; Andres Cavo,

(Spanish Government in Mexico) (1766) ; Francisco Saverio Clavijero (1731-87), An¬ cient History of Mexico) ; Granado y Galvez, 'Indian History) ; Antonio Lorenzana, 'History of New Spain5 (1770) ; Jose Beristain (1756-1817), <Biographies) and Mariano Vey-tia (1718-79), (Ancient History of Mexico. 5

The 19th and 20th centuries of Mexican his¬ torians include Lucas Alaman, Marco Aroniz, Carlos M. de Bustamante (1774-1848), An¬ tonio Garcia Cubas (1832-96), Luis Gonzalez Obregon, Ignacio M. Altamira.no, ˆ Diego de Landa, Nicolas Leon, Joaquin Garcia Icazbalceta, Manuel Orozco y Berra (1816-81), Carlos Pereyra,

Anselmo de la Portilla (1816-79), Pantaleon Tovar, Eufemio Mendoza, Eduardo Gallo, Jose Maria Vigil, Augustin Rivera (1824 —), Manuel Rivera Cambas, Francisco Sosa (1848 —), Justo Sierra, Niceto de Zama-cois, Manuel Payno (1810-94), Genaro Garcia, Victorio Salado Alvarez, Edurado Ruiz, Man¬

uel Santibafiez, Jose Maria Iglesias, Fernando Iglesias Calderon, Vicente Garcia Torres, An¬ tonio de Leon y Gama, Manuel Revilla and Jose Victor Martinez (1810-61).

Bibliography.— Maudslay, A. P., bibliog¬ raphy of Mexico Alphabetically Arranged5 (in Diaz del Castillo), 'The True History of the Conquest of New SpaiiP (London 1908); Me¬ dina, J. T., (La Imprenta en Mexico) (Santi¬ ago de Chile 1907-12) ; id., (La Imprenta en la Puebla de los Angeles J (ib. 1908) ; Pimentel, F., Conde de Heras, 'Historia critica de la Lit-eratura y de las Ciencias en Mexico 5 (Mexico 1883) ; (Obras Completas de D. Francisco Pi¬ mentel } (ib. 1903-04); Starr, F., (Readings from Modern Mexican Authors5 (Chicago 1904) ; 'List of Works in the New York Pub¬ lic Library Relating to Mexico5 (New York 1909) ; Pan-American Union, (List of Latin-American History and Description in the Co¬ lumbus Memorial Library) (Washington 1907; supplements 1 and 2, 1909 and 1914) ; Cornyn, J. H., 'Living Literary Men of Mexico5 (Mex¬ ico City 1916).

John Hubert Cornyn, National University of Mexico.

17. HISTORY. Pre-Conquest Period. —

The history of Mexico divides itself into three parts : aboriginal Mexico under the domination of its native Indian rulers, from the border land of prehistoric times to 1521 ; Spanish oc¬ cupation from 1521 to 1821 and independent Mexico from 1821 to the present.

A score of distinct aboriginal tongues and more than 100 dialects still spoken within the confines of the Mexican Republic are evidence of the presence of numerous races that over¬ ran the country at various periods during its prehistoric existence. These early races seem to have had considerable influence upon the traditions, mythology and customs of the people who followed them in the country. From the confused movement of the shadowy peoples of the past stand forth the forms of several more or less distinctly cultured races w'hose written and traditional records, legends and folklore reach back to the dim border land beyond which all is mythical. During the early semi-

historical part of this period the great Nahua race, beginning its many years of wandering from the north, crossed the Mexican boundary in the 6th century and continued southward. These migrations were participated in by nu¬ merous tribes or nations. The first of these, the Toltecs, came from the semi-mythical land of Old Tlapallan under the leadership of their high priest and chief, Heumatzin, he of the big hands, and arrived at Tulancingo (a short distance north of Mexico City) in 720, after 176 years of wandering. Soon afterward they established populous centres at Tula, San Juan, Teotihuacan, Cholula and numerous other places and extended their power over a wide reach of country. They are said to have been a highly civilized race, to have been builders of great and handsome cities and to have ex¬ tended organized commerce for hundreds of miles beyond their own territory which, at the height of their powder and prosperity, stretched from the Gulf of Mexico to the Pacific and far southwTard to the border of the domains of the Maya of Yucatan, Chiapas and Campeche. They had a settled form of government and

complicated, far-reaching codes of law which included military, political, social and religious regulations ; and these, in their turn, were sup¬ ported by racial customs and dogmas. See Mexico — Mythology ; Mexico — Literature.

While the Nahua held the central portion of what is modern Mexico, the Maya and other kindred races occupied the south, stretching from Campeche, Yucatan and Chiapas south and west to the Pacific and into Guatemala, where they established a civilization rivaling that of the Toltecs. Between the Maya on the south and the Toltecs on the north lay the Zapoteca and the Mixteca, almost as far ad¬ vanced as they in the arts and sciences and the principles of government. All four peoples were skilled workers in metals and excellent makers of pottery and woven fabrics. They recorded their histories, traditions, religious formulas, tribute rolls and important events in complicated hieroglyphics which varied with the different races. They were good agricul¬ turists, excellent builders and organizers and they maintained

extensive and well-apportioned armies and systems of public instruction. All education was in the hands of the priests and administered from the temples, thousands of which, rising from high, truncated, pyramidal structures, covered the land. These temples were specially numerous and of notable mag¬ nificence in the Aztec land and Yucatan. See Mexico — Architecture ; Mexico — Art.

Civil wars, internal dissensions, famine and plague are given as the causes of the disruption of the Toltec empire which came to an end in 1116, after nearly 400 years of existence. A part of the Toltec population is said to have migrated southward and to have entered the land of the Maya. It is certain, however, that many remained behind and lost their identity in the Chichimeca and other less cultured races who occupied the valley of Mexico and sur¬ rounding country. From this union sprang the famous Texcocans, whose capital, Texcoco, on the lake of the same name, preserved the civil¬ ization of the early Nahua and finally became the most noted centre of culture in the Mexican empire.

The Aztecs, Texcocans, Tepanecas, Chaleos and Tlaxcalans are the most notable of the Nahuatl tribes who took possession of the country deserted by the Toltecs. Of these the most important are the Aztecs, who began their wanderings from Aztlan, their old home in the north, about a century after the Toltecs. Six hundred years later they arrived in the valley of Mexico, where they eventually, after many struggles and privations, established themselves on two little islands in Lake Texcoco, and founded their capital, Tenochtitlan, the Place of Tenoch, their priestly leader and mighty warrior, or Mexico, the Place of Mexitli, their war god.

The Aztecs prospered, grew in numbers and extended their power over the Chaleos and other tribes bordering on the lakes of the valley of Mexico and, forming an alliance with the Texcocans and the Tepanecas, carried their conquering arms from the Gulf of Mexico to the Pacific and, from some distance north of Mexico City, southward past the Isthmus of Tehuantepec almost to the border of modern Guatemala, where they encroached upon the land of the Maya. The creation of this vast

empire which, in extent and power, outrivaled that of the Toltecs, was due to the skill, in¬ telligence, executive ability and warlike prowess of a line of kings which began with Acamapit-zin, Prince of the Reeds (1376-1404), 50 years after the founding of Tenochtitlan. The other

Aztec rulers in succession, up to the arrival of Cortes, were Huitzilihuitl, Hummingbird's Feathers (1404-17), Chimalpopoca, Smoking Shield (141 7—27) , Ixcoatl, Obsidian Knife (1427-40), Moctezuma I, Wrathy Chief (1440-69), Axayacatl, The Fly (1469-81), Tizoc, Lame Leg (1481-86), Ahuizotl, Water-rat (1486-1502) and Moctezuma II (1502-20), all of whom worked zealously for the upbuilding of the Aztec empire and the beautifying and extension of their capital.

From the beginning of the reign of Mocte¬ zuma II, Spanish navigators had been explor¬ ing the neighborhood of the Mexican coast and several had touched on the mainland of Yuca¬ tan and Campeche. In 1519 Hernan Cortes, inspired by the dream of conquering a great and rich land, of which reports had been brought to Cuba,, set out with a small military force on his daring expedition to the uplands of Mexico. On the way he defeated the Tlax¬ calans, an independent nation, and the Cholu-lans, who formed a semi-dependent province of the Aztec empire. From these he recruited a considerable native army, with which he con¬ tinued his march to Mexico City, where he was reluctantly received by Moctezuma II and quartered in one of the royal ˆpalaces. He finally succeeded in making a prisoner of the Aztec ruler, who was killed a short time after¬ ward (30 June 1520) either by the Spaniards or by the Mexicans themselves. The presence of the Spaniards in the city, the death of the emperor and the profanation of the shrines of their deities enraged the Aztecs to such an ex¬ tent that they rose against Cortes and he was forced to leave the city by night. In the re¬ treat he lost his cavalry, artillery and most of his infantry. After recruiting a new army and obtaining additional war equipment, Cortes re¬ turned and laid siege to the City of Mexico which he captured (13 Aug. 1521) and after¬ ward continued the conquest of the domains of the Moctezumas.

Under Spanish Rule. — Immediately after the surrender of Tenochtitlan the government of Mexico fell into the hands of the conquistadores who, being purely military governors, ad¬ ministered the affairs of the land by means of military law. Gradually the large cities were granted local government similar to that of Spain and the province was divided into dis¬ tricts controlled by the central government in Mexico City. In 1528 auditors (oidoves) were introducedˆ to keep a check on the captain-gen¬ eral,. Cortes. They soon succeeded him and continued to. govern the country until 1535, when Antonio de Mendoza became the first viceroy. He was a very earnest and capable man and at once proceeded to replace with an orderly and settled form of government the hap-hazard methods of the oidores and mili¬ tary leaders.

Spain monopolized the trade of Mexico, or (<New Spain. » Commerce to and from the colony could be carried only in Spanish bot¬ toms; nothing was. permitted to be grown in Mexico that might in any way come into com-

petition with products from Spain. Only native-born Spaniards could hold office under the government in New Spain. The establish¬ ment of manufactures of all kinds was dis¬ couraged or prohibited. Yet Spain gave her colonies a strong government and one that was thoroughly understood by the mass of Indians and mestizos who composed the greater part of the population of Mexico, for it was much like the kind they had been accustomed to for centuries under their native rulers. The en¬ couragement of literature and art, the beautify¬ ing of the cities and towns, the extension of great highways of commerce, the improvement of harbors, the establishment of high schools, colleges and a provincial university and the practical eradication of the native religion with its human sacrifices were far-reaching benefits which Spain bestowed upon Mexico. But the evils of Her administration outran the good. The establishment of peonage and the concen¬ tration of the Indians in centres, towns, camps or ranches under the pretense of civilizing and Christianizing them soon destroyed all the ma¬ chinery of the native civilization. The masses of the population, their aboriginal laws and codes of morality gone by the board, soon lost their pride of race and descended to a condition of slavery bringing with it debauchery, a loss of interest in life and a consequent loss of ambition. These and scores of other abuses created discontent throughout the viceroyalty, which was destined to show itself in vigorous protests and insurrection against Spanish au¬ thority. An unsuccessful revolutionary plot in the capital in 1808 was followed by the uprising of Hidalgo, the patriot priest of Dolores, on 16 Sept. 1810. Hidalgo, after a wonderfully successful initial campaign which brought him, with an army of 100,000, almost to the gates of the capital, was finally defeated, captured and executed the following year. The war of liberation dragged on with varying success un¬ til 1821, when the life of independent Mexico began.

Independent Mexico. — The first government of independent Mexico consisted of a council of six, with Gen. Augustin Iturbide, the com¬ mander of the revolutionary army, as presi¬ dent. On 19 May 1822 Iturbide was proclaimed emperor, and on 21 July he and his wife were crowned in the cathedral of the capital. But dissensions soon set in and Iturbide was forced to abdicate and to leave the country. On re¬ turning to Mexico in 1824 he was arrested, tried and shot as a traitor. Then followed many kaleidoscopic political changes in which the personal ambition of military leaders played the foremost part.

Santa Anna, who became President in 1833, and who was looked upon as a good soldier, took the field against the Texas revolutionists with an army of 6,000 trained men. Successful at first, he was defeated in 1836, captured and taken to the United States, but was allowed to return to Mexico the following year. For more than a generation, from the first days of the republic to the middle of the 19th century, the figure of Santa Anna appears ever in the fore¬ ground of the political life of Mexico guiding the destinies of the nation or watching polit¬ ical moves from either voluntary or forced retirement. Shortly after his return from the United States the French government sent a

squadron to Vera Cruz to enforce the payment of claims against Mexico held by French citi¬ zens. Santa Anna, who had gone into one of his periodical retirements, came forth and placed himself at the head of a force to oppose the French, who finally withdrew. Santa Anna claimed the honor of having driven them from the country. This claim and the fact that he lost a leg in the encounter made him once more a national figure and a popular hero, al¬ though Mexico had been forced to comply with the French demands.

Bustamante, recalled from exile, became President in 1837, on the outbreak of the revo¬ lution in Texas. The struggle between am¬ bitious military leaders became more intense. Santa Anna, Paredes, Bustamante, Farias, Her¬ rera, Nicolas Bravo and others played their several parts on the constantly changing stage. The admission of Texas to the American Union as a State, 29 Dec. 1845, roused the resentment of Mexico against the United States to a high pitch. James K. Polk, who succeeded Tyler as President of the United States, was an ardent expansionist and included in his plan of expansion the acquisition of California, Ari¬ zona and New Mexico, then Mexican territory. Claims amounting to several million dollars were held by American citizens against the Mexican government, which was unable

to meet them. Polk proposed to settle these claims in exchange for Mexican territory, pay¬ ing, in addition, to Mexico $25,000,000 in cash. In November 1845, John Slidell was . sent .as diplomatic representative to Mexico City, with instructions to press the matter of cession of Mexican territory to the United States.. But the Mexican authorities, having learned in ad¬ vance of Slidell's commission, did not receive him. Polk was ready to ask Congress to de¬ clare war against Mexico in May 1846 when the news reached Washington that armed Mex¬ icans had already crossed the border and killed a number of Americans. War was declared against Mexico, 13 May. General Taylor, in command of American forces on the Rio Grande, was ordered into Mexico. In Septem¬ ber 1846 he defeated a Mexican army and cap¬ tured Monterey and, on 22 February, he fought a drawn battle at Buena Vista (Angostura). A month later Gen. Winfield Scott arrived at Vera Cruz, which he captured, 29 March, and began the long and toilsome march toward the upland plateau and the capital of Mexico, which he reached six months later. After the capture of Molino del Rey, Churubusco and Chapultepec, fortresses defending the capital, Scott's army entered the City of Mexico. In the mean¬ time American forces had taken possession of California and New Mexico without opposition. In February 1847 a treaty was. signed, at Guadalupe Hidalgo, near the Mexican capital, between representatives of Mexico and the United States by the provisions of which Cali¬ fornia and New Mexico were ceded to the United States.

Santa Anna, who had again become dictator of Mexico while the country was at war with the United States, retired to Jalapa, and Gen¬ eral Herrera became President, 3 June 1848. He was succeeded (January 1851) by General Arista, who was forced out of office by Santa Anna.

A new constitution for the republic which

became law on 5 Feb. 1857 figured in every Mexican conflict during more than half a cen¬ tury. President Comonfort repudiated it, thus estranging his own following without gaining the support of his

opponents. He was forced to flee the country, and his departure gave rise to internal dissensions not finally settled for years. Benito Juarez, president of the Supreme Court, claimed the presidency in accordance with the provisions of the Constitution. War divided the people and devastated the land and the reactionary party forced Juarez from the capital. In the midst of all this civil trouble, a real danger threatened the republic from without. . In 1861 England, France and Spain entered into an agreement known as the Treaty of London, by which they were to send a three¬ fold fleet to Vera Cruz to demand of Mexico guarantees for the payment of her foreign debt and for the safety of their subjects in Mexican territory. This fleet, which appeared at Vera Cruz on 8 Dec. 1861, captured the port and proceeded to Orizaba, where a conference was held with Juarez, who agreed to comply with the demands of the powers. England and Spain at once withdrew their troops from the country. But the French, who had a secret understanding with the Mexican reactionary party, at the head of whom was Miramon, who had disputed the presidency with Juarez, re¬ mained in Mexico with the avowed purpose of settling its social and political difficulties. The French army soon began its march toward the uplands, but it was defeated before the walls of Puebla and forced to retreat to Orizaba

(1862).

The Archduke, Maximilian of Austria, and his consort, who had been selected by Napoleon hi as emperor and empress of Mexico, ar¬ rived in Vera Cruz 24 May 1864. In the capi¬ tal they were welcomed and crowned with great ceremony. The protest of the United States forced the withdrawal of French troops from Mexico, and Maximilian, left to his fate, was compelled to surrender at Queretaro in 1867. He was tried, found guilty of treason to the Mexican people and shot on the Hill of the Bells near Queretaro, together with his two generals, Miramon and Mejia, 19 June 1867. The concerted action of the Army of the North under Escobedo and the Army of the East under Porfirio Diaz defeated the Imperialists; Mexico City surrendered to Diaz 21 June, two days after the execution of Maximilian; and on 15 July Juarez returned to the capital amid the rejoicing of the populace. But opposition to the Juarez government soon developed and his administration was troubled by constant uprisings and disaffection. Juarez died sud¬ denly 19 July 1872, shortly after he had been re¬ elected President. He was succeeded by Sebas¬ tian Lerdo de Tejada, who served one term and was forced out of office shortly after his re-election by Gen. Porfirio Diaz who defeated the Lerdist party at . the

battle of Tecoac, marched upon the capital and was there pro¬ claimed provisional President, 24 Nov. 1876, and later constitutional President. At the expira¬ tion of his term of office, 30 Nov. 1880, he was succeeded by, Gen. Manuel Gonzalez, who con¬ tinued the Diaz policy of encouraging the con¬ struction of railways and increasing the efficiency of the rural police charged with the

protection of the country from revolutionary and robber bands.

Diaz succeeded Gonzalez in the winter of 1884, and, for more than a quarter of a cen¬ tury, he continued to be the one great power in Mexico. He found the country in debt and the income of the administration inadequate to meet the demands on it. He increased the reve¬ nue of the nation over 400 per cent; he built railways, highways, roads and harbors; he drained the valley of Mexico and made the pest-ridden coast towns places of resort. He encouraged foreigners to settle in or invest in the country and to. contribute their part to his program of expansion and development, and he created a credit for the nation and steadily increased and improved it. He introduced sys¬ tem and encouraged honesty in the public serv¬ ice and prevented, to a very great extent, mal¬ versation of public funds, which had been so noticeable during previous administrations, by the introduction of a rigid and modern system of accounting and by holding the heads of the departments accountable for the funds passing through their hands. With Diaz the Indian and mestizo elements, constituting fully 85 per cent of the population, began to come into their own.. Thus a new social life was created in Mexico under his regime, and in it the mestizo, for the first time, began to play a prominent part.

Diaz found public instruction neglected and practically non-existent and he set to work to remedy this defect. Training schools for teachers were established and the higher schools and. colleges were, increased and improved with a view to supplying, through them, the teach¬ ing body for new primary and secondary schools. Though lack. of funds hampered this work, the results achieved bore fruit in the rapid increase of the standard of intelligence in the larger towns and cities. Under Diaz the resources of the country were developed ; com¬ merce threw off its provincialism and became national and international, and new industries sprang up throughout the land. But, with a government which had absolute control of the affairs of the country so long as that of Diaz, abuses were bound to creep in. About the President had grown up a strong personal party the members of which, while

professing intense admiration for him and his government, suc¬ ceeded. in enriching themselves, their relatives and friends through concessions and privileges secured through their close connection with the administration.. The spread of public instruc¬ tion. and the rise of the Indian and mestizo to public prominence introduced into the political equation a new and restless element which Diaz had constantly, throughout his long regime, to curb, control and discipline. The discontent in¬ creased ; Mexican exiles in the United States used every means in their power to hasten the overthrow of the man they characterized as autocratic, and tyrannical. Ramon Corral, the Vice-President,, who was looked upon as. the leader of the sinister influence at work in the party surrounding the President, was singled out as the special object of attack of the anti-government agents. Diaz, in the face of the impending storm, supported Corral, who was re¬ elected in 1910. During the month of Septem¬ ber 1910 the 100th. anniversary of the declara¬ tion of Mexican independence was celebrated

MEXICO

throughout the republic with great pomp and ceremony and special representatives of for¬ eign nations gathered in the capital to lend dignity to the occasion. But scarcely had the month of national rejoicing ended when polit¬ ical unrest began to show renewed activity. Francisco I. Madero, who had presented him¬ self as a candidate for the presidency in op¬ position to Diaz and had been arrested on the charge of sedition and finally released from prison and ordered to leave the country after the elections had been held, furnished the neces¬ sary leader to the Liberals in the United States and their many sympathizers in Mexico. The active revolutionary propaganda already begun was intensified, and agents of the insurgent party spread their doctrines throughout Mexico and induced uprisings in Vera Cruz, Puebla, Chihuahua, Durango and other cities and towns of the republic; and, as Madero crossed the border to head the insurgents, similar out¬ breaks took place south of Mexico City, while revolutionary bands gathered in force in the north near Torreon, Gomez Palacio and Par-ral. The inauguration of Diaz as President (1 Dec. 1910) increased the revolutionary centres and quickened their activities, thus compelling the government to weaken its strength by dis¬ tributing its forces over a large and constantly increasing area of territory. Radical changes were effected in the Diaz Cabinet and attempts were made to meet the demands of the revolu¬ tionists, as American troops were ordered con¬ centrated along the Mexican border; for this move was taken in Mexico to mean a threat of intervention. The government offered to enter into peace negotiations with the insur¬ gents, but attempts made to this end proved abortive and were suspended 6 May. Juarez fell to the insurgents 10 May, and Diaz, urged to save the country from further bloodshed and the danger of intervention, resigned, 25 May, and was succeeded in office by Francisco de la Barra, Secretary of Foreign Affairs, as Presi¬ dent ad interim pending an election. Two weeks later Madero entered the capital where he was enthusiastically received. So powerful was his

influence that the de la Barra adminis¬ tration was forced to consult him in every im-# portant move made. On 15 November Madero was unanimously elected President of Mexico; but scarcely had he assumed office when op¬ position began to develop and revolutionary intrigue to show itself within his own party. Zapata revolted in Morelos and Gen. Bernardo Reyes attempted an unsuccessful insurrection. Gen. Pascual Orozco, one of the foremost revolutionary leaders, rebelled and captured Tuarez 12 Feb. 1912. Gen. Felix Diaz took Vera Cruz, but was himself captured, tried and condemned to be shot — a sentence which was commuted to confinement in the penitentiary near Mexico City. In the meantime Madero found himself unable to control those who sur¬ rounded him, to establish a stable government or to carry out the promised reforms.

General Mondragon, backed by his own troops and the students of the Military Train¬ ing School at Tlapam, a suburb of the capi¬ tal, rose against the government, 9 Feb. 1913, marched to the military prison and set free General Reyes, and from there to the peni-tentiarv and liberated Gen. Felix Diaz. Prac¬ tically unopposed the three generals entered the

capital, where Reyes was killed in an attack on the National Palace. The revolutionists seized The Citadel, a strong fortress and ammunition depository, while the Madero forces took pos¬ session of the National Palace, Chapultepec and other points in and around the city. Both factions bombarded one another almost con¬ tinuously for 10 days, when Gen. Victoriano Huerta, commander-in-chief of the govern¬ ment forces, brought the conflict to a dramatic close by the seizure of President Madero and Pino Suarez, the Vice-President, who were forced to resign their respective offices. Pedro Lascurain, Minister of Foreign Relations suc¬ ceeded to the presidency. He appointed Huerta his minister of foreign relations and resigned in his favor. Thus, in one day Mexico had three Presidents. On the morning of 23 Feb¬ ruary Madero and Pino Suarez were murdered, presumably by agents of the Huerta govern¬ ment. For this act, Venustiano Carranza, gov¬ ernor of Coahuila, disavowed the new govern¬ ment and issued the Plan of Guadalupe which called for reforms in the administration, equi¬ table taxation, extension of the educational sys¬ tem and the solution of the land problem (March 26). President Wilson dispatched John Lind to Mexico City as his personal representative with a view to bringing the opposing parties together; but Huerta's refusal to be eliminated as a presidential candidate and his arrest and imprisonment of 110 Congres¬ sional deputies and the

forcible dissolution of Congress (10 and 11 October) made any com¬ promise impossible. A new election held on 26 October, under pressure, resulted in the selection of Huerta as President. The new Congress, which met on 15 November, in view of a protest from Washington, declared void the election of the President and Vice-Presi¬ dent but confirmed Huerta in the office of provisional President. The Constitutionalists determined to make no compromise with Huerta, and the war went on. Villa took Juarez 15 November; other important places fell and early in 1914 Villa captured Ojinaga, after the Federal garrison of 4,600 had re¬ treated across the American border. Then turning southward he took Torreon in April, while Mazatlan and Tampico surrendered to the Constitutionalists in Mayr and Carranza set up his government in Saltillo.

Huerta found himself in constantly increas¬ ing difficulties on account of his defiance of the United States. These difficulties had culmi¬ nated when sailors from the United States steamship Dolphin had been arrested in Tam¬ pico 10 April and marched through the city under armed guard. For this insult Admiral Mayo demanded that the Mexican government should order a salute to the American flag. This Huerta refused to concede; and President Wilson laid the matter before Congress 20 April, requesting authority to use the forces of the nation to enforce Mayo's demand. While Congress was debating this request American marines were forcibly landed in Vera Cruz to prevent the entrance at that port of a shipment of arms from the steamer Ipiranqa. At this juncture Argentina, Brazil and Chile, known as the A B C powers, offered to serve as mediators. The offer was accepted and the diplomatic representatives of these powers at Washington met at Niagara Falls, Canada, 20

May to 24 June, without' being able to find a solution for the troubled conditions in Mexico. On the day they adjourned Gonzales took Zacatecas and, two weeks later, Obregon en¬ tered Guadalajara; and in July, San Luis Potosi, Manzanillo and several smaller places fell to the Constitutionalists. Huerta, forced to resign, 15 July, was succeeded

by Francisco Carbajal, Minister of Foreign Relations, who at once entered into communication with the Con¬ stitutionalists and resigned in favor of Car¬ ranza, 13 August. Two days later Obregon took possession of the capital, where Carranza arrived on 20 Aug. 1914.

With the elimination of Huerta and the suc¬ cess of the Constitutionalists, bitter dissensions appeared in the heterogeneous elements com¬ posing the party. A convention of generals called to meet in Mexico City on 1 October served only to intensify the trouble and the convention was moved to Aguascalientes, where, dominated by Villa, it disallowed the claims of Carranza and elected General Gutierrez pro¬ visional President. It was also decided to march upon Mexico City and. compel Carranza to yield to the will of the Convention. In the face of this threatened danger, the latter went to Puebla and, from there, to Vera Cruz on the withdrawal of the American forces from Mexico 23 November. Zapata and Villa at once occupied the capital and Gutierrez set up his government there (3 December). In January 1915 the Convention, disowning Gutierrez, pro¬ ceeded to govern Mexico City in its own name ; but the approach of Obregon with a strong force compelled.it to abandon the capital, which was occupied (28* January) by the Carranza commander, who, in turn, was forced to retreat before a Zapatista horde, 10 March. Two weeks later Villa recognized as convention provisional President Gen. Roque Gonzalez Garza.

One of the dramatic incidents of the year was the siege of Naco, Sonora, by General Mayortena. Five Americans were killed and 50 or more wounded by shots coming across the border. Washington warned both the contend¬ ing parties to refrain from firing into Ameri¬ can territory. Early in January General Scott, representing the American government, and Villa held a conference at which.it was agreed to withdraw the contending forces from Naco. In the meantime the Convention, party was faring badly in the north. Guadalajara fell to Carranza and Villa was defeated at Celayo in March. Other disasters followed and finally Washington notified the Constitutional and Convention parties, • 2 June, that unless peace was restored soon, the United States would be compelled to support some man or group of men capable of bringing order out of chaos-Meanwhile raids were being frequently made across the Texas border by bands from Mexico instigated from without Mexico by certain predatory interests, and finally, on the night of 9 March 1916, an armed band of Villistas at¬ tacked Columbus, N. M., killing eight soldiers and a number of civilians. Washington at once acted, 17 March, and sent into Mexico 12,000 troops under General Pershing with orders to take Villa dead or alive. Carranza refused a request from the American government

for per¬ mission to ship, over the Northwestern Railway, supplies to Pershing's forces which were finally

compelled to come to a halt at Parral, where several American soldiers were killed and others wounded in a surprise attack.

In April General Scott, chief of staff, who had been sent to the Mexican border to report to Washington on the situation, held a confer¬ ence with General Funston, commander of the American forces on the frontier, and General Obregon, Mexican Minister of War. The lat¬ ter insisted on the withdrawal of the American punitive expedition from Mexico, and this was conditionally agreed to, 2 May. Carranza, charging the American government with bad faith and asserting that the presence of United States troops in Mexico proved a constant source of irritation and weakened the hands of the Mexican authorities, refused to ratify the agreement. Washington replied by reviewing the course of events in Mexico and charging that the Mexican government apparently did not wish to see the border raiders captured. On 18 June the American militia was ordered to the Mexican border two days after General Trevino had been enjoined by Carranza to pre¬ vent the movement of the Pershing expedition in any direction except homeward and to op¬ pose the entrance of further American troops into Mexico. In pursuance of this order an American force of some 90 troopers was at¬ tacked at Carrizal and a number of officers and troopers killed and 17 taken prisoners. On a peremptory demand from Washington the lat¬ ter were released, 22 June 1916. Carranza be¬ gan to show a more friendly front, and pro¬ posed the naming of commissioners by the American and Mexican governments to con¬ sider the issue between them, 12 July. This proposition was accepted and Uuis Cabrera, Minister of Finance, Ignacio Bonillas, Minister of Communications and Alberto Pani, head of the National Railways, representing Mexico, met in New London, Conn., with Franklin K. Lane, Secretary of the Interior, Judge George Gray and Dr. J. R. Mott. After many sub¬ jects had been discussed Carranza declined to approve any form of agreement, and finally the troops of the United States were withdrawn from Mexico without having accomplished any definite result.

A constituent assembly whose members were chosen at elections supervised by the Carranza army met at Queretaro. That assembly made radical changes in the constitution of 1857 which were promulgated on 5 Feb. 1917 and went into operation 1 May 1917. This pro¬ vided for the democratization of the Judiciary, free justice

without court costs, and created a labor code providing for a minimum wage, compulsory profit-sharing, a free employment bureau and protection against trusts. It also provided for confiscation by the government of churches, schools and hospitals in the pos¬ session of religious bodies ; and that all clergy be native born. A congress was elected and began its sessions on 15 April 1917, on which occasion President Carranza declared that the nation would continue to be neutral in the European conflict. During the Eurouean War many Germans fled from the United States to Mexico, and these were accused of fomenting trouble for the Entente. General charges were made in the United States and in Britain, usually by capitalists interested in Mexican mines or their agents, that Mexico, notwith-

standing her proclaimed neutrality, was secretly encouraging the Germans. However, the con¬ nection of the Mexican government, if it ever existed, with this movement, has never been proved. From 1917 to 1919 there was friction between the Mexican government and the for¬ eigners resident in the country over taxes and restrictions placed on mining-and oil properties in the Republic, both of which national assets the government rightly aims at nationalizing and protecting from exploitation by predatory foreign corporations. In 1916 the national cur¬ rency was rehabilitated so as to give it a recog¬ nized and regular standard of valuation. In 1919 President Carranza issued a public state¬ ment that, in conformity with the provision of the constitution which prohibits re-election for second term of the chief official of the Republic, he would not again be a presidential candidate. Civil war broke out again in May 1920. Carranza fled from the capital and was assassinated. Adolfo de la Huerta was made Provisional President. At the elections later in the year General Obregon was elected President.

Bibliography. — Diaz del Castillo, B., (Historia Verdadera de la Conquista de la Nueva Espana) (Mexico 1870), (True History of the Conquest ' (1908), and (The Mastering of Mex¬ ico, Told by Kate Stephens> (New York 1916) ; Garcia, G., (Documentos ineditos 6 muy raros para la historia de Mexico5 (36 vols., Mexico 1905-11) ; id., (Documentos historicos mexicanos) (7 vols., ib. 1910) ; id., (Documentos ineditos del siglo XVI para la historia de Mexico5 (ib.

1914) ; Franck, H. A., tramp¬ ing Through Mexico5 (New York 1916) ; Fyfe, H. H., (The Real Mexico5 (London 1914) ; Hagar, G. J., (Plain Facts about Mexico5 (New York 1916) ; Humboldt, A. de, (Political Essay on the Kingdom of New Spain5 (London 1811) ; Lane, F. K., (THe President's Mexican Policy5 (New York 1916) ; Lumholtz, C., Un¬ known Mexico5 (New York 1902), and (New Trails in Mexico5 (New York 1912) ; Mac-Hugh, R. J., (Modern Mexico5 (London 1914) ; Noll, A. H., (Short History of Mexico5 (Chicago 1890) ; Susan Hale, the Story of Mexico5 (New York 191 1) i Morris, C., the Story of Mexico5 (Philadelphia 1914) ; Roscher, W., the Spanish Colonial System5 (New York 1904) ; Smith, D. E., the Viceroy of New Spain5 (Berkeley, Cal., 1913); Bustamente, L. C. M., (Cuadro historico de la revolucion de la America mexicana5 (Mexico 1823) ; Frias y Soto, H., (Episodios militares mexicanos de la guerra de independencia5 (Paris 1901) ; Ne¬ grete, E. del Castillo, (Mexico en el siglo XIX5 (40 vols., Mexico 1881-89) ; Gutierrez de Lara and Pinchon, the Mexican People5 (New York 1914) ; Elton, J. F.. (With the French in Mexico5 Philadelphia 1867) ; de Keratry, E., the Rise and Fall of the Emperor Maximilian5 (London 1868) ; de Zayas Enriquez, R., the Case of Mexico and the Policy of President Wilson5 (New York 1914) ; de Farnaro, C.,

(Carranza and Mexico5 (ib. 1915) ; Prescott, W. H., (History of the Conquest of Mexico5 (New York 1847) ; Rowe, L. S., the Scope and Limits of our Obligations toward Mexico } (American Academy of Political and Social Science, Annals, Vol. LIV, pp. 219-235, Phila¬ delphia 1914) ; Terry, T. P., terry's Mexico5 (City of Mexico 1909), and. (Mexico: an Out¬ line Sketch of the Country, its People and

their History5 (Boston 1914) ; Winter, N. O., the Fundamental Causes of the Present Situ¬ ation in Mexico5 (Clark University, Latin America, New York 1914).

John Hubert Corny n, National Universitv of Mexico. 18.

DIPLOMATIC RELATIONS OF THE UNITED STATES WITH MEXICO. Early relations were largely determined first by the Mississippi question and later by the failure to define the western limits of Louisiana in the treaty of 1803 and consequent friction with Spain after 1805.

The American government viewed with sympathy the Mexican revolutions, beginning in 1810, and later accorded belligerent rights to the revolutionary government which was aided by filibustering

expeditions from the United Slates ; but it endeavored to maintain ‘neutrality until 1822 when, after the final ratification of the Florida Treaty with Spain, it recognized Mexico -as an independent state whose govern¬ ment promptly opened Texas to American im¬ migration.

At the close of 1822 Jose M. Zozaya was ac¬ credited first Mexican Minister at Washington, but the real beginning of the Mexican legation dates from the arrival of Pablo Obregon in No¬ vember 1824. In March 1825, the American government sent Joel R. Poinsett as Minister to Mexico to recover the prestige lost by delay, but his methods aroused increasing distrust and suspicion which postponed the completion of treaty negotiations and finally led to his recall. After successfully opposing the plans of Mex¬ ico to unite with Colombia for the liberation of Cuba, he negotiated a Treaty of Commerce of July 1826 and another treaty of February 1828, both of which failed in the Mexican Congress after ratification by the American Senate. He hastily concluded a Boundary Treaty of Tanuary 1828 which was lost by delay in the Mexican Congress, but was revived in 1832 and ratified following the ratification of the new Treaty of Amity and Commerce negotiated in April 1831 by Anthony Butler, the successor to Poinsett.

Meantime there arose new sources of fric¬ tion which produced strained relations after 1829, temporary severance of relations in 1836 and finally (a decade later) resulted in war. In Texas, which the United States unsuccess¬ fully attempted to purchase in 1825, 1827 and 1829, internal troubles arising from differences between the Mexican government and the American colonists, and increasing after the Mexican attempt to prohibit American immi¬ gration in 1829 and the Mexican establishment of military posts in 1831, finally resulted in a successful revolution of 1835, in which many Americans participated and also in the Amer¬ ican recognition (in 1837) of Texan independ¬ ence — which, together with other grievances, aroused the hostility of Mexico. Relations temporarily severed in 1836 were again seri¬ ously threatened in 1837 by the withdrawal of the Mexican Minister who was not replaced by a successor at Washington until 1842. In 1835 President Jackson, renewing proposals to Mexico for purchase of Texas, authorized ne¬ gotiations for a boundary on the parallel of 37° westward from the Rio Grande to the Paci¬ fic, but in 1837 he declined Texan offers of an¬ nexation.

Relations were also endangered by Amer-

ican claims (against Mexico) which in 1837 brought the American government to the verge of reprisals by force. Attempts at adjustment were made by the Convention of 1838 which was not ratified by the American government, and by another Convention which was ratified by both parties in April 1839 and made effective by acts of Congress approved on 12 June 1840 and on 1 Sept. 1841. These claims, allowed by a commission under the Convention of 1839 and a later Convention of 1843, were only partially paid, and later negotiations for another Con¬ vention were prevented by war.

Following the American annexation of Texas by joint resolution in March 1845 (after failure of the Senate to ratify an American-Texan Treaty of Annexation), Mexico again severed relations and later refused to receive John Slidell whom President Polk sent to Mex¬ ico to re-establish relations and to negotiate for adjustment of claims and for the annexa¬ tion of California which was the chief aim of his Mexican policy. Finally, in the rich pas¬ ture lands of the border territory in dispute be¬ tween the Rio Grande and the Nueces, the clash of rival military forces precipitated war, recog¬ nized as existing by declaration of the Amer¬ ican Congress in May 1846.

Peace negotiations following the war were begun by the American government in April 1847 after important victories at Buena Vista and Vera Cruz. Nicholas P. Trist was sent as confidential agent with instructions similar to those of Slidell and with full powers to con¬ clude a treaty of peace at a propitious mo¬ ment. In November 1847, however, he received instructions to return. Unexpectedly detained, he finally determined to remain; and without the authority of his government, he negotiated the Treaty of Guadalupe Hidalgo of 2 Feb. 1848, by which the Mexican government ceded New Mexico and Upper California for $15,000,- 000 and the American assumption of all Amer¬ ican claims against Mexico. This treaty, in¬ cluding all Polk's sine qua non except the right of transit over Tehuantepec (which had be¬ come less important by the recent acquisition of rights over a better route by the Treaty with New Granada),' on its arrival at Washington was hastily accepted by Polk, who, although he refused to pay the salary of the ˆimpudent® clerk, was anxious for peace.

For over a quarter-century after 1848, rela¬ tions were disturbed by border turbulence, fili¬ bustering expeditions, Mexican internal trou¬ bles, questions of new claims and of protection of transit routes and apprehension of Euro¬ pean designs or of foreign intervention.

In compliance with a demand for additional territory, James Gadsden concluded with Mex¬ ico a Treaty of 30 Dec. 1853, by which the United States for $10,000,000 obtained south of the Gila River a strip of territory including the Mesilla Valley, and also a right of transit across the Isthmus of Tehuantepec where con¬ flicting interests complicated later negotiations and relations.

The Mexican problem, which thrice had been adjusted by change of boundaries, still per¬ sisted after the Gadsden Purchase. Compli¬ cated with Southern interests, and largelv un¬ der the influence of Southern statesmen, the remedy most persistentlv proposed for its sol¬ ution, in connection with an American transit

route across Mexico, was an additional reduc¬ tion of Mexican territory by a new cession to the United States, or, if that should fail, the establishment of an American protectorate which was expected in time to result in new annexations to the stronger country. The problem, only partially solved by the Pierce administration, was inherited by the Buchanan administration, which continued to negotiate — first, for the acquisition of additional Mexican territory and territorial concessions as long as there was any hope of success, and later for territorial concessions and alliance and direct intervention (to enforce treaty stipulations) un¬ til the secession of the Southern States pre¬ cipitated the beginning of the American Civil War and thereby increased the possibility and probability of the long-predicted intervention of European powers in Mexico, and exposed Mexican territory to the possible designs of Confederate filibusters.

The sequel to the story of persistent nego¬ tiations, which terminated in an unratified treaty, may be found in the Confederate policy to form an alliance with Mexico or to absorb it, the French policy of intervention in Mexico, and the American policy under Seward to pre¬ vent the execution of both Confederate and French policies and to preserve the integrity and independence of Mexico.

Through the entire period of the Civil War the American government consistentlv main¬ tained cordial relations with the constitutional Juarez government. In 1861 it obtained through Mr. Corwin a Treaty

of Extradition of Criminals and Fugitives from Justice. To guard against the extinction of the Mexican Republic or the danger of European interven¬ tion, it authorized the negotiation of a treaty obligating the United States to pay the inter¬ est on the Mexican fifnded debt for five years and to take for security a mortgage or pledge on the public lands and mineral rights of north¬ ern Mexico (Lower California, Chihuahua, So¬ nora and Sinaloa). This plan, however, did not meet the approval of France and England and was also opposed at Washington by senators who feared it might result in annexation.

Against the French invasion and occupation of Mexico and the establishment of the Maxi¬ milian government, which was regarded inimi¬ cal to republic institutions in America, the government at Washington promptly protested and issued discreet warnings. Later it de¬ manded withdrawal of French forces from Mexico, resulting in the fall of Maximilian in 1867 and the restoration of the republican form of government.

The United States concluded with Mexico, in 1868, a naturalization convention regulating citizenship of emigrants and a claims commis¬ sion convention for adjustment of mutual claims. Under the latter a commission was duly organized at Washington 31 July 1869. Its powers were extended by convention of 19 April 1871 and again by a convention of 27 Nov. 1872. A mutual arbitration provided by the treaty gave a balance of about $4,250,- 000 to American citizens. The famous Pious Fund Case (q.v.), first presented for adjustment to the Mexican Claims Convention in 1870, be¬ came a source of a new difference which was finally settled under a protocol of 1902 submit¬ ting it to the Permanent Court of The Hague,

For a decade after the withdrawal of the French, Mexico was disturbed by domestic con¬ tentions attended with serious border lawless¬ ness which at times impaired good relations and gave rise to troublesome questions and diffi¬ culties reaching an acute stage after November 1876, when the constitutional order of Mexico, which the United

States had continually rec¬ ognized for 17 years (since 1859), was over¬ thrown by the successful military revolution of Gen. Porfirio Diaz. The cattle raids from Tamaulipas on the Louver Rio Grande, which had caused trouble since 1848 and had be¬ come prominent in the remarkable incident known as the Cortina war in 1859-60, but had declined during the Civil War, were renewed at the close of the campaign against Maxi¬ milian, and culminated in the Corpus Christi Raid of 1875 which attracted the attention of the American government to the precarious position of Americans along the border. These raids and depredations were intimately con¬ nected with the collateral question of the condi¬ tion of the free zone along the Mexican side of the Rio Grande and the subject of extradi¬ tion. Meantime the American government con¬ tinued a temporizing neglectful policy, but, in 1875, it sent additional troops to the border and finally on 1 June 1877, authorized Federal forces to cross the border in hot pursuit.

The dangerous breach in relations of amity was for a time widened by the delay of the American government under President Flayes to recognize the government of Diaz. Finally the American Minister (John W. Foster), who had advised against the withholding: of recog¬ nition, received authority by which he promptly placed himself in official relations with the Diaz government on 11 April 1878, nearly a year after it had been recognized by the other powers. Meanwhile, in December 1877, the House of Representatives adopted resolutions looking toward a consideration of the best means of removing the existing and impending causes of difference and of confirming and en¬ larging commercial relations.

The friendly feeling manifested following recognition of Diaz was of brief duration. Negotiations, which encountered delays, were rendered more difficult by complications result¬ ing from new revolutions and disorders. American forces again crossed the border in hot pursuit of marauders in the spring and summer of 1878. Diaz, induced by Mexican clamor, demanded the withdrawal of the Amer¬ ican order for crossing the border. This the administration at Washington declined to do. By October 1878 the situation threatened to result in war. Finally, with the establishment of orderly conditions by co-operative action in 1879, the American government in 1880 with¬ drew the order for crossing the border.

At the same time by the steady growth of centralized power in Mexico, relations had be¬ come increasingly friendly. The danger from Mexican internal disorders had largely dis¬ appeared in 1880, when Diaz retired and ac¬ quiesced in the election of his lieutenant

whom he succeeded by re-election four years later. Border conditions rapidly improved. A reci¬ procity treaty was signed in 1882 and trouble¬ some questions of the ((free zone® and extradi¬ tion were considered in a friendly spirit. A partial relief from the continuation of border

lawlessness was sought in 1882 in the agree¬ ment (later renewed yearly for several years) providing for crossing the border by armed forces of either country in pursuit of Indians, and by a convention for the establishment of the international boundary by suitable commis¬ sions of survey.

Steady improvement in relations wras also greatly aided by extension of railway communi¬ cation to the frontier by 1881, and to the in¬ terior of Mexico by 1883ˆ84, by American capital and also by connecting the telegraph systems of the two countries through the com¬ pletion of a submarine cable in March 1881. The establishment and multiplication of inter¬ national railway communications, revolution¬ izing commercial conditions, largely supplanted the need of reciprocity treaties which, although negotiated in 1882 and 1891, were defeated in the American Congress.

Relations continued to improve in mutual friendliness, although public opinion in Mexico was divided between a policy of isolation and a policy of closer intercourse and concessions for industrial enterprises. In pursuance of the latter policy, the Mexican government by 1889 modified the old Mexican land laws and gave to American citizens liberal railroad, mineral and other grants.

A better understanding followed the estab¬ lishment of an international water boundary commission in 1889 and the remarking of the southwestern boundary westward from El Paso in 1891-96, as defined by the Treaty of 1848. An unsatisfactory effort was made in 1895 to remedy the abuse of the Mexican free zone by smugglers. In 1896 a copyright treaty was negotiated and in 1899 an extradition treaty (supplemented in 1902). In 1895, through the good offices of the United States, Mexico con¬ cluded with Guatemala an arbitration conven¬ tion for settlement of a long-standing bound¬ ary dispute. In 1900 the Mexican Congress appropriated $30,000 for sufferers in the Gal¬ veston disaster.

The better understanding was indicated by the reference of the famous Pious Fund con¬ troversy to arbitration by The Hague Court (1902),

the adjustment of boundary difficulties arising from the shifting of the Rio Grande and Colorado rivers, the negotiation of a con¬ vention (of May 1906) for the equitable dis¬ tribution of the waters of the Rio Grande for irrigation purposes, and the negotiation of an arbitration treaty in 1908. It was especially illustrated by the Americo-Mexican coopera¬ tion in 1907 in plans tactfully initiated Iby the United States to maintain order in Central America.

The growing intimacy of relations during the long presidency of Diaz, indicated by many international agreements, culminated in a gen¬ eral treaty of arbitration and the meeting of Taft and Diaz in 1910.

Relations again became strained after 1911 in connection with the collapse of the Diaz government and by conditions of the Maderista revolution, both in Mexico and along the bor¬ der, which were a source of much concern to the United States.

The American government under President Taft, although it mobilized troops on the fron¬ tier, declined to intervene and with difficulty maintained neutrality — both before and after

it recognized the new government of Madero, which was finally overthrown in February 1913 by Felix Diaz and General Huerta. In 1912 the rumor of Japanese plans to secure a har¬ bor at Magdalena Bay caused the Senate to pass an opposing resolution which, however, was not accepted by President Taft.

Under President Wilson's new policy of using non-recognition as a means of discour¬ aging the establishment of governments based on force and violence, the American govern¬ ment refused to recognize Huerta, unsuccess¬ fully urged an early free election in Mexico, warned Americans to leave that countrv and vigorously demanded both the de facto govern¬ ment of Huerta and insurrectionists to respect lives and property of Americans.

In April 1914, after a series of irritations and insults it sought reparation by a naval and military force which occupied Vera Cruz; but, with certain restrictions, it promptly ac¬ cepted friendly mediation of the ABC powers of South America (Argentine, Brazil and Chile) which in May 1914 considered plans for settlement of the internal and external diffi¬ culties of Mexico.

Finally, after the failure of an appeal (by a Latin-American conference at Washington) to the rival factions to settle their differences, the American government, on 19 Oct. 1915, recognized the Carranza government as t e de facto government of Mexico.

In March 1916 a new trouble arose from an attack of Villistas on the American town of Columbus, N. Mex., instigating the' Ameri¬ can government to send a punitive American force under General Pershing into Mexico in hot pursuit. Carranza protested and insisted upon withdrawal while the United States, re¬ fusing to recede from a settled determination to maintain its national right and its dutv to remove the peril, called 150,000 militia to the border. The situation during a period of nego¬ tiations was complicated by a new raid of Mexican bandits into Texas. An encounter with Mexican troops, resulting in casualties on both sides and capture of 17 Americans as prisoners, threatened to produce a final crisis which was averted only by Mexican acquies¬ cence in the American demand for immediate release of the prisoners. The strain of the situation continued until complications were solved by agreement upon a joint ''ommission of

six members, who, however, could not reach an acceptable plan of action. Early in 1917, the American government, after gradually with¬ drawing American troops, sent an ambassador to the Mexican government of Carranza under whose auspices preparations for better condi¬ tions were begun by the adoption of a new national Constitution.

Later relations were affected by conditions relating to the World War. In Februarv 1917 when the American government was 'becoming more determined in its resistance to Germanv's piratical acts against American rights upon the seas, Mexico proposed to neutrals to invite the European belligerents to terminate the conflict, or, in case of failure, to reduce the conflagra¬ tion by refusing any kind of implements and by suspending commercial relations. In reply the American government, declining the pro¬ posal, exposed a recently discovered plot of the German government to induce Mexico to

negotiate an alliance with Japan for war against the United States by offering Mexico as the price of her cooperation with Germany the recovery of territory ceded to the United States in 1848. Although the Mexican government denied any participation in the plot, German influence in Mexico continued inimical to the United States.

Bibliography. — Annual Cyclopedia ; Blakes-lee, G. H., (Latin America) (1914) ; (Boundary Commission Report5 (1898) ; Callahan, J. M., (Cuba and International Relations5 (1899) ; Callahan, J. M., (Evolution of Seward's Mexi¬ can Policy 5 (1909) ; (Despatches, Secret and Special Service) (1853) ; Foster, J. W., Dip¬ lomatic Memoirs) (1909) ; Garrison, G. P., (Westward Extension (1906) ; House of Rep¬ resentatives, 701, 45-2 (1878); Unternational Year Book) ; Jones, C. L., (Caribbean Interests of the United States5 (1916) ; Latane, J. H.,

(Diplomatic Relations of the United States and Spanish America5 (1900); Manning, W. R., (Early Diplomatic Relations between the United States and Mexico5 (1910) ; Moore, J. B., Unternational Arbitrations5 (1898) ; Moore, J. B., Unternational Law Digest5 (1906); Polk, J. K., (Diary5 (1910); Reeves, J. S., (American Diplomacy under Tyler and Polk5 (1907) ; Rives, G. L., (The United States and Mexico, 1821 — 48 5 (1913) ; Romero, M.,

(Mexico and the United States5 (1898) ; Ro¬ mero, M., (Memoir on annexation of Mexico to the United States5 (1890) ; (State Department Pamphlets5 (1882—95) on Mexico-Guatemala boundary; Smith, H., (

Annexation of Texas5 (1911); (United States Treaties and Conven¬ tions.5

James M. Callahan,

Professor of History and Political Science, West Virginia University.

MEXICO, a state of the United States of Mexico, in the southeast ; bounded by the state of Hidalgo on the north, on the east by Tlaxcala and Puebla, on the south by Morelos and Guerrero, and on the west by Michoacan and Queretaro. Adjoining the state of Morelos is the federal district enclosed by the state of Mexico but outside of its jurisdiction. The area of the state of Mexico is 9,247 square miles and its population about 1,000,900. The capital is Toluca. Several railroads traverse the state and centre in Mexico City.

MEXICO, Mo., city, county-seat of Au¬ drain County, on Salt River and on the Wabash, the Chicago and Alton and the Burlington rail¬ roads; about 115 miles northwest of Saint Louis. Mexico was settled in 1833 and in 1852 was incorporated. It is in an agricultural sec¬ tion, the chief products of which are wheat and corn. The manufactures are dressed mar¬ ble, flour, shoes, cigars, stove lining, firebrick products. Mexico is the centre of the saddle-horse producing section of the West. It leads also in mules and livestock and has recently completed 18 miles of electric railway north to Santa Fe, Mo. Corn, wheat and blue grass are principal products. Mexico is the seat of the Missouri Military Acajdemy and of the Har¬ din College for Women, founded in 1873. The charter under which the government is ad¬ ministered was granted in 1893, and provided for a mayor who holds office two years, and a council. Pop. 5,939.

.

a] >. ‘

.

.

:

»•

,

■

.

‘

,

Efifiin!^r rr ir ?

rtf yfftjraflNh ^

m

“?V -

i

Efifiin!ˆr rr ir ?

rtf yfftjraflNh ˆ

m

“?V -

i

1 i Ma

./ ■ it ˆniw

(| I %v\ .-1

* 1 » anil

gHPˆTgjL®

|

c > AlW

| TOl

Imito

7 V.‘f .‘Yj &

£■ > £ J;~. “V t’lyi&lih’ffMiUi !

I

I

1

4

i

i

THE

ENCYCLOPEDIA

AMERICANA

Impy

UklVEHSAL

JtflOWLEDGEj

In Thirty Volumes

1922

THE ENCYCLOPEDIA AMERICANA 1

CORPORATION K

NEWYORK CHICAGO |

|

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN i b 1922

©CI.A654317

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XIX

ALDEN, RAYMOND M., Ph.D., Litt.D.

Professor of English, Leland Stanford Junior Uni¬ versity

NARRATIVE POETRY

AUSTIN, O. P., M.A.

Statistician of the National City Bank, New York City •

NATIONAL DEBTS OF THE WORLD

BABASINIAN, V. S., Ph.D.

Professor of Chemistry, Lehigh University

MICHLER'S KETONE

BALDWIN, CHARLES SEARS, Ph.D.

Professor of Rhetoric and English Composition,

. Columbia University

MORTE D'ARTHUR

BARNES, HARRY ELMER, Ph.D.

Professor of History, Clark University

NATIONALISM

BERRY, GEORGE RICKER, Ph.D., D.D.

Professor of Old Testament Interpretation and Semitic Languages, Colgate University

MICAH, BOOK OF

BIEN, MORRIS, Ph.B., LL.B., LL.M.

United States Reclamation Service, Washington,

MINERAL LAND LAWS OF THE UNITED STATES

BOUCKE, EWALD A., Ph.D.

Professor of German, University of Michigan

MEYER, CONRAD FERDINAND

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

MILL ON THE FLOSS, THE MR. MIDSHIPMAN EASY MYSTERIES OF UDOLPHO

BROOKE, TUCKER, M.A.-, LittJB.

Professor of English, Yale University

MUCH ADO ABOUT NOTHING

BROWN, ERNEST W., S.D., F.R.S.

Professor of Mathematics, Yale University

MOON, THE

BRUBACHER, A. R., Ph.D.

President, State College for Teachers, Albany, N. Y.

MUNICIPAL COLLEGES AND UNI¬ VERSITIES

NATIONAL UNIVERSITY

CAIRNS, WILLIAM B., Ph.D.

Associate Professor of American Literature, Uni¬ versity of Wisconsin

MOBY DICK MODERN INSTANCE, A

CAPPS, W. L.

Chief Constructor, United States Navy; and

TAYLOR, D. W.

Chief Constructor, United States Navy

NAVAL ARCHITECTURE

«

CARMAN, E. A.*

Brigadier-General, United States Army

MIDDLEBURG, ALDIE AND UPPER-VILLE, CAVALRY ENGAGEMENT AT MINE RUN, CAMPAIGN OF MONOCACY, BATTLE ON THE MORGAN'S RAID INTO INDIANA AND OHIO

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

MICROTOME

CHANDLER, FRANK W., Ph.D.

Professor of English and Comparative Literature, University of Cincinnati

MONNA VANNA

CLARK, JOSEPH B., D.D.

Secretary, Congregational Home Missionary Society

MISSIONS, PROTESTANT HOME

CLEWELL, J. H., Ph.D., B.D.

President of the Moravian Seminary and College. Bethlehem, Pa.

MORAVIAN CHURCH

CORNYN, JOHN HUBERT, B.A., LL.B.

Birmingham Southern College

MOUND BUILDERS AND MOUNDS MYTHOLOGY NATURE STUDY NATURE WORSHIP

COUMBE, CLEMENT W.

Technical Art Expert

MONASTIC ARCHITECTURE MONASTIC ART

CUSHMAN, ROBERT EUGENE, Ph.D.

Associate in Political Science, University of Illinois

MUNICIPAL DEBTS MUNICIPAL HOME RULE MUNICIPAL OWNERSHIP MUNICIPALITIES

* Deceased.

Contributors to Volume XIX — Continued

DARTON, NELSON H.

Geologist, United States Geological Survey

MINERAL PRODUCTIONS OF THE UNITED STATES

DUTTON, GEORGE B., Ph.D.

Department of English, Williams College, Williamstown, Mass.

MIDDLEMARCH

DWIGHT, HENRY O., LL.D.

Author of “ Blue Book of Missions,” *etc.*

MISSIONS, PROTESTANT FOREIGN

EISERHARDT, EWALD, Ph.D.

Professor of German, University. of Rochester

MINNA VON BARNHELM

ELROD, MORTON J., Ph.D.

University of Montana

MONTANA

ELSON, LOUIS C.

Instructor at New England Conservatory of Music, Lecturer and Author

MUSIC

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

MILITARY COURTS MARTIAL MILITARY EDUCATION MILITARY ENGINEERING MILITARY RAILROADS MILITARY TERMS MILITARY TRANSPORTATION MINE PLANTERS MINE-SWEEPING MOTORS IN WARFARE NAVAL AERONAUTICS NAVAL AUXILIARY VESSELS NAVAL EDUCATION NAVAL MILITIA NAVAL MINES

FAY, ALBERT H.

Mining Engineer, United States Bureau of Mines

MINE ACCIDENTS MINING

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

MOVING PICTURES

FULLER, GEORGE N.

Secretary Michigan Historical Commission

MICHIGAN

GARNER, JAMES W., Ph.D.

Professor of Political Science, University of Illinois

NATIONALITY

GEARE, RANDOLPH I.*

Fprmerly of the National Museum, Washington, O. C.

MOZART, JOHANNES CHRYSOSTOMUS WOLFGANGUS THEOPHILUS

GEDDES, JAMES, JR., Ph.D.

Professor of Romance Languages, Boston University

MY PRISONS (‘ LE MIE PRIGIONI ’)

GEHRING, ALBERT, A.M.

Author of * The Appreciation of Music,’ *etc.*

MUSIC, EDUCATION IN MUSIC, THE PSYCHOLOGY OF

GILDER, JOSEPH B.

Secretary of the Industrial Finance Corporation

MORRIS PLAN, THE

GRAVES, REV. CHARLES

Hartford, Conn.

MIRROR OF PERFECTION, THE

GRAVES, MARK

Director, Bureau of Municipal Accounts, State Comptroller’s Office, Albany, N. Y.

MUNICIPAL ACCOUNTING IN THE UNITED STATES

GREENE, EVARTS B., Ph.D.

Professor of History, University of Illinois

NATIONAL IDEALS IN THE WAR

HAMLIN, ALFRED D. F., A.M., L.H.D.

Professor of History of Architecture, Columbia University

MURAL PAINTING

HART, ALBERT BUSHNELL, Ph.D., LL.D., Litt.D.

Professor of Government, Harvard University

MONROE DOCTRINE, THE

HARTMANN, JACOB WITTMER, Ph.D.

Assistant Professor, Department of German Lan¬ guage and Literature, College of the City of New York

MINNESONG MORIKE,' EDUARD

HIBBEN, JOHN GRIER, Ph.D., LL.D., L.H.D.

President, Princeton University

NATURALISM

HODGE, FREDERICK W.

Bureau of American Ethnology, Washington, D. C.

NAVAJO INDIANS

HORNADAY, WILLIAM T., Sc.D.

Director New York Zoological Park

MOOSE

* Deceased.

HOWARD, WILLIAM G., A.M.

Assistant Professor of German, Harvard University

NATHAN THE WISE

INGERSOLL, ERNEST

Zoologist

MIGRATION MIMICRY IN ANIMALS MOUSE MYCORRIZA

ISAACS, ABRAM S., Ph.D.

Professor of Semitic Languages and Literatures, New York University

MOHAMMEDAN LITERATURE MOHAMMEDAN SECTS MOSES

JELLIFFE, SMITH ELY, M.D., Ph.D.

Formerly Professor of Pharmacognosy, Columbia University

MIGRAINE

MUSCLES

MUSCULAR SYSTEM

KENNEDY, BRUCE

General Secretary, Montgomery Chamber of Com¬ merce

MONTGOMERY, ALABAMA

KRAPP, GEORGE PHILIP, Ph.D.

Professor of English, Columbia University

MONTAIGNE'S ESSAYS

LAWRENCE, WILLIAM WITHERLE, Ph.D., Litt.D.

Professor of English, Columbia University

MIRACLE PLAYS

LEONARD-STUART, C., B.A.

Editorial Staff of The Americana

MOSELEY COMMISSIONS MUSICAL ELEMENTS AND TERMS .

LIVINGSTON, ARTHUR

Professor of Romance Languages, Western Uni¬ versity, London, Ontario, Canada

MORGANTE MAGGIORE

LUCAS, FREDERIC A., Sc.D.

Director, American Museum of Natural History

MUSEUMS

LYDECKER, CHARLES E.

Brevet Lieutenant-Colonel, National Guard, New York (Retired)

MILITIA

McGRANE, R. C., Ph.D.

Assistant Professor of History, University of Cin¬ cinnati

MONROE, JAMES

McLENEGAN, CHARLES E.

Librarian of the Public Library, Milwaukee

MILWAUKEE

MAYES, EDWARD C., LL.B.

Author of “ Educational History of Missi; sippi ”

MISSISSIPPI

MIMS, EDWIN, Ph.D.

Professor of English, Vanderbilt University

MIDSUMMER NIGHT'S DREAM, A

MODELL, DAVID A., A.M.

New York City

MUSIC, CHILDREN'S

MORGAN, FORREST

Secretary Connecticut Historical Society

MISSISSIPPI RIVER

MOSES, ALFRED J., E.M., Ph.D.

Professor of Mineralogy, Columbia University

MINERALOGY

MUMFORD, FREDERICK B., B.S., M.S.

Dean and Director of the College of Agriculture, University of Missouri

MULE AS A WORK ANIMAL, THE

NORTON, EDWARD QUINCY

MOBILE, ALABAMA

PARSONS, E. DUDLEY

Instructor in English, West High School, Min¬ neapolis, Minn.

MINNEAPOLIS

MINNESOTA

PARSONS, EUGENE, A.B.

Author and Editor

NATIONAL HYMNS

PEELE, ROBERT, E.M.

Professor of Mining, Columbia University, New York

MINING ENGINEERING

PILCHER, LEWIS F., Ph.B., LL.D.

New York State Architect

MILITARY ACHITECTURE

RICHARDS, D. D.

Secretary Missoula Chamber of Commerce

MISSOULA, MONTANA

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers' In¬ surance Company, Hartford, Conn.

MOLECULAR THEORY

Contributors to Volume XIX — Concluded

SCOTT, WILLIAM A., Ph.D., LL.D.

Professor of Political Economy, University of Wis¬ consin

MONEY

SHERMAN, HENRY C., Ph.D.

Professor of Food Chemistry, Columbia University, New York

MILK

SHOWERMAN, GRANT, Ph.D.

Professor of English, University of Illinois

MURRAY'S TRANSLATIONS OF EURIPIDES

SIEGFRIED, F. P.

Professor of Mental and Moral Philosophy, Saint Charles Seminary, Overbrook, Pa.

MYSTICISM

STURGIS, RUSSELL*

Author of “ The Appreciation of Pictures ”

MICHELANGELO

THAYER, HARVEY W., Ph.D.

Assistant Professor in Modern Languages, Prince¬ ton University

MICHAEL KOHLHAAS

THOMPSON, J. W.

Law Examiner of the Bureau of Mines, Department of the Interior, Washington, D. C.

MINING LAWS OF THE UNITED STATES

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of Literature, Columbia University

MILTON, JOHN

TUCKER, MARION, Ph.D.

Professor of English, The Polytechnic Institute of Brooklyn

MICHAEL

TUFTS, JAMES H., A.B., A.M., B.D.

Professor of Philosophy, University of Chicago

MILL, JOHN STUART

VANDER VEER, ALBERT, M.D.

Albany, N. Y.

MILITARY SURGERY

WARDROP, G. DOUGLAS

Managing Editor of “ Aerial Age ”

MILITARY AERONAUTICS

WEICKUM, LOUIS

Secretary New York State Nautical School

NAUTICAL TRAINING SCHOOLS

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature,” *etc.*

MONDE (Le) OU L’ON S’ENNUIE

WILCOX, C. De W.

Colonel, United States Army; Professor, United States Military Academy

MILITARY SCIENCE

WILCOX, DELOS F.

Franchise Expert; Author of “ The Government of Great American Cities,” *etc.*

MUNICIPAL GOVERNMENT

WILCOX, MARRION, A.B., LL.B.

Coeditor of “ Encyclopedia of Latin America ”

MONTEVIDEO

WILLIAMS, WALTER, LL.D.

Professor of English and Principles of Journalism, University of Missouri

MISSOURI

WOLFF, SAMUEL LEE, Ph.D.

Instructor in English, Extension Teacher, Columbia University

MODERN PAINTERS

WRIGHT, HERBERT F., Ph.D.

Division of International Law, Carnegie Endow¬ ment for International Peace

MINUCIUS FELIX, MARCUS MISANTHROPE, LE

* Deceased

KEY TO PRONUNCIATION.

••

a

far, father

a

fate, hate

a or a

at, fat

a

air, care

a

ado, sofa

a

all, fall

ch

choose, church

e

eel, we

e or e

bed, end

e

her, over : also Fr. e, as in de; eu, as in neuf; and oen, as in boeuf, coeur; Ger. d (or oe), as in okonomie.

e

befall, elope

e

agent, trident

ff

off, trough

g

gas, get

gw

anguish, guava

h

hat, hot

h or h

Ger. ch, as in nicht, wacht

hw

what

I

file, ice

- w

1 or 1

him, it

A

1

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

•

J

gem, genius

kw

quaint, quite

ri

Fr. nasal m or n, as in embon¬ point, Jean, temps

n

Span, h, as in canon (can'ydn), pihon (pen'yon)

ng

mingle, singing

nk

bank, ink

6

no, open

o or 5

not, on

A

o

corn, nor

6

atom, symbol

0

book, look

oi

oil, soil ; also Ger. eu, as in beutel

o or oo

fool, rule

ou or ow allow, bowsprit

s

satisfy, sauce

sh

show, sure

th

thick, thin

fh

lather, thither

u

mute, use

u or u

but, us

u

pull, put

ii

between u and e, as in Fr. sur, Ger. Mitller

V

of, very

y

(consonantal) yes, young

z

pleasant, rose

zh

azure, pleasure

‘(prime),

“(secondary) accents, to indicate syllabic stress

isilJ. ‘ ,*n:l

■Aui ,>r n f

A. i

‘ ■

i.‘MJO , < > fl O

tna ,inta

CKiur/

. A ,;i .» > • I . ;ll,v ,i.„ i

0

il/IHlb 1800il;i

97/ .by

-\ii fTi SJS .V‘T ogh vjvo ,T3rf I ii , > ;V. 1 > C3 1. .1! H . i ;»•

/.‘OH ■ i < .)

df

d)

liV’.’.: 1 1 ; ; ,li M t.

Jori i.. •

»t • I i> fi; * t w

x ; fruo'c '(k >)

• . if !' 'I \ ' . .t > i *:

1/

i

i 'A,

. j. «>

jf?C

Ji nt n-i Of , union {■' ur ˆinhq)'

lit ,V\ •;:> ,A (fi R

…… . n><\

*

Meyer, mi'er, Adolf, American pa¬ thologist and alienist : b. Nieder-wenigeri, near Zurich, Switzerland, 13 Sept. 1866. He was educated at Zurich, Paris, London, Edinburgh, Vienna and Berlin, and came to the United States in 1892. He was honorary Fellow and docent at the

University of Chicago in 1892-95, and pathologist to the Illinois Eastern Hospital for the Insane at Kankakee in 1893-95. He was pathologist and later director of the clinical and laboratory work at the Worcester, Mass., Insane Hospital and docent in psychiatry at Clark University in 1895-1902. He was direc¬ tor of the Pathological Institute at the New York State Hospital in 1902-10; professor of psychiatry at the Cornell University Medical College in 1904-09 ; and since 1910 has been processor of psychiatry and director of the Henry Phipps Psychiatric Clinic at Johns Hop¬ kins University. He is a member of the New York Academy of Sciences, served as president of the New York Psychiatric Society and has contributed to scientific periodicals.

MEYER, Adolf Bernhard, German zoolo¬ gist and anthropologist: b. Hamburg, 11 Oct. 1840; d. Dresden, 22 Aug. 1911. He was edu¬ cated at the universities of Gottingen, Vienna, Zurich and Berlin, later making explorations in the Malays and in the Philippines. He was director of the Royal Museum of Natural His¬ tory at Dresden from 1874 until his retirement in 1905,. Author of (Abbildungen von Vogels-keletten) (1879-95) ; (Publikationen des konig-lichenethnographischen museums zu Dresden) (1881-1903) ; (Album von Philippinentypen) (1885-1904) ; (Amerikanische Bibliotheken und ihre Bestrebungen) (1906) ; (Romerstadt AgunP (1908), *etc.*

MEYER, Annie Nathan, American drama¬ tist, author and educationalist: b. New York, 19 Feb. 1867. She was educated at home and took examinations at Columbia University, women not then being admitted to the univer¬ sity. She was married to Dr. Alfred Meyer in 1887 and is known for her work as a founder of Barnard College, the women's department at Columbia. She has been active as an anti¬ suffragist. Author of (Woman's Work in America) (1891) ; (Helen Brent, M.DP (1893) ; (My Park Book* (1898) ; (Robert Annys) (1901); (The Dominant Sex> (1911); (The Dreamer) (1912).

MEYER, Balthasar Henry, American rail¬ way economist : b. Mequon, Wis., 28 May 1866.

He was graduated at the University of Wiscon¬ sin in 1894 and later studied at Berlin. He was connected with the staff of the University of Wisconsin from 1895 and was professor of political economy there in 1900-10. He was appointed a member of the Railroad Commis¬ sion of Wisconsin in 1905, and served as its chairman in 1907—1 1 . President Taft appointed him to the Railroad Securities Commission in

1910 and to the Interstate Commerce Commis¬ sion in 1911. Author of (Railway Legislation in the United States* (1903) ; < History of Trans¬ portation in the United States Before 1860)

(1917).

MEYER, Conrad Ferdinand, Swiss novel¬ ist and poet: b. Zurich, 11 Oct. 1825; d. Kilchberg, near Zurich, 1898. He devoted himself in his earlier years chiefly to studies in history and art. The two historians who influenced Meyer particularly were Vulliemin at Lausanne and Jacob Burckhardt at Bale whose book on the ˆCulture of the Renaissance) stimulated his imagination and interest. From his travels in France and Italy (1857) Meyer derived like¬ wise much inspiration for the settings and characters of his historical novels. His mind matured slowly and it was not until the Franco-Prussian War in 1870 that he found himself and. his genius. In Meyer's novels a great crisis will often release latent energies and precipitate a catastrophe. In the same manner his own life which so far had been one of dreaming and experimenting, was stirred to the very depths by the events of 1870. Meyer identified himself with the German cause and as a manifesto of his sympathies published the little epic, <(Hutten's Last Days® in 1871. The following two decades from 1870 to 1890 were the years of harvesting and brought to light a number of historical novels and tales.

C. F. Meyer's works include six long and five shorter historical tales, two short epic poems and a volume of lyrics, among them some ballads of exceptional merit. The periods of the Renaissance and Counter Reformation fur¬ nished the subjects for most of his novels in which the aesthetic, charm of a picturesque set¬ ting is combined with keen psychological analy¬ sis. (Jurg Jenatsch* describes the political plots and intrigues in which the Swiss canton, Graubiinden, became involved during the Thirty Years.' War through the conflict between Spain-Austria and France. The hero is a Protestant minister and fanatic patriot who, in his deter¬ mination to preserve the independence of his little country, does not shrink from murder and

treason and in whom noble and base motives are strangely blended. (The Saint> tells the story of Thomas a Becket of Canterbury who, from being a devoted servant of his worldly lord, King Henry II, turns against him when he is made archbishop of Canterbury and henceforth serves the interest of a higher lord or his representative, the Church of Rome. In the 'Monk's Wedding) Dante himself is introduced at the court of Cangrande in Verona as narrator of the strange adventure of a monk who, after the death of his brother, is forced by his father to break his vows but who, instead of marrying the widow, falls in love with an¬ other young girl and runs blindlv to his fate. 'Die Richterin,) a more sombre tale, introduces Charlemagne and his palace school; 'The Tempting of Pescara) tells of the great crisis in the life of Pescara, general of Charles V and husband of Victoria Colonna. Among his shorter stories may be singled out (Gustav Adolf's Page,) 'Plautus in a Nunnery) and 'The Shot, from the Pulpit* as three gems of his inimitable art. Most of his plots spring from the deeper conflict between freedom and fate and culminate in a dramatic crisis in which the hero, in the face of a great temptation, loses his moral freedom and is forced to fulfill the higher law of destiny. As a psychologist and interpreter of enigmatic characters Meyer has not his equal in the field of the historical novel. See Saint, The.

Bibliography. — C. F. Meyer's works are published by H. Haessel, Leipzig, in 9 volumes. The most recent and complete biography is by D'Harcourt, R., 'C. F. Meyer: Sa vie son ceuvre) (Paris 1913). Two older biographies by Langmesser, A. (Berlin 1905), and Frey, A. (Stuttgart 1909). Other monographs: Taylor, M. L., 'A Study of the Technique of C. F. Meyer's Novellen) (Chicago 1909) ; Blaser, O., 'C. F. Meyer's Renaissancenovellen) (Berne 1905) ; Korrodi, E., 'C. F. Meyer: Studied (Leipzig 1912). Several novels are accessible in annotated American editions, but only two, so far, in translations : 'The Monk's Wedding) (Boston 1887) ; and 'The Tempting of Pescara) (New York 1890). Consult also, 'German Classics of the Nineteenth Century,) Vol. 14.

Ewald A. Boucke,

Professor of German, University of Michigan.

MEYER, Eduard, German historian : b. Hamburg, 25 Jan. 1855. He was educated at the universities of Bonn and Leipzig, and after completing his studies spent one year in Con¬ stantinople. In 1879 he

went to the University of Leipzig as privatdocent ; in 1885 became professor of ancient history at Breslau and in 1889 at Halle. He has written ‘Geschichte der Alten TEgypteU (1877) ; ‘Geschichte des Altertums) (1884-1902), his largest work; ‘Forsch-ungen zur Alten Geschichte) (1892-99) ; ‘Untersuchungen zur Geschichte der Gracchen> (History of Greece) (1894) ; ‘Wirtschaftliche Entwickelung des Altertums) (1895) ; and ‘Die Entstehung des Judentums> (1896) ; ‘Zur Theorie und Methodik der Geschichte* (1902) ; ‘Der Israeliten und ihre Nachbarstamme*

(1906).

MEYER, George von Lengerke, American Cabinet officer and diplomat : b. Boston, 24 June 1858; d. 9 March 1918. He was graduated at Harvard in 1879, and engaged in business as

merchant and trustee in 1879-99. He was a di¬ rector of various trust companies, banks, manu¬ facturing companies, and public utilities con¬ cerns, and was a member of the Boston com¬ mon council in 1889-90. He served in the Massachusetts house of representatives in 1892— 97, acting as speaker in 1894-97, and was a member of the Republican National Committee in 1898-1904. He was ambassador extraor¬ dinary and plenipotentiary to Italy in 1900—05, and to Russia in 1905-07. He served as Post¬ master-General under President Roosevelt in 1907-09, and in the Taft Administration he was Secretary of the Navy. He has been an over¬ seer of Harvard University since 1911.

MEYER, Hans, German explorer and pub¬ lisher : b. Hildburghausen, 22 March 1858. He was educated at Leipzig, Berlin and Strassburg, afterward traveling in India, North America and South Africa. Subsequently he visited East Africa and South America. He entered the publishing house of his father, the Biblio-graphisches Institut at Leipzig, in 1884. and in the following year became one of the directors of the firm; but at intervals he continued his exploring expeditions. Among his explorations are the ascent and survey of the summit of Kilbo Peak in East Africa in 1889 and 1898; and the Ecuadorian Cordilleras in 1903. Author of ‘Zum Schneedom des Kilimandscharo* (1888) ; ‘Der Kilimandjero) (1900) ; ‘Die Eisenbahnen im tropischen Africa) (1902); ‘In den Hoch Anden von Ecuador* (1907), *etc.*

MEYER, Heinrich August Wilhelm, Ger¬ man biblical commentator: b. Gotha, 10 Jan. 1800; d. Hanover, 21 June 1873. He studied at Jena, was pastor at Harste, Hoye and Neustadt, and upon his retirement in 1848, settled in Hanover. He is remembered for his 'Com¬ mentaries on the New Testament,) begun 1832 and completed 1859. Since his death this work has been continued by Weiss, Wendt, Beyschlag and others. The English translation in Clark's series is in 20 volumes (1873-82), and there is an American edition in 11 volumes (1884-88).

MEYER, Henry Herman, American Meth¬ odist Episcopal clergyman and editor: b. Cham¬ paign, Ill., 21 Nov. 1874. He was educated at German Wallace College, Ohio; the Drew Theological Seminary; Teachers' College, Columbia; and at Jena. He was ordained in the ministry in 1900 and filled pastorates in Wilmington, Cal., and Mount Vernon, N. Y. He was professor of Saint Paul's College, Minnesota, in 1900-01 ; and in 1903 became as¬ sistant editor of the Methodist Episcopal Sun¬ day School publications, becoming editor in 1914. Author of 'The Lesson Handbook) (an¬ nual J904—) ; 'The .Graded Sunday School in Principle and Practice) 1910), *etc.*

MEYER, Hugo Richard, American author and economist : b. Cincinnati, Ohio, 1 April 1866. He was graduated at Harvard in 1892, and at¬ tended the Harvard Graduate School in 1892-96. He was . instructor in political economy at Harvard in 1897-1903, and was assistant pro¬ fessor in that subject at the University of Chicago in 1904-05. Since 1907 he has been engaged at Melbourne in writing a history of State Ownership in Victoria, Australia. Author of 'Government Regulation of Railroad Rates* (1905) ; 'Municipal Ownership in Great Britain) (1906) ; 'The British State Telegraphs) (1907) ;

(Public Ownership and the Telephone in Great Britain) (1907).

MEYER, Johann Georg, commonly known as (<Meyer von Bremen,® German painter: b. Bremen, 28 Oct. 1813; d. Berlin, 4 Dec. 1886. In his 21st year he went to Diisseldorf and be¬ gan his studies under

Sohn and Schadow ; in 1841 he opened a studio of his own but removed to Berlin as his fame increased (1853). While scenes from the Bible were first the subjects of his brush, he later turned his attention to inci¬ dents of popular life, especially among the Hes¬ sian peasantry, and finally to the portrayal of family life in its pathetic aspect. Such pictures as (The Jubilee of a Hessian Pastor* (1843) ; (Christmas Eve) ; (Blindman's Buff* ; (The Soldier's Return) ; (The Inundation) (1846); (The Repentant Daughter* (1852, in the gallery at Bremen), are full of intense sympathy with the "simple annals of the poor.® After taking up his residence at Berlin, he chose especially scenes from child life, which he rendered with spirited humor. Among his pictures of this kind are (The Fairy Tale* ; (Children Playing Blindman's Buff* ; ˆGrandfather and Grand¬ child, * *etc.* A third group of his pictures in¬ cludes those of young women, as single figures or in groups. Such are (The Tryst* ; (The Love Letter.* An excellent example of his work, (The Letter) (1873), is in the Metropoli¬ tan Museum, New York. All his works are dis¬ tinguished by true human feeling, truthfulness and thoroughness of execution.

MEYER, Joseph, German publisher : b. Gotha, 9 May 1796; d. 27 June 1856. He or¬ ganized various industrial undertakings, founded a publishing business at Gotha, which soon at¬ tained large proportions, was removed by him to Hildburghausen (1828), and in 1874 was transferred to Leipzig. The best known of his publications is the (Meyers Konversations-lexikon,* the rival of Brockhaus in the ency¬ clopaedia field, which has been brought down to date by constant revisions and supplements. He published also a series of the German Classics, a historical Library,* and a (Library of Nat¬ ural Philosophy.*

MEYER, Kuno, German Celtic scholar; b. Hamburg, 20 Dec. 1858. He was educated at the Gelehrtenschule of the Johanneum, Ham¬ burg, and at the University of Leipzig. In 1884-95 he was lecturer, and in 1895-1915, pro¬ fessor of Teutonic languages at University College, Liverpool; and from 1911 he was pro¬ fessor of Celtic at the University of Berlin. He founded the Zeitschrift fur Celtische Philologie in 1895, and with Whitley Stokes founded the Arcluv fur Celtische Lexikocjrapliie in 1898. He founded the School of Irish Learning at Dublin in 1903. He is a member of the Royal Prussian Academy. His pro-German sympathies brought him into disfavor in England and Ireland after the outbreak of the European War. Author of (Eine irische Version der Alexandersage) (1883) ; (The Irish Odyssev) (1885) ; (The Vision of Mac-Conglinne) (1892); (Early Relations . of the Brython and GaeP (1896); (Liadain and Curithir* (1902) ; (Ancient Irish Poetry)

(1911), *etc.*

MEYER, Lothar Julius, German chemist : b. Varel, Oldenburg, 19 Aug. 1 830 ; d. Tubingen, 11 April 1895. He studied medicine at Zurich

and Wurzburg and later specialized in physiological chemistry at Heidelberg, and in mathe¬ matical physics at Konigsberg. He became privatdocent in physics and chemistry at Bres¬ lau in 1859, taught in the School of Forestry at Neustadt-Eberswalde in 1866-68, and at the Karlsruhe Polytechnic in 1868-76; and from 1876 he was professor of chemistry at Tubingen. He is known for his theory of the action of car¬ bon monoxide on the blood; and for his work in the periodic classification of the elements. Author of (Die modernen Theorien der Chemie) (1896) ; (Die Stomgewichte der Elemente aus den Originalzahlen neu berech-net) (1883) ; (Grundziige der theoretischen Chemie) (1902).

MEYER, [Marie] Paul Hyacinthe, French philologist: b. Paris, 17 Jan. 1840; d. 19 March 1917. He was educated at the Lycee Louis le Grand and at the Lcole des Chartes, specializing in the Romance languages. He was attached to the manuscript department of the Bibliotheque Nationale in 1863-65, and in 1865 founded the Revue Critique. He was keeper of the national archives in 1866-72 and in 1872 founded Romania, to which he was the leading contributor. He was appointed professor of the languages and literatures of southern Europe at the College of France in 1876, and from 1882 he was a director of the Lcole Na¬ tionale des Chartes. He became honorary pro¬ fessor at the College of France in 1906. His work in connection with romance literature is of exceptional value and he is considered the leading modern authority on the French language. He was a member of the Institute of France, a commander in the Legion of Honor and an associate of the British Acad¬ emy. He edited a large number of old French texts, many of which were for the Societe de l'histoire de France and the Societe des anciens textes frangais. Among them are (Aye d'Avignon) (1861) ; (Flamenga* (1865) ; (Histoire Guillaume le Marechal, comte de Striguil et de Pembroke) (3 vols., 1891-1901) ; fragments d'une vie de Saint Thomas de Cantorbery* (1885), *etc.* Author of (Rapports sur les docu¬ ments manuscrits de l'ancienne litterature de la France conserves dans les bibliotheques de la Grande Bretagne) (1871) ; (Recueil d'anciens textes bas-Latins, provencaux et frangais* (2 parts, 1874-76) ; (Alexandre le Grand dans la litterature frangaise du moyen age1* (2 vols., 1886) ; (Histoire des relations de. la France avec Venise* (1896) ; (Documents linguistiques du midi de

la France) (1909), *etc.*

MEYER, Victor, German chemist : b. Ber¬ lin, 8 Sept. 1848; d. Heidelberg, 8 Aug. 1897. He studied at the University of Berlin and under Bunsen at Heidelberg. In 1868 he en¬ tered the laboratory of Baeyer at Berlin, and in 1871 he became professor at the Stuttgart Poly¬ technic. He was professor of chemistry and director of the laboratory at Zurich in 1872-85, professor at Gottingen in 1885-89, and from 1889 until his death he occupied the chair of his former master, Bunsen, at Heidelberg. He is famous for his experiments establishing a method of determining vapor densities and for the discovery of thiophen. He was awarded the Davy medal of the Royal Society in 1891. Author of <Die Thiophengruppe) (1888); (Chemische Probleme der Gegenwart* (1890) ;

(Lchrbuch der organischen Chemie) (2 vols., 1891-92) ; (Marztage im Kanarischen ArchipeP (1893), *etc.*

MEYER-HELMUND, Erik, Russian-Ger¬ man composer: b. Petrograd, 25 April 1861. He studied in Berlin and became known as a composer of appealing songs, for many of which he wrote both words and music. Author of the operas (Margitta> (1889) ; (Der Liebes-kampP (1892); (Heines' Traumbilder) (1912); the burlesques <Trischka> (1894); <'Lucullus) (1905), and the light opera <Taglioni) (1912).

MEYER-LUBKE, Wilhelm, German-Swiss philologist: b. Diibendorf, Switzerland, 30 Jan. 1861. He was educated at the universities of Zurich and Berlin, and in 1887 became pro¬ fessor at Jena. He was appointed professor of Romance philology at Vienna in 1890, serving as rector in 1906-07. Author of (Grammatik der romanischen Sprachen) (4 vols., 1890-1905) ; Htalienische Grammatik) (1891) ; (Ein-fuhrung in das Studium der romanischen SprachwissenschafD (1901) ; (Historische Grammatik der franzosischen Sprache) (1908) ; (Romanisches Worterbuch) (1912), *etc.*

MEYERBEER, mi'e-bar, Giacomo (Ital¬ ianized form of Jakob Meyer Beer), German composer: b. Berlin, 5 Sept. 1791; d. Paris, 2 May 1864. His father, Jakob Beer, was a rich banker of Jewish descent, and of high reputa¬ tion in the commercial world. The son gave early proof of his devotion to the art of music, and at nine was regarded as a masterly pianist in a city famous for its excellent musicians. After studying composition under Bernhard Anselm Weber, he entered in 1810 the school of the Abbe Vogler at Darmstadt, where for three years he had the companionship of Karl Maria von Weber (q.v.). An intimate friend¬ ship sprang up between them, which was only interrupted by the death of the. latter. While at Darmstadt Meyerbeer composed a cantata, (Gott und die Natur,} which brought him the appointment of court musician to the grand-duke. In 1811 his opera (Jephthas Geliibde) was produced at Munich, but failed to please the audience, though highly praised by Weber, Vogler and other musical authorities. Dis¬ couraged by its public reception, Meyerbeer went to Vienna, where he made his debut as a pianist with such success that he seemed des¬ tined to eclipse the fame of all contemporary artists. Commissioned by the court of Vienna he produced (Alimelek, oder die beiden Kali-fen,) which was no more successful than his former effort. He was induced to visit Italy, and became a convert to the new musical school of that country. He rapidly composed in this style a series of operas, which were gen¬ erally well received: (Romilda e Costanza) (1818) ; (Semiramide riconosciuta) (1819) ; 'Emma di Resburgo) (1819) ; (Margherita d'Anjo5 (1820) ; (L'Esule di Granata5 (1822) ; and (I1 crociato in Egitto) (1824). The suc¬ cess of the last-mentioned opera traveled be¬ yond the Alps, and the composer was invited to Paris to superintend the preparations for the production of the <Crociato) at the Grand Opera, where it met with an enthusiastic re¬ ception. In 1831 his ˆRobert le Diable) was produced for the first time, and the excitement it caused was perhaps unparalleled on the Parisian stage. Meyerbeer had ceased to be a

pupil of Rossini, and (Robert } combined in a singular degree oriental gorgeousness, German massiveness, French vivacity and Italian bril¬ liancy, which the preceding works of the com¬ poser had not prepared the world to expect. He reached the climax of his fame by his next opera, (Les Huguenots) (1836). He was ap¬ pointed Royal music director at Berlin in 1842, and returned to Paris in 1849. (Les Huguenots > was followed at long intervals by (Le Prophete) (1849) ; (Pierre le Grand) ((L'Etoile du Nord) 1854); (Le Pardon de PloermeP ((Dinorah) 1858); and (L'Afri-caine) (1865). The composer did not live to see the production of his last work. Besides his operas he wrote

many songs, an oratorio, cantatas, a Te Deum, music for the tragedy of <Struensee) by his brother, and other works. Consult De Curzon, H., (Meyerbeer: biographie critique) (1910) ; De Bury, (Meyerbeer, savie, ses oeuvres et son temps > (1865); Hervey, A., <Meyerbeer) (1913) ; Mendel, (Giacomo Meyer¬ beer, eine biographic (1868) ; Pougin, (Meyer¬ beer J (1864).

MEYERHEIM, Friedrich Eduard, fred'- rih ed'oo-ard mi'e-him, German artist : b. Dantzic, 7 Tan. 1808; d. Berlin, 18 Jan. 1879. He studied landscape painting in his native town, and in his 22d year went to Berlin, where he attended the Academy and fell under the influ¬ ence of Schadow. He became a member of the Berlin Academy in 1838, and a professor there in 1850. Ten lithographic views of Dantzic, published by him in 1832, were in¬ cluded in his (Architektonische Denkmaler der Altmark Brandenburg,* which appeared the following year. Between 1833 and 1841 he pro¬ duced a number of genres with a romantic motif as illustrative of peasant and bourgeoise life. Of such a character is (The Champion ShoD (1836) in the Berlin National Gallery. In his search for character, costume, scenery and incident he traveled, studied and sketched over a wide area of territory, which included Westphalia, Altenburg, Thuringia, Hesse and the Harz district. His admirable genres are distinguished by a clear enamel-like coloring. Amongst the most notable are (Leaving Church in Altenburg) ; Hn an Altenburg Cornfield* ; 'The Little Kid* (1842) ; <Bedfellows) (1844) ; his masterpiece, (Waiting> (1845); and (Good Morning, Dear Father* 1858). Consult his (Autobiography* (1880).

MEYERHEIM, Paul, German painter: b. Berlin, 13 July 1842. He was a son of Fried¬ rich Eduard Meyerheim and was taught by his father, and afterward studied at the Berlin Academy. Travel through Belgium and Hol¬ land enlarged his artistic experience and knowl¬ edge, and he afterward spent a year at Paris. He then returned to Berlin, where he applied himself to animal painting, but also did some portrait, genre of common life, humorous scenes, still life, interior decoration of build¬ ings, *etc.* He executed works both in oil and watercolors, and his versatility is only equaled by his delicate sense of color and brilliant technique. Considering all these qualities his fertility must be called extraordinary. Some of his best works are (History of the Locomo¬ tive in Seven Pictures on Copper) (Villa Bor-sig, Berlin) ; (An Antiquary of Amsterdam* (1869) ; (Four Seasons in the Life of a Bird* ;

(In the Menagerie) (1891) ; (Portrait of his Father and D. Chodowiecki* (1887) ; (The Theatre of Monkeys) ; (The Hare and the Frog) ; (Tourists in the Mountains Meeting a Herd of Cattle) ; *etc.* In 1863 he undertook a journey into Egypt, from which he brought back many landscape and figure studies. He is a Royal professor, and has been awarded the grand gold medal at the Berlin Exhibition.

MEYERSDALE, Pa., borough in Somer¬ set County, on the Casselman River, 37 miles northwest of Cumberland, Md., and on the Baltimore and Ohio Railroad. The borough is located in a coal mining district, which forms its principal industry. There are also manu¬ factories of bricks, machinery and cigars. Pop.

3,741.

MEYNELL, mi'nel, Alice Thompson,

English poet and essayist : b. London, England 1850. She is the daughter of T. J. Thompson, a friend of Dickens, spent much of her childhood in Italy, became a convert to Roman Catholi¬ cism, and was married in 1877 to Wilfrid Mey-nell, a London journalist. She has published <Preludes,) a collection of poems (1875), illus¬ trated by her sister Elizabeth, Lady Butler ;

(Rhythm of Life) (1893) ; (The Color of Life> (1896); (The Children> (1896); <The Spirit of Place) (1898) ; (John Ruskin) (1900) ; (Later Poems *(1901). Consult Archer, (Poets of the Younger Generation (New York 1902) ; (Ceres' Runaway* (1910) ; (Mary, Mother of Jesus> (1912) ; Collected Poems) (1913); (Essays* (1914). The quality of her work stands very high, but her output in poetry has been small — her (Collected Poems* con¬ tain only 76 pieces. She is regarded as the best of contemporary English poetesses, and her sister, Lady Butler, was the best woman artist of her time.

MEYRICK, mi'rik, Frederick, English Anglican clergyman and controversialist : b. Ramsbury vicarage, Wiltshire, 28 Jan. 1827; d. Blicking, 3 Jan. 1906. He was educated at Oxford, where he was tutor (1851-59) and he was ordained to the priesthood in 1852. Since 1868 he has been rector of Blicking, Norfolk, and a canon non-residentiary of Lincoln from 1869. He was moderately evangelical in his views and strongly anti-Roman, and labored for the establishment of a union between the Anglican and the old Catholic churches on the Continent. Among his many works, some of which are controversial books in Latin, Span¬ ish, etc., may be cited (The Practical Working of the Church in Spain* (1857) ; HTniversity and Whitehall Sermons* (1859) ; f Kingsley and Newman* (1864) ; ˆJustin Martyr* (1896) ; (Scriptural and Catholic Truth and Worship* (1901) ; Memories* (1905).

MEZEN, mez-any', or MESEN, a river in the northern part of Russia in Europe. It rises in the Timan Mountains, flows north and south, forming two loops, then its course changes to the northwest through the govern¬ ment of Archangel and enters the White Sea through Mezen Bay. It is about 510 miles in length. It is navigable for some distance from the mouth; but is ice-locked about six months in the year.

MEZEREON, me-ze're-on, or MEZEREUM, the dried bark of Daphne mezereum Linne, Daphne gnidium Linne, or Daphne

laureola Linne, of the family Thymeleacece. All are hardy, low shrubs. Daphne Mezereum has a smooth, dark-gray bark easily separated from the wood. The flowers precede the leaves and are of a purplish rose-color, or very rarely, white, and are fragrant. The fruit is oval, bright red, or yellow from the white-flowered variety, fleshy and contains a single round seed. It is native to Europe and western Asia and has escaped cultivation in eastern United States and Canada. Daphne gnidium has a deep purplish-brown bark and white flowers, the bark being equally active medicinally with Daphne mezereum. It is native to the dry, uncultivated portions of southern Europe. Daphne laureola or Spurge laurel has a purplish-gray bark and is used commercially, but its medicinal value is inferior. The bark of both stem and root is used, although that of the root was formerly thought superior. The dried bark of the Daphne mezereum is olive-brown ; of Daphne gnidium purplish-brown; of Daphne laureola purplish-gray. The taste is at first slight but is of increasing acrid¬ ity and pungency. The bark is almost odorless. The berries and leaves of the plant are also active and have been known to prove fatal to children. The berries are used

in Russia as a purgative ; and a tincture is used in Germany as an external remedy for neuralgia. The ap¬ plication of the bark to the skin causes in¬ flammation followed by vesication, and it has long been used as an epispastic in southern Europe. A small piece of the bark is moistened with vinegar and is applied and renewed twice daily until a blister is formed, and occasionally longer to insure discharge. Its action is slow, requiring 24 to 48 hours to vesicate. An oint¬ ment was formerly prepared to maintain dis¬ charge from blistered surfaces. It is of value in cases of obstinate ulcers, but valueless as an internal remedy. Overdoses produce nau¬ sea, vomiting and purging; and it has been known to act as a narcotic. It is used in com¬ bination with sarsaparilla in preparing the beverage of that name. See Daphne.

MEZES, Sidney Edward, American edu¬ cator : b. Belmont, Cal., 23 Sept. 1863. He was graduated from the University of Cali¬ fornia in 1884 and received his doctor's degree from Harvard University in 1893. From 1892 to 1914 he was engaged in teaching, principally at the University of Texas, where he was pro¬ fessor of philosophy and dean of the college. In 1908 he was elected president of that uni¬ versity, and in 1914 he succeeded John H. Fin¬ ley as president of the College of the City of New York. Dr. Mezes is ex-president of the Texas Academy of Science and has contrib¬ uted many articles on ethical and philosophical subjects for reviews. His published works are (The Conception of God* (1897) ; (Ethics, Descriptive and Explanatory* (1901), and articles in reviews on education, ethics and philosophy.

MEZIERES, Alfred Jean Frangois, al-fra zhon fran-swa ma-ze-ar, French critic and politician: b. Rehon, 19 Nov. 1826; d. October 1915. He studied at the ficole Normale and in Athens; was professor of literature at Nancy (1854-61) and at the Sorbonne (1863) ; be¬ came an Academician in 1874 ; in politics was a member of the moderate Opportunists, and

was deputy from 1881 to 1900, when he was elected senator for Meurthe-et-Moselle. Be¬ sides contributions to the Revue des Deux Mondes and Temps, he wrote (Shakespeare J (1861); (Shakespeare's Predecessors and Contemporari (1863); < Shakespeare's Contem¬ poraries and Successors* (1864) ; (Dante) (1865); (Petrarch > (1867); 'Goethe* (1872— 73); (In France* (1883); (Outside of France* (1883); (Mirabeau) (1891); 'Petrarch* (1895); (Dead and Living> (1898); 'The Passing Time* (1906); Portraits of Soldiers* (1907) ; (Ulbina Verba* (1914).

MlSZlfcRES, ma'zyar, Philippe de, French soldier, religious pilgrim and author: b. Cha¬ teau de Mezieres, Picardy, about 1327; d. Paris, 29 May 1405. While still very young he served under Lucchino Visconti in Lombardy and shortly afterward under Andrew, king of Naples. He served with the French army in Smyrna in 1346, was knighted and afterward went to Jerusalem where he endeavored to found an order of knighthood to be main¬ tained in the holy city for its protection against the Mohammedans. He visited Cyprus in 1347 and made a convert of Peter, the son of King Hugo IV ; and after the accession of Peter to the throne, in 1358, he returned to the island and became his chancellor, probably in 1360. He was associated here with the legate Peter Thomas, who became patriarch of Constanti¬ nople in 1364. Mezieres traveled with King Peter to the courts of western Europe, seeking support for a new crusade, and was with him at the capture of Alexandria in 1365. One-third of the booty was awarded Mezieres for the creation of his order, the plan of which was laid forth in his (Nova religio passionis) (1367-68), and which he extended in 1386 and 1396. Finding the Crusaders unwilling to aid him in realizing his dream Mezieres was com¬ missioned to visit Venice, Avignon and western Europe to enlist their aid for the kingdom of Cyprus against the sultan. Failing in his efforts he again sought converts for his order, but in 1368 returned to Cyprus, where he re¬ mained until the assassination of King Peter in 1369. In 1372 he was attached to the court of Pope Gregory XI, and in 1373 he became a counsellor of Charles V, at Paris. He enjoyed the king's full confidence and was tutor to his son, who became Charles VI. After the acces¬ sion of Charles VI, however, Mezieres retired to the Convent of the Celestines. He never lost touch with public affairs, but devoted him¬ self chiefly to literature and the endeavor to establish his order at Jerusalem. His writings are of great historical value. His life of his friend and confrere, Peter Thomas, 'Vita S. Petri Thomasii* (Antwerp 1659), contains a highly valuable account of the Alexandrian ex¬ pedition. Most of his writings concerned his project for the founding of his Order of the Passion, among them being (Songe du vieil pelerm)

(1389) and the autobiographical (Oratio traegedica.* He was an earnest worker for friendship between England and France, and greatly desired the marriage of Richard II and Isabella of France, believing that it would ensure peace between the two countries and that his crusade could then be successfully inaugurated. His ‘Epitre lamentable et con-solatoire) (1397) was written after the disaster

which overtook the Crusade of 1396, which he had not thought well advised. Consult Jorga, N., (Philippe de Mezieres et la croisade au xiv siecle* (1896).

MˆZIˆRES, France, capital city of the Department of Ardennes, on the neck of a peninsula formed by the Meuse, 55 miles north¬ east of Rheims, on the Eastern Railway. It is connected by a bridge with Charleville on the opposite bank of the Meuse, which, together with Arches, Pierre and Mahon, forms prac¬ tically one city with Mezieres. It was formerly a fortified town but its forts were dismantled in 1886. It was successfully defended by Bay¬ ard against Emperor Charles in 1521, but was besieged and taken by the Germans in 1815 and in 1871. It fell into German hands early in the European War in 1914 and remained in the enemy’s hands until after the signing of the armistice, 11 Nov. 1918. See War, European. Its parish church is a fine Gothic edifice dating from the 16th century. Together with Charle¬ ville it. forms an important manufacturing centre in the metallurgical industries. Pop. about 10,403.

MEZOTUR, me’zo-ter, Hungary, city in the County Jasz-Nagykun-Szolnok, on the Berettyo, an affluent of the Tisza, 88 miles east of Budapest. It is situated in a rich agricul¬ tural district for which it furnishes a trade centre, and there are extensive communal pas¬ toral lands upon which large herds of cattle are grazed. There are several large fairs held annually and the town has important potteries Pop. 25,835.

MEZZA-MAJOLICA. See Pottery Man¬ ufacture.

MEZZANINE, in architecture, a low win¬ dow occurring in attics and entresols. Some¬ times applied to an entresol. A mezzanine story is a half story; one lower than the stories above and below. In theatres it is usually a floor between the stage and the bottom of the deep cellars of

large theatres, from which floor the short scenes and traps are worked, the lcii gc scenes going* down through openings into the cellar; hence the name, from being midway between the stage and cellar floor.

„ MEZZOFANTI, Giuseppe Gaspardo, joo-sep pe gas-par do med-zo-fan te, Italian linguist *b-Boiogna, 17 Sept. 1774; d. Rome, 15 March 1849. He studied at the seminary of Bologna and took priest's orders in 1797. He was appointed librarian and professor of Ori¬ ental languages at the university; in 1831 went to Rome, there succeeded Angelo Mai as keeper o the Vatican Library (1833), and in 1838 was made cardinal. It is said that he was familiar with over fifty languages, and even with the provincialisms of these various tongues. Byron called him "a monster of languages, the Briareus of parts of speech.* His library and his_ papers came into the possession of the University of Bologna. His attainments were not entirely limited to proficiency in languages, but only one printed work of his, a eulogy of Emmanuele da Ponte, a Spanish Jesuit who had taught him Greek, is in existence. Consult the 'Lives* by Russell (1858; 2d ed. 1863) and Bellesheim (1880) ; Manavit, 'Esquisse Historique sur le Cardinal Mezzofanti* (18541* Quarterly Review,* Vol. Cl.

MEZZOTINT, met'so-, a process of en¬ graving on copper which dates from the 17th century. The smooth plate of the metal is abraded with a file-like tool, and tiny points are raised over the surface. These points catch and hold the ink, and an impression taken from a plate in this condition would give a soft velvety mass of black without variety of light and shade. A burnisher is next used to get rid of the raised points where half tones and lights are wanted. Sometimes where very brilliant high lights are required, they are cut away so as to ensure a smooth surface of copper. By means of this burnishing process, all grada¬ tions of light and shade are obtained from the white of the smooth copper to the black of the roughened plate. See Engravings.

MHOW, m-how', India, town and British cantonment, in the Rajput state of Indore, 13 miles southwest of Indore. The town, situated on an

eminence 1,800 feet high above the Gum-ber, is European in its appearance, having a church with a conspicuous steeple, a well-fur¬ nished library, a spacious lecture-room and a theatre. The cantonment is situated half a mile southeast of the town, and, in virtue of the Treaty of Mandsaur, is occupied by a con¬ siderable force. Mhow was one of the centres of the Sepoy mutiny of 1857. Pop. about

29,820.

miacidˆ:, one of the most recent and most, important families of creodonts, dis¬ tinguished by a single pair of carnassial teeth, and by a larger brain-case and more advanced brain than other creodonts. The feet were five-toed, and spreading, and their claws were small, sharp and partly retractile. In general the structure was a composite of characters that seems to have led by specialization to the vari¬ ous families of fissipede carnivores of more modern times. This development becomes very apparent in the Carnivora of the Eocene, especially in the direction of the dog-type. It may be said that the Miacidae represent the stock that in the Upper Eocene <(passed im¬ perceptibly into the Fissipedia, more obviously into the dog family,® which naturalists con¬ sider stands in the central line of fissipede development.

MIAGAO, me-a-ga'o, Philippines, a pueblo of the province of Iloilo, Panay, on the southern coast of the island on Iloilo Strait, 22 miles west of Iloilo, the provincial capital. Pop. 20,656.

MIAKO, me-a'ko. See Kioto.

MIALL, mi'al, Edward, English non-con¬ formist politician : b. Portsmouth, 8 May 1809 ; d. Sevenoaks, Kent, 29 April 1881. He studied at Wymondlev Theological Seminary, Hertford¬ shire; was pastor of independent chapels in Ware, 1831-34, and in Leicester, 1834-41 ; then removed to London, where he founded the Nonconformist, a weekly devoted to church disestablishment. From 1852-57 and aeain from 1869-74, he was a member of the House of Commons. He was one of the founders of the Liberation Society, and in 1858 was appointed to represent Nonconformity on the Education Commission. He urged the disestablishment of the Irish Church in 1856, and repeatedly moved for the formation of committee on English disestablishment. He was twice the recipient of valuable public testimonials. He wrote <The

Nonconformist Sketch Book) (1845), (The British Churches in Relation to the British People5 (1849). (Wayside Musings5 (1865), and (Social Influences of the State Church5 (1867). Consult the (Life5 by his son Arthur

(1867).

MIALL, Louis C., English naturalist : b. Bradford, 1842. He was made curator of the Leeds Literary Society in 1871 and professor of biology in the University of Leeds, 1876-1907 and was Fullerian professor of physiology the Royal Institution, 1904-05. He has written (Object Lessons from Nature5 (1891) ; Anat¬ omy of the Indian Elephant5 (1878) ; (Natural History of Aquatic Insects5 (1895) ; (Round the Year5 (1896) ; (Thirty Years of Teaching5 (1897) ; Unjurious and Useful Insects5 (1902) ; (House, Garden and Field5 (1904); and (The Early Naturalists5 (1912).

MIAMI, mi-am'e, Ariz., town in Gila County, in the Pina Mountains, 10 miles west of Globe and 60 miles east of Phoenix, on the Arizona Eastern Railway. The town owes its existence to the rich copper mines in its vicinity and dates from 1909, being incorporated in 1914. It is growing rapidly and the buildings are largely of concrete. Its light and power are supplied from the Roosevelt Dam, 40 miles to the northwest. Pop. (1920) 6,689.

MIAMI, Fla., town and county-seat of Dade County, at the mouth of Miami River on Biscayne Bay, and on the Florida East Coast Railroad. It has steamship connection with Havana, Nassau and San Juan. It is situated in an important citrus fruit and trucking district and is a shipping centre for great quantities of fruit and winter vegetables for the northern market. It has also a considerable fishing in¬ dustry; and sponge fishing also is carried on in Biscayne Bay. The town dates from its selection as the southern terminal of the Florida East Coast Railway in 1896, at which time it was practically non-existent. The railroad was later extended to Key West, and the erection of the Royal Palm Hotel formed the inauguration of the town as a winter resort. The United States subtropical laboratory is located here, and it is the site of the now abandoned Fort Dallas, famous in the Seminole War. Pop. (1920) 29,549.

MIAMI, Okla., village and county-seat of Ottawa County, 16 miles

southwest of Baxter Springs, Kan., on the Saint Louis and San Francisco, the Missouri, Oklahoma and Gulf, and the Oklahoma, Kansas and Missouri Interurban railroads. It is situated in a rich grain¬ growing district and there is a considerable in¬ dustry in lumber, as well as the mining of lead and zinc. Pop. (1920) 6,802.

MIAMI, a river of Ohio, which rises in Hardin County and flowing south and south¬ west for a distance estimated at 150 miles, pass¬ ing Troy, Dayton and Hamilton, enters the Ohio River at the southwest corner of the State, 20 miles west of Cincinnati. It is a rapid stream, passing through a picturesque and fertile country, and admits of navigation for only a portion of its length. Its principal branches are the West Branch, the Mad and the Whitewater rivers. The Miami Canal runs along the river for about 70 miles, and together they furnish extensive power for manufacturing

purposes. This river is sometimes called the Great Miami, in distinction from the Little Miami, which rises in Madison County, and after a southwest course of about 100 miles, nearly parallel to the former, enters the Ohio six miles east of Cincinnati. It is skirted for the greater part of its course by the Little Miami Railroad, connecting Xenia and Cincinnati.

MIAMI INDIANS, an American tribe of the Algonquian family, and first known to French explorers, in 1658 and then located near Green Bay, Wi's. In 1700 they removed to Illinois, Indiana, and Ohio, and later sepa¬ rated into two distinct tribes Wea and Pianki-shaw. In the Colonial wars the Miamis figured with both combatants, but eventually joined Pontiac's alliance in 1764, opposing the Amer¬ icans. After their defeat by General Wayne they signed a treaty at Greenville in 1795. They again joined the British against the Amer¬ icans in 1812, fighting under Tecumseh (q.v.). In 1827 they sold most of their lands and re¬ moved to Kansas. Disease killed off the ma¬ jority of them, and the remnant of the tribe located in Wabash County, Ind., until 1872, when they moved to the Quapaw Reserve in Indian Territory. In 1905 their numbers — which probably never at any time

exceeded 1,700 — in Indian Territory were 124, and in Indiana 243, all of mixed blood.

MIAMI UNIVERSITY, in Oxford, Butler

County, Ohio, is a coeducational institution. In 1788 J. C. Symmes purchased from the United States 1,000,000 acres of land, bounded south by the Ohio River, east by the Little Mi¬ ami, and west by the Great Miami. One condi¬ tion of this purchase was, that a full township, six miles square, should be set apart «for the endowment of an academy and other seminaries of learning.);> This condition was not complied with ; but as. the prospect of the establishment of a university within the bounds of Symmes' purchase had induced many to settle there, in 1803 Congress ceded to the State of Ohio the township of Oxford, to be held in trust for educational purposes. The university was in¬ corporated in 1809. The lands are leased for 99 years (renewable forever, without re-valua¬ tion), subject to an annual quitrent of 6 per cent on the purchase money. The govern¬ ment is vested in a board of 27 trustees ap¬ pointed by the governor of the State, nine of whom retire everv third year. A grammar school was established in 1818, and in Novem¬ ber 1824 the college department proper was opened. The school has normal and college departments, the courses leading to the degrees of B.A. and B.S. In 1916 there were connected with the institution 55 professors and in¬ structors and 789 students in the regular year, 1,154 in the summer school. The grounds and buildings were valued at $900,000. There were oyer 46,000 volumes in the library. The State aid amounted to about 205,652, and the total in¬ come from tuition, productive fund and State was $250,000. The first class, consisting of 12 members, was graduated in 1826.

MIAMISBURGH, ml-am'iz-berg, Ohio, city, in Montgomery County; on the Miami River and the Miami and Erie Canal, and on the Cleveland, Cincinnati, Chicago and Saint Louis and on the Cincinnati. Hamilton and Day-ton railroads; about 45 miles north by east of

Cincinnati. It is an agricultural region, where abundant water power has made it an important manufacturing place. It has large shipments of tobacco, manufactures and cereals. One of the largest Indian mounds in the State is iust outside the city. In March 1913 the city suf¬ fered severely from a river flood, the damage being estimated at $1,500,000. Pop. about 4,300.

MIANABUG, a Persian tick of the genus Argcis, greatly dreaded by travelers in former times; but its reputed powers of poisoning and otherwise harming humanity have been greatly exaggerated.

MIANTONOMOH, mi-an-td-no'md', an American Indian chief, a sachem of the Narragansetts, who succeeded his uncle, Canonicus, in 1636. In 1637 he assisted the early settlers of Massachusetts in the Pequot War. In 1643 he attacked Uncas, his bitter rival, was captured and turned over to the commissioners of the United Colonies at Boston. He was placed on trial before an ecclesiastical court, found guilty, condemned to death, and Uncas was commis¬ sioned to carry out the sentence. A brother of Uncas, however, assassinated the captive before the sentence could be executed. He was buried where he fell, and a monument was erected over the spot in 1841.

MIAO-TSE, me-ao-tse, or MIAU-TSI,

general name of. numerous aboriginal Chinese tribes dwelling in the provinces of Yunnan, Kweichow, Hunan, Kwangsi and Kwangtung, China. They are hillfnen and number some 80 tribes, with a population running into millions, although their numbers are decreasing. While nominally under Chinese rule they are prac¬ tically independent, maintaining their own government, customs and dress; the authority of the Empire extending only so far as to keep them within the hill districts and prevent their attacking their neighbors. They speak several dialects and the customs of the different tribes vary, considerably. The last serious uprising was in 1832, since when they have in the main kept to themselves. They are of low stature and more angular in feature than the Chinese, and somewhat darker of complexion. Consult Bridgman, E. C., Sketches of the Miau-tsP ; Williams, S. W., (The Middle Kingdom* (1883) ; Edkins, (The Miau-tsi Tribes* (1870) ; Boulger, D. C., (The History of China) (1898).

MIAS. See Orang-utan.

MIASMA, or MIASM (Gr., ˆpollution**), an ancient term, now obsolete, which meant a disease-producing emanation in the atmosphere, from decaying animal or vegetable material; malaria ; malarial poison. Diseases at one time supposed to be thereby produced were classified as miasmata — such as intermittent and remittent fever, typhus and typhoid fever. The term is used infrequently at the present day, as micro-organisms (bacteria-germs) are believed to be responsible for the spread of most of these diseases, and do not exist in the form of a miasm. While some of these organ¬ isms are carried by the atmosphere, and are in¬ haled, others are conveyed by insects

to articles of food, and are taken into the body when such ‘fpod is eaten. Others, still, are elaborated in a kind of mosquito (Anopheles) and injected into the blood.

ZAVOD, me-as’ke za-vod, or MIAS, MIYASS, or MIYASK, eastern Rus¬ sia, city in the government of Orenburg, in the Ural Mountains, 35 miles west of Chelia-binsk, near the Trans-Siberian Railway. It has important gold mines. Pop. 25,479.

MIAULIS, me-ow’les, Andreas Vohos, or Bokos, Greek admiral: b. Negropont, about 1768; d. Athens, 24 June 1835. His family name was Vokos or Bokos, his surname Miaulis being derived from the Turkish word for a felucca. He was a wealthy merchant captain living on the Island of Hydra at the outbreak of the Greek war of independence in 1821, and was appointed to the command of the Greek fleet. He assisted at the relief of besieged Missolonghi in 1822-23, and succeeded in blocking the Turks’ further advances after

their capture of Psara in 1824. He was able to supply troops and stores to Missolonghi in the second siege of 1825, although he could not prevent the fall of the town. He was outnum¬ bered by the Egyptian naval forces, but suc¬ ceeded in hampering their movements. He was superseded in the command of the Greek naval forces by Lord Dundonald in 1827, and there¬ after ably supported his successor, the repre¬ sentative of the powers intervening in behalf of Greece. After the establishment of Greek independence he was a vigorous antagonist of Capodistrias and the Russian party, and again commanded the fleet in the insurrection of 1831. He was one of the deputation commissioned to offer the Greek crown to King Otho, and he remained his staunch supporter. He was named by King Otho rear-admiral, and later, vice-admiral.

MICA (Lat. mico, flash), a mineral group, marked by high basal cleavage, and laminae which may be made very thin by a process of continued separation. The micas are silicates; muscovite, the commonest, is a silicate of potas¬ sium and aluminum, and is often styled potas¬ sium mica ; paragonite, or sodium mica, corre¬ sponds closely to muscovite, but has sodium in¬ stead of potassium; biotite, a silicate of mag¬ nesium, potassium and iron, is marked by its darker tints, and is commonly called magnesium iron mica; lepidolite is a lithium mica, with fluorine, potassium and aluminum in its com¬ position, and a rose tint. Mica is widely scat¬ tered in North America and Asia, especially India. Ruby colored mica, no matter what its provenance, is now called ˆIndian.® Europe has no commercial supply. Deposits are most frequently found in pegmatite (q.v.) dikes, varying in ‘thickness from a few inches to several hundred feet, and correspondinglv in length. Many other minerals accompany it, especially quartz and feldspar, and the mica is scattered through the dike, or vein, as the miners call it. Moreover, scarcely more than 10 per cent, and sometimes as little as 2 per cent, is commercially useful. Mica was well known in prehistoric America, traces of its use being widespread. A great shaft near Mount Mitchell, in North Carolina, was discovered in 1869. This not merely solved the question as to the origin of the early supply, but gave the first impulse to the mining of mica in the United States. Mica lands in North Carolina became tremendously valuable. This boom was quickly followed by the development of the in¬ dustry in southern New Hampshire; and this

in turn by important discoveries, in the 80’s, in Canada and India. In Quebec, Ottawa and Perth and Renfrew counties, Ontario, the sup¬ ply is of excellent quality, and hence is easily mined and cheap. Hindu labor and an excellent grade of mica make the output of Bengal, Bom¬ bay and the Madras presidency even cheaper. To classify the various sources of supply roughly, it may be said that India gives the world one-half, and Canada and the United States each about one-fourth of the entire sup¬ ply. Everywhere the (<veins® start near the surface; hence mining is simple. In New Hampshire there has been a break from the primitive methods, but in North Carolina, ap¬ parently the richest field in the United States, the mining is still unorganized, being done al¬ most entirely by farmers, with the simplest of tools, between crops. In this region, mica is largely used as a medium of exchange between farmers and storekeepers.

In 1870 mica waste was first utilized by Frederick Beck, who introduced the use of <(mica-flour,® or ground mica, as a coating

for cheap wall-papers. Scrap-mica, formerly worth¬ less, rose to $17 a ton, and then gradually fell to $6 or $7. This branch of the business is confined to the United States. Since 1895 there has been a fresh and most important use for mica, namely, as an insulator. For this pur¬ pose the sheets are split very thin and glued to cloth, then wound into rings for armatures. As a result of this variation of the uses of mica, only the colorless sorts, notably muscovite, are largely used for lamp chimneys and stove doors. Mica is also valuable as a lubricant, as an ab¬ sorbent of glycerine in making dynamite, and, in the case of the lithium silicates, such as lepido¬ lite, in the manufacture of lithium salts. See Mineral Production of the United States.

MICA SCHIST, shist, a schistose rock, metamorphic in nature, containing mica and quartz. The origin of most of the mica schists is uncertain ; the sericite variety seems to be the result of mountain-building forces acting upon igneous rocks ; other sorts are almost as certainly due to the same force acting upon sedimentary rocks. Mica occurring in schist is usually muscovite, that is, the colorless sort ; biotite, or dark mica, is less frequent. Various embedded minerals occur, notably garnets.

MICAH, mi'ka, the sixth of the minor prophets, dwelt in Moresheth, a little town, once a dependency of the Philistine city of Gath, but by the conquests of Uzziah reduced with the whole of western Judah, including the city of Gath, to Hebrew domination. His main public work was accomplished during the reign of Hezekiah. He dwelt on the great interna¬ tional highway between Egypt and Assyria and was led to take a wide view of the political movements in Western Asia in their effect upon his own people. He lived in the 8th century b.c. and he witnessed the ending of the northern kingdom, and the invasion of Pales¬ tine by Sargon and Sennacherib. He witnessed also the corruption of morals which Hezekiah only partially corrected. His prophecy is di¬ rected against Samaria and Jerusalem, whose sufferings for their sins and irreligion he de¬ clares shall be greater than those of Ba'bylon and the other Gentile cities. His style is pure and correct, his images bold, his denunciations full of strength and severity.

MICAH, Book of. The title of the book, i, 1, describes it as wthe word of Yahweh that came to Micah the Morashtite in the days of Jotham, Ahaz, and Hezekiah, kings of Judah.® In Jeremiah xxvi, 18, is a quotation from the words of the elders : <(Micah the Morashtite prophesied in the days of Hezekiah king of Judah.® The chronology of this period is some¬ what uncertain. The probable dates, however, are Jotham, 74CF736; Ahaz, 736-727; Hezekiah, 727ˆ 695. The title, like most similar titles, is doubtless a later editorial addition. Hence the evidence indicates most definitely the activity of Micah during the reign of Hezekiah. The most probable period is shortly before the cap¬ ture of Samaria, i, 5-6, perhaps about 724 b.c., although this might refer to a later period, inas¬ much as Samaria was not entirely destroyed at that time and, according to the Assyrian records, was active again not long after that event.

It is now quite generally agreed that Micah was not the author of the whole of the book. But there is much difference of opinion con¬ cerning the details of authorship. The most of chapters i-iii is a unity, with-the exception principally of ii, 12-13, and was doubtless written by Micah. This is throughout a message of condemnation with a prediction of punish¬ ment upon Judah, and to a minor degree upon Israel, for their sins. The remainder of the book contains some portions of a tenor similar to this, but consists for the most part of messages of blessing and restoration. There are two parts, chapters iv-v, and vi-vii. It seems reasonably certain that Micah was not the author of all of iv-vii, especially because of obvious inconsistencies, both within these chap¬ ters and as compared with i-iii : v, 2-4, e.g., is out of harmony with v, 5-6; iv, 11-13 is incon¬ sistent with iii, 12. The connection of thought in iv-vii is ‘not close so that evidently either the original order has been changed, or it was originally a composite of miscellaneous portions. The following portions in iv-vii are similar, as messages of punishment, to i-iii, and were probably written by Micah : v, 1, 10-13 ; vi, 9-16; vii, 1-6. Most of the remainder of iv-vii to¬ gether with ii, 12-13 contains messages of hope and restoration after disaster. It is a possi¬ bility that most of this may have been written by Micah. But, if so, it must have been at a different period, presumably much later, as Isaiah probably gave some messages that were distinctly of hope at the latter end of his ministry. The strong probability remains, how¬ ever, that these portions were not written by Micah but consist of various later fragments, mostly of the time of the exile and after the exile. The change of tone is less probable for Micah than for Isaiah, because Micah’s original message had in it no real hope, while that of Isaiah did, at least from an early

period in his ministry.

Micah is described as the Morashtite, mean¬ ing probaby an inhabitant of Moresheth-gath, Micah i, 14. This place is not mentioned out¬ side of this verse. It probably was a town named Moresheth, a dependency of the well-known Philistine city Gath. He was thus of the country, and shows a corresponding type of message, differing markedly from that of his contemporary Isaiah who was a city-dweller, an inhabitant of Jerusalem. Micah's denuncia¬

tion of the sins of the people and threats of punishment are similar to those of Amos. His most characteristic specific addition to the pro¬ phetic message is the prediction, first given by him, that Jerusalem shall be destroyed for the sins of the people, iii, 12. The later additions to Micah for the most part contain no specially notable message, vi, 6-8 give, however, a clear statement of the high prophetic ideal of life.

Bibliography. — Cheyne, T. K., (Book of Micah > ((Cambridge Bible,) 2d ed., Cambridge 1895) ; Smith, G. A., (The Book of the Twelve Prophets> (Expositor's Bible, > Vol. I, New York 1896) ; Smith, J. M. P., (Micah) (Hnternational Critical Commentary,* New York

1911).

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

MICAH CLARKE, a novel by Sir Arthur Conan Doyle, published in 1888. It presents in the form of fiction a graphic and vivid picture of the political condition in England during the Monmouth Rebellion (1685).

MICAWBER, mi-ka'ber, Mr. Wilkins, a

shiftless, unsuccessful optimist, always in trouble, but always sure "something will turn up,® one of the secondary characters in Dickens' (David Copperfield* (1849). He is a portrait of the novelist's father, not only in character but in the principal incidents in his career, and Mrs. Micawber, who has great faith in her hus¬ band, was patterned after Dickens' mother.

MICELLAR THEORY, in botany, the theory, proposed in 1862 by the Swiss botanist K. W. Nageli (q.v.), that the accretion of starch-grains and similar bodies within cells in a living plant, and the formation and growth of the walls of cells, was by means of mole¬ cules, each an aggregation of lesser molecules, to which he gave the name micellce. They are invisible to even the highest powers of a microscope. Two or more having united, the growth of the grain to be composed, or the cell-wall to be broadened, is accomplished by more micellae crowding into crevices between those already in place. Some important plant-physiologists have always refused to accept this hypothesis, which is now generally distrusted.

MICHAEL, mi'kel or mi'ka-el (Hebrew,

<(who is Godlike®), is spoken of in Daniel (x, 13, 21; xii, 1) as one of the <(chief princes,® and the ((great prince.® In Jude (verse 9) he is called the archangel who disputed with the devil about the body of Moses. In the Revela¬ tion (xii, 7) it is said ((there was war in heaven : Michael and his angels fought against the dragon.® From this expression it has been in¬ ferred that he was the chief of the celestial hierarchy. Milton calls him ((of celestial armies prince,® and ((prince of angels,® and attributes to him the command of the heavenly forces. He was ranked by Thomas Aquinas, followed by Dante, as the first of the seven archangels, a character in which he first appears in the Ethiopian Enoch, in which he is represented as executing the commands of God at Judgment Day, or presenting the prayers of the saints before the throne of God. In France especially churches dedicated to this saint, whose day in the Western Church is 29 September, are often built on the loftiest hill tops, to afford the

wamor angel a vantage ground in warring against the evil (<powers of the air® and driving off plague, drought and murrain.

atˆICLHAEˆ r» RHANGABE, or RHAG-ABE, Byzantine emperor: d. about 845. He succeeded Stauracius in 811 and after carrying on war with the Bulgarians was deposed in 813 by Leo V, an Armenian

general in his service, and spent the rest of his life in a convent.

MICHAEL II Balbus (The Stammerer), Byzantine emperor: d. 829. He came of an obscure Phrygian family, but was ennobled by Leo V. The latter, however, suspecting Michael of conspiracy against him, ordered the Phrygian to be put to death. Michael saved himself by the assassination of Leo and became emperor in 820. During his reign Sicily and Crete were lost to the Western empire.

MICHAEL III (The Drunkard), Byzan¬ tine emperor : d. 867. He was a grandson of Michael II, and in 842 succeeded his father, Theophilus, though his mother Theodora con¬ tinued regent till 856. With his uncle, Bardas, he made an expedition against the Bulgarians in 861 and converted the king of Bulgaria. In 866 he associated Basilius the Macedonian with himself in the government and was assassinated by him the next year.

MICHAEL IV (The Paphlagonian). Byzantine emperor: d. 1041. He received his surname from the place of his nativity, and be¬ came chamberlain to Zoe, wife of the Emperor Romanus III. On the death of Romanus in 1034 he became emperor and the husband of Zoe, who is presumed to have murdered Ro¬ manus because of her love for Michael.

MICHAEL V, Calaphates (The Calker), Byzantine emperor. He was a nephew of Michael IV, whom he succeeded on the throne. His banishment of the Empress Zoe led to a revolt in Constantinople, in which he was over¬ thrown and compelled to retire to a convent.

MICHAEL VI (The Warrior), Byzantine emperor. He succeeded the Empress Theodora in 1056, but after the expiration of a year was deposed by Isaac Comnenus and spent the rest of his life in a convent. He was the last of the Macedonian dynasty.

MICHAEL VII, Ducas or Parapinaces,

Byzantine emperor. He was the son of Con¬ stantine XI, and came to the throne in 1071. He was a weak monarch, the prey of unscrupu¬ lous favorites, and an insurrection in 1078 drove him from. the throne and into a monas¬ tery.

MICHAEL VIII, Palaeologus, Byzantine emperor: b. 1234; d. 1282. After having com¬ manded the French mercenaries employed by the emperor of Nicaea he became one of the guardians of the Emperor John Lascaris in 1259. The next year he was proclaimed joint emperor of Nicaea in 1260, and the next year, after deposing his colleague

Lascaris, became sole monarch. In the same year he wrested Constantinople from the Latins and was shortly afterward crowned emperor of the Byzantine empire. He made an unsuccessful attempt to effect the union of the Western and Eastern Churches.

MICHAEL IX, Palaeologus, Byzantine emperor : d. 1320. He was the son of Andro-

nicus IT, with whom he was associated in the government after 1295, but died before his father.

MICHAEL, Tsar of Russia. See Roman¬ off.

MICHAEL, Arthur, American chemist : b. Buffalo, N. Y., 7 Aug. 1853. He was edu¬ cated at the universities of Berlin and Heidelberg, and at the ficole de Medecine de Paris. He was professor of chemistry at Tufts Col¬ lege in 1882-89 and in 1894-1907, and was pro¬ fessor emeritus there in 1907-12. Since 1912 he has been professor of organic chemistry at Harvard University. He is a member of the National Academy of Sciences. He has made extensive researches in pure chemistry and published reports of his investigations in the (Proceedings } of the National Academy of Sciences; the American Chemical Journal; and the (Berichte der deutschen hemischen GesellschaftP

MICHAEL, Attaliates, Byzantine jurist : lived in 11th century. He wrote a history of the years 1034-79; and published a succinct and methodic abridgment of the Basilicae (1073).

MICHAEL, a pastoral ‘narrative in 482 , lines of blank verse, by William Wordsworth, was composed and published in 1800. In a let¬ ter to Fox, 14 Jan. 1801, Wordsworth writes: <(In the two poems, (The Brothers) and (Michael, > I have attempted to draw a picture of the domestic affections, as I know they exist among a class of men who are now almost con¬ fined to the north of England. They are small independent proprietors of land, here called statesmen, men of respectable education, who daily labor on their little properties …

Their little tract of land serves as a rallying-point for their domestic feelings, as a tablet upon which they are written, which makes them objects of memory in a thousand in¬ stances, when they would otherwise be for¬ gotten.® The theme of Michael, as suggested in Wordsworth’s letter, has two phases: the love of a ˆstatesman® for his little landed property in the hills, and1 of a father for his son. The

story of the poem is founded upon fact. To Michael and his wife in their old age is born a son, Luke, whom his father cher¬ ishes both as a companion and as his heir. When Luke is 18 years old, Michael, through the fault of another, loses a portion of his property. Luke must go to the city and there earn enough to redeem the land. ‘Before the boy leaves, he lays the. cornerstone of the sheepfold which he and his father were to build together, now left for the old man to build alone. Far away in the city, Luke is finally led away by bad companions and is heard from no more. The old father’s heart is broken ; the sheepfold, symbol of his faith and love, is never finished.

f Michael > is an illustration of Wordsworth’s theory that the emotions find their best soil in common life, where they (<are incorporated with the beautiful and permanent forms of nature.® Michael himself is perhaps Words¬ worth’s ideal man, and, possibly because he was the type best known to the poet, is more clearly portrayed and more highly indi¬ vidualized than any other of Wordsworth’s characters. He has the ruggedness, strength

and majesty of the Westmoreland hills among which he lives. The setting, the characters and the story of the poem are too interdependent, too integrally fused, to be separately analyzed. The style, classical in its simplicity and re¬ straint, and stripped of all extraneous ornament almost to severity, is merely a crystal medium through which appears the essential poetry of the subject. The magical suggestiveness of such lines as

“Hence had he learned the meaning of all winds,”

and

“ . he had been alone

“Amid the heart of many thousand mists,”

are far surpassed both in suggestiveness and essential poetry by the simple passage which states that the old broken-hearted father often tried to complete the sheepfold, and that

“many and many a time he thither went “And never lifted up a single stone.”

Marion Tucker.

MICHAEL AND HIS LOST ANGEL.

Mr. Henry Arthur Jones during his long career as a playwright wrote more than half a hun¬ dred plays which may be roughly divided into three categories, — melodramas, comedies of manners and ‘serious plays. Of the latter group (Michael and His Lost Angel > is gener¬ ally regarded by writers on modern drama as the most notable. This consensus of opinion is the more interesting in view of the fact thai although on 15 Jan. 1896 the play received the rare distinction of a simultaneous production in London and New York, with Forbes-Robert- son and Marion Terry in the principal roles in London and Henry Miller and Viola Allen in New York, it failed in both places, was with¬ drawn in its second week and has never been revived. The two chief characters are familiar ones on the stage and especial favorites with Jones, namely, the priestly ascetic and the worldly siren. The opening scene is thor¬ oughly effective. Michael Feversham, an aus¬ tere young clergyman, has forced the erring daughter of his secretary to public confession of her sin in the church before all the towns¬ people. When Audrie Lesden, a mysterious and charming new parishioner, presently ap¬ pears on the scene, we are left in no doubt from the moment of her entrance that she is the temptress ; her tempting, indeed, is so obvious, the fall of Michael so predestined, and the ex¬ piation of his guilt by public confession so plainly foreshadowed in the first scene, that there are no surprises. A more serious defect is that the author fails to enlist the sympathy of his audience for either of his main charac¬ ters. Michael remains a <(holier than thou® prig with what the Freudians would call an “impurity complex,® and Audrie is so patently selfish and frivolous that only an actress of very great personal charm could make Mi¬ chael’s infatuation convincing.

MICHAEL KOHLHAAS. This story by Heinrich von Kleist was published as the first of his Erzahlungen, “Stories® (1810), after a fragment of the story had been issued in a periodical, Phoebus, two years before. Michael Kohlhaas, an upright and highly respected horse-dealer, is wantonly wronged by a young nobleman; after fruitless efforts to obtain jus¬ tice from the legally constituted authorities, he

resolves to take matters into his own hands, even in rebellion against the social order which has failed to afford him protection. With pathetic obstinacy he still insists upon the simple terms of his original claim, even after the forces which he has gathered about him have engaged in a kind of civil war. Ultimately he gains his contention, recompense for his loss and the punish¬ ment of the privileged offender, but he himself suffers death as a penalty for crimes committed while seeking justice in his own way. The outlines of the story Kleist took from the career of Hans Kohlhase (executed in 1540), which was probably familiar to him both by oral tradition and through the chroni¬ cles of Hafftitz and Leutinger. But Kleist used the artist’s prerogative and altered the material at will, creating the characters anew, and supplying the substance with an ethical problem. Through a sense of personal wrong, following his own conception of justice, a man of spotless integrity becomes a criminal and. an outlaw. The problem of so-called folk-justice, which is here illustrated, has been notably treated elsewhere in German literature, con¬ spicuously in Ludwig’s ˆrbforster.* Kleist followed his historical source in . introducing Martin Luther into the story of his hero, and presents a firmly drawn portrait of the German reformer. The story is a masterpiece of nar¬ rative skill; it is all narrative, without de¬ scription of people or of places, without com¬ ment or sentiment; it moves forward with the simplicity of a chronicle, one event following another in tragic and inevitable succession. (Michael Kohlhaas* is one of the most power¬ ful stories in the whole range of German fic¬ tion. It was translated into English by Fran¬ ces H. King in (The German Classics* (Vol.

Iy).

Harvey W. Thayer.

MICHAEL OBRENOVITCH III, o-bren’- o-vich, Prince of Serbia: b. Kragujevatz, 4 Sept. 1823 ; d. near Belgrade, 29 May 1868. He was the youngest son of Prince Milosh, and after the abdication of his

father, in 1839, and the death of his brother Milan Obrenovitch II, in 1840, he succeeded to the throne of Serbia. His effort to continue the policy of his father, which was to free Serbia and the Christian peoples of the Balkans generally from Turkish rule, met with the support of Russia and the determined opposition of Turkey and Austria, together with that of the party which had de¬ posed his father. A revolt in 1842 resulted in the election of Alexander Karageorgevich as Prince of Serbia, and Prince Michael was forced to leave the country. In 1858 his father, Prince Milosh Obrenovitch II, was recalled to the throne and upon his death in 1860 Michael succeeded him. He at once set about securing the emancipation of Serbia's internal affairs from Turkish domination, secured an under¬ standing with Montenegro, Greece, Austria and the Bulgarian, Bosnian and Albanian leaders for either support or non-intervention in case of war with Turkey, and demanded the with¬ drawal of Turkish troops from Serbian for¬ tresses. He was supported in his demands by the influence of Great Britain, Russia and Aus¬ tria, and Turkey yielded, the forts being sur¬ rendered 26 April 1867. He largely reorgan-MICHAEL1S — MICHAELMAS

ized the administration of public affairs, strengthened the military organization, and placed his country in the ranks of civilized European states. A plot against him was or¬ ganized by the followers of the deposed Karageorgevich dynasty and resulted in his assassi¬ nation. He was succeeded by a cousin, Michael Obrenovitch IV.

MICHAELIS, me-ka-a'lis, Adolf, German archaeologist: b. Kiel, 22 June 1835; d. Strassburg, 10 Aug. 1910. He was educated at the universities of Berlin, Leipzig and Kiel, and in 1862 became professor at Griefswald. He was appointed professor of classical philology and archaeology at Tubingen in 1865, and from 1872 he was professor of archaeology at Strassburg. He became a member of the German Central Archaeological Institute at Rome in 1874 and published a history of its activities (Berlin 1879). He edited O. Jahn's (Bilderchroniken) (1873) and Springer's (Handbuch der Kunst-geschichte> (1898, 1901, 1904, 1907). His chief publication was his critical edition of Tacitus' (Dialogus de Oratoribus> (1868). He was also author of the archaeological treatises (Der Par¬ thenon (1871) ; cAncient Marbles in Great Britain0 (trans. by Fennell, 1882) ;

ˆtrassburger Antiken (1901) ; (A Centry of Archae¬ ological Discoveries) (trans. by Kahnweiler, 1908), *etc.*

MICHAELIS, Georg, German statesman : b. 1857. After entering the civil service he acted as a teacher in the German school at Tokio from 1885 to 1889. On his return to Germany he served in various provincial posts as a state attorney. He was appointed director of the Churches and Schools Administration in 1897 and after a period of office in Breslau he became under-secretary in the Prussian min¬ istry of finance. Early in the European War Herr Michaelis, while retaining his post in the ministry, was selected as director of the ((War Corn Office,® one of the first establishments set up to deal with the food problem. On the fall of Bethmann-Hollweg in July 1917 Dr. Michaelis, then an almost unknown bureaucrat, was appointed Imperial Chancellor by the Kaiser. The appointment occasioned much sur¬ prise and speculation ; the only one of the eight imperial chancellors of the German Em¬ pire from Bismarck to the end of the European War who was not a member of the nobility, Dr. Michaelis was destined to a short and in¬ glorious tenure of that high office. After little more than three months he was dismissed. The charges against him were somewhat obscure and can only be described as a general accusa¬ tion of incompetence — inability to procure peace or to satisfy any political party in Ger¬ many. The Socialist organ, Vorw'drts, declared that ((the remaining of this man in office con¬ stitutes a paralysis of all political functions of the empire abroad and at home.® Count Hert-ling (q.v.) was appointed Chancellor on 1 Nov. 1917 and Michaelis retired from the stage deco¬ rated with the Chain of the Grand Cross of the Red Eagle.

MICHAELIS, Johann David, yd'han

da'ved me'ha-a'ITs, German biblical scholar : b. Halle, Prussia, 27 Feb. 1717 ; d. Gottingen, 22 Aug. 1791. He studied at the University of Halle, traveled in Great Britain and Holland, became professor of philosophy at Gottingen in

1746, and professor of Oriental languages there in 1750. He was one of the editors (1 753— 70) of the Gottingen gelehrte Anzeigen, and served for a time as librarian to the university. Mod¬ ern biblical criticism in Germany sees in Michaelis one of its forerunners, whose works are of interest in the history of its develop¬ ment. They include his (Hebraische Grammatik) (1778) ; (Einleitung in die gottlichen Schriften des neuen Bundes) ; (Mosaisches Recht* ; <Moral)

(1792-1823) ; (Orientalische und exegetische Bibliothek) (1786-93). Con¬ sult his (Lebensbeschreibung von ihm selbst abgefasst,* ed. by Hassencamp (1793), and his letters (1794-96). Consult the (Life) by Smend (1896).

MICHAELIS, Karin (Mrs. Charles Emil Stangeland), Danish author: b. Randers, 20 March 1872. Her maiden name was Beck-Brondum, and she was married in 1895 to Sophus Michaelis (q.v.), from whom she later separated. She was married to Charles Emil Stangeland, an American, in 1912. Author of (Hoit SpiP (1898); (Hellig Enfold> (1903); (Den Farlige Alder) (1910) ; (Grev Sylvanus Hcevn) (1911).

MICHAELIS, Karoline. See Vascon—

cellos, Karoline Michaelis.

MICHAELIS, mi-ka-a'Hs, Sophus, Danish author: b. Odense, 14 May 1865. He was edu¬ cated at the University of Copenhagen and afterward engaged in extensive foreign travel. He is known as a novelist, poet and dramatist, and also made translations of Flaubert's cSalammbo> ; (Sucassin et Nicollete) ; and (Tentation de Saint Antoine.* He edited Kunst in 190(H)6. Author of <Solblomster) verse (1893) ; <yEbelo,) romance (1895) ; (Livets Fest) (1900) ; <Palmerne) (1904) ; the novels (Dodedansen) (1900) ; <Giovanna) (1901) ; and the dramas <Revolutionsbryllup) (1906) ; (Den Evige Sovn) (1912), *etc.*

MICHAELIUS, me-ka'le-oos, Jonas, first Dutch Reformed minister in America : b. in the north of Holland, 1577; d. Holland, after 1637. He studied at Leyden, had a country church in Holland from 1612 to 1616; was sent to San Salvador, Brazil, in 1624; was transferred thence to Guinea in 1626; and in 1628 went to Manhattan, where he organized a consistory after the Dutch Reformed government, remain¬ ing probably until 1633. His last years were spent in Holland. A letter written by him in 1628, and now preserved in the New York Public Library, describes the condition of the New York Indians, urging work among the children; it is published in the New York His¬ torical Society's <Collections) (1880).

MICHAELMAS, mik'el-mas, the feast of Saint Michael and All Angels, 29 September. The festival was first appointed by Pope Felix III, 480. In the Greek Church it did not origi¬ nate earlier than the 12th century. It was an old custom in England to mark the day by electing civil magistrates, perhaps in allusion to the analogy between the superintendence of magistrates and that of guardian angels, of whom

Saint Michael was reported the prince. A more famous custom is that of eating roast goose, the origin of which has long exercised the wisdom of antiquaries. The traditional Michaelmas goose has been traced at least as

far back as the 10th year of Edward IV ; and it is said that one of the strongest objections of the English commonalty to the reformation of the calendar was based on the confusion which would follow if Michaelmas day was not celebrated when stubble geese are in their highest perfection. There is an old proverb <(If you eat goose on Michaelmas day, you will never want money all the year round.® Con¬ sult Chambers's (Book of Days.)

MICHAL, wife of King David and younger daughter of King Saul. After David was driven away from court and his life saved by Michal, who favored his escape, her father married her to Phalti, from whom David event¬ ually recovered her, but was permanently alien¬ ated from her by her levity and want of sym¬ pathy with his enthusiastic joy over the return of the ark to Jerusalem.

MICHALOWSKI BLASTING POW¬ DER. See Explosives.

MICHAUD, Joseph Francois, zho-zef fra li-swa, French historian: b. Albens, Savoy, 19 June 1767; d. Passy, 30 Sept. 1839. He became a journalist at Paris, where he wrote for Royalist papers and stoutly upheld the monarchy; and in 1794 established the Quo - tidienne. His opposition to the Revolution brought upon him sentence of death (27 Oct. 1795), and though the sentence was later re¬ voked, he was finally exiled by the Directory and went into hiding in the Juras. He was allowed to return under the consulate, but re¬ mained an apologist of the Bourbons, and at the Restoration took up the publication of the Quotidienne. The well-known 'Biographie moderne) was published under his direction and part of the (Biographie universelle) He was elected to the Academy in 1823. Among his more important works are 'Histoire de I 'Empire de Mysore) (1801); 'Histoire de Croisades) (181 2— 22) ; 'Dernier regne de Buonaparte)

(1815) ; and Collection de memoires pour servir a l'histoire de France depuis le XHIme Siecle) (1836-39).

MICHAUT, me-sho, Gustave Marie Abel,

French literary critic and educator: b. Perrigny, 20 Feb. 1870. He was educated at the ficole Normale Superieuer, was professor at the Uni¬ versity of Fribourg, Switzerland, in 1894-1904, and has since been lecturer at the University of Paris. He lectured in the United States in 1911. He was laureate of the French Academy in 1896, 1901, 1903, 1907. Author of 'Edition des Pensees de PascaP (1896) ; 'Des Discours sur le passions de l'amour de B. PascaP (1900); 'Les Pensees Marc-Aurele (1901); 'Etude sur le livre d'amour de Sainte-Beuve (1905) ; 'De la poesie frangaise jusqu 'au regne Henri quatrieme® (1908); 'Honore d'UrfeP poems (1909); 'Pages de critique et d'histoire litteraire) (1910); 'Anatole France; etude psychologique) (1914), *etc.*

MICHAUX, Andre, an-dra me-sho, French botanist: b. Satory, Versailles, 7 March 1746; d. Madagascar, 16 Nov. 1802. His father, a rich farmer, took him into partnership, but the death of his wife soon after their marriage drove him to the study of botany and to travel. He traveled through France and England in 1779-81 ; then through Persia and to the bor¬ ders of Tibet (1782-85) ; and in 1785 to North

America, where he made an exhaustive study of the flora of the Atlantic Coast, and near Charleston, S. C., and in Bergen County, N. J., established large nurseries. In 1800 he set out to investigate the flora of Madagascar, where he died. He wrote a 'History of the Oaks of North America) (1801) and 'Flora Boreali-Americana) (1803).

MICHAUX, Frangois Andre, French bota¬ nist : son of Andre Michaux (q.v.) : b. Ver¬ sailles, 1770; d. Vaureal, 23 Oct. 1855. He was his father's assistant, and in 1802 and 1806 was sent to North America by the French govern¬ ment. He wrote a 'Journal } of his travels, translated into English (1805); 'The Natural¬ ization of American Forest Trees) (1805) ; and the important 'North American Sylva) (3 vols., 1810-13), translated by Hillhouse 0817-19) and completed, for western America, by Nuttall

(1842-50).

MICHEL, me'shel', Claude (Clodion),

French sculptor: b. Nancy, 20 Dec. 1738; d. Paris, 29 March 1814. He went to Paris in 1755 and studied sculpture under his uncle, Lambert Sigisbert Adam, and later under Pigalle. He was awarded the grand prize for sculpture at the Academie Royale in 1759, and in 1761 the first silver medal for studies from life. He lived in Rome in 1762-71, studying and working, the years 1767-71 being especially productive. He was invited to Petrograd by Catherine II, his fame being widespread by this time, but eventually decided upon his return to Paris. He rapidly gained a large patronage, executing orders for the Chapter of Rouen, the Direction Generate and the States of Languedoc. His work ranged from serious groups and statues of splendid line and noble conception, to delicate statuettes, usually of terra cotta, and portraying cupids, fauns, nymphs and simi¬ lar subjects. During the Revolution he returned to his birthplace, Nancy, where most of his time until 1798 was spent in modeling decora¬ tions for houses. He is perhaps best known for his statuettes, which are treasured in both private and public collections. Among his work may be mentioned the statue of Montesquieu; the 'Dying Cleopatra) ; 'Vestal Crowned with Flowers) ; a mantelpiece in the South Kensing¬ ton Museum; and the statue and relief of Saint Cecelia in the Cathedral at Rouen. In New York his work is represented at the Metropoli¬ tan Museum by statuettes in the Morgan and Altman collections. Consult Thirion, 'Les Adam et Clodion) (1885) ; Jacquot, 'Les Adam et les Michel et Clodion) (1898).

MICHEL, Dan (Dominus or Master), or MICHEL OF NORTHGATE, English trans¬ lator and brother in the cloister of Saint Augustine of Canterbury: lived 1340. He is known only through his translation of a French moral treatise written in 1279 by Frere Laurens (Latin name Laurentius Gallus), for Philip III, of France. The French manuscript is entitled 'Le Somme des Vices et des vertus) ; and Dan Michel's translation into the Kentish dialect is known as 'The Syenbite of Inwit,) i.e., 'The Again-biting of the Inner Wit,) or 'The Re¬ morse of Conscience.) The manuscript is auto¬ graphed by Dan Michel and dated 1340. It is preserved in the Arundel manuscript 57, and is of high philological value as an authentic and dated specimen of the Kent dialect of the 14th

century. Consult editions by Stevenson for the Roxburghe Club (1855); Morris for the Early English Text Society (1876).

MICHEL, Francisque Xavier, French archaiolGgist : b. Lyons, 18 Jan. 1809; d. Paris, 18 May 1887. He was educated at Lyons and became known for his work in editing French manuscripts of the Middle Ages. He was sent to England in 1833 and to Scotland in 1837 for the purpose of making researches for the French government. He was appointed professor of foreign literature at the Faculte des lettres at Bordeaux in 1839. He edited numerous manu¬ scripts written between the 11th and 14th cen¬ turies, among them 'Chanson de Roland) and c Roman de la Rose.) He later translated into French many works of Goldsmith, Shakes¬ peare, Sterne and Tennyson; and he was author of (Histoire des races naudites de la France et de l'Espagne> (2 vols., 1847) ; 'Recherches sur le Commerce pendant le moyen-age> (2 vols., 1852-54) ; < Etudes de Philologie comparee sur 1'argoD (1856); 'Histoire du commerce et de la navigation a Bordeaux^ (2 vols., 1867-71), *etc.*

MICHEL, Frangois Emile, fran-swa a-mel me-shel, French painter and art critic: b. Metz, 19 July 1828; d. 24 May 1909. After studying under Migette and Marechal, he made his debut in the Salon in 1853, since which he has produced 'Summer Nights) (1872); 'Sow-ing in Autumn) (1873) ; 'The Harlem Sound) (1885) ; the two latter being now in the Luxem¬ bourg. He was elected to the Institute in 1892. Among his works are 'Rembrandt) (1886); 'Jacob van Ruysdael et les paysagistes de 1'ecole de Haarlem) (1890); 'Le maitres du paysage) (1906); 'Nouvelles etudes sur l'histoire de 1'arD (1908) ; 'La foret de Fontaine-bleu) (1909).

MICHEL, Louise, French anarchist: b. Vroncourt, Upper Marne, France, 29 May 1830; d. Paris, 9 Jan. 1905. When very young she wrote verses of unusual power and in 1860 opened a school in Paris. In the Franco-Ger¬ man War she tended the sick and wounded and took part in the sorties from Paris; and during the government of the Commune in 1871 she fought at the barricades, was made prisoner, sentenced to deportation for life, and spent some years in New Caledonia, but was pardoned by the amnesty of 1880 and returned to Paris, where she edited 'La Revolution sociale) and continued her anarchistic teachings. She was imprisoned in 1883 and in 1886, later made her home in London, where she continued her work and returned to Paris in 1895. Her sobriquet, (<The Red Virgin of Montmartre,® was a tribute to the purity of her life. She published 'Le Coq Rouge); 'Les Meprisees) ;

‘Ses Mem¬ ories) ; ‘L’Ere NouvelleP Consult Gerault, E., ‘La bonne Louise) (1906).

MICHELANGELO, Buonarroti, ml-kel- an’je-lo or me-kel-an’ja-16, boo-6-nar-ro’te, whose name during his lifetime was written as Michelagnolo (or Michelangiolo) di Ludovico di Buonarroti-Simoni ;. Italian sculptor, painter and architect: b. Caprese, Tuscany, 6 March 1475; d. Rome, 18 Feb. 1564. The family was well established as a family of citizens in Flor¬ ence ; but had been allowed heraldic bearings, a custom not unusual in relation to the control¬ ling families of the Italian cities.

At a very early age Michelangelo became a student of fine art, entering first the workshop of Domenico Bigordi, called Ghirlandajo, and studying also in a primitive kind of art school which had been formed in the palace and gar¬ dens of Lorenzo dei Medici. It appears that the extraordinary abilities of the boy were noticed by his patrons and also by the artists of the epoch from the first. Michelangelo thought of himself only as a sculptor, and he put his energies into the study of bas-relief and statuary ; studying the remains of Graeco-Roman antiquity which were accessible, and producing works of such importance as caused surprise to his contemporaries, although most of these very early works are either lost alto¬ gether or are uncertain — pieces which are usually ascribed to this epoch not having cer¬ tain ascriptions. The earliest very important work which has remained to us is the Pieta, which is now in a chapel of Saint Peter’s Church at Rome. The figures are slightly larger than life, the Madonna holding the body of Christ on her lap in a not unusual attitude; a belt passing over the left shoulder of the Virgin is inscribed with the name of Michel¬ angelo the Florentine: which is for years the only case in which Michelangelo signed a piece with his name. The famous group of the Madonna and Child in the Church of Notre Dame at Bruges, in Belgium, is generally ac¬ cepted as the work of Michelangelo, and if so, was of this early epoch. The reason for its transportation to Bruges is disputed. An en¬ tirely authentic piece of the time is a colossal David, which having been for three centuries in the open air at the portal of the Palazzo Vecchio at Florence, is now under shelter in the Accademia in the same city. This extraordinary work is a frank attempt to render the as yet imperfectly developed form of a very young man.

The only portable painting which can with certainty be ascribed to Michelangelo belongs to the closing years of the 15th century, when

Michelangelo was approaching the age of 25 years. This is the circular picture, a Madonna with the Child and Saint Joseph, in the Uffizi Gallery. The fact of his producing this and several other small works of painting is not to be counted against his accepted position as a sculptor; for most of the artists of the time practised in the different arts, and it is probable that Michelangelo, was at this time much less in the habit of painting than were other sculp¬ tors of well-known ability. His own continual occupation upon works of pure form in marble was a sufficient reason for his continued absten¬ tion from the sister arts.

With the election of Pope Julius II began the Roman life of Michelangelo, for he was called upon by the new Pope in 1505 to build a great monument which the Pope desired to finish within his own lifetime. This monu¬ ment was never completed, however, and the controversies and other difficulties which arose continually with regard to it, embittered a large part of the great artist's life and consumed time which could but ill be spared from actual work. The great statue of Moses, which was executed at a somewhat later time (not to be exactly fixed), was the only very important piece of statuary completed for this tomb.

In 1506 Michelangelo returned to Florence,

and at that time there was a decided pause in the work upon the tomb, as other thoughts had taken up the mind of the Pope. Indeed, his return to Rome was followed immediately by the commencement of the painting upon the vault of the Sistine Chapel. This work as we have it is much the most important piece of mural painting of the modern world, for it occupies the whole vaulted room, 133 feet long and 45 feet wide, and is one continuous and unbroken composition containing hundreds of figures, life-size, of heroic size, and colossal, and done in pure fresco, except as it has been retouched in places, either by the artist himself or in later times, in what is called dry fresco — that is to say, the colors laid upon the dry plas¬ ter. There is this marked characteristic of the painting — that it has no landscape

backgrounds except in the small compartments devoted to The Deluge and The Temptation, nor any other accessories as of costume, arms, buildings and the like, but is everywhere a simple architec¬ tural composition of painted pedestals and corbels seeming to carry figures which them¬ selves are painted in the most abstract way — studies of the human form simply dressed and having no artistic interest other than that. It has generally been considered that the paintings draw their only importance from the astonish¬ ing power of the draughtsmanship and the great composition of abstract lines ; but a more care¬ ful consideration of what they were before their partial defacement by the smoke of can¬ dles and the injuries and repairs which they have received, shows that the work is one of interest as to color composition as well. Michelangelo has never shown himself to be a colorist in the sense in which Correggio and the great Venetians were colorists, but then the medium in which he painted was fresco, that is, painting upon wet plaster, which does not lend itself to elaborate combinations of warm and profuse coloring — its tendency is always to¬ ward pale combinations and the expression of delicately modulated form rather than of chro¬ matic splendor. It is not, however, intelligent criticism to say that these paintings are the work of a sculptor taken rudely from the practice of his own art. On the other hand, it is quite un¬ reasonable to say, as some English critics have said, that the turning of Michelangelo to sculp¬ ture had been unfortunate, as depriving us of the greatest of Christian religious painters while giving us only a melodramatic sculptor. The truth is that this artist is the most perfect exemplar of that way of 'treating all fine art, of which form alone (pure and abstract and al¬ most separated from its usual purpose, as that of description and narrative), is the subject studied and gives the effect sought. Every¬ thing else — truth of anatomy, expression of face, energy of pose and of apparent movement — is subordinated to the one important thing, the getting of form which would be splendid in the artist's eyes. If, then, we have to regret a frequent excessiveness and extravagance of design, it can only be said that the extraor¬ dinary energy and force of the man, driving him on to undertake more than mortal man could achieve even had he been (as Michel¬ angelo was not) left to pursue his own course in peace, resulted as of necessity in frequent exaggeration in the very desire to give vigor and as yet untried combinations of form as

shown in the human body posed singly or in elaborate groups.

After 1513, when Julius II died, Michel¬ angelo undertook a fagade

for the church of Saint Lorenzo in Florence. This front was never finished; but not long after he began the building of a new sacristy for this church, in which square room, very finely adorned with classical architectural forms, are the two re¬ markable tombs of the princes Lorenzo and Giuliano dei Medici. These monuments have each a seated statue of the prince in question, raised high above the sarcophagus ; and on the lid of the sarcophagus two colossal reclining figures, in each case one man and one woman. The sculptures are not all completed. The ex¬ traordinary power of their modeling has made these monuments very famous fn the modern world.

About 1535 Michelangelo settled finally in Rome, and from that time until his death was very much occupied as an architect in connec¬ tion with the great church of Saint Peter. The building had been going on for many years, and different architects had successively changed the design, so that Michelangelo took up the work at that point where it became necessary to roof the central mass. This he did by means of the famous cupola which dominates the city of Rome and the country around, although the rounded shell of stone itself was not erected during his lifetime.

As an architect Michelangelo was not, on the whole, beneficial to Italy or to the art of the 16th century, because he had never, as a youth, studied construction or the use of details, and because his almost exclusive devotion to more elaborate and organic forms than those possible to architectural masses, prevented his designing such features as frontons and consols with gravity and simplicity. The architecture inspired by him, and more especially that pro¬ duced by his immediate successors, ran to ex¬ travagance; and the worst period of Italian decorative art was to follow upon his own epoch of work. The sculpture of his later years is much less important and much less in quantity than might have been expected ; but the work upon the church occupied his energies, and in 1535 he was appointed by Pope Paul III, archi¬ tect, sculptor and painter to the papal palace, and he began work immediately upon the east wall of the Sistine Chapel. Here he painted that prodigious (Last Judgment filling all the wall above the altar, including the lunette, and up to the nearly semi-circular vault. The pic¬ ture is, like the ceiling paintings, entirely a study of the human body in vigorous action, and in highly studied pose. As a work of color, or even of light and shade, it is almost unrecog¬ nizable for what it was, as the smoke of the candles on the altar has caused very great changes in color, and has led to repainting, and because of certain painted additions made in the next century in order to disguise the com¬ plete nudity of the figures.

Throughout his life Michelangelo had been a writer of verse, and it is known that import¬ ant sonnets of his were left by him. These, however, were edited in a destructive manner by his nephew, so much so that we have at the present day no certain knowledge, even, of what the poems were as thev left Michelangelo's hand. This part of his intellectual life has been

Painting by Alexander Cabanel

STATUE OF MOSES, BY MICHELANGELO

treated with great thoroughness by John. Ad¬ dington Symonds in his life of the artist (1892) ; and on which Walter Pater writes fascinat¬ ingly in (The Renaissance: Studies in Art and Poetry* (1912). The frescoes of the Sistine Chapel have been peculiarly the study of Heath Wilson who, about the middle of the 19th cen¬ tury, had a scaffolding erected in the chapel and studied the paintings inch by inch, and who recorded his observations in a valuable book (1876). Apart from these two books and the life by Harford (1857), the best book on Michelangelo is the volume of the (Gazette de Beaux-Arts,* published in 1876. This volume contains papers by the sculptor, Eugene Guil¬ laume, the architect, Charles Gamier, and the competent writers, Charles Blanc, Paul Mantz, A. Mezieres and Anatole de Montaiglon. Karl Frey's (Michaelagniolo Buonarrotti* publica¬ tion of which began in 1907, and Thode's (Michelangelo und das Ende der Renaissance * (1902-12), are among recent authoritative studies.

Russell Sturgis.

MICHELANGELO, Life of. Herman Grimm's Life of Michelangelo, apart from its value as the record of a notable life, is one of the masterpieces of German prose. Written at a time when photographic illustrations

were unknown (it was published in 1860) and when the expense of travel barred Italy to most young artists, its purpose was to give them a vivid and realizable word-picture of the sculptures, paintings and architectural creations of the most universal of all artists, and at the same time to show how constructive a part art can play in the spiritual life of a nation when artists are large enough for leadership.

It is not only a biography; it is a history of the Italian Renaissance with Michelangelo as the central figure. During the 80 years of his life Italian art knew Donatello, Ghirlandajo, Leonardo da Vinci, Titian and Raphael ; Savanarola lived and died praying for the soul of Florence; the Popes — r Borgias, Farneses, Medicis — exerted their power for good and ill in the world of the sword as well as the world of the spirit ; the Medicis fought for the temporal mastery of Florence and conquered, fought and lost again. In every part of this seething political, religious and artistic life Michelangelo had his share. His life and that of Florence ran parallel lines. The star of Florence had barely risen when Michelangelo sculptured his first marbles in the garden of the Medicis ; it had set, never to rise again, before his body was brought back for burial from the Rome which had been his refuge when Florence deserted her tradition of freedom.

It is the achievement of Herman Grimm — that which places this biography with Boswell's Life of Johnson and the Autobiography of Benvenuto Cellini — that he has known how to make the city and the times live equally with the man whom he portrays, and how to give form and color to the figures of the lesser men and women in his picture. Fine illustrations heighten the value and the interest of new edi¬ tions, both in the original and in the translation by Miss Bunnett.

MICHELET, Jules, zhfil mesh-la. French historian: b. Paris, 21 Aug. 1798; d. Hyeres, 9 Feb. 1874. His father was an unsuccessful VOL. 19 — 2

printer, and his boyhood was one of poverty and want. He was educated at the Lycee Charlemagne and in 1821 became a professor at the College Rollin. After the revolution of 1830 he was appointed chief of the historical section in the Archives, and in 1838 professor of history at the College de France. He lost his offices by his refusal to take the oath of allegiance to Napoleon III (1851) and there¬ after devoted himself to his busy literary la¬ bors. His (Histoire de France* (18 vols. 1833-67 ; new ed. 19 vols. 1879) is among the monumental productions of historical composi¬ tion, and definitely established his

fame. His (Histoire de la Revolution* (1847-53; new ed. 1889) is a splendid specimen of eloquent writ¬ ing, but hardly a great history. In all his his¬ torical writing Michelet has been criticized for unduly subordinating historical values to dra¬ matic effect and for permitting his prejudices to destroy his perspective. But his descriptions are remarkably vivid, and his rendering of cer¬ tain episodes is unsurpassed. Among his fur¬ ther writings are (Precis de l'histoire moderne* (1827) ; (Histoire romaine* (1831) ; several volumes of impressions of nature — ^'Oiseau* (1856), (L'Insecte* (1857), fZ'Amowe* (1859); (La Mer* (1861) ; (La Montagne* (1868) ; and several volumes of polemics. Consult (Lives* or studies by brushes (1898) ; (Correard* (1886); (Monot* (1905); and (Jules Simon*

(1886).

MICHELET, Karl Ludwig, karl lood'vig meshe-la, German philosopher : b. Berlin, 4 Dec. 1801 ; d. 16 Dec. 1893. He was graduated from 'the University of Berlin in 1824, and in 1829 was appointed to the professorship of philology and philosophy in the French gym¬ nasium, which he held for 25 years. In 1829 he also became professor of philosophy in the University of Berlin. He devoted himself especially to the doctrines of Aristotle and pub¬ lished (Die Ethik des Aristoteles* (1827), an edition of the Nicomachean ethic with Latin commentary (1829-33), and a memoir entitled (Examen critique du livre d' Aristotle, intitule Metaphysique* (1836), which was crowned by the Academy of Moral and Political Sciences. From 1832 to 1842 he was engaged as one of the editors of Hegel's works, in illustration of whose system he wrote (Geschichte der letzten Systeme der Philosophic in Deutschland von Kant bis Hegel* (1837-39) ; (Entwickelungs-geschichte der neuesten Deutschen Philosophic* (1843) ; and a controversial dissertation, (Schelling und Hegel* (1839). His own stand¬ point and tendency are most decisively shown in his (Vorlesungen fiber die Personlichkeit Gottes und die Unsterblichkeit der Seele, oder die ewige Personlichkeit des Geistes* (1841) ; and (Die Epiphanie der ewigen Personlichkeit des Geistes* (1844-52).

MICHELL, mich'el, John, English phys¬ icist, geologist and astronomer: b. about 1724; d. Thornhill, Yorkshire, 29 April 1793. He was educated at Queen's College, Cambridge, became a Fellow there, and in 1762 was made professor of geology. From 1767 until his death he was rector at Thornhill. His inven¬ tion of the torsion balance shortly before his death preceded that of Coulomb, and was used by

Henry Cavendish in his famous experiment determining the mean density of the earth.

broken by low conical hills, whose fertile in¬ tervening dales form the courses of small streams. At the east, a morainal elevation, forming two watersheds, rises in Hillsdale County, 600 feet above the lakes, the highest point in this part of the State. The southeast¬ ern shore is low and comparatively level. Along a large part of the entire western shore of the peninsula, wind-blown sand dunes reach, in places, a height of 200 and 300 feet.

Off the shores of the two peninsulas lie some 200 islands within the State boundaries, the largest of which is Isle Royale, in Lake Supe¬ rior. Others of the largest islands are : In Lake Superior — Grand Isle; in Lake Michi¬ gan — Beaver, Fox and Manitou ; and in Lake Huron Sugar Island, Encampment Island, Drummond Island, Bois Blanc and Mackinac. The coolness of the summer climate of the up¬ per Great Lakes has made of that region a de¬ lightful watering place, particularly in the vicin¬ ity of the Straits of Mackinac. Of the island resorts the most widely known is the picturesque Mackinac Island.

Soil.— The three principal soil types of the two peninsulas are determined by the relative amount of sand, clay and lime. In the southern peninsula, the soils vary from the light sandy loam of the north central plateau to heavy blue clay, on the Huron shore, and to the dark clay loam of southern Michigan. The wide distribution of sand gives warmth to the soil, and its porosity prevents the drowning of crops; while the generous depth of the soil keeps it from drying out. There is little irre¬ claimable marshland. In general, the soil is easy to work, presenting but little stony land like New England and very few barrens due to outcrops. The mixture of clay and sand makes a soil not too adhesive for the plow and one not easily washed full of gullies. The lime¬ stone areas are specially fortified against de¬ terioration through, wasteful farming, and in many places there is an abundance of natural fertilizers. In the upper peninsula, in the west, the rocks are either barren or thinly covered, with an occasional fertile valley; in

the east, the. soil is of good depth and generally rich in a variety of mineral elements.

Drainage and Water Power.— Michigan has more, than 5,000 interior lakes, mainly of glacial origin. Many of those ‘near the shores, especially of Lake Michigan, were once a part of the Great Lakes. They vary in size from an acre to a thousand acres, covering in the ag¬ gregate an area of 712,864 acres. Generally they have a border of woodland and sandy or muddy margins, with more or less vegetable and animal life. Many of these lakes are beau¬ tiful pleasure resorts. Streams are fed by these lakes, which together with them form an equa¬ ble system of drainage. The rivers, though nu¬ merous, are relatively short and shallow, ow¬ ing to the peninsular character of the State. Some have cut deep enough to form rapids, es¬ pecially in the north, furnishing water power. Of the large power they could develop, 250,000 horse power is now furnished, mainly by the Saint Mary’s, the Au Sable, the Menominee, the Saint Joseph, the Muskegon, the Grand, the Kalamazoo, the Huron and the Thunder Bay. In lumbering days, the Saginaw, the Mus¬ kegon and the Menominee were chief among

the many rivers for transportation of logs to mill. Aside from the strait-like Saint Mary’s, Saint Clair and Detroit rivers, Michigan streams are not navigable, except for the small¬ est of river craft. Worthy of mention, besides the rivers named, are, in the lower peninsula-the Clinton, the Raisin, the Rouge, the Black and the Manistee ; in the upper peninsula, the Taquamenon, the Carp, the Sturgeon, the Ma-mstique, the Rapid, the Whitefish, Falls River and Dead River. The waters of these rivers are received by numerous bays and inlets which indent the shores; of these, the largest along the upper peninsula are Keweenaw, White Fish and the Big and Little Noquette bays; along the lower peninsula, the Grand and Little Traverse, the Thunder and Saginaw bays.

Agriculture. — The chief industry of the State is farming, which engages about a third of the population. The value of farm prop¬ erty is double the capital in manufacturing and about one-half of the total assessed valuation of all property in the State. About one-half of the lands are in farms, of which about two-thirds are improved. Of the half not in farms, about one-half would make good farm land. Less than one-fifth of the upper peninsula is in farms, with about 12 per cent of the total farm¬ ing population of the State In the lower pen¬ insula, nine-tenths of the farms and 70 per cent of the farm population

is south of the lati¬ tude of the northern boundary of Midland County. In general, Michigan lands produce many kinds of crops on each farm, contributing about half of the total value. Corn is the lead¬ ing crop, raised mainly in the southern part of the lower peninsula ; only a few hundred acres are raised in the upper peninsula and in the northern third of the lower peninsula only about as much as in any one of the better south¬ ern counties. . The wheat crop is second and has been decreasing since 1900, the yield is only about one-fifth that of Minnesota. Wheat raising tends to concentrate in the central part of the lower peninsula. Oats rank third in the

Estimated Crop Statistics, 1918.

CROP

Acres

Quantities,

bushels

Value

Corn .

1.610,000 754 , 000 1,658,000 472,000 275,000 78 , 000

48,300,000

10,716,000

66,320,000

6,750,000

8,332,000

780,000

$62 , 790,000 22,397,000 45,761,000 10, 125,000 8,332, 000 1,326,000

Wheat .

Oats .

Rye .

Barley .

Buckwheat ….

Total cereals…

4,847,000

141 , 198,000

$150,731,000

State. The hay crop, chiefly clover and tim¬ othy, is widely distributed and yields about one-fourth of the total value of farm crops. A great variety of vegetables are raised, in large quantities. Michigan leads in beans and peas. The estimated output of beans in 1918 was 4,887,000 bushels, valued at $24,435,000. Owosso is the centre of the bean area. The pea belt in¬ cludes the northeast and east central parts of the lower peninsula. The west central part of

MICHIGAN.

Estimated population, 3,054,854

Pop.

5,703 Alcona.… pq

7.675 Alger . ‘.B &

39.819 Allegan . j 5

19,965 Alpena . F 9

15,692 Antrim . !] F 6

9,640 Arenac . G 9

6,127 Baraga . ….b 3

22,633 Barry . 7 a

68,238 Bay . H 8

10.638 Benzie . p %

53,622 Berrien . 1.4

25,605 Branch . ’ ’ ’ ‘ t, a

56.638 Calhoun … K 6

20,624 Cass . V.’.’.L 4

19,157 Charlevoix . E 6

17,872 Cheboygan . J7

24,472 Chippewa . C 9

9,240 Clare … . H 7

23,129 Clinton . J 7

3,934 Crawford . F 7

30,108 Delta . C 6

20,524 Dickinson . C 4

30,499 Eaton . K7

18,561 Emmet . .E 6

64,555 Genesee . 19

8,413 Gladwin . G 8

23,333 Gogebic . B 2

23,784 Grand Traverse …F 5

28.820 Gratiot . I 7

29,673 Hillsdale . Y 7

88,098 Houghton . B3

34,758 Huron . H 10

53,310 Ingham . j 8

33,550 Ionia . j 6

9,753 Iosco . G 9

15,164 Iron . C 3

23,029 Isabella . H 7

53.426 Jackson . K7

60.427 Kalamazoo . K 5

8,097 Kalkaska . F6

159,145 Kent . 15

7,156 Keweenaw . A 4

COUNTIES

Pop.

4,939

26,036

10,608

47,907

17,736

4,004

9,249

32.606 26,688 46.739 21,832 19,466 25,648 14,005

10.606 32,917 32,069

3,755

40,577

19,220

49,576

18,379

8,907

8,650

17,889

2,027

6,552

45,301

11,249

2,274

89,290

33,930

8,681

33,246

52,341

25,499

34,913

33,185

44,714

531,591

20,769

Lake . H 5

Lapeer . ilO

Leelanau . f 5

Lenawee .] l 8

Livingston . j 9

Luce . b 7

Mackinac … C 8

Macomb . j n

Manistee . q 4

Marquette . c 5

Mason . jj 4

Mecosta … *.H 6

Menominee ……. D 5

Midland . n 8

Missaukee . G 6

Monroe . l 9

Montcalm . . I 6

Montmorency …. E 8

Muskegon . I 4

Newaygo … H 5

Oakland . j 10

Oceana . h 4

Ogemaw . . G 8

Ontonagon . b 2

Osceola . H 6

Oscoda . f 8

Otsego . f 7

Ottawa . j 4

Presque Isle . E 8

Roscommon . G 7

Saginaw . is

Sanilac . in

Schoolcraft . c 6

Shiawassee ……. j 8

St. Clair . J 11

St. Joseph . L5

Tuscola . 19

Van Buren … K 4

Washtenaw . K 9

Wayne . K 10

Wexford . G 5

Incorporated Cities and

474 Addison . L 8

11,458 Adrian . L8

766 Ahmeek . A 4

473 Alanson . E 7

5,833 Albion . K 7

1,204 Algonac . Jll

3,419 Allegan . j 5

2,757 Alma . 17

675 Almont . J10

13,273 Alpena . E 9

15,010 Ann Arbor . K 9

155 Applegate . Ill

748 Armada . Jll

513 Ashley . 17

631 Athens . K 6

252 Au Gres . G 9

494 Augusta . K 6

648 Au Sable . G 10

1,559 Bad Axe . H 10

502 Baldwin . H 5

543 Bancroft . J 8

1,158 Bangor . K 4

1,071 Baraga . B 3

248 Baroda . L 4

411 Barry ton . H 6

29,480 Battle Creek . K 6

47,942 Bay City . H 9

504 Bear Lake . G 4

418 Beaverton . H 7

4,119 Belding . 16

1,050 Bellalre . F 6

486 Belleville . K 9

930 Bellevue . K6

10,833 Benton Harbor … K 4

563 Benzonia . F4

880 Berrien Springs ,..L4

4,583 Bessemer . B 1

4,519 Big Rapids . H 6

1,607 Birmingham . j 10

1,474 Blissfield . L 9

501 Bloomingdale … .K 5

5,218 Boyne City . E 6

325 Boyne Falls . E 7

595 Breckenridge . 17

219 B reeds ville . K4

767 Brighton . J 9

370 Britton . L 9

1,020 Bronson . L6

602 Brooklyn . K 8

690 Brown City . I 10

1,831 Buchanan . L4

464 Buckley . G 5

237 Burlington . K 6

752 Burr Oak . L 6

427 Byron . J 8

9,915 Cadillac . G 6

422 Caledonia . J 5

20,000 Calumet . A3

392 Camden . L7

761 Capac . J 11

2,272 Caro . I 10

808 Carson City . 17

Towns of 5000 and over

401

Carsonville . .

Ill

442

Caseville .

. H 10

308

Casnovia …

1,126

Cass City .

. H 10

1,358

Cassopolis .

947

Cedar Spring’s …

..15

613

Centerville .

813

Central Lake …

. .E 6

2,420

Charlevoix …

4,886

Charlotte … .

. . J 7

6,859

Cheboygan .

. .D 7

1,764

Chelsea .

. . K 8

1,363

Chesaning ….

1,350

Clare .

345

Clarkston .

372

Clayton .

308

Clifford .

425

Climax .

1,011

Clinton .

810

Clio .

5,945

Coldwater .

. .L 6

909

Coleman .

. . H 7

701

Coloma .

. . K 4

853

Colon .

369

Columbiaville …

.1 10

543

Concord .

1,244

Constantine ….

. L 5

814

Coopersville .

..15

490

Copemish .

1,384

Corunna .

1,380

Croswell .

.1 11

55

Croton, Newaygo

.H 5

3,775

Crystal Falls ….

277

Custer .

228

Daggett .

349

Dansville .

. . J 8

673

Davison .

911

Dearborn .

K 10

1,286

Decatur .

628

Deckerville .

H 11

443

Deerfield .

721

Detour .

■ C 10

571,784 Detroit .

K 10

726

Dexter .

1341

Dimondale .

[485

Douglas .

. .J 4

5,088

Dowagiac .

. .L 4

371

Dry den .

.J 10

1,070

Dundee . .

,.L9

2,315

Durand .

133

Eagle .

800

East Grand Rapids.

Kent .

2,516

East Jordan .

.E 6

802

East Lansing …

. .J 7

1,452

East Tawas .

.G 9

2,094

Eaton Rapids .

.K 7

307

Eau Claire .

1,063

E corse .

K 10

752

Ed more .

1,673

Elk Rapids .

553

Elkton .

H 10

Pop.

592 Elsie . 18

292 Emmett . Jll

578 Empire . F 4

15,485 Escanaba . C5

1,477 Essexville . H9

1,386 Evart . H 6

437 Fairgrove . 19

564 Farmington . K 10

522 Farwell . H7

533 Fennvllle . j 4

2,331 Fenton… •. . J 9

340 Fife Lake . F 6

54,772 Flint . 19

938 Flushing . I 9

1,689 Ford City, Wayne K 10

234 Forest ville . H 11

476 Fowler . J 7

905 Fowlerville . J 8

693 Frankenmuth . 19

1.555 Frankfort . F4

220 Fraser . J 11

460 Freeport . J 6

2,009 Fremont . 15

330 Fruitport . 14

358 Gagetown . H 10

238 Gaines . J 9

656 Galesburg . K6

405 Galien . L 3

497 Garden . C 6

1,538 Gaylord . E 7

4,211 Gladstone . C 5

988 Gladwin . H 7

537 Gobleville . K 5

5,856 Grand Haven . 14

2,893 Grand Ledge . J 7

128,291 Grand Rapids … . J 5

680 Grand ville . J 5

428 Grant . 15

760 Grass Lake . K 8

1,775 Grayling . F 7

4.045 Greenville . 16

830 Grosse Point … . K 11 862 Grosse Point Farms,

Wayne . K 10

290 Grosse Point Park,

Wayne . K 10

3,559 Hamtramck . K 10

12,079 Hancock . A3

364 Hanover . K7

1.556 Harbor Beach …H 11 1,805 Harbor Springs …E6

336 Harriette . G 5

543 Harrison . G 7

444 Harris ville . F 10

1,555 Hart . H 4

1,268 Hartford . K4

4,383 Hastings . J 6

310 Hersey . H 6

462 Hesperia . H4

4,120 Highland Park.. .K 10

411 Hillman . E 8

5,001 Hillsdale . L7

225 Hilltop, Berrien…L 4

12,185 Holland . J 4

1,537 Holly . J 9

1,008 Homer . K 7

5,113 Houghton . A3

1,046 Howard City . 16

2,338 Howell . J 9

450 Hubbardston . 17

1,059 Hubbell . A3

2,178 Hudson . L 8

1,174 Imlay City . 110

5,030 Ionia . J 6

9,216 Iron Mountain … .C 4

2,450 Iron River . C 3

14,779 Ironwood . B 1

12,448 Ishpeming . B 4

1,876 Itnaca . .’ . 17

35,363 Jackson . K 8

1,396 Jonesville . L 7

48,886 Kalamazoo . K 5

1,415 Kalkaska . F6

467 Kent City . 15

360 Klnde . H 10

497 Kingsley . F5

302 Kingston … .1 10

703 Laingsburg . J 8

171 Lake Ann . F 5

740 Lake City . G 6

2,325 Lake Linden . A3

1,222 Lake Odessa . J 6

954 Lakeview . 16

708 L’Anse … . B . 3

40,498 Lansing . J 7

3,946 Lapeer . I 10

10,356 Laurium . A3

663 Lawrence . K 4

1,042 Lawton . K 5

313 Leonard . J 10

331 Le Roy . G 5

1,032 Leslie . K 8

519 Lexington . I 11

122 Lincoln . F 9

550 Linden . J 9

96 Lisbon, Kent . 15

660 Litchfield . K 7

1,761 Lowell . J 6

10,367 Ludington . H 4

626 Luther . G5

611 Lyons . J 7

546 McBain . G 6

236 McBrides . 16

714 Mackinac Island ,.D7

Pop.

697 Mackinaw . D7

1,200 Mancelona . F6

1,047 Manchester . K8

12 381 Manistee … . G 4

4,722 Manistlque . C 6

1,069 Manton . G 6

529 Maple Rapids . 17

1,047 Marcellus . K 5

3.770 Marine City . J 11

767 Marion . G 6

57 Marlborough, Lake H 5

1,062 Marlette . 110

12,409 Marquette . B 5

4,236 Marshall . K 7

1,742 Mason . J 8

310 Maybee . L 9

687 May ville…. . 110

352 Mecosta . H 6

242 Melvin… . I 11

557 Memphis . J 11

768 Mendon . L6

10.507 Menominee . D 5

505 Merrill . 18

510 Mesick . G 5

276 Metamora . J 10

804 Middleville . J 6

2,527 Midland . H 8

100 Mikado . F 9

1,355 Milan . K 9

973 Milford . J 9

519 Millersburg . E 8

623 MillingtoD . 19

332 Minden City … .H 11

6,893 Monroe . L 10

942 Montague . 14

362 Montgomery . L 7

443 Montrose . 19

1,515 Morenci . L8

337 Morley . 16

470 Morrice . J 8

7,707 Mt. Clemens . J 11

513 Mt. Morris . 19

3,972 Mt. Pleasant . H 7

463 Muir . J 7

312 Mulliken . J 7

2,952 Munising . B 6

26,100 Muskegon . 14

1,690 Muskegon Heights,

Muskegon . I 4

1.346 Nashville . J 6

9,416 Negaunee . B 5

1.207 Newaygo . 15

920 New Baltimore. ..Jll

1,182 Newberry . B 8

528 New Buffalo . L3

478 New Haven . J 11

5,156 Niles . L 4

440 North Adams . L 8

717 North Branch ….I 10 352 North Muskegon ..14

524 Northport . E 5

1,665 Northville . K 10

4,974 Norway . C 4

237 Oakley . 18

781 Oakwood, Wayne K 10

627 Olivet . K 7

367 Omer . G 9

2 702 Onaway . E 8

324 Onekama . G 4

398 Onsted . L 8

1,964 Ontonagon . B 2

717 Orion . J 10

377 Ortonville . J 9

864 Oscoda . G 10

312 Otis ville . 19

2,812 Otsego . K 5

273 Otter Lake . I 9

1,078 Ovid . J 8

285 Owendale . H 10

10,230 Owosso . J 8

1,191 Oxford . J 10

509 Parma . K 7

1,643 Paw Paw . K 5

274 Peck . Ill

1,089 Pellston . D 7

1,129 Pentwater . H 4

288 Perrinton . I 7

720 Perry . J 8

490 Petersburg . L 9

4,778 Petoskey . E7

289 Pewamo . J 7

183 Pierson . 15

687 Pigeon . H 10

477 Pinckney . K 9

677 Pinconning . H 8

1,493 Plainwell . K 5

1,671 Plymouth . K 10

17,524 Pontiac . J 10

533 Port Austin . G 10

344 Port Hope . H 11

18,863 Port Huron . J 11

1,832 Portland . J 7

216 Port Sanilac,

Sanilac . Ill

263 Posen . E 9

430 Pottervllle . J 7

1.347 Quincy . L7

1,102 Reading . L 7

328 Redford . K 10

4,211 Red Jacket,

Houghton . B 3

El, 690 Reed City . H 5

465 Reese . 19

278 Richland . K 6

‘

Longitude West from Greenwi

;Manitoc I.

w

veenaw Point

Eagle Rive

(. Ahim-ck

Northern Portion of

|Caribou I,

MICHIGAN

8tannari > Rock,/

c w :£

L. 7 iioum

SCALE

Statute Miles, 44 = 1 Inch,

/8jnth Ilani ‘ yi’.lin,

Jacobs vflHi

•injt Abbaye

_Qiyt»n Wij < >

Skanie

quaming

L.InUu

Big Bay4*

ucn < lcncty

I1/”?- Poo

Vcnmliui

jldrnkc.

|l I I’ar i bienne

t VhiteFish/f,

Lw(

Herman’

.Summit I

■‘UrVn’i Marais

.Perch %:mchttaˆ\

m i -■ -

,Cuelno\

“o Hurley1

“ˆCurtis Fi boro WO*

Vy[%. V Vjixih.Sed.i.‘ft

— < >— “T» Dal ter 7a» V

C H)ls P P EyWA

WJ«“VI& y*“ Km™SˆMcCnV rK-y” tiw* ˆ-“rSiv, - tj£ —

iShnwS*?’

KSb -LulIˆ

LWitbeok Princeton’

£. K‘*“3.rJi

1 Floodwood Jt \n®n’°® I \

_ Turner ,<) RalpbigA

Witch Ltl

iAXawspin Bbi»|

e Limestone i

4oW ”Sfv,n,.„ I

tf g» ■ \ l:\Trenary _ |

R-Vpticr Uno’ .Maple] Ridge

Germfni

•ˆ/Scotts

SlCHOOLCRA

ElmwjA<n>-h Bass (rood*

AiiiaaacYBnlsain

CrystalHsPonfi’

JKhIIsVSH -

sC_uJ a qs/Fq—jM a r ˆvVDunn /

Carnot

tteuben

PlcktoiUˆ,

Vf I1

■«-t/ ■ Ms

.Held C

(dickinson

[Northland

j|SH|MAait!,AC 1.

181ˆ B£ A

1 AˆAfSPolnt Aux Pins

fvˆOhllSigni.

I C H Fit O V G A N\ , I

tMMMBJu

Drumwo

oodl tnvl

ubub I

.*■1 LttbtonehSb a. rv

\itt-Dlˆ1’V

Minooqua

GrdscatSˆXf ˆ StilgmuV*.ˆ

|il Strait ji/ˆMapM

W™ >

“‘‘ CmpLakeˆ

., r /f&C EMMClTj

®* fui

Garden i, a

Phillips

taA”* rxˆA ,r..4’% V

l#

l)EN(0 (Vtl N E OJJ / *? Talbot Mox \ a ,TI > *aetlc|darR. bf
IStnˆhpO’iofrW >- t Ingalls A

ˆFt. Detour Summer I.

Crandun

Monico.

04° Longitude West from Greenwich

Pratt

Strait

MICHIGAN

Drexel/or Kent) P.0.

lWMm&fjUV S~- M.

‘ “i t i -

In l* nomi ii oov ˆ •Jlai’ineUeˆˆˆ

SCALE

Statute Miles, 33.5 = 1 Inch

Tan Ostraud

Rand McNally’s New 11 x 14 Map of Michigan. Copyright by Rand McNally A Co.

- Railroads

> +«+«S1eam & Electric • • Electric Lines

fs Daggett J^Ccdai River

ij m(en Nominee If

w«n*o. ML … . 3 .

“Hnuiuioii’L

Icr^ueocoO

1 Onaway

[/Washington I

Carbon i

f galls ton

3 ms

“Ccr thr.ˆ

Ellsworth

Vanderbilt

■nominee

Norfip/tSˆEaetpoV

Ad

)NElmir?

.Marinette

Lelanq?

«ineki°’ ＜5

Utserjo Bluˆ [Lobe Uf

ff Sailing Tˆoeabm

6 Otsego L4»ke lAiBt. n ‘Waters oX/^

Glen 4 Glen Haven)

,llubbard[

Comfori

Hubbard !•<*

Lovells

1 / Westwood)

p I .cetsr 1 l)e l fCr oDarragn

LKASKA

.Kulkiiska

Comins „

Fairvlew 0

iu W 0 Hardobvo | () Frederic ^v/judgel

‘Kneelando — -o^Hucke V \ lsVAlexander \/ oSlzEbeel

nr y

‘ CRLAWFORD

/Traverse CM

h Keystone Cr

ˆAND

onipb MuyfU’ld

TRAVEIRSE *

‘Lincoln!

‘”/Lake Ann

WIJBdUlM

<‘JA’ rnwnˆd

Crystal XMj] Frank fora

Gust in

.Flat Rock Mikado, VMJamfield

TˆNtC* leun ie VA\» ■

Ireenbush

Luzerne

Curt ft ill«

•n

‘ Veiling /n

. *\?l [Rcrratlella

£*“‘W.ooln Jo.

s“We

C°T i _

.KosVoninou

Man! **°li _] FlveOuinneU ■> < >AuSinith JcNy -4A-A)- ˆTs-Ellukc

ee Mooreeiowno Hiigu

j>Ii nton o St Iti ˆlle L)

! AdeneM ISSAU K Vy

Jen lings ,3 Lake ˆeT,T}ˆ//

pin saukw Jc.nrf 1 i.L

k Hecker.K.ˆ

ˆ nlu». Fairu,hA

ob rt~35T~ˆ Me Bain Modi

IMoore*

iacn]a\VArr<rtnfsnP QoireM. 1 alter m ad oi‘ pAfesl.ik Gilbert/

fWEXFORDp

iHnmotto it

A~°^f^lBoon

MHba’lilf‘Ck^v. 1

■ tn.iiitef

■k°rp Axln^/ oHoxeyvllle fUo

Pierpo

Onek

Onekamaj

St. HelenS

, L-l.iS5PsS2^> oKir

J ROSCOMMON

0 Lor ley erevllle

O G E M

\ IV est id \ Branchl

^-TChicf

MANIS

East kaloBr

LoranzerV , Greenwood’

rcscott.

Wlat meter

iTw6 Rivers

Irons

Turner

0 Butman \ A1 Bomanvillo

TlStin / :

-ffRiverbank /Le Roy

Aux Barques

ˆEdgettBj

Lutber

ˆ Fountaln\

M A s 0s

Hamlin Lakl

Harr be 11

[Pt. Lookout

■Sterlingˆr-Q’/ˆˆ

1 Siandislr Bentley J / Tf//

1 03 LLMftb

SAGINAW*

BAY , 1

-Hi wfy\ “

vJL* ,

Elnde Port Hope Flllon

Liidingtuii)

«■/ Ashton

/OSCEOL

1 lOrono E vart

Custer*

Ugioton

-llatton

Rhodes,

Eetey /

Tiarbor Beach

loo.

E

‘Clarks Had Axe

i Wadsworth

i Horoeetoc1® mlOwendalo./

Plymouth

Brier o

”nOPCr

Bradley

ˆAyVilN

Crji£l ‘ “lle, °

Walkarrllle J’LiUrt dears tf

lO C\£ ANA

* Shelby 7 2 Hesperia, b New Era

Alderson

pr1’” rtcofonSaju.)

Rosebueh] ˆJ,JeCfssSvX

I JordlanˆTLeatou Sanford’

1 9/V IsabcllLav 1 Mini;

ˆtlPloasanjlPˆcˆs-l U

1 I’&A,ˆ lIl a f

L -I °Wl”“ ‘\ fih., hi > rd /f

oti.\Huˆˆ SoUviffi/ˆ Rtmonml* (/Field

tlExW A\Y/G O ˆ iy fni.itf wteˆCIoudv

/Ruth j)

ˆbd*jPl

Palms \k

- ˆTyroXˆ j °Cumb«W

oArgyle

jhabbona

Remusv J MlllbrookM 1 Blanchard]

DcckervlUo | DowulngVbn

feusi,

V. Carson v die

*oF remont Iceman ˆLs

ˆ■Brunswick

Sa 11 du sky’

Mom

Whl]

Wabanin’.

Lakew

＞ri Washington

y/) Newaygo

Howard Ci

it V .

21 Ashland _ fV . -w, - . Pifffad

U)f| Sand Lakf I

oral Entrican

N T C A

UKrufnnt ,, j

Sidney Vi i* RGowen V A Llb’cln Lake T

SnX/r-*^

Applegate

kef Swan Cr. ^ Garfield a1 St .Charles/

S A6f(

Brant o Alii Fergus) j Chc8aning\]

j..0llk W1

Hcn-‘Jw dcr son YfAtsj

sjc.nh.d

3VT ^ jjCllffora

skJofcif’i

Otisville _^>l(jUi.r’Lak<! N.Bran

\ R°erMy < r^’,|Af%,,,blo’illAKInga

iton frT^ 0,1 VIthaca

,„n UG RATKOT

North\

^ s Y s-Star 4

PhShernia^n^^^^^^

Muskegonlvf^

Lake Harbor P. < A° \

|_o

8 p r 1 n z Waf IS^’ Ferry sbdrsjg^p;

Grand IlnvenV u/

EdgArton

.Rockford

P E\E R

,apt*er\Lum

Attica > fcL

llubt.nrdstoD e Eureka 0 pi-tX ” Maple Rapid* r*,8,l < sv° ofl’-

,CW ‘ AvocaVu RY. Abbotsford

Balmont

o Cannon*)- ck Park Q. /

Mnthrrti

Uaynor

- zpnri —

.OT.TA W I A

\ + Robinson

W”< cT*’^

PI eta .11 tpfcdrirh

| W Slmith/To. ■ rl..„X ^

/Smiths

Cr.

_ St.1 Cliuri

I’lrand KO nines

[MjClarks-

[orrice

535” Oxford ˆ Ro

ˆDavlsburgcole

GoIodWˆt J

t WaterfoppN-r ocViester’Md

Dray ton PlninANJgff,ˆ”

, Pontluc/fr — °y’r%T

OAK L/An\N JD

ˆMilford /Orchnid Jfoj

Hid Luke Lake ‘VUiim”

■ - 1 -i”

1 If r Lcn W

-.sMogton New Barely

M A C O M/B,

V CheMerflsld#*^ / \b tica

Ottawa

Castle ParkjT? | Filmore or Filltnore CeAlor P.

E. SaiJ/mtuck

Saugatucl^y Sj

Odessa’

lohoctab

llaslett

OIOS “i > “ Webber^‘1*

> odland LA A’ Si ^\e Mille

v^v Dimonjl

A^Cchester^rf^

Ch

\ v’Oak Grove I

1 1 Hartland) \/~ HlgMand N^.illowell

n’gIsnton

hllsrAr vBrjsi

, r/T0111’

ianultou r hinund

A/. at-: Grove

‘JUa8tiu|

UuioShaUv

fctoverdnle/

j>B A/F

(Delton

. s o nun t ow

’fel N.G HAM

A oAMason

Kenosha

Ganges/

Q1.J

Dansvll]

Gregor

Wlxom JFinnklin SJNotI J

J rFnrwiogt-

O Dowlint Al!yria0

IvUle m (SSsBiKS

[f»JL-4K£^^

^.ST.CLAIRS

)Eatoti,

Bravol

Leslie

lllc oHickc-ry

illevue

8outh Havei /

Packing Palisades Parlq&

7 A* Q//Mut ith

o

Wy ˆ/Tlraterloo

kWo

.Sauustonc ˆ -ˆ-V*ra

Arlan dˆjAr

Wlllian

Bedford |

aazd

] Hller O,

p-Comber

ˆffi.L,WASHTENAl

Leoni 3ri (Lr*ˆ - PiiurtoldQS

»* i Sonoma ItC A L H

ˆ■FE. Leroy 1 , /Burliiigyii?ˆ,

Malta

Essex

r-B*4lcvi

csTSaliVcV,U‘^

Whittaker,

Hartford]

ickford’

Pavilion

^ulton°

Law t n ‘ icksbi Sch< olcraft />•_

Benton HarhoD^K^ St.JOS.-l.ljSK;, Olon LtjrjlVj NsN? -S tc v ens

Bridgin^S af o /M’F « ^ ^

p ;vAVl|Oi.adt,\ V^VfA>jNew Troy/ M V^ucJb.iiianJ>,

xGtq wniow ■lilaij Wnlt» Carle ton/ ■ Scofield^

ilngtonl

Cbntot ruin.. 1 1

•Cement City . Pcnteicxt °

Moore] F Parkdˆt

wowsv

Marccllus,

-o-ˆUoneavUleˆAdd jldltleˆˆAdnn’.s

ˆeEs/osseoˆE-Ud*3

0/ Piit.forCˆ - vl

,g > HILLSDALE fo*

/Frontier,, PrattaUUtf I 8 o RaoBoUl O jren, i

Camden, yy aldron pˆrL — -

* Htf’r/ill 1ˆ.

h r fjf BbVera

st/josepih

9 iNVyConalantine I’-hflel 8turgisi/-

L E N A W/

‘hicafjo

/»i ;

ˆ/Ed|rardsburg /•

Montgomerj

Michigan

Ottawa

oleclo

South

2970

MICHIGAN—

Pop.

1.277 Richmond . j n

4,163 River Rouge … .K 10 1,516 Rochester …… .J 10

843 Rockford . 15

705 Rogers . E 9

1,787 Romeo . J lo

425 Roscommon . G 7

542 Rose City . G 8

1,071 Royal Oak . K 10

55,642 Saginaw … 19

816 Saline . K9

370 Sand Lake . 15

993 Sandusky . Ill

845 Saranac . J 6

621 Saugatuck . J 4

13,919 Sault *Ste.* Marie …B 9

816 Schoolcraft . K 5

891 Scottville . H 4

1,347 Sebewaing . H 9

1.260 Shelby . H 4

835 Shepherd . H 7

436 Sheridan . 16

260 Sherman . G 5

346 Sherwood . L 6

524 South Boardman,

Kalkaska . F 6

681 South Frankfort,

Benzie . F 4

3,57? South Haven . K 4

615 South Lyon . K 9

1,097 South Range,

Houghton . B 3

1,203 Sparta . 15

802 Spring Lake . .14

584 Springport . K 7

1,451 St. Charles . 18

2,633 St. Clair . J 11

1,252 St. Clair Heights. K 11

2,118 St. Ignace … .C9

3,154 St. Johns . J 7

5,936 St. Joseph . K 4

1,940 St. Louis . 17

1,322 Stambaugh . C3

828 Standish . H 8

1,012 Stanton . H 6

185 Stanwood . H 6

527 Stephenson . D 5

Continued

Pop.

243 Stevensville . K 3

663 Stockbridge . K 8

3,635 Sturgis . L6

385 Sunfield . J 6

402 Suttons Bay . F 5

1,061 Ta was City . G9

2,332 Tecumseh . L 9

573 Tekonsha . K 6

815 Thompsonville …F 5

1,175 Three Oaks . L 3

5,072 Three Rivers . L 5

545 Tower . E 8

13,816 Traverse City . F5

1,224 Trenton . K 10

371 Tustin . G 6

267 Twining . G 9

442 Ubly . H 10

1,340 Union City . K6

456 UnionviUe . H 9

496 Utica . J 10

371 Vandalia . L 5

ft 523 Vanderbilt . E 7

1.659 Vassar . 19

650 Vermont ville . J 6

435 Vernon . J 8

1,624 Vicksburg . K 5

714 Wakefield . B1

435 Waldron . L 8

371 Walker ville . H 4

297 Warren . K 10

728 Watervliet … K 4

725 Wayland …… . J 5

1,263 Wayne . K 10

349 Webberville . J 8

1,276 West Branch . G 8

366 Westphalia, Clinton J 7

648 White Cloud . II 5

1,437 Whitehall . I 4

667 White Pigeon . L 5

218 Whittemore . G 9

1,042 Williamston . J 8

794 Wolverine . E7

304 Woodland . J 6

9,609 Wyandotte . K 10

81,223 Yale . I 11

86,230 Ypsilanti . K 9

1,982 Zeeland . J 5

MICHIGAN

the peninsular has the largest crops of potatoes, in which Michigan ranks third.

CROP

Acres

Quantities

Value

•

Hay (tame)… .

2,598, 000

2 , 676 , 000 tons

62,886,000

Potatoes .

340 , 000

28,560,000 bu.

25,418,000

Beans .

543,000

4,887,000 bu.

24,435,000

Clover seed …. Sugar beets worked in

93,000

121,000 bu.

2,493,000

factories ….

108,200

873 , 700 short tons

Total…

3,682,200

$115,232,000

The following table shows the acreage, yield and yield per acre of corn, potatoes, sugar beets and hay and forage for the year

1918:

CROP

Acreage

Yield

Yield per acre

Com .

2,236, 134

46,201,475 bu.

20.66 bu.

Potatoes .

274,394

22,468,034 bu.

81.88 bu.

Sugar beets .

115,500

1 ,066, 787 tons

9 . 24 tons

Hay and forage .

1,933,429

1 ,891 ,507 tons

0 . 98 ton

Grain and seed threshed in Michigan up to and including 25 Jan. 1919, per returns of threshermen, is as follows:

CROP

Acres

Bushels

Yield per acre, bushels

Winter wheat .

652,968

9,168,692

14.04

Spring wheat .

43,191

777,630

18.00

Rye .

475,392

6,810,612

14.33

Oats .

1,580,709

62,236,452

39.37

Speltz .

9,411

257,785

27.39

Barley .

279,667

8,358,611

29.89

Buckwheat .

41,506

375,439

9.05

Peas .

20,834

300,475

14.42

Timothy seed .

711

1,789

2.52

Clover seed .

70,144

70,251

1.00

Beans .

350,768

3,264,187

9.31

On the muck lands are raised large quantities of celery, chicory and peppermint, in the pro¬ duction of which Michigan is the leading State. In the vicinity of Kalamazoo are the most fa¬ mous celery beds in the Union. Southwestern Michigan is the chief source of peppermint for the world. Of Michigan farms, more than four-fifths are cultivated by the owners. Less than 5 per cent are operated by cash tenants and about 11 per cent by share tenants. The following table shows the general development of Michigan farming by decades since 1860:

YEAR

Number of farms

Acres in farms

Value of farm property

Value of farm products

1860

1870

1880

1890

1900

1910

1917

62,422 98,786 154,008 172,344 203,261 206,960 205 , 500

7,030,834

10,019,142

13,807,240

14,785,636

17,561,698

18,940,614

21,000,000

$190,371,098 369,409,941 574,242,654 647,938,255 690,355,734 1,088,858,379 *989 , 000 , 000

$91,159,858

83,651,390

146,547,681

Fruit-growing. — The principal orchard products are peaches and apples, but large quantities are raised of pears, plums, cherries and grapes. They are quite uniformly distrib¬ uted over the southern half of the State. Of peaches and grapes, more delicate varieties are raised, in larger quantities, in the ((fruit belt," extending along the Lake Michigan shore, north as far as the Grand Traverse region. There, more attention can be given, where the lighter soil makes the raising of more reliable crops less profitable; a strong demand is present in the markets of Chicago and Milwaukee, easily and quickly reached by lake steamers ; the con¬ centration of the industry favors better

organ¬ ization as to methods of culture and market¬ ing; the presence of Lake Michigan, tempers (<cold waves," diminishing danger from killing frosts, lengthens the growing season and in¬ creases the humidity. In this belt are raised large crops of strawberries, blackberries, rasp¬ berries and currants, in which Michigan ranks second among the States. In the production of peaches, Michigan ranks with Ohio, Pennsyl¬ vania and New York, and is a leading State in the production of cherries.

Stock Farming and Dairying. — Horses, dairy cows, sheep, swine and fowls are the chief domestic animals raised in Michigan. In the production of wool, the State ranks second only to Ohio, east of the Mississippi.

Estimate on farms 1 Jan. 1919

Horses and mules .

/ - *-

. 670,000

$70,354,000

Milch cows .

. 848,000

70,384,000

Other cattle .

. 729,000

28,358,000

Sheep .

. 2,119,000

26,488,000

Swine .

. 1,355,000

31,978,000

All live stock .

. 5,721,000

$227,562,000

On 1 Jan. 1918 there were in Michigan 1,926,- 000 sheep, 680,000 horses, 874,000 milch cows, 752,000 other cattle and 1,372,000 hogs. The dairy interests are rapidly increasing. Of 1,497,823 cattle in 1910, about one-half were dairy cattle. This industry is mainly in south¬ ern Michigan, though the upper peninsula is well adapted to the raising of dairy herds. The industry supports 350 creameries, 8 condensaries and 150 cheese factories, located chiefly in rural centres. In butter and cheese mak¬ ing, the Hollanders have made Ottawa the leading county of the State. In general dairy products, Michigan ranks about equal with Wisconsin, Illinois, Indiana and Ohio. Cheese making is falling off in Michigan, with the in¬ crease of creameries and condensaries to sup¬ ply the demand for milk and cream in rapidly-growing cities.

Number

Milk produced on farms . 352 , 858 , 180 gals.

Butter made on farms and in factories . . 85,917,185 lbs. Cheese made on farms and in factories. . 13,673,336 lbs.

Lumbering and Forestry. — Of the prod¬ ucts of the soil, Michigan's forests have been one of the most important sources of her ma¬ terial wealth. The great variety and abundance of both hard and soft woods has made it a lead¬ ing State in lumber and in timber products. Roughly, the forests originally presented two strongly marked divisions, separated by the 43d parallel of latitude; the pine and soft

* Estimated.

Moods wdre north, the hard woods south. South of this latitude, the principal farming area, the vicissitudes of early settlement rap¬ idly and permanently destroyed the forests, ex¬ cepting woodlots. which now aggregate one or two townships per county. North of this lati¬ tude in the lower peninsula, the principal hard woods are above a line from Ludington to Os¬ coda, and verv scattered. The hard wood for¬ ests of the upper peninsula are chiefly in the eastern part, on the rolling lands of the gla¬ cial moraines. Pine lumbering, which reached its climax in 1890, has cut most of the white pine from the State. The present stage of lum¬ bering is taking the hard woods and the re¬ maining pine, mainly in the upper peninsula. Lumbering has had exceptional advantages in Michigan ; the timber was massed in large stands, making large scale operations possible ; and it was located mainly on large streams, down which logs could be floated to mill, and the lumber thence to the Great Lakes, by which markets could be easily reached. The first great impulse in Michigan pine lumbering came with the opening of an eastern market, due to the exhaustion of eastern forests and the de¬ velopment of railroads; the growth of

Chicago and the settlement of the prairie States fur¬ nished a stimulus from the West. In 1890 Michigan produced 4,245,717,000 feet of lum¬ ber; since then she has dropped from first place to tenth place. Out of the lumber industry have grown most of the cities of the State above the latitude of the Saginaw Valley, which was the first great centre of pine lum¬ bering; exceptions are Sault Sainte Marie and cities in the mining districts. The cities have now found in manufacturing a basis for per¬ manent growth, principally in the manufacture of timber products. The following table shows the development of lumbering in Michigan since 1850:

YEAR

Estab¬

lish¬

ments

Capital

Average number of wage earners

Wages

Value

of

products

1850

$2,464,329

7,040,190

31,946,396

52,449,928

83,121,969

54,290,520

61,513,560

1860

1870

1880

1890

1900

1909

1,571

1,649

2,124

1,705

1,180

$26,990,450

39,260,428

129,467,072

67,379,698

57,290,000

20,058

24,235

54,308

26,199

35,627

$6,400,283

6,967,905

15,548,833

11,122,030

16,298,000

In 1903 the State set aside 34,000 acres of State lands and an annual appropriation of $7,500 for forestry purposes, now increased to $60,000 per annum, making possible extensive forest pro¬ tection and reforestation. The State now holds 53 forest reserves aggregating about 235,000 acres, which is under the administration of the Public Domain Commission.

Minerals and Mining. — In the upper pen¬ insula, whose copper and iron mines are among the most valuable in the world, the chief competitor of lumbering and agriculture is min¬ ing. Native copper was known and mined in the Lake Superior region by a primitive people hundreds of years ago. It is first mentioned in a book by Legardes published in 1836. Its commercial development was begun in 1842, by

Boston capital, in Keweenaw County ; the be¬ ginning of well-organized mining began in 18k6, with the discovery of the Calumet and Hecla conglomerate lode, in Houghton County; that county produces more than four-fifths of Mich¬ igan's output to-day, one-half of which is mined near Calumet. This copper averages aborft 20 pounds per ton of rock. The advantages for mining here are the relative purity of the cop¬ per ; the concentration of abundant pay-rock in mines fairly dry and needing little timbering; the altitude of the mine mouths, permitting the use of a natural incline to stamp mills at lake level ; and an all-water route for shipment to market. The total product from these mines aggregates approximately 5,345,000,000 pounds, which gives Michigan rank in total produce sec¬ ond only to Montana ; in annual output the State is surpassed only by Montana and Ari¬ zona.

Iron was discovered in 1844, near Ishpeming. The first ore was mined and smelted in 1841, by capital from Jackson, Mich. In the period centring about the Civil War, more than 50 companies were organized, the great demand for war purposes having forced the

improvement of the Marquette Railroad and the <(Soo):> Canal and led to a new period of settle¬ ment in the upper peninsula. The chief iron regions are the Marquette Range, the Menomi¬ nee Range and the Gogebic Range. In all of these there are unusual advantages for min¬ ing; high grade ores, concentration in small area, down-grade short hauls from the mines, the proximity of timber and an all-water route to market. Most of the ore is shipped east for smelting; the first shipment, of 70 tons, from the Marquette Range, was smelted at Sharon, Pa. Michigan's share in building national in¬ dustry has been largely through her iron sup¬ ply to the markets of the East. The total pro¬ duction has been approximately 450,000,000 long tons. The annual output of these mines is equaled only by that of Minnesota, in the United States; it is tvdce that of Russia, nearly three times that of Sweden and more than that of either France or Spain.

Other minerals are salt, gypsum, clay, lime¬ stone, sandstone, granite, slate, marl, peat, coal and graphite. _ Michigan leads in salt, which is found chiefly in three belts, one extending from Wyandotte to Harbor Beach, a second in the Saginaw Valley and a third near Manistee and Ludington. The chief gypsum deposits are at Grand Rapids and Alabaster, the quarry at Ala¬ baster being the largest in the Mrorld. Most of the limestone is buried too deep under gla¬ cial drift to be quarried. The most valuable outcrops of sandstone are on the south shore of Lake Superior. Peat bogs abound in the lower peninsula, but have not been worked, owing to the relative cheapness of other fuel. The coal basin covers about 8,000 square miles in the cen¬ tre of the lower peninsula, estimated to con¬ tain about 80,000,000,000 tons, of which about half is in workable seams. This coal is mainly of a low bituminous variety; of the annual out¬ put of \l/2 million tons, valued at about $3,330,- 000, all but about 2 per cent is mined in Bay and Saginaw counties.

Manufacturing. — Michigan has over 9,000 manufacturing industries, employing about 300,000 men and a capital of over $500,000,000.

Its annual output in 1909, valued at $685,109,- 000, gave it seventh

place in the United States. The following table gives a comparative view of progress by decades since 1850:

also for clothing and its accessories, particu¬ larly furs. It is also the chief centre for ship¬ building and for drugs and medicines. Michi¬ gan ranks first among the States in the manu-

YEAR	Number of estab¬ lishments	Capital	Wage earners	Total wages	Cost of materials	Value of products
1850 .						
I860 .						
	2,023					
	3,448					
	9,455					
	8,873					
	12,127					
	16,807					

9,159

9,070

$6,563,660 23,808,226 71,712,283 92,930,959 262,412,240

9R4. no 7 1 11

9,344

23,190

63,694

7 7 cm

$2,717,124

6,735,047

21,205,355

25,513,682

54,982,906

66,467,867

153,838,044

188,000,000

$6,136,328

17,635,611

68,142,515

92,900,269

154,521,918

199,559,905

368,612,022

$11,169,002

32,658,356

118,394,676

150,715,025

277,896,706

356,944,082

685,109,169

1870 .

1880 .

1890 .

, v > y i

148,674

1900 .

1909 .

583,946,965

600,000,000

loz , *300

9A') 111

1916* .

ZOZ ,111

285 , 000

* Estimated.

In the 10 years, 1899-1909, Michigan had a higher per cent of gain in value of manufac¬ tures than any State which surpassed it in total

value of output. In 1909 it had 18 industries, each of which put out a total product valued above $10,000,000. The bulk of the total prod¬ uct is produced in the southern 20 counties, where are employed over three-fourths of the men. Michigan's rapid growth in manufac¬ tures is due primarily to abundant resources in timber, iron and copper and cheap water trans¬ portation ; its rapid growth in variety of manu¬ factures since 1890 is due to the release of capital from lumbering and the development of the automobile industry, in which Michigan now leads all the States. Outside of Detroit, which is the centre, the leading Michigan cities in the manufacture of automobiles, are Flint, Lansing, Pontiac and Jackson. This industry has stimu¬ lated a great variety of associated manufac¬ tures. The manufacture of lumber and timber products is the chief industry of cities in the northern part of the lower peninsula and in the upper peninsula except in the mining cen¬ tres. Of the timber products, the chief are paper pulp, shingles and lath, charcoal and chemicals, veneer, tanbark, turpentine and rosin, and a great variety of wooden-ware. Foundry and machine-shop products, which rank ahead of furniture, are made chiefly in the large cities in the southern part of the State. Flour and gristmill products rank next and are widely distributed. The food industry is confined chiefly to Detroit, Battle Creek and the west central part of the lower peninsula. Furni¬ ture ranks fifth; over 150 furniture plants are distributed in over 30 important centres, among which Grand Rapids and Detroit lead. Detroit has about one-third as much capital invested as Grand Rapids. The chief factors in Grand Rapids' supremacy have been the initial impulse from the abundance of pine timber, the invest¬ ment of capital since the decline of lumbering, skilled labor, facilities for marketing and the early organization of the industry on modern business lines. The Furniture Fair held there twice a year is a centre of interest to all the States and to foreign countries. Supplies ac¬ cessory to printing and publishing are an im¬ portant industry. Leather goods and tobacco goods are also made in large quantities. De¬ troit is the chief centre for all kinds of struc¬ tural materials, including stoves and furnaces,

facture of automobiles, salt, drugs and refrig¬ erators ; second in furniture and third in beet-sugar.

Transportation and Commerce. — The first means of transportation used, common wagon roads, have been the last to be thoroughly im¬ proved. The State now has about 70,000 miles of dirt roads, partly improved. The automobile has been most effective in strengthening the ftgood roads® movement. In 1905 was created the State highway

department, which has ex¬ pended about $1,000,000 in money awards to encourage townships in their common road building. Among the most important improve¬ ments is a State road along the entire shore line of the lower peninsula, which is partly com¬ pleted. At the spring election, 1919, Michigan voted to bond the State for $50,000,000 for good roads. Railroad building began in Michigan shortly after Stevenson experimented with the (CRocket.® The first road built, the Erie and Kalamazoo, from Toledo (then in Michigan) to Adrian, was the first west of the Appalachian Mountains. The first State constitution, adopted in 1835, provided for a system of in¬ ternal improvements, in which three trans¬ peninsular railroads were included; of these, the Michigan Central was partly built by the State, but was completed to Chicago by private capital in 1852. The census of 1910 shows 10,584 miles of steam roads, and 1,400 miles of electric roads, with a total investment of • $141,875,000, employing about 80,000 men. Nine trunk lines cross the State from east to west and three from north to south. The chief rail¬ road centres are Detroit, Jackson, Grand Rap¬ ids, Saginaw, Kalamazoo and Lansing. The topography of the lower peninsula has favored a general distribution of roads, through a sys¬ tem of intersecting morainal valleys. In the western end of the upper peninsula is the only portion of the railway system of the State with steep grades. The leading lines are the Michigan Central, the Chicago and Grand Trunk, the Grand Rapids and Indiana, the Lake Shore and Michigan Southern, the Pere Mar¬ quette and the Duluth, South Shore and Atlan¬ tic. Connecting with these railroads are the several large steamship lines of the Great Lakes. In general, the lake traffic is confined to a few of the heaviest and bulkiest com¬ modities — iron ore, copper, lumber, grain and coal. The tonnage of this traffic is one-third

the total tonnage of ships owned in the United States. The tonnage of the Detroit River is five times the foreign tonnage of New York Harbor and exceeds the combined tonnage of Hamburg, Liverpool and London. About four-fifths of the through freight on the Lakes passes through the ((Soo® Canal. Vast sums have been spent by the State and

by the Na¬ tional government, in improving the Great Lakes harbors, especially at Cheboygan, Alpena, Saginaw, Saint Joseph and Grand Haven, and the channels through the Saint Mary's River, the Detroit River and the Saint Clair Flats; 45 life-saving stations and 120 lighthouses and flag-signal stations are maintained.

Government. — Michigan has had three con¬ stitutions, adopted in 1835, 1850 and 1908. Con¬ stitutional development in Michigan has been in the direction of restricting and defining the powers conferred upon the State government. The last constitution, which went into effect 1 Jan. 1909, contains a declaration of rights in 21 sections. Amendments to it may be pro¬ posed in either house of the legislature and by a two-thirds vote may be referred to the people, who may adopt by majority vote; amendments may also be initiated by signature of at least 10 per cent of the electorate. At the general election in 1926 and in each 16th year there¬ after the question of a general revision of the constitution is to be submitted to the elec¬ torate. The elective franchise is conferred upon every male citizen of the United States 21 years of age or over who has resided six months in the State and in the township or ward in which he offers to vote 20 days next preceding an election. Women who have the qualifica¬ tions of male electors and who have property assessed for taxes in any part of the district or territory to be affected by the result of an election, may vote at such election on any question involving the direct expenditure of public money or the issue of bonds.

The seat of government is at Lansing. The legislative department consists of a senate of 32 members and a house of representatives of 100 members; the lower house may not consist of more than 100 nor less than 64 members. A newly elected legislature meets in every odd-numbered year, on the first Wednesday in January. Membership in both houses is reap¬ portioned every 10 years — next in 1923 — upon the basis of the preceding national census. All legislation is by bill, and every bill to be¬ come a law must receive the assent of a major¬ ity of the members elected to each house; a two-thirds vote is requisite for bills appro¬ priating the public funds; by a two-thirds vote the legislature may pass a bill over the gover¬ nor's veto; all other bills, to become law, re¬ quire the governor's signature. At special ses¬ sions the legislature can consider only such subjects as are named either in the governor's proclamation or in his message. The consti¬ tution of 1909 reserves to the people the power of the initiative and the referendum.

The officers of the executive department are a governor, lieutenant-governor, secretary of state, treasurer, auditor-general and attorney-

general. All are elected for two years. The governor, in whom is vested the chief executive power, must be at least 30 years of age, five years a citizen of the United States and a resident of the State two years next preceding

his election. His salary is fixed by the consti-. tution at $5,000 a year. In case of vacancy, the office is filled by the lieutenant-governor, who is ex officio president of the senate. The governor may veto any bill within 10 days (Sundays excepted) of its presentation by the legislature. The appointive power of the gov¬ ernor is limited to minor officials.

The judicial power is vested in a Supreme Court, Circuit Courts, probate courts, justices of the peace and inferior courts established by the legislature. The Supreme Court consists at present of one chief justice and seven associate justices, two members being elected every two years for a term of eight years, at a salary of $7,000 a year. The court holds four terms a year in Lansing. Each of the 39 Circuit Courts holds four terms a year, respectively, in each county within its circuit; each Circuit Court has one judge, elected for a term of six years at a salary of $3,500. In each county a probate judge is elected for a term of four years; probate courts have, in addition to usual duties, original jurisdiction in all cases of juvenile de¬ linquents and dependents. Justices' courts are established in the townships, presided over by justices of the peace, four in each township, elected for a term of four years.

In each of the 84 counties, a board of supervisors is elected by townships and city wards. Other officers are elected annually in April, generally for a term of two years. Owing to the large number of cities and vil¬ lages — nearly 100 cities and over 300 incorpo¬ rated yillages — township government is of minor importance; the cities are in general governed by special charters.

Banking. — The first bank in Michigan was a private bank, established in 1806, in Detroit. By the time Michigan was admitted to the Union (1837), there were 15 banks, with an aggregate actual capital of less than $1,500,000. President Jackson's specie circular precipitated a national crisis, which was met in Michigan by a general banking law, of such a nature that the State was soon dotted with "wildcat® banks, without capital paid in, with excessive issue of notes, and without, in most instances, either ability or intention to redeem them. In 1844, this banking law was declared uncon¬ stitutional and provision was

made in the new constitution in 1850 that no general banking law could be enacted without first receiving the approval of a majority of the electors of the State. The constitution of 1909 provides that such law, to be valid, must receive a two-thirds vote in the legislature. Under the pres¬ ent law, a State bank must have a capital stock of at least $20,000 in cities of 1 500 in¬ habitants, and not less than $250,000 in all cltles °J ov.er 110,000. At least 15 per cent of the deposits of commercial and savings banks must be kept on hand and every stockholder is liable. A State banking department, at the head of which is a commissioner appointed by the governor for a term of four years exercises general supervision over all banks in the State.

aixu taxation. — A11 lt)J/ lIie nrsi

S om non ˆSJatUre aVtl19rlze<l a l°an of over ˆ UUU,UUU tor public improvements, most of

which was placed with eastern companies which soon afterward failed. In 1846 the State sold its improvements, realizing sufficient money to

The State Capitol at Lansing

maintain its credit; but of this debt there still remained at the beginning of the Civil War $2,316,328. The war debt increased the amount to $3,880,399. It was not wholly liqui¬ dated until a short time previous to 1900. A loan of $500,000, made in 1898 on account of the war with Spain, has also been paid. The constitution of 1909 provides that no debt shall be contracted by the State in excess of

$250,000, except to suppress insurrection or repel invasion.

In 1899 the assessed valuation of the State was $968,189,087; in the current year (1916), the State board of equalization placed the equalized value of the State at $2,800,000,000, which was a cut of $280,000,000 from the esti¬ mate of the State tax commission. Of this amount, 29 per cent is assessed to Wayne County ($836,000,000). In addition to a prop¬ erty tax, the State levies certain indirect taxes, which yield about one-tenth of the total revenue. The direct tax is spread by the auditor-general among the various administrative districts, which levy and collect, at the same time with the State tax, the taxes for the counties, town¬ ships, villages, cities and highway labor. The moneys collected for the State are disbursed principally for the expenses of the State govern¬ ment and the maintenance of State institutions, including the State colleges and the University of Michigan. For the ye'ar ending 30 June 1916 the State's revenue and expenditures were as follows :

Balance 1 July 1916 . $12,578,230

Receipts, 1916-1917 . 20,061,320

Total . $32,639,550

Disbursements, 1916-1917 . 20,819,170

Balance, 1 July 1917 . $11,820,380

Corrections and Charities. — State penal and charitable institutions are under the Michi¬ gan State board of corrections and charities, established in 1871. This is an unpaid board of five members, one of whom is the governor ex officio, who appoints the other four, for a term of eight years; one retires every two years. During the year ending 30 June 1916 the board held 20 meetings, 16 of which were at State institutions, in conference with the local board in immediate control ; in general, the local boards consist each of three members appointed by the governor and are unpaid. The oldest penal institution is the State prison at Jackson, established in 1838. In 1885 a branch prison was established at Marquette, in the Upper Peninsula. Minor offenders are sent to the reformatory at Ionia, established in 1877. The total population of all of these is about 2,000. The cost of maintenance is about $300,000 a year, which is about half de¬ frayed

by receipts from prison industries. Progress is being made in prison management; the indeterminate sentence has been adopted, and a pardon board of four members, appointed by the governor, reports to him upon all peti¬ tions for pardon. Allied to the prisons in nature, is the Industrial School for Boys at Lansing (estab. 1855), and the Industrial Home for Girls at Adrian (estab. 1879), containing together about 1,000 inmates. County super¬ intendents of the poor are required to send all neglected dependent children to the State Public School at Coldwater (opened 1874). The Soldiers' Home at Grand Rapids (estab.

1885) cares for Michigan soldiers of recent wars. The Asylum for the Insane at Kala¬ mazoo was opened in 1859; in 1877 a similar institution was established at Pontiac, and in 1893 at Newberry, in the upper peninsula; there is one also at Traverse City (estab. 1881). These four institutions contain over 4,000 pa¬ tients. At Ionia was established in 1885 the Asylum for Dangerous and Criminal Insane. At Lapeer is the State Home and Training School for the feeble-minded, and at Wahja-mega (Tuscola County) is the Farm Colony for Epileptics ; the division between these two classes has been only recently made, both classes having been cared for at Lapeer since 1893. The School for the Deaf and Dumb is at Flint (estab. 1854) ; the School for the Blind is at Lansing (estab. 1879) ; these were formerly together at Flint. At Saginaw is maintained an employment institution for the blind (estab. 1903).

Education. — The constitution of 1909 con¬ tains (Art. XI, Sec. 1) the well-known clause from the Ordinance of 1787 : (<Religion, moral¬ ity and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall for¬ ever be encouraged. At the head of Michi¬ gan's school system is the superintendent of public instruction, elected in April of odd-numbered years, for a term of two years; salary $4,000 a year. He is ex officio member and secretary of the State board of education; three other members are elected, one at each biennial spring election, to hold office six years. The board has general supervision of the State normal schools, examines textbooks on the sub¬ ject of physiology and hygiene offered for use in the public schools, and conducts examina¬ tions for teachers' life certificates. In its gen¬ eral outline, Michigan's educational system, which it owes to its first superintendeat of public instruction, John D. Pierce (1836-41), has been used as a model in nearly all the western States. Its distinctive features are universal education in common free schools with compulsory attendance,

training for teach¬ ers in normal schools, and higher education in colleges and a State university. _ These schools are supported partly from the interest derived from the sale of school and university lands, partly by legislative appropriations. Immedi¬ ately under the superintendent of public in¬ struction there is now elected in each county a county school commissioner, who, with two county examiners, examines and licenses teach¬ ers. In some counties there are townships or¬ ganized as single school districts, which may support a high school in addition to a common school ; but, in general, the townships are divided into districts, by a township board of three (two elected school inspectors and the township clerk), who also exercise _ general supervision ; each district is under its own elected board of three members. Most villages and cities support high schools.

Teachers are trained in four normal schools: the State Normal College at Ypsilanti and three others at Mount Pleasant, Marquette and Kalamazoo. Higher and special education is provided at the Michigan Agricultural College at East Lansing; the Michigan College of Mines at Houghton; and the University of Michigan at Ann Arbor. The Agricultural Col-

lege is the oldest in the United States (estab. 1850) and is under control of an elected State board of agriculture. The College of Mines (estab. 1885) is under a board appointed by the governor. The University (estab. 1837) is under control of an elected board of regents. Besides the State educational system for higher education there are several denominational col¬ leges, at Albion and Adrian (Methodist), at Hillsdale and Kalamazoo (Baptist), at Olivet (Congregational), at Holland < (Dutch Re¬ formed), at Alma (Presbyterian), and at Detroit (Catholic).

School Statistics for Year Ending

June 1918.

School population . 919,664

School enrollment . 655,941

Number of ungraded school districts . 6,660

Number of graded school districts . 669

Number of township school districts . 169

Number of schoolhouses . g _ 943

Estimated value of school property . $11,998ˆ534.00

Average school year in months . 8.5

Total number of teachers employed . 23,051

Total wages of teachers . $15,452,303.99

Average wages of teachers per month:

Males . $113.80

Females . $70.77

Revenue.

From balance for preceding year . $5 , 683 , 789 . 99

From primary school interest fund . 6,192,412.43

From district taxes for all purposes . 18,246,396.72

From non-resident pupils for tuition . ’480,897 .84

Library moneys . 224ˆ044. 27

Amount received from loans . 6.75L959.57

From all other sources . 2,902 ‘ 458. 59

Total . $40,481,959.41

History. — The Indians who originally occu¬ pied Michigan were principally the Ojibwas (Chippewas), the Ottawas and the Potawatomis; minor tribes were the Hurons (Wyandots), and the Sacs and Foxes. In historic times, the Ojibwas have been principally iden¬ tified with the upper peninsula, the Ottawas and Potawatomis with the Lake Michigan shore of the lower peninsula, and the minor tribes with the region between Saginaw Bay and Detroit.

The first white men to visit Michigan were the missionaries and the explorers and traders, who came from the French settlements of the Saint Lawrence Valley in Canada. The route by which they came, and by which the traffic with the Indians was carried on until the dis¬ covery of the waters connecting Lakes Huron and Erie was over the Ottawa River, Lake Nipissing, the French River and the Georgian Bay. Jean Nicolet, in whose honor a bronze tablet was erected on Mackinac Island in 1915, was the first white man to pass through the Straits of Mackinac (1634). He was an agent of Champlain, then governor of Canada, who in the interests of trade sent him to find a passage to the South Sea. Nicolet apparently penetrated as far as central Wisconsin. The Jesuit missionaries followed close upon this lead. In 1641, Fathers Jogues and Raymbault preached to the Ojibwas at Sault Sainte Marie. The first permanent settlements were made by Fathers Dablon and Marquette, in 1668 and 1671, at Sault Sainte Marie and Michilimackinac (Saint Ignac). In 1701, Antoine de la Motte Cadillac (q.v.), who had been commandant of the French fort at Michilimackinac, founded

Detroit. The Treaty of Paris in 1763, closing the struggle between France and Great Britain for possession of the continent, all of Canada, with the Great Lakes region, passed from French dominion; the frontier posts had al¬ ready been garrisoned with British troops, soon after the capitulation of Montreal, in 1760. The Indians, who were friends of the French, and who underestimated the power of the British, believed that a united and determined resistance could drive the British from the continent, and under the leadership of the great Ottawa chieftain, Pontiac, made a simultaneous attack in 1763 upon the British posts from the Straits of Mackinac to western New York. Fort Mackinac, on the south side of the Straits, was captured, and all but a few of the garri¬ son massacred. Pontiac himself conducted the siege of Detroit, but unsuccessfully, and finally the Indians were everywhere defeated.

The British held possession of Michigan until the Jay Treaty of 1796, although the Treaty of Paris (1783), closing the War of the Revolution, had ceded it to the United States. Previous to that war the Quebec Act (q.v.) of 1774 applied to the government of Michigan as well as to Canada. The population increased but slightly; a few British merchants and trad¬ ers came to Detroit, and a few families set¬ tled on the shore lands above and below that point. At the outbreak of the Revolution, Henry Hamilton was appointed lieutenant-governor at Detroit, by whom supplies of tomahawks and scalping knives were distributed liberally among the Indians, and whose reports to General Carleton of the success of scalping expeditions in the settlements sufficiently char¬ acterize his administration. The retention of the posts at the close of the war was alleged to be justified on several grounds; among the real reasons was the desire to retain control of the rich fur trade. The policy of giving presents to the Indians was long continued. In 1787 the military force at Detroit was increased by two full regiments, the fortifications were strength¬ ened, and large supplies of presents were dis¬ tributed among the Indians, which so increased their hostility against the American settlements that the United States Government had to send troops against them; first under General Har-mer who was defeated in 1790; then under Gen¬ eral St. Clair who was also defeated in 1791 ; and finally, under Gen. Anthony Wayne, whose force was of sufficient strength to insure victory. On 20 Aug. 1794 Wayne defeated the combined force of British and Indians at the Battle of Fallen Timbers. By the Treaty of Grenville, 3 Aug. 1795, the Indians ceded a large strip of Michigan land, six miles wide and extending from Lake Saint Clair to the Raisin River, also Mackinac Island, Bois Blanc Island, and other important lands. Following these successes came the treaty negotiated by John Jay with Great Britain in 1796, according to a stipulation in which the British garrison was withdrawn from Detroit, 16 June 1796; on 11 July a detachment of United States troops took possession.

One of the earliest acts of the new Federal Government was to organize a territorial gov¬ ernment for the Great Lakes region. The <(Ordinance of 1787,» adopted for the North¬ west Territory, provided a government in which

a governor and three judges made laws, to be enforced by these judges as the highest court. It contained a guarantee of religious liberty, a bill of rights, a provision for general edu¬ cation, a declaration against human slavery, and the means of erecting new States from these lands. In 1800 the Territory of Indiana was erected, which included the western half of the Territory of Michigan and the eastern end of the upper peninsula ; the remainder of both peninsulas was added in 1802. On 30 June 1805 the whole was separated into two Terri¬ tories, Indiana and Michigan (the lower peninsula), and the Ordinance of 1787 was made the law of Michigan Territory. In 1800, Michigan's white population was 3,206, which in 10 years increased to 4,762 people, of whom 1,650 were in Detroit. Detroit was the capital. President Jefferson had appointed as governor, William Hull, of Massachusetts, an officer of honorable service in the Revolution, but now of advanced age, and temperamentally unfitted to be the chief officer of a frontier settlement.

In 1807, by the Treaty of Detroit, Hull se¬ cured from the Indians the cession of a large area of land in southeastern Michigan ; but by 1809 the Indians had begun to realize the seri¬ ous meaning of the treaty, and to make trouble which he was unable to quiet. The battle of Tippecanoe, 7 Nov. 1811, in which Gen. Wil¬ liam Henry Harrison defeated the Indians near Lafayette, Ind., drove them over to the British, and made Michigan the scene of the opening campaign of the War of 1812. In December

1811. Hull went personally to Washington, to beseech Congress to strengthen Michigan's defences, but he unwisely accepted personal command of a force which was much too small for the purpose. In the following war, which was declared against Great Britain, 18 June

1812, Mackinac was captured by the British on 17 July, which Hull deemed decisive as to the control of the Great Lakes. The arrival of British reinforcements before Detroit, under the British General Brock, demanding sur¬ render, together with the threatening possibility of an Indian massacre similar to that at Macki¬ nac in 1763, decided Hull to comply with the British demands (16 Aug. 1812) to the indig¬ nation of his soldiers and of the nation. It is still believed that he might have been able to resist an immediate attack, and that he would have been speedily reinforced; at the time he was court-martialed, and sentenced to be shot, but was pardoned by President Jefferson on account of his honorable record in the Revolu¬ tion. The immediate result of the surrender was to place the settlements at the mercy of the Indians. On

23 Aug. 1813, following the capture of General Winchester at Frenchtown on the Raisin River, the Indians, with scarcely any restraint from the British General Brock, foully massacred nearly the entire garrison (see Frenchtown, Battle of). The victory of Commodore Perry on Lake Erie (10 Sept. 1813) which made possible that of General Harrison on the river Thames (5 Oct. 1813) restored Michigan to the United States.

On 13 Oct. 1813, Lewis Cass, who had served as a brigadier-general under Harrison, was ap¬ pointed governor of Michigan Territory, and until 1831, when he was appointed a member of Andrew Jackson's Cabinet, his exceptional talents were used for the upbuilding of the

commonwealth. His intimate knowledge of Indian character was specially useful in wean¬ ing the tribes from their British sympathies and gaining their respect for the United States government. By the Indian treaties of 1819 and 1821 he secured the cession of large areas of land adjacent to and including the Saginaw and Grand River valleys. In 1836 the Indians ceded practically all the remaining portion of the Lower Peninsula, and the eastern half of the Upper Peninsula ; and before 1840 they had been removed to Western reservations. With the first public land sales at Detroit in 1818, the beginning of steam navigation on the Great Lakes, the opening of an all-water route to the Atlantic seaboard through the Erie Canal in 1825, the settlement of Michigan made rapid strides, especially in the closing years of the Territorial period, which brought the popula¬ tion from 31,639 in 1830 up to 87,273 in 1837.

The admission of Michigan to the Union was delayed by a dispute with Ohio about Michi¬ gan's southern boundary. In 1835 the people of Michigan adopted a State constitution, elected a complete set of State officers and later this constitution of 1835 was accepted by Congress without readoption; the original delegate was seated in Congress without re-election, and the original State officers continued to serve with¬ out re-election after the formal admission of the State by Congress (26 Jan. 1837). From 1 Nov. 1835 Michigan was de facto a State, though not technically a State in the Union. The boundary question was settled in 1837 in favor of Ohio, when Michigan acquired, as compensation for the loss on the south, the Upper Peninsula, then but little known. At the very outset, the State was seriously crippled by the financial panic of 1837, and the failure of Eastern companies with which the State had placed a $5,000,000 loan for public improve¬ ments. The improvement scheme, which in¬

volved the building of three trans-peninsular railroads, had to be abandoned, and the debt was not entirely paid until long after the Civil War. The improvements made, mainly on the Michigan Central and the Michigan Southern railroads, were carried on however by private enterprise, the former road being completed to Chicago in 1852. In 1850 a new State consti¬ tution was adopted, prohibiting the State to engage in any similar undertaking. In accord¬ ance with a provision of the constitution of 1835, the question of the permanent situation of the State capital was taken up by the legislature in 1847, with the result that it was located at Lansing. During the Civil War, Michigan put into the field nearly 100,000 men; among the many who won distinction for service was Gen. George Armstrong Custer (q.v.), leader of the famous Michigan Cavalry Brigade. Michigan's (<war governor® was Austin Blair. In this period began the career of Zachariah Chandler, who served three terms as United States senator (1857-75). While Mr. Chandler was in the National Senate, Michigan had seven governors, all but one of whom served two terms.

Since the Civil War, Michigan has gained rapidly in population, wealth and prosperity. Agriculture has continued to be the leading in¬ dustry in the southern peninsula, and mining in the northern ; pine lumbering, in the years immediately following the war, developed to

enormous proportions in lower Michigan, but is now carried on principally above the Straits. The conditions of labor have favored rapid immigration ; only one serious strike has oc¬ curred in Michigan's history, in the Copper Country, in 1913. After the war there ensued a great activity in railroad building, aided by national and State land grants totaling nearly 6,000,000 acres. For the original Sault Sainte Marie Canal the national government granted 750,000 acres of land, and in 1881 assumed con¬ trol on completion of the Weitzel lock, which it had constructed at a cost of more than $2,000,000. The establishment of public insti¬ tutions has kept pace with the State's growth in material wealth, coming rapidly into exist¬ ence between 1870 and 1885. Many subordi¬ nate departments of

government have been or¬ ganized as the administration of the State's affair have became more complex. In 1879 a new capitol building at Lansing was completed and occupied. Legislation has been in the di¬ rection of a more equitable distribution of taxes, greater freedom in elections, and increased control of local government by municipalities. The system of <(county option,® with high license, is now in force, the State having re¬ pealed in 1876 the prohibition law of 1855. At various times the question of a general revision of the constitution has been submitted to the people, in 1867, 1874, 1892 and 1898, but defeated, until 1908, when a new constitution was adopted, which went into effect 1 Jan. 1909. In politics Michigan was strongly Demo¬ cratic previous to the Civil War, until the formation of the Republican party in 1854, since which time Michigan has elected Repub¬ lican governors, except in 1882, 1890, 1912 and

1914.

Governors of Michigan.

TERRITORIAL.

William Hull . 1805-13

Lewis Cass . 1813-31

George B. Porter . 1831-34

Stevens T. Mason . 1834-35

John S. Horner (acting) . 1835

STATE.

Stevens T.

James W. Gordon (acting) . .

John S. Barry . .

Alpheus Felch .

William L. Greenly (acting) .

Epaphroditus Ransom .

John S. Barry .

Robert McClelland.. .

Andrew Parsons (acting)

Moses Wisner .

Austin Blair .

Henry H. Crapo… . Henry P. Baldwin . .

John J. Bagley .

Charles M. Croswell. David H. Jerome … Josiah W. Begole …

Cyrus G. Luce. Edwin B. Wina

Hazen S. Pingree . Aaron T. Bliss … Fred M. Warner. Chase S. Osborn. Woodbridge N. F(

Alex. J. Groesbeck.

Democrat ….

1835-40

Whig .

1840-41

a

1841-42

Democrat ….

1842-46

it

1846-47

it

1847-48

it

1848-50

u

1850-51

it

1851-53

u

1853-55

Republican …

1855-59

u

1859-61

u

1861-65

a

1865-69

a

1869-73

u

1873-77

a

1877-81

u

Democrat and

1881-83

Greenback. .

1883-85

Republican …

1885-87

1887-91

Democrat ….

1891-93

Republican …

1893-97

U

1897-1901

u

1901-05

u

1905-11

u

1911-13

Democrat ….

1913-17

Republican …

1917-21

U

1921-23

appreciable

increase

ame after 1818, when

he market ;

but not

until about 1835 was the increase rapid. It was checked by the financial panic of 1837, but was again on the increase by 1840. The

first foreign immigration, especially from Germany, came with the revolutions of 1830 and 1848 in Europe; economic depression in Ireland caused an Irish exodus in the early half of the 19th century. Religious oppression in Holland brought a Dutch colony to western Michigan in 1846. Overcrowding in the countries of south¬ ern Europe has stimulated the Italian, Hun¬ garian and Greek immigrations of recent years. Nearness to Canada has facilitated the coming of many Canadians since 1850. The French-Canadians began coming as early as 1701 to the shore lands about Detroit. Direct immigration from France has not occurred to any extent. The Germans are most numerous in south¬ eastern Michigan about Ann Arbor and Sagi¬ naw. The strongest Dutch centres are Holland, Grand Haven and Grand Rapids. Poles are especially numerous in the "Thumb® and about Detroit, Grand Rapids, Bay City and Saginaw. The largest Italian colony in the Lower Peninsula is in Detroit; and in the Upper Peninsula at Calumet and Iron Moun¬ tain. The most numerous foreign-born popula¬ tion in the Upper Peninsula are the Finns, mainly in the mining regions. The Swedes and Norwegians are most numerous in the coun¬ ties of Houghton, Delta. Dickinson and Gogebic. In the Copper Country there are many Cornishmen. In 1910 Michigan's total foreign-born population was 597,550, or 21.3 per cent of the total population. Following are the number of foreign births by the principal countries represented (United States census) :

Canada (French and others) . 419,968

Germany . 424,753

England . 120,323

Russia . 60,023

Sweden . 56,937

Scotland . 25,477

Norway . 16ˆ774

Hungary . . C … 14 ! 198

In total population Michigan ranks seventh in the Union; in density, 17th. This population is distributed in the two peninsulas as follows :

Urban Rural

Population population population

Upper Peninsula… 325,631 181,987 143,544

Lower Peninsula .. . 2,484,542 1,431,192 1,053,450

About one-third of the population of the Upper Peninsula is in the Copper Country, and another third in the vicinity of the iron mines. In the Lower Peninsula the population is largely in the southern counties, and densest in and about the largest cities — (1910) Detroit, Grand Rapids, Saginaw, Bay City, Jackson. Kalamazoo, Muskegon, Port Huron, Battle Creek, Lansing and Ann Arbor. In 1910 Detroit contained about one-sixth of the popu¬ lation of the State. Since then its rate of gain has been vastly greater than that of most other cities. Lansing and Flint have risen far above the rank allotted them in 1910. The trend of population is at present, as it has been for over 20 years, away from the small vil¬ lages and rural districts to the large cities, and, in general, there is a perceptible trend toward the northern and northwestern parts of the State, The general growth in popula-
MICHIGAN

29

hdi by decades from 1810 to 1920 is given in the following table :

1810

1820

1830

1840

1850

1860

1870

1880

1890

1900

1910

i920

4,762

8,896

31,639

212,267

397,654

749,113

1,184,059

1,636,937

2,093,890

2,420,982

2,810,173

3,668,412

Bibliography. — State publications ; the most important above used are the reports and bulle¬ tins of the Geological and Biological Survey, Public Domain Commission, Railroad Commis¬ sion, Board of Agriculture, Highway Depart¬ ment, Department of Public Instruction and Board of Corrections and Charities (consult for others, Bowker, R. R., State Publications) ; United States Census, 1910; ˆMichigan His¬

torical Collections > (Lansing 1877-1915) ; (Michigan Political Science Association Publications) (Ann Arbor 1893-1905) ; legislative Manual* (Lansing 1915) ; Cooley, ‘Michigan* (American Commonwealth series, rev. ed., Boston 1905) ; Shelden, (The Early History of Michigan *(New York 1856); Lanman, (History of Michigan* (New York 1839) ; Farmer, (History of Detroit and Wayne County and Early Michigan* . (Detroit 1890); Wood, Ge¬ ography of Michigan* (Kalamazoo 1914) ; Mc¬ Laughlin, ‘Lewis Cass-* (American Statesmen series, Boston 1892) and (Higher Education in Michigan) (Circular of Bureau of Education, Washington 1891) ; Cook, (Michigan, its His¬ tory and Government* (New York 1905) ; Campbell, (Outlines of the Political History of Michigan) (Detroit 1876) ; Dilla, (The Politics of Michigan, 1865— 1878ˆ (New York 1912).

George N. Fuller.

Secretary Michigan Historical Commission.

MICHIGAN, Lake, in the northern part of the United States, the second in size of the Great Lakes (q.v.), and the largest body of fresh water lying wholly within the United States. It is bounded on the north and east by the State of Michigan, on the south by Indiana and on the west by Illinois and Wisconsin. Its outlet is Straits of Mackinac, through which its waters flow into Lake Huron (q.v.). The Mis¬ sissippi is supposed to have been Its outlet in ancient times ; and now the lake is con¬ nected with this river by means of the Chicago Drainage Canal and the Illinois and Michigan Canal. Lake Michigan is a most important part of a great water system which furnishes transportation to the ocean for an extensive grain-growing and lumbering region. The lake is 581 feet above sea-level; its length from north to south is 316 miles; the average width 75 miles, the maximum depth, 875 feet and mean depth, 690 feet; area, 22,450 square miles; drainage area, 68,100 square miles. It is subject to violent storms, which are most destructive in the late autumn months. A lunar tidal wave shows itself in a slight degree. The shore-line of the southern part of the lake, east and west, is regular, but that of the northern part, east and west, has a number of indentations many of which form good harbors. At the mouths of rivers whiqh

flow into the lake there are good harbors. Nearly the whole extent of coast is low, most of it sandy; the Michigan coast has some high bluffs and considerable rocky shore-line. Green Bay on the west, indenting Wisconsin, is the largest bay ; and Grand Travers Bay, on the east

indenting the coast of Michigan, is the next in size. Another important inlet on the east is Little Travers Bay. Big Noquet and Little Noquet are inlets from Green Bay. The chief harbors, which are formed by mouths of rivers, are Chicago, Milwaukee and Grand Haven. Escanaba and several other good har¬ bors are on the shores of Green Bay (q.v.). There are few islands in the southern part of the lake, all small and near the coast. At the entrance to Green Bay there is a group of islands, the largest of which is Washington. The Manitou (q.v.) group, in the northern and northeastern part of the lake, has several good-sized islands ; the largest, Beaver, is about 52 miles long.

The chief rivers which flow into the lake are the Ford, Escanaba and Manistique from the north ; the Manistee, Pere Marquette, Muskegon, Grand, Kalamazoo and Saint Joseph from the east. The Fox and the Menominee enter the lake through Green Bay.

The chief cities on the lake are Chicago in Illinois and Milwaukee in Wisconsin. Other important cities are Kenosha, Racine and Man¬ itowoc (Wis.), Manistee, Ludington and Grand Haven (Mich.), and Michigan City (Ind.). The navigation on Lake Michigan is most ex¬ tensive and important. In the upper waters, or the southern part, navigation continues nearly all the year, but in the northern part navigation is closed about four months on account of the ice in the Straits of Mackinac. Large shipments of lumber are sent by way of the lake from northern Michigan and Wisconsin to Milwaukee and Chicago, and a vast amount of wheat and corn of the Mississippi Valley is sent east through Chicago and over Lake Michigan. Large mineral shipments are made. The fish¬ eries of the lake are most important. The lake trout and whitefish of Lake Michigan are sent, fresh and canned, to all the large markets of the vicinity and to the Eastern markets.

The early missionaries and traders traversed the waters of this lake. In 1634 Jean Nicolet, an agent of Champlain (q.v.), visited the north¬ ern part of the lake, entered Green Bav and partially explored the Fox River. Father Mar¬ quette (q.v.) visited this lake and established mission stations on its shores. La Salle (q.v.) and Father Hennepin (q.v.) in 1679 made their famous voyage on this lake, and La Salle built a fort at the mouth of the Saint Joseph River.

MICHIGAN, University of, chartered in 1837 and first opened at Ann Arbor in 1841. It is a part of the public educational system of the State and is under the control of a board of regents elected for eight years by popular vote. The law of 1837 establishing the uni¬ versity provided for three departments, namely, literature, science and the

arts, law and med¬ icine. The curriculum has since Teen enlarged till the organization now includes eight de¬ partments: (1) Literature, science and the arts; (2) engineering and architecture; (3) medicine and surgery; (4) law; (5) the Col¬ lege of Pharmacy; (6) the Homoeopathic Med-

ical School; (7) the College of Dental Surgery, and (8) the Graduate School. The College of Literature, Science and the Arts offers courses in language and literature, his¬ tory, philosophy, science and the liberal arts, and includes special curricula in journalism, business administration, insurance and statis¬ tics, chemistry, forestry and landscape design, as well as combined curricula leading to de¬ grees in letters and law, letters and medicine and letters and dental surgery: the degrees conferred are bachelor of arts and of science. The colleges of engineering and architecture offer courses in civil, chemical, mechanical, electrical and marine engineering, aeronautics, conservation engineering, naval architecture, architecture and architectural engineering, and confers the degrees of bachelor of engineering and of architecture. Other degrees conferred by the university are as follows : Doctor of medicine in the Medical School and in the Homeopathic Medical School; bachelor of laws, juris doctor and master of laws in the Law School ; pharmaceutical chemist, and bache¬ lor of science (in pharmacy), in the Col¬ lege of Pharmacy; and doctor of dental surgery and doctor of dental science in the College of Dental Surgery. Advanced work in all lines is carried on in the Graduate School, leading to the degrees of master and doctor of arts, of science and of public health, and civil, electrical, mechanical and marine engineer. There are summer sessions in the colleges of Literature, Science and the Arts, Engineering and Pharmacy, and in the Med¬ ical, Law and Graduate schools. A summer engineering camp and a biological station are maintained on lands owned by the university in northern Michigan. The regulation of the affairs of each department is in the hands of the faculty of that department; there is also a university senate which considers matters of common interest. The standard of scholarship at the university is high, and it has long

ranked among the foremost of State universities. The system of inspecting and accrediting secondary schools and admitting their recommended grad¬ uates originated at this university in 1870 under the acting presidency of Henry Simmons Frieze, whence it has been universally adopted throughout the United States. The university is also distinguished as a pioneer in adopting the principle of coeducation, being opened to women in 1870, and giving them equal privi¬ leges in all respects ; this system has proved very successful from the first, and has never incurred any adverse criticism. The dormitory system adopted at first was discarded early in the history of the institution, but has in recent years, been revived for women students. In addition to cottage dormitories, three com¬ modious and magnificently appointed halls of residence for women, given by friends of the university, were opened in 1915. The 1,700 women students are all required to live in ap¬ proved houses. Besides the halls and labora¬ tories of the different departments the import¬ ant buildings are the Alumni Memorial Hall, the Hill Memorial Auditorium, seating 5,100, the library, the museum, the observatory and the two gymnasiums. The university has a number of valuable collections in natural his¬ tory, archaeology, ethnology, materia medica, anatomy and the industrial and fine arts.

Among these are the Chinese government ex¬ hibit at the New Orleans Exposition, presented tc the university in 1885, and the Stearns col¬ lection of musical instruments. This is one of the most complete and significant collections of the kind in existence, containing about 1,500 examples of every type of musical instrument, and is supplemented by a very inclusive collec¬ tion of books bearing upon the subject. The Frieze memorial organ, first built for the Chi¬ cago Exposition of 1893 and presented to the university by friends, was ‘completely rebuilt and much enlarged when recently transferred to Hill Auditorium. The musical festivals, held annually in May at the university, are of inter¬ national repute. The general library in 1919 numbered over 308,000 volumes, not including pamphlets ; special libraries also belonging to the university are the science library (15,000 volumes), the chemical library (10,000 vol¬ umes), the engineering library (15,000 vol¬ umes), the medical library (30,000 volumes), the law library (40,000 volumes), the homoeo¬ pathic library (4,000 volumes) and the dental library (3,100 volumes). A large and splendidly equipped building will be occupied in 1919. The main observatory, erected by the citizens of Detroit and known as the Detroit Observatory, contains a meridian circle constructed by Pistor and Martins of Berlin, a refracting telescope with an object-glass of 13

inches diameter and aˆ recently constructed reflecting telescope of 37*4 inches aperture and a refractor of 24 inches aperture. The observatory also contains a com¬ plete set of seismographs. Two hospitals are connected with the university, one under the direction of the Medical School, the other under the charge of the Homoeopathic Medical School ; with each of these is connected a training school for nurses. A course in public health nursing has also been introduced. The University-hos¬ pital will be rebuilt at an expense of more than $1,000,000 appropriated by the last two legisla¬ tures, and an appropriation of $300,000 for a school of education. The State Psychopathic Hospital is connected with the former. Ample provision is made for physical culture and athlet¬ ics ; besides the two well-equipped gymnasiums, one for men and one for women, there is an athletic field of 75 acres for men and a sports field of seven and one-quarter acres for women ; the general supervision of athletic sports is vested in a board of control of 11 members, on which the faculty is represented by five members chosen from the university senate, the Alumni Association by three members and the students by three members chosen by the directors of the Students' Athletic Association. Important among student organizations is the University Oratorical Association, established by the stu¬ dents of the College of Literature, Science and the Arts to foster an interest in oratory and debate ; this association is affiliated with vari¬ ous oratorical and debating leagues composed of representatives of universities of the North-Central States. The total income in 1918 was $2,378,556, including the regular State appro¬ priation, together with an additional appropria¬ tion of $200,000 for the new library building; the fees to students are small, being somewhat less for residents of the State than for non-residents. The faculty numbers 610; the average annual attendance of students is over 7,000. During the World War, 1914-18, 3,000 students were

em oiled with the colors. The total number of graduates to 1918 was 35,544. Tuition fees range from $45 to $130; living expenses $500.

T 3?iCHtIGAN agricultural COL¬ LEGE, chartered in 1855, and opened in 1857, situated at Lansing. It was the first institution tor agricultural education established in the United States. The Michigan State constitu¬ tion provided that ftThe legislature shall as soon as

practicable provide for the establish¬ ment of an agricultural school.® In 1850 the legislature petitioned Congress for a grant of land for an agricultural college withm the State, but no attention was paid to this peti¬ tion. In 1855, however, the legislature appro¬ priated land and money for such a college and located it on a farm of 684 acres. From that time until 1862 the college was supported by State appropriations, and in that year received control of the Federal land grant. The courses offered in the. college include full four-year courses in agriculture, engineering, home eco¬ nomics, forestry and veterinary medicine. Also short courses (varying from 8 to 16 weeks in length) in general agriculture, horticulture, poultry, creamery management and cheese¬ making. Graduate work is also provided for. The college holds each year, during the winter months, about 500 farmers' institutes through¬ out the State. The State Experimental Station is also connected with the college and receives a separate Federal appropriation annually. The extension work is carried on co-operatively with the United States Department of Agri¬ culture under the terms of Act of Congress of 8 May 1914, known as the Smith-Lever Act. The farm consists of about 1,013 acres and the buildings are valued at about $900,000. The library (1916) contains about 40,000 volumes. The total annual income is approximately $750,000; the students number 2,000 and the faculty and assistants 140.

MICHIGAN CITY, Ind., city in Laporte County, on Lake Michigan and on the Chicago, Indianapolis and Louisville, the Pere Marquette, the Lake Erie and Western and the Michigan Central railroads, about 40 miles east of Chi¬ cago. The place was visited frequently in the 18th century by missionaries, explorers and . traders, but the first, permanent settlement was made in 1832. The incorporation was made in 1833. It has excellent transportation facilities which contribute to its commercial and indus¬ trial growth. Its chief manufactures are hosiery, knit underwear, chairs, lumber, railroad cars, furniture, bicycles, surgical instruments and clothing. It has a large trade in iron ore, salt, lumber and farm products. It has the North¬ ern Indiana State Prison, a United States life¬ saving station and on the lake front a park. Its educational institutions are a high school, public and parish schools and a public library. The city is governed under a charter of 1867, since amended, which provides for a mayor, elected biennially, and a common council. The administrative officials are elected by the coun¬ cil or appointed by the mayor subject to the approval of the council. The waterworks are owned and operated by the city. Pop. (19201

19,457.

MICHIGAN COLLEGE OF MINES, at

Houghton (q.v.), Mich., was founded in 1885 and opened in 1886. The school, a State-

supported institution, is located in the midst of the mining region of the State, thus giving the students exceptional opportunities for ob¬ servation and study. Practical work in mine surveying and mining is carried on for five weeks, 45 hours each week. The first two weeks, are devoted to surveying and mapping a mine in the <(copper country® or in the iron min¬ ing district; the last three weeks are given to the examination of mining methods and to making sketches of mines in the vicinity. The courses of study lead to the degrees of bachelor of sci¬ ence and engineer of mines. The college is well equipped with all necessary apparatus. There are nine college buildings with a library of 30,000 volumes. The metallurgical and assay laboratory is a brick building, and the ore-dressing building or stamp mill is a wooden building. A reverberatory roasting furnace stands near the mill. There are 26 instructors and an average yearly attendance of 135 students.

. MICHIPICOTEN, mish-e-pe-ko'ten, a bay, island and river in the western part of the province of Ontario, in Canada. The bay is an arm of Lake Superior, on the northeast shore about 100 miles north of Sault Sainte Marie. At the entrance to the bay is Michipicoten Island. . The river has its source in lakes on the south side of the height of land dividing the waters, of Hudson Bay and Lake Superior and falls into the bay 125 miles north of Sault Sainte Marie.

MICHLER'S KETONE, Tetramethyl-diaminobenzophenone (CH3) zN.CeHˆOCsHˆN (CH3)2, was first prepared in 1876 by W. Michler. He obtained the ketone by passing carbonyl chloride into cooled dimethyl aniline. The reaction mixture was then heated with water and the product was purified by treat¬ ment with hydrochloric acid and caustic soda. With slight modifications Michler's method is employed at the present time for the prepara¬ tion of the compound. The ketone has also been . prepared (1) by heating hexamethyl-tri.aminotriphenyl carbinol with hydrochloric acid, and (2). by heating a mixture of dimethyl-aminobenzanilide and dimethyl aniline in the presence, of a small quantity of phosphorus oxychloride, and by decomposing the conden¬ sation product with an acid at slightly elevated temperatures.

Michler's ketone forms bright grayish plates when crystallized from alcohol.

It melts at 179° C. and boils with decomposi¬ tion above 360° C. It has been used to a great extent in the manufacture of certain dyes. Thus heated with dimethyl aniline and phos¬ phorus oxychloride it yields Crystal violet; with ammonium chloride in the presence of a dehydrating agent it forms Auramine; it con¬ denses. with phenyl-alphanaphthylamine into Victoria Blue B ; with methyl-phenyl-alphanaphthylamine into Victoria Blue 4R, and with ethyl-alphanaphthylamine into Victoria Blue R. It. also forms, dyes with dioxynaphthalenes and with pyrogallic acid.

V. S. Babasinian,

Professor of Chemistry, Lehigh University.

MICHMASH, mlk'mash (modern Mukhmas), Palestine, seven miles northeast of Jeru¬ salem. It occupies a highly important strateg¬ ical position, commanding the north side of the Pass of Michmash on one of the two an-

I

cient caravan roads from Jerusalem to Mount Ephraim. Michmash lies on a plateau of roll¬ ing ground, but the road descends sharply into a rough valley at the bottom of which is the Pass of Michmash, a gorge with steep sides, which must be traversed by the caravans. It was here that Ihe Philistines made their head¬ quarters in their movements against the first uprising under Saul, and it was the scene of Jonathan's exploit related in 1 Samuel xiv. It was also Jonathan's headquarters in the time of the Hasmonaeans (1 Macc. ix, 73). It was never a city, but was surrounded by wheat-lands, and in the time of Eusebius it was a considerable village. The present village, Mukhmas,

is small, and the road on which it stands is more or less abandoned in favor of the caravan road which keeps to the high ground and avoids the Pass of Michmash.

MICHOACAN, me-cho-a-kan', Mexico, a state, on the Pacific Ocean, bounded on the north by the states of Guanajuato and Jalisco, on the east by Mexico, on the south by Guerro and the Pacific and on the west by the Pacific, Colima and Jalisco. Area, 22,874 square miles. Three railroad lines cross parts of the state. The surface generally is mountainous ; in the north and south are some flat lands. The vol¬ cano of Jorullo is in the southwest. The lar¬ gest drainage streams are Las Balsas and Lerma on the boundary, and the Tepalcatepec. There are a number of lakes within the state limits, the largest of which is Cuitzeo. Except where the lands are low, the climate is health¬ ful. The soil is fertile; the principal crops are sugar, tobacco, vanilla, wheat, rice and tropical fruits. Considerable attention is given to stock-raising. The minerals are valuable: The Don Estrellas mine is the largest producer of gold and silver in the country. The capital is Morelia (q.v.). Pop. of state about 1,003,491.

MICKIEWICZ, mits-ke-ev'ih, Adam Bern¬ ard, Polish poet: b. Novogrodek, Lithuania, 24 Dec. 1798; d. Constantinople, 26 Nov. 1855. He was educated at the University of Wilna, where he became affiliated with several of the leaders against Russian control. His first vol¬ ume of poems appeared in 1822 and stamped him the greatest poet of his country. Implica¬ tion in political affairs caused his banishment to Russia in 1824, but in 1828 permission to leave Russia was granted him and he traveled in Germany and Italy, and in 1834 he went to Paris, where, in 1840, he became professor of Slavonic languages and literature in the College de France, where his radical teaching led to his suspension in 1844. In 1848 he attempted to enlist Polish regiments for service in the Italian struggle with Austria. He became li¬ brarian at the Arsenal in Paris in 1852. His remains were interred (1890) at Cracow. (See Pan Tadeusz). Among his works are Conrad Wallenrod) (1818); ˆCrimean Sonnets) (1826) ; (The Books of the Polish People and of the Polish Pilgrimage> (1832) ; (Pan Tadeusz> (1834), *etc.* Consult L. de Lomenie, (Galerie des Contemporaines,* and Gardner, W. M., (Adam Mickiewicz, National Poet of Poland) (1911).

MICKLE, mik'l, William Julius, Scottish poet : b. Langholm, Dumfriesshire, Scotland, 28 Sept. 1735; d. Forest Hill, near Oxford, 28 Oct. 1788. He removed to London in 1764,

and in 1775 appeared his principal production, a translation of the (Lusiad) of Camoens, with a historical and critical introduction, including a life of Camoens. His poetical works were published collectively, with memoir by Sim, in 1806. Among the best of Mickle's poems is the ballad of Cummor Hall, which has attained ad¬ ditional celebrity as having suggested to Sir Walter Scott the groundwork of his novel of (Kenilworth.) The popular song, rThere's nae Luck about the HooseP has been claimed for him; other ascribe it to Jean Adams (1710-65), schoolmistress near Greenock.

MICMACS, mik'maks, a tribe of American Indians. See Algonquian.

MICROBE (Greek pinp6qy little ; P [o g , life), a microscopic organism; applied particu¬ larly to bacteria, and more especially to the forms that cause disease. See Bacteria ; Protozoa.

MICROCEPHALUS, in pathology, the condition of having an abnormally small head, further marked by a peculiarly shaped cranium. The forehead is small and receding and the vertex somewhat pointed. The various parts of the brain are unnaturally small. The con¬ dition results in mental deficiency, amounting in some cases to idiocy. Operative measures to restore or supply the ununited sutures and the spaces permitting the growth of the brain have been tried, but found unavailing.

MICROCLINE, a feldspar identical in composition with orthoclase, but crystallizing in the triclinic system. The name was given by A. Breithaupt in 1830, but the species was really first established by Des Cloizeaux in 1876. There is a green feldspar called Amazon stone which is really microcline, and much of the potash feldspar called orthoclase also is micro¬ cline. Thin sections examined in polarized light frequently show a grating-like structure, due to double twinning. The color varies from white to yellow and, occasionally, red or green.

MICROCONODON, a fossil animal of the Upper Trias in North America, doubtfully placed among the Protodonta, or most primitive of Mammalia, and of interest chiefly in refer¬ ence to the structure of its teeth as indicating the subsequently developed mammalian type. Consult Osborn, (Evolution of Mammalian Molar Teeth* (New York 1907).

MICROCOSM AND MACROCOSM.

Among the ancients a belief prevailed that the world or cosmos was animated, or had a soul. This theory led to the notion that the parts

and members of organic beings must have their counterparts in the members of the cosmos. The natural philosophers of the 16th century took up this theory in a somewhat modified shape, and considered the world as a human organism on the large scale, and man as a world, or cosmos, in miniature; hence they called man a microcosm (Greek, «fittle world®) and the universe itself the macrocosm (((great world®). Heylin gave the title <Microcosmus) to a work on cosmography in 1621.

MICROCOSMIC SALT, used in blowpipe analysis ; prepared by mixing concentrated solu¬ tions of phosphate of soda and chloride of am¬ monium. It has the composition NaNHiHPCX,

4 H20.

MICROFARAD. See Farad.

MICROLESTES. See Plagiaulacidˆe.

MICROLITE (Greek, (<small))), a native pyrotantalata of calcium, containing fluorine and also nibium and various other bases. The formula has not yet been satisfactorily deter¬ mined. Microlite crystallizes in octahedral forms belonging to the isometric system, and the crystals are often very small. It was first found at Chesterfield, Mass., where the crystals were so minute as to suggest the name ((micro-li.te.-0 Excellent crystals as much as an inch in diameter have since been found in Amelia County, Va., as well as imperfect ones weigh¬ ing as much as four pounds. The mineral is usually yellow or brown in color, with a resin¬ ous lustre, a hardness of 5.5 and a specific gravity of from 5.5 to 6.1.

MICROMETER, an instrument for meas¬ uring minute angles and distances. The (<double-image micrometer® is of importance in measuring the diameter of a celestial object; it is an eve-piece containing two halves of a lens, each half being movable by a microm¬ eter screw (q.v.) in a direction parallel to the common

diameter. When the halves form one lens the heads of the screws indicate zero. In making an observation of the diameter of a heavenly body the half-lenses are so moved that the image formed by one of them of one limb of the body coincides with the image of the opposite limb formed by the other half¬ lens ; the readings of the screw-heads deter¬ mine the apparent diameter of the body.

MICRON, ml'kron (Greek, (<very small®), a unit of length equal to the millionth part of a metre, or the 25,400th part of an inch. It is much used among physicists in connection with precise measurements, and has been officially sanctioned by the International Commission of Weights and Measures. The Greek letter fi is used as its symbol. Thus ((4 7 ˆ ® is read (<4 7 microns.® The names <(bicron® and (<tri-cron® have been proposed, respectively, for the billionth and trillionth part of a metre, but they have not been generally adopted, and prob¬ ably will not be. Etymologically, at least, they are monstrosities.

MICRONESIA. To the islands shortly north of the equator in the Pacific has been applied the designation <(Micronesia® (Greek, mikros, small; nesos, island). The designation aptly describes the physical appearance of the islands of this subdivision of Oceanica, for they are generally small and generally low, and the section contains a larger proportion of islands of the atoll type than any other subdivi¬ sion of the globe. Listing the several archipel¬ agoes from the east toward the west we find the Marshall group, with its two chains, the Ratak and Ralik; the Caroline group; the Palau, and the Marianas or Ladrones. In the order of their discovery all of these islands, with the exception of the Marshall group, came under the sovereignty of Spain in the 15th century, and with a single exception remained Spanish until the year after the Spanish War, in which they passed to the German Empire, by purchase, for 24,000,000 pesetas ; they remained German until their capture by the naval forces of Japan in October 1914. The single exception to the German purchase from Spain is the island of Guam, which was captured by the United States in the Spanish War in 1898, and now re-vol. 19 — 3

mains an important base of American naval strategy in the Pacific. This is the southern¬ most island of the Ladrones, possesses a good harbor and is 47 miles distant from the island of Rota, its nearest neighbor. Despite the in¬ frequency of rain all of these islands may be regarded as fertile and abundantly productive. The staple product of such agriculture as is practised by the inhabitants is the cocoanut,

whose dried meat, known commercially as copra, finds extensive use in the production of oil and feed-cake. In climate, conditions are found such as might be expected in low alti¬ tudes in immediate proximity to the equator, but the excessive temperature is very pleasantly moderated by the prevalence of ocean breezes. Lying in the region between the two trade winds precipitation is generally below the nor¬ mal, and the supply of water is markedly de¬ ficient, in some islands the only potable water being that which is obtained by filtration through the beach sand into temporary wells which are dug above high water mark. The islands in general lie outside the hurricane belt, yet at rare intervals they have been visited by destructive gales of this type.. The ethnolog¬ ical position of the islanders is as yet imper¬ fectly known; physically and in language they differ from the other inhabitants of the Pacific, and in some particulars they seem to suggest a certain degree of derivation from the races of the southeastern corner of Asia, between Tibet and Cambodia. Within a historic period, the native race of Guam, the Chamoro, have been destroyed in a futile insurrection against the introduction of foreign culture.

In 1850 the greater part of Micronesia came under the influence of American missionaries, who in that year established a station on the island of Kusaie, in 1856 extended their work to the Marshall Islands, and later spread their efforts over all of the eastern Caroline Islands; in this latter field they came into conflict with the Spanish government, and were forced to withdraw. Micronesia, since the discovery period, has been but scantily subjected to sci¬ entific investigation, except upon the linguistic side. Consult Christian, F. W., (The Caroline Islands) (London 1899) ; Furness, (The Island of Stone Mone}ˆ (Philadelphia 1910) ; Father Salesius, (Die Karolinen-Insel Jap} (Stuttgart 1904) ; Bartolis, (Las Carolinas) (Barcelona 1885) ; Cabeza Pereira, (Estudios sobre las Carolinas) (Manila 1895).

MICRO-ORGANISM. See Bacteria.

MICROPHONE. See Electrical Terms.

MICROPHOTOGRAPHY, the art of

photographing minute objects by combining a camera with a microscope in such a way as to obtain a picture of the object as enlarged by the lenses of the latter instrument; also, the art of making a ’photograph on a minute scale, by means of reducing lenses, of any object, as a page of print, which may afterward be en¬ larged by rephotographing it through a micro¬ scope. Also called

Photomicrography. See Photography. fv

MICROPYLE, the minute opening inVthe integument of an animal egg-cell, or in the ovule of a plant, by which the spermatozoon ik the case of an animal, or the pollen of the plant, enters the egg or ovule to make contact

with the germinating vesicle and effect ferti¬ lization.

MICROSAURI, an order of Prosauria.

See Herpetology.

MICROSCOPE, an optical instrument by which images of objects are so magnified that details invisible or indistinct to the naked eye are clearly observed. In the ordinary micro¬ scope the magnifying power is interposed di¬ rectly between the eye and the object, in the manner of a magnifying glass; and although the power may consist of several lenses, they combine as one. See Lens.

Microscopes are of two types — simple and compound, the former being used for low mag¬ nifications, rarely exceeding 20 diameters, whereas the latter may give as high as 4,000 diameters magnification. In the simple form the eye views the object directly (Fig. 1), whereas in the compound form an enlarged image is formed by one lens, which image is magnified by another lens or pair of lenses, at the spme time reversing it so that what is at the right hand in the object is at the left hand in the image. (Fig. 2.) A short focus posi¬ tive lens becomes a simple microscope when used for directly viewing an object; its usual form is that of the Pocket Magnifier, and al¬ though generally consisting of a combination of two or more lenses with the view of im¬ proving its quality, it always remains optically simple. The most simple forms are one or several convex lenses mounted separately and offering a variety of foci, and hence of magni¬ fying power. These

lenses have two defects, one, chromatic aberration, which fringes the images with the colors of the spectrum, most noticeably red or yellow, and blue; the other, spherical aberration, which is most noticeable by the lack of distinctness increasing toward the edge of the field. Improved forms are constructed to overcome these defects. The most simple of these is the Coddington lens, originally a section of a sphere, but, as generally made, a thick double convex lens with a circu¬ lar groove which acts as a diaphragm. The achromatic lens when composed of three lenses, two concavo-convex flint glass lenses enclos¬ ing and cemented to a double convex crown glass lens, is the best form. These are usually placed in a folding mounting for pocket use. The simple microscope is also made in more complex form for dissecting purposes, a me¬ chanical construction, more or less elaborate, being added, which provides adjustment for the lens in relation to the object, a platform or stage for the latter, and a mirror for re¬ flecting light to illuminate the object. (Fig. 3).

In the compound microscope the lens which

•gives the first magnified image is the one nearest the object, and therefore called object-glass or objective. The optical part which mag¬ nifies the image formed by the objective is the one to which the eye is applied and is called the eye-piece or ocular. This latter, in its common

form, is called a Huyghenian, eye-piece, after Huyghens, who used it in the earliest and most primitive telescope construction. It con¬ sists of two plano-convex lenses (Fig. 2), suit¬ ably mounted in brass, the lower lens, il, being called the field lens, the upper one, op, the eye lens. It is a negative eye-piece, as its

Fig. 3. — Dissecting Microscope.

focus lies within itself, a diaphragm cd which limits the field of vision being placed at this point. _ The action of the compound microscope is plainly shown in Fig. 2. The image of the object ab is carried through the objective gh to the field lens il of the eye-piece, and thence

to a focus at the diaphragm cd. At this point it is viewed by the eye lens of the eye-piece and magnified to the size cf. Fig. 4 shows the appearance of the working instrument in which the principles exhibited in the diagram, Fig. 2, are applied. The particular instrument shown is fitted with three objectives of different focus set on a pivot, so that any one of them may be brought into the axis of the tube. There is a rack and pinion for adjusting the focus and micrometric attachments for moving the object on the stage. The tube and stage are pivoted on the two pillars to incline at any convenient angle. The magnification of the compound microscope depends upon three conditions : (1) The power of the object-glass, (2) the power of the eye-piece, (3) the amount of

separation of these two optical parts. If the focus of the object-glass is reduced, the power is increased, and the same holds true with the eye-piece. The more the objective and eye¬ piece are separated, the greater will be the power. It will appear from this statement, therefore, that the magnification of the micro¬ scope is unlimited, but the mere magnification of an object is less sought after and is of less value in the modern microscope than its defini¬ tion or power to disclose detail and structure. The length of tube which connects the eye¬ piece and objective is limited to from six to eight inches, for the sake of convenience in use. A draw-tube permits the length to be extended to 12 or 13 inches for the highest powers. The standard length of the micro¬ scope tube must be closely adhered to or else the optical capacity (correction) of the objec¬ tive will be disturbed. The power of the eye¬ piece rarely exceeds 15 diameters and that of

Fig. 4. — Compound Microscope.

the objective 150 diameters. A convex lens of one inch focus gives a magnification of about 10 diameters at a distance of 10 inches, and this holds true of a combination of lenses of this equivalent focus as in the eye-piece. If therefore a one-inch focus eye-piece is 10 inches distant from a one-inch objective, the magnifying power is 10 X 10 = 100 diameters; or, if 5 inches distant, is one-half as great, or 50 diameters. The designation of power is according to the focus of a single lens having the same magnifying power as the series or combination of lenses which make up the objective as well as eye-piece. As the image of the objective is magnified by the eye-piece, it is evident that any defect in the objective is magnified to the same extent, and unless elimi¬ nated would seriously interfere with obtaining a distinct image. The main problem, therefore, remains to convey through the objective as many image-giving rays, free from defects, as possible. As a matter of fact, objectives, what¬ ever their power, are composed of a series of lenses whose purpose it is to correct errors which would exist if single lenses alone were used, and the greater the power of the objec-Fig. 5. — A low power (§”) microscope objec¬ tive of two systems.

Fig. 6. — A high power (l-1 2”) microscope ob > jective of four systems,

tive, the larger the number of lenses required. In the low powers there are generally two systems of lenses, each of which is an achro¬ matic doublet ; in the medium powers the prin¬ cipal magnification is obtained by a single front or hemispherical lens and two systems of cemented and corrected lenses ; in the high powers it is usual to employ two superposed hemispherical lenses, adding thereto two cor¬ rected combinations. As may be supposed, the production of these lenses and setting them in mountings involves the most accurate processes. First of all the various kinds of glass must have fixed and previously calculated properties and be of absolute homogeneity and freedom from blemishes. The production of such glass is in itself a laborious and delicate process. The lenses must be accurately ground and polished to absolutely correct spherical sur¬ faces, truly centred and cemented, then set in suitable mountings without strain at absolutely correct distance and the axes of all in align¬ ment. The efficiency of an objective to gather up rays emanating from an object and form a perfect image depends upon its angular aper¬ ture — in other words, upon the angle at a point in the axis of the microscope

subtended by the diameter of the object in its normal horizontal plane ; and this really determines

the visibility of detail (correction for chro¬ matic and spherical aberration being presup¬ posed). On account of the loss of light and inability to obtain sufficient angular aperture in the ordinary way in the very high powers, it is necessary to construct them for immersion con¬ tact with the object, and they are then termed immersion objectives.® The immersion me¬ dium commonly used is a drop of cedar oil, which has the same refractive index as glass. 1 he connection of the objective with the object by the globule of oil prevents the light rays from scattering. The highest power in general use is the l/12:inch focus, giving a magnification up to 3,000 diameters, the me¬ dium powers are ˆ to /8 inch, and the low powers from 1 to ˆ inch.

Haying reached the practical limits in the reduction of the focal length of microscope objectives the lens makers turned to the prob¬ lem of increasing the ((numerical aperture® — that is, an arbitrary numeral representing the product of one-half of the angular aperture of the objective by the refractive index of the medium between the cover glass of the slide and the outer lens of the objective. A high degree of success has been attained, so that dry lenses of 0.9, water immersion lenses of 1.2 and oil immersion lenses of 1.4 are avail¬ able (against theoretical calculations respec¬ tively of 1.0, 1.4 and 1.53).

To properly adjust the optical parts which have a fixed relation to one another by means of a tube (body), and to hold the object in its proper position in relation to them involves certain mechanical appliances which provide stability, convenience of adjustment and illumi¬ nation : a rack and pinion provides coarse adjustment and a micrometer screw ‘fine ad¬ justment; both are extremely delicate; the stage or platform for placing the object, and mirror beneath the stage for reflecting abun¬ dant light and a base for stability. This aggre¬ gate of mechanical parts is called the “stand.® The collar at the end of the tube to which the object glass is applied is the nose-piece; double and

triple nose-pieces are also made to take two and three objectives, which may be rotated and focused on the object in turn. A mechanical stage provides delicate means of adjusting the object in place of the hands. The high powers require more than the usual amount of light for illumination and a con¬ denser gathers it from the mirror and con¬ centrates it upon the object. Micrometers are provided to determine the amount of mag¬ nification and measure the actual size of an object A camera lucida attachment is made to project the magnified image upon a sheet of paper on the table to facilitate its drawing. Beside the microscope with single tube, there is another in which the rays from the objective are bisected and diverted into a second tube, so that the object may be viewed with both eyes. This is the binocular microscope. A special form of microscope known as the "micro-metallograph® is used for the examina¬ tion of cold metals. The stage is above, with the objective below it and looking upward. The eye-piece is at the end of a horizontal tube, the light rays being carried into it by means of a prism. Another prism on a lower plane is used to illuminate the lower side of

the object. The so-called <(thermal microscope® is so modified from the usual model as to have a water-jacket around the objective to keep it cool while examinations are being made of heated objects in the small electric furnace provided as an accessory with the metallur¬ gist s microscope. So far as our knowledge of the action of light and the constitution of visual images goes, the best microscopes now made realize about the limit to which the seeing powers of the instrument can be brought, al¬ though experiments with especially controlled illumination, now in progress, may result in advancement in this direction. Nevertheless the field of research and discovery into which the microscope has as yet not penetrated, and which are within its powers, are almost unlimited.

I he microscope is used as a necessary acces¬ sory in a large number of the sciences and in many industries. It is, primarily, the assistant of the teacher of biology, botany, bacteriology, histology, pathology and the allied branches of science. The medical profession employs it in the examination of the urine, blood and of can¬ cerous and tumorous growths, as well as in searching for the parasites of the body, fungi which infest the hair and skin and for diagnos¬ ing febrile diseases. For the examination of steel, iron and other metals to determine their intimate structure, the microscope is extensively used. Its use for the detection of adulterations in foods, drugs, paints, earths, starches and many other substances is often the only effec¬ tive method of

working. The Bureau of Ani¬ mal Industry of the United States government depends wholly on the microscope for the detec¬ tion of living parasites in the flesh of animals slaughtered for food. The microscope is used in many industries for counting fine lines, threads and fibres, and for determining the physical structure of cements, emulsions and other substances. The finest possible measure¬ ments of space are made with the micro¬ scope to which a filar micrometer is applied, and with it the rate of growth in plants is determined.

The use of the microscope for photography also embraces an extremely wide and useful field. Photographs of minute objects enlarged as much as 5,000 diameters (25,000,000 areas) can be produced in this manner, and a per¬ manent record made which can also be used tor reproduction by the usual printing processes for the illustration of books, *etc.* Recently the movements of insects and other small creatures have been reproduced by a biographic micro¬ scope, and moving pictures of the unseen world are now presented to audiences as a means of amusement and education.

The microscope was invented between 1590 and 1609 the honors being divided between Hans and Zacharias Janssen, two Hollanders and that greatest of early opticians, Galileo! brom its early form, consisting simply of a double or plano-convex object lens with an eye¬ piece of a single convex lens to magnify the image, it developed by gradual stages until the latter part of the 18th century, without becom-mS much more than a toy for the amusement of dilettante. As a matter of fact nearly every form of accessory which is in use at the pres¬ ent time was devised and used in some form

but the desire for the ornamental and extraor¬ dinary rather than the practical was every¬ where manifest. With the awakening of general interest in scientific investigation, the micro¬ scope began to be used as a tool to accomplish heretofore impossible results. This led to more practical forms of construction, and at last to their production in large quantities and at a cost which placed them within the reach of laboratories and individuals. In 1820 Fraun¬ hofer invented a

complete system of compu¬ tation for telescope lenses, and Seidel and Steinheil soon followed with formulas for photographic lenses. In 1840 the Gauss theory was introduced and workers in optics applied this theory to computing lenses for the micro¬ scope. In the early 70's Professor Abbe of the Zeiss optical works at Jena produced com¬ putations for microscope lenses which placed them in the front rank of scientific appliances. Among the early American pioneers in the optical improvement of the microscope, the names of Robert Tolies and the two Spencers stand prominent. By their extraordinary man¬ ual skill and knowledge of optical principles, they succeeded in producing lenses which, in the case of one by Tolies, had a focal length of 1/75 inch, the highest power objective which has ever been constructed. It was found in practice, however, that, through inability to in¬ crease the angle of aperture, these lenses gave no advantage over those of longer focus, and it is now rare to find an objective of less than 1/16 inch focus. With the introduction of the new optical glasses by the Jena works in 1886-92, new corrections were possible with micro¬ scopic systems, and the phosphoric acid and boric acid glasses were especially useful to the microscope makers. But the greatest advance was made by the discovery of fluorite as a lens material, permitting the flat curvatures neces¬ sary in the correction of spherical aberration. The resolving power of microscope lenses was greatly increased and the problems of their manufacture materially simplified by the in¬ vention by Tolies of his ((duplex front® objec¬ tive, a construction which was voted imprac¬ tical by the experts of the time, but which has since superseded all others in the construction of high-power lenses. By the application of Tolies' correction formulas to the Jena glass lenses a new series of very superior micro¬ scopic systems was produced in 1911 by Winkel of Gottingen, notable particularly for bright¬ ness and sharpness of the image. See Micros¬ copy, Clinical; Ultramicroscope.

Bibliography. — Carpenter, W. B., (The Microscope and Its Revelations) (Philadelphia 1901); Gage, S. H., (The Microscope) (Ithaca, N. Y., 1911); Hovestadt, H., (Jena Glass and Its Scientific and Industrial Applications1 (London 1902) ; Spitta, E. J., (Microscopy : The Construction, Theory and Use of the Microscope) (New York 1907) ; Zeiss, K., (Microscopes and Microscopical Accessories1 (Jena, Germany, 1906).

MICROSCOPE, Solar, a form of micro¬ scope in which the illumination is gained from the condensed rays of direct sunlight. It is used for projection purposes where a very powerful light is needed to exhibit the micro¬ scopic images upon a screen.

MICROSCOPIUM, in astronomy , one of the 14 constellations which Lacaille added to

the heavens in connection with his work at the Cape of Good Hope. It is a very inconspicuous constellation, its brightest star being of only 5.1 magnitude.

MICROSCOPY, Clinical, the use of the

microscope in the diagnosis of disease. The microscope, ever since its first construction, has been used in the study of disease processes, but only within comparatively recent years has it attained its present importance as an adjunct in the clinical diagnosis of many different types of disease. Owing to the development of knowledge of parasitic and infectious diseases, the physician of to-day is better able to make an accurate diagnosis by means of the micro¬ scope than were his forefathers. The micro¬ scope may be used not only to confirm a diag¬ nosis which has been made by ordinary clinical methods, but it may abbreviate such clinical examination, or by it a diagnosis may be made without such preliminary examination. Thus at the present time consumption of the lungs may be microscopically diagnosed by an exami¬ nation of the sputum, though the patient be 1,000 miles away, and in the same manner a number of diseases of allied forms may be recognized by certain minute evidences inter¬ pretable by the microscope.

The most important of the intestinal para¬ sites that can be thus identified are the tape¬ worm, roundworm, hook-worm, fluke-worm and pin-worm. In all of these the physician of the present time, by a microscopical examina¬ tion of the faeces, can detect the presence of the eggs of the different kinds of worms and make a definite diagnosis. It is not necessary for parents to .guess at the presence of worms and to treat their children ((on suspicion.® The presence or absence of worms can be accurately and definitely determined by a competent micrro-scopist. Not only can a diagnosis of worms in general be made, but the precise kind of worm can be known by the characteristic configura¬ tion of the eggs. Examination of the faeces by the microscope can further detect various forms of indigestion and various kinds of inflamma¬ tion in the intestinal tract.

As already indicated, tuberculosis can be told by an examination of the sputum, and the bacillus of tuberculosis can also be identified if it invades other organs of tffe body, notably the skin, bladder, kidneys,

etc. The presence of tuberculosis in milk can also be demon¬ strated by the microscope. The influenza bacil¬ lus, the bacillus of diphtheria, the organism of cholera, of dysentery, of malignant pustule, of blood-poisoning, of pneumonia, of actinomy¬ cosis, etc., can all be identified by a micro¬ scopical examination, as also can a number of diseases due to animal parasites in the body, other than intestinal worms. Thus there is no excuse for the general diagnosis of malaria unless the exact confirmatory evidence of the malarial parasite is found in the blood. The presence of Trichina in the body can also be learned by the peculiar changes that take place in the blood, and the blood-parasite Filaria (see Filariasis), which causes a variety of conditions in the tropics, is recognizable under the microscope. Further, the microscopical examination of the blood itself offers a large field for clinical microscopy; a field which is very rapidly widening and offering increasing evidence of the value of this class of exam-38

ination. There are many blood-diseases, per se, which can be diagnosed by simple examination. Anaemia and pernicious anaemia are important examples. Moreover, most of the acute in¬ fectious diseases cause certain changes in the blood which may be utilized in microscopical work for diagnostic purposes. The Widal ag¬ glutination reaction in typhoid fever is an important development in this line. Other agglutinating reactions are of immense import¬ ance in medico-legal work. These blood-changes are of a very definite character and have been studied by physicians the world over. Because of their peculiar technical nature they lend themselves to charlatan misinterpretation and serve as a basis for many quackish advertisers.

Microscopical examination of the urine has long been practised. By it various forms of disorder of the bladder and of the kidney can be told, and both renal disease and bladder-disease can be detected long before such troubles become chronic and dangerous. In much the same manner the microscope can be used to examine other secretions and excretions of the human body — the secretions from the nose, the vomit, the exudates in pleurisy, exu¬ dates in meningitis and peritonitis, etc.— and in the study of drinking-water, milk and food¬ stuffs. . In fact there is no branch of medicine in which definite and far-reaching results have not been obtained by means of the microscope. Consult von Jaksch, (Clinical Diagnosis5 ; Simon, (

Clinical Diagnosis5; Ewing, Pathol¬ ogy of the Blood5 ; and Cabot, <The Blood.5

MICROSOME, one of the minute cor¬ puscles that exist in great number in the inte¬ rior layers of the protoplasm within a cell, giv¬ ing to that protoplasm its characteristic granu¬ lar appearance. See Protoplasm.

MICROSPORANGIUM, in botany , the pollen-sac which produces the tiny microspores in quantity, as distinguished from the mega¬ sporangium, the pollen-sac which produces but one large spore or megaspore. Both kinds of pollen-sacs are found in certain members of the Pteridophyta and the Phanerogams. In the former group are the aquatic cryptogams be¬ longing to the families Mar sileacece , or pepper-worts, and Salviniacece , known as “floating moss,55 and the Selaginellaceee , closely akin to the “club mosses.55

MICROTASIMETER, an instrument in¬ vented by Thomas A. Edison in 1878. He uses the principle of the carbon microphone to measure infinitesimal pressure, or for detecting very slight pressure.

MICROTOME. The microtome is an in¬ strument used by botanists and zoologists for cutting thin sections of plant or animal tissues A sharp and highly tempered knife is held in a rigid clamp, while the object to be sectioned, also firmly held in a clamp, is moved up, a little at a time, as successive sections are cut. To one unacquainted with modern microscopical technic, the results obtained with the latest microtomes seem almost miraculous. The pollen grain of a lily is so small that it is barely visible to the naked eye, but it can be cut into 50 sections, which can be mounted in order without the loss of a single section. A photo¬ micrograph of such a section can be made, and lantern slide made from the photomicrograph,

and the section of the pollen grain may be pro¬ jected so as to cover a 15-foot screen, its thou¬ sands of starch grains appearing as large as walnuts and its two nuclei as large as footballs. Sections as thin as 25,000 to the inch have been cut successfully. Such thin sections, however, are hardly necessary in practical work. Most sections are cut at about 10 times that thick¬ ness, or 2,500 to the inch. Before such thin sections can be cut, material must undergo a rather complicated treatment. A root tip, for instance, may be treated as follows: It is killed and somewhat hardened in chromic acid; the acid is washed out in water; the root tips are then placed in weak alcohol, then in

stronger and stronger alcohol, several hours in each solution ; then in absolute alcohol which not only completes the hardening but removes the last traces of water; then some oil, like xylol, is mixed with the absolute alcohol in succes¬ sively stronger solutions until pure xylol is reached; paraffin is then added gradually for several days ; the material is then placed' in a paraffin oven and thoroughly infiltrated with paraffin, after which it is poured out and cooled, so that the root tips are now embedded m a matrix of paraffin. A rectangular block containing a root tip is now fastened in the microtome and sections are cut. As each suc¬ cessive section is cut, it sticks to the preceding section, so that a ribbon, often several feet in length, may be obtained. Thus the sections are in perfect series. The sections are then mounted on glass slides, the paraffin is dissolved away, various stains are applied and finally a drop of balsam and a thin glass cover complete the preparation, and it is ready for use. Inves¬ tigations upon the structure of tissues and cells are dependent upon the microtome and micro¬ scope and histological technic. Consult Cham¬ berlain, C. J., (Methods in Plant Histology5-Guyer, M. F., (Animal Micrology.5

Charles J. Chamberlain.

. ,u ˆ ˆ in u mu INI, an organiza¬

tion formed in the United States in 1918 under Pudency of Prof. T. G. Masaryk, leader of the Czecho-Slovak Committee. An offspring of the European War, the Union was com¬ posed of the nationals, descendants, emigrants from and sympathizers with the "subject races55 of central Europe, with the object of promoting the liberation and independence of those countries from the political ties which bound them to Austria, Germany and Russia. The nationals or states claiming self-determina¬ tion were from Russia, Poland, Finland, Ukraine, Lithuania, Livonia, Courland and Es-tfioma, from Germany, the Polish region of East Prussia (Posen) ; from Austria-Hungary, Austrian Poland, Galicia, Czecho-Slovakia (in¬ cluding Bohemia), Jugoslavia (including Ser¬ bia, . Montenegro, Albania, Croatia and Sla¬ vonia) and the Rumanians of Transylvania; Italian and Greek "irredentists,55 Albanians and Zionists. All these are dealt with elsewhere under their respective headings. The total 0t P°Plllations involved was given

as 65,000,000. On 26 Oct. 1918 the Union issued a "declaration of independence55 at Independence Hall, Philadelphia, pledging the people they represented and all their resources to the support of the

Allies against our common enemy.55 The dec-

laration condemned secret diplomacy and ap¬ proved the formation of a league of nations. It was the defection of the Slav nationalities in Austria-Hungary that was mainly responsible for the collapse of the Dual Monarchy in the war.

MIDAS, mi'das, in Greek myth, a king of Phrygia, proverbial for his golden touch and for his ass's ears. The gift of the golden touch came from Bacchus, whose follower, Silenus, Midas rescued and treated kindly; in return Bacchus offered him any wish he would name and Midas asked that all that he touched should be turned into gold. When he found that food and drink became gold at the touch of his lips, Midas besought Bacchus to take back the gift; some stories say he was sent to bathe in the river Pactolus, which ever after was full of gold-bearing sand. His ass's ears were given Midas by Apollo to punish the king for declaring Pan's pipe more musical than Apollo's lyre. Hence ((ears of Midas® is a phrase used of ignorant critics. Midas' barber discovered the king's secret deformity; and whispered it into a hole in the ground, when reeds grew up whispering the story in the wind.

MIDAS, a genus of marmosets, of the family Mid idee. The name is given to more than 20 species, among which are the lion-marmoset, marikina, pinche and tamarin. The name is most commonly applied to the mari¬ kina.

MIDAS MONKEY, a marmoset (q.v.).

MIDDELBURG, mid'del-boorg, Nether¬ lands, capital of the province of Zealand, on the island of Walcheren, 4j4 miles northeast of Flushing. Middelburg was a mediaeval Hanse town, and one of the leading mercantile cities of the United Provinces, sending many ships to the East and West Indies, and the Levant. Its former commercial importance, however, has declined, being now confined chiefly to a coasting and domestic trade.

MIDDLE AGES, Democracy in. See

Democracy, History of.

MIDDLE AGES, The, a period of history supposed to extend from the fall of the Roman Empire to about the year 1550, covering from 10 to 11 centuries. The Middle Ages embrace that period of history in which the feudal sys¬ tem was established and developed, down to the most prominent events which necessarily led to its overthrow, though its consequences and influences are still very observable in the states of Europe. The first centuries of the Middle Ages are often termed the Dark Ages (q.v.). Still, the destruction of Roman insti¬ tutions by the irruption of barbarous tribes is often unduly lamented, and the beneficial con¬ sequences attending it overlooked. True it is that many of the acquisitions which had cost mankind ages of toil and labor were lost in the general wreck, and only regained by the ef¬ forts of many successive generations; the flowers of civilization were trampled underfoot by barbarous warriors ; the civil development of society suffered a most severe shock; those nations to which Roman civilization had ex¬ tended previous to the great invasion of the Teutonic tribes were thrown back in a great measure to their primaeval barbarism, and the unruly passion for individual independence

greatly retarded the development of public and private law, and in some countries has entirely prevented a regular civil constitution. So also the most remarkable institution of that time, its characteristic production — chivalry — exhibited all the peculiarities of the corporations. War was the profession of the nobles. No one of their order who was not a knight could bear a lance or command cavalry. The weak side of the Middle Ages is the scientific. Physical science was still in a very crude state, and the lack of the proper apparatus necessary for its accurate pursuit was a serious handicap. Con¬ sidering, however, the inefficient means then at hand, the knowledge attained, though of course rude, inaccurate and often mere guessing, was greater than is popularly supposed. The ef¬ forts of Charlemagne in the 8th century to encourage science and instruct the people laid the foundations for a more thorough and sys¬ tematic training, which culminated in the great schools of Scholasticism of the 12th and 13th centuries. The process was slow and often re¬ tarded by the unsettled social and political con¬ ditions that prevailed through this period. The 14th and 15th centuries witnessed a rapid and brilliant development finding its apogee in the Renaissance movement. See

History, Mediae¬ val.

MIDDLE C, in music, the note C', on the first ledger line above the base or below the treble staff. It is the usual starting point of both keyes, tones and notes, and is also known as Alto C. The pitch is from 250 to 265 vibra¬ tions a second. It was set at about 240 .in 1700 and has been as high as 275. The French set it at 251, the English at 256 and the Ger¬ mans at 264.

MIDDLE EAR, Inflammation of. See

Otitis Media.

MIDDLE ENGLISH. See English Lit¬ erature.

MIDDLE EUROPE, in German, MIT-TEL-EUROPA, is the name applied to one of the alleged policies that were to be pursued by Germany in the process of carrying out the Pan-German program of ((World Empire or Downfall.® Briefly stated, the scheme con¬ sisted of absorbing a number of European states into a German confederation either by treaty agreements or conquest. Thus, Norway and Sweden were to be absorbed; Holland with her colonial possessions was to become an ally of Germany; in order to establish Germany's position as a naval power, naval stations would be necessary at Dover and Malta; the western portion of Russia down to the Black Sea was to be conquered; according to Bernhardi, Den¬ mark was ((of great military importance to us® ; the command of the Straits leading to the Bal¬ tic would be imperative for operations against England ; according to some exponents, Hol¬ land, Belgium, Luxemburg and Switzerland were to be annexed and all foreign influence eliminated; while Livonia, Trieste, Venice and the north of France from the Somme to the Loire were to be included. Germany, Austria-Hungary and Italy were to be firmly united by an economic union. The items represent the Mittel-Europa plan, beyond which lay other necessary acquisitions, such as Egypt, central Africa, Asia Minor, India and sundry South

American republics. See Pan-Germanism. Consult Naumann, (Central Europe* (New York 1916).

MIDDLE KINGDOM (Chinese, Chung Kwoh), or the MIDDLE FLOWERY KING¬ DOM, a native name for China dating from the establishment of the Chau dynasty, about 1150 b.c., and originally applied to the special state of the imperial family, which was in Honan and was surrounded by the others. As the empire grew the name was retained and ap¬ plied to the entire country and popular belief interprets it as meaning that the empire is the centre of the earth.

MIDDLE TEMPLE. See Temple, Lon¬ don; Inns of Court.

MIDDLE TOWN INDIANS. See Miwok Stock.

MIDDLEBORO, midTbur-o, Mass., town in Plymouth County, on the Nemasket River, and on branches of the New York, New Haven and Hartford Railroad, about 30 miles south of Boston and 18 miles northeast of Fall River. It is one of the oldest towns in the county, hav¬ ing been incorporated 1 June 1669. It includes the villages of Nemasket, North Middleboro, South Middleboro, Four Corners, Pudding-shire, Waterville, Tack Factory, Eddyville, Rock, the Green and Thomastown. It has ex¬ cellent water power, obtained from three falls. The chief manufactures are woolen goods, shoes, stove polish, lumber, dressed marble, grates, foundry and machine-shop products. It has several well-built churches, good schools and a public library. It is a favorite summer resort, on account of its attractive scenery and the temperature being modified by the sea breezes. Pop. 8,300. Consult Barber, ˆHis¬ torical Collections of Massachusetts.*

MIDDLEBURG, mid'l-berg, Aldie and Upperville, Cavalry Engagements at. On 16

June 1863 General Stuart, with three brigades of his cavalry division, moved north from the Rappahannock to screen the movement of the Confederate army toward the Potomac. Stuart's orders were to keep along the eastern base of the Blue Ridge, occupy the passes of Bull Run Mountain, and cover the front of Longstreet's corps. On the 17th Fitzhugh Lee's brigade, under Colonel Munford, was sent from Piedmont, by way of Middleburg, to Aldie, to hold the gap in the mountain as a screen to Longstreet's movements, while W. H. F. Lee's brigade reconnoitred toward Thoroughfare Gap. Robertson's brigade was posted at Rectortown. Stuart, with his staff and a few pickets, made his headquarters at Middleburg. General Pleasonton was near Manassas Junction and scout¬ ing in the direction of Bull Run

Mountain, and at 2.30 p.m. of the 17th Kilpatrick's brigade of cavalry ran into Munford's pickets, driving them back to Aldie, where, west of the village, he found Munford strongly posted on a hill covering the road to Snicker's Gap. A severe engagement ensued, lasting until dark, when Munford withdrew toward Middleburg, under orders from Stuart, who had been attacked. The Union loss was 50 killed, 131 wounded and 124 missing. Munford's loss was 119 killed, wounded and missing. While Kilpatrick was engaged at Aldie Colonel Duffie, with the First Rhode Island Cavalrv 300 strong, having passed

through Hopewell Gap, reached Middleburg about 4 p.m., drove in Stuart's pickets, and oc¬ cupied the town, Stuart narrowly escaping to Rector's Cross Roads, and sending orders for Munford to withdraw from Aldie, the other two brigades to move upon Middleburg, and all to concentrate against Duffie. Robertson's brigade arrived at 7 p.m. and attacked Duffie, who made a good fight behind stone walls and barricades, repelling several assaults, but was finally driven from town, with severe loss, and compelled to retreat by the road upon which he had come until he had crossed Little River, where he halted, and where during the night he was entirely surrounded by W. H. F. Lee's brigade. Duffie endeavored to cut his way out, but was met by heavy fire, and a great part of his command captured, Duffie escaping with a few men and making his way back to Hopewell Gap and Centreville. His total loss, killed, wounded and prisoners, was over 200. On the 18th Stuart took position outside of Middle¬ burg with Robertson's brigade. Munford was on the left at Union and Jones' brigade was ordered up as a reserve. Pleasonton moved forward with all his available force, and oc¬ cupied Middleburg and Philemont on the road to Snicker's Gap. On the 19th Gregg, with two brigades of his own division and one of Buford's, advanced and steadily drove Stuart in the direction of Upperville, losing 99 in killed, wounded and missing. During the day Hooker advanced and occupied Aldie Gap with infan¬ try. On the 20th Stuart concentrated his five brigades about three miles west of Middleburg, Pleasonton remaining at Middleburg. On the morning of the 21st Pleasonton moved out of Middleburg, Buford's division by the road through Union, to turn Stuart's left, Gregg's division, supported by Vincent's infantry bri¬ gade on the main road to Upperville. Buford encountered W. H. F. Lee's and Jones' brigades and drove them back, and Gregg met Hamp¬ ton's and Robertson's brigades, driving them steadily to Goose Creek, where they remained several hours, when they again fell back to effect a junction at Upperville with Jones and W. H. F. Lee, who were falling back before Buford. As Pleasonton neared Upperville th:

fight in¬ creased in severity, and Stuart was driven through the town to Ashby's Gap. The Union loss during the day was 12 killed, 130 wounded and 67 missing. On the 22d Pleasonton fell back to Middleburg and Aldie. The Union loss June 17-21 was 883 killed, wounded and miss¬ ing; the Confederate loss was 65 killed, 279 wounded and 166 missing, an aggregate of 510. Consult (Official Records) (Vol. XXVII) ; Doubleday, ˆhancellorsville and Gettysburg) ; McClellan, (Life of Maj.-Gen. J. E. B. Stuart.*

E. A. Carman.

MIDDLEBURY, mid'l-ber-i, Vt., village, county-seat of Addison County, on the Otter Creek, and on the Rutland Railroad, about 40 miles in direct line southwest of Montpelier, the capital of the State, and 35 miles south of Burlington. It is on the eastern slope of the Green Mountains, near the foothills in an agricultural and stock-raising region, with large marble quarries in the vicinity. It was settled in 1773, but was abandoned during the Revolutionary War, because it was on the route traversed by many of the British and Indian soldiers, and the fives of the people were con-

stantly in danger. It was incorporated as a borough in 1813 and as a village in 1832. The chief manufactures are lumber and lumber prod¬ ucts, wood pulp, foundry products, flour, lime, dressed marble and dairy products. The vil¬ lage is the seat of Middlebury College (q.v.), and has two libraries and the Sheldon Art Museum. Some of the principal buildings, be¬ sides the college, libraries and museum are the opera house, courthouse, several churches and the public and parish schools. The water power is valuable, and sufficient for more manu¬ facturing establishments. Since 1877 a revised charter vests the government in a board of trustees elected annually; the subordinate offi¬ cials are chosen by the trustees. Pop. about 2,000. Consult Swift, (History of the town of Middlebury) (Middlebury 1859).

MIDDLEBURY COLLEGE, in Middle¬ bury, Vt., was chartered by act of

the Vermont legislature 1 Nov. 1800. The charter has never been amended. The institution is governed by a self-perpetuating board known as <(The Presi¬ dent and Fellows of Middlebury College.® There are no denominational restrictions and the college has always been non-sectarian. It is the oldest college in Vermont in point of service, beginning its work as a college 5 Nov. 1800 and graduating its first class in 1802, at which time the first academic degrees conferred in Vermont were bestowed. The founders were prominent citizens of Vermont, several of whom lived in Middlebury and adjacent towns. They were counseled by President Timothy Dwight of Yale College and the first presi¬ dent, Jeremiah Atwater, was a Yale graduate. The first building of the college was shared with the Addison County Grammar School and it was 1815 before the college acquired its first permanent structure, Painter Hall. This build¬ ing was named for Gamaliel Painter, a gener¬ ous benefactor. The college had a . steady growth for half a century and during its first 40 years was easily the first institution in Ver¬ mont. Dissensions over the slavery question, followed by the depletion of students during the Civil War, weakened the institution seri¬ ously. In recent years there has been complete recovery and rapid growth. The college has now a campus of 140 acres, beautifully situ¬ ated with commanding views of the Green Mountains and Adirondacks. There are 13 permanent buildings, valued at $708,455. The endowment is $570,941. There has been a net gain in student attendance annually since ’1904. the attendance now being 468, or exclusive of the summer session 351. The college gives the degrees of A.B. and B.S. The curriculum is organized in 20 departments. Special attention is given to the training of high school teachers and district superintendents, which is supported by an annual State appropriation. The State of Vermont also supports 60 . scholarships. There are no technical or professional courses. The faculty numbers 32, of whom 10 are full professors. The institution was on the first list of the accepted institutions of the Carnegie Foundation and has received the cooperation of the General Education Board. The latest additions to the buildings are a memorial chapel, the gift of ex-Gov. John A. Mead, ’64, and a boys’ dormitory and commons, the gift of A. Barton Hepburn, 71. Since 1883 the college has admitted women; in 1902 the

legislature of the State granted a charter au¬ thorizing the establishment of a co-ordinate college for women.

MIDDLEMARCH. To many critics (Middlemarch) (1871-72) is the greatest novel George Eliot ever wrote. Its scope, its variety, its

maturity and insight, are indubitable. Yet to others it lacks something of the charm and spontaneity of the author's earlier works, and its very inclusiveness and scope lead to a certain confusion of plan and blurring of outline that mark it as artistically imperfect. Whichever view is correct, the novel is admittedly great. Written late in George Eliot's career, it is at once weighty with her considered evaluation of the essential factors in life and rich in her observation and experience of human nature. The plot is the most involved of any that the author has presented, and the characters are numerous even for a Victorian ˆthree-decker.® In general there are two main groups of char¬ acters, not, it must be confessed, as closely interrelated as artistically they should be. Dorothea Brooke may be regarded as the centre of one group, and Dr. Lydgate of the other. Both represent the tragedy of high aims that fail to take fully into account the actualities of life. Dorothea sentimentally pines to be the helpmate of a genius ; but as. the wife of the Rev. Edward Casaubon,. who is writing a (Key to All Mythologies, > she is disillusioned, and her misery is ended only by the death of her husband. Dr. Lydgate comes to Middlemarch with excellent training, determined to push forward in biological research. . However, he marries the attractive but unpractical Rosamond Vincy, is overwhelmed in debts and his possible career fades into nothingness. But George Eliot's view of life is not distortedlv pessimistic. Over against the sombre recognition of the inadequacies and weaknesses of humanity must be placed her portrayal of the fine and strong elements. Dorothea herself is genuine and charming fundamentally; the Garths are ster¬ ling, and full of vitality. For all its wavering and crowded plot, (Middlemarch) is perma¬ nently valuable because it represents a realism that endeavors to reflect in just proportions the good and bad in life ; a realism, moreover, that does not content itself merely with presenting life, but shrinks not from the task of inter¬ pretation and evaluation. Consult Stephen, Sir Leslie, (Life of George Eliot> (Chap. 12, New York 1902), and Cross, J. W., (George. Eliot's Life) (Chap. 16, 3 vols., London 1885).

George B. Dutton.

MIDDLESBORO, Ky., town in Bell County, near the Tennessee boundary line, 48 miles north of Knoxville, Tenn., on the Louis¬ ville and Nashville and the Southern railroads. It is situated between the Pine and Cumberland mountains and is patronized as a summer resort. It has iron and coal mining interests and its industrial establishments include iron and coke works. Pop. (1920) 8,041.

MIDDLESBROUGH, mid'lz-bro (not Mid-dlesborough), England, a river port, municipal county, parliamentary borough and market town, in

the North Riding of Yorkshire, seven miles from the mouth of the Tees, 44 miles north of York. Middlesbrough dates from about 1830, and the development of the coal and iron mines of the neighboring Cleveland Hills and Durham

fields. It is distinguished for its municipal enter¬ prises ; has wide and regular streets, handsome public buildings, including a fine Roman Catholic cathedral; and extensive and commodious docks. Its chief industries are connected with iron manufactures, producing annually over 2,500,- 000 tons of pig-iron, of which it is the principal seat in England. It has numerous blast-fur¬ naces and rolling-mills, foundries, engineering works, potteries, chemical works, shipyards, *etc.* ; and salt is extensively worked, there being a thick bed of rock salt at a depth of 1,300 feet. The borough was incorporated in 1853 and re¬ ceived a county charter in 1888. The borough returns one member to the House of Commons. The chief public utilities are municipally owned. Pop. about 104,767. Consult Reid, (Middles¬ brough and Its Jubilee) (1881).

MIDDLESEX (mid'l-seks) FELLS, Bos¬ ton, Mass., a picturesque hill, wood and lake reservation of the metropolitan park system of ((Greater Boston,® enclosing Mystic Lakes ; area from 3,000 to 3,200 acres. The Fells are part of the suburban townships of Malden, Mel¬ rose and Stoneham north of Boston.

MIDDLETON, mid'l-ton, Arthur, Amer¬ ican colonist: b. South Carolina, 1681; d. 1737. He was conspicuously engaged in public affairs as a member of the council as early as 1712; and exerted his political influence in favor of popular claims, opposing the lords proprietors, and finally heading the revolution which threw off the whole proprietary government and placed the colony under the immediate protection of the Crown (1719). In 1725 he succeeded Nicholson as acting governor of the colony, which office he held till 1731, when the royal governor arrived ; he then retained his position in the governor's council. His administration as governor was partly occupied by war and negotiations with the Spaniards of Florida and

the French of Louisiana.

MIDDLETON, Arthur, American patriot, signer of the Declaration of Independence, grandson of the preceding: b. Middletown Place, Ashley River, S. C., 26 June 1742; d. Goose Creek, S. C., 1 Jan. 1787. He was educated in-England at the University of Cambridge, then returned to South Carolina for a time and was a member of the legislature, but went abroad again for two years' travel on the Continent. On his final return to America, he established himself as a planter, and soon became one of the leaders of the Revolutionary party. He was one of the most efficient members of the first council of safety, and in 1775 was sent to the Provincial Congress. In 1776 he was sent as a delegate of the State to the Continental Congress, and as such affixed his signature to the Declaration of Independence. He held his seat in Congress until 1777, declined the gov¬ ernorship of South Carolina in 1778 and took the field for the defense of Charleston in 1779. His plantation was devastated by the British and he was made a prisoner after the fall of Charleston in 1780, and was one of the leading citizens who were kept in confinement as hostages. His estate was sequestered, and. he was shipped to the castle of Saint Augustine, and thence transferred to the Jersey prison ship. Exchanged in the latter part of 1780, he served till the close of the war as a delegate in the Continental Congress, and was afterward elected

to the State senate. He was a skilful stenog¬ rapher, and reported many of the debates in which he participated. He also wrote effective political essays under the signature of ((Andrew Marvell.®

MIDDLETON, Conyers, English divine: b. York, or Richmond, Yorkshire, 27 Dec. 1683; d. Hildersham, near Cambridge, 28 July 1750. He was educated at Cambridge and was elected a fellow there in 1706. He married soon after¬ ward, thus losing his fellowship, and for a short time was rector of Coveney in the Isle of Ely, a rectory in the gift of his wealthy wife. He received his D.D. at Cambridge in 1717. He was appointed university librarian in 1721. and was in Italy in 1 724 — 25. His (Letter from Rome) (1729) dealt at some length upon the adaptation of pagan beliefs and ceremonies in the Roman Catholic Church and was highly praised by the orthodox English clergy, and occasioned great indignation among the Catho¬ lics. His controversy with Waterland, in which he urged the then heretical theory that theo¬ logians should not attempt to maintain the historical accuracy of the Bible in all instances, brought a storm of criticism and he was obliged to make some qualifications regarding

his statements in order to retain his Cambridge degrees. He next engaged upon a life of Cicero, which to a great extent was related in the statesman's own words, and which gained a high reputation as a model of style, but was later found to be largely a plagiarism from a rare book of William Bellenden's (De Tribus Lumin-ibus Romanorum) He then returned to the field of theological controversy, publishing his Untroductory Discourse) (1747), and his (Free Inquiry) (1748), attacking the miraculous powers supposed to have been inherent in the Church from early times. While this con¬ troversy was in progress Middleton died. He attained a high reputation as a master of prose style, Pope, in particular, considering him an authority upon the language ; while Parr ranked him next to Addison. His modern rating, how¬ ever, depends upon his strength as a contro¬ versialist ; wherein, although he was extremely bitter, he exhibited keenness of perception and contempt for superstition, while in many re¬ spects his opinions antedated those later ac¬ cepted by modern students of religious history. His collected writings, with the exception of the (Life of Cicero) (2 vols., 1741), were published (4 vols., 1752; 5 vols., 1755). Consult Stephen, L., (English Thought in the Eighteenth Cen¬ tury) (Chap. 6, 1786).

MIDDLETON, George, American play¬ wright: b. Paterson, N. J., 27 Oct. 1880; d. 25 Nov. 1916. He was graduated at Columbia University in 1902 and engaged in literary work. He was a frequent contributor to mag¬ azines; in 1912 became literary editor of La Follette's Weekly; and was author of the plays (The Cavalier* with Paul Kester (produced by Julia Marlowe, 1902) ; (The Wife's Strategy) (produced by Margaret Anglin, 1905) ; (The Sinner* with L. Westervelt (produced by Rob¬ ert Edeson, 1907) ; (Rosalind at Red Gate > (1910) ; (The Prodigal Judge) (1913) ; (Hit-the-Trail-Holliday) with George M. Cohan and Guy Bolton (1915). His books include (Em-bers) (1911); (Nowadays) (1914); (Possession) (1915).

MIDDLETON, Henry, American patriot, son of Arthur Middleton, 1681-1737 (q.v.) : b. South Carolina, 1717 ; d. Charleston, S. C., 13

June 1784. He was elected to the South Caro¬ lina House of Commons and in 1 745 — 47 was its speaker. He was appointed commissioner of Indian affairs in 1755 and served as a member of the council in 1755-70. He was elected a delegate to the Continental Congress in 1774, serving as its president from October 1774 to May 1775. He was president of the Provincial Congress of South Carolina in 1775-76. He was reelected to the Continental Congress in 1776, but owing to failing health was replaced by his son Arthur, 1742-87 fq.v.), who became a signer of the Declaration of Independence. He was a man of great wealth and wide influence, and was an earnest worker for the independ¬ ence of the colonies.

MIDDLETON, Henry, American poli¬ tician and diplomat: b. Middleton Place, S. C., 1771; d. Charleston, S. C., 14 June 1846. He was elected to the State legislature in 1801, serving till 1810. He was soon recognized as a leader, and in 1810-12 was governor of the State. He supported the war policy in 1812, and in 1815 he was elected to Congress, where he served four years. In 1820 he was appointed Minister to Russia, in which capacity he nego¬ tiated a treaty regulating trade and fisheries in the Pacific (1824). He returned to the United States in 1830, and retired from public life.

MIDDLETON, Thomas, English drama¬ tist: b. probably in London about 1570; d. New¬ ington Butts, July 1627. Little is known of his life, but his writings testify to the excellence of his education before his entry at Gray's Inn in 1593 (or 1596). Several minor prose works preceded what seems to be his first play, (01d Law,J written with Rowley in 1599. From that time on he wrote constantly for the stage, now alone, now with Rowley, Massinger or Dekker. Among these works are several masques, of which the best and most dramatic is (The World Lost at Tennis. > Middleton's (Witch > is his best known work because of the claim often made since its publication in 1778, that it must have furnished hints for the song of the witches in Shakespeare's (Macbeth > ; but Mid¬ dleton's verse, which is particularly reminis¬ cent of (Romeo and Juliet,* and his imitation of Shakespeare, as, for example, of 'Hamlet* and (Tempest,* possibly of (Pericles,* too, in <The Mayor of Quinborough,* make such a view untenable. It is more likely that the songs were taken from Middleton's play and inserted into the acting edition of (Macbeth.* The most successful play by Middleton was (A Game of Chess, > which satirized the wooing of the Spanish Infanta and was stopped by Privy Council ; it packed the playhouses because of its political and Protestant tone. Among his other plays are (Michaelmas TernP (1607), a story of city intrigue; (A Trick to Catch the Old One* (1608), his best comedy of intrigue; <The Roaring GirP ; <The Spanish Gipsy,)

which, like the (Mayor of Quinbo rough > and (A Mad World,) has the Hamlet-like trick of a play within a play; and (Women Beware Women, > his best single play. As a rule Mid¬ dleton is erratic and ill-sustained, and his char¬ acters low and coarse, but sometimes wonder¬ fully analyzed. Consult the editions by Dyce

(1840) and Bullen (1886), and Swinburne's essay in the Nineteenth Century for January 1866. Middleton's best plays appear in a vol¬ ume of the (Mermaid Series) (1887).

MIDDLETON, Canada, a town of Annap¬ olis County, Nova Scotia, 102 miles northwest of Halifax, at the junction of the Dominion-Atlantic and the Canadian-Northern railroads. There are granite quarries in the neighborhood. Concrete products are manufactured. There are medicinal springs, and the vicinity has nu¬ merous orchards. Pop. 1,000.

MIDDLETON, England, market town, municipal borough, in Lancashire, six miles northeast of Manchester. Its industrial estab¬ lishments include cotton and silk factories, dye and print works, ironworks, chemical works,, etc., and coal is extensively mined in the vicin¬ ity. The church dates from the 12th to the 16tn century; the grammar school was founded in 1572; there is a handsome town-hall and free libraries and reading-rooms, parks and a hand¬ some market-place. Gas and electric lighting plants are municipally owned. Pop. 27,980.

MIDDLETOWN, midTtown, Conn., city, county-seat of Middlesex County, on the Con¬ necticut River, and on the New York, New Haven and Hartford Railroad, about 18 miles south of Hartford. It is opposite Portland, where are valuable brownstone quarries. The places are connected by a long drawbridge. The city was founded in 1650 and the next year was incorporated as a town under the name of Mattabeseck. Two years later the name was changed to Middletown. It was granted a city charter in 1784. For a number of years there was considerable trade with the West Indies, and until 1886 Middletown was the port of entry. In that year the custom-house business was removed to Hartford. Middletown is in an agricultural region in which tobacco is one of the principal products. Abundant water¬ power has aided in making the place a manu¬ facturing city. The chief manufactures are pumps, bone goods, cotton webbing, hammocks, rubber goods, silks, toys, shoes, chemicals, har¬ ness trimmings, locks, marine hardware and silver-plated ware.ˆ The. educational institu¬

tions are the public and parish schools, the Wesleyan University (q.v.), the Berkeley Divinity School (P. E.), opened in 1854, and the Russell Free Library. It is also the seat of the State Hospital for the Insane, and the State Industrial School for girls. The charter of 1882, under which the government is adminis¬ tered, provides for a mayor, who holds office two years, and a city council. The subordinate officials are chosen bv the mayor and council. Pop. about 14,000. Consult Adams, Middletown Upper Houses) (New York 1908) ; Whittemore, (History of Middlesex County, Conn.* (New York 1884).

MIDDLETOWN, Del., town in Newcastle County, on the Appoquinomink River and on the Philadelphia, Baltimore and Washington Railroad, 24 miles south by west of Wilming¬ ton. It is in an agricultural region in which the chief productions are fruits. The principal manufactures are canned-fruits, wagons and agricultural implements. The waterworks and electric-power plants are municipally owned. Pop. about 1,500.

MIDDLETOWN, N. Y, city, in Orange County, on the New York, Ontario and West¬ ern, the New York, Susquehanna and Wil¬ mington, and the Erie railroads, nearly midway between the Hudson and Delaware livers, and about 66 miles northwest of the city of New York. Middletown was settled about the mid¬ dle of the 18th century; its location on the Minisink road, the route to the <(West,)) and half-way between the important rivers of this section, gave the place its name, and its early importance. At first it was included in the Walkill township. In 1848 it was incorporated as a village, and 27 June 1889 was chartered as a city. It is in a fertile agricultural region, and has a large trade in dairy products, live¬ stock and garden produce. It has the New York, Ontario and Western Railroad shops and the chief manufactures are hats, shirts, saws, automobile tires, cut glass, printers' supplies, files, carpet-bags, leather, condensed milk, paper boxes' and cigars. Some of the noted public institutions are the State Homoeopathic Hos¬ pital for insane, the Federal building, churches, public schools (ward schools), one parish school, an excellent high

school, Saint Joseph's Academy (R. C.), and the Thrall Public

Library. There are two national and one sav¬ ings bank and one trust company bank. The government is administered under a charter of 1902 which provides for a mayor, who holds office two years, and a common council of nine members, each one of whom holds office two years. The mayor appoints, subject to the approval of the council, the members of the board of health, and the council elects the en¬ gineer, city clerk and corporation counsel. Pop. (not including over 2,000 State Hospital inmates), (1920) 18,420.

MIDDLETOWN, Ohio, city, Butler County, on the Miami River, and on the Cincinnati, Hamilton and Dayton, the Cincinnati Northern and the Cleveland, Cincinnati, Chicago and Saint Louis railroads about 34 miles north of Cincinnati. It was settled about 1794. It is in an agricultural section, but is noted for its many paper mills and large steel plants. Pop. 23,594.

MIDDLETOWN, Pa., borough, in Dauphin County, on the Susquehanna River, and on the Philadelphia and Reading and the Pennsylvania railroads, about 10 miles southeast of Harris¬ burg. It was founded in 1756, and in 1828 was incorporated. It is in a farming region, but it has considerable manufacturing interests. The principal manufactures are shoes, foundry products, stoves, furniture and cars. Stone quarries in the vicinity contribute to the indus¬ trial wealth of the borough. Its trade is in the manufactured articles, farm and dairy products. The borough owns and operates the electric-light plant. Pop. 5,920.

MIDEWIN, me'de-win, or MIDEWIWIN,

me'de-we'win, or MIDE, me'de, or MEDA SOCIETY, a secret religious organization of the Algonquian Indian tribe. Both men and women were admitted to it and women as well as men might hold office. A resemblance to the Masonic ritual in its progressive degrees has been remarked. Consult Hoffman, W. J., (The Midewiwin of the Ojibway) in the (Seventh Annual Report of the Bureau of American Ethnology.)

MIDGARD, mid'gard, in Scandinavian mythology, the dwelling-place of the human race, formed out of the eyebrows of Ymir, one of the first giants, and joined to Asgard, the abode of the gods, by the rainbow-bridge.

MIDGE. See Blackfly ; Gnat.

MIDHAT PASHA, mid'hat pash a, Turk¬ ish statesman: b. Constantinople, 1822; d. Arabia, May 1884. He entered the Turkish government service, was made pasha in 1860, was governor successively of Uskup, Bulgaria and Salonica, and distinguished himself by his wise administration. In 1873 he was for a short time grand-vizier. He aided in deposing the Sultans Abd-ul Aziz and Murad V in 1876, was grand-vizier under Abd-ul Hamid (Dec. 1876-Feb. 1877), and was then banished by the suspicious monarch. Later, however, he was governor of Smyrna, then of Syria. He was tried with other pashas for the murder of Abd-ul Aziz, was found guilty and was sen¬ tenced to death ; but this sentence was com¬ muted to life imprisonment. He wrote (La Turquie: Son Passe et son Avenir) (1878).

MIDIANITES, mid'i-an-itz, an Arab tribe, descended, according to Scripture, from Midian, the son of Abraham by Keturah. They occupied most of the country between the Ara¬ bian Gulf and the Plains of Moab. The Midi-anites were very troublesome neighbors to the Israelites till Gideon's victory over them. Midian ceased to be Egyptian and became Turkish in 1887. Consult (Midian Revisited)

(1879).

MIDLAND, Mich., city, county-seat of Midland County, on the Chippewa and Titta-bawassee rivers, and on the Michigan Central and the Pere Marquette railroads, 18 miles west of Bay City. Its principal manufactures are shingles, lumber, tubs, hoops, pails, chemi¬ cals, bromine and salt. It has a fine new Fed¬ eral building, banks, grade and high schools. The city is governed by a mayor and city coun¬ cil. Pop. (1920) 5,483.

MID-LOTHIAN, or EDIN BURG-SHIRE. See Edinburghshire.

MIDNAPUR, mid-na-poor', India, a town and administrative district of Bengal. The town is the capital of the district and is 68 miles by rail west of Calcutta. It is the centre of an important indigo and silk industry, and has manufactures of brass and copper goods. Pop. about 33,200. The district forms the southern part of the Bardwan division, bounded on the east by the river Hugli. It has an area of 5,186 square miles.

MIDNIGHT JUDGES, or APPOINT¬ MENTS, a term applied to executive appoint¬ ments or nominations made by President John Adams, the last night of his administration. Congress had passed a bill

authorizing the ap¬ pointment of 18 new United States judges, and Adams with the consent of the Senate ap¬ pointed judges to fill these newly created vacan¬ cies. They were known as ((Adams Midnight Judges.” The new law was repealed early in Jefferson’s term and the judges lost their offices.

MIDRASH (Hebrew, from darash, to make research), among the Jews, is the general name given to the exposition or exegesis of the

Scriptures. When such writings first arose is not known, but the most flourishing period of midrashic exegesis was from about 100 b.c. to 200 a.d. The term midrash expressed ((any and every ancient exposition on the law, psalms and prophets, disquisitions that took the form of allegorical illustration, homiletics or prac¬ tical commentary.® Thus in its most general meaning it expressed the whole uncanonical Jewish literature, including the Talmud, down to the compilation of the book Jalkuth in the 13th century, since which time the term grad¬ ually ceased to be applied to rabbinical writings.

MIDRIFF (A.-S. mid, middle; hrif, abdo¬ men), the diaphragm (q.v.).

MIDSHIPMAN, in the American and British navy, a young officer who has previously held the position of a naval cadet. The cadets require to be nominated before they can come forward for competition. After two years’ training on board a training-ship, the cadet is expected to pass the examinations appointed. If he gain a first-class certificate he becomes a midshipman at once, otherwise he has to serve for 6 to 12 months at sea. A midshipman after four years and a half may become a sublieu¬ tenant; he then studies at the Naval College, is trained in gunnery and torpedo practice, takes a course in pilotage and then may be¬ come a lieutenant.

MIDSHIPMAN, a California coast-fish of the genus Porichthys. See Cabezon.

MIDSHIPMAN EASY, Mr., a nautical romance by Capt. Frederick

Marryat, pub¬ lished in 1836. It narrates the adventures of a spoiled lad, the son of a so-called philosopher, who cruises about the world, falls in love, has misfortunes and at last good luck and a happy life. The incidents themselves . are nothing, but the book is entertaining for its ((character® talk, and because the ‘author has the gift of spinning a yarn.

MIDSUMMER EVE. See John’s, Eve of Saint.

MIDSUMMER NIGHT’S DREAM, A.

First printed in 1600 and mentioned by Meres in 1598. (A Midsummer Night’s Dream > was probably written in 1594, or even earlier. It was doubtless written for some wedding festi¬ val as it has many of the characteristics of a masque. The incidents connected with The¬ seus and Hippolyta were taken from Plutarch’s <Life of Theseus* and perhaps Chaucer’s (Knights Tale,* while the fairy story which makes up such a large part of the play was Shakespeare’s transformation of the somewhat crude elements of mediaeval folklore. The first and last acts take place in Athens at the palace of Theseus, and the other three acts in the forest near Athens. Theseus and his queen fit into the story in so far as they cele¬ brate their nuptials, and as they are interested in the love affairs of Demetrius and Helena, Lysander and Hermia; they are brought into the forest only by their love of the chase, which is realistically portrayed. The well-known words of Theseus upon ((the lunatic, the lover and the poet, as of imagination all compact,® are in striking contrast with the fantastic fairies that really dominate the play. Even further removed from fairyland are the pro¬ saic mechanics who represent, with all the

characteristics of low comedy, the story of Pyramus and Thesbe. By their rehearsal in the forest they are caught for a moment in the magic web of Oberon, Titania and Puck. Under the same influences fall the Athenian lovers, who after unfortunate experiences are brought to the happy conclusion of their dreams. The title of the play, as indeed the major part of the story and the background, suggest the tone, the atmosphere, of the play. It is the magical midsummer-night with the moon in the sky that forms the appropriate setting of the mystery, the fantasy, and the un¬ reason of fairyland. Oberon, Titania and Puck, along with the other incarnations of the beauty and magic of nature, have fixed in the popular imagination the principal elements of fairyland. The fact that they were repre¬ sented by boys on the Elizabethean stage gave to these creations the spirit of childhood that

has been lost in the modern stage represen¬ tation. No analysis can suggest the delicacy, or the beauty, or the charm of these airy noth¬ ings to which Shakespeare has given a local habitation and a name.

Edwin Mims.

MIDWAY ISLANDS, North Pacific Ocean, so named from being midway between Asia and America, are the northernmost islets of the Hawaiian group, extending about 1,800 miles north by west of Honolulu. The islands have come into prominence as the intermediate sta¬ tion of the American-Pacific cable to the Ladrone and Philippine islands via Honolulu. The group consists of a low coral atoll 18 miles in circumference, enclosing Sand Island, East¬ ern Island and two islets. Sand Island, the largest, is one and three-fourths miles long, three-fourths of a mile wide and has an aver¬ age elevation of from 3 to 10 feet above sea-level, the highest point attaining 43 feet. Eastern Island is one and one-fourth miles long, one-half mile wide and from 6 to 12 feet high. Both islands are partly covered with coarse grass and bushes, the breeding ground of the tern or sea-swallow. Good water is obtained by sinking wells, while fish of many varieties, turtles, crabs and crawfish, etc., abound in the lagoon; sea-birds also are easily caught. The islands are inhabited only by the employees at the cable, stations. From 1887-89 a shipwrecked crew lived here for 14 months until rescued, losing, however, several of their number from scurvy. A short distance west of the islands a submarine mountain rises 2,200 feet from the ocean bed to within 82 fathoms of the surface, and between the islands and Guam is an abyss of over 4,900 fathoms, one of the deepest in the world.

MIDWIFE FROG. See Obstetrical Frog.

MIDWIFERY. See Obstetrics.

MIELATZ, Charles Frederick William,

American etcher: b. Breddin, Germany, 24 May 1860; d. 2 June 1919. He came to the United States when a child and was educated in Chicago, studying drawing at the Chicago School of Design, and painting under F. Rondel, Sr. He was elected a member of the National Academy of Design and as instructor in etching there exerted a considerable influ¬ ence over the younger artists of his time. He became widely known for his etchings, dry

points, aquatints and lithographs. He executed ?. large number of views of New York as well as of rural, woodland and marine scenes. Among his works may be mentioned the etchings (The Battery) ; (Rainy Night, Madison Square* ; (Kingsbridge on the Har¬ lem } ; (Arch of the Cathedral of Saint John the Divine' ; (Saint Paul's' ; (New York from the Harbor' ; (Chelsea Docks' ; (The Naval Arch' ; (Poe's Cottage at Fordham' ; (Across the Fields, Narragansett' ; (A Glimpse of New Haven' ; (In the Gardens, Georgian Court, Lakewood' ; (Near the Golf Links, Lakewood' ; the dry points, (Falls of Pawtucket' ; (Fisherman's Luck' ; <A Mill at Block Island' ; the aquatints, (Foggy Day on Shore' ; (Winter Night' ; and the lithographs, (Bowling Green' ;

(Fifth Avenue.'

MIELZINER, mel'zin-er, M9ses, Amer-can rabbi and educator : b. Schubin, Germany, 12 Aug. 1828; d. Cincinnati, Ohio, 18 Feb. 1903. After studying at the University of Berlin he became rabbi of a congregation in Waren, Ger¬ many, and then head of a theological school in Copenhagen. In 1865 he was called to the rabbinate of a New York synagogue, which he held until 1873, when for six years he was principal of a private school besides co-operat¬ ing in the Emanu El Preparatory School. In 1879 his real educational work was begun in the United States when he was appointed pro¬ fessor of the Talmud at the Hebrew College, which position he held until his death. As teacher he was clear, exact and thorough. His published works include (The Jewish Law of Marriage and Divorce' (1884) ; Selections from the Book of Psalms' (1884) ; Slavery among the Ancient Hebrews' (1894); (Introduction to the Talmud' (1884 and 1903) ; Segal Maxims and Fundamental Laws of the Civil and Criminal Code of the Talmud' (1898) ; (Rabbinical Law of Hereditary Suc¬ cess' (1900).

MIER, Mexico, commune in state of Tamaulipas, 95 miles northeast of Monterey, on the Rio Grande. Pop. 7,114.

MIERES, Spain, city in the province of Oviedo, 12 miles by rail southeast of Oviedo, on the river Caudal. It is situated in a moun¬ tainous region with heavy forests and fertile land. It has coal, iron, sulphur and cinnabar mines, and iron and chemical works. The town

has also a trade in fruit, timber and livestock. Pop. 27,866.

MIERIS, me'ris, Frans van (The Elder), Dutch painter: b. Leyden, 12 April 1635; d. there, 12 March 1681. He was originally a pupil of the glass painters A. Torenvliet and G. Dous, and eventually became so famous as a canvas artist that the Grand Duke of Tuscany and other noblemen ordered pictures from him; his work was remarkable both for refinement of handling and elegance of design. His por¬ traits and genre pictures, in which both nobility and bourgeoise are represented, are not con¬ spicuous for striking and original characteriza¬ tion. Only two or three figures appear in most of his genres, and his compositions of this kind are delicate and smooth to a degree that ren¬ ders them almost inanimate. There are por¬ traits of himself and his wife in the gallery of The Hague, and in the Pinakothek at

Munich, which latter collection is especially rich in examples of this master, among them (An Oyster Breakfast' ; (Lady Playing a Lute' ; <The Trumpeter' ; (The Sick Woman.' Many of his pictures are to be met with in the gal¬ leries of Paris and Dresden such as (The Ar¬ tist' ; (A Lady Painting' ; (Love's Message' ; <The Music Lesson' ; and in the Berlin Gallery is his (Young Lady before a Looking-glass.'

MIERIS, Frans van (Tile Younger), grandson of the preceding, Dutch painter : h. Leyden, 24 Dec. 1689; d. there, 22 Oct. 1763. He painted genre and portraits after the man¬ ner of his father, who had produced a number of small club pictures, and of his grandfather. He did more service perhaps by his literary work than by his pictures, which have the an¬ cestral fault of superficiality. He wrote (Histoire der Nederlandsche Vorsten' (1732-35); (Groot Charter-book der Graven van Holland, van Zeeland en Herren van Vriesland' (1753-56) ; and (Handvesten der Stad Leyden'

(1759).

MIFFLIN, Thomas, American soldier and politician: b. Philadelphia 1744; d. Lancaster, Pa., 20 Jan. 1800. He was by birth a Quaker; was graduated at Philadelphia College in 1760; entered public life in 1772 as a member of the Pennsylvania assembly; and in 1774 was elected a delegate to the Continental Congress. In 1775 he entered the army with the rank of major, and as colonel and first aide-de-camp to Washington accompanied him to Cambridge. He subsequently held the

appointment of ad¬ jutant-general, and in the spring of 1776 was commissioned as brigadier-general. He fought in the battle of Long Island, and by his energy succeeded in the latter part of 1776 in raising considerable reinforcements in Pennsylvania to recruit Washington's army. He was present at the battle of Trenton, and did good service in driving back the enemy's line of cantonments from the Delaware. In 1777 he was made a major-general, and in the same year became an active member of the faction organized for the purpose of placing Gates at the head of the Continental army, and known in history as the Conway Cabal (q.v.). The project failing, he resigned his commission, and in 1782 was elected to Congress, of which body he became president during the following year. In this capacity he received from Washington the resignation of his commission as commander-in-chief. In 1785 he became speaker of the Pennsylvania legislature, and in 1787 he was a delegate to the Constitutional Convention. In October 1788, he succeeded Franklin as presi¬ dent of the Supreme Executive Council of Pennsylvania, which position he filled for two years; and from 1790 to 1799 he was governor of the State. In 1794, while holding this office, he rendered important assistance to Washing¬ ton in quelling the Whisky Insurrection (q.v.).

MIFFLIN, Warner, American reformer: b. Accomac County, Va., 21 Oct. 1745; d. near Camden, Del., 16 Oct. 1798. When a boy on his father's plantation he became convinced of the evil of slavery, and when he himself became a slave owner, he freed all his slaves and paid them for their past services. He was a Quaker, and traveled widely, preaching against slavery. It was largely through his efforts that the

Quakers came to oppose slavery, and many fol¬ lowed his example in freeing their slaves. On account of his religious principles he opposed the Revolutionary War, and at the time of the battle of Germantown interviewed both Gen¬ eral Washington and General Howe to impress upon them the evils of the war. In 1782 he was instrumental in securing a law in Virginia which allowed for emancipation of slaves ;

in 1783 he presented a memorial to Congress in regard to slavery, and in 1791 another memorial on the same subject to the President and Con¬ gress, which was tne cause of a sharp debate on the right of petition. Shortly afterward he published a series of essays defending his posi¬ tion in the matter.

MIFFLIN, Fort. See Fort Mifflin.

MIGDOL (Hebrew, a tower). Egypt, town mentioned in Jeremiah xliv, 1; xlvi, 14, as in lower Egypt ; in Ezekiel xxix, 10 ; xxx, 6, as the northern limit of the country, opposite Syene ; as a station on the route of the Israel¬ ites to the Red Sea in Exodus xiv, 2, and in Numbers xxxiii, 7. .It is also probably the magdolum of the (Antonine Itinerary,) situated 12 Roman miles from Pelusium.

MIGNARD, Pierre, French painter and en¬ graver: b. Troyes, November 1612; d. Paris, 20 May 1695. He studied in Bourges under Jean Boucher and in Paris under Simon Vouet. In 1636 he went to Italy and spent most of his time in Rome, whence he was surnamed <(The Roman® (Le Romain). He imitated Annibale Caracci, and among other portraits, including those of many Roman nobles, painted likenesses of Popes Urban VIII and Alexander VII. In 1654 he went to Venice where his success as a portrait painter continued. On being summoned to Paris by Louis XIV he painted portraits of the young king and of Mazarin and afterward was commissioned to decorate the cupola of the church of Val de Grace with over 200 figures of prophets, martyrs, *etc.* This work, the largest piece of fresco painting in France, soon lost the beauty of its coloring, owing to the painter's want of familiarity with the art of working on a wet plaster ground. He subse¬ quently produced some paintings for the palace of Versailles and was made director of the royal art collection and superintendent of the manufacture of the Gobelin tapestry. His pictures suffer from the faults of his day; they are stiff and conventional ; but glow with the warm and harmonious coloring of the Venetian school. His portraits are the best of the early French school. A remarkable collection of his works is to be found in the Louvre, but the Berlin Museum possesses the finest of his por¬ traits, that of Maria Mancini. Consult Lebrun Dalbaume, (Etude sur Pierre Mignard) (1878).

MIGNE, Jacques Paul, French priest and editor: b. Saint-Flour, Cantal, 25 Oct. 1800; d. Paris, 25 Oct. 1875. He was educated at Orleans, was ordained a priest in 1824 and had charge of the parish of Puiseaux in the diocese of Orleans until 1833 when he went to Paris and founded L'Univers religieux, which after¬ ward became L'Univers under the

direction of Veuillot. In 1836 he disposed of his interest in that publication and established a publishing house for the production of religious books in inexpensive editions. While his work as a pub¬

lisher was of vast scope much of it was super¬ ficial and prepared at too high a rate of speed to be accurate. An exception is the <Patrology) which was under the direction of the scholar Benedictine J. B. Pitra, and which covers many works not included in other collections nor produced in special editions. It was published as cPatrologiae cursus completus) (Latin series, 221 vols., 1844-55; Greek series, in Latin, 85 vols., 1856-61 ; Greek series, with Greek text and Latin trans., 165 vols. 1857-66). Among other publications are (Scripturae sacrse cursus completus) (28 vols., 1840-45) ; Collection des auteurs sacres) (100 vols., 1846-48) ; (Encyclo¬ pedic theologique) (171 vols., 1844-66), *etc.* The Migne publishing plant was a total loss by fire in 1868, but it was rebuilt, and in 1876 it was sold to Gamier Freres, who also purchased Migne's copyrights.

MIGNET, Frangois Auguste Marie, fraii-swa o-giist ma-re men-ya, French historian: b. Aix, Provence, 8 May 1796; d. Paris, 24 March 1884. He was educated at Avignon ; studied law in Aix; went to Paris in 1822 after winning a prize from the Academy of Inscriptions by his essay on French institutions, government and legislation in the time of Saint Louis; joined the staff of the Courrier Frangais; lectured on modern history at the Athenee; was elected to the Academy in 1836; and after the Revolution of 1848 lost the place he had held for 18 years as archivist of the Foreign Office. His most important work was a (History of the French Revolution (1824). Besides this he wrote biographies of Franklin (1848), of Mary Stuart (1851), and of Charles V (1854). Con¬ sult Trefort, (Mignet und seine Werke) (1885).

MIGNON, French term of endearment (darling, favorite, pet), sometimes used as a given name. 1. A mysterious Italian girl, the daughter of an aged harpist, who dies in despair through unrequited love in Goethe's (Wilhelm Meister's LehjahreP 2. Opera by Ambroise Thomas, founded on (Wjlhelm MeisteiQ with words by Carre and Barbier, produced in Paris in 1866, in London in 1870 and in New York in 1871. 3. A term of opprobrium applied to cer¬

tain favorites of Henry III, of France, youths of frivolous habits and-effeminately fashionable dress, popularly credited with dissolute morals and generally hated because of the king's lavish generosity to them. Among them were Quelus, Saint-Megrin, Maugiron, Epernon

and Joyeuse.

MIGNONETTE, mm-yo-net', a genus (Reseda) of annual and perennial herbs of the family Resedacece. The species, of which there are about 50, are natives of western Asia and the Mediterranean region. They have simple or compound leaves, and terminal spikes of small, pale, usually greenish flowers. Less than half a dozen species are cultivated, the most im¬ portant being the common mignonette (R . odorata), a universal favorite both in gardens and in greenhouses because of its fragrant flow¬ ers. It is a branching annual herb of decumbent habit when in its prime, and will thrive in any cool, moist, fairly rich soil, when partly shaded from the noon-day sun. For outdoor blooming the seeds are sown successionally from early spring to midsummer, and for winter blossom¬ ing from that time forward at intervals of three or four weeks.

MIGRAINE, OPHTHALMIC MI¬ GRAINE, or SICK HEADACHE, a very widespread affection, also known as megrim, hemicrania or bilious headache. It is a vaso¬ motor disturbance; in other words, one in which the nerves which expand or contract the arteries and blood vessels are affected, thus restricting the flow of blood. The number of happenings which may cause this malady is ex¬ ceedingly great, including such diverse causes as the merely physical ones of severe blows, falls, fast movements, sudden alteration of temperature or of atmospheric pressure. Migraine may also be caused by chemical stimuli such as nicotine, and by the secretions of various glands of the body such as the thyroid. It is often, too, caused by some other deep physiological alteration, such as that ex¬ perienced in extreme fatigue, or that coming from some other disease such as meningitis or tumors. It may also have as chief cause some undue emotional strain as in great anger, in fear (which produces important changes in metabolism, q.v.), in disappointment or in chagrin. The vital point about the mental causes is that they may not always be in con¬ sciousness, but may be solely in the uncon¬ scious, and will therefore be quite unknown and unknowable to the average person, unless he

can receive treatment at the hands of an experienced psychoanalyst. (See Psycho¬ analysis). If the causes act through the cere¬ bral sympathetic nervous system, they may produce spasms of the vaso-motor muscles such that the blood pressure is increased in the brain.

The study of the worst forms of the disease alone has enabled investigators to correlate the multiform symptoms into a consistent picture. Fortunately the worst forms are not the com¬ monest, which may be termed abortive forms. In these abortive forms now one and now another of the symptoms appear in individual cases, some having many or most of the symp¬ toms, but in different attacks. One patient, for instance, is on record who in 15 years had at different times all the variations of the disease which have been reported.

The commonest abortive attacks of migraine begin with chilliness, sometimes accompanied by cold feet and pinched face. Apprehension, depression and general wretchedness then fol¬ low, sometimes accompanied by a peculiar de¬ fect of sight which is known as scotoma. This is a spot in the visual field, quite distinct from the quite ordinary (<blind spot,® but one which interferes with the sight to a varying extent, and goes through different phases, sometimes within the short space of 20 minutes, constitut¬ ing, in the cases where it does occur, the pre¬ lude to the actual pain in the head. The scotoma begins onlv as a slight blurring, notice¬ able especially when reading. The attention directed to it shows a cloudy spot which shifts with the eye, as it changes its direction. Gradually the spot expands into more or less crescent shape, usually being found in the left eye. The interference in vision is however sometimes found to affect only the upper half of the field of vision, while in rarer instances a temporary total blindness occurs.

Another important disturbance associated with migraine is that of speech. Not only is the ability to pronounce certain words affected,

but the comprehension is also sometimes in¬ terfered with. Inability to write is not unknown and also a disturbance of the auditory images used in-singing. A case has even been described in which unsteadiness of gait was coupled with a sensation that the body or particular parts of it were doubled.

The headache itself is, however, the most important symptom and has an infinite varia¬ bility as to its location, its quality, its duration and its intensity. The commonest form appears a quarter or a half an hour

after the appear¬ ance of the other phenomena including the scotoma, and is generally confined to one side of the head, hence its name: migraine (from hemicrania, Greek for (<half head®). But cases occur where it involves both sides or may be in the front or back of the head. In many cases the eyes alone are the seat of the pain, while in others the pain may be in the neck. The qual¬ ity of the pain is described generally as lancinating. Some sufferers become hysterical, rolling on the floor and holding their heads with both hands, and shrieking with pain. Others with less acute suffering describe the pain as beating or thumping, particularly when stooping or requiring fo do any violent exer¬ cise. All the phenomena of the pain indicate a change in pressure of blood w-ithin the brain, a change which may be either an increase or a decrease. The pain is aggravated in diverse wrays in different patients, sometimes increasing on the taking of alcohol, on smoking, on eat¬ ing, w?hich sometimes on the contrary helps, on being subjected to sudden and loud noises, or to strong light. It has been found, too, that certain odors increase the pain, such as that of cooking and of certain drugs like chloroform or ether. The vaso-motor disturbances which accompany all cases of migraine are manifested in the coldness, paleness and gooseflesh, evi¬ dences of constriction in the calibre of the blood vessels, or in the redness of skin and even discharge of blood from various parts of the body. The secretions are frequently affected.

The connection between migraine and the mental factors which are above enumerated as among its causes is a matter which is being investigated at the present day through the technique of psychoanalysis (q.v.), which has unearthed much material going to show that the left sided headache represents an unconscious conflict relating to some love affair. wTile those on the right side are associated with fantasies concerning the nutritive libido. As a prelimi¬ nary to the onset of the sickness the general conscious situation of the patient may show a slight or almost unnoticeable or even a pro¬ found change, varying from violent agitation to mild depression. In the observation of one specialist 25 per cent of the patients showed psychical symptoms, and while others show' a smaller proportion, the presence of the purely mental element indicates that an important if not exclusive factor in the causation of the malady is the unconscious conflict. Treatment consists in removing as far as possible all the physical causes known to produce migraine, such as eye-strain, adenoids, diseased turbinates, constipation, dysmenorrhea, etc., or gastro¬ intestinal disorders, and if the migraine still persists, there is very good reason to believe that the condition is the result solely of the

unconscious conflict. In this case the patient should receive analysis from an experienced psychoanalyst.

Smith Ely Jelliffe.

MIGRATION. The term migration is often used very loosely in popular writings about animals, so that it seems wise to define it as limited in the present article to: (1) The annual change of residence by a species with the change of seasons from winter to sum¬ mer or the reverse; (2) irregular mass-move¬ ments of a species under pressure of famine, over-population of a locality, or some more obscure influence. While these classes have been enumerated in the order of their promi¬ nence to our eyes, especially in the behavior of birds, it will be well to consider the second sort of migrations first, as these sporadic cases may throw light on the more regular phenom¬ ena, and how they came to be habitual.

Insects. — An eminent entomologist tells us that certain butterflies, as our milkweed frit-tilary (Anosia plexippus) and the cotton moth (Aletia argillacea), pass northward in the United States for hundreds of miles in spring, and again in huge swarms southward in au¬ tumn ; but whether the individuals are the same is not determined. (See Milkweed Butterfly). Among other butterflies periodical migrations occur, as in movements of vast columns across the Isthmus of Panama out to sea, and flights miles in breadth have been observed to cross Ceylon, the individuals occupying several con¬ tinuous days in their passage. Wallace ob¬ served the swarming of pierid butterflies in the Indian Ocean, and Clark in Venezuela, the vast throng composed of males moving steaddy east¬ ward for several days in the face of the trade

winds. , . ,

The late Dr. A. S. Packard, whose special studies of the habits of the Rocky Mountain locust about 1880 were so valuable, reported that that destructive insect is migratory in cer¬ tain seasons favorable to

the species when over¬ production occurs; the young on hatching, after having devoured every green thing at hand, are forced, when becoming winged, to rise in enor¬ mous swarms and sail on the wings of the wind for hundreds of miles to other regions where they lay their eggs. The next year's brood sometimes returns to the original spawn¬ ing ground to lay their eggs. The same thing is characteristic of similar locusts in Syria and central Africa.

Crustacea. — The members of several fam¬ ilies of crabs, mostly tropical, have acquired the power of living out of water, and even of wandering extensively inland, but regularly re¬ turn to the sea, sometimes in marching hordes, to deposit their eggs in the water, after which they go back to the highlands. See Land Crabs.

Fishes. — Many kinds of fishes are regular migrants ; the anadromous families, such as those of the shad, herring and salmon, annually ascend the rivers to spawn, whence in some cases they return to the sea, in others never get back, but their young, after the succeeding winter, go back to salt water. Certain fishes retire to the deeper or warmer parts of the ocean during the winter, but in early summer travel toward the shore-shallows, or t<p the cool north, in vast swarms ; and the same is true of a large variety of other marine creatures, in¬ cluding some of the humblest and most minute vol. 19 — 4

forms, in which cases the direction of the mass-movements are largely determined by the ocean currents. Moreover there occurs in the ocean a regular movement of deep-sea forms toward the surface in the night, the animals sinking again as daylight approaches. Fishermen in the north Atlantic and on the coast of Norway are familiar with the vast influx in the spring of such fishes as herrings, cod, plaice and capelan. The eminent Norwegian naturalist, G. O. Sars, concluded that some of these fish-migra¬ tions were undertaken in order to obtain food, and others for the purpose of reproduction. ((When the capelan gathers in millions on the coast-banks of Finmark or Labrador, when countless numbers of cod approach the banks of Lofoten, and when the herrings flock to western Norway, they migrate to spawn. The fat-herring collecting off the coast of Nordland, and the cod gathering around the shoals of capelan in the Barents Sea, are examples of feeding-migrations.®

Sea-turtles have a similar history, going regularly toward shore in the breeding season to deposit eggs in the beach sand.

Mammals. — The reader will have perceived that most of the foregoing cases are not ex¬ amples of true migration because the element of habitual return is absent, or at best a very few survive to return; or else the movement, when seasonal and regular, is purely local, such as going to the nearest shore for spawn¬ ing; or is merely the pursuit of traveling prey. In this class must be put most of the so-called migrations of mammals. From time to time certain small animals, as lemmings, field-mice, squirrels and the like, develop enormous num¬ bers in some region (or formerly did so, before civilization was so worldwide) and overflow in great ˆarmies® into neighboring parts of the country, where they gradually expire. In the plains regions of the world a lack of good pasture in one place will often cause movement of antelopes, bisons, etc., to some better dis¬ trict in great herds; and in other situations the wild animals are accustomed to go up into the hills in summer and come down to the shelter of the valleys in winter, but these are local movements. The only examples of real migra¬ tion afforded by the mammals are the case of certain bats that regularly journey every year between the tropics and more northern climes, and the case of the caribou and, to a less extent, the reindeer. These deer do make a real fall migration from the barren Arctic coast to the margin of the forested region southward and go back in the spring. It is to the birds, then, that we must turn for a study of migra¬ tion in the stricter sense of the term, and even here it is only partial as regards many species and groups.

Migration of Birds. — This subject is so large that we can give no more than a super¬ ficial sketch, following in general the lines of investigation conducted by the late Wells W. Cooke, of the United States Biological Survey, who devoted almost his whole life to a study of this phase of ornithology as exhibited espe¬ cially in North America.

The motive or cause of the periodical migra¬ tion of birds has excited inquiry since ancient times, and at present two different methods of explaining it are in vogue. The opinion is general that in Pleistocene times, just previous

to the advance of the cold climate and finally to the great accumulations of ice and snow over the northern parts of the world, the whole of the northern hemisphere possessed a mild climate, and birds of every sort dwelt com¬ fortably all the year round throughout virtually its whole extent. The coming of the Glacial Period so affected the north, as to limit more and more the residence in winter of birds there, although in summer they might venture somewhat toward it, when vegetation and in¬ sect life annually revived. As the ice advanced very gradually, now and then receding, but on the whole enlarging itself, these enforced north¬ ward and southward movements of the birds increased both in distance and duration, until migration became a fixed habit with all birds whose life was affected by the change of cli¬ matic conditions. Finally most northern birds were restricted all the year to middle America and the Mediterranean region and southern Asia. But the habit of migration had been formed, and when the glacial ice began to retreat toward its present position, the birds annually followed its receding margin, until at last they had established their present long and diversified migration routes.

Thus far all theorists are in substantial agreement. The divergence is as to the pre¬ vailing motive. One school argues that a long¬ ing to continue their inherited habit of resi¬ dence in the north, and individually to leturn to their birthplaces, is the incentive that com¬ pels them to leave the tropics and make a jour¬ ney, often of surprising length, every spring. The other school maintains that <(the birds' real home is in the Southland® ; that that re¬ gion becomes overcrowded, and the birds in annually flying northward are seeking a region where there is less crowding and less com¬ petition for food. The truth perhaps lies in a combination of these influences, varying in intensity with different kinds of birds. It is an important circumstance, especially with ref¬ erence to the second theory, that no similar migration occurs southward from the tropics to Bolivia and Argentina, whose plains and mountains offer a poor supply of bird-food, and not much more from the equatorial to South-African districts. <(The conclusion is in¬ evitable,® Cooke believes, <(that the advantages of the United States and Canada as a summer home, and the superb conditions of climate and food for successful rearing of a nestful of voracious young, far overbalanced the hazards and disasters of the journey thither. It must be remembered too that the migratory species have acquired various adaptations relating to their migrating habits that tend to fit them more and more to endure the exertion and danger required ; also that the regular routes followed by each species are the products of thousands of generations of experience, and

presumably represent the easiest way in each case.

Phenomena of Bird-Migration.. — In the

restricted space of this article it is impossible to go into detail as to the general subject, and attention must be confined mainly to what ap¬ pears in North America. Australasia and the South Pacific islands share to some extent, in the annual movements of continental species, but have an inter-insular migratory system of their own. <(In Europe,® says a recent re¬

viewer, (<and central Asia there are numerous routes, at least nine, according to Palmen. Of these one begins on the Siberian shores of the Polar Sea, Nova Zembla, and the north of Russia, and passes down the western coast of Norway to the North Sea and the British Isles; another arising in Spitzbergen follows much the same course, but is prolonged past France and Spain to the west coast of Africa. Many migrants wintering in North Africa (Algeria, etc.) have flown there from northern Russia, by way of the Baltic Sea, Holland, passing up the Rhine Valley, and crossing to the Rhone, the column splitting on reaching the Mediterra¬ nean, one line of migration passing along western Italy and Sicily, a second crossing by way of Corsica and Sardinia, the third by southern France and eastern Spain. Egypt re¬ ceives its winter visitors from the Russian river-valleys of the Obi and Volga, the line crossing the Black, Bosporus and ZEgean seas to the Nile Valley. One important migration-route is to and from India along the Danube Valley and across Persia.®

An important fact to consider at first is that the migratory habit is possessed in its com¬ pleteness by comparatively few birds, and these belong almost wholly to a single order, that of the Passeres, or insect-eating song-birds. The exceptions are mainly seafowl and certain water-birds. Even in these groups two classes are to be found, one of species than are resi¬ dent the year round in the regions they sever¬ ally occupy; and the other whose migrations are of slight extent. Even in the northern half of the United States many birds are pres¬ ent in winter, some of which are those that retreat from the North only so far as driven by deep snow and excessive cold ; while the Southern States have a longer list of resident birds, supplemented in winter by many kinds that moved only a little way southward to es¬ cape the dearth of food at that season in the snowy parts of the country. This shows that in respect to distance, migration varies from a distance almost as great as the breadth of the globe (the Arctic tern passes

annually from Patagonia to Alaska, and back again) to no change of residence at all, even on the Arctic coast and islands.

Northward Movement in Spring. — Let us

now consider the actions of the real migrants, who have been spending the winter in tropical America, on the arrival of spring. Nothing that we can see compels them to move, yet they abandon the delights of their winter home and proceed northward as soon as the proper time comes. This <(pr˚Per time® seems to have no relation to the weather or to food-conditions there in the tropics, which are almost change¬ less, but is determined by the weather and food conditions the bird will find when it ar¬ rives at its northern destination, if the season there be an average one. This varies with the requirements of different birds, so that some start much earlier than others. Thus the ducks and geese, which ask only that the rivers and ponds in the north shall be free from ice, come to us much earlier than do the warblers and .flycatchers that must wait until flowers are in bloom and insects numerous. As the last are the most numerous they come in crowds soon after the leaving-out of the north¬ ern woods and orchards.

Not all, however, pursue the same route, although each species keeps to its traditional path until it arrives in the district suitable to it, when it scatters. The configuration of con¬ tinents, narrowing into a mere isthmus be¬ tween North and South America, permits only a very narrow land-path for the migrants be¬ tween their winter and summer resorts, yet most of those who winter south of Panama crowd along this narrow neck. Certain shore-birds, confident of their strength, strike straight north from Brazil to Nova Scotia, and a few species follow the line of the Antilles from Venezuela to Florida. Birds whose destina¬ tion is California and northward follow the western coast of Mexico, and those aiming at summer homes in the Rocky Mountain region pass straight north through central Mexico and across the desert, or skirt the eastern coast of Texas and the plains. All these are habitual routes for certain species. The great body of migrants, whose

songs are later to be heard in the eastern United States and Canada, fly straight across the Gulf of Mexico from Yucatan to landings on the northern shore all the way from eastern Texas to Florida. Ar¬ rived there — and as a rule this is about day¬ light, the journey from Yucatan having taken but one night — .they spread northward along two main channels, one up the coast eastward of the Alleghanian Mountains (diverging into these uplands at each river valley) ; and two up the Mississippi Valley, separating into bands that ascend every tributary, and rapidly cover the whole country, while those bold species, sur¬ prisingly many in number, who are content only in the subarctic zone, hasten on to Alaska and down the Mackenzie Valley. The point to keep in mind in this general sketch is that every species pursues the same route every year, and sometimes it is far from the most direct one. The speed of travel is not great as a rule. The birds must feed by the way, and this food must be found as a rule by daylight; therefore, most species travel during the night, and are often delayed by foggy, rainy nights or by cold storms. The swallows, swifts, night¬ jars, hawks and some others that capture their prey on the wing feed as they go and prob¬ ably rest at night. Those bound for the far north must and do move more rapidly than the southern breeders ; and Cooke has gathered some very interesting statistics on this matter.

Autumnal Migration.— The autumnal re¬ turn of the birds presents some very different features. It begins in the far north before any change in weather or food suggests the necessity of departure, and is led by male birds, after whom the mothers and young fol¬ low as soon as they have strength to travel. The movement is far less direct and hurried than the spring flight. They make a long stage by night, flying sometimes a mile or more above the earth, and drop down at dawn to feed and rest, then loaf along. The members of each species gather gradually into the regular route, which in many cases is quite different from that followed northward > in May; and those that are inclined to flocking at this season form large companies that go on together, striking out at last from the Gulf shore to cross in a night that space of dark water, or disappearing in the Mexican forests.

How do Birds in Migration find Their

Way? — We have seen that they follow definite routes ; also that these in places lead across wide spaces of water; also that the routes in some cases differ according to season ; and had we been able to give more details it would appear that often these routes are very eccen¬ tric. Moreover, they travel mostly at night ; and finally certain species

cross areas of ocean hundreds of miles wide, and far from land, as when golden plovers fly from Nova Scotia to hundreds of miles wide, and far from land, as in the case of the curlews that migrate be¬ tween Australia and New Zealand. It is also pleasingly evident that birds return year after year to the same grove, dooryard and nest¬ ing-place. How do they do it?

It was formerly taught that they followed landmarks, such as coast lines, ranges of mountains and large river-courses, which are visible even on clear nights from a great height, and doubtless these are aids to the day-fliers and when the sky is clear. But many lines of migration cut across such landmarks, instead of follow them, and Others stretch across wide plains and vast water-spaces. Other theories, as of magnetic influences, etc., are without value. It appears plain that birds are guided by an innate sense of direction. This need not be esteemed miraculous, for in a lesser degree it is possessed not only by various other animals, but by wild men, espe* dally those who dwell in a forested region, where in following game they would become lost daily had they not a faculty for orientation. The direct testimony to such a faculty in savage mankind, and comparison of the evi¬ dent ability of many animals in this direction, makes its presence in the minds of birds easily credible, the more so as the sense is by no means infallible, since birds sometimes be¬ come completely bewildered when buffeted about at sea by high winds. Add the ele¬ ments of observation and memory and a suffi¬ cient explanation is at hand of how migratory birds find their way.

Bibliography. — An early treatise on this subject of much value is by Alfred Newton in his dictionary of Birds) (London and New York 1893-96). A more recent review is a part of the introduction of Dr. Frank M. Chapman's (Handbook of Birds) (2d. ed., New York 1912), which includes an extensive bibliography. The latest and most important results of study are in the writings of W. W. Cooke, summarized in Bulletin 185 of the United States Department of Agriculture (Washington 1915).

Ernest Ingersoll.

MIGUEL, me-gel', Dom Maria Evaristo,

Portuguese pretender, son of John VI of Por¬ tugal: b. Lisbon, 26 Oct. 1802; d. Castle Bronn-bach, Baden, 14 Nov. 1866. He was brought up in Brazil, and upon the accession of his father repeatedly raised rebellion as head of the Absolutists. In 1826 after his father's death he was made regent, but proclaimed him¬ self king, attempted to keep

Maria de Gloria, the real heir to the throne, who had been offered to him in marriage, out of the king¬ dom, and was successful until Dom Pedro pf Brazil came to the aid of his daughter Maria, defeated Miguel and forced him to leave Por¬ tugal. Miguel is usually described by the

faction hostile to him as ignorant, vicious and drunken, but his coreligionists make him a model prince.

MIKADO (Japanese Mi, <(exalted,® Kado, <(gate®), the ancient and poetic title of the Japanese emperor, in origin identical with <(Sublime Porte® as used of the Ottoman sul¬ tan, that is, probably transferred to the ruler and judge from the gateway of his palace, at which he did justice. The word mikado was never used as a separate title for a spiritual ruler; the incorrect idea to the contrary re¬ sults from the well-known historical fact that much of the temporal power of the Mikado was long usurped by shoguns or generals, who, how¬ ever, always admitted that they derived their power from the Mikado. The present Mikado, Yoshihito (q.v.), is the 122d (or 124th) of his line, which dates back to 660 b.c. ; of him the title ((Mikado® is less used than Tenshi Sama, ((Son of Heaven,® or Shu-jo, ((Supreme Mas¬ ter.® See Japan.

MIKADO, The, or THE TOWN OF TITIPU, a comic opera in two acts, libretto by W. S. Gilbert, music by Sir Arthur Sullivan ; first production, Savoy Theatre, London, 14 March 1885 ; first appeared in America at the Museum, Chicago, 6 July 1885. The plot is simple burlesque without the infusion of any Eastern imagery. The Mikado, a highly moral ruler, has issued an edict condemning to death every man found guilty of flirtation <(unless connubially linked.® To evade this stern sen¬ tence the citizens of Titipu hit upon the idea of appointing one thus condemned (Ko-Ko, the tailor) to the office of executioner, with the result that he could not behead the next man until he had first executed himself. It being necessary eventually to execute some one, Ko-Ko, who is engaged to Yum-Yum and is also first on the list of the condemned, finds a substitute in Nanki-Poo (the Mikado's son in disguise), who had gone into temporary ob¬ scurity to

avoid marrying the elderly Katisha. Nanki-Poo agrees to suffer execution a month hence provided he can be married to Yum-Yum for that period. Legal complications follow, and in the end Nanki-Poo is forgiven and weds Yum-Yum, and Ko-Ko saves himself by marry¬ ing Katisha. An amusing character is Pooh-Bah, ((Lord High Everything Else.®

MIKANIA, also known as WILLUGH-BEIA (both Neo-Latin from the names of J. C. Mikan and Francis Willughby, respec¬ tively), a genus of composite plants of the tribe Eupatoriece and sub-tribe Ageratece. It is widespread throughout tropical and temperate America and grows either in an erect shrub or in twining vines. The genus numbers more than 150 recognized varieties, all natives of the warmer regions of America, except one species which grows in Asia and tropical Africa. The plant is characterized by opposite leaves, heart-shaped or triangular, toothed at the base and with petioles. The flowers are small and white, pinkish or yellowish. The tropical types, M. amara, M. cordifolia and M. gaaco, have a high reputation in South America for the cure of snake bite, and ad¬ ministration of a medicine made from them is also supposed to render one immune to snake bite. There is no scientific proof of the efficacy of the herb either as remedy or pre¬

ventive. M. scandens is the familiar climbing hempweed, with abundant pink flowers, grow¬ ing in moist soil from Long Island to Texas.

MIKHAILOV, Mikhail Larionovitch,

Russian author: b. Ural Mountains, 1826; d. Siberia, 1865. He was educated at Petrograd and engaged in literary pursuits as a translator, journalist and writer of fiction. His political sympathies caused his exile to Siberia. He was a contributor to Sovremennik (The Con¬ temporary) and an able advocate of the re¬ forms of the self-emancipation era. His col¬ lected translations and writings were published (3 vols., 1858-59).

MIKHAILOVSKI, Nikolai Konstantino-vitch, Russian author and sociologist: b. 1842; d. 1904. He belonged to the school of thinkers which became famous in Russia in the seventies and eighties as fearless exponents of political and economic reforms. He was a con¬ tributor to the Otechestvennya Zapiski (The Annals of the Fatherland) from 1869 until it was suppressed in 1884. He became coeditor of

Severnvi Vestnik (The Northern Messen¬ ger) in 1873, and from 1890 until his death in 1904 he was coeditor of Russkoye Bogatstvo (Russian Treasure) with V. G. Korolenko. His collected writings were published (Petrograd

1913).

MIKKELSEN, Aksel, Danish educator : b. Hjorring, 14 Aug. 1849. He introduced the Swedish system of sloid schools into Denmark, organized schools and seminaries on the sys¬ tem, which teaches manual training as an aid in developing the pupils physically and mentally as well as affording a basis of technical train¬ ing. From 1907 he was inspector of the sloid system in Denmark. Author of (Hvad er Slojd) (1886) ; (Hvordan arbejder Slojdskolen) (1886) ; (Opdrageren) (1891-92) ; <Slojl3ere) (1894) ; <Arbejdsstilinger:> (1896), *etc.*

MIKKELSEN, Ejnar, Danish explorer: b. Vester Bronderslev, Jutland, 20 Dec. 1880. He was a member of the Smdrup expedition to Christian XI Land, East Greenland, in 1900, and in 1901-02 served with the Baldwin-Tiegler expedition to Franz Josef Land. In partner¬ ship with Leffingwell he organized an Anglo-American polar expedition in 1906, and suc¬ ceeded in determining the position of the con¬ tinental shelf of the Arctic Ocean. His expedi¬ tion to the north coast of Greenland in 1909-10 resulted in his recovery of the records of the lost explorers Mylius-Erichsen and Hoeg-Hagens, and in proving the non-existence of Peary's Channel. Author of (Conquering the Arctic Ice) (London 1909) ; (Lost in the Arctic) (1913) ; ˆylius-Erichsen's Report on the Non-Existence of Peary's ChanneP (1913), *etc.*

MIKLOSICH, Franz von, Austrian phi¬ lologist: b. Luttenberg, Styria, 20 Nov. 1813; d. Vienna, 7 March 1891. He took his degree in philosophy at Gratz and in law at Vienna; and for a time practised law at Vienna, soon, however, abandoning that profession for the study of the Slavonic languages. He was ap¬ pointed to a place in the Imperial Library in 1844 and retained it until 1862, also serving as professor of Slavonic philology at the Uni¬ versity of Vienna in 1849-86. He was a man of profound scholarship and not only revolu-

tionized modern Slavonic philology but made important contributions to the knowledge of the Albanian, Gypsy, modern Greek, Hungarian and Rumanian languages. He was a member of the Academy of Vienna and a corresponding member of the French Academy of Inscrip¬ tions. His first contribution to Slavonic phi¬ lology was his review, in 1844, of Bopp's < Com¬ parative Grammar.' From that time he issued a large number of works, not only on the Slavonic but on other languages, all of high importance, and among which the most notable are (Vergeleichende Grammatik der Slawischen Sprachen' (1852-74) ; (Etymologisches Worterbuch der Slawischen Spracken' (1886).

MILAN, mil'an or mi-lan', second city of Italy, the capital of the province of Milan, an archiepiscopal city on the Olona, about 90 miles by rail northeast of Turin. It is situated in a beautiful and fertile plain between the Adda and Ticino, which feed several canals, one of which, encircling a considerable portion of the interior of the city, divides it into two unequal parts. The town is built in the form of an ir¬ regular polygon, and is surrounded, except on the castle side, by a wall or rampart called the Bastione, encircled on the outside by a fine road shaded by chestnut-trees. Suburbs have sprung up beyond this circuit, and the general railway station is also outside. The city is entered by 11 gates, several of which are magnificent. The streets leading from these gates are wide, well paved and lighted and traversed by electric street car lines ; the lateral streets are less com¬ modious. The houses are built mostly of brick, but have often a handsome and showy exterior. The principal street is the Corso Vittorio Emanuele, a prolongation of the new and hand¬ some Corso Venezia, together leading from the cathedral to the Porta Venezia; other good streets are the Corso Porta Romana, Via Torino, Via Dante, *etc.* The chief square is the Piazza del Duomo, in which stands the Duomo or cathedral; and another is the Piazza della Scala. Besides fine public gardens (Giardini Pubblici) there is a large public park (Parco Nuovo) occupying an area that was long a drill-ground, and was previously the site of the citadel and connected works. This has been finally laid out and planted, and an artificial lake and mound have been constructed. Adjoining these is an amphitheatre, capable of containing 30,000 spectators. The castle — recently re¬ stored and now converted into a museum of art and antiquities — fronts the park on one side; at the opposite side is the Porta Sempione with the fine

Arco Sempione or Arco della Pace, a triumphal arch of white marble.

Among the public edifices of Milan the first place belongs to the Duomo or cathedral, a magnificent structure, inferior in magnitude to Saint Peter's at Rome, but in some respects not an unworthy rival. It is built of white marble, and though exhibiting a somewhat incongruous mixture of styles, in which the ancient Gothic occasionally gives way to the modern Italian, is one of the most impressive ecclesiastical edi¬ fices in the world. The Duomo in its present form was commenced in 1387, and is not yet entirely completed. Its form is that of a Latin cross, divided into five naves, terminated by an octagonal apsis, and supported by 52 octagonal pilasters of uniform size, except four, which,

having to bear the cupola, are larger. It is 486 feet long, the tower is 356 feet high, it occupies an area of 14,000 square yards and can hold 40,000 people. Around the exterior are 4,500 niches, of which above 3,000 are already occu¬ pied by statues; in the interior everything is of the most imposing and gorgeous description. Among the other remarkable edifices are the basilica of Sant' Ambrogio, founded by Saint Ambrose in 387, and though completely repaired in 1631, still retaining much of its original form and containing many relics of the ancient build¬ ing embedded in its walls ; the churches of Sant' Eustorgio, San Lorenzo, Santa Maria della Grazie, with a cupola and sacristy by Bramante, and the celebrated (Last Supper' by Leonardo da Vinci ; Santa Maria della Passione, a majestic edifice, with excellent paint¬ ings and a magnificent mausoleum; San Paolo; San Carlo Borromeo, *etc.* Among the palaces are the Palazzo Reale or La Corte, adorned with numerous frescoes and surmounted by a lofty tower; the archiepiscopal palace, adjoin¬ ing the cathedral ; the Palazzo di Comando Militare ; the Palazzo Marino, now the Munici-pio, a colossal structure ; the Palazzo Ciani, completed in 1861, and adorned with heads of Victor Emmanuel, Garibaldi, *etc.* ; and the Palazzo di Brera or Delle Scienze Lettere ed Arte, containing the Pinacoteca or picture-gallery, with a very valuable collection of paint¬ ings and statutary, and containing also the library of the Academy, 300,000 volumes. Be¬ sides this library Milan possesses the Ambrosian Library, the earliest, and still one of the most valuable, public libraries in Europe. There is also a valuable museum of natural history and one recently founded, of theatrical relics, a world-famous conservatory of music, a mili¬ tary college, a theological seminary, a veter¬ inary school. The principal structure erected in recent times is the Galleria Vittorio Emanuele, a kind of covered street connecting the Piazza del

Duomo with the Piazza of La Scala Theatre. It is 320 yards long, contains handsome shops and is adorned with 24 statues of celebrated Italians. Milan has a number of theatres ; La Scala is the second largest theatre in Europe, and accommodates 3,600 spectators. The principal benevolent endowments, are the Ospedale Maggiore (founded 1456), richly en¬ dowed, and occupying a vast range of buildings in the Gothic style, with accommodation for 4,000 patients, and several other hospitals for the cure of diseases. Since it formed part of United Italy no town has more rapidly, in¬ creased in commercial and industrial activity and in population than Milan. The spinning and throwing of silk employ a large number of hands. Other important articles of manu¬ facture are machinery, locomotives and rail¬ way cars, automobiles, boilers, electrical ap¬ paratus, tobacco, cotton, lace, carpets, hats, glass, earthenware, chemicals, white-lead, jew¬ elry, *etc.* Besides these, corn, rice, cheese and wines are the principal articles of trade. The municipality is one of the most progressive in Europe ; great street improvements have been carried out; there is an adequate street railway service giving communication with the neighboring communes; and, while there is still much overcrowding and congestion of population, the death rate has been greatly re-54

duced. Milan is the see of an archbishop, the seat of courts of primary resort, criminal and mercantile courts, and a Court of Appeal for all Lombardy, The United States is repre¬ sented by a consul.

The foundation of Milan is attributed to the Insubrian Gauls; but the first distinct notice of it occurs 221 b.c., when it was subdued by the Romans, under whom it acquired so much importance, that in the division of the empire attributed to Constantine the Great it ranks as the second city of Italy. In the middle of the 5th century it was sacked by the Huns under Attila, and again in the following century by the Goths. Greater horrors yet awaited it; and the Goths, who had been driven out by Belisarius, having regained possession by the aid of the Burgundians, gave it up to the flames and put almost all its inhabitants to the sword. Rebuilt, it again became very flourish¬ ing under the Lombards and Charlemagne. Arrogance grew with its prosperity, and Milan lorded it so haughtily over the neighboring towns and republics, that in 1162, when the Emperor Frederick I, whose supremacy it re¬ fused to acknowledge, had resolved to take

summary vengeance, the inhabitants of Pavia, Cremona, Lodi, Como and Novara eagerly hastened to the task and razed it to the ground. The cruelties practised produced a reaction, and in 1167 the famous Lombard League was formed at Pontita, and among other important results succeeded in bringing back the Milan¬ ese; and the city, again rebuilt, became even more populous and influential than before. It long continued, however, to be torn by internal factions, headed by the leading nobility, among whom the Visconti at last gained the ascend¬ ency, and ruled it from 1395 till 1447. They were succeeded by the Sforzas, _ whose rule ended in 1535. Milan passed next into the pos¬ session of the Spaniards. At the close of the War of Succession it was allotted to Austria (1714). Under Bonaparte it became the capital of the Cisalpine Republic, of the Italian Re¬ public, and of the Italian kingdom. In 1815 it was restored to Austria, and continued the capi¬ tal of the Austro-Italian kingdom until 1859, when by the Peace of Villafranca Lombardy was ceded to Piedmont. Pop. about (563,000.

Bibliography. — Ady, C. M., (A Historv of Milan under the Sforza) (New York 1907) ; Beltrami, L., (Reminiscenze di storia e d'arte nella citta di Milano) (Milan 1862-67) ; Noyes, Ella, (Story of Milan) (in the Mediaeval Town Series, 1 London 1908) ; Shaw, Albert, Mu¬ nicipal Government on the Continent of Europe' (New York 1906) ; Valeri, F. M., Milano' (Bergamo 1906).

MILAN, Mo., town and county-seat of Sullivan County, on the Quincy, Omaha and Kansas City and the Chicago, Burlington and Quincy railroads, about 100 miles east by north of Saint Joseph. It is in an agricultural and stock-raising region, and in the vicinity of bi¬ tuminous coal fields. The chief manufactures are flour and lumber. Milan is the head¬ quarters of a division of the Quincy, Omaha and Kansas Gity Railroad, and the shops of the road are located here. The trade is principally livestock, grain, lumber and flour. Pop. 2,395.

MILAN, Tenn., city in Gibson County, on the Illinois Central and the Louisville and Nash¬

ville railroads, about 95 miles northeast of Memphis. It is in an agricultural and lumber¬ ing region ; the principal products are cotton and fruit. The chief manufacturing establish¬ ments are flour-mills, fruit-canning works, cot¬ ton gins and barrel factory. It has a college and good schools. Pop. (1920) 2,057.

MILAN DECREE, issued by Napoleon I, at Milan, 18 Feb. 1801, cutting

off Great Britain from all connection with the Continent.

MILAN EDICT, issued by Constantine the Great at Milan, 313 a.d., granting toleration to Christianity and all other religions in the Roman Empire.

MILAN OBRENOVITCH I, o-breno- vich, king of Serbia: b. Jassy, 22 Aug. 1854; d. Vienna, 11 Feb. 1901. He was cousin to Michael Obrenovitch III, Prince of Serbia, by whom he was adopted on the death of his parents. He was educated in Paris at the Lycee Louis le-Grand and upon the assassina¬ tion of Michael in 1868 he succeeded him as Milan Obrenovitch IV, Prince of Serbia, under a regency headed by Ristitch. In 1872, at the age of 18, he took over the government, retain¬ ing, however, the services of Ristitch. He care¬ fully balanced political relations between his country and Austria and Russia, so strengthen¬ ing his position that after the Russo-Turkish War he was successful in having Serbia's inde¬ pendence declared and himself proclaimed as Milan Obrenovitch I, king of Serbia, in 1882. He then entered into a secret treaty with Austria, by whom his subsequent administra¬ tion of affairs was largely influenced. He im¬ proved transportation facilities and developed the country to a considerable extent, but with¬ out due reflection as to expense of the measures, so that heavy taxes and increased military serv* ice influenced the country against him. This state of affairs, coupled with his notorious private life and his offensive quarrels with his queen, Natalie, caused great public dissatisfac¬ tion and in 1889 he suddenly decided to abdicate in favor of his 13-year-old son, Alexander. He returned to Belgrade in 1894, was officially reconciled to the queen and undertook the re¬ organization of the army under the sovereignty of his son. He was appointed commander-in¬ chief in 1897, and is credited with greatly im¬ proving the military service in Serbia. Upon the marriage of his son, Alexander, to Draga Mashin, in 1900, Milan resigned his position as commander-in-chief of the army and was ban¬ ished. He went to live in Vienna and died there in the following year. See Serbia.

MILANAS Y FUENTES, Jose Jacinto,

ho-sa' ya-ken'to me-lan-as e fwan'tas, Cuban poet: b. Matanzas, 16 Aug. 1814; d. there, 14 Nov. 1863. He was self-taught, being a poor clerk and later a blacksmith's helper. But when he was 19 some of his verses were published and his excellent drama, (E1 Conde Alarcos,' which appeared in 1838, won him a comfortable position. Several other plavs followed, notably (Una Intriga paternal.' But his early hard¬ ships had undermined his reason; he traveled for relief in the

United States and in Europe in 1848 and 1849, and spent his last years in melancholia broken only occasionallv by intelli¬ gent literary effort. Consult the biographical sketch in the North American Review for 1849.

MILAN CATHEDRAL

MILAZZO — MILDEW

MILAZZO, me-lat'so, or MELAZZO,

Sicily, a fortified seaport city in the province of Messina, on a promontory 21 miles by rail west of Messina. It has a good harbor and carries on a trade in fruit, wine, cattle, fish and sulphur. It has a theatre, a technical school, a library containing over 10,000 volumes, a city hospital ; and the building now used as a jail was originally a 13th century castle. Milazzo is the ancient Mylae off which in 260 b.c. the Romans won a great sea-fight over the Cartha¬ ginians. Here also Garibaldi, 20 July 1860, with 2,500 men, defeated 7,000 Neapolitans and com¬ pelled the garrison to evacuate the fortress. Pop. of commune 16,569.

MILBANK, Joseph, American philanthro¬ pist: b. New York, 1848; d. 7 Sept. 1914. He w?as the son of Jeremiah Milbank, the million¬ aire organizer and builder of the Chicago, Mil¬ waukee and Saint Paul Railroad, and at an early age became a director of the road. He inherited, with his sister, Mrs. Elizabeth Milbank Anderson, a fortune of great extent, which he further augmented by his own efforts in banking and railroad enterprises. . With his cister he gave the Milbank Memorial Chapel to Teachers' College, and Milbank Memorial Hall to Barnard College, Columbia University ; the Jersey City People's Palace; founded a So¬ cial Welfare Bureau at a cost of $650,000; and contributed $500,000 to the Children's Aid So¬ ciety. Their benefactions totaled $5,000,000.

MILBURN, William Henry, American clergyman ; b. Philadelphia, 26 Sept. 1823 , d. Santa Barbara, Cal., 10 April 1903. At five he suffered an accident which caused partial and finallv complete loss of sight. He was edu¬ cated at Illinois College (Jacksonville, Ill.); in 1843 became a Methodist itinerant preacher; was largely active in the South ; and for a time had charges at Montgomery and Mobile, Ala. In 1845 he was elected chaplain of the House of Representatives, and he served as such in 1853, 1885 and 1887. In 1893 he was made chaplain of the Senate. He lectured with suc¬ cess throughout the United States and in 1856 in Great Britain. He was generally known as the «blind preacher.® Among his writings are (Rifle Axe and Saddle-Bags) (1857); Ten Years' of Preacher Life> 0.859) ; and Pioneers and People of the Mississippi Yalley> (1860), all based on his Western experiences.

MILCOM, national god of Ammon (1 Kings xi, 5, 33 ; 2 Kings xxiii, 13). Other re - erences occur in Jeremiah xhx, 1, 3, and m l Kings xi, 7, where the spelling varies slightly but the identity is clear. The name appears to be derived from the West Semitic word melck, “king® ; although melek ‘ am , “king of the peo¬ ple,® is also considered. The name of the deity has not been found in inscriptions and nothing is known of the religion. There is no base for the supposition that human sacrifice was prac¬ tised by the Ammonites, as it was by the Moab¬ ites to their god Molech, which deity is often confused with Milcom. The Ammonites wor¬ shiped on the Mount of Olives while the Moab¬ ites performed their religious rites in the val¬ ley of Hinnom. The Ammonites and their re¬ ligion disappeared in the migrations and politi¬ cal upheavals which occurred’ m the districtˆ to the east of the Jordan shortly prior to the Christian era.

MILDEW, specifically, any fungus belong¬ ing to the group Erysiphacece, the powdery or true mildews, and Peronosporacece, the downy or false mildews ; loosely, many plant diseases, especially the rusts and smuts of cereals, and some not of fungous origin; vaguely, molds of any kind upon preserved fruit, clothing, walls or other materials, the origin of which is more or less organic. The powdery mildews develop mostly upon the outside of the host plants, which they enter only by means of their suck¬ ing organs of attachment (haustoria). In warm weather they develop innumerable spores upon erect branches and later produce thick-walled resting spores which germinate in the spring. Upon the host plants they usually appear as a sort of bloom, but later they often cause dis¬ tortion of the leaves and not infrequently the death’ of the host. Being mainly upon the sur¬ face they may be combated with any fungicide (q.v.), and often with sulphur, either in the form of powder or vapor (not burned) evap¬ orated without flame. This method is widely practised in greenhouses. Some of the best known are rose mildew (Spharotheca pan-nosa), gooseberry mildew (S . mors-uva ?), hop mildew (S. castagnei), cherry, pear and apple mildew (Podosphcera oxycanthce), wheat mil¬ dew (Erysiphce graminis) and gˆrape mildew (Unicinula spiralis).

The downy mildews all live within the tis¬ sues of the host plant, appearing outside the surface only when producing summer spores (conidia) which usually give a downy appear¬ ance to the infected spots. The resting spores are produced internally and make . their escape in the following season when the tissues of the host (leaf or other part infected) have de¬ cayed. They cannot be combated like

the pre¬ ceding, because of their habit of feeding in¬ ternally. Fungicides (q.v.) may be applied. to prevent attacks, however, and this, together with the destruction of leaves in autumn and general cleanness of the premises, are believed to be the only safeguards. Among the best known and most destructive are Potato rot, blight, or mildew (Phytophthora infcstans), lettuce mil¬ dew (Premia lactucce), damping-off fungus (Pythium debaryanum), downy mildew of the grape (Plasmopara victicola), radish mildew, also found on other members of the Crucifer# (Cystopus candidus) , melon and cucumber mil¬ dew (Plasmopara cubcnsis) and onion mildew (Peronospora schleideniana) .

The rusts and smuts which are sometimes called mildews are discussed elsewhere The mildews, so-called, which appear upon leather, wall-paper, cloth, etc., belong to various other groups. Since they are generally seen only where dampness prevails, especially in cellars and closed rooms or houses, they may be pre¬ vented more or less effectually by the adequate ventilation of such places. And having gained a foothold in these places they may be destroyed bv liberal applications of whitewash, in which copper sulphate or sulphur have been mixed, or where this cannot be applied, bv burning sul¬ phur in the closed quarters. This last remedy may also be used where cloth is sitt3.clced. Awn ings sails, etc., should be thoroughly dry before being stored or folded for any . considerable time. They may also be soaked in a solution of copper sulphate and then dried. Until this is washed out by rain it will act both as a pre-MILE — MILES

ventive of attack and will often save fabrics if not too far gone.

MILE (Latin mille, a thousand, a Roman mile being 1,000 paces), a measure of length or distance. The English statute mile, fixed in the reign of Queen Elizabeth, is 1,760 yards. The geographical mile, which is commonly used by the navigators of all nations, is one-sixtieth part of a degree at the equator. In many countries the kilometer now holds the same position as the English statute mile in Britain. The following are some of the principal stand¬ ards of miles or leagues which are or have been in use in the principal countries of Eu¬ rope :

Kilometer .

Ancient Roman mile .

Modern Roman mile .

English statute mile .

Tuscan mile…

Ancient Scottish mile .

Geographical mile .

Italian mile .

Irish mile .

French posting league … . Spanish league (judicial) . .

French league .

Portuguese league .

German short mile .

Flanders league .

Spanish league (common) . German geographical mile German (new imperial) …

Old Prussian mile .

Danish mile .

Swiss mile .

German long mile .

Swedish mile .

1 , 093 . 6 yards.

1,614 1,628

1.760 1 , 808 1,984 2,028.4 2,028.4 2 , 240 4,263 4,635

4,860 “

6.760 6,859 6,864 7,416

8,113.6 “

8 , 202 8,237

8,244 “

9,153 10,126 11,700

The English statute mile is generally used in the United States.

MILEAGE, a term used in the United States, for fees paid to certain officials, such as members of Congress, of State legislatures, special commissioners and others, for their traveling expenses, at so much per mile. The system has led to gross abuses, each senator and representative estimating for himself the distance he had traveled. There is now a fixed table of mileage. The term mileage was for¬ merly applied in the United States to railroad transportation, sold in tickets good for 1,000 miles of travel. These tickets were issued in book form, convenient for the pocket, and known to travelers as mileage books. In 1903 a system of interchangeable mileage tickets was issued, good for transportation on any one of eight different railroad lines in the Eastern States. Early in 1919 this mileage system was changed, all partly used books recalled and in¬ stead there was issued what is known as script, the coupons representing different amounts of money rather than miles. This system was an advantage to the traveler as the script could be used on any of the roads then under control of the Federal government.

MILELLI, Domenico, do-ma’ne-ko- me-lel’le (((Conte di Lara®), Italian poet: b. Ca-tanzaro, Italy, 1841 ; d. 1905. He was educated for the priesthood, but finding literature more to his liking turned his

attention to writing, which is in subject of a paganish character. He was one of the leaders of the class called Veristi. Among his works are (In giovinezza) (1873); (Odi pagane> (1879); (I1 rapimento di Elena) (1882) ; (Verde antico>

(1885).

MILES, George Henry, American dram¬ atist: b. Baltimore, Md., 31 July 1824; d. Thornbrook, Md., 23 July 1871. He was graduated from Mount Saint Mary's Col¬ lege, Emmitsburg, Md., and practised law in Baltimore for several years, after which he devoted himself to literature. In 1850 his (Mohammed> was awarded the $1,000 offered by Edwin Forrest for the best drama by an American author. In 1859 he was appointed professor of English literature at Mount Saint Mary's College, where he remained until his death. His works comprise (Senor Valiente> (1859) ; (Christine, a Troubadour's Song)

(1866) ; (Abu Hassan the Wag> (1868), *etc.*

MILES, Nelson Appleton, American army officer : b. Westminster, Mass., 8 Aug. 1839. He was a clerk in a Boston mercantile house at the outbreak of the Civil War in 1861, and left his business to raise a company of volunteers, and enter the army as lieutenant in the 22d Massachusetts regiment. In 1862 he was pro¬ moted to the rank of colonel, commanding the 61st New York regiment. He was engaged in the battles of the Peninsula, before Richmond and at Antietam, and in every battle of the Army of the Potomac, with one exception, until the surrender of Lee at Appomattox Court House. He was distinguished in the battles of Chancellorsville, Wilderness, Spottsylvania Court House, Reams Station, Richmond cam¬ paign of 1864 and many other important battles of the war; and, at one time, at the age of 25, was in command of the Second Army corps, numbering 25,000 men. He was wounded three times, most severely at the battle of Chancel¬ lorsville. In May 1864 he was promoted briga¬ dier-general and in 1865 major-general of vol¬ unteers.

At the close of the war he entered the regu¬ lar army and was commissioned colonel of the 40th United States Infantry, and attained the rank of brigadier-general in 1880 and of major-general in 1890. He successfully conducted several important campaigns against the In¬ dians and did much to open up for civilization large portions of the West. In 1874 and 1875 he defeated the Cheyennes, Kiowas and Comanches in the Staked Plains country; he also subjugated the

hostile Sioux and other Indians in Montana, driving Sitting Bull across the frontier and breaking up the bands that were led by him and other chiefs. In Decem¬ ber 1877, after a forced march over a distance of more than 160 miles, he captured Chief Joseph and his tribe of Nez Perces after a hard-fought battle of four days in northern Montana ; in 1878 he intercepted and captured Elk Horn and his band on the edge of the Yellowstone Park. In 1886 he subjugated and forced to surrender Geronimo, Natchez and the band of Apaches that had made a large portion of the Southwest uninhabitable, thus restoring peace and prosperity to Arizona and New Mex¬ ico. For his services up to this time he re¬ ceived the thanks of the legislatures of Kansas, Montana, New Mexico and Arizona. Later he settled the Indian troubles in the Dakotas, sav¬ ing the country from a serious war that had threatened it for years. In 1894 he was in command of the United States troops sent to Chicago at the time of the railroad strike; and in October 1895 succeeded to the command of

the United States army. He represented the army at the scene of the Turco-Grecian War and at Queen Victoria's Diamond Jubilee in 1897. In 1898 he conducted the brief cam¬ paign in Porto Rico with ability, taking pos¬ session of the island with trifling loss ; and in June 1900 was promoted to the rank of lieuten¬ ant-general. In December 1901 he was officially reprimanded for publicly expressing his ap¬ proval of Admiral Dewey's report on the Schley case. In 1902 he made a tour of inspection to the Philippines and on his return filed a report which called forth considerable controversy by its denunciation of some of the abuses he had found in the conduct of military affairs there. In August 1903 he was retired from active service. He wrote (Personal Recollections) (1896) ; (Military Europe } (1898), besides

magazine articles and official military reports.

MILES CITY, Mont., city and county-seat of Custer County, 150 miles northeast of Bill¬ ings, on the south bank of the Yellowstone River, and on the Northern Pacific and the Chicago, Milwaukee and Saint Paul railroads. It is situated in an important grazing country and is the

centre of the Montana cattle district. It has an extensive trade in cattle, sheep and horses. There are modern waterworks and lighting facilities, high school, State industrial school, an Ursuline convent, public library and a hospital. Pop. 7,937.

MILES GLORIOSUS (Lat, «braggart soldier®). (1) Comedy by Plautus. (2) Name slyly applied by Ferdinand of Bulgaria at a banquet when toasting Kaiser Wilhelm II of Germany who mistook it for a compliment.

MILES O'REILLY. See Halpine, Charles Graham.

MILESIAN TALES, a form of anecdotal satire current in Miletus and Asia Minor about a century b.c. The tales are of an erotic char¬ acter, but are important in so far as they form a link in the chain of the development of satirical romance, exemplified in Petronius' 'Supper of Trimalchio) and Apuleius' (Story of Cupid and Psyche. } Six volumes of the tales were collected by Aristides of Miletus and were later translated into Latin by Cor¬ nelius Sisenna (119-67 B.C.), but of these only fragments remain. They have been compared to the French fabliaux and the tales of Boccac¬ cio. Consult Muller, <Fragmenta Historicum Graecorum) (IV) ; Bucheler's small edition of Petronius (Berlin 1882) ; Peck, H. T., transla¬ tion of Petronius' (Dinner [Supper] of Trimalchio> (New York 1898).

MILESIANS, mi-le'shi-anz, or ml-le'- zhanz, early colonists of Ireland, a portion of whose inhabitants, according to Irish tradition or legend, are descended from Milesius, a fabulous king of Spain, whose two sons con¬ quered the island several thousand years before Christ, establishing a new nobility. _ This was the last of the traditional prehistoric coloniza¬ tions of Ireland.

MILETUS, ml-le'tus, Asia Minor, an an¬ cient city opposite the mouth of the Meander on the Latmic Gulf, which, inhabited _ by Carians, was in existence prior to the coloniza¬ tion of the coast by the Ionians. The Ionians are said to have taken forcible possession of

the town, massacred the men and taken the women as their wives. The extent of the harbors of Miletus, one of which could contain a large fleet, soon raised the town in the hands of the Ionians to a place of importance, and it became one of the first cities and republics of Asia Minor. Its commerce covered the Medi¬ terranean and extended to the Atlantic. It had upward of 75 colonies, most of which were on

the coasts of the Euxine. On the rise of the Lydian kingdom repeated attempts were made to conquer it. It finally recognized the sov-eignty of Croesus, and paid tribute. A similar arrangement was made with Cyrus, which saved it the calamities of a contest with the Persians. Civil dissension, however, had long been rife. The Persians were compelled to intervene, and committed the government to the most peace¬ able landowners. The city revolted against the Persians 500 b.c. It was taken by storm 494 b.c., was plundered and the inhabitants massa¬ cred or transported. It recovered its independ¬ ence in 479 b.c., after the battle of Mycale. It yielded for a time to the supremacy of Athens, but ultimately threw off the yoke. It stood an assault by Alexander the Great 334 b.c., part of the city was destroyed, but the conqueror did not interfere with its government. From the time of its subjugation by the Persians it had never recovered its early importance; but it still continued to enjoy some commercial prosperity under the Romans until the time of Saint Paul, who visited it twice, as recorded in Acts xx, 17 and 2 Tim. iv, 20. It was finally taken and destroyed by the Turks. From the change made on the coast by the deposits of the river the site of the city was with difficulty excavated by the Berlin Museum in 1899, and the foundations of various parts of the city exposed.

MILFOIL, or MILLEFOIL. See Yar¬

row.

MILFORD, mil'ford, Conn., town in New Haven County, at the mouth of Wepowaug River, on Long Island Sound and on the New York, New Haven and Hartford Railroad, about 10 miles southwest of New Haven. The place was settled by people from Wethersfield and New Haven in 1639. The Indian village was called Wepowage. Milford became a part of the <(Colony of New Haven® in 1644, and in 1664 the town became a part of Connecticut. The chief industries are oyster cultivation, farming, seed-growing, the manufacturing of electrical supplies, telephone apparatus, shoes, straw hats and silverware. It has a beautiful, well-kept park, several fine churches and school buildings, and the Taylor Library, which has about 10,000 volumes. In 1889, on the 250th anniversary of the settlement of Milford, a memorial bridge was erected. Pop. (1920) 10,193.

MILFORD, Del., town in Kent and Sus¬ sex counties, on Mispillion River, and on the Philadelphia, Baltimore and Washington Rail¬ road, about 62 miles south of Wilmington. A settlement was made here in 1678-79 and in 1787 the town was incorporated. It is the trade centre for a fertile agricultural region in which fruit growing receives special

atten¬ tion. The industries of the town are con¬ nected with the farm and orchard products. Pop. (1920) 2,753.

MILFORD, Mass., town in Worcester County, on the Charles River, and on the New York, New Haven and Hartford and the Bos¬ ton and Albany railroads, about 17 miles south¬ east of Worcester. It was settled in 1669 and was then a part of the east precinct of Men-don. On 11 April 1780 it was incorporated as a separate town. It is in an agricultural re¬ gion, but the town has considerable manufac¬ turing interests. In the vicinity are large granite quarries. The chief manufactures are foundry and machine-shop products, silk, boots and shoes, thread, boot and shoe trees, straw goods and bone cutters. The granite quarries contribute to the industrial wealth of the town. The town has a fine high school, good public and parish schools and a public library. Town meetings, held usually twice a year, administer the government. Pop. 13,471.

MILFORD, N. H., town in Hillsboro County, on Souhegan River, and on the Boston and Maine Railroad, about 27 miles south by west from Concord and 15 miles southwest of Manchester, The chief industries are con¬ nected with manufacturing, quarrying granite, lumbering and agriculture. The principal man¬ ufactures are canvass, leather, lumber, piano keys, harness, furniture, quarry machinery, post-office equipment, soap, paper boxes, ice¬ cream freezers, toys and novelties. There are a national and a savings bank, also a building and loan association. The government of the town is in the hands of a board of selectmen. The waterworks are municipally owned. Pop.

4,000.

MILFORD, Pa., town and county-seat of Pike County, on the Delaware River, and seven miles from the Erie Railroad, about 45 miles east of Scranton and seven miles southwest of Port Jervis. It is situated in a portion of the Delaware Valley noted for its beautiful and picturesque

scenery. The Sawkill Falls and the Cliffs are in the vicinity, and on the north¬ west and south of the town are mountains. Three miles south are the falls of the Ray¬ monds Kill and 21 miles south are the cataracts of Big and Little Bushkill creeks. Milford is one of the pre-Revolutionary places, but it was not made a separate township until 1832. The town of Milford was laid out in 1796. It is a favorite resort for hunting and fishing parties. Many of the legends and stories connected with the place may be found in (Pike County Folks,) by E. H. Mott. Pop. about 900. In summer the population is over 6,000.

MILFORD, Wales, a seaport town of Pem¬ brokeshire on the celebrated Milford Haven, one of the safest, deepest and most capacious harbors in Britain, forming a deep indentation in the southwest coast of the county. The haven stretches about 10 miles from east to west, with a breadth of from one to two miles, and branches off into numerous bays, creeks and reaches. The largest vessels can enter and put to sea in any wind or at any tide more expeditiously than from almost any other large harbor in Great Britain, and it has long been proposed to make Milford the eastern seat of the transatlantic trade, as bringing London nearer by several hours. The haven is de¬ fended by fortifications. Henry II embarked at Milford Haven in 1172 on his way to the conquest of Ireland, and here Richmond landed

(1485) in his successful effort to dethrone Richard III. The town of Milford on the north shore, eight miles northwest of Pembroke and six miles from the mouth of the haven, has extensive modern docks and a busy agricul¬ tural and domestic trade with Irish ports. It is the seat of a United States consular agent. Pop. of urban district, 6,399.

MILFORD, Engagements at. Milford, Va., on the east bank of the south branch of the Shenandoah, was the scene of several skirmishes and three cavalry engagements dur¬ ing the Civil War. On 24 June 1862 detach¬ ments of the First Maine and First Michigan cavalry attacked about 300 mounted Confed¬ erate infantry at the place, without decisive result, and withdrew. When Sheridan, after the battle of the Opequon (q.v.), followed Early up the valley, he ordered General Torbert, commanding the cavalry, up the Luray Valley, to get past Early’s right and cut off his retreat. Wilson’s division advanced and 21 Sept. 1864 attacked Wickham’s cavalry di¬ vision of two brigades and drove it from Front Royal and up the valley to Milford, where Wickham took up a strong defensive position on the south side of Milford Creek, one flank on the Shenandoah and the other on a knob

of the Blue Ridge. When Torbert came up on the 22d he concluded that the position -was too strong to be attacked, and not knowing that Sheridan had attacked Fisher's Hill (q.v.) fell back to near McCoy's Ferry, again advancing, and on the 23d occupying Milford, which had been abandoned by Wickham. Sheridan was greatly disappointed by Torbert's failure to carry the place on the 22d. After the battle of Cedar Creek (q.v.), 19 Oct. 1864, Milford was occupied by Lomax's Confederate cavalry di¬ vision, and its defenses strengthened. On 24 October Powell's cavalry division, two brigades of about 1,100 men, with six guns, moved up the Luray Valley to reconnoitre. Powell skirmished with Lomax's outposts on the 25th, and on the morning of the 26th attacked Lomax in position at Milford, using his artil¬ lery freely, and continuing the contest until 2 p.m., when, finding the defense so stubborn and the position too strong to be carried, he with¬ drew.

MILFORD HAVEN, Louis Alexander, Marquis of. See Battenberg, Louis Alexan¬ der.

MILFORT, Le Clerc, le klark mel-for, or mil'fort, French adventurer: b. Mezieres, France, about 1750; d. there, 1817. He came to America, traveled through the colonies and about 1776 visited the Creek Indian nation. Here he attached himself to the Creek chief¬ tain, Alexander McGillivray, whose sister he married. He was made a war chief by the In¬ dians, was called Tastanegy, or <(great war¬ rior, }) and was in active service against the Whigs of Georgia during the Revolution. He remained with the Creeks for 20 years. In 1796 he returned to France and was made a general of brigade by Bonaparte. He wrote, or per¬ haps merely furnished material for, the inter¬ esting (Memoires, en Coup-d'ceil Rapide, sur mes Voyages dans la Louisane, et mon Sejour dans la Nation Creeke} (1802).

MILHAUD, Gaston, French author and

philosopher: b. Nimes, 1858. He was pro-

fessor of philosophy at the University of Mont¬ pellier in 1894-1910, and has since been pro¬ fessor of the history of philosophy at the Sorbonne, Paris. Author of ‘Legons sur les origines de la science grecque) (1893) ; (Nnm ‘Cartesii methodus tantnm valet in suo opere illustrando quantum senseriD (1894) ; ‘Les philosophes geometres de la Grece, Platon et ses predecesseurs) (1900) ; ‘Le hasard chez Aristole et chez Cournot) (1902); ‘Cournot et le pragmatisme scientifiq.ue contemporaitP (1911), *etc.*

MILIARIA (Miliary Fever, Millet-seed Rash, Prickly Heat), a very common fine papular or papulovesicular eruption. It is caused by too profuse sweating attended by un¬ due congestion of the skin. Hot weather, ex¬ cessive clothing, vigorous exercise, alcoholic dissipation commonly evoke the disease, espe¬ cially in those who are debilitated or who have a delicate skin. It may appear and disappear rapidly without any apparent cause. Its ap¬ pearance is attended by pricking, burning or itching sensations. It is generally limited to a portion of the trunk, but may appear upon the face, neck and extremities. Fresh crops may follow one another. In subsiding the vesicles become opaque and yellowish white.

MILICZ, me’lich, or MILITZ, Johann,

Moravian reformer : b. Kremsir, Moravia, about 1325; d. Avignon, France, 29 June 1374. He entered the Roman Catholic priesthood in 1350 and in 1360 became canon at the cathedral of Saint Vitus in Prague and was appointed sec¬ retary to Charles IV, who took him to Ger¬ many. Becoming convinced of the hollowness of court and Church life, in 1363 he resigned and began to preach to the lower classes in Prague in their own tongue, instead of the Latin, and gained over them a wide influence. Convinced that Antichrist had arrived and that the day for reform was at hand, he went to Rome that he might consult the Pone and was arrested by the Inquisition, but was released and was well received by Urban V. Upon his return to Prague he resumed his preaching, but in 1372 he was accused of heresy by his brother priests and summoned to Avignon for trial. He proved his innocence, but died before the verdict was rendered. Consult Palacky, ‘Die Vorlaufer des Hussitenthums) (1869).

MILITARISM, term applied to the policy of giving to military training and exploits dis¬ proportionate prominence in a nation’s affairs and the resulting subordination of civil author¬ ity; or the maintenance of a government by military force. The term is used chiefly in con¬ nection with the vast armaments maintained by European countries ; and has come in particu¬ lar to mean the preparation, as in the case

of Germany prior to the launching of the Euro¬ pean War, of a vast force maintained not for purposes of national defense but for those of imposing at pleasure the will of the powerful nation upon those weaker and less well armed. It carries in its train the extremist theories of war as a necessity to the proper development of a nation's material and spiritual welfare.

MILITARY. See Army; United States, Army of the.

MILITARY ACADEMY, Royal, an insti¬ tution at Woolwich, England, where candidates

for the Royal Engineers and the Royal Artil¬ lery of the British army receive their finishing education. See Military Education.

MILITARY ACADEMY, United States.

See United States Military Academy.

MILITARY AERONAUTICS. Ever since the early days of aeronautics, with the develop¬ ment of the old spherical balloon, the use of aircraft in time of war has been a fruitful theme for discussion. Lighter-than-air craft has fig¬ ured prominently in warfare. The French used a military balloon at the battle of Fleurus on 26 June 1794 and from that date for over a century, until after the South African War, the aerial machines employed for purposes of observation were either captive in the form of balloons attached to winches, or in the guise of man-lifting kites or they perforce drifted at the will of the winds that blew. In the Franco-Prussian War, during the siege of Paris alone, as many as 66 balloons left the stricken city, carrying 60 pilots, 102 passengers, 409 carrier pigeons, 9 tons of letters and telegrams and 6 dogs. Gaston Tissandier went over the Ger¬ man lines and dropped 10,000 copies of a procla¬ mation addressed to the soldiers, asking for peace, yet declaring that France would fight to the bitter end. In the American Civil War an aeronaut named La Fontaine went up in a bal¬ loon over an enemy camp, made his observation, rose higher into the air and succeeded in getting into a cross-current, which carried him back to his place of departure. The first cross-chan¬ nel flight was made by balloon in 1785, by Blanchard, who had with him an American doctor named Jefferies, together with a large supply of provisions, ballast and oars. With the development of dirigible balloons in the clos¬ ing years of the 19th century and the advent of the areoplane a few years later the spheri¬

cal type of balloon fell into disfavor as an auxiliary in war, although it was used with some success by the French in the colonial cam¬ paigns and also on the western front during the World War of 1914-18. In the article Aeronautics (q.v.) are described the de¬ velopment, construction, advantages and limita¬ tions of the several types of aircraft — the spherical balloon, kite balloon, dirigible, non-rigid, semi and rigid types and the aeroplane. In this article it is only intended to point out the development of special military types and their adaptability to the several tasks for which they were designed.

Uses. — briefly, there are five main uses for aircraft in war. The first and widest is for reconnaissance. The second is for cooperation with artillery to locate the enemy's batteries and determine accuracy of fire. The third is as instruments of offense in encounters in mid¬ air, either by classes of bombs, quick-firing guns or the use of other arms to destroy the pilots or machines of the enemy and therefore to prevent his achieving any of his aerial pur¬ poses as well as to cause him loss of personnel and equipment. The fourth is bombardment either of moving military objectives, like trans¬ ports and so forth, or of stationary objects, such as airdromes, camps and the like; or, contrary to international law as defined by The Hague Convention, to drop missiles on unfortified areas and on buildings such as hospitals, cathedrals, churches and the like. The fifth use is for

convoying vessels such as troopships, merchant¬ men and even warships, by reason of the much wider range of vision possible from an altitude, whereby the approach of any enemy craft on the surface of the water can be detected at a much greater distance and whereby in normal atmospheric conditions and on certain surfaces it is possible to detect the approach of subma¬ rines and the presence of mines. The types of aircraft adapted to these five main uses are:

THE MARTEN HALE

AEROPLANE BOMB (longitudinal section).

The lower part con¬ tains 340 steel bullets and an explosive charge of 4.41 pounds of trini¬ trotoluol. The upper or neck portion carries two small wings (c), a handle and a safety-pin (J). In throwing the bomb the safety-pin J is withdrawn and the handle released. The air-pressure during the fall causes the wings (c) to turn and in so doing they unscrew the stem d until it is stopped by the shoulder f. The two balls g are then free, and the detonator when the bomb lands, compresses the spring and strikes the needle i, which explodes the charge. Adjustment is so fine that the charge is exploded merely by dropping the bomb on a water surface.

The Captive Balloon. — Notwithstanding the supremacy of the aeroplane in most fields of aerial warfare, the captive balloon in military operations still has it advocates. The great advantage of the captive balloon is that the observer is constantly in direct tele¬ phonic communication with the artillery com¬ manders in his vicinity, constant and thorough inspection of the enemy's positions with the aid of powerful glasses reveals every movement of bodies of troops or anything new that has developed during the previous night and the targets thus presented can be immediately taken under fire. Caotive balloons are placed from

two to four miles in the rear of the front line and are separated by intervals depending upon the artillery activity in various sectors. The altitude at which they are held depends upon atmospheric conditions and upon the activity and distance of the enemy's artillery. Cap¬ tive balloons are usually sent up at daylight and remain in the air until dark, being drawn down whenever necessary to change observers. Occasionally they are left up at night and it is frequently found that enemy guns that are not visible by daylight may be located at night by their flashes. It is customary to have two officers in the car and they are connected with the ground by telephone. The great disad¬ vantage of the captive balloon is the compara¬ tive ease with which it may be destroyed by a hostile aeroplane. The late war furnished instance after instance in which the observers in captive balloons were obliged to jump with a parachute on the approach of enemy aero¬ planes, so certain had become the destruction of such balloons upon incendiary bullets being hurled into them from an aeroplane. Man¬ carrying kites have advantages and disadvan¬ tages similar to the captive balloon.

Free Balloons. — This type is now little used save as a means of communication from a be¬ leaguered city or fortress. There being no means of steering such craft they are as likely to be wafted toward the enemy as toward their friends, as in the case of those liberated during the siege of Paris in 1870, many of which fell into the hands of the Prussians.

Military Dirigibles. — The military dirigible is used extensively for night scouting, bombing, and to some extent for transportation of mili¬ tary personnel. Hundreds of dirigible balloons, ranging in size from the small “Blimp,® about 180 feet long, to the huge Zeppelins, 700 feet long, were used in the late European War. The “Blimps® were used mostly for coast patrol and for convoying ships ; the large dirigibles were used primarily for bombing. Three types of dirigibles are used: (1) the rigid; (2) the semi-rigid, and (3) the non-rigid. The rigid type of dirigible is one in which the shape of the gas compartments is maintained by means of rigid framework. The semi-rigid dirigible has a rigid longitudinal frame usually below the gas bag; ‘this frame serves to distribute evenly the ascensional strains against the supported weights of engines, crew, etc., to prevent buck¬ ling of the gas bag which in most dirigibles of this class depends upon internal gas pressure to maintain the shape of the envelope. The non-rigid dirigibles depend entirely on gas pressure within the envelope to maintain shape, the nacelle, or body, being suspended by a net of longitudinal canvas bands sewed to the enve¬ lope. The chief advantage of the non-rigid type is that it can be transported deflated; its defect that a rent in the gas bag puts it out of commission. In France dirigibles are classed according to volume, which runs from 2,000 cubic metres for the Vedette class to over 10,000 cubic metres for the cruiser or dread¬ nought type. The latter is especially favored because of its greater range, speed and lifting power. These ships are equipped with rapid fire guns to repel attacks by hostile aircraft, with wireless equipment in order to communi¬ cate with its base. It is however as a bomb-MILITARY AERONAUTICS

Clement — Bayard (French).

Br6guet (French).

Aviatik (German).

Deperdussin (French').

Albatross (German).

Fokker (German).

ing machine that these heavy machines find their best field. For reconnaissance purposes the aeroplane is superior. The bombing raids on London throughout the war show the possi¬ bilities of attack of the large dirigible type.. With the development of anti-aircraft guns, dirigibles were obliged to keep at a greater height when dropping bombs and thus their accuracy of aim was greatly impaired. The verdict of most experts having in view the per¬ formances of dirigibles during the late war is that they have been a disappointment. They cannot be safely employed in daylight hours because of their vulnerabilitv to hostile aero¬ planes; their great cost as compared with aero¬ planes— about 50 to 1— is disproportionate when it is remembered that the aeroplanes can, with a greater margin of safety, perform simi¬ lar functions. The problem for sheltering diri¬ gibles is also a serious one.

Aeroplanes.— The Wright, Farman and Bleriot machines (see Aeronautics) may be considered as the parent types from which has

been evolved the large variety which at the present time are at the disposal of the military aviator. Among the various types which have sprung from the parent forms we search in vain for any underlying new principles. There is, however, in the various types plenty of variety of constructional detail. Perhaps the two most important features of modern military aero¬ plane work are (1) the gradual

substitution of steel in place of wood, and the general strength¬ ening of aeroplane construction; (2) the ar¬ moring of vital parts of aeroplanes for the. ex¬ igencies of warfare. Regarding the various types of machines now available, it must suffice here to especially mention the features of spe¬ cial interest for the purpose of warlike oper¬ ations. As the military operations in Europe developed it became apparent that the aeroplane was suitable for very many military purposes. It is from the air that artillery fire is regulated, after the airmen have reconnoitred and photo¬ graphed the enemy's position, taken the plan of their trenches and discovered the importance

and emplacements of their batteries. It is from the air that the arrival of reinforcements by rail or motor is signaled. By means of aerial bombardments attempts are made to cut, or at least disorganize, the enemy's communications. These attempts are made even on the base rail¬

way stations, and, further still, on the facto¬ ries and powder and ammunition dumps. Dur¬ ing the battle the aeroplane flies over the troops and regulates the lengthening of the fire as the assaulting force advances. Four years of war resulted in the subdividing of types and their relegation to various specific duties. Scouting is the first and widest use of the aeroplane in war. For this work fast monoplanes and bi¬ planes have been developed into the strategical reconnaissance type, with a cruising radius of 500 miles, carrying pilot and observer with sketching outfit, aerial camera, wireless set and navigating instruments. The tactical-reconnais¬ sance aeroplane has similar personnel, only the observer is trained in military tactics and trans¬ mits technical reports of enemy movements. The fire-control aeroplane is designed to give a particularly wide range of visidn to the ob¬ server, who transmits the results of his observa¬ tions by wireless. There are two classes of long-range bombers, the machine of excessive speed with pilot and bomber, and the multiple-engined machine, with

heavy bomb load, great wing spread, pilot and two bomber-mechanics. The pursuit machine takes many forms — mono¬ plane, biplane, triplane — one-place and two-place, highly powered and with minimum aero¬ foil to permit of the maximum of speed and manoeuvrability. The one-place machines are equipped usually with automatic machine guns, firing above or through the propeller zone by means of a synchronizing device. The two-place machines are equipped with from two to five machine guns, several automatically fired by mechanisms thrown into mesh by the oper¬ ator and others manually by the operator. In the course of the European War aerial strategy developed from the single machine reconnais¬ sance of 1914 to the flying squadron formation, scouting, fighting and bombing groups, under wireless control from the ground, which were operating in 1918. See Aeronautics; Aero¬ plane; Aeroplane Engines; Signal Corps; Strategy; Tactics; War, European.

Bibliography. — Abbott, Willis John, Air¬

craft and Submarines; the Story of the Invention, Development, and Present-day Uses of War"s Newest Weapons* (New York 1918) ; Ader, Clement, (Avionnerie Militaire) (Paris 1918) ; Berry, W. H., Air¬ craft in War and Commerce) (New York 1918) ; Loening, Grover C., (Military Aeroplanes) (Boston 1918) ; Woodhouse, Henry,

(Textbook of Military Aeronautics) (New York 1918) ; Collins, Francis A., (The Air Man: His Conquests in Peace and War* (ib. 1917) ; Fales, Elisha N., 'Learning to Fly in the United States Army: A Manual of Avia¬ tion Practice) (ib. 1917) ; Gill, Napier J., (The Flyer's Guide: An Elementary Handbook for Aviators* (London 1917) ; Muller, Hollis R., 'Manual of Military Aviation' (Menasha, Wis., 1917) ; Munday, Albert H., 'The Eyes of the Army and Navy* (New York 1917) ; Rolt-Wheeler, Francis W., 'The Wonder of War in the Air* (Boston 1917) ; Widmer, Emil Joseph,

(Military Observation Balloons (Captive and Free) : A Complete Treatise on their Manufac¬ ture, Equipment, Inspection and Handling, with Special Instructions for the Training of a Field Balloon Company) (New York 1917) ; Wins¬ low, Carl Dana, 'With the French Flying Corps* (ib. 1917) ; Woodhouse, Henry, text¬ book of Naval Aeronautics> (ib. 1917) ; Ader, Clement, (L' Aviation militaire) (10th ed. rev. et corr., Paris 1916) ; Bek, Roustam, Aerial Rus-sia) (New York 1916); Crouvezier, Gustave, 'L'aviation pendant la guerre) (Paris 1916) ; Hearne, R. P., 'Zeppelins and Super-Zeppelins) (New York

1916) ; Lafon, Charles, ‘Les armees aeriennes modernes* (Paris 1916) ; Lanches-ter, Frederick W., Aircraft in Warfare* (Lon¬ don 1916) ; Robson, William A., Aircraft in War and Peace) (London 1916) ; United States Staff Corps — War College Division, (Military Aviation* (Washintgon 1916). Consult also the Aeronautical Journal (London, quarterly, 1911 et seq.) ; and Aviation and Aeronautical Engineering (New York 1916 et seq.).

G. Douglas Wardrop.

MILITARY ARCHITECTURE. Pre¬ historic. — During the primitive eras of man’s development his structural interests were cen¬ tred in the fulfilment of the demands of simple shelter for worship and protection. Safety from attack was attained by the erec¬ tion of domiciles in inaccessible places or in rearing lake dwellings on wooden piles, as in Switzerland. Aggregations of houses were in very early times surrounded by walls of earth or stone erected for the purpose of fortification

Heroic Age. — Tiryns and Mycenae furnish typical examples of the military architecture of the Heroic Age of Greece. At Tiryns the pal¬ ace of the ruler, reared on an Acropolis, is surrounded by massive walls in which are pas¬ sages covered by stones successively corbelled until they meet. The masonry is formed of colossal stones put together without cement. At Mycenae there still exists the remains of a city gate of this period. The huge lintel of this gate is relieved of the superposed weight that the solid and very heavy wall would have brought to bear upon it, by a triangular opening which is filled with a most celebrated sculp¬ tured group representing two rampant lions flanking a column. This triangular opening presented the weakest spot in the whole length

of the wall and was embellished with the sacred lion form to protect it from the assault of superstitious assailants.

Civilization gradually traced her way from the flat alluvial areas of

Mesopotamia" to the valley of the Nile. Reinforced with the ele¬ ments of progress and power of Egypt, through the medium nations of Asia Minor ' and the Mediterranean, the laws of order and culture were transmitted to Greece. Greece, in her turn, taught imperial Rome the elements of universal government. As in the other arts, so in the problem of protecting her cities from the carefully planned destructive agency of man, the constructive experience of Egypt and the Orient was transmitted to succeeding civiliza¬ tions. The first four links of the chain that binds the world together are the civilizations of Minoa, Mesopotamia and Egypt, Greece and Rome. Minoan protective art has been known to us by the remains at Cnossus, Mycenae and Tiryns, and the primitive walls and embryonic projects at Orchomenos, Delos and Phigaleia.

Egypt. — In Egypt the early fortifications consisted of a quadrangular double wall of sundried brick approximately 15 inches thick and at times 50 feet in height. Square towers of the same height as the walls occurred at intervals. Both walls and towers were crowned with parapets. At times the entrance was addi¬ tionally protected with outworks consisting of a second lower wall and towers. Frequently there was a keep or citadel used as a last re¬ sort for defenders. Lower Egypt was undoubt¬ edly greatly influenced by the advanced systems of fortifications with which the Egyptians be¬ came acquainted during their wars against the Hittites in western Asia.

Hittite. — The culminating type of the Hittite military system was the double-moated city of Kadesh, of which we have a lively illus¬ tration in the battle scene from the great Kadesh reliefs of Rameses II on the walls of the Ramesseum. These carvings show the capital, Kadesh, situated on an island in the Orontes River. The city, protected by two moats, ap¬ proached by two parallel drawbridges, is en¬ circled by a huge, high wall. The main gate¬ ways are strengthened by increasing, at the place of their occurrence, the thickness of the wall, heightening the towers and providing rooms for the housing of a special gate guard. The relief shows the city to have been built in the form of a circle or ellipse. (Consult plan of Chateau-Gaillard, France). The plan at once obviates the four danger points inherent in the rectangular city enceinte. The walls were surmounted by battlements and strength¬ ened by auxiliary towers or buttresses, the top of which did not extend far above the main wall. At Senjirli extensive ruins of a fortified Hittite palace have been found. The entrance was planned as a fortress-like portico. Massive towers flanked the approaches. The guard-room, the ceiling of which was supported by columns, intervened between the moat and the gate. The city was divided into sections, each separated from the other by protecting walls. (Consult

plan of Haidra, Africa). It is a notable fact that the ancient Hittite protective city plan finds .its reproduction in more or less complete form in the great fortified cities and towns of mediaeval Europe and Africa.

Mesopotamia. — The configuration of the land exposed the cities of Chaldaea, Assyria and Babylonia to easy attack, for the flat character of the territory made siege from four sides possible. Hence it is that military architecture, forced to meet the added hazards of the locus, received a mature study and development that had not occurred elsewhere in the pre-classic world. It was in Asia that the early develop¬ ments of the art of war construction, which subsequently formed the basis of the Roman, Visigothic and Mediaeval science, was through necessity established,. Numerous ruins serve to show us the character of the Chaldaeo-Assyrian protective scheme. Typical of every phase of this art was the city of Dur-Sharrukin, the modern Khorsabad and site of the palace Sar-gon. The ancient city was surrounded by a wall 150 feet wide and 60 feet high, furnished with battlements, towers and outworks, and entered by means of arched gateways flanked by pro¬ tecting towers. The palace of the ruler stood upon a stupendous platform constructed strad¬ dling the northwest wall. The position of the palace gave to it the maximum amount of pro¬ tection from within and from without the city.

Greece. — Early Greece was settled by wandering tribes. Tribal equality ceased when unusual strength established local domination on the part of a family or a tribe that had waxed powerful. This condition forced, for protection, a union of local interests — through the establishment of these confederations the Greek city came into existence. Religion and daily life were indissolubly connected in Greece, and the acropolis or upper city of the Hellenes was graced with the monuments erected in honor of the beneficent gods who were every¬ where the guardians of the city and society. In the Orient the protected heights that the Greeks reserved for their shrines were pre¬ empted by the luxury-loving despots as the safest place for their court buildings and pal¬ aces. Athens, with its Acropolis crowned by the noble Parthenon, was the sacred centre of the Attic life, and upon its safety was lavished the thought and ingenuity of the military ex¬ perts of the time. Its capture and sack by the Persians forced a reconstruction of all of its defenses. Under Themistocles, the Athenian leader, the entire city was surrounded by a strong wall and the Piraeus, the port of Athens, was fortified and its harbors protected by moles. Subsequently the city and port were joined by long walls, thus

making it possible to control the Attic lands as well as her mari¬ time interests. These extensive military con¬ structions embody everything that the Greeks thought would be of value to them, with which they had come in contact through the wide¬ spread medium of the Delian League. The knowledge thus gained was later absorbed by Magna Graecia and Sicily.

Rome. — The Romans exhibited an extraor¬ dinary genius for organization and adaptation. The site of a Roman city was usually selected on territory sloping toward a river. If the area chosen were terminated by another embank¬ ment sloping in the opposite direction, a perfect site, from the Roman point of view, was avail¬ able. The city with its walls flanked on one side by the river was approached by a bridge, the end »f which on the bank opposite the city

was defended by a tete-de-pont. Within the walled area or enceinte a castle was constructed which commanded the whole system of defense and provided a final refuge for the garrison. If the walls failed, the side of the town opposite the river, on account of the escarpment, was difficult of access and the protecting wall on this side was comparatively easy to defend. The walls connecting the river walls and the escarpment walls presented the weakest parts of the fortifications. It was therefore neces¬ sary additionally to protect the towers and walls in this position with ditches. In order that the defenders might harass the flank of besiegers, the gates were flanked with towers that pro¬ jected well out from the walls. The Romans took care not to surround a hill with a wall. Their principle was to carry a defense wall across the summit of the elevations of any city site. The typical example of the Roman sys¬ tem, as carried out on a great scale, is the city of Rome herself. The Romans, according to Vezetius, found that the enclosure of a for¬ tified place ought not to be in one continuous line, for the reason that battering rams would thus be able too easily to effect a breeching; whereas, by the use of towers placed sufficiently close to one another in the rampart, greater

safety would be provided. In erecting the walls for their fortifications of cities, the Romans built two strong walls of masonry separated by an interval of 20 feet, which in¬ terval was filled with the spoil from the extra¬ mural trenches. This fill formed the base for a parapet walk. The Roman military camp, curiously enough, has exerted a tremendous influence upon civil architecture. This is be¬ cause the Emperor Diocletian, upon his abdi¬ cation, laid out at Spalato, in Dalmatia, a great palace based upon the plan of the military camp. The carefully cut masonry walls en¬ closed a rectangular space. Four gates gave access to the palace city, one in the centre of each of the walls. Two intersecting avenues connected these entrances. In the usual camp, the quarters for officers and soldiers were built of brick or wood. The general-in-chief was provided with elaborately protected quarters adjacent the Praetorian or principal gate. In the Castra, palace of Diocletian, quarters for servants and for the guards were constructed. At Mousmieh, the ruins of 'the Praetorium or Guardhouse, with its curious handling of con¬ structive detail, established an architectural type which exerted notable influence on later work.

Byzantium. — The ancient Greek city, Byzan¬ tium, was built on a site that was strategically excellent, surrounded, as it was, by water on three sides and protected from the ravages of the barbarians by a wall on the north side. The traditions relating to the construction of the walls cover all the discoveries and technique of the various ages of Greek and early Roman civilization. The Byzantine walls of mediaeval Constantinople consist of three distinct sections : that on the west toward landward side ; sec¬ ondly, that on the Golden Horn ; and third, that on the Marmora or the seaward side. The Byzantine city was completely enclosed by these wall sections. In the design of all of the By¬ zantine fortification construction, aesthetic pos¬ sibilities have been suppressed and completely subordinated to the requirements of defense.

The widespread influence of Constantinople carried the spirit of the Byzantine science of military engineering throughout Mesopotamia, Asia-Minor, northern Africa and southern Spain. At Granada, in Spain, the hill domi¬ nating the city was crowned with the strongly-fortified palace of the ruler. The enclosure was surrounded by a strongly-built wall, rein¬ forced by great defensive towers that served to render the palace, in its day, practically im¬ pregnable.

Middle Ages. — The traditions of Rome, with here and there

modifications due to Byzantine influence, determined the arrangement of the defenses of the fortified towns and castles of the Middle Ages. The cities were often pro¬ tected by several walls ; at other times the city proper was located upon the highest available ground and surrounded by heavy walls. Its suburbs were outposts, furnished with protec¬ tive towers and curtain walls. From the 3d to the 11th centuries the Roman defensive sys¬ tem underwent but little modification. The most notable existing example of this period is the reconstructed Visigothic city of Carcas¬ sonne. This was a frontier city of the greatest importance. During the 13th century the Visi¬ gothic enceinte was thoroughly repaired and the celebrated Tresan tower and Narbonnaise gate on the eastern side were erected. The castle is the most carefully defended work of the period and the precautions taken to ensure its safety arouse the admiration of all who study its intricate arrangement of moats, ramparts and barbicans, or advance fortified towers. Ra-gusa, on the eastern shores of the Adriatic, and Haidra, Africa, serve to visualize for us the massive picturesque security that made these cities practically unconquerable previous to the use of artillery. In Italy the great feudal lords, commanding lofty sites in the neighborhood of cities, erected secure fortresses. During the first half of the 12th century, due to the in¬ tolerable depredations of the half-savage nobles, the various cities of northern Italy overcame and dispossessed the majority of the feudal chieftains and forced them to come into the cities. The great residences that they built were provided with high and strongly-fortified tow¬ ers. These constructions made it possible for the nobles to defy the municipal restrictions and set at naught the conventions of the city. The famous leaning towers of Bologna, the Asinelli and Garisenda (12th century) are among the very few remaining examples of the Italian defensive towns of the Middle Ages.

Castles. — The castles serving as a refuge for a town garrison differed in general plan from the castles of the isolated nobles, which aimed to procure the security that was so well obtained in the Chateau-Gaillard, built by Rich¬ ard Cceur-de-Lion in the Andelys. Selecting a place where a sharp bend in the Seine formed a st rategically strong peninsula, and this peninsul' being made secure, on a lofty promontory on ffie opposite bank the major fortress was buiF To the south a tongue of rock, less than 15 icci In width, served to connect the isolated promontory with the adjacent hills. This was the only attackable point of the fortress. To protect this vulnerable point a strong tower flanked by subordinate ones and curtain walls wa .« built and so commanded the plateau. This

outwork was separated from the enceinte ot the castle by a deep ditch excavated in the rock. The body of the place consisted of two parts, the lower court, and, separated from this by a moat, the internal castle, with its elliptical enceinte. The strength of the defense culmi¬ nates in the keep or donjon. The donjon was to the castle what the castle was to the for¬ tified towns — its last retreat, and upon it there¬ fore was lavished the utmost care.

Artillery — Modern. — Toward the middle of the 15th century artillery had attained a great development. As a result of this progress the problems of attack and defense were wholly changed. In attack, how strangely modern reads this excerpt from the 'Past and Future of Artillery, > by L. Napoleon Bonaparte, Vol. II : "Instead of erecting bastiles all round the town, the besiegers established before the great fortresses a park surrounded by an intrenchment, beyond the reach of cannon. From this point they conducted one or two branches of the trenches towards the point where they estab¬ lished their batteries… . We have arrived at the moment when trenches were employed as a means of approach concurrently with covered ways of timber.ˆ It was obligatory, in view of the new agencies of war, to replace the picturesque high, machicolated towers and battlemented walls of feudalism with low breastworks on an extended line. The per¬ sistency of tradition, however, caused the re¬ tention in numerous places of feudal forms until well in the 17th century.

The following formula, developed by Viollet-le-Duc, epitomizes the necessities of the prob¬ lems that determined the character of the tran¬ sition to new and modern military architecture : (<To command the outside parts at a distance and the approaches by horizontal fire of artillery, and to provide against escalade by works of a great elevation with crest-works, according to the ancient system for close defense.ˆ

The castle of Bonaguil (Charles VII) is one of the very few military structures that have been preserved that was designed to fulfill the spirit of the formula just enunciated. The requirements of present-day defensive civic architecture are based upon the fundamentals that

appear in the planning of the castle of Bonaguil and shape the fabric of the numer¬ ous modern armorv buildings designed for the housing and training of the military safeguard of the nation. Typical examples of the modern adaptation of the newer principles of military architecture, where the necessities of protecting militaiy stores of arms and ammunition from mob and riot assault require the masses and parts of the fabric to be so disposed that the attacking force may be seen while the defend¬ ers are hidden from sight, and a possibility of obtaining a cross and defile fire may be pro¬ vided at all vulnerable portions of the structure, are to be found in the armories of the 8th Coast Artillery and the 15th Infantry, New York City.

Bibliography. — Consult Britton, Architect¬ ural Antiquities,* Vol. Ill (London 1807-26) ; Clark, 'Mediaeval Military Architecture) (Lon¬ don 1884) ; id., 'Fortification* (London 1907) ; Enlart, (Manuel d'archeologie frangaise* (Paris 1904) ; Harvey, (The Castles and Walled Towns of England* (London 1911); McGibbon and Ross 'Castellated and Domestic Architecture of Scotland from the Twelfth to the Eighteenth

Century) (Edinburgh 1887-97) ; Rey, 'Etude sur les monuments de Tarchitecture militaire des croises en Syrie) (Paris 1871) ; Thompson, 'Military Architecture in England* (London 1912) ; Viollet-le-Duc, 'Dictionnaire raisonne de l'architecture frangaise du Xle an XVIe siegle* (10 vols., Paris 1876). Lewis F. Pilcher,

New York State Architect.

MILITARY BRIDGES. See Bridge; Mil¬ itary Engineering.

MILITARY COMMISSION. See Law,

Military.

MILITARY COURTS-MARTIAL. For

each general or special court-martial the author¬ ity appointing the court appoints a judge-advo¬ cate, and for each general court-martial one or more assistant judge-advocates when neces¬ sary. The judge-advocate prosecutes in the name of the United States and under the di¬ rection of the court prepares the record of As proceedings. In conjunction with the president of the court, he authenticates the

record by his signature and, at the end of the trial, transmits the same to the reviewing authority. Should the accused, for any reason, not be represented

by counsel, the judge-advocate from time to time throughout the proceedings advises him of his legal rights. During the trial he sees that the accused has full opportunity to inter¬ pose such pleas and make such defense as may best bring out the facts, the merits or the ex¬ tenuating circumstances of his case. In so far as such action may be taken without prejudice to the rights of the accused, any advice given him by the judge-advocate should be given or repeated in open court and noted upon the rec¬ ord. The judge-advocate is not challengeable ; but in case of personal interest in the trial or pf personal hostility toward the accused he should apply to the convening authority to be relieved. Throughout the trial the judge-advo¬ cate should do his utmost to present the whole truth of the matter in question and should op¬ pose every attempt to suppress facts or to dis¬ tort them, to the end that the evidence may so exhibit the case that the court may render im¬ partial justice. The accused has the right to be represented before a general or special court-martial by counsel of his own selection, for his defense, if such counsel be reasonably available. This counsel performs such duties as usually

devolve upon the counsel for a defendant be¬ fore civil courts in criminal cases.

General courts-martial have power to try any person subject to military law, for any crime or offense made punishable by the Arti¬ cles of War. In addition they have power to try any person other than above, who by the law is subject to trial by military tribunals, for any crime or offense in violation of the law of war. Punishment upon conviction is discre¬ tionary with a general court-martial, except when mandatory under the law, or when lim¬ ited by order of the President under the Arti¬ cles of War; in addition, the death penalty

can be imposed only when specifically authorized. The death penalty is mandatory in the case of spies ; dismissal is mandatory for conduct un¬ becoming an officer and gentleman ; either death or imprisonment for life is mandatory for murder and rape ; punishment is manda¬ tory in part and discretionary in part for false muster, false returns, officer drunk on duty in time of war and personal interest in the sale of provisions. The usual punishments imposed upon soldiers are the following, beginning with the least severe : Detention of pay, forfeiture of pay, reduction, hard labor without confine¬ ment, confinement at hard labor and dishonor¬ able discharge. In the absence of evidence of two or more previous convictions, a minor of¬ fense, the nature of which appears to demand punishment by hard labor, should ordinarily be punished by hard labor without confinement, rather than by confinement at hard labor. For offenses properly punishable by detention of pay, forfeiture of pay, reduction or hard labor without confinement, those forms of punish¬ ment should, as a rule, be resorted to before confinement at hard labor is imoosed. Many punishments formerly sanctioned have now, un¬ der a more enlightened spirit of penology, be¬ come so obsolete as to be effectually prohibited by custom without the necessity of regulations. Punishment by flogging, or by branding, mark¬ ing or tattooing on the body is prohibited un¬ der the Articles of War ; and no person can, by general court-martial be convicted of an offense for which the death penalty is made mandatory by law, nor sentenced to suffer death, except by the concurrence of two-thirds of the members of said court-martial and for an offense in the Articles of War expressly made punishable by death. No sentence of a court-martial can be carried into execution un¬ til the same shall have been approved by the officer appointing the court or by the officer commanding for the time being. Any sentence of death requires confirmation by the Presi¬ dent before the sentence of a court-martial can be carried into execution, except in the cases of persons convicted in time of war of murder, rape, mutiny, desertion or as spies, and in such excepted cases a sentence of death may be car¬ ried into execution upon confirmation of the commanding general of the army in the field or by the commanding general of the territorial department or division.

An officer charged with crime or with a serious offense under the Articles of War is placed in arrest by the commanding officer, and in exceptional cases an officer so charged may be placed in confinement by the same authority. A soldier charged with crime or with a serious offense under the Articles of War is placed in

confinement, and when charged with a minor offense he may be placed in arrest. Any other person subject to military law charged with crime or with a serious offense under the Arti¬ cles of War is placed in confinement or in ar¬ rest, as circumstances may require ; and when charged with a minor offense such person may be placed in arrest. Any person placed in ar¬ rest is restricted to his barracks, quarters or tent, unless such limits are enlarged by proper authority. An officer is placed in arrest by his commanding officer in person or through an¬ other officer, by a verbal or written order or communication, advising him that he is placed in arrest, or will consider himself in arrest, or words to that effect. An officer in arrest can¬ not exercise command of any kind. He cannot wear a sword nor visit officially his command¬ ing or superior officer, unless directed to do so. Plis applications and requests of every nature are made in writing. Officers are not placed in arrest for light offenses. For these the cen¬ sure of the commanding officer generally an¬ swers the purpose of discipline. In ordinary cases where inconvenience to the service would result from it, a medical officer is not placed in arrest until the court-martial for his trial convenes. Except as provided in the Articles of War, or when restraint is necessary, no sol¬ dier is confined without the order of an officer, who previously inquires into his offense ; it is proper, however, for a company commander to delegate to commissioned officers of his com¬ pany the power to place enlisted men in arrest as a means of restraint at the instant when re¬ straint is necessary, but such action must at once be reported to the company commander. Non-commissioned officers are not confined in company with privates if it can be avoided. When placed in arrest, they are not required to perform any duty in which they may be called upon to exercise authority or control over others, and when placed in confinement, they are not sent out to work. When the sen¬ tence of a general court-martial prescribes dis¬ honorable discharge and confinement, so much of the sentence as relates to confinement is ex¬ pressed in substantially the following form : To be confined at hard labor at such place as

the reviewing authority may direct for -

(leaving to the reviewing authority the desig¬ nation of the place of confinement). A mili¬ tary post, station or camp is designated as the place of confinement of any general prisoner whose confinement is directed to be in a peni¬ tentiary or disciplinary barracks. The arrest of an officer has been compared to an enlarge¬ ment on bail, the security being the officer's commission. It is for this reason that the pun¬ ishment for breach of arrest may include dis¬ missal. The distinction between arrest and confinement lies in the difference

between the kind of restraint imposed. In arrest the re¬ straint is moral, imposed by the orders fixing the limit of the arrest,, or by the terms of the Article of War. The intention or motive that actuates a breach of arrest is immaterial to the question of guilt, though, of course, proof of . inadvertence or bona-fide mistake is admissible in guiding the court in fixing punishment.

The present system of courts-martial leads to injustice logically, naturally and inevitably, and needs corrective modification. It is an in¬ heritance from the old British code, which was

adopted in 1774 and never changed. Instead of being a court in the proper sense, it is simply the executive arm of a commanding officer. When the accused is arrested and brought be¬ fore this tribunal he generally has no counsel skilled in the law and (when convicted) is con¬ victed by a court which has no knowledge of law. The sentence is reviewed by an authority sometimes equally ignorant of law and the man is forced to undergo the sentence imposed. An illustrative case, from the records of trials bv courts-martial, is that .of a man who was ar¬ rested and charged with desertion. He was sentenced to forfeit all pay, be dishonorably dis¬ charged and serve ninety-nine (99) years at hard labor. The reviewing authority in sus¬ taining the court naively remarked that it would not enforce the part of the judgment providing for the man's dishonorable discharge until he had served his prison sentence.

Edward S. Farrow,

Consulting Military and Civil Engineer.

MILITARY EDUCATION. The foun¬ dation of all military education is the school, ranging from the school of the soldier or grenadier to the school of the battalion. Re¬ cent wars have demonstrated that it is necessary to organize schools for specialists and schools for command where officers and men of all grades can be instructed in the essential prin¬ ciples of modern war and in the proper em¬ ployment of

different military means and en¬ gines. By these schools the complete harmony between the different arms and between the commander and his troops can be secured. The organization of all military instruction must provide for instruction in the essential principles of war and the combination in combat of the different arms employed, and the condi¬ tion of permanence and of continuity is neces¬ sary in all such instruction if the best possible results are to be obtained. As practised in the schools of Europe (patterned largely after the United States Military Academy) the in¬ struction of troops gives thern indispensable intellectual training and information on the pro¬ cedure in battle and assists the officers in ob¬ taining from them their best efforts. Ihe in¬ struction of specialists employs such methods as give the men full confidence in their army and weapon, a confidence based upon results obtained by employing it under the conditions of battle. The schools which correspond most nearly to the United States Military Academy are the Military Schools of Italy, the Lcole Militaire de Belgique, or Military Academy at Ixelles, the Theresa Military Academy of Wie-ner-Neustadt, the Technical Militarv Academy of Vienna, the Royal Military Academy at Woolwich, the Royal Military College at Sand¬ hurst, the Lcole Polytechnique at Paris, the Lcole Speciale Militaire at Saint Cyr and the Upper Cadet School of Gros-Lichterfelde.

The military schools of Italy are divided into three classes, viz.: (1) The Collegi Militari, or military preparatory schools of which there are five, established at Naples, Florence, Milan, Rome and Messina. (2) The military schools for the training of officers and 'non¬ commissioned officers, known as the Military School of Modena, the Military Academy of Tunis, the Military Sanitary School of Apnlica-tion in Florence and the Non-Commissioned Officers' School in Caserta. (3) The military

schools of application proper, for officers, known as the War School (Scuola di Guerra), in Turin; the School of Application of Artil¬ lery and the Engineers, in Turin; and the School of Cavalry, in Pinerola. There are, in addition to the foregoing, schools for artillery and musketry practice, a school of fencing, and batteries and platoons of instruction for train¬ ing non-commissioned officers.

The £cole Militaire, or Military Academy, at Ixelles, supplies officers to the infantry, cavalry, artillery and engineers. The length of the course of instruction is two years for the infantry and cavalry section, and four years for the artillery and engineer section. All students, on

commencing the second year's course, contract to serve for eight years, and there are no admissions to the school except by competition. The Minister of War decides upon the persons who are to be admitted to the military academy, in accordance with the results of the competitions.

The Theresa Military Academy of Wiener-Neustadt educates officers for the infantry, rifles and cavalry; the Technical Military Acad¬ emy of Vienna educates officers for the artil¬ lery, engineers and technical troops (including the railway and telegraph troops). The dif¬ ferent kinds of places at these military acad¬ emies are Ararial (imperial or treasury) places, wholly or half free; Stif tangs (foundation or endowment) places; and paying places. These different kinds of places are at the disposal of the Imperial War Ministry or the ministries of national defense of Austria and Hungary. The places for which there are endowment of private funds are disposed of in accordance with the stipulations of the letter of donation. The Ararial places were formerly given di¬ rectly by the emperor. In awarding these places preference is given to the sons of offi¬ cers, and then to the sons of officials. The Stif tangs places are disposed of by competi¬ tive examination, the persons who are allowed to compete being designated by the state, coun¬ try or other authorities.

The Royal Military Academy is maintained for the purpose of affording a special military education to candidates for commissions in the royal artillery and royal engineers. Candidates must, in the opinion of the commander-in-chief (who is the president of the Royal Military Academy), be in all respects suitable to hold commissions in the army. An independent in¬ spection is made annually by a board of visitors, appointed by the Secretary of State for War, and reporting to him. Such visitors are not a permanent body, but are not all changed at the same time. The report of this board is presented to Parliament. The academy is un¬ der the control of a military officer, styled governor and commandant, appointed by and responsible to the Secretary of State for War, through the commander-in-chief. The gover¬ nor is assisted by a staff officer styled the assist¬ ant commandant and secretary, who is respon¬ sible in his temporary absence for the charge of the establishment. This officer commands the cadet company, and has the custody of the records and correspondence of the academy and gives the governor such . assistance as he may require. The governor is assisted in the arrangement of the studies by a board com¬ posed of the assistant commandant and the

professors or senior instructors of the different branches. The head of each branch has the supervision and inspection of the studies in his department and reports on them to the gover¬ nor. Admission to the Royal Military Acad¬ emy as cadets is granted to the successful candidates at an open competitive examination.

The Royal Military College at Sandhurst is maintained for the purpose of affording a spe¬ cial military education to candidates for com¬ missions in the infantry and cavalry. Candi¬ dates must, in the opinion of the commander-in-chief, be in all respects suitable to hold commissions ‘in the army. The commander-in¬ chief is president of the Royal Military Col¬ lege, and, as at the Royal Military Academy, there is an annual independent inspection and a governor and commandant in control, assisted by an assistant commandant and secretary, who commands the cadet battalion and has the custody of the records and correspondence of the college. Admission to the Royal Military College is granted to successful candidates at a competitive examination and to Indian Cadets, pages of honor and others subject to a qualify¬ ing examination. The characteristic features of the Woolwich and Sandhurst schools are the brief period of instruction and -the some¬ what exacting competitive standards *or admis¬ sion. The two occupy to a considerable ex¬ tent ‘the relation of cause and effect, with some diversity of judgment expressed as to their expediency.

The Polytechnic School, or L’Lcole Poly¬ technique, at Paris, was founded in 1794 and has been reorganized by various decrees. The object of the school is to train students for the following branches of the public service: The artillery of the army and the marine artillery; the engineer corps of the army; the engine r corps of the navy or naval constructors; the corps of naval officers ; the hydrographic corps ; the marine commissariat corps ; the corps of highways and bridges; the manufactories of the state; ‘the engineers of the powder and salt¬ petre service ; the mining engineers and the telegraphic lines ; also for such other public services as require a profound knowledge of the mathematical, physical and chemical sci¬ ences. Admittance ‘to the school is exclusively by competitive examination. After a two years’

course the student may go to one of the special schools of application for any of the above mentioned services, provided he can pass suc¬ cessfully the final examinations and - de¬ clared to be acceptable for this service by the decision of a committee which draws up the classification list for ‘the public services. Ful¬ filment of these conditions does not give an absolute right to enter any of the public serv¬ ices ; admission to any service depends upon the number of vacancies existing at the time of leaving the school, upon the physical aptitude of the student and his place on the order of merit. The school is directly subject to the Minister of War.

The Special Military School of Saint Cyr, or Saint Cyr, as it is popularly designated, dates from the time of Louis XIV, and is intended to supply officers for the infantry, the cavalry and the marine infantry. The course of in¬ struction lasts two years, and no scholar is allowed to remain more than three years at the school. The privilege of taking a third

year to complete the course is only allowed where circumstances of exceptional gravity have compelled a student to suspend work at the school. Admittance to the school is exclusively by competitive examination and competitors are limited to those who have obtained certain degrees, or a certificate of qualification for the baccalaureate degree in secondary or classical modern schools. In France the system adopted in the armies at the front is that of centraliz¬ ing the instruction in each army. This in¬ struction embraces: (1). Schools of the line — (a) course for captains which prepares for the command of the battalion, (b) special course for commanders of division depots, (c) course for company commanders, (d) course for non¬ commissioned officers, (e) practical course in engineering; (2) schools of specialists — (a) school for grenadiers, (b) machine-gun schools, (c) automatic rifle school, (d) school for the 37 mm. gun, and (e) school of liaison and signal¬ ling. These schools are generally in a zone about two or three days’ march from the front. In addition to these schools, practical instruc¬ tion is given in the division depots to recruits who have just joined combat organizations. Behind the front are instruction battalions formed from recruits of the youngest classes, and in the interior of the country are vast camps where schools of specialists carry on their training.

In Germany, the school which corresponds most nearly to the United States Military Academy is the Upper Cadet School, at Gross-Lichterfelde (Haupt-Katetten-Austalt). This school is fed or supplied by

the ((Kadettenhau-sen,® or preparatory cadet schools. Saxony and Bavaria have their own cadet corps corre¬ sponding to the preparatory and upper cadet schools of Prussia, from which appointments are made to the Saxon army corps and to the corps of the Bavarian army. Saxony, however, has no artillery and engineer school, and officers of those arms have to pass through the Prus¬ sian School at Berlin. Bavaria has its own artillery and engineer school at Munich.

The military educational system of the United States comprises:

1. The Military Academy at West Point for the education of cadets.

2. Post schools for the instruction of en¬ listed men.

3. At each military post a garrison school for the instruction of officers in subjects per¬ taining to the performance of their ordinary duties.

4. Service schools. See Army Service Schools.

5. The military department of civil institu¬ tions at which officers of the army are detailed under the provisions of law. The detail of these officers at these institutions is announced and the regulations governing the courses of instruction therein are issued from the War Department.

War Department orders prescribing regula¬ tions to govern post and garrison schools lay down specifically the course to be followed in the more elementary schools for officers and en¬ listed men. Brigade commanders devote special attention to the post-graduate scheme of in¬ struction, which runs through the entire period of garrison training. The post-graduate course of instruction includes such map

problems, terrain exercises, tactical or staff walks or rides, or other work pertaining to the local terrain as brigade commanders may pre¬ scribe; this portion of the course may be made to amplify the work of

the elementary schools for officers and enlisted men, as well as the drill and practical instruction preparatory to field training.

See Naval Education and United States Military Academy.

Edward S. Farrow, Consulting Military and Civil Engineer.

MILITARY ENGINEERING. Military engineering is officially stated to be that branch of engineering science applied by engineer troops in the field to the emergencies of mod¬ ern warfare in order to protect and assist troops, to ameliorate the conditions under which they are serving, to facilitate locomotion and communication and whenever the occasion requires to act as purely combatant troops. In the performance of these duties engineers are trained and equipped to supplement or amplify by scientific measures the efforts of combatant troops in the services mentioned below and such other special services of an engineering nature as may arise and are beyond the tech¬ nical training of combatant troops, or such as require the use of engineering implements and material not supplied to combatant troops. The following services are executed under the supervision of engineer officers by engineer troops, by details from other troops, by civilian labor or by any combination of these means as the particular circumstances may require:

1. The service of reconnaissance, including

tactical reconnaissance, engineering reconnais¬ sance, surveying, mapping and sketching, pano¬ ramic sketching, photography, drafting and map reproduction…

2. The service of castramentation, including

the selection, laying out and preparation of camps, the reconnaissance and municipal and sanitary engineering incident thereto, and the installation, operation and maintenance of water-supply systems… .

3. The service of fortifications, pertaining both to the attack and the defense and includ¬ ing the selection of defensive positions when not in the presence of the enemy; rectification of and assistance in the selection of such posi¬ tions in the presence of the enemy; the loca¬ tion, design and construction of the more im¬ portant field works ; assistance in and super¬ vision of the construction of hasty defenses wherever possible; the supply of tools and ma¬ terials, and the reconnaissance, demolitions, water supply and communications incident

thereto… . , .

4 The service of sieges, pertaining both to

the attack and defense and including the selec¬ tion and location of defensive lines, lines of investment and siege works, > the construction of saps, mines and countermines; the operation of searchlights ; preparation for and assistance in attacks, counter-attacks and sorties; organi¬ zation of captured points, and the supply of

tools and materials. . ,

5. The service of demolitions, including the carrying out of all work of this nature au¬ thorized bv the commander and not within the scope of other troops.

6. The service of battlefield illumination, in¬ cluding the supply and operation of search¬

lights and other means of battlefield illumina¬ tion.

7. The service of general construction, in¬ cluding the location, design and construction of wharves, piers, landings, storehouses, hospitals and other structures of general utility in the theatre of operation.

8. The service of communications, including the construction, maintenance and repair of roads, ferries, bridges and incidental structures ; the selection and preparation of forts; the con¬ struction, maintenance and operation of rail¬ ways under military control and the construc¬ tion and operation of armored trains.

9. Special services, including all municipal, sanitary and other public work of an engineer¬ ing nature which may be required in territory under military control.

Fire Action. — To comprehend the subject of fortifications it is imperatively necessary to know and understand the effect of fire both from small arms and artillery, destructive forces quite different in action from those against which the engineer must ordinarily pro¬ tect his works. To shoot straight, to direct a projectile true to its target, is a feat of engineer¬ ing just as much as the accurate adjustment and pointing of a theodolite in a geodetic sur¬ vey. Rifle fire which dominates a certain space and prevents the enemy from occupying it is just as effective as that which strikes his men, and the

greater the space which can thus be occupied by fire action per unit volume of fire the more efficient is that fire. Artillery fire has of late become a most important factor in mod¬ ern tactics with its great increase and accuracy and bids fair almost to revolutionize battle tactics and the art of fortification. By the ap¬ plication of indirect fire and spotting a battery can take up a position of safety and systemat¬ ically search out the landscape.

Fortifications. — Fortifications may be de¬ fined as any engineering devices for increasing the fighting power of troops in the field. En¬ trenchments, screens or blinds, obstacles, com¬ municating trenches, mines and demolitions, all come under the designation of fortifications. Of these the most important are those which afford protection from the enemy's fire and incidentally provide concealment and means of intercommunication. The term fortification as commonly employed, refers to works of this character only. Field works are usually con¬ sidered as to (1) location, or siting; (2) trace, or ground plan; (3) construction; (4) ccm-cealment. Engineers generally make three dis¬ tinct classes of field or temporary fortifica¬ tions: (1) all works devised for the temporary protection of important points, such as cities, arsenals, bridges, fords, positions, etc., tech¬ nically known as field works; (2) the various devices of the engineer for reducing a forti¬ fied place by means of parallels and approaches, known as siege works; (3) quickly made de¬ fenses by which an army in the presence of an enemy protects itself, known as battle entrench¬ ments or hasty entrenchments.

The general line to be held or defended de¬ pends upon strategical considerations and the location of trenches is affected by the general line to be occupied, tactical considerations and features of the terrain. Tactical considera¬ tions, such as actual or potential interference by the enemy with the construction, may affect

the location. All works for the defense of a position should provide concealment, a clear field of frontal fire, good communications to the rear, the flanks resting upon some natural obstacle or in contact with

adjacent troops. A clear field of fire to the front was formerly considered all important and necessary to be secured at the expense of all other considera¬ tions ; but, with the greatly increased effective¬ ness of modern artillery, it has been accepted as a maxim that, that which is seen is as good as destroyed, and concealment of the works be¬ comes of first importance.

Organization of a Portion. — The organ¬ ization of a position does not imply the estab-

Ground rising in respect of line of sight.

Ground falling in respect of line of sight.

B Liotl Ground

r

Falling Ground

D

< Fatting C round

E

Sk Fatting Ground

The relation of ground to fire effect.

lishment of a continuous firing trench. The terrain in front of a position is best covered by a combination of frontal and flank fire from distinct elements, such as trenches, block¬ houses, etc., separated by small intervals ; thus economizing the personnel which is one of the advantages of fortification, and mini¬ mizing the effect of the enemy's artillery fire. Each of these elements is occupied by a fixed garrison, which should always be a complete unit, the strength of which, variable according to circumstances, may be as much as a platoon. These elements are not uniformly distributed along the front;

their distribution is deter¬ mined by the features of the terrain, the neces¬ sity of having a greater volume of fire at one point than at another, in one direction than another, and other tactical considerations. A line can always be forced at some points so that it is necessary to have elements in rear which come into action when the first have fallen. It is, therefore, necessary to disperse the elements laterally and in depth. A group of elements, thus disposed, is known as a strong point, and by their mutual support should permit the garrison to hold and stop the enemy by its fire. It should be surrounded by a continuous obstacle and should always be oc¬ cupied by a fixed unit responsible for its de¬ fense. Strong points are grouped together lat¬ erally and in depth to form supporting points and the combination of several supporting points under one commander forms a sector. This organization is a gradual development made during a prolonged occupation of a posi¬ tion in trench warfare such as developed on the western front in Europe. In the initial occupation of a position the first step is the construction of the strong points for the firing line, with their firing trenches and obstacles

The Beaten tone is greatest on slope A-D, the Trajectory being practically parallel to the surface of the ground.

first, then their cover, approach and communi¬ cating trenches. The next step is the construc¬ tion of the strong points for the support trenches, with the necessary communicating and approach trenches. Finally the defensive zone is completed by the construction of the reserve and intermediate trenches organized into strong points, and all of these into supporting points and sectors.

Obstacles. — The object of an obstacle is to check a hostile rush and delay the enemy under the close fire of the defense, and it should be at such distance from the parapet that it is difficult for hostile bombers to crawl up to it and throw bombs into the trench. On the other hand, the obstacle should be under close observation and fire of the defense. If possible it should be concealed for purposes of surprise and to decrease its liability to injury by artillery fire; it should form no shelter for the enemy. Some form of wire entangle¬ ment is ordinarily used. Obstacles are usually placed all around strong and supporting points and often on both sides of approach trenches. Passages through them for counter attacks are usually covered by machine gun fire. At im¬ portant points the wire entanglement is placed in belts 20 feet

wide, two or more belts about 20 yards apart being used. The modern form is a compromise between the high and the low wire entanglement and is generally from two to two and one-half feet high. The wire is strung loosely, and many forms of spirals and hoops have been devised. Barbed wire is ordi¬ narily used; the posts are of wood or iron; the iron ones are provided with eyelets for attach¬ ing the wire. There are usually three rows of posts set in quincunx order from six to eight feet apart.

Concealment and Observations. — The

trenches and other works should be made as nearly invisible as possible, and their conceal¬ ment should be completed by treating the front slope of the parapet so that its appearance from the front and from aircraft will corre¬ spond to that of the surrounding ground.

Portion of a company trench designed for a squad.

Crops should be replaced where disturbed, and carefully arranged; bushes should be planted to hide the parapet, the men on watch, riflemen and observers. Sod should be preserved and placed on the parapet and parados. Dummy trenches and works should be freely employed

so as to deceive the enemy as to the strength of the defender and to scatter his fire. The observation of the enemy is of first importance in position warfare. It should give complete knowledge of all elements of the hostile line and prompt information of any movement of the enemy. It is effected by observation from the ground and from aircraft. Observation from the ground is divided into three echelons : (a) In front of the firing line from small posts and listening posts, (b) On the firing line by sentinels and lookouts, (c) In rear pf the fir¬ ing

line, by artillery observers, sentinels and lookouts of the shelters. Observations on the firing line are effected by lookout posts organ¬ ized preferably at the salients where the view is more extended. They are provided with periscopes, range finders and large scale maps. The location of the lookout posts and observa¬ tories must be determined in accordance with a complete plan for each supporting point or sector of defense. In position warfare, careful and studied attention must be given to illumina¬ tion on the battle field, lines of information, depots for material and ammunition, the em¬ ployment of machine guns, trench weapons, command posts, first-aid stations, kitchens, latrines, lavatories, shower baths, water supply, maintenance, protection against asphyxiating gas and protection against bombs and grenades. When circumstances render night work neces¬ sary, special dispositions must be made.

Mining. — Underground communications are classed according to their directions as gal¬ leries, which are horizontal or nearly so, and shafts, which are vertical or nearly . so. . Gal¬ leries are classified according to their size as great or grand galleries, which are six feet high by seven feet wide; common galleries six feet by three and one-half ; half galleries, four and one-half feet by three feet; branches, three and one-half feet by two and one-half feet; and small branches, two and one-half feet by two. Shafts may be drill holes or wells, or may range in size from the smallest in which a man can work, say three feet by three feet, to any size which may be required, seldom more than 6 feet by 10 feet. If troops or guns are to be passed through galleries, they must be made large enough for that purpose. Grand and common galleries usually meet these re¬ quirements. The primary requisites of sub¬ terraneous excavations are accuracy of direc¬ tion, prevention of caving, ventilation, drainage and lighting. Picks and shovels for mining are similar in form to standard tools, but are smaller and have shorter handles. A special tool called the push pick is very conyement in soft earth. In large galleries a transit may be used, and in smaller ones a plane table or pris¬ matic compass. The box compass cannot be sighted and read with sufficient accuracy for

this work. , ,

The transfer of the azimuth underground depends on whether the gallery starts from a shaft from a reverse slope, or, if not very deep, from a level with a descending branch. In the second and third cases, which will be the rule in military mining, the azimuth may be estab¬ lished in the gallery by a transit or compass used in the ordinary way. In the case of a shaft which will be the exception, the azimuth must' be established across the top or mouth and transferred to the bottom

by means of

plumb lines. Prevention of caving is accom¬ plished by linings. In very firm soil it is some¬ times practicable to drive small shafts and galleries short distances without lining them. Galleries constructed during a siege are lined with wood. Wooden linings are of two general types, known as cases, and frames and sheeting.

In sinking shafts especial care must be taken to make the excavation no larger than is required for placing the lining. Partly lined shafts should only be used for small depths and when they are expected to stand for a very short time. They are a constant menace to the miners, owing to the danger of their caving in, and in a much greater degree to the probability of stones, etc., falling from the unprotected parts and seriously injuring or killing the men at the bottom. In changing direction horizon¬ tally with frames and sheeting, if the soil will stand for a distance of one frame interval or even less, it is only necessary to place one or more frames at an angle until the necessary change is secured. The sheeting on the outside is placed by running the forward end past the frame and then inserting the rear end behind the last bay of sheeting. When, the earth shows a tendency to cave, which it will fre¬ quently do in great galleries, the cap sill must be put in position and supported while the miner excavates the grooves for the ground sill and stanchions, for which purpose two crutches are used.

In military mining and especially in gallery work careful attention must be given ventila¬ tion and drainage. . A pressure-blower,, worked by hand or power, is among the essential items of a mining equipment. If water shows itself or is suspected, dead-level galleries must be avoided, and all slopes should fall toward a point or points where the water can be disposed of.

A satisfactory explosive for the purposes cf military engineering must be: (1). Stable as to its constitution and characteristics for. a long period. (2) Unaffected by ordinary varia¬ tions of temperature and moisture. (3) In¬ sensible to .shock of handling, transportation, projectiles and neighboring explosions. (4) Not too difficult of detonation. (5) Quick enough to give good results when not confined and slow enough to give good results when con¬ fined. (6) Convenient in form and consistency for packing and loading and for making, up charges of different weight. These conditions point to a high explosive of medium strength of granular or plastic consistency, put up in waterproof cviindrical cartridges of standard size and length. The

detonating compound in general use is fulminate of mercury,, and all methods of firing involve the explosion of a small quantity of fulminate enclosed in a cap or fuse and placed in the charge. Bickford or safety fuse is used to ignite the fulminate when electricity is ‘not available. This fuse may be used in wet holes, but for underwater use it should have a continuous rubber coating ; when a total blast is divided into a number of charges it is important that all should go at the same instant. In simultaneous ignitions by electricity, the fuses are connected in series: that is to sav, they are all placed in the same circuit. A lead from the firing apparatus is connected to one wire of a fuse on one flank. The other wire of this fuse is connected to a

wire of the next fuse, and so on, until the last fuse is reached, the second wire of which is connected back by a lead to the firing point. It may be assumed as sufficiently exact that charges of the same explosive develop total energies directly proportional to their weights. This energy is exerted in all directions in com¬ pression of the surrounding medium. The distance at which this disturbance remains sufficient to destroy galleries is called the radius of rupture and the surface joining the ends of these radii is called the surface of rupture. The relief of pressure on one side shortens all radii of rupture which have a component in that direction, but does not appreciably affect those which have no such component. Hence, when material is displaced the surface of rup¬ ture is ellipsoidal; when no material is dis¬ placed it is spherical. Land mines are usually formed by excavating from the surface and are designed to be exploded at the moment the enemy is over them. They are usually em¬ ployed in front of defensive positions and in connection with visible obstacles. The charges are placed deep enough only to avoid artillery projectiles. If no artillery fire is to be expected they may be placed just under the surface. If a bore hole is sufficient the charge is placed at the bottom and the hole well tamped. If an open pit is dug the mine chamber should be in firm ground at one side and the hole back-filled and well rammed.

In siege operations mining is done at close quarters, and is, or should be, opposed by countermining by the enemy. There is then a double purpose in view ; to reach the original objective by placing the charge where intended and firing it, and while so doing to detect and circumvent any attempt of the enemy to inter¬ fere, or to prosecute any enterprise of his own.

Demolitions. — Military demolitions have for their purpose to destroy or make unservice¬ able any object in the theatre of war the preser¬ vation of which would be unfavorable to the army or favorable to the enemy, excepting always objects neutralized by international con¬ vention or the laws of war. Demolition is permissible only under a military necessity. They may be made by fire, by mechanical means or by explosives. Fire is the only agent when absolute destruction is necessary, as in case of food supplies, munitions of war, structural ma¬ terials, *etc.* Soluble matter, as gunpowder, sugar, salt, etc., might be destroyed in water, but this method is laborious. Burning is equally effective and much easier. For quick results with slow-burning materials a quantity of highly combustible stuff must be collected. In the destruction of railroads, operations may be directed against rolling stock, bridges, cul¬ verts, tunnels, track or accessories, such as water stations, telegraphs, *etc.* Locomotives are temporarily disabled by removing valves or other small vital parts ; permanently, by building a fire in a dry boiler or by detonating a charge of explosive in the boiler. In haste, piston or connecting rods, links, etc., may be destroyed by explosives, or a hole may be blown in the bottom of the tender tank. Cars may be burned or wrecked by collisions or derailment. The best places are in deep cuts or tunnels. Wooden bridges may be burned or small ones may be pried off their seats by levers or dragged off

with tackle. Track may be destroyed by taking it up, burning the ties, heating the rails on the fires and twisting them with bars through the bolt holes, with a chain and lever, or a hook and lever. Telegraph lines are temporarily disabled by breaks, in which the wires are cut, grounds in which the wires are connected to the ground and crossed in which a metallic connection is made between the wires. A ground may be made by connecting a wire to the rail or to a bar or plate of metal in damp earth. Copper i§ best. To destroy a telegraph line cut down and burn poles, cut and tangle wires and break insulators. To disable guns, smash the sights and firing gear; endeavor to dent or burn the corners of the breech-closing wedge and damage the elevating gear. Unscrew the striker plug and take it out : fire one or two rifle bullets into the opening. The degree of success attained in

demolitions with explosives depends upon the experience of the powder men doing the work. The explosive adopted for the United States service is triton (tri¬ nitrotoluene, trinitrotoluol, trotyl, TNT). It may often become necessary to use whatever explosive is at hand ; for this reason data for their use is given. There are many uncer¬ tainties attending the military use of explosives, and local conditions frequently raise a doubt as to the efficiency of the application of for¬ mulated methods. Where a lifting effect is desired, gunpowder should be used : but, when a cutting or shattering effect is necessary, a high explosive is better, such as triton, dyna¬ mite, gun cotton, *etc.* Each company of engi¬ neers carries on each of its two tool wagons a demolition outfit and supplies, consisting of earth and wood augers, pinch bars, magneto exploders, sledge hammers, picks, shovels, firing wire, caps, fuses, etc., and 200 pounds of ex¬ plosive. In addition it has two pack demolition outfits, each with demolition tools and supplies, including 45 pounds of explosive. Each squad¬ ron of cavalry has a pack demolition outfit with demolition equipment and supplies, including 80 pounds of explosive.

Bridges and Pontons.— When an army has to cross a stream, passage may be made on a bridge, by fording, by use of boats, rafts or ferries,, or on ice. Tactical requirements will determine the general location of the point of crossing, and within the limits imposed by these requirements the site of crossing must be selected and the method adopted that is best suited to the site. The site is selected as a result of reconnaissance to verify and complete the information shown by existing maps. To meet tactical requirements the near shore in an advance should afford concealment for the pre¬ paratory work in connection with the bridge, and should, if possible, facilitate a converging fire upon the enemy, while the farther shore should be open to favor development. The reconnaissance should furnish information as to the liability of freshets and their probable height, the rise and fall in tidal streams, the width and depth of the stream, the presence or absence of navigation, the nature of existing facilities such as roads or fords and the pres¬ ence of bridge material such as timber, rope or wire. Where possible, the approaches should be straight and in line with the bridge.

Military bridges are divided primarily into

floating and fixed. The types of floating bridges most commonly used are the ponton bridge, built with the equipage carried with the army, and bridges built with boats or

cavalry. Artillery and wagons can cross water three feet deep and keep dry. The bottom should be even, hard and tenacious. A ford may be rendered impassable by a freshet or by

Floating bridge by successive bays

Abutment. Up. str.anchors. Down str. anchors. Balk carriers. Balk Jashets. Chess. Side rail*. Cable!

IT

1

2

3

X

1

2

3

4(x

1

2

3 4

i

2

3 4

5 IX

1

2

3

TT

1

2

3

4

5

0

7

8

9

10

“I

1

2

3

7]7j

&

l

2

3

2

3

2

3 4

i

2

ill

5 [X

1

2

3

4 [XI

2

3

4

5

<5

7

8

9

10

ilk

2

3

Ail

barges. Types less frequently used are the bridges built with casks, rafts, timber, inflated skins and other means in the nature of bridg¬ ing expedients. The fixed bridges best adapted to military use are pile, trestle, spar and sus¬ pension bridges. Other types that may be used are cribwork, steel girder, trussed and canti¬ lever bridges. Some of the loads (in pounds per linear foot) to which military bridges may be subjected are as follows:

Infantry, single file .

Infantry, column of twos Infantry, column of fours

Cavalry, single file .

Cavalry, column of twos

140

280

560

196

392

In the absence of bridges a ferry may be operated by stretching a cable across the river and pulling the boat by hand along the cable. Another

method is to use a long rope fastened to a point up stream, either on the bank or to an island or anchor in midstream, and navigate the boat back and forth by utilizing the force of the current acting obliquely on the boat. This is called a flying ferry. The wooden ponton will carry 40 infantrymen armed and fully equipped, in addition to the crew, under favorable conditions. If a stream has high banks, with tfees or other means available as anchorages, it may be practicable to stretch a rope across and transport men and materials in chairs, baskets or slings suspended from the

r°PFords may be used by small bodies of troops without bridge equipage, but they are unreliable crossings and are generally unsatisfactory for large bodies. If the current is moderate a depth of three and one-half feet may be passed by infantry and four and one-half feet by

the deepening resulting from the loss of ma¬ terial stirred up and carried away during the passage of troops. A ford may be destro3ˆed by filling the deepest part with harrows, teeth up, or with planks filled with spikes, with barbed wire or other obstructions.

Benefiting by the experience of the Euro¬ pean armies, the United States has greatly in¬ creased the proportion of engineer troops. A recent order gives the following units for each field army, in addition to the divisional engineer troops: One regiment, gas and flame; 1 regi¬ ment, mining; 1 regiment, water supply; 1 regiment, general construction; 1 regiment,

engineer supplies (1 battalion transport, 1 bat¬ talion skilled labor, 1 service battalion to aid in this work) ; 1 battalion, mapping and print¬ ing; 4 battalions transport service (6 service battalions to aid in this work, 6 truck trains of 31 trucks each, 5 wagon trains of 61 wagons

each). Assigned to the line of communications and constituting an independent group, each field army has the following engineer troops : One regiment, general construction (6 service battalions to aid in this work) ; 1 regiment, engineer supplies (3 service battalions to aid in this work) ; 10 battalions forestry (9 service battalions to aid in this work) ; 1 regiment, quarrying (3 service battalions to aid in this work). The European War was one of engi¬ neers, and upon the efficient leadership of engi¬ neer troops depended in large measure the ultimate success of the Allies.

Edward S. Farrow, Consulting Military and Civil Engineer.

MILITARY FRONTIER. See Frontier.

MILITARY GOVERNMENT. See Gov¬ ernment.

MILITARY HONORS, salutes and other marks of deference paid to army and navy officers, government officials and certain other distinguished individuals. See Orders and Decorations of Honor ; Salutes, Military.

MILITARY HOSPITALS. See Hospi¬ tals, Military.

MILITARY INSIGNIA OF RANK. In¬ signia of rank are worn to-day in all armies to distinguish the various grades of officers and non-commissioned officers. It is usually in the form of epaulets, straps, braid, buttons or chevrons, and is worn on the shoulder, sleeve or collar of the uniform coat, according to the custom of the country to which the soldier belongs.

Military uniform did not come .into existence until after the Thirty Years' War, the house¬ hold troops of Louis XIV of France being the first to wear it. Badges of rank were not in general use in the different armies until the latter part of the 18th century, although some regiments had adopted distinctive devices for this purpose long before that time.

In all armies the insignia of rank are such as is prescribed by the government, and all officers and soldiers are forbidden to wear any insignia except such as that to which their rank entitles them. The form of the insignia is al¬ ways the same for officers or non-commissioned officers of the same rank, but its color some¬ times differs according to the arm of the service to which the wearer belongs.

The various badges of rank worn to-day in the principal armies of the

world are as fol¬ lows :

United States.

In the United States army there are three recognized uniforms known as full dress, dress and service. Officers attending social func¬ tions of a military nature are permitted to wear a snecial full-dress uniform of a cut similar to civilian evening dress.

The full-dress coat for officers is dark blue and double-breasted, the dress coat is dark blue and single-breasted having concealed buttons, the service coat is single-breasted and of an olive drab color. The coats of all enlisted men

are single-breasted, dark blue for full dress and dress and olive drab for service. Officers wear their insignia of rank on the sleeves of their full-dress and special full-dress coats, and on the shoulders of their dress and service coats. With the dress coat the distinctive in¬ signia forms a part of the shoulder strap, the field of which differs in color according to the arm of the service to which the wearer be¬ longs ; on the service coat the device is attached directly to the shoulder loop which is of ˆie same material as the coat.

Sleeve Insignia.

Major-General. — Two silver stars placed above a band of gold embroidered oak leaves which encircle the cuff.

Brigadier-General. — One silver star placed as above.

Colonel— Five strands of gold wire lace arranged in the form of a knot extending from the cuff to just below the elbow.

Lieutenant-Colonel. — Four strands.

Major. — Three strands.

Captain. — Two strands.

First Lieutenant. — One strand.

Second Lieutenant. — Without gold lace.

Shoulder Insignia.

Major-General. — Two silver stars.

Brigadier-General. — One silver star.

Colonel. — One silver eagle.

Lieutenant-Colonel. — One silver leaf.

Major. — One gold leaf.

Captain. — Two silver bars.

First Lieutenant. — One silver bar.

Second Lieutenant. — One gold bar with a blank field with dress uniform, no insignia with service uniform.

Officers of the United States army wear the letters <(U. S.® on the collars of their dress and service coats; officers of the United States Volunteers the letters <(U. S. V.® ; officers of the National Guard the initial letters of their respective States, unless when in national service when ((N. G.® is superposed on (<U. S.® Na¬ tional army officers wear <(N. A.® over <(U. S.,® Reserve officers <(U. S. R.®

Each branch of the service and each staff department has a distinctive color with which the uniforms of the members of that portion of the army are faced.

The following are the colors of the different facings :

Staff, Corps. — Dark blue.

Engineers. — Scarlet piped with white.

Signal Corps. — Orange piped with white.

Ordnance Department.— Black piped with scarlet.

Medical Corps. — Maroon.

Quartermaster Corps.— Buff.

Cavalry. — Yellow.

Artillery. — Scarlet.

Infantry. — Light blue.

The rank of non-commissioned officers is in¬ dicated by means of chevrons, of the color of the arm of the service to which the soldier belongs, worn point upward midway between the elbow and the shoulder on the sleeves of all uniform coats.

Sergeants wear three stripes, corporals two and lance corporals one. In addition to his stripes, a regimental sergeant-major has an arc

of three bars, a battalion sergeant-major an arc of two bars, a battalion quartermaster-sergeant a tie of two bars, a first sergeant a lozenge and a company quartermaster-sergeant a tie of one bar. Non-commissioned officers of the different departments wear the distinctive de¬ vices of their departments with ‘their chevrons.

Rank of non-commissioned officers is fur¬ ther indicated by the width of the trouser stripes, sergeants wearing a one and one-quarter-inch stripe, corporals a one-half-inch stripe.

To indicate service in war all enlisted men who have seen such service are entitled to wear on the sleeves of their dress coat a diagonal half chevron of white cloth, piped on each side with the facing of the arm of the service in which they earned the right to wear the chevron.

Confederate States.

During the Civil War the rank of officers and non-commissioned officers of ‘the Confed¬ erate army was indicated in the following man¬ ner, the insignia being displayed upon the uni¬ form coat, which for officers and enlisted men was double breasted and of -a cadet gray color.

Rank of officers was designated by an orna¬ ment of gold braid worn on both sleeves of the coat extending around the seam of the cuff and up the outside of the arm to the bend of the elbow. The ornament was composed of four braids for general officers, three for field offi¬ cers, two for captains and one for lieutenants. Besides this sleeve

decoration, the rank of offi¬ cers was further shown bv devices worn on the collar of the tunic as follows:

General Officers. — A wreath with three stars enclosed, embroidered in gold.

Colonel. — Three gold stars arranged hor¬ izontally.

Lieutenant-Colonel. — Two gold stars.

Major. — One gold star.

Captain. — Three gold bars arranged hor¬ izontally.

First Lieutenant. — Two gold bars.

Second Lieutenant. — One gold bar.

Rank of non-commissioned officers was indi¬ cated by chevrons worn on both sleeves of the coat above the elbow, point downward, of the color of the facing of the arm of the service to which ‘the wearer belonged.

Sergeant-Major. — Three bars and an arc in silk.

Quartermaster-Sergeant. — Three bars and a tie in silk.

Ordnance-Sergeant. — Three bars and a star in silk.

First Sergeant. — Three bars and a lozenge in worsted.

Sergeant. — Three bars in worsted.

Corporal. — Two bars in worsted.

The coats of both the officers and of the enlisted men were piped with a facing of the color of the arm of the service to which they belonged, the facings being as follows :

General Officers, Adjutant-General’s Depart¬ ment, Quartermaster-General’s Department, Commissary-General’s Department and Engi¬ neers. — Buff.

Medical Department. — Black.

Artillery. — Red.

Cavalry. — Yellow.

Infantry. — Light blue.

Great Britain.

Insignia of rank in the British army is worn on the sleeves and overcoat shoulders by officers, and on the right sleeve of the coat by enlisted men.

The rank badges of the officers, which are of embroidery, and which are attached to the shoulder pieces of the coat, are as follows:

Field-Marshal. — Crossed batons on a wreath of laurel, with a crown above.

General. — Crossed sword and baton, with star and crown above.

Lieutenant-General. — Crossed sword and

baton, with crown above.

Major-General. — Crossed sword and baton, with star above.

Brigadier-General. — Crossed sword and

baton.

Colonel. — Crown and two stars below.

Lieutenant-Colonel. — Crown and one star below.

Major. — Crown.

Captain. — Three stars.

Lieutenant. — Two stars.

Second Lieutenant. — One star.

Prior to May 1902, a captain wore two stars, a lieutenant one star and a second lieutenant had no badge of rank.

Regimental officers having brevet rank wear the badges of their army rank, department offi¬ cers having honorary rank the badges of that rank.

The rank of non-commissioned officers is indicated by means of a chevron, worn point downward, on the sleeve of the coat above the elbow. A sergeant wears three stripes of gold braid, a lance sergeant three stripes of worsted, a corporal two stripes of worsted and a lance corporal one stripe of worsted.

Germany.

Insignia of rank in the German army is worn on the shoulders by officers and on the collar by non-commissioned officers.

Prior to 1808 there were no recognized badges of rank in the Prussian army, although Bavaria had already adopted them to some extent. During that year a system of rank badges was devised for the officers of the Prus¬ sian army which were worn on the shoulder pieces of the coat. During the campaign of 1813—14 these shoulder pieces were converted into epaulets and the insignia of rank was transferred to them, and the epaulet has eve/* since remained the distinctive mark of the offi¬ cer. The German army in 1914 was composed of 22 army corps named after the different kingdoms which composed the empire. Each kingdom had some distinctive mark which was worn only by its troops; the insignia of rank however was the same throughout the army without regard to corps or arm of service.

Except in the case of a general field-mar¬ shal, the rank of officers is indicated by means of stars worn on the shoulder knots or epaulets.

Officers below the grade of major wear shoulder knots or scale-like epaulets, all other officers fringed epaulets. Shoulder knots are formed of half moon shaped pieces of gold or silver embroidery (according to the regiment) enclosing a cloth field of the color of the army corps to which the regiment belongs. On the field is displayed the regimental number and the

insignia of rank. Epaulets for officers below the grade of major-general are of the same design as that of the shoulder knot with the addition

of gold or silver fringe, according to the embroidery of the knot.

The epaulets of general officers are of silver bullion.

Insignia of rank for officers is as follows:

General Field-Marshal. — Two gold crossed batons.

Colonel-General. — Three gold stars.

General of Infantry or Cavalry. — Two gold stars.

Lieutenant-General. — One gold star.

Major-General. — Blank epaulet.

Colonel. — Two gold stars.

Lieutenant-Colonel. — One gold star.

Major. — Blank field.

Captain. — Two gold stars.

Field Lieutenant. — One gold star.

Second Lieutenant. — Blank field.

Non-commissioned officers wear the insignia of their rank on the standing collar of their coat, the different grades being distinguished in the following manner :

Lance Corporal. — Two small buttons of gold or silver (according to regiment) worn, one on each side of the collar directly above the shoulder.

Corporal .— A stripe of gold or silver lace extending around the too of the collar.

Sergeant. — The same collar stripe as that of a corporal with the addition of two large buttons worn on either side of the collar in the same manner as the buttons of a lance corporal.

France.

In the French army, insignia of rank is worn on the sleeves of the uniform coat by both officers and enlisted men. For officers it con¬

sists of stripes of gold or silver braid, according to the arm of the service, worn either straight across the sleeve directly above the cuff, or arranged in the form of a loop extending from the cuff to a point midway between the elbow and the shoulders. For enlisted men it consists of stripes of red or yellow cloth, or gold or silver braid, worn diagonally across the sleeve of the coat above the cuff.

Officers of infantry, engineers, spahis and of the Garde Republican wear straight gold stripes; officers of cuirassiers, dragoons, chas¬ seurs a cheval, hussars, chasseurs d'Afrique, zephirs, and of the gendarmie, straight silver stripes, officers of zouaves, turcos and artillery, looped gold stripes.

Corporals of infantry, zouaves, cuirassiers, dragoons, chasseurs a cheval, hussars, artillery and engineers wear red stripes corporals of turcos, chasseurs a pied, zephirs, chasseurs d'Afrique and spahis, yellow stripes.

The distinctive insignia of ' the various grades is as follows :

General of Division — Six stripes of black mohair braid arranged in the form of a pointed loop, and two silver stars on epaulets.

General of Brigade. — Six stripes of black mohair braid arranged as for a general of divi¬ sion, and one silver star.

Colonel. — Five stripes of gold or silver braid.

Lieutenant-Colonel. — Three stripes of gold and two of silver, or three of silver and two

of gold.

Major. — Four gold or silver stripes.

Captain. — Three gold or silver stripes.

Lieutenant. — Two gold or silver stripes.

Sous Lieutenant. — One gold or silver stripe.

Sergeant-Major. — Two gold or silver diag¬ onal stripes.

Sergeant. — One gold or silver diagonal stripe.

Corporal. — Two red or yellow diagonal stripes.

Adjutants rank between officers and non¬ commissioned officers, a grade corresponding to that of a warrant officer of the United States navy. They wear practically the same unitorm as that of a sous lieutenant, but their stripe is of the opposite color from that of the officers of their regiment.

Insignia of rank is also worn on the cap by officers, the cap being braided to conform with the sleeve decoration. When in full dress, offi¬ cers wear epaulets of gold or silver accord¬ ing to the arm of the service to which they belong.

Austria-Hungary.

In the Austrian army, the insignia of rank is worn on the standing collar of the coat by both officers and enlisted men. Officers below the grade of major and all non-commissioned officers wear the badges of their rank upon a field of cloth, of the color of their regimental facing, extending from the front of the collar to the line of the shoulder piece; all other offi¬ cers wear their badges of rank upon a field of gold.

The following is the distinctive insignia of the different grades :

Commander-in-Chief. — Gold collar embroid¬ ered with oak leaves.

Marshal. — Three gold stars.

Field-Marshal. — Two gold stars.

Major-General. — One gold star.

Colonel. — Three silver stars.

Lieutenant-Colonel. — Two silver stars.

Major. — One silver star.

Captain. — Three gold stars.

First Lieutenant. — Two gold stars.

Second Lieutenant. — One gold star.

Sergeant. — Three worsted stars, and a yel¬ low stripe extending around the front and lower side of the collar field.

Lance Sergeant. — Three worsted stars.

Corporal. — -Two worsted stars.

Lance Corporal. — One worsted star.

Italy.

In the Italian army the insignia of rank, except in the case of general officers, is worn on the sleeve of the coat. The design, which is that of a loop, extends from the cuff to the elbow.

General officers wear one, two or three stars on shoulder straps of bullion according to rank. Sleeve insignia is as follows:

Colonel. — One wide and three narrow stripes of gold braid. Three stars on shoulder straps with gold lace edging.

Lieutenant-Colonel. — One wide and two narrow stripes of gold braid. Two stars.

Major. — One wide and one narrow stripe of gold braid. One star.

Captain. — Three narrow stripes of gold braid.

First Lieutenant. — Two narrow stripes of gold braid. Three stars on plain shoulder strap.

Second Lieutenant. — One narrow stripe of gold braid. One star.

Sergeant. — One red stripe with one gold stripe underneath.

Corporal. — One red stripe.

Spain.

The insignia of rank in the Spanish army is worn on the cuff of the coat by both officers and enlisted men. It consists of a form of

braiding, technically known as galones, of gold, silver or cloth, which extends across the top and down the back of the cuff. These galones vary in width according to rank and are of gold in some regiments and of silver in others. Stars of either gold or silver, to match the galones, are worn by all officers below the grade of brigadier-general.

The distinctive insignia of the various grades is as follows:

Captain-General — Three stripes of twisted gold braid.

Lieutenant-General. — Two stripes of twisted gold braid.

Major-General. — One stripe of twisted gold braid.

Brigadier-General. — • One stripe of twisted silver braid.

Colonel. — Three stripes of gold or silver braid (according to regiment) of five threads each, and three eight-pointed stars, of gold or silver, worn below the galones.

Lieutenant-Colonel. — Two stripes and two stars like those of a colonel.

Major. — One gold and one silver stripe, and one gold and one silver star worn below the galones.

Captain. — Three stripes of gold or silver braid, and three stars to match, worn above the galones.

Lieutenant. — Two stripes and two stars like those of a captain.

Ensign. — One stripe and one star like those of a captain.

Staff-Sergeants. — One stripe like that of an ensign.

First Sergeant. — Three narrow gold or sil¬ ver stripes.

Sergeant. — Two stripes like those of a first sergeant.

Corporal. — Three stripes of scarlet cloth.

Lance Corporal. — Two stripes of scarlet cloth.

Russia.

Russian army officers wear their insignia of rank on their shoulders, the distinctive badges being displayed upon shoulder straps extending

from the sleeve to the collar, when in undress and service uniform, and on shoulder knots and epaulets when in full dress. The following are the designs of the different shoulder straps and the badges of rank worn with them..

For general officers a strap of zig-zag pat¬ tern.

General. — No badge.

Lieutenant-General. — Three stars.

Major-General. — Two stars.

For field officers, and staff officers of the same rank, a strap containing two stripes.

Colonel.— No badge.

Lieutenant-Colonel.— Three stars.

For company officers, and staff officers of the same rank, a strap containing one stripe.

Captain. — No badge.

Second Captain. — Four stars.

First Lieutenant. — Three stars.

Second Lieutenant. — Two stars. Sergeant-majors, sergeants and corporals have respec¬ tively three stripes, two stripes and one stripe on their shoulder-strap.

The Hussars of the Guard have a special form of shoulder strap but the insignia dis¬ played thereon is the same as that worn by the rest of the army.

In addition to the stars, the shoulder straps bear likewise the numbers or letters designat¬ ing the unit to which the officer belongs. The different colors of the straps denote the various arms of the service.

Japan.

The Japanese wear the insignia of their mili¬ tary rank on their sleeves, the design, which is in the form of a pointed loop of braid,

extend¬ ing from the cuff to a point midway between the elbow and the shoulder. The number of stripes which compose the loop indicate the dif¬ ferent grades of rank.

For all officers except those of the Pay and the Medical Corps, the stripes are of gold, for the officers of the Pay Corps they are of silver, and for the officers of the Medical Corps of alternate silver and gold. General officers wear their stripes above a band of gold ; all other officers wear them above a pointed cuff of the color of the arm of the service to which they belong.

The colors which denote the various arms of the service are, scarlet for infantry, green for cavalry, yellow for artillery and dark red for engineers.

The sleeve insignia of officers is as follows :

Marshal. — Seven stripes.

General. — Same as marshal.

Lieutenant-General. — Six stripes.

Major-General. — Five stripes.

Colonel. — Six stripes.

Lieutenant-Colonel. — Five stripes.

Major. — Four stripes.

Captain. — Three stripes.

First Lieutenant. — Two stripes.

Second Lieutenant. — One stripe.

The rank of non-commissioned officers is indicated by means of stripes of the color of the arm of the service to which the wearer belongs, worn in the form of a band around the cuff.

First Sergeant. — Three stripes.

Sergeant. — Two stripes.

Corporal. — One stripe.

MILITARY LAW. See Law, Military.

MILITARY MASTS, in naval architecture, masts on a modern fighting ship, provided purely for military purposes. They are of steel, and hollow, and through them access is had to the conning tower on the superstructure of the deck where are the wheel, the wires communicating to all parts of the ship, and where the captain generally takes his stand; to the fighting-top with its rapid-fire guns; and to the lookout far above all of these.

MILITARY MINING. See Military Engineering.

MILITARY MUSIC. See Band; Music.

MILITARY OCCUPATION, Law of.

See Law, Military.

MILITARY ORDERS. See Orders, Royal.

MILITARY POLICE, in the United States army police duty is required of the provost guard ; in the British army it consists of mounted and unmounted branches of the regu¬ lar army service; in France police duty is performed by the gendarmes (q.v.) ; in Canada, the Northwest mounted police do patrol duty, and there are similar bodies in Australia. In South Africa, the Cape mounted police are available for military duty, and there are simi¬ lar forces in most of the African colonies.

MILITARY PRISONS, in the United States, penitentiaries or prisons set apart for military convicts. Long term prisoners are sent usually to the military prison at Fort Leavenworth, Kan., or on Alcatraz Island in San Francisco Bay. For small offenses prison¬ ers are confined in the smaller prisons con¬ nected with forts and barracks. Most of the prisoners in the Department of the East are confined at Governor’s Island, N. Y.

MILITARY PUNISHMENTS. See Law, Military.

MILITARY RAILROADS. The general subject of military railroads includes the loca¬ tion, construction, operation and maintenance of railroads in the theatre of war under mili¬ tary auspices and for military purposes ; that is, with a personnel consisting of officers, enlisted men and civilian employees, and for the main purpose of facilitating the movements and sup¬ ply of an army. The difference between war and peace conditions causes a wide departure of military from civil railroad practice. The more prominent conditions of military railroad service are :

1. Quick results for a short period.

2. A trained personnel for the full develop¬ ment of the mechanical possibilities of the property.

3. Moderate and practically uniform speed requirements for all traffic.

4. A civil road is operated on the presump¬ tion that the track is safe; a military road must be operated on the presumption that the track is unsafe.

5. The property is usually in fair but un¬ equal condition, often hastily restored after partial demolition. The operation of the whole depends on the condition of the most inferior parts.

6. A military road is best operated with an ample supply of motive power and rolling stock, and a moderate speed : whereas on a civil road the tendency is to increase speed to econo¬ mize motive power. The known ratios of equipment and mileage on civil roads cannot be taken as sufficient for military roads.

Railways constructed and operated for mili¬ tary purposes vary from a rough, narrow-gauge ■ road on which the motive power is man or (mule, to a fully equipped modern, standard-gauge road. The first would probably be used in the approaches of siegeworks or to supply an army in a winter camp or a fortified position of great extent, and the latter when an existing commercial line is taken over for military uses. Between these two extremes are numerous grades of railways, but each grade shades grad¬ ually into the next above and below, and any considerable classification must be artificial and of very little use in discussing the general sub¬ ject. The only classification that seems logical is to divide them into those that are built and operated within

and beyond the field of the enemy's field of observation and fire. The former are called combat railways and the lat¬ ter supply railways.

Within the field of observation and fire of a besieged place practically all movements must be made under artificial cover. The location of

Commander of Lino of Commonicntion |

* " - I

I Chief of Staff of Line of Goftirruinicat'on 1

{ Director of Railwoys |

/

these lines of approach are dictated by military principles, and the line of the combat railway will therefore be determined, not by questions of economy, or ease of construction, but by the location of the siege approaches and paral¬ lels. For the same reason, the grade of the line is practically thrown out of the consideration, although a slight change in the direction of the approach might be made to keep the grade of the line below the limiting grade, if by such a change no military advantage were lost. This limiting grade should be kept as low as prac¬ ticable, for the difficulty of moving cars under such adverse conditions is very great, and for any slope greater than six or eight feet in a hundred, the difficulties of ascent with loaded cars will be great, even for animal traction ; and above that, the cars would have to be moved by cable.

The possibilities of combat railways for both offense and defense are very great . and have never been fully realized. Guns up to six inches calibre and howitzers of larger calibre can easily be fired from cars. Some blocking up may be necessary. Such use of a railway increases greatly the amount of artillery avail¬ able in any sector of the defense whence it can be as rapidly moved elsewhere. Owing to the light

weight or narrow-gauge cars, an empty car can be easily lifted back on the track if it is derailed. With loaded cars, however, this is not always the case, and car replacers will be necessary to facilitate this replacing without unloading the cars. Whether a road is con¬ structed or merely taken over for military pur¬ poses makes no difference in the operation and maintenance of the line. The unit of organiza¬ tion is the division, or a section of line from 150 to 300 miles in length which is self-con¬ tained. The persons in charge of a military railway are divided into two classes — Military Controlling Staff and Civilian Officials. The former is chosen from engineer officers and others who have had railway experience, and their function is to make known the military desires and to see that the roads are operated so as to attain these ends. Having given their instructions, they allow the civilian officials and employees to work out the technical details in the manner dictated by their railway experi¬ ence; the military staff only interferes in cases where they believe that the civil officials are not endeavoring to carry out the military plans, or are not succeeding in doing so. The organiza¬ tion and line of responsibility and the relation of the military controlling officials are shown in the diagram.

The presence of civilian employees on a military railroad, particularly in the lower grades, is likely to prove a source of friction with the personnel of the service of defense, with the railroad troops and with troops of all kinds traveling on the line. . Furthermore, the lack of military discipline is prone to cause difficulty in strikes, disagreements as to pay and promotion and individual insubordination and desertion. It is seldom practicable to secure a purely military organization, but in the case of railroads operated in occupied foreign ter¬ ritory effort should, be made to. secure a mili¬ tary organization with fixed military rank, pay and allowances for all employees, if possible, and in any case for all train crews, yard oper¬ atives and the higher officials. The transpor¬

tation and equipment of railway troops should be that provided for an engineer regiment in so far as relates to supply, shelter and admin¬ istration : technical equipment witn its neces¬ sary transportation is furnished as deemed nec¬ essary from the base by the director of rail¬ ways. Sanitary personnel and equipment should be the same as provided for an engineer regiment.

The duties of the director of railways of an army and his staff are, to operate the railroads so as to promote the plans of the commanding general, to supply the military knowledge not possessed by the

railway staff and to shield the railway operatives and officials from unau¬ thorized military interference. In any large theatre of operations there are one or more independent lines of railwav. For military purposes all such lines should be operated as a single system under the director of railways. If only one line exists, the director of railways acts as the military executive of the line. If more than one line exists, he acts as military executor of the system and assigns an assistant director of railways to each separate line to act as military executive of that line. If two or more lines of communications exist in one theatre of operations, they might be operated as separate systems under separate heads if they were entirely separate lines physically ; but if at any point they come together, they should be operated under a single director of railways.

As soon as a railroad is taken under military control, a bulletin for railway use is published, giving the capacity of cars, and the maximum number of cars, loaded and empty, to be run in trains, where the whole tonnage rating of the engines cannot be utilized. The carrying capacity of coaches and other cars is given for both normal transportation and hurried trans¬ portation; the normal transportation is used unless the other be specifically stated, in which case trains are made to carry every available man that safety will permit. Rations to the men on the train are carried in the baggage cars, or kitchen cars if provided.

When an entire unit cannot be carried on one train, battalions can be broken up and certain companies assigned to one train, while the re¬ mainder follow in another. The assignment of troops to trains rests with the railway officials. Where regiments carry tentage and camp equipage these are normally sent ahead of the troops in one train and is not divided up amongst the trains carrying the troops. In in¬ fantry regiments, the officers' horses are shipped ahead in the train with the camp equipage. In mounted regiments, the first trains carry the horses, with men to look after them. The picket lines and a proper amount of forage are carried on the horse trains. Guns, caissons and wagons follow on trains in the rear of the regiments to which they belong. In loading artillery wagons on trains, they are loaded on the cars from a platform or from portable ramps. They are loaded on one car and run by hand or horse power to the car on which they are to be carried. The openings between cars are covered by plates of iron, or wooden runways, over which the vehicles may run. Unloading of troops and animals at or near the railhead must be expedited in every possible way, platforms and portable ramps

being supplied at all unloading points. The method of unloading is the converse of the method of loading.

The defense of a railway against a brigade or division that may be sent against it or its systematic destruction can only be made by a force of sufficient strength to meet and defeat the raiding forces. Besides these attacks by large bodies there are the continual depreda¬ tions against the line made by small bodies ranging from a regiment down to the lone indi¬ vidual who tries to burn a bridge or misplace a switch. The greatest difficulties in operating a road come from small bands which can operate against the line, especially in a hostile country, without great danger of apprehension. The defense of the railway is usually maintained by the combined use of block houses and armored trains. See Railway Engineering and Con¬ struction and Supply Railways.

Edward S. Farrow,

Consulting Military and Civil Engineer.

MILITARY RESERVATIONS, United

States, a general term applied to all military posts set aside for military occupation. In most instances large tracts of land surrounding military forts, schools, barracks, etc., are pur¬ chased by the government and improved and adorned; buildings, constructed thereon for officers' residences, parade grounds established and works of defense erected. The Presidio reservation in San Francisco is one of the lar¬ gest in this country.

MILITARY RULE. See Law, Military.

MILITARY SANITATION. Military sanitation is largely a matter of engineering combined with discipline. The health and fighting strength of a command is maintained by (1) excluding from the

service the physi¬ cally unfit and those predisposed to disease, by (2) the exercise of surgical and medical skill in promptly restoring the sick and wounded to duty, and (3) by securing preventive measures such as the various vaccinations, inoculations and prophylactic treatments tending to increase individual powers of resistance to disease or to prevent its development after infection. All of these are the special province of the Medi¬ cal Corps. <

The engineering problems connected with camp sanitation comprise water supply, drain¬ age, disposal of refuse (animal wastes, garbage and rubbish) and the selection and laying out of camp sites, or castramentation. Nearly all diseases to which the soldier is subject are caused by germs, which are either little animals or plants so very small that they can only be seen by aid of the microscope. All diseases caused by germs are “catching.® All other dis¬ eases are not “catching.® There are only five ways of catching diseases: (a) Getting certain germs on the body by touching some one or something which has them on it. Thus, one may catch venereal diseases, smallpox, measles, scarlet fever, chicken pox,. mumps, boils, body lice, ringworm, barber’s itch and other dis¬ eases. Wounds are infected in this manner, (b) Breathing in certain germs which float m the air. In this way one may catch pneumonia, consumption, influenza, diphtheria, whooping cough, tonsilitis, spinal meningitis, measles and certain other diseases, (c) Taking certain

germs in through the mouth in eating or drink¬ ing. Dysentery, cholera, typhoid fever, etc., may be caught in this manner, (d) Having certain germs injected into the body by the bites of insects, such as mosquitoes, fleas and bedbugs. Malaria, yellow fever, dengue fever and bubonic plague may be caught in this way. (e) Inheriting the germ from one’s parents.

In both permanent and temporary camps the water supply is a matter of the greatest im¬ portance both as to quality and quantity. Where the character of drinking water is the least in doubt it should be made safe by sterili¬ zation. The usual method of boiling cannot always be resorted to^* owing to lack of time and fuel, and troops in the field generally re¬ sort to the chlorination method of sterilization which simplifies the problem. The liquid chlorine treatment, though probably the most efficient, is not adapted to military field use on account of the apparatus required. Of the hypochlorites, that of sodium, in liquid form, is more efficient for its bulk, but that of cal¬ cium (bleaching powder) is ordinarily the more readily obtainable.

The latter, however, when loose or packed in cardboard, loses its strength very rapidly. It is best kept by mak¬ ing up and bottling a strong stock solution.

The strength used in sterilizing municipal supplies is 0.2 parts per million, that in the field about 10 times as great, or 2.0 per million. In the former case fresh powder, from air-tight drums, is usually available, the mixing is more thorough and the distribution more carefully regulated. Usually also the water has been partially purified by sedimentation in a reser¬ voir. In such cases, 20 minutes is supposed to render the water safe for drinking. For field use, a level teaspoonful of calcium hypochlorite (chloride of lime) is dissolved in two quarts of water for a stock solution. One teaspoonful of this solution is added to a gallon of water, or 10 tablespoonfuls to a barrel. The water is considered safe to use after standing for 30 minutes.

A sterilizing bag, of linen fabric, holding about 40 gallons of water, is issued to troops in the field. As the chemical acts better in clear water, a filter cloth is provided to strain it in filling the bag. The sterilizing medium is calcium hypochlorite, sealed in glass tubes, which are marked with a file to facilitate breaking them without fragments. They each contain about 15 grains of the chemical, which gives a proportion of 2.0 parts per million, sufficient to destroy germ life in even highly in¬ fected, though not in sewage polluted, waters. The bag is covered to keep out dust, and tjie water is cooled by the evaporation of the mois¬ ture which exudes through the fabric. Water is drawn off through small self-closing faucets set in a circle around the bag, slightly above the bottom.

A camp site requiring extensive drainage operations to make it habitable should not be adopted, as even when drained it will remain damp for a long time. Occasionally, however, sites are found which are otherwise favorable, but upon which water may be inclined to stand after a heavy rain. A simple system of ditches constructed by the troops themselves will usu¬ ally remedy this defect. The camp should never be sited upon the lowest ground in a neighborhood, even if perfectly dry, as drainage

during and after rains will then be very diffi¬ cult.

The interior drainage of the camp is taken care of by gutters along the company's streets and by crowning the latter to avoid puddles and mudholes. Ditches are dug around the tents, directly under the canvas walls, with the earth banked up inside the tent. These ditches con¬ nect with the street gutters. The ground under picket lines is crowned and gutters dug, leading to lower ground ; otherwise, the ground would become very muddy in wet weather.

Animal wastes are the most dangerous to the health of the camp, and naturally the great¬ est precautions must be taken to see that these are finally disposed of in a manner which will effectually prevent their ever becoming a source of infection or nuisance.

Where a system of water carriage can be in¬ stalled, this method is of course the most de¬ sirable. Its layout and operation will differ little from ordinary municipal practice. Such a system will be quite a tax upon the water supply of the camp, as well as a considerable additional expense, and may require treatment works if the discharge is into an inland river. In tidal estuaries or waters not used for public supplies these works would not be necessary. Where the cost would be prohibitive, or where the water supply is insufficient for water car¬ riage, other systems must be adopted. Various systems of dry sewerage, as the pail system, have been advocated and used to a considerable extent, but are open to many objections, the principal one of which is the hauling or carry¬ ing of this matter through the camp. The ground about the pails becomes much polluted, accidents happen in removing them, causing pollution of the ground within the camp, and the final disposal is always a matter of much difficulty. Burial, dumping into water and in¬ cineration have all been tried and none found entirely satisfactory. The pollution of water supplies and the creation of a breeding place for flies are the main objections. Incineration usually creates an odor, which, while probably not a menace to health, is distinctly disagree¬ able when carried to camp. The most satis¬ factory method has been dumping into large pits, the deposits being covered with crude oil. This prevents odor and keeps the flies out. The problem of cartage through the camp, how¬ ever, and of cleaning the pails, has not been satisfactorily solved, and leads naturally to an inquiry as to the possibility of making the place of deposit the place of final disposal.

Kitchen wastes and kitchen water must be carefully regarded and

removed. Kitchen crem¬ atories and incinerators of the most ap¬ proved types should be freely used. The com¬ pany incinerator largely used in the United States army which is economical of fuel and efficient in the consumption of liquids and solids is constructed as follows: Dig apit five feet long, three and one-half feet wide and one foot deep. Fill the ground level with rock. Build a rim wall one foot thick and one foot high on two sides and one end. Bank earth on the outside against the rim walls to the top of same leaving open the end with no rim wall. If clay is available make a mortar of same and plaster it over the earth, banked against the two sides and one end; When hard this clay covering may be whitewashed. A

man should be specially detailed to care for the incinerator and keep it clean and neat at all times. The style of incinerator shown in the drawing employs an extra flue tc secure an induced draft.

Stb/ey <Sfove

Incinerator with induced draft.

Vermin may be killed with gasoline, or by hot ironing or scorching underclothing. It is comparatively simple, by attention to personal cleanliness, to destroy full-grown lice, but the eggs are killed with difficulty, for they are de¬ posited in the seams of underclothing, trou¬ sers, *etc.* Brush thoroughly, apply heat or rub in the special grease (vermijelli) , which smothers the young on emerging from the eggs. Dust also with vermin powder.

In general, the functions of the sanitary service are as follows: (a) The institution of all practicable sanitary measures, to the end that the fighting forces suffer no depletion in strength due to avoidable causes, (b) The temporary care and professional treatment of the sick and wounded and their transportation to accessible points where they are transferred with as little delay as possible to the line of communications, (c) The supply of the neces¬ sary sanitary equipment. In addition, the sani¬ tary service is charged with the

preparation and preservation of individual records of sick¬ ness and injury in order that claims may be adjudicated with justice to the government and the individual.

The personnel of the sanitary service in the zone of the advance may be classified into two general groups, as follows • First, that attached to organizations smaller than a brigade, which functions under the imme¬ diate orders of the organization commander and accompanies its unit into combat; second, that attached to the sanitary train which functions under the orders of the divi¬ sion surgeon in accordance with such general or specific instructions as he may receive from the division commander. When necessary the sanitary personnel attached to organizations may be temporarily detached, in whole or part, and directed to operate with the sanitary train.

MILITARY SCHOOLS. See Military Education; United States Military Acad¬ emy.

MILITARY SCIENCE, Development of.

In tracing here the development of military science, we shall begin with the 19th century because everything relating to the military art

before its opening may be regarded as taking on, if the expression be not too strong, an archaeological character. In a military point of view, this century divides itself naturally into certain well-marked periods. We have first the great era of the Napoleonic wars, closed by the battle of Waterloo. This is followed by long years of peace, broken at last by the Crimean War. The next period to come under notice is that of our own Civil War, in which, in reality, modern conditions of warfare may be said to have taken their rise. The use of independent cavalry, the proper organization of field artil¬ lery, the entrenched battlefield, the influence of railways, to say nothing of other particulars now regarded as essential by all military nations, find their first formal expression, if not always their full development, in this great struggle. Recrossing the Atlantic, the next term in the military

progress of the century is found in the rise of Prussia, through the defeat of Austria in 1866, as a power of the first^ rank, a position confirmed four years later by its com¬ plete overthrow of France. Since that epoch, military development, where fostered, has con¬ sisted almost wholly in an imitation, more or less close, of the German system of organiza¬ tion. These last years are marked, moreover, by a hitherto unparalleled application of the arts and sciences to the improvement of the material of war.

It is clear, then, that the growth of the military art during the 19th century was in no wise a direct function of the time. In some of its most notable aspects the art developed more rapidly during the past 40 years than it had in the preceding 100. So conspicuously is this true that we may not assert that its state at the opening of the century was even a transi¬ tion state. In all countries, with the exception of France, the conditions of the 18th had over¬ flowed almost unchanged into the 19th century. The era was that of the great Frederick. His example still bore undisputed sway(> to such a degree, indeed, that the husk was mistaken for the kernel, the appearance substituted for the reality. The armies of the day were in all essentials hired armies, the soldiers mercenaries, in the sense that war was _ largely a trade. Organization, recruiting, mobilization, adminis¬ tration, supply, transportation — all these, the life-blood of a modern army, were, if not un¬ known, at least not understood as they are to-day. They had not as yet been generalized into a continuing system applicable to a state either of peace or of war.

Similarly of arms and of equipment: the flintlock musket, found in the hands of the troops of all armies, had been for many years substantially a constant quantity, while gun¬ powder, the only explosive and propelling agent employed, had an unbroken ancestry of centuries of continuous use. The great objective in the training of men, France again possibly excepted, lay in the development of a machine-like pre¬ cision of drill, and this rigidity was carried so far as to convert manoeuvring, . even under fire, into a sort of geometrical exercise. On the field, deep columns and serried ranks were the rule. Infantry opened fire at 200 yards with un¬ certain, if not innocuous, results at superior ranges. Naturally, under these conditions, cavalry could and did intervene directly in the decision of affairs on the battlefield. The range

of field artillery was limited, and, until Na¬ poleon's appearance, its powers and possibilities were not, on the whole, well understood.

The picture changes when we turn to the 20th century. The army is now the <(,nation in arms® — that is, war is no longer a trade, but a duty, and preparation for war a personal obligation to the state. Upon a declaration of hostilities, at the present day, the effort is made to bring the full strength of the nation to bear, or in other words, mobilization takes place. But this implies a full degree of preparedness, and preparedness, in its turn, a thorough study and application of the principles of organization and training, of supply and administration. Here we touch upon a well-defined characteristic of final as contrasted with initial conditions ; prep¬ aration for war goes on unceasingly, in times of the profoundest peace, although no possible cause for war can be discerned in any direction. On the material side, the transformation is equally complete. All the possible resources of modern science have been levied on to con¬ tribute their share not only toward the improve¬ ment of weapons and of war material in gen¬ eral, but toward supplying the means of placing and maintaining an army in the field. ‘ Where 100 years ago but one explosive was known, modern chemical science has supplied hundreds, and the end is not yet. Whereas, in the days of cur grandfathers, any respectable foundry could turn out serviceable guns, to-day, the gun is the finest product of metallurgical science, and its Construction necessarily limited to specialists. Instead of the flintlock, harmless beyond 200 yards, we have the magazine rifle, sighted up to 1,800 yards, and deadly two miles and more away. The muzzle-loading field-piece of limited range and accuracy has given way to the rapid-fire, breech-loading field gun, delivering from 10 to 15 aimed rounds of shrapnel a minute upon a target so distant as to be practically invisible to the naked eye, with an accuracy so great in trained hands that exposure is suicide. Under these conditions in open combat, the masses of elder days have dissolved into thin lines of invisible skirmishers, and cavalry has all but disappeared from the field of actual conflict. In general, armies have increased vastly in size, and important battles last for days and even months.

In war, as in everything else, the secret of success lies in organization and preparation. It is interesting, then, to note how two separate and apparently independent conditions have been combined in the evolution of the modern army. The first of these in time, and, with reference to actual combat, in importance, is the creation of the army corps by Napoleon in 1805. What a long step forward this was may be inferred from the fact that Frederick the Great’s army was not formed into even brigades and divi¬ sions. Besides assuring unity of command, the creation of this strategic unit has led in .modern times to the full recognition and definition of the <(tactics of the three

arms.® All modern armies, therefore, whether they belong to mili¬ tary or to unmilitary nations, on taking the field are formed into corps, and these corps are maintained as organic units in times of peace by the great military nations of the world for administrative as well as for purely military reasons.

Hardly less important as leading to a prin-

ciple of organization was the limitation imposed by Napoleon after Jena upon the size of the Prussian army. This was never to exceed 42,000 men, and, in fact, it never did; that is, at no time while the limitation was in force did Prussia keep more than that number of men under arms. But, thanks to Von Scharnhorst's foresight and intelligence, the members of this army were continually changing. As fast a$ trained, they were liberated to make room for new and untrained men. With the immediate results of this idea we are not here concerned : what we wish to bring out clearly is that this plan of organization, originally local in both time and circumstance, is to-day fundamental in the formation of the armies of all military states. Indeed, these, if the paradox be per¬ missible, may be said not to have a regular army at all. Great Britain has one, as have the United States, but in all other important nations the condition of universal military service has made the distinction superfluous, if not mean¬ ingless, by wiping out one of its terms. Hence, with the exceptions noted, a mold exists, so to say, a form, through which all citizens capable of bearing arms have to pass. From this comes the dictum, <(The army is to-day the nation in arms,® as distinguished from the purely profes¬ sional army of the earlier part of the century. The application of the principle of universal service has resulted naturally in a classification of the male population with respect to service. Thus we find in Germany the active army made up of the men with the colors, the reserve of the active army, the Landwehr and the Land-sturm (q.v.). Classes more or less similar exist in other countries under different names, the underlying principle being, however, substan¬ tially the same in all. This principle further leads directly to the distinction

between peace footing and war footing, passage from the one to the other being effected by mobilization, an operation unknown at the opening of the cen¬ tury. Since, moreover, the whole nation is the army, it results that the modern army has greatly increased in size, a result that would prove embarrassing but for the existence of the staff. It is clear that the formation, instruction, training, supply and administration of this army form a task of the greatest magnitude. Further¬ more, when once formed, if it be not intelli¬ gently led and accurately directed upon its ob¬ jective, it runs the risk, from its mere size, of degenerating into an armed mob. Hence the conditions leading to the formation of the modern army have led, pari passu, to the forma¬ tion of the modern staff. This simply means that by a natural evolution the functions of the staff have expanded until they now include duties not formerly contemplated. Thus the conception of a general staff, whose special business it is during times of peace to study and prepare for any campaign whatever on any theatre of war whatever, is distinctively modern. The existence of such an organization is evidently a necessity due partly at least to the great size of modern armies. This very con¬ dition, by increasing the difficulties involved, has suggested the only cure of these difficulties — a body of specialists trained to weigh them in peace" and to remove them in war. And so of the administrative staff under the same con¬ ditions : the supply of an army, taking that term in its most comprehensive sense, is reduced to

a continuously operating system. Obviously this particular question could not be left to look to chance for its answer.

The limits of this article forbid more than a mere mention of the influence of the railway, of the telegraph and of the telephone. The telephone is in current use upon the battlefield and wireless itself has been applied to military purposes both in action and in manoeuvres lead¬ ing to action. Without the railway, rapid con¬ centration and regular supply would be impos¬ sible, a matter of capital importance in view of the great numbers enrolled. It would be hazardous to assert that it has been a prime factor in determining these numbers, but there can be no doubt that it has wielded a great influence in this direction. Other things being equal, it is logical and proper to have a large army, because the means of transporting and of supplying a large army are at hand.

The art of war is usually defined to consist of two elements, strategy and tactics. Of these, the former is essentially immutable, its prin¬

ciples, few and simple, having remained un¬ changed throughout the whole course of history. The only recent development in strategy is one, therefore, affecting not its principles, but the means of applying those principles. The em¬ ployment of the railway, of the telegraph and of other means of communication has greatly increased the rapidity with which strategic com¬ binations may now be carried out, and has added to the number possible within a given time and area. In general, then, strategy is not a measure of the changes occurring between any two given epochs, while tactics, on the contrary, responding sooner or later, if not instantane¬ ously, to any new influence, does furnish such a measure. We shall here briefly consider the tactics of infantry from this point of view, because this arm is still the <(queen of battles, » and the others have to conform to its possibil¬ ities.

To clear the way, let us recollect that the tactics of infantry had remained substantially unchanged from 'the days of Gustavus Adolphus to those of Frederick the Great; that the latter, by the use of lines in place of columns as a habitual formation, had increased the mobility, and, by the substitution of an iron for a wooden ramrod, the rate of fire, of his troops. As, however, the range of the musket was extremely limited, fire was opened at very short distance, and, independentlv of any system of tactics, the bayonet was, therefore, a weapon of great im¬ portance. Indeed, it might happen on a rainy ' day that the bayonet was the only weapon avail¬ able. As was but natural, Frederick's system, known as the <(linear» system of tactics, was copied by all other armies.

With the French Revolution came a change. Unquestionably inspired by our own Revolu¬ tion, in which, for the first time, skirmishers ap¬ peared on the field of battle, the French aban¬ doning the precise linear system, substituted therefor small columns for manoeuvre and as¬ sault, and deployed lines for firing. In man¬ oeuvring, skirmishers covered the front, un¬ masking it as each company arrived on the firing-line. We note at once that this employ¬ ment of skirmishers is not the modern use, but, nevertheless, it marks the breaking of tradition. The French system, known as the perpendicular, was followed in all Napoleon's earlier cam-

paigns. In 1805 he prescribed that the normal formation of the division should be by wlinked brigades,® a disposition carrying with it the advantage of giving each brigade a separate objective. This principle is to-day fundamental in combat-tactics, even the company having its designated objective.

Frederick's system, decisively beaten at Austerlitz, was finally overthrown at Jena-Auerstiidt, and, in 1813, the tactics of the French, including the use of skirmishers, be¬ came universal. But before this the English had adopted a two-rank formation, and had successfully opposed thin lines to the heavy columns which the French, for reasons into which we need not here enter, had apparently found themselves compelled to readopt in the Peninsula. In fact, the type-formation was not as yet firmly fixed, the English using heavy columns at New Orleans, and the French, in spite of their experience in Champagne, re¬ suming them with disastrous results at Waterloo.

All the changes here touched upon, it will be noticed, are independent of any change or improvement in weapons, and are simply efforts in the direction of increased mobility and flexi¬ bility. Passing by the Crimean War in which, apparently, the experience of the past had been totally forgotten by both sides, we reach our own Civil War, "remarkable as a turning-point of tactics, there being scarcely a feature of the tactics of the present day that did not have its germ, its prototype, or its development in that great contest.® Both armies were now armed with the rifle, the extreme range being 1,000 yards; in the Union army the breech-loader made its appearance before the end of the war. Markmanship was of a high order on both sides, and infantry fire consequently so deadly as to effect marked changes in tactical formations. These are, briefly, attacks by rushes, attacks in successive deployed lines, the use of heavy lines of skirmishers in place of the line of battle, and the use of hasty entrench¬ ments. They were brought about by the com¬ mon sense of the American soldier, who. un¬ hampered by tradition, knew how boldly to adopt his tactics to the confronting situation.

Europe, however, was slow in learning the lessons of our war. In 1866 the Prussians, using the breech-loader against the Austrian muzzle-loader, generally attacked in company columns, preceded by skirmishers, who were ordered to feel and develop the enemy. But the Prussian privates instinctively left their columns to join the

skirmishers, with the re¬ sult familiar to all. Strange as it mav seem, the Prussian authorities failed to appreciate the new conditions of warfare, for, deprecating “the disorder and tumult of the impromptu at¬ tack-formation, which had sprung into being under the Austrian fire, … they waited for the appalling losses of a greater war to em¬ phasize the necessity of a change in their pre¬ scribed tactical methods.® This experience came in 1870. Both combatants were now armed with the breech-loading rifle, the Chassepot be¬ ing effective at 1,300 yards. Before the end of the war, under the superior rifle fire of the French, the Germans found themselves com¬ pelled to deploy their columns, the direct attack being made, and the hostile position invariably carried, by the rushes of swarms of skirmishers.

All the nations of Europe now hastened to bring their tactical systems into agreement with* the experiences of the Franco-Prussian War. But it took still another war -toˆ drive home the conclusions reached by us in 1861—65. The Turks, in 1877-78, armed with the Peabody-Martini rifle, a weapon vastly superior to any heretofore used, by their use of the American system of hasty entrenchments compelled the Russians finally to deliver their assaults in suc¬ cessive lines of deployed battalions.

This very brief outline shows us that the revolution wrought in infantry tactics has been due almost wholly to the improvements in the rifle. The most recent of these, namely, the introduction of rapid fire through the use of a magazine, will simply carry on the development along the lines already laid down, while the ad¬ vent of smokeless powder has increased the powers of the defense. All the conditions of the modern combat, therefore, combine ‘to make the frontal attack the exception, flank attack the rule, a principle which is characteristic of modern tactical methods. And it should be recollected that where flank attack is impos¬ sible (e.g., on the western front, War of 1914), frontal attacks are preceded by artillery preparation of so intense a character, that, under these circumstances at least, the artillery is the principal, the infantry, the auxiliary, arm.

But progress has been marked in other directions as well. We may remark the im¬ portance of “combined tactics,® or ((tactics of the three arms.® This, of course, is not a new idea; it has simply received fuller expression through a more stringent application of the principle of division of labor, growing out of the universal recognition of the corps as a strategic unit. As this is really a complete army in itself, though on a small scale, so its full effect can be felt only in case all the

arms composing it act in concert to secure the com¬ mon end. Hence, the powers of the three arms are, perhaps, more accurately measured, their relations to one another better adjusted. The new role of cavalry, too, deserves notice. If it has lost its former weight on the actual battlefield through the power of both infantry and artillery fire, it has gained in consequence of its employment in independent masses. Operating far in advance of the army, it is the purpose of these masses to cover its concen¬ tration and to screen its movements, while seeking at the same time to prevent the forma¬ tion of the hostile forces, and in any case to discover their emplacements, numbers and ob¬ jective.

In other ways, too, it has gained. The dis¬ mounted fire-action of: this arm — that is, its action on foot as in infantry — is now recog¬ nized, the alternative being helplessness on the tactical defensive. So highly have we developed this mode of using cavalry in our own country that many foreign writers have asserted that our cavalry is only mounted infantry. Our an¬ swer is that all European mounted troops are either reluctantly or unconsciously conforming to the type of the American cavalryman of 1864-65, without abating one jot or tittle of their right to be, and to be called, cavalry. In England, chiefly, a solution was sought in the creation of mounted infantry. The idea here was that the horse shall serve purely as a means of rapid transportation, his rider dismounting

on reaching the scene of action. No better ex¬ ample can be found than that furnished by the British themselves in South Africa, in their attempts to cope with the mobility of the Boers. The reader will recognize at once in the mounted infantry a reversion to the original type of dragoon. But mounted infantry has now ceased to exist.

We may fitly conclude this part of the dis¬ cussion by drawing attention to the increased responsibilities devolved by modern conditions of warfare on the private in the ranks. He has ceased to be considered a machine, mere food for powder, a molecule of the mass whose shock is to crush the adversary. On the contrary, as many

occasions will surely arise calling for the exercise of sound judgment, so is he expected to be an intelligent element of the national defense, his value to his country bearing a direct ratio to the degree to which his. intelli¬ gence can be awakened and trained.

No survey of the subject would be adequate without some reference to the immense develop¬ ment given by the mechanical spirit of the age to the enginery of war. Of course, the im¬ pulse in question is not purely military ; it is simply the application to war of a principle per¬ vading every other phase of life. In general, every invention that might possiblv increase the economy, certainty or rapidity of a displace¬ ment, whether of men, of material or of pro¬ jectiles, has been summoned to give its share of improvement. All inventions bearing on the transmission or acquisition of intelligence have been pressed into service. One of the latter is the balloon ; it antedates the century, but the idea of photographing the enemy's position from its car is new. So is the application of wire¬ less telegraphy to purposes of communication in the field; this invention was turned to a military end almost before it had definitely left the inventor's hands.

The greatest advance, however, has been in the perfection of man-killing machinery. Upon this one subject have been expended all the resources of modern metallurgical and chemical skill until the projectile weapon of the day, whether gun or small-arm, is a marvel of strength, accuracy and convenience. From the rude tube of our forefathers we have passed to engines of complicated structure, deadly be¬ yond the limits of unaided vision, and of a rapidity of fire undreamed of even 30 years ago. So great is the volume of fire, so de¬ structive the shrapnel, that in field artillery duels the question of success is reduced to that of being the first to get the range. Each class of guns must now have its special propelling agent, and a serious effort is making to dis¬ cover some means of launching in safety the frightfully destructive explosives due to modern chemical research.

Side by side with this sort of development has marched that of the art of protection. But here, in contrast with the increasing complexity of the means of offense, we remark the increas¬ ing simplicity of the means of defense. At the dawn of the century, the genius of Vauban still prescribed the bastion system for any and all sites to be fortified. Just as in the field, rigid and pedantic notions governed all troop-evolu¬ tions so in fortification the prevailing idea in each case was to furnish a rigid geometrical solution. But later the idea was first of all to

adapt the work to the site, independents of the type. Steel turrets, cupolas, armored case¬ mates, were provided for specially exposed points — a solution made possible bv the great general advance in metallurgy. Concrete dis¬ placed masonry, and the face presented to the enemy was always either of earth or, where that was impossible, of steel.

Upon the general question of fortifications, authorities were divided into two camps. Those of the first asserted that fortresses covered a mobilization, retarded the enemy, allowed a defeated army to refit under shelter. Their op¬ ponents, on the other hand, maintained that they tied down an army, reduced the numbers of the field armies; that forts would be covered and not reduced ; that they would not keep out a superior, and would be useless against an in¬ ferior, enemy; and that a government could not afford to man them, if the antagonists we e otherwise evenly matched. In the meantime, the frontiers of Europe bristled with forts, and most important capitals were the centre of a vast entrenched camp. The great contribution of the 19th century to the question of fortifica¬ tion was not so much one relating to the type, though this was marked, as one relating to the occasion. From hasty or improvised entrench¬ ments these latter days have seen the evolution to such defenses as those first of Petersburg, then of Plevna, and lastly of the battlefields of the War of 1914, erected not with the deliberation of peace, but under the stress of war, to meet its exigencies as they arise. See Fortifications.

The principles hereinbefore set forth came to their full growth during the World War. The nation in arms, the importance of communica¬ tion, the application of mechanical resources, the power of artillery, all these and other mat¬ ters as well, received in that war an extension undreamed of before. To these must be added aeronautics and the use of the motor vehicle. So marked has been the effect of all these ele¬ ments, that on one front, the western, war may be said to have changed its face, in that it passed from field fighting to trench-fighting; it is within the compass of the truth to say that on this front we have had the phenomenon of two armies besieging each other. And this example is typical of future conflicts between two numerous, brave, highly-trained and com¬ pletely equipped adversaries.

The principle of the ˆnation in arms” coupled with growth of population (Germany) or with the existence of a great population (Russia) has led to the formation of armies so vast that operations pure and simpleˆ are continental in range, e.g., western front, from the Channel to Switzerland; eastern, from the Baltic to Rumania. Hence violations of neu¬ trality with consequent degradation of interna¬

tional law. The needs of the vast modern hosts call for an equally vast development of the systems of transportation. Hence not only are railway systems increased in time of peace, sometimes' merely for future military necessi¬ ties, but motor transport has been, and will in future be, called upon to the limit of its possi¬ bilities. An excellent illustration is furnished by the French at Verdun, regularly supplied by a train of over 6,000 motor vehicles. But the application of motor resources is only one item of the "mobilization of industries" by a

nation at war, a mobilization as vital to suc¬ cess as the Science of the generals and the valor of the men on the line, and that will as¬ suredly be a factor of dominating importance in any war to come. In other words, whenever a great nation goes to war, not only must it put into the field and there maintain enormous armies, whose effectives are numbered by mil¬ lions, but the energies of the people at home must be wholly concentrated upon the supply of those armies in the field. The expression (<the nation in arms^ has taken on a new and significant meaning.

The most important of the supplies just mentioned, in a purely military point of view, is that of munitions. For side by side with other improvements has gone the evolution of artillery. Foreshadowed in the Balkan wars, it is accepted as a principle that an army must be accompanied not only and merely by the classic field piece of small calibre, but also by large-calibred pieces, effective not only against troops, but against positions as well, and not only against positions taken as the fortune of war may dictate, but against positions, i.e., fortresses, or their future substitutes, carefully prepared in time of peace. For the evolution of artillery has caused fortresses as such to lose their value: Liege, Namur, Maubeuge, Antwerp proved of no account, and if Verdun held out, it was not because of its strength as a fortress, but simply because it had become a sector in a long line, like that of Ypres or Arras. It has been made abundantly clear by the war that cities, capitals, fortresses and provinces will be taken in vain, so long as the enemy army remains unbeaten.

When two armies are besieging each the other, and resting on impassable flanks, only frontal attacks are possible: this has produced a strength of trench that can be overcome only by the intensest long-continued artillery fire using high-explosive shell, an expense of am¬ munition made possible only by mobilization of industries. Under these conditions, Uines® have become literally areas of trenches, one line behind the other, joined by communica¬ tions. The capture of a first line may be a success of no value. In the defense of these entrenched lines, the machine-gun has played during the European War, and will play in the future, in field-, as well as in position¬ fighting, a part of the first importance. Mining and countermining, heretofore used only in sieges of regular fortresses, will have peculiar weight when two entrenched armies face each other over a long front impossible to flank. And these armies will normally live, move and have their being under the ground.

A feature of trench warfare in the World War was the occasional but deliberate use of asphyxiating gases and burning liquids. Whether in the future this violation not only of The Hague Convention but of fundamental humanity will be endured only experience can tell but there is every reason to believe that asphyxiating gases have come to stay. The end of the war saw them used in cloud form, and in projectiles (projection and artillery pro¬ jectile proper). That is, the gas projectile had won its right in open warfare, and had become as much a necessity as the shrapnel itself.

The greatest advance in the military art proper has resulted from the application of

aeronautics, the great contribution of the 20th century. First shown to be practicable by the Wright brothers, aviation, neglected in America, was at once seriously taken up by the French and converted to military use. The rest of the world (the United States and Great Britain excepted) soon followed suit. The aeroplane has been without influence on strat¬ egy, but has profoundly affected tactics. It has made surprise well-nigh impossible and dissi¬ pated the fog of war. Thanks to its assistance a commanding general now sees the enemy, and what is more sees him almost at once. Hence combinations of troops, movements, con¬ centrations are reported almost as soon as made, intentions laid bare and adequate meas¬ ures of prevention made possible in good time. The aeroplane moreover has proved itself in¬ dispensable to the artillery by correcting fire and by detecting hostile batteries whose emplace¬ ments would otherwise be unknown.

As an agent of destruction, it was not nearly so useful at first as it was in the acquisition of informa¬ tion. But as the war progressed bombing be¬ came generalized on both sides ; with direct military results when employed against railway stations, depots, ammunition dumps, troops in concentration and even in combat. The airship (Zeppelin) has on the whole disappointed ex¬ pectation : it should be recollected, however, in respect of both airships and aeroplanes that the whole subject, in spite of the experience of the Great War, is still visibly in its infancy. See Military Aeronautics.

Whether other wars will follow the great conflict that broke out in 1914 no one can undertake to say. In the meantime it may be safely asserted that human nature, integrated into national ambitions, will continue to be what it always has been. Hence future strug¬ gles are not unlikely. When they do occur, they will call into play the whole of a nation's energy. High courage, nobilitv of principles, unselfishness of ambitions, these alone will not avert defeat and disaster.

C. DeW. Willcox,

Colonel, United States Army; Professor, United States Military Academy.

MILITARY SERVICE INSTITUTION OF THE UNITED STATES, a society of officers of the United States regular army, organized in 1878 by Generals Fry, Stanley, Rodenbaugh, Colonel Lieber and others. It was designed as a similar organization of the Royal United Service Institution of Great Britain. The presidents of the American So¬ ciety have been Generals Hancock, Schofield, Miles and Ruger. The headquarters are at Governor's Island, N. Y., where the institution has acquired a library of 20,000 volumes, in¬ cluding many rare documents. The society issues The Journal of the Military Service In¬ stitution.

MILITARY SURGERY. Military sur¬ gery was first recognized as a separate branch of medical science about the middle of the 16th century, but was not taught as a special study in medical colleges until the year 1829. Since then instruction has been given by the ablest surgeons both in Europe and America.

At no time in the history of the world has there been so great a number of nowerful and destructive instruments of war as during

the terrible conflict of the great World War. Statistics prove that at no time has there been so great a saving of life among the sick and wounded. We must not be surprised to note that a great part of mankind has occupied, and still continue to occupy, themselves in the improvement and perfection of the art of war, and that this art of destroying life is con¬ stantly advancing.

For the earnest, faithful army surgeon many opportunities for careful study and close in¬ vestigation are offered. Perhaps on his skill in caring for the sick and wounded depends the success of a campaign. The well-defined and carefully prepared plans of our ablest generals have been defeated and come to naught through the incompetency of medical officers.

It is, therefore, .the duty of the military sur¬ geon to prevent, as far as possible, all useless expenditure of life. If battles must be fought, the results should be obtained with as little mutilation, suffering and sacrifice as is con¬ sistent with life and the welfare of the cause. For this the world is indebted to our

profession. .

Subjects absolutely necessary and important for the surgeon to understand in performing the duties that pertain to an army surgeon are: In addition to climatic condition, he must have knowledge of the location of the country from which the soldier comes and his surroundings there ; knowledge of the care of the individual — clothing and personal hygiene. It is to be re¬ membered that the majority of soldiers are made up of youths from the age of 18 to 25, and, gen¬ erally speaking, they know very little about the care of themselves individually. In the exam¬ ination of the selective draft man the medical department must learn all about his habits, some of ‘them to be corrected, as he enters upon his military life, and others of such a nature as to exclude him. The study of hygiene is of great importance, such as the care ot the camp. In 1917 soon after our men were assem¬ bled at the cantonments there was a develop¬ ment of chest trouble, such as bronchitis and pneumonia. Surgeon-General Gorgas made a very thorough, personal inspection discovered it was the result of an overcrowded condition, very difficult to correct, but

attended to as rapidly as possible and resulting m immediate lessening in number of the sick. Also, kitchen, cooking utensils, drainage and sanitary surroundings of every kind should be care¬ fully studied. The subject of food supply and its manner of preparation exacts great interest on the part of the medical officer, regarding a correct diet. You might present a meal to the British soldier that would please him very much, but it would not be well received by the American soldier, or those of other nations. The medical officer must inform himself also upon the nature of all insects, vermin of every description, the evil effects of even the house-fly, for at the present time all of these factors enter into the development of diseases that disable and impair the best work of the soldier He must understand fully all that pertains to the quartermaster and commissary departments, in order that his sick may re¬ ceive such luxuries and comforts as are their due. His knowledge of camp diseases is ab¬ solutely necessary — typhus, typhoid fever, for all infectious diseases come to him and must

have immediate attention. These are ˆ condi¬ tions that will admit of but a few hours delay, and then attention to minor cases, such as the care of the feet, is so very important, vv itnin a few years the specialty of chiropody has advanced in a marvelous manner, and the sol¬ diers are fortunate in having with them a num¬ ber of attaches of the hospital who are com¬ petent to give proper treatment. Proper care must be taken of the feet, and perfectly fitting socks and shoes is another of the admirable methods adopted by the surgeon-general s office, all this working to the advantage of the soldier.

The military surgeon must have an acquaint¬ ance with many medical problems : The condi¬ tions developing diarrhoea and dysentry, the exposure to heat and cold, causing sunstroke and frost-bite, all of which he must be familiar with; the condition and treatment of the vari¬ ous classification of burns that occur from fire and from the materials used in some of the high explosives, also the care of the soldier who suffers so seriously from multiple wounds made by the explosion of the so-called mud shell,® the particles penetrating the clothing, and where there are often 50 to 100 abrasions that are very painful. A responsibility of grave importance is the selection of the camp site, and which is usually entrusted to the medical

officer, as it should be. , . ,

When the United States entered into the European War the surgeon-general's office, en¬ dorsed by the War Department, organized schools

of instruction. The splendid response made by the members of the medical profession to comply with the governments, lequcst that they have a few months preparation for ai my service enabled thousands of doctors to better fit themselves tor looking after the Sick ant-wounded soldiers than in any of our previous wars. It was said by United States army sur¬ geons, when this war began, in August 191s, that, in many respects, it would be the most humane ever waged; that it would be settled in a much shorter period of time than most persons believed possible; however, this proph¬ ecy came far short of the real resu.t. . day dressing stations, evacuation and base hos¬ pitals are terms with which we have become very familiar. It was stated, and this proved true, that the mortality list from disease would be very small. The control of typhoid, typhus and malarial fevers was very perfect. Alas, that the epidemic of influenza and septic pneu¬ monia presented so many serious conditions hitherto unknown, causing a death rate t: a., while not large, yet was un ‘xpected.

While it was believed that the rapid-firing rifle, with its smaller metal cap bullets, would disable men quickly, the results would not be so fatal in the loss of life, and would not cause so great a number of seriously injured as when the slow-firing, larger bullets, such as was the Minie ball, used during the Civil War. This, to a great extent, proved true. I he break¬ ing of bones, the tearing of blood vessels, the injuries to nerve trunks, in proportion to the number of wounded, was not as great in th _ European Wˆar as in some of our recent conflicts.

Much important experience had accumulated during the Russo-Japanese and some of value during the Spanish-American War. In the Euro pean War as a whole, wounds were not so fatal,

but the prediction that there would be a less number of infective wounds and injurious com¬ plications did not prove to be true. The knowl¬ edge of preventive methods, and important sani¬ tary precautions, helped decidedly in the saving of life, as they were so vigorously investigated and carried out. The sad lesson of the Spanish-American War had served to warn our medical officers and they made

a noble success of all that was placed at their disposal for the care of the soldier. One can enumerate but a few of the many aids that came to the medical and surgical departments of the American army, in the European War, such as the Red Cross, the Y. M. C. A., the Y. W. C. A., the Knights of Columbus, the Salvation Army, the establishment of canteen huts, stations at the front for dress¬ ing of wounds, the evacuation hospitals, base hospitals, methods of transportation, which have never been equalled, and the statistics that have been compiled prove greatly to the credit of our surgeons that they did all that was possible for the sick and wounded soldiers.

When war begins suffering and pain enter, and the surgeon, having everything in readiness, endeavors to relieve his patient as promptly as possible. The use of anaesthetics has passed through a very thorough analysis, resulting in the positive doing away with all mixtures of ether, chloroform and alcohol, for they have met with little endorsement in military opera¬ tions. The same experience has come to many surgeons in civil life as the unequal evapora¬ tion makes their use somewhat uncertain. The administration of ether, or chloroform, sepa¬ rately, with plenty of air, has resulted very favorably. It is to be observed that many of the writers on the subject have endorsed plac¬ ing the patients under a minimum narcosis, then watching them very carefully, and the after effects have been excellent. Local anaesthesia seems to have inspired a good deal of confi¬ dence, particularly among those who worked mainly in the evacuation and base hospitals, as well as rest homes.

As the battle opens the sight of blood is the first object lesson to the alert surgeon. For lack of prompt and efficient treatment of hemorrhage many a soldier has yielded up a noble life. The control of hemorrhage has been carried out along the lines of the civil surgeon. Momberg's method of controlling hemorrhage, for amputation at the hip-joint, does not seem to have met with any great ad¬ vance, and the number of operations done are comparatively few. The use of the tourniquet in some form has been applied by fearless as¬ sistants and the stretcher-bearers in so intelli¬ gent a manner that many lives have been saved. Wyeth's method has been of service.

Surgery of the heart has presented some very striking illustrations of progress, in keep¬ ing with the advances of the past few years in civil life, regarding the operations done in this direction. Especially is this true in bayonet and stab wounds, and here an excellent oppor¬ tunity is offered for securing an estimate of the final results. There are so many more cases to be studied than in civil practice. Much re¬ search work has resulted and more operations were performed than could

possibly have oc¬ curred in civil life for decades.

It is interesting to note the treatment of

such large vessels as the inferior vena cava and others that have been reached when operating upon wounds of the abdomen. Injuries to the arteries and veins have developed a large num¬ ber of traumatic and arterio-venous changes. Apparently nothing has escaped the military surgeon of to-day. Surgery of the blood ves¬ sels, in the form of traumatic aneurisms, as well as like surgical procedures, will, when the concensus of opinion has been reached, show that great skill has been exercised from time to time in doing this work.

Possibly there is no part of the body that will show such marked advance in immediate operative interventions as that of gunshot and stab wounds of the lungs, together with more or less fracture of the thorax and in the lodg= ment of foreign bodies within the cavity of the pleura. This is well illustrated by the en¬ trance of a portion of shrapnel within the cav¬ ity of the lung. An immediate operation is done, at the nearest place to the receipt of the injury, with safety to the operator and as¬ sistants, the wound enlarged, portions of frac¬ tured ribs removed, if required, hemorrhage controlled as promptly as possible, the lung ex¬ posed, the foreign substance searched for and removed, then thoroughly aseptic work accom¬ plished, the wound closed, with or without drainage, and a very large proportion of these patients make a prompt recovery, without sup¬ puration. The employment of air bags, sacks or balloons to fill space, and for the lungs to press against — removing them gradually — ap¬ parently has proven of value. No such splen¬ did work as this has been accomplished in the history of any of our previous wars.

This same prompt operative intervention also applies to wounds within the abdominal cavity. There was a marked contrast in the his¬ tory of surgery during the first year of the World War, and that of the last, regarding the advances made in the treatment of these wounds. In the first period many surgeons were of the impression that non-operative in¬ terference in a penetrating wound of the ab¬ domen led to more successful results, but, gradually, in the study of these cases, they be¬ came more practical, and, as a result of ‘their observations, surgery was pushed to a point of careful inspection and operative work, where (<the sooner the better® it was discovered. So soon as the patient could reach a place of safety, and proper appliances, an operation was done at once, consisting of opening up the ab¬ dominal

cavity, if necessary resecting the in¬ testines, or properly closing all wounds or lacerations within the cavity of its contents, controlling hemorrhage, and then carefully closing the wound. It has been shown that many of these cases die of hemorrhage if not operated upon at once. Only in such cases as seemed absolutely necessary was drainage made use of, and the percentage of recoveries has been most marked. In these wounds, and which also applies to the cavity of the cranium, the same bold successful surgery was done in enlarging the opening in the skull, trephining as called for, placing the patient in as comfort¬ able a position as possible for transportation — which applies to all wounds in any portion of the body — not handling any more than can be avoided, the dressing watched carefully, not to be disturbed, if all goes well, and' when

reaching the base hospital keeping them ab¬ solutely quiet.

There is no doubt that when the final chap¬ ter on the history of surgery in the Great War is written, there will be largely to the credit of the skilled and able surgeon a record of such great progress as will astonish the medical man, who can yet look back and call to mind his experiences during the Civil War, the Franco-Prussian War, the Spanish-American War and the Russo-Japanese War.

Never had an army had such eminent spe¬ cialists to care for their sick and wounded. Great advances also resulted in the splendid manner in which the question of transportation was solved. No army ever had such a perfect system of ambulances — electric and otherwise — steamboat and railroad facilities, and the avoidance of handling the wounded added greatly to their recoveries.

Especially to the credit of the American sur¬ geon was the adoption of the method of con¬ tinuous treatment from the dressing stations to evacuation and base hospitals, and the stand¬ ardization of splints. This was ˆkindly received on the part of the surgeons in the various armies, and proved of inestimable value. In all the various wounds that were studied and treated, during the nearly five years of the war,

it is plainly noticeable that, step by step, surgery advanced, with that degree of success, that the final summing up will demonstrate the greatest progress in history, in the ability to return men to the fighting ranks, with so little loss of serv¬ ice, and in the actual saving of life.

Another chapter has been added to making surgery a more exact science. I he art, the skill, could scarcely be improved, for in other wars we have had evidence of some of the most scientific operations possible for human ability to perform ; however, the great advan¬ tage this modern military surgeon possesses, in instruments, operating paraphernalia, dressings, splendid nursing, can not be excelled in the best of civil hospitals and all this aided mate¬ rially in the wonderful success.

Great gratitude is due the women of America for much of these splendid results. Their weary days of preparing surgical dressings have been well rewarded. Out of it all there came a knowledge of the treatment of wounds that is apace with the fierceness exhibited by the cruel weapons employed in this recent war, and with more destructive surroundings than ever known

in the history of the world.

What can directly be called military surgery has never presented such an amount of mate¬ rial, including research, laboratory investiga¬ tions and the study of all forms of wounds in¬ flicted by every possible kind of missile ‘gss, mustard and poisoned bombs, liquid fire, dis¬ ease-producing germs, everything conceivable for the destruction of human life. All of these conditions our surgeons, aided by the chemist and investigations in the laboratories, were able to treat promptly and successfully, as our medical journals so clearly indicate. #

In collating the advances made in the de¬ partment of military surgery medical journal¬ ism deserves great credit.

In the War Supplement of the Index Medicus, 1914-17, > the classification of all papers and addresses on the subject is a marvel.

The enerpy exhibited by the bacteriologist and the ability to bring the laboratory up to the firing line aided immensely in obtaining methods of relief ; however, it is impossible here to give any positive, concise summary of the methods adopted for the treatment of these differently classified wounds, under the care of the evacuation and base hospitals,

but out of the vast amount of material there resulted un¬ mistakable evidences of success.

X-ray work was of a superior quality, par¬ ticularly when applied to the extremities, such as the long and small bones of the arms, hands, legs, feet and all irregular bones, as well as soft parts, muscles, vessels and nerves. The appa¬ ratus is now so perfect there is little risk in the development of X-ray burns.

Great progress in the treatment of wounds followed the Russo-Japanese War, yet no war ever took place when the ability to treat injuries of the kidneys, ureters and bladder was equal to that which was accomplished in this recent great conflict, regarding the immediate care of these cases. It may be stated here that the rich supply of X-ray apparatus enabled' the surgeon to study with great exactness or to obtain such im¬ portant information, after receipt of the patient in the evacuation hospital, as was hitherto un¬ known.

There is now a record of the application of modern dentistry, by employment of the X-ray and producing radiograms to be studied care¬ fully, that not only is of great value in immediate treatment, but will continue to be in all recon¬ structive work.

There can be no question but that the wear¬ ing of steel helmets lessened scalp and skull wounds and.injuries of the upper portion of the face and neck by a large percentage.

It is interesting to note that in shaping the latest patterns the designers had in mind even greater protection. The one objection was their weight.

It is a matter of great interest to note the similarity of wounds in connection with the American Civil War and the European War.

Shrapnel used extensively during the Euro¬ pean War causes a wound very much like that of the Minie ball of the Civil War, but the bullet of the machine gun of to-day is not so destruc¬ tive as that of the rifles used during the conflict between the North and the South.

Aside from this progress, to which we have referred, the study and treatment of tetanus be¬ came a very important subject. The first year of the war very rapidly developed the danger of immediate infection of the wounds, and a large percentage of the cases when they reached the base hospitals were in an infected, suppura¬ tive condition. In association with these wounds was also the development of cases of acute tetanus, largely thought due to the nature of the infective soil

where the fighting occurred, and here, near the battle line, laboratory work was of great assistance. The consequence was that prophylactic treatment by use of the tetanus antitoxin serum, in all lacerated and dirty wounds, lessened the number of these cases very

decidedly. . , . , .

The British were slow in making use of this antitoxin. The American military .surgeon had learned from civil life its great value and was at once prenared to employ it. Here credit

should be given to the great State of New York in early establishing a State laboratory for the study and free distribution of this serum to its boards of health.

The one great department that can be classed as a division of military surgery is known as orthopedic or reconstructive work, and in the hospitals that were established by the United States government have been accomplished re¬ sults in the restoration of the functions of vari¬ ous portions of the body that hitherto were deemed impossible.

Reconstructive occupational therapy in the study and treatment of lesions of the organic nervous system is apparently receiving a good deal of attention.

Shell shock is a new term, possibly to be followed by a better interpretation of this new lesion in war surgery, but its proper under¬ standing and treatment is being worked out in a most admirable manner. There can be no doubt that men are seriously affected by the bursting and passing of shells and the firing of these high explosives. The system receives a shock that afterward manifests itself in various ways. The patient may become temporarily insane, his mentality receiving a severe shock in many forms. It may be only functional and disappears when surroundings are such as to restore his confidence, returning him to his former normal courage and ability to get con¬ trol of himself. There were a good many of these cases, and great care

had to be exer¬ cised that no injustice be done in their diagnosis and treatment.

The treatment of gunshot wounds of the face and jaws has attracted much attention. In the building up of the face, the nose, and especially that portion that relates to fractures of the upper and lower jaws, our military surgeons have recognized the aid of the up-to- date dentist.

During the entire time of the World War civil practice was quite entirely overshadowed, the study and treatment of wounds received in battle claiming the greater attention.

In the care of wounds it was early observed that prompt treatment was of great import¬ ance. The removal of all possible sources of infection, giving a clean incision in the soft parts, then bringing them together, resulted in excellent recoveries.

It was assumed that wounds passing beyond the eighth hour were in danger of infection and more serious complications, giving a prolonged and anxious line of treatment.

Free incision, when once the wound showed evidence of infection, care in removal of any material that might have been left behind, brought out different views as to irrigation, drainage and the use of antiseptics. There has been great discussion regarding the use of the latter, some surgeon writers coming to the con¬ clusion that any sterile preparation — and keep¬ ing the part clean — was sufficient.

The Congress of American Surgeons and Clinical Surgeons was arranged with great care by its officers for 1918, and many surgeons con¬ nected with the armies abroad accepted invita¬ tions to prepare papers and discussions on the classification and treatment of wounds.

In consequence of the epidemic of influenza this meeting had to be abandoned, which was a

great disappointment to all ; however, the for¬ eign delegates who did come visited a number of our larger cities, attended hastily called meetings and gave clinics, that, later, as they appeared in our medical journals, added greatly to our present literature on military surgery. .

As has been stated, it is impossible in the space available to make any detailed report on what has come to be considered as the better treatment of all wounds ; however, this much can be said : At dressing

stations, so far as time and the wound will permit, such dressings should be applied as will enable the patient to reach the base hospital. More serious wounds are to be treated at the evacuation hospital, such as the control of hemorrhage, amputation that may be necessary, all wounds that can be, and time will allow, to have more permanent dressings, in order to transport distances to the base hospital with as little handling and dis¬ turbance of the dressings as possible. Here should be used prophylactic doses of the tetanus antitoxin in such wounds as seem to require it. On arrival of the wounded at the base hospital all cases to be carefully inspected, those found infected to have free incision, all necrosed tis¬ sues, or foreign substances, such as pieces of clothing, dirt, fragments of missiles, anything that may conduce to the 'Spread of infection, removed, and bringing the wound into a better condition for immediate union. Also in these cases there enters the application of the drain¬ age tube, and the beginning of the Carrel method of treatment, the Dakin antiseptic solu¬ tion, the use of the newer antiseptics, such as dichloramin-T., chlorinated eucalvptol, chlori¬ nated paraffin oil, aceiflavin and proflavin, bril¬ liant . green and other methods of antiseptic dressings. Wright's theory of thorough irriga¬ tion and the 20 per cent solution of picric acid in alcohol have been used with good success in the treatment of sepsis. In the cases of gas infection, or gas gangrene, emphasis is placed upon long and free incisions, amputations with¬ out aqy attempt at bringing the flaps together and also the use of the serum treatment. Keen's book on <(Treatment of War Wounds® has af¬ forded much valuable information.

In the treatment of convalescents it is very much to the credit of our government that the wounded were brought as near to their homes as possible, and one had but to notice the almost daily arrival of steamers to observe how faith¬ fully this was being carried out.

Albert Vander Veer, M.D.

MILITARY TELEGRAPH, commonly applied to the use of telegraph wires in warfare as in the Civil War when a corps of engineers constructed temporary telegraph lines from the front to points in the rear of an army. In later years this system has been superseded by the heliograph (q.v.) and still later by wireless telegraphy and the use of flag signals com¬ monly known as wig-wagging (q.v.).

MILITARY TENURE. See Tenure.

MILITARY TERMS. The numerous changes (strategically and technically) and ad¬ vancements in the science and art of war brought

forward many technical military terms, most of which are known and understood only

by the military student. The following are the more important of such terms :

Advance Section.— The area of the service of the line of communication within which are situated the advance depots of ammunition, supplies, animals and material from which issues are made to divisional trains.

Aerial Mine. — A type of grenade, weighing as much as 200 pounds, used to beat down the enemy's defenses, destroying his sand bags and revetments, and cutting away wire entanglements and other obstacles. A smaller variety is known as the winged torpedo.

Alignment. — A straight line upon which several elements are formed, or are to be formed; or the dressing of several elements on the same line.

Ardois Signals. — A system of signaling in which a set of electric lanterns arranged vertically on a staff is used to send alphabetical signals. The globes of the lanterns are half red and half white and the letters are formed by the different combinations of the two colors.

Armed Tractor. — An armored motor car, resembling an enormous armadillo, capable of advancing over rough terrain. Its chief work is to locate the machine gunners and blow them out of their positions and thus save the advancing infantry.

Artificial Darkness. — A temporary expedient in dissimu¬ lation. It may be produced by the discharge of black powder, or by burning damp straw or setting fire to vege¬ tation to form a heavy cloud of smoke. The darkness of night may be intensified by throwing the beam of a search¬ light across and some way in front of the object to be screened.

Assembly Positions. — When compelled to withdraw, troops that have been actively engaged are usually obliged to fall back for several miles in deployed formation before efficient reorganization and assembly is possible. The assembly position must be far enough to the rear to enable the deployed lines to thoroughly free themselves from all contact with the enemy.

Azimuth Deviation. — In gunnery, the difference between the azimuths from the directing point of the battery to the centre of the target and to the point of splash at the instant the projectile strikes.

Barrage. — A wall of shell fire thrown against an advancing enemy with such regularity that troops cannot pierce it. It is employed to prevent an enemy's advance or retreat, or the bringing up of reinforcements. It is also used for the protection of troops advancing to the attack.

Base. — A place where the line of communication originates, where magazines of stores for the forces in the field are situated and maintained under direct military manage¬ ment and control and where the business of supplying these forces is located and organized under the military authorities; in fortification, the exterior side of the polygon; in ordnance, the protuberant rear portion of a gun between the knob of the cascabel and the basering; also the element on which the movement is regulated.

Battalion Reserves. — Reserves, usually consisting of at least one company, used to reinforce the firing when the whole of the supports have been thrown into it, to rein-

' force the firing line at the moment of the assault, to cover the advance of the firing line, to protect the flanks from counter-attack and, if possible, to bring an oblique or enfilading fire to bear on that portion of the enemy's position which is being attacked by the firing line.

Battle Sight. — The position of the rear sight on the service rifle when the leaf is laid down. This corresponds to a range of 547 yards.

Bayonet Combat. — The last resort, either in attack or defense, is the bayonet. The percentage of bayonet wounds, as compared with bullet or shrapnel wounds, is small, but a man wounded in bayonet combat seldom recovers. Hand grenades are much used in breaking up bayonet charges.

Bearing. — In map reading, the angle a line makes with the true north

line is a true bearing. The angle a line makes with the magnetic north line is a magnetic bearing. The angle in both cases is measured from' north by east and south. _ •

Belgian Pits. — In trench warfare, small shallow pits, con¬ structed in a number of rows, generally seven. The spaces between the pits are made impassable by pointed stakes and tripwire. . Wire nooses are also anchored here and there.

Best Point of Entry. — In an approach against a fortifica¬ tion, the blindest eye of the work, or the particular spot in its firing-line where its own fire is least effective over its immediate foreground, or is least well supported by cross fire from adjacent works, or from artillery in the

distance…

Bleiazid. — A high explosive used for detonations. Its force of detonation is twice as great as that of fulminate of mercury and it resists high temperatures.

Bomb Screen. — For protection against bombs and gren¬ ades a grille of wire netting is erected in front of the trenches and arranged at such a slope that the majority of gren¬ ades passing over the screen will also clear the trench.

Bracket. — In gunnery, a space in the direction of range, the limits of which are determined by firing. A target is said to be enclosed in a 100-yard bracket when, of two ranges differing from each other by 100 yards, one is over and the other is short of the target; also, the cheek or side of an ordnance carriage.

Burst Interval. — In gunnery, the distance in the plane of site from the point of burst to the target. It is given with a minus sign when it is between the gun and target, and with a plus sign when it is beyond the target.

Camouflage. — A blind or cover screening military move¬ ments and operations from the enemy air scouts, and other reconnoitering parties. The most practicable and con¬ venient cover is made of small foliage-bearing trees and brush. Camouflage, in its fullest sense, is the art of vary¬ ing the visibility of objects, and of deceiving as to their nature.

Clock-face Method. — In gunnery, a method employed to indicate the position of the target described in relation to a description point. In employing it, the clock-face must be imagined as hanging vertically, with its centre directly over the description point.

Close Billets. — Billets adopted when a greater state of readiness is required than is possible in ordinary billets. For this reason, tactical considerations invariably have precedence over considerations of comfort, and arms and units should never be mixed.

Coast Artillery Supports. — Small bodies of coast artil¬ lery or mobile troops assigned to the defense of the forti¬ fications against attack by raiding parties; they are under the orders of the coast defense commanders.

Coefficient of Wind-pressure.— In gunnery and aero¬ nautics, the numerical constant in the formula express¬ ing the pressure of the wind against a stationary object or of the air resistance to a moving object.

Combat Practice. — In small arms firing, the prescribed firing at targets which simulate the appearance of an enemy under conditions approaching those found in war, and the application of this class of fire to tactical exercises.

Communication Trenches. — Those connecting fire trenches with the cover trenches and the cover trenches with any trenches (reserve) in rear where natural covered com¬ munication is impracticable. They are zigzagged to escape being enfiladed. .

Cone of Dispersion. — In small arms firing, a term applied to the figure formed in space by the trajectories considered together of a series of shots fired by a body of soldiers at a common objective and with the same rear sight setting; also the elliptical shaped cone made by the dispersion of shrap¬ nel balls when the shrapnel bursts in the air.

Convergence Difference. — If the guns of a battery be accurately laid for converging fire upon a target and the panoramic sights be then turned upon a common aiming point, the sight readings will be found to vary by differ¬ ences which are for all practical purposes equal from gun to gun throughout the battery. This common difference is called the convergence difference.

Counter-trenches. — Trenches made against the besiegers, which consequently have their parapets turned against the enemy’s

approaches, and are enfiladed from several parts of the place on purpose to render them useless to the enemy if he should chance to come into possession of them… .

Covering Position. — In the transport service, a position to be occupied by an advanced detachment of troops at such distance from the selected landing that neither anchorage, beach nor forming-up place is exposed to shell fire from the enemy's land forces.

Curtain Fire. — Another name for barrage or a zone of artillery, machine gun or trench weapon fire established for the purpose of preventing the passage of troops.

Curved Fire. — When a projectile is fired so as to just clear an interposing cover, and then descend upon the object, the line of fire being perpendicular or nearly so to the front of troops or works to be destroyed; fire with low muzzle velocity, the elevation not exceeding 540 mils, usually from howitzers. . ,

Danger Angle. — The angle which the tangent to the tra¬ jectory at the point of splash makes with the plane con¬ taining the point of splash and parallel to the horizotital plane through the muzzle of the piece in the firing position. Also called Angle of Splash.

Danger Space. — The distance, in the plane of the slope considered, over which an object of a given height would be pierced by a given trajectory.

Deflection. — Generally the angle set off on the panoramic sight of the directing gun. It may or may not be the same for the other guns. In direct laying, it is such as is neces¬ sary to correct for wind, drift and the movement of the target; the deviation of a shot or ball from its true course; sometimes written deflexure.

Deflection Difference. — The common converging or diverging difference applied to guns other than the direct¬ ing gun, necessary to bring them to bear on their proper portion of the target.* The deflection difference for parallel fire is always equal to the parallax of the aiming point. It is positive if the aiming point is in front and negative if in rear.

Delaying Actions. — Actions in which the advance of the enemy is delayed as long as possible without imperiling the safe withdrawal of the delaying force; and, in which this foree must hold its position for a time that is depend¬ ent upon conditions in other parts of the field or in the theatre of war.

Deployment. — An evolution by which a command extends its front; it may be partial, as when heads of columns form on the same line; or complete, as when a firing line is formed, with supports and reserves.

Depth Bomb. — A bomb designed for use against submarines and other submerged objects. Submarines, once seen below the surface, are pursued and destroyed by dropping depth bombs from the observing aircraft. Depth bombs are also known as diving torpedoes.

Diamond-hitch. — In animal transportation, the side packs are slung across the aparejo by the sling ropes and lashed on with the lash rope and cincha in the form of the diamond-hitch, the formation of which is accomplished by two packers, termed the “near” and “off” packers. Dissimulation. — The production of targets less attractive to the enemy than those which would be offered by the undisguised works of the defender, and which are less likely to arouse the enemy’s suspicion, while at the same time they conceal the true nature of the defenders’ powers

of offense…

Dressing Stations. — Stations established during combat by ambulance companies of the sanitary train in the imme¬ diate rear of the line of regimental aid stations, which are the places where all wounded unable to walk are collected from regimental aid stations by bearers of ambulance

companies. .

Echelon. — A body of troops is “in echelon with refer¬ ence to another body when it is more or less advanced and unmasks or uncovers the same, wholly or in part. Units so placed are called echelons. Sometimes used to designate the different elements of a tactical command. Effectiveness of Fire. — The effectiveness of fire under battle conditions and in combat firing exercises is depend¬ ent upon the three factors, the percentage of hits made, the number of

targets hit and the time of execution. The ultimate effect may be expressed synthetically by the number of enemies disabled or targets hit in a unit of time. Elements. — The simplest of the distinct isles of resistance. They are generally made up of a small collection of trenches and barricades, and receive as a garrison a complete unit, from a squad to a platoon, having special orders to fit

their location. .

Energy of Recoil. — An expression for the work done m the recoil of a gun when fired. It may be reduced by de¬ creasing the weight of the projectile, by decreasing the muzzle velocity or by increasing the weight of the gun and carriage. , .

Enfilading Battery. — A battery used for destroying the artillery and traverses, and silencing the fire of the defenses. Positions are chosen for the enfilading batteries from which the terrepleins of the faces can be swept throughout. Evacuation Points. — In the sanitary service, the places at which the sick and wounded are transferred from the division to the lines of communications.

Examining Post. — A small detachment, under the command of an officer or a non-commissioned officer, stationed at some convenient point to examine strangers and to receive bearers of flags of truce brought in by the outguards or patrols. , . • , ,

Field Telephone. — A line of telephone set up and quickly transferred from place to place in the field of military operations, employed for transmitting information from various points to the station of the general officer com¬ manding and for the distribution of orders emanating from said station.

Field Wireless. — Temporary wireless stations set up in the field of military operations to facilitate the transmis¬ sion of orders, to gain knowledge of enemy movements and to communicate with aircraft acting under orders of the ground officer.

Files. — Two men, the front rank man and the correspond¬ ing man in the rear rank. The front iank man is the file leader. A file without a rear rank man is a blank file. The term file applies also to individual men in single rank formation and to a single mounted man in ranks.

Fire Control. — The exercise by a commander, over his unit or units, of that power which enables him to regulate the fire in obedience to his will. It pertains especially to the technicalities immediately involved in delivery of

fire. , .

Fire Direction. — A general term embracing the various steps, including tactical disposition, which enables the commander of one or more fire units to bring an effective fire to bear upon the desired target at the proper time. It pertains especially to preparation of fire.

Fire Discipline. — The training of men so that they will instinctively carry out all orders of fire-unit commanders and in the absence of orders adjust their sights and fire with due regard to the tactical situation.

Fire Superiority. — Superior moraA or physical fire effect as compared to that of the adversary. Fire superiority is implied if the assailant can advance or force back the defender.

Firing for Effect. — The fire delivered for the purpose of producing effect on the target. It usually follows imme¬ diately after adjustment and is delivered with the greatest rapidity consistent with proper laying of the guns.

Fixed Batteries. — The batteries containing the siege guns and mortars of the heaviest calibre and longest range, placed when possible in enfilading positions and deliver¬ ing their fire within the interior slope of the face enfiladed.

Flight Commander.— In aeronautics, an officer who com¬ mands and leads a squadron of aircraft, executing orders of the ground officer as far as possible, being followed by

the squadron. . ,

Gas Attacks. — Attacks in which chlorine and other gases are brought up to the trench compressed in steel cylinders. These are dug into the bottom of the trench and connected with pipes leading over the parapet. When the valves of the cylinders are opened the gas escapes with a loud, hissing noise, mixes with the air and is carried by the wind to the opposing trenches, spreading out in a continuous cloud as it goes.

Gas Hemlet. — A defensive mask, usually referred to as the P. H. helmet or tube helmet, consisting of a flannelette bag which pulls over the entire head and which is chemically treated. It is fitted with a mouthpiece with a valve which is rubber covered, and when in use is

gripped by the teeth. Inserted in the front are glass windows for the eyes. During the passage through the material of the helmet, the poisonous gas is absorbed by the chemicals.

Gas Warfare. — The use of poisonous and asphyxiating gases in attacking the enemy, either by emanation or by means of shells and grenades. The first requires a favorable breeze of about five miles per hour and there must be no rain. In the shells and grenades method of dissemination, shells and bombs are used containing liquid gas, or a substance which gives off irritant fumes.

Ground Section. — In gunnery, the zone of dispersion. In connection with the effective ranges of shrapnel balls it will be found that many balls impacting near the outer limit of a ground section are ineffective due to lack of man-killing energy…

Group of Posts. — Sub-sections organized by the com¬ mander within each section of an entrenched zone. The general duties of the commander are the same as those for an outpost commander. .

Gun Squads. — Soldiers grouped for the purpose of making units for the operation and service of guns in battle and to facilitate their control and movement. Their habitual formation is in column.

Hairbrush Grenade. — A racket bomb used to demoralize the enemy, the noise created by its explosion being very great. It consists of a board about 12 inches long and 6 inches wide, cut down to the shape of a brush. On the large end of this is wired or tied a slab of wet gun cotton. In the centre of the slab is placed the dry primer or cone of guncotton with detonator and time fuse.

Head Cover. — A vertical shield of any material which protects the heads of the troops from fire. In fortifica¬ tion, any horizontal cover which may be provided above the plane of fire. It is advantageous only when the con¬ ditions of the foreground are such that the enemy cannot get close up. …

Height of Burst. — The angle in mils which a line joining gun and the point of burst makes with the plane of site. The height of burst adopted for adjustment is one mil and for effect three mils. .

High Explosive Shrapnel. — A shrapnel differing from the common shrapnel only in the substitution of an active for an inert matrix. The matrix surrounding the balls in a common shrapnel is resin and mono-nitro-naphthalene; in the high explosive shrapnel the matrix is trinitro- toluol, a high explosive. The fuse of the high explosive

shrapnel, in so far as the time action is regulated, is the same as the field artillery 21-second combination fuse.

Holding Attack. — An attack for the purpose of holding the enemy to his position by offensive action in one part of the field while a decisive blow in the nature of an assault or of an enveloping or a turning movement is struck in another quarter.

Illuminating. Grenade. — A contrivance, weighing about 14 ounces, attached to the muzzle of the ordinary service rifle. In projecting it into the air, the butt of the rifle is placed on the ground. A firing rod releases a parachute and ignites the illuminating substance — calcium carbide.

Incendiary Grenade. — A form of grenade designed to scatter molten metal upon bursting. The most effective of the kind contains the ingredients necessary for making the compound known as thermit.

Independent Cavalry. — Cavalry independent of the in¬ fantry divisions advancing behind it and under the sole orders of their own commander, who receives his instruc¬ tions direct from the commander-in-chief. It is the chief means of providing the commander-in-chief with the in¬ formation which he requires in order to dispose the whole of his force to the best advantage and with the greatest hope of success.

Interior Guards. — Police guards, guards of property, etc., who are liable to come in contact with the enemy.

Journal of Attack. — In actual siege operations, a daily record made by each engineer officer on duty in the trenches,

of the amount of work done, the time required, the means of execution, etc., with any observations that may seem of value.

Journal of Defense. — A journal in which is kept by the commander of

a place and the chiefs of engineers and of artillery, during war, in order of date, without blank or interlineation, all orders given or received, the manner in which they are executed, their results, and every event and circumstance of importance in the progress of the defense.

Jump of a Gun. — The increased angle of departure at which a projectile leaves a gun, after the gun has been truly leveled at the target or object to be struck.

Knuckle Knife. — In raids and trench work, a knife about nine inches long, ending in a handle that has openings for the four fingers to go through, thus serving as a “ knuckle duster.”

Lateral Communications. — Communications between the different portions of an army when moving from one common base by different roads toward an enemy, so that in case of a concentration being required on any particular point, instructions and orders can be readily carried out.

Liaison. — A French term signifying the connection or com¬ munication to be established between various officers or between various units and officers.

Line. — A formation in which the different elements are abreast of each other; the numbered organizations of an army in contradistinction to the guard or guards; the infantry, cavalry, artillery, etc., in contradistinction to the staff corps and departments; a picket line or side line; an imaginary limiting line in fencing; a trench or rampart; a general term applied to all combatant troops; a posi¬ tion occupied by troops, as a defensive line.

Line of Circumvallation. — An exterior line of works form¬ ing an unbroken line of entrenchments composed of the most simple elementary parts, as tenailles, redans, etc., with a slight profile; its chief object being to prevent suc¬ cors of small detachments from slipping into the place.

Line of Communication. — The communication by rail, road and navigable waters between the army and its base or bases inclusive, together with the district through which it passes, within such limits as the commander-in-chief may determine.

Line of Countervallation. — The line of field works con¬ structed in front of the camps, and on the side next to the besieged position, to defend the camps, parks and trains against any attacks which might be

made by the besieged.

Listening Posts. — Sheltered positions in advance of a defensive line for the purpose of early detection of the enemy's movements. They are connected with the mam line by a communicating trench or subterranean gallery.

Longitudinal Deviation. — In gunnery, the perpendicular distance (over or short) of the point of splash from the vertical plane passing through the centre of the target and perpendicular to the plane of direction.

Longitudinal Resistance. — In gunnery a strain or resist¬ ance produced by the longitudinal pull or elongation caused by the direct thrust of the pressure in the bore on the head of the block, and by the displacement in longitudinal direction caused by the pressures which act normally upon the interior and exterior of the jacket. .

Lookout Posts. — Protected positions, usually located in the first line trenches, at points where good views may be obtained of the enemy's line. They are usually constructed on the right side of a traverse and in_an excavation in the front wall of the trench.

Map Reading. — The art of forming a clear mental picture of the actual features of the ground by reading the char¬ acters representing the same on the map. To be able to do so, the scale and map distances of the map must be known.

Mean Radial Distance. — The mean radial distance of the shots from the centre of the group on the target. To determine it, find the point of mean impact, and rneas-ure the absolute distance of each shot from it. Divide the sum of these distances by the number of shots on the target.

Meeting Engagements. — Meeting engagements are char¬ acterized by the necessity for hasty reconnaissance, or the almost total absence of reconnaissance; by the neces¬ sity for rapid deployment frequently under fire; and usually by the absence of trenches or other artificial cover. These conditions give further advantages to the offensive. The whole situation will usually indicate beforehand the proper general action to be taken on meeting the enemy.

Meeting System of Convoys. — A system under which two sections of transport, one of which is loaded and the other unloaded, meet at some point half way between two stages, exchange their vehicles or transfer their loads, and then return to their respective stages.

Mil. — The unit of angular measure, 1-6400 part of a circle. The arc which subtends a mil at the centre of a circle is, for practical purposes, equal to 1-1000 of the radius. The arc and its tangent are nearly equal for angles not greater than 330 mils.

Military Order. — An authoritative direction, respecting the military service, issued by a military commander with a view to regulate the conduct of military persons, or control the movements or operations of individuals or organizations under his command.

Military Police. — Police whose duty is to enforce all police regulations in the theatre of operations and in mobili¬ zation and concentration camps. They protect the in¬ habitants of the country from pillage and violence and prevent excesses of all kinds; keep all roads clear; arrest all soldier and civilian employees absent without proper authority from their organizations; arrest all marauders; and are charged with relieving organizations from the care of prisoners of war and with their safe conduct.

Military Reconnaissance. — A survey or examination of a country made under the protection of an armed force. It is one of the most essential operations connected with the tactics of the field, and serves as the basis of every movement or combination which it may be pro¬ posed to make.

Military Vocabulary. — The technical terms applied to the organization, weapons, equipment, formations and duties of various arms. It is important that the military vocabulary in each unit of an army should be uniform as to its various terms, especially in regard to the indication and description of targets.

Motor Transport. — A constant and serviceable means of transport, for troops and materials. In conjunction with trailers it may be employed for any and all special purposes, embracing motor ambulances, ammunition-wagons, artil¬ lery and machine-guns, kitchens, searchlights and tele¬ graphs, and cause a close union of the three arms of service. It greatly increases the efficiency of engineer troops, making possible the more rapid transportation of tools and mate¬ rials, gasoline power plants, *etc.*

N-Square Law. — In aeronautics, an expression meaning that if, for example, onLy five machines were flying in sufficiently close formation to act in attack or defense simultaneously — that is to say,

so that the enemy could not approach one without coming under fire of all — they (in formation) would be more than a match for any force of machines (of equal individual fighting value) that might attack singly up to the number of 25.

National Salute. — A salute of 21 guns. It is also the salute to a national flag. The salute to the Union, com¬ memorative of the Declaration of Independence, and con¬ sisting of one gun for each State, is fired at noon on 4 July, at every post provided with suitable artillery.

Natural Point-blank. — The point at which the line of sight intersects the trajectory the secmd time; or, more practically speaking, it is that point which, being aimed at, is struck by the projectile.

Night Assault. — An assault undertaken in order to gain a point of support for further operations in daylight, to drive in an enemy's advanced troops, to secure an outpost position as a preliminary to an attack at dawn or to sur¬ prise an ill-trained, ill-disciplined or semi-civilized enemy.

Night Operations. — Movements undertaken to out¬ manoeuvre an enemy; to avoid observation, particularly when the enemy is provided with aircraft; to pass over an area of ground which it has been found difficult or impos¬ sible to traverse in daylight; to continue or complete an attack begun before dark; and to effect a tactical surprise.

Nobel Lighter. — A lighter for hand grenades having a five-second fuse attached. It consists of two cardboard tubes, one fitting over the other. Inside the top end of the outer tube there is a layer of friction composition; fixed on the top end of the inner tube is a forked brass friction head, which is held in position by a safety pin fastened through both tubes. Inside the other end of the inner tube is a small copper band, into which the fuse is fitted.

Noizet System of Fortification. — A system embracing the teaching of the school of Metz and having no sensible departure from the views and method of Cormontaigne, excepting to introduce such modifications as would remedy some of the acknowledged defects of his method. The front planned by Noizet has been taken as an elementary exercise for instruction in the art of fortification for the cadets at the United States Military Academy at West Point.

Observation. — Watching the effect of fire on the target with a view to correction or verification of sighting, either by watching for the

dust thrown up by bullets, or the behavior of the enemy.

Offensive Patrols. — That class of patrols made exterior to the line of outposts, with a view of gaining intelligence of the enemy's whereabouts. They are composed of larger bodies of men than defensive patrols. In aviation, these patrols go far beyond the lines and make invaluable reconnaissances.

Ordinary Billets. — Billets in which troops are lodged in houses or buildings at the rate of about one man to each three to four square yards of floor space. In agricultural districts, ordinary billets without subsistence can be pro-

. vided at the rate of about 10 men per inhabitant.

Ordnance Depots. — The ordnance services on the lines of communications consist of ordnance depots, the personnel far which is found from one or more ordnance companies.

These depots are distributed at the base, advance base and at other localities on the lines of communications. Intermediate depots are also established as may be neces¬ sary. Ordnance depots contain all the necessary reserves of arms, ammunition, equipment, etc., exclusive of medical and veterinary stores.

Orientation. — In artillery, the determination of the east point of the compass, in taking bearings. The orientation of mortars is frequently tested and the setting of the azi¬ muth indices corrected. A drawing is said to be oriented when so placed that its true meridian is parallel to the true meridian of the ground.

Outward Flank. — The extreme file on the right or left of a division, subdivision or section, according to the given front, when the battalion is at close or open column, and which is the farthest wheeling point from line into column, or from column into line.

Overhead Fire. — Fire directed over the heads of troops. Its object is to cover the advance of troops, to increase the fire effect on any particular portion of the enemy's lines and to cover the enemy communication trenches and pre¬ vent supports coming up.

Oversea Operations. — Operations undertaken with a view to (a) the establishment of a base for military operations either against the enemy's field armies or against a coast fortress, (b) the establishment of a flying naval base, or (c) raids against shipping, communications, *etc.*

Pack Transportation. — A division of animal transporta¬ tion, in which the animal is the unit, and each can carry, on a conservative estimate, 300 pounds gross or 225 pounds net load. The great advantage of pack transportation is its mobility, and ability to go over rough country where wagons are impassable.

Panorama Sketch. — A sketch too extended to be viewed in its entirety at once, but is exhibited part at a time by being unrolled and passing continuously before the spectator. Panoramic sketches are made by means of panoramic cameras transported by aircraft or otherwise.

Parachute Grenade. — A percussion grenade whose body consists of a tin cylinder of explosive with a hemispherical head of larger diameter containing shrapnel bullets. A buffer cylinder passes through the body and projects, so as to produce the explosion slightly above ground. A para¬ chute safety arrangement is attached to the head of the handle in order to prevent fragments flying to the rear on explosion, and also to cause the grenade to fall on its head.

Patrols. — Small detachments employed for a variety of pur¬ poses, the name of the detachment indicating its duty, as visiting, connecting, combat, exploring, reconnoitering, flanking, harassing, pursuing patrols, *etc.*

Permissible Explosives. — Explosives based variously upon ammonium nitrate, nitroglycerine and nitrostarch. They are poorly adapted for demolitions, but are peculiarly suitable for mining operations.

Photograph Officer. — In aviation, an officer in charge of the photographic lorry who is responsible for the photo¬ graphic apparatus and the development of plates delivered by the observing aviators who have been aloft.

Picric Powders. — Powders consisting of pure picric acid, or that acid combined with a non-metallic base. They are non-sensitive to shock, unaffected by heat or cold, and in some forms by water, can be produced in a granular form or fused into solid shapes. Melinite, lyddite, ecrasite and shimose are of this class.

Pill-Box. — A slang term for a concrete and steel shelter and outpost defense, armed with machine guns as used by the Germans on the western front. It generally contained two main chambers and mounted from three to five machine guns in a bastion beyond these chambers. A stair¬ way led to the top which might be used for observation purposes.

Plane of Site. — A plane containing the right line from the muzzle of the gun to the target, and a horizontal line per¬ pendicular to the axis of the bore at the muzzle. It is sometimes called the zero plane.

Plunging Ricochet. — The description of ricochet fire, when the angle of fall is comprised between 6 degrees and 10 degrees. In this fire, the ball is given a small velocity, and the curve described is short and high.

Point Blank Range. — The distance from the muzzle of the piece to that point in the projectile's trajectory where it cuts the prolongation of the natural line of sight, a second time, the natural line of sight being horizontal.

Position of Deployment. — A place (preferably a large open space) near some landmark easily recognizable, where the whole of the infantry detailed for the attack can halt for a few minutes in order to make sure that all the units are present and can easily deploy for the attack.

Position in Readiness. — A position for action in which troops are placed where it is intended to resist the advance of the enemy in the immediate vicinity and the knowledge of his movements is not sufficiently definite to decide upon a plan of action.

Potence. — Troops are ranged en polence by breaking a straight line, and throwing a certain proportion of it either forward or backward, from the right or left, according to the circumstances, for the purpose of securing that line. An army may be posted en potence by means of a village, a river or a wood.

Practice Marches. — A part of the field training of troops having in view the hardening of the men and animals and the instruction of officers and men in duties incident to a campaign, marching, camping, cooking, etc., and the prin¬ ciples of tactics, including the services of information and security. .

Profiling. — An operation by the construction of field works which consists in erecting at proper points along the sub-

[crests wooden profiles which give the form of the parapets at those points, and which guide the workmen in the con—

r struction of the works.

Progressive Powder. — A gunpowder made so that it burns slowly until the projectile moves, and then with increasing, or progressive rapidity, to avoid the extreme pressure caused by the explosion of powders in which the combus¬ tion is instantaneous. _ .

Protective Cavalry. — The first line of security until the opposing infantry columns get within striking distance of each other. It covers the advance of the army or group of divisions to which it is attached, to prevent the enemy obtaining information as to the disposition of the force which it is covering, and to allow the force tactical freedom of action…

Protective Patrols. — Patrols detailed for the immediate protection of the force and to prevent the enemy's scouts and patrols from attempting to penetrate the screen and gain the fullest information as to the advancing infantry.

Provost Guards. — Guards used in the absence of military police, generally in conjunction with the civil authorities at or near large posts or encampments, to preserve order among the soldiers beyond the interior guard.

Quadrant. — In gunnery, an instrument, generally made of brass, for ascertaining or adjusting the elevation of ord¬ nance, particularly mortars, which have no tangent scale. It is graduated into degrees and parts of a degree, having a mpvable index, with a spirit level and vernier attached to it…

Quarter Guard. — A guard mounted in camp, immediately on the arrival of each corps on its ground. It is placed in front of the centre of the camp, at about 80 paces from it, and is charged with special duties. '

Quarter-sights. — In gunnery, division marked on the upper quarters of the basering, commencing where it would be intersected by a plane parallel to the axis of the piece, and tangent to the upper surface of the trunnions. These sights are used for giving elevations up to 3 degrees.

Radian. — A unit of angular measurement. The true mil is a thousandth part of a radian, or practically 1-1570 part of a right angle. …

Rafale. — A variety of artillery and infantry fire which has for its object the production of a paralyzing, instantaneous effect produced by suddenly delivered, very violent gusts of fire of short duration, separated by more or less prolonged intervals of calm. Rafale in French literally means “ squall.”

Rally. — The rapid grouping behind a leader of the various elements of a command without reference to their previous situation or formation.

Range-azimuth Table. — A table of ranges and the corre¬ sponding azimuths from a gun to points in the centre of the main ship channel or channels. It is kept at the gun and used for firing without the use of range-finding apparatus.

Range Officer. — In coast artillery, the officer in charge of the position finding equipment and the range section of the battery command. His station is at the battery plotting room and he is responsible to the battery commander for the condition of the material and for the efficiency of the personnel under his charge; an officer charged with the police and care of a target range and its accessories.

Record Practice. — In small-arms firing, a practice to afford the soldier an object lesson of his progress, and to obtain a record by means of which the soldier may be graded in awarding insignia and increased pay.

Re-entering Place of Arms. — In fortification, an enlarge¬ ment of the covered-way, at the re-entering angles of the counterscarp; this space is formed by setting off demi-gorges of 30 yards (more or less) and making the spaces form angles of 100 degrees with the adjoining branches of the covered way.

Relief. — The height of the interior crest of a parapet above the bottom of the trench; or, the length of time that men have to work before being relieved; or, a number of men who work or are on duty

for a given length of time.

Rendezvous. — Place to which the columns of the line of communication are sent where they are met by agents of the trains and conducted to refilling points.

Representative Fraction. — In military map reading, a fraction whose numerator bears to the denominator the same proportion that a distance on the map bears to the distance on the ground it represents. The numerator must always be 1, and the denominator is expressed in similar units.

Ring-gauge. — A circular steel gauge used in inspecting shot and shells. They are made of two sizes for each calibre, the larger being a trifle more and the smaller a trifle less in diameter than the true calibre of the projectile. All shot received must pass through the larger gauge, but are rejected if they pass through the smaller.

Rolling Fire. — A discharge of musketry by soldiers in line, in quick succession, and in the order in which they stand; also a fire where the axis of the piece is parallel or nearly so, with the ground or water, and the projectile rebounds over the surface in a succession of ricochets.

Route Marches. — Marches used in peace to conduct a body of troops from one station or post to another. In time of war they are used for the purpose of assembling the fractions of an army on its base of operations of conducting troops through a country where there is no enemy.

Russian Sap. — A gallery without sheathing, the top _ of which is cut in the form of an arch. The earth is carried to the rear as in the case of the deep sap. Ventilation holes are arranged here and there, permitting the location of the arched roof in relation to the surface of the earth as the work progresses.

Salient. — In fortification, that which points outward from the interior

of any work. For example, the central angle of a bastion, pointing toward the enemy, is a salient angle. Also, in map reading, a projection from the side of a hill or mountain, running out and down from the main feature.

Salvo. — Concentrated fire from a greater or less number of pieces of artillery. Salvos, corresponding to volleys of musketry, are frequently fired by way of salutes ovei* the graves of officers at the time of burial.

Sanitary Service. — The service embracing the institution of all practicable sanitary measures to the end that the fighting forces suffer nb depletion in strength, the temporary care and professional treatment of the sick and wounded and their transportation and the supply of the necessary sanitary equipment. .

Sanitary Train. — A train including all vehicles, animals, personnel and reserve sanitary material, not attached to organizations, employed in collecting and caring for the sick and wounded of the division pending their evacuation by the line of communication.

Searching Fire. — Searching is the term applied to collective fire when the depth of its dispersion over a beaten zone is increased by the use of combined sights.

Searchlights. — Important elements of the defense in a coast defense command. The standard service search¬ lights are 60-inch. Depending upon their tactical use, they are classified as searching or as illuminating lights, and, depending upon their assignment, as fort, fire or mine searchlights. .

Second Line. — The line of fire trenches, with the covering fire trenches, support trenches, support dug-outs (an exact duplication of the front line system) far enough behind the front line that in the event of the first system being taken, the second line is ready to be taken up by the troops driven out of the front line, and receive the support of troops lying in brigade or divisional reserve.

Secondary Bases. — Bases required, as an army advances, to enable it to have its supplies at hand. These bases, which should present the same qualities as does the original base, are usually established by detached bodies of troops, or by the reinforcements sent forward, so that the army will not be delayed in its onward movement.

Sector.— The joining together of several supporting points under the same commander is called a sector. It is gener¬ ally held by a division,

and is divided into sub-sectors of brigades and regiments. The force assigned to defend a sector has its own separate reserve district from the reserves of the supporting points. .

Sector of Explosion. — At the moment a gun is fired, a spherical sector of fire is formed in front of the piece, whose extremity presses against the bottom of the bore, while the external portion of it terminates in the air, which this sector compresses and drives in every direction.

Sector Without Fire. — That space exterior to a work which is not defended by the direct fire of the adjacent faces. The space is included between lines drawn througn a salient, perpendicular to the faces.

Sentry Over Arms. — A sentry mounted at the picket post to watch for any signals from the videttes or cossack posts, or in the case of infantry sentries or sentry groups, and to guard the picket against surprise.

Sentry Squad. — A squad posted in observation at an indi¬ cated point. It posts a double sentinel in observation, the remaining men resting near by and furnishing the reliefs of sentinels. In some cases it nay be required to furnish a patrol.

Service Colors and Standards. — National colors or stand¬ ards made of bunting or other suitable material, but in all other respects similar to the silken national colors or standards. These colors and standards are for use at drills and on marches, and on all service other than battles, campaigns and occasions of ceremony.

Service of the Interior. — The function of the service of the interior, in time of war, is to supply the commander of the field forces with the means necessary for _ the accom¬ plishment of his mission. This service is carried on by the bureau chiefs, department commanders, and in certain instances by commanders of concentration camps and of ports of embarkation. Their respective operations are directed and co-ordinated by the Secretary of War through the medium of the chief of staff.

Sheaf Ranging. — In coast artillery, the firing of two or more guns at the same instant with their range settings differing by equal increments and increased or decreased from the right by the specified increment in yards, observ¬ ing the relative positions of targets and splashes, and making corrections from these observations.

Shelter Recess. — In fire-trenches made in favorable ground, a forward burrow, made by the individual rifleman, into the interior slope at the level of the firing step, in which he can lie in safety and at full length when not on duty at the firing point.

Shot Group. — Owing to different well-known causes the variations in the trajectory are such that in a series of shots fired at a target, no two shots will strike in the same spot, the hits being arranged in a certain diagram called the shot group, the size of which varies with the skill of those firing. Good shots will make a small group and poor shots a large one.

Sniperscope. — A device by the use of which a soldier can both aim and fire his piece at an object in front without exposing himself above the parapet.

Spade Warfare. — -War or hostilities carried on from trenches and underground constructions. The spade has become a main feature in land warfare, since it has become necessary to get down into the earth to seek cover against the de¬ structive effects of machine-guns, rapid-fire guns and other modern firearms.

Sprengle Explosives. — A class of explosives consisting of separate constituents, each non-explosive, which are com¬ bined at the moment of use. The most common is rack-a- rock, which consists of chlorate of potash a dry crystalline substance, and nitrobenzol, a liquid.

Stokes Trench Mortar. — - A light mortar, weighing 105 pounds, made in three sections (the barrel, the mount and base plate) to ensure easy transportation to the front line trenches. It projects a bomb 3 inches in diameter which weighs 1 1 pounds and is loaded from the muzzle of the gun or mortar. The bomb slides down the barrel and when it strikes the bottom it is fired automatically.

Supervision Trenches. — Trenches to facilitate the move¬ ment of the troops, general supervision of same and to afford more shelter, freer movement and for accommoda¬ tion of any additional men who are necessarily required when an assault is intended.

Supply Columns. — A part of the supply service for troops in campaign. Line of communications supply columns (usually auto-trucks or tractors with wagons) are dis¬ patched to a rendezvous point, where they are met by an agent of the commander of the field forces and conducted to distributing points. When it is possible to do

so, the supply columns go to the actual distributing points.

Supply Train. — A train including all vehicles, animals and personnel employed in transporting the divisional ration and grain reserve, or in bringing up the same from the refilling points to the distributing point. To it may also be attached herds of beef cattle, remounts, *etc.*

Tables of Occasions. — Tables showing by whom and on what occasions each article of uniform of the United States is worn; they also show the various articles of uniform and equipment — by whom, when and how worn.

Tables of Organization. — The details of organization, the amounts and kinds of transportation and the factors on which the allowance of transportation is based are fixed in the tables of organization United States army.

Tactical Decisive Points. — Points on a field of battle which, when occupied by an army, will enable it to make an attack on the enemy whose success would be decisive on the issue of the engagement. .

Tactical Pursuit. — Pursuit directed at a flying enemy with a view to directly harassing him, causing him as much loss as possible and maintaining the loss of morale which may have such important consequences.

Tactics of Position. — That element of tactics or strategy of the battlefield which depends largely on the moral energy of the commander-in-chief for accomplishment.

Target Designation. — It is sometimes necessary, where a target is indistinct, to use what are called “ auxiliary points ” for target designation; and m this case the method is resorted to of giving the direction of the point to be fired upon from this auxiliary point. In giving this direction the notations on the clock face are used as in determining the direction of the wind on a target range.

Teamwork. — The work and accomplishment of a number of persons or soldiers associated together. The compara¬ tively wide fronts of deployed units increase the difficulties of control. The success of the whole depends largely upon how well each subordinate co-ordinates his work with the

general plan. „ , . , , ,

Theatre of Operations. — The whole area of land or sea in which

fighting may be expected, or in which the movements of troops, etc., are liable to interruption or interference on

the part of the enemy. ., .

Thermit. — A compound of powdered aluminum and oxide ot iron successfully used in incendiary projectiles. When ignited the heat given off is sufficient to melt the free iron.

Tin Cups.— Cups used with heavy breech-loading guns, which serve, in conjunction with the vent piece, to seal

more effectually the powder-chamber, and to prevent the escape of gas, which is very destructive to the angular face of the vent piece.

Tower Forts. — Towers employed either as isolated forts or combined in a system of detached works for covering a space to their rear for an entrenched camp. They have several tiers of covered fire for artillery and musketry, and an open battery on top.

Traveling Trunnion-beds. — Contrivances for the purpose of distributing the load more equally over the gun-carriage. On the upper surface of the cheeks, near the rear ends, are placed two projecting bolts which, with the curve of the cheeks, form resting places for the trunnions, when the piece is in position for transportation.

Traversing. — Sketching by means of a continuous series of measured straight lines, the direction or bearing of which is taken with a compass at each change of direction. These lines are called traverse lines, and the. sketcher must pace actually along these lines. The detail is sketched by means of offsets or cross-bearings.

Traversing-gear. — An automatic traversing apparatus, in machine-guns, by which a limited angular movement in a horizontal plane may be given. Elevating or depressing the gun does not interfere with the lateral traverse.

Trench-dump. — A convenient spot or place selected by whosoever may be commanding that particular sector of trench to which carrying parties bring up the trench stores during the night in order to have them ready for distribu¬ tion in the morning.

Trip. — A useful trick in bayonet fighting. It is performed when in close grips with an opponent, by leaning forward and pushing him backwards, so as to cause him to throw his weight on one foot, at the same time deftly and quickly jerking his other foot upwards. This will throw him on his back at once. . ….

Tripping Piece. — A part of the firing mechanism in quick firing ordnance, being a flat piece of steel, fitted over a stud at the rear of the striker, and kept pressed downwards by a flat spring. It has a shoulder for the smaller cam-lug on the inner end of the firing lever to engage with in order to cock the striker… .

Triton. — An explosive made by the successive nitration of toluene, a coal-tar derivative. It is a neutral compound, very stable, of great strength, yet highly insensitive. It is pressed into blocks under high pressure, the insensitiveness of the explosive increasing with its density. Also written trinitrotoluene, trinitrotoluol and trotol\ frequently abbrevi¬ ated as TNT.

Very Lights. — Lights used to signal between aeroplanes or stations or between the ground and aeroplanes, when a code is prearranged; a flare for illuminating the enemy’s position.

View of a Place. — A reconnaissance of a fortified town, its situation, the nature of the country about it, as hills, valleys, rivers, marshes, woods, hedges, etc., taken in order to judge of the most convenient place for opening the trenches, and carrying out the approaches.

Visiting Patrols. — Patrols detailed to keep up communi¬ cation with the pickets, the supports on either flank and the reserve (if any). They also patrol any ground lying between the pickets and supports, which cannot be ob¬ served by either.

Warning Calls. — The class of calls comprising first call, guard mounting, full dress, overcoats, drill, stable, water and boots and saddles, all preceding the assembly by such interval as may be prescribed by the commanding officer.

Wheel Transportation. — A division of animal transporta¬ tion, in which the wagon is the unit, and each animal can haul, on a conservative estimate, 1,200 pounds gross or 700 pounds net load.

Wagon transportation should always be used unless the country is impracticable or the rate of march too rapid for wheels.

Wind Component Indicator.— In artillery and gunnery, a device for determining the wind reference numbers to be used on the range and deflection boards and to indicate the numbers to the operators of these boards.

Wing Traverses. — In fortification, where the approach is exposed to an enfilading and a slant reverse fire, and does not admit of a change of direction to avoid these wing traverses are erected across the line of trench to cover an enfilading view.

Wire Company. — The field signal organization used by the commander of a division for establishing and maintaining those tactical lines of information which radiate from division headquarters, and which serve, in general, to con¬ nect these headquarters with the major subordinate units.

Zero of a Rifle. — That reading of the wind gauge necessary to overcome the drift of a rifle at a particular range. All allowances for wind should be calculated from this reading.

Zone Energy. — A mode of expression in artillery, whereby the relative power of different guns as armor-piercers is estimated, viz., by the number of foot-tons per inch of the shot's circumference. At the muzzle of each gun, this power is a maximum.

Zone of Operations. — The strip of territory which contains the lines of operations, or lines on which an army advances, between the base and the ulterior object.

The foregoing terms or definitions have been officially approved by the United States War Department. Consult Farrow's Dictionary of Military Terms (New York 1918).

Edward S. Farrow,

Consulting Military and Civil Engineer.

MILITARY TERRITORIES OF FRENCH SUDAN, former designation ap¬ plied to the French Sudan, now known as the colonies of the Upper Senegal and Niger and the Military Territory of the Niger. Ex¬ tensive changes in the administration of the governmental affairs of the region

were inau¬ gurated in the period from 1895-1905. See French Sudan; French West Africa; Niger, Military Territory of; Upper Senegal and Niger.

MILITARY TRANSPORTATION. In

wheel transportation the wagon is the unit, and each animal can haul, on a conservative esti¬ mate, 1,200 pounds gross or 700 pounds net load. In pack transportation the animal is the unit, and each can carry, also a conservative estimate, 300 pounds gross or 225 pounds net lead. A given quantity of freight carried on packs requires three times as many animals as would be necessary to carry it on wheels. The larger number of animals means a proportion¬ ate increase of the forage to be provided and in the labor of feeding, shoeing, *etc.* If, how¬ ever, the country and season are favorable for grazing, the pack mule will get on without any forage, while the draft mule cannot. Other dis¬ advantages of pack service are that packages must be limited in size and weight much more closely than for wagons; long articles, as tent poles, cannot conveniently be carried except by special construction, and loading of pack cargoes is an expert service which must be per¬ formed by a few. trained men, while loading of wagons is work in which all can participate..

The great advantage of pack transportation is its mobility, and this consideration is often paramount. A good pack train, well handled, can make two miles to one of the best wagon trains on good roads and more on bad ones, and can besides go where there are no roads and where the country is so rough that roads could hardly be made and wagons could not pass them if they were made.

Wagon transportation should be used unless the country is impracticable or the rate of march too rapid for wheels. The permanent pack train should be limited to the probable re¬ quirements of rapidly moving columns, and in those baggage, etc., should be kept down to an absolute minimum.. When great difficulties of wagon transportation are foreseen the draft mules should be broken, to pack . service and enough aparejos carried in the train so that in case the wagons must be abandoned one-fourth to one-third of the loads may be placed on the mules and the march continued. The com¬ bination of harness and pack saddle \yhich nat¬ urally suggests itself in this connection is not practicable. Such a combination would make a very poor harness and a worse pack saddle.

The mule is the standard draft and pack animal of the United States service. He can best be described and understood by noting his points

of difference from the horse, which he resembles very closely. The points of differ¬ ence in conformation are mainly larger, thicker

bead, longer ears and smaller feet, larger girth, shorter legs and longer body. The relative dis¬ position of bones and their angles are the same as for the horse.

Pack Saddles. — The adopted pack saddle is of the Spanish type, and is commonly called by its Spanish name, aparejo. Its principal parts are the body, the cover, the cincha and the crupper. These parts are subdivisions, which are less important. The accessories added to the above to make the aparejo com¬ plete are the corona, the blanket, the lash rope with its cincha, the sling ropes, the lair ropes and the mantas or pack covers.

The body of the aparejo consists of two pieces of heavy leather 24 inches wide by 58, 60 or 62 inches long, sewed together at the edges and across the middle of the length, forming two pouches, into which moss or hay is stuffed to form pads fitting the contour of the animal on either side of the backbone. In the American form the pads are given a pe¬ culiar elastic stiffness by means of ribs of wood or metal extending from a saddle piece at the top of each pouch to a boot piece at the bottom. These ribs are stiffer at the front and more flexible at the back, varying uniformly between. They convert each pad into an elastic lever, by which the pull of the cincha on the bottom acts to raise the aparejo and its load from the backbone, while the stuffing distributes the load uniformly over a large space on the ribs. The stuffing is introduced through a hand¬ hole in the middle of the underside of each pad, through which it is always accessible, and the finest art of the packer consists in fitting the pads to the shape of the particular animal which is to carry the aparejo, and keeping them so regardless of changes in the animal s con¬ dition by shifting, removing or renewing the stuffing. If a bunch rises on the animal it can be worked down by taking out stuffing im¬ mediately over it so as to take off the pressure at that point. Determine the proper point by wetting the top of the bunch and laying the aparejo on the mule.

Aparejos and mules are numbered and the same pack is always on the

same mule…

Animal Power.— The capacity of an animal to exert a tractive effort decreases as speed and time increase. As a basis, it may be as¬ sumed that an average draft mule can pull on a level 80 pounds at 2>4 miles an hour for 10 hours every day, or, in other words, can pull 80 pounds over 25 miles of average level roads every day. If a pull of 160 pounds is required ir can be made over 12j4 miles a day only, the lesser distance being covered by a slower gait or longer rests, or, as is usually the case, partly by each. An animal can exert 2ˆ4 times the normal pull for a few minutes at a time anc five times for a few seconds, provided in each case the demand is not repeated too frequently.

The load which can be hauled on any pull depends mainly on the kind and condition of the road and a little on the wagon, especially as to width of tire and size of wheels. For the standard army wagon and on a level aver¬ age dirt road in good condition the load cor¬ responding to 80 pounds standard pull may be taken at 1,000 pounds per animal. Of this, 300 pounds will be wagon, leaving 700 pounds net freight. Any reduction of this load to lessen the pull must come out of the 700 pounds.

To reduce the pull to 40 pounds, 500 pounds must be taken from the freight, leaving 200 pounds only to be hauled. This 200 pounds pulled over 25 miles would equal 5,000 pounds pulled over 1 mile, while if the full load of 700 pounds is hauled over 12f4 miles, which can be done with the same effort, the result equals 700 X 12ˆ4 = 8,750 pounds hauled 1 mile 1 1 the length of the march is fixed, the animal can be relieved only by reducing the pull ; other¬ wise it is better to relieve them by shortening

the march. .

On hilly roads there is no traction on the down grades and an increased gait is usually taken without appreciable extra exertion. This saves time, which may be spent in rests, allow¬ ing greater effort on the up grades. > Up to 8 per cent grade, the load can be retained by reducing the distance. Up to 3 per cent grade, the distance can be maintained by reducing the pull. Above 8 per cent, both pull and

distance must be reduced. The reduction of pull may be accomplished by removing part of the freight, by doubling up teams or by putting men on drag ropes.

Motor Transportation. — The company com¬ mander of an organization equipped with motor transportation is responsible for everything con¬ nected with its operation and maintenance. He formulates rules for the proper handling of. the vehicles on the road and in camp or garrison and sees that the same are rigidly enforced. He establishes the division of responsibility with reference to operation, repairs and upkeep of the mechanical equipment of his company and sees that each member is thoroughly familiar therewith. He personally sees that all motor governors are properly sealed and keeps the sealing tool in his personal possession. He keeps accurate check on all gasoline, lubricating supplies, tools and spare parts. It is a favorite practice to use gasoline for many purposes ex¬ cept fuel. Motor parts, being high priced and readily salable, can only with difficulty be pro¬ tected against theft.

In organization supplied wholly or in part with motor transportation a mechanic or me¬ chanics are designated to assist in the repair of vehicles. In the telegraph company five me¬ chanics are provided; a chief mechanic and one for assignment to each station, if desired. The chief mechanic, assisted by the other me¬ chanics, has general supervision over the mechanism of the motor vehicle equipment, as well as the detailed repair work. He is in charge of the company repair outfit and utilizes it for the above purpose as necessity requires. He sees that the assistant mechanics are quali¬ fied and if necessary instructs them.

Chiefs of section are responsible for the proper operation and maintenance of the motor vehicles under their direct supervision. This especially applies when, as will frequently hap¬ pen, the section is operating detached. In this Ccisc a mechanic, if available, should always be assigned to duty with the section.

The duties of the driver include the keeping of his assigned vehicle and its equipment in proper repair and working older. He. is quired to be familiar with the mechanism of his vehicle and its proper operation. Repair work performed by drivers is limited to that class designated as minor repair. Work on the motor, ignition and lighting system, or on the

interior mechanism of running parts should be performed normally under direct supervision and orders of the chief mechanic or one of his assistants. Drivers are responsible for proper lubrication at all times and promptly report any defect noted or repair needed. Each is responsible that the vehicle under his charge is not subjected to abuse of any kind and that all regulations in force regarding operation and maintenance are properly observed.

Field trucks furnished organizations by the quartermaster corps are of standard make and are normally equipped with the war body. The inside dimensions of this body are as follows :

Width

‘ Length, - - A - - Depth,

feet Feet Inches feet

One and one-half ton .. . 10 5 1 2

Three-ton . 12 6 6 2

See Army Transport Service.

Edward S. Farrow, Consulting Military and Civil Engineer.

MILITARY TRIBUNALS. See Law,

Military.

MILITARY UNIFORMS. See Uni¬

forms.

MILITCHEVITCH, Djakov Milam, Ser¬ bian author and ethnologist: b. Ripany, 4 June 1831 ; d. Belgrade, 1908. H concluded his theological education in 1850, entered the serv¬ ice of the state in 1852 and in

1861 he became secretary to the Minister of Education. He edited the periodical Skola in 1868-76, in addi¬ tion to his official duties ; and in 1886 was ap¬ pointed librarian at the National Library of Belgrade. He ranked as one of the foremost Serbian scholars of his time. He wrote his¬ tory of Pedagogy) (1871) ; (The Principality of Serbia) ('1876) ; (Life of the Serbian Peasant* (1867-77); (Lives and Works of Illustrious Men) (1867-79) ; (The Kingdom of Serbia) (1884); (Biography of Famous Serbians of Modern Times) (1888), *etc.*

MILITIA. The World War has greatly enlarged the conception of national military power. Militia from the earliest period has signified the manhood power of a nation, avail¬ able for military purposes (and also, in a re¬ stricted sense, the enrolled volunteers from that body, who might, under sanction of law, be locally organized), as distinguished from such regular governmental military force, as a nation might maintain. Strong governments have maintained large, regular armies, the larger, the surer to strike aggressively; while republics have been prone to neglect the crea¬ tion of armies until some necessity drove them to act for defense.

The advance of civilization found the entire man power of the nations of the world, in 1918, organized on military lines, some from precon¬ ceived ideas, some from necessity, and the na¬ tions becoming exponents of universal military training and service. What the war sequel will be is a fruitful theme for thought.

When the Constitution of the United States was adopted, the term militia had a definite meaning. By that instrument Congress obtained power to <(provide for organizing, arming and disciplining the militia, and for governing such part of them as may be employed in the service

of the United States… .® The Constitu¬

tion also created the President ((Commanderdn-Chief of the Army and Navy of the United States, and of the militia of the several States when called into the actual service of the United States.® The Articles of Confederation had provided, ((that every State shall always keep a well regulated and disciplined militia, sufficiently armed and accoutered, etc.® When the colonies united against the mother country they joined their quotas of volunteers from the militia, and with them fought the battles of the Revolution; and 80 years later the great Civil War was fought by militia, using that term in the sense

which the government had adopted. By the Act of Congress passed in 1792, the first exercise of its power, the militia was de¬ fined to be all male citizens of the United States between the ages of 18 and 45 years, excepting certain specified exempt classes. The term thus used by our original lawmakers, with apparent positiveness as to its meaning and as to its function, was a natural result of the fol¬ lowing facts.

English Militia. — As early as the time of Alfred the Great, the division and organization of society in England comprised the enrolment of the people in bands or companies, com¬ manded by a leader, who was elected in the folkmotes, and called ealdorman or earl, and whose authority extended over the county. «By the Anglo-Saxon laws, or rather by one of the primary and indispensable conditions of political society, every freeholder, if not every free man, was bound to defend his country against hostile invasion.® Every 10 families, as far as convenient those related to each other, formed a tithing, commanded by the ((bors-holder® in his military capacity; 10 tithings formed a hundred, several of these forming a trything, or riding, as the word has been perpetu¬ ated in Yorkshire. Three public burdens, the trinoda necessitas, were imposed upon the citizen ; to serve under arms, to repair and-construct fortresses and to make and repair roads and bridges. The Norman Conquest was the means of creating an army made up of bands which attended the king under the com¬ mand of their immediate lords by ((knight service,® but that in no way changed the funda¬ mental character of the militia. It was enacted by Henry II (1181, The Assize of Arms) with the consent of Parliament, that every freeman, according to the value of his estate or movables, should hold himself constantly furnished with suitable arms and equipments, the poorest hav¬ ing to provide himself with a ((wambais® or linen coat stuffed with cotton, and a lance. In the time of Edward I (1275) the Statute of Winchester defined these requirements more clearly. ((Every man between the ages of 15 and 60 was assessed and sworn to keep armour according to the value of his lands and goods, a hauberk and iron breastplate, a sword, a knife and a horse. For smaller property less expensive arms were required and these provisions were enforced by semiannual in¬ spections by constables chosen in every 100.® From the earliest times the high constable of the county, or sheriff, was the officer by whose authoritv the citizens were called out, either to drive off predatory bands of robbers, or to assist him when he was in the performance of

any duty required by the courts of law. When thus called out for the latter purpose, the body was known as the posse comitatus, or power of the county, and to this day the same power is lodged in our office of sheriff and is the ulti¬ mate resort of the county officer charged with legal process. The constitutional military force of the kingdom consisted, therefore, of the feudal troops and the posse comitatus. But the latter could not be marched out of the kingdom, nor yet out of their shire, except in case of invasion. The sheriff was also charged with the same duty of calling out the militia when the citizens were organized in pursuance of parliamentary enactments, but later, when the kings considered themselves to be in need of troops more under their immediate control, he was superseded by commissioners of array, al¬ though his authority remained unaltered as to summoning assistance for local duties. Prior to the reign of Elizabeth, lords lieutenant in the several counties were appointed by the Crown to marshal the military forces. The people were always exceedingly jealous of their rights, and as a nation insisted more upon pursuing their home labors than upon conquests and achieving glory, and one of the earliest records of this spirit is the enactment in the time of Edward III, made as a restraint upon the in¬ fractions of the rights of the people, that no man shall be obliged to equip himself except as has been the custom, and shall not be obliged to leave his shire except when necessity require it for the defense of the realm. Conscriptions and levies were resorted to at times, but were tolerated by the people only when their love for the government exceeded the bounds of resistance or revolution. The Civil War of 1642, the result of which was the execution of Charles I, was precipitated and protracted in part by the militia question. The right of the king, as chief executive of the nation, to call the militia into service in time of need was undoubted, but through the natural jealousy and distrust of Parliament, the power of the king was sought to be curtailed by making the office of lord lieutenant irrevocable for two years and giving those offices to the persons approved by Parliament. For six years this was one of the main topics of contention in the wars and negotiations which resulted in the establishment of the Commonwealth. The re¬ sult of the war was to put England under the subjection of Cromwell and his army, and ulti¬ mately to fill the people with a great detestation of a permanent military establishment, and the whole course of subsequent legislation, upon soldiery was directed with care to avoid the dangers

of a standing army. The Restoration of 1660 was finally accomplished through the militia of England. To epitomize Macaulay's statement : (<It was an exciting time,® the flame of civil war was actually rekindled, the nobility put forth their best energies to assemble and train the militia, and train bands were held ready to march in every county. The popular feeling and strength were too great to be dis¬ regarded; the old army of 50,000 men was humored as well as intimidated into accepting \he unmistakable desire of the nation, and it saw itself destroyed, without striking a blow, looking sullenly on the triumphal entry of Charles II into London, while the militia in¬ vested the country with a strength they dared

not measure. A force of upward of 120,000 men had been organized to act in this great emergency.

Shortly after the Restoration, the Parliament, filled with the idea of how important as well as how trustworthy the militia was, passed a bill organizing it. A horseman was required to be provided, equipped and paid for by every one having an income of £500 a year derived from lands or £6,000 of personal property. And every one whose income or possession was one-tenth of those amounts was charged with the equipment and pay of a pikeman or musketeer, and those of less estate were obliged to com¬ bine in furnishing horse or foot soldiers. The size of the body of soldiery thus created was estimated at 130,000 men. For a time, this force became a useful and serviceable body, but the influence of the Crown was not lent to perfecting it. The king's desires were rather to obtain possession of any army that could be used to do his bidding. James II was met by the jealousy of Parliament just as Charles 1 had been. Of a religion that was hated by the mass of the people, and repeatedly thrusting men who were tools of the Crown into office, James II awakened a sense of distrust and opposition ; his attempts to raise a regular army, by demands for the necessary appropria¬ tions from Parliament, were the occasions of debate upon what the military establishment of the country was and should be. These argu¬ ments were renewed pro and contra on differ¬ ent occasions, but the king's .wishes were dis¬ regarded when, at the very height of his power, the dangers of a standing army were empha¬ sized by Parliament ; and a bill to make a militia more efficient was passed at the same time that supplies for the army , were granted. The popular feeling was embodied in what was said in Parliament at this time in answer to what the courtiers had to urge in favor of regular troops. Sir Edward Seymour, Sir William Twisden, Sir Richard Temple and Sir John Maynard, the most learned lawyer of

this time, gave vent to these utterances. Said the first of these: ((The militia might not be in a satisfactory state, but it might be remodeled, and he would rather give up a million to keep up a force from which he had nothing to fear than half a million to keep up a force of which he must ever be afraid.® The troops enrolled in the regular service, however, continued to increase in number, made necessary through the foreign relations of the English government, but the people accepted the increase always holding fast to the idea of a militia as their real protector. The force of circumstances, when the House of Orange was called to the throne, changed to an extent the feeling of the country in this regard, and danger from foreign foes made soldiers a necessity which the people reluctantly recognized, without such fear for their domestic content as they had before en¬ tertained. The sentiment of the country was again shown when the House of Hanover came to the throne of England, although at this time the regular army had become a permanency, having been continuously provided for on the theory that a standing army was a necessity «for better preserving the balance of power in Europe.® In 1757 the militia of England was again reorganized, the impelling motive being that which had always been uppermost in the

minds of Englishmen, namely, to take away the pretext for a standing army, and a quota was fixed for each county. The provisions were for five years' service, the position of an officer was made important by proper qualifications and it was provided that without the exigency of service the companies should not be marched out of their counties. It was believed that the possession of the offices by gentlemen of es¬ tates would, although under the authority of the Crown, always ensure the services of the militia to the good of the people. This force gradu¬ ally became, by reason of the limited size, the right given to furnish substitutes and a pro¬ gressive necessity to supply pay, clothing and all other expenses, a feeder for the regular establishment, a distinct species of reserve, and in consequence the free, patriotic and military spirit of the country began to manifest itself by the creation of volunteer organizations. Prior to that time the <(militia had enjoyed

for many years as compared with the regular forces, a social, as well as a constitutional superiority.® The volunteers so called into ex¬ istence now replaced, to an extent, that ancient power and continued until the events of the Boer War when they ceased to exist and the Territorial Army was created. The control of the militia of Great Britain was taken from the country and lodged in the Crown in 1871, and since then the militia has been a part of the regular force and has constituted the army that shared in the defeat of Germany.

The foregoing brief reference to the militia of Great Britain is of greater interest than an account of the militia of Greece, of Switzer¬ land, of South Africa, of Argentina or of any other country, because it is the foundation of our military policy. In all free or republican countries the embodiment of the military spirit is shown by the willingness and ability to bear arms and to organize for war. The transition of nations from a condition of popular military education, discipline and strength, to military powers, possessing large armies, devoted to war for defense or conquest, involves an un¬ derstanding of the great World War begun in

1914.

American Militia. — The peculiar life of the colonies in America rendered it necessary that the colonists should keep themselves armed and experienced in the use of weapons of defense; inheriting the institutions of the mother country, the existence of a militia was an as¬ sumed matter in their organization. The adop¬ tion of the Constitution of the United States, above quoted, in 1789 was the subject of innu¬ merable debates and political views and proph¬ ecies, and the proceedings of the constitu¬ tional conventions concerning the adoption of the clauses relating to the militia are most in¬ teresting as a matter of political history; space, however, will not permit an account of them. Singularly enough, South Carolina and Vir¬ ginia were on the side of giving the govern¬ ment greater power, while Massachusetts and Connecticut were opposed to curtailing the State control. Propositions were successively voted down in attempts to frame the Constitu¬ tion in this regard, among others as follows :

(a) To make laws regulating and disciplin¬ ing the militia, not exceeding one-tenth part in any one year.

(b) To establish a uniform and general system of discipline for the militia of the States and to make laws for arming and dis¬ ciplining and governing such part of them as may be employed in the service of the United States.

(c) To establish a uniformity of arms, ex¬ ercise and organization for the militia and to provide for the government of them when called into the service of the United States.

(d) To add to the clause reserving to the States respectively the appointment of the offi¬ cers, the words <(under the rank of General Officers.®

We have to bear in mind that the majority tried in many instances to yield to the general government the minimum of the powers deemed essential to that government, and this fact explains the fragmentary character of the provisions as to the militia. But the convic¬ tion was general that the militia must be trained with uniformity and be so organized as to become a defense to the nation, and that the only authority to provide therefor was the general government. Hamilton in the Feder¬ alist fully defended the Constitutional plan. Patrick Henry in Virginia was convinced that ruin would follow the adoption of the law. So much concern was felt regarding the militia that among the 10 amendments which were promptly made and declared to be in force 15 Dec. 1791 was that (No. 2), providing ((a well regulated militia being necessary to the secu¬ rity of a free State, the right of the people to keep and bear arms shall not be infringed.® The State constitutions and the State laws have from time to time, and invariably, dealt with the militia of the respective States and are held by the courts to be controlling, so far as not inconsistent with the Federal laws, but they have not been uniform as to service, duty or organization. It has been demonstrated that Congress by the Act of 1792 made an ineffec¬ tive law, by merely prescribing uniform duties for the entire male population composing the militia, and though thereafter for over 100 years the law was retained with slight amendment upon the statute book, it was not enforced and was the subject of repeated efforts at modification. The Presidents of the United States, notably Washington, Jefferson, Madison, Adams, Jackson and Van Buren in their messages to Con¬ gress, urged further legislation to create an ef¬ ficient militia. Elaborate reports were made from committees in Congress, but nothing was accomplished except that in 1808 an annual ap¬ propriation of $200,000 was begun, which was increased in 1887 to $400,000 and in 1900 to $1,000,000. Between 1819 and 1825 various bills and propositions were advanced for a classifi¬ cation of the militia, so that only a small

part of it would have duty to perform in time of peace; then a board was convened by the Sec¬ retary of War, which made a report that was transmitted to Congress recommending the in¬ struction of officers in camps of instruction 10 days each year. Jackson urged encouraging volunteer organizations. The Secretary of War of President Van Buren's Cabinet, in 1840, proposed that 100,000 men apportioned to the States be maintained, by draft or other¬ wise, to serve four years, one-fourth to go out each year and to form the reserve, continuing

as such four years more, the President to order the active portion on duty 30 days . each year and defray all charges for pay, subsistence, *etc.* It is said that no subject, except finance, was more discussed prior to the Civil War than the militia. The debates in Congress are full of it, reports and bills are numerous, both from the War Office and the committees of the Senate and House, but as stated, they were un¬ acceptable, until after the war with Spain. The language of the Constitution ˆreserving to the States respectively, the appointment of the of¬ ficers, and the authority of training the militia according to the discipline prescribed by Con¬ gress, was always considered to be an insur¬ mountable obstacle to Federal control of the militia in time of peace. As indicated, the army and Congress long endeavored to secure the adoption of a plan to limit the organized militia to a practicable number.

Military Law of 1903. — • In 1903 the United States Congress adopted a new militia law, by which the militia was defined to be practically all able-bodied males between 18 and 45 years, divided into two classes, namely (a) ((the Or¬ ganized Militia,® being such forces as may be created, under State laws, regardless of the name they bear, and (b) the remainder of the militia. A period of five years was given to all the States to adopt laws making the organ¬ ization, drill and discipline of their organized militia the same as that of the regular army and the participation of the States in an annual appropriation of $1,000,000 was made depend¬ ent on such State action and the

creation of forces accordingly ; the limit in number was as it stood theretofore, to wit, 100 men for each Congressional representative ; those States which became entitled to participate in the an¬ nual fund became a part of the Organized Militia.® Authority was given to the President to call forth such number of the militia ((organ-lzed® or “reserve,® as he might deem necessary, in case of invasion, danger of invasion, rebel¬ lion or inability to execute the laws of the Union, and officers or enlisted men who neg¬ lected to present themselves to a mustering offi¬ cer to be mustered into the service of the United States, if found fit, were subject to trial by court-martial.

Subsequent to 1903, the continued threat of Mexican trouble kept the military topic upper¬ most and a continuous series of legislative measures followed.

In 1916 the country had advanced to the po¬ sition that the above supposed insurmountable obstacle about appointing officers and training the militia should be surmounted — or ignored. By the Act of 3 June 1916, Congress enacted that the army of the United States consisted of the Regular’ Army, the Volunteer Army, the Officers’ Reserve Corps, the enlisted Reserve Corps, the National Guard while in the serv¬ ice of the United States and such other land forces as are now or may hereafter be author¬ ized by law.

The National Guard is therebv made the reg¬ ular enlisted militia between 18 and 45 years of age organized, armed and equipped as therein provided. The number to be organized is in the proportion of 200 for each senator and representative in Congress, and increased each year in the proportion of 50 per cent until a

strength of 800 for each senator and represen¬ tative in Congress be reached, which creates theoretically a force of 420,000 men.

Power was given to the President to as¬ sign units to divisions, brigades, etc., and to detail officers to command them ; likewise of¬ ficers as chiefs of stall and assistants to the chiefs of staff. Adjutants-general of States report to the Secretary of War. Funds appor¬ tioned under ((just and equitable procedure® in ratio of the number of enlisted men are to be paid for all general purposes. The States may fix the location of units within their borders and enlistments are to be for six years ; three in the active and three in the reserve, and the law prescribes the contract, which creates a Federal soldier. Provisions for reserve units exist and authority is given to supply all ma¬ terial, as

may be necessary to arm, uniform and equip the (<National Guard,® also for training, inspections, service schools, details, courts-martial and pay for service. The (<National Guard® may be used for Federal service or may be drafted into the military service of the United States, in which case they cease to be National Guard and are discharged therefrom.

On 6 April 1917, the United States declared a state of war, and then followed the enact¬ ment for universal military service. This great and wise step has done more to educate the United States than any act passed bv Con¬ gress ; and its relation to the militia of the United States will be far reaching.

The war having been brought to a close the continued pressure for universal military in¬ struction and training has not yet resulted in concrete plans. The creation of reserve offi¬ cers' training corps in colleges and universities under the National Defense Act of 1915 is be¬ ing accomplished by the War Department and the officers' reserve corps is a present factor of great importance through the demobilization of the American Expeditionary Forces.

The fact that the great body of the militia (except the 420,000 above mentioned com¬ prising the ((National Guard®) are not yet sub¬ ject under the law to military consideration is not likely to be ignored permanently.

State Militia or State Guard.— For over 100 years the militia had been called the State force, being in time of peace under the State, as in England it was under the county; the new law seeks to secure uniformity and perfection through active national participation in control, under the general power in Congress to raise armies. The term "National Guard® had been adopted by some States to designate its organ¬ ized or volunteer militia. This appellation was adopted by one of the most famous militia organizations of the world, the Seventh Regi¬ ment of New York, at the time Lafayette vis¬ ited America in 1824 and in his honor, after the "Garde Nationale.® The State of New York appropriated the term in 1862 to describe the organized militia, and other States followed, but the term that Massachusetts has used, "Volunteer Militia,® was more correct. The organized militia of the States bore names as follows: Georgia, South Carolina and Florida ((State troops® ; Arkansas and Kentucky, ((State Guard®; Louisiana, "State National Guard®; Rhode Island, "Militia®; Texas, (<Volunteer Guard®; Virginia, "Volunteers®; Massachu-102

setts, <(Volunteer Militia.55 The remaining States used the term “National Guardi

The State guard, regardless of its name, has always been a volunteer body, and although in many States some military organizations have existed excellent in drill, discipline, rifle shoot¬ ing and general military proficiency, actually comparable with corresponding bodies in the regular service, their character has been partly social. Sustained by men who were fond of military work and who enjoyed performing patriotic service and attaining a prominence which gratified pride, such units were devel¬ opments of a latent military spirit and were the means of giving popular military education to the youth of the country.

The assumption of general and universal military training of the youth of the land by the Federal government, and the inhibition of the maintenance of troops by the State, except a police force or constabulary, brings the State guard into a new form of organization.

During the World War the States gener¬ ally created defense bodies, or State guards without support of the Federal government, and in the reorganization of the National Guard they are likely to be absorbed.

The military policy of the nation involves the proper conception of the militia. It is a political, economic and patriotic question of statecraft. The military sciences, which have been so marvelously developed by war, will nat¬ urally enter into the question, as well as the trained personnel of the army and navy, be¬ cause the subject relates to the embodiment of national forces, but only for the perfection of a result and not for its creation.

The military power is subordinate to civil authority except when the military power must be exercised for the life or welfare of the na¬ tion. Asserting that this should be always kept in mind, Hallam says: (<Nothing would more break down this notion of the law’s supremacy than the perpetual interference of those who are really governed by another law.®

Bibliography. — Concerning the English in¬ stitution consult Edward, Earl of Clarendon,

(History of the Rebellion and Civil Wars in England5 ; Napier, (

Defence of England by Volunteers Corps and Militia5 ; Chamberlayne, (State of England5 ; Grose, (Military Antiqui¬ ties respecting a History of the English Army5 ; Hallam, Constitutional History of England5 ; Macaulay, (History of England5 ; Townshend and Windham, dan of Discipline for Nor¬ folk Militia5 (1760) ; and for the United States reference may be made to Elliot's (Debates,5 Curtis' Constitutional Flistory of the United States,5 American State Papers (Military Af¬ fairs), Congressional Debates, reports of Sec¬ retaries of War and of congressional commit¬ tees, messages of Presidents to Congress, opin¬ ions of attorney-generals, and numerous court decisions, both in the Federal and State courts. Among the former, reference should be made to the opinions of Justices Washington, John¬ son and Story (in Houston v. Moore, 5 Wheaton, 1), of Justice Story (in Martin v. Mott, 12 Wheaton, 19), of Chief Justice Taney (in Luther v. Borden, 7 How. 1).

Charles E. Lydecker,

Brevet Lieut enant-C olonel , N. G., N. Y., retired.

MILITIA, Naval. See Naval Militia.

MILIUM, or GRUTUM, an old name, a skin disease caused by the retention of the secretion of the sebaceous glands, resulting in small white or yellowish-white globules the size of a pinhead or less, constituting a minute tumor. It usually forms around the eyes, on the cheeks or forehead, although it also occurs on other parts of the body. The tiny tumor lies just beneath the skin, slightly raised above its surface, and is supposed to form through the destruction of duct through which the secre¬ tion of the sebaceous formerly passed. It may undergo calcification, but at no time in the process of its formation nor in its continued presence is there inflammation. In some cases it disappears in the course of the continuous change in the cuticle. The treatment consists of opening the globule with a fine-pointed knife, evacuating the contents and treating the sac with tincture of iodine or nitric acid. Elec¬ trolysis is likewise employed in the same man¬ ner as for the permanent removal of hair.

MILK may be defined as the normal secre¬ tion of the mammary glands. The milk of all mammals is similar in qualitative composition, consisting essentially of water, fat, proteins, milk-sugar and salts or ash. Colostrum, the fluid secreted for a short time immediately after giving birth to the young, is composed of sim¬ ilar substances, but

differs considerably from normal milk in its quantitative composition and physiological properties. The average percen¬ tage composition of some of the more import¬ ant milks is approximately as follows :

	Human milk .	Cows' milk .
Water	88.00	87.00
Fat	3.80	4.00
Protein	1.50	3.35
Sugar	6.40	4.90
Ash	0.30	0.75

Goats’ milk .

85.70

4.75

4.30

4.45

0.80

Ewes’ milk .

80.80

6.85

6.55

4.90

0.90

Asses’ milk .

89.50

1.75

2.00

6.25

0.50

Mares' milk .

90.75

1.20

2.00

5.70

0.35

Human milk varies to such an extent that any attempt to state its average composition is liable to be misleading. The percentage of any constituent, and especially that of proteins, may differ widely from that given above while the milk is still entirely normal. Such differences are found not only in the milk of different women, but in that of the same woman at dif¬ ferent periods of lactation.

Cows' milk differs from human milk in con¬ taining less sugar and considerably more proteins and ash. The proteins are also of a somewhat different character, the casein being more easily coagulated and forming a denser curd. Goats' and ewes' milks being rich in fats and proteins are well adapted to the manufac¬ ture of cheese and are largely used for this pur¬ pose in some parts of Europe. Asses' and mares' milks have been recommended as prefer¬ able to cows' milk for infant feeding, since they show some resemblance to human milk in the amount and nature of the proteins which they contain. In this country, however, the milk of the cow is the only one of commercial importance. Unless otherwise explained all of the statements which follow will be understood

to refer to cows' milk, but many of them are true of the milk of other

mammals as well.

Cows' Milk. — The constitution of cow's milk has been concisely stated by Richmond : ((It is essentially an aqueous solution of milk-sugar, albumin and certain salts, holding in suspension globules of fat and in a state of semi-solution, casein together with mineral matter. Small quantities of other substances are also found.® As regards its physical prop¬ erties, milk is an opaque, white or yellowish fluid, somewhat heavier and more viscous than water, having a faint characteristic odor and a slightly sweetish taste. The yellowish color is due to the fat and the opacity and viscosity in part to the fat and in part to the casein and lime salts present. The specific gravity is usually between 1.029 and 1.034 at 15.5° C. (60° F.). Normal fresh milk shows toward litmus an amphoteric reaction, and reacts acid with phenol-phthaline. This property is at¬ tributed to the presence of phosphates and of carbonic acid. The gases contained in cows' milk, carbonic acid with small amounts of oxygen and nitrogen, are for the most part evaporated in the usual processes of handling the milk and therefore need not be further con¬ sidered here.

Proportions of Water and Solids. — The

proportion of water in cows' milk varies con¬ siderably, depending upon breed, individuality, period of lactation, *etc.* While the average amount is about 87 per cent, the mixed milk of a herd may easily show as much as 88 or as little as 85 per cent of water corresponding re¬ spectively to 12 or 15 per cent of solids. The milk of a single healthy cow in normal condi¬ tion may sometimes contain as little as 10 or as much as 18 per cent of solids, while in extreme cases even these latter limits may be passed. The writer has found 19.88 per cent of solids in the milk of a perfectly healthy cow and 27.40 per cent in that of a cow having fever. Over 16 per cent of solids in the mixed milk of a herd or over 18 per cent in that of an in¬ dividual is, however, comparatively rare. .

Breed — While much depends upon the indi¬ vidual cow, it is well known that some breeds tend to yield richer milk than others. The fol¬ lowing figures, obtained by averaging the rec¬ ords of tests made at the New York and New Jersey agricultural experiment stations, serve to illustrate the variation in richness of milk yielded by different breeds:

BREED

Total solids, per cent

Fat, per cent

Solids-not-fat, per cent

14.87

5.19

9.68

14.69

5.16

9.53

13.38

4.05

9.33

12.73

3.64

9.09

11.96

3.43

8.53

•

—

Advance of Lactation — After the third or fourth month the milk tends to increase in richness as lactation advances. A study of nearly 50 lactation periods of individual cows at the New York State Experiment Station yielded the following average results, the ob¬

servation being continued in each case for 10 months :

MONTHS

Total solids, per cent

Fat,

per cent

Solids-not-fat, per cent

Thirst month .

14.00

4.54

9.46

Second month .

13.50

4.33

9.17

Third month .

13.47

4.28

9.19

Fourth month .

13.64

4.39

9.25

Fifth month .

13.75

4.38

9.37

Sixth month .

14.00

4.53

9.47

.Seventh month .

14. 18

4.56

9.62

Eighth month .

14.33

4.66

9.67

Ninth month .

14.46

4.79

9.67

Tenth month .

14.83

5.00

9.83

- .

In the last few days of lactation, when the yield becomes very small, the proportion of solids often rises to a marked degree, some¬ times reaching 20 per cent or over.

Food, Weather, *etc.* — Other conditions being the same milk is richer in winter than in summer, in cooler than in warmer weather, and on rich dry food than on pasture, except that on first turning the cows to pasture a richer milk may be obtained for a time. Probably anything v/hich induces a greater consumption of food has a tendency to increase at first the richness of the milk secreted. In most cases, however, such increase in richness is found to be only temporary, the more permanent in¬ fluence of better feeding being to improve the quantity rather than the quality of milk pro¬ duced.

Partial Milking. — All of the statements regarding the composition of milk refer to the product of a complete milking. In partial or fractional milking the first portions drawn are comparatively poor, especially in fat, and the last portions or ˆstrippings® are much richer.

Milk Fats. — Milk fat, like other fats, is a. mixture of gycerides (compounds of glycerin and fatty acids). It differs from other animal fats in containing a smaller proportion of stearic acid and large proportions of the acids of lower molecular weight. A detailed study of the constitution of milk fat by Browne gave the following results:

ACID

Per cent of acid obtained

Correspond¬ ing per cent of glyceride

OJpJc .

32.50

1.00

1.83

38.61

9.89

2.57

0.32

0.49

2.09

5.45

33.95

1.04

1.91

40.51

10.44

2.73

0.34

0.53

2.32

6.23

DiV»y v<;t.parir. .

Palmitic .

lVf vriˆt.ip .

Capric .

Piitvrir .

94.75

100. OC

The last four acids are the <(volatile fatty acids,® the large amount of which serves to dis¬ tinguish milk fat (butter) from other fats which as a rule have only a fraction of a per cent of these acids. In the milk the fat exists in the form of minute suspended globules which

vary considerably in size, but average about of an inch in diameter. A drop of aver¬ age milk contains over 100, 000, 000 fat globules.

Amount of Fat in Milk. — The percentage of fat in milk varies more than that of any other solid constituent or, indeed, of all the other solids combined. In the mixed milk of herds where the influence of individual cases of ad¬ vanced lactation is minimized, we may consider the usual range to be from 3 to 6 per cent of fat and from 8.5 to 9.5 per cent of solids not fat. Hence the varying richness of cow's milk is due principally to differences in fat content, and as fat is also the constituent of greatest pecuniary value, a ˆrich® mil!- is essentially one containing a high percentage of fat.

Nitrogenous Compounds or Proteins of Milk. — The greater part of the nitrogen in milk (usually over three-fourths) is in the form of casein, a compound protein which contains phosphorus in organic combination and is prob¬ ably also combined with lime salts. Casein is readily coagulated by acids or rennet and the curd thus formed encloses the greater part of the fat which the milk contained. Of the nitro¬ gen compounds other than casein, albumin is by far the most abundant. Milk albumin is not coagulated by rennet, nor by acids at ordinary temperatures, but is coagulated by heat. In addition to casein and albumin milk contains small amounts of other protein bodies including the enzymes or unorganized ferments which play an important part in cheese-making and probably aid the digestion when milk is con¬ sumed in the fresh state without previous heat¬ ing. Among the nitrogenous compounds other than proteins which have

been found in milk may be mentioned small amounts of lecithin, amino acids, <(vitamines)} and traces of am¬ monia and urea.

Amount of Proteins in Milk. — Formerly,

through faulty methods of separation, the re¬ ported percentages of proteins were often very inaccurate and were usually too high. The amount of protein matter as determined by modern methods is usually between 3 and 4 per cent,, being higher in those samples which are rich in fat. Average milk with 13 per cent of solid matter usually contains about 4 per cent of fat and 3 1/3 per cent of proteins. In richer milk the increased amount of solids is usually made up of about three-fourths fat and one-fourth proteins. In other words, the per¬ centages of fat and proteins tend to rise and fall together approximately in the proportions represented by the formula — Proteins = 2.00 + 1/3 Fat. Variations in fat, especially if due to temporary causes, are not always accom¬ panied by so much variation in proteins as the formula would indicate. On the other hand, the percentage of proteins is apt to exceed that indicated by the formula, in very advanced lactation. As a rule when the amount of solids-not-fat exceeds 9 per cent, the excess is due chiefly to excess of proteins.

Milk-Sugar.— Milk-sugar, or lactose, has the same composition as cane-sugar, but differs from the. latter in some of its chemical proper¬ ties and is less sweet and less readily soluble in water. The amount of sugar is rather more constant than that of proteins, being usually between 4.5 and 5.25 per cent in normal milks. While the latter figure is rarely exceeded, occa¬ sional samples may show considerably less than

4.5 per cent. In any genuine milk containing an unusually low percentage of solids-not-fat, the deficiency is apt to be principally in the milk-sugar. Such milk is apt to be yielded in case of fever or unusual excitement or fatigue, and may sometimes be obtained from appar¬ ently healthy cows under normal conditions, especially during hot, dry weather.

Salts or Ash of Milk. — When milk is dried and burned there remains a white ash, the average composition of which is stated by Fleishmann and Schrodt to be :

Per cent

Potassium oxide . 25.42

Sodium oxide . 10.94

Calcium oxide . 21.45

Magnesium oxide . 2.54

Ferric oxide . 0.11

Sulphuric anhydride . 4.11

Phosphoric anhydride . 24.11

Chlorine . 14.60

103.28

Less oxygen equivalent to chlorine . 3.28

100.00

A part of the phosphoric anhydride of the ash is derived from the phosphorus of the ca¬ sein. The sulphuric anhydride also comes from the oxidation of the milk proteins. If these acid constituents are deducted the bases in the ash are found to be in considerable excess. In the milk these bases are combined partly with the casein and partly with citric acid, a very small quantity of the latter being a normal constituent of cows' milk. The amount of ash does not, therefore, exactly represent the min¬ eral matter originally present. The ash of nor¬ mal milk is usually between 0.65 and 0.80 per cent, averaging about 0.73 per cent. The ash tends to vary with the proteins approximately in the proportion — Ash = 0.38 + 1/10 Protein.

Nutritive Value and Place in the Diet. — From the above statements regarding the com¬ position of milk one may conclude that it con¬ tains proteins, fats, carbohydrate and salts in good quantitative relation to each other. The nature of the nutrients in milk also emphasizes its value as a food. Recent feeding experi¬ ments

comparing different proteins have shown milk albumin to have the highest nutritive value of any protein known, both for maintenance of grown animals and for supporting the growth of the young. Casein also has a very high nutritive efficiency and it is probably safe to say that the proteins of milk are of superior value in nutrition to those of any other known article of food. The fat of milk being in the form of an emulsion is more easily digested than ordinary food fats, and while the various fats after being digested and absorbed are of about equal value as sources of energy, yet milk fat and the butter made from it have been found to have a special value as food because of the presence therein of the recently discov¬ ered fat soluble vitamine mentioned below. The sugar of milk is less likely than cane sugar, either to directly irritate the stomach or to undergo fermentation, and it is among the most readily available of foodstuffs, requiring only a single cleavage to bring it into form for ab¬ sorption and utilization by the body. The pro¬ portions of the different elements in the ash of milk make it an exceptionally valuable source of these inorganic foodstuffs, partial-MILK

larly because of its high calcium content. In addition to the foodstuffs of known chemical nature it has recently been found that there are required for normal nutrition two other substances or groups of substances both of which are furnished by milk. The one has already been mentioned as occurring in the milk fat. It is referred to in recent literature as ((fat soluble vitamine or <(fat soluble A®. The other essential foodstuff furnished by milk is soluble in water and therefore remains in the skim milk in butter-making or in the whey in cheese-making. It is referred to as the <(water soluble vitamine® and as ((water soluble B.® Milk is therefore the nearest approach to <(the perfect food® that we have in any one commercially available article of diet.

On account of the richness of milk in all groups of .foodstuffs, including those whose ex¬ istence has only recently been recognized, the purchase of milk at ordinary prices is a much more economical investment than is commonly supposed. For families spending as much as 20 cents per person per day for food, milk at 10 cents a quart may be considered a more profitable investment than the average of the food purchased; and for those able to spend 30 to 40 cents per

person per day for food the purchase of the highest grade of milk, even at a price of 15 to 20 cents a quart, is by no means extravagant. The commonest defect of the dietaries of city families is the inadequate use of milk. Investigations under the auspices of the New York Association for Improving the Condition of the Poor have shown that city dietaries are more often deficient in calcium than in any other chemical element and that the use of more milk is the most effective way of remedying this defect and at the same time making the diet better balanced in other re¬ spects and much better suited to the needs of growing children. In families where there cˆre as many children as adults, at least as much money ought to be spent for milk as for meat.

Food Laws — Standards of Purity — On account of the great importance of milk as food most of the States had laws regulating the sale of milk and established standards of com¬ position for it even before the enactment of the general food laws. More attention has doubtless been given to the standard of purity for milk than for any other article of food. The official definition and standard of composition followed in the enforcement of the United States Food and Drugs Act and is most of the States is as follows:

Milk is the fresh, clean, lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained within 15 days before and 10 days after calving, and contains not less than 8.5 per cent of solids-not-fat and not less than 3.25 per cent of milk fat.

In recent years much attention has also been given to the establishment of sanitary standards and the grading of milk on the basis of sani¬ tary qualities. The grades and standards rec¬ ommended by the National Commission on Milk Standards are as follows:

Grade A.

Raw Milk. — Milk of this class shall come from cows free from disease as determined by tuberculin tests and physical examinations by a qualified veterinarian, and shall be produced and handled by employees free from disease as determined by medical inspection of a qualified physician, under sanitary conditions, such that the bacteria count shall

not exceed 10,000 per cubic centimeter at the time of de¬ livery to the consumer. It is recommended that dairies from which this supply is obtained shall score at least 80 on the United States Bureau of Animal Industry score card.

Pasteurized Milk. — Milk of this class sha.ll come from cows free from disease as determined by physical examina¬ tions by a qualified veterinarian, and shall be produced and handled under sanitary conditions, such that the bacteria count at no time exceeds 200,000 per cubic centimeter. All milk of this class shall be pasteurized under official super¬ vision, and the bacteria count shall not exceed 10,000 per cubic centimeter at the time of delivery to the consumer. It is recommended that dairies from which this supply is obtained should score 65 on the United States Bureau of Animal Industry score card.

Grade B.

Milk of this class shall come from cows free from disease as determined by physical examination, of which one each year shall be by a qualified veterinarian, and shall be pro¬ duced and handled under sanitary conditions, such that the bacteria count at no time exceeds 1,000,000 per cubic centi¬ meter. All milk of this class shall be pasteurized under official supervision, and the bacteria count shall not exceed 50,000 per cubic centimeter when delivered to the consumer.

It is recommended that dairies producing grade B milk should be scored and that the health departments or the controlling departments, whatever they may be, strive to bring these sources up as rapidly as possible.

Grade C.

Milk of this class shall come from cows free from disease as determined by physical examinations, and shall include all milk that is produced under conditions, such that the bacteria count is in excess of 1,000,000 per cubic centimeter.

All milk of this class shall be pasteurized, or heated to a higher temperature, and shall contain less than 50,000 bacteria per cubic centimeter when delivered to the consumer.

Whenever any large city or community finds it neces¬ sary, on account of the length of haul or other peculiar condition, to allow the sale of grade C milk, its sale shall be surrounded by safeguards such as to insure the restric¬ tion of its use to cooking and manufacturing

purposes.

These grades and standards have been adopted, either directly or with such modifica¬ tions as local conditions might suggest, in sev¬ eral of the States and cities ot the United States and it seems certain that such grading of the milk supply will soon become the general rule.

Significance of Bacteria in Milk. — There has been considerable controversy as to what sanitary significance can properly be attached to the presence of large numbers of bacteria in milk. It is certain that many of the species which multiply most rapidly in milk are entirely harmless and in fact certain fermented milks which contain enormous numbers of lactic acid bacteria are believed by many to be particularly wholesome. On the other hand it is, in gen¬ eral, only as a result of unsanitary methods or insufficient safeguards in the handling of milk that the large numbers, sometimes found in market milk, can be accounted for, so that in general the presence of large numbers of bac¬ teria reflects serious doubt upon the sanitary quality and even upon the wholesomeness of milk. Present opinion on this matter is per¬ haps best presented in the words of the follow¬ ing resolution recently adopted by the Commis¬ sion on Milk Standards:

“ Whereas, milk is one of the most perishable foods, being extremely susceptible to contamination and decom¬ position, and . . , ,.

“ Whereas, the milk consumer is justified in demanding that milk should be clean, fresh and cold, in addition to having the element of safety, and .

“ Whereas, milk which is from healthy cows and is clean, fresh, and which has been kept cold, will always have a low bacterial count, and

“Whereas, milk that is dirty, stale, or has been left warm, will have a high bacterial count; therefore, it is

resolved: . _ …

“ First: That the health officer is justified in using the bacterial count as an indicator of the degree of care exer¬ cised by the producer and dealer in securing milk from

healthy cows and in keeping the same clean, fresh and cold; and

” Second: That the health officer is justified in con¬ demning milk with a high bacterial count as being either unhealthy or decomposed, or containing dirt, filth, or de¬ composed material as a result of the multiplication of bacteria due to age and temperature.

“Third: That the health officer is justified in ruling that large numbers of bacteria are a source of possible danger, and that milk containing large numbers of bacteria is to be classed as unwholesome, unless it can be shown that the bacteria present are of a harmless type, as for example, the lactic acid bacteria in buttermilk, or other especially soured milks.”

Pasteurization. — Since under ordinary con¬ ditions it is not always possible to guard per¬ fectly against the possible introduction of the germs of communicable disease into milk and since times and temperatures of heating milk, so as to ensure destruction of such pathogenic bacteria with exceedingly little, if any, injury to the milk itself, have now been thoroughly worked out, there is now practically unanimous agreement among those most interested in the subject that all milk, except that produced under extraordinarily good sanitary conditions, should be subjected to modern low temperature pasteurization before being used. In order to guard against injury to the antiscorbutic prop¬ erties of the milk it should preferably be pas¬ teurized at a temperature of only 140° to 145° F. (60° to 63° C.). Heating at this temper¬ ature for 20 to 30 minutes is the best safeguard against distribution of disease through milk; and milk thus pasteurized and protected from subsequent contamination or deterioration may be used with confidence that it has been ren¬ dered safe as regards pathogenic bacteria with¬ out serious injury to any of the normal con¬ stituents of the milk itself. Since there is a possibility that the antiscorbutic properties of milk may be injured to a slight extent by even low temperature pasteurization, it is advisable that infants and young children fed on pas¬ teurized milk should be given orange juice or other food of known antiscorbutic property and suited to the age of the child.

Preservation of Milk — Milk produced under usual conditions contains large numbers of bacteria. At ordinary temperatures these multiply rapidly and soon cause such changes as to render the milk unsalable,

if not unfit for use. Various preventive measures may be adopted, either to prevent bacteria from get¬ ting into the milk, to check or control their growth or to destroy them entirely. Strict cleanliness and the use of sterilized utensils exclude a large proportion of the bacteria usu¬ ally present in milk and greatly improve its keeping qualities. If such milk is protected from access of air and kept cold, it will remain sweet and fresh for at least two or three weeks without any other preservative measures. (The sanitary production and handling of milk are more fully described in the article: Dairy Interests, American). In this respect the American dairy practice is much in advance of that of other, countries, as was strikingly shown at the. exhibit of dairy products at the Paris Exposition of 1900. Three dairies engaged in city milk supply, one in. New York, one in New Jersey and one in Illinois, sent regular ship¬ ments of fresh milk and cream to Paris throughout the summer. These products were found to be sweet and sound when opened from 15 to 20 days after bottling, and it was only with great difficulty that European dairy

experts could be convinced that nothing but ((cleanliness and coldw had been used to pre¬ serve them. No other country except France attempted to show natural milk and cream and the French exhibits were all sour on the second or third day.

It is evident that milk may be preserved much longer than is usually necessary by the observance of cleanliness to exclude bacteria as far as possible and the maintenance of a low temperature to retard the growth of those present.

Chemical Preservatives. — Various sub¬ stances have the power of preventing or re¬ tarding the growth of bacteria. Those most often used to prevent milk from souring are boracic acid or borax, and formaldehyde. Much more rarely salicylates, chromates, fluo¬ rides and other substances have been reported. Since milk often forms the sole food of infants and invalids., the use of chemical preservatives is more objectionable in milk than in other foods and should be strictly prohibited, as is usually the case.

Milk is sometimes treated with carbonate or bicarbonate of soda which neutralizes the lac¬ tic acid which would otherwise make the milk sour. These substances do not check the growth of bacteria but simply mask the results of their activity. By neutralizing the lactic acid they favor the growth of the bacteria which attack the proteins as well as those which affect principally the milk-sugar. Such milk, therefore,

tends to become unwholesome more rapidly than milk to which nothing is added.

Methods of Analysis and Detection of Adulterations. — The complete analysis of a sample of milk requires much time and elabo¬ rate apparatus and is not practicable for others than trained chemists. The tests described be¬ low are more easily performed and if carefully carried out will in many cases yield all the in¬ formation required. Before taking a portion for any determination the milk to be tested should be thoroughly mixed by repeatedly pouring it from one vessel to another.

Determination of Fat.— Since fat is both the most valuable and the most variable of the solids in milk, its determination is often re¬ quired. This may be accomplished by the method devised by Dr. S. M. Babcock, of the Wisconsin Agricultural Experiment Station, and popularly known as the Babcock test. In making this test, a measured amount of milk is treated with about an equal volume of com¬ mercial concentrated sulphuric acid which dis¬ solves the other constituents, leaving the fat free in a heavy solution from which it is sepa¬ rated by centrifugal force and collected in the graduated neck of the test bottle, where its vol¬ ume is read off at once on the completion of the test. Complete directions are furnished with the testing outfit, which can be purchased for a few dollars from dealers in chemical appara¬ tus or dairy supplies.

Determination of Specific Gravity and Estimation of Solids-Not-Fat.— Since the specific gravity of milk is raised by all of the other solids and lowered by the fat, it follows that after the influence of each has been deter¬ mined, it should be possible to estimate from the percentage of fat and the specific gravity

the percentage of solids-not-fat which the sam¬ ple contains. To determine the specific grav¬ ity it is convenient to use a “Quevenne® or a “Soxhlet® lactometer, either of which is prac¬ tically a hydrometer of sufficient range to cover the gravity of all ordinary

milks and so gradu¬ ated that the thousandths in excess of unity are represented by whole numbers on the scale. Thus a milk with a specific gravity of 1.0315 will give a lactometer reading of 31.5. The temperature should be observed at the same time with the lactometer reading and the latter corrected to 60° F. by adding to the reading 0.1° for each degree F. above the standard tem¬ perature of 60° F. One-fourth of the cor¬ rected lactometer reading plus one-fifth of the percentage of fat gives a fairly close approxi¬ mation to the percentage of solids-not-fat. The lactometer reading may also be useful aside from the estimation of solids-not-fat. Although the addition of cream to milk would lower the gravity, yet in general the lactometer reading is a rough indication of the richness of the milk, because a high percentage of fat is usually accompanied by a high percentage of protein which raises the lactometer reading. Cases in which genuine milk shows a low grav¬ ity as the result of a high percentage of fat are not common and can usually be detected by noticing the viscosity and opacity of the milk as it runs from the . bulb of the lactometer. The lactometer reading taken in connection with the appearance is therefore a useful pre-. liminary test and is used as such by the milk inspectors of many cities.

Detection of Skimmed or Watered Milk. — The most common adulterations of milk are the removal of cream (or the addition of skimmed milk, which amounts to the same thing), and the addition of water. Milk which contains less than 3 per cent of fat has usually been partially skimmed, and milk containing less than 8.5 per cent of solids-not-fat has usually been watered, In most States there are mini¬ mum limits established by law and milk falling below the limit is considered to be adulterated. Thus in New York State milk must contain at least 3 per cent of fat and at least 11.5 per cent of total solids. As stated above, the percentage of fat varies much more than that of solids-not-fat. Skimming is therefore more difficult to detect than watering. In fact, it is usually impossible to distinguish by analysis between a genuine sample containing, say, 3.6 per cent of fat, and a sample originally containing 4.5 per cent of fat, one-fifth of which has been re¬ moved. On the other hand, the addition of 20 per cent of water would almost certainly re¬ duce the percentage of solids-not-fat to a figure considerably below the normal minimum. Re¬ cently, too, a more delicate method for the detection of watering has been devised.

Other Adulterants. — The addition of chalk, calves' brains, etc., though frequently men¬ tioned in the older works on food adulteration, is now almost unknown. Cane-sugar or starch may sometimes be added to mask the effect of watering. The former may

be detected by the rosered color produced when about 10 cubic centimeters of milk are boiled for five minutes with one cubic centimeter of hydrochloric acid and 0.1 gram of resorcin. To detect the pres¬ ence of starch, boil about 10 cubic centimeters of milk, cool it thoroughly and then add a few

drops of a solution of iodine in potassium iodide. If starch is present a characteristic blue color will be produced.

Artificial Coloring Matter. — Caramel or yellow coloring matter such as is commonly used in butter may occasionally be added to milk. The detection of these is of little prac¬ tical importance, since they would ordinarily be used only to mask the effects of gross skim¬ ming or watering such as would be readily de¬ tected by the methods already given.

Detection of Preservatives. — Formalde¬ hyde (“Formalin®). — ‘Dilute the milk with an equal bulk of water in a test tube and carefully pour in commercial concentrated sulphuric acid, inclining the tube so that the acid and milk will not mix. If formaldehyde is present a violet ring forms at the junction of the two liquids. If pure acid is substituted for the commercial, a trace of some ferric salt should be added. Boracic Acid or Borax. — Evapo¬ rate a portion of the milk to dryness and burn to ash. Moisten with a few drops of dilute hydrochloric acid and introduce a slip of yellow turmeric paper. This is turned reddish brown by boracic acid and the color may be changed to bluish black by treating with a solution of sodium carbonate. Carbonates or Bicarbo¬ nates if present in the milk would remain as carbonate after ignition and be shown by an effervescence when the ash was moistened with acid in the test for boracic acid just described.

Bibliography. — Aikman, C. M., (Milk: Its Nature and Composition; A Handbook on the Chemistry and Bacteriology of Milk, Butter and Cheese) (New York 1895) ; Allen, A. H., Commercial Organic Analysis) (Vol. IV, New York 1898) ; Buchanan, R. E., (Household Bacteriology) (New York 1913) ; Chapin, H. D., (Theory and Practice of Infant Feeding) (New York 1902) ; Conn, H. W., (Agricultural Bac¬ teriology } (3d ed., Philadelphia 1918), (Bacteria in Milk and its Products) (Philadelphia 1903) ; Farrington and Wall, (Testing Milk and Its Products) (Madison, Wis., 1912) ; (Diseases of Infancy > (New York 1902) ; Hunziker, O. F., Condensed Milk and Milk PowdeC (Lafayette, Ind., 1914) ; Lane-Claypon, (Milk and its Hy¬ gienic

Relations) ; Leze, R., (Les industries du lait) (Paris 1904) ; Richmond, (Dairy Chemistry) (1899); Rose, M. S., ‘Feeding the Family) (New York 1917) ; Rosenau, M. J., Che Milk Question) (New York 1912) ; Pre¬ ventive Medicine and Hygiene* (New York

1913) ; Rothschild, ‘Bibliographia Lactaria> (8,375 titles, Paris 1901) ; Russell and Hastings, . Cutlines of Dairy Bacteriology* (9th ed., Madison, Wis., 1910) ; Savage, W. G., f Milk and the Public Health* (London 1912) ; Sher¬ man, H. C., Pood Products* (New York

1914) ; Chemistry of Food and Nutrition* (2d

ed., New York 1918) ; Snyder, H., (Dairy Chemistry) (New York 1906) ; Stocking, W. A.s (Manual of Dairy Products) (New York 1916) *Van Slyke, L. L., ‘Modern Methods of Testing Milk and its Products* (New York 1906) ; Wing, H. H., ‘Milk and its Products* (rev. ed., with bibliography, New York 1913). Consult also Reports and Bulletins of the United States Department of Agriculture; the United States Public Health Service; the State departments of agriculture and of health and the agricultural experiment stations. H. C. Sherman,

Columbia University, New York.

MILK, Human. This liquid has a specific gravity of 1028.34, and contains water, 87.4; total solids, 12.6; fat, 3.4; albuminoids, 1.2; sugar, 7.0; ash, 0.2. It is slightly alkaline, is sterile and differs mainly from cow’s milk in being sweeter and having less fat and casein. Its fat is more fluid and the casein is more readily dissolved. Cow’s milk is frequently acid and its casein is often digested with difficulty. Experience shows that an infant should, if possible, be nursed during the earlier months of its life, for human milk is usually adapted to the digestive powers of infants. Its alkalin¬ ity, its temperature (98°-100° F.), its chem¬ ical constituents aid the development of the child. But poor health of the nurse, mental emotions, improper food or deranged diges¬ tion of the infant may prevent natural feeding or require its cessation. It is an interesting fact that the demands of the nursing

infant have a great influence upon the quantity of mother's milk. Thus a wet nurse feeding two infants produced 720 grams, but this quantity increased to 1,750 grams when it becomes neces¬ sary for her to nurse five. In human milk there is a great variability in the fat contained, while the globules are more numerous in hu¬ man than in cow's milk. The effect of varia¬ tion of food upon the composition of human milk is doubtful, with the exception that when the mother is undernurtured, her consumption of fat will increase the fat in her milk, but when fat is fed to well-nurtured mothers the fat in their milk increases only temporarily. It is therefore concluded that only a dimi¬ nution of food can permanently affect the fat in human milk. The effect of some drugs is seen in the mother's milk. Traces of alcohol have been found in the milk of mothers after they have drunk to excess. In cases where the mother is syphiletic, the injection of salvarsan has produced an excretion of it in her milk and in these cases the child which has also the disease is sometimes improved but has in other cases died. Immunity to certain diseases is thought to be secured through the mother's milk, from the fact that typhoid fever, mumps, scarlet fever and measles are not usually con¬ tracted by nursing infants.

If it is impossible for any reason for the mother to nurse her own child, and a suitable wet nurse cannot be obtained it is quite easy for the physician to direct the making of a modified milk from cow's milk which shall have almost the same properties as human milk, this is secured by the removal of the cream or a part of it and mixing it with the proper proportion of the skimmed milk and with milk-sugar. Often a small amount of lime water is added to offset the greater acid¬ ity of cow's milk. For this modified milk it is imperative that the cleanest possible raw milk be had, as pasteurization of the milk re¬ moves some of the requisite qualities and that the cream be <(gravity cream,® i.e., be not re¬ moved by a separator which produces so-called <(Centrifrigal cream.® With modified milk pre¬ pared in this way under the direction of a physician experienced in infant's diet the child may be brought up to be quite as healthy, as those fed at the breast. The formula of milk, cream, sugar of milk and lime water will be changed from week to week as the child in¬ creases in weight and the sugar of milk and

lime water gradually diminished until the in¬ fant's digestion is trained to take unmodified cow's milk.

MILK-CURE. The living on milk alone, or mainly, for weeks is a

recognized form of treatment in obstinate hysteria, hepatic conges¬ tion, dropsy and various disorders of nutrition. The amount of milk taken is gradually in¬ creased, beginning at about four ounces every three hours. When used exclusively, two or more quarts are ordinarily consumed daily. When the taste of milk becomes disagreeable, salt, coffee, bread, arrowroot, cocoa, rice, etc., may be added as the attending physician decides. The sole use of milk for a length of time may increase the frequency of the pulse, stimulate the kidneys to undue action, coat the tongue and produce obstinate constipation. It is not a cure to be undertaken without the supervision of a physician.

MILK-FEVER (called ephemeral fever when the symptoms disappear very quickly) is a febrile state, the temperature reaching 102° F. or over, occurring in the mother usually two or three days after delivery, considered to be connected with the beginning of the milk sup¬ ply. It chiefly affects those in a feeble condi¬ tion or under-or overfed, or in whom the milk-ducts have not been freed by early lacta¬ tion. A chill may induce it. It occurs in the lower animals as well as in the human being. It begins with rigors, which are followed by headache, pains in the limbs, fever, swelling and tenderness of the breasts (going on, it may be, to abscesses), and sweating, when the symp¬ toms abate. Pain is to be relieved by hot-water bottles, breasts to be emptied, bowels moved by salines and fever reduced by diaphoretics ; other medicines may be necessary. Owing to antiseptic obstetrics and great care as to hy¬ gienic measures, milk-fever is nowadays com¬ paratively rare. If not relieved promptly by medical skill, it may prove a dangerous disease.

MILK FISH, a clupeod fish (Chanos cha-nos) common in the Pacific Ocean and valu¬ able as a food fish. It attains a length of about four feet.

MILK-LEG. See Phlegmasia.

MILK-SICKNESS (sometimes called (<trembles®), a malignant fever attacking man and some of the lower animals, such as un¬ weaned calves and their mothers, horses and colts, sheep and goats. Formerly it prevailed in the Western and Southwestern States, re¬ cently in North Carolina and Indiana. The cause was formerly supposed to exist in poison¬ ous herbs eaten by cattle, but kter researches have established the fact that it is caused bv the presence of the Bacillus lactimorbi discov¬ ered by Jordan and Harris in 1907-09. Man is infected by the products of cattle — meat, milk, cheese or butter. The disease belongs to the end of summer and the beginning of autumn. The symptoms are headache, loss of appetite fatigue, nausea,

vomiting, thirst, constipation, a foul breath, then a typhoidal condition with •coma or convulsions. The prognosis is gen¬ erally favorable, but death may occur in a few days. The duration of the disease is from two or three days to as many weeks. The treatment consists in clearing out the intestinal tract, and in administration of sodium bicarbonate. Serum therapy has not yet been successfully tried.

Infected animals should be isolated and no milk or milk products used either for animals or humans.

MILK SNAKE. See House-Snake.

MILK-TREE, any of various tropical trees yielding a milky, wholesome sap. See Cow-tree.

MILK-VETCH, a pea-plant of the genus Astragalus (see Vetch), regarded as increas¬ ing the flow of milk when eaten by goats. Many species grow in the United States, es¬ pecially on the Western plains, where they are useful fodder-plants, although including one baneful species, the locoweed (q.v.).

MILKWEED. See Asclepias.

MILKING MACHINE, a mechanical ap¬ paratus for milking cows without hand labor. The milking is accomplished by producing a vacuum at the end of the cow's teat. The ap¬ paratus consists of a rigid teat cup with a collapsible upper edge for the purpose of pre¬ venting the entrance of air, and which receives the milk, the four cups being attached to four rubber tubes which are connected to a larger rubber tube emptying into a covered pail. One or two cows are attached to a pail and the vacuum is furnished by a large pump, run by electricity or gasoline, and is made intermittent by means of a pulsator piston. Some machines are provided with an air filter which further lessens the danger of contamination to the milk. While the machines are still in process of im¬ provement there are several which

perform their work efficiently and without injury to the cow, while at the same time producing milk in which the bacteria count is reduced to a mini¬ mum provided the apparatus is kept thoroughly clean and the rubber tubes and teat cups im¬ mersed in a 10 per cent solution of salt when not in use. The bearing of the machine on the labor problem is considerable, since two men can raise food and otherwise provide requisite care for a herd of cows for which three milkers are required. The practicability of the machine depends largely upon the size of the herd, the attitude of the men toward the machine and their adaptability in using it. Young cows are said to take more readily to machine milking than those long milked by hand, and young cows hard to milk because of short teats and older cows known as <(hard-milkers® are often more satisfactorily milked by the machine than by hand. A quiet, well-treated herd is said, to yield more readily to the use of the machine than a herd roughly handled. In some cases no difficulty is encountered in milking <(clean® by the machine, and in others it is found more practical for one man to operate two double milking units while a second man follows and ˆstrips.®

MILKOWSKI, Zygmunt, or Sigismond

(pseud. Theodore Thomas Jez), Polish novel¬ ist: b. Saracea, 1824; d. Lausanne, Switzerland, 13 Jan. 1915. He was educated at the Odessa Lyceum and at the University of Kiev, and was connected with the Hungarian uprising in 1848 and with that of Poland in 1863. He was thereafter compelled to live abroad and in 1877 he settled' definitely in Switzerland, becoming curator of the Polish Museum at Rapperswil. His romances founded on Galician history form an important contribution to the literature of

the Slavonic peoples, but his novels with Polish historical backgrounds were less successful. He wrote (Handzia Zahornica) (1860) ; (Szandor Kowacz) (1861) ; (Historya o praprawnuku i prapradziatku) (1864) ; <Uushoki> (1870) ; (Derslaw z Rytian) (1872) ; <Ofiary). (1874); (Pod ObuchenP (1878); (Zciezkich dni) (1881); (Narceczona Haram-baszy) (1882); (Rycerz chrzescianskP (1890), *etc.*

MILKWEED, or MONARCH BUT¬ TERFLY, a large, reddish-brown, black-veined nymphalid butterfly (Anosia plexippus) of North America. Its black and green cater¬ pillars, which have a pair of black filaments at each end of the body, are found upon milkweed almost throughout the world. The bright green, gold-dotted chrysalids hang from the under sides of the leaves in midsummer. The adults, which

are among the strongest flyers of their order, migrate southward in the autumn and hibernate. In spring they fly northward even into Canada. They often form immense flocks in glades, even concealing the bark of trees upon which they alight in the lee of the wind. They are protected from their enemies by scent scales and are imitated by species not so protected, especially in the United States by the viceroy butterfly (Easilarchia disip pus).

MILKWORT, the common name for plants of the genus Polygala, widely distributed throughout the temperate and tropical zones. See Polygala.

MILKY WAY, The, or THE GALAXY,

in astronomy a luminous band of irregular form, consisting of a great circle entirely sur¬ rounding the heavens. It contains myriads of stars, so crowded together that their united light only reaches the unaided eye ; this band of stars can be seen on any dark, clear night. If we could stand where the earth is and have it removed, we could see this splendid circle com¬ pletely surrounding us ; it is thus reasoned that we are a part of the Milky Way, and that our sun is near the centre of it. The circumpolar constellations Cassiopeia and the Swan are always to be found in the Milky Way, while Sirius, Capella and Aquila may be seen on its edge when they are in sight. The formation of the Milky Way assumes the general appear¬ ance of a silvery ribbon, but in places it is divided into two great branches, which after¬ ward reunite. Between these divisions are dark places comparatively devoid of stars; one of these, the Coal Sack, has become celebrated, and was so named by sailors because they could see no stars in this dark spot.

MILL, Hugh Robert, Scottish geographer: b. Thurso, Caithness, 28 May 1861. He was edu¬ cated at the University of Edinburgh, was physicist and chemist to the Scottish Marine Station in 1884-87 and University Extension lecturer in 1887-1900. He was librarian for the Royal Geographical Society in 1892-1900; and in 1910 presented to the trustees the accumu¬ lated records for the rainfall of the British Isles from 1677. Since 1901 he has edited British Rainfall and Symons's Meteorological Magazine. He wrote (The Realm of Nature* (1892; new ed., 1913) ; (The Clyde Sea Area> (1895); (The English Lakes) (1895); (Hints on the Choice of Geographical Books) (1897) ; <New Lands* (1900) ; (The Siege of the South

Pole > (1905) ; (Historical Introduction to Sir Ernest Shackleton's (Heart of the Antarctic (1909). He also edited the (Report of the Sixth International Geographical Congress) (1896), and (The International Geography* (new ed., 1911).

MILL, James, British economist, historian and utilitarian philosopher: b. Northwater Bridge, Forfarshire, Scotland, 6 April 1773; d. Kensingston, 23 June 1836. His father was a cobbler, his mother a farmer's daughter and his early abilities were so marked that great care was taken with his education, so that in 1790 he entered Edinburgh University. There he was carried away with Dugald Stewart's philosophy until he came to know Bentham's system, which he then adopted. But in the university he was better known as a remark¬ able Greek scholar than as a philosopher. In

1802 he went to London, where he was from

1803 to 1806 editor of the Literary , Journal and then began the cHistory of India, *which oc¬ cupied him 10 years. During this time he wrote much for periodicals and came to know Ben¬ tham personally; at the same time he was busied with the painstaking education of his children, notably John Stuart Mill (q.v.). The (History of India,* a wonderfully scholarly and unpartisan work, marred only by his lack of personal knowledge of country and people and a consequent theorizing at times, was pub¬ lished in 1818 and immediately won for him a place in the India Office and relief from his long battle with penury. This position was the more flattering a tribute since he was now well known as a radical and a skeptic. He rose rapidly, becoming head of the office in 1830. The Westminster Review founded in 1824 as the organ of Bentham's followers, contained many contributions by Mill ; and several ap¬ peared in the London Review. Both in ethics, where his position was strongly utilitarian, and in political economy, where he may still be reckoned as typical of the orthodox school so bitterly attacked by Ruskin, Mill is little more than a follower of Bentham, with greater force, perhaps, because of his comparatively larger knowledge of the world. In psychology, how¬ ever, although largely a follower of Hartley, his work is more important, for he developed and gave to Hartley's principle of association a wider application, and thus was the founder of the school to which Spencer and Bain belong. Mill

took part in politics and contributed largely to the success of the Reform Bill by introduc¬ ing to England philosophical radicalism. His personal character was strangely unhuman and unlovable, though perfectly correct. His im¬ portant works besides the (History of India> are (Elements of Political Economy, > the first great philosophic treatise on the subject (1821), and (Analysis of the Phenomena of the Human Mind) (1829). Consult Bain's biography (1882) and J. S. Mill's <Autobiography)

(1867).

MILL, John Stuart, English social and political reformer, philosopher, economist: b. London, 20 May 1806; d. Avignon, 8 May 1873. Few. have combined so intimately a vital en¬ thusiasm for human progress, with a keenly critical and most scholarly temper. He presents in all. his most important lines of work the in¬ teresting conflict which results when a candid,

open mind, instinct with human interest, at¬ tempts to work with narrow conceptions and an inadequate method. The conceptions and method have in many respects been super¬ seded, but the candor and sincerity, the schol¬ arly, investigative temper, the deep interest in all things human, the democratic sympathy which manifest themselves in his works, give them permanent value.

Mill was the oldest son of James and Har¬ riet (Burrow) Mill. His early education, con¬ ducted by his father, was extraordinary. He began Greek when about three years old, and Latin at seven, and read a great amount in both languages, especially in Greek, before he was 12. He studied algebra, geometry and the differential calculus also in this period. His¬ tory he read of his own accord and found amusement in books on natural science. At 12 Aristotle's (Logic* began a more ad- ' vanced course of instruction which included the more difficult classical authors, and ended, so far as his father's personal instruction was concerned, in his 14th year with a thorough study of Ricardo's (Political Economy.* Mill himself says that it ((was not an education of cram.® "Anything which could be found out by thinking I never was told, until I had ex¬ hausted my efforts to find it out for myself.® At the same time he declares that it "was in itself much more fitted for training me to know than to do.® After a year in France, which had an important influence, the reading of Ben¬ tham made an epoch in

his life. “I now had opinions; a creed, a doctrine, a philosophy; in one among the best senses of the word, a re¬ ligion ; the inculcation and diffusion of which could be made the principal outward purpose of a life.® In the winter of 1822-23 he planned a society to which he gave the name of “Utili¬ tarian,® and thus brought the term into com¬ mon use. In May 1823 he received an appoint¬ ment from the East India Company as clerk in the office of the examiner of India cor¬ respondence. Here he remained 35 years, ris¬ ing to be examiner two years before the trans¬ fer of India to the British government in 1858, when he retired upon a pension of £1,500. He became a frequent contributor to the West¬ minster Review founded in 1823 as a Radical organ, and in 1834 became editor of a new Radical review, the London Review (after¬ ward the London and Westminster) . He was one of an ardent party of “philosophic radi¬ cals®; his object in life “to be a reformer of the world.® Bentham, Malthus and Ricardo were influential upon the group. But several new influences now began to unsettle his po¬ litical and social views. Coleridge, especially through Maurice and Mill’s intimate friend Sterling, Carlyle, Goethe, Wordsworth, and the Saint Simonians, gave broader views of human interests, and greater importance to feeling and sentiment than James Mill and Bentham. In Mill’s own judgment, however, the most im¬ portant, influence, especially in leading “him to apply his abstract principles to the actual state of society and estimate their bearing upon human interests and sympathies more clearly and widely than he would otherwise have done,® was that of Mrs. Taylor, to whom he was first introduced in 1830. He maintained with her for 20 years a friendship of increasing intimacy, and after the death of her husband

married her in 1851. Mill loved his wife tenderly and spoke of her, notably in the Auto¬ biography/ and in the dedication of the volume (On Liberty* which was a joint production, in terms which seemed extravagant to his friends. A third period of Mill’s mental progress fell at about the time between the first and third edi¬ tions of his (Political Economy * (1848-52). In the earlier period, he writes in his Auto¬ biography/ UI was a Democrat, but not the least of a Socialist.

We were now much less democrats than I had been, because so long as education continues to be so wretchedly im¬ perfect, we dreaded the ignorance and espe¬ cially the selfishness and brutality of the mass; but our ideal of ultimate improvement went far beyond. Democracy, and would class us deci¬ dedly under the general designation of Social¬ ists. In .1858 his wife died of congestion of the lungs in Avignon. When the Civil War in America broke out he contributed a strong ar¬ ticle on the side of the North. In 1865 he was elected a member of Parliament from West¬ minster, and took an active part in support of various/ reform measures, but was defeated for re-election in 1868. His later years were spent in literary labors until his death, which occurred at Avignon. He had then come to be generally regarded as the foremost living philosopher and economist of England.

Mill's published works are the following: (System of Logic* (1843); / Essays on some unsettled questions of Political Economy> (1844); Principles of Political Economy> (1848) ; (Memorandum of the Improvements in the Administration of India* (1858) ; (On Liberty) (1859) ; (Thoughts on Parliamentary Reform) (1859) ; dissertations and Discus¬ sions* (1859-75); Considerations on Represen¬ tative Government* (1861) ; (Utilitarianism) (1863) ; Examination of Sir William Hamil¬ ton's Philosophy* (1865) ; Auguste Comte and Positivism* (1865) ; (England and Ireland) (1868) ; (Subjection of Women) (1869) ; Au¬ tobiography (1873) ; (Nature, the Utility of Religion and Theism* (1874). In addition may be mentioned his edition, with notes, of James Mill's Analysis of the Phenomena of the Hu¬ man Mind) (1869) ; his Hnaugural Address de¬ livered to the University of Saint Andrew's* (1 Feb. 1867) ; (Speech in Favor of Women's Suffrage/ 12 Jan. 1871 (1873) ; (Speech on the Admission of Women to the Electoral Fran¬ chise/ 20 May 1867 (1867); H. D. Pym's (Memories of Old Friends/ which contains 14 letters from J. S. Mill (1882) ; several articles in the Westminster Review and the London and Westminster Review, not reprinted in the dissertations and Discussions/

The keynote to Mill's method is found in the individualism which he inherited from the 18th century. This meant associationalism in logic and psychology, a metaphysical conception of reality as made up of separate phenomena, an ethical theory that made pleasure and pain the motives of action, laissez-faire in political economy, and the political doctrine . that the end of government is to protect each individual in the possession of the produce of his labor. But in all these various fields he passed the bounds set by his inheritance. He was more concerned to find truth than to maintain a creed.

As Logican, Mill's greatest contribution was

his treatment of induction. The four ((methods® of agreement, difference, residues and concomitant variation had been mentioned by J. Herschel, but were by Mill first brought out clearly. In the part of his (Logic* which deals with the nature and conditions of knowl¬ edge he attempts, with only partial success, to give logic a more vital relation to truth and fact than it had borne since Hobbes and Locke. He insists that propositions concern (<things® not ((ideas® ; that there are «real kinds,® not merely class names ; that cause is not to be defined with Hume as (<invariable antecedent® but as ˆunconditional antecedent® or <(sum of conditions.® But he does not see that this really implies a reconstructed view of nature, in which a conception of an interrelated system or whole should replace the conception of a mere sum of individuals or particulars. He remains true to his older presuppositions in holding that reasoning is from particular to particular, and that axioms owe their force to association. Matter, he holds, following Ber¬ keley, is only permanent possibilities of sen¬ sation. In his view of the self, on the one hand, he considers that we can know only states of consciousness, that the law of association is the "governing principle,® and that the concep¬ tions by which knowledge is organized are impressed upon the mind from without® ; on the other hand he recognizes <(the paradox, that something which, ex hypothesi, is but a series of feelings, can be aware of itself as a series.® He therefore admits that "the mind, or ego, is something different from any series of feelings or possibilities of them.® While, then, he holds to the doctrine of (<circumstances® as deter¬ mining character, he is careful to insist that this is not "necessity® in the ordinary sense; (<our own desires can do much to shape those circumstances.®

As Economist, Mill attempted to follow the general plan of Adam Smith and give the sci¬ ence a more concrete form than it had received at the hands of Ricardo ; to treat it not merely as an abstract science of the ((economic man,® but as ((branch of social philosophy, so inter¬ linked with all the other branches that its con¬ clusions are only true conditionally.® The cur¬ rent economist had aroused the antagonism of the working classes. Mathusianism held out a grim prospect of increasing stress with increase of population. Ricardo's presentation of the laws of wages seemed to condemn as absolutely futile all effort to raise wages, whether by vol¬ untary association or by political action. The repeal of the corn laws would, it was feared, ultimately benefit the employers instead of the employed. Mill

retained the Mathusian doc¬ trine as one of his cornerstones. He sees hope for the laboring classes only if they will restrict their offspring and thus diminish the supply of labor. He retains also the doctrine that labor is supported by capital, and in his Political Economy) speaks of a ((wage fund.® But as an ardent sympathizer with the working class Mill makes various concessions and suggestions which made his work far less a <(dismal sci¬ ence.® (Political Economy* “has no pretension to the character of a practical guide, apart from other classes of consideration.® While the laws of the production of wealth are real (<laws of nature,® the modes of its distribution, ((subject to certain conditions, depend on human will.®

The (<existing arrangements of society‘7 have much to do with determining what shares fall to laborers, capitalists and landlords, and these arrangements may be altered wby the progress of social improvement.® At first he thought only of getting rid of primogeniture and en¬ tails, and of promoting restraint of population by general education. He later came to look for a great advance in cooperation, and in the character which this implies. In 1869 he definitely retracted the (<wage-fund doctrine, recognizing that there is a considerable range in the wage which economic conditions allow and hence that trades-unions may raise wages to a certain extent.® In his last years he was es¬ pecially impressed with the injustice of the places which the landowners occupy at ((Malthus’s feast.® <(Land alone has the privilege of steadily rising in value from natural causes.® The <(unearned increment® should be not for the private owner but for the nation. He dif¬ fered from more complete Socialists in retain¬ ing competition in his scheme, and insisting that the associations for cooperation must be voluntary. He regarded the problem of the future to be ((how to unite the greatest individ¬ ual liberty of action, with a common owner¬ ship in the raw material of the globe, and an equal participation of all in the benefits of combined labor.®

His moral and political theories are set forth in his Etilitarianism,5

Eiberty5 and Sub¬ jection of Women.) He always remained a Utilitarian in the sense that he believed ((those actions right which promote the greatest happi¬ ness of the greatest number® ; further, he at¬ tempted to prove this by the individualistic doctrine that since each one desires his own happiness, the general happiness must be a good, not noticing the possible conflict between such happiness-seeking in individuals, which would make a ((sum® impossible. But else¬ where he breaks away decisively from Bentham's doctrine that happiness means only pleasure of varying intensity, length, certainty, etc., regardless of what objects produce it. ((Higher pleasure,® a <(sense of dignity,® will not be exchanged for any amount of the ® lower® by the expert judge. It is ((better to be Socrates dissatisfied than a pig satisfied.® This is evidently abandoning pleasure pure and simple as standard, and setting up instead a ˆstandard for pleasure,® namely, the character of the man who judges. In the Eiberty5 he states that the utility which is the ultimate ap¬ peal ((must be utility in the largest sense, grounded on the permanent interests of man as a progressive being.® The motives on which he relies are not the external ((sanctions® of Bentham ; nor yet the association of private with public happiness which James Mill had regarded as the structure of conscience. These sud¬ denly appeared to him artificial. Partly under the influence of Comte he came to hold, rather, that conscientious regard for others is sup¬ ported by natural social instincts. His lib¬ erty, 5 the most carefully written of his works, contains a fresh and vigorous argument for the principle that only self-protection — to pre¬ vent harm to others — justifies society in inter¬ fering with the individual's liberty of action. <(His own good is not a sufficient warrant.® The positive reason for this is the great value of individuality in human welfare. The prin¬

ciple requires not only liberty from lega* re¬ straint, but from the coercion of public opin¬ ion. It comprises, first, liberty of thought and discussion, in order that truth may be reached; secondly, liberty of tastes and pursuits; thirdly, freedom to unite for any purpose, not involving harm to others. In the Subjection of Women5 he argues for the complete legal equality of men and women, not only to remove injustice but because <(the only school of genu¬ ine moral sentiment is society between equals.® ((We have had the morality of submission, and the morality of chivalry and generosity; the time is now come for the morality of justice.® Moreover, a position of equality with its ac¬ companying effects of enlarged interests, wider responsibility, greater dignity and the possi¬ bility of individual development and satisfac¬ tions would add immeasurably to the well

being of all other members of the family.

Mill's religious views are found chiefly in the Examination of Sir William Hamilton) and in the three essays published after his death. He found no warrant for making na¬ ture a standard of morals or for inferring from it perfect benevolence or justice. Indeed only by sacrificing the attribute of omnipotence can we reconcile nature with the existence of a moral deity. In all this he is considering the older deistic conceptions, nature, man and God, as three separate beings. But there is much in his thought which is incompatible with such mechanical separation of nature and spirit, and of human and divine, notably in the fa¬ mous passage from the Examination.5 In re¬ ply to Dean Mansel's mode of reconciling sup¬ posed divine action with human conceptions of justice by the doctrine that God is Incon¬ ceivable, and therefore what is wrong by hu¬ man standards may be right by divine standards, Mill replies, <(I will call no being good, who is not what I mean when I apply that epithet to my fellow creatures; and if such a being can sentence me to hell for not so calling him, to hell I will go.® See Mill, John Stuart, Auto¬ biography; On Liberty.

Bibliography.— Albee, E., (History of Eng¬ lish Utilitarianism) (London 1902) ; Bain, A., (J-S. Mill: A Criticism with personal recol¬ lections5 ; Bourne, F., Eife of J. S. Mill5 (London 1873) ; Cadman, S. P., <(John Stuart Mill® in (Charles Darwin and Other English Thinkers5 (Boston 1911) ; Cairnes, J. E., (J.

S. Mill5 (London 1873) ; Courtney, W. L., Metaphysics of J. S. Mill5 (London 1879) ; and Eife of J. S. Mill5 (London 1889) ; Doug¬ las, C., (John Stuart Mill, a Study of his Phi¬ losophy5 (London 1895) ; Gomperz, T., (J. S. Mill5 (Vienna 1889) ; Green, T. H., «The Logic of J. S. Mill® in Green's (Works5 (Vol. II, London 1886) ; MacCunn, J., ((The Utilitarian Optimism of John Stuart Mill® in (Six Radical Thinkers5. (New York 1910) ; Pattison, A. S. P., English Philosophers and Schools of Phi¬ losophy® in (Channels of English Literature Series5 (New York 1912) ; Stephen, L., (The English Utilitarians5 (Vol. Ill, New York 1900) ; Watson, J., (Comte, Mill, and Spencer5 (New York 1895; new ed. revised as (An Out¬ line of Philosophy,5 Glasgow 1898) ; Whittaker,

T. , (Comte and Mill5 (New York 1909).

James H. Tufts,

Professor of Philosophy, University of Chicago.

MILL, JOHN STUART, AUTOBI¬ OGRAPHY. This has been called the his¬ tory of an education, showing what may be accomplished in forming a boy's mind both for good and ill. Mill's teacher was his father, whose ardor in the task was stimulated by the facility of his pupil. He began Greek at three; Latin at eight ; by 12 he knew most of the best in both languages, besides reading in English (<chieHy histories,® and composing one book in continuation of Pope's HliadC From 12 he began logic, at 13, political economy, at 17 he was writing articles for the Westminster Re¬ view. But such forcing of the faculties must be paid for. It was impossible that Mill's edu¬ cation should not produce a distinguished mind, it was equally impossible that it should produce a joyous one. His boyhood lacked games and youthful companionship. At 20, a not un¬ natural reaction caused a sudden collapse in his whole intellectual outlook, resulting in pro¬ found depression, when this brilliant boy ((seemed to have nothing left to live for." From this state of <(dry, heavy dejection,® he was roused by the discovery of beauty, art, music and poetry, all of which had been omitted from the system of the elder Mill. Thus he came to perceive the value of feeling and emotion, and was brought back to hope and enjoyment by pleasure in Wordsworth's poetry and the Memoirs of Marmontel. Admirable as all this is, not less so is his account of (<that friendship which has been the honor and chief blessing of my existence,® his marriage with Mrs. Tay¬ lor in 1851. Mill's intellectual isolation made the experience a vital one; and the words in which he draws his wife's character and their companionship in work and thought are among the most impressive of their kind. Much of the (Autobiography } is taken up with an ac¬ count of the genesis and growth of Mill's chief works and with a discussion of his father s character and opinions and of the philosophy of Sir William Hamilton and of Comte. But the book, while primarily intellectual, is not without humanity and warmth, even apart from the glowing passages devoted to the author s wife. Mill's friends, Austin, Maurice, Sterling, the Carlyles and others, come into the human picture as well. The style is admirable for the purpose, clear, dispassionate and not unduly restrained ; and the attitude of sane analysis, of modesty and of thoughtful discrimination has never been surpassed in any autobiography. The world has taken the earlier portion of the book — the story of the growth of the boys mind and character — as its unique contribution to the literature of autobiography ; but scarcely

less valuable are Mill's pictures of his con¬ temporaries and his analysis of the thought and the social movements of his time.

Anna Robeson Burr.

MILL, the general name of a machine for grinding, crushing or pulverizing. Also a lapi¬ dary's grinding wheel, known as roughing mill. Also a machine, or complication of engines or machinery, for working up raw material; as, a cotton mill, a spinning mill, a saw mill, an oil mill, *etc.* In die-sinking, the hardened steel roller having the design in cameo, and used for impressing in intaglio a plate, as in the bank¬ note system of engraving; or a copper cylinder,

as in the process of engraving cylinders for calico printing.

MILL ON THE FLOSS, The. This novel, by George Eliot (Mrs. Marianne Evans Cross), published in 1860, was the second of the long novels of the author, being preceded by the various (Scenes from Clerical Life} and the novel (Adam BedeC It was favorably received on publication and the opening parts, particularly those dealing with the childhood of Tom and Maggie Tulliver, are commonly re¬ garded as among the best work that George Eliot ever did, but the last of the three vol¬ umes as originally published was regarded less favorably, largely because of some artificiality of episode and treatment.

In many respects (The Mill on the Floss } is the most personal of the author's stories. In depicting the heroine she drew to some ex¬ tent from her own experience, and many of the characters in the book are drawn from people in her own family. The central idea is char¬ acteristic of the writing of the author. It is the hopelessness of the attempt of a person of given temperament to accommodate herself to unsympathetic conditions. Maggie Tulliver, a young woman of unusual sensibility and al¬ ways seeking for happiness, grows up among plain, hard, matter-of-fact people and narrow surroundings. Her volatile temperament causes numerous misunderstandings with her robust and sturdy young brother, Tom, as notably in her forgetting to feed his rabbits during his absence. His partisanship in the feud that had wrecked the fortunes of the Tulliver family and brought about the ruin and death of his father thwarts Maggie's growing love affair with Philip Wakem and later on condemns her for her lack of fairness and firmness in the somewhat artificial episode of Stephen Guest. Meanwhile she has sought consolation in read¬ ing (The Imitation of Christ,* but this, like her family and friends and her affectionate

nature, proves a fragile reed. The author, apparently despairing of any possible outcome under such conditions for the happiness of Maggie Tulliver or for her finding even a satisfactory place in the world, drowns her along with her newly-reconciled brother in a somewhat supererogatory flood. The desire of the author was apparently to push the tempera¬ ment to an inevitable conclusion but the real problem was to account for Maggie had she remained normally alive. The factitious ele¬ ments which have been spoken of are out of keeping with the general tendency of George Eliot's work, which is to analyze and account for the development of character under less accidental conditions of life. The life of George Eliot by her husband, J. W. Cross, should be referred to.

William T. Brewster.

MILL SPRINGS, Ky., village in Wayne County, on the Cumberland River, about 90 miles south of Frankfort. It has steamer con¬ nections with places on the Cumberland and Ohio rivers. A battle was fought here on 19 Jan 1862, between the Federal and Confederate forces. (See Mill Springs, Battle of). A National cemetery located here contains 718 graves of soldiers.

MILL SPRINGS, Battle of. The opening of the Kentucky-Tennessee campaign of 1862. At the close of 1861 the Confederate line ex¬ tended from Columbus, Ky., on the Mississippi, through Fort Henry on the Tennessee, Fort Donelson on the Cumberland, Clarksville, Tenn., and Bowling Green, Ky., to Mill Springs on the Cumberland. Gen. A. S. Johnston was in chief command. Gen. D. C. Buell was the opposing Union commander. Gen. F. K. Zollicoffer es¬ tablished the Confederate right at Mill Springs early in December. Gen. Geo. B. Crittenden took general command there at the middle of the month, with the brigades of Zollicoffer and W. H. Carroll under him. Gen. Leonidas Polk held the Confederate left at Columbus, Gen. J. B. Floyd reached Fort Donelson 13 February, and had under him Generals Pillow, Buckner and Bushrod Johnson. Gen. A. S. Johnston was at Bowling Green, the centre. Gen. Geo. H. Thomas was on the Union left, with General

Schoepf immediately opposed to Zollicoffer, while General Buell, with headquarters at Louis¬ ville, was in close communication with the Union centre, which threatened Bowling Green and Nashville.

General Zollicoffer, having crossed from Mill Springs to the north bank of the Cumber¬ land and entrenched his position, from which he threatened central Kentucky, General Thomas was sent against his forces, now commanded by General Crittenden, from the direction of Lebanon. On 18 January General Thomas reached Logan's Cross Roads about 10 miles from Crittenden's entrenchments. The latter officer, with the purpose of attacking before Thomas could concentrate his forces, marched at midnight of the 18th with Zollicoffer's and Carroll's brigades, consisting of eight regiments of infantry, six guns and four battalions of cavalry, and attacked General Thomas soon after daylight of 19 January.

The Union troops, consisting of six infantry regiments, one battery and a portion of a cavalry regiment, were brought rapidly into action, both sides fighting with spirit. Finally, when three fresh Union regiments fell on the Confederate right, and the 2d Minnesota was pouring a galling fire upon the centre, the 9th Ohio (German Turners) made a brilliant bayonet charge completely turning the Con¬ federate left, resulting in the Confederate lines breaking and retiring in confusion. At this point General Schoepf's brigade from Somerset leached the field, and the whole force continued in pursuit, reaching the Confederate entrench¬ ments during the night, and forming to assault them at daylight. During the night the Con¬ federates succeeded in crossing their men, leav¬ ing artillery, cavalry, horses, mules, wagons, camp equipage and private baggage. The Confederate right wing was effectually broken and largely dispersed.

The overthrow of the Confederate right was followed 6 February by the capture by Admiral Foote, acting in cooperation with General Grant, of Fort Henry on the Tennessee, and 16 February by the capture of Fort Donelson, with its artillery and garrison of about 15,000, by General Grant.

On 8 February General Johnston notified the Secretary of War that the loss of Fort Henry and the movement against Fort Donelson made

the Bowling Green line untenable, and that he had directed General Hardee at Bowling Green to prepare to fall back on Nashville. The evacuation was completed 14 February, and by the 17th General

Hardee had crossed the Cumberland at Nashville and proceeded toward Murfreesboro. Ten days later, all army sup¬ plies having been sent to Chattanooga, which place was held by troops sent by General Bragg from Mobile, Johnston's army marched for the line of the Memphis and Charleston Railroad at Decatur, this line having been decided upon as the next for defense.

By the last of March Johnston's column had taken position at Corinth, Bragg's forces had reached him from Mobile and a portion of Polk's from Columbus.

Meantime (15 February) Bowling Green was occupied by Union forces under O. M. Mitchel. Pressing on, he reached Edgefield opposite Nashville on the 14th. Nelson's division ar¬ rived by transports the next day, and soon after the first of March Buell's entire column, com¬ ing partly by land and in part by river, was con¬ centrated at Nashville.

The Union movement to Pittsburg Landing began 10 March by the dispatch of Gen. W. T. Sherman's division from Paducah up the Ten¬ nessee. It proceeded, under orders of Gen. C. F. Smith, to the vicinity of Eastport; but find¬ ing all streams inland at flood, the expedition dropped back to Pittsburg Landing, where it found Hurlbut's division. The latter took post one and one-half miles back 18 February, and Sherman's the next day about three miles back, at Shiloh Church. These were followed within a few days by the divisions of Prentiss, Mc-Cdernand and W. H. W. Wallace, each selecting its own camp without special reference to a general line, the movement being regarded as a concentration preparatory to an advance on Corinth. Gen. Lew Wallace's division was halted at Crump's Landing, five miles below Pittsburg. General Grant arrived and assumed command 17 March, establishing his head¬ quarters at Savannah nine miles below, on the opposite side of the Tennessee.

General Buell's advance left Nashville 15 March to join General Grant at Savannah. After marching 130 miles in nine days he was stopped by high water in Duck River, necessitat¬ ing bridging, and then marched the remaining 90 miles in six days. General Grant had ad¬ vised him that it was not necessary to hurry, as he would not be ready to cross his command over the river till 8 April. However, Buell pushed on and fortunately reached Savannah with the head of his column the night of the 5th. > General Johnston, with the design of at¬ tacking Grant before Buell could join him, had marched from Corinth 3 April, with the ex¬ pectation of attacking on the 5th, but heavy rains delayed his columns, and his unexpected attack was delivered soon after daylight

of 6 April, thus opening the battle of ‘ Shiloh or Pittsburg Landing. See Shiloh, Battle of.

H. V. Boynton.

MILL VALLEY, Cal., town, 12 miles north of San Francisco on the Northwestern Pacificˆ Railroad. Marin County, in which this town is situated, is noted for its beautiful scenery. Mill Valley is in a fine fruit-growing district and owns its waterworks. Pop. 2,550.

MILLAIS, mil’ld’, Sir John Everett, Eng¬ lish painter: b. Southampton, England, 8 June 1829; d. London, 13 Aug. 1896. His earliest years were spent in Jersey and at Dinan in France, and at the age of eight he was sent to study art under Mr. Sass in London. In 1840 he became a student in the Royal Academy, and in 1846 he exhibited his (Pizarro seizing the Inca of Peru.5 Next year the gold medal of the Academy was awarded to his (Young Men of Benjamin seizing their Brides.5 In 1848, along with Holman Hunt, Dante G. Rossetti and others, he founded the Pre-Raphaelite Brotherhood. Among the chief works of this period are (A Huguenot,5 (The Order of Release) and the Proscribed Royalist.5 In 1853 he was elected an associate of the Royal Academy, and 10 years later Academician. For a few years thereafter his pictures were still in¬ fluenced by the Pre-Raphaelite principles, which he gradually abandoned. He developed into a splendid colorist, a master of technique and altogether a great modern master. Numerous honors fell to him; he was decorated with the Legion of Honor in 1878, elected a member of the Academie des Beaux-Arts in 1882, created a baronet in 1885 and elected to succeed Lord Leighton as president of the Royal Academy in 1896; but he only held this last position about six months, dying on 13 August of the same year. He was most successful in figure-pieces and portraits, but he also produced a certain number of landscapes, one of the finest being (Chill October5 (1871). He painted portraits of some of the foremost men of the day, in¬ cluding Mr. Gladstone, Lord Beaconsfield, Lord Salisbury, Mr. Ruskin, Lord Tennyson and others. Consult Baldry, A. L., (Millais: His Art and Influence) (London 1899) ; Bayliss, Eive

Great Painters of the Victorian Era5 (New York 1902) ; Hare, T. L., (Leaders of English Pre-Raphaelites5 (New York 1909) ; Millais, J. G., (Millais' Life and Letters5 (Lon¬ don 1899); Reid, J. E., (Sir J. E. Millais5 (New York 1909) ; Spielmann, (Millais and His Works5 (London 1898).

MILLAIS, John Gaille, English artist and authpr, son of Sir John Everett Millais (q.v.) : b. London, 24 March 1865. He was educated at Trinity College, Cambridge, and in 1886 en¬ tered the 72d Highlanders, retiring with rank as first lieutenant in 1892. He has traveled in Iceland, Africa, western America, Canada, Newfoundland, Norway, Alaska and the Carpathians. He has a museum and a collec¬ tion of about 3,000 birds, mostly of the British Isles. He has illustrated several books on sport and natural history, among them Seebohm's and Sir R Payne Gallwey's works, and the Encyclopaedia of Sport.5 Author of <Game Birds and Shooting Sketches5 (1892) ; <A Breath from the Veldt5 (1895) ; (British Deer and Their Horns5 (1897) ; (Natural His¬ tory of British Surface5 (1902) ; Eritish Div¬ ing Ducks5 (2 vols., 1913) ; European Big Game5 (1914); (American Big Game5 (1915); Ehododendrous and Their Hybrids5 (1917), *etc.*

MILLAU, or MILHAU, France, city in the department of Aveyron, at the confluence of the Tarn and Dourbie rivers, 74 miles north of Beziers and on the Southern Railwav. There is the Romanesque church of Notre Dame, re¬

stored in the 16th century; a notable Gothic belfry; and a fine modern church of Saint Frangois. It was the ancient Emilianum, and in the Middle Ages was the seat of the counts of Barcelona and afterward of the counts of Armagnac. It was a Huguenot stronghold in the 16th century and after its revolt and sub¬ mission in 1620 its fortifications were leveled by the orders of Richelieu and Louis XIII. The modern town is noted for its manufactures of gloves, and has other leather and woolen industries. It has a trade in wool, wines, skins and Roquefort cheese. Its present pros¬ perity dates from after the Revolution. Pop. about 17,673.

MILLBURY, mil'bu-ri, Mass., town in Worcester County, on the Blackstone River, and on the Boston and Albany and the New York, New Haven and Hartford railroads, about six miles southeast of Worcester. It was settled in 1743 and was called North Par¬ ish of Sutton until 1813 when it was incorpo¬ rated. It is claimed as the place where the <(Lyceum Lecture System55 originated in 1820.

It is a manufacturing town; the chief industrial establishments are foundries, machine-shops, linen cloth factory, woolen mills, thread facto¬ ries, hosiery mills, lumber mills, weaving ma¬ chinery and cotton mills. Pop. (1920) 5,652.

MILLEDGE, milej, John, American sol¬ dier and politician: b. Savannah, Ga., 1757; d.

9 Feb. 1818. At the outbreak of the Revolution he was one of the party which, led by Joseph Habersham, made a prisoner of Wright, the royal governor, 17 June 1775, the first bold rev¬ olutionary act performed in Georgia. When Savannah was taken by the British, Milledge escaped to South Carolina, where he was cap¬ tured by a party of Americans, and came near being hanged as a spy. In 1779 he was present at the unsuccessful siege of Savannah. He was also at the siege of Augusta, and in South Carolina and Georgia, at various places, did valuable service in the patriot army. In 1780 he was appointed attorney-generalˆ of Georgia, and afterward served frequently in the State legislature. In 1802 he was elected governor of Georgia and served two terms. He was a rep¬ resentative in Congress from 1792 to 1802, ex¬ cept one term, and United States senator from 1806 to 1809. Milledge was the principal founder of the University of Georgia, and pur¬ chased and presented a tract of land which is the site of the university and of a part of Athens, its seat. See Milledgeville.

MILLEDGEVILLE, mil'ej-vil, Ga., city and county-seat of Baldwin County, on the Oconee River, and on the Georgia and the Cen¬ tral of Georgia railroads, about 30 miles north¬ east of Macon. It is near the geographical centre of the State; and streams nearby furnish natural drainage and water power. The dam on the Oconee increases the water power. The place was settled in 1803, received its city char¬ ter in 1836 and was named in honor of John Milledge (q.v.). From 1807 to 1867 it was the capital of the State. It is in a fertile agricul¬ tural region in which cotton, corn, wheat, hay and fruits are the chief products. In the vicin¬ ity are fine deposits of talc, kaolin and fire-clay. Ornamental and building brick are manufac¬ tured extensively and quantities of clay are shipped to other places. The preparation of

cotton for the markets is a most important in¬ dustry. The building which was once the State capital is now the Georgia Military College, a school with an attendance of over 500 students. Other institutions are the Georgia Normal and Industrial College, a State School for Girls and the State Sanitarium for the Insane. The State prison farm is just outside the city limits. The government is administered under a char¬ ter of 1900 and is vested in a mayor, who holds office two years, and a council. The mayor is a member of the council. Pop. (1920) 4,619.

MILLENARIANS. See Millennium.

MILLENARY, the space of a thousand years; same as Millennium (q.v.). The word is also used to designate a thousandth anniver¬ sary, such as that of the Domesday Book, 12 May 1886; and the commemoration of the death of King Alfred, at Winchester, England, 18-20 Sept. 1901.

MILLENARY PETITION, in English history, a petition named from the number of signatures appended to it presented by the Puritans to James I, in 1603. The petitioners desired to be relieved from the use of the sign of the cross in baptism, the ring in the mar¬ riage service, confirmation and bowing at the name of Jesus. The petition in reality con¬ tained only 750 names, instead of 1,000.

MILLENNIUM (Lat. mille, 1,000, and annus , a year), a period of 1,000 years. Hence it is a term applied to the period during which, according to some, Jesus Christ will return to reign on earth before the end of the world. This premillennial appearance of Christ will be signalized by a first or particular resurrection of the just, who are to reign with Him on earth, and by the destruction of Antichrist. Those who hold such views are called millenarians or chiliasts, and their tenet chiliasm (Gr.

1,000). It is admitted on all sides that these views were, if not general, at least very common in the ancient church. The belief was generally founded on Psalms xc, 4, according to which 1,000 years are before the Lord as one day, compared with the account of the creation as given by Moses. The six days of creation are taken as designating 6,000 years of toil, and the subsequent sabbath as designating 1,000 years of rest and happiness. The millennium was to be the sabbath rest of the new creation of mankind in Christ. Besides these passages, Rev. xxi, 1-6, is especially quoted by chiliasts in support of their views. Chiliasm prevailed chiefly among the Jewish Christians, who re¬

tained after their conversion the hope that they would rule over all other nations under a royal Messiah (q.v.). The Ebionites, the Nazarenes and Cerinthians all advocated it and Montanus, and the sect which was called after him, re¬ garded it as a fundamental doctrine of the Christian religion. Some early fathers of the Church also' declared themselves generally in favor of the doctrine; Papias, Irenaeus and Tertullian were chiliasts; and Papias appealed in support of his view to apostolic traditions. On the other hand, however, the epistles of Clement of Rome and Ignatius of Antioch are silent about it. Justin Martyr who wrote in the 2d century was a believer in the millennium. <(I and all Christians whose belief is in every respect correct,® he says, wknow that there will be both a resurrection of the flesh and a thou¬

sand years in Jerusalem, which will then be re¬ built, adorned and enlarged, as the prophets Ezekiel, Isaiah and others declare.® This view was opposed by the whole Alexandrian school, especially by Origen, who believed in a spiritual supramundane interpretation of Revelations. Still it continued to find advocates during the 3d century, among whom Tertullian, Nepos, bishop of Arsinoe, and Methodius, bishop of Tyre, were prominent. In the 4th century, Jerome, who did not believe in it himself, did not dare to condemn it, in consideration of the many pious and learned advocates it had found in former centuries. Soon after it began to die out; it was temporarily revived toward the close of the 10th century, by the popular belief in the approaching end of the world, but it never regained great strength. The reforma¬ tion of the 16th century gave a new impulse to chiliasm. Fanatical opinion identified the Pope with Antichrist,- and regarded the anticipated downfall of the Roman Catholic Church as foreshadowing the approach of the millennium. But when the Anabaptists undertook in 1534 to erect the new Zion, both the Lutheran and Re¬ formed churches declared themselves against this reversion of the old doctrine. Yet it was preached by many sectarians and theologians of the 16th and 17th centuries, among whom were Weigel and the Moravian bishop Comenius in Germany, Jurieu in France, the Labadists in the Netherlands and Joseph Mede and Jane Lead (d. 1704) in England. A third period in the history of chiliasm may be commenced with the writings of the esteemed exegete and New Tes¬ tament commentator, Johann Albrecht Bengel. He practically reintroduced it into Protestant theology, where it has ever since been advo¬ cated by a number of prominent theologians. The ingenious prelate Oetinger (d. 1782)

brought it into connection with his favorite the-osophic views. Hahn (the founder of a pietistic sect in Wiirtemberg), Stilling, Lavater and Hass gave it a wide circulation among the lower classes of the people in Germany and Switzerland. In opposition to the “spiritual¬ ism® of modern exegesis, it was advocated, with exegetical arguments, by Hoffmann, De-litzsch, Kurtz, Hebart and others; while Thiersch, Nitzsch, P. Lange and Ebrard sup¬ ported it from a dogmatical as well as an exe¬ getical standpoint. Swedenborg taught that the last judgment took place in 1757, and that the New Church or church of the New Jerusa¬ lem had actually been formed both in heaven and on earth. After Germany, England and America have been the chief fields of modern chiliasm. The “Catholic Apostolic Church,® organized by Edward Irving, laid great stress on the belief that the kingdom of glory was very near. Chiliasm lies at the foundation of Mormonism, whose adherents call themselves “Latter Day Saints® in reference to the near approach of the last day. In the United States great excitement was caused by the preaching of William Miller (q.v.) who sought to prove from the Scriptures that the second advent of Christ would take place about 1843. He not only, met with numerous chiliasts in most de¬ nominations, but he also founded the sect of Adventists (q.v.). Chiliasm has been seriously taken in declarations of doctrine formulated by several churches. The Augsburg Confession implicitly repudiates it, speaking of “the last

days foreshown in Holy Scripture, in which the world is to become ever more and more degen¬ erate and mankind more sinful and weak.® The Council of Trent declares that ((the Scrip¬ tures also inform us that the General Judgment shall be preceded by the preaching of the Gospel throughout the world, a defection from the faith and the coming of Antichrist.® There is a sort of millennium also looked forward to by those who disbelieve in religion as the reno¬ vator of the world. According to these teach¬ ers there is a material millennium quite within the range of future possibilities. They teach that the race must look to its renewal and im¬ provement by the non-propagation of disease and impotency of every nature, and to the per¬

sistent and joyous multiplication of the best ele¬ ments of our race, in a continual progress toward the Hierarchy of Life. The millen¬ nium, according to this newly invented philoso¬ phy, will come by natural and not supernatural means. See Eschatology; Resurrection; Jews and Judaism — Zionism.

Bibliography. — Beet, J. A., (Last Things* (London 1897) ; Briggs, C. A., (The Messiah of the Apostles* (New York 1895) ; Bonar, H., (Prophetical Landmarks) (London 1866) ; Charles, R. H., (Critical History of the Doc¬ trine of the Future Life) (London 1899) ; Davidson, S., (Doctrine of Last Things* (Lon¬ don 1900) ; Drummond, J., (Jewish Messiah) (London 1877) ; Elliott, E. B., (Horae Apocalyp-ticse* (London 1862) ; MacCulloch, (Early Christian Visions of the Other World) (Edin¬ burgh 1912) ; Newton, I., dissertations on the Prophecies* (London 1755) ; Salmond, S. D. F.,

(Christian Doctrine of Immortality,* 3d ed. (Edinburgh 1897) ; Seis, J. A., (The Last Times* (2d ed., Philadelphia 1878) ; Stanton, V. H., (The Jewish and Christian Messiah> (Edinburgh 1886) ; Terry, M. S., (Biblical Apocalyptics* (New York 1898).

MILLEPEDE, a myriapod of the Chilognatha, the second order of the class Myriapoda in which each segment of the body,, except a few of the front joints, bears two pairs of legs — the joints in the nearly-related centipedes (q.v.) bearing each one pair only. The com¬ mon species (genus Julus) are found in damp places, concealed under stones, or under the bark of trees. The body consists of from 40 to 50 joints, protected by a horny skin, and when irritated or at rest these animals coil up for protection. The mouth is provided with a pair of strong jaws or “mandibles® ; and the antenna or feelers consist of six or seven joints. See Myriapodea.

MILLEPORE, family (Milleporida) of Hydrozoa, remarkable for secreting massive calcareous skeletons like corals, with which they were for a long time classed. The hy-dranths are of two kinds : gastrozoids, or feed¬ ing polyps, which provide nourishment for the colony, and dactylozoids, which are elongated, mouthless, protective polyps provided with large numbers of nematocysts. The generative cells are remarkable for their wanderings, through the tissues of the polyps and colonies. The colonies are hermaphrodite, but the related family Stylasteridce has unisexual colonies. They live in warm seas and form reefs in shallow waters. Millepora alcicornis is abun¬ dant near low water in the West Indies, where

representatives of the Stylasteridce also occur in deep water.

MILLER, Adolph Caspar, American econ¬ omist: b. San Francisco, Cal., 7 Jan. 1866. He was graduated at the University of California in 1887 and later studied at Harvard, Paris and Munich. He was connected successively with the faculties of Harvard, the University of California and Cornell; was professor of finance at the University of Chicago in 1892-1902, and Flood professor of economics and commerce at the University of California in 1902-13. He served as assistant to the Secretary of the Interior in 1913-14, and has since been a member of the Federal Reserve Board. He is advisory editor of the Journal of Political Economy.

MILLER, Charles, American financier: b. Oberhoffen, Alsace, France, 15 July 1843. He came to the United States in 1854, received a common school education and in 1869 entered the oil business. He was for many years presi¬ dent of the Galena-Signal Oil Company — and afterward was chairman of the boards of the American Steel Foundry Company and the • American Locomotive Company, serving also as director in some 40 other corporations ; and as president of the Lake Erie, Franklin and Clarion Railroad Company. He was mayor of Franklin, Pa., for -two terms, served for six years on the Pennsylvania State Board of Charities, and was for five years a major-gen¬ eral in the Pennsylvania national guard. He is active in church work and since 1890 has con¬ ducted at his own expense the Miller Night School at Franklin. He is a Chevalier of the French Legion of Honor.

MILLER, Charles Henry, American land¬ scape painter: b. New York City, 20 March 1842. He was graduated from Mount Wash¬ ington Collegiate Institute, New York, and ex¬ hibited his first oil-painting at the National Academy of Design, 1860. He received the degree of M.D. from the New York Homeo¬ pathic College in 1863, but after his first trip to Europe as surgeon of a ship in 1864 he resolved to devote his life to the fine arts. He studied at the Bavarian Royal Academy with Adolf Lier from 1867 to 1870, when he re¬ turned to America. He was president of the New York Arts Club for five years, having become a member of the National Academy of Design in 1875. His paintings are prin¬ cipally landscapes of Long Island. He re¬ ceived the gold medal from Boston and New Orleans international expositions. His best-known work, (The Bouquet of Oaks,* is in the Metropolitan Museum. His (Sunset, East Hampton* (1878) is in the Brooklyn Museum; <High Bridge* hangs in the Democratic Club, New York. He is a lecturer, and author, under the pen name of Carl de Muldor, of (The Philosophy of Art in America) (1885).

MILLER, Cincinnatus Heine (better known as Joaquin Miller), American poet, whose pseudonym was due to his defense of Joaquin Murietta, a Mexican bandit : b. Wabash district, Ind., 10 Nov. 1841 ; d. San Francisco, Cal., 17 Feb. 1913. His father took him to Oregon in 1854. He got a little schooling but soon ran away from home ; went to the Cali¬ fornia gold mines ; accompanied Walker on the

Nicaragua filibustering expeditions; lived fa¬ miliarly among the Indians and the Spaniards of the Pacific slope; studied law for a few years, having^ graduated at Columbia College, Oregon, in 1858; practised law unsuccessfully in Idaho, where he soon turned express messenger, and in 1863 settled in Oregon for a short time, becoming editor of the Eugene City Demo¬ cratic Register, which was suppressed in the same year because of its treasonable character. In 1864 he began to practise law in Canon City, Ore., made himself popular by his services against the warlike Snake Indians and from 1866 to 1870 was judge of Grant County. His writings collected under the title ‘Songs of the Sierras) he could not sell in the East, and so took them to London, where they were pub¬ lished and brought him fame. He visited Lon¬ don again in 1873; lived in Washington, D. C. ; and in 1887 returned to California, settling near Oakland. His life sums up the adventure of the Pacific slope, and his verse and fiction are to be prized especially on this account as being real “documents® of certain phases of American life. They are, moreover, fresh, vigorous and original in style ; his metre is free and power¬ ful and his narrative forcible. He excels, per¬ haps, in his pictures of Nature. In a few short lyrics there is a quiet melancholy, bred of com¬ munion with solitary wood and mountain. But on the whole he is not a great artist, although his work has a distinct value as descriptive of various American types. Hence his fame has been much greater in England, where he was even styled “the American Byron,® than in America. Miller’s verse includes (Songs of the Sunlands) (1873) ; (Songs of the Desert) (1875); ‘Songs of Italy> (1878); /Collected Poems) (1882) ; and ‘Songs of Mexican Seas) (1887) ; ‘Building of the City BeautifuP (1893). His prose works are (The Baroness of New York) (1877) ; (The

Danites in the Sierras) (1881; later in the form of a play) ; and ‘’49, or the Gold-Seekers of the Sierras) (1884). An introduction and an autobiography appear in the definitive edition of his <Poems) (6 vols., San Francisco, 1909-10).

MILLER, Edward, American physician : b. Dover, Del., 9 May 1760; d. New York, 17 March 1812. He studied in the hospital at Baskingridge, N. J., was surgeon’s mate in the Revoluntionary War and in 1784 was graduated from the medical department of the University of Pennsylvania. He practised at Dover in 1783-96, and then established himself in New York. With Dr. Elihu H. Smith and Dr. Samuel L. Mitchell he founded in August 1799 the first American medical periodical, The Medical Repository. He was appointed professor of the practice of medicine at the University of New York in 1807, and clinical lecturer at New York Hospital in 1809. He wrote a highly valuable report, ‘Yellow Fever in New York in 1805,) a paper which is still regarded as authoritative. His other papers were included in the biog¬ raphy written by his brother, Samuel Miller, ‘Memoir and Writings of Edward Miller }

(1814).

MILLER, Ferdinand von, German bronze founder: b. Furstenfeldbruck, 18 Oct. 1813; d. Munich, 11 Feb. 1887. He studied at the Munich Academy, and under his uncle Stigl¬ mayer, as well as under Soyer in Paris. He

executed the castings from the designs of Schwanthaler, and likewise the great statue of Bavaria at Munich and that of Germania in the Niederwald monument. Among a large num¬ ber of commissions in America perhaps the most notable was that of the capitol doors at Washington, D. C.

MILLER, Ferdinand, Baron von, German sculptor and bronze founder: b. Munich, 8 June 1842. He studied tinder his father, Ferdinand von Miller (q.v.), and afterward in London, Paris, Berlin, Dresden and Munich. He later traveled in Italy; served in the Franco-Prus- sian War in 1870-71, with rank of lieutenant; and afterward traveled in the United States. He became a director of the Bavarian Academy of Fine Arts in 1900, and received the title of baron in 1912. His work is well represented in the United States and includes the figure of a soldier

for the Soldier's Monument at Charleston ; statues of Shakespeare, Columbus and Humbolt at Saint Louis, and the statuary for a magnificent fountain at Cincinnati. He also executed the equestrian statue of Emperor William I, at Metz, and others of King Ludwig I, Prince-Regent Leopold, Prince Friederich-Karl, *etc.*

MILLER, Florence Fenwick, English

doctor, lecturer and author: b. 5 Nov. 1854. She entered the Ladies' Medical College, London, in 1871; gained a wide practice and did much charity work; was thrice a member of the Lon¬ don school board; and is a prominent advocate of women's suffrage. She married Frederick A. Ford in 1877, but kept her maiden name. She wrote 'The House of Life> (1879); 'Physiology for Schools) (1880); 'Atlas of Anatomy> (1880); 'Readings in Social Economy) (1883) ; 'Life of Harriet Martineau) (1884); and 'In Ladies' Company) (1892).

MILLER, Francis Trevelyan, American journalist and historian: b. Southington, Conn., 8 Oct. 1877. He was graduated from Trinity College, Hartford, 1899; and received the de¬ gree of LL.B. from Washington and Lee Uni¬ versity in 1901 ; Hon. Litt.D. from Washington College in 1913; and Hon. LL.D. from the Uni¬ versity of Kentucky in 1913. He entered on his journalistic career in 1894 and was con¬ nected with various newspapers of the coun¬ try. From 1907-11, he was editor-in-chief of the Journal of American History. He con¬ ducted and published numerous sociological in¬ vestigations of Greater Antilles and contributed short stories, essays and articles to newspapers and magazines throughout the United States. He is the founder and editor-in-chief of the 'Photographic History of the American Civil War) (10 vols., New York 1910-11); 'Travel History of the World) (18 vols. in process) ; 'Photographic History of the Great WarJ (1914-15); and has published textbooks on geography and history, now in use in New York City schools.

MILLER, Frank Augustus, American inn¬ keeper and antiquarian: b. # Tomah, Wis., 3 June 1859. He removed with his parents to California in 1872, and later founded the Glenwood Mission Inn at Riverside, Cal. He has made the inn a careful reproduction of the architecture of the old Spanish missions in ar,d has gathered a notable collection of objects connected with the missions of the

18th and early 19th centuries. In 1898 he built the Riverside and Arlington Electric Railway, of which he was manager for 15 years; and he has been active in promoting the growth and public interests of Riverside.

MILLER, George Abram, American math¬ ematician : b. Lynnville, Pa., 31 Julv 1863. He studied at Muhlenberg College, Pennsylvania, Cumberland University, and at Paris and Leip¬ zig. He was instructor in mathematics at the University of Michigan in 1893-95, and at Cornell in 1897-1901. He was associated with the faculty of Leland Stanford, Jr., Universitv in 1902-06, was associated professor of mathe¬ matics at the University of Illinois in 1906-07, and has since been professor of mathematics there. He is editor of the American Mathe¬ matical Monthly and of School Science and Mathematics ; and coeditor of the Encyclopedic des Sciences Mathetiques. He wrote ‘Deter-minants) (1892) ; (Historical Introduction to Mathematical Literature) (1915) ; is coauthor of Mathematical Monographs> (1911), and (Theory and Application of Groups of Finite Order) (1915).

MILLER, Harriet Mann (“Olive Thorne Miller®), American author: b. Auburn, N. Y., 25 June 1831 ; d. 1918. Her earliest writ¬ ings were signed “Olive Thorne,® and after her marriage to W. T. Miller in 1849 she added her husband’s name to her signature. She be¬ gan her study of birds in 1880 and has published for young people’s reading ‘Little Folks in Feathers and Fur* (1879) ; (In Nesting Time) (1888); (Little Brothers of the ArC (1892); (A Bird-Lover in the West> (1894) ; (Under the Tree Tops> (1897); (The First Book of Birds) (1899) ; ‘The Second Book of Birds) (1901); ‘True Bird Stories) (1903); ‘What Happened to Barbara) (1907) ; (Harry’s Run¬ away and What Came of It) (1907) ; ‘The Bird our Brother* (1908); ‘The Child’s Book of Birds) (1915).

MILLER, Henry, American physician : b. Lexington, Ky., 1 Nov. 1800; d. Louisville, Ky., 9 Feb. 1874. He was graduated at the Transylvania University, Lexington, Ky., in 1821, and practised for a time in Glasgow and in Harrodsburg. Upon the founding of the Medical Institute, Louisville, Ky., he became its professor of obstetrics and the diseases of women and children, a position he held until he became

professor emeritus in 1869. He then occupied a similar chair at the Louisville Medical College until his death. He was author of ‘A Theoretical and Practical Treatise on Human Parturition (1849), later revised and published as ‘Principles and Practice of Obstetrics* (1858). A partial list of his writ¬ ings appears in the Surgeon-General’s Cata¬ logue, Washington, D. C.

MILLER, Henry (John), American actor; b. London, England, 1 Feb. 1860. He came to America in 1871, received a public school edu¬ cation and made his first appearance on the stage in Toronto. He became a member of Modjeska’s company in 1878; played with Adelaide Neilson for two seasons; and ap¬ peared at Daly’s Theatre, New York, in (Odette> in 1882. He appeared as “Herbert® in ‘Young Mrs. Winter* at the Madison Square Theatre; was leading man for Minnie Mad-dern; and was the leading juvenile of the

original Lyceum Theatre Company. He was leading man in the Empire Theatre Stock Com¬ pany under Charles Frohman; and starred in the original production of ‘Heartsease) in 1896. He was star in ‘The Master) in 1898, and created the leading role in ‘The Only Way* in 1899. He opened the Princess Theatre with ‘The Great Divide> in 1906; he was leading man in ‘The Havoc) in 1911, and in ‘Daddy Long-Legs* in 1915, and appeared in ‘The Fountain of Youth) (1918).

MILLER, Hugh, Scottish geologist and au¬ thor : b. Cromarty, 10 Oct. 1802 ; d. Portabello, near Edinburgh, 23 Dec. 1856. When five years old he lost his father, a seaman, and thus came under the care of his mother and her two brothers, who were unable to keep him in school, so fond was he of outdoor life, of unrestrained reading and of composition. That he might have the winter months free to write in he choose the trade of a stonemason, at which he worked from 1819 to 1834. He gained some literary repute in the meantime, especially by letters to the Inverness Courier on the herring fishery; in 1834 became accountant in the bank at Cromarty; wrote ‘Scenes and Legends of the North of Scotland> (1836) ; and gradually became known for his knowledge of geology, to the study of which he had first been drawn by noting the ripple marks on a block he was handling in the stonecutters’ yard. ‘Old Red Sandstone, or New Walks in Old Fields) (1842) made Miller famous, and the Old Red Sand¬ stone became freshly important to the geologist. Miller was a devout Christian, one of the founders of the “Free Church® of Scotland, and intensely orthodox in his opinions. Hence he opposed the doctrine of development ad¬ vanced in the anonymous ‘Vestiges of Crea¬ tion, >

and in 1847 published ‘Footprints of the Creator,* to which ‘The Testimony of the Rocks* (1857) formed a sort of sequel. In these books Miller held that, while the Bible is not a scientific textbook and should not be so regarded, yet it is not contradicted by science. In particular, he urged that the narrative of a six-day creation was entirely consonant with modern geological discovery; indeed he divided into six eras, to correspond with these six “days,® all geological history. His interest in the Free Church movement prompted him in

1839 to write ‘A Letter to Lord Brougham* and ‘The Whiggism of the Old School, * in which he protested against the law of patronage and vindicated the right of popular election to pastorates in the Scottish Church. Both pamphlets were so forceful that their author in

1840 was made editor of the lT/itness, an Edinburgh bi-weekly devoted to the cause of ecclesiastical independence. This post he held (with a brief interval) for nearly 17 years, while his health gradually broke under the stonemason’s disease contracted years before; at the same time his mind suddenlv failed, and in a moment of aberration he shot himself.

Miller’s enduring fame may be set down to his admirable, simple and fascinating style. As a scientist he did, it is true, urge the doctrine of specific creation, and emphasize the complete definiteness of demarkation between strata of various geological series and the catastrophic nature of the change from one era to another; but these views were not reactionary at the time, being held by o < ther scientists with far

wider and deeper training than Miller. His common sense and native sagacity led him to the correct solution of many minor concrete problems in geology ; and his books popularized the study of that science. As a controversial¬ ist he was the literary brain of the Free Church. Consult Miller’s famous autobiography, (My Schools and Schoolmasters > (1852) ; Bayne,

(Life and Letters of Hugh Miller > (1871); a memoir by Agassiz in the later American edi¬ tions of footprints of the Creator,* and Brown, ˆLabour and Triumph> (1858).

MILLER, James, American soldier and pol¬ itician : b. Peterboro, N. H., 25 April 1776; d. Temple, N. H., 7 July 1851. He studied for the bar, but entered the army as major in 1808, and distinguished himself on the northern fron¬ tier. In 1812 he was brevetted colonel for bravery as commander at Brownstown, and in the following year participated with credit in the capture of Fort George. In 1814, as colonel of the 21st Infantry, he accompanied the invad¬ ing army into Canada, and fought with gallan¬ try at the battles of Chippewa and Lundy's Lane (q.v.), the success of the Americans in the latter conflict being mainly due to his capture of a British battery. For these services he was made brigadier-general, and received from Con¬ gress a gold medal. In 1819 he resigned his commission in the army, and from that year until 1825 served as governor of the Territory of Arkansas. He was collector of the port of Salem, Mass., from 1825 to 1849, when he re¬ tired to private life.

MILLER, Joaquin. See Miller, Cincinnatus Heine.

MILLER, Johann Martin, German novel¬ ist and poet: b. Ulm, 3 Dec. 1750; d. 21 June 1814. He was educated at Gottingen and was on terms of intimate friendship with Klopstock, Voss and Holty. He attained a wide popularity as a writer of lyric verse and of ro¬ mantic tales. His (Siegwart> (1776), a novel written in the manner of Goethe's (Sorrows of Werther,* was widely popular and was trans¬ lated into French, Dutch and Polish. His verse was published in the periodicals of his time, (Was frag' ich viel nach Geld und Gut) making an especially wide appeal. His col¬ lected verse was published (1783). His fur¬ ther efforts in fiction include (Beitrag zur Geschichte der ZartlichkeiP (1776) ; (Geschichte Karls von Burgheim und Emiliens von Rosenau* (1778-79), *etc.*

MILLER, John Franklin, American sol¬ dier: b. South Bend, Ind., 21 Nov. 1831; d. Washington, D. C., 8 March 1886. He gradu¬ ated at the New York State Law School in 1852 and established a practice at South Bend, and took a leading part in State politics. In 1860 he was elected State senator, but resigned to enter the army the next year. He was in active service from almost the beginning of the Civil War, and in the battle at Stone River he per¬ formed services which led to his promotion to the rank of brigadier-general. He resigned at the close of the war though offered a commis¬ sion as colonel in the regular army, and re¬ moved to California, w'here he for a time prac¬ tised law and

then entered business life. He continued an active interest in politics, and from 1881 until his death was United States senator.

MILLER, Joseph, also known as Joe Miller, English comedian: b. 1684; d. 1738. For several years he was connected with Drury Lane and was a great favorite in many roles. In 1739, the year following his death, there appeared a collection of jests under the title (Joe Miller's Jests.) The real compiler was a certain John Mottley, an obscure author (1692-1750).

MILLER, Joseph Nelson, American naval officer: b. Ohio, 22 Nov. 1836; d. Brick Church, N. J., 26 April 1909. He entered the navy in 1851, in 1861 had risen to the rank of lieuten¬ ant, and was promoted lieutenant-commander in 1862. As executive officer of the Passaic he took part in the attack upon Fort McAllister and Fort Sumter, and in the two attacks upon Fort Fisher as executive officer of the Monad-nock ; and was commended by his commanding officers for bravery and skill in these engage¬ ments. In 1870 he was promoted to the rank of commander, and in 1875 was assigned to the Tuscarora, and had charge of the deep sea soundings between the Hawaiian and the Fiji Islands. He obtained the rank of captain in 1881, commodore in 1894 and rear-admiral in 1897. In the latter year as commander-in-chief of the Pacific stations he hoisted the American flag at Honolulu, and in 1898 again raised the flag there, when American sovereignty of Hawaii was established. In 1897 he was the representative of the United States navy at Queen Victoria's Jubilee, with the Brooklyn as flagship; and during the Spanish War (1898) he organized the naval reserves on the Pacific Coast. He was retired from active service in November 1898.

MILLER, Lewis, American inventor and philanthropist: b. Greentown, Ohio, 1829; d. New York, 17 Feb. 1899. He was a machinist, settled at Canton, Ohio, where he made agri¬ cultural tools, many of them after his own de¬ signs, notably the first successful reapers and binders; and later had factories at Akron and Mansfield. In Akron he built a model Sunday school, and he gave much money for Sunday school work throughout the country. On his ideas the Chautauqua Assembly was planned and he was its president from 1874 until his death.

MILLER, Nathan L., American jurist and statesman: b. Solon, Cortland County, N. Y., 10 Oct. 1868. He was graduated from Groton (N. Y.) Union School in 1883 and from Cort¬ land Normal School in 1887. He taught school, 1887-92. In 1893 he was admitted to the bar. He was

corporation counsel of Cortland', 1901— 02; State comptroller, 1902-03; justice of the Supreme Court of New York, sixth judicial dis¬ trict, 10 Nov. 1903 to 1 Jan. 1913; associate jus¬ tice, Appellate Division, Second Department, 1905—10 ; First Department, 1910—13 ; associate judge of the Court of Appeals, 1 Jan. 1913 to 1 Aug. 1915, when he resigned and resumed the practice of law. In 1920 he was elected governor of New York on the Republican ticket

MILLER, Olive Thorne. See Miller, Harriet (Mann).

MILLER, Patrick, Scottish pioneer in steam navigation: b. Glasgow, 1731; d. Dalswinton, Dumfriesshire, 9 Dec. 1815. He was engaged in business as a banker in Edinburgh,

and was a leading stockholder in the Carron Iron Company, in whose shops carronades were first manufactured and from which they de¬ rived their name. In 1785 he purchased the estate of Dalswinton in Dumfriesshire, and here spent the latter part of his life, devoting his attention to agriculture (he introduced fiorin grass, or white bent, into Scotland, and wrote a treatise on it), and to experiments in shipbuilding. On 14 Oct. 1788 he first demon¬ strated the possibility of steam navigation by sailing a steam-propelled boat, 25 feet long and 7 broad, on the lake near his house. Miller had Robert Burns at one time as his tenant and correspondent. Consult Woodcroft, (Steam Navigation (1848).

MILLER, Richard E., American artist : b. Saint Louis, Mo., 22 March 1875. He stud¬ ied at the Saint Louis School of Fine Arts, and at Julien Academy, Paris, and made his first exhibition at the Paris Salon in 1901, receiving the gold medal. He has since received medals at Saint Louis, 1904; Liege, Belgium, 1905; Portland Exposition, 1905; the Temple gold medal of the Pennsylvania Academy of Fine Arts; the Clark prize at the National Academy of Design ; Potter Palmer gold medal, Chicago ; and the gold medal of honor at the Panama Exposition, 1915. His work is represented in the Luxembourg and other European galleries, and in the Corcoran Gallery, Washington;

the Metropolitan Museum, New York; the Penn¬ sylvania Academy of Fine Arts ; the Art Insti¬ tute, Chicago; the Carnegie Institute, Pitts¬ burgh ; and other galleries. He is a professor of the Lcole Colorossi, Paris; and in 1906 be¬ came a Chevalier of the Legion of Honor. Among his paintings are (The Old Maiden Ladies) ; (Portrait of an Old Woman' ; (The Boudoir' ; (The Open Window.'

MILLER, Samuel Freeman, American jurist: b. Richmond, Ky., 5 April 1816; d. Washington, D. C., 13 Oct. 1890. He was graduated from the medical department of Transylvania University in 1838 and engaged in practice, but in 1847 he was admitted to the bar and abandoned medicine. He was an ear¬ nest advocate of emancipation of the slaves, and in 1850 freed his own slaves and removed to Keokuk, Iowa, where he established a law practice and changed his political affiliations from the Whig party to the Republican, be¬ coming a party leader in his State. In 1862 he was nominated by President Lincoln to suc¬ ceed Justice Peter V. Daniels as a justice of the United States Supreme Court, where for many years before his death he was senior jus¬ tice. He gained a high reputation for ability and force of character and his decisions car¬ ried great weight. Among his official opinions was that on the Louisiana slaughter-house cases, defining the respective rights of the State and Federal governments; the ˆ Kilbourn-Thompson Case, defining and limiting the au¬ thority of Congress as a co-ordinate branch of the government ; and his motion as a member of the Electoral Commission in 1877, which resulted in the decision that Congress pos¬ sessed no authority to go behind the returns of legally accredited State officials. He was se¬ lected by the Electoral Commission to prepare its report and to go before Congress to explain its decisions. He was president of the National

Conference of the Unitarian Church for three years, and was the principal orator at the cen¬ tennial celebration of the adoption of the United States Constitution held at Philadelphia in 1887. Author of (Lectures on the Constitu¬ tion of the United States' (1891).

MILLER, Warner, American manufacturer and politician : b. Hannibal, Oswego County, N. Y., 12 Aug. 1838; d. 21 March 1918. He was graduated from Union College in 1860; and for a year was professor of Greek and Latin at the Fort Edward Collegiate Institute. In the Civil War he served in the Fifth New York Cavalry, enlisting as a private, and attain¬ ing the rank of lieutenant; he fought under Sheridan, and was taken prisoner at the battle of Winchester, was paroled on the field and afterward honorably discharged. After the war he established

a paper manufacturing busi¬ ness, in which -he continued to hold large interests. He was also an active member of the Republican party, was delegate to the National Convention in 1872 and was elected to the New York legislature in 1874; and was a member of Congress from 1879 to 1881. In 1881, when T. C. Platt (q.v.) resigned from the United States Senate, Miller was elected to fill the vacancy, serving as senator till 1887 ; in 1888 he was nominated for governor of New York by the Republicans, but failed of election. Later he was interested in the Nicaragua Canal project, and was president of the Nica¬ ragua Canal Company.

MILLER, Willet Green, Canadian geol¬ ogist: b. North Walsingham, Ontario, about 1870. He was educated at the universities of Toronto, Chicago, Howard and Heidelberg. He was assistant in field geology in the Canadian Geological Survey in 1891-93 ; lec¬ turer and subsequently professor of geology at Queen's • University, Kingston, in 1893-1902; and has since been provincial geologist and inspector of mines for Ontario. He had charge of the field work for the Eastern On¬ tario Bureau of Mines in 1897-1901, and was president of the Canadian Mining Institute in 1908-10. He was a member of the Ontario Nickel Commission in 1915-16; and since 1918 has been Canadian Representative on the Impe¬ rial Mineral Resources Bureau. He is author of numerous papers on the pre-Cambrian and economic geology of Ontario ; corundum-bear¬ ing rocks, iron ores, gold deposits, cobalt-silver ores and kindred subjects, and of (Minerals and How They Occur' (1906).

MILLER, William, American religious leader: b. Pittsfield, Mass., 5 Feb. 1782; d. Low Hampton, Washington County, N. Y., 20 Dec. 1849. Most of his education he obtained through books procured by wood-chopping. He became a farmer at Poultney, Vt., in 1803, and in 1816 removed to Low Hampton, N. Y. In the War of 1812 he was captain of a company organized to protect the northern frontier. He was at first a student of Hume, Voltaire, Thomas Paine and Ethan Allen, and an avowed deist ; but afterward became a member of the Baptist church at Low Hampton. After a prolonged study of the Bible, enlightened by no help excepting that of a concordance, he began in 1831 to preach the second advent of Christ. He was licensed as a preacher by

the church at Low Hampton, but was never ordained. For a time all pulpits except the Roman Catholic and Episcopalian welcomed him. He first set the time of the second com¬ ing as somewhere between 21 March 1843 and 21 March 1844, and on 14 March 1844 pro¬ claimed it as near at hand. Months intervened and then in October the faithful . gathered in their assemblies. At the end of November they dispersed. Many of the Second Adventists, or Millerites, as they were sometimes called, affili¬ ated with other sects, but about 50,000 remained under the direction of Miller, who, on 25 April 1845, called a convention by which a declara¬ tion of faith was adopted, and the name of "Adventist11 selected for the sect, which in¬ creased in numbers, and is to-day divided among six branches. Miller assisted in estab¬ lishing in 1840 The Signs of the Times and Exposition of Prophecy, later. called the Advent Herald. He published (Evidence from Scrip¬ ture and History of the Second Coming of Christ about the year 1843 … in a Course of Lectures) (1842) ; a widely-cir¬ culated (Dream of the Last Day1 and other writings. Consult the biographies by Bliss (1853) and White (1875). See Adventists; Millennium.

MILLER, William, English soldier: b. Wingham, Kent, 2 Dec. 1795; d. on H. M. S. Naiad, Callao Harbor, Peru, 31 Oct. 1861. He entered the field train department of the British artillery and was appointed assistant commis¬ sary in 1811. He served with Wellington's army in the Peninsula campaigns in 1811-14, and later saw service in the war against the United States in the operations about the Chesapeake and New Orleans. After the peace he traveled in Europe for two years and then went to South America. He joined the army of Chile in its struggle for independence, and later commanded the marines on the O'Higgins. He became a general of brigade in the Peruvian army in 1823 and attained rank of general of division and commander-in-chief of cavalry under Bolivar, rendering important service at the decisive battle of Ayacucho in 1824. He was appointed governor of Potosi in 1825. In 1826 he returned to Europe, but returning to Peru in 1830 he filled various important posi¬ tions until 1839, when changes in political con¬ trol caused his banishment. He was appointed British consul-general in the Pacific in 1843 and died while on a mission to the Peruvian government. Consult Miller, J., (Memoirs of General Miller) (2 vols., London 1829).

MILLER, William, English line engraver: b. Edinburgh, 28 May 1796; d. Sheffield, 20 Jan. 1882. He was educated in England and at the

University of Edinburgh, and studied engrav¬ ing at Edinburgh and also under George Cooke during a residence in London, after which he returned and settled in his native city. His work was much commended by J. M. W. Tur¬ ner, and he engraved many plates after and in accordance with the suggestions of that master. Of these the most important are ‘The Bass Rock in a Storm1 (1826); (Great Yarmouth1 (1829) ; (The Grand Canal, Venice1 (1837) ;

(Modern Italy1 (1849) ; ‘The Bell Rock Light¬ house in a Storm1 (1864) ; (Saint Michael’s Mount1 (1866). The chief features in his

engravings are the remarkable skill with which he gives the tone and value of color effects in black and white; the boldness and freedom with the line is employed in expressing the movement and gloom of storm clouds, the transparent fluidity of tossing waves and the glassy surface of still rivers. He was remark¬ ably successful in book illustrations, of which fine examples may be seen in the Abbotsford edition of the Waverly Novels.

MILLER, William, Scottish poet: b. Bridgegate, Glasgow, August 1810; d. Glasgow, 20 Aug. 1872. Uncertain health preventing his becoming a physician, he adopted the trade of wood-turning. He published ‘Whistle Binkie1 (1852-53) and ‘Scottish Nursery Songs and Other Poems1 (1863), which earned for him the title of the <(Laureate of the Nursery.11 One of his most popular poems is (Wee Willie Winkie.1

MILLER, William, Canadian statesman : b. Antigonish, Nova Scotia, 12 Feb. 1834; d. 25 Feb. 1912. He was educated at the Anti¬ gonish Academy, was called to the bar of Nova Scotia in 1860 and became queen’s counsel in 1872. He served in the Nova Scotia assembly in 1863-67 and was a staunch supporter of the projected Confederation, although certain fea¬ tures, particularly the financial plan, were opposed by him. Largely through his efforts a compromise was effected which secured the adherence of Nova Scotia and the appointment of the delegates to London in 1866. He served in the Senate from 1867 until his death, and in 1883-87 he was speaker. He served on many important committees and was chairman of the Parliamentary committee for the codification of the Dominion’s criminal law. He declined judicial appointments from both Alexander Mackenzie and Sir John Macdonald. He be¬ came a privy councillor for Canada in 1891.

MILLER, William Hallowes, English

mineralogist: b. Velindre, near Llandovery, Carmarthenshire, 6 April 1801 ; d. Cambridge, 20 May 1880. He was graduated at Saint John's College, Cambridge, in 1826, was elected a Fellow there in 1829, and in 1832 he was appointed professor of mineralogy, which posi¬ tion he occupied until 1870. His system of crystallography was published in 1838 and re¬ ceived prompt recognition for its great worth, a reputation it still retains. He was one of the committee appointed in 1843 for the pur¬ pose of restoring the standards of weight and length, which were destroyed when the Houses of Parliament burned in 1834. His report of the work appears in the Philosophical Trans¬ actions1 (1856). In 1870 he was appointed to the Commission International du Metre, where he rendered valuable service. He was elected to the Royal Society in 1838, was its foreign secretary in 1856-73 and received a royal medal in 1870. He was also a knight of the orders of Saint Maurice and Saint Lazare in Italy, and of Leopold in Belgium, and was a corre¬ sponding member of the French Academy. He was author of treatises on hydrostatics and hydrodynamics, contributed 45 papers to the 'Royal Society's Catalogue,1 as well as writing for other scientific publications, and edited William Phillips' 'Elementary Introduction to Mineralogy1 (1852).

MILLER, William Henry Harrison,

American jurist: b. Augusta, N. Y., 6 Sept. 1840; d. 25 May 1017. He was graduated from Hamilton College, Clinton, N. Y., in 1861 and in 1862 entered the army, serving through the war. He engaged in law practice in Fort Wayne, Ind., 1866-74 ; in 1874 removed to Indianapolis and formed a partnership with Benjamin Harrison, and under the latter's administration (1889-93) was Attorney-General of the United States.

MILLER, William Lash, Canadian chem¬ ist: b. Toronto, about 1865. He was educated at the universities of Toronto and Munich, and became demonstrator in chemistry at Toronto. Since 1907 he has been professor of physical chemistry there. He is a member of the Ameri¬

can Association for the Advancement of Sci¬ ence, a. Fellow of the Royal Society of Canada and author of numerous technical papers.

MILLER, Fort, a former fortification on the site of the present village of Fort Miller, Washington County, N. Y., on the Hudson River, 40 miles north of Albany.

MILLERAND, Alexandre, French lawyer and statesman: b. Paris, 10 Feb. 1859. He was educated at the Lycee Vanves, the Lycee Henri IV and at the University of Paris, where he studied for the bar. He established his reputa¬ tion when he acted as a member of counsel for the defense of the strikers at Montceau-des- Mines in 1882. In politics he was a radical So¬ cialist and as such he was elected to the Cam¬ ber of Deputies in 1885, advocating collective ownership of production, and international unions of labor. He was, with Clemenceau, one of the arbitrators of the Carmaux strike in 1892. He had owned and edited La V oix from 1889, and he later edited La Petite Republique, the organ of the Socialists. In 1899 he -was appointed Minister of Commerce in the Waldeck-Rousseau Cabinet, after which time he abandoned his extreme views and bent his energies toward encompassing certain practical reforms. Among them were improve¬ ments in the merchant marine ; stimulation of trade; reforms in postal service; the establish¬ ment of a 10-hour working-day for women and children; an eight-hour day for miners; and the inauguration of one rest day a week for workers. He also endeavored to secure an en¬ forcement of arbitration in labor disputes. He was an advocate of old age pensions, the law for which was passed in 1905 ; and he was re¬ sponsible for the institution of separate depart¬ ments for the direction of labor, Insurance and pensions. His influence with the Socialists waned and his connection with the party was severed because of his entering the cabinet of an opposing party. In 1898 he became editor of La Lanterne and in 1902 the Waldeck-Rous¬ seau Cabinet was dissolved. He served in Briand's Cabinet as Minister of Public Works in 1909-10, and was Minister of War under Poincare in 1912-13. On the organization of the war cabinet under Viviani, 26 Aug. 1914, he was again appointed Minister of War. He was criticized for lack of vigor in prosecuting the war and in the cabinet organized by Briand 31 Oct. 1915 he was succeeded by General Gal-lieni, whereupon he resumed his law practice, but continued in active service in the Chamber of Deputies. He was designated to attend the War Conference at London 20 Jan. 1916. In

September 1920 he succeeded Paul Deschanel as President of France.

He wrote (Socialisme Re-formiste en France* (1903) ; (Travail et Travailleurs) (1906) ; (The Charitable Efforts of the United States) (1917) ; (La guerre litera-trice* (1918), *etc.*

MILLERITE (named in honor of W. H. Miller (q.v.), and formerly known as hair pyrites and as capillary pyrites), a mineral con¬ sisting of nickel sulphide; of bronze color and having a metallic lustre. It occurs in tufts of capillary crystals and in incrustations of deli¬ cate fibres loosely interwoven. It is found at Merthyr Tydvil, South Wales; in Cornwall, England ; Saxony and Bohemia ; in Sherbrooke County, Quebec; Jefferson County, N. Y. ; Lancaster County, Pa. ; and in Missouri and Wisconsin.

MILLER'S TALE OF THE CARPEN¬ TER, The, one of Chaucer's Canterbury Tales) (1475). It records the deception prac¬ tised on an old husband, a carpenter of Oxford, by his young wife and a clerk who lodges with them. The source of the tale is unknown.

MILLER'S-THUMB, the English name for a spiny fresh-water goby (Cottas gobio), of which many species occur in Europe and elsewhere. It seldom exceeds three or four inches in length, the fins are large, the flesh delicate and when boiled of a salmon color. They are frequently called ˆbullheads® (q.v.), but are different from toe small Amer¬ ican catfish so called. Consult Gill, T. M., (Miller's-thumb and Its Habits* (Smithsonian Institution Miscellaneous Collections, Washing¬ ton 1910).

MILLERSBURG, mil'erz-berg, Ohio, vil¬ lage, county-seat of Holmes County, on Kill-buck Creek and on the Cleveland, Akron and Columbus, and the Baltimore and Ohio rail¬ roads, about 70 miles northeast of Columbus. It is a manufacturing village; its principal in¬ dustrial establishments are flour and lumber mills, foundry, brick yards and machine shops, and its waterworks are municipally owned. In the vicinity are deposits of iron ore and bitu¬ minous coal. Pop. 2,020.

MILLES, Ruth Anna Maria, Swedish sculptor, sister of Vilhelm Karl Emil Andersson Milles (q.v.) : b. Vallentuna, Uppland, 10 Feb. 1873. She studied at Stockholm and at Paris and is known for the delicacy and ele¬ gance of her statuettes, groups, bas-reliefs. Among her works are (Red Riding-hood and the Wolf* (1902); (Fisherman's Wife*; <Yvonne,> (Wildflower,* (After Waiting, * National Museum (1907), *etc.*

MILLES, Vilhelm Karl Emil Andersson,

Swedish sculptor : b. Lagga, near Upsala, 23 June 1875. He studied at Stockholm and at Paris and early gained a reputation as a sculp¬ tor of great promise. His work is chiefly in bronze and has placed him in the foremost ranks of Swedish sculptors. Among them are the Sten Sture monument, near Upsala, exe¬ cuted in 1901 ; portrait busts of Julius Kronberg, in the Goteborgs Museum (1902) ; Pro¬ fessor Mittag-Leffler (1904) ; F. Boberg, National Museum (1906) ;.0. Leventin (1910), and G. Stridsberg, National Museum (1910) ; numerous groups of animals in granite and in

bronze, the Scheele statue at Kopings (1912), *etc.*

MILLET, Aime, a-ma me-la, French sculp¬ tor: b. Paris, 1816; d. there, 14 Jan. 1891. He studied art under David d' Angers (see David, Pierre Jean), and the architect Viollet-le-Duc (q.v.), applied himself first to painting and ex¬ hibited a picture in the exhibition of 1842, toil¬ ing at the easel for 10 years with no success. He meanwhile had turned his attention to the plastic arts and exhibited his first statue, a (Bacchante, ' in 1845. This was followed by his (Ariadne) (now in the Luxembourg), a (Mercury' and a statue of (Civic Justice) for the mairie of the First Arrondissement, Paris; the statue of a (Young GirP for a monument in the cemetery of Montmartre, an (Apollo ' for the faqade of the New Opera House and a bronze statue of (Vercingetorix) (1865). Among his portrait and personal works are the statues of Chateaubriand at Saint Male ; of Denis Papin, at Blois, and numerous busts. His style has all the realism of modern French sculpture, combined with a certain theatrical demonstrativeness, a vividness of expression, pathetic, tragic or passionate. Consult Dumes-nil, (Aime Millet, Souvenirs Intimes ' (Paris

1891).

MILLET, Francis Davis, American artist, author, war correspondent and illustrator: b. Mattapoiset, Mass., 3 Nov. 1846; d. 15 April 1912,

one of the victims of the Titanic steam¬ ship disaster. During the Civil War he acted as drummer and assistant surgeon. In 1869 he was graduated A.B. and A.M. in 1872 at Har¬ vard University. While contributing and illus¬ trating special articles for American publica¬ tions he studied, in 1871-72 at the Royal Acad¬ emy of Fine Arts, Antwerp, and in France and in Italy. In 1877-78 he was official correspondent for the New York Herald , the London Graphic and the London Daily News during the Russo-Turkish War, receiving Russian and Rumanian medals and decorations for bravery. In 1885 he was elected to the National Academy of Design, later to the American Academy of Arts and Letters, and was made an honorary mem¬ ber of the American Institute of Architects. He was awarded medals for pictures exhibited in 1889 at Paris, in 1893 at Chicago where he was in charge of the decorations and functions in connection with the World's Fair, and in 1901 at Buffalo. In 1898 he was correspondent for the London Times and Harper's Weekly in the Philippines. In 1905-06 he was actively en¬ gaged in organizing and securing endowment for the American Academy at Rome, of which he was elected the first secretary. Among his best-known paintings are (An Old-Time Melody) and (A Cozy Corner) in the Metro¬ politan Museum, also (At the Inn-* in the Union League Club, New York city; (Between Two Fires) in the National Gallery of British Art, London. Portraiture includes paintings of Nicholas Murray Butler, president of Columbia University, and of Mrs. Millet. His best-known works are his five mural paintings, notably the (Evolution of Navigation ' in the Baltimore (Md.) Custom-house, and those in the Essex County Courthouse, Newark, N. J. ; the Hud¬ son County Courthouse, Jersey City, N. J. ; the Cleveland, Ohio, post office ; the Supreme Court at Madison, Wis., and in the Minnesota

State Capitol. Besides his numerous contribu¬ tions to periodical literature his published books include (Capillary Crime and Other Stories' (1892); (The Danube' (1892); (The Expedi¬ tion to the Philippines' (1899). With Maj. Archibald W. Butt, another victim of the Titanic disaster, he is commemorated by a memorial fountain erected in 1913 in Wash¬ ington, D. C.

MILLET, Jean Frangois, zhon fran-swa me-la, French painter, the founder of the Barbizon school of painting: b. Gruchy, near Cher¬ bourg, 4 Oct. 1814; d. Barbizon, 20 Jan. 1875. The son of a Norman peasant, he owed much in his childhood to a woman of simple piety and strong individuality, and to her brother, and learned enough Latin to delight in the Vulgate and Virgil. He was educated in the Academy of Design at Cherbourg, and received a bursary from that city which

enabled him, in 1837, to proceed to Paris, where he entered the studio of Delaroche. This does not seem to have been a congenial home for his early art life, yet at first he struggled to comply with his surroundings and painted genres in the style of Watteau (q.v.) and Boucher (see Boucher, Franqois), as well as Biblical and mythological incidents, with landscape backgrounds, and sign¬ boards. It was in 1848 that he really found himself, and hit upon the line of art in which he could give utterance to the sincere feelings of his heart. This turning point in his career was marked by the appearance of his genre painting, taken from country life, (The Win¬ nower.' Henceforth his days were to be spent far from the glitter of Paris, the competition and jealousies of the studios; settling in Bar¬ bizon, on the edge of the forest of Fontaine¬ bleau, he devoted himself to the study and portrayal of peasant life. The hardship, toil and privation of the farm laborers *he sym¬ pathized with acutely, and some have even ac¬ cused him of being a social revolutionist, but he professed no views of this tendency, though his interpretation of the peasant's lot may be too gloomy and pessimistic, and his ironical bitter¬ ness of spirit such that it infected his canvas and clouded the beauty of external nature as depicted there. He himself was almost all his life battling with that poverty whose privations had early robbed him of his young wife. There is a profound pathos in his conception of the rural isolation and hardship of soil slavery, with all its stolid but unrequited patience, and this he has portrayed with a certain broad and impressionistic treatment which is both sincere and original. At first, his works were passed by or misunderstood, but gradually they were recognized at their true value, and he was hailed as the greatest painter of modern France. Since his death his pictures have been sold at enormous prices and are looked upon as the most precious pieces in private or public col¬ lections.

Millet's greatest picture, the (Angelus' (1859), was sold by him for 1,800 francs and later brought at auction 800,000 francs. Millet himself sold his picture (The Woman with the Lamp* for $2,800 in 1872. Shortly after it was sold for $4,600 and again for $7,000. In 1882 it fetched $18,000. The most important of his other works are (The Sower' (1850) ; (Man Spreading Manure' (1852) ; (The Reapers'

(1853) ; (The Gleaners) (1857, in the Louvre) ; ‘Death and the Woodcutter ; (La Becquee’ (Feeding Her Birds) — a mother feeding her three children from the same bowl. These all belong to his early period when he was tor¬ tured with sickness and harassed by debt. Af¬ ter the appearance of the ‘Angelus’- his repu¬ tation was established, but chronic poverty still pursued him. In 1860 he produced his won¬ derful picture, the (Sheep-Shearing ’ in which he seems to express as much pity for the dumb beast as for the patience of the human toiler who is bent over it. In 1862 appeared the ‘Potato Planters) ; in 1863 (The Wool Carder,’ and ‘The Man with the Hoe.’ In 1867 he was awarded at the Paris Exposition a medal of the first class and the ribbon of the Legion of Honor in 1868. He took refuge in Cher¬ bourg during the Franco-Prussian War, but returned to Barfbizon in 1871, where he con¬ tinued in broken health, though still working with untiring brush, until the end came.

Among the paintings of this artist now in the United States are (The Sower) : ‘The Water Carrier’ (Vanderbilt collection) ; ‘A Peasant Grafting a Tree> (Rockefeller collection) ; (The Turkey Tender) (C. A. Dana collection, New York) ; (The Buckwheat Threshers’ and the (Potato Planters’ (Quincy Shaw collection, Boston) ; harvesters Resting’ and home¬ stead at Greville’ (Boston Art Museum) ; ‘The Churners) (F. L. Ames collection) ; ‘Potato Diggers’ and ‘Breaking Flax’ (Walters collec¬ tion) ; ‘The Man with the Hoe’ (San Francisco Museum).

The drawings, etchings and pastels of Millet are eagerly sought after and always bring a high price at auction or private sale. The most familiar is his own portrait, a sketch often re¬ produced. His (Woman Feeding Chickens’ * ‘Flock of Sheep with Shepherd’ ; the (New¬ born Lamb’ ; ‘Laundresses on the Shore’ are best known. Among his pastels are ‘The Vine Dresser’ and (Butter Making.’ All his works show masterly drawing, and the landscapes which appear in many of them are put in with an ease and atmosphere worthy of the best periods of French art. His coloring may be sombre, and he disregards the power of the human countenance as giving expression to the sentiment of his conception. But the life of each picture is to be found in the inimitable pose of the figures, and the suggestiveness of the background. The hands, shoulders and feet of these figures, as they move in harmony with forms cumbrous, almost grotesque, are made to suggest the dull torture in which stolid and half-bestial creatures are held under the yoke of toil and poverty. The light reflected upon these figures from religious sentiment or natu¬ ral affection only serves to intensify the

pro¬ found melancholy by which the story of their lives is clouded.

Bibliography. — • Ady, J. C, ‘Jean Franqois Millet: His Life and Letters’ (New York 1902); Marcel, H., ‘Jean Franqois Millet: biographie critique’ (Paris 1903) ; Sensier, ‘La vie et l’ceuvres de Jean Franqois Millet’ (Paris 1881) ; and its abridged English translation (Boston 1896) : Thomson, D. C., ‘The Barbizon School’ (London 1890) ; Turner. Percy M., < Millet’ (in the (Masterpieces of Color’ series, London 1909) ; Yriarte, C. E., (Jean Franqois Millet’ (Paris 1885).

MILLET, or MILET, Pierre, French-Canadian pioneer missionary: b. Bourges, France, 1635; d. Quebec, Canada, 31 Dec. 1708. He entered the Jesuit order and in 1667 went to Canada. In 1668 he was sent as missionary to the Iroquois in New York and in 1671 he was placed at the head of the Oneida mission. He succeeded in converting the principal chief and slowly gathered a congregation of consider¬ able proportions. In 1684 he left his work among the Oneidas to accompany De La Barre in his campaign against the Senecas, and he served as interpreter between the Iroquois and the French at Frontenac in 1686. He was sta¬ tioned at Fort Niagara in 1687 and afterward at Frontenac, in the hope that his experience among the Iroquois might enable him to pro¬ mote friendly relations between them and the French. During the siege of Frontenac in 1689 he was captured by the Onondagas, who after maltreating him gave him over to the Oneidas. There he was sentenced to the stake but was finally rescued by an Indian convert who suc¬ ceeded in having him adopted into the tribe. In 1694 he was permitted to return to Quebec, and afterward was petitioned by the Oneidas to return to them. From 1697-1703 he was missionary at Sault-Saint Louis.

MILLET, a popular name for many grasses grown in the Old World as cereals, but in the New almost wholly as forage. The principal ones are true or bruomcorn millet (Panic urn milaceum) ; foxtail millet (Setaria italica) ; barnyard or Japanese (Panicum crus-galli) ; pearl or cat-tail millet (Pennisetum typhoid-eum) and the African, Chinese, Indian, black and erroneously called (<pearl millet” (Sorghum vulgare). Sometimes Elusine coracana is called African millet. In general they constitute one of the most important groups of food-plants, since they are the staple diet of about one-third of the world’s population, the annual planta¬ tion in India alone being estimated at approx¬ imately 35,000,000 acres. The first three men¬ tioned are the most important groups grown in the United States. The plants all thrive well upon rather light, well-drained soils, which should be

prepared as for other cereal crops. In order to make a millet harvest succeed the harvest of other cereals, the seed is sown late in the spring. Broadcasting and drilling are both practised, the latter more extensively. Just after blossoming, the crop may be cut and cured for hay; for seed, just before the seed becomes fully mature to prevent loss from shattering. The hay makes valuable fodder, but some stockmen attribute various animal ail¬ ments to its excessive or exclusive use; others experience no such difficulties. The seed may be ground for stock food, but it is little used. For poultry, especially for young chicks, it is widely employed.

MILLIGAN, George, Scottish educator and clergyman : b. about 1860. He was edu¬ cated at the universities of Aberdeen, Edin¬ burgh, Gottingen and Bonn, and was afterward minister of Saint Matthews, Morningside, and of Caputh. Since 1910 he has been regius pro¬ fessor of divinity and religious criticism at Glasgow University, and he has served as clerk of the senate since 1911. Author of (History of the English Bible' (1895) ; (The Theology of the Epistle to the Hebrews' (1899)* 'The

New Testament Documents: Their Origin and Early History* (1912) ; coauthor, (The Vocab¬ ulary of the Greek Testament (Parts I and II, 1914-15), *etc.*

MILLIGAN, Robert Wiley, American rear-admiral: b. Philadelphia, 8 April 1843; d. 14 Oct. 1909. He entered the navy with rank as third assistant engineer and was attached to the United States steamship Mackinaw in the North Atlantic Blockading Squadron dur¬ ing the Civil War. He saw service at both battles of Fort Fisher, and was present at the fall of Wilmington, N. C., and of Petersburg and Richmond, Va. He afterward served in the North and South Atlantic and Pacific squadrons, and was on duty as instructor at the United States Naval Academy. He was pro¬ moted chief engineer in 1892, in which capacity he served on the United States battleship Oregon on her famous run from the Pacific to the Atlantic coast in the Spanish-American War, and also served at the battle of Santiago. He was fleet

engineer of the North Atlantic Fleet, on the flagship New York , for one year; was promoted commander in 1899 and was chief engineer of the Norfolk navy yard in 1899-1905. He received rank as captain in 1902 and was retired with rank as rear-admiral in 1905.

MILLIGAN, William, Scottish Presby¬ terian clergyman and commentator : b. Edin¬ burgh, 15 March 1821; d. Edinburgh, 11 Dec. 1893. He was educated at the University of Saint Andrew's, entered the ministry of the Established Church of Scotland, held pastorates at Cameron and Kilconquhar and was professor of Biblical criticism in the University of Aber¬ deen from 1860. He was moderator of the General Assembly in 1882, and was appointed principal clerk to the assembly in 1886. He was one of the revisers of the New Testament and the author of (The Higher Education of Women) (1878) ; (The Resurrection of Our Lord) (1881) ; Commentary on the Revelation) (1883) ; (The Resurrection of the DeacP (1890), *etc.* He visited the United States in 1872 as a delegate to the Presbyterian General Assembly from the General Assembly of the Scottish Church.

MILLIGAN, Ex Parte, a decision handed down by the Supreme Court of the United States in 1866 holding a military commission to be without power in a State not invaded nor in rebellion, and where the usual civil courts, both Federal and State, were open; rendered by a barely sufficient majority, with Chief Justice Chase and Justices Wayne, Swayne and Miller dissenting, and Chief Justice Chase pronouncing a forcible protest. The case was that of one Lambdin. P. Milligan, a United States citizen residing in Indiana, arrested by military author¬ ities in 1864 on a charge of conspiracy, dis¬ loyal practices, inciting insurrection and aiding and comforting the enemy. He was found guilty by a military commission and sentenced to death. His counsel filed a writ of habeas corpus in the United States Circuit Court and the case eventually was carried to the Supreme Court, where the military commission was held to be without jurisdiction in his case. Chief Justice Chase asserted that the power of Con¬ gress ((to authorize trials for crimes against

the security and safety of the national forces,

#■

may be derived from its constitutional power to raise and support armies and to declare war® ; and that while the civil courts <(might be open and undisturbed in their functions … yet

wholly incompetent to avert threatened danger, or to punish, with

adequate promptitude and certainity, the guilty conspirators.® Consult (Wallace's Reports of the Supreme Court of the United States > (Vol. IV, 1866).

MILLIGAN COLLEGE, in Milligan, Tenn., a coeducational institution founded in 1882 by Josephus Hepwood, under the auspices of the Disciples of Christ. It has a prepara¬ tory department and a college department ; the courses lead to the degrees of A.B., B.S. and Ph.B. In 1915 there were connected with the school 14 professors and over 170 students. The. library contained about 3,000 volumes. The grounds and buildings were valued at $75,000, and the income was about $14., 000.

MILLIGRAM, the thousandth part of a gram. See Weights and Measures.

MILLIKEN UNIVERSITY. See James Milliken University.

MILLIKEN'S BEND, Engagement at.

Milliken's Bend, La., on the west bank of the Mississippi, about 15 miles above Vicksburg, was the base of some of the military operations against that place and the lower Mississippi. Early in June 1863, when Grant was besieging Vicksburg from the east, Gen. E. Kirby Smith, commanding the Confederate Department of the Trans-Mississippi, sent Gen. J. G. Walker's division of 4,000 men to seize, the place and other points on the river, and open communica¬ tion with General Pemberton, in Vicksburg, with the object of furnishing him supplies, or failing in that, to cover his escape across the river. Walker moved to Alexandria, La., and reported to Gen. R. Taylor, commanding in West Louisiana, and was sent in transports up the Washita and Tensas rivers, until abreast of Vicksburg, when he landed and marched across to Richmond. At this time Milliken's Bend was held by Gen. E. S. Dennis, with about 1,400 men, mostly colored troops. A recon¬ noitring party sent out by Dennis was driven back by the Confederates. Walker arrived at Richmond at 10 a.m. on the 6th, and was ordered by Taylor to send one brigade to Young's Point and one to Milliken's Bend, dis¬ tant respectively 20 and 10 miles, and to hold a third brigade in reserve six miles in advance of Richmond. Harris' brigade moved at night on Young's Point, was delayed and accom¬ plished nothing. Gen. H. E. McCulloch, with a Texas brigade of 1,600 men and 200 cavalry, marched from Richmond at 6 p.m. on the 6th and at 3 a.m. on the 7th, when within one and a half miles of Milliken's Bend, the Union skirmishers were encountered and the Confed¬ erate advance driven back in some disorder ; but McCulloch

rallied his men and pushed on, driving the Union troops back slowly to their main line, carrying the Union breastworks, then driving the Union troops to the bank of the river, where two gunboats came to their assist¬ ance and, pouring shells into the ranks of the Confederates, obliged them to withdraw and return to Richmond. The Union loss was 127 killed, 287 wounded and 266 missing; the Con¬ federates lost 44 killed. 131 wounded and 10

missing. Consult (Official Records) (Vol. XXIV).

MILLIKIN, James, American banker and philanthropist: b. Pennsylvania, 2 Aug. 1830; d. Orlando, Fla., 2 March 1909. In 1860 he en¬ gaged in banking and later founded the firm of Milliken and Company at Decatur, Ill., now the Milliken National Bank. He is president of the Union Works. He founded the Anna B. Millikin Home, an institution for the care of aged women and children, built and supported mostly by him, and named by the board of directors after his wife, Anna B. Millikin. He also founded the James Millikin University, dedi¬ cated in 1904 by President Roosevelt.

MILLIN, Aubin Louis, French antiquary and naturalist: b. Paris, 19 July 1759; d. there, 14 Aug. 1818. He was destined for the priest¬ hood but preferring to devote himself to litera¬ ture he entered the Royal Library. His sym¬ pathies in the Revolution caused his imprison¬ ment at Saint Lazare. He was appointed keeper of medals and antiquities at the Royal Library in 1794; and he also assumed the edi¬ torship of the Magasin Encyclopediqne in 1795, which publication became the Annales Encyclo-pediques in 1817. In the issues of these periodi¬ cals appeared many highly-learned articles by Millin himself. He was a member of the F'rench Institute and a chevalier of the Legion of Honor. He translated (Melanges de litera¬ ture etrangere) (6 vols., 1785-86) ; and was au¬ thor of (Antiquites nationales) (5 vols., 1790-98) ; (Discours sur l'origine et les progres de Thistoire naturelle en France) (1790) ; de¬ scription statues du jardin des Tuileries> (1798) ; (Monuments antiques inedits ou nou-vellement expliques) (2 vols., 1802-04) ; (Nouveau dictionnaire des

beaux arts} (3 vols., 1806) ; (Histoire metallique de la Revolution franqaise) (1806); (Voyages dans les depart¬ ments du midi de la France) (5 vols., 1807-11) ; (Peintures des vases antiques) (2 vols., 1808-10) ; (Galerie mythologique) (2 vols.,. 1811) \ (Voyage en Savoie, en Piemont, a Nice et a Geneve) (2 vols., 1816) ; (Voyage dans le Milanais) (1817), *etc.*

MILLINOCKET, Me, village in Penob¬ scot County, 83 miles by rail north of Bangor, on the Bangor and Aroostock Railroad and in the Maine lake region. There are paper mills and a limited lumber trade. Pop. 3,368.

MILLIPEDE, or MILLEPED ("thou¬ sand-legs))), common name for a myriapod 'of the suborder Chilognatha or Diploda, so called from its many feet. The body is hard and cylindrically shaped, with many segments, most of which have two pairs of feet. They are found in water or damp places and are harm¬ less, differing in this respect from some of the centipedes. See Centipede; Myriapoda.

MILLIS, John, American army engineer: b. Wheatland, Mich, 31 Dec. 1858. He was graduated at the United States Military Acad¬ emy in 1881. He was in charge of the improve¬ ments in the New Orleans Harbor and the Mis¬ sissippi levees in 1890-94; and was chief engi¬ neer of the United States Lighthouse Board, Washington, D. C, in 1894-98. He was on duty with the Engineers' Battalion at Willets Point, N. Y, and in Cuba in 1898-1900, reaching rank as major in 1900. He had charge of the con¬

struction of harbor fortifications on Puget Sound; of river and harbor improvements in Washington, Idaho and Montana ; of improve¬ ments in Mount Ranier National Park and of surveys and harbor improvements in Alaska in 1900-05 ; and was in charge of all fortifications construction in the Philippine Islands in 1905— 07. While on leave of absence he traveled through China, Burmah, India, Egypt and Eu¬ rope on his return from the Philippines. He was in charge of river and harbor improve¬ ment work on Lake Erie and in Ohio. Indi¬ ana, Massachusetts and Rhode Island in 1908-12; and in 1912-16 was on special duty in con¬ nection with the lighthouses of the northeast shore. He was promoted colonel in 1910. He was division engineer for the Southeastern Coast Defenses in 1916, and in 1917 was ap¬ pointed chief engineer of the Southeastern Mili¬ tary Department, Savannah, Ga. Author of (Safety of Navigation on Great American Lakes) (1912).

MILLOM, England, market-town in Cum¬ berland, on the Duddon Estuary, nine miles northwest of Barrow and 60 miles north of Liverpool, on the Furness Railway. There is an early Norman church and the dismantled castle of Millom, built in the 11th century and fortified in the 14th century. The park of the castle was turned into farm lands early in the 19th century. The largest known deposits of red hematite in the country are located here, and a seawall and embankment have been built for the mine's protection as part of it lies un¬ der the Duddon Estuary. There are smelters in the neighborhood and the town owns its water and gasworks and has a technical school. Pop. 8,612.

MILLS, Albert Leopold, American army officer: b. New York City, 7 May 1854; d. 8 Sept. 1916. He was graduated from West Foint in 1879 and was commissioned in the cav¬ alry. He served in several campaigns against the Indians and in 1894-98 was instructor in the United States Military School at Fort Leavenworth, Kan. Upon the opening of the war with Spain he was ordered to the front, where he rendered distinguished service at the bat¬ tles of Las Guasimas and Santiago and was brevetted major and lieutenant-colonel. From 1898-1906 he was superintendent at West Point, with the rank of colonel and regimental cap¬ tain. On 28 July 1902 he was awarded the Congressional Medal of Honor for distin¬ guished gallantry in action near Santiago de Cuba, 1 July 1898, for encouraging those about him, though shot through the head and practi¬ cally sightless. He was commandant of the Department of Visayas (1907-08) ; of the De¬ partment of Luzon (1908-09); of the Depart¬ ment of the Gulf, Atlanta, Ga. (1909-12) ; presi¬ dent of the Army War College after 1912.

MILLS, Benjamin Fay, American clergy¬ man: b. Rahway, N. J., 4 June 1857; d. 1 May 1916. He was graduated from Lake Forest University, Illinois, in 1879; was ordained to the Congregational ministry in 1878; held pastor¬ ates at Rutland, Vt., Albany, N. Y., and other places; and was a prominent evangelist from 1886 to 1897. In 1897 he withdrew from the Congregational denomination, owing to his lib¬ eral views, and in 1897-99 conducted independ-

ent religious meetings in Boston. In October 1899 to October 1903 he was pastor of the First Unitarian Church of Oakland, Cal. From No¬ vember 1903 to June 1915 he delivered courses of lectures on philosophy, psychology and soci¬ ology in leading cities throughout the United States. In June 1915 he returned to the evan¬ gelical ministry, was received as a member of the Presbytery of Chicago and resumed his former evangelistic work. Among his books are (Power from on High* (1899) ; 'Victory Thru Surrender* (1892) ; (God's World) (1893); (The Divine Adventure) (1904).

MILLS, Clark, American sculptor : b. On¬ ondaga County, N. Y., 1 Dec. 1815; d. Wash¬ ington, D. C., 12 Jan. 1883. He went South, learned the millwright's trade, worked at New Orleans and later at Charleston, where he was employed by a plasterer, and discovered a method for taking a cast from the living face which enabled him to make plaster busts cheaply. In 1845 he completed a bust in mar¬ ble of Calhoun, which was placed in the Charles¬ ton city hall in 1846. In 1848 he was appointed by the government to execute an equestrian statue of Andrew Jackson. This was the first large statue cast in metal in the United States. Mills was obliged to learn casting, since there was then no foundry in the country adequate to the work, and when the statue was at last completed it was at a loss to himself of $7,000. This was later repaid to him by Congress in an appropriation of $20,000 for a replica at New Orleans. His colossal equestrian statue of Washington, depicting the general at the bat¬ tle of Princeton, was unveiled at Washington on 22 Feb. 1860. He also cast from designs by Thomas Crawford (q.v.) the statue of <(Free-donU which was placed surmounting the dome of the capitol in 1863, and took a life-mask of President Lincoln shortly before the latter's death.

MILLS, Darius Ogden, American banker and capitalist: b. North Salem, Westchester County, N. Y, 5 Sept. 1825 ; d. 3 Jan. 1910. He was educated in the North Salem Academy and the Mount Pleasant Academy, Sing Sing, N. Y. He became cashier of the Merchants' Bank of Erie County, Buffalo, N. Y. In 1849 he went to California where he founded the banking-house of D. O. Mills and Company; from 1864-67 was president of the Bank of Cal¬ ifornia, San Francisco, and after the failure of that institution he again took charge of it until 1878. After 1880 he was largely interested in New York real estate; also prominent in phil¬ anthropic enterprises, the Mills hotels being the most noted examples of his generosity.

MILLS, David, Canadian jurist: b. Oxford, Ontario, 18 March 1831 ; d.

8 May 1903. He was educated at the University of Michigan and entered early upon a public life. He served in the Dominion House of Commons in the Liberal interest 1867-96 and was editor of the Canada Daily Advertiser, London, On¬ tario, 1882-87. In 1876-78 he was Minister of the Interior, was elevated to the Senate in 1896, was Minister of Justice 1897-1902, and in 1902 was appointed a puisne judge of the Supreme Court of Canada. He was an au¬ thority on constitutional and international law and was the author of a (Report on the Boundaries of the Province of Ontario)

(1873); (Canadian View of the Alaskan Boundary Dispute) (1899); and (The English in Africa) (1900).

MILLS, Hiram Francis, American engi¬ neer: b. Bangor, Me., 1 Nov. 1836. After grad¬ uation from the Rensselaer Polytechnic Insti¬ tute in 1856 he was engaged in engineering work for the Bergen, N. J., tunnel of the Erie Railroad (1858); for the Brooklyn water¬ works (1859) ; and for those at Cohoes, N. Y., and Lowell, Mass. He was also engaged in engineering work on the Hoosac Tunnel, Fitchburg Railroad, Mass. Mr. Mills' chief distinction is in connection with the con¬ trol and distribution of water. He was in¬ strumental in planning the control of water power on the Merrimac River at Lawrence and Lowell ; was chief engineer of the Essex Company at Lawrence in 1894; consulting en¬ gineer of the Boston Metropolitan Water and Sewerage Board; and from 1896 to 1914 engi¬ neer member of the Massachusetts Board of Health and chairman of its committee on water supply and sewerage. He also directed the Lawrence Experiment Station investigation of water and sewerage purification. In 1878-93 he designed and built the slow-sand filters of the waterworks of Lawrence, Mass., which be¬ gan a new era in the purification of water. He was consulting engineer for important works in many cities of the United States and Mexico, and published numerous papers and essays on engineering subjects. Harvard gave him the degree of M.A. in 1889.

MILLS, James, Canadian agriculturist and educator: b. near Bond Head, Ontario, 1840. He was graduated at Victoria University in 1868. After teaching for many years he be¬ came president of the Ontario Agricultural College at Guelph in 1879. As president and organizer of farmers' institutes for 25 years, he greatly promoted agriculture in Ontario. In 1899 he was a member of the San Jose Scale Commission. In 1904 he was appointed a mem¬ ber of the Board of Railway Commissioners for Canada. From 1890 to 1910 he served on the board

of regents for the Victoria Uni¬ versity and he also became senator of the To¬ ronto University. With Thomas Shaw he pub¬ lished (First Principles of Agriculture) (1890).

MILLS, Lawrence Heyworth, American philologist: b. New York, 1837. He was gradu¬ ated at New York University in 1857, and at Fairfax Episcopal Theological Seminary, Vir¬ ginia; and entered the Episcopal ministry in 1861. He was stationed in Brooklyn for six years; retired from the ministry in 1867; studied Gnosticism and the Avesta in Europe 1872-87 ; and in the last-named vear, having established his reputation as an authority on the Zend-Avesta, went on Max Muller's in¬ vitation to Oxford, where he became professor of Zend philology in 1898. He contributed largely to Oriental journals various papers on the Gathas and early Zoroasterianism ; trans¬ lated (Zend-Avesta* (Part III in (Sacred Books of the East,* 1887) ; and wrote (Study of the Five Zarathushtrian Gathas* (1894) ; (Gathas of Zarathushtra in Metre and Rhythm* (1900) ; dictionary of the Gathic Language of the Zend-Avesta) (1902-14) ; and (Zoroaster, Philo, the Achaemenids and Israel 5 (1903-06) ; (Avesta Eschatology Compared with the Books

of Daniel and Revelations) (1908); (Yasna I, > with Avesta, Sanskrit, Pahlavi and Persian texts (1910) ; (Our Own Religion in Ancient Persia* (1913) ; (Lore of Avesta in Catechetical Dialogues) (1914). (The Creed of Zarathushtra* (1916) ; (The Vital Necessity of the Per¬ sian Theology to all Biblical Study* (1916).

MILLS, Robert, American architect and engineer: b. Charleston, S. C., 1781; d. Wash¬ ington, D. C., March 1855. He was a pupil of the architect Benjamin Latrobe (q.v.), and be¬ side designing important structures in Phila¬ delphia, including the single-arch bridge across the Schuylkill, erected custom-houses and marine hospitals in various parts of the United States and the Washington Monument in Baltimore. In 1837 he was appointed architect of the gen¬ eral government at Washington, where he built the Treasury, General Post Office and Patent Office and designed the Washington Monument. He published Statistics of South Carolina) (1826) ; (American Pharos, or

Lighthouse

Guide* (1832), *etc.*

MILLS, Roger Quarles, American lawyer and politician : b. Todd County, Ky., 30 March 1832; d. 1911. He moved to Texas in 1849 and studied law ; was admitted to the bar at 20, the Texan legislature removing the disability of minority; and began practice at Corsicana. In 1859 he was elected to the Texas legislature. On the outbreak of the Civil War he joined the Confederate service and fought throughout the war. In 1872 he was elected to Congress as a Demo¬ crat, serving till 1892; he was chairman of the House Committee on Ways and Means, and drafted the Mills Tariff Bill, which, however, failed to become a law. In 1892 he was elected to the Senate to fill an unexpired term and in 1893 was reelected for the full term of six years.

MILLS, Samuel John, American Congregationalist clergyman: b. Torringford, Conn., 21 April 1783; d. at sea, 16 June 1818. He was graduated from Williams College in 1809, where he had as an undergraduate organized the first society of foreign missionaries in America, and he afterward studied at Yale and at Andover Seminary. In 1810 he founded the American Board of Commissioners for Foreign Missions. He was licensed to preach in 1812 and at once went on a missionary tour through the Southern States and made a second tour in 1814, succeed¬ ing in organizing various religious societies. He was ordained to the ministry in 1815 and in 1817 was sent to Africa to select a site for a colony. He died on the way home.

MILLS, Thomas Wesley, Canadian physi¬ ologist and educator : b. Brockville, Ontario, 1847; d. 1915. He was educated at Toronto University and studied medicine at McGill Uni¬ versity, Montreal, afterward completing his course in Germany and England. In 1910 he became professor emeritus of physiology at McGill after having taught there from 1882. He was one of the founders of the Society for the Study of Comparative Physiology in 1885. His publications include (Text Book of Animal Physiology* (1889) ; (Text Book of Compara¬ tive Physiology > (1890) ; (How to Keep a Dog in the City> (1891) ; (The Dog in Health and Disease) (1892); (Nature and Development of Animal Intelligence* (1898); and (Voice Pro—

duction in Singing and Speaking on Scientific Principles* (1906).

MILLS BILL. See Tariff.

MILLS COLLEGE, at Mills College (P.O.) in Alameda County, Cal., was founded in 1871 as Mills Seminary for Young Women. It was chartered as a college in 1885 and the preparatory department was discontinued in 1911. The A.B. and B.S. degrees are granted. Beside the so-called standard departments, four-year courses in home economics and physical training are offered leading to the B.S. degree and a teacher's certificate. In 1915 there were 30 instructors and 153 students. The property was valued at over $400,000.

MILLSAPS COLLEGE, in Jackson, Miss., founded in 1892 by the Methodist Episcopal Church, South. The courses of study lead to the degrees of A.B., B.S. and Ph.B. In 1916 there were connected with the school 22 pro¬ fessors and instructors and 250 students.

„ MILLSPAUGH, milz'pa, Charles Freder¬ ick, American botanist: b. Ithaca, N. Y., 20 June 1854. He studied two years at Cornell; was graduated from the New York Homoe¬ opathic Medical College in 1881 ; practised medicine for 10 years and became botanist of West Virginia University in 1891 ; professor of medical botany in the Chicago Homoeopathic Medical College in 1897 ; and has been curator of the department of botany in the Field Mu¬ seum of Natural History since 1894. He trav¬ eled in Mexico, in Brazil, in the West Indies, Japan, China, Straits Settlements, Java, Burma, Philippines, India, Ceylon and Europe. He is a member of the Explorers' Club and various scientific societies, as well as of the Mexican and Brazilian Faculties of Medicine. His pub¬ lished works are (American Medical Plants* (1887); (Flora of Saint Croix, D. W. I.* (1902) ; (Plantae Yucatanae* (1903) ; Contribu¬ tions to North American Euphorbiaceae* (1898) ; (Plantae Insulae Ananasensis* (1900) ; (Plantae Utowanae* (1900) ; Contributions to the Flora of Yucatan I, II, III* (1895-98) ; (Praenunciae Bahamenses* (1906) ; (Flora of the Sand Keys of Florida* (1907) ; Cne Thousand American Fungi* by Macllvaine, revised and supple¬ mented edition (1912).

MILLSPAUGH, Frank Rosebrook, Amer¬ ican Protestant Episcopal bishop: b. Nichols, N. Y. ; d. November 1916. He was graduated from the Shattuck School, Fairbault, Minn., in 1870, and from the Seabury Divinity School there in 1873. He entered the Episcopal minis¬ try in the year last named, served as missionary in Minnesota 1873-76, was

subsequently dean of the Omaha (Neb.) Cathedral, rector of Saint Paul's, Minneapolis, and dean of Topeka (Kan.) Cathedral. In 1895 he was consecrated bishop of Kansas.

MILLSTONE, one of the two cylindrical stones used to grind grain into flour (q.v.). The best foreign stones are the German basaltic lava quarried near Cologne, and the French burstone; both are imported into the United States in small pieces from which the cylindrical stone is built up. The native stone is com¬ monly used in the single piece ; a sandstone found in Ulster County, N. Y., and in Lan¬ caster County, Pa., and a burstone much like the French, are the best materials, being hard

and tough and having a cellular structure, which in the burstone is due to the presence of fossil casts. The lower stone is usually fixed; the upper stone is the ˆrunner.® Each stone is deeply scored with furrows, which lead the milled grist away from the centre; the inter¬ vals are styled ((land® ; and the hole in the cen¬ ter is called the (<eye.® A depression about the eye is the < <bosom.)) The scheme for scoring the stone varies greatly. The roller process (de¬ scribed under Flour) has relegated the mill¬ stone to the minor grist mills. See Mineral Production of the United States.

MILLSTONE GRIT, a hard siliceous conglomerate with quartz pebbles found at the base of the Pennsylvania coal measures series of the carboniferous system. The formation occurs as far north as New York and as far south as Alabama, practically throughout the Appalachian Range. In Pennsylvania the beds are coarse and over 1,200 feet thick. The rock in Pennsylvania is light in color and is called the Pottsville Conglomerate. It is interstrat-ified with some sandstone, thin beds of car¬ bonaceous shells and thin beds of coal. In the southern portion of the Appalachian Mountains the coal beds are richer and more plentiful. See Carboniferous.

MILLVALE, Pa., borough, in Allegheny County, on the Allegheny River, opposite Pitts¬ burgh. It is an industrial suburb of Pittsburgh ;

its chief manufactures are lumber, iron and steel products, saws and dressed stone. Pop.

8,600.

MILLVILLE, mil'vil, N. J., city in Cum¬ berland County, on the Maurice River, a navi¬ gable stream 20 miles in length, which empties into the Delaware Bay, and on the West Jersey and Sea Shore Railroad, a branch of the Penn¬ sylvania Railroad, situated just 40 miles south of Philadelphia and 40 miles north of Cape May, N. J. In 1801 Millville was incorporated as a town and in 1866 received its city charter. It is entirely a manufacturing city, and the largest industrial centre in South Jersey. Its chief industrial establishments are foundries, glass factories, dye works, bleacheries, cotton mills and machine shops. Sand mining is also a very important industry in this community. It has a large up-to-date high school, eight grammar schools and one parochial school, 10 large and beautiful church buildings, consisting of all denominations, a large park, situated on the shores of Union Lake, a body of fresh water three miles long and almost a mile wide, and numberless fine private residences, paved streets and sidewalks. The city proper covers a radius of five square miles, and is one of the best electric lighted cities in the East, having installed the very latest and most up-to-date type of street lights. The best State roads in the State lead through the city, which can be approached from any direction and there is also a new and high-grade Municipal Hospital, erected in 1913, at a cost of $35,000. The gov¬ ernment is administered under the new city charter of 1913, which provides commission form of government by the election of five commissioners who hold office for a period of four years, and who have charge of various de¬ partments of the city's business. The president of this commission is one of the five commis¬

sioners, who is elected as such, and termed mayor by his colleagues. Pop. (1920) 14,691.

MILMAN, Henry Hart, English historian and poet: b. London, 10 Feb. 1791; d. near Ascot, 24 Sept. 1868. He was graduated from Brasenose College, Oxford, in 1814, became a Fellow of the college in that year, took orders in 1816, was appointed incumbent of Saint Mary's, Reading, in 1818, and was professor of poetry at Oxford 1821-31. In 1835 he became rector of Saint Margaret's, Westminster, and in 1849

dean of Saint Paul's. His best-known works are his <Fazio,) a poetical drama (1815), first presented at London in 1818 with great success; (History of the Jews* (1830), in which he showed himself a pioneer in the appli¬ cation of criticism to the records of the chosen people; and his (Latin Christianity > (1855), an excellent general survey written with admirable candor and breadth. Among his other publications are (The Fall of Jerusalem* (1820), a dramatic poem; (History of Chris¬ tianity under the Empire* (1840). He is the author of such well-known hymns as (When Our Heads are Bowed with Woe) and (Brother, Thou art gone before us.* Consult Milman, A., (Henry Hart Milman) (1900).

MILMORE, Martin, American sculptor: b. Sligo, Ireland, 14 Sept. 1844; d. Roxbury Highlands, Boston, Mass., 21 July 1883. He studied at Boston with Thomas Ball and estab¬ lished there his own studio. In 1863 he exe¬ cuted for the Sanitary Fair the statuette (De¬ votion, J later studied for a time in Rome, where he made busts of Pius IX, Charles Sumner, Wendell Phillips, Emerson and others of emi¬ nence and designed the soldiers and sailors' monument on Boston Common, for which he had been commissioned by the city. This monu¬ ment, generally regarded as his greatest work, was dedicated in 1877. He executed also the soldiers' monument at Charlestown, Mass., a mediocre composition (America) at Fitchburg, Mass., and the (Weeping Lion) at Colby Uni¬ versity, Waterville, Me. His bust of Sumner is in the Metropolitan Museum, New York; that of Ticknor in the Boston Public Library; and a bronze copy of that of Phillips is also in the Boston Library, to which it was presented by the Phillips Memorial Association in 1900. One of his best-known works is the huge granite Sphinx in Mount Auburn Cemetery, Cambridge, Mass. .

MILNE, John, English geologist and seis¬ mologist: b. Liverpool, 1850; d. Isle of Wight, 30 July 1913. He was educated at King's Col¬ lege and the Royal School of Mines, London, and practised as mining engineer in Cornwall, Lancashire, central Europe and Newfoundland, besides accompanying an expedition to Arabia as geologist. In 1875 he was appointed by the Japanese government to the chair of geology and mining in the Imperial College of Engi¬ neering at Tokio, where he married a Japanese lady and remained nearly 20 years. In 1880 he founded the Seismological Society of Japan, from which hundreds of observing stations sprang up all over the country — a land sub¬ ject to perhaps a thousand earthquake shocks a year. With the assistance of English col¬ leagues Milne was the first to devise instru¬ ments for recording these shocks, and his in¬ vestigations led to the precision now obtaining

in the science of seismology. Shortly before leaving Japan his residence was destroyed by fire ; all his books, instruments and 2000 vol¬ umes of the transactions of the Seismological Society of Japan* were lost,. Returning to England in 1895 Milne and his wife settled in the Isle of Wight, where he erected the world-renowned seismological observatory and equipped it with instruments that record shocks in any part of the globe. This annual analyses of the records thus obtained approximately de¬ termined the positions of 57 earthquakes per year. The Milne seismograph is the standard instrument in use to-day. He compiled a Cata¬ logue of Destructive Earthquakes, ad. 7 to a.d. 1899) (1912) for the British Association, show¬ ing 4,151 entries. His two volumes on (Seis¬ mology * and <Earthquakes) are standard text¬ books. Milne was the recipient of numerous decorations and honors from different coun¬ tries.

MILNE-EDWARDS, Henri, French nat¬ uralist: b. Bruges, Belgium, 23 Oct. 1800; d. Paris, 28 July 1885. His parents were English. He studied medicine in Paris, taking his degree in 1823. Soon he turned his attention to zool¬ ogy. After teaching for several years in the College de Henri IV, he was elected in 1838 a member of the Academie de Sciences in Cuvier's place. His (Recherches anatomiques sur les crustaces,* published in 1828, attracted attention, and from that time until his death he published books and essays on his specialty; taught natural history, and became a noted edu¬ cator, as well as an original investigator. In 1837 he became editor of the zoological depart¬ ment of the (Annales des sciences naturelles,* which he held for 50 years and to which he was a contributor. In 1841 he became professor of entomology in the Jardin des Plantes (Mu¬ seum of Natural History), Paris, where 21 years later he succeeded Geoffrey St. Hilaire in the chair of zoology. In 1864 he became di¬ rector of that famous institution. The Royal Society of England honored him in 1850 with the Copley medal for his zoological work. Milne-Edwards was the first to describe, the im¬ portant biological principle of the physiological division of labor. Although a contemporary of Darwin and Huxley, Milne-Edwards was little influenced by those men of science and held to the doctrine of special creations instead of the evolution theory. In the work of his latest

years he was assisted by his son, Alphonse (1835-1900), who was a specialist in the study of fossil birds and deep-sea exploration. Milne-Edwards published Elements de zool-ogie ou legons sur l'anatomie, la physiologie, la classification, etc., des animaux* (1834—35) , which had an enormous circulation, and was much used as a basis for manuals of zoology; a revision of Lamarck's (L'histoire naturelle des animaux sans vertebres* (1836ˆ45),. and with Dehayes Regons sur la physiologie et l'anatomie comparees de l'homme et des animaux) (1855-84); (Histoire naturelle des crustaces* (1834—40) and (Histoire naturelle des .corallinaires) (1857-60) were noteworthy. His (Lectures on the Physiology and Compara¬ tive Anatomy of Man and the Animals* (14 vols., 1857—81) are valued for their great fund of information and ample references. He also published (Natural History of the French Coasts) (1832-45) and (Natural History of the

Mammalia) (1871). His elder brother, William Frederick (Jamaica 1776-Versailles 1842) was almost as celebrated. He founded the Ethno¬ logical Society in Paris and is considered as the father of ethnology in France.

MILNER, Sir Alfred, Viscount Milner, English administrator: b. Bonn, Germany, 23 March 1854. He studied in Germany, where his father had been instructor in English at the University of Tubingen, then at King's Col¬ lege, London, and at Balliol, Oxford; was Fel¬ low of New College, Oxford; was called to the bar in 1881, and after several years in journal¬ ism, part of the time on the Pall Mall Gazette, became private secretary to Mr. Goschen, Chancellor of the Exchequer, in 1887. From 1889 to 1892 he was Under-Secretary of State for Finance in Egypt; in 1892 became chairman of the Board of Inland Revenue, and in 1897 was appointed to the double post of high com¬ missioner for South Africa and governor of Cape Colony. In 1900 he became administrator of the Transvaal and Orange River colonies, of which he was made governor in 1901. He took a prominent part in all negotiations with the Boers before, during and after the war, and his conduct throughout was the subject of much controversy in Great Britain. After the passing of a resolution in the House of Commons di¬ rected. against his policy on Chinese labor he resigned in December 1905. He has taken a prominent part in advocating the causes of im¬ perial federation, tariff reform and compulsory national service. In December 1916 he became a member of the Inner War Cabinet in Lloyd George's National Ministry. He is a man of high culture and is the author of (England in Egypt* (1892), and (The Nation and the Em¬ pire: Speeches and Addresses) (1913). He was created G. C. B.

baron in 1901 and viscount in 1902. Consult Worsfold, (Lord Milner's Work in South Africa) (1906) and Reconstruction under Lord Milner > (1913).

MILNER,. John, Roman Catholic bishop and archaeologist: b. London, England, 1752; d. Wolverhampton, England, 1826. He was or¬ dained priest in 1777. In 1779 he settled in Winchester, the architecture and historical as¬ sociations of which appealed to him strongly. In 1803 he became titular bishop of Castabala, Cappadocia. In 1804 he settled in Wolverhamp¬ ton, having been made apostolic vicar of the Midland district in England. He took con¬ spicuous part in the controversy regarding the removal of the right of vote on appointment of Roman Catholic bishops as part of Peel's Cath¬ olic Relief Act (passed in 1829). His courageous action in this fight gained him the sobriquet of <(the English Athanasius.® He was the author of (Antiquities of Winchester (2 vols., 1798-1801 ; 3d ed., 1839) ; treatise on the Ecclesiastical Architecture of England during the Middle Ages) (1811; 3d ed., 1835), and (The End of Religious Controversy * (1818). Consult Husenbeth, F. C., Rife of John Milner) (Dublin 1862), and Ward, (Dawn of the Catholic Revival in England, 1781-1803) (2 vols., Dublin 1909).

MILNER, Joseph, English ecclesiastical historian: b. Leeds, England, 1744; d. 15 Nov. 1797. He was educated at Leeds Grammar School and at Cambridge and became well known as headmaster of Hull Grammar School.

In 1768 he was lecturer at Holy Trinity Church, Hull, and greatly advanced the success of the Evangelical movement, both there and as vicar of North Ferriby, near Hull. He published essays and sermons, but his chief work is the (History of the Church of Christ,* of which he lived to complete three volumes, ending with the 13th century. The fourth volume (to the 16th century) was edited from manuscripts by his younger brother, Dr. Isaac Milner, dean of Carlisle Cathedral, who also published a com¬ plete edition of the works of Joseph Milner (8 vols., 1810). The principles on which Milner based his (History J are

of the narrowest kind and he shows little critical insight.

MILNES, Richard Monckton, See

Houghton, Richard Monckton Milnes.

MILO, mi'lo, ancient Greek athlete. He was a native of Crotona, in Magna Graecia, Italy, and celebrated for his great strength. He bore off the prize six times in the Olympic games, and on an equal number of occasions at the Pythian. He was appointed to command an army against the Sybarites, and at the battle at the Crathis, 511 B.C., his great strength is said by Diodorus to have given the victory to the Crotonians. Many anecdotes are related of him. He once carried a heifer of four years to the sacrifice on his shoulders, killed it with a blow of his fist, and afterward, it is added, ate the whole of it on one day. His death is characteristically related. When enfeebled by age he attempted to rend open the trunk of a tree partially split by wood-cutters, but the wood, closing on his hands, held him fast and he was attacked and devoured by wolves.

MILO, Titus Annius, Roman tribune and political leader: b. Lanuvium in early part 1st century b.c. ; d. district of Thurii, 48 b.c. In 57 b.c., when tribune of the plebs, his quarrel with Publius Clodius began. Seeking prefer¬ ment in the state, he became the ally of Cneius Pompey, urging the recall of Cicero from exile, whither he had been sent at the instance of Clodius, as a pretext for their acts. Bands of gladiators in the emplov of Milo and of Clodius kept Rome in constant terror by their skir¬ mishes. Finally, in a clash at Bovillae, on the Appian Way, Clodius was murdered 20 Jan. 52 b.c. Milo was impeached for acts of violence in occupying public places and going about under arms, and for bribery in his canvass for the consulship. His trial began 4 April 52 b.c. Cicero undertook his defense, but the hostility of the Clodius faction was so marked that his speech was not delivered. In a revised and enlarged form it was sent by Cicero to Milo at Massilia (Marseilles), whither he had gone into exile upon his condemnation under the first count. In 48 Milo returned to Italy and joined Marcus Caelius in rebellion against Caesar.

MILO, or MILOS. See Melos.

MILOSH, prince of Serbia. See Serbia ;

Obrenovitch.

MILOUNA (rm-loo'na) PASS, Greece, a frontier-pass of the Olympian Mountains in Thessaly, a few miles north of Tyrnavos. On 18 April

1897 it was the scene of a fierce battle between the Turks and Greeks during the Graeco-Turkish War of that year. About 50,000

men were engaged on both sides, and the Greeks were defeated with heavy loss.

MILREIS, mil'res, or MILREI, a Portu¬ guese coin and the unit of account in Portugal. A thousand reis is one milrei, equal to $1.08. In enumeration the figure $ is used to denote the thousandth place, thus one milrei is written 1$000. The colon marks the place of contes (1,000,000 reis), the period the place of thou¬ sands of millions. The milreis is also the mone¬ tary unit of Brazil and is valued at 54.61 cents (United States).

MILROY, Robert Huston, American sol¬ dier: b. Washington County, Ind., 11 June 1816; d. 1890. He was graduated from Norwich University, Vermont, in 1843 and served in the Mexican War, after which he studied law and was admitted to the bar in 1849. In 1851 he was appointed justice of the Eighth Judicial Circuit Court of Indiana. When the Civil War broke out he organized a company of volun¬ teers and was mustered into service as colonel, later receiving the rank of brigadier-general, and in 1862 was made major-general. In 1863 he was engaged in battle with a superior force under General Lee, and after a gallant fight of three days' duration was compelled to retreat. An investigation of his conduct followed, which resulted favorably for Milroy, who, however, resigned in 1865. He was trustee of the Wabash and Erie Railroad in 1868, in 1868-74 was superintendent of Indian matters _ in Washington Territory and in 1874—85 Indian agent.

MILTIADES, mil-ti'a-dez, Athenian gen¬ eral : d. 489 b.c. He was a descendant of the Phila'ides and, after being archon at Athens in 524, inherited a minor principality in the Chersonesus in 518. He governed well there; accompanied Darius against the Scythians in 515, and being left at the bridge across the Danube urged its destruction in order that Greece might thus be rid of a possible Persian enemy. This plan was vetoed by Histiaeus, an¬ other Greek tyrant. In 493 he left his kingdom for fear of the Persians, and upon their in¬ vasion of Greece in 490 became one of the 10 generals of the Athenian army. Each of the other generals retired in Miltiades' favor, but he refused to lead the army until his own day of command came. Then he won the great battle of Marathon, routing the Persian land forces. The victorious general in the next year asked the state of Athens for a fleet

of 70 ships, got his request, but did not explain that he wished to punish the people of Paros from motives of private revenge, and, when his ex¬ pedition failed and its purpose became known, he was impeached, fined 50 talents and impris¬ oned for lack of ability to pay. He died in prison of a wound received at Paros.

“““MILTIADES, Saint, also called MEL-CHIADES, Pope or bishop of Rome from 2 July 310 to 10 or 11 Jan. 314. He is best known as having sat as presiding officer at a synod held at Rome in 313, by desire of the Emperor Constantine, to hear a petition from the Traditones or Catholics in North Africa who had, on demand of the Emperor Diocletian, given up their sacred books and thus, in the opinion of those who resisted the demand, forfeited the rights and privileges of Church membership. The action of the Traditones split the Church

into two bitter factions, a condition that was not suppressed until several synods and other courts, of which the Roman synod was one, had effectually quelched the movement by deny¬ ing the pleas of the Traditones on every occa¬ sion. Nothing is known of the early history of Miltiades, except that he was born in Africa, and the date of his death is uncertain.

MILTITZ, Karl Von, German ecclesias¬ tic: b. about 1490; d. about 1529. He was the son of a nobleman of Saxony, entered upon a clerical career as priest, and was subsequently canon of Mainz, Treves and Meissen. By favor of Pope Leo X, after appointment as a papal notary in 1515, he was chosen by that pontiff to confer with Luther, then very trou¬ blesome to the Church authorities, also with Frederick the Wise, of Saxony, Luther’s pro¬ tector. The sale of indulgences had been con¬ demned by Luther, and Miltitz was dispatched to the scene of Luther’s activity with a view to pacification. The whole subject was ear¬ nestly discussed, and as an outcome of the conference Luther promised to submit and pos¬ sibly recant his heretical opinions. Later meet¬ ings between the Saxon priest and Miltitz took place at Altenberg, Liebenwerda and Nichten-berg, but the triumph of the Pope’s envoy was annulled by the receipt of a papal bull of de¬ nunciation before the conference came to an ending. Miltitz was subsequently sent to disci¬ pline Tetzel, the priest who had aroused Luther’s ire, and denounced him as being both indiscreet and unclerical. Miltitz died, it is supposed by drowning, when on his way

back to the Vatican. Consult the biography by Creutzberg (Freiberg 1907).

MILTON, John, English poet: b. London, 9 Dec. 1608; d. London, 8 Nov. 1674. He was the son of John Milton (d. 1647), a prosperous and cultivated scrivener with marked leanings to Puritanism, and Sarah Jeffrey (d. 1637), of whom little is known. The pair had six chil¬ dren, three of whom came to maturity. _ The eldest of these was Anne, mother of the infant girl upon whom Milton wrote his elegy, (0 fairest flower, no sooner blown than blasted) ; of Edward Phillips, author of (Theatrum Poe-tarumP and of the hack-writer, John Phillips, both of whom Milton taught. She married for her second husband, Thomas Agar. John, the poet, was the second of the Milton's surviving children. The youngest was Christopher (1615— 93), who became a loyalist and a Roman Cath¬ olic, and was knighted and made a judge by James II.

Milton was born in Bread street, Cheapside, at the sign of the Spread Eagle, where his father conducted his business. The elder Mil-ton was a talented organist and composer, who is said to have taught his son to play the organ and to have made his house the resort of jhe best musicians of the day. John was beautiful in childhood and soon showed literary and scholarly proclivities. He was at first taught at home by Thomas Young, afterward a -noted Puritan clergyman, to whom he addressed his fourth Latin elegy. Then he attended Saint Paul's School under the two Alexander Gills, profiting from the classical acquirements of the elder. Here he formed the most memorable of his friendships, that with Charles Diodati, the son of an Italian Protestant who had settled in

London as a physician. He spent between four and five years at this school, straining his eyes with study, learning five languages and reading much poetry, especially that of Spenser, whom he later acknowledged as a master, and Joshua Sylvester's (q.v.) uncouth translation of Du-Bartas, which had a slightly deleterious influ¬ ence upon his own early poetical compositions. Metrical paraphrases of Psalms cxiv and cxxxvi, preserved by Milton, furnish speci¬ mens of his juvenile accomplishments.

On 9 April 1625 he matriculated as a pen¬ sioner of Christ's College, Cambridge, his tutor being William Chappell, a religious contro¬

versialist, afterward bishop of Cork. With this tutor Milton had some unexplained trouble, which apparently led to a short rustication and to his transfer to another tutor. The interlin¬ eation in the manuscript of Aubrey's sketch of the poet to the effect that Chappell "whipt® his most famous pupil may refer to some sort of personal encounter, or else may represent anti-Puritan gossip.

It is abundantly clear from later references to Cambridge in his writings, that Milton, al¬ though he was honored for his character and his scholarship, and was several times selected to represent his college as a public speaker, had no great respect for the university's methods and ideals. His beauty of person and his chaste life gained him the nickname of ftthe lady*1 and he seems to have formed no special friendships with such promising undergraduates of other colleges as Thomas Randolph, and Edmund Waller (q.v.), his seniors, or with John Cleve¬ land (q.v.), the satirist, and Henry More, the Platonist, junior members of his own college. This aloofness from his fellows and his ap¬ parent inability to find inspiring personalities among his instructors probably increased his absorption in his studies and encouraged him to correspond in Latin with Diodati, then at Oxford, as well as to compose poetry, in both Latin and English, not incon¬ siderable in quantity and extraordinarily good in quality. (On the Morning of Christ's Na-tivityJ (1629) is the crowning performance of this period and, despite some youthful defects of fantastic extravagance, is one of the few really great odes in our literature. Less ex¬ cellent but still memorable are the lines on Shakespeare (1630), the sonnet (On his Hav¬ ing Arrived at the Age of Twenty-Three) and (An Epitaph on the Marchioness of Win¬ chesterˆ

Milton, whose brother Christopher had fol¬ lowed him to Christ's, took his bachelor's de¬ gree 26 March 1629 and his master's 3 July 1632. He tells us that the college authorities would have been glad if he could have con¬ tinued to reside with them — probably as a Fellow. His design had been to take orders in the Church, but the High-Church reaction, which Archbishop Laud was fostering, was obnoxious to him, and he was unwilling to come under the control of that masterful prelate. Theo¬ logical difficulties and objections to an elabo¬ rate ritual do not seem to have weighed greatly with him at this time — certainly not to such a degree as the natural aversion of a proud and liberty-loving spirit to submit to the restraints imposed by an ecclesiastical organization domi¬ nated by a zealot. No other profession spe-

dally attracting him — though there are hints that he thought of the law — - he gave himself up to reading and study, with the hope that he might later compose something the world ((would not willingly let die.® As this meant that for several years he must be a charge upon his father, the latter surely deserved the thanks conveyed to him in the Latin poem entitled (Ad PatremP and he should be con¬ sidered one of the most farseeing of parents.

From July 1632 to April 1638 Milton lived at his father's semi-suburban residence at Hor¬ ton, in Buckinghamshire. He visited London to purchase books and to take lessons in mathe¬ matics and music; but he doubtless found his chief interest at home in studying the classics and French and Italian literature, and in enjoy¬ ing the beauties of the country around him. His occupations and ideals seem to be described in the companion poems <L'Allegro> and (I1 PenserosoP which are generally assigned to the second half of 1632; unless, indeed, these idyllic pieces, contrasting as they do two varieties of temperament and modes of life, represent the perplexed state of his mind when he was choos¬ ing between a secular and an ecclesiastical career, and belong to a slightly earlier period. To the Horton epoch we certainly owe three of the most notable of his so-called <Minor Poems) — the songs and rhymed speech entitled (ArcadesP the masque <Comus) and the pas¬ toral elegy (LycidasP The first named was part of an entertainment given before the Countess-dowager of Derby at Harefield in 1633 or 1634. The music for this was furnished by the composer Henry Lawes (q.v.), a friend of Milton's family, and their copartnership in the slighter performance probably led to their asso¬ ciation in providing a masque for the celebra¬ tion of the entrance of the Earl of Bridgewater upon his duties as president of the coun¬ cil of Wales. <Comus,) as the masque has been called without Alilton's authorization, was prob¬ ably performed in the great hall of Ludlow Castle on Michaelmas-night (29 September) 1634. So many of Lawes' friends asked after¬ ward to be allowed to read it that the com¬ poser had an edition published anonymously in 1637. From that day to this it has been one of the most admired of English poems, and whatever its defects of construction, it is unsurpassed as an idealistic presentation of the

power and charm of personal purity. The year that <Comus) was printed saw also the writing of (Lycidas,) which has been pronounced by Tennyson to be a ˆtouchstone of poetic taste® and by Dr. Johnson to be a poem which no man could have fancied he read ((with pleasure had he not known its author.® This elegy was first published in 1638 in a volume of academic tributes to Edward King, a successful rival of Milton's for a fellowship, who was drowned in the Irish Channel in August 1637. The ap¬ parent absence of great personal interest on the part of the poet in his subject, and the decreased toleration of the conventions of pas¬ toral poetry,, probably account for much of the adverse criticism <Lycidas) has received; but it should be remembered that Milton could have attained the requisite sincerity of utter¬ ance by centring his thoughts and emotions upon the loss sustained by the Church in the death of so promising a clergyman, and that such consummate art of versification and dic¬

tion as <Lycidas> displays and such a felicitous adaptation of a time-honored form of poetry to comparatively modern uses should render a poem, which a series of competent judges has pronounced a masterpiece, unamenable to the censure of the catholic reader. On the other hand, it may be remarked that it seems some¬ what uncritical to rank, as is often done, these poems of the young poet of Horton, admirable but still not magnificent in scope, above the sublime masterpieces which gave Milton his place among the supreme poets of the world. It is scarcely conceivable that if Milton had died immediately after writing <Lycidas) his name would now be widely known outside the English-speaking nations.

In 1638, after his mother's death, Milton, through his father's generosity, was enabled to take a foreign tour in a style befitting a gentle¬ man. At Paris he met Grotius (q.v.), but he did not like the city and passed soon into Italy, going by sea from Nice to Leghorn. He spent about a year on the peninsula, two visits of some two months each being given to Florence, where he made friends among men of culture, and impressed them by his accomplishments both in the classics and in Italian. In Rome his outspoken Protestantism almost got him into trouble. At Naples he formed an acquaintance with the aged Marquis Manso, the protector of Tasso and Marini, to whom he addressed some Latin verses important as showing that he was planning an epic upon King Arthur. Here he abandoned his intention of visiting Sicily and Greece, since the political news from England was too disturbing to allow a patriot to wander far from home. He made a leisurely return, was in Geneva early in July 1639, where he

probably heard of the death of Diodati, and landed in England toward the end of the month.

The literary memorials of the tour consist of a few fluent Italian sonnets and a canzone (which afford shadowy evidence of a love affair with a young lady of Bologna), and some Latin verses, including three epigrams inspired by the singer, Leonora Baroni. Milton does not seem to have profited greatly from what he saw of the treasures of plastic art, but his contact with historic places and with the natural beauties of Italy and his association with great men, of whom Galileo, whom he met at Florence, is the most illustrious, must have broadened and deepened his capacities of thought and feeling. With the close of his journey and the composi¬ tion of what is practically his last, and plainly his best, Latin poem, the touching pastoral elegy on Charles Diodati, entitled (Epitaphium DamonisP Milton's first period ends. The comely, accomplished young man, who blends the grace of the Cavalier with the serious pur¬ pose of the Puritan, gives place to the strenuous controversialist, the zealous reformer in church and state, the idealistic partisan. The poet is not. entirely swallowed up in the prose man, but he is nearly submerged.

. On his return, to England Milton took lodg¬ ings in Saint Bride's Churchyard and began to tutor, the two children of his sister by her first marriage, Edward and John Phillips. Then he moved to a house in Aldergate street, where his nephews boarded with him. Here he lived the life of. an abstemious student and developed apd practised the stimulating, though rather visionary, educational theories later outlined in

»

his letter to Hartlib (June 1644). In 1643 he received a few more pupils, and he continued to play the part of schoolmaster until the autumn of 1647, when his father's death apparently left him in fairly

comfortable circumstances.

Meanwhile he had been giving earnest of his literary and scholarly ambitions and of his in¬ terest in public affairs, which were rapidly ap¬ proaching chaos. He planned to write some poem on a noble scale, whether a tragedy or an epic, and he made a list of nearly a hundred possible subjects, chosen from sacred and early English history. At the head of this were four entries which show that the theme of (Paradise Lost,* to be treated in the form of a Greek tragedy, was then uppermost in his mind. There were also two entries dealing with the story of Samson, one of which later bore fruit in (Samson AgonistesP But the times were not propitious to poetical composition, and for nearly 20 years Milton wrote only occasional sonnets and scraps of verse, besides some rather astonishingly doggerel versions of Psalms. In 1645, however, he collected his somewhat scanty tale of English and Latin poems into a volume, which was published by Humphrey Moseley, the Tonson or the Moxon of the day. It seems to have made much less impression on readers than the collection of Waller's poems issued the same year. He also worked upon tasks in keeping with his duties as schoolmaster, such as his (Historv of Britain) to the Norman Con¬ quest, not published until 1670, and probably, his (Accidence commenc't Grammar* (1669) and (Artis Logicae Plenior Institutio ad P. Remi Methodum concinnata) (1670).

His prose writings practically began in the summer of 1641 with his (Of Reformation Touching Church Discipline in England..* At¬ tacks had been made in the Long Parliament upon the episcopal system, and the Bishop of Exeter (later of Norwich) Joseph Hall (q.v.), long since famous as a satirist, had published a defense of his order and a remonstrance to Parliament, which had drawn forth a reply from five Puritan divines under the pen-name ((Smectymnuus** formed from their initials. The <(t** and the ((y):> of this uncouth compound were furnished by Milton's former tutor, Thomas Young, who is probably, responsible for his pupil throwing himself into the fray. Hall replied to ((Smectymnuus** and secured the support of the learned Archbishop Usher (q.v.) and the five Puritans vindicated themselves. Milton's was the sixth pamphlet, of the series ; and between May 1641 and April 1642 he con¬ tributed four others— (Prelatical Episcopacy) (June 1641, a reply to Usher) ; (Animadyer-sions upon the Remonstrant's Defense against Smectymnuus> (July 1641, a bitter, point by point answer to Hall's reply to <(Smectymnuus**) ; (The Reason of Church-government urged against Prelaty* (about February 1641-42, his most weightv and dignified argument against the episcopal system) ; and (Apology against a Pamphlet, called A Modest Confuta¬ tion of Animadversions upon the Remonstrant against

Smectymnuus* (March 1641—42, a re¬ ply to the pamphlet, whose title is included in his own title, which was apparentlv the work of Hall and his son, and was certainly a per¬ sonal attack, the grossness of which largely extenuated the fierceness of Miltons retort).

Of these five anti-prelatical tracts, none of

which is of great length, the first and third have most value in themselves, because they have a broad basis in history, philosophy and theology, and thus afford proofs of Milton's learning and of his powers as an idealistic con¬ troversialist. The three others too frequently give unpleasant evidence that Milton was an almost unrivaled master of personal invective. The chief value of the entire series lies in the fact that they contain much nobly conceived and expressed autobiographical information, as well as some of the most sonorously harmoni¬ ous prose to be found in any literature — for example, the closing paragraphs of the first tract. In general, their cumbrous, style, their involved arguments and their antiquated sub¬ ject matter make them difficult reading to all save professed Miltonians; but when their many merits are duly weighed and the stand¬ ards of 17th century controversy are borne in mind, it seems scarcely an exaggeration to say that they combine with Milton's other works in prose and verse to give his fame a broader foundation than is possessed by any other Eng¬ lish writer.

The pamphleteer and poet appears to have determined deliberately that he could do his country more good by writing on subjects of public concern than by entering the army. It was doubtless a wise decision. This can hardly be said of his resolve to marry. In the spring of 1643 he took a mysterious journey into Ox¬ fordshire — possibly to collect a debt owed him by a cavalier named Richard Powell. A few weeks later he returned to London with this gentleman's 17-year-old daughter, Mary, as his bride. Of the wooing and the reasons for the marriage nothing is known. The bride is said to have remained with Milton a month and then, finding her life dull, to have gone back to her father with the promise that she would return to her husband by the end of September. She failed to keep her promise, and Milton sent a messenger for her, who was u .pleasantly treated by her family. Then the irate husband declared he would never receive her and wrote his first tract on divorce. Such is the story given by Edward Phillips. There is an extant copy of the divorce tract, however, which is marked 1 Aug. 1643 — and, unless this is a mis¬ take, we are forced to believe that Milton was pleading for liberty to break the

chains of matrimony at a time when, according to prece¬ dent, he should have regarded them as strings of roses. Such an idealist might have ex¬ pressed such views without reference to his own experiences and desires, but it is hard, to divest one's self of the belief that in this in¬ stance the wish was the father of the theory. It is almost certain that, whether or not there was between the pair a suddenly discovered incompatibility of temperament, each had rea¬ son to regret the alliance, Milton because he had too young and flighty a partner, his wife be¬ cause her Puritan husband, twice as old as herself, was too serious and self-absorbed. In the absence of evidence it is idle to discuss the suggestion that the bride resolved to be one in name only.

In (The Doctrine and Discipline of Divorce Restored, to the Good of Both Sexes,* Milton took the advanced stand that ((obstinate incom¬ patibility of mind or temper between husband and wife is as lawful a ground for divorce as

infidelity.® (Masson) . He argued with his usual idealistic fervor and showed plainly that no man could have a higher conception of true marriage than he; but he was singularly blind to the weight of the sociological objections to his theory. His views naturally met with ad¬ verse criticism and he expanded them in a sec¬ ond edition under his own name (February 1643—

44) . In July 1644 he published a less interest¬ ing, but far from feeble tract entitled, (The Judgment of Martin Bucer on Divorced Then he was denounced before Parliament, which de¬ creed that a licensing ordinance be prepared and that Milton and his printers be sought for. Nothing further happened, so far as the bold pamphleteer was concerned, save that later he came near being examined by the House of Lords, and that he was given the occasion to write the best-known and most uniformly ex¬ cellent of his prose works, his eloquent

(Areopagitica, or Speech for the Liberty of Unli¬ censed Printing5 (November 1644). It is need¬ less to say that the Parliament he addressed so boldly with arguments, not absolutely liberal but far in advance of his times, had no oppor¬ tunity to listen to Milton's own voice, which, however, in a metaphorical sense has since echoed in every legislative hall of every free people. It is probable that he had friends in Parliament who blocked the measures taken to call him to account and that in a less turbu¬ lent period he might have paid dearly for his rashness. As it was, he had the dubious honor of having a group of adherents named after him and he published without molestation two more tracts on divorce — (Tetrachordon, or Expositions upon the four chief places in Scrip¬ ture which treat of marriage) (March 1644-45) , and (Colasterion : a Reply to a Nameless Answer Against the Doctrine and Discipline of Divorce5 (March 1644-45). The temper dis¬ played in the latter pamphlet was not calculated to allay the hostile criticism that assailed him, nor was the rumor that he was courting the attractive daughter of a Dr. Davis particularly to his credit. This rumor and the financial distress of her royalist family seem to have brought Mrs. Milton to terms. She suddenly appeared before her husband while he was visiting at a neighbor's, begged his pardon, and was taken back.

The united couple took a larger house in the Barbican, and the school was somewhat en¬ larged. Between July 1646 and May 1652 three daughters and a son were born to them, the boy dying in infancy. The mother died not long after the birth of her last child. Mean¬ while her father and mother, with some of their children, had been obliged to live with Milton, and money troubles had arisen, scarcely to be wondered at. Another house had also been taken in High Holborn — and the school had been given up.

During these years Milton seems to have grown as radical in his ecclesiastical and polit¬ ical views as he apparently was in his educa¬ tional theories and in his domestic economy. He sympathized with the army against the Parliament, with the Independents against the Presbyterians and was one of the first to ap¬ prove the execution of Charles I. His loosely reasoned (Tenure of Kings and Magistrates5 appeared within two weeks of that event, and was probably the cause of his speedy appoint¬

ment as Latin Secretary to the Council of State at a salary of about £290 (March 1649-50). His main task was the translation of dispatches intended for foreign governments, 'but he had also to

answer attacks made on the home gov¬ ernment, and, ironically enough, to act as a sort of censurer of the press. He was given official apartments in Scotland Yard, was ex¬ pected to be present at audiences of foreign envoys, in short, held a post of considerable dignity and importance.

The first of his official publications was his Observations on the Articles of Peace between Ormonde and the Irish rebels5 (May 1649). The second was (Eikonoklastes,5 a point for point answer to the popular (Eikon Basilike,5 supposed to be the last meditations of Charles I, but really, it would seem, the work of John Gauden (q.v.). Milton's answer, which ap¬ peared in October 1649, is perhaps the strongest of his controversial pamphlets, but it is now mainly known for its exposure of a plagiarism by Gauden from Sidney's (Arcadia5 and for the over-emphasized evidence it affords of Milton's increasing Puritanism in matters of taste. An¬ other answer to a more important book was the (Defensio Pro Populo Anglicano,5 pub¬ lished in or about March 1650 to counteract the effect produced by the <Defensio Regia pro Carolo I,5 which the learned Salmasius (Claude de Saumaise, professor at Levden) had written at the instigation of Charles II. Milton's book gave him a Continental reputation, for it was generally felt that he. had shown himself to be a match for Salmasius (q.v.) as a writer of Latin, and. more than a match as a scurrilous controversialist. Such a reputation was, how¬ ever,. but a slight recompense for the loss of his sight, which was partly due to his persisting to labor on this book as a patriotic task de¬ spite the warnings of his physicians. The glau¬ coma, from which he seems to have suffered, would probably have ended in blindness in anv event, but the sublimity of the poet's patriotic self-sacrifice is scarcely lessened by this fact.

Milton's next book was his <Defensio Secunda5 (May 1654), a reply to an invective by Peter Du Moulin which had been edited by a professor' in Holland, one Alexander Morus or More, ((a Frenchman of Scottish descent.55 Mil-ton mistook the editor for the writer and over¬ whelmed him with abuse, not disdaining to rake up charges of sexual misconduct. Morus naturally, but unluckily attempted a replv and was again violently assailed by Milton in his (Pro Se Defensio5 (August 1655). Even the most devoted Miltonian must regret the writing of these gross tracts, although the former does contain interesting passages illustrative of its author's life and political ideals.

Meanwhile Milton at the close of 1651 had removed to a home in Pettv France. West¬ minster. By the middle of 1652 he was wholly blind, but he continued with the help of as¬ sistants to do the work of

his office at a re¬ duced salary. The most important dispatches, such as those of Cromwell protesting against the persecution of the Vaudois, were still en¬ trusted to him. On 12 Nov. 1656 he married his second wife, Katherine Woodcock, who died 15 months later in childbirth. Milton wrote in her. memory a fine sonnet, imitated from an Italian one, but beyond this testimony to her worth little is known of her. We are equally

ignorant of the way his house — with a blind father and three small daughters — was con¬ ducted during his two periods of widowerhood. He had a small circle of friends, including two of his old pupils, Cyriac Skinner and Henry Lawrence, Lady Ranelagh and Andrew Marvell (q.v.), the last named of whom from 1657 to 1660 assisted him in his duties as secretary. Toward the close of the Protectorate his literary work declined to the writing of a few sonnets and t'he publication of two or three ecclesiastical and political pamphlets, which are important chiefly as showing that he resisted steadfastly the drift toward monarchy and an established church. It is pathetic to find him at the end of Richard Cromwell's short regime willing to preserve republicanism in name only provided liberty of conscience could be secured. His projects were chimerical and were much ridiculed, the nobility of his idealism making but a slight appeal in such tumultuous times. The dashing of his hopes as a reformer prob¬ ably led his thoughts back, however, to the channel from which they had been diverted throughout the period of strife. From about 1658 he seems to have meditated an epic poem on the theme of (Paradise Lost.* The Stuarts were restored to their kingdom and Milton to his ; but, while we may be grateful for this, we need scarcely, with Mark Pattison, view Mil¬ ton's controversial period as so many lost years. It seems better to agree with Dr. Garnett that (Paradise Lost> would not be the poem it is if Milton had not been allowed to develop his powers through his contact with men and affairs.

At the Restoration Milton went into hiding in a friend's house. Two of

his books were burned by the hangman, but in some unexplained way, partly no doubt through the influence of Marvell, he was not exempted from the benefits of the Act of Indemnity (29 Aug. 1660). Later he was arrested, but he was soon released and he had influence enough to protest vigorously against being required to pay excessive fees to the sergeant-at-arms of the House of Com¬ mons. His immunitv from punishment caused much comment, and stories like that of a mock funeral and that of the intervention of Sir William D'AVenant (q.v.) in return for a previous similar intervention by Milton, were probably invented to account for what seemed to be an extraordinary case of leniency or of forgetfulness. When he was out of danger, Milton took a house in Holborn and then in Tewin 9treet. The loss of his salary and of some investments doubtless forced him to lower his scale of living and also prompted him to look out for a third wife who would manage his home better than his eldest daughter did. In February 1662-63 he married Elizabeth Min-shull, who seems to have made his last years comfortable in a house in Artillery Walk, Bun-hill Fields.

Not long after this last marriage he appears to have finished Paradise Lost> and, with some trouble, to have secured a license for it Horn Thomas Tomkyns, chaplain to the Archbishop of Canterbury. During the plague of 1665 he retired t© Chalfont Saint Giles in Buckingham¬ shire, and there he loaned his Quaker friend, Thomas Ellwood (q.v.), the complete manu¬ script of the great epic. Ellwood on returning it made the famous remark which led to the writing of (Paradise Regained :> «Thou hast

said much here of Paradise Lost, but what hast thou'to say of Paradise Found ?® It was not until April 1667, partly, perhaps, in consequence of the fire of 1666, that Milton secured a publisher for (Paradise Lost.* Then he signed a contract with Samuel Symmons by which the latter was to pay £5 down and £5 more on the sale of each of the first three editions, which were not to exceed 1,500 copies apiece. This is usually referred to as a hard bargain, but in view of Milton's unpopularity, the length and theme of his poem, and his innovation in the use of blank verse, it seems unfair to blame Symmons. It is equally unfair to Milton's contemooraries to maintain that Addison's criticisms in The Spectator first showed Englishmen that they possessed an epic poet worthy to rank with Homer and Virgil. Six editions had been pub¬ lished before the close of the 17th century, elaborate annotations had been made upon it and Dryden and Marvell had extolled it. The religious nature of its theme has al¬ ways, of course, given it a

standing somewhat independent of its consummate poetic merits; but these, especially its sublimity and its un¬ rivaled harmonies, have rarely been denied by competent critics of any nationality, and efforts to show Milton's excessive indebtedness to other poets, such as Andreini and Vondel, have not met with great success. That Para¬ dise Lost) is a popular poem or Milton a poet whose genius is ungrudgingly acknowledged by all is not to be maintained ; but the supreme and isolated greatness of both seems likely to es¬ cape serious challenge. When Paradise Regained) was finished and when (Samson Agonistes* was written cannot be accurately determined. They appeared in one volume in 1671, and probably represent Milton's last crea¬ tive literary labors. It is said that he could not bear to have Paradise Regained) pronounced inferior to Paradise Lost) — a fact, if fact it be, which has been twisted into the statement that he preferred the poem which the public most systematically neglects. This is scarcely credible since the theme, scope and style of the two poems are so different as to render com¬ parison rather meaningless save with regard to interest and to the level kept by the poet's imagination, points in which the superiority of Paradise Lost* is manifest. On the other hand. Paradise Regained* in its noised nobility and its artistic use of the materials furnished by the Gospel narratives of the Temptation is so perfect of its kind that Milton's indignation at hearing it undervalued is easily compre¬ hended. (Samson Agonistes) has fared better at the hands of critics and readers. It is probably the most, successful tragedy of the Greek type ever written by an English, if not a modern, poet, and it is certainly full of the un¬ quenchable spirit of its author. Samson blind, in the midst of his enemies, the victim of his own infatuation for a woman, was a hero with whom Milton, of all men, could thoroughly sympathize.

The poet's health was now undermined by the gout, and he devoted his closing years to setting his miscellaneous writings before the world in a proper shape. Besides the academic publications already mentioned, he revised his early poems in 1673, adding to them a few youthful pieces and some of his later sonnets, and the next year he collected his Familiar

Epistles, with his College Exercises. On 8 Nov. 1674 he died peacefully, and four days later he was buried in Saint Giles, Cripplegate, beside his father. It may be inferred that some of the obloquy once heaped upon him had been dissipated, since his funeral was well attended. His daughters, who had not made his life pleas¬ ant, and whom he had employed as readers in languages 'they could not understand, and had not educated or perhaps appreciated as a school¬ master and man of such refinement might have been expected to do, disputed with his widow the terms of his nuncupative will, but the mat¬ ter was finally compromised. The widow sur¬ vived till 1727, a date at which all trace of the poet's descendants through certain Clarkes in India seems to have been lost. The grand¬ daughter for whose benefit <Comus) was per¬ formed in 1750 had buried her seven children in infancy. Nor was the poet's progeny short¬ lived only; it appears to have sunk decidedly in the social scale.

From the portraits and descriptions of Mil-ton it may be gathered that he was somewhat short and well made, with light hair and clear-cut features. He was stately in his manners, dressed neatly, was temperate and methodical in his habits, which were those of the student rather than of the artist, although he kept up his music to the end of his life. He was on pleasant terms with a small group of friends, and was accessible to foreigners of distinction. He took regular exercise and indulged in an occasional pipe. Perhaps his only striking ec¬ centricity — for in such an age of confusion his religious and political radicalism should not ex¬ cite surprise^ — was his adoption of <the notion that his creative genius worked freely only from the <(Autumnal Equinoctial to the Vernal.® It is at least fairly certain that his poetical powers were not so distinguished for affluence as for felicity and strength. When he was in the mood for composing (in his latter years) he seems to have stored up passages in his memory and to have dictated them by batches of 20 and 30 lines to any chance amanuensis he could secure.

Milton's position in English literature, as settled by popular consent, would seem to be not far below Shakespeare and well above all other authors. He has had and has adverse critics, however, while a few persons would place him at least on an equality with Shake¬ speare in greatness. As a conscious poet artist he has not been clearly surpassed in the litera¬ ture of the world; he is doubtless the consum¬ mate master of the sublime; and he has few equals as a writer of erudite and sonorous prose. As an exponent of idealism in conduct he is almost as memorable as he is in his function of poet; as an inspired

and inspiring patriot of liberal mold he is practically unparalleled. In total range of appeal as poet, scholar, patriot and man his closest students are seldom willing to admit his inferiority to any other mortal.

The titles and dates of the main works pub¬ lished by Milton during his life have already been given. To these should be added, as posthumous publications, a surreptitious collec¬ tion of (Letters of State) (1676, translated by Phillips, 1694) ; (A Brief History of Moscovia) (1682), and (J. Miltoni Angli de Doctrina Christiana Libri duo posthumi5 (edited by

Sumner, 1825). This treatise on { Christian Doctrine,5 the manuscript of which went through curious adventures, gives formal justi¬ fication ‘to the idea that Milton developed a sort of semi-Arianism, traces of which have been discerned in (Paradise Lost.5 Milton’s Com¬ monplace Book,5 edited in 1876 and 1877 (for the Camden Society), seems to include nothing original. The manuscript now in the library of Trinity College, Cambridge, which contains the lists of subjects for a long poem and copies of several early poems, including JComus5 and (Lycidas,5 was published in facsimile in 1899. Several productions have been attributed to Milton on but slight grounds, the latest being a romance in Latin, (Novae Solymae Libri Sex) (1648), resuscitated by the Rev. Walter Begley and translated and published by him in 1902. The real author appears to have been Samuel Gott. See Areopagitica ; Comus; II Penseroso ; L’ Allegro ; Lycidas ; Paradise Lost ; Paradise Regained; Samson Agonistes.

Bibliography. — Among the most important editions of Milton’s poetical works are those of Newton (1749-52), Todd (1801, 1809), Sir Eger-ton Brydges (1835), R. C. Browne (1870, 1901, the English Poems), Masson (1874, 1877, 1882), Bradshaw (1892 — the New Aldine), W. V. Moody (1899), H. C. Beeching (1900), and W. Aldis Wright (1903). The Aldine edition of 1832, with a life by John Mitford, should also be mentioned, as well as Bentley’s curious edi¬ tion of (Paradise Lost) (1732), and Thomas Warton’s excellent edition of the so-called Minor Poems (1785, 1791). Editions of sepa¬ rate poems, especially for school purposes, are very numerous. Of the prose works the follow¬ ing editions may be noted: — Of Tohn Toland (1698), T. Birch (1738), T. Birch and R. Bar¬ ron (1753), C. Symmons (1806), R. Fletcher (1833), R. W. Griswold (1847), J. A. St. John (Bohn’s Standard Library, 5 vols., 1848-53, in¬ cluding the ‘■Christian Doctrine5)* J. Mitford (1851, 8 vols., including ithe

Poems, but not the (Christian Doctrine5). There is no thoroughly .good modern edition of the complete works; but there has been of late more attention given to the prose. Consult elaborate editions of tracts in ˆale Studies in English5 and E. Lockwood's (Of Education,5 etc., containing reprints from the earliest biographies of Mil-ton (Boston 1911). There are concordances to the Poems by G. L. Prendergrast, C. D. Cleveland (1867) and John Bradshaw. <A Lexicon to the Poetical Works of John Mil-ton,5 by L. E. Lockwood, was published in 1902.

The standard biography of Milton is the monumental work of Professor Masson (6 vols., 1859-80). Most of the editions mentioned above contain memoirs, which in some cases are verv elaborate, e.g., that by Mitford in the edition of 1851. Of the early memoirs, that by Milton's nephew, Edward Phillips, was prefixed to his translation of the Letters of State (1694), and that by Toland to his edition of the prose works (1698). Later lives are by Thomas Keightley (1855), Alfred Stern ((Milton und Seine Zeit,5 1877-79), Mark Pattison (1879, in the English Men of Letters), Stopford Brooke (1879, in Classical Writers), and Richard Garnett (1890, in Great Writers, with a bibliography). Dr. Johnson's famous life in the (Lives of the Poets5 influenced public opinion against Milton until the tables were somewhat turned by Ma-

Camay's enthusiastic essay in the Edinburgh Review (1825). The number of essays and monographs and books dealing with special topics connected with Milton's life and works is, of course, very large, e.g., Hilton's Prosody) (1893, 1901), by the poet Robert Bridges, Ed-mundson's (Milton and Vondel* (1885); Spaeth's . (Milton's Knowledge of Music) (1913) ; Myers' (Relations of Latin and Eng¬ lish during the Age of Milton) (1913), and Bailey's (Milton and Jakob Boehme) 1914). Important critical discussions of moderate length may be found in the collected works of Matthew Arnold, Walter Bagehot, the elder William E. Channing, S. T. Coleridge, De Quincey, Emerson, Lowell and Macaulay. To these critics may be added Augustine Birrell,

Edward Dowden, Edmund Scherer and Sir Leslie Stephen. Special volumes dealing with the poet are Hiram Corson's (Introduction to the Works of Milton) (1899), W. P. Trent's (john Milton: a Short Study of his Life and Works) (1899) ; Walter Raleigh's <Milton) (1900) ; Alden Sampson's (Studies in Milton* (1913), and Thompson's (Essays on Milton* (1914). The chief histories of English litera¬ ture, such as Taine's and that by Garnett and Gosse, as well as Saintsbury's (Elizabethan Literature,* and the (Cambridge History of English Literature,* should also be consulted. An excellent edition of Johnson's life, the merits of which should not be underrated, is now provided in Dr. Birkbeck Hill's edition of the (Lives of the Poets,* in three volumes (1905). The Milton tercentenary, celebrated in 1908, was the occasion for the publication of a Catalogue* of the exhibition held in London in that year, and of the (Milton Memorial Lec¬ tures,* edited by Percy W. Ames. The course of Milton's fame may be traced in J. W. Good's (Studies in the Milton Tradition* (Urbana, Ill., 1915). For further bibliographical information consult E. N. S. Thompson's (John Milton Topical Bibliography* (New Haven 1916).

William T. Trent,

Professor of Literature, Columbia University.

MILTON, John, soldier and politician: b. Jefferson County, Ga., 21 April 1807 ; d. Talla-hassa, Fla., 1 April 1865. Milton received a good school education, studied law and prac¬ tised with success in Columbus, Mobile and New Orleans. As a captain of volunteers he took part in the Seminole War.. In 1846 he engaged in cotton planting in Florida, but main¬ tained a lively interest in public affairs, serving (1849) as a Democrat in the State senate and in numerous party positions. He favored se¬ cession and in 1861 was elected governor for a four-year term. During the Civil War Milton raised, outfitted and dispatched troops, col¬ lected supplies and provided for the defense of the State. Much distressed at the misfortunes of the Confederacy, Governor Milton's mind gave way and he died soon after.

MILTON, Canada, town, in Ontario, and capital of Holton County, on the Canadian Pacific and Grand Trunk railways, about 30 miles southwest of Toronto. Its industries and manufactures are lumber, flour, .wire, nails, cream, boots and shoes, pressed brick, crushed stone and lime, wood, screws,, rivets, carpets, nickel and silver plating, electric motors. Mil¬

ton has two parks, waterworks and electric lighting. Pop. 1,654.

MILTON, Mass., town in Norfolk County, seven miles south of Boston, on the Neponset River and the New York, New Haven and Hartford Railroad. Milton is an attractive and wealthy residential suburb of Boston, valued in 1914 at $31,602,839 and occupy¬ ing about 13 square miles. A portion of the Blue Hills belongs to Milton. On Great Blue Hill (625 feet) fires were kindled on the news of the repeal of the Stamp Act; of the adop¬ tion of the Declaration of Independence; and on the surrender of Burgoyne and Cornwallis. Beacon fires burned here during the Revolu¬ tionary War. At an early date an observatory for tourists was erected on Great Blue Hill and in 1885 the Blue Hill Observatory for meteorological investigations was established by Abbott Lawrence Rotch (1861), who made im¬ portant investigations regarding clouds. Milton Academy was founded in 1798 and a public library was opened in 1871. Milton owns two granite quarries and two public parks : Cun¬ ningham Park and Hutchinson Field, the latter on a portion of the estate of Thomas Hutchin¬ son, a colonial governor of Massachusetts. Mil-ton was settled in 1640. It was originally a part of Dorchester and was called Uncataqui-sett. The town was separated in 1662 and in¬ corporated. It owes its name either to Milton Abbey, Dorset, from which members of the Tucker family emigrated, or to the number of mills established here — Mill Town. It was the residence of two colonial governors — Jonathan Belcher and Thomas Hutchinson. In 1712 the Blue Hill lands were divided between Milton and Braintree. In 1868 part of Milton was given to the new township of Hyde Park. Milton now includes the village of East Mil-ton, Lower Mills and Mattapan. Milton was brought into political importance during the early days of the Revolution by the passage of the famous (<Suffolk Resolves.** These bold resolutions were passed on 9 Sept. 1774, at a meeting of the citizens held in the house of Daniel Vose, these men having adjourned from Dedham. The ((Suffolk Resolves** declared that a sovereign who breaks his contract with his subjects forfeits their allegiance; that the re¬ pressive measures of Parliament were uncon¬ stitutional ; that tax-collectors should not pay over money to the royal treasury; that the towns should choose public officers from the patriot party; that they would obey the Conti¬ nental Congress ; that they favored a provincial congress ; that they would seize Crown offi¬ cers as hostages for any political prisoners arrested by the governor; and they recom¬ mended that all persons in the colony should abstain from lawlessness. Consult Teete, A. K., (History of Milton, Mass.* (Milton 1887).

MILTON, Pa., borough, in Northumber¬ land County, 50 miles north of Harrisburg, on the Susquehanna River. It is situated on the

Pennsylvania and the Philadelphia and Reading railroads and on the Pennsylvania Canal. The scenery is picturesque and a fine bridge spans the river. Milton was settled in 1792 and in¬ corporated in 1817. It is governed by a re¬ vised charter of 1890 and has a chief burgher, elected every four years, and a council. Its in¬ dustries and manufactures are rolled iron, lum-

ber, cars, woodworking, machinery shops, nails, nuts, bolts, furniture, shot, flynets, bam¬ boo novelties and paper-boxes. It suffered from a severe fire in 1880. Pop. (1920) 8,638.

MILTON, Wis., village, in Rock County, on the Chicago, Milwaukee and Saint Paul Railroad, eight miles northeast of Janesville, in a grain-growing district. It is the seat of Milton College (Seventh Day Baptist). Fountain pens are manufactured here. Pop.

873.

MILTON COLLEGE, in Milton, Wis., a coeducational institution, was founded in 1844 by pioneers from Eastern States, the most of whom were Seventh-Day Baptists. It was first known as Du Lac Academy; in 1848 it be¬ came incorporated; in 1854 the name was changed to Milton Academy; and in 1867 it re¬ ceived its charter as a college. The influence of Milton College is Christian rather than sec¬ tarian, although it has always maintained a closely sympathetic relation to the Seventh-Day Baptist people. It is strictly a college of lib¬ eral arts, of general culture. In 1916 it re¬ ported 16 professors an$ instructors; 135 stu¬ dents; over 10,000 volumes in the library; grounds, buildings and apparatus, valued at $85,000; productive funds, nearly $150,000; total income for the year, $15,500. The num¬ ber of graduates up to 1916 was over 400.

MILUTIN, Dmitri Alexievitch, Count, Russian field-marshal: b. 1819; d. Yalta, Crimea, 5 Feb. 1912. The son of poor parents, he entered the

army in 1833 and studied at the Military Academy in Saint Petersburg (Petrograd), where he became professor of geog¬ raphy. His first active service was in the Cau¬ casus against Schamyl. From 1861 to 1881 he was Minister for War, during which long period he introduced important reforms, espe¬ cially the establishment of conscription in 1874. He took part in the Russo-Turkish War in 1877 —78 and for a time added the duties of Foreign Minister to his own. He retired in 1881 and devoted himself to writing military history.

MILVAIN BRIDGE, or MULVAIN BRIDGE, ancient bridge over the Tiber at Rome built in 109 b.c. by Marcus ˆFhnilius Scaurus on the famous Flaminian Way. Here Cicero had the ambassadors of the Allobroges arrested (60 b.c.) who were conspiring with Cataline; and here Maxentius was drowned after his defeat by Constantine (312 a.d.). The modern Ponte Molle now spans the Tiber in place of the Milvain Bridge. ‘Consult Plat-ner, S. B., (The Topography and Monuments of Ancient Rome) (2d ed., New York 1911).

MILWAUKEE, mil-wake, Wis., capital of Milwaukee County and the metropolis of the State; on the west shore of Lake Michigan, at the confluence of three rivers — Milwaukee, Menomonee and Kinnickinnic. The converg¬ ing streams flow into a bay of great natural beauty, which extends nearly three miles inland and affords excellent harborage for vessels within the shelter of two miles of breakwater constructed by the Federal government.

Topography. — A distance of six miles sep¬ arates the high north and south headlands that mark the extremes of the bay. The interven¬ ing shore, except around the deltas formed by

the disemboguing streams, is a series of bold bluffs that overlook the harbor from an alti¬ tude varying from 85 to nearly 150 feet above Lake Michigan, thence sloping gradually to the lower levels of the rivers that enter the city from the north, south and west respectively. The river bottoms were, half a century ago, stretches of wild-rice marshes and tamarack swamps, but the leveling processes prompted by business necessities have transformed them into solid ground whereon the chief business section has been built. The residence districts are located on the higher altitudes above the three valleys formed by the streams that trisect the city.

Trade and Industries. — Milwaukee’s ex¬ cellent harbor has been the leading factor in promoting the commercial and industrial growth of

the city. Three navigable rivers, the Milwaukee, Menomonee and Kinnickinnic, which merge at a common mouth, afford, with connecting canals and slips, about 20 miles of water frontage. A large proportion of the frontage on the Milwaukee River, however, is occupied by mercantile structures which face thoroughfares paralleling the river. The Me¬ nomonee River, which flows from the west and has a navigable length of about two miles, car¬ ries the major portion of the tonnage of the port. The Kinnickinnic River, extending southerly about two and three-quarters miles, is next in this respect, while the Milwaukee River, reaching to the northward about two miles, ranks third. The rivers average from 140 to 225 feet in width and have a maximum depth of 20 feet.

Coal represents the greater portion of the receipts of the port, and grain and miscella¬ neous freight of the shipments. In normal times the total inbound and outbound tonnage aggregates between eight and nine million tons with a combined valuation of close to $150,000,- 000. Governmental statistics rank Milwaukee as the second largest coal receiving port on the Great Lakes. The port holds first place in point of number of arrivals and departures, second place as to valuation of freight tonnage and third place in the matter of shipments of flour and grain and grain products.

In addition to the coal and grain trades, a large volume of general merchandise is trans¬ ported by steamers which run to Georgian Bay and ports on Lake Erie. Two carferry lines maintain service throughout the entire year to and from ports on the east shore of Lake Mich¬ igan, where direct connection is made with rail¬ ways to the East. These ferries carry 30 rail¬ way cars each and make daily trips. In addi¬ tion to the carferry service, two steamboat companies operate passenger and freight steamers to across-the-lake points practically the year round. Passenger and freight steam¬ ers also ply daily between Milwaukee and Chi¬ cago and also make trips to points north, in¬ cluding Green Bay ports.

A feature of Milwaukee harbor is an outer anchorage basin, or harbor of refuge, formed by a sea wall extending southeasterly from the north point of the bay. The protected area available for the use of vessels is about 270 acres with a depth ranging from 16 to 32 feet. Plans are now being prepared under the direc¬ tion of the harbor commission for the devel¬ opment for harbor purposes of the lake front

from Wisconsin street on the north to Russell avenue on the south, a distance of about two miles, and also the inner side of a peninsula known as Jones Island, at an estimated cost of from five to six million dollars. The project contemplates municipally-owned terminals of every nature, and has for its purpose the ac¬ commodation of the increased traffic of the future and the diversion of as much business as is possible from the present congested and closely bridged channels to the more accessible deep-water district above named.

The chief industries of the city, in the order of their importance as regards annual product, are metal, $107,802,063; packed meats, $42,- 220,000; leather, $39,200,000; coal and wood products, $25,000,000 ; automobile parts and com¬ mercial trucks, $24,000,000; electric and tele¬ phone supplies, $24,000,000; boots and shoes, $21,650,000; wheat shipments exceed 9,000,000 bushels annually. From 1880 to 1890 the total product of the city's industries increased 147 per cent; from 1890 to 1900, 88.6 per cent; 1900 to 1910, 88.8 per cent; 1910 to 1915, 21.8 per cent; 1915 to 1917, 48.3 per cent.

The manufacturing statistics in 1817 were as follows : Persons employed, 147,087 ; paid in wages, $113,820,814; capital employed, $350,- 222,365; value of products, $595,520,102; the value of products increased 80.7 per cent from 1910 to 1917 ; wages paid, 72.8 per cent.

Population. — Within the city's corporate limits are comprised 24 square miles, a smaller area than that of any other city of considerable population in the United States. The first enu¬ meration, in 1838, revealed a population of 700, which had increased to 9,666 by the date of the incorporation of the city in February 1845. The number of inhabitants according to the Federal census of 1900 was 285,370. During the next decade (1910) it increased to 373,587. The population (U. S. official) in 1920 was 457,147. The great bulk of the residents are working¬ men, and it is estimated that fully 80 per cent of them own their own homes. Local banking statistics show savings deposits aggregating $45,409,476, of which 75 to 80 per cent are esti¬ mated to be those of wage-earners. There has been no considerable strike in Milwaukee since the general labor disturbance of 1885, except a walk-out of street car employees in 1896. The

population of the city is polyglot. A map of the city with division lines determined by the predominating nationalities inhabiting certain districts would bear much resemblance to that of Europe as to nomenclature. For many years the population was largely of German birth, and Milwaukee acquired the title of the ((German Athens of America.** The first Ger¬ man settlers came in 1838, but it was not until 1845 that large numbers of Germans began to make the young city their home. For nearly half a century their customs found expression in the chief social life of the city. At one time the number of daily newspapers printed in Ger¬ man was nearly twice the number printed in the English language. A theatre was built expressly for performances in German, with stock companies drawn from Germany. A German market hall was constructed. Six turn¬ er halls were erected, and a seminary for stu¬ dents of physical training was established. During the Civil War, one company of volun¬ teers was composed wholly of German turners.

The tide of German immigration was followed, beginning 40 years ago, by a stream of Poles, Dutch, Scandinavians and Bohemians, and more recently Italians and Syrians have estab¬ lished colonies in certain sections of the city. The preponderance of German population has now disappeared, although certain wards re¬ main largely German. The foreign-born in¬ habitants are grouped in various sections of the city. German, Polish, Bohemian and Scan¬ dinavian papers and periodicals are published in Milwaukee, including two dailies in the Polish and one in the German language. The first Polish daily paper established in the United States was printed here.

Churches. — The seat of a Catholic arch¬ bishopric and of a Protestant Episcopal bishop¬ ric are located in Milwaukee. The 206 churches are distributed among the following faiths and creeds: Adventist, 1; Baptist, 9; Catholic, 45; Christian, 2; Christian Science, 4; Congrega¬ tional, 4; Episcopal, 10; Evangelical, 10; Evan¬ gelical Association, 7 ; Greek, 1 ; Italian Evan¬ gelical, 1; Jewish, 8; Lutheran, 60; Free Lutheran, 1; Methodist Episcopal, 20; Free Methodist, 1; Mormon, 1; Presbyterian, 12; Reformed, 3; Serbian, 1; Spiritualistic, 3; Syrian, 1 ; Unitarian, 1. The property of the religious organizations is valued by the tax commissioner at $10,878,380. Some of the church edifices are architecturally beautiful, notably Saint Paul's Church, in the Norman style; Saint Josaphat's, Byzantine; Gesu, Immanual and Saint James, Gothic. The convent-of Notre Dame, which occupies a square in the heart of the city, is the mother house of the order in the United States. In the suburb of Saint Francis the

Catholic seminary of Pio Nono is surrounded by a magnificent tract of 200 acres. Marquette University (Jesuit) and Concordia College (Lutheran) are located on the west side.

Government. — The elective city officers are the common council, mayor, city attorney, city treasurer and city comptroller. In addi¬ tion to these are the various appointive officials, including the commissioner of public works, commissioner of public health, tax commis¬ sioner, inspector of buildings and the chiefs of the fire and police departments. The common council, as constituted in 1918, consists of 37 members, 25 of whom are elected by wards for a term of two years. Twelve are elected for terms of four years by the city at large. In 1920, according to an amendment to the city charter adopted in April 1918, the council will be reorganized to consist of 25 aldermen, elected by wards for a term of four years each. The distinctive feature of the government of Milwaukee is the board or commission plan. An increasing number of these boards have been created with broad administrative powers, in most cases entirely independent of the com¬ mon council, except in the matter of financial supervision. Chief of these is the school board, which consists of 15 members elected by the people at large, and entirely independent of the common council even in its financial trans¬ actions. Other boards are the park board, library board, sewerage commission, museum board, central purchasing board and the board of city service commissioners, all of which con¬ trol the city activities indicated by their names. The members of these boards are in most cases

appointed by the mayor subject to the approval of the council.

Public Works. — The water works prop¬ erty valued at $8,906,170 is owned by the city, the entire cost of construction and mainte¬ nance having been paid out of its proceeds, and its surplus revenues aid in defraying other municipal expenses. Following a comprehen¬ sive survey of street lighting systems and problems, a system of electric light distribution, unique both in practical efficiency and artistic

beauty, has been designed and is now being in¬ stalled. An incinerator for consuming gar¬ bage, which is collected by the city without charge, is in operation. A free emergency hospital, originally a private benefaction, is maintained at public expense, likewise six large natatoriums throughout the year, and in the summer two free public bathhouses on the lake beach. In addition to triangles, squares and boulevards, there are 13 parks of which the total acreage is 939. These parks vary in size from 6 to 180 acres. During the winter months free public evening lectures for adults are given in public school halls, the expense being borne by the school extension fund. A city hall was completed in 1896 at a cost of $1,016,935, and the library and museum build¬ ing is valued at over $2,000,000, with contents. The library contains 351,848 volumes. There are 397,607 specimens in the museum, as well as 24,565 books, pamphlets and maps, and .17,310 lantern slides. The city is constructing a system of intercepting sewers and the sewage commission is conducting extensive experiments in the activated sludge system of sewage disposal.

Education. — ■ Milwaukee is splendidly equipped with educational facilities. Its pub¬ lic school system is composed of six high schools, 64 district schools, a trade school for girls, a boy's technical high school and a day school for the deaf. There is an open-window school for children who are below normal. Special classes are provided for blind and crippled children. The girls' trade school, with classes in sewing, dressmaking and cooking, has an average membership of 421. In addi¬ tion to the public school system, there are, including Lutheran and Catholic institutions, 58 private parochial schools. Marquette Uni¬ versity for men includes in its curriculum not only general academic courses but fine schools of medicine, law and engineering. Milwaukee Downer College, for women, has a well-de¬ served reputation throughout the Middle West. The State of Wisconsin has located a normal school in the city, which offers regulation courses for teachers as well as training for kindergarteners, music teachers and teachers of art. The Extension Division of the University of Wisconsin maintains an office in Milwaukee which offers unusual opportunities to the student.

History. — The first permanent settlement of Milwaukee is usually dated from 1818, when Solomon Juneau erected his little log cabin on the east side of the Milwaukee River. French and English traders had been here be¬ fore that date, and a procession of Jesuit priests and French voyageurs had preceded them. The first recorded visit of a white man on the site of the future city is in the journal of Father

Zenobe Membre, a Recolle missionary priest who accompanied Robert Cavalier de la Salle on his memorable exploratory trip from Lake Erie to the Illinois country in 1679. He notes that both Mascoutens and Foxes were dwellers <(on the banks of the river called Melleoki.® John Frangois Buisson de Saint Cosme jour¬ neyed in 1699 along the west shore of Lake Michigan from Michilimackinac to the Mis¬ sissippi. ((On the seventh,® he wrote, (<we arrived at Melwarik (Milwaukee). This is a river where there is a village which has been considerable and inhabited by the Mascoutens and Foxes, and even some Pottawattamies.® The word Melleoki and its numerous variants, which by a process of evolution has become Milwaukee, is of Pottawattamie origin and sig¬ nifies <(good land.® Another definition accepted by some historians is ((council place,® this hav¬ ing been regarded as neutral territory by different tribes of Indians. The dwellers in the old Indian village were evidently a tur¬ bulent set, for Col. Arent de Peyster, com¬ mandant at Michilimackinac, wrote of them in the early years of the Revolutionary War as ((runagates — a horrid set of refractory In¬ dians.® Lieutenant James Gorrell, whose British regulars occupied the stockade at Green Bay in 1762 and gave it the high-sounding title of Fort Edward Augustus, wrote the name of the place as <(Milwacky.® An English trader lived among the Indians at this place in that year. Fur traders made brief stays in the village from time to time. Alexander Lafromboise and his brother were located as traders here in 1785, with a large stock of goods. In 1795 Jean Baptiste Mirandeau, a Canadian black¬ smith who had married an Indian woman, built a cabin and made himself useful to the Indians by mending their firearms. He received as compensation game and furs. He died in 1819, being survived by a family of 10 children, who joined the Indians when the Milwaukee band was removed. Thomas Gummersall Anderson, the son of a Loyalist, was a resident upon the site of the future city of Milwaukee from 1803 till 1806. He took an active part in the capture of Prairie du Chien by the British during the War of 1812. When Solomon Juneau arrived in 1818 he found a Pottawattamie village. He settled on the east side of the Milwaukee River, which later was called Juneautown; the west side of the river became Kilbourntown, after Byron Kilbourn (1834), and George H. Wal¬ ker gave the name of Walker's Point (1834) to the region south of the Menomonee River. Each of the three natural geographical divisions became the nucleus of a little community, and acrimonious rivalry was a natural resultant. The different names of streets on opposite sides of the rivers, now connected by 28 bridges, are a survival of the bitter feelings then en¬ gendered. The village of Milwaukee, now the East Side, was organized 27 Feb. 1837 ; Kil¬ bourntown, now the West Side, was annexed 11 March 1839; and

Walker's Point, now the South Side, 5 Feb. 1845. The city was incor¬ porated 5 Feb. 1845, and Solomon Juneau chosen first mayor.

Bibliography. — Anderson and Bleyer, Mil¬ waukee's Great Industries) (1892) ; Barton, (Industrial History of Milwaukee) (1886) ;

Buck, (Pioneer History of Milwaukee) (4 vols.,

COUNTY COURT HOUSE, MILWAUKEE

-1

4

MILYUKOV

MIMETITE

143

1876, 1881, 1884, 1886) ; Chapman, (In and Around Milwaukee' (1896); Conrad, 'History of Milwaukee from its first Settlement to 1895' (1895); Flower, (History of Milwaukee, Wis¬ consin, from Prehistoric Times to the Present Date> (1881) ; Frank, (Medical History of Milwaukee' (1915); Gregory, 'Early Political History' (1895) ; Holton, Commercial His¬ tory of Milwaukee ' (1858) ; La Piana, 'Italians in Milwaukee ' (1915); Lapham, documentary History of the Milwaukee and Rock River Canal' (1840) ; Larson, financial and Admin¬ istrative History of Milwaukee' (1908); Mor¬ rison, 'Milwaukee's History) (1892); Odell, 'Industrial Milwaukee) (1903) ; 'Sentinel Al¬ manac and Book of Facts; a cyclopedia of his¬ tory and statistical facts' (1897-1900); Wheeler, 'Chronicles of Milwaukee)

(1861) ; Wight, ‘Annals of Milwaukee College) (1848-91).

Chas. E. McLenegan, Public Librarian.

MILYUKOV, Pavel Nikolaevitch, Rus¬ sian historian, educator and political leader : b. near Saint Petersburg, 1857. Educated in Moscow he became a tutor in history at the university in 1886-95. Because of his liberal views regarding political reforms he was banished from Russia. He then went to Bul¬ garia and became professor of history at the University of Sofia. In 1897-98 he traveled in Europe and then came to the United States. Settling in Chicago he lectured on Russian subjects at the University of Chicago. A course of lectures delivered there was pub¬ lished in 1905 under the title of ‘Russia and Its Crisis. ’ In 1905 Milyukov returned to Rus¬ sia on the outbreak of the revolutionary move¬ ment to further the cause of liberty. He was imprisoned for a while, but on his release re¬ sumed his activities and was instrumental in forming the Union of Unions (composed of the educated and professional classes). He was elected to the first Duma as a Constitutional Democrat, which party (universal suffrage and constitutional government) he had cre¬ ated. While the Duma was in session he was arrested. After a month’s imprisonment he was liberated. He was a member of the Bal¬ kan Committee of Inquiry which investigated the conduct of the war of 1913. Milyukov edited the Constitutional Democrat papers, the Free Nation and Popular Rights, until they were suppressed by the Russian authorities. Then he became editor of the Petrograd news¬ paper called Rech. Besides a vast number of essays and magazine articles Milyukov has pub¬ lished many books. These include ‘Main Cur¬ rents of Russian Historical Thought’ (1893-95) ; ‘Sketches of the History of Russian Culture) (1895-96) ; ‘Russia and its Crisis) (1895) ; ‘Democracy and the Second Duma’ (1905) ; ‘A Year of Struggle’ (1907) ; and ‘The Balkan Crisis and Politics’ (1910).

MIMANSA (from the Sanskrit man, to investigate), investigation, is the collective name 6f two of the six divisions of orthodox Hindu philosophy. The two Mimansa divisions are: (1), the Purva-mimansa (Prior Inquiry, or Karma-mimansa), investigation concerning works that deal chiefly with the Vedic ritual and its significance; and (2), Uttara-mimansa (Later Inquiry, or Brahma mimansa), investi¬ gation concerning the Supreme Spirit, or, more

commonly, Vedanta (see Vedanta Philosophy), dealing with speculations on the nature of the Supreme Spirit. The principles are

em¬ bodied in a series of Sutras, or aphorisms, in 12 books, discussing the sacred ceremonies of the Veda and the merit accruing from their proper performance. Although the Mimansa is ranked by all Indian writers with the other philosophical systems, the term philosophy can hardly be applied to it in the same sense as to the other systems of philosophy. The object of the Mimansa is merely to lay down a correct interpretation of such Vedic passages as refer to the Brahmanic ritual ; to solve doubts wher¬ ever they may exist on matters concerning sac¬ rificial acts and to reconcile discrepancies (or seeming discrepancies) of Vedic texts. Jas-mini, a sage, was the founder of this school of interpretation. The standard introduction to the study of the Mimansa is by Madhava Achaeya. Consult Cowell and Gough, 'The Sarva-Darsana-Samgraha of Madhava-Acharya' (London 1894). The oldest extant commentary on the Mimansa is the Bhashya of Cabara-Svanim, written before the birth of Christ. This commentary was annotated about 700 a.d., by Kumarila, a great authority on In¬ dian philosophy. Colebrooke published a treat¬ ise on this subject in 1826, which was published in his 'Miscellaneous Essays' (London 1873). The subject is finely treated in 'The Six Sys¬ tems of Ancient Indian Philosophy,' by Max Muller (New York 1903). Consult also Macdonell, 'Sanskrit Literature' (London 1913).

MIMBRES RIVER. A stream rising on west slope of Mimbres Mountains in the north¬ ern part of Grant County, N. Mex., flowing south across Luna County near Deming and disappearing in the wide desert flat east of Florida Mountains. This flat is separated from Rio Grande Valley but to the south opens into the wide basin which contains Lake Guzman in Sonora, Mexico. The river has running water in Grant County, but excepting in time of freshet is dry in Luna County. The name is Spanish for osier or water willow which grows in the upper part of the valley.

MIME, a dramatic entertainment, native to Sicily and Magna Grascia, and appealing to popular taste by its scurrilous caricatures of low life. Originally performed in public squares on festival days, it was later developed into artistic form by Sophron Syracuse in the 5th century b.c. The 'Mimiambi' of Herondas (q.v.), a Greek poet of perhaps the latter half of the 3d century b.c., representing the every¬ day life of the common people, furnish trust¬ worthy examples of these literary mimes. The Romans adopted the mime in its unliterary form as early as the 3d century b.c., but it was not until Cicero's time that it received a place in literature at the hands of Decimus Laberius and Publius Syrus, of whose works we have fragments. As an after-piece, and under the empire as an independent performance, it was as popular as it was indecent in words and action.

MIMETITE, a mineral consisting of a lead arsenate and chloride closely resembling pyromorphite, occurring in hexagonal crystals. In color mimetite is usually yellow, or brown, rarely white, or colorless. Like pyromorphite, mimetite is found in the upper parts of veins

of lead ore where it has been formed by the oxidation of galena and mispickel.

MIMICRY IN ANIMALS. One of the

ways by which species and groups of animals are perpetuated. Its effect is to assure the safety of individuals by reason of their having such a likeness to something else that the eye of another animal seeking to do them harm overlooks them, by mistaking their real nature for the object mimicked, so that the enemy passes on. This is one of the phases of <(protective resemblance,® of which the two princi¬ pal are: (1) Mimicry, similarity in form to some inanimate object; (2) Imitation, similar¬ ity to another animal that for some reason is immune from attack by the enemies of the imi¬ tating species. In both cases color is likely to serve as an important element in the practical deception. See Coloration, Protective; Imi¬ tation.

These two phases, and other manifestation of deception for safety's sake, are regarded by the exponents of the Darwinian theory of or¬ ganic evolution as results of the gradual and unconscious acquirement, through the process of natural selection, of changes advantageous to the animal in its struggle for existence. The present article considers such beneficial results as have been obtained by acquiring by certain animals a resemblance to some vegetable or inanimate article of no interest or value to the enemy.

It is plain that if a moth or a caterpillar sitting on a tree-trunk can be mistaken by a bird or lizard for a bit of lichen or a dried twig it may frequently be passed by, and thus allowed to live long enough, perchance, to per¬ petuate its species. This happens actually in nature. Mimicry is developed, however, almost exclusively in small creatures

that are other¬ wise defenseless; and sometimes is restricted to the young of a species whose individuals when adult can either take care of themselves well or develop some special method of concealment or passive resistance. It also occurs in a few plants.

It is mainly exhibited by insects, but is manifest in some marine animals, for example sea-anemones, which when closed are to all appearance lumps of mud ; and many hydroids have a most deceiving resemblance (in our eyes, at least) to the seaweeds on or amid which they grow; while a pipe-fish, standing on its head, among the eel-grass alongshore, as is its custom, is as effectually concealed as any¬ thing can be. A few large examples might be cited, as the mata-mata turtle of South Ameri¬ can rivers, which is so tagged and fringed with outlying processes that it has the exact appear¬ ance of a weedy rock; but in this case, as in some others of mimicry, the advantage is more that the turtle's prey (fishes, etc.), will come near enough to be seized before they suspect its fatal presence, than that the turtle itself will be safer.

Mimicry is most prevalent, however, among insects and spiders. These are to be found in all countries with deceptive resemblance to withered, gnawed or moldy leaves ; to bits of twig, particles of dung, cocoons whose contents are breaking out; or to any of various objects under which insects seek refuge or conceal¬ ment, as flakes of bark or bits of stone. The

records of observation in the books of Darwin, Wallace, Bates, Fritz Muller, Semper, Belt, Forbes and other naturalists abound in in¬ stances, many of which were discovered by the merest accident. The classic example is the amazing likeness of a kind of butterfly of the East Indies, when at rest, to a leaf which ex¬ tends not only to the general color of the under surface of the closed wings and their markings, but to the attitude of the insect as it alights, for it places itself in a relation to the branch to which it clings precisely similar to the nat¬ ural arrangement of the real leaves about it ; and, of course, frequents only the one kind of tree whose leaf is mimicked. A tropical ˆwalking-stick® insect has flat extensions of the skin along its legs and body which are so shaped, and so mottled in color, that Wallace found even the sharp-eyed Dyak boys o f the Bornean forest deceived into thinking this in¬ sect <(a stick grown over by a creeping moss.® But our own northern, greenish-brown walk¬ ing-sticks are sufficiently deceptive in their twig-like aspect when, as is their custom, they sit on a bush-branch, holding their bodies stiffly out at an angle with their

fore legs stretched straight in front of their heads ; many must be overlooked for one that is detected. More familiar, perhaps, are the measuring-worms (hairless caterpillars of geometrid moths) which, clasping a branch firmly by their hind legs, will stand out rigidly from it, and main¬ tain this attitude for hours. Their dull gray color gives them exactly the appearance of a broken twig, and as long as they remain mo¬ tionless they are virtually safe. The whole race of mantids exhibit this character in a greater or lesser degree.

Another very striking example of mimicry is that first made known by H. O. Forbes who met with it in Java and in Sumatra. In the first instance, he noticed a certain butterfly perched, as often happens, on a white patch of bird's excrement dropped on a leaf. Approaching cautiously, he closed finger and thumb over the wings of the insect, which seemed glued to the sticky substance; ((To my surprise, however,® Forbes relates, C(part of the body remained be¬ hind, adhering, as I thought^ to the excreta.

… I looked closely at, and finally touched

with the tip of my finger, the excreta to find if it were glutinous. To my delighted astonish¬ ment I found that my eyes had been most per¬ fectly deceived, and that the excreta was a most artfully colored spider lying on its back, with its feet crossed over and closely adpressed to its body.® Forbes made the same mistake a second time, some months later in Sumatra ; and speaks of this extraordinary spider as <(a living bait so artfully contrived as to deceive a pair of human eyes even intently examining it.® Consult for the examples mentioned above Wallace, A. R., (Malay Archipelago > (New York 1869) ; Forbes, (A Naturalist's Wander¬ ings } (New York 1885).

Ernest Ingersoll. .

MIMIR, me'mir, in Scandinavian mvthol-ogy, the god of wisdom, and most celebrated of the giants. ((Mimir's Well® was the fountain of all wit and wisdom, in whose depths the future was clearly mirrored.

MIMNERMUS, the earliest writer of Greek erotic elegy, was born in Colophon or Smyrna,

and lived in the last half of the 7th century b.c. His collection of love-poems, called ‘Nanno* from the name of a flute-player whom in his old age he courted in vain, survives only in fragments which may be read in a separate edition by N. Bach (Leipzig 1826) or in Bergk’s (Poetae Lyrici GraeciP

MIMOSA, a genus of herbs, shrubs, trees and a few climbing species of the natural order Leguminosce. The species, of which more than 200 have been discribed, are natives principally of the American tropics. They have pinnate leaves, usually spicate clusters of small flowers, followed by flat, oblong or linear pods which when ripe break into one-seeded joints. Many of the species are noted for their sensitive leaves which at nightfall close and droop Others respond to a touch. Of these the humble or sensitive plant (M. pudica) is perhaps the best known.

MIN. Egyptian god of agriculture, typify¬ ing the generative forces of nature. Annual har¬ vest festivals were held in his honor. He is represented as a human being with a headdress of two enormous feathers and in his right hand he holds a flail. Behind him is a shrine with trees. The ram is sacred to him. Min was the local god of Panopolis or Akhmin and of Koptos. In later times Min was identified with Ammon Ra. The Greeks identified him with Pan. Consult Budge, A. Wallis, (The Gods of the Egyptians) (London 1904) ; Wiedemann, (Religion of the Ancient Egyptians) (New York 1897) ; Erman, A., (Life in Ancient Egypt > (London 1894).

MINA, Francisco Espoz y, Spanish guerrillero leader and general: b. Ydozin, Navarra, Spain, 17 June 1781 ; d. Barcelona, 24 Dec. 1836. As he sprang from the yeomen class, he naturally espoused radical and democratic ideas at an early age. When Napoleon tried to seize Spain, in 1808, Mina enlisted in Doyle’s regiment and then passed into a band of guerrilleros commanded by his nephew, Xavier Mina. When Xavier was captured by _ the French in 1810, seven men of the band decided to follow Mina; and soon afterward the Junta of Aragon gave him command of all the guerrilleros of Navarra. The national government of Cadiz gave him rank and in 1812 he was promoted commander-in-chief in Upper Aragon and on the left bank of the Ebro. Mina was an excellent organizer and strategist. His po¬ sition made it possible for him to confiscate war supplies imported by the French and to levy duty upon all imported war materials. This provided him

with money to pay his troops regularly; and he was, therefore, able to main¬ tain an excellent morale among his men and to please the countryside by avoiding a levy of taxes and contributions. Mina served with distinction under the Duke of Wellington in the campaign of 1813-14 and was frequently wounded. When Ferdinand VII was restored, he fell from favor, made an unsuccessful at¬ tempt to instigate an uprising among the Lib¬ erals at Pampluna and went into exile. The Revolution of 1820 brought him back and he served the Liberal party throughout northern Spain, resisting the French attempts to bring back the king. He was forced by the French to capitulate in November 1823, and the French allowed him to escape into England. In 1830

he made another attempt against Ferdinand; but notwithstanding this, on the death of Fer¬ dinand he was recalled to Spain and the gov¬ ernment of the regent, Cristina, gave him the command against the Carlists, in 1835, although fearing his Radicalism. By this time his health was broken and he resigned his command in April 1835. A year later he took command in Catalonia and aided in forcing the regent to grant a constitution to Spain (August 1836). Mina was a brave man. Mention is made of him in all the histories dealing with Spanish matters in the early days of the 19th century. He was a master in the practice of irregular mountain warfare and was not averse to high¬ handed methods. His first act was to arrest and shoot a brigand who was pretending to be a patriotic guerrillero. He made large claims; for instance that in two years (1810-12) he had fought 143 actions, taken 13 fortified posts and captured 14,000 prisoners. He also said that he immobilized 26,000 French troops which would otherwise have served with Marmont in the Salamanca campaign. In 1825 he published (A Short Extract from the Life of General MinaP Consult his (Memorias, > published by his widow (Madrid 1851-52).

MINA, Francisco Xavier, Spanish solder: b. Ydozin, Navarra, 1789; d. Mexico, 11 Nov. 1817, nephew of Francisco Espoz y Mina (q.v.), with whom he served in the guerrilla warfare against the French in 1808-10. Taken prisoner, he was detained four years in Vincennes. In 1814 he served against Ferdinand VII, and fled to France and thence to England. While in England he became interested in the cause of Mexican patriots, and, aided by some wealthy Englishmen, he organized an expedition. Ar¬ riving in the United States he received sup¬ port. Two hundred volunteers followed him to Galveston in

November 1816. More assist¬ ance came from New Orleans. His force landed at Soto Marina, province of Tamaulipas, in April 1817. With his 300 men he took the towns of Leon and Guanajuato with the fortress of Sombrero and defeated the generals Arminan and Ordonez; but he was deserted by his followers, surprised by an overwhelming force and taken to Mexico, where he was shot.

MINA, an ancient Greek denomination of money. The Attic mina contained 100 drach¬ mae, and was valued at about $16.

MINA-BIRD, or MYNA, a starling or grakle (Eulabes religiosa), very familiar throughout India and eastward, nestling confid¬ ingly in gardens. Its color is a deep velvety black with purple and green reflexions, and with a white mark on the base of the quills of the wing. The bill and feet are yellow, and there are two yellow wattles on the back of the head. The Hindus regard it as sacred to Ram Deo. Certain other similar species are also called mynas in some localities.

MIN7EANS. See Sabˆans.

MINAHASSAS, a medley of _ Malayan tribes of more or less savage type living in the province of Minahassa in northern Celebes. By some authorities this group of natives is called Alfuros, meaning wild, or half-savage. In language the Minahassas seem to belong to the Malay stock, but physically they resemble the Tagals and other Philippine tribes. Some

of them have a suggestion of Japanese char¬ acteristics. They are supposed to have immi¬ grated from the north into the island. The word Minahassa means ((a country that has been formed by binding a number of territories into one.® Ihe original form was Nimahasa. The chief town is Manado, or Menado, pleasantly situated on the shores of a wide open bay of the same name. The population of Manado consists of a very small percentage of white Europeans, a number of half-castes com¬ prising Chinese, Eurasians, Arabs, Christians, a few Mohammedan natives and the Bantiks, a race of Alfuros that still

retains its old re¬ ligion. The population of Manado is between 5,000 and 6,000. The exports are copra, coffee, cocoa, vanilla, rattan, spices (chiefly nutmeg) and ebony and other wood. After the arrival of the Dutch colonists, wars, assassinations and revolting savage customs disappeared and the people are now peaceful, industrious and law-abiding. _ The change from a strict matriarchy to a strict patriarchy has, in many instances, taken place by the introduction of capture marriages. The change may be seen in opera¬ tion in some of the Malay tribes at the present day. For a complete account of the history, manners and customs, mythology and industries of the Minahassas, consult Hickson, Sydney J., (A Naturalist in North Celebes* (1889).

. MINAMOTO YORITOMO, Japanese war¬ rior and statesman and one of the most famous figures in Japanese history: b. 1146; d. 1199. The chief clans in Japan in the middle of the 12th century were the Taira and their rivals, the Minamoto. The Mikados, like the Valois kings of France in the wars of the Huguenots and Catholics, vainly tried to balance one party against the other. In 1159 the Taira clan crushed the Minamoto clan and one of the Minamoto chieftains, Yoshitomo, was killed. Four of his sons escaped; two of them, Yoritomo and his younger brother, Yoshitsune, were destined to overthrow the Taira and to subjugate the three islands, Honshiu, Shikoku and Kiushiu. When Yoshitomo was treacher¬ ously murdered bv Kiyomori, chief of the Taira clan, Yoritomo fled. Captured and brought before Kiyomori he was ordered o be beheaded; but, at the request of Kiyomori's stepmother, he was spared. He was banished instead to Idzu. While there, he married the daughter of Hojo Tokimasa, one of his guardians in exile. In 1180 he gathered an army made up of his father's scattered re¬ tainers, followers of his father-in-law and some monks of Hiyeizan,— a force of 27,000 men. He occupied the north bank of the Fuji River; and across the river was the Taira army nearly double the size. A decisive battle was about to be fought when suddenly the Taira armv was seized with panic and retreated westward to¬ ward Kioto. At this moment Yoritomo was joined by his younger brother, Yoshitsune (1 158—89) , a graceful, well-knit youth, and, notwithstanding his early age, the best swords¬ man ˆ in Japan. Yoshitsune became lieutenant of his brother, Yoritomo, and marched out of Kioto 19 March 1184 with 75,000 men, most of them bodies of mounted archers. On 21 March Yoshitsune, while the Taira troops were en¬ gaged on both flanks, with a detachment of cavalry of the Minamoto army threaded his way across the mountains and riding down the steep

declivity charged the enemy's centre. Both the Taira wings were crushed and the battle of Ichi-No-Tani was won. The victory of Ichi-No-Iani did not end the war, however, for the Taira fleet was intact. Yoritomo preferred to attack it; and the great sea-fight of Dan-No Ura took place on 25 April near the Straits of Shimonoseki. Yoshitsune was in command and had 800 junks as against 500 junks. Yoshitsune was victorious. The island of Kiu¬ shiu, like that of Shikoku and most of Honshiu, fell under control of the Minamoto leaders. Yoshitsune returned to Kioto with the reputa¬ tion of being the foremost soldier and sailor in Japan. His success excited the jealousy of Yoritomo, who tried to have him assassinated. Yoshitsune, however, escaped with 11 comrades and raised a rebellion against his brother, which was unsuccessful. Finally Yoshitsune was murdered by a great noble named Mutsu.

Yoritomo now made Kamakura his capital and instituted many reforms, both civil and military. He became Shogun in 1192 and his methods for ensuring that the executive power should remain in his own hands and in those of his successors were remarkable. With the establishment of the Shogunate a new epoch in Japanese history began; and, with only a few breaks, it remained the prevailing form of gov¬ ernment until the 19th century when Japan came into relation with the modern world. The foundation of the Shogunate must not be re¬ garded, however, as the work of one man; it was the result of a long evolution of the feudal system which had its beginnings in the time of the Fujiwara.

Like Napoleon Yoritomo was a short set man with a large head. His voice was power¬ ful and ringing; when he pleased his manners were extraordinarily gentle. Brave, astute and iron-willed, he is one of the most noteworthy of all Japanese characters. Of a cold, calculating nature, he knew how to use men and women as his tools and he stopped at nothing, not even at fratricide, to achieve his ends. In religious matters he proved a tolerant ruler. Among the monuments still extant at Kamakura are the temple of Hachiman, the god of war and tutelary deity of the Minamoto clan, and the temple of Kwannon, both of which he erected The institutions founded by Yoritomo and modified by Tokugawa Iyeyasu at the beginning of the 17th century lasted until 1868. The Minamoto were in time superseded by the Hojo clan into which Yoritomo had married. On the death of Yoritomo, his son became Shogun but his grandfather, Hojo Tokimasa, had him murdered after he had reigned four years. His brother, the third Shogun, succumbed to a plot by Hojo Yoshitoki and the Hojo clan ultimately obtained possession of the Shogunate. A portrait of Minamoto Yoritomo and also a battle of the Minamoto and Taira

appear in Saito Hisho, (A History of Japan, > translated by Elizabeth Lee (1912).

MINARET (Arabic, minarat, a lantern), a tower generally surrounded with balconies, and erected in connection with the mosques in Mo¬ hammedan countries, and peculiar to Moham¬ medan architecture from which the muezzin summons the people to prayer and announces the hours, bells not being used by the Moslems.

I he form is derived from the Pharos light¬ house at Alexandria. The earliest mosques had

no minarets, the first known being that of Damascus, erected about 705. They are a square construction up to the height of the wall of the mosque, with a winding stairway, and above they are octangular. The tower of the Madison Gardens in New York is copied from the Giralda of Seville, which is 308 feet high. See Mosque.

MINAS, me'nas, or BELLO HORI¬ ZONTE, Brazil, the capital of the state of Minas Geraes, stands at an elevation of over 3,000 feet, 60 miles northwest by rail of Ouro Preto, which it replaced as the administrative seat in 1894. It is a modern town with wide streets, electrically lighted, and adorned with handsome public buildings, elegant residences and fine parks. Pop. 14,000.

MINAS, Uruguay, the capital of the depart¬ ment of Minas, 56 miles by rail northeast of Montevideo. It carries on a trade in the pro¬ duce of the surrounding agricultural region, and in the marble and granite of the neighboring quarries. Pop. 8,955.

MINAS GERAES, me'nas zha'ris, Brazil, a southeastern state bounded north by Bahia, east by Bahia and Espirito Santo, south by Rio de Janeiro and Sao Paulo, southwest by Sao Paulo, and west by Goyaz; area, estimated at 221,951 square miles. The surface is mostly moun¬ tainous, and though lying within the tropics its general elevation, averaging about 2,000 feet, renders the climate temperate and

healthful ; but the low tracts are periodically flooded, and contain extensive swamps and pools. It is rich in minerals, gold and diamonds being at one time a great source of wealth; silver, platina, copper, lead, rubies and other precious stones being found. Extensive ironworks have been erected in the neighborhood of Ouro Preto. Sugarcane, cotton, millet, to¬ bacco and coffee are cultivated. The cultiva¬ tion of cereals is extensive, and the finest Euro¬ pean fruits have been introduced. Vast herds of cattle and swine feed in the pastures and forests. Timber and dye-woods of the most valuable kind, together with numerous varieties of gums, balsams and medicinal plants, grow freely in the latter. Some trade in home manu¬ factures, and an extensive foreign commerce, have been established. For administrative purposes Minas Geraes is divided into 14 comarcas. It sends 20 members to the general assembly and 10 to the senate. The provincial assembly is composed of 36 members. It sits at Minas (q.v.) since 1894, when the adminis¬ trative seat was removed from Ouro Preto. Pop. 4,649,825.

MINAS DE RIO TINTO, Spain, town in the province of Huelva, 32 miles northeast of the city of Huelva. The -mountainous country in which this town is situated contains rich de¬ posits of copper ore which were worked by the ancient Phoenicians. In 1873 a London com¬ pany took control of these mines and produced the ore by new methods. More than 10,000 workers are now employed. In 1911 the ore produced amounted to 1,603,854 tons. In 1845 the town had only 800 inhabitants : in 1910,

12,626.

MINBU. A district and division of Upper Burma. This district consists of 3,299 square miles with a population of 233,377. The physical

features exhibit low plain land toward the Irrawaddy, and an undulating country inland, rising ever higher westward toward the Arakan hills. Between the plain and the Arakans run the Nwa-Madung hills, north and south. The chief rivers and streams are the Irrawaddy, the Mon, the Maw and the Salin. They are much used for irrigation. Along the Irrawaddy and in the lagoon fed by it, called Paughlin Lake, there are fisheries, the rights to which are sold yearly by public auction, and realize an average of $5,000. The valleys are cultivated, but are deadly except to natives. Oil has been discovered near the

mud volcanoes of Minbu, but lie too deep to be profitably worked. Along the Mon River the betel-vine is cultivated. The district of Minbu contains much forest land. The chief crops are rice, millet, grain, beans, peas, sesamun and tobacco. The annual rainfall varies everywhere. In the hot months the thermometer rises to 100° F., and in December it falls to 49° F. The chief town is also called Minbu. It is situated on the Irrawaddy, which is here three miles wide with many islands and sandbanks. Pop. about 5,780. In the dry season the steamers cannot come nearer to the town than two miles. The division of Minbu consists of the districts of Minbu, Magwe, Thayetmyo and Pakokku. Its area is 17,172 square miles. Pop. about

1,076,280.

MINCH, The, Scotland, the channel off the northwest coast between the mainland and the northern part of the Outer Hebrides ; it is from 25 to 45 miles wide and has a very rapid current, and on either side are numerous lochs or sea-arms penetrating inland. It is connected with the Sea of the Hebrides on the south by the Little Minch, the channel between the island of Skye and Long Island; it is from 14 to 20 miles wide.

MINCIO, min'cho, Italy, a river, the ancient Mincius, which flows from the south extremity of Lake Garda, near Pescheria, and after forming the lake and marshes that sur¬ round Mantua falls into the Po eight miles below the city. Its banks are remarkably fertile, and celebrated for their beauty by Virgil, who was a native of this country. It formed an important base of operations in the wars be¬ tween France and Austria. The length of its course is about 115 miles.

MINCOPIES, min-ko-piz, natives of the Andaman Islands. They are typical Negritos, averaging less than five feet in height with cephalic characteristics similar to those of the negro. Their condition is low. They live in open huts (called chongs), consisting of a roof on four stakes, and subsist on roots, wild fruit and game. In hunting they use a peculiar S-shaped bow. There are 12 tribes of Min-copies, all descended from a common stock but each with its own dialect and tribal habits. Consult Deniker, (Races of Man> (1901) ; Brown, A. R., (Notes on the Language. of the Andaman Islands> (1914) and (Aborigines of the Andaman Islands) in the Journal of the Anthropological Society (Vol. XI, London

1882).

MIND. See Psychology.

MIND-CURE. See Mental Science; Suggestion.

MIND READING. See Hypnotism ; Telepathy.

MIND-STUFF. See Panpsychism.

MINDANAO, men-da-now', Philippines, the most southeastern and second largest island of the archipelago, lying between lat. 5° 35' and 9° 50' N. and between long. 121° 53' and 126° 28' E., about 220 miles northeast of Borneo. It is bounded on the east by the Pacific Ocean and on the west by the Sulu Sea; area, 35,457 square miles ; with its dependent island, 36,293 square miles.

Topography and Climate. — The outline of

the island is very irregular and the coast is uneven and much indented with deep bays and inlets; the shore line is 1,592 miles and the width of the island from east to west 386 mil^s. The island is very mountainous, particularly in the interior, the mountain system consisting of a number of irregular ranges extending gener¬ ally north and south, and as a rule approaching near the coast. The mountain formation shows the effect of earthquake and volcanic action, and there are many volcanoes, some of which are active. The principal peaks are Apo (10,312 feet), near the southeastern coast, and Malindang (8,560 feet) in the northwest. The island is drained chiefly by two large rivers, both over 200 miles long, the Grande de Min¬ danao (q.v.), flowing southwest and west, on the western side of the central mountain range, and the Butuan or Agusan, flowing northwest, on the eastern side of the same range. There are numerous other small streams and nine large mountain lakes. There are iron springs at Placer, in the province of Surigao; sulphur springs at Mainit, Surigao and Balingasag, Misamis, and medicinal thermal springs at Malibato.

As the island is within 10° of the equator, the climate is hot and humid, but more equable than that of Luzon ; rains are frequent and heavy, the annual fall being 100 inches.

Forests and Fauna. — The island is covered with forests of valuable woods for ship and house-building and furniture making; among these are the molave narra (similar to the yel¬ low pine), teak, ebony and cypress; the gum and resin-producing trees and medicinal and dye plants also grow abundantly. Animal life is abundant in these forests ; over 200 species of birds have been classified, of which 17 species are peculiar to Mindanao and Basilan; deer, wild hogs, monkeys and the haguang or colugo (q.v.) are numerous. Reptiles, includ¬ ing the giant lizard, iguana and large snakes, particularly the boa, also infest the forests and crocodiles the river.

Industrial Resources. — The staple, agricul¬ tural products are rice, sugar, cotton, corn, tobacco, indigo, coffee and hemp ; other prod¬ ucts of special value are cloves, nutmegs, cin¬ namon and other spices, betel nuts and betel peppers. The most important industry is the cultivation and shipment of hemp and forest products ; large herds of cattle and horses are raised ; and there is a little weaving of hemp and cotton fabrics for home use. Less than 2 per cent of the land is under cultivation. Edible birds' nests are also gathered and ex¬ ported. Communication is largely by water, as there are few roads except in the immediate vicinity of the chief towns, and the towns and

villages are situated on the coast or on the large lakes and rivers. Gold is obtained in small quantities by the natives, and is doubtless abundant; coal, sulphur, copper and platinum are also reported.

People and Government. — About a third of the population of Mindanao is composed of Christianized Malays ; there are also tribes of the Moro race who are Mohammedan in re¬ ligion ; the interior is peopled by pagan tribes and the northern and eastern coasts by Visayan Filipinos. The island was first occupied by United States troops in 1899. Civil government was provided for Mindanao and adjacent is¬ lands under the Philippine Commission in 1903, under the name of the Moro Province. In 1914 the department of Mindanao and Sulu was cre¬ ated, the military governor of the old Moro province giving place to a civil governor in¬ vested with wide powers and whose construc¬ tive task it will be to bring a turbulent and suspicious Mohammedan population into har¬ monious relations with the Christian Filipinos. There was a serious outbreak of cholera in

1915. Pop. 499,634. See Philippine Islands; Moros.

MINDANAO, Grande de, gran'da da men-da-now', a large river of the island of Min¬ danao, Philippines. It rises in the Rangayan Mountains, flows south to the Lake of Ligua-san, and passing through this lake flows north¬ west to Illana Bay. About 25 miles from its mouth it divides into two branches, which enter the bay about five miles apart, with a large delta between them ; the north arm is the larger and more navigable ; the south arm is narrow and only five feet in depth. The river is navigable for 70 miles for small vessels not drawing over four feet. Its course is mostly through a very fertile region and it drains an extensive plain with several large lakes ; in length and volume it is the largest river of the Philippines. In the upper part of its course it is known also as the Pulangui.

MINDEN, Neb., city and county-seat of Kearney County, on the Chicago, Burlington and Quincy Railroad, about 120 miles west by south of Lincoln. It is in a fertile agricultural region in which stock-raising is also a promi¬ nent industry. It has considerable trade in wheat, corn, hay and livestock. There are one State and two national banks, courthouse and an excellent high-school building. Pop. 1,600.

MINDEN, Prussia, a town of Westphalia, on the left bank of the Weser, 35 miles south¬ west of Hanover. It is one of the oldest towns in Germany and the streets in the ancient parts are narrow and crooked. It has a fine cathedral of the 13th century, in the early pointed Gothic style, a gymnasium -and an orphan hospital; manufactures of linen and cotton, tobacco, chicory, chemicals, soap, lamps, machinery, etc., and an important transit and general trade. It was made the seat of a bishopric by Charle¬ magne, was afterward a member of the Han¬ seatic League, became a possession of the Elector of Hanover and finally passed into the possession of Prussia in 1814. On 1 Aug. 1759 the French were defeated here by an Anglo-Hanoverian army during the Seven Years' War. Pop. 26,454, predominantly Protestant.

MINDORO, men-do'ro, Philippines, an island lying south of Luzon, a

little north of the centre of the archipelago ; length, north¬ west to southeast, 110 miles; width, northeast to southwest, 56 miles; area, 3,851 square miles, with dependent islands, 4,024. The island, which is oval in outline, is mountainous, the general topographical features consisting of several high broken ranges, forming an elevated plain in the interior ; and from this plain sierras extend in different directions toward the coast, which is mostly low and marshy, especially on the north and east ; on the west coast along Mindoro Strait is prairie land. The culminating point of the mountain system is Halcon Mountain in the north (8,800 feet). There are numerous small rivers, but no gen¬ eral river system of main stream and tribu¬ taries. The climate is variable ; the rainfall heavy and monsoons frequent ; the western coast is temperate and healthful, but the north¬ ern and eastern coasts are hot.

At one time, before the decay of the Spanish monarchy, the rice yield was so abundant that Mindoro was called ((the granary of the Philip¬ pines" ; but the frequent attacks of Moro pirates destroyed the prosperity of the island, and the agricultural products are now unim¬ portant, being almost entirely for home con¬ sumption. Sugarcane is being profitably ex¬ ploited ; rice, cocoa, tobacco, hemp, cotton, etc., are raised ; the cultivation of hemp is increas¬ ing and a small amount of cotton is exported to the island of Ipil. In the time of the early Spanish explorers reports of great mineral wealth, especially gold, were circulated; the real mineral resources are but little known, though as far as modern exploration has gone copper, gold and coal have been found. The island is heavily wooded and its chief commer¬ cial wealth is in forest products; the trees in¬ clude cedar, ebony, mahogany, gum trees, gutta¬ percha, palms and dye woods. Near the prin¬ cipal towns wood-cutting and rattan splitting for the Manila market is the chief industry; rattan, buri, honey, forest gums, balao oil, pitch and other forest products are the chief articles of export; tortoise-shell, obtained from the small neighboring islands, and canoes cut from a single piece of wood are also exported; and there is a considerable production of . sago. There are only a few roads, access to inland villages being by mountain trails or by river-canoes; the local trade between coast towns is carried on mostly by native sailing craft; all exports for Manila and other islands are con¬ centrated at ports of call for steamers.

In June 1902 civil government was extended to Mindoro and adjacent islands, and it was detached from the province of Cavite and made a subprovince of Marinduque (q.v.). The in¬ habitants of the interior are wild tribes, among whom the Manguianes (about 15,000 in number) predominate ; the people of the north coast are mostly

Tagalogs, those of the south coast Visayans. Pop., estimated to include wild tribes of the interior, 28,361.

MINE ACCIDENTS. The conservation of human life in mining and other industrial plants is of such importance that it has re¬ sulted in the enactment of inspection laws, the purpose of which is to safeguard the work¬ men. The first coal mine-inspection law was

enacted in Pennsylvania in 1870,* and since then the other States have done likewise until all the important coal-producing States are under State inspection.

The United States has produced 11,093,- 500,000 tons of coal under inspection since the first State-mine inspection law was enacted. The complete records for this production to the close of 1917 show that 59,269 men have been killed in coal-mine accidents while in the per¬ formance of their regular duties of mining coal. The number of men engaged in the production of this amount of coal represents the equiva¬ lent of an army of 18,078,000 men engaged for one year. The number of men killed per 1,000 employed during this 48-year period was 3.28. For every 10,000,000 tons of coal produced 55 lives were lost, or a production of 186,700 tons for each life.

At the beginning of the inspection service, the fatality rate was 5.92 per 1,000 men em¬ ployed, or a production of 74,238 tons of coal per fatality. In both 1915 and 1916, the fatality rate was 3.09 per 1,000 men employed, while in 1917, owing to war conditions, the fatality rate was 3.56 per 1,000 men employed. The largest production per fatality was in 1916 when 265,- 094 tons of coal were mined for each man killed during the year.

Records of non-fatal accidents at coal mines are incomplete, but with the enactment of com¬ pensation laws since 1911, data relating to these are being collected, but it has not been as¬ sembled sufficiently to give a total for the United States for any particular year. How¬ ever, it is believed they will be comparable with the figures for the metal mines.

Inspection in metal-mining States has not been as complete as in the coal-mining States. However, in 1911 the United States Bureau of Mines began a systematic census of metal mines and quarries, resulting in representa¬ tive data. Complete returns are not possible, by reason of the law not making it compulsory to report to the bureau.

Sufficient data have been obtained, however, to indicate that the non-fatal accident rate in metal mines is more than 300 per year per 1,000 men employed. It is believed that this rate will also apply to coal mines. The quarry rate is less, about 125 per 1,000, as all work is performed in the open day¬ light conditions.

Table 1 shows that for the mines, quarries and metallurgical works of the United States more than 1,000,000 men are employed, of whom three out of every 1,000 are killed each year. At least 300 per 1,000 in the combined industries are injured to the extent that valu¬ able time is lost, and in most cases medical attendance required. A reduction of 50 per cent in the number of accidents would mean an annual saving of 1,500 lives, to say nothing of lessening the injuries and sufferings sustained by about 300,000 workmen. From an humani¬ tarian point of view, a great good would be accomplished if this reduction could be brought about. Accidents will occur, yet experience shows that they may be reduced in number, al¬ though it is impossible to eliminate them entirely.

*For details of coal-mine fatalities, 1870-1914, the reader is referred to U. S. Bu. Mines Bull. 115, coal-mine fatalities in the United States, 1870-1914, by A. H. Fay.

The accompanying tables point out some of the principal causes of accidents and furnish enough basic information to call attention to the importance of accident prevention.

As a summary of what may be done to assist in accident reduction, the following is submitted :

1. Keep exact records of all accidents as to time, place, cause and result of accident along the line of the report required by the insurance companies before a claim is paid.

2. Keep detailed records of men employed, days worked, as well as shifts and wages lost by reason of accidents. This will bring out the

economic loss due to accidents.

3. Standardization of mining laws, rules and regulations so that all companies will be re¬ quired to render to the State mine inspector, or compensation commission, the same type of report.

4. Cooperation with State and Federal agencies, whose objects are a reduction of acci¬

dents, the welfare of the workman and the installation of safety devices.

5. The spread of safety-first propaganda as much as possible in any manner whatever whereby an interest may be created among the employees, and thus educate them to be able to take care of themselves.

6. The installation of safety devices ; syste¬ matic inspection, and above all the education of employer and employee as to the needs of re¬ sults to be obtained from accident-prevention work.

Fatalities in the Mining Industry Due to Explosives. — Table 4 shows the number of fatalities from the use of explosives in the bituminous coal mining industry and Table 5 shows the number and percentage of fatalities at metal mines and quarries due to explosives. In 1903 (Table 4) 9.8 per cent of the fatalities at bituminous mines were due to the use of ex¬ plosives, whereas in 1917 only 2.65 per cent

Table 1. — Fatality Rates in Different Branches of Mineral Industries in 1917

Compared on a 300-DAY Basis.

(Length of shift not considered.)

BRANCH OF MINERAL INDUSTRY

Average

days

active

Men employed

Days of labor performed

Killed

Number killed per 1,000 employed

Actual

number

Equiva¬ lent in 300-day workers (calcu¬ lated)

On

actual

time

basis

On 300-day basis

Metal mines .

287

200,579

192,085

57,625,811

852

4.25

4.44

Metallurgical workers:

Ore dressing plants .

303

24,111

24,372

7,311,499

47

1.95

1.93

Smelters * .

342

44,376

50,659

15,197,643

53

1.19

1.05

Auxiliary works .

328

15,555

17,014

5,104,146

16

1.03

.94

Coal mines .

251

757,317

634,666

190,399,680

2,696

3.56

4.25

Coke ovens:

Beehive .

308

18,820

19,295

5,788,576

25

1.32

1.30

Byproduct .

360

13,597

16,300

4,889,853

51

3.75

3. 13

Quarries (inside) .

249

54,804

45 , 449

13,634,773

91

1.66

2.00

Quarries (outside) .

285

27,486

26,076

7,822,584

40

1.46

1.53

Total, 1917 .

266

1 , 156,645

1,025,916

307,774,565

3,871

3.35

3.77

Total, 1916 .

255

1 , 128,257

957,393

287,218,232

3,224

2.86

3.37

* Does not include iron and steel industry.

Table 2.— Non-Fatal Injuries in the Metal Mining Industry of the United States,

by Mining Methods.*

METHOD OF MINING

1915

1916

1917

Number

of

injuries

Number injured per 1,000 300-day workers

Number

of

injuries

Number injured per 1,000 300-day workers

Number

of

injuries

Number injured per 1,000 300-day workers

Room and pillar… … .

Overhand stoping… . . ‘… . .

Underhand stoping .

Caving methods … .

Open pit, with steam shovel .

Open pit, without steam shovel .

Total and average .

2,819

15,668

976

5,801

1,908

142

413.95 382.72 507.81 328. 13 250.97 120.03

4,013

13,198

1,707

7,134

2,416

108

477.17 436.44 460. 11 349. 71 281.58 348.39

2,953

13,066

1,380

6,545

2,287

109

290.68

358.23

297.99

329.94

221.39

86.71

27,314

358.73

28,576

398.83

26,340

318.52

* The data shown hefe represents 75,000 300-day workers, or three-eighths of the entire metal mining industry for each of the three years.

Table 3. — Metal Mines, Coal Mines, And Quarries: Principal Causes of Fatalities,

Showing Percentage Due To Each Cause, 1911 to 1917, By Years.*

Cause of death

INDUSTRY

Falls of overbur¬ den, roof, quarry material, ore, or coal

Explo¬

sives

Haulage

and

handling rock, ore, or coal

Falls

of

person

Elec¬

tricity

Ma¬

chinery

Gas

and

dust

explo¬

sions

Other

causes

Total

; i • »

1911:

Mp.t.a1 mines …

35.52

11.22

7.63

15.39

2.45

3.16

27.63

100.00

Coal mines .

47.40

6.02

17. 13

1.28

3.73

1.51

13.74

9. 19

100.00

Quarries .

25.53

26.60

20.21

8.51

1.07

9.04

9.04

100.00

1912:

M pt a 1 minps .

34.49

49.03

14.22

6.08

10.28

13.92

3.78

3.78

19.52

100.00

Coal mines .

19. 14

1.36

3.64

1.65

11.99

7.11

100.00

Quarries .

17.37

22.06

27.70

8.92

1.87

11.74

10.33

100.00

1913:

Metal mines .

34.70

13.03

12.88

12.30

3.81

4.39

18.89

100.00

Coal mines .

45.39

4.95

18.31

1.80

3.16

1.80

18.45

6.14

100.00

Quarries

14.75

24.04

23.50

9.29

2.73

12.57

13.12

100.00

1914:

100.00

Metal mines

36.32

10.73

10.20

16. 10

3.04

2.50

21.11

Coal mines .

46.09

5.95

18.79

2.85

4.07

1.87

14.22

6.16

100.00

Onarrip.s .

29.45

19.44

18.33

12.78

1.67

6. 11

12.22

100.00

1915:

100.00

Mpf.al minp < ?

36.71

14. 10

10.49

15.91

2.53

1.99

18.26

Coal mines .

47.55

6.83

18.64

1.37

4.36

1.68

13.40

6. 17

100.00

Quarries .

30.40

18.92

15.55

11.48

2.03

9.46

12.16

100.00

1916:

100.00

Metal mines

32.28

12.77

10.04

14.64

3.73

2.58

23.96

Coal mines .

47.84

6.56

20.89

1.39

4.36

1.89

10. 15

6.92

100.00

Quarries .

19.08

16. 18

19.66

8.09

4.05

16.76

16. 18

100.00

1917:

100.00

26.17

9.27

10.33

13. 15

2.23

2.00

36.85

Coal mines .

45. 18

4. 12

22.11

.96

3.52

2.34

13.43

8.34

100.00

Quarries .

18.32

16.03

24.43

11.45

1.52

15.27

12.98

100.00

* Fay, Albert H., “ Metal-mine accidents in the United States,” 1917; Tech. Paper 224, Bureau of Mines, 1919.

were due to this cause, owing to the introduc¬ tion of permissible

explosives.

Table 5 shows that from 11 to 14 per cent of the metal-mine fatalities and 16 to 26 per cent of the quarry fatalities are due to ex¬ plosives, whereas in Table 4 for the same years the percentage in bituminous coal mines was 3.68 to 2.65 in 1917.

Table 4. — Fatalities Due to Explosives at Bituminous Coal Mines, 1903-17.

YEAR

Number

killed

Per¬ centage of total killed

Number killed per 1,000 em¬ ployed

1903 .

138

9.80

0.339

1904 .

121

8.64

.290

1905 .

119

7.49

.264

1906 .

115

7.27

.246

1907 .

134

5.29

.264

1908 .

109

6. 17

.216

1909 .

122

5.88

.244

1910 .

113

5.09

.203

1911 .

72

3.68

. 130

1912 .

70

3.85

. 128

1913 .

63

2.91

.110

1914 .

56

3.01

.096

1015 .

76

4.52

. 136

1016 . .

60

3.59

. 106

1917 .

56

2.65

.092

1 01 R …

85

4.19

Table 5. — Number and Percentage of Fatali¬ ties Due to Explosives, at Metal Mines and Quarries in the United States.

YEAR

Metal

mines

Quarries

Number

Per cent

Number

Per cent

1911 .

78

11.22

50

26.60

1912 .

94

14.22

47

22.06

1913 .

89

13.03

44

24.04

1914 .

60

10.73

35

19.44

1915 .

78

14. 10

28

18.92

1916 .

89

12.77

28

16.18

1917 .

79

9.27

21

16.03

Principal Coal-Mine Disasters. — Table 6 on the following page gives what is believed to be a complete list of those coal-mine disasters in the United States in which 100 or more men were killed.

Bibliography. — Fay, A. H., (Coal-mine Fa¬ talities in the United States, 1870—1914,) with statistics of coal production, labor and mining methods, by States and calendar years (Bull. 115, United States Bureau of Mines, Washing¬ ton 1916) ; Willcox, F. H., Occupational Haz¬ ards at Blast-furnace Plants and Accident Pre¬ vention based on Records of Accidents at Blast furnaces in Pennsylvania in 1915 > (Bull. 140, United States Bureau of Mines, ib. 1917) ;

Table 6. — Coal Mine Disasters in which 100 or more were Killed.*

DATE

Name of mine

Location of mine

Nature of accident

Killed

1869

Sept. 6

Avondale .

Plymouth, Pa .

Mine fire .

179

1884

Mar. 13

Laurel .

Pocohontas, Va .

Mine explosion .

112

1891

Jan. 27

Mammouth .

Mount Pleasant, Va .

Mine explosion . .

109

1892

Jan. 7

No. 11 .

Krebs, Okla .

Mine explosion .

100

1900

May 1

Winter quarters Nos. 1 and 4…

Scofield, Utah .

Mine explosion .

200

1902

May 19

Fraterville .

Coal Creek, Tenn .

Mine explosion .

184

1902

July 10

Rolling Mill .

Johnstown, Pa .

Mine explosion. .

112

1903

June 30

Hanna No. 1 .

Hanna, Wyo .

Mine explosion and fire.. .

169

1904

Jan. 25

Harwick .

Cheswick, Pa .

Mine explosion .

179

1905

Feb. 20

Virginia City. .

Virginia City, Ala …

Mine explosion .

108

1907

Dec. 6

Monongah Nos. 6 and 8 .

Monongah, W. Va .

Mine explosion .

361

1907

Dec. 19

Darr .

Jacobs Creek, Pa. .

Mine explosion . .

239

1908

Nov. 28

Rachel and Agnes .

Maiianna, Pa .

Mine explosion .

154

1909

Nov. 13

Saint Paul No. 2 .

Cherry, Ill .

Mine fire .

259

1911

Apr. 8

Banner .

Littleton, Ala .

Mine explosion …

128

1913

Oct. 22

Stag Canon No. 2 .

Dawson, N. Mex .

Mine explosion. .

263

1914

Apr. 28

Eccles Nos. 5 and 6 .

Eccles, W. Va .

Mine explosion .

181

1915

Mar. 2

Layland No. 3 .

Layland, W. Va .

Mine explosion .

112

1917

Apr. 27

Hastings .

Hastings, Colo .

Mine explosion .

121

* Fay, Albert H., “ Coal-mine Fatalities in the United States,” 1917, U. S. Bureau of Mines, 1918.

Fay, A. H., (Metal-mine Accidents in the United States > (Tech, paper 224, United States Bureau of Mines, ib. 1917) ; id., (Coke-oven Accidents in the United States in 1916) (Tech, paper 173, United

States Bureau of Mines, ib. 1917) ; id., (Coal-mining Fatalities in the United States in 1916) (Washington 1917). Coal¬ mine fatalities in the United States, 1918, with tables supplemental to Bureau of Mines Bull. 115 (Washington 1919).

Albert H. Fay,

Mining Engineer, United States Bureau of Mines.

MINE GAS, the same as fire-damp (q.v.).

MINE PLANTERS. The mine planter service in time of peace is organized for instruc¬ tion purposes. In time of war the vessels of this service, together with such additional ves¬ sels as may be obtained for this duty by the War Department, are assigned to the various coast defenses for service in planting mines. The vessels for this service are known as United States army mine planters, and when not assigned to coast artillery districts, coast defenses or to the Coast Artillery School, are under the control of the quartermaster-general of the army.

Upon arrival in a coast-defense command for the purpose of carrying out the instructions of the War Department, the commanding offi¬ cer of a mine planter reports by telegraph to the coast artillery district commander and in person to the coast-defense commander. He retains command of his vessel, but the planter becomes a part of the local submarine defense equipment of the coast-defense command. The planter is assigned, for instruction purposes, to the mine commands by the coast-defense com¬ mander. The latter exercises general super¬ vision over the mining instruction, and is held responsible that full advantage is taken of the presence of the planter for instruction purposes. Except in case of emergency he does not use the mine planter, nor permit the use thereof, for any other purpose than for carrying out the instructions prescribed by the War Depart¬ ment.

Whenever a mine planter leaves one coast-defense command for another, or leaves for any locality outside the limits of a coast-defense command for repairs or for other pur¬ pose, the commanding officer of the planter telegraphs to the coast artillery district com¬ mander his time of departure, and on arriving at his destination his time of arrival thereat. During the time mine planters are beyond the limits of a coast-defense command they are under the direct control and supervision of coast artillery district commanders. At such times coast artillery district commanders have the same control over mine

planters, as they have over other elements of the coast defenses, within the limits of their districts, respectively, subject to the requirements prescribed by the War Department.

Upon completion of the work in a coast-defense command, the commanding officer of the vessel submits a report covering (1) in general terms the work done during the pres¬ ence of the mine planter; (2) a statement of any unusual difficulties encountered; (3) the condition of the entire mine equipment in the coast-defense command (including both struc¬ tures and material) and (4) any important recommendations. This report is submitted in triplicate to the coast-defense commander. Communications relating to the crew's equip¬ ment and repairs are sent to the quartermaster-general of the army.

On the last day of each month the com¬ manding officer of the vessel forwards to the adjutant-general of the army, through military channels, an extract from the logbook, showing the movements of the vessel during the month; any unusual incidents, collisions, groundings or other accidents; assistance rendered other ves¬ sels ; dates of inspections and by whom ; also the quantity of coal consumed, in pounds, and the number of miles run each day; with the total coal and water consumption, number of mines planted, number of mines taken up, miles of multiple cable laid, miles of multiple cable taken up and miles traveled during the month. The shipping laws recited in the official log¬ book of the Mercantile Marine of the Depart-

ment of Commerce govern so far as they may be applicable to mine-planting boats and are not in conflict with army regulations and orders of the War Department.

When engaged in planting or taking up mines a lifeboat is kept in readiness for immediate launching. Edward S. Farrow, Consulting Military and Civil Engineer.

MINE RUN, Campaign of. During the Civil War, on 7 and 8 Nov. 1863

General Meade crossed the Rappahannock at Kelley's Ford and Rappahannock Station, and concentrated his army of 70,000 men in the vicinity of Brandy Station, General Lee, with 50,000 men, with¬ drawing beyond the Rapidan to an entrenched line, the left of which covered some of the fords of the river, the right being perpendicular to it and extending to Bartlett's Mill on Mine Run. On • 26 November Meade began the Mine Run cam¬ paign by sending the First, Fifth and Second corps to cross the Rapidan at Culpeper Mine and Germanna fords, and the Third and Sixth corps to cross at Jacob's Mill, all five corps to converge upon the old turnpike and the plank-road near Robertson's Tavern, both leading tQ Orange Court House, and turn the right of Lee's position. An early start was made on the 26th, but owing to delay in some of the columns, all were halted for the night but a short dis¬ tance beyond the river. The march was re¬ sumed at daylight of the 27th. The Second corps reached Robertson's Tavern at 10 a.m., to find itself in the presence of a considerable body of Ewell's corps which Lee had hastened there, and it was ordered to remain on the defensive, until the Third corps, followed by the Sixth, came up on the right. But the Third corps was delayed. Lee, on discovering Meade's movement, had promptly ordered Early, commanding Ewell's corps, to move to the right. Part of his command had reached Robertson's Tavern and confronted the Second corps, and Johnson's division was moving in the same direction when it came into collision with the Third corps, on Payne's Farm, and a battle ensued, lasting until dark. Both sides claimed the advantage, but the engagement resulted in a delay to Meade's operations, and, as he claims, the failure of his campaign. The Union loss was 125 killed, 747 wounded and 71 missmg. Lee reported a Confederate loss of 545. The Second corps was severely engaged during the day, and advanced some distance beyond Rob¬ ertson's Tavern. At night the First corps moved up to the support of the Second. The Fifth corps, which had supported Gregg's cav¬ alry division in an engagement at Parker's store, on the Orange plank-road, was brought over to support the Second, and next morning the Third and Sixth corps came up on the right of the Second. On the 28th Meade advanced to the attack, but on driving in the Confederate pickets it was found that Ewell's corps had fallen back. Pursuit was made, the Second corps in advance, and after a march of two miles Ewell was found in position on the west side of Mine Run. A. P. Hill had come up and formed on Ewell's right, covering the Orange plank-road. The line was very strong, and on it were 150 guns. It was after dark when the Second, Sixth and First corps, with part of the Third, fronted this position. An examina¬ tion of Lee's position convinced Meade that

there was no probability of success in an attack in his immediate front, and he determined to send General Warren, with his Second corps and a division of the Sixth, to feel for Lee's right flank and turn it if practicable. The 29th was spent in reconnoitring and demonstrations, while waiting for Warren's movement. Early in the morning of the 29th Warren started from Robertson's Tavern, crossed over to the plank-road, drove in the skirmishers of A. P. Hill's* corps and late in the day came upon Hill's position across the road. Warren reported to Meade that the conditions were favorable for an attack, and personally assured him that he could carry everything before him. Meanwhile some of Sedgwick's division commanders had discovered weak points on Lee's left, no works being thrown up, and Meade ordered an attack for the morning of the 30th, the right and centre to open with artillery at 8 o'clock, at which time Warren was to make the main? attack, and at 9 o'clock Sedgwick was to assault Lee's left with five divisions of the Fifth and Sixth corps. Two divisions of the Third corps were sent to Warren, thus increasing hi's command to six divisions of 26,000 men. The batteries on the right and centre . opened a furious fire at 8 a.m. The skirmishers of the First and Third corps advanced across Mine Run and drove in those of the enemy, and Sedgwick was about to assault when Meade ordered him to desist. He had received a dispatch from Warren advising against am attack on Lee's right, as it could not succeed.. During the night of the 29th Warren had made dispositions for an overwhelming assault, but on the morning of the 30th he saw on the' heights before him a line of strong work*; thrown up over night, well filled with infantry, and heavy batteries covering the slope up which it was necessary to charge, and therefore he deemed successful attack impossible. Meade rode over to Warren, who proved unchangeable in opinion, and Meade tried to arrange for an attack later in the day, but found it impracti¬ cable. The armies remained confronting each other that day and the next, and on the night of 1 December Meade withdrew to his former position beyond the Rapidan. Lee followed part way on the 2d. The Union loss in the Mine Run campaign, 26 November to 2 Decem¬ ber, was 173 killed, 1,099 wounded and 381 missing. The Confederate loss was 110 killed, 570 wounded and 65 missing. Consult (Official Records) (Vol. XXIX) ; Humphreys, (From Gettysburg to the Rapidan* ; Pennypacker, (Life of General Meade* ; Wather, (History of the Second Army Corps) ; Powell, (History of the Fifth Army Corps) ; The Century Com¬ pany's (Battles and Leaders of the Civil War*' (Vol. IV). E. A. Carman.

MINE SURVEYING. See Surveying.

MINE-SWEEPING. Almost immediately upon the development of the mine itself came the development of measures for combating of mines. From the very first the mine was used as a weapon of offense and it became necessary to find some means of protection against it. As early as 1777, Bushnell, an American inventor, devised moving machines which were dis¬ charged in the Delaware River against British ships. These were later ridiculed in a ballad called (The Battle of The Kegs.* Later in the

blockade of American harbors by the British in 1813, and in the Crimean War, nothing more useful seems to have been employed in the de¬ tection and destruction of mines than dragging for them with nets, *etc.*

During the American Civil War, however, mines began to be used on so large a scale and so effectively that it became necessary for the Northern States to adopt adequate measures for protection against them. The first idea was to creep for the cable connecting the torpedoes, in the hope that the creep would break the cable or explode the mines. Later, chains towed between two vessels were used in an attempt to seizze the moorings of the mines, the latter being then raised and rendered harmless. These methods do not appear to have met with any great measure of success.

In 1863, Ericsson constructed his mine-de¬ stroyer, which consisted mainly of a strong float attached to the forward part of the ship and extending well to the front of the bow. At the extreme front end of the float and sev¬ eral meters under the surface of the water was fixed an explosive charge of 700 pounds of powder. In front of the charge were rigged two timbers which, upon engaging ‘an obstacle, closed upon each other as do the parts of a parallel ruler, thereby igniting the charge. The important feature of the invention was the air chamber placed directly in front of the charge. This gave way at the push of the explosion and allowed the full foce to be sent forward against the obstacle, thereby protecting the float itsself from any damage. A large number of these mine-catchers were produced at that time, but for

some reason or other no further use was made of the invention.

Up to quite recent times nothing had been done toward the improvement of methods for the detection of mines. They had been used mostly as a weapon of defense for the protec¬ tion of coastal localities and the blocking of channels, until the outbreak of the Russo-Jap¬ anese War. During this war, however, it be¬ came the custom to strew broadcast great num¬ bers of unanchored1, mines, and it became neces¬ sary to find a means of searching out the loca¬ tion of these mines and destroying them.

The oldest method of protecting warships against mines was in the use of less valuable ships as exploders. One or more of these would go ahead of the battleships, in the hope of strik¬ ing and exploding enough mines to make a breach in the minefield. The exploder had to be of draught at least equal to that of the ship to be protected, and also had to be so constructed that after the explosion of the first mine the engines would still drive it ahead to the destruction of others. To meet the latter requirement, the ship had to have its engines located aft, as in the case in tank steamers. Of course, the exploder was inevitably sacri¬ ficed, so that the method was a very expensive one. Other objections were that even a num¬ ber of these ships might go through a field and miss mines that would sink the ships to be pro¬ tected, and that success in the exploder's mis¬ sion meant sure death to her crew.

Another contrivance for the discovery of and protection against mines is the mine-catcher. This is a very heavy and clumsy apparatus, consisting of steel frames or wooden balks fixed to the sides of the vessel, supported and stiff¬

ened below by wire hawsers. The mine-catcher is expected to break the moorings, causing the mine to rise to the surface, where it can be rendered harmless, or to overturn the mine, causing the explosive to be displaced. In any case, it is quite likely that the resulting explo¬ sion will damage the catcher, necessitating fre¬ quent repair. In order to be able to break a wire hawser, the mine-catcher has to be very strongly constructed. This results in a bulk and weight which greatly hinder the proper navigation of the ship and hold it down to a very slow pace. Countermines are often used although they are in reality not employed to seek out the location of mines, but rather to destroy a field which has already been located. They are joined up in a series and towed along on a wide front. When it is found that the

countermines have engaged the enemy mines, the boats sheer off the necessary distance and' the charges are exploded by electricity, the nearby enemy mines being thereby destroyed.

A many-fluked grapnel is often used to drag for the cables of such mines as are exploded from the shore. In some cases the fished-up cable fails to break, so that it is well to have an explosive charge in the grapnel, with an arrangement for detonating it from the vessel by which the grapnel is operated. During the American Civil War, search was made for mines with chains and hawsers. This is the method which is now usually employed when no other means are at hand. It was the one used by the Russians when they first started searching for the mines which the Japanese placed in waters about the harbor-mouth at the siege of Port Arthur.

The Russians used two boats in dragging for mines, with a hawser stretched between them. It was soon found that little could be accomplished with this arrangement on account of the fact that the hawser in motion tended to rise toward the surface, and that it formed an acute angle in the middle, thus reducing greatly the area swept. The first of these diffi¬ culties was partially overcome by attaching weights to the cables where they were fastened to the sweeping-hawser. A further improve¬ ment, partially overcoming the second difficulty, was in placing floats at the ends of the cables,' suspending weights from each float to the proper depth, and attaching the hawser to these weights. The floats were so constructed and attached as to cause them to sheer out, thus giving the sweep the necessary spread.

From this time dates the organization of the first mine-sweeping flotilla ever employed. It searched and cleared the channel on a regular plan, affording ships a safe ingress and egress. No Russian ships went out of the harbor untii the mine-sweeping flotilla had first searched the channel. The use of floats and weights necessi¬ tated a contrivance of great bulk, difficult to cast and haul in, and too heavy to permit of any but the slowest speed. To overcome these difficulties, use was made of the well-known theory that a pent-shaped log, towed behind a boat, can be kept at any given depth with any given speed by adjusting the tow-line to the proper length.

Sjostrand, a Swedish inventor, used this theory in producing his mine-sweeper, which consisted of a drag-hawser attached at the ends to logs or kites kept at the proper depth by

i egulating the length of cable and the speed of the vessel. The kites were constructed and attached in such manner as to cause them to sheer out and maintain a wide spread of sweep. This device was in reality only a mine-searcher. An improvement converted it into a mine-re¬ mover as well. The hawser was so attached to the cable at one end that, upon encountering a mine-mooring, it would break from the cable. At the loose end was fixed a grappling-hook containing an explosive charge. The mooring having been encountered and the hook end freed thereby, the hawser was dragged along the mine cable until the hook or catcher grappled and held it. The charge was then exploded from the ship and the mine destroyed or brought to the surface.

The removal of mines brought to the sur¬ face is most easily accomplished by firing into them ; for this work, small-calibre guns firing shell are provided. Small-bore rifle bullets make holes so small that the water enters very slowly into the mines. Guns firing shell pro¬ duce much larger holes, and there is always the possibility of exploding the mine with a fragment. The great importance which the ex¬ perience of war attaches to all means of com¬ bating mines has led to the production of a great many appliances, but none of them are practicable, so that the mine-sweeping appli¬ ance of Swedish origin remains the most ad¬ vanced and the best. This sweep is useful only against mines which are anchored, since it at¬ tacks the moorings. Against free mines, there is no protection except a sharp lookout. The only real protection against drifting mines lies in the development of naval aircraft, from which the location of mines can be established, especially drift mines, which float on or near the surface.

Edward S. Farrow.

Consulting Military and Civil Engineer. MINE WORKERS OF AMERICA, United, an American labor organization, formed 25 Jan. 1890, to (<unite mine employees that produce or handle coal or coke … and

ameliorate their condition by means of concilia¬ tion, arbitration, or

strikes. ˆ Its executive offi¬ cers are president, vice-president and secretary-treasurer; a national executive board is made up of these officers and of 25 delegates, one each from the various district divisions. The United Mine Workers made great gains in membership by its bituminous strike in 1897, and by the famous anthracite strikes of 1900 and 1902; the two last mentioned strikes were under the leadership of Pres. John Mitchell (q.v.). The policy is typically aggressive and almost the entire funds of the union are used to support strikes and spread the organization. The organ is The United Mine Worker.

MINER, Alonzo Ames, American Universalist clergyman : b. Lempster, N. H., 17 Aug. 1814; d. Boston, Mass., 14 June 1895. He was educated in secondary schools, taught for a time, was ordained to the Universalist ministry in June 1839, was pastor at Methuen, Mass. (1839-42), and at Lowell (1842-48), was col¬ league of Hosea Ballou at Boston (1848-52), and full pastor (1852-62; 1874-95). In 1862-74 he was president of Tufts College (Medford, Mass.). He originated the Universalist Publish¬ ing House, Boston; was chairman of the Amer¬

ican Peace Society, which he represented at the international congress, Paris, 1889; was Prohi¬ bition candidate for governor of Massachusetts in 1878 and for mayor of Boston in 1893 ; and was also once known as a lecturer on anti¬ slavery. He edited the Star of Bethlehem at Lowell, and published (Bible Exercises) (1854-84); (01d Forts Taken) (1878-85);

(Doctrines of Universalism.* Consult Emer¬ son, G. H., (Life of Alonzo Ames Miner) (Boston 1896).

MINER, Charles, American journalist: b. Norwich, Conn., 1 Feb. 1780; d. Wilkesbarre, Pa., 26 Oct. 1865. At the age of 19 he removed to the Wyoming Valley, Pennsylvania, where, with his brother, he established the Luzerne Federalist and afterward The Gleaner, for which he wrote humorous sketches. Subse¬ quently he became assistant editor of the Polit¬ ical and Commercial Register of Philadelphia and also established, with his brother, the West Chester Village Record, to which he contributed under the name of <(J°lm HarwoodT He was a member of Congress from Pennsylvania in 1825-29 and was the first to bring to the notice of that body the possibilities of the culture and manufacture of silk in the United States. His (History of Wyoming) (1845) contains a vivid description of the Wyoming massacre, obtained from an eye-witness.

MINER, William Harvey, American jour¬ nalist and author: b. New Haven, Conn., 5 March 1877. He took a special literary course at Yale University in 1896 and was graduated at Columbian (now George Washington) Uni¬ versity in 1899. For a time he was a staff member of the Lowell (Mass.) Mail. He trav¬ eled extensively in the Middle and Far Wes#t, in Canada and in Europe and published (George Catlin, a Memoir > (1900) ; (The Lewis and Clark Expedition (1901) ; (Daniel Boone* (1901) ; (The Rowfant Club* (1903) ; (The Beginnings of American Science) (1906) ; Rav¬ age and Chatterton) (1907); (Life of Charles ChurchilP (1907) ; (The Iowa Indians* (1911) ; (History of the American Indians, North of Mexico> (1913).

MINERAL ACIDS, Toxicology of. Poi¬ soning by ingestion of sulphuric acid causes pain in mouth, nose, throat and epigastrium ; bloody saliva; vomiting, bloody diarrhoea; feeble pulse; cold, damp surface; and collapse. Ulceration of stomach and larynx may occur and if t" e patient survives, a form of Bright's disease fol¬ lows quickly. The antidote is any ayailable al¬ kali as soap, chalk, magnesia or whitewash, scraped, perhaps, from a wall. Hydrochloric acid (q.v.) causes similar though possibly less severe symptoms and recovery is more often possible. The antidotes are the same. Nitric acid (q.v.) exceeds sulphuric in the violence of the symptoms caused, with sudden death. In¬ stead of black sloughs in the mouth, oesophagus and stomach, such as occur in sulphuric-acid poisoning, in nitric-acid intoxication yellow sloughs and stains are found after death. Nitromuriatic-acid poisoning resembles poison¬ ing by nitric acid in symptoms and pathological results. Similar yellow staining is found. The antidotes are alkalis. Phosphoric acid (q.v.) is not corrosive to animal tissues, though the glacial acid coagulates albumen. Its antidote

is any alkali at hand, but its effects are not highly dangerous. See Acids ; Toxicology.

MINERAL COLORS, inorganic materials in the making of paint. They date as far back (or farther) in the history of coloring mate¬ rials as

organic materials, the paints used by primitive peoples for personal decoration being more commonly of this class. In Greek paint¬ ing the main sources of coloring matters were carbonate of chalk for whites ; red and yellow ochres ; and carbon. Apparently these same colors were used in Egyptian wall-painting. The range was much widened at the beginning of the Christian era at Rome and the chemical activity of the last century has added largely to the mineral sources of colors. These may be roughly classified as follows: Whites from calcium, for example, carbonate and sulphate ; from barium, for example, sulphate (natural and artificial) and tungstate; from lead, for example, carbonate, hydrocarbonate, sulphate, antimonite, tungstate; from zinc, the oxide, oxychlorine, etc.; from silicum and talc; from antimony; and from the hyponitrate of bis¬ muth. Reds are based on iron, as sesquioxide and red ochre ; on mercury ; on lead, as min¬ ium ; on arsenic, as arseniate of cobalt; on anti¬ mony and on gold. The greatest source of yellows is chromic acid derivatives; next the lead colors ; and then the ochres and other minor sources. Blues are derived from copper (hydrate, arseniate, carbonate), from cobalt (aluminates and silicates) and from iron (‘phos¬ phates, etc.) ; greens from chrome (notably sesquioxide), copper, manganese, etc.; and blacks mostly from carbons. An excellent handbook of the subject is Perret, (Couleurs Minerales) (1902).

MINERAL LAND LAWS OF THE UNITED STATES. Mineral lands of the United States are disposed of under the gen¬ eral laws dating back to 1866. Lands contain¬ ing valuable mineral deposits may be acquired by one of two methods, the first as provided for lode claims and the second as provided for placer claims. The applicant must be a citizen of the United States or have declared his in¬ tention to become a citizen. Each person in the case of an unincorporated association must be similarly qualified and a corporation making mineral entry must be organized under the laws of the United States or of any State or Territory.

Lode claims are those based upon a lode, ledge or vein of mineral-bearing rock and they may include an area of not more than 1,500 linear feet along the course of the vein and not more than 300 on each side of the vein; that is an area of about 10*4 acres. The law, how¬ ever, recognizes the local laws and customs which may provide for smaller limits in the area to be taken. This method of acquisition is intended to include gold, silver, copper, lead, tin and other similar minerals occurring in veins. One who discovers a mineral deposit may record his claim in the local county rec¬ ords as provided by the State laws or regula¬ tions and he may retain the right of possession indefinitely by performing $100 worth of labor thereon annually or

making improvements of equivalent value. Patent from the United States may be obtained by filing mineral entry

in the local land office and making proof in ac¬ cordance with the law and the regulations.

Placer claims are those allowed in the case of discovery of mineral deposits not occurring in a lode or a vein. These claims may not ex¬ ceed 20 acres in the case of an individual nor 160 acres by an association of persons. Annual proof of $100 worth of labor or improvement is required as in the case of lode claims and there must also be proof of improvements of a value not less than $500. Besides the precious minerals, placer claims have been extended to include deposits of phosphates, oil, gas, *etc.* Patent is obtained in the same manner as in the case of lode claims. By the Act of 17 July 1914 Congress provided for agricultural entries in the case of lands classified as containing phosphate, nitrate, potash, oil, gas or asphaltic minerals. This permits the use of the surface of the land for agricultural purposes in such a way as not to interfere with the extraction of these minerals. Mineral lands are supposed to be classified at the time of survey by the sur¬ veyor who indicates the several areas which ap¬ pear to be agricultural or mineral ; but lands not so classified as mineral may be acquired under the mineral laws.

The coal land laws provide for the acquisi¬ tion of lands valuable for coal by entry by an individual above the age of 21 who is a citizen of the United States or has declared his inten¬ tion to become such and shall not exceed 160 acres. An association of persons may take 320 acres but each person composing an association must be qualified as in the case of an individual entryman. When an association of not less than four persons each qualified as above shall have expended not less than $5,000 in working and improving a mine or mines of coal upon the public lands, such association may enter not exceeding 640 acres, including such mining im¬ provements. Only one entry of coal lands may be made by any person or association of per¬ sons.

The land must be paid for at its appraised value according to the estimated amount and character of the coal therein, the price being not less than $10 per acre when situated not more than 15 miles from a completed railroad and $20 when situated within 15 miles of a completed railroad.

In the Territory of Alaska coal land can be acquired only by lease in

tracts not exceeding 2,560 acres to any person above the age of 21 who is a citizen of the United States or to any association of such persons or to any corpora¬ tion or municipality organized under the laws of the United States or of any State or Terri¬ tory. These leases are offered through adver¬ tisement, competitive bidding or such other method as the Secretary of the Interior mav adopt. The lessees shall pay such royalties as may be specified in the lease which shall not be less'than two cents per ton and an annual rental at the rate of 25 cents per acre for the first year, 50 cents for the second, third, fourth and fifth years and $1 per acre for every .year there¬ after during the continuance of the lease, which may not exceed 50 years, but shall be subject to renewal on such terms and conditions as may be authorized by law at the time of such re¬ newal. The earliest action in regard to the mineral lands of the United States is found in

the ordinance of 20 May 1785 for the disposal of lands in the Western Territory passed by Congress under the Articles of Confederation, and provided for the reservation of one-third of all gold, silver, lead and copper mines to be sold or otherwise disposed of. By the Act of 3 March 1807 Congress inaugurated the plan of leasing mineral lands. This method of dealing with the mineral lands was continued in force until the conditions developed by the discovery of gold in California and other Pacific States forced Congress to take more definite action. As a result of long years of investigation Con¬ gress by the Act of 26 July 1866 provided the means for acquiring title to mineral lands, the areas and other conditions of acquisition to be subject to the local customs or rules of miners in the district where the land is located. This method was adopted because in the absence of any definite law miners in each district were forced to organize and adopt some plan for de¬ fending and protecting the rights of those who were discovering and working mineral claims. While there was a similarity in the local rules so adopted there was sufficient variation to make it rather difficult for Congress to fix specific conditions at that time. By gradual de¬ velopments the law in regard to mining and placer claims was fixed as above described.

Under the Acts of Congress of 17 July 1917 and the Soldiers' and Sailors' Civil Relief Act of 8 March 1918 no right to any entry or claim to the public lands will be subject to cancella¬ tion or forfeiture while the applicant is in mili¬ tary service.

There is a general feeling among those in¬ terested in mines and mining that present laws and decisions of the courts are not well adapted to future development and there is a strong movement on foot for a codification of the mining laws so that they may better apply to the present conditions of the mining indus¬ try.

Morris Bien,

United States Reclamation Service, Washing¬ ton, D. C.

MINERAL METABOLISM. See Pa¬ thology.

MINERAL PAINTS. See Mineral Pro¬ duction in the United States.

MINERAL PHOSPHATES. See Fer¬ tilizers.

MINERAL POINT, Wis., city in Iowa County, 50 miles west of Madison, on the Chi¬ cago, Milwaukee and Saint Paul and the Mineral Point and Northern railroads. Iron, lead, zinc and sulphur are found in the vicinity. The chief industry is the manufacture of oxide of zinc, lead and sulphuric acid. The city owns waterworks, a public library, a high school building and a municipal auditorium. Mineral Point was settled in 1827. Pop. 2,925.

MINERAL PRODUCTION OF THE UNITED STATES. The output of mineral products in the United States has had a steady increase for many years and in 1916 reached a grand total of more than $3,500,000,000. The European War had great influence in increasing

Total Value of Mineral Products of the United States from 1880 to 1916.

(United States Geological Survey).

YEAR

Metallic

Non-metallic

Unspecified (metallic and non-metallic)1

Total

1880 .

$187,880,880

189,413,459

215,820,070

197,881,610

$173,581,917

$6,000,000

$367,462,797

1881 .

207,207,019

6,500,000

403,120,478

1882 .

230,785,547

6,500,000

453,105,617

1883 .

243,679,889

6,500,000

448,061,499

1884 .

180,284,208

172,218,218

204,399,872

221,755,346

5,000,000

407,039,554

1885 .

242,332,845

5,000,000

419,551,063

1886 .

250,985,090

800,000

456,184,962

1887 .

240,791 ,068

294,041,980

800,000

535,633,048

1888 .

242,010,000

310,888,983

900,000

553,798,983

1889 .

250,324,369

291,001,413

1,000,000

542,235,782

1890 .

303 , 440 , 430

310,988,907

1,000,000

615,429,337

1891 .

280,484,844

319,363,338

1,000,000

600,848.182

1892 .

283,715,295

337,516,444

1,000,000

622,231,739

1893 .

223,153,770

321 ,339,395

1,000,000

545,493,165

1894 .

186,835,353

362,409,394

1,000,000

550,244,747

1895 .

248,033,039

393,658,083

1,000,000

642,691,122

1896 … .

252,075,130

387,965,870

1 ,000,000

641,041,000

1897 .

269,934,178 308 , 247 , 446

380,677,600

1,000,000

651,611,778

1898 .

417,794,018

1 ,000,000

727,041,464

1899 .

483,520,531

525,571,880

1,000,000

1,010,092,411

1900 .

513,731,959

493,313,578

604,517,044

588,753,010

594,194,796

1,000,000

1,108,926,755

1901 .

660,764,256

1,000,000

1,155,077,834

1902 .

722,433,728

1,000,000

1,327,950,772

1903 .

905,628,365

1 ,000,000

1,495,381,375

1904 .

501 ,114,224

859,074,529

400, 000

1,360,588,753

1905 .

702,584,608

921,181,524

400,000

1,624,166,132

1906 .

886,179,981

1,016,390,015

200,000

1,902,769,996

1907 .

904,093,201

1,165.748,197

100,000

2,069,941,398

1908 .

550,744,388

1,043,702,454

250,000

1,594,696,842

1909 .

754 , 940 , 809

1,131,515,921

300,000

1,886,756,730

1910 .

749,876,234

1,241,039,986

300,000

1,991,216,220

1911 .

680,888,929

1,245,145,079

250,000

1,926,284,008

1912 .

866,381,073

1,377,152,760

500,000

2,244,033,833

1913 .

883,222,012

1,555,517,716

420,000

2,439,159,728

1914 .

691,081,734

1,423,648,599

470,000

2,115,200,333

1915 .

992,816,853

1,393,565,098

7,450,000

2,393,831,951

1916 .

1,621,832,177

1,878,507,232

15,000,000

3,525,339,409

Grand total .

$17,906,535,584

$25,358,755,213

$79,040,000

$43,354,330,797

1 Estimated.

the production in 1914-16 for a vast amount of mineral matter was consumed in many lines of manufacturing, munitions, shipbuilding, etc., connected with the conflict. The values of mineral products from 1880 to 1916 and the

production of the principal minerals in 1916 are given in the following tables together with the figures for 1908 for comparison. They are taken from the data obtained by the United States Geological Survey.

Mineral Production of the United States.

(First Products).

1908

PRODUCTS

Quantity

Value

Asbestos .

936 tons

$19,624

Asphalt1 and bituminous rock Raryt.es .

78,565 short tons 38,527 short tons

517,485

120,442

Bauxite .

52, 167 long tons

263,968

Rnrax (crude) .

25,000 short tons

975,000

Bromine .

1 , 055 , 636 pounds

102,344

Clement, natural .

. 1 , 686 , 862 barrels

834,509

rpmp.nt. Portland .

51,072,612 barrels

359 long tons

43,547,679

Chrnme ore .

7,230

133,197,762

final anthracite .

74,347,102 long tons 332,573,944 short tons

669 short tons

158,178,849

Coal bituminous .

374,135,268

Emery .

8,745

Feldspar .

70,474 short tons

428,553

Fluorspar .

38,785 short tons

225,998

Fuller’s earth .

29,714 short tons

278,367

Cram et. .

1 , 996 short tons

64,620

Glass sand .

1 , 093 ,553 short tons

1,134,599

(“rranliitp rrvstalline .

144 short tons

132,840

(Traphit.p amorphous .

1 , 443 short tons

75,250

Gypsum .

1,721, 829 short tons

4,075,824

Iron ore .

35 , 983 , 336 long tons

81,845,904

Iron ore, manganiferous .

Lithium minerals .

55 , 620 long tons

203 short tons

132,556

1,550

M a gn esi te .

6,587 short tons

19,761

Manganese .

6, 144 long tons 2,417 short tons

62,779

Mica, scrap .

33,904

Mica sheet .

972 , 964 pounds

8 , 469 short tons

234,021

Marls .

4,330

Millstonp.s .

31,420

Monazite .

422 , 646 pounds

68 , 694 short tons

55 , 868 , 820 gallons sold

50,718

Mineral paints .

2,410,367

Mineral waters .

6,712,680

Molybdenum

Natural gas .

54,640,374

O 1 stones .

217,284

Petroleum .

178,527,355 barrels

129,079,184

Phosphate rock .

2 , 386 , 138 long tons

11,399,124

Peat .

133,000

Pumice .

10,569 short tons

39,287

415,063

Pyrite …

222,598 long tons

857,113

Quartz (Silica) .

47,316 short tons

190,157

Salt .

28,822,062 barrels

7,553,632

Sand and gravel .

36,122,491 short tons

12,135,433

1,029,699

6,316,817

Sjafp .

Soapstone and common talc . .

46,615 short tons

703,832

Stn-np hiiildinP’ .

16,040,630

20,262,012

Stonp rriifshp-d .

Sandst.rmp. .

7,594,091

Stonp limp.st.one .

27,682,002

Sulphur .

369 , 444 long tons

6,688,215

Sulphuric acid from smelters . Talc, common; see Soapstone Talc fibrous .

70,739 short tons

697,390

Tripoli and infusorial earth . .

‘Thorium qpp Monazitp

97 , 442

Not any .

Tungsten ores .

671 short tons

229,955

Zinc ore, exported .

26,108 short tons

877,745

Zinc, oxide .

56,292 short tons

5,072,460

Uranium and vanadium min¬ erals .

Estimated miscellaneous .

8,000,000

Grand total .

$1,595,670,186

t

1916

Quantity

Value

5 , 986 short tons 1,479 short tons 98,477 short tons 221,952 short tons 425 , 100 long tons 103,525 short tons 688 , 260 pounds 842,137 barrels 94 , 552 , 296 barrels 47 , 035 long tons

78,195,083 long tons 502,519,682 short tons 15,282 short tons 132,681 short tons 155,735 short tons 67,822 short tons 6,171 short tons 2,018,317 short tons 5,416 short tons 2,622 short tons

2,757,730 short tons 77,870,553 long tons 548 , 803 long tons 619 short tons 154,974 short tons 26,997 long tons 4,433 short tons 433 short tons

$555,186 448,214 923,281 1,011,232 2,296, 400 2,409,459 922,225 430,874 104,258,216 726,243 207,260,091 202,009,561 665,116,077 123,901 702,278 922,654 706,951 208,850 1,957,797 914,748 20,723 766,140 7,959,032 181,902,277 2,005,491 12,035 1,393,693 * 627,417 69,906 524,485

37,872 pounds 135 , 606 short tons 55,928,461 gallons

1 , 228 short tons

300 , 767 , 158 barrels 1 , 982 , 385 long tons

33,320 short tons

423 , 556 long tons 88,514 short tons 6 , 362 , 906 short tons 87,073,415 short tons

119,725 short tons

250 short tons Not public 1 , 069 , 589 short tons

93,236 short tons

205 short tons 5,923 short tons

44,559 3,400 23,515,803 5,735,035 114,866 120,227,468 154,573 330,899,868 5,896,993 369,104 82 , 263 217,793 1,965,702 242 , 786 13,645,947 27,852,198 1,474,073 5,338,837 1,292, 293

1 .

f 79,041,699

14,099ˆ927

961,510

241,553

18,400

12,074,000

20,300 short tons

500,000

15,000,000

$3,525,339,409

1 Not including asphalt manufactured for American petroleum.

Production of Metals in the United States.

(First Products).

PRODUCTS

1908

1916

Quantity

Value

Aluminum .

11,152, 000 pounds 13,629 short tons

$2 , 434 , 600 1,264,771

Antimonial lead .

Antimony .

Cadmium .

Copper .

942,570,721 pounds

152 , 018 long tons 4,574,340 Troy ounces 15,936,018 long tons 310,762 short tons

124,419,335

6,080,720

94,560,000

254,321,000

26,104,008

Ferro alloys .

Gold .

Iron, pig .

Lead .

Magnesium .

Molybdenum .

Nickel .

Platinum .

750 Troy ounces 19 , 752 flasks 52,440,800 Troy ounces few tons

190,749 short tons

14,250

824,146

28,050,600

17,930,406

Quicksilver .

Silver .

Tin .

Zinc .

Quantity

Value

$33 900 000

24 , 038 short tons

4,463,582

4,500 short tons

40,580

135 ,212 pounds

205,433

1,927, 850 , 548 pounds

474,288,000

589, 738 long tons

50,281,692

4,479,056 ounces

92,590,300

39,126,324 long tons

663,478,118

552,228 short tons

78,207,000

75,401 pounds

311,462

206, 740 pounds

205 , 000

918 short tons

671,192

28,088 ounces

2,301,762

29,932 flasks

2,576,547

74,414,802 Troy ounces

48,953,000

278,000 pounds

120,874

563,451 short tons

151,005,000

Some Important Secondary Mineral Productions of the United States.

PRODUCTS

1908

1916

Quantity

Value

Quantity

Value

Asphalt from petroleum .

Alum .

102,281 short tons 7,700 short tons

$1,322,616

236,710

688,334 short tons 27,257 short tons 153,860 short tons

30,708 short tons

$6,178,851

1,177,881

4,410,741

2,139,230

Alumina sulphate .

Alumina abrasive (alundum, etc.) .

1,580 short tons

87 , 600 short tons

2 , 603 , 505 pounds

1 , 149,000 pounds

189,600

5,247,240

99,193

103,410

Ammonium sulphate .

Arsenic .

11,972, 000 pounds 688,260 pounds 26,062 short tons

555,186

922,225

216,129

Bromine .

Calcium chloride .

Cement, slag .

4 , 535 , 300 barrels

23 , 496 , 666 short tons 37,654,961 pounds

35 , 334 short tons 7,385,511 pounds 125,728 short tons 11,751 short tons 2,766,873 short tons

12 , 254 short tons 110, 225 long tons 9,197 short tons

3,628,240 55,595,792 1,833,796 388,674 502 , 667 11,488,315 1,199,339 11,091,186 1,231,206 220,450 77,228

Coke .

54,533,585 short tons 49,728,577 pounds

170,841,197

Copper sulphate .

Copperas .

Graphite, artificial .

8,398,000 pounds 128,977 short tons 23,035 short tons

4 , 083 , 803 short tons 37,739 short tons Not public Not public 9,720 short tons

7,025 short tons

21,274,480

3,933,566

18,618,816

5,853,543

Lead, white . .

Lead, red and orange mineral. Lime .

Litharge .

Manganese residuum .

Mineral wool .

Potash .

Silicon carbides (carborun¬ dum, etc.) . .

2 , 453 short tons

294,430

4,242,730

707,120

The various mineral products of economic importance are described in detail under sepa¬ rate headings throughout the Encyclopedia. The following is a brief review of the source in the United States of the principal ones in the above lists :

Antimony. — Chiefly used for hardening lead; was in con¬ siderable demand during the World War. Part is produced as antimonal lead. Since 1915 Alaska has furnished a large proportion of the antimony ore; same comes also from California, Nevada and a few other Western States.

Aluminum. — The extensive demand for aluminum light¬ weight machinery and utensils and the lowering of its price by improved methods of reduction account for the vast increase in its production in the last decade. Much of it is made from bauxite largely mined in Pulaski and Saline counties, Ark , with smaller supplies from Georgia, Alabama and Tennessee.

Arsenic. — The arsenic of commerce extensively used in making dyes, glass, poisons and drugs is mostly produced from mines in Washington and small amounts are obtained from some of the smelters.

Asbestos. — Most of our supply of this useful mineral fibre is imported from Canada (133,339 tons in 1916), but small amounts are mined 40 miles northeast of Globe, Ariz., and near Salt Mountains, Georgia. The fine asbestos in the bottom of the Grand Canyon appears to be too inacces¬ sible to be utilized.

Asphalt. — Besides the 688,334 tons of asphalt produced from petroleum, natural asphalts and bituminous rocks are mined at various places in Utah, California, Kentucky and Texas. While much of the material is used for roads, the minerals gilsonite, grahamite, wurtzilite and ozocerite have many uses in the arts.

Barytes. — Used principally as white pigment notably in " lithopone, " is mostly mined in Georgia, Missouri, Ten¬ nessee, Kentucky, South Carolina, North Carolina, Ala¬ bama and southwestern Virginia. Production has been increasing steadily and in 1910 it passed the $1,000,000 mark.

Bismuth. — This metal is used mostly in alloys for safety fuses, and in medicine. It is separated from various ores at several smelters and is also mined in small amounts in Colorado and Utah.

Borax. — This salt is produced from colemanite mined in a few localities in southern and southeastern California.

The famous Death Valley mines are no longer large producers.

Bromine. — Separated from salt brines at several places in Michigan and West Virginia and at Pomeroy, Ohio. It is used extensively in photography, for dissolving gold and in various chemicals and

medicines.

Cadmium. — Produced in small amount as a byproduct in lead and zinc smelting, is used as an alloy for safety plugs of automatic fire extinguishers, for increasing the malle¬ ability of silver for silverware, in pigments and in dental amalgam. Its value is about $1.50 a pound.

Cement. — There is almost an unlimited supply of limestone and other materials available for making Portland and other cements but their utilization depends on the demand and proximity to market. Pennsylvania leads in its manu¬ facture but Indiana, Iowa, California and New York are important producers. . …

Chromium. — Chromite or chromate of iron is the principal source of this metal which is in great demand for harden¬ ing steel. It is also used for pigments, notably in one which gives khaki its distinctive tint. Shasta County, Cal., is the largest producer but additional supplies come from other parts of that State and from Oregon, Wyoming and Maryland.

Clay. — See Clay.

Coal. — See Coal.

Copper. — Arizona is the leading producer of copper with Montana second, Michigan third and Utah fourth. Several other States have large yields, notably Nevada, New Mexico, Alaska, and California. The only Eastern State is Ten¬ nessee, where the Ducktown mines contributed nearly 8,000 tons.

Emery. — Ordinarily a large amount of emery is imported from Asia Minor and Greece. It is mined near Peekskill, N. Y., the purer mineral corundum is produced in North Carolina and imported from Canada.

Feldspar. — Used mainly in making pottery, china and enamels and there are projects for using it as a source of potash. The principal production is from Maine, with small amounts from Maryland, New York, North Carolina, Pennsylvania, Georgia and Virginia.

Fluorspar. — An important agent in the manufacture of open-hearth steel. Illinois and Kentucky afford the largest supplies with small amounts from Colorado, New Hamp¬ shire, New Mexico and Arizona.

Fuller’s Earth. — But little Fuller’s earth is now employed for fulling cloth, its principal use being for decoloring oils and fats. Florida, Arkansas, California, Georgia, Massa¬ chusetts and Texas are the

principal producers with 80 per cent from Florida at an average price of $10.62 a ton. The vast deposits between the Black Hills and Big Bad-Lands in South Dakota are not yet utilized.

Garnet. — This mineral is considerably harder and tougher than quartz and is used as an abrasive for leather and wood, and general grinding and polishing. The principal supply comes from Adirondack Mountains, and from New Hamp¬ shire and North Carolina.

Glass Sand. — A sand of much more than ordinary purity is required for high grade glass. Uniformity of size of grain and low percentage of iron, magnesia and clay are important requisites. Illinois, southern New Jersey, West Virginia, western Maryland, Missouri and Ohio are the principal producers with small amounts from a dozen other States. The friable Saint Peter sandstone of Illinois is the source of about 500,000 tons a year.

Graphite. — Graphite or “black lead occurs mostly in metamorphic rocks either in grains or in veins of various sizes. Some deposits are coal beds baked by igneous rocks. Most of the domestic production is from Alabama and the southeastern slope of the Adirondacks in New York, Texas, Pennsylvania and California. An amorphous variety comes from near Providence, R. I. Much artificial graphite is produced in electric furnaces at Niagara Falls. The chief uses are “ lead ” pencils, lubricants, crucible, stove polish and paint. A large amount is imported. Grindstone. — Ohio with 22 quarries leads in the pro¬ duction of grindstones but there are also quarries in Michigan and West Virginia.

Gypsum. — This mineral when roasted and ground is plaster of Paris. It occurs in large amounts in many parts of the western United States, notably New Mexico, Wyoming, Utah and Texas, but New York, Michigan and Iowa yield the largest part of the product. The usefulness of the deposit depends largely on its proximity to markets.

Iron Ore. — About 82 per cent of the ore is mined in the Lake Superior region. The Birmingham district in Ala¬ bama contributes about 10 per cent and smaller amounts come from New Jersey, New York, Pennsylvania, Georgia, Tennessee, North Carolina and some other States. The amount mined in the Far West is about 1 per cent. Iron ore being pre-eminently a war mineral the production was greatly increased in 1915 and succeeding years. Iron ores containing manganese have lately become very important because of diminution of foreign shipments of manganese during the war and the great need of that metal in steel making. Manganiferous iron ores occur most

extensively in the Cuyuna district, central Minnesota, but smaller deposits at Leadville, Colo., Philipsburg, Mont., Tomb¬

stone, Ariz., and Franklin, N. J., and near Batesville, Ark., are also producing. .

Lead. — A large amount of lead is produced in the reduction of silver ores, especially when the price of silver is high. Missouri leads in lead production with Idaho not far

‘ behind, Utah third and Colorado far behind as fourth. Smaller amounts come from Nevada, Arizona, Montana, Oklahoma, Wisconsin and a few other Western States.

Lime and Limestone. — Limestone is quarried in part for burning and in part for building stone in 43 of the 48 States and large bodies of the rock are in proximity to the larger industrial centres. Production in the Western States is relatively small because of limited market. A large amount of limestone is used for Portland cement and road metal. Some is used in agriculture. _

Lithium Minerals. — Lithia salts are used in small amounts in manufactured mineral waters and in storage batteries. Spodumene and amblygonite from the Black Hills, and lepidolite (lithia mica) and amblygonite from near Pala in California, are the principal sources.

Magnesite. — Carbonate of magnesia extensively used in the basic open-hearth process of steel making is mostly produced from mines near Porterville, Tulare County, Cal. Smaller amounts come from adjoining counties and from newly discovered deposits of crystalline mineral 60 mil§s north of Spokane, Wash.

Manganese. — As this metal is required in large amounts in modern steel-making, the ore is in great demand. Much is imported. Most of the mines in the United States are in Georgia, California, Virginia and Arkansas. Manganiferous iron ores, ores in some of the silver mines and residue from zinc ore of Franklin, N. J., are also native sources of the metal.

Marls. — Marls containing the potash-bearing greensand, glauconite, are dug in southern New Jersey and eastern Virginia for fertilizer both for direct use on the fields and for admixture with fish scraps.

Mica. — With the vast increase in manufacture of electrical supplies

mica production is continually increasing, espe¬ cially as the small plates are now utilized for insulating. Ground mica is also in demand and mica board is made by compressing small fragments. The principal supply comes from North Carolina and some is mined in the Black Hills of South Dakota, New Hampshire and Vir¬ ginia. Much is imported from Canada and India.

Millstones and Grindstones. — Sandstones quarried in eastern New York, Pennsylvania, North Carolina and Virginia, Ohio, Michigan, West Virginia. Both have to be of particular hardness and structure.

Mineral Paints (ochre, umber, sienna, Indian red, etc.). — These pigments are oxides of iron varying from deep-red hematite to light-yellow ochre and mostly containing con¬ siderable clay. Principal production is from Georgia, Pennsylvania, New York and Tennessee with small amounts from California and Vermont.

Mineral Waters. — Waters from mineral springs are bottled at many localities and some of them are shipped to distant markets. Saratoga, N. Y., is a large producer. See special article on this subject.

Molybdenum. — Used mainly in steel-making is obtained from ores from a few mines in Arizona with smaller amounts from California, New Mexico and Utah.

Monazite. — The principal source of thoria used extensively in incandescent gas mantles. Some varieties carry as much as 20 per cent. Most of the native supply is from North Carolina and South Carolina.

Natural Gas. — Wells producing the largest amounts of natural gas are in West Virginia, Pennsylvania, Ohio, Oklahoma, Kansas, California, Texas,. New York and Louisiana. West Virginia yields more than one-third, having been in the lead since 1910.

Nickel. — Is used in most high grade steels, especially in armor plate. The only production from native ore is a byproduct in the electrolitic reduction of certain copper ores.

Peat. — The extensive deposits of peat in the North Central States and New England are not drawn on very heavily for fuel in this country but considerable is used for fer¬ tilizers and for mixing with stock food.

Petroleum. — See Petroleum.

Phosphate Rock. — Calcium phosphate occurs in various forms in nature from the mineral apatite to fossil bones. Large bodies of phosphate rock occur in Montana, Idaho, Utah and Wyoming, Arkansas, Tennessee, South Carolina and Florida. The South Carolina deposits have been worked since 1867, the Florida deposits from 1888. The vast beds in the Far West are not yet utilized extensively and the deposits in north central Arkansas are only worked on a small scale. See Fertilizers.

Platinum. — This metal, used most extensively for part of the apparatus for producing sulphuric acid by the con¬ tact process, is mostly imported from Russia and Co¬ lombia. In 1916 about 710 ounces were obtained in gold dredging in California and Oregon.

Potash. — This material which is used mostly for fertilizer has been produced in the United States in quantity only, since imports from Germany were cut off. Natural brines furnished about two thirds, alunite and furnace dust fur-

nished about one-seventh, kelp one-fifth and the remainder came from distillery waste and ashes. The alkali lakes of western Nebraska yield a steady output and the great deposits of mixed salts at Searles Lake, California, are being utilized.

PinviiCE. — The volcanic ash mined in Nebraska, Kentucky, California, Idaho and Utah is termed pumice but as the material is pulverulent the name is a misnomer. It is used extensively in polishing powders called “ cleansers.”

Precious Stones. — See Gems.

Pyrite or iron sulphide is employed mainly for the manu¬ facture of sulphuric acid. The native production is only about one-third to one-quarter of the amount used. Vir¬ ginia and California are the principal producers with smaller amounts from Illinois, New York, Missouri, Indiana, *etc.*

Quicksilver. — About two-thirds of the ores of mercury are mined in California while nearly 30 per cent comes from Texas. Nevada, Arizona and Oregon yield smaller amounts. The use of mercury in detonators naturally caused greatly increased demand for the metal during the war.

Salt. — See Salt.

Sand-lime Brick. — Bricks made by heating a mixture of lime and sand are fast growing in popularity and more than a quarter of a billion were produced in 1917. Michigan leads in the production, with Minnesota second and Massa¬ chusetts third.

Silica. — Sand dug so extensively in many places for con¬ crete and other uses consists of silica. Quartz and quart¬ zite are also mined and crushed in various States for pot¬ tery, paints, polishes, polishing powders and soaps, sand¬ paper, filters and many minor uses.

Silver. — Many ores of gold have silver as a byproduct and much silver occurs in lead ores. Ores of the latter class are worked extensively in the Coeur d'Alene district, Idaho; Park City, Tintic and San Francisco districts, Utah, and Aspen, Creede and Rico districts, Colorado, and some other localities in the West.

Slate. — Slates of various kinds come mostly from Vermont, eastern New York, Pennsylvania and Virginia,, with smaller amounts from New Jersey, Maryland, Georgia, Arkansas, California and Minnesota. Most of it is used for roofing, but considerable of it is made into mantels, table tops, tiles, floorings, *etc.*

Soapstone and Talc. — Virginia is the principal producer of soapstone which is used largely for laundry tubs, switch boards and table tops. Talc or the purer mineral is mostly ground for toilet powders, paints, heat insulators, paper filler, lubricant and many minor uses. It is obtained mostly from near Gouverneur, N. Y. Some comes from North Carolina, Pennsylvania and California.

Stone, Building. — The great deposits of building stones in the United States are worked at many localities, some producing " sandstone," " marble," " granite " and a

j variety of others. Part of this is in building blocks and part crushed for concrete and road making. Nearly all the States produce some form of stone excepting along the coastal plain from New Jersey to Texas, where rock is scarce and in the interior Western States where the local demand is slight… .

Strontium Minerals. — Celesite, the principal source ol strontium, is mined in small amount in Arizona, California and Washington. It is used largely for making red fire in fireworks, signals, *etc.* ,

Sulphur. — Nearly all the sulphur produced m the united States come from Louisiana and Texas. It has been estimated that the consumption in 1916 was about 900-GOO tons for paper, chemicals and explosives and other uses.

Tin Ore. — Tin is mostly imported, but 139 tons were pro¬ duced from ore obtained in Alaska. A small amount comes from North Carolina. The deposits in Black Irnls or South Dakota and San Bernardino County, Cal., are not producing… . -

Titanium Ores. — Rutile (TiOj) is the principal source of titanium now used in electric lights, steel making and coloring artificial teeth and pottery glass. Nelson County, Va., is the principal producer. .

Tripoli and Infusorial Earth. — Tripoli, a light-colored silica resulting from weathering of silicious limestone, is produced mostly in Missouri and rottenstone of similar origin is mined in central Pennsylvania. They are used for polishing powders. Infusorial or diatomaceous earth consists of silicious remains of minute aquatic plants. It is used as an absorbent, for fireproofing and in records for talking machines. The principal production is from California, Nevada and Maryland.

Tungsten Ore. — Tungsten is in great demand for harden¬ ing steel for use in high speed work and also for electric lamp filaments. Atolia, Cal., Boulder County, Colo., and Dragoon, Arizona, are the principal producers.

Uranium and Vanadium Minerals. — Carnotite, the most important ore of uranium and vanadium in the United States, also contains minute amounts of radium. This ore is obtained mostly from western Colorado and adjoin¬ ing portions of Utah, disseminated in sandstone or .in joints. It also is obtained near Green River, Utah. Uvamte is produced near Temple, Utah. Pitchblende is mined

near Central City, Colo. Vanadium is used for hardening steel; it is mined in San Miguel County, Colo.

Zinc Ore. — Zinc is produced directly from various zinc ores and also

as a byproduct in working lead and silver ores. Leadville, Colo., and Cceur d'Alene, Idaho, are important producers of the latter. The Joplin district of Missouri furnishes about one-fourth of the zinc ore and Franklin Furnace, N . J., and Butte district, Mont., each yield about one-fifth.

Nelson H. Darton,

Geologist, United States Geological Survey.

MINERAL TA.LLOW, also called hachit-tite, a yellowish-white, soft and inodorous min¬ eral wax, or tallow, that melts at 115° to 170° F. It is composed of about 86 per cent carbon and 14 per cent hydrogen. The substance is closely related to ozocerite. It is found in Wales, Scotland, Moravia, Austria, Germany and Siberia.

MINERAL WATERS, a term used to designate such waters as have as constituents an unusual proportion of medicinal minerals. Mineral waters have been used as remedial agents from the earliest days of Greece and Rome. There were sulphurous thermal springs at Tiberius, which are still used by invalids from all parts of Syria, in cases of tumor, rheumatism, gout and other diseases. There are also warm springs at Calirrhoe, near the Red Sea, which are mentioned by Josephus as having been tried by Herod in his sickness. The Romans discovered the thermal springs in Italy, and the springs in other parts of Europe — Baden-Baden, Aix-la-Chapelle, the Spa in Bel¬ gium and others. Pliny mentions mineral springs in various parts of Europe.

Classification. — No classification of mineral waters based upon their chemical composition can be strictly exact, because many springs are intermediate between well-characterized groups. The following classification is regarded as the most comprehensive :

The first general division is as to thermal or non-thermal. Waters which issue from the ground at a temperature above 70° F. belong in the first class; those whose temperature is below 70° to the second class.

Four divisions are made as to the chemical constitutions of the several waters: (1) the alkaline; (2) the alkaline-saline; (3) the saline, and (4) the acid. The alkaline . waters are those which have an alkaline reaction and con¬ tain carbonic acid or bicarbonic acid ions in predominating quantities; or boric or silicic acid ions in predominating quantities, so that their alkalinity is evidently due to the presence of borates or silicates. The saline waters are those having

an alkaline or neutral reaction and contain sulphuric, muriatic or nitric acid ions in predominant quantities. The alkaline-saline waters come between the two groups just described : they have an alkaline reaction and contain sulphuric, muriatic or nitric acid ions along with carbonic or bicarbonic acid ions; or they contain sulphuric, muriatic or nitric acid ions along with boric acid or silicic acid ions — both classes being present by predominating constituents. The acid waters have an acid re¬ action and contain either sulphuric or muriatic acid ions in predominating quantities.

Mineral waters are also grouped as to their gaseous constituents: (1) non-gaseous; (2) carbon-dioxidated,— containing carbon dioxide gas; (3) sulphuretted — containing hydrogen sulphide gas; (4) azotized — containing nitro-

gen gas; (5) carbureted — containing methane gas, and (6) oxygenated — containing oxygen gas.

The scheme proposed by the United States Bureau of Chemistry for the exact classified descriptions of mineral waters is as follows:

mal springs: Sweet Springs, W. Va., 74°; Warm Springs, French River, Tenn., 95°; Washita, Ark., 140” to 156°; San Bernardino Hot Springs, Cal., 108° to 172°; Las Vegas, N. Mex., 110° to 140°; Sulphur Springs, Aix-les- Bains, France, 108° ; Kaiserquelle, Aix-la-

Carbonated or Bicarbonated Borated

Silicated

! .

- Alkaline

Sodic

Arsenic

Lithic

Sulphated

Alkaline—

Saline

Bromic

Thermal

Potassic

1 Muriated

Iodic

or

Calcic

Nitrated

Siliceous

non-thermal

Magnesic

Boric

Ferruginous

Sulphated]

Lithic

Aluminous

Muriated

Saline

Ferruginous

Nitrated J

Etc.

Sulphated 1

Muriated J

Acid

Non-gaseous

Carbondioxated

Sulphureted

Azotized

Carbureted

Oxygenated

The description of a sample mineral water might read according to this schedule, <(a non-thermic, calcic, bicarbonated, alkaline waterˆ ; or ((a thermal, sodic, borated and carbonated, alkaline water}) — and be exactly classified.

The substances which are usually sought for and measured quantitatively in mineral waters are basic radicales (cations) : iron, aluminum, manganese, calcium, strontium, barium, mag¬ nesium, sodium, potassium, lithium, ammonium and hydrogen.

Acidic radicles (anions) : chlorides, bro¬ mides, iodides, fluorides, carbonates, bicarbon¬ ates, sulphides, thiosulphates, sulphites, bisul¬ phites, sulphates, bisulphates, nitrites, nitrates, arsenites, arsenates, metaborates, pyroborates, orthophosphates, metasilicates and hydroxides.

Gases: carbon dioxide; hydrogen sulphide; oxygen, and methane.

The therapeutic action of mineral waters depends chiefly upon their chemical composition and to some degree upon their temperature. Other circumstances, as situation, elevation, climate, geological formation and mean temper¬ ature have an important bearing upon the suc¬ cess of the treatment.

All drinking of these medicinal waters for remedial effects should be solely under the di¬ rection of a physician. The effects upon each individual are largely constitutional and a course of water beneficial to one may be highly injurious to another. As a general rule min¬ eral water at the springs is taken before break¬ fast, at intervals of about a quarter of an hour between each tumbler, moderate exercise being taken in the intervals. In many cases bathing is of even greater importance as a remedial agent than drinking. Baths are gen¬ erally between breakfast and dinner, and should never be taken soon after a full meal. The time during which the patient should remain in the bath varies very much at different springs, and the directions of the local physician should be strictly attended to on this point. As a

general rule the treatment should not be pro¬ tracted beyond the space of six weeks or two months, but on this point the patient must be solely guided by the physician resident at the springs. As regards temperature, if the waters are between 70° and 98° they are called tepid, while all exceeding the latter are classified as hot springs. The following examples give the degrees of temperature found in different ther-

•Chapelle, Prussia, 131°; Carlsbad, Bohemia, 162°.

American Springs. — In the United States the Rock Spring was known at Saratoga, N. Y., among the Indians as early as 1767, and over 40 springs have since been discovered there. In 1830 springs were well and popularly known in West Virginia, and of these the Bath mineral spring, now known as the Berkeley Spring, was visited as early as 1777, while the White Sulphur Springs were used by the Indians in 1778. In these American springs, like those in Europe, the geologists agree that dissolved min¬ eral substances are obtained from the rocks through which the water has flowed. The ma¬ jority of waters contain carbonic acid which greatly increases their solvent powers in the presence of lime, magnesia and iron. If the waters are alkaline they may take up sub¬ stances which are ordinarily rather insoluble, such as silica. There is, undoubtedly, more or less relation between hot springs and the geological structure of a region.

Alkaline Waters.— Simple alkaline acidu¬ lous waters are composed of carbonic acid and bicarbonate of soda. The most important springs of this class are the thermal springs of Las Vegas, N. Mex., and the cold springs at Sharon, N. Y. These waters are useful in cer¬ tain forms of indigestion, jaundice, gallstones, gravel, gout and chronic catarrh of the respira¬ tory organs. Muriated alkaline acidulous waters, which differ from the preceding, con¬ tain a considerable quantity of chloride of sodium. The most important springs of this kind are the thermal springs of Ems and the cold springs of Selters and Salzbrunn. They are useful in chronic catarrhal affections of the bronchial tubes, the stomach and intestines. Alkaline saline waters contain sulphate and bi¬ carbonate of soda, such as the warm springs of Carlsbad, serviceable to patients suffering from abdominal plethora, if unconnected with dis¬ eases of the heart or lungs. These waters afford an excellent remedy for habitual con¬ stipation.

Bitter Waters. — The chief contents of these waters are the sulphates of magnesia and soda. The best-known springs of this class are those

of Sedlitz and Kissingen ; English examples are in the bitter waters of Cherry Rock, in Glou¬ cestershire, and the Purton Spa, in Wiltshire, and in America the springs at Mount Clemens^

Mich. These waters act as purgatives and diuretics.

Muriated Waters. — 'Simple muriated waters contain a moderate quantity of chloride of so¬ dium or common salt. The chief springs of this class are Wiesbaden and Baden-Baden, which are hot; and those of Kissingen, Hom-burg and Cheltenham, which are cold. The muriated saline springs of Saratoga, in the United States, are some of them chalybeate, others sulphurous or iodinous ; all of them be¬ ing rich in carbonic acid gas. The Ballston saline springs near Saratoga have a very high proportion of carbonic acid. They are chiefly employed in cases of gout, rheumatism and scrofula. Muriated lithia waters contain chlorides of sodium and lithium. In gout they first aggravate the pain, but then give relief; and in periodic headache they have been found serviceable.

Earthy Waters. — These contain sulphate and carbonate of lime. The Wildungen water is a diuretic, and not only promotes the elimination of gravel, but by its tonic action on the mucous membrane of the urinary passages serves to prevent the formation of fresh concretions. It is also much used for chronic catarrh of the bladder. The baths of Leuk, in which many patients remain nine hours daily, until an erup¬ tion appears, are chiefly used in chronic skin diseases.

Mild Thermal Waters contain a small amount of saline constituents. Of the springs of this class the most important are Hot Springs, Ark., and Roanoke, Va. Their most striking effects are to stimulate the skin and excite the nervous system. They are especially used in chronic rheumatism and chronic gout and in diseases of the skin.

Chalybeate Waters. — Simple acidulous chalybeates contain carbonic acid and bicarbonate of protoxide of iron. Saline acidulous chalybeates contain sulphate of soda and bicarbonate of protoxide of

iron. The quantity of iron present is very small — from .08 to .15 in 1,000 parts. Many of the chalybeate springs, espe¬ cially in Germany, contain also much carbonic acid; carbonate, sulphate and chloride of sodium are frequently present and may help in the cure. The Putnam Spring at Saratoga and the springs of Maine and Massachusetts are ex¬ amples of chalybeate wells which are very sel¬ dom thermal. Maine has both chalybeate and sulphurous springs. Chalybeate waters are valuable in anaemia.

Sulphurous Waters. — These waters con¬ tain sulphuretted hydrogen or metallic sulphides (sulphurets), or both. The most important sulphurous thermals are those of A;x-la-Chapelle, Baden, Bareges and Bagneres de Luchon, in Europe. There are hundreds of these sulphurous springs in the United States, in¬ cluding those at Mount Clemens, Mich., Bath, Va., and Warm Springs, Va. They are ex¬ tensively used in chronic disease of the skin, and are of service in many cases in which exudations require to be absorbed, as in swell¬ ings of the joints, in old gunshot wounds and in chronic gout and rheumatism. The sul¬ phurous. waters are employed externally and internally, and mineral mud-baths are believed by many physicians to form a valuable auxiliary.

Production. — The commercial output of

mineral waters in the United States in 1916 amounted to 55,928,461 gallons, valued at $5,735,- 035. The imports in the same year amounted to 1,723,440 gallons. These figures are based on 802 producing springs as against 695 springs in 1908. New York, Wisconsin, Minnesota, Ohio, Massachusetts, Connecticut, California and Virginia are the largest producing States in the order given. The above figures do not include the quantities of water drunk at the springs, but do include the natural waters which were carbonated artificially, or otherwise combined and placed on the market for sale. The effect of the war in shutting out the usual supplies from Austria-Hungary and Germany was to increase the demand for American me¬ dicinal waters, so that the receipts for such waters have been larger for the last three years than before. It has been found that there are springs in America which almost exactly du¬ plicate the analyses of famous foreign springs, and give equal satisfaction to consumers.

The majority of the commercial springs of the United States are found east of the Missis¬ sippi. In the South, Kentucky, Tennessee and Arkansas are the chief producers of mineral waters. The Hot Springs of

Arkansas are among the most important thermal springs in the entire country. The Texas springs are peculiar from the fact that many of them show free sulphuric acid. In Wisconsin the springs of Waukesha are widely known. In New Mex¬ ico, the Las Vegas Hot Springs are often vis¬ ited. There are no hot springs in the New Eng¬ land States.

Bibliography. — Goosman, J. C., (The Car¬ bonic Acid Industry > (Chicago 1906) ; Mitchell, C. W., (Mineral and Aerated Waters) (London 1913) ; New York State Saratoga Springs Res¬ ervation Commission Report 1914, ‘ Report on European Spas* (Albany 1914) ; Oefele, F., ‘American Balneology) (New York 1915) ; United States Chemistry Bureau Bulletin No. 91, ‘Mineral Waters of the United States) (Washington 1905) ; United States Foreign Commerce Bureau, Special Consular Reports, Vol. 14, Part 2, ‘The Mineral Water Industry) (Washington 1901) ; Walton, G. E., ‘The Min¬ eral Waters of the United States and Canada* (New York 1890).

MINERAL WELLS, Tex., city in Palo Pinto County, 55 miles northwest of Fort Worth, on the Weatherford, Mineral Wells and North¬ western and the Gulf, Texas and Western rail¬ roads. The well-known mineral springs in the vicinity attract thousands of visitors and more than 1,000,000 gallons of waters are shipped annually. There are numerous drinking pavil¬ ions in and near the town, which is essentially a health and pleasure resort. Near by are places of scenic beauty, including Lake Pinto, Elmhurst Park and Lovers’ Retreat. Commis¬ sion government was adopted in 1913. Pop.

(1920) 7,890.

MINERAL WOOL, a product of molten slag, or rock under air or steam-jet, also called slag wool, rock wool, silicate cotton, cotton fibre. The result of this process is a thin vitre¬ ous fibre, useful as a non-conductor. It was first manufactured in Germany in the early 70’s. In 1875 a little was made at the Greenwood iron furnace, Orange County, N. Y. ; the industry

was firmly established by 1885; then because of the entry into the field of rock wool, that is, a fibre made directly from the rocks and not from slag, the slag wool industry fell off. In 1909 11,626 tons of mineral wool, valued at $101,621, was the product of the United States, a gain of more than 35 per cent over the pre¬ ceding year when the product weighed 9,197 tons and was valued at $77,228. These figures included rock and slag wools ; the former com¬ mand a price 50 per cent higher than the latter. The slag wools have a small percentage of sul¬ phur, unless especially desulphurized after the slag has been remelted, and thus sulphuric acid may be formed if water gets access to the wool and acts on the calcium sulphide in it. The sulphuric acid thus formed is injurious to the pipes. Hence rock wool is substituted for slag wool, or the slag wool is carefully desulphur¬ ized. Mineral wool of either sort, if of good grade, is one of the best practical non-inflam¬ mable coatings ; as a lining for floors it has the double advantage of being sound-proof and non-conducting.

MINERALOGY is the science which treats of minerals and especially of the prop¬ erties of these minerals, their chemical be¬ havior and composition, their crystalline form and structure, their physical characters, their classification and their determination. Mineral¬ ogy also considers the part each mineral plays in Nature, its history, its formation and altera¬ tions, its variations under different conditions and its relation to other minerals. From a prac¬ tical standpoint it records the uses of each mineral and the localities in which it has been found.

Mineralogy has many connections with other sciences, especially with crystallography and geology, for minerals are crystals for the most part and must be studied as such, and rocks are only aggregates of minerals and are identi¬ fied by study of the component minerals. Physics, chemistry and mathematics are funda¬ mental in the study of minerals and minerals are the raw material of the chemist and used by the physicist for the establishment of phys¬ ical laws. Finally the arts of mining and metal¬ lurgy are concerned, the one with the extrac¬ tion of minerals from the earth, the other with the extraction of metals from minerals.

Minerals are those substances of definite chemical composition which are found ready made in the crust of the earth and are not directly products of the life or decay of an organism. Usually also they will exhibit definite and characteristic molecular (crystalline) struc¬ tures.

Although minerals constitute the larger por¬ tion by far of the known so-called mineral kingdom, the definition excludes certain por¬ tions. Lack of homogeneity excludes asphalt and petroleum; lack of definite chemical com¬ position excludes the natural glasses ; ice made in the factory and ruby made in the furnace are not minerals. Coral and pearl are direct products of organic life, therefore not min¬ erals.

The fundamental requirement of definite chemical composition is sometimes apparently waived because other facts, especially proof of definite crystalline structure, have been obtained, although a satisfactory formula has not. For

instance, it is not yet possible to state an un¬ objectionable formula for tourmaline, and the formulas of the great triclinic feldspars were long a source of confusion. The reasons are manifold, faulty analysis, impurities, replac-ments of one element or group by another, and sometimes, as in the so-called colloid minerals, the originally formed material has taken out other things from solutions which in the dried-out mineral remain inextricably admixed.

The characteristic crystalline structure is so frequent that minerals are sometimes defined as natural crystals. But it is now recognized that crystallinity is dependent on conditions during or preceding solidification, and that, theoreti¬ cally, like any other chemical substance a min¬ eral may, under different conditions, form in the crystalline state or the amorphous state. Not only is this theoretically true, but there are many so-called <(gel® minerals which are known only in the amorphous state and other minerals which are known both in the amorphous and the crystalline state.

Historically, mineralogy as a science dates from the 18th century only. While the ancients utilized a very considerable number of minerals, some for the metals they contained, others as pigments, others as ornaments, charms and talismans and still others in medicine and the arts, they knew little as to their composition and nothing as to their molecular structure. They classified them, it is true, for there is still extant part of a work, (On Stones,* written by Theophrastus, who died 286 b.c., while Pliny in his great work on natural history, published 77 a.d., devotes five books to (<earths, metals, stones and gems.®

The greatest contribution to mineralogical knowledge prior to the 18th century was made by Georg Agricola (1494-1555), professor of chemistry at Chemnitz, Saxony, who minutely discussed the known

important ores, their min¬ ing, concentration and metallurgy; and may be said to have summed up and systematized the knowledge of minerals at that period.

As chemical knowledge increased the com¬ positions of minerals were gradually determined and chemical tests began to replace arbitrary distinctions of structure, color and the like. This is clearly shown in the works of Wallerius, 1747, and Werner, 1798; and from this time the composition became the dominating character.

The existence of a characteristic crystalline structure for most minerals was very gradually recognized and, until the publication of the works of Rome de l'lsle in 1783 and Rene Just Haiiy (who (<raised mineralogy to the rank of a science®), played no part in the study of min¬ erals. From this period the fundamental im¬ portance of the crystalline structure and the part it plays in the interpretation of both phys¬ ical and chemical phenomena have been every¬ where recognized.

Mineralogy may conveniently be considered under the following headings : (1) Crystallog¬

raphy; (2) Physical Mineralogy; (3) Chemi¬ cal Mineralogy; (4) Formation and Occur¬ rence; (5) Uses; (6) Descriptive Mineralogy; (7) Determinative Mineralogy.

1. Crystallography. — Crystallography, al¬ though a distinct science, has developed with mineralogy and is so interwoven with it that the two sciences are usually taught and studied

by the same specialists. Crystallography is dis¬ cussed separately in the articles Crystals ; Crystallography; Chemical Crystallog¬ raphy ; and Physical Crystallography. The subject need here be only briefly referred to in its relation to mineralogical study.

As previously stated most minerals exhibit in all or some of their

occurrences a definite crys¬ talline structure. If the mineral develops “well faced’* crystals the geometric symmetry and constants are obtained by a measurement of the interfacial angles of these crystals. If however these plane-faced crystals are lacking the crystalline structure is studied by the direc¬ tional characters : cleavage, behavior with polar¬ ized light, etch figures, thermal and electrical properties, etc., which yield not only charac¬ teristic constants but often the complete sym¬ metry.

Aside from these mentioned constants and symmetry relations resulting from a study of the crystals, interesting problems arise such as the relations between composition and crystal¬ line structure, the causes of variation in crystal habit, and the reasons for vicinal planes and parallel growths.

2. Physical Mineralogy. — Physical miner¬ alogy considers the physical characters of min¬ erals. Many of these are crystal characters since they vary with the direction and have therefore been discussed in the articles on Crystals; Crystallography; Cleavage; and Physical Crystallography. Other physical characters, however, which are not dependent or notably dependent on the direction the test is made, are, nevertheless, important and some of these may be described as follows:

Lustre, in the mineralogical sense, is not the degree of brilliancy, but the kind of brilliancy. Light reflected from different substances and quite independently of the color, produces dif¬ ferent effects ; one substance resembles a metal, another glass, another silk, and they are said to possess respectively metallic lustre, vitreous lustre and silky lustre. The determining causes appear to be transparency, structure and re¬ fractive power. The most used terms are: Metallic lustre exhibited by those opaque min¬ erals which with the exception of the native metals have a black or nearly black powder. Non-metallic lustre exhibited by all transparent or translucent minerals, which is subdivided into vitreous, adamantine, resinous, pearly, silky and waxy according to the similaritv in sheen to glass, diamond, resin, mother of pearl, silk and wax respectively.

Color, by either transmitted or reflected light, depends upon the power of the sub¬ stance to absorb different proportions of the lights of different wave lengths which together make up the light used. The same substance may, therefore, appear of different colors when viewed with different sources of light; and some minerals are strikingly different as, for instance, alexandrite, which by daylight is bluish to olive green and by lamp or gas lmht raspberry red. Color is

one of the least con¬ stant mineral characters and varies with dif¬ ferent specimens of the same species. The variation may be due to a few hundredths of 1 per cent of some organic or inorganic sub¬ stance dissolved in the mineral, or to larger amounts of mechanically included foreign mate¬

rial. Color effects may also be due to inter¬ ference of light, usually as a result of some imperfection in the substance, or, in cut stones, from some purposely chosen shape producing notable dispersion of the white light into its component colors. Such effects are known as play of color, iridescence, opalescence, asterism, *etc.*

Stretok, is the color of the fine powder of the mineral and is nearly constant, no matter how the color of the mass varies.

Hardness, to the mineralogist, means the re¬ sistance to abrasion of a smooth surface by a pointed fragment. It is usually, though very crudely, determined by comparison with the following scale introduced by Mohs: (1) Talc; (2) Selenite; (3) Calcite; (4) Fluorite; (5) Apatite; (6) Orthoclase; (7) Quartz; (8) To¬ paz; (9) Sapphire; (10) Diamond. Inter¬ mediate values are window glass 5.5; jeweler's file 6.5; zircon 7.5; chrysoberyl 8.5; carborun¬ dum 9.5. The more common procedure is to use pointed fragments of the scale minerals to scratch smooth surfaces of the mineral being tested. Sometimes this is more conveni¬ ently reversed and roughly polished plates of the scale minerals are tried by sharp edges or points of the mineral. The members of the scale are not in arithmetical ratio. The aver¬ age of five attempted comparisons from 9 down give, roughly, sapphire 100, topaz 30, quartz 18, orthoclase 12, apatite 7, fluorite 3}4, calcite 2ˆ4, gypsum y2. The scale, nevertheless, serves a useful purpose and no convenient substitute has yet been suggested. Elaborate tests with a dia¬ mond point, loss of weight by grinding with a standard powder, production of a crack by impact or pressure have been tried but fail to agree even approximately.

The Specific Gravity of a mineral, as of any other chemical substance, is of first rank as a test and is a function of the density of the molecule. As explained in the article Chemical Crystallography comparative molecular vol¬ umes are obtained by dividing the molecular weights by the specific gravities.

The specific gravity of a substance is de¬ fined as its weight divided by the weight of an equal volume of distilled water at 4° C. The range,

in varieties of the same species, is not great and even this is principally due to actual differences in composition. The value is usually obtained by means of a delicate balance provided with attachments for weighing the substance in water, such as a small wooden bench to hold a beaker of distilled water above the scale pan, and a platinum spiral to hold the specimen. Three weighings are needed:

W = weight of the stone. ˆ = weight of the spiral when suspended from the end of the balance frame and immersed in the distilled water. W, = = weight of the stone and the spiral suspended in distilled water.

W

Then, Sp. Gr. $ _j \y’

Instead of absolute weighings, relative weights may be determined on a scale by the stretching of a spring as in the Jolly balance or by the distance the apparatus sinks in water, as in the hydrometer; the results are ap¬ proximate.

Liquids of high specific gravity such as con¬ centrated solutions of mercuric and potassic

iodide or of silver thallium nitrate, or organic liquids like bromoform or methylene iodide, are often used for quick distinctions between similar appearing substances, one higher in specific gravity than the liquid, the other lower. They may also be conveniently used for cer¬ tain exact determinations, being equally accu¬ rate for minute fragments and coarser mate¬ rial. A liquid is chosen which will float the material; the proper diluent is’ then stirred in drop ‘by drop until a stage is reached at which the substance, if pushed down, will neither sink nor rise but stay where pushed. The specific gravity of the liquid may then be determined either roughly by dropping in fragments of material of known specific gravity until one is found which just sinks

and another which floats, the liquid being of a specific gravity be¬ tween these; or for more accurate determina¬ tion a special balance, such as the Westphal, may be used.

Numerous other non-directional characters, some of which, such as fusibility and elasticity, are susceptible of exact determination, are ap¬ proximately expressed by convenient terms. Fusibility, for instance, is determined in terms of a scale of seven minerals iby comparing the effect of the blowpipe flame on small fragments of similar size. Elastic substances are distin¬ guished as elastic and flexible. Tenacity is ex¬ pressed as brittle, sectile, malleable, ductile or tough. The fracture surface is said to be conchoidal, even, uneven, splintery; and terms are used describing taste, odor and the sense of touch.

Certain characters are limited to a few minerals rather than exhibited by all. Such a character is luminescence or the property of emitting light at ordinary temperatures after being subjected to some exciting influence, such as light, friction, X-rays, ultraviolet light or radium.

3. Chemical Mineralogy. — Minerals are either elements or are formed by the uniting of atoms of different elements in definite propor¬ tions in accordance with the laws of chemistry and for either identification or classification their chemical composition is their most im¬ portant characteristic.

The methods of analyses and the calculation of formulae are in general the same as in the analyses of other definite chemical substances. Much attention has to be paid to securing homogeneous material and in general the prob¬ lem is complicated by the fact that most min¬ erals are isomorphous mixtures (or mixed crystals) rather than simple salts.

True molecular formulae are not generally determinable. The empirical formula is calcu¬ lated from the analysis. Thus, for instance, beryl :

Proportionate

Percentage Atomic Number

Composition Weights of Groups

BeO . 14.01 -7-25 = .56

Al2Os . 19.26 -T-102 = .189

Si02 . 66.37 4-60 = 1.106

or closely in the ratio 3Be0.Al203.6Si02 or, summing up, BesAkCSiOsV If the material is an isomorphous mixture, the sum of the ratios of the replaceable elements or groups is considered, for instance, in the sphalerite analysis which follows, the sum of the propor¬

tions in which Zn Fe Cd and Pb are found is 1.040 and the S 1.039.

Pro-Number

Per-Atomic por-of

centage Weight tion Groups

S . 33.25 -f-32 = 1.039 I

Zn . 50.02 -7-65.4 = .756

Fe . 15.44 -=- 56 = .276 1 1.040 I

Cd . 30 -r-112 = .003

Pb . 1.01 -t-207 = .005

Such a composition could be expressed either by RS or (Zn.Fe.Cd.Pb) S, the letter R being used to represent a varying group of isomorphic or equivalent elements, and the parentheses with periods between the elements to show that the zinc, iron, etc., taken together accompany one atom of sulphur.

The question whether the wˆter given off during heating is due to the destruction of an acid or basic salt or a hydroxide or is more loosely held as so-called water of crystallization, or is present in solid solution or is adsorbed or adhering atmospheric water, is often difficult to answer. Carefully worked-out water curves showing the loss at

frequent intervals of tem¬ perature and the rate of loss at each tempera¬ ture will often assist the judgment.

The chemical testing of minerals in practice is very commonly by the so-called ((blowpipe tests® which possess certain advantages in speed, minute amounts of material needed and in directness of application. Usually no at¬ tempt is made to secure a complete qualitative analysis, but merely to determine the dominat¬ ing constituents. Easy tests exist for most of the common and many of the rare elements, and while group separations, except for in¬ stance into volatile and non-volatile, are not practicable the order of testing is such that certain elements are detected and largely re¬ moved before the tests for the others are made.

4. The Formation and Occurrence of Min¬ erals. — - The history of a mineral, the role it has played, is largely told by its occurrence, associates and alterations, and these facts arc often illuminated by the successful reproduc¬ tion of a mineral by a method which does not conflict with the known natural conditions. The processes of mineral formation may be broadly grouped under the headings :

(1) Crystallization from a fluid magma con¬ sisting chiefly of silicates but partly of oxides, sulphides, fluorides and ferrates mutually dis¬ solved in each other with certain volatile con¬ stituents, chiefly water. By far the greater por¬ tion of the earth's crust has formed from such magmas and a comparatively few mineral groups are found to dominate them. Clarke's estimate* is

1. The feldspars . 59.5 per cent.

2. The pyroxenes and amphiboles . 16.8 " "

3. Ouartz . 12.0 " "

4. The micas . 3.8 " "

5. Accessory minerals . 7.9 " "

The estimated 7 per cent of accessory includes rarer silicates, elements, sulphides and oxides, sometimes in quantities which are of economic value, especially when they have undergone a natural concentration known as magmatic segre-

*Bulletin 491, United States Geological Survey, p. 31.

MINERALOGY

9 Amethyst Crystals in parallel position

10 Reniform Hematite

11 Conchoidal fracture of Uintahite

12 Tree agate showing arborescent form of Wad

13 Cubical cleavage of Halite

14 Curved Gypsum

15 Star Sapphire

16 Reticulated Cerussite

gation, as in the important nickel ores of Sud¬ bury, Canada.

(2) Formation by pneumatolysis, that is processes in which gases and vapors especially steam, hydrofluoric, boric, suphuric and hydro¬ chloric acid play a principal part. These gases and vapors are released by the cooling magmas and when charged with dissolved matter deposit it later as new minerals in pegmatite veins, con¬ tacts, tin lodes and other places to which they may penetrate. These vapors dissolve, trans¬ port and concentrate minerals rare in the rocks which they penetrate; they form new species into the composition of which they enter and the >- serve as Mineralizers,® apparently with catalytic action.

(3) Crystallization or precipitation from aqueous solutions. Rain water carrying oxygen and the underground waters with dissolved carbon dioxide and other constituents are the chief agents in the disintegration and altera¬ tion of the minerals which are at or near the surface. They take away selectively much of the soda, potash and lime and much less of the magnesia and alumina and silica. The solu¬ tions due to this “weathering® are in part re¬ deposited as cements, in part precipitated in the residual minerals, but much is carried away to rivers, lakes or oceans, and there may form deposits of new minerals, such as carbonate of lime in rivers or underground channels, salt or other minerals of soda in lakes (or if boric acid has been present borates may form) and in land-locked basins, great beds of anhydrite, gypsum and common salt, or, more rarely, as at Stassfurt, salts of potassum and magnesium.

The minerals of veins by their composition and arrangement are shown to be deposits from watery solution, but in most cases not simply solutions of the neighboring rocks in the under¬ ground water, but also solutions in the \ apors of deep-seated magmas. As the vapors rise into regions of lower pressure and tempera¬ ture condensation takes place, fluid solutions form, various species separate _ and are

de¬ posited on the walls and may ultimately fill the

fissure, forming a vein. .

Animal and vegetable organisms often assist in the formation of minerals from watery solutions. The original deposits may not always be strictly mineral species as with coral, shells, diatomaceous earth, but directly or indirectly true species often result,, such as limomte, apatite, sulphur and soda nitre. The formation of a mineral may involve very complex agencies such as the combined action of intense pres¬ sure from rock folding and of circulating waters often hot and charged with many constituents, including the so-called mineralizing agents. The new minerals are often denser than the originals and many contain constitutional water.

5. The Uses of Minerals. — The mineral in¬ dustry of this country ranks next to the agri¬ cultural, and the value of the minerals consid¬ erably exceeds $2,000,000,000 a year. While the principal value of these minerals is for the ex¬ traction of particular constituents such as the metals or the substances of use in the chemical industries, there is a large use of the minerals in their natural state not only as constituents of building stones, but as abrasives., fertilizers, fluxes, pigments, refractory materials and in the making of pottery, porcelain, glass, *etc.* Minerals susceptible of polish and with any

claim to beauty are utilized as precious or orna¬ mental stones.

Minerals are the raw material from which all the metals and all the chemical salts except the organic compounds are made. Not all minerals containing a desired element are util¬ ized, and generally only one or two materials are obtained directly from a mineral. These products are themselves used for the manu¬ facture of others, as for instance the mineral halite or common salt is the indirect source of nearly all of the sodium salts, but is the direct source principally of a crude sodium sulphate from which a multitude of other salts are manufactured.

6. Descriptive Mineralogy.— It may be

said that it is the province of descriptive min¬ eralogy to sum up all the results of the study of minerals, as already outlined, into orderly form for each mineral species and to so classify the different species that related minerals shall be grouped together. . • .

The basis of classification may be scientific, or economic or genetic ; each for certain pur¬ poses being the most satisfactory. Classifica¬ tions until the 18th century were based on dis¬ tinctions of structure, color, use, or some fancied similarity, and as has been said were “chiefly designed to enable amateurs to arrange their collections in a fixed order.® Pliny the natu¬ ralist (23-79 a.d.) classified as metals eartns, stones and gems. Avicenna nearly 1,000 years later used a very similar classification with many subdivisions based on either external characteristics or easily ascertained properties Scientific classifications based on essential characters began as the increased chemical knowledge brought composition and chemical tests to the front. This was instanced in the systems of Wallerius in 1747 and Werner m 1798. The still later realization that most min¬ erals possessed a characteristic molecular structure revealed by its crystals and physical characters followed naturally the discoveries of de lisle, Haiiy and others of the laws govern¬ ing crystals ; and the methods of examining crystals placed crystalline structure alongside chemical composition as the bases of natural scientific classification. The system of James D Dana is probably most used throughout the world and “follows first the chemical composi¬ tion and second the crystallographic and other phvsical characters which indicate more or less clearly the relations of individual species. Eight principal divisions are made from a chemical standpoint as follows :

I.

II.

III.

IV. V.

VI.

VII.

VIII.

ive Elements.

, hides , Selenides, Tellundes, Arsenides, Antimon—

iho-salts. — Sulpharsenites, Sulphantimonites, Sul—

Dids ˆChlorides, Bromides, Iodides, Fluorides, ies.

ˆCarbonates. 2. Silicates, Titanates. 3. Niobates, Tantalates 4. Phosphates, Arsenates, V anadates, Anlimonates, Nitrates. 5 Borates, Uranates. 6. Sulphates, ChYOtnates, Telluyates . 7. lung—

states, Molybdates. „ ,

s of Organic Acids. — Oxalates, Mellates, *etc.*

In subdividing, the chemical composition and crystalline form are considered with the pur¬ pose of assembling in groups those minerals which have analogous compositions and closely similar forms. For instance the barite group

under anhydrous sulphates consists of sulphates in which Ba, Ca, Sr and Zn are in the same

Mendeleeff group,

and which

show

close sim

ilarity in crystal constants.

S

b

c’

Barite BaSO.i .

. 0.8152

1

1.3136

Celestite SrSO* .

_ 0.7790

11.2801

Anglesite PbS04 .

_ 0.7852

1

1 . 2894

Anhydrite CaSCh .

_ 0.8933

1

1 . 0008

Zinkosite ZnSO« .

_ 0.8925

1

1.4137

Hydrocyanite CuSO«…

_ 0.7971

1

1 . 1300

Descriptive mineralogy also serves to keep in order the nomenclature. Uniformity can only be obtained if after careful consideration the term entitled to priority and otherwise satisfactory is made the name of the species and the host of synonyms and often unessential variety names assembled under it.

7. Determinative Mineralogy. — This sub¬ ject has already been discussed in a separate article. See Determinative Mineralogy.

Bibliography. — The following is a partial list of comparatively recent works and may be supplemented by the lists following the articles on Crystals and Crystallography.

Treatises, Mineralogy. — Dana, J. D., Sys¬ tem of Mineralogy' (6th ed., with three ap¬ pendices, 1899, 1909 and 1915, New York 1892) ; Hintze, Carl, (Handbuch der Mineralogie) (Bd. I, 1904; Bd. II, 1897, Leipzig; still incomplete).

Textbooks, Mineralogy. — Bauer, M., <Lehrbuch der Mineralogie' (2d ed., Stuttgart 1904) ; Dana-Ford, (Manual of Mineralogy ' (13th ed., New York 1912) ; Dana, E. S., (A Textbook of Mineralogy ' (New York

1907) ; Moses, A. J., and Parsons, C. L., (Mineralogy, Crystallography and Blowpipe Analysis' (5th ed., New York 1916) ; Miers, H. A., Mineral¬ ogy. An Introduction to the Scientific Study of Minerals' (London 1902) ; Naumann-Zirkel, (Elemente der Mineralogie) (13th ed., Leipzig 1898) ; Phillips, A. H., (Mineralogy' (New York 1912) ; Rogers, A. F., introduction to the Study of Minerals) (New York 1912) ; Tschermak, G., dehrbuch der Mineralogie) (6th ed., 1905).

Determinative Mineralogy and Blowpipe Analysis — Brush-Penfield, (Manual of Deter¬ minative Mineralogy) (16th ed., New York

1906) ; Eakle, A. S., Mineral Tables) (New York 1904) ; Fuchs-Brauns, (Anleitung zum Bestimmen der Mineralien) (6th ed., Giessen 1913) ; Frazer-Brown, (Tables for the Deter¬ mination of Minerals) (6th ed., Philadelphia 1910) ; Kraus-Hunt, (Tables for the Deter¬ mination of Minerals) (New York 1911); Lewis, J. V., (Determinative Mineralogy) (2d ed., New York 1915) ; Plattner-Kolbeck, (Pro-bierkunst mit der Lotrohre) (7th ed., Leipzig

1907) .

ˆ Chemical Mineralogy. — Brauns, R., (Chemische Mineralogie) (Leipzig 1896) ; Doelter, C., (Physikalische-Chemische Mineralogie> (Leipzig 1905) ; Doelter, C., dandbuch der Mineral Chemie) (Bd. I, II, III, Dresden 1912-13).

Occurrence, Association and Origin of Minerals. — Beyschlag-Krusch-Vogt (trans. by S. J. Truscott), (The Deposits of the Useful Minerals and Rocks' (Vol. I, 1914; Vol. II, 1916; Vol. Ill, London); Clarke, F. W., <The Data of Geochemistry) (Bulletin No. 660, United States Geological Survey, 1915) ; Leith and Meade, (Metamorphic Geology) (New

York 1915) ; Lindgren, W., (Mineral Deposits) (New York 1913) ; Pirrson, L. V., (Rocks and Rock Minerals) (New York 1908) ; Van Hise, C. R., (A Treatise on Metamorphism' (Mono¬ graph 47, United States Geological Survey, 1904) ; Weinschenck, E., (Grundzuge der Ge-steinkiinde' (Freiburg im Briesgau 1905).

Rock Minerals and their Microscopic Ex¬ amination. — Daly, R. A., (Igneous Rocks and their Origin' (New York 1914) ; Iddings, J. P., (Rock Minerals> (2d ed., New York 1912) ; Johannsen, A., determination of Rock Form¬ ing Minerals> (New York 1908) ; Tohannsen, A., Manual of Petrographic Methods' (New York 1914) ; Luquer, L. Mcl., (Minerals in Rock Sections) (4th ed., New York 1913) ; Weinschenck-Clark, * Petrographic Methods) (New York 1912) ; Wright, F. E., {The Meth¬ ods of Petrographic-Microscopic Research ' (Carnegie Institution 1911).

Microscopic Study of Minerals. — Mur¬ doch, J., (Microscopical Determination of the Opaque Minerals' (New York 1916) ; Schroe-der van der Kolk, J. L. C., (Tabellen zur mikro-skopischen Bestimmung der mineralien nach ihren Brechnungsexponenten' (2d ed., Wies¬ baden 1906) ; Seeman, F., (Leitfaden der Min-eralogischen Bodenanalyse' (1914); Winchell-Winchell, (Elements of Optical Mineralogv' (New York 1908).

Rare Minerals. — Cahen and Wootten, (The Mineralogy of the Rarer Metals' (Phila¬ delphia 1912).

ˆ Gems and Precious Stones. — Bauer, Max, (Edelsteinkunde' (2d ed., Leipzig) ; Cattelle, W. R., (Precious Stones' (Philadelphia 1903) ; Crookes, Sir Wm., diamonds' (New York 1909) ; Escard, J., des Pierres Precieuses' (Paris 1914) ; Farrington, O. C., cGems and Gem Minerals' (Chicago 1903) ; Eppler, A., die Schmuck und Edelsteine' (Stuttgart 1912) ; Smith, G. F. H., (Gem Stones' (New York 1912).

The Uses of Minerals. — Dammer und Tietze, die Nutzbaren Mineralien' (2 vols., Stuttgart 1913) ; (Mineral Resources of the United States' (Annually since 1883. U. S. Geol. Survey) ; (The Mineral Industry' (Annu¬ ally since 1892. New York) ; Engineering and Mining Journal, especially Annual Review number.

History of Mineralogy. — Fletcher, L., (Guide to Mineral Collection of British Mu¬ seum' ; v. Kobell, F., Geschichte der Mineralogie* (Miinchen 1864).

Mineral Synonyms. — Chester, A. H., dic¬ tionary of the Names of Minerals' (New York

1896).

Alfred J. Moses,

Professor of Mineralogy, Columbia University.

MINERS, Western Federation of. See

Western Federation of Miners.

MINERS' ANZEMIA. See Hookworm

Disease.

MINERS' INCH. See Hydrology.

MINERS MILLS, Pa., borough in Lu¬ zerne County, three miles northeast of Wilkesbarre, on the New Jersey Central, the Delaware and Hudson and the Lehigh Valley railroads. The chief industry is coal mining. The town contains a flour mill, a brick plant and iron¬ works. Pop. 3,159.

GOLD

SILVER

MERCURY ORE

(C. nnfibflˆ

RED OXIDE of IRON

ˆHerrialit'a')

IRON PYRITES

(Fools Gold)

ANTHRACITE COAL

(li-Ide scent)

SULPHIDE of ARSENIC

(Oepiment)

COPPER

(Vein Ro.ck)

ALUMINIUM

(Boxile.)

- oj*-

lead

COPYRIGHT, 1912, BY F. E. WRIGHT.

VALUABLE MINERALS AS THEY

ARE

FOUND

MINERSVILLE — MINES AND MINING MILITARY

MINERSVILLE, Pa., borough, in Schuyl¬ kill County, on the west branch ot the Schuyl¬ kill River, and on the Philadelphia and Reading and the Lehigh Valley railroad, about 45 miles north by east of Harrisburg. Situated in the hard coal region, its chief industries are con¬ nected with mining and shipping coal. Indus¬ trial establishments include machine shops, foundries, underwear factories, lumber and brick yards. Pop. 7,500.

MINERVA, mi-ner'va, from the Greek ftryo<r, menos, spirit, strength, typifying The Thinker, — Goddess of Wisdom — and applied to Pallas Athena, signifying Maid of Athens, a Greek divinity, in earlier times worshiped as Ergane, the goddess of crafts, and Nike, the goddess of battles. Her statues called Palladina (often said to be gifts or windfalls from Heaven) were sternly guarded in the city tem¬ ples as ensuring the citadel's impregnability. Her greatest shrine, the Parthenon — from Par~ thenos, virgin, — the <(Temple of the Virgin® at Athens, graced with the gold ivory statue by Phidias, was the highest achievement of Greek architecture. Minerva was perpetuated in Ro¬ man mythology, as a daughter of Jupiter, and one of the great • divinities. She was looked upon as the patroness of all Roman arts and trades, and her annual festival, called Quinquat-rus, celebrated throughout Etruria, lasted from the 19th to the 23d of March, inclusive. Consult Fairbanks, A., (The Mythology of Greece and Rome) (New York 1907) and (Handbook of Greek Religion) (New York 1910) ; Fowler, W. W., (Roman Festivals> (London 1899).

MINERVINO MURGE, Italy (Lucus Minervse), a walled town in Apulia, 43 miles west of Bari. Fruits, vegetables and oil are produced here. There are also large quarries and limekilns. Pop. 19,325.

MINES, Drainage of. See Mining.

MINES, Submarine. See Submarine Mines.'

MINES AND MINING, Law of. See

Mining Laws of the United States.

MINES AND MINING, Military. In all

periods of the history of warfare, particularly in siege operations and the somewhat similar operations in trench warfare, recourse has been

had to the use and construction of subterranean passages, either as a means of penetrating the lines of the enemy, or to avoid a dangerous advance under fire at the surface, or for the destruction of a hostile position by the use of explosives, or to prevent on the part of the enemy undertakings such as those already de¬ scribed. These operations constitute military mining, and the charge of explosives set off under a position of the enemy is known as a mine. While any of the devices and methods employed in commercial mining may be used in appropriate military situations, military min¬ ing is dominated by the consideration of sim¬ plicity — for complicated tools cannot be brought up to the battle-line — speed and incon¬ spicuousness. In addition, by far the greater part of the work is done in soil which is suffi¬ ciently soft to present relatively little difficulty to excavation, but which manifests a constant tendency to cave in. This tendency is accentu¬ ated by the continual disturbance of the soil by artillery fire and the countermines of the

enemy. Accordingly the reinforcement of the walls of his excavation is generally among the chief problems of the military miner. The methods used are much the same, whether the excavation is a vertical shaft or an approxi¬ mately horizontal gallery. They fall into two general classes. In one casings are inserted as the work progresses. These consist of four lengths of stout planking surrounding the exca¬ vation. Two opposite lengths are provided with mortises and the other two with tenons. In the other type of mining, longitudinal planks known as sheathing are held in place by frames of strong timber.

Galleries are divided into great or grand galleries (6 feet high by 3j4 feet) ; half gal¬ leries (4l/2 feet by 3 feet) ; branches (Zy2 feet by 2 x/2 feet) ; and small branches (2 l/2 feet by 2 feet). The smaller galleries are often excavated (by earth augers ; the larger ones by ordinary excavating tools reduced in size so as to be adapted to use in a confined space. An especial digging tool known as the push-pick is also employed. The direction of galleries is determined by the ordinary surveying instru¬ ments used on the surface, due allowance being made for the unreliability of the compass un¬ der ground. The targets are of course slits through which an artificial light shines. The azimuth is transferred from the top to the bot¬ tom of a shaft by means of a pair of plumb-lines, which are oriented by compass and map above ground. Ventilation is essential, and is secured by various mechanical means, or in a system of galleries with two or more outlets, by a fire near the upper end of a shaft. In difficult places, air may be pumped in by a hose. Respirators may be worn in case of

emergency. Drainage is secured by sloping the floors of the galleries and supplying them with gutters. If it is not possible to make all the galleries slope toward the entrance, a sump is dug from which the water is pumped or carried in buckets. The lighting of galleries is often a difficult problem, on account of the nearness of explosives and the difficulties of ventilation. Electric lights are often used. Where it is possible, daylight is reflected into the gallery by mirrors or white surfaces, and the walls are whitewashed. The disposal of the excavated earth is often a diffi¬ cult problem. It is usually taken away in sacks or relays of wheelbarrows. Sometimes small narrow gauge railways have been used.

The mine chamber is nearly cubical or of the shape of a cylinder with an altitude twice its radius. It is often simply the end of a gallery or shaft. The charge is usually some high ex¬ plosive such as dynamite or trinitrotoluol. It is set off by a detonator and primer, usually fired by electricity, though a powder fuse may be used. The charge is tamped by obliterating from 6 to 10 feet of the passage leading up to the chamber.

The explosion of a mine produces a com¬ pression of the surrounding soil which will blow in any gallery within a certain radius. It also causes a pit or crater to be excavated in the surrounding soil, provided the chamber is sufficiently near the surface. A mine which does not break the surface is known as a com-ouflet. In a normal mine, the depth of the charge beneath the surface is equal to the radius of the crater at the surface of the ground.

Mines dug from the surface are known as land mines, or if the crater is filled with stones, etc., so as to form a crude mortar, as fou¬ gasses. Land mines are only permissible in ground obviously prepared for defense. They may be set off by devices under the control of some operator, or automatically by triggers or other such means.

The tactics of mining depend on the opposi¬ tion of mines by countermines. It is always necessary to supplement one’s own effort to

attain his objective by an effort to frustrate the plans of the enemy. The only way by which re¬ liable information of the progress of the enemy can be attained is by listening either directly, or with the aid of microphones. Men are trained for this purpose, and stationed in galleries called listeners, placed sufficiently near to one another to prevent a hostile gallery from being pushed between them without being heard.

It is generally better in mining operations to come into actual contact with the counter¬ mines than to fire too soon. The best place to attack a hostile gallery is from the side, as then a greater length of gallery is destroyed.

Mines are sometimes used to form craters to take the place of trenches in an advance. A row of such craters serves not only as a parallel on the surface but as a starting-point for new mines.

Galleries are usually started as near the hostile lines as possible, i.e., from advanced saps. In fortresses concrete lined permanent galleries often serve as a beginning for counter¬ mine galleries in case of siege. Consult Engi¬ neer Field Manual* (Washington 1912).

MINETTE, an igneous rock belonging to the syenite group, of granular texture and com¬ posed essentially of feldspar and biotite. It occurs in dykes.

MINGHETTI, min-get-te, Marco, Italian

statesman and writer; b. Bologna, Italy, 8 Nov. 1818; d. Rome, 10 Dec. 1886. He came of a wealthy family and was given a university edu¬ cation. After studying the political institutions of France, Great Britain and Germany, he re¬ turned to Italy and published an essay on the commercial advantages of free trade as exist¬ ing in England, espousing the economic views of Richard Cobden, which were similar to the teachings of the Tuscan economist, Bandini, already adopted by him. Minghetti began his public career in 1846 by establishing a liberal journal, II Felsineo, in Bologna. In 1847 he was called to Rome by Pius IX to become a member of the Consulta delle Finanze and in 1848’he became Minister of Public Works. When the Pope yielded to Austria, Minghetti trans¬ ferred his services to Sardinia, joining the army under Charles Albert in Lombardy. He was appointed on the royal staff with the rank of captain. After the battle of Goito, he was made major and distinguished himself in the engage¬ ment of Custozza (25 July 1848). Invited to Rome by Count Rossi as a member of the new constitutional ministry, he arrived the day of Rossi’s

assassination. He refused the Pope's request to take Rossi's place and returned to the Piedmontese army. After the defeat at Novara (1849), Minghetti lived quietly in Milan for several years, devoting himself to political economy. In 1859 he became Cavour's Secre-. tary of State for Foreign Affairs. On Cavour's

death in 1861 he was regarded as the ablest representative in the Italian Chamber. In 1863 he became Prime Minister and in 1864 he con¬ cluded with Napoleon III the ((September Con¬ vention, }) which seemed to place an obstacle in the way of completing Italian unity. He left office in 1864. In 1868 he was Ambassador to London. For a short time, subsequently, he was at the head of the Agricultural and Com¬ mercial Department of the Menabrea Ministry (1869). He was Ambassador to Vienna in 1870-73; and from 1873 to 1876 again head of the Cabinet, first as Minister of Finance and then as Minister of Foreign Affairs. His last years were spent in partial retirement and study. Minghetti's writings include (Della economia publica e delle sue attinenze con la morale e col diritto) (1859) ; (Lo Chiesa e lo Stato> (Milan 1878) ; ˆOpuscola letterari ed economicˆ (1872) ; and (Discorsi parla-mentari* (Rome 1888-90). Minghetti was also a student of the fine arts, lectured on Dante and Raphael and wrote a book, (Le donne italiane nelle belle arte al secolo XV e XVP (1877) and a biography of Raphael (1885). His autobiography, (I miei recordi,* appeared after his death (1888).

MINGO JUNCTION, Ohio, city in Jef¬ ferson County, 12 miles northeast of Urbana and 50 miles south of Youngstown, on the Pennsylvania, the Pittsburgh, Cincinnati, Chi¬ cago and Saint Louis and the Wheeling and Lake Erie railroads. The Carnegie steel works are situated here. Farming, dairy-produce and fruit-growing are the chief industries. Coal is found in the vicinity. The place was settled about 1800. Pop. 4,616.

MINGRELIA, a region bordering on the Black Sea and situated in the Caucasus, a for¬ mer province of Transcaucasia. It is now in¬ cluded in the Russian state of Kutais. Long a vassal state of Georgia, it became in 1414 independent under its own princes, although tributary to Turkey and Persia. Mingrelia passed under Russian control in 1803 but the administration was left in control of native chiefs until 1867. Then, as a result of peasant uprisings, begun in 1857, Russia annexed it. The population is now about 250,000. In an¬ cient times the district was known as Colchis, famous in Greek mythology as the home of Medea and the Golden Fleece, the goal of the Argonauts. To

the Greeks the province was famous as the seat of Dioscurias, a colony of Miletus, noted for its wines and fruits. Col¬ chis was subject to Persia; to Mithridates, king of Pontus; and ultimately came under the rule of the Roman Empire.

MINGRELIANS, inhabitants of Mingre¬ lia, now in the Kutais region of the Caucasus. Of the Georgian group they are above the average in height and many of them, like the Georgians proper, possess much physical beauty. Their language varies considerably from the Georgian stock. They have a folk-literature, consisting of legends and songs and folk-music and dances. Many of this tribe are Christian. Their national character is not admirable. ((A11 trace of the names of Colchians, Iberians and Albanians has long since passed aw&yˆ writes James Bryce in (Transcaucasia and Ararat* (London 1896), (<and though Mingrelians now live where Jason found the Colchians, there is

nothing to show that any of the blood of .#Letes and Medea flows in their degenerate veins, though the names of the Greek hero and his formidable bride are used to-day as Chris¬ tian names in the country. We find the Mingrelians along the Black Sea coast from the Turkish border to Sukhum Kaleh. They are the ne'er-do-wells of the Caucasian family. All their neighbors, however backward a West¬ erner may think them, have a bad word and a kick for the more backward Mingrelian. To believe them, he is lazy, sensual, treacherous and stupid, a liar and a thief. Lazy, the Min¬ grelian certainly is; and he lives in so damp and warm a climate that violent exercise must be disagreeable. He is a well-made, good-look¬ ing fellow, but with a dull and, perhaps, rather sensual expression. And he is certainly back¬ ward in agriculture and trade, making very little of a singularly rich country.®

MINIATURE PAINTING (from the Latin minium, ((red lead®), a painting on a very small scale. The art has its origin in the prac¬ tice of embellishing books, in which the prin¬ cipal pigment used was red lead. Hence the Low Latin verb ((miniare,® to color with red lead, was applied to the art, and those who practised it came to be known

as (<miniatori.® (See Manuscripts, Illuminated). The exact date of the introduction of portraits into these embellishments is difficult to ascertain. How¬ ever, such tiny likenesses gained great favor, often engaging the effort of great artists; and eventually the word ((miniature® took on a new meaning, and was applied to very small portrait paintings exclusively.

The early artists painted on vellum, and used body-colors, i.e., colors mixed with white or other opaque pigments and this was con¬ tinued until the 17th century when thin leaves of ivory fixed on cardboard with gum were substituted. The ivory was adapted naturally to richer and more varied coloring, and trans¬ parent colors were employed on faces and hands, while opaque colors were used for other textures. From the use of miniatures on vari¬ ous articles such as snuff boxes, card-cases, etc., enamel came into popular favor also.

Of the earliest painters of portrait minia¬ tures, Holbein (the younger) stands foremost in excellence. The miniatures ascribed to him are characterized by the same perfection which mark his larger portraits. He was followed in England by Nicholas Hilliard, who was the first to develop painting in miniature as an art per se. He flourished about 1547-1619, and painted chiefly on vellum. His productions show a marked adherence to manuscript form — the colors used are opaque, while gold is used for background and ornamentation. His son Lawrence improved in coloring. Isaac Oliver (about 1567-1617), his contemporary, produced some excellent work, but the best English work of the 17th century was done bv Samuel Cooper (1609-72). His work is not limited by the size of his canvas, and in breadth and dignity shows the master hand. Other well-known English miniaturists were Richard Cosway (1741-1821) who produced exquisite ef¬ fects on ivory and vellum ; George Englcheart (1750-1829); Andrew Plimer (1763-1837) ; John Smart (1741-1811), who displays a fine treatment of texture; and Andrew Robertson (1777-1845) and Sir William Ross, who de¬

veloped the so-called larger miniatures. The revival in the 19th century brought others to the foreground.

In Germany, some of the great artists painted an occasional miniature, notably Lucas Cranach the Elder. German and Austrian miniaturists are best represented by Ismael Mengs (1688-1764), Sophie Friederike Ding-linger (1736-91), Martin van Meytens, a Swede who executed his principal work at Vienna (1695-1770), and Heinrich Friedrich Fiiger

(1751-1818). The 19th century revival found an able exponent in E. Bastanier at Berlin.

Italy, the home of the miniature in its orig¬ inal meaning, produced comparatively few por¬ trait miniaturists of note. Guilio Clovio, in the Renaissance pˆ od, executed charming lit¬ tle portraits, rich in color and vigorous and clear in their drawing. Rosalba Carrera, the 1 7 th century painter of pastels and a native of Venice, painted imaginative delicate miniatures which have few eauals.

France produced numerous prominent artists in this field, especially in the 18th century. The art is said to have been introduced by Jean Clouet in the early 16th century. One of the earliest exponents of the art was Klingstet, a native of Riga, who practised in France, but he pandered too much to the decadent taste of the 18th century society to produce works of lasting value. His portraits, however, are esti¬ mable creations. Masse also flourished at this period, his notable contemporaries being Ti-baldi, Sartori, Camerata, Laine and Jean Gros. Under the sovereignty of Marie Antoinette, the art of the miniature reached its height and wras promulgated by prominent artists : Vincent, La Chaussee, Mausson, Mosnier, Villers; and, greatest of all, the Swede, Hall (1783-93). The extreme finesse and vigor with which he subordinated details to the general effect won for him the title of <(the Van D}rck of Miniature.® Siccardi and Fragonard continued in his style, increasing the breadth of treat¬ ment. Dumont, Isabey, Augustin and Duchesne carried the art to a high point of perfection, during the days of the Directory and the Em¬ pire. Their portraits of Napoleon and his court are fine and spirited examples. In enamel work, excellent miniatures were produced by Petitot (1607-91) for Louis XIV. His son carried on his wrork.

In Spain the painter Goya executed some fine miniatures. Hans Bol (1543-93) in Hol¬ land gained considerable reputation.

The United States is best represented in this field by the portrait painters, Copley, Gilbert Stuart and Peale. Malbone (1777-1807), how¬ ever, was the first great American miniaturist. His portraits show warmth and depth, and by their excellence placed American miniature on an equal footing with those of foreign con¬ temporary artists. Fraser, his contemporary, Miles and George Freeman also deserve men¬ tion.

The introduction of photography greatly lessened the demand for small portraits and the life of the art of miniature was threatened. However, it was not long before the superior artistic merit of the little

paintings began to awaken a new interest in discriminating per¬ sons, and an important revival of the art took place in the latter part of the 19th century. Miniature still flourishes, although the popular

demand has relegated it to a comparatively minor place.

Of miniature collections one of the very finest is that of J. P. Morgan (Metropolitan Museum of Art, New York). Excellent col¬ lections are in the possession of the king of England, the queen of Holland and also at the Louvre, Amsterdam, Berlin, Petrograd, Vienna, Florence, Stockholm and Helsingfors. Private collections of fine quality belong to notable families in England.

Bibliography. — Ferrand, (Traite de peinture en email et en miniature) (Paris 1732) ; Mayol, Hntroduction a la miniature5 (Paris 1771) ; {Ecole de miniature5 (Leipzig 1776) ; Propert, J. L., (History of Miniature Art5 (London 1887) ; Bradley, J. W., dictionary of Minia¬ turists, Calligraphers and Copyists, From the Establishment of Christianity to the 18th Cen¬ tury5 (London 1887-89) ; Williamson, dor-trait Miniatures from the Time of Holbein 1531, to that of William Ross, I8605 (London 1897) ; Wharton, A. H., (Heirlooms in Minia¬ tures5 (Philadelphia 1898) ; Foster, J. J., (Min- . iature Painters. British and Foreign,5 and (British Miniature Painters and Their Works5 (New York 1903) ; Leichsing, (Die Sildnis Aluniaturmalerei in Osterreich5 (Vienna 1905) ; Heath, D., ˆMiniatures5 (London 1908) ; Faust, C., (Les Miniatures de l'Empire et de la Restau-ration5 (Paris 1913). Consult also the cata¬ logues of the various collections.

MINl£, mee-nee-ay, Claude Etienne,

French soldier and inventor: b. Paris, 1814; d. 1879. He enlisted in the army as a private when very young and left as a colonel in 1858. He devoted himself to the perfecting of firearms and in 1849 invented the Minie rifle and bullet. In 1858 the Khedive of Egypt appointed him director of a small arms factory and musketry school in Cairo.

MINIMITES (Fratres minimi, <(least brethren55), a Catholic religious order founded by Saint Francis of Paula (1416-1507). Hav¬ ing become a Franciscan monk Saint Francis went into retreat near Paula, where he was joined by devout companions and, their number increasing, a community life was begun in 1454, when a large monastery and church were built. The rule of life was of extraordinary severity. To express the character of extreme poverty and humility Saint Francis eventually obtained from the Holy See permission to call his order, Minims, <(the least of all religious bodies.55 In 1474 Sixtus IV confirmed the order which was first known by the title Hermits of Saint Francis. Alexander VI changed it to Minims. Their first definite rule was drawn up by Saint Francis in 1493. It was so austere that all ani¬ mal products, including butter, cheese, milk and eggs were forbidden, as well as meat. At one time the order numbered 450 monasteries and convents, but to-day only a few remain in Italy. Saint Francis also founded an order for nuns, which never had more than 14 con¬ vents, and a third order for persons living in the world. Louis XI summoned Saint Francis to France; and in Paris the order was known as ((Bons Hommes,55 from the fact that it suc¬ ceeded an older monastery of that name in Vincennes. In Spain the order was called Fathers of Victory, because the recovery of Malaga from the Moors was attributed to their

prayers. The Emperor Maximilian called the Minims to Germany in 1497. Consult d'Attichy, (Histoire generate de l'ordre sacre de Minimes5 (2 vols., 1824) ; Butler, (Lives of the Saints5

(1798-1800).

MINIMUM DUTIES. See Duty.

MINIMUM THERMOMETER. See

Thermometer.

MINIMUM WAGE, the lowest reward that legislature considers just payment to la¬ borers for their regular work. It is a wage, •not only commensurate with the bare cost of living, but, so far as reasonably possible, to supply to every worker the means of procuring health, comfort and happiness in the broadest sense of those words. The minimum is dif¬ ficult to determine because the cost of food, housing, fuel and clothing differs in different countries and States.

Investigations of the conditions of living have to be taken into con¬ sideration before the sum can be determined. The minimum wage movement may be defined as a concerted effort on the part of social re¬ formers and workers to wrest from capitalists a fair sum for the workers employed by them. The statutory minimum wage movement is a modern idea. It first appeared in Belgium in 1887 in the form of a minimum wage statute for laborers employed in public work. The first legislative minimum wage applying to pri¬ vate employment was adopted in Victoria, Aus¬ tralia, in 1896, and was soon followed by sim¬ ilar statutes in other Australian provinces and in New Zealand. It has also been in force in England since January 1910. These acts were applied to both male and female laborers. The adoption of a minimum wage in this country, beginning with the Massachusetts act of 1912, was borrowed, as was other labor legislation, from England. See Labor; Wages.

MINING. Mining is a basic industry, the magnitude of which is indicated by the 6,000,000 men employed in the various mines in the world. Of this number about 3,800,000 men are en¬ gaged in coal mining and 2,200,000 in other mining. In addition millions are employed in the allied industries, such as the manufacture of iron and steel, copper wares, coke and chem¬ icals, all of which are directly based upon the mining industry. The mines and quarries o*f the United States in 1917 employed over 1,127,- 000 men segregated as follows : Coal mines, 757,000; metal mines and metallurgical works, 280,000 ; quarries, 90,000.

Geographic Distribution. — The mining in¬ dustry of the United States is roughly geo¬ graphically distributed as follows : The an¬ thracite coal mines are in northeastern Pennsyl¬ vania the bituminous coal mines occupy the western slope of the Appalachian Mountain system from northern Pennsylvania to north¬ ern Tennessee, with a large coal field in the vicinity of Birmingham, Ala. The central coal field occupies central and southern Illinois, southwestern Indiana and western Kentucky. The coal fields west of the Mississippi River include southern Iowa, northern and western Missouri, southeastern Kansas and northeast¬ ern Oklahoma, with large bituminous and lig¬ nite fields in Texas. The coal fields of the Rocky Mountain States are scattered with the principal fields in southern Wyoming, northern Wyoming, western Montana and northeastern

New Mexico and southeastern Colorado. The Pacific Coast States coal fields occupy the north¬ western part of Washington with a small area m western Oregon and a small field in Cali¬ fornia. Alaska has coal fields in the southern portion which are of considerable importance, although not well developed. The United States is the greatest producer of coal, and in normal times the yield is 38 per cent, Great Britain 22 per cent and Germany 20 per cent of the world's output of coal. The metal-mining in¬ dustry of the United States is distributed ap¬ proximately as follows: The principal iron mines are in Minnesota, Michigan, northern Wisconsin, northeastern New York and central Alabama. The principal copper mines occur in northern Michigan, western Montana, Utah, Nevada, Arizona and southern Alaska. The lead mines are in southeastern Missouri, the Cceur d'Alene district, Idaho, and in Colorado. The principal zinc mines occur in southwestern Missouri and eastern Oklahoma ; Leadville, Colo., and Butte, Mont., are becoming large producers. The gold and silver mines occur in Alaska, California, Colorado and Nevada, while every Rocky Mountain and Coast Range State produces more or less of the precious metals. Phosphate rock occurs in large quanti¬ ties in Tennessee, Florida and South Carolina; bauxite in Arkansas and Georgia; salt in New York, Michigan and Kansas; petroleum and natural gas in Oklahoma, Texas, California, Pennsylvania, Ohio, West Virginia and In¬ diana.

The United States is the world's largest pro¬ ducer of copper, iron, lead, zinc and petroleum. About 20 per cent of the world's gold supply comes from the United States ; 40 per cent from South Africa and 15 per cent from Australasia. (See article on Gold Mining). The Central Powers of Europe produce only 0.6 per cent, while the United States and her allies produce 91.3 per cent, and neutrals (1918) produce 8.1 per cent.

Prospecting. — Preliminary work in mining operations is known as prospecting, and is often conducted by individuals who work on their own account, spending weeks or months in out¬ lying districts in search of mineral outcrops or rock indicating that valuable minerals may be present. The prospector of the early days is fast disappearing and prospecting is now carried on in a scientific way by large develop¬ ment or exploration companies, whereby a promising

mineral field is thoroughly tested by churn drills or core drills as economy may suggest. The core or diamond drill is most im¬ portant in this particular work in that it obtains a core so that it is possible to know accurately the formation through which the drill has passed together with its thickness, depth and mineral content. The ground is marked out in squares of 100 to 500 feet on a side and at the corners or in the centre of each square a drill hole is sunk, and the core or cutting thor¬ oughly tested. This work is carried on in conjunction with geological studies, in which the character of the various country rock is studied, as, for example, its position and com¬ position, lithological character and other data which may be of interest to the prospector and geologist, and help to point out the places where ore deposits are most likely to occur. Trenches are often cut across mineral zones, and small

shafts sunk to test the character and quality of the mineral.

Development. — After a property has been prospected and it is definitely known that it contains mineral deposits of economic import¬ ance the development proper begins by the con¬ struction of shafts, entries or slopes, and the blocking out of the ore or coal which is to be taken out at a later date. This work is usually done preliminary to the building of a mill or other reduction works.

Drainage. — In the development of mines one of the important factors to be taken into consideration is the matter of drainage and ventilation. Of course drill holes and pre¬ liminary shafts indicate to a certain extent the amount of water that will be encountered, but as the mine workings are extended larger areas are opened for the entrance of ground waters, thus increasing the amount of water which in the small mines would be considered negligible. When a mine is opened on a hillside, the drainage is usually taken care of by an adit and all of the mine workings drained from the lowest level, the upper workings in this case being absolutely without water. Where a mine cannot be thus drained, it is necessary to install large and expensive pumping plants, as fre¬ quently the amount of water handled is far in excess of the coal or ore produced.

Ventilation. — The ventilation of mines is also an important item to be considered, espe¬ cially when mines are opened to a considerable depth. The ventilation of coal mines has been well worked out in the anthracite and bitumi¬ nous fields by reason of the fact that many of the mines generate noxious or poisonous gases, making it impossible

to work without adequate ventilation. The metal mines as a rule do not generate gas, therefore their ventilation has not, in many cases, received proper attention. Natural ventilation in metal mines is usually provided for by surface openings at different elevations which, in most cases, give a very satisfactory distribution of fresh air. Where there is but slight difference in elevation of two or more openings it is necessary to install mechanical ventilation whereby fresh air is supplied by fans. Coal mines, and frequently metal mines, are often opened by a drift-slope tunnel or adit with no outlet at the inner end, so that it is necessary to use a force fan to send in new air to the working force. The fresh air then circulates through the places in the mines where the men are at work; the air thus circulated becomes more or less vitiated as to its oxygen content, and is also burdened with gas and dust, before escaping from the mine. Its escape is often assisted by a suction fan. The circulation of large volumes of air is necessary to make working conditions tolerable in gaseous mines.

Systems of Mining.

There are two classes of mines, namely: (a) Open-pit mines, which are operated with or without steam shovels, and (b) underground mines, which are entered by a shaft, drift, entry or slope, and in which the mining is done under cover of rock.

Open-pit Mines. — This class of mines is becoming more and more important since the development of the steam shovel. In the iron mining districts of Minnesota, it is not un-

common for mines to be operated where an overburden of 100 or 150 feet is stripped and carried a distance of three or four miles in order that large ore bodies may be exposed. After the overburden has been removed the operation of the steam shovel is continued and the iron ore loaded into railway cars which are provided for it in the bottom of the pit which in many cases is 80 acres, or more, in area. Steam-shovel mining is the principal method of mining ore in Minnesota, and is rapidly coming into favor for mining copper ores in Arizona, Utah

and Nevada. The steam shovel is becoming an important factor in coal mining where an overburden of 15 to 50 feet may be removed from a four-or five-foot coal bed, and the coal loaded by steam shovel into rail¬ road cars. The open-pit mines op¬ erating without steam shovel are usu¬ ally small and in this connection the overburden is removed by drag line scrapers, wheel scrapers, as in the case of railway excavations, or by the use of wheelbarrows and hand labor. This work is confined largely to the less important minerals, as barite, small iron-ore deposits, phos¬ phate deposits and to shallow coal beds.'

Placer Mining. — Another class of open-pit mines is known as pla¬ cers or placer mines, where gold-bearing sands and gravels are mined for the gold which they contain. In the earliest stages of placer min¬ ing the gravel was washed in pans, the gold collecting at the bottom, and saved as metallic gold. This was followed by mechan¬ ical devices such as the rocker, long tom and sluice. The sluice consists of a long wooden trough or box, or channels cut in the bed rock, provided with riffles in which the gold collects as the gold-bearing sands are washed through the sluices. Mercury is spread in the bottom of the sluice so as to catch the fine particles of gold, forming a gold-mercury-amalgam. The "clean-up® takes place at stated intervals when the amalgam is col¬ lected and the mercury is driven off by heat and the gold collected. The large placer oper¬ ations are known as hydraulicing and dredg¬ ing. Mining by hydraulic methods consists in using water under various pressures from 250 to 400 pounds per square inch, which escapes through a nozzle and is directed at the gold-bearing gravel banks; as the water carries the finer gravels and sands to the sluices the gold is collected in the manner described above under sluicing. The latest commercial development in placer mining is dredging, whereby it is possible to recover sands and gravels containing as low as five or six cents in gold per cubic yard. The powerful dredges scoop up the sand and pass it through screens, the finer material being washed through sluice boxes provided with riffles and mercury traps and the gold is recovered by cleaning out the sluice and retorting the amalgam.

Underground Mining. — Stoping. — A method of mining in which the ore is excavated from a vein by driving horizontally upon it a series

of workings, called stopes, one immediately over the other or vice-versa. (See Fig. 1). A stope is an excavation from which the ore has been extracted, either above or below a level, in a series of steps and is usually applied to highly-inclined or vertical veins, or an open place

in a thick ore body. The term is fre¬ quently used incorrectly as a synonym of room, which is a wide working-place in a flat mine.

Each horizontal working or stope (probably a corruption of step), when a number of them are in progress, assumes the shape of a flight of stairs. When the first stope is begun at a lower corner of the body of ore to be removed, and, after it has advanced a con¬ venient distance, the next is commenced above it, and so on the process is called overhead stoping. When the first stope begins at an upper corner and the succeeding ones are below it, it is underhand stoping. The term stoping is loosely applied to any subterranean extrac¬ tion of ore except that which is incidentally performed in sinking shafts, driving levels, etc., for the purpose of opening the mine. This method probably originated in the Cornish tin mines and is applicable to vertical or highly-inclined ore bodies ; also to massive deposits which may have great thickness.

Room-and-Pillar. — A system of mining in which the distinguishing feature is the winning of 50 per cent or more of the coal in the first working. The coal is mined in rooms sepa¬ rated by narrow ribs or pillars. The coal in the pillars is won by subsequent working which may be likened to top slicing in which the roof is caved in successive blocks. The first work¬ ing in rooms is an advancing and the winning of the pillar coal a retreating method. (See Fig. 2). The rooms are driven parallel with one another, and the room faces may be ex¬ tended parallel with, at right angles, or at an acute angle to the dip. When applied to metal mines, with a good cover, as much as 75 to 85 per cent of the ore is removed, leaving pillars 10 to 20 feet in diameter; wherever possible, pillars

are left in the poorest ore, hence their position is more or less irregular as compared with the pillars left in coal mining. This method is applicable to flat deposits, such as coal, iron ore, lead and zinc, etc., which occur in bedded deposits. Modifications of this method are

County of Durham system; Double-entry room-and pillar mining; Double-room system; Double-stall working; Heading and stall; Pil¬ lar and stall; Post and stall; Room and stoop; Single-entry room-and-pillar mining; Single¬

stall working; Square work (South Stafford¬ shire thick seam method); Stall and breasts; and Triple-entry room-and-pillar mining.

Longwall Method. — A system of working a seam of coal or ore in which the whole bed or seam is taken out and no pillars left, ex¬ cepting the shaft pillars, and sometimes the main-road pillars. Longwall advancing con¬ sists in mining the coal outward from the shaft pillar and maintaining roadways through the worked-out portion of the mine. (See Fig. 3, in which the arrows indicate the direction of advance and points to the working face). Longwell retreating , first driving haulage roads and airways to the boundary of a tract of coal and then mining it in a single face without pil¬ lars toward the shaft. The longwall method is usually applied to coal mining and occasionally to flat ore deposits, as iron, *etc.* This system of mining is also known as Longwork, Shrop¬ shire method, Combination longwall and Not¬ tingham or Barry system.

Milling. — A system of mining originating in the combination of open cut and underground mining, where the ore is mined in open cut (surface workings) and handled underground. It is underhand stoping applied to large de¬ posits, wherein the ore is mined near the mouth of winzes or raises and dropped by gravity to working levels below for transportation to the

surface. Sometimes called ˆglory-hole® method. (See Fig. 4).

Caving System. — A method of mining in which the support of a great block of ore being removed, it is allowed to cave or fall, and in falling is broken sufficiently to be handled ; the overlying strata subsides as the ore is withdrawn. Two important variations are Top slicing and cover caving; Top slicing combined with ore caving.

Top Slicing and Cover Caving. — The im¬ portant feature in this method is the working of the ore body from the top down in successive horizontal slices that may follow one another sequentially or simultaneously. The whole thickness of the slice is worked and the ore broken by over¬ head or under hand stoping in each unit. It is a

retreating method, as the overburden or cover is caved after mining a unit. The longwall, the pillar robbing in both room-and- pillar and bord-and-pillar methods of mining coal are essentially the same in principle as top slicing. The principal difference is-that a single slice only is worked in these methods when applied to coal mining. There are two modifications : top slicing by drifts and top slicing by rooms. A timber mat is used as a cover in almost all cases. The method is ap¬ plicable to thick or massive ore de¬ posits. Other terms used for this system are Caving system ; Crosscut method (combined with removal of pillars) ; Horizontal slicing descend¬ ing; Mining ore from top down; Panel slicing; Prop slicing; Remov¬ ing pillars and allowing roof to cave ; Slicing 'under mats of timber in panels; Square-set slicing; Top slic¬ ing and caving; Transverse slicing with caving.

Top Slicing Combined with Ore Caving. — In this method the ore body is worked from the top down in successive slices. Instead of taking the full height of the slice, only the lower part is taken and the upper part is caved. After removing this portion of the ore, the cover is caved. A timber mat is used in most cases to separate the broken cover from the ore to give safety. Also known as Caving system, Sub-drifting and caving, Sub-slicing, Slicing under ore with back caving in rooms, Sub-level caving and Sub-level slicing.

Explosives. — In all methods of mining, ex¬ plosives are essential. The maximum amount of explosives is used in stoping and room-and-pillar methods, while a minimum amount is used in the caving system and its various modi¬ fications, due to the fact that much of the ore is loosened by caving of the overburden. The importance of the mining industry is further shown by the fact that 75 per cent of all ex¬ plosives used in the United States are used in the mining industry (not including quarries). The enormous production from the mines in the United States would not be possible without the use of large amounts of explosives. The total production of explosives in the United States in 1917 was as follows: Black powder, 277,118,525 pounds; dynamite and high explo¬ sives other than permissibles, 262,316,080; per-

missibles, 43,040,722. Of the black powder, 85 per cent was used in coal mining; of high ex¬ plosives, 10.8 per cent ; and of permissibles, 76.5 per cent. Other mining consumed 3.4 per cent of the black powder, 50.4 per cent of high explosives and 14.2 per cent of permissibles. In the production of coal an explosive is re¬ quired which will not shatter the coal and at the same time not produce too long a flame nor too much heat and thus ignite gas and dust with which it might come in contact. This led to the introduc¬ tion of so-called safety or short-flame explosives in the coal mines of Pennsylvania at Johnstown in 1902, and since that date their use has increased rapidly. The term ˆpermissible explosives® was coined by Dr. J. A. Holmes in 1908, and in 1909 the Federal Bureau of Mines established a testing station at Pitts¬ burgh to determine the permissibil¬ ity of explosives that are to be used in coal mines. This work is still being carried on in connection with the investigation of mine explosions to determine the nature and char¬ acter of an explosive that will meet the needs of the various branches of mining, and especially to increase safety in coal mines. Both the im¬ proper use of explosives and the use of improper explosives have resulted in coal-mine disasters. The Fed¬ eral Bureau of Mines has brought about what is little short of a revolution through the introduction of new types of low-tem¬ perature, quick-flame powders, designated as ˆpermissible explosives,® for use in the more dangerous coal mines of the country. In the bituminous coal mines of the United States the fatality rate per 10,000 men employed has been reduced from 3.39 in 1903 to 0.80 in 1917, largely as a result of the use of permis¬ sible explosives. In metal mining a different type of explosive is needed, namely, one which will shatter the hard mineral formation, and for this purpose dynamite of different grades is employed. Black powder, by reason of its slow heaving action, is used to a certain extent in the iron mining districts, where steam-shovel work is carried on, and where it is necessary to loosen large masses of soft or friable ore.

Mine Haulage. — The transportation prob¬ lem is one of the most important features in the development of the mining industry with which the mining engineer and mine manager have to deal. (It is seldom given a passing thought by the layman). The quantity of mer¬ chantable material handled by the various mines and quarries in the United States during a single year is in excess of 1,000,000,000 tons. The work of the Panama Canal is cited as perhaps the greatest engineering feat in mod¬ ern times, yet the amount of material

handled at the canal each year was but slightly in excess of the amount of iron ore and over¬ burden removed annually in two States, namely, Michigan and Minnesota. The task of moving 1,000,000,000 tons of ore, coal and rock would require 20,000,000 50-ton cars. Reducing this to trains of 40 cars, each would represent 500,000 trains. Assuming the average length of a 50-ton car as 40 feet, the length of train

required to carry the above amount of ore would be 151,500 miles, or six times the cir¬ cumference of the earth. The mine-haulage problem is usually separated into three divi¬ sions: (1) Underground haiilage, that is, from the working face of the mine to the bottom of the shaft or to the surface in the event that the mine is opened by a tunnel or adit. (2) Hoisting, that is, handling the ore or coal from the mine through either vertical or inclined

KAN Of

LONGWALl ADVANCING

(hay et 4mm oft oousu .utry)

if.'.

• PLAN OF

LONGWALL RETREATING

et J0HGU MLDOUBLE U1TRY)

FI6UB6S IHDICATC successive poscrions j OF HAULAGt CIWCS.

SURFACE. OUTCROP

Fig. 3. — Long Wall Method of Mining.

shafts to the surface. (3) Surface haulage, which delivers the ore or coal from the mouth of the shaft to ore bins at smelters or coal tipples at railway yards.

Evolution of Mine Haulage. — In the early years of the mining industry the transportation of ore or coal was crude, and even to-day primitive methods prevail in the more remote districts. In China the ore is transported by coolies, and in some of the mining regions of Mexico Indians carry the ore on their backs for perhaps a number of miles. This class of transportation will apply both to surface and underground workings. In Central America Indians carry ore in a box mounted on two small poles, similar to a hospital stretcher, two men working together. In Peru and Bolivia the llama is the beast of burden and occupies the same position as the burro in Mexico. In early years a large percentage of the coal trans¬ portation underground in Great Britain was handled by women and children. The coal was loaded into buckets which were mounted on sleds and when these were used in thin coal beds it was necessary for the women or chil¬ dren to creep along the floor on their hands and knees and draw the sled behind them. A laborious task indeed. The next step in under¬ ground transportation was the introduction of two-wheel carts and wheelbarrows, followed by small wooden cars operated on wooden tracks. In 1803 the wooden tracks were first covered with strap iron. The motive power in these cases was largely women and children, and this condition existed in Great Britain until prevented by law in 1842. In 1846 ponies were first used in the English mines. The next im¬ provement was the introduction of iron tracks followed by the use of substantial wooden cars and sheet-iron cars with a capacity of about one ton. The cars were enlarged and horses

and mules were introduced into many of the mines, and to-day occupy an important place in underground and surface haulage in both the United States and foreign countries. In many cases the animals are lowered into the mines and remain there until they are either crippled or too old to work. Dogs have been used to some extent for haulage

purposes, and as late as 1909 one coal-mining company in Illinois was reported as using 31 dogs for this

Fig. 4. — Milling System of Mining.

purpose. Dogs are used in the far North for transporting mine supplies during the winter season, when the snow and ice are suitable for sleighing purposes. Steam locomotives , have been used underground since the early 50's, but on account of the smoke given off their use is restricted to small, well-ventilated areas. The compressed-air locomotive was introduced into the mines about 1885 and still occupies a promi¬ nent place in the mining industry. Electric haulage was begun in 1887 and is now common in the large coal and metal mines. The first electric tramway for mine use was installed in Colorado in 1890. In 1890 electrical storage battery locomotives were first considered for use in mines, and to-day they are in successful operation. They are used largely inside the mines for gathering the coal from the working face and delivering it to the main haulage sys¬ tem. In the operation of these locomotives a track is laid from the main haulage system to the working face, and the storage-battery loco¬ motive operates over these lines without the danger attending installations where trolley wires are in place. The latest motive power applied to mine haulage is the gasoline loco¬ motive, and tests on this engine indicate that it may be an important factor in underground transportation, providing ventilation is such as to get rid of the waste gases. #

Hoisting .— Hoisting through inclined or vertical shafts is the connecting link between VOI.. 19 — 12

underground and surface haulage. In some of the old abandoned mines in Mexico, the pros¬ pector frequently finds notched poles, nick¬ named ((chicken ladders," which were used by the early Spaniards and the Indians in mining the precious metals. The ore was placed in skin bags containing 50 to 100 pounds each and carried on the backs of the natives as they climbed these poles to the surface. Oftentimes a series of these ladders would cover an eleva¬ tion of 500 to 1,000 feet. Similar methods ot ore transportation are still in use in remote districts of China. Vertical ladders were used for many years for carrying ore to the surface, which now find a place only as a sec¬ ondary escapeway to be used in case of accident. Following this was

the intro¬ duction of a crude hand windlass with ropes made from the skins of animals. The hand windlasses are usually known as “Armstrong” hoists, as the power is applied through the arm of the operator. The next improvement was probably in the matter of cables whereby the skins were successively replaced by hemp, cot¬ ton and steel cables. As work pro¬ gressed, the hand windlass was replaced by the horsewhim wherein by means of a long sweep geared to a drum the horse performs the winding as he travels in a circle. Following this was the small steam plant which is now in common use in all prospects and small mines in all the mining districts. These small steam winding plants will handles 500 to 1,000 pounds of ore at a single hoist, and have been gradually enlarged and improved until we have to-day the huge plants with winding drums 20 to 30 feet in diameter and capable of containing 5,000 to 6,000 feet of cable. The largest hoist of this kind is the « ne used at the Tamarack shaft, Michigan, where ore is hoisted at a single lift from a depth of 5,260 feet vertically. The Transvaal mines in South Africa are from 2,000 to 5,000 feet deep, and next to our Michigan mines have the best hoisting equipment of any mines in the world. These shafts are equipped with hoisting plants that will handle from 5 to 10 tons of ore at a single trip, at a rate of 3,500 feet per minute. The majority of these larger hoists are operated by steam. _ The increasing use of electricity has led mining engineers to consider the question of substituting electric motois for the steam hoisting engine. The first electric hoist in America was installed in July 1888 at Aspen, Colo. The motor was seven and one-half horse power with a capacity of handling 1,500 pounds at the rate of 100 feet per minute. In 1894, then the largest electric h nst in the United States was installed in Colorado. The plant consisted of a 150 horse-power motor with an auxiliary 60 horse-power motor. There were two reels, each capable of containing 1,500 feet of 4k2-inch X Jˆ-inch flat cable. The cage weighed 1,375 pounds, and operated at a speed of 600 feet per minute. It had a capacity of carrying an overbalanced load of 10,000 pounds. The” Seamans-Ilgner electric hoisting system utilizes high tension currents that are reduced to about 500 volts. Between the motor and generator is mounted an enormous balance

wheel which is kept in continuous motion and absorbs the shock due to the sudden starting of the heavy loads. A hoist of this type is now in use at the Hecla mine, Burke, Idaho. The balance wheel weighs 30,000 pounds. There are two reels, each capable of holding 2,500 feet of 3ˆ-inch X 4-inch flat steel cable, and hoisting at a speed of 2,400 feet per minute. The capacity of this hoist is 16,000 pounds unbal¬ anced load from a depth of 2,500 feet. The total weight of the equipment is 300,000 pounds.

Another electric hoist recently installed is that of the Ray Consolidated Mining Company, Ray, Ariz. While it is not intended to hoist from a great depth, it handles a load of 12*4 tons from a depth of 500 feet at a rate of 300 feet per minute.

Surface Haulage. — The evolution of sur¬ face haulage follows closely to that of under¬ ground work as given above, beginning with coolies in China, Indians in Mexico as men of burden, followed by the llama, burro and pack trains, and later by wagons, as represented by the 20-mule-team of a borax company in California. A few years ago 125 horse¬ power traction engines were tried in the West many of which were abandoned on the plains by reason of the fact that they could not carry sufficient fuel and water to run them across the desert country. Steam, compressed-air, gasoline and electric locomotives are in almost universal use in the various mining districts of the United States. The introduction of the motor truck is now quite common in many of the remote dis¬ tricts where railroads have not yet been built.

Wire Rofe Trams. — Wire rope trams were first introduced 200 years ago. Cable ways, such as are now used in quarries, were invented and used in 1851. One of the earliest large installations of cable ways was in the Tilly Foster mine, New York, where 600,000 tons of ore was recovered after the removal of an over¬ burden of 300,000 tons. A typical example of the aerial tram is that of the American Nettie mine in Colorado. This tram is 3,400 feet long, the first 500 feet of it sloping 45 degrees. The longest span is 1,800 feet. The ore is carried in. buckets each carrying 1,000 pounds of ore. Another example of an aerial tram used in coal mining is one installed at Electric, Mont. The cable is 7,800 feet long, the ele¬ vation of the upper end of which is 1,200 feet above the lower. This type of transportation finds a place in rough inaccessible mountain regions.

Gravity planes are used at some of the mines, as for example, the one

now in use at the Boston Consolidated mine in Utah. This plane is 1,900 feet long sloping 22 degrees, and representing a height of 737 feet. Twelve-ton skips are used on this incline and 1,350 tons of ore is handled per eight-hour shift. This is one of the largest incline planes in the United States.

Belt Conveyor. — An example of belt con¬ veyors is that recently installed at Miami, Ariz., where a 30-inch belt conveyor travels 300 feet per minute up an incline of 15 degrees. The capacity of this belt is 2,000 tons of crushed ore daily. Belt conveyors are used largely in ore-dressing plants, cement mills and other sur¬ face plants. Many of these are operated by electric motors.

Endless Rope Haulage. — Endless rope haul¬ age is in use at many mines.

Railway Haulage. — At nearly all large mines, the major part of the surface haulage is on the scale of railroad operations. For example, in the Minnesota iron mines, and copper mines in the West where the mining is done by steam shovels, the ore is loaded direct into 40 or 50-ton steel cars. In the case of the Minnesota iron mines these loaded cars are sent 75 to 100 miles to Duluth to the ore docks, where the cars are dumped automatically into bins from which the ore is drawn into the lake steamers. It requires less than two hours to load one of these steamers with 10,000 tons of ore. In the case of the Western copper mines, the standard gauge cars that are loaded by steam shovel are sent direct to the smelter varying from only a few miles to 100 or more.

Treatment of Ores. — After the ore or min¬ eral has been mined, it is subjected to various metallurgical treatments as the case may require ; thus iron ore is sent direct to the blast furnace where it is melted into pig-iron. Copper ores are concentrated and the concentrate sent to the blast furnace where it is smelted in a manner similar to the iron ores, thus producing copper bullion. Gold and silver ores require various treatments depend¬ ing upon the character of the ore, the principal methods being stamp milling, amalgamation, cyaniding, chlorination and lixiviation. (See article on Gold Mining). Lead ore, after con¬ centration, is smelted in an ordinary blast fur¬ nace, while zinc ore is distilled in retorts and collected in its metallic state known as spelter. Mercury is likewise distilled and condensed in retorts and when cold remains liquid. The treatment of minerals from which such metal as chromium, cobalt, titanium, tungsten and vanadium are obtained is

described under the various headings. See Copper; Gold; Lead; Zinc, *etc.*

Bibliography. — The following books (fre¬ quently used as textbooks) are sources of much information on various phases of the mining industry :

Mining and Mining Methods. — Hoover, H. C., Principles of Mining) ; Ihlseng, M. C., and Wilson, E. B., ‘A Manual of Mining* ; Crane, W. R., (Ore Mining Methods> ; Mayer, L. W., ‘Mining Methods in Europe) ; Sanders, W. E., MacDonald, B., and Parlee, N. W., (Mine Timbering*; Brinsmade, R. B., c Mining without Timber* ; Storms, W. H., timbering and Mining) ; Redmayne, R. A. S., (Colliery Working and Management ; Weatherbe, D’A.,

(Dredging for Gold in California*; Wilson’

E. B., (Hydraulic and Placer Mining*; Peele, R., ‘Mining Engineer’s Handbook ; Fay, A. H.. ‘Glossary of the Mining and Mineral Industry.)

Prospecting and Geology. — Gunther, C. G., ‘Examination of Prospects* ; Spurr, J. E., ‘Geology Applied to Mining* ; Stretch, R. H., ‘Prospecting, Locating and Valuing Mining1* ; Farrell, J. H., ‘Practical Field Geology* ; Lirtdgren, W., ‘Mineral Deposits* ; Kemp, J.

F. , ‘Ore Deposits of the United States and Canada* ; Rickard, T. A., ‘Ore Deposits* ; Posepny, F., ‘Genesis of Ore Deposits* ; Eckel’, E C., ‘Iron Ores* ; Shamel, C. H., ‘Mining, Mineral and Geological Law* ; Ries, H., and Watson, T. L., ‘Engineering Geology.*

Mine Surveying.— Trumbull, L. W., (Manual of Underground Surveying*; Dur-ham E. B., (Mine Surveying*; Shurick, A. T.,

Coal-mine Surveying.*

Mining Economics — Charlton, W. H., (American Mine Accounting*; Finlay T r’ ;The Cost of Mining*; Rickard, TJ A!!

Economics of Mining*; Skinner, E. N., and Plate, H. R., (Mining Costs of the World.*

Albert H. Fay,

Mining Engineer, United States Bureau of Mines.

MINING ENGINEERING, is that branch of engineering which pertains to the operations of extracting useful minerals from the deposits in which they occur. While no distinct line can be drawn between the fields occupied by mining and mining engineering, the former may be termed an art and the latter a science. “The present article will be confined to a consider¬ ation of the qualifications, professional duties and training of the mining engineer ; the subjects relating to mining as an art, namely, the modes of searching or prospecting for mineral deposits, the various systems or methods of working mines, and the details of the operations connected therewith, are dealt with under the head of Mining.

The province of the mining engineer com¬ prises the testing and valuing of mineral de¬ posits, the planning and execution of the various mining works required to reach the deposit — such as tunneling, shaft-sinking, *etc.* — the choice and application of a suitable method of opening the mine and bringing the ore to the surface; and, lastly, the installation of the neces¬ sary surface and underground plant. In addi¬ tion, therefore, to a knowledge of the theory and practice of the various kinds and methods of mining, the successful pursuit of the profes¬ sion demands not only a training in mathe¬ matics, mechanics, physics and other funda¬ mental subjects which underlie all technical education, ‘but also an intimate acquaintance with certain of the natural sciences, particularly geology, mineralogy and chemistry, and many of the principles of civil, mechanical and elec¬ trical engineering. In a well-planned course of professional instruction the scientific studies would preferably come first, but the engineer is incomplete until to these he adds a knowledge of the actual practice of mining. The arts of metallurgy, ore-dressing and milling, moreover, are so related to the art of mining that these subjects ‘also, at least in part, must be included in the equipment of the mining engineer. The functions of the mining engineer cannot be de¬ fined in precise terms, largely because of the infinite variety of local conditions which may be encountered, and the differing physical, mineralogical and chemical characteristics of the ore deposits themselves. (See Ore Deposits). There has been perhaps a greater tendency to¬ ward specialization in mining than in other de¬ partments of engineering. As the

professional field has broadened, no one man can hope suc¬ cessfully to cover it all. Quite a sharp dis¬ tinction exists, for example, between metal min¬ ing and coal mining. The modes of deposition of coal and of the metalliferous ores, the geological and physical conditions, and the ac¬ cepted systems of mining, are so different that the engineering of collieries has become largely

a specialty. So again among the metals them¬ selves. Engineers may be led to specialize in the direction of iron, or lead and zinc, or cop¬ per, or gold and silver mining. This latter dif¬ ferentiation is not the result of any fundamental diversity in the methods of developing and working the mines, but is due rather to differ¬ ences in the scale of operation, the phvsical characteristics of the deposits themselves, the treatment of the ores of the various metals and their final disposition. It frequently happens that the dressing, or concentration, and even the smelting, or other process for the reduction of the ore, are carried on at or near the mine itself, and under the same general management. The mining engineer, therefore, must be some¬ thing of a metallurgist also, and, though not necessarily highly skilled in this direction, he should at least be able to decide upon and select the plant and process appropriate to the char¬ acter of the ore, and to supervise its erection and operation. But this applies to the mining and treatment of the non-ferrous metals. The metallurgy of iron and steel forms far too large a field to be included in the range of work of the mining engineer. It requires a special training, and has developed into a dis¬ tinct profession.

Several more or less conventional distinc¬ tions are made as to the particular branch of work in which a mining engineer may special¬ ize. He may devote himself to examining, valuing and reporting on mines, being engaged for such work by intending sellers or buyers; he may serve in the capacity of consulting engi¬ neer for one or more mining companies; or in doing a general business he may be retained by his clients in an advisory capacity similar to that occupied by a counsellor-at-law, leaving to others the actual execution of the work or the carrying out of the policy determined upon. On the other hand, a mining engineer who be¬ comes identified with the management of the affairs of a particular company must be a suc¬ cessful organizer and business man; he must possess the ability to make favorable contracts for work, the purchase of material and disposal of product, to control men, and not only to plan work but to know how it should be executed to attain the best economic results. He often combines with, his purely professional functions the duties of superintendent or

manager, and the smaller the property the greater usually is the variety of responsibility devolving upon the engineer. When in charge of a small or tem¬ porarily non-paying mine, especially one situ¬ ated in a remote region, the engineer may be compelled to serve simultaneously in the capaci¬ ties of superintendent, foreman, assayer and bookkeeper. He must know enough of chemis¬ try and of civil, mechanical and electrical engi¬ neering to exercise intelligent control in mat¬ ters relating to these branches, and he should have at least a general knowledge of mining law.

Formerly, the profession of mining engi¬ neering was less complex and exacting in its requirements than at the present time. The great advances made during the past 50 years in scientific and technical lines have brought with them constantly increasing responsibilities. An inspection of the course of study prescribed in mining schools of good standing will show how largely the education of a student in min¬ ing engineering lies in the direction of subjects

not relating specifically to the art of mining itself. Manual labor has been more and more replaced by mechanical appliances, and the engineer must be alert in availing himself of the innovations which have been introduced in endless variety; the ever-widening applications of electricity and compressed air for the trans¬ mission of power, the use of internal combus¬ tion engines, the numerous improvements in machines and processes for the concentration and reduction of ores, the increase in knowl¬ edge of the relations of geology to the deposi¬ tion of ores ; all these constitute new tools in the hands of the mining engineer, but they unite also in demanding a broader and more severe training. Up to 1870 applications of electricity and compressed air to mining were practically unknown ; now they are employed in nearly all departments of mine work. Compressed air rock drills are used everywhere for both sur¬ face and underground excavation of rock; electric and compressed air locomotives or rope haulage have superseded hand tramming and haulage by mules and horses, wherever the conditions are suitable and

the quantity of material dealt with is sufficient to warrant the additional first cost of plant; the greatly increased depths at which mining is car¬ ried on in many districts have made necessary the design and erection of enormously powerful and complicated hoisting engines; and finally, the successful and economical operation of such plants requires the maintenance of well-equipped machine and other repair shops.

The question of hoisting large quantities of ore from great depths, that is, vertical depths of say more than 5,000 feet, is one of the most serious mechanical problems at present con¬ fronting the mining engineer. Depths of approximately 5,000 feet have been already at¬ tained in several mining districts, notably in the Lake Superior copper region and the Witwatersrand in South Africa, while in the important Butte, Mont., copper district, the silver mines of the Comstock Lode, Nevada, and the Bendigo gold fields of Victoria, Aus¬ tralia, depths of 3,000 to 3,500 feet have been or are being reached. In a number of places where the present maximum depth of shaft does not exceed 3,000 feet, elaborate engines capable of hoisting from 5,000 feet or more have been installed. The prosecution of work at such depths involves the solution of rather intricate problems, among which are the proper construction of hoisting drums for winding the great lengths and weights of rope required, the design of reliable controlling apparatus for hoisting at speeds of 3,000, 4,000 or even 5,000 feet per minute, the means of raising and low¬ ering with safety, speed and economy the hun¬ dreds of men required in large and deep mines, and the difficulties involved in the varying weight of the rope itself, as it winds upon its drum, a weight which often greatly exceeds that of the ore raised at each hoisting opera¬ tion. A high degree of mechanical skill and knowledge is demanded for the effective solu¬ tion of these and other problems. Consult discussions on <(Hoisting from Great Depths,® which appeared during 1902 and 1903 in the (Transactions of the Institution of Mining and Metallurgy,* London, the South African Association of Engineers ; and the Engineering and Mining Journal, New York.

In all branches of his work the mining en¬ gineer of the present day finds himself com¬ pelled to introduce every new method and appliance that promises some saving in the cost of production. This is the result, not only of competition and of increase in wages but also of the reduction in market price of nearly all of the metals within the past four decades. In 1873 the price of silver was $1.30 per ounce; now (May 1919) it is $1.01; copper was then worth 30 cents per

pound, now 15.3 cents; lead was then 6.5 cents per pound, now 4.7 cents, and other similar examples of the decline in value of the staple metals can be cited. Furthermore, as the more easily accessible mineral deposits are exhausted, the mining engineer is called on to practise his profession farther afield, often in regions remote from centres of population. Here he may be confronted with new problems arising from the lack of transport facilities, dis¬ tance from source of supplies and materials, labor insufficient in quantity and poor in qual¬ ity and adverse and unhealthful climatic con¬ ditions.

That function of the mining engineer which relates to examining and reporting on mining properties is both delicate and difficult, and calls for the highest degree of professional effi¬ ciency. In brief, the examination of a mine includes a study of the local conditions, topo¬ graphical, geological and economic, and of the mineral deposit itself ; the mineralogical char¬ acter, quality, quantity and grade of the ore and its value per ton ; an estimate of the cost per ton of mining the ore and the net profit which reasonably may be expected; and, lastly, the probable life of the mine. Upon these factors depends the market value of the property. In determining the quantity and grade of the ore, the deposit, as revealed by the development work already done, must be carefully and sys¬ tematically tested. This is done by taking a series of samples in a manner which will enable the engineer to obtain a true average of such ore as can be examined and measured with sufficient accuracy and definiteness to warrant confidence in the results obtained. Evidently much depends upon how and to what extent the mine has been developed. The variety of con¬ ditions which may be met is almost infinite. Nature does not work with rule and plumb-line. Besides the ore which can be actually measured and sampled, the engineer may often be warranted in taking into consideration the quantity of ore which in the future will prob¬ ably be rendered available by further develop¬ ment of the mine. In balancing such probabil¬ ities or possibilities, he must be guided mainly by geological and mineralogical analogies de¬ duced from his previously acquired knowledge and experience. Lengthy discussions bearing upon this subject, by well-known engineers, have been published in the transactions of the mining engineering societies and in the tech¬ nical periodicals. It may be added that the cir¬ cumstances under which mine examinations are made are often rendered difficult and embar¬ rassing where the perpetration of fraudulent practices by interested persons may be at¬ tempted, for the purpose of misrepresenting or concealing the true condition of the mine; records of cost and of the value and amount of previous production may be falsified, or the

samples taken by the engineer tampered with. Constant vigilance is required to guard against such contingencies.

With the development of the mining indus¬ try and the wider adoption of mechanical appli¬ ances and engineering methods in connection with mining operations, the demand for trained engineers has steadily increased until, at the present time, probably no field of engineering affords better opportunities for a young man. It is true that the course of preparatory study is exacting and the life somewhat arduous, but as yet it is one of the few professions which cannot be said to be overcrowded. Formerly, the so-called ˆpractical® man monopolized most of the positions of responsibilty and emolu¬ ment, but the educated engineer has made his way to a degree that has produced an active demand for his services. Mining companies have found that the greater breadth of view resulting from a sound technical education has a direct money value. The trained engineer is acquainted with what is being done in his pro¬ fession in other regions or countries. He keeps himself informed as to the experiments and discoveries made by others; is quick to utilize improved and more economical methods, and knows not only what to do but also what to avoid. His competitor who lacks this knowl¬ edge, and who has at his command only what has come within his own personal experience, is in danger of failure, if circumstances bring him face to face with new conditions, and with problems the prompt and efficient solution of which must be based on a familiarity with the principles of engineering practice. It must be remembered that the young graduate of a min¬ ing school is not yet an engineer; he has been grounded in the fundamentals of his profession, has absorbed a multitude of facts relating to its practice and his powers of observation have been cultivated; but before he is fitted to deal successfully with the diverse problems which sooner or later will confront him, he must in most cases patiently continue his education in the field for some years after graduation. His first employment is likely to be that of chemist, assayer, draughtsman, surveyor or assistant to one of the heads of department in the mine or works. How fast he advances will depend on his native energy and ability and the effi¬ ciency of his preparatory training. Not all young men are fitted by nature to become suc¬ cessful mining engineers. If the student has no aptitude for such a pursuit, the sooner he finds it out the better, both for himself and his

instructors. Unquestionably, an immense amount of time, money and energy are wasted in the attempt to give a scientific and technical education to young men whose bent — if they possess any decided bent — is in some other direction. The curriculum of the school, there¬ fore, should be so planned as to eliminate ineffi¬ cient students as early in the course as possible.

In the making of an engineer, circumstances and opportunity are important. A well-known engineer and instructor has said: ((A man without school education may make a remark¬ able engineer ; but it may have taken him years to get his training and at the end of the. time there may be whole regions of knowledge utterly unknown to him; in other words, he is liable to be a one-sided man without a broad outlook upon other fields than his own. The

school cannot teach him everything, but it can give him the keys to the storehouses which he may need to draw from in after life." A grad¬ uate of a good mining school has this advan¬ tage over his .uneducated competitor; that he is better able to avail himself of the opportunities presented to him.

Mining Schools. — The need of technical schools specially equipped for preparing young men for the profession of mining engineering was long ago recognized in Europe, and some of the institutions there established have exerted through their graduates a marked and beneficial influence upon the mining industry of the world. Previous to 1865, mining practice in the United States was based chiefly upon European methods, and the earliest work prosecuted on a large scale in this country — for example, at the Comstock mines, Nevada — was in great measure planned and managed by American engineers who had received their education in Europe. The influence of the Continental institutions also made itself felt in the organization of the older American mining schools. The first School of Mines in the United States was founded in 1863 under the auspices of Columbia College, New York. Since then, mining schools have been estab¬ lished in many parts of the country, the total number being now about 40. The majority of them, however, are small, with limited equip¬ ments and teaching forces. Many exist simply as departments of technical schools connected with State universities. A few are separate and distinct institutions. The leading mining schools of the United States are the School of Mines of Columbia University, the Mining De¬ partment of the Massachusetts Institute of Technology, the College of Mining of the Uni¬ versity of California, the State School of Mines of

Colorado, the Michigan College of Mines, the School of Mines of the University of Minnesota and the schools at Rolla, Mis¬ souri, Lehigh University and Lafayette College. The courses of study leading to the degree of mining engineer generally occupy four years but exhibit quite wide variations in plan and scope. Some of the best of the schools have rigidly prescribed courses ; others offer a range of elective subjects, comprised in more or less interdependent groups. Without attempting a comparison of the curricula of these schools, a condensed statement of the ground that should be covered by a well organized School of Mines may here be given :

First Year. — Algebra — general theory of equations (elementary algebra required for ad¬ mission), analytical geometry, spherical trigo¬ nometry (plane trigonometry required for ad¬ mission), general inorganic chemistry, qualita¬ tive analysis, physics, descriptive and determi¬ native mineralogy, including crystallography and blowpiping, theory of surveying and me¬ chanical draughting. In the vacation follow¬ ing the first year, five weeks' field practice in surveying.

Second Year. — Calculus, elementary and analytical mechanics, physics, industrial chem¬ istry, theory of railroad surveying, general geology, elements of electrical engineering, quantitative analysis, descriptive, geometry and drawing. In the vacation following, five weeks' field work in general surveying and four weeks' railroad surveying.

Third Year. — Analytical mechanics, eco¬ nomic geology, properties and resistance of structural materials, masonry and timber con¬ struction, engineering of power plants, earth and rock excavation, railroad and mine tunnels, boring and shaft-sinking, exploration, develop¬ ment and methods of working mines, general metallurgy, and metallurgy of the non-ferrous metals, graphic statics, assaying, principles of electrical engineering, experimental mechanical engineering, optical mineralogy and petrog¬ raphy. Vacation work: six weeks' systematic study in mines selected for the purpose, one week of mine surveying, one week's study in metallurgical works and one week of field geology.

Fourth Year. — Thermodynamics, steam en¬ gines and boilers, heat and its applications, internal combustion engine, hydraulics, ore-dressing, mine engineering, mine plant and equipment, mine surveying, mine administration, metallurgy of silver, gold, copper, lead, zinc, iron and steel, draughting and design of mine plant, geological examinations and surveys, mining laws, thesis or project in mining. Laboratory work is required in connection with geology, mineralogy, physics, qualitative and quantitative analysis, assaying, testing of mate¬ rials, electrical engineering, metallurgy and ore-dressing.

Admission. — The requirements for admis¬ sion to the best American mining schools com¬ prise elementary and certain portions of ad¬ vanced mathematics, elementary chemistry and physics, free-hand drawing, English, history and elementary French, or Spanish. Under certain circumstances, students may be admitted on certificate of other institutions.

Bibliography. — Bowie, (A Practical Treatise on Hydraulic Mining in California5 (10th ed., 1905) ; Brough, (Mine Surveying5 (14th ed., London 1916) ; Bulman and Redmayne, (Colliery Working and Management5 (London 1896) ; Charleton, (Report Book for Mining Engineers5 (1895) ; Curie, (The Gold Mines of the World5 (1902) ; Denny, (Deep Level Mines of the Rand5 (1902) ; Durham, (Mine Survey¬ ing5 (1913) ; Finlay, (Cost of Mining5 (1909) ; Foster, (Ore Mining5 (1910); Futers, Me¬ chanical Engineering of Collieries5 (1909) ; Goupilliere, (Cours ^'exploitation des mines5 (Paris 1897) ; Habet, (Cours d'exploitation des mines5 (Liege 1906) ; Hoover, H. C., Principles of Mining5 (New York 1909) ; Horwood, (Gold Deposits of the Rand5 (1917) ; Hughes, (A Text Book of Coal Mining5 (1901) ; Kerr, Practi¬ cal Coal Mining5 (1914) ; Ketchum, (The De¬ sign of Mine Structures5 (New York 1912) ; Pamely, (The Colliery Manager's Handbook5 (1898) ; Peele, Mining Engineer's Handbook5 (1918) ; Redmayne, Modern Practice in Min¬ ing5 (4 vols., London 1908-11) : Skinner and Plate, Mining Costs of the World5 (1915) ; Storm, (Timbering in Mining5 (New York 1909) ; Stretch, Prospecting, Locating and Val¬ uing Mines5 (1903) ; Truscott, (Witwatersrand Gold Fields5 (1907) ; Williams, (The Diamond Mines of South Africa5 (1902) ; Wilson, (Hydraulic and placer Mining5 (1918) ; Young, (Elements of Mining5 (1916). Also consult the transactions5 of the following societies: American Institute of Mining Engineers, New York ; Institution of Mining and Metallurgy,

London; Institution of Mining Engineers, New¬ castle-upon-Tyne, England.

Robert Peele,

Professor of Mining, Columbia University,

New York.

MINING ENGINEERS, American Insti¬ tute of, an organization founded in 1871 to pro¬ mote the arts and sciences connected with the economical production of the useful minerals and metals, and the welfare of those employed in these industries, by means of meetings for social intercourse and the reading and discus¬ sion of professional papers, and to circulate, by means of publications among its members and associates, the information thus obtained. The publications of the organization are issued in three volumes of transactions5 annually and in the monthly Bulletin. The headquarters are in New York City in the Engineering Building. Membership over 5,000.

MINING GEOLOGY, the application of geology to the exploitation of mineral re¬ sources. See Mining; Geology; also Ore De¬ posits ; Economic Geology.

MINING INDUSTRY, American. See

Mining.

MINING LAWS OF THE UNITED STATES.* Government Ownership of Min¬ erals — Discovery of Gold. — The United States mining statutes apply mainly to the ownership and acquisition of minerals in the public lands. They do not regulate or control underground mining operations. The govern¬ ment on its formation made no claim to min¬ erals in lands within the original States. The Ordinance of 20 May 1785, providing for the disposal of public lands, reserved one-third of all gold, silver, lead and copper mines. An early enactment of Congress required sur¬ veyors to note in their fieldbooks the situation of all mines. By resolution, 16 April 1800. Congress authorized the collection of informa¬ tion relative to copper mines near Lake Superior.

A system of leasing the lead mines and of re¬ serving all salines was in force for many years. But President Polk in his first message, 2 Dec. 1845, suggested that the leasing system was defective and unprofitable, and recommended that mineral lands be sold ˆreserving to the government an equitable percentage of the gross amount of

mineral product.55 The policy of the government always has been to reserve all minerals and to dispose of them by methods distinct from that of the disposal of other public lands. No discovery of the precious metals had been made in the public lands before the cession of the territory by Mexico, in 1848. For 300 years the Spaniards had found no gold in the sands of that vast domain. Ameri¬ cans, seeking the development of the country, discovered the precious metal before the treaty of peace was signed. At this time there was no statute authorizing the private appropriation of minerals discovered upon the public domain. The laws of the United States were never ex¬ tended to the territory acquired from Mexico, but automatically this domain came under mili-

* This article treats only of the United States mining statutes. The mining codes of the various states regulate mining operations under ground and include features separate and distinct from those of the Federal mining statutes.

tary rule, and on 12 Feb. 1848, 10 days after the peace treaty had been signed and 25 days after the discovery of gold, the military gov¬ ernor, Col. R. B. Mason, issued a proclamation abolishing the Mexican laws and customs pre¬ vailing in the California region relative to the denouncement of mines. But Mexican rule and law over the ceded territory ended without this manifesto. No law authorized and none prevented miners from prospecting for gold. Pioneers were occupying the land without Con¬ gressional license, and the miners began pros¬ pecting under the passive leave of the govern¬ ment. The silence of the ruling body was construed to be consent. From the time of the discovery of gold until 1853 there was neither authority nor law permitting, prohibiting or condemning the wholesale trespassing upon the public lands, and the mining and appropriating the minerals that belonged to the government. In 1853 the Supreme Court of California de¬ cided that the deposits of gold and silver within its boundaries belonged to the State. The Congress, and the executive branch of the government, acquiesced in this holding, and mining operations on the

public domain grew to vast proportions. Not until 1861 was this doctrine of State ownership repudiated, and the title to the minerals conceded to be in the United States.

In the meantime, miners from the southern Appalachian regions, from the tin and lead mines of Great Britain, from the mines of Mexico, South America, Continental Europe and from the islands of the sea, and adventurers from the Eastern States and from all quarters of the civilized world poured into California as a new El Dorado.

Miners' Rules and Regulations. — At the

beginning of this wild rush there was locally no law to restrain and no court to punish an of¬ fender for trespass, misdemeanor, larceny or murder. The miner whose rights were invaded, or whose property was taken, had neither court nor authority to which he could resort for the protection of his rights, or redress of his wrongs. This tide of immigration carried on its crest men of learning, integrity and honor; but it also swept before it the derelicts of society, the depraved, the vicious, the thug and the thief — criminals fleeing from punishment past or prospective. For self-protection, the thoughtful and law-abiding prospectors organ¬ ized themselves into local communities acting with the direction and authority of constituted bodies exercising power to preserve order and punish offenders. These communities were known as ((mining districts.® These districts usually included one or more ((diggins® or min¬ ing camps, and were bounded by natural objects — mountains, gulches and rivers. The districts varied in size from a small mining area to vast stretches of valleys and gorges. In each district meetings were held at stated times, or as neces¬ sity might demand, on call. The meetings were in a sense deliberative assemblies, conducted in an orderly manner <(with the business tact of American instinct for public assemblies.® The meetings were the people's forum, an instance of pure democracy, legislative in their nature and executive in purpose ; they were more than mere occasions for mental effervescence or than safety valves for community complaints. Their sessions were governed by properly

selected officers, and records were kept of their proceedings.

These meetings enacted laws for the punish¬ ment of offenders, including all grades of offenses. From lack of jails and places of con¬ finement for persons convicted of violating the laws, capital punishment was inflicted on the more serious offenders, and those

convicted of lower grades of crimes were flogged or banished. Here also were formulated and adopted rules and regulations for the govern¬ ment of mining claims. These rules stated the miners' rights, prescribed the size of mining claims, the method of locating, holding and working them, and declared the rules as to abandonment and forfeiture, and even the method of using water. They usually stated the conditions that would excuse the working of a claim and permit the claimant to retain title. In some instances, the rules and regula¬ tions prescribed the qualificatiQiis of locators of claims. Recorders were selected, and their duties were usually defined, including the re¬ cording of claims in a suitable book to be kept for that purpose, the book to be open for the inspection of interested persons. A miners' rule or regulation did not acquire validity by the mere enactment, but its legal force arose from the customary obedience thereto after its adoption, and unlike a statute it lost its force and validity from general disuse. On this theory a rule or regulation duly enacted by a regular meeting might on abandonment be sup¬ planted by an unwritten custom that prevailed generally, however different or even contrary to the original written rule.

The origin of these miners' rules and regu¬ lations is not well authenticated. It cannot be attributed solely to the American genius for formulating laws, but rather to the American genius for adopting practical ideas and em¬ bodying them in workable codes. The gold hunters incorporated into these local codes the valuable features of the mining laws of foreign countries. Their information came from miners working with them from Cornwall, Derby and Devonshire; from Mexico, Chile and Conti¬ nental Europe. These brought with them the mining laws of their several countries and into the local codes were incorporated the best fea¬ tures of the Chilean, the Mexican and the Spanish mining laws and the rules and terms that were born in the stannary parliament of Cornwall, Derby and Devonshire. These facts, even in the absence of other authority, are sufficiently attested by the mining terms that were incorporated into the earliest of these regulations and that still in form and substance are found in the present mining codes, and in the prevailing mining vernacular.

These rules and regulations were the govern¬ ing codes of the early prospector and miner. They were of such importance as to be recog¬ nized in all Congressional enactments, and are by statutes in the mining States made admissible in evidence in actions relating to mining claims. Federal and State laws governing the location of mining claims have supplanted these local laws, but their influence is stamped upon these statutes, and is reflected in the jurisprudence of

Federal and State courts.*

*A collection of these miners' rules and regulations is found in Volume 14 of the Census Reports of 1880.

Federal Mining Legislation. — Five days after the admission of California as a State, 14 Sept. 1850, Senator Fremont introduced a bill "to make temporary provisions for the working and discovering of gold mines and placers in California and providing order in the gold mining districts.® The discussion of the Fremont bill showed on the part of some senators a desire for the government to retain the ownership of all minerals in the public lands and to create a revenue from the mining opera¬ tions. A majority of the senators, as evidenced by the vote, were against the revenue idea and in favor of making the mineral lands open to free acquisition and the minerals subject to private ownership without fee, license or royalty. Senator Fremont's bill passed the Senate, but reached the House too late in the session for action.

The miners of California and the people of the country generally accepted the provisions of this bill and the sentiments expressed by the majority vote of the Senate as at least reflect¬ ing the attitude of the United States govern¬ ment toward its mineral lands. They assumed that the miners who had been taking the min¬ erals were not to be regarded as trespassers but that these minerals were, and would con¬ tinue to be, open for free exploration, and the fruit of the miners' work was to be without rent or royalty. From 1848, to 1866, the miner dug over the valleys, tunneled into the mountains and took from the earth a billion dollars worth of the precious metals without a single expression of assent or dissent from the owner of both land and minerals. In this period of time these gold hunters accumulated, erected, owned and were operating on the pub¬ lic lands millions of dollars' worth of mining property and were increasing and continuing their industry on the assumption that no barrier would be interposed to their operations.

Congress, on 27 Feb. 1865, passed an act pro¬ viding that possessory actions between persons for the recovery of mining claims or for dam¬ ages thereto should not in any wise be affected by the fact that the paramount title to the land and the mineral was in the United States. Proceding the 39th Congress, December 1865, agita¬ tion was general on the question of free mining and on the disposal of mineral lands as dis¬ tinct from that of other public lands. Some public men and private citizens advocated a royalty on minerals as a source of substantial revenue to aid in the payment of the national debt which had reached an alarming sum. Another party insisted that no distinction should be made between the disposal of mineral lands and other public lands.. A third party, which proved to be the majority, opposed any change of policy after such long delay and1 acquiescence on the part of the government. On 13 Dec. 1865, George W. Julian, chairman of the House Committee on Public Lands, introduced a bill providing for the subdivision and sale of gold and silver lands and for the coinage of these minerals as mined. The bill nroposed a change in the policy respecting the disposal of mineral lands and was intended to increase the revenues. On 9 April 1866, Senator Sherman of Ohio in¬ troduced1 a bill embodying the recommendations of the Secretary of the Treasury providing for the payment of royalties on the products of mines. This bill was amended by the Commit¬

tee on Mines and Mining, representing the majority, and favored the free mining policy. The bill as passed by the Senate was entitled, <(A bill to legalize the occupation of mineral lands and to extend the right of pre-emption thereto.® It was taken up in the House on 3 July 1866, and on motion was referred to the Committee on Public Lands, ‘but no opportunity was ever given either the Committee or the House to consider the bill. Mr. Higby of California, on 8 March 1866, introduced in the House a bill entitled, “Granting the right of way to ditch and canal-owners in the State of California over the public lands.® This bill was passed 13 June 1866. This bill was taken up in the Senate and amended by substituting the bill formerly passed by the Senate and, as amended, was passed by that body 20 July 1866. The amended bill was taken up in the House 21 July 1866, when the Senate substitute was explained by Mr. Ashley of Nevada, and on his motion the previous question was ordered and the bill was ready to be put upon its passage. Mr. Julian and his followers bit¬ terly assailed the proceedings and viciously at¬ tacked the bill. After much filibustering, Mr. Julian was given the privilege of explaining its provisions and he charged that it was an attempt to put the bill through under a gag rule with no opportunity for debate or amend¬

ment and that interested persons were attempt¬ ing to force through the House a measure “revolutionizing the whole land policy of the government, abdicating in the name of the nation its authority and jurisdiction over the richest mineral possession on the face of God’s earth, found imbedded here and there over a million square miles of our national territory.®

Thereupon the motion to pass the bill under the previous question was reconsidered and withdrawn and the entire matter was open for discussion and those opposing the bill were given a full hearing. A substitute embodying his views was offered by Mr. Tulian and re¬ ceived only 17 votes, and on 26 July 1866 the substituted Senate bill passed the House by a vote of 77 to 37.

The misleading title was retained because the substituted bill had passed the Senate under that title, and possibly to prevent the bill from being referred to Mr. Julian’s committee. But no member of either Senate or House was misled or deceived by the title, and instead of the bill being surreptitiously passed, as some¬ times charged, it was accorded the fullest and freest discussion in both branches of the Con¬ gress and its friends and opponents alike were well informed as to its contents. This act as passed by Congress and found in Vol. XIV, United States Statutes at Large, page 251, con¬ sists of 11 sections. The purpose of the bill as declared in the first section was that “the mineral lands of the public domain, both sur¬ veyed and unsurveyed are herebv declared to be free and open to exploration and occupation by all citizens of the United States.® It did not purport to be a mining code and its object was not to regulate mining as such, but to au¬ thorize entry upon the mineral lands and to permit prospectors and miners to discover and possess themselves of the hidden treasure. It was the first mining, law enacted by Congress, and it was the first instance in history where a sovereign, as owner of the minerals, broke

away from the old regalian rights and made to the citizens an absolute gift of all the mineral wealth without condition and without

limitation. The act of 1866 made no provision for the location of placer claims and on 9 July 1870 the act was amended by the addition of six new sections (16 United States Statutes at Large, 217), providing for the location of placer claims and with some detailed provisions as to procedure in the location of mining claims. The original act of 26 July 1866, after a test of six years, was found to be inadequate in that it failed to give the locator of a claim a sufficient quantity of surface ground for the proper working of a claim, and limited the claim along the lode to 200 feet and did not contain adequate provisions for patent. Ex¬ perience proved that 200 feet on a vein was in¬ sufficient to justify an investment in mining machinery and property sufficient to properly operate a mine. Accordingly a new act embrac¬ ing all the features of the acts of 1866 and 1870 was passed by Congress, 10 May 1872. This act was entitled, ((An act to promote the de¬ velopment of the mining resources of the .United States® (17 United States Statutes at Large, 91). It was subsequently codified and with the addition of an introductory section constitutes sections 2318 to 2346, United States Revised Statutes 1878. On 3 March 1873 Con¬ gress passed an act providing for the entry of coal lands, and this act is a part of the revision of 1878 following the sections relating to minerals, as sections 2347 to 2352.

Location of Claims — Lode Claims. — The law as codified reserves all lands valuable for minerals from sale except as specially directed, and makes all valuable mineral deposits free and open to exploration and provides that the deposits of mineral and the land in which they are found shall be open to purchase by citizens of the United States and by those who have declared their intention to become such.

The statute provides that upon the discovery of valuable mineral deposits a location may be made upon the surface. Location is made upon or along what is termed the ((apex® or the out¬ crop of the vein or lode. The side lines of the location must be so laid along the strike of the vein as to include the vein within the boundaries of the location, but cannot extend more than 1,500 feet in length and shall not be more than 300 feet on each side from the centre of the vein at the surface. These lines are re¬ quired to be neither straight nor parallel but may bend or turn with the direction of the vein. No claim shall be limited to less than 25 feet on each side of the middle of the vein at the sur¬ face. The end lines must be parallel and straight, or the locator is deprived of a valuable right. The location on the surface may ‘be in the form of a parallelogram, a square, a trapezium or substantially a triangle.

No notice is required to be placed upon the claim but <(the location

must . be distinctly marked on the ground so that its boundaries can be readily traced.® If a State statute or a miners' rule requires a record of a claim, then such record shall contain the name of the locator, the date of the location and such a description of the claim located by reference to some natural object or permanent monument as will identify the claim. Not less than $100 worth of labor shall be performed or improve¬

ments made during each year so long as a claim is held without patent. Where claims are held in common or where claims are in a group with a common ownership, the work or improvements required for each may be done upon one claim, or outside of all claims, if it tends to facilitate the development and the ex¬ traction of ore from all the claims. The owner of a mining claim may hold his claim in¬ definitely by the performance of the annual assessment work. If he opens and works a mine, and the work and improvements are equivalent to the required amount, the statute is satisfied. The possessory right under these conditions secures for him the same protection that complete title would. The time for the performance of assessment work or for making the improvements for the first year commences the first day of January of the year following the date of location, and closes with the last day of December of that year. After the end of the year in which the location was made the labor must be performed or improve¬ ments made before the end of each year. Upon the failure of a locator to perform the re¬ quired assessment work, within the statutory period, the claim is subject to relocation; and a valid relocation made of forfeiture gives the relocator not only the right to the possession of the ground, but also to all buildings and improvements placed thereon by the original locator. But if a locator has failed to com¬ plete his assessment work before the end of the year and is in the course of its performance, the ground is not subject to relocation. Upon the failure of any co-owner to perform or con¬ tribute to the performance of the assessment work, his interest may be forfeited, on notice. A claim that has been abandoned by the locator or owner is open to relocation at any time after the abandonment is complete.

Where two or more veins intersect or cross each other below the surface, the owner of the senior surface location is entitled to all the minerals within the space of intersection, but the owner of the junior location is entitled to a right of way through such point of intersection for the working of his vein below such point. If the two veins unite, the senior surface locator is entitled to the entire vein both at and

below the point of union. Authority is given for discovering veins or developing mines by means of tunnels. The owner of a tunnel is given all veins or lodes within 3,000 feet from the face of his tunnel on the line thereof, not previously known to exist, and is protected against discoveries from the surface, if he prosecutes his tunnel construction with reasonable diligence. A State legislature may enact statutes, or the miners of a mining district may make rules and regula¬ tions, governing the location of mining claims, the manner of recording and the amount of assessment work, but these must not be in con¬ flict with the United States statutes.

Location and Discovery a Unit. — No time is given by the statute in which to make a loca¬ tion as distinct from the fact of discovery. The statute in effect makes discovery and loca¬ tion a unit, and a location without a discovery is of no force. A vein does not always out¬ crop on the surface and. time may be neces¬ sary to discover the required valuable deposit. The statutes of most of the metal mining States

have cured this defect in the United States statutes by giving a locator a stated and rea¬ sonable time in which to make a discovery after otherwise perfecting his location, and in con¬ sideration of this they require the locator to do certain specific work, such as the excavation of a discovery shaft of a given circumference and depth. The purpose of such State statutes is to give the locator time to explore the vein and to find its true strike and thus enable him to lay his claim properly upon the surf ice. Such requirements are not in conflict with the United States statutes and are valid and recognized as beneficial.

Sufficiency of Discovery. — The statutory test of a valid mining claim is the discovery of valuable mineral deposits ; but a prospector is not required to discover a profitable mine in order to validate his location. The statute is satisfied when minerals have been discovered and the evidence is sufficient to justify a per¬ son of ordinary prudence in making an ex¬ penditure of labor and money with reasonable prospect of success in developing a valuable mine.

Protection of Miner's Possessio Pedis. —

A miner not infrequently marks out his sur¬ face location without an actual discovery of minerals and to validate his claim by discovery he proceeds to make excavations in the hope of finding the required valuable mineral deposits. In such a case, where a controversy has arisen, the courts have kindly supplemented the mining statute and protected the miner in what is termed his possessio pedis, so long as he con¬ tinued diligently in prosecuting his discovery work. The courts have not limited thi . Posses¬ sio pedis to the miner's actual working place while seeking a discovery, but hold it to .e co¬ extensive with his surface location.

Swinging a Claim. — A locator may on mak¬ ing the explorations required by a State statute discover not only the required mineral deposit but may also discover the true strike of the vein and find that his surface location does not comply with the statutory requirements. In such case he may, within the period given by the State statute, swing his claim in any direc¬ tion so as to extend along the strike of the vein within a circular area, the diameter of which is equal to the longest distance claimed from the point of discovery, and all conflicting locations made subsequent to the time of his surface location are invalid to the extent of any conflict.*

Extralateral Rights. — Locators of valid miping claims, on continued compliance with existing laws and regulations, are entitled to the exclusive possession of all ground within their surface lines and of all ((veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of the surface lines extended downward vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side lines of such surface locations. But their right of pos¬ session to such outside parts of such veins or ledges shall be confined to such portions thereof as lie between vertical planes drawn downward, as above described, through the end lines of their locations so continued in their

* This rule was established by the Supreme Court of Montana in Sanders v. Noble, 22 Mont. 110,

own direction that such planes will intersect such exterior parts of such veins or ledges.®

This right to follow a vein beyond the ver¬ tical planes of the side lines of a surface loca¬ tion is known as the ((extralateral rights It is sometimes referred to as the “apex® law. The veins of mineral bearing ore in the West¬ ern mining regions are usually in the form of thin and broadly extended sheets, standing or resting at a greater or less angle from the perpendicular. The upper edge of this sheet or vein frequently extends to and is ex¬ posed at the surface and is variously denomi¬ nated the “outcrop,® “apex® or “top® of the vein. The line of this outcrop or apex as it extends along, or more or less below, the sur¬ face is called the “strike® and the downward course of the vein is known as its “dip.® Mining operations usually begin at the outcrop, the ore being taken from the vein as it ex¬ tends downward on its dip. The miner in taking out the ore is given the right to follow the vein on its dip without reference to the side lines of his surface location; but he can only follow this dip within the section of the vein as cut and bounded by the vertical planes of his end lines. The parallelism of the end lines operates to give him the same portion of the vein in following it on its dip. Gen¬ erally, the veins have an identity and continu¬ ity resembling in a degree that of the several roots of a tree and ordinarily can be followed on their dip with the same degree of cer¬ tainty that a single or separate root of a tree could be followed and taken out.

In no event can a claimant mining out his vein enter upon the surface of another claim in following his vein, but the vein must be followed on its downward course beyond the vertical planes of the side lines as it is mined out under ground and the operations on the surface must be within the boundaries of the surface location. A vein may thus be fol¬ lowed so long as its identity and continuity can be traced and these are questions of fact that a claimant must establish by proof if his right is controverted. If the end lines of a location are not parallel, or if the vein is flat, or what is known as a broad vein, the locator loses this extralateral right.*

Placer Claims.— Placer claims may include all forms of deposit except veins of quartz or other rock in place. In locating placer claims the. legal subdivisions of 40 acres may be sub¬ dividend into 10-acre tracts. A single claimant may not make a location in excess of 20 acres ; but an association of two or more persons may make a location in extent equal to 20 acres for each member of the association ; but an associa¬ tion location is limited in any event to 160 acres, this, being the largest area that can be embraced in any placer claim. Two or more pei sons having contiguous claims of any size though less than 10 acres may make joint entry thereof. Placer claims when on surveyed lands shall conform to the legal subdivisions, and no further

survey or plat is required. “No such

It is variously charged that the exercise of this extralateral right has been the source of practically all mining litigation in the Western States. But in answer to this charge it has been shown that 2,331 cases have reached the highest courts of the nine leading metal mining States involv¬ ing all phases of the mining industry, and of these only 71 involved controversies have grown out of the grant of extra lateral rights — a percentage of 3.045,

location shall include more than 20 acres for each individual claimant.” The land embraced in a placer claim must be paid for, if patented, at the rate of $2.50 per acre. Where a vein or lode is known to be within the limits of a placer claim, the claimant must, on application for a patent for his placer, include such known vein or lode, or the patent will not embrace such known vein or lode and it is subject to loca¬ tion by any other discoverer, except the width of the lode claim throughout the placer can¬ not exceed 25 feet on each side of the vein. But a placer patent includes all veins and lodes within its limits that are not known to exist at the time the patent issues.

Mill Sites. — The owner of a mining claim worked as a mine may appropriate and patent a tract of non-mineral and non-contiguous land, not exceeding five acres, for a mill site on the same conditions as he may obtain patent for his claim. So the owner of a quartz mill or re¬ duction works not owning a mine in connection therewith may have a patent for his mill site as for a mining claim.

Patent. — If a qualified locator desires a patent for his claim he may file in the General Land Office his application under oath, giving an accurate description with a plat and field notes, showing the boundaries and monuments. He must file proof of the posting and publica¬ tion of notice of the application and a certifi¬ cate of the surveyor-general to the effect that $500 worth of labor has been expended or im¬ provements made on the claim. He is required to pay $5 per acre for the land covered by his lode claim. Any person having an adverse claim or superior right to that of the applicant must

adverse the application by filing a state¬ ment of his claim in the Land Office. Upon the filing of an adverse claim, the adverse claimant must within 30 days begin proceedings in a court of competent jurisdiction to determine his right to the claim. The judgment of the court determines the relative rights of the parties and the successful claimant must present a certified copy of the judgment to the Land Office. A court of competent jurisdiction is within the statute an ordinary State court or a Federal court, if the other necessary jurisdic¬ tional requirements are present — such as the proper amount in controversy or diverse citizenship.

By special provision a patent may issue for a mining claim in the absence of an adverse claim, if the locator or if the locator and his successors have held and worked the ground as a mining claim for a period equal to the Statute of Limitations of the State in which the claim is situated. This provision was to obviate the difficulty or impossibility of making the required proof in patent proceedings in cases of claims of long standing.

Mining Statutes Supplemented.— The United States statutes governing the location of mining claims have stood for practically a half century with few amendments and no sub¬ stantial changes. The defects in the original enactments have not been so pronounced as to induce Congress to attempt their general re¬ vision. The several States by permission of these Congressional enactments have adopted local mining codes supplementing and improv¬ ing the United States laws. Both Federal and State courts in the heart of the mining country

and in sympathy with the prospector and the miner have so interpreted these laws as to make them practicable and workable. Under the stimulus of these benign statutes the golden treasure has been mined from the valleys and mountains and the country has been enriched beyond the most fantastic dreams of those who placed these laws upon the statute books. Con¬ sult Barringer and Adams, < Mines and Mining) (Boston 1897) ; Clark, H. F., (Miners' Manual > (Chicago 1898) ; Copp, H. N., (American Min¬ ing Code* (19th ed., Washington 1910) ; Costi-gan, Geo. P., (Handbook on American Mining Law> (Saint Paul 1908) ; Lindley, Curtis H.,

(American Law Relating to Mines and Mineral Lands) (3rd ed., San Francisco 1914) ; Morri¬ son, R. S., (Mining Rights) (14th ed., Denver 1910) ; Snyder, W. H., 'Mines and Mining' (Chicago 1902) ; Thompson, J. W., (United States Mining Statutes Annotated'

(Washing¬ ton 1915) ; White, E. J., ‘Law of Mines and Mining Injuries) (Saint Louis 1903).

J. W. Thompson,

Law Examiner of the Bureau of Mines, De¬ partment of the Interior, Washington, D. C.

MINING AND MILLING MACHIN¬ ERY. Problems in mining may be classified into groups according to their relation to ge¬ ology, engineering, machinery and metallurgy; but as the problems of each group overlap to some extent those of the others, the special con¬ sideration of the subject of mining machinery necessarily involves a general consideration of mining methods and results in their geological, engineering and metallurgical aspects.

Mining methods differ according to the form and geological relations of the mass of ore or other minerals to obtain which the mining opera¬ tions are instituted. These relations outline two general methods — those applicable to “surface deposits,” and the more complicated meth¬ ods required in the working of “underground deposits.”

Surface deposits are those in which the mass of ore is of considerable superficial extent and lies on or near the surface of the ground. The first step in this case is to uncover the ore by “stripping” off the overlying worthless ma¬ terial called the “burden.” If this consists of soft earth or gravel it may be removed with pick, shovel and wheelbarrow, or by the use of steam shovels and small tram-cars drawn by horses, mules or locomotives. If the burden is too hard to be stripped by any of these methods, blasting operations are usually em¬ ployed. The burden is first blasted off and .removed, and the subsequent work of extract¬ ing the mineral thus exposed is carried on by benches or terraces along the hillside, so that the cuts will naturally drain into the pit, and the ore will have a favorable grade, for its transportation, in removal. If the pit is lo¬ cated in level or depressed ground, the use of pumping machinery will become immediately necessary, entailing a heavy expense at the very beginning of the operations. Open cuts are the simplest and most convenient form of excava¬ tion, but they expose the men and machinery to the weather, and usually necessitate the aban¬ donment of all operations during the winter. Another method of surface mining consists in the employment of water jets for working auriferous gravels. This is technically known

as “hydraulic mining.® Water conducted from great distances and elevations is directed against the ore-bearing gravel banks and beds, in the torm of powerful jets through large nozzles called “giants.® The impact of the water under the great pressure due to its heavy fall washes away the gravelly material of the banks with almost incredible rapidity through sluices where the gold is separated from the sand and gravel by amalgamation with the mercury in the riffles of the sluice boxes. The sluices usually consist of a series of 12-foot troughs which empty into one another and often form a line of troughs several hundred feet long. The bottoms of the troughs have corrugations called riffles, and are cut out at intervals and replaced by a grating called a “grizzly.® Under the grizzly another broad trough is placed at right angles to the top trough and empties into another trough which runs parallel to the direction of the top trough and forms the continuation of the main sluice. As the material of the bank is washed through the sluice boxes by a strong stream of water the sand and gravel is caught by the grizzly while the gold passes through into the lower trough where it amalgamates with the mercury which is frequently sprinkled into the riffles.

Underground deposits are worked by the use of shafts and tunnels driven through the overlying earth and rock into the “lodes® or veins of ore. In these operations the overlying rock is always supported in place over those portions of the mines where the borings are used as passageways, and the arrangements for ventilation are more and more carefully made as the workings grow deeper and deeper.

The machinery employed in underground mining is not extensive as to variety. The principal tool is the drill with which is formed the hole for the explosive used to break out the metalliferous rock. To drive the drill the pneumatic hammer is the machine commonly used. In some cases steam is the source of power, but the compressed air mechanism is valued above steam because its exhaust sup¬ plies the mine chambers with a continuous sup¬ ply of fresh air. The air-compressor is com¬ monly located above ground at the mouth of the shaft, the air

being brought to the drills by a pipe conduit. In mining native metal, as in the case of virgin copper, a chisel is used, driven by the pneumatic hammer. One of the accessory machines of the mine is the drill sharpener, operated usually by steam. This is an adaptation of the power hammer, . carrying a die with which is reforged the cutting edges of the drill heated to cherry-redness. The tempering is done by hand. In most under¬ ground mines the water-pump is as much a necessity as in the surface diggings. Hoisting engines are an indispensable part of the outfit and are of various design, adapted to the vary¬ ing conditions.

The metalliferous rock or ore as broken out by the explosive is prepared for the ex¬ traction of its valuable constituent by processes to which the designation “ore dressing® has been given.

Ore dressing consists of two processes — crushing and separation, which employ two dis¬ tinct types of machinery.

By crushing, the material is broken up into coarse fragments, or ground into a fine powder,

and the valuable ore detached from the worth¬ less rock. In some mines the coarse crushing is done underground.

By separation, the valuable ore is concen¬ trated into smaller bulk and weight by being separated from the waste, or in the case of two valuable ores, they are separated from one another. The term “concentration® is spe¬ cifically used for a separation by mechanical means as distinguished from that accomplished by hand.

The selection of the particular types of crushing and grinding machinery is always de¬ termined by the character of the ore and the process of extraction for which the ore is prepared.

The processes of extraction may be briefly defined as follows: (1) Smelting processes in which the pure metal is extracted from its ore by fire; (2) amalgamation process in which the metal forms an amalgam with mercury from which it is subsequently separated by the dis¬ tillation of the latter; (3) chemical processes in which the metal is dissolved by various solu¬ tions and then precipitated in solid form by suitable precipitations; (4) electrolytic proc¬ esses in which the extraction is accomplished by electrolysis.

The crushing and grinding machinery used in mining consists of the

following classes of machines :

Rolls. — These are the standard machines for crushing brittle ores which are being prepared for concentration except where fine crushing is required.

Steam stamps are the standard machines for crushing ores containing native copper.

Gravity stamps are the machines most ex¬ tensively used for fine crushing.

Tube mills are also quite extensively used for fine crushing and are the most efficient competitors. of the gravity stamps, and in many gold mines are used to follow the latter for the finest grinding.

Pulverizers are used for crushing and grind¬ ing ore as it comes from the crusher or rolls, for fine concentration or for the recrushing of middlings and tailings from jigs for subsequent treatment on concentrating tables or other con¬ centrating machines.

The preliminary crushing is usually accom¬ plished by jaw or gyratory crushers and then the material is passed over to the rolls, stamps or ball mills. The selection of screens having the proper mesh to crush through is one of the most important details. For purposes of. con¬ centration it is usually advantageous to begin by crushing to a coarse size, separating as much of the waste as possible, then recrushing to a finer size and again separating the waste. In crushing gold ores for subsequent treatment by the cyanide process, fine crushing gives a higher extraction than coarse crushing.

The following examples have been selected to illustrate the various classes of these ma¬ chines :

Fig. 1 shows a general view of a Blake Crusher, a machine of the “jaw-crusher® type. They are made in dimensions which provide a capacity of receiving rocks ranging from \J/i inches by 3 inches to 15 inches by 24 inches in size, which they reduce to fragments ranging from 1 inch to 3 inches in size, at the rate of

15 to 250 tons per 10 hours of work, .according to the size of the machines.

They range in power from one-half horse power in those weighing 1,000 pounds to 25 horse power in those weighing 26,000 pounds,

and require a speed of 225 to 250 revolutions per minute for their operation.

Fig. 2 shows a general view of an Austin Gyratory Rock Breaker. It represents one of the strongest and most durable of this class of crushers. It is made in sizes which have re¬ ceiving openings ranging from 4 inches by 5 inches to 18 inches by 63 inches, and have re¬ duction capacities ranging from 2 to 200 tons per hour, according to the fineness to which

the material is reduced and the size of the ma¬ chine. In weight they range from 3,000 to 100,000 pounds, and require from 4 to 150 horse power to drive them at speeds ranging from 350 to 500 revolutions per minute.

Fig. 3 shows a general view of a set of crushing rolls. It consists of a set of station¬ ary and a set of movable rolls ; an automatic feed hopper built in sections, so that the wear¬ ing parts may be easily replaced; a dust cover;

and two extra heavy, band wheels for the driv¬ ing belts. The main frame and the journals for the stationary rolls are cast in one piece. The movable journal is held in the centre of the main frame by means of a heavy steel shaft, and the swinging journals are held in place by tension rods which are attached to nests of powerful coiled springs between washers on the rods. These springs are stiff enough to resist the pressure imposed upon them by ordinary crushing without being compressed, and yield

only to abnormal strains caused by the acci¬ dental passage through the rolls of uncrush-able substances, such as broken drill points, *etc.* The rolls may be adjusted to a nicety by screwing or unscrewing the nuts on the adjust-

ing bolts, which arc attached by a (<key colter® to the movable journal and are held in place by lock nuts which rest against the heavy brackets cast on the main frame.

The size of rolls ranges from 24” X 15” to 60” X 24”, and ranges in weight from 14,000 to 69,000 pounds. Their operative speed ranges from 100 revolutions per minute for the larger and from 100 to 175 revolutions per minute for the smaller machines.

Fig. 4 shows an Allis-Chalmers steam stamp designed for the reduction of copper ores. This stamp is driven by a vertical steam cylinder with valve gearing arranged to keep the steam-port freely open during the downward stroke, thus adding the power of the steam to the weight of the stamp. The mortar has four dis¬ charge screens and rests on a heavy anvil or bed plate, and is held in place by angle guide pieces cast upon the massive framing of iron columns. The upper and lower guides for the

Fig. 5. — ’Ten-Stamp Battery.

stamp-stem are detachable bronze bushings in which the stem is slowly revolved by a hori¬ zontal pulley on a sleeve between the upper and lower guide brackets. The sleeve contains two feathers which fit into corresponding slots in the stamp-stem, by which the latter is rotated. The steel piston-rod is connected to the steam-stem

by a circular disc which is encased in a cast-iron bonnet bolted to the flange of the stem, the space between being filled with pure gum-rubber packing, so as to relieve the shock on the piston and to permit its removal for repairs without disturbing the stamp. These stamps have a capacity of several hundred tons per day. Other forms used chiefly on copper ores are the Kraus Atmospheric Stamp and the Tremain Steam Stamp.

Fig. 5 shows the general aspect of a 10-stamp battery operating gravity stamps. The screen and a portion of one of the sectional mortars is removed so as to reveal the stamps and the

dies. Fig. 6 shows a sectional view of the same battery, with automatic feeders in place. From the ore bin down to the stamp die within the mortar the various devices and their movable

Ore fan

parts, which comprise the battery, are illustrated by the following figures : Fig. 7, ore-bin gate and spout. These are built in sizes ranging from 18 to 24 inches, or in special sizes as may be required. Fig. 8, a <(Challenge® ore-feeder. This is an automatic arrangement which may be used with wet or dry ores. Its operation is simple and regular: The cast-iron plate placed

at an angle below the hopper is rotated by bevel gears actuated by a friction device in the shape of a tappet-rod or forked lever, which engages a feed collar placed on the central stem of the

bˆtery i he entire apparatus is about 4ˆ feet m height 3 feet 9 inches in width and weighs abou 845 pounds. Other types of feeders are the “movable suspended,® and the “fixed sus-

Fig. 8. — “Challenge” Ore-Feeder.

pended,® automatic feeders. The principal ad¬ vantage of using the suspended type of feeder is that it gives an unobstructed floor space behind the battery, and thereby facilitates the work of “clean up,® repairs, *etc.* When they are used for feeding “Huntington® mills or other pulverizing mills, they are usually ar¬ ranged to be driven by belting.

Mortars are made in a great variety of forms, and are designed for both wet and dry crushing. Fig. 9 is an example of the deep single dis¬

charge type, designed for copper lining plates in the back and front, the former bolted through the mortar, and the latter attached to a block under the screen frame. The copper plates are coated with mercury. The ore is fed through the opening in the back near the top and is dis¬ tributed under the stamps by their own action, peculiar to the order of their drop. The water enters at the top against each stamp and carries the crushed ore or “pulp® through the screen as fast as it becomes fine enough, by being

dashed up against the screens by the falling stamp. Amalgamation takes place within the -mortar by the pulp being splashed up on the copper lining plates. Fig. 10 is an example of a deep straight-back mortar not provided with copper lining plates, amalgamation being ef¬ fected outside. It is provided with steel lining, and a steel . wearing plate, and is so propor¬ tioned that it affords unusual facilities for the quick discharge of the pulp through the screen. Fig. 11 illustrates a double-discharge mortar

designed for use in wet crushing silver, in con¬ centrating or in combination mills where large crushing capacity is desired. The pulp dis¬ charged through the back screen flows toward the centre at the back of the mortar, and pass¬ ing through an opening in the base of the mor¬ tar proper joins the pulp from the front screen. Fig. 12 is an

example of the mortars designed for dry crushing. All of them are made double-discharge, with the dies so placed that the dry pulp will easily reach the screens when it is dashed up against them by the action of the stamps. A peculiar feature is the fastening of the die by a dove-tail flange at the bottom. Fig. 13 illustrates a general view and cross-sec¬ tion of a sectional mortar. Its construction in sections adapts it for mule-back transportation in mountainous countries.

It is important to note in this connection that the capacity of a battery of stamps depends very largely upon the construction of the mortors used.

Battery or mortar screens are usually made of genuine Russia iron, or of the best quality of cold rolled homogeneous steel. They are of various patterns — “roundhole screens® with

perforations ranging from % to 1 millimeter in diameter; “needle slot screens® perforated with diagonal or horizontal slots usually 15/32 of an inch in length, and ranging from 12 to 70

mesh ; and <(indented-slot screens.” Fig. 14 illustrates an example of each type. In addi¬ tion to these regular patterns, most of the large manufacturers are always prepared to furnish screens punched according to any specifica-

Pig. 14. — Perforated-iron Screens.

tions that may be submitted as may be required for use with particular ores.

Stamp dies are made of very hard and tough material, usually the

same as that used for the body of the shoe. Fig. 15 shows six of the principal forms.

the lower for the neck of the shoe, and the upper for the tapering end of the stamp-stem, which requires no other fastening than the wedging action of its taper to bind it firmly to the head. Slots are cut from the outside of the head into the sockets, through which by means of wedges the stem and the shoe can be forced out when necessary.

Fig. 18.

The tappets are collars fastened to the stamp-stems. They bear against the revolving cams and thus alternately lift and drop the stamps. Each tappet is fitted with a gib which, being pressed against the stem by cross keys behind, binds the tappet on the stem as firmly as pos¬ sible, and at the same time admits of a quick adjustment to another portion of the stem when¬ ever necessary. As shown by Fig. 18, they are

Stamp shoes are made in a variety of regu¬ lar and special patterns. Fig. 16 shows one of the usual pattern. In wet crushing mills it is attached to the stamp-head by means of strips of wood placed in the space between the neck of the shoe and the socket of the head. The wooden strips are swelled by the water and thus hold the shoe and head firmly together. In

Fig. 16. Pig. 17.

dry crushing mills strips of iron are used for this purpose.

Stamp-heads are made the same diameter as the stamp shoes. As shown by Fig. 17, the stamp-head has a tapering socket at each end —

made with either two or three keys, and are counterbored to prevent

slipping on the stem.

Cams are being made in a variety of patterns depending upon the height the stem is lifted and dropped, and the necessary distance be¬ tween the centre of the cam-shaft and the centre of the stamp-stem. They are made both right-handed and left-handed, and are either keyed onto the cam-shaft, or attached by means of taper-bushings which give a self-tightening effect. Fig. 19 shows side and edge views of both types, and the method of applying the taper-bushings.

Fig. 20 shows their positions on the cam¬ shaft so as to give the most general order of a drop for a 10-stamp battery, when driven from either end of the shaft.

The other essential parts of the battery are the ((cam-shaft boxes," ((cam-shaft pulley" and the (<stamp guides." These are illustrated by Figs. 21, 22, 23, respectively. . The cam-shaft boxes are made of metal and in the improved forms are provided with an oil drip launder which extends around the two ends and the front of the box and thus prevents the lubricat¬ ing grease from dripping into the mortar and onto the amalgamating plates. Standard cam-

shaft pulleys are built up of well-seasoned pine, properly laid in oil and spiked. The face and sides are turned and thoroughly covered with oil paint. The hub is of cast-iron, the through sleeve and one flange being cast in one piece. The sleeve is bored to fit the cam-shaft and

turned and key-seated to receive the following flange, the two flanges being bolted together with through bolts.

The stamp guides are made of wood ; wood bushings in iron frames; or entirely of iron. They are made either solid or sectional, the latter form being preferable as a considerable saving in time can be effected

by their use, especially when the guides require dressing down.

The stamps range from 840 to 1,200 pounds

ORDER of DROP

17395 284-10 6

ORDER of DROP

17395 284 10 8

Pu/teyfnd

Left Hand Cams ‘ Right Hand Cams

Fig. 20.

Tube Mills. — These are used for the purpose of reducing ores to a fineness up to 200 mesh. Fig. 24 is an example of the cylinder type. Another favorite form is conical or double conical. With the demand for extreme fineness in the cyaniding and flotation processes, as well

Fig. 21. Fig. 22.

as for concentration and speedy amalgamation, the tube mill has become increasingly popular, and has been greatly improved by being enlarged as to diameter and shortened. This gives a greater force to the falling balls, and the cost of grinding has been reduced to seven cents per ton of ore, for the larger sizes. The progressive

Fig. 23.

treatment of ore has thus become the Blake or gyratory crusher for the primary work, the stamps, disc crushers or rolls for secondary and the tube mills for finishing — a conical mill for a 90-mesh product for amalgamating or concentrating and a cylindrical mill for a 200-mesh product for the cyanide and flotation

Fig. 24— Tube Mill.

in weight each, and are usually operated through a mean space of six inches at rates ranging from 105 to 110 drops per minute. Their crush¬ ing capacity ranges from 6 to 40 tons for 24 hours according to the milling quality of the ore.

processes. One of the advantages of the tube mill is the capability of grinding in any desired size. This type of mill, however, is not an economical crusher for hard quartz ores, but is best adapted to those of moderate hardness. In the case of the hard ores, the stamp mill has

no rival. In the gold mining plants it is now the practice to use one tube mill for regrind¬ ing to each 10 stamps in the battery. The type of mill to be used depends upon the character of the ore; the harder the ore the larger diameter required. In the Marathon tube mill a series of rods from one-half inch to two inches in diameter replace the balls or pebbles of the usual type.

Fig. 25. — Huntington Mill.

Pulverisers. — Perhaps the best representa¬ tives of this class of machines; are the <(Huntington® and the ˆChilian® mills. Fig. 25 shows a general view of a Huntington mill of the latest pattern. In operation, the ore arid water fed into the mill through the hopper is thrown by the rotating rollers and scrapers against the ring-die where it is crushed to any degree of fineness desired by the centrifugal force

of the rollers as they roll over it. The water and pulverized ore are thrown against the screens through which they are discharged when ground sufficiently fine to pass the mesh, which ranges

in fineness from 60 to 120. Very little slime results from the operation, and the pulp or pul¬ verized ore is delivered in good condition for concentration. The rollers are suspended so as to leave a space of about one inch between them and the bottom of the mill, thus allowing them to pass freely over the quicksilver and the amalgam without grinding it or throwing it from the mill, while at the same time the agita¬

tion of the pulp is sufficient to make amalgama¬ tion perfect.

They are built in sizes ranging from three and a half to six feet in diameter, and from 7,000 to 44,500 pounds in weight. They require from 5 to 15 horse power to drive them at pulley speeds ranging from 120 to 150 revolu¬ tions per minute, to give capacities ranging from 10 to 75 tons of ore for 24 hours.

The principal machinery used in the proces¬ ses of separation are of the following classes :

Preliminary washers, which are employed for the purpose of disintegrating and floating off the adhering fine clayey substances from the coarse particles, by the use of running water aided by some form of stirring device.

Sieves and screens are used for separating the finer from the coarser particles of ore. They are of two classes, (1) ˆstationary screens,® which include the wire-cloth gravel screens, and the perforated plate screens, and (2) ((moving screens,® which include the oscil¬ lating bar screens, the plain shaking screens or riddles and the revolving screens or trommels.

Classifiers are used for obtaining a series of products of diminishing size by means of cur¬ rents of water.

When the process of separation is accom¬ plished by ((hand-picking® methods, the work of separating the valuable ore from the waste material is usually done on <(tables,® of which there are at least five classes in general use : (1) Stationary horizontal tables; (2) station¬

ary sloping chutes; (3) shaking tables; (4) belt, rope or plate conveyors, and (5) revolving circular tables.

Other methods of separation employ ((hydraulic jigs,® which perform their work through the alternating upward and downward action of two currents of water upon a bed of sand supported by a screen ; ((vanners® or endless belts which are shaken rapidly either endwise or sidewise, and have a continuous slow motion up hill ; (<bumping tables® ; <(film sizing tables,® and various forms of magnetic separators.

Fig. 26 shows an ore-grizzly, which repre¬ sents the various forms of metal bar screens. See Air-Compressor; Blowing Machine; Power Transmission; Pulsometer; Pumps.

Bibliography. — Del Mar, A., <Tube Mill¬ ing* (New York 1917) ; Engineering and Min¬ ing Journal, (Who's Who Among Manufactur-urers of Mining Machinery) (New York 1911) ; Ihlsen, M. G, and Wilson, E. B., ˆManual of Mining) (New York 1911); Richards, R. H., (Ore Dressing* (New York 1909); Whitcomb, G. D., (Mechanical Methods of Mining* (Chi¬ cago 1911); Young, C. J., Elements of Min¬ ing* (New York 1916).

Revised by Richard Ferris.

t MINISTER, a high officer of state entrusted with the administration of any department of state government. Collectively, the persons who constitute the administration are called in Europe the ministry, and also the cabinet. The term minister is seldom applied in the United States to members of the cabinet, but is used, as in Europe, to designate diplomatic officers who differ from ambassadors in that the latter hold power as personal representatives of the head of the government. The technical title of min¬ isters is envoy extraordinary or minister pleni¬ potentiary. In Great Britain the term is used to

designate the entire body of secretaries which is called the ministry, i

he executive government of France is divided into 10 departments or (ministries. ˆ See also Ambassador; Cabi¬ net; Envoy; Consul; Diplomacy.

MINISTER S WOOING, The, a novel by Harriet Beecher Stowe, first published in serial form in the Atlantic Monthly in 1859. The scene is laid in New England, and deals with the habits and traditions of the close of the 18th century. The ˆminister® in the tale is the famous Samuel Hopkins (q.v.) 1721-1803, the founder of “Hopkinsianism.” The central pur¬ pose in this story is to show the sternness and inflexibility of the New England conscience, which clings to the Calvinistic doctrines through all phases of life. The struggle that goes on in the heart of the heroine and her mother when the brother and son, James, is supposed to be drowned and unconverted is a graphic delineation of the moral point of view at that time.

MINIUM. See Lead.

MINIVER, the Siberian squirrel, which has fine white fur; also the fur itself.

MINK, a circumpolar species of weasel (family Mustelidce), valuable as a fur-bearer, known in North America as Putorius vis on, and in the Old World as P. lutreola, although substantially the same animal. The mink is a true weasel, with 34 teeth and not a marten with 38; but it is of larger size, being 24 to 27 inches long, one-fourth of which belongs to the tail, and has a stouter form and bushier tail, more like the martens. Males are much larger than females. The mink differs greatly from both weasels and martens, and in those points in which it is modified toward this mode of life, namely, the half-webbing of the toes, short ears and close-set, bristly, glistening pelage, it makes an approach toward the others. In color the mink ranges from dull yellowish-brown to a rich blackish chocolate-brown. The ordinary color is a dark reddish-brown, grow¬ ing blackish on the tail and marked by a white patch on the chin of variable extent. The pelage consists of a dense, soft, matted under¬ fur, mixed with long, stiff, lustrous hairs on all parts of the body and tail. The gloss is great¬ est on the upper parts ; on the tail the bristly hairs predominate. Northern specimens have the finest and most glistening pelage ; but the rough treatment given its coat by the animal in scrambling through holes and crevices in rocks, rotten logs and broken ice so rapidly damages its fur that only the pelts taken in early winter show the fur to perfection and yield full value to the trapper. Both sexes, are extremely odorous, due to the secretion, equally in both sexes, of a fetid musky scent in small perineal sacs opening near the orifice of the

rectum, on each side; the smell is powerful, penetrating and lasting, and is under volun¬ tary control of the animal, but it cannot be dis¬ charged like that of the skunk, and is by no means so overpowering. The purpose of this secretion is undoubtedly the attraction of the sexes, and it is used to advantage by trappers as a scent-bait for their traps.

Minks occur in all parts of North America, and are so prolific, so well supplied with food and so secretive that they survive numerously

even in the more thickly settled parts of the country. They abound near the coast and in the neighborhood of the larger lakes, rivers and marshes, but are to be found along almost every stream, even in the dryest portions of the interior. The minks cling to the watercourses, where they find plentiful food in the form of meadow-mice, frogs, mussels, fishes (espe¬ cially eels) and insects. In New England, at least, they feed largely on earthworms, getting them in plenty even in midwinter; and when very hungry, or a good opportunity offers, do not hesitate to attack larger animals, as musk¬ rats — which they are able to pursue through underwater ways into their houses, — rabbits partridges, ducks and poultry. They search the stream-banks for prey, diving and swimming long distances with ease, go about under loose ice and snow, climb rough-barked trees and penetrate crevices and hollows almost with the ease of a serpent, so that nothing is safe from their inquisitive ferocity, and in winter they wander widely.

Their own homes are made in burrows, usually but not always opening in the bank of a stream, and are more often accidental than carefully contrived. In some such retreat the female brings forth in early spring her litter of four or five young, which she guards with great care and courage from all enemies, in¬ cluding the males of her own species. The kittens, and the older ones indeed, exhibit the same playfulness in and out of the water which characterizes otters.

No fur-bearing animal is so unsuspicious of traps and so easily caught as the minks ; and they are the victims of boys and amateurs as well as of professional trappers in all parts of the country. The value of the pelts varies with their color, condition, size and the varying de¬ mands of changing fashion, but good ones are always of sufficient worth to make them reward the trouble of taking. When captured young they are easily habituated to confinement in suitable pens, and are tamable to a certain de¬ gree. They will breed in captivity, and sev¬ eral temporarily successful attempts have been made to rear

them in large numbers for the sake of their pelts. They are fed upon fish, coarse meat, *etc.* The sexes are kept separate except during the month of March, and repro¬ duction begins when the female is one year old. Tame minks make excellent ratters, doing the duty of ferrets.

Consult Audubon and Bachman, (North American Quadrupeds) (Washington 1851) ; Coues, (Fur-bearing Animals) (1877) ; Cram, c Little Beasts of Field and Wood* (New York 1899) ; Stone and Cram, (American Animals* (ib. 1902) ; Hollister, (A Synopsis of American Minks* (Washington 1913) ; Seton, (Life His¬ tories of Northern Animals) (New York

1909).

MINK FROG (Rana septentrionalis) , a small frog inhabiting the northwestern United States. It measures two and one-quarter inches from nose to vent and is dark olive-green above with sooty brown bars and spots and is pure white beneath. In general effect the hue resembles that of the mink, whence its name. Its habits are quiet and solitary. Con¬ sult article by H. Gamier in The American Naturalist (Vol. XVII, Philadelphia 1883).

MINNA VON BARNHELM — MINNEAPOLIS

MINNA VON BARNHELM. Lessing's < Minna von Barnhelm or The Soldier's For¬ tuneˆ a comedy of five acts in prose begun 1763, published' 1767 — is most important for the rise of modern German literature since it was the first dramatic work of timely interest growing out of great national events (consult Goethe, (Dichtung und WahrheiD (Book 7). It takes place at a hotel in Berlin about six months after the conclusion of the Seven Years' War (1756-63), and, according to Goethe, pur¬ poses to relieve in a simile, as it were, the hostile tension between the defeated Saxons and the victorious Prussians. The Prussian Major von Tellheim desires to be guided above all by his rigid sense of honor, which forbids him to owe his entire good fortune to a woman or to make a woman share in a life which, as far as appearances go, may be ex¬ posed to contempt. Minna von Barnhelm, his fiancee, a beautiful and rich young lady of Saxony, fixes her eyes steadily upon Tellheim s sterling character, disregards the opinion of the world and by a well-meant artifice

makes him realize that love's highest gratification is to stand by the beloved person in trouble. Minna conquers. True love proves superior to an extreme feeling of honor, although the value of the latter is by no means denied. In (Minna von Barnhelm* a deep moral problem is proposed and carried almost to a tragic turn. But the charm of Minna and the naturalness of Franziska and the sergeant captivate the specta¬ tor; the rascals are easily seen through, the atmosphere is conciliatory,, the jokes to the point. For all this the genuine spirit of com¬ edy is ever present, and (Minna von Barnhelm* can maintain its place among the best specimens of the higher type of comedy. Consult edition of Lessing's w'orks in (Deutsche National-Literatur) (1882-98, Vol. II) ; English transla¬ tion in Harvard Classics, Vol. XXVI ; Kettner, G., (Ueber Lessings Minna* (Berlin 1896; Kettner, G., (Lessings Dramen in Lichte unserer Zeit* (Berlin 1904) ; von Stockmayr, (Die deutschen Soldatenstiicke des 18. Jahrhunderts seit Lessings Minna von BarnhelnP (Weimar

1898).

Ewald Eiserhardt.

MINNEAPOLIS, the county-seat of Hen¬ nepin County and the metropolis of Minnesota, situated at the Falls of Saint Anthony, on the Mississippi River. On the east the city is con¬ tiguous to Saint Paul for half its length, the two being known as the Twin Cities. Min¬ neapolis lies on both banks of the river which crosses it diagonally from northwest to south¬ east. Passing just above the falls Hennepin avenue divides the portion of the city on the west bank into North and South Minneapolis, and the portion on the east bank into Northeast and Southeast Minneapolis. Nicollet avenue, branching off from Hennepin a block west of the river, runs southwest for a mile and then south to the city limits. Both of these two avenues are broad and well developed, and Nicollet is clear of street-car tracks. Crossing these avenues are numbered streets and Wash¬ ington avenue, which make the business dis¬ trict. The river is crossed by seven railroads and nine highway bridges, the finest of which is at Third avenue south, a beautiful structure of concrete costing $3,000,000. From the Falls

of Saint Anthony south to the city limits the river runs between banks over 100 feet high covered with a great variety of trees and shrubs that present a very picturesque appearance. The total area of the city

is 53 square miles.

Manufacturing and Commerce.— Minne¬ apolis was founded by men who sought to util¬ ize the power of Saint Anthony Falls for mill¬ ing. The lumber industry, at first of prime importance, gave its place to flour milling upon the introduction of patent devices that made it possible to manufacture flour quickly and cheaply; and this industry has increased its importance until it produces nearly $200,000,000 annually, making Minneapolis the chief flour milling city in the world. The annual output is over 17,000,000 barrels. By its situation near the great American grain fields the city has be¬ come the greatest primary wheat market in the world, its elevators having a capacity of 52,-500,000 bushels. _ In 1917, 181,898,480 bushels of grain were received by the mills and elevators of the city. The second industry of import¬ ance is the manufacture of machinery, espe¬ cially of gas tractors and other farm imple¬ ments. This industry with allied iron and foundry work amounts to $25,000,000 annually. The city is the shop headquarters of three rail¬ roads, the Chicago, Milwaukee and Saint Paul, the Minneapolis and Saint Louis and the Soo Line. The third industry is that of lumber, with sash and door manufacturing, cooperage and other woodworking crafts. Although the city does not now rank high as a lumber mill¬ ing centre, it is still first in sash making; and on account of its early pre-eminence it re¬ mains the chief lumber market in the United States, being the meeting ground of Eastern buyers and representatives of the great coast companies. The fact that Minnesota still leads in the manufacture of white pine lumber and contains numerous wood-pulp plants besides cutting 500,000,000 feet of various kinds of lumber annually also contributes largely to the importance of Minneapolis as a lumber centre. The total value of the annual woodworking product is $12,000,000. The fourth industry is the making of linseed-oil and meal. This has grown rapidly during the last decade until it produces 812,000,000 annually. The proximity of Minneapolis to the flax fields of Minnesota and the Dakotas, makes it the natural centre of this trade. Besides these activities there is a diversification of manufacturing that has stead¬ ily increased during the past decade — food products of many kinds, including bakery goods, ice cream and confectionery, clothing, especially knit goods and laborers' wear, blank-books and other publishers' products and a wide variety of articles used in the construction of buildings, bridges, elevators, automobiles and electrical machinery. In fact the outstanding feature in the history of manufacturing in Minneapolis is the growing diversity of industry. In 1890 there were in the city 384 firms producing an annual value of $78,617,170, of which $39,000,000 was reported by the flour and lumber indus¬ tries. In

1917 there were 1,512 firms producing $275,000,000, of which $200,000,000 was the value of flour and lumber. During the past 10 years the value of Minneapolis manufacturing has increased 55 per cent, and the city has be¬ come the 14th in rank of manufacturing in the United States. With Saint Paul, Minneapolis

OJUU

Avenue

I Avenue

ˆAvenue

i Ayen/ue

Av£niie

M il wau kNe’e Stationˆ

Holden

k’WenˆSf

NN’Masonic’Aˆ’

Siju)ert/T)re Lyri : [lˆMeatre

Orpheum

ˆT”ˆeatre/

TTKestnuF

venue

.awxhdrne—

ELLIOTT

PARK

LAKE

Coluinblu

talce CJueuciˆ

[CTHltd

Lake/

Heights

]itOe Canada

N/orth Town

v Jc4i

Crystal <5*

* La fee

ˆunadai

N. E. Minnea

/ EastE ‘ Minneapolis Jc. ESMintLApolis \ “V fto 1 $

ags

Hamliifc’

ˆ Lai-e\j §

Efialen\J?

Clayinont\&3-ˆ

-Jr. j Daytons;

icbk’

jpgfljgyi

GT-

‘Mcrrinm L Park (

MINNEAPOLIS’

(MAIN PORTION)

McNally’s New 11 x 14 Map of Minneapolis (Main. Portion* Copyright by Rand McNally k Co.

Iwt\

itjTaul

J fjPTwW Men,orti&W?

l illnft’ js0?* A yy

“

il1* Vicinity of

” ST. PAUL and MINNEAPOLIS

woo’d*

M nielli

[cnaoti

:

Ave. V

1

[_

\

. : 1

Ave.

MINNEAPOLIS

197

shares in a jobbing and wholesale trade that covers a very large territory, including Wis¬ consin, Iowa, North and South Dakota, Mon¬ tana, Wyoming and Canada. Considerable business from the Pacific coast comes to the Twin Cities. In 1917 for Minneapolis alone this wholesale and jobbing trade amounted to over $300,000,000. Besides general merchandise this business includes drugs, hardware, machinery, building material, lumber, paper and automo¬ biles.

Power and Transportation. — For this man¬ ufacturing there is available 40,000 horse power from Saint Anthony Falls. Saint Croix Falls, 70 miles distant, supply 30,000, and Coon Creek, on the Mississippi, 20 miles north of the city, 15,000. A new government dam in the Mis¬ sissippi near Minnehaha, constructed to make the river navigable to Minneapolis, it is esti¬ mated will produce another 40,000; and other projects yet undeveloped promise considerable more electric power. The city is well con¬ nected with the great coal docks at Duluth, so that its industries can easily use steam as well as electric power. Altogether the city uses in all of its industries over 90,000 horse power. By virtue of its position the city early became a railroad centre. The Chicago, Milwaukee and Saint Paul ; Chicago, Saint Paul, Minneapolis and Omaha: Chicago, Burlington and Quincy;

Chicago and Rock Island; Chicago and Great Western; Minneapolis and Saint Louis; Min¬ neapolis, Saint Paul and Sault Sainte Marie operate some of the finest trains in the world between Minneapolis and Chicago, and provide for the shippers of Wisconsin, Iowa and Min¬ nesota. With the grain fields of the Dakotas and with the Pacific Coast States the Great Northern, Northern Pacific, Soo Line and Chi¬ cago, Milwaukee and Saint Paul make excel¬ lent communication. Duluth, the tonnage of which is not exceeded by that of any port in the world, is closely bound to Minneapolis by four of these lines. A system of trolley lines is being developed that promises to greatly in¬ crease the trade of the city with its immediate territory. The completion of the government dam in the Mississippi, that makes Minneapolis the head of navigation on the river, has al¬ ready persuaded the city to construct its own wharves suitable for the landing of freight from barges.

Finance. — The city has four national, 33 State, four savings banks and three trust com¬ panies. In these the total capital invested is $16,-560,000 ; the total deposits, $194,463,611. In 1917 the bank clearings amounted to $1,662,078,303.37. The city is the centre for the Ninth Federal Reserve District. It is connected on the one hand with the rural banks of the great agricul¬ tural territory of the Dakotas, Montana, Min¬ nesota and parts of Iowa and Wisconsin that are tributary to Minneapolis, and on the other with the powerful financial institutions of the East. Thus it not only serves to finance the * crop moving, but also to guide capital to the best investment. The Minneapolis banks have done a great deal to forward education among the farmers of the Northwest, especially en¬ couraging expert training in agriculture.

Revenue. — The total assessed valuation of Minneapolis is $216,000,000, the total taxable wealth $864,000,000. This produces a revenue of $8,640,000, of which $2,226,188 is spent for

current expenses ; $2,898,500 for education ; $1,002,188 for interest; $587,799 for police protection ; $542,540 for parks ; $500,000 for fire protection and $329,700 for library equip¬ ment and support. The bonded indebtedness of Minneapolis is $29,000,000; and for the retirement of bonds an annual allowance, or sinking fund, of $635,000 is provided. Miscel¬ laneous expenses make up the total budget. It should be understood that the Tax Law of Minnesota provides that assessments be made on a 40 per cent valuation of all property. On this basis the total taxable wealth of the city is $864,000,000. In

addition to the rate for city purposes a State and county tax amounting to nine mills is levied, so that altogether $10,584,- 000 is raised within the city.

Buildings, Parks, *etc.* — In the late eigh¬ ties many handsome buildings were erected, including the Public Library, Guaranty Loan (now Metropolitan Life) Building, West Hotel and several churches, notably the First Bap¬ tist. The city hall and courthouse, begun in 1887 and finished in 1909 at a cost of $3,000,000, post office, Security Bank, McKnight, First National-Soo Line, Plymouth and Metropolitan Bank buildings and the Andrews, Dyckman, Leamington and Radisson hotels are good types of modern architecture. The Art Institute, Im¬ maculate Conception Procathedral, Plymouth (Congregational), Hennepin Avenue, the cost¬ liest Methodist church in the world, and Saint Mark's Procathedral, said to be the best ex¬ ample of pure Gothic in the United States, are recent additions to the beauty of the city. The great variety of landscape has made pos¬ sible the building of many houses of fine archi¬ tectural design. The city has taken advantage of its variety of scenic features in its planning of an extensive park system. Altogether there are 3,820 acres in the system, of which 1,211 are water. The largest park is Glenwood, con¬ taining 586 acres. Other popular resorts are Lake Harriet, Minnehaha Falls and Riverside, the last named of which is being enlarged to include land bordering on the lake formed by the widening of the Mississippi above the new government dam. One unique feature of the system is the connection by canals of Brownie, Lake of the Isles, Cedar and Calhoun lakes making possible a canoe or launch trip of nine miles. Another is the Grand Rounds, a system of boulevards bordering the lakes on the western boundary, crossing the Mississippi near the northern city limits, paralleling Shin¬ gle Creek, and descending to enter Glenwood Park on the western edge of the city, com¬ pleting thus a circuit in which every possible variety of landscape, save ocean view, is pre¬ sented. From the centre of the city the Grand Rounds is entered through the Parade on the west, and through the grounds of the Univer¬ sity of Minnesota on the east, of the river. In all there are 55 miles of drives. In the past decade recreational facilities have been greatly increased to accommodate all classes Df people, until now the city supports golf, tennis and other pastimes in 39 playgrounds, canoeing, bathing and skating. Calhoun Beach accom¬ modated 166,830 persons during the season of 1917 and other lakes 130,000. The board also provides for fishermen and maintains a regular launch service. It conducts 35 ice-skating and hockey rinks. Minneapolis owns its own

water system, including a filtration plant valued at $1,000,000. It has 580 miles of water main, 409 miles of sewers, 135 miles of straightway and 255 miles of 27 feet paving. Of its 881 miles of streets only 94 are still ungraded. The streets lighted by electricity total 469 miles, those lighted by gas, 96. All lighting, except fot the two wards adjacent to the mu¬ nicipal garbage consumer, is done by private ownership ; and the street car service is simi¬ larly conducted. On account of the absence of steep grades and natural obstructions to traffic it has been relatively easy to provide the city with through lines that materially re¬ duce the cost of operation and keep the serv¬ ice uniform. A five-cent fare wLh transfer privileges prevails. Four lines connect the cen¬ tre of the city with that of Saint Paul.

Education. — Minneapolis has 50,000 pupils in her public schools. There are 75 buildings worth $8,200,000. Six of these are high schools and three junior high schools. The high school enrolment is 7,000. Parallel to the work for girls in the Girls' Vocational High School is that for boys in the Dunwoody Institute, a privately endowed institution, co-operating with the public school system. There are 1,700 teachers in the public schools subject to auto¬ matic salary increase and retirement on pen¬ sion. Stanley Hall and Northrup Collegiate School, for girls, and Blake School for boys prepare for college. Saint Margaret's Acad¬ emy, De La Salle Institute (Catholic), Minne¬ haha Academy and Minnesota College (Lu¬ theran) are prominent in the educational life of the Northwest. The city is the seat of the University of Minnesota and of Augsburg Seminary. Besides these institutions the Min¬ neapolis School of Music and Dramatic Art, the Northwestern Conservatory of Music, the McPhail School of Music, the Minneapolis School of Fine Arts and the Handicraft Guild (affiliated with the University of Minnesota), together with several business colleges and other technical schools, provide instruction for several thousands of students. The Public Library, its 17 branches, 20 stations and 437 distributing points, circulated 1,566,000 volumes in 1917 in addition to over 125,000 pictures, lantern slides, pieces of music and other mate¬ rial. It owns 334,763 books. Minneapolis has made great progress in the arts, especially during the past 15 years. The Minneapolis Symphony Orchestra, the Philharmonic and Apollo

clubs and the Thursday Musical with the various conservatories, and 400 music teachers whom the advantages of the city as a musical centre attract to Minneapolis are chiefly responsible for giving the city its leader¬ ship. The choral work in the public schools is of a high quality. The Institute of Art, one unit of which was completed in 1913 at a cost of $500,000, with the art schools and the art departments of the public schools exerts a great influence in the building and decorating of the Northwest. The Walker Art Gallery is well known for its collection of originals.

Government. — Minneapolis is governed by a mayor, who appoints a chief of police, and by a council of 26 aldermen, two from each ward, elected alternately for a term of four years at the time of the State elections. The council chooses an engineer, attorney, fire chief and health officer. The schools are under the

charge of a board of seven, each elected from the city at large, for a term of four years. The board elects a superintendent and business superintendent, appoints teachers and other em¬ ployees, not under civil service provisions, and administers affairs in general. The park and library boards are similarly independent of council control, but the mayor is ex officio a member of both. The board of corrections and charities controls the poor department, munici¬ pal lodging-house, city workhouse and four hospitals. The civil service commission ex¬ amines candidates for clerkships and other positions. The board of tax levy, consisting of the mayor, president of the council, chairman of the council ways and means committee, city comptroller, the presidents of the school, library and park boards, the chairman of the board of commissioners of Hennepin County and the county auditor, at a meeting held on the second Monday in September fixes the rate to be levied in the city and county. The city treasurer and comptroller are elected by the people as are also municipal judges. All candidates for office run on a non-partisan ticket, at a primary election held in June, the two candidates for each office receiving the highest number of votes being declared nomi¬ nees to contest at the general election on the first Tuesday after the first Monday in Novem¬ ber of the even-numbered years. The city has a patrol limit system that confines saloons to a restricted district in ‘ the centre of the city and within certain other boundaries.

History. — Minneapolis is built about Saint Anthony Falls which Father Hennepin, the first white man to view them, so far as is known, named in 1680. No settlement was made until the establishment of

Fort Snelling, first called Fort Saint Anthony. Then in 1821 the government built a mill to saw lumber on the west bank of the river just below the falls. Later this mill also ground flour. Settlers, however, were rigorously excluded from the Fort Snelling reservation until after the Indian lands east of the Mississippi had been relin¬ quished. This was in 1837. The following year squatters from the fort built log cabins on the east bank of the river in attempting to claim the water-power rights as soon as the government should permit settlement. It was not until 1848 that Franklin Steele and William Cheever laid out the village of Saint Anthony. The former also built a sawmill to cut the pine that Daniel Stanchfield and other Maine woodsmen, whom news of the inex¬ haustible supply had attracted to the settlement, sent down the river; and the village grew rap¬ idly to importance, becoming a city in 1855. The pioneers were interested in education and general upliftment as well as in material things; and it was one of their first moves to found a university, which after a period of hardships became the University of Minnesota, and to establish lecture courses and lyceums. In 1851 Col. John Stevens, acting for Steele, crossed to the west bank and laid claim to a quarter section of land, upon which the business por¬ tion of Minneapolis was later built. He gave lots to those who would build; and in con¬ sequence many settlers were attracted. A ferry, first, and then a suspension bridge, served as the connecting link between the two villages. In 1855 the plot of the western set-COURT HOUSE AND CITY HALL, MINNEAPOLIS

*

tlement was validated by the government ; and from then on it began to lead, taking the name, Minneapolis, a compound of the Indian Minne¬ haha (Curling Water), and the Greek, polis (city), upon a suggestion of Charles Hoag, a schoolmaster and public-spirited citizen. In 1867 it became a city. In 1872 the two cities became one under the name Minneapolis.

With the advent of the railroad and the period of prosperity that followed the Civil War, the city grew rapidly. It was stimulated by the

installation of the Swiss Roller System in place of the buhr stone with which the first flour-mills were equipped and by the introduc¬ tion of a bolter process that purified middlings, thus making it possible to save as flour that which had formerly been wasted. These two inventions, the construction of an apron to prevent the wearing away of the limestone ledge of the falls, and the completion of sluice¬ ways, made it possible to produce flour swiftly and cheaply so that Minneapolis became known as the Flour City. At the same time the cut¬ ting of lumber kept increasing until 1890 when 500,000,000 feet were produced. At the Repub¬ lican National Convention in 1892 Minneapolis was justly advertised as the chief lumber and flour city in the world. After a brief period of comparative inactivity caused by the panic of 1893 and the depression that followed, the city began to attract new ventures of various kinds and to reflect their influence on the Northwest as. suggested in the discussion of her trade. The growth in population has been as follows: (1860) 5,000; (1870) 18,079; (1880)

46,887; (1890) 164,739; (1900) 202,718; (1910) 301,408; (1920) 380,582.

Bibliography. — Hudson, H. B., (A Half-Century of Minneapolis) (Minneapolis 1905) ; id., (Dictionary of Minneapolis) (ib 1917) ; Parsons, E. D., <The Story of Minneapolis) (ib. 1913); Reports of the city departments; pamphlets of Minneapolis Civic and Commerce Associations. E. Dudley Parsons,

Instructor in English, West High School, Min¬ neapolis.

MINNEAPOLIS, Kan., city, county-seat of Ottawa County, on the Solomon River and on the Atchison, Topeka and Santa Fe and the Union Pacific railroads, about 130 miles west of Topeka. It is in an agricultural and stock-raising region. Its chief industrial establish¬ ments are flour-mills, grain elevators, foundry, carriage shops and creamery. Stone quarries in the vicinity contribute to the industries of the city. Pop. 2,000.

MINNEAPOLIS SYMPHONY OR¬ CHESTRA, founded in 1903, consists of 80 players, all under regular salary. The orchestra is maintained by a guarantee fund. The con¬ ductor, Emil Oberhoffer, has had charge of the orchestra since its organization. The standard of programs and performance are high and the orchestra ranks with the best musical organ¬ izations of the United States.

MINNEDOSA, Canada, town 135 miles northwest of Winnipeg, in the Marquette Elec¬ toral Division, Manitoba, and on the Little Saskatchewan River and on the Canadian Paci¬ fic Railway. Minnedosa, being a railway cen¬ tre, is growing rapidly. It is in a fine agricul¬ tural country and possesses a sash-factory and a gristmill. Pop. 1,378.

MINNEHAHA, min-e-ha'ha, Falls of (Sioux, Mini-haha, <(curling water®), a cas¬ cade in the Minnehaha River, now in the Min¬ nehaha Park, which belongs to Minneapolis, Minn. The cascade has a fall of about 60 feet and is in a picturesque glen which extends to the Mississippi River. Just below the falls the river is spanned by a rustic bridge. The name has become world-known through Long¬ fellow's (Hiawatha. >

MINNESINGER, min e-sing-er, or MIN-NESANGER (from old German minne, love), the name given to the German lyric poets of the 12th and 13th centuries on account of love being the chief subject of their poems. The cradle of German lyric poetry was Upper Austria. The earliest German poetry was chiefly narrative, and this not only when past events formed the poet's theme, but also when he celebrated pres¬ ent occurrences. But this contact with the pres¬ ent naturally gave occasion to the expression of the poet's feelings and gradually led to the lyric pure and simple. Such was the origin of the oldest extant poems of Dietmar von Aist (1143-70) and others. But the development of German lyric poetry was greatly hastened by the influence of the French poetry of the same class, which at that time flourished in Cham¬ pagne and Flanders. The immediate effects of this French influence were greater strictness and variety in the versification, a greater pre¬ ponderance of the subject of love and a more purely lyrical treatment. The minnesingc s were generally of noble birth, and like the trou¬ badours who preceded them wandered from place to place. The Westphalian Heinrich von Veldeken, afterward regarded by the minne¬ singers as the true father of their art; Fried¬ rich von Hausen, a native of the Palatinate; the Thuringian Hugo von Salza ; the Saxon Heinrich von Morungen ; the semi-mythical Heinrich von Ofterdingen ; and the two Swa¬ bians Heinrich von Rucke and Ulrich von Gutenburg, were the chief minnesingers of the latter half of the 12th century. The 13th cen¬ tury witnessed the highest cultivation of the minnesong, and also the beginning of its decay. Its greatest masters are Walther von der Vogelweide, Wolfram von Eschenbach, Gottfried von Strassburg and Hartmann von Aue. After the art had ceased to be practised by the minne¬ singers, it was taken up by the

artisans of the towns under the name of meistersingers (q.v.).

MINNESONG (German Minnesong, Min-negesang, from minne, < <love,)) and sang, ˆsong®), a mediaeval type of German love-lyric, written chiefly by knightly poets in the 12th, 13th and 14th centuries, in the Middle High German dialect. The earliest of the 300 or more names of minnesingers that have been preserved are Kiirnberger, Memlo von Sevel-ingen, Dietmar von Aist, etc., but only about 160 of them have left poems that are still ac¬ cessible. Some groups of minnesingers were very distinctly under the influence of French (Provencal) and Italian models, such as Fried¬ rich von Hausen, Rudolf von Fenis, Ulrich von Gutenberg, Heinrich von Rugge und von Morungen, *etc.* The flower of the type blos¬ somed in Walther von der Vogelweide and Reinmar von Hagenau about the year 1200, co¬ incident with the great mediaeval German epic, the 'Nibelungenlied.* Most of these songs

were intended for musical performance and are divided into classes, distinguished by the names lied, leich and spruch. Rudiger Manesse (d. Zurich 1325) and his son are said to have collected them in the Great Heidelberg Manuscript, which was taken to Paris in the course of the Thirty Years' War, and later re¬ turned to Heidelberg. It contains 137 minia¬ tures and over 7,000 strophes ; published by von der Hagen (Leipzig 1838), Pfaff (Heidelberg 1899), Mathieu (Paris 1850). But many poems not in the Manesse manuscript are found in other manuscripts. Later minnesingers, such as Ulrich von Lichtenstein, began to regard the occupation of producing such poems as a sort of sport or handicraft and the art passed out of the hands of the lower nobility into those of the burgher <(masters® (see Meistersingers) and roaming minstrels. Consult Lachmann, K., and Haupt, M,, (Minnesangs Friihling) (Leip¬ zig 1884) ; Lyon, O., (Minnesang und Meister-gesang) (Leipzig 1883); Grimme, F., (Geschichte der Minnesinger) (Paderborn 1897).

Jacob Wittmer Hartmann.

MINNESOTA (Dakota, ((sky-tinted water®) is bounded on the east by the Mississippi River, the Saint Croix River and a line running north from near the western bend of this stream for 40 miles to a point near the extreme western end of Lake Superior, and by the curving north¬ west shore of the lake. These boundaries sep¬ arate Minnesota from the State of Wisconsin. On the north the State is separated from the province of Ontario in Canada by the Pigeon and Rainy rivers, by a line passing northward and westward through Lake of the Woods, then southward to the 49th parallel which, for 100 miles until it is intercepted by the Red River of the North, forms the boundary between Min¬ nesota and the province of Manitoba. The Red River* from its source in Lake Traverse and a line running southward from the Big Stone Lake, separated from Lake Traverse by a mile of land, to the northern boundary of Iowa, di¬ vides Minnesota from North and South Da¬ kota on the west. The line between Minne¬ sota and Iowa, on the south, is 275 miles long. Within these boundaries the State has an area of 87,1% square miles, of which 6,338 is of water. It is 408 miles long from north to south, and from 357 miles, the distance from the Red River to Pigeon Point, on Lake Su¬ perior, to 180 miles, the distance from Big Stone Lake to Saint Croix Falls, or an average of something over 200 miles wide.

Topography. — The most important fact about the surface of Minnesota is that its north-central part forms the divide from which water flows northward to Hudson's Bay, east¬ ward by way of the Saint Lawrence River to the Atlantic and southward through the Mis¬ sissippi to the Gulf of Mexico. This divide is the. old Laurentian highland which slopes steeply to Lake Superior, gently to the south and west. Two-thirds of the State is a rolling plain, well drained and easily cultivated. The average elevation is 1,275 feet, this figure in¬ volving calculations of such low altitudes as 616 feet in the southeastern part of the State pnd the heights of the Mesabe Range and the Sawteeth Mountains in the northern part, the greatest of which attains 2,200 feet. The val¬ ley of the Red River is 800 feet above sea-level and the Twin Cities have the same altitude.

Rivers and Lakes. — The early explorers found in Minnesota wonderful canoe high¬ ways. From Lake Superior they could ascend the Saint Louis River, then cross over to the Mississippi, by which, with short portages, they could easily reach the Red ; or they could de¬ scend the Mississippi, carry around the Falls of Saint Anthony, enter the Minnesota, ascend to Big Stone Lake, carry to Lake Traverse and enter the Red from that direction. Again they could enter the

Saint Croix at its confluence with the Mississippi and ascend to the Wis¬ consin divide, on the northern slope of which they found numerous streams leading to Lake Superior. With the exception of a portage the way from Lake Superior to the Red River was open along the northern boundary and it was easy to get from the Minnesota River into the Des Moines River, and thus travel through what is now the State of Iowa. Each of the larger rivers is fed by numerous goodly tributaries — -the Mississippi by the Crow Wing, Rum, Minnesota, Saint Croix, Cannon, Zumbro and Root; the Minnesota by the Blue Earth, Cottonwood, Redwood, Chippewa, Pomme de terre and Lac Qui Parle; the Red by the Red Lake and Wild Rice; the Rainy by the Vermillion, Big Fork and Little Fork; the Saint Croix by the Little and the Snake* All of these are wholly within the State. The Mississippi and Minnesota, with their branches, drain 48,700 square miles of territory; the Red, 15,100; and the Rainy, 10,300. The Missouri drains about 1,700 square miles.

There are innumerable lakes in the State, with a total area of 3,000 square miles. They range in size from a few acres to the great expanses of Red Lake, 400 square miles ; Leech Lake, 200, and Mille Lacs, 200, and in¬ clude such resorts as Minnetonka and White Bear, near the Twin Cities, Vermillion, 90 miles north of Duluth, the Otter Tail and the Chisago lakes. Within the limits of Saint Paul and Minneapolis there are 13 lakes of notable size and excellent beaches. No portion of the State, except the extreme southeastern and the lower Red River Valley, lacks the advantages for recreation afforded by a good lake.

Climate. — Stories of Minnesota climate are based on the extraordinary experiences of ex¬ plorers and settlers rather than on the weather records; but even these experiences show a wide divergence. For instance Le Seuer's sec¬ retary reports that in 1700 the rivers were frozen in September, and Carver declares that the winter of 1766 was so warm that he could live in the open without discomfort. Plowing has been accomplished in February and snow has blocked trains in October. It is of record that the mean annual temperature of the south¬ eastern part of the State is 46° F., at the Twin Cities 44° and 36° in northern Minnesota. The coldest month is January, during which the mean temperature is 14° in the southeast, 12Q at Saint Paul and 0° in the north. July is the warmest month, the temperature varying from 76° in the southern part, 74° at Saint Paul and Minneapolis to 68° in the north. It is seldom that extreme temperatures prevail for more than a day or two at a time and the State has been remarkably free from destructive storms. In fact since its settlement in the fifties only four dangerous tornadoes and three

blockading snows have occurred. The rainfall is 22 inches

MINNESOTA.

Estimated population, 2,279,603.

COUNTIES

Pop.

10.371 Aitkin . 16

1 2,493 Anoka . 19

18,840 Becker . D 6

1 9.337 Beltrami . F 3

1 1,61 5 Benton . H 8

9,367 Bigstone . C 9

29.337 Blue Earth . G 11

20,134 Brown . Fll

17,559 Carlton . J 6

17,455 Carver . II 10

11,620 Cass . G 6

13,458 Chippewa … D 9

13,537 Chisago . J 9

19,640 Clay . C 6

6,870 Clearwater . E 4

1,336 Cook . K 2

12,651 Cottonwood . E 11

16,861 Crow Wing . G6

25,171 Dakota . 110

12,094 Dodge . J 12

17,669 Douglas . E8

19,949 Faribault . H 12

25.680 Fillmore . K 12

22.282 Freeborn . I 12

31,637 Goodhue . J 11

9,114 Grant . D 8

333,480 Hennepin ……. I 9

14,297 Houston . L 12

9,831 Hubbard . F5

12,615 Isanti . 18

17,208 Itasca . 15

14,491 Jackson . E 12

6,461 Kanabec . 18

18.969 Kandiyohi . F 9

9.669 Kittson . B 2

r 6,431 Koochiching . H 3

15,435 Lac qui Parle … .C 10

8,011 Lake . M 4

18,609 Lesueur . H 11

9,874 Lincoln . Cll

15,722 Lyon . Dll

18.691 McCleod . G 10

3,249 Mahnomen . D 5

Incorporated Cities,

1,432 Ada . B 5

576 Adams . J 12

1,112 Adrian . D 12

1,638 Aitkin . H 6

657 Albany . F 8

6,192 Albert Lea . I 12

544 Alden . 112

3,001 Alexandria . E 8

223 Alpha . F 12

200 Altura . • . L 11

128 Alvarado . A3

435 Amboy . G 12

624 Annandale . G 9

3,972 Anoka . I 9

1 ,221 Appleton . D 9

97 Arco . '…..Cll

744 Argyle . B 3

733 Arlington . G 10

334 Ashby . D 7

600 Atw'ater . F 9

300 Audubon . D 6

1,919 Aurora . Iv 4

6,960 Austin . J 12

£212 Avoca . Dll

277 Avon … G 8

184 Backus . G6

395 Badger . D 2

801 Bagley .: . . E 8

364 Balaton . D ll

149 Banning . 4 7

1.353 Barnesville . C 6

{262 Barnum . J 7

278 Barrett . D 8

105 Barry . C 8

567 Battle Lake . D 7

897 Baudette . F2

481 Beardsley . B 8

1 95 Beaver Creek …. C 1 2

210 Becker . H 9

448 Belgrade . • E 9

1,204 Belleplaine . HU 6

359 Bellingham . C 9

149 Beltrami . -B 4

290 Bel view . E 10

5,099 Bemidji . F4

179 Bena . ˆ5

1,677 Benson … L 9

42 Benton, Carver. .H 10

296 Bertha . 1’ 7

221 Bethel .

195 Bigelow . B >12

325 Big Falls . H “

167 Bigfork . H 4

229 Big Lake . H 9

285 Bingham Lake. ..H2

931 Bird Island . F 10

1,690 Blwabik . K 4

942 Blackduck …… .64

854 Blooming Prairie .1 12

2,319 Blue Earth . H 12

148 Blullton . E 7

1,377 Bovey . 1 °

Pop.

16.338 Marshall . C 3

17,518 Martin . F 12

17,022 Meeker . F 9

10,705 Millelacs . H 7

24,053 Morrison . G8

22,640 Mower . J 12

11,755 Murray . D ll

14,125 Nicollet . Gil

15,210 Nobles . D 12

13,446 Norman . B5

22,497 Olmsted . K 11

46,036 Ottertail . D 7

9,376 Pennington . C 3

15,878 Pine . J 7

9,553 Pipestone . Cll

36,001 Polk . C 4

12,746 Pope . E 8

223,675 Ramsey . 19

6,564 Red Lake . C 4

18,425 Redwood …… . E ll

23,123 Renville . F 10

25,91 1 Rice . …Ill

10,222 Rock . C 12

11.338 Roseau . D 2

14,888 Scott … .1 10

8,136 Sherburne . H 9

15,540 Sibley . G 10

163,274 St. Louis . K 4

47,733 Stearns . F 8

16,146 Steele . Ill

8,293 Stevens . C 8

12,949 Swift . D 9

23,407 Todd . F 7

8,049 Traverse . C8

18,554 Wabasha . K ll

8,652 Wadena . F 6

13,466 Waseca . H 12

26,013 Washington . J 9

11,382 Watonwan . F 12

9,063 Wilkin . B 7

33,398 Winona . L 12

28,082 Wright . FI 9

15.406 Yellow Medicine D10

Towns, and Villages

164 Bowlus . G 8

431 Boyd . D 10

406 Braham . 18

9,154 Brainerd . G 7

276 Brandon . E 8

1,840 Breckenridge . C7

311 Brewster . D 12

352 Bricelyn . H 12

101 Bronson . B 2

160 Brookston . J 6

562 Brooten . E 8

633 Browerville . F7

264 Brownsdale . J 12

361 Brownsville . M 12

509 Brownton . G 10

1,058 Brown Valley … .B 8

229 Bruno … J 7

137 Buckman . H 8

1.227 Buffalo . H 9

371 Buffalo Lake … .F 10

1,005 Buhl . J 4

217 Burtrum . F 8

377 Butterfield . F 12

272 Byron . J 11

1,372 Caledonia . M 12

276 Callaway . D 6

245 Calumet, Itasca . .H 5

900 Cambridge . 18

303 Campbell . -V,*

1,528 Canby . C 10

1 385 Cannon Falls … . J 11

345 Canton . L 12

167 Carlos . E 8

597 Carlton . K 6

571 Carver . H 10

2,011 Cass Lake . F 5

252 Center City . J 9

330 Ceylon . F 12

225 Chandler . D 12

164 Chanhassen,

Carver . H 1 0

2,050 Chaska . H 10

1.228 Chatfield . K 12

276 Chisago City . 19

7.684 Chisholm . J 4

328 Chokio . C 8

587 Clara City . E 10

275 Claremont . 112

364 Clarissa … . E 7

603 Clarkfteld . D 10

263 Clear Lake … H 9

311 Clearwater . G 9

132 Clements . Ell

212 Cleveland . H 11

269 Climax . B 4

384 Clinton . B 8

187 Clitherall . E 7

153 Clontarf . D 9

7,031 Cloquet . K 6

87 Cobden . F 11

521 Cohasset . H5

718 Cokato . -GO

Pop.

594 Cold Spring . H 8

1,613 Coleraine . I 5

390 Cologne . H 10

590 Columbia Heights,

Anoka . 19

238 Comfrey . F 11

102 Correll . C 9

231 Costin, St. Louis . J 4

770 Cottonwood . D 10

208 Courtland . G 11

143 Cromwell . J 6

7,559 Crookston . B 4

329 Currie . D 11

272 Cyrus . D 8

175 Ddlton . D 7

217 Danube . F10

215 Danvers . D 9

72 Darfur . F 11

643 Dassel . G 9

1,318 Dawson . D 10

343 Dayton, Henne¬ pin . I 9

234 Deephaven,

Hennepin . 19

313 Deer Creek . E 7

900 Deer River . . H 5

586 Deer Wood . H 7

215 De Graff . E 9

1,031 Delano . H 10

284 Delavan . .H 12

159 Delhi . E 10

184 Dennison . J 11

244 Dent … . D 6

2,807 Detroit . 0 6

281 Dexter . J 12

957 Dodge Center … .J 12 132 Donaldson …… . B 2

276 Donnelly . C 8

93 Doran . C 7

233 Dover . K 12

174 Dresbach . M 12

94,495 Duluth . K 6

188 Dumont . C 8

357 Dundas . Ill

175 Dundee . E12

170 Dunneli . F 12

551 Eagle Bend . F7

231 Eagle Lake . H 11

2,533 East Grand Forks

B 3

262 Easton . H 12

430 Echo ‘ . E 10

740 Eden Valley . F 9

381 Edgerton . C 12

1,191 Edina Mills . K 9

151 Elba . K .11

776 Elbow Lake . D 7

324 Elgin . K .11

169 Elizabeth . D 7

859 Elk River . H 9

86 Elkton . J 12

261 Ellendale . I 12

536 Ellsworth . D 12

795 Elmore . G12

3,572 Ely . L f

345 Ely sian . H 11

223 Emmons… . H 12

324 Erskine . 0 4

112 Evan . F 11

389 Evansville . E 7

7,036 Eveleth . L 4

1,015 Excelsior . H 1 0

423 Eyota . Kll

815 Fairfax . F 10

2,958 Fairmont . F 12

426 Fall Lake, St. Louis

J 4

9,712 Faribault . I U

43 Farley, Beltrami . .F 3

1,024 Farmington . 110

143 Farris . F 5

141 Farwell . D 8

149 Felton . C 5

6,887 Fergus Falls . D 7

614 Fertile . C 4

186 Finlay son . J 6

328 Fisher . B 4

481 Floodwood . 16

710 Foley . H 8

66 Forada . E 8

540 Forest Lake . 19

204 Foreston . HS

1.075 Fosston . D 4

321 Fountain . K 12

39 Fowlds . E 4

206 Foxhome . C7

439 Franklin . E ll

1,645 Frazee . -D6

450 Freeport . F 8

138 Frost .

743 Fulda . O 12

59 Funkley . G 4

160 Garfield . E8

251 Gary … C 5

610 Gaylord . G 10

140 Geneva . 1 12

182 Georgetown . Bo

210 Ghent . D 10

533 Gibbon . G 10

1,700 Gilbert . K 5

1,788 Glencoe . G 10

368 Glenville . I 12

2,161 Glenwood . E 8

295 Glvndon . C 6

Pop.

692 Golden Valley,

Hennepin . 19

408 Goodhue . J 11

419 Good Thunder …G 12

987 Graceville . C 8

333 Granada . G 12

355 Grand Marais … . K 2 552 Grand Meadow. . J 12

2,230 Grand Rapids - 15

1,454 Granite Falls …,D10

189 Grasston . 18

274 Greenbush . C 2

256 Green Isle . G 10

378 Grey Eagle . F 8

351 Grove City . F 9

84 Hackensack . F 6

136 Hadley . DU

910 Hallock … . B 2

494 Halstad . . B 5

153 Hamburg . G 10

271 Hamilton. Scott. H 10 241 Hammond . Kll

190 Hampton . I 10

524 Hancock . D 9

275 Hanley Falls … .E 10

267 Hanover . H 9

310 Hanska . Fll

292 Hardwick . C 12

655 Harmony . K 2

673 Harris . J 8

227 Hartland . 112

3,983 Hastings . J 10

800 Hawley . C 6

586 Hayfield . J 12

121 Hazel Run . D10

866 Hector . F 10

111 Heidelburg . H 10

753 Henderson . G 10

406 Hendricks . C 10

355 Hendrum . B 5

603 Henning . .E 7

604 Herman . C8

803 Heron Lake . E 12

322 Hewitt … . F 7

16,412 Hibbing . J 4

127 High Forest . J 12

220 Hill City . H 6

398 Hills . C 12

673 Hinckley . J 8

391 Hoffman . D 8

400 Hokah . M 12

2 1 6 Holding, Stearns.. F 8

293 Holland . Cll

215 Holloway . D 9

88 Holman, Itasca…H 4

700 Houston . . L 12

626 Howard Lake … .G 9

264 Hugo . J 9

2,368 Hutchinson . G 10

1,487 International Falls. I 3

200 Invergrove . I 10

300 Iona . D12

76 Iron Junction,

St. Louis . 14

316 Isanti . 19

41 Island Lake . E 4

484 Ivanhoe . CIO

1,907 Jackson . E 12

1,173 Janesville . H 11

704 Jasper . C 12

227 Jeffers . E 11

130 Jenkins . G 6

192 Johnson . C 8

1,151 Jordan . I 10

185 Kandiyohi . F9

138 Karlstad . C 2

700 Kasota . Gil

932 Kasson … … J 12

695 Keewatin . 15

294 Kelliher . G 4

372 Kellogg . L 1 1

232 Kennedy . B 2

244 Kensington . D 8

238 Kent . B 7

1,237 Kenyon . Ill

432 Kerkhoven . E 9

258 Kiester . H12

208 Kilkenny . HU

312 Kimball . G 9

137 Kinbree . D 12

491 Knife River . L6

372 La Crescent . M 12

195 Lafayette . G 11

844 Lake Benton … .C 11

3,142 Lake City . K 11

1,055 Lake Crystal … .G 11

924 Lakefield . E 12

175 Lake Fremont,

Sherburne . H 9

740 Lake Park . D 6

385 Lakeville . 110

219 Lake Wilson …Dll

652 Lamberton . Ell

204 Lancaster . B2

987 Lanesboro . K 12

140 Laporte . F 5

48 La Prairie . I 5

167 Lengby . D14

‘ 702 Le Roy . J 12

420 Lester Prairie …G 10 1,755 LeSueur . . H 11

741 Lesueur Center . . H 11

473 Lewiston . L 12

218 Lewisville . G 1?

itude W estxrom Greenwich.

N. E . Corner of

State of Minnesota,

I SHOWING

COOK COUNTY.

\Raw-ka~kaw~waata * or Crow Lake

** «

&4 < lot*.

‘Pai.vted Rock

Portage i

Sabos kof

Plnecreek*0* -

Bo* Ian:

f sH

I IJike £ .? *

^ | Roseau j ^ -

0 > r^” C O • !- * *V* > ’“‘TBadger A

irccnf ush o Oawd^ dialling

|k Eddy J oTencer i vo)o^’annaska

— T3 Cascade ^

•an\J Marais A

Cedarhend

M l fTS\

ieci Kennedy -% *£ ‘■’Enok \ k« h A Donaldson

i \i Spoouj 0-Jr

Roniei

Casperson

Englund

‘Penˆuren

Baldus

r vi’

\ s~< J* J /V’RoUI*„

Cypress ˆ Lake

“HUNTERS

{Fairland

*/LitHeforlrji

(>/>“• V1

(jl WisnerAy

a il

il \y*r*‘eji\ V1

Point Lake

Orbelm o ° Maloolig o Carmel

, ISLAND

Crooked Lake

Saganaga

)wtvaˆˆn-

ˆ , jRit/er thland _*» ‘ q J*A

ff£0 £ˆ/f£

Trout

Margie.

llendale-

Bum fait)

Lake,

Silverdale’

[elliheT y

I Mizpalu/V

uemrnell

Wildwood

Jorothy P.0 JO. > — MilltoJjoy

Nortliome

CookV’*

\Fork\

Idingtoir

Pi ion 1

led.-Lake’

Landing-

(M/ebiih

Itoblnaon,

—i ■ * Xkeuny Deer~La

n *«•? r —

;S Jf.

_iTi)r,c\[c£ -‘7ˆ . /Vnrl Lake

ifjfclir kdt:Lˆ7.

ISH County/ Coffey Wrroud .&V.

N ˆad/(rW-A * <

Tenebonoeˆj

‘Udpr-JgsA

I y > Houpt / j rBergville Dormj > P« j, u,,if ie.yVanceiy Bast

;Ro8j <©> ˆ

I Sound L. Lit

•ichl °P*necre8t

\“2

to ire.wrea

mts /ox’lt*°nC\ . rs iˆ/cUmas) 6V TK Rus8ia\ M#1

Wagoner o

vFowlds

•Buenav

Ctokrtreot?ˆ \ h

‘ I

\L M AHfˆOMEN {jf

\X. dQu/at o/ thSiliiiittifjpi M

[ttl Vfj>

Mentor

teet «

AlhenfiVEmbarra 8

•“•Va

le> ˆJwˆMeBab;

jDeway

Beltrami

k •*/ Joels’

f\3lar8b . . ,

Ilk River | Lockhart

ˆNvP R\M A N

fair banks’

Hornby

\Brlmeon <V0*V . ‘ Jj Rollins 3A

*T , AMSt:

Feralne -j jU ˆ iprairie •

s. Blackberry y\cr«])

IFl.ndrul

■*. mu.iSSˆV Nife <s

'Pederjri«fo»’ , .CCobaesetNyj?.

Grand Kaiiids 5T\Bov River „ . i. ˆ /ifcT

V Raboln

, A Wilkin

Guthrie’

I Wheat ville

jeˆ«a

Georgetown I

A ˆ Pi Felton U1®“?

/ Hornby*

tlarrleˆOi

JcJ J > run»

uVoi£*e *abeK»\ ˆUE|BARDn-all[(1l >

Emnlaville LaVglAHcˆW -JN’AT.r

■/

WdrbffU

Swan\Rivetˆ

ˆ*iS«T0’

Rush

Lake

Reuierˆjw > ’

Elmer,

l»troud

rdyjtawjbfs

Longvllle

yMm&,

}Xrthurˆ Z/ˆˆ’

Cˆy Nea

!* oˆYBortlctt

//c\lv > k1 A*r*w

irr)hˆMui—

S‘.oiˆ‘y-o”o C < *’ EndloD j

Caaselt;

(5) (WdmQji’Lak P Gj JCalre

BackUfl TFtw\6u» ;

r klfi aplds

Hubbard <£

ft JyheTl Cjtyˆ

GowanV ; Mirbat

Lonnrot’jj- • Tegneer

Afoo*e

iˆOrawfoˆ

lV”a

Emily I /

° J u

Esquagarriah

fRustail

| PanoKiˆr>jV_ˆ

J ’JfcnkinejK—

STˆpu,

< ˆ P Lake FVdja\

/I V JTubert

wr*** GuUil

ViUarfˆ EaX-e IlirfP

O *Ca.j0

.Paliaa

■.Dent”11 •>/ \R-A*il(

‘ˆiabtowa

Mapstono Rothuj Me Ca uleyvil Is tlKent ,

KhOOtˆr.

Otter Tail Cy.

. vfCreek, Park ton Henning ˆVrighUloWl

\ Almora

Bcldec

iingsdale

Qloverton/

Pinelaˆt

i.Topek» M I Belle Prairie •’° o Gravels

(oTnealj ‘ Xroaon

inamia

ilayward

Cenola,

Beroun. fgCrose L

Alexanilrin

Hoffmanˆ

iranta-ˆ

Wheaton

Z. . - Jh “tos/

y \ Dumont—

traveIrse I

d Collie’

Traverse,

Moose \ I Island P |s Donnelly\

S T E JVV j. n. Morris’

dinglord

St.

Cruolieayosi 0Sf. Wtndall)

<& o-J

3— v ‘o/l\ i TiUeW6*

JAo;a Lowry *vˆ

I A/.VTr… X;

ˆ West] Gfenwood

Canada

w.

ISWikfSp’-lofvsˆ u

IPrinceton’wSiB rwto < T’Ctt nil

\ ˆ D ‘irS?A’ M

. e W&W, wi.OOrwM x4l

l loiter o me P-O-

Ljl; ojP*doB

rfparent yl-p. (t.Cloud°Dicimj

U

V > ˆ < on«

Chnftwij

Batavia*

•’•”“”“Tp.o

Noˆ tB•5u”,,

Tjavea8anti:

Branch c*‘v S/rf, CHISAGOJrcLjV

(enter

:tg|-

V’ramaUQf’Pn V

Xw./ -(Marine Huˆ„rVa-t,vn;/«Ri

BluchiUo1 E R 8 U

t.L*k,9 O0r ebalida /

_ */jo&nna Erick eon

i pVySwift Falla Kina

v&uohurdo CoPe»°l

Oxford

Clontarf

ˆeir/ikid

7 Enfield

- r-\ ‘fˆfr.rr <7rNs5

\»kD Woniioollo

— jtaeuuae ir4„, (t)rtonvillc i | §

■Junction Switch Sj

itfiTjˆrCorAdlHoyo—

way

ˆf<Lou la I) u Bellingham:.

LAC

Jtadisun Prr/o-‘Oorio

forest Lallt

. K A0 j BtpvbllC,

Ceolvn J|l«j|

, B*ld fijf]

*n

‘DeGraffT

pdin* Millˆ

Fort 8nelling

MINNEAPOLIS,ˆ

8T. PAUL /pij

VVWIlbanV

j . - jyor.‘ay u lobusi

Danvers X. c Best Lake Uk< ~ fe? Sivenodaj“f MurdookX: *J.* Tlingw’ˆP ASˆicer

1011 fJ £ Eerkhoveo’-v A-Iˆ’cl’aˆa,iy >/oru# 8ta

-

, “? ls>urietona &*j. i ♦yˆ3S5|ˆv?-irf}

\chippewa yVh ,a

ˆMjA’atson c Havelock <V>ˆ ?

8t-Paul Jo. w f-Wr loor Mendota c’

IENNEf>TtˆvO(

Invergrovet Weatcott f-

LitchfleldˆXˆXJ * 0 BonniivdXsˆIills |

Roeendale °J

Nicols

ov 31ontevi.deoˆ’

MINNESOTA

tOWB*

Watertp’

.Dawson

Maynard

IBaonla k flt)£ | ‘ ~j

~ TTrˆIiiaEy V

lˆ“r”y?Green Iafeˆˆ‘j Ootˆˆ

Freeland Ihrovidence o ,

Jr < Sˆ\v

jl.retor BiNo)enni»rk O DouglMX

Tb.wrN” FaiupyrAˆ.ˆLJ: — v

MEDICI N TˆaWa <7f Stavanger 0 Woodaakoˆˆe,

- ; A Echo 8taX

ˆ.•Fr““y/;:ot{onm)oa-P-

SCALE

Statute Miles, 84 = 1 Inch.

.“Burr «?‘5?

\ AtkJSaint

E LALO W C] Can WNˆporter I

‘Castle wood

f/1 M.-.vleo \A,r‘0| .. \Bglut Lak

;asiCAp-T

Lp3?ˆ«ˆ-u.0

K.od MeXsll,’. N.wll.lOl.p.fWiBD

Copyright by RocdL’MeRaliy A Co.

’Norfolk

iptoo

Astoria

Poinnet

Pira. plaint l/Rattn Slrta

I Onion Hi ll (_

J 5] Hat dalbtrgQ. \ iTbomii #&o. I

Railroads

T~ˆr~’ UendefsonCˆ

Uendrrton 8ul rl*l<e 0/*a luiV fii»’ ®‘JpnV fs o No real an.

ifaO O L I® E TV

teas&Si

2; Webster L’ 1 Troodlpj

lO/TˆC V a*

I *. O, JT,.

h ‘ Stnut.io 9°C|, k Waatedo,, By ■ ? G—O O ~

A en tladarQ Rloe. ˆpeltlhdo -oreej/

VˆJlarshall

L I N (5 >p l N,

Id lew< Id llUnd L*k Arcok . I JJcnton ;

Lake/&*\ WlrT

JSXJ

iy

dtqiati C. VˆUcB°r

! tsgepfl® skY&ll*2Xi

Theilmanl V

^^fiiUTlU, SmitUu\W X

＜5. “«rnaiood 0 We»**rVt?\j＞’

pihiatiewˆ 7Wto“ei*h*v5～

° ■ L| dk, /ji Btavtr -.WhitmaDV

“Ejlkenoy

ft’.Vu”°Ro«:oe0 \wl/

■and \ggˆrg Pino iy

ZElkton’

lUuM

”Ruthtoi

Kil 1 r > jilt* inu f » We»t Coneort 1*^5 ftVtenet

j aooemie A Clinton r «J

Alma Cit/

.■u OtfscoA ^•T®0‘1 I O’iA S ! Berlin!

A 1 toon 1

> °7Galesvll\eA^

°Jh > ntorV. J C

o-r^nvo^f

JJaneka L.

snovixv

&T.yp^Jeffer3-AIci.oTto^i w >

> ,.c Kerni MountaV,:re

Watoni

bDart’ur

yStockt^ rnr Homer

Chandler

‘ B*ft»i’ord

Pipestone /w’

Medo o * |BLlt«io

’Mnplejfll

‘N < * Hartford

Fulda

B»» > iy _ «- ‘U

ofromin ˆ itoyhNortnlˆ

Or.

_ ˆ *ƒ “1 < U*AˆSSˆ

4? §.K»llao-2inbraˆ

■c’ — vWilmont Prairie

o e tf e s 0i

4 ReadlngSa Brewsterˆ

— t-C” oi” i;n&inoiaj

Stdraa j C. r

mjt O W a. ˆ 1 ajtoa

ˆi°gi»l»«I < 0»Fon 4fc, ®*4l

“¥W/ CS

m Lake jyamam. ferw» (QBcryen95’ 5ak« V%rli,

KtfC’o T*J0w«a. Bi own«« d|«

HOUSTON

n »i* .C£Le(lonl1

Pr«6I«o| SktUom p v

R E H ,J i Ct~Blaek jr

vTl(,*ˆ5 (Lamm*y Freebar*

0*23* In, WiU.ngtonOr.

Buntloi

‘[/Austin A-; ,9s > .Roso “V jfloNTreck \

H oNˆ

ill ˆ Ad&ms w

Xakcficld

Worthlugtoi

ˆlyrOeo

iGlentlUt

‘anjasknV’,3

M A |R .CenlCl

Coylonv

N>j

P.ixley

Chain

r ‘ , - *

haparanzi

tetfttlk Rock o ‘fL.Ellsw.oxth

DICKINSON

worthVVˆ

inrth wood ˆ v /

OSCEOLA

ALLAMAKE\E

WINNESHIEK

North wood

MINN ESOTA — Continued

t‘OP- , T Q

522 Lindstronx . J ®

268 Lis more . R 12

2.333 Litchlield . F ®

6,078 Little Falls . G 8

104 Littlefork . •“ ■,«

161 Long Lake . H 10

1,250 Long Prairie . / «

271 Lonsdale . 1 11

88 Louisburg . L 9

252 Lowry . -D*

98 Lucan . Ell

139 Luce . D 6

2,540 Luverne .

552 Lyle . 3

126 McGregor . .16

634 McIntosh . D 4

411 McKinley . K 4

549 Mabel . L12

1,273 Madelia . G 11

1,811 Madison . -y®

335 Madison Lake …H 11

189 Magnolia . C 12

796 Mahnomen . C 5

78 Mallard, Clear water

E 4

Mankato . Gil

Mantorville . J H

Maple Lake . H 9

Mapleton ……. H I 2

Marble . I £

Marietta . G 9

Marine Mills . J ®

Marshall . D 11

Mayer … H 10

Maynard . u iu

Mazeppa . K 11

Meire Grove . r 6

Melrose .

Menahga . 16

Mendota . M 9

Mentor . G 4

Mesaba . K 4

Middle River . C 3

Milaca. . H 8

Milan . 0 9

Millerville . -E J

Millville . K 11

Milroy . Ell

10,365

410

522

8Q9

887

338

491

2.152

161

386

471

163

2,591

346

245

222

84

149 1,102

468

150 156 137

363,454 Minneapolis …. .K 8

Minneiska . L 11

Minneota . C 10

Minnesota City . . L 1 1 Minnesota Lake .H 12 Minnetonka Beach,

Hennepin . I ®

Mizpah . G 4

Monterey . F 1 2

Montevideo . D 10

Montgomery … .H 11

Monticello . H 9

Montrose . H 9

Moorhead . B 6

Moose Lake . J 7

Mora . -IS

Morgan . El 1

Morris . D 8

Morristown . I 11

Morton . F 10

Motley . F 7

Mountain Lake . .E 12

Mount Iron . J 4

Murdock . E 9

Nary . F 5

Nashua . L 7

Nashwauk . 15

Nassau . C 9

Nelson . • E °

Nerstrand . Ml

Nevis . F 6

New Auburn …. G 10 New Brighton … .L 8 New Germany …G 10

New London . F 9

New Market . I 10

New Munich . F 8

Newport . L 9

New Prague . I 10

New Richland …H 12

New Trier . J 10

New Ulm . G 1 1

New York Mills…E 6

Nicollet . Gil

Norcross . C 8

North Branch . J 9

Northfield . .Ill

North Mankato,

Nicollet . Gil

Northome . G 4

North Redwood. .E 10 North St. Paul … M 8

Norwood . G 10

Nymore, Bel¬ trami . F 3

Odessa . C 9

Odin . F 12

Ogema … D 6

Ogilvie . 18

Olivia . E 10

Onamia . H 7

Ormsby . F 12

Ortonville . C 9

Osakis . E 8

Oslo . A 3

395

819

211

445

166

149

177

3,056

1,267

858

284

4,840

526

892

553

1,685

592

761

428

1,081

1.343

288

49

271

2,080

213

157

292

238

261

375

210

418

901

190

370

1,554

685

144

5.648

474

338

177

642

3,265

1.279

206 143

? ,404

522 834

.235

139

171

270

960

314

112

1,774

1,013

344

Pop.

390 Osseo . 19

176 Ottertail . E 7

5,658 Owatonna . I 11

383 Parkers Prairie … E 7

1,801 Park Rapids . F 6

901 Paynesville . F 9

1,019 Pelican Rapids …D 6

189 Pennock . E 9

260 Fequot . G 6

1,376 Perham . D 6

188 Perley . B 5

266 Peterson . L 12

545 Pierz . G 8

216 Pillager . G7

1,258 Pine City . J 8

834 Pine Island . J 11

329 Pine River . F 6

2,475 Pipestone . C 12

1,175 Plainview . K 11

238 Plato . G 10

139 Plummer . C4

253 Porter . CIO

1,193 Preston…. . K 12

1,555 Princeton . 18

162 Prior Lake ……. I 10

2,243 Proctor … . K 6

25 Rainy Lake City,

Koochiching…. H 3

195 Randall . . G 7

182 Randolph… . J 10

190 Rainier . . 13

334 Raymond . E 9

92 Redby, Beltrami. .E 3 1,757 Red Lake Falls …C4

10,004 Red Wing . K 10

1,666 Redwood Falls . .E 10

1,182 Renville . E 10

134 Revere . Ell

262 Rice … . G 8

2,673 Richfield, Hennepin

I 9

563 Richmond . G 9

255 Richville . D6

765 Robbinsdale . K 8

7,844 Rochester . J 12

287 Rockford . H 9

127 Rockville . H 8

205 Rollingstone . L 11

132 Ronneby, Benton .H 8 252 Roosevelt …….. F 2

644 Roseau . D 2

202 Rose Creek . J 12

238 Rosemount . I 10

343 Rothsay . C 7

237 Round Lake … .D 12

676 Royalton . G 8

964 Rush City . 18

1,011 Rushford . L 12

686 Rushford . L 12

237 Rushmore . D 12

262 Russell . D 11

290 Ruthton . D 11

89 Rutledge, Pine … .J 7 587 Sacred Heart … .E 10

462 Sanborn … .E 11

1,818 Sandstone . J 7

76 Sargeant . J 12

240 Sartell, .Stearns … F 9

2,154 Sauk Center . F 8

1,745 Sauk Rapids . G8

572 Scanlon, Carlton . J 6

Seaforth . Ell

Sebeka . F 6

Sedan . E 8

Shakopee . I 10

Shelly . B 5

Sherburn . F 12

Shevlin . E 4

Silver Lake . G 1 0

Slayton . Dll

Sleepy Eye . F 1 1

Solway . E 4

South Haven . G 9

South St. Paul …M9 South Stillwater,

Washington … .J 9

Spicer . F 9

Spooner . G 2

Springfield . F 1 1

Spring Grove ….L 12

Spring Hill . F 8

Spring Valley … K 12 St. Bonifacius…H 10

St. Charles . K 12

St. Clair . H 11

St. Cloud . G 8

St. Hilaire . C 3

St. James . F 12

St. Joseph … G 8

St. Louis Park,

Hennepin . 19

St. Martin . F 9

St. Michael . H 9

St. Michael Station H

247,232 St. Paul . L

832 St. Paul Park.

Washington … . J

St. Peter . G 11

St. Vincent . A 2

Staples . F 7

Starbuck . D 8

Stephen … . .B 3

158

428

127

2,302

195

814

172

382

850

2,247

85

287

4,510

1,343

228

668

1,482

620

100

1,817

275

1,159

323

11,817

468

2,102

706

1,743

177

401

222

4,176

328

2,558

497

618

9

9

Pop.

412 Stewart . G10

794 Stewartville . J 12

10,198 Stillwater . J 9

183 Sturgeon Lake … J 7

397 Swanville . F 8

549 Taconite, Itasca. H4

140 Taopi . J 12

205 Taunton . C 10

454 Taylors Falls . J 9

185 Tenney . B 7

250 Tenstrike . F 4

3,714 Thief River Falls .D 3

169 Thomson . K 6

217 Tintah . C 8

107 Tonka Bay, Hennepin

H 9

1,111 Tower . K 4

1,876 Tracy . Dll

243 Triumph . F 12

181 Trosky . C 12

451 Truman . G 12

108 Turtle River . F 4

543 Twin Valley . C 5

4.990 Two Harbors . L 5

614 Tyler . . C 11

438 Ulen . C 5

172 Utica . L12

237 Vergas . D 6

161 Vermillion . J 10

538 Verndale . F 7

289 Vernon Center …G 12

235 Veseli, Rice . I 11

243 Vesta . . E 11

260 Villard . E8

21 2 Vining . E 7

15,193 Virginia . K 4

2,622 Wabasha . L 11

343 Wabasso . E 11

817 Waconia . H 10

1,820 Wadena . . F7

406 Waite Park,

Stearns . F 8

917 Walker … . F 5

366 Walnut Grove …Ell

i v/ [J •

103 Walters . H 12

170 Waltham . J 12

129 Wanda . Ell

1,613 Warren . B 3

927 Warroad . E 2

3,054 Waseca . H 11

465 Watertown . H 10

1,273 Waterville . I 11

366 Watkins . G 9

152 Watson . D 9

230 Waubun . D 5

460 Waverly . H 9

492 Wayzata . I 16

543 Welcome . G 12

1,755 Wells . II 12

175 Wendell . C7

429 Westbrook . E 11

584 West Concord ….J 12 3,022 West Minneapolis,

Hennepin . K 8

2,660 West St. Paul . L 9

161 West Union . E 8

121 Whalan . L 12

85 Wheatland, Rice. .Ill

1,300 Wheaton . C 8

1,505 White Bear Lake . M 8

95 Wilder . E 12

4,135 Willmar . E 9

212 Willow River . J 7

258 Wilmont . D 12

215 Wilton. . F 4

1,749 Windom . F 12

1,554 Winnebago. …. .G 12

18,583 Winona . Lll

296 Winsted . G 10

1,043 Winthrop . G 10

292 Wood Lake . D 10

226 Woodstock . C 11

2,385 Worthington … .E 12 456 Wykoff . K 12

207 Wyoming. I 9 303 Young America. . H 10

208 Zumbro Falls …K 11

1,138 Zumbrota . J 11

in the lower Red River Valley, 28 at the Twin Cities, Rainy Lake or Lake Superior, and 34 in southeastern Minnesota. The elevation of the State, its fine drainage system and the dry¬ ness of its atmosphere, especially in the winter, contribute to make it one of the most health¬ ful regions in the world. At the Twin Cities the death rate is only 10 per thousand annually.

Soil. — The prevailing soil is a black loam underlaid by clay. This soil

is deep and rich in the southern part of the State and in the Red River Valley. It is somewhat more shal¬ low and sandier in the belt that skirts the pine woods, and quite sandy in the northeastern part.

In the northern part are swampy tracts which, as they are being drained, add largely to the fertile acreage. The heavy soil produces all the varieties of grains and grasses, the sandy sod, clovers and potatoes, vegetables and fruit. With the exception of some rocky land in the northern part, a great deal of which is being reserved for a permanent white pine forest, there is scarcely any land in the State that is not productive or that does not promise to be productive as soon as it can be reached with the necessary improvements, either ditching or clearing.

Geology. — The surface of Minnesota, ex¬ cepting the southeastern corner, is of glacial drift. Under this drift are found rocks of all ages. On the international boundary extend¬ ing east to Lake Superior from Lake of the Woods and thence southwestward to the Min¬ nesota River between Big Stone and New Ulm but terminating southwest of the river occur the gneisses, schists and granites of the Archa-ian, or earliest, geologic age. Granite Falls in the upper Minnesota is formed by a granite out¬ crop. Of the second geologic period, the Pale¬ ozoic, the earliest, or Cambrian, limestones and sandstones occur from Taylor's Falls on the Saint Croix and Kettle rivers southwest to the Minnesota and Blue Earth rivers, and along the Saint Croix and Mississippi to the southeastern part of the State. Lower Cambrian, or red sandstone conglomerate and trappean rocks, are found on the border of Lake Superior and in Pine, Chisago and Kanebec counties in the eastern part of the State. . In southwestern Minnesota this formation is found as red quartzite, or the pipestone and jasper of which the Indians were very fond. Rocks of the sec¬ ond system of the Paleozoic Age, Silurian lime¬ stones and shales are found from Minneapolis south to northeastern Iowa, and those of the Devonian, or third system, extend through ri-rnore and Mower counties into Iowa. Ut the Mezozoic, or third geologic age, including Car¬ boniferous, or coal-bearing limestones, Minne¬ sota has none; but of the Cenozoic, oi touil great system, rocks are found over the western two-thirds of the State. These belong to the Cretaceous, or earliest period of this age and are the basis of the Coteau des Prairies in the

southwestern part. ,

The glacial sheet, which covered almost the

entire State, receding, left its drift to an aver¬ age depth of 100 feet.

Twelve marginal mo¬ raines marking the successive outlines of the front of the ice sheet have been mapped These cross Minnesota. 4 heir ridges and knolls contain large boulders. In the Red River Valley, sloping southward in the direc¬ tion of the ice recession, a great ice-dammed

lake — called Lake Agassiz by the geologists was formed and held by the waning ice sheet. This lake attained a length of 700 miles and extended into Montana with a width of over 200 miles. It thus had an area of about 110,- 000 square miles. Many ridges of sand and gravel reveal the beach lines of the lake, which as it was lowered, ceased to drain southward through the Minnesota and Mississippi rivers and was finally reduced in size to Lake Winni¬ peg, leaving behind the present Red River Val¬ ley, the most fertile wheat land in the wTorld.

Minerals. — - Minnesota produces more iron ore than any other district in the. world. In 1884 the first mines were opened in the Ver¬ million Range and for the first 20 years pro¬ duced 1,000,000 tons annually.. In 1892 the Me-sabe Range was opened and in 10 years aver¬ aged 5,000,000 tons a year. During the next 15 years these ranges averaged nearly 25,000,000 tons a year. In 1910 the Cuyuna Range, ex¬ tending southwestward from the Mesabe for 50 miles, was opened. It has yielded an annual output of approximately 1,000,000 tons. From the beginning of mining in the State a grand total of 500,000,000 tons have been shipped. In 1917 the production was 45,398,787 tons. The school of mines of the University of Minne¬ sota estimates that there are 1,500,000,000 tons of merchantable ore remaining on the different ranges. This estimate does not provide for possible discoveries still to be made by which a great deal of ore may become merchantable.

A great deal of the mining is of the open-pit character. Steam shovels load the ore on trains that are run directly to the docks at Two Harbors or Duluth where steamers wait to carry it to the steel centres at Chicago, Gary or Erie. See article on Duluth.

Minnesota also quarries its valuable build¬ ing stone. Mankato and Saint Peter limestone and Kettle River sandstone are prized. In 1916 stone worth $1,492,341 was produced. Clay, sand and gravel for tile and brick making and for concrete work and road building are found

in large quantities. .

Flora and Fauna.— In Minnesota are found most of the plants and animals of the north tem¬ perate zone. Along the streams of the south¬ ern part thickets of oak, elm, ash, maple, pop¬ lar, basswood, plum and cherry, trees in great variety are found festooned with grape-vines and sheltering the small fruits and other shrubs, especially the hazel-bush. Scattered over the prairies are strawberries and the northern woods produce blueberries for many markets. These woods, after more than 50 years of arduous lumbering, contain more white pine than is found elsewhere in the Union, besides other varieties of pine, balsam and spruce and hemlock. The State flower is the dainty lady-slipper found along the marshes that also shelter the fringed gentian, and glow with marigolds and golden-rod in 36 va¬ rieties. The snow no sooner leaves the prai¬ ries than the pasque-flower appears and the anemone shows through the leaves soon after. Violets, columbines, bloodroots, geraniums, buffalo-beans, roses, tiger and pond lilies and sun-flowers follow through the summer until the aster succumbs to the September frost. Clovers, especially persistent, have invited ex¬ tensive dairying and many varieties of grasses have been introduced to supplement them. In

fact the climate and soil of Minnesota have made possible the introduction of many plants once looked upon as exotic but now showing everywhere on the lawns and farms of the State without being protected against the win¬ ter.

The French explorers found the beaver working along every stream, and they, with succeeding trappers, almost exterminated this animal ; but of late years under the protection of the State the beaver is multiplying rapidly. Marten, otter, mink, muskrat and other fur-bearers have always been numerous. In the wilder parts of the State coyotes and timber wolves, black bears, foxes, lynx and various rodents, including the gopher, for which Min¬ nesota has been called (<The Gopher State,® are prevalent, except where care has been taken to prevent their becoming a nuisance to stock or to crops. Deer and moose attract hunters to the northern part of the State. The

streams and lakes are well stocked with pickerel, pike, bass, crappies and sunfish and some trout are caught.

Forestry. — The pine of Minnesota seemed inexhaustible to the pioneers. It stretched from the Rum River, 20 miles north of Minneapolis, to the international boundary and covered two-thirds of the State in width. Mills at Minne¬ apolis, in one year cutting 500,000,000 feet of lumber, made that city the first lumber centre of the world. Gradually the lumbering opera¬ tions have moved northward, following the di¬ minishing timber, until they are confined to a comparatively small area. Within this area, however, mills, notably at Virginia, are prom¬ ised logs for 20 years; that is regardless of fresh supplies guaranteed by scientific forestry. Ir. 1917 the total lumber cut in the State was 1,500,000,000 feet. Beside this, 800,000,000 feet of pulp-wood, 425,000,000 feet of ties, posts, poles and mining timber, and 225,000,000 feet of box-lumber were cut. Balsam, hemlock, spruce and even the once despised jack-pine are used for the coarse grades of lumber as well as for these other purposes. Of white pine 20,000,000-000 feet remain, of other woods, 70,000,000,000.

Minnesota, through its forestry commission which employs the State forester and his ran¬ gers, is taking steps to protect the timber that remains and to replant large areas unfit for ag¬ riculture that will grow merchantable white pine in 40 years. It has passed laws to con¬ trol the operations of lumbermen, so as to pre¬ vent fires from accumulations of waste, to safe¬ guard limber from locomotive and camp fires, to assist lumbermen through laboratory experi¬ ments and to ensure to the State a permanent supply of lumber. The State owns 400,000 acres in forest reserves ; and the United States gov¬ ernment 1,000,000. To patrol this territory and to carry on the other work of the forestry com¬ mission 50 men are employed. It is estimated that 15,000,000 acres can profitably remain in forest, or about half of the original timber area. With the development of the plans outlined by the commission Minnesota will be able to pro¬ duce 4,000,000,000 feet of lumber annually.

Agriculture. — Minnesota has been called <(the Bread and Butter State,® for its yields of wheat and dairy products have been its chief claim to agricultural distinction; but other crops are gaining in importance. Corn-grow¬ ing has advanced northward until Aitkin

County, 250 miles north of the Iowa line, once supposed to be the

limit beyond which corn could not be ripened, enters prize-winning ears at the Minnesota State Fair. The growing of corn in the southern part of the State, and the corresponding increase of stock-raising, has restored the soil to profitable wheat land, al¬ though the great wheat fields are in the Red River Valley. Potatoes are the chief crop in the district between the upper Saint Croix and the Mississippi rivers; and are entering into the calculation of farmers in other parts of the State. While Minnesota cannot be called a fruit-growing State in the sense that New York and Michigan are held, its State Horti¬ cultural Society and experiment stations have made it clear to the farmers that they can count on good crops of strawberries, raspber¬ ries and plums, each of which have been greatly improved in yield, appearance, keeping quality and cold-resisting ability. Apples are pro¬ duced in all parts of the State, although a good winter apple is still to be found. Vegetables of all kinds are easily produced and grow to a great size, especially in the sandy parts of the State. The dairying industry shows a con¬ stant gain over the State year by year. Poul¬ try-raising is also on the increase. A striking movement is that toward the improvement of stock. Bee-keeping has received an impetus through the appointment of State inspectors to ensure the health of the colonies and to sug¬ gest the best methods of obtaining results. It is significant that as the cut-over lands are brought, under cultivation by the assistance of the United States and Minnesota agricultural stations, the most efficient men are sent out as county agents to prevent the waste and loss that were inevitable in the days of the first prairie farms, so that surprising improvement takes place in the shortest possible time. A comparison between the statistics for 1910 and 1917 follows:

1910 1917 Value, 1917

Acres m farms . 27,675,823 . $45.62*

Improved land . 19,643,533 .

Number of farms… . 156, 137 . ……

Acreage per farms . 177.3 . ….

Number of cattle - 2,347,435 2,506,281 $75,090,53i

Horses and mules - 760,000 902,925 101,720,636

Swine . 1,520,257 2,951,000t .

Sheep . 637,582 668,000t .

Poultry. . 11,862,787 15,000,000 3,065,868

Creameries and

cheese factories … . 784 922

Pounds of butter

and cheese . 35,000,000 138,816,826 $37,196,349

Bushels of wheat . 57,057,412 57,965,000 117,089,000

Corn . 67,897,051 90,000,000 99,000,000

Barley . 34,927,773 37,800,000 41,958,000

Oats . 93,897,717 120,250,000 75,758,000

Rye . 4,426,028 7,585,000 12,667,000

Potatoes . 26,802,948 33,600,000 30,576,000

Tons of hay . 6,036,747 5,224,000 60,619,000

Flaxseed, bushels - 3,277,238 1,980,000 5,841,000

* Value per acre. t 1920.

The total value of the 1917 crop, according to the United States government, was $447,- 498,000. The value of the machinery and im¬ plements used on the farms is $52,329,000. Of all the crops, onions show the largest returns per acre, yielding 504,600 bushels on 1,400 acres with a total value of $732,000, or $504.60 per acre.

The State still holds 2,000,000 acres of farm land and the United States 800,000. The pro¬ posed special government aid in developing pub¬ lic lands and a law already in force that pro-

vides for the clearing of a portion of each 40-acre tract sold by the State, will greatly stimu¬ late agricultural improvement in Minnesota.

Manufactures. — The raw materials close at hand — breadstuffs, livestock, lumber and iron — are the basis of most of the manufacturing done in the State. Flour-and gristmill products are of prime importance. Beginning with the gov¬ ernment mill at Saint Anthony Falls in 1821 the industry has thrived enormously. By the substitution of steel rolls for buhr stones, and by the invention of the bolting process that purifies and saves the middlings that once were largely waste, Minnesota millers in the seven¬ ties took first place in the world, and in 1917 mills to the number of 286 made flour valued at $300,000,000. (See Minneapolis — Manufac¬ turing). The second industry is the slaughter¬ ing of cattle, sheep and hogs. South Saint Paul is the centre of this trade. Extensive yards receive the stock from the ranches and farms of Montana, Wyoming, the Dakotas and Minnesota, and the packing-houses produce an annual value of $47,710,000. The third industry is the manufacture of lumber and other timber roducts, such as sash and doors, cooperage and oxes. In these interests there are 481 firms, and they produce an annual total of $47,000,000. Foundry products, machinery and car repairs together make a fourth industry of importance. In all 450 concerns produce goods valued at $39,000,000. The gas tractor is a rapidly in¬ creasing figure. Although farm machinery is chiefly made there is apparently growing di¬ versity in this industry. At Duluth, steel mills are turning the ore of the Mesabe and other ranges into ingots for Eastern shipment, and are making some steel, although the Western market for this product is necessarily limited. Other products of Minnesota manufacturers are butter and cheese (see Agriculture) ; other foods, including confectionery, ice cream and bakery products, valued at $32,350,000 ; clothing, including knit goods and boots and shoes, $20,000,000; printing and publishing, $20,200,- 000; linseed oil and meal, $12,356,000, and malt liquors, $14,300,000. There are ‘5,794 firms in the manufacturing trade. They employ 92,834 persons and produce annually $493,354,136 worth of goods. For this manufacturing there is al¬ ready available 100,000 horse power in the streams that have been exploited, and, by gov¬ ernment estimate, another 100,000 awaiting de¬ velopment. Saint Anthony and Saint Croix Falls, Thompson Dam, in the Saint Louis River, and Coon Creek

in the Mississippi are the chief points of contact with an electric system that promises to complete many other projects in the near future. Coal enters the State over Lake Superior, and is stored, pending shipment to various manufacturing points, at the Duluth docks. See Duluth — Commerce.

Banks and Banking. — Minnesota has care¬ fully drawn laws governing banking operations. There are no private banks. All State banks are subject to inspection of the bank examiner. In 1917 there were 1,125 of these banks. Their capital was $23,612,500; their deposits, $259,- 277,135. The list pf State banks includes nine savings banks, capitalized at $350,000, with de¬ posits at $36,719,749. There are 294 national banks with a total capital of $32,506,000 and deposits of $289,031,000; and 12 trust companies, capitalized at $4,260,000. At Minneapolis is the

Federal Reserve bank for the Ninth District; and at Saint Paul is the Federal Farm Loan Bank for the Northwest territory.

Finance. — Under the direction of the Minne¬ sota Tax Commission all assessments in the State are reviewed, first by the local board, then by the county board to adjust differences between districts, and finally by the commission to arbitrate between counties. Personal prop¬ erty of the first class, including iron ore, in stack piles, is assessed at 50 per cent of its value; personal property of the second class, including livestock, manufacturers' materials and auto¬ mobiles, bears an assessment on 33p3 per cent of its value; and personal property of the third class, or household goods beyond exemption of $100, is assessed at 25 per cent of its value. All credits and money is assessed at full value. Rural real estate is taxed at 33 pj per cent and urban real estate at 40 per cent of its value. Railroads and telegraph and telephone lines pay a gross earnings tax of 5 per cent and 3 per cent respectively. On this basis the State assessed in 1917 its personal property, $263,193,685; its real estate, $1,403,409,459; and its money and credits, $284,968,875. The true and full value of its real estate was $3,684,054,- 371, and of its personal property, $778,612,283. In 1896 the State treasurer reported receipts from all sources of $5,482,876; in 1916 of $20,061,320. For defraying the general ex¬ penses of the State government and activities there was of this sum $17,800,000 available; the remainder was credited to various school funds, certificates of indebtedness and the prison re¬ volving fund in amounts of $3,645,225, $3,275,- 930 and $2,077,813 respectively. Of each dollar received by the treasurer for defraying gen¬ eral expenses,

35.47 cents came from general property taxes, 30.80 from railroad taxes, in¬ cluding freight lines and sleeping-car compa¬ nies, 9.89 from interest on State lands, State loans and trust funds, 6.80 from various State institutions, 6.64 from departments, 3.78 from inheritances, 2.86 from insurance companies, 1.42 from the State prison and 2.34 from mis¬ cellaneous sources. The present rate of State taxation is 3.80 for general expenses, and 2.23 for school and university.

A great asset of the State is its land which is held in trust for the school, university and for permanent improvements. The State owns 2,000,000 acres which, by law passed by the first State legislature, may not be sold for less than $5 per acre, and are actually being sold at a minimum price of $10. The accumulation of the funds received for land already sold amounts to $36,288,569, which is invested under the direction of the State board of investment. The income derived from this investment is apportioned among the schools of the State according to their status (see Education) . The State owns buildings worth $19,000,000.

Transportation.— Owing to the early settle¬ ment of. the Saint Croix and Mississippi valleys, the Twin Cities became the railroad centre of the State. Later Duluth developed in commer¬ cial importance. A glance at the map shows two great wheel-like systems radiating from these centres, and so intersecting as to provide all parts of the State with transportation. Entering the Twin Cities through Wisconsin are the Minneapolis, Saint Paul and Sault Sainte Marie (Soo Line), two lines; the Chi-

cago, Saint Paul, Minneapolis and Omaha and the Chicago, Burlington and Quincy. On the west bank of the Mississippi the Chicago, Mil¬ waukee and Saint Paul, two lines, Chicago, Rock Island and Pacific, Chicago and Great Western, Minneapolis and Saint Louis and the Chicago, Saint Paul, Minneapolis and Omaha. Westward from the Twin Cities run lines of the Chicago, Milwaukee and Saint Paul, the Minneapolis and Saint Louis and Great North¬ ern, and

northwestward to the Red River Val¬ ley and Manitoba, the Great Northern, North¬ ern Pacific and Minneapolis, Saint Paul and Sault Sainte Marie. These last three systems, each with two lines, connect Duluth with the Twin Cities; and also put it within easy com¬ munication with the Dakotas and Canada. Two short lines connect Duluth with the iron ranges, and the Canadian Northern gives it additional advantages for both Western and Eastern trade. The Chicago, Milwaukee and Saint Paul, Great Northern and Northern Pacific are transcon¬ tinental lines, and hence put Minnesota within reach of the great Western Territory with its rapidly increasing commerce and industry. Electric and other lines are developing the more closely populated districts. In all there are 42 companies listed in the report of the railroad and warehouse commission with a total mileage of 9,102, a capitalization of 1,509,- 349,088, gross earnings of $121,821,203 and net earnings of $54,988,303. These companies in 1916 paid dividends from net earnings of $56,- 997,194, and from surplus of $33,260,818. They paid to the State in gross earnings a total of $5,436,572. Their bonded indebtedness is $2,034,479,307 ; their total investment $4,159,-

487,932.

Water transportation is due to become more of a factor in solving the commercial problem of the State now that the government high dam at Minneapolis is completed, making possible navigation on the Mississippi to that point. For satisfies on river navigation and lake trade see articles on Saint Paul and Duluth.

Under the direction of the State Highway Commission and with the aid of laws that take the building of roads from limited local juris¬ diction the highways of the State are being greatly improved. The stone and gravel that are easily accessible are being used in road construction with the result that districts in the remote parts of the State are now reached by permanent roads. This is especially true of the northern part of the State. The legislature of

1919 adopted an amendment to be voted on in

1920 allowing the State to issue $10,000,000 a year to a total of $75,000,000, allowing counties to issue up to $250,000. This promises to give the State $109,000,000 for roads within a few years.

Education. — With an annual income of over a million and a half

dollars from the per¬ manent school fund, Minnesota is able to en¬ courage all of the local school districts to sus¬ tain a high educational standard ; at the same time care has been taken to conserve the in¬ itiative of these districts by withholding State aid from all that do not meet certain require¬ ments. An attendance of 100 days must be credited to each pupil counted in the number attending a school for a year on which the apportionment is based; a sanitary building properly ˆquipped and teachers graduated from

a normal course are other requirements for general aid. Special aid is given to schools that sustain normal courses, agricultural in¬ struction, manual training and domestic science departments. One of the most recent and most effective movements in education is the consolidation of rural schools to provide for grading and more efficient teaching. In 1916 there were 139 such schools in the State, and the number is rapidly increasing. The schools are classified as either rural, consolidated, semi-graded, graded and high. Districts are either common, independent or special, the last being a classification for cities such as Minneapolis. Common school districts are governed by the voters in mass meeting who elect and direct a board of three members how to administer the affairs outside of the detailed management of the school. The independent district is some¬ what freer of control by the people, but cannot spend money for sites or buildings except as directed by vote. A consolidated district may be either common or independent.

There has been a great growth during the past few years. In 1912 the number of men teaching in the State was 1,720; in 1916 it was 1,952, an increase of 14 per cent despite a loss of 20 per cent in men teaching rural schools due to consolidation. The increase of men in graded and high schools in the four years was ‘46 per cent. Similarly wages increased from $54 for men and $45 for women in the rural schools, and $109 for men and $57 for women in the graded and high schools, to $113 for men and $64 for women in the rural schools and $145 for men and $78 for women in the graded and high schools. Of the teachers em¬ ployed in 1916 in the rural districts 3,777 had had a high school training, 3,076 a high school and normal course, 682 a normal training and 191 college training. In the high and graded schools 2,132 were high school graduates; 172 had had high school normal training, 4,684 normal and 2,414 college training. In four years the number of normal graduates had in¬ creased 18 per cent, the number of college graduates 40 per cent. In all there were em¬ ployed during 1916 17,793 teachers. The total enrolment was

481,583. The schoolhouses numbered 9,400, valued at $47,459,317. There were 7,630 libraries containing 1,824,8 32 vol¬ umes. In 1916 $21,821,468 was expended in the State for education.

Higher education is carried on in the five normal schools and in the University of Min¬ nesota. These normals are located at Winona, Mankato, Saint Cloud, Moorhead and Duluth, the university at Minneapolis. The normals enrolled 4,208 pupils and in 1916 graduated 728 pupils, a gain of 147 over 1912. The university enrolled 13,279, of whom 5,725 were in the col¬ leges of liberal arts, engineering and mechanic a.rts, mining, agriculture, law, medicine, den¬ tistry, pharmacy and education; and in the schools of analytical and applied chemistry, school for nurses and graduate school. In the various agricultural courses and in the exten¬ sion division there were 7,554 enrolled. Like the common schools the university has invested funds derived from the sale of lands amounting to $1,647,059. On 6 May 1915 the regents adopted a recommendation to establish at Rochester graduate research in cooperation with the Mayo Foundation. This provides a

State Capitol at Saint Paul

fund of $1,500,000, free use of laboratories and clinical facilities and pays all salaries of instructors.

Religion. — From the time that the Episco¬ palians and Presbyterians organized services for the soldiers at Fort Snelling, that the Congregationalists labored with the Indians at Lake Harriet, the Catholics built their chapel at Mendota and the Methodists preached to the first settlers along the Mississippi, missionary effort and church

organization in Minnesota has been a great agent in the development of the commonwealth. The Catholics are the strongest numerically, with 480,535 communi¬ cants. Saint Paul is the centre of their work. Here is the beautiful cathedral erected in 1913 at a cost of $3,000,000. ˆ Here are also the Hill Seminary, and Saint Thomas College with an enrolment of 800. Saint John's Col¬ lege is at Saint Cloud. It enrolls 365. This Church supports parochial schools, both grade and high, in the Twin Cities ; and at other places orphan asylums, relief agencies and hos¬ pitals, especially Saint Mary's at Rochester, connected with the Mayo Foundation. In all it controls 66 institutions. The Lutherans, Norwegian, Swedish, Danish and German are the second denomination in point of numbers. Altogether there are 300,000. They also sup¬ port hospitals and colleges. At Saint Paul are Concordia College (German), Luther (Nor¬ wegian) and Luther (German) seminaries; at Minneapolis, Augsburg Seminary and Min¬ nesota College (Swedish) ; at Saint Peter, Gustavus Adolphus College (Swedish), and at Northfield, Saint Olaf's College (Norwegian). Altogether the Lutheran colleges and seminaries enroll 5,000 students. They control 60 institu¬ tions. The Episcopal cathedral is at Faribault, where are also Saint Mary's school for girls and Shattuck Military Academy for boys, and the Seabury Divinity School. The Episcopalians have 16,000 members and support 10 institutions. Enrolled in its higher institutions of learning are 800. The Presbyterians number 30,000. They support Macalester College at Saint Paul, which enrolls 400 students. The Methodists are 50,000 in number. Hamline University at Saint Paul and Parker College at Winnebago City, with a total enrolment of 600, are their colleges. The Congregationalists number 25,000. Carleton College at Northfield and Windom College at Montevideo enroll 600. There aie 25,000 Baptists and 35,000 of other faiths in

the State. . ,

Charities and Correction.— Under the ˆdi¬ rection of the State board of control are five asylums and hospitals for the insane, schools for the blind, deaf, feeble-minded, dependent children, delinquent boys and delinquent girls, reformatory, prison, sanitorium for consum¬ ptives, hospital for crippled children and hos¬ pital for inebriates — in all 16 institutions. To support them the State appropriated $3,864,- 900 for the year 1917-18. The number of in¬ sane is 5,839; of defectives, 3,585; of depend¬ ents 655-of delinquent children, 4C0; of adult prisoners, 1,300; of patients, 1,200. Probation officers reported 5,863 cases during the year 1914 and 1915 in which children have been helped Jail inspectors reported that 11,822 cases had been disposed of during 1915; and there were in the various county poorhouses of the

State 1 910. The total cost of the various

county charities during the year of 1915 was $1,317,477. The income from various poorhouses was $29,290 and the income from the work of the State prison twine and farm ma¬ chinery factories was $556,591. Besides this there was received $125,000 worth of farm and garden produce used or sold by the various institutions. The twine is sold to Minnesota farmers at a slight reduction in price from out¬ side factory products.

History.— The first white men known to have been in Minnesota were Radisson and Groseillers, two French adventurers and traders who made treaties with the Dakota and Chip¬ pewa Indians in 1656 and 1659. It seems that they were on Prairie Island in the Mississippi near Red Wing and in what is now Kanabec County. In 1680 Father Louis Hennepin, dispatched by La Salle to explore the upper Mississippi, was captured by the Dakotas and held as a prisoner at their village at Mille Lacs until released by Daniel Greysolon Du Lhut, who had made his way to Fon du Lac in the year previous and had heard of the capture of the other Frenchman. Hennepin descended the great river in August 1680 and named the falls after his patron saint, Saint Anthony. Nine years later Nicholas Perrot, another trader, established himself on Lake Pepin, and in 1700 Pierre Le Seuer ascended the Minnesota and established Fort L'huillier, near the present city of Mankato. He returned to France with some of the peculiarly colored earth of the vicinity which he falsely presumed to be copper ore. In 1732 Captain Verendrye traveled along the northern border of the State, going as far west as the Missouri River. None of the French settlements, however, were permanent.

The English, on the other hand, were inter¬ ested in the extension of empire rather than merely trading adventures. Jonathan Carver, a native of Connecticut, in 1766 made a con¬ siderable inquiry into the extent and the re¬ sources of Minnesota, and sought earnestly to form friendships with the natives. He traveled on the Mississippi as far as the Saint Francis River, and on the Minnesota nearly to its source. After his return home he went to England, where his journal was published. The English established trading-posts on the prin¬ cipal waterways and developed an important trade in furs. ' The Hudson Bay, and later, the Northwest Fur, companies were strongly en¬ trenched in the confidence of the Indians. In the War of 1812 Dakotas served against the American troops.

Upon the purchase of Louisiana, which in¬ cluded Minnesota west of the Mississippi, the eastern part belonging first to Michigan, then to Wisconsin, the United States government de¬ termined to explore the territory. < Accordingly Lieutenant, afterward Cantain, Pike was sent up the Mississippi to make such treaties with the Indians as would guarantee a permanent peace between the Dakotas and Chippewas, hereditary enemies, and thus make possible a profitable trade with both nations. Pike pro¬ cured from the Dakotas a <(strip nine miles long from the Minnesota River on both sides of the Mississippi,® and a similar strip on the Saint Croix River, the Indians reserving the right to pass freely through the ceded territory on their hunting expeditions. In 1817 Major Long of the United States Engineers selected

a suitable site for a fort, and two years later Colonel Leavenworth led a body of soldiers to construct the work, first called Fort Saint Anthony, then Fort Snelling, after the com¬ mandant relieving Leavenworth, at the junc¬ tion of the Minnesota with the Mississippi. In 1821 the government built a saw mill on the res¬ ervation opposite the falls and in 1823 erected a flour mill nearby. In 1837 the lands east of the Mississippi were opened to settlement by treaty with the Indians ; but the government would not permit the settlement of the reserva¬ tion. Franklin Steele, sutler at the fort, how¬ ever, built a squatter's cabin on the east bank of the river, intending to lay claim to the water rights. In 1848 he and others were allowed to develop their holdings, and consequently the village of Saint Anthony was platted. Steele built a saw mill, and soon the lumber industry, stimulated by the arrival in Minnesota of ex¬ perts from Maine, was in full process of de> velopment. Similar was the development of the Saint Croix Valley,- especially in the neighborhood of Stillwater. Meanwhile other explorations had extended the knowledge of the State. In 1832 Henry Schoolcraft had dis¬ covered, or rediscovered after William Morri¬ son, the source of the Mississippi in Lake Itasca. In 1823 Beltrami, an Italian count, explored the country between the Red and Mississippi, and Major Long, G. W. Feath-erstonaugh and Catlin, the artist, had adver¬ tised the picturesqueness and the possibilities of southwestern

Minnesota by their tours along the Minnesota River.

These explorations and the beginning of lumbering operations drew the attention of the nation to Minnesota, so that immigration in¬ creased rapidly. Saint Paul, at first but a col¬ lections of cabins about the home of a whisky trader named Parrant, or (<Pig's Eye® in mock¬ ery of a defect, afterward enlarged by Swiss refugees from Lord Selkirk's colony at Pem¬ bina and dignified by Father Gaultier's build¬ ing of Saint Paul's Chapel in 1841, became the leading town in the territory; and in 1849 was made the capital of the Territory of Minnesota, organized in that year with Alexander Ramsey governor. Saint Paul was not only the prac¬ tical head of navigation in the Mississippi, but was the natural outfitting point for pioneers to the rich Minnesota Valley which was opened to settlement in 1851 by treaty with the Dakota Indians. For this reason it grew rapidly. Still¬ water on the Saint Croix and Saint Anthony also received large numbers of people. The latter overflowed to the west bank of the river, and Minneapolis (Dakota, ((Minnehaha® — Laughing Water— - and Greek ˆPolis,® city) was born, and received official recognition as a village in 1855. Townsites were plotted in vari¬ ous inaccessible parts of the State, real estate values became badly inflated, credit was over¬ strained, until in 1857, in common with other parts of the country, the Territory suffered from financial panic. Nevertheless, 12 May 1858 a bill giving statehood to Minnesota was signed by the President, and Henry Sibley, who as fur factor for the American Fur Company, had been a unique figure in the life of the Terri¬ tory for a quarter of a century, and who had been its first delegate in Congress, was made the first governor.

Upon the outbreak of the Rebellion, Ram¬ sey, the second governor, had the honor of offering President Lincoln the first troops, and during the war 11 regiments of infantry, two regiments of artillery, two battalions of cavalry and a company of engineers were sent from Minnesota — 27,000 men in all. Part of these troops were also employed to put down an up¬ rising of the Dakotas under Chief Little Crow. These Indians, resentful over the failure of the United States government to keep its engage¬ ments with them, and excited by the prospect of seizing their land while the government was engaged in war, made a sudden attack in August 1862 upon the settlers of the upper Minnesota Valley, and not until 800 whites had been killed were the Dakotas subdued. In Sep¬ tember, General Sibley succeeded in capturing the leaders, of whom 38 were executed at Mankato. The tribal life of the Dakotas in the State was broken up so that they never

threat¬ ened the peace of the State again.

At the close of the war Scandinavians came into the State in great numbers, as Germans had done in the early fifties, and began to open up the central and western parts of the State. Railroad building, delayed by the war, pro¬ gressed rapidly. The introduction of rolls to take the place of buhr stones and the invention of the bolting process to purify middlings made Minneapolis a great flour centre, as the prox¬ imity to immense tracts of white pine had made it a great lumber centre. Saint Paul became a railroad centre of importance and the whole¬ sale and jobbing market of the Northwest.

These advantages and the rapid rise of values produced another period of speculation that culminated in the panic of 1893. The hard times that followed were severly felt in the Twin Cities and in Duluth; but, owing to the substantial development of the rural districts, there was little, if any, retardation in the growth of the State. Lands in the Red River Valley and in southwestern Minnesota produced increasingly, and were in demand. By 1898 the cities were recovering from the effects of the panic, and were beginning to grow con¬ servatively and to improve sanely. For this reason as well as because the riches of the State haye been gathered and distributed by most efficient methods the history of Minnesota since 1900 has been one of unbroken prosperity.

Government. — The seat of government is at Saint Paul in a capitol building designed by Cass Gilbert and decorated by LaFarge and other artists, and costing $4,000,000. The dis¬ tinctive features of Minnesota government are the School Land Law (see Education) , the Railroad and Warehouse Commission, elected by the people, and designed to adjust rates and other details of transportation in the interests of the public; the administration of State in¬ stitutions under a board of control appointed by the governor; the Non-partisan Election Law, making all candidates for office within the State, except those running for State executive offices, appeal to the electors on their ability to perform the work required by the office, instead of making the work a political issue, and the Primary Election Law, which takes the place of the conven¬ tion system of naming candidates. The State

has adopted effective measures for road-build¬ ing, preservation of resources, including Game, Fish and Forest, a Workmen's Compensation Act and a Minimum Wage Law that prohibits the employment of women for less than $8.75 per week. The legislature meets for the first 90 days in each odd-numbered year. Terms for the lower house are two years; for the senate, four. A voter must have lived in the State a year, in his precinct 30 days and be a citizen of the United States. The governor, lieutenant-governor, secretary of state, auditor and treasurer are each elected on a partisan ticket for a term of two years. There are 10 Congressional districts.

In politics the State has been regarded as solidly Republican, and in Presidential elections can be counted on for good Republican ma¬ jorities. There has been, however, . a decided tendency toward independence in politics within the last two decades, especially in the choice for governor. Below is the list of governors since the territory was organized in 1849 :

Territorial.

1849-53

1853-57

1857-58

State.

1858-60

Democrat

1860-64

Republican

1864-66

Republican

1866-70

Republican

1870-74

Republican

1874-76

Republican

1876-82

Republican

*1882-87

Republican

1887-89

Republican

1889-93

Republican

1893-95

Republican

1895-99

Republican

1899-1901

Democrat-Populist

1901-05

Republican

1905-09

Democrat

1909-15

Republican

1915-17

Democrat

1917-21

Republican

1921-

Republican

;d to odd-numbered years by

William R. Merriam ….

Knute Nelson .

David M. Clough .

John Lind .

Samuel R. Van Sant .

John A. Johnson .

Adolph O. Eberhart .

William S. Hammond …

Joseph A. A. Burnquist. .

J. A. O. Preus. . 1921-

* Inauguration changed legislature.

Population. — The population of the State bv decades is given herewith : 18a0, 6,077 ; 180U,

172 023 1870 439,706; 1880, 780,773; 1890,

1,301 $26; 1900, 1,751,394; 1910, 2,075,708; 1920

(U. S. official) 2,387,125 Of this population 11 000 are Indians, mostly Chippewas on White Earth Reservation; 9,000 are negroes; the rest are whites. Of the white population 74 per cent are native-born, 26 per cent are foreign. Of the foreign-born 250,000 are Scandinavians, 200,000 Germans, 40,000 Canadians, 35,000 Brit¬ ish 18,000 Russians, 42,000 Austrians, 27,000 Finns, 3,000 Italians and 15,000 from other

countries.

Bibliography. — Bond, (Minnesota and Its Resources) (New York 1854) ; . Johnson, C., (Highways and Byways of the Mississippi Val-lev> (New York 1906) ; Neill, (The History of Minnesota* (Saint Paul 1882) ; Folwell, W. W., Minnesota5 (in (American Commonwealth Series,* Boston 1907) ; (Minnesota in Three Centuries) ; Parsons, (The Story of Minnesota) (1916) ; Pollock, (Our Minnesota* (1916); Minnesota Historical Society Collections (Saint Paul, 15 vols.) ; Minnesota History Bulletin (1 916—17—18) ; Flandrau, (History of

Minnesota) (Saint Paul 1900) ; Gilfillan, (Early Political History of Minnesota* (ib. 1901);

McVey, F. L., (The Government of Minnesota> (New York 1905) ; O'Brien, (Minnesota Pioneer Sketches* (Minneapolis 1905) ; Robin¬ son, E. V., (The Cost of Government in Minnesota) (Saint Paul 1913) ; id., (Early Economic Conditions in Minnesota> (ib. 1915) ; Carney, (The Story of Minnesota) (1919) ; Emery, (The Story of Minnesota, 1916) (Saint Paul 1916) ; Skinner, (The Story of Minnesota> (Chicago 1914) ; Virtue, Government of Minnesota) (New York 1912) ; United States Geo¬ logical Survey, Reports of ; reports of State departments and of the United States Census Bureau Crop Survey.

E. Dudley Parsons, Author of (The Story of Minnesota .*

MINNESOTA, a river, which rising in the northwestern part of South Dakota flows through Big Stone Lake on the boundary be¬ tween Minnesota and South Dakota, then con¬ tinues southeast in Minnesota a distance of about 350 miles, to where it receives the waters of the Blue Earth, when it turns and flows northeast to the Mississippi River. It enters the Mississippi just south of Minneapolis and opposite Saint Paul. The head waters of the Minnesota rising on the eastern slope and those of the Red River of the North rising on the northern slope of the Coteau des Prairies — the Hill of the Prairies — of Dakota, are but a short distance apart. The Minnesota is navigable to a rapids about 40 miles from its mouth, and for small vessels nearly 300 miles above the rapids. Its whole length is about 475 miles.

MINNESOTA, University of. A coedu¬ cational State institution of higher learning on the east bank of the Mississippi River in Minne¬ apolis, Minn., established by an act of the Ter¬ ritorial legislature in 1851 and confirmed by the State constitution adopted in 1857. The present charter was adopted in 1868, and the first collegiate work was begun in the following year under the direction of the first president, William Watts Folwell, LL.D., a graduate of Hobart College, and a faculty of nine mem¬ bers. In September 1884 Cyrus Northrop, LL.D., a graduate of Yale and professor of English at that institution, succeeded to the presidency. In 1911 he was succeeded-by George Edgar Vincent, LL.D., a graduate of Yale, and dean of the faculties of arts, litera¬ ture and sciences of the University of Chicago. Its government is vested since the death in 1901 of the life regent, John S. Pillsbury, in a board of 12 regents, 9 appointed by the gov¬ ernor of the State and holding office for six years, and three ex-officio

members, the. gov¬ ernor, the State superintendent of public in¬ struction and the president of the university. The university comprises the following colleges, schools and departments; (1) The Graduate School, with advanced courses in all branches. (2) The College of Science, Literature and the Arts, offering four-year courses, largely elec¬ tive, leading to the degree of bachelor of arts ; a four-year course in arts and music leading to the degree of bachelor of arts in music ; courses in .which the senior work is offered conjointly with the Schools of Law, Medicine, Dentistry and Chemistry, leading to the same degree; also a four-year course in sci¬ ence and medicine leading to the degree of

bachelor of science. (3) The College of Engi¬ neering and Architecture is offering five-year courses in civil, mechanical and electrical engi¬ neering, and architecture, leading to the de¬ grees of civil, mechanical and electrical engi¬ neer and architect. The degrees of bachelor of science in engineering and architecture are conferred at the end of the fourth year. (4) The Department of Agriculture embracing (a) the colleges of agriculture (including agricul¬ tural and home economics courses), and fores¬ try, offering four-year courses leading to the degrees of bachelor of science, (b) The

schools of agriculture, offering three-year

courses adapted especially to the need and op¬ portunities of farm boys and girls, (c) Short courses in dairying, farm management and

traction engineering, (d) The experiment sta¬ tions, offering research advantages, (e) Ex¬ tension work in agriculture. (5) The law school giving a three-year course leading to the degree of bachelor of laws. (6) The medi¬ cal school with (a) the five-year course, includ¬ ing one year of hospital interneship leading to the degree of doctor of medicine; (b) the

School for Nurses, offering a three-year course leading to the degree of graduate in nursing; and (c) the School of Embalming, offering an

annual eight-weeks course, leading to the State embalmers' license. (7) The College of Den¬ tistry with a four-year course leading to the degree of doctor of dental surgery. (8) The College of Pharmacy offering a three-and a four-year course leading to the degrees of pharmaceutical chemist and bachelor of sci¬ ence in Pharmacy respectively. (9) The School of Mines, offering three five-year courses leading to the degrees of engineer of mines, engineer of mines in geology and metal¬ lurgical engineer. (10) The School of Analyt¬ ical and Applied Chemistry with two five-year courses, the Applied Course leading to the de¬ gree of chemical engineer, the other offered conjointly with the College of Science, Liter¬ ature and the Arts, leading to the degrees of bachelor of arts and bachelor of science in chemistry; and a four-year course in analytical chemistry leading to the degree of bachelor of science in chemistry. (11) The College of Education for the training of teachers and su¬ pervisors, with a two-year course leading to the degree of bachelor of arts in education. (12) The University Extension Service offer¬ ing educational opportunities to the people of the State through (a) correspondence courses, (b) evening classes, (c) lecture courses, (d) field debates on public questions, (e) reference bureau. The university also has charge of the geological and natural history survey. The de¬ grees conferred for graduate work are the master's degree in arts, science and pharmacy, and the doctor's degree in philosophy and medi¬ cine. No honorary degrees are conferred. The departments of law, medicine and educa¬ tion require two years of collegiate preparation. In all other departments students are admitted on examination or on certificate from accred¬ ited schools of the State. Tuition ranges from $30 to $175 a year. In 1914-15 the facultv num¬ bered 608 and the attendance was 13,252, of whom 5,076 were women. Of this number 4,752 were of college grade, 5,606 sub-collegiate and 2,894 extension. The general library contained 175,000 volumes and there are special libraries

in connection with the various departments of instruction. The laboratories are extensive and well equipped. There are dormitories for the School of Agriculture and one dormitory accommodating 90 women on the main campus. The main university grounds comprise about 109 acres and are valued at $2,000,000. The build¬ ings of the entire institution are valued at $5,700,000, and their equipment at about $2,416,-

654.35. The university farm, located between Saint Paul and Minneapolis and connected with the main campus by private car line,

con¬ sists of about 420 acres and is valued at $413,000. The buildings and equipment of the department of agriculture are estimated at $2,-

374.386.35. The university is supported by the income of its permanent endowment, a State tax of three-hundredths of a mill, and special legislative appropriations for maintenance, buildings and equipment. The gross income for 1914—15, exclusive of special appropriations, was $988,206.56. The endowment was $1,605,-356.62, and the value of all the university prop¬ erty, $12,800,205.55.

MINNESOTA HISTORICAL SOCI¬ ETY. This society was organized in 1849, the same year with the beginning of Minnesota as a Territory. Its objects are to collect and preserve the history of Minnesota and the Northwest. Membership is open to all who are interested in the work of the Society, on-their nomination by any of the present members. At present membership includes 22 honorary members, 80 corresponding members, 255 life members and 68 annual members, in total 425. The life and annual members represent, more or less fully, all large districts of Minnesota. The library. now comprises 114,425 books and pamphlets, including 10,042 bound volumes of newspapers. The number of individual por¬ traits, historical pictures and framed documents is about 700, besides 40 group pictures, which comprise about 1,500 portraits. The museum has 30 large cases filled with historical and archaeological relics, . including about 40,000 specimens of aboriginal implements, weapons and ornaments.

MINNEWAUKON, min-ne-wa'kon, N. Dak., village, county-seat of Benson County, on Minnewaukon Lake, on the Great Northern Railroad, about 115 miles northeast of Bis¬ marck. It has lumber-mills, a grain elevator and a large trade in their manufactured prod¬ ucts and agricultural supplies. Pop. 500.

MINNEWAUKON, min-ne-wa'kon, or DEVIL'S LAKE, North Dakota, one of a group of salt lakes which have no apparent outlet. It is. about 45 miles long and from 2 to 13 miles in width;. area, 750 square miles. The color of the water is darker than that of the fresh waters south. The .water is too brackish to be used by human kind, but not . for the wild animals of the. surrounding region. Several villages, exploiting lumber and agricultural products, are on its shores.

MINNOW, a small fresh-water fish; orig¬ inally a small European fish of the carp family (Leuciscus plioxinus') . In the United States most of the minnows are of the same family (see Cyprinpˆ), and are widely known as <(shinersw on account of the silvery character of the

scales.. <(The spring or breeding dress of the male is often very peculiar, the top of the

head and often the fins and portions of the body are covered with small tubercles, out¬ growths from the epidermis; the fins and lower parts of the body are often charged with bright pigment, the prevailing color of which is red, although in some genera it is a satin-white, yellowish or even blacks — Jordan. These lit¬ tle fishes live in clear brooks for the most part and go about in companies furnishing food for larger fishes. Many of them afford good sport to young anglers ; and all are sweet pan-fish, but very bony. They are of value and largely used as live-bait. Most of the Eastern exam¬ ples belong to the genus Notropis. (See Top-Minnows). Consult Jordan, (Vertebrates of the Northern United States5 (11th ed., Chicago

1914).

MINO DA FIESOLE, mee-no dah fee-ay- so-lay, Florentine sculptor : b. Poppi in the Casentino in 1431 ; d. Florence, 11 July 1484. His real name was Mino di Giovanni. He be¬ gan work as a stonecutter for Desiderio da Settignano, who always remained his master and friend. His home was Florence, but he worked in Rome in 1454, 1463 and 1464. Of Mino's early works the best are in the Duomo of Fiesole — altarpiece and tomb of Bishop Salutati extecuted before 1466. In the Badia of Florence are an altarpiece and the tombs of Bernardo Giugni (1466) and the Margrave Hugo (1481). These are carved in white mar¬ ble with life-size sleeping effigies and attend¬ ant angels all in the beautiful Renaissance style. After finishing the pulpit in the Prato Cathedral, in collaboration with Antonio Ros-sellino in 1473, a work remarkable for its deli¬ cately sculptured bas-relief depicting the life of the Virgin, he went to Rome where he executed the tomb of Pope Paul II (now in the crypt of Saint Peter's) ; the tomb of Francesco Torna-buoni in Santa Maria sofra Minerva; and a much-admired little tabernacle for the holy oil in Santa Maria in Trastevere. He is also

thought to have been the sculptor of several monuments in Santa Maria del Popolo, particu¬ larly those of Bishop Gomiel and Archbishop Rocca. The marble reredos here nresented by Pope Alexander VI is also said to have been the work of his hands. There are several tabernacles by him in Santa Croce, Florence, and in the Muzio Nazionale are busts of Piero de' Medici (1453); Giuliano de' Medici and Rinaldo della Luna (1461). Other portrait busts and profile bas-reliefs are preserved in the Bargello, Florence. They are full of life and expression. The Museum of Ber¬ lin possesses a female bust and a portrait of Niccolo Strozzi. The Louvre contains a San Giovannino. Consult Vasari, (Lives of the Painters5 (Vol. II) ; Perkins, C. C., (Handbook of Italian Sculpture5 (1883); Bode, Wilhelm, (Denkmahler der Renaissance Skulptur Tos-canus5 (1892-1905); Angeli, (Mino da Fiesole5 (1905) ; Winckelmann and D'Agincourt, (Stona della Scultura5 (1813); Semper, <Architektea der Renaissance5 (1880).

MINOR, me'nor, Jakob, Austrian scholar: b. Vienna, 15 April 1855; d 1912. He was educated at Vienna and Berlin, and became professor of German language and literature at Prague (1884) and of Teutonic philology at Vienna (1885). Besides numerous editions of texts, he published (Neuhoc'hcleut.sche Metrik5 VOL 19 — 14

(1893), an excellent study in prosody, and a valuable although unfinished work on Schiller (2 vols., 1890).

MINOR, mi'.nor, Lucian, American lawyer and writer: b. Louisa County, Va., in 1802; d. Williamsburg, Va., in 1858. He was graduated at William and Mary College in 1823, and five years later became commonwealth attorney for Louisa County, Va.,' holding this office until 1852. In 1855 he was made professor of law in William and Mary College, which post he held until his death. He was a strong advo¬ cate of temperance and wrote much on the subject. His tract, (Reasons for Abolishing the Liquor Traffic, > reached a sale of 30,000 copies. He wrote a portion of John A. G. Davis' (Guide to Justices5 (1838) ; added notes to Daniel Call's 'Virginia Reports5 and condensed the four volumes of Hening and Mumford's (Reports5 into one volume. His interesting notes of (Travel in New England5 were edited by James Russell Lowell for the Atlantic Monthly after his death.

MINOR, Robert Crannell, American artist: b. New York, 1840; d. 1904. He studied at Barbizon and became a pupil of Diaz. He subsequently went to Antwerp and was taught by Van Luppen and Boulanger, making a specialty of landscape. His student travels led him through

Germany and Italy, and on re¬ turning to New York he was elected to the National Academy of Design and the Society of American Artists. He exhibited in the salons of Antwerp and Paris, in the Royal Academy of London, as well as in New York, Boston and Chicago. Among his best-known works are (Dawn5 ; ‘Sundown5 ; ‘The Stream5 ; ‘October Days5 ; ‘Morning in June5 ; (The Vale of Kennet5 ; ‘Sunrise on Lake Cham¬ plain5 ; ‘Cradle of the Hudson5; (Cloudy Moonlight5 ; and ‘A Mountain Path.5

MINOR, in law, a person under age of legal capacity, either for any or all acts. Some¬ times, as in Scotland, the word is distinguished from the term infant by being more intensive, including those under age but above 14 for male and 12 for. female. Usually minor is synonymous with infant (q.v.).

MINOR, a musical term applied to inter¬ vals and modes (or scales). I. Interval : For purposes of art certain relative distances of height and lowness have to be definitely deter¬ mined and maintained. The sounds so chosen are notes of the system and the distances be¬ tween them are intervals. Various national scales present great diversity in this respect; for instance, the ancient Gaelic and the Chinese scales (the ladder of notes is called a scale), were constructed so as to avoid any mtervals as small as a semitone. The intervals of the ancient Greeks were calculated to develop the resources of melody without harmony. On the other hand the intervals of modern scales are calculated for the development of the resources of harmony rather than melody. The modern scale system is a product of artistic invention ; and the determination of the intervals took many centuries to establish. By the time of Bach it was clearly settled.. The interval be¬ tween one note and another is named according to the number of degrees between them on the scale, both notes included; but some intervals, _ thirds, for example, — have four semitones

and some have three semitones. The former is, therefore, called a major interval and the latter a minor interval; or in other words, a major third and a minor third.

II. Modes : When the immediate predeces¬ sors of Bach and Handel succeeded in estab¬ lishing a stable key-system, that key-system took two forms, in both of which the three chords of tonic, dominant and subdominant occupied cardinal points. In one form, or mode, the tonic chord was natural, that is to say, major. In the other form the tonic chord was artificial, that is to say, minor. In the minor mode so firm is the position of the tonic and dominant (the dominant chord being al¬ ways major) that it is no longer necessary to conclude with a major chord as was the custom in the 16th century. The effect of the minor mode is normally plaintive, because it centres round the artificial concord instead of the natural ; and though the keynote bears this artificial triad, the ear, nevertheless, has an expectation (which may be intensified into a powerful emotional effect) that the final conclusion of the harmonic scheme may brighten out into the more sonorous harmonic system of major chords. On the modern sense of the identity of the tonic in major and minor rests the whole distinctive character of modern har¬ mony and the whole key-system of classical composers. The minor mode recognizes two forms of scale, the harmonic and melodic. See Scale.

MINORCA, mi-nor'ka (Sp. Menorca, ma-nor'ka), an island in the Mediterranean, be¬ longing to Spain, the second largest of the Balearic group; greatest length, northwest to southeast, 35 miles ; average breadth, about 10 miles; area, 260 square miles, and with depend¬ ent islands 293 square miles. It is situated northeast of Majorca, from which it is sepa¬ rated by a strait of 27 miles broad. The coast is much indented on all sides except the south, and generally presents a succession of bold headlands, enclosing small creeks and bays, of which several form good harbors. Of these the best and most frequented is Port Mahon, the capital of the island. The coasts are rug¬ ged, and the surface broken and mountainous. Mount El Toro in the centre attains a height of 1,207 feet. The soil is not generally fertile; still, in good seasons the quantity of wheat and barley grown is sometimes equal to the con¬ sumption. The other principal products are oil, wine, hemp, flax, oranges and lemons. Some good cheese is made, and considerable atten¬ tion is paid to the rearing of bees. There is an abundance of small game on the island. Iron, copper, lead, marble, porphyry and ala¬ baster abound in several districts. The in¬ habitants make excellent sailors, but generally are indolent, ignorant and bigoted. At an early period Minorca was under the Carthagin¬ ians, who drew from it a number of excellent slingers, who distinguished themselves during Hannibal's wars in Italy. It afterward passed successively into the hands of the Romans, the Vandals and the Moors. The last were ex¬ pelled in 1285

by the Spaniards. During the greater part of the 18th century it belonged to the British, who finally ceded it to Spain at the Peace of Amiens (1802). Its exchange with Great Britain for Gibraltar has been frequently

discussed. Pop. about 41,939 Consult Mark¬ ham, Sir C. R., (The Story of Majorca and Minorca) (London 1908).

MINORCA, a breed of large black and white domestic fowls. See Poultry.

MINORITY. See Elections; Primary Direct; Vote, Voters, Voting.

MINORITY AND PROPORTIONAL REPRESENTATION. Under prevailing

election methods the views of large numbers of voters are not represented by men of their choosing. Minority parties get a voice in legis¬ lative assemblies only by the haphazard pre¬ ponderance of their members in a few localities. In every voting district that group of electors which is in the minority has ‘no direct repre¬ sentation, and sometimes for a generation its members will go to the polls in vain. Though Norway, in its Constitution of 1814, appears to have been the first country to make an attempt to change this, the subject did not attract gen¬ eral attention till toward the middle of the century. In 1844 Thomas Gilpin published in Philadelphia a pamphlet that led a long train of literature, and in 1857 appeared the first of several books by Thomas Hare, in whose idea of ((personal representation® J. S. Mill thought he discovered (<the greatest improvement of which the system of representative government is capable.® Since then many plans to accom¬ plish the same end have been suggested. All presuppose that more than one place is to be filled at a time, as a board of aldermen to be elected on a general list, or several representa¬ tives from one district. The simplest plan is the single-vote system, where each elector has but one vote and the candidates receiving the largest number of votes are declared elected. It has been used in Philadelphia by the Repub¬ lican party in the election of ward executive committees, and by the Democratic party in choosing inspectors of election. It is the method justified by the theory that no voter is entitled to be represented in any representative body by more than a single representative and would seem admirably adapted to the conduct of the internal affairs of parties. On the other hand, where the supremacy of party views is the issue, it is manifestly objectionable, as

with¬ out an impracticable degree of party machin¬ ery and discipline, the majority party, if it has nominated as many candidates as there are places to be filled, may so scatter its votes that less than half of them will be elected, and in any event cannot allot its votes so as to ensure a result proportionate to its preponderance. Systems based on the limited vote® theory meet this objection to some extent. Under them each voter may vote only for some fixed num¬ ber of candidates less than the number to be elected. In operation this secures representa¬ tion to the minority party second in rank, but with no relation to its numerical importance and smaller minority parties get no represen¬ tation at all. With the next group of systems, those known as ˆcumulative,® arithmetical complications grow. The first practical test of the idea came in 1870, when it was adopted as the method of electing English school boards, and in the same year it was put into the consti¬ tution of Illinois by the proviso that <(each voter may cast as many votes for one candidate

as there are representatives to be elected, or may distribute the same or equal parts thereof among the candidates as he shall see fit.® To each legislative district were allotted three members, so that a voter could cast his three votes for one, a vote and a half for each of two or one vote for each of three. The chief objection comes from the chance and tempta¬ tion for members of the majority to <(plump,® that is, cast all three votes for one man ; some¬ times this permits the minority to elect two men, when the bulk of the majority vote is concentrated on one popular candidate ; there¬ fore, it invites to contests between party col¬ leagues instead of political antagonists, breeds jealousies and disrupts organizations. These evils have been more conspicuous in the choice of English school boards, for the more men to be elected the greater the dangers from <(plumping.® Apparently the projectors of the minority representation plan in Illinois ex¬ pected that the two great parties would con¬ tinue to nominate three candidates in each dis¬ trict, but the politicians soon discerned the folly of nominating candidates for certain de¬ feat, and each party nominated only two candi¬ dates for the three positions to

be filled; hence all the nominees except one were practically certain of election. Furthermore, in districts strongly Republican, the Republicans would nominate only two candidates and the Demo¬ crats one and the reverse would occur in strongly Democratic districts, with the result that the voter had no choice whatever and a party nomination became equivalent to an elec¬ tion. Public opinion in Illinois has long called for the abolition of this system, but owing to the difficulty of securing constitutional amend¬ ments the efforts have been unavailing.

Several systems of proportional representa¬ tion of minorities have been devised, each of which has its variations in different countries or sections. The first, known as the ((free list® plan, provides that the lists of candidates shall be made up by the parties before the election and that the seats to be filled shall be divided between the parties in the proportion of the total votes cast by each, the higher men on each list to be declared elected to the number their party proportion warrants. This system has been in use in some of the Swiss cantons and Belgium enacted it into law in 1899. Its weak¬ ness is that it makes election wholly a party matter, practically preventing independent can¬ didacies. A ((freer list® plan advocated by Wil¬ liam H. Gove of Salem, Mass., provides that the lists shall be made up by the candidates, rather than by the parties. In advance of the election the candidates are to designate who shall get the benefit of any ineffective votes cast for them. When the votes are counted, the first step is to divide the total number of bal¬ lots by that of the places to be filled; the quotient determines the number of votes a can¬ didate must get in order to be elected,— his (<quota.® Votes cast for any one man beyond his ((quota® are ineffective and are ignored, so far as he is concerned, but are to help some other candidate, and the same is true of votes for candidates receiving so small a number that they must fail of election. The “freest list® system, the Hare plafi, has the list of preferences made up by neither the party nor the candidate, but by the voter, who designates

on his ballot the order of his choice. In the counting, as soon as it appears that a first-choice candidate needs no more votes, the second-choice candidate moves up into his place, being credited with the ballots until he in turn has reached his quota, and so on. Theoretically the smallest possible number of votes is wasted but in practice difficulty is ex¬ perienced in large districts, since the ballot boxes must be brought to a central bureau to count the vote. There is also a considerable amount of chance in the order of counting the ballots.

See also District; Apportionment; Congress; Senate, United States; House of Representatives. Consult Commons, J. R., (Proportional Representation (New York 1907) ; Humphrey, J. H., Proportional Repre¬ sentation (London 1911) and authorities cited under article Elections.

James W. Garner.

MINOS, mi'nos, in Greek mythology, (1) a ruler of Crete, said to have been the son of Zeus and Europa. He was celebrated as a wise lawgiver and a strict lover of justice. (2)

A grandson of the preceding son of Lycastus, son of the elder Minos and of Ida. This sec¬ ond Minos was the husband of Pasiphae, whose unnatural passion gave birth to the Minotaur. He was king of Crete, but is not represented as having succeeded to the kingdom, but by one tradition as having acquired it through the favor of the gods, and by another as having conquered it over his brother Sarpedon. He is said to have made war upon the Athenians to revenge the death of his son Androgeos, who was killed at the festival of the Panathenaea by the candidates whom he had defeated at the games. Minos, having defeated the Athenians, exacted from them every year a tribute of seven youths and seven maidens, who were de¬ voured by the Minotaur. Theseus delivered the Athenians from the burden of this tribute.

MINOT, ml'not, Charles Sedgwick, Amer¬ ican scientist: b. West Roxbury, Mass, 23 Dec. 1852; d. 19 Nov. 1914. He was graduated from the Massachusetts Institute of Technology in 1872, studied also at Leipzig, Paris, Wurzburg and Harvard, was lecturer on embryology and instructor in oral pathology and surgery in the Harvard Medical School in 1880-83, instructor in histology and embryology in 1883-87, as¬ sistant professor in 1887-92 and professor from 1892. He invented two forms of the micro¬ tome, an instrument for the automatic prepara¬ tion of sections for microscopical study. He was elected president of the American Society of Naturalists in 1894, and president of the biological section of the American Association for the Advancement of Science in 1901. Among his works are 'Bibliography of Verte¬ brate Embryology) (1893), and (A Laboratory Textbook of Embryology) (1903).

MINOT, ml'not, George, American law¬ yer: b. Haverhill, Mass., 5 Jan. 1817; d. Read¬ ing, Mass., 15 April 1856. He was graduated at Harvard in 1836 and at the Harvard Law School in 1838. He completed his legal studies with Rufus Choate and was admitted to the

bar in 1839. He became a noted Boston lawyer and was for many years solicitor of the Boston and Maine Railroad Company. Mr. Minot edited (Digest of the Decisions of the Supreme Court of Massachusetts, } 45 volumes with sup-

plement (18J4— 52); with Richard Peter, Jr., eight volumes of the (United States Statutes at Large 1 (1848), and was for 10 years sub¬ sequently editor of that work. He was also associate reporter of the decisions of the first circuit and edited (English Admiralty Reports1 (9 vols., 1853-54).

MINOT, George Richards, American

jurist: b. Boston, Mass., 22 Dec. 1758; d. Bos¬ ton, 2 Jan. 1802. After graduation at Har¬ vard in 1778, he studied law with Fisher Ames and was admitted to the bar of Boston, where he practised his profession. From 1781 to 1791 he was clerk of the Massachusetts House of Representatives. In 1792 he was appointed probate judge for the county of Suffolk, also serving at the same time as secretary of the convention that adopted the United States Con¬ stitution. In 1799 he was made chief justice of the Court of Common Pleas, and judge of the Municipal Court of Boston on its estab¬ lishment in 1800, holding this office until his death. One of the founders of the Massa¬

chusetts Historical Society, he edited three volumes of its Collections. He delivered the oration on the anniversary of the Boston

Massacre (5 March 1782). He published his¬ tory of the Insurrection in Massachusetts in 17861 (Worcester 1786) and a (History of

Massachusetts Bay,1 a continuation of Hutchin¬ son's (History of Massachusetts Bay1 (2 vols.,

1798-1803).

MINOT, N. Dak., city and seat of Ward County on the Mouse River, 196 miles west of Grand Forks. It is situated on the Minne¬

apolis, Saint Paul and Sault Sainte Marie and the Great Northern railroads. Minot is an important trading centre. Here the time is changed from “Central11 to “Mountain11 time, according to the system adopted in 1883. Minot has a fine hospital and a United States land office. _A term of the District Court is held here. Pop. (1920) 10,476.

MINOTAUR, rnln’o -tar, in Grecian my¬ thology, the son of Pasiphae, wife of Minos and a bull sent by F’oseidon, having the body of a man with the head of a bull, or the head of a man and the body of a bull. He ate human flesh, on which account Minos confined him in the labyrinth built by Daedalus, and at first exposed to him criminals, but afterward the youths and maidens yearly sent from Athens as a tribute, until at length Theseus killed him, and freed the Athenians from this tribute.

MINOT’S LEDGE, or COHASSET ROCKS, in Massachusetts, a promontory and lighthouse in Boston Harbor. See Lighthouse.

MINSK, mlnsk, Russia, city and govern¬ ment in extreme Western Russia. Minsk, the city and capital of the government, is on the Svisloch, 420 miles by rail southwest of Petrograd. It is the see of a Greek archbishop and of a Roman Catholic bishop. It has some manufactures of woolen cloth, hats, leather and a considerable general trade. Pop. 117,600. The government, bounded on the north and east by Vilna, Vitebsk and Mohilev; on the south and west by Chernigov, Kieff, Volhynia and Grodno, has an area of 35,220 square miles. Pop. 3,070,900.

MINSTER (Anglo-Saxon, Mynster, from monasterium) anciently signified the church of

a monastery or convent. In Germany and in Great Britain this title is given to several large cathedrals, as York Minster, the minster of Strassburg, *etc.* It is also found in the names of several places, which owe their origin or celebrity to a monastery, as Westminster, Leo¬ minster, *etc.*

MINSTREL, a name introduced into Eng¬ land by the Normans, and which comprehended singers and performers of instrumental music, together with jugglers, dancers, sleight-of-hand performers and other

similar persons. See Negro Ministrels ; Troubadour under Pro¬ vencal Language and Literature.

MINT, a genus of perennial herbs (Men¬ tha) of the family Menthacece. Many species have been described, of which 12 are either native or naturalized in America, character¬ ized by square stems, opposite simple leaves, small, purple, white or pink, two-lippcd, axillary flowers, in whorls which often form terminal spikes. All are noted for the fragrance of their foliage, due to the presence of an essential oil, for the production of which half a dozen spe¬ cies are more or less cultivated. The following are the most important ones: Spearmint (M . spicata) , peppermint (M . piperita), pennyroyal (M . pulegium), bergamot-mint (M. citrata) and Japanese mint (M. arvcnsis, var. piper-ascens). Spearmint is the species most used as a culinary herb in the form of mint sauce served mainly with roasted lamb. Peppermint is largely employed in flavoring candy and for the production of menthol. Bergamot-mint is chiefly used in perfumery. Medicinal properties have been attributed to all of them, and they have all been cultivated upon a com¬ mercial scale to supply the various demands. Besides these cultivated species, which are frequently found as escaped plants near gardens, there are several other species, of which the following are perhaps best known: Round-leaved mint (M . rotundifolia) , a native of Europe, naturalized rather interruptedly in the coast States from Maine to Texas; water mint (M. aquatica), with hairy stems, rather rare in wet places in New England and south¬ ward to Maryland; whorled mint (M . sativa) and its close relative, corn mint (M . arvcnsis), which are found in damp fields in New Eng¬ land; and wild mint (M . canadensis), which extends northward from the Northern States across the continent. All are recognizable by their resemblance to other members of the genus, especially by their odor. Several other related plants of other genera are called mint, among them being mountain mint (Koellia spp.), also popularly known as basil. The numerous species are widely distributed throughout the United States and Canada, and have a mint-like flavor and odor. Catnip (Nepeta cataria) is often called cat mint, and several species of Monarda, especially M. punctata, are known as horse-mint.

The half-dozen cultivated mints are man¬ aged alike. They will grow on any soil that will produce good crops of potatoes, but since they are considered exhausting crops are in¬ cluded in the rotation only once in five or more years. Upon reclaimed swamps, however, which are considered best adapted to their cultivation, they are generally allowed to remain consecu¬ tively for five years or even more without

change of crop. The land having been plowed, harrowed and otherwise fitted, small pieces of the rootstock are dropped at inter¬ vals of a few inches in shallow furrows about 30 inches apart. All through the season the land is kept scrupulously free from weeds, especially of smartweed, fireweed, ragweed and horseweed, which seriously injure the prod¬ uct if included in the “hay® from which the oil is distilled. Hand-weeding is commonly practised after horse cultivation is stopped by the luxuriant vines. About midsummer, or when the earliest flowers appear, the tops are cut, either with scythes of sometimes with mowing machines, and cured like hay. They are then stored under cover for distilling. This process is usually conducted with steam, which enters the still below, passes upward through the mass of hay, carrying the essential oil with it, and condenses in coils of pipe chilled by running water. After condensation, the oil and water separate by gravity. After standing for a greater or less length of time, crystals of menthol (q.v.) appear in the oil of peppermint. The annual yield of oil per acre sometimes exceeds 50 pounds, and some¬ times a second profitable cutting of the crop may be made in autumn. Having once been planted the crop takes care of itself from year to year. The most important producing centre is in southwestern Michigan and northwestern Indiana. Perhaps next is Wayne County, N. Y. Other important mint fields are at Mitcham. Surrey and Lincolnshire, England, and in Saxony, Germany.

MINT, a government establishment for the coining of lawful metallic money. The United States mint was established in 1791, and re¬ mained an independent department of the Federal government until 1873, when it became subordinate to the Treasury Department under the title of ((The Bureau of the Mint.® This bureau is controlled by the Director of the Mint, who has general supervision of all the mint and assay offices in the country. He is the active manager, and formulates the rules of operation under which the bureau is run, but these rules require the approval of the Secretary of the Treasury before they become effective. Besides making the coined money of the country the United States mint makes metallic money for foreign

nations, and also does considerable business in the line of sup¬ plying fine gold and silver in bars for indus¬ trial uses, and in making assays of bullion and ores of the precious metals for private owners.

During the fiscal year ended 30 June 1916, coining operations were carried on at the mints of Philadelphia, San Francisco and Denver. The mints at New Orleans and Carson City and the assay office in New York were oper¬ ated as assay offices. The assay offices at Seattle, Boise, Helena, Salt Lake City and Deadwood were operated only as purchasing agencies for the active institutions. Refining was carried on at New York, Denver and San Francisco. The value of the gold acquired by the United States government at the mints and assay offices during the year cited was $508,- 083 262.92. The amount of the silver purchased was 654,516,196 fine ounces, costing $3,348,-

642 49.

The United States coinage for the year amounted to $37,2 09,062.83, of which $31,077,409

was gold; $3,328,882.50 silver; $1,790,468.15 nickel; and $1,012,303.17 bronze. These figures include the 19,534 one dollar gold pieces coined for the Panama-Pacific International Exposi¬ tion. There were also coined for foreign na¬ tions, at the Philadelphia mint: For Cuba, 3,092,890 gold pieces; 11,574,450 silver pieces and 25,912,150 nickel pieces; for Colombia. 852,663 silver pieces; for Ecuador, 1,000,000 silver pieces ; for Salvador, 1,000,000 nickel pieces; for Venezuela, 2,000,000 nickel pieces; and for Peru, 100,000 gold planchets and 500,829 silver planchets. The mint at San Francisco coined for the Philippines 1,435,000 silver pieces and 5,500,000 bronze pieces. No other minting institution in the world turns out annually so large a number of pieces of money nor an amount of money of so great a value as the United States mint.

The seigniorage for the year cited amounted to $4,046,740.26 ; the profits in the handling of old metal amounted to $280,259.72, and other profits amounted to $658,174.91, making the total receipts, $4,985,174.89. The operating ex¬ penses were $1,228,029.06. The net profits to the government from the mint were, there¬ fore, $3,757,145.83.

The total value of money coined by the United States mint since 1793,

the first year of its active operation, has been $4,494,094,087.68. Of this, $3,422,949,938.50 has been in gold; $995,956,436.30 in silver; and $75,187,712.87 in minor coins.

The process of manufacturing coins com¬ prises several distinct operations: (1) melting the metal bullion and casting it into bars; (2) rolling the bars into strips or ribbons; (3) cut¬ ting out the round discs or planchets ; (4) ad¬ justing the weight of the individual planchets; (5) rolling the rim of the planchet; (6) anneal¬ ing and cleaning the planchets with acid; (7) striking the impressions on the planchets ; (8) weighing each finished coin.. In the rolling machines the rollers are adjustable and the space between them is governed by the oper¬ ator. About 200 ingots are run through per hour on each pair of rollers. When the rolling is completed the strip is about six feet long. As it is impossible to roll perfectly true it is necessary to “draw® these strips, after being softened by annealing. The drawing benches resemble long tables, with a bench on either side, at one end of which is an iron box se¬ cured to the table. In this are fastened two perpendicular steel cylinders. These are the same distance apart that the thickness of the strip is required to be. It is drawn between the cylinders, which reduces the whole to an equal thickness. These strips are now taken to the cutting machines, each of which will cut 225 planchets per minute. The press now used consists of a vertical steel punch. From a strip worth $1,100 about $800 of planchets will be cut. These are then removed to the adjusting room, where they are adjusted. After inspec¬ tion they are weighed on very accurate scales. If a planchet is too heavy, but near the weight, it is filed off at the edges; if too heavy for fil¬ ing, it is thrown aside with the light ones to be ’remelted. The planchets, after being ad¬ justed, are taken to the coining and milling rooms, and are passed through the milling machine. The planchets are fed to this ma¬ chine through an upright tube, and as they

descend are caught on the edge of a revolving wheel and carried about a quarter of a revolu¬ tion, during which the edge is compressed and forced up. By this apparatus 560 half-dimes can be milled in a minute; for large pieces the average is 120. The massive but delicate coin¬ ing presses coin from 80 to 100 pieces a minute. These presses are attended by women. After being stamped the coins are taken to the coin¬ er's room. The light and heavy coins are kept separate in coining, and when delivered to the treasurer they are mixed in such proportions as to give him full weight in every delivery. By law, the deviation from the standard weight, in delivering to him, must not exceed three penny¬ weights in 1,000 double eagles. See Coinage.

The mint at Philadelphia was the sole United States mint from 1792 to 1833. It was located at 37 and 39 North Seventh street, and the actual coining was done in a brick building in the rear, which was erected by the govern¬ ment. These buildings were sold at auction in 1836. In 1835 the New Orleans mint was es¬ tablished. This was suspended in 1861, and was not reopened until 1879. Coining was again suspended there in 1909. The mint at Charlotte, N. C., was organized in 1838; sus¬ pended in 1861 ; and abolished in 1913. The San Francisco mint was established in 1853, and the Denver mint in 1862. The mint at Carson City was organized in 1870, but coinage was suspended there in 1893.

In Great Britain there was formerly a mint in almost every county. Besides the sovereign, barons, bishops and the principal monasteries exercised the right of coining. From the time of William the Conqueror the great' bulk of the coining of Great Britain was done in London, but it was not till the reign of William III that all the provincial mints were abolished. The present mint on Tower Hill, in London, was erected between the years 1810 and 1815. The furnaces of the British, or Royal, Mint number 16 and are gas fired, consuming 15,000 cubic feet of gas per hour. In the five-year period 1911-16 there was melted in these furnaces precious metals to the amount of 9,900 tons. The London mint supplies the whole of the coinage of the British Empire, except Australia and the East Indies, which are supplied from branch mints at Sydney, Melbourne, Perth, Cal¬ cutta and Bombay. In France the number of mints was at one time considerable, and in the earliest times indefinite. Before the Revolution there were 27 mints, each of which had a letter or letters of the alphabet for its sign. In 1857 there were still seven French mints, namely, Paris, Bordeaux, Lille, Lyons, Marseilles, Rouen and Strassburg. In 1858 those of Lille, Marseilles and Rouen were abolished, and in 1860 that of Lyons, so that there were only three mints remaining in 1870, when Strassburg was taken

by the Germans.

Consult Director of the United States Mint, (Annual Reports y ; Watson, D. K., (History of American Coinage* (New York 1899).

MINT GERANIUM. See Costmary.

MINTON, Thomas, English pottery manu¬ facturer: b. Wyle Cop, Shrewsbury, 1765; d. 1836. He was originally an engraver, having learned his art from John Turner, who had paid special attention to the process of print¬ ing on delft or chinaware. He settled at

Stoke upon Trent in 1791 and founded a pot¬ tery factory with the object of producing glazed pottery in the highest style, which should com¬ pete with the productions of foreign countries. He was completely successful and the range of his manufactures was increased by his son, Herbert Minton (1793-1858), who succeeded him in 1836, and manufactured the famous “Parian® porcelain and the encaustic tiles, with which the name Minton is now most commonly associated.

MINUCIUS FELIX, Marcus, probably the earliest Latin apologist of Christianity. Al¬ though he is mentioned by Lactantius and Saint Jerome, practically nothing is known of his life except what may be gathered from his one known work, (Octavius, J a popular defense of Christianity in dialogue form. Almost all modern critics agree in putting the date of its composition before that of Tertullian’s (Apolo-geticum* (197) which bears a close resemblance to it, although the matter has been the source of great controversy. Waltzing, who has pub¬ lished the best and most recent edition (Leip¬ zig 1912) and made many other valuable con¬ tributions to the literature of the subject, places it between 160 and 185. There is an English translation in the (Ante Nicene Fathers.* The dialogue, which is modeled chiefly on Cicero’s (De natura deorum,* takes place between three lawyers: the author (who acted as judge), Caecilius Natalis (a pagan and native of Citra), and Octavius Januarius (like the author, a Christian convert and native of Africa). The three had left Rome during the autumn vacation for a sojourn at nearby Ostia, where on a walk along (the strand the discussion was provoked by the saluting of a statue of Serapis by Caecilius. By agreement he begins, giving an arraignment of Christianity which alleges the impossibility of man arriving at truth, the inexpediency of disturbing long-established religious beliefs (especially those which have been the cause of Rome’s greatness), the want of culture among the Christians, the indecency of their worship

and the inherent absurdity of their doctrines. Refuting these allegations point for point, Oc¬ tavius, upon purely philosophical grounds and therefore without explicitly quoting the Holy Scriptures or mentioning the name of Christ or the mysteries _ of Christianity, treats of the creation, Providence, the unity of God, the ab¬ surdity of paganism, the resurrection and the reward after death. Caecilius acknowledges himself vanquished, but wishes some further explanations to be made later. The dialogue, in spite of the inevitable traces of the general decadence of taste, attains a rare degree of ele¬ gance, grace and limpidity. The introduction especially is a masterpiece because of the naivete and naturalness with which the stage is set. Saint Jerome speaks of another work appear¬ ing under the name of Minucius Felix, (De fato vel contra mathematicos,* but believes that it is not genuine because of the difference in style. Minucius in his dialogue had promised a special work on fate and it may be that this inspired the publication under his name of a work that was not his.

Bibliography.— Waltzing, J. P., <Studia Minuciana* (Louvain 1906) ; Teuffel, W. F., Geschichte der romischen Literatur* (6te aufl.' Leipzig 1913) ; Bardenhewer, Otto, (Les Peres

de l'figlise; leur Vie et leurs Oeuvres' (tome 3, Paris 1898) ; Salmon, George, (Minucius Felix, Marcus' in Smith and Wace's (A Dic¬ tionary of Christian Biography' (Vol. Ill, London 1882) ; Chevalier, Ulysse, Dio-Bibliog- raphie' (Paris 1905).

Herbert F. Wright.

MINUET, min'u-et', a graceful and stately dance of French origin, the name of which, de¬ rived from menu, small, was suggested by the little steps. It developed from the branle of Poitou and was introduced into Paris in 1650. It was at first a gay and sprightly dance; but after appearing at court it became grave and very dignified. It is mentioned by Beauchamps, father of dancing-masters, who flourished in the reign of Louis XIV, and also by Blondy, his pupil ; but it was Pecour who

gave the minuet popularity. The first known minuet tunes of artistic value were written by Lully (composer of ballets and operas) in 1653. The minuet was a great favorite at the court of Louis XIV, and was equally popular in the con¬ temporary court of Charles II in England, where it continued in vogue into the reign of George II. The minuet reached perfection in the reign of Louis XV. It was then a dance for two persons, in moderate triple time, and was generally followed by the gavotte (q.v.). Afterward the minuet was considerably devel¬ oped, and, with the gavotte, became chiefly a stage dance and a means of display. The orig¬ inal court minuet was a grave and simple dance, although it did not retain its simplicity for long. It was elaborated and molded into a beautiful form, — the perfect expression of an age in which deportment was carefully cul¬ tivated, manners were polished and bodily grace developed to the highest degree. The many slow graceful movements, the bows, the pauses to be filled with pretty compliments and the opportunity the dance gave for the display of beauty and bravery of costume made the minuet a factor in the polite world on both sides of the Atlantic. These court minuets were written in three-quarter time and con¬ sisted of two eight-bar phrases, each of which was repeated. Mozart's beautiful minuet in (Don Giovanni' shows the form exactly. The form was soon extended. As a complement to the first movement, a second minuet was added, similar in form but contrasted in feeling. This, being usually written in three-part harmony, received the name of Trio, a name retained to the present time, long after 'the restriction as to the number of parts has been abandoned. A further enlargement of the form of the minuet consists of the ex¬ tension of the number of bars to 16. Bach and Handel introduced the minuet into their suites and Handel also used it frequently as a con¬ cluding movement for the overtures to his operas and oratorios. Bach's minuets are re¬ markable for their variety of form and char¬ acter. The historic importance of the minuet arises from the fact that it still holds its place in the symphony, the descendant of the suite. The first composer to introduce the minuet into the symphony appears to have been Haydn. Examples are also found in Haydn's string-quartets. Havdn, however, while retaining the form, changed the spirit and introduced a light¬ hearted humor. The form of Mozart's minuets

is identical with Haydn's, but Mozart again changed the spirit and in his hands tenderness and grace take the place of mere exuberance.

It is in Mozart's concerted instrumental works that his minuets are chiefly to be studied. Bee¬ thoven continued the popularity of the

minuet. First he followed the form and general char¬ acteristics of Mozart, but gradually he trans¬ formed the minuet into the Scherzo ; and in the great majority of symphonies since Beetho¬ ven, the Scherzo replaces the older form. Oc¬ casionally the minuet appears as in Mendels¬ sohn's (Italian Symphony' and in Schumann's (E-flat Symphony.' The Italian composers were most successful in their use of this form. Among them was Boccherini (1743-1805), whose quintets contain gems that are still popu¬ lar. The beautiful minuet in the last scene of Verdi's (Falstaff' is a most happy adaptation of the old form to modern music.

MINUIT, min'u-it, MINUITS, or MINN-EUIT, mm'e-wit, Peter, German colonist in America: b. Wesel, Rhenish Prussia, about 1580; d. Fort Christiana, New Sweden (Dela¬ ware), 1641. He was an official in America in the service first of the Dutch West India com¬ pany and then of the Swedish West India Com¬ pany. Appointed governor of New Netherlands by the Dutch West India Company on 19 Dec.

1625, he landed on Manhattan Island on 4 Mav

1626, purchased the island from the Indians for trinkets valued at approximately $24, built Fort Amsterdam and governed with a great degree of success until his recall in August 1631. The vessel on which he sailed wras forced to put in at Plymouth, and he was imprisoned for some months on a charge of illegal trading. In 1633 the charter of the Swedish West India Com¬ pany, originally granted in 1626, was renewed, and in 1637 Minuit, under the direction of the company, set sail from Gothenburg with 50 Swedish apd Finnish colonists to found a colony in North America. He arrived at Dela¬ ware Bay in April 1638, purchased from the Indians the territory between the falls of the Delaware at Trenton and Cape Henlopen, called this region New Sweden, and built Fort Chris¬ tiana, near the site of Wilmington, Del. The establishment of the colony aroused the resent¬ ment of the Dutch, by whom it was taken in 1655. Consult Mickley, (Some Account of William Usselinx and Peter Minuit' (in Dela¬ ware Historical Society Papers,' Wilmington

1881).

MINUTE, a division of time and of angu¬ lar measure; the 60th part of an hour, and the 60th part of a degree. In astronomical works minutes of time are denoted by the initial letter m, and minutes of a degree or of angular space by an acute accent ('). In architecture the 60th part

of the diameter of a classic column, measured at the base.

MINUTE MEN, in the American Revolu¬ tionary War, the militia, who. were prepared for service at a minute's notice. Thev were principally civilians, resident in Massachusetts, who were enrolled in accordance with an act of the provincial congress, passed 23 Nov. 1774. There were in Boston alone 16,000 minute men ready for service.

MINYAS, min'i-as, in Greek mythology, the son of Chryses, the hero of the Minyce, from

whom were descended most of the Argonauts. His three daughters, Clymene, Iris and Alcithoe, or Leuconoe, Leucippe, Alcithoe, were changed into bats for having made light of the mysteries of Dionysus.

MIOCENE, in geology , the third epoch of the Tertiary period, intermediate between the older Oligocene and the newer Pliocene. Con¬ sidered in respect to its invertebrate (fossil) fauna the earlier part of it (Hower® iocene) forms a part of the Oligocene (q.v.) ; but no such distinction can be made when the period is judged by its vertebrate remains. (See Ter¬ tiary). Marine beds of Miocene Age are known on the Atlantic and Gulf Coastal Plain of the United States, showing that the eastern edge of the continent was under water. Marine Miocene is also known on the Pacific Coast, the western margin of the continent also being submerged. In the Rocky Mountains and Great Plains, terrestrial gravels, sands and clays ac¬ cumulated, in part in lakes, in part on flood plains. The great lava flows of the Columbia Plateau and the Yellowstone Park Region are of this age. In Middle or Late Miocene came the folding of the Coast Ranges, and probably simultaneously came the uplift of the Alps, the Apennines, the Caucasus and the Himalayas.

MIOHIPPUS, a fossil horse of later Miocene time. See Horse, Evolution of.

MIOTIC, a word that notes or character¬ izes the stage in the life-history of an organism at which miosis, or reduction, occurs ; in other words it is the suppression of an entire whorl of floral organs. The term is also applied to vegetable alkaloids used in medicine to cause contraction of the pupil of the eye, mydriatics being the designation of drugs which cause dilation. Consult Mann, A., Preparation of unbroken Mother-cells and other Cells for Studies in Miosis) (in Science, Vol. XXXVI, n. s. 1912).

MIQUELON, mek-lon, an island in the Atlantic Ocean, near the southern coast of Newfoundland, at the entrance of Fortune Bay, with Saint Pierre (q.v.) forming a French colony. The southern part of it is called Little Miquelon (Petite Miquelon) or Langley Island, and was once a separate island, but since 1783 has been connected with it by a sand¬ bank. The island was discovered by Sebastian Cabot in 1497, and is a French possession. It is under the direction of the commandant of Saint Pierre and is occupied only by a few families engaged in the fisheries. The area of Miquelon is 83 square miles. Pop. about 600.

MIR, mer, in Russia, a name given a com¬ mune, consisting of the inhabitants of one or more villages, who are as a community owners of the surrounding land which is redistributed to the members from time to time, and who are mutually liable for the taxes. The mir is self-governing as a community, with elective officers, but is subject to bureaucratic control.

MIRA, mi'ra or me'ra, or STELLA MIRA

(the wonderful star), in astronomy, the star Omicron Ceti, a remarkable variable, situated in the neck of <(the whale. ® Its variability was discovered in 1596 by Fabricus. The period is somewhat irregular, but averages about 331 days. During the greater part of this time the star remains of about the 9th magnitude, but

during about 100 days it rises to a maximum which may vary from the 2d to the 5th magni¬ tude, remains for a week or 10 days there, and then sinks to its minimum again. When shin¬ ing with a brightness of the 2d magnitude, it is giving out more than 600 times as much light as when at the 9th magnitude. Its greatest recorded variation occurred between the years 1779 and 1783, when, after attaining a bright¬ ness equal to that of the first magnitude star, Aldebaran, it sunk so low that it was invisible, even in telescopes showing stars of the 10th magnitude. The period of its changes is also irregular, sometimes varying to the extent of two months. Thus, neither the times of great¬ est brightness nor the amount of the brighten¬ ing can be accurately predicted.

As to what occurs in this and similar long period variables to occasion so great an out¬ burst of light at the approximately constant interval of about 11 months, we are ignorant. As the time of greatest brightness of Mira ap¬ proaches the spectrum gives evidence of

power¬ ful disturbance, and the outburst is from the depths of the sun, the outlying strata of vapors remaining comparatively cool. A periodical surging of the material of the ball of the sun is thus suggested, and this so widespread as to amount to a real bodily distortion rather than to a mere tide, but the cause of this disturb¬ ance we do not know.

MIRABEAU, Gabriel Honore Riquetti,

ga-bre-el o-no-ra re-ket-te me-ra-bo, or mir'a-bo-, Comte de, French orator and Revolutionary leader: b. Bignon, near Nemours, 9 March 1749; d. Paris, 2 April 1791. In 1767 he en¬ tered the Berry cavalry regiment, was pro¬ moted 2d lieutenant, but on account of miscon¬ duct was later imprisoned on the island of Re until March 1769. He then joined the expedi¬ tion to Corsica, in 1771 was commissioned cap¬ tain of dragoons and in 1773 was married. In 1774 he was imprisoned in the Castle of If, owing to debts and quarrels with his wife and father, and the next year was transferred to the Castle of Joux, near Pontarlier. Here he fell in love with the young wdfe of the Marquis de Monnier; trouble ensued and Mirabeau finally escaped to Switzerland, where he was joined by his mistress, Sophie, as he called her, and in October 1776 they settled in Amsterdam. In May 1777, however, they were arrested, brought to Paris and Mirabeau was imprisoned for three years and a half at Vincennes, being released in December 1780. After Mirabeau had forsaken her, Sophie committed suicide in 1789. Having secured the revocation of the death sentence imposed upon him for the seduc¬ tion of Sophie, and being legally separated (1783) from his wife, he left France for a few months.

Upon Mirabeau's return he began his life¬ long intimacy with Henrietta van Haren, known as *Mme.* de Nehra, whose influence was undoubtedly exerted to his great benefit. In August 1784 he was forced to flee to London to allow more trouble to blow over, and while there wrote the Considerations sur l'ordre de CincinnatusP About 1784 he began to devote himself to politics, visited London, was en¬ trusted by Calonne with a secret mission to Prussia, and published various treaties, which made him sufficiently well known to the tiers

etat to be elected by the town of Aix, to be its representative in the States-General of 1789. Here he speedily eclipsed all the other orators of the Assembly, and became the centre round which gathered all the men of greatest mark and force of character in the third estate. He was the immediate cause of the French Revolu¬ tion, by the resistance which he offered to the demand of the king after the royal sitting of 23 June 1789, that the third estate should vote separately from the other two orders. It was on this occasion that he gave the vigorous reply to the grand-master of ceremonies, who had communicated to the Assembly the royal will, concluding with the words, ((Go and tell your master that we are here by the will of the peo¬ ple, and that no one shall drive us out except by the force of bayonets.® Both before and after this occasion he delivered many eloquent speeches, which obtained for him the title of the <(French Demosthenes.® Among the most remarkable of these are his address to the king demanding the removal of the troops encamped at Versailles, speeches on the national bank¬ ruptcy, on the civil constitution of the clergy, on the royal sanction, on the right of peace and war, and his reply to the Abbe Maury on eccle¬ siastical property. After having shown himself a bold reformer, and the most dangerous ad¬ versary of the court, Mirabeau ended by offer¬ ing his support to the throne ; the court paid his debts and supplied him with funds, although he continued to make a show of opposition to royalty in order to uphold his popularity. This state of matters dates from May 1790. It ap¬ pears to be true that in this change of position he acted from conviction, foreseeing the im¬ minence of a great catastrophe, which he de¬ sired if possible to avert. Whatever may have been his motives, this conduct, when it became known, naturally raised up against him numer¬ ous enemies. But on 30 November he was elected president of the Jacobin Club, and on 29 Jan. 1791 of the National Assembly. His remains were buried with great pomp in Sainte-Genevieve Church (the Pantheon), but three years later they were exhumed to make room for those of Marat. Mirabeau's aim was to make France a constitutional monarchy after the English pattern. Statesmanship and oratorical powers were marvelously combined in him. *Mme.* de Stael said of him that his speech was <(like a powerful hammer, wielded by a skilful artist, and fashioning men to his will.® His speeches, however, were not his own altogether: a group of his friends united to supply him with the framings, and these he suffused and sublimated with his own. genius.

Bibliography. — <Memoires biographiques, litteraires et politiques de Mirabeau,* by his adopted son, Lucas de Montigny (1834-35); and

(Correspondance entre le Comte de Mira¬ beau et le Comte de la Marck pendant les an-nees 1789-91) (1851). Other important works on Mirabeau are Merilhou, (Essai sur la vie et les ouvrages de Mirabeau) (1827); Reynald, (Mirabeau et la Constituante* (1872) , Louis and Charles de Lomenie, (Les Mirabeau* (1878 and 1889); Aulard, <Mirabeau* (1882); A Stern, (Das leben Mirabeaus* (1889; Fr. trans. 1895) ; Mezieres, <Vie de Mirabeau* (1892) • (Carlyle, (French Revolution* and As¬ says on Mirabeau*; Willert, (Mirabeau* (1898) ; Tallentyre, (Life of Mirabeau* (1908) ;

Trowbridge, (Mirabeau the Demigod* (1907), and the bibliography in the translation from the French of Louis Barthon's (Mirabeau*

(1913).

MIRABILITE. A mineral consisting of hydrous sodium sulphate or glauber salt, Na2So4. IOH20O, occurring in the United States in Arizona, California, Oregon, Wyoming. Used to some extent for manufacture of soda.

MIRACLE PLAYS. The earliest dramatic representations of religious themes grew up within the Church itself. At certain seasons of the year, tableaux of gospel scenes were shown to the people, a practice which still survives in the representations of the Nativity in modem Catholic churches. The introduction of action and music into these tableaux is easy to under¬ stand, particularly in view of the dramatic ele¬ ments in the celebration of the Mass, and in the ritual for special occasions, like the consecration of a church. Tropes or simple texts set to music were added to the regular service, and gave a further opportunity for dramatic scenes. In time these tropes grew more elabo¬ rate, passages in the vernacular were intro¬ duced and popular elements not taken from the Bible were added. Meanwhile, the little plays, which in the beginning had been given in the choir, were transferred to the nave, and set up against the pillars. So popular did these representations become, and so great was the concourse of spectators, that a move outside the building into the churchyard had to be made. Secular elements crept in very rapidly, and the plays were finally transferred to open spaces in the cities and towns. The liturgical drama reached its height in the 13th century; by the beginning of the 14th century it had largely passed out of the hands of the clergy, although representations continued to be given in many

churches.

The growth of the miracle play in England is due to the influence of the Normans. There are almost no evidences of dramatic impulse in England before the Conquest. The earliest play of which there is mention by name is a (Playof Saint Katherine,* at the beginning of the 12th century, produced under the direction of a Frenchman who afterward became abbot of Saint Albans. To the same century belongs the work of Hilarius, a pupil of Abelard, and per¬ haps of English birth. He wrote Latin plays on subjects taken from the Scriptures, and di¬ versified them with refrains in Old French. It seems probable that French plays may have been acted in England at this time, but none are extant.

The term ((miracle play® is properly applied to the religious plays which developed in Eng¬ land out of liturgical beginnings. They have sometimes been called ((mysteries,® but this term, which is more generally and rightly used of pro¬ ductions in France, does not antedate the 18th century in England, the mediaeval name being miraculum, or miracle. A great impetus was given to the plays by the institution of Corpus Christi Day, with its elaborate processions and outdoor ceremonial, and many came to be pre¬ sented at this season, when the conditions of weather were likely to be favorable. In time the procession served as a mere preliminary to the dramatic performances to follow. A desire for more elaborate stage effects and a greater

number of incidents within the plays was con¬ stantly increasing, until there developed out of the relatively simple early pieces long groups of plays of cyclic character, covering the prin¬ cipal events of the Scripture narrative, in both the Old and the New Testament. The series given at York in 1415 begins with the Creation, and ends with the glorification of Mary and Jesus in heaven, embracing 48 separate pieces in all. These cycles were often not all given on one day, but extended over two or more days, or they were divided, and presented in succeeding years.

After leaving the churches, the plays soon passed into the hands of the guilds, or associa¬ tions of tradesmen. In the 13th century clerics were forbidden by papal edict to appear on the stage, but these prohibitions were frequently disregarded. The control of the plays by the guilds marks a period of great importance in the history of the English drama. Much care was devoted to the production and acting of the various pieces. The corporation of the city had general charge of the matter, deciding when the performances should be given, and dividing the various scenes among the several companies. An effort was made to have the play suit the character of the guild that gave it; the shipwrights showed the building of the Ark, the waterman the Flood, and so forth. The plays were given on movable stages called pageants, which consisted of "high scaffoldes with two rowmes,® one beneath which was used as a dressing-room, and one above, open on all sides to give a better view, and occasionally provided with a canopy. These wagons moved from place to place, repeating the performance at different stations. The number of these sta¬ tions varied with the size of the town; there were sometimes a dozen or more. The pageant wagons were gaily painted and decorated. They were generally rectangular, but special shapes were required for the Ark, or for Hell-Mouth, a huge painted head with open jaws belching fire and smoke. The scenery was of a rude sort. Palaces, temples and castles were some¬ times represented by boxes or wickerwork covered with cloth. Occasionally the actors made use of the open space in front of the pageant ; Herod's "raging55 appears to have been partly done in the street. The costumes were often expensive, but frequently grotesque. Herod was attired like a Saracen, with red gloves. Pilate always wore a green cloak and wielded a huge club. God the Father was rep¬ resented in person, and dressed all in white, with a gilt wig. The devils and the Evil One were made very realistic, and came to furnish a great deal of low comedy. Various accounts of sums paid for properties and costumes are still preserved.

Four cycles of miracle plays are still extant, the York, Chester, Coventry and Towneley or Woodkirk plays. The Towneley series, so called from the family who long owned the manu¬ script, much resembles the York cycle, and like it displays much vigor and humor. The Chester plays perhaps appeal most to modern taste. The religious passages are more reverent, the humor •less coarse and the versification less harsh. The Coventry plays are full of didacticism, and this, with the introduction of personified abstrac¬ tions, relates them more closely than the others to the Moralities, Fragments of other cycles

have also survived. The Vulgate and the Apocrypha are the chief sources of the texts. In places some tragic elevation is reached, marred, however, by repetition and moralizing. Melodramatic and ranting scenes were popular. The comic scenes are often very spirited, and clearly based upon observation of the life of the people. Anachronisms are common, and the supernatural is treated with great naivete.

The miracle plays were at their best in the time of Chaucer. In the 15th century the Moral¬ ities arose to compete with them for favor, but never equaled them in dramatic achievement. The miracle plays continued to be given until the beginning of the 16th century, but in the reign of Elizabeth they had ceased to be a vital force. Their influence in preparing the way for the Elizabethan drama was very great, however. They introduced elementary types of comedy and tragedy, farce and melodrama, and accus¬ tomed the people as a whole to dramatic conven¬ tions. They made a national drama possible in the time of Shakespeare, and kept the theatre from being a mere amusement for the nobility, or a diversion for a small group of literary people.

Bibliography. — Chambers, ‘The Mediaeval Stage 5 (2 vols.) ; ‘Chester Plays,5 edited by Wright (London 1847) ; D’ Ancona, A., ‘Sacre rappresentazioni dei secoli 14-165 (Florence 1862) ; Davidson, Charles, (Studies in the Eng¬ lish Mystery Play) (New Haven 1892) ; ‘Digby Mysteries,5 edited by Furnivall (London 1882) ; Gayley, C. M., (Plays of Our Forefathers> (New York 1907) ; Hemingway, S. B., Eng¬ lish Nativity Plays) (in ‘Yale Studies in English, > Vol XXXVIII, New York 1909) ; Jusserand, J. A. J., (Literary History of the English People) (ib. 1895) ; Mackenzie, W. R., ‘English Moralities) (ib. 1914) ; Manly, J. M., Specimens of the Pre-Shakespearean Drama5 (Boston 1897) ; ‘Miracles de Notre Dame, 5 edited by G. Paris and Robert (Paris 1876-81) ; Moore, E. H., ‘English Miracle Plays and Moralities5 (London 1907) ; Pettit de Julleville, Louis, ‘Les Mysteres5 (in ‘Histoire du theatre de France,5 2 vols., Paris 1886) ; Pollard, A., W., ‘English Miracle Plays, Moralities and Interludes5 (5th ed., Oxford 1909) ; Stoddard, F. H., ‘References for Students of Miracle Plays and Mysteries5 (Berkeley 1887) ; Symonds, ‘Shakspere’s Predecessors in the Eng¬ lish Drama5 ; ‘Towneley Mysteries,5 edited by Raine (Newcastle 1836) ; Ward, A. W., ‘His¬ tory of English Dramatic Literature5 (3 vols., New York 1899) ; Wright, ‘Early Mysteries5 (London 1831) ; ‘York Plays,5 edited by L. T. Smith (Oxford 1885).

William Witherle Lawrence, Professor of English, Columbia University.

MIRACLES, works which excite wonder, because they are beyond ordinary human ex¬ perience and appear to contravene the known laws of nature.

The well-known argument of Hume against the credibility of a miracle has often been re¬ futed. A miracle, he said, was contrary to ex¬ perience, but false witnesses in history are not contrary to experience; it is less probable that the miracle is true than that the witness is false. There are two fallacies in this reasoning; it begs the question by the use of the words con¬ trary to experience, for the point at issue is

whether miracles are contrary to experience or no. If they are contrary to Hume's experi¬ ence, may it not be because his experience is limited? He has not lived at an age when a new religion was instituted and extraordinary guarantees demanded in order to accredit it with a hostile world. Even mankind's experi¬ ence in nature is becoming widened every year, and many wonderful things take place at this moment which our ancestors of a century ago would have looked upon as magical or miracu¬ lous, such as wireless telegraphy, communi¬ cation by telephone, the effects of the Roentgen rays, the power of radium, *etc.* For miracles are not to be looked upon as a violation of the laws of nature, but merely as the interposition of a higher law overruling a lower one. To those who believe in an intelligent creator and conserver of the world there can be no difficulty in apprehending the possibility of the miracu¬ lous ; even those who like Herbert Spencer have a vague belief in what they style Force or Power underlying all the operations of nature should not hesitate in admitting that the force which keeps up the multitudinous activi¬ ties of the universe may manifest itself at times in unprecedented fashions, even as the new discoveries and combinations of science are constantly revealing new powers in the domain of natural law.

Pascal has said that the certainty and gen¬ uineness of certain miracles is proved by the falsity of others, meaning presumably that the very fact that general human consent has been given to the idea of

miracles proves that such idea has a counterpart in reality. There are of course certain concomitant circumstances which may be taken as affecting the credibility of a miracle. Most of the miracles of history may be put aside as inventions; such are many of the stories told bv Livy and Herodotus, and the wild fables of Hindu history, as well as many miraculous incidents in the life of Mohammed. Christian apologists lay particular emphasis on the moral aspects of the miracle. To those who deny or doubt the existence of a supreme being, the moral ruler of the universe, a miracle is an impossibility. On the other hand, without miracles the revelation of God is impossible. Hence, a miracle with a moral object is most in accordance with the character of a Supreme Being governing the world with a moral end. All idle or superfluous miracles are to be re¬ jected as at variance with the character of such a being. Equally to be rejected are miracles which are merely tentative, that is, sometimes successfully accomplished, sometimes ending in failure; as well as others which are doubtful in their nature and those which are merely ex¬ aggerations of natural events.

In the early Church those who defended Christianity against the attacks of those outside laid great stress on the evidence of miracles, and claimed that miraculous power still existed among Christians. Irenaeus asserted that this power was universal among Christian churches. Saint Augustine asserts the reality of the mi¬ raculous on the testimony of his own experi¬ ence. He makes the acute remark that a miracle is not contrary to nature but tc> what we know of nature. The schoolmen did not agree with Augustine on this point. Thomas Aquinas defines a miracle as “something out of the order of nature? Albertus Magnus

declares that God has implanted the possibility of miracles in the very nature of things, al¬ though denying that he can do anything con¬ trary to nature. Luther puts the miracle of grace in the heart far above any physical miracle, while he assigned the Bible miracles their proper place in the development of the faith. The Roman Catholic Church has always claimed the possession of miraculous powers and continues to do so to this day. The So-cinians and Arminians maintain that God has always revealed himself by means of super¬ natural works, and Grotius in his defense of Christianity makes miracles the foundation of his argument. There has always, however, been a school of rationalists or philosophers who have opposed or attacked the belief in miracles, although Leibnitz admitted this belief into his philosophical system. He defines a miracle as an event inexplicable by natural causes. The

laws of nature, he says, are not necessary and eternal; God can for his own purpose suspend them ; the miraculous is included in the divine plan and forms a part of “the pre-established harmony.® Spinoza made the statement that miracles are impossible. In his pantheistic phi¬ losophy nature and her laws are identical with the will, intelligence and nature of God, who cannot work contrary to the laws of material nature. Kant like the English Deists did not deny the possibility of miracles, for they might be wrought by powers and in accordance with laws of nature with which we are unacquainted, but believed that such laws were never exer¬ cised. Schleirmacher contests the apologetic value of miracles and endeavors to eliminate the miraculous from the Christian scheme, which he thinks is lowered by this supernatural element. The modern agnostic claims that the advance of science has made a belief in the miraculous impossible. Some have tried to explain the recorded miracles of Scripture by a reference to natural causes ; others would treat them as allegories or legendary accretions or folktales, or attribute them to self-deception, or fraud, or the credulous exaggeration of bystanders and witnesses. Miracles are re¬ garded by conservative theologians as an essen¬ tial part of Christianity which cannot be explained away or eliminated without destroy¬ ing its authority. The more advanced theo¬ logians claim the right to question the reality of miracles, even including the virgin birth of Christ and the resurrection, and they regard as the matter of supreme importance the fact that Christ spiritually still lives and is trans¬ figuring the life of mankind. Certain it is that miracles no longer hold the place they once did as Christian evidences ; conversion, the “expulsive power of a new affectionˆ vivifying and transforming the soul, the divine response to prayer, communion with God and the su¬ preme miracle of Christ himself as the spiritual regenerator of mankind — these have placed outward signs and evidences into a subordinate place.

Bibliography. — There is an inexhaustible list of works on the subject; but in addition to authorities named in the article consult Arnold, Matthew, literature and Dogma* (new ed., London 1902) ; Balfour, A. T., foun¬ dations of Belief > (1895) ; Bonney, T. G., <The Present Relation of Science and Religion* (ib. 1913) ; Bruce, A. B., (The Miraculous Element

in the Gospels5 (ib. 1886) ; Davies, E. O., (The Miracles of Jcsus) (ib. 1913) ; Gordon, G. A., (Religion and Miracle) (Boston 1910) ; Headlam, A. C., (The Miracles of the New Testa¬ ment (ib. 1914) ; Illingworth, J. R., (Divine Immanence> (ib. 1898) ; (The Gospel Miracles) (ib. 1915) ; Figgis, J. N., (The Gospel and Human Needs5 (New York 1910) ; Lecky, (Rise of Rationalism) (London 1865) ; Lodge, Sir Oliver, (Man and the Universe) (ib. 1908) ; McCosh, (The Supernatural in Relation to the Natural 5 (ib. 1862) ; Mozley, J. B., (Eight Lec¬ tures on Miracles5 (ib. 1865) ; Newman, J. H., (Two Essays on Miracles5 (ib. 1873) ; Orchard, (The Attitude of Science Toward Miracles5 (ib. 1910) ; Pfleiderer, (Philosophy and De¬ velopment of Religion5 (ib. 1894) ; (The Early Christian Conception of Christ5 (ib. 1905) ; Saintyres, (Le discernement du miracle5 (Paris 1909) ; Trench, R. C., (Notes on the Miracles of Our Lord5 (London 1847) ; Wallace, A. R., 'Miracles and Modern Spiritualism5 (ib. 1896) ; Wendland, (Miracle and Christianity5 (ib.

1911).

MIRAGE, mi-razh', the name given to cer¬ tain illusory appearances due to the bending of rays of light in the atmosphere. The earliest attempt to explain the mirage seems to be that of Monge, who accompanied Bonaparte's Egyp¬ tian expedition ; he thus describes what was ob¬ served by the French soldiers: "The villages seen in the distance appeared to be built upon an island in the midst of a lake. As the ob¬ server approached them the boundary of the apparent water retreated, and on nearing the village it disappeared, to recommence for the next village55 ; he attributed the phenomenon to the hot sand of the desert keeping the lower layers of the atmosphere at a less density than the upper ones; the rays of light from the lower parts of the sky and objects in the distance arrive at the surface separating the less dense layer of air from those above, and are there subjected to total reflection; the eye sees the sky in the direction of the received rays, and this gives rise to the idea of a lake.

It is often assumed that rays of light pass through the atmosphere in straight lines ; this is approximately true for short distances, but astronomers and surveyors have to correct their observations for refraction. By the laws of optics it is easy to see why a ray passing

obliquely through the atmosphere, when this is arranged in horizontal layers of equal density (those of greater density being lowest), should bend, and that a vertical ray should not bend ; but optics does not tell us why a horizontal ray is much more refracted than an oblique one. The explanation (first given by Dr. James Thomson) is easy on the undulatory theory of light. The wave front of a horizontal ray of light is at right angles to the ray, and is a vertical plane ; now light is less rapidly prop¬ agated in the lower layers of air, hence the lower part of the wave front is retarded, and when the light has proceeded some distance its wave front is no longer vertical, and the ray has bent downward (the ray is always sup¬ posed to be normal to the wave front). Thus, in the atmosphere in its normal state the path of a ray of light is always slightly concave downward. Professor Everett thus explains the appearance of <(castlcs, obelisks and spires,55

cities with many buildings, forests of naked trees and great basaltic precipices sometimes assumed by irregularities in cakes and fields of ice. It sometimes happens that several inverted images of an object are seen in the same sky; these may be accounted for by assuming that there are several layers of air, in each of which there is a rapid variation (an increase upward) of the index of refraction. Mirages are not un¬ common in California, Nevada and Alaska.

MIRAMICHI, mir"a-trn-she', Canada, a river of New Brunswick formed by the junc¬ tion of the northwest and southwest Miramichi, about 35 miles above its mouth in Miramichi Bay on the Gulf of Saint Lawrence. The north¬ west affluent rises in the highlands east of the Nepisiquit and is about 90 miles long, 16 miles of which are influenced by the tides. The southwest or main headstream flows from a lake near the Tobique, and fed by numerous rivulets draining a lake district becomes a con¬ siderable river 185 miles long to its confluence with the northwest branch. The Miramichi is navigable 40 miles from its mouth. Salmon, trout and other varieties of fish abound in the river and its tributaries.

MIRAMON, Miguel, me-gel' me-ra-mon', Mexican soldier: b. City of Mexico, 29 Sept. 1832; d. Queretaro, 19 June 1867. He was edu¬ cated in the military school of Chapultepec in 1846; was a volunteer in the war with the United States; became a colonel in the Mexican army; deserted with his regiment to take part in the revolt at Puebla in 1856; and for that was degraded when Puebla was taken by Co¬ monfort. In October 1856 he headed another revolt at Puebla, in 1856-58 was conspicuous in the party of the reactionists and was

chosen by the electoral junta to succeed Zuloaga as President 2 Jan. 1859 (entered office 2 Febru¬ ary). He continued to take part in the ((war of reform55 in 1859-60, but was defeated at Calpulalpam, near Mexico, 22 Dec. 1860, by Ortega, and fled to the coast, sailed to Europe and probably was concerned in the plans of Napoleon III for an invasion of Mexico. Maximilian appointed him grand-marshal and Minister to Berlin. Later he was given a high command in the imperial army and conducted with Maximilian the defense of Queretaro. He was captured on the surrender of the city and shot with the emperor.

MIRANDA, me-ran'da, Francisco Antonio Gabriel, Venezuelan revolutionist: b. Caracas, 9 June 1756; d. Cadiz, Spain, 14 July 1816. In 1773-82 he was an officer in the Spanish army and then served with the French allies in the colonies in the Revolutionary War (1779, 1781). A general of division in the French republican army (1790-93), he was tried, but acquitted, on a charge of treachery at Neer-winden. He began a scheme for obtaining the independence of Spanish South America, founded the important society Gran Reunion Americana, which included many names later prominent in the South American revolution, and in 1806 made a futile attack on the Vene¬ zuelan coast. In 1810, on the breaking out of the revolution in Venezuela, he returned; in 1812 he was made President, but on 25 July capitulated to the royalists. He was sent to Spain and there remained a prisoner. Con-MIRANDOLA — MIRROR

suit Biggs, ˆHistory of Don F. Miranda's Attempt to Effect a Revolution in South Amer¬ ica' (1809) ; Baralt, (Historia de Venezuela) (1841) ; Robertson, (Francisco de Miranda and the Revolutionizing of Spanish America) (Washington 1909).

MIRANDOLA, me-ran'do-la, Italy, town in the province of Emiliana, 17 miles northeast of Modena. It was the home of the Pico family, who held the town from the 14th century to 1710, when Joseph I of Austria took posses¬ sion. The Pico castle is now in ruins. The cathedral, dating from the end of the 16th cen¬ tury, has been restored. The Palazzo del Com¬ mune is a Gothic building of the 15th century. The church of Gesu is also interesting. The chief industries are silk, rice and cattle-raising. Pop., commune 16,740.

MIRBEAU, me’bo, Octave Henri Marie,

French novelist and playwright: b. Trevieres (Calvados), 16 Feb. 1850. He was educated in a Jesuit school at Vannes, studied law in Paris and became dramatic critic on the Bona-partist paper, L’Ordre. For a time he was sous-prefet and then prefet of Saint-Girons ; but after 1877 he devoted himself to literature. His journalistic career was stormy and his at¬ tacks on established reputations involved him in several duels. He gradually developed ex¬ treme views. In 1890 he wrote for the Revolte and he was one of the first and most persistent defenders of Capt. Alfred Dreyfus. He was also one of the earliest supporters of the Im¬ pressionist painters. In 1887 he married the actress, Alice Regnault. Mirbeau first at¬ tracted attention as a fiction writer by his series of tales of the Norman peasantry, (Lettres de ma chanmiere> (1886), although he had previously published a novel, (Jean AIarcellin) (1884). He then published (Le Cal-vaire> (1887); <L’Abbe Jules> (1888) ; /Sebas-tien Rochp a bitter picture of the Jesuit school in which he had passed his youth (1890) ; (Le Jardin des supplicesP a Chinese story (1899) ; (Les Memoires dune femme de chambre> (1901) ; (Les Vingt-et-un jours d’tin neuras-chenique) (1902) ; and (Dans l’antichambre) (1905). In 1897 (Les mauvais bergersP a five-act drama, was played at the Renaissance by Sarah Bernhardt; and he gained a great suc¬ cess with his next play, (Les affaires sont les - affaires) (1903), represented in New York under the title (Business is Business* (1905). Some of his short plays appear in his book, (Farces et Moralites* (1904). (Le foyer* (1909) was suppressed by the censor. (Dingo* was published in 1913.

MIRFIELD, England, town and district five miles northeast of Huddersfield, on the Calder, in the West Riding of Yorkshire. It is one of the chief railway centres in the country and has manufactures of woolen and cotton goods, carpets and blankets. In the vicinity are coal mines. The church of Saint Mary’s was completed in 1874 from designs of Sir Gilbert Scott. The tower of the ancient church re¬ mains. Pop. 11,702.

MIRIAM, the sister of Moses and the eldest of the family, is first mentioned as being sta¬ tioned by her mother to watch her brother’s cradle among the sedges on the river’s brink. Later she procured her mother as nurse for

the child when found by the princess. After crossing the Red Sea she is mentioned as ((Miriam the Prophetess,** and she takes the lead with

Aaron in the complaint against Moses for his marriage with a Cushite. For this action she was stricken with leprosy, but later the curse was removed and she died to¬ ward the close of the wandering in the desert. She was buried in Cadesh.

MIRKHOND, mer'kond, Haman Ed Din, Persian historian: b. 1433; d. 1498. He was the son of a pious and learned man of an old Bokhara Sayyid family, direct descendants of Mohammed. From an early age he devoted himself to 1 istory and literature; and in Herat, where he spent the greater part of his life, he gained the favor of a famous patron of letters named Mir Alishir. About 1474, in the quiet convent of Khilasiyah, which his patron had founded in Herat, he began his great work on universal history, the (Rauzat-us-safa) (Gar¬ den of Purity), a collection of biographies of prophets, kings and caliphs from mythical times to 1523. Although written in a flowery and bombastic style and with no attempt at critical examination, the (Rauzat) is ranked as one of the most remarkable of literary achievements. It is composed of seven large volumes and a geographical appendix. As the seventh volume contains accounts of events after Mirkhond's death, it is supposed to be the work of his grandson, the historian Khwandamir (1475-15341, who probably fin¬ ished the appendix. The entire (Rauzat* has been lithographed in folio (Bombay 1853 and Teheran 1852-56), and with Turkish transla¬ tion (Constantinople 1842). The <Rauzat) has been translated by various hands : (The Early Kings of Persia) by D. Shea (London 1832) ; the Sassanids into French by S. de Sacy, (L'histoire de la dynastie des 5assanides) (Paris 1793) and also by Jaubert (Paris 1843) ; (Histoire des Samanides,* by Defremery (Paris 1845) ; (Histoire des Sultans Ghurides,* by Defremery (Paris 1844) ; Seljuks into German by Vullers (Giessen 1837) ; and the story of Mohammed by Rehatsek, into English (5 vols., London 1891-94), the latter was rendered from English into French bv Lamairesse (Paris 1894). For the life of Mirkhond, consult De Sacy, (Notice sur Mirkhond) in his (Memoires sur diverses antiquites de la Perse* (Paris 1793) ; Jourdain, (Notices et extraits) (Vol. IX, Paris 1812) ; and Elliot, (History of India,* Vol. IV.

MIRROR, a smooth surface usually of glass, capable of regularly reflecting rays of light. A mirror may be (1) a polished surface of glass; (2) a surface of tin-foil on the fur¬ ther side of a sheet of glass (as in the common looking-glass) ; (3) the surface of a deposited film of silver or platinum on a polished glass surface, so that rays of light to and from the metallic reflecting surface do not pass through the glass; (4) a polished surface of silver, gold, platinum or speculum metal (a bronze composed of about 32 parts of copper to 15 of tin, small quantities of lead, antimony and ar¬ senic being sometimes

added).

The use of a reflecting surface would be¬ come apparent to the first person who saw. his own image reflected from water; and for primi¬ tive man the only mirrors were probably his

own reilection in the still water of ponds and lakes. The use of mirrors of brass by the He¬ brews is mentioned in the Pentateuch ; and bronze mirrors were used by the Egyptians, Greeks and Romans. The use of silver in the manufacture of mirrors was taught by Praxi¬ teles in the 4th century before Christ. Look¬ ing glasses were first made in Venice in a.d. 1300, and in 1673 were introduced into England. They were a great improvement on the more ancient speculum metal mirrors, whose reflect¬ ing surfaces were liable to oxidation from ex¬ posure to the air, but they have the disadvan¬ tage that there are two reflecting surfaces, one of glass, the other of metal. Polished metals reflect nearly all rays of light at all incidences ; glass reflects very few rays at the normal inci¬ dence, but the amount of reflection becomes greater and greater as the incidence becomes more and more oblique. Mirrors are usually either “plane® or “spherical.® Spherical mir¬ rors are small portions of the surface of a sphere. In a spherical mirror, concave or con¬ vex, the line through the centre of the spher¬ ical surface of which the mirror is a part and the middle point of the mirror is called “the axis.® From a concave mirror rays parallel to the axis converge after reflection to a point called the “principal focus,® which is half-way between the centre of the sphere and the mirror. (See Light). Rays from a luminous object outside the spherical centre of a concave mirror form a small, real, inverted image of the ob¬ ject between the centre and the principal focus; when the object is between the centre and the principal focus the image is beyond the centre, and is large, real and inverted.

Prior to 1835 mirrors were almost univer¬ sally made by applying a coat of tin-foil amal¬ gamated with mercury to the surface of plate-glass. In 1835 Baron Liebig observed that on heating aldehyde with an ammoniacal solution of nitrate of silver in a glass vessel, a brilliant

deposit of metallic silver was formed on the surface of the. glass. To this observation the more recent process of silvering glass is really due. In 1849 Drayton made known a method in which he employed as a backing composition two ounces of nitrate of silver, one ounce of ammonia, three ounces of alcohol and three ounces of water. The defects of these two modern processes are that the deposit of silver on glass is not so adherent and unalterable under the influence of sunlight and sulphurous fumes as the old amalgam of tin and mercury; besides, the newer processes give the glass a slightly yellowish tinge. These disadvantages have been obviated by applying to the silver coating a weak solution of cyanide of mercury, which immediately forms a kind of amalgam and renders the deposit at once much whiter and more adherent. The silvering is protected from mechanical abrasion and the chemical action of gases and vapors by a coating of shellac or copal varnish, which when dry may receive a further covering of red-lead paint. A method of coating glass with platinum has been recently introduced. A solution of bichlo¬ ride of platinum is spread over the surface of the glass with a fine brush, and the metal is precipitated with oil of lavender. As this sum¬ mary process produces a somewhat gray lustre it is used only for cheap mirrors, the lids of ornamental boxes, toys and the like.

MIRROR CARP. See Carp.

MIRROR OF KNIGHTHOOD, The,

Spanish romance of chivalry. It was one of the books in Don Quixote's library and of it the priest said to the barber: "In this same 'Mirror of Knighthood) we met with Rinaldo de Montalban and his companions, with the Twelve Peers of France and Turpin the his¬ torian. These gentlemen we will condemn only to perpetual exile, as they contain some¬ thing of the famous Bojardo's invention, whence the Christian poet Ariosto borrowed the groundwork of his ingenious compositions; to whom I should pay little regard if he had not written in his own language (Italian).® (The Mirror of Knighthood) is identified with the 'Cavallero del Febo) (Knight of the Sun), a romance belonging to the Amadis de Gaul Cycle. It seems to have been the work of several hands and was unfinished. An English translation was printed in 1578.

MIRROR FOR MAGISTRATES, The.

This once popular work, the first part of which was published in 1555, and the last in 1620, was the result of the labors of at least 16 persons,

the youngest of whom was not born when the oldest died. It probably owed its inception to George Ferrers, master of the king's revels at the close of the reign of Henry VIII; and he associated with himself William Baldwin. Richard Niccols is responsible for the book in its final state; and in the interim, it was con¬ tributed to by Thomas Newton, Tohn Higgins, Thomas Blennerhasset, Thomas Chaloner, Thomas Sackville (who wrote the poetical pref¬ ace called the Induction and the life of Buck¬ ingham), Master Cavyll, Thomas Phaer, John Skelton, John Dolman, Francis Segar, Francis Wingley, Thomas Churchyard and Michael Drayton. It is a "true Chronicle Historic of the untimely falles of such unfortunate princes and men of note, as have happened since the first entrance of Brute into this Hand, until this our latter age.® It was patterned after Lyd¬ gate's (Fall of Princes, } a version of Boccac¬ cio's poems on the calamities of illustrious men, which had been very popular in England. The stories are told in rhyme, each author taking upon himself the character of the "miserable person® represented, and speaking in the first person. The first one told by Ferrers is that of Robert Tresilian, chief justice of England.

MIRROR OF PERFECTION, The, is a

most intimate and exceedingly illuminating ac¬ count of the son of Peter Bernardone, cloth merchant of Assisi. Christened John he was nicknamed by his father "Francisco® and is known to the world by no other name than that of Saint Francis of Assisi.

The volume, small enough to be attractive — there are only about 50,000 words to it — was written by Leo of Assisi who is often spoken of as the "beloved disciple® of Saint Francis. "Brother Leo, was not merely a fellow-towns¬ man, 'companion,) disciple, and dear friend of Francis of Assisi. He was also his sick-nurse, secretary and confessor during the last six years of his life. None knew Francis so intimately, or remembered him so well. None could be more scrupulously conscientious in recording what he believed to be the exact truth about the not yet canonized Saint.® The character and fashion of the record tempts one

to speak of him as Saint Francis's Boswell. It is the ((oldest life of the Beloved Francis,® being ((done,® so a note at the end of the volume informs us, <(in the most holy place of S. Mary of the Little Portion, and completed this fifth of the Ides of May in the year of Our Lord 1228.® Saint Francis died 3 Oct. 1226.

The significance of the title is disclosed in these words of the author : (<Here endeth the Mirror of Perfection of a brother Minor ; to wit, of the Blessed Francis, wherein we may most sufficiently behold as in a glass the per¬ fection of his calling and profession.® With¬ out a doubt a less scrupulous writer would have said also the perfection of the life of the Blessed Francis. He refrained from saying this most likely because he knew that Saint Francis would most flatly resent being spoken of as perfect.

The style in which the book is written is singularly in keeping with the spirit and char¬ acter of the subject, and of the type of life he represented — simple, direct, homely, shorn of all scholarly vanities and conceits as the life of the subject was shorn of all wordly comforts. There is an indescribable charm and power of revelation to this narrative that is simple and homely even almost to the point of bluntness. Narrative is hardly the correct word. Per¬ haps it is better described as ((a chaplet of im¬ mortelles set upon the head of the Saint on the morrow of his death to typify the crown of glory achieved by this beatified Spirit.®

It is hardly a disinterested picture or biography. Some of it has been written with a distinct purpose, the intent being to show not merely what kind of a man Saint Francis was and the kind of life he lived but what prin¬ ciples and ((Rules® he laid down as the founda¬ tion of the famous Order which takes its name from him, and it is plainly also the purpose to show what obedience to these principles is the true path of the perfect Christian. Sometimes Brother Leo becomes controversial, taking vigorous issue with those, and they were many, who ((desired to ignore certain of the wishes and to modify certain of the injunctions of Francis in what they believed to be the inter¬ ests of the Order.® All this however does not lessen the value of the book as a carefully drawn and wholly reliable picture of the founder of the order of Franciscans. By his scheme of minutely, yet briefly, telling what Saint Francis did on those occasions when it seemed best that by example he should make clear to those concerned what doctrines he be¬ lieved should govern their conduct, and of re¬ peating what reply was made to those who came to Saint Francis seeking information or

to question his ideals, the author gives the reader a very impressive picture of this noted re¬ ligious character. With the devotion of one who is wholly of the same mind and spirit as the subject of his writing Brother Leo with painstaking accuracy repeats in <(what wise the Blessed Francis declared the will and intention which he had from the beginning to the end as regards the observance of poverty® and of ˆmaintaining poverty in books, and beds, build¬ ings and appliances,® and ((how he did induce and teach his brethren to go forth for alms,® thus disclosing what manner of man he was. He recounts instances showing with what un¬ swerving zeal Saint Francis carried out to the

very limit of perfect example his ideals of absolute poverty in all things, of humility, charity, compassion and condescension. There may be much more to the life of the Blessed Francis than is here given, but the author has without doubt in these pages pictured Francis in the fashion in which he most desired to ap¬ pear before his fellow-men. It is a book one must read if he would know the real Saint Francis and appreciate the ideas and ideals which moved him to fashion his life after the manner of the rules he made for the order that grew up about him.

Rev. Charles Graves.

MIRYACHIT, mer-ya'chit, a peculiar nerv¬ ous disease prevalent in Siberia and some other countries, the chief characteristic of which is mimicry by the patient of everything said or done by another person.

MIRZA, mer'za, Persian title, equivalent to <(Prince.®

MIRZA, Husain Ali Nuri, Persian reli¬ gious reformer: b. Mazadran, Persia, 12 Nov. 1817; d. Akka, 28 May 1892. He was of noble family, joined the Bahai movement in 1850 and was imprisoned during the fierce political and religious persecutions which the sect suffered shortly after the death of Mirza Ali Moham¬ med. (See Bahaism). His prope* .y was confiscated and he himself, with his family, was banished from Persia to Bagdad (Turkey) in 1852. Many Bahais followed him, most of them fleeing from the fierce persecution at home. Mirza Ali organized these into a com¬ pact, well-governed and self-sustaining com¬ munity which soon became wonderfully pros¬ perous, growing steadily in wealth and numbers. He was early looked upon as the great leader foretold by the founder of the faith ; and new adherents came from all over Asia to study under him or to join the

colony in Bagdad. This prosperity of the colony and the popularity of Mirza Ali, the <(Bab® (gate or door), ex¬ cited the jealousy of the Persian government and church, and the prophet and the whole colony were extradited and brought back to Constantinople. During the exodus, Mirza Ali proclaimed himself the expected prophet and took the name of <(Baha'o'llah® (the Glory of God), by which designation he has ever since been known among his followers (1864). As the Bahai movement continued to grow with great rapidity in Constantinople, Mirza Ali was banished to Adrianople. Thousands of the faithful followed him there and he was re¬ moved to Akka (Palestine), a Turkish penal settlement, with 70 of his most active disciples (1868). They were all subject to the most rigorous imprisonment and treated with great harshness for seven years. At the expiration of this time the Bahais were allowed to form settlements in the town of Akka. To these settlements came people of all sects and creeds, and the penal colony became the centre of an intense religious movement which pro¬ claimed the brotherhood of man, the unity of the race and the identity of all true spiritual aims and thought. There Mirza Ali remained from 1868 to 1892, writing his doctrinal books, working out plans for the government of the society and studying moral, social, political and economical questions and applying the lessons thus learned to the illustration of the gospel of

the unity of mankind, of religion, of society and of government. He boldly attacked the problems of the day and attempted to solve them through the application of his own reli¬ gious views. Among the works of Mirza Ali are (The Hidden Words) ; (The Most Holy Book) ; (The Book of Certainty) and The Seven Valleys. > See Bahaism ; Abdul Baha.

MIRZAPUR, mer-za-poor', India, a city and district of the Benares division of the United Provinces. Mirzapur, signifying the Prince's Town, the capital of the district, is on the right bank of the Ganges, 56 miles by rail southeast of Allahabad and 509 from Calcutta. It pre¬ sents an imposing appearance from the river, with fine ghats leading

down to it, and numer¬ ous mosques, temples and handsome European houses occupying some of the most conspicuous sites, but the interior is disappointing. It has the largest mart in Upper India for grain, cot¬ ton and other raw produce, but with the rail¬ way era and the rise of Cawnpore to commer¬ cial importance, much of its trade has migrated elsewhere. Shellac, brassware and carpets are manufactured. There are imports of grain, sugar, cloth, metals, fruit, spices, tobacco, lac, salt and cotton; and exports of the same articles with manufactured lac-dye, shellac and ghee butter. Pop. 32,232. The district has an area of 5,238 square miles, and a population of about 1,100,000, chiefly Hindus. The chief products are wheat, barley, cotton, oilseeds and fruits.

MISAMIS, me-sa'mis, Philippines, a prov¬ ince of the island of Mindanao, situated on the north central coast, bounded on the east by Surigao ; area, 3,406 square miles, with depend¬ ent islands, 3,521 square miles. The province is crossed by two mountain ranges, one on the east side with three summits of over 5,000 feet elevation, and the other on the west side with a peak that rises 8,560 feet. It has a number of rivers, and is crossed by the Grande de Min¬ danao, or Pulangui, which rises in the north¬ east ; Lake Lano also extends over the southern boundary within its limits. The staple agri¬ cultural products are hemp, chocolate, coffee, cotton, sugar, rice, tobacco, corn and sweet potatoes; the forests contain woods valuable for building as well as resinous trees. The chief industry is the manufacture of fabrics used for dress for home consumption and sacks for packing purposes. There are no good roads' of any importance ; the inland towns and villages are reached by river or trail, and the trade between coast towns is by native craft. The population is mostly Visayan, with some Moros in the western part. Pop. 175,683.

MISANTHROPE, Le, le me'zan'tro-p', a

comedy of Moliere in five acts in verse, pre¬ sented for the first time in the Theatre of the Palais-Royal, 4 June 1666, when the author was 44 years old. Moliere played the title-role and his wife the part of Celimene. This play, which is Moliere's nearest approach to tragedy, concerns one Alceste, who rails at the insin¬ cerity of mankind and yet is in love with a coquette, Celimene — a stroke which art is in¬ capable of without genius. Alceste excites at once our admiration, pity and laughter. An upright and sincere man even to an unreason¬ able degree, he is made miserable by a letter of Celimene which seems to justify his right¬ eous indignation. Notwithstanding that these

fears seem to be well founded, Alceste remains in love with Celimene, but wishes her to with¬ draw with him from human society — which she of course refuses to do. The splendid emptiness of the life in a Parisian salon of the 17th century is placed vividly before us. There is no place for a natural and honest character in such society. Everything is artificial, de¬ ceptive and shallow. Moliere's own experience had been so painful that the accent of truth pervades his treatment of the character which so nearly resembled his own. His life, sad¬ dened by hostile criticism, ill-health and an un¬ happy marriage, had become embittered, and some have attempted to prove therefrom that Moliere himself is the real Alceste. It is true that he revealed more of his real self in this play than in any of his other plays, but he was too much of an artist to depict merely his own character. His unhappy domestic life probably did influence him to some extent, but the germ of the play is to be found in his earlier but unsuccessful play, Tom Garde de Navarre* (4 Feb. 1661), from which he borrowed freely both scenes and verses The Duke de Montausier, the character of Megabate in Mile, de Scuderi's (Le Grand Cyrus) and Boileau may also have been, as has been claimed, in Moliere's mind in his delineation of Alceste. As a foil for the rigorous Alceste, the author presents us with the indulgent Philinte, who bears with men's faults from the necessity of living among them. So likewise with the coquette is con¬ trasted the virtuous Lliante. The prude Arsinoe, and the marquis, typical of the large class of nobility whom Moliere suspected of using their influence at court against him, con¬ stitute the other principal characters. Sheri¬ dan has imitated a scene of (Le Misanthrope) in his (School for ScandaP and Wycherly has imitated the entire play in his (Plain Dealer,* but in a comparison between the imitation and the original the difference is seen between genius and brutality. The idea behind (Le Misanthrope) may perhaps be best rendered in the words of Philinte : <(A11 these human defects give us opportunity in life of exercis¬ ing our philosophy. 'Tis the most amiable em¬ ployment virtue finds; and if every place were full of honesty and all hearts were frank, just and docile, the greatest part of our virtues would be useless to us, since the use of them is placed in this, in the power of bearing the injustice of another in respect to our property, without being ruffled.® From this it is evi¬ dent that Moliere in his characterization does not discredit virtue, as such critics as Rousseau and Fenelon claimed, but merely the austerity of virtue not tolerant enough of human weak¬ ness. The public of the time was not prepared for such a fine distinction and did not appreciate the humor which reigns throughout. Conse¬ quently, in spite of its purity and elegance of style, the play was coldly received. It is said that at the first presentation, . after the reading of Oronte's sonnet, the pit applauded,

but Alceste afterward in the same scene contended that the sonnet was mere trash, whereupon the audience, through embarrassment at having ap¬ proved it, became prejudiced against the entire play. Subsequently, it has become to be almost universally acknowledged as the most perfect piece of French comedy and the masterpiece of

Moliere. There is an extremely clever trans¬ lation of (Le Misanthrope, > with the French text en regard, in the fourth volume of the works of Moliere published by John Watts (London 1748).

Herbert F. Wright.

MISCARRIAGE, literally a failure, a going astray. I. A miscarriage of justice is a failure of the law to attain its ends; or a breach of legal duty. Such is the significance of the term as employed in the fourth section of the Eng¬ lish Statute of Frauds and in similar statutory provisions in the United States. II. Miscar¬ riage in medical jurisprudence is employed in the sense of abortion (q.v.).

MISCEGENATION, from the Latin viis-cere, to mix, and genus, race, a mixture of races-. The word is usually applied to the amalgama¬ tion of the white and negro races in America, and came into general use toward the middle of the 19th century, when certain publicists advocated absorption of the blacks by inter¬ marriage with the white race. Consult Daven¬ port, C. B., (Heredity of Skin Color in Negro-White Crosses> (Washington 1913). See Mixed Races.

MISCHIANZA, mis-ke-an’tsa, The, in American history, an entertainment given in Philadelphia, 18 May 1778, during the war of the Revolution, by officers of the British army, in honor of Sir William Howe, about to return to England after his supercession. The enter¬ tainment was given at the country home of Thomas Wharton and comprised a dinner, dancing, a regatta, mock tournaments and various games. Major Andre was prominent in planning the entertainment. Consult Sargeant’s <Life of Major Andre> (New York

1902).

MISDEMEANOR, in law, any offense be¬ low felony; the least offense by English com¬ mon law: In the United States, the different States vary widely in defining misdemeanor, so that what is misdemeanor in one State may be indictable felony in another. Among the offenses commonly classed under this heading are malicious mischief, assault and battery, *etc.* ; criminal proceeding on such charges may be dropped, in many States, if the injured party acknowledge satisfaction, which suggests a dis¬ tinction between felony. The historic line be¬ tween the two classes of offenses was based on the outcome of conviction;. in the case of felony the convicted person forfeited his property, real and personal, if the felony was capital, per¬ sonal only if the felony was not capital. But no forfeiture of property ensued upon convic¬ tion for misdemeanor.

MLSE OF AMIENS, mez,. ov a'me'an', (mise, Anglo-French term meaning judgment, from the French mettre, to place), is the name given to the decision of Louis IX of France in the controversy between Henry III of England and his barons (23 Jan. 1264) Henry went in person to Amiens to attend the arbitration , but an accident prevented Simon de Montfort from doing the same. Louis had his idea ot the dignity of royalty and was too scrupulous not to credit another king with a desire ot doing his duty. He, therefore decided all points in favor of Henry and annulled the ro visions of Oxford and all engagements founded VOL. 19 — 15

upon them, leaving Henry a free hand to appoint his ministers and to enjoy his royal power as fully as he had done before the enact¬ ment of the Provisions of Oxford. See Montfort, Simon de; Henry III; Barons' War.

MISE OF LEWES, lu'is, a treaty, made by Henry III after the battle of Lewes (14 May 1264), where he was defeated and captured by the Barons under Simon de Montfort. The Mise of Lewes contained seven articles. By the first and second, after a reconformation of the Provisions, a new body of arbitrators was named — the archbishop or Rouen, the bishop of London, Peter, the chamberlain of France, and the new legate the cardinal bishop of Sabina, with the Duke of Burgundy or Count of Anjou as umpire when necessary; the third directs that the arbi¬ trators shall swear to choose only. English

counsellors ; by the fourth the king is bound to act on the advice of his counsellor in ad¬ ministrating justice and choosing ministers, to observe the charters and to live at moderate expense; by the fifth Edward and his cousin Henry are given as hostages ; by the sixth is provided the indemnity of the earls of Leices¬ ter and Gloucester, and the seventh fixes the next Easter as the time for the completion of the compromise. Peace was declared on 25 May and published at London on the 11th of June. See Henry III; Montfort, Simon de; Barons' War.

MISENO, me-sa no-, Cape, Italy, a promon¬ tory forming the west side of the Bay of Pozzuoli (ancient Cumae), 10 miles southwest ot Naples. On it are the ruins of the ancient city of Misenum, destroyed by the Saracens, 890 a.d which Augustus made one of the principal naval stations of the Romans.

MISERABLES, Les, la me'za'ra'bl, by Victor Hugo, is by universal consent one of the great novels of the world. Heralded since 1854 as designed to be a sort of social gospel, written almost wholly in exile by one whose political intransigence had attracted general re¬ gard, the work, extending to 10 volumes, ap¬ peared simultaneously in as many languages (3 April to 30 June 1862) and has since been in constant and wide circulation in many lands. It was Hugo's first novel since <Notre-Dame,, 31 years before. That had been an evocation of the past. Here his eyes were on the pres¬ ent, his heart in the future. To profound compassion for the sufferings of the unfortu¬ nate he joined a sturdy faith in the possibilities of moral regeneration and social reform through a realizing sense of human brother¬ hood. KSo long,® he says, in a preface «as there shall exist, through the fault of our laws and customs, a social condemnation that creates artificial hells in the midst of pur civilization and complicates a divine destiny by human fatalism; so long as the three problems of the century, — the degradation of man by the pro¬ letariat, the fall of woman by hunger, the ar¬ rested development of the child by ignorance-are not solved ; so long as social asphyxia is possible in anv place — in other words and in a wider aspect, so long as there shall be on earth ignorance and misery, books like this cannot be useless.® The first of the three problems is here impersonated in Jean Valjean,

the second in Fantine, the third in her unfa¬ thered daughter, Cosette.

In structure (Les Miserables> is loose-jointed, discursive, straying too readily into by¬ paths of antiquarian lore, political reminis¬ cence, philological speculation, scientific con¬ jecture, sociological visions. Hugo is apt to proclaim some commonplace with oratorical emphasis, as though it were a revelation of social salvation. He is apt to overcharge his characters till they become hardly human em¬ bodiments of some abstract quality, it may be mercy and forgiveness as in Bishop Myriel, untempered social justice as in Javert, political intransigence as in Enjolras, unmitigated cun¬ ning and cruel greed as in Thernadier. But through all there is a sincere and intense if vague emotion, a deep pulsing sympathy, a splendid indignation at the ignoble and base degradations of outworn institutions and con¬ ventions, an unfailing force of moral convic¬ tion, a glowing eloquence, that make it easy to pass by, if not to forget, the occasional Cyclo¬ pean lack of humor and the passages of puerile insipidity that are in strange contrast to others of impassioned and beautiful lyric appeal.

Hugo is a social optimist, often grand, never petty, though sometimes grandiose. Its foibles apart, (Les Miserables> is a noble plea for more practical recognition of the brotherhood of man, for more charity in judging the tempted, the wretched and the fallen. Jean Valjean, whose struggle for social reintegration is the connecting thread of the 10 volumes, is a dis¬ charged convict contending against social and legal proscriptions that must have driven him back to the galleys whence he came, had not Bishop Myriel redeemed him with the gift of the silver which he had stolen. He makes him¬ self respected and beloved. But a petty theft remains unexpiated, and rather than see an¬ other suffer on account of it he surrenders him¬ self again to prison. But first he lightens the last hours of Fantine, once a symbol of joy, <(innocence floating on error,® now the dying mother of Cosette, whom she has in desperation consigned to the mercies of Thernadier and now commits to the heart of Valjean. Here ends <(Fantine,® the first of the novel's five parts, to be remembered especially for Bishop Myriel, said to be essentially Monsignor de Miollis, a former bishop of Digne. The sec¬ ond part, <(Cosette,® opens with a justly famed picture of Waterloo, whence the scoundrel camp-follower Thernadier, a plunderer of corpses, had saved for his own base ends Colonel Pontmercy, father of Marius, the romantically predestined husband of Cosette, and apparently reminiscent of Hugo's own. Then it tells of Valjean's life in the galleys and of his escape, how he was pursued by justice

incarnateˆ in Javert, how he rescued Cosette from Thernadier and himself found refuge as a convent gardener, with reminiscences of Hugo's own childhood at Les Feuillantines. ((Marius,® the third part, is concerned mainly with the restless political agitation among those dissatisfied with the results of the Revo¬ lution of 1830. Marius is what Hugo thought he himself might have been. The charm of this part is in the very genial account of the Parisian gamin, Gavroche. Part 4, <(Saint Denis,® has a brilliant account of the great

barricade and riot of 5 June 1832, with the touching death of Gavroche and the first bud¬ dings of the love of Marius and Cosette. <(Jean Valjean,® the fifth part, is especially not¬ able for its account of the rescue of the wounded Marius by Valjean and their passage through the sewers, of the despairing suicide of the baffled Javert, of Thernadier's uninten¬ tional enlightenment of Marius as to his real debt to Valjean and for the very beautiful pic¬ ture of the redeemed convict's august end.

cLes Miserables) has been abridged by O. B. Super (Boston 1903), and well translated by C. E. Wilbour ('Everyman's Library, } 1909) and others. Consult Bire, (V. Hugo apres)852) (Vol. I, pp. 126-153), and, for summar¬ ized contemporary criticism, Bersaucourt, (Les Pamphlets contre V. Hugo* (pp. 227-279, 1912).

MISERERE, miz-ˆ-re're (Latin, <(have mercy®), the name (taken from its first word) by .which the 50th psalm in the Vulgate (or Latin version) is known, corresponding to the 51st of the authorized version. It is the fourth of the seven Penitential Psalms. The Miserere forms part of certain liturgies, and various great composers have taken it as a subject. The Miserere of Allegri is particularly famous.

The name Miserere is also given to a pro¬ jection on the underside of the seats of the stalls of mediaeval churches and chapels. They are usually ornamented with carved work, and are so shaped that when the seats proper are folded up they afford a small seat at a higher level sufficient to afford some support to a per¬ son resting upon it, and were thus used by priests suffering from bodily infirmity.

MISERICORDIA, or MISERICORDE, a

narrow-bladed Italian dagger used in giving the coup de grace or finishing stroke to a wounded foe. Also the name of a society in Florence, founded in the 13th century, who tend the poor sick, carry

victims of accidents or disease to the hospitals and the dead to their burial.

MISFEASANCE, mis'fe-zanc', from the French mefaire, to do wrong, signifies the doing of a lawful act in a negligent, or im¬ proper, manner. Misfeasance is, in some cases, punishable by law. It should be con¬ trasted with malfeasance, the doing of a wrong¬ ful act, and non-feasance, the failure to perform a promised act.

MISHAWAKA, mish'a-wa'ka, Ind., city in Saint Joseph County, four miles east of South Bend, on the Saint Joseph River and on the Grand Trunk and the Lake Shore and Michigan Southern railroads. It takes its name from an Indian village formerly on this site, was settled in 1828 and was chartered as a city in 1899. Saint Joseph Iron Works, laid out on the south side of the river in 1835, was made a village in 1839 ; Indiana City was laid out on the north side in 1836; and these two towns were combined and incorporated as the town of Mishawaka, in 1839. Two miles up the river is the Hen Island dam which, with the Mishawaka dam nearer the city, supply Mishawaka with water power for many factories. The products include automobiles, wagons, plows, farm im¬ plements, machine-shop and foundry products, pipe organs, rubber boots and shoes, furniture] beer,, pulleys, ladders, cement blocks, iron beds, aluminum castings, curtain stretchers, pearl

buttons, felt shoes and slippers, cigars and leather goods. The city owns three fine parks, a public library, high school, hospital and or¬ phans' home and an electric-light plant. Three bridges cross the Saint Joseph River at this point. In the surrounding country corn, wheat, oats, rye and peppermint are produced. Pop.

(1920) 15,195.

MISHNA, mish'na, the first part or text of the Talmud, the second part or Gamara (supr plement) consisting of a commentary on or

elucidation of the Mishna, which consists of oral traditions and glosses on the Pentateuch, made in Galilee by the Rabbi Jehudah or Judah Hakkodesh, who completed the work 220 a.d.

A commentary was rendered necessary by the extreme terseness and conciseness of style with which the Mishna is composed. It is written in Hebrew, but it contains a number of Greek, Latin and Aramaic words, which had become naturalized in the Hebrew, and bears traces also of Aramaic idiom. The traditions set down in the Mishna were held by the Pharisees to be of equal authority with the written law of Moses, and were supposed to constitute an oral law delivered to Moses by God and by Moses delivered to Joshua, by Joshua to the elders, by the elders to the prophets and by the prophets to the men of the Great Syna¬ gogue. Such is the statement of the Mishna itself, which the Pharisees accepted. The Sad-ducees, however, rejected this doctrine, al¬ though in many cases they followed in practice «the traditions of the elders® with much fidel¬ ity. See Jews and Judaism — The Talmud.

MISIONES, me-se-ones, Argentine Re¬ public, a territory bounded on the north, east and south by Brazil, on the east, by the rivers San Antonio and Pepiri or Pepiri-Gauzu, sepa¬ rating it from Brazil, and on the west by the province of Corrientes and Paraguay. Area, 11,511 square miles. Three low mountain chains radiate from the centre, and the greater portion of the surface is covered with forest, producing building and dye-woods, oranges, medicinal herbs and the yerba mat t or Paraguay tc3.. The country is well watered a.nd fertile and there are valuable granite quarries. The Iguezu Falls, 196 to 200 feet in height, are more than twice as broad as Niagara. Maize is largely grown and sugarcane to some extent, and several sugar-mills are in operation. There are interesting and other ecclesiastical remains of the early Jesuit missions. Posadas, the cap¬ ital, on the Parana, was founded in 1865. The territory had a population of about 53,563. A railway is projected to run through the centre of the territory.

MISKOA (from Greek, meaning hair-foot) , an order of the Chaetopoda, fossil marine worms (Annelida), discovered by Walcott in the Middle Cambrian rocks of British Colum¬ bia at Misko Pass, whence their name.

MISKOLCZ, mish'kolts, Hungary, capital of the comitat of Borsod, 24 miles northeast of Erlau. The inhabitants are chiefly employed in the cultivation of cereals and the vine, and there is an important trade in wine, corn, leather, stone, *etc.* Among the churches is a Gothic one of the 13th century, and it has also a fine hospital, several gymnasia and

other edu¬

cational institutions and a theatre. Pop. about

51,459.

MISNOMER (from the French menomer, misnaming), an error in naming a person in a pleading, deed or other written instrument. See Plea and Pleading.

MISPICKEL. See Arsenopyrite.

MISPRISION, (1) the concealment of a crime, as felony or treason ; called also negative misprision. (2) High misdemeanor or contempt, as maladministration by a public official or inducing a witness to refuse to testify; called also positive misprision. Misprision of felony is still punishable in the English law, but is practically obsolete elsewhere. Misprision of treason was formerly punished in England by forfeiture of goods and imprisonment for life, but to-day the maximum penalty is penal servi¬ tude for life. In the United States it is a Federal offense, punishable by imprisonment not to exceed seven years and a fine not to exceed $1,000.

MISREPRESENTATION, in lew, any act, whether verbal or tacit, tending to create or creating a false impression on another, such that by acting upon this impression he is in¬ jured. ” Misrepresentation falls under two heads, deliberate and unwitting. Deliberate misrepre¬ sentation is either deceit or fraud. Unwitting misrepresentation is legal mistake, and its treatment by the law depends largely on cir¬ cumstances, but is unfortunately too much in¬ fluenced by the principle that “ignorance does not excuse,® which should strictly be confined to the application suggested by its original form, “ignorance of the law.®

MISRULE, Lord of, a whimsical title given to the leader of the Christmas revels in the Middle Ages. He is a descendant of the king of the ancient Roman Saturnalia who im¬ personated Saturn. His duties were to lead the multifarious revels of the season ; or, in other words, to act as master of ceremonies. Stow in his (Survey > gives the following account of him: “In the feast of Christmas there was in the kings’ house, wheresoever he lodged a Lord of Misrule or Master of Merry Disports, and the like had ye in the house of every noble¬ man

of honor or good worship. The mayor of London and the sheriffs had their several Lords of Misrule ever contending without quarrel or offence, who should make the rarest pastime to delight the beholders. These lords beginning their rule at Allhallows Eve continued the same till the morrow after Candlemas Day, in which space there were fine and subtle disguisings, masks and mummeries, with playing at cards for counters in every house, more for pastimes than for gain.®

In the University of Cambridge the func¬ tions of the Lord of Misrule were performed by one of the masters of arts who was regu¬ larly elected to superintend the annual re¬ production of Latin plays by the students be¬ sides taking a general charge of their games and diversions during the Christmas season, and was styled the Imperator, or Praefectus Ludorum. A similar Master of Revels was chosen at Oxford. It seems to have been in the Inns of Court in London that the Lord of Misrule reigned with the greatest splendor, being surrounded with all the parade and cere-

mony of royalty, having his lord-keeper and treasurer, his guard of honor, and even his two chaplains, who preached before him on Sunday in the Temple church. On Twelfth Day he abdicated his sovereignty. In the year 1635 this mock representative of royalty expended in the exercise of his office about £2,000 from his own purse; and, at the end of his reign, he was knighted by Charles I at White¬ hall. The office was regarded among the Templars as most honorable and was gen¬ erally conferred on young gentlemen of good family. The Lord of Misrule was always cos¬ tumed extravagantly and carried a fool's bauble as badge of office. A favorite form for his lordship to enter upon his duties was to absolve the company of all their wisdom, leaving them <(just wise enough to make fools of themselves.® Fealty was sworn to the merry monarch and the reign of fun and folly began.

In Scotland this character was called the Abbot of Unreason; in France, he was the Abbe de Liesse and Abbas Stultorum — the Abbot, or Pope of Fools. Scott gives a descrip¬ tion of one of these mock-

ecclesiastics in (The Abbott

MISSAL (Latin missale, from missa, mass), the book which contains the prayers, rubrics, antiphons, etc., of the mass. It was formed by comprising in one volume the sepa¬ rate books formerly used in different parts of the service, namely the Oratorium, Lectio-narium, Evangeliarium, Antiphonarium, the Canon, etc., for the convenience of the priest. Variations and corruptions in the course of time crept into the text of the Missal, and the Council of Trent suggested a revision of it. This was accordingly accomplished by order of Pius V (1570), who required the new Missal to be used by the whole Church, with the ex¬ ception of those societies which for more than two centuries had followed another ritual. Subsequent revisions made under Pope Clement VIII (1604), Urban VIII (1634) and Leo XIII (1884, 1898) extended little beyond alterations of single expressions, and the addition of new masses, both obligatory and permissive, uni¬ versal and local. In the ancient and mediaeval Church there were missals in use, varying ac¬ cording to the various rites. Thus, in England, there were missals of the Sarum use, Hereford use, Lincoln use, Bangor use, *etc.* There are also missals of the Greek Church, the Church of the Maronites and other Christian bodies. The earliest printed missal is the <Missale per totius Anni Circulum More Ambrosiano com-positunP (Milan 1475, folio), which was fol¬ lowed by the (Missale secundum Consuetudi-nem Romanae Curiae) (Rome 1475).

MISSI (Latin, meaning those sent), name given to officials sent on special errands by the Frankish kings. Their institution dates from Charles Martel and Pepin le bref ; but Charle¬ magne made them a regular part of his ad¬ ministration. Under Charlemagne the missi dominici were most important. Into each dis¬ trict of the great empire were sent each year two missi: one a lay nobleman and the other an officer of the Church. It was their business to hold court, hear complaints, redress griev¬ ances and report all this to the emperor. By this means C harlemagne controlled the courts and centralized the government. The missi

dominici disappeared from France and Ger¬ many in the 9th century and from Italy in the 10th century. Consult Thompson, J. W., de¬ cline of the Missi Dominici in Frankish GauP (Chicago 1903).

MISSING LINK, a term used to desig¬ nate the gap in the scheme of evolution be¬ tween the ape and man. See Ape; Evolution ; Darwin; Pithecanthropus Erectus.

MISSION INDIANS, a general name given the Indians of southern California who in the 18th century were Christianized by the Spanish Franciscan missionaries. The Mission Indians were originally of many tribal families and dialects, but chief among them were the Yumas and the Shoshones. Father Junipero Serra (q.v.) and the other friars who followed him succeeded in gathering the Indians into communities, mission houses and chapels were built and vineyards planted. The work began about 1776 and continued successfully until 1831. In this latter year they numbered 19,000, but with the overthrow of the Spanish power by the Mexicans a period of confiscation and destruction began, which continued to 1840. The friars were banished, the mission aban¬ doned and the Indians driven back to the deserts and the mountains. Under the Ameri¬ can rule in California, both Indians and mis¬ sions were neglected until after the Civil War, when, principally at the instigation of Helen Hunt Jackson (q.v.), the government took steps to care for the unfortunate natives. They now occupy about 30 small reservations, which in the aggregate contain 180,000 acres. The remaining Indians number about 2,600. They are partly civilized and fairly industrious. Within recent years an organization in Los Angeles has endeavored to rebuild the ruined missions and preserve them in remembrance of the historic past. (See Pious Fund). Consult Englehart, Z., (Missions and Missionaries of California) (San Francisco 1908) ; Wetmore, C. A., (Mission Indians of Southern Cali¬ fornia* (Washington 1895).

MISSION SOCIETY, American Baptist.

See Missions, Protestant Foreign.

MISSIONARY RIDGE. See Chatta¬ nooga, Battle of.

MISSIONARY SOCIETY, Methodist.

See Methodist Churches of the World.

MISSIONS, Protestant Foreign. Foreign missions were not seriously undertaken by Prot¬ estants until more than 200 years after the Ref¬ ormation. This curious fact is sufficiently ex¬ plained by the circumstances that the reformers were involved at the outset in a struggle not only for liberty but for life itself; that Chris¬ tendom did not yet control the whole of Europe; an aggressive Mohammedan power with its foot in Hungary and its fleets in the Mediterranean being still active in its purpose of conquest; and that the state alone com¬ manded resources sufficient for enterprises of any kind in remote regions like the Indies, Africa or America. These circumstances

of life in Europe in the 16th century materially lessen the importance of the question whether Luther and his followers did or did not see that a Christian Church must die which is not actively missionary in principle.

The first Protestant missions, perhaps natu¬ rally, were state enterprises, unless we reckon as a mission the single effort of Heiling (1634) in Abyssinia, which ended with his murder 20 years later. In 1556 the Council of Geneva sent missionaries to Brazil with Coligny's colony, who perished with the colonists. In 1635 the Duke of Gotha sent a mission to Persia, and in 1663 again a mission to Abyssinia ; both unpractical embassies were quickly forgotten. The Dutch government, after gaining possession of the East Indian Archipelago in 1602, made a serious effort to Christianize the Malays, and the people of Ceylon and of Formosa, producing perma¬ nent results in Java and the adjacent islands of the East Indian Archipelago only. The Dutch government published in 1685 the New Testa¬ ment in Malay (the second of modern transla¬ tions of Scripture into heathen languages ; Eliot's translation into Mohican in 1663 having been the first), and the whole Bible in 1701. It has also maintained a Malay Protestant Church in Java, the Moluccas and Celebes, which now has about 400 ministers and 250,000 adherents, of whom probably one-half are descendants of the 17th century converts. A similar state mis¬ sionary enterprise undertaken by a Protestant government of Europe was the Danish mission to South India, founded by King Frederick IV of Denmark in 1706. The king sent out as the first missionaries to Tranquebar, Ziegenbalg and Plutschau, Germans from Francke's school at Halle. Other Germans from the same sur¬ roundings followed, notably Schultze and his later associate, Schwartz, making this Danish mission the first serious Protestant mission in India. Ziegenbalg translated the New Testa¬ ment into Tamil (the third of modern transla¬ tions of Scripture into heathen language), and before the end of the century from 30,000 to 50,000 Tamils had become Christians.

Another mission maintained by Frederick I\ of Denmark was that commenced by Hans Egede in Greenland in 1721, and later trans¬ ferred to the care of the Danish Missionary Society. This mission Christianized the whole Eskimo population in the vicinity of the Danish

trading stations…

The British government showed a similar sense of responsibility for missionary work in its colonies, and the duty of preaching to the North American Indians was laid down in the charters of Virginia (1584) and Massachusetts (1628). Parliament even went so far as to con¬ sider in 1648 the endowment of a state foreign missionary enterprise. It voted a grant in aid of the "Society for the Propagation of the Gos¬ pel in New England,® formed in 1649 and still existing under the name of the New England Company, which educates Indians in Canada with the revenues of the ancient government grant. John Eliot of Roxbury, Thomas Mayhew of Martha's Vineyard, and others through this government solicitude received state support m their missionary work for Indians. The British East India Company, moreover, was required by its charter in 1698 to maintain chaplains at its stations, and to instruct its Hindu servants in

Christian doctrine. (

All of these state enterprises in the line ot foreign Protestant missions were uncertain in method and precarious in stability. They served, at least, to show the possibility of prosecuting missions in the colonies, but were sufficiently

barren to suggest the formation of those volun¬ tary societies for missionary effort which proved to be the effective form in which the mission¬ ary idea among Protestants was to express itself.

Unsatisfactory religious conditions in the East India Company's trading posts led in 1698 to the organization of the (<Society for the Pro¬ motion of Christian Knowledge,® with the pur¬ pose of providing books and schools for neglected English communities, and in 1701 to the appearance of the ((Society for the Propaga¬ tion of the Gospel in Foreign Parts,® intended to provide for the religious culture of English¬ men residing in foreign lands. Both of these societies were directed by the Church of Eng¬ land, although voluntary in form and in the sources of their revenues.. Neither of them were foreign

missionary societies. But the first now publishes books in Oriental languages, and it saved the Danish Mission in South India from dying with its royal founder, and supported it during a century, until it was taken over by the Society for the Propagation of the Gospel. This latter society, too, has gradually taken up the work of evangelizing pagans until it has (1915) 1,005 missionaries in India, China, Japan, Korea, Malaysia, Africa and the West Indies, with nearly 3,500 native clergy and laymen in the various departments of its work. These two societies then, founded about the beginning of the 18th century, may be considered as the pio¬ neers of the voluntary foreign missionary socie¬ ties of Protestant Christendom.

It was not until the 19th century was about to dawn, however, that a general movement toward missionary enterprises began among Protestants in Europe and America. This movement grew out of that revival of personal religion in the 18th century which was fostered by the writings of Spencer and Francke, the Pietists of Halle, and by the devoted lives of men like David Brainard of Connecticut, and Zinzendorf, the patron and leader of the Mora¬ vians, and was stimulated by the exhortations of Whitefield, the Wesleys and Jonathan Ed¬ wards, and by the example of the "Unity of Brethren® (Unitas Fratrum or Briider Unitdt) as the Moravians call themselves. The Mora¬ vians, not as a church that begs men to volun¬ teer, but as a community in which every mem¬ ber has equal interest in evangelism, were the first decided champions of Protestant missions. They held it the duty of all Christians to tell men what benefits they had received from Jesus Christ. They established missions be¬ tween 1732 and 1770 in the West Indies, in Greenland, in the Indian settlements of North America, among the Hottentots of South Africa, and in Labrador. They (1913) support 359 missionaries and 2,157 native preachers and teachers in their various mission fields which include, besides those already named, Alaska, Australia and the border lands of Tibet. The English Wesleyans should also be reckoned with the Moravians as having taken up mis¬ sions in advance of the general movement of the Protestant churches. They did not formally organize the Wesleyan .Methodist Missionary Society until 1814. But in 1779 they employed missionaries among the North American In¬ dians, and in 1786 they began an important work among the slaves of the West Indies. The Society has (1915) 807 missionaries, and

5,756 native workers and teachers in India, Ceylon, South Africa, China, Polynesia and the West Indies.

Before this extension of Wesleyan missions took place a surprising outburst of zeal for the missionary idea appeared almost simultaneously in England, in the United States and on the Continent of Europe. It was a revolution, since formalism had made the Protestant churches almost forget that to be a Christian means to be always in some sense a missionary. The characteristic feature of the movement was its origin in the conscientious convictions of isolated individuals, from whom the Church did not expect initiative and whom it sometimes regarded as unsteady enthusiasts. William Carey, a cobbler and a Baptist minister in Eng¬ land, made the first move in 1786 and was frowned down by his elders. But in 1792 his earnest conviction carried the day; 12 men united to form the Baptist Missionary Society (England), and Carey and Thomas went to India as its first missionaries. There is no space here to describe the marvelous activities of Carey and his associates Marshman, Ward and others, at the Danish trading post of Serampur near Calcutta, where they were given asylum when the East India Company refused to tolerate their presence in its territories. The great school buildings which these missionaries erected at Serampur stands to-day, and their press added to the then slender stock of Bible translations passably good versions of Scrip¬ ture in 34 Oriental languages and dialects. The Baptist Missionary Society has (1915) 477 mis¬ sionaries and 2,000 native preachers and teachers in India, Ceylon, China, Africa and the West Indies.

This example was contagious. In 1795 ffThe Missionary Society® was formed in London by the union of notable men of four different de¬ nominations. Its name was afterward changed to ((The London Missionary Society.® It is (1915) substantially composed of Independents (Congregationalists) alone, and has 480 mis¬ sionaries and 7,000 native preachers and teachers, in Polynesia, New Guinea, Madagas¬ car, Africa, India and China. In 1796 two similar societies were formed in Scotland which at first aided the London Societv, but later took up independent work in the West Indies and in South Africa, and finally (1824) became merged in the Church of Scotland Foreign Missionary Committee, of which a later (1843) offshoot was what has now become the Foreign Missionary Society of the United Free Church of Scotland. The Church of Scotland Foreign Missionary

Committee now has 120 mission¬ aries and 1,200 native workers, and the United Free Church has 541 missionaries and 5,093 native preachers and teachers in India, China, Africa, Arabia, the New Hebrides, Manchuria and the West Indies. The same impulse led in 1797 to the formation in Holland of the Netherlands Missionary Society. This was first an auxiliary of the London Missionary Society but soon undertook independent work. In 1913 it had 63 missionaries and 154 native workers in the Dutch East Indies.

The same conviction of responsibility to¬ gether with realization of the extent and con¬ dition of the heathen world led in 1797 to the organization in London of 26 men belonging to the Church of England as the <(Societv for

Missions to Africa and the East.® This name later gave place to the familiar one of the <(Church Missionary Society.® Among its founders were William Wilberforce, Henry Venn and Charles Simeon ; but the Church of England gave the Society no encouragement until the successes of nearly 50 years compelled recognition. Hence the first missionaries of this Society were commonly Germans; for the most part men of the highest ability and attain¬ ments. The fields of the Church Missionary Society are India, Ceylon, China, Japan, Africa, Mauritius, New Zealand, Persia, Palestine, Egypt, the Sudan and the Arctic regions of British North America. It has (1915) 1,369 missionaries and 11,181 native preachers and teachers.

Missionary enterprises next began to sprint up in Germany and in America. The marked characteristic of the movement in every case was the same profound conviction of individ¬ uals, commonly not officials of the churches to which they belonged. Five students of Wil¬ liams College in Massachusetts furnished the initiative that resulted in the organization of the <(American Board of Commissioners for Foreign Missions® in 1810. This was at first an interdenominational society. Its first mis¬ sionaries, Newell, Judson, Hall, Rice and Nott, were sent to India and were ordered out of the country by the East India Company the moment they landed. Judson and Rice took refuge with the English Baptists at Serampur, while the others succeeded in effecting a lodg¬ ment at Bombay and in Ceylon. The fields of this Society in 1915 were India, China, Japan, Ceylon, Africa, the Balkan States, Turkey, Aus¬ tria, Spain, Mexico, the Philippines and Micro¬ nesia. Its missionaries number 656 and its na¬ tive laborers 4,777. After 40 years of exist¬ ence as an interdenominational society, it handed over its missions in Persia, Syria and the Gabun region of West

Africa to the Pres¬ byterians, and part of its field in South India to the American Reformed (Dutch) Churdh, and has become substantially a Congregationalist body. Judson and Rice of the earliest mis¬ sionaries of this Society decided on arriving in India that they would prefer to serve under a Baptist organization and this decision led to the formation .in 1814 of what is now the American Baptist Foreign Mission Society of Boston. Burma was the field selected for its first efforts and the heroic work of Adoniram Judson in that land made his name great among modern Protestant missionaries. The Society had in 1915 701 missionaries and 8,589 native laborers in Burma, Siam, Assam, India, China, Japan, the Philippines and Africa.

Meantime, in Germany, Jannicke of Berlin, whose brother was a missionary of the ((Danish Halle® band in South India, opened a Mission¬ ary Training School at Berlin in 1800. This school during the next 25 years furnished about 80 missionaries to the service of the English and Dutch societies, and served to arouse in¬ terest in missions among the Germans. Its influence led in. 1815 to the establishment of a Missionary Training Institute at Basel in Ger¬ man Switzerland. The latter institute furnished many, admirable men to the service of other societies and in 1822 began to send out mission¬ aries of its own. The fields of the Basel Mis¬ sionary Society are in India, China and Africa,

and graduates of its institute are pastors of Protestant churches in Turkey. In 1913 it had in the field about 475 missionaries and 624 native workers.

In 1824 10 strong men in the Lutheran Church, among whom were Neander and Tho-luck, formed the Berlin Missionary Society ; beginning operations, according to the wise con¬ tinental practice, by opening a training school for missionaries. It began to send out mission¬ aries in 1834 and now carries on missions in Africa and China. It had in 1913 about 150 missionaries (wives of missionaries not counted) and 1,000 native preachers and teachers. Other missionary societies sprang up in Germany during the first ciuarter of

the 19th century. Of these the Rhenish Missionary Society is perhaps the largest. Its fields were in South Africa, China, Sumatra, Borneo and New Guinea. It has 382 missionaries and 1,340 native laborers. There are a score, at least, of other German missionary societies of which the chief are the Gossner Society, the Her-mannsburg, the Leipzig, the North German and the Breklum societies, working in the Dutch East Indies, Africa, India, China, Australia and Turkey.

The same period saw the formation in France of the Paris Evangelical Missionary So¬ ciety (1824), designed at first merely to aid existing enterprises, but quickly beginning to send out missionaries of its own. In 1913 it had 173 missionaries, men and women, and 1,274 native workers, in Madagascar, Senegam-bia and the Barotse and Basuto regions of Africa. With the development of French colo¬ nial expansion it has also taken the place of the London Missionary Society's missionaries in Tahiti and in parts of Madagascar, and of American missionaries in the French Kongo region. Protestant missionary societies in Hol¬ land, Denmark, Sweden, Norway and Finland sprang later from the same causes and are doing good work with 831 missionaries and about 4,000 native workers in Africa, India, China, Chinese Turkestan and Madagascar.

The same spiritual awakening of widespread effects gave rise also to the British and Foreign Bible Society (1804), the American Bible So¬ ciety (1816), the Netherlands Bible Society, and Religious Tract Society of London (1799) and the American Tract Society of New York (1820). The Bible societies do true foreign missionary work in publishing the Scriptures as soon as missionaries have translated them into the languages of non-Christian peoples and in disseminating the Scriptures in these languages. Some 500 modern translations have been pub¬ lished. The British and Foreign Bible Society in 1915 employed about 2,000 colporteurs and Bible women and its total issues of Bibles, New Testaments and lesser parts of Scripture amounted to 11,059,617 copies. The American Bible Society has about 1,500 colporteurs in foreign mission fields and issued in 1915 7,150,-911 copies. The Scottish National Bible So¬ ciety issued in the same year over 2,500,000 copies, besides joining with the first named societies in providing finances for translating and publishing the Bible in various languages.

The tract societies aid missions in a similar manner; providing funds for the publication of undenominational Christian literature in the languages of non-Christian peoples. The Reli¬

gious Tract Society of London at its centen¬ nial anniversary was able to report that it had given for this purpose to English and American foreign missions aid equivalent to $100 per day during the whole period of its existence.

In the second quarter of the 19th century the American Methodist Episcopal Church and the American Presbyterian Church began their missionary work in foreign lands. The two great branches of the Methodist Episcopal Church in 1915 had 1,199 missionaries and 10,800 native laborers. The Presbyt< rians North and South have 1,551 missionaries and 6,866 native laborers. Almost all denominations in the United States and in Great Britain now have foreign missionary organizations of their own. Interdenominational and international missionary societies, like the China Inland Mis¬ sion, the North Africa Mission, the Christian and Missionary Alliance and other bodies of greater or less importance have been formed to carry on missionary enterprises by methods more free from machinery than the older so¬ cieties sometimes seem to require. The total number of Protestant missionary societies now existing probably exceeds 500. The World War has interfered with collection of statistics, but in 1912 these societies reported 24,092 mis¬ sionaries, men and women, and 111,862 na¬ tive workers.

Four points are noteworthy, in the history of the development of these missionary so¬ cieties, as each marking an epoch of expansion of their scope. These are: (1) The adoption of education as a missionary agency; (2) The general adoption by women of mission work for womankind; (3) The establishment of medical missions; (4) The opening of indus¬ trial departments in many missions.

1. Education. — The aim of foreign missions is to tell of Jesus Christ to those who do not know Him. The aim is to lead them to sur¬ render self-will to the control of Jesus Christ so completely that converts shall be true Chris¬ tians, who, if the missionary leaves to-morrow, will stand immovable in their devotion and their impulse to teach others the ‘truth that has bene¬ fited themselves. At the outset the task seemed simple enough. To preach and preach again was all that was necessary. As a result of the first half century of experience, the discovery was made that common schools are essential in all missions which urge the reading of the Bible. Rev. Dr. Alexander Duff, a missionary from Scotland who left ineffaceable marks upon India, was a leader in championing the thesis that education in all grades is also an essential department of missionary effort. This prin¬ ciple is now established with all that it means of general enlightenment for backward races, and in 1912 there were in the Protestant mis¬ sions

throughout the world 35,000 educational establishments of all grades from kindergarten to university, attended by about 1 ,670,000 young people of every form of religious belief.

2. Woman's Work. — • As early as 1825 mis¬ sionaries undertook the education of girls in India, Africa, Turkey and elsewhere. In 1835 a Woman's Missionary Society was formed at Berlin, Germany, for the instruction of women in the East; and later schools for girls were opened in several non-Christian lands by dif¬ ferent missionary societies. It was not until 1860 that the women of Christian lands began

to take the matter into their own hands. Be¬ ginning with the Woman's Union Missionary Society of New York (I860), mission boards of women were organized in almost all the Protestant denominations of Great Britain, Canada and the United States. These mission¬ ary societies of women are for the most part closely allied to the general missionary boards of the denominations to which they belong, but they send out women as missionaries and have produced vast extension of the scope of the missionary enterprise. The impossibility of carrying on successful missions without women missionaries to win and instruct their own sex is now fully recognized. There were in 1912 about 2,968 unmarried women working as mis¬ sionaries in all parts of the non-Christian world. No mission field is so dangerous or so repellent in its barbarism as to be denied the ministering service of devoted women of Christendom.

3. Medical Missions — At the outset physi¬ cians were sent to the missions with the pri¬ mary duty of caring for the health of mis¬ sionaries. They could not, however, fail to use their knowledge for the relief of suffering in lands where surgery was unknown and the science of medicine parodied. It was not until about 1885 that the Medical Mission was fairly established as a recognized channel of mission¬ ary influence. Since that time the number of missionary physicians, both men and women, and of missionary hospitals and dispensaries has increased every year. In 1912 there were 800 men

and women physicians and surgeons, with 1,638 hospitals and dispensaries in connec¬ tion with foreign mission fields.

4. Results of Foreign Missions. — It used to be common for critics of missions to picture be¬ wilderment among pagan hearers as a neces¬ sary result of denominational differences among missionary preachers. But the gospel preached to pagans by Protestant missionaries of different denominations is one in essence, and the prob¬ lems of missionary effort in all fields are much alike. Sixty years ago missionaries of different denominations at work in India conferred to¬ gether on the more efficient prosecution of the common work. The advantage of such confer¬ ences was so clear that the solidarity of the different missions may be set down as one re¬ sult of the missionary enterprise. Conferences between the different missions are now held regularly in many foreign lands. Moreover general conferences of the societies of different nations have been held with notable advantage to the cause of missions. Such was the Confer¬ ence of London in 1888, the Ecumenical Con¬ ference on Foreign Missions held in New York in 1900 and the World Foreign Missions Con¬ ference of Edinburgh in 1910. The Latin America Mission Conference of 1916 was a gathering of the same nature which brought to¬ gether at Panama almost 500 missionaries and friends of missions from 21 nations. An an¬ nual assembly of the same class is the Foreign Missions Conference of the United States and Canada which brings together representatives of more than 40 missionary societies. Similar annual conferences are held in Great Britain and in Germany. Fruits of such gatherings are increase of sympathy and comity and diminution of possible causes of friction between different denominations and a steady advance in effi¬ ciency and economy on the foreign field. At

home this unification of missionary interest has produced such interdenominational enterprises for the support of foreign missions as the Mis¬ sionary Education Movement, the Student Vol¬ unteer Movement and the Laymen's Missionary Movement.

In 1912 the stations of foreign missionaries numbered 12,123 besides about 38,000 other places more or less regularly visited. The or¬ ganized congregations were 15,396. In connec¬ tion with these congregations the number of persons in full church membership was 2,644,170. Figures are proverbially uncertain agents for setting forth facts and their meaning. In any general statement such as is here attempted it should be remembered that before statistics can be gathered from the wide areas concerned many of the details will not

be up to date. One thing that should be clear to the reader of this article, however, is the widening of the scope of foreign missions since the first fruition of the missionary idea in the modern Christian Church. This expansion of the scope of missions is not due to any modification of their fundamental purpose. It is due to experience of the needs of non-Christian peoples and especially of their need of a future nurture similar to that en¬ joyed by Christians at home. Let no one for¬ get that no miraculous short cut exists by which a pagan savage can be transformed into a Christian gentleman of culture. The planting of the aspiration is a miracle, but a majority of converts remain children in development. Some may use this fact to belittle the moral change seen in multitudes. The number of con¬ verts who do become leaders in the mission churches is not thus to be set aside. Men from the lowest classes have risen through de¬ votion to Jesus Christ to the highest ability, like the slave-boy Crowther of Yorubaland and Constantian of Turkey who became eminent among Bible translators ; or like Abdul Masih and Imaduddin of India, whose work among their own people as Christian ministers was that of masters of apologetics ; or like Dr. Saleeby of the Philippine Islands, once a village boy in Mount Lebanon, whose fitness for good serv¬ ice was grounded on the instruction received in American mission schools in Syria. The clean and kindly lives of converts in the mission fields, their sincerity and stability influence their people. Of the 150,000 persons received into Church membership in foreign missions during 1912, it is not rash to estimate one-half as having been won to a serious study of Chris¬ tianity by the subtle influence of the lives of Christian acquaintances. Furthermore the high qualities discovered in Christians often produce a gradual moral uplift among those who have ■not accepted the religious message of the mis¬ sionary. It is a significant fact that in 1912 the missionary societies reported as income from the mission field $7, 902,256. This money came in part, of course, from church collections, but a large part came from non-Christian patrons of mission schools and patients in mission hos¬ pitals. The Bible is widely circulated in mis¬ sion fields. Some of the people decline to ad¬ mit its authority as containing the principles of life on which must depend the stability of the universe ; but they do regard it as a repository of experiences of men, wise and unwise, through many ages of time. These records sharply touch their own problems of life and

character. In 1915 a Chinese official, not a Christian, bought in Peking several thousand copies of the New Testament in Chinese which he gave to friends and subordinates as contain¬ ing the noblest scheme of moral conduct which the world has ever known.

Add to such byproducts of foreign mis¬ sions the direct fruits of missionary effort in endowing illiterate languages with alphabet and writings, in purifying literary thought and ex¬ pression in languages which already have liter¬ ature, in enlightening womankind, hitherto guarded against culture, in training children and youth, in teaching an industrial efficiency which touches the world's commercial interests, and one gains fuller comprehension of the results of foreign missions. This vast enterprise so reaches the source of social development among those masses with whom is the reserve vitality of every nation that it must be reckoned among the great agencies by which Europe and America are shaping the destinies of backward races throughout the world.

The outbreak of the Great War in 1914 cre¬ ated a reaction against Christianity throughout the mission fields of the world which prevailed until the East understood that the British Em¬ pire, and later the United States, were both fighting for justice and righteousness and for the rights of unprotected humanity. German foreign missions naturally suffered during the defeat of the nation which h?d violated the fundamental principle of Christianity, «Peace on Earth — God's will to men,® and the inter¬ denominational, international missionary or¬ ganizations which reached their culmination at the Edinburgh Missionary Conference in 1910 were, for the time, disorganized. The continu¬ ation committee there launched had been re¬ markably successful in binding under one or¬ ganization the Protestant missionary forces of

the world. „ . . , „ . ,

By the stand of the British Empire and

America, North and South, a reaction occuried which increased the endeavors . of Protestant foreign mission work as shown in the statistics presented at the Foreign Mission Conference of North America at Garden City, N Y., in 1918. Gratifying increase was shown along all lines of foreign missionary endeavor and was best

exemplified by the grand total of the in¬ comes of the affiliated societies, representing as far as it was possible to be ascertained the amount given in Canada and the United States for carrying on foreign Protestant missionary enterprise. Of the total amount, $18,500,000 were given by living donors,, a balance of nearly $2 000 000 representing the incomes from lega¬ cies, endowments and other sources.. Exclu¬ sive of the income of the societies derived fiom the mission fields themselves, the total income amounted to $20,400,000 as compared to $16,- 039741 in 1915 and $11,946,218 rn 1910.. Offi¬ cially advanced by the National Missionary Society of Sweden in a communication to Sec¬ retary Tames L. Barton, chairman of the Amer¬ ican National Committee, representing the mis¬ sion societies of North America the sugges¬ tion is to be acted upon, although many diffi¬ culties appear in the way of the achievement. ((Whether plans should not be inaugurated by the Protestant missionary bodies of the world to out all foreign work upon a supei national basis so that in case of any future war, no

matter what countries were involved, their in¬ stitutions and their work should remain abso¬ lutely undisturbed?55

Bibliography. — The literature of foreign missions is enormous. Only a few standard works can here be suggested. Dr. S. M. Jackson's (Bibliography of Foreign Missions 5 (1891) may well be consulted. General Sur¬ veys and Statistics: Warneck, (Outlines of a History of Protestant Missions) (1907) ; Den¬ nis, (Centennial Survey of Foreign Missions) (1902) ; (World Atlas of Christian Missions,) Student Volunteer Movement (1917); Bliss,

E. M., Encyclopedia of Missions5 (2 vols., 1891); Dwight, Bliss and Tupper, /New En¬ cyclopedia of Missions5 (1904) ; Dwight, H. O., (The Blue Book of Missions5 (1907); Barnes,

L. C., Two Thousand Years of Missions be¬ fore Carey5 (1901). Missionary Societies: Lovett, R., 'History of the London Missionary Society5 (2 vols., 1895) ; Stock, E., (History of the Church Missionary Society5 (3 vols., 1899) ; Hamilton, L. T., 'Moravian Missions5 (1901) ; Pascoe, C. F., (Two Hundred Years of the So¬ ciety for the Propagation of the Gospel5 (1901) ; Merriam, E. F., (History of the Amer¬ ican Baptist Missions5 (1902) ; Strong, W. E.,

< Story of the American Board of Commis¬ sioners for Foreign Missions5 (1910) ; Canton, (History of the British and Foreign Bible

So¬ ciety5 (5 vols., 1904) ; Dwight, (Centennial History of the American Bible Society5 (1916); Report of the Centenary Missionary Conference (London 1888) ; Report of the Ecumenical Conference (New York 1900) ; Reports of the World Missionary Conference (Edinburgh 1910) ; Dennis, (Christian Mis¬ sions and Social Progress5 (3 vols., 1897— 1906). On Special Fields: Reports of the great Shanghai Conference (1907) ; MacGilli-vray, (China Missions' Year Book5 (1915) ; Gibson, 'Mission Problems and Mission Meth¬ ods in South China5 (1893); Inglis, India's Protestant Missionary Directory5 (1915) ; Jones (India's Problem5 (1903); Dearing and others, (The Christian Movement m Japan5 (1915) ; Stewart, 'Dawn in the Dark Conti¬ nent5 (1903); Stock, 'The Story of Uganda5 (1894); Curtis, 'The Laos of North Siam5 (1903); Brown, (The New Era in the Philip¬ pines5 (1903); Zwemer, (Mohammed or Christ ? 5 (1916); Wilson, 'Modern Movements among Moslems5 (1915); Dwight, 'Constanti¬ nople and its Problems5 (1901); Beach and others, 'Protestant Missions in South Amer¬ ica5 (1900) ; St. John, B., 'A Comparison in Missionary Statistics5 (in The Missionary Re¬ view of the World, Vol. XLI, pp. 356-359,

New York 1918). tt ˆ _

Henry O. Dwight,

Author of ' Blue Book of Missions ,5 *etc.*

MISSIONS, Protestant Home. Home

missionary effort in the United States is older than its organized form. Before the War of the Revolution individual churches in New Eng¬ land and New York were sending their pastors, for weeks or months at a time, into the new settlements, to preach the Gospel and adminis¬ ter the ordinances of religion. Connecticut pastors received for this service $4 a week, and $4 more were allowed for the supply of their pulpits, the money being raised by voluntary subscriptions among the home churches. These

desultory efforts continued more or less inter¬ mittently for 25 years ; they were warmly wel¬ comed by the struggling settlements and were influential in preparing the way for better or¬ ganized endeavors.

Organized American home missions began with the establishment of the ((Missionary So¬ ciety of Connecticut,® 21 June 1798, by the Congregational churches of that State. Massa¬ chusetts Congregationalists followed one year later, 1799, with the ˆMassachusetts Missionary Society.® Both of these Societies, bearing the names of the States where they originated, and supported by the States whose names they bear, were not primarily for the benefit of Connecti¬ cut and Massachusetts. The object of the Con¬ necticut Society, as stated in its charter, was <(to Christianize the heathen (Indians) of North America and to support and promote Christian Knowledge in the New Settlements of the United States.® The charter of the Massa¬ chusetts Society describes its object as being ((to diffuse the Gospel among the heathen (In¬ dians) as well as other peoples in the remote parts of our country.® Both Societies, there¬ fore, while local in their origin and support, were truly national in spirit and aim. Other New England States followed the lead of Con¬ necticut and Massachusetts in organizing similar societies; New Hampshire in 1801; Rhode Island in 1803; Maine and Vermont in 1807, all of them under Congregational auspices. They all continue to the present time with but slight changes in name, and with increasing devotion to home missions, State and national. The first organized movement on the part of the Baptist churches was made in 1802, when the “Massa¬ chusetts Domestic Missionary Society® was established at Boston, with the same broad ob¬ ject as its Congregational predecessors, namely, ((to furnish occasional preaching and to promote the knowledge of evangelistic truth in the new settlements of these United States, or further, if circumstances should render it proper.® To the same year 1802 belongs the first systematic effort of the Presbyterians of New York, Penn¬ sylvania and New Jersey, acting under the same broad charter with those of the Congre¬ gationalists and Baptists of New England; ((to send forth missionaries well qualified to be em¬ ployed in mission work on the frontiers, for the purpose of organizing churches, administering ordinances, ordaining elders, collecting informa¬ tion concerning the state of religion in those parts, and preparing the best means of estab¬ lishing a Gospel ministry among the people.® Meanwhile the Reformed Church of America had not been idle. Sporadic missionary work began with it as early as 1786, culminating in 1822 in the organization of the ((Missionary Society of the Reformed Dutch Church,® differ¬ ing nothing in spirit from its forerunners, but with a wider scope, as it included home and foreign

missions under a single organization. Methodist and Episcopal missions, as well as the Lutheran and those of the Disciples of Christ, belong necessarily to a later period.

It is important, historically, to remember that all these early missionary bodies were called into being by one motive and for one object. Barbarism in the new settlements was the com¬ mon dread of the East, and to prevent such a disaster by pre-empting those rapidly gathering communities with religious institutions was the

motive of all early home missionary organi¬ zations. At the opening of the 19th century, what was known as the new settlements were found mainly in northern New England, east¬ ern and central New York and northern and southern Ohio, and these were the first points of home missionary attack. The opening of the Northwest Territory and the passage of the Ordinance of 1787 attracted a stream of emi¬ gration from the East, mingling with which was a considerable element from Great Britain, Hol¬ land, Scandinavia, Germany and Moravia, Bel¬ gium and Switzerland. The earlier settlers in New York, Ohio, Indiana and Illinois were gen¬ erally Protestant in their sympathies, but un¬ able at once, with a new country to subdue and new homes to be built, to provide themselves with the institutions of worship. To the help of these hopeful but destitute settlers came the missionary organizations of the East. Their missionaries were hurried forward to every needy point, not only in the wilds of New York and Ohio, but to the remoter settlements of Indiana, Illinois, Kentucky and Tennessee. They even found their way down the Mississippi to New Orleans and crossed the northern borders to Canada. A specially promising field of effort was a section of Ohio, bordering on Lake Erie, settled chiefly by emigrants from Connecticut and for this reason commonly known as ((New Connecticut.® At the beginning of the century the tract contained about 1,400 inhabitants. In 1804, it had 400 families ; one year later the 400 had become 1,100, one-half of them from New England. In less than 30 years from the beginning of organized home missions 90 churches had been planted, all of them by home missionaries sent out and supported by Con¬ necticut and Massachusetts. To sum up in a sentence the work of the Missionary Society of Connecticut at the end of 30 years, 200 mission¬ aries had been employed whose joint labors were equivalent to 500 years of ordinary serv¬ ice by one man, and 400 churches had been established in the new settlements of the land. With what wear and tear of body, with what sacrifice of comforts in the wilderness, with what patience of hope and courage of faith and labors of love, no

words can fitly portray. Not a mile of railroad had been built. The river and the canal, the stage coach, the emigrant wagon and the saddle, were the only conveniences of travel, and to these the missionary added foot¬ sore and weary tramps from settlement to set¬ tlement. During the same period 125 Puritan * churches had been gathered in the growing settlements of New York State, supported in whole or in part by home missionary funds.

All these earlier efforts were marked by a commendable absence of the sectarian spirit. A common danger threatened the nation. The problem presented to the churches of the East was how to overtake the new and rapidly multi¬ plying settlements with the means of Christian civilization. No rivalry entered into the struggle but only a strong sense of the need of prompt, united action. In their love of humanity and of country every thought of denomina'tional supremacy was buried under the all-absorbing issue whether the New America should be heathen or Christian. This spirit was particu¬ larly active between Presbyterians and Congre¬ gationalists which were then the strongest church bodies in the land; for 50 years, be-

tween 1801 and 1851, they carried on their missionary work in the new settlements under a ((Plan of Union,® mutually agreed to, by which the churches of either order, wherever formed, might worship in the same house, listen to the same pastof and profess the same creed, while at the same time they were left free to govern themselves by the polity they loved and preferred.

In 1826 Congregational, Presbyterian, Re¬ formed and Associated Reformed churches united at New York City in organizing a Na¬ tional Society. Such change of policy had be¬ come necessary. Hitherto, State societies had been doing national work, each in its own way. But several missionary organizations working independently had resulted in an unequal dis¬ tribution of men and money. Some sections had been over-supplied and others were left destitute. Moreover, the laborers themselves came into conflict with each other. The time had arrived for federation and co-ordination of effort, and to

this end the American Home Mis¬ sionary Society was organized, as above stated, with headquarters in New York City, the vari¬ ous State societies making themselves auxili¬ aries to the national organization. Perhaps nothing more potential in the progress of American Home Missions belongs to its history than this act. For years the churches making alliance labored together in fraternal unity, con¬ tributing to a common treasury and governed by a single board of direction. Receipts rapidly increased, the missionary force doubled and trebled, and instead of being an itinerant preacher, the home missionary became a settled pastor, dwelling among his people. It was only when these allied church bodies had grown strong that they withdrew one by one to organ¬ ize separate societies, leaving the Congregationalists to inherit the name and traditions of this honored organization. Indeed, it was not until many years later that “American® was dropped from its charter name and the designation of “Congregational® was substituted. Meanwhile the Methodists had organized their “Missionary Society® (national) in 1819, including home and foreign work; the Episcopal Church, its “Domestic and Foreign Missionary Society,® in 1821 ; the Baptists, their “American Baptist Home Mission Society® in 1832, also national ; the Lutherans, their “Home Missionary Society of the General Synod® in 1845, and the Dis¬ ciples, their “American Christian Missionary Society,® in 1849. The Southern Presbyterians, Southern Baptists and Southern Methodists have also their home missionary organizations which are doing a great religious work in the Southern States. Thus, by natural evolution, all the leading Church bodies of America have gradually become organized for home evangeli¬ zation and a movement, which began in 1798 for the Christian enlightenment of the new set¬ tlements, has developed into a system as broad as the national domain, by which the stronger churches of the land are sharing the burdens of their weaker brethren and strengthening those forces of Christian civilization upon which the safety of the nation depends.

The purchase of Louisiana (q.v.) in 1803 imparted a mighty impulse to the missionary movement. That expansion gave us the mouth of the Mississippi and undisturbed possession of its entire course. It carried our western

boundary from Lake Superior to the Rocky Mountains, doubling the national area by a stroke of the pen. Fourteen States and Terri¬ tories have been carved out of the Louisiana Purchase. They include the great corn and wheat belts of America, and their underground treasures are among the richest of the world. Emigration from the East

and Middle West began at once and has reached enormous pro¬ portions. It is rivaled in volume only by the millions of foreign birth that have poured and are still pouring into this new and mighty West. By these movements a great missionary problem was presented which the organized home mis¬ sionary army welcomed with zeal and have never wearied in their efforts to solve. The order of missionary progress through the Louisiana Purchase was strictly along lines of immigration. There is not a State in that vast tract which the home missionary did not enter while it was yet a Territory, and always in the first and feeblest stages of settlement. From Missouri to Iowa, from Iowa to Minnesota, Kansas and Nebraska, thence to the Dakotas, and on from these points to Wyoming, Colo¬ rado and Montana, and last of all, when the door was opened to Oklahoma, until every State in this imperial purchase has been leavened with Christian institutions. Something of the volume of this work may be gathered from the fact that in 1916 over 30,000 Prot¬ estant churches were enumerated within the Louisiana Purchase, holding property to the value of $80,000,000 and having 2,700,000 com¬ municants, and, with rare exceptions, this church growth is the fruit of home missionary culture, begun, maintained and supported until the need ceased, by the missionary revenues of these Eastern societies. The same process was repeated when about midway in the century the Oregon Treaty made sure our possession of the Northwest and the discovery of gold opened the Californias to the world. Home mission¬ aries ordained in the East promptly started for the Pacific Coast reaching their fields by the way of Cape Horn and the Sandwich Islands. The strategic positioin of the far West and Northwest as related to the work of foreign missions in China and Japan was keenly appre¬ ciated by the churches and their missionary boards at the East. Money was contributed freely and many of the ablest preachers of the East went forth cheerfully to lay the founda¬ tions of Christian society on the sunset shores of the republic. “The Mexican Cession,® in¬ cluding Texas, New Mexico, Arizona and Utah, ‘was another belt of peculiar missionary need, which in spite of ancient superstitions and modern delusions has proved a rich field of rewarding home missionary effort.

The close of the Civil War introduced, at the South, a home missionary problem that was absolutely new, and which continues to absorb the interest of Northern churches to an extra¬ ordinary degree. Four million slaves were sud¬ denly set free. Government opened its bureaus of relief, and the churches of the North through their missionary boards, hurried forward preachers and teachers. The greatness of the opportunity quickened the home missionary spirit of the whole country. Several of the boards opened freedmen’s

departments and the churches magnified the privilege of responding to their appeals. To the missionary, himself,

there was in this call an element of peril which, so far from deterring him, only stimulated his zeal. The Yankee preacher and teacher were not well received at first by the white South. Social ostracism was not the only penalty they had to face for their devotion. Violence to their persons and destruction of their property were not infrequent in the early years of this missionary endeavor. An ugly spirit of caste included the negro teacher with the negro and young women delicately reared in the best homes of the North suffered from neglect or open indignity. These conditions have mostly passed away; respect and even gratitude, on the part of the South, have been won, as the fruits of this vast home missionary effort have become more apparent. These fruits appear not only in organized churches for the negro race, but in a long array of universities, colleges, acad¬ emies, normal, common and industrial schools, planted exclusively for the benefit of the blacks, all of them specifically Christian, and all of them originally supported by the free-will offer-* ings of Northen churches. Howard, Hampton and Fiske, Atlanta and Tugaloo, Talladega and Straight, Shaw and Richmond, Wayland and Leland, Nashville and Bishop, and a host be¬ sides, are names as familiar to the educational world as Harvard, Yale or Princeton. They are all the fruit of negro emancipation and all of them are the creation of home missionary interest and enterprise.

It was in 1840 that foreign immigration be¬ gan to attract the attention of the friends of home missions. Up to that time its entire vol¬ ume from all sources had not exceeded 500,000. Then began the flood. During the next 30 years the country received about 6,000,000 for¬ eigners. Driven by famines and oppressions at home and drawn by the opportunities of labor in a new country and by our generous home¬ stead laws, they were arriving, for continuous years, at the rate of 500 to 1,000 per day. Between 1865 and 1885 more than 7,000,000 were added to our foreign population, which means that in

these 20 years foreign immigra¬ tion exceeded that of the entire previous record of the country. It is needless to say that, as this vast problem began to be measured and sanely comprehended by the churches, the ap¬ peal of home missions was almost revolution¬ ized. Hitherto that appeal came from our own people and often from our own kin. To follow close after them on the westward trail and to stand with them in planting the church and the school had been for years the whole of home missions. While this feature has never lost its claim and probably never will, another claim has entered to divide the attention and concern of the churches. To the peril of domestic heathenism has been joined the larger fear of imported barbarism, and thus for many years foreign missions at home has come to be a distinct interest of American home missions. All branches of the church have taken part, through their organized societies, in this effort to Christianize the alien. No nationality has been overlooked; Germans and Scandi¬ navians, Bohemians, Poles and Russians, Hol¬ landers and Hebrews, Spanish, French, Italians, Armenians, Chinese, every sort and condition of foreigners, however forbidding or hopeless, has been made the object of home missionary culture, with results that have astonished the

most sanguine believer and rebuked the most despairing doubter and which have all but silenced the prophets of evil who predicted the direst consequences from the infusion of so much foreign blood into the moral, social and political life of the nation. Many times over it has been demonstrated that every grade of foreign immigrant is susceptible to religious de¬ velopment and is entirely capable of being both civilized and Christianized, and is in fact being rapidly assimilated, through the agencies of education and religion, into the best types of American life. Great migrations are not feared to-day as they were in 1840. Fears have been quieted and the native American stock have come to view with less and less alarm what 50 years ago almost crazed them with apprehen¬ sion.

To attempt any adequate summary of the results of home missions at the end of 120 years would require a survey of the develop¬ ment of 50 States and Territories so vitally have the home missionary and his work en¬ tered into the beginnings and the early history of all our Commonwealths. A few salient facts must suffice. The vitality of the home mission¬ ary idea has shown itself, first of all, in the growth of organizations. Beginning in 1798 with the Connecticut Missionary Society it has multiplied itself into more than 30 home mis¬ sionary bodies, all Protestant, all evangelical and all national. These

organizations have col¬ lected and disbursed $150,000,000. Their chief agent has been the Church, with its ordained preacher and its divinely appointed ordinances, and for the Church, these millions have been given. This total, however, takes no account of co-operating agencies, which have been called into being to serve the missionary work of the churches. Add these : Sunday school planting ; Bible and tract printing; church building and Christian education; which by careful inquiries are found to have expended $150,000,000 more, and the grand total for home missions, root and branch, in organized form, is $320,000,000. Not a dollar of this immense fund has been paid in any commercial sense for value re¬ ceived. All of it has been given, a free-will offering of Christian people to mark their in¬ tense conviction of the peril of a nation with¬ out the Gospel and their supreme faith in its leavening power. What have these millions ac¬ complished and what of visible fruits remain to justify their cost? It is a fact not generally known, and when known not sufficiently ap¬ preciated, that the great evangelical bodies of the United States trace most of their church organizations directly to home missions. Congregationalists admit that four-fifths of their churches are of home missionary origin. The proportion would be larger but for the fact that hundreds of their churches were born before home missions began. . Presbyterians confess that nine-tenths of their churches are of home missionary planting. Baptist, Methodist and Episcopal estimates range from five-sixths to nine-tenths. Such ratios can mean but one thing: that these far-spreading ecclesiastical bodies have become strong in church power, not by their own help, but by home missionary aid, the few, strong, bearing the burdens of the many, weak, and they answer the inquiry which suggests itself at once* to a thinking mind : where and what would these ecclesi-MISSIONS, ROMAN CATHOLIC

astical establishments be to-day but for the helpful agency of organized home missions? To the credit of home missions, therefore, should stand the undoubted truth, that an overwhelming majority of the evangelical churches of America owe their being to its nurture and care. What does such a fact mean in the religious development of the country? In the year 1800 the United States had one evangelical communicant in 14.50 of the popu¬ lation. In 1850 that ratio had grown to one in 6.57; in 1870, to one in 5.78; in 1880, to one in 5 ; in 1890, to one in 4.53, and in 1900, to one in 4.25. In other words,

evangelical church membership increased three and one-half times faster than the population in less than 100 years. Between 1800 and 1890 population in¬ creased 11.8 fold; in the same period evangel¬ ical church membership increased 38 fold. To these figures Dr. Daniel Dorchester, their com¬ piler, adds the comment: ((This exhibit of re¬ ligious progress cannot be paralleled in the his¬ tory of God's kingdom in any land or any age.® It is only 140 years since Voltaire in Geneva declared : <(Before the beginning of the 19th century Christianity will have disappeared from the earth,® and it is less than 100 years ago that American infidels were prophesying that the Church would not survive two genera¬ tions in this country. In defiance of these dismal auguries the average yearly increase of evangelical communicants has fulfilled the prophecy of a larger average, than ever for the 20th century. It is no vain boast, there¬ fore, but the obvious truth, that by far the larger part of this remarkable, growth is due to the direct agency of American home mis¬ sions, since in its own carefully planted gardens most of this growth has taken place. But not the only, nor even the highest, fruits of home missionary efforts are contained in the nu¬ merical results. President Roosevelt, in a pub¬ lic address, declared: ((It is such missionary work that prevented the pioneers from sinking perilously near the level of the savagery against which they contended. Without it the con¬ quest of this continent would have had little but an animal side. Because of it, deep be¬ neath and through the national character, there runs that power of firm adherence to a lofty ideal upon which the safety of the nation will ultimately depend.® Thus home missions has been in a very true and high sense both the builder and the savior of the American nation. In a government of the people and by the. peo¬ ple nothing counts for so much as high ideals of duty. With these enthroned in the thought and life of its citizens a nation may meet any shock from within or from without; and nothing has yet been discovered on earth or re¬ vealed from heaven that has the power to create higher ideals of duty than Christianity and the obligations it inculcates. It is thus, that mis¬ sionary societies, whose sole function is the planting of churches, enter into the hidden life of a nation in ways that political parties can never enter, and which even Christian men are sometimes slow to appreciate. Not only law, order, temperance, respect for the Sabbath, security of life and property and the claims of humanity are thus conserved and fostered, but the instinct of patriotism itself, in which the very life of the nation consists, finds its nursing mother in the Church of Christ. Many vic¬

tories of a Christianly educated public senti¬ ment might be cited in

American history, but the Civil War of 1861 furnishes a typical ex¬ ample. When that inevitable conflict came the value of 65 years of . church planting by Amer¬ ican home missions in the East, the West and the Northwest began to appear. Every home missionary pulpit flamed with patriotic fire and summoned its worshipers to arms. Congre¬ gations and Sunday schools were decimated by enlistments. From a careful inquiry made near the close of the war it was ascertained that the home missionary churches of the entire West, on both sides of the Mississippi, ((had sent into the army one in four of their entire male membership, including in the count old men, invalids and boys.® Commenting on this fact that peerless interpreter of history, Richard Salter Storrs, was moved to declare in his Brooklyn pulpit, ((Home missions saved this country once, and will save it again if neces¬ sary.®

Bibliography. — Bacon, L. W., (History of American Christianity) (1898) ; Carrol, H. K.,

(Religious Forces of the United States5 (1893) ; Clark, J. B., (Leavening the Nation5 (1893) ; ((Connor, R.® (Gordon, C. W.), (Black Rock5 (1898); (Sky Pilot5 (1899); Dorches¬ ter, D., (The Problem of Religious Progress5 (1881) ; Dubois, W. E. B., (The Souls of Black Folk5 (1903); Dunning, A. E., (Congregationalists in America5 (1894); Monroe, H. E., (Twice-born Men in America5 (Philadelphia 1914) ; Morehouse, H. L., (Baptist Home Mis¬ sions5 (1904) ; Puddefoot, W. G., (The Minute Man on the Frontier5 (1895) ; Riis, J., (Battle with the Slum5 (1902).; Storrs, R. S., (The Divine Origin of Christianity5 (1884) ; Strong, J., <Our Country5 (1885) ; (The New Era5 (1893) ; (Religious Movements for Social Bet¬ terment5 (1900) ; (The Next Great Awakening5 (1905) ; Thompson, R. E., (The Hand of God in American History5 (1902) ; Washington, B. T., (Up from Slavery5 (T901) ; Whipple, H. B., (Lights and Shadows of a Long Epis¬ copate5 (1899).

Joseph B. Clark,

Secretary, Congregational Home Missionary

Society.

MISSIONS, Roman Catholic Church, Home and Foreign. A complete account of the missions in the Roman Catholic Church would be coterminous with the history of the growth and progress of Christianity, for the Church is essentially missionary. The com¬ mission that was given to the Apostles, by the Founder of Christianity,

was not to establish a system of philosophy, nor even to maintain a ceremonial form of worship, but it was (<Go ye into the whole world and preach the gospel to every creature.® For the fii'st time in the history of the world was there conceived a project of forming a worldwide institution, that would embrace all nations under one head¬ ship, no matter how divergent their ideas or their racial traits. The measure of the uni¬ versality of the Redemption was the fact that the Church was not to be national or racial, but it was to be Catholic or Universal, for all peoples and for all ages. It was designed to be the continuation of the beneficent work of the Incarnation of the Son of God ((unto the con¬ summation of all things.® To create this world-238

wide institution, the primary business of the Apostles and their successors was to preach the gospel to every creature, and the highest vocation of the Church therefore is the mis¬ sionary vocation.

It would be difficult, then, to give anything but a meagre sketch of the efforts that wei'e put forth to widen the saving influences of the Church, and the ultimate crystallization of the fruits of these efforts into the marvelously com¬ plex organization, whose centre is in Rome and whose ramifications extend to the uttermost ends of the earth.

The history of the work of the missions begins on the first Pentecost in the market place of Jerusalem, wherein were gathered represen¬ tatives from all the nations of the earth. The providence of God had prepared the time and the place through a thousand years of effort, first by preserving the monotheistic idea of God among the Jews, second by importing Greek culture and intellectuality (it was no mere accident that led to the translation of the sacred writings of the Hebrews into the Greek Septuagint), and third, by creating the great civil organizations of the Roman Empire, whose well-made roads led to the pillars of Hercules on the west and to the waters of the Danube on the east and beyond. The same providence of God that had prepared the soil selected the special psychological moment for the seed-sowing, and on the first Pentecost, Peter stood up in the midst of that throng in the market place and preached the first great missionary sermon, a verbatim report of which is given to us by Luke the Evangelist and in Greek, too, that all the world might read it (Acts

ii). There were 3,000 converts made that day. The same chronicler tells later on of the missionary journeys of Paul and of the many neophytes that were baptized into the Church. Finally both Peter and Paul came to the city of Rome, and there the Prince of the Apostles set up his throne under the shadow of the throne of the imperial Caesars, and there it has remained ever since, and out from Rome, and with the authority of the Roman pontiffs, have gone the missionaries that have converted the heathen world to Christianity. Into Italy they went, and beyond into Gaul and Hispania and into the forests of Germany, and along the Danube into the regions of east¬ ern Europe. Before three centuries went by the missionaries with Roman Catholic ordina¬ tion celebrated the divine mysteries and with Roman Catholic consecration exercised eccle¬ siastical jurisdiction, and after they had preached Roman Catholic doctrine and had gathered the fruits of their labors, they brought them to the feet of the Roman pontiff for his blessing. A good type of this work is seen in the conversion of Britain. Pope Eleutherius (178 a.d.) sent Fugatus and Damianus to Britain at the request of Lucius, a British chieftain, and an incipient hierarchy was estab¬ lished. (Bede, I, ch. iv) ; (Tertullian, (Adv. Hoer. > 1) .

During the persecution of Diocletian (303 a.d.) many Christians in Britain were done to death and the British martyrology was headed by the illustrious Saint Alban. The happy effect of the change that was wrought by the edicts of Constantine was a source of joy in Britain, because Constantine's mother, Helena,

was the daughter of a British prince, and his father, Constantius, was converted and died in the faith at York in Britain. (Euseb. in *Vitae, > 17). When the Pelagian heresy began to disturb the faithful of Britain at the in¬ stance of the deacon Palladius, Pope Celestine sent Germanus of Auxerre, in his own stead, to drive out the heretics. (Saint Prosper's (Chronicle,* 429 a.d.). So with more or less fervor of piety (Gildas, ch. vii) Britain pre¬ served the faith of the Roman Catholic Church <(entire and inviolate® and maintained the suc¬ cession of British bishops up to the time of Saint Augustine, whom Pope Gregory the Great (597 a.d) sent to England to convert the Anglo-Saxon, and for a thousand years after¬ ward all spiritual jurisdiction was from Rome.

The same story is true in Ireland: Saint Patrick was sent by Pope Celestine; Saint Boniface went into Germany with a similar message and authority, and in a like way Den¬ mark and the Scandinavian Peninsula were brought in subjugation to the yoke of Christ. The missionary went first, and as has been done in India and in China in

the 19th century, then gradually the native churches began to grow in numbers, a bishop was sent with consecra¬ tion and authority from Rome, and the nascent church assumed definite organization until in the course of time it grew into hierarchical per¬ fection. Looking at the missionary work of the Roman Catholic Church from one point of view, there are no foreign missions, because she is a worldwide organization, at home in every land.

This work of evangelizing the countries of Europe went on with more or less ardor all through the Middle Ages. The barbarian races rushed in at the breaking up of the Roman Empire and while the military power was too weak to stem the onward rush, still the spiritual masters of the Church met them and chastened their fierce, warlike spirits, and made them sub¬ missive to law and order. The vast monastic system grew up. Canon Farrar says:

“ Under the influence of Catholicism the monasteries pre¬ served learning and maintained the sense of the unity of Christendom. Under the combined influence of both, grew up the lovely idea of chivalry molding generous instincts into gallant institutions, making the body vigorous and the soul pure, and wedding the Christian virtues of humility and tenderness to the national graces of courtesy and strength. During this period, the Church was the one mighty witness for light in an age of darkness, for order in an age of lawless¬ ness, for personal holiness in an epoch of licentious rage. Amid the despotism of kings and the turbulence of aristocra¬ cies it was an inestimable blessing that there should be a power which by the unarmed majesty of simple goodness made the haughtiest and boldest respect the interests of justice, and tremble at the thought of temperance, righteous¬ ness and judgment to come.”

The Crusades were but great witnesses to the missionary power of the Church, and they did not a little to break the power of Islam and save Europe from Mohammedan blight. In the 11th century came_ the great preaching orders, notably the Dominicans and the Fran¬ ciscans, and for the next three centuries the voices of these missionaries were heard in every corner of the civilized world. The fall of Constantinople and the consequent spread of the city’s learned men through the West was a new leaven to awaken the European mind, and the invention of the astrolabe, together with the art of printing from movable types, gave a new impetus to the missionary movement. Columbus was filled with this spirit, and one

oi his deepest purposes was to find a shorter way to India and the East in order to bring the gospel to the people who sat in darkness and in the shadow of death. His expedition from Palos was a profoundly religious affair, and on his return from the newly-discovered continent he brought six dusky savages, who were duly instructed and baptized, and Queen Isabella stood at the font of baptism as their godmother. These six converts to Catholicism (1498) have become the 14,000,000 Catholics of the United States to-day. Other discoverers followed Columbus, and while their voyage was in many instances a search for the <(Golden Fleece,® yet they invariably brought with them missionaries, and wherever they landed their first act was to erect the cross and gather the natives to listen to the tidings of salvation. The Cabots planted the cross on Cape Cod 120 years before the landing of the Puritans at Plymouth Rock. Champlain, who, as Bancroft says, (<considered the salvation of one soul more important than the conquest of an empire,® opened the Northwest to civilization. Cortez introduced missionaries among the Indians of Mexico, and La Salle, who had been trained in a Jesuit novitiate, brilliant, restless, daring, went by the way of the Great Lakes and down the Mississippi and opened the West to mis¬ sionary effort.

While the stories of the wonderful Western World were being whispered in Europe a little knot of ardent spirits gathered about Ignatius Loyola at Paris and plighted their vows to work for God. One of the number was Saint Francis Xavier, who within two decades preached and baptized hundreds of thousands in India and penetrated to the very gateway of China. During the 16th century fierce religious dissensions broke out in Europe, and the Ger¬ man and English nations were lost to the Church, but the Jesuit missionaries, together with the Franciscans and Dominicans, made a mighty recompense for the losses in Europe by the gains they secured in India among the Brahmans, in China among the Confucianists, in South America among the Indians and in North America among the savages.

The 16th and 17th centuries were marvelous in the record of missionary triumphs. China had been a sealed book for 2,000 years, but <(Where neither merchant nor traveler has pene¬ trated the

Roman Catholic missionaries have found their way.® (Gutzlaff, c China Opened, } Vol. I, ch. 6). They brought to Europe exact knowledge of the hidden empire and they did it in defiance of every menace of torture and of death. In 1583 Father Ricci landed at Can¬ ton, and for 27 years, in the habit of a Bonze or a Literati, he pursued his way to the imperial throne and baptized many princes of the reign¬ ing family. When he died there were more than 300 churches in the different provinces (Gutzlaff, (History of China,) Vol. II), and by his public interment, with the emperor's official sanction, Christianity was legalized in China (Abbe Hue, Tome II). He was suc¬ ceeded by Father Adam Schaal, S.J., who taught the Chinese all they know of mathe¬ matical science, and later on by other mis¬ sionaries. The storm of persecution came and ((more than 300 churches were either destroyed or converted to profane uses, and more than 300,000 Christians were abandoned to the fury

of the heathen® (Du Halde). The story of their dreadful sufferings, their fierce tortures and their agonizing deaths read like the acts of the martyrs in the early Roman persecutions. In the meantime the evangelization of the Philippines was going on. Three centuries of effort has left 6,000,000 of the Malay, race deeply imbued with the principles of Christian¬ ity, so that Peyton (Episcopalian) was able to write of them :

"I found in all the towns a magnificent church. I attended mass several times, and the churches were always full of natives, even under unfavorable circumstances, on account of the military occupation. There are almost no seats in these churches, the services lasting from an hour to an hour and a half. Never in my life have I observed more evident signs of deep devotion than those I witnessed there — the men kneeling or prostrated before the altar, and the women on their knees or seated on the floor. Nobody left the church during the services, nor spoke to any one. There is no sectarian spirit there. All have been instructed in the creed, in prayer, in the ten commandments, and in the catechism. All have been baptized in infancy. I do not know that there exists in the world a people as pure, as moral, and as devout as the Filipino people. (Report of Philippine Commission)."

South America, too, had been traversed by the missionary, and the Indians of the Andes as well as the wild tribes of Paraguay had accepted the religion of Christ. Whatever the races of South America and of Mexico know of Christianity to-day, they have learned it from the missionaries of the Roman Catholic Church.

Since the year 1622 the work of the ((Missions® has been so specialized as to make it a department of Church administration. In that year Pope Gregory XV canonically instituted the Congregation de Propaganda Fide and gave to it the duties of Church extension. The car¬ dinal prefect of the Propaganda is second only to the Pope himself in power, for he has juris¬ diction over all so-called missionary countries. The present prefect, the venerable Cardinal Gotti, is assisted by 25 other cardinals and as many consultors, making a quasi-senate for the administration of Church affairs. Affiliated with the Propaganda there are a half a hun¬ dred colleges and seminaries for the education of the natives of the missionary countries, and in these colleges most of the languages of the civilized and uncivilized world are taught. The Propaganda had a polyglot press for the print¬ ing of literature.

In 1862 Pope Pius IX instituted a special congregation for the affairs of the Oriental churches, for the Roman Catholic Church ex¬ ercises a jurisdiction not only in Europe but over portions of the ancient Eastern churches whose beginnings are traceable to the Apostles other than Saint Peter, and claims a jurisdic¬ tion over them all through the primacy of Saint Peter. These churches in communion with the Pope are united in a complete doctrinal life, that is, all and every one of the dogmatic teach¬ ings of the Roman Catholic Church are accepted by the adherents of these Eastern churches, though they are permitted to retain their an¬ cient liturgies which may be peculiarly their own, and they are not obliged to conform in all matters of discipline, as, in some instances, a married clergy is permitted among them. A distinction has always been made between the acceptation of the dogmatic formularies and the toleration of varying rites and ceremonies. In the former the Church is. most exacting, she never permits the least variation in the letter or the spirit of her teaching, but like an in¬ dulgent mother she permits her children to

maintain their time-honored customs, liturgies and languages.

The Oriental rites, under the administra¬ tion of the Propaganda, are

as follows:

1. The Ethiopian or Abyssinian Rite, prin¬ cipally in the Abyssinian Church, first planted by Saint Matthew, increased by Saint Frumentus, in the 4th century, was represented at Council of Florence 1445, — principal mission¬ ary of modern times Joseph Sapeto. It includes 30,000 souls.

2. Armenian Rite — gospel first preached by Gregory the Illuminator, though the modern Church was reorganized by constituting the bishop of Cilicia as patriarch of the Armenians. The liturgy is in ancient Armenian. It includes 109,000 lay members and 357 priests.

3. Coptic Rite. — Church first established by Saint Mark, disciple of Saint Peter and bishop of Alexandria in Egypt. The people went into schism under Dioscorus, but later on were re¬ stored to the unity of the faith. The bishop of Alexandria is the patriarch; 22,500 members with 44 priests.

4. Greek Rite — subdivided into (1) Pure Greek in which the Greek language alone is used; (2) Rumanian Greek; (3) Bulgarian Greek, using the Slav language; (4) Ruthenian Greek, and (5) the Melchite Greek. The entire Greek rite in communion with Rome numbers 4,645,803 members with 5,251 priests. They have numerous seminaries and educa¬ tional institutions.

5. Syriac Rite subdivided into (1) Pure Syriac; (2) the Syro-Chaldaic; (3) the Syro-Malabaric, and (4) the Maronites. The Syrians number 626,029 with 1,171 priests. All these Oriental rites together make a total of 5,433,332 members under the administration of many bishops and 6,823 priests. Many of these East¬ ern churches have, their seminaries for the training of their missionary priests in the city of Rome. Under the jurisdiction of the Propa¬ ganda, according to official statistics, there are:

Oriental churches — 5,433,332 members, 6,825 priests.

Occidental churches — 27,218,297 members, 33,148 priests.

The latter are distributed as follows:

Members

Priests

TEn orl a n rl .

1,362,489

2,674.

RrntlanH .

373.500

432

3,547,079

3,445

Norway 1

SwpHpti > .

9,750

74

Denmark)

TTnllflfwi .

1,854,340

3,168

Ppnin<;ii1ar .

686,210

890

CtTPPPP .

34,710

109

Tm-Vpy t t .

129,680

310

.

7 , 650

11

Arahia .

1 , 500

11

T-nHia fΓˆncr ˆ .

1,870,000

1,180

827,680

823

57,800

532,448

89

C’liinese Km nire .

1,168

TCnrpa anrl Tanan .

84,410

772

Afriea .

458,170

1 ,015

Pritisb Ameriea .

2,187,480

2,766

TTniteri States .

9,479,250

*10,049

West. Indies .

339,200

195

Patacmnia .

99 , 500

70

Australia .

704,170

736

Polynesia .

196,850

348

* 11,289,710 population and Directory.

12,968 priests.-

— Official

This list does not include the Philippine Islands, Porto Rico, Cuba, Mexico nor any of the South American countries, as these coun¬ tries were ancient dependencies of Spain, and therefore not under the Propaganda. The total aggregate under both branches of the Propa¬ ganda or the Missionary department of the Ro¬ man Catholic Church at the close of the cen¬ tury was over 32,000,000 with about 40,000 priests.

This statement does not take into account the large army of teaching orders of brothers and sisters and native catechists, nor does it give any estimate of the educational institu¬ tions, hospitals and orphan asylums that are under the auspices of the Church in these countries. Some idea of the growth of the missionary work of the Church may be real¬ ized from the fact that at the beginning of the 19th century there were only 5,000,000 under the jurisdiction of the Propaganda; at the be¬ ginning of the 20th century there were over six times that number.

This account will be incomplete without some statement of the material resources by which the missions have been carried on. The Congregation of the Propaganda has vast funded resources amounting to $135,000,000, the revenues of which are applied to the support of the work and the colleges under its care. Be¬ side this there have grown up during the 19th century many auxiliary societies ; the principal one is known as the Lyons' Society for the Propagation of the Faith. It began with the idea of assisting the poverty stricken missions in New Orleans under Bishop Dubourg, but it soon broadened its scope. It asked only a cent a week from its members, and during its ex¬ istence (1822-1900) it has gathered and spent $65,690,017. The Annals of the Propagation of the Faith, the official organ of this

society, is now issuing 300,000 copies every two months and in 12 different languages. There are 58 different religious societies of priests engaged in the work of the missions, together with 82 orders of brothers who have no aspirations to the priesthood, yet are consecrated to mission¬ ary work, and 434 different orders of religious sisterhoods. These 574 different societies em¬ brace a membership numbering very nearly 100,000 who have left all that this world holds dear, of houses, land, country and the pleasures of the domestic hearth, and have sacrificed their lives in poverty, celibacy and exile for the souls, of the heathen and the unevangelized. Their consecration to this life is not for a few years, but they count it their greatest joy to spend and be spent till death comes, that the blessed name of Jesus Christ may be better known and more deeply loved.

Under the caption of Home Missions, a short account may be given of the missions to non-Catholics in the United States. The idea of the need of organized effort to present the teachings of the Catholic Church to the Ameri¬ can people is what brought together five priests, Isaac Hecker, Augustine F. Hewitt, Clarence Walworth, Francis Baker and George Deshon, who founded the organization known as the Paulist Fathers (q.v.). This idea was prac¬ tically systematized in its present form by Rev. Walter Elliott, in September 1893, when he began, in Michigan, a series of missions in pub¬ lic halls and churches for the purpose of ex-

plaining the doctrines of the Catholic Church. These missions to non-Catholics prohibited con¬ troversy and invited the spirit of inquiry by placing a ((Question Box® at the door, into which were dropped all questions concerning the teachings of the Church which anyone de¬ sired to have answered. During the last 10 years the work has grown to vast proportions. While the Paulists inaugurated the movement in the United States, yet the work is the normal work of the Church, and therefore be¬ longs to every branch of the service, particu¬ larly to the diocesan clergy. The leaders of the movement contemplate the

placing in every diocese a band of talented preachers whose business will be extra-parochial and whose duties will be to go into the towns and country places where the Church is weak, or does not exist, and arrange for the inauguration or strengthening of Church organizations. This band of diocesan missionaries will largely do the duties of a Church extension committee in the spiritual and missionary sense. The growth of this ((Home Missionary Movement,® after 10 years, has been such as to necessitate the building of the Apostolic Mission House at the Catholic University at Washington. This in¬ stitution will provide special lectures and in¬ structions in missionary methods, and in this way will give training to the diocesan mis¬ sionary. The legal organization which is financing the work is the ((Catholic Missionary Union,® incorporated under the laws of the State of New York. Its president is the arch¬ bishop of New York, ex officio, and there are six other directors. The practical effect of 10 years of this home mission work has been to give the American people a more correct view of the teaching and spirit of the Catholic Church, to eliminate antagonisms and to make Church relationships more harmonious. It has also tended to increase, and .this in no small degree, the stream of converts that has been flowing into the Church.

The growth of the Roman Catholic Church under the jurisdiction of the home missions during the last 100 years has been one of the marvels of the 19th century. The following figures give some measure of it : In 1800 there were 40 priests; in 1830 the number in¬ creased to 232; in 1850 to 1,800; in 1906 to 15,177. In 1800 the Catholic population was 100,000, in 1910 it is estimated at not less than 14,000,000. In 1800 there were but 25 churches ; in 1910 there were 17,000. The value of church property, as given by census reports in 1850, was $9,256,758; in 1860 it was $26,774,119, a ratio of increase of 189 per cent, while the aggregate wealth of the country increased only 125 per cent. In 1870 it was $60,985,5(55. In 1906 value of church property had risen to

$292,638,000.

While this external growth indicated by numerical strength and material wealth is very remarkable, the internal growth indicated by evidences of maturing organization, as well as by signs of increasing spirituality is none the less remarkable. The first flowering of the Church's inner life is the vocations to the re¬ ligious orders whereby men and women accept the call to the life of the evangelical counsels. In 1790 there was one convent with less than 10 religious, in 1909

there were over 5,000 con¬ vents with more than 60,000 religious. This

army of men and women devote themselves without hope of worldy gain to the alleviation of the ills of humanity in the hospitals by the sick bed, in the tenements of the poor, in the slums among the depraved, in the asylums caring for the orphans and among the aged, who have been stranded on life's shore, with¬ out one cent of salary, contenting themselves with meagre fare, with short hours of sleep on a hard bed, and long hours of prayer and de¬ votion to the sick and the poor and the wretched, because they know and are convinced that their reward will be very great in heaven. Many of these religious communities are off¬ shoots of orders that have been established in the old country, but some are indigenous to the American soil. Noteworthy among the com¬ munities of men are the Paulist Fathers, founded by five converts, and among the women the Sisters of Charity, founded by Mother Seton, also a convert.

The growth in the Church in the United States of course is principally due to the great stream of immigrants, but not the least element of growth and present strength is the large number of converts who have been , drawn to her through the conviction that she is the one Catholic and Apostolic Church. There are no accurate statistics of yearly conversions, but Cardinal Gibbons puts it in this way: ((If the same ratio of conversions is preserved through¬ out the country as exists in the archdiocese of Baltimore, the yearly number of conversions would amount to 44,800 souls.® To sum up the aggregate number of Catholics, under the Amer¬ ican flag is as follows : United States (Car¬ dinal Gibbons' estimate), 14,000,000; Philip¬ pines, 6,600,000; Porto Rico, 980,000; Hawaii, 33,000; American Samoa, 3,000; Guam, 9,000, making a total of 21,625,000 souls under the jurisdiction of an apostolic delegate, 14 arch¬ bishops and 88 bishops.

On account of the worldwide events cul¬ minating in the Great War, 1914-18, for sev¬ eral years it has not been possible to obtain statistics of Catholic foreign missions. It may, however, be safely said that the numbers of converts have greatly increased, in many cases have been doubled.

Bibliography. — (La Gerarchia Cattolica e la-Famiglia Pontificia Rome) ; (Lettres Edifiantes et Curieuses des Mission Etrangeres) ; (

Annals of the Propagation of the Faith > ; Henrion, (Histoire Generale des Missions Catholiques depuis le Xllle Siecle jusqu'a nos Jours' *; Marshall, (Christian Missions* ; (Collectanea

Constitutionum, Decretorum, Indultorum ac In-structionum Santae Sedis ad Usu.m Operariorum Apostolicorum Societatis Missionum ad Ex-teros* ; (Missiones Catholicae cura S. Cong, de Propaganda Fide descriptae* in 1901 A.p. ; (So-crietatis Jesu usque ad Sanguinis et Vitae, pro-fusionem Militans in Europa, Africa, Asia, et America, contra Gentiles Mahometanos) ; Tan¬ ner, (Travels of the Jesuits in various parts of the world* ; Lockman, (The Catholic Missions) ; <The Missionary) (Quarterly Magazine, 120 W. 60th street, New York) ; De Thiersant, (Le Catholicisme en Chine au VUIe Siecle de Notre Ere* ; Abbe Hue, Christianity in China, Tartary and Tibet) ; (History of Christianity in Cochin China and Tonking* ; Shortland, (De Rebus Japonicis, Indicis, et Peruanis, Epistolae Recentiores) ; Hayo, (History of Church in

Japan) ; Charlevoix, Christianity in Ceylon* ; Tennent, (Missions of the Zambesi* ; Weld, Excursions in Afrique) ; Van Sooy, (Historia Ethiopica Ludolfus) ; Tellez, (Travels of Jesuits in Ethiopia) ; Gutzlaff, (History of China-*; China Opened. *

Rev. A. P. Doyle, C.S.P.,

Secretary , The Catholic Missionary Union.

MISSISAGA (mis'si-sa'a) INDIANS, an

American tribe of the Algonquian family re¬ siding in Ontario, Canada. In 1746 the tribe was admitted to the Iroquois confederacy. The name refers to the ((eagle® and also to <(great mouth,® signifying the outflow of the Missi-saga River, near which they lived when first visited by French explorers. They signed a treaty in 1764 with an eagle as their tribal mark. There are upward of 600 of the Missi-sagas remaining. They inhabit small reserva¬ tions in Ontario,

are mostly Methodists and are progressive, industrious, self-supporting citi¬ zens.

MISSISSIPPI, one of the southern United States and the seventh admitted to the original Union, situated between lat. 30° 13’ and 35° N. and long. 88° 7’ and 91° 41’ W. ; extreme length, north and south, 332 miles ; average breadth, 142 miles, varying from 78 miles below lat. 31° N., to 189 miles on that parallel, and 118 miles on the north line; area, 48,610 square miles, being 1.61 per cent of the territorial extent of the United States. It is bounded north by Tennessee, east by Alabama, south, between the Alabama line and Pearl River, by the Gulf of Mexico, and from the Pearl to the Mississippi on the parallel of 31° N., by the State of Lou¬ isiana ; and west by Louisiana and Arkansas, having below lat. 31° N. the Pearl River, and above that line the Mississippi as the dividing lines. The Round, Horn, Ship, Deer, Cat, Petit Bois and several other islands lying out¬ side of and forming the southern limit of the Mississippi Sound belong to this State. Mis¬ sissippi was admitted to the Union 10 Dec. 1817 and takes its name from the river which forms its western boundary for a distance of over 500 river miles. There are 80 counties in the State. The capital city is Jackson.

Topography. — Mississippi lies in two prin¬ cipal hydrographical divisions, separated by a low broad watershed ; the eastern rivers flow¬ ing into the Gulf of Mexico, and the western¬ most streams emptying into the Mississippi. East of the dividing broad ridge the surface of the State consists of broad rolling fertile prai¬ ries ; the ridge itself is rolling and broken into narrow valleys where streams afford plentiful water supply, while to the west the land falls away into the low swampy lands of the Yazoo and Mississippi rivers. The State is very low, the highest altitude being but 1,000 feet. The coast has a shore line on the Gulf of Mexico of 88 miles, or including the irregularities and islands, of 287 miles. In the eastern part of the State the prairies are covered with grass the greatest part of the year. East of this prairie region extends a level but very fertile tract on the upper course of the Tombigbee River. In the northern district is a range of hills of moderate elevation, well-wooded but devoid of undergrowth. These hills find their western limit in the Walnut Hills; and west of them and between them and the Mississippi

River, in about lat. 32° 30’, for a distance of more than 170 miles, north and south, and 60 miles extreme east and west, the country is oc¬ cupied by immense bottom lands, produced and fed formerly by

the inundations of the Missis¬ sippi, constituting the so-called ((Delta.® Nearly all of this low region has been now re¬ claimed by a system of levees and is rapidly being opened up and settled, and penetrated by railroads. The bottom-lands are about 7,000 square miles in extent.

Rivers and Lakes. — Mississippi is well watered by the Homochitto, Big Black, Yazoo, Sunflower, Coldwater and Tallahatchie rivers, all emptying into the Mississippi, and the Pearl, Pascagoula, Leaf and Tombigbee, all empty¬ ing into the Gulf of Mexico. There are many small streams in all parts of the State, which, though inferior in capacity to those already no¬ ticed, are locally important, watering extensive districts and giving fertility to the soil. In the bottom lands are numerous lakes, bayous and channels, and in this district, along the Mis¬ sissippi, levees are built by the State partly from a fund derived from a special tax on the land, and partly with moneys derived from the sale of swamp lands. Drainage districts in the Yazoo-Mississippi Delta have been recently es¬ tablished, one project alone calling for the ex¬ penditure of $8,000,000.

Climate. — The State lies in what is called the semi-tropic climate belt. The winters are short and mild, the mean temperature 45° F. ; the summers are devoid of intense heat, the mean 81°, seldom reaching 100°. Ice from 1 to 2 inches thick forms in the northern part of the State. The elevation of the surface and the Gulf breezes render the climate delightful during most of the year. The annual rainfall ranges from 48 to 58 inches. The death rate is very low — 12.9 in 1,000. The heaviest rains occur in late winter or early spring, when the warm Gulf winds meet the cold north winds. The average wind velocity for the whole year is seven miles per hour. The prevailing wind for January is from the north, while it is from the south for July.

Geology. — Mississippi is occupied wholly by deposits of the Tertiary and Upper Secondary formations, which, sweeping around from the southern Atlantic States, attain here their greatest width. Near the Gulf of Mexico the sands and clays of the largest periods are spread over the country, and further north the deposits gradually become of greater age. At Vicksburg the Eocene appears at the base of the river bluffs and the upper portion of these is covered by a deep deposit of yellowish loam or loess, containing fresh-water and land shells. This extends over the country east¬ ward and attains a thickness of 60 feet or more. The Upper Secondary appears near Jackson and occupies the northern portion of the State. Fossil remains of a gigantic marine animal, resembling the alligator, are found in the prai¬ rie regions.

Flora and Fauna. — There are over 100 species of trees in the State, including 15 varie¬ ties of oak. There are cypress, poplar, long¬ leaved pine, tupelo, sycamore, persimmon, mag¬ nolia, holly, cucumber tree, sweet-gum, black-walnut and various species of hickory, elm and maple. Wild animals, such as the deer, puma, wolf, bear and wildcat, are still occasionally

MISSISSIPPI.

Estimated population, 1,951,074

COUNTIES

Pop.

25.265 Adams . B 8

18.159 Alcorn . G 1

22,954 Amite . C 8

28.851 Attala . E4

10.245 Benton . FI

48.905 Bolivar . C 3

17.726 Calhoun . F 3

23,139 Carroll . E4

22,846 Chickasaw . G3

14.357 Choctaw . F4

17.403 Claiborne . C7

21.630 Clarke . G 7

20,203 Clay . G 3

34,217 Coahoma . C2

35,914 Copiah . D 7

16,909 Covington . E 7

23,130 De Soto . El

20,722 Forrest . F 8

15.193 Franklin . C 8

6,599 George… . G 9

6,050 Greene . G 8

15.727 Grenada . E3

11,207 Hancock . E 10

34.658 Harrison . F9

63.726 Hinds . D 6

39,088 Holmes . D4

.. .. Humphreys . C4

(Pop. included in Holmes, Washington and Yazoo Co’s.)

10,560 Issaquena . • • -C 5

14,526 Itawamba . H2

15,451 Jackson . G9

18,498 Jasper . F 6

18,221 Jefferson . C 7

12,860 Jefferson Davis …E 7

29,885 Jones . F 7

20,348 Kemper . G5

21,883 Lafayette . F2

11,741 Lamar . F8

46,919 Lauderdale . Gb

13,080 Lawrence . D7

18,298 Leake . • - F 5

28,894 Lee . G 2

Pop.

36,290 Leflore . D 3

28,597 Lincoln . D 7

30,703 Lowndes . H4

33.505 Madison . E 5

15,599 Marion . E 8

26.796 Marshall . FI

35,178 Monroe . H 3

17,706 Montgomery . E3

17,980 Neshoba . F 5

23,085 Newton . F 6

28,503 Noxubee . G4

19,676 Oktibbeha . G4

31.274 Panola . E 2

10.593 Pearl River . E 9

7,685 Perry . G8

37,272 Pike . D 8

19,688 Pontotoc . F 2

16,931 Prentiss . G 1

11.593 Quitman . D 2

23,944 Rankin . E 6

16,723 Scott . F 6

15.694 Sharkey . C5

17,201 Simpson . E 7

16,603 Smith . F 7

… Stone . F 9

(Pop. included in Har¬ rison Co.)

28,787 Sunflower … .C 3

29,078 Tallahatchie . D3

19,714 Tate . El

14,631 Tippah . G 1

13,067 Tishomingo . H 1

18,646 Tunica . D 1

18,997 Union . G 2

…. Walthall . D 8

(Pop. incl. in Pike Co.)

37.488 Warren . C 6

48,933 Washington . C4

14,709 Wayne . G7

14,853 Webster . I* 3

18,075 Wilkinson . B8

17,139 Winston . F 4

21,519 Yalobusha . E 2

46.672 Yazoo . D 5

Incorporated Cities, Towns, and Villages

243

3,708

1,398

328

152

2,122

512

217

535 146 105

192 787 116 171 344 774

3,388

836

240

220

193 160 367

1,059

412

369

9.670

79

650

167

841

632

536 1,337

444 720 286 5,293 850 421 231 336 .,1 1 137 477 3,929 608 315 85 216 865 1.834 62 280 4 079 1 .001 767 211 421

Abbeville . F 2

Aberdeen . H 3

Ackerman . F 4

Albertson. Jones . .F 7 Algoroa, Pontotac ,F 2

Amory . G 3

Areola . C 4

Arkabutla . D 1

Artesia . G 4

Ashland . F 1

Austin . D 1

Baird . C 4

Baldwyn . G 2

Banner . F 2

Barlow, Ccpiah …D 7

Bassfield . E 7

Batesvllle . E 2

Bay St. Louis . . F 10

Bay Springs . F 7

Beauregard . D 7

Belden, Lee . G 2

Belen . D 2

Bellefontaine . F 3

Belmont … . . H 2

Belzoni . C 4

Benoit . C 3

Beulah . C 3

Biloxi . F 9

Black Hawk . D 4

Blue Mountain …Gl Blue Springs . . G 2

Bogue Chitto . D 8

Bolton . E) 6

Bond . F 9

Booneville . G 1

Boyle. . G 3

Brandon . E 6

Braxton . E 6

Brookhaven . D 7

Brookville . G 4

Bucatuma . G 8

Buena Vista . G 3

Burnsville . H 1

Byhalia . El

Caledonia . H 3

Calhoun City . F 3

Canton . E 5

Carrollton… E 4

Carthage . E 5

Cascilla . • • • D 3

Cedar Bluff . Go

Centerville . B 8

Charleston . D 2

Chester . £ 4

Chunky .

Clarksdale, .

Cleveland . C 3

Clinton . D 6

Coahoma . G 2

Coffeeville . E J

774 Cold water . D7

2,581 Collins . E 7

2,029 Columbia . .E 8

10,561 Columbus . H4

905 Como . E 1

152 Conehatta . F6

5,020 Corinth . HI

304 Courtland . E 2

396 Crawford … . G 4

358 Crenshaw . D 2

1,343 Crystal Springs …D7 143 Dancy, Webster. . ,F 3

283 Decatur . F 6

147 Dennis . H 1

383 Derma . F 3

284 Dio . E 7

278 Drew . D 3

499 Duck Hill . E 3

284 Duncan . C 2

1,881 Durant . E 4

819 East Side, Jackson G 9

130 Ebenezer . D 5

475 Ecru . G 2

176 Eden . D 5

589 Edwards . C 6

161 Elliott . E 3

2,446 Ellis vUle . F 7

191 Enid . E 2

877 Enterprise . G 6

631 Estabutchie . F 8

896 Eupora . F 3

143 Falkner . G 1

775 Fayette . . C 7

67 Fentress . . F 4

747 Flora . D 5

260 Florence . D 6

1,136 Forest . F 6

‘ 133 Fort Adams . B 8

220 French Camp . F 4

875 Friar Point . C 2

194 Fulton . H 2

188 Gallman . D 7

232 Gandsi . F 7

155 Gattman . . H 3

165 Glenallen . B 4

207 Glendora . D 3

1,486 Gloster . B 8

209 Golden . H 2

603 Goodman . E 5

1,409 Graysport . E 3

10.S46 Greenville . C4

5,836 Greenwood . D3

2,814 Grenada . E 3

6,386 Gulfport . F 10

515 Gunnison . C3

330 Guntown . G 2

234 Hamburg . C 7

907 Handsboro . F 10

166 Hardy Station …. E 3

179 Harperville . E 6

Poo. o „

253 Harriston . C 7

16.4S2 Hattiesburg . F 8

2,056 Hazlehurst . D 7

477 Heidelberg . F 7

300 Hermanville . C 7

660 Hernando . El

600 Hickory . F6

261 Hickory Flat . FI

104 Highpoint . jF 4

217 Hiwamee Wayne

G 7

152 Holcomb . D 3

481 Hollandale . C4

163 Holly Ridge,

Sunflower … .C 3

2.192 Holly Springs . FI

389 Houlka . G 2

1,400 Houston . G 3

106 Independence ….El

I, 098 Indianola . C4

234 Ingomar . G 2

221 Inverness . C 4

478 Isola . C 4

1.427 Ittabena . D 4

1,221 Iuka . HI

29,737 Jackson . D 6

170 Johnston Station.. D 8

367 Jonestown.. . C 2

380 Kilmichael . E 4

168 Knoxville . B8

2,385 Kosciusko . E4

193 Kossuth . G 1

140 Lafayette Springs ,F 2

429 Lake . F 6

75 Lamar . FI

573 Lambert . D 2

327 Lauderdale . H 6

II, 779 Laurel . F7

466 Leakesville . G 8

134 Learned . C6

1,547 Leland . C4

2.428 Lexington . E 4

556 Liberty . C 8

1,026 Long Beach . F 10

1,181 Louisville . F 4

190 Longview . G 4

69 Louise . C 5

108 Love Station . D 1

160 Lula . C 2

797 Lucedale … ,H 9

153 Lucien, Franklin . . C 8

2.122 Lumberton . E 8

223 Lyon . C 2

6,237 McComb . D 8

422 McCool . F 4

627 McHenry . F 9

539 Maben . F 3

2,024 Macon . G 4

685 Magee . E 7

I, 823 Magnolia . D8

161 Mantachie . G 2

222 Mantee . F 3

146 Marietta . G 1

670 Marks . D 2

151 Martin . C 7

576 Mathlston . F 3

185 Mayersville B 5

180 Mayhew . G 4

260 Meadville . C 7

606 Mendenhall . E 7

21,818 Meridian . . G 6

241 Merigold … . C 3

328 Merrill . • . . G 9

54 Michigan City …FI

321 Mize … E 7

450 Monticello . D 8

427 Montrose . F 6

506 Moorhead . D 4

374 Morton . E 6

241 Moselle . F 7

3,054 Mosspoint . G 10

537 Mound Bayou . . ,C 3

1,077 Mount Olive . E7

130 Mt. Pleasant . FI

255 Myrtle . FI

II, 791 Natchez . B7

122 Nesbitt . E i

733 Nettleton . G 2

2.032 New Albany . F 2

191 Newhebron E 7

1,878 Newton . F 6

348 Nicholson . E 9

130 Nola . D 7

889 Norfleld . C8

302 Northcarrollton … E 3 269 North Greenwood,

Leflore . D 3

311 Noxapater . F 4

351 Oakland . L 2

298 Oakvale . . E 7

1,472 Ocean Springs . G 10

2,584 Okolona . . • G 3

221 Olive Branch . El

462 Ora . E 7

187 Orvisburg . E 9

824 Osyka . D 8

383 Ovett . G7

2,014 Oxford . F 2

187 Pachuta . G 6

186 Paden, Tishomingo

H 1

137 Paris . . F2

3,379 Pascagoula . H in

2,458 Pass Christian . . F 10

Pop.

499 Pearlhaven

Lincoln . D 7

943 Pelahatchee . E6

282 Pheba . F 3

1,209 Philadelphia . E »

846 Picayune . E 9

61 9 Pickens . D 5

241 Pinola . E 7

294 Pittsboro . F3

165 Plantersville . G2

182 Pleasant Hill . El

1,277 Pontotoc . F 2

163 Pope . E 2

53 Poplar Springs,

Union . G 2

1,272 Poplarvillc . F9

2,252 Port Gibson . B 7

312 Potts Camp . FI

1 60 Prairie . G 3

640 Prentiss . E 7

724 Purvis . F 8

950 Quitman . G 6

162 Randolph …… F 2

579 Raymond . C 6

114 Reform . F 4

1.250 Richton . G 8

158 Ridgeland . D 6

434 Rienzi . G 1

767 Ripley . Gl

338 Rodney . B7

148 Rome . D 3

1,103 Rosedale . C3

294 Roxie . B 8

451 Ruleville . D 3

247 Sallis . E 5

306 Saltillo . G 2

604 Sandersville . G 7

1,406 Sardis . D 2

162 Sarepta . F 2

187 Satartia . D 5

255 Saucier . F 9

165 Scobey . E3

322 Scooba . G 5

526 Seminary . E 8

1,275 Senatobia . E 1

564 Shannon . G 12

871 Shaw . C 3

645 Shelby . C 3

353 Sherman . G 2

198 Shivers . D 7

1,168 Shubuta . G 7

636 Shuqualak . H 5

391 Sidon . D 4

341 Silver City . C4

544 Silver Creek . E 7

175 Slate Springs . F 3

179 Smith ville . H 2

162 Soso . F 7

2,698 Starkville . G 4

363 State Line . G 8

188 Stewart . F 4

137 Strayhorn . D 1

267 Stringer . F 7

321 Sturgis . F 4

1,471 Summit . 18

364 Sumner . D 3

147 Taylor . E 2

623 Taylorsville . E 7

478 Tchula . D 4

473 Terry . . D 6

143 Tliaxton . F 2

64 Thornton . D 4

163 Tillatoba . E 3

212 Tishomingo,

Tishomingo …HI

233 Toccopola . F 2

57 Tocowa . 92

198 Tomnolen . F 4

85 Troy . G 2

151 Tula . F 2

555 Tunica . D 1

3,881 Tupelo . G 2

410 Tutwiler . D 2

795 Tylertown . D 8

693 Union . F 5

572 Utica . C 6

713 Vaiden . E 4

180 Vance . D 2

439 Vardman . F 3

558 Verona . G 2

22,810 Vicksburg . C 6

107 Wahalak . G 5

1 99 Walnut Grove …. F 5

171 Walthall . F 3

4,275 Water Valley . F 2

554 Waveland . F 10

652 Waynesboro . G7

175 Weathersby . E 7

292 Webb . D 3

220 Weir . F 4

2,024 Wesson . D 7

276 West . E 4

4,864 West Point . G 3

181 Wheeler . G 1

980 Wiggins . F 9

2,512 Winona . E 4

626 Wisner, Smith - F 7

156 Woodland . F 3

1.233 Woodville . B 8

6.796 Yazoo City . D 5

-HARDIN-

Forrest City

A M C. I S

LAUDERDALE

5 Ar’ˆnasoga ;Kei

ˆCorinth

A L C-vO

1 Burrow Q KosVuth\ <WuQ~-Xv

&£ DanvUlc~Xj Alˆrn ,

IlKeHum 0‘/ ojxhwtlˆ

»$? / Rienzi *(JacintoˆVT*

’Mount Pageant/’ Michigan,.

Kw ˆIitierarSvQlivflBrtn rn W«Ui iU—

Lake Pleasant

ˆNesbitt o Hill

-S-0 T O Leyaslmˆs’”

r of JV ictoi

liernaiicto °w

\o Cuokrum°>ˆv * I

>reL’ *jr~ -

ta. r <v’‘V akcfield

lnder,endˆnccpriun < SyEokles °Bowmaj*“pC“bSenatobia F

>aS\ V Tyr0 °|f

Spnnghill.” ,rd.

o Maxwell TiplersvlUej

BENTON J °Cbˆ

i Salem Q Finger0 p t

|«t Ashland J ,

I Shawnee j j/p

V cTas£a ybalTa \Atway Q rJ'Y

HuoSon vllleˆl ˆia "ˆ4.Red Banks far3ftwˆ. <! , pi.

M A R S>kA/L if V ˆiaonHollyi Higdˆl oatf"k5PV{ll§>5 NWaitS I - Coleman o l/HlHonˆv

4-ˆ<talTj »

iraLWaterford/ F

Lebanon e)

iwahill ˆBetblchemˆ

— JWfflftg pj&«c ,

Piera Conner sˆiile d D®* ˆAˆan

le Burt© TvWyLAlbany

ˆ Gomez Abbeville oNoah Tv D y N_ legchlllo J IIold®r Walton 0| EuˆRˆT7 University Keel BuajL Sage 9Vom° °J) Oxford LibertˆETiii "

oLAF/a ye TTE ET.ranxa

Eaves (■ lurns\illev

Irinklei

Blarianua

WtCommerc

[lojlywoodc

Clarcndoi

nlca /Prichard vAustin]

Cold xv ol

Savagt

va . - v. ft. wpEvansvilli

V YˆT-WN I C AJ

<. ft Utytlra .Dubb.

Crros lJMllu(i

mho, r /Bear

‘Lake Ifcˆ-

iTacaleeobl

Cotton Plant

Inis

IMann.

‘WheelerˆE

Marietta’

I JetVrieX Trotters Point

franklin

[azeldell]

PHTLLflP.S

Sowell villej

_Q’J Lespldez a

N QrCTAT?na

ˆKˆJiatesvilh

ˆCentral Academy ˆhapcltown Cloudy cowa V Courtland j» Ipop.Keynotd, iG/nuL ˆMelbourne

\ˆllervi ˆtiuiitwWn/ Kirk’ igon > ar~ˆ > BiuˆSprlpge j Rat 11 — _ VlyCˆltilloi

Shermat ’k-Befflen/ Chesterville |ˆ\ LS/E \ Cox / Rrame ‘

tlodgeg °

lour v““nJc

) ° Ingraham

av(fil°’ Eastman©

T Kara Avis © .

jok/„Fulton o I © Clayo lalel ITAWAMBA I

V Tremont® J COtiB , jCardsville / 0 Elkvilleo I

Birdie

% k zTCoahoma j DioKersWd J onestiijvm rgsjijkv allr} Eaglegnestf // Faˆell (3 CloveˆliTill .

** co/ahomJa r

JE’RFER-SON

, BurgeBS I Splinter loOrwood,

iilvoo

rajlT™^’]

iblnoˆvy.ˆ y. \,a°V Yarl’kr.

flrS!”’

IOC

oChiwi Goodfood j Troy o i \ oGershori

City Kverj: ,Pn&d|°

tqv «,Uand8

Sfiuttcn

Marion

©

Uaiuilton

Reyikb

Shannon

revj ˆ c

Teaadab

ˆFrancˆ ˆ‘Alligatorˆ

1R0UO<|./d1O01-J’

ogmifhril

RleginS0

Glllett

ilka ocdeville

Okolonai

‘entral-‘

Floyton o Spin* jJˆUntley ° . QuincyX. O’**?

M/R O

‘-ivi cSenath J

ˆAberdeen

L Barttahatchie0

y Beeson

.Shelby

l, A 9vrtW«

lˆtmann

Coffee-

— yj Airmount

v? ville Yalobusha c

‘HATCH IE sftbey-

|fJE®e MuxpbreeBlKjro , 1 -‘Neednu’rej c—

I O U N I Parkersburg / x fPittsboi|o

Jj}/ P’orthsblr* =ˆHGunDdson ˆVrlght Vj’ lOsedaleT

ˆBˆLNf v\

\ Beulah

I WebbVc Xˆlblnb ˆjs’M»an l)

;| (»lendora\

/; K A S A \ Houston

Hollf&i

CˆiLoun Cityˆ _

Big°Creek Bcrtˆ

Buenˆ\l#ta HcConQ.M\Oib3on

layou

Benela1

•— ˆAtlantt

I’\V oodlaud;

Conirosal ■ “3fante3S “Monte vista jj Dolphin0 ‘,11 ˆftmory o o BeUc-fontaineˆ o jU W a 1 til all o Cumberland/ 1

imsville

ijftT-LjfitoTirf tereuada

&£G’ “FI E n\a D AoRin«

KfS“ 0N»«oo XSim‘11‘1™’™ lXSom ElliottV

Y °/8lnW.rd

Mulflon X vp Strongsˆ C

Vernon©

, Lobdell

Fayette

g o Montpellerf j | ˆ Abbott a (| \

Y

lunny Side* Hilandaleˆ TSchlater / , Shelltnouj

Pahomy > Keys1 lenolfr o, Grapelan

Monticello

Arkansas City

13’ T P S

plLlr

tie ; I Greei Suwloxver I InVjWsOˆA

pwnuuiuu • »»

r∼J Laura o |DabneyW E B S,,T E R

INTGOMERY ®UnSSS

Sawyef Lodij ToiaQo, ‘

-Winona &‘te,

＞Tue vˆV^^^Ruffo 1

Che,

■MrtiiiA«.‘D”rrlstille Bittkrtvn a/”” I . - -i.

,irt CHOCTAW-

}/ i - Huo LVllle cJMDch CmiEjd/ |i*,ur? lr •[T’w.L.‘iiuni ‘ \ ..1/ brim

SUN FLO’

iWaverly

&Duuna £j

ilPiiiii

Trimc5»/°>4 ‘S/

U“^“leF\

Adaton ^-^v^-Agrl

C.T IB’S £ t-n^

^wLLar,tue8B°

C-WhlteBtowno c 1 Agency

iMooreW

Lament v

liPfiSeilltt

: Stephens

//Columbus

H*v /

Carrolltoi

Hemingway

Reforms

Reform

Woodhui

:n ville

Shute0 Bryant ville I

Black-Hawk Vaiden

le ° Adair. - .Mills

,Sw|iftwater(l‘ [r4 ! Burden ft

PHI

t4f.“TBtFLbaS®vfp

tarkkvH

iiKcini^

Carrollton

/ oZilpba oEades

.o ‘itiley ,

Aurls gim8 o MoCo5^

5/ J^Hesterville 0 Zebulon

I ^“Hughes ° “cll8|tbeP

I Weeks ATT AXl~

‘Ivosciusko/^C.

- - - CV^ D’-ld-r > -

C. Pleasant

■ mm

WASHINGTON.) Hel,.onlH _ J‘ ■

= FrIty;) .HUMPHREYS

Lake1

1 Pettit V*1

?pCB

Prairie Point °

NX \U B E E e

Auhrcj

oi

/‘J\ _ Foxtrap .

W«fit

v Greg >ty

TurketJ —

rNV/llowardrr1—

Mileeton

‘Thornton ˆ.v Fret -Beelakeiˆ oTotari

ipchrane

Eudora 1

lluntlo1

•Let tie iclloEhuqua

(Voˆ lN’-npatoX oood

ia 0 1’ Mttsburir / ,

Iksviliflf

RSTfeStP

eerjmˆ-O*ˆ.

iZoiglervilte”

4) i \ ^

J-J west//

‘ Lake Providence”

QA.RROLl/ J

/($ CARBC

Arline

o Fusk:

Fcol ,/

Homocbjeo

Entaw

D^weyo 0 Prince

iirthiend Do°ko ^eden ** Philadelphia K E M ..srr ; - oS.r 6 i a.»e - m«« “ e

Fide ‘Vo,Wt’» NESHOBA PeJrldge De Kalb ° If °Pe °n Fairground Cushtuaa. .Moscow o Mt.. > -bo

I,3d’°“ ! oW.tktasvillJ j,v» SP’Ak»0 V

Zion | o •!_ , o Rio /.

hill ° I Dixon. W Engine I o Dixie 0

Walnut* ‘Beech springs 6jje8hoba Calvert. J ^

‘ *• t - r\r.veX - I n Oktibbeha

yyCouparle.

‘ Cameron Thointl °Oaks ˆ °Canjde °SbarpBburg ˆ Sulphur o T 0 SpringsofabQ1

,llk 0Shar«n = J

O.U/ . t t M A d I SON MU1]

Stokes 0 GˆCaat0/1 /

ˆinahrson 0 Charlton J (jrome *

Flora\ˆ Gluckstadt/ Melton - JAdelle Malˆnsdaleo c ville -/ ˆ>,”Sanabil|\ _

o Ro’ inBorf Sprs-dfˆyt’ ‘ .n/a.JsAKASprs.

I St:i *JS Swiruil* Ri4fcelaad

l^ VtlZOO Citj’vftˆiu >-/V,Uilton0 c Benton B “ ” O DeaEonvlllj

MOREHOUSE

Hast nip

LSpanUf, F{ »V Blanton

Enola .

Collineton

lljrta.’W,

|y) <\ / ; And in;

V ./ˆSartart ia

. A“lrr’r,h ˆ D = °l

1 ˆrMecbanicsburg dˆadnri tq Fhccnix y- ˆBallgrLupd fRusBcllvilie

, ˆ ˆ .Oakridge, .v- . _ ,

I Redwood fftl o Tocahbntasq ■*A/f- \ 5 o\ vOrangevllle \

Vlllanjivˆo YoungtRn . Greens 1

J W A .RjR EN, / \ Cjuthia’

CM:

~j- — djl/H’ ; £,i ‘“au Winkleˆ

M > #V J > 4ˆd8 MoRaven-mˆ

Enomdale

Shilok X.Kc1_f(ˆ

SˆMcgna, Vista

))1 -

■gˆCbotjird j Bnms.wiok

LJ\lngst < uu’

MTE ‘R

Tamol

DalevilS

° Grove

.ebastopol .0ti

iseua . \J0’ lyb °Lucern J ° Cooksey

oConehatt*

Jeff,

|NE\V

-Toh-,, J

X oOhadiah

iailej .Topton/ Lockhart I

‘U D E RO A L ET -d*/

\ Mate/Ma > don_ˆi—ˆT- : -o _* ˆOq# **lf. y/ˆBoDitaˆe// ˆ«»d/,4

’Meridian, _

F.s.Cm. /w5r‘°ll

Tnllulali

|Stage_

v x - ˆRankin r ; .

4il7 Bramluil Mosclfcy

RANK UN ˆ

Plain .Monterey Chapman | (

Flore nceˆpobso® Virgil ‘

l J. hComebj _ a,d > ˆCalil’

rd ° V Braxton ” 5 Acfe °n..«

\uKk_

is \ t rwrem

oL-ood- i

I R«r

Bartlett

,CooperviJIe _ | °

/ _ Lorena

olkville . o I

/EutnBoK1’m |

° Aadovei 1

) < u»iel Shongelol _

ˆur«1»L K-Sˆta? to a s P E R

Garland ville

/ MiellJ

ˆEnergy |

ISjtes

Is’anafaliaj

J! iddletta

ˆE. > p. 1

ollankii

˚Rock

Jmp£rej« „]int\tMc Scutcl . W dl |o W

Thompsonville

IHOCTAW

CiqSnter 0”j„k

Fouke

-fJStkveas. -

j Lake Como ˚AltJ L ˆ Addlne. T, TexV

tyCrystal

} Currie o Bezel Wy Spri

DpnngB

0 Willing -/ • - v!

&?Sv_ Dent ville “/ Ilopewellbˆ Gallmanr Georgetoi CoOrshlilo

. i,Hazleliiii

IT A H#oe.

Ashley * 5K®° .. .

j. \ enue (

0 o Hale

Goodwatei

e /f©sMeudenllSill0 Faroe

HiTinola Ro|aˆˆ*|p£

° Fairdaleo P’ Xj .

“mi. Zl0B = ‘sf“™ˆ = dika(SfThJbroV |\Kloii«sV4.

of ’ Stiatv,

I® J Vixen° CI™f! oPwcll ‘

. cov 1 1

‘St.ElzMSir

?headville\

ytPuftjOibsdnf •ˆWˆstfi LAI/

ft = Ruasum / 1

_ yvc Rodney ‘ ~ TTtfr

ˆ Lor man/

l.{

jiomrijge StoniilTton /

gTVi.J e fV;e

eˆSjChuroh

feˆJUUi v / f «3

Hgrmamyille .

11 8on ville’* /’c \

|c>kn oMizpah.

jjV’oyGoiaC 0

J , Glancy

I 0 Burnell Martinsville Alien0 .. _ A

. Uomochitto Beauregard •PeetBvUla

p\v ernon

[Tubal

Heidelberg! Hosey /

Chaparral

>lamond

Schley ! ˆSbivcrs-

ˆPaan«r.8Tllle %mXJ . U8b.«J

Gretna Tokio I

Mathews

ServiceV

.Fuller

, o Pinnelivil

HOUL,

＞ehbam

iTON ˆCollins

X Kola “TVGandsi Thames\X o

yui«kWa3,nefbo1

Tj ˆVStrengthford

M . Carmel

Winchester

Montgomery’

Black

River

BrookhaveiL

“Tp Cobbs

r fto’b‘1‘15/

‘Stanti

NoUiX. BerTason 5ˆ-Frlendshipj. LAV/RJEN’ COLN oFaar River

Mont icello WArm

P”eb°l nAu. 4

b ‘ITopeka. ?\U

ˆfdgar° . ,‘VerDaM.TllCfa-

/T A#ˆVSeltna

\ya»bington

ˆTatclTez’

Jeannette0

ADAMS i

4 c Sibley Whiteapplci

Kingston , °4r,,- | /

-

S»Fyr Ixeland^^l-v >- Lcla’J PerryUnrn y P Doloroso ,

Clara? %\« ^CbicormX\ \ Old ‘Bucatui&aY 0 Bethel X C ‘ Ilend ereon StateT^ini

Oldenburg Veto

CUatom

fTawant f MoselR

IRoxit]

Bassfield

i Yellow 4 -Pine

.WASHINGTON

.Melba”

ittle Springs: Dick°

Runn’j town j

urg.

.noxville

Wells

ithorn

jhnstons Sta.’

. n Leaton oT

o eZion Hill

ip ˆ

selB ˆVˆXlardner

°lieall °Ff oBcwel.come

[hdale

3lotl VWaterloo R\c

Okaluda/

C-A M A (rt

bS“W

BaxtervlUe h o .”^SA. fTilol

[intohrllle w

.,v^staV’

Btk moM A^P

yj Jame6townj

Eastfork

Ir*jeJ

ftrovBhelbyb < ji;

WL»Bn* -l

JLeakea.vIlU r r YXyg/C0 R EXi

miaFW I L K I N S O N

sy£- Lessley

on Adams WOOdville

1 *

‘ Leggett ° xylW’tovtfn ‘V Emerald0 ,\ONewziono Chatty. Huottrl V5 / DMtet

8,rˆb*,j.’y.Xravi” B §} y/ aTa*e 1 ’4 ‘S/Ecbo “«”)>’

Centerville

ˆshwood

.Pinckney v illc W h i I

rarbert

Barbara

‘Angola

KeLtwood

/ *Ty° Bilbo XiUillBdalcTvcf

Orvlsburg if \ & V]

r iPoplarvllle ˆ

J PEARL/RIVER <J ˆ

,o Wheat /Glade Ny4 1\° S

Chinqimjpln . I Derby J\L

S～*a Evanston\^\ -^^Crossroade^^^V

renoT\v^^° Basin

Jacks*

WissiQS^I

N ° Wisdom’

/ Perkln8ton

v’FrarikUntnn

Varnade

GTON

Bogalusaj

;cluse°’[^

HELENA

*t > er

.McHenry

IrnncisvilU

Harleston’

pAmericufl

Hurley,

( ) Amite

Ludncrlo

Mobile

, Farneli]/

Mayer

1 « ˆ Emery J

Carriero? a

iGood year j Caeaar <

? .f / »

Picayune p

TANGIPAHOA

Folsom1

° Anner Hariel

. Saucier }

fi I S ON

VW urtham

iRleevllle

Utaej A

Yancleave 0 Latimer °

Dawes

ˆIheodore,

‘Jfatalbany

\ Ramsay

“Wn Lorraine

TCatahoula

lANCOCKi

T/Tl’ecan iranie Grove

Livingston

Mandeville Jo.

Springville

/St. Tammany oJ Mindevllle

St. Loui*\Iiat)l

alnoBville

Bay St. Louiˆ

*ˆPearllngton/l/

WI,ake6hor/V

nb Fa : D.ycphivf X ˆ

1

Slidell

HORN;

Longitude D

from E Greenwich.

T

TarncrN

F~~ —^

©Star Clty^y

1 Lincoln

/| COLBERT

MISSISSIPPI

SCALE

Statute .Miles, 38 ‘A = 1 Inch.

Ttand .McNally’s Ne« 11 x 14 Map of MlssissippL Copyright by Band McNally A Co.

seen. Alligators occur in the Mississippi River as far north as the mouth of the Arkansas, and in some of the smaller rivers ; and most of the streams abound in fish. Paroquets are seen as far north as Natchez and wild turkeys are still somewhat common.

Forestry. — There are about 32,000 square miles of timbered land in the State. The yel¬ low pine ranks first among the forest trees, and extends northward from the coast for 150 miles. The hills or bluffs along the Mississippi Delta extend to the prairie lands on the east¬ ward and affords numerous forests of oak, gum, poplar, tulip, ash, maple and hickory, and a few pine trees. The prairies of the southern part are covered with the long-leaved pine. Only within recent years has the timber prod¬ uct been important. Nearly all the timber cut consists of yellow pine and oak and other hard woods. Turpentine, resin and other naval stores are no small portion of the product from the timber belt.

Agriculture.-— The fertility of the soil and a favorable climate give to Mississippi eminent advantages as an agricultural State. Nowhere in the world are there better alluvial lands than the Mississippi bottom or ˆDelta® contains — an alluvial plain in a mild climate, level as the surface of the ocean and of inexhaustible fer¬ tility ; and this plain is only a small part of the fertile lands of the State. The tablelands of the north, the loams along the bluffs and banks of the Mississippi, the dark and heavy prairie lands of the northeastern section and the in¬ land bottoms are of scarcely less fertility. The prairies, especially in the Tombigbee district, furnish excellent pasturage and, besides the common crops, produce fine alfalfa. Sugar is produced in the southern portion, besides mo¬ lasses, but cotton and cottonseed form the great staple of practically the entire State. Maize and oats are grown everywhere and wheat of fine quality is sometimes, though not commonly, produced in the northern parts. All the fruits of temperate climes grow in perfec¬ tion, including berries and melons ; plums,

peaches and figs are abundant and, in the southern part, oranges and pecans. The farms of Mississippi, according to latest reliable statistics, numbered about 274,382 (average size 67.6 acres), total acreage 18,557,533 acres, of which 9,008,310 acres were improved land, val¬ ued at $426,314,634. Of this, $254,002,289 was value of land, $80,160,000 was value of build¬ ings $16,905,312 of implements and machinery and ' $75,247,033 of domestic animals, poultry and bees. Of the farmers, 108,909 were native-born whites, 736 were foreign-born whites, 164,239 were negroes, 248 Indians and 11 Chi¬ nese. Of the whites, 67,040 were owners, 41,- 886 were tenants and 719 managers ; of the non¬ whites, 25,026 were owners, 139,605 were ten¬ ants and 106 managers.

The principal crops with their acreage, pro¬ duction and value in 1910 were : Corn, 3,232,— 000 acres, 66,256,000 bushels, valued at $41,741,- 000 • wheat, 5,000 acres, 70,000 bushels, valued at $81,000; oats, 175,000 acres, 3,360,000 bushels, valued at $1,848,000; sweet potatoes 56 04S acres 4 427,988 bushels, valued at $2,213,944; cotton, 3,400,210 acres, 1,127 156 bales, valued at $47 340,000; cottonseed, o64,000 tons, valued at $6,692,000: hav from cultivated grasses, 98,788 acres, 128,351 tons, valued at $1,732,000,

cane sugar, 24,861 acres, 222,600 tons, valued at $2,226,000 ; cane molasses, 2,920,519 gallons, valued at $1,000,000.

The total value of Mississippi crops for 1910 was, including fruits, nuts and vegetables, $147,315,621, with approximately $9,008,310 im¬ proved land in farms. In 1915 the aggregate value of cotton, cottonseed and cottonseed products was $82,000,000, and that of grain crops, hay and potatoes was $57,496,000.

The total value of livestock on farms and ranges in 1910 was $73,255,756, of which $15,269,364 represented the value of cattle, $20,303,851 horses, $32,028,421 mules, $4,913,166 swine and the rest asses, burros, goats and sheep. Of the cattle, $429,587 represented the value of dairy cows.

In 1917 cotton was grown on 2,801,000 acres and yielded 895,000 bales, valued at $127,538,- 000; maize yielded 84,050,000 bushels from 4,100,000 acres and valued at $115,989,000. Oats in the same year yielded 5,700,000 bushels from 300,000 acres and valued at $5,358,000. Potatoes were raised on 14,000 acres, yielded 1,092,000 bushels valued at $1,835,000. The 1917 hay crop from 261,000 acres

was valued at $5,676,- 000. In 1918 the State had 253,000 horses, 307,000 mules, 508,000 milch cows, 644,000 other cattle, 174,000 sheep and 1,902,000 hogs.

Many counties are pressing vigorously the work of tick eradiction and more than ˆ5 of the territory of the State is now freed from that pest and from the Federal quarantine on cattle shipments. The value of the fruit prod¬ uct of the State in 1917 was about $1,900,000, of this amount nearly 50 per cent was con¬ tributed by the peach crop; 10 per cent by apples, and 5 per cent each by figs and straw¬ berries.

Fisheries. — This industry is centred at Biloxi, from which great quantities of oysters and shrimps are shipped annually. Buffalo fish, mullet, catfish, sea trout are the principal fishes sought. About 2,000 persons are engaged in the industry in which is invested capital to the extent of over $500,000. The value of the annual catch is about $550,000.

Minerals. — Mississippi is not a mining State. Clay is the principal product, being produced annually to the value of about $800,000. Marl, phosphate rock, hydraulic lime, gypsum and lig¬ nite are also found in limited quantities. None of these are worked to any considerable extent. There are six mineral springs which in a re¬ cent year produced 257,200 gallons, valued at

$52,780.

Manufactures. — At the last industrial

census, measured by the value of products of its manufacturing industries ($79,550,095), Mis¬ sissippi ranked 39th among the States and with an average of 46,702 wage-earners engaged in its industries, the State ranked 31st in this respect. The census reported 2,209 industrial establishments, employing 52,277 persons, of whom 2,386 were proprietors and firm mem¬ bers, 3,189 salaried employees and 46,702 wage-earners. The primary horse power required to operate these establishments aggregated 186,434, the capital amounted to $81,005,484; the cost of materials aggregated $41,340,122; the value of products $79,550,095, making the value added by manufacture $38,209,973. Of the latter sum only $19,176,627 was paid in wages and $3,831,133 in salaries, or an average

of $410 per annum for each wage-earner, leav¬ ing over $15,000,000 for rent and taxes ($1,320,- 197), payments for contract work ($2,075,852), interest on investment, depreciation, *etc.* The following table shows the relative importance of the leading manufacturing industries:

INDUSTRY	No. of estab¬ lish¬ ments	Wage earn¬ ers	Value of products	Value added by manu¬ facture
Lumber and timber	1,296	29,640	$38,537,743	$23,681,893
Oil, cottonseed and coke … . .				

67

2,336

17,599,651

3,162,023

Cars and shop construction .

15

3,278

3,682,100

2,189,199

Cotton goods .

11

1,989

2,789,007

977,007

Fertilizers .

11

379

2,059,786

454,801

Turpentine and

rosin .

61

3,275

1,997,139

1,416,960

Canning .

18

1,052

1,654,772

777,577

Wood preserving…

4

241

1,478,528

417,511

Printing and publishing .

219

663

1,266,730

953,031

Mineral and soda

waters .

80

308

1 ,066,364

500,247

Ice .

58

476

1,045,940

719,037

Bread and bakery

products .

83

306

919,007

404,681

Foundries and machine shops .

43

423

699,444

437,042

Brick, tile, terra cotta, etc .

38

551

512,777

325,234

Carriages and

wagons .

23

210

479,436

255,947

Flour and grist

mills .

17

48

410,332

66,054

Gas and heating…

8

113

291,959

181,314

Food preparations.

5

19

Copper, tin and

sheet metal .

18

82

201,376

35 , 692

Marble and stone. .

13

58

190,945

100,490

Saddlery and harness .

10

24

149,404

72,886

All others .

111

1,231

146,914

48,770

$2,370,741

$1,032,577

Of the 52,277 persons engaged in manufac¬ turing industries, of whom 46,702 were wage-earners, as already stated, 46,069 were 16 years of age and over and 633 under 16 years; 1,904 were women and girls and 119 of the latter were under 16 years of age. Consult (Census of Manufactures) (Vol. I, issued by Depart¬ ment of Commerce, Bureau of the Census, Washington, D. C., 1918).

The above statements do not include about 2,000 cotton-ginning plants.

Finances.— On 1 Oct. 1918, the total in¬ debtedness of the State, including $2,354,607.74 of debt for school funds, on which interest alone is paid, was $5,102,991. Total bonded debt as of May 1, 1919 is $8,301,607.74. The assessed valuation in 1917 was as follows: Real estate, $417,164,293 ; personal property, $117,551,983; public service corporations, $91,580,335; total, $626,296,611 ; and the State tax rate $4 per thousand. The total receipts for the year 1 917— 18 were $9,485,790.68, total disbursements, $8,301,526.57. The main source of income is a direct State property tax, which yields almost 45 per cent of the total income. Of the dis¬ bursements in 1918, 15 per cent were for com¬ mon school purposes and 5 per cent for re¬ demption of the State debt.

Banks and Banking.— The first bank in the State was opened in Natchez in 1809. On 31 Dec. 1918, there were 33 national banks in opera¬ tion with $30,310,811.87 of deposits, including

savings deposits; and 288 State banks with $83,891,325.59 of

deposits, including $8,301,526.57 of savings accounts. A comparative statement of the State banks, not including national banks, is: On 30 June 1900, resources, $19,345,840; on 25 Aug. 1905, $50,620,811 ; on 2 June 1910, $66,688,649; on 31 Dec. 1918, $149,198,055.78. In this State the Uniform Negotiable Instru¬ ments Act has been adopted.

Education. — Nearly all the cities and towns in the State maintain graded schools for 10 months in the year. The country free schools are maintained four months. Separate schools are conducted for the two races. In 1915 the children of school age numbered 737,356; the enrolment in public schools were 575,653, and the average daily attendance was 312,650. There were 6,656 licensed teachers, 7,500 pub¬ lic school buildings, and school property valued at $2,500,000. The State appropriation for com¬ mon schools in 1915 was $1,695,651, in addition to which the counties and the towns levy addi¬ tional taxes for schools, and there are other sources of public revenue for schools. For higher education, there were 115 graded public schools, 17 private secondary schools, 3 public and 2 private normal schools, 8 universities and colleges for men and 6 colleges for women. The men's colleges include the Agricultural and Mechanical College (State) at Starkville; the Mississippi College (Baptist) at Clinton; Millsaps College (Methodist) at Jackson; Jef¬ ferson College (at Washington) near Natchez; Chamberlain-Hunt (Presbyterian), Port Gib¬ son; Rust University at Holly Springs. Among the most notable women's colleges are the Industrial Institute and College (State) at Columbus; Blue Mountain College (Baptist) at Blue Mountain; East Mississippi Female College (Methodist) at Meridian; Belhaven College (Presbyterian) at Jackson; Hillman College (Baptist) at Clinton; Whitworth College (Methodist) at Brookhaven; Gren¬ ada College (Methodist) at Grenada; Stan¬ ton College at Natchez. The University of Mississippi at Oxford is a coeducational in¬ stitution, as also the Alcorn Agricultural and Mechanical College at Rodney, a State techno¬ logical institute for colored pupils; also the Tougaloo University, a Baptist missionary in¬ dustrial institution, at Tougaloo, near Jackson. Normal schools are established at various points.

In 1916 there were 227 newspapers issued in the State, including 16 daily, 183 weekly, 7 semi-weekly, 2 fortnightly, 5 semi-monthly and 14 monthly; 2 agricultural and 13 religious.

Religion. — The Baptist Church claims over half the church population of the State; and then follow the Methodist Episcopal, South ; the African Methodist, the Methodist Episcopal, the Roman Catholic, the Southern Presbyterian, the Cumberland Presbyterian, the Disciples of Christ and the Protestant Episcopal. At pres¬ ent there are

6,500 Sunday schools conducted by church organizations, with over 33,000 officers and teachers and about 300,000 pupils.

Charities and Correction.— There is a State penitentiary, the prisoners being employed at labor on State farms. There are State hos¬ pitals for the insane at Asylum and Meridian. The State Deaf and Dumb Institute, for white and colored, and the School for the Blind (white) are located at Jackson. The Beauvoir

State Capitol at Jackson

>

I . .

Home is located at Beauvoir. There are char¬ ity hospitals supported by the State at Jackson, Natchez and Vicksburg. There are altogether 17 benevolent institutions, of which about 12 have been founded by private or church au¬ thorities. At present there are about 435 pau¬ pers in institutions, being 24.3 per 100,000 popu¬ lation, and about 2,300 prisoners in penal institutions, being 127 per 100,000 of the population.

Government. — • The State is governed under a constitution adopted in 1890, with some later amendments. The governor is elected for a term of four years, and receives a salary of 555,000 per annum. He is not eligible for re-elec¬ tion. Other executive officers are the

lieutenant-governor, auditor, attorney-general, secretary of state and treasurer. Legislative sessions are held biennially, beginning on Tuesday after the first Monday in January; but only those ses¬ sions held in the leap years are unlimited as to scope and duration ; the other sessions can deal only with revenue and appropriations and such other matters as the governor shall sub¬ mit to them by message. The legislature and entire State government are Democratic. Each member receives $400 per annum and mileage. There are eight representatives in the United States Congress. The legislature is composed of 138 representatives and 45 senators. There are six supreme judges, elected by the people for eight years; and circuit judges and chancery judges, also elected by the people for four years. Voters must have resided in the State for two years and in the election district for one year. Registration is necessary, and the voter must be able to read any section of the Constitution of the State, or be able to under¬ stand the same when read to him, or give a reasonable interpretation thereof. He must also have paid taxes for two years and must pay a poll tax of $2 for school maintenance.

State and county officials are nominated at primary elections, the expenses being paid by the political parties interested. The commis¬ sion form of government is permitted to mu¬ nicipalities, which enjoy a large measure of home rule. The initiative and referendum is allowed in municipal charters and is called into operation by petition of 10 per cent of the voters. A commission charter may be aban¬ doned by any city by a vote of the electors after it has been six years in operation. Among the special statutory provisions is one according to which a public service corporation forfeits its charter for intrastate commerce in case it removes a suit from the State to the Federal courts. Contributory negligence is not recog¬ nized as a bar to a suit for damages for in¬ juries, *etc.* Women may make contracts and dispose of or acquire property on equal terms with their husbands.

Transportation.— The total length of rail¬ roads within the State in 1916 was 4,242 miles; besides 44 miles of electric interurban railways. The most important lines were, the Yazoo and Mississippi Valley, having 1,143 miles within the State; the Illinois Central, 679 miles; the Gulf and Ship Island, 305 miles; the Kansas City, Memphis and Birmingham, 143 miles; the Mobile and Ohio, 315 miles; the Southern, 377 miles; the Alabama and Vicksburg, 141 miles; the Louisville and Nashville. 74 miles;

\

the New Orleans and Northeastern, 153 miles; the New Orleans and

Great Northern, 106 miles ; the Mobile, Jackson and Kansas City, 370 miles; and the Mississippi Central, 164 miles. . Vicksburg, Greenville and Natchez are the principal ports on the Mississippi River ; and Gulfport, . Biloxi and Pascagoula, on the Gulf of Mexico. The various counties are spending a great deal of money improving the roads by graveling to the extent of many hun¬ dreds of miles in the aggregate.

Population.— The total population in 1910 was 1,797,114, or 38.8 to the square mile, of which 908,000, or 58 per cent, were colored. There were 1,253 Indians and 9,389 foreign-born inhabitants, of whom 1,665 were German, 2,137 Italian and 747 Irish. The population in 1920 (U. S. official census) was 1,790,618. Until 1830 and later, the white population was somewhat in excess of the colored; but in ‘the decade 1830 to 1840 the cessions of Indian Territory within the State made by the Chickasaw and Cherokee Indians, and the opening for occu¬ pancy of the lands so ceded, constituting more than half the State, invited an immediate and immense inflow of settlers, with very many slaves because of the fine cotton land:, the colored population at once ran over the white, and it has so remained since. The history is shown by this table :

YEARS

Whites

Free

colored

Slaves

Total

1800 .

5,179

182

3,489

8,850

1810 .

23,024

240

17,088

40,352

1820 .

42,176

458

32,814

75,448

1830 .

70,443

519

65,659

136,621

1840 .

179,074

1,366

195,211

375,651

1850 .

295,718

930

309,878

606,326

The total population in 1860 was 791,305; in 1870 was 827,922 ; in 1880 was 1,131,597; in 1890 was 1,289,660; in 1900 was 1,551,270; in 1910 was 1,797,114; in 1920 was 1,790,618. The largest cities are Meridian, 23,399; Jackson, 22,817; Vicksburg, 17,931; Natchez, 12,608. Other important towns are Hattiesburg, Green¬ ville, Laurel, Biloxi, Yazoo City, Gulfport and McComb City.

History. — Hernando de Soto (q.v.) and his companions first visited the Mississippi region in 1539. They made no settlements, however, and the death of the leader in 1542 put an end to the expedition. In 1682 La Salle de¬ scended the Mississippi, took formal possession of the adjacent country for the king of France and called it Louisiana. In 1698 M. dTberville was authorized by the French king to colonize the regions of the lower Mississippi. He landed near Ship Island and, from this point, setting out with two large barges, explored the coast, discovered the mouth of the Missis¬ sippi, reaching the bend at the mouth of the Red River, and returning to Ship Island erected a fort at the Bay of Biloxi, about 80 miles east from the site of New Orleans. He then embarked for France, leaving the fort in com¬ mand of his two brothers, Sauvolle and Bien¬ ville. In December 1699, Iberville returned, and soon after built a fort on the banks of the Mississippi. In 1700 the Chevalier de Tonty

arrived at Iberville's fort with a party of Cana¬ dian French from Illinois. Availing himself of de Tonty's knowledge of the country, Iberville dispatched a party under his lead to explore the river and its banks. They ascended to the Natchez country, 400 miles above the French fort, and here selected a site for a fort and called it Rosalie. A settlement was also made in 1703 on the Yazoo River, which was called Saint Peter's. The colonies thus planted grew but slowly, and New Orleans, being founded soon after, drew off a large portion of the colonists from the interior, besides attracting the new immigrants. In

1728 the settlers and the Natchez Indians became enemies and, as a result, the latter massacred the settlers, and over 200 persons were killed and 500 taken prisoners. 1 he captives were, however, re¬ leased, and new and stronger forts were erected. Aided by the Choctaw tribes, the French succeeded in destroying the tribe, the greater part of which fell in battle. In 1733 the colony went to war with the Chickasaws, allies of the English, and the conflict continued for several years. There was a peace, followed in 1752 by another Indian war. In 1762 when Florida was ceded to Great Britain, that part of the present State lying south of a line drawn eastward from the mouth of the Yazoo River (practically from Vicksburg) was claimed to be part of Florida; and when in 1781 Spain conquered Florida, that part of the State came under Spanish rule. In 1798 the Mississippi Territory was creaited by Con¬ gress. Its boundaries were the Mississippi River on the west, the 31st parallel on the south, the Chattahoochee on the east and. a line drawn from the mouth of the Yazoo due east on the north. The Territory having been surrendered to the United States as part of Georgia, the consent of that State had been previously ob¬ tained ‘to the establishment of a territorial government. This consent was followed in 1802 by the further cession by Georgia of all her lands south of Tennessee, and these by an act of Congress in 1804 were attached to the Mississippi Territory, which thus comprised the whole of what are now the States of Alabama and Mississippi from »the 31st to the 35th parallel. The territory between the Pearl and the Perdido rivers was added in 1811, having been wrested from Spain under the plea that it had originally formed a part of Loui¬ siana. In March 1817, Alabama was separated from Mississippi and organized under a terri¬ torial government of its own; and on 10 De¬ cember of the same year Mississippi was ad¬ mitted into the Union as an independent State. In 1861 it passed an ordinance of secession, took a prominent part in the Civil War, and finally, in January 1869, was readmitted to representation in Congress, after ratifying the 15th amendment. The principal battles fought here during ‘the Civil War were those of Co¬ rinth, Baker’s Creek, Holly Springs, Iuka and the siege of Vicksburg. The several State constitutions have been those of 1817, 1832, 1869 and 1890; the latter, with certain amend¬ ments, being now in force. The State has had four territorial governors, two provisional gov¬ ernors, one Union Democrat, three Republican and 30 Democratic governors.

Governors of Mississippi

Winthrop Sargent… . William C. C. Clai¬ borne .

William C. C. Clai¬ borne .

Robert Williams .

Robert Williams .

David Holmes .

David Holmes .

David Holmes .

TERRITORIAL

. 7 May 1798

(Recess appointment) 25 May 1801

(Appointed on con¬ firmation) . 26 Jan. 1802

(Appointed on con¬ firmation) . 1 March 1805

(Appointed on con¬ firmation) . 14 March 1808

(Appointed on con¬ firmation) . 7 March 1809

(Appointed on con¬ firmation) . 31 March 1812

(Appointed on con¬ firmation) . 10 Dec. 1814

STATE

David Holmes… Democrat—

Republican 7 Oct. 1817, to 5 Jan. 1820

George Poindex¬ ter . Democrat… 5 Jan. 1820 to 7 Jan. 1822

Walter Leake … “ 7 Jan. 1822, to 17 Nov. 1825

Gerard C. Bran¬ don i* . “ 17 Nov. 1825, to 7 Jan. 1826

David Holmes. … “ 7 Jan. to 25 July 1826

Gerard C. Bran¬ don 2 . “ 25 July 1826, to 9 Jan. 1832

Abram M. Scott 3 “ 9 Jan. 1832, to 12 June 1833

Charles Lynch.. . “ 12 June to 20 Nov. 1833

Hiram G. Run¬ nels . “ 20 Nov. 1833, to 20 Nov. 1835

John A. Quitman4 Whig . 3 Dec. 1835, to 7 Jan. 1836

Charles Lynch.. . Democrat… 7 Jan. 1836, to 8 Jan. 1838 Alexander G. Mc¬ Nutt . “ 8 Jan. 1838, to 10 Jan. 1842

Tilghman M.

Tucker . “ 10 Jan. 1842, to 10 Jan. 1844

Albert G. Brown. “ 10 Jan. 1844, to 10 Jan. 1848

Joseph W. Mat¬ thews . “ 10 Jan. 1848, to 10 Tan. 1850

John A. Quitman. “ 10 Jan. 1850, to 3 Feb. 1851

John I. Guion 5. . “ 3 Feb. to 4 Nov. 1851

James Whitfield 6. “ 24 Nov. 1851, to 10 Jan. 1852

Henry S. Foote.. Union-

John J. Pettus 7. . John J. McRae . . Wm. McWillie… John J. Pettus… Charles Clark … William L.

Sharkey 8 .

Benjamin G.

Humphreys … Adelbert Ames 9 . James L. Alcorn . Ridgley C. Pow¬ ers 10 .

Adelbert Ames … John M. Stone 14 . Robert Lowry… John M. Stone.. . Anslem J. Mc—

Laurin .

Andrew H. Lon—

gino.... .

James Kimble Vardaman .... Edmond Favor

Noel .

Earl LeRoy

Brewer .

Theodore Gilmore

Bilbo .

Lee M. Russell...

democrat 10 Jan. 1852, to 5 Jan. 1854 Democrat... 5 Jan. to 10 Jan. 1854

10 Jan. 1854, to 16 Nov.1857 16 Nov. 1857, to 21 Nov.1859 21 Nov. 1859, to 16 Nov. 1863 16 Nov. 1863, to 22 May 1865

June to 16 Oct. 1865

16 Oct. 1865, to 15 June 1868 Provisional. . 15 June 1868, to 10 Mar. 1870 Republican. . 10 Mar. 1870, to 30 Nov.1871

Democrat.

U

30 Nov. 1871, to 4 Jan. 1874 4 Jan. 1874, to 29 Mar. 1876 20 Mar. 1876, to 9 Jan. 1882 9 Jan. 1882, to 13 Jan. 1890 13 Jan. 1890, to 20 Jan. 1896

20 Jan. 1896, to 16 Jan. 1900 16 Jan. 1900, to 19 Jan. 1904 19 Jan. 1904, to 21 Jan. 1908

21 Jan. 1908, to 16 Jan. 1912 16 Jan. 1912, to 18 Jan. 1916

18 Jan. 1916, to — Jan. 1920 to

Jan. 1920

* For references see next page.

Bibliography. — Claiborne, (Mississippi as a Province, Territory and State> (1889) ; Davis, Recollections of Mississippi) (1889); Duval, (History of Mississippi (1892); Garner, Re¬ construction in Mississippi (1901) ; Goodspeed, (Memoir of Mississippi (1891); Hurt, <Mis-oˆcm1' ˆtS Climate, Soil and Production (1883); Hilgard, /Report on the Geology and Agriculture of Mississippi (1860) ; Lowry and McCardle, (History of Mississippi (1891) ; Monette, (History of Mississippi Valley* (1848) ; Mayes, Educational History of Mis¬ sissippi (1891); Rozier, (History of Early

Settlements in the Mississippi Valley5 (1890) ; Tracy, c Mississippi as It Is5 (1895) ; Wall, (The State of Mississippi5 (1879) ; Winsor, (The Mississippi Basin5 (1895) ; Publications of the Mississippi Historical Society5 (16 vols.) ; Rowland, Encyclopaedia of Mississippi His¬ tory5 (2 vols., 1907) ; Reports of the Executive Departments of the State; Rowland, (Official and Statistical Register of the State of Missis¬ sippi5 (Centennial ed., Madison, Wis., 1917).

1 Governor Leake died 17 Nov. 1825, and was succeeded by Lieutenant-Governor Brandon.

2 Governor Holmes resigned in July 1826, and was suc¬ ceeded by Lieutenant-Governor Brandon.

3 Governor Scott died 12 June 1833, and was succeeded by Charles Lynch, president of the senate.

4 Governor Runnels vacated the executive office 20 Nov. 1835, and was succeeded by John A. Quitman, president of the senate.

6 Governor Quitman resigned 3 Feb. 1851, and was suc¬ ceeded by John I. Guion, president of the senate.

6 Governor Guion's term as senator expired 3 Nov. 1851. The senate met 25 November and elected James Whit¬ field, president, who served as Governor until 10 Jan. 1852.

2 Governor Foote resigned 5 Jan. 1854, and was succeeded by John J. Pettus, president of the senate. _ ,

8 Governor Clark was removed by Federal soldiers 22 May 1865, and was succeeded by Judge William L. Sharkey as provisional governor by appointment of President

Johnson. , , _ , , ...

9 Governor Humphreys was removed by Federal soldiers 15 June 1868, and was succeeded by Adelbert Ames as military governor.

10 Governor Alcorn resigned 30 Nov. 1871, and was suc¬ ceeded by Lieutenant-Governor Powers.

11 Governor Ames resigned 20 March 1876, and was suc¬ ceeded by John M. Stone, president of the senate, the lieutenant-governor having been impeached.

Edward Mayes,

Author of (Educational History of Mississippi .5

MISSISSIPPI, University of, at New Ox¬ ford, Miss., was chartered 23 Feb. 1844, and the Lyceum building, two dormitories and resi¬ dences for four professors, built from, the plans of William Nicholl, elected supervising architect, were ready for the opening of the first session which took place 6 Nov. 1848, with a faculty of four members and 50 students. From its opening until 1880 the university was maintained by annual appropriations made by the legislature. In 1856 a special appropriation of $100,000, to be paid in five yearly instalments, was made by the legislature and with the aid of this the university made its first large growth in facilities and equipment. Since then

commensurate with the growth of the institu¬ tion the legislature has provided the necessary funds. The departments besides the collegiate comprise governmental science, law, engineer¬ ing, pedagogy, medicine and pharmacy. The liberal appropriations made by the legislature have enabled the university to enlarge its facili¬ ties with fine new buildings, including a com¬ modious dormitory for women students, who were welcomed to the university courses upon equal conditions with men in 1882, and a new library building, in part a gift from Andrew Carnegie, erected in 1911. The tuition fees are $60; annual living expenses amount to $130. The faculty now numbers 30; the average annual attendance of students is 400. From its inception to 1917 the number of graduates was 2,200, of whom 1,700 were living; during the World War, 1914-18, 400 of the students were enrolled with the colors.

MISSISSIPPI AGRICULTURAL AND MECHANICAL COLLEGE, founded in 1880, at Agricultural College, Miss. The regu¬ lar four years' courses offered are the agri¬

cultural, mechanical and textile, leading to the degree of B.S. ; a short course (10 weeks for two years) is given in the winter; graduate courses are also provided; and there is a pre¬ paratory department. Women are admitted to all courses. The experiment station is con¬ nected with the college, and receives special Federal appropriation; and farmers' institutes are organized by the college and attended by • members of the faculty; in 1910 such institutes had an attendance of 2,000. The college was endowed by the Federal land grants of 1862 and 1890, and receives also State and Federal appropriations ; no tuition is charged to resi¬ dents of the State. Military instruction is given. In 1918 the students numbered 1,207; the instructors, 72; and the library contained about 36,200 volumes.

MISSISSIPPI BUBBLE, a celebrated financial scheme projected by John Law (q.v.) at Paris in 1717. Law issued shares for a vast company to be called the Compagnie d'Occident, and to be engaged in the colonization and cultivation of the banks of the Mississippi. Re¬ ports skilfully spread as to gold and silver mines discovered in these parts raised in the people the hope of great gains. The company soon absorbed those of the Senegal and the East Indies, and took the new title Compagnie des Indes. Such were the hopes raised by this undertaking that the shares originally issued at $100 were sold at 10, 20, 30 and 40 times their value. Law had promised to the regent that he would extinguish the public debt. To keep his word he required

that the shares in this com¬ pany should be paid for one-fourth in coin and three-fourths in billets d'etat or public securi¬ ties, which rapidly rose in value on account of the foolish demand which was created for them. In October 1719 the shares mounted as high as $4,000. The state took advantage of the popu¬ lar frenzy to issue increased quantities of paper money, which was readily accepted by the pub¬ lic creditors and invested in shares of the Compagnie des Indes. This went on till the value of the paper money in circulation was more than three milliards, while the value of coined money was no more than 700,000,000. Before this stage was reached Law himself who had originated the idea of paper money had endeavored to check the issue but his efforts were unavailing. A catastrophe was now in¬ evitable. About the end of 1719 the more prudent speculators began to sell out. In pay¬ ment of their shares they received, of course, in great part, billets d'etat, and with these bought gold, silver, diamonds, lands or anything else having a real value. As the billets became depreciated such articles as tallow, soap, etc., were often bought at fabulous prices. Law struggled desperately against the fall in the value of these shares, but all his devices to check their downward course were futile or had only a temporary success, and when the state finally declared that it would receive no further payments in paper, he perceived that all attempts to bolster up the scheme were in vain, and made his escape from France (December 1720). The affairs of the company were wound up by the state acknowledging itself debtor to the creditors of the company to the amount of $340,000,000. The public debt was augmented by $2,600,000 of ((annual rentes.55

MISSISSIPPI CATFISH (Ictalurus fur-catus, or Ictalurus pondcrosus) , the largest of American catfish (so called from the purring sound it makes when taken out of the water). It is chiefly found in the Mississippi River, but it also inhabits the Great Lakes, the larger waters of the Saskatchewan and the Missouri valleys. In color it is greenish slate with paler ■sides. The fish grows darker as it ages. The flesh is firm, flaky and of fine flavor. The fish sometimes reaches 150 pounds in weight. It spawns in April or May. It is caught with a hook

and prefers live bait. It is called ((mud cat® and ((flannel mouth® in the South.

MISSISSIPPI COLLEGE, Clinton, Mass., founded in 1826 under the auspices of the Presbyterian Church, came under control of the Baptists in 1850. It has an academy and col¬ legiate department. The college courses lead to the degrees of J3.A., B.S and M.A. In 1915 the school had 17 professors and instructors, and 430 students. The library had 5,000 volumes. The property was valued at $405,000, exclusive of the productive fund of $130,000. The annual income is $25,000.

MISSISSIPPI RIVER (Ind. Missi Sepe, <(father of waters,® (<great river®), the main stem of the greatest drainage system of North America, and one of the greatest in the world (1,257,000 square miles); draining the entire western slope of the Alleghany-Appalachian range, and all the eastern slope of the United States Rockies save a small southern portion, with all between — 19 States and two Territories in all, from New York to Montana, but narrow¬ ing considerably in the lower basin. The Mis-sissipi extends nearly the entire length of the United States, from within 100 miles of Canada to the Gulf of Mexico, in a watercourse of about 2,550 miles, varied slightly by the lower river bends and cut-offs ; and forms the boundary, total or partial, of 10 States — Minne¬ sota, Iowa, Missouri, Arkansas and Louisiana, on the west, and Wisconsin, Illinois, Kentucky, Tennessee and Mississippi, on the east. On its banks are four cities with; populations ex¬ ceeding 230,000 (Saint Louis, New Orleans, Saint Paul and Minneapolis), and 17 others of over 10,000 — Winona, Minn.; La Crosse, Wis. ; Dubuque, Clinton, Davenport, Muscatine, Bur¬ lington and Keokuk, Iowa; Rock Island, Quincy, Alton and Cairo, Ill.; Hannibal, Mo.; Memphis, Tenn. ; Vicksburg and Natchez, Miss.; and Baton Rouge, La. It is navigable over 2,000 miles from its mouth to Minneapolis (Falls of Saint Anthony), though the end of regular navigation is Saint Paul, 13 miles below; and is brokenly navigated by smaller steamers to Leech River, 415 miles farther on, along differ¬ ent reaches. It has about 100,000 tributaries, 240 large enough to figure on small-sized sta¬ tistical charts, 45 of them navigable for dis¬ tances varying from 2,300 to 50 miles, and aggregating some 15,700 miles of inland navi¬ gation; steamers can go upon it and its tribu¬ taries some 4,000 miles east and west without breaking bulk — from Great Falls, Mont., on the Missouri, to Olean, N. Y., on the Allegheny. The greatest of the affluents, the Missouri, is usually considered the main stream, being about 1,600 miles longer than the upper Mississippi above the mouth (4,200 miles from the Gulf, the longest river course on the globe), having

a basin more than three times as great, and discharging a considerably larger volume of water annually; nevertheless the upper Mis¬ sissippi has so much steadier a flow — the Missouri shrinking at low water to 1-48 the volume in flood, and practically unnavigable then — that the former as between the two maintains the permanent navigability of the joint stream, and is justly enough held the main body in popular estimation ; besides that the axial valley is continuous. Moreover, the Ohio with its great rainfall (41.5 inches, against 35.2 for the upper Mississippi and 20.9 for the Missouri) discharges far more than either, and if that were valid ground, should itself be held the main stream.

The chief tributaries of the lower Missis¬ sippi are as follows, in order of contribution to the volume of water in the lower river: Ohio, 1,300 miles long (to source of Allegheny) ; width 1,200 feet at Pittsburgh, 3,000 at mouth; basin, 207,111 square miles; annual discharge, about 5,000,000,000,000 cubic feet ; per second, 158,000. Missouri, 2,908 miles long; width, 1,500 feet at Fort Benton (head of large-steamer navigation), 3,000 at mouth; basin, 527,690 square miles; annual discharge, 3,780,000,000,- 000 cubic feet; per second, 120,000. Upper Mis¬ sissippi, 1,330 miles long; width, 1,200 feet at Saint Paul (head of large navigation), 5,000 at junction with the Missouri, basin 179,635 square miles; annual discharge, 3,300,000,000,000 cubic feet; per second, 105,000. Arkansas, 1,514 miles long; width, 1,500 feet at Fort Smith (head of large navigation), and about the same to its mouth ; basin, 184,742 square miles ; annual dis¬ charge, 2,000,000,000,000 cubic feet ; per second, 63,000. Red, 1,200 miles long; width, widely varying from log dams, *etc.* ; annual discharge, 1,800,000,000,000 cubic feet; per second, 57,000. The three next greatest basins are the White, Yazoo and Saint Francis. The total annual discharge, including three outlet bayous, is 21,300,000,000,000 cubic feet, or 675,000 per second.

The following are the distances from the farthest sources on the main stem to the chief landmarks on its course, and the mean-water elevations above sea-level at the end of the reaches :

Dist.,

Miles

Mississippi Springs, above Itasca,

and miles from outlet .

Outlet at Itasca to outlet at Winnibigoshish Lake .

To Falls of Saint Anthony (Minneapolis)

To Saint Paul, Minn .

To La Crosse, Wis …

To Prairie du Chien, Wis .

To Dubuque, Iowa .

To Rock Island, Ill .

To Burlington, Iowa .

To Keokuk, Iowa .

To Quincy Bridge, Ill .

To Hannibal, Mo .

To mouth of Illinois River .

To Saint Louis, Mo .

To mouth of Ohio River (Cairo, Ill) .

To Memphis, Tenn .

To Natchez, Miss .

To Baton Rouge, La .

To New Orleans, La .

To Fort Saint Philip, La .

To head of Passes .

To Gulf .

(Or 2,553 miles from ultimate sources).

114 546 559 715 787 849 957 1,039 1 ,086 1,127 1,147 1,249 1,288 1,470 1 , 695 2,177 2,310 2,435 2 , 509 2,529 2,546

Elev.,

Feet

1535

1292.8

782

680.5 621.2

597 . 5

578.2

533 . 7 505 . 1

472.3

453.8

444.9

399.4 384.8 275 201

40.5

18.5 8

3

1.8

MISSISSIPPI RIVER

I

The ˆsource® of a great river is often a term of little import, as its waters may gather from the drainage of a large district ; but taking it in its current sense, of the ultimate reservoir of its farthest extension, the Missis¬ sippi rises in the basin draining into Itasca Lake (q.v.) in northern Minnesota. Into the west arm flows from the heights, through a couple of small ponds, a stream of considerable power and fullness, called by its discoverer Nicollet the ((Infant Mississippi,)} and now confirmed as such so far as there is one ultimate stream ; and out of it, from the north arm, flows the Mississippi. Nicolett in 1836 found it 16 feet wide and 14 inches deep at the outlet. Government Commissioner J. V. Brower in 1893 found it 50 feet wide and three or four feet deep in mid-channel, with a muddy bottom and a current of about two miles an hour. As the current increases it narrows to some 30 feet ; is filled with debris, shoals and boulders ; and for some distance down the stream free passage with canoes is impeded by reeds, flag and water grass. It continues northward with slight falls and rapids to Lac Travers or Bemidji, about 10 miles long by 4 feet wide, set in a basin surrounded by forested hills and with a beach of perfectlv white sand. Thence it issues on the east, and for 25 miles southeastwardly brawls over a series of rapids, from whose foot it flows in a clear even stream 120 feet wide and four or five deep to Cass Lake, twice as large as Bemidji ; thence on the east six miles to Winnibigoshish, still larger, whence it issues again on the east 172 feet wide, and as before grows narrower, deeper and of swifter current as it drains the marshes and meadows below. Just above the junction with Leech River, the outlet of the noble Leech Lake, the largest in this region — 25 by 15 miles — it strikes a bed of sandstone with a fall of 20 feet in one-sixth of a mile, and is ruffled into rapids called the Falls of Pokegama, in a channel 80 feet wide. This is about 130 miles from the source ; small steamers run to the foot of the rapids. Thence it runs crookedly with a general south trend, about 120 feet wide, through hardwood forests, swamps and sand¬ hills, covered with glacial gravel and boulder drift. From the entrance of Swan River to that of the outlet of Sandy Lake there are six rapids; the latter lake has a small stream run¬ ning from a small pond to the eastward, not far

from Saint Louis River, emptying into Lake Superior at Duluth, and forms the old canoe route from Minnesota to the Great Lakes. Thence to the entrance of Pine River, about 150 miles from the Pokegama Falls, it has numerous rapids and is broad enough to en¬ close several islands ; it receives several smaller tributaries; and the powerful Crow Wing River, 47 miles below Pine River, also fed from a district of lakes, contributes almost as much volume to the joint stream as the Mississippi itself. At the Sauk Rapids, a mile long, 133 miles below the Crow Wing and at the en¬ trance of Sauk River, begin the first rocky banks of Potsdam sandstone, extending down to Rock Island.

At the Falls of Saint Anthony, 80 miles below, the river descends about 65 feet in three-fourths of a mile, forming rapids interrupted in the middle by a precipice 18 feet high, over

which the river, now 1,200 feet wide, formerly plunged in a cataract of great beauty and fame. An island divided it into two channels, the western being the larger. Here the water power has been used to build up the immense manufacturing interests of Minneapolis. Thir¬ teen miles below a convenient landing has established Saint Paul as the head of continu¬ ous navigation for large steamers an*d made it the great wholesale distributing point for the Northwest, and onward the valley is richly fertile, very beautiful and often of much gran¬ deur Below Saint Paul the river widens into the island-studded «Lake» Pepin. From Daven¬ port, Iowa, 943 miles from the source, to Rock Island, 14 miles below, there are rapids of 22 feet fall, formerly obstructing the navigation; the government has now cut a channel in the solid rock. The formation of the bed is pecu¬ liar; it consists of stratified limestone, crushed into folds which form a series of six or seven parallel bars across the channel, one to three miles apart. From this point onward the for¬ mation is carboniferous and the banks rise into picturesque rocky bluffs sometimes 300 feet high, as far down as nearly to the begin¬ ning of the alluvial region, 140 miles below Saint Louis. At the mouth of the Des Moines River, 130 miles below Rock Island, is another rapid-of 24 feet fall, now avoided by a ship canal; and between Muscatine and Keokuk is one 12 miles long, with 23 feet descent. Nearly 200 miles below Keokuk the first great change comes to the river. Into this clear placid stream is poured a swift, muddy, red torrent, at high water of far greater volume than its own, that of the enormous Missouri, creating tur¬ bulent eddies, and for many miles flowing side by side with the white northern stream without mixing of waters. The bends and winds of the river, making the current cross from side to side, finally mingling them within 100 or 150 miles. Not

quite 200 miles farther on comes in the mighty Ohio, with a volume over two-thirds as great as that of the other two united.

But 30 miles above here and three miles above the great geological landmark of Cape Girardeau, Mo., begins a still greater change , the vast northern upland, mainly elevated rock with a moderate soil covering it, which has been drained by the river, ceases. The remain¬ ing 1,100 miles of its valley is the creation of its own silt, through which it meanders in deep curves and loops and narrow horseshoes, shift¬ ing its channel capriciously, continually build¬ ing up one side and cutting away the other, but rarely twice the same side. Cape Gi¬ rardeau is an ancient headland of an ancient ocean, into which the silt-laden river poured its deposits as the present river does into the Gulf, and which has receded, leaving more than 1,000 miles of the garden of the world. < And the relation of the river to its bottoms is re¬ versed also. From the Falls of Saint Anthony to the end of the uplands are deep strips of bottom land overflowed at high water ; _ but except at such periods they are above the river. But in the lower bottoms made by the river itself, the surface of the latter is normally above that of the bordering lands. The friction of the current on the sides and bottom causes the water held back to keep depositing fresh layers of the heavier sediment on the edges and in the channel; so that as the depth of water

remains the same and the channel continually shallows, the surface of the water must rise and would at last empty itself did not the same process elevate its retaining walls. The river therefore runs in a groove, cut into a ridge considerably above the surrounding country, its surface much higher and its bed much lower than the region for many miles back; it slopes away with a gradient at first of about seven feet to the mile, decreasing regularly to the outer edges of the flood plain — which at the Ohio is about 10 miles wide and 50 to 70 in

lower Louisiana, widening to 150 at the Delta — and ending at about six inches per mile in the swamps and bayous at the outer edge. The natural method of discharging the waters at flood seasons is to overflow the banks and flood the adjacent country, part of the waters flow¬ ing off through semi-river channels (bayous) in the soft earth, the rest remaining in pools and swamps and gradually evaporating; and the attempt to keep it in the same channel which suffices for low water, to comport with the needs of civilized occupancy, has produced an excessively costly battle with nature, of which the success is by no means yet assured or assurable.

. The junction of the Red introduces us to still another phenomenon. That great river for¬ merly discharged its main waters to the - Gulf through the Atchafalaya ®Bayou,)) roughly par¬ allel with the Mississippi ; but that and the Mississippi both sent their surplus waters through an amazing network of lesser bayous, which still penetrate southern Louisiana with thousands of miles of navigable channels. The head of the Atchafalaya silted up and became choked with logs and rubbish, and the Red opened a channel into the Mississippi ; later in the 19th century the government dredged out the head of the bayou to make a navigable channel ; it rapidly widened to a great river, became again the main channel of the Red and threatened to ruin a great district of fertile plantations, so that works had to be undertaken to prevent its enlargement. As we approach the place where the Mississippi plain merges in the great coastal plain of the Atlantic, the surface grows lower and the soil spongier; and the river (which above the Mississippi is about a mile wide, thence to the Red half a mile to a mile, with occasional reaches of a mile and a half, and below the Red narrows to a width of about 3,000 feet, which it retains with curious persistence) widens to about a mile and a half and enters the Gulf — through the Delta, a quaking, impassable, finally half liquid salt marsh land in process of making — by three great arms or “passes,® of which two ramify still further. These are known as the Southwest Pass, the South Pass (with two arms near the Gulf) and an eastern arm soon dividing into North Pass and Pass a l’Outre.

It should be said, however, that these allu¬ vial bottoms do not quite monopolize the space from the Ohio to the Gulf. Here and there on the east bank there are spots where high solid ground, old capes and peninsulas of the antique ocean, come down to the river side ; as at Columbus, Ky., Randolph and Memphis’ Tenn Vicksburg, Grand Gulf and Natchez, Miss., and Raton Rouge, La. With one exception, each of these spots has been utilized as a considerable

road for the commerce of the interior to the great waterway.

Improvements of the River. — These are broadly divisible into two classes : those de¬ signed to improve navigation and those de¬ signed to prevent overflows. From 4 March 1789 to 30 June 1886, a period of 97 years, in the improvement of the Mississippi and its 44 navigable tributaries, the Federal government expended a total sum in round numbers of about $57,000,000. The control of the waters of the Mississippi so as to make the navigation of the river safe and so as to make the imme¬ diately surrounding country fit for agriculture has been an economic problem of more than merely local interest. The problem is national historically, for to the control of the Mississippi as much as to any other one thing the histori¬ cal growth of the country is due. It is even more strikingly true that the problem is of national significance from the commercial point of view, simply because this vast river drains the richest territory in the world, 70 per cent of the area of the United States. Among the older methods of control was that of narrow¬ ing the channel to deepen the available water. This operation involved closing off side chan¬ nels around islands, etc.— stopping up the heads, diking off small bays and inlets, strengthening caving banks and obstructing the side current by solid spur dikes, set obliquely out into the stream nearly to the channel line. After the entrance of the Missouri, the mass of sediment furnishes a new and effective weapon. Between here and Cairo hurdles of piles and brush are laid along the banks, jetty fashion ; the sediment packs into the brush and speedily becomes solid, and the results in cre¬ ating new banks to narrow the channel have been most gratifying, besides reclaiming large tracts of overflowed bottom lands. Caving banks are protected by mattresses ; the depth of water being slight, they are made lighter than in the lower river. Below Cairo the work is of the same nature, but more difficulufrom the volume of water and the alluvial lands easily crumbling. Here the channel is nar¬ rowed, where it exceeds about 3,500 feet, by mattresses from 800 to 2,000 feet long and' 200 to 300 feet wide, weighted down with rubble stone. But the immense weight of water, which may be from 60 to 100 feet deep at flood, has forced their continual increase in weight and strength of construction. The brush and small saplings have been replaced by fascines (solid rods tightly withed together), the binding poles by strong wire; the cost per foot of bank pro¬ tect1™1 treblinff.in 25 years, from about $10 to $30. For closing off side channels and water¬ courses, rows of piles are driven in, 8 or 10 feet apart and the rows 20, and the upper row interwoven with brush. Caving banks are graded down to a slope and faced with mat¬ tresses , of late, however, rubble stone has been used with better success. On

the lower river, where stone has to be brought from long dis¬ tances, concrete has been experimented with.

Another system is that of levees. For¬ merly, under the slave system, each planter along the rivers liable to overflow had rude dikes erected for himself ; the importance of the work to neighborhoods led to common town action, then to county and State action.

I hese levee systems, of course, were broken

through in floods, but the water rose only to its natural height in the channel and soon subsided ; and to furnish absolute security against overflow would cost not only an enor¬ mous sum but would exceed a hundredfold the capital value of the districts imperiled. When in 1879 Congress appointed the Missis¬ sippi River Commission, it forbade them to consider the protection of lands from overflow as part of their work. Nevertheless a majority of the commission believed that the levee sys¬ tem could be used efficiently to improve naviga¬ tion, and estimated that $11,443,000 below Cairo would furnish a complete protection for the banks and double the depth of permanent river channel, by the natural scour of the water as with jetties. The level of the river has risen with the levees over six feet and is esti¬ mated to ultimately reach 11 when the levee system has made a smooth solid bank all the way, with no place for overspill. These levees are from 8 to 14 feet high, with a width on top of eight feet and a side slope of one-third; they project three feet above high water, but need to be raised every few years as the river rises. They have to be placed near the banks to protect riverside plantations and avoid the slope away from the river; and very large amounts of them have to be replaced yearly from cave-ins.

The Act of 28 June 1879, by which the com¬ mission was created, defines its duty in part as follows :

To direct and complete such surveys of said river, between the Head of the Passes near its mouth to its headwaters as may now be in

progress, and to make such additional surveys, examinations, and investigations, topographical, hydrographical, and hydrometrical, of said river and its tributaries as may be deemed necessary by said commission to carry out the objects of this act. • • • To take into con¬ sideration and mature such plan or plans and estimates as will correct, permanently locate, and deepen the channel and protect the banks of the Mississippi River; improve and give safety and ease to the navigation thereof; prevent destructive floods; promote and facilitate commerce, trade, and the postal service; …

Under the authority of this and subsequent acts making appropriations and relating to the subject, surveys and observations have been carried on and works of improvement under the authority and direction of laws making appropriation for that purpose have been un¬ dertaken and executed. The original project contained in the report of the Mississippi River Commission dated 17 Feb. 1880 contemplated the permanent fixing and improvement of the channel to a depth of at least 10 feet at ex¬ treme low water by the construction of the low-water width to about 3,000 feet, the protection of the banks against caving and the control of the flood water by means of levees. This report was the one upon which Congress made its first appropriation for the improvement of the Mississippi River under commission plans, thereby officially adopting such plans for the inauguration of this work.

When the Mississippi River Commission be¬ gan the work of improvement there were few, if any, precedents of practical value to serve as guides in a project of such magnitude. But very meagre data as to the regimen of the river were available, and a thorough knowledge of its many varying phases was essential before satisfactory comprehensive plans of improve¬ ment could be developed. Exhaustive surveys and observations of the physics of the river

from the headwaters to the mouth were there¬ fore inaugurated and carried on until the data needed were secured and experiments with vari¬ ous kinds of plant and material were also made in order to develop the equipment and type of construction needed for efficient work. This work occupied several years. During these years the appropriations were compara¬ tively small, and sometimes failed altogether, with disastrous results to the channel works, so progress was necessarily slow. As a result of the knowledge of the regimen of the river acquired and the lesson taught by the experi¬ mental work, definite projects are now entered upon with confidence of success, but

efforts looking to improved methods to secure greater efficiency and economy will be continued.

The earlier works were designed primarily for the rectification and improvement of the channel, and were confined to the Plum Point Reach, 147 to 186 miles, and Lake Providence Reach, 517 to 552 miles below Cairo. These reaches were selected because here the shifting sand bars and deficient depths were most pro¬ nounced and the low-water navigation most diffi¬ cult. Highly beneficial results were obtained in the improvement of the channel depths in those reaches, and the work done in them confirmed the soundness of the theory upon which it was based, but also demonstrated that more sub¬ stantial types of construction were needed and that the permanent improvement of the channel by contraction and revetment works would con¬ sume a long period of time, while the press¬ ing needs of commerce called for immediate relief. The development in hydraulic dredging machinery had reached such a stage at this time as to hold out the hope that an immediate and economical solution of the problem of temporarily deepening the channel for naviga¬ tion purposes might be found in the opening and maintenance of channels across the ob¬ structing bars at each low-water season by means of dredging. After extended studies and experiments, hydraulic dredges of large capacity adapted to the peculiar service re¬ quired were developed by the commission and this method of temporary improvement of the low-water channel was adopted with a view of maintaining a navigable channel _ not less than 250 feet in width and 9 feet in depth, and has been applied with success.

Since the adoption of dredging, the perma¬ nent work of channel improvement has been confined to the revetment of banks, and a type of revetment has been developed which suc¬ cessfully withstands the scouring action of the river. Concrete has been largelv substituted for the upper bank revetment, and its use for sinking the present type of willow mat, as well as a possible substitute for the mat itself, is being tried out with a view to further economy and increased efficiency.

The extent of bank revetment is, however, relatively so great when compared to the funds available for its construction that it has been necessary to confine the work to cases of urgent necessity, such as caving banks which ‘threaten cut-offs or the safety of large levees which could only be replaced at excessive cost, and the harbor fronts of cities. Substantial revet¬ ment for the purpose of fixing the banks of the river is essential to any successful scheme of improvement, and as the project adopted by

Congress requires that the commission shall “correct, permanently locate and deepen the channel and protect the banks of the Mississippi River,® large increase in expenditures for revet¬ ment construction are urgently needed.

An important item in the operation of the commission is the construction and general re¬ pair of levees, which was first authorized with¬ out qualifying restrictions by the Act of 19 Sept. 1890 ; and since that date about one-half of the appropriations made by Congress have been devoted to that purpose.

Briefly stated in general terms and quoting in part the several acts of Congress under which the project is being carried out, the work now in progress covers the Mississippi River from Rock Island, Ill., to <the Head of the Passes, 1,568 miles, ((the Ohio River from its mouth to the mouth of the Cache River,® and “the Arkansas River between its mouth and the intersection thereof with the division line be¬ tween Lincoln and Jefferson counties,® and it includes :

1. Flood protection by construction, extension, and repair of levees from Rock Island, Ill., to Head of the Passes, 1,568 miles; along the Ohio River below the mouth of the Cache River and the Arkansas River up to the Lincoln-Jefferson County line, in cooperation with the several States and levee boards, to “prevent destructive floods.”

2. Continuation of improvement below the mouth of the Ohio River so as to “give safety and ease to navigation” of the Mississippi River at flood states by facilitating the inter¬ change of traffic, “commerce, trade, and the Postal Service with a view to securing a permanent channel depth of 9 feet” by means of:

(a) Revetment of caving banks to “correct, permanently locate, and deepen the channel, and protect the banks of the Mississippi River;” and for the preservation of harbors and the security of levees.

(b) Dredging for the purpose of maintaining at all stages a “navigable

channel 250 feet in width and 9 feet in depth," including construction, operation and maintenance of suitable dredge boats and auxiliary devices and appliances therefor.

3. The maintenance of a navigable channel between the waters of the Mississippi, Red and Atchafalaya rivers.

4. Physical investigations, maintenance of gauges and discharge measurements of the Mississippi River and its tributaries; preparation and publication of maps and physical data; surveys and investigations covering all phases of river regimen governing the work of channel improvement and flood control "from the headwaters of the Mississippi River to the Head of the Passes."

5. Other miscellaneous details incident to the execution of the general project.

Since the creation of the Mississippi River Commission in 1879 there has been appro¬ priated and allotted for expenditure under it on the Mississippi River and its tributaries to

1917, $96,375,610.68.

Consult Anderson, A. D., (The Mississippi and its Forty-four Navigable Tributaries) (Washington 1890) ; Chambers, J., (The Mis¬ sissippi River and its Wonderful Valley; Twenty-seven Hundred and Seventy-five Miles from Source to Sea) (New York 1910) ; Ocken, (The Mississippi; Some of its Physical Characteristics) (1900); Clemens, (Life on the Mis¬ sissippi (1883) ; (Mississippi River Commission) in Annual Report, Chief of Engineers, United States Army, War Department (Wash¬ ington, D. C., 1879-1918).

Forrest Morgan.

MISSISSIPPI SCHEME. See Missis¬ sippi Bubble.

MISSISSIPPI SOUND, an arm of the

Gulf of Mexico, extending along the coasts of Mississippi and Alabama from Bay Saint Louis on the east to Mobile Bay on the west and connecting with the latter by Grant's Pass. It is about 100 miles long, from 7 to 15 miles wide,

from 6 to 10 feet deep and is formed by a chain of low, narrow, sandy islands, chief of which are Daphine, Petit Bois, Horn, Ship and Cat. It is traversed by steamers and coasting vessels trading between New Orleans and Mobile.

MISSISSIPPIAN. See Carboniferous.

MISSOLONGHI, mis-so-long'ge, or ME-SOLONGI, ma-so-16ng'ge, Greece, a north¬ western town, capital of the nomarchy of Acar-nania and 2Etolia, on the marshy site on the north side of the Gulf of Patras, 24 miles west of Lepanto and the seat of an archbishop. Missolonghi is the most important strategical point of western Greece and is famous for the sieges it has undergone. In 1804 it came under the rule of Ali Pasha. In the Greek revolt against the Turkish conquerors in 1821 it was brilliantly defended by 400 men against a Turk¬ ish army of 14,000 for two months; when reinforced, they again for over a year resisted the Turks, who raised the siege 6 Jan. 1823. The town was hastily fortified, and from Sep¬ tember to December 1823 was again besieged by the Turks, who were defeated by a small Greek force under Marcos Bozzaris (q.v.), but with the loss of their patriotic general. In 1825-26 it stood a long siege by the Turks. A body of its defenders cut their way through the Turkish force and escaped; the remainder determined to sell their lives as dearly as pos¬ sible, and when the Turks forced their way in, the powder magazine was exploded, thus over¬ whelming besiegers and besieged in one com¬ mon catastrophe. Lord Byron, who went to Missolonghi 5 Jan. 1824 to aid the Greeks, died there 19 April 1824; his heart was interred in the church of Saint Spyridion, and a monu¬ ment was erected by the Greeks in his honor. Here also is the tomb of Bozzaris. Pop. about

10,702.

MISSON, Francis Maximilian, French

traveler and author: b. Lyon, about 1650; d. London, England, 12 Jan. 1722. He was a Councillor in the Parliament of Paris, but at the revocation of the Edict of Nantes, as a Protestant, fled to England. There, in 1685, he became tutor to Charles Butler, afterward Earl of Arran, whom he accompanied on his travels. In 1691 he published (Voyage d'ltaliep in which his comments on the customs of the Roman Catholic Church led to a celebrated controversy with Father Freschot. In 1698 he published a volume of (Memoires et observations, } which constitutes a humorous descriptive dictionary of London life in Queen

Anne's reign. His other chief work is 'Theatre sacre des Ce-vennes) (1707).

MISSOULA, mi-zoo-la, Mont., city, county-seat of Missoula County, situated on both sides of the Missoula River, a tributary of the Columbia River, in a beautiful and fer¬ tile valley, called by the early settlers Hell Gate Ronde, on the main line of the Northern Pacific and the Chicago, Milwaukee and Saint Paul railroads. The city has an elevation of 3,201 feet above sea-level and is situated in 46° 52' N. lat., and 113° 50' W. long., 120 miles by rail northwest of Helena. The city is noted for jits mild and salubrious climate, the winters being mild and the summers and fall offering a really delightful climatic condition. The city has many attractions for summer tourists on account of the beauty of its environ-

ment and the fine outing advantages of the surrounding country. Hunting and fishing are exceptionally good in this vicinity. The first log cabin was built at Hell Gate, a short dis¬ tance from Missoula, in 1864. Worden and Company were the pioneer merchants of this district. In 1865 they built a grist and saw mill and opened a general store. The city was at that time known as Missoula Mills. It was in¬ corporated in 1883 and the name changed to Missoula. Radiating from this city are numer¬ ous valleys which have developed into wonder¬ fully productive agricultural sections. Mis¬ soula is the natural distributing centre for this rich and growing territory. The chief re¬ sources of this district are diversified farming, lumbering, dairying, horticulture and mining. There has been much development in this dis¬ trict during the past few years. Five branch lines running out of Missoula increase the dis¬ tributing possibilities of this section. This section contributed a large amount of the prize winning grain and apples at the Panama-Pacific Exposition and is noted for the quality and quantity of its products per acre. The city itself is modern in every respect. The street¬ car system, sanitary and storm sewers, pave¬ ments, up-to-date lighting system and hand¬ some public buildings make this one of the leading and most substantial cities of its size in

the Northwest. From an educational stand¬ point it is exceptionally well equipped. Mis¬ soula is the seat of the University o £ Montana and in addition has one of the most efficient public school systems in the State. The county high school is in every way first class. There is also a Catholic academy and high school which ranks high among the accredited high schools of the State. Practically every re¬ ligious denomination of consequence is repre¬ sented in the city and the majority own hand¬ some church buildings. The Missoula Business and Normal College gives an opportunity for business training and has a high standard. Among Missoula's public buildings are the Federal building, Land Office and Federal court, courthouse, Elk's temple, Masonic temple, Knights of Pythias, Montana block, opera house, library, Chamber of Commerce building and many other structures creditable to a city of much larger size. Fort Missoula is located four miles to the south of the city and Bonner — noted for its large lumber mills — six miles to the east.

From the standpoint of the historian Mis¬ soula is of exceptional interest. The city is located in a district noted for its intimate con¬ nection with the important facts in the early history of the State. The first gold in Mon¬ tana was discovered within a few miles of this city and there is considerable mining activity throughout this district. The Flathead Indian Reservation, about 15 miles north of the city, contains approximately 1,750,000 acres of fine agricultural, grazing and timber lands. This body of land has been surveyed by the United States government, and thrown open to set¬ tlement. Practically all of the available land has been taken up. Over 2,000,000 bushels of grain were raised there last year. Missoula is situated in the heart of the country formerly occupied by the Flathead tribe of Indians which was ceded to the United States by a treaty made in 1855, known as the Stevens

Treaty. Missoula is a Flathead Indian name or word, meaning or signifying t(At the stream or water of surprise or ambush.® In the olden days prior to the advent of white men amongst the Indians of this section, the Blackfeet, who were very numerous, and occupied the country on the waters of the upper Missouri, and the Flatheads, who occupied the country in the vicinity of Missoula, were hereditary enemies and engaged in a continuous warfare one against the other. The place where the city of Missoula is now located, being at the western foot of the mountains, and near the mouth of a long and deep canon, with a beautiful stream of water near by, was a favorite camping place for the Flatheads with their lodges and families. The

Blackfeet, having a knowledge of this fact, would often take advantage of it, and when on the warpath would secrete themselves in the willows and rocks, and from this ambush at¬ tack their unsuspecting enemies, hence the name, ((at the stream or water of surprise or ambush.® Missoula is known throughout the State as the ((Garden City,® because of its magnificent gardens and the abundance of flowers grown here. The city is supplied with an abundance of electricity generated at its power plant on the Big Blackfoot River and transmitted by cable a distance of seven miles. Among its industrial establishments are a beet-sugar factory, creamery, flour mill, sash and door factory, potato-chip works, vinegar and cider factories, brick and tile plants, book-binderies and a lithographing establishment. It also has an abundance of water of the best quality, supplied by a water company from a never-failing stream coming direct from the snow-clad mountains to the northeast of the city. Pop. (1920) 12,668.

D. D. Richards,

Secretary Missoula Chamber of Commerce.

MISSOURI, mi-zoo'ri, State of the North American Union, geographically the central commonwealth of continental United States. Sometimes called a Southern State and again a Western State, it is neither southern nor western, in history, population nor location. Though it extends farther south than Virginia, it extends farther north than Kansas. It is practically well-nigh equally divided between the two great parties. Its negro population is small, only 5 per cent of the total. Though an original slave State, Missouri abolished slavery by its own act. It may be properly classed not as northern or southern, eastern or western, but as a central State. The State is bounded on the north by Iowa, on the south by Arkansas, on the east by Illinois, Kentucky and Tennessee and on the west by Nebraska, Kansas and Okla¬ homa. Its capital is Jefferson City. In area it is 69,415 square miles (693 of water). _ It is larger than any State east of or bordering on the Mississippi except Minnesota. The census of 1910 gives the population of the State as 3,293,335. By 1920 it had increased to 3,404,055.

Physiography. — Missouri has three distinct physiographic regions : the Upland Plain of the northern and western part of the State, the Ozark Plateau of the southern half of the State and the lowland area in the southeastern corner of the State. The upland area and the Ozark regions are separated from Saint Louis to Boonville by the Missouri River. At Boonville the line turns to the southwest and passes

out of the State to the north of Joplin. There is a well-marked escarpment between the Ozark Plateau and the southeast lowlands. The lowlands have an altitude of little more than 300 feet above sea-level. The upland area is marked by broad rolling hills and wide valleys. Much good farming land is in this region. The Ozark region of the southern part of the State is distinctly different in its topography from the upland region of northern Missouri, though at their junction they grade into each other. The Ozark region has a mature topography, nearly every bit of the region being in a slope. The crests of the ridges are very narrow and only the largest streams have developed river flats to any extent. The ridges have about the same altitude. The region is densely forested.

River Systems. — Missouri has possibly more miles of navigable rivers than any State in the Union. Along the eastern shore of the State flows the Mississippi, which affords transporta¬ tion 10 months of the year. The Missouri River forms the northern half of the western border, and turning east cuts the State into halves and unites with the Mississippi at a point 12 miles north of Saint Louis. From the Ozarks flow the Osage, the Gasconade, the White and other smaller streams north and east into the Mis¬ souri. The Meramac flows through a hilly, wooded country northeast and empties into the Mississippi near Saint Louis. North of the Missouri are smaller tributaries, principal among which are the Grand, the Chariton and the Platte rivers. All small rivers in the north¬ ern half of the State east of Macon flow into the Mississippi. The largest of these is the Salt River.

Climate. — Missouri is in the central portion of the United States far from either ocean and unprotected by mountain ranges. The climate is, therefore, one of extremes both in warm and cold weather, moisture and drought. The high¬ est range of mountains in the State, the Ozarks, is not sufficiently lofty to affect the climate of the State at large and influences the climates of the neighboring counties only to a slight de¬ gree. The mean summer temperature, as shown by ‘the observation of the United States Weather Bureau, for the portion of

the State north of the Missouri River for a period of 27 years is 74° and for the southern portion 78.5°. The maximum temperature, however, is often more than 100°. The winter temperature dur¬ ing this period averaged 33.9° for the State, varying from 28.5° in the northern half to 39.5° in the southern half. The winter climate is variable. Often the temperature falls below zero. During other winters the temperature scarcely reaches zero. In the winter months of 1915 a temperature of 30° and slightly more below zero was registered in several sections of the northern half of the State. The Mis¬ sissippi River is frequently frozen over at Saint Louis and other river points. Ice gorges form about the piers of the bridges, blocking all river traffic. In some winters the Missouri River is frozen over during the entire season. The Mississippi often remains open until the middle of the month of February and at other times closes early in December. The mean annual temperature of the State varies from 53° to 57°. In spite of abundant rains the climate is, gener¬ ally speaking, a dry one. The evaporation is so rapid that the atmosphere is seldom overloaded

with moisture. A clear sky, a fertile, produc¬ tive soil and fair weather are among the chief natural advantages of the State. Thunder¬ storms are of frequent occurrence, especially in the month of June.

Farming and Stock Raising. — The staple products of Missouri are wheat, oats, Indian corn and rye, but in the southern portions of the State cotton, hemp and flax are raised to some extent. Thirty bushels of wheat to the acre is an average yield but is often far ex¬ ceeded. The flour from Missouri wheat is in great demand in foreign as well as home mar¬ kets, and is regarded as of a high quality. All kinds of grass which favor stock raising grow luxuriantly, such as blue grass, timothy, red top and red and white clover. The raising of pork is a large industry, due to the cheapness of feed. All kinds of fruits are successfully cultivated, not only the more hardy fruits, such as the apple, pear, plum and cherry, but those which require a softer climate, such as apricots and many varieties of grapes. Apples and peaches grow well in all parts of the State. In the southern portion of the State, particu¬ larly in the southwest, are grown many vari¬ eties of grapes. In the southern counties of Missouri sheep raising has been carried on at a profit, the mild climate, the quality of grass and the abundance of good water being especially favorable here to this particular branch of stock raising. There are in Mis¬ souri 24,581,186 acres of improved land. The land surface of the State is approximately 43,- 985,280 acres. Much of the unimproved land is in forests. The value of farms, including land and improvements, not buildings, as esti¬ mated by the

Census Bureau is $1,441,529,000; the value of the buildings, $268,976,000; of the implements and machinery, $50,769,000, and of livestock, $160,540,000. There are on farms throughout the State 1,040,000 horses, 2,000,000 mules, asses and burros, 2,692,000 milk cows and other cattle, 1,466,000 sheep and 4,708,000 swine. Missouri ranks high among the corn-producing States of the Union. No State in the Union raises as many mules. The annual production of the State in cereals, as shown in the 1915 yearbook of the State Board of Agri¬ culture, for the year of 1914 was: Corn, 175,- 158,072 bushels; wheat, 36,933,501 bushels; oats, 18,534,533 bushels-; rye, 116,560 bushels; flax, 61,467 bushels; buckwheat, 14,406 bushels; barley, 9,270 bushels. The hay yield for the year was 1,877,402 tons of tame hay and 121,404 tons of prairie hay. Other products were : Broom corn, 591,175 pounds; cotton, 26,847,360 pounds; potatoes, 2,500,000 bushels; tobacco, 2,726,760 pounds; sorghum syrup and seed, syrup yield, 902,410 gallons; seed yield, 203,360 bushels; clover seed, 14,141 bushels; timothy seed, 10,522 bushels. Reports for an average year in fruit production are: Apples, 8,698,170 bushels; peaches, 61,006 bushels; grapes, 13,- 783,656 pounds,, and cherries, 62,708 bushels. The surplus dairy production of 1914 was val¬ ued at $18,000,000. The annual butter output is estimated at $12,000,000. The State is well adapted to the dairy industry. Strawberries are grown to the amount of about 15,000,000 quarts annually. Poultry raising is an import¬ ant industry. The annual production of eggs is estimated at 100,000,000 dozens.

The 1917 corn crop amounted to 252,000,000

MISSOURI.

Estimated population, 3,410,692

COUNTIES

Pop.

22,700 Adair . A 7

15,282 Andrew . B3

13.604 Atchison . A 2

21,687 Audrain . C9

23.869 Barry . H 5

16,747 Barton . F 4

25.869 Bates ….E4

14,881 Benton . E 6

14.576 Bollinger . G 13

30,533 Boone . D8

93,020 Buchanan . B 3

20,624 Butler . H 12

14.605 Caldwell . B 4

24,400 Callaway . D 9

11.582 Camden . E7

27.621 Cape Girardeau ..G 13 23,098 Carroll . C 5

5,504 Carter . H 11

22,973 Cass . D 4

16,080 Cedar . F 5

23,503 Chariton . B 6

15,832 Christian . H 6

12,811 Clark . A 9

20,302 Clay . C 4

15.297 Clinton . B 4

21,957 Cole . . D 8

20,311 Cooper . D 7

13.576 Crawford . E 10

15 613 Dade . G 5

13,181 Dallas . F 6

17.605 Daviess . B 4

12,531 Dekalb . B 4

13,245 Dent . F10

16,664 Douglas . H 7

30,328 Dunklin . E 14

29.830 Franklin . E 10

12,847 Gasconade . E 9

16,820 Gentry . A 4

63.831 Greene . G6

16,744 Grundy . A 5

20,466 Harrison . A 4

27,242 Henry . E 5

8,741 Hickory . F 6

14.539 Holt . A 2

15,653 Howard . C7

21,065 Howell . H 9

8,563 Iron . F 11

283,522 Jackson . D4

89,673 Jasper . G4

27,878 Jefferson . E 11

26.297 Johnson . D 5

12,403 Knox . A 8

17,363 Laclede . F 7

30,154 Lafayette . C5

26.583 Lawrence . G 5

15,514 Lewis . B 9

17,033 Lincoln . C 10

25,253 Linn . B 6

Pop.

19,453 Livingston . B 5

13,539 McDonald . H 4

30,868 Macon . B 7

11,273 Madison . G 13

10,088 Maries . . E 9

30,572 Marion . B 9

12,335 Mercer . A 5

16,717 Miller . E 8

14,557 Mississippi . H 14

14,375 Moniteau . D 7

18,304 Monroe . C 8

15,604 Montgomery . D9

12.863 Morgan . E 7

19,488 New Madrid … .H 13

27,136 Newton . H 4

28,833 Nodaway . A3

14,681 Oregon . H 10

14,283 Osage . E 9

11,926 Ozark . H 8

19.559 Pemiscot . E 14

14,898 Perry . F 13

33.913 Pettis . D 6

15,796 Phelps . F 9

22,556 Pike . C 10

14,429 Platte . C 3

21,561 Polk . F 6

11,438 Pulaski . F 8

14,308 Putnam . A 6

12.913 Ralls . C 9

26,182 Randolph . C7

21,451 Ray . C 4

9,592 Reynolds . Gil

13,099 Ripley . H 11

24,695 St. Charles . D 11

16,412 St. Clair . E 5

10,607 *Ste.* Genevieve… F 12

35,738 St. Francois . F 12

82,417 St. Louis . D 12

087,029 St. Louis City. D 12

29,448 Saline . C6

9,062 Schuyler . A 7

11,869 Scotland . A 8

22,372 Scott . G 13

11,443 Shannon . G 10

14.864 Shelby . B 8

27,807 Stoddard . H 13

11.559 Stone . H 5

18,598 Sullivan . A 6

9,134 Taney . H 6

21,458 Texas . G 9

28,827 Vernon . F4

9,123 Warren . D 10

13,378 Washington . F 11

15,181 Wayne . G 12

17,377 Webster . G 7

8,007 Worth . A 4

18,315 Wright . G 7

Pop.

2,894 Butler . E 4

789 Cabool . G 8

887 Cainesville . A 5

220 Cairo . C 8

128 Caledonia . F 11

684 Calhoun . E 5

2,154 California . D 7

526 Callao . B 7

477 Camden . C4

169 Camden Point … .C 3

2,980 Cameron . B 4

1,781 Campbell . D 14

296 Canalou . H 13

2,218 Canton . A 9

10,775 Cape Girardeau . .G 14 874 Cardwell . E 14

1.115 Carl Junction . G3

3,452 Carrollton . C 5

4, 539 Carterville . G 3

9,524 Carthage . G4

3,655 Caruthersville …E 15

7 81 Cassville . H 4

208 Cedar City . D 8

112 Cedar Gap . G 7

540 Center . C 9

285 Centertown . D 8

2.116 Centralia . C 8

2,082 Chaffee . G 14

649 Chamois . D 9

3,144 Charleston . H 14

6,265 Chillicothe . B 5

384 Chula . B 5

1,322 Clarence . B 8

300 Clark . C 8

399 Clarksburg . D 7

416 Clarksdale . B 3

918 Clarksville . C 11

682 Clarkton . D 14

140 Clary ville . F 13

263 Clearmont . A 2

170 Cleveland . D 3

248 Clever . H 5

4,992 Clinton . E 4

368 Clyde . A3

349 Coffey . A 4

910 Cole Camp . E 6

230 College Mound …. B 7

259 Collins . F 5

12,530 Columbia . D 8

544 Commerce . G 14

132 Conception . A 3

931 Concordia . D 5

652 Connelsville . A 7

196 Conran . H 13

394 Conway . G7

110 Cora . A 6

649 Corder . . C 5

253 Corning . A 2

170 Cosby . ‘ . B 3

170 Cottonwood Point

Pemiscot . E 14

363 Cowgill . B 5

621 Craig . A 2

1,002 Crane . H 5

400 Creighton . E 4

288 Crowder . * . .G 13

Towns,

619

238

Cuba .

…E 10

175

Incorporated Cities,

and Villages

Curryville … .

…c 10

507

929

Adrian .

… .E 3

346

Bertrand .

. ,H 14

94

Cyrene .

…0 10

201

621

Advance .

…G 13

1,931

Bethany .

… . A 4

401

Dadeville … .

208

429

Agency .

… .B 3

235

Bethel .

… .B 8

261

Dalton .

,…C6

299

1,922

Albany .

. … A 4

1,900

Bevier .

… .B 7

113

Danville .

…. 1) 9

1,057

225

Aldrich .

…. F 5

156

Bigelow .

… .A 2

352

Darlington …

191

243

Allendale ….

… .A 4

760

Billings .

… . G 5

186

Dean Lake…

….C6

257

Allenville ….

…G14

497

Birchtree .

…G10

499

Dearborn … .

… .C 3

443

319

Alma .

… .C 5

136

Birmingham . .

… .C 3

1,398

Deepwater …

… .E 5

1,592

270

Altamont ….

… . B 4

848

Bismarck .

…Fll

129

Deerfield … .

… .F 3

1,243

279

Altenburg… .

…F 13

389

Blackburn ….

… .C 6

391

Dekalb .

… .B 3

67

Altona .

… .E 4

371

Blackwater …

…D6

175

Deray .

…G 13

1,215

456

Amazonia ….

… .B 3

288

Blairstown …

… . E 4

287

Des Arc .

…Gil

2,628

173

Amity .

… . B 4

359

Bland .

E 9

4,721

De Soto .

…Ell

261

307

Amoret .

… .E 3

422

Blodgett .

H 14

423

Dewitt .

…. C 6

279

162

Amsterdam . .

… .E 3

1,147

Bloomfield … .

. . H 13

2,322

Dexter .

…H 13

2,007

721 Anderson . H 4

160L Annapolis . Gil

364 A nniston . H 14

1,018 Appleton City … . E 5

98 Appleton . F 13

131 Arbela . A 8

289 Arcadia . Fll

246 Archie . E 3

176 Argyle . E 8

87 Arkoe . A3

579 Armstrong . C 7

336 Arrow Rock . C 6

295 Ashburn . C 10

1,075 Ash Grove . G 5

341 Ashland . D 8

523 Atlanta . B 8

267 Augusta . D 11

166 Aull ville . D 5

4,148 Aurora . H 5

135 Aurora Springs… .E 7

411 Auxvasse . D 9

713 Ava . H 7

379 Baring . A 8

338 Barnard . A3

118 Barnett . E 7

74 Bates City . D 4

316 Bell City . H 12

922 Belton . D3

320 Benton . G13

233 Benton City . C 9

742 Bernie . H 13

67

561

345

316

376

1,975

4,500

4,252

767

382

82

1,585

458

1,027

1,025

181

129

104

263

5,749

629

348

1,606

790

410

820

788

556

942

73

Blue Ridge, Harri¬ son . A 4

Blue Springs . D 4

Blythedale . A 4

Bogard . C 5

Bolckow . A3

Bolivar . F 6

Bonne Terre . F 12

Boon ville . D 7

Bosworth . C 6

Bourbon ……. E 10

Bowers Mill . G 4

Bowling Green C 10

Brashear . A 7

Braymer . B 5

Breckenridge . B 5

Brewer . F 13

Bridgeton . D 12

Brimson . A 5

Bronaugh . F 3

Brookfield . B 6

Browning . B 6

Brownington . E 5

Brunswick . C 6

Bucklin… B 7

Buckner . C 4

Buffalo . F 6

Bunceton . D 7

Bunker . G 10

BurlingtonJunctionA 2 Burnham . H 9

160 Diehlstadt . H 14

715 Dixon . . F 8

72 Dongola . G 13

1,225 Doniphan . H 11

214 Dover . C 5

513 Downing . A 8

512 Drexel . E3

150 Dudley . H 12

330 Eagleville . A 4

277 East Lynne . D 4

225 Easton . B 3

534 Edgerton . C3

1,562 Edina . A 8

1,209 Edna, Scott . G 13

1,999 Eldon . E 7

2,503 Eldorado Springs. .F 4 512 Elmer . B 7

342 Elmo . A 2

1,018 Elsberry . C 11

2,071 Elvins . F 12

343 Eolia . CIO

548 Essex . H 13

423 Ethel . B7

195 Eugene . E 8

49 Eve . F 3

522 Everton . G 5

327 Ewing . B 9

3,900 Excelsior Springs. .C 4

375 Exeter . H 4

666 Fairfax . A 2

62 Fair Haven . F 4

Pop. 1915 „ .

421 Fair Play . * g

305 Farber . G “

96 Farley . • ° “

2,613 Farmington . tit

2,586 Fayette . G 1

499 Federal, St.

Francois . r it

172 Fenton . p 11

1,658 Ferguson . D 12

2,556 Festus . t,it

232 Fillmore . K

5,112 Flat River . tit

765 Florissant . D 12

227 Foley . V*

534 Forest City . B 2

478 Forest Park,

Lawrence …-Go

187 Forsyth . “ °

203 Fortuna . p ‘

318 Foster . • E £

793 Frankford . C

2,632 Fredericktown . . • * 1 <-

331 Freeburg . p 9

251 Freeman .

5,228 Fulton . G 9

195 Gainesville . £ »

353 Galena . B »

1,825 Gallatin . B 4

583 Galt . A 5

713 Garden City . D4

226 Gentry . . A 4

225 Gerald . E iu

123 Gerster . * $

226 Gibbs . • A ‘

143 Gibson . D 14

702 Gideon . tl it

58 Gifford . B7

299 Gilliam . p b

537 Gilman City . A %

1,507 Glasgow . • G *

106 Glenallen . G i«J

375 Glenwood . A ‘

882 Golden City . . G 4

170 Gordonville . G 13

84 Gorin . A ®

370 Gower . b 3

365 Graham . A j

133 Grain Valley . D 4

2,442 Granby… .

393 Gramteville . * 1 1

1,207 Grant City . • - A %

454 Greencastle . A £.

844 Green City . A 7

1.434 Greenfield . G 0

436 Green Ridge . p b

275 Green Top . • A £

914 Greenville . G 12

207 Guilford . A”

587 Hale . Bb

195 Hallsville . c 8

1,761 Hamilton . . B 4

21,836 Hannibal . B iu

635 Hardin . pa

395 Harris . A ”

146 Harrisburg . G »

1,947 Harrisonville . p 4

niuviwi . ~ v .

Harwood . ‘in

Hawk Point . p 10

Hayti - - • • • • \E 14

Henderson MouncL New Madrid … H 13

H 14

iUO . n o

262 Holliday . G 8

111 Hollister . B «

36 Hollywood . E 14

336 Holt . V 4

909 Hopkins . .*. . • A

390 Hornersville . E 14

644 Houston . G 9

349 Houstonia . D b

913 Humansville . t o

514 Hume . E 3

292 Humphreys . A 6

406 Hunnewell . B 9

91 Huntsdale . D 8

2,247 Huntsville . C7

322 Hurdland . A 8

428 Iberia . • B °

976 Illmo, Scott . G 13

11,672 Independence - C 4

105 Ionia . *E 6

338 Irondale . F 11

721 Ironton . Fll

2,105 Jackson . G 13

200 Jacksonville . B 8

358 Jameson . B 4

611 Jamesport . B4

305 Jamestown . D8

664 Jasper . G 4

13,484 Jefferson City …. D 8 395 Jerico Springs . . • - F 4 84 Johnstown . E 4

‘ \

> ”• Jr: < ’ ,

.

.

■

.

A. ‘■ In • ‘ ■ I* “ii \ Ful l,

\/;\ Furmin?t’ > iSs < *— 4 V\elcoV

iclcQ\ jˆjidisoi

Farming

>J a;k *llopklus-Y* Isail-r:

Tlcarmnnt/ˆSheriiliuiJf.ˆ c <-

vW°nnt\cVer‘n? JL £i

‘U.1D A/\(/ A WjfjJ

\ licoKˆf* £y<‘ |-r - 1

arrril lefts’ if R«Wbnwood

.1 VˆSjˆcdi/s’in, ,.ou j,

, Canton

OAiy „ Hatfield jj

Buslinell

,Mcndo»a\

V,’ ataonj

lcit,ˆ‘TCˆ

ale BlythedalJ Eagleville J f

Marooil)

DuYi

iuylerT

n I Cubu • F U L

®.l,ewl»town

[R C E R Lfc,

\i’t*inn*lu«Li/

Me” — — e\£ “

|| SCCjT-LAND ‘if

:s _Jr v

tftiton

Carthago

Rand McNally’s New 11 x 14 Map of Missouri. Copyright by Rand McNally & Co.

McDOlNOUGH

‘Hamilton

;*andria

I -‘“tv,

[linatbsviUe

9 < Gorib C L\A R X

£. I 4 . 1 .,91 jl 7 L.lDli

I..T,. Tdl V’v-«:

Boyntbu© -* ■ “6 /T

S U ifL/l V aTFTc $

ˆyfi &LV

S, r < *-ora*

W inigar.

Skidmore

/C’”’”

i Vermont

ffSublett

/ˆRC/SON-ˆ

1 iif v erdonVˆ

‘ttpiokard

Maitlnm

ELECTRIC LINES.

RAILROADS

Littleton | /j

SCHUYLER’ ˆ — ˆRnshvlllc /

Byrds,,, (f

xN. ‘ˆ‘WniiamgtoAV ity “VV BenjatniuL

■t?vE W\ 1 s

[Tolon* \Q >

‘GuilfoSrd A\xfl

lord Cy

mrStowi

/Dunlap

bT rentoi ‘ Laredo j

tO.LTl 3

iNapier 5

\ New PoinF/£°*od“1’ ˆPOregool y.ilfnofC

Lincoln.

Bol/fckow 1

o/XWhiM

cFnllˆ>

‘v Gdlderr

Plu.ask?

Mnrua v

ybveDy

+ >iim tfti

ja»»6l

SalemV

alnut;

?‘r DEKALB

“i1”’ jr»v«viiifrJ

_4ˆV?Cl-＞«k»dul« ‘J

s&y

axa* r\Vr 4-

Purdln

iSteffenvilU

Chula,

Nclsonrillc

Vivj-ginit

• ˆ Xs-VLinnen!

It&monp

Quincy

Aahlari

/Winston. Mabel j

Rl > GFl

PbiWlclp’rii’J‘11

Wfcra

Woodland/

i I O’M]

ANElfW!

St. Jo!*

lDForkor nr /

Clarcnceyj£\ˆL

Lentncraˆˆ Lp ;

7Q%j

8s /” ‘•/

StariWd/;

Curran/

Jlnnuibal vvaB

‘U’lduth

[\rdmoi P” Hcge

Mimbilo

Avalon

\< iV/7*lT’lUe Wien /] l\y lllymimvillˆ 7\

rF //Mendon Hamden S fj

P/C HA JR I LOXˆF

Musselfork i*

ˆ \Triplett . cv „Jj

I

“1°*ˆ

.V. ˆ

aclcv/uT

Vi vUle J

/ ‘ \Calfu |J

kygsj

‘SvJIAN

Quote Tina

Murray

Pittsfield

Findlay’

f Di*nrhorn/ LNowMiiiket-IˆCaaidrn/ri (Vo’od r <i tl £

A T C H I Sp N

A Hawthˆfueˆ V

- >-uZ _ A

, , J- ˆ >_y . Dean CaM

I *o’*rvl“r ˆnvdHfi/

*\f Bogard/ˆ

(V’f A ferny

7v’v’^Xiis^l,r’ ,-^k ir ^

limira

(Quincy Jo.

‘Center^

Loulsit

GirurdJ

ir victor, Slnlther0 Santa Pe

ISinltTifUla «n ^.*jSy k. H pur, no >*

anawllle

MoWerly

J /) MdT une*-Stu

. P

b0-1/111 P.oJV

idaic Blliuty W

ˆ.Ilyhcc yj frGb

yreno KiwingctO

‘ˆ/tdgewood ˆ Eolmˆ.plynesV.

low den’

enwortlij

Leaven wortlˆd

G01V1ERY

Irving »

Hillsboro I

iarrolitoiX J

ˆv-ˆOskaloosa”

JEFFbRSOI

5J

ˆSxuor

HOWARDˆ;

Fay otto/

/Landmitrk onesborox v i

Estlll/^uV-V”’ /

innklinZ Xl_L ‘7/ .

l»r, • lGazettcVy .

■rT 4”«’

ay,etJe

I St. Elmo,

lUesidc

Jf j)\jzy?\ 1. . feVLe-cssrrx^r^ ‘V cIliDgto> >

feSSSSff-^**

tth Topeka

-n —

JiiircP^z

Wellsville fs-Gaiumao v \CMiN<XI>r“h!blti

TOPEKA,

ilavviowW/^ % \

AulhjllV^^x

‘Concordia J**j

MartlnsboTj

r uce

i^iA

Brizmton

‘Borento

Aatidalia

outheast Corner Extension’

ilawrence

. 4jV Chnntil^U,

‘X.uAvasf

Bellfloi

-uer,\ NewTroˆraiˆ

’\10N\TG0MERY f u

\ ®/. VNpw Florodc* .

v Vnil1: /

aˆJSSMS

＞ˆfcˆARR

QvPrfnuMO

H°on viHeˆ ’BllllopH’llte vj V?oobl«’»»

J/DN＜5°

•‘u-Martin ＜iCvˆcitj

KeuncTn)’:

DOUGLAJS

‘aretteville

ˆUsjoiiV

‘ New is ,5lu＜l« i«jr

K3ii.it /Speed

C O tO P E R,

moeton\ Bom

.i:ir l James

D - iii v - V er ni u ii t &

ftambu?-

Beaman.

■U > 3UU

Clevelan

? it.

rmai , ˆ

Iiurlingtcm

Jlaf risnnvUli

*M*Q_N r

ortuna

/ l’t. flb aKOl ‘Portas’fcvill..,

“v

-c 4ˆ

VjSL. P-7 ‘ji’alrBtmvn/

0,0

Osawati

KLIN

ˆfbaoks V

ST.CLAIR

‘Lnthern

fcer IVIVJrsVjˆlN >

arv in\

Vemilks Ole

b Todd’ˆ BarnsttVA oj ‘Rockjmouoi— Bldoi

of.i.Miˆ V, ˆfesl

•w 0F*op Glftdˆmuo VO J i* -Z ja < Wnyhnmj,i f’

’nil WeWuhnlit

” O’ IS A

Rich ‘Ffinotain’ lomas .

*o .fcj

“‘h-CeAu

CliottuiN

■

Morr Jilton/ˆ 4 ˆStontonˆX J

Kluiont/4ˆ’ Sullivan Pen

rnr‘”<OrTˆ Huk

/‘UourboaJ c

V’>-4Afej

•J’ c8prmn \

ffersont

r? u.uoIm. tj [C Sulpliur 3pr«; T* Mill PcvelW

>oro %SuenA

.ClintonvR‘(Aleland

LeesviUeˆ E/ N T /O N

KackcTJk fEdmonSun Z.

anymewickN

ˆolpbinˆllevlaJˆA’AWOY E R

ilff#SAfZle.«V¥liIr5cl*0o<i

Loncdell , Mivin.ioo*

i AmoretsN

RlltlersprucJ ˆ4untPro8e

Montelth Jo. L _

liAppltTnn Cl o Pleasant *Clty Ohioo i3l p Gap oj I L,J'vry Ci Utˆ?*
°*c4;r{*,s4 Chalk Level VX? ˆe/L c t r

ipnydown (_rj- _ 3 QtOVrdi fW

M figt?-li)E oS°ˆ°jlPˆ

Bnoktow«n/V. > ado1 Uigh 0 U li iVVpIdoB \ ',chTo oBi-.(U'v«r £■]
HnydenL j Veto. 3*f«°|

.?/ ˆft"°ry ° Liektl

r;l •ˆ■/'ˆTT.'fdooieo Koobviewˆ

Jv/

(\Varsinv Lii-eij-o *° m liofitodn L, -.Fairfield Nohhyˆl

.Edwards II

e,oa Clifnnxlˆ

Dmvningtv

S «aˆ

yat.ErTTjni.oth ˆ V

Tit son 111 Ilia

LIE R si. t.;

•y Htmstiliy’ U“

r Victoca ,\

cˆatssi)*

|tlLrv / Rucully-I D.K

taJSfisss’Sjffls

f Pleasant< >n\

I ii ud CltyAˆˆY Linton) Jlluo 3Iound -nj

Tower

liser 0 Lima n °Ant’ Watkins* Brays* “““ˆr IWriaˆ.ˆ • Hrumley

iom Bcntojarjllo ■Averyx ‘

NorCbrutt

CoOuytOI

Ronton

DOLPH

>*c

JVIoody

J Schell City *(C_J 1 7r uiriiii -L.*

jˆIlarworid/ˆxi [Walker/ V ! [Nej'atfaVT |

oˆDedericlrrˆ £> j*.

mj«UtG A

I Roach1

H'.U"

rJjuLˆ

Lillorinltaj

WoaublentO

VFf;"p&

.YiisSZEAL

L O R YAh

; Preaton NemolF » !

ˆfˆXjdierrj-Vnlb ‘

,-Cd

I /v, Bruxuh j

icysvillo % p7

lr» cCho try Till*1 ” Sˆˆ nTisv.UeA

X* K > in° New

‘•tdˆrjyjloVno Ti ll* L > l3cnbutg/T/iel i T v/co”.d-\c*ifWemFn

A o

i’VSiv inknCtˆSTE. GEN EVI

M PR/AVjCCˆIS.ˆ. STˆaoMinn

DoAliiln)c/.v .‘7 *1 / c

nu I

ylroo MonninTo ‘Ci“‘l”v … . VNi “• XFu..t > KTrTT7 XrsK.- — fT

long, I 0 Roselle \l.amotte jL /Arc/ilia a

y—’ t ‘f.fu£c«« Xvld; &r4fe(madTso n\ I

fler,|, pin* French Mille .Zlon \l s o 2o k Newett . Mar.iuand‘4

I « > ”•”,}“ VBUkL??x*TE

&yy uloair Cold wilier ° iJC..

BirdBojnj

ˆLclln’/f ’Ina8ant. 1« JX > 0’kf I ‘ lew’ |U-“

v iF”lel

‘/Mont«jrall.iC ED/3 StooktonG ” aV’nerˆ Jerico Sprˆ

RlrbanaWˆ

cLouisburg

Pladu fcy

V-ordTlldˆxn

IDAkTiA’SvS

lrn“uc

BOURDON

” ˆ’}w,feTlˆ§Si! ,e Yan.-TV, rt-iuey ˆarto3r|ab Mill*3,

Toronto

irvart

Spring Cr«-klLocom«r?, Bongeltt 0WiC’Aˆ}l

T-’ST’l?r«

Duke E&irtEpr*. (ˆy P.O.t LJeutaK*‘f n < *; > ˆ b°°‘7’ « /Salem Ark

— , Jˆkr)ow >

1. iJgeˆ ““‘b’.,.oVi| i > nri “n 0Tur«-n

CouIaI* »no! vJoy ‘ Gl,Btcr_n «irOovert°Llck,0montaukJlul«5,i ux\‘ PrnkcoU I _ V .I Vdlirgrove

f E/RR 0YVbaiu

f1! booatnwn® cB,ar

xF*ter /?BclUTlew

‘’ioodl.nd Oˆninwil

ˆJ＝4—w — ?-4ron＜

＞ss -‘Ed8c’l‘^^mtc M..jger “CateS^^i 7 MontorcyP C West Fork ˆBluok Hifcanl

ˆ/djv ‘guW ˆ JSaliula

B id..o}ˆ＜JFar ria8ˆ n’t Jt＞ll§! IV. Ai)niry\jiUe R*drordL*,P O

llaU PV LoDgiuvra® Jjraxrnujyittdenb/g ti,ehlanil5ki, • . FrobnaO . nl /

-■ L’j’.li.ij kFrlertiieim NˆTtirX

T\Bm iv.u.ml riiS, 4k K,5r＝-*S!’“”“”“M

ill . 0KurrovilL＜ J Mayfield rMill«*r«vilU ?/rruillu’nilv

‘5＜j3°s™L.CAPE GIR/AROEAU ” 1 .1 ,.rksun.3 “OP*

＜BurforˆMlle / Mills

- I Marble0 II li I yo.irdon-v/jss X£. Laflln -t)„. .\villo Lf[/Y

Zodiac

j- /Hannon ..

N,E/l!ieral lrw,Ql Milford

ˆrB. A R Tj O Nˆ’et

CbanutA

‘Cofkvaie

Br”«b

‘tcckJ

i»jh.laijd Dry, nob 7ˆji

Kus«,lw«,Y £

Oris _c V1* St ,nn

OlharLˆVlurns f

drloh (‘ iUoVan t Karlin l ˆ ss*t 1

\ vIL Falr Grovei

pg Lane Jhilllpsb rg Charity /

h Conway / i

•TNeelys or I \Aely8 Land

(iiruriT’

DRAWI

Aroola

v I -5 ‘I-oei uerii N cola o 55 /Dadovillti

, D A d: E hi

(ireenlic*ld > Wuinut|

Lockwood lV J p,j

/M inden or”’’-

[Mindenmines

BUnket

Giln° i

Enuttlo

(ingsvillo

rtEmbre

•rnell 1 ,u-Nashville

NeodesbajAJC

Bink in I

‘Akers RaitCoi

TV °N Dacon

S. Green field W Penusboro \r

r~,wc./u ~7 vl

yj JvAsl,ui\

JJrf Waco

“k&kee’h

ˆVySmitbfieldi

Aj irnrdeai

lYfV

V “” y

or Fuaon

lairv’ilL* UcLLtaˆ.i u

‘ˆYNOlDSAj

•ˆ.Ellington rj~ ■Ach unge pJe.(I

ˆNi-irthYiew

r3rd’Hcw,ia’

ten

MASSAC

, Yukon Huitslioro ■> °Eunic Sum men 1

mgau P

v j Olinger ? Lan ronce bilrg %Bois D.

i*aV\Al\1,erI e I’ar*‘6 u TElwi.odVv 1 helps LSprinep HaliLwo Nicholˆ LAvVR\FNCE~> b’poltline Sta.HVk Lft Rim»eirory(p i Republic/.,,, . oChe»nt/okeu/0a. t. Vein (j rp=3*ifcAS!Jild mg by. NX N ˆ Billii eg / Cf,Je]>’ HoberGK \K1 I “if. \ ‘

iN /i/XltauVont

Nlads HillrB,.undfj I PattersonY °ˆ\r \ Burbank

uenneg ReˆTtAa

‘Hartrllle Ft

‘ˆ(0.

ˆ Ruble”’

/ˆAllLARO’ last Cairo

‘?‘ˆ~Ktnloenl

‘urdlitud

lanefleld

SVDearing

,v” GaXi‘jgs

Baxter Sprsdff.l O’ Jfilrund

ˆ.Greonvll

jˆXˆMiU ˆTr ./

laoouib

Sw,\o*V

9. I. Hoberˆ (Freistattj p

CoffeyviTle*

IVTekitfTF

-DiamSˆ)

in j*vV\ • ZadoOT/Tˆf Aquiibyr’ Tr/ A’

’/& s t/6 n dbct

KoV»bnnerC7Aid Hunt/rvilb

■0, Sy’v＝’*(o/ k’e5kQ

b\Mullin

ˆIKcrtraj

ludkeyˆ

Verlum

mptc« Cr/|

Chaoniˆ

WopUBj

ˆ .Ritchey,

5r ＞wns

Trask Congo /”xv”0’ in Vi*iiˆ o “ N ˆ

AaArnotˆVttˆ nDb’kejr dtxlbup” Liilissu s£t O’

? lb-.: id* birdner oR-lf iStnalUtlˆnuitca Ben i

K UU-rd l-A p ‘>*tton V Bjggjs JcTuriˆn ˆ“‘nhani ■.rUi’.n. ©Cord* \Pomena_

Hoilfc-*

Eastwoodˆ

Barren

[ilunter Hendricksonˆ ˆtirandin* A*1’ U

ˆrkfc’ty H Madry® £i Af’H McDowell Schol® u, ■ /X ° Lear

“rA/R K

isyjlleurtiiˆ Cnto

ton L,amo‘ Innistot/ \lrieˆˆ

Church Ncw Blbertyf

.Neusl.ui

foCartmell

/Deweyf •1 o » Bartles

CroenoVˆ _ Belmont

* Wolfjp tMcdle

-Ease* ‘risoo Gfnail Marco ‘ LaVallcJr Bernie \ *ToSpi*ˆ.wii

Wilderness]

[Dudlej

’Ooˆ0or-\lmnilha

rod ° Cu»ryer-) ˆ∼,becI„ Romnnre ■ tThoinfidd ˆv.ilhoit ‘l.d-
Nottmghill y.nuitni

Budapest1

t’.-pc FairV1

rro.NEN

rv Noilly

‘/Radical h(

ˆoWkonuf

City Aˆsˆ Bo«ky Comfoj

M r/DyO N A L D’S’j

S3?

,tfw OnpiK-e

,1’*;“‘1 Brsn.tsviro. iidjtta 0Cottbua ®l ”South Fork - lT|mJ Fruit v

id v’ 0Lcbo Lcota _ pLantoi

Vinlta

i Nˆi-eo I»beHa L’cdnrriBekThct lusiao n

K3r°om «u*hˆ

ProUm0 Dug imwilic*’

GnineBvUli

‘Broad

lalden.

..Risoo

bpoogg

[lick man’

:° Slmebtttry

MounW’fiif*”

Ne.livlllj

I v.tna < «

GatSuoid? Myrtle f 1 _P <

farewell

. RAN ©0 L

ixThayor

‘ South West Clt;

DELAWARE

i ®

Jay

> StyraN. 1

> plsgotr A

[SHARPl

Greenwich

MISSOURI

SCALE

Statute Miles. 34* = 1 Inch.

Soto I

willia/mson

10 ! Mario,.

1 20°

MISSOURI—

Pop.

456 Jonesburg . DIO

33,216 Joplin . G 3

1,758 EGahoka . A 9

297,847 Kansas City . 03

631 Kearney . C4

190 Kelso . G 14

3,033 Kennett . E 14

963 Keytesville . C 7

306 Kidder . B 4

235 Kimmswick . E 12

966 King City . A 4

535 Kingston . B 4

238 Kingsville . D4

6,347 Kirksville . A 7

4,171 Kirkwood . D 12

670 Knobnoster . D 5

395 Knox City . A 8

452 Koshkonong . H 9

1,017 La Belle . A 9

740 Laclede . B 6

614 Laddonia . C 9

1,360 La Grange . B 9

137 Lakenan . B 8

2,316 Lamar . G 4

684 Lamonte . D 6

964 Lancaster . A 7

1,605 La Plata . B 7

-Continued.

Pop.

758

Laredo .

…. B 5

261

Larussell .

…. G 4

1,038

Lathrop .

… .B 4

604

Lawson .

. C 4

2,430

Lebanon .

1.455

Lees Summit .

… .D 4

420

Leeton .

. . D 5

66

Levasy .

…. C 4

405

Lewistown …

…. A 9

5,242

Lexington …

. Co

800

Liberal .

2,980

Liberty .

… .C 4

351

Licking .

…. G 9

484

Lilbourn .

336

Lincoln .

…,E6

532

Linn .

… .E 9

435

Linn Creek …

… .E 7

882

Linneus .

… .B 6

98

Lithium .

…F 13

225

Lockspring…

… .B 4

961

Lockwood …

… .G 5

158

Longtown… .

…F 13

4,454

Louisiana … .

…C 10

462

Lowry City …

…E 5

264

Lucerne .

… .A 6

164

Lupus .

… .D 8

163

Luray .

. … A 9

&51

Lutesville …

… G 13

385

Me Fall .

… . A 4

127

McKittrick …

. ..D 10

3,584

Macon .

… .B 8

638

Madison .

… .C 8

736

Maitland .

. … A 2

2,116

Malden .

… D 14

399

Malta Bend …

… C 6

100

Manley .

… D 14

477

Mansfield ….

… G 7

4,976

Maplewood …

…D 12

313

Marble Hill…

…G 13

3,920

Marceline ….

. .. . B 7

1,272

Marionville …

… .H 5

339

Marquand ….

…G 12

4,869

Marshall .

… .C 6

1,193

Marshfield ….

… . G 7

258

Marston .

…H 14

436

Martinsburg . .

… .C 9

4,762

Maryville .

…A3

237

Matthews… .

…H 14

1,051

Maysville ….

… .B 4

308

Mayview .

… .C 5

580

Meadville .

… ,B 6

111

Melbourne ….

… .A 5

1,984

Memphis .

. … A 8

408

Mendon .

533

Mercer .

… .A 5

195

Merwin .

… . E 3

399

Meta .

… .E 8

240

Metz .

… .F 3

5,939

Mexico .

… .C 9

431

Miami .

… .C 6

80

Middle Brook.

. . F 11

88

Middlegrove, Monroe .

… .C 8

323

Middletown …

…C 10

2,191

Milan .

…A 6

343

Miller .

. . G 5

99

Millers ville … .

. . G 13

252

Mill Grove… .

. . A 5

128

Milo .

…F 4

591 Mindenmines . G3

290 Mineral Point… . F 11 559 Missouri City, Clay C 4

12,752 Moberly . C8

111 Modena, Mercer…A 5

646 Mokane . D 9

122 Monegaw Springs .E 5

4,177 Monett . ..H5

1,949 Monrop City . B 9

146 Montevallo . F 4

1,789 Montgomery City D 10

283 Monticello . A 9

667 Montrose . E 5

157 Montserrat . D 5

205 Mooresville . B 5

1,636 Morehouse . H 13

494 Morley . G 13

794 New Franklin . 120 New Hamburg,

120 New Market . C 3

293 Newtonia . H 4

261 Newtown . A 6

276 Nixa . G 6

1,241 Norborne . C 5

78 North view . G 7

232 Novelty . B8

1,711 Novinger . A 7

641 Oak Grove . D 4

256 Oak Ridge . G13

1,531 Odessa . D4

251 Old Monroe . D 11

214 Olean . . E 7

1,023 Oran . G13

1,002 Oregon . B 2

1,912 Oronogo . G3

435 Orrick . C 4

360 Osborn . B 3

1,114 Osceola . F 5

204 Osgood . A 6

453 Otterville . D 7

677 Owensville . E 10

813 Ozark . H 6

1,418 Pacific . E 11

2,168 Palmyra . B 9

87 Papinsville, Bates. E 4

1,474 Paris . C 8

765 Parkville . . C3

905 Parma . D 14

438 Parnell . A3

1 044 Pattonsburg . A 4

205 Peculiar . D 3

895 Perry . C 9

1,708 Perryville . F 13

97 Phelps City . . , …. A 1

199 Philadelphia . B 9

264 Pickering . A3

1,154 Piedmont . Gil

2,043 Pierce City . H 4

654 Pilot Grove . D 7

445 Pilot Knob . F 11

763 Platte City . C 3

1,650 Plattsburg . B 4

68 Pleasant Green … D 7

2,065 Pleasant Hill . D 4

125 Pocahontas . G 13

99 Point Pleasant … D 15

526 Polo . B 4

6.916 Poplar Bluff . H 12

218 Portage des SiouxD 12

987 Portageville . D 15

772 Potosi . Fll

113 Prairie Hill . C 7

184 Prairie Home . D 7

1,385 Princeton . A 5

994 Purcell . G 3

337 Purdin . B 6

459 Purdy . H 4

814 Puxico . H 12

701 Queen City . A 7

231 Quitman . A 2

123 Randolph . C 3

251 Ravanna . A 5

341 Ravenswood . A3

218 Raymore . D 3

239 Rayville . C 4

298 Reeds . G 4

213 Renick . C 8

884 Republic . G6

196 Revere . A 9

190 Rhineland . D 9

303 Richards … F 3

2,755 Rich Hill . E 3

884 Richland . F8

3,664 Ricnmond . C 4

841 Ridgeway . A 5

110 Roanoke . C 7

434 Rocheport . D 7

1,053 Rockport . A 1

566 Rockville . E 4

2,621 Rolla . F 9

182 Roscoe . …F5

359 Rosendale . A3

245 Rothville . B 6

Pop.

168 Rush Hill .

. .C 9

Pop. 1915

1,966 Tarkio .

… .A

…D 9

566 Rushville .

. . B 3

1,613 Thayer .

,..G5

335 Russellville .

. . E 8

304 Tina .

… . 1

. I) 10

. 418 Rutledge .

. . A 8

1,273 Tipton .

… .r

..Ell

1,796 Salem .

. . F 9

176 Tracy .

. (

… A 2

1,834 Salisbury .

. .C 7

43 Treloar .

…D

… F 3

71 Sandy Hook… .

. D 7

5,656 Trenton .

… .p

. . G 8

1,311 Sarcoxie .

. .G 4

222 Trimble .

… .(

. H 9

1,583 Savannah .

. . B 3

473 Triplett .

… .(

. . C 6

562 Schell City .

. .E 4

1.120 Troy .

…D

… A 5

19.449 Sedalia

. . D 6

212 Turney .

… .1

… G 5

1,029 Senath .

.E 14

285 Tuscumbia …

… .1

…C 4

981 Seneca .

. H 3

934 Union .

…E

.H 11

590 Seymour .

. .G 7

388 Union Star …

… .1

. . G 3

2,174 Shelbina .

. B 8

2,000 Unionville… .

… .P

.H 12

685 Shelby ville .

. . B 8

2,417 University, St. Louis

. . D 6

528 Sheldon .

. .F 4

D

. .H 4

409 Sheridan .

..A3

484 Urich .

… .f

…F4

3,327 Sikeston .

.H 14

1,595 Vandalia .

… .C

. ,B 9

276 Silex .

.C 10

388 Vanduser ….

,..F9

86 Siloam Springs . .

. .H 9

446 Verona .

. . B 7

562 Skidmore .

. .A 2

1 ,598 Versailles ….

… . E

. D 10

3,238 Slater .

. .C 6

110 Vibbard .

… .(

. .C 7

346 Smithton .

. . D 6

279 Wakenda .

… .(

680 Smithville .

. C 3

364 Walker .

… .1

G 13

148 SouthGifford.MaconB7

4,689 Warrensburg .

… ,r

. . A 4

746 South Gorin, Scot—

795 Warrenton …

…D

. D 10

land .

. .A 8

824 Warsaw .

… . E

. B 10

274 South Greenfield

.G 5

219 Washburn .

. . ,H

.H 14

77 South Lineville,

3,670 Washington ..

…E

483 Southwest City…H 3

271 Sparta . H 6

638 Spickard . A 5

241 Spoonerville, Dunklin

E 14

156 Sprague . E 3

40,341 Springfield . G6

60 Spring Garden… . E 8

127 St. Catherine . B 6

10,350 St. Charles . D 11

397 St. Clair . E 10

1,967 *Ste.* Genevieve… F 13

1,100 St. James . F9

85,236 St. Joseph . B 3

757,309 St. Louis . D 12

702 St. Marys . F 12

269 St. Peters ……. D 11

2.121 Stanberry . A 4

333 Steele . E 15

773 Steel ville . F 10

543 Ste warts ville . B 3

560 Stockton . F 5

159 Stotesbury . F3

548 Stotts City ……. G 4

315 Stoutsville . C 9

386 Stover . E 7

180 Strasburg . D 4

663 Sturgeon . C 8

934 Sullivan . E 10

236 Summersville . G 9

394 Sumner . B 6

1.122 Sweet Springs ….D 6

193 Syracuse . D 7

124 Taney ville, Taney . H 6

245 Watson . A

777 Waverly . (

384 Wayland . . A

257 Waynesville . , I

171 Weatherby . B

347 Weaubleau . 1

13,821 Webb City . G

7,080 Webster Groves . .D

558 Wellington . C

7,312 Wellston, St. Louis D

1,194 Wellsville . C

154 Wentworth . H

539 Wentzville . D

333 Westboro . . A

120 Westline . ;..D

1,019 Weston . C

321 Westphalia . E

2,914 Westplains . H

129 Whiteside . C

250 Whitewater . G

242 Whiting, Mississippi

H

204 Williamstown . A

477 Williamsville …H 1,401 Willow Springs … H

2,241 Windsor . E

422 Winfield . D

444 Winona . G

257 Winston . B

87 Wittenburg . F

119 Wooldridge . D

159 Worland . E

377 Wright City . D

480 Wyaconda . A

197 Zalina . G

bushels, wheat to 27,540,000 bushels and cats to 59,200,000 bushels. In the same year 140,000 acres were planted to cotton, which yielded 51,000 bales, valued at $7,012,000; 6,000 acres were planted to flax, yielding 51,000 bushels of flax-seed ; 3,000 acres were planted under

tobacco, which yielded 2,820,000 pounds valued at $598,000. The aggregate value of the corn, wheat, oat, rice, potato, cotton, tobacco and hay crop of 1917 was $461,729,000.

Lumber. — Missouri is one of the few middle States that yet markets ties, lumber, laths and shingles in large quantities. The State annually markets about 10,000,000 rail¬ road ties, worth about $4,000,000 to the pro¬ ducer. More than 1,000 sawmills had an out¬ put of 60,159,000 feet of lumber in one year, ac¬ cording to the last census report, the approxi¬ mate value of which was, in round numbers, $30,000,000. This production, however, has now begun to diminish.

Mineral Resources. — Missouri has the lar¬ gest deposits of lead, zinc, coal and clay of the Middle Western States. The principal lead dis¬ trict is in southeastern Missouri in Saint Fran¬ cis, Madison and Washington counties, but an important production of lead is made in the Joplin zinc district of southwestern Missouri. The lead, in the form of mineral galena, oc¬ curs disseminated through the sedimentary rocks of the region, especially in the dolomites of the Bonne Terre formation of the Cam¬ brian Age. The average ore contains about 3.5

to 4 per cent of lead, but the large scale upon which the deposits are worked gives a good profit. This district is one of the most im¬ portant lead-producing areas in the world. Lead was discovered in southeastern Missouri about 1720 and the region has produced the mineral more or less continuously ever since. Missouri's total production of lead is about $15,000,000 annually, the larger part of which comes from the southeastern district. In the war years the production reached the value of $32,000,000. The chief ore mineral of zinc in the Joplin district is sphalerite, or zinc blende, but there is also an important production of zinc, silicate, calcimine and zinc carbonate, smithsonite. The ores are found in runs or circles and in sheet ground of limestone. The runs and circles may be 10 to 50 feet wide and are respectively shallow. The sheet ground may be from 10 to 70 feet thick and reaches a depth of 200 feet. The recent high price of both lead and zinc has greatly stimulated the mining industry and led to the opening up and development of new areas, as well as the ex¬ tension of the older ones. The clay resources of Missouri are large and especially suited for the manufacture of common and fancy brick, tile, sewer-pipe, fire-brick and . terracotta. While clays are found in all parts of the State, they are not all equally adapted to the specific uses given above. Missouri ranked eighth in this industry in the United States in 1914. Mis¬ souri originally had an estimated available ton¬ nage of 79,362,000,000 tons of coal.. Since 1840, which is the first recorded production, 115,000,- 000 tons have been mined and an additional 60,000,000 tons destroyed in mining the above quantity, thus leaving about 79,187,000,000 tons, of which not more than 60 per cent will be re¬ covered. The coal occurs in the lower part of the Pennsylvania formation. The beds are

rarely over four feet and most of those mined average about three feet or less. The Bevier bed furnishes about 60 per cent of the coal in Missouri. Other important coal-producing cen¬ tres are at Rich Hill and Lexington. Missouri has long been famous for her ((iron mountain,® but the total amount of iron produced at this locality was only about 4,000,000 tons. There are many scattered deposits of hematite and limonite over the Ozark region. Missouri's total production is probably not more than 10,000,000 tons. The State also has many ex¬ cellent building stones, notably the granite of southeastern Missouri and the limestone at Carthage and Phoenix, as well as stones in other parts of the State. Missouri has produced 60 per cent of the annual production of barite for the United States for many years and still has large reserves of this valuable mineral in Washington and other counties of the State.

Production and Value of the Chief Mineral Industries in 1915 and 1916.

YEAR

Mineral

Production

Value

1915..

Coal .

3,811,593 s. t.

$6,595,918

1915..

Iron .

40,2901. t..

99,853

1915..

Zinc .

136,300 s. t.

33,802,400

1915..

1915..

Lead .

Limestone, sand and granite .

210,440 s. t.

19,781,360

2,145,501

5,431,569

4,007,679

1915. .

Brick, tiles, pottery . .

1915..

Portland cement… .

4,628,484 bbl.

1916..

Lead .

233,088

32,166,144

1916..

Zinc .

155,960

41,797,280

1916. .

Coal .

4,742,146

9,044,505

s. t. = short tons. 1. t. = long tons.

Manufactures. — Outside the city of Saint Louis, the leading manufacturing counties are Jackson, Buchanan, Saint Charles, Marion, Jasper, Franklin, Greene, Cole, Cape Girardeau, Platte, Pike, Ralls, Boone and Lafayette. Ac¬ cording to the summary of the United States Census Bureau for 1914, the value of the manu¬ factured products of the State was $637,952,000 and the number of persons engaged in manu¬ facturing, 188,266. Saint Louis is the largest manufacturing centre of the State. The chief manufacturing industries of that city, accord¬ ing to a 1913 report of the State Bureau of Labor, are :

Boots and shoes . $35 , 865 , 261

Carriages and wagon material … 6,347,352

Railroad and street cars . 19 , 582 , 231

Clothing . 13,136,594

Foundries and machine shops . 14,276,715

Grocers' sundries . 11,791,967

Malt liquors . 22,419,289

Slaughtering and meat packing . 25 , 007 , 634

Drugs and chemicals . 9,981, 539

Tobacco in various forms . 22,912,535

Next in importance as manufacturing cities are Kansas City and Saint Joseph. The valua¬ tion of the manufactured products of Kansas City in 1912 totaled $71,854,885, including:

Bakeries . $7,948,699

Bags and bagging . 3,227, 000

Cars and general shop construction . . 2 , 100 , 708

Liquors, malt . 4,661,367

Liquors, rectifiers . 4,333,041

Clothing (factory products) . 2 , 286 , 850

Planing mills . 2,502,876

Confectionery…… . 2,012,247

Printing and publishing (book and job) . 7,916,915

In 1912 the value of products in Saint Jo¬ seph was $81,752,571, principal among which is the packing industry. Here is a partial list of the most important industries :

Candy and confections . $2,834,857

Clothing (factory product) . 1,778,615

Flouring and gristmill products . 2 , 659 , 7 49

Slaughtering and meat packing . 62,438,553

Springfield, Joplin and Hannibal lead in manufacturing among the smaller cities of the State.

The following partial list of factory prod¬ ucts shows the varied character of the manu¬ facturing industry : Cob pipes, pearl buttons, soap, glass, musical instruments, lime, electri¬ cal instruments, spelter, zinc oxide, white lead, drugs, street and railway cars, motor vehicles, rubber goods, flags and banners, books, furni¬ ture, brick, tile, bed . springs, stoves, cement, dynamite, coffins, surgical and mathematical in¬ struments, chemicals, dyes, engines, boilers, farm implements, carriages, wagons, stoneware, pottery, paper, paint, clothing, leather goods, millinery, wire, gas, jewelry, confectionery, food preparations, brooms and brushes.

Finances. — In 1915, according to the records of the State auditor, the assessed valuation of all taxable property in Missouri was $1,856,-885,145.47. The bonded debt of the State,

1 Jan. 1913, was $3,500,000 — bonds issued to erect a new capitol.

The rate of taxation in 1915 was two cents on the $100 for the capitol, one cent for the school certificates of indebted¬ ness, five for the public schools and 10 for all other purposes. The bonded debt of the State on 1 Jan. 1918 was $2,384,000. According to the Council of the Corporation of Foreign Bondholders the State has a defaulted debt of about $7,000,000, the remnant of the $27,370,000 railroad debt assumed by the State in 1862, after the disastrous era of speculative railroad construction. In 1917 the State revenue amounted to $15,585,244 and the expenditures to $16,102,946. On 1 Jan. 1918 the treasurer had a balance on hand of $2,991,111.

Banks. — ‘There are 131 national banks in Missouri, according to the official manual of the State for 1915-16, with a total of demand deposits of $124,929,599.90, and over 30,000 de¬ positors. The incorporated State banks number 1,281 and have individual deposits of $140,810,- 534.01. There are also 20 private banks and, in the larger cities, 67 trust companies with a combined capital of $465,623,000. There are in Saint Louis 40 banks and trust companies with a total capital and surplus of $57,998,000. In the year of 1872 there were 58 banks in the State with a capital and surplus of $20,196,098* showing that during the last 46 years the num¬ ber of banks and their capital and surplus has increased many times. The total number of banks in the State is 1,499, with a total capital and surplus of $131,906,429.51. Missouri is the only State in the Union which has two Federal Reserve banks, one located at Saint Louis and the other at Kansas City.

Railroads. — Many of the important trunk lines of the United States traverse the State of Missouri and other systems connect with them giving excellent transportation facilities to the northern parts of the State, but there are a few counties of the southern tier without railway. Approximately 30 railroads have

their entrance into the Union station of Saint Louis and about 20 into Kansas City’s Union station. In addition to these, many electric roads and branch lines have been constructed or are in the process of construction through¬ out the State. The leading trunk lines with eastern branches are the Wabash, the Pennsyl¬ vania, Baltimore and Ohio and the Big Four. Running directly to Chicago are the Illinois Central, Chicago and Alton, Chicago, Burling¬ ton and Quincy, Wabash, Rock Island and the Santa Fe. Feeding the West and Southwest are the Santa Fe, the Missouri Pacific, the Union Pacific, the Wabash, the Missouri, Kansas and Texas, the Chicago, Burlington

and Quincy, the Frisco and the Rock Island. River transportation, which was neglected for many years following the Civil War, is now being developed and large quantities of cereals and other products are taken from Saint Louis to New Orleans by river and transferred to ocean¬ going liners. The Missouri is open to merchant crafts from Saint Louis to Kansas City. There are 66 railroad systems in the State, with 8,274 miles of main track and 26 electric roads with 928 miles.

Education. — The public school system of education in Missouri was adopted in 1839. The system consists of district schools, graded and ungraded; city schools, graded and with high school courses ; five normal schools, Lincoln Institute for negroes and the Univerˆ sitv of Missouri. The University of Missouri is supported by what is designated as a per¬ manent endowment consisting of certificates of indebtedness amounting to a total of $1,235,839, and by appropriations from the general assem¬ bly. The total amount of the funds for the use of public schools, as given in a recent report of the state auditor, is $15,162,665.77. From the income on this amount there was paid in 1915 for teachers' wages $1,064,525 in the city, town and village schools. Free public schools are required by law for children, white and negro, between the ages of 6 and 20 years in every district in the State. Besides these State schools, there are also many private insti¬ tutions for both sexes. Among the larger institutions of this kind are Saint Louis Uni¬ versity, founded in 1829, under the control of the Jesuit order of the Roman Catholic Church, with buildings worth approximately $1,000,000; Washington University, Saint Louis, which has an endowment fund of several mil¬ lions of dollars; William Jewell College at Liberty, a Baptist school ; Drury College, Springfield, Congregational ; Central College, Fayette, Southern Methodist; Westminster Col¬ lege, Fulton, Presbyterian; Missouri Wesleyan, Cameron, Northern Methodist; Missouri Val¬ ley College, Marshall, Presbyterian; Hardin College, Mexico, Baptist; William Woods, Ful¬ ton, Christian ; Stephens, Baptist, and Christian, Christian, Columbia ; Lindenwood, Saint Charles, Presbyterian'; Christian University, Canton, and other smaller institutions. The value of .buildings and grounds of private edu¬ cational institutions is approximately $7,000,000 and the amount of their endowments approxi¬ mately $9,000,000. At the time of the last census there were within the State 111,116 illiterates of 10 years and over, a percentage of illiteracy of 4.3. Among native whites of

native parentage the percentage was 3.4, among native whites of foreign parentage, 1.2, and among Afro-Americans, 17.4. In 1915 the total public school enrolment was 711,355, and the average daily attendance 528,153; there were in the same year 19,826 teachers. Male teachers received an average annual salary of $603 and female teachers $511. In the same year $19,700,000 were expended on education.

Religion.— Missouri's earliest settlers were Roman Catholics. The first Protestant church was the Christ Church (Protestant Episcopal) which was founded in Saint Louis in 1819. Soon after various religious bodies established themselves in various parts of the State. The Roman Catholic Church has retained its strength in the cities and towns along the great rivers, and its members are numerous through¬ out the entire State. The Methodists (Northern and Southern), the Disciples of Christ, the Baptists, the Presbyterians and the Episcopal¬ ians are the leading Protestant churches. Each of these churches supports a college with the exception of the Episcopalian. The Roman Catholic has one large university, a number of preparatory schools and many parochial schools located largely in the cities.

Government. — The present constitution of the State was adopted by popular vote in 1875 after it had been framed and recommended by a convention called for that purpose.. The general assembly of the State, consisting of the senate and house of representatives, meets biennially on the Wednesday after the first day of January following the election of the members. The senate is composed of 34 mem¬ bers and the house 142. The pay of the mem¬ bers is not to exceed $5 a day for 70 days and if the session is further prolonged, an allow¬ ance of $1 a day is made until the body adjourns. The members are also allowed mile¬ age to and from the meetings of the assembly. In the executive department are the governor, the lieutenant-governor, the secretary of

state, the state auditor, the state treasurer, the attorney-general and the superintendent ot public schools. The governor, in whom is vested supreme executive power, is chosen tor four years, as are all of the other members of the executive department. The governor is given a qualified veto upon acts of the assembly. The judicial system of the State is composed of the Supreme Court, the Saint Louis, Kansas City and Springfield courts of appeals, the cir¬ cuit courts, criminal courts, probate and municipal courts. The judges and officers ot the Supreme Court are elected for a term ot 10 years; of the Saint Louis and Kansas City courts of appeals for a term of 12 years and of the circuit courts of the State for six yeais. The house of representatives is given the sole power of impeachment of executive and judicial officers. The senate tries all cases of impeachment. Every male citizen of the United States and every male person of foreign birth who may have declared his intention of becoming a citizen of the United States accord¬ ing to law, not less than one year and not more than five years before he offers to vote, who is over the age of 21 years, is entitled to vote at all elections by the people if he has resided in the State one year immediately preceding the election, and has resided in the county, city vol. 19 — 17

or town where he shall offer to vote at least 60 days immediately preceding the election. In 1908 the initiative and referendum were adopted by constitutional amendment. Capital punish¬ ment was abolished in 1917.

Charitable and Penal Institutions.— 1 he State of Missouri has four hospitals for the care of the insane, a colony for the feeble¬ minded and epileptic, a State sanitonum for the tubercular, a school for the deaf and dumb and a school for the blind as its charitable institutions maintained by appropriations and the labor of the persons within them. The penal institutions are a penitentiary, a reform school for boys, and girls' industrial school and an industrial school for negro girls. In addi¬ tion to these, the State maintains a home for Federal and a home for Confederate veterans. The hospitals for the insane are located at Fulton, Saint Joseph, Nevada and Farmington, and have a total property valuation of approxi¬ mately $2,725,000. Marshall is the home of the colony for the feeble-minded and epileptic. The State sanitorium for the tubercular was established in 1905 at Mount Vernon, Lawrence County, on the crest of the Ozark Mountains. The 48th assembly appropriated $175,700 for the use of the institution. The school for the deaf and dumb is located at Fulton and has 300 students who are given an industrial training peculiar to their needs.

The school for the blind is located in Saint Louis. The peniten¬ tiary of the State is at Jefferson City and the official manual of Missouri for 1915-16 gives the total number of its prisoners, 1 April 101N as 2,585 males and 55 females. Its property valuation is $1,987,113.87. The reform school for boys at Boonville has 339 inmates. At Chillicothe is the industrial school for girls which has 225 girls in its care. The State industrial school for negro girls was estab¬ lished at Tipton, 14 June 1909, by an act which appropriated $20,000 for its beginning. A total appropriation of $199,742.19 has been made for the completion of the buildings of the school and the support of the institution. The Con¬ federate veterans home is at Higginsville. I he Federal soldiers home is at Saint James and has 296 veterans who make their home there. Ac¬ cording to the last census there were m paupers in almshouses, being 72.5 per 100,000 ot population, and 3,523 prisoners in penal insti¬ tutions, being 107 per 100,000 of population.

Politics.— Missouri for more than 30 years has been usually a Democratic State. The vote of the State for presidential electors in 1880 was: Democratic, 208,609; Republican, 155,567, other parties about 80.000. In 1892 the Demo¬ cratic vote was 268.398; Republican, 226,918 , other parties about 85,000. In 1908 however, the Democratic vote w a s# 346,574, the Repub lican, 347,203; other parties, about 19,000 In 1912 the Democratic vote was_ 330, 746; Repub¬ lican, 207,821; the Progressive, 124,821. In 1916 the Democratic presidential vote was 398,- 032 and the Republican, 369,339

Population.— The State of Missouri is com¬ posed of 114 counties and the city of Saint Louis The number of the inhabitants of the State since 1850 is shown in table on following

page.

‘’The 1910 census of the United States gives the foreign-born population o) the State

as 229,779. There were also 157,452 persons of negro descent. The early settlers of the State were foreign, coming from France, and the population of what is now Missouri remained French for 50 years after the first settlement. Many descendants of these earlier French families are to be found in Saint Louis and other of the older river towns. A large part

YEAR

Males

Females

Total

Density

per

square

mile

1850…

357,832

324,212

682,044

14.37

1860…

622,201

559,811

1,182,012

18.08

1870…

896,347

824,948

1,721,295

26.34

1880…

1,127,187

1,041,193

2,168,380

31.55

1890…

1,385,238

1,293,946

2,679,184

39

1900…

1,595,710

1,510,955

3,106,665

45.2

1910…

1,687,813

1,605,522

3,293,335

47.9

of the population of the State is of German extraction having settled especially in Saint Louis and along the Missouri River. A large percentage of the population is also composed of Irish, 23,290; English, 13,751 ; Canadians, 7,961; Swiss, 6,141; Russians, 21,401, and 5,654 Swedes. The native American population until a generation ago was mostly descended from immigrants from the States of Kentucky, Tennessee, North Carolina and Virginia, but during the last 40 years a large accession of the population has come from the Eastern and Northwestern States. Saint Louis, the largest city in the State and one of the most important in the Mississippi Valley, had a population of 772,897 according to the 1920 official census. Kansas City, the next largest city in the State on its western border, had a population of 324, 410, and is growing more rapidly than any other city in the State. Saint Joseph, in the northwestern part of the State, is given by the same census a population of 77,939 ; Hannibal, a river town in the eastern part of the State, 19,306; Springfield, in the central southern por¬ tion, 39,631 ; Joplin, in the extreme south¬ western part of the State, 29,902; Sedalia, in the central part of the State, 21,144; Jefferson City, the capital, 14,490.

History. — Missouri is a part of the terri¬ tory taken possession of by the French ad¬ venturer and discoverer, La Salle, 9 April 1682, which he named Louisiana in honor of the reigning king, Louis XIV, of France. The exact dates of the first settlements are un¬ known. Some historians give 1763 as the date of the first settlement and others, supported by traditions, place it as early as 1735. Saint Louis was settled by Pierre Laclede Liguest, a Frenchman. The site was selected in 1763, and in 1764 August Choteau, at the order of Liguest, began the erection of a village. Other earlier • settlements were for years confined to the banks of the rivers. The French governor's official residence to 1701 was at Fort Biloxi; from 1701 to 1723 at Mobile, and then at New Orleans. On 3 Nov. 1762, France ceded Louisiana to Spain, but the Spanish authorities did not take possession of Upper Louisiana, of which Saint Louis was the capital, till 20 May 1770. Spain retroceded Louisiana to France by treaty of 1 Oct. 1800, ratified 21 March 1801, but the actual transfer of Upper Louisiana

was not made until 9 March 1804. France ceded for a cash consideration the province of Louisiana to the United States, 30 April 1803, the actual transfer of Upper Louisiana being made at Saint Louis on 10 March 1804. Under act of Congress, approved 31 Oct. 1803, Presi¬ dent Thomas Jefferson appointed Wm. C. C. Claiborne (who was at the time governor of the Mississippi Territory) governor, and in¬ vested him ((with the powers heretofore exer¬ cised by the Governor and Intendant of Louisiana.® Governor Claiborne assumed ihe government at New Orleans, 20 Dec. 1803. Capt. Amos Stoddard was appointed agent and commissioner of the French republic 12 Jan. 1804. In that capacity he had received the province from Delassus at Saint Louis 9 March, and the following day delivered it to himself for the United States, having been authorized to do so by Wm. C. C. Claiborne, ex officio governor of the Territory of Louisi¬ ana. From 1 Oct. 1804, the district of Louisi¬ ana consisted of all that part of the territory purchased from France, except that portion lying south of what is now the State of Arkansas. The government was assigned to the officers of the Territory of Indiana, of which William Henry Harrison was governor until 3 March 1805. On this date the Territory of Louisiana was erected with the same limits as the district of Louisiana. The capital was Saint Louis, and from 3 March 1805, until the last part of 1806 James Wilkinson was governor. The Territory of Missouri was erected 7 Dec.

1812, and had the same limits, government and capital as the Territory of Louisiana. From 7 Dec. 1812, to July 1813, Frederick Bates was secretary and acting governor. From July

1813, to 1820 William Clark was governor. Under act of Congress, passed 6 March 1820, the State of Missouri was organized. The Con¬ stitutional Convention met in Saint Louis, 19 July 1820. The State officers assumed their duties, 19 Sept. 1820, proclamation was issued by President James Monroe, admitting Missouri as a State, 10 Aug. 1821. By act of Congress 7 June 1836, which took effect by proclamation 28 March 1837, the western boundary was ex¬ tended to include the <(Platte Purchase,® area of which was 3,168 square miles. The appli¬ cation for statehood and admission into the Union of Missouri on 8 Jan. 1818. was fol¬ lowed by two years of controversy which ex¬ cited the entire country. The controversy raged about the question as to whether or not slavery should be permitted in Missouri. It was finally brought to an end by the admission of Missouri into the Union upon what is known as the ((Missouri Compromise® (q.v.), which forbade the existence of slavery in that part of the Louisiana Purchase north of 36° 31’ ex¬ cept in Missouri. The constitution adopted upon, the admission of the State remained practically

unchanged until 1865.- The first governor of the State was Alexander McNair. Saint Charles was first fixed upon as the seat of the government, but in 1826 the capital was removed to Jefferson City, where it remains. The official census of the State, taken in 1821, showed that there were 70.647 inhabitants, of whom. 11,254 were slaves. The Missouri troops came in for due recognition in the Indian wars, such as the Black Hawk War of 1832, the Florida War of 1837 and afterward in the

Mexican War of 1846. Besides being a border State and a slave State as well, in all troubles preceding the outbreak of the Civil War, Missouri was deeply concerned. In many parts of the State, the sentiment was strongly in favor of secession. Governor Jackson on 3 Aug. 1861 declared that Missouri must take its stand by the side of the slave-holding States whatever they might desire to do. In a con¬ vention called to consider the affairs of the nation sentiment was found hostile to secession and the convention refused to commit the State to secession. United States troops were gathered at Saint Louis. Attempts made to take possession of the United States arsenal at Saint Louis, with its equipment, by the Secessionists were defeated and within a few months after the outbreak of the war the greater part of the State was under the control of the Federal forces. Governor Jackson declared the State out of the Union, and Confederate forces were assembled in the southwestern part of the State. The State Convention which had con¬ vened before the war again convened and de¬ clared the executive officers and the seats of the members of the general assembly vacant. The executive offices were then filled by ap¬ pointment by the convention. At the battle of Wilson's Creek, near Springfield, General Lyon, who had been a strong Union leader, was killed and General Fremont, who had been placed in charge of the Department of the West, declared martial law throughout the State. At the beginning of 1862 the Confederates held nearly half of the State, but their strength gradually waned. The State furnished to the United States during the Civil War 108,773 troops, and to the Confederate army more than 50,000, keeping the State's quota full without draft or

enforced enlistment not merely in one but in both armies, a record unexampled among the States North or South. In 1865 a new con¬ stitution was adopted by the people, and in 1869, by a large majority, the 15th amendment to the United States Constitution was adopted. In 1875 a convention framed and the people adopted a new State constitution, omitting many of the drastic provisions of the constitu¬ tion of 1865 which had been ratified in Recon¬ struction days. This constitution has since been the fundamental law of the State, modified in minor details by several amendments adopted from time to time.

List of Governors.

TERRITORIAL PERIOD.

♦William C. C. Clai¬ borne .

Amos Stoddard .

William Henry Har¬ rison (Gov. of Ind. Ter.) .

James Wilkinson… .

Joseph Browne .

Frederick Bates… . . Meriwether Lewis…

Frederick Bates .

fBenjamin Howard.. Frederick Bates .

William Clark .

Acting Governor-General and Intendant of Louisi¬ ana…, . 1803-04

First Civil Commandant of Upper Louisiana. . 1804

Governor “ District of Lou¬ isiana ”…. . ,. 1804-05

Governor Territory of Loui¬ siana . 1805-07

Acting Governor . 1807

“ “ . 1807

Governor . 1807-09

Acting Governor . 1809-10

Governor . 1810-12

Acting Governor “ Terri¬ tory of Missouri ” . 1812-13

Governor . 1813-20

* Claiborne was Stoddard’s superior.

f Governor of Territory of Louisiana, 1810—12; Governor ot Territory of Missouri.

STATE.

Alexander McNair .

Frederick Bates .

Abraham J. Williams (act’g).

John Miller .

Daniel Dunklin .

Lilbum W. Boggs. .

Thomas Reynolds .

M. M. Marmaduke (acting).

John C. Edwards .

Austin A. King .

Sterling Price .

Trusten Polk .

Hancock Jackson .

Robert M. Stewart .

Claiborne F. Jackson .

Hamilton R. Gamble .

Willard P. Hall (acting)

Thomas C. Fletcher .

Joseph W. McClurg .

B. Gratz Brown .

Silas Woodson .

Charles H. Hardin .

John S. Phelps .

Thomas T. Crittenden .

John S. Marmaduke .

A. P. Morehouse .

David R. Francis .

William J. Stone .

Lon V. Stephens .

Alexander M. Dockery .

Joseph W. Folk .

Herbert S. Hadley .

Elliott W. Major .

I rederick D. Gardner .

Arthur M. Hyde .

Democrat . 1820-24

“ 1824-25

“ . 1825

“ 1825-32

“ 1832-36

“ 1836-40

“ 1840-44

“ . 1844

“ 1844-48

“ 1848-52

“ 1852-56

“ 1856-57

“ . 1857

“ 1857-61

“ . 1861

Provisional . 1861-64

“ 1864-65

Republican . 1 865-69

“ _ … 1869-71

Liberal Republic

and Democrat… 1871-73 Libei al Republic

and Democrat… 1873-75

Democrat . 1875-77

“ 1877-81

“ 1881-85

“ 1885-87

” 1887-89

“ 1889-93

“ 1893-97

“ . 1897-1901

“ . 1901-05

“ 1905-09

Republican . . ‘ . 1 909-1 3

Democrat . 1913-17

“ 1917-21

Republican . 1921—

W alter Williams,

Professor of History and Principles of Jour¬ nalism, University of Missouri.

MISSOURI, a river in the United States, the largest tributary of the Mississippi. Its headwaters are in southwestern Montana, and the Missouri River proper begins at the con¬ fluence of the Jefferson, Madison and Gallatin rivers. The Madison has its source in Yellow¬ stone Park, near the headwaters of Yellow¬ stone River and the geysers in the western part of the park. The Gallatin also has its rise in the same park and not far from the source of the Yellowstone and

Madison rivers. The Jef¬ ferson rises farther west; its headwaters are near the source of the Snake River. The Missouri from the confluence of the three rivers flows north and east to the Bear Paw Moun¬ tains, when it turns and flows south and east a distance of about 50 miles, when again the course changes toward the east, from the 108th meridian to about 107° 30’ northeast, then east to North Dakota, which State it enters at 49° N. It has a very irregular course in the north¬ western part of North Dakota, but it is gen¬ erally southeast to South Dakota, which State it enters at 100° 20’ W. It crosses the State of South Dakota, marking an irregular course, generally in a southeasterly direction to the boundary of Nebraska at 42° 45’ N. From here it forms the boundary between South Dakota and Nebraska to Iowa at 42° 20’, when it turns south and forms the boundary between Nebraska and Iowa, Nebraska and Missouri, and Kansas and Missouri to Kansas City, where it enters the State of Missouri, flows east by north to Bruns¬ wick, then east by south, making two large curves, to the Mississippi which it enters 20 miles north of Saint Louis and three miles be¬ low Alton, Ill. The length of the whole course from the source of the Madison River is about 2,915 miles, from the source of the Jefferson about 3,000 miles. From its source to the mouth of ihe Mississippi River is a total length of

4,200 miles, the longest continuous waterway in the world. There are some peculiar irregulari¬ ties along its course, one in Montana, where the Musselshell River enters, is in the form of a <(V,® its opening toward the north, and the sides about 12 miles long. Along the course in each State there are long narrow loops, enclosing lands which are almost islands; across the State of Missouri the river forms three crescents, one pointing north and two pointing south.

The Missouri is noted for the great amount of suspended silt it always carries and which has given it the name <(Big Muddy.® This silt is deposited in reefs which change the current, and frequently much damage results. In 1903 considerable damages were sustained by the washing away or grinding away of portions of Decatur, and Covington

in Nebraska, Sioux City in Iowa and Yankton in South Dakota. The river follows no known rules as to when or where it will deposit its burden of silt, change its current and begin to destroy a solid shore line. Dikes and stone walls have been constructed in many places. In the upper part of its course the Missouri passes through the (<Gate of the Rocky Mountains,® a gorge about six miles long and having perpendicular walls about 1,200 feet in height. At Great Falls, Mont., there are a series of falls making a vertical descent of 350 feet in 16 miles. The highest falls is 87 feet.

The chief tributaries are in Missouri, the Osage and Kansas; in Nebraska, the Platte and Nibrara ; a large number of short streams in Iowa; the Big Sioux, White, James and Che3ˆenne, in South Dakota ; the Little Missouri in North Dakota; and the Yellowstone and Milk in Montana. The extent of country drained by the Missouri and its tributaries is about 500,000 square miles or nearly two-fifths of the whole Mississippi Basin. The northern point of the basin of the Missouri extends al¬ most to the Saskatchewan River. The Missouri is a swiftly flowing stream in its upper course, and for a distance of about 500 miles it presents scenes of almost unequaled grandeur. It forces its way through narrow gorges, foams over cataracts and winds around mountains. In the lower part of its course the waters move more slowly on its journeys across the vast plains. It is navigable in summer, during the flood period, to Great Falls, Mont., and in low water as far as Buford at the mouth of the Yellowstone River. The flat-bottomed steam¬ boats are necessarily those used for navigation on the Missouri.

The principal cities on the river from the upper course to its mouth are Great Falls and Fort Benton in Montana; Bismarck, the capital of North Dakota; Pierre, the capital of South Dakota; Sioux City, Iowa; Omaha, Neb.; Atchison, Leavenworth and Kansas Citv, Kan. ; Kansas City, Saint Joseph and Jefferson City, Mo. That portion of Iowa lying near the mouth of the Little Sioux and north for about 70 miles, between the Missouri and the Little Sioux, is below the level of the Missouri from 8 to 32 feet. The area of the tract below water level is about 840 square miles, and embraces some of the finest farms and most prosperous towns of the State.

The history of this river is connected with the history of the early explorers and mission¬

aries and with the lives of the miners and settlers of the latter part of

the 19th century. The possibilities in the unused water power of its upper course are enormous. The great prairies through which the river passes on its lower course contain the most productive lands in the United States.

MISSOURI, University of, a higher edu¬ cational institution established by an act of the general assembly of the State of Missouri, ap¬ proved 11 Feb. 1839, two days after the ap¬ proval of the act establishing the public school system of the State. In June of the same year the university was located at Columbia, Boone County, which is near the State's geographical centre. Boone County was selected as the home of the State's highest educational insti¬ tution because its people offered the most lib¬ eral bid of the six central Missouri counties. The cornerstone of the main building was laid 4 July 1840, and in the following spring, April 1841, instruction in academic courses was be¬ gun. The first class, consisting of two mem¬ bers, was graduated in 1843. Something of the growth of the university is indicated by the fact that in 1917 it awarded 838 degrees and cer¬ tificates. Women were admitted to the teacher-training department of the university in 1869. Since that time all other departments have been opened to them on the same terms as to men, and gradually the proportion of women stu¬ dents to men has grown, until in 1917 women numbered about one-third of the total enrol¬ ment. The government of the University of Missouri is vested in a board of curators, con¬ sisting of nine members appointed by the gover¬ nor of the State, the terms of three members expiring every two years. The student enrol¬ ment in 1916-17 was 4,349. The faculty con¬ sisted of 208 members of the rank of instructor or higher. Its foundation was made possible by the enlightened policy of the national gov¬ ernment with reference to Territories seeking admission into the Union. In admitting Mis¬ souri in 1820, Congress set aside two townships of land — 46,080 acres — for the support and maintenance of ((a seminary of learning.® From the income of this national grant, from the gifts of Boone County people and from student fees, the university received its entire support for the first 28 years of its existence. The first State aid was given in 1867, when $10,000 was appropriated by the general as¬ sembly for building and repairs. The univer¬ sity is now supported and maintained by appro¬ priations from the State treasury, by Federal appropriations, income from its endowment funds and by the fees and deposits received from students. Tuition is free to residents of Missouri ; students from other States pay a tui¬ tion fee of $10 a semester.

The national character of the early Univer¬ sity of Missouri has been strengthened by the continuing Federal appropriations and the coming

each year of students from more than three-fourths of all the States and nearU all the non-contiguous possessions of the United States. In its former student body of 7,000 graduates and about 25,000 non-graduates, every State and nearly every leading nation of the world has representatives. The university has extended its educational scope to include in the curricula of its various schools and colleges

theoretical instruction and practical training in all the leading activities of its constituents. Starting in 1841 with only an academic depart¬ ment, it is now composed of the following col¬ leges and schools : College of Arts and Sci¬ ence, College of Agriculture, School of Edu¬ cation, School of Law, School of Medicine, School of Engineering, School of Mines and Metallurgy, School of Journalism, School of Business and Public Administration, Graduate School and the Extension Division.

The School of Mines and Metallurgy is at Rolla, Phelps County, Mo.; the other divi¬ sions are at Columbia. In addition to the woik of the above schools and colleges, emphasis is given in particular lines of study by the estab¬ lishment of minor divisions, chief of which are the Agricultural Experiment Station, the. Engi¬ neering Experiment Station, the Missouri State Military School and the Mining Experiment Station at Rolla. The university, also holds a summer session. In all the divisions of the university the laboratory method is followed. The university grounds at Columbia cover more than 800 acres. The main divisions are in the West Campus, the East Campus, the athletic fields and the university farm. A 20-acre tract of timber land near the university is used for experimental work in forestry and a demon¬ stration forest. About five miles south an 80-acre tract is used for experimental work in horticulture. On a 90-acre tract two miles nouth of the university is a new plant for the manufacture of hog cholera serum. The uni¬ versity also has a forest of 50,000 acres in the Ozark Mountains of southern Missouri. . On the grounds at Columbia are about 50 univer¬ sity buildings. The libraries of the university are the general library; law library; medical library; engineering library;

agricultural, li¬ brary; collections in the observatory, chemical, geological and zoological buildings; and the library of the School of Mines at Rolla. ihese libraries contain about 200,000 volumes and pamphlets, and 1,400 publications are received currently in Columbia. The general library is now housed in a separate building, erected in

1915. ,

Students' expenses average $300 a year tor men and $375 for women. Material reductions from these figures may be accomplished by liv¬ ing at the university dormitories and eating at

the Commons... . . ,

Scholarship at the university is promoted by the offering of a large number of fellowships scholarships and prizes. These yield from $50 to $400 a year. Each school and college also has its honorary organizations, and there are local branches of several national, scientific and professional societies.

MISSOURI COMPROMISE, in American

politics, a term given to a compromise under an act of Congress passed in February. 1821, at which time Missouri was admitted into the Union as a slave State, declaring that all terri¬ tory west of Missouri and north of lat. 36° 30 should forever be free from slavery. This compromise was virtually repealed in 1854 when territorial governments were established for Kansas and Nebraska. Consult Woodburn on (Historical Significance of the Missouri Compromise) (in Annual Report of the Ameri¬ can Historical Association, 1893) ; and Hodder,

(Side Lights on the Missouri Compromise* (ib. 1909). See Kansas, History ; Kansas-Ne- braska Bill; Missouri.

MISSOURI, or GOURD-SEED, SUCKER, a fish. See Blackhorse.

MISSOURI VALLEY, Iowa, city in Har¬ rison County, on the Chicago and Northwest¬ ern Railroad, about 120 miles west of Des Moines, the capital of the State, and 20 miles north of Council Bluffs. It is in a fruit

grow¬ ing and stock raising district and has large rail¬ road shops, machine-shop, flour-mills, dairy products, bricks, coffins, grain elevators and stock yards. The fair grounds of the County Agricultural Society are located here. It has a Carnegie public library and the city owns and operates the waterworks. Pop. about 4,000.

MISSOURI VALLEY COLLEGE, in

Marshall, Mo., a coeducational institution, founded under the auspices of the Cumberland Presbyterians in 1889. The courses lead to the degrees of A.B. and Ph.B. The faculty com¬ prises 13 instructors and professors and the average attendance of students is over 200. The library and the grounds, buildings and ap¬ paratus are valued at $125,000; the productive funds at $113,000, and the annual income about

$19,000.

MIST. See Fog.

MISTAKE, a term commonly used as the equivalent of blunder, error, erratum and par¬ ticularly employed in law of a misconception affecting action. In general the law, by an ex¬ tension of the rule that ignorance is no excuse, makes a mistake without remedy. This does not apply, however, in any misapprehension which may be brought under the law of con¬ tracts or the principle of quasi-contract. So, too, in equity there is a possibility of relief for mistake and its consequences.

MISTASSINI, mis-tas-se'ne, Canada, a lake in Quebec province, about 300 miles north of Quebec, and due east from the southern point of James Bay in Hudson Bay. It con¬ sists of two parallel narrow portions separated by - a chain of islands, the western and larger portion being about 100 miles long, and a maxi¬ mum breadth of 20 miles. Area, 975 squaie miles. It has a depth of between 300 and 400 feet. It drains by Rupert River into James Bay. The waters of Mistassini teem with fish, while its shores are densely wooded. The lake was first visited by French missionaries in 1671, but was not surveyed until 1884. The Hudson s Bay Company maintains a trading-post on the

lake.

MISTLE-THRUSH, or STORMCOCK,

British names for a large European, thrush (T urdus viscivorous) , whose fine song is heard for a longer season than in the case of most birds, and on rainy days as well as sunny Its common name is due to its unusual fondness for the berries of the mistletoe. In plumage it resembles the American wood-thrush.

MISTLETOE, a popular name for several related shrubs parasitic upon various deciduous trees, such as apple, thorn, maple, poplar, locust, linden, but rarely oak. The European or com¬ mon mistletoe (Viscum album) of the natural order Loranthacea, is the one referred to in

poetry and prose but a relative named Phora-dendron flavescens is the species most com¬ monly found at Christmas time in the markets of America. The former, which is common almost throughout Europe, is an evergreen, bifurcately branched shrub, with opposite, al¬ most sessile, oblong, leathery leaves; incon¬ spicuous flowers in small terminal heads or in the angles of the branches, the pistillate and staminate flowers upon separate plants ; and whitish, translucent, glutinous berries about a quarter of an inch in diameter. The stickiness serves to attach the berries to the host plant until germination is complete, the sprout, it is said, always turning toward the point of attach¬ ment. The American or false mistletoe is simi¬ lar in habit and appearance, and has fallen heir to some of the traditions and functions of its European cousin, especially the Christmas prac¬ tice of kissing under a suspended sprig. An¬ ciently the European species was held to be sacred by the Druids and the Germans, and by the Celts was credited with magical properties, references to all of which are frequent in liter¬ ature. Its formerly reputed value in medicine has also passed away. Several other species are well known, especially the fragrant flow¬ ered Loranthus odoratus, and L. europaeus; the latter being distinguished for its racemes of flowers and its trequent appearance upon oak trees. The common American species men¬ tioned above ranges from New Jersey to Indi¬ ana and southward to Florida and Texas. Several related species are found on the Pacific coast.

MISTRAL, mestral, Frederic, French poet : b. Maillane, Bouches-du-Rhone, 8 Sept. 1830; d. there, 25 March 1914. He studied law for a time, but abandoned it and gave his attention to writing in Provencal, the dialect of southern France, which, under the influence of Jasmin, the “barber-poet,® had entered on a renaissance as a literary medium. In 1854 he, with six others, founded the well-known Society of the Felibrige ; and in 1859 he published his <Mireio,) a narrative poem in the recovered language, which was crowned by the Academie in 1861. A second work ‘in verse, ˆalendau,* came out in 1867; a volume of poems, (Lis Isclo d’Or) (The Isles of Gold), in 1875; (Lou Tresor dou Felibrige, } a dictionary of modern Provencal, in 1878—86; and the historical poem <Nerto,) in 1884. (La Reino Jano} (1890) is a tragedy, and (Le Poeme du Rhone > (1879), another narrative poem. There are English renderings of (Mireio) by Grant (1867), Crichton (1868) and Preston (1872). In 1904 he was awarded, jointly with Jose Eshegaray, the Nobel prize in literature. Consult Downer, (Frederic MistraP (1901).

MISTRAL, the local or provincial name of a strong northwest wind, which, blowing from the Alps, forms one of the scourges of Prov¬ ence and the valley of the Rhone. It is caused by low atmospheric pressure in the Gulf of Lyons with high pressure in the north, and corresponds with the “bora® of southern Russia. It blows with great violence during the winter and spring months. Its approach is indicated by a sudden change in the temperature from warmth to cold ; the air becomes purer and more invigorating, light fleecy clouds are seen in the sky and at night the stars shine

with extraordinary brightness. The tempest it causes in the Mediterranean from Ebro to the Gulf of Genoa is very dangerous to small vessels.

MISTRETTA, me-stret’ta, Sicily, town in* the province of Messina, 34 miles northeast of Caltanissetta, 50 miles northwest of Catania and about 11 miles from the sea. It is in the most fertile region of Sicily and is 3,200 feet above sea-level. Lignite is mined in the vicinity. The chief industries are farming and cattle¬ raising. An annual fair is held here. The name was anciently Aniestratus. Pop. 18,000.

MISTRIAL, a trial which is erroneous on account of some defect in the persons trying, as if the jury come from the wrong county, or because there was no issue formed, as if no plea be entered, or some other defect of juris¬ diction. Where a jury is discharged without a verdict,

the proceeding is properly known as a mistrial. Consent of parties cannot help such a trial, when past. It is error to go to trial without a plea or issue, in the absence of coun¬ sel and without his consent, although an affi¬ davit of defense be filed in the case, containing the substance of a plea, and the court has ordered the case on the calendar for trial. On an indictment for perjury, an infant under the age of 21 years, and not otherwise qualified, not having, in fact, been summoned, personated his father as a juror. Here was a mistrial, because the verdict in the case was the verdict of but 11 jurors. A mistrial leaves the parties to an action in statu quo ante, and in criminal cases the indicted person may be retired as at a mis¬ trial such a person is not considered to have been placed in jeopardy. See Trial.

MISU, Nicholas, Rumanian diplomat, repre¬ sented his country (with M. Bratiano) at the Peace Conference in Paris. By origin a Mace¬ donian Rumane, M. Misu adopted Rumanian citizenship and served for many years in Balkan capitals. In London he carried on the negotiations with the British government relat¬ ing to Rumania's entry into the war. He was called home when the conclusion of peace with Germany became inevitable to negotiate terms with the conquerors. He possesses a remark¬ able knowledge of European and Balkan languages.

MITANNIANS, a race dwelling in Meso¬ potamia in the 2d millenium b.c. and that came to light by the discovery of some cuneiform tablets found in the rock tombs of Tell-el- Amarna in Upper Egypt (between Memphis and Thebes) in 1887— 88. These clay tablets contained Egyptian correspondence with Babylonia, Assyria and other ancient nations. In these tablets, through the scholarship of learned Orientalists, it was discovered that there was a kingdom of Mitanni in northern Mesopotamia which had important relations with Egypt. Moreover, this country was identified as Aram-Naharayim (Aram of the Two Rivers), called in Syriac, Beth-Nahrin, i.e., "the land of the rivers® — Euphrates and Tigris — and meaning particularly the northern por¬ tion of Mesopotamia. Aram-Naharayim, in other words Mitanni, was the home of Balaam and probably his famous animal, for in Deut. xxiii, 4 Balaam is called a native of Aram-Naharayim and Numbers xxiii, 7 reads that

Balaam was brought ((from Aram out of the mountains of the east.®

The Mitannian kings whose names have been discovered seem to have belonged to the -Hittites or Harri, whose capital was at Boghaz Keui, North Cappadocia, explored in 1907. One of these kings, Dushratta whose letters were discovered in the Tell-el-Amarna tablets, was the father-in-law of Amenhotep III of Egypt (1411-1389 b.c.). He was also a contemporary of Subbiluliuma, the Hittite monarch, who seems to have obtained lasting^ dominion in Syria by subduing Dushratta. Three kings ol the same dynasty, Saushshatar, Artatama I and Sutarna I, preceded Dushratta and Ortatama 11 Artashshumara, Mattuaza and Sultarna II fol¬ lowed him. Some authorities think that this dynasty took possession of the native Mitannians ; other authorities find grounds for be¬ lieving the Mitannians to have been the Hittites, who in 1932 b.c. put an end to the Amoritish dynasty in Babylon and established themselves in Mesopotamia thereafter. Hittite hiero¬ glyphics and cuneiform script were both used among the Mitannians. The gods of this race were the same as in the Babylonian and As¬ syrian pantheons.

«The discovery of the Tell-el-Amarna tablets revealed to us,® writes Dr. A. H. Sayce, <(the existence of a new language, once spoken in northern Mesopotamia in the kingdom of Mitanni, the Aram-Naharayim of the Old Testament. One of the letters addressed to Dushratta, king of Mitanni, to the Egyptian Pharaohs is in the native language of his country and its length is such that a compari¬ son of it with those of his letters which are written in Assyrian makes a partial decipher¬ ment of it possible. Shortly after the publica¬ tion of the cuneiform text by Winckler and Abel in (Mittheilungen aus den orientalischen SammlungeiP (I No. 27) attempts at the de¬ cipherment of the language by Professor Briinnow, Professor Jensen and myself ap¬ peared simultaneously in the Zeitschnft fur Assyriologie (Vol. II and III, 1890.) The cunei¬ form text has recently been subjected to a very careful re-examination by Dr. Ivnudtzon and the result of his labors is given in the Beitrage zur semitischen Sprcichwissenschaft (IV, PP-134-153). In one of the letters of Dushratta one of his envoys is called Tunip-ipriJ (iell-el- Amarna Tablets in the British Museum, 9, 47) (<the king of Tunip. This raises a presumption that the power of Mitanni extended as far as Tunip, the modern Tennip, and that the Mitannian language was spoken there. The presumption is confirmed by a letter sent to the Pharaoh by the

people of Tump in which the native words added to the Assyrian trans¬ lation, where the latter did not seem quite clear or literal enough, all belong to the language of Mitanni. In the Mitannian letter of Dushratta itself the meaning of a few words and forms is cleared up by the ideographs attached to

tˆC < q’t is clear that Mitannian is in its general structure a Caucasian language. It resembles Georgian in its habit of piling suffix upon suf¬ fix pronoun upon pronoun, until the verbal forms become almost impossible to analyze. Like Georgian, also, it occupies a middle posi¬ tion between inflection and agglutination. In

this respect it resembles the ancient languages of Asia Minor, so far as we know them, though it is to be noticed that it illustrates the fact that, as we pass eastward, agglutination is more prominent, while westward, as in the case of Lycian, inflection is more pronounced.® See Hittites. Consult Tell-el-Amarna I ablets in the British Museum (1892) ; Davies, (Rock Tombs of Ell-Amarna) (1903) ; Bezold, C.,

(Oriental Diplomacy: the transliterated text of the Cuneiform Despatches discovered at Tell-el-Amarna) (1893); (The Tell-el-Amarna Let¬ tersˆ English translation by M. Winckler (Berlin 1896) ; Knudtzon, J. A., cDie El-Amarna Tafeln > (Leipzig 1907-09) ; Petrie, W. M. F., (Syria and Egypt from the Tell-el- Amarna Letters) (1898) ; Bork, Ferdnand, (Die Mitannis sprache) (Berlin 1909) ; Winckler,

(Vorderasien im zweiten Jahrtausend* (Leip¬ zig 1913), and Sayce, A. H., (The Language of . Mitanni) in Proceedings of The Society of Biblical Archaeology (June 1900).

MITAU, me’tou (Russian Mitava), Latvia, town and capital of the government of Courland, on the right bank of the river Aa, 26 miles southwest of Riga, on the Riga-Orel Railroad. The town is supposed to have received its name from the German Mitte in dcr Aue and is said to have been founded in 1266 by Conrad Man-dern, grand-master of the Order of the Breth¬ ren of the Sword. When the Lithuanians plundered it in 1345, it had become an important town. In 1561 the Duke of Courland made it his residence and the palace became the seat of government. This castle, which was situated on an island in the river, was destroyed by Duke Biren, who erected in its place (1/38-/ Z), a fine palace, now the official residence. Mitau was captured three times by the Swedes in the 17th century and in 1795, when Russia annexed Courland, Mitau was included. The Duke of Provence

(afterward Louis XVIII) made Mitau his home in 1798—1801 and again in 1804-07. Napoleon I captured it in 1812. Mitau is only 12 feet above sea-level and at high water the town is sometimes inundated. A canal surrounds the town in the place of the old for¬ tifications. The streets are broad and regular and many contain handsome residences of the German nobility. Mitau possesses a museum with a library, a gymnasium and a theatre and is the home of the Lettish Literary Society. The chief manufactures are chocolate, oilcloth, ink, flour, iron products and hats; and the town also possesses sawmills, tanneries and ironworks. The trade is large in grain, cattle and wood. Germans outnumber the rest ot the races, which include Poles, Letts, Russians and lews. Most of the inhabitants are Protestant and a general superintendent of the Lutheran Church has his seat there. Pop. 39,2UU.

MITCHAM, England, a suburb of London, on the river Wandle in Surrey, four miles northwest of Croydon on the London, Brighton and South Coast Railway. It is 10 miles south of London Bridge. The neighborhood abounds in market-gardens and plantations of roses, lavender peppermint and other herbs for the manufacture of perfumes and essences. Mitcham Common, covering 480 acres, has one of the best golf courses near London. Pop.

30,000.

MITCHEL, mich'el, John, Irish patriot: b. Dungiven, County Derry, 3 Nov. 1815; d. Drumalane, 20 March 1875. He was graduated from Trinity College, Dublin, in 1836, and practised several years as an attorney at Ban-bridge. Soon after the starting of the Nation in 1842, Mitchell began to contribute to that journal and after the death of Thomas Davis, in 1845, became assistant editor. In 1848 he began the publication of the United Irishman, for his articles in which he was sentenced to 14 years' transportation for felony. He was sent to Bermuda, and next to Tasmania, whence he made his escape to the

United States in the summer of 1853. Here he published a series of short-lived newspapers, the Citizen (at New York), , the Southern Citizen (Knoxville, Tenn.), the Inquirer (Richmond, Va.) and the Irish Citizen (New York). An advocate of slavery, he favored the Con¬ federates in the Civil War, on which side his three sons fought, and he was at one time under arrest by the Federal authorities. In 1874 he returned to Ireland. He was elected to Parlia¬ ment from Tipperary, was declared ineligible, but was reelected. Among his writings are (Life of Hugh 0'Neille) (1845) ; (Jail

Journal; or Five Years in British Prisons* (1854), and a (History of Ireland from the Treaty of Limerick* (1868). Consult Dillon, W., (John MitcheP (London 1888).

MITCHEL, John Purroy, American public official: b. Fordham, N. Y., 19 July 1879; d. near Lake Charles, La., 6 July 1918. His grandfather was the Irish patriot, John Mitchel, who with his three sons fought in the Confederate army during the Civil War. John Purroy was educated at Fordham College (now Fordham University) and in 1899 was graduated at Columbia University. Two years later he was graduated at the New York Law School and was admitted to the bar the same year. One of his early cases involved a mining claim in South America. His work there in an un¬ healthy tropical region resulted in a fever and peculiar headaches, one of which is thought to have been responsible for the accident which resulted in his death several years later. His entrance into public life was his appointment by Mayor George B. McClellan as special coun¬ sel to the city of New York in December 1906. In April of the following year he was made commissioner of accounts and in this capacity he investigated the office of the borough presi¬ dent of Manhattan, John F. Ahearn. The lat¬ ter was removed and many grafters were made to feel the heavy arm of the law. All advo¬ cates of good government in New York were pleased with the ability and integrity of Mitchel and in 1909 he was elected president of the board of aldermen on a fusion ticket, William J. Gaynor being elected mavor at the same time. In August-September 1910 Mitchel was acting mayor while Mayor Gaynor was re¬ covering from a wTound inflicted by a maniac. On 7 June 1913 President Wilson appointed Mr. Mitchel collector of the port of New York and in the autumn of the same year he became the fusion candidate for the mayoralty in oppo¬ sition to C. S. Whitman, then district attorney of New York County. Mitchel won the nomi¬ nation and after a bitter campaign defeated Judge Edward E. McCall, the regular Demo¬

cratic nominee, at the November election of 1913. Mitchel's administration passed its first year in comparative peace, municipal markets were established, but on a wholly inadequate scale. Storms came in 1915, 1916 and 1917. On the whole the city administration did much to relieve the increasing number of the unem¬ ployed. Sections of the city press began to at¬ tack the administration for its failure to curtail expenditures, for its attempt to place the city public schools on an undemocratic basis, and above all for its supineness in dealing with cer¬ tain railroad corporations who were seeking valuable franchise privileges. Other disclosures in regard to the Rockaway land deals and the Brooklyn terminal project further alienated popular support. Mitchel also angered a great and powerful section of his fellow-citizens through the alleged biased and unfair investi¬ gation of Catholic charitable institutions spon¬ sored by him, and in which city officials re¬ sorted to the illegal method of wiretapping in an unsuccessful effort to involve certain Catho¬ lic clergymen and prominent laymen. As a re¬ sult, at the close of his administration Mitchel found himself strongly supported by all cor¬ poration and big moneyed interests in the city, and, heartily despised among the masses of the city's toilers. In 1917 he was again a candidate for mayor. By lavish expenditures of money at the primaries his friends endeavored to se¬ cure him the nomination but he was defeated by Bennett. Over 21 persons were indicted for fraud in connection with Mitchel's primary campaign. After defeat at the primaries he stood for re-election as an independent candi¬ date, but at the November election he received 149,260 votes, while the Socialist Hillquit re¬ ceived 141,739, and Hylan, the regular Demo¬ cratic candidate, received a grand total of 298,- 149 votes, the greatest plurality in New York's history and an emphatic repudiation of Mitchel's administration. On 11 Jan. 1918 Mr. Mitchel was commissioned major in the Avia¬ tion Corps of the United States army. He re¬ ceived his cadet training at San Diego, Cal., and soon became noted for his daring in the air. He was transferred to Gerstner Field, near Lake Charles, La., to receive the finishing stages of training necessary for service at the war front. On the morning of 6 Tuly Mr. Mitchel fell from a single-seater scout plane at a height of about 500 feet and was killed. A few days later a public funeral was held from Saint Patrick's Cathedral.

MITCHEL, Ormsby McKnight, American astronomer: b. Morgansfield, Ky., 10 July 1810 * d. Hilton Head, S. G, 30 Oct. 1862. He was graduated from West Point in 1829, and was made assistant professor of mathematics there, which post he held for two years. From 1832 to 1834 he was counsellor-at-law in Cincinnati, Ohio; from 1834 to 1844

professor of mathe¬ matics, philosophy and a.stronomy at Cincinnati College; and 1836-37 chief engineer of the Lit¬ tle Miami Railroad. He lectured in various parts of the United States on astronomy in 1842-48, raised funds for the building of an observatory at Cincinnati, the cornerstone of which was laid 9 Nov. 1843, and was its director in 1845-59. In 1859 he became director of the Dudley Observatory at Albany, N. Y. He was known as a popular lecturer on astronomy, and

2frf >

scarcely less distinguished for his mechanical skill. He perfected a variety of apparatus of great use to astronomy. One of the most im¬ portant of his constructions was an apparatus for recording right ascensions and declinations to within too'o of a second. He also invented an instrument for the measurement with great accuracy of large differences of declination, such as the ordinary method by micrometer was unable to reach. In 1861 he entered the Federal army as brigadier-general of Ohio volunteers, and on 11 April 1862 was promoted major-general. From 17 September he com¬ manded the Department of the South and the Tenth corps, operating in South Carolina. He was known in the army as ((01d Stars.® He was a Fellow of the American Academy of Arts and Sciences and an associate of the Royal Astronomical Society of London. He published and edited The Sidereal Messenger (1848-58), and wrote (The Planetary and Stellar Worlds) (1848) ; (The Orbs of Heaven1 (1851) ; (Popular Astronomy1 ; <A Concise Elementarv Treatise of the Sun, Planets, Satellites and Comets1 (1860), both republished (London 1892), and (The Astronomy of the Bible1 (1863). Consult Mitchel, F. A., (Life of Ormsby McKnight Mitchel1 (Boston 1887).

MITCHELL, mich'el, Anthony, Scottish bishop: b. Aberdeen, Scotland, 24 Oct. 1868; d. there, 17 Jan. 1917. He was educated at Aber¬ deen University, where he won prizes for his ability in classic studies, and at Edinburgh Uni¬ versity and the Episcopal Theological College, and was ordained in 1892. After serving as rec¬ tor of Saint Mark's Church, Portobello, he be¬ came principal and Pantonian professor of the¬ ology at the Theological College of the Episcopal Church in

Scotland in 1905. He was ap¬ pointed canon of Saint Mary's Cathedral in 1905, and chancellor in 1912. He was well known in the United States, having come here in 1914 to deliver lectures on theology and on the history of Scotland. His published works are (Tatters from a Student's Gown1 (1890) ;

(History of the Episcopal Church in Scotland1 (1907) ; (Story of the Church in Scotland1 (1908) ; (Biographical Studies in Scottish

Church History1 (1914).

MITCHELL, Charles, English pugilist: b. Birmingham, 1861 ; d. Hove, near Brigh¬ ton, April 1918. He first took to fencing, of which science he became a teacher be¬ fore he was 20. Adding boxing to his reper¬ tory, he had passed through several successful bouts with amateurs until he distinguished him¬ self in 1882 by winning a competition open to all Enghsh heavyweights. Although he was little more than a lightweight himself, he had already won a similar competition for middle-weights. He was then brought to America to meet John L. Sullivan, who then weighed 204 pounds against Mitchell's 150 pounds. In the second round at Madison Square Garden the Englishman knocked his opponent off his feet, and at the close of the third round the fight was stopped by the police. Mitchell's two-handed blows were so accurate and severe that for a long time Sullivan declined his chal¬ lenge to a contest under Prize Ring rules in a 24-foot arena. On 10 March 1888, however, they met at Chantilly in France, and after a struggle of 39 rounds, lasting 3 hours, 10

minutes, 55 seconds, the fight was declared a draw. Fought in the open air, in a pouring rain, that battle formed one of the strangest chapters in the annals of old-style pugilism. The rounds varied in duration from 7 minutes,

7 seconds to 10 seconds, Mitchell often going down at the slightest tap to economize his strength. In the earlier stages, Sullivan, with 42 pounds advantage in weight, had much the best of the fighting, but he could never really corner his elusive opponent, who seemed little the worse for the punishment he had received when the draw was mutually agreed to. Mitchell practically retired from the ring after the fight, but returned in 1894, past his prime and out of form, only to be knocked out in the third round 'by J. J. Corbett after an exciting contest. Mitchell had never been knocked out before. He was married to a daughter of George Washington Moore, popularly known as

dony11 Moore, formerly a circus rider and one of the founders of the Moore and Burgess Minstrels. In temperament Mitchell, though a most brilliant and courageous boxer, was ex¬ tremely sensitive and quick to take offense.

MITCHELL, Clifford, American physician: b. Nantucket, Mass., 28 Jan. 1854. He was graduated at Harvard in 1875 ; studied medi¬ cine in the Chicago Medical College and the Chicago Homoeopathic Medical College ; began to practise in Chicago in 1878; and devoted himself to diseases of the kidneys. He was for many years professor of chemistry, toxicol¬ ogy, and renal diseases at the Chicago Homoeo¬ pathic Medical College, and after 1905 of clinical urinology and renal diseases at Hahne¬ mann Medical College, Chicago. He is associate editor of the Clinique and of the Phi Alpha Gamma Quarterly. Has established a diagnos¬ tic laboratory in the Marshall Field Annex, and invented a stain for urine sediments and a rapid test for albumin in urine. He is author of (Student's Manual of Urinary Analysis1 (1879) ; (Physician's Chemistry1 (1884) ; den¬ tist's Manual of Special Chemistry1 (1887) ; denal Therapeutics1 (1898) ; diseases of the Urinary Organs1 (1903) ; (Modern Urinology1

(1912).

MITCHELL, Donald Grant, American author ((<Ik Marvel11) : b. Norwich, Conn., 12 April 1822; d. Edgewood, Conn., 15 Dec. 1908. He was graduated at Yale in 1841; studied law in New York; was United States consul to Venice in 1853; and in 1855 settled on his farm, ˆEdgewood,11 near New Haven. He has writ¬ ten much, on various themes, and always with a genial charm and ease of style. His best-known works are the idyllic sketches called (Reveries of a Bachelor1 (1850), and dream Life1 (1851). He also wrote drench Glean¬ ings1 (1847), descriptive of his first European trip, as (The Battle Summer1 (1850) was of his stay in Paris in 1848; (The Lorgnette1 (1850), a satiric novel of New York life in the forties; dudge Doings1 (1855), another New York society novel; (The Seven Stories with Basement and Attic,1 a series of tales of travel (1864); dr. John1 (1866), a religious story contrasting life in Connecticut and in the French Midi ; and the more characteristic papers on men, books and outdoors, such as (My Farm at Edgewood1 (1863) ; (Wet Days at Edgewood1 (1865); dural Studies1 (1867);

‘English Lands, Letters and Kings* (1889), and (American Lands and Letters) (1897).

MITCHELL, Edward Page, American journalist: b. Bath, Me., 24 March 1852. He was graduated at Bowdoin College in 1871 and joined the staff of the Boston Advertiser. Since 1875 he has been engaged on the editorial staff of the New York Sun, of which he be¬ came editor in 1911. In 1913 he was special lecturer at the Columbia School of Journalism. In 1909-11 he was president and after that date vice-president of the Sun Printing and Publishing Company. Mr. Mitchell’s writings on the editorial page of the Sun have attracted wide attention for their brilliancy. He has also contributed to magazines. He is an overseer of Bowdoin College and a member of numerous clubs.

MITCHELL, Elisha, American scientist: b. Washington, Conn., 19 Aug. 1793; d. on Mount Mitchell, N. C., 27 June 1857. He was graduated at Yale in 1813; four years later be¬ came professor of mathematics in the Univer¬ sity of North Carolina; and in 1826 was made professor of chemistry, mineralogy and geology in the same institution. The Olmsted-Mitchell Geological Survey (1824-28) did important work under his supervision. He discovered that a peak in North Carolina is the highest in the Eastern States and during a storm he was killed by a fall from this height. It is now called in his honor Mount Mitchell or Mitchell’s High Peak, and on its summit he is buried.

MITCHELL, Henry, American civil engi¬ neer: b. Nantucket, Mass., 16 Sept. 1830; d. Boston, Mass. 11 Dec. 1902. He was a son of William Mitchell (q.v.), was educated at the Normal School in Bridgewater, Mass., and in 1851 was appointed to government service as a civil engineer under the United States Coast Survey. He acted as assistant to the commis¬ sioners on harbor encroachments in New York in 1859 and discovered the underflow of the Hudson. He was later engaged in Boston har¬ bor and assisted in the improvement of the mouth of the Mississippi in 1874. He made an investigation of the Panama Canal scheme under De Lesseps and held many government commissions to investigate the principal harbors along the Atlantic Coast, including Portland, Me., Providence, R. I., Norfolk and Ports¬ mouth, Va., and

Philadelphia, Pa. He was ap¬ pointed professor of physical hydrology at the Massachusetts Institute of Technology in 1869. In 1874 he was the representative of the United States Coast Survey on the board of engineers for the improvement of the mouth of the Mississippi, and later a member of the James B. Eads advisory board and of the Mississippi River Commission. In 1879 he visited the Suez Canal and inspected it under the authority of Ferdinand De Lesseps. He published many reports of surveys, *etc.*

MITCHELL, Hinckley Gilbert, American biblical scholar: b. Lee, Oneida County, N. Y., 22 Feb. 1846. He was graduated at Wesleyan University in 1873 and in the theological de¬ partment of Boston University 1876, and Leip¬ zig University 1879. From 1879 to 1880 he was pastor of the Methodist Episcopal Church at Fayette, N. Y. In 1880-83 he was instructor in Hebrew and Latin in Wesleyan University, and in 1883-1905 professor of Hebrew and

biblical exegesis in Boston University; 1905-06 instructor in the Semitic languages in the same institution. Since 1910 he has been professor of Hebrew and Old Testament exegesis in Tufts College. In 1901-02 he served as director of the American School of Biblical Research in Jerusalem; in 1914 for the summer quarter he was supplying professor in the University of Chicago and lecturer at two sessions of the Summer School of Theology, Harvard Univer¬ sity. His most important publications are 'Hebrew Lessons) (1884) ; (Amos) (1893) ; 'The Theology of the Old Testament, *a trans¬ lation from Piepenbring (1893) ; 'Isaiah, chap¬ ters i-xii* (1900) ; 'The World before Abra¬ ham* (1901) ; 'Tales Told in Palestine,* in col¬ laboration with J. E. Hanauer (1904) ; 'Genesis) (1909) ; 'Haggai and Zechariah) (in the International Commentary 1912) ; 'The Ethics of the Old Testament* (1912), and numerous articles in The Journal of Biblical Literature and various theological publications.

MITCHELL, John, American labor leader : b. Braidwood, Will County, Ill., 4 Feb. 1870; d. New York, 9 Sept. 1919. He entered the mines at Braidwood at the age of 13, and in 1885 joined the Knights of Labor. The next few years he spent in the West and Southwest, and in 1890 settled at Spring Valley, continuing his work at his trade. He read and studied constantly and was a member of several debat¬ ing societies and reform clubs ; he was also active in the labor movement and was presi¬ dent of the Knights of Labor local at Spring Valle}7. On the formation of the United Mine Workers in 1890 he became a member of that organization, was frequently delegate to district conventions

and in 1895 was elected secretary-treasurer of the northern Illinois subdistrict; in 1896 he was chairman of the Illinois mine workers' legislative committee, and in 1897 was made a national organizer of the United Mine Workers. In January 1898 he was elected vice-president of that organization and in September of the same year became acting president; he was elected president in 1899, but retired in March 1908; he was also a vice-president of the American Federation of Labor from 1898 to 1914. During his term of office as president of the United Mine Workers the union was enlarged, wages were increased and the eight-hour day extended ; he conducted the strikes of the anthracite miners in 1900 and 1902, and brought the latter to a close by his offer in behalf of the miners to accept the decisions of a commission appointed by the President of the United States. After serving for nearly three years as active head of the Trade Agree¬ ment Department of the National Civic Feder¬ ation, he spent two years on the lecture plat¬ form, speaking in all parts of the country. He served on the New York State Commission on Employers' Liability and Workmen's Compen¬ sation, which drafted the first compensation law enacted by the State of New York. In March 1914 he was appointed to membership on the Workmen's Compensation Commission of New York State, then created, and when in May 1915 this commission was merged with the State Department of Labor, under the ad¬ ministration of the Industrial Commission, he was made chairman of the Industrial Commis¬ sion of the State of New York.

MITCHELL, John Ames, American editor and author: b. New York, 17 Jan. 1845; d. 29 June 1918. He was educated at Harvard and studied in Boston and Paris, and was an archi¬ tect in Boston in 1870-76, after which he be¬ came interested in decorative art and studied art in Paris, 1876-80. Returning to New York he engaged in journalism as artist, illustrator and writer, and in 1883 founded and edited Life, one of the very best periodicals of its kind in the United States. He was a member of the National Institute of Arts and Letters. He pub¬ lished (Croquis de l'Exposition' (1879) ; (The Romance of the Moon) (1886) ; (The Last American) (1889) ; (Amos Judd' (1895) ; (The Pines of Lorv)

(1901); (The Villa Claudia' (1904); (The' Silent War' (1906); 'Pandora's

Box> (1911).

MITCHELL, John H., American lawyer and senator: b. Washington County, Pa., 22 June 1835; d. Portland, Ore., 8 Dec. 1905. He was educated at Witherspoon Institute, Pa., and was admitted to the bar of Pennsylvania and went to California, where he established a law practice, but in 1860 removed to Oregon and engaged in practice there. He was State senator in 1862-66 and president of the senate in 1864. In 1867-71 he was professor at Wil¬ lamette University, Salem, Ore. In 1873-79 and 1885-97 he was United States senator from Oregon and was returned to the Senate in 1901. He acquired a considerable fortune as lawyer to the great Western railroads.

MITCHELL, John Kearsley, American physician : b. Shepherdstown, Va., 12 May 1798; d. Philadelphia, Pa., 4 April. 1858. Re¬ turning from Ayr and Edinburgh, Scotland, where he had been sent at the age of eight, he studied medicine under Dr. Nathaniel Chap¬ man and was graduated at the medical depart¬ ment of the University of Pennsylvania in 1819. He made three voyages to China and the East Indies as ship-surgeon and then set¬ tled in Philadelphia as general practitioner. In 1824 he lectured on the institutes of medicine and physiology at the Philadelphia Medical In¬ stitute, and in 1826 became professor of chem¬ istry there. He was given the chair of chem¬ istry at the Franklin Institute in 1833 and for five years delivered annual courses of lectures on chemistry as applied to medicine and the arts. From 1841 to 1858 he was professor of the theory and practice of medicine at Jefferson Medical College. Dr. Mitchell was visiting physician to the Pennsylvania and City hos¬ pitals. In addition to numerous papers pub¬ lished in medical and scientific journals, he wrote (Saint Helena, a poem by a Yankee) (1821); Undecision, a Tale of the Far West and Other Poems' (1839); <On the Wisdom, Goodness and Power of God as illustrated in the Properties of Water' (1834) ; and (On the Cryptogamous Origin of Malarious and Epi¬ demic Fevers) (1849), a theoretical anticipa¬ tion of modern views. His 'Five Essays on Various Chemical and Medical Subjects) were published after his death by his son, Silas Weir Mitchell (1858).

MITCHELL, Langdon Elwyn (pen-name <(1ohn Philip Varley"), American author and olavwright : b. Philadelphia, Pa., 17 Feb. 1862,

son of Dr. Silas Weir Mitchell (1829-1914). He was educated at Saint Paul's School, Con¬

cord, N. H., and in Europe. He studied law at Harvard and Columbia, and in 1886 he was admitted to the New York bar. From 1883 he devoted himself to literature and the drama. He is a member of the National Institute of Arts and Letters and of the Players Club, New York. His most successful plays are (Becky Sharp' and (The New York Idea.' His books are 'Sylvian and Other Poems' (1884) ; 'Poems' (1894) ; and (Love in the Back-woods' (1896).

MITCHELL, Maggie. See Mitchell, Margaret Julia.

MITCHELL, Margaret Julia ("Maggie Mitchell"), American actress: b. New York, 1832; d. 22 March 1918. She made her first appearance on the stage as an infant and before she was five had taken child parts. She made her debut as Julia in 'The Soldier's Daughter' at Burton's Chambers Street Theatre in New York, and as Fanchon, the Cricket, produced in 1860, she made herself famous. She was married to Henry Paddock, her manager, 15 Oct. 1868, and continued her career on the stage, playing in many famous roles: 'The Pearl of Savoy' ; 'Jane Eyre' ; (Little Barefoot' ; 'Mig-non,' *etc.* She divorced Mr. Paddock in 1888 and married Charles Abbott, her leading man, in August 1889. Her last public appearance took place in April 1892.

MITCHELL, Maria, American astronomer: b. Nantucket, Mass., 1 Aug. 1818; d. Lynn, Mass., 28 June 1889. She was the daughter of William Mitchell (q.v.), an astronomer of some note, and when a girl frequently assisted him in his observations. She taught for a time in a private school, and was for 20 years librarian of the Nantucket Athenaeum, but continued to carry on her astronomical studies and obser¬ vations. She first became known as an astron¬ omer by her discovery of a comet in 1847, and for this discovery she received a medal from the king of Denmark. She later discovered several nebulae and was engaged in computa¬ tions for the (Nautical Almanac' and on work for the Coast Survey for several years. In 1848 she was elected an honorary member of the American Academy of Arts and Sciences, the first woman to receive this honor, and in 1857 went to Europe, visited the principal ob¬ servatories and was received with honor by Herschel, Humboldt and other noted scientists. In 1865 she was appointed professor of astron¬ omy and director of the observatory at Vassar College. She went to Burlington, Iowa, with some of her students to observe the total eclipse of the sun in 1869

and on other eclipse expedi¬ tions ; but for the most part she gave up her research and observation work to devote her¬ self to teaching and building up her department. She was an inspiring and original teacher and deeply interested in the advancement of the interests of the college ; during her later years there she endeavored to raise a fund toˆendow the chair of astronomy; this fund ($50,000) was completed after her death and was named in her honor the Maria Mitchell Endowment Fund. She resigned from her position at Vas¬ sar in 1888 and was made professor emeritus. She was a member of the American Associa¬ tion for the Advancement of Science and was given the degree of LL.D by Hanover in 1852 and by Columbia in 1887. She was a believer

in woman's suffrage, blit not active in the suffragist movement; she was, however, a mem¬ ber and for several years president of the American Association for the Advancement of Women. In 1908 the Maria Mitchell Obser¬ vatory was dedicated at Nantucket. The Maria Mitchell Astronomical Society was named in her honor. Consult Babbitt, M. K., (Maria Mitchell as Her Students Knew Her) (Pough¬ keepsie 1912) ; Kendall, P. M., Rife, Letters, and Journals of Maria Mitchell 5 (Boston 1896) ; Mitchell, Henry, in Proceedings of the American Academy of Arts and Sciences) (Vol. XXV, Boston 1889-90) ; Whitney, M. W., (In Memoriam) (Poughkeepsie 1889).

MITCHELL, Peter, Canadian statesman :

b. Newcastle, New Brunswick, 4 Jan. 1824; d. Montreal, 25 Oct. 1899. He studied law and was admitted to the bar in 1848. Shipbuilding and other business pursuits soon engrossed his attention and he abandoned law, but in 1856 he entered political life as Liberal member in the provincial assembly of New Brunswick, and in 1860 was appointed to the legislative council, and five years later was appointed a life mem¬ ber of the legislative council and was premier 1865 to 1867. Mitchell was one of the foremost in the organization of the Canadian confeder¬ ation, and was a delegate to the Charlottetown and Quebec conferences, and to London in 1866. He was appointed to the

Canadian Sen¬ ate in 1867, and resigned in 1873. He was Minister of Marine and Fisheries, 1867-74, and was chiefly instrumental in settling the negotia¬ tions between the United States and Canada over the Bering Sea fisheries. He sat in the House of Commons, 1874-78 and 1882-96. He purchased in 1885, and for some years edited, the Montreal Herald. In 1897 he was ap¬ pointed inspector of fisheries for the Atlantic provinces. He was the author of a review of President Grant's message to Congress relative to the Canadian fisheries (1870).

MITCHELL, Samuel Alfred, American

astronomer : b. Kingston, Ontario, Canada, 29 April 1874. He was graduated at Queen's University, Kingston, in 1894 and took his Ph.D. in Johns Hopkins in 1897, where he had been Fellow in astronomy in 1896. He was tutor and instructor in astronomy at Columbia in 1899-1908 and became professor of astronomy at the McCormick Observatory, University of Virginia, in 1913, which post he now (1918) holds. He was a member of the United States eclipse expeditions to Georgia (1900), to Sumatra (1901), to Spain (1905) and to Ore¬ gon (1918). In the summers of 1907, 1909, 1910 and 1911 he was research associate at Yerkes Observatory, University of Chicago. In 1909-12 he was editor of the Monthly Evening Sky Map. He is a member of various scientific societies.

MITCHELL, Samuel Augustus, American

geographer: b. Bristol, Conn., 30 March 1792; d. Philadelphia, 20 Dec. 1868. His early life was devoted to teaching in which he was very successful, but the inadequate treatment of geography by the textbooks then in use induced him to turn his attention to the making of satisfactory ones and he spent 40 years in Philadelphia in the preparation of textbooks on that subject. So general was their adoption that they reached a total sale of 400,000 annually.

Besides his geographical textbooks, of which there were 24, he edited a new edition of John James Audubon's Rirdsof America) and wrote (General View of the World, Physical, Political, and Statistical 5 (1846), and (New Traveller's Guide through the United States) (1850).

MITCHELL, Silas Weir, American physi¬ cian, inventor of the <(rest cure,® poet and novelist: b. Philadelphia, 15 Feb. 1829; d. 4 Jan. 1914. He studied at the University of Pennsylvania, was graduated from Jefferson Medical College in 1850, entered practice in

Philadelphia, during the Civil War was in charge of the Turner's Lane United States hospital (Philadelphia) for diseases and in¬ juries of the nervous system, and subsequently was president of the Philadelphia College of Physicians. In his professional capacity he became known for his researches in connection wdth nervous diseases, and in physiology and toxicology. A bibliography of his publications would supply the titles of some 150 medical papers, recounting investigations of high scien¬ tific importance. To a wider degree, how¬ ever, he is known through his literary work, composed principally of poetry and fiction. He was elected to the American Academy of Arts and Sciences and the National Academy of Sciences, and was also made associate corre¬ sponding or honorary member of foreign scien¬ tific societies. His works in medical science in¬ clude Researches on the Venom of the Rattle¬ snake } (1860) ; (Gunshot Wounds and other Injuries of Nerves) ; Reflex Paralysis5 (1864); (On Injuries of the Nerves and their Conse¬ quences5 (1872) ; and Rat and Blood, and How to Make Them5 (1877). Among his other writ¬ ings are, in verse, (The Hill of Stones5 (1882) ; (The Masque5 (1887) ; (The Psalm of Death5 (1890), and (The Wager5 (1900) ; in fiction, Roland Blake5 (1884) ; Rar in the Forest5 (1888); <A Madeira Party5 (1895); Hugh Wynne5 (1897) ; (The Adventures of Frangois5 (1899) ; (The Autobiography of a Quack5 (1900); (Circumstance5 (1901); (Collected'

Poems5 (1896) ; (Memoir of Owen Jones5

(1896) ; (Constance Trescot5 (1905) ; (Doctor and Patient.5 Consult Oberholtzer, E. P., Rersonal Memories of Weir Mitchell5 (in the Bookman, Vol. XXXIX, New York 1914) ; the Book News Monthly (Vol. XXVI, Philadelphia 1907) ; Tucker, B. R., (S. Weir Mitchell5 (Bos¬ ton 1914) ; Williams, Talcott, (Dr. S. Weir Mitchell5 (in the Century Magazine, Vol. LVII, New York 1898). Consult also (A Catalogue of the Scientific and Literary Work of S. Weir Mitchell5 (Philadelphia 1894).

MITCHELL, Sir Thomas Livingstone,

Scottish explorer: b. Craigend, Stirlingshire, Scotland, 16 June 1792; d. Darling Point, Sydney, Australia, 5 Oct. 1855. He served in Wellington's army in the Peninsular War from 1808 until the end of the campaign, obtaining the rank of major in 1826, and was sent to survey the battlefields afterward. His map of the Lower Pyrenees is still valued. This led to his publishing (Outlines of a System of Surveying for Geographical and Military Pur¬ poses5 (1827) and the appointment of deputy surveyor-general of New South Wales (1828).

Between 1831 and 1846 he made four explor¬ ing expeditions discovering the Peel, the Namoi, the Gwyder and other rivers and traced the

course of the Darling and the Glenelg. He was also the first to penetrate into the district that he named Australia Felix. On his last expedi¬ tion, devoted to the discovery of a route be¬ tween Sydney and the Gulf of Carpentaria, he explored the Fitzroy Downs, and discovered the Balonne, Victoria, Warrego and other rivers. Visiting England in 1838-39 he was knighted and made D.C.L. by Oxford. He took with him some of the first specimens of gold and the first diamond found in Australia. In 1851 he was sent to the Bathurst goldfields to make a report. In 1853 he again visited England where he patented his boomerang propeller for steamers. His publications chiefly relate to his explorations : (Three Expeditions into the Interior of Eastern Australia) (2 vols., London 1838) ; journal of an Expedition into the Interior of Tropical Australia) (1848) ; Australian Geography) (1850); and (The Lusiad of Camoens Closely Translated) (1854).

MITCHELL, Walter, American Protestant Episcopal clergyman : b. Nantucket, Mass., 22 Tan. 1826; d. 1908. He was graduated from Harvard in 1846 and admitted to the bar in 1849, but deciding to enter the Episcopal minis¬ try, received ordination to the priesthood in 1860. He held many important charges and was for a time chaplain of Kenyon College, Gambier, Ohio, until he retired from active service. He published Two Strings to His Bow) ; (Bryan Maurice,* *etc.*

MITCHELL, William, American astrono¬ mer: b. Nantucket, Mass., 20 Dec. 1791; d. Poughkeepsie, N. Y., 19 April 1868. He taught for a time, became cashier of the Pacific Bank in Nantucket, and interested in astronomy and mathematics, made a long series of investiga¬ tions in connection with the United States Coast Survey studies of the figure of the earth. Be¬ sides lecturing on astronomy in Boston and elsewhere, he contributed to the American Journal of Science, and supplied time to whal¬ ing vessels. He received academic honors from Brown and Harvard universities and was elected to the American

Academy of Arts and Sciences.

MITCHELL, Ind., a city in Lawrence County, 43 miles southwest of Columbus on the Chicago, Indianapolis and Louisville and the Baltimore and Ohio Southwestern railroads. Limekilns are among the chief industries. There are also mills for flour and timber. Pop.

3,438.

MITCHELL, S. Dak., city and county-seat of Davison County, is located on two divisions of the Chicago, Milwaukee and Saint Paul Rail¬ way, and 68 miles east by north of Sioux Falls. Il was settled in 1879, incorporated as a city in 1883, and is governed under the general law charter of 1890 by a mayor who holds office for two years, and a council of eight members, four of whom are elected each year. The ter¬ ritory surrounding Mitchell is an agricultural district, producing principally corn and alfalfa, fruits and vegetables, while hogs, cattle, sheep and all stock, especially dairy herds, are found in great numbers. The city's grain products, *etc.* reach all of the Eastern terminals, South¬ ern markets and Southern export markets and considerable stuff goes to the west coast and much to export via Puget Sound cities . The wealth of the city and county is reflected in its

banks and trust companies, which have a com¬ bined capital, surplus and undivided profit of $934(479t84, with deposits over $4,000,000. Mitchell is the seat of Dakota Wesleyan Uni¬ versity, a Methodist Episcopal Church State University and has well-equipped schools and churches. Poo. about 8,800.

MITCHILL, mlch'Il, Samuel Latham. American scientist: b. North Hempstead, L. L,

20 Aug. 1764; d. New York, 7 Sept. 1831. He was graduated M.D. at the University of Edin¬ burgh in 1786, and in 1788 was a commissioner for treating with the Iroquois Indians for the purchase of land. In 1792 he was appointed professor of chemistry, natural history and philosophy in Columbia College, where he first introduced the system of nomenclature in¬ vented by Lavoisier. In 1797 he

founded with Dr. Edward Miller and Elihu H. Smith the quarterly Medical Repository, of which he continued the editor for 16 years. It was the first scientific periodical published in the United States. In 1801 he became a representative in Congress, and in 1804 was chosen to the United States senate. At the expiration of his term of office he was again elected to the House of Representatives. On the establishment of the College of Physicians and Surgeons he was ap¬ pointed (1808) professor of natural history, be¬ coming in 1820 professor of botany and materia medica. The institution in 1826 gave place to the Rutgers Medical School, of which Dr. Mitchill became vice-president. Though widely respected in his lifetime as a man of extraordi¬ nary learning and styled the ((Nestor of Amer¬ ican science,® he was occasionally the butt of the satirical wits of New York, and the poems of <(Croaker & Co.,® to which Fitz-Greene Halleck was a contributor, contain records of some of his eccentricities. He proposed to change the name of this country to ((FredomaC and wrote in 1804 (An Address to the Fredes, or People of the United States. > He was one of the early supporters of Robert Fulton, whom he accompanied in 1807 in the first steamboat journey on the Hudson. He was tlie author of ˆObservations on the Absorbent Tubes ot Animal Bodies' (1787) ; 'Nomenclature of the New Chemistry' (1794) ; 'Life, Exploits, and Precepts of Tammany, the famous Indian Chief,* a half historical, half fanciful address before the Tammany Society of New York (1795) *etc.* Consult Francis, (Reminiscences of Samuel Latham Mitchill* (1859).

MITE, formerly a term applied to a very small coin worth about one mill. The name was used for a small coin current in Palestine in the time of Christ.

MITES, small parasitic members of the Arachnidan order Acarina, which also contains the ticks (q.v.), mange-insects and similar forms. The body is compact, not divided into separate regions, as head, thorax and abdomen , and they appear, as they are, greatly inferior to the spiders. They have eight legs, eyes useless, or nearly so, two spiracles onlv, and mouths with sharp, beak-like mandibles, fitted for biting or for piercing the skin of the animal on which they reside or prey by imbibing its juices, the mites undergo a .metamorphosis, the larva passing through a series of changes varying with the species. The species are many, and are parasitic on a large variety of animals, and

on mankind. In America, for instance, no less than 18 kinds infest poultry, of which the red mite (Dermanyssus gallince) and the chicken itch-mite (Sarcoptes nutans), attacking the feer, are the most commonly met with. A contagious disease among chickens is caused by a sort of mange-mite (Cytodites nudus) that flourishes in the air-passages, setting up inflammation of the lungs. The most serious disease of sheep is caused by the scab-mite (Psoroptes com¬ munis), varieties of which also produce “scab” in horses, cattle, goats and rabbits.

Household pests are the cheese-mites of two species that now have a worldwide distribu¬ tion ; but they will flourish equally well in other sorts of stored goods. A cheese once attacked will speedily be reduced to a powdery mass of mites, cast-off skins and excrements, the result of the amazingly rapid multiplication of the mites, and the fact that they produce living young. The new generation matures quickly and at once continues the production. When the stock of food is wholly consumed the youngest and oldest mites die, but those in vigorous middle age assume a scale-like quiescent form, called the hypopus stage, which is able to subsist indefinitely without activity or food. Finally a cockroach, mouse or some other small creature comes near enough to be seized by the hypopus, when it clings ‘to a hair, crawls to the surface of the skin, begins to feed and sets up a new colony.

Of the mites inhabiting the human body the itch-mites (Sarcoptes scabei) is the most import¬ ant and fortunatelv is disappearing. It affects a large number of hairy kinds of animals in all parts of the world, as well as man, and lives continuously on its host. The itching sensation denoting its -presence is caused by the female mites burrowing beneath the skin, where the eggs are laid, and by the young feeding on the tissues before making their way to the surface in search of breeding-mates. Mange (q.v.) in dogs is the result of the presence of a simi¬ lar mite (S. canis). Workers in copra are annoyed by related mites ; and soft sugar is sometimes infested with mites of the genus Tyroglyphus, which cause <(grocer’s itch” in those who handle it. A common mite whose presence gives little if any trouble is the one (Demodex) found in the “blackheads,” or blackish follicles that disfigure the noses of some of us.

That desperately annoying pest of autumn in some places, the minute red “harvest-bugs® of the genus Leptus, inhabit vegetation whence they attach themselves to man and other ani¬ mals and begin to burrow in the skin causing an intolerable heat and itching, often resulting in bad sores. Consult authorities in Economic Entomology and Hygiene : especially Ealand, Hnsects and Man> (New York 1915). See Tick.

MITFORD, mit’ford, Mary Russell, Eng¬ lish writer: b. Alresford, Hampshire, England, 16 Dec. 1787 ; d. Swallowfield, near Reading, Berkshire, 10 Jan. 1855. Her education was obtained largely through her very wide reading. She won a lottery prize of £20,000 when three years old, with which her-spendthrift father built a house at Reading. Owing to his extrav¬ agance, the family had to move to a laborer’s cottage, and she to earning by her pen. Her

first published work was (Miscellaneous Poems’ (1810). With the sketches (Our Village,’ de¬ scriptive of English rural life (first appeared in Lady’s Magazine , 1819; collected 1824, 1826, 1828, 1830, 1832), she may be said to have originated a branch of literature. Among her dramatic works, five in number, (Rienzi’ (1828) was most successful; in America it be¬ came popular with Charlotte Cushman as Claudia. Included in her further writings are (Recollections of a Literary Life’ (1852), and the works of fiction (Belford Regis’ (1835) and (Atherton’ (1854), the latter highly praised by Ruskin. Her correspondence (published 1870) has been by some ranked almost with her books. Consult the (Life’ by L’Estrange (1870) ; ib., (The Friends of Mary Mitford as Revealed in Letters from her Literary Cor¬ respondents’ (1882)’; the correspondence with Boner and Ruskin, edited bv Elizabeth Lee (1915) ; and Roberts, W. J., (Mary Russell Mit¬ ford: The Tragedy of a Blue Stocking’ (1913).

MITFORD, William, English historian : b. London, 10 Feb. 1744; d. Exbury, 10 Feb. 1827. He was educated at Oxford, and ob¬ tained a commission in the Hampshire militia, of which he became colonel. His early fond¬ ness for Greek led him to the study of Greek historians, and he was induced, partly through the advice of Gibbon, a fellow-officer in the same regiment, to undertake a ‘History of Greece.’ The first volume appeared in 1784; the fifth and last, bringing the narrative down to the death of Alexander the Great, in 1818. With considerable critical acumen and diligent research he elucidated many obscure ooints, and until the appearance of the works of Thirlwall and Grote, his history was considered of the highest authority. A strong

prejudice against democracy leads him to speak of the Athenians as a horde of treacherous miscreants, of De¬ mosthenes as a malignant demagogue and of Philip as a perfect statesman and warrior. Mitford was professor of ancient history in the Royal Academy, and member of Parlia¬ ment for three boroughs in succession 1 785— 1818. Besides his principal work he published an (Essay on the Harmony of Language' (1774) and lesser works.

MITHAN. See Gayal.

MITHRAS, mith'ras, in Perso-Iranic divin¬ ity, first the god of the heavenlv light and the lord of all countries, afterward the sun, or the genius of the sun, which was worshiped as a deity bv the Persians, and at a later per¬ iod also in Rome. Mithras stands as a medi¬ ator between Ormuzd and the world, and was involved in the struggle with Ahriman, the evil power. He is commonly represented as a hand¬ some youth, wearing the Phrygian cap, tunic and cloak, and kneeling on a bull, into whose throat he is plunging the sacrificial knife. The bull is at the same time attacked by a dog, a serpent and a scorpion. As the monuments of this worship were destroyed during the Mohammedan conquests, knowledge of its doc¬ trines and rites is necessarily vague and uncer¬ tain ; but it had some remarkable resemblances to Christianity. The worship of Mithras was formally suppressed in the 4th century. In Germany many tokens of its former existence are still to be found, as the monuments at

Hedernheim, near Frankfort-on-the-Main, and other places.

MITHRIDATES (mith-ri-da'tez) VI, surnamed Eupator, and also styled commonly The Great, king of Pontus : b. Sinope, 134 b.c. ; d. Pantacapaeum, 63 b.c. He ruled from 121 b.c. until his death. He early entered on his career of conquest, which ultimately involved him in war with Rome. He subjugated the peoples on the northern shore of the Euxine (Black) Sea, attacked Cappadocia and Bithynia, and since these were allies of Rome, there encountered Roman opposition. After the death of Sulla, 78 b.c., Mithridates levied another army to expel

the Romans from Asia. Being defeated by Lucullus, appointed consul 74 b.c., he was fol¬ lowed by the victorious Romans into his own states, and driven to seek refuge in Armenia, then ruled by Tigranes, who refused to deliver him up. Here Mithridates raised a third great army, and in 67 b.c. completely defeated the Romans; and, following up his success, rapidly recovered the larger part of his dominions. The Romans now invested Pompey with abso¬ lute power in the East, and by him, in 66 b.c., the forces of Mithridates were completely routed near the Euphrates. The king retired to Bosporus (the Crimea), where his troops headed by his son Pharnaces, broke out in mutiny, and Mithridates killed himself. He was considered by Rome its most formidable enemy. He was a patron of art and science, and is said to have spoken 22 languages. See Pom¬ pey ; Sulla.

MITLA, met'la (((the place of the dead®), Mexico, a village of the state of Oaxaca, on the Mixtecapan Plateau, 26 miles southeast of Oaxaca. It is celebrated for its extensive an¬ cient ruins which comprise five great groups of temples, palaces, tombs and other edifices cover¬ ing about 2,000 feet square and respectively known as (1) the Catholic establishment: (2) the Columns; (3) the Arrows; (4) the Abode; and (5) the South Side. They were elabo¬ rately decorated with admirable mosaic work in geometrical designs and with pictographic mural paintings. The ruins of a fort of the same architecture dominate a hill a short dis¬ tance west of the city and in the vicinity are the quarries whence the stone for building the city was obtained. See Mexican Archeology. Consult Saville, (Cruciform Structures near Mitla> (1900).

MITLAG-LEFFLER, mit'tag-lef'ler, Mag¬ nus Gustaf, Baron von, Swedish mathema¬ tician: b. Stockholm, 16 March 1846. After studying mathematics in Upsala, Paris and Ber¬ lin he began to teach in Upsala where he ob¬ tained a degree in 1872. In 1877 he became professor of mathematics in Helsingfors and in 1881 at the University of Stockholm. Under the patronage of King Oscar he founded the Acta Mathematica, one of the leading mathematical journals in the world. He was several times rector of the University of Stockholm and became a member of the Academy, of Sciences of Sweden in 1883. His mathematical writings deal chiefly with the theory of functions.

MITO, me'to, Japan, a town in the island of Hondo, seven miles from the east coast and 73 miles by rail northeast of Tokio. It is a town of considerable antiquity and has played an im¬ portant part in the history of the country.

There is an old castle and some fine public gardens. The manufactures include cloth, paper, for which it is famous, cigarettes, *etc.* Pop. about 35,000.

MITO, Doctrine of, said to be the creed of the Mito school of Japan from the middle of the 17th century to the overthrow of abso¬ lute power in the 19th century. This doctrine rested on the revival of the old learning of Japan, the honoring of the emperor and the expulsion from the country of ((the barbarians® or foreigners.

MITO, or MYTHO, French Indo China. See Mytho.

MITOSIS, or KARYOKINESIS, the

process of indirect nuclear division of cells undergoing growth or beginning those changes in the egg which bring about the growth of an embryo. This is almost universal, but (<amitosis,® or direct cell-division occurs in pathological tissues and a few of the lowest organisms. The first stages are characterized by a rearrangement of the nuclear network into a series of loops or V-shaped bodies. Meanwhile a minute body in the cytoplasm, or extra-nuclear cell-contents, has divided into two, and the portions have arranged themselves at opposite poles, with the nucleus between them. Each of the two portions forms a star-like aggregation consisting of a centrosome with a radiating mass. The V-shaped bodies, or chromosomes, of the nucleus arrange them¬ selves with their open ends outward and their closed ends near the centre, and they then separate along the central or equatorial plane, one-half proceeding to each centrosome, with whose rays it becomes incorporated and is firmly held. The cell then becomes constricted between the centrosomes, and in each of the two portions a new nucleus is developed by a process essentially the reverse of that just de¬ scribed. The final result is the formation of two daughter-cells out of the original mother¬ cell, each of which contains an exact half of the essential chromatin elements not only in respect to equal quantities, but in respect to those qualities, chemical or. other, which con¬ stitute the inheritable individuality of ‘the or¬ ganism. For fuller information see Cell; Embryology; and consult the authorities cited under those titles.

MITRA, me’tra (Sanskrit, meaning friend), an Indian god of light, belonging to the Vedic period. Mitra is the Friend, the personification of Daylight, a bright being beloved of man. His name is coupled with that of Varuna, another bright being. The association between them is so close that they present themselves to the mind as an inseparable

pair — Varuna-Mitra or Mitra-Varuna, — who drive the same golden chariot and think the same thoughts. Together they are the keepers of the Cosmic Order and the Law of Righteousness, and together they watch the deeds and hearts of men, equally all-seeing and all-knowing. The suit is often called the eye of Mitra-Varuna as well as Varuna's alone; and Light is the chariot on which these two inseparable gods ride through space on their appointed path. They are also avengers and forgivers of sin. It is Mitra's particular business to wake men and call them to the duties of a new day. Only one hymn is addressed to Mitra alone.

The general character of the hymns of the Rig-Veda is as follows: ((Mitra and Varima, you mount your chariot, which is golden when the dawn bursts forth and has iron poles at the setting of the sun; from thence you see what is boundless and what is limited, what is yonder and what is here.® Varuna and Mitra are both Adityas, that is, sons of Aditi, who, in consequence, is called ((Mother of the Gods.® She probably designates boundless space (aditi, space). Varuna and Mitra are, therefore, Sons of Boundless Space, Sons of Eternity, Sons of Beauty and Brightness, forgivers of sin, guardians of purity and truth, givers of health. They are thoroughly prac¬ tical and beautiful deities. Mitra is identical with the Iranian Mithra, or Mithras, also a solar deity and the central figure of a special cult. See Mithras; Avesta, and Vedic Literature.

MITRA, Rajendra Lala, Indian Orientalist: b. near Calcutta, 15 Feb. 1824; d. Calcutta, 26 July 1891. He came of the writer caste of Bengal and educated himself in his father's li¬ brary, where he studied particularly Sanskrit and Persian. In 1846 he was made librarian of the Asiatic Society and devoted the rest of his life to this body, working as philological secretary, vice-president and president from 1885. The University of Calcutta gave him the degree of LL.D. in 1875 and he received the Companionship of the Indian Empire when that Order was founded in 1878. He became Raja in 1888. Besides numerous contributions to the Journal of the Asiatic Society and a

series of Sanskrit texts entitled (Bibliotheca indicaP he published three important works, (The Anticuities of Orissa) (2 vols., 1875 and 1880) ; (Bodh Gaya,* the hermitage of Sakya Muni (1878) ; and Hndo-AryansP dealing with the manners and customs of the people of India from Vedic times (2 vols. 1881).

MITRAL VALVE. See Heart, The.

MITRE, me'tra, Bartolome, Argentine soldier, politician and author : b. Buenos Aires, 26 June 1821 ; d. there, 19 Jan. 1906. In early manhood he found it discreet to leave the coun¬ try, as his political poems were offensive to the dictator, Rosas, and he engaged in newspaper work in other parts of South America. He be¬ came the leader in the movement in which Buenos Aires proclaimed itself independent, 11 Sept. 1852, and was successively Minister of the Interior and of War in the Buenos Aires gov¬ ernment. The force commanded by him was defeated by Urquiza at Capeda, 23 Oct. 1859, and Buenos Aires was reunited with the Argen¬ tine Confederation. In May 1860 he was elected governor of Buenos Aires. New troubles with the Confederation arose, and he defeated Ur¬ quiza at Pavon, 11 Sept. 1861. In 1862 he was elected President of the New Argentine Repub¬ lic to serve for six years, and after a very prosperous administration became Minister to Brazil. He was defeated for the Presidency in 1874 and 1898, and was afterward elected to the Senate, of which he became president. He was the founder of an influential newspaper, La Nacion, and is one of the most noted writers Argentina has produced. His chief works are 'Historia de Belgrano) (1857) ; and (ttistoria de San Martin) (1884), of which there is an abridged English translation (1893).

MITRE, in ecclesiastics, a sacerdotal head¬ dress worn by bishops and certain other Church dignitaries on solemn occasions, being a sort of cap pointed and cleft at top. There has been much controversy regarding the date at which the mitre became part of the official dress of bishops, but the general view is that it was not in use in the Church till the begin¬ ning of the 11th century. Some have con¬ tended that the early Christian Church adopted with little change the headdress of the Jewish priests. Three kinds are worn in the Roman Catholic Church, namely, the precious mitre, of gold or silver and ornamented with jewels; the mitra auriphrygiata of gold cloth, without jew¬ els (except pearls) ; and mitra simplex or plain mitre, of white silk or linen. Bishops and mitred abbots receive their mitres from the bishop who consecrates them. The Greek Church has no mitre properly so

called. Since the Reformation the mitre has rarely formed a part of the costume of an English Church dig¬ nitary until within recent years, when it has been adopted by many bishops. See Costume, Ecclesiastical.

MITRE-SHELL, the shell of a gastropod mollusk of the genus Mitra and family Mitri-dee, closely allied to the Muricidce, so called be¬ cause of its resemblance in form to a bishop's mitre. The shells are thick, somewhat fusi¬ form, with the spire very high and acute, and a small aperture and operculum. The genus is a very large one, comprising several hundred species mostly from shallow, tropical seas and especially abundant in the Malayan region. Mitra episcopalis is abundant on the tidal flats of the Philippine Islands. During the day, es¬ pecially at low water, they burrow beneath stones or hide in crevices, but are active at night. They secrete a purple fluid having a nauseating odor and act as scavengers. Con¬ sult Cooke, (Cambridge Natural History* (Vol. I, 1895).

MITROVICZ, rmt'ro-vits, Jugo-Slavia, also called, Mitrovicza and Mitrowitz, town in Croatia-Slavonica, on the river Save in the county of Syrmia, 43 miles west of Belgrade. Roman remains have been discovered in the neighborhood and the city occupies the site of Sirmium, or Syrmium, the chief city of lower Pannonia under the Roman rule. The Em¬ peror Probus (232-282) was born and buried at Sirmium ; and here, according to some authori¬ ties, the noble emperor, Marcus Aurelius (121-180), died. Ecclesiastical councils of import¬ ance met in 351, 357 and 358 at Sirmium, which became an episcopal see in 305. In 1773 it was united with the diocese of Bosnia. The Huns sacked Sirmium in 441 and the Turks ravaged Mitrowitz completely in 1396 and 1521, destroy¬ ing all the old buildings. A few ruins of the ancient Roman city are still to be seen. The countryside produces fruit, wine and grain, and the industries are chiefly the culture of silkworms and tanning leather. Pop. about

12,909.

MITSCHERLICH, mich'er-lik, Eilhard, German chemist: b. Neuende, near Jever, Ol¬ denburg, 7 Jan. 1794; d. Schonberg, near Ber¬ lin, 28 Aug. 1863. He was the son of a clergy¬ man and nephew of the celebrated scholar, Christophe Wilhelm Mitscherlich (1760-1854). Going to Heidelberg in 1811, he devoted him-

self to philology and more particularly to Per¬ sian. In 1813 he went to Paris, hoping to ob¬ tain permission to join the embassy which Na¬ poleon I was about to send to Persia. Political changes ended this plan and Mitscherlich then determined to study medicine in order to have the privileges accorded to physicians traveling in the East. He went to Gottingen to study medicine, and while there published a book on (Persian History,) compiled from manuscripts in the university librarv. It was printed i'n Persian and Latin (1814). While studying medicine in Gottingen, his attention was at¬ tracted to geology, chemistry and physics, and in 1818 he went to Berlin to work in the lab¬ oratory of H. F. Link (1767—1851). His re¬ searches led to the discovery of the law of Isomorphism (1819). Berzelius invited him to Stockholm (1820), whence he returned in 1822 to fill the chair of chemistry in Berlin. One of his earliest discoveries in Berlin was that of the double crystalline form of sulphur, one of the first observed cases of dimorphism. His investigations regarding the production of artificial minerals and his memoir on benzine and the formation of ether were also important. His principal work is (Lehrbuch der Chemie (2 vols., 1829-1835, 4th ed., 1840-48). After his death his notes were published in the (Memoirs> of the Berlin Academy (1868). Con¬ sult Rose, (Eilhard Mitscherlich) (Berlin 1864) and (Erinnerungen an Eilhard Mitscherlich> (1894).

MITSUI, met-soo'e, a name which has in Oriental financial circles a prestige similar to that of Rothschild in those of the West. Ihe mercantile house of Mitsui and Company was established by Takatoshi (1633-1706), and has been identified with almost every large concern of industrial and economic interest in Japan.

MIT.SUKURI, mit'su-ku'ri, Kakachi, Jap¬ anese zoologist: b. Edo, Japan, 1857, d. 1909. He came to the United States in 1873, received his Ph.D. from Yale in 1879 and Johns Hop¬ kins in 1883; and, returning to Japan, became professor in College of Science, University of Tokio, in 1882. In 1893 he was made councillor of this university and in 1901 dean of the Col¬ lege of Science. In 1896 he was placed at the head of the fur-seal commission and signed a treaty with the United States and Great Bri¬ tain. In recognition of his public service

the Order of the Sacred Treasure was given to him in 1907. He was one of the leading zoolo¬ gists of Japan and published a very important series of papers on the embryology of turtles

(1886-96).

MITTERMAIER, mit'er-mi'er, Karl Jo¬ seph Anton, German jurist: b. Munich, 5 Aug. 1787; d. Heidelberg, 28 Aug. 1867. He was educated at the universities of Landeshut and Heidelberg. After serving as professor in Bonn in 1819-21, he became professor of law and jurisprudence in Heidelberg, which he held for the rest of his life. His greatest work is a complete manual of criminal law, (Das deutsche Strafverfahren in der Fortbildung durch Gerichtsgebrauch und Landesgesetz-biicher> (Heidelberg 1845-46). He published a number of books and treatises on important questions relating to jurisprudence, trial by jury and the penal code. Many of these were translated into various languages. He was a VOL. 19 — 18

member of the Baden legislature for many years; president of the Frankfort vorparha-ment ; and representative of the city of Baden in the German National Assembly. Consult Mittermaier, <Bilder aus dem Leben von K. J.

A. MittermaieU (Heidelberg 1886).

MITTIMUS (from the Latin, we send), the name of a written warrant issued by an official and directing a proper officer to convey safely the body of a prisoner to jail or any other place of' confinement until released by the due process of the law.

MITTWEIDA, Germany, a town in the kingdom of Saxony, 30 miles southwest of Dresden and 12 miles north of Chemnitz, on the Zschopau. It possesses a handsome Evan¬ gelical church, a classical, modern and technical school, cotton and spinning mills, and engineer¬ ing and furniture works. Cigars and cement are also produced here. The town is chiefly Protestant. Pop., including Rossgen, about

17,800.

MITYLENE, mit-i-le'ne, MYTILENE, or LESBOS, a historic island of the ˆgean Archipelago, off the northwest coast of Asia Minor, since 1913 belonging to Greece, and called by the Greeks Mitilini or Mytilene, from its capital. In shape it is nearly triangular, but on the south there are two deep and nearly land-locked bays ; area, 675 square miles. It is mountainous (the highest peak, Mount Olym¬ pus, is 3,077 feet) but fertile and is one of the finest islands of the archipelago. The culti¬ vated fruits include the olive, vine, fig, orange, pomegranate, apricot, pear and apple. The olive is the most important crop, large quantities of oil being produced. Wine, for which the island was anciently famous, is still made, but after antiquated methods. The chief exports are oil, hides, wool, valonia and fruits. There is ex¬ cellent marble, deposits of iron, copper, alum, etc., and thermal springs utilized in the cure of rheumatism and nervous diseases. There are some tanneries, soap-works, numerous oil-mills, earthenware works, *etc.* The chief town is Castro, near to which are the ruins of Mitylene, the ancient capital. Pop. (estimate of 1914)

182,167. t

The island anciently known as Lesbos was famous as a centre of Greek life and civiliza¬ tion. It formerly contained six cities, by far the most important being Mitylene and Methymna. It was early inhabited by Greeks of the ZEolian race. Its inhabitants made an active resistance to the Persians, but were finally obliged to submit (about 540 b.c.). After the defeat of the Persians by the Greeks at the battle of Mycale (479 b.c.) it became the ally of Athens. During the Peloponnesian War it revolted from Athens, whereupon an Athenian fleet was sent against it, the walls of Mitylene were demolished a.nd 3. thousand of the richest inhabitants put to death. The island itself was divided into 3,000 parts, of which 300 were de¬ voted to the service of the gods, and the rest divided among the Athenians, by whom they were rented to the ancient proprietors. The cities, nevertheless, soon rebelled again. Alex¬ ander the Great made a treaty with the Les¬ bians after the battle of Gramcus ; the island was afterward reduced by the Macedonians and subsequently became part of the Roman province of Asia, and it was placed by Con-274

stantine in the Provincia Insularum. Saint Paul passed through the

channel between the island and the. mainland on his way from Corinth to Jerusalem (Acts xx, 14). In 1462 a.d., after belonging to a Genoese family, the island was taken by Mahommed II. During the War of Independence, the Turkish and Greek squadrons fought a battle off Mitylene 7 Oct. 1824, on which occasion the Turks were defeated and their fleet was destroyed. In con¬ sequence of strained relations between France and Turkey a French fleet was sent to Mitylene 5 Nov. 1901 and remained there till the Porte agreed in full to the demands made. As one of the islands occupied by Greek forces during the Graeco-Turkish War of 1912-13, it fell to that power on the conclusion of peace.

The Lesbians in ancient times were notori¬ ous for their dissolute manners, and the whole island was regarded as the abode of pleasure and licentiousness. At the same time they had the reputation of the highest refinement and of the most distinguished intellectual cultiva¬ tion. Poetry and music made great progress there. The Lesbian school of music was cele¬ brated and is said to have produced musicians superior to all the other musicians of Greece. Among these the most distinguished were Arion of Methymna and Terpander of Antissa. Alcaeus and Sappho, both Lesbians, were es¬ teemed the first in lyric poetry. Pittacus (one of the seven wise men), the philosophers Theo¬ phrastus and Theophanes (the bosom friend of the great Pompey) and the historians Hel-lanicus, Myrtilus, etc., were also natives of this island. It was often chosen as a place of resi¬ dence by distinguished foreigners. Epicurus and Aristotle taught there. Consult Tozer, (Islands of the .TEgean5 (London 1890).

MIVART, miv'art, Saint George Jackson,

English naturalist: b. London, 30 Nov. 1827; d. there, 1 April 1900. He was educated at Harrow and King's College, London. Having joined the Roman Catholic Church in his 17th year, he thereafter received his academic train¬ ing in Saint Mary's College, Oscott. In 1851 he was called to the bar at Lincoln's Inn, but the possession of ample means enabled him to gratify his taste for natural history. He was appointed lecturer on zoology in Saint Mary's Hospital Medical School in 1862, and from 1874 till 1877 was professor of biology in the Roman Catholic University College at Kensington. On the invitation of the Belgian bishops he ac¬ cepted, in 1890, the chair of the philosophy of natural history in the University of Louvain. He was vice-president of the Zoological Society in 1869 and 1882, secretary of the Linnsean Society 1874-80 and its vice-president on two occasions (1880 and 1892). Among Mivart's contributions to reviews, etc., are those on 'The Structure of the Fins of Fishes, 5 'The Oste¬ ology of Birds,5 'The

Zoology, Anatomy, and Classification of Apes and Lemurs,5 and his ‘Memoir of the Insectivora.5 He also pub¬ lished several important works on natural his¬ tory subjects and the philosophical questions arising out of them. His best-known work is ‘The Genesis of Species) (1871), in which, while fully admitting organic (though not mental) evolution, he argues against Darwin’s theory of natural selection and attempts to ex-1 lain the production of new species as due to

an innate plastic power. Among his other works may be enumerated ‘Lessons in Elemen¬ tary Anatomy5 (1873) ; ‘Man and Apcs) (1873); ‘The Common Frog5 (1874; new ed., 1881) ; ‘Lessons from Nature5 (1876) ; ‘Con¬ temporary Evolution5 (1876) ; ‘The Cat5 (1881), a good introduction to the study of the vertebrate animals, especially the mammals; ‘Nature and Thought5 (1882) ; ‘A Philosophi¬ cal Catechism5 (1884) ; ‘On Truth: A System¬ atic Inquiry5 (1889), in which he discusses the ultimate basis of science; ‘The Origin of Hu¬ man Reason5 (1889), in which he insists on the fundamental distinction between man and all other animals; ‘Monograph of the Canidae5 (1890); ‘Birds: The Elements of Ornithology5 (1892), a musical introduction; ‘Essays and Criticisms5 (1892); ‘Types of Animal Life5 (1893), all vertebrate ‘and mainly mammalian; an ‘Introduction to the Elements of Science5 (1894). The articles in the 9th edition of the ‘Encyclopaedia Britannica5 on Apes, Reptilia (Anatomy) and Skeleton were from Mivart’s pen. He published anonymously a novel, ‘Henry Standon,5 republished shortly after his death under the title ‘Castle and Manor.5 Mivart’s contributions to the study of the verte¬ brate animals, though not of epoch-making importance, were always valuable and luminous. In the latter part of 1899 and the beginning of 1900 he expressed himself with considerable freedom regarding certain doctrines of the Roman Catholic Church, and on hrs refusal to sign a declaration of faith submitted to him was inhibited by Cardinal Vaughan from taking the sacraments of the Church.

MIWOK STOCK. See Moquelunan.

MIXED MARRIAGES, a name applied to

marriages between persons of different reli¬ gions. In the United States the term generally refers to a marriage between a Roman Catholic and a Protestant. In England a marriage be¬ tween a baptized and an unbaptized person is ecclesiastically unlawful; one between a mem¬ ber of the Catholic Church and of any other Christian community is civilly valid, but ecclesi¬ astically unlawful unless a

dispensation is first obtained. If a Roman Catholic and a Prot¬ estant desire to marry, they must, according to Roman Catholic practice, promise that the children shall be brought up in the Roman communion; the bishop may then grant a dis¬ pensation and the marriage, without the nuptial benediction, must be performed by a Roman Catholic priest, no repetition of the ceremony by priest or clergyman of any other communion being tolerated. See Ne Temere Decree.

MIXED PROPERTY. That which is not altogether real or personal, but a compound of both, such, for example, as heirlooms, tomb¬ stones, *etc.*

MIXED RACES. Racial amalgamation, or crossing of the races, which begun in prehis¬ toric times, has been continued into our own era with ever-increasing speed and complicity of results. Broadly speaking, any two races can unite to form a third race. As the process of amalgamation has been going on for so many thousands of years, an exhaustive classi¬ fication of the existing mixed races is impos¬ sible. The types that stand out most promi¬ nently are the mulatto, the cross between the

white and the negro; the mestizo, the cross be¬ tween a European and the American Indian; the Eurasian, or Anglo-Indians, the mixture of English and natives ; and the complex mixture found in the East Indian Archipelago, in which Chinese and Malayan types predominate. The results of racial intermarriage have been ex¬ ceedingly variable. Sometimes it has produced a better race. This is the case when the cross¬ ing has been between different but closely allied stocks. ((The Englishman,® writes Dr. J. G. Wilson, ((who has resulted from the commin¬ gling of so many Teutonic tribes with the native Briton and Celt and the composite molded and directed by Roman culture, is, perhaps, the very best example of a good result from extensive crossing. Likewise the cross which has taken place in Ecuador, Mexico and Peru has pro¬ duced a race of great promise. It is not so much a question of the possibility of producing a vigorous

cross race under favorable condi- • tions, as whether such a cross is, in itself, a desirable thing. The vital question is whether this inevitable amalgamation is worth the fos¬ tering care and regulation of our government. The answer to this question depends altogether upon what will be the results of this immigrant blood upon our own individual selves and upon our social and political institutions. When we come to consider the question of the influence of racial amalgamation upon our habits of thought, upon our morals and upon our institu¬ tions — upon our spiritual selves — we are con¬ fronted with a much graver problem. History is replete with instances where nations have lost their own peculiar form of civilization and political institutions on account of overwhelm¬ ing alien influences. That the influence of the alien in the United States is enormous, and that it is yearly becoming more and more important, is almost a self-evident proposition. Whatever the race of people from which the immigrant comes, the final result is not to be feared so long as he does not come in overwhelming numbers. If he trickles in slowly we shall take care of him. Let him be what he will, the amal¬ gamation will finally be complete. On the other hand, if we continue to let him come in what is practically unlimited numbers, we can¬ not take care of him. He will take care of us. We shall lose our inherited Anglo-Saxon ideals, and instead of a perfect amalgamation we shall confront the danger of a complete racial sub¬ stitution.® It has been the misfortune of white civilization in its contact with the colored races in America, Africa and Australasia that both its worst products and its least desirable repre¬ sentatives were the ones first in the field. This has been an important factor in shaping the early relations of the races. It is the rover, the outlaw and the irresponsible trader who come first, and it is too often the contraband goods of civilization that they carry. It has been the rougher type of white also who has intermar¬ ried with native women and become the father of a hybrid progeny. There is a varying de¬ gree of adaptability and fusing power among the different branches of the white race in their relations with backward peoples. The Latin peoples in Europe have shown peculiar capacity for successful intermarriage with tropic races. Spaniards have crossed with fair success with both Indians and negroes in America and with Mˆalays in the Philippines, as

have the Portuguese with the two former types in Brazil. In the Spanish and French West Indies there is a greater proportion of mixed marriages than in the British West Indies and there are fewer evidences of social friction. Prejudice against the blacks is not confined to Europeans and Americans. The Chinese, the most

cosmopolitan of peoples, sometimes ex¬ hibit a striking aversion to taking black wives, but manifest no particular aversion to the na¬ tive women of Java or Borneo. East Indian laborers imported into the British West Indies and the British Guiana have sometimes interbred with blacks; but in British Guiana they are generally said to despise the negroes. Prof. U. G. Weatherly writes: ((It is an unquestion¬ able fact that the yellow, as well as the negroid peoples possess many desirable qualities in which the whites are deficient. From this it has been argued that it would be advantageous if all races were blended into a universal type embodying the excellencies of each. But sci¬ entific breeders have long ago demonstrated that the most desirable results are secured by specializing types rather than by merging them.

The color line is evidence of an attempt, based on instinctive choice, to preserve those distinctive values which a racial group has come to regard as of the highest moment to itself. Although sometimes based on a blind prejudice surviving from the primal instincts of periods of isolated savagery, it invariably has in it the core of a sound scientific truth, which is, that specialization is the law of effi¬ ciency. The fact that it is always the lighter race that puts the taboo on the colored and that the latter is every where eager to mix with the whites, is only an evidence of the general trend of choice towards the higher efficiency of the white race.® Consult Weale, B. L. Putnam, <The Conflict of Color) (London 1910) ; Bryce, James, (The Relations of the Advanced and Backward Races of Mankind) (Oxford 1902) ; Boas, Franz, (The Mind of Primitive Man) (New York 1911) ; Popular Science Monthly (pp. 474-495, 1911).

MIXITE. A rare mineral, basic hydrous

copper bismuth arsenate, 2OCuO.Bi2O3.5A2O5.22H2. Occurs in very slender bluish green acicular radiating crystals and tufts in Tintic district, Utah.

MIXOGAMY (from the Greek words meaning mixed marriage), a term describing the breeding habits of fishes. Gunther, in his (Introduction to the Study of Fishes) (London 1880), describes mixogamous fishes as follows: ((The males and females congregate on the spawning beds, and, the number of the former being in excess, several males attend to the same female, frequently changing, from one fe¬ male to another. Some Teleostei (Ophioceph - alus), and probably all chrondropterygians are monogamous; and it is asserted that the con¬ nection between the pair is not merely tempo¬ rary, but lasts until they are separated by acci¬ dent.®

MIXOPHYTE, a term applied to plants that are capable of living independently or dependently upon dead organic matter. It is now definitely established that all green plants take up minute proportions of organic food. Many species attach themselves to the bodies of other organisms and derive all of their food supply

from their host;. Consult Macdougal, Daniel Trembly, Practical Textbook of Plant Phvsi-ology) (New York, London, Bombay and Cal¬ cutta 1912).

MIXOSAURUS, a genus of small fish-lizards (/ chthyo pterygia) from the Triassic formations of Europe, differing from typical ichthyosaurs by their fewer teeth and some minor characters.

MIXTEC, mes'tak, or MISTEC («cloud people®), a Mexican tribe of Indians of the Zapotecan stock occupying the coast of Guerrero and the northwest of Oaxaca. They are highly skilled in agriculture and the simpler arts, have built cities and temples of hewn stone and pos¬ sess a hieroglyphic literature, keeping a cal¬ endar like the Aztec tribes. They are noted for their pottery and woven products. Pop. about 200,000.

MIXTURE (from the Latin mixtura), a product of mixing, i.e., the amalgamation of different ingredients mutually diffused through one another. It also means the action of be¬ coming mixed such as a mixing or blending of races. Mixture is, moreover, used to denote a preparation for medicinal purposes and in pharmacy is applied to potions of liquid medi¬ cine. Mixture is also used to denote ((type-set-ting that calls for the use of two or more dis¬ tinct faces, or faces and bodies of type.® Mix¬ ture is the opposite of solution.

MIXTURE, an organ stop. It is ordinarily furnished with from three to six small metallic pipes to each key and is compounded of the higher sounding and therefore shorter members of the foundation and nutation classes of stops, combined or mixed and arranged to draw to¬ gether as in practice they are seldom required to be used

separately. ((The mixture,® writes an authority, ((represents or corroborates the higher consonant harmonic sounds suggested by nature, and in the bass produces tones to the third or fourth octave above the major or chief foundation tone. As the musical scale ascends the higher harmonics become weak and inaudible to the ear; hence in a mixture stop it is customary to discontinue the higher ranks as they ascend, one or more at a time, and insert in lieu a rank of a lower tone than was previously in the stop but appearing as a separate stop.® This alteration is called a (<break.®

MIZPAH, miz'pa, or MIZPEH, the name of several places in Palestine. The word signi¬ fies a high place or lookout mentioned in the Bible. Mizpeh of Gilead (Gen. xxxi, 45) marks the site of the pillar and heap of stones put up by Jacob and his brethren in the moun¬ tains of Gilead in token of God being a witness to the covenant made between him and Laban. The (<Mizpah ring® takes its name from this episode (see verse 49). The site is still pointed out with its group of rough stone monuments in the village of Suf. — The Mizpeh of Ben¬ jamin (Josh, xviii, 26, etc.) lay north of Jerusalem on an unknown site. — That of Judah (Josh, xv, 38) stood north of Hebron and 20 miles south of Jerusalem. Nothing is positively known of the Mizpeh of Moab (1 Sam. xxii, 3).

MJOSEN, mye'sen, Lake, Norway, situ¬ ated in a picturesque and fertile valley, 36 miles

northeast of Christiania, is the largest lake in the country. It is 62 miles long, with a maxi¬ mum breadth of 10 and an average breadth of two miles. It is exceptionally deep, having a maximum depth of 1,460 feet. It is fed by the Laugen River and drains through the Vormen and Glommen into the Skager Rack. There are numerous popular summer resorts on its shores.

MLAWA, m'la'va, Poland, town in the gov¬ ernment of Plozk, 65 miles northwest of War¬ saw on the river Mlaum, at the junction of the Marienburg-Mlawa and the Kowel-Mlawa rail¬ ways. It has five churches, a 16th century town-hall, a custom-house of the first class and has importance as a trading point. It was founded in 1429 and was a wealthy city till the Swedish invasion. In 1910 it had a popula¬ tion of 18,652. In the World War the town fell into the hands of the Germans.

MNEMONICS, •ne-mon'iks, a system of artificial aids for assisting the

memory. Such methods have been in use for many years. They consist in the main of some mechanical scheme or framework which, by association, is linked with what one desires to memorize. One of the oldest forms of verbal mnemonics is contained in the familiar lines, <(Thirty days hath September, April, June and November,® *etc.* ; and many similar devices are known. The medical student has an unlimited number of mnemonic aids whereby to remember the names of the muscles, to call to mind the relation of important viscera and to determine accurately the order of the cranial nerves. Students of logic have for years made use of mnemotechnic devices to remember the parts of the syllogism. (See Logic). Some of these devices are based on topical association, whereas others depend on number and letter relations, and a great many which have been in vogue in recent years are based upon sound and rhyme relations. A general criticism that can be made of most of these memory-schemes is that the processes are purely mechanical, and that one of the funda¬ mental features in memory, that is, memorizing for the sake of idea-relation, is given up for the sake of word-relation. For certain classes of students and for certain lines of work these mechanical schemes may be of much service; for salesmen, for instance, who need to bear in mind immense quantities of goods with their wholesale, retail and discount prices. But as a process of general culture, improving mind-facilities, so called, mnemotechnics are mechanical. See Memory.

MNEMOSYNE, ne-mos'i-ne, in Greek my¬ thology, the goddess of memory; the mother of the nine muses of Zeus. She was a daughter of Uranus.

MOA, one of a race of extinct ratite flight¬ less birds of New Zealand, forming the family Dinornithidce and composed of several genera (see Dinornithes) ranked between the apteryx and the epiornis. They had comparatively small heads, small eyes, bills of varied form, great legs, wings almost or quite wanting, and the head and neck bare. The feathers of the body were rounded, loose in part, downy, with great aftershafts. Some of the feathers were black with red-brown bases and white, others blackish brown or yellowish. They varied in size from

that of a turkey (Anomalopteryx parva) so that of the huge Dinornis maximus, 12 feet in height. The remains of these birds are found in sand-dunes, bogs, caves and places where the aborigines had fed upon their flesh. Not only bones, but pieces of skin, ligaments, feathers and eggs have been recovered. It is probable, indeed, that these birds became extinct only four or five centuries ago. The Maori tradi¬ tions recount the wars of extermination which their early ancestors waged with the moa; and the natives profess to show the spot where the last one was killed. Clearer traditions say that the habits of the birds were sluggish, but their disposition fierce. They lived in pairs, fed upon green shoots and fern-roots and made rude nests on the ground. Their anatomy was elaborately described in a memoir by Owen,

(Lxtinct Birds of New Zealand) (London 1879), and a general account of them. may be found in Newton's (Dictionary of Birds* (ib 1896) ; and Rothschild's (Extinct Birds) (ib. 1907).

MOAB, mo'ab, the ancestor of a Semitic people who occupied! a region east of the Dead Sea and the Jordan (its other boundaries vary¬ ing) from an early period till the Christian era. In the Old Testament (Gen. xix, 37) he is said to be the son of Lot by his elder daugh¬ ter. The (< plains of Moab** spoken of in Num¬ bers are the hot plains of the Jordan Valley. The region to which the Moabites were con¬ fined by the Amorites was strongly fortified on every side by nature, and was noted for its rich pastures and its wine. The institution of monarchy was of much earlier introduction among the Moabites than among the Israelites, but the religion of Moab seems to have been very similar to that of their more celebrated neighbors and kinsfolk. Their supreme god was Chemosh, who held among them much the same position as Jehovah among the Israelites and they seem to have had something akin to the priesthood and general theocratic organ¬ ization of the Israelites, only that the inhabit¬ ants of conquered cities were massacred in his honor. The Moabites were for a time trib¬ utary to Israel, but regained independence in Rehoboam's reign. They were afterward harassed by the Assyrians, but at one period they assisted the latter against the Jews Moab is mentioned about the 6th century a.d., but the people, as distinct from their neighbors, have long passed out of existence. The extensive ruins which now cover their country bear wit¬ ness to their former greatness. The language of Moab was closely akin to that of Israel. Consult Tristram, (The Land of Moab* (New "York 1874); and Smith, George Adams, <The Historical Geography of the Holy Land1* (Lon¬ don 1897).

MOABITE STONE, in archeology, a monument of black basalt, about 3 feet 8J4 inches high, and 2 feet Zl/2 inches wide, and 1 foot 1$| inches thick, with rounded top but square base, on which there is an inscription of 34 lines in Hebrew-Phoenician characters, discovered in 1868 by F. A. Klein at Dhiban in the ancient Moab, just north of the river Arnon. An attempt made to purchase it led to a quarrel among the Arabs of the district, who thought to make more money out of it by selling it in pieces, and the stone was de¬

stroyed partially by being heated and then by throwing water upon it, which caused it to break into three large and several small pieces. The larger pieces were secured for the Louvre by M. Clermont Ganneau, an official connected with the French embassy at Con¬ stantinople, who was also fortunate in obtaining a paper impression of the inscription before the stone was broken. The inscription dates about 850 b.c., and is the oldest known in the Hebrew-

Phcenician form of writing. It was erected by Mesha, king of Moab, and is a record of his wars with Omri, king of Israel, and his succes¬ sors. The narrative also treats of Mesha s wars against the Edomites. Consult Ginsburg, <The Moabite Stone> (1870), and Bennett, W. H., (The Moabite Stone.)

MOBANGI, mo-bang'ge. See Ubangi.

MOBERLY, mo'ber'H, Mo., city, in Ran¬ dolph County, on the Wabash and the Missouri, Kansas and Texas railroads, about 125 miles northwest of Saint Louis. It is an agricultural region with valuable deposits of fire-clay and extensive coal fields. Some of its industrial establishments are the machine-shops of the Wabash Railroad, flour and lumber mills, ice factory, grain elevator, foundry and machine-shops, brick and lumber yards. The trade is chiefly in livestock, poultry, wool, tobacco, dairy products, hides and the local manufac¬ tures. It is the seat of Saint Mary's Academy, and has public and parish schools, a public library, a Young Men's Christian Association

building and the hospital of the Wabash Em¬ ployees Association. Moberly was laid out in 1866, incorporated as the count v-seat in 1868, received in 1873 a city charter revised in 1889. Pop. (1920) 12,808.

MOBILE, mo-bel, Ala., city and county-seat of Mobile County, situated on the western side of Mobile Bay, at the mouth of the Mobile River, 30 miles from the Gulf of Mexico and 50 miles below the junction of the Alabama and Tombigbee rivers. Mobile is 139 miles by rail from New Orleans; 179 from Montgomery on the Louisville and Nashville; Mobile and Ohio; Mobile and Bay Shore; Gulf, Mobile and Northern; Alabama, Tennessee and Northern; Southern; Pensacola; Mobile and New Orleans railroads.

General Plan. — The city is built upon a level, sandy plain from 6 to 35 feet above the river, rising gradually to the table lands 200 to 300 feet above sea-level, six miles west of the river, thus giving the fall required for efficient drainage. The streets are rectangular, many of them broad and shaded with live oak, magnolia, crepe myrtle, camphor and in some sections with pecan, dogwood, holly, sweet and black gum and sycamore trees. Government street noted for its fine homes, broad, lawns and oaks. Dauphin street — West End — Reed and Ann, Georgia and Rapia, Old Shell road, Hall's Mill, Fulton, Cedar Point and other roads to¬ gether with tours through the citrus, fig, pecan and trucking section surrounding the' city are among the many inviting and interest¬ ing drives.

Public Parks. — Mobile has 13 public parks; Bienville, in the heart of the city; Monroe, fronting the bay; Washington, Oakleigh, Bay Shore, Arlington, Ryan, with statue of Father Ryan, the poet priest; Gulf Coast Fair Grounds and Race Track, Monroe Ball Park, Dixie, Eureka, Fearnway, the site of the monument commemorating the death of Eli Frohlichstein, who fell in the taking of Vera Cruz, Mexico, in April 1914; and Lyons, this latter fitted with all modern means for recreation. The Bav Shore Park acquired in 1915 has great natural resources and scenic beauty. In addition to the public parks, there are private parks open to visitors, Ashland place — the home of the late authoress, Augusta Evans Wilson — Flo Claire, Monterey place, Creighton, together with the children's public playgrounds on Church

street. Duncan, on lower Government street, on which is Admiral Semmes' monu¬ ment, also the Monterey and Reed lots for neighborhood children; while at Springhill is the -fully eouinned and nopular Country Club.

Public Buildings. — The chief structures are the government building erected in 1852 at a cost of $379,564; the new post office, completed in 1916, constructed of Alabama marble at a cost of $425,000; county courthouse and jail, city buildings, including the city market, armory and drill hall. Mobile also has three modern railroad stations. Barton Academy. Masonic Temple, cathedral of the Immaculate Concep¬ tion, McGill Institute, Springhill College. City Bank and Trust Company building, Christ Episcopal Church, Southern, Inge-Bondurant and Mobile infirmaries, Battle House, several theatres and modern hotels, Medical College of Alabama and Jewish Temnle.

Educational and Charitable Institutions. —

Mobile has 24 graded public schools for white and seven for colored children. For secondary and higher education it offers Barton Academy and Conti Street High School, Wright's Uni¬ versity Military School and the Emerson In¬ stitute for colored pupils. In addition there are several Catholic and Protestant private schools, the most important being Springhill College, a Jesuit institution founded in 1830. There are five libraries, the Y. M. C. A., Mobile, Mobile public. Cathedral and Mobile County Medical Association. Charitable insti¬ tutions include the Hannon Home for the Aged, Colored Old Folks Home, Protestant Orphan Asylum, Saint Mary's Catholic Female Asylum, Salvation Army Lodging House. Church Home, Benevolent Home for Old Ladies, Seamen's Bethel, *etc.*

Commerce. — Mobile is one of the leading cotton markets and shipping points of the country, the natural centre of the Alabama-Tombigbee cotton region, the nearest tide¬ water shipping port for the soft coal, iron, cement, lime, lumber, turpentine, resin and agricultural products of the southern, central and northern sections of Alabama and large amounts from upper Mississippi and lower Tennessee. A weekly line of large freight and passenger steamers plies the Mobile and Alabama rivers to Montgomery (410 miles) and to Demopolis, at the junction of the Tombigbee River (231 miles) and smaller ves¬ sels ascend the Warrior to Tuscaloosa (360 miles) and at high water to Columbus (380 miles) on the main stream navigable the year round. In addition to the regular lines, there are power barge lines which

brinsr coal, iron and other products to Mobile, New Orleans and other Gulf ports. It is the third largest tropical importing city in the United States; has steamship connection with Europe, Cuba, Central America, Mexico, Windward and all Caribbean Sea islands, Brazil, the Pacific Coast of the United States, western coast of South America, Australia, New Zealand, Hawaiian Islands, Japan and China, via the Panama Canal, to which Mobile is the nearest, deep, fresh water railroad connected city in the United States, situated far enough inland to be beyond the reach of any gun fire from ships on the high seas. Mobile's imports for the calendar year 1913 were valued at $3,675,180. Its exports were $44,238,747. For the calendar year 1915, the total imports were $3,443,228, and the exports $21,317,683, the export figures not including the 84.798 long tons of bunker coal furnished vessels at this port and valued at $256,133. It will be noted above that the ex¬ ports for the year 1915 are less than half those for the year 1913. This was mainly due to the European War, the calendar year ending 31 Dec. 1916 showing exports to be $30,627,633 and the imports $3,997,317, showing still the effects of the war, though trade is rapidly being re¬ covered, the trade with Cuba, West Indies and Central America, increasing by leaps and bounds, beyond all former ratios, its trade with Cuba being second only to that of the port of New York. The calendar year ending 31 Dec. 1917 shows Mobile's imports to have been $2.- 873,680, and its exports $35,010,182. Mobile's trade territory from which to draw materials for export, is rapidly being extended and the

MOBILE, ALABAMA

Bienville Square

.

MOBILE

same is true as to imports. The above figures include for exports cotton and subsidiary products, coal, coal oil, crude oil and by¬ products, iron, iron pipe, cement and cement products, lime, whiting, fuller's earth, lumber and allied products, tar, turpentine, resin, live¬ stock, canned foods and other canned products, flour, lard, salted and pickled pork, salt, soap, cotton goods and notions, gun shells and other ordnance Stores, general foundry and machine-shop products, agricultural and mill machinery, belting and other mill supplies, fire and burglar-proof safes, scales, talking, typewriting, comput¬ ing and other machines, also store and office furniture and fixtures, electrical supplies, hardware, cordage and ship supplies, hay, grain, garden, flower and field seed, household furni¬ ture, sewing machines, musical instruments. Among its imports, are Cuban magnetic iron ore, zinc, ammonia sulphate, sulphur ore, iron pyrites, sodium nitrate, fire brick, tropical fruits and other products, coffee, molasses, sugar, sisal grass, chicle gum, mahogany # logs and lumber, iron, satin, sandal, lignum vitae woods, dye woods, cork, cigars, Cuban tobacco, Peruvian bark, opium and other drug materials, camphor, sponges, bird lime, dried bone, phos¬ phate rock, asphalt, lemons, limes, olives and olive oil, raisins, currents, nuts, mimes, mat" ting, bamboo poles and rods, together with a miscellaneous line of embroid'eries, laces, rugs, tovs *etc.* The importation of Cuban molasses or black strap, as it is now called, used in the making of stock feed and explosives, has in¬ creased to a greater extent than any othei

article of late years… . ,

Industries.— The city's industries include manufacturing jewelries, lithographing, en¬ graving, printing and bookbinding 'establish ments; newspapers, the Mobile Register morning daily — established m 1812; the News-Item — -evening week day; the Advocate and the Press , these two being colored week¬ lies There are three cotton compress ware¬ houses, one having two of the most powerful

and rapid1 cresses m the world, two cottoi mills, one with 10,000 spindles, making knitting and weaving yarns, the other mfll running 16 000 spindles and making a wide range ot cotton goods; a knitting mill, overall and cloth¬ ing factory, several saw nulls, _ the output o which ranks Mobile as the third arCeS t porter of mill production in the South a cot¬ tonseed-oil mill, cotton pickery, black strap stock feed mill, abattoir and packing-house, fertilizer plants, turpentine distilling plants, wood working plants, cooperage, sash, door and blind factories, two of. the largest cedar, cigai box and veneer mills in the

world, making 80 per cent of the entire output of the country, metal working machine shops and foundries, hoe factory, oxy-acetylene wrelding works, aero¬ plane and motor factory, saw and brass works, copper workers, corrugated conduits, con¬ tainers, resin recovery works, metal box fac¬ tory steam boiler works, stove, car wheel, pul-lev and gunshell foundry and machine shop, trolley and steam railroad car shops ship and boat repair plants and slips, floating dry docks, one of the latter being the largest marine dock south of the government dock on Chesapeake Bay and another of sufficient capacity to take in government ships of the greatest size. The Chickasaw Shipbuilding Company -a sub¬

sidiary of the United States Steel Corporation -has established a $10,000,000 plant upon the Mobile River, where ways have been set up and ships of iron and steel are under construction.

In addition to this, there are five other large shipbuilding companies, three ice factories, ice cream, candy, fruit products company, broom and brush factory, coffee and spice mills, creamery, chewing gum and proprietary m cine manufactures, peanut butter factory, trunk, bag, leather and carriage factories leather belting company, art glass and tile works, terracotta, brick, dram pipe and pottery plant, paint mills, roofing and cornice work, brass foundries. Mobile has two electric light and power companies, one operating 60 miles ot street car service, the other furnishing light, heat and power, two telephone companies and one gas company, these being privately owned, the Mobile and Ohio Railroad Company own¬ ing and operating the grain elevator, having a 250,000-bushel capacity. The International Harvester Company has long been importing, through this city, its sisal grass with which it has made its binder twine and has also estab¬ lished a cordage factory for the manufacture of ropes of all kinds and sizes. The fish and oyster, crab and turtle industries are also im¬ portant and growing industries.

Revenues, Banking, etc.— For the year 1916 the revenue of the city of Mobile other than receipts of paving assessments, from waterworks and other than special tax for the payment of the refunding bonds — was as fol i-lows: Taxes for general purposes, $258,4/4./ 1, business licenses, $109,684.49; city wharves, $24 382.31. Receipts from various other sources not specified above, $106,292.45, making a tota of $498,834.96. The city is living within its income and even anticipating its obligations, at the same time steadily improving in all depart¬ ments • the funds obtained from the issue of bonds

’amounting to $600,000 are being used in constructing docks and terminal railway con¬ necting these docks with railroads entering the city. These bonds, authorized by an election held 13 Aug. 1917, draw 5 per cent per annum interest, payable semiannually, May and No¬ vember, and run for 30 years. In addition to this municipal increment to the city s enter¬ prise, is a freight handling device known as the Telpher system, in which the city has a financial interest, with option to take it over a „ 1aler specified date. The assessed valuation for 1915M6 amounted to $35,911,654 and the citv is authorized to issue bonds aggiegating ner cent of this amount to be expended tor pur¬ poses other than schools, waterworks sewers, e°c The total bonded debt of the city under this provision is $1,664,950. The citv has five banks; the First National, established 1865 and the oldest in the State, capital $300,000 re Qnlirres $9 271 121.36, surplus and profits 8658,-363.38; the People’s Bank, capital $200,000 re¬ sources $5 000,000, surplus (earned) $200,000 and undivided profits $100,000 ; Merchants Bank, capital $150,000. resources $3,478,53041, surplus and undivided profits (earned) $262-909 51 ’ Union Savings Bank, capital $35,000, resources $305,054.74, surplus and undivided profits (earned) $19,215; The Farmers ; and Mechanics’ Bank of Mobile, capital $1 00,000, surplus paid in $10,000, organized 1917

Government — Mobile is under the com-

mission form of government, which went into operation 14 Aug. 1911, and three commis¬ sioners were elected to serve one, two and three years respectively; the terms of all having ex¬ pired, they have been reelected, the time of service being extended at each election, the elections in the future to be for a term of six years, the time of one commissioner expiring at the end of every second year. The commis¬ sion form of government has proved to be in every way more satisfactory than the former method of a mayor and council. Pop. about 51,521, or including the suburbs Creighton, Pritchards, Plateau and Whistler, about 63,000. Pop. in 1917 estimated to be 72,000.

History. — Mobile Bay was visited by the Spaniards in 1511 and was

the original seat of French colonization in Louisiana. The illustri¬ ous brothers Le Moyne d'Iberville and Le Moyne de Bienville in 1699 founded a tem¬ porary settlement on the back bay of Biloxi, Mississippi, but in 1702 moved it to Mobile River, 27 miles north of the bay, where occuried the <(petticoat insurrection® of the women against too much corn meal diet. On the western fagade of the city buildings, on South Royal street, is a bronze tablet with the follow¬ ing inscription: (<The city his monument. Jean Baptiste le Moyne. Sieur De Bienville 1680-1768. Who on this spot began building, Fort Louis De La Mobile. The First Capital of the Province of Louisiana. May a.d. 1711. Erected by the city of Mobile May 1911.® In 1711 a flood and hurricane nearly destroyed the place and the settlement was removed to the present site. The origin of the word Mobile is obscure, Judge Hamilton thinks it of Chocktaw deriva¬ tion and means (<paddling.® Mobile remained the capital until 1722 when New Orleans was given that designation. In 1763 Mobile passed into British hands and the name of Fort Conde was changed to Fort Charlotte. In 1780 the Spanish General Galvez captured it and the right of possession was confirmed to Spain by the treaty of 1783. On 13 April 1813, it was captured by the American General Wilkinson, then in command in New Orleans and for the first time the flag of the United States waved over Mobile. Fort Bowyer at the mouth of Mobile Bay was retaken by the British but again given up. Mobile was incorporated as a town 20 Jan. 1814; as a city, 17 Dec. 1819. In 1818 the Bank of Mobile was founded, which in the panic of 1837 was one of the four United States banks which did not fail. In 1818 steam¬ boats were operated on the rivers and in 1839 the city was nearly destroyed by fire and rav¬ aged by yellow fever and again in 1852 by flood and in 1853 by fever. On 4 Jan. 1861 the State authorities took possession of Forts Mor¬ gan and Gaines at the mouth of the harbor, though the State did not secede from the Union until 11 January. On 5 Aug. 1864 Farragut entered the harbor, bombarded the forts and destroyed the bulk of the Confederate fleet, including the ram Tennessee. Farragut cap¬ tured the forts and Mobile surrendered to Gen¬ eral Canby on 12 April 1865. Upon the re¬ establishment of Federal control, the govern¬ ment inaugurated great improvements in the harbor, widening and deepening the channel from 13 to 23 feet by 1903 and up to 1916 the channel had been deepened to 30 feet over the bar and up to the city, with a width of 250

feet. During the ˆReconstruction Period® the city became bankrupt and on 11 Feb. 1879 its charter was canceled and its name changed to (<Port of Mobile.® On 10 Dec. 1886 a new char¬ ter was given and

the old name restored. Since the close of the Civil War, the citv has been called the <(City of Five Flags,® that of the Confederacy being the fifth to wave over the city. The lower part of the city was inundated in 1906, when a severe gale from the sea caused the water to back up in the bay. A number of lives were lost and much property ruined. The population in 1920, according to the United States census, was 60,777. Consult Hamilton, P. J., (Colonial Mobile* (Boston

1910) ; id., bounding of Mobile 1702-18) (Mo¬ bile 1911) ; Powell, L. P., (Historic Towns of the Southern States) (New York 1900).

Edward Quincy Norton.

MOBILE, a bay on the southeast coast of Alabama, forming an estuary into which, through the deltaic mouths of the Mobile and Tensaw branches, flow the waters of the Tombigbee and the Alabama rivers. That part of the estuary to which the name of Mobile Bay is applied is about 30 miles long and from 9 to 12 miles wide. At the entrance to the bay are long narrow strips of land, almost obstruct¬ ing the entrance. On the east, at Mobile Point, is a revolving light ; on the west, on Dauphin Island, are Forts Morgan and Gaines. Between Dauphin and the mainland is Grant's Pass, a strait connecting Mobile Bay with Mississippi Sound. The United States government has im¬ proved the harbor, and from a shallow en¬ trance, which was a hindrance to navigation, there is now a channel through which vessels drawing 23 feet and over can enter, and vessels drawing 17 to 23 feet can ascend to the wharves of Mobile city.

MOBILE, a river in Alabama, the name given to the western stream or mouth of the river formed by the junction of the Alabama and Tombigbee rivers. The eastern stream or mouth is called the Apalachee or Tensaw. From this junction of the rivers to the head of Mobile Bay is, in direct line, about 25 miles, but the winding of the stream makes its course about 50 miles long. The Mobile and Tensaw communicate at several points, but the two streams enter the Mobile Bay at the city of Mobile, by the same delta.

MOBILE BAY, Battle of, a battle of the Civil War fought 5 Aug. 1864. Mobile Bay is divided from the Gulf of Mexico by Mobile Point east and Dauphin Island west, about three miles apart; but the ship-channel of less than 2,000 yards, narrowing to 750 outside, closely skirts Mobile Point. The latter was de¬ fended by Fort Morgan; the island by Fort Gaines, too far from the channels to be very formidable. Between them stretched a line of piles and torpedoes, but leaving a narrow chan¬ nel for blockade-runners, marked off by a red buoy.

Within was the Confederacy's most pow¬ erful ram, the Tennessee, and three small un¬ armored paddle-wheel gunboats. Farragut's Federal fleet (in order of battle) comprised the monitors Tecumseh, Manhattan. Winnebago and Chickasaw, forming an inshore column; and the wooden sloops of war Brooklyn, Hart¬ ford (flagship), Richmond, Lackawanna, Monongahela, Ossipee and Oneida, forming an

outer one, each with a smaller mate lashed to the port side, to ensure passage through if the starboard vessel's machinery should be disabled. Farragut would have led in the Hartford, but the Brooklyn had machinery for picking up tor¬ pedoes. The advance began at 5.30 a.m., and firing at 7.05 ; the instructions were to keep east of the red buoy, but the Tecumseh went west and was sunk by a torpedo. The Brook¬ lyn stopped in fear of a like disaster, and the Hartford with Farragut passed her and led the fleet into the bay. Each vessel received much damage from Fort Morgan, but they silenced its guns by destructive fire, and all succeeded in anchoring three miles up. One Confederate gunboat was then sunk, one captured and one took refuge next the fort; the Tennessee was to 'be attacked after dark, but itself assailed the flagship, and after a desperate fight was dis¬ abled and surrendered. The Lackawanna col¬ lided with the Hartford and nearly sunk her. The Union fleet lost 52 killed, 170 wounded and 113 drowned in the Tecumseh ; the Confeder¬ ates 10 killed, 16 wounded and 280 prisoners, besides the casualties in the fort. Both forts surrendered a few days later. The Union fleet carried 159 guns, and the officers and crews numbered 3,000 men. The Confederate fleet carried 22 guns and 470 officers and men.

MOBILE BILL. See Boundaries of the United States.

MOBILIER, Credit. See Credit Mobilier.

MOBILIZATION, the act of bringing an army to a war footing, before the concentration for war, which consists in the distribution of troops along the hostile frontier in such a man¬ ner that they may be

available for action. Mo¬ bilization consists in the call for men and the requisitioning of animals, the assembly of men and animals in mobilization camps and their division into field, depot and garrison troops. The mobilization of the German Army in 1870 is typical of the processes involved. In the first place, a plan of mobilization was drawn up for each year, and all the superior officers were supposed to keep on file all orders necessary for carrying this plan into effect. Tables of trans¬ portation were also kept in readiness, and on the declaration of war nothing was necessary but to carry the orders and tables into effect. Since the disposition of recruits and the dis¬ tribution of the various forces at points of mo¬ bilization was determined in advance, it was possible to mobilize much faster than the enemy and to gain the advantage of the first blow. When the order of mobilization was issued, it was to be immediately telegraphed to the com¬ manders of districts, from which the landwehr battalions were recruited. The landwehr sol¬ diers, according to the scheme, were imme¬ diately notified to report within 24 hours. By the end of five days they reached the points of mobilization. By that time the purchase of remounts was accomplished in a similar man¬ ner. The distribution and equipment of troops consumed another day or two, and by the seventh day of mobilization, the infantry and cavalry were ready to take the field. The artil¬ lery and the train were ready by the eighth day. Instructional organizations were preserved as far as possible. This was the plan of mobili¬ zation : the result was that infantry regiments were mobilized in from seven to nine days;

cavalry, in from 9 to 11 days, and the other services in 15 days.

It will be seen that speed and system were the two guiding principles of the German mo¬ bilization of 1870. This method of a rapid mobilization according to schemes prepared in time of peace has been adopted by all the armies of the world, and most especially by the great conscript armies. Armies such as the British and American were at the beginning of the Great War require a much longer and con¬ sequently more dangerous process before the}' can enter the field. The United States could only avail itself of its regular army for any¬ thing like immediate use, and even that did not enter the field for over six months. The mili¬ tia had to be recruited up to strength, reorgan¬ ized and trained. There was not a sufficient supply of officers, and so officers' training camps for civilians were opened. Ammunition, ordnance, uniforms and other equipment had to be manufactured. Large bodies of civilians were drafted and trained in great cantonments. At the end of a year the mobilization was only partial

and did not seem likely to be completed for a considerable period. This is to be con¬ trasted with the German mobilization in 1914, which rendered 1,850,000 men ready for service in six days, the French mobilization, which pro¬ duced an army of 1,380,000 men in two weeks, and even with that of Russia, which increased the regular army of 1,200,000 by 650,000 men in a month. Consult the field service regula¬ tions of the various great armies of the world.

MOBY DICK, or (The White Whale, > by Herman Melville, is a strange, conglomerate book, embodying much lore that the author had*, acquired during whaling voyages in almost every ocean, and by long study of almost every¬ thing directly or indirectly concerned with whales and the whale fisheries. As a romance, it tells of the cruise of a Nantucket ship com¬ manded by a crazed captain whose one thought is the capture of the ferocious monster that had maimed him on an earlier voyage. Rela¬ tively few, however, of the 135 chapters are occupied with the account of Captain Ahab and his search for the white whale, Moby Dick. The author gives exciting accounts of the pur¬ suit and capture of whales under various con¬ ditions. He describes in detail the equipment of a whaling vessel and traces the complicated processes of cutting up the carcass, trying out the blubber and securing the sperm oil. He gives much scientific information regarding the habits and the anatomy of whales, intermixed with ingenious and sometimes facetious spec¬ ulations of his own, and he has much to say of the whale in legend and in literature. He also portrays vividly many members of a whal¬ ing crew that included American Indians, ne¬ groes, East Indians and South Sea islanders, as well as Europeans of several nationalities. The book will prove disappointing to the reader who is impatient of delays and digressions in a story, but it contains few pages that are not interesting in themselves; and the effect pro¬ duced by the mixture of erudition, speculation, poetical rhapsody and narrative of real and imagined occurrences is most impressive.

William B. Cairns.

MOCCASIN, MOCCASON, MOCASSIN, or MOCCASSIN, originally a deerskin sandal.

the sole and upper of which are formed of one piece of leather. It was formerly the ordinary foot-covering worn by the North American Indians. In recent times fancy moccasins are made for the general shoe trade, all kinds of leather being utilized for the purpose.

MOCCASIN-FLOWER, a name for the American orchids (q.v.) of the genus Cypripe-dium, especially the large pink C. acaule, given to them by the Indians in allusion to the shape of the inferior part of the flower. Lady's-slipper is a common English name of the same import. See Orchid.

MOCCASIN SNAKE, or COTTON-MOUTH, a large venomous serpent (Ancistro - ■don piscivorus) of the rattlesnake family, but having no rattles, the tail ending only in a horny spike, like that of its near relative, the copperhead (q.v.), sometimes called ((upland moccasin.® The body is stout in proportion to length (about 4 feet) ; the head is chunky and distinct from the neck. It inhabits river-banks, swamps and fresh-water marshes throughout the southern half of the United States, swarming in some regions, like the Everglades of Florida, or the half-flooded woods of lower Louisiana, and constantly in¬ vading the rice-fields. Elsewhere it is not greatly to be feared, as it rarely leaves the edge of the water, where it is fond of lying upon some low overhanging bush or floating log, ready to drop upon the fishes and frogs, which form its principal food, and which it pur¬ sues with great speed in and under the water. It often reaches a length of four feet, and its bite is deadly, the widely opened mouth in the act of striking showing cottony white. Its color is a dark reddish brown, obscurely marked with blackish, and with white blotches on the lips and abdomen. Seven to 12 young are produced annually, viviparously ; these are frequently captured, and though they thrive in captivity, never yield any of their native sullen ferocity. One of the most complete, biogra¬ phies of this snake is that by Stejneger in the * Annual Report) of the Smithsonian Institution for 1893. Consult also Ditmars, (The Reptile Book) (New York 1914).

MOCHA, mo'ka (Arabian, moHa), or MOKHA, Arabia, a fortified seaport, the for¬ mer capital of Yemen, on the Red Sea, 130 miles northwest of Aden. During the 16th and 17th centuries Mocha was the chief port and emporium from which the coffee of Yemen was exported, whence the proverbial term <(Mocha coffee.® The trade has been diverted to Hodeida and Aden. Pop. about 4,800.

MOCK ORANGE, a name applied in Eng¬ land to the Syringa (q.v.), and in the United States to the Primus caroliniana, a small ever¬ green resembling the cherry-laurel.

MOCKER-NUT, a species of hickory (q.v.)

MOCKING-BIRD, a familiar and cele¬ brated songster of the southern part of the United States (Mimus polyglottus) , represent¬ ing a genus of thrush-like wrens, many other species of which are known in Mexico, Central America and West Indies. North of Delaware it is seldom seen outside a cage; but even in winter they are sometimes seen in Central Park, New York, and they are fond of human society. The plumage of all is bluish-gray

and white, with no striking ornaments but much elegance of outline and tint. Their habits differ little from those of thrushes and other migra¬ tory, insect-eating birds, but they show great courage in defending their nest (generally of four to six eggs), placed usually in a bush Of small tree, against cats, snakes and similar ene¬ mies. The young, when taken from the rlest for domestication, should be removed at an early period; or if taken later, they are generally removed by means of trap-door Cages. The ordinary song notes of the mocking-birds are clear, bold and varied. They sihg during the night, like the nightingales, and appear to begin their song with the rising moon. The imitative notes of these birds are, however, still more varied than their natural tones. They mimic with success the songs of their feathered neigh¬ bors and with such exactitude as to deceive the ear of the most experienced sportsman. When they are kept in confinement all the sounds of the household, as well as the mewing of cats, the barking of dogs, the cry of an in¬ jured chicken and the screech of the hawk are all exactly imitated. They are hardy and re¬ quire only ordinary care and attention to live contentedly for many years in any moderate climate. The mountain mocking-bird (Oro - scoptes montanus) of the Rocky Mountain re¬ gion and the various (<thrashers® (q.v.) are relatives not greatly inferior in song; while the mocking-wren (see Wren) is a more distant relative highly gifted in imitative powers.

MOCKLER-FERRYMAN, Augustus, Eng¬ lish military expert and author: b. Ireland, 1856. He was educated at Cheltenham College and Sandhurst, and entered the army in 1876. From 1900-03 he was professor of topography at Sandhurst Military College, and he acted as map editor on the British official history of the South African War

(1903-07). He was employed as General Staff Officer, 1st Grade (1914—16). He has published (Up the Niger: Narrative of Maj. Claude Macdonald's Mission) (1892) ; (In the Northman's Land5 (1896) ; (British West Africa) (1898) ; (Annals of Sandhurst (1900) ; (British Nigeria) (1902) ; Oxfordshire Light Infantry Chronicle) (21 vols., 1892-1913) ; (Military Geography of the Balkan Peninsula5 (1905) ; ˆRegimental War Tales5 (1915).

MOCQUEREAU, mok'ke-ro', Dom Andre,

French musician: b. La Tessouale, near Cholet, 6 June 1849. He was educated at Paris, where he appeared as cellist in the chamber-music concerts given by Charles Dancla. He entered the Order of Benedictines at Solesmes (1875), studied there, under Dom Pothier, Gregorian melody and was soon appointed instructor. He was the originator (1889) and is director of Pabeo graphie musicale, a periodical devoted to the research and publication of photographic reproductions of the oldest important examples of church melodies and their history (10 vols. by 1915). Other works of his are (Livre d'orgue5 (1898) ; (Petit traite de psalmodie5 (1897), translated into several versions; (Methode de chant gregorien5 (1899).

MODDER, or KAIBA, RIVER, South

Africa, a tributary of the Vaal River, joining the latter about 30 miles above its confluence with the Orange River. It has an eastward course of over 180 miles. It came into con-

siderable prominence during the Boer War of 1899-1902; along its banks at Maagersfontein the British were driven back with great loss in 1899, . and at Paardeberg the Boer general, Cronje, surrendered in 1900.

MODE, in music, (1) the manner of ar¬ ranging the tones and half-tones in a scale, this general designation being always accompanied by a qualifying adjective, as Dorian mode, minor mode. Greek music,

from which our modern music has been evolved, had an elaborate system of nine modes, which were afterward extended to 15. Authorities vary considerably as to the differences between the modes ; it is certain, however, that they were the outgrowth of an earlier Greek music, the basis of which was the tetrachord. A tetra¬ chord is a short scale of four notes, one of the intervals being a half-tone and the others whole tones, for example :

U-rx V> - to 0°

A ©

o ft ft ‘7

— —

■J-—— 11 - =

(A) Dorian tetrachord, half-tone, (B) Phrygian tetra¬ chord, half-tone, §; (C) Lydian tetrachord, half-tone, f. The slur indicates the half-tone.

The tetrachords were probably named after the people that originated them.

Until the time of Terpander (7th century b.c.) all Greek music seems to have been con¬ fined to the limits of a tetrachord. The lyre, which was then used merely to give the singer the pitch, had but four strings, each capable of sounding but one note. It was tuned in one of the ways shown above, though the notes written should be understood to be merely relative, each singer tuning his lyre to suit his own voice.

Terpander increased the compass of the lyre by adding a second tetrachord to the first, using the highest note of the first for the lowest of the second, thus making an incomplete scale of seven notes.

First tetrachord

Second tetrachord

Terpander ‘s Seven Note System.

The middle note, A, belonging to both tetra¬ chords, was called Mese (middle) and had somewhat the function of our modern keynote. It will be noted that the two tetrachords are both Dorian, which was the characteristic and favorite Greek tetrachord rather than the for¬ eign Phrygian or Lydian.

Pythagoras (582 b.c.) is the reputed author of the octave system (the foundation of our modern system). He probably learned it dur¬ ing his visit to Egypt, where it is said to have been in use for many centuries before. By this system the two tetrachords, instead of having a note in common, were separated by a whole lone, called the diazeuctic tone or tone of disjunction.

First tetrachord _ ˆ

a O ˆ U -

n v

71

n ..v . .

Diazeuctic tone

- -jj

Second tetrachord

Pythagoras’ Octave System.

A was still the keynote or Mese, though no longer the middle or connecting note. Terpander’s was called the conjunct system and Pythagoras’ the disjunct system. The latter as above printed constituted the Dorian mode, which may be defined as two Dorian

tetrachords separated by the diazeuctic tone, embracing the compass of an octave. Terpander's system, not having this compass, cannot strictly be called a mode. Music seems to have developed on both these systems simultaneously in Greece, though finally that of Pythagoras supplanted Terpan¬ der's and became universal.

By replacing the two Dorian tetrachords with two Phrygian or two Lydian the modes of the same name were formed.

-* - - — ft — cut »-■*■ ~

— j

0

L— f

Phrygian Mo

ul_ Li

>de.

>

Lydian Mode.

These three were the principal modes. Each had two auxiliary modes, one commencing a fourth below and distinguished by the prefix hypo, the other commencing a fourth above with the prefix hyper. The complete list of the nine original modes is as follows :

I. Dorian.

II. Phrygian.

III. Lydian.

IV. Hypodorian or yEolian.

V. Hypophrygian, or Ionian.

VI. Hypolydian.

VII. Hyperdorian or Mixolydian.

VIII. Hyperphrygian or Locrian.

IX. Hyperlydian.

A convenient way to remember them is to imagine a series of scales, all of natural notes, and an octave in compass, beginning on each of the seven natural notes. It should be remem¬ bered that the pitch is entirely relative ; each of these modes might begin on the same actual sound. The Mese or Keynote is the fourth note of each scale.

On examination it will be seen that the three Dorian modes are each formed of two Dorian tetrachords, the three Phrygian modes of two Phrygian tetrachords and the three Lydian modes of two Lydian tetrachords. In the three principal modes the diazeuctic tone separates the tetrachords. In the hypo-modes it is the

lowest note and in the hyper modes it is the highest note. In all the hypo and hyper modes the tetrachords are conjunct like those of Ter¬ pander. It will be seen that two of the hypos

correspond exactly with two hypers, namely, the hypophrygian and the hypodorian are the same as the hyperlydian and the hyperphrygian. It will be observed, however, that the arrange¬ ment of the tctrachords and the diazeuctic tone arc not the same.

Hypophrygian Mode.

diaz.l

one lsJtechrachord l244techrachord 1

1 _ ˆ y > - 45 —

h-A O V -

— 2lT - - “TV n ˆ - 1

rk — n - A3 - 1

‘■

-tfti — — -

- -

lˆt tetrach. 2*Lˆ

tetrach. d

i ax. tone.

Hyperlydian Mode.

Hypodorian Mode.

diaz. t

one 1SJ tetrach.

2*1ˆ tetrach.

r\ O - ˆ —

l3 V

- A - O - - -

-MV -O - ˆ -

- j -

1SJ tetrach. 2niGetra

;h . d\az. tone.

Hyperphrygian Mode.

Each mode was said to have its characteris¬ tic quality or sentiment ; the Dorian seems to have been the favorite one for heroic utter¬ ance, while the Lydian was said to be languish¬ ing and erotic.

The modes were afterward increased to 15, at least three of which were mere trans¬ positions by octaves of earlier modes. In fact some theorists hold that the later development of the Greek modes completely changed their original significance and that instead of their being different arrangements of whole and half tones in a scale they were all identical in for¬ mation and were in fact merely Dorian modes of different pitch. If this is so they should not be called modes at all, but keys, as in modern music. The modern system of equal or even temperament (see Temperament) adopted and developed by Johann Sebastian Bach early in the 18th century and in general use since the middle of the 19th century, would thus appear to have been known to some extent among the ancient Greeks. The titles of the modes seem to contradict this theory, but the subject is so confused and the different theories so difficult of proof that wide differences of opinion will probably always exist. The complete list of the 15 modes is . as follows, the pitch given being said to be the accepted one for each mode (or key) :

Fourths below Hypodorian (A)

Hypoionian (Bb)

Hypophrygian (B)

Hypoaeolian (C) Hypolydian (C$)

Originals Dorian (D)

Ionian or

Iastion (Eb) Phrygian (E)

ˆolian (F) Lydian (F$)

Fourths above Hyperdorian or Mixolydian (G)

Hyperionian (Ab)

Hyperphrygian or Locrian (A) Hyperaeolian (Bbˆ Hyperlydian (B$)

original Dorian mode changed to (a) chromatic and (b) enharmonic:

a , i O ˆ Jfc®: -

V

r/ - - - -

b

SiFi

- 1 t

* x -w- -

y

The X is used to represent a sound one-quarter of a tone higher than the one preced¬ ing it.

The Gregorian or ecclesiastical modes are based on the Greek modes, though many errors and changes of names were made in arranging the system. Saint Ambrose, bishop of Milan, chose four of the ancient

modes which he named Authentic. Gregory the Great is said to have added four others called Plagal. Six more were afterward added, making 14, two of which were declared imperfect and rejected. There are two kinds of Gregorian modes, the Authentic and the Plagal. The final or key¬ note of the authentic modes is the lowest note of its scale. Each authentic mode has an at¬ tending plagal mode, a fourth below it, the keynote of which is the same as that of the authentic mode. The plagal modes are there¬ fore similar in this sense to the Greek modes, the fourth notes of which were said to be key¬ notes. The Gregorian modes are numbered, the authentic receiving the odd and the plagal the even numbers. In addition, the old Greek names are used, the plagal modes receiving the prefix hypo, but unfortunately the Gregorian and Greek titles do not correspond, causing great confusion in all references to the modes. Thus, the Gregorian Hypophrygian is the same as the Greek Hyperdorian and the Gregorian Hypomixolydian with the Greek Phrygian.

As in the Greek modes it is convenient to remember the Gregorian modes by imagining a series of scales, all of natural notes and an octave in compass, beginning on each of the seven notes. These are the authentic modes from which the plagal with their prefix hypo can be readily counted. (It should be remem¬ bered that the pitch is entirely relative as in the Greek scales).

The Greeks had in addition three kinds of chromatic modes and an enharmonic mode. They were all modifications of one or both of the interior tones of the tetrachord, the outer tones of which were never allowed to change their relative pitch. These modes had no sig¬ nificance in the history of music and were not adopted by the Romans.

The following are examples of Pythagoras'

The Gregorian modes are still in use in the Roman Catholic Church, to the services of which it adds a remarkable effect of antiquity and solemnity.

In modern music but two of the old modes remain; the major, equivalent to the Greek Hypophrygian (or Hyperlydian) and the Gre¬ gorian Ionian, and the minor, equivalent to the Greek Dorian and the Gregorian ˆolian.

The choice of these two modes took many cen¬ turies and must have been made’ by entirely un¬ conscious perception of their greater value, especially of that of the major scale. A com¬ parison of the major scale with the favorite Dorian mode of the Greeks shows that the mod¬ ern ear desires the half tone at the top of a tetrachord instead of the bottom, as they did. Whether the favor in which the Dorian tetra¬ chord was held by the Greeks is a proof that they thought their music downward and were therefore doing just the same as we do when we think ours upward is very doubtful, though a well-known theorist has advanced this clever idea. It is much more likely that the introduc¬ tion of harmony caused a greatly increased recognition of the true function of the keynote, which, as we understand it, was unknown to the ancients. To us the keynote (in any oc¬ tave) is the only rest point to the ear; all other notes of the scale trend toward it more or less strongly, and in the instance of an ascending major scale the seventh note (the so-called leading note) demands it more than any other note. This quality of motion and rest led to the greater importance of the major mode over the minor, the seventh note of which, be¬ ing a whole tone distant from the keynote, lacked the great desire to progress these which is so important a characteristic of the major. Finally, probably by accident at first, the seventh note of the minor was raised so as to be but a half tone below the keynote ; this form of the minor key is now known as the ((harmonic minor, » and is the only one recognized in harmony.

O ˆ

-©-

X5 =

XE

But the distance from the sixth to the sev¬ enth being thus made a tone and a half, a very difficult interval to sing or treat melodically, the sixth was raised to secure smoother and easier passage upward and as the double change had made the upper part of the minor mode iden¬ tical with the major it was argued that neither leading note nor raised sixth was necessary in descending, so both were restored to their orig¬ inal position in descending. This is known as the ((melodic minor.**

° “*°I

fro. o 0

ft ho |

1

Tf 1 4

1 ˆ

I

1 - w n «.

pt > « n

A

□7

(2) A term used in mediaeval music to indi¬ cate the relative value of the Large, the Long and the Breve. Two kinds of mode existed, great and less, the first deciding the relation of the large to the long and the second that of the long to the breve. Both kinds could be perfect or imperfect. In great mode perfect the large is equal to three longs. In great mode imper¬ fect it was worth but two longs. In less mode perfect the long was equal to three breves, in less mode imperfect it was equal to two breves. During the end of the 15th century and the

beginning of the 16th musicians made extraor¬

dinary difficulties in their compositions by means of mode and prolation. See Greek Music; Meantone; Diazeutic Tone; Tem¬ perament.

George Gordon Thunder, Revised by C. Leonard Stuart, Editorial Staff of The Americana.

MODELING. The production of a tempo¬ rary plastic form to be later executed in per¬ manent condition copying this original, or the forming of a facsimile of an original shape. Modeling can be done in reduced, enlarged or true proportions (to scale) according to their purpose. Modeling is usually done in clay, plaster of paris, wax, wood or other plastic material. The sculptor almost invariably makes a model of his creation before treating it in the permanent medium. Gold and silver smiths and jewelers reduce their conceptions to plastic models before going to the expense of evolv¬ ing the design in the precious metals. The ship¬ builder usually works from a reduced facsimile or model of the desired construction. The artist, in producing the effect of relief or solid¬ ity in a plane (flat) surface, terms his shading and perspective manipulation ((modeling.**

MODENA, mo'de-na, Italy, a city and province, part of a former duchy now com¬ prised partly in the compartimenti of Emilia and Tuscany.

The city, capital of the province, pleasantly situated in a fertile plain, between the Secchia and the Panaro, 25 miles northwest of Bologna, is built with great regularity, and has. spacious streets and fine promenades on the site of its former ramparts. It consists of three parts' — the citadel, the old town and the new town. The most remarkable edifices and establishments are the cathedral, a fine specimen of Roman¬ esque, adorned in front with numerous curious sculptures; the Campanile, erected in 1224-1319, 335 feet high, and one of the finest in North Italy; the church of San Francisco, a hand¬ some Gothic structure, containing a fine terra cotta group of the Descent from the Cross, by Begarelli ; several other churches ; the ducal palace, begun in the 17th century, but enlarged by numerous modern additions, and forming a splendid structure, now used as a military school ; the Albergo Arti or building containing the municipal collections, especially the Estense Library of over 150,000 works, including several thousand MSS., and the picture-gallery em¬ bracing a large collection of paintings, several of them by the first masters ;

the theatre, the baths, the university, several other important ed¬ ucational institutions and charitable endow¬ ments. The manufactures consist chiefly of silk goods, silk twist, woolen and hempen cloths, leather and glass; the trade, however, is unim¬ portant. Modena is the see of an archbishop, and possesses various important public offices. It existed under the Etruscans, and as Mutina rose to great splendor under the Romans. It afterward was repeatedly sacked by the north¬ ern invaders, whose ravages left few vestiges of its ancient grandeur. Pop. 71,000.

The former duchy bordering on Tuscany, Lucca, Bologna, Mantua and Parma, had an area of 2,573 square miles which in 1901 con¬ tained a population of 785,930. It is now divided into the provinces of Modena and Reggio in the compartimento of Emilia, and the province

of Massa e Carrara in the compartimento of Tuscany. Modena was made a duchy in 1452, the ruler being Duke Borso of the house of Este, to which noble family Modena had be¬ longed since 1288. In 1796 the French took possession of the country and Modena after¬ ward was included in the Cisalpine Republic. By the Treaty of Vienna in 1815 it was restored to the Este family. The duchy took an import¬ ant part in the turbulent proceedings of the 19th century, which led to the consolidation of the Italian kingdom in 1860, when Modena proper was formed into a separate province with an area of 1,002 square miles. Pop. about 325,000.

MODERN INSTANCE, A, by Mr. Wil¬ liam Dean Howells, was published in 1882. The action takes place in Maine and in Boston, with one scene in Indiana, and the time is fixed by reference to events of the Hayes-Tilden presi¬ dential campaign of 1876. The story is one of domestic infelicity, and the tracing out of the gradual coarsening, physical and moral, of the husband, Bartley Hubbard, is a masterly piece of character delineation. The social and busi¬ ness life of a small town and the every-day ex¬ periences of a provincial couple embarking on life in Boston are presented with the author’s happiest realism, and save the book from gloom or morbidness. Indeed, it is

only after the reader has finished with the story, and finds himself impelled to reflect upon it, that he real¬ izes how great a moral tragedy it portrays.

Modern Instance) raises more ethical ques¬ tions than do most of Mr. Howells' novels, but the author is in no sense a propagandist. It may be his disinclination to commit himself on one of these questions that leads him to leave unsettled the fate of two of the chief characters. This indeterminate ending is condemned by those readers who complain that Mr. Howells' novels get nowhere, and the limitations and un¬ heroic qualities of Marcia Hubbard are disap¬ proved by those women who maintain that the author is never fair to their sex ; but his kindly, photographic reproduction of the little things of modern life and his insight into social conditions lead those who sympathize with his ideas of fiction to rank this novel among his best.

William B. Cairns.

MODERN LANGUAGE ASSOCIA¬ TION OF AMERICA. A society for the advancement of the study of modern languages and their literatures, through the promotion of friendly relations among scholars, the presenta¬ tion and discussion of papers at meetings and the publication of results of investigations by members. It was incorporated in Baltimore in 1883, and membership is open to all persons on payment of $3 annual dues. For geographical reasons a central association was incorporated in 1903, which holds meetings in the Western States independently of the parent body. A New England branch holds meetings annually. The association issues an annual volume of publi¬ cations in quarterly instalments. There are about 1,250 members.

MODERN MACCABEES, Knights of

the. See Maccabees, The.

MODERN PAINTERS, by John Ruskin

(5 vols., 1843, 1846, 1856, 1860), was begun in order to vindicate the landscape painting oi J. M. W. Turner against adverse criticism.

For this purpose Ruskin set forth systemati¬ cally and extensively what he conceived to be the aesthetics of visual art — not of landscape painting only, but of painting in general and sculpture as well, with lengthy illustrations from their supposed analogues in

literature — the whole in an elaborate a priori analysis of the ((Ideas Conveyed by Art® and of the several “Faculties® which produce or appreciate them. Incidental to the defense of Turner, however, come appraisals of other painters, and refuta¬ tions of critics, which confuse the theoretical treatment; this, as the work goes on, becomes more and more arbitrary, digressive, desultory, and wilful, at the same time that it retires more and more from the reader’s attention; until, though formally preserved throughout, it has lost, long before the end, all effectiveness as an organization of the subject.

The key to (Modern Painters) lies much less in its systematic structure than in its theory — pervasive across all divisions and subdivisions, and persistent throughout Ruskin’s 17 years of conscientious modification of opinion by study — concerning the general relation of man and art to nature. The notion that art can improve upon nature seemed to Ruskin pre¬ sumptuous — a part of the pagan and Renaissance tendency to magnify man and his works. His own faith taught that man is de¬ praved and fallen, and that there is no good in him. Hence Ruskin would minimize man’s function in art; he is definitely opposed to human tradition, and is ready, with Words¬ worth, to throw away the books and discard the schools. Greatness in art, moreover, com¬ monly assumed to be an effect of human powers, is nothing of the sort; it is a divine •gift. “Composition,® imagination,® idealiza¬ tion,® and the like — which rearrange actuality to the ends of art — are not achievable by any amount of conscious effort; given humble labor, these things may, perhaps, be added unto it by God; they are a grace vouchsafed to the elect. Such is the evangelical tinge given by Ruskin to the ancient theory of the artist’s divine inspiration, and to the modern preoccu¬ pation with the functioning of the subcon¬ scious. This Calvinism as regards man is supplemented, as regards nature, by that strange ((natural religion® — Platonistic rather than Platonic — which so fascinated impulsive hearts in the late 18th and early 19th centuries. Na¬ ture, never having fallen, is sinless, pure and perfect ; nature is the copy of a divine pattern ; let man, then, follow nature; for

…. every prospect pleases, a

And only man is vile.

Marking the belated arrival in art criticism of the naturalistic revolt against the human¬ istic tradition of the Renaissance, (Modern Painters) is to the criticism of painting very much what Wordsworth’s (Preface’s* and many of his poems — which Ruskin quotes continually — are to the criticism of poetry.

So understood, it becomes, historically, a document in that romantic anti-humanistic <(return to nature® which, for thoughtful per¬ sons, of the newer generation, was ended by the publication of Darwin's (Origin of Species) in 1859. We know now that nature is perfectly wasteful and unintelligent, perfectly cruel and unmoral, that her beauties cover up a million

festering murders; and that to the human de¬ mand for ethical values her answer is silence. Moreover, even could nature be held to be a copy of divine ideas, many modern readers would yet believe, with the Aristotelian aesthet¬ ics of classicism and the Renaissance, that art, embodying human concepts of perfection, can shape things actually nearer to their ideal than they ever occur in nature. But Ruskin had grown up in the old ((natural religion,® and he never shook it off, though he long survived Darwin's exposure of nature's ways. His books are probably the last great monument to the belief — which Butler, Paley, Words¬ worth, Emerson, and the Bridgewater Treatises illustrate in various modes — that nature, be¬ ing the copy of a divine archetype, is always right ; that all her phenomena are intended by God to teach man something; hence, that she is full of symbols, providential adaptations, and final causes, is analogous to morals and re¬ ligion, exists for man's ethical discipline, and is his monitress and preceptress, ever lessoning him for his good. The worship of nature is with Ruskin literally a part of religion; and he feels that the whole duty of art is to praise God by recording nature's works with the utmost possible fidelity to their supposed ethical ends.

Ruskin's criticism of art thus treats almost exclusively the representation of natural objects — a representation unmodified except upon con¬ siderations moral or religious. In the place of aesthetic standards he unblushingly substitutes on the one hand religious or ethical standards, and on the other hand standards which may be called ˆphysical.® In accordance with the first, he looks to art for a didactic content, for asser¬ tions or statements as explicit as those of literature; commends this Diterary® quality in pictures like

Tintoretto's, whose real excellence lies elsewhere ; and makes many excursions into the field of poetics and literary criticism : dis¬ cussing at length, for example, that distinction which had exercised the romantic school of literary critics in the early 19th century — the distinction between Imagination and Fancy; discussing, again, in a celebrated passage, the (<Pathetic Fallacy® @f the poets, based as it is upon the assumption that men's moods have a sympathetic analogue and symbol in nature. Again, from Ruskin's assumption that nature is morally perfect arise his impatience of classi¬ cal and Renaissance attempts to improve upon her by idealization® or ˆgeneralization,® and his inconsistent condemnation of Salvator Rosa and of the Dutch and Flemish realists because when they might have painted to edification, they chose to record ((ugly® or <(base® things.

In fact, ultimately even the religious and ethical standards fail to modify Ruskin's in¬ sistence upon representation ; he uses them rather, as in the cases just noted, to confirm his preferences, glorifying as accordant with the divine scheme whatever art appeals to him, and denouncing whatever art does not as tainted with sin. Likewise, though in his theoretical analysis he allows a considerable place to "idealization® and "imagination® — once even speaking of "over-fidelity® — yet practically he is always minimizing their functions and ex¬ plaining them away. It is with distinct relief, and with a certain unction and fervor, that he always returns to representation pure and

simple, detailed and loving and humble, which after all is his . religion of art.

This ultimate triumph of the <(physical® criterion has several interesting results. En¬ grossed in representation, Ruskin disregards or contemns abstract design and spatial pattern, and is almost insensible to Oriental art, which so largely depends upon these. Hence his later disparagement of Whistler and of (<le Japon-isme.® Hence also his commendation of the Pre-Raphaelite movement, whose medievalist revolt against the Renaissance, and whose love of detailed naturalistic representation ("fore¬ ground®), coincided with his own, but which he rather reinforced and championed than origi¬ nated or even decisively influenced. Hence, finally, the net historical effect of (Modern Painters) in making for sincerity and humility against the sentimentality, cockiness, prettiness, and emphase of contemporary British art.

These evils, thought Ruskin, were traceable, as has been suggested, to the Post-Raphaelites of the Renaissance tradition, with their sup¬ posed tricks and insincerities and “rules of com¬ position® and ((practice of the schools.® He must clear all that away, old masters and all ■ — especially the Bolognese eclectics, and Claude, Poussin, and Hobbema — and establish in their place nature and Turner. The underlying as¬ sumptions of his method have been shown; its most important and most bulky actual product remains to be mentioned : the remarkable col¬ lection of observations of natural phenomena which Ruskin adduces to illustrate Turner’s rich and various fidelity to nature. Large por¬ tions of the first, third, fourth, and fifth volumes, are given to description, in word and in picture, of nature’s endless phases — the effects of wind and mist, the structure of rocks and the radiation of light, the organization and appear¬ ance of mountains, of clouds, of tree-trunks, boughs, and leaves, of waves and foam and reflections in water.

The reader who is interested in (Modern Painters) for its place in Ruskin’s life or for its own evolution in time as a piece of writing will of course read it as it was written; but if he approach it for pleasure he will be well advised to begin with the third volume. The first two volumes, to be sure, contain some of its most gorgeous passages — like the celebrated word-pictures of Aricia and of Turner’s (Slave-Ship. > Yet these, after all, are purple patches; and the body of the text is undistinguished, or distinguished chiefly by a crude parallel structure in couplets — a parallelism often both forced in thought and actually bungled in exe¬ cution. Ruskin’s early fondness for inordi¬ nately long sentences, again here, too often leads him to jumble into a single perfervid period the material that should have formed a paragraph: instead of ordering it from sentence to sentence into separate articulated stages of thought, he pours it all volubly out into one heavy lump of a sentence loosely glued together by and, but, for, only, as, so and so that.

But in the 10 years between the publication of the second and the publication of the third and the fourth volumes Ruskin’s style under¬ went a sobering and clarifying change. He had had much practice in writing — had meanwhile published (Seven Lamps of Architecture) (1849), (The Stones of Venice) (1851—53) , <Pre-Raphaelitism) (1851), and *Lectures on

Architecture and Painting* (1854) ; and his ideas having gained acceptance, he now spoke with more of authority and plainness, and less of the hot rhetoric of controversy. Here also he virtually abandoned the dreary scholasticism of the aesthetic system he had so aridly set forth in the second volume. The reader, then, who plunges in medias res is more likely to reach at once the heart of (Modern Painters.* He will feel at once the essential nobility of a book which, often wilful and mistaken, is never mean and is often tonic. He will realize it as the outcome of many years' disinterested study both of nature and of painting, as a whole¬ hearted appreciation of Turner, who would be great upon any theory however arid, and as a valuable collection of natural facts and appear¬ ances, recorded by a loving observer, inde¬ fatigable students, and exquisite draughtsman, whose wilfulness vanishes when he is face to face with nature. Here lie its real strength and lasting value : it will probably stand as a great apprecation of a very great painter and, as a veritable treasury of things observed.

Samuel Lee Wolff.

MODERN SCHOOLS OF DRAMA. See

School of Drama, Modern.

MODERN WOODMEN OF AMER¬ ICA. See Woodmen of America, Modern.

MODERNISM, the designation applied to the advanced opinion of publicists and lecturers which in recent times were at variance with traditional orthodox doctrines. Official re¬ straint was laid on them when Pope Pius X during his pontificate < (1903-14) enunciated the following doctrines in his famous encyclical (CPascendi gregis** issued in 1907. Dealing with the ˆmodernist® movement and propaganda, and, speaking of it he laid down the following conditions and regulations, which he ordered Catholics to follow. He said in part:

«In the first place, as regard to studies, we shall not ordain that scholastic philosophy be made the basis of the sacred sciences. It goes without saying that if anything is met with among the scholastic doctors which may be re¬ garded as an excess of subtlety, or too

care¬ lessly stated ; if there is anything which does not square with later discoveries, or which is altogether destitute of probability, we have no desire whatever to propose it for the imitation of present generations. And let it be clearly understood above all things that the scholastic philosophy we prescribe is that which the an¬ gelic doctor has bequeathed to us. . _ . . In

the vast and varied abundance of studies open¬ ing before the mind desirous of truth, every¬ body knows how the old maxim describes the¬ ology as so far in front of all others that every science and art should serve it and be to it as handmaidens… . Anyone who in any way

is found to be imbued with modernism is to be excluded without compunction from these offices, and those who already occupy them are to be removed… . Equal diligence and severity are to be used in examining and se¬ lecting candidates for holy orders… . It is also the duty of the bishops to prevent writings infected with modernism, or favorable to it, from being read when they have been published, and to hinder their publication when they have not. No book or paper or periodical of this kind must ever be permitted to semi¬

narists or university students… . The Holy

See neglects no means to put down writings of this kind, but the number of them has now grown to such an extent that it is impossible to censure them all. … It is forbidden to secular priests, without the previous consent of the ordinary, to undertake the direction of papers or periodicals. … Let priests hold as sacred the authority of their prelates, let them take it for certain that the sacerdotal min¬ istry, if not exercised under the guidance of the bishops, can never be either holy, or very fruitful or without blemish. … It is im¬ possible to approve in Catholic publications of a style inspired by unsound novelty which seems to deride the piety of the faithful and dwells on the introduction of a new order of Christian life, on new ordinances of the Church, on new aspirations of the modern soul, on a new vocation of the clergy, on a new Christian civilization… . Ancient relics are to retain the veneration they have always enjoyed, except in those individual instances when there are clear arguments that they are false.® Consult Marchesan, A., <The Pro¬ gramme of Modernism : Reply to Encyclical of Pius X* (New York 1908).

MODESTO, Cal., city, county-seat of Stan¬ islaus County, on the

Tuolumne River, and on the Southern Pacific Railroad, about 80 miles south by east of Sacramento. It is in a pro¬ ductive agricultural region, the system of irri¬ gation contributing greatly to its prosperity. The trade consists chiefly of wool, grain, fruit and truck. The prominent buildings are the county courthouse, county hospital and churches. Pop. (1920) 9,241.

MODICA, mo'de-ka, Italy, capital city of the province of Syracuse, Sicily, located be¬ tween rocky declivities, on the Syracuse-Licata Railway and 33 miles distant from Syracuse city. It contains a beautiful 17th century church, an ancient castle on the heights, a monastery with 15th century ruins of a church, a lyceum and gymnasium, seminary, technical school and institute. Its chief industries are cattle-raising, cultivation of southern fruits and trade in agricultural products. Its population in 1911 was 55,924.

MODJESKA, mod-jes'ka, Helena, Polish actress: b. Cracow, 12 Oct. 1844; d. Bay City, Cal., 8 April 1909. Her father was a musician. In 1860, having married a theatrical manager, Modrzejewski, whose name she has since soft¬ ened to Modjeska, she began to act, and soon gained local fame. After her husband s death she appeared in Warsaw in 1868, after marry¬ ing Count Bozenta Chlapowski in September of that year. In 1876 she came with the latter to America. In July 1877, at ,San Francisco, she made her American debut as Adrienne Lecou-vreur in an English version of the play by Scribe and Legouve. Three years later she was seen in London as Camille, and from that time she was one of the foremost actresses of the English-speaking tragic stage. She starred with Booth in 1889-90. Her best roles were Shakespearean, notablv Lady Macbeth, Cleo¬ patra, Ophelia and Viola. Consult (Helena Modjeska: Memories and Impressions) (New York 1910).

MODJESKI, Ralph, American civil engi¬ neer : b. Cracow, Poland, 27 Jan. 1861. He

came to the United States with his mother in 1876 and, for American

naturalization, he changed his name to Modjeski, his mother being the celebrated tragedienne, Helena Modjeska. He was graduated at the College des Ponts et Chaussees, Paris, at the head of the class and with honors. He has designed and built many bridges in the United States, the largest among them being the government bridge at Rock Island over the Mississippi ; the Mississippi River bridge at Thebes, Ill. ; the McKinley bridge at Saint Louis ; the new Bis¬ marck bridge over the Missouri; bridges over the Columbia River at Vancouver, Wash., and Celilo, Ore.; two bridges over the Willamette River at Portland, Ore. He has recently con¬ structed two bridges over the Mississippi River, — one at Memphis, Tenn., and one at Keokuk, Iowa, and is also consulting engineer on the design and construction of the Ohio River bridge at Metropolis, Ill., for the Chicago, Bur¬ lington and Quincy Railroad and of the Thames River Bridge at New Haven, Conn., for the New York, New Haven and Hartford Railroad. He was one of the three members of the com¬ mission on the Quebec bridge, which has the longest span in the world. He received an honorary degree of doctor of engineering at the University of Illinois in 1911; is a past director and member of the American Society of Civil Engineers; member of the British In¬ stitute of Civil Engineers and of the American Institute of Consulting Engineers; past presi¬ dent and member of the Western Society of Civil Engineers; member of the Franklin In¬ stitute and of the American Railway Engineer¬ ing Association ; also member of numerous engineers' and social clubs.

MODLING, med'lrng, Austria, a town lo¬ cated at the foot of the Wienerwald, Lower Austria, to the south of Vienna, on the Mod-ling stream, and junction of two railways. On account of the cool summers it is a favored summer resort and has three Catholic churches, among them the Early Gothic Saint-Othmar Church, dating from 1454, with its Romanesque baptistry, a Protestant church, town-hall, city park with theatre and Kurhaus, a military acad¬ emy, high school and Obergymnasium, agricul¬ tural school with curricula in brewing, horti¬ culture, *etc.* ; also an orphan asylum with its church, chalybeate baths, sanatorium, *etc.* Its chief industries are wine growing, manufac¬ tures of iron and metal wares, tubular boilers, sash and door works, varnish and lacquer works. Pop. about 18,067.

MODOC (mo'dok) INDIANS, a tribe of northern California, which in 1872, after firing on the United States forces, retreated to the neighboring lava beds, and there defended themselves desperately till June 1873, murder¬ ing two peace commissioners sent to them and killing or wounding 132 of the troops. Their chief, Kintupash, commonly known as Captain Jack ' and three others, were hanged in Octo¬ ber; about 100 who had not followed him were permitted to

remain in California, the. rest (145) were transferred to Indian Territory. The Modocs originally made their home on the shores of Lost River and Klamath Lake. They called themselves the Maklaks, or <(the people.” They were always a warlike tribe, and when not fighting immigrants and settlers in the early days were warring with other tribes in their VQl*. 19 — 19

neighborhood. Of the surviving Modocs., about 200 reside at the Klamath Reservation in Oregon.

MODULATION, in music, the act of mov¬ ing through the sounds in the harmony of any particular key to those of another, or the tran¬ sition from one key to another. The simplest form is the change from a given key to one nearly related to it, namely, its fifth (domi¬ nant), fourth (subdominant), its * relative minor, or the relative minor of its fifth. Mod¬ ulation into the dominant is effected by intro¬ ducing in any of the parts (rarely in the bass, however) the sharp fourth, which becomes the seventh of the new key; thus, in the key of C,

F would be sharpened to effect the transition into the key of G; to pass from that key into that of D it would be necessary to sharpen the C, and so on. In modulating into the subdomi¬ nant the flat seventh is used, which becomes the fourth of the new key; thus, in passing from the key of C to that of F, the flat B is intro¬ duced, and from the key of F to that of B the E is flattened, and so on. The modulation into the relative minor is generally effected by em¬ ploying the sharp fifth, which becomes the seventh or leading note of the new key; thus in changing from C to A minor the G should be sharpened. As almost every piece ends on the key in which it begins, a second modulation becomes necessary; this is effected by flatten¬ ing the fifth of the new key if the first modula¬ tion is into the dominant and sharpening the fourth if in the subdominant. When a com¬ poser aims at a striking effect he may change from some given key to one quite unrelated, from C to E for instance; but such transitions should be sparingly employed. Modulation is generally resorted to in long compositions to please the ear with a fresh succession of chords. (See also Mode; Music;. Tempera¬ ment). Consult Groves, (Dictionary of Music and Musicians) (Vol. Ill, pp. 232-240, New York 1910).

MODULE, from the Latin modulus, a small measure. A term used in architecture to des¬ ignate an arbitrary unit of measurement on which to base the proportions of an order or the entire edifice. Architects have usually ac¬ cepted either the diameter or half-diameter of a

column at the base of a shaft as a unit or module for the order. This unit they divide into a graduated scale in minutes or parts ac¬ cording to individual selection. Vignola took a semi-diameter as his module and divided it into 12 parts for the Tuscan and Doric and into 18 for the other orders. Talladio, Cambria, Des-godetz, Le Clerc and others accepted a module in 30 divisions or minutes for all orders. Others have taken the entire height of the col¬ umn and divided it into 20 parts for the Doric, 22ˆ4 for the Ionic, 25 for the Corinthian, and so on, one of which is taken for the module by which to regulate the other parts. Perrault's module was a third part of the diameter of shaft at base, to avoid a fraction. See Orders of Architecture.

MODULUS, in mathematics, a constant re¬ ferring to properties of matter in certain equa¬ tions. As stress is proportional to strain with¬ in the elastic limits, some constant quantity may be introduced, making this pronortionality into an equality. In dealing with strength of mate-

rials, such a constant is called a modulus. Thus in Hooke's law, which says that extension, as of a bar, is proportional to the extending force, the constant which converts this proportionality into an equality is called the modulus of elas¬ ticity, or Young's modulus, and is denoted by E. Where the elastic limits are not exceeded, the transverse strain — i.e., the contraction per unit of transverse dimension — is from one-third to one-fourth the longitudinal strain. The symbol denoting the modulus of elasticity of bulk is K. It denotes the lessening of bulk per unit cube, usually per cubic inch, under hydrostatic stress. See Elasticity.

MOE, mo, Jorgen Ingebretsen, Norwegian folklorist and poet : b. Ringerike, 22 April 1815; d. Christiansund, 27 April 1882. He is most noted for collecting, in collaboration with his companion Asbjornsen, Norwegian sagas and folklore published under the titles (Norske Folkeaeventyr) (184-2 — 44 ; enlarged ed., 1882), in an English version by Dasent (1859) ; (Samling af Sange, Folkeviser og Stev) (1840; enlarged ed., 1869, with melodies by Lindeman). His (I

Bronden og KjaerneD (1851) containing juvenile stories and ser¬ mons are greatly admired, based, as they are, on folk poems. (Samlede Skrifter) (Chris¬ tiania 1877) is a collection of his works except¬ ing the folk stories. Consult Halvorsen, J. B., (Norsk Forfatter-Lexikon) (Vol. IV, Chris¬ tiania 1896).

MOEBIUS, me'be-oos, August Ferdinand,

German astronomer : b. Schulpforta, Germany, 17 Nov. 1790; d. Leipzig, 26 Sept. 1868. He was graduated from the University of Leipzig in 1815, and was for 50 years professor of as¬ tronomy there. Through his efforts the ob¬ servatory was remodeled and by his writings he established a new principle concerning the affinities of figures and proved the close con¬ nection between statics and geometry. He pub¬ lished (Der Barycentrische CalcuP (1827) ; (Lehrbuch der Statik* (1837) ; (Die Elemente der Mechanik des Himmels) (1843); (Haupsatze der Astronomie) (4th ed., Leipzig 1853), *etc.*

MOELLER, mel'ler, Henry, American Roman Catholic prelate: b. Cincinnati, Ohio, 11 Dec. 1849. His elementary studies were pur¬ sued at Saint Joseph's > parochial school and he afterward attended Saint Xavier's College. In 1869 he went to the American College, Rome, where he followed a seven years' course in philosophy and theology. He was ordained priest in the church of Saint John Lateran, Rome, 10 June 1876, and after his return to Cincinnati was made pastor of Bellefontaine and later appointed to a professorship in Mount Saint Mary's Seminary, remaining there till 1879. In 1880 Archbishop Elder named him chancellor of the diocese of Cincinnati, and on 25 Aug. 1900 he was consecrated bishop of Columbus, Ohio. In April 1903 the Holy See appointed him titular archbishop of Areopolis and Coadjutor Archbishop of Cin¬ cinnati with right of succession, and on the death of Archbishop Elder, 31 Oct. 1904, he as¬ sumed charge of the archdiocese, the pallium being conferred upon him 15 Feb. 1905.

MOELLER, Louis, American genre painter: b. New York, 5 Aug. 1855. He worked with

his father, a decorator, for four years; studied in Munich with Dietz and Duveneck; and in 1883 returned to New York. He became a member of the National Academy in 1895, and has exhibited there since 1883. Among his works are (Road to School* (1883) ; 'Puzzled*

(1884) ; ‘Short Measure) (1885) ; (An Interior) (1886), *etc.*

MCERIS, me’ris, Egypt, an ancient artificial lake north of Medinet-el-Fayum, until recent years confounded with Birket-el-KerOon (q.v.) — lake of the horn — with which it was con¬ nected. According to Herodotus, Lake Moeris was 350 miles in circumference, and about 300 feet deep. He states it to have been entirely the product of human industry. Birket-el- Keroon, about 30 or 40 miles long and six broad, is a natural basin. The works, there¬ fore, which Herodotus attributes to King Moeris (Amenemhat III) are the Bahr Jusuf (Canal of Joseph), which connected Moeris with the Nile, and the canal connecting with the Birket-el-Keroon. The fisheries of the lake were very productive. The revenue derived from them went to the Egyptian queens. The two colos¬ sal statues described by Herodotus were dis¬ covered at the end of the 19th century, at Biahmu, the site of Crocodilopolis, an ancient neolithic town on the lake near the Bahr Jusuf entrance.

MCERITHERIUM, a large amphibious animal of primitive proboscidian character, whose remains are found in the Eocene rocks of Egypt, about the shores of Lake Moeris in the Fayoum. It is of special interest as the earliest known progenitor of the elephants, and it also has many anatomical resemblances to the sirenians or sea-cows.

MCESIA, me’shi-a, a province of the ancient Roman Empire lying north of Thrace and Macedonia, and south of the Danube, corre¬ sponding to modern Serbia and Bulgaria. Its original inhabitants were, according to Strabo, a tribe of Thracians. In 227 b.c. a large body of Gaulish invaders entered Mcesia after the death of their leader, Brennus, and settled there under the name of Scordisci. The Romans first invaded it in 75 b.c., penetrating as far as the Danube. It was not, however, until 29 b.c. that it was finally subjugated. The Visigoths (Moesogoths) settled here in the 4th century, and it was afterward conquered by the Sla-vonianSi and Bulgarians.

MOFFAT, David Halliday, American capi¬ talist : b. Washingtonville, N. Y., 22 July 1839; d. 1911. He started life as a messenger for the New York National Exchange Bank (1854), became bank clerk (1855) at A. T. Stevens and Company, Des Moines, Iowa, then cashier at a bank in Omaha, Neb. In 1860 he joined the gold pilgrims for Pike’s Peak but started a stationery business, in partnership with C. C. Woolworth of New York, at Den¬ ver. After six prosperous years he accepted the position of cashier at the First National Bank, Denver, becoming its president and stay¬ ing in that capacity till his death. He was closely identified with the building of several railroads and was president of the Rio Grande Railroad from 1884 till 1891. His mining

in¬ terests in Colorado were among the largest in the State.

- 1

MOFFAT, mof'at, Robert, Scottish mis¬ sionary to South Africa: b. Ormiston, East Lothian, 21 Dec. 1795; d. Leigh, near Tun¬ bridge, 8 Aug. 1883. He obtained an ordinary education; became a gardener; and about 1813, being deeply moved by the story of some Methodist missionaries, decided to go to Africa, whither he was sent in 1816 by the Lon¬ don Missionary Society. His first work was in Namaqualand, where he made a convert of Afrikaner, a Hottentot robber; later he settled among the Bechuanas in Kuruman, where his wife, daughter of his former employer, who married him in 1819, joined him and helped him greatly. He resided in England from 1839-42. His book, 'Missionary Labours and Scenes in Southern Africa) (1842), stimulated interest in the Dark Continent. Moffat, with the assistance of several other missionaries, translated parts and finally all of the Bible (1872) into the lan¬ guage of Bechuanaland. He returned to Eng¬ land in 1870, where his wife died in the follow¬ ing year, and he spent the last years of his life in rousing interest in South African missions. One of his daughters married Dr. Livingstone (q.v.), the missionary and explorer. He was the staunch friend of the native races. Con¬ sult 'The Lives of Robert and Mary Moffat, > bv John S. Moffat, their son (1885).

MOFFAT, William David, American pub¬ lisher and author: b. Princeton, N. J., 17 Jan. 1866. He was graduated from Princeton Uni¬ versity in 1884 and entered the publishing busi¬ ness. * In 1897 he became business manager of The Book Buyer and of Scribner's Magazine. In 1905 he became president of the publishing firm of Moffat, Yard and Company. He has written 'The County PennanC ; (Brad Mat-

toon) ; (Not Without Honor, > *etc.*

MOFFETT, Cleveland Langston, Amer¬ ican author and journalist: b. Boonville, N. Y., 27 April 1863. He was a member of the New York Herald staff in Europe (1887-91) , then in New York (1891-92), becoming foreign editor of the New York Record (1893-94). From 1908 to 1909 he was Sunday editor of the New York Herald, but then became contributor <to the magazines. He wrote 'Real Detective Stories) (1898) ; 'Careers of Danger and Dar¬ ing) (1901) ; (A King in Rags) (1907) ;(The Battle) (1909); (The Bishop's Purse) (1913); 'The Mysterious Card) (1913) ; 'The War Beautiful) (1917). Of his prose poems may be mentioned 'A Woman's Breed) ; lhe Litany of Men) ; 'A Vision of Christmas) (1917). Among his plays are 'Money Talks) (produced 1906) ; 'Playing the Game) (pro¬ duced 1907); 'The Battle) (1908); 'For Bet¬ ter or Worse) (1910) ; 'Greater than the Law) (1912). He translated 'Cosmopolis) by Paul Bourget (1894).

MOGADOR, mog-a-dor, Africa, a seaport town in Morocco, known to the Moors as Suera, the beautiful, and by the Berbers as Tassart. It is located on the Atlantic Coast on a projecting cliff and separated from the mainland by a region of dunes. It is strongly fortified by walls mounting cannon, with towers and bastions. It has wide, clean streets bordered by high houses, also an aqueduct. The town consists of the Kasbah or citadel and the outer town with its Jews quartei (Mellah). The industries are restricted to Morocco

leather, tanneries and the making of beaten copper utensils, but there is considerable trad¬ ing in such imports as cotton goods, sugar, tea, hardware and in exports of goats, oxen, sheep skins, almonds, beeswax, olive oil, rubber, etc Most of the trade is with Great Britain and France. The population is about 22,000, over

half of whom are Jews. _ —

MOGOLLON (mog-y'on) MOUNTAINS, a range in southwestern part of Socorro County, N. Mex., constituting . the divide between the San Francisco and Gila rivers. It is over 30 miles long and the highest summit, Mogollon Peak, is 10,778 feet above sea-level. The range consists of a thick succession of Tertiary volcanic rocks with veins of silver and other ores mined near Cooney and Mogollon.

It is largely forested and has been included in Gila National Forest.

MOGOLLON PLATEAU, the southern edge of the high plateau of

Arizona extending from eastern Yavapai County to Apache County. Limestone in part covered by lava and averaging about 6,000 feet in altitude. It bears considerable pine forest and is included in Coconino and Sitgreaves National forests.

MOGUL, mo-gul', the same as Mongol, ap¬ plied particularly to the sovereigns of Mon¬ golian origin, called Great or Grand Moguls, descendants of Tamerlane, who ruled in India from 1526 to 1765, when the consolidation of British power in the peninsula reduced them to a position of tutelage. The last emperor joined the rebels during the Indian Mutiny in 1857, and died a prisoner in Rangoon in 1862.

MOHACS, mo'hach, Hungary, grand com¬ mune in the county of Baranya, on the Danube opposite the large Margaret Island. It is im¬ portant on account of its steamboat and rail¬ road lines, and has a castle, five churches and a monument to King Ludwig II. Consider¬ able trade is done in wood and grain and it has among its manufactures silk factories, electric works, tile works, *etc.* It is noted on account of the battle between Ludwig II and the Turks under Sultan Soliman II which was lost (29 Aug. 1526) together with the lives of 24,000 Hungarians, the king and the liberty of most of Hungary. On the 12 Aug. 1687 Duke Karl of Lorraine and Margrave Ludwig of Baden fought a bloody battle near here which cost the Turks 16,000 men and hastened the end of Turkish rule over Hungary. In 1910 it had a population of 17,092. Consult Kupelwieser, L 'Die Kampfe Ungarns mit den Osmanen bis zur Schlacht bei Mohacs 1526> (Vienna

1895).

MOHAIR. Mohair is the commercial and technical name of the fleece of the Angora goat. The word comes to the English through the Old French _ mohere, from the Arabic mukhayyar , meaning mohair cloth. In color mohair is pure white, except in rare cases, and grows in ringlets. The hairs composing a fleece are of varying lengths, but the average annual growth of the long hairs, which largely pre¬ dominate, is about 10 inches. _ The hairs are not composed of epithelia, as is the case with wool, and therefore the felting property char¬ acteristic of wool is wanting. In fineness mohair is variable with the individual animals, and is placed between the fine and coarse

wools; in lustre, durability and strength it has no equal among fibres.

The only vitiating feature of mohair as it comes from the animal is the intermixture of an undercoat of lustreless, chalky-white hairs which vary in length from one to three inches, and vary in total amount according to the breeding of the animal. This undercoat is known technically as ˆkemp,® and the principal objection to it is that it does not take the fast dyes. It becomes necessary, therefore, to re¬ move the kemp from the mohair used in the finest fabrics, and this work is done by a comb which, in removing the kemp, also takes out every mohair fibre of equal length or shorter than the kemp. This entails a loss ranging from 10 to 30 per cent, but the average -is be¬ coming smaller as better goats are developed.

The lustre of mohair is very pronounced, and no amount of washing, dyeing or other manipulation will dull it. Its durability is re¬ markable, and because of this fact it enters largely into goods of fine quality but which are subjected to hard usage, such as railway plush. Fast dyes have such an affinity for it that sunshine and storms have no effect on its brilliancy.

The uses of mohair are multifarious, and are capable of wider expansion as the supply of mohair becomes larger. Its largest use is in the manufacture of plush. Practically all of the railway plush of the world is made of mo¬ hair, and also large quantities of furniture plushes of varying qualities and numerous de¬ signs. It enters into brilliantine, zibeline and crepen dress goods, coat linings, so-called al¬ paca goods, imitation Astrakhan for capes, coats and muffs, and many other fabrics under trade names which do not show what the goods are.

There are about three countries producing mohair in appreciable quantities as yet: Turkey in Asia, with 10,000,000 pounds annually; South Africa, with 15,000,000 pounds annually; and the United States, with 2,000,000 pounds annu¬ ally. (These figures are approximated). The prices ruling in the United States in ordinary times are from 25 to 45 cents per pound. In New England and New York there are mills which consume all of the American product, besides importing large

quantities of Turkish and South African hair from Bradford, Eng¬ land.

MOHAIR GOAT, the Angora goat. See Goat.

MOHAMMED (((The Praised One®; also written : Mahomet ; Muhammad, the Arabic form; Mahmoud Mehemet, etc.). Prophet and founder of Islamism, general called by Chris¬ tians Mohammedanism (but not by the follow¬ ers of the faith of Islam) : b. Mecca, Arabia, probably in April 569 a.d (according to some authorities 570 and 571 a.d.) ; d. Medina, Ara¬ bia, 7 June 632 a.d. Mohammed was not born in a lowly state as we might be led to believe by some of the tales of his early life. On the contrary his progenitor, Hashim, of the illustri¬ ous tribe of Koreish, was the great benefactor of Mecca and the guardian of the Caaba, an honor never conferred except upon those be¬ longing to the most honorable tribes and fami¬ lies. Abdul-Muttalib, his son, succeeded to these honors, and the guardianship of the Caaba

was confirmed in the line of Hashim by his action in saving the sacred city from the on¬ slaughts of the Christians of Abyssinia. Abdul-Muttalib had many children and Abdal¬ lah was the youngest and most beloved. He was remarkable for personal beauty and pos¬ sessed the secret of winning the hearts of women. He married Amina, of the tribe of Koreish, and on the night of the wedding, we are told, 200 maidens died of broken hearts.

Mohammed was the only fruit of this mar¬ riage, and his father died two months after, leaving no other inheritance than five camels, a few sheep and a female slave. It is difficult to reconcile this fact with his former exalted position, but we are assured that it is true, as we are also asked to believe the statement that Amina suffered none of, the pains of childbirth, and that Mohammed, on the moment of com¬ ing into the world, raised his eyes to heaven and exclaimed, (<God is great ! There is no god but God, and I am his prophet.® Legend also tells us that signs and portents took place at the moment of Mohammed's birth. Lake Sawa dried up, and the sacred fire of Zoroaster which the Magi had kept burning uninterrupt¬ edly for over a thousand years was suddenly extinguished, and all idols fell down. The massive palace of Khosrau, king of Persia, shook to its foundations and several of its towers were thrown to earth.

When Abdallah died, Amina's grief was so great that it dried up her

breasts, and. she was forced to look for a nurse among the females of the Bedouin tribes. At length Halima, the wife of a Saadite shepherd, took him into the mountains and nursed him, but returned him to his mother at the end of two years because he had epileptic fits. His mother died when he was six years old, and his grandfather, Abdul-Muttalib, adopted him. On Abdul's death, an uncle, Abu Talib, took the lad and remained his closest companion and devoted protector throughout his life. He was a mer¬ chant and brought Mohammed up in the same line. On one of his trips to Syria he visited a Nestorian monastery and there imbibed many ideas. Even in his youth he carried religious contemplation to an extreme, and it is believed that his epilepsy had much to do with this mor¬ bid tendency. Wonderful mental faculties are ascribed to him but he was just as illiterate as most of his countrymen. When 25 years old he was employed by a rich widow, Kadi j ah, also of the tribe of Koreish. He displayed such good judgment and business qualities in caring for her caravans and other commercial interests that, in spite of the fact that she was already twice widowed, she married him. She was 15 years older than Mohammed, but bore him two sons and four daughters. Al-Kasim and Abd Allah, the two sons, who were respectively the oldest and the youngest of his children, both died in early yopth ; the four daughters survived — Fatima, Zainab, Rukaiya and Umm Kulthum. He lived with his wife in faithful and happy wedlock till her death.

With his marriage Mohammed acquired great wealth, and this gave him leisure to in¬ dulge the original bias of his mind ; his old habits of contemplation were revived. His judgment and probity were widely respected. There was a steady growth in his zeal to abol¬ ish idolatry and other evils, and to substitute a

new and purer faith. This was fostered by his intercourse with Jews and Christians whom he was forced to meet in his journeyings. The idea of a new religion finally engrossed his whole mind and influenced his every action. He believed tie saw the necessity for it ; all sorts of new dogmas were creeping into and rapidly undermining the faith of

his forefa¬ thers. During the first centuries of the Chris¬ tian propaganda religious doctrines were more numerous than the stars in the sky ; both Chris¬ tianity and Judaism had crept into Arabia, Zoroastrianism was on the wane and people refused any longer to accept and conform to the old pagan superstitions. Othman, Zaid and even Waraka, one of his wife's relatives, who had embraced Judaism, were preaching against the futility of star-worship, and their followers were ridiculing fetishes, ceremonies, and even the temples. Many were being exhorted to Judaism while others were . embracing Chris¬ tianity, and others still were falling away alto¬ gether. Everyone was looking for a religion which should embody the faith of their fore¬ fathers' with the simple doctrine of the unity of the Deity. Something had to be done — the time was ripe, and Mohammed launched the faith of Islam. He went back to the beginning of things, and adopted as a hypothesis that God had inculcated in Adam the one and only true religion — the worship of one indivisible and only God, the Creator. He believed that this religion of Adam had been repeatedly debased, and almost forgotten at times, but that a suc¬ cession of prophets was destined to come into the world to restore it from time to time and bring men's minds back to the original idea — such prophets were Noah, Abraham, Moses and Jesus Christ. These had all fulfilled their re¬ spective missions, but man now needed another guide. It is not to be wondered at that Mo¬ hammed looked especially to Abraham, the father of Ishmael, the progenitor of his own race, as one of the greatest of these. With the development of this idea of the oneness of God grew Mohammed's mission as he conceived it. We can scarcely doubt that he was honest in his convictions and in his purpose when he first undertook the reformation of the world, which he really began at the age of 40 years. .

Mohammed's first convert was his wife, Kadijah, to whom he told the particulars of an interview which he claimed to have had in a vision with the angel Gabriel, who declared him to be the apostle of God. He was passing, as was his custom, the month of Ramadan in the cave of Mount Hara after fasting, prayer and meditation, when the angel Gabriel appeared to him, displaying a silken cloth covered with writing. «Read!® said the angel. ((I know not how to read!® replied Mohammed. (<Read,® repeated the angel; and immediately he was illumined with celestial light and understand¬ ing, and read what was written upon the cloth, which contained the decrees of God as after¬ ward promulgated in the Koran. Through his wife, her uncle, Waraka, was won back from Christianity and became serviceable to Mo¬ hammed on account of his great knowledge of the Old and New Testaments. The next to be converted were the fiery Ali, his nephew,

and Zaid, his faithful servant; also Abu Bekr, a man of high position, at whose solicitation 10 of the best citizens of Mecca joined the faith.

Mohammed confided his revelations only to members of his household for a time, and was laughed at by) some and reproached by others — Abu Lahah, an uncle, called him a fool, and Abu Talib, his adoptive father, while always protecting him, never actually confessed belief in his works. Mohammed personally instructed all his early converts in the doctrines of the new faith of Islam. After four years Mo¬ hammed's converts numbered but 40, and they were obliged to hold their meetings in secret in a cave near Mecca. Even here they were discovered and attacked by a rabble. Mo¬ hammed had much to contend with in these early days; many members of his tribe were against him, and Abu Lahib, his uncle, a rich and influential man, openly opposed what he called Mohammed's heresy.

In answer to a vision Mohammed now began to preach publicly, and summoned all the Koreishites of the line oi Hashim to meet him on the hill of Safa. Scarcely had he begun his discourse when Abu Lazib attempted to hurl a stone at him. Mohammed turned, cursing the hand thus raised against him and predicting his doom, with the further assurance that his wife, Omm Jemil, would help build his death-fire. Mohammed soon called another meeting and this time boldly announced his divine command to impart his revelations received from heaven. At this meeting he called for a vizier or vice¬ gerent ; Ali was selected as he alone volun¬ teered. He soon found a following among the people at large, threw off all reserve, proclaim¬ ing himself a prophet sent by God to put an end to idolatry. His favorite places of preach¬ ing were the sanctified hills of Safa and Ku-beis; Mount Hara was his Sinai, whither he retired for contemplation and fresh revelations. He was often attacked with open force by his enemies, and in the 10th year of his prophetic office was deprived by death of his faithful wife, Kadijah, and Abu Talib. He then retired to the city of Taif but kept gaining numerous follow¬ ers, among others many inhabitants of Medina. About this time occurred his famous vision in which he claimed to have made a nocturnal journey to heaven on the beast A1 Borak, as referred to in the Koran. Shortly after, a con¬ spiracy to murder him was set on foot, and he was obliged to flee to Medina. This took place in 6 22 a.d., and is known as the Hegira ((<flight®) and marks the beginning of the Mo¬ hammedan era.

Mohammed was accorded a warm reception in Medina. He organized his followers and provided set forms of worship and religious

observances; he proselytized the Jews and other sects in the neighborhood and made many con¬ cessions to draw them to the new faith. As a result he was made judge and then ruler of Medina, and boldly assumed regal authority and dignity. After marrying Ayesha, the daughter of Abu Bekr, he announced his determination to take up the sword in furtherance of his doc¬ trines. The hope of plunder thus, held out brought him hordes of followers. His first ex¬ pedition attacked a Koreishite caravan led by Abu Sofian, and rich booty was secured and divided. But Abu Sofian returned shortly with 3,000 soldiers and utterly routed Mohammed who had but 1,000. Mohammed, badly wounded, managed to escape. He rallied his troops, however, and gained new followers, by

seductive promises, explaining that the defeat was due to the sins of his adherents. In 627 Abu Sofian again brought an expedition against him and laid siege to Medina with a force of 10,000 men. After 20 days, however, his forces broke and dispersed on account of internal dis¬ cord. Mohammed then led his army against the Jews who had sided with the Koreishites, and took a bloody revenge. Over 700 men were massacred, and the women and children were carried into slavery. From this time on Mo¬ hammed's thirst for warfare and blood seemed to be insatiable. His whole nature apparently underwent a change. He introduced a special chapter in the Koran to give himself permission to marry Zainab, the wife of his former slave Zaid. He followed this from time to time with numerous other marriages and amours and multiplied them to such an extent that at the time of his death he had no less than nine wives. All these affairs he explained by his divine mission, although diametrically opposed to his own laws as set forth in the Koran. His ambition and his views continued to expand with numerous successes in warfare and the tremendous growth in the number of his con¬ verts. He gradually conquered all the small surrounding tribes of Arabia; and then becom¬ ing still more ambitious and arrogant, sent dep¬ utations as missionaries beyond the frontiers. He sent to Khosrau Parviz, king of Persia; Heraclius, emperor of Constantinople; Mokaw-kas, ruler of Egypt; the king of

Ethiopia, and the princes of various districts of Arabia, to embrace the new revelation of the divine law made through him. The stronger and more remote principalities rebelled, but the weaker at once adopted the faith of Islam. The king of Persia and Amru, the Ghassamide, rebelled, and Amru had the ambassador from Mohammed executed. This caused the first war between the Moslems and the Christians ; the Moslems were beaten with great loss.

Mohammed now saw the importance of re¬ gaining the holy city and prepared what after¬ ward came to be known as the (<First Pil¬ grimage.® In 629 he appeared before the gates with 1,400 of the faithful. He succeeded in making a peaceful entrance, telling the Koreis¬ hites that he was on a mission of peace and wished only to worship in the Caaba. He and his followers were granted three days for this purpose and left on the fourth day, but not without having won over many Koreishites to the new faith, among them being Amru, Oth-man and Khaled. Soon after this Mohammed nearly died from the effects of poison ad¬ ministered to him by a Jewess.

He now determined to wrest Mecca from the hands of the Koreishites; in 630, or the 8th year of the Hegira, he marched against the city with 10,000 soldiers. The inhabitants gave up the holy city into Mohammed's hands, re¬ ceiving their life and liberty providing they accepted the faith of Islam. The Caaba was refinished, the idols thrown down, but Moham¬ med wisely refrained from destroying the ancient Black Stone, regenerating it with his own holy touch. Thus the temple became the sanctuary of the faith of Islam. This exercised a wonderful effect all over Arabia and the next year (9 of the Hegira) embassies arrived from all points of the compass to make submission. This is called (<The year of Embassies.®

In order to intimidate Heraclius, the em¬ peror, Mohammed marched into Syria half way to Damascus, at the head of an army composed of 20,000 foot soldiers and 10,000 horse, but returned to Medina without making an attack He then extended free worship to the Christians in consideration of tribute, added a new chapter to the Koran, revoking all regula¬ tions in favor of idolaters, and then promul¬ gated his great and last pilgrimage to Mecca, known as the (<Valedictory Pilgrimage.® It was toward the close of the 10th year of the Hegira that he started this pilgrimage accompanied by a throng estimated at from 40,000 to 150,000 persons. He preached to them from Mount Arafat, exhorting the faithful to piety and righteousness, to abstain from sin and to pro¬ tect the weak. On his return to Medina

he fell sick and declined rapidly. He gave instructions that Abu Bekr and Usama, the son of Zaid, should be the leaders of the army, and expired in the arms of his favorite wife, Ayesha, 12th day, 3d month, year 11 of the Hegira (7 June 632 a.d.). He was buried in the house of Ayesha where he died. It afterward was annexed to an adjoining mosque which became a place of pilgrimage for generations of Mohammedans.

Mohammed's personal appearance, to judge from Arabic tradition, was neither imposing nor pleasing, but inspiring. He was not above medium height, but was broad-shouldered and deep of chest; he was strongly and compactly built; head, large; brow, high; face, round and ruddy; mouth, large; nose, long and aquiline. His eyes, large, black and fiery, were full of his peculiar magnetic personal power. He wore his black hair long and curly and his beard remained unwhitened at his death. A large birthmark between his shoulders was looked upon as the holy mark of prophecy. His personality was strong and dominant, but his domestic life was as simple as was his frugality at meals. He was kind and generous, a tender father and a loyal friend. Even at the height of his power he lived in a miserable hut, slept upon straw and his pillow was made of palm leaves covered with leather. His life was withal a strange contradiction, for at times he was deceitful, cunning and cowardly, and in his later years gave way to gross sensuality. His mind in spite of his religion contained a strong ad¬ mixture of superstition ; he believed in omens, charms and good and bad spirits. Spasmodic convulsions always accompanied his visions or divine revelations, and by many were attributed to his disease of epilepsy. At such times he would perspire profusely and remain in a weakened condition for some time after.

As a political leader and a religious re¬ former Mohammed undoubtedly ranks among the greatest. Whether a real prophet or a charlatan, or a mixture of both, we cannot strip him of the qualities of greatness. His name has survived 12 centuries and his follow¬ ers to-day number over 175,000,000 living souls. (See Ishmaelites; Karmathians; Koran; Mohammedanism; Sunnites; Wahabees; Sunna, etc.). Consult Biographies by Sir Wil¬ liam Muir C 1851—61 ; abridged 1894); Noldeke (1863) ; Weil (1864) ; Sprenger (1869) ; Krehl (1884) ; Lamairesse and Dujarric (1898) ; also, Wellhausen, (Muhammed in Medina' (1882).; Muller, August, (Der Islam im Morgen-un<j Abendlande' (1885) ; Muir, (Mahomet and Is*

lam) (1887) ; Seyd Ali, (Life and Teachings of Mohammed) (1891) ; Muir, (The Caliphate1* (1891) ; Pool, (Studies in Mohammedanism* (1892) ; Margolionth, D. S., (Mohammed and the Rise of Islam* (1905). Also consult other works quoted under Mohammedanism ; Koran, and kindred subjects.

MOHAMMED I, Turkish sultan: b. 1375 ; d. 1421. He was son of Bajazet I, after whose death (1403) he became prince of Asia Minor and rival of his three brothers for the throne, to which he came in 1413, as the successor of Mousa. During his reign of eight years he strengthened the empire, which was suffering from the recent assaults of Timur (or Tamer¬ lane), pushed its boundaries as far as the Dan¬ ube and fostered friendly relations with the Greek Empire abroad, and literature, arts and sciences at home.

MOHAMMED II, Turkish sultan: b. Adrianople, 1430; d. 1481. He succeeded his father, Murad II, in 1451; two years later un¬ dertook the siege of Constantinople, which he carried by storm after 53 days' siege; made the city his capital ; made war on the Greek rulers in Morea and Trapezus, on Hunyadi of Hungary, on Scanderbeg in Albania and on Venice, winning for his empire the provinces of Bosnia and Serbia, as well as Euboea and Scutari (from Venice) and Kaffa (from Genoa), and for himself the names el-Ghazi, (<the Conqueror,® and Buyuk, (<the Great.® His conquests had extended as far north as the Crimea, and in 1481 had seized Otranto as a preparatory step to war on Naples, when he suddenly died.

MOHAMMED III, Turkish sultan: b. 1566; d. 1603. He succeeded his father, Murad III, in 1595, assuring himself the throne by the exe¬ cution of his 19 brothers. He captured Erlau in Hungary (1596), but was unsuccessful in his further movements in Europe, being at¬ tacked in Asia by Abbas the Great, Shah of Persia.

MOHAMMED IV, Turkish sultan: b. 1642; d. 1691. His father, Ibrahim I, was murdered by the Janizaries when Mohammed was only seven years old. He came to the throne under the nominal regency of his grandmother, which was soon exchanged for the actual control of the grand-viziers, the Kiuprili. Turkey's foreign policy was aggressive and successful under them; but in 1683 Kara Mustafa was defeated before

Vienna. The Holy League, composed of Poland, Russia, Venice and Leopold I, Ro¬ man emperor, then steadily gained victory after victory over the Turkish army, which rose against Mohammed, imprisoned him in 1687 and let him die in chains four years after the accession of his brother, Suleiman II.

MOHAMMED V, 35th Turkish sultan in male descent of the house of Othman : b. 3 Nov. 1844; d. 3 July 1918. A son of Sul¬ tan Abdul Medjid (d. 1861), he succeeded his elder brother Abdul Hamid II (q.v.) on the latter's deposition and exile, 27 April 1909. From his early manhood until the day when he was unexpectedly placed on the throne in his 65th year, Mohammed Reshad Effendi — as he was called— had been a state prisoner in close confinement in a palace on the Bosphorus. By the law of succession observed in the reign¬

ing family, the crown devolves according to seniority upon the male descendants of Othman (the founder of the empire) sprung from the Imperial Harem, whence all children, whether of free women or of slaves, are legitimate and of equal lineage. During his long captivity Mohammed had seen three sultans come and go — his uncle, the gloomy Abdul Aziz, and his two brothers, the insane Murad (d. 1902) and the (<Great Assassin,® Abdul Hamid (d. 10 Feb. 1918). All three had been deposed after reigning 15 years, three months, and 33 years, respectively/ Of very limited education, totally ignorant of the world and inexperienced in the mysteries of statecraft, he had been dragged from obscurity in his old age and suddenly made the ruler of 20,000,000 people. Mr. Morgenthau, former United States Ambassador to Turkey, described him as ((simply a quiet, easy¬ going, gentlemanly old man® of a ((benevolent, gentle nature.® Lacking the strength and cun¬ ning of his famous brother, he easily became a quiescent tool in the hands of the Young Turkey leaders. His personal share in the government of Turkey before and during the war may be described as nil. He was suc¬ ceeded by Mohammed VI. See Turkey.

MOHAMMED VI, 37th Turkish sultan of the house of Othman : b. Constantinople, 12 Jan. 1861. Wahid-ed-din (which was his former name) is a son of Sultan Abdul Medjid and the 14th child of that monarch. He is thus the youngest brother of his three immediate pre¬ decessors on the throne — Murad V, Abdul Hamid II and Mohammed V. He became heir to the throne on the death (by murder or suicide) of his cousin Prince Yussuf Izzedin in February 1916. On the death of Mohammed V on 3 July 1918, Wahid-ed-din succeeded him under the

style of Mohammed VI. He found his country disorganized and at war, with the government in the grasp of Enver Pasha, Talaat Bey and German officials. Three months later the two virtual rulers of Turkey fled and the sultan was compelled to sue for peace in a note to the United States government dated 12 Oct.

1918.

MOHAMMED AHMED, ah'med (The Mahdi). See Mad Mullah.

MOHAMMEDAN ART. The Moham¬ medan or Moslem culture, which from insig¬ nificant beginnings developed its military power with such extraordinary rapidity in the 7th century of our era, by subjugating nearly all western Asia, northern Africa, Spain and later Sicily and Sardinia, was at the outset almost wholly destitute of art. It was the Arabs who led in these conquests; the Moors who overran Spain were largely of Arabic blood, and the Arabs were not at first artistically gifted. Like the Mongols and the Turks, who were later concerned in the advance of Islam (as the Mohammedans call their faith), the Arabs and Moors were at first wholly dependent on the peoples they conquered for their art, and espe¬ cially for their architecture; upon the Syrians, Assyrians, Armenians, Persians, Byzantine Greeks, the Copts of Egypt, the Christians of North Africa, the Spaniards and Sicilians, all of them Christian's except the Persians. But the conquerors imposed upon their Christian and Persian builders and artists special pro¬ grams and requirements due to their faith, and

in the course of centuries developed predilec¬ tions and aptitudes wholly their own, which gave to all their arts an Oriental character wholly unlike that of the Western arts from which they were derived. The name ((Saracenic,® commonly applied to all Moslem art, is an unscientific inheritance from the age of the Crusades.

The development of this art took place dur¬ ing the early Middle

Ages, when European cul¬ ture was slowly and painfully emerging from the chaos of the centuries following the fall of Rome. It produced a civilization and an art that flourished with extraordinary brilliance. Bagdad, Cairo, Cordova, Granada, Toledo, Kairouan (Cyrene) and other cities of Arabia, Persia, Spain and North Africa, were for some centuries more splendid than any European city outside of Constantinople. Moslem universi¬ ties were great centres of learning; the Arabs cultivated mathematics and philosophy with enthusiasm, and the textile arts, ceramics and metalwork were carried to so high a degree of perfection that they powerfully affected European art as late as the 16th century.

Historical Development. — During the first century after the Hegira (622-722 a.d.) the Arabs conquered Syria (634-642 a.d.) ; the Sassanian empire of Persia in 642; Armenia and Mesopotamia in 644, and part of northern Africa in 645-692. Sicily was occupied early in the 9th century. The Ommyad sultans sub¬ dued the rest of North Africa during the 7th century and extended their conquest into Spain (710-713), where they established the inde¬ pendent khalifate of Cordova, as a rival to the Abbassid khalifate of Bagdad. The 9th and 10th centuries were a period of exceptional brilliancy in Moslem history: the age of Haroun-er-Reshid, of El Mansur, of an almost fabulous splendor in Bagdad, of conquests in Sardinia and Malta and of widespread archi¬ tectural activity. During the 7th and 8th cen¬ turies the original mosque of Omar at Jerusa¬ lem (of which the present so-called <(Mosque of Omar,® really the Kubbet-es-Sakhra, is a much later successor), and that called El Aksah in the same city; the mosques of Amru at Cairo and of El Walid at Damascus and the Great Mosque at Cordova had been built; dur¬ ing the 9th and 10th centuries the celebrated mosque at Kairouan, the mosques of Ibn Tiilun and of El Azhar at Cairo were built and that of Cordova greatly enlarged. Under the Fatimite dynasty, which succeeded the Toulunids in Egypt in 969, there began the practice of erecting domes over tombs and sepulchral chambers, and the earliest minaret was built in Cairo. But the greatest architec¬ tural activity in that city occurred under the Ayubite and Mameluke sultans of the 13th and 14th centuries, to which belong the splendid mosques of Kalaun (1284), Hassan (1356— 79), Barkuk (1384), Muayyad (1415) and Kait Bey (1465), and the remarkable group of domed and minareted tombs of the Karafah quarter, commonly known as the tombs of the Khalifs and of the Mamelukes.

The culmination of Hispano-Moresque architecture came somewhat earlier — singu¬ larly enough during the period of the disinte¬ gration of the Moorish power in Spain. The famous Giralda tower at

Seville (1160), the Alcazars or castle-palaces of Seville and Mal¬

aga (1181-1310) and the Alhambra at Granada (1248-1306), are the most noted extant products of this age.

Although Persia was so early subdued by the Arabs, and by the artistic proclivities of the people became the parent of Mohammedan art in Bagdad and Mesopotamia and later in Turkestan, nearly all the early monuments of Persian architecture were destroyed in the Mogul invasions of the 1 1th— 13th century. The recovery in architecture was slow until the ac¬ cession of the Sefavieh or Sufi dynasty in 1478, when there ensued a remarkable revival of all the arts in the cities of Ispahan, Tabriz, Aminabad, Hamadan, Shiraz, etc., with the building of great mosques, bazaars, caravan¬ serais and bridges, and a great development of decorative art in rugs, printed fabrics, ceramics and manuscript-illumination.

The conquest of the Indian states by the Mohammedans was late, gradual and incomplete, and neither the Hindu religion nor the native Hindu art was ever extinguished, even in those regions longest subject to Islam. Northern India was conquered in part in 1192, and de¬ veloped a style in which Persian and Hindu forms are inseparably blended, as in old Delhi and Ajmir. In other provinces during the next three centuries Mohammedan mosques and palaces were built in various local styles ; but it was the Mogul sultans (1494-1706), who in India as in Persia developed the arts, including architecture, with the greatest splendor, espe¬ cially in the magnificent mosques, palaces and tombs of Bijapur, Allahabad, Secundra, Delhi and Agra and their suburbs. In this period Persian conceptions and influences are domi¬ nant, but the Hindu , traditions are also plainly manifest.

Turkey was the latest of the Moslem em¬ pires to develop a characteristic art. The Seljuk Turks who had settled in Asia Minor in the 11th century, and had built up a notable capital at Iconium (Konieh) under the influ¬ ence of Persian art, were superseded by the Ottoman Turks in 1299 under Osman, the founder of the present dynasty. By the cap¬ ture of Constantinople in 1453 (having captured Adrianople nearly a century earlier), the Turks became masters of the Byzantine Empire. The resulting development in the arts shows a mingling of Arabic, Persian and Byzantine ele¬ ments, the latter predominating in the archi¬ tecture of the mosques.

In China the Mohammedan element has been too feeble to produce

any vital and char¬ acteristic Moslem art.

General Characteristics. — While in Mo¬ hammedan art five distinct style-developments are easily recognized — the Arabic, Moorish, Persian, Indo-Moslem and Turkish — certain common characteristics run through them all, due in part to the religion, in part to the Asiatic source of all the Moslem peoples. The Koran ‘forbids all representation of living beings, and sculpture in all its forms is rigidly proscribed, while pictorial art, and even the use of pure nature-forms in ornament, are equally rejected except by the Persians, who belong to the Shiah sect, and the Moslems of India. Everywhere else decorative art has been restricted to purely conventional motives, or to nature-forms so conventionalized as to be hardly recognizable. In spite of this restric

tion, it is in the arts of decoration that the Mohammedans have always been the strong¬ est. In these arts the Asiatic love of color and of surface ornament is everywhere evident, in contrast to the European predilection for plastic decoration based on structure. In all Moslem styles minuteness of detail and intricacy of composition are preferred to the clarity and repose of the European styles, and brilliant color, broken up into minute elements and cov¬ ering broad surfaces, is preferred to those effects of light and shade produced by sculpture and carving in varied relief. In the wall-decoration of the architecture the traditions of rug-design seem to dominate. Common to all the architectural styles are certain motives : the interlaced star (((star of Solomon®), the honey¬ comb or stalactite motive and decorative in¬ scriptions in the Cufic, Persian or Arabic forms of lettering. Arches, of whatever form, are almost invariably enclosed in rectangular panels or decorative frames.

Architectural Styles and Monuments.— As

Gothic architecture received form in the build¬ ing of cathedrals, so the Moslems developed theirs in the building of mosques. A mosque is primarily a prayer-nail, the ceremonial prayer of adoration of Allah

being the chief element in the Islamic worship. And since all prayer must be made toward Mecca, the holy city, the one prime essential of the mosque is the mihrab or niche in the side of the hall toward Mecca, indicating the kibleh or ritual direction of worship. To the right of this, in the larger mosques (Jami, Jouma or Jumma mosques), is a mimber or high narrow pulpit from which the Koran is read on Fridays. There is usually in front of the mosque an open court sur¬ rounded by arcades, entered by one or more lofty gates, and having in the centre a fountain for* the ceremonial ablutions without which the worshiper is deemed unfit for prayer. To nearly all mosques are attached one or more minarets from whose exterior galleries the muezzin chants daily at the appointed hours the far-sounding call to prayer. These require¬ ments permit of the utmost variety in plans and detailed arrangements, which differ widely in the five principal styles.

Of these five styles the Arabic has less unity than any of the others. It may, indeed, be divided into three sub-styles: the Syrian, based upon the Syrian-Byzantine architecture and later influenced by the Romanesque works of the Crusaders; the Mesopotamian, dominated by Persian influence, as at Bagdad ; and the Egypto-Arabic or Cairene, springing from Coptic prototypes, and by far the most dis¬ tinctive of the three. It is characterized by the pointed arch, the ovoid or pointed dome decorated in relief, with or without a drum ; minarets square below, with two or more diminishing stages and much surface-ornament; the use of stalactite corbeling, of marble veneer¬ ing internally and of carved and painted beamed ceilings. The buildings are seldom large in scale, even when covering large areas ; height and spaciousness are not sought after, as a rule. The material of construction is usually brick, faced externally with stone or with stucco. The entrance doorway is made im¬ pressive by setting it in a deep and lofty niche. Vaulting is chiefly confined to the domes over sepulchral chambers, a feature introduced in

the Fatimite period from Mesopotamia, whence also came the minaret. The early mosques in Cairo, as generally elsewhere also, consisted of a court surrounded by arcades, and the prayer-hall was simply a multiplication of these arcades on the side toward Mecca. But the Hassan mosque (1356) is exceptional in its prayer-hall covered by a huge barrel-vault of 70 feet span, and the ((Mosque of Omar® at Jerusalem in its concentric circular plan and vast wooden dome. Later it became customary to incorporate in the mosque not only one or more sepulchral chambers, but also hospitals and rooms for priests

and for schools and other purposes. After the Turkish conquest by Selim in 1517, mosques were sometimes erected in Cairo after the Constantinople type, with broad domes over the prayer-hall (Boulak, 1520; Mehmet Ali, 1821). The Arab houses of Cairo, built on the street, are noted for their fronts of mashrabiye latticework. Woodwork of intricate star-paneling inlaid with mother-of- pearl and ivory appears in doors and mimbers, and decorative tile-work is freely used in in¬ teriors — an art imported from Persia.

The Moorish style, of which the Hispano-Moresque is simply the Spanish development, employs the horseshoe arch, often cusped ; slender columns with carved capitals, often of cubical form above a high necking; massive square towers for minarets, and a system of wall-decoration in stucco, stamped or molded in intricate surface-patterns brilliantly colored, above a wainscot of colored tiles. Domes and vaults are very rare. Both stone and brick are used in construction, and external patterning in relief is a frequent feature of external brickwork, as on the Giralda at Seville. Both in Africa and Spain the decorative element pre¬ dominates over the structural. The most noted monuments have been mentioned ; others at Fez, Tangiers, Algiers, Tlemcen, both mosques and palaces, are of interest.

The Persian monuments differ in style from the Arabic and Moorish, alike in plan, construc¬ tion, form and decoration. The bulbous dome, the round minaret with a roofed gallery and bulbous top, the four centred pointed arch, portal-niches of huge size, and the veneering of the whole exterior with figured tiles in brilliant colors, give the Persian mosques an aspect nowhere else to be met with. Brick is the universal material of construction, and vaulting of great intricacy is everywhere used, alike in mosques and in secular buildings. In palaces wooden posts and wooden ceilings are common, brilliantly painted; but otherwise columns are infrequent. The principal mosques belong to the Sufi period, though the ruined mosque at Tabriz and the tomb of Khodabendeh at Sultanieh are of the early 14th century. The great square or Meidan, the mosque and col¬ lege and the Palace of the Mirrors, all at Ispahan, the caravanserai at Aminabad, and bazaars, bridges and mosques at Shiraz, Hamadan, etc., are notable examples of the style, to which may also be credited the fine though ruinous mosques at Bokhara and Samarcand, in Turkestan.

The various pre-Mogul Indian styles show a mixture of Hindu and Persian forms (e.g., mosque, gate and tomb of Altomsh at Old Delhi, mosques at Ajmir, Ahmedabad, Gujerat, Kalburgah, etc.). The Mogul conquest intro-

duced an entirely new architecture, Persian as to its forms, which include the bulbous dome, round minaret, great niche-portals and the four-centred arch. But it is an architecture of sandstone and marble, not of brick and tile, and is superior to the Persian in the scale, dignity and setting of its monuments. Among the most important of these are the mosques at Bijapur, Agra (Muti M.usjid or Pearl Mosque), Delhi (Jumma Musjid), and Fathpur-Sikhri; the great palace groups at Delhi and Fathpur-Sikhri ; the tombs of Akbar at Secundra and of Humayun at Agra, and the incomparable Taj Mahal near Agra, the tomb of Shah Jehan and of his queen, Mumtaz-i-Mahal.

The earliest Turkish architecture, the Seljukian, was an offshoot of the Persian. When the Ottoman Turks established their new capital at Brusa (1300), they employed at first the Seljuk style, as in the (<Green Mosque" ; but after the capture of Constantinople in 1453 the Byzantine influence became paramount in the plan and construction of mosques, while the de¬ tails betray mingled Arab and Persian origins. Of all the Mohammedan styles this is the most purely structural in masses and conception, and the most imposing in scale. The great mosques follow the prototype of Santa Sophia (q.v.), covering vast interiors with a lofty central dome and a combination of half-domes and cupolas; the minarets are round, with one or more galleries and a slender lead-covered spire. The Turks employ the simple pointed arch with alternating voussours of light and dark marble, enclosed in a rectangular panel; marble columns with stalactite capitals ; stalactite cor¬ beling and cornices, and a combination of tiles and painted ornament for interior decoration. All their finest buildings are of white marble; they include the Mehmediye Mosque at Con¬ stantinople (1460), the great Selimiye at Adrianople (1512-30), the Suleimaniye Mosque and tombs and the Shah Zade Mosque (1556), the Valide and Ahmet I mosques (17th century) and the Nouri Osmaniye (1756), all at Constan¬ tinople, besides many fountains, and several palaces built in the 19th century of a showy but inferior type.

The Decorative Arts. — The Asiatic races have always excelled in surface-decoration, especially in the use of color. Among them the Moslem nations have displayed great skill not only in the application of surface-deco¬ ration to buildings but also in many forms of textile and ceramic art and in certain kinds of woodwork and metalwork and even stainod glass. In textiles the place of honor belongs to the rug-weavers of Turkey, Persia and In¬ dia, whose art in this field is descended from very ancient times when Babylonia led the world in decorative weaving. The Turkish rugs, including those from Mesopotamia and Turkestan, are distinguished by their purely conventional patterns, composed almost entirely of rectilinear and angular motives. The Per¬ sian and Indian rugs are esteemed the finest; in these the patterns are in flowing lines, with liberal use of leaf and floral forms seminat¬ uralistic in treatment. The Persians also pro¬ duce remarkable hangings printed in colors by hand from engraved wooden blocks on cot¬ ton or linen. Both India and Turkey have produced remarkable needlework in colored silk on broadcloth or cotton; but this art has nearly

disappeared in Turkey. The Armenian and Syrian laces are of great beauty, but they are mostly the work of Christians, not Mo¬ hammedans. In ceramics the Persians have been from a remote antiquity the leaders among the Moslem nations. They inherited the art from the ancient Babylonians and in turn taught it to the Arabs of Egypt and the Moors of Spain, and later to the Turks of Asia Minor. (See Ceramics). Their use of patterned tiles for veneering the exteriors of their buildings has been already referred to. In all the Per¬ sian ceramics, both tiles and glazed pottery, floral patterns are freely used ; the cypress tree, the rose, carnation or pink, peony and other flowers appearing frequently, as well as birds, gazelles and other animals. The Arabs and Moors, on the other hand, avoided, as far as possible, such naturalistic representations. The Turkish tiles and pottery approach more nearly the Persian types. In metahvork the Indo-Moslems excel the other Mohammedans, especially in chased and perforated brass ves¬ sels, and in niello-work — the incrusting of patterns in gold or silver in or upon iron or bronze ; but it is not possible to distinguish the Moslem from the Hindu handiwork except where the chasing or incrusting of Hindu em¬ blems betrays its non-Moslem origin. The kin¬ dred art of damascening, or the insertion of gold, silver or brass wire into grooves cut in iron or steel, originated, as its name implies, in Damascus, and was carried to great per¬ fection by the Arabs, especially in the decora¬ tion of armor and weapons. The woodwork of doors and of numbers or pulpits in Cairo and in Turkey and the

mashrabiye of Cairo houses have been previously referred to. A similar treatment of intricately-framed paneling and of spindle latticework is employed for both fixed and movable furniture. The Moslems of India also excel in perforated and carved woodwork for interior decoration. The art of stained glass was developed in Cairo, perhaps as early as the 14th century, and spread thence to Turkey in the 16th. The patterns are per¬ forated in cement, and the perforations stopped with bits of colored glass, combined in har¬ monies of line and color.

Manuscript-decoration is in some respects the most distinctive of all the Moslem arts, and it is hard to decide which nation produced the finest works, though the palm would per¬ haps go to the Persians. The beauty of the Arabic lettering (of which the Turkish and Persian characters are mere variants) lends itself to decorative calligraphy in an eminent degree, while each of these nations has de¬ veloped an art of supplementary adornments in color and gold, in borders, decorative panels and other forms of ornament, that rival the finest manuscript of western Europe. To these embellishments the artists of Persia and India add the resource of pictorial illustra¬ tion in color, which the Arab and Turkish illuminators allow only in the rarest instances.

The decorative arts of Islam generally reached their highest attainment in the 1 5th— 17th centuries, since when there has been a long and slow decline, though they are still practised with success in many parts of Turke}r, Egypt, Persia and India.

Bibliography. — For the general subject the most important work is Saladin et Migeon,

(Manuel d’art mussulmaiL (Paris 1907) ; also Franz Pascha, J., (Die Baukunst des IslatrP (Darmstadt 1887). For Arabic art, Bourgoin, J., (Les Arts arabes) (Paris 1873) ; Gayet, A. J., (L’Art arabe) (Paris 1892) ; Migeon, G., (Le Caire) (Paris 1906) ; Prisse d’Avennes, (La Decoration arabe) (Paris 1885). For the His-pamo- Moresque, Goury, J., and Jones, O., (The Alhambra } (London 1842-45) ; de Prangey, G.,

(Monuments arabes et moresques de Cordoue,* *etc.* (Paris 1832-39). For Persia, Coste, P., (Monuments modernes de la Perse) (Paris 1867) ; Gayet, A. J., (L'Art persan) (Paris 1895). For India, Fergusson, J., (Indian and Eastern Architecture) (London 1910) ; Jacob, S. S., (Jeypore Portfolio of Architectural Details) (London 1890-94) ; Le Bon, G., (Les Monuments de l'Inde) (Paris 1887) ; De Forest, L., c Indian Architecture and Ornament) (Bos¬ ton 1887). For Turkey, Montani, ˆ'Architec¬ ture ottomane) (Paris 1890) ; Parvillee, L., Architecture et decoration turques) (Paris 1874). For Moslem ornament in general, Jones, Owen, (Grammar of Ornament) (London 1857) ; Racinet, A., (L'Ornement polychrome) (Paris 1869-73).

A. D. F. Hamlin,

Professor of Architecture, Columbia University.

MOHAMMEDAN LITERATURE. The

study of the traditions of Mohammed, in all their extended ramifications, comprises what might be termed Mohammedan literature ; and as these are pre-eminently embodied in the Koran, that work, without striking literary art and mechanically constructed, became the in¬ comparable classic of Islam, to give rise to schools of thought, to systems of theology and jurisprudence and to promote distinct branches of history, biography, criticism, science, gram¬ mar, philosophy, legend and poetry.. It is curi¬ ous how such a book, revealed in bits and scraps, arranged according to the length of the chapters, without uniform style, and whose text was not collated in the prophet's lifetime, should have been worshiped and idealized. But our Western mind cannot understand the Oriental point of view, and least of all the windings and complexities of the Semitic brain. Caliph Uthman had done awav with all exist¬ ing copies of the Koran except that of Abu Bekr, which itself was shortly afterward de¬ stroyed by Marwan, governor of Medina. All copies of the book to-day, wherever scattered, are reproductions of Abu Bekr's edition. Uni¬ formity and authoritative text could apparentlv be secured in no other way. Out of the exe¬ gesis of the Koran sprang the most vital and varied elements in Arabic literary history, which began in primitive pre-Islamic times in the ceaseless caravan-marches across the des¬ erts, where the camel's regular swing taught the Arab to sing rhymes. The more cultured Mohammedan of a later age is city dweller, and shares wider aspirations; but the Koran, not the desert, is still his starting-point, to which he always returns, whether he follows the simple monotheism of Mohammed or an agnostic mysticism.

It can readily be seen how history among the Arabs began with the Maghazi — books devoted to the study of Mohammed's wars. The deeds of that era were to be narrated, the chronicles and legends gathered, at second

hand generally. Efforts to obtain informa¬ tion as to the prophet's life gave birth to biography, which was to develop in later cen¬ turies. Parallel with histories of wars . and events were written histories of famous cities, like Medina or Mecca, Bagdad and the rest, most of which works have perished. Hov this field was cultivated can be shown from what is recorded of Tabari, the most illustrious historian (828-923), who for 40 years wrote 40 sheets a day. The oldest biography extant is that of the prophet by Ibn Ishaq (d. 767). The beginnings of the historical romances go back to the first centuries of Islam when vener¬ ation for Mohammed gave rise to legend and fable that passed as genuine history.

The literature of jurisprudence sprang nat¬ urally from the study of the hadith or sources of tradition. The Koran had to be supple¬ mented at an early date to provide laws for the Moslem world. The sayings of the prophet after his death, his usages and decisions, had to be collected, arranged and sifted. The Koran itself was absolute authority, if it con¬ tained a law applicable to the case in hand; otherwise the memories of the Sahibs, the companions of the prophet, were resorted to for his rulings. If these proved of no avail, recourse was had to the common law of Me¬ dina, and finally to the common sense of the judge. Hence a vast legal literature arose — collections of traditions, called Musnads, be¬ cause each tradition was "supported® against the companion from whom it came. One of the first and greatest of these was the <Misnad) of Ahmad ibn Hanbol (d. 863). It was printed a few years ago in Cairo in six quarto vol¬ umes of 2,885 pages and is said to contain about 30,000 traditions going back 700 years.

Another type of tradition-book was the (Musannaf> or "arranged,® — chapters classified according to their subject matter. A1 Bukhari (d. 879) made the most respected of all the collections, termed Sahih, which is so arranged as to form bases for a complete system of jurisprudence. Another is that of Muslim (d. 883). These were the two most, honored au¬ thorities. Four other legal collections, (Sunan) ("usages®), stand second to. the two Sahihs. Different writers, however, give the number of canonical works as five, seven or even 10. It did not take long before the six great books were themselves

abridged and explained — the rules of the faith were summed up into a selection of 40 traditions and these became the subject of endless commentaries. The Ro¬ man as well as the Rabbinical law had marked influence on Mohammedan law. Four schools of thought held sway, that of Abu Hanifa (d. 772), speculative jurist; of Malik (d. 801), historical jurist; of Ash Shafi'i (d. 826), rev¬ erent and conciliatorv; and that of the pupils of Ahmad Hanbol (d. 863), reactionary. A fifth school, the Zahirite, whose discovery is due to Dr. Goldziher, founded by the Abu Sulaiman David ibn Ali (815-883) insisted on the external meaning of the Koran and the traditions and repudiated further tradition. "It never held rank,® writes Macdonald, "as an acknowledged school of Mohammedan law.®

With the deeper study of the Koran, two further branches arose — the. science of read¬ ing the text and that of its interpretation. Oral tradition which was at first depended upon

was soon followed by written tradition and books were compiled on the various ways of reading, some of which dating from the 10th century are preserved at Berlin, Algiers and Leyden. One book, written by a grave jurist, and entitled (Kitab Muhbarakˆ (Blessed Book) is a story of those who died listening to the reading of the Koran. In the line of exegesis, the array of books is overwhelming, the mys¬ tical in large number. Hence arose the in¬ creased study of grammar, most of the com¬ mentators being grammarians.

In the department of theology, whole li¬ braries have been written. Ghazali, one of the most famous masters (1049-1111), wrote 69 works that are extant. Like its jurisprudence, Mohammedan theology could not begin until after the prophet's death. At first it was more political than religious but soon settled down to more or less logical wrangling between sect and sect. Christian, Jew, Persian, Greek alike had their influence, with developments now ra¬ tional, now mystical, now radical, now pan¬ theistic, giving birth to countless works, some of which are almost modern in their sugges¬ tions and implications. They prove the fertil¬ ity and the intensity of the Mohammedan in¬

tellect and what marvelous power existed in the prophet to have supplied thought for so many ages and to so many minds.

Bibliography. — The best recent books which can be recommended are Huart, Clement, (A History of Arabic Literature) (New York 1903) ; Macdonald, Duncan B., development of Muslim Theology, Jurisprudence and Consti¬ tutional Theory) (New York 1903).

Abram S. Isaacs,

Professor of Semitic Languages and Litera¬ tures, New York University.

MOHAMMEDAN SECTS. As Islam con¬ stitutes more than a religion and is in reality a combination of religion, politics and jurispru¬ dence — elements which entered into the prob¬ lem in the early centuries and have continued ever since — it is natural that schisms should occur and sects rise and decline from age to age with the varying national and historical conditions. The rise and development of doc¬ trine among the Mohammedans cannot be sepa¬ rated from the rise and development of his¬ torical and national traditions. Many influ¬ ences contributed to the consequent growth of sects and their distinguishing factors. The culture of neighboring lands, their literary and theological atmosphere, was an undeniable fac¬ tor. Both Jewish and Roman law exercised a profound influence and led in time to much con¬ troversy. Just as the Koran illustrates three lines of influence — Christian, Jewish and what we term heathen, the prevalent customs or modes of thought of the peoples among whom they lived were reflected largely in the conceptions of the Mohammedans. Perhaps, too, it was necessary for the faith to assume such charac¬ teristics, to facilitate its diffusion and make its proselytes feel more at home. Here was a fruitful field for the growth of sects. Then must be considered the effect of extended geo¬ graphical divisions. Islam embraced Arabia, Persia, Syria, Egypt, the coast of North Africa, central Asia to China, with Spain in Europe, India and the islands of Malay. What active sources for antagonism and division, what

favorable soil for mystic, ascetic, pantheist, rationalist with their ever-varying phases ! Then, further, the Semitic races with their tendency to segregation have an innate mili¬ tant spirit that leads if not otherwise checked to fanaticism and the formation ot sects. The fact, too, that Islam grew so rapidly and wielded for so many centuries a

remarkable sway in science and knowledge intensified the conflict of opinion, often to be decided by the sword within the fold.

The sects at the first glance seem endless from our point of view. An old tradition ascribes to Mohammed the saying that Islam would be divided in time into 73 parties. Arabian writers, with their different classes and divisions, multiply that number several times, the discrepancy being due to the want of system and the lack of a common basis of classification. Sharastani (d. 1153), whose ac¬ count of religious sects and philosophical schools is chief source-book, arranges the sects under six headings: Mu'tazalites, Jabarites, Sifatites, Kharijites, Murpiites and Shi'ites, upon which a list of a hundred names and more .has been founded. Many of these have dis¬ appeared; four, however, continue to our day over large portions of the world of Islam and stand on the common basis of the sunna or orthodox traditions. These are the Hanafites, the Shafi'tes, the Malikites and the Hanfalites.

Before discussing more closely the names and history of these sects one must refer to the vital point in Arab law, philosophy and theol¬ ogy — the historical basis of creed and dogma in their widest sense. It was religion not politics that produced the first schism, which still remains unhealed. The point at dispute is the successor to the prophet and ruler of Islam (Imam). Here we have a sharp division be¬ tween legitimist and illegitimist, orthodox and heterodox, with their endless disputes and antagonisms, more or less clearly enunciated. On the one side are the Sunnites, those who follow the Sunna or tradition to which belong the overwhelming majority; on the other the Shi'ites, from Shia, a party or sect, who con¬ stitute the largest numbers of dissenters. After the battle of Siffin (657) when Ali and Moawiya were rival claimants to the caliphate, and the former lost in the arbitration, the breach was made. The Shi'ites broke away and became the protestants or dissenters, holding that the succession belongs to the house of Mohammed and to Ali as his son-in-law, and ever after to the direct blood relations and descendants in the line of the prophet's daughter Fatima, the wife of Ali. The Shi'ites themselves are divided according to which branch of the descendants they recognize. Its high church or sect of the ˆTwelvers,® called also Imamites (they prefer the term Imam to Khalifah) traces its claim to Ali and transmits from father to son until the 12th Imam, Mo¬ hammed b. Hasan (<ul Askari.® In his eighth year he is said to have vanished and it is held by this sect of "Twelvers® that he has lived since then in secret, to appear at the last day as Imam Mahdi ! The Fatimites, another branch of the Shi'ites, founded a dynasty of some strength for a time in North Africa and Egypt (909-1171). It can readily be imagined how theories

of incarnation have arisen among the Shi'ites in their extravagant reverence for

Ali and his wife, who have become almost tutelar deities and endowed with superhuman dignities. It was only a short step to Gnos¬ ticism, which also developed in Islam, due largely to Babylonian and Persian ideas. The present day Druses constitute one of the sects that show the survival of these tendencies.

The dissatisfaction in the Eastern half of the caliphate with the Omayyad dynasty gave impetus to Shi'ites growth and many leaders founded sects of their own, with some of which obedience to a person not to law was inculcated as a religion. There is little doubt that the decline of the Omayyads and the suc¬ cess of the Abbasids was due in considerable measure to the aid of the Shi'ites, the early caliphs of that dynasty, until Motawakkil, be¬ longing to that sect. The Shi'ites are divided by Shahrastani into five divisions, of which the Isma'lites, the followers of Isma'il, the sixth Imam, have given rise, owing to the propa¬ ganda of Abd Allah ibn Maimun, to the Car-mathians, Fatimites, the Assassins and the Druses. In Persia the Shah is the temporary sub¬ stitute for the vanished Imam. The differences of the Shi'ites apart from the question of the suc¬ cession are due to adapting the rites of Islam to the Persian nationality and concern minor matters of ritual. They have their own col¬ lection of traditions, but the prayers are almost identical with those of the Sunnites, although there is no obligation to attend public worship in the lack of a legitimate Imam. Saints are zealously worshiped — religious feasts are multiplied. The Koran is also their source of law. Next to the cleigy (Mollahs), the der¬ vishes wield the greatest religious influence. New sects appear among the Shi'ites from time to time — the latest being Babism, founded in Persia (1844-45) by Mirza Ali Mohammed and his successors, who held to the view of pro¬ gressive revelation and display a high intelli¬ gence and ethical strength — at least in later writings. The sects that have survived and represent the great majority in Islam have been briefly mentioned as followers of the

Sunna. The Hanafites spring from the school of the Imam Abu Hanifah (767), predominat¬ ing to-day in Turkey, central Asia and in India. The Shafiites, called after Imam A1 Shafii (d. 819), are to be met in Egypt, south¬ ern Arabia, the Dutch colonies and in German East Africa. The Malikites, named after Malik Ibn Anas, the famous Imam of Medina (d. 795), can be found in northern Africa and in Upper Egypt. The Hanbalites, rigid tra¬ ditionalists, with the accompanying fanaticism, look back to Imam Ahmad ibn Hanbal (d. 855). Declining after the 15th century, the sect or school revived in the 18th, when the Wah¬ abite movement arose in central Arabia, adopt¬ ing its viewpoint of reform. Corresponding to the monastic orders in Europe, brotherhoods have arisen in Islam, which assume the im¬ portance of distinct sects, like the order of dervishes. The latest is the Brotherhood of As-Sanusi, established in 1837, of a ((severely reforming and puritanic character,® as Mac¬ donald expresses it. Holding to the strictist monotheism, all customs and ideas that <(do not accord with the view of the exact letter® of the Koran are prohibited. A theocratic state has been founded in the eastern Sahara, be¬ tween Egypt and Tripoli, from which mis¬

sionaries are sent to establish houses through¬ out North Africa and Morocco and far into the interior. Mecca is an important centre for the new cult, into which pilgrims and the Bedouin are initiated in large numbers. In marked con¬ trast are the Ibadites, who take their name from Ibn Ibad, associated with one of the earliest Mohammedan sects. They are found in Zanzibar and the coast of East Africa and in Algeria, where they maintain a certain sim¬ plicity and hold their primitive theological and legal views. It is forbidden them to marry other Muslims. The Ibadites in reality go back to the more modern elements of the Kharijites, one of the earliest parties in Islam, who organ¬ ized themselves after Ali's rejection for the caliphate as an independent body. Literally ((goers out,® as the name implies, they are op¬ posed to all other parties, as renegades to be killed at sight. Their democracy was absolute — the caliph could be of any family, to be elected and deposed by the entire Muslim com¬ munity. A picturesque if narrow sect, they have maintained themselves as an offshoot in a remote corner of the Islam world.

In the days of Ommayad caliphate (661-750) the three centres of religious thought — Damascus, Medina and the East — were open to non-Mohammedan influences and two heret¬ ical sects arose — the Murjiites and the Qadarites. The former postponed — hence their name — the judgment of human actions until the day of judgment.

They held, too, that no believer in the unity of God and his apostle Mohammed would meet everlasting death — a heresy in that day. The Qadarites opposed predestination and free will and claimed that man had power over his actions — heretical doctrine in the world of Medina to be pun¬ ished by death. In the East, with the Chris¬ tians, Buddhists, Zoroastrians and the rest in close contact with the Mohammedans, rational¬ ism arose in the sect of Mu'tazilites or (<sepa-ratists,® who wielded great influence and shared the favor of the state until 849, when orthodox doctrines again held sway. The Koran, tradi¬ tion, reason, custom, were pivots upon which both schools of law and of theology turned, but although the schools were many not all gave rise to special sects that had any lengthy ex¬ istence.

The sect of the Mu'tazilites might have at¬ tained a much wider activity had not Ash'ari (873-935) in his 40th year changed from ration¬ alist to orthodox and founded a scholastic theology of his own which was effective. Hold¬ ing a mediate position between extreme views on most points, his platform became dominant among the Shafi'ites. He asserted that God's attributes cannot be compared to human at¬ tributes. As to free will, he maintained man's responsibility, if denying his power. Despite occasional attacks and persecutions, this theol¬ ogy made its way East and West and is the prevalent system. The system of al-Matiridi, a Hanifite (d. 945), is its only active opponent to-day, represented by the creed of an-Nasafi, still used as a textbook in schools. Of the 13 points of difference between Mataridi and Ash'ari, Macdonald states that Muslim theo¬ logians admit seven are not much more than combats of words. Even Ghazzali, in most re¬ spects the greatest and most representative of Muslim theologians, accepted the system of

Ash'ari. Apart from the Wahabite movement in Arabia and the more recent Babism in Persia, Muslim orthodoxy has not been dis¬ turbed by new sects of any significance.

Bibliography. — Goldziher, Ignaz, (Mohammed Studien> (Halle

1889-90) ; Hughes, A., <A Dictionary of Islam) (London 1885) ; Haarbriicker (Asch-Scharastani's Religionsparteien, iibersetzt und erklarP (Halle 1850-51) ; Mac¬ donald, D. B., (Muslim Theology, Jurispru¬ dence and Constitutional Theory) (New York 1903, with four pages bibliography) ; Muller, (Der Islam un Abendland) (Berlin 1885-87) ; Schreiner, (Beit. zur Gesch. der Theolog. Beweg. in Islam) (Z. D. M. G. 11, pp. 463 ff.„ 513 ff.; Ill, pp. 51 ff.) ; Sell, E., <The Faith of Islam) (London 1896) ; Steiner, (Die Mu'- taziliten) (Leipzig 1865) ; Von Kremer, < Gesch. der herrsch. Ideen des Islams) (Leipzig 1868), and his (Culturgesch. des Orients unter den Chalifen) (Leipzig 1873). Burton's ˆPersonal Narrative of a Pilgrimage to Al-Madinah and Meccah) (London 1898) throws light on present-day Mohammedan sects, despite the author's diffuse style.

Abram S. Isaacs,

Professor of Semitic Languages and, Litera¬ tures, New York University.

MOHAMMEDANISM is the term fre¬ quently given to the religion taught by Mohammed, but not used by the followers of that religion. Abu-Bekr, the first caliph, is reported to have said that it is not Mohammed, but the God of Mohammed, that we worship. The term by which the religion is known, wherever professed, is Islam, <(submission to the will of God.® Those who embrace Islam are called Muslim (frequently written Moslem), a participle of the same stem from which the verbal noun Islam is derived. Still another term, used as the equivalent for Moslem, is Mumin, ˆbeliever.® It, likewise, is a participle, formed from the stem that gives rise to the word Iman, <(faith.®

Islam is the religion professed by Turkey, Syria, Palestine, Arabia, Persia, Asia Minor, Afghanistan, Baluchistan, Turkestan and the Malay Peninsula. India has more than 57,000,000 Moslems. China has about 25,000,000. Owing to the great difficulty of securing exact figures, an accurate statement is impossible. It is generally estimated at 175,000,000.

Islam is divided by the theologians into two heads : Iman, <(faith,® and Din, <(practice.®r

The separate articles of both heads are de¬ termined by the Koran, the Traditions or say¬ ings of Mohammed and the decisions of the learned officials. Under Iman are given six cardinal points of belief, as follows: belief in God and his unity; belief in angels, and good and bad spirits;

belief in the Koran and revela¬ tion; belief in the Prophet; belief in the resur¬ rection and the judgment day; belief in God's absolute rule of the world. (<There is no god but Allah, and Mohammed is his envoy.®

As to Islam's conception of the deity He is above all omnipotent. No phrase occurs more frequently than this: «and He is powerful over all things.® He is omniscient; ((And He knoweth all things,® is a phrase equally often met in the Koran. <(With Him are the keys of the secret things; none knoweth them besides himself: He knoweth that which is on the dry land and

in the sea; there falleth no leaf but He knoweth it; neither is there a single grain in the dark parts of the earth, neither a green thing nor a dry thing but it is written in the perspicuous book.® (Sura 6, 59). ((He is the ever-living, eternal God.® (<God ! there is no God but he; the living, the self-subsisting; neither slumber nor sleep seizeth him; to him belongeth what¬ soever is in heaven or on earth.® (Ibid.). He is, moreover, the creator of all things. (<His is the kingdom of heaven and earth; he giveth life and he putteth to death ; and he is almighty. He is the first and the last; the manifest and the hidden ; and he knoweth all things. It is he who created the heavens and the earth in six days, and then ascended his throne.® (Sura 57, v. 2). His word alone creates, <(When he de-creeth a thing, he only saith unto it, (Be, and it isP ® (Sura 3, v. 4), cf. (Sura 11, v. 9). As a creator he works not as man works, <(We created the heavens and the earth and what¬ ever is between them, in six days, and no weariness affected us.® (Sura 50, v. 37).

He is not only creator of all things, but ruler of all things, and protector as well. c(It is he who causeth you to sleep by night, and knoweth what ye merit by day ; he also awaketh you therein, that the prefixed term of your lives may (be fulfilled… . He is supreme

over his servants, and sendeth his guardian angels to watch over you, until, when death overtaketh one of you, our messengers cause him to die; and they will not neglect our com¬ mands… . Say, who delivereth you from

the darkness of the land, and of the sea, when ye call upon him humbly and in private, saying (verily, if thou deliver us from these dangers, we will surely be thankful.) Say, God deliv¬ ereth you from them and from every grief of mind.® (Sura 6, v.). His care is always

as¬ sured to those who follow his way. <(Say, my Lord hath commanded me to observe justice; therefore set your face to pray at every place of worship, and call upon him, approving unto him the sincerity of your religion. … A part of mankind hath he directed.® (Sura 7, 28). <(Whoever therefore shall deny Tagut (error) and believe in God, he shall surely take hold on a strong handle, which shall not be broken ; God is he who heareth and seeth. God is the patron of those who believe ; he shall lead them out of darkness into light.® (Sura 2, v. 257).

Though he is the ruler of all things and may do as seemeth good in his sight, yet is he a just God, and punishes only where punish¬ ment is due. (<We will appoint just balances for the day of resurrection ; neither shall any soul be injured at all; although the merit or guilt of an action be of the weight of a grain of mustard seed only, we will produce it pub¬ licly; and there will be sufficient accountants with us.® (Sura 21, v. 48). Those who suffer have gone astray or are being prepared for bet¬ ter things. <(Every soul shall taste of death ; and we will prove you with evil and with good, for a trial of you.® (Sura 21, v. 36). Of those sorely tried it is said : ((I have this day re¬

warded them, for that they suffered the in¬ juries ye offered them, with patience; verily they enjoy great felicity.® (Sura 23, 113). As he is a just God, every creature is responsi¬ ble to Him, and must answer for his choice of good or bad, <(Did ye think that we had created

you in sport, and thait ye should not be brought again before us? … whoever, together with the true God, shall invoke another god, con¬ cerning whom he hath no demonstrative proof, shall surely be brought to an account for the same before his Lord.® (Ibid. v. 117).

Though God is just, he is also merciful. (<We do not lay upon any soul more than it can bear.® (Sura 6, v. 153). Like the God of the Hebrews he puts off the evil day in the hope that man may repent. <(If God should punish men for their iniquity, he would not leave on the earth any moving thing; but he giveth them respite unto an

appointed time.® (Sura 16, v.

163).

God’s absolute decree is a separate article (the sixth) of Iman. Everything that has hap¬ pened or that will happen has been already lxed by God. <(Say, nothing shall befall us, but what God has decreed for us.® (Sura 9, v. 51). <(No soul can die unless by the permission of God, according to wh;at is written in the book containing the determination of things.® (Sura 3, v. 141. ((He hath formed his creatures; and … determined them to various ends,

and directed them to attain the same.® (Sura 87. v. 2). Mohammed was no theologian, how¬ ever, so there arose no question about God’s decree and man’s free will. His attitude to the question may be shown by a quotation from sura 4, v. 80: <(If good befall them they say it is from God; but if evil befall them, they say; this is from thee, O Mohammed: Say, all is from God; ‘but what aileth these people that they are so far from understanding what is said unto them? Whatever good bef aileth thee, O man, it is from God; and whatever evil befalleth thee, it is from thyself.®

There is one more aspect of the Moslem’s belief in God that must not be neglected. It is the most important attribute of the deity, and its statement is found in sura 112: ((Say, God is one God ; the eternal God ; he begetteth not, neither is he begotten; and there is not anyone like unto him.® In sura 19, v. 91, we read: <(They say, the Merciful has begotten issue. Now have ye uttered an impious thing.® In Islam there is no Trinity; there is no Fatherhood; God has taken to himself no son; but is alone in his glory and power. Christ, to the Moslem, is a prophet. He was the word of God ((conveyed into Mary.® Islam, failing utterly to grasp the significance of Christ’s life, could not accept the idea of his crucifixion. They have therefore found an end that they deem more worthy of a prophet, and in the Koran we read that one in the likeness of Christ was crucified.

Joined to the statement of the first great truth of Islam, ((There is no god but God,® is another statement considered by Moslems to be just as important; ((and Mohammed is the envoy of God.® Concerning his divine mission, Islam knows no doubt. He was the last and the greatest of all the prophets — ((The seal of the Prophets.® Of prophets, thousands are recognized by Islam; but there are six, only, deemed great enough to be the holder of a title; they are Adam, Noah,

Abraham, Moses, Jesus and Mohammed. As a prophet, Moham¬ med announced himself to the world when he first recited the 96th sura : “Read in the name of thy Lord who hath created all things.® He never claijned to be more than the envoy or

prophet of God, and as such only is he rever¬ enced by the intelligent Moslem. His tomb at Medina is an object of veneration to the Mos¬ lem world and should be visited by every pil¬ grim. His intercession may be asked in prayer ; for he was the friend of God. Five times every day Islam testifies to its faith in God and its veneration for the prophet. Every Moslem must believe in revelation, ((that which is sent down.® (Sura 2, v. 3). * Beginning from earliest times, there have been numerous revelations, each of which was a law for man¬ kind, till superseded by the next. So each of the six prophets mentioned was the recipient of a revelation. Mohammed’s revelation, the Koran, is the only one not to be abrogated. It is distinctly the Word of God as revealed to Mohammed and is on a higher plane than the Traditions or inspired sayings of the prophet. It was inscribed on tablets in heaven from eternity. From time to time portions of it were given to Mohammed by the angel Gabriel.

The Moslem must believe, furthermore, in angels, of whom there are great numbers. They were created long before the world was and are of a finer material. Every believer has two recording angels ; one for his good, the other for his bad deeds. The angels are charged with intercession for mankind. Certain angels preside over hell. Two important angels are Munkar and Nakir. There are four arch¬ angels : Gabriel, the angel of Revelation ; Michael, the patron of the Israelites; Izrafel, who, on the last day, will blow the trumpet, and Azrael, the angel of death. Besides these angels there are the ginn, good and bad spirits, in whom Mohammed believed. Sura 72 states that a band of them once passed Mohammed and paused to listen to him. What they heard caused them to exclaim : (<Verily, we have heard a marvelous discourse.® Some of them are believers in Islam and perform all the duties that devolve upon the true believer. They may assume various forms and are so numerous that the pious Moslem, in performing the most trivial act, such as building a fire, is apt to ex¬ claim ((with your permission, ye blessed.® By many it is believed that all ginn are to be de¬ stroyed on the last day ; others believe there is to be a special place, outside of paradise, where such as have been believers may dwell.

In the immortality of the soul, resurrection, judgment, paradise and

hell, the Moslem be¬ lieves most firmly. During the first night after death, the soul remains with the body, so that it may be questioned by the two angels Munkar and Nakir. It is a question as to whether the Koran refers to this belief or not ; but never¬ theless it is fixed in Islam. When the angels have finished their examination, they depart, leaving the believer in peace ; the wicked in tor¬ ment. This is the Moslem Hades. In Sura 23, v. 99, speaking of unbelievers who have died, it is said : “Behind them shall be a bar until the day of resurrection.® The word translated by Sale <(bar® is the Arabic barzach, and is ex¬ plained by the native commentators as a parti¬ tion between the living and the day of judgment, or as an intervening state between death and judgment. Generally speaking, it denotes the state of the departed soul and must be entered by all. When the trumpet is blown on the last day all must appear. Mention of this day is very often made in the Koran, especially in

the earlier suras. It is the one subject of su¬ ras 75, 81, 82, 83 and 84. On this day all actions shall be weighed. <(Those whose balances shall be heavy with good works shall be happy; but those whose balances shall be light are those who shall lose their souls and shall remain in hell forever.” (Sura 23, v. 104). This great day the coming of which is known to God alone, is to be ushered in by certain signs, divided into the wlesser” and the ˆgreater.” Of the former there are eight, such as decay of faith, tur¬ moils, wars, etc.; of the latter “there are 16, the sun will rise in the west ; the Antichrist will appear; Jesus is to come to earth, embrace Islam and slay the Antichrist. The last trial of this day is to be the crossing of the bridge Sirat, finer than a hair and sharper than a sword. Still, the believer shall cross in safety while the wicked fall to the gulf below. Should any who have professed Islam, yet lived wicked lives, be consigned to hell, they are not to re¬ main there forever ; but will be gradually puri¬ fied and released. To the Moslem, hell is for the followers of other religions.

In paradise the Moslem is to enjoy all those things which to the mind of the desert Arab seemed most desirable. Here are gardens, trees ever

green, rivers ever flowing, beautiful maid¬ ens, appetites that, so far from being satiated, increase as the delights are enjoyed. Here, too, he shall always see the face of (his) God and praise him, to whose mercy he owes his bliss ; for his works alone are not enough to assure him entrance.

Islam is not, however, a religion of faith only; for there are certain institutions, consti¬ tuting Din, or religious practice, the perform¬ ance of which is obligatory. Prayer, almsgiv¬ ing, fasting and the pilgrimage are duties that tax the Moslem to no small degree. Prayers are to be made to God five times every day, and are to be made with the utmost decorum. Preparatory to these prayers there are certain ceremonies of purification, consisting of ablu¬ tion, either partial or covering the entire body; for the idea of an unclean person in the pres¬ ence of God is intolerable to the Moslem. To facilitate these ablutions, every mosque is pro¬ vided with a tank, whence issue many small streams of water. Should the worshiper be praying where there is no water, he may use sand or dust. As he ends this ceremony he is to testify that ((There is no god but Allah, and Mohammed is his envoy," following this by re¬ citing sura 97. Should the worshiper be con¬ scious that he is clean, he may omit the cere¬ mony. He then assumes a certain position, fac¬ ing Mecca, and states softly that he intends to perform so many inclinations, following this by reciting the first sura. After this other expres¬ sions of praise are used. Though prayer is fre¬ quently mentioned in the Koran, the five periods at which it is enjoined are nowhere mentioned together. These periods are morning, noon, afternoon, sunset and night. The approach of these hours is heralded by the muezzin, who, ascending the minaret of the mosque, cries out : <(Allah is most great (four times) ; I testify that there is no god but Allah (twice) ; I testify that Mohammed is the envoy of Allah (twice) ; come to prayer (twice) ; come to security (twice) ; Allah is most great (twice) ; there is no god but Allah." Prayers may be said wher¬ ever the believer happens to be at the time ; but

on Friday they should be said at the mosque, where a sermon is also delivered.

Almsgiving is a very important duty in Islam. The Koran makes frequent mention of it, en¬ joining it in most emphatic terms. <(0 true be¬ lievers, bestow alms of the good things which ye have. gained, and of that which we have pro¬ duced for you out of the earth, and choose not the bad thereof to give it in alms, such as ye

would not accept yourself.” (Sura 2, v. 269). ((If ye make your alms to appear, it is well ; but if ye conceal them and give them unto the poor, this will be better for you, and will atone for your sins.” (Ibid. 272). How Mohammed con¬ sidered alms may be seen from several passages of the Traditions, as quoted by Hughes: ((Your smiling in your brother’s face is alms ; assisting the blind is alms.” The Koran distinguishes be¬ tween legal and voluntary alms; but this dis¬ tinction has been done away with to a great extent. The necessity of giving, however, re¬ mains and alms are given regularly by those who neglect many of the other duties. In the early days of Islam legal alms were collected by officials appointed for that purpose ; but their bestowal now is left to the individual con¬ science.

Fasting was considered of great importance by Mohammed, as thereby atonement might be made, and at the present day many who neglect their daily prayers perform all the duties of the fast. The month of Ramadan was chosen for the great fast, because in it revelation came to Mohammed. Throughout this month, during the entire day, drinking, eating, smoking and many other indulgences are forbidden. When night comes, however, restrictions are removed till the next day. This fast is very severe when it falls in summer (the year being lunar, each month passes through all the seasons) and many exemptions are provided for those unable to undertake its arduous duties. Other fasts, meri¬ torious, but not obligatory, are also in favor with Moslems. The object of these fasts is not altogether concerned with the mortification of the body ; the heart is to fast ; it must abstain from worldly matters and commune with God.

Once at least in his lifetime the Moslem must make the pilgrimage to Mecca. (<We ap¬ pointed the holy house of Mecca to be a place of resort for mankind, and a place of security; and said, Take the station of Abraham for a place of prayer; and we covenanted with Abra¬ ham and Ismael, that they should cleanse my house for those who should compass it, …

and those who should bow down and worship there.” (Sura 2, v. 119). <(And it is a duty to¬ ward God, incumbent on those who are able to go thither, to visit this house.” (Sura 3, v. 91). Some further regulations are found in sura 2, v. 194, and in sura 22. Trade may be indulged in while on the pilgrimage, and sura 5, v. 2, gives direction for women who contemplate the performance of this duty. When the pilgrim nears Mecca he bathes and puts on the Ihram, pilgrim’s robe, and advances to the city. Here there are certain ablutions to be performed be¬ fore kissing the Black Stone. He must then encircle the Caaba, the temple, seven times ; kissing the Black Stone each time.

After other prayers and ceremonies he must run between Mount Al-Safa and Mount Al-Marwa seven times, with stated prayers. Later he must visit the Valley of Mina and Mount Arafat where

more prayers are performed. On the 10th day he proceeds to Mina and casts stones at three pillars which are set up there, seven stones at each. After this very ancient custom there is a sacrifice which ends the pilgrimage. The pil¬ grim may then be shaved and resume his usual clothing. He should, however, visit Medina and do homage at the tomb of Mohammed.

Though not reckoned as one of the pillars of Islam, still the obligation to wage holy wars has been so firmly held that it deserves mention here. In early days every Moslem looked for¬ ward to a worldwide conquest and by means of these holy wars expected to bring all coun¬ tries under the banners of Islam. To a con¬ quered country the terms were : Embrace Islam, pay tribute or die. These were harsh terms, but much of their severity is accounted for by the early history of Islam. Broken oaths of allegiance and unprovoked attacks are re¬ sponsible, to a large extent, for Mohammed's uncompromising attitude. The Koran does state itself clearly on this point, yet no precept found there, when ((taken with its context, can justify unprovoked war.® At the present day a far more liberal policy is preached toward unbe¬ lievers and the subject is much debated by the learned in Islam.

Among the prohibitions of the Koran, the most important are those concerning wine and gambling. <(They will ask thee concerning wine and lots ; answer in both there is great sin and also some things of use unto men; but their sinfulness is greater than their use,® and suras 2, v. 216; 5, v. 92, treat of the same. These verses are held by the Moslem to be an abso¬ lute prohibition. There might be, however, some doubt as to that if the verses alone and not their traditional interpretation were con¬ sidered. Another prohibition of the Koran is murder. When one believer kills another in¬ tentionally he is to remain in hell forever. (Sura 4, v. 96). From this fate, however, popular belief rescues him. Should the killing be by accident, there are

certain expiations that may be made. There are also many prohibi¬ tions in regard to eating, the most important of which is that in regard to swine-flesh. (Sura 5, v. 4). Such flesh as is eaten must be from an animal killed in a prescribed manner. Laws of marriage, divorce, testaments and many other civil and criminal laws are founded on the Koran and the Traditions. Mohammed founded not only a religion but a social system as well, wherein the religious and the political life are inseparable. This is the unique feature of Islam. .

Mohammed is said to have told his follow¬ ers that after him 73 sects would arise. His prophecy has been more than fulfilled. It is impossible to give more than a synopsis of a few of the more important divisions of Islam. The two great divisions of sectarian Islam are the Sunnites and the Shiites. Compared with the Sunnite, the Shiite is a small sect, number¬ ing about 15,000,000, while the former has about 145,000,000 adherents. The Shiites believe All to have been the legitimate Caliph or Imam, that is, successor of Mohammed, and conse¬ quently reject Abu-Bekr, Omar and Othman. Ali, by his double relationship with the Prophet — he was cousin and son-in-law — as well as bv reasons deduced from the Koran, and by traditions assigning him the appointment at the vol. 19 — 20

hands of Mohammed himself, should have been Imam. When Omar died, Ali was offered the succession, but as he could, not satisfy, his op¬ ponents that he would rule in accord with their wish he did not receive it till the death of Oth¬ man. Ali, however, was soon murdered and his son Hasan abdicated in favor of Muawiyah on condition that he might resume his office at Muawiyah's death. Yazid, however, cheated Hasan of his rights and here starts the Shiite schism. They profess allegiance to a line of 12 Imams, beginning with Ali and ending with A1 Mahdi, who disappeared, but is to return.

In the meantime they receive religious and legal decisions from a class of learned men, called Mudgtahids, a class of authorities not recog¬ nized by the Sunnites except in the case of the •founders of the four orthodox Sunnite schools. There are numerous subdivisions of the Shiites, but on certain points they agree. The Shiites also observe the ceremonies of Moharram in commemoration of Hasan and Hosein, who were sons of Ali and were both murdered. Their memories are sacred to the Shiites. They differ from the Sunnites in that they credit the fire worshipers with the possession of an in¬ spired book or revelation. In the ritual and civil laws also many differences are found. They have a large collection of traditions, a fact often ignored by

scholars., misled by the Sunnites' claim to be the Traditionists par ex¬ cellence.

The Sunnites acknowledge the first four caliphs to have been the rightful successors of Mohammed. They are divided into four ortho¬ dox sects or legal schools, the first of which was founded by Abu Hanifa. This Abu Hanifa was a pupil of the sixth Imam of the Shiites; but separated from him to form the school of his name that now predominates in Turkey, central Asia and northern India. The second of these schools, that of Ash Shafia, prevails in southern India and Egypt. The third school, that of Malik, has its home in Morocco and Barbary. The last school, that of Ahmed ibn-Hanbal, is found in East Arabia and portions of Africa. The term Sunni, which they apply to themselves, is an arrogant title. It signifies (fone who is on the path.® They claim that they receive the six authentic books of tradition.

From the school of Ahmed ibn-Hanbal sprang the sect of the Wahhabites, who are named after their founder's father, the founder himself being named Mohammed. This Mo¬ hammed, born in Arabia, in the early part of the 18th century, having seen, in the course of his travels, that Islam had departed from its primitive faith, determined to restore to the religion of Mohammed its early purity. His zeal as a reformer received some temporary setback and he soon became the warrior-prophet. Many converts were made by his missionaries and the movement grew till Turkey feared for her own safety. In 1803 Mecca, and a year later Medina, was captured. The political power of the Wahhabites was soon destroyed, however, though the principles are still a force, in Islam. In India, too, the movement met with a similar fate.

The tenets of the Wahhabites are, practi¬ cally, those held by the early Moslem. They arrogated to themselves the name of Unitarians, stigmatizing other Moslems as polytheists, inas¬ much as the doctrine of the eternity of the

Koran meant two eternal beings, therefore, two gods. The reverence paid to saints and their tombs aroused to a high degree the antagonism of the Wahhabites. Even the tomb of Mo¬ hammed

receives no reverence from them, and when they captured Medina, all the rich orna¬ ments were stripped from this sacred spot.

Early in the history of Islam there arose a set of free-thinkers, whose theories are held at the present day. They are known as the Mutazalites and were founded by a Persian, Wasil ibn-Ata, who separated from the school of Hasan al-Basri. The Mutazalites hold that man is the governing factor in his own acts, and is perfectly free to choose; predestination being thus abolished from their tenets. They deny the eternity of the Koran, as well as the attributes of God, believing that each attribute would be a separate, eternal quality, and that, therefore, the unity of God would be destroyed.

Mokanna, (<the veiled,® is an interesting fig¬ ure in the history of Islam, owing to his ap¬ pearance in Moore's (Lalla Rookh.5 This fa¬ natic proclaimed himself God incarnate and taught that religion consisted in faith, not works. He sent out many missionaries and quite a force collected under his banners. At the advent, however, of the caliph's forces, which were sent to crush him, he deserted his followers and finally committed suicide to es¬ cape capture. Persian and Indian sources are responsible for many of his doctrines. He had secret followers for many centuries after his death.

Hasan ibn-Sabah, founder of the order of the Assassins, is a figure well known in history, owing to his connection with the Crusaders. He was at first an adherent of another sect and taught the doctrines of that sect throughout Arabia and Persia ; but having won the confi¬ dence of a powerful prince, he gained posses¬ sion of a fortress in Persia. Here he constituted himself grand-master of an order with a large number of minor officials, repudiated many of the tenets of his sect and began to preach reli¬ gious devotion and political assassinations. His followers were many throughout Syria and Per¬ sia and he soon announced himself as al-Mahdi, repudiated the Koran, and with it all moral laws. Under the title ((01d Man of the Moun¬ tain,® he became a terror not only to the Cru¬ sader, but to the Turk as well. They were finally overthrown. (<Of these sects there are still scattered remnants in Syria and India, and as late as 1866 an English judge at Bombay had to decide a case of disputed succession ac¬ cording to the law of the Assassins.®

There is a sect of Mystics in Islam known as the Sufis. They are Moslem in name only, for they deny the necessity of religion, though they admit that its practice is useful as a guide. Their chief doctrine is entirely pantheistic. God is all and is in all, consequently there is no good, no evil, only God. The only occupation of the Sufi is meditation,

constant meditation ; for by this he is made ready to return to God when his soul is released from captivity. They are divided into numerous sects, some of them believing themselves simply inspired of God, others believing themselves unified with God. Their belief, they claim, has always been pro¬ fessed. It obtained its chief hold in Persia, where it has stirred up much trouble. Though banished in 1797, (<the whole country has been

so undermined by this insidious heresy that it can almost be said that Persia, throughout its whole extent, contains no real Moslem.®

A few words may be added in regard to Islam's hope of a Messiah, Al-Mahdi, (<the guided one.® He is to come to restore the glory and power of Islam, and has been foretold by Mohammed, in many traditions. According to the Sunnites, he is still to come; but the Shiites believe he has already appeared in the person of the 12th Imam, who having disappeared for a time is to return. Many have announced themselves as the promised Mahdi. One, after proclaiming himself in 1881 as Mahdi and founding in the eastern Sudan his empire, was overthrown at Omdurman in 1898 by an Anglo-Egyptian army.

Mention must be made of Babism, of which Behaism is the latest development. In the year 1844, Ali Mohammed, in Persia, announced him¬ self as the Bab , or ((gate,® that is, ((the source through which revelation comes.® As the in-augurator of a new dispensation, he set about the reformation of men's lives. Many con¬ verts were made and the antagonism of their Moslem neighbors was aroused. Thousands of adherents to the new faith were slain, and in 1850 the Bab himself met this fate. As perse¬ cution continued many fled from Persia and finally settled at Akka. In this band of exiles was one upon whom the Bab had conferred the title of Bha Allah, that is, <(the Glory of God.® His declaration that he was the manifestation foretold by the Bab was accepted, and his fol¬ lowers have been styled Beha'is. At his death in 1892, his son, Abbas Effendi, succeeded him and is considered as the third of the divine messengers. The thousands of converts made by this new movement attest its importance. Its missionaries have made converts by thou¬ sands. Here, in the United States, its adher¬ ents are scattered throughout a few of the larger cities, and Professor Browne, the emi¬ nent English authority on Babism, speaking of its influence, states that the number and influ¬ ence of the Babis in Persia is immensely greater than it was a few years ago. See Bab¬ ism ; Koran; Mecca; Medina; Mohammed; Shiites;

Sunna; Wahabi; and consult works referred to under these articles.

Bibliography. — Ameer, Ali, (The Life and Teachings of Mohammed) (London 1891), a de¬ fense of Islam by an educated Moslem; id., (Short History of the Saracens 5 (1899) ; Ar¬ nold, T. W., (The Preaching of Islam: A His¬ tory of the Propagation of the Muslim Faith) (2d ed., London 1913) ; Atterbury, Uslam in Africa) (New York 1899) ; Bahadur, Ahmed Khan, (A Series of Essays on the Life of Ma¬ homet and Subjects Subsidiary thereto5 (Lon¬ don 1870) ; Becker, C. H. ((The Expansion of the Saracens,® in (Cambridge Mediaeval History) (Vol. II, Cambridge 1913) ; Blunt, (The Future of Islam5 (London 1880) ; Boer, T. J. de, (Geschicte der Philosophic im IslanP (Stuttgart 1901; Eng. trans., London 1903); Burckhardt, (Travels in Arabia5 (1829) ; Bur¬ ton, Pilgrimage5 ; Carra de Vaux, Bernard, (Le Mahometisme5 (Paris 1898) ; De Castries, (L'Islam5 (5th ed., Paris 1912) ; Deutsch, E. O. M., (Essay on Islam5 (London 1874) ; Dozy, R. P. A., (Het Islamisme5 (Leyden 1863; French trans., Paris 1879) ; Forget, E). A., (LTslam et le Christianisme dans l'Afrique

centrale) (Berlin 1900) ; Geiger, (Was Hat Mo¬ hammed aus dem Judenthum aufgenommen?) (Bonn 1833; Eng. trans., London 1899); Goldziher, Ignaz, (Die Religion des Islams) (2d ed., Berlin 1913); Grimme, Hubert, (Mohammed: Die weltgeschichtliche Bedentung Arabiens) (Munich 1904) ; Haines, (Islam as a Missionary Religion* (1889) ; Hartmann, Martin, (Der islamische Orient* (Berlin 1899) ; id., (Islam, Mission, Politik) (Leipzig 1912) ; id., (Fiinf Vor-trage iiber den Islam> (ib. 1912) ; Hauri, J., (Der Islam in seinem Einfluss auf das Leben seiner Bekenner) (Leyden 1881) ; Hogarth, (The Penetration of Arabia* (London 1905) ; Hou-das, O., <L'Islamisme) (Paris 1904) ; Hughes, T. P., (A Dictionary of Islam* (London 1885) ; Jansen, H., (Verbreitung des Islams) (Fried-richshagen 1897) ; Kremer, A. von, (Geschich(e der herrschenden Ideen des Islam) (Leipzig 1868); Lane,

E. W., (The Manners and Cus¬ toms of the Modern Egyptians *(London 1836 et seq.) ; id., (Selections from the Koran) (ib. 1843) ; Le Chatelier, (LTslamisme au 19e sie-cle) (Paris 1889) ; id., <L'Islamisme dans l'Afrique occidental (Paris 1899) ; Macdon¬ ald, D. B., development of Muslim Theology, Jurisprudence, and Constitutional Theory) (New York 1903) ; Muller, August, (Der Islam im Morgen-und Abendlande* (Berlin 1887) ; Margolionth, D. S., (Mohammed and the Rise of Islam) (London 1905) ; Pischon, C. N., (Der Einfluss des Islam auf das hausliche, sociale, und politische Leben seiner Bekenner) (Leip¬ zig 1881) ; Poole, (Studies in a Mosque) (Lon¬ don 1883) ; Sachau, (Muhammedanisches Recht nach schafiitischer Lehre) (Stuttgart 1897) ; Smith, < Mohammed and Mohammedanism) (1874) ; Vambery, Armin, der Islam im 19ten Jahrhundert) (Leipzig 1875) ; id., (Western Culture in Eastern Lands* (New York 1906) ; Zwemer, S. M., (Arabia* (2d ed., ib.

1912).

MOHAVE (mo-haVa) DESERT, Cali¬ fornia, an arid basin chiefly in San Bernardino County, in the southeast, and also extending into Arizona, and forming part of the great Colorado Desert with which its name is fre¬ quently used synonymously. The Mohave River rising in the San Bernardino Mountains flows through it for some distance, finally disappear¬ ing in the Mohave Sink.

MOHAVE, or MOJAVE, INDIANS, an

American tribe formerly the most populous and warlike of the Yuma family, residing in Ari¬ zona and California in the region of the Colo¬ rado River, between the Needles (the origin of their name) and the entrance to Black Canyon. They practised tattooing and cremated their dead. There are upward of 1,500 Mohaves re¬ maining, most of whom live on the Colorado River Reservation in Arizona. They are an agricultural people, rank high physically and are expert makers of pottery and baskets.

MOHAWK, a river whose headwaters rise in Mohawk Hill in the southern part of Lewis County, N. Y. It flows south to Rome, where east by south, with many curves, it con¬ tinues to the Hudson River, which it enters at Cohoes, nine miles above Albany. It is about 160 miles long, and is the largest tribu¬ tary of the Hudson. In several places along the route there are rapids and falls, as at Little

Falls in Herkimer County, Oriskany in Oneida County, and several other places, all of which are noted for manufacturing. The falls of the Mohawk River (Cohoes Falls) 70 feet high are near Cohoes, where in a glacial pot hole the complete skeleton of a mas¬ todon was discovered in 1883. The bed of the Mohawk River was once much wider than the present channel through which the water passes; in some places the distances between the old banks are from a mile to nearly three miles. The Mohawk Valley is noted for its beauty and the fertility of its soil. Ihe Erie. Canal (q.v.) is parallel with the river to Rome. Two railroads parallel the river to Rome, the New York Central and Hudson River and the West Shore. The manufacturing industries of the valley, which depend largely for motive power upon the water power of the Mohawk, are extensive. A number of pretty villages and thriving manufacturing towns are on its banks, chief of which from west to east are Rome and Utica in Oneida County; Ilion, Herkimer and Little Falls in Herkimer County; Fort Plain, Canajoharie, Fonda and Amsterdam in Mont¬ gomery County; Schenectady in Schenectady County and Mechanicville in Saratoga County.

In the <(Settlement Period® of the United States, this valley was the main highway from the <(East Colonies® to the Great Lakes. It was the home of the most warlike tribes of Indians, the headquarters of the Five Nations. The first missionaries and the first explorers who left the Hudson River in this part of the United States journeyed along the country through which flowed the Mohawk. In this valley, near the Mohawk, Goupil was killed by the Indians, and later Father Jogues (q.v.) was martyred at the place now called Auriesville, on the south side of the river a little east of Fonda. Sir William Johnson built two homes in this valley, one at Fort Johnson about one mile west of Amsterdam, now the railroad station of Akin, the other, Johnson Hall, near the present Johnstown in Fulton County. Much of the early history of the river and valley as re¬ lated to the whites is connected with the rule of Sir William Johnson and his power over the Five Nations. The centre of wealth and power, in the valley before the war, was at Johnson's home. At the breaking out of the Revolution¬ ary War, an effort was made by both parties to hold possession of the Mohawk. The death of Sir William Johnson, just at the beginning of the war, removed a strong power from the council. His sons and their friends lacked his humanity and wisdom. The union between the British and the Indians resulted in many ter¬ rible scenes, among others the massacres of Cherry Creek and Schoharie, the burning of homes and the taking of many lives in the valley. Burgoyne (q.v.) realized the value of having possession of this vallev, and some of the

important battles of the Revolution took place along the Mohawk. There were many Tories in “the valley; but a large number of the settlers were always patriots. When the news of Concord and Lexington reached the inhabitants along the Mohawk, many of them loaded into wagons all the grain they could spare and sent the precious cargoes over the rough roads to Boston. When the British de¬ termined to end the war the Mohawk Valley, the gateway to the West, was the site chosen.

Here the Tories outnumbered the patriots, and the Indians were the allies of the British ; but Saint Leger’s defeat at Oriskany by men under Nicholas Herkimer filled Burgoyne with de¬ spair and fired the enthusiasm and enlivened the hope of the patriots.

MOHAWKITE. An arsenical ore of cop¬ per with minor amounts of nickel and cobalt, a variety of domeykite. Occurs in Mohawk cop¬ per mines, Houghton County, Mich.

MOHAWKS, a tribe of North American Indian, the easternmost of the Six Nations, named collectively by the French, the Iroquois. According to their own tradition, confirmed by those of other tribes, they were the eldest peo¬ ple in the confederacy of the Six Nations and styled themselves Kaniengehaga, (<people .of the place of the flint.ˆ They believed that they were liberated from subterranean confinement by Tareya-wagon, who guided them into the valley of the Mohawk; thence they passed to the Hudson and to the sea. The valley in which they at first established themselves was the seat of their power from the discovery of the country until the American Revolution. Their dominion extended from Lake Cham¬ plain to the headwaters of the Susquehanna and the Delaware. A warlike tribe, they in¬ flicted great tortures on their prisoners and practised cannibalism. With the introduction of firearms by Dutch traders they became re¬ nowned above all the other nations for their skill as warriors, and carried terror wherever they went. Their forays extended as far as the Connecticut River, and their influence pre¬ vailed among the small independent tribes about the region of the present city of New York.

During the French and Indian War they supported Sir William Johnson, following him in his most perilous expeditions and aiding him in the contests of Lake ‘George and Niagara. After his death they transferred their attachment to his family, and were forced to flee from their ancestral home to Canada, where lands were assigned them on the Grand River and on the Bay of Quinte, near the east end of Lake Ontario, where over 1,200 still reside. See Iroquois League; Six Nations.

MOHEGAN (mo-hegan) or MONHE-GAN (mon-he’gan) INDIANS, a tribe of North American Indians of the Algonquian family, who formerly lived on the Thames River in eastern Connecticut. They were at one time united with the Pequots and after the death of Sassacus, the Pequot leader, the remainder of the tribe came to the camp of the Mohegan chief. After the death of King Philip in 1676, the Mohegan tribe was the only important one in that region. They became scattered, some joining the Brotherton Indians in New York. The survivors of this race are so mixed with negro and white blood that they have practi¬ cally lost their identity; about 100 of them continue to reside in the neighborhood of Mohegan or Norwich, Conn.

MOHILEV, mo-HO-lef’, Russia, a western town and government. The town and capital of the government is on both banks of the Dnieper, 85 miles southwest of Smolensk. The town has spacious streets and a large octagonal square occupied by the principal buildings, among others the palace of the Greek archbishop and

the bazaar. It is surrounded by ramparts and is fortified by a citadel on a commanding height. The staple manufacture is tobacco ; and the trade with Riga, Memel, Danzig, and Odessa, chiefly in leather, wax, honey, potash, oil and grain, is very extensive. Pop. 72,500, about half Jews. The government, bounded north by Vitebsk, east by Smolensk, southeast by Oreal, south by Czernigov, and west by Minsk, is about 210 miles long from north to south by 112 miles broad, and has an area of about 18,514 square miles. The sur¬ face, though in the line of watershed which divides Europe into two great basins, is gen¬ erally flat, and sends its waters chiefly to the South Dwina, but partly also to the Dnieper. The soil is fertile, though very imperfectly cul¬ tivated, and the forests, chiefly of oak and fir, cover extensive tracts. The principal mineral is bog iron ore. Both trade and manufactures are limited. Pop. 2,551,400.

Another Mohilev in the government of Po-dolia on the left bank of the

Dniester, 60 miles east-southeast of Kamenetz, has a population of 32,604, nearly half being Jews.

MOHL, mol, Julius von, German orientalist : b. Stuttgart, 25 Oct. 1800; d. Paris, 3 Jan. 1876. He studied theology at Tubingen and England, and Oriental languages at Paris, becoming as¬ sistant professor of Oriental literature (1826) at Tubingen. After several years' research at Paris, London and Oxford, he was appointed by the French government to translate and pub¬ lish (Shahname) by Firdosi, which appeared (Paris 1838-66) in six folio volumes de luxe. In 1847 he was appointed professor of Persian at the College de France and, in 1852, inspector of Oriental works in the Imperial printing bureau, becoming secretary and later president of the Asiatic Society at Paris. He published <Lettres de Mr. Botta sur les decouvertes a Khorsabad) (1845), concerning Botta's exca¬ vations at Nineveh. He wrote also ˆFragments relatifs a la religion de Zoroaster) (Paris 1829), in collaboration with Olshausen. His reports to the Asiatic Society were collectively published after his death by his widow (nee Miss Mary Clark) under the title (Vingt-sept ans d'histoire des etudes orientales) (1879-80). Consult Simpson, (Julius and Mary Mohl; letters and recollections) (London 1887).

MOHLER, me'ler, Johann Adam, German Roman Catholic theologian: b. Igersheim, Wiirtemberg, 6 May 1796; d. Munich, 12 April 1838. He studied theology at Tubingen and became successively tutor (1822), extraordinary professor (1826), and ordinary professor (1828) at that university, and in 1835 was called to a chair in Munich. He was an able doctrinal disputant, distinguished alike intellectually and spiritually; and did much to arouse the Ger¬ man Roman Catholic Church to new vigor. He wrote (Unity of the Church > (1$25) ; Athan¬ asius the Great) (1827) ; (Symbolism, or Exposi¬ tion of the Doctrinal Differences between Prot¬ estants and Catholics) (1832; English version by Robertson), and (a reply to the works of Baur and others against his (Symbolism)) , in 1834 (New Investigations on the Doctrinal Differences between Catholics and ProtestantsP He was one of the great theologians of the cen¬ tury. Consult the biographies in German by Friedrich (1894) and Knopfler (1896).

MOHLER, John Frederick, American phys¬ icist : b. Boiling Springs, Pa., 30 Oct. 1864. He studied at Dickinson College, Pa., receiving the degree A.M. (1890), and was given the degree Ph.D. (1897) at Johns Hopkins. He was ap¬ pointed instructor of mathematics and science at the academies of Wilmington and Dover (1887-90), instructor of mathematics at Wil-braham, Mass. (1890-94), and professor of physics at Dickinson College since 1896. His research work extended to surface tension of water, electric arc effects on wave-length dis¬ turbance of light rays and on light spectra of magnesium. He wrote (Practical Physics, J (1897) which has passed through three edi-tons, as well as a number of scientific contribu¬ tions to the periodicals.

MOHN, mon, Henrik, Norwegian meteor¬ ologist: b. Bergen, 15 May 1835. He studied at Christiania and was appointed (1861) ob¬ server at the astronomical observatory of the university, becoming (1866) professor at the university, then director of the Meteorological Institute of Christiania, which was founded through his active work. He directed a scien¬ tific expedition (1876-78) in northern Nor¬ wegian waters, and the Bossekop meteorologi¬ cal station was erected (1882-83) under his direction as well as other stations in northern Europe. He wrote (Grundziige der Meteor-ologie) (Berlin 1875; 5th ed., 1898), a very important work; (Temperature de la mer entre l'lrelande, l'Ecosse et la Norvege) (Christi¬ ania 1870) ; (Oversigt over Norges Klirna-tologP (ib. 1870) ; (The North Ocean, its depths, temperature and circulation (1887) ; cMeteorology : Report of the Second Norwe¬ gian Arctic Expedition in the From, 1898-1902 > (1907). He has also edited, since 1867, the Yearbook of the Norwegian Meteorological Institute.

MOHOCKS, md-hoks, The, a club in Lon¬ don, England, also known as the Mohawk Club, which had a scandalous existence in 1711-12. ((The avowed design of their institution was mischief® ; it was composed of young men of good families, and their conduct ˆvaried from horseplay to brutalities. Gay mentions in (Trivia) that the Mohawks rolled women in hogsheads down Snow-hill, and Swift told Stella of a report that 80 of them had been put into prison ; while Lady Wentworth, writ¬ ing to her son. Lord Strafford, says. <(I am very much frightened with the fyer, but much more with a gang of devils that call themselves Mohocks.® A royal proclamation was issued against them 18 March 1712.

MOHR, mor, Charles Theodor, American botanist: b. Esslingen, Germany, 28 Dec. 1824; d. Asheville, N. C., 1901. He was educated at

the Polytechnic School in Stuttgart and in 1845 visited Dutch Guiana in the interest of botany. He removed to the United States in 1848 and in the following year went to California, where his health becoming impaired he returned to the East, engaging in the drug business in Louis¬ ville, Ky., and later in Mobile, Ala. He was employed in various botanical and forestiy in¬ vestigations under the State and United States governments. In 1884 he was appointed botan¬ ist of the Alabama Geological Survey and in 1889 became agent of the forestry division of

the United States Department of Agriculture. He was a member of numerous learned and scientific societies, a contributor to the National Herbarium and published (The Timber Pines of Southern United States) (1896-97) ; (Plant Life of Alabama) (1901), *etc.*

MOHR, one of the larger of the West Afri¬ can gazelles (Gazella mohr), notable especially as the source of the c(mohr-stones,® or bezoars, derived from these animals and highly esteemed by the Arabs of Morocco and Algeria.

MOHS, Friedrich, fred'riH mos, German mineralogist: b. Gernrode 1773; d. Agardo, Lombardy, 29 Sept. 1839. He studies at Halle and the mining academy at Freiberg; in 1811 became professor of mineralogy at Gratz, and later held similar posts at Freiberg and Vienna. He is known as the inventor of a new system of classification for minerals, which regards, in the collecting of species into higher groups, only their external characteristics. He pub¬ lished (Die Charaktere der Klassen, Ordnun-gen Geschlechter und Arten oder Charakter-istik des naturhistorischen Mineralsystems) (1820) ; (Grundriss der Mineralogie) (1822-24, in English 1825), *etc.*

MOIDORE, moi'dor (from the Portuguese, mceda d'ouro, literally, coin of gold), a gold coin formerly used in Portugal (from 1690— 1722), worth about $6.50.

MOIRE, mwar, a French name for watered silks. Though made in the same way as ordi¬ nary silks, these are of double width and must be of a stout substantial make. They should also be folded in such a way that the air con¬ tained between the folds should not be able to escape easily. They are subjected to an enor¬ mous pressure, of from 60 to 100 tons, gener¬ ally in a hydraulic machine, and the air, in try¬ ing to escape, drives before it the small quantity of moisture that is used, and hence is effected the permanent marking called watering,

which is for the most part in curious waved lines. The finest kinds of watered silks are known as moires antiques. Woolen fabrics to which the same process has been applied are called moreen.

MOISE, Penina, American poet: b. Charles¬ ton, S. C, 23 April 1797 ; d. Charleston, 13 Sept. 1880. A personality of much charm, she was born of French parents of Hebrew extraction, who originally came from the island of Saint Eustatius. Her poetical gifts were early evi¬ denced and her contributions to the press of her day were many, the chief of which appear in (Fancy's Sketch-Book' (Charleston 1833.) Her hymn book, written for the Charleston Beth Elohin Congregation, is still utilized, and was a pioneer in its field. Despite blindness in her later years, she continued to write poems, and her home was a place of pilgrimage to a host of admirers.

MOISSAN, Henri, French chemist: b. Paris, 28 Sept. 1852; d. 20 Feb. 1907. He was edu¬ cated at the Museum of Natural History in Paris and at the School of Pharmacy; taught in the Higher School of Pharmacy 1879-83, and then (1886) became its professor of tox¬ icology. He isolated and liquefied fluorine, thus winning in 1887 the Lacaze prize from the Academy of Sciences; was transferred to the

chair of mineral chemistry in the School of Pharmacy in 1889 and to that of general chem¬ istry in the Sorbonne in 1900. He won great fame by his important experiments and achieve¬ ments with the electric furnace. In 1892 he made the manufacture of acetylene simple and commercially profitable by his discovery that if carbon and lime be fused in the electric fur¬ nace pure calcium will be formed, which makes the liberation of acetylene an easy matter. Much more spectacular was his formation of artificial diamonds in 1893 ; iron was melted in the electric furnace and saturated with carbon; the furnace at a temperature of more than 4000° C. (that is, more than 7200° F.) was plunged into cold water ; -the resulting ingot was attacked with hot aqua regia; the iron was thus dissolved and artificial diamonds were dis¬ closed. In 1906 he received the Nobel prize in chemistry. Moissan wrote (L'Isolement de fluor) (1886) ; Reproduction du

diamant5 (1893) ; (Etude complete des carbones amorphes et des graphites) (1898), and Classifica¬ tion des elements5 (1904).

MOISTURE. See Rain.

MOJI, mo'je, Japan, seaport town on the most northerly point of the Japanese island Kiushiu in the Strait of Shimonoseki and op¬ posite the harbor of that name. It is important as the shipping point of the coal obtained from the neighboring mines. The total of exports and imports in 1913 had grown to a value of over $19,500,000 and nearly $10,500,000 respec¬ tively, more extensive, therefore, than those of Noigasaki. The exports, besides coal, consist of cotton thread and cotton goods, cement, rice, porcelain wares and wood. In imports the chief articles are raw cotton, beans, grain, flour, sugar, metal ware, machinery and petroleum. Pop. 55,682.

MOKADDASI, mok'a-da-se, Arabian geog¬ rapher : b. Jerusalem, 946. His name is derived from his birthplace and signifies merely ((of Jerusalem.55 He was well educated, and after a pilgrimage to Mecca in 965 devoted himself to travel. His critical sense makes his work the most trustworthy by any Mohammedan geographer. Two editions of it were published in his lifetime; it was edited by De Goeje in 1877, and the part relating to Syria and Pales¬ tine appeared in an English version by Le Strange in 1886. Consult Le Strange, (Pales¬ tine Under the Moslems5 (1890).

MOKANNA, mo-kan'na, A1 (Hakim-ben- Allah), styled the (< Veiled Prophet,55 Moham¬ medan impostor of the 8th century. He hid his face under a veil, a proceeding which his fol¬ lowers ascribed to the splendor of his counte¬ nance. He attributed to himself divine powers, and is said, by means of his chemical and other knowledge, to have performed apparent wonders. He gained many followers, so that at last the Caliph Mahdi was compelled to send an armed force against him. He retired to a fortress in Transoxiana, where he first poisoned his soldiers and then burned himself. His fol¬ lowers continued to pay him divine honors after his death. He is the hero of Moore's (Veiled Prophet of Khorassan5 in the first part of (Lalla RooklP (1817).

MOKI, mo'ke, or HOPI, a Pueblo tribe of Shoshonean Indians inhabiting six pueblos on a reserve of 2,472,000 acres in northeast Ari¬ zona. They are mesa-dwellers, their seven vil¬ lages, chief of which are Walpi and Oraibi, being situated upon three mesas difficult of ac¬ cess, several hundreds of feet above the desert lands around.

The inhabitants of the small village of Hano are of Tanoan stock and speak a different language, being descendants of refugees from the Rio Grande who migrated in 1680 at the time of the Pueblo rebellion. They became first known to the whites (Spaniards) in 1540. The Moki are small in stature, but muscular and agile. They are of an indus¬ trious and provident nature, successful culti¬ vators, keeping their granaries always well stocked with agricultural produce, and are de¬ voting increased attention to pasturage ; they are also noted for their manufactures of pot¬ tery, baskets and blankets and for their wood¬ carving. They numbered, in 1904, 1,878 persons, are monogamists, and are descendants of tribes who according to the evidence of the ruins scattered around have inhabited the region for several generations. They are ruled by a coun¬ cil of hereditary clan elders and the chief of the religious fraternities, and are rich in mythology and folklore.

MOLA, Pietro Francesco, Italian painter: b. Coldre, near Como, 1612; d. Rome, 13 May 1668. At an early age he went to Rome, where he studied painting under Prospero d'Orsi and Giuseppe Cavaliere d'Arpino. He afterward painted at Venice, Milan and Bologna, in which last city he adopted the style of the local paint¬ ers, especially Albani. His landscapes are of special excellence. The English National Gal¬ lery possesses his (St. John Preaching in the Wilderness5 and (The Repose of the Holy Family in the Flight into Egypt.5 In the Ra¬ venna chapel of the Church of Jesus at Rome is his (Peter in Prison5 and in fresco (The Return of Peter to Rome.5 He also painted the (History of Joseph5 in the Quirinal Palace. Others of his works are to be seen in the Louvre, the Pinakothek at Munich and the Dresden Gallery. He was one of tfle followers of Annibale Caracci, whose manner he repro¬ duced with ease and dexterity, but he was lack¬ ing in imaginative depth, while his indebtedness to Albani and Guercino is too evident.

MOLA DI BARI, mo'la de ba're, Italy, town in the province and district of Bari, on the Adriatic Sea and on the Bari-Brindisi Rail¬ way. It has a church of the Norman period, a gymnasium, harbor, oil-presses and tanneries. Pop. 14,911.

MOLASSES. See Sugar.

MOLASSES ACT. See Acts of Trade.

MOLAY, Jacques Bernard de, zhak bar-nar de mo-la, French knight-templar, last mas¬ ter of that order: b. Burgundy, about 1243; d. Paris, 11 March 1314. He entered the Order of the Templars in 1265 and

became its grand master in 1298. In 1306, after the Templars had been driven from Palestine, and while he was in Cyprus busied about raising new troops against the Saracens, he was summoned to France by Pope Clement V, who was deter¬ mined to end the feuds between the Templars

and the Knights of Saint John. Philip the Fair, fearing, it is alleged, the power of the order in France, seized Molay and all the knights then resident in France, after receiving them with the greatest kindness, charged the order with heresy, tried them before a packed court and found them guilty. Molay was imprisoned and terribly illused for more than five years, then, after recanting certain admissions of guilt he had made, was burned at the stake. The guilt of the Templars is still a disputed historical question. Consult Prutz, (Entwicklung und Untergang des Tempelherrenordens* (1888), Lea, H. C., 'History of the Inquisition (Vol. III).

MOLDAU, mol'dow, a river of Bohemia, which rises in the Schwarzberg, on the fron¬ tiers of Bavaria, flows first southeast to Rosenburg, where it turns almost due north, and con¬ tinuing that direction, in a circuitous course, passes Budweis. After receiving several tribu¬ taries it traverses the town of Prague, and after turning due east, joins the Elbe on the left, 17 miles north of Prague. Its whole course is about 270 miles. It begins to be navigable at Rosenburg, where its north course commences, but at first only for shallow barges.

MOLDAVIA, mol'da'vi-a, Rumania, a northern division of the kingdom since 1861 (area, 14,759 square miles; pop. about 2,145;- 464), when the union of the former principali¬ ties of Wallachia and Moldavia as the Princi¬ pality of Rumania was proclaimed. See Ru¬ mania. i

MOLDENKE, mol'den'ke, Charles Ed¬ ward, American Egyptologist : b. Lyck, East Prussia, 10 Oct. 1860. He was graduated from Columbia in 1879, and from the University of Strassburg in 1885. He was ordained to the Lutheran ministry in the latter year and held

pastorates successively in Jersey City, N. J., 1885-90; New York, 1890-96; Mount Vernon, N. Y., 1897-1900. He has published (The Egyptian Origin of Our Alphabet ' (1886) ;

(The Trees of Ancient Egypt> (1886); (The New York Obelisk) (1891); (The Tale of the Two Brothers > (1898); (Egyptian Classics:*

(1900).

MOLE, Louis Matthieu, loo-e mat-te-e mo-la, French statesman: b. Paris, 1584; d. there, 3 Jan. 1656. His integrity and fearless¬ ness often resisted the arbitrary measures of the despotic Richelieu, and under the no less ambitious but less vigorous Mazarin, he ac¬ quired the esteem of all parties. In 1641 he was appointed first president of the Parlement through the influence of Richelieu, whom he had opposed in the process against the Marshal de Marillac. The disturbances of the Fronde soon after commenced. In this contest of fac¬ tions Mole defended with equal prudence and sagacity the interests of justice and freedom, as well as those of the court, and when Paris became the theatre of tumults, conducted him¬ self with so much firmness and dignity that his bitterest enemies could not withhold from him their approbation ; and even Conde and Cardinal De Retz were forced to esteem him, although his unshaken rectitude and devotion to the wel¬ fare of the nation and the safety of the throne frequently frustrated their designs. He was more than once threatened with personal vio¬

lence by the furious partisans of the Fronde, whom he overawed by his inflexible dignity.

In the memoirs of De Retz and other records of the time of the regency of Anne of Austria and Mazarin, Mole's happy influence in the troubled state is everywhere perceptible. His (Memoirs, > bearing on the stirring events in which he acted so great a part, were published in 1855.

MOLE, a small insectivorous mammal of the family Talpidce. They are related to the still smaller shrews (Soricidcs), from which the typical species may be distinguished by having the external ears so short that they are completely concealed in the fur, the fore feet broad and

shovel-like, the skull provided with an auditory bulla and a zygomatic arch, minute eyes and other characters. The moderate number of species, belonging to 11 genera, are found only in the temperate portions of the northern hemisphere. Three species, the com¬ mon mole (Scalops aquaticus) , the hairy-tailed mole (Paras calops breweri) and the star-nosed mole (Condylura cristata) occur in the eastern United States. The fourth genus (Scapanus) , with six species, is confined to the Pacific coast. The second is the smallest and is also distin¬ guished by its densely hairy tail and numerous teeth. It is not common and is found chiefly in mountains and about evergreen forests. The star-nosed mole is known at once by the rosette of fleshy processes on the snout and its larger size; both it and the common mole are abun¬ dant in cultivated lands and pastures, the former preferring moist, the latter dry lands. Their habits differ only in details. Moles are eminently fossorial — a mode of life for which they are by structure peculiarly adapted. They construct underground nests lined with soft grasses, from which several passages run off in different directions, and by branching become finally divided into a network of burrows which daily enlarges as the animal searches for the earthworms and insects on which it almost ex¬ clusively feeds. They seldom come to the sur¬ face except just at noon — a habit which has ■been repeatedly observed but never explained. The young are born in the nest and some species raise two broods. Notwithstanding its scientific name the common mole shuns water while the star-nosed mole shows a decided predilection for its vicinity and is an expert swimmer. Consult Stone and Cram, (American Animals) (1903).

MOLE, a long pier or breakwater built of masonry and extending into the sea, at times to a distance of a mile or more. In San Fran¬ cisco Bay are two of these piers, the Oakland Mole and Alameda Mole. The railroad ex¬ tends to the end of these moles and connects with a line of ferry-boats.

MOLE. See Nˆvus.

MOLE CRICKET. This insect (Gryllo - talpa vulgaris) is most appropriately named, for it combines the characteristics _ of the crickets, to whose family it belongs, with some of the habits and special adaptations of the moles. The mole-crickets dig winding burrows in the loose soil on the borders of ponds and ditches, raising ridges like miniature mole-hills. In their subterranean wanderings they cut the roots of plants, upon which, as well as upon

earthworms and larvae, they feed. A Porto Rican species (see Changa) does serious dam¬ age to crops. The European mole cricket lays several hundred eggs in an underground cham¬ ber where they are guarded by the female, though many of the young are later devoured by the male. The species occurring in the eastern United States are Gryllotapa boreais and G. longipennis. They may be recognized by their large brown bodies with a velvet-like covering of fine, close hair, short wing covers and fossorial front legs, not unlike the great paws of a mole. The ear of the mole cricket is situated on the front leg below the knee. Two pairs of wings are found, the tegmina or upper wings which are small, and the larger true wings which are long, delicate and flexible.

MOLECH. See Moloch.

MOLECULAR THEORY, in physics and chemistry, the theory which teaches that mat¬ ter, however homogeneous it may appear to be, is in reality a heterogeneous aggregate of ultramicroscopic particles called “molecules.® In a crude form this idea was entertained and de¬ fended, even before the Christian era, by cer¬ tain of the philosophers of Greece and Rome, among whom Democritus and Lucretius may be specially mentioned. The writings of these ancient authorities are of great interest to the historian, and are highly creditable when allow¬ ance is made for the state of science at the time they were produced ; but they are too nebulous to be of practical value to the modern physicist, who demands that every theory shall be tested by a critical comparison of its necessary conse¬ quences with the facts of observation.

The distinction between the atomic theory and the molecular theory, though still conven¬ ient for many purposes, is nevertheless an arti¬ ficial one, which will doubtless disappear in time. The atomic theory relates to the view that the chemist takes with regard to the con¬ stitution of matter, while the molecular theory relates to the point of view of the physicist. The atom has been the ultimate unit in which the chemist has been interested, while the mole¬ cule has been, until the very recent past, the ultimate unit with which the physicist has

con¬ cerned himself. The chemist has dealt mainly with the phenomena of chemical combination, as observed when two or more definite sub¬ stances unite so as to produce one or more new substances, and to him it has not been essential to_ speculate with regard to the physical nature of the tiny particles that constitute his funda¬ mental units, nor with regard to their behavior except as it concerns the chemical phenomena that he observes in his test-tubes and other apparatus. The physicist, on the other hand, has paid but little attention to the facts of chemical combination, but has confined his at¬ tention chiefly to the mechanical, thermal, elec¬ trical and magnetic phenomena that are ob¬ served in connection with definite substances whose chemical constitution remains unchanged, and to him the molecule has been a small, phys¬ ical body, possessing mass and extension, mov-chanics. The modern corpuscular theory of treatment in accordance with the laws of me¬ chanics. The modern . corpuscular theory of matter, however, promises to do a great deal to bring the physical and chemical viewpoints far closer together, and perhaps even to bridge

wholly the gap between them. (See Electron Theory or Corpuscular Theory). There is much evidence, already, to indicate that the “affinity® that chemical substances have for one another is of an electrical character; and when the physicist has arrived at a more definite knowledge of the ultimate nature of electricity, it is possible (and even probable) that this knowledge will go far to clear up the mysteries of chemical affinity, and to consolidate chemis¬ try and physics into a single science.

The molecular theory in its present form may be said to be a development of the 19th century; for although the celebrated Swiss mathematician, Daniel Bernouilli, had suggested, in the 17th century, that gases consist of little molecules moving freely about among them¬ selves, and that gaseous pressure is due to the collisions of these molecules with the walls of the containing vessels, and although other thinkers had made analogous suggestions which helped to prepare the way for the modern the¬ ory, it was the work of John Dalton, in chem¬ istry, which gave the first great impetus to the molecular theory, by making it, in some form or other, almost a necessity of thought. Dal¬ ton showed (1805) that when substances com¬ bine chemically, they do so in certain definite proportions ; and he concluded that the facts of this sort which he amassed could be best explained by assuming that matter consists of exceedingly minute particles, or “atoms,® each of which has a definite weight, and that

when bodies combine chemically, their atoms come together in pairs, or in threes, or fours, or in other combinations involving only integral num¬ bers, according to the compound formed. (See Atomic Theory). It was shortly afterward observed that when gases combine they do so in accordance with certain simple volumetric laws. One volume of hydrogen, for example, combines with one volume of chlorine, to form two volumes of hydrochloric acid gas; and two volumes of hydrogen combine with one volume of oxygen to form approximately two volumes of steam-gas. To bring facts of this sort into harmony with Dalton's theory, it was suggested by Avogadro in 1811, and independently by Am¬ pere in 1813, that all gases, when under the same conditions of temperature and pressure, contain the same number of molecules per unit of volume. With these tangible evidences of the molecular structure of matter as an incen¬ tive, physicists and chemists set themselves the task of testing, in all conceivable ways, the con¬ sequences of such a theory; and in the course of a century of experimental and mathematical study, no fact has been discovered which tends to controvert the fundamental doctrine that matter has a molecular structure. The molecu¬ lar theory, in some form, is, therefore, confi¬ dently believed to be true by practically all physicists and chemists. The observations which have been made, and which must be har¬ monized and explained by the molecular theory, are so numerous and so varied, however, that no single set of mutually consistent hypotheses about the nature of molecules has yet been pro¬ posed, which completely and demonstrably ex¬ plains everything that is known about mat¬ ter.

It is quite probable that our progress in the development of the molecular theory has been seriously handicapped by our natural reluctance

to throw overboard, when dealing with ultramicroscopical bodies, conceptions at which we have arrived by studying larger bodies upon which we can experiment, or the behavior of which we can directly observe. Many indica¬ tions of this are already apparent. For exam¬

ple, the principle of relativity (if further study proves it to be sound) will oblige us to substi¬ tute new mechanical axioms (or postulates) for those of Newton, in many lines of investiga¬ tion ; and we already recognize that when we have to deal with matter moving at extreme velocities (1) we can no longer assume mass to be constant, and (2) we have to distinguish between longitudinal and transverse mass, be¬ cause the behavior of the body with respect to an impressed force is different, according as the force acts parallel to the velocity or at right angles thereto. (See Electron Theory). In dealing with molecular and sub-molecular bodies and magnitudes, there is no logical rea¬ son why we may not make any assumptions whatsoever that prove to be convenient,— pro¬ vided these assumptions, when the bodies to which they are applied are large and tangible, harmonize with the facts of experience in the world that we can see ; and when this fact is fully appreciated, and we have wholly aban¬ doned the attempt to make the behavior of in¬ dividual molecules and corpuscules harmonize with conceptions we have formed from a study of the larger facts of nature, our progress will doubtless be much more rapid. But until we have found out the precise set of assumptions that will best account for the ultramicroscopic phenomena of the universe, we shall perforce continue to treat the molecule as though it obeyed Newton's laws of motion, except in certain special cases or aspects, where we may know that it does not; and in the transitional stage that science is now entering, we shall be further vexed by having to deal with incompat¬ ible assumptions to a large extent, and to ex¬ plain certain phenomena in accordance with our older conceptions, while at the same time we apply newer and broader conceptions to other closely related phenomena.

It has been abundantly proved that the "atom® of the chemist and the "molecule® of the physicist are (in general) different things, a molecule being a system formed by the union of a definite number of atoms, combined in a definite way. The molecules of a given sub¬ stance are the smallest parts into which that substance can be conceived to be divided, with¬ out changing its chemical character; while the atoms are the proximate constituents through whose immediate combination the molecule is formed. (The word "proximate® is employed here, because the atoms themselves are now believed to be composed, wholly or in part, of still smaller corpuscles, as will be explained subsequently). The molecules of most of the substances that are considered in elementary inorganic chemistry are comparatively simple in structure. Hydrochloric acid gas, > for ex¬ ample, is composed of molecules which each contain one atom of hydrogen combined with one atom of chlorine, as indicated bv the

formula HC1 ; and water (at least in the ˆ,rrP of steam-gas) is composed of molecules which each contain one atom of oxygen combined with two atoms of hydrogen, as indicated by the formula ILO. In organic chemistry molecules

occur which apparently contain hundreds of constituent atoms, and the comparative stability of such systems is hard to understand, on any hypothesis.

One of the most fundamental assumptions of the molecular theory in its usual form is that the molecules of any one chemical substance are identically alike in all respects. This point was tested by Graham, in the case of hydrogen, by passing the gas through a series of porous partitions, and comparing the final hydrogen, as it issued from the last partition, with the original gas. No difference could be observed, and hence it was concluded that hydrogen, at least, is not a mixture of dissimilar particles; because it is known that a mixture of different gases, whose molecules are different in size, can be partially separated by a diffusion process of this kind. Stas, the great Belgian chemist, investigated this question by determining the atomic weight of a given element as prepared in different ways and from different sources; and he found that the results obtained under these varying conditions were indistinguishable from one another," even when his work was so accurate that a variation in the atomic weight of the hundredth part of 1 per cent could hardly escape detection. It cannot be considered to be proved, however, that the molecules of any one substance are alike in every way, in the sense that a hundred standard machine screws are alike, for the question has not yet been tested exhaustively enough. Graham's method and Stas' method furnish evidence to which proper weight should be given, but they cannot be said to be conclusive. Neither can we admit the evidence of the spectroscope to be con¬ clusive, although it indicates that the internal vibrations of a molecule of hydrogen (for ex¬ ample) are performed with the same rapidity, whether the hydrogen is obtained from water, or from organic bodies, or from the gases that are occluded by meteorites and brought to us from the depths of space. The identity of mole¬ cules of the same substance is nevertheless a fundamental assumption of the usual molecular theory, and it will be assumed in the present article. In this connection the modern theory of isotopes should be considered. According to Soddy (who coined the word "isotope®) it is possible, or perhaps probable, that many of the substances now considered to be homogeneous elements may prove to be heterogeneous when we know more about them. Each so-called ele¬ ment may consist of

several different sub¬ stances, which are inseparable and indistinguish¬ able by any means we now have. Such sub¬ stances are said to be “isotopic® with one another, and among the radioactive elements several such bodies have already been recog¬ nized. Ionium, thorium and radio-thorium are isotopes, for example. Consult A. W. Stewart,

< Recent Advances in Physical and Inorganic Chemistry.*

All matter may be classified, for present pur¬ poses, as (1) gaseous, (2) liquid or (3) solid. (See Matter). According to the kinetic theory, a gas consists of molecules which are distributed through the space occupied by the gas in such a manner that the average distance from one molecule to the next one is large in comparison with the diameter of any one mole¬ cule. The molecules are all believed to be in rapid motion, so that from time to time they

encounter one another ; and when an encounter occurs it is believed that the molecules that come together rebound again as if they were per¬ fectly elastic bodies. They have motions of rotation as well as of translation, and the col¬ lisions affect both the rotative and the translatory velocities of the colliding molecules. A system composed of a practically infinite num¬ ber of bodies of this sort will have certain properties which are considered in the article Gases, Kinetic Theory of, and shown to be in general agreement with the properties of the actual gases of nature.

It may be shown, by the methods of the kinetic theory of gases, that the speed with which the molecules of a gas are moving may be determined by means of the formula

$v = 4/3PV$

where V is the volume, in cubic centimeters, of one gramme of the gas, P is the pressure ex¬ erted by the gas, in dynes per square centi¬ meter, andv’ is the square root of the average value of the squares of

the. velocities of the molecules, each expressed in centimeters per second. In the case of hydrogen at atmos¬ pheric pressure and the temperature of melting ice, we have _V — 11,160 and P = 1,012,000; and therefore v, for hydrogen molecules under the assumed conditions, is equal to 184,100 centi¬ meters (or 1,841 meters) per second. The kinetic theory of gases shows that the true average (or arithmetic mean) of the velocities may be found by mukiplying the so-called ((mean-square velocity,ˆ v (as obtained above), by the constant 0.9213. Hence the average velocity of the molecules of hydrogen, under the conditions here assumed, is 1,841 X 0.9213 = 1,696 meters (or 5,564 feet) per second. The mean (or average) velocity for any other gas, under these same conditions of tempera¬ ture and pressure, may be found by dividing the velocity of the hydrogen molecules by the square root of the number that expresses the density of the other gas, when the density of hydrogen is taken as unity. Furthermore, the molecular velocity increases, in any given gas, in proportion to the square root of the absolute temperature.

The molecules of a gas undoubtedly attract one another under ordinary circumstances (ex¬ cept in the case of hydrogen, where the force appears to be repulsive at all distances) ; but it is assumed that they are so far apart during the greater part of the time that the attractive forces that exist do not have any great effect upon the motions of the system as a whole. The path of a molecule of gas, between two suc¬ cessive collisions, is. called the <(free path® of the .molecule, and is believed to be sensibly straight, owing to the high velocity that the molecules have on the average, and the (as¬ sumed) fact that the attractive forces are un¬ important at distances comparable in magnitude with the mean <(free path.® Maxwell showed that the average free path of the molecules of a gas may be calculated by means of the simple formula

where L is the average free path in centimeters, k is the coefficient of viscosity of the gas in absolute measure (see Viscosity), S is the

average speed with which the molecules are moving (in centimeters per second), and D is the mass of one cubic centimeter of the gas (in grammes). At atmospheric pressure and the temperature of melting ice, this formula gives values of L approximately as follows, where the unit, in each case, is the millionth part of a centimeter: Hydrogen, 17; nitrogen, 9.1; oxygen, 9.7; carbon dioxide, 6.4.

‘The length of the free path of a given gas is increased, when the density of the gas is diminished, in the exact inverse ratio of the change in density. In an exhausted tube con¬ taining hydrogen, for example, at a densitv one one-millionth of the density assumed above, the mean free path of the molecules would be a million times as great as. the value given for hydrogen at the normal density — that is, the free path at this particular exhaustion would be 17 centimeters, so that the molecules would travel, on an average, over six inches between successive collisions. As the kinetic theory of gases assumes that the molecules collide with one another after traveling distances that are negligible in comparison with the dimensions of the whole mass of gas under consideration, its conclusions, when applied to gaseous masses in which this condition is not fulfilled, must be received with proper caution. Maxwell’s formula, for example, is itself doubtful when applied to the extreme case in which the density of the hydrogen is only a millionth of the normal value. It is certain, however, that the free paths of gas molecules ‘at such high ex¬ haustions are to be measured in inches, and it is also certain that the pressure is not neces¬ sarily equal in all directions in vacua of this degree of perfection, since it is ‘by means of the incessant collisions that this equality of pressure is brought about at ordinary densities. For these reasons (among others) Sir William Crookes considered that highly attenuated gases, in which the pressure is a millionth of an atmosphere or less, should be considered as constituting a ((fourth state® of matter, essen¬ tially distinct in its properties from the three states that are commonly recognized. He also devised the radiometer and other instruments to show the reality of the difference of pres¬ sure that can exist in high vacua. In recent years it has become increasingly probable that in certain forms (at any rate) of the apparatus devised by Crookes, — in those forms, namely, in which ((cathode rays® are generated by the action of powerfully excited electrodes, — the mechanical effects that are observed are not due directly to the motions of the gas molecules themselves, but rather to the motions of free electrical corpuscles given off by the gas molecules under the influence of the powerful electric discharge. Crookes himself appears to have held views not essentially different from this, though at the time they were stated they were clothed in language that was necessarily rather indefinite, since the corpuscular or elec¬ tron hypothesis had not then taken form. See Electron Theory; Radiation.

In liquids, the molecules are supposed to be so near together that the attractive forces that they exert upon one another are powerful at all times. The kinetic theory of liquids is imperfectly understood, but it is considered certain that collisions occur among the mole¬ cules just as

they do in gases and that the

colliding molecules rebound from one another like perfectly elastic bodies. In liquids, how¬ ever, there is nothing strictly analogous to the (<free path)} in gases; for the liquid molecules are always exposed to attractive forces of con¬ siderable magnitude and hence in the intervals between successive collisions they describe paths that are everywhere markedly curved. There is, doubtless, as great a variety of velocities among the molecules of a liquid as among those of a gas, but the law of distribution of velocities among liquid molecules has not yet been deter¬ mined, on account of the mathematical difficul¬ ties that are involved and which have thus far proved insuperable. Admitting the fact that the velocities of the molecules are unequal, let us consider what, would happen at a free surface of the liquid, assuming for the moment that above this free surface there is a boundless vacuum. A molecule that is well within the liquid is attracted, on the whole, equally in all directions. A molecule at the surface, how¬ ever, is attracted only downward. Hence it is evident that when a molecule, in the course of its wanderings, comes to the surface, the pos¬ sibility of its escape from the liquid depends upon the magnitude of the vertical component of its velocity. If this vertical component is sufficient to carry the molecule beyond the range of sensible attraction of the liquid, the molecule will pass away indefinitely into the space above. On the other hand, if the vertical component of its velocity is not sufficient to carry thernole-cule beyond the range of sensible attraction of the liquid, it will rise into the vacuous space only a short distance, its upward velocity grow¬ ing less and less, under the influence of the downward attractive forces, until it vanishes altogether; after which the molecule will begin to fall back and it will finally plunge into the liquid again. From the slowness with which free evaporation takes place, we must conclude that by far the greater part of the molecules that start upward fall back into the liquid. Those that do escape by reason of their great velocities carry off more than their equable share of the kinetic energy of the molecules of the liquid and this causes the average kinetic energy of

the liquid, per molecule, to grow continually less. In other words, free evapora¬ tion causes a reduction of the temperature of the mother liquid. When the liquid is enclosed in a containing vessel of finite volume, the phenomena are somewhat different, after the evaporation has proceeded for a time. If the space above the liquid is vacuous at the outset, the evaporation, at the first instant, takes place precisely as before. Of the molecules that come to the surface of the liquid, those that are mov¬ ing most rapidly in a vertical direction fly off as in the case previously considered ; but they can no longer pass away indefinitely into space. They are now retained in the vessel, in which they will accumulate, constituting a gas or vapor whose density will go on increasing until a certain limit is reached.. The molecules com¬ posing this vapor will travel in every direction, precisely as they do in other gaseous bodies. Many of them, therefore, will plunge back into the liquid again and become an integral part of it once more. Now the number of molecules that leave the mother liquid in a given time will be quite independent of the density over¬ head; but the number that fly back into it again,

in a given time, will be greater, the greater the density of the vapor. At the beginning of the evaporation the vapor will be quite rare and the number of molecules that fly off in any given time will greatly exceed the number that re¬ turn during that time. The density of the vapor will, therefore, increase. After a certain inter¬ val (short as measured by ordinary standards), the density of the vapor will become so great that the number of molecules plunging back into the liquid in a given time will become sensi¬ bly equal to the number that fly off from it in the same time. When this adjustment becomes perfect, the density of the vapor will no longer increase. It is then said to be ˆsaturated,5* and its density will remain constant until the tem¬ perature of the system is altered. If the tem¬ perature be now raised, all the molecules will be accelerated and hence more molecules will plunge from the the vapor into the liquid in a given time than before, and more molecules will also come to the surface of ‘the liquid from the interior. Furthermore, of the increased number of molecules that emerge from the interior of the liquid, a larger proportion than before will have velocities exceeding the critical velocity that a molecule must have in order to escape from the attraction of its fellows. Hence, on the whole, the density of the vapor will in¬ crease, approaching a new limit at which the number of incoming and outgoing molecules will again become equal. It follows, therefore, that for any vapor in contact with its liquid there is a definite density corresponding to each temperature. The existence of a critical point (q.v.) may be explained

in a similar manner, by considering the average kinetic energy that a molecule must have in order that it may be able to pass away from the attraction of other molecules in its immediate vicinity. A stone thrown upward by the hand does not proceed far before the attractive force of the earth an¬ nuls its velocity and causes it to fall back again. A rifle will project a ball far higher, but the ball will eventually fall back, just as the stone did. With a good modern cannon we can throw a projectile several miles into the air — and still it falls back. But we might conceivably project one with such a speed that it would leave the earth forever. It may be shown, in fact, that if the retarding action of the air is omitted from consideration, an initial vertical speed of 36,700 feet per second would be quite sufficient. With this much premised, conceive two molecules of a gas to be in contact, and let a sudden impulse be given to one of them, to drive it away from the other one. If the impulse is small enough, the disturbed molecule will only travel a short distance, and will then fall back to its original position ; but we may give it such a speed that the attractive force of the fixed molecule will fail to bring it back, and in this case it will travel onward indefinitely. Now, just as in the case of the cannon-ball and the earth, there must be some intermediate initial speed that will be just sufficient to separate the two mole¬ cules under consideration. We may call this the (<critical velocity, }) and we may say that if the molecules of a given gas are moving so that, on an average, when two of them collide they have a relative velocity greater than this critical value, the gas in question cannot be liquefied by pressure alone; for even if its molecules were forced almost into absolute contact with one

another, their velocities would be sufficient to separate them again indefinitely, as soon as the pressure was removed. From this, and from the relation between temperature and molecular velocity in gases (see Gases, Kinetic Theory of), it follows that for every gas there is a temperature above which the gas cannot be liquefied by any pressure whatever.

Very little is known about the molecular constitution of solid bodies. The most obvious property of a solid is, that it preserves its shape so long as it is not acted upon by external forces. Moreover, when such forces are applied, the solid indeed becomes deformed, but it even¬ tually regains its original shape after the forces have been removed, provided they did not ex¬ ceed a certain magnitude called the (<elastic limit,® which is peculiar to the solid under ex¬ amination, and to the way in which the forces were applied. We are obliged to conclude, from these facts, that the molecules of a solid are not free to roam about, but that some or all of them have determinate mean positions about which they may oscillate and rotate, but from which they never permanently depart except when constrained to do so by an external force great enough to overcome the internal forces (whatever they may be) which normally deter¬ mine the mean positions of the molecules. Some solids are brittle toward forces that are sud¬ denly applied to them, although they yield slowly, and after the manner of a viscous fluid, to smaller forces that are applied continuously for a long time. A mass of cold pitch, for example, may be easily shattered by a blow, and yet when allowed to rest for a sufficient time upon an inclined plane, it yields gradually to the relatively insignificant force of gravity, loses its shape and slowly flows down the plane. It is evident that solids of this character must have exceedingly complicated structures. Max¬ well suggested that they consist of two kinds of molecular groups, of which one is more stable than the other, and he supported his argument with considerable ingenuity. His views were purely speculative, however, and it appears to be fairly evident that the first advances that we make toward a good understanding of the molecular structure of solids must be based upon a study of bodies of crystalline nature, like quartz and iron.

It is certain that in crystals there is some definite regularity of orientation, either in the molecules themselves, or in their motions ; and it may be fair to assume that this regularity is of such nature that any given molecule, in its vibratory excursions, never passes outside of a certain imaginary ellipsoid, which may be con¬ ceived to be described about the mean position of the molecule. Crystals may then be regarded as aggregates of such ellipsoids, piled up in such a way that the corresponding axes of all of them are either parallel throughout the mass, or at least arranged in accordance with some definite geometrical scheme. When a substance crystallizes, either from solution or from a state of fusion, the ellipsoids that bound the crystal molecules must necessarily arrange themselves so that the potential energy of the resulting solid is as small as it can be,

consistently with the conditions under which the solidification takes place. For the sake of illustrating the applica¬ tion of the molecular theory to the explanation

of crystal structure, we may assume the ellip¬ soids to be simple spheres, and we may also assume that the potential energy of the system is least when the spheres are grouped together as closely as possible. The problem of crystal structure is then reduced, in its geometrical aspect, to the simple one of finding out how to pack the greatest number of equal spherical balls into a given space; and in order to properly comprehend the principles that are involved, a little patient experimentation with a liberal sup¬ ply of buckshot or spherical bullets is desirable. It will be found that pyramids can be built with them, apparently in several ways ; though the internal structure of the pile is really the same in all cases. The slant faces of these pyramids correspond to the plane faces of the actual crystal. When a crystal is forming (say by deposition from a solution) we are to conceive that a continuous series of exchanges is going on, all over its surface. Molecules of the dis¬ solved substance are caught by the attraction of the growing crystals, but, on the other hand, molecules of the solidified crystal are con¬ tinually passing into solution again ; and the gradual increase in size of the crystal is due to the fact that in a unit time more molecules are caught by it than are lost again. Suppose, now, that the surface of a partially formed crystal is injured slightly, and let us represent the injury, in our shot pile, by removing a few of the shot from one of the faces of a pyramid. A molecule that happens to lodge in the injured place will be in contact with more of the other attracting spheres than it would touch if it were to collide with one of the uninjured parts of the crystal, and it will, therefore, be held more firmly in place. In the exchange of molecules between the crystal and the solution, a molecule thus embedded will be less likely to be torn away again ; and this action tends to preserve the flatness of the faces of the growing crystals, and to cause the repair of damaged places to proceed with greater rapidity than the growth along normal, uninjured parts.

In the mathematical investigation of crystal¬ line structure it is usual to speak of crystals as possessing a ˆlattice-like® structure in space, — a space-lattice being defined as a numerous set of fixed points, arranged in such a way that the point-distribution is identically the same in every region. The points may be considered to be the mean positions about which the re¬ spective molecules oscillate. From the point of view of the investigator this conception has proved to be

exceeding useful, but for the pur¬ pose of giving a general conception of crystal structure the idea of piled spheres or ellipsoids is perhaps simpler and clearer.

It has been said, above, that the molecules of bodies attract one another. We do not know much, however, about the mechanism by which the attraction makes itself felt, nor even about the law in accordance with which the attraction falls off with increasing distance. It would be ‘ natural to assume it to vary as the inverse square of the distance, but it is usually held that there is good evidence that it falls off more rapidly than this, as the distance increases. Maxwell assumed, in certain of his writings, that the attraction varies as the inverse fifth power of the distance, but he apparently chose this law merely because it rendered certain of

his equations more manageable. William Suth¬ erland has advanced reasons for believing that the inverse fourth power is more nearly cor¬ rect for the distances that are commonest between the molecules of gases under ordinary conditions of density. We do not even know that the forces between molecules are “central,® — that is, we do know that the attractive force exerted by a molecule tends toward definite points within the substance of the mole¬ cules. Helmholtz showed, in a paper published in 1847, that if the universe consists of smooth spherical molecules, which attract one another only by forces that are directed toward their centres, the great fact of the conservation of energy is a necessary consequence (see Energetics) ; but as we now have good rea¬ son for believing that molecules are not bodies of this sort, the principle of the conservation of energy must be regarded as a mere fact of observation. The distance at which the at¬ tractive force exerted by a molecule is still sensible is of course indefinite, depending as it does upon the delicacy of the means that are employed for the detection of the force. Maxwell showed that a soap-bubble would be¬ come unstable when its thickness is reduced until it is only equal to the radius of sensible molecular attractive power; and as Reinold and Rucker have shown that soap-films become

un¬ stable at a thickness of about one two-millionth of an inch, we may take this as a rough esti¬ mate of the limiting distance at which molec¬ ular attractive power ceases to be sensible.

The aggregate volume of all the molecules in a given mass of gas may be obtained, to a rough approximation, by several methods, among which we may mention the so-called “characteristic gas equation,® which exhibits the relation between the pressure, density and tem¬ perature of a gas. Equations of this sort have been given by Van der Waals, Clausius and others, and in them a term occurs whose value depends upon the proportion that the bulk of the actual molecules bears to the total bulk of the gas that they constitute. The numerical magnitude of this term may be determined by experiments upon the variation of the pressure of a gas with temperature and density, and hence the aggregate bulk of all the molecules may be determined in a somewhat approximate manner. Roughly, it may be said that at ordi¬ nary densities, the actual total bulk of all of the molecules of a gas is from the thousandth to the ten-thousandth part of the bulk of the entire gas.

We are still far from being able to calculate the diameter of a molecule with any degree of precision, although we have no doubt advanced considerably beyond the point at which we stood when the first edition of the Encyclopedia Americana was published, for at that time ask¬ ing how big a molecule is was much like asking <(How big is a crowd?® The question could be answered only in an exceedingly crude way. We now know the individual masses of mole¬ cules with a considerable degree of precision, as will presently be shown ; but we cannot hope to be able to determine the geometrical dimen¬ sions of molecules in more than a general way, untii we attain to a clearer understanding of the physical constitution of these bodies. It is conventional, at the present time, to under¬

stand, by the expression “diameter of a mole¬ cule® the diameter of the smallest sphere that can be imagined to be drawn around the mole¬ cule, consistently with the condition that noth¬ ing could collide with the molecule without penetrating this sphere. German writers have called this imaginary sphere the “Wirkungs-sphare,® and French writers call it the “sphere de choc® or “sphere de protection.® Clausius and Maxwell showed that the diameter, d, of this collision-sphere may be calculated, in gase¬ ous substances, by means of the expression

7T/zLV 2

}

where d is the diameter in centimeters, L is the mean free path in centimeters and n is the number of molecules present in each cubic cen¬ timeter. The application of this formula to

actual gases gives the following values of d (Perrin) :

Helium . 1.7x10 8 cm.

Argon . 2.8x10 _ 8 cm.

Mercury vapor . 2.9x10 8 cm.

Hydrogen . 2.7x10 8 cm.

Nitrogen . 2.8x10 _ 8 cm.

Chlorine . 4.1x10 8cm.

These values, although admittedly crude, are probably of the right general order of magni¬ tude. See below for determination of n.

Considerable progress has been made in the last few years in the way of determining the masses of molecules, and the number of mole¬ cules that exist in a given quantity of matter. Some of the methods that have been proposed depend more or less directly upon a knowledge of the way in which the kinetic energy of a molecular aggregation is divided or partitioned among the constituent molecules. Our present knowledge with regard to molecular kinetic energy rests on a fairly sound basis in the case of gases, but it is still largely (though not wholly) conjectural in connection with liquids and solids. To facilitate the statement of the facts indicated by the kinetic theory of gases, let us assume that in any given mass of gas there are three intersecting and mutually per¬ pendicular straight lines drawn in fixed posi¬ tions in space, and let us call these lines the axes of X, Y and Z, respectively. The X-axis, for example, may extend in a north-and-south direction and the Y-axis in an east-and-west direction. The Z-axis will then be vertical. The individual molecules will be moving

in every possible direction, and with the greatest imaginable variety of speeds, but we may simplify matters somewhat by conceiving the velocity of every one of them to be resolved into three components, each parallel to one of the three fixed axes we have drawn. Then, confining our attention for the moment to a gas containing molecules of only one kind, the kinetic theory tells us that one-third of the total kinetic energy that the molecules of the gas have, in virtue of their motions of translation, will be accounted for by the components that are parallel to each of the three fixed refer¬ ence axes. Furthermore, if each molecule (so far as concerns the applicability to it, as a whole, of the accepted laws of mechanics) is assumed to be a rigid, elastic body in rotation, and if the rotation of every such molecule is resolved into component rotations about axes

passing through the centre of gravity of the molecule, and drawn parallel to the fixed axes of X, Y and Z, respectively, a similar statement may be made with regard to the rotational energy. Namely, one-third of the total kinetic energy represented by the rotations of the molecules will be accounted for by the com¬ ponent rotations about the axes that are par¬ allel to the axis of X, and the remaining two-thirds will be accounted for by the component rotations about the axes that are parallel to the axes of Y and Z, respectively. Furthermore, the aggregate kinetic energy due to the translatory motion of the molecules in any one given direction is equal to the total kinetic energy due to the component rotations of the mole¬ cules about axes parallel to any one given di¬ rection. For the modifications to which this principle is subject when it is applied to mole¬ cules that have a number of degrees of freedom greater or less than six, reference should be made to Gases, Kinetic Theory of.

If the given gas contains molecules of sev¬ eral different kinds, then the kinetic theory teaches us (1) that the foregoing statements are true for each species of molecule, separately and independently of all the others; and (2) that the average kinetic energy of translation is identically the same in each of the several species of molecules that

may be present ; and furthermore, (3) that the average kinetic energy of translation, in any one set of mole¬ cules, is proportional to the absolute tempera¬ ture of the gas as a whole.

The foregoing conclusions are based upon the researches of numerous mathematicians and physicists, beginning with Maxwell ; but the principle of the equable partition of kinetic energy, as here described, was established, in its full generality, by Boltzmann, and is often called <(Boltzmann's H theorem.® (See, in addi¬ tion, Watson, (Kinetic Theory of GasesD. There has been considerable controversy as to the soundness of the proofs that have been given of it, yet the principle itself has been exceedingly fruitful, and it has played an im¬ portant part in the development of the molec¬ ular theory in general. The consensus of opinion among physicists appear, to be, in fact, that the Boltzmann theorem, whether the proofs of it that we have are sound or not, constitutes a good general approximation to the real facts — provided we can regard molecules as behav¬ ing, in their excursions and encounters, sub¬ stantially like solid and perfectly elastic bodies, which obey the same laws of mechanics that are followed by bodies large enough to be vis¬ ible — and provided, furthermore, the mole¬ cules are not thrown into a state of internal vibration by reason of the shocks that they experience upon encountering one another.

It should be carefully noted, however, that even if we admit that Boltzmann's law of the partition of kinetic energy holds true in the case of a gas, it by no means follows that it is applicable to liquids and solids. In fact, cer¬ tain of Boltzmann's fundamental assumptions are not fulfilled, even approximately, in liquids and solids ; and hence his reasoning will not apply to such bodies, even though the conclu¬ sions at which he arrived may possibly still hold true. At first thought it appears highly improbable that molecular motions in solids

and liquids will be found to conform with the principles stated above, except that for any given substance the kinetic energy due to the translatory motions parallel to the three fixed axes will probably be equally divided, as before — though it is not obvious that even this would be true, in general, in crystals. Nevertheless, there is indirect evidence that tends to show that a distribution of kinetic energy similar in a general way to that established by Boltzmann for gases prevails also in liquids and solids. The numerous useful analogies that have been observed between gases and dilute solutions are strongly suggestive of a close relation in ulti¬ mate molecular behavior

between liquids . and gases, and the law of Dulong and Petit is similarly suggestive in connection with the solid state.

In physical chemistry it is often convenient to deal with the so-called “gramme-molecule® (or “gramme-atom®), a gramme-molecule (or gramme-atom) of any element or compound being defined as that quantity of it that has a weight in grammes equal to the molecular weight (or atomic weight, as the case may be) of the element or compound under - consider¬ ation. The convenience of this unit depends mainly upon the fact that when we measure out any two definite chemical substances in quantities proportional to their respective mo¬ lecular weights, we know that each sample then contains the same number of molecules. The actual determination of this number is a sep¬ arate and special problem ; but even if it proved to be forever impossible to enumerate the mole¬ cules, we should nevertheless find it useful, for many purposes, to know that the number of them is the same in two given cases. Assuming the atomic weight of magnesium to be 24.32 and that of platinum to be 195.2, to obtain a gramme-atom of each we weigh out 24.32 grammes of magnesium and 195.2 of platinum. Then we know, at all events, that we have taken the same number of atoms in both cases (ex¬ cept for slight errors in weighing and in deter¬ mining the atomic weights). Now the specific heat of magnesium is 0.250 and that of plati¬ num is 0.032. Hence 24.32 X 0.250 — 6.08 calo¬ ries of heat will be required to raise the tem¬ perature of the gramme-atom of magnesium by one Centigrade degree. Similarly, 195.2 X 0.032 — 6.25 calories will be required to raise the temperature of the gramme-atom of platinum by the same amount. The point to be specially noted is that approximately the same amount of heat is required, per atom, to raise the tem¬ perature of either metal by one degree; and this appears to be the ultimate significance of the law of Dulong and Petit — which states that the product of the specific heat and atomic weight of a solid chemical element has an ap¬ proximately constant value. It is true that there are apparent exceptions to this rule, but it is often found that there is a marked tend¬ ency to conform to the law when the tempera¬ ture of the exceptional substance is raised. The law of Dulong and Petit has been the subject of many investigations, and it has been shown to be applicable to numerous compounds as well as to the elements. “This is the case even at the ordinary temperature,® says Perrin, “for the fluorides, chlorides, bromides, iodides and sulphides of various metals, but not for oxygen-MOLECULAR THEORY

ated compounds. A specimen of quartz weigh¬ ing 60 grammes, composed of one gramme-atom of silicon and two of oxygen (or three in all), absorbs only 10 calories per degree of rise of temperature. But above 400° C. this same fragment uniformly absorbs 18 calories per degree, or precisely 6 for each gramme-atom, which is substantially the same result as was obtained above, for magnesium and platinum at ordinary temperature.

The law of Duloug and Petit would be an immediate consequence, if we should assume (1) that the heat absorbed by the solid is all ex¬ pended in accelerating the motions of translation and rotation of the molecules, (2) that the mole¬ cules of solid bodies all have the same num¬ ber of degrees of freedom, (3) that the kinetic energy of translation of a molecule is the same (at any given temperature) whether the sub¬ stance in which it exists is gaseous or solid, and (4) that the Boltzmann law of the parti¬ tion of kinetic energy is fulfilled in solids. The first of these assumptions cannot be rigorously true either for solids or for liquids, and even in gases it is probably only closely approxi¬ mate. The second assumption is also unlikely to be true of solid bodies in general, though solids may possibly be divisible into a small number of classes, in such a way that all the members of any one class will conform to it. When every reasonable allowance has been made for recognized uncertainties and sources of inaccuracy, the evidence that still remains is sufficient to suggest, as intimated above, that something akin to the Boltzmann law for gases holds true even in solids. Moreover, by making the assumption that a law of this general nature holds true in liquids, investigations have led to experimental results in good general agreement with those obtained by wholly different and totally independent methods.

Among the interesting and important re¬ sults obtained by assuming that in liquids the kinetic energy of translation is distributed in accordance with the Boltzmann law those ob¬ tained by Perrin deserve conspicuous mention. (See Brownian Movement). Perrin experi¬ mented with emulsions of various kinds, in which extremely small solid particles were sus¬ pended in liquids of a lesser specific gravity — extraordinary care being taken to have the particles uniform in size and as nearly spheri¬ cal as possible. The most trustworthy re¬ sults were obtained with gamboge or mastic, the gum being dissolved in alcohol and then precipitated by pouring the alcoholic solution into a large volume of water. Uniformity in size was assured by a careful fractional centrifugalization of the precipitated particles, while suspended in distilled water — a kilogramme of the

original mastic furnishing, after several months, a fraction containing a few deci¬ grammes of spherules of acceptable size and uniformity. The size and density of these spherules were then determined by several dif¬ ferent methods, which gave concordant results. In the experiments that were considered by Perrin to be most reliable, the radii of the spherules were 0.367 of a micron — a micron being the thousandth part of a millimeter. As¬ suming that particles of this size, when sus¬ pended in a liquid, will comport themselves like molecules so far as the distribution of kinetic

energy is concerned, so that the average kinetic energy of translation of the gum particles will become equal, after a time, to the average kinetic energy of translation of the molecules of the liquid in which they are suspended, it is possible to obtain, from a study of the visible particles in an emulsion, definite information respecting the invisible molecules composing the liquid in which the emulsion is suspended. Perrin made use of no less than four different methods, in endeavoring, in this way, to ascer¬ tain the number of molecules in a gramme-molecule of matter, and he gives a general ac¬ count of all four in his book on atoms. Sur¬ prisingly concordant results were obtained. In his simplest method, the emulsion was allowed to stand until the suspended particles in it had attained a permanent state of distribution — a condition which could be verified by making a miscroscopic examination of the emulsion, from time to time, at certain selected points. When the final state was reached, the number of solid particles per cubic millimeter of the fluid mass was greatest at the bottom of the contain¬ ing vessel, and diminished in a regular manner with increasing height. A careful study was made, by means of the microscope, of the dis¬ tribution of the solid particles at different heights, and by assuming that this distribution is determined by the same laws that hold in connection with gaseous molecules, it was found to be possible to determine the number of molecules in a gramme-molecule of matter of any kind. The idea upon which this work was based is exceedingly ingenious, and consists, as will be seen, in assuming that by working with fine-grained emulsions, where we have positive and definite knowledge of the mass, size, number, motions and distribution of particles that approach molecules closely enough to be presumably governed by similar laws, we can draw accurate conclusions as to the mole¬ cules themselves. From his most trustworthy series of experiments, Perrin concluded that Avogadro's number (that is, the number of molecules in a gramme-molecule of matter) is 68.2 X 1022. If this number be accepted as cor¬ rect, it follows that the mass of hydrogen atom is 1.47 X 10~ 24 grammes,

from which we can easily obtain the mass of the atom or mole¬ cule of any other substance, the atomic or mole¬ cular weight of which is known.

Ingenious and important as Perrin's meth¬ ods and results are, it is probable that future physicists will value them mainly for the light that they throw upon molecular behavior rather than because they afford us a means of deter¬ mining Avogadro's number. In fact, we al¬ ready have another and probably superior de¬ termination of the number of Avogadro, made by a totally different method, and based upon assumptions fewer in number and more likely to be generally admitted. Millikan, in his ad¬ mirable and classic researches, found the value of the electron to be 4.774 X Iff-10 absolute electrostatic units; and as the Faraday con¬ stant (or quantity of electricity required to lib¬ erate one gramme-atom of a monovalent ele¬ ment by electrolysis) is known to be 9,650 absolute electromagnetic units (or 2,894 X 10" absolute electrostatic units), it follows that (2,894 X 1011) -F (4.774 X Iff-10) =60.62 X 1022 separate' and individual electrons are concerned

in the deposition of one gramme-atom of such an element. Hence we infer that 60.62 X 10 is the value of Avogadro's number. This ap¬ pears to be an unexceptional and exceedingly accurate method, provided we admit that one and only one electron is liberated or neutralized, for every atom of the monovalent element that is deposited, — an assumption which approaches closely to certainty, and which is far more likely to be true than are some of the assumptions that underlie other methods of determining Avogadro's number. Accepting Millikan s value of this number, it is easy to show that the mass of a hydrogen atom is 1.662 X 1CM grammes, and that the number of molecules in one cubic centimeter of gas at 0°C. and 760 millimeters pressure, is 27,050,000,000,000,000,- 000. Millikan believes the probable error of his determination of the electron is only about the thousandth part of the concluded value as stated above, and if that estimate is justifiable, the values given above for Avogadro's

number, for the mass of the hydrogen atom, and for the number of molecules in a cubic centimeter of gas, may be considered to be correct to the same degree of relative certainty, — that is, each may be considered subject to a probable error of the thousandth part of its own value.

Our knowledge of the constitution of the molecule, although still meagre, has been ex¬ traordinarily advanced in the last few years. In the earlier scientific treatment of the molecular theory, atoms and molecules were assumed to be hard, smooth, spherical and perfectly elas¬ tic. It is doubtful if any competent physicist really believed them to have these characteris¬ tics, but the difficulties involved in the mathe¬ matical treatment of the molecular theory were considered to be insuperable unless as¬ sumptions of the kind here indicated were made. It should be understood, however, that even although the actual molecules or atoms, if we could examine them individually and closely, might not resemble, in the least degree, the description of them thus given, yet they might behave collectively in much the same way as the spherical particles to which the mathematician found it necessary to confine his first investigations. Moreover, certain characteristics of the molecule may sometimes be accounted for by means of one set of as¬ sumptions, while certain other characteristics are best explained by the aid of an entirely different set. It is, therefore, wise to con¬ sider all the different constitutions that sug¬ gest themselves, in order to see what particu¬ lar phenomena each one harmonizes with ; for by doing this we may perhaps be aided in our approach to the final solution of the problem.

Rankine, following certain suggestions of Sir Humphrey Davy, developed a theory of molecular structure which he called the (<hypothesis of molecular vortices^ and which as¬ sumed that each fundamental atom consists of a nucleus or central point surrounded by an elastic atmosphere which is retained in posi¬ tion by attractive forces. He ascribed the elasticity of vapors to the centrifugal force de¬ veloped in these atmospheres, which he as¬ sumed to be in a state of rapid revolution or oscillation about their central nuclei, and he believed that light is propagated through mat¬ ter by means of the vibration of the central

atomic nuclei, which were assumed to exert attractive or repulsive forces upon one an¬ other. (To account for the propagation of light through free space he assumed a certain special constitution for the ether, with which we are not at present concerned). From this

hypothesis of molecular vortices Rankine de¬ duced a number of the known properties of bodies, being specially successful in connection with the pressure of saturated vapors ; but sub¬ sequent mathematicians and physicists did not find the hypothesis attractive or promising and his theory still remains in the condition in which he left it, although it may yet be found to be a sort of crude forerunner of the modern corpuscular theory of molecular constitution.

Lord Kelvin made the interesting sugges¬ tion that atoms are merely definite portions of the ether of space, distinguished from the re¬ mainder of the ether by being endowed with a peculiar kind of motion called “vortex mo¬ tion? The smoke rings that are sometimes seen over the stacks of locomotives afford familiar examples of vortex motion and the cyclone is another example on a grand scale. According to the principles of hydrodynamics it appears that a vortex ring, once set in motion in a frictionless fluid, would be in¬ destructible and eternal. Moreover, it would possess certain elastic properties Mat are of special interest, inasmuch as perfect elasticity is one of the postulates that physicists have demanded for the atom or molecule from the very earliest times. It will be observed that the vortex theory of Kelvin does away with matter as distinct from the ether of space — the atom or molecule being distinguished from the remaining portion of the ether merely by reason of the special kind of motion with which it is endowed. Interesting as Kelvin’s vortex theory is, it presents numerous diffi¬ culties that are almost insuperable as soon as we endeavor to develop it sufficiently to make it harmonize with the vast range of physical and chemical facts that we now possess.

Dr. C. V. Burton suggested, some years ago, that the atom may be simply a region in which the ether is subject to a permanent strain of some kind. This hypothesis may be capable of considerable further development, but it does not appear to harmonize with the direc¬ tion in which present thought is tending. Dr. Burton’s conception has the apparently unique merit of making it possible even to explain the origin of matter; for if the ether had long ago possessed motion of the most general kind, we might imagine its present condition to be due to the degeneration of that motion into a fine-grained turbulence, and if the con¬ stitution of the ether is such that strain-figures of the sort imagined by Burton are possible in it, then atoms may have resulted from time to time whenever the ether chanced to become stressed, locally, to such an extent as to take what would correspond in the world of fa¬ miliar experience to a permanent set. In the vortex theory of Kelvin, an atom always con¬ sists of the same portion of ether, but in Burton’s ether-strain theory it is only the strain that is

propagated through the ether when the atom moves, the ether itself re¬ maining motionless.

At the present time physicists strongly

favor the electrical theory of the constitution oi matter. According to this view, an atom is a system composed largely or perhaps wholly of discrete charges of electricity, which main¬ tain their individuality throughout all the changes that the atom undergoes. Much more is known about the negative charges than about the positive ones, because negative charges can easily be detached from atoms and molecules and subjected to study. The little charges or masses of electricity with-which we are con¬ cerned in the investigation of molecular struct¬ ure are commonly called “electrons,® but some of the best modern authorities (following the original suggestion of J. J. Thomson) prefer to speak of them as “corpuscles® when con¬ sidering them as physical bodies and to use the word “electron® as the name of a unit of electricity — the quantity of electricity, namely, that each corpuscle bears Or of which it perhaps wholly consists. (See Electron).

According to present views, all negative cor¬ puscles are precisely alike, no matter from what source they come. The same is be¬ lieved to be true of all positive corpuscles; but the positive corpuscle is believed to be differ¬ ently constituted from the negative corpuscle — notably in respect to size and mass. There is also a marked tendency toward the belief that molecules contain nothing else in addition to these positive and negative corpuscles. If this conception be correct, we are to think of mat¬ ter as being composed solely of electric cor¬ puscles, the differences between the chemical elements being merely architectural — one differing from another only in the number and arrangement of the corpuscles of which the atoms consist.

We do not know the precise way in which the atom is put together, but certain funda¬ mental facts in relation to its structure are becoming reasonably clear. In the early days of the electrical theory,

Lord Kelvin sug¬ gested that the atom might consist of a spheri¬ cal charge or mass of positive electricity of considerable magnitude, with many negative corpuscles oscillating or revolving within it. Jf the positive charge were distributed uni¬ formly through the sphere, it would be easy to imagine a state of things in which the oscil¬ lations or revolutions of the negative corpuscles would be performed in certain definite periods and we might thereby hope to account for spec¬ tral lines that highly-heated substances show under suitable conditions. Later investigations have indicated, however, that this conception of the atom is hardly tenable. For example, it is now considered to be quite certain that the positive electricity in the atom is limited to an exceedingly small bulk, instead of occupying a considerable part of the total volume.

It is not possible to review all the theories of molecular structure that have been proposed and considered, nor would it be desirable to do so, because many of them that were regarded with considerable favor only a few years ago have now been definitely discarded on account of their demonstrated inadequacy. Something must be said, however, of the views that are at present in favor and which have been tested well enough to indicate that they are probably steps in the right direction.

It has long been known that the apparent mass of a body is larger when the body is VOL 19 — 21

electrically charged than it is when there is no such charge present. The difference is too small to be observed in bodies of ordinary size, but the theory of electricity indicates that if the charge is concentrated in an exceedingly small volume, the apparent mass due to electri¬ fication may become very significant and im¬ portant. Physicists now incline strongly to the view, in fact, that there is no such thing as “real mass® in the old sense of this expres¬ sion, but that the mass of a body is due exclu¬ sively to the presence, within the molecules of the body, of the highly-concentrated electric charges that constitute the corpuscles of which these molescules are composed. (For discussion of electrical mass, see Electron Theory). The mass of a stationary or slowly-moving negative corpuscle has been shown to be equal to the one thousand eight hundred and forty-fifth part of the mass of a hydrogen atom. It was thought probable, a few years ago, that we should, therefore, have to assume that the hydrogen atom contains 1,845 of these corpuscles, if we are to explain its mass on the electrical basis. It is now believed, how¬ ever, that the greater part of

the mass of the atom is resident in the positive corpuscles that it contains, and if this be true it is no longer necessary to assume that the atom has the highly complicated structure that would be implied by the presence within it, in some form of stable arrangement, of nearly 2,000 negative corpuscles, even in the simplest case.

It appears probable, at the present time, that an atom consists of a certain number of centrally-located positive electrons, perhaps as¬ sociated with an unknown number of negative corpuscles and certainly surrounded by other negative corpuscles which are in a state of rapid motion and which are related to the cen¬ tral nucleus in some such way as the planets of the solar system are related to the sun. Rutherford showed that the number of free positive electrons in a gold atom can be de¬ termined by observing the deflection experi¬ enced by alpha-particles (see Radioactivity) when these particles are passed through gold-foil of known thickness. The experiment was performed in Rutherford's laboratory (Philo¬ sophical, Magazine, 1913, p. 604) and was re¬ peated with foils composed of a number of other metals also, and it was found that, for the metals that were used, the number of free positive electrons in one atom was in each case approximately equal to half the atomic weight of the metal. This result harmonizes with the conclusions reached by Barkla from experi¬ ments of a wholly different kind; and Moseley, by his wonderful researches on the wave-lengths of X-rays, proved, beyond apparent question, that the number of free positive electrons in the nucleus of an atom is equal to the "atomic number® of the element to which the atom be¬ longs — that is, to the number that the element bears when all the elements are arranged in accordance with the so-called periodic law. The results obtained by the methods of Ruther¬ ford and Barkla are only rough and approxi¬ mate; but they substantiate Moseley's conclu¬ sions and as Moseley's results are absolutely definite and extraordinarily well founded, we may conclude that we now know, without much doubt, just how many free positive electrons the nucleus of every atom contains. The hydrogen

r

atom for example, contains 1; carbon atom, 6; chlorine atom, 17; iron atom, 26; gold atom, 79, and uranium, 92. We do not known how these central positive corpuscles are held to¬ gether, but we infer that when an atom has no free electric charge, it contains, distributed through its outer regions, freely-moving nega¬ tive corpuscles equal in number to the free positive electrons in the nucleus.

If these views be sound, then it follows that no very considerable part of the mass of the atom can be accounted for by the mass of the outer negative corpuscles, because they are too few in number. If, therefore, we ad¬ here to the view that mass is wholly electrical, it is highly probable that the mass of the atom resides mainly in the central positive corpuscles of the nucleus. As we now know the number of these, we may obtain a general estimate of their size (in accordance with the principles explained under Electron), in order that they may have the required mass. It is found, in this w'ay, that the diameter of the positive cor¬ puscle is only about one two-thousandth of the diameter of the negative corpuscle, and as the diameter of the negative corpuscle is only about the fifty-thousandth of that of the atom, it is evident that the positive corpuscle is minute beyond conception. If an atom were magnified up to the size of the earth, the nega¬ tive corpuscle would have a diameter of about 850 feet and the positive corpuscle would have a diameter of only about five inches.

It will be evident, from the data here given, that an atom is far from being a solid, im¬ penetrable body. It is more like the solar sys¬ tem in constitution — its bulk being mainly oc¬ cupied by space, in which a few small cor¬ puscles are circulating. This requires us to revise our old conception of the collision of atoms and molecules. They cannot often come together in actual physical contact, because the forces of attraction and repulsion that the com¬ ponent corpuscles exert are exceedingly great, and atoms or molecules, as they approach con¬ tact, must, therefore, be repelled apart with great violence by the mutual actions of their exterior negatively-electrified corpuscles ; though it has not yet been made entirely clear how this tendency can be consistent with the facts of chemical combination. A particle possessing sufficient kinetic energy could penetrate an atom and pass through it without sensible perturba¬ tion, unless it happened to strike the small cen¬ tral nucleus ; and we have photographic, proof that the heavy, alpha-particles with which we have to deal in the study of radioactivity can pass through no less than half a million

atoms in succession, before being stopped or sensibly deflected.

The electrical theory of the constitution of matter is still confronted by certain serious fundamental difficulties, notwithstanding its numerous successes. One of the most formi¬ dable of these difficulties is concerned with radiation. Electrical theory indicates, for ex¬ ample, that an electron must radiate, energy whenever its motion is changed, either in speed or in direction. An electron revolving with uniform speed in a circular orbit would, there¬ fore, radiate energy continuously. Unless we are prepared to abandon the principle of the conservation of energy or can show that atoms are continuously supplied with energy from

some external source, it is hard to escape from the conclusion that atoms are all “running down.® In some cases, indeed, we have evi¬ dence that this is true. The radioactive ele¬ ments, for example, are undergoing gradual spontaneous decomposition, but that is appa¬ rently due to the fact that the particular ar¬ rangements of electrons that prevail in their atoms are not altogether stable. It is no part of our present problem to consider whether this indicates that after a time the radioactive elements will disappear forever, or whether there is some unrecognized agency at work, renewing them, so that the supply will be maintained substantially as at present. It is important for us to note, however, that most of the matter with which we com¬ monly have to deal is composed of elements that show radioactivity either very slightly or not at all ; and hence we must recog¬ nize that the atoms of what may be called the “commonplaceˆ elements are apparently stable, except as they are modified within certain limits by electrification, chemical combination or some other external influence.

In view of the difficulty just suggested, it has been assumed, by some of the leading physicists of the past few years, that the de¬ duction that has been drawn from the theory of electricity, to the effect that an electron must radiate energy in consequence of a mere change in the direction of its motion, is (for some unknown reason) unsound and that radia¬ tion occurs only when the speed of the electron changes. A certain amount of indirect evi¬ dence in favor of this view is afforded by the phenomenon of permanent magnetism, which is not necessarily attended by the radiation of energy, although it is convenient to consider the magnetization to be due to the orientation of the orbits of some (or all) of the outer negative corpuscles in the atoms of the magnet. Apparently we here have a case in which the corpuscular

revolutions continue indefinitely, without loss of energy by radiation.

Bohr has had marked success in accounting for radiation phenomena by assuming (1) there is no radiation from a corpuscle that is moving with uniform speed, even when the path it follows is curved; (2) that although the negative corpuscles in the outer parts of an atom normally revolve in circular orbits sug¬ gestive of those followed by the planets in the solar system, yet they may (and do) pass some¬ what abruptly from one of these orbits to an¬ other; (3) that radiation from a corpuscle takes place only while the corpuscle is making a change of this kind in its orbit; and (4) that the possible stable orbits are not infinite in number, but that each stable orbit is char¬ acterized by the possession, by the corpuscle following it, of a quantity of kinetic energy expressed by p2 Ihn, where I is any integer, h is Planck's constant (see Radiation) and n is the number of orbital revolutions that the corpuscle makes per second. By means of his theory, Bohr is enabled to account for all the spectral lines of hydrogen with a wonder¬ ful degree of precision. The same high degree of precision is not obtained when the theory is applied to other elements, though the agree¬ ment is still close enough to be strongly sug¬ gestive. In fairness to Bohr's theory we should remember that it was originally proposed in

connection with the simple case in which the atom consists of a single negative corpuscle, revolving about a single free positive nucleus. That may very likely be the actual constitu¬ tion of the hydrogen atom, and hence we should expect the most accurate correspondence with the facts in that case. When the atom contains a larger number of free positive and negative electrons, the fields of force that they produce will naturally overlap to a large extent and it is possible that some portion of the inaccuracy of the Bohr theory, when applied to elements other than hydrogen, may be due to this cause.

See also Atomic Theory; Brownian Move¬ ment; Electron Theory or Corpuscular The¬ ory; Gases, Kinetic Theory of; Radiation; Radioactivity; X-rays; Zeeman Effect. For a general popular review of the older form of the molecular theory, consult Risteen, (Mole¬ cules and the Molecular Theory of Matter.' For the beginnings of the electrical views, con¬ sult also Thomson, J. J., 'Electricity and Mat¬ tel ; for later developments Comstock and Troland, 'The Nature of Matter and Electricity) ; Perrin, 'Les Atomes> (now also avail¬ able in an English translation) ; Millikan, 'The Electron) ; Stewart, A. W., 'Recent Advances in Physical and Inorganic Chemistry.'

A. D. Risteen, Ph D.

Director of Technical Research, The Traveler's Insurance Company, Hartford, Conn.

MOLESKIN, a fabric so called from its being soft like the skin of a mole. It is a strong twilled cotton fabric, cropped or shorn before dyeing. In the United States the word is also applied to the padded breeches worn by football players.

MOLESWORTH, molz'werth, Sir Guil¬ ford Lindsey, English civil engineer : b. Mil-brook, Hampshire, 3 May 1828. He studied at King's School, Canterbury, and at the Putney College of Civil Engineers; was apprentice to the chief engineer of the London and North¬ western Railway; was employed at Woolwich Arsenal during the Crimean War; went to Ceylon 1859, becoming director-general of rail¬ ways there in 1867, and in 1871 was appointed consulting engineer to the government of India. He received decorations for his services in the Afghan and Burma wars and retired in 1889. He was president of the Institute of Civil En¬ gineers 1904. He wrote a standard 'Pocket-Book of Engineering Formulae,' various other works on technical subjects, (Imperialism in India' (1885) ; (Reason and Instinct in Ants1* (1886); a prize essay, 'Silver and Gold' (1891); (Our Empire under Protection and Free Trade' ; 'Economic and Fiscal Facts and Fallacies' (1909).

MOLESWORTH, Mary Louisa Stewart,

English writer: b. Holland, 1842; d. 21 July 1921. In 1861 she was married to Major Moles¬ worth of the Royal Dragoons. Her earlier writings were novels under the pen-name "Ennis Graham" ; she wrote her first children's stories about 1875 and gained an immediate suc¬ cess Her most famous titles are 'Carrots' (1876)- 'The Green Casket'

(1890); ‘Meg Langholme’ (1897)’; ˆThe Laurel Walk’ (1898) ; ‘The Grim House’ (1899) ; ‘This and That’ ; (The House that Grew’ and ‘Peter-kin ’ Among her later novels are ‘Hather-

court Rectory’ ; ‘The Red Grange’ and ‘Fairies Afield.’

MOLESWORTH, Sir William, English politician: b. London, England, 23 May 1810; d. there, 22 Oct. 1855. In 1823 he succeeded as 8th baronet; studied at Edinburgh and Cam¬ bridge, but was obliged to leave the latter be¬ cause of his having challenged a tutor to a duel, and completed his education in Germany. He was a member of Parliament for East Corn¬ wall 1832-37, for Leeds 1837-41 and for South¬ wark from 1845 till his death. In 1853 he be¬ came first commissioner of public works under the Earl of Aberdeen, and in 1855 was colonial secretary under Palmerston. The close friend of Bentham and James Mill, he was looked upon as the parliamentary exponent of the “philosophical Radicals.” He founded the Lon¬ don Review in 1835 and the next year merged it in the Westminster Review. Consult Faw¬ cett, M. G., ‘Life of Sir William Molesworth’ (London 1901).

MOLFETTA, mol-fet’ta, Italy, a seaport city in the province of Bari, on the Adriatic, 15 miles northwest of the city of Bari. It has a magnificent Romanesque cathedral of the 12th century; several other churches; a college; man¬ ufactures of linen and saltpetre ; a harbor, well-sheltered except on the north, and a consider¬ able trade in corn, oil and fruit. Pop. 43,263.

MOLIERE, mo-le-ar (assumed name of Jean Baptiste Pocquelin, zhon ba-test pok-e- lan), French dramatist: b. Paris, 15 Jan. 1622; d. there, 17 Feb. 1673. His father was valet de chambre and upholsterer to the king. When his father had become debilitated he had to dis¬ charge his office about the person of Louis XIII. In 1641 he accompanied the king to Narbonne. The French theatre had at that time begun to flourish through the talents of the great Corneille, and young Pocquelin, who had imbibed a strong passion for the stage, now formed a company of young persons of similar tastes, exchanged his family name for that of Moliere, and resigned the office of his father. His company soon became distinguished; and we find him at the head of a strolling troop, which acted ‘L’Etourdi’ at Lyons probably in 1653. This is the first comedy written in verse by Moliere. The truth of the dialogue, the in¬ exhaustible skill of a valet continually employed in rectifying the blunders of his master, the in¬ terest of the situations

arising therefrom, have kept this piece on the stage notwithstanding the want of connection between the parts. Moliere gained equal applause as a poet and an actor, and drew all the spectators from another com¬ pany at Lyons. The art of representing charac¬ ter and manners on the comic stage was re¬ served for Moliere. 'L'Etourdi' was acted with equal applause in Beziers. Here the Prince of Conti, who had known Moliere at school, had just assembled the estates of Lan¬ guedoc. He received the poet as a friend, and entrusted him with the charge of amusing the town and the assembly. 'Le depit amoureux' (1656) and 'Les precieuses ridicules' (1659) were brought forward in the theatre of Beziers. In 'Le depit amoureux' the incidents are better arranged than in 'L'Etourdi.' In the actions of the personages a genuine comic vein is exhibited, and their language displays much spirit and humor; but the plot is too com-324

plicated, and the denouement not sufficiently probable. The plot in the (Precieuses ridicules> is more simple. A delicate satire on the pre¬ vailing affectation of the character of bel esprit and of a romantic style, on the pedantry of learned females, and affectation in language, thoughts and dress, is the object of this com¬ edy. It produced a general reform after it was brought out in Paris. The spectators laughed, recognized themselves, and applauded. Louis XIV, well pleased with the performances of Moliere's company, made it his own company, and gave its director a pension of 1,000 livres. (Sganarelle> appeared in 1660. This piece also contains a fund of sportive humor, and keeps the spectators continually amused. Censure was not silent on its appearance, but was not listened to. (Don Garde de Navarre* (1661), in imitation of the Spanish, was criticized with more justice. It is a cold attempt at a more elevated style. (L'Ecole des maris* (1661) the idea of which is drawn from the (Adelphi* of Terence, contains a simple and entertaining plot and a natural denouement. The theatre still resounded with the applause with which this piece was received, when (Les facheux* (1661), projected, executed and committed to memory by the actors within a fortnight, was performed at Vaux at the residence of Fouquet, intendant of finances, in the presence of the king and court. This comedy is almost desti¬ tute of plot, but the intention was to interest the spectators by the multiplicity of characters, the truth of the portraits, and by the elegance of the language. It is said that the king, on going away from

the first performance, hap¬ pening to see the Count Soyecourt, a tiresome narrator of his exploits in the chase, said to Moliere, <(There is an original that you have not copied.® In 24 hours the scene of the hun¬ ter was inserted; and as Moliere was not ac¬ quainted with the terms of the chase, he re¬ quested Soyecourt himself to explain them to him. (L'Ecole des femmes* (1662) met with critics, who, overlooking the art which prevails in the management of the inferior personages, and in the natural and quick transition from one surprise to another, animadverted upon some negligences of style. Moliere , answered them by his spirited (Critique de l'ecole des femmes* (1663). The Hmprompu de Ver¬ sailles* was a reprisal occasioned by an at¬ tack of Boursault, who had written a piece against him, entitled (Le portrait du peintre.* The court was much pleased in 1664 with (La princesse d'elide,* a comic ballet, prepared for an entertainment given by the king. Another ballet, (Le mariage force,* is drawn from Rabelais. (Don Juan* (1664), excited much reprehension by the impiety of some of the ex¬ pressions placed in the mouth of the profligate hero. Moliere retrenched the objectionable parts in the second representation. (L' Amour medecin* (1665) is one of the over-hasty works which are not to be strictly criticized. It was written, studied and represented within five days. In this Moliere for the first time attacks the physicians. His great piece, (Le misan¬ thrope* (1666), was but moderately well re¬ ceived at first, but in the sequel was justly con¬ sidered as one of the finest productions of mod¬ ern comedy. It has been more admired in the closet than it has pleased on the stage — the reason Voltaire believes to be because the plot

is delicate and ingenious rather than lively and interesting; because the dialogue, with all its beauty, does not always seem necessary and therefore retards the action; and because the denouement, though skilfully introduced, leaves the spectator unexcited. In 1665 appeared (Le medecin malgre lui,* a farce full of humor. <Le Sicilien* (1667) is a short piece which pleases by its grace and gallantry. But his rep¬ utation was carried to its highest summit when <Le Tartufe* appeared. Three acts of the comedy had been performed in May 1664 be¬ fore the king; but its pointed wit gave great offense to all the ecclesiastical authorities, and it was not until 1669 that permission was given for adequate unexpurgated representation. In this hypocrisy is fully unveiled, the characters are equally various and true, the dialogue is elegant and natural, the denouement alone is unsatisfactory. An impious and obscene farce, entitled (Scaramouche,* having been repre¬ sented at court, the king said to the great Conde,

as he was leaving the theatre in his com¬ pany, <(I should like to know why the people, who are so much scandalized at Moliere, say nothing about (Scaramouche. * <(The reason is,** replied the prince, <(that (Scaramouche* ridi¬ cules only God and religion, about which these people care nothing, while Moliere's piece ridi¬ cules themselves.® In 1668 Moliere published his (Amphitryon,® a free imitation of Plautus. With the exception of a tedious scene between Jupiter and Alcmena, nothing can be more humorous. (L'Avare* (the Miser), an imita¬ tion of the (Aulularia* of Plautus, is, in the leading character, a little overdone ; but the multitude is only to be struck by strong traits. (George Dandin* ; (Monsieur de Pourceaug-nac* ; (Les Fourberies de Scapin,* are rather amusing than instructive. ˚Le Bourgeois Gen-tilhomme,* though mixed with some buffoon¬ eries, is full of power. Moliere bestowed more care on his (Femmes Savantes,* a witty satire on affected taste and pedantic learning, which at that time prevailed in the Hotel de Rambouillet. The incidents are not all well connected; but the subject, dry as it may be in itself, is exhibited in a truly comic form. The development is admirable, and has been a hundred times imitated. The same is true of the (Malade imaginaire,* in which the quackery and pedantry of the physicians of the times are fully delineated. With this piece the author concluded his career. He was indisposed when it was performed, and the exertion with which he played produced convulsions, followed by a hemorrhage, and he died after the lapse of a few hours. The archbishop of Paris at first refused him burial ; but the king himself in¬ sisted on it, and he was interred in the ceme¬ tery behind the chapel of Saint Joseph, Rue Montmartre. In 1792 his remains were trans¬ ferred to the Museum of French Monuments, whence in 1817 they were removed to Pere Lachaise.

Moliere is the true father of French comedy. His works may be considered as a history of the manners, fashions and tastes of his times, and as the most faithful pictures of human life. Born with an observing mind, skilful in catch¬ ing the outward marks of the passions and emo¬ tions, he took men as thev were, and. with singular felicity, exhibited the most sacred re¬ cesses of their hearts, and the tone, the action

MOLINA

MOLINE

and the language of their various feelings. Of all who have ever written, Moliere is the one who has best observed men without seeming to do so. His knowledge of human character seems to have come by intuition. In his do¬ mestic relations Moliere was not fully happy; he who made merry on the stage with the weak¬ nesses of other men could not guard against his own weakness. A violent passion induced him to marry the daughter of the actress Bejart, and he thereby incurred the ridicule he had so often cast on husbands of a disproportioned age. As an actor Moliere was not to be sur¬ passed in high comic parts, such as Arnolphe, Orgon, Harpagon, *etc.* An edition of Moliere published at Paris in 1838 gave the actors' names after the dramatis persona, from which we learn that Moliere always played the prin¬ cipal comic parts himself. Among the last and best editions are those of Monval (8 vols. 1882) ; A. France (7 vols., 1876-91) ; and Des-fois and Mesnard (11 vols., 1873-93). See Don Juan; Learned Ladies, The; Misan¬ thrope, The; Tartuffe. Consult biographies by Baluffe (1886) ; Chatfield-Taylor (1906) ; Desfeuilles (1900) ; Larramouet (1886) ; Lo-theissen (1880) ; Mahrenholtz (1881) ; Brander Matthews (1910) ; Mesnard (1889) ;• Moland (1886); Regal (1910); Schneegans (1901); Trollope (1905); Wolff (1910); also 'La¬ croix, 'Bibliographic Molieresque* (1875) ; Loiseleur, 'Points obscurs de la Vie de la Moliere* (1877) ; Livet, 'Lexique de la Langue de Moliere (1895-97); Miles, 'Influence of Moliere in the Restoration Comedy * (1910).

MOLINA, mo-le'na, Alonso de, Spanish missionary: b. Escalona (Toledo), Spain, about 1510; d. Mexico, 1584. He accompanied his parents to San Domingo, and in 1523 went to Mexico, where he learned the Aztec language and acted as interpreter to the Franciscan monks, whose order he subsequently joined and engaged in missionary work, in which he was very successful. He was superior of the province of Santo Evangelio, and his books are among the earliest printed in America. Among them are 'Diccionario de la lengua Castellana y Mexicana) (1555) ; 'Arte de la lengua Mexicana) (1578) ; and several works in the Aztec language.

MOLINA, Juan Ignacio, Chilean naturalist and historian : b. province of Talca, Chile, 24 June 1737; d. Bologna, Italy, 12 Sept. 1829. He was educated in the Jesuit College at Santi¬ ago, and entering the order

after its expulsion from America in 1767, settled in Italy. After 1774 he lived at Bologna, teaching and writing. He published ‘Compendium of Chilean History) (1776) ; ‘Essay on Chilean Natural His¬ tory * (1782) ; ‘Essay on Chilean Civil History > 0787), the last-named being translated into several languages, including English, *etc.*

MOLINA, Luis, Spanish Jesuit: b. Cuenca, New Castile, 1535; d. Madrid, 12 Oct. 1600. He entered the Jesuit Order (1553), was ap¬ pointed (1570) teacher of theology at Evora, but turned to literary work (1590) and died soon after being called to the chair of moral theology at Madrid. His most important work is ‘Liberi arbitrii cum gratiae donis,# etc., con-cordia) (Lisbon 1588), which made him famous and created a great controversy; the Domini¬

cans contested’ his views as antithomistic, but many Jesuits (Molinisten) defended him with the consequence that a quarrel ensued that ended in the Jansenist dispute. Consult Schnee-mann, ‘Die Entstehung der thomistische molin-istischen Kontroverse) (Freiburg 1879-80) ; Kegnon, Th. de, ‘Bannesianisme et Molinisme) (Paris 1890) ; Gayraud, ‘Thomisme et Molinisme) (Toulouse 1890-92).

MOLINA, Olegario, Mexican statesman : b. Bolonchenticul, Campeche, 1843. He was educated in the Seminary of San Ildcfonso, Merida, where he subsequently became a pro¬ fessor. Later he founded in Merida a school of primary and secondary instruction, and still later a benevolent society known as “The Youths During this period he established and conducted two journals, La Guirnalda and Yucatan ; was elected to the Merida city coun¬ cil and later served one term in the national Congress. Returning to Yucatan he served as fiscal magistrate of the superior court of the state till in 1877 he took charge of the con¬ struction of the first railway in Yucatan, — the line which connects the cities of Merida and Progreso, — completing it in two years not¬ withstanding most discouraging conditions, and afterward and until 1881 operating it as man¬ ager. In the latter year he organized the present commission and banking house of O. Molina and Company. In 1902 he was elected governor of his state for the four years ending 1906, when he was reelected. Owing to ill health he retired from the governorship at the end of the first year of his second term. In March 1907 he was appointed by President Diaz to the Cabinet position of Secretary of Fomento, colonization and industry. During his five years’ service as governor Mr. Molina introduced and successfully carried through many important public improvements and: re¬ forms in the several departments of govern¬ ment, greatly

advanced the cause of education, stamped out yellow fever at Merida and built a fine general hospital and an asylum for the insane.

MOLINA, Tirso de. See Tellez, Gabriel.

MOLINARI, mo-le-na-re, Gustave de, Bel¬ gian political economist : b. Liege, Belgium, 3 March 1819; d. 1911. He studied medicine and became a homoeopathic physician in Brussels, but upon removing to Paris he entered jour¬ nalism. His reputation as a radical compelled him to return to Belgium upon the accession of Napoleon III and he was appointed to the chair of political economy in the Musee Royal d'Industrie Beige. In 1881 he returned to Paris and edited the Journal des Economistes and later founded the journals UEconomiste Beige and La Bourse du Travail. Among his books are 'Etudes economiques* (1846) ; 'Cours d'Economie politique) (1861) ; 'L'Evolution economique* (1880) ; 'Comment se resoudra la question sociale* (1896), *etc.*

MOLINE, mo-len', Ill., city in Rock Island County, on the Mississippi River, and on the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy and the Chicago, Mil¬ waukee and Saint Paul railroads, adjoining Rock Island on the west, nearly opposite Dav¬ enport, Iowa, about 181 miles west of Chi-

cago. In the part of the river between Moline and Davenport is an island from which to the shore have been built dams to secure water¬ power. Moline has good water-power which is utilized in developing the manufacturing indus¬ tries. The extensive coal fields in the near vicinity contribute to the industrial develop¬ ment of the city, lhe chief manufactures aie wagons, carriages, automobiles, tractors, furni¬ ture, agricultural machinery, steel, foundry and machine-shop products, steam engines, saw-and planing-mill products, pumps, paper, flour and dairy products. Some of the prominent build¬ ings are a library building, which cost (1903) $50,000, a city hospital, several fine church and school buildings. The city library was founded in 1892 and contains over 16,000 volumes. There is a good library

connected with the high school. The city owns and operates the waterworks. Pop. (1920) 30,709.

MOLINO DEL REY, mo-le'no del ra, Battle of, in the Mexican War (q.v.). Having captured Vera Cruz (q.v.) in March, Gen. Winfield Scott (q.v.) continued on toward his objective point — Mexico City and on the way fought and defeated the Mexicans in the battles of Cerro Gordo, Contreras and Churu-busco (qq.v.). In order not to hinder the peace negotiations then under way, Scott, on 24 Aug. 1847, arranged an armistice with the Mexican general, Antonio Lopez de Santa Anna (q.v.) but Scott soon learned that, in spite of his pledge to the contrary, Santa Anna was strengthening his fortifications, casting cannon from old church bells, and in other ways pre¬ paring for a resumption of hostilities. On 6 September Scott ordered such activities to cease on pain of suspending the armistice and proceeding with his attacks. The next day Santa Anna replied accepting the latter alterna¬ tive whereupon, on the night of the 7th, Scctt drew up his troops preparatory to storming the Mexican works. Scott's troops were di¬ vided as follows: those under Gen. John A. Quitman (q.v.) at San Augustin; those under Gen. David E. Twiggs (q.v.) at San Angel; those under Gen. Gideon J. Pillow (q.v.) at Mexico, and those under Gen. William J. Worth (q.v) at Tacubaya, where Scott himself had his headquarters. A mile or so away was a cluster of stone buildings known as El Molino del Rey, which had been used a foundry and which formed the west end of an enclosure surrounding the hill and castle of Chapultepec. A short distance west of Molino was La Casa Mata, a strong stone building defended by an earthwork, between the two lying Mexican bat¬ teries and infantry; west of Casa Mata was the Hacienda de los Morales, where another body of Mexicans was lodged. At about 4 o'clock on the morning of 8 September Worth's division began the assault on the Mexican cen¬ tre and left. The artillery thundered against the walls of Molino del Rey and the advanced batteries which, despite a desperate rally of the Mexicans, were captured; and the Mexicans on the left were driven from their position under the protecting guns of Chapultepec. The Casa Mata proved to be a stumbling block, since being surrounded with bastioned intrenchments and deep ditches, it afforded excellent protec¬ tion against an assaulting column. The first American assault was repulsed, but after the

Molino had been captured, all the American guns were brought to bear on Casa Mata. As the garrison was cut off from all support and exposed to a most destructive fire, the place was evacuated; two

attempts were made to re¬ cover the lost position but nothing could face the terrific artillery fire of the Americans, so that by 9 o'clock in the morning the battle was over. The Casa Mata was then blown up and the troops were marched to Tacubaya to prepare for the final assault on Chapultepec (q.v.). The Americans engaged numbered less than 3,500 of whom 787 were killed or wounded; the Mexicans numbered at least 10,- 000 and lost 3,000 dead, wounded and prisoners, among the dead being two generals. Consult Ladd, H. O., (The Mexican War> (pp. 244-48) ; Scott's (Memoirs) (Vol. II) ; Wright, M. J., <Life of ScotD (pp. 218-22) ; Wilcox,

C. M., (History of the Mexican War> ; Wiley and Rines, (The United States) (Vol. VII, pp. 242-45).

MOLINOS, Miguel de, me-gel' da mo-le'-

116*5, Spanish mystic, founder of the Quietists : b. near Saragossa, 21 Dec. 1640; d. Rome, 29 Dec. 1696. He studied at Pamplona and Coim¬ bra, took holy orders, went to Rome in 1669, and there published in 1675 his ˆGuida spirit¬ ualˆ which urged the immediate presence of God and pure love toward God as the only way to salvation and peace, which cannot be attained until the soul is free from all that is material. His opponents, notably the Jesuits, held that this meant the indifference of the individual to the external world. In 1685 he was summoned before the Inquisition ; two years later was found guilty of spreading dan¬ gerous doctrines. He publicly recanted all his teachings and was imprisoned until his death. Even Pope Innocent XI, a friend of Molinos, was examined by the Inquisition — but not as Pope, merely as Odescalchi, an individual. The spiritual Guide) has been translated into the languages of Europe. See Quietism. Consult Bigelow, (Molinos the QuietisD (New York

1882).

MOLLAH, mol'a, or MULLAH, mul'a, a Turkish title, originally meaning simply ((lord,® or <(sir,® in its narrower usage a judicial rank. In Turkey there are three classes of mollahs, with jurisdiction over divisions of various im¬ portance; those in control of small towns con¬ stitute the lowest grade; they, like the second grade, hold office only for a month at a time ; the first grade is made up of those having legal authority over pashaliks. The mollah ranks below the kahiaskar and mufti, but is superior to the cadi. He is versed in both ecclesiastical and civil lore. Hence and because of its original

meaning, the word is often used more loosely of Mohammedan dignitaries or scholars in Africa. See Mad Mullah.

MOLLAT, mol'lat, Guillaume Marie Charles Henri, French clergyman and his¬ torian: b. Nantes, France, 1 Feb. 1877. He re¬ ceived his education at the Ecole des Hautes Etudes, Seminary of S. Sulpice, Paris, the French Seminary, Gregorian University and Vatican Palaeographic School, Rome. In 1900 he was ordained to the Catholic priesthood ; was chaplain of the church of Saint Louis of the French, Rome, 1902-05, chaplain of the

Basilica of Montmartre, Paris, 1905-08, and since 1914 assistant at the church of Our Lady of Mercy, Passy. He has written (Mesures fiscales exercees en Bretagne par les papes d'Avignon a l'epoque du Grand Schisme d'Occident) (1903) ; (Etudes et documents sur l'histoire de Bretagne) (1907) ; (Les papes d'Avignon0 (1912) ; (Etude critique sur les Vitae Paparum Avenionensium d'Etienne Baluze) (1917). He collaborated in (Dictionnaire Apologetique de la Foi Catholique) ; (Dictionnaire d'histoire et de geographic ec-clesiastiquesP and is a contributor to (The Catholic Encyclopedia, > the Revue de l' Art Chretien , etc., *etc.*

MOLLENDO, mol-lan'do, Peru, a seaport on the Pacific Coast, in the department of Arequipa, near the mouth of the river Tambo, seven miles south of Islay. A railway con¬ nects it with Puno on Lake Titicaca. It is the port through which the bulk of the imports and exports of southern Peru and Bolivia pass. The principal exports are alpaca, wool, quinine, tin, silver and copper ores to an average an¬ nual value of $5,520,000 ; imports average $2,- 600,000. Pop. 4,000.

MOLLHAUSEN, mel'how'zen, Baldwin, German traveler and novelist: b. Bonn, 27 Jan. 1825 ; d. Berlin, 28 May 1905. He studied agri¬ culture in Pommerania, then went (1850) to North America, joining (1851) Duke Paul of Wiirtemberg and his party in the Rocky Moun¬ tains. He was wounded by Indians but, after five months, navigated the Mississippi to New Orleans. He became topographer and

draughts¬ man, at the instigation of Alexander von Humboldt, for an American scientific expedi¬ tion to the Far West, returning (1854), via San Francisco and the Isthmus of Panama, to Germany, where he was appointed custodian of libraries in Potsdam. He made another trip (1857-58) to North America exploring central Colorado. He wrote (Tagebuch einer Reise vom Mississippi nach den Kiisten der Sudsee) (Leipzig 1858) and (Reisen in die Felsenge-birge Nordamerikas) (ib. 1861). Of his novels most relate to adventure in America. Note¬ worthy are (Die Halbindianer> (1861); (Der Fluchtling) (1862); (Der Mayordomo) (1863); <Das Mormonenmadchen) (1864; 3d ed., 1871) : (Reliquien) (1865) ; (Die bieden Jachten> (1891); (Der Spion* (1893); (Das Fegefeuer in Frappes Wigwam > (1900), *etc.* A collection of his works was published (1906-13), under title of Hllustrierte Romane, Reisen und Aben-teuerP

MOLLOY, Joseph Fitzgerald, Irish author :

b. New Ross, County of Wexford, 19 March 1858; d. London, 19 March 1908. Among his numerous works may be cited (Court Life Be¬ low Stairs, or London under the First Georges) (1882); (Court Life Below Stairs, or London under the Last Georges) (1883) ; (Life and Adventures of Peg Woffington) (1884); (Life and Adventures of Edmond Kean) (1888) ; (The Most Gorgeous Lady .Blessington' (1896) ; ˆHistorical and Biographical Studies* (1897) ; (The Queen's Comrade) (1901), *etc.*

MOLLUSCA, one of the great divisions or phyla of the animal kingdom, containing the oys¬ ters, clams, snails, slugs, squid and cuttlefish. The group is sharply marked off from all others

and is characterized by the following features : The body is primarily bilaterally symmetrical with the mouth and anus at the two ends of the body, the alimentary tract traversing it as an axis, but this bilateral symmetry frequently be¬ comes obscured by secondary changes, often of a torsional nature. On the lower surface of the body is developed a muscular outgrowth, the foot ; while on either side a fold of skin arises near the back and hangs down enclosing a space between it and the body and foot. The fold is the pallium or mantle, and the cavity is called the mantle or branchial chamber, from the fact that the true gills (ctenidia) arise in the angle between mantle and body and project into the space. The dorsal surface of the body usually has the power of secreting a protective shell, ordinarily strengthened by carbonate of lime. The heart, which always contains arterial blood,

lies in a chamber (the pericardium) dor¬ sal to the intestines, while the excretory or¬ gans, which are true nephridia, connect the peri¬ cardium with the outer world. The nervous system consists of a series of paired ganglia connected by nerve-trunks. Of these ganglia the most constant are (1) the cerebral, at the anterior end, above the oesophagus; (2) the pedal in the foot; (3) the parietal on the sides of the body; and (4) the visceral near the hind end of the body ventral to the intestine. All of the 10,000 species of living mollusks are built upon this plan.

Details of Structure. — Mantle and Foot. — Typically the mantle is a paired structure, but in most groups the two halves unite in front and behind. This has its effect upon the shell, since where the lobes are separate, there are two halves or valves to the shell, but where united there is but a single (univalve) shell. Sometimes this univalve shell is a straight cone, but, while conical, it is usually coiled in a spiral, a part of the body extending toward the apex of the cone. As the animal increases in size the shells also increase in thickness and extent, the successive additions being usually recognizable on the external surface by lines of growth which run parallel to the free edge of the shell. When the edge of the mantle is provided with projec¬ tions, lobes, etc., these cause ridges or protuber¬ ances on the surface of the shell. When the mantle is colored (striped or spotted), the color-pattern is reproduced in the shell, since pigment from the mantle is deposited along with the carbonate of lime. There is also a structure to the shell which needs mention. On the outside is usually a thin organic cuticle and beneath this two layers of carbonate of lime. Sometimes the inner of these layers consists of thin lamelke parallel to the surface, the free edges of which produce diffraction spectra and thus give the in¬ side of the shell an iridescent appearance — mother-of-pearl. See Pearl.

In the bivalve shell (see Bivalves) an elas¬ tic hinge ligament connects the two valves and causes them to open. The valves are closed by muscles (adductors), one or two in number, which extend across the body, from valve to valve. In the univalves there is always a mus¬ cle attached to the inside of the spiral, by the contraction of which the animal is retracted into the shell, the foot being the last part to dis¬ appear. In many groups the posterior dorsal part of the foot bears a horny or calcareous plate, the operculum, which closes the aperture

of the shell like a door when the animal is re¬ tracted. On the other hand the shell is fre¬ quently greatly reduced and may become inter¬ nal, as in the slugs and squid; or it may be en¬ tirely absent in the adult, as in the so-called naked mollusks (nudibranchs) although it is formed in the young and later lost.

Foot. — The foot, which projects from the mid-ventral surface of the body, shows great modifications, but is rarely lacking. Usually it forms a broad creeping disc on which the ani¬ mal glides about, but in the Scaphopoda, as in most Pelecypoda, it is flattened from side to side and forms an efficient digging organ. In the cephalopods it becomes developed in part into the tube (siphon) connecting the mantle-cavity with the exterior ; in part into the ten¬ tacles surrounding the head.

Digestive Organs. — The alimentary canal is typically a straight tube, but in most forms it becomes convoluted to increase the amount of digestive surface, while not infrequently it is so flexed on itself that mouth and vent, instead of being at opposite ends of the body, are in close proximity to each other. In all except the Pelecypoda the region of the mouth contains a peculiar structure, variously known as the lin¬ gual ribbon, radula or odontophore. This con¬ sists of a strong band, having upon its upper surface numbers of rows of hard horny teeth — in fact, a flexible file ; and of muscles adapted to draw it back and forth over any object to which the mouth may be applied. In this way the snails rasp away vegetation, or, as in the case of shells of other mollusks, are perforated in order that the soft parts may be reached and devoured. In the cone-shells a poison-gland is connected with the lingual ribbon. Wear at one end of the ribbon is made good by constant growth at the other end. Behind the gullet is a large sacular stomach, and closely connected with it are the ducts of the voluminous liver. The intestine is long, without enlargements, and in many acephala is remarkable for passing through the heart.

Circulation. — The heart lies dorsal to the digestive tract enclosed in a special sac, the pericardium, which is to be regarded as the sole representative of the true body-cavity or coe¬ lom. (See Embryology). In the heart two parts are always to be distinguished, a muscular ven¬ tricle which forces the blood through the arte¬ ries to all parts of the body, and one or two auricles which receive the blood as it comes from the gills and force it into the ventricle. As will be seen, the heart thus receives only oxidized or arterial blood. With the loss of the gill

of one side the corresponding auricle disappears. When four gills are present as in the nautilus, there are four auricles. In the cephalopods branchial hearts, which force the blood through the gills, occur. At one time it was thought that some of the blood-vessels opened to the exterior, but this has been shown to be a mistake. The blood is usually yellowish or colorless, but occasionally is red, the color being due to the plasma and not to the con¬ tained corpuscles which resemble the leucocytes of the blood of man.

Gills. — As was mentioned above, there may be two kinds of gills, the ctenidia and the sec¬ ondary or adaptive gills, the latter occurring only in the gasteropoda. The ctenidia, which always occur in the angle between mantle and

body-wall, consist, typically, of a series of fila¬ ments with blood-vessels in the interior, the fila¬ ments and the ridge from which they spring resembling somewhat the teeth and back of a comb, whence the name (Greek rrevog comb). The ctenidia are typically paired, but in the nautilus there are two pairs, while in many gasteropods one ctenidium (that of the left side) is lost. The adaptive gills occur on vari¬ ous parts of the body, usually upon the back. In most land snails (Pulmonata) the gills en¬ tirely disappear and an air-breathing organ, the lung, is developed on the walls of the mantle cavity, the opening to it being usually on the right side of the body.

Nerves. — The nervous system was described above. It is only necessary to say that the gan¬ glia may coalesce into a smaller number. There are usually present three pairs of sense organs, a pair of eyes connected with the cerebrum, a pair of so-called ears (really organs of equili¬ bration) connected with the pedal ganglia, and a pair of organs of smell (osphradia) with the visceral ganglia. Of these the eyes are the least constant. In some cases they are replaced by numerous other eyes developed upon the back or upon the edges of the mantle.

Viscera. — The excretory organs are true nephridia, that is, coiled tubes opening at one end into the coelom (pericardium), and at the other to the external world. They are also known as the organs of Bojanus. The reproductive or¬ gans are large. Usually the sexes are separate, but some, like the land-snails, are hermaph¬ roditic. In no case is an asexual reproduction (fission, budding, etc.) known. A few bring forth living young. In many species a meta¬ morphosis occurs during the development. In these a peculiar larva, known as the

veliger, hatches from the egg, a larva which develops from a ˆtrochosphere® form like that of the annelids, a resemblance which points to a rela¬ tionship between the two groups. The veliger receives its name from the ˆvelum,® a circle of cilia upon the dorsal side of the head above and in front of the mouth, by means of which the larva swims.

Classification. — The mollusks are divided into five classes, Amphineura, Pelecypoda or Acephala, Scaphopoda, Gastropoda and Ceph¬ alopoda.

Amphineura. — This, the most primitive group of mollusks, contains the chitons (Placo - phora) and the Solenogastres, in both of which the body is markedly bilaterally symmetrical, while the nervous system is of a very low type. The chitons (q.v.) are flattened and covered with eight transverse plates of shell. The Solenogastres are worm-like shell-less forms of the deeper seas.

Pelecypoda or Acephala. — These are the mollusks which have the shell in two parts or <(valves,® no head, and the filaments of the gills more or less completely united into a couple of leaves (lamellae) on either side of the body. See Bivalves.

Scaphopoda. — This class includes a few ma¬ rine forms of small size known as tooth-shells, from having shells shaped somewhat like an ele¬ phant's tusk, and open at both ends. See Den—

TALIUM.

Gastropoda. — In these, the so-called snails, the foot is usually a broad creeping disc and the head is well developed. See Gastropoda,

MOLLUSCA

1 Pond Snail (Limnea stagnalis). 2. Slug (Arion empiricum). 3. Green Sea-Slug (Elysia vindis). 4 Pteropod (Hyalea tridentata). 5. Cone-shell (Conus textilis). 6. Achatina (Achatina mauntamca). 7. Tun-shell (Dolium

galea). 8. Wormshell (Vermetus gigas).

Cephalopoda. — In these the head is well marked oft from the body, and the mantles of the two sides are united so that a single mantle cavity results, which is open to the exterior in front. See Cephalopoda.

Formerly two other orders of mollusks were recognized, the Heteropoda and the Ptero-Poda , but the heteropods are now known to be prosobranchs, the pteropods to be opistho-branchs, both being modified for a life on the surface of the sea.

Bibliography. — Hescheler, in Lang's Com¬ parative Anatomy) (2d ed., 1896) ; Woodward, (Manual of the Mollusca > (4th ed., 1880); Cooke, (The Mollusca) (in Cambridge Natural History, Vol. Ill, 1895) ; Kingsley, (Standard Natural History) (Vol. I, 1885) ; part V of (A Treatise on Zoology, > edited by E. Ray Lankester, by Paul Pelseneer (London 1906) ; Tryon and Pilsbury began in 1896 a work in which they proposed to describe and figure every known species of mollusk. For mollusks of the United States consult writings of Gould, Binney, Morse, Tryon, Dali, Verrill, Bush, Stearns, *etc.*

MOLLUSCOIDA, a group of animals formerly recognized by some naturalists, which included the Brachiopoda, the Polyzoa, and the Tunicata (qq.v.). On account of misinterpre¬ tations of structure these were once included in the Mollusca, and when removed from that group the name Molluscoida was given. Next the Tunicata were removed to the Chordata, and later the group Molluscoida was abandoned.

MOLLUSCS, Eggs of. See Egg.

MOLLWITZ, mol-vits, Prussia, a village of Silesia, 25 miles southeast of Breslau, which gives its name to the battle fought to the east of the village 10 April 1741 between the Prus¬ sians under Frederick the Great and the Aus¬ trians under Marshal Neipperg. About 20,000 troops were engaged on each side, and the Austrians gained the first advantage in putting the Prussian cavalry to flight. The Prussian infantry, however, commanded by Marshal Schwerin, stood their ground for five hours and won the battle. The Prussians lost 5,500 men and the Austrians 5,340. The victory led to an alliance between

France and Prussia, and to Austria ceding the province of Silesia to Frederick the following year, to dissolve the alliance.

MOLLY MAGUIRES, an Irish secret so¬ ciety formed in 1843 at Farney, County Monaghan, to intimidate bailiffs or process-servers distraining for rent, or others impound¬ ing the cattle of those who were unable or un¬ willing to pay rent. A similar society called by the same name, existed 1854 to 1877 in the mining districts of Pennsylvania. The members disguised in (Molly Maguire) or women's dresses, sought to effect their purpose by in¬ timidation, and in some cases by murder. Under perilous detective work, several at length were arrested, tried and executed, and the society finally disbanded.

MOLLYMAUK, a bird. See Fulmar.

MOLMENTI, mol-man'te, Pompeo Ghe-rardo, Italian author: b. Venice, Italy, 1852. He studied law and practised in Venice, but aban¬ doned it to become professor of Italian litera¬

ture at the Liceo Marco Foscarini. His literary work comprises critical essays, history of literature and art and also fiction, among which are Umpressioni litterarie) (1873) ; (Studi e ricerche di storia e d'arte) (1892) ; (Antonio FogazzanP (1900). His greatest work is (Storia di Venezia nella vita privata) (Bergamo 1908-09; Eng. trans. by Brown, New York 1908) for which he was elevated to the rank of Senator of the Kingdom.

MOLOCH, mo'lok, or MOLECH (Heb. molekh, king), called in Scripture (I Kings 11, 7) an idol of the Ammonites, the fire-god of Phoenicia, also identified as the Carthaginian god, Kronos or Saturn. The ima'ge was an non statue, with a human body, the head of an ox, and extended arms. The statue is said to have been heated by a fire placed in the lower part, and children were placed as offerings in the arms. The cult was intro¬ duced into Judah, and Solomon built a temple to Moloch on the Mount of Olives.

MOLOCH, a small Australian desert-lizard (the moloch horridus) of the family Ayamidce, whose skin is covered with irregular plates bearing thorny pointed tubercles, spines and prickles all over the body, but especially well developed behind the head. Altogether its ap¬ pearance is alarming, reminding one of a miniature of some armored saurian of the Mesozoic era. It is, however, quite harmless, subsists mainly on ants, and its repulsive aspect, as in the case of the

similar horned toad (q.v.), is wholly defensive in two ways — first as a real defense against being too readily seized and swallowed by enemies, especially serpents; and second, by exposing a very large and highly absorbent surface to whatever moisture the air may contain. Consult Saville-Kent, (Naturalist in Australia) (1897).

MOLOKAI, mo‘16-ki, Hawaii, an island of the group about 40 miles long and seven to nine miles broad. It is noted for the govern¬ ment settlement for lepers where Father Damien spent his noble life of self-sacrifice. See Hawaii; Leprosy.

MOLOKANI, mo’lo-kane, or MALA-KANES, a Russian sect. It derives its name through its custom of living on milk (moloko or malako) on fast days. Istineeye Christiane (true Christians) is the name they give them¬ selves, also “Gospellers. » The sect arose in the middle of the 18th century in the government of Tambof. About 3,000 of them colonized, early in the 19th century, in the Crimea. Their claim is that the Bible is their sole foundation and they repudiate ceremonial, veneration of icons, priesthood, *etc.* They abstain from pork. They pay their devotions in prayer, hymn-singing and Bible-reading, besides re¬ ligious conversations. The meetings are held in private houses conducted by a presbyter and two assistants. They stand high in morals and brotherly benevolence. In theory they are against rulers and taxes or military service, yet are loyal, peaceful subjects in practice. Con¬ sult New Schaff-Herzog (New York 1911).

MOLTING, the change of skin, or of such cutaneous or partially cutaneous appendages as hair or feathers, which occurs annually or periodically in animals of many sorts, such as

arthropods, birds, reptiles, amphibians, *etc.* It is a process often perilous to the animal, being not infrequently attended by loss of life. In mammals it may be gradual, as when the pelage or hair is changed. Examples of analogous processes are the annual shedding of the antlers of deer in spring, or the autumnal dropping of the horns of the pronghorn antelope.

Molting in Amphibia and Reptiles. — Here the entire skin is cast. The newt in early spring sheds its skin by detaching it from around the jaws, then pulling it back over the head and the limbs. The toad in molting causes the old skin to split along the back, it then pulls it off as one would a coat by working the muscles of the back; it is detached by movements of the head from around the lips, face, eyes and mouth; the skin is more readily pulled off from the legs to the tips of the toes. The skin, as in salamanders, is a thin film, and it comes off in four pieces. Immediately after molting the creature is shy and active. Sharp describes the molting of the common striped snake (Eutcenia sirtalis). One came out of the water in a vivarium, gliding on to the grassy sod; it then shrugged itself for a moment, when the skin parted at the jaws. The skin on the head, how¬ ever, remained fixed, so that when the creature crawled out the old skin was inside out. The operation took less than one minute. The rat¬ tle of the rattlesnake (q.v.) consists of those parts of the successive molts which are re¬ tained by a long knob made by the coalescence of the last few caudal vertebrae.

Molting in Birds.— The feathers may all be cast or only a part of them. Young birds molt several times before adult age. The passerine birds undergo a complete ecdysis after the breeding season is over (post-nuptial), when the worn-out plumage is restored ; and they may also before the breeding time pass through an incomplete molt, when their wedding dress is put on. The process is so gradual as a rule that few birds, except the ducks, etc., are un¬ able to fly, or go unprotected. The height of the molting season is in August, though the feathers drop out in nearly every month of the year. The complete molt is undergone in from a month to six weeks' time. Besides, their feathers the pelican sheds a horny projection on the ridge of the bill, and the puffin and certain allied species shed the horny sheath of the bill, *etc.* For further information see Plumage.

Molting in Arthropods. — In most arthro¬ pods the various developmental stages become indicated in the external appearance of the animal by means of the successive molts, for no modification of form is possible without the removal of the rigid exoskeleton. The Arach¬ nid Limulus, the common horsefoot crab (q.v.), frequently sheds, its skin opening around the edge of the head ; this is also the case with the fresh-water crustacean Apus. In the crayfish and lobster the skin splits open be¬ tween the thorax and abdomen, and the animal draws itself out of the transverse rent thus formed. The skin is cast entire, while the chitinous lining of the mouth, throat, fore stomach and of the rectum is also shed. The process of exuviation in the crayfish has long been known to be aided by the outgrowth of little delicate papillae called casting-hairs; these serve to loosen the

old integument; recently

Packard has discovered similar papillae on the new or under-skin (hypodermis) of the lobster, and similar undergrowths aid the serpent in shedding its scaly epidermis.

In insects molting is frequent, especially in the larva stage, most caterpillars molting four or five times. The body moves convulsively and splits along the back, at the same time, casting hairs being usually absent, a molting fluid is poured out which serves to detach the old skin. The head is molted separately, the shell falling off by itself, then the body-skin is shuffled off, being pulled back toward the tail, and with the outer integuments all the lining of the digestive canal is shed (except that of the stomach and beginning of the intestine), and the lining of the spiracles, as well as the cuticle of all the hairs, and the spines.

Consult Dwight, (The Sequence of Plumage and Molts of the Passerine Birds5 (Annals New York Academy of Sciences, Vol. XIII, 1900) ; Mivart, St. J., <The Elements of Ornithology5 (London 1892) ; Newton,

(Dictionary of Birds5 (1893-96); Packard,

(Textbook of Entomology5 (1898). Further details will be found in the articles in this encyclopedia on specific groups of animals and the authorities mentioned therein.

MOLTKE, Helmuth Karl Bernhard, hel'-

moot karl bern'hart mo-lt'ke, Count von, Ger¬ man soldier: b. Parchim, Mecklenburg-Schwerin, 26 Oct. 1800; d. Berlin, 24 April 1891. In 1805 his father removed to Lubeck, where young Moltke shortly afterward saw his home looted and burned during the French invasion and his family reduced to poverty. In 1812 he was admitted as a cadet of the Royal Military Academy, Copenhagen. In 1818 he was ap¬ pointed one of the pages of the king of Den¬ mark and passed his examination for a com¬ mission as first of the candidates. Seeing little prospect of advancement, he entered the Prus¬ sian service in 1822, becoming 2d lieutenant. He' then studied three years at the staff college, Berlin;' in 1832 was appointed to the general staff; in 1833 became lieutenant, and in 1835 captain. He had already visited Italy, and he now went to Turkey, where he became military adviser of the sultan Mahmud. He took part in the Turkish expedition

against Ibrahim Pasha in 1839, but his advice was disregarded, and he returned to Constantinople, and on Mahmud's death to Berlin, where he was again employed on the general staff. His ex¬ periences in Turkey led him to publish two valuable works (The Russo-Turkish Campaign of 1828-29 in European Turkey5 (1835), and (Letters on Affairs in Turkey in the Years 1835-395 (1841)- After rising through the

various army grades he was placed permanently at the head of the general staff of the army in 1859 with the rank of lieutenant-general. His labors in reorganizing the Prussian army were of immense value to Prussia and to Ger¬ many, and had a great influence on the general history of Europe. The defeat of Denmark in 1864 was largely owing to his genius for mili¬ tary operations, and the result of the greater war of 1866 against Austria is equally to be at¬ tributed to him. Then followed the Franco-German War of 1870, for which Moltke was entirely prepared, having foreseen for some years what was likely to happen, and having

immediately after the Austrian War nrepared for a campaign against France. The brilliant success which followed was in very large measure a personal triumph for Moltke. He passed his 70th birthday at Versailles, and was raised by the king of Prussia to the rank of count on receipt of news of the capitulation of Metz. On his return to Berlin he was made a field-marshal, received from Parliament a grant of $225,000, was appointed for life a member of the Prussian upper house, and other honors were conferred upon him. He held the post of chief of the staff till after the accession of Em¬ peror William II in 1888, when he resigned on account of advanced age, but was made presi¬ dent of national defense. His 90th birthday was made the occasion of public demonstrations in his honor all over Germany. He was a man of great modesty and simplicity, kind and con¬ siderate to subordinates, and devoted, above all things, to duty. His military genius was com¬ pounded of boldness in design with minute care in execution. From his reticence it was wit¬ tily said that he was silent in

seven languages. Besides the works already mentioned, Moltke wrote (Letters) (1892), and the works of the general staff on the Italian War of 1866, and the Franco-German War of 1870-71 are largely from his pen. Consult the (Essays, Speeches and Memoirs5 (2 vols., London 1893) ; also Bigge, W., (Feldmarschall Graf Moltke) (2 vols., Munich 1901) ; Dressier, F. A., (Moltke in his Home5 translated by Barrett-Lennard (London 1907) ; Muller, W., Moltke5 trans¬ lated by Pinkerton (London 1879; 3d ed., Stuttgart 1889).

MOLTKE, Helmuth von, German general: b. 1848; d. 18 June 1916. A nephew of the famous strategist, he was appointed chief of the general staff in 1906, an event which oc¬ casioned considerable speculation in Germany. The general impression was that von Moltke had been chosen by the Kaiser as a convenient figure-head, and that the War Lord really in¬ tended to be his own chief of the general staff. Von Moltke did not originate, but rather identi¬ fied himself with, the standing plan of cam¬ paign to be adopted in a war on two fronts, namely, the rapid invasion of Belgium and lightning descent upon France during the period of Russian mobilization. The breakdown of that plan led to serious differences between the Kaiser and von Moltke; the latter had not displayed the military genius of his uncle, and was dismissed from his post early in Decem¬ ber 1914, to be succeeded by the Kaiser's favorite, General von Falkenhayn. See War, European — Western Front.

MOLUCCAS, md-luk'az, or SPICE IS¬ LANDS, East Indies, three groups of islands in the Malayan or Indian Archipelago (q.v.), between Celebes and New Guinea, and the Philippines and Timor Archipelago. (1) The Ternate Islands, or Moluccas proper, consisting of Ternate, Gilolo, Batshian, Obi, Morti Islands and numerous islets. (2) The Amboyna Islands, including, besides Amboyna, which is the chief seat of government for the whole Moluccas, the islands of Ceram, Booroo and other smaller islands. (3) The Banda Islands. They are nearly all mountainous, and some of them have peaks rising to a height of 7.000 feet or 8,000 feet, mostly volcanic; there are still

several active volcanoes in the group, and earthquakes are of frequent occurrence. Their aggregate area is estimated at 195,650 square miles; population 361,000. Cloves, nutmegs, mace and sago are exported to Europe ; and birds'-nests, trepang, and shark-fins to China. The Moluccas, discovered in 1512, were alter¬ nately in the possession of the Spaniards, Portuguese and Dutch. They were taken from the latter by the British in 1796, and in 1810, but in 1814 again given up to Holland, in whose possession they still remain. The general lan¬ guage on the coast is the Malay.

MOLY, magic herb of the ancient Greeks that Homer says Hermes gave to Odysseus as a talisman against the enchantments of Circe. The plant is described as having milk-white flowers, and has been identified by different scientists under different herbs of the Liliacea family, as the white water-lily, also as the gar¬ lics. Allium magicum L., or Allium Moly L. were claimed by Italian Renaissance botanists, but these kinds have yellowish-red to red bloom instead of white, causing some to claim Allium nigrum L. or black hellebore, as more probable. See Allium ; Garlic.

MOLYBDENITE, mo-lib'de-nite, a native sulphid of molybdenum crystallizing in tabular or hexagonal forms. It commonly occurs in granite, gneiss and other crystalline rocks. In the United States it is found in the New Eng¬ land States, and in New York, Pennsylvania, Colorado and California. It also occurs in Canada, in Pontiac County, Quebec, in Renfrew County, Ontario, and in other parts of the world. It is the chief of the commercial ores yielding the important metal molybdenum (q.v.), among which also are wulfenite, molybdite and other minerals, described as follows:

Molybdenite or molybdenum disulphide, M0S2, contains about 60 per

cent molybdenum and 40 per cent sulphur. It is a soft, opaque mineral, with a lead-gray color, sometimes bluish or brownish, and with metallic lustre. When crystallized it is found in tabular or short prismatic, hexagonal crystals. It has a perfect cleavage, and yields flakes which are flexible but not elastic. It is sectile and feels slightly greasy. Its hardness is 1 to 1.5, and its specific gravity is 4.7 to 4.8. Its streak is lead-gray metallic, bluish-gray on paper, and greenish on glazed porcelain. It occurs in fine granular or foliated masses or scales scattered through or imbedded in many crystalline rocks, including granite, gneiss, zircon syenite and granular limestone. Its appearance is similar to that of graphite, for which it is frequently mistaken by the prospector. Wulfenite is a molybdate of lead, PbMoCh, and contains about 26.2 per cent molybdenum and 56.4 per cent lead. Its color is bright red to orange or wax-yellow ; sometimes brown, grayish-white, or nearly colorless; occasionally yellowish-gray to pale green. Its lustre is resinous to adamantine. When crystalline it is translucent and occurs commonly in thin, square, tabular, tetragonal crystals. Sometimes octahedral and prismatic forms are found. It occurs also as crystal crusts and in massive granular forms. It is always found with other lead, minerals, espe¬ cially pyromorphite and vanadinite. It has one good pyramidal cleavage, and two less distinct. It is brittle and its fracture is subconchoidal.

Its hardness is 2.75 to 3, and its specific gravity is 6.7 to 7. Its streak is white. Molybdite, or molybdic ochre, is a hydrous ferric molybdate, Fe203.3Mo03.7ˆH20, and contains 39.6 per cent molybdenum. It occurs as an earthy, yellow powder, or in hair-like crystals of pale yellow color, usually associated with molybdenite, of which it is an alteration product. Alone, it is not an important ore of molybdenum. It has a dull lustre, a straw yellow streak, a hardness of 1 to 2, and a specific gravity of 4.5. Powel-lite is calcium molybdate, CaMoCh, and contains 48 per cent molybdenum. Sometimes tungsten replaces part of the molybdenum. It is green¬ ish-yellow to dull gray in color, subtransparent, resinous, without cleavage, has an uneven frac¬ ture, a hardness of 3.5, and a specific gravity of 4.52. Ilsemannite is an

oxide of molybdenum, M0O2.4M0O3, and contains about 68 per cent molybdenum. It is a blue-black to black cryptocrystalline mineral, associated with barite and wulfenite. It is soluble in water, giv'ng a deep blue solution which on evaporation yields dark blue crystals. Rare. Belonesite is mag¬ nesium molybdate, MgMoCh, and contains 52 per cent molybdenum. It is a white transparent mineral, occurring in minute tetragonal crystals. It occurs in rock fragments enveloped in Vesuvian lava. Rare. Pateraite is cobalt molyb¬ date, C0M0O4, and contains 43.8 per cent molybdenum, or it is molybdate of cobalt and iron, FeCoMo208, and contains 44.1 per cent molybdenum. It is an impure massive black mineral associated with uranium minerals. Rare. Achrematite is lead arsenate, chloride and molybdate, 3 (3Pb3As208.PbCl2)4(Pb2-M0O5), and contains 3.4 per cent molybdenum. It is a massive, cryptocrystalline mineral with an uneven to subconchoidal fracture, is brittle, has a hardness of 3 to 4, and a specific gravity of about 6. Its color is sulphur-yellow to orange and red, but in mass is liver-brown, ow¬ ing to admixture of limonite. Its streak is pale cinnamon brown. Its lustre is resinous to adamantine, and fragments are translucent on thin edges. Eosite is a vanado-molybdate of lead, Pb3V2MoOi6, and contains 8.9 per cent molybdenum. Its color is deep Aurora-red. It has a brownish, orange-yellow. streak. Its hardness is 3 to 4. It occurs in minute octahe¬ dral crystals of the tetragonal system which are found on pyromorphite and cerrusite. Molybdurane is molybdate of uranium, U02U03.2Mo04. Molybdo ferrite is molybdate of iron, FeMoCh.

MOLYBDENUM, md-lib'de-num, a pure white metal, softer than steel, malleable and capable of being forged and welded. It can be filed and polished and may be drawn into ribbons and fine wire. Metallic molybdenum is used in various electrical contact making and breaking devices, in X-ray tubes, in voltage rectifiers, in the form of wire for filament sup¬ ports in incandescent electric lamps, for wind¬ ing electric resistance furnaces and in dentistry. It is also employed in the manufacture of chemical reagents, dyes, glazes and disinfect¬ ants. The principal use of molybdenum is in the manufacture of special alloy steels, usually in conjunction with chromium, manganese, nickel, cobalt, tungsten or vanadium. These steels are used for self-hardening and high¬ speed machine tools, for crank-shaft and pro¬

peller-shaft forgings, high-pressure boiler plate, armor-piercing projectiles, permanent magnets and wire. During the World War the main uses were for gun-linings, armor plates, pro¬ jectiles and in the motor industry, especially in the crank-shafts and connecting-rods of

Liberty motors. The purest molybdenum is produced from wulfenite, but practically the whole of the world's supply of the metal and its com¬ pounds is obtained from molybdenite (q.v.). Molybdenite resembles galena in some respects and owes its name to this fact, the word ˆmolybdenite® being based upon the Latin name for galena. It was first clearly distinguished from galena by Scheele in 1778, and in 1782 Hjelm obtained the element molybdenum in the metallic form. Molybdenum may be prepared by reducing the oxide by hydrogen, carbon or potassium cyanide, as well as by various other methods. It has a specific gravity of about 8.6 and a specific heat of about 0.0659. Its melt¬ ing point is higher than that of platinum. Molybdenum is not affected by air or moisture at ordinary temperatures, but oxidizes slowly when heated in air, and at high temperatures it burns, whether heated in air or in steam. Chemically, molybdenum behaves both as a metal and as a non-metal. It has the chemical symbol Mo and an atomic weight of 96 if O = 16, or 95.3 if H — 1. It forms several oxides, of which the trioxide, M0O3, is the most important. This is the oxide that is formed when the metal is burned in air, and it may also be prepared by roasting the native sulphide in air. The trioxide occurs native in small quan¬ tities, as ((molybdenum ochre,® or ((molybdite.® Metallic molybdenum combines directly with chlorine to form M0CI5, and with bromine to form MoBn; but it does not combine directl}' with iodine. Unlike the other metals, molyb¬ denum does not readily replace the hydrogen of acids to form definite salts, but its oxides dissolve in acids with the formation of com¬ pounds which have, as yet, been but little stud¬ ied. The trioxide combines with water to form substances of the nature of acids, and which are, in fact, called <(molybdic acids.® These further combine with metallic bases to form an extensive series of compounds known as (<molybdates.® Ammonium molybdate is used in the laboratory as a reagent for the detection of phosphoric acid, a yellow precipitate being thrown down when a nitric acid solution of ammonium molybdate is added to a solution containing a phosphate. Consult Wolf, H. J., <Molybdenum) (Golden, Colo., 1918) ; Wilson, A. W. G., ((Molybdenum® in (The Mineral In¬ dustry during 1916, > Vol. XXV.

MOLYNEUX, mon-nooks, William, Irish philosopher: b. Dublin, 17 April 1656; d. there, 11 Oct. 1698. He was graduated from Trinity College, Dublin, entered the Middle Temple, London, became a student of applied mathe¬ matics and philosophy, and a friend of Locke; was elected F. R. S. in 1685 and was elected to Parliament for Dublin University in 1692 and 1695. Besides his (Dioptrica nova) (1692) on optics and philosophy, he wrote (The Case of Ireland's

Being Bound by Acts of Parliament in England1* (1698), a work on the legislative independence of Ireland, which created a con¬ siderable sensation.

MOMBASA, mom-ba'sa, Africa, an island and town on the east coast, the town, capital of the Seyidie province, the chief seaport and the _ seat of administration of British East Africa, being on the north side of the island, which is three miles long by two and one-half miles wide, close to the coast, 150 miles north of Zanzibar, lat. 4° 3' S. Here are an old Portuguese fort, a new European hospital and the offices and workshops of the British East Africa Company. A short railway connects Mombasa with Kilindini, the naval coaling depot, on the other side of the island, where is the residence of the chief administrator of the company. Mombasa is also the terminus of a railway connecting with the Victoria Nyanza. Trade in (imports) piece-goods, brass and iron wire, beads, rice; and in (exports) ivory, gum, copal, copra, ochella weed, maize and grain; carried on by natives of British India. Pop. about 30,000. Island and port are men¬ tioned as early as 1331. It was visited by Vasco de Gama in 1497, held by the Portuguese from 1529 to 1698 and by the British from 1824 to 1826, but the British refused to accept cession of it. Soon after the sultan of Muscat ob¬ tained possession of the town, which at his death fell to his son, the sultan of Zanzibar. In 1888 the Imperial British East Africa Com¬ pany received governing rights over it from the sultan of Zanzibar, since when it has passed definitely over to the possession of Britain, along with the huge territory on the mainland allotted to that country.

MOMENT of a dynamical quantity is the importance of that quantity in regard to its dynamical effect relatively to a given point or axis. The moment of a force about a point is the product of its amount into its perpen¬ dicular distance from the point. The tendency of the action of such a force is to cause rota¬ tion about an axis perpendicular to the plane passing through the point and containing the force. Thus, in the case of a pendulum, the effectiveness of the force in causing rotation

is measured by the moment W/, where W is the weight of the pendulum, and / is the distance of the line of action of the force W from the centre of rotation C, or the distance of the cen¬ tre of mass G from the vertical line through C.

The term moment enters into several other phrases, all of which relate either directly or indirectly to rotation. Thus, there is the mo¬ ment of momentum, or angular momentum, whose rate of change is the measure of the moment of the force producing the change. To obtain it for any given body rotating with angu¬ lar speed w about an axis, we first imagine the body broken up into a great many small portions of masses etc., at distances

ri,r2,r3, etc., from the axis, multiply the momen¬ tum (niiu) of each mass by its distance, and then take the sum of all these products. The angular speed w being the same in every ex¬ pression, the moment of momentum takes the form w (nhr \ + m2r22 + , etc.), which it is usual to write in the symbolic form <*>2 mr2. The quantity 2 mr2, which is the sum of the prod¬ ucts of each mass into the square of its dis¬ tance from the axis, is called the moment of inertia about that axis. It is the factor in the moment of momentum which depends upon the distribution of matter in the body. It enters

into all questions of mechanics in which rota¬ tion is involved, from the spinning of a top or the action of an engine governor to the stability of a ship. By an obvious extension, the word moment is also used in such combinations as moment of a velocity and moment of an accel¬ eration. Such phrases correspond to nothing truly dynamic, unless we regard velocity as meaning the momentum of unit mass and acceleration as the rate of change of that momentum.

If the mass of every small portion of mat¬ ter in a body be multiplied by the square of its perpendicular distance from a straight line, the sum of all such products is called the moment of inertia of the body about the line regarded as an axis. The radius of gyration of the body is the distance from the axis at which all the matter of the body might be concentrated with¬ out altering the moment of inertia. Thus, if 1 is the moment of inertia of the body, M its whole mass and k its radius of gyration,

1 = M k2. We see that the moment of inertia of a body about a line is found by adding a great number of products of small masses and squares of distances; if the body can be defined mathematically as to

shape, size and density, finding its moment of inertia is a problem of the integral calculus.

MOMENT OF INERTIA. See Mechan¬ ics.

MOMENTUM, in mechanics and physics, the product of the mass and velocity of a body. Like velocity, momentum is usually regarded as having a definite direction, as well as a definite numerical magnitude. The momentum gen¬ erated by a constant force acting upon a ma¬ terial particle for a definite length of time is numerically equal to the product of the force by the time during which it acts, and has the same direction as the force. See Mechanics.

MOMIERS, mo'my'a', from the French term for mummers. It was a nickname given in derision to the followers in Switzerland . (1814) of the Baroness von Krudener (q.v.), who charged the State Church with apostacy, held great conventicles and lived as aesthetics. They were led by the Geneva clergyman, H. L. Empeytaz, Cesar Malan, L. Gaussen, Merle d'Aubigny and F. Monod. From this sect arose the Evangelical Society at Geneva (1832), the Free Evangelical Church (Eglise fibre) of 1848 that, in 1883, divided and went into even severer directions. Consult Goltz, von der, (Die re-formierte Kirche Genfs in 19 ten JahrhunderC (Basle 1864).

MOMMSEN, mom'zen (Christian Mat¬ thias) Theodor, German epigraphist and his¬ torian : b. Garding, Schleswig, 30 Nov. 1817; d. Charlottenburg, near Berlin, Prussia, 1 Nov. 1903. He was a student of jurisprudence and philology at the University of Kiel ; took his Ph.D. in 1842; published with his brother Tycho and his friend Storm a volume of verse which was scathingly condemned by the reviewers (1843) ; began more successfully his career as historian with the treatise (De Collegiis et Sodalitiis RomanorunP (1843), commended for its thoroughness and a clarity of style new to German works of this kind; and in 1844-47 was in France and Italy under commission of

the Berlin Academy, collating manuscripts and inscriptions. On his

return he edited for a short while the S chleswig-H olsteinische Zeitung, and in 1848 became professor of Roman law at Leipzig. He entered politics as an advocate of constitutional progress, was arrested for inciting to revolt, and though acquitted by the courts was deprived of his professorship. From that time he was an eager if not invariably judicious disputant in many political contro¬ versies. He was appointed to the professor¬ ship of Roman law at Zurich in 1852, at Bres¬ lau in 1854; and from 1858 until his death was professor of ancient history in the University of Berlin. In 1873 he was elected perpetual secretary of the Berlin Academy; but this post he resigned in 1895. For 10 years (1873-82) he was a Liberal member of the lower house of the Prussian parliament, where he bitterly at¬ tacked Bismarck's domestic policy. In an elec¬ tion speech at Charlottenburg in 1882 he characterized the Iron Chancellor's tariff meas¬ ures as a (<Politik von Schwindel.® Such bold¬ ness could not go unrebuked, and Mommsen was brought to trial for slander. His ac¬ quittal by both, a lower and an appeals court was one of his great triumphs. He sternly advised the Teuton element in Austria in the struggle with the Czechs ; made some caustic observations in a North American Review article on British treatment of minor nations; to the last was quite as belligerent as ever.

But he was only incidentally the politician. He was pre-eminently what Freeman called l((the greatest scholar of our times, well nigh the greatest scholar of all times® ((Methods of Historical Study*). He was distinguished as a epigraphist, historian, jurist, numismatist and philologian. None in the 19th century, which he almost spanned, has, as Freeman goes on to say, ataken in so wide a range of subjects, all brought with the happiest effect to bear upon and to support one another.® To the edu¬ cated reader at large he will probably continue to be best known for his (Romische Geschichte*

• (3 vols., 1854—56; 8th ed., 1889), to the battle of Thapsus ; together with Vol. V on the provinces from Caesar to Diocletian (1885). Volume IV, on Imperial Rome, was unfinished at his death. There are English renderings by W. P. Dickson (Vols. I-III 1862-66; Vol. V .1886). This work opened a new epoch in historiography. Though written with great spontaneity, without even references to original sources, it was based on unrivaled knowledge, and presented its ma¬ terial with extraordinary clearness and at times with brilliancy. It is of course somewhat dogmatic, is certainly unfair to Cicero, and has been blamed, by Freeman among several, for undue glorification of mere power and success. To scholars Mommsen is above all the editor of the great (Corpus Inscriptionum Latinarum* (1863 et seq.; Vols. I, III, VIII, IX, by him¬ self; others under his immediate supervision). Every

inscription of this monumental collec¬ tion was taken down from the original. The errors and falsities of predecessors were cleared away, and a scientific foundation was supplied forˆ the study of Roman antiquities. Momm¬ sen's preface to the series is said to be thought by critics one of the finest specimens of Latin prose written in modern times. For a com¬ plete list of his writings, Zangemeister's (Mommsen als Schriftsteller* (Heidelberg

1887; new edition by Jacobs, with additions, 1905) should be consulted. Mention may be made of (Romisches Miinzwesen* (1850), (Romische Chronologie) (1859) and (Romisches Staatsrecht* (1871-88). All are standard, but the last, particularly, by the breadth and com¬ pleteness of his exposition of the Roman con¬ stitution, places Mommsen among the foremost of constitutional writers. He also edited the (Res Gestae Divi Augusti ex Monumentis Ancyrano et ApolliensP (1865; new ed. 1883); the (Digesta) in Vol. I of the (Corpus Juris Civilis) (6th ed., 1893), and many other pub¬ lications. His library, when partially burned in 1880, was replenished by gifts from foreign scholars. In 1902 he was awarded the Nobel prize in literature. Consult Hirschfeld, O., (Gedachtnisrede auf Theodor Mommsen *(1904) ; Sandys, J. E., (A History of Classical Scholarship* (Vol. Ill, Cambridge 1908) ; Wachsmuth, C., (Worte zum Gedachtniss an Theodor Mommsen* (Leipzig 1904).

MOMORDICA, a genus of plants of the gourd family, remarkable for their strangely marked seeds. Two or three species are cul¬ tivated in the United States as ornamental plants, one of which (M . charantia) produces a food for the Chinese in the pulp about the sculptured seeds; another Oriental food, the golkokra of India, is the fruit of M. cochin - chinensis; and the balsam-apple (M . balsa-mina) furnishes a healing principle which is infused in oil to form a liniment highly esteemed in the Levant.

MOMOTOMBO, md-mo-tom'bo, Nicara¬ gua, an active volcano rising 4,250 feet from the northwestern shore of Lake Managua. Eruptions took place in 1852, 1902 and 1905. The nearby village of Momotombo is connected by rail with Chinandega.

MOMPOS, mom-pos', Colombia, a town of the province of Bolivar on an island formed by the Rio Magdalena about 180 miles south of the deltaic mouth. The streets, which extend parallel to the river, are well laid out, but the houses are badly built. Mompos is a depot of foreign goods destined for consumption in the valley, of , the Magdalena; but

the changes in the river's course rendering it unnavigable have seriously injured its prosperity. Pop

11,000. *

MOMUS, in Greek mythology, the god of satire and mirth. He is generally represented raising a mask from his face and holding a small figure in his hand. His mother was Nyx, the goddess of night. As a mocking censor and carping critic Jupiter cast him out of heaven.

MONA, mo'na (1) a West Indian islet be¬ longing to the United States since 1898. It lies 42 miles east of Porto Rico, in the middle of Mona Passage, to which it gives its name; seven miles long by two miles broad, its area ismearly 10,000 acres. It is of coral formation, with a general level about 60 feet above the sea. A range of hills on the east side of the island runs from north to south, the highest peak of which is 175 feet above the water. The island is well watered and well drained, has a luxuriant vegetation and all kinds of tropical fruits grow in profusion. It is the

MONACO

THE HARBOR OF MONACO

1

-

•I

'

nesting place of thousands of green turtles, and the surrounding waters teem with the finest vanettes of fish. The only residents belong to the lighthouse establishment ; off the northwest point is Monita islet; (2) the ancient name mentioned by lacitus for the island of Anglesey (q.v.), Wales, also applied by other ancient writers to the Isle of Man.

MONA, a West African monkey (Cercopith - ecus mono), remarkable for its brilliant colora¬ tion, the head being olive-yellow, with a black stripe on the forehead ; yellowish whiskers and a purple face. The back is chestnut-brown, the undersurface is white and there is a white spot on each side near the root of the tail, which is black. It is constanly seen in menageries.

MONACO, mon'a-ko, the smallest inde¬ pendent European principality, bordering on the Mediterranean, nine miles east of Nice, and en¬ closed on its land borders by the French de¬ partment Alpes-Maritimes. It had an area of 53 square miles until 1861 when the Prince of Monaco ceded Mentone and Roccabruna to France for 4,000,000 francs. The principality has since been confined to the towns of Monaco, Condamine and Monte Carlo with the sur¬ rounding districts, having an area of about eight square miles, and a population of about 23,000. The expenses of government, municipal and other, are defrayed by a joint-stock com¬ pany, which carries on the famous gaming* es¬ tablishment at Monte Carlo (q.v.), and which also pays a handsome yearly sum to the Prince for the concession. The capital, Monaco (pop. 2,247), situated on a lofty promontory over¬ looking the sea, in the midst of olive, orange and lemon groves, is a renowned watering-place. Here are the palace and cathedral. There are numerous hotels and an English church at Monaco. In the 10th century the Emperor Otho I conferred Monaco on a prince of the house of Grimaldi, a scion of which (through a female branch) still continues to rule.

MONAD, in biology. See Infusoria.

MONADNOCK, mo-nad'nok, New Hamp¬ shire, an isolated mountain of a typical erosion character, near the southwest corner of the State, in Cheshire County, 10 miles southeast of Keene. The base covers an area of five miles by three, and the altitude is 3,186 feet above the level of the sea; it is composed of slate, talc and mica. The summit

commands a fine view, and it is a conspicuous landmark, visible even from the dome of the state house at Boston.

MONADNOCK. See Peneplain.

MONAGAS, mon-a'gas, Jose Tadeo, Ven¬ ezuelan soldier: b. Maturin, Venezuela, 28 Oct. 1784; d. El Valle, Venezuela, 18 Nov. 1868. He served in the War of 1813-21 tinder Bolivar and rose to the rank of brigadier-general and was afterward engaged in various military measures until 1830 when he became a member of Congress. Bolivar's death occurring in 1831 Monagas retired but was soon called to the command of the Orient. In 1835 he supported a revolution but made his peace with the gov¬ ernment a few months later and in 1847 was elected President. His administration was at first marked by liberal measures, but his policy

becoming arbitrary he was deserted by his party, whereupon he abolished Congress and assumed a dictatorship. He defeated Paez who led a revolutionary movement against him and disregarding his treaty, imprisoned him, and in 1851 took command of the army, the presi¬ dency being held by his brother. In 1855 he was reelected, but a revolution followed and he was compelled to leave the country in 1858, after resigning the presidency. He returned in 1864 and in 1868 headed a successful revolution and was elected President by Congress, but died before being installed in the office.

MONAGHAN, mon'a-han, John James,

American Roman Catholic prelate : b. Sumter, S. C., 23 May 1856. He was educated at Saint Charles College, Md., pursued a theological course at Saint Mary's Seminary, Baltimore, and was ordained to the priesthood in 1880. He held several pastorates in Charleston, S. C., and elsewhere, was chancellor of the diocese 1887-88, and assistant to the vicar-general at Saint Patrick's, Charleston, 1888—97. In May of the last-named year he was consecrated bishop of Wilmington.

MONAL, or MONAUL, a name among Anglo-Indian sportsmen for any of several Himalayan pheasants, especially the gorgeous species of the crested genus Lophopterus. See Impeyan Pheasant.

MONAMINE, in chemistry, an amine that is derived by replacing one or more of the hy¬ drogen atoms of a single molecule of ammonia by an equal number of monovalent organic radicals. Amines that are derived by joining two, three or four molecules of ammonia, through

the partial replacement of their hydro¬ gen by a single polyvalent radical, are called ditri-, and tetra-amines respectively; and the monamines are known as primary, secondary or tertiary, according as one, two or three of the hydrogen atoms of the ammonia molecule have been replaced. See Amine; Amide.

MONARCH BUTTERFLY. See Danais; Milkweed Butterfly.

MONARCHIANS, a sect in the early Church who asserted the oneness and single¬ ness of the divine person, as at variance with the orthodox doctrine of the Trinity, three Persons and one God. The supremacy of God the Father, they maintained, was impugned by those who said that the Son was coeternal. If there was but one God, they taught, and Jesus Christ was God incarnate, then the Father must have suffered and died. Hence they were called Patripassians (q.v.). Christ was there¬ fore merely one form or mode of the Father's manifestation; and the Father might also mani¬ fest himself through the Holy Spirit. This theory was called Modalism or Monarchial Modalism and its teachers Modalists. Praxeas (q.v.), a Christian of Asia, brought this doc¬ trine to Carthage in the 2d century and was controverted by Tertullian (q.v.). The most noted of Patripassians was Sabellius (q.v.), and Modalism was widely known as Sabellian-ism in both the Eastern and Western Churches. There were other Monarchians called Dynamic Monarchians who taught that Christ became Son of God dynamically, by having certain powers bestowed upon him in his adoption by

baptism. Pope Victor I in the 2d century ex¬ communicated Theodotus the Tanner who pro¬ fessed this theory, and an Asiatic synod (268) condemned and anathematized the view as taught by the noted Paul of Samosata (q.v.), the minister of Zenobia (q.v.), queen of Pal¬ myra. Monarchianism was revived in the 16th century by Socinus, and is in some form or other the essential basis of certain Unitarian creeds. Consult Harnack, A., (History of

Dogma } (Vol. Ill, Boston 1897).

MONARCHY (F r. monarchie, from Lat. monarchia, from Greek rule of one,

sole power). In the course of history, the word monarchy has been subjected to so many interpretations and has been applied to so many different kinds of governments that an exact definition or a classification of its main divi¬ sions is difficult. Strictly speaking, the word means undivided sovereignty or rule of a single person, and hence it has been used to describe states in which the sovereign or supreme au¬ thority is vested in a single individual, the monarch, who in his own right is the permanent head of the state. The king or chief magis¬ trate of a state may properly be termed a mon¬ arch only when he possesses the entire ruling power, but the term monarchy has outlived this original meaning and in popular language is used somewhat loosely to designate that form of government in which the chief authority is exercised ‘by a hereditary sovereign as distin¬ guished from republics with elected presidents, or for the <(monarchial principle® as opposed to the republican. Still more loosely the term is used to designate any government in which the political head is called king or prince, regard¬ less of the authority he may exercise or the manner in which political power is distributed. The changes in the power exercised by the monarchs of Europe have necessitated the in¬ vention of new terms for general use in de¬ scribing the various forms of government, but these terms in themselves are a contradiction of the true meaning of monarchy. We now have “limited® or “constitutional monarchy® as op¬ posed to “absolute® or “autocratic monarchy,® and a distinction is also made between “heredi¬ tary® and “elective monarchy,® though the dis¬ tinction is unimportant since these terms do not indicate the nature of the government.

As stated above, the absolute monarchy is the only real monarchy in the strictest interpre¬ tation of the word, since it is the only govern¬ ment in which the ruler is absolutely, supreme. (See Absolutism). A mixed or limited mon¬ archy is one in which the ruler, though still possessing the status and dignity of royalty, shares the supreme governmental powers either with a body of nobles, or with a popular repre¬ sentative body, or with both. A constitutional monarchy is one in which the power of the ruler is restrained by a constitution. Woolsey says : “Mixed monarchies are something more than limited ones. There may be a limited monarchy where king and people, the former restricted by a constitution, the latter organized and invested with certain means of preventing illegal government, are the only forces. This may be called mixed, perhaps, yet the term rather inclines to embrace only such states as have three or more political powers, as

king, nobles and people, united in the government, or

the same powers with the clergy, as in many mediaeval states. Thus all mixture contains limitations but all limited governments are not mixed.® There are now no constitutional or limited monarchies wherein the sovereign pos¬ sesses power to legislate by decree and in such a monarchy the democratic element is the only authority directly exercising any great degree of actual power. Monarchies are usually hereditary though they sometimes have been elective, but in the latter case they have gener¬ ally been attended with disastrous feuds and great confusion in the elections, as in Poland. Of the elective monarchies the most conspicu¬ ous were the papal states, the Pope being elected by the cardinals; but the states of the Netherlands were termed republics even though in some of them the office of stadtholder was hereditary. In Europe all monarchies were originally elective, within certain limits , and subsequent to the introduction of Christianity kinship with the reigning family did not count so much as the essential condition of the as¬ sumption of sovereign power as the "sacrmg by the divine authority of the Church. Consti¬ tutional monarchs in their origin may be elective or they may combine both systems, as when one family is disinherited and the supreme power under certain conditions declared hered¬ itary in another. The purely hereditary prin¬ ciple is of comparatively late origin, the out¬ come of obvious convenience which became a religious or quasi-religious dogma. The abso¬ lute monarchies of the present day are Abys¬ sinia, Afghanistan and Siam; and the limited monarchies are Belgium, Great Britain, Den¬ mark, Greece, Italy, Japan, Montenegro, The Netherlands, Norway, Persia, Rumania, Serbia, Spain and Sweden.

The conception of monarchy was derived through Christianity from the theocracy (q.v.) which was the earliest form of state and which was developed in Asia and northern Africa. The theocracy was ruled by a high priest or by a king or prince who represented within the limits of his dominions the monarchy of God over all things; hence religion was the bond of union and the idea culminated in the 17th cen¬ tury in the doctrine of divine right of kings. Therefore, when later transformed from a divinely ruled state into one with a human king, the distinguishing mark was despotism. But this barbarous form of monarchy was re¬ jected by the people of Aryan origin who gave some recognition to individual and class rights apart from the rights of kings and princes. Though at first the monarchies were absolute, yet the absolute monarchs were not always tyrannical but in many cases ruled for the good of their subjects. Among monarchs of this class

were Henry IV, Saint Louis, Canute, Charle¬ magne and others of the early centuries of European history and the “enlightened® or “benevolent® despots of the 18th century. The essential basis of the feudal monarchy (which followed the decline of Carolingian authority) was the bond of fealty between the king or supreme lord and his vassals, who derived from him their rank, power and property. The mediaeval monarchy was followed by the mod¬ ern absolute monarchy which first made its appearance in France, proclaiming the doctrine of divine right of kings and culminating in the absolutism of Louis XIV. The Stuarts of

England held this doctrine but the monarchial principle was shaken to its foundation by the execution of Charles I and the English revolu¬ tion of 1688, and was completely shattered by the French revolution of 1789. Since that time the monarchies of western Europe have been transformed into constitutfonal or limited monarchies, the growth of democratic ideas having infringed upon and greatly reduced the former powers of the king or emperor. ˆMonarchists.” strictly speaking, have long been a small and dwindling minority. See King; Absolutism; Sovereign; State; Government; Theocracy; Republic; Feudal System ; and the descriptions of the govern¬ ments of the various nations. Consult Brougham, H. P., (Political Philosophy,’ Pt. I (London 1842) ; Bluntschli, J. K„ (The The¬ ory of the State’ (6th ed., trans., Oxford 1885) ; Woods, F. A., (The Influence of Monarchs’ (New York 1913) ; Woolsey, T. D.,

(Political Science’ (Vol. I, pp. 487-585, New York 1878) ; articles on divine rights in The Outlook, 10 Sept. 1910; Living Age, 26 July 1913; and Current Literature, October 1910; and articles on modern kings and rulers and their influence as listed in the guides to period¬ ical literature.

MONASTERY. See Monasticism.

MONASTERY, Th®, a novel by Sir Walter Scott, published in 1820, the scene of which is in Scotland in the 16th century. In this tale Scott

for the first time introduces a supernatural ele¬ ment, as in the mysterious appearances of the <(White Lady of Arenel," and for this reason the book was never as popular with English readers as his other tales. Its sequel, ' The Abbot,' appeared the same year.

MONASTIC ARCHITECTURE. East Indian — The Buddhist priests' monasteries, known as vihdras, either adjoined or were in¬ cluded in the chaitya-house (building surround¬ ing the shrine). The most ancient (Hinayana) erected monasteries are no longer in existence, "but we know that the Jetavana monastery of Sravasti in the 5th century a.d. had splendid buildings seven stories high. The existing ancient monasteries are those cut into the living rock. Of these perhaps the following are of greatest interest: Those on the hills of the Upper Godaveri River, at Nasik; the Gautama-putra monastery (<(Cave III"), be¬ longing to the 2d century a.d. One of the grandest extant monastic structures is the Mahayana chaitya of Ajanta, but the magnifi¬ cent chaitya-house at Karle carved in the rocks of the Western Ghats, between Bombay and Poona, is considered to show the Hinayana School in its best light. The Buddhist rock-cut vihara at Bedsa, a 2d century b.c. work, has its cells round a chaitya-house, an apse around the chaitya and the usual barrel roof. The usual form of Indian monastery consisted of rows of cells ranged about the shrine, which was surmounted by its heavy mound (stupa). The architectural plan somewhat resembles the basilica with its interior lined with pillars and the shrine located in the domed extremity opposite the faQade. The style of the Dra-vidian religious edifice, with its pyramid-crowned gateway (gopura) , choultries, etc.,

belongs to the subject Architecture. See Architecture — Sasanian and Mohammedan.

Eastern Church. — The early Basilian monks attempted no special style or application of architecture, using the Byzantine, Greek or Eastern plans as best suited for their alloca¬ tions. From 306 to 322 the ascetics were with¬ drawing in bodies to the deserts, and under such leaders as Paul, Anthony and Pachomius, they established monasteries. To such belong those of Mount Athos (Rumelia), others in the Balkans, in Armenia, the Libyan Desert (((Coptic"). Many of these ((Levantine" mon¬ asteries were devoid of all external architecture, rendered as inconspicuous as possible to avoid drawing the attention of the passing marauding bands of natives. They were

usually sur¬ rounded by a high blank wall. The 4th and 5th century monasteries established under Pacho¬ mius rule in the Libyan Desert had small buildings, called laura, which contained sepa¬ rate cells, known in their combination as coenohia, the dwellers thereby being called Coenobites. They were governed by an abbas (father), hegumenos (leader), or archimand¬ rite (superintendent).

Western Church. — Benedictine Monasteries. — Saint Benedict published his (Rules' and es¬ tablished his monastery at Monte Casino about 520, but the first positive and complete informa¬ tion we have on monastic architecture of his Order is the plan (designed in 822) for the construction of the monastery of Saint Gall. The precept of Saint Benedict demanded that all the workers of the monastery should find their workshops inside the walls of the en¬ closure. In the Saint Gall plan the grounds form a long rectangle in which the church is about the centre. Annexed to the church are the dwellings of the monks, the chapter-house, cloister and refectory. In a wider circle are grouped the residence of the abbot, the school house, the lodgings for strangers, the stables, brewery, bakery, mill, workshops and barns. Behind the church are located the hospital with residence for physicians and a garden for cul¬ tivating medicinal herbs. Here are also an acolytes' school, cemetery, horticultural and vegetable gardens and a poultry yard. This ambitious plan was not carried out in its entirety and few of the buildings are now in existence.

Cistercian Monasteries. — While the Benedic¬ tines aimed at richness in architectural effect, especially in their church edifices, the Cister¬ cians held to strict simplicity. Their mother monastery was at Clairvaux, but the abbey of Maulbronn, Wiirttemberg, founded 1146 and finished in the 13th century, has come down to us in such a good state of preservation as to serve best for model. It is (according to periods of construction) in Late Romanesque, Transition and early Gothic. The cloister forms the central point connecting on the south with the church, on the east with the chapter-house and on the north with the men's re¬ fectory. To the west lies the lay refectory and, somewhat separate, we find the residence of the abbot and the farm buildings. When pressed for space the refectory served also as chapter-house, where the monks gathered daily to hear a chapter read from the (Rules' and in which the more important affairs were dis¬ cussed. The monks slept at first in a common

dormitory but later received separate cells. The dormitory was usually located in an upper story and the cell contained only a bedstead, table and stool and a window. The superiors, however, had more spacious and better fur¬ nished rooms.

Premonstratensian and Grandmontine Monasteries. — In these the central point of the enclosure is occupied by the cloisters, which include a separate court enclosed entirely by galleries under which the doors of the different apartments are located. In the centre of the court are a well and a cistern. The abbey church occupies one entire side of the square, either the north or south side. The western side of the cloisters is attached to the building which forms the exterior fagade of the abbey and is composed of cells or stores of provi¬ sions surmounted by the dormitory of the menial servants. On the side of the square facing the church is the kitchen, communicat¬ ing with the refectory by a wicket. The re¬ fectory has an elegantly carved chair for read¬ ing. On the east, following the refectory, come the workroom or several apartments serving as library, scriptorium, shops, *etc.* On the eastern side of the cloisters, between the work¬ ing quarters and the church choir is a passage affording access to the gardens, then comes the chapter-hall, generally several steps downward from the cloisters with which it communicates by a great portal flanked by two richly adorned windows. It is generally vaulted and neatly decorated; the abbots were often interred under its pavement. The sacristy is usually located between the chapter-hall and the church, also the vestment room and chart room ; sometimes a prison cell for delinquents. Above these compartments extends the dormitory of the monks, communicating by a staircase with the church choir. Opposite the stairway is the cell of the abbot overlooking his monks. The collection of buildings is closed in by a water¬ course or walls with an entrance on the east facing the fagade of the abbey. The porter's lodge is located alongside. Within this en¬ closure are the lodgings for the laity; eastward are the apartments for ecclesiastical guests and the novitiate. The agricultural buildings (near a stream) and the mill and factories are scat¬ tered on the sides, the infirmary being carefully isolated.

The monastic housing plans of the Jesuits differed greatly from those of the mediaeval monasteries. They rivaled one another in beautifying

and enlarging their buildings and grounds. The church, of course, showed the chief magnificence, but the libraries and re¬ fectories boasted all the ornamentation the architectural periods afforded. They set aside special spaces for festivities and for the en¬ tertainment of distinguished guests, even fur¬ nishing (in Austria) a theatre, Imperial hall and ducal hall. Good examples exist at Otto-beuren, Salem, Ettal, Saint Florian near Linz, Melk (Lower Austria). The Carthusians adopted a plan differing in many respects from other Orders; the Knights Templar united mili¬ tary architecture with that of the monastery. The Franciscans and Dominicans of the 13th century dropped tradition in modifications, and by the 17th century followed no style entirely. The Cluniacs (from 912) developed the Roman¬

esque style in their monasteries. The Cister¬ cians (from 1098) adapted the Gothic to their needs, and the Trappists also utilized the Gothic style. In Italy the Renaissance period (of course) furnishes the finest specimens of monastic architecture. Of such perhaps the most prominent is the Certosa, near Pavia (Carthusian), built 1473, with its celebrated church fagade, considered to be the most magnificent monument of the Italian early Renaissance. The Carthusian monastery, jDuilt by Michelangelo, which adjoins the Santa Maria degli Angeli church at Rome (now the Museo Nazionale delle Terme), is noted. The cloister of Santa Croce, Florence, contains the greatly admired portal of Brunelleschi. Con¬ sult Havell, E. B., Ancient and Mediaeval Architecture of India) (London 1915) ; Ju-bainville, d'Arbois de, (Essai de l'etat interieur des abbayes cisterciennes) (Troyes 1863) ; Lenoir, Architecture monastique) (Paris 1852-56). See Architecture; Byzantine Art; Christian Architecture.

Clement W. Coumbe.

MONASTIC ART. In its final analysis art is the visible, concrete proof of the develop¬ ment and stage of advance or decay of civiliza¬ tion. And the most prominent fact in connec¬ tion with the history of art of the Christian era is that the holy flame of the spirit of artistic effort was kept burning for numerous centuries solely by the aid of the Catholic Church (East¬ ern and Western), while all outside of the mon¬ asteries was in a riot of barbarism, devastation, murder and rapine.

Art in the Eastern Church. — The basilicas (q.v.) of the early Christians, themselves de¬ signed on pagan lines but adapted to their needs, used for internal decoration the art of mosaics, which

flourished in the 6th and 7th centuries. The monks produced manuscripts from the hands of their miniaturists, wonder¬ ful in their lovely illumination and calligraphy, beautiful creations in ivory, impressive ex¬ amples of gold and silversmithing, enamel work, embroidery, *etc.* These are in the style termed Byzantine. (See Byzantine Art). The conquering barbarians, with no native art of their own or knowledge of the antique, quickly absorbed the prevailing style, adopting it to¬ gether with the religious influences of the Christian Church. With the fall of the Roman Empire workers in the arts were driven to the Orient for their existence and art flourished in the churches of Constantinople and Terusalem. The Basilians, an order founded by Saint Basil (d. 380), had, among their "rules,® the mandate that work was part of their monastic life; and art was one of the chief "works® done in pro¬ ducing the decorative elements of the churches. In this mediaeval period we find the monastic life spreading from its centre (Constantinople) to Mount Athos (from 960). Greek monas¬ teries were founded at Rome in the 6th and 7th centuries, the cult reaching to south Italy, Sicily and Calabria. From the monastic art standpoint of great importance is the fact that Basilian monachism spread into Russia, and, its art accompanying it, was absorbed by the Slavs (Kiev c. 1050). The Byzantine miniatur¬ ists were in the zenith of their fame up to the 11th century.

Art in the Western Church. — All the above art work was under Oriental (Mohammedan) influence. In the 11th century commences the true Christian monastic art of Europe, but we must go much further back for its inception. The early Christian art of the monasteries of the Irish and the Anglo-Saxons (about the 5th century) remains a source of bewilderment and mystery when we consider its marvelous (exquisite illuminated manuscripts, art jewels in¬ laid with enamels, etc.) execution and remem¬ ber that the artist-monks had but just been converted to the Christian faith. And it was Winfred (683-755), an English priest who went as a missionary to Friesland and established successful monasteries and the adjunct art cult through North Germany, to be canonized as Saint Boniface after his

martyrdom. From the 6th century thb Benedictine Orders, starting from Monte Casino, Campania, carried on the entire culture of Europe for 500 years, the arts being a large and valuable part of the work. The ((Rules® of Saint Benedict, disclosed in his (Regula Monachorum) show the system required of the monks in their work. Cassio-dore followed Saint Benedict soon with his monastery at Viviers in Calabria and its li¬ brary, where in their cells (called scriptoria') the calligraphists and illuminators did their copying of manuscripts, illuminating and paint¬ ing as well. And we now come to the great crowd of painters, sculptors and architects as well as calligraphers and illuminators that were trained by the orders to radiate their influence and example through all classes of society. And it is to these disciples that the world owes all it owned of art from the 7th to 12th cen¬ turies. Great centres of Benedictine work, be¬ sides Monte Casino (Italy), were the Alemannic domain of Saint Gall and Reichenau, later Hirsau and Fulda, in Germany. In France led the Cluniacs (from 912) ; in England York and Canterbury were great monastic art centres. In this interesting period we find hard manual labor, side by side with intellectual endeavor, done by monk and prelate alike. We find Abbot Herluin carrying sand and mortar dur¬ ing the building of the monastery at Bee in 1033; Canonicus Hezelo, rich and distinguished, became a monk at Cluny so as to be able to work as coemcntarius (stonemason) on the great abbey church founded by Hugo; Count Frederick at Verdun, as a monk at Saint Van-nes, in 1000, dug the foundation to the dormi¬ tory with his own hands. The ranks of the monks of that day contained a remarkable num¬ ber of versatile artists. Tutilo of Saint Gall (end of the 9th century), Ekkehard tells us, was painter, sculptor, poet and teacher; Abbot Mannius of Evesham, England, was noted as painter, musician, calligraphist and goldsmith; Fulco, the praecentor of Saint Hubert's monas¬ tery in the Ardennes, was architect and minia¬ ture painter, besides being mentioned as an efficient stonemason and carpenter; the Alle-mannic chronicler Herman the Lame, at Rei¬ chenau, was a talented writer, poet, musician, while he was practised in astronomy and mechanics, at the same time being busy in making musical instruments and clocks. Bern-ward (b. 993, d. 1022), who rose from monk to bishop of Hildesheim, produced art work in metai and precious stones, some of which exist at the present day. He worked hard introduc¬

ing the arts and crafts into Germany, and es¬ tablished schools and studios in his palace, sending pupils abroad to learn the different Byzantine arts, secrets and styles. Thiemon, monk at Altaich and later

archbishop of Salz¬ burg, was painter (as he himself claimed when suffering martyrdom in Palestine) as well as architect and goldsmith. And we come, in the 12th century, to the great monastic influences over the arts in France. The prelates of that period greatly enriched their churches (espe¬ cially with goldsmithing work) with beautiful utensils for the cult. Of such monastic art patrons we find the name of Lambert, abbot of Saint Bertain at Saint Omer; of Gerard, bishop of Angouleme (d. 1136). But towering above all others would appear to have been Suger, who was abbot of Saint Denis (d. 1152), minister of Louis the Lusty and regent under Louis VII. Suger was censured by Saint Bernard for his rich beneficence to the artisans in embellishing his church. To his fine vessels in the precious metals he added furniture of .great artistic re¬ finement, also beautiful bronze doors with bas-reliefs of the Passion, *etc.* The episcopal and monastic schools of this century were pro¬ ducing more numerous and more beautifully illuminated manuscripts than in the preceding century, specimens of which are still extant. The abbey of Saint Denis created also lovely stained glass windows and mosaics. Some idea of the perfection of mechanical technique reached by the monks is afforded us by the work, (Diversarum artium schedula) written by Theophilus, a monk or priest (10th or 11th century), in which he defines the manipulation and gives the formulie used by the practitioners of the arts among the monks and lay cowork¬ ers. He gives perfect and practical information on painting on canvas, wood, vellum, glass, encaustic and fresco, mosaic work, goldsmith¬ ing, *etc.* While to the Rules of Saint Benedict and the assistance later of the Cistercians and Cluniacs in their establishments was due the propagation of art in the Middle Ages, the citizen class arising from the rapid growth in wealth of the civic communities together with the Crusades made a great change in the propa¬ gation of the arts. The clericals had not re¬ linquished their efforts to aid the art move¬ ment, for they maintained the closest relation¬ ship with the arts at least till the Rococo period and practised the work extensively. But the civic lay element, from the 13th century, be¬ came stronger and more and more distinguished. Thus, while the monastic orders held supreme domain in the building of churches, the lay body took up the leadership of the plastic arts and painting in the persons of Niccolo of Pisa, Giotto, *etc.* And with Brunelleschi and Alberti on the scene we find the field of architecture also falling into the hands of civilians, displac¬ ing permanently the monastic talent. This was the Trecento period of the early Renaissance. Consult Labarte, J., <Histoire des arts indus¬ tries au Moyen age et a l'epoque de la Renaissance) (Paris 1864) ; Kraus, F. X., (Geschichte der christlichen KunsC (Freiburg im Breisgau 1896) ; Springer, A. H., (Klosterleben und KlosterkunsC (Bonn 1886) ; Zouche,

R. C., (Visits to Monasteries of the Levant* (London 1916). See Christian Architecture; Manu¬ scripts, Illuminated.

Clement W. Coumbe.

MONASTIC ORDERS, Costume of. See

Costume, Ecclesiastical.

MONASTICISM, or MONACHISM, is a

state of life in retirement from the world adopted for motives of religion. It is not peculiar to Christianity, for in many religions, as that of Israel, and in those of India, China and Tibet, the same motive has led men to withdraw themselves wholly or in part from converse with worldly society and to seek in seclusion and retirement opportunity to lead a purer or higher life. The Nazarites, the Recha-bites, the Essenes, the Therapeutae were separa¬ tists from society in a greater or less degree, and in this respect were the precursors of the ascetae of the earliest Christian age and of the hermits or anachoretae and the coenobites of the 3d and 4th centuries.

In the middle of the 3d century, during the persecution of the Christians by Decius, Paul of Thebes in Egypt (Saint Paul the first hermit), withdrew to a wilderness, and during the remainder of his long life lived in absolute solitude in a cavern of a mountain, deriving his food and his vesture from a neighboring grove of palm trees. Many others fleeing from perse¬ cution or from the contagion of a profoundly corrupt society, flocked to the wildernesses of the Nile country; among them was Antony (Saint Antony), who after many years of the strictly solitary life of an anchorite was in a manner compelled by circumstances to adopt the coeno¬ bite rule. He was by choice an anchorite like Saint Paul the Hermit, but the fame of his vir¬ tues and his miracles brought to his cell in a remote wilderness many who desired to devote themselves to the service of God under such a master ; and as he could not refuse their prayer he became, in

fact if not in name, the Father or Abbot of a pretty numerous ccenobium ; hence he is called the Father of Monachism, that is, of the life-in-common of those who retire from the world for reasons of religion; they retain the title of monk, monachus (a solitary), though since Saint Antony's day they are no longer solitaries but coenobites.

Antony's coenobites occupied each a separate hut or a separate grotto; but Saint Pachomius, a contemporary of Antony, introduced a further development of the community life. The cells or huts were now to hold three brethren ; meals were eaten in common ; the labor of the monks was regulated ; the brethren were graded ac¬ cording to their spiritual proficiency; the com¬ munity was presided over by an abbot, with inferior officers ; in addition to the primitive industries of petty agriculture, basket-making and mat-weaving, the monks practised the trade of the smith, of the tanner, *etc.* ; there were daily assemblies of the community for prayer and conference. When Saint Pachomius died, about the middle of the 4th century, 7,000 monks were subject to his rule.

From Egypt monachism soon sprea-d into Syria, Palestine, Mesopotamia, Asia Minor and Armenia.

The introduction of monachism in the West¬ ern countries of the Roman Empire dates from a little after the middle of the 4th century when a few small communities of monks, under the Pachomian rule, were founded at Rome and in Northern Italy. Later, when the rule of Saint Basil had been translated into Latin, communi¬ ties of Basilian monks sprank up in Southern

Italy. Saints Jerome, Augustine and Ambrose were zealous promoters of monachism in Italy and Africa, Saint Martin of Tours in Gaul; when Saint Martin died (397) his body was fol¬ lowed to the tomb by 2,000 monks.

Whether under the Pachomian or the Basil¬ ian rule or under modifications of these, monas¬ tic establishments multiplied rapidly in the West. But the disorder which attended the decline of the Western Empire and the bar¬ barian invasions, had its effects upon mona¬ chism, and the monastery exhibited the same anarchy as did civil society.

Early in the 6th century Benedict of Nursia, who had already led for three years the life of a strict recluse in a cave at Subiaco, about 40

miles distant from Rome, was chosen by the monks of a monastery in the same place as their abbot; but very soon, his new ’subjects having deposed him, he returned to his solitude and commenced that reform of Latin monachism which made his name illustrious. He gave to his monks a rule which, variously amended and modified, has been the law of the monastic life of Western Europe ever since. In its preamble Benedict recognizes two and only two legitimate classes of monks — coenobites and anchorites

— those who lead the life in common and those who live in solitude — usually now called her¬ mits.

Two other classes he names, but only for condemnation, namely, sarabaites — professing monks who live two or three together without any superior or any fixed rule ; and gyrovagi or circulatores, tramps, wandering beggars who wear the cloak of a religious profession. To do away with these scandals of the monastic life, Benedict’s rule requires that the postulant for admission to a monastery shall take in addition to the usual monastic vows of poverty, chastity and obedience, a further vow that he will remain all his days in the community in which he makes his profession, and never be absent from the monastery save by leave of his superior.

Besides monasteries for men Benedict insti¬ tuted also monasteries for women, and the first abbess of a community of Benedictine nuns was his sister Scholastica.

The Benedictine order was for a long time a powerful agency in the civilization and Chris¬ tianization of the barbarian nations of Europe. Wherever a Benedictine foundation was made there the face of the country was quickly changed : forests were cleared, marshes drained, the arts of husbandry developed, peace and civil order maintained, science and learning fostered, schools, hospitals and refuges established.

Monastic institutions founded in Britain, France, Switzerland, Italy and Germany by Cel¬ tic monks prior to Benedict’s reform conformed to the Benedictine rule. The Carthusian order, founded in the end of the 11th century, was a reversion to the anachoretic type of monachism

— the solitary or eremitical instead of the coenobitic life. In the s&me century arose the order of the Camaldoli, another order of her¬ mits.

The beginning of the 12th century saw the rise of that singular

development of monachism, the knightly orders, the members of which be¬ sides the usual three vows of the monk took a fourth vow, of making war on the infidels for the defense of Christendom. The Knights Hos-

pitallers were originally a religious society bound by vow to harbor in health and in dis¬ ease pilgrims visiting the holy places in Jeru¬ salem ; their house in the holy city was a (<hos-pitalw or guest-house. The full title of the Knights Templar is <(pauperes commilitones Christi templique Salomonis" — poor knights-companions of Christ and of Solomon's temple. Another military order contemporary with these was the Teutonic order. History records the titles of over 90 military orders or of bodies styling themselves so.

The chronic state of war between Christen¬ dom and the Mohammedan power led to the in¬ stitution of the order of Trinitarians and that of Our Lady of Mercy. The mission of these orders was the redemption out of slavery among the Mohammedans of Christian captives. Bear¬ ing the alms and gifts contributed1 by the char¬ ity of Europe, the members of those orders visited the Mohammedan countries on the Med¬ iterranean and procured the liberation of the enslaved Christian captives and restored them to their native countries. The Trinitarians had at one time 250 houses ; the Christians redeemed by them, from first to last, numbered oyer 30,000. The order of Mercy was at first a mili¬ tary order, but in 1218 it put off its military character, and devoted itself wholly to the char¬ itable work of redeeming the captives.

There seemed to be now a sufficiency of re¬ ligious orders to satisfy all needs. But at this very time, the beginning of the 13th century, two new orders were instituted — and that by Pope Innocent III. who in the Lateran Council had procured the enactment of a decree forbid¬ ding the creation of new monastic orders. The new institutes were the order of the Friars Minor (Franciscans) and that of the Friars Preachers (Dominicans) ; and to these very soon were added two more — the order of Austin Friars (Augustinians) and that of the

Carmelites. These are the four mendicant orders, so called because by their rule they re¬ nounce all property and all endowments and subsist on the alms of the faithful.

The membership and the establishments of these mendicant orders increased with aston¬ ishing rapidity throughout the whole of Europe. Dominican and Franciscan friars were-soon the great lights of the theological schools — Albertus Magnus, the Doctor Universalis, as he was styled by his contemporaries, and Thomas of Aquinum, the Angelic Doctor, being the fore¬ most of the Dominican divines, and Duns Scotus, the Doctor Subtilis, and Roger Bacon holding the first rank among the Franciscans. The friars were also effective missionaries both among the poor and the rural populations at home and among the heathen and the infidels.

The Company of Jesus is the latest of .the great religious orders; it was founded in 1534 and its mission was to resist the onward march of Protestantism, directly by combating the Protestant assault on the Catholic Church and by instructing the Catholic populations in the grounds of their religious faith and practice; indirectly by organizing a system of higher edu¬ cation for Catholic youth, and offering educa¬ tional advantages superior to those afforded by Protestant universities and academies. The Company of Jesus took also as its special field of labor the evangelization of the heathen.

Nearly all the later religious orders and in¬

stitutes have had for their object the Christian education of the young, the reformation of the fallen, or the relief of the poor and distressed; among the orders established for these ends are those of the Nuns of the Good Shepherd, the Sisters of Charity and of Mercy, the Brothers of the Christian Schools, and numerous other congregations.

The Reformation was hostile to monasticism, and in those countries where it obtained, the monasteries were suppressed and the monastic life disappeared. Henry VIII seized upon the monastic properties throughout his realm and applied them for his own religious or secular purposes. In Protestant Germany, Scandinavia and Switzerland, the monastic institution ceased to exist shortly after the triumph of the Ref¬ ormation. In the 18th century a concertedly hostile movement against monasticism took shape in all the countries under Bourbon rule. The governments of Portugal, France, Spain, Sicily and some of the Italian principalities ex¬ pelled the Jesuits and

brought such political pressure to bear upon the Papacv that Clement* XIV reluctantly signed the decree suppressing that famous Society in 1773. Pius VII restored the Society in 1814. During the latter half of the 19th century a recrudescence of hostility on the part of the governments of the Latin countries against the religious orders manifested itself. In Spain, France, Italy, Mexico and some of the South American republics expul¬ sion for some orders and hampering restrictions upon freedom for others have contributed to retard their growth and development. The rea¬ sons usually alleged for these coercive measures by these governments are political and economic, the merits of which it would be out of place to discuss here. In the open¬ ing decade of the 20th century the French government aimed a deadly blow at monas¬ ticism in that country in its Associations Law. Germany admits all the religious orders except the Jesuits. In Great Britain full freedom is now given in the establishment and development of monastic institutions. In the United States, _ where there are absolutely no legislative restrictions upon the freedom of monastic life, the religious orders are in a flourishing condition. In this country there are 8,400 male and over 50,000 female members of religious orders.

In the Church of England within the last 50 years there has been a revival of the monastic idea with no inconsiderable results. Dr. John Mason Neale and Canon Carter pro¬ moted the establishment of sisterhoods (of Saint Margaret and of Saint John Baptist), in which life vows of poverty, chastity and obedience were taken, and a mother house of the Sisters of Saint John Baptist was founded in New York as a branch of the central house in England. There is also the Protestant Episcopal sisterhood of Saint Marv and many others in the United States. Among the male orders of Protestant monasticism must be men¬ tioned the Cowley Fathers, founded bv Dr. Ben¬ son, and in the United States the Order of the Holy Cross, a preaching order founded by J. O. Huntingdon, son of Bishop Huntingdon. An order of monks was also founded by Rev. Joseph Leycester Lyne in 1870 at Llanthony Abbey, Wales, and the strict rule of Saint Benedict was adopted. It is no exaggeration to say that the

monastic movement is now flourishing, both in the Church of England and in its daughter church, the Protestant Episcopal Church in the United States. For further details see . the articles on the various orders, Benedictines, Cistercians, *etc.*

Bibliography. — Allen, A. V. G., (Monasticism in its Relation to the Episcopate and to the Catholic Church } (in (Christian Institutions, > New York 1909) ; Allies, I. W., (The Monastic Life, from the Fathers o,f the Desert to Charlemagne* (London 1896) ; Bertouch, (Geschichte der geistlichen genossenschaften* (Wiesbaden 1888) ; Butler, E. C., in Cam¬ bridge Mediaeval History) (Vol. I, Cambridge 1911) ; Clarke, W. K. L., (St. Basil the Great, a Study in Monasticism* (ib. 1913) ; Feasey, H. J., (Monasticism) (London 1898) ; Gasquet, Francis A. (Cardinal), (Monastic Constitu¬ tional History) (ib. 1896) ; id., (Henry VIII and the English Monasteries* (ib. 1910) ; Hannay, J. O., (Spirit and Origin of Christian Monasticism* (ib. 1903); Harnack, A., (Monasticism : 'Its Ideals and History) (Eng. trans., New York 1910); Heimbucher, A., (Die Orden und Congregationen der katholischen Kirche) (Paderborn 1896; 2d ed., 1907); Henrion, (Histoire des ordres religieux) (Paris 1835) ; Mohler, (Geschichte des Monchthums in der Zeit seiner Entstehung,* edited by Dollinger (Regensburg 1839) ; Montalembert, C. F. R. de T., (Les Moines d'Occident* (Eng. trails., 2 vols., London 1896) ; Morin, L. F. G., 'Ideal of the Monastic Life Found in the Apostolic Age* (New York 1914) ; Smith, I. G., Christian Monasticism from the Fourth to the Ninth Centuries) (London 1892) ; Steel, 'Anchoresses of the West) ; id., Convents of Great Britain* ; Taunton, 'English Black Monks) ; Weingarten, 'Ursprung des Monchthums) (Gotha 1877) ; Wheeler, E. R., 'Women of the Cell and Cloister) (London 1913) ; Wishart, A. W., 'Short History of Monks and Monasteries) (2d ed., Trenton 1903) ; Woodhouse, F. C., (Monasticism, Ancient and Modern) (London 1896) ; Workman, H. B., (Evolution of the Monastic Ideal* (ib. 1912).

MONASTIR, mon'a-ster, Africa, a seaport town on the east coast of Tunis on a peninsula in the Gulf of Hammamet. It is strongly for¬ tified with surrounding walls surmounted by towers and has its Kasba (castle), 13 mosques, a high school for the natives and beautiful gar¬ dens in the vicinity. Its chief industries are soap-making and oil trade. The town is known locally as Mistir and is the ancient Ruspina. Its population is about 6,000, most ot the Euro¬ peans being Italians and Maltese.

MONASTIR, or BITOLIA, be-to'li-q, Jugo-Slavia, a city and district of

Macedonia (q.v.). The city, 86 miles by rail northwest of Saloniki, is attractively built at the west edge of a plain, in a recess formed by two lofty moun¬ tains, and is intersected by a river, crossed by numerous bridges. The streets are wide and well paved ; the houses neat and clean ; the mosques and minarets picturesque; and the ba¬ zars handsome. Before 1912 Monastir was an important centre for military operations by Tur¬ key and was a scene of great activity during the Balkan Wars 1912-13 and after the out¬ break of the European War in 1914. The ma¬ jority of the inhabitants are Greeks and Bul¬

garians, the Turkish residents being now few in number. It carries on a large trade with Con¬ stantinople, Saloniki, Vienna and Trieste. Pop. about 45,000. The district has an area ot 10,690 square miles. Pop. about 850,000.

MONAZITE (Greek, “solitary,® in allusion to its rare occurrence), a native phosphate of the metals of the cerium group, often also con¬ taining more or less thorium silicate. It is reddish or brownish in color, with a resinous lustre, and crystallizes in the monoclinic sys¬ tem, though it also occurs in massive and granular forms. It is commonly translucent and brittle, with a hardness of from 5 to 5.5, and a specific gravity of about 5.0 to 5.2. It is found at Norwich, Conn., and also in the Ural district, as well as in Australia, Brazil and other parts of the world. The chief commercial supply, however, comes from North Carolina and from certain parts of Brazil. In these regions monazite is a constituent of the granitic rocks, and is obtained by washing the gravels and sand that have been formed by the disintegration of those rocks. The Brazilian output has been controlled by a German syndicate since 1902, and practically all of it now goes to Europe. The monazite produced in the United States comes chiefly from Burke and Cleveland coun¬ ties, North Carolina. Monazite owes its in¬ dustrial importance to the cerium and thorium that it contains, the former being utilized for the preparation of cerium oxalate, which is used in medicine and in the arts, while the tho¬ rium is employed in the manufacture of man¬ tles for incandescent gas-lighting.

MONBODDO, James Burnett. See Bur¬

nett.

MONCHEUR, mon-sher, Ludovic, Baron, Belgian diplomat: b. Brussels, 12 May 1857. He was educated at Louvain, entered the diplo¬ matic corps, became attache to the Belgian lega¬ tion at The Hague in 1883

; held posts in the legations to Vienna (1885), (Berlin (1887), Rome (1892) ; became minister to Mexico in 1898; and in 1901 became minister to the United States. He has written on the geo¬ graphy of Mexico and is a member of the Ant¬ werp Geographical Society.

MONCLOVA, mon-klo'va, Mexico, a town of Coahuila, the terminus of a branch line of the Mexican International Railroad to Cuatro Cienegas, 100 miles northwest of Saltillo. Monclova dates from the 17th century and was formerly the capital of the dual state of Coa¬ huila and Texas. It has railroad works, cot¬ ton factory, stock raising interests, and a trade in the agricultural produce of the region. Pop.

7,000.

MONCRIEFF, mon-kref', Sir Alexander,

British ordnance expert, inventor of the dis¬ appearing gun system : b. Edinburgh, 17 April 1829; d. Bandirran, 3 Aug. 1906. He was edu¬ cated at Edinburgh and Aberdeen ; apprenticed to a civil engineer ; served in the Scottish Royal Artillery; during the Crimean War planned the Moncrieff ordnance system, also called the pro¬ tected barbette, or the disappearing system, for the invention of which he received $50,000 from the British government. The important point in this system is that the recoil of the gun is utilized to drop it out of sight after firing and to raise it again when necessary, a contrivance

which did away with the cumbrous and expen¬ sive system of steel-plated forts. It substituted for them the simple, inexpensive Moncrieff pits, mere slight excavations for the masking of coast batteries. He received the honor of Knighthood in 1890.

MONCTON, munk'ton, Canada, a city and port of> entry in Westmoreland County, New Brunswick, at the head of navigation of the Petitodiac River, a tidal stream entering the Bay of Fundy; the

Atlantic terminus of the National Transcontinental Railway, 86 miles northeast of Saint John, and 185 miles north¬ west of Halifax. It has a good harbor and an extensive trade in lumber and produce. The tide in the Petitcodiac estuary is one of the most remarkable in the world, coming in with a bore from four to six feet high and rising (in spring tides) to a maximum height of 60 feet. The offices and chief workshops of the Cana¬ dian government railways are here, employing 2,000 men. Enormous quantities of natural gas have been discovered in the vicinity, which are used for light, heating and power, the street railways being run by this means. Moncton was celebrated for its shipbuilding in the days of wooden vessels. Pop. 11,345.

MOND, mond, Ludwig, English manufac¬ turing chemist: b. Cassel, Germany, 7 March 1839; d. 11 Dec. 1909. He was of Jewish par¬ entage, and educated at the Cassel Polytechnic and the universities of Marburg and Heidel¬ berg; went to England in 1862, to enter the ep-ploy of the Leblanc soda works, where he in¬ troduced his method of recovering sulphur from alkali waste; in 1873 introduced the Sol-vay process of manufacturing ammonia soda, into England; and continually improved this process. His alkali works at Northwich are the largest in the world. He invented a means of manufacturing chlorine as a byproduct of the ammonia soda process, and devised new gas-batteries, new processes for manufacturing nickel based upon his discovery ot nickel car¬ bonyl, and a new method of producing gas for power and heating, ammonia being a by-prod¬ uct. In 1896 Mond endowed the Davy-Faraday Research Laboratory at the Royal Institution. His remarkable collection _ of paintings, be¬ queathed mainly to the National Gallery, Lon¬ don, has been described by J. P. Richter in (The Mond Collection (London 1910).

MONDAY (moon and day; Saxon, Monan-daeg; German, Montag; Latin, lunce dies), the second day of the week, formerly sacred to the moon. See Calendar.

MONDE (LE) OU L’ON S’ENNUIE,

le mond oo Ion son’nwe (‘The Society that Bores) 1881), by Edouard Pailleron, is still, what after 15 years it seemed, ((on the whole the most brilliant comedy of modern days” {Athenaeum, 27 Jan. 1906). It is not only an extremely keen and witty satire on the modern Parisian blue-stocking, the counterpart for its day of Moliere’s (Femmes savantes,} but its individual characters stand out so clean-cut that “keys” to it were once in vogue, and many thought to recognize unmistakably some at least of the originals. The .outstanding

characters are all types easily recognizable in modern counterparts of this society of literary, intellec¬ tual, political and social pretense. First is Bel-

lac, the complacent object of admiring adula tions, such as the would-be intellectual Parisi-ennes were then bestowing on Professor Caro, who vapors of Platonic love, the better, in his own phrase, to (<enjoy life and avoid mar¬ riage." Then there is the soldier-senator bore, General de Briais ; the transcendental bore, Saint-Reault; the sentimental, yet shrewdly tart Duchess de Reville, who insists: "The older I grow the more I see that there is no happiness else in the world than love" ; her niece, Madame de Ceran, the hostess, busybody of intrigue for reputation, and Lucy Watson, the may-pole Englishwoman, who translates Schopenhauer. The better to set these off and spice the whole come the recently-married, gaily sensible Paul and Jeanne Raymond and the delightfully ingenuous young girl Suzanne, vivacious yet tender, sensible yet gamine, whose hand one grudges a little to her guardian, the right-hearted but rather slow-witted Roger. Consult Claretie, 'Edouard Pailleron) (Paris

1883).

Benjamin W. Wells.

MONDOVI, mon-do-ve, Italy, an episcopal city in the province of Cuneo, 58 miles by rail south of Turin. Its chief building is the 15th century cathedral of San Donato crowning the steep height of the upper town. Silk, cloth, paper, pottery, machinery, etc., are among its manufactures, and it has a school of industrial arts and handicrafts. Near the city the Sardin¬ ians were totally defeated by Napoleon, 22 April 1796. Pop. 10,000; with suburbs, 19,300.

MONER, the simplest form of protozoan, regarded as the simplest known animal organ¬ ism, and included among the rhizopods in the order Lobosa. One of the forms most frequently met is Protamaeba. Consult Haeckel, E., his¬ tory of Creation, > ed. by Lankester (4th ed. 1906).

MONET, mo'na, Claude, French painter: b. Paris, 14 Nov. 1840. He opened a new road to landscape painting by his application of scien¬ tific principles deduced from the laws of light. His work, a magnificent verification of the opti¬ cal discoveries made by Helmholtz and Chev-

reul, forms the very basis of the Impression¬ ist movement with all its chromatic demonstra¬ tions of light and color. Suppression of local color and the study of reflections by means of complementary colors and division of tones by the process of pure, juxtaposed colors are the essential principles of Impression. Monet's first luminous studies date from about 1885. For years he remained unknown.

Light is the real subject of his pictures. He has treated one and the same site in a series of pictures painted from nature at all hours of the day. The most famous of this series are the ' Hay-ricks,) the (Poplars, *the 'Cliffs of EtzetatC the 'Golfe JuanC the 'Coins of Riviere. > the 'Cathedrals, > the 'Water Lihes) and the 'Thames.* Monet paints this series from nature. He notes, for example, from 9 to 10 o'clock the most subtle effects of sun¬ light upon a hay-rick; at 10 o'clock he takes up another canvas; and so on from hour to hour, he follows step by step the modifications of the atmosphere. He finishes almost simultaneously the whole series. He has painted a hay-stack in a field 20 times over and the hay-stacks are all different; and when

this series is exhibited the beholder can follow, led by the magic of his brush, the history of light playing on one and the same object, a dazzling display of luminous atoms, a presenta¬ tion of atmospheric vitality. The shadows, true to nature, are lights where certain tones — blue, purple, green or orange — predominate exactly as happens in optic science.

Usually his subjects or motifs are simple; a hay-rick, some slender trees, a cluster of shrubs or group of rocks. No one knows bet¬ ter than he how to place a rock amidst tumul¬ tuous waves, how to construct an enormous cliff or how to give the sensation of a group of pine-trees blown and bent by the wind. Most unexpected tones play in the foliage and on the ground. On close inspection the beholder sees the canvas striped with orange, red, blue and yellow touches of the brush, but seen from a distance the freshness of the green foliage ap¬ pears as in nature. The eye of the beholder recomposes what the painter's brush has analyzed and dissociated. Monet is now con¬

sidered one of the greatest of all landscape painters, ranking with Claude Lorrain and J. W. M. Turner. He understands and depicts with equal facility the true character of every soil and the true character of every kind of vegetation. Monet is also able to turn like all great artists from demonstrations of power to displays of tender charm. His studies of the austere rocks of Belle-Isle en mer where heavy waves and blinding spray dash with fury over the granite rocks are unparalleled, while his series of Water-lilies express the melan¬ choly and quiet beauty of sequestered pools where the water is thick with tangled stems and sleepy blossoms. Monet has also painted the woods in autumn where the sunlight plays on tones of bronze and gold and red ; chrysan¬ themums, dazzling sun-flowers, tulip-gardens in Holland; sailing boats on sunny rivers; and many portraits and other studies. The series called (The Cathedrals) is famous. It consists of 17 studies of the west front of Rouen Cathedral, the towers of which fill the whole space of the picture. The gray stone, worn by time and blackened for centuries, is for 17 times made the theme for the painter's vision. Pale and rosy at sunrise and differently rosy and glow¬ ing at sunset, purple at midday, shrouded in mist or ethereal under the moonlight, the superb faqade is reconstructed in the boldest way, yet producing the effect of its thousand details of architectural beauty and exhibiting the most dazzling and poetic atmospheric har¬ monies. Whatever subject he treats Monet creates an aesthetic emotion in the beholder. Consult Duret, (Le peintre Claude Monet> (Paris 1878); Van Dyke, John C., 'Modern French Masters5 (New York 1896).

MONETA, in Greek mythology, a name ap¬ plied to Juno, known as the goddess of coin or money. A temple was dedicated to her in this capacity on the Capitoline Hill, in which the mint was located.

MONETARY COMMISSION OF THE UNITED STATES CONGRESS, a commis¬ sion appointed in August 1876, by the 44th Con¬ gress, to inquire into the causes and economic effects of the decline in silver, the best means for resuming specie payments and other na¬ tional monetary questions. The commission

consisted of three senators, three representa¬ tives and three monetary experts. Meetings were held in Washington and New York, dur¬ ing a period of six months. The results of these conferences were published by the government in monographs issued by the Treasury De¬ partment.

MONETARY CONFERENCES, Inter¬ national. In addition to the monetary conven¬ tions (q.v.) held among European nations, four great International Monetary Conferences have been held, three at Paris 1867, 1878 and 1881, and one at Brussels in 1892. Encouraged by the success of the Latin Union (q.v.), France invited all the powers to participate in a gen¬ eral conference for the purpose of relieving the problems of international exchange. The con¬ ference was attended by 18 European nations and the United States, and was presided oyer by the French Minister of Foreign Affairs. Eight sessions were held, the principal topics of discussion being the uniformity of coinage and the larger problems attendant upon such proposed uniformity. Two important decisions were reached: (1) that it would be more ex¬ pedient and less expensive to the several nations to adopt as a uniform standard some already existing monetary system than to invent a new standard; and (2) that gold was the only standard which was adapted to international money. The standard of fineness was set at nine-tenths, and the five-franc piece was recom¬ mended as the common denominator. It was likewise agreed that all gold coins having this common denominator should have legal cir¬ culation in the states mutually bound by the conference. Since no treaties were contracted to bind the members of the conference to their decisions, little was really accomplished. . The principal value of the first conference lay in the fact that it opened the way to further discus¬ sion.

The second conference was called by the United States by Act of Congress, 28 Feb. 1878, under which the President was directed to in¬ vite the nations of Europe to join in a “con¬ ference to adopt a common ratio between gold and silver for the purpose of establishing inter¬ nationally the use of bi-metallic money, and securing fixity of relative value between those two metals. 5) This determination was occa¬ sioned by the fact that the silver production of the United States had assumed immense pro¬ portions. Also Germany’s use of the gold standard threatened the value of silver money, and it was deemed advisable to establish the ratio between gold and silver before serious depreciation of the value of silver might set in. Twelve countries participated, Germany alone of the great powers refusing to enter into the conference. The United States submitted two propositions,, one covering the desirability of the unrestricted coinage of silver and its use as money of unlimited legal tender; and the sec¬ ond, advocating a double standard of gold and silver on the basis of the establishment of a fixed ratio between them. The European powers with the exception of Italy, after much discussion, made answer as follows: “That it is necessary to maintain in the world the monetary functions

of silver as well as those of gold, but that the selection for use of one or the other of the two metals, or of both

simultaneously, should be governed by the special position of each state or group of states. ® They agreed also that bimetallism must be determined by the discretion of the individual states chiefly in relation to the country's relation to the silver market ; and that, in lieu of the fact that a mutual agree¬ ment on the question of ratio between the two metals could not be reached, the question had better be dropped for the time being. The con¬ ference therefore produced no effective results.

The French and United States governments joined in calling the third conference. The decline of gold production again brought up the problem of bimetallism. England and France met with seriously diminished gold re¬ serves, and the United States was forced to import gold, which upset the European market. Germany was unable to find a satisfactory means of disposing of her stock of silver. Nineteen countries attended the conference. It recommended the establishment of the 15*4 to 1 .ratio, and then adjourned for the purpose of giving the various nations time to consider the proposition, with the intention of recon¬ vening on 12 April 1882. However, the con¬ ference was not reassembled on that date, and was therefore fruitless.

The fourth conference was called by the United States <(for the purpose of conferring as to what measure, if any, can be taken to increase the use of silver as money in the cur¬ rency system of nations.® Twenty countries were represented. A delay was caused by the fear of a cholera epidemic, and in November 1892, the sessions were finally held. England and the United States were the most enthusias¬ tic members of the group. Political factors began to play also on the interests of these two countries, and the discussion, though lengthy, was altogether unprofitable. Various schemes for a bi-metallic standard and for the wider circulation of silver through some co¬ operative system were brought forward. There was no unanimity and

the conference finally adjourned; 30 May 1893, was the date set for its reconvention, but this never took place. (See Money). Consult the various official reports of the conferences; and also (Coinage Laws of the United States> (1792-1894) ; Muhleman, M. L., (Monetary Systems of The World) (New York 1895) ; and Russell, H. B., Hnternational Monetary Conferences) (New York 1898).

MONETARY CONVENTIONS, confer¬ ences between European nations, for the regu¬ lation of their coinage. Two of such conven¬ tions have been held, the ((Latin Monetary Con¬ vention,® and the ˆScandinavian Monetary Con¬ vention.® The former includes France, Bel¬ gium, Italy and Switzerland, the agreement having been made in December 1865, in virtue of which the coinages of those countries are of the same weight and fineness. Greece sub¬ sequently joined the convention, and assimi¬ lated her drachma to the franc. Spain, Austria and Hungary, Finland, Rumania, Serbia, Bul¬ garia and Monaco have also coined large amounts of either or both gold and silver money, of weight, fineness and value exactly proportionate to, or identical with, that of the countries included in the convention. Since 2 Aug. 1892, the gold standard has prevailed in Austria, and since 1 Oct. 1897, in Japan. The

ˆScandinavian Monetary Convention" dates from 1873, and includes Norway, Sweden and Denmark. See Latin Union.

MONETITE, a native acid phosphate of calcium, CaHP04 occurring massive and in small, triclinic crystals, in the islands of Moneta and Mona, in the West Indies. The mineral is found in limestone, beneath a deposit of guano. (Also spelled (<monitite.®)

MONEY, Walter, English author: b. Don-nington, Berkshire, 21 Aug. 1836. He received his education in a private school and early be¬ gan to study on historical and archaeological sub¬ jects, and for a number of years was the local secretary of the Berkshire Society of Antiqua¬ rians, London, and of the British Archaeological Association. From 1889-97 he was a member of the Berkshire County Council. Among his publications are (The History of Newbury) ; (The History of Hungerford) ; (The History of Speen — the Roman Spinae) ; (Church Goods in Berkshire> ; (The Two Battles of Newbury, 1643-44 > ; (The Story of the Siege of Donning-ton Castle) ; (The Siege of Basing) ; (A Royal Purveyance in the Elizabethan Age* ; (A Pop¬ ular History of Newbury and the Neighborhood) (1905) ; and many memoirs on historical and archaeological subjects.

MONEY. Money is a term used to describe the standard of value and a very important part of the medium of exchange of a country. By a standard of value is meant any commodity, which is used to measure and express the ratios in which other commodities exchange for each other. For example suppose whea-t has been traded for wood, cattle, sheep and plows on the following terms: 1 cord of wood for 5 bushels;

1 ox for 50 bushels; 1 sheep for 20 bushels; and 1 plow for 10 bushels. The figures 5, 50, 20 and 10 express the market values of these commodities and the ratios at which they should exchange for each other, and, since each refers to bushels of wheat, wheat may be called the standard of value.

Standards of Value. — In a community in which barter was the only method of exchange each person would trade the commodity he produced or the service he rendered for the other commodities and services he required, and would express their values in terms of the com¬ modity or service thus bartered, no other method of' expressing their values being available to him. Standards of value in such a community would therefore be individual and would be as numerous as the individual traders, and diffi¬ culty would be experienced in discussing values because each person would speak a language not intelligible to others or only intelligible after a mathematical calculation. For example, one man would express the value of a given com¬ modity, say a horse, as so many bushels of wheat, another as so many cords of wood, an¬ other as so many yards of cloth, another as so many days of labor, *etc.* The only method of removing this difficulty would be the acquisi¬ tion by each member of the community of the ability and the habit of quoting values in terms of the same commodity; that is, by the acquisi¬ tion of a community standard.

Such community standards were early estab¬ lished in every trading group of which history furnishes any record, and, as trade developed

between different communities, standards com¬ mon to wider and

wider areas and to larger and larger groups appeared, until, with world¬ wide trade, we have standards common to many nations. Indeed, at the present time all the nations in which commerce has been highly developed use the same standard, gold, and only two standards, gold and silver, are used throughout the civilized world.

Only a commodity which possesses a high degree of utility for purposes of ordinary con¬ sumption can serve as a community standard since only for such a commodity would every person barter his commodities or services, and such barter, as we have seen, is a condition necessarily precedent to service as a community standard. Since several commodities in the same community and at the same time, how¬ ever, may possess this essential quality of univeral exchangeability, other qualities are also important in the determination of a community's standard. These are high value in proportion to bulk, divisibility, durability, fitness for coin¬ age and steadiness or stability of value. The first four of these are important, because, as will appear later, it is desirable that the stand¬ ard of value should serve as an element in the medium of exchange, and the fifth because of the relation between the standard of value and prices which will also be explained later. Among several commodities, therefore, for which every person has frequently bartered his commodities or services, the one which pos¬ sesses these other qualities in the highest degree of perfection will become the community stand¬ ard. This fact explains the almost universal use of gold and silver for this purpose, and the possession of the first of these qualities, relatively high value in proportion to bulk, and possibly the last one, steadiness and stability of value, in a higher degree than silver, account for the use of gold as a standard in the most important commercial nations of the world. # The numerical expression of the ratios in which goods exchange for the standard of value is called prices. Thus in the United States when we say that the price of a bushel of wheat is one dollar, we express the fact that wheat is exchanging on our markets for stand¬ ard gold at the ratio of one bushel of the former for 25.8 grains of the latter, which amount of gold has been declared in our stat¬ utes to constitute a dollar. This being the case, the causes of changes in prices may be grouped under two heads, namely, those affecting the value of the standard commodity and those affecting the value of the commodity the price of which is under consideration, value in this connection meaning not ratio of exchange, but that quality of a commodity which is changed in magnitude by changes in the relations be¬ tween its demand and supply. The price of wheat, for example, will change when the rela¬ tion between its demand and supply changes, or when the relation

between the demand and supply of gold changes, unless the change in the value of one commodity exactly offsets that in the value of the other.

The phrase standard of value, as used in the preceding sections, should be qualified by the adjective primary, in order to distinguish it from standards occasionally used which may be described as secondary. In the United States 2 secondary standard wa* in use from 1862 to

1879. In the former year the United States government, in order to assist in paying the expenses incident to the war then in progress, issued its notes promising payment to bearer in denominations suitable for circulation as money and made them legal tender in payments between individuals, i.e., decreed by law that the tender of these notes in the payment of financial obligations would constitute discharge of such obligations.

These notes speedily depreciated. That, is to say, the people of the United States, and of other countries as well, did not consider them worth, and would not give for them on the open market, the amounts the payment of which was promised on their faces. As a result of this depreciation these notes took the place of coin in the circulating medium of the country, because people could melt down the coins and exchange the bullion for these notes at their depreciated value and with them meet a much greater volume of financial obligations than they could have met by tendering the coins directly. When everybody thus came to ten¬ der depreciated notes in the payment of all their obligations, prices were universally quoted in these notes instead of in gold, and they thus became the standard of value of the country.

The dependence of prices upon the value of gold was not, however, thereby in any way broken. What the government promised to pay in these notes was dollars, and dollars meant a certain amount of gold carefully speci¬ fied in laws enacted by Congress. The value of the. notes themselves, i.e., what people were willing to pay for them on the open market, was daily quoted in terms of the gold stand¬ ard. The notes, therefore, were a secondary standard only, gold continuing to serve as the primary standard. Under these conditions prices fluctuated, not only because of changes in the relative value of gold and of. com¬ modities, but also because of changes in the degree of depreciation of these notes.

The phrase medium of exchange describes the go-between in exchanges now almost uni¬ versally used in place of barter. Instead of ex¬ changing the good or service we have directly for the one we want, we nowadays exchange it for a third thing which we in turn exchange for what we want and this third thing is called a medium of exchange. A farmer, for ex¬ ample, who comes to market with a load of grain and wants an overcoat does not search for a clothier who not only has for sale the coat he wants, but also wants the grain he has, but he exchanges his grain for coin, or govern¬ ment notes, or bank checks, and transfers these to the clothier in exchange for the coat.

Medium of Exchange. — The explanation of the almost universal practice of using a medium of exchange is found in the difficulties of barter. One of these is to find two persons each of whom has the thing which the other wants and wants the thing which the other has, and is willing to take the precise amount of the thing desired which the terms of the exchange agreed upon would bring him. There would be little commerce if this difficulty could not be overcome, and in overcoming it the medium of exchange has rendered a service essential to the progress of civilization.

In a state of barter also the process of saving is so difficult and expensive as to be practically

impossible as a general practice and on a large scale. It is that of hoarding surplus products. In such a state the farmer saves by storing his surplus grain and allowing his herds to grow and accumulate, the manufacturer by piling up goods in his warehouse, the wageworker, not being able to accumulate his services, could only save by exchanging them for such commodities as he might desire to consume in the future and hoarding these. In all these cases, however, the risk that the product hoarded would keep during the savings period, that it could be sold at the end of that period, and that the terms of the sale would be such as to render the sacri¬ fice of saving worth while, would have to be assumed. In the vast majority of cases, these risks would be so great as to more than offset the inducement to save. The

losses experienced by people who had attempted saving under these conditions would discourage others, and it is safe to say that few would ever make the attempt. A proper medium of exchange re¬ moves all these risks and thus renders saving possible and attractive.

A medium of exchange also promotes bor¬ rowing and lending. Without it a person with an unused surplus could aid another with a deficit only by transferring his surplus to him, but unless this happened to be in the precise form needed, which would rarely be the case, it would do the borrower little or no good. On the other hand, with a proper medium of ex¬ change the lender can transfer to the borrower the means of purchasing at any time anything the market supplies, thus enabling him either to satisfy his own immediate wants or to pur¬ chase the means of producing wealth.

In order that exchanges may be accurately, conveniently and safely made under all con¬ ditions, that is, when the commodities to be exchanged differ widely in quality and value or when they differ very little, when the ex¬ change is to be completed without delay or after a delay of days, weeks, months or years, when the persons between whom the exchange is to be made are face to face or separated widely in space or time, etc., the medium of exchange must represent every conceivable combination or amount of value ; must be easily, cheaply and safely transportable from place to place; must be easily recognizable, durable, and certain in value ; must be acceptable to all the parties in¬ volved in the trade, and must be automatically adjustable in volume to the fluctuating needs of commerce.

In the United States at the present time the medium of exchange must render it possible to make trades in values as low as one cent and as high as millions of dollars, and in every possible combination of amounts between those figures. It must be possible also to make up these amounts in a very short space of time, without long and difficult calculations and with¬ out danger of loss. The medium of exchange would be imperfect and quite incapable of meet¬ ing the public needs if it did not measure up to this requirement.

Since commerce takes place between people living far apart, in different cities, states and even nations, the medium of exchange must be of such a character that it can be sent through the mails and by express, over the railroads and on steamships, and be carried about in bags, pockets and purses, and it must be pos¬

sible without danger of loss to transport in these ways all amounts large and small.

The importance of being easily recognized is well illustrated in a busy station where change must be made with great rapidity and where difficulty of distinguishing one element of the medium of exchange from another would render impossible the transaction of the necessary business.

Without elements of great durability a good medium of exchange would be impossible, be¬ cause the wear and tear necessarily involved is great, and as an instrument of saving it fre¬ quently needs to be kept for long periods of time. Certainty of value is also absolutely essential. If there is any uncertainty regard¬ ing the value of any element of the medium of exchange, people will either refuse to accept it, in which case it will cease to be a medium, or they will protect themselves against possible loss by charging a higher price for the goods or services exchanged. In either case com¬ merce is obstructed or made impossible.

In order that people may be willing to part with their commodities in return for the medium of exchange, they must be assured that it in turn will serve them in making desired pur¬ chases — that is, that the persons who have the goods they want will be willing to accept it in exchange for such goods. This requirement implies the possession of practically universal acceptability in some of the elements of the medium, of acceptability among wide circles in all of them, and of interchangeability be¬ tween all, such interchangeability enabling the holder of any element which does not possess universal acceptability to exchange it for one which does.

The volume of exchanges in any community varies from time to time. In this and most other countries it varies with the seasons, being greatest in the spring and fall and least in midsummer and midwinter. The medium of exchange should adjust itself to these changes increasing automatically in volume as the volume of exchanges increases, and decreasing automatically under the opposite conditions.

The qualifications required in a good medium of exchange account for the composi¬ tion of the currencies of modern nations and for the changes which have taken place in the past and which are still in progress. Every such currency consists of elements which from different points of view may be classified as follows: (1) hand-to-hand money, written or printed orders of one party to pay specified sums to another, and book accounts; (2) coin, government notes and bank

currency, the lat¬ ter sub-classified into bank notes and checking accounts ; and (3) standard money and credit currency.

By hand-to-hand money is meant those ele¬ ments of the medium of exchange which per¬ form their service by mere transfer from hand to hand without endorsement or any other formality. In the United States at the present time it includes all our coins, several varieties of governmental notes and bank notes. Under the head of written or printed orders to pay specified sums to specified persons belong bank checks and drafts, postal money orders, ex¬ press money orders and other similar devices. Some of these can be transferred between other than the original parties by the formality

of endorsement. Book accounts are widely used and constitute much the most important element of the medium of exchange of modern nations. Any book account serves as a medium of exchange if directly or indirectly it enables purchases and sales of commodities to be bal¬ anced against each other, for example, that of a grocer who credits farmers with the proceeds of eggs, butter, vegetables, and other produce purchased and debits them with their purchases from him, or that of the farmer himself who credits his hired man with the wages agreed to be paid for his services and debits him with house rent, milk, butter, eggs, potatoes, wood and other produce advanced him. In¬ directly the checking accounts of commercial banks balance against each other on a large scale the purchases and sales of individuals, communities and nations, and thus constitute the largest element of the medium of exchange of all highly developed commercial nations.

The second of the above classifications is based in part upon the form and in part upon the source of the medium of exchange. The metallic element of the medium usually takes the form of coins, though bullion is also used. Government notes are those issued by the gov¬ ernment and1 for the payment of which it is responsible, while bank currency originates with banks, which are responsible for meeting the obligations involved in its issue. The name paper money is frequently

applied to govern¬ ment and bank notes to distinguish them from coins. Coins may be sub-classified on the basis of the metals employed in their manufacture into gold, silver, nickel, or amalgam and copper, and on the basis of their relation to each other, into standard and subsidiary.

The basis of the third classification is the presence or absence of the element of credit. Standard coins, that is, those made from the standard of value, are the only ones in which this element is entirely absent. All other coins, all paper elements of the currency and all book accounts which serve as a medium of ex¬ change contain the element of credit in some degree. Our silver coins, for example, are actually worth as bullion much less than the amount stamped upon them and government and bank notes are in and of themselves worth practically nothing. People take them at the value indicated by the stamp upon them only because somebody in whom they have confidence is under obligation to make that value good, the government in some cases, banks in others, specified persons or corporations in others. The term credit cur¬ rency is appropriately applied to all elements of the medium of exchange which circulate at a value greater than the market value of the substance of which they are made because the credit of some government or bank or person or corporation is an essential factor in such circulation.

The maintenance of a medium of exchange consisting of coins made of different substances and of paper elements issuing from different sources is only possible when complete elimi¬ nation has been made of the interest, of any¬ body and everybody to discriminate in favor of one element and against others. If such discrimination is for any reason profitable, those elements which alone can with profit be used as a medium of exchange will soon be

the only ones so used. The others will be de¬ voted to other uses which are more profitable and on this account will disappear from circula¬ tion. This fact was observed in the 17th cen¬ tury by Sir Thomas Gresham, director of the English mint, and stated in the form of a law which has since borne his name. <(Bad money,) h said, (<drives good money out of circulation. }>

This law has been brought into operation many times by the circulation in large quan¬ tities of worn and clipped coins. When the proportion of such coins becomes large, full weight coins will either be melted down and sold as bullion or clipped and sweated It was

cases of this kind which Sir Thomas. Gresham had in mind when he used the adjectives good and bad in the statement of his law, bad money referring to worn and clipped coins and good money to full weight coins.

The operation of this law has also been frequently illustrated by. the substitution of sil¬ ver for gold coins and vice versa. In the early part of our history five silver dollars contained 15 times as many grains, of silver as did a five-dollar gold piece grains of gold, 15 to 1 in 1793, at the time these coins were first minted, being about the relative values of the same weight of silver and gold. Subsequently the value of silver relatively to gold fell so that it required nearly 16 ounces of silver to sell upon the markets for as much as an ounce of gold. The result was that gold coins com¬ pletely disappeared from circulation, because they were worth more as bullion than as coin. For the opposite reason, silver remained in circulation and silver bullion was taken to the mint and coined. Later still, in our history, on account of a great fall in the value of gold relative to silver, gold, coins took the place of silver, the latter being melted down or exported and' sold as bullion.

The disappearance of coin as the. result of the circulation of depreciated notes is another form in which the truth of Gresham's Law has been frequently demonstrated. During the war between our northern and southern States, both the Federal and the Confederate governments paid a portion of their bills in their own. notes payable to bearer, made legal tender and. issued in denominations suitable for circulation as money. They very soon depreciated and be¬ came a secondary standard of value, and coin of all kinds disappeared from circulation, since on the bullion market they could be sold for these notes at a good premium, and a five-dol¬ lar note would pay as many debts or buy as many things as five silver dollars or a five-dollar gold piece.

The terms in which Sir Thomas Gresham stated his law may be objectionable because the phrases bad money and good money are not accurate descriptions of the forces which crowd some of the elements of the medium of exchange out of circulation and hold others in, but the law itself is as certain in its opera¬ tion as those of the Medes and Persians. It is really only one form of the expression of a law of much broader application, namely, that all men are prone to make the most of their possessions.

The device of making some coins subsidiary to others which are called standard and of making the paper elements of the currency redeemable in coin prevents the operation of

Gresham s law and has, therefore, been incorpo¬ rated into the practice of all commercial na¬ tions. (See article Currency). This practice renders it desirable that standard coins should constitute an element of the medium of ex¬ change, since the stamps on the other coins and the paper elements of the medium refer to definite amounts of the standard of value, and their exchange on the markets, rapidly and . conveniently at all times and places for precisely these amounts requires that this com¬ modity should be put up in convenient sized and conveniently labeled packages and be widely spread throughout the commercial world. These ends can only be attained when the standard of value is put up in the form of coins and used as a medium of exchange.

The money of a country, which consists of its standard of value and of those elements of its medium of exchange which pass freely from hand to hand by mere act of transfer and without endorsement and which are ac¬ cepted without question by everybody, is an historical product, and can, therefore, be ex¬ plained only by reference to its history.

The Monetary System of the United States. — The foundation of the monetary sys¬ tem of the United States was laid in 1792 in which year Congress passed our first coinage act. That act provided for the manufacture of gold coins of the denomination 10, 5 and 2*4 dollars, to contain respectively 247ˆ2, 123J4 and 6171$ grains of pure gold; of silver coins of the denominations dollar, half-dollar, quarter-dollar, dime and half-dime, to contain, the dol¬ lars, 371ˆ4 grains of pure metal, and the other proportionate amounts; and of copper coins of the denominations one cent and one-half cent. It further provided that the gold and silver coins authorized should be manufactured with¬ out charge by the United States mint for any persons who would supply gold and silver bul¬ lion of the requisite degree of fineness and that all such coins should <(be a lawful tender in all payments whatsoever.®

While the mint ratio of 15 to 1 between gold and silver coins

established by this act closely corresponded to the bullion ratio between the two metals in 1792, it no longer did so in 1794 when the mint at Philadelphia was ready to begin operations. At that time the bullion ratio was about 15.37 to 1, and it never again fell to so low a point as 15 to 1. Gresham's law, therefore, operated almost from the begin¬ ning and the gold coin disappeared from cir¬ culation. Unfortunately the new silver coins did not circulate freely. Pending the construc¬ tion of a mint and the manufacture of a suffi¬ cient quantity of new coin to supply the needs of the country, Congress had authorized the use of several-kinds of foreign coins, including the Spanish milled dollars. Since these latter contained more silver than the new American dollars and since both the Spanish and the American dollars were accepted at their face value in both the United States and the Spanish West Indies, with which we were at the time carrying on an active trade, the merchants of Boston, New York, Philadelphia and Baltimore engaged in this trade discovered a source of profit in shipping American dollars to the West Indies and in bringing West Indian dollars home and transforming them into American dollars at the mint.

A remedy for this condition was not success¬ fully applied until 1834, and in the meantime the currency of the country consisted chiefly of notes issued by the banks of which there were two varieties — state institutions and the United States banks — the first one operating in the period 1791-1811 and the second in the period 1816-36. The notes of many state banks were issued in small as well as large

denominations, thus in part supplying the need

for small change which the scarcity of coin frequently rendered urgent. In the interval be¬ tween the first and the second United States

banks, 1811-16, our second war with England

was fought, and the . conditions thus created, aggravated by the liquidation of the first United States Bank forced the state banks into a state of suspended specie payments. Their notes depreciated in consequence and coin of all kinds, foreign as well as domestic, disappeared from circulation. The remedy applied was the authorization of the second United States Bank which was charged with the task of securing a resumption of specie payments. President Jackson's war against this bank started during his first administration

had reached a stage by 1834, which foreshadowed the certain end of that institution so soon as its charter should expire in 1836 and that fact, together with the discovery of gold in North Carolina and a recollection of the currency difficulties which succeeded the liquidation of the first United States Bank accounts for the passage in 1834 of another important coinage act.

That act lowered the weight of the gold coins by decreasing the amount of pure metal in the eagles from 247.5 to 232 grains, and that in the other gold coins proportionately thus changing the mint ratios between gold and silver coins from 15 to 1 to 16 to 1. The bullion ratio of that time being about 15.73 to 1 gold coin was slightly overvalued at the mint and, therefore, was restored to circulation, but for the same reason, silver disappeared, and a new problem was created, namely that of sup¬ plying the country with small change. That problem was solved in 1853 by an act which reduced the half-dollars, quarters and dimes to the status of subsidiary coins by diminishing the amount of metal in them by 7 per cent, by taking away from private persons the privi¬ leges of having silver bullion transformed into them at the mint, and by providing that here¬ after they should be manufactured only on government account and sold to private persons at par for gold and that in the future they should be legal tender only for sums not exceeding five dollars. The silver dollar was not affected by this act, but its coinage was unprofitable because the bullion necessarv to manufacture it was worth considerably more than a dollar.

The acts of 1834 and 1853 together with the increased production and faffing value of gold occasioned by the discoveries of new mines in California and Australia gave the country for the first time an adequate supply of specie. The greater part of the circulating medium even during this period, however, was supplied by the state banks, which increased rapidly in number, especially after the removal of the competition of the second United States bank in 1836. This portion of the currency was de¬ fective on account of wide differences in the

character of the banks which were issuing notes. There was no uniformity in the laws passed in the various States for the regulation of banks, nor in the practices of the banks themselves. The notes of most banks, therefore, enjoyed a local circulation only and the country lacked

a uniform credit medium.

The Civil War inaugurated a new era in American monetary history. In February 1864 an act was passed authorizing the government to issue legal tender inconvertible notes in denominations suitable for circulation as money and within a few months these notes had de¬ preciated to such an extent that gold and silv of all denominations disappeared from circula¬ tion. The National Banking Act, passed m 1863, provided another form of currency m the form of national bank notes secured by government bonds. These notes, being re¬ deemable in the depreciated legal tender notes of the government, shared their depreciation. State bank notes were forced out of circulation by a 10 per cent tax levied on them in lbob and have not formed an element of our cir¬ culating medium smee that time. This com bination of government and national bank notes constituted the currency of the country until 1879 on 1 January of which year specie pay¬ ments were resumed by the government in pui-suance of an act passed in 1875. _

While the problem of resuming specie pay¬ ments was being considered in Congress two important coinage acts were passed, inat o 1873 dropped the silver dollar from the list oi coins authorized to be manufactured, thus com¬ pletely depriving private persons of the privi¬ lege of transforming silver bullion into silver coin at the United States mints, that privilege in the case of half-dollars, quarters and dimes having been taken away from them by e Act of 1853. Silver having fallen greatly in value in 1876 and subsequent years on account of greatly increased production from recently discovered mines in Nevada, the loss o t is privilege seriously affected the profits of the owners of these mines, and agitation for the •restoration of the free coinage of the silver dollar was started by them in combination with the opponents of the resumption of specie pay¬ ments, politicians and speculators who saw in the free coinage of silver an opportunity to further their own ends. This combination was not strong enough, to force through Congress the free coinage act they wanted, but it was strong enough to force the passage of a com¬ promise measure in 1878 known as the Bland Act which compelled the Secretary of the Treasury to purchase each month not less than two and not more than four million dollars worth of silver bullion and

to com it into silver dollars. This act also originated the sil¬ ver certificate which has been an element of our currency since that date.

Like all compromises, the Bland Act was unsatisfactory to both parties to the controversy. The advocates of free silver continued their agitation both in and out of Congress, and in 1890 secured a further concession in the form of the Sherman Act, which directed the Secie-tary of the Treasury to purchase each month • 4,500,000 ounces of silver and to pay for it in Treasury notes redeemable on demand either in silver dollars or gold coin at the option of the Secretary of the Treasury. However,

since the act declared it to be the policy of the United States to maintain a parity between the two metals at the existing legal ratio, the Secretary was practically compelled to redeem these notes in gold so long as the mint ratio

remained above 16 to 1.

The steady injection of a stream of overvalued silver into our currency combined with the obligation of the government to redeem on demand in gold the United States and the Sherman notes helped to create the crisis o 1893 and seriously embarrassed the 1 reasu y during that crisis. The result was that the silver purchase clause of the Sherman Act was repealed at a special session of Congress called by President Cleveland in the summer of 1898 and in 1900 an act was passed providing among other things for the gradual retirement of the Sherman notes and for the establishment of a gold reserve of $150,000,000 to be used for no purpose except the redemption of the United States notes, such notes when redeemed to be retained in the Treasury until they should be withdrawn in exchange for gold com.

The only noteworthy change in the currency system of the United States since the Act of 1900 was the result of the establishment of our Federal Reserve system in 1913. Under the operation of that system a new element has been added to our currency in the form oi Federal Reserve notes issued in exchange tor rediscounted commercial paper. This nei\ ele¬ ment has supplied the necessary element oi elasticity which our currency previously lacked since these notes automatically expand and contract in volume in response to the changing needs of commerce. The other elements of our currency are either stationary m volume or fluctuate in response to other influences than currency needs. See Banks and Banking Foreign Exchange, Commercial Paper,

Fed¬ eral Reserve System, National Banking Sys¬ tem, *etc.* ; Bimetallism ; Coin ; Coinage, Cur¬ rency ; Gold; Gold Coinage in the United States ; Gold Standard and Gold Production ; Legal Tender ; Money, Paper ; Silver. < .

Bibliography. — Dewey, D. R., c Financial History of the United States) (New York and London) ; Johnson, J. F„ <Money and Cur¬ rency in Relation to Industry, Pi ices and the Rate of Interest (New York 1906) ; Kinley, D., (Money> (New York 1914) ; Laughlin, J. L., <The Principles of Money) (New York 1903) ; Noyes, A. D., (Thirty Years of American Finance) (New York and London 1898) , Scott, W A., (Money) (Chicago 1913) ; and (Money and Banking> (New York 1916) ; Sumner, W. G., (History of American Currency) (New York 1884) ; White, H., (Money and Banking Illustrated by American History) (Boston and

New York). ‘ . _

William A. Scott,

Professor of Political Economy, University of Wisconsin.

MONEY, Coin. See Coinage; Numismat¬ ics.

MONEY, Paper, a money issue of a nation or government; a stamped sheet of paper or Darchment, given an official value and used as a medium of exchange. Although coins were used before paper money, the latter was known among the ancients. Corn, cattle, iron, leather, cocoa, shells, tobacco and other commodities

were all, in point of fact, used as money, in different ages and different countries; but they have long ceased to be so used, by commercial nations. The high estimation in which the precious metals have been held, in nearly all ages and all regions, made it practicable

to use them as money. The scarcity of gold and sil¬ ver, the need of bills of exchange and the want ot a money more convenient for the individual to carry, and lastly, the issuance of government credits forced on bankrupt nations, brought about the use of paper money in European countries, and Colonial America early adopted this medium of exchange from the English.

Provincial Paper Money. — In the earliest days of America paper money was first issued by Massachusetts in 1690. The object was not to supply any supposed want of a medium for trade, but to satisfy the demands of some clamorous soldiers. Other issues were subse¬ quently made, partly with a view of defraying the expenses of government and partly with a view of making money plenty in every man's pocket. The ill-judged expedition of the Carolinas against Saint Augustine, in 1702, entailed a debt of £6,000 on that colony, for the dis¬ charge of which a bill was passed by the pro¬ vincial assembly for stamping bills of credit, which were to be sunk in three years by a duty laid upon liquors, skins and furs. For five or six years after the emission the paper passed in the country at the same value and rate as the sterling money of England. To de¬ fray the expenses of an expedition against the Tuscaroras and to accommodate domestic trade the legislature of South Carolina estab¬ lished a public bank in 1712 and issued £48,000 in hills of credit, called bank-bills, to be lent out on interest on landed and personal security, and to be sunk gradually at the rate of £4,000 a year. Soon after the emission of these bank-bills the rate of exchange and the price of produce rose, advancing in the first year to 150 and in the second to 200 per cent. By the year 1731 the rate of exchange rose to 700, at which it continued with little variation upward of 40 years. In the year 1723 the prov¬ ince of Pennsylvania made its first experiment of a paper currency. It issued in March £15,000 on such terms as appeared likely to be effect¬ ual to keep up the credit of the bills. It made no loans but on land security or plate deposited in the loan office; obliged the bor¬ rowers to pay 5 per cent for the sums they took up; made its bills a tender in all payments, on pain of confiscating the debt, or forfeiting the commodity; imposed sufficient penalties on all persons who presumed to make any bargain or sale on cheaper terms in case of being paid in gold or silver, and provided for the gradual reduction of the bills by enacting that one-eighth of the principal as well as the whole interest should be annually paid. These early specimens of provincial paper money were large notes, printed from copper-plates, having en¬ graved borders on three sides. The inscrip¬ tions on the bills were in type, with arms or motto engraved in the left side centre. The signatures of the province officials were signed in red ink.

Continental Money. — The first issue of paper money under the authority of the Con¬ tinental Congress was dated 10 May 1775, but the notes were not actually placed in circula¬

tion until the August following. On 31 May 1781 the continental bills ceased to circulate as money, but they were afterward bought on speculation at various prices, from 400 for one, up to 1,000 for one. The value of continental paper was not the same in different parts of the country. The exchange was, for example, at 35 for one in New England, New York, the Carolinas and Georgia, and at 40 for one in Penn¬ sylvania, New Jersey, Delaware, Maryland and Virginia. An account taken from the books of merchants in Virginia shows that the deprecia¬ tion there regularly followed that in Philadel¬ phia, though, toward the close, it sometimes lagged a month or more behind. Thus when exchange was in Philadelphia at 100 for one, in January 1781 it was in Virginia at 75 for one. As late as May 1781 speculations were entered into at Philadelphia to purchase continental money at 225 for one and sell it at Boston at 75 for one. It is worthy of remark that the depreciation of continental money never stopped the circulation of it. As long as it retained any value at all it passed quickly enough, and would purchase hard money or anything else as readily as ever when the exchange was 200 for one, and when every hope or even idea of its being ultimately redeemed at nominal value should have entirely vanished. The facility of raising ways and means, in the early part of the Revo¬ lutionary War, by issues of paper, led to much extravagance in the commissary depart¬ ment and prevented the establishment of a sound system of finance. It is said that when a proposition was before Congress to establish a regular revenue system one member ex¬ claimed, ((Do you think, gentlemen, that I will consent to load my constituents with taxes, when we can send to our printer and get a wagon load of money, one quire of which will pay for the whole !®

Connecticut.— Under date of 4 March 1762, Connecticut issued a series of colonial notes of the following values : 9 pence, 1 shilling, 2 shil¬ lings and 6 pence, and 10, 20, 30 and 40 shillings. There were 19 regular issues, the last being dated 1 July 1780. There were also three single bills in the nature of treasury notes, the last dated 26 Jan. 1791. Over 100 different bills were issued by this colony. The smaller values were for 2, 3, 4, 5 and 7 pence, issued 11 Oct. 1777. In Connecticut the 6 shilling bill was not infrequently raised by clever counterfeiters to the value of 10 shillings.

Delaware.— In this colony paper money was issued in 1735. One

value only of these notes has been preserved ; the denomination is 10 shillings. The designs of the early issues are all about the same, a type body with a border of the same and wood cut of the royal arms. On 28 Feb. 1746 a new series was issued of the same general design, but noteworthy from having been printed by the celebrated Benjamin Frank¬ lin and his partner D. Hall. On bills of this colony we first get the information that ((To Counterfeit is Death,® which is repeated in every possible form. The 2 shilling 6 pence bill of January 1776 issue is adorned with pillars, and probably to show that the edifice supported can stand any sort of usage, one is placed upside down. The last series issued, May 1777, contains bills from 3 pence to 20 shillings, and changed the cut of the royal arms

for that of the State. Sixty bills emitted by this colony are known.

Georgia. — The earliest bill printed in Geor¬ gia was of the value of 2 shillings 6 pence and was dated 7 March 1749. The Georgia bills were printed on one side of white paper and were usually made attractive by copper-plate vignettes printed in various colors. The vig¬ nettes represented figures of liberty, soldier, deer, hog, rattlesnake, palmetto tree, *etc.* The last issue was dated 16 Oct. 1786. There are over 110 varieties from 3 pence to £5.

Maryland. — The first bill of this colony is dated 1740 and of the value of one shilling. This was followed by a series of five values in 1748 and from then a regular succession of issues until their final extinction in 1781. The design of the early issues may be described, as the arms of Lord Baltimore supported by two men in the costume of the day, one with a fish and the other with a spade. This is differ¬ ently placed on the various bills. The lettering or form of contract is in the following words, “This indented Bill of Eight Dollars shall en¬ title the bearer to receive Bills of Exchange payable in London, at the Rate of Four Shil¬ lings and Six Pence Sterling per Dollar for the said Bill, according to Directions of an Act of Assembly of Maryland, Dated in Annap¬ olis, this 1st day of January, Anno Domini 1767,® followed, of course, by two signatures. The quaint idea of scalloping the end of a

legal document to show that it has been pre¬ pared with due care and thought and not cut off in a hurry is carried out on these bills. In some values even the word “indented® is printed in a wavy line, and that there should be no mistake as to what is meant by a dollar a minute representation of a Spanish dollar is inserted in the text. The values of the Mary¬ land bills were 3, 4, 6 and 9 pence, and so on up to £3. There were over 100 varieties issued.

Massachusetts. — Prior to 1775, some 13 ex¬ amples of paper money were issued in this colony. ‘One of these is a copper-plate engrav¬ ing said to have been the work of the noted patriot, Paul Revere, of Boston. The series was issued by order of the general assembly of the Colony of Massachusetts Bay, 7 Dec. 1775. The reverse of these bills bear the figure of a man in continental dress, with a drawn sword in one hand and a copy of the Magna Charta in the other, above “Issued in defence of Amer¬ ican Liberty,® below in Latin, “He seeks by the sword calm repose under Freedom.® The series of 16 Oct. 1776 repudiates the title of Colony for that of State. Coin must have become scarce, as more than half of the denominations are under one shilling. The codfish was the principal design on these bills. The next issue of eight values was of interest-bearing notes which are guaranteed by the United States. Upward of 135 bills were issued by Massachu¬ setts.

New Hampshire. — The design of the New Hampshire bills was usually the British arms with inscriptions in elaborate frames. The earlier issues were type-set. About 60 varieties are known.

New Jersey. — The issues in this colony be¬ gan in March 1724 and continued regularly to May 1786. In shape the bills were a small, narrow oblong. The high value notes were printed in blue and red. In 1781 the royal

arms became the arms of the State, the type reading as follows: “State of New Jersey, hive Shillings, This bill shall pass for Five Shillings agreeably to an Act of the Legislature of this State, passed the ninth day of January, One Thousand Seven Hundred and Eighty-one.® An entire collection of New Jersey bills would number 185.

New York. — The first bill issued was in 1709, and then followed a series ot four dated 18 Dec. 1737. In the next issue the form reads “By a Law of the Colony of New York this Bill Shall Pass current for Three Pounds New York the 20th April 1756.® A set of United States guaranteed notes appeared 15 June 1780.

North Carolina. — The earliest notes were dated 1748, and upward of 120 varieties were printed up to 1780. The most of the North Carolina bills bore motto inscriptions such as “Virtuous Councils the Cement of States”; “A Righteous Cause the Protection of Provi¬ dence® ; “A Lesson to arbitrary Kings and wicked Ministers® ; “Liberty and Peace the Re¬ ward of Virtuous Resistance® ; “Persecution the Ruin of Empires® ; “Union of Hearts the Strength of Interests®; “American Virtue Tri¬ umphant,® *etc.*

Pennsylvania. — The earliest known bill was dated 10 Aug. 1723 and was printed by Benja¬ min Franklin. The general style of the notes is the same as used in Delaware, bearing the royal arms, or in 1756 those of William Penn, with his motto, “Mercy Justice.® In 1764 a curious notion was adopted of spelling the name of the colony differently on each bill, thus on the series we find Pennsylvania, Pensyl-vania, Pennsilvania and Pensilvania. This was perhaps designed as a protection against counterfeiting. On some of the notes issued in 1771 is the signature of Francis Hopkinson, and on the bills of April of the following year that of John Morton, both signers of the Dec¬ laration of Independence. In 1777 the shape of the bill changed to the oblong form, and the arms of Pennsylvania took the place formerly devoted to those of Great Britain. This series are found both in black and red with black type. In 1780 a set guaranteed by the United States, of the same design as issued for other States, was put in circulation, and on 16 March 1785 the last of the series saw the light, the denominations running from 3 pence to £4, 16 values in all. The varieties issued by this colony were over 250.

Rhode Island. — The paper money of Rhode Island was similar in design and value to that of Connecticut. The first issue was in 1715 and the last in 1786. . There were about 75 varieties.

South Carolina. — There were various notes issued in this colony from 1712 to 1770. The bills dated 6 March 1776 were supposed to have the value of silver, equivalent in currency is given thus, 6 Spar Ah milled dollars = £9 15s. currency. In 1779 appeared the handsomest notes heretofore used in the country, the backs of the $50, $70 and $90 bills representing Atlas, Prometheus and Hercules being especially note¬ worthy. The total number of bills for South Carolina was 105.

Vermont. — In this colony there were but two series, the first issued in February 1781 is an ordinary type-printed note, with engraved border on three sides with the State seal about the centre. This consists of a pair of scales

| J-’HTS BILL Jhallpafs No! current in all Payments in this Cf.Nf C °lony, for HALF a Spa-Po \ni/b mdled DOLLAR, or the llo? Value thereof in Gold or Silver Currency ; according to the Refolu-tiou of the Provincial Congrefs, of Nexu York, on the fecond Day of September, 1775.

If

SXOTXyC iygrfeMOˆ-EjBoi/

fNˆ-rr

FIVE SHILLINGS

possessor

of this Bill, fhall be paid by the Treˆsitrer of the Colo¬ ny of Connecticut, Five Shil linos. Lawful Money, by the Fir Jl Day of January, A. D. One thou-fand feven hun¬ dred and eighty one

By Order of AS¬ SEMBLY, — Hartford, June lib, 1776

ffilasn/i/o

2

One Shilling.

The PofTeffor of this

kill fhall be paid by the Trea/urer , jof the Sute of VERMONT, ‘ONE SHILLING in Silver at Six Shillings and Eight Pence per\ Ounce, by (he

firA 1 Dayof]une,A D.\

J 7 8;

By Order of A/Jem-jjj

bly, Wjnxjs or,'|^

February, 1781.

4

State of NEW-JERSEY.

[No. //?#% J One Shilling and 6d.

THIS Bill fhall pafs current for One Shilling and Six¬ pence, agreeably to an ACl of the Legiflature of this State, pafTed the ninth Day of Ja¬ nuary, One Thoufand Seven Hun¬ dred and Eighty one.

6

1 New York Province Half-dollar. 1775

2 Connecticut Colony 5 shillings. 1776

3 U. S. Continental Currency, $3. 1775

4 Vermont State Currency, 1 shilling. 1781

5 New Jersey State Currency, Is. 6 pence. 1781

6 North Carolina Currency, $6. 1776

and a chain of 14 links (the only instance where the number is carried above the original 13) enclosed in a circular band inscribed <(Vermont Calls For Justice.” The second issue is in the form of treasury notes, the amounts be¬ ing tilled in with ink.

Virginia. — The first issue for this State was in 1755. The notes are of two varieties, the first a fine, large bill after the English style, and then something between a draft and a bank-bill, being probably made to fill a pressing want. The bills are copper-plate engravings filled out in ink. On the issue of 1775 are the royal arms of Virginia in an engraved frame. The lettering reads ((Three Pounds Current Money of Virginia Pursuant to Ordinance of Convention Passed 17 July 1775.® The follow¬ ing year introduces the ((sic semper tyrannis® in place of the arms.

Bank Notes. — From the Revolutionary period to the days of the Civil War and to the present time many issues of paper money have been made by the government and by national, State and local banks. See Banks and Bank¬ ing.

Confederate Paper Money. — During the Civil War the Southern States in secession is¬ sued millions of dollars in paper money, be¬ ginning in July 1861, with bills of from $5 to $100. On these were designs of the Confed¬ erate flag, a train of cars, cotton bales, *etc.* In September 1861 appeared at least 50 varieties of bills in value from $5 to $100. They were of various designs. A $20 bill showed a head of Alexander H. Stephens in one corner; a $10 bill pictured General Marion offering a break¬ fast of sweet potatoes to a British officer. Por¬ traits of Davis, Hunter, Memminger, Stephens, Mrs. Pickens, Mrs. Davis, Benjamin, General Jackson and others appeared on the high value notes. There was an issue of $1 and $2 bills in 1862 and in April 1863

appeared a series in value from 50 cents to $100. Some of these bore designs of the capitol buildings at Rich¬ mond, Nashville, Montgomery, *etc.* The last issue of bills from 50 cents in value to $500 ap¬ peared 17 Feb. 1864. Many of these are still in existence, and in 1917 some one with an ac¬ cumulation sold them on the streets of down¬ town New York at five cents a bill.

Postal Currency. — The United States gov¬ ernment printed a paper money as a substitute for fractional currency during the Civil War, owing to the scarcity of silver. This was the suggestion of General Spinner, United States Treasurer under Lincoln, and was commonly known as (<shin-plaster® money. The issue was in small scrip of the denominations of 3, 5, 10, 25 and 50 cents. It disappeared from general circulation about 1870.

Greenbacks, Silver and Gold Certificates. — The more recent issues of American paper money in circulation at the present day are printed at the Bureau oi Engraving and Print¬ ing at Washington. The engravers are special¬ ists, and the figures and intricate designs of their work are often marvels of artistic skill. Portraits of living persons are never put on the notes, and all the figures, vignettes, borders, lettering, etc., are engraved separately before they are put on the plates. First the engraver works out his design and after transferring it by hand to a plate of soft steel the plate is hardened and a soft steel roller lakes the

pression from it. After this roll is chilled an¬ other impression is taken on another steel plate, and after this latter has been hardened it is ready for use. The geometric lathe which makes the border is a complete and wonderful piece of mechanism. The lines for the borders, backs and other conventional designs seen on the notes are made by this machine. The paper for printing the bank-notes is manufactured under the supervision of government officials. It has various lines of short, uneven colored silk threads running through it.

Foreign Paper Money. — The notes of the Bank of England are five by eight inches in dimensions and are printed in black ink on Irish linen water-lined paper, plain, white with ragged edges. The notes of the Bank of France are made of white water-lined paper, printed in blue and black, with numerous mythological and allegorical pictures. South American currency is about the size and ap¬ pearance of the American, but is commonly in¬ ferior in appearance and easier to counterfeit, being produced by a cheaper lithographic proc¬ ess. The

German notes are printed in green and black. The Chinese paper money is in red, white and yellow, with gilt lettering and vari¬ ous devices. Italian notes are printed on white paper in pink, blue and carmine and orna¬ mented with a vignette.

Bibliography. — Sumner, (History of Amer¬ ican Currency' (New York 1884) ; Johnson, J. F., (Money and Currency' (Boston 1906) ; United States Mint, 'Monetary Systems of the Principal Countries' (Washington 1912).

MONEY ORDER SERVICE. See Postal Money Order Service.

MONEYWORT, CREEPING CHAR¬ LEY, CREEPING JENNY, or HERB-TWOPENCE, are popular names for Lysi-machia nummularia of the primrose family. The plant, which is a native of Europe, is a perennial with roundish leaves and axillary flowers borne from early summer until autumn. It is very popular for planting in rookeries', vases, hanging-baskets and shady situations, and has become naturalized in the eastern United States. Propagation by seeds or cuttings is very simple, and the plants seem to thrive in any moist, shaded garden soil, cool greenhouse, or window. Several other plants are sometimes called moneywort; for example, Anagallis te-nella, Dioscorea nummularia , and Thymus chamadrys. See Loosestrife.

MONGE, monzh, Gaspard, French mathe¬ matician and physicist: b. Beaune, France, 10 May 1746; d. Paris, 18 July 1818. He was educated at Beaune and Lyons and at 16 was a teacher. He made rapid progress and some valuable discoveries in engineering, and in 1783 was called to the professorship of hydrodyna¬ mics in the Paris Lyceum. He was a supporter of the French Revolution, became Minister of Marine and was temporary Minister of War and one of the signers of the death warrant for Louis XVI. He resigned soon after the king's death and was engaged in manufacturing arms and gunpowder for the army. He founded the Ecole Polytechnique under the Directory and was professor of mathematics there, but was later sent to Italy to assist in the removal to France of the art treasures captured by French

armies, and there gained the friendship of Napoleon whom he accompanied to Egypt in 1798, continuing his scientific researches. . He resumed his position in the Ecole Polytechnique upon his return to France and in 1805 was elected senator. Napoleon gave him an estate in Westphalia, and the title of Count of Pelusium, but the downfall of the emperor resulted in reverses for Monge who was expelled from his positions in 1815. He is renowned principally as the founder of descriptive geometry, and one of the earliest scientists in modern geometry. He published (Traite elementaire de statique' (1788) ; (Legons de geometrie descriptive' (1795). Consult Dupin, (Essai Historique sur les services et les travaux scientifiques de Monge' (1819) ; Obenrauch, (Monge der Begriinder der darstellenden Geometrie als Wissenschaft' (1893-94).

MONGHYR, mon-ger', or MONGHIR,

India, the capital of a district in the Bhagalpur division of Bahar, Bengal, on the right bank of the Ganges, 80 miles east of Patna. It commu¬ nicates by a steam ferry with its railway depot on the opposite bank. It is of great antiquity, and has an elevated fort, enclosing the district administrative offices. Monghyr still enjoys a local reputation for its former important manu¬ factures of swords, firearms and hardware. Pop. 36,000.

MONGOLIA, China, a vast northern cen¬ tral and eastern colonial territory, between lat. 35° and 52° N, and long. 82° and 123° E., bounded on the north by Asiatic Russia, east by Manchuria, south by China proper, and west by Sungaria and East Turkestan; estimated area, about 1,367,600 square miles.

The central portion, nearly a fourth of the whole, is occupied by the Desert of Gobi, an extensive sandy plateau, with a few spots of pasture and brushwood. Other parts are inter¬ sected by lofty granitic chains, the principal of which are the Altai, the Thian-shan, the Khing-han, and the In-shan. The largest rivers areˆ — in the north the Salenga, in the south the Shira-muren, and in the west the Irtish. The climate presents the opposite extremes of intense win¬ ter cold and summer heat. Agriculture is but little developed, and that only in the south on the borders of China proper; cattle raising, a few domestic industries and the transportation of goods are the chief occupations of the in¬ habitants. There is a considerable transit trade with Russia and China;

the principal commer¬ cial centres are Kuku-Ivhoto, Kalgan, Biru-Khoto, Dolon-nur, and Kuku-erghi, in southern and southeastern Mongolia; Kerulen m the northeast, Kobdo, Uliasutai and Urga, in the northwest. Urga is the principal town, a popu¬ lous frontier emporium for the caravan trade across the Gobi Desert from China to Kiakhta, Siberia, 170 miles to the north and 100 miles east of Lake Baikal. The chief exports are wool, skins, hides, furs, horns, etc., to an annual value of nearly $5,000,000; while the varied im¬ ports amount in value to $7,800,000 annually. The population is estimated at about 2,600,000, divided into tribes chief of which are; (1) the Khalkas, or Mongolians properly so called, who occupy the entire north of Mongolia; (2) the Ouryantai and the Darkhat, who are Mongo-lized Turks; (3) the Ordos of pure Mongolian

blood; (4) the eight tribes of the Tsaktar, of Mongolian blood.

The Khalkas are divided into four, ˆaimaks," or principalities, the creation of which, it is said, dates back to Genghis-Khan. These are Toucheton, Tsetsen, Sain-Noin, and Tsatsatkou. Each aimak is divided into (<hoshuns," which are subdivided into ((sumuns." Such distribu¬ tion of the territory is very ancient.

Although the Mongolians are vassals of China they govern themselves. In each admin¬ istrative subdivision there is elected a chief, whose election is ratified by the Chinese govern¬ ment, and who receives from Peking a title of honor of slight importance, along with a button or peacock's feather for his cap. At Urga, the seat of the Bogdo Khan the Mongolian prince in charge (theoretically) of the administration of the affairs of the Khalkas has for adjunct (theoretical) a Manchu envoy, the ftamban," who is really the master of the situation; and the decisions made in common (or that are sup¬ posed to be) by the two exalted persons are those dictated by the amban, that is to say, the Peking government.

The Khalkas are nomads, but only relatively so. Within the limits of their hoshun and sumun they periodically shift their, quarters in search of ((pastures new" for their herds of camels, horses and sheep, but they never travel very far, and it is always possible to find an encampment within a radius of a few miles.

They live under the (<y˚urte," which consists of a light circular framework covered with pieces of felt. The form is that of a dome sup¬ ported by a small sub-basement, and about 10 feet in height. In

order to render it habitable, it suffices to cover it with pieces of felt and close the central orifice above with a movable piece of the same material. Through this orifice the smoke of the *pot d feu ” escapes. The fire¬ place is situated in the centre of the abode, the •household gods are placed opposite the door, and the housekeeping utensils are arranged along the walls. Around the fireplace are spread out, in lieu of seats, pieces of felt, for which the well-to-do substitute carpets. The princely yourtes are furnished with board floors and decorated with silken hangings.

In summer the men wear wide trousers and a shirt of calico, in most cases blue. Over this they place a long robe, which is buttoned upon the shoulder and side. This is of blue or brown cotton, but sometimes of red or dark green silk. The lamas, or church people — the religion being Buddhism — affect yellow. This robe is gathered in at the waist by a cloth girdle whence, to the right, hangs a knife, and to the left a tobacco bag and tinder box.

Boots with pointed upturned toe and high heel, generally of red leather with a thick sole, complete the accoutrement. The fact that the Mongolian shoemakers make but one size of footgear explains why the son can wear the boots of his father, and why the Mongolian (who also is naturally lazy) does not like to take even the shortest walks afoot. He be¬ strides his horse in order to travel a distance of a hundred paces, and it is only during the coldest weather that he decides to dismount from his steed in order to walk half a mile or more.

The Mongolians shave and wear a cue. The headgear or national hat consists of a small cone of figured silk or damask, which forms the

skull-capˆ The rim, which is of black velvet, ls. turned up so as to describe an acute angle vvith die central cone. Behind, float two long wide ribbons, which are invariably of red silk. .1 he button or the tuft that crowns the cone is likewise always red. When it rains (a rare event in the Khalka country) the velvet rim is turned down, and the

hat assumes the form of an extinguisher that protects the ears and neck. In winter, these hats are replaced by a headgear trimmed with fur, squirrel among the poor, and sable among the rich, the change ot hat is accompanied with a change of costume. The long cotton or silk tunic is replaced by a mantle of sheep or deer skin, or among the rich, by a long coat of silk trimmed and lined with costly fur.

The majority of the Mongolians are thin and emaciated. Although they are not strong, they are wiry and capable of withstanding consider¬ able fatigue on horseback. But they object to muscular work. It takes two or three to lift a weight that could be easily handled by one Cos¬ sack. To the European eye, they are, with their broad, flat noses, their high cheek-bones, and their little, beady eyes, intensely ugly. They are generally of a low stature, and sometimes have a certain nobility of countenance. Almost all have a kind, benevolent expression to which one soon becomes habituated.

In their youth, the women are prepossessing. Their lineaments are refined, their eyes lan¬ guishing and their faces plump and smiling like those of the Japanese. They wear the same style of underclothing that the men do; the same boots and the same hat. But the married women wear a long tunic with very narrow sleeves that are generally red from the middle of the arm to the wrist, which is covered by a small point of the sleeve, if the latter is not rolled up. The robe may be blue, brown, violet, or red, but the sleeve is always red. Above the shoulder the sleeve is padded to a consid¬ erable height. A tucker of this same red color covers the top of the throat. Maidens, whose robes resemble those of men, wear their hair in a single braid hanging down the back. The children go nude during the summer season, and it is not till they have reached the age of 10 that they are clad in the long national tunic. The name of the Mongolians became sud¬ denly known in the 13th century, and the world was soon filled with the narratives of the ex¬ ploits of these nomad warriors. The celebrated chief known to history as Jenghis-Khan (or Genghis-Khan) was born probably in 1162. By his ardor, courage and successes he grouped around him a band of young warriors, took part in a number of wars between the Chinese and Mongolians, fighting now on one side and now on the other, subjugated all the tribes living between Irtish and the Khingan Mountains, and in 1206, at the diet of the Mongolian nobles that he had assembled, received the title of Jenghis-Khan, or (<the most powerful prince,55 under which he was to be known to posterity. Marching from conquest to conquest, he soon became master of the ‘southern provinces of China, and in 1210 made himself master of Bok¬ hara and Samarkand. Seven years later, he died, while his army divided into three parts, one of which marched against

Afghanistan, an¬ other against Russia and the third completed the conquest of China. In 1237 the whole of

Russia, except Novgorod, was paying tribute to the Mongolians, who next invaded Poland and Silesia, and finally Moravia and Hungary. At this period the power of the Mongolians was at its apogee; but, at the end of the 13th century, it declined, and in 1368 these people were driven from China, and the prince who had occupied the Chinese throne returned to the steppes of the north, with his vassals, where he reigned over his fellow countrymen only. A century later, the Mongolians were beaten and dispersed by the Russians, who had been their vassals for two centuries. Subsequently, the Khans of southern Mongolia acknowledged themselves vassals of the emperor, Son of Heaven, the (<Bogdo-Khan.55 Northern Mongo¬ lia, that is to say, the country of the Khalkas, divided into four principalities, remained inde¬ pendent for a longer time, but in 1691 placed itself under the protection of the emperor of China. Soon after the Chinese Revolution in 1912, Outer Mongolia declared its independence which was recognized by the Russian Govern¬ ment in a convention and protocol signed at Urga, 3 Nov. 1912. On 5 Nov. 1913 at Peking, Russia and China reached an agreement to recognize Outer Mongolia as territory under Chinese suzerainty, China recognizing its au¬ tonomy. Frontier and other questions were settled June 1915, at a tripartite conference be¬ tween Mongolians. Chinese and Russians.

Consult Bulstrode, B., {A Tour in Mongolia5 (London 1916) ; Carruthers, D., (Unknown Mongolia5 (London 1913) ; Gilmour, J.,

(Among the Mongols5 (London 1888; 1893); Podsneeff, A., ‘Mongolia and the Mongols5 (7 vols., Saint Petersburg 1896).

MONGOLIAN RACE, a general name ap¬ plied to a majority of the people of Asia. In ethnology, the term is used for one of the five great races of the world discriminated and named by Blumenbach, and adopted by Cuvier when he reduced Blumenbach’s five to three. The head of the Mongolian is square; the face flattish, nearly as broad as long, the parts not well distinguished from each other; the eyelids narrow, obliquely turned up at their outer angle ; the space between the eyes flat and broad, the nose flat, the cheeks projecting, the chin some¬ what prominent. The hair is straight, the color black, that of the face and body yellowish (sometimes inaccurately called olive, which im¬ plies an admixture of green). The race includes not merely the natives of Mongolia properly so called, but the Tartars, the

Chinese, the Japan¬ ese, the Cochin Chinese, the Burmese, the Tamuls, the Turks, and the Finns. See Ethnology.

MONGOLIAN SUBREGION. In zoo¬ geography, a subdivision which includes the tablelands of central Asia, from the Caspian Sea to Japan. Its separation from other Asiatic faunal regions is mainly on ornithological grounds, and is neither distinct nor important.

MONGOOSE, MONGUSE, *etc.* See Mungoos.

MONICA, Saint, mother of Saint Augus¬ tine (q.v.) : b. Africa 332; d. Ostia 387. A Christian who, in accordance with the wishes of her parents, also Christians, married a pagan. She devoted nearly all her life to the conversion of her husband and son Augustine. Her self-

sacrifice was at last rewarded; her husband, Patricius, became a Christian, and Augustine, seeing the error of his ways, reformed. After the baptism of Saint Augustine at Easter, 387, she set out with her two song for Africa. Ar¬ riving at Ostia she became ill and here died. A friend asked her in Ostia if she were not afraid to be buried in a place so far from her own country. She replied: <(Nothing is far from God? Her eminent son preserved many of her holy sayings which he often repeated in his sermons. In the Roman Catholic Church she is regarded as the model and patroness of wives and mothers. Her feast is 4 May. In 1430 her relics were brought to Rome, and were later deposited in the Church of Saint Augustine. Consult (Saint Augustine's Works > edited by Tillemont; Butler, Rives of the Saints?

MONIER-WILLIAMS, Sir Monier, Eng¬ lish Sanskrit scholar: b. Bombay, 12 Nov. 1819; d. Cannes, France, 11 April 1899. He was a son of Monier-Williams, surveyor-general. He was educated at Oxford, and was for a short period a student at the East India College, Haileybury. He was professor of Sanskrit at Haileybury from 1844 to the extinction of the college in 1858, and in 1860 became Boden San¬ skrit professor at Oxford, a post which he held till his death. Among his numerous works are Practical Sanskrit Grammar } (1846) ;

(English-Sanskrit Dictionary } (1851); edition with notes, translations, etc., of the Sakuntala (1853) ;

(Introduction to Hindustani) (1858) ; (Indian Epic Poetry) (1863) ; (Sanskrit-English Dic¬ tionary } (1872; 2d edition 1899); < Indian Wis-dom) (1875) ; <Hinduism) (1877) ; (Modern India and the Indians* (1878); Religious Life and Thought in India* (1883) ; (The Holy Bible and the Sacred Books of the East) (1886) ;

(Brahmanism and HinduisnP (1889) ; Remi¬ niscences of old Haileybury College* (1894). He traveled extensively throughout India in order to study the native religions, and to fur¬ ther his scheme of an Indian institute, which he succeeded in getting established at Oxford.

MONISM, a philosophical term which may be briefly translated by ((doctrine of unity.® The word was coined by Christian von Wolff, a German philosopher of the first half of the 18th century, and is derived from the Greek monos which means ((single; alone; lonely; unique; existing in only one copy.® Wolff, the inventor of many happy terms that acquired currency in philosophy, introduced the word to characterize such philosophies as recognized the

existence of one ultimate form of reality only, be it spirit or matter, and he contrasted it with “dualism,® that is, doctrine of duality, held by all those thinkers who believe that both spirit and matter are ultimate forms of exist¬ ence. Monism is also opposed to a view like that of Leibnitz, which maintains the existence of many substances; the latter is called plural¬ istic. The word “monism® has come to be ap¬ plied to views maintaining a unity of a non-substantial nature. It has been adopted as the label of a certain type of positivistic theory that emphasizes the owners of things. (See Dualism and Pluralism). Consult Haeckel, E. H., Riddle of the Universe* (New York 1900) ; Walker, W. L., (Christian Theism and Spiritual MonisnP (New York 1906) ; Worsley, A., (Concepts of Monism* (London 1907). Discussions of monism will also be found in any of the numerous introductions to meta¬ physics.

MONITEUR, mo-ne-ter, Le, French jour¬ nal, established 5 May 1789 by Panckoucke under the name Gazette Nationals, on le, Moniteur Universel. Under the title of L’Ancien Monitcur the issues for 1789-99 were published in 32 volumes by Gallois (Paris 184CP45). In 1800 the Moniteur published the. official Actes du government. The name in

1811 was changed to Moniteur Universel. Four years later the government publications were omitted from the paper and printed separately in the Journal Officiel. Its policy again changed and it continued as the government organ until 1868, when the Journal Officiel was again pub¬ lished separately.

MONITITE. See Monetite.

MONITOR, The, an ironclad, the first of a class of naval vessels designated as monitors (see ‘Warships). It was designed and built for the United States government in 1861-62 under direction of the engineer John Ericsson (q.v.), who adopted as the most essential fea¬ ture of its construction the revolving gun-turret devised by the American inventor, Theodore Ruggles Timby (q.v.). The Monitor was launched at Greenpoint, L. I., 30 Jan. 1862, only 100 days after the laying of her keel. She put to sea 6 March following, under command of Lieut. John L. Worden (q.v.), arriving on the night of the 8th at Hampton Roads, Va. Ex¬ traordinary energy had been displayed by the builders to meet a grave emergency of the gov¬ ernment, then weak in naval resources, fur making effectual the blockade of Southern ports

Theodore R. Timby’s Model sent to China by Caleb Cushing in 1843, which suggested to J. Ericsson the Low Freeboard.

which President Lincoln had proclaimed, as well as for aggressive action and coast-defense. This emergency soon became a dire peril which threatened the destruction of the Union through superior sea power acquired by the Confederacy with foreign aid or connivance. How this dan¬ ger was first averted is shown in the account of the famous action in Hampton Roads (see Monitor and Merrimac).

The Monitor was built by a company of men, John F. Winslow and John A. Griswold of Troy, N. Y., and their associates, who were ac¬

tuated by patriotic motives. With T. R. Timby, who had taken out patents <(for revolving towers for offensive or defensive warfare whether placed on land or water,® they entered into a contract for the use of his inventions covering the revolving turret, paying him $5,000 as royalty on each turret constructed by them. They built the Monitor at their own risk, Wins¬ low and Griswold furnishing 90 per cent and C. S. Bushnell of New Haven, Conn., 10 per cent of the cost. Ericsson, for his services as engineer, received 5 per cent of the gross sum paid to the company for the Monitor and kindred vessels built by them. A contract with the government was made by the company and Ericsson, and the government paid for the Monitor $275,000, the actual cost being $195,000.

Ivory model of the turret made by T. R. Timby in 1841; now in possession of the Patriotic League of the Revolution.

The contract with the government provided for the building of ((an ironclad, shot-proof steam battery of iron and wood combined,® and the hull of the Monitor was of iron with wooden deck beams and side-projection. Her dimensions were :

Extreme length . 172 ft.

Extreme breadth . 41 ft. 6 in.

Depth of hold . 11 ft. 4 in.

Draft . 10 ft. 6 in.

Inside diameter of turret . 20 ft.

Height of turret . 9 ft.

Thickness of turret . 8 in.

Thickness of side-armor . 5 in.

Thickness of deck-plating . 1 in.

Diam ter of propeller … . 9 ft.

Diameter of steam cylinders (two) . 36 in.

Length of stroke . 2 ft. 2 in.

Displacement . . 1 , 255 tons

Armament, two 11-in. shell-guns, each 15,668 pounds.

In all the models, drawings and plans of his invention made by T. R. Timby himself, the pilot house or “lookout® was placed on top of the turret. ((For some inexplicable reason,® he has said, <(the Monitor had her pilot-house placed upon the deck, forward of the turret, in the way of her own guns.®

The success of the Monitor aroused much interest in all maritime nations, and was the direct cause of many modifications in the con¬ struction of vessels in the navies of Europe,

though nowhere except in the United States navy was the monitor adopted as a distinct type of warship. During a gale off Cape Hatteras, 31 Dec. 1862, the Monitor was sunk.

John H. Clifford.

MONITOR LIZARD, the type of a family of pleurodont lizards (V arnidce). They are found in Africa, the Eastern Archipelago, etc., and are the largest of modern lizards, some species attaining a length of six or eight feet. The skin is covered with very small juxtaposed scales and tubercles dorsally, while ventrally the scales are square and arranged transversely. The tail is long, cylindrical in the terrestrial, but compressed laterally in the aquatic forms, and possesses a sharp underridge or keel. The limbs are well developed and the toes provided with claws. Most of these great greenish-gray lizards inhabit rivers and ponds, and are active and fierce enemies of all lesser aquatic life. They feed upon eggs and young of crocodiles, turtles and aquatic birds; and on fishes, amphi¬ bians, swimming-birds, anything in fact, small enough to be mastered. There is one genus and nearly 30 species. • The most familiar species, probably, is that of the Nile and other African rivers (Varanus niloticus), upon which the English name (<monitor® was first fastened by a ridiculous misinterpretation of the Arabic word ouaran (lizard) ; it is aquatic and fre¬ quently exceeding five feet in length. An equally well known kind is the East Indian monitor (V. salvator), which is to be met with from Ceylon and western India to the Philip¬ pines, and is equally at home in the

water, on land or in trees. Its rapacity is great and varied; and it is connected with many extraor¬ dinary rites and superstitions among the na¬ tives, some of which are given in Fennent's (Sketches of the Natural History of Ceylon) (1861). Australia has a large species (V. gouldi).

MONITOR AND MERRIMAC. The

contract for the construction of the Monitor was entered into by the Navy Department in the hope that she could be completed before the Merrimac, then building by the Confeder¬ ates at the Norfolk navy yard, could be finished, and that the Monitor would be able to cope with this formidable ironclad. The Merrimac, called by the Confederates the Vir¬ ginia, was being reconstructed upon the hull of the United States frigate Merrimac, of 3,200 tons, which had been sunk, when the Norfolk navy yard was abandoned, by the Union forces, and was subsequently raised by the Confederates. Her armament was two 7-inch rifles, two 6-inch rifles and six 9-inch smooth-bores.

Each side was aware of the effort of the other to be first ready for active service. The Confederates won by a day. At noon 8 March 1862, the Merrimac, attended by two gunboats, Raleigh and Beaufort, each one gun, was dis¬ covered coming out of the Elizabeth River into Hampton Roads (q.v.) and standing toward the Union fleet off Newport News and Fort Mon¬ roe, composed of the steam-frigates Minnesota, Roanoke and Congress, each 50 guns ; the sail¬ ing-frigate Saint Lawrence, 12 guns, and the sloop Cumberland, 24 guns. Their armament was mainly 8-inch and 9-inch guns, with several 10-inch pivot guns. These vessels had the

heaviest batteries which the government had been able to assemble to watch the Merrimac. The latter bore down directly upon the Con¬ gress and Cmnberland. At less than a quarter of a mile the Congress delivered her broadside, her heaviest shot making no impression. The return-fire of shells crashed through her sides with terrible effect.

Passing the Conaress at 300 yards, the Merrimac received the fire of the heaviest guns of the Cumberland without the slightest harm resulting, and without replying she drove her iron prow through the side of the Union frigate, crushing it, and at the same time pouring in a fire of shells. Leaving the Cumberland rapidly sinking, the ironclad steered for the Congress, which had been run ashore, and from a point 150 yards astern raked her decks with shells which caused general destruction and set the ship afire. The Congress was obliged to surrender. The Cumberland fired a broadside as the water reached the gun-deck, and went down with her flag flying. As she sank, the Confederate steamers Patrick Henry, 12 guns, and the Jamestown, two, came out of the James River and joined the Merri¬ mac. The Minnesota had grounded where the Merrimac could not approach within a mile, and her firing was so bad that only one shot struck the frigate. The other Confederate ves¬ sels were finally driven off after inflicting much damage with their rifled guns. After several hours' ineffectual attempts to reach the Minne¬ sota, the Merrimac and attending gunboats re¬ turned to Norfolk. Several shore-batteries which had attempted to help proved as useless as the batteries of the frigates had been. The Congress continued to burn, and finally blew up. Over half the crew of the Cumberland were lost. The crew of the Congress were made prisoners, but, with the exception of the officers, were released. The total loss was some 250, the Confederate loss was nominal. The battle of an afternoon had ended the day of wooden navies.

The reports of the destruction by the Merri¬ mac caused consternation at Washington, and in the coast cities and, indeed, throughout the North. Secretary Stanton ordered all prepara¬ tions made for obstructing the channel of the Potomac far below the capital, and warned those in charge of coast-defenses to use every means that could be devised for protection.

Meantime the Monitor, in command of Lieut. John L. Worden, had left New York and after a rough voyage entered Hampton Roads at 9 o'clock the night after the battle. At 2 o'clock on the morning of the 9th she had anchored alongside the Minnesota. At 6 o'clock the Merrimac appeared bearing down on them, but at first passed by, gained the channel in which the Minnesota lay, and then steamed directly toward her. The Monitor swept in between the two and steered for the Merrimac. At close quarters the latter brought her bow-guns to bear and missed. There was little to fire at except the low turret with a cross-section of 20 feet. The first reply of the Monitor was a solid 11-inch shot which shook the Merrimac from stem to stern. The answer was a broad¬ side, some of the shot of which struck

the tur¬ ret, either glancing or falling as harmless as the shot of the frigates the day before had proved against the Merrimac , Then followed broadside after broadside without producing the

slightest effect on this ((cheese-box on a raft,® as spectators described it. At every opportunity of maneuver the Monitor closed in and smote with her 11-inch solid shot, bending the heavy armor and straining the timbers of her ad¬ versary. Finally the Merrimac left the Monitor and crowded steam for the Minnesota. Upon reaching point-blank range she received a full broadside, and a shot from a 10-inch pivot gun, without suffering the slightest damage. In reply she raked the Minnesota with a shell, set her afire, blew up a tug alongside, and but for the Monitor, which had followed under full steam, and now swept in between the two, the Minnesota would have shared the fate of the Congress and Cumberland. In changing position to meet the Monitor the Merrimac grounded, and the Monitor continued her ham¬ mering with 11-inch shot. As soon as the Mer¬ rimac was floated she started rapidly down the bay, pursued by the Monitor. Suddenly she turned and attempted to run the Monitor down. The blow she struck with her prow glanced, and the Monitor was unharmed. The Merri¬ mac then started for the Minnesota for the purpose of ramming her; but when within easy range the Merrimac, with all the Confederate ships, changed course at noon headed for Nor¬ folk. Her officers subsequently gave as a reason that in attempting to ram the Monitor her iron prow was broken, and their vessel was leaking. The armor was reported dam¬ aged, the stem twisted, the muzzles of two guns shot away and the steam-pipe and smokestack riddled. The casualties were only two killed and 19 wounded. The consternation of the day before at Washington and the North was transferred to Richmond and the South. Prepa¬ rations were hastily made by the Confederates for blocking the channels in the Elizabeth and Nansemond rivers, and to obstruct the channel of the James.

The Merrimac did not again engage the Monitor, and after the evacuation of Norfolk, which occurred 9 May, she was destroyed by the Confederates.

The Monitor had hurried direct from her shipyard to Fort Monroe and fought without a previous trial-trip, and before she had been accepted by the government. Her five hours' battle settled many questions, and once again in American history had been fired a ((shot heard round the worlds

MONITORIAL SYSTEM. See Lancasterian System.

MONK, munk, or MONCK, George, Duke

of Albemarle, English general and naval com¬ mander; the restorer of the Stuart dynasty: b. Potheridge, Devon, 6 Dec. 1608; d. Newhall, Essex, 3 Jan. 1670. At 17 he enlisted and served in the Cadiz expedition under Sir Rich¬ ard Grenville, a relative; then entered the Dutch army; and returned to England in 1639, fought brilliantly in Scotland and after 1640 in Ireland, and on the outbreak of the Civil War kept his commission in the king's army. But in 1644 he was captured by the Parliamen¬ tarian forces, and after two years' imprisonment in the Tower, joined the victors, for whom he went to Ulster as governor. Accused of ex¬ ceeding his powers by arranging a truce (which was almost an alliance) with Owen O'Neil, he was recalled to England in 1649 and repri-

manded at the bar of the House of Commons. At the victory of Dunbar in 1650 he did good service ; a year later he was made lieutenant-general of the ordinance and in Cromwell's absence was commander-in-chief of Scotland. In 1652 he was made a general of the fleet. He introduced the elements of land tactics into naval formation and administered two crushing defeats to the Dutch, van Tromp being killed in the latter battle. In 1654 he again was sent to Scotland on the Royalist rising as commander of the army, and acted there with much more prudence and success. After Oliver's death and Richard Cromwell's resignation Monk set him¬ self to effect the Stuart Restoration, quietly shifted the forces in, England until all was so arranged that there was no chance of armed resistance, and then (1660; brought back Charles II — a bloodless revolution meeting with general favor. He was made Duke of Albemarle, received other high honors, main¬ tained order and showed rare courage in Lon¬ don during the Plague, but with an empty treasury in 1667 could not keep the Dutch from burning the shipping in the Thames. Short, fat, fair and wrinkled, Monk was not a win¬ ning personality, being cold, prudent past a virtue and rather unprincipled; but he was a

wonderfully able general, with technical skill rare in one so lacking in theoretical training. His life was written by his chaplain, Dr. Thomas Gumble (1671). Consult also the biographies by Guizot (1838 and 1850) ; and that by Corbett, J., in the (English Men of Action) series (New York 1889).

MONK, a bird. See Friar-bird.

MONK. See Monasticism.

MONK-FISH, ANGEL-FISH, or FID¬ DLE-FISH, a broad, flattened fish (Squatina angelus), closely allied to the sharks, but more like a ray in appearance, five or six feet long, having enlarged, wing-like pectoral fins. It is found near the coast in the warm seas of Europe and North America; it usually stays near the bottom, is from three to four feet long, slow in motion, dull, voracious and use¬ less, except that some shagreen may be ob¬ tained from its skin.

MONK-SEAL, a seal of the genus Monachus, so called from a humorous suggestion in colors to the habit of a monk, the species prop¬ erly so called is that (M. albiventer) of the Mediterranean; but the West Indian seal (M . tropicalis) is very similar to it, and is of inter¬ est as being almost extinct. See Seals.

MONKEY-BREAD, the fruit of the bao¬ bab tree (q.v.).

MONKEY-FLOWER, any of many plants of the genus Mimulus (figworth family), so called because the face of the fox-glove-like corolla suggests that of a cheerful monkey. They are erect, tall herbs, with opposite, clasp¬ ing, lanceolate dentate leaves, which bear in late summer solitary, axillary irregular blos¬ soms of showy colors. The genus contains some 50 North American species, of which the most familiar is the square-stemmed of the Eastern and Central States (M. r ingens). Its flower is violet. A common species in Cali¬ fornia and on the Pacific Coast (M. guttatus) has the corolla yellow, often blotched with

red or purple.

MONKEY-POT, the fruit of a forest tree of Brazil. See Brazil Nut and Sapucaia Nut.

MONKEYS, a general name for the ani¬ mals of the highest mammalian order, the Pri¬ mates (q.v.), excepting mankind and the

lemurs; ordinarily also excepting the anthropoid apes (see Ape) and the baboons (q.v.). The term in fact, then, is suitably limited to three families, considered in their broadest sense, the Hapalidce, Cebidce and Cercopithecidce. General characters are as follows : the short hallux, or great toe, is opposable to the other digits of the foot, so that the feet become converted functionally into hands. The pollex, or thumb, of the fore limbs may be absent, but when developed it is usually opposable to the other fingers. These animals may thus be called ˆfour-handedˆ or quadruma-nous ; hence the old designation Quadrumana. The limbs are nearly of equal length. There is only one pair of mammary glands, which are pectoral in position. In many cases the cheeks are dilated into pouches. The teeth consist of two incisors in each side of each jaw. The premolars, or false molars, vary in number. The true molars number three in each side of each jaw, the latter teeth being furnished with tubercles of various sizes and shapes, adapted for crushing fruits and vegetables. The canine teeth are generally strong and of large size. A diastema or interval exists between the lower canine and the first lower premolar tooth, and between the upper canine and outer incisor teeth; this interval admitting of the large ca¬ nines being brought into apposition when the jaws are closed.

For information as to the probable descent and geological history of monkeys, see Pri¬ mates.

The small American monkeys of the family Hapalidce, more usually called marmosets (q.v.), seem to be lowest in the scale of structure and nearest the lemurs, and are by some naturalists separated from the Cebidce in a group Arcto-pithecini. They are least in size of the race, have the tail long, hairy and not prehensile; no cheek-pouches or natal callosities; the fore limbs shorter than the hind ones ; the thumb not op¬ posable; the ears hairy and of large size; the body covered by a close fur. Their dental formula gives four incisors, two canines, six premolars and four molars in each jaw — this dentition resembling that of the Old World monkeys, and also that of man himself. The molars are provided with blunt processes. They are confined to tropical America, and wholly arboreal, feed on insects and fruit, and are tamable, gentle and intelligent. See Marmoset.

Next to these come the Cebidce, called New World monkeys, because the family is confined to the American continent, and also known as Platyrhini, because of the broad partition in the nose, which widely separates the nostrils and causes them to open somewhat laterally, though this term is often applied to the Hapalidce also. They are characterized by the possession of an extra premolar on each side of

each jaw; and by the length and strong prehensility of the tail in most forms — an arrangement by which the end of the tail (naked there on its underside) curls without effort around a limb and clings firmly to it, giving so great assistance in climb¬ ing that many of these monkeys exhibit wonder¬ ful agility among the trees, grasping and

swinging by their tails alone, leaving all four feet (or hands) free. The ears are rounded and with most of the face are destitute of hair, there are no cheek-pouches or callosities on the buttocks, so characteristic of the Old World forms. The hind limbs are generally the longer in this section. In the spider monkeys, however, the fore limbs are longer than the hinder mem¬ bers. The thumbs are not generally opposable, and may be wanting; and the thumb in these monkeys nearly approaches the other fingers in size and form when present. Unlike other mon¬ keys, they have the thumb placed in nearly the same plane as the other fingers, so that the mere position of the thumb renders it unfitted. The great toe is generally of large size, and is more capable of being opposed to the other digits than the thumb. The diet is mainly of a vege¬ table nature, and their life almost exclusively arboreal, a fact which, more than any question of climate, seems to limit them in range to the region of the tropics, between the plains of northern Mexico and those of southern Brazil, since several species dwell in the cold regibns of high mountains. Of the Cebidce the spider-monkeys (Ateles) present very typical examples. In these forms the tail reaches its greatest de¬ velopment as a prehensile organ. The limbs are exceedingly slender, and the thumb is rudi¬ mentary. (See Spider-Monkey.) The capu¬ chin monkeys, or Sapajous (q.v.) form the type of the genus Cebus, and include many species, as also does the genus Callithrix (see Squirrel-monkey). The howling monkeys (Mycetes) are so named from the loud howling noises they are capable of producing, through the posses¬ sion of a bony “drum,® which opens into the larynx, and which greatly increases the reso¬ nance of the voice. Other genera are Pithecia, the sakis, or hooded monkeys; Uacavia, the woolly monkeys; Chrysothrix or golden mon¬ keys ; and Nictipithecus, the Dorocoulf monkeys.

The last and highest section of the monkeys (next to the anthropoid apes) is that of the Old World tribe Cercopithecidce, if that family name is used, as is recently the custom, to cover all the formerly called ˆcatarrhine® monkeys, dis¬ tinguished by their obliquely-set nostrils, the nasal apertures being placed close together, and the nasal septum being narrow. Opposable thumbs and great toes exist in all, except the genus Colobus , the members of which want thumbs. The teeth are arranged to exhibit four incisors, two canines, four premolars and six molars in each jaw; the incisors are prominent, and the canines are especially large and strong — the latter teeth being separated by an interval or diastema from the upper outer incisor, and from the first lower premolar. The tail may be rudimentary or wanting, but in no case is it pre¬ hensile. Cheek-pouches, or pocket-like cavities excavated in the cheeks, which are used as receptacles for food preparatory to its mastica¬ tion, are present in many; and the skin covering the prominences of the buttocks is frequently destitute of hair, becomes hardened and thus constitutes the so-called natal callosities of these animals. Sometimes these callosities exhibit brilliant colors, and the skin in the neighborhood of the nose, as in the mandrill, may also be striped with gay hues. In their distribution all the catarrhine monkeys inhabit Asia and Africa, a macaque inhabiting the Rock of Gibraltar, and called Barbary ape (q.v.).

Many of these monkeys are small or of mod¬ erate size, handsome and graceful. Such are the African guenons, green monkeys and man-gabeys (qq.v.) of the genera Ccrcopithecns and Cercocebus. Nearly related to them are the macaques (q.v.) ; and the baboons (q.v.). These have cheek-pouches, and the fore limbs the longer. The genera without cheek-pouches and with the hind limbs longer than the fore limbs are the African thumbless genus Colobus , which contains the guerezas (q.v.) ; and the East In¬ dian tribe Semnopitheons which contains the Hindu sacred monkey or entellus (q.v.), the proboscis monkey, negro monkey and several others described elsewhere under their names, some of which are large and extraordinary.

These Old World monkeys are more varied in their food and activities than are those of America, and are far superior to them in intelli¬ gence; consequently they furnish nearly all the pets, circus-performers and servants of wander¬ ing musicians that we see from time to time. Many of them breed in captivity, adapt them¬ selves well to civilized life and betray a sur¬ prising ability to learn in various directions, though prone to be inattentive, and growing dull and surly in old age. Few, however, when taken into cold climates live long, even when

most carefully treated, as they seem peculiarly sus¬ ceptible to diseases of the lungs, which usually have a fatal termination.

Excellent accounts of the monkeys of the world exist in the (Standard, } (Royal, J (Cas¬ sell's, } and (Allen's Natural Histories) ; the last and most recent being a monograph by Forbes. Otherwise information must be gleaned mainly from the books of scientific travelers.

MONKHOUSE, William Cosmo, English author, poet and art critic; b. London, 18 March 1840; d. Skegness, Lincolnshire, England, 2 July 1901. He received his education at Saint Paul's School in London and in 1857 became a junior clerk in the Board of Trade office with which he was connected with advancement for the re¬ mainder of his life. Although not a great poet his work enjoys a high reputation among the works of the minor poets and as an art critic he won considerable attention. His work for the (Dictionary of National Biography > takes within its scope practically all of British art. He published (A Question of Honor, > novel (1868) ; (The Works of John Henry Foley) H875) ; (The Italian Pre-Raphaelites* (1887) ; (British Contemporary Artists) (1899), *etc.* Among his poetical works are (A Dream of Idleness) (1865) ; (Corn and Poppies) (1890) ; (The Christ upon the HilP (1895) ; and (Pasi-teles the Elder, * published after his death.

MONKSHOOD. See Aconite.

MONLUC, mon'luk', or MONTLUC,

French marshal and military writer: b. Sainte Gemme, near Auch, 1502; d. Estillac, near Agen, July 1577. He entered the army *as an archer, fought (1525) at Pavia, accompanied the cam¬ paign of Francis I against Charles V and aided much in the outcome by improvements in tac¬ tics and in the artillery and engineering. His defense of Siena (1555) was brilliant, but he became hated, as governor of Guienne, for his severity against the Protestants. He was first to recommend the introduction of caring for the wounded and the testing of officers. His (Memoirs,) which takes in from 1521 to 1574

AMERICAN MONKEYS

Im _

/ M ■

k.

¥ m

Kim

wmm

iULr\ i

gaZ& - t j

1

1 Titi or Death’s Head Monkey (Chrysothrix sciureus)

2 Uakari Monkey (Uacaria calva)

3 A Group of Capuchins or Sapajous (Cebus)

4 Barrigudo (Lagothrix humboldti)

5 Spider Monkey (Ateles bartletti)

6 Black Couxios (Pithecia satanus)

OLD WORLD MONKEYS

1 Hanuman Monkey (Semnopithecus entellus)

2 Negro Monkey (Semnopithecus maurus)

3 Green Monkey (Cercopithecus callitrichus)

4 Pig-tailed Monkey (Macacus leoninus)

5 Bonnet Macaque (Macacus cynomolgus)

6 Diana Monkey (Cercopithecus diana)

and Henry IV, and called the (Soldier's Bible, > has considerable value in the history of war¬ fare. The best issue is by A. de Ruble (5 vols., Paris 1865-72) ; (Les Guerres d'ltalie > (ib. 1886, was edited by Baudrillart. Consult Riistow, 'Military Biographies* (Zurich 1858) ; Nor¬ man, (Les memorialistes, Monluc* (Paris 1892) ; Courteault, Paul, (Blaise de Monluc, historien* (ib. 1908), contains a bibliography.

MONMOUTH, mon'muth, James, Duke of, royal pretender and claimant to the English throne: b. Rotterdam, 9 April 1649; d. London, 25 July 1685. He was the natural son of Charles II and of Lucy Walters, as seems certain from the king's open recognition of him, although he so closely resembled Robert Sidney, whose mis¬ tress his mother had been, that Sidney has been supposed his father. Placed under the guard¬ ianship of Lord Crofts, he assumed the name of James Crofts and was brought up in France under the care of Henrietta Maria, the queen-dowager ; was recognized and summoned to England by his father after the Restoration: was married to Anne Scott, heiress of Buccleuch and made Duke of Monmouth ; and served in Holland in 1673. His Protestant sympathies, his clemency to the Scottish Covenanters whom he defeated at Bothwell Bridge (1679), and a story persistently circulated (and denied before Privy Council by the king) that Charles had secretly married his mother in Holland, made him popular with the Protestant party; and Shaftesbury repeatedly urged the king to legit¬ imatize him and ensure a peaceable Protestant succession. He did his best to exclude James from the throne. After the Rye House Plot he escaped to Holland. Thence after the ac¬ cession of James II he invaded England, pos¬ sibly with the complicity of William of Orange, called the people to arms, raised a large force of Protestants, was proclaimed king at Taunton, but was defeated by Faversham at Sedgemoor. Taken prisoner he begged for his life from the king to no purpose, and was

executed at the age of 36. He was handsome, weak, fickle and in his claims to the throne no doubt entirely under the control of political plotters. The (Diaries) of Evelyn and Pepys give the setting of Monmouth's career ; his rising is sketched with some historical verisimilitude in Doyle's (Micah Clarke) (1888), a romance. Consult also Roberts, (Life of Monmouth) (1844) and Fea, A., (King of Monmouth) (New York 1902) ; the latter work outlines the popular leg¬ end that Monmouth was not executed, a sub¬ stitute having taken his place, and tells how the country people long expected his return.

MONMOUTH, Ill., city, county-seat of Warren County, on the Chicago, Burlington and Quincy and the Iowa Central railroads, about 95 miles north by west of Springfield. It is in an agricultural region, and nearby are coal fields and valuable clay deposits. It was settled in 1836 and in 1852 was incorporated, receiving a new' charter in 1874. The chief manufactures are pottery, sewer pipe, stoneware, boxes, a-gri- cultural implements, stump-pullers, soap, hour and dairy products. The trade is principally in coal, grain, flour, poultry, dairy products and livestock. Monmouth College, founded in 1856 under the auspices of the United Presbyterian Church is here, also the Warren County Li¬ brary. 'The chief city officers are the mayor,

who holds office two years, and the council. The waterworks are owned and operated by the municipality. Pop. (1920) 8,116.

MONMOUTH, Battle of, in American history, a celebrated engagement between the American and British forces, the former com¬ manded by General Washington and the latter by Sir Henry Clinton, which took place at Free¬ hold, Monmouth County, N. J., 28 June 1778. On 18 June Sir Henry Clinton, acting under peremptory orders from the British Ministry, evacuated Philadelphia, which had been occu¬ pied by his army since the preceding September, and proceeded across New Jersey toward Brunswick, with a view of embarking on the Raritan. On hearing of this movement, Wash¬ ington broke up his camp at Valley Forge, and having sent forward some light troops to harass the enemy started in pursuit. Owing to exces¬ sive heat the march of both armies was slow. At Allentown, Clinton turned to the right by a road leading through Freehold to Sandy Hook, to embark at the latter place; and Washington, who had hitherto been deterred by the advice of his officers, and particularly of Gen. Charles Lee, from attacking the

enemy, determined at once to give him battle. The evening of the 27th found the main body of the enemy en¬ camped on high ground near Monmouth court¬ house, while the American advance, about 4,000 s- trong, under Lee, was posted at Englishtown, five miles distant, with the main body about three miles in the rear. The command of the advance had originally been given to Lafayette, with the consent of Lee; but the latter subsequently applied for and obtained it. Early on the 28th Lee engaged the rear division of the enemy, his orders being to hold it in check until the main body under Washington could come up. The Americans were at first successful, but owing to causes which have never been satisfactorily explained, the whole body soon after fell into a confusion and commenced a disorderly re¬ treat, closely followed by the British. Wash¬ ington, who w7as advancing hastily with the main body, received the first intimation of this movement in the crowds of fugitives who poured along the road. Exasperated at the failure of Lee to execute his orders he rode up to that general and reprimanded him. Then he reformed them, and hastened back to bring up the main body. Lee, resuming his command, held his position with spirit until compelled to retire and brought off his troops in good order. The main body, which had meanwhile taken a favorable position on an eminence, with a mo¬ rass in front and a wood in the rear, opened an effective cannonade upon the British. The latter, after an ineffectual attempt to turn the American left under Lord Stirling, directed their chief efforts against the right commanded by Greene, where Wayne, under cover of an orchard, was harassing their centre by a severe fire. To dislodge him Colonel Moncton ad¬ vanced with a column of royal grenadiers, but fell at the head of his troops, who were re¬ pulsed with considerable loss. The enemy at length fell back to the ground occupied by Lee in the morning, whither Washington was pre¬ paring to follow them when the approach of night and the exhaustion of his men induced him to defer the execution of his plan until the morning. During the night Clinton effected a

noiseless retreat, and at daybreak was many miles away from the scene of battle. The ex¬ cessive heat of the weather and the fatigued

condition of the troops rendered a pursuit im¬ practicable, and the royal army was suffered to proceed unmolested to the place of embark¬ ation. The American loss in this engagement was 69 killed and 160 wounded; the British 300 killed and 100 prisoners including wounded. Their total loss by desertions and the casual¬ ties of battle during their march through New Jersey has been estimated at 2,000. For his conduct in this battle Lee was court-martialed and suspended for one year from his command. Consult Carrington, H. B., (Battles of the American Revolution (New York 1876) ; Daw¬ son, H. B., (Battles of the United States) (New York 1858) ; <Lee, C., Trial of, 4 July 1778) (New York 1864).

MONMOUTH COLLEGE, in Monmouth, Ill., a coeducational institution, under the aus¬ pices of the United Presbyterians. It was founded in 1856, and in 1915 there were con¬ nected with the school 26 professors and in¬ structors and 451 students. There were about 12,000 volumes in the library; the grounds and buildings were valued at $340,000; the produc¬ tive funds amounted to $284,000; and the an¬ nual income was about $49,000. The depart¬ ments are the preparatory, music and art and graduate. The college courses consist of nine groups which lead to the degrees of B.A. and B.S.

MONNA LISA, or (La Gioconda,* the famous masterpiece of Leonardo da Vinci, dis¬ appeared from the Louvre in Paris 21 or 22 Aug. 1911. The picture had been taken out of the frame, which was found on a back staircase of the building. For over two years the mys¬ tery remained unsolved. On 12 Dec. 1913 it was announced that the painting had been recovered in Florence and returned to Paris. It had been stolen from the Louvre by an Italian workman named Vincenzo Perugia, who gave as his reason for the theft that he wished to retaliate on France for taking so many Italian masterpieces from Italy. On 5 June 1914 Perugia was sentenced to one year and 15 days' imprisonment with payment of costs.

MONNA VANNA. In 1902 Maurice Mae¬ terlinck, who for a dozen years had been com¬ posing tenuous dramas of the imagination, ex¬ pressive of vague fears, and symbolic of the coming of death, turned in (Monna Vanna* to a more usual type of play. In place of an airy plot but half suggested, he developed a close-knit story; in place of shadowy figures uttering childlike phrases and implying as much by their silence as by their talk, he presented living figures engaged in rhetorical debate; and in place of the merest impressionism of mood, he displayed a sudden practical interest in prob¬ lems of conduct. Two such problems, in par¬ ticular, he considered: first, as to whether a woman might ever honorably sell her honor; and, second, as to

whether her husband's dis¬ belief in the purity of her motives might ever justify her leaving him for one who could understand her. Monna Vanna, in order to save the lives of 30,000 starving Pisans, be¬ sieged by the Florentines, consents to yield her honor to the commander of the enemy. But the latter, her boyhood lover, refuses to

profit from the advantage he has taken of her, and, assailed by the state he serves, returns with her to Pisa as her guest. Her husband, who has raged against her decision to go to Prinzivalle in the first place, refuses to believe that this warrior has spared her. She can rescue him from death only by falsely pro¬ claiming his guilt and her own desire for ven¬ geance, thus gaining possession of the keys to his dungeon, from which she will flee with him at the earliest opportunity. Thus Maeterlinck, like Shakespeare in (Measure for Measure) and Phillips in (Pietro of Siena,* though he raises the question of a woman's riedit to barter her honor for the life or lives of others, does not venture to exact of her the price. Such is his procedure, also, in two other plays, <Joyzelle) and ˆarie-Magdeleine.* Neither of these has been so successful upon the stage as (Monna Vanna,* which may be read in the English versions of A. I. du Pont Coleman (1903), Charlotte Porter (1904) and Alfred Sutro (1907). The piece is discussed in the monographs on Maeterlinck by Gerard Harry, M. J. Moses, Edward Thomas and Una Clark.

Frank W. Chandler.

MONO, mono, a lake or <(sink** in Mono County, Cal., on the eastern slope of the Sierra Nevada, in a gold and silver mining region, about 150 miles southeast of Sacra¬ mento. The lake is circular in form, nearly 15 miles across; area, about 200 square miles, contains almost as a central point, Mono Island. A short railroad passes along the eastern shore, chief village station, Monolake. A number of streams enter the. lake, but it has no apparent outlet. The waters are alkaline and contain no fish. A species of insect deposit their ova on the surface of the waters, and sometimes so great are the numbers that they look like islands. The Digger Indians collect the insects and ova and prepare from them an edible delicacy. See Koo-cha-bee.

MONO, the common name in Guatemala for* the Central American howling monkey (Mycetes villosus).

MONOCACY, mo-nok'a-si, Battle on the,

an engagement during the Civil War when on 4-5 July 1864, General Early with 20,000 Con¬ federate troops, after driving the Union forces, under General Sigel, from the lower Shenan¬ doah Valley, crossed the Potomac into Mary¬ land north of Harper's Ferry, on his march to Washington, demonstrated on Sigel, who had retreated to Maryland Heights and, crossing South Mountain by Turner's and Crampton's Gaps, concentrated his main body on the night of the 8th near Middletown in the Catoctin Valley, his cavalry, after some sharp skirm'sh-ing during the day, being in advance, between Middletown and Frederick. Meanwhile Union forces had gathered to oppose his march. Gen. Lew Wallace, commanding the Middle Depart¬ ment, with headquarters at Baltimore, on the 6th collected a mixed force, numbering 2,700 men, _ under Gen. E. B. Tyler, at Monocacy Junction, near Frederick, and disposed it to coyer the Baltimore and Ohio Railroad and its bridge, and the Baltimore pike with its stone-pier bridge. Cavalry was sent out on the road beyond Frederick, which ran into Bradley T. Johnson's cavalry, and fell back. On the 8th Wallace was joined by a part of Ricketts' divi-MONOCEROS

sion of the Sixth corps from the Army of the Potomac, which was advanced to Frederick, but during the night it was withdrawn and crossed to the east bank of the Monocacy, where mean¬ while other parts of Ricketts' division had come up by rail from Baltimore. Ricketts' division of about 3,350 men was formed on Tyler's left, covering the Washington road and its wooden bridge. Both flanks and the fords were guarded by cavalry and skirmishers were de¬ ployed on the bank of the river. Wallace had but six field-guns; three were given to Tvler and three to Ricketts. An earthwork and two blockhouses commanded both the railroad bridge and the bridge on the Washington road. On the morning of the 9th Early advanced from Frederick to attack Wallace, Rodes' divi¬ sion on the left, along the Baltimore pike, and Ramseur's in the centre on the Washing¬ ton road, while Gordon's division, following McCausland's cavalry, inclined to the right to reach the fords a mile below Wallace's left. Rodes and Ramseur drove the Union skirmish¬ ers to the bank of the

river; Ramseur drove those in his front beyond it; and four heavy batteries of 16 guns crowning the heights near the river, at 9 a.m., opened fire upon the Union lines opposite. By noon the Confederate cav¬ alry had forded the river, and dismounting, advanced on Ricketts' left, gaining a temporary advantage, but were soon driven back. Gor¬ don then crossed his infantry and reinforced the cavalry. Ricketts, holding on the bridge with his right to check Ramseur, changed front to the left and engaged Gordon and the cav¬ alry, sometimes yielding ground, and again regaining it, but the enfilading fire of the guns across the river, and the continued heavy pres¬ sure of Gordon on his front, right and left flanks, caused Wallace at 4 p.m. to withdraw him toward the Baltimore pike, having first burned the wooden bridge and the blockhouse at its farther end. Tyler had continued to hold his position against Rodes, in part west of the river, covering the stone bridge of the Baltimore pike, but Gordon's troops, following up the east side of the stream, on Ricketts' heels, struck the pike before the bridge-guard could get away, capturing several hundred pris¬ oners, Tyler narrowly escaping. Wallace fell back by the Baltimore road in the direction of Ellicott's Mills, Early following but a short distance. Early buried his dead and sent over 400 of his severely wounded to the hospitals in Frederick. He levied and collected $200,000 from the citizens of Frederick, seized a good supply of shoes, bacon and flour, and on the morning of the 10th resumed his march on the direct road to Washington, halting at night within four miles of Rockville. The Union loss at Monocacy was 123 killed, 603 wounded and 568 missing, a total of 1,294, of whom 1,073 were of Ricketts' division. Early reports his loss as about 700 killed and wounded, but it must have been greater, as Gordon reports the loss in his division alone as 698. The great importance of the battle on the Monocacv lies in the fact that the dav gained in delaying Early enabled the remainder of the Sixth corps to reach Washington from Grant's army, as well as a part of the Nineteenth corps from New Orleans, before Early could make an at¬ tack on the city. General Grant says : ((Whether the delay caused by the battle amounted to

a day or not, General Wallace contributed on this occasion, by the defeat of the troops under him, a greater benefit to the cause than often falls to the lot of a commander of an equal force to render by means of a victory. » Con¬ sult (Official Records> (Vol. XXXVII) ; Pond, 'The Shenandoah Valley in 1864) ; Grant's Per¬ sonal Memoirs) (Vol. II) ; Early, Past Year of the War for Independence) ; Haynes, E. M., 'History of the Tenth Regiment, VtP (Vol. Ill, pp. 184-238, Rutland 1894) ; The Century Com¬ pany's (Battles and Leaders of the Civil

WaU (Vol. IV).

E. A. Carman.

MONOCEROS, mo-nos'er-os, or UNI¬ CORN, from the Greek povog, monos (single), and Ktpag, keras (horn), a constellation in the. astronomical chart lying between Canis major and Canis minor, south of Gemini and Cancer, and introduced (1624) by Bartsch. It is made up of multiple stars, clusters and nebulas but has no star brighter than fourth magnitude.

MONOCHORD, a musical instrument with one string, invented by Pythagoras, and much employed by the ancients in the musical training of the voice and ear. The modified form of the instrument Used in natural philos¬ ophy lecture-rooms is often called a sonometer; it consists of one or more strings stretched over a sounding-box. A string is fastened at one end of the box, and passes at the other end over a fixed pulley, which enables it to be stretched by means of weights; it passes over two fixed bridges near the ends of the box, and there is a movable bridge between to alter the length of the vibrating portion of the string. Strings are employed to produce musical sounds in the violin, harp, guitar, piano, *etc.* The son¬ ometer is an indispensable piece of apparatus to lecturers on acoustics not only for the proof of the law of vibrating strings, but also to illustrate the relations of harmonics and the fundamental ideas of undulations.

MONOCHROMATIC LIGHT, in phys¬ ics , a light which consists of a single color which is so pure and so definite that when it is examined by the spectroscope it gives but a single bright line. An approximately mono¬ chromatic light may easily be obtained by vol¬ atilizing salt, or some other sodium compound, in the flame of a Bunsen burner. An orange-yellow color, of great purity, results. Viewed by this light, everything white or yellow looks bright, while vermilion, ultramarine and other colors that do not contain any sensible propor¬ tion of yellow appear black. Monochromatic light is greatly used in physics, for the study of certain kinds of phenomena in optics.

MONOCHROME (Greek, monos, single, and chroma, color), in ancient art, a painting executed in a single color. The word is gen¬ erally applied to painting in the various shades of the same color. The first specimens of the art of painting were of one tint only, which was most commonly red, made either with cin¬ nabar or minium. Instead of red, white paint was sometimes used. The first four plates in the first volume of the paintings of Hercula¬ neum contain several monochromes upon mar¬ ble. The most numerous monuments

existing of this kind of painting are on terra cotta.

MONOCLINE. See Folds.

MONOCOTYLEDONS, plants of that great division of angiospermous plants whose embryos sprout in only one seed-leaf or cotyle¬ don, which springs from one side of the axis of the growth ; the opposite of Dicotyledons (q.v.). In one system of botany the term was employed as a synonym of Endogens, but this use is obsolete.

MONOD, mo'no, Adolphe, French Protes¬ tant theologian : b. Copenhagen, 1802 ; d. Paris, 6 April 1856. He studied at Geneva, was minis¬ ter at Naples (1825-27), where he founded an Evangelical congregation ; then at Lyons (1828-31). From 1836 he was a professor at Montauban, and from 1844 he was minister of the Reform Church. He wrote (Sermons) (Paris 1860 ; 3d ed., 4 vols.) ; (La Femme' (Paris, 11th ed., 1894) ; (Lesadieuxa mes amis et a l'Eglise' (1856; 12th ed., 1894). Consult Monod, S., (Life and Letters of A. Monod) (London 1885) ; Stapfer. (La grande predica¬ tion chretienne en France. Bossuet, Adolphe Monod' (Paris 1898).

MONOD, Frederic, French Protestant clergyman: b. Monnaz, Switzerland, 17 May 1794; d. Paris, 30 Dec. 1863. He was educated at Geneva, but came under the influence of Robert Haldane and was ordained in 1818. He then went to Paris in service of the Bible So¬ ciety, then assisted (1820) his father, a pastor at Paris, becoming (1832) titular pastor of the Oratoire. As editor of the Archives dn christianisme au dix-nenvieme siecle for 43 years, he became prominent (1848) when re¬ ligion was menaced by the revolution. He favored the separation of Church and State and a Reformed Church creed ; he, opening the synod, in September, found his motion for formulation of a creed lost. Thereupon he decided on establishing a free church on orthodox basis in spite of the persuasion of his brother Adolphe (q.v.), the synod and the Paris Consistory. Resigning from his Oratoire pas¬ torate (1849) he opened a small chapel and founded the figlise Libre. He was successful in uniting the Protestant congregations

who had left the State Church, and established a constitution the first clause of which stated: ((We believe that the entire Scripture of the Old and New Testament is inspired by God, and thus constitutes the sole and infallible rule of faith and life.® At the Third Biennial Synod (1852) evangelization commenced and 22 posts exist at present besides affiliations, but the number of congregations (73 in 1873) has fallen off to 36 recently, many returning to the Reformed Church. Consult Monod, G., (La Famille Monod' (Paris 1890) ; Pedezert, T., (Cinquante ans de souvenirs religieux' (Paris

1896).

MONODELPHIA, a name formerly ap¬ plied to all mammals esteemed higher than marsupials (Didelphia) considered as a group distinguished primarily by the fact that the uterus or womb is single and shows a single uterine cavity. It has been shown that this dis¬ tinction does not hold and the term has conse¬ quently become obsolete.

MONODY, from the Greek monodia, a solo in contradistinction to the polyphony, the song of several or many voices. The term has been brought down to modern times as convey¬ ing a sense of melancholy or sadness in its

diction. Thus in literature a monody is a com¬ position dwelling on some single emotional sub¬ ject. In poetry the monody of the Greeks was a lyric solo in tragedy, an ode voiced by an actor on a painful motive, hence, when of a funeral or dirge character, it closely approaches threnody. In music monody is a song for a single voice with musical accompaniment; monodies have been introduced into opera, Peri's (Dafne' (1597) being probably the first occasion, and they have found a regular place in the growth of operatic composition as well as in oratorios. The term is also used recently as synonymous with monotony as ((the monody of the waves," *etc.*

MONCECIUS INFLORESCENCE. See

Dicecious Flower.

MONOGRAM {monos, single or only, and gramma, meaning ((a single mark"), a character or cipher composed of one, two or more letters interwoven, being a sort of abbreviation of a name, used as a seal or

badge, in coats of arms, *etc.* Monograms were much used on coins by the Greeks and the Romans. They were also used on standards, walls and tapestry, seals and documents, in which they were employed not only by princes and ecclesiastical dignitaries, but also by magistrates and notaries. At the commencement of the Christian period their use was universal. The titles and rubrics of Greek manuscripts are frequently monogrammatic, and numerous and diversified monograms are found in Latin manuscripts. Alphabets like the Roman, of an angular character, have many letters with corresponding parts; and the up¬ right strokes, the horizontal lines and the curves are easily made by arranging them so that similar portions shall coincide, to produce numerous combinations. Monograms are gen¬ erally combinations of more than two letters; when only two were incorporated they were gen¬ erally designated ligatures. After the 12th cen¬ tury they gradually went out of use. The use of them remained longest in Germany, where it was formally abolished by the Diet of Worms in 1495. The knowledge of monograms of this public kind is of great importance for the illus¬ tration of the monuments and documents of the Middle Ages, and therefore forms a par¬ ticular branch of diplomatics; for they were much employed in the mediaeval diplomatic art. The term was subsequently applied to all sorts of ciphers and signs, with which artists, par¬ ticularly painters and engravers, were accus¬ tomed to designate their works. The mediaeval seal-engraver, to economize as much as possible the annular space available for the legend, favored both ligatures and monograms. Many of those seals had the initials of their own¬ ers blended and incorporated with the de¬ vices, called merchant-marks, corresponding somewhat to the modern trademarks, which were the stamp, as it were, by which the work of each artist was known. Many of the mod¬ ern monograms are copied from mediaeval ex¬ amples. Consult Brulliot, (Dictionnaire des Monogrammes' (1832-34) ; Duplesssis and Bouchot, (Dictionnaire des Marques et Mono¬ grammes de Graveurs' (1886-87); Bouvenne, (Les Monogrammes Historiques' (1870) ; Fa¬ gan, (Collectors' Marks' (1883).

MONOLITHS. See Stones, Standing.

MONOMANIA, from the Greek fiovoq, monos (single), and pavia, mania (madness). That form of mental derangement which dis¬ tinguishes itself by an abnormal conception or action on one subject only, leaving the mind sane on all other points. The eccentricity of delusion does not extend to any other subject or act. The term erase is often used to cover mild forms of monomania.

MONOMKTALLI.SM, the principle of having only one metallic standard in the coin¬ age of a country, opposed to bimetallism. See Bimetallism; Coinage; Currency.

MONONA, mo-no'na, a lake in Wisconsin, one of a group of lakes near Madison in Dane County. See Four Lakes.

MONONGAHELA, mo-non-ga-he'la, a river which has its rise in the northwestern part of West Virginia, and flows north into Pennsylvania, where it unites at Pittsburgh with the Allegheny to form the Ohio River. The headwaters of the Monongahela are in the Alleghany Mountains near the headwaters of the Potomac. The two headstreams of the Monongahela unite near Fairmont in Marion County, W. Va., and from the point of junction on the north become a swiftly flowing stream, furnishing water power for several manufac¬ turing towns and cities. The whole course is very irregular ; the length is about 300 miles. It was made, navigable about 106 miles from its mouth to Morgantown, in Monongahela County, W. Va., by a system of locks, nine in number, and other locks above Morgantown now make the river navigable as far as Fairmont. The largest tributary is the Youghiogheny, a navi¬ gable river, which has its source in the moun¬ tains in the southwestern part of Garrett County, Md., and enters the Monongahela near Pittsburgh. The Cheat River, the next largest tributary, is a stream in the northeastern part of West Virginia. It joins the Monongahela in Pennsylvania, a few miles north of the border. The river flows through a country which has fertile farm lands in the valley and the whole section is rich in coal. Near Pitts¬ burgh, then Fort Duquesne, on the banks of the river, on 9 July 1755, the French and Indians won a victory over Braddock's Anglo-American troops.

MONONGAHELA CITY, Pa., city, in Washington County, on the Monongahela River, and on the Pennsylvania, and the Pitts¬ burgh and Lake Erie railroads, about 32 miles south of Pittsburgh. It is in a coal region, in which the chief industries are coal mining and manufacturing. It was settled in 1792 bv Joseph Parkison, was

incorporated as a bor¬ ough 3 April 1833 and chartered as a city 24 March 1873. It has large industrial estab¬ lishments, employing about 6,000 persons, or about 600 more than the whole population as given by the federal census of 1900. The chief manufactures are glass, foundry and ma¬ chine-shop products, flour, lumber, chemicals and paper. It has considerable trade in the home manufactures and in coal and farm prod¬ ucts. The principal buildings are 15 churches, six public schools, an academy, government building, memorial hospital and municipal building. The four banks contain a combined capital of $2,500,000. The government is ad¬ ministered under a third-class city rule. The

government provides for a mayor, comptroller and a board of commissioners, four in number, the mayor being president of the board. All are elected every four years. The majority of the inhabitants are American born, but there are quite a number of Italians and Slavs. Pop.

(1920) 8,688.

MONOPHYSITES (from Greek monos, single, and physis, nature), those followers of the opinion in the early Church which ascribes but one nature to Christ in contradistinction to the orthodox doctrine that he was both divine and human, true God and true man. The Monophysites were mainly confined to the Eastern Church and obtained no footing in the West. The edict called Henoticon, issued by the Emperor Zeno in 482, was not able to quiet the long and often bloody contests incident to this controversy, and the orthodox Church, by its sentences of excommunication, occa¬ sioned a formal secession on the part of the Monophysites. This separation took place in the first half of the 6th century. Nor did they remain united among themselves. In 519 con¬ troversies arose, among them respecting the question whether the body of Christ is cor¬ ruptible or not. About 560, a Monophysite, Askusnages, and after him Philoponus, a noted Alexandrian philosopher of that century, con¬ ceived the idea of styling the three persons of the Deity three Gods. These Tritheists and their adherents, even in the eyes of the Mono¬ physites, were heretics, and were the occasion of many Monophysites turning Catholics. In Egypt, Syria and Mesopotamia the Monophysite congregations, however, remained the strongest, had patriarchs at Alexandria and Antioch, ex¬ isting, without interruption, by the side of the im¬ perial

orthodox patriarchs ; and after the Syrian, Jacob Baradaeus had, about 570, established their religious constitution, formed the independent churches of the Jacobites and Armenians, which separated from the Greeks as well as the Ro¬ mans, and have for that reason been able to maintain themselves since the 7th century, even under the dominion of the Mohammedans. Ex¬ cepting their doctrine of one nature in Christ they coincide, in the main points of belief, with the Greek Church ; their worship also resembles the Greek rather than the Roman, but has, from their national character and their superstition, received variations, which are most Striking in the religious constitution of the Egyptian Jacob¬ ites (q.v.). See Jacobites; Armenian Church under Armenia.

MONOPLEGIA, mon-6-ple'ji-a, a paraly¬ sis limited to one organ or part, e.g., one arm or one leg. If both arms or legs are stricken the condition is called paraplegia; while if arm and leg and other organs on one side are affected it is called hemiplegia. It is caused by circumscribed lesions of the nervous system, in brain, spinal cord or nerves. An example of monoplegia is Bell's palsy (q.v.). See Brain, Diseases of.

MONOPOLI, mo-nop'6-le, Italy, town, in the province of Bari, on the Adriatic Sea and on the Bari-Brindisi Railway. It is the site of the ancient Minopolis and the present seat of a bishopric. Its old castle and remains of the encircling wall and its prehistoric graves lend it considerable archaeological interest. It has a 12th century cathedral, a gymnasium, technical

school, open harbor, and its industrial activity extends to oil-pressing, soap-making and trad¬ ing in oil and wines. In 1911 it had a popula¬ tion of 24,104.

MONOPOLY (Greek, rnonopolia, single or sole selling) is an exclusive right, secured to one or more persons, to carry on some branch of trade or manufacture, in contradis¬ tinction to a freedom of trade or manufacture enjoyed by all the world. The most frequent monopolies

formerly granted were the right of trading to certain foreign countries, the right of importing or exporting certain articles, and that of exercising particular arts or trades. Such exclusive rights were very common in Great Britain previous to the accession of the house of Stuart, and were carried to an op¬ pressive and injurious extent during the reign of Queen Elizabeth. The grievance at length became so insupportable that, notwithstanding the opposition of government, which looked upon the power of granting monopolies as a very valuable part of the prerogative, they were abolished by an act of 1623. However, various companies for the exploitation of the colonies and possessions of Great Britain, such as the Hudson Bay and East India companies (qq.v.), of an essentially monopolistic nature, continued to exist until well on in the last century. Nevertheless this act secured the freedom of industry in Great Britain, and has done more perhaps to excite a spirit of invention and in¬ dustry and to accelerate the progress of wealth than any other in the statute book. Govern¬ ment monopolies, however, are common on the Continent, and constitute one of the chief means of obtaining revenue. There is one species of monopoly sanctioned by the laws of all countries that have made any advances in the arts, namely, the exclusive right of an in¬ vention or improvement for a limited number of years. It is, in fact, a kind of property created by law for the benefit of the inventor, and which he could not effectually acquire or secure without the aid of the law. The ex¬ clusive right of an author to the publication of his own work is hardly a monopoly, but rather a right of property, resting upon the same prin¬ ciple as the right to lands or chattels. The law, therefore, by giving an author the exclusive right to the publication of his own work for a limited number of years makes no grant ; it is only allowing him what is his own for a lim¬ ited time. But the exclusive right to the use of an invention or improvement is a monopoly, since it deprives others, for that period, of the chance of the advantage of making the same improvement, discovery or invention them¬ selves. Capitalists, either single or combined, may produce commodities so much better and cheaper than others can do as practically to command the entire sale, and are in popular language called monopolists. But having no legal rights or advantages that are not open to all, they are not in the legal sense in posses¬ sion of a monopoly. In the oldest sense of the term they are monopolists ; but since the term is now used in an unfavorable sense, its dis¬ continuance as applicable to these is only just. It may be assumed as an economical axiom that every interference with absolute freedom in acts of exchange can be defended only on the highest grounds of public policy. Any ad¬ vantage given to a particular interest is not

only a wrong to the general public, but will in time bring a just retribution to the favored class.

In the United States the only monopolies that the laws and the individual states look on with favor consist of the post office, which is a government monopoly, and the rights granted to individuals under the patent and copyright laws. Monopolies commonly known as trusts are looked on with odium, and various States have enacted laws making a trust an illegal combination of individuals. See Trusts ; Copyright; Patent.

Bibliography. — Ely, R. T., (Monopolies and Trusts> (New York 1900) ; Levy, H., (Monopoly and Competition (New York 1911) ; Schaffie, (Theorie der ausschliessenden absatz-verhaltnisse) (Tubingen 1867).

MONORAIL, a single-rail type of railway designed for economy of construction, in¬ creased speed and for mountainous regions. The first idea of a single-rail railway dates back to 100 years ago, and many such are now being used in various parts of the world.

The first car run on a single rail, the inven¬ tion of M. Charles Lartigue, has been in prac¬ tical operation for many years in Djiboniti, a French-African post. The car is kept vertical by its attachment to a laterally placed horse, which balances the car as a hansom is balanced by attaching the horse in front. The develop¬ ment of this primitive idea attracted the genius of all great civilized countries, and aided by government patronage, individual effort and fortunes, made great progress.

An early type of monorail was one where all the different resistances to a swiftly moving car or train, except the atmospheric resistance, was concentrated in the vertical plane of th.e centre of gravity of the car or train, being par-

The Tunis Monorail.

tially concentrated by centrifugal force, and those resistances which were not concentrated at the centre are nearly compensated for by friction removing devices. When the said body is at rest, or slowly moving, the unbalanced forces, only, are mechanically concentrated with a minimum friction, and the stability is posi¬ tively and

absolutely preserved without jarring movement. The downward vertical force con¬ sists of the weight of cars, trucks and load. This weight is delivered to, and directly sus¬ tained by, two centrally disposed bearing rails laid with precision as to alignment and surface, and closely gauged to each other, so as to con¬ stitute practically a single support, while the vertical integrity or stability of the weight thus delivered to a central point is conserved when necessary by upward forces acting through the medium of dependent tension members, fitted with frictionless wheels bearing against in¬ verted girders or rails; when moving at speed,

stability is almost entirely preserved naturally and automatically, and only slight strain is on the dependent tension members. The magni¬ tude of the downward forces is a matter sim¬ ply of weight of cars; the upward forces are a matter of mechanical moments or leverages; the upward forces may amount to 10 per cent of the downward forces for usual cases. The downward force is delivered through the me¬ dium of the main central wheel, bearing on the two central rails as on a single rail. The side clutch wheels, that bear against the inverted girders or rails, guide, clutch and secure the car truck to its normal plane or path, forcing the truck to follow precisely any assigned in¬ clination; for example, around curves. The central bearing rails and the inverted side clutch rails being laid with precision as to line, grade and inclination, the lateral and top-heavy swaying and recurrent oscillation now observ-For surface street construction, showing overhead truck at the maximum height of 14 feet.

able in locomotives in motion can never obtain; nor can the truck derail, as it is clutched to the track.

The propulsion of cars is effected by electric motors, two or four motors to each truck, the number of motors being dependent upon the starting pull, acceleration and speed required.

William B. Mack’s design, shown here, ap¬ pears to have been awarded more consideration among engineers than any of the many

similar plans patented. As far back as 1872 a charter was granted in the State of New York for the building of a hanging railroad which had the general mechanical principles of the hanging roads more recently exploited in Germany, France and Russia, but the Cook system, shown here, appeared to be the only serious effort made to date at hanging cars on the side of the structure in place of underneath.

E. Moody Boynton patented plans for a monorailway which were approved by such ex¬

perienced railroad men as Austin Corbin. Sev¬ eral short test roads were built and operated. The Tunis plan, here illustrated, is a modifica¬ tion of Boynton's. As will be seen, the single rail is laid on the ground like the rails of steam roads and trolley lines. Over the single rail

PtUtcruL Ven.txAaJki.Tr 3

at fixed intervals are trusses, or bents, joined by cross pieces at the top and supporting the guides which prevent the car from toppling over.. The car itself also embodies some unique and interesting features. It is narrower than the standard trolley or railroad car and rests on a single pair of wheels, or, in the full-size coach, on two trucks of two wheels each, ar¬ ranged tandem, just under the centre of the floor, the platform and superstructure being balanced on them. The car is balanced on the single rail, the wheels being of the grooved pattern. So accurately are the weights ad¬ justed that a slight lurch of the body will sway the car from side to side. At first some appre¬ hension was expressed that in going around curves the centrifugal motion of the car would impose too great a strain on the bents, but this fear has proved wholly groundless. By allow¬ ing for the centrifugal force by the slant toward the inner side of the circle which is

accomplished on ordinary roads by raising the other rail the weight is thrown off the bents and approximately equalized.

The English monorail known as the Behr System, here illustrated, has

been in operation for a number of years at Ballybunnion, Ireland,

and was successfully tested by the Belgian gov¬ ernment, securing a speed of 83 miles per hour with a car weighing 70 tons. In 1901 and 1902 the English Parliament granted Mr. Behr's company the right to construct a road between Manchester and Liverpool, after the plans had been examined and approved by many eminent engineers.

The track is a single rail of the same shape and weight as generally used on steam roads. This rail is fastened at the top of an A-shaped structure made of steel. The structure is riveted to steel ties firmly imbedded in cement and rock ballast. The triangular supports for the rail are only four feet high, and one is placed every three feet three inches. At each side and 18 inches from the ground is placed a light guide rail to keep the moving car in position. The entire weight of the car rests upon large grooved wheels which travel upon the large rail at the top of the framework. As electric motors are used to propel the train, each of these wheels is a ˆdriver.® Current is conducted on rails placed upon the ties, but insulated from them.

The car consists of two compartments, one on each side of the structure, and are 60 feet long, weighing four tons each.

The monorail idea has been exploited in Germany, France and Russia in its application to hanging cars, but Germany alone has se-

Suspension Railway, Barmen, Germany.

cured results. A suspended overhead railway system of rapid transit is now in operation between the three manufacturing towns of Vohwinkel, Eberfeld and Barmen, near Cologne, Germany. The road is built on a system of latticed longitudinal girders, one vertical and two horizontal, assembled into the form of an Isection. The main girders form the web of the I, and the lateral girders, which give the requisite

lateral stiffness, serve as the top and bottom flanges of the I. Diagonal tie-rods ex¬ tend from the upper panel points of the central girder to a connection with the chords of the bottom lateral girder. The last mentioned chords consist of steel I-beams, and upon their upper flanges is laid the single T-rail, from which the cars depend and on which they run. The girders, which vary in span from 21 to 33 metres (68.88 feet to 108.24 feet), are car¬ ried upon supports varying in structure with the locality where they are used. Where the railway is carried immediately above the Wup-per River the A-frame style of pier is used, while in the towns through which the line passes the trusses are carried upon substantial U-frames. The A-frame consists of two rec¬ tangular latticed struts, which are united at the top by a rectangular plate yoke.

The cars are 37.7 feet long, 8.5 feet high and 6.88 feet wide; are therefore fairly long and narrow, and are slightly tapered at the ends.

They have a seating capacity of 50, and are built with two side doors opening inwardly, and two auxiliary doors at the ends. The total weight of each car is 12 tons. The cars are freely suspended from two trucks spaced eight metres apart and having a diameter of 0.9 metres. The wheels are mounted in tandem to run on a single rail and are driven by two electric motors of 36 horse power each, through the medium of transmission gearing. The motor trucks receive current by means of a slipshoe and a contact rail, which is carried on the bottom of the lateral girder, somewhat to the inside of the main supporting beam.

The truck-frames embrace the rail-girders and the rails so closely that a play of seven millimetres is allowed and that derailment is impossible. If a wheel or axle should break the cars would be held up by the frames.

Oscillation of the car is limited by two pro¬ jections on the lower part of the hook-shaped frame. The cars swing around the curve in a slightly inclined position and spontaneously re¬ assume their normal vertical position when a straight part of the rail is reached. To the passengers the change in equilibrium is imper¬ ceptible. Since a sudden change in equilibrium causes an oscillation proportionate to the veloc¬ ity and the angle determined by the radius of the curve, which oscillation lies within twice the value of this angle, comparatively long transi¬ tional bends have been provided by reason of which the equilibrium is gradually changed, with the result that

almost inappreciable oscillations are produced.

A Russian electric engineer named Hippolyte Romanoff has invented a monorailway of some merit. The invention consists of a monorail hanging car as shown here. The rails are sup¬ ported by T-shaped columns, the carriages be¬ ing suspended in the air and propelled by wheels running along the rails. These wheels are without flanges, which Romanoff asserts retard speed by clinging to the rails while rounding curves, but are prevented from leaving the rails by means of smaller wheels which grip the rails horizontally.

An electric feed-wire runs parallel with the rail. The cars have three supports each. If the first is broken the second comes into play automatically, and then the third. Should any one of the cars be stopped by an accident or for any reason other than the natural one of pausing at a station, all the cars behind would stop also, thus preventing any rear-end colli¬ sions.

In May 1907, with a gyroscope monorail car Mr. Louis Brennan, C. B., the inventor of the Brennan torpedo used by the British govern¬ ment, demonstrated before the Royal Society of Great Britain that he had discovered a prac¬ tical application of the gyroscope.

The invention is, briefly, a system by which a vehicle or a train of vehicles supported by a single row of wheels may travel on a single rail and maintain perfect equilibrium in motion regardless of the distribution of the load, wind pressure, *etc.* Automatic stabili tv mechanism carried by the vehicle itself endows it with this power. The mechanism consists essentially of two flywheels rotated directly by electric

motors in opposite directions at a very high ve¬ locity and mounted so that their action can be utilized. These flywheels are mounted on high-class bearings and are placed in exhausted cases so that both air and journal friction is reduced to a minimum, and consequently the power required to keep them in rapid motion is very small. The stored

up energy in the fly¬ wheels when revolving at full speed is so great and the friction so small that if the driv¬ ing current is cut off altogether they will run at sufficient velocity to impart stability to the vehicle for several hours, while it will take from two to three days before they come to rest. The model car, while running on a curved monorail, leans and so automatically balances the effect of centrifugal force, while a single wire hawser stretched across a river or ravine is all that is necessary in the shape of a bridge.

In 1909 Froelich, a German, developed an¬ other type of gyroscopic car with a so-called “precession motor,® which did not pass beyond the experimental stage, and about two years later the Schilowsky system was brought out in which the gyroscopic principle is also em¬ ployed. Consult Journal of the Franklin In¬ stitute (Vols. CLXIX and CLXXIV) and files of the Scientific American, the Engineer and Engineering (London) .

MONOTHEISM (Greek /iovo<r single god), in religion, the belief that God is one or that there is only one God. Several religious beliefs are in opposition to this tenet : polytheism, which holds that there are many gods ; atheism, which denies the existence of God altogether; and scepticism or agnosticism, which doubts the existence of a supreme being. The historical sources of monotheism are very ancient and involved, and need not be dealt with here. However, in the history of religious thought, three philosophical types of mono¬ theism have developed which are distinct enough logically, if not practically, to make analysis possible.

The first type is exemplified in the later monotheism of the Israelitish tribes. The unity of God is derived from an ethical concept of the universe. God is one, holy and the right¬ eous ruler of the world. He is the dispenser of justice, the giver of the law. He derives his power from the fact that he is the creator and, therefore, he enjoins upon his creatures ethical responsibility and heightened moral conscious¬ ness. Apart from the world, he sits in su¬ preme jurisdiction over it.

In Greek philosophy we find the second type of monotheism, in which God as a unity or unifying principle is the source, the explana¬ tion of the order and rational coherence of the universe. According to Aristotle, he is at once the commanding general of the universe and the rational order of it.

The Hindu philosophy represents the third type. In its teaching, a distinction is main¬ tained between the reality of the world and the reality of God. The earth on which man lives and its phenomena are of

the “stuff that dreams are made® ; it is ephemeral, transitory, unreal. God, who is imminent in all things, is at the same time transcendental, superior — the ultimate reality. Knowledge of God cannot be obtained by intellectual reasoning alone. It must come as a direct revelation by insight to VOL 19 — 24

those souls who are best prepared to receive it. Therefore, the contemplative life is to be de¬ sired and commended in preference to the practical. Logically, this mysticism argues that, since knowledge obtained through sensu¬ ous experience is at best defective and limited, some comprehensive perfect reality partaking of the nature of all things must exist somewhere — and this is the one God.

These various types of monotheism did not exist as pure concepts practically, however. The continued study of the problem of the relation of the world to God brought about interesting syntheses of these several philosophies. The intellectualism of Greek monotheism which con¬ ceived the “Logos® or divine essence of things to be the ruler and the order of things at the same time, soon found its position besieged by ethical questionings. How establish the proper relationship between a remote, righteous God who orders all things and a lawless unjust world? How reconcile, in other words, the Greek rational and the Jewish ethical mono¬ theism? The NeoPlatonic school turned to mysticism for the solution. Likewise, early Christianity found itself beset with similar problems, and in its answer also found recourse to transcendental philosophy necessary. In Christian monotheism, a curious synthesis of all three monotheistic concepts is found, together with the doctrine of the personality of God. The ethical and mystical concepts predominate. The existence of a rational world is acknowl¬ edged to the point of fixing the ethical re¬ sponsibility of human relationships. But beyond that, the things of the earth are untrue, im¬ perfect, unreal. The whole truth is in God, of whom knowledge is obtained through insight and revelation. The concept of immortality solves the problem of injustice and evil, for in the after life all ethical readjustments are made. The Hellenistic concept of the universe as a well-ordered system capable of being fathomed by the intellect also survives in Christianity in the attempt to rationalize its doctrines and to build up a definite convincing system to estab¬ lish the unity between the finite world and its infinite ruler.

Constant revivals of the third type of mono¬ theism arise also out of the problem of synthet-izing all three forms. The escape from the

difficulties attendant upon the acceptance of any of the three per se is generally in trans¬ cendentalism of some form or in scepticism. True monotheism must take into just considera¬ tion the ethical, rational and intuitional elements of religious philosophy.

Consult Martineau, J., (A Study of Re¬ ligion J (Oxford 1888) ; Inge, W. bL, Chris¬ tian Mysticism5 (London 1899) ; Royce, J., (The World and the Individual5 (New York 1900-01); Hoffding, H,, (The Philosophy of Religion5 (New York 1906) ; King, I., (The Development of Religion5 (New York 1910) ; Lang, A., (The Making of Religion5 (3d ed., New York 1910).

MONOTHELITES (Greek, monotheletai, from monos, and thelo, I will), a sect who main¬ tained that though Christ had two natures co¬ existing distinctly in the unity of the person, yet these natures possessed or acted by but a single will — the divine, which so predominated over or absorbed the human as to deprive it of all action or efficiency. They have been regarded

as an offshoot of the Monophysites, though they themselves denied all connection with them. The doctrine originated with the Em¬ peror Heraclius, who in 630, by adopting a middle course, attempted to reconcile the Monophysites to the orthodox church. The at¬ tempt was for a time successful. Heraclius consulted Sergius I, patriarch of Constanti¬ nople, on the new dogma, and he not only ap¬ proved of it, but became its most active propa¬ gandist. At his instance, and mainly in conse¬ quence of his representations, Pope Honorius I addressed two letters to Sergius, which accord¬ ing to some interpreters would seem to favor Monothelism. The successors of Honorius condemned the Monothelites, and Martin I, in 649, issued a bull anathematizing them. For this he was sent prisoner to the Chersonesus by the Emperor Constans, who protected the Monothelites. The sixth ecumenical council, that of Constantinople (680), condemned this heresy, and with this the early controversies on the incarnation became gradually fainter, till they were forgotten amid the disputes between the Iconoclasts and their opponents.

MONOTREMATA, an order of mam¬ mals belonging to the subclass Protothesia (q.v.) and represented by the duckbill (q.v.) of Australia and Tasmania, and the spiny ant-eaters (see Echidna), the range of which ex¬ tends into New Guinea. In many respects they recall the Sauropsida and especially the birds, a fact reflected in the name Ornithodelphia sometimes applied to them. The most marked of these peculiarities are the obliteration of the sutures of the skull, the possession of a ter¬ minal canal (cloaca) into which both the di¬ gestive tract and the urogenital organs empty; the possession of a well developed coracoid bone; and the fact that they do not, like other mammals, bring forth living young, but lay eggs. After the eggs are laid they are trans¬ ferred to a temporary pouch beneath the abdo¬ men, where they hatch and the young are nour¬ ished by the mammary glands.

MONOTYPE. See Composing Ma¬ chines.

MONOXIDE, in chemistry, a compound consisting of one atom of oxygen united to one atom of another divalent substance, or of one atom of oxygen united to two atoms of some other monovalent substance. The word is used when it is necessary to distinguish two or more states of oxidation of the same substance. Thus CO is called <(carbon monoxid,11 in distinction C02, which is called <(carbon dioxid.11 Simi¬ larly Na20 is ˆsodium monoxid,11 while Na202 is ((sodium dioxid.11 See Oxide.

MONREALE, monTa-a/la, Italy, town in the Sicilian province Palermo, five miles south¬ west of Palermo city and connected with it by surface car tracks. It is the seat of an arch¬ bishopric, has a well-preserved cathedral (built 1174-89) with old bronze doors and beautiful mosaics, monumental graves, of Normanic kings ; also there is a Benedictine abbey dating from the 12th century with a magnificent clois¬ ter of 216 mosaic pillars and large library. Among its other public edifices are a gymna¬ sium and a lyceum. In 1911 it had 20,103 in¬ habitants.

MONRO, mun-ro', Alexander, Scottish anatomist: b. London, 8 Sept. 1697; d. Edin¬

burgh, 10 July 1767. He studied at Edinburgh, afterward in London under Cheselden, and still further both in Paris and Leyden, at the former under Bouquet, and at the latter under Boer-haave. On his return to Edinburgh in 1719 he was made professor of anatomy and

surgery to the surgeon's company; in 1720, the first uni¬ versity professor of anatomy, though not in¬ ducted till 1725. He attended the wounded on the field at Prestonpans (21 Sept. 1745), and was an accurate observer, having studied the effect of the presence of solid bodies in the vermiform appendix, and otherwise anticipated later views. He resigned his professorship in 1764. His principal work is (Osteology, a Treat¬ ise on the Anatomy of the Human Bones) (1726), once a popular textbook.

MONRO, Alexander, known as Secundus; Scottish anatomist: b. Edinburgh, 20 May 1733; d. there, 2 Oct. 1817. He was son of Alexander Monro, called Primus (1697-1767) (q.v.). Educated at Edinburgh University (M.D. 1755), he also studied on the Continent, and in 1759—1808 lectured at Edinburgh. In 1783 he described the communication between the lateral ventricles of the brain, known as the foramen of Monro. He published (Three 1 reatises on the Brain, the Eye, and the Ear1 (1797) and other medical works.

MONRO, Alexander, . known as Tertius, Scottish anatomist: b. Edinburgh, 5 Nov. 1 773 - d. Craiglockhart, near Edinburgh, 10 March 1ˆ59. He was the son of Alexander Monro (1. 33-181 7) (q.v.). He obtained his M.D. at Edinburgh in 1797, was appointed conjoint pro¬ fessor with Monro Secundus of medicine, sur¬ gery and anatomy, and in 1817—46 was sole pro¬ fessor. His works include (Observations on Crural Hernia) (1803), and other publications.

MONRO, Dana Carleton, American his¬ torian. b. Bristol, R. I., 7 June 1866. He was graduated (1887) at Brown University, then studied (1889-90) at the universities of Strassburg and Freiburg. He was instructor and as¬ sistant professor of Roman and mediaeval his¬ tory (1893-1902) at the University of Pennsyl- /mS irˆ professor of European history

imc 1 at the Univer?ity of Wisconsin. In 1915 he accepted the chair of mediaeval history at Princeton University. He received the degree L.H.D. from Brown University in 1912 From 1894-1902 he was editor of Translations and Reprints from Original Sources of History and has written (Mediaeval History1 (1902) • ˆA Source Book of Roman History1 (1904)*

(Syllabus of Mediaeval History1 (7th ed 1913) • (German War

Practices1 (1917), and’ was a

nmˆoratw,?n,.<Essays on the Crusades1 (1902) and (Mediaeval Civilization1 (1904).

Chicago, Ill 23 Dec. 1860. She was graduated rom the Visitation Academy, Georgetown, D. C., in 1879 and has since devoted herself to literature.. In 1889 she wrote the text of the cantata given at the opening of the Chicago Auditorium and in 1891 wrote by request of the committee the ˆColumbian Ode1 which was *u,n? at the dedicatory ceremonies at the Worlds Columbian Exposition in 1892. She

nQ09?Ubhfre,d (Xaleria and 0ther Poems1 f <4?hn Root — a Memoir’

(1096); 1 he Passing Show — Five Modern

Q1ˆ5 (A903) ‘> (THe DanCe Of the

Seasons (1911); (You and I — Poems) (1914).

In 1912 she established and became editor of Poetry, a magazine of verse.

tt James, fifth President of the

United States : b. in Westmoreland County, Va 28 April 1758; d. New York, 4 July 1831. His fathei, Spence Monroe, was descended from Hector Monroe, an officer of Charles I ; while his mother, Eliza Jones, of King George County, was of Welsh descent. Monroe at¬ tended William and Mary College, but with the outbreak of the Revolutionary War he became a lieutenant in a Virginia regiment (1776). He was with his troops at the battle of Har¬ lem Heights, White Plains and at Trenton, where he distinguished himself, being wounded in the

shoulder. During the campaign of 1777-78 Monroe served on the staff of Lord Stirling with the rank of major, taking part in the battles of Brandywine, Germantown and Mon¬ mouth. As staff officer Monroe lost his place in the Continental army, and failing to raise a new regiment authorized by the legislature of Virginia, Monroe withdrew from active military services, confining himself to volunteer efforts in defense of his State. In this capacity he attained the rank of lieutenant-colonel in a new regiment to be raised in Virginia. In 1780 his military services were definitely interrupted and concluded by his undertaking the study of law under Thomas Jefferson, then governor of the State. So began the lifelong friendship and intimacy between these two representative Virginians. In 1782 he was elected to the Virginia legislature, and although still a very young man, was appointed to the executive council. From 1783 to 1786 he served in the Congress of the Confederation where he played a conspicuous part in endeavoring to strengthen the Confederation's powers for the regulation of commerce, and the favorable report of the special committee appointed as the result of his motion on this topic contributed to the ultimate alteration of the articles. Monroe also disclosed a lively interest in the development and division of the West, on the right of the United States to the navigation of the Missis¬ sippi, on the subject of trade between the States and in the public lands. On retiring from Congress he began the practice of law at Fredericksburg, Va. ; but in 1787 he was chosen a member of the Virginia legislature and in 1788 a member of the State convention to ratify the Federal Constitution. In this convention Monroe sided with the opponents of the new draft, and in the two main speeches which he made — characterized as ((dull and weighty® — he objected to the ratification on account of ((the power of direct taxation, absence of a bill of rights, the lack of legislative and executive responsibility, and the re-eligibility of the Presi¬ dent.® In 1790 he was selected by the legisla¬ ture United States senator to fill the vacancy caused by the death of William Grayson. From 1790 to 1794, as United States senator, he was classed as one of the most decided Anti-Federal¬ ists of the administration of Washington. Yet, in 1794 he was appointed Minister to France to succeed Gouverneur Morris, at the same time Jay was sent to England. These were trouble¬ some days for American commerce when the United States endeavored to preserve its strictly

neutral attitude in the death struggle between France and England. Morris had made him¬ self unpopular to the Republican government of France, and undoubtedly one reason for Mon¬ roe s appointment was his well-known opposi¬ tion to England. In other words, Monroe's

selection was ((forced by the exigencies of the situation.® It was hoped that Monroe's well-known French inclinations would harmonize the strained relations between France and the United States. He was instructed to assure France of the firm friendship of the govern¬ ment ; the determination of the United States to maintain strict neutrality; to help adjust outstanding disputes between the two lands over spoliations, but to refrain from negotiating a treaty of commerce; and to quiet French suspicions regarding the Jay mission. Monroe was not informed of the wide latitude of Jay's instructions toward negotiating a treaty of com¬ merce with Great Britain. Trouble therefore ensued, due to the fact that Monroe's French sympathies caused him to act indiscreetly on certain occasions; and also to the fact that he was not fully in the confidence of his home gov¬ ernment concerning the Jay negotiations. Ac¬ cordingly, in 1796, he was recalled because the Federalists criticized his republicanism and his failure to appease the French. Nevertheless, he had accomplished almost all the points set forth in his instructions by securing the recall of the French decree injuring American com¬ merce, by protecting the interests of American citizens in France, by securing treaties with Algiers and Spain and by maintaining peace between the United States and France.

On his return to America, Monroe published, in December 1797, a defense of his conduct in a pamphlet of 500 pages entitled ((A View of the Conduct of the Executive in the Foreign Affairs of the United States as connected with the Mission to the French Republic during the years 1794-96.® The pamphlet was widely cir¬ culated and aroused much discussion throughout the nation. In 1799 Monroe was chosen gov¬ ernor of Virginia and occupied this office until 1803, when he was appointed by President Jef¬ ferson as Envoy Extraordinary and Minister Plenipotentiary to France to aid the resident Minister, Robert R. Livingston, in obtaining the territory at the mouth of the Mississippi, including the island of New Orleans, as an out¬ let for the traders of the West, and to co¬ operate with Charles Pinckney, our Minister at Madrid, for cession of the Floridas. By the secret treaty of San Ildefonso (October 1800), Spain had ceded Louisiana to France, and in 1801 the Spanish intendant had given notice that New Orleans ((would no longer be a (place of depositˆ ® This had aroused the inhabitants of the West and had occasioned the appoint¬ ment of Monroe. However, by the time Monroe had reached Paris, Napoleon had given up his scheme of a colonial empire, and through one of his ministers had offered all of Loui¬ siana to Livingston. On the arrival of Monroe, the two Ministers determined to exceed their instructions and so negotiated the purchase of Louisiana.

In the same year he went as Minis¬ ter to England and while there he met Nicholas Biddle of Philadelphia, who was then touring Europe. A friendship sprang up between the young man and the Minister which continued

throughout their lives and ultimately resulted in Biddle's appointment by President Monroe as one of the directors of the Second Bank of the United States. In 1804 he proceeded to Spain to help Pinckney define the boundaries of Louisiana and acquire the Floridas. Failing to accomplish his purpose, Monroe returned to England where, assisted by William Pinckney of Maryland, a treaty was drawn up (December 1806) between England and the United States. But the treaty failed to provide against the im¬ pressment of American seamen and to secure indemnity for American losses, and accordingly Jefferson "pigeon-holed* it. In 1807 Monroe returned from England only to find his conduct the subject of much discussion; this called forth a pamphlet in defense, and for a time caused an estrangement between Monroe and Jeffer¬ son. In 1810 he was elected to the Virginia legislature, and in 1811 governor of the State, which office he held from January to November, when he resigned to become Secretary of State under Madison. He held this office until his election as President, during part of the time acting as Secretary of War. In both offices he displayed energy and diligence.

In 1816 Monroe was elected President by the Republican party, receiving 183 electoral votes against 34 for Rufus King, the Federalist candidate. His administration marks the advent of what is erroneously called the "era of good feeling,* when political rancor is supposed to have ceased. As a matter of note during his administration the first crisis of the slavery issue took place, resulting in the Missouri Com¬ promise in 1820 and the Seminole Campaign of 1817, laying the foundation for the political strife of the Jacksonian era. In 1820 he was reelected, receiving all the electoral votes but one, and this was cast by an elector of New Hampshire for J. Q. Adams, in order, it is said, that no one might share with Washington the honor of a

unanimous election. The important events of Monroe's two administrations are the Seminole Campaign, 1817—18 ; the acquisition of Florida, 1819; the Missouri Compromise, 1820; the veto of the Cumberland Road bill on con¬ stitutional grounds in 1822, and his celebrated message of 2 Dec. 1823, setting forth the Mon¬ roe Doctrine (q.v.). In 1825 Monroe retired to private life and took up his residence in Loudoun County, Va. He took part in the Constitutional Convention in 1829 called to re¬ vise the State constitution. In his later years, owing to financial difficulties, he was forced to seek aid from Congress, which body in 1826 authorized the payment of $30,000 to him, and after his death the purchase of his papers. He died in New York in 1831, and in 1858, the cen¬ tennial year of his birth, his remains were re¬ interred with solemn ceremonies at Richmond. Va.

Theodore Roosevelt has characterized Mon¬ roe as "a very amiable gentleman, but distinctly one who comes in the category of those whose greatness is thrust upon them.* This statement is undoubtedly true. Monroe was not a good speaker, he lacked tact and was often indis¬ creet, and he often allowed party feelings to get the better of his own judgment. Yet he was highly respected by his associates, and retained their friendship and admiration until his death.

Bibliography.— <The Writings of James Monroe) (7 vols., New York 1898-1903; edited by S. M. Hamilton) ; Gilman, D. C., (James Monroe) in (American Statesmen Series) (Bos¬ ton 1898) ; Bond, B. W., (Monroe's Mission to France, 1794-1796) (in (Johns Hopkins Studies, > Vol. XXV, Baltimore 1907) ; Cox, I. J., (The West Florida Controversy, 1 798— 181 3 J (Balti¬ more 1918) ; Irelan, J. R., (History of the Life, Administration and Times of James Monroe) (in Vol. V of (History of the Republic, } Chi¬ cago 1887). Consult also standard histories of the United States.

R. C. McGrane,

Assistant Professor of History, University of Cincinnati.

MONROE, La., city, parish-seat of Oua¬ chita Parish, on Ouachita River, and on the Missouri Pacific and the Vicksburp-S and P. railroads, Arkansas and Louisiana Midland Railway and L. R. and Monroe Railway, about 155 miles north by west of Baton Rouge and 97 miles east of Shreveport. It has steamer con¬ nections with New Orleans and way towns on the bay. It is in an agricultural section in

which raising cotton, corn, oats, cattle and hogs and lumbering are the chief industries. There are cottonseed oil mills, cotton com¬ presses, / brick yards, lumber mills and wooden-ware factories. Pop. (1920) 12,675.

MONROE, Mich., city, county-seat of Monroe County, on the Raisin River, and on the Michigan Southern, the Pere Marquette, the Michigan Central and the Lake Shore rail¬ roads, about 40 miles southwest of Detroit and 85 miles southeast of Lansing, the State capital. Was settled in 1784 by people from Canada, and was first called Frenchtown. In 1815 the name was changed to Monroe in honor of James Monroe (q.v.). It was chartered as a city in 1836. Here took place 22-23 Jan. 1813 the “Battle of Raisin River.* (See French¬ town, Battle of). The city is in a fertile agricultural region and a trade centre for a large section of the southeastern part of the State. Its principal manufactures are flour, lumber, paper, paint, brick, agricultural imple¬ ments, stoves, furnace products, furniture and canned .goods. The nurseries nearby and the fisheries give employment to a number of peo¬ ple. The chief buildings are. the courthouse, opera-house, armory and two orphan asylums, a home for the aged, Saint Mary’s Academy, a public library and a convent. It has the mother house of the Sisters of the Immaculate Heart of Mary, a teaching order of sisters who have schools in various parts of the country, and whose pupils number about 10,000. In connection with the convent and academy are a large library and a fine museum. Pop. (1920) 11,573. P

MONROE, N G, city, county-seat of Union County, on the Seaboard Air Line Rail¬ road, about 120 miles in direct line southwest of Raleigh. It is in a cotton-growing region, and nearby are gold mines. Municipal enter¬ prise includes waterworks and electric-lighting plant. The chief industrial establishments are cotton mills, cotton gins, lumber mills and iron works, with an active trade in their products and tobacco. Pop. 4,084

JAMES MONROE

Fifth President of the United States

‘

3 Vi

MONROE, Wis., city and county-seat of Green County, on Chicago, Milwaukee • and Saint Paul and Illinois Central railroads, 40 miles south by west of Madison. It is situ¬ ated in a cheese-making and dairy cattle-breeding region, Green County manufacturing more foreign type of cheese than any other county in the Union. Over 15,000,000 pounds of cheese are shipped annually. Industrially the condensing of milk and manufacturing of carriages, wagons, lumber and foundry products lead. Telephone, gas and electric companies are privately owned and waterworks is oper¬ ated by municipality. It has excellent public schools and a fine library, which contains 8,000 volumes. In 1859 Monroe was incorporated as a village and chartered as a city in 1882. Pop.

(1920) 4,788.

MONROE DOCTRINE, The. The term <(Monroe Doctrine® has been popularly used for a variety of principles intended to explain or to define the policy of the United States toward Latin-American countries. The same words have had very different meanings at different periods of our history, but are now generally used to declare that it is contrary to the in¬ terest of the United States that any European powers should establish new settlements or colonies in any part of the Americas, or should exercise preponderant influence in Latin Amer¬ ica. The whole subject may best be taken up under the following topics: (1) Conditions of the doctrine from 1775 to 1823. (2) Mon¬

roe's Doctrine as stated in his message of 1823 and applied down to 1845. (3) Theories

as to Latin America put forward by Presidents and Secretaries of State from 1845 to 1900. (4) The modern doctrine of ((the paramount

interest® of the United States in American affairs, as developed since 1901. (5) The pres¬

ent status of the doctrine in our relations to European, Asiatic and American powers.

I. Conditions of the Doctrine (1775-1823). — The prime reason for the Monroe Doctrine was the rise of a new kind of nation in the western hemisphere. Down to the American Revolution all the occupied parts of both con¬ tinents and the Caribbean basin were simply outlying parts of European countries and shared in the religion, institutions, law, foreign policy and wares of their mother countries. They were in the same situation as Africa at the present time, a group of dependencies, incap¬ able of direct influence upon the world at large.

The Revolution, with its theories of the right of every people to choose their own gov¬ ernment, resulted in the creation of the first American state. The new United States had no territory, claims or ambitions outside of the continent of North America. During the French Revolution and Napoleonic wars it stood aside as a neutral and insisted on sev¬ eral new principles of neutral rights in trade and citizenship. Europe quickly saw that this example was likely to be followed elsewhere and was not surprised when in 1806 the colonies of Spain and Portugal in the New World began to drop off. In 15 years the process was com¬ pleted, for by 1821 not a Spanish colony re¬ mained loyal except Cuba and Porto Rico; and Brazil was forever lost to Portugal.

These new communities appealed to the ex¬ ample of the United States, imitated its gov¬

ernment and expected its friendship. By 1823 there appeared on the map the independent states of Mexico, Colombia, Peru, Chile, La Plata, Haiti, Paraguay and Brazil. In the West Indies and on the north coast of South America small colonies remained to Great Britain, France, Holland, Sweden and Denmark. These, with Canada and the British plantation of Belize, were the only American colonies re¬ maining to Europe. America boasted no longer a single star of liberty, but a brilliant constel¬ lation of independent republics.

The people of the United States felt a natural and deep interest in what seemed a repetition of their own experience of breaking away from a mastering European government. They welcomed the liberal

trade opened up to them in regions where for centuries Spain had restricted communication. They enjoyed the sensation of being the pioneers and leaders in what they hoped was a world movement in democracy.

The new states at once demanded recogni¬ tion by their elder sister. In 1822 President Monroe, under powerful pressure from Henry Clay and other statesmen, received authority to recognize the new countries, and soon ex¬ changed ministers with Colombia, Chile, Mex¬ ico, Brazil and LaPlata. This step gave the certificate of the American Republic to the new freedom of her neighbors. It committed the United States to the principle that they were self-sustaining, self-governing, genuinely inde¬ pendent and entirely separated from their former European connections. They were too confidently accepted as equal sister states, a part of a free America.

II. Monroe's Original Doctrine (1823-1826). — This feeling of confidence in the con¬ tinuance of the new governments received a severe shock when the combination of central European powers, commonly called the Holy Alliance (q.v.), after crushing several attempts at liberal government in Europe, turned its attention to Spain and to the Spanish colonies. A French army, with the mandate of the Holy Alliance, in 1823 overran Spain and restored the royal despot to power. The Bourbon mon¬ arch naturally asked for the application to these revolted colonies of this principle of sup¬ porting the legitimate sovereign. Metternich, the grand master of the Alliance, thought well of the idea, and it was discussed at the Con¬ gress of Verona of 1822. The United States feared that France would undertake this com¬ mission also, and would claim Cuba as the price of the service to Spain, thereby securing a broader foothold in America and gaining a rich island almost overlooking the American coast. The tension was increased by the atti¬ tude of Russia on the northwest Pacific Coast, where the tsar claimed exclusive ownership of the mainland and islands as far south as the 51st parallel by an imperial ukase dated 4 Sept. 1821. The Russians also asserted the right to keep the vessels of other powers out of the north Pacific Ocean.

The United States was thus pressed in two directions by what looked like an attempt of several European powers to come in and occupy the territories wrested from Spain and the un¬ settled part of North America. For many years the government had been practising the

MONROE DOCTRINE

“Policy of Isolation,® which was early laid down by Washington, Hamilton, Jefferson, John Adams and other statesmen. Its purport was that the United States had no share in European political combinations, was not a party to European wars and would pursue the policy of developing itself as an American state. From this policy it was an easy transition to the complementary doctrine that European powers ought not to interfere in American affairs.

The time seemed to have come in 1823 for some sort of action that would head off the threatened invasion of Latin America by third parties in behalf of Spain. Something was also needed to check the Russian advance into North America; and the opportunity was convenient for expressing the undying love of Americans for the popular government that they had chosen. At this moment George Canning, For¬ eign Minister of Great Britain, stepped into the controversy. England was interested in unrestricted trade with the Spanish-American countries and was extremely opposed to the constricting policy of the Holy Alliance, both in Europe and America. Hence, in August and September 1823, Canning four times proposed to Richard Rush, our Minister in London, that the United States join England in a declaration against intervention, and Monroe was inclined to accept the proposal. After long Cabinet discussions John Quincy Adams, Secretary of State, convinced the President that it would be better to make an independent declaration. Adams’ papers show that he not only suggested but formulated most of the important presi¬ dential message of 2 Dec. 1823, several pas¬ sages in which, construed together, constitute the original and genuine Monroe Doctrine.

The principal points in this declaration, which is the original form of the Monroe Doc¬ trine, are substantially as follows: (1) The two spheres. The whole statement is based upon the theory that there were two natural spheres of world influence, separated by a meridian drawn through the Atlantic Ocean; and that the European and the American re¬ gions had two different sets of political and commercial interests. Since the United States took no part in the affairs of the European sphere it was common sense that European powers should keep out of American affairs. (2) Intervention. The message assumed that the Latin-American states were permanently independent and

capable of conducting civilized governments ; and it explicitly and strongly protested against ((any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any Euro¬ pean power.® (3) Colonization. <(The Ameri¬ can continents, by the free and independent condition which they have assumed and main¬ tain, are henceforth not to be considered as subjects for future colonization by any Euro¬ pean powers.® This was directed against Rus¬ sia but had a general bearing and has often been cited as applying to all European powers. (4) Political system. Monroe held that it would be hostile and dangerous to the United States if ((the allied powers should extend their political system to any portion of either con¬ tinent.® This clause plainly refers to the mu¬ tual assistance given by members of the Holy Alliance; but history shows that Adams and

Monroe both meant to protest against the prin¬ ciples of absolutism in government — and were replying to a reference to the European “po¬ litical system® in a recent Russian state paper. (5) Protection of the United States. The fundamental reason for setting forth the prin¬ ciples just stated was not America’s interest in the Latin Americans but in the United States. Many statesmen then felt an apprehension that, after having subdued the Latin Americans in the South, the Holy Alliance might move its forces northward. (6) Geographical extent. The doctrine in terms excepts from its appli¬ cation the then existing European colonies, which meant Canada, Cuba, Porto Rico, the English and French West India islands and the three South American plantations. From that day to about the time of the Spanish War of 1898 there was little objection to the con¬ tinuance of the old colonies. (7) Peace. Clearly the Monroe Doctrine was intended to keep the peace — to prevent wars from break¬ ing out in other parts of America and to avoid dangers to our own republic. In that respect the doctrine has been an eminent success. With the exception of the French invasion of Mexico in 1861, no serious or devastating wars have taken place between Latin-American and European countries.

The original Monroe Doctrine was at once effective. Canning was so much interested in the result that he claimed it for himself and said (21 Dec. 1826) : CCI looked another way … I sought for compensation in another hemisphere. … I called the new world into existence to redress the balance of the old.® In reality it was John Quincy Adams who struck out the policy and clothed it in a set of appropriate phrases for his country. European intervention was abandoned ; but when our Latin-American neighbors asked for a more distinct promise

of military protection, at the Panama Congress of 1826, the United States took the ground that our neighbors must pro¬ tect themselves in case of a fight with Euro¬ pean powers; that the Monroe Doctrine was only a pledge by the United States to itself.

III. Enunciations (1845-1900).— In the 75 years from 1826 to 1900 a variety of official statements were made on Latin America by Presidents, Secretaries of State and other states¬ men; and from time to time new questions were raised as to the application of the Monroe Doctrine to new circumstances. Out of these may be selected the following, as the principle attempts to state and apply the doctrine. (1) Van Buren, Webster and other statesmen, from 1829 to 1843, gave public notice that the United States would not permit the transfer of Cuba to any other European power; an extension of the doctrine to prevent the transfer of colonies from one European power to another. (2) President Polk in 1845 and 1848 favored the annexation of parts of America which might be in danger of European dominion. This statement was backed up by the Mexican War, as a practical demonstration that the United States was not bound by the Monroe Doctrine to refrain from enlarging her territorv at the expense of Latin-American states. (3) In the disputes over the Clayton-Bulwer Treaty in the fifties, the principle of the Monroe Doctrine was invoked against the British colony in Honduras, on the ground that it was an exten-MONROE DOCTRINE

sion of European influence. (4) Secretary Seward, undoubtedly in accord with President ncoln, from 1861 to 1865 warned the French not to torce a foreign empire upon unwilling Mexicans, and in 1865 Seward gave formal notice that the French must leave Mexico, which was backed up by a display of military oice on the border. Though Seward avoided the term Monroe Doctrine, he applied its prin¬ ciples very effectively. (5) President Grant in 1869 repeated Polk's warning by announcing that no territory in America could be trans¬ ferred to any European power, whether the inhabitants were willing or unwilling. (6) Secretary Fish in 1870 proposed that the United States should take the lead in a general politi¬ cal and commercial policy for the republics of America. This is the first distinct statement of a policy of leadership by the United States, which had undeniably been in the mind of John Quincy Adams. (7) Secretary Evarts in 1880 was the first

American statesman to see the relation of the Isthmus Canal to the Monroe Doctrine. He claimed <(paramount interest® for the United States in any land or water communication across the American isthmus. President Hayes added the significant declara¬ tion that any interoceanic canal would be “Virtually a part of the coast line of the United States.® (8) Secretary Blaine in 1881 made the position of the United States more precise by stating that for any European power to share in the construction and control of the canal would be an introduction of the European political system. (9) Secretary Blaine drafted for the Panama Congress of 1889 the state¬ ment that the ((principle of conquest® should not be considered as admissible under American public law. This was intended to apply to the wars between. Latin-American powers, and also to foreign invasion. (10) Secretary Olney in 1895 went to the farthest point in a protest addressed to Great Britain, in relation to a boundary dispute between that power and Venezuela. He stated that the Monroe Doc¬ trine ((has been the accepted public law in this country ever since its promulgation® ; he thought ((any permanent political union between an European and an American state unnatural and inexpedient®; he asserted that «to-day the United States is practically sovereign on this continent and its fiat is law upon the subjects to which it confines its interposition.® Presi¬ dent Cleveland restated the same principle in the words ((The Monroe Doctrine finds its recognition in those principles of international law which are based upon the theory that every nation shall have its rights protected and its just claims enforced.®

This series of utterances, along with others of a similar tenor, clearly show a steady growth of responsibility and authority in American affairs. The Panama Canal brought out many rival interests between the United States and European powers, and the State Department at Washington insisted that it was for this govern¬ ment and no other to decide where, how and when the canal should be constructed. Secre¬ tary Olney and President Cleveland pushed the doctrine. far beyond any previous statement. Their doctrine was certainly not the original Monroe Doctrine, for it really laid down the new principle that Great Britain, which for nearly three centuries had been one of the lead¬

ing American powers, was no longer to exercise influence on Central and South America. Olney’s farther expressions, if carried to their logical outcome, would justify the United States in doing anything and taking anything in North or South America that seemed desirable,

under penalty of the hostilities at which President Cleveland distinctly hinted.

IV. Modern Doctrines (1901-19). — So far as the relation of Great Britain to Ameri¬ can affairs was concerned the Olney Doctrine was successful, for Great Britain took the les¬ son to heart, accepted the arbitration with Venezuela which was thrust upon her, cheer¬ fully accepted the finding of the arbitrators (which were almost entirely in her favor) and prepared to give up that joint control of the Canal which was embodied in the Clayton-Bulwer Treaty of 1850. During the Spanish War of 1898, Great Britain made it clear that othej-European powers must not interfere with the American policy of the United States. The next step was for Great Britain in the first Hay-Pauncefote Treaty of 1900 freely and without consideration to give up the joint control over isthmus transit. The Senate in¬ sisted that there should be a formal abrogation of. the Clayton-Bulwer Treaty and Great Britain gave way and accepted the second Hay-Pauncefote Treaty of 1901, bv which the United States was left free to control any isthmus canal that might be constructed and to ((neutralize® it in her own way.

When England was fairly out of the way, Germany loomed up on the horizon. That power for some years had been looking about the world for an opportunity to plant colonies, and was supposed to have a special interest in South America. President Roosevelt took up this question and in 1902 faced the issue of in¬ tervention by European powers in Venezuela. This was one of the Latin-American states which objected to foreigners coming in and occupying a privileged status superior to that of natives, by calling on their home govern¬ ments to press claims for the fulfilment of con¬ tract and for damages for personal injuries.

A combination was made between Germany, Great Britain and Italy which prepared to land forces on the Venezuelan coast and hold part of the country till the claims of the subjects of those countries were satisfied. The great Brazilian jurist, Calvo, had laid down what was known as the Calvo Doctrine, to the effect that foreign governments ought not to use even diplomatic methods in behalf of private claims. Drago, Foreign Minister of the Argen¬ tine Republic, during the Venezuelan crisis pro¬ posed a modification, commonly called the Drago Doctrine (q.v.), which was to the effect that no intervention ought to be allowed to enforce the obligation of contracts, whether made by individuals, or by the government. This principle was accepted by President Roose¬ velt as reasonable and was afterward incor¬ porated into The Hague Conventions of 1907.

When it came to the actual dispatch of the fleets, President Roosevelt demanded from the German government a point blank statement that they would not land or occupy Venezuelan territory. The promise was reluctantly given and was kept. The squadron therefore con¬ tented itself with blockades and captures of vessels on the coast and mild bombardments.

The Venezuelans finally agreed to arbitrate and the fleets were withdrawn.

The episode led the mind of President Roosevelt to consider what ought to be done in cases where Latin-American countries went beyond the negative refusal to execute con¬ tracts and advanced to attacks on the persons, property or diplomatic representatives of a foreign country. He, therefore, in various public speeches and messages declared that the Monroe Doctrine was intended to be one. of peace, and that to keep the peace the United States might be forced in flagrant cases <(to the exercise of an international police power. w This is the so-called <(policy of the Big Stick, » and President Roosevelt and his successors proceeded to apply it in various cases.

(1) In 1902, Cuba which had been released from Spain by the Spanish War, was obliged to consent to the Platt Amendment, to the effect that the nominally independent state must not incur any obligations to foreign countries \Uiich would interfere with the interests of the United States. This virtually made Cuba a protectorate of the United States. (2) In 1903 the infant republic of Panama ceded the canal strip to the United States and entered into a treaty which left it also a dependency. (3) In 1905 President Roosevelt made an. agreement with the government of the Dominican Republic to administer its customs, setting apart a portion of the proceeds for the public debt service. Santo Domingo thus ceased to be a. really in¬ dependent country. (4) In 1911 President Taft made a similar arrangement with Nicaragua. (5) In 1915 Haiti entered into a financial arrangement which virtually placed it under United States control and provided for an American receivership of customs.

In every instance the reason for this as¬ sumption or acceptance of authority over Latin-American republics was based upon the belief that otherwise some foreign country would come in and interfere with American interests and threaten the future of the country affected. That is, the United States acquired six pro¬ tectorates lest some European power might have cause to descend upon them by armed force. A supposed attempt of Japan in 1912 to secure a footing at Magdalena Bay on the west coast of Mexico led to the adoption by the Senate of a resolution introduced by Sena¬ tor Lodge against such occupation for naval or military purposes. Ex-Secretary Root in 1914 attempted to show that the Monroe Doctrine did not require the United . States to exercise a domination over its neighbors. President Wilson also in public statements and addresses in 1913 disclaimed any ambition of the United States to extend its territory in America.. The only way to reconcile these statements with the facts of our protectorates is to admit that the Monroe Doctrine is a check to the territorial greed of European powers but. does not . re¬ strain the United States from bringing portions of Latin America under her influence.

V. Present Status. — The war of 1898, in¬ cluding the annexation of the Philippine Islands by the United States, was a frank ad¬ mission that there were no longer two spheres in modern world politics. Eastern Asia is honeycombed with European settlements and interests, and the occupation by the United States, of the Philippine Islands, near China,

makes us near neighbors of Russia, b ranee and Great Britain. On the other side, at the con¬ ference of Algeciras in 1906, the United States accepted membership on the pressing in¬ vitation of the German emperor and had the determining voice in the result. It was there¬ fore, no longer possible for our government to insist that European powers must keep out of America because we keep out of European affairs. The Japanese have been thought to have some designs on the western coast of North or South America which would be con¬ trary to the Monroe Doctrine. At the other extreme was the danger, which for a time was « feared, of German occupation of a part of Brazil or other South American countries. Should either danger ever occur the Monroe Doctrine would presumably become active.

As respects thej Latin Americans themselves, they have always welcomed, whatever protec¬ tion the declarations and influence of their powerful neighbor might give against foreign aggression ; but

many of them fear that the United States will eventually seek extensive an¬ nexations to the southward. The taking over of the six protectorates and the great interest of the United States in the Mexican question heighten that apprehension. The growth and steadiness of the ABC powers — Argentine, Brazil and Chile, — with about half the total Latin-American population, give a more positive basis for permanent alliances and relations. It has been suggested that the Monroe Doctrine will naturally develop into some kind of Pan-American Union (q.v.) in which the United States will be the most populous and strongest member of a great American federation. The difficulties in the way of a permanent union between a country of 100,000,000 and 20 other countries which together aggregate 75,000,000 are hard to surmount.

The question of the right of. a nation to exercise special authority over its neighbor¬ hood was raised in another form by the steady growth of Japanese power in Eastern Asia. On 30 Nov. 1908, by the Root-Takahira agree¬ ment, the United States recognized this special interest; and in November 1917, in the Lansing-Ishii agreement, went still farther in approving practically the doctrine of special interest, it being tacitly understood that Japan would in like manner respect the American Monroe Doctrine.

The negotiations of 1919 at the end of the Great War seemed for a time likely to weaken the Monroe Doctrine by substituting a system of world peace organization which would take the place of the earlier method, inasmuch as the League of Peace provided a machinery for hearing complaints and settling controversies such as were likely to arise between Latin American and European powers. A strong pro¬ test was made in public discussions on the sub¬ ject in the United States. In the final form the covenant of the League of Nations included the following limitation : ((The covenant does not affect the validity of international engage¬ ments, such as treaties of arbitration or regional understandings like the Monroe Doctrine, for securing the maintenance of peace.

This clause would seem to be a guarantee of the special relation of the United States to Latin America; and so far as ratified by those States would bind them to accept the doctrine

as a “regional understanding.® It is likewise a reaffirmation of the Japanese Monroe Doc¬ trine, and is likely to be claimed in support of sphere r ˆ Merest in the Mediterranean, Asia &1 ij r*Ca‘ Acceptance of the treaty by most world nations is therefore an assertion of the right of powerful nations in various parts of the earth to exercise a general protection over groups of small or weak powers, and at the same time to exclude external powers from in¬ terfering with the leadership of the strongest power in such a combination.

Bibliography.— Adams, J. Q., (Memoirs) (Vol. VI, 163; 177-179; 186-216); Blakeslee, W., (Latin America) (1914) ; Channing, Hart and Turner, (Guide to the Study of American History) (1912); Ford, W. C. (in American Historical Review, Vol. VII, p. 676; Vol. VIII, 28) ; Hart, A. B., ‘The Monroe Doctrine, An Interpretation) (1916); Henderson, J. B., (American Diplomatic Questions) (1901); Kraus, ‘Die Monroedoktrin) (1913); Moore, John Bassett, (Digest of International Law) (1906); Paxson, F. L„ Hndependence of the South American Republics) (1903); Polk, J. K., (Diary of James K. Polk) (1910) ; Redda-way, W. F., ‘The Monroe Doctrine) (1898) ; Richardson, (Messages and Papers of the Presidents) (1896-99); Roosevelt, Theodore, ‘Theodore Roosevelt: An Autobiography) (New York 1913) ; Rush, Residence at the Court of London) (1855) ; Sherrill, (The Mon¬ roe Doctrine). (1916). Discussions of the Mon¬ roe Doctrine in the press and periodicals during the discussions of 1918 on the League of Nations.

Albert Bushnell Hart, Professor of Government, Harvard University.

MONROVIA, Cal., town in Los Angeles County, on the Atchison, Topeka and Santa Fe Railroad, about 19 miles east of the city of Los Angeles and 10 miles east by south o4-‘ Pasadena. It has a healthful climate and a beautiful situation near the southern border of the San Gabriel National Forest. It has ex¬ tensive fruit-growing interests and is a thriving progressive town with modern improvements. Pop. (1920) 5,480.

MONROVIA, mun-ro’vi-a, Liberia, the capital of tthe West African Republic, a com¬ mercial and seaport town, on Cape Mesurado near the mouth of the Saint Paul’s River. It has regular steamship service by British and Spanish vessels, direct cable communication with Europe and New York, and two wireless stations. It exports rubber, palm

kernels and oil, pissara fibre, cocoa, coffee, ivory, ginger, camwood and annatto. A college is maintained by the government and one by Methodists ; missions are carried on by Catholics and Amer¬ ican Protestants, and the city is the see of a Protestant Episcopal bishop. Monrovia was named after James Monroe, President of the United States. Pop. (with Krutown) 6,000.

MONS, mons, Belgium, the capital of. Hai-nault, on the Trouille, 38 miles by rail south¬ west of Brussels. An encircling belt of promenades occupies the site of the fortified ramparts demolished in 1862. The Canal de Conde connects Mons with the Scheldt. The church of Saint Waldru (1450-1589) is a mas¬ terpiece of Gothic ; and there are a town-hall (1458), a belfry (1662) 275 feet high, a good

library, *etc.* The manufactures include woolen and cotton goods, cutlery, hardware and sugar ; while in the vicinity is the extensive coal field of Borinage. Mons, occupying the site of one of Caesar's camps, was made the capital of Hai-nault by Charlemagne in 804. France, Spain and Austria often contended for its possession. The battlefields of Malplaquet and Jemappes are in the neighborhood. In 1914 Mons was captured by the Germans in their advance on Paris, and around Mons some of the severest fighting occurred during the progress of the war. See War, European. Pop. about 28,000.

MONS. See Mensa.

MONSEIGNEUR, mon-sa-nyer (French my lord), a title of dignity in France. Before the Revolution the king's oldest brother was styled monseigneur. Princes, dukes and peers, archbishops, bishops, cardinals, marshals of France, presidents of Parliament, etc., were ad¬ dressed by this title.

MONSELL, mun'sel, James Samuel Bew-ley, Anglican clergyman and hymn-writer : b. Londonderry, Ireland, 2 March 1811: d. Guil¬ ford, England, 9 April 1875. He was graduated at Trinity College, Dublin, in 1832, and took orders in the Church of England in 1835. As a writer of hymns he became famous, over 100 of his hymns still continuing in popular use. Among his publications are 'Parish Minings4 ; 'Simon the Cyrenian and Other Poems) ; 'Spiritual Songs); (Our New Vicar) (1867; 13th ed., 1890).

MONSIGNORE, mon-se-nyo're, a title of honor given to prelates of the Roman Catholic Church. Prior to the Revolution in France the

corresponding title of Monseigneur was al¬ lowed to all high dignitaries of the Church, but its use was forbidden in 1801 by a law of the French Convention.

MONSIGNY, mdn-se'nye, Pierre Alexan¬ dre, French composer: b. Fauquemberg, 17 Oct. 1729; d. Paris, 14 Jan. 1817. He went at an early age to Paris and was appointed, under the influence of the Duke of Orleans, major-domo. He studied counterpoint under Gianotti and composed a series of comic operas which were highly successful, to be followed, with equal success, by grand opera plays. But the Revolution, having robbed him of his position and his fortune, he' lived his later days on a pension from the Opera Comique, becoming (1815) a member of the Academy. Among his most popular operas were (Les aveux indiscrets) (1759) ; 'Le cadi dupe) (1760) ; (Le roi et le fermieD (1762) ; 'Le deserteur) (1769), his most prized work; and 'Le Faucon) (1772), which was very popular. Consult Pougin, A., 'Monsigny et son temps) (Paris

1908).

MONSON, mun'son, Sir Edmund John,

British diplomat : b. Chart Lodge, Kent, 6 Oct. 1834; d. 29 Oct. 1909. He was educated at Eton and Balliol College, Oxford; was Fellow of All Souls, Oxford, 1858; had entered diplo¬ macy in 1856; held various minor posts, as at¬ tache or under-secretary, until 1876, when he was sent on special service to Dalmatia and Montenegro. He was Minister to Uruguav (1879), to Argentina and Paraguav (1884), to Denmark (1884), to Greece (1888), was ap¬ pointed arbitrator of the Butterfield claims be-

tween Denmark and the United States in 1888, Minister to Belgium 1892, Ambassador to Austria 1893, and to the French Republic 1896-1904. He was made a Privy Councillor in 1893. His decision in

1900, in favor of the action of the Danish authorities in 1854-55 at the island of Saint Thomas, disposed of the claims of the two American vessels belonging to Butterfield and Company. In 1903 he re¬ ceived the order of the G.C.V., and was knighted in 1905.

MONSOONS, mon-soonz', in meteorology, are certain winds, operative from the tropic of Cancer to lat. 7° S., and from the coast of Africa through the Indian Ocean and the Bay of Bengal to Japan and the western Pacific. There are two monsoons, the southwestern and the northeastern. The latter prevails from Oc¬ tober to April, and the former from April to October. Monsoons are caused by the unequal heating of the land and water and of the sev¬ eral land masses themselves in the regions which they affect. Independently of their great use in bringing rain to countries which other¬ wise would degenerate into deserts, they are useftil for navigation. As in the case of the trade winds, navigators of sailing vessels plan their voyages to take advantage of the mon¬ soons. Consult Ferrel, W., (A Treatise on the Winds> (New York 1889).

MONSTERS. See Teratology.

MONSTRANCE (Lat., monstrare, to show) , called also osˆtensorium or expositorium, the sacred vessel in which, in the Roman Catholic Church, the host is shown to the ceople, through a glass-covered opening, at benedic¬ tions, processions and other solemnities. Its use dates from the institution of Corpus Christi Day (1264) by Pope Urban IV. It was not until after the Council of Cologne 1452 that the consecrated wafer was exhibited to the people, having been previously deposited in the ciborium which enclosed and concealed it.

MONSTROSITY. In anatomy and physi¬ ology any deviation in form or function so great as to be noticeable may be termed a monstrosity by the extension of the term. But it is customary to consider as true monstrosi¬ ties only such deviations from the normal as are excessive. Supernumerary fingers, toes, legs, arms, etc., or the absence of any or all of them from birth are not called true monstrosities. Deviations from the normal in form or function are almost limitless, the study of them being otherwise known as teratology. The subject of human teratology has been systematized by Saint Hilaire and slightly modified by Hirst and Piersol and is as follows: (1) Hemiterata are all abnormal developments which are not true monstrosities, lacking the element of excess, with the exception of excess in numbers re¬ ferred to. They include, however, anomalies in size such as dwarfs and giants, anomalies in form of head, pelvis, etc., of color . such as albinism or melanism, of position, including curvature of the spine,

hernia, clubfoot, etc., of continuity, including imperforate esophagus, rectum or vagina. (2) Heterotaxes, which in¬ clude the anomalous position of heart,. liver, *etc.* (3) Hermaphrodites, which according to the definition of Ahlfeld are those individuals which possess sexual glands both masculine gnd feminine, but show all possible variations

of one sex organ upon the other. (4) True monsters, where there are either more or less than the normal number of legs, arms or there are no heads or rudimentary heads or two or more. This group also contains what are called omphalositic monsters which are embryos at¬ tached to an original foetus and depending on it for what nourishment and development they can get. The best-known type of monsters, those which have been frequently exhibited, are the composite monsters of which the Siamese Twins and the Tocci Brothers are examples. Other illustrations are of children with two bodies joined together at the pelvis but having no legs, and the bodies pointing in opposite directions. There are also terata with two heads and two faces or with one head and two faces like the ancient conception of the god Janus.

It is almost impossible to imagine any deviation in form, function or size which has not been recorded, since the curiosity of man¬ kind has been such as • to be. attracted from time immemorial to anything in the nature of the marvelous. The composite . monsters on record have shown almost all varieties of union of lower extremities and of reduplication of both lower and upper; and of the partial or total reduplication of . the entire body, the climax being reached in the twins which are united by only a comparatively small cartilage. Double monsters are either parasitic or inde¬ pendently nurtured as was the case of the Siamese Twins, who lived to the age of 63 years. There are also known .triple, monsters, one case being recorded by Saint Hilaire of . a three-headed child who was born in Italy in

1832.

The very unpleasant side of anatomic teratology has its more cheerful compensation in the records of extraordinary developments in vitality and fecundity and in the recovery of many persons who have suffered accidents or other misfortunes ordinarily found fatal, or who have shown remarkable abilities of adapta¬ tion to apparently impossible conditions. For not only do we see the monstrosities of fatness and

leanness, the people with elastic skin, the bearded women, etc., but there have been re¬ corded a large number of cases of extraor¬ dinary ability to function in spite of adverse circumstances. Examples of teratology of function are seen in suspended animation, a case being recorded of a man who could, ap¬ parently at will, cause his heart to stop beat¬ ing. He succeeded once in prolonging this in¬ activity of the heart for about 30 minutes. The function appeared to be restored automatically. A post mortem examination of his heart showed nothing extraordinary. Other illus¬ trations of purely physiological wonders with¬ out, however, showing any other abnormality are seen in very high temperature. One case is on record of a man whose temperature ran up to 148° and was between 120° and 125° for five days in succession.

Among anomalies of excess in function are to be included also mental prodigies such as extraordinary memory and other mental func¬ tions of which one of the most remarkable was Jacques Inaudi born in 1869 in Piedmont. He had an extraordinary mathematical ability which enabled him to perform mentally opera¬ tions with numbers in the billions and trillions.

He had no other unusual ability. Many promi¬ nent men such as Edmund Burke, John Locke, Pascal, Liebnitz and Euler were noted for super¬ normal memory. Another mathematical prodigy was a man named Rube Fields of Johnson Count}", Mo., who added columns of figures as rapidly as they were read to him, and per¬ formed incredibly enormous operations in multiplication. He was an uncultivated boor¬ ish man with no other mental ability worth mentioning.

These facts are of importance from the point of view that the average individual prob¬ ably possesses powers of endurance, toleration of disease and of mental development far above that which the ordinary person acquires, and that the mine of human abilities has up to the present age not merely not been worked but has probably not even been more than sampled. What may be the cause of this relatively un¬

developed mentality in men in general is sug¬ gested by the recent investigations into the unconscious mental activity.

MONT BLANC, mon blon (white moun¬ tain), France, a mountain, the loftiest of Europe, belonging to the Pennine chain of the Alps, and rising 15,781 feet above sea-level, the main portion and the highest summit being in France (Haute Savoie), seven miles south of the Switzerland frontier. It forms a huge mass stretching northeast and southwest, in which direction the boundary line between France and Italy runs along it. Its northeastern extremity enters Switzerland. In this latitude the snow line is at 8,000 feet ; consequently 7,700 feet of the mountain are within the region of perpetual snow and ice. Its shape, when seen on the north or south, is pyramidal. On the southeast it presents an immense wall-face, on which few glaciers can be formed. These, of which 18 in all are counted, are chiefly on the northwest slope, where the glaciers Des Bossons, Bois, Talefre and Mer de Glace are seen. The mass of the mountain consists almost entirely Qf granite. In 1760 the scientist, Saussure, offered a prize for the discovery of a practi¬ cable passage to the summit, which was reached by Jacques Balmat, a guide, June 1786. The <(Grande Ascente® in the 19th century became an ordinary tourist excursion, regularly made every season by great numbers and is now facilitated by the railway built up to a short distance from the summit by French engineers. In 1893 an observatory was erected on the sum¬ mit of the mountain by Pierre Janssen.

MONT CENIS, mon se-ne, or MONTE CENISIO. See Cenis, Mont.

MONT CERVIN, moii ser-van. See Cer-vin, Mont.

MONT PELEE, mon pa-la. See Pelee, Mont.

MONT-DE-PIETE, rnon-de-pe-a-ta (in Italian Monte di Pietd), an authorized licensed or government pawnshop; a bank of charity which lends money on pledges at a low rate of interest, and whose aim is purely philan¬ thropic. The chief customers of such institu¬ tions, which are found in France, Italy, Ger¬ many and other Continental countries, are work¬ men pressed by a temporary failure of employ¬ ment ; small tradesmen without a bank account; or travelers in a large town whom some acci¬

dent has subjected to a momentary strait; to all of whom it is a matter of necessity to conceal any compromise of their position in procuring

money for present necessities. These institu¬ tions were established to prevent the scandal and abuse of usury. They date their origin from the Middle Ages, when the loan of money on pledges was almost exclusively in the hands of the Jews. They originated in Italy about 1450, and not long after were approved by several papal bulls. Several French and Italian cities possessed monts-de-piete in the latter half of the 15th century, among others, Mantua, Parma, Milan, Rome, Padua, Treves, Boulogne, *etc.* . The French monts-de-piete, with the ex¬ ception of those of Montpellier, Toulouse, Grenoble and. Angers, which lend without in¬ terest, exact interest at the rate of from 4 to 12 per cent. The chief mont-de-piete in France is that of Paris, which transacts a greater amount of business than all the rest together. In the United States and Great Britain pawn¬ brokers take the place of monts-de-piete, which were introduced in the beginning of the 18th century, but failed. See also Government Pawnshops in France; Pawnbrokers.

MONT-SAINT-MICHEL, mon-san-me-shel, France, a famous seat of learning and pilgrimage resort of Normandy as early as the 12th century, now an equally celebrated tourist resort. It consists of a collection of mediaeval houses, hostelries, ecclesiastical buildings, and fortifications, grouped on a conical rock in the Bay of Cancale or Saint Michel, at the mouth of the Couesnon River, here forming the bound¬ ary between Normandy and Brittany, 15 miles southeast of Granville. Anciently a lofty hill in the forest of Scissy which was submerged in the 7th century by a tidal cataclysm, the rock in prehistoric times was crowned by a Celtic temple; it was the Roman Mons Tumba, and the C(mons in periculo maris* — the mount in danger of the sea — of the monastic chroni¬ clers. The Bay of Saint Michel, 15 miles wide at its mouth, and 8 miles long from north to south, is nearly dry at low water, but fills with treacherous rapidity at flood tide. In 1880 a dyke nearly a mile long was completed which connects the Mont with the mainland. Ram¬ parts, towers and bastions of the 16th century encircle the base of the rock which has a circuit of about two miles, and the entrance is through a gate which opens on the single, narrow, wind¬ ing street of a small village (pop. 250) built around the southern slope and leading by sev¬ eral flights of stone steps to the fortified abbey on the summit. Crowning the abbey is a superb 15th century Gothic basilica, a fine statute of the Archangel Michael capping the spire, which towers conspicuously 250 feet above the wide expanse of sandy bay and lowlying country around. Saint Aubert, bishop of Avranches, founded the abbey in 709 and his first chapel, restored, is on a rocky projection on the north side of the Mont. In 1203 the abbey was destroyed by Philip Augustus, and the

present buildings date from that period. It was an important fortified post during the English and religious wars and was successfully de¬ fended against all assaults by the Knights of the Order of Saint Michael. At the Revolution it was converted into a prison for political of¬ fenders, and now ranks as one of the protected

historical monuments of France. An elaborate process of restoration since 1863 has renewed its ancient strength and beauty. Among the chief features of the Mont are the abbey church, elaborately decorated cloisters, La Merveille, ((the marvel,® or massive north wall of the abbey, the Salle des Chevaliers, the Chatelet or guardhouse, the crypts with their remarkable columns, the cellars, the dungeons, the mediaeval elevator with its enormous hoist¬ ing wheel formerly operated by a donkey, *etc.* ; and in the village the ancient parish church, a museum, the famous Porte du Roi and Duguesclin's Tower.

MONTAGNA, Bartolommeo, bar-to-lom-ma'o mon-tan'ya, Italian painter: b. Orzinovi, near Brescia, about 1450; d. Vicenza, 11 Oct. 1523. He settled at Vicenza in 1480, was in¬ fluenced by Bellini, Carpaccio and Andrea Mantegna, worked in Padua and Verona, and from 1496 until his death was again in Vicenza, being the first great master resident there. His work in general resembles the earlier Venetian school, is serious, marked by distinctness, power and severity of drawing, and has harmonious coloring in which a brown gleaming tint is noticeable. The human form is almost always shown as over-muscular. His principal works are the (Madonna and Child) at the Venice Academy, (Ecce Homo) at the Louvre, frescoes in the church of San Nazaro at Verona and an altar piece in the Brera, Milan. In the Johnson collection at Philadelphia he is represented by a (Madonna with Saints5 and in the New York Metropolitan Museum by (A Lady of Rank as Santa Bi'biana5 and a (Madonna and Child.5

MONTAGNAIS (mon-tan-ya) INDIANS, a general name applied to several American In¬ dian tribes. One of these, of the Athapascan family in British North America, were Chris¬ tianized by Roman Catholic missionaries. Another and best-known tribe of this name was

of the Algonquian family, and resided along the shores of the Saint Lawrence River. They have practically disappeared in recent years.

MONTAGNARDS, mon-tan-yar (Fr., mountaineers), a popular name in French his¬ tory, applied in 1793 to the radical democratic party, the leaders in the French Revolution and its excesses. Soon after the fall of Robes¬ pierre the denominations of <(Montagnard55 and ((Montagne55 gradually disappeared from party nomenclature. After the Revolution of 1848 an abortive attempt was made by the extreme party in the National Assembly, under Louis Blanc and Rollin, to revive the title.

MONTAGU, mon'ta-gu, Andrew Jackson,

American lawyer and statesman : b. Campbell County, Va., 3 Oct. 1862. He was graduated at Richmond College in 1882 and studied law, taking the degree of LL.B. at the University of Virginia, 1885. He was admitted to the bar and began the practice of law in 1885; from 1894 to 1898 he was United States district at¬ torney for the western district of Virginia, and in 1898-1902 attorney-general of the State. In 1902 he was elected governor of Virginia for a term of four years. He became one of the foremost advocates of direct primaries to pre¬ vent party machine rule. He was also active in the movement for improved popular educa¬

tion in the South, and gave many public ad¬ dresses throughout the State, advocating the increase of educational facilities for all with¬ out regard to race or creed. In 1903 he re¬ ceived the degree of LL.D. from Brown Uni¬ versity. From 1906 to 1909 he was dean of the Law School of Richmond College, and member of the 63d to 67th Congresses, 1913 to 1923, serving as delegate on various inter¬ national conferences.

MONTAGU, Edwin Samuel, British states¬ man: b. 1879. He became Under-Secretary of State for India under Lord Morley in 1910, and his first budget speech a few months later in the House of Commons created a highly favorable impression. He entered the Cabinet as Chancellor of the Duchy early in 1915. He was Minister of Munitions in the first Coali¬ tion Government but retired with Mr. Asquith on the accession of Mr. Lloyd George. When Mr. A. Chamberlain resigned the Indian secre¬ taryship in the summer of 1917, Mr. Montagu was chosen for the post. He proceeded to India to investigate the political situation of the country in association with the viceroy, with a view to

the gradual development of self-government for India. In July 1918 their joint report on Indian constitutional reforms was issued. In the new Lloyd George Cabinet of January 1919 Mr. Montagu was reinstalled Secretary for India with a native under-secre¬ tary in the House of Lords, Sir S. P. Sinha (q.v.).

MONTAGU, Elizabeth Robinson, Eng¬ lish author and society leader: b. York, 2 Oct. 1720; d. London, 25 Aug. 1800. In 1742 she married Edward Montagu, grandson of the first Earl of Sandwich, who died leaving her a for¬ tune. To wealth she added literary accomplish¬ ments, and these, joined to other personal qualities, enabled her to secure her social leadership. Among her visitors and associates were Lord Lyttelton, Samuel Johnson, Horace Walpole, Burke, Sir Joshua Reynolds, Garrick, Hannah More and other celebrated persons. To the gatherings at her house the term blue¬ stocking (q.v.) is said to have been first ap¬ plied. Three of the dialogues in Lord Lyttel¬ ton's (Dialogues of the Dead5 were written by her in 1760. She also wrote an (Essay on the Writings and Genius of Shakespeare, com¬ pared with the Greek and French Dramatic Poets5 (1769). Much of her correspondence was published (1809-13). Consult the Mem¬ oirs5 of Elizabeth Carter (London 1816) ; Doran, (A Lady of the Last Century5 (Lon¬ don 1873) ; (Elizabeth Montagu, the Queen of the Bluestockings; Her Correspondence from 1720—1 761 5 (2 vols., New York 1906) ; Huchon, R., (Mrs. Montagu and her Friends5 (New York 1907).

MONTAGU, Lady Mary Wortley, Eng¬ lish author: b. 1689; d. 21 Aug. 1762. She was the eldest daughter of Evelyn Pierrepont, after¬ ward Duke of Kingston. She learned Latin very early, and also became versed in English literature, especially its romance and drama. The Kit-Cat Club (q.v.) by acclamation ad¬ mitted her to membership. In 1712, without the consent of her father, she married Edward Wortley Montagu, a wealthy Whig scholar, with whom the former had quarreled. On the accession of George I in 1714 Montagu ob-

tained an official position in London, and Lady Mary came out from

the seclusion in which she had lived. Her beauty, wit and vivacity gained her admiration and influence, and she became familiarly acquainted with Addison, Congreve, Pope and other distinguished writers. In 1716 her husband was appointed Ambassador to Turkey, and Lady Mary accompanied him to Constantinople, where they remained from January 1717 to May 1718. During this period her famous (Turkish Letters) were written. On her return to England she re-entered the world of wit and fashion. She had a quarrel with Pope, and a long and keen literary war ensued, which did honor to neither. In 1739, for reasons never satisfactorily explained, she left England to live on the Continent, 'this she did with the full concurrence of her husband. She lived chiefly in Italy until her husband's death in 1761, and soon after her return to England she herself died. Her letters are marked by great sprightliness, combined with graphic power and keen observation, and with independence of judgment. Lady Mary has another claim to remembrance in her coura¬ geous adoption for her own children of the Turkish practice of inoculation (q.v.) for small¬ pox, and for her energy in promoting its intro¬ duction into England in the face of violent prejudice. Consult her <Works,) edited by Lord Wharncliffe, her great-grandson (1837; latest ed., 1893) ; and Symonds, E. M., (Lady M. W. Montagu and her Times5 (New York

1907).

MONTAGUE, Francis Charles, English

historian: b. London, 31 Aug. 1858. He was educated at University College, London, and graduated (M.A.) at Balliol College, Oxford, became (1881) Fellow of Oriel and was called to the bar in 1884. He has been, since 1893, professor of history at University College, Lon¬ don ; lecturer in modern history since 1897 at Oriel College, Oxford. He was curator of Indian Institute, Oxford (1900-13). He wrote (Limits of Individual Liberty5 (1885) ; (Life of Sir Robert PeeP (1888) ; (Elements of Eng¬ lish Constitutional History5 (1894). He con¬ tributed to Cambridge Modern History (The History of England from the Accession of James I to the Restoration,5 in Vol. VII; and to Longman's (Political History of England5 > (1907). He edited Macaulay's (Essays5 (1903).

MONTAGUE, Mass., a town including several villages, in Franklin County, on the Connecticut River and on the Central Vermont and the Fitchburg railroads, about 35 miles north of Springfield. The most important vil¬ lage in the town is Turner's Falls, the location of a

large electric-power plant. Montague was settled about 1716, and in 1753 was incorpo¬ rated as a district. It is in an agricultural and manufacturing region. The chief industrial establishments are large cotton mills, paper and pulp mills, brick, waterwheels, hardware, cut¬ lery, pumps, toilet articles, soap and machinery. There are three public libraries. The govern¬ ment of the town is determined by popular vote at regular town meetings. Pop. 7,675.

MONTAIGNE, mon-tan' (Fr. mon-tan- ye), Michel Eyquem de, French essayist: b. Chateau Montaigne, Perigord, 28 March 1533; d. there, 11 Sept. 1592. He was educated by his father after a fashion all his own, learning

Latin from house servants who never spoke French, and being roused from bed every morn¬ ing by soft music. At six he was sent to the College de Guyenne in Bordeaux, where he stayed for seven years, apparently under the charge of the great classical scholars, Bu¬ chanan and Muretus. Thereafter he probably studied law at Bordeaux and Toulouse, and when he came of age was made a member of the Cour des Aides at Perigueux. This court was abolished three years afterward and Mon¬ taigne with the other members was appointed counsellor to the Bordeaux parliament, a body in which he made the acquaintance of La Boetie about 1559. For the next few years he was at court, now at Paris, now at Bar-le-Duc ; we know that in 1562 he swore allegiance to the Catholic Church on his own motion ; that in 1565 he married Frangoise de la Chassaigne, daughter of one of his fellow-counsellors, and that the death of La Boetie in 1563 and that of his father in 1568 had greatly lessened Mon¬ taigne's interest in public affairs. These events had also no doubt sobered him — he admits that his youth had been wild; at any rate in 1571, having prepared La Boetie's posthumous works for the press, having received himself the Order of Saint Michel for a rather mediocre version of the (Theologia Naturalis5 of Ray¬ mond de Sebonde, his only literary venture so far, after selling his post as counsellor, he retired to Montaigne. There he began, and in the next nine years completed, the first two books of his essays, whether purposing them for publication or not is unknown, though their style seems to point to the fact that in their earliest form they must have been mere jot¬ tings in a commonplace book. By the middle of 1580 his health had so much failed that he left Chateau Montaigne for the first time since 1571, save for an occasional trip to Paris, and traveled through Switzerland, Germany and Italy, meeting Tasso at Florence. His (Jour¬ nal 5 of this trip, discovered and published in 1774, adds nothing to his

literary fame and not much more to our knowledge of his person¬ ality. During this absence from France, and apparently quite against his will, Montaigne was elected mayor of Bordeaux; he served in this office from 1581 to 1583 and then was reelected for another two years ; at the close of this suc¬ cessful administration, in which with no small skill he had steered safely the king's lieutenant in Guyenne and the king of Navarre, governor of the province, he refused to be present in the city as was required for the election of his suc¬ cessor, because of the plague — one of the few lights on his personal character and not a pleas¬ ant one. The three years immediately follow¬ ing (1585-88) * were occupied in the revision of his two books of essays and the addition of a third. He received the rites of the Church upon his death-bed. His wife bore him several children; ((two or three,55 he says, died in in¬ fancy; and one, a daughter of whom he was very fond, survived him. But his family ties were not strong; his life with his wife seems to have been a philosophic makeshift; and his love for his daughter cannot compare with his attachment to Mile, de Gournay, a Parisian, who was attracted to him by his literary fame, was called by him his adopted daughter and was fortunate enough to receive from Mon¬ taigne's widow a copy of his (Essays 5 with

manuscript additions and corrections, the basis of a new edition, published in 1595. Mon¬ taigne's literary reputation is safe, though in the hands of the few, not the many. His spirit is skeptical, essentially typical of his time, and it was not for nothing that his study at Chateau Montaigne was decorated with texts from Ecclesiastes, Ecclesiasticus, Lucretius and Horace, for he was akin to these ancient writers who proclaim the vanity of all things. His theme is varied, his treatment discursive and his charm largely due to this very variety, together with a quaintness and raciness of style that did much for French prose and was mostly original even if patterned on Amyot. His manner of approaching the questions of life and criticism is apparently purely subjective; indeed, his delightful egoism that makes his own life, experiences and thoughts the theme of the essays seems at first to be quite inde¬ pendent of so serious a purpose. But this sub¬ jective

manner brings him nearly as close to the analysis of universal problems as does the dramatic objectivity of a Shakespeare. His entire attitude is skeptical, but he is not to be ranked as the enemy of religion. He is the curious, interested skeptic, not the doubting cynic. Professor Saintsbury well says that the nearest spiritual parallel to Montaigne in liter¬ ature is Charles Lamb.

Montaigne affected English literature scarcely less than he did French. His essays, trans¬ lated by Florio (1603), seem to have been known to Shakespeare in their English form, and this same version, revised by Hazlitot (1893), is still the standard in English. The best editions of the original are those by Amaury-Duval (1820) and Le Clerc (1865). (See Montaigne's Essays, Florio's Trans¬ lation of). Consult the appreciations by Emer¬ son, Representative Men) (1850); Church, Miscellaneous Essays 5 (1888) ; Pattison, (Es-says) (1889), and Pater, (Gaston de Latour5 (1896) ; also Bonnefon, Montaigne et ses Amis) (1892) ; Stapfer, Montaigne5 (1894) ; Lowndes, Michel de Montaigne5 (1898) ; Guizot, Montaigne5 (1899) ; Champion, <Introduction aux Essais de Montaigne5 (1900); Dowden, E., Michel de Montaigne5 (Phila¬ delphia 1905) ; Woodberry, G. E., (Great Writers5 (Garden City 1907) ; Sichel, E., Michel de Montaigne5 (New York 1911).

MONTAIGNE'S ESSAYS, Florio's Trans¬ lation of. The interest of Florio's translation of the essays of Montaigne is manifestly due in the first place to Montaigne and only very secondarily to Florio. The world has never failed to find the good-natured and wise father of the modern essay both amusing and inter¬ esting, and Montaigne, in whatever dress he might wear, would be sure of a welcome in any reflecting but not too serious society of men and women. Yet it is no small credit to Florio that he has not only kept Montaigne alive and to the fore in his translation, but has also managed to slip in by the way some considerable flavor of himself. His translation of his French original is not always accurate in detail, though it is perhaps not less accurate than translations customarily were in the days when it was made. It has something better, however, than simple verbal accuracy, it has color and life. Like most Elizabethan trans¬

lators, Florio was seldom content to let a single English word stand as the equivalent of a significant word of his original. In order to be sure to get the full content of his French source, he amplified by the addition of inten¬ sifying modifiers and synonyms. The result is that the translation is often more wordy and more highly colored stylistically than the orig¬ inal, is often quaint and colloquially

picturesque when Montaigne is simple and direct. Florio was above all a lover of the ingenious style, and his ingenuity not infrequently betrayed him into the grotesque. He was fond not only of strange words, but also of puns, alliteration and the other frippery of the courtly writing of his 4ay. When it suited his convenience he did not hesitate to Anglicize a French word, with the result that though he put Montaigne ((in English clothes55 it was done Many times with a jerke of the French jargon.55 Yet when one compares the (Epistle Dedicatorie5 of the translation, addressed to his <(best-best Bene¬ factors and most-most honored Ladies, Lucie Countesse of Bedford; and her best-most loved-loving Mother, Ladie Anne Harrington,55 where he was writing in his own person, with the body of the translation, one notes with gratitude that Florio has not done his worst in the way of verbal ingenuity. His original exerted a salutary restraining influence when he came to the actual task of translating, and few readers will cavil at him for being occa¬ sionally Florio, since he really gives us Montaigne.

George Philip Krapp.

MONTALEMBERT, Charles Forbes de Tryon, sharl forb de tre-on mon-ta -lon-bar, Comte de, French publicist and historian: b. London, England, 29 May 1810; d. Paris, 13 March 1870. He received a university educa¬ tion at Paris; identified himself with the Liberal Catholic movement of Lamennais (q.v.) and Lacordaire (q.v.), whom he assisted in estab¬ lishing (18 Oct. 1830) and editing L! Avenir, and in efforts to obtain the freedom of educa¬ tion at that time impossible under the state system, and in 1831 went with these two leaders to Rome to present their cause. On his return he opened with Lacordaire and De Coux at Paris a free Catholic school, which was promptly closed by the police, while the direc¬ tors were arraigned for infringement of the laws respecting instruction. Montalembert made a notable defense before the Chamber of Peers, but the directors were sentenced to pay the costs and 100 francs apiece in fines. When the doctrines of L' Avenir were condemned by Gregory XVI in an encyclical of 15 Aug. 1832, Montalembert duly submitted and did not pro¬ ceed with Lamennais to final revolt. He en¬ tered the Chamber of Peers in 1835, spoke much and eloquently on ecclesiastical matters, and in 1836 published his (Histoire de Sainte Elizabeth de Hongrie,5 which appeared in an English rendering by Hackett and Sadlier (1854). His Catholic zeal was combined with liberal ideas and after the Revolution of 1848 he was elected as a Moderate Republican to the Constituent Assembly; but here, as in the Legis¬ lative Assembly, where he sat from 1849 to 1857, he became more and more conservative. In June 1851 he debated against Victor Hugo in

opposition to the proposed constitutional re-383

vision. He found himself unable to support the measures of the Empire; was known as one ot the most determined opponents of Napoleon 111; and for an article, (Un Debat sur l'lnde au rarlement Anglais,* unfavorably contrasting rrench and British institutions, was sentenced

\°nnrtXr monthf imprisonment and a fine of ˆ,UU(J francs, though the penalty was remitted, rlis chief work is (Les Moines d'Occident Saint Benoit jusqu'a Saint Bernard* (136Q-67 ; Eng. trans.), which, though of much value, has been criticized as in general too argumentative and oratorical in manner to fulfil the highest demands of history. He wrote many pamphlets, the last of which, (La Vic-toire du Nord aux Etats-Unis> (1865; Eng. 1866), was an appreciation of the triumph of the Union cause in the Civil War. He opposed in a letter of 28 Feb. 1870 the opportuneness of the definition of the doctrine of papal infallibility, but acquiesced at once when the dogma was published. Consult the memoir by Mrs. Oliphant (London 1872) ; the study by De Meaux (Paris 1897) ; Craven, (Le Comte de Montalembert* (London 1873) ; Lecanuet,

Montalembert d'apresses papiers et su cor¬ respondence (3 vols., Paris 1895-1905).

MONTALEMBERT, Marc Rene, Mar¬ quis de, French military engineer: b. Angouleme, 16 July 1714; d. Paris, 29 March 1800. He took part in a number of campaigns (17 36—4 1) in Italy, Flanders and Germany and wrote dur¬ ing the following peaceful years several disserta¬ tions for the Academy, of which he became a member (1747). In the Seven Years' War he was chief of commissary, and directed the forti¬ fying of Anklam and the strengthening of Stralsund. Later he fortified Oleron Island after his own system, newly worked out. He invented the low-framed .gun-carriage. He wrote (La fortification per pendiculaire* (Paris 1776), and this, his chief work, was severely criticized, which caused him in self-defense to write (L'art defensif superieur a 1'offensif* (1796, 11 vols.).

MONTALVAN, mon'tal-van, Juan Perez

de, Spanish dramatist and novelist : b. Madrid, 1602; d. there, 25 June 1638. He was already making success as dramatist at 17 years of age and was soon working with Lope de Vega. In 1625 he was ordained to the Church and became apostolic notary of the Inouisition. A collec¬ tion entitled (Comedias* which distinguish themselves through their national attitude ap¬ peared in two volumes (Madrid 1635, Alcala 1638 and 2d ed., Valencia 1652) ; seven plays are in Biblioteca de autores espanoles, and eight novels of his in <Sucesos y prodigios de amor* (Madrid 1624, with frequent new editions), and others in Ochoa's Tesoro de novelistas espanoles (Paris 1847) ; in (Paratodos* (Huesca 1633) are novels on morals and dissertations. His (Orfeo* (Madrid 1624) is a poem in octaves. On the death of Lope he wrote Tama postuma de Lope de Vega* (Madrid 1636). Consult Bacon, G. W., (Life and Dramatic Works of Dr. J. P. de Montalvan* (in Revue Hispanique, Voi. XXVI, Paris 1912) : Fitzmaurice-Kelly, James, in Bibliographic de Vhistoire de la litterature espagnole (ib. 1913).

MONTALVO, Garci Ordonez De. See

Ordonez De Montalvo, Garci.

MONTANA, mon-ta'na, the (<Treasure State** (admitted to the Union 8 Nov. 1889), is bounded north by Canadian provinces, east by North Dakota and South Dakota, south by Wyoming and eastern Idaho, west by Idaho. Capital, Helena; area, 147,182 square miles; population (1910) 376,056; percentage of increase m 10 years, 54.5; population (1920) 548,- 3«9; percentage of increase in 10 years, 46. The name is Spanish for mountain. The floral em¬ blem of the State is the bitter-root. The yellow pine is the State tree. The State seal contains the words Oro y Plata, gold and silver Topography.— The State has within its borders 94,196,780 acres of land. Of this amount approximately 26,000,000 acres are classed as mountain lands, 50,000,000 acres as taiming lands and 18,000,000 acres as grazing lands. This is approximately 40,000 square miles of mountains, 78,000 square miles of farming lands and 19,000 square miles of graz¬ ing lands. The mountain area of the State is about equal to the area of either Indiana, Ken¬ tucky, Virginia, Ohio or Tennessee. Its graz-lng land is about equal in area to Delaware and Maryland. Its farming land embraces an area about as large as Michigan or Minnesota. The J?®un*a*n area is mainly in the western part. The main range of the Rocky Mountains enters the State on the north at a point about a hun¬ dred miles east of the Idaho-Montana State line, and extends across the State from north¬ west to southeast, in a very tortuous line, leav¬

ing the State where the Divide enters Yellow¬ stone National Park. Glacier National Park (q.v.) embraces a portion of the main range and outlying and projecting spurs. In this sec¬ tion is some of the finest scenery and sharpest peaks of the entire State, although the altitude of the mountains is by no means as high as in the southern part. Among the peaks included in Glacier Park are Cleveland (10,438) Merritt (9,948), Wilbur (9,293), Grinnell ’(8,836), Gould (9,541), Seyeh (10,004), Going-to-the-Red EaSle (8.800), Little Chief (9,542), Gunsight (9,250), Blackfeet (9,570), <10.155). Pinchot (9,332), Jackson (10,023), Kintla (10,100). Hanging on these mountains are many glaciers, large and small, which give the name to the park. The most important of these glaciers are Agassiz and Kintla glaciers, on Kintla Peak; Rainbow glacier on Rainbow Peak; Carter glaciers on Mount Carter; Chaney glacier on Mount Mer¬ ritt and the Divide; Sperry glacier on Edwards and Gunsight; Harrison glacier on Mount Jackson and Walton; Blackfoot glacier on Mount Jackson and Blackfoot; Pumpelly gla¬ cier on Blackfoot; Grinnell glacier on Grinnell and Gould; and Vulture glacier on Vulture Peak. About the middle of the State a portion of the main range is called the Anaconda Range, with Mount Haggin (10,598). Mount Howe (10,475) and Evans (10,635). Here the range makes a sweep to the west, then turns at a sharp angle southward, forming the boundary between Montana and Idaho. The remainder of this boundary line of mountains is made by the Bitter Root and Cceur d’Alene ranges. The higher portion of the former range is in projecting spurs, and includes Lolo (9,075), Saint Mary (9,335), Ranger (8,810) Ward (9,010) and El Capitan (9,936). The smaller ranges in the western part of the State

are variously named. In the extreme north¬ western part is the Kootenay, which extends northward into British Columbia. Between the Kootenay and the Bitter-Root Range are the Cabinet Mountains, extending approximately southeast and northwest, and continuing west¬ ward into Idaho. The Mission Range extends almost due north and south for about 100 miles, the northern end beginning in the valley at the upper end of Flathead Lake, rising higher to¬ ward the

southern end, containing McDonald (10,100), Sinyaleamin (9,500) and McLeod (8,500). East of the Mission Range lies the Swan range, extending almost parallel witn the former, and continuing much farther north. Like the Mission Mountains, the Swan Range is highest at the southern end, culminating in Swan Peak (over 10,000), and Baptiste. East of the main range are many small ranges, in some cases quite isolated, and in others con¬ necting the Great Plains to the Continental Di¬ vide. The Big Belt Mountains form the boundary line between Meagher County on the east side, and Lewis and Clark and Broad¬ water counties on the west. The range extends from northwest to southeast for more than a hundred miles. Between Chouteau and Cas¬ cade counties are the Highwood Mountains, a range of beautiful summits, including Highwood (7,600), Middle (7,000) and Arrow (7,- 420). The Little Belt Mountains are between Meagher and Cascade counties. The highest summit is Neihart (9,000) ; Thunder Mountain is 8,000. Between the Little Belts and the Crazy Mountains further south are the Blue Mountains, the Elk Range and the Castle, a series of crags with an elevation of 8,606. The Crazy Mountains, the first mountains the travel¬ er is likely to see as he speeds along the rail¬ road near Bigtimber, lie partly in Meagher and partly in Park counties. They contain some beautiful mountains, Crazy Peak (11,178), Sun¬ light (10,087), Conical (10,731), Loco (9,187) and Fairview (8,400). In Fergus County, which is about as large as the State of Massa¬ chusetts, are three small ranges called the Big Snowy, the Little Snowy and the Moccasin mountains. In the southern part of the State, just north of Yellowstone Park, in Park County, are the Absaroka Mountains, also called the Snow Range, with some high summits, whose majestic snow caps are seen 100 miles away. Among these are Pyramid (10,760), Haystack (10,990), Emigrant (10,969), Cowan (11,190), The Needles (10,939), Douglas (11,- 300), and Sheep (10,620). East of the Absarokee Range, and bordering the State line, are the highest mountains in the State, the Beartooth Range, culminating in Granite Peak, with an elevation of 12,850. Extending north and south in Gallatin County is the Gallatin Range, with many lofty and beautiful summits. Among these are Blackmoon (10,196), Hyalite (10,110), Twin (10,246), Bighorn (10,000) and Gallatin, between the Gallatin and Madison ranges (10,967). Also in Gallatin County, and north of the Gallatin Range, is The Bridger Range, with Bridger Mountain as the highest point (9,106). This range also contains a mountain named for the Indian Bird Woman who accompanied the Lewis and Clark expedi¬ tion, Sacajawea. West of the Gallatin Range, in Madison County, are the Snow Crest Range, the Ruby Mountains, the Tobacco Root Moun¬

tains and the Madison Range. The last named contains the Sphynx (10,000), and the Wedge (10,606). Along the Wyoming boundary, and east of Yellowstone Park, are the Pryor Mountains, in Bighorn County, and still farther east are the Rosebud Mountains. In the ex¬ treme southeastern part of the State is the High Plateau Ridge. Southeast of Billings is a long elevation called Pine Ridge, which in level countries would be called mountains, but which in comparison with the high ranges is not so called. In the central part of the State near the eastern boundary, in Wibaux and Dawson counties, is a series of high and wooded hills called the Blue Hills. In the central por¬ tion, Sweet Grass County, is a range called the Sweet Grass Hills. In the eastern and north¬ ern part of the State is a series of isolated buttes, some of them of sufficient size and ex¬ tent to be called mountains. Among these are Mountain Sheep Bluffs, nearly 100 miles long. Between the Yellowstone and Missouri rivers, and between Yellowstone and Musselshell coun¬ ties, are the Bull Mountains, the location of a big field of coal. North of the Missouri River are several important small ranges, although the larger portion of the country is in the plains country. Where Chouteau, Hill and Blaine counties join is located the Bear Paw Range, culminating in Mount Garfield (5,794), Hancock (5,078) and Centennial (6,074). Much of the mountainous region is yet unex¬ plored, save by the hardy trapper and prospector. The transcontinental railroads give the traveler a poor idea of the sublimity of the scenery which the mountain ranges afford. Many of the peaks, lakes, glaciers and creeks are un¬ named. Owing to the varied topography and elevation of the State there is great variation in the soil and climate, resulting in correspond¬ ing variation in occupations of the people.

River Systems and Lakes. — Montana is unique in one respect; unlike any other State or country, the waters from the mountains are carried by different river systems to the three oceans, the Arctic, the Pacific and the Atlantic through the Gulf of Mexico. In the western part the Bitter-Root River gathers the waters from the snow crests of the Bitter-Root Range and from the spurs of the Rockies, and unites with the Missoula near the city of Missoula. The Missoula River through its various tribu¬ taries gathers the waters from a large portion of the western slope of the main range, includ¬ ing that which is used in the great smelters of Anaconda, and that which comes from the rich mines of Butte. Further north, the North-Fork, Middle-Fork and South-Fork of Flathead River receive the drainage from the Mis¬ sion and Swan ranges, the west slope of the main range and a part of the Kootenais. These unite to form the Flathead River, which first pours its waters

into the greatest reservoir of the State, < Flathead Lake, and later joins the Missoula in the beautiful but narrow Paradise Valley to form Clark's Fork of the Columbia. The Kootenay River takes the drainage from the extreme northwestern corner, a part of the Columbia drainage system. The rivers on this western side are clear and swift, with rocky and picturesque canons. The Belly and Saint Mary rivers in the northern part of the main range carry the ice-cold water from the glaciers of the Continental Divide, Chaney, Swift Cur-

/MONTANA.

Estimated population, 459,494

Pop.

6.446

3,491

13,962

28,833

17,191

14,123

12.723

12,988

17,385

18,785

14.079

2,942

5,601

21,853

3,638

7,229

4,190

23,596

Beaverhead . 17

Big Horn . G 18

(Pop. incl. in Rose¬ bud and Y ellowstone Cos.)

Blaine . C 16

(Pop. inch in Chou¬ teau Co.)

Broadwater . G 11

Carbon . I 15

Carter . I 24

(Pop. included in Fal¬ lon Co.)

Cascade . E 11

Chouteau . D 12

Custer . H 23

Dawson . E 21

Deerlodge . H 7

Fallon . H 24

(Pop. inch in Custer Co.)

Fergus . F15

Flathead . C 5

Gallatin . Ill

Garfield …….. E 19

(Pop. inch in Daw¬ son Co.)

Glacier . B 8

(Pop. inch in Teton Co.)

Granite . G 7

Hill . 0 12

(Pop. inch in Chou¬ teau Co.)

Jefferson . H 9

Lewis and Clark … F 9

Lincoln . B 2

McCone . D 22

(Pop. inch in Rich¬ land and Dawson Cos.)

Madison . 110

Meagher . G 13

Mineral . E 3

(Pop. inch in Mis¬ soula Co.)

Missoula . F 5

Musselshell . G 16

(Pop. inch in Yellow¬ stone and FergusCos.)

COUNTIES Pop.

10,731

10.562

Anaconda .

,..G7

806

302

Bear Creek … .

. I 15

2,992

561

Belgrade ……

.H 11

630

1,158

Belt .

5,359

1,022

Bigtimber .

. H 14

433

14,422

Billings .

H 17

4,697

5,107

Bozeman .

.H 11

18,214

514

Bridger .

.116

573

43,425

Butte .

H 8

268

780

Chinook .

1,109

601

Columbia Falls .

…C6

481

521

Columbus .

H 15

369

888

Conrad .

. .C 10

4,860

528

Culbertson ….

. C 25

1,513

2,570

Deer Lodge … .

,.G8

399

1,835

Dillon .

…19

345

603

Eureka .

… B 4

796

1,398

Forsyth .

. . G 20

325

1,004

Fort Benton …

. D 13

674

1,158

Glasgow .

. .C 20

759

2,428

Glendive .

, ,E 24

491

13,948

Great Falls… .

.E 10

374

2,240

Hamilton .

…G6

467

383

Harlem .

.B 16

2,491

770

Harlowton ….

. .G 14

1,479

3,624

Havre . .

,.B 14

417

13,612

Helena .

. .F 10

417

389

Joliet .

5 549

Kalispell .

487

Park . I 12

Philips . D 17

(Pop. inch in Blaine and Valley Cos.)

5,904 Powell . F7

Pondera . C 8

(Pop. inch in Chou¬ teau and Teton Cos.) Powder River… . I 22 (Pop. inch in Custer Co.)

Prairie . 22

(Pop. inch in Dawson, Custerand FallonC os) .

11.666 Ravalli . G 5

Richland . D 24

(Pop. inch in Daw¬ son Co.)

Roosevelt . C 23

(Pop. inch in Sheri¬ dan Co.)

7,985 Rosebud . H 20

3,713 Sanders . D 3

Sheridan . B 24

(Pop. inch in Valley Co.)

56,848 Silverbow . H8

Stillwater . I 14

(Pop. inch in Carbon, Sweet Crass and Yel¬ lowstone Cos.)

4,029 Sweet Grass . H 14

9,546 Teton . C 9

Toole . B 10

(Pop. inch in Teton and Hill Cos.)

Treasure . G 19

(Pop. inch in Rose¬ bud Co.)

13,630 Valley . C 22

Wheatland . G 14

(Pop. included in Mea¬ gher and Sweet Grass Cos.)

Wibaux . .E 25

(Pop. inch in Daw¬ son Co.)

22,944 Yellowstone . H 16

and Villages

Laurel . HI?

Lewistown . F 1

Libby . C f

Livingston . I if

Malta . Cl*

Miles City . G 2“

Missoula . F “

Moore . FP

Neihart . F if

Philipsburg . G®

Plains . E 4

Pony . . H 1”

Red Lodge . Ilf

Roundup . FI*

Sheridan . I ®

Sidney . D 2ˆ

Stevensville . G

Thompson Falls… D «

Three Forks . H ly

Townsend . G if

Twin Bridges . I ®

Victor . G 5

Virginia City . B 3

Walkerville . H 8

Whitefish . C 4

Whitehall . H ®

White Sulphur

Springs . G 12

Wibaux . F 25

Foremost

Coulee

hake

Pakowk

Cardstoi

.Attawan

Ittlewa;

HUPSOTˆQA Y

fVfˆTreskan

Puck La£e’ [Lower St. yfary L,

*Kintlp\Lˆk\

V.V\ *Vˆ\

7T > Flentywj

s| AnU

yr eMreFˆ \|

R | D aSn

Reserve

Laird

Corral Coulee

o Westbutte

”Komiˆ V

iStonellill

■iTweoaP’J jkUial | X

Whitlash°|

Turner j

Twete {

‘Gold Stone

Opheim 0 ,

Glentaua’ Baylor 0/4

.Golrihutte

TORES’

I.ONAL

, s～«9,

1 Alrna

Scobey*

fo a von cl ale'¬ ll CHsctte

White

Water

Lovejoy ,1-ost La

Vnlle:

Aledlcloe Lake l| a Medicine' >

Lake I

(CfV olcbui)}] Warlund H Xarnell 'Jenning-y

gredette'

[iTHomesti

ifsinni

,^<=1

VNni smith fry \ˆJjiver

T\ ™ rice Ledger OˆV.

>lcC»'» Si)

W V alley

ii.jd-'B'lL-'Ayi

JITCIearcreeJf | ˆ ˆ J' jMaddoxgSandd

* I > - . Holmes

arrlck Riedel\ V>

fowler.

Box Elder,

Williams

' Selma p Ashmoore

ourad

- ,ˆna'v

Pendroyp

} — 3-^^W.A- / Ag

ckleaf

Somers1

Galpirv

Elmdalco (~ . . F^rrJet0l |

| Spr^ ThW ° RMs “‘T/))’

Monrock_o_^ Buttee’Si^”^^ / I ■ — cOl denkw PI I

\

<fr4nevillr or / n)\ \

, CAine’r, 0./ Jr ‘ ♦ I

Sullivan 1 1 a*>e

° 1 Butne/M

l q Bloomfield 1 JJ , .

“ink | int.ko44^;L-^

dawso ^

lion Lindsay ally yy Specs’

Hubbart

ark,-

Genou

Riverside,

-Content-

Lismas.

fmsf

TEtwiilosup Brooteic

Bynum’

Pattonhill

Uj

’Farmiug-ˆ

,on Cl

2-<H ˆTˆxqrilRiOGE

ˆVSSrˆˆˆCargVn

N — v •Power ˆ

Nf <?< v p \ » ■ ■ - icA .

i j ■ˆIradV’of Dkyfqˆ

f

J Lonjjt’iriNw

, Y MTS’

•utton

Choteaii

^^,1’ort Benton Tˆj

te */ - TX®, tl«ro| ˆV

& >| iˆc. *vK *<» s

Square Butte JJ ˆ

- J ° LonetriV J

J VyaHlOHWOQDB >vˆ

‘i JhTTˆWooo A’

■ -ˆTˆmYˆNAT-rpiˆT«TcA- <ˆV“ IfrAy 1 ~Z1\ 1 1 [pkjTon\

Flowereel

Oravet~£fctX°

Uamhliu

Leedy

Weldon ˆ HorBelCreek

Richey

rM nV Wtheajj 0,1 Yer ynlch J

jjA** V?5 ˆloan / Gree nsp*Jng°

Redwater

Flax?$ Maulandoˆj o j ? 0 Gerhard

OˆVioifred

ViuˆJnnH’

& UaiJro I

GiliZlf

gusta,

Wilder

ˆw4“‘°’co(£r.

>\Antrim

10ˆ Phon

Circle,

•Isonl Creek

Ind.Sdhool

?e«. Great Fa!ˆ

ail UlmrfKy«k

D’E, jtlverdalc cfeyS e

Brusel

eplerv UlejW

Mecoha

Stony

Butte

CaAjyR ,BPi

oJSenzlen gmokj > Butte

ˆ Cr

rprtlaa,

J N’*o ’ Freedom

\Watklns

’Valentine

’ascadi

Irooks’

Mid (ˆnon

Wateon

Cohagen Garfield ˆ7

J-Adel

OvandoJ

lonarcb

rAW*/! Otˆ DvSo)RE ST

yUes

eAi,aalJ7;ˆ LincolrlD/’*.

SjhTOI

liv l.°. W

ˆ VaO C«.

iLimdo i

* JiBenton

”avL N eibart* 4

ri!E;BELTj

Moore B»»th

| k.m/r »s

Snowbelt

Mitchell

tires throve

Vf ee(.0:

lendoni

Meredith » Calypso,

.Greene,

.MTS.

Buffalo i ˆBarrows’

Saugus y/Aku

Bonfield / x. 1

KlnBetˆ/ˆˆ-d t? fffc Jordan I

- Tusler

C¥“Mum

ˆ°JIayfield

ˆilcn«(ala

oU SSHL S. H

OarneiTlLrˆ .Judith O ttj

Voi

„ \<nic’ “W estmort \

°\5. plevna •SS£J Tonquln

UakPrˆv

. KlnS»»ntS

’ Bother lanj

J,e Chloagˆ.

R

‘^^f^jMaxvl’nej

prflO

|liiii7ˆ.sbur£rˆK Granite ❖•

p L l1 \ G A TCE° » !

Uite Sulpnim] x Springs VLj

>1 © Delpio*

4”e\A gher

\ Os«llec Grovelaoi

\Bru no JˆArLeut

mPflOia!

i Inchon |

IWHEA1

kviartinedale

/c,«oo7v! Mixon Alheiubˆl,

;rbinˆjLfTor«>n (Ji

r Deeri—

Lo.k.

j 0C ah ton-whllˆ Uoward ”/A’i

yTowiiˆ >Aip WATEF jdHolker ˆ /IToetoh;®

1 Fattig

, vˆMizpal

T E)R

bitter

E!Jl

L‘SS““rt

?eˆfBuQtl

.llCliaussfcˆT-

ˆWaldheim

Belmont ,T

Sa Painted Robe °

mevlew

XˆSoventy-o nine

fBeelw.

Progress ‘

fyffalo Cx.

t/ HotSprs.lot/ K*

/Tr**k F.nSqV: t

ˆJEFFERSON?.

tuart-;

falkerri

Garland

Lombard;

Barronc

ihgon ‘ ＜£■“’??

»,Wilt«U

Ekalaka’s

IekaI-aka

RAT.fFOltf

‘onianche’

TW BekaN

AVill/wCrˆ‘C*ˆ

Belgrade

Volborg

Acton,

ˆore-1

lolt^

randenberg.

o Coalwood

io.wdprville

ˆ /AT.faˆl

l|.’1″ ? ‘ ˆWisdom i irjiton J

ifSilTeratxry*/ *5j ’ Iron Rod /V* \ *[Melro*°Rych48ter J, Browne 7*°_ .

Utod A Twin JtjBridges

XˆSherldanˆ A

H Blaine . L’|^- *Laurin^B-uBS a*V I Aiders f’LaY

[Virginia City

a dI£|

Kingsley /

) Epsie’o Broadus

Asblan’

. Maiden j Reel BIO hole % NAT. rtREST

Reich lei

Ridgway

c A R > T

Boyes

Anoenaf i Sales

dvingeftoi

J TONGUE RIVER, “nor. Cheyenne} indIreS’ r\

i moth * V.

Norrisi

BA”CCO

ˆ-AUjM.T,

Capitol ji1 Ericson’f I

larryoweni

o,

• St. 0

V’avii-r V

. V/ Absarokce,

rSflehWi®0ˆ

ySeJmeaˆ/ˆ

A R /B

Rosooa /P-‘*’-

.Piniele

7 Robert)

!k»i

Golden

NWWWWW ■

!Grahtt“lUidge

/- ˆ Dillon

“^^IlarrattBl ˆGrayling HCmepark*

K&ps > y-l

|mts,

■Moorhead

line run

JW y old

Abcifdee

Decker

ll I.-.- v.-r ˆ i

Grant

I Armstead

|^_^?uElectric I Pk,* BaroneLte

MstfP^*£cocirVPkiftl

^Abiathar Pk.

[he Thunderer:

FOBEST

Frannie

SlmoTOToffi

— *I Holim-s "JVU. Washburn*

|i: EATIoVl|4

*W"A \ •Jlo wst one \ ) '

WM jJe Lake^^i I |

r - t'i shothont T jet"",; r

/.Crab Tree's

iff; Belli

Goaman'

"■'A.OimtLakaV

S'AX^ECjltE^

SUerida

.LimaVˆ

Um

Cody

.cv Sundance

|j ‘Shoshone

Buffalo

ˆlyitiDoano

Basin

yPifchston# \ Plateau? 1

hAln*ˆ/<

MONTANA

E S T 0\N

Newcastle

Worlan<

Statute Miles, 48.3 = 1 Inch,

<V-yfst . A n t bony

Jacksons Lake

Rand McNally's New 11 x 14 Map of Montana. Copyright by Rand McNally A Co.

Longitude West from Gree nw ch ˆ j

icrmopoTis.

MONTANA

385

rent, Grinnell, Sexton, Blackfeet and Red Eagle glaciers, and from Cleveland, Merritt, Wilbur, G°uld, Piegan, Going-to-the-Sun, Citadel and . cd Eagle mountains, and the adjacent region in Glacier National Park, on to the Arctic Ocean. The sources of these two rivers are in the wildest and most picturesque region of the State. By the plans of the Federal government much of the water of the Saint Mary will be diverted by canal to the Milk River, and used in the vast system of irrigation for the north¬ ern part of the State. Triple Divide Peak (8,001) claims the proud distinction of sending its waters to three oceans. By far the greater portion of the State is in the Missouri River

drainage sys¬ tem. The Madison, Gallatin and Jefferson rivers gather the waters from the many small ranges adjacent to the Yellowstone Park and unite at Three-Forks to form the Missouri. Near the city of Great Falls are the <(Falls of the Missouri." From Fort Benton, a short dis¬ tance below the Great Falls, the river is navi¬ gable to its juncture with the Mississippi. The Yellowstone River rises in Yellowstone Lake in the Yellowstone Park, and after taking its two mighty leaps in the park and flowing through its magnificent gorge, it emerges as a restless river, continuing in swift descent until its waters merge with the muddy Missouri. The Yellowstone is the most rapid navigable stream in the world, but it has long since ceased to be used by boats as a commercial highway. From the north the Missouri receives the waters of the Marias, Teton, Sun and Milk rivers, all of which flow through valleys of great fertility. The scenery along the rivers is varied and exhibits some striking antitheses. The valley of the Bitter Root is one of remark¬ able beauty. The river, as it winds back and forth like a stream of silver, when viewed from Mount Lolo, Ward's Peak or Saint Mary's in the Bitter-Root Range, is probably equaled in quiet and peaceful grandeur only by the Yel¬ lowstone as it flows through Hayden Valley in the Park. The three branches of the Flathead present to the few travelers along their course many gorges and canons. The South-Fork in one place in the Lewis and Clarke Forest reserve has cut its way through solid rock, making a canon so narrow that pack horses may be and are forced to leap from brink to brink, while the river seethes and boils many feet below, its ominous roar announcing certain death if the leap is short. The Missouri has made the famous ((Gateway of the Moun¬ tains," its splendor first told by Lewis and Clark, and later made famous by the brush of artists. At the city of Great Falls, it hastens its speed before tumbling over the beautiful Black Eagle Falls, spanned by a bridge on the Great Northern Railroad, and does not diminish its speed until the bottom of the Great Falls is reached. The valleys of these rivers and their smaller tributaries make rich farming soil, suitable for grain, vegetables and fruit. The Bitter-Root Valley in the West was settled first, and is a great farming and fruit raising region. The country adjacent to Flathead Lake is thickly settled, and produces abundant har¬ vests without irrigation. The Gallatin Valley has become famous for its bountiful harvests, and the Yellowstone is being largely used for agriculture and fruit. The Musselshell River vol. 19 — 25

takes its first waters from the crests of the Crazy, Castle, Little Belt and Big Snowy mountains. It flows eastward, through the cen¬ tral portion of the State, makes an abrupt turn northward, emptying into

the Missouri. The Judith takes its rise on the northern slopes of the Little Belt and Big Snowy mountains, flows north and gives its waters to the Missouri. The Milk River heads in the Hudson Bay Divide east of Upper and Lower Saint Mary lakes, turns north into Canada, flows east for over 100 miles, returns to the State for another 200-mile stretch before it reaches the Missouri. The Dearborn, Sun and Teton rivers are short' but important streams which head in the main range of the Rockies and flow eastward to the Missouri in the Great Falls Region. They fur¬ nish the water for large irrigation systems. The Bighorn River rises far south, in the mountains in middle Wyoming, and flows north into the Yellowstone near Custer. The Little Bighorn is a tributary of the former, famous in history because of the Custer massacre on its banks by the Indians. The Powder River also rises far south in middle Wyoming, flowing north with a tortuous course, emptying into the Yellowstone east of Miles City. The Tongue River heads in northern Wyoming and flows into the Yellowstone at Miles City. There are many smaller streams designated as rivers, of greater or less importance, depending upon their location and usefulness in irrigation. There are several large lakes in the State, and many small ones. In the Glacier Park alone (q.v.) are some 250 lakes, large and small. Other sections have numerous lakes, many of which are unnamed. Flathead Lake, in the western part, is about 30 miles long, has an area of 189 square miles and is 289 feet deep. The size and depth of lakes in Glacier Park are given under that heading. The larger ones are Upper and Lower Saint Mary, Kintla, Logging, Bowman and McDonald. Georgetown Lake, near Philipsburg, has an extreme length of several miles. Hauser Lake, a widening of the Missouri River near Helena, was made by the construction of the Hauser Dam.

Climate and Rainfall.— The climate of the State is exceedingly varied, and is much more salubrious than is generally supposed. West of the main range the winters are mild, the summers and falls are delightful. The rain¬ fall at Missoula and Kalispell averages about 16 inches, while at Culbertson and Glendive in the eastern end the rainfall is about 13 inches. Rain and snow prevail during the spring until early July. July, August and September are largely without rain, although in many places there is no need of irrigation. During the last decade, possibly due to increased irrigation and to the tilling of many millions of acres that formerly were used only for range, the rainfall during summer months has increased. In many sections of the State large crops have been raised without irrigation. It must be remem¬ bered, however, that there is no certainty of summer rains, and most lands without irriga¬ tion are liable to suffer from drouth. Owing to the different altitudes, snow may fall later in the spring at some places

than at others. An area of 40,700 square miles is below 3,000 feet elevation above the sea ; this is equivalent to a State the size of Georgia. About 10,200 square

miles exceed 8,000 feet altitude. The climate on the Pacific slope is milder and less changeable than that of the Atlantic side. The majority of the areas of high barometer, and accompany¬ ing cold, originate in the Arctic Region, and are deflected southward or eastward by the Rocky Mountains. While eastern Montana and the Dakotas may be in the throes of a blizzard the western end may be enjoying balmy weather. As in any extreme northern state, the ther¬ mometer occasionally records a low midwinter temperature, but the cold spells are short. While they remain there is practically no wind. The air is dry and the sunshine clear. Ordinary outdoor occupations may be carried on with little inconvenience. Summer temperatures are not oppressive, and heat prostrations are un¬ known. In 1916 Missoula, on the west side of the range, had maximum temperature of 98° F., minimum — 17° F. ; east of the moun¬ tains Havre, from which the climate of Mon¬ tana seems to be determined, because it is the first weather bureau station in the United States to record advancing cold waves, had maximum 92° F., and minimum — 33° F. These are merely typical of the greatly varying tempera¬ tures. The mean temperature in the western end is 44° F. At Helena, altitude 4,500, the mean temperature is 43°. Chinook winds may occur over the entire State, melting large quan¬ tities of snow in a short period of time. Owing to the usual absence of a high percentage of humidity, the cold weather is not extremely dis¬ agreeable, nor the warm days smotheringly op¬ pressive. The hot days may blister the skin, while the nights following will be cool enough to require blankets. Rarely does one sleep with¬ out considerable covering, and some people wear the same clothing summer and winter, donning extra coats or wraps in winter. This may be given as the general summary : the springs are rainy; the summers are clear and dry; the autumns are delightful; the winters are clear and bracing. Owing to the absence of high humidity the climate is very beneficial to health, as statistics will show. It is especially

beneficial to those affected with pulmonary dis¬ eases. Malaria is entirely absent. The central Weather Bureau Station is located at Helena. There are stations at Kalispell, Havre and Miles City.

Agriculture and Husbandry. — In the early days of Montana's history it was not thought possible to grow crops in the State to much ex¬ tent. Nearly everything was shipped in from the outside. As the mines developed the de¬ mand for food became so great as to stimulate agriculture, and fruit raising was also attempted. Marked success attended the efforts, and large acreages of grain and orchards were put out annually until agriculture and husbandry have developed in rank above the mineral wealth. In 1902, nearly 250,000 fruit trees were set out; the number was almost doubled the next year. At the close of the year 1903 nearly 1,500,000 fruit trees had been set out in various parts of the State. Since then the acreage has been very greatly increased. The trees in the orchards in¬ clude apples, cherries, plums, apricots and peaches. Small fruit, such as gooseberries strawberries, blackberries, currants and the like, produce enormous crops from small acreage, while to describe the size and weight of the fruit is almost beyond belief. Apples are

shipped to all parts of the country and to Europe. As they are quite free from insect pests, owing to the stringent legislation and watchful care in orchard Inspection, home¬ grown apples are always in demand, the demand being far in excess of the supply. The Bitter-Root Valley, in the western part of the State on the Pacific slope, is the oldest orchard sec¬ tion, and has become famous as a fruit-grow¬ ing valley. But the orchards are not confined to this beautiful and fertile valley. The valley to the north of Flathead Lake is filled with orchards, already breaking beneath their loads of fruit. The Yellowstone Valley is developing rapidly as a fruit-growing region, even growing grapes. The most recent observations show that fruit trees may be grown and that apples will mature in every portion of the State. Since the portion of the State east of the Rocky Mountains is much greater than on the west the fruit-growing possibilities of the State ma}' be readily understood when it is known that the great majority of the fruit trees of the State are on the Pacific side. About 10,000,000 acres of the 94,000,000 acres of the State were in crops in 1918. This does not include pasture. In the last 10 years the State has had such a large increase of farmers that no safe compari¬ sons with former periods can be made. Great stretches of former prairie land that was given over to grazing and stock raising have been taken by homesteaders, and used for farming purposes. The former prairie wilderness has

become a settled country, with farmhouses, schoolhouses, towns, and even cities of good size. The total acreage in farms in 1900 was almost 85 times that reported in 1870, and the increase since 1900 has been tremendous. In the extreme eastern part are the ((Bad Lands,® a continuation of the <(Bad Lands® of the Da¬ kotas, Wyoming and Nebraska, practically non-irrigable because of the uneven surface. The Yellowstone Valley has become famous for its growth of alfalfa. Two or three cuttings, a total of four to seven tons per acre, are had. The Gallatin, Madison and Jefferson valleys in the southeast produce rich harvests of cereals, never failing through irrigation. In the west the Bit¬ ter-Root, Missoula and Flathead valleys, while less extensive, produce as abundant harvests, often without irrigation. The lands are of three general classes — the bottom lands, near the streams, with rich, black, alluvial soil ; the bench lands, whose soil is a sandy loam, capable of wide range of cultivation; and the high bluffs, suitable largely for grazing. The crops in 1918 were, wheat, 31,963,000 bushels; oats, 19,040,000 bushels; rye, 121,000 bushels; barley, 1,879,000 bushels; flax, 3,487,000 bushels; great quantities of corn, hay and forage, potatoes, peas and vegetables. During the past few years, many small fruit and truck farms have been started, promising greater returns per acre' and greater variety of farm products, as ready market awaits all kinds of farm products. Montana leads the Union in the number of sheep, there being more than 5,500,000 in 1910. The sheep industry has proven profitable in the eastern portion where there is much open range. In 1910 there were 925,000 cattle and 319,000 horses, the as¬ sessed valuation of the former being about $3,700,000, and of the latter $6,061,000. Since then the increase has been enormous.

Forests and Lumber. — Twenty-nine per

cent of the total area of the State is covered with timber, which is 8 per cent less than for the average of the entire United States. The timber growth is largely of coniferous trees, yellow pine, tamarack and Douglas spruce (red fir), comprising the most of the commercial

product. Along the streams occur forests of cottonwood. In the drier portions of the State, stunted red cedars often grow along the smaller water courses, of great value to settlers, as they supply posts and wood. Forests of white cedar or arbor-vitae, white pine and Engelmann's spruce occur in the western part. On the higher slopes and summits the alpine species thrive ; but as they have limbs to the base of the tree and inaccessible, they are not of value com¬ mercially. They are useful in preventing the rapid melting of the snow in the spring, hold¬ ing it until later in the season when it is needed in irrigation. A considerable portion of the State's timbered area is included in govern¬ ment forest reserves. The area embraced in each is as follows :

Forest

National

forest

land

Other

lands

Total

Acres

Acres

Acres

Absaroka .

842,467

145.243

987,710

Bear tooth .

662,537

19,393

681 ,930

Beaverhead .

1,337,223

27,777

1,365,000

Bitter Root .

1,047,012

108,856

1,155,868

Blackfeet .

865,077

202,013

1,067,090

Cabinet .

830,676

195,874

1 ,026,550

Custer .

428,922

83,888

512,810

Deerlodge .

833,178

130,822

964,000

Flathead .

1,802,905

285,815

2,088,720

Gallatin .

564,855

344,575

909 , 430

Helena .

687,983

232,497

920,480

Jefferson .

1,039,766

135,919

1,175,685

Kootenay .

1,336,061

287,279

1,623,340

Lewis and Clark . .

811,161

15,199

826 , 360

T^iln .

850,677

330,341

1,181,018

Madison .

958,691

77,169

1 ,035,860

Missoula .

1,031,529

336,662

1,368,191

Sioux .

96,743

17,798

114,541

Total .

16,027,463

2,977,120

19,004,583

The annual output of lumber from Montana mills is quite large. The cut for 1916 is con¬ siderably above the average for the 10-year period, 1906 to 1915, and also higher than the 1917 cut The total lumber cut for 1916, based upon miils cutting 50,000 feet board measure 01-more per year, was _ 383,884,000 feet board measure. A conservative estimate of the total cut for 1916 was in round numbers at least 385 000,000 feet board measure. The lumber production by species for 1916 is shown below • •

Feet board measure

Yellow pine … Douglas fir … . White pine ….

Larch .

Spruce . .

Cedar .

White fir. …. • Lodgepole pine Cottonwood …

138,206,000

56,845,000

10,497,000

163,829,000

6,790,000

2,612,000

3,408,000

1,631,000

66,000

Total reported

383,884,000

In addition to the lumber produced in 1916 there were 25,522,000 pieces of lath and 16,- 266,000 shingles. Figuring that 7,000 lath is equal to 1,000 feet board measure and that

10,000 shingles is equal to 1,000 feet board measure of lumber, the lath and shingles pro¬ duced are equal in round numbers to ap¬ proximately 5,200,000 feet board measure. The total forest products amount to 594,740,000 feet board measure. In 1916 there were 138 saw mills in the State, 157 in 1917. The an¬ nual increment of all timber lands in the State and the annual cut are approximately equal at present. Under proper management, Montana has sufficient timber land to supply the present annual consumption of the State indefinitely with a surplus for disposal elsewhere. It is roughly figured that western Montana forests, if properly protected and managed, will sustain an annual cut, under present conditions, of about 700,000,000

feet of sawtimber, as com¬ pared to a cut at present of less than 400,000,- 000 feet. The entire State will probably sus¬ tain a cut of 900,000,000 feet annually. The United States Forest Service is the only or¬ ganization in Montana growing and planting forest trees for timber production. A nurserv, perhaps the largest evergreen nursery in the United States, is maintained at Haugan, Mont., along the foothills of the Bitter-Root Moun¬ tains in the extreme western portion of the State. Until the present year, 1918, in which shipments have been curtailed by the war, the annual production of two and three-year-old forest trees has been approximately 4,000,000 annually, thus making it necessary to keep a stock on hand of trees of all ages of approximately 12,000,000. These trees are field planted on burned-oyer areas, not capable of re¬ stocking naturally, in the White Pine belt of western Montana and northern Idaho. About two-thirds of the output of the nursery is planted in Idaho and one-third, or approxi¬ mately 1,300,000, are planted in western Mon¬ tana. Forest fires in the State of Montana during the 10-year period 1908-17 inclusive have caused a damage of approximately $6,500,000. For suppressing the 5,833 fires, which caused this damage, the State of Montana, the United States Forest Service and private agencies have spent about $1,170,000. By far the greatest damage was done in 1910 when the fires es¬ caped from control and destroyed nearly $6,- 000,000 worth of standing timber and other property. The largest expenditure for suppres¬ sion was in 1917 when a little over half a mil¬ lion dollars was spent in controlling nearly 1,400 fires. The result of this expenditure is shown in greatly reduced damage. Only about 16.2 per cent of the fires are caused by lightning, which is the only natural cause of any consequence. Railroads cause 37.2 per cent; campers, 17.2 per cent; brushburning, 10.2 per cent; incendiaries, 4.3 per cent: lumbering, 0.9 per cent; miscellaneous causes, 2.3 per cent, and 11.7 per cent are from unknown causes. Prior to December 1908 the Forest Service was administered from Washington, with in¬ spection districts in charge of inspectors throughout the West? each containing a number of national forests. In December 1908 the headquarters of District No. 1 was established at Missoula. The organization of the district office consists of a district forester with four assistants. These heads of administrative offices have each a corps of assistants. The total num¬ ber of people employed in the district office

is approximately 80. In addition to the timber resources of the national forests of Montana, they yield each year an abundant crop of for¬ age for the production of livestock. In the fiscal year ending 30 June 1918, 193,108 cat¬ tle and horses and 810,355 sheep and goats grazed on the 18 national forests of Mon¬ tana, mainly during the summer period, and yielded a revenue to the United States of $136,-478.68. The revenue, however, represents merely a nominal charge for the forage used. The true commercial value would perhaps reach approximately $500,000 annually.

Mines and Mining. — In the early years of the State's history Montana was known prin¬ cipally on account of her mines. Although mining has taken second place to agriculture the State is still a mining section, with vast expenditure and enormous returns. A thou¬ sand million dollars worth of precious and semi-precious metals is a fair estimate of the mineral products, extending over half a cen¬ tury. The early history is the search for gold, and many of her towns and cities are built in gulches where placer gold was mined. Hel¬ ena and Virginia City are illustrations, the lat¬ ter being the oldest camp in the State. Al¬ though Butte is the greatest mining camp in the State, and indeed the greatest in the world, there are many other places where mining is carried on. Gold was discovered in Montana in paying quantities in 1862. The find was in Grasshopper Creek, where later the town of Bannock was built, and where the first seat of government was established in 1864. The diggings of Alder Gulch and Last Chance Gulch, where Helena now stands, followed. It is estimated that in the first 20 years of placer mining $200,000,000 in gold was taken, although no accurate system of determining is possible. Montana Bar in Confederate Gulch, Broadwater County, }delded $1,600,000. This was packed in kegs, hauled in freight wagons to Fort Benton and taken thence by boat to Sioux City, the nearest railroad. The men of

the Lewis and Clark Expedition probably stirred big values in gold, unknowingly, as they laboriously poled and dragged their boats up the Missouri past this bar. The true source of the gold found in the placer mines is yet a mystery. Following the discovery of free gold came gold quartz mining. The first mine was the Ore Cache at Summit in Adler Gulch. Other discoveries were made rapidly. In the 60's every reef and outcrop in Madison County was staked and recorded. Then came the

at¬ tempt to mine and smelt silver-lead ores. Long before a railroad reached the State lead-silver bullion was shipped to Crinne, Utah, in freight wagons, for smelting. Copper ore of value was not discovered in Butte until about 1880. Ore was found in seemingly inexhaustible quan¬ tities. Smelting works were erected, big plants being constructed. In later years zinc deposits have been developed and an electrolytic zinc-reducing plant has been constructed at Great Falls. Manganese ores, which have heretofore been of a negligible quantity, have been found in the Butte mines. The Philins-burg region is also rich in manganese. The high price for this ore on account of the war caused great activity in manganese produc¬ tion in 1917 and 1918. Other mineral producing regions are Jardine, Park County, which pro¬ duces gold, silver, selenite and tungsten ; Emi¬ grant Gulch, placer gold; Hell Gate, copper ore; Radersburg, gold and other ores; Silver Camp, at the headwaters of the Big Blackfoot, silver, copper and zinc; Elkhorn, in Bea¬ verhead County, several ores; Neihart, Cas¬ cade County, silver-lead ore; Castle, Meagher County, lead; mines near Helena, gold. The total value of all minerals produced in 1914 was about $47,800,000. In 1915 the output was almost doubled, reaching $87,000,000. In 1916 this was again almost doubled, $145,300,000. Production in 1917 and 1918 was still enor¬ mously increased. The output of the different counties is given for the year 1916, showing the distribution of the mineral wealth.

COUNTY

Beaverhead… . Broadwater… .

Cascade .

Deer Lodge… .

Fergus .

Gallatin .

Granite . .

Jefferson .

Lewis and Clark

Lincoln . .

Madison . .

Meagher .

Mineral .

Missoula . .

Park .

Phillips .

Powell .

Ravalli .

Sanders .

Silver Bow .

fGold, fine, ounces

fSilver, fine ounces

273.37

90,616

3,990.50

7,223

316.02

98,651

35,848.54

36,155

20,931.23

13,920

2

6,482.35

649,328

4,857.43

164,703

36,673.76

101,635

447.23

303

39,678.63

43,915

2.95

282

589.21

76,411

338.92

946

33.23

616

19,946.90

175,907

1,631.16

13,730

981.67

27,924

26.66

8,328

47,071.39

14,983,771

Copper, Lead,

pounds pounds

226,132

785,308

700,542

46 , 480

3,916

635,169

163,949

50,593

8,280

93,351

1,486

493 , 349

75 , 709

852,857

679,760

33,102

92,285

594

10,500

116,744

383,557

236,545

380,565

1,309,188

41,321

6,086

27,957

86,083

16,038

62,620

86,498

83,365

349,538,498

9,195,082

Recoverable zinc content, pounds

19,106

18,754

89,063

898,348

43,318

3,116,812

488,532

224ˆ585 [i 42

Total, 1916 Total, 1915

220,130.15

242,077.03

16,494,366

14,378,437

352,928,373

267,231,014

13,595,136

13,756,356

229,359,072

187,146,895

Total value

$175,091

262,784

118,795

811,180

450,324

367

699,782

585,872

815,306

10,314

904,310

58,437

664.251

17,794

1,512

528,086

55,570

112,396

33,062

127,547,714

*$133 , 882,947 82,912,254

* Average value of metals: Gold, $20.6718 per ounce; silver, $0,658 per pound; zinc, $0,134 per pound, t Includes placer production.

per ounce; copper, $0,246 per pound; lead, $0,069

MONTANA

389

Montana is one of the richest coal States in the West, although much of it is undeveloped. The cretaceous, bituminous and semi-bitumi¬ nous coal areas in the State cover about 13,000 square miles, and the lignite area about 25,000. Not all of this territory contains coal, of course, but the deposits are found quite abun¬ dantly throughout the State. The quality varies from anthracite to low grade lignite. Anthracite is present, but not in commercial quantity. The inferior lignite is in the Great Plains section. The grade of coal improves as the mountains are approached, culminating, usually, in highest grade in or near the moun¬ tains. Tests show the bituminous coal to be little inferior to Pennsylvania bituminous coals. Lignite is not yet extensively used because methods of making briquettes are as yet com-‘ mericially expensive, and without briquette moisture and gas rapidly leave the coal. But lignite is a natural resource with great future value. One lignite bed near Miles City is 40 feet thick. Over 1,810,000 tons of coal were mined in the State in 1910. In 1916 the output was doubled, having risen to nearly 3,700,000 tons. New mines are being opened annually. Bituminous coal or lignite has been found in nearly every county in the State. The unde¬ veloped coal

industry will, without doubt, > be a prominent factor in the future expansion of other industries of the State. In addition to its coal, the State has extensive beds of clay, of different grades and qualities.. Stones for building purposes are quarried in many sections. Montana leads the States of the Union in the production of sapphires, the actual mining of which began in 1891. Four mining regions may be mentioned: A belt 12 miles northeast of Helena on the Missouri River; the Rock Creek region, 30 miles west of Ana¬ conda; the Cottonwood Creek fields, 10 miles east of Deer Lodge, and the Yago mines in Fergus County, 13 miles west of Utica. The last is the most productive region. In recent years both oil and gas have been found in the State. Oil was first discovered in the Elk Basin, Carbon County, near the Wyoming line, 11 Nov. 1915. Since then seven Montana wells are producing in this district. The. fust well was sunk to a depth of 1,494 feet, with a pro¬ duction during the first 24 hours of 150 barrels. The flow continued about 200 barrels daily after the first day. In October 1917 two oil prospects were discovered near Laurel in Yel¬ lowstone County. Exploratory work is con¬ ducted in the Dry Creek Basin in Carbon County, near Bridger and Laurel in Yellow¬ stone, in Toole and Sweet Grass counties, in Musselshell County, near Lavina and Roundup, in Deer Lodge, Lewis and Clark, Cascade and Dawson counties. The Montana oil wells mar¬ keted in 1916 44,917 barrels. Gas has been dis¬ covered in the northern, the central, the south¬ ern and eastern parts of the State. A number of gas wells near Havre were brought in in 1915, with a supply more than ample to heat the city. A fine deposit of gas has been found near Baker and the gas has been piped to the town for use. About 70 miles from Billings, near the State line, a well was blown in in 1916 with a flow of 100,000,000 cubic feet of gas every 24 hours and was extremely difficult to plug and control.

Manufactures. — The predominating indus¬ try is the smelting of ores. The largest smelter of the world, the Washoe, is located at Anaconda. For the treatment of ores water is brought from Silver Lake, some 15 miles away, in the mountains. Ores from Butte and elsewhere are treated at the Washoe. The ores are transported by an electrically operated railroad 28 miles in length. The smelter re¬ duces about one-fourth of the copper mined in the United States. In connection with the smelter is a large sulphuric acid plant. An¬ other great smelter is built on the sloping bank of the Missouri River at Great Falls, securing an abundance of water from the river. The third great smelter of the State is at East Helena. In 1916 about $8,000,000 worth of lumber was cut by the mills of the State. The larger mills are

located at Hamilton, Missoula, Bonner, Saint Regis, Somers, Eureka and Libby. At most of these places there are, in connection with the mills, factories for the manufacture of sash, doors, windows and vari¬ ous forms of cases and cabinet work. Con¬ siderable furniture is made from native lumber. Large flour mills have been built in practically every section of the State. With the increase in grain growing in the State the manufacture of flour and cereal products has in very recent years made great advancement. In 1916 the flour production was 1,500,000 barrels. Much of this went outside of the State. The manu¬ facture of beet-sugar was first started at Billings, where the large factory produces as high as 35,000 tons a year. The byproducts of the factory are of great commercial import¬ ance. A beet-sugar factory has been erected at Missoula and others are being planned for various places in the State. Creameries have been built in nearly every valley, and with many of these a cheese factory is associated. Flax fibre mills have been built in the eastern part of the State, where flax is extensively raised. Nearly every large town has a factory for the brewing of beer. As the State went dry 1 fan. 1918, this will cease to be an industry. In a number of cities meat packing is an in¬ dustry, but small as compared with the big houses. Although the State leads in wool pro¬ duction it is shipped East for cleaning and carding. Brick, tile and some kinds of pot¬ tery are made quite extensively in places, and there are many remarkable clay beds unused. A cement factory is located at Trident. 1 he State's population is yet small, but has grown very rapidly in the last 10 years. Manufacture has in that time increased enormously. The great natural resources of the State will make it in the years to come a great manufacturing region.

Railroads.— There are three transconti¬ nental systems crossing the State from east to west the Great Northern, Northern Pacific and Chicago, Milwaukee and Saint Paul, with many branch lines. It is the only Rocky Mountain State to be crossed by three transcontinental lines These roads traverse some of the most beautiful and picturesque portions of the State, giving travelers an idea of the scenic beauty of plains, rivers and mountains. The long dis¬ tance across the State from east to west by the Northern Pacific is 806 miles. The Oregon Short Line connects the States to the south

with these main trunk lines. It terminates at Butte. The Burlington enters the State south of Billings, giving a short route to all points toward the southeast. The Great Northern and Northern Pacific operate nearly 4,600 miles of track in the State, including sidings, spurs and sidetracks. The Chicago, Milwaukee and Saint Paul operates by electricity all its trains from Harlowtown, Mont., to Avery, Idaho, a distance of 450 miles. Powerful electric loco¬ motives requiring neither coal nor water, and making no smoke nor cinders, draw the heavy trains over the Rocky Mountains. The engines are so constructed that on down grade elec¬ tricity is generated, the current thus produced being transmitted to the feed wire. This elec¬ trical generation acts as a brake. It requires 24 hours or more to go the entire length of the State by rail. The Northern Pacific fol¬ lows the Yellowstone River from Glendive to Livingston. At this place a branch line goes to Yellowstone Park. At and near Bozeman the road crosses the famous Gallatin Valley. It then follows the Missouri River to Townsend, where the ascent to the main range of the Rockies really begins. In the western part of the State it follows the beautiful scenic shore of Clark's Fork of the Columbia. The Great Northern follows the Missouri for a long dis¬ tance after it enters the State, and then along the Milk River for several hundred miles. Continuing westward across beautiful prairie country to the Rockies it crosses to the Pacific side, giving superb view of some of the beauti¬ ful peaks in Glacier Park. Near the western border it follows the Kootenay River with majestic mountains on either side. The Mil¬ waukee enters from Dakota in the eastern prairie region, crosses the Yellowstone River at Terry, follows this river about 75 miles to Forsyth, continuing westward from here to the Musselshell River, and further west to the Three Forks of the Missouri. Here the ascent of the main range begins. On the west the road traverses the Bitter-Root Mountains, over a pass with beautiful view in every direction, and down hill to Spokane. During the past few years not much construction has been un¬ dertaken, although prior to that many hundred miles were built in a short time. In 1917 and 1918 more than 100 miles of new road were built and put in operation. The rapid develop¬ ment of the State agriculturally has made great demand for railroad construction. The immedi¬ ate future will doubtless see a great increase in railroad mileage.

Finances. — The total assessed valuation of the State in 1917 was $582,286,529. The valua¬ tion for 1918 was approximately $596,000,000. The valuation of railroads was a little more than $82,000,000. The total wealth production of the State in 1917 was $317,000,000, of which $113,000,000 came from the mines.

Politics. — Montana was admitted as a Re¬ publican State 8 Nov. 1889. It was organized as a Territory in 1864. Owing to the silver question its politics were for a time very un¬ decided. In 1896 the State was overwhelmingly for free silver. In 1900 the fusion of Democrats, Laborites and Socialists carried almost every¬ thing. In 1902 a Republican was elected to Congress. In 1912 the Progressive party car¬ ried the State, which \yent for Wilson in 1916.

The State has two Congressional districts, and is represented in Congress (1919) by two con¬ gressmen and two senators. In 1916 Montana elected the first woman to Congress, Miss Jeannette Rankin, a graduate of the State Uni¬ versity in her home town, Missoula.

State Government. — The Constitutional Convention met at Helena 4 July 1889, conclud¬ ing its labors 19 August. The constitution was approved by the people at a special election in October, and the proclamation making Montana a State was issued 8 November. Women are now possessed of the full franchise and may vote at all elections and hold office. In 1919 women fill every position for county superin¬ tendent of schools. The office of State super¬ intendent of public instruction is filled by a woman. Women are elected to different county offices. Two women sat in the State legislature in 1917. The governor and State officers hold office four years, elected by a plurality vote. The Territorial and State governors and their terms of office are as follows:

TERRITORIAL.

Sidney Edgerton . . 22 June 1864, to 12 July 1866

Thomas F. Meagher, Acting 1865 to 1866

Green Clay Smith . 13 July 1866, to 9 April 1869

James M. Ashley . 9 April 1869, to 12 July 1870

Benjamin F. Potts . 13 July 1870, to 14 Jan. 1883

J. Schuyler Crosby . 15 Jan. 1883, to 15 Dec. 1884

B. Plat Carpenter . 16 Dec. 1884, to 13 July 1885

Samuel T. Hauser . 14 July 1885, to 7 Feb. 1887

Preston H. Leslie . 8 Feb. 1887, to 8 April 1889

Benjamin F. White . 9 April 1889, to 8 Nov. 1889

STATE.

Joseph K. Toole, Democrat 8 Nov. 1889, to 2 Jan. 1893 John E. Rickards, Repub¬ lican . 2 Jan. 1893, to 4 Jan. 189 7

Robert E. Smith, Demo¬ crat and Populist . 4 Jan. 1897, to 4 Jan. 1901

Joseph K. Toole, Demo¬ crat and Populist . 4 Jan. 1901, to 1 April 1908

Edwin L. Norris, Democrat 1 April 1908, to — Jan. 1913

Samuel V. Stewart, Dem… Jan. 1913, to Jan. 1921 Joseph M. Dixon, Rep… Jan. 1921 — -

The governor is a member of the State board of prison commissioners, State board of examiners, State board of land commission¬ ers, State board of equalization, State board of education, State board of commissioners for the insane, State board of commissioners for the deaf, dumb and blind, State board of horti¬ culture, State board of farmers' institutes, State board of livestock commissioners. By and with the advice and consent of the State senate he appoints the members of the various boards where the law does not particularly specify. He appoints the State land agent, the register of lands, the veterinarian, the forester, the engineer, the commissioner of labor and indus¬ try, the dairy commissioner, the recorder of marks and brands, the mine inspectors and some other appointive officers. The legislature has biennial sessions in odd-numbered years. The State senate is composed of one member from each county. The State house of repre¬ sentatives has such apportionment' as is made by the legislature. There are 43 in the senate, four years, one-half holding over, and 97 in the house, making a total legislative assembly of 120. The State has two representatives in Congress from two districts. There are three judges of the State Supreme Court, for a term of six years. There are 18 judicial districts, the judges elected for four years. The term of county commissioners is four years, each county having three members. State officials

are elected for four years, county officials, ex¬ cept commissioners, for two years.

Banks and Banking. — At the close of the fiscal year ending 30 June 1917, Montana led the nation in the number' of new national banks chartered during the year. Thirty new banks brought the total of national banks to nearly 100. There were at that time 264 State banks and 13 private banks. The total capitali¬ zation of banks is about $11,200,000; loans and bonds, $80,000,000; cash on hand, 11 Sept. 1917,

$24,000,000.

Education. — Although young among the States, Montana ranks nigh in the efficiency of her educational system. When Montana was admitted to the Union the common schools re¬ ceived as an endowment from the national gov¬ ernment one-eighteenth of all the public land in the State. When fully completed by survey and selection of lien lands the total will be approximately 5,234,000 acres. Up to 1918 the total sales of 794,914 acres netted the common school fund $14,539,887. More than one-third of this is invested in bonds, warrants, and farm loans, bearing interest. Nearly $8,000,000 is represented by deferred payments, drawing 5 per cent interest. The State treasurer has $1,247,576 in cash awaiting investment The total income from this source in 1917 was $877,536, a total of $5.50 per capita for school children. Land grants to the State institutions for higher learning aggregate 668,080 acres, much of which has been sold. The fund ac¬ cumulating from sales is loaned at interest. In

1917-18 there were 122,000 children enrolled in the schools of the State, an increase in nine years of 88 per cent. In the same year there were 5,781 teachers, an increase in 10 years of 203 per cent. The greatest increase in teach¬ ers and children was in the northeastern part, where heavy immigration had taken place. Summer school attendance of all Montana teachers in 1918 was 1,227. The average salary of superintendents and principals in the county-seats was $2,282.67. All of the county super¬ intendents in the State are women. All but five county superintendents have supei vision of territories larger than Rhode Island, and six county superintendents have counties to travel that are larger than Delaware and Rhode Island together. The public schools of the the State are under the supervision of the State department of public instruction. Under the State supci intendent there is a deputy, and two rural school inspectors. The legislature in 1918 made provision for an inspection of high schools. The control of the higher State insti¬ tutions is in the hands of the State board of education. This board consists of the gover¬ nor, the attorney-general and the State superin¬ tendent of public instruction, ex-officio mem¬ bers and seven other members appointed by the governor. The University of Montana, composed of its four schools, as well as the State School for Deaf, Dumb and Feeble-Minded, at Boulder ; the State Industrial School, at Miles City, and the State Orphans Home, at Twin Bridges, all come under the jurisdiction of the State board. Each of these institutions has a local adminif lrative board to carry on its work, and the four schools com¬ posing the University of Montana have, m addition to the local board, a chancellor of the university, located at Helena, whose duty it

is to correlate and unify the work. The State has a system of county high schools, under a separate board of trustees and with separate administration from city schools. These schools are maintained by county assessment, and are free to pupils in the county. The law was passed in 1898. Eighteen counties in the State have county high schools. For these schools, expensive and lasting buildings are constructed. The State Normal School at Dillon has 535 in attendance. The State Agricultural College and experiment station at Bozeman (1892) has about 1,000 students. The State School of Mines (1899) is at Butte, with about 100 students. The State University (1895), at Mis¬ soula, has about 1,000 students. The university established a summer school for science at Flathead Lake in 1899, known as the University of Montana Biological Station. It has continued in successful operation since, and has drawn many from the State and from Eastern States The Montana Wesleyan College (Methodist) is at

Helena. The College of Montana (Pres¬ byterian) was for years the only institution for higher education in the State. Financial diffi¬ culties caused its suspension about 1898. The Billings Polytechnic Institute is at Billings. Many private schools are maintained by the Catholic Church. The Sacred Heart Academy at Missoula has art" attendance of several hun¬ dred, as have also the academies in Butte and other places. In accordance with an act of the legislature approved 8 March 1915, teach¬ ers who have taught 25 years, the last 15 of which have been in Montana, may retire on an annual retirement salary of $600. School officials are required to deduct $1 every month from the salary of every teacher in their em¬ ploy for the benefit of the retirement salary fund. This applies to all teachers except those actually in the employ of Montana schools at the date of the approval of the act, who were allowed till 1 Jan. 1916 to decide whether to avail themselves of the law or not. There are 18 county high schools. The number of ac¬ credited high schools (1918) is, for four years, 55-for three years, 10; for two years, 38; for one year, 18. There are nine academies and private schools accredited for four years. The number of county libraries (1918) is four; high schools with normal training courses, 11 ; school nurses in city schools, 11.

Charitable and Penal Institutions.— The penitentiary is located at Deer Lodge. Convicts are given outdoor work on the public highways in different parts of the State, on parole. The system gives highest satisfaction both to the inmates and to the guards. It is no uncommon sight to see from 50 to 100 con¬ victs at work, absolutely unguarded Of the inmates a small proportion is native born, the remainder being from other States. Many criminals flee to the mountains, and Montana undoubtedly helps care for the criminal popu¬ lation of many other States. Chanties and reform are placed in the hands of a board of three members, appointed by the governor for four years. The reform school for boys is located at Miles City. The school for deaf, dumb and blind, and for delinquents, is located at Boulder, ine soldiers' home is at Columbia Falls. The asylum for the insane is at Warm Springs. A sanatorium for tuberculosis patients

with capacity for 80, is located at Galen near Deer Lodge.

Government Reservations. — Notwith¬ standing the large area of the State much of it is set apart by act of Congress as reserves. The Glacier National Park includes 915,000 acres, or about 1,450 square miles. The forest reserves, with about 16,000,000 acres, or nearly 15,000 square miles, are mentioned elsewhere. In the early days the Northern Pacific Railway Company received a grant from Congress of every other section for a distance of 50 miles on either side of the railroad, approximating 15,000,000 acres in Montana, or nearly one-sixth of the area. Of this amount much has been sold. Approximately 3,500,000 acres are yet in the hands of the company. There are several large Indian reservations in the State. In recent years the only reservation west of the divide, the former Flathead Reservation, was opened for settlement. Each Indian was given an allotment, and the remainder was opened for settlement, the homesteader paying a stipu¬ lated amount per acre. This money was placed in a fund for the Indians. This reservation covered 2,240 square miles, and is now largely in farms. In the northeastern part of the State, with its southern boundary made by the Missouri River, is the former Fort Peck Reser¬ vation, comprising 2,775 square miles. This, also, has been been opened to settlers, and has been homesteaded. Four Indian reservations are left: the Crow, in Yellowstone and Custer counties, covering an area of 5,475 square miles, larger than the State of Connecticut; the North Cheyenne, in Rosebud and Bighorn counties, 765 square miles; the Fort Belknap, in Blaine and Phillips counties, 840 square miles; and the Blackfeet, which includes about a third of Teton County, or about 2,000 square miles. The total land now comprised by Indian reservations is about 3,700,000 acres, and about 3,800,000 have been opened for settlement. There are about 300,000 acres in military reser¬ vations. The State lands comprise about 3,000,- 000 acres. The National Bison Range, under the control of the United States Biological Survey, located at Ravalli, a few miles west of Missoula, contains nearly 20,000 acres. In it are buffalo, antelope, elk and deer. The Willow Creek Bird Reservation, about one sec¬ tion, is near Augusta, in Lewis and Clark County, and is for the protection of plover and avocets. The Flathead Lake Bird Reserva¬ tion consists of two small islands in Flathead Lake.

History. — The first explorations are be¬ lieved to have been made by Pierre and Cheva¬ lier Verendrye, who, with two Canadians and a party of Indians, are supposed to have entered Montana about 1743. The route they took and the points to which they reached are puzzling and the records conflicting. It was at first thought they had gone as far west as the Gate of the Mountains, and is so recorded in the

Contributions to the Historical Society of Montana. y It seems to be generally agreed by later investigators that the party went only into the southeastern part of the State, and it is doubtful if they came into Montana at all. While in the country of the Choke Cherry In¬ dians they planted on an eminence a leaden plate on which were engraved the arms of France, and erected a monument of stones. In

1913, 170 years later, this leaden plate was found by some school children, but this was in Pierre, S. D., much farther east than had been supposed, as it was supposed to have been buried near the Great Falls of the Mis¬ souri. For 50 years the country remained un¬ known to history. The whole territory was ceded to Spain by France along with Louisiana in 1764. In 1800 the country again passed to France by treaty. In 1803 the Louisiana grant, embracing a large part of what is now Mon¬ tana, was ceded by France to the United States for a consideration of $15,000,000. The por¬ tion of the State west of the Rocky Mountains was embraced in the Territory of Oregon, when Oregon was organized in 1848. In 1863 a new Territory of Idaho was formed, includ¬ ing Montana. In 1864 the Territory of Mon¬ tana was organized with its boundary the same as that the State now has, except that about 2,000 square miles have been added in the southeast. In 1804 President Jefferson sent an expedition to explore the northwestern territory. The expedition was under the di¬ rection of two army captains, Lewis and Clark, and has become famous in history as the Lewis and Clark Expedition (q.v.). They ascended the Missouri, explored some of its tributaries, crossed the range to the Pacific Ocean, and returned in safety to Saint Louis. The first trading post was that of Manuel Lisa, built in 1807 on the Big Horn River. In 1827 another was established on the Missouri at the mouth of the Milk River. In 1829 Alexander Mac¬ kenzie, for the American Fur Trader Company, built Fort Union on the Missouri above the mouth of the Yellowstone. In 1832 the steam¬ boat Yellowstone ascended to this point. Previ¬ ous to this all supplies were taken overland, a distance of nearly 2,000 miles. In 1835 a steam¬ boat went 60 miles up the Yellowstone. In 1846 Fort Benton was built. Steamboats as¬ cended the Missouri to the fort in 1860, and the property was turned over to the United States in 1869. On the western side Father DeSmet established Saint Mary's Mission at Stevensville in 1845, still standing in 1919. Later he founded Saint Ignatius' Mission in the valley at the foot of Flathead Lake and in the shadow of the beautiful Mission Mountains, which for 50 years was a great power for good among the Indians. From 1840 to about 1860 the history of Montana is occupied mainly with the missionary labors of Father DeSmet arid his associates

among the Flathead Indians. About 1855 there were rumors of gold. In 1852 a half-breed named Frangois Finlay, commonly known in Indian as Benetesee, found gold in the sands of Gold Creek in Deer Lodge County-Rich discoveries were found in 1861. In 1862 Grasshopper and White's Bar were discovered, and Bannack in January 1863. Gold dust to the amount of $25,000,000 was taken from Alder Gulch in a few months. Last Chance Gulch, where Plelena now stands, produced many fortunes. The early mining was largely from placers, but the introduction of machinery made the treatment of ores of silver, gold and cop¬ per very productive, and made the permanent prosperty of Butte. The introduction of so many settlers was not without a struggle. The Indians resisted the advance of the white men. Many minor conflicts occurred, but two are worthv of special mention. The war with the Sioux

MONTANA

1 Senate Chamber, Montana State Capitol

2 House of Representatives, Montana State Capitol

MONTANA

Era

jjg|

r-|g fgwp

/»;; i mm#

■

HB

*

-*

■ Bfrˆl

1 Governor’s Reception Room, Montana State Capitol

2 Law Library, Montana State Capitol

opened in 1S76, and was a desperate conflict. General Custer was dispatched against the Sioux, under the leadership of Sitting Bull, numbering 6,000 warriors. Pushing up the Rosebud to its headwaters Custer found the Indians encamped on the Little Big Horn. Custer was surrounded and his entire com¬ mand massacred, not a man escaping. Within a year a series of victories under General Miles had destroyed the power of the Indians. In 1877 Chief Joseph, of the Nez Perces in the western part of Idaho and his tribe prepared to cross the Bitter-Root” Mountains against the orders of the government. They crossed the mountains and passed up the Bitter Root, pur¬ sued by soldiers under the command of General Gibbons. At the Big Horn a bloody and in¬ decisive battle was fought. Chief Joseph passed through, up the Madison, through the Yellow¬ stone National Park, across the prairie to Snake Creek and was captured only a few miles from the Bear Paw Mountains — a trail of over 1,500 miles, more than half of which was a running battle. A convention met in Helena in January 1884 which adopted a State constitution. This was approved by the people in November of the same year. Congress re¬ fused to sanction the request for statehood, and this was not granted until 1889. Since then immigration has brought many citizens from other States. The former restless popu¬ lation has changed into people who are desir¬ ous of making permanent homes. Agriculture and fruit culture, through irrigation, has added a new industry to the State, and the people of the farm join hands with the toiler beneath the surface in the mines,

in an exchange of products, to the advantage of both and for the material advancement of the State.

Population. — The first Territorial census in 1860 shows but 288 people in the Territory, exclusive of Indians. The population as given by the census for each decade is as follows :

(1860) 288; (1870) 20,595; (1880) 39,159; (1890) 132,159; (1900) 243,329; (1910) 376,-

056; (1920 official) 548,889. Illiteracy is

low. There are 50 counties in the State, as fol¬ lows, with their county-seats :

County

County ceat

Beaverhead ….

Big Horn .

Blaine .

Broadwater ….

Carbon .

Carter . .’ .

Cascade .

Chouteau .

Custer .

Dawson .

Deer Lodge ….

Fallon .

Fergus .

Flathead .

Gallatin .

Garfield* .

Glacier* .

Granite .

Hill .

Jefferson .

Lewis and Clark

Lincoln .

Madison .

McCone* .

Meagher .

Mineral .

Missoula .

Musselshell ….

Park .

Phillips .

Pondera* . .

Dillon

Hardin

Chinook

Townsend

Red Lodge

Ekalaka

Great Falls

Fort Benton

Miles City

Glendive

Anaconda

Baker

Lewistown

Kalispell

Bozeman

Jordan

Cutbank

Philipsburg

Havre

Boulder

Helena

Libby

Virginia City C ircle

White Sulphur Springs

Superior

Missoula

Roundup

Livingston

Malta

Conrad

County County seat

Powder River* .

Prairie .

. Terry

Ravalli .

. Hamilton

Richland .

Roosevelt* .

Rosebud .

. Forsythe

Sanders .

Sheridan .

Silver Bow .

. Butte

Stillwater .

Sweet Grass .

Teton .

. Choteau

Toole .

Treasure* .

Valley .

Wheatland .

Wibaux .

. Wibaux

Yellowstone .

* Established by the legislature in 1919, without county-seat, which was to be determined by county commissioners of each county.

The following is the population of cities with more than 10,000 population, as given by the 1920 census: Butte, 41,611; Great Falls, 24,121; Missoula, 12,668; Helena, 12,037; Ana¬ conda, 11,668; Billings, 15,100. Cities of over 2,000 population are Glendive, Miles City, Red Lodge, Roundup, Dillon, Deer Lodge, Glasgow, Havre, Kalispell, Whitefish, Bozeman, Liv¬ ingston, Lewistown. Nearly all of the cities and towtls are growing rapidly. Many import¬ ant business places have appeared within a few years, as Baker, Hardin, Roundup, Valier, Poi¬ son and Hysham. Many small places far in¬ land from railroads do very large business. Butte, the largest city in the State, is situated on the Pacific side of the main range, at an alti¬ tude of 5,700 feet, a few miles from the sum¬ mit of the range. It is noted for the wonder¬ ful richness and extent of its mines. It is a railway centre, the transportation facilities mak¬ ing it an important wholesale and distributing point. The State School of Mines is located at Butte. Great Falls, the second city in the State, was located and plotted by Paris Gibson, yet living, and James J. Hill, in 1883, before the coming of the railroad or the building of a house. It is a beautiful city, with parks and boulevarded streets. It is an important com¬ mercial centre and the several falls in the river make it a great source of electrical power. A large smelter is located on the bank of the Mis¬ souri River. It has many factories and is the centre of a large agricultural country. Mis¬ soula, the Garden City, is on the west side of the range, at the mouth of Hell Gate Canon. It has a large surrounding agricultural, fruit¬ growing and lumber country. The Milwaukee and Northern Pacific transcontinental roads pass through the city and there are branch roads up the Bitter-Root River, over the Cceur d'Alene Mountains to Idaho and up the Big Blackfoot River. It has a beet sugar factory, erected in 1917, flour mills and other factories and is the seat of the State university. A few miles out is the government army post, Fort Mis¬ soula. Helena, the capital of the State, owes its existence to the discovery of gold in Last Chance Gulch. The capitol is a beautiful

build¬ ing, constructed .from sandstone from Colum¬ bus, costing $1,100,000. The elevation of Hel¬ ena, 4,700 feet, and its location near the sum¬ mit of the main range of the Rockies, give it a delightful climate. The Montana Wesleyan and Mount Saint Charles College are located in Helena. The State Fair is held annually near the city. Anaconda, the Smelter City, was

founded by Marcus Daly as a suitable place for the erection of smelter works. The Washoe Smelter, employing between 3,000 and 4,000 men, is the largest in the world. Anaconda is on Warm Spring Creek in the Deer Lodge Val¬ ley, elevation one mile above sea-level. A State fish hatchery is located in Anaconda. Billings is the largest city in eastern Montana and is in a rich agricultural region, with extensive live¬ stock interests. It has excellent railroad facili¬ ties and is a large distributing centre. A large beet sugar factory is located at Billings and near the city is the Billings Polytechnic Insti¬ tute. Miles City is ((the greatest primary horse market55 in the world. Bozeman is the home of the State College of Agriculture and Me¬ chanic Arts and of a United States fish hatch¬ ery. Livingston is the gateway to the Yellow¬ stone National Park. Red Lodge has great coal mines.

Bibliography. — The following works may be consulted for further information relative to the history and development of the State : Bancroft, (History of the Northwest Coast) (1886); (Idaho and Montana) (1890); Biddle,

(History of the Expedition under the Com¬ mand of Lewis and Clark-* (1842) ; Davies, c Civics of Montana > (1896) ; Lewis and Clark, (Travels from St. Louis by W'ay of Mis¬ souri and Columbia Rivers to the Pacific Ocean) (1804-06) ; Palladino, < Indians and Whites in the Northwest; or, a History of Catholicity in Montana) (1895) ; Roosevelt,

(Ranch Life and the Hunting Trail5 (1888) ; (Geological Survey of the Territory) ; Pre¬ liminary Report of Montana and portions of Adjacent Territories5 (1871) ; Dimsdale, (Vig¬ ilantes5 ; Brady, Hndian Fights and Fighters5 (2 vols., 1903-07) ; Chittenden, < American Fur Traders of the Far West5 ; Chittenden, his¬ tory of Early Steamboat Navigation on the Missouri River5 ; DeSmet, (Western Missions and Missionaries5 ; Fogarty, (The Story of Montana5 (1917) ; Judson, (Montana, the Land of the Shining Mountains5 (1909) ; Lant, Pathfinders of the Northwest5 ; Miller, (History of Montana5 ; Sanders, <History of Mon¬ tana5 ; Shields, (The Battle of the Bighole5 ; Stone, Poliowing Old Trails5 (1913) ; Swain, (Civics for Montana Students5 ; Wheeler, (The Trail of Lewis and Clark5 (1904) ; Wonder¬ land, issued annually by N. P. Railway, Saint Paul ; Rocky Mountain Magazine; Proceedings of the State Historical Society. Publications from the agricultural experiment station at Bozeman, from the University of Missoula and by the various State officers. Annual report, Bureau of Agriculture, Labor and Industry, Helena.

Morton J. Elrod,

Director of Biological Station, University of Montana.

MONTANA NATIONAL BISON RANGE AND HERD. — The range is in western Montana, along the Northern Pacific Railroad between Ravalli and Dixon. The tract set apart for the home of the herd con¬ tains approximately 20,000 acres, with both grazing land and timber. In the centre is a mountain about 2,500 feet high, with grassy slopes and wooded ridges. On the north side of the range several miles of Post Creek are included. On the south side the range takes

in about a mile of the Jocko River. In the in¬ terior are several large springs. The place is ideal for buffalo. It is estimated the food sup¬ ply is sufficient for a herd of from 1,500 to 2,500 animals. The range was selected by Prof. M. J. Elrod, of the University of Montana, for the American Bison Society, with W. T. Hornaday, then president. In 1908 Senator Dixon of Montana introduced in Congress a bill to provide for the purchase of the range and for fencing. This became a law in May 1908. The American Bison Society raised a fund of $10,560 for the purchase of bison for the range. Thirty-seven animals made the nucleus of the present herd, about 300’ (spring of 1919). In addition, elk, antelope and whitetailed deer have been added since, and are doing well. The selection of the range was a part of the plan of the American Bison Society to save the bison from extinction. Mr.

Hornaday ex¬ pressed the opinion that this herd alone, one of several now in the United States, is sufficient to save the species from becoming extinct. The location is ideal, the surface is sufficiently undu¬ lating to afford protection from storms from any direction, there is abundance of bunch grass, it is easy of access and the animals sub¬ sist summer and winter upon the vegetation of the range. Consult Report of the American Bison Society (1908) and subsequent reports.

MONTANA STATE SCHOOL OF MINES, made one of the component parts of the University of Montana by act of legisla¬ ture in 1913, founded in 1899, is located at Butte, the greatest mining centre in the world. Its work is confined exclusively to the prepara¬ tion of mining engineers. It was endowed by a land grant of 100,000 acres, of which 33,085 acres have been sold, cash and deferred pay¬ ments amounting to $661,192.93. This amount draws interest. The number of students in 1917 was 88, in 1918, 52. The number of alumni was 135. There were seven professors, one of whom acted as president. The total value of all property (1918) was $134,735. The total income was $38,500. The -departments in¬ clude chemistry, geology, mineralogy, mathe¬ matics, mechanics, metallurgy, mining engi¬ neering and mining law. The course of in¬ struction covers four years.

MONTANA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS,

made one of the component parts of the Uni¬ versity of Montana in 1913, founded in 1893, is located at Bozeman. It was endowed by a land grant of 140,000 acres, of which 41,543 acres have been sold, the cash and deferred payments amounting to $668,637.50. This draws interest. The number of students in 1917-18 was 789 — 382 men and 407 women. Several hundred additional students were en¬ rolled in the short courses for farmers and their wives, and ministers. The total number of instructors, not including Experiment Sta¬ tion workers and members of the extension service, was 66. The alumni numbered 353. The State Experiment Station, with its di¬ rector and staff of workers, is connected with the college. The college receives the benefit of the Federal land grants of 1862 and 1890, and also State and Federal appropriations. The

income in 1918 was, for the college, $241,668; for the station, $106,250; for extension service, $93,023. The total endowment fund from land grants amounted to $680,250. The college course is offered under several groups : the College of Agriculture, the College of Engi¬ neering, College of Applied Science, College of Household and Industrial Arts, School of Home Economics, School of Agriculture, School of Music and Vocational Education. The degree of Bachelor of Science is given for the completion of the various courses, and graduate work is offered. Short courses are offered in some lines of work. Farmers' Week brings several hundred people for intensive work. Ministers' Week has brought together nearly 50 each year. The buildings are modern and of permanent construction, and include the Main Hall, Hamilton Hall (dormitory for women), Agricultural Hall, Chemistry (new), Drill Hall and Engineering, with many smaller buildings and barns for experimental and lab¬ oratory work.

MONTANA STATE NORMAL COL¬ LEGE, The. One of the four components of the University of Montana. The institution is located at Dillon and was created by act of the State legislature in 1892. In March 1913, made effective 1 July 1913, the several higher institutions of the State were constituted the University of Montana. The first chancellor was appointed and assumed his duties on 1 Feb. 1916, on which date the Normal College really became a part of the university through methods of administration. There were 19 members of the faculty on the instructional force. The number of students was 535. The income from all sources in 1918 was $105,600. The land grant of the institution totals 100,000 acres, 33,000 of which have been sold. The proceeds of sales, invested in bonds, amount to $423,625, with deferred payments of $119,599 in 1919. The Shakespeare Club Loan Fund, to aid seniors, the Alumni Loan Fund, to aid seniors, and the S. P. Wells Loan Fund, to aid juniors and seniors, total more than $1,000. For high school graduates two courses of instruction are provided, one two years in length, the other three years in length leading to the degree bachelor of pedagogy. Special courses for the preparation of rural school teachers and for supervision of domestic science, manual training and music in elementary schools are also offered. The public elementary schools of Dillon are utilized as a training school. This training school enrolls 600 pupils.

MONTANA STATE UNIVERSITY,

originally the University of Montana, made one of the component parts of the latter by legisla¬ tive act of 1913, is located at Missoula. It was endowed by a grant of land, 46,560 acres, from Congress in 1892. Of this amount 30,668 acres have been sold, the sales amounting to $539,715. The doors of the institution were opened Sep¬ tember 1895 with a few students and six mem¬ bers of the faculty. In September 1918, the faculty included 65 professors, assistant pro¬ fessors and instructors, 19 lecturers and 7 li¬ brarians, a total of 91. The total number of students was 941, — 304 men and 637 women. The total number of alumni was 488. The in¬ come from all sources was $309,409.78. Courses

are offered in the College of Arts and Sciences in biology, botany, chemistry, economics, edu¬ cation, English, fine arts, geology, history and political science, home economics, Latin and Greek, mathematics, modern languages, physics, psychology, public speaking, physical education. There are professional schools in forestry, journalism, law, music and pharmacy. Provi¬ sion is made for graduate work. A biological station is maintained at Flathead Lake. The work of the university continues throughout the year, on the four-quarter system. The de¬ grees conferred are A.B. and B.S., and the cor¬ responding masters' degrees. Women are ad¬ mitted on equal terms with men. The income is derived in part from the sale of land, in greater part from legislative appropriation. The campus contains about 50 acres, with an adjoining portion of Mount Sentinel of 560 acres. This beautiful mountain rises from the level plain 3,200 feet high. In 1918 the build¬ ings were main hall, science hall, Craig hall (women's dormitory), library, natural science building (new), gymnasium, two barracks buildings constructed for the Student Army Training Corps, a hospital to care for 50 pa¬ tients and a Y. M. C. A. hut. Legislative ap¬ propriation was made for a new library build¬ ing. The library contains about 40,000 vol¬ umes and 18,000 pamphlets, and receives over 400 periodicals.

MONTANAR, mon-ta-nar, Valentine Hil¬ aire, French-American missionary: b. Marign-ane, France, 14 Feb. 1870. He was educated at the seminaries of Aix, France, and the Paris Seminary for Foreign Missions. In 1889 he joined the Society for Foreign Missions, was ordained priest in 1893 and the same year was sent on the Kwang-tong mission, China. While in that province he was stationed successively at Linchow and San Ning. From 1908 to 1912 he was in New York in charge of the Chinese Catholics of that city and from 1912 to 1915 he was in charge of the Catholics of Chinese birth at

Montreal, Canada. He was persecuted dur¬ ing the Boxer uprising in China and saw many of his Christian chapels and villages laid waste. In 1905 he was accused by Chinese officials at San Ning of implication in the massacre that took place there that year. He was exonerated of all blame, however, upon investigation by Mr. Lay, American consul at Canton, and Com¬ mander Evans of the United States navy. He compiled, a. Chinese-French dictionary, for use in the missionary schools conducted by him and is the author of 'Method of Learning the Can¬ tonese Language*; (Fifteen Years in China,* and contributions, to 'The Catholic Encyclo¬ pedia, } the Bulletin de Notre Dame de Beaure¬ gard, and various American and French period¬ icals.

MONTANELLI, mon'ta-nel'le, Giuseppe, Italian author and patriot: b. Fucecchio, January 1813; d. there, 17 June 1862. He studied law. He became counsel, writing at the same time on philosophical subjects and (1836) issued a volume of lyric poetry. In 1846 he was made professor of Italian and commercial law at Pisa. He founded the Society of Fratelli Italiani (1844), started (1847) the periodical L' Italia, fought at Curtatone (1848) and was made (1849) a member of the triumvirate with Guer-razzi and Mazzini. He was given a mission in

Paris, from whence he issued a series of works of a striking character such as (Memorie sull' Italia e specialmente sulla Toscana dal 1814—1850) (Turin 1853-55) ; (La sensazione) (Paris 1856), a dramatic poem; <Camma,) a gripping tragedy; also the political works, HI partito nazionale italiano) (Turin 1856) ; (L'impero, il papato, la democrazia in Italia 5 (Florence 1859). In 1859 he was again called to arms and (1862) was elected to Parliament. Consult Provenzal, (Alla cara memoria di Guiseppe MontanellP (Leghorn 1862) ; Redi, Ricardo, (Biografico di Giuseppe MontanellP (Florence 1883) ; Orlando. (I1 Montanelli poeto,* in Mar-zocco (ib. 1910).

MONTANISM, mon’-, the religious system of Montanus (q.v.).

MONTANITE, a mineral consisting of the hydrated oxides of bismuth and tellurium, and having the formula Bi2O3.TeO3.2H2O. It occurs as an incrustation, frequently in connection with the mineral teradymite, from which it is often formed by alteration. It is soft and opaque with a waxy lustre, and is variable in color. Montanite is found at Highland, Mont., and also in Davidson County, N. C, and at Norongo, N. S. W.

MONTANUS, mon-ta’nus, Phrygian sectary of the middle of the 2d century a.d. Of him practically nothing is known save in connection with his sect, the Montanists. He was a heathen priest, a native of Ardahan; was con¬ verted to Christianity about 156: and about 171 a.d., proclaimed himself the Paraclete or Comforter promised by Jesus. He soon gath¬ ered around him a group of followers who be¬ lieved with him that he was the mouthpiece of the Holy Spirit, as were his companions Prisca, or Priscilla, and Maximilla, each of whom had left her husband to join Montanus. Both these women uttered prophecies, but like Montanus claimed to be only the passive agents of the Holy Ghost. Montanus’ principal tenets, apart from his belief that every believer may be the means of special revelation, were largely millenarian; in view of the approaching end of the world he enjoined asceticism, strict church discipline with, the exclusion of all offending members, the terrible effect of mortal sin and the incompetency of the Church to forgive it. He and his followers counted it sin to attempt escape from persecution. He was excommuni¬ cated with his followers about 175, and died soon after; Maximilla, the last of the prophets, died in 179. His teaching spread after his death, Lis most notable disciple being Tertullian (q.v.). The sect soon died out in the West, but survived in the East until the time of Jus¬ tinian, when it was suppressed. Consult Bon-wetsch, (Geschichte des Montanismus> (1881) ; Erlangen, De Loyres F., (Montanism and the Primitive Church) (Cambridge 1878).

MONTARGIS, mon-tar-zhe, France, a town

in the department of Loiret, 47 miles east by north of Orleans. It is a manufacturing town with an important trade in paper, cotton goods, leather, shoes, chemicals and agricultural prod¬ uce. Mirabeau was a native; the castle anciently a favorite residence of the reigning family was called ((The Royal Cradle, }> and here in 1371 occurred the famous judicial combat between the <(dog of Montargis® and Macaire, its mas¬

ter's murderer. The dog not only showed the spot in the forest of Bondy where its dead master was buried, but singled out the murderer, and when Charles VI granted the ordeal of battle to test his guilt, the dog flew at his throat and so proved its charge upon his body. Pop. 13,000.

MONTAUBAN, mon-to-bon, France, cap¬ ital of the department of Tarn and Garonne, on the Tarn, 342 miles south by west of Paris. It is situated on a plateau surrounded by the Tarn, the Tescou and a deep ravine. The cathedral, episcopal palace, hotel de ville and the bridge over the Tarn are its principal features. Montauban has manufactures of silk bolting cloths, of common cloths, colors, porcelain, starch, can¬ dles, *etc.* ; silk and wool spinning-mills, dye-works, potteries, *etc.* During the religious wars in France, Montauban was a stronghold of the Huguenots, and was besieged in 1580 by Mont-luc, and in 1621 by the troops of Louis XIII, without success ; but it was taken in 1629 by Richelieu, and its walls razed to the ground. The Protestants maintain both an academy and a theological college. The artist Ingres was born at Montauban; many of his pictures are in the museum and his celebrated Wow of Louis XIIP hangs in the cathedral. Pop.

30,000.

MONTAUK INDIANS, an American tribe of the Algonquin family formerly oc¬ cupying the extreme eastern end of Long Island, N. Y. They were formerly a pow¬ erful people, but a pestilence in the 17th cen¬ tury reduced their number to less than 1,000. Since 1903 only about a dozen of the Montauk tribe survive on Long Island.

MONTAUK POINT, N. Y, the eastern peninsular promontory of Long Island, in Suf¬ folk County, with lighthouse and life-saving stations, the lighthouse, in long. 41° 4' N. ; lat. 71° 51' W., being built of stone, 170 feet high, and its light visible 19 miles. The peninsula has a height of from 50 to 100 feet above the sea, is rolling and wooded and noted for its bracing healthful climate. Here in 1898 Camp YVikoff was established for the sick, wounded and con¬ valescent soldiers who had served in the Spanish-American War.

MONTAUSIER, mon'to'zya, Charles de Sainte-Maure, Marquis de, French diplomat: b. 6 Oct. 1610; d. 17 May 1690. He en¬ tered the army young, distinguished himself in Italy and Lorraine and in his 28th year be¬ came major-general. After seceding from the Reformed Church and subscribing to the Cath¬ olic faith (1645) he was created

lieutenant-general and governor of Saintonge and An-goumois. He remained true to the court dur¬ ing the Fronde war and, in 1665, he was raised to marquis and peer, being appointed guardian of the Dauphin in 1668. In 1680 Ire was made chief chamberlain. Under his supervision Bossuet and Huet edited the classical writers in U sum Delphini. He was distinguished for strict morality and love of the truth, in fact his char¬ acter was inclined to be sombre, from which fact he was used by Moliere as the original Misanthrope. He married Julie Lucine d'An-gennes, daughter of Marquis de Rambouillet, a lady of great beauty and whose talents made their home the centre of the most noted sages

arl*st.s °f the aay. Consult Roux, A., Montausier, sa vie et son temps* (Paris 1860).

MONTBˆLIARD, mon'ba'lyar, France, capital town and fortress in the department Doubs, located on the Allaine, into which the Lisaine discharges at this point. It is on the Rhine-Rhone Canal and on the Lyons Railway and has a lofty castle dating from the 15th and 16th centuries, a Protestant church (Saint Martin's), erected 17th century, and a modern Catholic church. There are monuments to Cu¬ vier, who was born here, and Denfert-Roch- ereau, also a natural history and an archae¬ ological museum, a college, trade school, li¬ brary, Chambers of Agriculture and Trade, also manufactures of hardware, clocks, tools, cotton goods. Considerable trade is done in building lumber and cheese. It was formerly the capital of the dukedom of Burgundy, be¬ coming the domain of Wiirtemberg (1397) by marriage but was repeatedly occupied by the French (1674— 97 and 1723-48) , becoming French territory (1801) by the Treaty of Luneville. Pop. (1911) 10,392, mostly Protestants.

MONTCALM, mont-kam' (Fr. moii-kalm), Louis Joseph de Saint Veran, loo-e zho-zef de san va-raii, Marquis de, French soldier: b. near Nimes, 1712; d. Quebec, Canada, 14 Sept. 1759. He entered the army at 14, distinguished himself in the war for the Austrian Succession and gained the rank of colonel in the battle of Piacenza, Italy, in 1746. In

1756, being then a brigadier-general, he was appointed to com¬ mand the French troops in Canada, where he began operations against the English with great activity and success. Fort Ontario at Oswego was carried on 14 Aug. 1756, after a well-con¬ ducted attack. The next year he took Fort William Henry, at the head of Lake George, which was held by a garrison of over 2,500 men, and thus became possessed of 42 guns and large stores of ammunition and provisions. In the campaign of 1758 he occupied the strong position of Fort Carillon (Ticonderoga), made it still stronger by entrenchments, and on 8 July held it with 3,600 men against a British force of over 15,000. His personal bravery had . gained him great popularity among his soldiers, but the want of energy on the part of the home government, the scarcity of food all over New France and personal dissensions be¬ tween himself and the civil governor forbade him to look for much assistance; and he ex¬ pressed his conviction that in a few months the English would be masters of the French col¬ onies in America; yet he prepared as best he could for the campaign of 1759. The English had sent strong reinforcements and were pre¬ paring for an attack on Quebec. As the suc¬ cess of the whole campaign and indeed the conquest of Canada depended upon the taking of. that city, Montcalm had concentrated his principal forces on the banks of the Montmor¬ ency River to protect it. In the first attack, 31 July, the English general, Wolfe, was re¬ pulsed ; he later .succeeded in landing his troops above Quebec, and on 13 September brought his whole force to the Heights of Abraham ; Mont¬ calm at once opposed his advance, but though he led the attack in person, his troops soon broke before the fire of the British. Wolfe fell in the moment of triumph ; Montcalm was mortally wounded and died the next morning.

Consult Bonnechose, (Montcalm et la Canada Frangaise* (1877); Parkman, cWolfe and Montcalm* (1885); Falcairolle, (Montcalm de-vant la Posterite* (1886) ; Doughty, (The Siege of Quebec and the Battle of the Plains of Abraham* (1901).

MONTCEAU - LES - MINES, mon’so-la- men’, France, town in the department Saone-et-Loire, on the Canal du Centre and the Lyons Railway. It is the centre of coal mining, lime¬ burning and copper foundries and has wooden-ware factories. Pop. (1911) 26,830.

MONTCHRESTIEN, mon’kra’tyah’, An¬ toine de, French dramatic author: b. Falaise, about 1575; d. near Tourailles, 1621. Having killed his adversary in a duel he had to flee to England but was pardoned by Henry IV and was killed in a Huguenot uprising. Of his tragedies

worth notice are (Sophonisbe* (1594); (Aman* (1599); (L'Lcossaise, ou Marie Stuart *(1601). He was also the first to give a conception of political economy in his (Traite d economic politique) (1615; new ed. by Funck-Brentano, Paris 1889). Consult Du¬ val, (Memoire sur Antoine de Montchrestien* (Paris 1868) ; Funck-Brentano, (Montchrestien, sa vie et son oeuvre* (ib. 1889) ; Julleville, Louis Petit de, (Les tragedies de Montchres¬ tien* (ib. 1891); Lavalley, Paul, (L'oeuvre economique d'Antoine de Montchrestien* (Caen

1903).

MONTCLAIR, mont-klar', N. J., a town in Essex County, five miles northwest of Newark, on the Lackawanna and Erie railroads. The upper portion was originally called Speertown when settled by Hollanders from Hackensack, and the lower portion was first called Crane-town, then West Bloomfield, by its English settlers from Newark. It was at first included in Newark, and afterward in Bloomfield. It received its present name in 1865 and received its . charter of incorporation in 1868. Mont¬ clair is situated on the first range of the Orange Mountains, at an average altitude of 300 feet, its highest point at 650 feet embracing an ex¬ tensive view. It is noted for its healthful climate, and is principally a residential place, the home of many New York business men. It has a hospital, military academy, two ornhan asylums, high schools, public library, national and State and savings banks. Its industrial establishments include electric construction works, printing establishments, et-. Pop. 28,810.

MONT-DE-MARSAN, town, capital de¬ partment Landes, France, 65 miles south of Bordeaux. It has a. mineral spring, manufac¬ tures of resin and oil, and a trade in lumber, wine and cattle. Pop. 12,000.

MONTE, Saint Angelo, mon'ta sant an'ja-lo, Italy, town in the province of Foggia, located on the southern slope of Monte Gargano near the Gulf of Manfredonia. Its noted 11th cen¬ tury grotto church dedicated to Saint Michael is much visited by pilgrims. The inhabitants of the entire commune were 23,012 in 1911.

MONTE CARLO, mon'te kar'lo, Monaco, a town of the principality about one mile north¬ east of the capital, celebrated for its Casino, the most luxuriously appointed gambling estab¬ lishment in the world, founded in 1858. Monte Carlo, is also noted for its scenic surroundings, its mild and healthful climate and its attractive

appointments of perfect roads, magnificent gar¬ dens, handsome promenades and elegant resi¬ dences. Its situation on an isolated elevation overlooking a bay of the Mediterranean is particularly beautiful. The ((Association of the Watering-Place and Strangers Club of Monaco, w with a capital of $6,000,000 in 60,000 shares, holds the contract, which was made with the late M. Frangois Blanc to expire in 1913, whereby the reigning prince was paid annually the sum of $350,000 for the concession to play. The society in 1898 was granted an extended concession to 1947, for a cumulative decennial increase in its annual payment; it practically bears also the cost of the temporal and spiritual government of the principality, its annual ex¬ penditure alone amounting to over $4,000,000. Roulette and trente et quarante are the prin¬ cipal games played. Pop. 10,000. See Monaco.

MONTE-CASINO. See Casino, Monte.

MONTE CRISTO, mon'te kres'to, or kris'td', a small island in the Mediterranean belonging to the Italian province of Leghorn, 28 miles south of Elba. In the 16th century it was ravaged by pirates, and as it is rocky and barren, rising 2,000 feet above the sea, it long remained uninhabited. Since 1874 there is a penal agricultural colony here. The elder Dumas gave the name of this isle as title of the hero of one of his most popular romances, (The Count of Monte CristoP

MONTE ROSA, ro'sa, on the Italian-Switzerland boundary, is an Alpine mountain mass of the Pennine ridge, with numerous peaks, eight of which are over 13,000 feet high. Dufour Spitze, the principal peak, is second to Mont Blanc as the highest peak of the Alps, reaching an altitude of 15,217 feet, 564 feet less than its rival, 50 miles to the southwest. Monte Rosa is covered on all sides with glaciers, chief of which is the Gorrier Glacier on the west, six and one-half miles long. The peak was first ascended — a most difficult feat — in 1855. Copper and iron mines are worked in the mountain.

MONTE SAN GIULIANO, mon'ta san joo-lya'no*, Italy, town in the Sicilian province of Trapani and located 2,540 feet above sea-level on

an isolated mountain, the Eryx.of the ancients. Remains of the old Phoenician walls still exist and a few remnants of the ancient temple of Aphrodite as well as the cis¬ tern (Venus spring). It has a 14th century church and a castle affording a magnificent panoramic view. Its industrial life consists of olive culture and marble quarries. In 1911 it had 28,663 inhabitants.

MONTEBELLO, mon'ta-bel'lo, Italy, vil¬ lage in the province of Pavia, situated on the Coppa. It is noted through two battles fought here. The first occurred 9 June 1800, and is frequently called the battle of Casteggio, in which General Lannes defeated the Austrians thereby gaining the title Duke of Montebello. The second, fought 20 May 1859, was won by the French under Forey, while the Austrians were commanded by Stadion. Pop. 2,183.

MONTECUCULI, mon-te-koo-le, or MON-TECUCOLI, Raimondo, Austrian military commander: b. near Modena, 21 Feb. 1609; d. Linz, 16 Oct. 1680. He entered the Austrian service and served during the Thirty Years'

War with great distinction. After the Peace of Westphalia (1648) he visited Sweden and England in a diplomatic capacity ; and in 1657 the emperor sent him to the aid of the king of Poland against Rakoczy and the Swedes, and next year he assisted the Danes against the latter. In 1664 he gained a great victory over the Turks after having driven them out of Transylvania. In 1673 he was placed at the head of the imperial troops and checked the progress of Louis XIV by the capture of Bonn and by forming a junction with the Prince of Orange in spite of Turenne and Conde. Mon-tecuculi's subsequent advance into Alsace was repulsed by the Prince of Conde. His last military exploit was the siege of Philipsburg. The Emperor Leopold made him a prince of the empire and the king of Naples gave him the duchy of Melfi. His memoir on the Turk¬ ish war, written in Italian (1703), was trans¬ lated into several languages. Consult Campori,

(Raimondo Montecucoli, la sua famiglia e i suoi tempi* (Florence 1877) ; Grossmann, (Rai-mund Montecucoli* (Vienna 1878).

MONTEFIASCONE, mon'ta-fyas-ko'na, Italy, town in the province of Rome and cir¬ cuit of Viterbo, situated on a hill to the south¬ west of Lake Bolsena and on the Attigliano-Viterbo Railway. It is the seat of a bishopric and has among its most prominent buildings a beautiful cathedral, a Romanesque church (San Flaviano), a 16th century castle,

etc. The mus¬ catel wine cultivated here is known as ((Est, Est, Est,® which has some connection with the grave inscription here dedicated to the Canon John von Fugger. Its population in 1911 was 9,563 for the commune. Consult Buti, L. Pieri, (Storia della citta di Montefiascone* (Montefiascone 1870).

MONTEFIORE, mon-te-fe-6're, Claude Joseph Goldsmid, English author and Jewish communal worker : b. London, 1858. He studied at Balliol College, Oxford; identified himself with Hebrew charities and educational movements in London; was president of the Jewish Historical Society (1899-1900) ; and is head of the Anglo-Jewish Association, the Jews' Infant Schools, *etc.* With Israel Abra¬ hams he edited The Jewish Quarterly Review and wrote a series of sermons, (Aspects of JudaisnP (1895). He has published besides the Hibbert Lectures for 1892, (The Origin of Religion, Illustrated bv the Ancient Hebrews) ; (Liberal JudaisnP (1903) ; (The Synoptic Gospels) (1909) ; (Some Elements of the Religious Teachings of Jesus) (Jowett Lectures, 1910).

MONTEFIORE, Sir Moses Hayim, Jew¬ ish philanthropist : b. Leghorn, Italy, 24 Oct. 1784; d. Ramsgate, England, 28 July 1885. He was descended from a family of wealthy Anglo-Italian bankers; was educated in London; be¬ came a leading member of the Stock Exchange; and retired from active business in 1824. From that time he devoted himself to the service of his race, working for the removal of disabili¬ ties and oppression under which the Jews in England and elsewhere had suffered great hard¬ ship. His wife, whom he married in 1812, was Judith Cohen, a relative of the Rothschilds, and in her Montefiore found a companion who entered ardently into his philanthropic under¬ takings. He was for a time high sheriff of Kent, and after long exclusion and repeated

MONTE CARLO

1 The Casino

2 An interior view

MONTEGO BAY

MONTENEGRO

re-election was legally recognized as sheriff of London in 1837. . In that year he was knighted and in 1846 raised to a baronetcy in recog¬ nition of his meritorious public services. He distinguished himself by his practical sympathy for his race in various countries, chiefly in Poland, Russia, Rumania and Damascus. He made seven journeys to the East, the first in 1827, and the last in 1874, mainly for the amelio¬ ration of the condition of the Jews. At Bucha¬ rest during an anti-Jewish tumult, he boldly faced the mob at the risk of his life. In 1865 he endowed a Jewish college in memory of his wife, who died three years before, at Ramsgate, where he passed the last years of his life, dying there in his 101st year. In his 100th year he was a type of hale and venerable man¬ hood.

MONTEGO BAY, West Indies, harbor on the north coast of the island of Jamaica. It contains a teachers' seminary, hospital, etc., and has a considerable export trade in fruits and other produce. It is the seat of an American consular station and had 6,616 inhabitants in

1911.

MONTELEONE DI CALABRIA, mon'- ta-la-6'na de ka-la'bre-a, Italy, capital of a cir¬ cuit in the province of Catanizara, near the Gulf of Sant Eufemia and located on the Naples-Reggio Railway. It contains the ruins of the castle built by Frederick' II, and also of the 15th century San Michele Church, besides a lyceum and grammar school. Its commerce consists chiefly of silk and oil production. The town was

utterly destroyed by earthquake in 1783, and again much injured in 1905. In 1911 it had 13,066 inhabitants. Consult Pignatari, (Sunto di notizie storiche intorno alia citta di Monteleone) (Monteleone 1896).

MONTˆLIMAR, mon'ta'le'mar, France, capital town of the arrondissement in depart¬ ment Drome, located at the juncture of the rivers Roubion and Jahron on the Mediterra¬ nean Railway.# It contains an ancient castle, now a prison, with a Romanesque chapel, a col¬ lege, library, museum, Chamber of Agriculture, *etc.* Among its manufactures are hats, silks, paper goods, agricultural instruments and its noted almond candy (nougat). It has also con¬ siderable trade in silk, wine, truffles, lime, *etc.* The town receives its name from Ademar de Monteil who rebuilt it after its destruction, in the 10th century, by the Saracens. In the 15th century the town fell into the possession of the French Crown. It withstood the siege of Coligny heroically in 1570 but was taken by the Huguenots in 1587.

MONTEMAYOR, mdn-ta-ma'yor, Montemor Jorge, Spanish-Portuguese poet and novel¬ ist: b. about 1520; d. 1561. His real name was Montemor, but it assumed the Spanish form Montemayor in Spain. There is little definitely known of the life of Montemayor. He was one of the poet musicians of his day who found refuge and welcome at the Spanish court where he was already on familiar terms in 1548. Six years later he accompanied Juana, the Infanta, to Lisbon where she was to be married to Dom Joao. He seems to have visited England and Holland with Philip II, and he may have been to Paris. He was assassinated in 1561. His most famous work is a pastoral novel entitled

'Diana Enamorada) (Madrid, between 1545 and 1559). Inflated in style, artificial in its depict¬ ing of character, indifferent in poetical value yet, as Cervantes had said, (<it has the honor of being the first of the books of its class.® Partly in verse and partly in prose, the latter is much the superior. The ' Diana > is written principally in Spanish, but it contains songs and prose passages in Portuguese. It became immensely popular and was widely imitated not alone in Spain but in the other countries of southern and western Europe. It was translated into Eng¬ lish by Bartholomew Young in 1583 and pub¬ lished in 1598 and was very widely read in Eng¬ land. Sidney's <Arcadia) probably owed its existence to the (Diana) and it was certainly strongly influenced by it ; and Shakespeare, in 'Two Gentlemen of Verona) and in parts of other plays shows the effect that the <Diana> had already\had upon English literature. Montemayor's

work, being modeled on the Italian pas¬ toral novel which had, to a certain extent, al¬ ready had its influence upon English literature, the 'Diana* found the proper soil in which to plant itself. Montemayor, who had not finished the ' Diana Enamorada) at the time of his death, left instructions that it should be completed by Dr. Alonso Perez of Salamanca who wrote ac¬ cordingly 'Segundo del Salamantino) in 1564. In the same year Gil Polo wrote a second 'Diana EnamoradaP Both of these books are patent imitations of Montemayor's novel. Scores of other imitations followed, among the authors thereof being no less personages than Cervantes and Lope de Vega. The 'Cancion-ero > of Montemayor (2 vols., Antwerp 1544— 58) contains some of his own lyrics. An edi¬ tion of Montemayor's works was published in Barcelona in 1886.

Bibliography.— Butler, Clark H., 'Spanish Literature) (London 1909) ; Fitzmaurice-Kelly, James, 'A History of Spanish Literature) (1898); also article in the Revue hispanique (1895, Vol. II, pp. 304—311); Garcia Perez, Domingo, 'Catalago razonado biografico y bibliografico de los autores portugueses que escribieron en castellano) (Madrid 1890) ; Gim-aaes, D., 'Birnardin Ribeiro) (Lisbon 1908) ; Marsan, J., 'La pastorale dramatique en France) (Paris 1905) ; Milendez y Pelayo, Marcelino, 'Los siete libros de la Diana) (Vol. VII, Nueva Biblioteca de Autores Espaiioles) ;• 'Orige nes de la novela* (Vol. I, Nueva Biblioteca de Au¬ tores Espaiioles) ; Rennert, H. A., 'The Spanish Pastoral NoveP (Philadelphia 1912) ; Schon-herr, G., 'Jorge de Montemayor, sein Leben und sein Schaferroman* (Halle 1886) ; Ticknor, G., 'History of Spanish Literature > (New York

1854).

MONTENEGRO, mon-te-na'gro (native, Tzernagora; Turkish, Karadagh, Black Moun¬ tain), a former kingdom northwest of Turkey, bounded north by Bosnia and Herzegovina, east by Bosnia, south by Albania and west by the Adriatic Sea and a strip of Dalmatia. Its area was increased by the Treaty of Ber¬ lin of July 1878, from about 1,710 to about 3,630 square miles, and after the Balkan War in 1913 to about 5,603 square miles. The country is a succession of elevated ridges, diversified here and there by a lofty mountain peak, some of them attaining elevations of 5,000 or 6,000 feet, or even 8,000

feet on the borders of the country, with a few beautiful and verdant plains and valleys, in which the soil is tolerably fertile; chief of these are the department of Tzernitza and the valleys of Bielopavlich, watered by several streams, the principal of which is the Mortasa, which falls into the Lake of Scutari. The climate is health¬ ful. Forests of oaks and holly, ash, beech, firs, walnuts, hazel, wild pears, poplars, willows, alders and the sumach, used for dyeing and tanning, cover many of the mountain sides. The cultivated productions are corn, potatoes, cab¬ bage, cauliflower and tobacco, with several kinds of fruit-trees, including the peach, olive, pomegranate, mulberry and others. In the de¬ partment of Tzernitza, already mentioned, apples, vines, carobs, almonds, figs, quinces, wal¬ nuts, etc., also grow in abundance. Agriculture is in a rude state, though every cultivable piece of land, even if only a few feet square, is planted with corn, potatoes or some other useful plant. Sheep, goats and pigs are reared in great numbers; the two former affording a profitable supply of wool and cheese for expor¬ tation. Game is not abundant, but fish are taken in great quantities, and are of excellent quality, particularly the trout, which are celebrated, and some of them of immense size; and a kind of carp is caught in large quantities, and dried and salted for export to Vienna and Trieste. Manu¬ factures, with exception of a coarse woolen stuff, are unknown. The chief occupations of the inhabitants are agriculture and fishing; the latter carried on principally in the Lake of Scu¬ tari, which lies partly in Albania. The exports of Montenegro are smoked mutton-hams, salted fish, wax, honey, hides, tallow, cheese, butter, cattle and other agricultural produce. The chief imports are cattle, tobacco, salt, wine, brandy, coffee, sugar and manufactured goods. The Montenegrins belong to the Serbian branch of the Slavonic family of peoples. They are generally of tall stature and well proportioned, with singularly powerful voices, which enable them to carry on conversations at incredible dis¬ tances; foreheads good, face rather square, moderately aquiline or straight nose and ani¬ mated eyes. Both men and women are robust : the latter are often beautiful when young but soon lose their good looks by laborious and un¬ feminine occupations. The people generally are cheerful in manner, extremely brave and hos¬ pitable and courteous to all except the Turks, whom they hate. The men go at all times fully armed. The houses are of stone, generally with thatched roofs ; but many are covered partly or entirely with wooden shingles. There are

few towns in Montenegro, but there are some 300 villages; Cettinje (q.v.) is the capital; Pod-goritza (pop. 14,000) ; and the seaports Dulcigno and Antivari are the principal towns. The lan¬ guage of the Montenegrins is a Slavonic dialect. In religion they are all of the Greek Church. Education, which was formerly much neglected, is now becoming freely diffused, the public schoolsˆ having increased from one in 1851 to about 70 in 1890. Montenegro, until 1851, was a theocracy, governed by a Vladika or prince, who was at once a bishop, a judge, a legislator and a commander-in-chief. The office was hereditary in the family of Petrovitch from 1697 . But as the Vladika could not marry, the dignity was inherited through brothers and nephews. In 1851 the civil and ecclesiastical

offices were disjoined, the Vladika confining himself to the latter, while the former devolved on the Hospodar. The revenue of the princi¬ pality was estimated for 1914 at about $390,000. Montenegro has no coinage of its own. Pop. about 516,000.

Montenegro formed a part of ancient Illyria, and in the Middle Ages belonged to the great Serbian kingdom. The origin of the sacerdotal power dates from 1516, when the secular prince, having no children, withdrew to Venice, and transferred the government to the Archbishop Germanos. In the reign of Peter the Great the Montenegrins placed themselves under the pro¬ tection of Russia, both sharing in a common enmity against the Turks. In 1796 the Prince-bishop, Pietro I, inflicted such a loss on the Pasha of Scutari, who had invaded Montenegro, that for many years they left it unmolested. Pietro II (1830-51) made strenuous efforts to improve the condition of his people by liberal¬ izing the constitution, and attempting to reclaim his subjects from their vindictive and predatory habits. His successor, Danilo I, having sepa¬ rated the civil and ecclesiastical offices, Russia withdrew her subsidy of 8,000 ducats, but sub¬ sequently resumed payment of it, not, however, before great internal commotion had arisen from the necessary imposition of taxes to meet the deficit so caused. The Turks, led by Omar Pasha, again invaded the country, but a treaty was arranged 15’ Feb. 1853. Danilo was assassi¬ nated in 1860, and was succeeded by Prince Nicholas I. In 1861 the Montenegrins excited a rebellion against the Turkish sway in the jHerzegovina, the result of which was the in¬ fliction of such punishment on them that they were compelled (1862) to accept a disadvanta¬ geous peace, in which it agreed to the occupa¬ tion of several points on the road from Herze¬ govina to Scutari by Turkish troops. In 1870, however, the principality managed to get these troops

withdrawn. In 1876 Montenegro joined Serbia in a war against Turkey, and on the con¬ clusion of the Russo-Turkish War of 1877-78, and the Balkan War in 1913, it received, as already mentioned, an accession of territory. On the 50th anniversary of his accession, 28 Aug. 1910, Nicholas I, by request of the Na¬ tional Skupshtina, assumed the title of king. When the European W<ir began in 1914, Monte¬ negro allied herself with Serbia, and in 1915 was overrun by the Teutonic forces. Ipek was captured, 6 Dec. 1915, and the capital, Cettinje, occupied, 13 Jan. 1916.. the Montenegrin govern¬ ment retiring to Neuilly-sur-Seine, France. For later history see Jugo-Slavia. Consult Den¬ ton, W., (Montenegro : Its People and Their History> (London 1877) ; Murray, W. S., (The Making of the Balkan States) (London 1912) ; Stevenson, F. S., (A History of Montenegro) (London 1912) ; Trevor, R., (Montenegro, a Land of Warriors) (London 1913).

MONTENOTTE, mon'ta-not'ta, Italy, vil¬ lage in the province of Genoa, in the district Savona, and located on the Cairo-Montenotte-Alessandria Railway. It is noted on account of the battle in which Napoleon won his first vic¬ tory here, 12 April 1796, over the Austrians under Argenteau. It has but about 200 inhab¬ itants.

MONTEPIN, mon'ta'pan, Xavier Aymon, Count de, French writer: b Apremont, 18

March 1624 ; d. Paris, 30 April 1902. He was one ot the most fertile and successful representa¬ tives of the strung-out / euilleton novel writers ol small literary merit. Most of his novels ap¬ peared in fragments in the Petit Journal before being brought out in volume form, when they were dramatized by his friend Dornay for use on the Ambigu stage. Among the best-known works are (Confessions d'un Boheme) (1850); (Mignonne) (1851); (Mademoiselle Lucifer) (1853); (Les viveurs de Paris) (1852— 56, 14 vols.) ; (La maison maudite) (1867); (Les tragedies de Paris> (1874); (La Majeste 1 Argent' (1877) ; (Trois millions de dot) (1891), *etc.* Successfully placed on the stage were (Le Connetable de Bourbon) (1850) ; (La Sierene de Paris) (1860); (Le medecin des pauvres) (1865); (La porteuse de pain*

(1889); (La joneuse d'orgue* (1896).

MONTEPULCIANO, mon'ta-pul-cha'no, Italy, a district capital in the province Siena, located on one of the Subapennine heights of Tuscany and on the Empoli-Chiusi Railway. It has churches and palaces dating from the 14th to the 17th centuries, among which are the cathedral writh its funeral monuments by Dona¬ tello and Michelozzo, and the beautiful cupola church Madonna di Saint Viaggio outside the town, started by Antonio da Sangallo the Elder (1518); an ancient castle, 14th century town-hall, gymnasium, technical school, library, col¬ lection of ancient Etruscan antiquities, *etc.* It has an excellent wine culture and produces much oil and silk. It is the birthplace of Car¬ dinal Bellarmin and the sage and poet, Angelo Ambrogini (Poliziano). Its population in 1911 was 15,994 in the entire commune.

MONTEREAU, mdn'te-ro, France, a town in the department Seine-et-Marne and arrondissement Fontainebleau, located on the left bank of the Seine which is here joined by the Yonne. It is the junction of the Lyons and East rail¬ ways and has a church dating from the 13th-16th centuries, a statue of Napoleon I on the Seine bridge, a commercial court of justice, chamber of manufactures, military hospital. Among its chief manufactures are porcelain, earthenware, mosaic tiles, shoes, agricultural machines, *etc.* Considerable trade is done in wine, grain, wood and cattle. This location was the Gallo-Roman Condate and received its name in the 6th century from a monastery (Monasteriolum) . Duke John the Fearless (q.v.) was assassinated (1419) on the Yonne bridge here by the followers of the Dauphin. In the vicinity the French, under Napoleon I (18 Feb. 1814), won a victory over the Allies.

MONTEREY, mon-te-ra, Cal., city in Mon¬ terey County, on Monterey Bay and on the Southern Pacific Railroad, about 100 miles south by east of San Francisco. The site of the city was first discovered by Juan Rodri¬ guez Cabrillo in 1542. In 1602 it was rediscov¬ ered by Viscaino, who named it ˆMonterey** in honor of his patron, the Vicomte de Monterey, but it was not until 1770 that the Spanish, un¬ der Junipero Serra, made the first settlements and founded the mission San Carlos de Borromeo de Monterey, the second in California. From 1774 to 1825 it was the capital of the Spanish province. On 26 March 1825, the con¬ stitution of the republic of Mexico was rati¬ fied and the city remained the capital of Cali—

fornia during Mexican rule. Commodore Jones, of the United States navy, captured the place in 1842 and held it for one day, under the erroneous impression that war had been de¬ clared against Mexico. On 7 July 1846 Monte¬ rey was captured by Commodore Sloat. The American flag was raised over the custom house, which still stands, and California passed to American rule. In 1849 the State Constitu¬ tional Convention was held here and the first legislature of the State of California met in Colton Hall, another historic building w7hich still stands. In 1850 the place was incorporated. The section in which the city is located con¬ sists of farm lands upon which are raised grains and fruits. Fishing and stock-raising are prominent industries. Over 10,000,000 pounds of fish are packed here annually and many tons shipped to the market. The total annual value of the combined catch is estimated at $1,500,000. The combined resources of the Bank of Monterey and Monterey Savings Bank amounts to $1,193,386; the combined deposits to $999,625. Monterey is a favorite resort for summer and winter. Here is located the fa¬ mous hotel and resort, Del Monte, with its 134 acres of beautiful gardens and grounds. Other points of interest are San Carlos Mission, Car¬ mel Mission, home of Robert Louis Stevenson, home of Thomas O. Larkin, first American consul, headquarters of Generals Sherman and Halleck, ruins of the old Spanish fort, first brick house in California and the presidio of Monterey. It has good public and parish schools and a public library. The harbor at Monterey is the only undeveloped deep-water port on the Pacific Coast. It is the only harbor where vessels can enter in all kinds of weather and drop anchor without the aid of a pilot. Governmental appropriations aggregating $800,- 000 have been made for the construction of a breakwater to destroy the currents which make it dangerous for large vessels to lay alongside at times and which is the harbor’s only defect. Pop. (1920) 5,479.

MONTEREY, Mexico, capital of the state of Nuevo Leon, situated at the foot of the Sierra Madre Mountains at an altitude of 1,800 feet above sea-level, an important railroad cen¬ tre for trade and commerce with the United States, 168 miles from the Texas boundary. The most notable industry is an extensive iron and steel mill, which employs a great number of men and produces large quantities of heavy iron and steel manufactures, both rolled and cast. Over $25,000,000 are represented by the manufacturing and industrial enterprises of the city. No other point in northern Mexico is so important commercially, as Monterey. There are two local financial institutions, the Bank of Nuevo Leon, with a capital of $2,000,000 and the Mercantile Bank, with a capital of $2,500,- 000. The National Bank has a branch here and the Bank of London and Mexico an

agency. The principal educational institutions are the School of Jurisprudence, Normal School for males, Normal. School for females and the Acad¬ emy of Drawing. There is a Natural History Museum and a well-equipped public library. The principal buildings of the city are the Tua-rez Theatre, the cathedral and the churches of San Francisco and the Purisima. The streets are well paved. In the centre of the city there

is a large spring of clear water. Four miles distant are the Topo Chico Hot Springs, the hourly output o f which is 68,000 gallons. The waters of these are much like those of the fa¬ mous hot springs of Arkansas. The prevailing style of architecture is Moorish. Pop. 78,500. 1 he city was founded by the Spaniards in 1585 as Ciudad de Leon but renamed Metropolitan City of Our Lady of Monterey in 1596. The city was besieged in 1846 by General Taylor and compelled to capitulate. See Monterey, Battle of.

MONTEREY, Battle of, in American his¬ tory ; in the early part of the war between the United States and Mexico, Monterey, which oc¬ cupies a strong natural position and was well fortified by art, was held by the Mexican Gen¬ eral Ampudia, with about 10,000 regular troops. In August 1846, General Taylor (q.v.) with a force of 6,625 men, mostly volunteers, marched from Matamoras to attack Monterey; and on 9 September he encamped within three miles of the place. Ten days were spent in recon¬ noitring, and on the afternoon of 19 Septem¬ ber General Worth was ordered to march with his division around the hill occupied by the bishop's palace, to take a position on the Sal¬ tillo road and to carry the enemy's detached works in that quarter, while the main body of the army were to make a diversion against the centre and left of the town by batteries erected during the night. In the morning these batter¬ ies opened upon the city, which replied by a heavy fire from the citadel and other works. The lower

part of the city was assaulted and entered by the Americans, and a Mexican work of great strength captured after hard fighting by a brigade under General Quitman. General Butler also entered the town at another point with the 1st Ohio regiment. Meanwhile Gen¬ eral Worth carried the heights south of the river and the Saltillo road, and turned the guns of the Mexican works in that quarter upon the bishop's palace. The Mexicans evacuated the lower part of the city during the night, and early next morning General Worth stormed the height overlooking the bishop's palace ; and by noon that stronghold itself was taken by the Americans and its guns turned upon its flying defenders. The houses of the city being solidly built and capable of defense, and the streets strongly barricaded, the Americans were forced to take each house in succession by breaking through the walls till they reached the principal plaza. The conflict lasted till the 23d, the Mexi¬ cans contesting desperately every foot of ground till nothing remained in their possession but the citadel. On the morning of the 24th Gen¬ eral Ampudia capitulated and was allowed with his army to march out with the honors of war. The loss of the Americans in these operations at Monterey was 120 killed and 368 wounded. That of the Mexicans was not ascertained, but was probably much greater. See Mexican War. Consult Howard, O. O., (General Tay-lor) (New York 1892) ; Ladd, H. O., (The War with Mexico) (New York 1883) ; McElroy, R. M., (The Winning of the Far West* (New York 1914).

MONTESA, mon -ta'sa, Order of Our Lady of, one of the Spanish military orders established by James II of Aragon (1319) after the fall of the Knights Templar (1311)

and endowed with the latter's estates. The town and castle of Montesa also came into their possession as residence. The order followed the rule of the Benedictines. In 1587 it be¬ came united with the Spanish Crown • and in 1872 was abolished, to be re-established in 1874. The decoration of the order is a golden loz¬ enge with a red cross in the field surmounted by a trophy on a red ribbon. The garb is a white mantle with red cross. The knights are divided into Caballeros profesos and Cabal¬ leros novicios.

MONTESANO mont-e-sano, Wash., town, county-seat of Gray's Harbor County, on the Chehalis River, at the head of tide-water navi¬ gation and on the Northern Pacific Railroad, about 45 miles west by south of Olympia. It is in a region in which the chief occupations are farming, lumbering and fishing. It manu¬ factures considerable lumber and

lumber prod¬ ucts and has creameries and important salmon fisheries. Three miles above the town on the Chehalis River is a salmon hatchery. Pop.

(1920) 2,158.

MONTESINOS, mon -ta-se'no, Fernando, Spanish historian: b. Osuna, Spain, 1593; d. Seville, Spain, 1655. He went to Lima, Peru, in 1610 and served under the government, after¬ ward becoming visitor of the audencia of Char¬ es5 and councillor of the viceroy. By his con¬ siderate treatment of the Indians he won their friendship and their caciques placed at his dis¬ posal valuable information concerning their history. He ranks at the head of the Peruvian archaeologists and he published several able works on metallurgy. Among his books are Ophyr de . Espana, 6 anales de los reynos de Quito y Lima) (1640) ; (Memorias historicas del antiguo reyno de Quito > (1652), *etc.* Con¬ sult Prescott's (History of Peru, > Vols. I and II and Jiminez de la Espada, M. (ed.), (Me-monas antiguas historiales y politicas del Peru) (in (Coleccion de libros espannoles raros 6 curi-osos > Vol. XVI, Madrid 1882).

MONTESPAN, Frangoise Athenais, .f ran—

swaz ath-e-na mon-tes-pari, Marquise de, mis¬ tress of Louis XIV of France: b. 1641-d. Bourbon-l'Archambault, 27 May 1707. She w as the 2d. daughter of the Duke of Mortemart, and was, in 1663, married to the Marquis de Alontespan. To great beauty she added a nat-ur. hvehness and wit, and a highly-cultivated mind. Soon after her appearance at court she attracted the king's attention and from 1668 till 1674 shared his favor with Mile, de la Val-liere, but supplanting her in 1674 ; M. de Montespan alter a detention in the Bastle had already been ordered to retire to his estate. *Mme.* de Montespan bore eight children to the king, four of whom died in infancy. The others were en¬ trusted to the care of *Mme.* Scarron, after-w a r d De Maintenon. The influence of *Mme.* de Montespan was often exercised in public affairs, and her sway over the king continued until about 1679, when a growing attachment ˆ9. *Mme.* de Maintenon finally estranged his affections from *Mme.* de Montespan She rarely appeared at court after 1685, and in 1691 entirely quitted it. Her last years were de¬ voted to religious exercises, acts of benevolence and penitence. The regent Orleans married Mademoiselle de Bloi-s, one of her daughters by the king.

MONTESQUIEU, Charles Louis de Secondat, Baron de la Brede et de, French philosophical historian : b. at La Bride, near Bordeaux, 18 Jan. 1689; d. La Brede, 10 Feb. 1755. He was of a noble family, received an excellent education and studied law which was the family traditional profession. From his father and his mother he inherited titles, prop¬ erty and position, and his uncle, who died in 1716, left him his whole fortune, his very im¬ portant judicial office of ˆpresident a mortierˆ and his old and noble family name of ((Montesquieu.® The office thus bequeathed him he held for 12 years, but his serious occupation was writing on philosophy, politics, natural science and various other subjects. In 1721 his (Lettres persones) were published at Amster¬ dam anonymously. In these Montesquieu satirizes the follies of his age in literature, society, politics and religion. So popular were these letters that the public called for several editions in the first year following their pub¬ lication. They pointed the way to a new field in literature and are credited with being the first book in the so-called ˆPhilosophe® move¬ ment. Montesquieu became a sort of literary lion in Paris and he enjoyed his reputation and the peculiar advantages it brought him to the full. But to do this he sold the life tenure of his office in Brede and removed to the capitol in 1726, and two years later he was elected a member of the Academie Frangaise. He sud¬ denly resolved upon an extensive tour of Europe with the purpose of observing the life of the various countries visited. His tour took him to Austria, Hungary, Italy, England and the Rhine country and occupied nearly four years which were very fruitful in the life of the author. Returning to La Brede he set up a great study hall and library 60 feet long by 40 feet wide. The result of his work here was, in part, Considerations sur les causes de la grandeur et de la decadence des Romains-* which was published anonymously in Amster¬ dam in 1734. This became at once popular, not alone in France, but all over Europe, and was probably the most widely read of all Montes¬ quieu's works. It opened the wide field of the philosophy of history. In the meantime he was carrying on deep and original researches for a still greater work. But he loved the literary salons and the brilliant life of Paris and much of his time was

spent in the capital, however, not to the neglect of his literary investigations, for the (Esprit des lois,* the most original book of its age, appeared in Geneva in 1748. It was published in two volumes comprising in all 31 books. Though the (Esprit} met with considerable opposition at first, in France, it became popular in other European countries, and France soon also fell into line and Montes¬ quieu was looked upon as the greatest literary man of his day. His passion for literary work continued ; but most of his subsequent writings remained unpublished during his lifetime. His fame continued long after his death and for more than a century he was the one great authority of the moderate reform party, not alone in France, but also in other countries where the spirit of reform was abroad. Of all the early writers on the science of comparative politics and history he easily stands first on account of the actual excellence of the work

done, the originality of thought which he con¬ stantly displays and the deep and lasting in¬ fluence he had upon the thought of his own day and upon succeeding generations. In France, however, Montesquieu's enemies and detractors have accused him of being more English than French in literary form and in manner of thought ; and, in fact, so great an admirer was he of everything English, that he was looked upon, during his lifetime and long afterward as an Anglomaniac. Montesquieu is a much more rational thinker than Voltaire, though the latter far outran him in popularity. The two men were, however, so far apart in their modes of thought that neither was able to appreciate the greatness of the other. The cool, moderate reasoning of Montesquieu was not only in every way fitted for the age in which he lived, but it was couched in language that attracted and commended itself to all men of liberal tendencies. Thus it was a preparation for the work that Voltaire himself was called upon to do; and both Montesquieu and Voltaire, though working along different lines and imbued each with a different spirit, were both on the broad road to the Revolution of 1789 and the rejuvena¬ tion of France. In an age when the real spirit of all just law was hidden from the sight of most men, the original, truthful and clear-cut views of Montesquieu on politics and their rela¬ tion to law came as an inspiration and took hold of the imagination of thinking Europe. He made men think clearly and powerfully along lines that they had been unaccustomed to think rightly for centuries. His masterly genius for generalization may be said to have created the science of politics. His plain, un¬ adorned, forceful language and withal beautif 1 composition is in marked contrast to the spirit that ruled the literature of his own and the following generation. To this simplicity of language and directness

of thought he owed much of his popularity. Montesquieu was well known to the more inquiring spirits of the Eng¬ lish colonies in America and his work had a strong influence over the revolutionary spirit that began to make itself felt among the colonies early in the latter half of the 18th century, where, during the struggle for inde¬ pendence, it became a veritable textbook of the Revolutionary party. There have been many editions of Montesquieu's works published in French and in all the languages of Europe. (See Les Lettres Persanes; Spirit of the Laws). Consult Sorel (translated by Masson), Mon¬ tesquieu) (London 1887) ; Vian, (Histoire de la vie et des oeuvres de Montesquieu > (Paris 1879) ; Lowell, E. J., <Eve of the French Revo¬ lution (Boston 1893) ; Ilbert, C. P., Mon¬ tesquieu J (Oxford 1904) ; Dargan, E. P., (2Es-thetic Doctrine of Montesquieu) (Baltimore

1907).

MONTESQUIOU-FEZENSAC, mon-tes- ke-oo-fa-zan-sak, Robert, Count de, French poet : b. Paris, 9 March 1855. He was well known as an art collector and as an amateur goldsmith and enameler in 1892, when he pub¬ lished (Les Chauves-souris,* a volume of verse symbolizing the mystery of night. It was fol¬ lowed by (Chef des Odeurs suaves> (1893), of which the theme was flowers and perfumes, (Les Hortensias Bleus) (1896) and (Perles Rouges) (1899), the latter a series of sonnets

reviving Versailles at its glory; by (Les Paons) (1901), on precious stones and their mystic meanings; and by two volumes of essays (Roseaux pensants) (1897) and (Autels privilegies) (1899), both attempting to appreciate some wronged artist. Later works include , rofessionelles beautes} (1905); (Altesses serenissimes) (1907) ; / vssemblee de notables) (1909); (La petite mademoiselle) (1911); L inextricable graveur Rodolphe Bresdin) (1913). He appeared in New York in the winter of 1902-03 as a lecturer and reader. His style is hyper-assthetic, with much weird beauty, and his themes strangely far-fetched.

MONTESSORI, mon'tes-so're, Maria, Ital¬ ian educator . b. Rome, about 1872. She was educated to be a physician, and while studying applied herself especially to the investigation of nervous diseases in children, and to the problem of evolving a form of training that would draw out the capabilities of those of diseased and abnormal temperaments. She was the first woman to be graduated in medicine at the Uni¬ versity of Rome (1894), and for some time she acted as an assistant in the Psychiatric Clinic and later as a lecturer on anthropology in that institution. Then for six years she was in charge of one of the hospitals for defective children in Rome. Having acquired a familiar¬ ity with the systems of Pestalozzi, Frbbel, Segum, Itard and other early masters, she now developed therefrom a method of educating feeble-minded children under more modern con¬ ditions. In 1898-1900 she was directress of the Scuola Ortofrencia, or mind-strengthening school, where she met with marked success in applying the methods, particularly, of Seguin and Itard to the education of defectives. She then devoted herself to the study of experi¬ mental psychology, pedagogic anthropology and the methods of modern education. An occasion offered in 1907 for putting her theories to prac¬ tical test, when a school was established in connection with the tenants erected by the Roman Association for Good Building. The first house (Cora dei Bambini) was opened in January 1907, and was soon followed by three others. Dr. Montessori maintained her connection with these schools until 1911 when she devoted her time to the extension of her methods to older children. Both professional educators and laymen have taken a deep interest in her work, the principles of which she has set down in (Antropologia pedagogica-* (Eng. trans. by F. T. Cooper, (Pedagogic Anthropol¬ ogy, > New York 1913) and (I1 metodo della pedagogia scientifica applicato all'educazione infantile nelle case dei BambinP (Eng. trans. by A. E. George, (The Montessori Method* New York 1912).

MONTEVERDE, mon'ta-var'da, or MON¬ TEVERDI, Claudio, Italian composer: b. Cremona, May 1567; d. Venice, 29 Nov. 1643. He was a pupil of Ingegneri at Mantua, became (1590) violinist and singer at the Mantuan court and was appointed (1602) bandmaster. In 1613 he was appointed bandmaster of Saint Mark s, Venice, in which position he served till his death.. His is one of the most interesting personalities in the history of modern music. He was a pioneer in opera and became noted as composer of madrigals before entering (1583) the operatic field. Among his operas are

1Orfeo) (1607); (Arianna) (1608); <P roser-Pina rapita* (1630);

(Adone> (1639); (Enca e Lavmia) (1641); (Ulisse> (1641); <L'incoro-natione di Pappea* (1642). He also composed a ballet, (Tirsi e ClorP (1615) and the dra¬ matic scene HI combattimento di Tancredi e Clorinda* (1624), besides numerous religious works as masses, psalms, motets, *etc.* Consult Vogel, Emil, (Claudio Monteverdi (in Vier-teljahrsschrift fur Musikwissenschaft 1889) ; Goldsmith, (Studien der geschichte der Italien-ischen Opera in 17 Jahrhundert* (Leipzig 1904) ; Mitjana, Rafael, (Claudio Monteverde) (Ma¬ laga 1911).

MONTEVERDE, Giulio, Italian sculptor: b. Bistagno, 8 Oct. 1837. He was at first wood-carver, but went to the academy at Genoa (1859) and won (1865) the Prize of Rome. His first works were a statuette of (Columbus as a Boy, *(a Group of Children playing with a Cat,* The Genius of Franklin,* copies of which are found everywhere. He became noted out¬ side Italy by his group (Jenner inoculating his own Child/ a work showing great refinement and sentiment. . Of his more recent works should.be mentioned Crucifixion-* in marble; memorial to Bellini for Catania; King Victor Emanuel for Bologna (1888). From 1874 he has been professor of San Luca Academy at Rome.

MONTEVIDEO, Minn., village, county-seat Chippewa County, at the junction of the Minnesota and the Chippewa rivers, and on. the Chicago, Alilwaukee and Saint Paul Railroad, about 125 miles west of Saint Paul. It is in a fertile agricultural region where wheat , is one of the important products. The chief industrial establishments are flour-mills, grain elevators, a creamery, cheese factories and a cooperage. It is the seat of Windom Institute (Congregational) and it has a high school, a public library and a town-hall. Near the village is a monument erected to commemorate the surrender of Little Crow, the Sioux chief in 1862. Pop. (1920) 4,419. '

MONTEVIDEO, mon-te-vid'e-o (Sp. mon-ta-ve da-o), Uruguay, capital of the depart¬ ment of the same name; also capital and emporium of the republic; situated on the northern coast of the Rio de la Plata (see La Plata, Rio de). Founded in 1726, its inhabit¬ ants nu.m]>ereci only 3,500 in 1818, and 9,000 in to2v , indeed, it was scarcely more than a fortress until 1834, and at various times the governments of. Argentina, England and Brazil attempted to gain possession of this stronghold, commanding the entrance of the great water¬ way of the south. Montevideo was taken bv a British force of 4,600 men on 2 Feb

1807 after a vigorous assault by land and sea (Eng¬ lish fleet under Commodore Popham). Subse¬ quently the combined English forces in the river, under command of General Whitelocke, were defeated at Buenos Aires, and, withdraw¬ ing from Montevideo, abandoned the Rio de la Plata. The demolition of the walls, the open-mg of new streets, and (in 1836) the beginning of foreign immigration, transformed the place. In the years from 1838 to 1841, about 28,000 European immigrants entered the port. There were 45,000 inhabitants in 1860; 105,000 in 1872; 238,080 in 1892; and at the beginning of 1902

about 278,186 in the territory of 256 square nines embraced in the department. Immigrants arriving in 1901 were: Italian, 3,777; Spanish, 2-708 ; Brazilian, 715; French, 512; German, 336 ; and English, 209. The harbor is the best on the Rio de la Plata; blit formerly was far from satisfactory. An elaborate system of moles and docks, projected for harbor improve¬ ment, began in July 1901. The water at the harbor's entrance being but 15 to 17 feet deep, vessels of great draught formerly anchored in the outer roadstead and discharged their car¬ goes on lighters. Since 1913 further improve¬ ments have increased the port's facilities. The city is built on a chain of hills of moderate ele¬ vation with a gradual slope toward the shore; the conditions are therefore favorable for effi¬ cient drainage. An active commerce is main¬ tained with foreign countries and towns of the interior. As it is the only port of entry it furnishes nearly all of the revenue of the gov¬ ernment, receiving or forwarding about 90 per cent of the importations of the entire country and about 67 per cent of the total exportations. The imports in a recent year amounted to $21,876,987, and exports to $23,340,239. The steamers of 20 different companies, including 12 British and three French, visit the port peri¬ odically. Conspicuous buildings are the Parlia¬ ment House, Government Palace, National Bank, Solis and San Felipe

theatres, Uru¬ guay Club and School of Arts and Sciences. There are commercial houses of every class, street railways, telegraph and telephone serv¬ ice, electric-light works, printing establish¬ ments and foundries. The streets are wide, straight and generally well kept. The water supply is obtained from the Saint Lucia River, at a point about 12 miles distant. Plazas, 16 in number, occupy high ground in the middle of the city, the most attrac¬ tive of these public squares being the Zabala, Independencia and Constitucion. The Uni¬ versity of Uruguay has more than 400 stu¬ dents and a relatively very large number of native and foreign professors; there are also normal and elementary schools, a military col¬ lege, *etc.* Banks are: English (2), and Italian, Spanish and French (1 each). No city in South America is more cosmopolitan in character: nearly all the languages of the civilized world are heard in its streets. The environs contain beautiful residences surrounded by gardens; at a distance of about three miles from the city is the fine park called El Prado.

Marrion Wilcox.

MONTEVIDEO, Department of. See

Uruguay.

MONTEZ, Lola (assumed name of Marie Dolores Eliza Rosanna Gilbert), adventuress : b. Limerick, Ireland, 1818; d. Astoria, N. Y., 17 Jan. 1861. Her parents took the child to India, where her father died, and her mother, again marrying, sent Lola back to Europe. In 1837 she married a Captain James, went to India with him, tired of him and returned to England in 1842. She next became a public dancer, performing in London and in cities of the Continent, and in 1846 went to Munich, where she fascinated the old artist-king Louis I of Bavaria who made her his mistress, created her Countess of Landsfield and granted her a large annuity. For a while she also exercised

great political power, which she directed against the Jesuits and in favor of liberalism; but with the outbreak of the Revolution of 1848 she was once more set adrift. In London she married a guardsman, Stafford Heald, was soon divorced from him and in 1851 sailed for the United States. After touring through this country with a play called (Lola Montez in Bavaria, > she went to Australia, returned here, was twice married in California and in 1858 lectured in New York where she settled and spent her last days in rescue work among women. Her writ¬ ings include lectures,* with an autobiography, and (The Arts of

Beauty > (1858).

MONTEZUMA, mon-te-zoo'ma (Aztec Montecuhzoma, the severe or sad one; found written also Monte£UMA, Moctezuma, Mutec-zum a, Motezuma), surnamed Ilhuicamina (archer of heaven) and called Montezuma I, chief, or emperor, of ancient Mexico : b. about 1390; d. 1464. He succeeded his brother Izcohuatl in the chieftainship in 1436, but was not inaugurated until 1440. His success in war with neighboring tribes was great, and he is said to have extended Mexican conquest to the Gulf. With Netzahualcoyotl, chief of Tezcuco, he built, to prevent inundations from Lake Tez¬ cuco, huge dams, the ruins of which in the San Lorenzo Valley have shown them to have been a marvelous feat of engineering. He also re¬ built Tenochtitlan (on the site of the modern Mexico), the chief Aztec city, substituting for the primitive buildings others of lime and stone ; established a severe legal code and de¬ veloped the ceremonial and influence of the tribal religion. Consult Bancroft, H. H., Na¬ tive Races) (San Francisco 1874-82).

MONTEZUMA, surnamed Xocoyotzin and called Montezuma II, chief, or emperor, of ancient Mexico: b. 1479 (authority of Bernal Diaz) ; d. Tenochtitlan, Mexico, 30 June 1520. He is well known as the ruler of the Aztecs at the time of the Spanish invasion. He succeeded his uncle Ahuizotl as chief in 1503. Almost constant wars were carried on by him with the Tarascans and Tlascalans, and he is said to have led an expedition as far south as Hon¬ duras. His internal policy was in many re¬ spects wise. He severely enforced the laws, introduced valuable changes in the courts and built many public works, including temples, a new conduit for the water supply and a hos¬ pital for invalided warriors. But by his arro¬ gance and pomp, his seclusion, his restriction of appointments to those only of noble rank and his heavy taxation he made himself greatly disliked. His conquests enlarged the empire, but the various parts were without cohesion, and insurrections were frequent. When news was brought in 1518 that ships and white men (of Jean de Grijalva's expedition) had been seen off the coast, Montezuma was greatly alarmed, because an ancient prophecy foretold that Quetzalcoatl, the white god, would at some time come to reign over Mexico. He sent pres¬ ents to Cortez, who had landed at Vera Cruz in April 1519, and tried to prevent him from marching to Tenochtitlan. Cortez, however, arrived there in November and was well re¬ ceived. Fearing an outbreak of the people, who did not agree with the conciliating policy of the monarch, Cortez then took Montezuma prisoner and retained him as a hostage in the

quarters of the Spaniards. The Aztecs finally made an attack upon the quarters (June 1520) Montezuma, at the request of Cortez, attempted m a speech from the wall to end hostilities, but was wounded by a volley of stones and died four days later. Jhe Indians came to regard him as a deity, and indeed called him their chief god, though this reverence did not include worship. Consult Prescott, W. H., (Conquest of Mexico) (1843) ; Bancroft, H. H., ˆexicoP Vol. I (Vol. IX of his (Works > 1883-90) ; Diaz, B., (Historia verdadara de la conquista de la Nueva EspanaP

MONTEZUMA, Iowa, town, county-seat of Poweshiek County, on the Chicago, Rock Island and Pacific and the Iowa Central rail¬ roads, about 60 miles east of Des Moines. Agriculture and stock-raising are the principal industries of the surrounding region. Bitumi¬ nous coal-fields are in the vicinity. The chief industrial establishments are a pearl-button factory, wagon factory, foundry, machine-shop and a creamery. Pop. 1,200.

MONTEZUMA CASTLE. A remarkable prehistoric dwelling situated in an alcove in a high cliff on the west bank of Beaver Creek, three miles from old Camp Verde, near Pres¬ cott, Ariz. It is accredited to Aztecs and even supposed to have been occupied by Montezuma, but ethnologists doubt the validity of this claim! or especially of the existence of any evidence to sustain it. The building consists of five stories, with walls two feet thick at base. It contains about 20 rooms, most of them extend¬ ing along cliffs which support the higher stories. The structure shows evidence of having been occupied a long time. It was repaired by the Arizona Antiquarian Society in 1895, and in 1906 was made a National Monument. Consult description by Mearns in Popular Science Monthly, 1890.

. MONTFAUCON, Bernard de, bar-nar de mon-fo-koii, French critic and classical scholar: b. Languedoc, France, 18 Jan. 1655; d. Paris, 21 Dec. 1741. He entered the army but resigned to become a Benedictine monk and devoted himself to classical studies. His (Palseographia GrsecaP published in 1708, made him famous and constituted him the founder of scientific palaeography. He traveled in Italy where he was

honored by Innocent XII, and in 1719 was elected a member of the Academy of Inscrip¬ tions. In the course of his work he examined thousands of manuscripts and his books are a storehouse of classical archaeology. Among them are (LAntiquite expliquee et representee en Figures (15 vols., 1719-24); ˆMonuments de la Monarchic franchise* (5 vols., 1729-33). Consult De Broglie, < Bernard de Montfaucon et les Bernardins) (Paris 1891).

MONTFERRAT, mon-fer-ra, Italy, a former independent duchy, bounded by Pied¬ mont, Genoa and the Milanese territory. It lay in two detached portions between the Mari¬ time Alps and the Po and had an area of about 1,000 square miles. The capital was Casale. Mention is made of a Marquis of Montferrat m 980. In 1305 the marquisate was inherited by a branch of the imperial family of the Palaeologi, and in 1536 was granted by Charles V to Federico II, duke of Mantua. It was erected into a duchy by Maximilian in 1573 or

1574. In 1631 a considerable part of it was ceded to Savoy by the Duke of Mantua, to whose ancestors Charles V had granted it in 1536, and in 1703 the remainder was annexed to the same duchy. See Savoy.

MONTFORT, monfffort (Fr. mon-for), Simon de, Earl of Leicester, English political reformer: b. France, about 1208; d. Evesham, 4 Aug. 1265. His father was Simon, the Con¬ queror of the Albigenses, his mother, Alice of Montmorency; the former had been disin¬ herited of his English estates by King John in 1207 and hence had joined the more readily the orthodox French party in fighting the Al¬ bigenses, who were led by John's brother-in-law, Raymond of Toulouse. But the younger and greater Simon in 1229 was forced to leave France and throw himself on the mercy of the English king, Henry III, who restored him his lands in Leicester and married him to his own sister Eleanor, the young widow of Lord Pembroke, secretly and without dowry in 1238. The irregularity of this match endangered Simon with the nobles, who had not been con¬ sulted; almost immediately afterward he quar¬ reled with the king and was only saved by his crusader's vow, which he fulfilled under Richard of Cornwall in 1240. In France he fought under Henry III (1242-48), who made him commander of the army in Gascony. There he crushed successive rebellions, but another quarrel between the monarch and his subject followed and Simon was removed from office. Henry soon had to recall Simon, who in 1257 and 1258 quarreled hotly with William of Va¬ lence, one of the king's foreign favorites and his half-brother.

Simon's boldness in this mat-tei put him at the head of the movement among the barons for administrative reform. In June 1258 the 24 commissioners, of whom he was one, drew up the famous Provisions of Oxfoid, signed in October of the same year, but repudiated in 1262 by the king. Simon de Montfort had been actual head of the reforming party since the conclusion of the peace with France (4 Dec. 1259) which had made reform possible. Now, after the cause of the nobles had been submitted to the king of France to arbitrate and his sentence had been entirely favorable to the king, setting aside the Oxford Frovisions entirely and reserving to the people only such rights as they had before possessed Simon put himself at the head of the party which was eager to fight for the privileges of the nobles. On 16 May 1264, after a brilliantly conducted engagement, Simon captured the kmg' , a new constitution was formed giving the power to a council of nine, over whom were three electors, removable by Parliament; and m this new regime Simon was practically mas¬ ter of the kingdom. He summoned a Parlia¬ ment 30 Jan. 1265, which was the. actual basis of the present English Parliament and of Brit¬ ish constitutional freedom. But the Parliament was marked by a quarrel between Simon and uC tˆa i °* Gloucester ; the latter went over to the border nobles. Simon moved against him with splendid fearlessness ; made a sudden peace with the Welsh king, and turning to meet Gloucester failed to effect a juncture with his son At Evesham on 4 Aug. 1265, fighting to the last and scorning to retreat, he was slain his forces being so outnumbered by the troops

with Gloucester and Prince Edward that at sight of the enemy Simon is said to have ex¬ claimed, (<Let us commend our souls to God, for our bodies are theirs. }) Personally haughty and high tempered, but sober, simple, pious and cultured, he was a great general, one who stood firmly by the right, the idol of the people, who made his tomb a shrine and carried on the work he had begun. To call him the <(creator of the House of Commons,)) however, is a misapprehension of his work, which for¬ warded rather than fathered representative government. Consult Pauli's life which treats primarily

of the constitutional bearings of Montfort's career and is translated into Eng¬ lish by Miss Goodwin (1876) ; the English life by Prothero (1877); the French biography by Bemont (1884), which first untangles Mont¬ fort's continental career; the (Song of Lewes) (edited by Kingsford, 1890) ; the (Miracles of Simon de MontforC (edited by Halliwell for the Camden Society, 1840), showing the popular canonization of the hero ; and such general works as Stubbs, Constitutional History } (Vol. II, 6th ed., Oxford 1897), and Green, (History of the English People* (Vol. I, new ed., Lon¬ don 1908).

MONTGOLFIER, mont-gol'fi-er (Fr. mon-gol-fe-a), two French inventors, Joseph Mi¬ chel (b. Vidalon-les-Annonai, France, 1740; d. Balarue-les-Bains, 26 June 1810) ; and Jacques Etienne (b. Vidalon-les-Annonai, 7 Jan. 1745; d. Servieres, 2 Aug. 1799). They were sons of a paper-maker and devoted themselves to the study of mathematics, mechanics, physico and chemistry. As their scientific labors were al¬ ways carried on in combination it is not easy to decide to which of the two the credit of their several inventions is due. The first idea of the balloon seems to have arisen in the mind of Joseph, but Jacques Etienne suggested many improvements upon it. Joseph was also the in¬ ventor, among other things, of the water-ram which raises water to the height of 60 feet, and Jacques Etienne of vellum paper, which he was the first to make in the manufactory for¬ merly carried on by his father. See Balloon.

MONTGOMERY, mon-gom-e-re, Gabriel, Count de, French captain: b. about 1530; d. Paris, 26 June 1574. He was son of the com¬ mander of the Scottish troops in the service of the French court, but in 1559 he accidentally wounded King Henry II with whom he was tilting and killed him. Montgomery was con¬ demned to retirement in the country, where he read many religious books, and was soon led to join the Protestant party. In 1562 he entered Conde's army, serving with much bravery and ability. He saved himself by the swiftness of his horse during the Massacre of Saint Bar¬ tholomew. In 1574 he led a band of Huguenots and began war in Normandy, was captured at Domfront, taken to Paris, tried and beheaded.

MONTGOMERY, mont-gum'e-ri, George, American Roman Catholic archbishop : b. Da¬ viess County, Ky., 30 Dec. 1847; d. San Fran¬ cisco, Cal., 10 Jan. 1907. He was educated at Saint Charles College, Maryland, and Saint Mary's Seminary, Baltimore, and was ordained to the priesthood in 1879. He officiated as a priest for 15 years in San Francisco and in 1894 was consecrated coadjutor bishop of Los

Angeles. He was elevated to the rank of coadjutor archbishop of San Francisco in 1902.

MONTGOMERY, James, British poet and journalist: b. Irvine, Ayrshire, 4 Nov. 1771 ; d. Sheffield, Yorkshire, 30 April 1854. The son of a Moravian divine, he was educated for the ministry at the Fulneck Moravian Seminary near Leeds, but in 1792 he procured an engage¬ ment with a bookseller in Sheffield the pro¬ prietor, editor and publisher of the local Register. Montgomery succeeded him later as editor and publisher of the paper, the name of which he changed to the Sheffield Iris. The publication of a liberal journal was at that period fraught with manifold dangers. He was twice prosecuted for trivial offenses and condemned on the first occasion to three and on the second to six months' imprisonment. During his confinement he composed a volume of poems, (Prison Amusements, > published in 1797. In 1806 appeared his (Wanderer in Switz¬ erland, } his first popular effort. It was fol¬ lowed in 1809 by the (West Indies, > a poem exposing the iniquities of the slave trade. Later volumes were (The World before the Flood) (1813); Greenland,* a missionary poem (1819) ; and (The Pelican Island) (1827). In 1825 he resigned the editorship of the Iris and passed the remainder of his life in religious and literary work. To the world of to-day he is known as a hymn writer. Over 100 of his hymns still keep their places in hymnals, their authorship frequently and unfortunately con¬ founded with the work of Robert Montgomery (q.v.). Consult Carruthers, ed., (Political Works of James Montgomery (Boston 1860) ; Plolland and Everett, (Memoirs* (London 1854-56) ; King, (Life of James Montgomery) (London 1858).

MONTGOMERY, John Berrien, Amer¬ ican naval officer: b. Allentown, N. J., 17 Nov. 1794; d. Carlisle, Pa., 25 March 1873. In 1812 he entered the navy as midshipman and was on board Perry's flagship at the victory on Lake Erie in 1813 where for gallant service he received the thanks of Congress. He was later engaged at Mackinaw in 1814 and in 1815 served in the Algerine war. In 1839 he be¬ came commander, and in the war with Mexico, aboard the Portsmouth, established United States authority on the coast of California, blockaded Mazatlan and assisted in the cap¬ ture of Guaymas. In 1849-51 he was executive officer of the navy-yard at Washington and he commanded the Pacific squadron in 1861— 62. He was made a commodore in 1862 and rear-admiral on the retired list in 1866. Con¬ sult Montgomery, T. H., (A Genealogical His¬ tory of the Montgomery Family) (1863).

MONTGOMERY, Richard, American sol¬ dier: b. Convoy House, near

Raphoe, Ireland, 2 Dec. 1736; d. Quebec, 31 Dec. 1775. At 18 he obtained a commission in the British army, in 1757 began his career of active service in America, and at the siege of Louisburg in 1758 and elsewhere gave evidence of high military capacity. After a period of residence in Eng¬ land from 1765, in 1772 he sold out his com¬ mission and, emigrating to New York, settled in Rhinebeck, Dutchess County. In 1775 he represented Dutchess County in the provincial Congress, and in the same year was appointed

one of the eight brigadiers to serve in the newly organized army of the united colonies of the young Republic. He was immediately attached to the larger of the two divisions sent to Canada in the summer of 1775 and by a series of well-directed movements successively acquired possession of Chambly, Saint John's at ˚ntreaI» thereby becoming in the middle of November master of a great part of Canada. Effecting a junction on 4 December with Arnolds troops, then recently arrived, he im¬ mediately proceeded to take a position before fjuebec. At a council of officers it was deter¬ mined to attempt to capture the place by a coup dc main, and accordingly, on 31 December at <3 a.m., an attack on the town was begun. Montgomery, who headed the attack on the Cape Diamond bastion, fell dead at the first and only discharge by the British artillerymen His men, panic-stricken by the loss of their leader, began a disorderly retreat, and the as¬ sault on the city ended in failure. He was in¬ terred within the city walls. British states¬ men vied with Americans in their praise of Montgomery. Congress testified ((their grateful remembrance, profound respect, and high veneration^ by placing a monumental tablet to his memory in the front of Saint Paul's Church Broadway New York. In 1818 the State of Aew York had his remains transferred from Canada and buried with imposing solemnities beneath the monument. Consult Armstrong, Life of Richard Montgomery-* (in (American Biography, > Sparks, J., ed., Boston 1834).

MONTGOMERY, Robert, English versi¬ fier and Anglican clergyman: b. Bath, 1807: d Brighton 3 Dec. 1855. His name survives chiefly

through the merciless criticism and ridicule of his work by Lord Macaulay in the Edinburgh Review. Having taken orders in the Church of England, he officiated at Percy Street Chapel in London till his death in 1855, with an interval of four years as pastor of JiMes Episcopal Chapel in Glasgow. His chief works, overpraised by uncritical senti¬ ment for their popular vein, amply justify Macaulays strictures, though hardly their offensively dogmatic tone. They include ˆThe Omnipresence of the Deity> (1828); <Satan> (1839), whence his sobriquet of «Satan Mont¬ gomery, » and (The Messiah. >

. MONTGOMERY, Ala., State capital and j1, cltY of the State in population, and seat of Montgomery County, 52 miles southeast ol the centre; on the left bank of the Alabama, 410 miles above the Gulf by water and 180 by rail. It is the greatest railroad centre in the State, seven lines converging there, the Louis¬ ville and Nashville, Mobile and Ohio, Atlantic Coast Line, Central of Georgia, Seaboard Air Line, LJmon Springs and Northern and Western of Alabama; 62 passenger trains a day arrive and depart from its union station. The city is a leading Southern trade and social centre.

Commerce and Industry. — Montgomery nes m the heart of the famous Black Belt, the hand of rich dark soil which stretches across and beyond Alabama.. 120 miles wide, and one of the chief cotton districts in the country as well as a great producer of grain, fruit and \egeiablcs. It is the great central market of all this territory, and one of the foremost i licking centres for the supply of vegetables to

i he. northern markets; its wholesale grocery business amounts to some $14,000,000 a year out of a total of over $50,000,000. It is one of the chief cotton marts and distributing points of the South, handling 150,000 to 175,000 bales a year in its extensive warehouses. The export ˚f isi to some extent, sent in barges down the river to Mobile, and there reloaded for foreign shipment. The Alabama is one of the best rivers in the United States for steamer navigation, having a deep, broad channel open as high as Montgomery for eleven months in the year. Lying between the coal and iron fields on the north and the vast forests of yellow pine on the south, as well as in the midst of the cotton belt, the city has great natural advantages for manufacturing; and a dam across the 1 allapoosa at 4 allahassee, 30 miles away, fur¬ nishes 25,000 horse power applied to its ‘manu¬ factories, and used for trolley and lighting. An English syndicate, the Alabama Power” Com¬ pany, has developed other water power in this section with a potentiality of 500,000 horse power. Already electricity

is sold in Mont¬ gomery as low as one cent per kilowatt hour.

1 he city s interests are considerable and varied, there are 181 manufacturing enterprises em¬ ploying $12,000,000 capital and 6,000 employees. Cai shops and foundry work for the numerous railroads, with boilers, and other iron goods, are the largest items ; but there are two cotton factories and a cordage factory; four ginning and compress plants, five cottonseed oil and cake works and 11 great fertilizer plants; 13 woodworking and lumber concerns, besides cooperage works (mainly for the oil and allied products), carriages, cabinets, show cases furniture, confectionery, crackers and brushes and paper boxes, saddlery and harness, brick and tile, paving and roofing materials, *etc.*

I he aviation depot, or aeroplane construction plant, of the United States government is located at Montgomery. It employs 600 civilian mechanics and is the only plant of its kind in America.

. Pin?“9e and Government.— The city’s bank-mg facilities have kept pace with its commercial increase In 1919 Montgomery had four national banks, and three State banks, having a combined capital of $2,500,000; surplus, $635,- 000; individual deposits, $13,000,000. The post-office receipts had increased 35 per cent within ve years. There are trolley systems covering city and suburbs, and electric light, good sewer age and artesian water almost chemically pure • the streets are well paved and the country roads of remarkable excellence. Assessed valuation about $35,000,000. Of about $150 000

wnmne?cpendll;llrte’ as9e from inferest on debt, $90,000 is spent for schools. Montgomery has

commission government.

Public Buildings, Institutions, Etc.— The

S % lsu handsomely built on a high red clay bluff bordering the river, and stretching back to undulating hills; it has many fine old gardens, and 50 acres of public parks The

streets and the foun^tion

* n «. CoUrt’ Commerce, toward the river and Dexter avenue to the capitol. The Umon Station, costing $250,000, the govern¬ ment building, the city hall, -the courthouse the Young Men s Christian Association and’ the

Wsnfh.WrenS-ChHst/an Ass˚ciation build¬ ings, the Masonic temple and fhe Carnegie

MONTGOMERY, ALA

n * M

[8 jO

v *Ti* • ■ *4 1* < t

Wm fegffL

| Jr » ■ '-•'» 'disk jbn 1

Ic-mll MsriHIS

? * j!#! -

I tk: .....BM

5h3§3> TT.Tna

& i pl'- ^

■vf

..I

it O'

Hi * Vmi

ifc£

ill

'iSi1 iii

" Cfil

1 Montgomery County Courthouse 2 A Residential Street in Montgomery

library are the chief structures in the centre. ˆ u ˆUtol dates from 1846; in its grounds is a handsome Confederate monument. There are 86 church societies of all denominations; several of them with handsome, modern edifices. There is a State Normal School for the colored here with 1,500 students, the Montgomery Industrial School for Girls and charitable institutions. Montgomery is the home of the Women's Col¬ lege of Alabama. There are three daily news¬ papers and several institutional libraries. There are 19 public school buildings, the same pro¬ vision being made for colored as for white students.

History. — Montgomery was founded in 1817 by Andrew Dexter, of Rhode Island, on the site of the legendary Indian village of Ecun-chatty ; it was part of the Creek Lands. Dex¬ ter named the place New Philadelphia; the situation was tempting, and in 1818 two more settlements were made — East Alabama Town closely adjoining, divided by the present lower Court street (whence the streets on its two sides run from it at different angles), and Ala¬ bama Town, a mile or so down the river. On 3 Dec. 1819, the former was consolidated with it as Montgomery, named after the Indian fighter Lemuel Montgomery or the Revolution¬ ary hero Richard Montgomery. The early so¬ ciety was like many pioneer communities, and vigilance committees had to be invoked to re¬ store the reign of the law. The first steamer arrived 22 Oct. 1821 ; the Montgomery Railroad opened its first 12 miles in 1840. The place re¬ ceived a city charter about 1837; on 22 Jan. 1846 it was made the State capital; the capitol was occupied 1847, burned 1849, replaced by the present, in 1851. Montgomery's interests and central location made it the focus of the seces¬ sion movement; its position as capital drew in some of the ablest leaders and orators of the South, the famous William L. Yancey (q.v.) being one; and it was made the first capital of the Southern Confederacy, whose government was organized there 4 Feb. 1861. The next year the capital was removed to Richmond ; the Union army reoccupied Montgomery 12 April 1865. Alabama was among the first

of the States to create a Department of History and Archives, which is located here. This de¬ partment has a complete record of all State documents since territorial days. It maintains a museum and art gallery.

Population. — The population in 1840 was

2,179; 1850, 6,728; 1860, 8,843; 1870, 10,588; 1880, 16,713; 1890, 21,883; 1900, 30,346; 1910,

38,136. The population in 1920, according to the United States official census, was 43,464. This is an increase of 14 per cent over the 1910 cen¬ sus. About 40 per cent of the population is col¬ ored. The city's suburbs have far overspread the official limits.

Bruce Kennedy,

General Secretary , Montgomery Chamber of Commerce.

MONTH, a period of time derived from the motion of the moon. The ((sidereal® month may be regarded as the period in which the moon, as seen from a fixed star, would appear to make a complete revolution round the earth ; it is evidently the period in which she passes through the 12 signs of the zodiac; its mean value during the year is 27.32166 days. The

Synodical® month, more commonly called a "lunar month® or Hunation,® is the period dur¬ ing which the moon goes through all her phases. It is usually reckoned from new moon to new moon ; to complete the lunation the moon must not only pass through the 12 signs of the zodiac, but also come again to occupy her old position relatively to the sun, which has itself advanced in the zodiac, hence the lunar is longer than the sidereal month. The mean value of the lunation is 29.5306 days. The Solar® month is the 12th part of one solar year, or 30.4368 days. The ˆanomalistic® month is the period in which the moon passes from perigee to perigee of her orbit; it differs from the sidereal month be¬ cause the perigee varies its position. The line of nodes of the moon's orbit varies its position, and the <(nodical® month, or the period of her motion from ascending to ascending node, dif¬ fers from the other months mentioned above. The 12 civil or calendar months of the year have from 28 to 31 days each. The lunar month was used by the Chaldaeans and Egyp¬ tians, and is still by the Jews, Turks and some uncivilized nations. The calendar months are not equal divisions of the year, some (April,

June, September and November) consisting of 30, and the remainder of 31 days, except Feb¬ ruary, to which a period of only 28 days is as¬ signed (see Leap Year), with the addition every fourth year of one more day. These dis¬ tinctions often give rise to much confusion as to the time intended to be designated by a month. In popular language it is often under¬ stood to be four weeks, as this is very nearly an equal period, expressed in the division by weeks, to the month. This was even laid down by Blackstone as the legal definition of the term, so that a lease for 12 months was only for 48 weeks. The expression of ((a twelve-month,® however, has been legally held to mean a solar year. See Calendar; Moon; Zodiac.

MONTHOLON, Charles Tristan, sharl t res-tan mon-to-lon, Comte (later Marquis) de, French soldier; b. Paris, 21 July 1783; d. 21 Aug. 1853. After service in the navy, he en¬ tered the army in 1798, took part in the Napo¬ leonic campaigns in Italy, Austria and Prussia, distinguished himself at Wagram (5-6 July 1809), was made chamberlain (1809), was sent on an important diplomatic mission to the Arch¬ duke Ferdinand of Austria (1811) and became general of brigade (1814). During the Hun¬ dred Days he was adjutant-general to Napoleon, whom he accompanied in his exile to Saint Helena, and by whom he was appointed one of his executors. Proclaimed chief-of-staff by Prince Louis Napoleon (later Emperor Napo¬ leon III [q.v.]) when the latter landed at Bologne in 1840, he was condemned by the Peers to 20 years' imprisonment, but was liber¬ ated after the February revolution (1848). He was elected to the Legislative Assembly in 1849. He published (Memoires pour servir a l'Histoire de France sous Napoleon, Ecrits a Sainte Helene sous sa Dictee) (with Gourgaud 1822-25; 2d ed., 1830), and (Recits de la Captivite de Napoleon) (1846).

MONTH'S MIND, the requiem mass cele¬ brated in the Roman Calholic churches for the deceased the 30th day after death. The pray¬ ers of the mass are the same as those of the

requiem mass celebrated on the day of decease or burial except the

(<Collect,® <(Secret® and ˆPost-Communion.® In the early English church the prayers were offered daily for a month after the person's death. The anniver¬ sary of the death is commemorated similarly by the mass called the Year's Mind. Consult (MissaP ; O'Brien, (The Mass) ; Sullivan, (History of the MassP

MONTI, Vincenzo, ven-chend'zo mon'te, Italian poet: b. Fusignano, near Ravenna, 19 Feb. 1754; d. Milan, 13 Oct. 1828. He was educated in law against his inclination; became secretary to Prince Luigi Braschi; won his literary spur with (Saggio di poesie) in 1779; gained speedy popularity with various occa¬ sional odes; and in 1787 and 1788 brought out his two great tragedies, <Aristodemo) and (Ga-leotto Manfredo,} both in the style of Alfieri. His ˆBasvillianaC a Dantesque poetic chronicle of recent happenings, notably the massacre of the French envoy Basville by the Roman popu¬ lace, showed ability to treat a theme in politics ; but from the detestation expressed in that poem for the excesses of the Revolution and his ap¬ peal to the Austrians against the French, he soon came to the most ardent praise of Napo¬ leon and fled to France to escape punishment from Austria. His panegyric of the mathema¬ tician Mascheroni (1801) is largely an attack by the poet upon his personal enemies. (See Mascheroniana) . After Marengo he returned to Italy and became professor of oratory at Pavia, imperial poet-laureate in Milan, and, after the coronation of Napoleon, historiog¬ rapher of the Italian kingdom. From that time until the restoration of Austrian rule in Italy, Mpnti was devoted to Napoleon and wrote numerous odes of victory in his honor. In his latter years, a period of study and adversity, he joined his son-in-law, Giulio Perticari, in his fight with the Della Cruscans, and published his single great work, a version of the (Iliad) (1810). His translation of Persius should be mentioned and his most successful drama, (Caio Gracco) (1802). Monti was an ardent classicist and in his ˆermone sopra la mito-logia) (1825) combated romantic tendencies. Consult the biographies and appreciations by A. Monti (1873), Vicchi (1879-87) and Zum-bini (1894) ; and the Milan (1839), or Flor¬ ence edition (1817) of his works.

MONTICELLI, mon-te-cel'le, Adolphe, French painter: b. Marseilles, 1824; d. Mar¬ seilles, 1886. He made a short stay in Paris and contributed to the Salon ; but, not meet¬ ing with success, returned to his native town, where he died poor, ignored and insane. Un¬ appreciated, he sold his pictures in cafes for 10 or 20 francs; to-day they bring large sums. Collectors have made fortunes out of the small canvases which have given Monticelli posthu¬ mous fame. His (Court of the Princess) is in the Metropolitan Museum, New York. ((Monticelli,® writes a French critic, ((painted land¬ scapes, romantic

scenes, still life and fetes galantes in the style of Watteau. One cannot imagine a more inspired sense of color than shown by his works, which seem to be painted with powdered jewels, with powerful harmony, and beyond all else with an unheard of deli¬ cacy in the perception of fine shades. There are tones which nobody had ever invented be¬

fore, and a richness, a profusion, a subtlety which almost vie with the resources of music. The fairyland atmosphere of Monticelli's pic¬ tures surrounds a very firm drawing of charm¬ ing style; but, to use the words of the artist himself, (<in the canvases the objects are the decoration, the touches are the scales and the light is the tenor.® Monticelli has created for himself an entirely personal technique, which can only be compared with that of Turner. He painted with a brush so full, fat and rich that some of the details are often modeled in relief, in a substance as precious as enamels, jewels, ceramics — a substance which is a de¬ light in itself. Every picture by Monticelli aroused astonishment. Constructed upon one color, as upon a musical theme, a picture by Monticelli rises to an intensity which one would have thought impossible. His pictures are magnificent bouquets, bursts of joy and color, where nothing is ever crude and where everything is ruled by a supreme sense of har¬ mony.® Consult biographies by Faure (Paris 1908) ; Gouirand (Paris 1900).

MONTICELLO, mon-te-sel'lo, Ark., town, county-seat of Drew County, on the Saint Louis, Iron Mountain and Southern Railroad, about 81 miles south by east of Little Rock. The industries and trade are connected with the lumber, fruit, cotton and grain of the sur¬ rounding region, and stock raising is also car¬ ried on. Municipal enterprise has installed waterworks, sewage-disposal system and electric lighting. It is the seat of the Hinemon Uni¬ versity school, the Arkansas Orphans' Home (Baptist) and of the State agricultural school. Pop. 2,500.

MONTICELLO, Fla., town, county-seat of Jefferson County, on the Seaboard Air Line and Atlantic Coast Line railroads, about 32 miles east by north of Tallahassee. It is in an agricultural section, where the chief products are cotton and fruit, of which it prepares and ships large quantities for northern markets. Pop. (1920) 1,704.

MONTICELLO, Ill., city, county-seat of Piatt County, on the Illinois Central and the Wabash railroads, about 147 miles south by west of Chicago. It is situated in an agricul¬ tural and stock-raising region and

has attractive high school, library and court buildings. The chief manufactures are foundry and machine-shop products, dairy products, patent medicines, sirups, tile, brick, wagons and carriages. It is the trade centre for a large part of Piatt and the nearby counties, and ships considerable hav, livestock and vegetables. Pop. (1920) 2,280.”

MONTICELLO, Ind., town, county-seat of White County, on the Tippecanoe River and on the Chicago, Indianapolis and Louisville and Pittsburgh, Cincinnati, Chicago and Saint Louis railroads, about 75 miles north by west of Indianapolis. The river furnishes good water power for manufacturing. The chief manufac¬ turing establishments are flour and lumber mills and creameries; farming implements, thread, cement and tiles are also manufactured. The town owns and ooerates the waterworks Pop. (1920) 2,536.

MONTICELLO, N. Y., village, county-seat of Sullivan County, the terminus of the Port Jervis, Monticello and New York Rail-

road, about 67 miles northwest of New York

flty’ s*tuated m an agricultural region

irom which large quantities of potatoes, apples and a considerable amount of dairy products are shipped to New York markets. Perfumery, gloves and leather goods are manufactured, lhe nearby Mongaup Falls furnish ample water power and the village owns its waterworks. The village is a favorite summer resort on account ot its pleasant climate and beautiful scenery. A destructive fire in 1909 cost a property loss of $1,000,000. Pop. (1920) 2,330.

MONTICELLO, mon-te-sel’lo (It. Little Mountain), Virginia, the estate and residence once owned by Thomas Jefferson (q.v.), third President of the United States. It is in Albe¬ marle County, Va., about two miles from Char¬ lottesville. The estate was an unbroken forest

the early part of the 18th century, until in 1735 the land came into

possession of the father of Thomas. Peter Jefferson, the father, and his brother-in-law decided to ((go West* and try a new country, so they left the tide-wator set¬ tlements on the James River and journeyed about 100 miles toward the west, to what is now Albemarle County, and located 20 miles east of the Blue Range and among the foot¬ hills of the Southwest Mountains. Peter Jef¬ ferson ˆpatented® a tract of land of about 1,000 acres. In looking over his new possession he found no site for a home, such as pleased him; his neighbor, Randolph, sold him from his tract 400 acres for (< Henry Weatherbourne's biggest bowl of arrack punch." The place was then called Shadwell, after Shadwell street in Lon¬ don, and the country around Goochland. Thomas Jefferson was born in the old residence at Shadwell, and this house was his home for 27 years. From his boyhood his favorite spot on the estate was Little Mountain. Often he and his most intimate friend, Dabney Carr, afterward his brother-in-law, ascended the mountain in the twilight, and in the long vaca¬ tions they studied many an hour under an oak tree, their favorite of the forest. They agreed that whichever one died first, the other would have buried under this tree, and at an early age Dabney Carr was here laid to rest. Later Jefferson, his wife, two daughters, and others of his descendants were buried in the little cemetery which was formed around this oak.

It was when Jefferson was a member of the house of burgesses of Virginia, to which he was elected in 1769, that he began the erection of his residence on the summit of the world-re¬ nowned eminence, Monticello. (Jefferson changed the English name to the Italian, Monti¬ cello). The Shadwell mansion was on a hill on the north bank of the Rivanna River, and Monticello is south, just where the stream cuts its channel through the outlying range of the Alleghanies, the Southwest Mountains. On the northeast Monticello has a steep rocky base, washed by the Rivanna, on the southwest is a dip of about one-third the height of the moun¬ tain which connects it with Carter's, a higher peak. Monticello is still covered by a dense growth of timber, mainly hardwood deciduous trees.

Before the residence on Monticello was com¬ pleted, the Shadwell mansion was burned down,

1 Feb. 1770. The first building on Monticello was a brick story-and-a-half structure contain¬ ing one good-sized room and some smaller

rooms; it still stands as the south pavilion. Here Jefferson brought his bride in 1772. He was often absent from this beloved home, but his

own manuscripts, especially his garden-book, show his love for a quiet domestic life. This same garden-book shows that in 1769 he planted Variety of fruit trees on the southeast slope of the mountain, many of them still in existence. The house was enlarged to suit the needs of the family, and in accordance with the owner's plans. From his European journeys he brought back many new ideas, so that the architecture of the house is somewhat complex. It has the appearance of an Italian villa, with a Greek portico, and considerable of the features of Colonial architecture. The Marquis de Chas-tellux in a book of travels mentions a visit to Monticello in 1782, and says of Jefferson: ((He is the first American who has consulted the fine arts to know how to shelter himself from the weather." Architecture in America has ad¬ vanced since that time. Some of the plans, drawn by Jefferson himself, are still in exist¬ ence. The part of the home that was to last was made of good material and possessed a cer¬ tain elegance, but the furniture was most simple. His last days saw the estate of Monticello so deeply in debt that it was feared he would have to end his life an exile from his beloved moun¬ tain. He sacrificed some of his estate hoping to save the residence and some land for his daugh¬ ter. His friends assisted him so the estate was not lost to the Jefferson heirs until after his death; it had been his home for 56 years. No debt was allowed to defame the name of Jeffer¬ son ; Th°mas Jefferson Randolph, the grandson, and his daughters paid every dollar of debt their eminent ancestor owed after Monticello had been sold. The great-granddaughters kept a school to assist their father in paying this debt. Ten years after Jefferson's death, Monti¬ cello was purchased by U. P. Levy, U. S. N., who bequeathed it to the nation. His will was contested and Jefferson M. Levy, New York congressman, bought off the other heirs, and restored the building and estate to their original condition. From 1912 a campaign conducted by Mrs. Martin W. Littleton was carried on to induce the government to purchase the prop¬ erty as of national interest. The contemplated plan was to make it a Virginia home for Presi¬ dents of the United States, the owner, Mr. Lew having stipulated that in the event of its sale "it should not be used as a museum. Consult (Century Magazine, > Vol. XII, p. 643, article by Nicolav, (Monticello ; Home of Jefferson > ; Craighill, (The Virginia Peerage*; Foote, Sketches from Old Virginia.)

MONTIGNIES-SUR-SAMBRE, mon'te'-

nye sur-san br , Belgium, town in the province Hainaut, located on the Sambre 30 miles south of Brussels and on the Lodelinsart-Givet Rail¬ way. It is the centre of a coal mining industry and has manufactures of ovens, machinery, steel ware, *etc.* Its population in 1910 was

21,748.

MONTIJO, mon-te-zho, Eugenie-Marie de.

See Eugenie, Empress of the French.

MONTJOIE SAINT DENIS, mon-zhwa san den-e, a French war cry dating from the 12th century. The name is derived from the hill near Paris on which Saint Denis suffered martyrdom.

MONTLOSIER, mon'lo'zya, Frangois Dominique Reynaud, Count de, French pub¬ licist and politician : b. Clermont, Auvergne, 11 April 1755; d. 9 Dec. 1838. He was elected a member of the States-General (1789) and favored protection of royalty and nobility. He fled (1791) to London where he started an anti-revolutionary paper, the Courrier de Lon-dres. In 1800 he was won over by Bonaparte and given a position in the ministry of foreign affairs. He frequently accompanied Napoleon I as political correspondent during his cam¬ paigns, but resigned in 1812. After the first. Restoration his (De la monarchic frangaise depuis son etablissement jusqu'a nos jours > (Paris 1814) was a work in praise of the feudal state. Under the Restoration he took a prominent place fighting the activities of the Jesuits and published his (Memoir a consulted (1826), but in his (De la crise presente et de celle qui se prepare > (1829) he tries to inter¬ mediate between the parties, returning to his early aristocratic views in his (Memoires sur la Revolution frangaise, le Consulat, l'Empire et la Restauration) (1829). He defended the Louis Philippe government and was created a peer.

MONTLUQON, France, town in the De¬ partment of Allier, located on the Cher, start¬ ing point of the Berry Canal and junction of the Orleans Railway. It consists of the old town with its 15th century castle, and the modern industrial section which has been built up since the opening up of the coal field of Commentry. It possesses a

lyceum, commercial court, cham¬ bers of agriculture and manufactures, a library and theatre. Its industries are important and consist chiefly of iron and steel works, glass and mirror factories, chemical products, ma¬ chinery and considerable trade. In 1911 it had a population of 33,799.

MONTMAGNY, Charles Jacques Huault

de, sharl zhak ii-olt de mon-man-ye, French colonial governor; d. France, about 1649. He was Canada's second governor-general, 1636 — 48, and proved himself a wise and able ruler. The condition of the colony improved under his administration, he defeated the Iroquois and concluded a treaty with them at Three Rivers in 1645; and had begun the subjugation of the Hurons when he was recalled in 1647. Under his rule the Jesuits made extensive explorations and settlements, but though deeply religious Montmagny disapproved of the founding of Montreal, considering it a weakening of the missionary forces.

MONTMARTRE, mon-mar-tr, France, a northern district of Paris, a former suburban village, on a conical hill commanding an exten¬ sive view of the metropolis. See Paris.

MONTMEDY, mon'ma-de, France, capital of the Arrondissement of the same name in the Department of Meuse, located on the river Chiers and the East Railway. It is a fort of the second class and consists of the citadel on a rock 960 feet above sea-level with its old or upper town built in 1235 by Arnoux III, Count of Cas and Chiny, and surrounded by its high walls and tower, and the lower town (Bas-Medy). It was several times taken by the French but always released to the Spaniards until, in 1659, it came permanently under French rule. Louis XIV had Vauban greatly strengthen

the fortifications. In 1815 the Prussian and North-German allies besieged and then took the lower town by storm when it capitulated. In 1870 it became a useful railroad centre for the Germans. In the World War it was again captured by the Germans. In 1911 it had a population of 2,774.

MONTMORENCY, mon-mo-ron-se, Anne, Due de, French soldier: b. Chantilly, 15 March 1492; d. Paris, 11 Nov. 1567. He was a dis¬ tinguished general in the wars of Francis I, and was taken prisoner at Pavia (1525). In 1538 he was made constable of France, but by a

rapid change of fortune was banished the court in 1541 under suspicion of conspiracy. He was restored by Henry II (1547), in 1557 was de¬ feated by the Spaniards and taken prisoner at Saint Quentin, and in 1562 was again captured while commanding against the Huguenots at Dreux. In 1563 he drove the English from Havre, and in 1567 received a fatal wound in the battle against Conde at Saint Denis. Con¬ sult <Life) by Decrue (1885-89).

MONTMORENCY, mon'mo-roii-se, Henri, Due de, French soldier: b. Chantilly, 30 April 1595 ; d. Toulouse, 30 Oct. 1632. In 1612 he purchased the viceroyalty of Canada from the Prince of Conde for 11,000 crowns, and was wise enough to retain Champlain in command at Quebec. He wearied, however, of the post, which gave him constant trouble, and in turn sold it. His services against the Huguenots in the civil wars were distinguished, and included a victory over the Due de Rohan in 1628; but he took part in the insurrection of Gaston of Or¬ leans in 1629, was made prisoner, condemned for treason, and beheaded.

MONTMORENCY, mont-mo-ren 'si, Falls of, Canada, a beautiful cascade near the mouth of the Montmorency River, on the Saint Law¬ rence River, seven miles below Quebec. The river has an irregular course north and south of about 15 miles, and just above its confluence with the Saint Lawrence falls over a precipice 251 feet high, and 100 feet wide at its crest. The falls are visited by great numbers of tour¬ ists, and are utilized to supply the power neces¬ sary for the electric and street railway plants of Quebec.

MONTOJO, mont-o'ho, Patricio, Spanish naval officer: b. 1833. He entered the navy when a young man, and at the outbreak of the Spanish-American War was in command of the Spanish fleet in the Pacific. This force was attacked by the American Pacific squadron under Dewey in Manila Bay 1 May 1898. Montojo's flagship, the Reina Christina, was successively engaged by the Olympia, Balti¬ more, Raleigh and Boston, received 70 shots, which killed 52 men and wounded 150; and finally caught fire. Montojo transferred his flag to a gunboat. In September 1899 he was court-martialed in Madrid, and urged in his defense that the fault of the defeat was the Spanish government's, as it had not given him proper equipment. He was retired without right of promotion.

MONTORO, mon-to'ro, Spain, town in the province of Cordova on the rocky left bank of the. Guadalquivir and on the Madrid-Sevilla Railway. It has a beautiful church and a fine bridge built in the 16th century and remains of

ancient Moorish fortifications. Its chief industry is olive oil and cultivation of tropical fruits. Its population in 1910 was 15,144.

MONTORSOLI, Fra Giovanni Angelico

da, fra jo-van'ne an-jel'e-ko da mon-tor'so-le, Florentine sculptor and architect : b. Montor-soli, 1507 ; d. Florence, 1563. He was a mem¬ ber of the religious order known as Servites; worked at Genoa, after retiring from that order, and by building the Serra and Doria pal¬ aces and adding a chantry and Doria tomb to the church of San Mateo, established his repu¬ tation as a sculptor and architect (1525). He was soon afterward engaged as assistant by Michelangelo in his work on the chapel of the Medici at Florence; the statue of Saint Cosmas there is by him. Among his other productions are the fountain in the Cathedral square at Messina (1547) ; he also designed several chap¬ els in the cathedral there and built the light¬ house.

MONTOUR, mon-toor', Esther (called

((Queen Esther®), American half-breed Indian of the 18th century. She had French blood in her veins and was supposed to have been a de¬ scendant of Count de Frontenac, governor of New France. She married Eghobund, chief of the village of Sheshequin, and her keen intelli¬ gence enabled her to completely dominate the Senecas over whom she reigned as ((Queen Esther.® She was friendly to a Moravian mis¬ sion which was located near her village for some years, and accompanied the delegates to various congresses of the Six Nations in Phila¬ delphia, where she was well received among the best people owing to her pleasing manners and beautiful person. In the Wyoming mas¬ sacre in July 1778 the savage in her nature, however, asserted itself and to avenge the death of her son she deliberately tomahawked 14 prisoners. Consult Cook, (General Sullivan's Indian Expedition (1887).

MONTPELIER, mont-pel'yer, Vt., city, capital of the State, county-seat of Washington County, on the Winooski River, and on the Central

Vermont, the Montpelier and White River, and the Montpelier and Burlington rail¬ roads, about 38 miles southeast of Burlington. It is situated in a beautiful valley surrounded by hills and in an agricultural region. In the vicinity are valuable granite quarries. The chief industrial establishments are flour, feed and lumber mills, machine shops, hardware, patent medicines, granite works, lathes for turning steel clothes pins and creameries. It controls a large portion of the trade of the sur¬ rounding country, and ships considerable farm products, especially hay, maple sugar, apples and potatoes, and also dairy products, poultry, granite and lumber. One of the prominent buildings is the State capitol, a fine granite structure built in the form of a cross, the dome, 124 feet high, surmounted by a statue of agri¬ culture. A marble statue of Ethan Allen is at the entrance, under the portico ; large State ad¬ ministration building under construction. An¬ other fine building is Montpelier High School built 1915, also the Heaton Hospital, opened in 1896. The city has public and parish schools, the Washington County Grammar School, the Montpelier Seminary, under the auspices of the Methodist Episcopal Church, the Wood Art Gallery, the State Library, the Washington

County Grammar and Montpelier Union School Library, and the seminary library. The Y. M. C. A. is in flourishing condition. The govern¬ ment is administered under a charter of 1900 v/hich provides for a mayor, who holds office one year, and a council. The mayor appoints, subject to the approval of the council, the police; and the council elects the health officer, over¬ seers of the poor, superintendents of streets and water and other officers. The waterworks, owned and operated by the city, were opened in 1884, and now (1913) comprise about 40 miles of mains. The water is brought from Mirror Lake, or Berlin Pond, situated about four and one-half miles southeast of the city. The land which is the town site was chartered in 1781, but the first permanent settlement was made in 1787 by people from Massachusetts. The town was organized in 1791, and in 1805 Montpelier was chosen as capital of the State. It was in¬ corporated as a village in 1855. For 40 years it maintained town, village and school district organizations, until 1894, when it was chartered as a city. Among the noted people who have lived in Montpelier are Admiral George Dewey and Rear-Admiral Charles E. Clark, Joseph A. Deboer, an authority on insurance and loans. Pop. 7,125. Consult Hemenway, (Gazeteer of Vermont, > and (History of the Town of Montpelier) ; Thompson, (History of Montpelier. >

MONTPELLIER, mon-pel-le-a, France, chief town of the department of

Herault, on the Lez, six miles north of the Mediterranean, and 80 miles northwest of Marseilles. It is one of the handsomest towns of the south of France and with its equable climate a favorite tourist and winter resort for invalids. Among its noteworthy features are the Peyrou, a splen¬ did promenade, on which is the Chateau d'Eau, at the termination of a lofty double-arched aqueduct; the citadel; the cathedral; the Palais-de-Justice ; the university buildings, and Porte de Peyrou, a triumphal arch of the Doric order. Montpellier is well equipped with educational and other institutions, and since the 12th century has been famous for its school of medicine, said to have been founded by Arab physicians driven out of Spain. It is now merged in the celebrated University of Mont¬ pellier, dating from 1289, which has also ((faculties® of law,, science and literature, and an average annual attendance of 1,500 students; there is a public library of 130,000 volumes. The botanical garden, begun under Henri IV in 1593, is the oldest in France. Montpellier manufactures cottons, candles, soap, verdigris, chemicals, *etc.* It carries on an active trade, Cette serving as its harbor. Montpellier dates from the 8th century as a village built around a Benedictine abbey. It was a stronghold of the Huguenots, and suffered much in the reli¬ gious wars. The edict of Montpellier (20 Oct. 1622) granted the free exercise of their reli¬ gion to Protestants, and confirmed the Edict of Nantes. The philosopher Comte was one of Montpellier's distinguished sons. Pop. about

80,250.

MONTPENSIER, Anne Marie Louise d'Orleans, an rna-re loo-ez dor-la-an mon-pon- se-a, Duchesse de, French princess, better known as Mademoiselle or La Grande Made¬ moiselle: b. Paris, 29 May, 1627; d. there, 5 April 1693. Her father was Gaston d'Orleans,

Louis XIII's brother; and her mother was Marie de Bourbon-Montpensier, who died when her daughter was five days old, leaving her the richest princess of Europe. Her wealth, pride and romantic

disposition prompted her to a high match. In 1646 she refused the Prince of Wales, later Charles II, and her chance to marry Louis XIV was ruined in 1652, when she sided with Conde for whose protection she had the cannon at the Bastille fired on the royal troops. Upon her return to the court in 1657 she fell in love with Lauzun, a Gascon cavalier, whom Louis refused to let her marry. Lauzun was imprisoned for 10 years, but Mademoiselle seems to have married him secretly, in spite of the king, only to find him a brutal husband ; they were separated and her last years were spent in pious devotion. Her (Memoirs,* cov¬ ering the years 1630-88, are particularly valu¬ able for the light they throw upon the history of the Fronde; they are edited by Cheruel (1858). Consult Barine, (La Jeunesse de la Grande Mademoiselle 1627— 52) (New York 1901) ; Price, E. C., VA Princess of the Old World) (New York 1907).

MONTPENSIER, Antoine Marie Phil¬ ippe Louis d'Orleans, an-twan ma-re fe-lep loo-e dor-la-aii, Due de, French prince and claimant to the Spanish throne: b. Neuilly, 31 July 1824; d. San Lucar, near Seville, 4 Feb. 1890. The fifth son of King Louis Philippe, he studied at the College Henri IV, entered the army in 1842, served in Algiers, and in 1846 married the Spanish infanta Maria Luisa Fer¬ nanda. After the revolution of 1848 he lived in England and Holland; then settled in Spain, where he received the title of Infante and was made captain-general of the Spanish army; was suspected of a plot against the Crown and was exiled from Spain, returning only after the revolution of 1868. In 1870 he quarreled with the Duke of Seville, also a claimant for the throne, and killed him in a duel. During the reign of King Amadeus (1871-73), Montpensier was exiled to the Baleares ; upon his recall in 1873 he sided with Alfonso XII, and mar¬ ried to that prince his daughter, Maria de las Mercedes, who died without issue in 1878, the close of Montpensier's political activity. His eldest daughter married the Comte de Paris, and his only son became the husband of the Infanta Eulalia in 1886.

MONTREAL, Canada, the largest and most important city of the Dominion, and fourth in population among American cities, is in the province of Quebec. It lies on the left or north bank of the Saint Lawrence, at the head of ocean navigation, 985 miles from the Atlantic, 180 miles southwest of Quebec and 420 miles north of New York.

Topography.— Montreal lies in the middle of that great plain which stretches from the Laurentians to the Adirondack Mountains and extends from the sea into the middle of the Continent. The rivers which traverse this plain, the Saint Lawrence and the Ottawa, fall

together at the head of the Island of Montreal, which is 32 miles long and 10 miles wide at the broadest part. The city is built upon the south¬ east side of this island, at a point where the Lachine Rapids make further navigation impos¬ sible. It owes its importance to this situation. Immediately behind the city Mount Roval rises

to a height of 753 feet above the level of the sea. Upon three sides the mountain ends in a sheer cliff, but toward the west it extends in broken ridges for three miles. Mount Royal gives to the city its character. It was con¬ verted into a park by Frederick Law Olmstead, who succeeded admirably in bringing to light its characteristic beauties, by obeying the de¬ sign which nature had already laid down. By following the terraces a roadway was con¬ structed, devious, but always ascending until after a complete circuit the summit is reached. From the various levels and the different points of outlook a wide and diversified view is ob¬ tained. To the south, the White, Green and Adirondack mountains may be descried upon the horizon. In the middle-distance a number of rounded eminences arise from the plain, which are, like Mount Royal itself, the roots of old volcanoes. Villages, Longueuil, Saint Lam¬ bert and La Prairie, mark the southern bank of the Saint Lawrence, which at this point is two miles wide. Away to the westward the valley of the Ottawa opens out, and the river, dividing on the Island of Montreal, sends its waters on either side to mingle their dark col¬ ors with the blue of the Saint Lawrence. Fur¬ ther to the west Lake Saint Louis is spread out like a sea. The Lachine Canal threads the plain, and upon occasion one may see the leap and sparkle of the Rapids. To the north the Laurentians extend their dark purple irregular masses. Immediately around the mountain and upon its lower terraces lies the city.

Geology. — Fourteen distinct geological for¬ mations or horizons have been described within a radius of a few miles from Montreal. Four of these belong to the quaternary or newest sys¬ tem ; one is doubtfully but probably referable to the Devonian, one to the Silurian (Upper Silurian of Murchison), seven to the Ordovi¬ cian (Lower Silurian and Cambro-Silurian of many authors), and the remainder to the Laurentian or part of the great Archaean Complex.

History. — The site of Montreal was first visited by Jacques Cartier in 1535. He landed upon the island and followed an Indian path¬ way: «And we, being on the road, found it as beaten as it was possible to see, in the most beautiful soil and the fairest plain ; oaks as fair as there are in any forests of France, under which all the ground was

covered with acorns.

And about a league thence, we com¬ menced to find the lands tilled, and fair large fields full of. the corn of their lands, which is like Brazil rice, as large, or more, than peas, whereof they live as we do on wheat. And in the midst of these fields is situated and fixed the said town of Hochelaga, near and adjoining a mountain which is in the neighborhood, well tilled and exceeding fertile: therefrom one sees very far. We named that mountain Mont Royal?

The next European to visit the spot was Samuel de Champlain in 1611. He landed at a place which he called Place Royale, a name it still bears. He found «in the middle of the river an. island about three quarters of a league m circuit, fit for the building of a good and strong town, and I. named it the Isle of Saincte Heleine. The rapids come down into a sort of lake, where there are two or three islands and fine meadow-landsA By this time all trace of Hochelaga had vanished, leaving only ob-

MONTREAL, CANADA

City of Montreal from Mount Royal

Dominion Square

MONTREAL, CANADA

MONTREAL, CANADA

Notre Dame Church

MONTREAL

scure legends of a Huron Helen and of the evil which had been wrought by her.

The founding of the present city dates from 1642 and it was marked by voices and visions and dreams and signs. Its inception is shrouded in mysticism ; there was Dauversiere who whipped himself with a scourge of small chains ; there was Olier who afterward founded the Sulpician Seminary, to whom came a revelation as the choir was chanting Lumen ad revelationem gentium. These two men were miraculously brought together in the church of Notre Dame de Paris, and to them in an ecstasy the Virgin appeared. All these things are set forth in the Relations des Jesuites.

The proposal was to found at Montreal three communities, one of secular priests, to direct the colonists and convert the Indians; one of nuns to nurse the sick; and one to teach the Faith to children white and red alike. This was at a time when, from the condition of In¬ dian warfare, it was like entering a kennel of wolves. The soldier captain of the expedition of 40 men was Paul de Chomedy Sieur de Maisonneuve, a valiant and sober mai of grave demeanor and full of courage. Accompanying the expedition was the devoted Jeanne Mance. Arriving at Quebec they encountered only jealousy and distrust. It was then the leader cried : (<I have not come to deliberate but to

act ; it is my duty and my honour to found a colony at Montreal, and I would go if every tree were an Iroquois.® Upon the 17th of May 1642 this strange expedition arrived at the foot of Saint Mary's current. Maisonneuve sprang ashore on the spot where the Customs House now stands. In the words of the officiating priest, Pere Vimont, <(tents were pitched, camp¬ fires were lighted, evening fell and mass was celebrated. Fire-flies caught and imprisoned in a phial upon the altar served as lights.® An al¬ tar was raised, and kneeling together the ad¬ venturers heard the voice of the priest: (<You are a grain of mustard-seed that shall rise and grow till its branches overshadow the earth. You are few but your work is the work of God. His smile is upon you and your children will fill the land.® To trace the trials and growth of the Colony would be to write the romance of Christian chivalry.

As a result of the victory which Wolfe ob¬ tained over Montcalm on the Plains of Abra¬ ham, Canada fell to the British, and Montreal formally capitulated to General Amherst on 8 Sept. 1760. When the war of the American Revolution broke out, operations were directed against Canada. Montreal yielded Jo Brigadier-General Wooster, and General Carleton was obliged to withdraw to Quebec. During the winter of 1775-76 the Commissioners of Con¬ gress, Benjamin Franklin, Samuel Chase and Charles Carroll, took counsel as to how they might detach Canada from its allegiance to the British Crown, which had lasted only six years. The ecclesiastical authorities, with the astute¬ ness of their race, took the occasion to drive a hard bargain with England, by which their re¬ ligion and laws were guaranteed to them for ever. To England Canada was, in the mocking words of Voltaire, nothing more than a few acres of snow, and the mother country adopted an easy way out of her difficulties. The Com¬ missioners were outwitted and resorted to force. The expedition, which was sent to Quebec un¬

der General Montgomery, received no support on the way, and it was ultimately defeated and its commander slain before the barriers of Quebec.

Monuments, Parks and Public Buildings.

— Place d'Armes is a small enclosure sur¬ rounded by several noble buildings. The parish church of Notre Dame, with the seminary of the Sulpicians, occupies the southern side. The Bank of Montreal with its classic front faces the church, and upon either hand are large buildings for commercial purposes. The most notable feature of the Place d'Armes is the statue erected in honor of Sieur Chomedy de Maisonneuve, the founder of Montreal. He is represented in bronze, in the costume of the 17th century, holding a fleur-de-lis banner. The granite pedestal shows the inscription : "Paul de Chomedy de Maisonneuve, Fondateur de Montreal, 1642P It rests upon a fountain and displays bas-reliefs representing Maisonneuve killing the Indian chief ; the founding of Ville-Marie; the death of Lambert Closse defending his enclosure near Saint Lambert Hill ; the heroic death of Dollard, who fell with his com¬ panions at the Long-Sault on the Ottawa, and saved the colony. At the four corners are life-size bronze figures, representing an Indian, a colonist, with the legendary dog Pilote, a soldier and Jeanne Mance, all finely done by Philip Hebert, the Canadian sculptor.

Jacques Cartier Square fronts the river and is adorned with a column and statue of Lord Nelson, erected in 1808, and recently restored. Into this square the traffic from Bonsecours market overflows, and it has lost all the dignity of a public place. At the head of this square Frontenac burned four Iroquois in 1696, with good effect upon the tribe.

Victoria Square is in the centre of the city, at the foot of Beaver Hall Hill, and contains a good bronze statue of Queen Victoria, of colossal proportions, by Marshall Wood. A monument to King Edward VII adorns Phillips Square.

Dominion Square occupies the site of an old cemetery. The square is a pleasant place and acquires dignity from the buildings on either side; the Canadian Pacific Depot, the Windsor Hotel and on the east the cathedral of Saint James. Here have been erected the ice palaces when Carnival was king. Near the centre of the square is a structure containing a figure in bronze of the late Sir John A. Macdonald. The figure itself is of commanding proportions with a reasonable degree of harmony in its parts, but the canopy with its obscure adornments and trifling decorations, disguises the value of the figure.

Saint Helen's Island, at the foot of the cur¬ rent, is a small island called by the name of Helen, wife of Champlain, the first European woman to visit Canada. The English govern¬ ment acquired it from the Barons of Longueuil for a military depot and station. There is yet upon the island a battery of guns and barracks. The place is prettily wooded and has many secluded spots.

Churches. — The Catholic cathedral of Saint James has an imposing situation upon Dominion Square. It is erroneously called the cathedral of Saint Peter, because it is a repro¬ duction of Saint Peter's at Rome, modified to suit the exigencies of the Canadian climate;

for example, the roof is sloping to throw off the snow. This noble edifice was projected by the late Archbishop Bourget in 1852, when

his church and palace on Saint Denis street were consumed in the great fire of that year. The work was commenced in 1868 and is now nearly finished. Apart from the plan the ex¬ terior is hard and gloomy in appearance. The dome is a noble adornment and a salient feature in the architecture of Montreal. Its height with the cross is 250 feet and its di¬ ameter 90 feet. The plan is cruciform after the manner of its prototype, the tribune and ends of the transept being rounded. The total length is 330 feet, the breadth of the transept 225 feet, the height to the roof-tree 80 feet. The interior is upon the model of the Italian churches. At the north entrance is a statue to the founder by Hebert.

The parish church of Notre Dame faces the Place d'Armes. It is a plain stately edifice of late Gothic style, built of graystone in 1824, by James O'Donnell. The present site was occu¬ pied by a church built in 1672, a long low structure with a pointed roof. Notre Dame is one of the largest churches in America, being 255 feet long and 134 feet wide, and capable of containing 18,000 persons. There are* two towers, 227 feet high provided with an elevator, and from the summit a notable view may be ob¬ tained. They contain a chime of 10 bells which are rung upon special occasions. There are three others, one ((le Gros Bourdon,® the largest bell in America, weighing 15 tons. The in¬ terior is florid and tasteless in its decorations, but the wood carving is good. The organ was built at Saint Hyacinthe in 1890. Behind the choir is a richly adorned Lady Chapel.

Adjoining the church is the seminary of Saint Sulpice, erected in 1710 and now used for the offices of the Order. As in the days of Charlevoix, it is ((a stately great and pleasant house, built of freestone, after the model of that of Saint Sulpice at Paris; and the altar stands by itself, just like that at Paris.®

Notre-Dame-de-Lourdes, on Saint Catherine street, is the only church in Canada in which all the interior decoration is meant to illustrate one central idea ; in this case, the dogma of the Immaculate Conception. M. Bourassa, the art¬ ist, was stimulated to this effect by the declara¬ tion in 1854, of Pius IX, that this dogma was of faith. The style of architecture is Byzantine and Renaissance in harmonious proportions. Within and without the effect is one of unity and force.

Notre Dame-de-Bonsecours dates from 1673, when it was founded by Marguerite Bourgeois. The present edifice dates from 1771, and several times has been in danger of being swept away by the tide of commerce at its base. It has been sorely mishandled by the renovator.

The church of the Gesu on Bleury street, with Saint Mary's College adjoining, is the abode of the Jesuits. They returned to Canada in 1847, and erected the present church in 1864. Members of this Order were the first to estab¬ lish missions in Canada, and an account of their trials affords the most romantic reading of its history. Individual priests penetrated the wil¬ derness and lived and died often in hideous torment amongst the savages of the Iroquois confederacy. At the time of the conquest they were expelled from Canada, and their estates

confiscated. Up to 1892 their revenues were devoted to educational purposes when, under arrangements, their estates were restored to the Order. The church is 194 feet long, 96 feet wide, the transept 144 feet and the nave 95 feet high. The frescoes are in grisaille, grayish tints imitative of bas-reliefs — a very effective decoration for the interior. The evening music is very fine, and an admirable sermon in Eng¬ lish is often preached which attracts many non¬ adherents of the Roman communion.

Amongst the churches of Montreal the An¬ glican Christ Church Cathedral holds first place in correctness of style. The style chosen is early English. The architect has insisted very clearly upon its proportion and symmetry, and has succeeded in erecting one of the most im¬ portant architectural units in America. Its con¬ ception is due to Bishop Fulford, the first resi¬ dent bishop of Montreal, and his memorial on the east side is much admired. It resembles the Martyrs' Memorial at Oxford. The church is in the form of a Latin cross. The total length is 212 feet, transept 100 feet, height of spire 224 feet, nave 67 feet. The material of which it is built is Montreal limestone faced with Caen sandstone, which, though soft for the climate, has weathered to a very delicate tone of color. There is no attempt at interior decoration, except in the staining of the glass, which is well done, especially the northern windows and those of the transept. Other features are the seats of the choir, and the capitals of the columns carved to imitate Canadian flowering plants. The chapter-house, an octagonal building with broken outlines, adds to the general effect. In spite of, or perhaps by reason of, the correctness of the design and the adherence to it, the edifice somehow lacks the true cathedral feeling.

Saint George's Church, Anglican, on Do¬ minion Square, is a very dainty piece of build¬ ing, after the manner of the 13th century Gothic. One notes the following features : the stone porch, the spire

230 feet high, with a fine chime of bells, the wide span of the roof, and the freedom of the nave from pillars. The church was erected in 1870, of limestone and olive sandstone.

The church of Saint James the Apostle, on Saint Catherine Street West, is a pleasing little edifice. It contains a chime of six bells which ring with good effect. One admires the pulpit church was erected in 1870, of limestone and the stalls of carved buttonwood.

The principal Presbyterian churches are Saint Andrews (Church of Scotland) on Beaver Hall Hill; Saint Paul's, Knox, American, and Crescent on Dorchester street; and, most im¬ portant, Erskine Church, on Sherbrooke street.

Saint James is the chief of the Methodist churches. _ It is situated on Saint Catherine street; it is elaborate in design and within the arrangement is of a very modern kind.

Educational Institutions. — McGill Univer¬ sity, non-denominational, was founded in 1821, when James McGill, a native of Glasgow, born 1744, died 1813, under a will dated 1811 be¬ queathed £30,000 to the Royal Institution for the Advancement of Learning. This corporate body dates from 1801 and it secured a new charter in 1821, but it was not till 1829 that educational work was undertaken. McGill Uni¬ versity contains four faculties, Arts, Law,

Medicine and Applied Science, the Royal Vic¬ toria College for Women and a Conservatorium of Music. In 1917-18 the enrolment was 1,040; about 2,300 students and graduates were serv¬ ing in the Great War.

The university library, a fine Romanesque building, erected in 1893, contains over 150,000 volumes. It is particularly strong in history. The museum, erected in 1882, is rich in geo¬ logical collections. The observatory is the centre of much valuable work in astronomy. Connected with the university are the Presby¬ terian, Wesleyan,

Anglican, Diocesan and Con¬ gregational colleges. There is also in Montreal the Medical Faculty of Bishop's College, Len-noxville.

Laval University was founded in 1852 by the Quebec Seminary, which itself was founded in 1663 by Mgr. de Laval Montmorency, the first bishop of Quebec. Laval operates under a royal charter signed at Westminster 8 Dec. 1852 and under the bull, Inter Varias Sollicitudines, promulgated by the Sovereign Pontiff Pius IX, 15 April 1876. In conformity with the decision of the Propaganda a branch of Laval University was established in Montreal in 1877, enjoying all the privileges of the mother university at Quebec. A new building which is a modern adaptation of the Renais¬ sance was erected on Saint Denis street out of the large funds of the seminary. The first floor is occupied by the law faculty, the second by the faculty of medicine. This faculty was formed by an amalgamation in 1891 with the Montreal School of Medicine and Surgery, founded in 1843. In 1919 this branch became the independent University of Montreal.

The Seminary of Saint Sulpice undertakes the theological teaching for the Montreal branch of Laval University, and a portion of the work in arts. Its buildings extend from Sherbrooke street up the slope of the mountain and include the grand seminary and the Semi¬ nary of Philosophy. There are more than 450 students in residence with 28 professors. Two towers, the remains of the fort constructed in 1671, still stand in front of the seminary.

Saint Mary's College is conducted by the Jesuits and adjoins the church of the Gesu on Bleury street. Here 400 students are assembled and receive an excellent training in classics.

The Sisters of the Congregation of Notre Dame was established in 1653. These sisters have 91 educational establishments in Canada and the United States with 1,000 nuns and over 30,000 pupils. The mother house, Villa Maria, was burned in 1895, but it is now being replaced on a new site.

The Sisters of the Holy Names of Jesus and Mary inhabit the Hochelaga Convent for a mother house. They have 36 minor houses in which 10,000 children are taught.

Hospitals. — The Hotel Dieu, 253 beds, founded in 1643, occupies a pile of buildings erected in 1859. During the Iroquois Wars and ever since this hospital has done good service. It is attended by the surgeons of Laval. The 'Montreal General Hospital (484 beds) was founded in 1819, and opened in 1822. The Royal Victoria Hospital

(355 beds) was founded, erected and endowed between 1888 and 1893 by Lord Strathcona and Mount Royal and Baron Mount-Stephen. Other hos¬ pitals are the Notre Dame, with 148 beds,

which is now erecting new buildings with accommodation for contagious cases, the West¬ ern General Hospital and the enormous hos¬ pital of the Soeurs Grises for foundlings and the aged infirm. The <(Alexandra Hospital" for contagious diseases was erected by the Prot¬ estant community at a cost of $200,000.

Other public buildings are the city-hall, an imitation of the Hotel de Ville in Paris ; the courthouse, in a classical style with a dome ; the Art Gallery, with some good pictures but not equaling those held in private collections ; the Fraser public and reference library with accommodation for 300,000 volumes, opened by Field Marshal Joffre on 1 September; the Canadian Pacific Railway Station, a fine castel¬ lated structure. Many of the private residences are fine, and the general material of construc¬ tion being gray limestone gives to the city an appearance of dignity.

Navigation and Trade. — The Montreal-Quebec channel, with a minimum depth of 31 feet, accommodates vessels of 15,000 tons, and the port handles one-third of Canada's com¬ merce. Montreal has eight miles of deep water in the harbor, and it is well equipped for the expeditious handling of traffic. Port statistics for 1917 show 6,921 arrivals, of which 579 were Atlantic ships, 68 from the Maritime Provinces and 6,274 from inland waters (gross tonnage, 5,217,309 tons). The total value of the imports for year to 31 March 1916, $129,139,- 817, and of the exports of Canadian products, $173,436,739. The customs receipts for 1917 were $37,857,723, and the inland revenue re¬ ceipts, $15,685,451.

Banking and Finance. — Montreal is the banking centre for Canada. There are 20 chartered banks in Canada, many of which have their head offices in Montreal and nearly all have branches. The bank clearings in Mon¬ treal for 1917 were $4,188,255,210; the assess¬ ment valuation was $824,630,229 (doubled in six years). The municipal budget, $14,230,492 in 1916, is the highest in Canada.

Railways. — Three great railway systems, the Grand Trunk, Canadian Pacific and Grand Trunk Pacific, have their headquarters in Montreal

with general offices and large works. Two bridges span the Saint Lawrence. The Victoria bridge, one and three-fourths miles long, tubular, costing $6,300,000, was designed by Robert Stephenson, and the work was inaugurated by the Prince of Wales in 1860. It was long regarded as one of the engineer¬ ing feats of the world, but in 1898 it was converted into a structure more suitable for modern needs with two tracks, a driveway and foot-path. The Canadian Pacific Railway bridge, light and graceful, crosses the river at Lachine. It is built on the cantilever principle, and has two spans each 408 feet long. In order to obtain terminal facilities for the Canadian Northern Railway, a tunnel has been con¬ structed through Mount Royal.

Population. — The population *of Greater Montreal is now (1917-18) approaching 800,000. In the city 75 per cent of the population are of French-Canadian extraction. Both French and English languages are officially recognized and the majority of the population speak both languages. In 1800 the city had 7,000 popula¬ tion. Montreal has the largest birth rate of any of the world's large cities, being in 1915

36.96, the death rate was 19.60; but infant mortality is heavy, 185 per 1,000.

Schools. — The public schools are con¬ trolled by boards of commissioners, one for Catholics and one for Protestants. These are elected by the legislature and the city council. The schools are in the main effective, though the commissioners are chiefly clergymen, and education is free. The city was placed under government by commission in 1918.

Climate. — The weather in Montreal is cold in winter and pleasantly warm in summer. The greatest cold, however, is rarely below 20° zero, and the greatest heat above 88°. The annual mean temperature is about 42°. There is gen¬ erally plenty of snowfall in winter and sleigh¬ ing begins about 1 December. Consult Bosworth 'Hochelaga Depicta> (new ed. 1901); Dawsons 'Handbook* (1888); Hinshelwood, 'Montreal and Vicinity* (1904); Brumath, 'Histoire populaire de

Montreal* (1890).

Andrew Macphail.

MONTREAL, Capture of, in American Revolution. See Quebec, Battle of.

MONTREAL, University of. See Laval University.

MONTREUIL, mon'trey, France, town in arrondissement Sceaux and department of Seme, five miles east of Paris and north of Vincennes. It has a church dating from the 12th-14th century. The place is noted for its remarkably fine fruit especially its cherry orchards. It has manufactures of chemicals, Indiarubber goods, dolls, pianos, porcelain and

43217UrmtUre' ItS population' approximately,

MONTREUX, moii'tre, Switzerland, invalid resort in the canton of Vaud, located on Lake i r*uVacˆnd on ˆhe Geneva-Saint-Maurice line …. o Simplon Railway. It consists of several villages scattered on the cliffs and lake shore among them Vernex (the capital), Clarens, Ter-ntet, Veytaux, Glion, *etc.* In 1910 the communi¬ ties numbered 18,800 souls. On account of its lovely scenery and mild and healthy climate the year round it is greatly frequented by in¬ valids and convalescents. The ancient noted castle of Chillon is in the neighborhood. A rack-and-pinion railway takes visitors from Glion up to the Rochers de Naye, 5,800 feet above sea-level. Consult Gribble, F. H., 'Mon¬ treux* (New York 1908); Biihrer, C., 'Le chmat de Montreux* (Montreux 1902).

MONTROSE, mon-troz', James Graham,

Marquis of, Scotch Royalist general : b. 1612 ;

~Fnburgh, 21 May 1650. He was son of the Lari of Montrose, whom he succeeded in that title in 1626. He was educated at Saint Andrew s ; joined the opposition to Charles I's t? introduce episcopacy into Scotland in 1637, becoming one of the leaders of the Covenant. In 1638— 39 he three times overran A ierdeen. In the latter year he was an envoy to the king at Berwick; in 1640 he was the first to cross the Tweed in the Scottish invasion of Lngland. In 1641, being found in secret cor¬ respondence with the king, he was imprisoned by Argyll for five months. In the following year he was offered the command of the Cove¬ nanting army, but declined; and in the fol¬ lowing year definitely turned to the Royalist side. In 1644 he left Oxford disguised

as a

groom and penetrated to Blair Atholl. He then united the western clans, united by their com¬ mon hatred of Argyll against the Covenanters, and with them he won several victories — at Tippermuir, Aberdeen, Inverlochy, Auldearn Alford and Kilsyth — only to be crushed at Philiphaugh (12 September) by David Leslie. Montrose escaped to Norway. In 1649 he suc¬ ceeded in urging the younger Charles to send him again to Scotland, raised an army at Got-tenburg, landed at Orkney, was defeated at Carbisdale in Southerlandshire and afterward was captured, taken to Edinburgh and there drawn and quartered. His loyalty to the Stuart cause is only less remarkable than his own scheme of Scottish independence of ecclesiastical control, an ideal to which he always remained faithful. Montrose was a political poet, whose verse is vigorous. As a general he ranks first among the Scottish Royalists. Consult Buchan, J°h,n» Jhe Manluis of Montrose* (London tt ‘ Gardmer, ‘The Great Civil War* (Vol. II, which is particularlv able in its criticism of Montrose’s strategy) ; Mowbray, Morris, ‘Mon¬ trose* (in the ‘English Men of Action* series, London 1892) ; and Napier, ‘Montrose and the Covenanters* (ib. 1838).

MONTROSE, Colo., town, county-seat of Montrose County, on the Uncompahgre River and on two branches of the Denver and Rio Grande railroad, about 355 miles southwest of Denver It is in the Uncompahgre Valley, in which there is a large acreage of fertile soil, which is made productive by irrigation. The chief products are fruit, grains and vegetables.

1 he three local banks have combined resources amounting to $1,586,830. The assessed property $3,002,320, on a real value estimated at $5,000,000. The town’s principal public build¬ ings are the courthouse, city hall, library, fire house, and pump station. The annual revenues are about $160,000. There are two graded schools and a county high school. Considerable attention is given to stock-raising. The govern—

O920)iS3 581the commission”manager Plan. Pop.

MONTROSE, Pa., borough, county-seat of busquehanrm County, on the Montrose, the Le-UP’1 * a IRy, and the Delaware, Lackawanna and Western railroads; also on the Scranton and Binghamton Electric Railroad; about 40 miles north by west of Scranton. It is about 2,000

feet above the sea, and its cool climate in sum¬ mer and the beauty of its scenery make it a favorite summer resort. The value of taxable propei ty is about $400,000 on a basis of 33 per cent valuation. The tax rate is about 5 per cent I he manufactories are machine shops lumber mills, flour mills and creameries The public buildings include the county courthouse jafl and the public library. The government is ot the regular borough pattern common in Pennsylvania. Pop. (1920) 1,661.

MONTROSE, Scotland, a seaport town and /£l-hurgKln, Forfarshire, 90 miles northeast of Edinburgh by rail, at the mouth of the South Lsk, which widens out into a shallow expanse behind the . town, known as Montrose Basin.

oJ!finVer •? croˆs? < J by a suspension bridge, and by a railway bridge.- Montrose is well built and has the usual public buildings and institu¬ tions, including two public libraries and one of

the largest parish churches in Scotland. It has one of the best golf links in Scotland. The principal employment is flax-spinning. Boat building is also carried on. There are extensive sawmills, and a large aerodrome nearby. The foreign trade is largely in timber, flax, *etc.* Montrose is also the centre of a fishery-district. It dates from the 10th century. Pop. 12,666. Consult Mitchell, ‘History of Montrose) (Mont¬ rose 1866).

MONTROYDITE. A mineral, oxide of mercury, HgO in ore mined in the Terlingua district, Texas.

MONTS, Pierre du Guast, pe-ar dii ga moii, French colonist in North America: b. Saintonge, France, about 1560; d. Paris, 1611. He was of an Italian family and educated in the Roman Catholic faith, but became a Pro¬ testant, fought on the Protestant side in the wars of religion, and was made governor of Pons in Saintonge. He made several voyages to America, and is believed to have accom¬ panied Chauvin’s expedition of 1600. In 1603 he was appointed lieutenant-

general with vice¬ regal authority of a company of colonists to whom Acadia had been granted, a territory which included the present maritime provinces of Canada, and part of the province of Quebec and the greater part of New England. He sailed from Havre in 1604 with Samuel Cham¬ plain and the colonists, and after exploring the Bay of Fundy discovered Annapolis Basin, which they called Port Royal, and then explored and named Saint John River. He established a colony at Saini Croix and at Port Royal and then returned to France, but his patent for colonization was canceled in 1607, and after¬ ward renewed for a year. At his own expense he sent relief to his colonists and assisted Cham¬ plain and Pontgrave to make a voyage to the Saint Lawrence in 1607 ; and Quebec was founded by explorers aided by him in 1608. He lost favor at court upon the death of Henry IV. The date of his death is uncertain. Consult Lescarbot, (History of New France) in the Champlain Society's edition, edited by Grant and Biggar (3 vols., Toronto, 1907-14) ; Parkman, (Pioneers of France in the New World) (1865) ; and tercentenary of De Monts' Settle¬ ment at Saint Croix Island) (Maine Historical Society's publications, Portland 1905).

MONTSERRAT, montser-rat', Spain, a deeply eroded mountain 4,070 feet high in the province of Catalonia, 30 miles northwest of Barcelona, famous for its ancient Benedictine monastery, composed, in part, of 13 hermitages, accessible only by steps hewn out of the steep rock, and founded by Sifredo el Vellaso, count of Barcelona, on the spot where a miracle-working image of the Virgin Mary was found in the 9th century. It was enlarged and richly endowed by Philip II. Learned Benedictines had established themselves here as early as 976; and they and their successors formed a large library, which was destroyed when the monas¬ tery was pillaged by the French and partly de¬ stroyed in 1811. After the restoration of Fer¬ dinand VII the rebuilding of the monastery was begun, but was stopped again when the monks were expelled by the Carlists in 1827. The monastery has fallen more and more into de¬ cay since the abolition ot the order to which it belonged. While living in this monastery

Ignatius of Loyola (q.v.) conceived the idea of founding the order of Jesuits. According to legend Montserrat was the site of the castle of the Holy Grail.

MONTSERRAT, mont-se-rat', West Indies, a British island of the Leeward group, almost at the same distance (about 30 miles) from the islands of Nevis, Antigua and Guadeloupe. It is 32 square miles in extent, nearly two-thirds of which is mountainous and barren. Its cul¬

minating point is the Souffriere, a volcano 3,000 feet high. The climate is on the whole healthful. The principal exports are sugar, molasses, tamarinds and lime-juice, and the principal imports, cottons and clothing mate¬ rials, hardware and other manufactures. Reve¬ nue •(1915-16) , £10,722; expenditure, £11,969; imports, £33,686; exports, £43,141. The govern¬ ment of the island is vested in the governor-in-chief of the Leeward Islands, who is repre¬ sented by a commissioner, assisted by a nomi¬ nated executive and legislative council. Ply¬ mouth, the capital (pop. 1,500), is on the south¬ west side of the island. The island was dis¬ covered by Columbus and was colonized by the British in 1632. It was twice in the hands of the French, but since 1783 has been uninter¬ ruptedly possessed by the British. Pop. 12,215, of whom not more than 200 are whites.

MONTT, mont, Jorge, Chilian sailor and politician : b. Santiago, Chile, 1846. He was a son of the Chilean statesman Manuel Montt (q.v.) and early entered the navy, where he had gained the rank of captain when in 1890 an uprising against President Balmaceda was threatened. When the revolution broke out in 1891 Montt was given command of the naval and land forces subject to the control of Con¬ gress, and after the suicide of President Bal¬ maceda was appointed provisional President and in November 1891 was elected to the office. His moderate and conciliatory admin¬ istration did much to heal the wounds of war ; he reformed the currency, reorganized the navy and army and made the municipalities locally autonomous.

MONTT, Manuel, Chilian statesman: b. Petorca, Chile, 5 Sept. 1809; d. Santiago, Chile, 20 Sept. 1880. He was graduated from the National Institute in Santiago and was en¬ gaged as instructor there until he entered upon his political career. As assistant secre¬ tary of state he sternly suppressed the revolt of 1837, and in 1838 was made a judge of the Supreme Court. His election to the chamber of deputies followed and he was for a time president of that body. He was Minister of Justice 1841-45 and of the Interior 1846-48, was elected President in 1851 and under his firm, conservative policy a succession of revolts were crushed, many industrial improvements were introduced and the laws reorganized and codi¬ fied. After the expiration of his second term he resigned his office to his successor and as¬ sumed the presidency of the Supreme Court. He was president of the American Congress which met in Lima in 1865.

MONTUCLA, mon’tu’kla’, Jean Etienne,

French mathematician: b. Lyons, 5 Sept. 1725, d. Versailles, 18 Dec. 1799. He was survevor-in-chief of the royal buildings in Paris

(1766-92). He wrote (Histoire des recherchcs sur la quadrature du cercle, etcP (2d ed, Paris

1831) ; (Histoire des mathematiques) (ib. 1758, 2 vols.; 2d ed., 1799 — 1802, 4 vols.), the first and most important work on the scientific history of mathematics up to the time of Moritz Cantor (1860).

MONTYON (moii-te-on) PRIZES, re¬ wards from a fund left in charge of the French Academy by Jean Baptiste Robert Auger Baron de Montyon (b. 1733; d. 1820), a French economist and philanthropist and a friend of Franklin. He founded in his lifetime six prizes, of which two, that for useful discov¬ eries in the arts, and that for valuable medical discoveries, lapsed after his death. The others are (1) a prize, founded in 1782, granted an¬ nually to the author of a literary work ad¬ judged the most beneficial to the temporal good of mankind ; (2) founded in the same year, for the most important discovery making more healthful the occupations of workingmen; (3) founded in 1783, to promote mechanical re¬ search, and (4) a prize, first given in 1783, for the most heroic act on the part of any poor French citizen. For each of these prizes he left a capital fund of 10,000 francs ($2,000).

MONUMENTA G.ERMANL® HISTORICA, a great historical work dealing with the monuments and antiquities of Germany, the first volume of which was published in ‘l826. It was begun in 1819 and later was placed un¬ der the direction of the Prussian Academy of Sciences. In 1914 upward of 114 volumes had been issued.

MONUMENTAL INTERIOR DECO¬ RATION. See Interior Decoration.-

MONUMENTS. The term monument is applied to structures which are characteristic or remarkable on account of their being erected as memorials, and also, though loosely, to those buildings which express some form of worship, or have peculiar prominence on account of their beauty, proportion or grandeur. In modern times, churches are often erected as memorials to individuals, and yet the term monument

is not applied to them except in the vague general sense named above. It is evident, therefore, that such buildings may be commemorative monuments, as well as columns or tombs. Se¬ pulchral monuments are the memorials most commonly erected. In Egypt, pyramids are monumental on account of their size, showing very little of so-called architectural art. There are about 100 of these, each containing a room which was used as a royal sepulchre. The Great Pyramid built by Khu-fu, called by the Greeks, Cheops, about 950 b.c., measures 764 feet square at its base and is 482 feet high. As Saint Peter's, at Rome, is about 15 feet less in height, it could be covered by the shell of this pyramid. In Assyria and Chaldaea there are few temples and no tombs remaining of sufficient architectural importance to be classed as monuments. Important buildings in these countries were placed on huge mounds or ter¬ races of earth, which raised them above the surrounding country, but as these structures were mainly of unburned bricks, they have fallen into shapeless mounds.

The earliest existing Greek monuments are found at Mycenae and Tiryns. The Lion Gate at Mycenae shows two large lions rampant on each side of a column, carved in bas-relief above the lintel ; and this sculpture is wholly

monumental in character, related both to reli¬ gious and dynastic associations. The gateway at Mycenae is one of the earliest of porches or towers of entrance which were among the chief monuments of Greek art : these were the Propylaea of which the most important was that of the Acropolis of Athens, with the small Ionic temple of Nike Apteros close by. The choragic monument erected by Lysicrates to commemorate his choral victory may still be seen at Athens. This was built at the time of Alexander's conquest, when Athens was de¬ clining and Asia Minor was being filled with magnificent temples of the Corinthian order. Other choragic monuments still exist at Athens in a partly ruined condition. The Tower of Winds, or Clepsydra of Andronicus, was erected at Athens about 100 b.c., but this was rather a utilitarian structure, as it served as a meas¬ ure of time. Other Greek monuments were the Arch of Hadrian, of the later Roman period; entrances to other temple sites, similar to the Propylaea of the Acropolis, as that of Eleusis; theatres, colonnades, stadia and gymnasia. Greek tombs that remain at the present time are nearly all to be found in Asia Minor, the best known being the Mausoleum at Halicar¬ nassus. The small Greek monuments and tombstones are very simple and refined in detail. Of, the same epoch are the rock-cut tombs of Asia Minor. Some of these are of great beauty, the exterior

face of the living rock having been smoothed and made vertical, and adorned with magnificent bas-reliefs of very large size.

The principal Roman monuments were on a large scale, the rough work being executed by cheap labor, soldiers, barbarians or slaves. The Roman Forum was crowded with temples, arches and individual memorials. Arches were' characteristic products of Roman civilization and were generally erected in honor of some victorious general or in commemoration of some great event.

Columns were also frequently erected. The column of Trajan is still standing in Rome. It is 133 feet high and has a spiral line of figures in relief from the foot to the top of the shaft showing the story of one of Trajan's cam¬ paigns. I here is a staircase within the column leading to the top. The sepulchral monuments ot the Romans were generally small. One of the larger ones was the circular tomb of Had¬ rian now the castle of San Angelo. Small sepulchral monuments lined the sides of Roman roads for miles outside the city. Many have been found at Pompeii. The tomb of Csecilia Metella, a characteristic example, was built by Ciassus, about 60 b.c. It was circular in plan with a square base.

Early Christian architecture, developing af-ter the fall of Rome, used or copied Roman buildings. At Ravenna interesting monuments of tins period were the tomb of Galla Placidia,

fl of ˆ 5th century, and the

tomb ot 1 heodonc, erected early in the 6th century, a two-storied structure, roofed by a single stone 36 feet in diameter. Basilicas com¬ memorating scenes in the life of Christ were erected as early as the 4th century in Syria at Bethlehem, at the sepulchre near Jerusalem and on the site of the temple.

Tim principal monumental buildings of the Byzantine period were in Syria, where from the

4th to the 8th century what we call Syrian architecture was in full luxuriance. The noble tombs of cut stone are, together with the churches and villas built of the same material, rather Graeco-Syrian than strictly Byzantine in construction and design. Romanesque architec¬ ture in western Europe has not left us many monuments of great size and importance, but some tombs of great beauty remain in the churches of England, France and Germany.

Prominent monuments of the Gothic period were erected in the cathedrals at Paris, Char¬ tres, Rouen, Amiens, Rheims and in the Sainte Chapelle, Paris. In England, early English Gothic is well shown in the crowd of altar-tombs, some of them with canopies, which are found in the churches, especially in Westminster Abbey. Memorial chapels were also built of great richness and splendor. A good example of the decorative period is to be found in Henry VII's chapel at Westminster. Italian Gothic monuments include many of the wall-tombs in the cathedrals at Florence, Sienna and Milan.

The Renaissance is represented by the Flor¬ entine wall-tombs of Santa Croce and the Vene¬ tian ones of the churches of Saints Giovanni e Paolo, the Frari and many others. The prin¬ cipal monument of Saracenic architecture in India is the Taj Mahal in India, built in the middle of the 16th century, but the tomb-mosques of the caliphs near Cairo are equally fine as architecture, however inferior in cost and splendor.

In the 19th century, a list of monuments should certainly include the triumphal arches of the French empire, the arch of the Carrousel and the Arc de l'Etoile, the Pantheon, the Madeleine, the Colonne Juillet; the Siegesthor in Munich and the Brandenburger Thor in Berlin; in America, the tomb of General Grant in New Yotk, the many Lincoln and Washing¬ ton monuments in different cities, and a host of statues, some equestrian, for which see Sculpture.

Bibliography. — Bartlett, < About Monuments) (1878); Bartoli, (Veteres arcvs Av-gvstorvm trivmphis insignes ex reliqviis qvae Romae adhvc svpersvnG (1824) • Benvenuti, (Monumenti sepolcrali della Toscana) (1819) ; Boussard, ˆEtudes sur l'art funeraire moderne dans ses conceptions les plus pratiques, cha-pelles, sarcophages,* *etc.* (1870) ; Brindley, (Ancient Sepulchral Monuments to the End of the 18th Century) ; Chancellor, (Ancient Sepul¬ chral Monuments of Essex* (1890) ; Clochar, 'Monumens et tombeaux measures et dessines en Italie) ; Conze, (Die attischen Grabreliefs) (1890-92) ; Gardner, (Sculptured Tombs of Hellas* (1896) ; King, (Roman Sculpture) (1907); Macklin, ˆMonumental Brasses) (1890) ; Tatham, (Etchings of

Grecian and Ro¬ man Architectural Ornament* (1826) ; Thomp¬ son, S., (Sepulchral Monuments of Italy >

(1883); Walters, (Art of the Greeks* (1906); id., *Art of the Romans) (1911) ; Ware, (The Memorial Hall of Harvard University) (1887) ; Wasmuth, (Monumente und Standbilder* (1891—

1901).

MONVEL, Louis Maurice Boutet de, loo-e mo-res boo-ta de mon-vel, French painter and illustrator: b. Orleans, 1850; d. 16 March 1913. He studied with Rudder, Cabanal and Carolus

Duran, with the last, after some work in the Atelier Julien. His first picture exhibited in the Salon appeared in 1874. He prefers the decorative to the realistic effect in color and modeling. The illustrations which he made for the (Life of Jeanne d'Arc > (1897) in the Cen¬ tury Magazine are supremely successful both in line and color. In the Memorial Church at Domremy he has painted six panels illustrating the career of La Pucelle. Among his best-known pictures is (The Apotheosis) (1885) and his portraits are famous.

MONYPENNY, William Flavelle, English journalist: b. 1866; d. 23 Nov. 1912. He joined the staff of the London Times in 1893, and in 1899, shortly before the outbreak of the South African War, became editor of the Johannes¬ burg Star. Under his direction the Star had strongly advocated the cause of the Uitlanders against the Kruger regime. The Boer Presi¬ dent, ordered his arrest, but Monypenny escaped in female garb and joined the Imperial Light Horse. He went through the siege of Lady¬ smith and after the war returned to his edi¬ torial duties in Johannesburg. He disapproved of the Chinese Labor Ordnance and resigned, returning to England in 1903. He was there appointed to write the authoritative (Life) of Disraeli, but died before the work was com¬ pleted. It was carried on by Mr. George E. Buckle, retired editor of The Times.

MONZA, mon'za, Italy, a town of Lom¬ bardy, in the province of Milan, 11 miles by rail northeast of Milan, on the Lambro. The town is of great antiquity and has a quiet, ven¬ erable air. The most remarkable edifice is the cathedral of Saint John the Baptist, originally founded at the end of the 6th century by the celebrated Lombard queen, Theodalinda, but subsequently renovated and enlarged. It con¬

tains the iron crown of Lombardy, which ac¬ cording to tradition was beaten out of one of the nails used at the Crucifixion and which was restored to the Italians by Austria in October 1866, as well as various other relics and some valuable art treasures. There is also an old im¬ perial palace surrounded by a large and well-laid-out park. It has been a residence and the place of coronation of the kings of Lombardy for 900 years. Here, while on a visit, King Humbert of Italy was assassinated 29 July 1900. It has a technical school, a lyceum and gymna¬ sium and there are manufactures of silk, hats, leather, bricks, tiles and sausages, for which the town has long been famous. Pop. 53,214.

MONZONITE. An igneous rock of granu¬ lar texture often quarried and sold as ((granite** which it closely resembles. In mineral composi¬ tion, however, it is intermediate between syenite and diorite; both alkali feldspars (or orthoclase) and lime-soda feldspar (or plagioclase) being present in approximately equal amounts.

MOODY, Agnes Mary (Claypole), Amer¬ ican biologist: b. Bristol, England, 1 Jan. 1870. She graduated (1892) at Buchtel College, Akron, Ohio, then studied at Cornell, taking the degree M.S. in 1894 and obtaining (1896) the degree of Ph.D. at the University of Chicago. She taught two years at Wellesley College and two years at Cornell, being the first woman to teach in laboratory and recitation courses re¬ quired of all students. She assisted her father

at Throop Polytechnic Institute, taking charge of the department on his death (1903). She wrote (Embryology of Anurida Maritima) which appeared in the Journal of Morphology

‘ (1898).

MOODY, Dwight Lyman, American evan¬ gelist: b. Northfield, Mass., 5 Feb. 1837; d. there, 22 Dec. 1899. He worked for a time on a farm,

then went to Boston as a salesman in a shoe store, and while there became a member of a Congregational church. He later obtained a position in a shore store in Chicago and there began his active religious work in the Sunday school by forming a class of poor boys; from this beginning he built up a large Sunday school a.nd after 1860 devoted himself entirely to re-hgious work. During the Civil War he worked among the soldiers in the employ of the Chris¬ tian Commission and at the close of the war resumed his mission work in Chicago, becoming president of the Young Men's Christian Associa¬ tion in 1865. . A large church was built for his work, of which he became pastor, though never regularly ordained. In 1870 he was joined by Ira D. Sankey, the singer, and in 1873 the two visited. England and Scotland, where, in spite of their American methods, they were the in¬ struments in a great religious awakening that had not been paralleled since the days of Whitefield and Wesley. On their return large meet¬ ings were held in New York, Brooklyn and Phil¬ adelphia, and subsequently in many cities throughout the United States, at which it is estimated Mr. Moody addressed over 50,000,000 people. Without abandoning entirely his evan¬ gelistic tours, he made Northfield his headquar¬ ters and established there a girls' academy (1879) and a training school for religious work¬ ers, and at Mount Hermon a boys' academy. Later he founded a school for Bible study in Chicago; and inaugurated the custom of hold¬ ing, at Northfield, summer conferences of col¬ lege students and missionary volunteers, and the annual meetings of the Young Men's and Young Women's Christian associations. He also established systematic preaching and dis¬ tribution of religious literature among inmates of the prisons ; and built up at Chicago and Northfield establishments for the publishing of inexpensive religious books, tracts, *etc.* His marked executive ability won him the confi¬ dence of men of wealth, who gave generously to his enterprises. Though a Bible student, he was not a theologian and did not understand the methods of Higher Criticism ; he was primarily a preacher of the Word of God as he believed it. The power of his preaching was due to his strong personality, his simplicity of thought and language, and his thorough sincerity and ear¬ nestness. In conjunction with his colleague, Mr. Sankey, he surrendered the great profits on their (Sacred Songs and Solos) to public pur¬ poses. He published (How to Study the Bible } ; (Men of the Bible) ; (Weighed and Wanting) ;

(Arrows and Anecdotes* (1877) ; <The Way and the Word* (1877) ; (Heaven> (1880) ; < Se¬ cret Power* (1881); (The Way to God) (1884); and <Bible Character (1888). Con¬ sult Drummond, (Impressions of Dwight L. Moody* ; Hartzler, <Moody in Chicago*;

Moody, W. L., <Life of D. L. Moody) (1900) ; and Moody, P. D., and Fitt, A. P., Shorter Life of D. L. Moody. *

MOODY, James, American soldier: d. New Jersey, 1744; d. Sissibou, Nova Scotia, 3 April 1809. He was a New Jersey farmer at the out¬ break of the American Revolution, but with 73 of his neighbors joined the British forces and was active in attacks upon his former friends. He was daring and unscrupulous in his move¬ ments and succeeded, in 1781, in seizing import¬ ant despatches of Washington's; he was cap¬ tured and imprisoned at West Point, but made his escape. Though unsuccessful in many in¬ stances, his knowledge of the country enabled him to make his escape after his expeditions as a spy and his name was regarded with fear in the region in which he worked. He went to England after the war, and then to Canada where he was presented with an estate and re¬ ceived halfpay as colonel of the militia during the remainder of his life. His adventures are recorded in his (Lieutenant James Moody's Narrative of his Exertions and Sufferings in the Cause of Government since the Year 1776)

(1783).

MOODY, John, American financial writer : b. Jersey City, N. J., 2 May 1868. He was en¬ gaged in newspaper work until 1890, then en¬ tered the service of Spencer Trask and Com¬ pany, bankers, rising from office boy to man¬ ager (1890-1900). He founded (1900') Moody's Manual of Railroads and Corporation Securi¬ ties and was its editor till 1907. In 1905 he founded Moody's Magazine , an investor's monthly, and (1909) Moody's Analysis of In¬ vestments, both of which he edited. He also wrote (The Truth about the Trusts) (1904); (The Art of Wall Street Investing) (1906) ; 'The Investor's Primer) (1907); blasters of Capital in America* (1911) ; (How to Invest Money Wisely) (1912).

MOODY, William Henry, American law¬ yer and statesman: b. Newbury, Mass., 23 Dec. 1853; d. 2 July 1917. He was graduated from Harvard in 1876; studied law and began the practice of his profession in Haverhill, Mass. He quickly attained success as a lawyer, was city solicitor for a time, and from 1890 to 1895 district attorney for the eastern district of Mas¬ sachusetts. In this position he showed himself an active, fearless prosecuting officer, notably m the case of certain aldermen of the city of Lawrence whom he brought to

punishment for receding bribes; he was also associated with the Massachusetts attorney-general as prose¬ cuting attorney in the trial of Lizzie Borden for the murder of her parents. In 1895 he was unanimously nominated for Congress by the Republicans, to fill a vacancy ; he was elected at that time and also to the three succeeding Congresses. Through close study of the rules of the House he became distinguished as a par-hamentanan and was suggested ˆts a possible candidate for speaker; he was a most active and efficient member of the committee on ap¬ propriations and regularly had charge of the Sundry Civil Appropriations Bill, which he ex¬ amined in detail ; he was also appointed to the committee on insular affairs and through his work on both these committees gained special knowledge of naval matters. In 1902 he was appointed Secretary of the Navy to succeed John D. Long (q.v.), in 1904 he became Attor¬ ney-General and on 17 Dec. 1906 became an

associate justice of the Supreme Court of the United States, resigning in ill-health in 1910.

MOODY, William Vaughan, American poet; b. Spencer, Ind., 3 July 1869; d. 17 Oct. 1910. He was graduated from Harvard in 1893, where he was for a time an instructor in Eng¬ lish and afterward an assistant professor in English literature in the University of Chicago. He published (The Masque of Judgment) (1900) ; (Poems* (1901) ; and, with R. R. Lov¬ ett, a (History of English Literature) (1902); (The Fire Bringer* (1904) ; and the dramas, ‘The Great Divide* and (The Faith Healer* (1909). His verse is well wrought, not infre¬ quently rising to a sustained high level as in his (Ode in Time of Hesitation.* See Faith Healer, The; Great Divide, The.

MOON, William, English philanthropist: b. Horsemonden, Kent, 1818; d. England, 1894. He was educated for the Church but was com¬ pelled to abandon this career upon becoming totally blind. He devoted his life to estab¬ lishing schools and educational helps for blind children and invented a new and simple sys¬ tem of embossed letters for the use of the blind. He established libraries of his books in Eu¬

rope and United States and greatly furthered the facilities for home instruction. Consult Rutherford, (William Moon and His Work for the Blind* (1898).

MOON, The, from the earliest times, has been the chief object in the sky to attract the attention of the human race. The con¬ tinual change in its appearance from day to day, its value as a light giver at night, the apparent irregularity of its motions, the curious markings on its face, its connection with the ebb and flow of the ocean, and many a real or supposed influence in terrestrial affairs, have always caused it to be a subject of speculation and inquiry among philosophers of every age. Yet it is only within the last 300 years that the various theories and superstitions connected with it have been put to the test, and that order has been evolved from the chaos of fact and fancy. Even at the present time many a belief, tested by science and found wanting, finds sup¬ port in otherwise enlightened communities.

Size, Weight, *etc.* — The moon is a nearly spherical body with a diameter of 2,163 miles, a little more than a quarter of that of the earth, moving at an average distance from the earth of 239,000 miles. Its surface is therefore Vis and its volume 149 that of the earth. It is, however, less dense in the ratio of 10 to 16, or, on the average, its density is the same as that of the rocks on the earth's surface, so that it would re¬ quire the materials contained in 81 moons to form our globe. Its smaller size and mass cause gravity at the surface to be only % of the terres¬ trial attraction : the same exertion which would lift a given weight here would raise a weight six times as great there, and a body, instead of falling 16 feet in the first second, would fall only 22/ z feet. It moves so as to always turn the same face to the earth and therefore rotates on its axis in the same time that it takes to go round the earth — about 27 days. The rotation of the moon about its axis and its mo¬ tion round the earth is neither quite uniform or circular, as will be seen later; consequently extra portions of the eastern and western faces come successively into view. Further, the

moon's axis is not quite perpendicular to the plane of its orbit, so that the north and south caps are in turn a little inclined toward the earth. These motions are called the librations of the moon, and they permit us to see rather more than half (about three-fifths) the surface.

Light and Atmosphere. — Like the earth, the moon possesses no light of its own, but re¬ ceives all from the sun, and its day — the inter¬ val from sunrise to sunrise — is a month. At full moon it sends to us

about one 600,000th part of that given by the midday sun. The sur¬ face is not nearly so white as its concentrated light would seem to indicate; its brightest por¬ tions are nearly of the shade of salt and its darkest that of slate, the average being the color of gray weathered sandstone. The long sun¬ shine for two weeks and the absence of sun for the. following two weeks must cause immense variations of temperature. But Professor Langley of Washington estimates that the tem¬ perature of the surface, even at the hottest, probably never rises above the freezing point of water; the heat is radiated out nearly as fast as it is received. In the long night the temperature must fall to something like 200° below zero. In spite of this small amount of heat, .Professor Langley, by inventing a very sensitive instrument called a bolometer which would detect the heat from a candle a mile away, succeeded in detecting heat rays coming from the moon. His results depend partly on the many fruitless attempts which have been made to find evidences of the existence of an at¬ mosphere. If air is present its pressure cannot exceed 1-750 that at the earth's surface and it is probably much less, as no refraction has ever been observed when the moon's limb passes over a star. A similar argument applies to the exist¬ ence of water in any quantity, and no clouds have been certainly seen. It is possible that water — probably in the form of ice — may exist at the bottom of some of the deeper craters, but the low temperature would scarcely permit it to be liquified even when the sun was shining full on it.

Surface Marks. — The well-known resem¬ blance of the full moon to a human face dis¬ appears almost immediately if a glass — even the smallest opera glass — is trained on to it. When it is looked at through a moderately large telescope, the surface is seen to be broken up into mountain ranges and valleys as well as darker portions, which seem to be comparatively flat. A closer inspection made at more favor¬ able times when the moon is not full so that the shadows cast by the sun can be well seen, puts these features clearly into view. The magnifi¬ cent telescope in the Lick Observatory in Cali¬ fornia brings the satellite so near that objects which might be seen with the naked eye if the moon were only 100 miles distant, can be dis¬ tinguished on the surface under favorable cir¬ cumstances.

Craters. — The most marked feature of the lunar surface is the number of craters which appear in almost every region. These are cir¬ cular rings with diameters ranging from half a mile to 100 miles, and with exterior walls sometimes as high as 20,000 feet — formations comparatiyely rare on the earth's surface where they seldom exceed a diameter of a very few miles with much lower walls. In some parts they are scattered in the wildest profusion,

overlapping one another, smaller ones breaking into the walls of the larger and so crowded to¬ gether that it is difficult to distinguish one from another. In many cases there is a central cone or a group of peaks which often rise as high as the walls of the ring and on which small craters can sometimes be seen. There are also lofty ranges of mountains ten to fifteen thou¬ sand feet high, some peaks of the Lunar Appenines rising to 20,000 feet.

Seas. — The so-called seas of the moon are simply portions of the surface darker in color than the average and very much less broken up by craters or mountain ranges. These form the main features of the face seen at full moon. They are crossed by thin lines known as rills or clefts which run in all directions, sometimes straight and unbroken for hundreds of miles, even intersecting ranges of mountains and craters and reappearing on the other side. These rills are generally two and rarely exceed 10 miles in width, their depth varying from 100 yards up. A curious feature of a different kind is an absolutely straight cut — the great Alpine valley— some 83 miles long, which crosses a range of mountains and under low magnification looks as if some wan¬ dering celestial body had grazed the surface.

White Rays •— The most puzzling feature of the surface consists in a series of white rays or streaks which radiate from a few of the principal craters in every direction. In their brightness they mask all other shades of tint on the surface and seem to continue their course, sometimes for hundreds of miles, quite inde¬ pendently of the nature of the country they cross. Prof. W. H. Pickering, however, who has studied the systems carefully, considers that their actual length has been much exaggerated and believes that the apparent length is due to lines of small craters from which they emerge. The most remarkable system is that starting from the crater Tycho, itself of a bril¬ liant whiteness, and giving the whole region the appearance of a globe cracked by internal pressure — a suggestion made by Nasmyth who actually cracked a glass globe in this way and obtained a striking resemblance.

Origin of the Formations. — The origin of these various formations has been the object of much speculation. That the craters and moun¬ tain ranges came into existence after the cooling down of the outer crust and were produced by its contraction and by the enormous tidal dis¬ turbances caused by the earth seems a suffi¬ ciently probable hypothesis. Objection has been raised to this view on account of the fact that terrestrial volcanoes all show the presence of large quantities of water and that the earth has comparatively few of such formations. But weathering action has undoubtedly had little effect on the moon's surface, while it has been a powerful factor in eliminating such features on the earth. Another theory, that the craters are of the nature of cracked bubbles like those which appear in cooling slag which contains gases, does not require the presence of water, but it has not met with any general acceptance. The rills or clefts are unexplained; some as¬ tronomers incline to the idea that they are dried watercourses, others with greater probability that they are fissures produced in cooling. The white streaks or rays are considered by Monsieurs Loewy and Puiseux, whose work on the moon accompanies a big atlas of photographs taken lately at Paris, to be formed of volcanic dust or cinders shot out from the craters and carried for considerable distances by currents of air before being deposited on the ground. Prof. W. H. Pickering inclines to the same theory. The rays were the last evidences of ac¬ tivity before the body of the moon became cold and absorbed the small quantities of air and water which at one time were present outside.

Surface Changes. — The evidence as to changes in the moon's surface since the first careful observations were made — about a cen¬ tury ago — is doubtful. One crater, Linne, ob¬ served by Beer and Madler, is given as having a diameter of about six miles. At various times it seems to have appeared and disappeared again — possibly owing to the different circum¬ stances under which it was seen; at present it is scarcely visible. In the absence of air and water such changes must be very rare, the weathering action which takes place on the earth having little or no effect; possibly the enormous differences of temperature every two weeks may in time cause a breaking up of the rock.

-tmotograptis. — 1 he photography of the moon's surface was started bv Draper and Bond in America about the middle of the 19th cen¬ tury. The pictures of the latter were shown at the London Exhibition in 1851 and inspired De la Rue in England and others as to its pos¬ sibilities for the accurate investigation of the lunar surface. The magnificent photographs of Rutherfurd made in New York and

published in 1873 have only recently been surpassed by those taken at the Lick, Yerkes and Paris ob¬ servatories. It is possible that photographs taken 20 or more years from now may, on com¬ parison with these, enable astronomers to detect changes if such occur. The varying aspects of the moon will make this difficult, but the per¬ sonal element, always present when drawings have to be made, will at any rate be eliminated. At the same time the eye can detect minute de¬ tails which are absent from photographs.

Periods.— The average time occupied by the moon in moving in its orbit round the earth, is 27d; 7h. 43m., its sidereal period. The synodic period is the. interval between successive new moons and it is a little longer owing to the time 365% days, occupied by the earth in moving round the sun. The moon performs 1/27%, of its orbit and the earth 1/36514 each day, and therefore the difference between these \/27% — 1/36514 — 1/2914 is the daily fraction of its path which the moon describes with respect to the sun ; that is, 29%2 days (29d. 12h. 44m) is the synodic period If the plane of the moon's orbit coincided with that of the earth's equator the moon would rise about 50 minutes later each day, but the inclination of these planes to one another varies between 18° and 29ˆ4° so that this retardation is quite different at different times. When full moon occurs near the autum¬ nal equinox, it may, in the latitude of New York, be as small as 23 minutes, while further north it may reduce to nothing, so that for sev¬ eral nights the full moon rises about the same time, soon after sunset. The feature is known as the harvest moon and in countries where the autumn weather is very uncertain, it is a valu-MOON

1 The Moon, 15 days old, photographed by Ritchie at the Yerkes Observatory (Natural or naked eye view)

2 General Map of the Full Moon, showing the location of the Craters and of the Maria (as seen by the naked eye)

SURFACE OF THE MOON

mu

i j

1 The Crater of Copernicus

2 The Appenine Mountains and Crater of Archimedes

PART OF THE HARVARD PHOTOGRAPHIC ATLAS OF THE MOON

Showing Some of the More Prominent Craters

1 Mare Tranquillitatis. Mare Serenitatis

2 Mare Imbrium. Plato

3 Kepler. Aristarchus

PART OF THE HARVARD PHOTOGRAPHIC ATLAS OF THE MOON

Showing Some of the More Prominent Craters

1 The Full Moon

2 Piccolomini. Theophilus

3 Piccolomini. Theophilus

MOON

425

able help to the farmers, furnishing them with light to get in their crops after the setting of the sun. The hunter's moon is the next full moon after the harvest moon ; the same phe¬ nomenon, less marked, occurs. The anomalistic month, a little over 27ˆ2 days, is the interval between the times when the moon is in its peri¬ gee, that is, when it is nearest to the earth.

Moon's Path. — The shape of the moon's path is approximately an ellipse whose two axes are nearly of equal length, but an ellipse will only represent its orbit for a very short time. In order to give an idea of its complicated motions, a model, on a scale of 1:125,000,000, can be constructed as follows: The first part, to represent the motion of the earth, consists of a rail on raised sup¬ ports (which are movable) in the shape of an ellipse whose semi-axes are respectively 390 feet 10 inches and 390 feet 3 inches long and whose plane we shall for convenience take to be hori¬ zontal. The earth is represented by a carriage moving on this rail and the sun by a ball placed on the longest diameter, distance 6 feet 7 inches from the centre of the ellipse. A straight bar two feet long is attached to the carriage by a ball and socket joint at a point 2/$ inch from the centre of the bar. Th'e bar forms the long¬ est diameter of an elastic tube in the shape of an ellipse and the tube is so attached to the bar that it may change its size and shape slightly. The plane of the tube is to be in¬ clined about 5° to the horizontal. A bead slid¬ ing freely within the tube represents the moon.

Motion. — Now let the carriage run along the rail not quite uniformly but so that its angular velocity about the ball representing the sun varies inversely as the square of its dis¬ tance from the ball, and it makes it a complete circuit once in 365ˆ4 days. At the same time the plane of the tube attached to the carriage is to turn round slowly in the opposite direction, so that the horizontal line in it (that formed by the intersection of the plane of the tube with the horizontal plane and called the line of nodes) will describe a circuit once in 183ˆ years; the inclination of the tube is to oscillate not more than 5’ on either side of the mean inclination of 5° 8’ to the horizontal. With these motions, the bar carrying the tube is to slowly turn round in its own plane in a forward direction so as to complete a circuit once in about nine years, and the tube is to slightly change its shape and size to and fro as it moves, finally, the bead representing the moon moves according to the same law and in the same direction as the carriage, that is, not quite uni¬ formly, but so that its angular velocity about the joint varies inversely as the square of its distance from the joint; its circuit in the tube is completed once in 27.5546 days — .the anom¬ alistic period. These various motions, com¬ plicated as they are, only give a general idea of the way in which the moon moves, but the model is sufficient to explain most of the phenomena connected with the moon’s motion. All the parts are in a state of oscillation about their average positions, the periods varying from a few days to many thousand years. Even the plane, size, shape and position of the rail are not quite constant but varv slowly from year to year. The attempt to disentangle even the principal oscillations had become an almost hopeless task until Isaac Newton in the 17th

century was able to reduce them all to mani¬ festations of a single law known as the law of gravitation. This law states that every two particles of matter in the solar system at¬ tract one another with a force which is pro¬ portional directly to the product of the masses and inversely to the square of the distance be¬ tween them, that is, if either of the masses be doubled, the force is doubled, but if the dis¬ tance be halved, the force is increased four-fold. From his time mathematicians have been en¬ gaged in working out the consequences of this law. If there are only two particles acting, they describe ellipses about one another, but if more than two act, the motion is so complicated that it taxes the mathematician to the utmost to determine it completely. The moon is attracted mainly by the earth, but it is much disturbed from its elliptic motion round the earth (that in the tube) by the pull of the sun (which mainly causes the motions of the tube), and to a small extent by that of the planets. Up to the last

quarter of the 19th century this work was undertaken by European mathematicians, among whom may be mentioned Euler, Laplace, de Pontecoulant, Hansen, Delaunay and Adams : the tables of Hansen, published in London in 1857, are still used, with a few corrections, for the places of the moon in the nautical almanacs of the present day. The greatest advance made during the last 30 years was started by Dr. George William Hill, who was for many years on the staff of the (American Nautical Almanac) at Washington. His two papers published in 1877 opened a new era in the mathematics of astronomy and especially in that of the moon, and they have formed the basis of nearly all the progress which has since been made in all departments of celestial mechanics. His name, though fully known to astronomers all over the world, is less familiar to the public, on account of the highly mathematical nature of his work. In a different part of the subject, the work of Professor Newcomb is not less valuable, com¬ prising as it does, difficult and laborious investi¬ gations into the sufficiency of Newton's law for the explanation of every detail of the moon's motion, and involving researches into ancient records of eclipses of the sun. A new theory of the moon's motion, leading to the formation of new tables, has now been nearly completed by E. W. Brown on the basis of Dr. Hill's work. Brown has shown that Newton's law of gravi¬ tation will account for the motion of the perigee of the moon within ioooofo of 1 per cent.

Secular Acceleration. — In illustration of the great accuracy with which calculations and ob¬ servations may be compared at the present time may be mentioned what is known as the secular acceleration. Observation shows that at the end of each century the average time of revolution of the moon round the earth is 2 seconds less than it was at the beginning. Newton's law shows that a slight change in the shape of the earth's orbit (that is in the shape of the rail above) due to the attractions of the planets will account for Y of this amount; the other 2/$ are still unexplained. This means that astronomers are searching for the cause of a monthly change of less than 1/1000 of a second in the length of the month.

Phases. — The phases of the moon arise from the combined motion of the earth and moon. To resume our mechanical model, imagine the

tube to be transparent and the ball an electric light. When the bead is furthest from the ball, the side of the bead facing the carriage is illu¬ minated and this corresponds to full moon. As the bead moves round the tube a spectator on the carriage sees less and less of the illuminated half; the bead then passes through its third and last quarters until it is at its nearest to the ball and almost invisible. Still progressing, its illu¬ minated half begins to be visible from the other side (new moon) and passing on to its first and second quarters its illuminated half is again fully seen.

Eclipses. — An eclipse of the moon takes place whenever the earth gets between the moon and the sun, cutting off the light of the latter from the moon, an eclipse of the sun when the moon gets between the earth and the sun. (See Eclipse). It so happens that the apparent size of the moon as seen from the earth is very nearly equal to that of the sun. Owing to the varying distance of the moon and sun from the earth, sometimes the moon, as seen from a place on the earth, will completely cover the sun for a time which may be as long as eight minutes, and we have a total eclipse ; at other times it fails to cover it and we get a partial eclipse or, if its centre passes across the sun's centre, an annular eclipse. A total or annular eclipse is seen over only a narrow band of the earth's surface. From our mechanical illustra¬ tion it is evident that an eclipse of the moon can occur only at full moon, and one of the sun just before new moon. If the plane of the tube were horizontal there would be eclipses of both moon and sun every revolution of the bead, that is, once a month ; actually, it is only when the bead is very near the horizontal plane (or near the line of nodes) at the time when it is nearest or furthest from the ball, that the event can take place. A complete cycle of eclipses will evidently occur each time the line of nodes completes a circuit — once in about 18 years. This, is known as a lunar cycle and during that period there will be on the average 41 eclipses of the sun and 29 of the moon.

Tides. — Besides the indirect effect of the moon as a light-giver on the earth the most important influence it exerts is that which causes the tides. (See Tides). These have in their turn a slight reactionary effect on the motion of the moon as we shall see presently. Some slight traces of lunar effect are also ob¬ servable in the variations of the earth's mag¬ netism. But the most widespread idea with re¬ gard to lunar influence is its supposed connec¬ tion with the changes in the weather. Many an old saying exists, handed down the ages, giving a.

rule for prophesying the weather by its con¬ dition at certain phases of the moon. Since the time when careful daily records have been kept of the temperature, height of the barometer, rainfall, etc., science has been employed in ex¬ amining whether any kind of period can be traced in them and especially periods connected with the moon's changes. Little positive suc¬ cess has attended these efforts, but there is plenty of negative evidence. Every attempt to connect a periodical change in the weather with one in the moon's motion has resulted in fail¬ ure. Undoubtedly some slight connection of a tidal nature must exist, but it is very small and is entirely masked by variations of the weather due to unknown causes. A reason for the pop¬

ular error is not far to seek. The weather changes, especially in countries lying within the temperate zone, follow one another at short and seemingly irregular intervals ; the changes of the moon's phases occur also at short but regular intervals. Coincidences between the two must frequently occur, but humanity is apt to notice these and to forget the failures of co¬ incidence which are just as numerous if not more so.

Origin. — The past and future history of cur satellite has been tne subject of interesting re¬ searches during the last 30 years, principally undertaken by Prof. George Howard Dar¬ win. The chief influence in its life history is assigned by him to tidal action, an idea first broached in 1754 by the philosopher Emmanuel Kant. Imagining that the earth, unattended by any satellite, was in a molten condition — the most probable supposition in view of its nearly spherical form and the nature of its surface — Professor Darwin inquires under what condi¬ tions its rotation should be so rapid that, like a bursting flywheel, portions of matter should be thrown off. He finds that ihis would happen if the earth were rotating about its axis in some¬ thing like two hours. He has also shown that pear-shaped and dumb-bell shaped forms will result from a rapid rotation and from the ac¬ tion of the sun in producing tides; the moon might have been evolved froiyi such a figure by the thinning and breaking of the handle. The earth would then have a satellite revolving very close to its surface in the same time that the earth took to turn on its axis. Either of these hypotheses seems to be allowable.

Past History. — From this point, rigorous argument takes the place of speculation. The period of the satellite's revolution (a ((month))) begins to be slightly longer than that of the earth's rotation on its axis (a ˆday®). The moon raises tides on the earth and the friction of these,

like a break on a flywheel, gradually lengthens the day; the reactionary effect on the moon is to increase the length of the ˆmonth® also, but more rapidly than the <(day.® This goes on until the number of ((days)) in a ((month» is 29. After this date the month and day still go on getting longer, but at different comparative rates, so that the number of days in a month diminishes until it is 27 1/3 — the present condition. The time in which all these changes have taken place must be reckoned in millions or tens of millions of years and though both bodies have grown cool and solid, the water on the earth's surface has in the later portion maintained the process at a slower rate. All this time the tidal friction has also had the effect of sending the moon further and further away from the earth.

Future. — In the future, the same processes will continue. The lengths of the month and that of the day will continue to increase, the latter overtaking the former until they are both over 1,300 hours or about 55 of our present days. Then, not only will the moon turn al¬ ways the same face to the earth, but the earth will turn the same face to the moon and they will move together as if strung on a rigid bar. The same causes have operated to cause the moon always to present the same face to the earth. When the satellite was in a molten condition and not far from the earth, the tides raised on it by the attraction of the earth must have been

enormous. The friction of these tides passing over the surface of the moon then slowed down the rotation of the moon on its axis until it was in a position where no more friction could act : that is, high tide on the moon was always at the same place on the moon and just under the earth. The axis of the moon in the direction of the earth must from this cause be a little longer than the other axis, though the differ¬ ence has not been certainly observed.

Bibliography. — Besides the numerous text¬ books on general astronomy, all of which con¬ tain information, readers may consult Nasmyth, 'The Moon) (2d ed., 1903) ; Neison. 'The Moon) (1873) ; Prootor, (The Moon) (1876) ; the 'Lunar Theory) (1896) by the writer

is a mathematical treatise on its motions. ‘The Tides, > by Darwin, contains the latest theories concerning its past and future history. A new photographic atlas and description by Pickering has just appeared. The Lick and Paris ob¬ servatories are also gathering materials for a complete description and charts of the surface.

Ernest W. Brown.

Professor of Mathematics, Yale University.

MOON, Mountains of the, Africa, a myth¬ ical chain of mountains designated by Ptolemy as containing the sources of the Nile and ex¬ tending across the broadest part of Africa from Cape Guardafui, on the Indian Ocean, to the Bight of Benin, on the Atlantic. Modern ex¬ ploration has proved that no such range exists, though there are numerous different mountain systems in that extensive region. The only mountains that can be looked upon as repre¬ senting the ancient Mountains of the Moon lie in eastern Equatorial Africa. The loftiest of these are Mount Kilimanjaro, 19,200 feet high; Mount Kenia, which has an estimated elevation of 17,191 feet, and Ruwenzori, which is 16,816 feet in height.

MOON GODDESS. See Mythology, Man and Nature.

MOONEY, James, American ethnologist : b. Richmond, Ind., 10 Feb. 1861. He was edu¬ cated in the public schools and began his career as a teacher. In 1879 he engaged in journal¬ ism and in 1885 began his connection with the Bureau of American Ethnology, Washington, with which he has remained ever since. He has conducted extended field investigations among the Indians of the South and West, notably the Cherokees ; has prepared government Indian exhibits for Chicago, Nashville, Omaha and Saint Louis expositions and discovered the Cherokee ritual. He is a member of the Amer¬ ican Anthropological Association, the Anthro¬ pological Society of Washington, the American Association for the Advancement of Science. He has published ‘Sacred Formulas of the Cherokees) (Washington 1891) ; ‘Siouan Tribes of the East* (Bull. 22. Bureau American Ethnology, Washington 1895) ; ‘Ghost-dance Religion and the Sioux Outbreak of 189(P (ib. 1896) ; ‘Calendar History of the Kiowa Indians) (ib. 1898); ‘Myths of the Cherokee’ (ib. 1900) ; ‘Cheyenne Indians’ (Lancaster 1907). He contributed Indian articles to vari¬ ous encyclopedias and also to the Therapeutic Gazette and Harper’s Monthly.

MOONEYE, a fish of the small family Hyodontidce, related to the herrings and some¬ times called toothed herrings. They inhabit the

rivers and lakes of the interior of North America, and are elegant, silvery, large-eyed fish, eight to 12 inches long, extraordinarily well supplied with teeth and voracious. “They are eager biters and take indiscriminately the feathered lures, small spoons, grasshoppers, grubs and other natural baits. ” In Canada they afford much sport in fly-casting and repeatedly leap into the air when hooked, like trout. The principal species called mooneye is Hyodon tergisus ; the more northerly one, called toothed herring and la queche (Canada), is H. alosoides. Neither is good for food.

The “Mooneye cisco” is a small whitefish (Argyrosomus hoyi), related to the lake herring. See Whitefishes.

MOONFISH, any of the compressed ovate highly silvery fishes of the family Carangidae, genera Selene and Vomer, including small tropical forms allied to the pompanos. One greenish species (Vomer setipinnis) is well known in New York Bay and markets as a pan¬ fish, sometimes called blunt-nosed shiner. More widely recognized is the look-down or horse-head (Selene vomer), which reaches a length of more than a foot, and is regarded along the south Atlantic Coast as one of the best of food-fishes; it also occurs along the western coast of Mexico and Central America, as do certain other species. It has a rhomboidal outline, with a hind-head greatly elevated, the line of the profile almost equal to the length of the body, and the dorsal and ventral fins pro¬ longed into streamers. Consult Jordan and Evermann, ‘Food and Game Fishes’ (1902).

MOONGA, or MOOGHA. See Silk¬

worms.

MOONLIGHT SONATA, a term used popularly in Germany and E-gland for the Beethoven sonata quasi una fantasia in C minor (1802), dedicated to the “Damigella Contessa Giulietta Guicciardi.” The term arose from the critic Rellstab comparing the first movement to a boat gliding by moonlight on Lake Lucerne. Vienna knows it as ‘■Lauben-sonata.”

MOONSEED. See Sarsaparilla.

MOONSHINER, a term applied in the

United States, and especially in the southern and western States, to makers of illicit whisky and other spirituous liquors. Moonshine stills

are frequently raided by the secret service officers. Of late years the business has been largely confined to the Tennessee and Kentucky mountain regions.

MOONSTONE. A translucent or trans¬ parent variety of the mineral feldspar (orthoclase, albite or labradorite) which exhibits a delicate pearly opalescent play of colors. Used as a gem.

MOONWORT, a popular name for a fern (Botrychium virginianum) of the natural order Opliioglossacece, and also for various species of Lunaria of the natural order Cruciferce. The former is the most popular of its genus, being readily grown in partial shade and with no special treatment; the latter are also readily cultivated under ordinary garden conditions and are popular because of their showy flow¬ ers, but more especially because of their large, flat pods which are used in winter decorations. One of their popular names, honesty, is sug-

gested oy visibleness of the seeds through the pods. Lunaria annua, especially its variegated variety, is the most valuable species.

MOORCROFT, William, English veteri¬ nary surgeon and traveler: b. about 1765; d. Andekhui, Afghanistan, 1825. He studied veterinary science in France, settled in London and made a fortune which he lost in patents, and then became veterinary surgeon (1808) to the Bengal army. He crossed the Himalayas, explored (1811-12) the sources of the Sutlej and Indus rivers, explored (1819-22) Lahore and Kashmir, visited Bokhara in 1825 and died at Andekhui, Afghanistan. Prof. H. H. Wilson edited and published his papers under the title (Travels in the Himalayan Provinces of Hindustan and the Punjab from 1819 to 1825* (1841). He wrote also on veterinary surgery and made a translation of Valli's Ex¬ periments in Animal Electricity) (1793).

MOORE, Addison Webster, American professor of philosophy: b. Plainfield, Ind., 30 July 1866. He was graduated at De Pauw University (1893-94) and obtained Ph.D. diploma (1898) at Chicago University. He served in the University of Chicago as assist¬ ant in

philosophy (1895-97), associate (1897— 98), instructor (1898-1902), assistant professor (1902-04), associate professor (1904-09) and professor (1909). He was lecturing on philoso¬ phy at Harvard in 1918. Among his works are (Pragmatism and its Critics) (1910) ; Exist¬ ence, Meaning and Reality) (1903). He was president of the Western Philosophical Asso¬ ciation in 1911 and of the American Philosoph¬ ical Association in 1917 and associate author of (Creative Intelligence* (1916).

MOORE, moor or mor, Alfred, American jurist, son of Maurice Moore (q.v.) : b. Bruns¬ wick County, N. C., 21 May 1755; d. 15 Oct. 1810. At 20 he became captain in a regiment of North Carolina troops, but was soon after¬ ward obliged to resign in order to provide for his destitute relatives. When the British seized Wilmington, however, he raised a troop of vol¬ unteers, with whom he rendered great service to the American cause. In order to alleviate the distress to which his patriotism had reduced him, the general assembly in 1782 made him attorney-general ; and though he had not yet mastered the first rudiments of law, he soon attained, by hard study, a foremost rank in his profession, was raised to the bench in 1798 and became associate justice of the Supreme Court of the United States in 1799. He resigned in

1805.

MOORE, Benjamin, American Protestant Episcopal bishop: b. Newtown, L. I., 5 Nov. 1748; d. New York, 29 Feb. 1816. He was graduated at King's (now Columbia) College in 1768, studied theology and in May 1774 went to England to obtain orders and in June of the same year was ordained deacon and priest. On his return to New York he became an assistant minister of Trinity Church and succeeded to the rectorship in December 1800. In 1801 he was consecrated bishop of New York. He was also rector of Trinity Church and president and professor of logic in Columbia College. In 1811 an attack of paralysis rendered him in¬ capable of further active duty.

MOORE, Charles Herbert, American pro¬ fessor of art: b. New York, 10 April 1840. He

was educated at Harvard and was professor of art at that university from 1896 to 1909. He has published Examples for Elementary Prac¬

tice in Delineation ; (The Development and Character of Gothic Architecture) (1889; en¬ larged ed., 1899), and (Mediaeval Church Archi¬ tecture of England) (1912). In the latter work, which has been widely circulated among students of architecture, he takes the position, earlier adopted by Viollet le Due, that Eng¬ lish Gothic is wholly a development from a French source, and that the progress of the art in England was always some years behind its French original. His warm advocacy of this view has excited some opposition among Eng¬ lish critics.

MOORE, Charles Leonard, American poet and essayist : b. Philadelphia, Pa., 16 March 1854. He was educated in the public schools of his native city. In 1878-79 he was one of the managers of the Madeira and Mamore Railroad Construction Company and was United States consular agent at San Antonio, Brazil, the headquarters of that operation. He was afterward engaged in railroad construction in Pennsylvania. He was then secretary of one of the Disston Florida Sand companies for four years. For the last 20 years he has been occupied with literary work. He has been a constant contributor to The Dial during that time. He has published <Atlas) (1881) ; (Poems Antique and Modern* (1883) ; (Book of Day Dreams) (1887) ; Eanquet of Palacios) (1889) ; (Odes* (1896) ; (Ghost of Rosaly> (1900) ; (Red Branch Crests) (1904) ; Uncense and Iconoclasm* (1915).

MOORE, Clarence Bloomfield, American archaeologist: b. Philadelphia, 14 Jan. 1852. He was graduated at Harvard (1873), then traveled through most of Europe, Asia and Egypt. He ‘crossed the Andes and traveled down the Amazon (1876) and made a journey round the world (1878-79). During the last 20 years he has been exploring the Indian mounds of South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana. His many scientific writings have been mostly published by the Academy of Natural Sciences, of Phila¬ delphia.

MOORE, Clement Clarke, American edu¬ cator and poet: b. New York, 15 July 1779; d. Newport, R. I., 10 July 1863. He was a son of Benjamin Moore (q.v.) ; was graduated at Columbia College in 1798; in 1821 became pro¬ fessor of biblical learning at the General Theo¬ logical Seminary, New York, and retired from that position in 1850. He gave to the seminary the ground on which it stands. A collection of *Poems* which he published in 1844 included (A Visit from Saint Nicholas,* better known under another title — (Twas the Night Before Christmas* — which has long had great popu¬ larity with grown people as well as with chil¬ dren. Written in 1822 for his own children, these verses were printed anonymously and without Moore’s

knowledge, in the Troy Sen¬ tinel 23 Dec. 1823. He also compiled a (He-brew and English Lexicon* (1809) and wrote (George Castriot, Surnamed Scanderbeg, King of Albania* (1850). Consult Stedman, (An American Anthology* (1900).

MOORE, Clifford Herschel, American Latin professor: b. Sudbury, Mass., 11 March

1866. He was graduated (1889) at Harvard University and received (1897) the Ph.D. diploma (1897) at the University of Munich He was classical master (1889-1892) at Belmont School, California, professor of Greek (1892-94) at Phillips Academy, Andover, Mass., instructor (1894-95), then assistant professor of Latin (1895-98) at the University of Chicago. From 1898 to 1905 he was assistant professor of Greek and Latin at Harvard and professor of Latin since 1905. He was professor of Latin (1905-06) at the American School of Classical Studies, Rome. He has been trustee for Phil¬ lips Academy since 1902. He wrote (Religious Thoughts of the Greeks } (1916) ; and numer¬ ous articles on his special subjects and edited Allen's Medea (1899) and Horace's 'Odes and Epodes) (1902). In 1914 he received the de¬ gree of Litt.D. from Colorado College. Con¬ tributed to International Encyclopaedia.

MOORE, David Hastings, American Meth¬ odist Episcopal bishop : b. Athens, Ohio, 4 Sept. 1838; d. Cincinnati, Ohio, 23 Nov. 1915. He was graduated from the Ohio University in 1860 and ordained to the ministry in that year, but entered the Federal army at the outbreak of the Civil War, remaining in it till the close of the war and attaining the rank of lieutenant-colonel. He was president of the Cincinnati Wesleyan Female College (1875-80) and of the Colorado Seminary, and chancellor of the Uni¬ versity of Denver (1880-89). He was elected bishop in 1900 and had his episcopal residence during the three ensuing quadrennial periods in Shanghai, China, Portland, Ore., and Cincinnati, Ohio. He retired in 1912. He was a member of the General Conferences of 1888, 1892, 1896 and 1900, and of the North China Branch of the Royal Asiatic Society.

MOORE, Edward, English fabulist and dramatist: b. Abingdon, Berkshire, 1712; d. 1757. He was, by trade, a linen-draper but failed in business and took up literature. His first work was ‘Fables for the Female Sex) (1744) and in 1748 his ‘Trial of Selim the Persian) and ‘The Foundling) were pub¬ lished. He owed, no doubt, some of his suc¬ cess in the literary world to such prominent patrons as George Lyttelton, 1st Baron Lyttel¬ ton, and Henry Pelham. His (Gil Blas> was published in 1751 and ‘The Gamester* in 1753, Garrick probably assisting him in the work. From 1753-57 he was editor of The World, a satyrical periodical. A collection of his works under title of ‘Poems, Fables and Plays) was published in 1756.

MOORE, Edward, English Dante scholar: b. Cardiff, 1835 ; d. 2 Sept. 1916. He was edu¬ cated at Pembroke College, Oxford, where he received high honors and became Honorary Fellow, and was principal of Saint Edmund Hall, 1864—1913 and a canon of Canterbury from 1903. His early research was on Aristotle and his editions of the ‘Ethics) and of the ‘Poetics) are excellent. But he is much more favorably known for his studies of Dante, and published ‘Time References in the Divina Commedia) (1887; revised, in Italian, 1900); ‘Textual Criticism of the Divina Commedia* (1889) ; ‘Dante and His Early Biographers* (1890); the ‘Oxford Dante) (complete in one volume, 1894) ; and ‘Studies in Dante) (3 series 1896,

1899, 1903).

MOORE, Edward Caldwell, American theologian: b. West Chester, Pa., 1 Sept. 1857. He was graduated (1877) at Marietta College, then at Union Theological Seminary (1884). He studied (1884-86) at the universities of Berlin, Gottingen and Giessen, then received (1891) the degree Ph.D. at Brown University. In 1884 he was ordained to the Presbyterian ministry and served as pastor at Yonkers, N. Y. (1886-89), and Central Congregational Church, Providence, R. I. (1889-1901). He then became Parkman professor of theology and Plummer professor of Christian morals at Harvard University (1901 —) and served as preacher to the university (1905-06). He lec¬ tured at Mansfield College, Oxford, England, in 1894 and 1913, at Andover Theological Seminary, 1900; Yale Divinity School, 1906; Low¬ ell Institute, Boston, 1903. In 1909 he received the degree of D.D. from Yale University. He wrote ‘The New Testament in the Christian Church* (1904); ‘History of Christian Thought since Kant* (1912). He was a mem¬ ber of the American Board of Commissioners of Foreign Missions (1899-1914), its chairman (1905-14) and was elected

president in 1914.

MOORE, Edward Mott, American surgeon: b. Rahway, N. J., 15 July 1814; d. Rochester, N. Y., 4 March 1902. He studied medicine in New York and Philadelphia and was gradu¬ ated (1838) as M.D. at the University of Penn¬ sylvania. He served as resident physician at Blockley Hospital and Frankford Lunatic Asylum but settled in Rochester in 1840. In 1842 he received a call to the chair of surgery at the medical school of Woodstock, Vt., where he lectured for 11 years. He served then suc¬ cessively at Berkshire Medical College, Massa¬ chusetts (1853-54) ; Starling Medical College, Columbus, Ohio (1854-55), then went (1858) to Buffalo Medical College, serving in the same capacity till 1883. His greatest work was done in research and experiments on the heart's ac¬ tion. He was president of the New York State Medical Society; a founder of the American Surgical Association, succeeding Dr. Gross (1883) as its president; and was president of the American Medical Association (1889-90). For many years he was president of the board of trustees of the University of Rochester, and also of Reynolds Library and Rochester Public Health Association.

MOORE, Eleakim Hastings, American mathematician: b. Marietta, Ohio, 26 Jan. 1862. He was graduated (1883) at Yale, receiving the Ph.D. diploma in 1885. He then studied at Berlin (1885-86) and was appointed tutor in mathematics at Yale (1887-89), becoming as¬ sistant professor (1889-91) at Northwestern University and associate professor (1891-92). In 1892 he was made professor of mathematics at the University of Chicago becoming head of the department since 1896. He edited Trans¬ actions of the American Mathematical Society (1899-1907) and has been associate editor of the Proceedings of the National Academy of Sciences since 1915. He was vice-president at the International Congress of Mathematicians held at Cambridge, 1912. -The mathematical periodicals of Europe and America have pub¬ lished many of his contributions.

MOORE, Frank Frankfort, British novel¬ ist and dramatist: b. Limerick, Ireland, 15 May

1855. He was educated at the Royal Academ¬ ical Institution, Belfast, and has traveled ex¬ tensively in Africa, India and South America. From 1876 to 1892 he was art editor of the Belfast News Letter. He has since lived in London. Among his recent novels are ‘Nell Gwynne) (1900); (The Capture of Coralie> (1900); (He Loved but One1 (1905); Pris¬ cilla and Charybdis) (1910) ; ‘The Lady of the Reef1 ; ‘The Romance of a Red Cross Nurse) (1915) ; ‘The Rise of Raymond) (1916). Pop¬ ular plays by him include (Moth and Flame) (1878); (Broken Fetters1 (1881); ‘Oliver

Goldsmith1 (1892); and ‘Kitty Clive1 (1895); and he is also author of ‘The Discovered (verse, 1911) ; ‘A Georgian Pageant1 (essays, 1910) ; and a work on antiques, ‘The Common-sense Collector1 (1911).

MOORE, Frank Gardner, American edu¬ cator: b. West Chester, Pa., 25 Sept. 1865. He was graduated (1886) at Yale, receiving the Ph.D. diploma in 1890. He studied (1890—91) at the University of Berlin and became tutor in Latin (1888-93) at Yale. He was made as¬ sistant professor in Latin (1893-1900) at Dart¬ mouth College, then associate professor of Latin and Roman archaeology (1900-08). He was made professor of Latin (1908-10) at Trin¬ ity College, Hartford, Conn., and professor of classical philology at Columbia University from 1910. He edited Tacitus’ ‘Histories,) (Vols. I and II, 1910) ; Cicero’s ‘Cato Major1 (1904) and ‘Transactions and Proceedings of the American Philogical Association,1 of which society he was secretary (1904-16), becoming president in 1917.

MOORE, George, English author: b. Ire¬ land, 1853. He studied art in London under Luyten, but completed his education in France and became thoroughly imbued with a Gallic spirit. Apart from a few contributions to periodicals, his first literary work was con¬ tained in two volumes of quasi-French verse, ‘Flowers of Parnassus) (1877) and ‘Pagan Poems) (1881). With his entry into fiction he allied himself immediately with the French realistic or naturalistic school, as may be seen in ‘A Mummer’s Wife) (1884), a story of the degeneration of a farmer’s wife, her elopement with a strolling player, and the sufficiently squalid sequel; in ‘Mike Fletcher1 (1891), in which a gay young Irishman wins a fortune by his wits and his social success, and then swings from his riotous living to remorse and back again, only to commit suicide at the end ; or in ‘Esther Waters1 (1894), a detailed sketch of life among the servant class and in a country inn, the theme being the allurements of gam¬ bling. ‘Evelyn Innes) (1898) and its sequel, ‘Sister Teresa1 (1901), are a keen analysis of a musical and sensuous temperament under the successive influence of social temptation and of convent life. What he exemplified in these nov¬ els

he stated abstractly but over-eagerly and passionately in ‘Confessions of a Young Man1 (1888) and ‘Impressions and Opinions1 (1890), both urging the dead level of mediocrity or worse in English literature of the day as con¬ trasted with French. His desire to found an English “Theatre Libre11 and his growing con¬ viction that the English stage and English novel were far gone led him to assist in founding the Irish Literary Theatre in Dublin and to

take a prominent part in the movement styled the Irish Renaissance, a movement of which his ‘Bending of the Bough1 (1900) is one of the most promising dramatic productions and rank¬ ing above ‘The Strike at Arlingford1 (1893). His later works include ‘The Untilled Field1 (1903); ‘The Lake1 (1905); ‘Memoirs of My Dead Life,1 which purports to be autobiograph¬ ical ; the autobiographical ‘Hail and Farewell1 (3 vols., New York 1911-14) ; ‘The Brook Kerith1 (1916), a brilliantly written novel of Palestine in the times of Christ, the publica¬ tion of which gave rise to a good deal of crit¬ icism; ‘Lewis Seymour and Some Women1

(1916).

MOORE, George Foot, American Oriental¬ ist : b. West Chester, Pa., 15 Oct. 1851. He was graduated at Yale in 1872 and at Union Theological Seminary in 1877. Entering the Presbyterian ministry, he was pastor of the Putnam Presbyterian Church, Zanesville, Ohio, 1878-83, and in the latter year became Hitch¬ cock professor of Hebrew and the history of religions at Andover Theological Seminary, and from 1899 to 1901 was president of the faculty there. In 1902 he was appointed pro¬ fessor of theology at Harvard and in 1904 Frothingham professor of the history of reli¬ gions. For some years he edited the ‘Journal of the American Oriental Society,1 of which he was president 1911-12. He has written ‘A Commentary on Judges1 (1895) ; ‘The Book of Judges,1 a translation with notes for the Polychrome Bible (1898) ; and ‘The Book of Judges in Hebrew1 (1900) ; ‘The Literature of the Old Testament1 (1913) ; ‘History of Reli¬ gions1 (Vol. I, 1913) ; and ‘Metempsychosis1 (Ingersoll lecture at Harvard, 1914).

MOORE, George Henry, American his¬ torical writer : b. Concord, N. H., 20 April 1823; d. New York, 5 May 1892. In 1839 he re¬ moved to New York and was graduated at the University of the City of New

York (now New York University) in 1843. As assistant to his father, Jacob Bailey Moore (q.v.), li¬ brarian of the New York Historical Society, he had been long connected with that institution when, in 1849, he succeeded to his father's posi¬ tion, which he held until 1872, and then became first superintendent of the Lenox Library. This office he retained until his death. His contri¬ butions to the proceedings of historical socie¬ ties and to historical magazines were numer¬ ous. He also published 'The Treason of Charles Lee1 (1858) ; 'The Employment of Ne¬ groes in the Revolutionary Army1 (1862) ; 'Notes on the History of Slavery in Massa¬ chusetts1 (1866) ; and 'A History of the Juris¬ prudence of New York1 (1872).

MOORE, George Thomas, American bot¬ anist: b. Indianapolis, 23 Feb. 1871. He was educated at Wabash College and graduated A.B. at Harvard (1895), A.M. 1896 and Ph.D. 1900. He was appointed assistant in crypto-gamic botany at Harvard and teacher at Radcliffe College. From 1899-1901 he had charge of the botany department at Dartmouth College and was (1903-05) physiologist and algologist at the Bureau of Plant Industry, Department of Agriculture. He had charge of botanv at the Marine Biological Laboratory at Woods Hole, Mass., and became professor of applied botany and plant physiology at Shaw School

of Botany, Washington University (1909-12). as well as being physiologist to the Missouri Botanical Garden, of which latter he became director from 1912. Among his most useful work was the discovery of a method of pre¬ venting water supply, pollution through algae and pathogenic bacteria, and the perfection of a method of increasing crops by impregnation of the soil, through bacteria, with atmospheric nitrogen. .He has contributed many useful sci¬ entific articles to the botanical periodicals.

MOORE, Harry Humphrey, American ar¬ tist:ˆ b. New York, 1844. He studied under Gerome at Paris and Fortuny in Madrid, and subsequently made painting tours through Ger¬ man}'-, Italy and as far east as Japan. He has devoted himself to such genre pictures as his

two masters excelled in, and his best-known works are (Gypsy Encampment, Granada) ; (Moorish Water-Carrier*: (Almeh> ; *The Blind Guitar-Player) ; and (A Moorish Beg¬ gar.) He is deaf and dumb.

MOORE, Sir Henry, English colonial gov¬ ernor: b. Vere, Jamaica, 1713; d. 1769. In 1756 he became lieutenant-governor of the island, and. until 1762 was practically in control of its affairs. He suppressed the slave insurrection of 1760, and for that service was rewarded with a baronetcy. Appointed governor of New York in July 1765, he reached there at the outbreak of the Stamp Act excitement. Public opinion was strongly pronounced against the act, and Moore, yielding to the demands of the colonists, suspended its enforcement. He re¬ mained governor until his death.

MOORE, Henry, Irish Wesleyan clergy¬ man: b. near Dublin, 1751; d. 1844. After conversion, he joined a Methodist class in 1777, began to preach, gave up his trade of wood-carver, opened a school, and in 1779 was ap¬ pointed by Weslev to the Londonderry circuit. Called later to London, he assisted Wesley (1784-86) as traveling companion and amanu¬ ensis, serving again in the same capacities 1788-90. Wesley appointed him one of his three literary executors, and also selected him to become (after Wesley's death) one of 12 ministers in charge of services at the City Road Chapel, London. In 1804, and again in 1823, Moore was president of the Wesleyan Con¬ ference. Refusing ordination in the Church of England, he was ordained by Wesley, with two Episcopal clergymen assisting. The proposal to establish a hierarchy in the Methodist Church was opposed by Moore, who also objected to the scheme for establishing a Methodist theo¬ logical school, and to the proposed acquisition of land by the Methodist body in 1839, when the centenary fund was created. In 1792, with Thomas Coke, he published a Life of the Rev. John Wesley.) Although the work was au¬ thorized by the Conference, the third literary executor prevented them from using Wesley's papers in its preparation. With the aid of these he wrote a new (Life, 5 which was pub¬ lished in 1824-25. Moore also wrote (A Reply to Considerations on the Separation of the Methodists from the Established Church) (1794); (Thoughts on . the Eternal Sonshio) (1816); two religious biographies: ˆSermons,* with an autobiography (1830). Consult <Life> (with the autobiography) by Mrs. Richard Smith (1844).

MOORE, Jacob Bailey, American journal¬ ist and author: b. Andover, N. H., 31 Oct. 1797; d. Bellows Falls, Vt., 1 Sept. 1853. He learned the

printer's trade on the Concord Patriot, became bookseller and publisher, then partner in the above paper. In 1826 he founded the New Hampshire Statesman to aid the elec¬ tion of John Quincy Adams as President, and became (1828) member of the State legislature and, in the same year, sheriff of Merrimac County (1828-33). In 1839 he edited the New Hampshire Journal, but soon moved to New York to edit the Daily Whig. He war govern¬ ment clerk in the Washington post office (1841— 45), then librarian of the New York Historical Society (1845-49), when he moved to San Francisco as its postmaster (1849-53). He col¬ laborated in compiling a topographical, histo¬ rical and biographical work on New Hampshire (Concord 1822-24), and he published (A Gazet¬ teer of the State of New Hampshire* (1823); and histories of Concord and of Andover, N. H., and (Memoirs of American Governors)

(1846).

MOORE, James, American colonial gov¬ ernor: b. probably in Ireland about 1640; d. Charleston, 1706. He is supposed to have been a son of the Irish rebel, Roger Moore, and to have come to this country about 1665. Set¬ tling in South Carolina, he became a leader among those who openly resisted the lords proprietors in their oppressive demands. In 1682 he was made a member of the governor's council, and in 1692 was sent to the Assembly. In the latter year the proprietors named , him for exclusion from their pardon. Two years later he was again one of the governor's coun¬ cil ; that body in 1700 elected him governor; and he filled the executive office until 1703, when Sir Nathaniel Johnson arrived. Ap¬ pointed by the Assembly to lead an expedi¬ tion for the capture of Saint Augustine (1702). Moore took the town without difficulty, but failed to reduce the fort. Under Governor Johnson he served as attorney-general, and was successful in an expedition (1703) against the Apalachee (q.v.). Consult McCrady, (History of South Carolina Under the Proprietary Gov¬ ernment (1897).

MOORE, James, American colonial officer: b. Charleston, S. C, 1667; d. 17 Feb. 1723. He was a son of the James Moore preceding, in whose expeditions against the Indians he participated. In 1713 Governor Craven ap¬ pointed him commander of the forces sent to aid the North Carolina colony against the Tuscarora Indians, and two years later served as lieutenant-general of an expedition sent to subdue the Yamasi. In 1719, when Gov. Rob-: ert Johnston was deposed, the Convention hav¬ ing made an end of the proprietary

govern¬ ment, Moore became governor. He was suc¬ ceeded in 1721 by Francis Nicholson, who was commissioned by the English crown, afterward becoming speaker of the assembly.

MOORE, James Hobart, American lawyer and promoter: b. Berkshire, N. Y., 14 June 1852; d. 8 July 1916. He was bank clerk (1871-73) at Binghamton, N. Y., went to Chi¬ cago (1873) and was admitted to the Illinois bar (1881). In collaboration with his brother, William H. (q.v.), he created the great <(Moore group® of four great corporations which

together had a capitalization of $187,000,000, these since being incorporated in the United States Steel Corporation. They were also the promoters of the National Biscuit Company, and other mercantile amalgamations. He was a director of the American Can Company, American Tin Plate Company, and numerous other leading industrial corporations.

MOORE, John, Scottish physician and au¬ thor: b. Stirling, December 1729; d. Richmond, Surrey, 21 Jan 1802. Having obtained a knowl¬ edge of medicine and surgery he went to the Netherlands in 1747, and served as a surgeon's mate in the military hospitals. Returning to Scotland he practised till 1772. In that year he became medical attendant to the ninth Duke of Hamilton, whom he accompanied on a five-year tour on the Continent. In 1779 he pub¬ lished (A View of Society and Manners in France, Switzerland and Germany,) which passed through numerous editions, and has been translated into several foreign languages. In 1781 appeared his (View of Society and Man¬ ners in Italy5 ; and in 1786 (Medical Sketches,5 followed by <Zeluco,) a novel (1786) ; (A View of the Causes and Progress of the French Revolution5 (1795) ; and two other novels, which were not so successful as his first.

MOORE, Sir John, British soldier, son of the preceding: b. Glasgow, Scotland, 13 Nov. 1761 ; d. Spain, 16 Jan. 1809. He served in Nova Scotia during the American Revolution¬ ary War; from 1784-90 was

member of Parlia¬ ment for a group of Scottish burghs; served in Cordica, the West Indies (1795), in Ireland during the rebellion of 1798, in Holland in 1799 and in Egypt in 1800-01. He was. created Knight of the Bath in 1804 and was in com¬ mand in the Mediterranean (1806-08). He was appointed commander-in-chief of the British army in Portugal in 1808. His intention was to cut the French communications with Madrid, but struggling against the apathy of the Span¬ iards and intrigue among his own countrymen, he advanced to Salamanca in spite of the gravest difficulties, but was ultimately forced to make a midwinter march to Coruna, a dis¬ tance of 250 miles, through a desolate and mountainous country, rendered almost impass¬ able by snow and rain, and constantly harassed by the enemy who outnumbered him by three to one. His troops arrived at Coruna in a dis¬ tressing condition; Soult was ready to attack, him as soon as he began the work of embarka¬ tion, and in the battle that followed Moore fell, mortally wounded, in the hour of victory. Wolfe's celebrated poem, (The Burial of Sir John Moore,5 keeps his memory green. Con¬ sult Carrick Moore, (Life of Sir John Moore5 (1835), and his (Diary 5 (ed. by Maurice 1904).

MOORE, John Bassett, American lawyer, diplomatist and author : b. Smyrna, Del., 3 Dec. 1860. He attended private schools and was graduated at the University of Virginia in 1880. He read law in the office of Edward G. Brad¬ ford, now United States district judge at Wil¬ mington, Del., and was admitted to the bar there in 1883. In 1885 he nassed the first civil service examination for admission to the De¬ partment of State, at Washington, and was an-pointed a law clerk in that denartment in July of that year. In August 1886 he was appointed Third Assistant Secretary of State. In the

summer of 1887, he acted as secretary to the conference between the Secretary of State and the British and German ministers on the affairs of Samoa ; and in the winter of 1887-88 he acted as American Secretary in the conference on the North Atlantic Fisheries. He assisted at the organization of the First International American Conference at Washington, and later made a report to the conference on the subject of extradition. In 1891 he resigned the post of Third Assistant Secretary in order to take the newly-created chair of International Law and Diplomacy at Columbia University, New York, a chair which he has since continued to hold. In April 1898, on the outbreak of the war with Spain, he was without solicitation appointed by President McKinley to the posi¬ tion of Assistant Secretary of State. This position, which he had on three previous occa¬ sions declined, he

resigned in September of. the same year, in order to accompany the American Peace Commission to Paris as Secretary and Counsel, in which capacity he took part in the negotiation of the Treaty of Peace with Spain. In 1904 he acted as agent of the United States before the United States and Dominican Arbi¬ tration Tribunal. He was a member of the delegation of the United States in the Fourth International American Conference, at Buenos Aires, in 1910, and afterward served as a spe¬ cial plenipotentiary to the Chilean Centenary. In 1912 he was appointed the delegate of the United States on the International Commission of Jurists, which was organized at Rio. de Janeiro in that year, under the Pan-American Treaty of 1906, for the codification of Inter¬ national Law. In March 1913 he became, by appointment of President Taft a member of the Permanent Court of Arbitration at The Hague. In the following month he was appointed by President Wilson counselor for the Department of State and was invested with authority to sign as acting Secretary of State in the absence of the Secretary, the grade of the position thus being raised. He resigned the post of counselor in March 1914. Mr. Moore is a member of the Institut de Droit International, of the Institut Colonial International, of the American Philosophical Society, of the American Political Science Association, of which he was president in 1913-14, and of various other learned so¬ cieties. He is a member and honorary secre¬ tary of the Hispanic Society of America ; and an honorary member of the College of Lawyers at Costa Rica. He was a member of the Pan-American Financial Congress at Washington in May 1915, acting as chairman of the com¬ mittee on uniform laws, by which the scheme of work of the Congress was drawn up; and he is vice-chairman of the American section of the International High Commission organized to carry out the plans of the Congress. He was a delegate of Columbia University and of various learned societies , in the Second Pan-American Scientific Society at Washington, December 1915-January 1916. He is vice-president of the Pan-American Society of America. He is an incorporator of the Amer¬ ican National Red Cross and a member of its central committee and of the executive com¬ mittee of the New York chapter. His publica¬ tions, apart from occasional papers and ad¬ dresses, include (Report on Extraterritorial Crime5 (Washington 1887) ; (Report on Ex-MOORE

tradition) (Washington 1890) ; (Extradition and Interstate Rendition

(2 vols., Boston 1891) ; (American Notes on the Conflict of Laws) (Boston 1896) ; (History and Digest of International Arbitrations* (6 vols., Washing¬ ton 1898) ; cAmerican Diplomacy, its Spirit and Achievements* (New York 1905) : A Digest of International Law* (8 vols., Washington 1906) ; (The Works of James Buchanan* (12 vols., Philadelphia 1908) ; (Four Phases of American Development: Federalism, Democracy, Imperi¬ alism, Expansion* (Baltimore 1912). He is one of the editors of the Political Science Quarterly, of the Journal du Droit International Prive, *etc.*

MOORE, John White, American naval officer: b. Plattsburg, N. Y., 24 May 1832; d. 1913. He was educated at Plattsburg Acad¬ emy, Williston Seminary and under private tuition at New York City. He was appointed (1853) third assistant engineer, United States navy, promoted (1855) to second assistant engi¬ neer, becoming. (1894) chief engineer. For valuable service in the Civil War he was created (1906) rear-admiral. He originated chain cable protection on sides of wooden vessels and of “fighting tops,** now in general use. After be¬ ing in action with the West Gulf Blockading squadron and the lower Mississippi River, en¬ gaging rebel batteries at head of passes and at defense of Pensacola (1861), passage and capture of forts Jackson and Saint Philip, capture of New Orleans and Port Hudson (1863), etc., he became superintendent of iron¬ clads at New York and Boston (1863-67) and served at various navy yards. He was fleet engineer (1867-68) on staff of Admiral Farragut, European squadron, and fleet engineer of Asiatic station (1872-75). He retired in 1894 with the rank of commodore, serving, how¬ ever, as inspector of the New York navy yard during the Spanish American War.

MOORE, Maurice, American patriot and jurist: b. Brunswick County, N. C., 1735; d. 1777. Having studied for the bar, he acquired a high reputation as a lawyer, was one of the three colonial judges of North Carolina at the time of the Revolution, was a member of the provincial congresses at Hillsborough in 1775 and Halifax in 1776 and had a prominent part in framing the constitution of North Carolina. He was one of a committee appointed at the commencement of the Revolution to draw up an address to the people of Great Britain on the wrongs of the North American colonies. His letter to Governor Tryon, under the signature of “Atticus,** is an incisive piece of work.

MOORE, Robert, American civil engineer: b. New Castle, Pa., 19 June 1838. He was graduated (1858) at Miami University, receiv¬ ing A.M. diploma in 1866. He has been en¬ gaged principally in the location and construc¬ tion of railways such as the Illinois Central, the Illinois Southern, the Baltimore and Ohio, *etc.* He was sewer commissioner

and a member of the board of public improvements at Saint Louis (1877-81) and has been consulting engi¬ neer for a number of railway companies and reorganization commissions.. From. 1897-1913 he was a member of the Saint Louis board of education and its president 1905-06 and 1909-10. He was a member of the Brazos River Board and the South West Pass board of engi-vol. 19 — 28

neers, and is a past-president of the American Society of Civil Engineers, *etc.*

MOORE, Thomas, Irish poet: b. Dublin, 28 May 1779; d. Bromham, near Devizes, 25 Feb. 1852. He was educated at Trinity College, Dublin, with a view of becoming a lawyer, and in 1800 entered as a student at the Middle Tem¬ ple. In 1800 he published a translation of (Anacreon* dedicated to the Prince of Wales (his enemy in after years), and in 1801 (The Poetical Works of the late Thomas Little.* His fine musical talent got him admission to the best society. The office of admiralty registrar at Bermuda was bestowed on him in 1803. The post was given to him as a sinecure, and he quitted it after appointing a deputy to per¬ form his duties. In November 1804 after a tour through the United States and British America, he was back again in England. In 1806 he published (Odes and Epistles,* which contained some attacks on America, and, casti¬ gated by Jeffrey in the Edinburah Review, oc¬ casioned the memorable frustrated duel be¬ tween him and the distinguished critic who had no bullet in his pistol. Moore entered in 1807 into an engagement with Power, the music r>ublisher, to produce a series of adaptations to the national Irish airs, he furnishing the words and Sir John Stevenson the music. This great undertaking, which extended over a number of years, only completed in 1834, is the work on which his reputation will mainly rest. Many of the numbers, such as (The Last Rose of Sum¬ mer,*. and (Those Evening Bells,* are generally familiar. His (National Airs* (1815) included (Oft in the Stilly Night* and the (Sacred Songs* (1816) ; (Sound the Loud Timbrel.* In 1811 he married Bessie Dyke, an actress. (The Twopenny Post . Boy, by Thomas Brown the Younger,* a series of satires on the proceed¬ ings of the prince-regent and his ministers, appeared in 1812, and by their genuine wit attracted, much attention and in this kind of composition he afterward excelled. The same year he removed to Mayfield Cottage, near Ashbourne, Derbyshire, and here his (Lalla Rookh* was elaborated. Its production was the result of an agreement with Messrs. Longman, by which he was to receive 3,000 guineas for a poem to form a quarto volume. It appeared in 1817, and its success fully justified the

liberality of Moore's publishers. It was translated into numerous languages, and attained a European fame. Later criticism has deemed it rather a work, as Garnett says, <(of prodigious talent,** than of the genius ascribed to it in Moore's own day. The same year appeared a satirico-burlesque poem, (The Fudge Family in Paris* (1818) in the form of a series of amusing letters supposed to be written by the different mem¬ bers of an excursion party to the Continent. (Rhymes on the Road* and (Fables of the Holy Alliance* followed in 1819. About this time he became involved in serious embarrass¬ ments by the defalcations of his deputy in Bermuda and found himself suddenlv called upon to make up a deficiency of £6,000, ulti¬ mately reduced to about £1,000. This vast sum he contrived to clear off by his literary earnings. In 1822. appeared his <Loves of the Angels* The (Life of Sheridan* was produced in 1825, and the (Epicurean,* a prose romance of small value, in 1827. Next came the justly praised

'Life of Lord Byron > (1830). (See Byron). His remaining works include the 'History of Ireland* (1846), written for Lardner's 'Cyclo¬ paedia* and a task which he found very severe. For nearly the last 30 years of his life he resided at the cottage of Sloperton, near De¬ vizes. Moore's fame, great in his own dav, has suffered diminution, except in so far as his songs are concerned, his more ambitious poems being little read. A biography in eight volumes, edited from his journal and corre¬ spondence, was published after his death by his friend, Lord John Russell (1853-56). Con¬ sult also Clark, J. C. L., (Tom Moore in Bermuda) (Boston 1909) ; Gwynn, 'Thomas Moore) (in the 'English Men of Letters> series, London 1905) ; Gunning, (Thomas Moore, Poet and Patriot (ib. 1900) ; Vallat, (Thomas Moore sa vie et ses ceuvres) (Paris 1887). See Lalla Rookh.

MOORE, William Henry, American law¬ yer and capitalist: b. Utica, N. Y., 25 Oct. 1848; d. 16 May 1916. He was educated at Am¬ herst College and called to the Wisconsin bar 1872. He settled in Chicago making a specialty of corporation law and, with his brother James H. (q.v.), he created the great "Moore Group® of four corporations

having a total capitalization of $187,000,000, all of which have since become absorbed in the United States Steel Corporation. Other immense in¬ dustrial amalgamations brought about by them were The Diamond Match Company, National Biscuit Company, American Tin Plate Com¬ pany, *etc.* He was known to the public as “Judge Moore,® through his prominent posi¬ tion at European and American horse shows, his own stable taking frequent prizes for coach¬ ing teams. He was director of the Delaware and Lackawanna Railway Company, the Lehigh Valley Railroad Company, American Cotton Oil Company, First National Bank of New York, *etc.*

MOORE, Willis Luther, American mete¬ orologist: b. Scranton, Pa., 18 Jan. 1856. At eight years of age he joined his father, with Grant’s army, at City Point, Va., and sold papers to the troops in the field; was educated in the Binghamton public schools; was student of natural sciences under scientific staff of the Weather Bureau for 15 years and under private tutors six years. He served full apprenticeship as printer and pressman on the Binghamton Republican, and worked as union printer in Chicago, Burlington, Iowa and Washington, D. C. ; entered Signal Corps (now Weather Bu¬ reau) 1876, and rose through successive grades to local forecast official in Milwaukee, 1891—94 ; won professorship of meteorology in open competitive examination against 23 contestants, 1894, and was assigned to duty as district fore¬ caster at Chicago; was chief United States Weather Bureau, 1895-1913; professor applied meteorology George Washington University 1914. He was lecturer for the Royal Institu¬ tion (London) in 1912; and is popular lecturer on the Lyceum and Chautauqua circuits ; is fel¬ low of the American Association for the Ad¬ vancement of Science; and honorary member of the Royal Meteorological Society (London), and of the Austrian Meteorological Society; was president of the National Geographic Society, 1905-10; and vice-president Washington Acad¬

emy of Science, 1900-10. He has published ‘Descriptive Meteorology* (1904) ; Meteorolog¬ ical Almanac* (1901); and is a contributor to scientific and other publications.

MOORE, Zephaniah Swift, American edu¬ cator, first president of Amherst College: b. Palmer, Mass., 20 Nov. 1770; d. 29 June 1823. He was graduated at Dartmouth College in 1793, entered the Congregationalist ministry, and preached at Leicester, Mass., from 1798 until 1811, when he was appointed professor of lan¬ guages in Dartmouth College. He was chosen president of Williams College in

1815, but fail¬ ing in his efforts to procure the removal of the institution to the banks of the Connecticut, he resigned in 1821, and was chosen president of Amherst College.

MOOREA, mo”d-ra’a, or EIMEO, I’me-o, one of the Society Islands, in the Pacific Ocean, about 20 miles west-northwest of Tahiti, the principal member of the group; area 51 square miles. It consists of deep valleys and abrupt hills — the former well cultivated, and the latter heavily timbered. Here Christianity was first introduced in Polynesia; and here the South Sea College of the London Missionary Society was established. Most of the natives are Pro¬ testants. Pop. 1,500.

MOOREHEAD, moor’- or mdr’hed, War¬ ren King, American archaeologist : b. Sienna, Italy, of American parentage, 10 March 1866. Fie was educated in public schools of Ohio, and devoted himself to the study of Indian ar¬ chaeology and later studied three years in the Smithsonian Institution, and was afterward en¬ gaged in investigations of the earthworks and other Indian relics in Ohio for four years. He had charge of the investigations in Ohio, Utah, Colorado and New Mexico for the Chicago ex¬ position and was curator of the museum of the Ohio State University. He is at present curator in the department of archaeology at Phillips Academy. He is a member of the United States Board of Indian Commissioners; and since 1909 has investigated conditions on Indian reserva¬ tions for the Interior Department; fellow of the American Association for the Advancement of Science. He received the degree of M.A (honorary) from Dartmouth in 1901, and has published ‘Primitive Man in Ohio* (1892); ‘Stone Age in North America) (1910) ; ‘Amer¬ ican Indian in the United States) (1914).

MOORE;S CREEK, a short stream in North Carolina, which flows into Cape Fear River , about six miles above Wilmington. Moore’s Creek is noted on account of a battle fought on its banks, 27 Feb. 1776, between American and British forces. The British sol¬ diers, nearly all Highland Scotch under Briga¬ dier-General MacDonald, numbered 1,500, and the Americans under Caswell arid Lillington numbered 1,000. The charge was made by the British, who tried to cross the stream on the girders of a bridge, the planks had been taken away, but the militia and minute men of the American force routed them. Fully 30 British were killed, many wounded, and about 700 taken prisoners. The victory gained by the Americans was an inspiration to the Carolinas; it had the same effect in the South that the Battle of Lex¬ ington had in New England.

MOORES HILL COLLEGE, in Moore's Hill Ind.; coeducational; opened in 1856 by Methodist Episcopals. In 1917 the college had

14 professors and instructors, 106 students, and about 6,000 bound volumes and 2,000 pamphlets in the library. Ihe grounds, buildings and ap¬ paratus were valued at $35,000, the productive fund was $30,000, and the annual income about $13,000. The courses of the collegiate depart¬ ment lead to the degrees of A.B., B.S., and Ph.B.

MOORHEAD, mor'hed, Minn., city, county-seat of Clay County, on the Red River of the North, and on the Great Northern and the Northern Pacific Railroad, opposite Fargo, N. Dak. It is in a productive farming region in which wheat is one of the great crops. It has flour mills, grain elevators, foundries, machine shops, brick yards, and stock yards. It is a trade centre for a large part of Clay and Nor¬ man counties, and ships large quantities of wheat. It is the seat of Concordia College, the Sharp High School, a State Normal School, and has public and parish schools. The city owns and operates the electric-light plant and the waterworks. Pop. (1920) 5,720.

MOORISH ART. See Architecture; Mohammedan Art.

MOORS (Lat. Mauri; Sp. Moros; Dutch, Moors), the people of Morocco. The Arabs who conquered the Roman province of Mauri¬ tania in North Africa in the 7th century com verted to Mohammedanism the native popula¬ tion, who in Europe were still called Moors, though in their own language they called them¬ selves Berbers, while by the Arabs they were termed Moghribees, ˆwesterners® or <(men of the west.® Arabic manners and customs, and in a corrupt form the Arabic language, soon prevailed in the country, the Arab conquerors freely amalgamating with their converts, who far exceeded them in numbers. In 711 an army drawn from this mixed population, under Arab leaders, crossed the straits at Gibraltar, so named from their leader, and began the con¬ quest of the Spanish peninsula. The Spaniards and Portuguese called these invaders Moors because they came from Mauritania, and the term Moors with them soon became synony¬

mous with Mohammedans or Moslems, as the invaders designated themselves. The Spanish writers subsequently applied the term to all the Mohammedans of northern Africa; and when, at the close of the 15th century, the Portuguese made their way around the Cape of Good Hope and encountered the Arabs on the coasts of East Africa and of Asia, they still called them Moors. See Morocco.

MOOS, mos, Salomon, German aurist: b. Randegg, Baden, 15 July 1831 ; d. Heidelberg,

15 July 1895. He studied at Heidelberg, Prague and vienna ; in 1859 he became privatdocent at Heidelberg, and in 1866 professor of aural surgery there. His most valuable researches were in relation to the diseases of the labyrinth of the ear, and he was the first to demonstrate that in certain infectious diseases, micro-organ¬ isms within the ear labyrinth cause derange¬ ment of hearing and equilibrium. He wrote (Klinik der Ohrenkrankheiten) (1866) ; (Anatomie und Physiologie der Eustachischen Rohre) 0874) ; (Uber Meningitis cerebro-spinalis epi-demica) (1881); (tjber Pilzinvasion des Laby¬ rinths im Gefolge von einfacher Diphtherie >

(1887) ; Hind im Gefolge von Masern) (1888) ; (Untersuchungen fiber Mittelohrerkrankungen bei den verschiedenen Formen der Diphtherie) (1890). He also founded and edited with Knapp the (Zeitschrift ffir OhrenheilkundeP

MOOSE. The deer family (Cervidce) em¬ braces not only all the round-horned deer, but also the caribou and moose, whose horns are flattened in a manner known as <(palmation.® Of this family, the American moose (Alces americanus) is the most colossal and also the most picturesque member. The moose of Europe and Asia, there called ((elk® (q.v.), is a much smaller animal. Even in comparison with the largest American elk, our moose, is a giant, and it is impossible to appreciate fully the great height and bulk, length of leg and size of antlers of this wonderful creature, without seeing a full-grown bull, either in his native wilds or mounted in a museum. .

At nearly every point the species presents a peculiarity. The largest specimens ever shot and measured by naturalists stood from 78 to 84 inches in height at the shoulders. The body is very short in comparison with the great length of the legs, but the depth of the chest is unusually great. The end of the nose is flabby and pendulous, and overhangs the end of the chin by three or four inches. In browsing

it is half prehensile, and is of great use in convey¬ ing twigs into the mouth. A moose in full winter pelage is covered by a coarse thatch of straw-like hair, from three inches in length on the body to six inches on the neck and shoul¬ ders. The color of the hair is purplish-gray, and for an animal which lives so far north, the pelage is exceptionally coarse and open.

The antlers of the moose are strikingly peculiar. The upper two-thirds of the beam is enormously flattened, often to a width of 12 inches or more, and the upper end of this great shovel of solid bone terminates in a row of from 6 to 12 short points. The single brow-tine is a]so well palmated, and usually terminates in three or four long points of great strength. Occasionally the main shovel throws out sidewise a palmated spur of striking form and size, and such a head when seen from the front presents a choatic jumble of tines and palmations. The largest antlers known are in the Field Columbian Museum, and have a spread of 78 inches, greatest width of palmation 16 inches, thickness of palmation 2%s inches, and a total of 34 points. The weight of the antlers and skull is 93% pounds. At least 25 pairs of antlers are known to exceed 70 inches in spread. The female has no antlers.

The moose is a browsing animal, and its favorite food consists of twigs of the willow, birch, hemlock, spruce, alder, aspen and maple. It also feeds upon moss, and in summer is very fond of wading in ponds and eating the stems and leaves of water-lilies. Because of their very unusual feeding-habits, moose are very difficult to rear in captivity to adult age. About 90 per cent die of gastro-enteritis before they attain the age of three years. For this reason the market value of a live moose is far below its rarity and general desirability in a collection. Moose calves are born either singly or in pairs, in May or June. At birth an average specimen stands about 32 inches in height, and is a most grotesque-looking creature. Its first coat of hair is sandy-red, like that of a buffalo calf. At 15

months old, a healthy young animal is about five feet high at the shoulders. The weight of a large adult male moose is between 1,100

and 1,200 pounds, but the maximum weight for the species would probably reach 1,500 pounds.

The range of the moose extends from Nova Scotia and New Brunswick to northern Alaska, a total distance along the axis of distribution of about 4,100 miles. This animal does not seem to have arrived in the United States, at least, before the final retreat of the ice of the last glacial age ; and a somewhat different deer (see Cervalces) probably preceded it.

The valley of the Ottawa River and its trib¬ utaries yet affords good hunting for moose, and so does northern Manitoba. The species still exists in small numbers in northern Minnesota, and along the western slope of the Rockies as far south as the head of Green River, Wyoming, (lat. 43°). Northward, moose are found in British Columbia, Alberta, Athabasca, Yukon and in many portions of Alaska. Those found on the Kenai Peninsula and north of Cook Inlet have the most massive and widespreading ant¬ lers to be found, and have even been described as an independent species, under the name of Alces gigas.

Everywhere throughout its range, the killing of moose is regulated by law. The open sea¬ sons are very short, the number that may be killed by each hunter is limited to one or two males, and the killing of females is forbidden. For the protection of the species in Alaska, Congress enacted in 1902 a stringent law, which will at least serve to prevent much of the reck¬ less slaughter that up to that time had been proceeding. But, despite all -laws that can be framed and enforced, the size of the moose, and its desirability, both as a hunter's trophy and for food, render it practically certain that the species will be destroyed far faster than it breeds, and that 25 years hence it will be as nearly extinct in America as the buffalo is to¬ day. Consult bibliography under Deer and Elk.

William T. Hornaday, Director New York Zoological Park.

MOOSE-BIRD, one of the names in east¬ ern Canada for the Canada jay. See Jays.

MOOSE-FLY, a small biting fly (Hcema - tobia aids), parasites on the moose and very annoying to that deer in the Northwest. It is closely related to the horn-fly (q.v.).

MOOSE JAW, city in Saskatchewan, Can¬ ada. It is 398 miles west of Winnipeg and 420 miles east of Calgary, on the Canadian Pacific (divisional point), Canadian Northern and Grand Trunk Pacific

railroads. Is a well laid out centre in a rich wheat-growing tributary region, situated in a valley at the confluence of the Moose Jaw River and Thunder Creek, and is a thriving agricultural and industrial town. There are government elevators with a total capacity of 4,000,000 bushels ; flour mills, brick works, brass and iron works, and coal mines have been opened 40 miles south of the city. The city is well equipped educationally, and has a handsome Collegiate Institute ; there is a general hospital and one under construction for the Gray Nuns. The street railway, electric power, light and waterworks are municipally owned. The population (1,558 in 1901) was 13,823 in 1911, and, according to a local esti¬ mate, was over 16,000 in 1916.

MOOSE-WOOD, a local name in the East¬ ern States and Canada for either of two shrubby trees of whose leaves and twigs the moose is fond: (1) the striped maple or whistle-wood (see Maple) ; (2) leatherwood (see Cyrilla).

MOOSEHEAD, the largest lake in Maine, lies at an elevation of 1,026 feet on the bound¬ ary between Piscataquis and Somerset coun¬ ties. It is about 35 miles long; its aver¬ age width is about 7 miles and maximum 12. A number of rivers flow into the lake, and its direct outlet is Kennebec River. Part of its waters enters the Penobscot by way of a short stream and the lakes which are the source of the Penobscot. Game abounds, fish fill its waters and but few people inhabit the region near the shores. The Canadian Pacific Rail¬ road passes along the southwest shore and con¬ nects the villages of Greenville and Moose-head.

MOOSE, Loyal Order of. A secret fra¬ ternal society founded in 1888 at Louisville, Ky., by Dr. J. H. Wilson. The first lodge was organized in Cincinnati, Ohio. The Supreme Lodge administers the society which comprises 1,610 subordinate lodges and has nearly 616,000 members. The society is beneficiary, furnishing the social advantages of brotherhood, and with¬ out obligation to buy life insurance or pledging to any specific cause, paying sick and funeral benefits. A home and vocational school for dependents and orphans of members of the society with suitable buildings are maintained on a farm of 1,000 acres at Mooseheart, near Aurora, Ill.

MOPSUS. (1) A seer, the son of Ampyx by Chloris, and one of the Thessalian Lapithse, who died from the bite of a serpent which sprang from the blood of the Gorgon Medusa. (2) A legendary Greek prophet, son of Apollo and Manto, who vanquished Calchas in pro¬ phetic skill.

Mopsus fell by the hand of the prophet Amphilochus. The name is also com¬ monly used of the shepherd poets of Greek bucolic poetry, and hence of . pastoral poetry generally.

MOQUEGUA, mo-ka'gwa, Peru, a prov¬ ince in the southern part of the republic, bounded on the north by the department of Arequipa, on the east by Puno, on the south by Chile and on the west by the Pacific Ocean. Area, 5,549 square miles. The eastern part is crossed by the Andes Mountains. The fertile portions are on the mountain slopes, the re¬ gion along the coast is a rainless desert. The chief products are brandy and wine and there is considerable mineral wealth. Pop. 31,920. (2) Moquegua, the capital, is southeast of the centre of the province, was destroyed by earth¬ quake in 1868. Pop. 6,125.

MOQUELUMNAN, a family of North American Indians, living in California and con¬ sisting of the Miwok and other tribes. The Moquelumnan family was originally included with the Costanoan in the so-called Mutsun, named after the language, or more probably the village, at the mission of San Juan Bautista. The Moquelumnan family, as at present gen¬ erally recognized, consists of two detached di¬ visions, the principal one occupying the terri-

tory in the San Joaquin Valley and on the slope of the Sierra Nevada; the other, a smaller territory on and near the coast north of San Francisco. The smaller division comprises three dialects, which are spoken in two sepa¬ rate areas : one near Clear Lake, the other north of San Francisco Bay. That spoken in the area near San Francisco is again divided into two dialects. The people of the principal division of the Moquelumnan family call them¬ selves by some form of the name Miwok. They occupy one of the largest territories held by a single family in California, extending from the Consumnes River on the north to the Fresno and Chowchilla in the south. There are three well-marked Miwok dialects : one in the northern plains, the second in the northern and central hills and mountains and the third in the south. These dialects resemble the northern neighbors of the Miwok people — the Maidu — and not those of the Yokuts to the south. Consult

Barrett, S. A., (Geography and Dialects of Miwok Indians) (Berkeley, Cal., 1908), and Viroeber, A. L. (in American Anthropologist, Vol. VIII, Lancaster, Pa.,

1906).

MOQUI (mo'ke) INDIANS, a semi-civil¬ ized tribe living in northern Arizona. The first accounts of them date from the expedition of Coronado in 1540. Their history is strikingly similar to that of the Indians of New Mexico, except that after a successful revolt against the Spaniards, in 1680, they remained independent. They are kind-hearted and hospitable, cultivate the soil, raising grain and vegetables, possess large flocks of sheep and goats and weave very fine blankets. The houses are built of stone, set in mortar, and for security are perched upon the summits of almost inaccessible mesas. They number about 1,600. See Indians.

MORA, mo'ra, Francis Luis, American artist: b. Montevideo, Uruguay, 27 July 1874. He studied art in the School of Drawing and Painting, Museum of Fine Arts, Boston, and the Art Students' League, New York. From 1892 he worked on illustrations for magazines and other periodicals, receiving his first import¬ ant commission (1900) for a large decorative panel for the Lynn (Mass.) Public Library. In 1904 he did some decorative paintings for the Missouri State building and for the Saint Louis Exposition. He received the Sears prize, Museum of Fine Arts, Boston; Rothschild prize, Arts Students' League; gold medals from the Philadelphia A,rt Club (1901) and the American Fine Arts Society, Philadelphia (1902) ; a bronze medal from the Saint Louis Exposition (1904) ; 1st Hallgarten prize, National Academy of Design (1905) ; Beal prize, New York Water Color Club (1907); Evans prize and Shaw prize, Salmagundi Club (1908 and 1910); silver medal, International Fine Arts Exposition, Buenos Aires (1910). His works are displayed in the Boston Art Club; Lotos Club, New' York Art Gallery, Oak¬ land, Cal.; Columbia University; State Gallery, Dallas, Tex. ; National Academy Collection, New York, *etc.* Spanish influence is apparent in most of his creations, which show true color¬ ing and due attention to detail; his figures are full of expression. Of his best works might be named (The Letter) ; <The Mendicants> (1906); (Spanish Cafe) (1906); 'After the

Bull Fight, Granada } (1910) ; (Studio Tea> (1911) ; (Evening News)

(1914).

MORACE2E, a family of trees and shrubs (rarely herbs), related on the one hand to the elms and on the other to the nettles, whose botanical characteristics are : flowers unisexual, usually with four perigone leaves; stamens straight or inflexed in the bud; ovary dimerous, with one suspended, anotropous ovule ; stipules caducous; juice milky. The species are mainly tropical and include the mulberries, figs, ban¬ yans, etc., bread-fruit, osage-orange, rubber or caoutchouc plants, upas tree (qq.v.) and others.

MORAINE, a deposit of sand, gravel or clay made by a glacier. Moraines may be di¬ vided into two classes, those that exist on the ice itself and those that are formed at the edge of or under the ice. Of the first type, the most common are the lateral moraines. These are ridges of debris that accumulate on the ice next to the rock wall on either side. They consist in part of material that the glacier has scraped from the valley sides and in part from ava¬ lanche debris. When two glaciers unite into one, two lateral moraines are brought together to form a medial moraine. Glaciers that re¬ sult from many branches uniting may have sev¬ eral such medial moraines. The lower stag¬ nant ends of many large glaciers are wholly covered with debris that was once frozen into the ice, but which has accumulated as the ice wasted away by melting. Such deposits are known as ablation moraines. Forests grow on the ablation moraine of the famous Malaspina Glacier in Alaska. Such moraines as the above three types seldom remain as distinct ridges after the glacier has melted away.

Of the second type, the frontal or terminal moraines are of the most importance. These are formed at the ice front, when loss by melt¬ ing just equals ice advance, and all the debris is accumulated in one ridge. In the case of valley glaciers, these form dams across the val¬ leys, often producing lakes. In the case of con¬ tinental ice sheets the moraine may stretch for miles across the country as they do across our Northern States, at the* southern margin of the glaciated region. Sometimes the ice in its re¬ treat pauses several times, ‘building a moraine at each pause, in which case they are called re¬ cessional moraines. The thin sheet of till (q.v.) that a glacier spreads over the country at large and which results chiefly from material that the ice is forced to drop from the bottom, due to overload, is called ground moraine. Drumlins (q.v.) are a special phase of ground moraine. Morainic debris is mostly unstratified and contains many polished and striated boulders. See also Glaciers and the section on Glaciology in the article on Geology.

MORAIS, Sabato, American rabbi and edu¬ cator : b. Leghorn, Italy, 13 April 1823; d. Phila¬ delphia, 11 Nov. 1897. He was carefully trained in Hebrew lore, and taught first in Leghorn and then for a few years in London. In 1851 he came to Philadelphia and until his death was minister of the Mikve Israel Synagogue. In 1867 he was appointed professor of biblical exegesis in the short-lived Maimonides College of Philadelphia, and he was one of the founders and the first president of the Jewish Theological Seminary of New York. During nearly five decades of activity he was a representative of

conservative Judaism, unremitting in his efforts in behalf of education and charity and an earn¬ est and scholarly contributor to the Jewish press on historical, literary and theological themes.

MORAL EDUCATION. See Education,

Moral.

MORAL PHILOSOPHY. See Ethics.

MORALES, Luis de, loo-es' da mo-ra'las, Spanish painter: b. Badajoz, about 1509; d. there, 1586. His early artistic life was spent in Andalusia, but he removed to Madrid in 1564, where he remained for the rest of his life, re¬ turning to his native city only to die. He was essentially Spanish in his conception of re¬ ligious art, from his devotion to which he was called ((E1 Divino.55 The main theme of his paintings was the Dead Christ and the Mater Dolorosa. There is in them a blending of re¬ ligious austerity with a sense of beauty which recalls the early Italian school, but his figures have the distorted and macerated air which later became the accepted type in Spanish re¬ ligious paintings. His drawing is monotonous and mannered, and his modeling such as to attenuate into half skeleton proportions the limbs and features, but his coloring is of sweet and melting tenderness. The Madrid Museum has several examples of this master, namely, an (Ecce HomoJ a (Mater Dolorosa5 and a 'Madonna.5 A half-length figure of 'Christ Bearing the Cross5 is in the Louvre tinder his name. An (Ecce

Homo5 of his hangs in the Dresden Gallery, and one in that of the New York Historical Society.

MORALITIES, the name given a class of allegorical plays, so termed ‘because they con¬ sisted of moral discourses in praise of virtue and condemnation of vice. The dialogues were carried on by such characters as Good Doc¬ trine, Charity, Faith, Prudence, Discretion, Death, etc., whose discourses were of a serious cast. Moralities were occasionally exhibited as late as the reign of Henry VIII. The morality play, ‘Every Man,5 was performed by Ben Greet’s company in America and England in 1902 and 1903. Consult Mackenzie, W. R., ‘English Moralities5 (New York 1914) ; Moore, ‘English Miracle Plays and Moralities5 (Lon¬ don 1907), and Pollard, A. W., ‘English Miracle Plays, Moralities and Interludes5 (5th ed., Ox¬ ford 1909). See Drama.

MORALITY. See Ethics.

MORAN, m5-ran’, Edward, American painter: b. Bolton, Lancashire, England, 19 Aug. 1829; d. New York, 9 June 1901. He was a pupil of Hamilton and Weber in Philadel¬ phia and in 1862 went to Europe, where he studied in France and England for seven years. He afterward made his permanent home in New York. His best-known pictures are ma¬ rines, such as ‘Outward Bound5 ; ‘Launch of the Life-Boat5 (1865) ; ‘The Coming Storm in New York Bay,5 *etc.* His historical series, representing epochs in American seafaring from the ‘Landing of Leif Ericson5 (1001) to (Dewey’s Return,5 was completed in 1899 and exhibited at the Metropolitan Museum, New York, in 1904. He was a member of the Na¬ tional Academy.

MORAN, Patrick Francis (Cardinal), Australian Roman Catholic prelate: b. Leighlin

Bridge, Carlow, Ireland, 16 Sept. 1830; d. Sydney, Australia, 16 Aug. 1911. He received his education at the Irish College, the Gregor¬ ian University and the Propaganda, Rome, and was ordained to the priesthood in 1853. He was successively vice-rector of the Irish Col¬ lege, Rome; professor of Hebrew at the Propa¬ ganda; vice-rector of the Scots College, and secretary to Paul, Cardinal Cullen, archbishop of Dublin. In 1872 he was consecrated titular bishop of Olba and made coadjutor to the bishop of Ossory. He succeeded to the diocese of Ossory in the same year and remained there until 1884, when he was appointed archbishop of Sydney, Australia. In 1885 he was made car¬ dinal of the Roman Church with the titular church of Saint

Susanna. He convened and presided at three plenary synods of the Church of Australia in 1885, 1895 and 1905, and also the Catholic congresses held at Sydney in 1900 and 1909. He was the author of ‘Memoir of the Venerable Oliver Plunkett5 (1861); ‘Essays on the Early Irish Church5 (1864) :

(History of the Archbishops of Dublin5 (1864) ;

(History of the Persecutions of the Irish Catholics5 (1865); ‘Acta Sancti Brendani5 (1872) ; (Monasticon Hibernicum5 (1873) ; (Spicilegium Ossoriense5 (1874); ‘Irish Saints in Great Britain5 (1879) ; (Pastoral Letters of Cardinal Cullen5 (1882) ; Occasional Papers5 (1890) ; ‘Letters on the Anglican Reformation5 (189(3); (History of the Catholic Church in Australasia5 (1894) ; ‘Reunion of Christendom and Its Critics5 (1896) ; ‘The Mission Field in the Nineteenth Century5 (1900) ; ‘Three Patrons of Erin5 (1905); (Priests and People of Ireland5 (1905). He founded the Irish Ecclesiastical Record; edited it for some time and was a frequent contributor to its pages. He contributed to ‘The Catholic Encyclopedia.5

MORAN, Peter, American artist: b. Bolton, Lancashire, England, 4 March 1842; d. Phila¬ delphia, 9 Nov. 1914. He belonged to an artistic family, being brother of Thomas Moran and of Edward Moran, both painters of repu¬ tation; he ‘became their pupil at Philadelphia and chose landscape and animal life as his special department. Among his paintings are ‘Return of the Herd,5 to which a medal was awarded at the Centennial Exhibition; ‘Santa Barbara Mission5 ; ‘Pueblo of Zia, New Mex¬ ico.5 He was also successful as an illustrator and etcher and at the Centennial of 1876 re¬ ceived a medal for his etchings of animals.

MORAN, Thomas, American artist: b. Bol¬ ton, Lancashire, England, 12 Jan. 1837. He came to the United States with his parents in 1844, was educated in the public schools of Philadelphia and studied painting in that city, first exhibiting in the Pennsylvania Academy of Fine Arts in 1856. In 1862 he visited England and at this time formed his great, and lasting admiration for the work of J. M. W. Turner, the English landscape painter. In 1871 he ac¬ companied the F. V. Hayden expedition to the Yellowstone country and on his return painted ‘The Grand Canyon of the Yellowstone,5 which was purchased by the government for the Senate Hall in the Capitol. He made a trip to Arizona in 1873 and the result was ‘ The Chasm of the Colorado,5 also bought by the government. He made many other expeditions into the western country and Mexico, also to

Europe and painted many canvasses of Venice. About 1873 he removed to New York and at this time did an enormous amount of drawings on wood for magazine illustration and for schoolbooks. He also did much etching. He is a member of the National Academy of De¬ sign, the American Water Color Society and similar societies. Other important works from his hand are (Mountain of the Holy Cross* ;

(Shoshone Falls* ; (The Grand Canal, Venice) ; (The Pearl of Venice* ; (The Dream of the Orient* ; (Solitude,* *etc.*

MORANT, mo-rant, Sir Robert Laurie, English educator: b. London, 7 April 1863; d. 13 March 1920. He was educated at Win¬ chester, and at New College, Oxford; B.A. 1885. He undertook educational work of sev¬ eral kinds, becoming tutor to the royal family of Siam and organizer of education in that country. He then took up social and educa¬ tional work in East London, becoming (1895) assistant director of special inquiries and re¬ ports in the Educational Department, Whitehall, which included education reports on England, France and Switzerland, *etc.* He was ap¬ pointed Permanent Secretary, Board of Edu¬ cation, 1903-11, and was chairman of the In¬ surance Commission after 1912. He was cre¬ ated Knight Commander of the Bath in 1902.

MORAT, mo'ra', Switzerland, town in the canton Fribourg, located on Lake Morat and on the Palezieux-Lys and the Ins-Fribourg railways. It has a 13th century castle, but is chiefly noted for the brilliant victory of the Swiss and their confederates over Charles the Bold, 22 June 1476. Consult Ochsenbein, (Die Urkunden der Belagerung und Schlacht von Murten* (Basle 1876).

MORATIN, mo'ra-ten, Leandro Fernan¬ dez, Spanish dramatist: b. Madrid, 10 March 1760; d. Paris, 21 June 1828. He was son of Nicolas (q.v.) and was early instructed in poetic art, and (1786) went to Paris as secre¬ tary of Count Cabarrus, where he gained the acquaintance of Goldoni who strengthened his purpose of reforming the Spanish stage

by in¬ troducing French rules. Returning (1789) to Spain he was granted a benefice by Minister Florida-Blanca which permitted him to follow a literary life. His first comedy, (E1 viejo y la nina (1790) was successful and it was followed by the satyric play (La comedia nueva (1792) which revenged him for the opposition given him by the old adherents to the national taste. Prince Godoy afforded him the means to visit France, England, Germany, Switzerland and Italy, returning in 17%. Next year appeared his (Elbaron,* (La mogigata,* <E1 si de las ninas,* the latter proving an immense success and soon being translated into various lan¬ guages. Under French occupation he accepted (1811) the post of librarian to King Joseph for which persecution drove him to exile and he settled (1822) in Paris. His plays have their characters drawn true to life, the dialogues are lively and these works show originality. Con¬ cerning the history of Spanish drama he wrote (Origenes del teatro espanol,* a worthy work. The Spanish Academy published his operas (Madrid 1830-31) and the <Biblioteca de autores espanoles* (ib. 1867) published his (Obras postumas. *Consult also Ford, (Si de las ninas* (Boston 1899).

MORATIN, Nicolas Fernandez, Spanish poet and dramatist: b. Madrid, 20 July 1737 ; d. there, 11 May 1780. He studied law at Valla¬ dolid, devoting time also to fine arts, and re¬ ceived a position in court after finishing his studies. He first turned to the drama, start¬ ing with the play <La petimetra* (1762), at¬ tempting to combine his national taste with that of the French. Next came (E1 poeta> and the tragedy <Lucrecia) in orthodox style which he held to in his later <Hormesinda) and (Guz-man el Bueno.) The small income he derived from his literary work decided him (1772) in taking up the work of attorney-at-law, but he was soon made professor of poetry. . His last and superlative work was (Canto epico de las naves de Cortez destruidas* (1785), one of the finest of the Spanish heroics. His son Lean¬ dro edited a collection of some of his works under the title of <Obras postumas* (Barce¬ lona 1821), but a more extended collection ap¬ peared in (Biblioteca de autores espanoles* (Vol. II, Madrid 1848), printed later in Pans (1881). R. Foulcke-Delbosc published his re¬ maining works under title of (Poesias ineditas) (Madrid 1892).

MORAVA, mo'ra-va, Serbia, a river about 250 miles long, formed by the confluence at Staladsh of its head streams, the western Mo¬ rava rising near the southwest boundary, ˆand the southern Morava, with its source in Ivos-sovo, Turkey. It is the largest river in Serbia and is navigable 50 miles from its mouth in the Danube River, 30 miles east

of Belgrade.

MORAVA, a river of Austria-Hungary. See March.

MORAVIA (German, Miihren) , Czecho¬ slovakia, a province of the new state, bounded north by Prussia, northeast by Galicia, east and southeast by Hungary, south by Hun¬ gary and Austria and west by Bohemia; area, 8,584 square miles. Moravia proper consists of a large basin surrounded by mountains, on the north the Sudetes, on the east the Carpathians and on the west a low range of hills which gradually ascends toward the north until it unites with the Sudetes and open only on the south, at a central point, toward which all its slopes converge and all its drainage is carried. Its climate is milder and more genial than that of most European countries under J;he same latitude, the mean at Briinn being 48° F. Mo¬ ravia belongs to the basin of the Danube, all the smaller streams falling into the March or Morava, a tributary of the Danube. About 55 per cent of the land is arable and 27 per cent is occupied by forests. The minerals are of considerable importance and include silver, lead, copper, iron, coal, graphite, *etc.* The soil is generally fertile and all the ordinary cereal, leguminous and root crops are raised in abun¬ dance. Flax of excellent quality is extensively grown in several districts and fruit is so abundant that many parts of the country have the appearance of one great orchard; but the favorite culture is that of the vine, for which both the soil and exposure of the province are admirably adapted. The pastures, in general excellent, occupy a large extent of surface. The rearing of cattle, nevertheless, gets compara¬ tively little attention and is not sufficient to meet the home demand. Sheep, on the other hand, are reared in abundance and are of good

quality. They have been much improved by judicious crossing with the merino and furnish a wool, to the excellence of which the woolen manufactures of the country owe their pros¬ perity. The horses, too, are of a strong, hardy, active breed and were much usˆd in the Austrian service for heavy cavalry. Manufactures have made great progress and in all the great branches of industry — in iron and

ironmon¬ gery, leather, linen, cotton and woolen tissues, particularly the last — Moravia takes prece¬ dence of most of the provinces of the state. Other manufactures deserving of notice are silk, glass, paper, potash, tobacco and beet-root sugar. The trade in most of these articles is of considerable importance. The waterways are unimportant. About 71 per cent of the in¬ habitants are of Slavonian extraction and 28 per cent Germans, the latter found mostly in the towns and on the borders. The language chiefly spoken and called Moravian is merely a Slavic dialect ; German, however, is gener¬ ally understood by all classes. The religion al¬ most universally professed is Roman Catholic (97 per cent) and 2 per cent are Jews. Ele¬ mentary education is generally diffused and numerous gymnasia furnish education of a very superior order. There are theological colleges at Olmutz and Brtinn, the latter city the capi¬ tal of the province (pop. 125,737). Moravia was anciently inhabited by the Marcomanni and Quadi, afterward by the Rugii, and still later by the Longobardi. It was finally occu¬ pied by a colony of Slavs, who took the name of Moravians from the river Morava. In 1029 Moravia was united to the kingdom of Bohe¬ mia, with which it had the same constitution, administration and laws. In 1197 it was erected into a margraviate, with a separate* court and a separate administration. With Bohemia it passed to the house of Austria in 1527. In 1849 it was separated from Bohemia and erected into a distinct province. Moravia subsequently sent 49 members to the Austrian House of Deputies and the provincial diet was composed of 151 members, the majority elected by nation¬ alities German and Bohemian. Proportional representation was introduced in 1905. Pop. 2,622,27 1. On 28 Oct. 1918, Moravia united with Bohemia, Slovakia and Silesia to form Czech-Slovakia. Consult Monroe, W. S., Bo¬ hemia and the Czechs, together with an Account of Moravia and Silesia> (Boston 1910).

MORAVIAN CHURCH, The, the common name given in England and America to the re¬ newed Unitas Fratrum or Church of the Breth¬ ren — for a time styled also in English the Church of the United Brethren — which origi¬ nally flourished in Bohemia, Moravia and Po¬ land, was disrupted and suppressed in the 17th century, was resuscitated in Saxony in the 18th century and at present exists in its reorganized form in Europe and America with an extensive mission work in many parts of the world. It was a product of the evangelical movement led by the Bohemian reformer, John Hus, wdio suffered martyrdom at Constance, 6 July 1415. It developed out of an association formed in 1457 near Kunwald in northeastern Bohemia to foster pure Christian teaching and life within the National Church. Its attitude toward the

abuses of the time and its rapid growth caused it soon to be put under proscription by the

authorities. Drastic measures intended to sup¬ press and disintegrate it had the contrary effect. It formed a more compact union, perfected its organization and gradually became a distinct church with its own ministry, established through the good offices of Waldensian bishops who conveyed the historic episcopate to it in 1467. A system was developed which followed primitive Christianity in its elementary princi¬ ples. It began with the congregation as the unit, based on Scripture, bound by a Brotherly Agreement and governed by an elected elder¬ ship. With the increase of congregation, the Synod was formed, legislating by delegated au¬ thority. The Synod committed executive con¬ trol to the Council which was also elective and representative, for while the episcopacy stood at the head, the presbytery and the laity had a voice in it, with the central principle of confer-ential government and collegiate administration fixed. This principle, inherited with the ancient episcopate, is cardinal in the modern structure of the Church, adjusting together conceptions of polity commonly regarded as opposites and pre¬ senting affinities to widely divergent church types.

Its history during the ancient period is to a great extent one of cruel persecution. Its speedy recuperation after such ordeals and its increase during intervals of peace were phe¬ nomenal. When the German Reformation be¬ gan in 1517, the Bohemian and Moravian Brethren numbered nearly 200,000 with about 400 places of worship. In the baronial castle and in the peasant's cottage loyalty to their Church, which embodied the best ideals of the nation, rendered them amenable to a discipline in which they stood pre-eminent and made them a strong moral power to be coped with by ecclesiastical and political authorities. In their highest ascendency they led the educational and literary activity of the regions in which they were established. Their formulated concep¬ tions of Christian doctrine were a gradual growth. Their last and most mature confes¬ sion of faith before the overthrow of the Church in its original seats was published in

1573.

The Counter-Reformaion inaugurated by Ferdinand II in 1621 brought

the organized ex¬ istence of the Church to an end in Bohemia and Moravia, subjected many of its members to martyrdom and drove thousands into exile. It was excluded from the terms made to other evangelical parties in the Peace of Westphalia which ended the Thirty Years' War in 1648, and the hope of its resuscitation in its home-lands was crushed. The parishes of its Polish prov¬ ince, founded in 1548, maintained an organized existence much longer, but they were gradually absorbed by the Reformed Church of Poland of which ultimately even the clergy in whose per¬ sons the episcopate of the Unitas Fratrum was being perpetuated in the hope of its renewal were legally recognized ministers.

The first step in the restoration of the Church occurred in 1722, when a little company of refugees from Moravia were given an asy¬ lum by Nicholas Lewis, Count of Zinzendorf, on his estate, Berthelsdorf, in Saxony where, on 17 June of that year, they began a settlement which was called Herrnhut. Many others from Moravia, Bohemia and different parts of Ger¬ many joined them during the next few years,

and a gradual process of organization took place in which the plans of the Moravians were merged with those of Zinzendorf who had in view rather an evangelical association har¬ monizing different confessional affiliations and Church traditions, with the necessary adaptation of the whole to its situation within the pale of the state church. The doctrinal articles of the Augsburg Confession were adopted and con¬ cessions from the Saxon and Prussian govern¬ ments permitted the establishment of Moravian Church order and constitution modified to suit the new conditions.

The Moravian episcopate was transferred to the new organization on 13 March 1735, when David Nitschmann was consecrated a bishop at Berlin by Bishop Daniel Ernst Jablonsky with the written concurrence of Bishop Christian Sitkovius of Lissa, they being the last two sur¬ viving bishops of the old line. A notable spirit¬ ual experience which marked the year 1727, when the first definite organization took place at Herrnhut, produced an intense zeal for evan¬ gelization. The result,

during the next few years, was the establishment of other congre¬ gations on the continent of Europe, the found¬ ing of the Church in England and America and missions to the heathen which have chiefly given the Church its reputation. The first such mis¬ sion was begun in 1732 on the island of Saint Thomas, West Indies.

The first Moravian evangelist came to Penn¬ sylvania in 1734. The first settlement in Amer¬ ica and mission to the Indians was founded at Savannah, Ga., in 1735. Untoward political conditions caused its abandonment in 1740 and the removal of the colonists to Pennsylvania, where a permanent settlement arose in the pres¬ ent Northampton County, with organized activ¬ ity in Philadelphia and New York and an exten¬ sive itinerary among white settlers and Indians. The Moravian pioneers in <(the Forks of the Delaware" first located on a tract of land which the evangelist George Whitefield had purchased and named Nazareth, where he proposed to found a village and a negro, charitv school. This property came into possession of the Moravian Church in 1741. On another tract at the conflu¬ ence of the Monocacy Creek and the Lehigh River its chief settlement was founded in that year and at Christmas 1741, when Count Zin¬ zendorf was at the place, it received the name Bethlehem. In Tune 1742, a considerable colony from Europe joined the pioneers and the settle¬ ment was regularly organized. The population was divided into an itinerant and a local con¬ gregation, the former to engage in gospel work among white settlers and Indians, the latter to develop the settlement and provide supnort for the missionaries. Thus, from the first, Beth¬ lehem was the centre of the Moravian Church in America and of its various activities.

Until 1762 a co-operative union was main¬ tained at Bethlehem and Nazareth which was called the General Economy. All labored for a common cause and received sustenance from a common stock, but there was no surrender of private property and no obligation which pre¬ vented the individual from withdrawing when he chose. Numerous colonies came to America during those years on vessels owned and man¬ aged by the Church and under the arrangement which existed results were accomplished which would not otherwise have been possible. The

material benefits of the settlement were appre¬ ciated by the authorities of Pennsylvania, and the spiritual activities prosecuted by the Moravians, although misunderstood and op¬ posed by some, as was the case also in Europe, were epoch-making in the religious

growth of the country.

Two notable lines of effort in colonial times, in addition to the Indian missions, were the propagation of Zinzendorf's idea of evangelical alliance and denominational federation, and religious education of children. Desiring to di¬ minish rather than increase denominational divisions the leaders of the Church generally refrained from organizing distinctly Moravian congregations and in consequence of this policy the Moravian Church remained numerically a small body. The European plan of the Church to concentrate in exclusive settlements to some extent was followed for a full century. Be¬ sides Bethlehem and Nazareth, such church-vil¬ lages, founded prior to the Revolutionary War, were Lititz in Lancaster County, Pa., Hope in Sussex, now Warren County, N. J., — abandoned in 1808 — and Salem, now a part of Winston-Salem in Forsyth County, N. C., the central settlement on a large tract of land purchased of the earl of Granville and named Wachovia. These places continued long to be conserving centres of all that was distinctive in the reli¬ gious and social life of the Moravian Church, as fostered under the influence of Zinzendorf's ideas and methods, presenting interesting ex¬ periments in municipal government, industrial order and general culture. They are yet the seats of widely known educational institutions, all founded in the 18th century. A few of the town and country congregations organized in colonial times, without the peculiarities of the church settlements, are yet in existence. Dur¬ ing the years from 1844 to 1856, the exclu¬ sive system was entirely abolished by all of the Moravian villages in America and their unique character rapidly disappeared. At that period active home mission work was revived and since then many congregations have been founded in various parts of the United States. The most fruitful of these efforts have been in several of the Northwestern States.

The Moravian Church has no peculiar doc¬ trines. It is simply and broadly evangelical, in harmony with other Protestant denominations on the cardinal doctrines of Christianity, and bound by no articles on the points of difference. Its only prominent doctrinal feature is the strongly Christ-centred tendency of its teach¬ ing which pervades its official statements, its liturgy and its characteristic preaching. The digest (ˆResults") of the General Synod, the catechisms and the Easter Morning Litany sufficiently set forth the doctrinal position of the Church. The Church has an established liturgical system, with a litany used regularly on the Lord's Day, and a variety of offices for different Church seasons, in which special prom¬ inence is given to singing; the cultivation of church music having always been a conspicuous feature of the Moravian cultus. The general order of the ancient church year is

observed in the services. Of distinctive services retained by some congregations, the love-feast, intro¬ duced in 1727 in imitation of the Agapse of the Apostolic Church, is the most conspicuous. Moravian orders of the ministry are bishops,

presbyters and deacons. A diocesan episcopacy does not exist. The bishops are, as such, everywhere on a parity, representing the entire Unitas Fratrum. They are ex officio members of the General Synod and of the synods of the several provinces in which they reside. Besides having the exclusive function of ordaining men, they are looked to as pre-eminentlv the guard¬ ians of sound doctrine and established order. In governing boards they officiate, not by virtue of episcopal authority, but by election, and those who do not occupy executive posi¬ tions serve, meanwhile, in pastorates. The Moravian Church in America is divided into a Northern and a Southern province, constitut¬ ing, with the British and German branches of the Church, an organic unity under the Gen¬ eral Synod. The legislative authority of each province is the Provincial Synod which elects an executive board known as the Provincial Elders' Conference and composed usually of a bishop and1 two presbyters. The Northern province is divided into districts, each organ¬ ized with its synod and its executive board. The communicant membership of the American Church in 1917 was 21,302 and its total 30,441. The enrolment in the 14 mission provinces of the Church was 109,079 and its grand total in all countries was 156.210, besides 70,000 members of the state churches of Europe, ministered to by Moravian home missionaries.

Bibliography. — Croger, (Geschichte der erneuerten Briiderkirche) (Gnadau 1854) ; Gindely, (Geschichte der bohmischen Briider) (Prague 1857) ; id., (Ueber des Johann Amos Comenius Leben und Wirksamkeit5 (2d ed., Znaim 1893) ; de Schweinitz, E. A., (Historv of the Unitas Fratrum5 (Bethlehem 1885) ; Schwarze, W. N., (John Hus, The Martyr of Bohemia) (New York 1915). For the history of the Church in the United States consult Carroll, H. K., (Religious Forces in the United States5 (New York 1912) ; Hamilton, J. T., (History of the Moravian Church in the United States5 (New York 1895) ; id., (History of the Missions of the Moravian Church5 (Bethlehem 1901) ; Reichel, (Early Historv of the Church of the United Brethren in North

America5 (Nazareth 1888) ; Schwarze, (History of the Moravian College and Theological Seminary > (Bethlehem 1909) ; Clewell, (History of Wach¬ ovia in North Carolina.5

Bishop J. M. Levering.

Revised by J. H. Clewell, President of the Moravian Seminary and Col¬ lege , Bethlehem, Pa.

MORAVIAN SEMINARY AND COL¬ LEGE FOR WOMEN, at Bethlehem, Pa., founded almost at the beginning of the Mora¬ vian settlement of Bethlehem (1741), it is the second oldest girls' boarding school in the United States, the Ursuline Academy, New Orleans (7 Aug. .1727), being the first. <(Colonial Hall,55 built in 1748, is the oldest structure in the group of buildings owned by the sem¬ inary. From the roof of this building it was customary in pre-Revolution days to play the trombone on festal occasions or to announce the death of members. Tradition says that on one occasion during the French and Indian War a band of Indians had planned to attack the set¬ tlement, and at sunset as they lay waiting on Calypso Island, for the darkness, they heard a

strange melody floating down from the sky. They had never heard anything like it before, and thinking it must be the voice of the Great Spirit warning them, they held a hurried coun¬ cil, and silently stole away in the darkness. In 1776-78, (<Colonial Hall55 served as a military hospital for the Continental troops. After the battle of Brandywine the place was crowded with wounded. On the slope of the hill, just west of Monocacy Creek, are the graves of over 500 of unknown dead. Many of the distin¬ guished women of the nation have graduated at this institution. A prepara tor}' school, music, art and science departments are connected with the seminary, and 10 years ago a fully ac¬ credited college course leading to A.B. and B.S. degrees was added, and is recognized by the College and University Council of Pennsyl¬ vania. The average attendance is about 200, the number of teachers 20.

MORAVIANS. See Moravian Church.

MORAWETZ, mor'a-wets, Victor, Amer¬ ican corporation lawyer : b. Baltimore, 3 April 1859. He studied at foreign universities, and received the degree LL.B at Harvard (1879), and was admitted to the bar in 1880. In his practice of law he has acted chiefly in the capacity

of counsel for railway and other cor¬ porations. He was general counsel, director and chairman of the board of directors of the Atchison, Topeka and Santa Fe Railway Com¬ pany, and is now director and member of the executive committee of the Norfolk and West¬ ern Railway Company, as well as director in other corporations. He was made LL.D. in 1914 by Williams College. He wrote (Law of Private Corporations5 (1882); 'Banking and Currency Problem in the United States5 (1909).

MORAY, mur're, Earl of. See Stuart, James, Earl of Murray or Moray. More correctly Stewart: it was Mary Queen of Scots who adopted the latter spelling Stuart.

MORAY FIRTH, Scotland, a large bay on the northeast coast, containing at its widest ex¬ tent the sea enclosed by a line running from Dunscansby Head in Caithness-shire to Kin-naird Head in Aberdeenshire. It thus com¬ prises the Dornoch Firth and the inner Moray Firth, to which the name is more strictly ap¬ plied, the entrance to which lies between Tarbet Ness in Cromarty and Burghead in Elginshire, and which .gives off Cromarty Firth and Beauly Firth and Loch. The opening of the outer firth to the North Sea is 80 miles in width. The rivers which enter the firth include the Deveron, Spey, Findhorn, Ness, Beauly, Oykel.

MORAYS, eel-like fishes of the family Murcenidce. There, says Jordan, may be dis¬ tinguished by the small round gill openings and the absence of pectoral fins. The skin is thick and tough, the narrow jaws are armed with knife-like or else molar teeth, and the lower one is moved by muscles of extraordinary size and power. They are carnivorous and pugna¬ cious fishes, and some of them, which reach a length of five or six feet, may be dangerous to bathers and fishermen. They abound in the tropics, lurking in the crevices of rocks, coral-reefs and similar places, and most of them are colored in striking patterns, as fine marblings of black or lustrous green, or varied spottings.

Several genera and more than 100 species are known, of which a

celebrated type is the mu-nena (Murcena bellina) of the Mediterranean Sea, which was extensively cultivated by the Romans, in the classic period, for the sake of its flesh. Two or three species are well known as food-fishes on both coasts of tropical Amer¬ ica, and one, usually called “conger,” is similarly utilized in southern California.

MORAZAN, Francisco, fran-ses’ko mo-ra- san’, Central American soldier and politician: b. Tegucigalpa, Honduras, 1799; d. San Jose, Costa Rica, 15 Sept. 1842. He early entered political life and in 1824 was secretary-general of Honduras ; when Honduras and Salvador revolted against President Arce of Central America, Morazan came rapidly to the front as a military leader, and in 1830, after a series of brilliant military exploits, was elected Pres¬ ident of the Central American Confederation. Though a wise ruler, his administration was interrupted by several revolts. At the close of his second term it was found that no provision had been made for electing his successor, and in spite of his efforts the union of the states of Central America was dissolved and he himself compelled to find refuge in Peru. In 1842 he landed in Costa Rica, proclaimed the federation of the states, and after defeating Carillo as¬ sumed the Presidency at San Jose. A revolu¬ tion followed directed against his federal pro¬ clivities and he was captured and shot. Con¬ sult Bancroft, (History of Central America) (Vol. Ill, 1887).

MORDANT, in dyeing , a substance which is capable of penetrating the fibres of the sub¬ stance that is to be colored, or of forming an insoluble deposit upon them, and which also forms an insoluble compound with the dye that is to be used. Mordants vary greatly in char¬ acter, according to the nature of the dye and of the fabric. They may be classified, how¬ ever, as “acid” and “basic”; an acid mordant¬ being required to fix a basic dye and a basic mordant to fix an acid dye. Tannic acid is a typical example of an acid mordant. Cotton may be mordanted with this substance by soak¬ ing it in a solution of tannic acid and then passing the fabric through a solution of a salt of antimony, tin or some other suitable base, by which the tannic acid is fixed upon the fibre in the form of an insoluble tannate, with which the dye subsequently combines. The acetates and sulphates of aluminum and of iron may be cited as examples of basic mordants. Wool may be mordanted, for example, by boiling it in a dilute solution of such a salt (usually with the addition of certain other substances, such as cream of tartar or oxalic acid), the wool causing the mordant to partially dissociate, so that a more basic compound is deposited upon and within its fibres, while a more acid one remains in solution. Wool, when treated in this way, will fix dyes (such as alizarin) that

are of a phenolic character. See Dyeing.

MORDECAI, mor'de-kl, Alfred, American engineer: b. Warrenton, N. C., 3 Jan. 1804; d. Philadelphia, 23 Oct. 1887. Graduating at the head of his class from West Point in 1819, he became 2d lieutenant of engineers, and after work as instructor at West Point and assistant engineer was appointed captain of ordnance

corps 30 May 1832. He was assistant to the chief of ordnance at Washington (1838-42) and member of the ordnance board (1839-60). Brevetted major (1848) for meritorious conduct in the Mexican War, he was sent to the Crimea (1855-57), his observations on military organi¬ zation and ordnance being published by order of Congress in 1860. He resigned from the service in 1861, settling in Philadelphia, where, after acting as assistant engineer of the Mexi¬ can and Pacific Railroad (1863-66), he became (1867-87) treasurer and secretary of canal and coal companies controlled by the Pennsylvania Railroad. Among his works are (Digest on Military Laws) (1833) ; (Reports of Experi¬ ments on Gunpowder) (1845-49) ; (Artillery for the United States Land Service,) as de¬ vised and arranged by the Ordnance Board with plates (1849) ; (Ordnance Manual for the Use of Officers of the United States Army* (1841 and 1850).

MORDECAI, Alfred, American engineer, son of the preceding: b. Philadelphia, 30 June 1840; d. 20 Tan. 1920; graduated, West Point (1859) ; and brevetted 2d lieutenant, topographical engineers. After service on the field (June-August 1861) he taught at West Point for nearly a year and then was promoted until he became chief of ordnance, Department of the South (1863-64). From May to September 1864 he was chief of ordnance, Army of the James, later holding similar office in the Army of Ohio, Army of the Cumberland, and mili¬ tary division of the Tennessee. Brevetted lieutenant-colonel for services in the war (13 March 1865), he was instructor of ordnance and gunnery at West Point 1865-70, and again 1874-81. He was commander, with rank of colonel, of the Benicia (Cal.) arsenal, 1899-1902; promoted brigadier-general and retired in January 1904.

MORDENITE, a native hydrous silicate of aluminum, potassium, sodium and calcium, oc¬ curring in small monoclinic crystals, or in small hemispherical concretions with a fibrous struc¬ ture. It is white, or nearly so, with a vitreous lustre. Mordenite occurs at Morden, N. S., and in western Wyoming.

MORDVINS, mord'vmz, a race of people scattered over the Volga provinces of European Russia and to the south and east of these, and belonging fo the Ural-Altaic family. There are two distinct groups, the Ersh or northern and the Moksha or southern, with differences in feature, and the latter of darker hue. They are a well-built, hardy race, and superior to the Russians by whom they are surrounded. Their chief sources of livelihood are cattle-rearing, hunting, fishing and bee-keeping, and they are famous as carpenters and woodworkers. They are nominally Christians, the work of conver¬ sion beginning at the time of the Empress Anna; but their Christian beliefs have been superimposed on remains of the old pagan wor¬ ship. Pop. about 1,000,000.

MORE, mor, Hannah, English moralist: b. Stapleton, near Bristol, 2 Feb. 1745; d. Clif¬ ton, near Bristol, 7 Sept. 1833. She was edu¬ cated in the seminary in Bristol kept by her elder sisters, and her talents early made her acquainted with Johnson, Burke, Garrick and other literary men of the period. Her first

success was as a dramatic writer. (The In¬ flexible Captive5 ; 'Percy5 ; and (The Fatal Captive) were successfully brought out .through the patronage of Garrick and her other friends. After the production of the last in 1779 she gave up playwriting from religious motives, and devoted herself to writing works, of a moral and religious tendency, the diffusion of tracts and other philanthropic labors. In this new course her talents commanded an extraor¬ dinary measure of success. A series of tracts called the (Cheap Repository,5 commenced at Bath in 1795, is said during the first year to have had a circulation between 1,000,000 and 2,000,000 copies, and led to the foundation of the Relifious Tract Society. Her most popular fiction, 'Ccelebs in Search of a Wife) (1809), ran through eight editions in the course of a year, and passed through 30 editions in. America. Svdney Smith's hostile review of this work in the Edinburgh is highly diverting. Her works include Strictures on the Modern System of Female Education) appeared in 1799, followed by 'Hints Towards Forming the Character of a Young

Princess) (1805) ; ‘Practical Piety5 (1811); ‘Christian Morals5 (1813); ‘Character and Writings of Saint Paul5 (1815) ; ‘Moral Sketches, with Reflections on Prayer5 (1817). Consult Roberts, ‘Life of Hannah More5 (1838) ; Thompson, ‘Life of Hannah More5 (1838) ; ‘Correspondence of Hannah More with Zachary Macaulay5 (ed. by Roberts, 1860) ; Yonge, C. M., ‘Hannah More5 (1888) ; Har-land, Marion, ‘Literary Hearthstones: Hannah More5 (1900).

MORE, Louis Trenchard, American edu¬ cator: b. Saint Louis, 9 April 1870. He studied at Johns Hopkins taking (1895) the degree Ph.D. He was instructor of physics (1896) at Worcester Polytechnic Institute and was ap¬ pointed instructor and adjunct professor of physics at the University of Nebraska (1896-1900), becoming professor of physics (1900) and dean (1910-13). He was dean of the Graduate School (1916) .at the University of Cincinnati. He has written ‘The Limitations of Science5 and contributed many articles to the technical press on such subjects as light, electricity, mag¬ netism, ionization and sound.

MORE, Nicholas, English colonist: b. Eng¬ land : d. Philadelphia, Pa., 1689. He was a phy¬ sician and left a promising career ;n England to come with William Penn to America in 1682. He was from the first prominent in the affairs of the colony, was president of the first assem¬ bly in 1682 and in that year presiding judge of the courts of Philadelphia. In 1683 he was clerk of the provincial council and the next year was speaker of the assembly. He was appointed first chief justice of the Supreme Court of the province in 1684, and in this position incurred the disapproval of the colony and was im¬ peached for having wielded “an unlimited and arbitrary power.55 He retained the confidence of Penn, however, who appointed him in 1686 one of the five commissioners in control of the government.

MORE, Paul Elmer, American author: b. Saint Louis, Mo., 12 Dec. 1864. He was graduated at Washington University in his na¬ tive city in 1887, studied later at Harvard and was instructor in Sanskrit there for a year and subsequently at Bryn Mawr for two years. He

was literary editor of the Independent, 1901-03, and of the New York Evening Post , 1903-14. He also was editor of the Nation from 1909 to 1914. To it he contributed many valuable re¬ views and essays in literary criticism. His fine scholarship and effectiveness of method have placed him in the front rank of American liter¬ ary critics. He has published ‘The Great Re¬ fusal5 ; ‘A Century of Indian Epigrams:

chiefly from the Sanskrit of Bhartrihari5 (1898) ; ‘The Judgment of Socrates5 ; ‘Life of Benjamin Franklin5 ; ‘Translation of the Prometheus Bound of iEschylus5 ; ‘The Jessica Letters,5 with Corra Harris; ‘Shelbarne Essays5 (9 vols., 1904-13); ‘Nietzsche5 (1912).

MORE, Sir Thomas, English statesman and author: b. London, 7 Feb. 1478; d. there, 6 July 1535. In 1492-94 he studied at Canterbury Hall, now Christ Church, Oxford, and in 1494 was a student in Lincoln’s Inn. At 21 he obtained a seat in Parliament, and distinguished himself with spirit in opposition to a subsidy de¬ manded by Henry VII. After being admitted to the bar he enjoyed great reputation as a pleader. In 1516 he accompanied the commis¬ sioners sent to renew the alliance between Henry VIII and Charles, then Archduke of Austria, and showed much ability. In 1516 he published his celebrated political romance ‘Utopia.5 Cardinal Wolsey pressed him to re¬ ceive a pension, which he refused as incon¬ sistent with his official duties ; but he was induced to accept the place of master of re¬ quests. He was shortly after knighted, and taken into the Privy Council. In 1521 he was appointed treasurer of the exchequer, and in 1523, at the instance of Wolsey, was elected speaker of the House of Commons. He was joined with Wolsey in a mission to France in 1527 and on his return made Chancellor of the Duchy of Lancaster. In 1529 he succeeded the cardinal as Lord High Chancellor, which office he filled for three years with scrupulous in¬ tegrity, but he was severe in his punishments for heretical opinions. Unable to acquiesce in the king’s wishes respecting his divorce from Catherine of Aragon, he obtained permission to resign the seals. The affront rankled in the mind of Henry, and was further inflamed by his refusal to attend the coronation of Anne Boleyn. An attempt made to implicate him in the practices of Elizabeth Barton altogether failed; and he also perfectly cleared himself of the charge of inducing the king to publish the book against Luther, in which the Pope’s authority was held forth — a doctrine now found inconsistent with the intended attack on the Roman See. The king was declared su¬ preme head of the Church in 1534; but More steadily refused to recognize any other head than the Pope, declined to take the oath of supremacy and was consequently committed to the Tower and indicted for treason. After an imprisonment of 12 months, he was brought to trial, and despite his eloquent defense con¬ demned and sentenced to be hanged and quar¬ tered. The king altered the sentence from hanging and quartering to beheading, and this act of grace More received with his usual vein of humor. While in prison he wrote a ‘Dia¬ logue of Comfort against Tribulation5 and a treatise on Christ’s passion. At his execution he comported himself with dignity and with a

great degree of good humor. The news of his death startled Catholic Europe, and British ambassadors were instructed to explain that all was done by due legal process. More's learning was varied and extensive, his wit abundant and his elocution ready and agree¬ able. He wrote elegant Latin prose and verse, and a terse and simple English. His <Utopia) is a classic of literature, and he, one of the brightest spirits of the Renaissance. The sec¬ ond degree of beatification, that of Blessed, has been conferred on More by the Roman Catholic Church. His English works were published collectively, in 1557, and his Latin in 1567. (See Utopia). Consult the (Life} by Roper (1626, reprinted 1716), and Stapleton's (Tres Thomae) (1588), the principal sources; and the biographies or studies by Bremond (Eng. trans. with bibliography, London 1904) ; Bridgett (ib. 1891) ; Campbell's (Lives of the Chancellors* (ib. 1845—48) ; Sir Sidney Lee's (Great Englishmen of the 16th Century* (ib.

1904) ; Manning's (Household of Sir Thomas More> (ib. 1851) and (The Book of Sir Thomas More> in (Malone Society Reprints) (ib. 1911).

MOREA. See Peloponnesus.

MOREAS, mo'ra'a', Jean, French poet and author: b. Athens, 15 April 1856; d. 1910. His real name was Jean Papadiamantopulos. He was sent to Paris to study law but, from 1882, devoted himself entirely to poetry. His poems, (Les Sytres> (1884) and (Les Cantilenes* (1886), made him one of the most promi¬ nent representatives of symbolism. In the novel, (Le The chez Miranda* (1886), so hard to understand, he tries to bring prose under the same new tendency. His poem, (Le Pelerin passionne* (1891), shows a happy leaning to¬ ward Ronsard. The six books of <Stances) (1905) contain most of his more perfect works. He wrote a version of Euripides' Uphigenia in Aulis* (1903) in semi-archaic language, which was produced at the Odeon, Paris, with success. Consult Gourmont, J. de, (Jean Moreas* (Paris

1905) .

MOREAU, mo-ro, Gustave, French painter: b. Paris, 1826; d. there, April 1898. He be¬ gan his career under the influence of Dela¬ croix, but on going to Rome he chose as his especial subjects of study the fantastic archi¬ tectural effects of Mantegna and the dramatic composition and sometimes violent poses of Luca Signorelli. His works show the charac¬ teristics of these masters and are eminently original both in design and coloring, though little known until the latter days of his life, as he seldom exhibited until he was past 40, or offered his works for sale. On his death he left upward of 800 canvases to the municipality of Paris to form the Musee Moreau. In 1892 he was appointed professor in the Ecole des Beaux-Arts and held the position till his death. He was made an officer of the Legion of Honor in 1883 His most notable pictures are (Death and the Young Man* (1865); <Orpheus* (1867) in the Luxembourg; <Prometheus> (1869) ; <Hesiod and the Muses) and (The Ap¬ parition, > the last two in the Luxembourg also. Consult Ary Renan, <Moreau* (Paris 1900) ; Flat, (Le Musee Gustave Moreau* (ib. 1905) ; Muther, (History of Modern Painting) (Lon¬ don 1896).

MOREAU, Hegesippe, French poet: b. Paris, 9 April 1810; d. there, 20 Dec. 1838. Of illegitimate descent, losing both parents early, he died young, in poverty and need, in a hospital. He set up type for a book-printer, first in Provins, then at Paris, but found no favor or success in his writings. Tenderness and nobility of character appear in his earlier poems with excellent effect but his more ma¬ ture works show the ills of fashion and the world's sorrows. His finest poems are the elegies, (La Voulzie,* *etc.* Among his novels are (La Fermiere, *(Contes de ma soeur* and the shy prose novelles, (Le gui de chene,* *etc.* His works are published under the title (My-osotis) (1838) and his correspondence in (CEuvres completes > (1890-91). Consult

Moret, J., (Hegesippe Moreau) (Provins 1871).

MOREAU, Jean Victor, French general: b. Morlaix Finistere, 11 Aug. 1763; d. Laun, Bohemia, 2 Sept. 1813. His father was a law¬ yer and the son, apparently against his will, studied law and held a post in the justiciary at Rennes. But at the beginning of the Revolu¬ tion he entered politics, formed a company of the National Guard and in 1791 was elected lieutenant-colonel of a volunteer battalion which joined

Dumouriez in the field. He rose rapidly, replaced Pichegru in 1795 as com¬ mander of the Army of the North, and in 1796 was put at the head of the Army of the Rhine and the Moselle. His retreat before a superior force after Jourdin's defeat at Wiirs-burg, and his swift movement to the attack again before the truce of Leoben proved him a masterly strategist. Momentarily retired for failure to reveal Pichegru's Royalist plot, he was recalled in 1799; served under Scherer in Italy and'largely recouped his superior officer's losses; succeeded Joubert after that general's death; was Bonaparte's confidant in the coup d'etat of 18th Brumaire; passed the Danube and the Rhine; defeated the Austrians in a series of brilliant engagements culminating in Hohenlinden (1800) ; and then with the backing of the Royalists attempted to oust Bonaparte. He was found guilty of plotting against Napoleon and was exiled from France for two years, which he spent on a farm in Pennsylvania. Although Republican in his sympathies, in his last campaign he took arms with the Allies, served against France in 1813 and was killed at the battle of Dresden. Consult Jochmus,

(General Moreau* (Berlin 1814) ; Ary Renan, <Moreau) (Paris 1900).

MOREAU RIVER. One of the larger branches of the Missouri River draining a wide area in northeastern South Dakota. Its length is about 180 miles. The name is a French one, signifying a dark horse or nosebags. On some maps the name Owl River is improperly given to this stream.

MORECAMBE, mor'kam, England, a Lan¬ cashire seaside resort on Morecambe Bay, four miles by rail northwest of Lancaster. . Its prin¬ cipal features are the promenade pier, three miles long, observation tower, winter garden, etc., and the fine beach of Morecambe Bay, this inlet of the Irish Sea being about 18 miles long and 10 miles broad. Pop. 12,131.

MOREEN. See Moire.

MOREHEAD, John Henry, American pub¬ lic official: b. Lucas County,

Iowa, 3 Dec. 1861. He was educated in the public schools, removed to Nebraska in 1883 and taught school for some time. Later he engaged in mercantile affairs at Barada, Neb., and in 1896-99 served as county treasurer of Richardson County. In 1900 he was mayor of Falls City and in 1910 was elected member of the Nebraska senate. He was president pro tempore of the senate and lieutenant-governor in 1910-11 and served as gov¬ ernor of Nebraska for the terms 1913-15 and

1915-17.

MOREL. See Fungi.

MORELAND, William Hall, American

Protestant Episcopal bishop: b. Charleston, S. C., 9 April 1861. He was graduated from the University of the South in 1881 and was assistant rector at Christ Church, Hartford, Conn., in 1884-85. In 1885-93 he was rector at the church of the Good-Shepherd, Nashua, N. H., and in 1893-99 rector of Saint Luke's, San Francisco. He was consecrated bishop of Sacramento in 1899. He has published (What is Christianity?5 (1887) ; (The Church or the Churches: Which?5 (1894), *etc.*

MORELIA, Mexico, capital of the state of Michoacan, situated on the line of the Na¬ tional Railway, 234 miles west from the city of Mexico, elevation 6,314 feet above the sea, dis¬ tant by straight line from the nearest point on the Pacific Ocean about 140 miles. The city was founded in 1541 and known as Valladolid until 1828, when it was given the name of Mo¬ relia in honor of Morelos (q.v.), patriot and soldier, who was a native of the city, to whom the most notable monument in the city is ded¬ icated. Morelia is set on a rocky eminence ris¬ ing from the Guayangareo Valley, which is al¬ most surrounded by mountains, and in climatic conditions favorable to the successful cultiva¬ tion of nearly all grains, fruits and vegetables. Patzcuaro Lake, the most beautiful body of water in the republic, is only 39 miles to the southwestward. The College of Saint Nicholas was founded three centuries ago ; the School of Medicine (in the General Hospital) and the Charity Hospital for Women, are among its in¬ stitutions. There are several _ well-equipped libraries, the State Library having a remark¬ able collection of rare books. The great cathe¬ dral, begun in 1640 and completed in 1741, is a very imposing edifice. A stone aqueduct of ex¬ ceeding beauty supplies water for domestic

pur¬ poses. Cottons and woolens and sugar are among its industries, and guayabate, a high-class confection. There are extensive barracks. The streets are well paved, with electric light¬ ing and a municipal tramway system. Pop.

40,042.

MORELL, George Webb, American sol¬ dier: b. Cooperstown, N. Y., 8 Jan. 1815; d. Scarborough, N. Y., 12 Feb. 1883. He was graduated at the West Point Military Academy (1835) but resigned (1837) to become civil engineer. He worked three years in Michigan and southern coast States on railroad construc¬ tion, settling (1840) in New York to study law. He was admitted to the bar (1854) and began practice but was made commissioner of the United States Circuit Court for the southern district of New York. When civil war broke

out he was inspector-general on the staff of Major-General Sanford, with the first division New York State militia, and accompanied it to Washington. He was colonel on General Pat¬ terson's staff during the Shenandoah campaign and was promoted to brigadier-general, then major-general, commanding the 2d brigade, 2d division, 5th Army corps, to be given next com¬ mand of a division. He was in command of the supports of the celebrated battery of 100 guns at Malvern Hill, and was engaged at Han¬ over Court House, Mechanicsville and Gaines's Mills. He contracted germs of disease during the Chickahominy campaign that later proved fatal. He lived on his farm at Tarrytown, N. Y., after being mustered out of the service and was senior warden for many years at Trin¬ ity Episcopal parish church, Tarrytown.

MORELL, John Daniel, English philos¬ opher and inspector of schools : b. Little Bad-dow, Essex, 1816; d. 1891. He studied at Glas¬ gow, taking (1841) the degree of M.A., when he went to Bonn to study theology and philos¬ ophy. He was made Congregational minister at Gasport (1842-45), becoming inspector of schools (1848-76) through Lord Lansdowne. Fie wrote numerous works dealing with Eng¬ lish grammar and spelling, as well as his better known (Historical and Critical View of the Speculative Philosophy of Europe in the Nine¬ teenth Century5 (1846), and his (Philosophy of Religion5 (1849). Other works are (On the Philosophical Tendencies of the Age5 (1848) ; Philosophical Fragments5 (1878). Consult Theobald, R. M.,

Memorials of J. D. MorelP (London 1891).

MORELLA, mo-ra'lya, Spain, town in the province Castellon de la Plana in the mountain district Maestrasgo. It has a 14th century . Gothic church, and an aqueduct, a powerful castle and is surrounded by walls with towers. Its industries consist of cloth and cotton fabric factories, dyeing establishment, *etc.* This is the location of the old Roman Castra Aelia, and it played a prominent role during the Carlist wars. In 1839 it was stormed by Cabrera, who received the title Count of Marella. In 1910 it had a copulation of 6,722.

MORELLI, mo-rel'le, Domenico, Italian historical painter: b. Naples, 1826; d. there, 13 Aug. 1901. His true name was Soliero. He studied at Rome under Camillo Guerra, ad¬ vancing his talent under the influence of Filippo Palizzis, studying nature. He ripened thus into a 'historical and genre painter of the most suc¬ cessful form, especially through his attractive religious pictures. His chief early works were (The Sicilian Vesper,5 (Count Lara,5 (The Refugees from Aquileja,5 *etc.* In 1867 he turned to biblical work with his (Christ Walk¬ ing on the Sea,5 a grand work; (The Descent from the Cross,5 (Christ in the Desert,5 *etc.* He painted the (Ascension of the Virgin5 for the royal palace at Naples. He created sev¬ eral (Temptations of Saint Antony.5 Among other work, the fruits of his journey in the Ori¬ ent were (A Street in Constantinople,5 (The Road to the Bath,5 (The Prayer in the Wil¬ derness5 and (Mohammed before the Battle.5 Fie was made senator of the kingdom of Italy and became director of the Institute of Fine Arts and the Museum of Applied Arts at

Naples, where he used his best influence to ad¬ vance the decorative arts at the latter institu¬ tion's classes. Consult Willard, (Sketch of the Life and Works of Domenico MorellP (Boston

1895).

MORELLI, Giovanni, Italian art critic and statesman: b. Verona, 25 Feb. 1816; d.* Milan, 28 Feb. 1891. He was educated at Bergamo, then Aarau (Switzerland), but turned his studies to natural science at Munich, becoming interested at the same time in art through Genelli, the painter. After a short stay at Erlangen and a visit to Berlin, where he made the acquaintance of Waagen, the art critic, he joined (1838) Agassiz in investigating the Swiss glaciers. In Paris and Siena and through numerous journeys he gained increasing culture and made acquaintance with Manzoni, Gino Capponi and other prominent Italians. In 1848 he took to politics for a short while, never returning to that field till (1859) he was made commander of the National Guard at Magenta. In 1860-70 he was elected deputy for Bergamo, and (1873) became senator of the kingdom of Italy. His knowledge in art criticism .gained during his travels he published in treatises in Zeitsclirift filr bildende Kunst (1874-76). His work (Die Werke italienischer Meister in den galerien von Miinchen, Dresden und Berlin* (Leipzig 1880), contains his criticism, empiric principles being their base, and show unexcelled connoiseurship. As sequels to this clever work amplifications are contained in the later pub¬ lished (Kunstkritischen Studien fiber italienische MalereP : Vol. I, (Die Galerien Borghese and Doria Pamfili in Rom) (Leipzig 1890), Vol. II, (Die Gaulerien zu .Miinchen und Dres¬ den* (ib. 1891) and Vol. Ill, (Die Galerie zu Berlin* (ib. 1893). Italian translations of these were published (Milan 1897). His (Kunstkritische Studien) has been translated by Ffoulkes into English under the title of Htalian Painters; critical studies of their works* (1892). In 1895 a monument was erected at Milan to the memory of this genius of keen critical art research.

MORELLY, R., French publicist of the 18th century: b. Vitry-le-Frangois. Beyond the place of his birth and the fact that he became an abbe there, nothing whatever is known of his life. His works, however, are known and important; they are philosophical and social¬ istic, and consist chiefly of <Le prince; les delices du coeur, au traite des qualites d'un grand roi, etc.* (2 vols., Amsterdam 1751), a description of a prince who made his people happy by carrying into action philosophical ideas; <Naufrage des lies flottantes, ou la Basilide du celebre Bilpai* (1753), an allegori¬ cal communistic novel which depicts a people ruled by natural laws instead of political. His third work was (Code de la Nature* (Amster¬ dam 1755; Paris 1841), erroneously attributed to Diderot, which sketches a perfect com¬ munistic organization and is said to have had considerable influence in the formation of the socialistic propaganda of the French Revolution.

MORELOS Y PAVON, Jose Maria, ho-sa' ma-re'a mo-ra'los e pa-von', Mexican patriot: b. near Apatzingan, Michoacan, 30 Sept. 1765; d. near City of Mexico, 22 Dec. 1815. He worked for many years as a muleteer ; at 32

entered the college of Valladolid; was ordained to the priesthood three years afterward; and from 1801 to 1810 was in charge of the parishes of Caracuaro and Nucupetaro. In 1810 he joined the standard of rebellion raised by Miguel Hidalgo, who had been rector of the college of Valladolid during Morelos' student days, and after Hidalgo's death kept the cause alive in the north by his own vigorous move¬ ments in the south.' His few followers soon be¬ came an army, and having defeated several Spanish armies he advanced upon the City of Mexico, defeated Porlier 22 Jan. 1812, success¬ fully held Cuautla for 62 days against the famous siege by the viceroy, finally making a skilful withdrawal of his forces, and captured Oaxaca (October 1812) and Acapulco (August 8113L He was made captain-general in No¬ vember 1813 by the Congress convened at Chilipancingo, and the declaration of Mexican independence soon followed. He attempted to capture Valladolid, was defeated by Iturbide, and taken prisoner was shot as a traitor at San Cristobal Ecatepec. His remains lie in the cathedral of Mexico City.

MORELOS, Mexico, an interior state south of the Federal District and the state of Mexico. Capital, Cuernavaca (q.v). Area, 2,773 square miles; pop. about 183,700. It was named in honor of Gen. Jose Morelos y Pavon.

MORENO, Afredo Baquorizo, al-fra'do ba-kwo-re'sd mo-ra/no, Ecuadorian diplomatist and novelist: b. Guayaquil, Ecuador, 29 Sept. 1859. He was graduated in law from the Uni¬ versity of Quito and began the practice of his profession in 1884. From 1897 to 1901 he was a member of the Superior Court of Guayaquil, was Minister of Foreign Relations, 1901-02, was elected Vice-President of Ecuador in January 1903, and is now Minister from Ecuador to the United States. He is author of (Poetas) (1882) ; and the novels (Titania* (1892) ; (E1 Senor Peneo* (1892) ; <Una Sonata en Prosa> (1894); (Evangelina* (1895); <Luz) (1901).

MORESNET, mor'na, a small neutral ter¬ ritory on the Belgo-Prussian border about five miles southwest of Aix-la-Chapelle, traversed by the Belgian Lfittich-Bleiberg on the west and the Prussian Herbesthal-Aachen railways. The only village is Neutral-Moresnet (or Kel-mis)

with the important calamine (zinc-silicate) mines and 3,400 inhabitants. The territory was under the protectorate of the signatories of the Vienna Congress (1815) and the citizens had choice of military service with either the Belgian or Prussian army. Many of the in¬ habitants were French and Dutch, as well as Flemish and German. Under the terms of the Peace Treaty, promulgated 7 May 1919, Bel¬ gium was awarded full sovereignty over the con¬ tested territory of Moresnet and over part of Prussian Moresnet.

MORETO Y CABANA, mo'ra to e ka-ba'- nya, Augustin, Spanish dramatist: b. Madrid, 9 April 1618; d. Toledo, 28 Oct. 1669. Return¬ ing home from the University of Alcala, where he had just been graduated in law, he began writing successfully for the stage (1640). In Madrid he soon found a friend and patron in Calderon. He was very prolific, turning out drama after drama until he finally passed the 100 mark before he had reached middle age.

His popularity was immense and he was rated as the equal, if not the superior, of Lope de Vega, by his admirers, among whom were the best critics of the age. Posterity, however, while recognizing the genius of Moreto and his valuable contributions to the Spanish drama, has not sustained this high verdict of his con¬ temporaries. One reason is that Moreto was not original in the sense that Lope de Vega was. His dramas or ((Comedias de capa y espada,® while clever in themselves and instinct with the dramatic spirit, have more than an echo of Vega and Calderon, from whom he frequently borrowed and sometimes improved upon, as in (E1 desden con el desden,* which is generally considered to be his masterpiece. In addition to ((dramas of intrigue® he also produced historical dramas and wrote consider¬ able lyrical poetry and autos sacrementales. Moreto's incursion into the field of historical drama was probably occasioned by the decree of the Royal Council and Chamber of Castile which, in 1644, educed the numbers of dramas and comedies licensed and ordered that, in the future, the dramatists should turn their atten¬ tion to historical drama and plays based on the lives of the saints. He found a new field in

recasting old dramas, comedies and other plays and making them conform to the requirements of the censor, who was, in reality, controlled by the Church authorities who had dictated the new move for restricting the activities of the drama and the stage. Like Shakespeare, Moreto put so much of himself into this work of recon¬ struction that many of the new-made dramas were more deservedly his than the work of their first creators. He excelled in painting certain human passions and feelings, among them all the shades of love, including undying passion, disdain, the suffering of unrequited love, jealousy, friendship, faithfulness, unfaithful¬ ness, intrigue in love and in the ordinary affairs of life. In this field he surpassed his prede¬ cessor and master, Lope de Vega, and led the way for true and delightful character painting in which the Spanish drama and novel have since shown such power and realism combined with idealism. Moreto painted people of more re¬ fined feelings, sentiments and position in life than did Lope de Vega, probably because he was better acquainted with upper class society than was the older dramatist. The complicated complexion of Spanish court life with its in¬ trigues, ambitions, plots and insincerity is well pictured in the dramas of Moreto who swept into his dramatic net every character and con¬ dition that he met in his march through life. While he lacks invention and made use, without conscience, of his predecessors and followed the style of drama made popular by Lope de Vega, he gave the Spanish drama characteriza¬ tion and artistic development that it had not previously possessed. He rejuvenated old plays and scenes, breathing into them the breath of life, and he polished his work as no Spanish dramatist had done before his day. He thus pointed the way to the successes that have since his time, been achieved by dramatists and novelists in Spain. Spanish literature, there¬ fore, owes him much. What he lacked in originality of invention be made up in his knowledge of the stage and in his ability to reconstruct the scenes and thoughts of others. His plots move along with rapidity, satisfactory

development and wonderful management of dialogue which is ever fluid and graceful. He surpasses his contemporaries in the number and variety of characters which he handles with great skill in his realistic pictures of the extrava¬ gances, customs and vices of the life of his day; so that he has made himself the greatest of the Spanish writers of character drama. In this field he shows his deep and wide knowledge of the world and his power to analyze character-ers and motives, passions and prejudices. Yet, on the whole, his plays are in better taste and superior in morality to those of any of his contemporaries. Comparatively early M,oreto entered a convent, embracing monastic

life. From there he sent out numerous plays that became the delight of Madrid and other Spanish theatrical audiences for 10 years or more. Among his more notable plays are (De fuera vendra quien de casa nos echara, *(Trampa adelante,* (Los Jueces de Castilla,* (San Franco de sena,* (La fuerza del natural,* (E1 Undo don Diego,* (E1 parecido,* (Santa Rosa del Peru,* (E1 desden con el desden,* (Rico hombre de Alcala* and many autos sacremen¬ tales.

Bibliography. — Carrara, E., (Studio sul

teatro ispano-veneto di Carlo-Gozzi* (Caghari 1910) ; Clarke, H. B., (Spanish Literature) (London 1909) ; Fernandez-Guerra y Orbe, Luis, (Augustin Moreto y Cabana* (Biblioteca de autores espanoles, Vol. XXXIX) ; also in Vol. LVIII of the same work for (Autos Sacrementales) of Moreto; Fitzmaurice-Kelly, (A History of Spanish Literature) (New York 1898) ; Giyas, E., (Studien og Essays) (Copen¬ hagen 1898) ; Mariscal de Gante, Jaime, (Los autos sacramentales desde sus origines hasta mediados del siglo XVIIP (Madrid 1911) ; Perez Pastor, Cristobal, (Bibliographia Mad-rilena* (part 3, Madrid 1907) ; Ticknor, G., (History of Spanish Literature) (New York

1854).

MORETON (mor'ton) BAY, Australia, on the east coast of Queensland, formed inside the islands of Moreton and Stradbroke, is 40 miles long by 17 broad; its south half is dotted with islands and sandbanks. It receives six con¬ siderable rivers, including the Brisbane, with the important city of Brisbane at its outlet. The entrance at the north end is. practicable at all times for vessels of the largest size; the entrance between Moreton and Stradbroke islands is narrow and less safe. Moreton Bay was discovered by Captain Cook in 1770, and explored by Flinders in 1799.

MORETTO DA BRESCIA, mo-ret'to da bra'che-a (his proper name was Alessandro Bonvicino), Italian painter: b. Brescia, 1498; d. there, 1554. He took Titian as his model, imitating also Palma Vecchio an.d Romanino, whose styles he developed on independent lines of his own.. He was already famous as an artist at 18, and is reckoned a master of pictorial ex¬ pression, uniting in his coloring tenderness and freshness of flesh tones with a brilliant power of chiaroscuro. His pictures are particularly noted for their bright background, from which his figures stand out with lifelike clearness. His frescoes were less successful. His numerous religious paintings are full of devotional

feeling. Most of these are at his native town of Bres-

cia. In Saint Clement's Church in that city is a vast altarpiece of his containing a Madonna and Child surrounded by singing angels and the Saints Clement, Dominick, Florian, Cath¬ arine and the Magdalen. He painted an (Assumption> in the church of San Mazaro. His masterpiece, ˆThe Virgin Appearing to a Shep¬ herd,5 is in the church at Paitone, province of Brescia. There are some fine paintings of his in the galleries at Berlin and Frankfort, and in the Brera at Milan: and examples are to be found also in the public galleries of Vienna, Petrograd, London and Paris. The portraits by this master are equally excellent in conception and power of coloring. Consult the volume in the ˆPainters Series5 (New York 1910), and (Masters of Art5 (Vol. IX, Boston 1908).

MOREY, mo'ri, Samuel, American in¬ ventor: b. Hebron, Conn., 23 Oct. 1762; d. Fair-lee, Vt., 17 April 1843. He eaHy evinced a talent for mechanics and engineering, and at the time of the opening of the Connecticut River to navigation designed and built the locks at Bellows Falls. On his large estates he built chutes with which to bring his pine logs to the mills years before Napoleon's accomplishment of the feat in the Alps. When but. 18 he began his experiments with steam, and in 1790 had conceived the idea of propelling boats by means of an improved steam-engine. In 1793 he suc¬ ceeded in building a boat which attained a speed of four miles an hour, which later he im¬ proved and exhibited in New York with a speed of five miles an hour. Morey was often in consultation with Professor Silliman of Yale College as to the value of his inventions; and when Chancellor Robert R. Livingston offered him $7,000 for the patent allowing him to run the boat from North River to Amboy, Morey declined. He continued his experiments, encouraged by an offer of $100,000 for an eight-hour steamboat which Livingston was said to

have made, and several patents were issued to Morey which showed that he con¬ sidered the object almost within his reach. In 1797 he exhibited a greatly improved boat at Philadelphia and became famous throughout the Middle and New England States. His ob¬ ject seemed practically achieved and arrange¬ ments were made for the operation of the steamboats, when misfortune overtook the capitalists who were to promote the enterprise and it failed of operation. Morey is believed by many authorities to have been the real in¬ ventor of the steamboat, as . Robert Fulton visited him before the exhibition of his own invention.

MOREY, William Carey, American pro¬ fessor: b. Attlemoro, Mass., 23 May 1843. He left his studies at the University of Rochester to enter the army as volunteer during the Civil War, becoming brevet major and lieu¬ tenant-general. Returning to college he grad¬ uated (1868) at the University of Rochester and entered (1869) the Rochester Theological Seminary. He was professor of history and English literature at Kalamazoo College (18/U-72), becoming professor of Latin, and history (1872-83) and of history and political science 0883 —) at the University of Rochester. He had the desrree D.C.L. conferred on him by Denison (1903) and Rochester (1908). He

wrote Outlines of Roman Law5 (1884) ; Out¬ lines of Roman History5 (1900) ; (Government; of New York5 (1902) ; Outlines of Greek His¬ tory5 (1903); (The study of Roman Law in Liberal Education5 (1911) ; Outlines of An¬ cient History5 (1906).

MOREY LETTER, The, in American po¬ litical history the forgery of a letter during the Garfield-Hancock campaign of 1880. The letter which favored Chinese immigration purported to have been written by General Garfield and to be addressed to H. L. Morey, Lynn, Mass., and was made public in the New York Truth, 20 Oct. 1880, and a facsimile published in the same paper three days later. James A. Garfield, Re¬ publican candidate for President, denounced the letter as a forgery, but Democrats made liberal use of the document and many votes, it is said, were lost to the Republicans through the publication of the letter. Consult Davenport,

(History of the Morey Letter5 (New York

1884).

MORGAGNI, Giovanni Battista, jo-van'ne bat-tes'ta mor-gan'ye, Italian anatomist : b. Forli, 25 Feb. 1682; d. Padua, 6 Dec. 1771. Af¬ ter taking his degree of M.D. at Bologna, he went to Venice and ultimately to Padua, where in 1712 he became professor of the theory of physics; and in 1715, as successor of Molinetti, was appointed to the principal anatomical chair in the same institution, which he continued to occupy till his death. He was the first to show the importance of anatomy as being the basis of all other medical studies, and is regarded as the founder of pathological anatomy. He established a great reputation, students from all parts of Europe flocking to Padua. His most celebrated works are (Adversaria Anatomica5 (1706-19), afterward enlarged and published under the title of < Adversaria Omnia5 (6 vols., 1741) ; and particularly his (De Sedibus et Causis Morborum per Anatomen Indagatis5 (1761; 6 vols., Leipzig 1827), which has been translated into various European languages.

MORGAN, Charles Hill, American me¬ chanical engineer: b. Rochester, N. Y., 8 Jan. 1831; d. 1911. He was educated at public school and Lancaster Academy, entering his uncle's machine shop at Clinton, Mass., in his 18th year, studying in spare time mechanics and drawing. From 1855-60 he was draughtsman for Erastus B. Bigelow. He designed and con¬ structed one of the first automatic paper bag machines and associated himself with his brother in paper and paper bag making in Philadelphia. He became superintendent (1864) of Washburn and Moen Wire Works, Worcester, Mass., where he. became, very prominent as mechanical . engineer, bringing about great improvements in the wire drawing processes, *etc.* In 1887 he became consulting engineer for the American Wire Company, Cleveland, Ohio, and opened up an office in Worcester. In 1891 he established the Mor¬ gan Construction Company, of Worcester, Mass, for making rolling mill appliances, etc., and at the same time was president of Worcester Polytechnic Institute. In 1881 the Morgan Spring Company was organized at that city of which he became president. He was. president of the American Society of Mechanical Engi¬ neers 1899-1900.

MORGAN, Conwy Lloyd, British zoolo¬ gist : b. London, 6 Feb. 1852. He was educated at the Royal Grammar School, Guildford, and Royal College of Science. From 1878-83 he was lecturer in English and physical science at the Diocesan College, Rondesbosch, Capetown, then (1884) professor of zoology and geology at University College, Bristol, becoming prin¬ cipal (1887-1909). He was appointed vice-chan¬ cellor of the University of Bristol, but resigned after three months. He has written (Animal biology) (1887); (Animal Life and Intelligence) (1890); (Animal Sketches) (1891); introduc¬ tion to Comparative Psychology (1895) ; in¬ stinct and Experience > (1912); (Spencer's

Philosophy of Science) (1913).

MORGAN, Daniel, American soldier: b. Hunterdon County, N. J., 1736; d. Winchester, Va., 6 July 1802. His early life was passed in obscurity and in 1753 he removed to Virginia where in 1755 he served under Braddock as a teamster. He was afterward engaged in In¬ dian warfare and served in Pontiac's War and in Lord Dunmore's War. In 1775 he entered the army of the colonists and commanded a company of riflemen under Washington. He accompanied Arnold at Quebec in 1775 and rendered gallant service there but was captured by the British and not exchanged until nearly a year afterward. He was then given com¬ mand of a Virginia regiment with the rank of colonel, and in the campaign against Burgoyne took a prominent part; but his services not be¬ ing recognized by Congress, he resigned. In 1780 he returned to the service as brigadier-general under Gates, and under General Greene who succeeded Gates. Morgan won a brilliant victory over Tarleton at Cowpens, which was recognized by a gold medal from Congress. His subsequent movements were of serious an¬ noyance to Cornwallis, but in 1781 he resigned from the army owing to ill health. In 1794 he returned to it as major-general and helped to crush the Whisky Insurrection, and from 1795-99 was a member of Congress. Consult Graham, <Life of General Daniel Morgan of the Virginia Line) (1856) ; McConkey, (The Hero of Cowpens) (2d ed., 1885).

MORGAN, Edwin Dennison, American politician: b. Washington, Mass., 8 Feb. 1811; d. New York, 14 Feb. 1883. He was educated in the public schools, at 17 entered the store of his uncle in Hartford, Conn., and three years later was made a partner in the business. In

1836 he removed to New York and engaged in the grocery business. During the cholera visi¬ tation of 1849 he rendered devoted service. Elected. to the State senate in 1850, he con¬ tinued in that office until 1858, when he was elected governor of the State and served until 1862, his administration during those trying times being marked bv great sagacity and patriotism. About 223,000 troops were raised for. the Federate; New York's firm attitude during the war being in large measure due to Governor Morgan's influence. In 1862 he was elected to the United States Senate; in 1865 he declined the secretaryship of the treasury offered him by President Lincoln, and again refused it under Arthur. He served in the Senate until 1869, and though still taking an active interest in politics held no further political office ex¬ cepting that of chairman of the Republican

committee which conducted the presidential campaign of General Grant in 1872. He was connected with numerous great financial en¬ terprises during the last years of his life and was a generous benefactor to education, notably to the New York Theological Seminary and Williams College.

MORGAN, Edwin Vernon, American di¬ plomatist : b. Aurora, N. Y., 22 Feb. 1865. He graduated (1890) at Harvard University and studied (1891-92, 1894—95) at the Berlin Uni¬ versity. He was appointed assistant in history (1892-94) at Harvard and instructor in history (1895-98) at Adelbert College, Cleveland. In 1899 he was appointed secretary to the Samoan Commission, and (1900) secretary of legation at Seoul, Korea. He served as second secre¬ tary of the embassy, Saint Petersburg (1901) and as consul at Dalny, Manchuria (1904), Minister Plenipotentiary to Korea (1905), fill¬ ing the same diplomatic position at Cuba (1905-10), then Uruguay, Paraguay (1910-11), and Portugal (1911-12). He was made Ambassador Extraordinary and Plenipotentiary at Brazil

1912.

MORGAN, George Campbell, British

Congregational preacher : b. Tetbury, Glou¬ cestershire, 9 Dec. 1863. He was educated at the Cheltenham Douglas School, became master in the Jewish Collegiate School, Birmingham (1883-86), then mission preacher (1886-88), to be ordained (1889) to the Congregational

ministry. He served as pastor at Stone, Staf¬ fordshire (1889-91); Rugely (1891-93); West¬ minster Road, Birmingham (1893-97); New Court Tollington Park, London (1897-1901). He was extension lecturer (1901-04), then pastor of Westminster Congregational Chapel (1904-17). He wrote (The Analyzed Bibie) (10 vote. 1910); (Evangelism) ; (The Life of the Christian) (1904); (God, Humanity and War) (1914). He has been editor of The Westminster Bible Record and The West¬ minster Pulpit.

MORGAN, Sir George Osborne, English

politician: b. Gothenburg, Sweden, 8 May 1826; d. 1897. He was graduated at Oxford in 1848 and was admitted to the bar in 1853. In 1868 he became a member of the House of Com¬ mons and was a staunch supporter of various reform movements, particularly those concern¬ ing the English land laws, Welsh disestablish¬ ment and education. He was appointed judge-advocate-general in Gladstone's ministry in 1880 and. carried through legislation abolishing flogging in the army; and in 1886 was Under¬ secretary for the Colonies. He was created a 'baronet in 1892 and was leader of the Welsh party in the House of Commons until his death. He was the author of a work on (Chancery Acts and Orders) (1858).

MORGAN, George Washbourne, Ameri¬ can organist: b. Gloucester, England, 9 April 1822; d. Tacoma, Wash., 10 July. 1892. When he . was eight he played the entire service at Saint Nicholas' Church in Gloucester, and at 12 became assistant organist at the cathedral there. He removed in 1853 to New York, where he was organist in several leading churches, and gave recitals in different cities of the United States with marked success. He conducted an annual Lenten service in Chicker-

ing Hall, New York, after 1880, and was the author of an Episcopal service, and numerous compositions.

MORGAN, George Washington, Ameri-ican soldier: b. Washington

County, Pa., 20 Sept. 1820; d. Old Point Comfort, Va., 26 July 1893. He left college in 1836 to enlist in the Texas army and fought for the independence of that country as lieutenant and then as captain when he resigned and in 1841 entered West Point. In 1843 he left the academy to study law and established a law practice at Mount Vernon, Ohio, in 1845. When the Mexican War broke out he became colonel and served under General Scott with distinction, becoming brevet brigadier-general. He returned to his law practice and in 1856 was sent as United States consul to Marseilles; in 1858 he went from there to Portugal Minister where he remained until 1861. He entered the army immediately upon his return to the United States and as brigadier-general was given a command under General Buell. In 1862 he took command of a division of the Army of Ohio, later was with Sherman at Vicksburg and held the command at the capture of Fort Hind¬ man, Ark. He resigned in 1863 on account of failing health. He was a member of Congress from 1869 to 1873.

MORGAN, Sir Henry John, Welsh bucca¬ neer, lieutenant-governor of Jamaica: b. Llan-rhynny, Glamorganshire, about 1635 ; d. Jamaica, 1688. While a boy he was kidnapped at Bris-told and sold at Barbados. Just when he joined the Jamaica buccaneers is uncertain, as there were several Morgans in the marine at Jamaica at the time, but he may have com¬ manded his own ship as early as 1663; a Cap¬ tain Morgan who sailed from Jamaica in that year taking part in the sack of Vildemos, Trux-illo and Granada (1665-66) . In 1666 Morgan sailed under Mansfield to capture Curasao, and was chosen admiral after Mansfield s death at the hands of the Spaniards. In 1668 he cap¬ tured Puerto Principe in order to get informa¬ tion of Spanish plans for an attack on Jamaica , then took Porto Bello, Panama, after a sharp siege during which the buccaneers planted scal¬ ing ladders under the cover of captured priests and nuns, sacked the city and tortured and mal¬ treated its inhabitants ; and in the end of the summer again ravaged Cuba. The next year, 1669, saw Morgan's attack on Maracaibo, fol¬ lowed by fresh outrages. The arrival of three Spanish warships did not check Morgan's suc¬ cess, for he set fire to one ship, captured an¬ other and forced the Spaniards to beach and burn the third; he killed almost all his prison¬ ers, recovered 15,000 pieces of eight from the sunken ship, got a ransom for the city from the Spanish forces in the fort and by a clever manoeuvre made his escape. Returning to Ja¬ maica he was first reproved for exceeding his powers and then made commander-in-chief of the entire naval force of Jamaica,, so that in 1671, with a stronger force under him than be¬ fore, he approached the city of Panama, which he captured after a thrilling battle, in which the Spanish cavalry was broken by

riding into a swamp, and further execution was done by a herd of cattle which the Spaniards intended should break the English ranks but which stampeded the Spanish. This attack and the

capture of Panama occurred some time later than the signature of peace between England and Spain, and in consequence Morgan was ordered to England for trial in 1672. Nothing serious came of this, however, possibly because Morgan made free use of his wealth in Eng¬ land. In November 1674 die held a commis¬ sion as lieutenant-governor of Jamaica. He can hardly be called a pirate ; his cruel, brutal methods were those of his enemies and Eng¬ land's enemies. The primary source for Mor¬ gan's life is Exquemeling, (Buccaneers of America) (1684), the work of one of Morgan's followers and reprinted in the (Adventure Series* (London 1891) . Professor J. K. Laughton in the dictionary of National Biography) (Vol. XXXIX, 1894), first set straight the chronology of Morgan's life. Popular ac¬ counts are Hutcheson, <Sir Henry Morgan* (1890) ; Pyle, (Buccaneers of America) (1891) ; Stockton, (Buccaneers and Pirates of Our Coast* (1898) ; and Brady, (Sir Henry Morgan,* a romance (1902).

MORGAN, James Appleton, American lawyer and author : b. Portland, Me., 2 Oct. 1850. He was graduated at Racine College, Wisconsin, in 1867, and at the Columbia Law School in 1869, and in 1871 began the practice of law in New York City, becoming profession¬ ally associated with railroad interests. In 1885 he founded the Shakespeare Society of New York, of which until 1910 he was . president. His view of the First Folio of 1623 is that the plays as therein printed are not monographs almost solely attributable to Shakespeare, but ˆgrowths® embodying ˆimprovements,** altera¬ tions and expressions by many hands ; and the society's publication, the (Bankside Edition of Shakespeare) (22 vols., 1888-1906), edited by him, contains the earliest players' rendering printed in parallel columns with the First Folio. His writings include (Macaronic Poetry* (1870); (The Law of Literature) (1874);

(Legal Maxims) (1877) ; (The Shakspearean Myth* (1880) ; (Shakespeare in Fact and Criti¬ cism* (1884) ; (Some Shakespearean Commentators) (1885); (Digest Shakespeareana* (1887) ; (The People and the Railways) (1888) ; and (The Society and the Fad) (1890); (Bankside Restoration Shakespeare) (5 vols., 1905-08).

MORGAN, John, American physician: b. Philadelphia, 10 June 1735; d. Philadelphia, 15 Oct. 1789. He was graduated (1751) at the College

of Philadelphia (now known as the University of Pennsylvania) and served an ap¬ prenticeship in medicine under Dr. John Red¬ man. He entered the provincial, army as sur¬ geon and lieutenant, resigning his commission to continue (1760) his medical studies in Lon¬ don and Edinburgh, receiving the degree of M.D.. 1763. During a visit to Pans he was made member of the Academy of Surgery for clever anatomical preparation of a kidney. In Italy he was made member of the Society of Belles-Lettres, Rome, and on his return to Lon¬ don was elected Fellow of the Royal Society and licentiate of the Colleges of Physicians of both London and Edinburgh. Returning (1765) to Philadelphia he laid the plan for es¬ tablishing a medical school in that city, which he had formulated, at the request of the trus¬ tees of the College of Philadelphia. The plan

adopted, he was elected professor of the theory and practice of medicine, and, three years later, five young men received medical degrees — the first conferred in America. In 1775 he was appointed by Congress director-general and physician-in-chief to the general hospital of the American army, and reorganized the hospitals of the army. But lack of supplies for the sick and wounded made his energetic efforts largely ineffective and complaints to Washington caused Congress (1 777) to dismiss him without reason. A committee of that body, however, after an investigation, honorably acquitted him of blame, while Washington wrote him: ((No fault could be found with the economy of the hospitals during your directorship.® He wrote (A Discourse on the Introduction of Medical Schools in America) (1765), and his disserta¬ tion (The Reciprocal Advantages of a Perpet¬ ual Union between Great Britain and her American Colonies) (1766) won him a gold medal from England.

MORGAN, John Hartman, British pub¬ licist and educator: b. 20 March 1876. He was educated at Caterham School, studied at Uni¬ versity College of South Wales, Balliol College, Oxford, and University of Berlin. From 1901-03 he was on the literary staff of the Daily Chronicle, became editorial writer on the Man¬ chester Guardian (1904-05), and London Uni¬ versity Extension lecturer as well as at the London School of Economics. He became lec¬ turer in constitutional law at London Univer¬ sity College (1907) and was Liberal candidate, in 1910, for Edgbaston (Birmingham), and later in the year for West Edinburgh. Since 1916 he has been staff-captain on the adjutant-general's staff. Lie has written (The House of Lords and the Constitution (1910); (The New Irish Constitution (1912) ; (The German War Book) (1915); (German Atrocities: An Official Investigation (1916). Many articles from his pen have appeared in the leading pe¬ riodicals.

MORGAN, John Hunt, Confederate gen¬ eral: b. Huntsville, Ala., 1 June 1826; d. New Greenville, Tenn., 4 Sept. 1864. His boyhood was spent in Lexington, Ky., where he was later a manufacturer of

bagging. He served through the Mexican War as lieutenant of cav¬ alry. At the outbreak of the Civil War he, with 200 men of the local militia, made tor the Confederate fines, and he was appointed a cap¬ tain of volunteers. Soon discovering that he could best serve the Confederacy by adopting guerrilla methods of warfare he began the series of raids which so annoyed the Union commander. Moving with great celerity, and accompanied by his own telegraph operator, he kept himself acquainted with the plans of the enemy while he misled them regarding his own position. As the result, bridges which they ex¬ pected to cross were burned, much-needed sup¬ ply trains were captured and railroad tracks were destroyed. In 1862 he was rewarded by appointment as major-general. In 1863 he pro¬ jected an extended raid through Kentucky, Ohio and Indiana, but was captured and, with many companions, imprisoned in the Ohio Peni¬ tentiary. Escaping, he again attempted a raid but, while sleeping at a farmhouse near Green¬ ville, Tenn., he was surrounded by National

troops under Gen. Alvin C. Gillem, and upon attempting to escape was killed. See Morgan's Raid into Indiana and Ohio.

MORGAN, John Livingston Rutgers,

American chemist: b. New Brunswick, N. J., 27 June 1872. He was graduated (1892) at Rutgers College, received Ph.D. diploma at University of Leipzig (1895) and was ap¬ pointed assistant in chemistry at Stevens Insti¬ tute (1895-96). He became instructor of quantitative analysis at Brooklyn Polytechnic Institute (1896-97). He served at Columbia LTniversity as 'tutor of chemical physics and chemical philosophy (1897-1901), professor of physical chemistry (1901-05) and as professor since 1905. He has written (The Principles of Mathematical Chemistry) from Helms' Ger¬ man work (1897) ; (The Theory of Solution and its results> (1897) ; (Elements of Physical Chemistry* (5th ed., 1914) ; (Physical Chem¬ istry for Electrical Engineers * (2d ed., 1909), besides contributing to the chemical periodicals.

MORGAN, J(ohn) Pierpont, American financier: b. Hartford, Conn., 17 April 1837; d. Rome, Italy, 31 March 1913. He was the son of J. S. Morgan (q.v.). He was educated at the English High School in Boston and at the University of Gottingen, Germany. He began his business career in the banking house of Duncan, Sherman & Co., New York City; in I860 he became agent and attorney in the United States for George Peabody & Co. of London; in 1864 junior member of the

banking firm of Dabney, Morgan & Co., and later mem¬ ber of the firm of Drexel, Morgan & Co., of which his father was also a partner. By the death of the older members of the firm he became the head of the latter house and the firm name was changed to J. P. Morgan & Co. He also controlled the firm of J. S. Morgan & Co. of London and had partnership interest in Drexel & Co. of Philadelphia. For many years his chief interest lay in railroad nego¬ tiations and combinations, and he gradually gained control of the New York Central sys¬ tem, the New York, New Haven and Hartford, the Reading, the Erie, the Lehigh Valley, the Southern, the Northern Pacific, the Big Four and the Chesapeake and Ohio. Shortly after this great railroad consolidation was com¬ pleted (1901), he succeeded in organizing the ((United States Steel Company,® uniting the Carnegie Steel Works and other large concerns with a capitalization of $1,100,000,000, and dom¬ inating the steel industry of the United States. In the same year he bought up a large English shipping line with the evident design of organ¬ izing a trust for the control of transatlantic shipping, but did not succeed in completing the consolidation. He was the head of both the anthracite and the soft coal trusts, and was several times prominent in the 'settlement of miners' strikes. In 1895 he organized the syndi¬ cate which floated the United States bond issue of $62,000,000, for the increase of the gold re¬ serve; and in 1901 secured American subscrip¬ tions of $50,000,000 to the British war loan. In 1912 he testified before the Pujo Banking Com¬ mittee in Washington, appointed by the House of Representatives to investigate the alleged (< Money Trust.® Probably no other American capitalist was so well known and so thoroughly

MORGAN

trusted in Europe as Mr. Morgan ; particularly was this true as regards England, and a large majority of English investments in American securities were made through his house ; every¬ where he was recognized, not merely as a man of vast wealth, but also as a man of

unusual organ¬ izing and constructive ability. He gave largely to many charities and institutions, particularly to hospitals, churches and the Trade School in New York, and to Harvard University. He was an enthusiastic yachtsman, was for two years commodore of the New York Yacht Club and built the yacht Columbia, which de¬ feated Sir Thomas Lipton's Shamrock in the international yacht races. Mr. Morgan was the greatest art collector of his time, his col¬ lections being among the most varied and im¬ portant ever owned by an individual. The historic and romantic aspects of art appealed more strongly to him than the purely aesthetic. He built a beautiful library adjoining his home, wherein he housed a collection of important manuscripts and rare and handsomely-bound books. The Metropolitan Museum of Art in 1913 exhibited most of his collections. Thir¬ teen galleries were needed to house the many rare specimens of Byzantine and Gothic en¬ amels and ivories, bronzes and marbles of the Renaissance, metal work, crystals, Flemish tapestries, a great collection of miniatures and paintings by artists of the first rank. His col¬ lection of porcelains, French furniture and objects of decorative art and the paintings of the celebrated Fragonard room were sold by his son in 1915. Mr. Morgan published elabo¬ rate catalogs of nearly all of his collections. Consult the catalogs published by the New York Museum of Art (1914), and for much valuable material on Mr. Morgan's career as financier, art collector and philanthropist, con¬ sult the New York Evening Post of 31 March

1913.

MORGAN, J(ohn) Pierpont, American financier, son of John Pierpont Morgan (1837 1913) : b. Irvington, N. Y., Sept. 1867. In 1889 he was graduated at Harvard University and soon afterward entered the London branch of J. P. Morgan & Co., bankers, remaining until 1901. He became a member of the firm and upon his father's death in 1913 became its head. He inherited the greater portion of his father's vast wealth including his almost priceless art collections. He also succeeded to the director¬ ate of several corporations in which his firm held large financial interests, including that of the New York, New Haven and Hartford Railroad. He resigned from the latter in 1914 when criticism of the financial management of that road became general. Mr. Morgan is a director of the United States Steel Corpora¬ tion, of the international Mercantile Marine Company, ofjhe Pullman Company, the North¬ ern Pacific Railway, the First Security Com¬ pany of the i !ity of New York, the .Etna In¬ surance Com] any and the New York and Flar-lem Railroac Company. When the United States

negotiated the purchase of existing canal rights in the Panama Zone Mr. Morgan ar¬ ranged for tl e payment of $40,000,000 in gold to the Frencn Panama Canal Company. After the outbreak jof the European War he made a first loan of $12,000,000 to Russia. In Janu¬ ary 1915 the Morgan firm was appointed the

commercial agent of the British government in the United States and thereafter conducted the purchase of all munitions and supplies for the Entente in the United States. In the same year the control of the Equitable Life Assurance Society was sold by Mr. Morgan to T. Cole¬ man Du Pont. On 1 July 1915 at Glen Cove,

L. I., Mr. Morgan was shot by a fanatic, but escaped with minor injuries. A loan of $50,- 000,000 was made to the French government by the Morgan firm in April and a few months-later the firm organized a syndicate of about 2,200 banks in the United States and floated a loan of $500,000,000 to the Entente Allies. Mr. Morgan is a member of the advisory council of the Federal Reserve Board, member of the New York Exchange, trustee and treasurer of the Church Pension Fund and governor of the Peabody Donation Fund.

MORGAN, John Tyler, American lawyer and politician: b. Athens, Tenn., 20 June 1824; d. Washington, D. C., 11 June 1907. He went to Alabama when nine years old, received his education there, was admitted to the bar in 1845 and commenced practice. Fie rapidly gained a high reputation as a lawyer and speaker ; was presidential elector in 1860, vot¬ ing for Breckenridge, and in 1861 was a dele¬ gate to the Alabama convention which declared for secession. He enlisted in the Confederate army as a private in 1861 ; in 1862 raised a regi¬ ment in his State, of which he was made colo¬ nel ; and in 1863 was commissioned brigadier-general and commanded a division under Gen¬ eral Johnston. After the war he resumed the practice of law at Selma, Ala.; was presiden¬ tial elector on the Democratic ticket in 1876, and sat in the United States Senate from 1877 until his death. He was long recognized as one of the ablest leaders of the Democrats in the Senate, was a member of the Senate Com¬ mittee on Foreign Relations and for some years its chairman; in his last term he was chairman of the Committee on Interoceanic Canals and, favoring in that capacity the Nicaragua Canal route instead of the Panama, was removed from his post in November 1903. He was an earnest and able advocate of recognition of Cuban independence, and won popularity in all parts of the country by his eloquent speeches in behalf of Cuba. In 1892 he was a member of the board of arbitration on the Bering

Sea Fisheries, and in 1898 was one of the com¬ mission appointed to prepare a system of laws and organize the government for the Hawaiian Islands.

MORGAN, Junius Spencer, American finan¬ cier: b. West Springfield (now Holyoke), Mass., 14 April 1813; d. Monte Carlo, Monaco, 8 April 1890. He entered a drygoods store when a boy and remained there until he came of age, when he was engaged for 18 months in banking in New York. He returned to the drygoods business in Hartford, Conn., where he was junior partner in a leading firm and rapidly advanced until he formed a partner¬ ship under the name of J. M. Beebe, Morgan & Co., which became one of the largest drygoods establishments in the United States. In 1854 he became a member of the banking house of George Peabody & Co., in London, which sub¬ sequently became J S. Morgan & Co., and was ranked among the world's greatest banking

houses. He was a generous benefactor of various public and private institutions, among them being Trinity College, Hartford, and the Hartford Orphan Asylum. He established a public library in Hartford and made valuable donations to the Metropolitan Museum of Art, Yale College, *etc.*

MORGAN, Lewis Henry, American archae¬ ologist and anthropologist: b. Aurora, N. Y., 21 Nov. 1818; d. Rochester, N. Y., 17 Dec. 1881. He was graduated at Union College in 1840, practised law at Rochester in 1844—64 and served in the State assembly (1861) and sen¬ ate (1868-69). His enduring fame rests on his researches in the history and customs of the American Indians. In his labors he received the aid of the Smithsonian Institution and the United States government. He spent much of his time among the tribes and was regularly admitted into the Senecas. His earliest work, 'The League of the Iroquois) (1851; new ed., 1904), was the first scientific account of the organization and government of an Indian tribe; but even more valuable are his (Systems of Consanguinity and Affinity of the Human Family) (1869) and his treatise on 'Ancient Society) (1877), each

based on the same ma¬ terial, the former being a collection of facts, the latter a philosophical treatise. He also pub¬ lished (The American Beaver) (1868) and houses and House-life of the American Aborigines) (1881). In 1875 he was elected to the National Academy of Sciences and 1879 was president of the American Association for the Advancement of Science. He bequeathed $80,000 to found a woman's college at the Uni¬ versity of Rochester.

MORGAN, Matthew Somerville, American artist: b. London, 27 April 1839; d. New York, 2 June 1890. He studied scene painting, but soon abandoned it to become correspondent and illustrator for the London News, afterward studying in Paris, Italy and Spain, and in 1858 penetrated the interior of Africa on a sketch¬ ing tour. Returning to London he became joint editor and proprietor of the Tomahawk, and his cartoons, which audaciously attacked the aristocracy and royalty, brought him into disfavor. He assisted in the establishment of the London Fun, and in 1870 removed to the United States, where he was engaged with Frank Leslie. He managed several theatres in New York, managed the Strobridge-Litho- graph Company of Cincinnati in 1878-85, and founded in that city the Matt Morgan Pottery Company and the Art Students' League.

MORGAN, Morris Hickey, American classical scholar: b. Providence, R. I., 8 Feb. 1859; d. 1910. He was graduated (1881) at Harvard, receiving (1887) the degree Ph.D. He held the chair of classical philosophy at Harvard. He wrote (De Ignis Eliciendi Modis apud Antiquos5 (1890) ; dictionary to Xeno¬ phon's Anabasis) (1892) ; 'A School Latin Grammar' (1899) ; 'The Minor Works of Tacitus) (1904) ; 'The Language of Vitruvius) (1906). Among his published translations are 'Xenophon's Art of Horsemanship) (1893) ; 'Bibliography of Persius) (1893) ; 'The Phor-mio of Terence> (1895) ; 'Eight Orations of Lysias5 (1895). Numerous essays and reviews from his pen have been published in the con¬ temporary philological periodicals.

MORGAN, Sydney Owenson, Lady, Irish novelist: b. Dublin, Ireland, about 1783; d. London, 14 April 1859. Her father was an actor on the Dublin stage, of the name of Mac Owen, afterward changed to Owenson. She was a governess for a time. Her first literary effort was a volume of poems (1801), fol¬ lowed by a collection of Irish songs and two novels, (Saint Clair) and the (Novice of Saint Dominick) (1804). In 1806 appeared her 'Wild Irish Girl,5 a novel which, avowedly nationalist in sympathy and containing good descriptive passages, established her reputation, became immediately popular and

secured for her a high position in fashionable and literary life. She had by this time removed from Dublin to London, and in 1812 was married to Sir Charles Morgan, an eminent physician. She also con¬ tributed English words to be set to Irish airs. In 1837 she received a civil list pension of £300 a year, the first woman author to be so re¬ warded. Her style was inflated and gushing; her vanity was inordinate ; but she drew many vivid characterizations of Irish character. Among her other works are novels 'O'Don-nelP ; (Florence McCarthy) ; and (The O'Briens and The 0'Flahertys) ; the 'Life and Times of Salvator Rosa) ; 'Woman and her Master5 ; and (Passages from my Autobiography.5 Con¬ sult Fitzpatrick, W. J., 'Lady Morgan5 (Lon¬ don 1860).

MORGAN, Tali Esen, American choral conductor: b. Llangynwyd, Wales, 28 Oct. 1858. He studied music and came (1876) to Scran¬ ton, Pa., and was publisher of the Cambro-American, Scranton, in 1879, also editing The People , the State prohibition organ for six years. He was associated (1887) with Walter Damrosch on musical work and later with Anton Seidl; conducting the Ocean Grove (N. J.) Festivals since 1888, becoming manager and conductor of the Ocean Grove Summer Music Festivals from 1898. He was next conductor of the New York Festival Chorus. He is editor and publisher of The American Musical Times and president of the International Correspond¬ ence School of Music, Asbury Park, N. J.

MORGAN, Thomas Hunt, American zool¬ ogist : b. Lexington, Ky., 25 Sept. 1866. He was graduated (1886) at the State College of Ken¬ tucky, took the degree Ph.D. (1890) at Johns Hopkins and became professor of biology at Bryn Mawr (1891-1904). In the latter year he was appointed professor of experimental zoology at Columbia University. He was given the degree LL.D. by Johns Hopkins in 1917. He has written 'The Development of the Frog's Egg) (1897) ; Regeneration5 (1901) ; Evolu¬ tion and Adaptation5 (1903) ; Experimental Zoology5 (1907) ; 'Heredity and Sex5 (1913) ; 'Critique of the Theory of Evolution5 (1916). Many monographs and papers of his have been published on biology and embryology, *etc.*

MORGAN, William, American Freemason, whose death was the immediate cause of the formation of the Anti-Masonic party: b. Cul¬ peper County, Va., about 1775 ; d possibly near Niagara in 1826. He fought in the defense of New Orleans in 1815; removed to York, Can¬ ada, in 1821, where he became a brewer, and whence soon after he moved to Batavia, N. Y. ; and in August 1826 disappeared soon after a

rumor had been spread that he was to reveal in a book the secrets of the Masonic Order. He was supposed to have been abducted by fellow-Masons and drowned in Lake Ontario, but his death was never proved. A corpse found near the mouth of Niagara River was stated to be his, and as such was claimed by his family, but disinterred and believed to be some one else. Much political capital was made of the alleged abduction and drowning and it was averred that Thurlow Weed, a leader in the anti-Masonic movement (see Anti-Masonry), cynically said that it was <(a good enough Morgan till after election,)} a remark that has become proverbial for campaign deceit. Morgan's book (Illustra¬ tions of Freemasonry, by One of the Fraternity Who Has Devoted Thirty Years to the Sub¬ ject (1826) roused much less excitement than the story of his death. This book under the title (Free Masonry Exposed and Explained) was reprinted in 1912. Consult Greene, (The Broken SeaP (1870); Morris, (History of the Morgan Affair* (1852); O'Reilly, (American Political Anti-Masonry) (1879).

MORGAN, Fort. See Fort Gaines and Fort Morgan.

MORGAN CITY, La., city, port of entry, in Saint Mary's Parish, on the Atchafalaya Bayou and on the Southern Pacific Railroad, about 70 miles west by south of New Orleans, and 20 miles from the Gulf of Mexico. Ihe place was formerly known as Brashear City. The Atchafalaya Bayou is navigable for steam¬ ers of light draught, and as it connects Grand Lake and the Gulf, Morgan City has steamer connections inland for some distance and with the principal Gulf ports. Considerable sugar¬ cane is cultivated in the country around Mor¬ gan City. The chief industrial interests are connected with the cultivation of sugarcane, rice and with market gardening, fish and oysters. It has Oneonta Park in which are botanical gardens and a fine zoological collec¬ tion. Water and sewage works are municipally owned. On 23 Tune 1863, a Confederate force of 3,000 soldiers under Richard Taylor captured the Federal garrison of about 1,000 soldiers. The Confederates secured property to amount to $2,000,000; but they soon abandoned the city, and the Federals again took possession. Pop.

5,477.

MORGANATIC MARRIAGE, a marriage between a prince or noble and

a woman of in¬ ferior rank in cases where a perfect marriage is not legal except with a woman of equal rank. The distinctive feature of the morganatic mar¬ riage is that the wife does not acquire the rank of the husband, and the children, legitimate though they are, do not inherit it: in some states they do not inherit either entailed estates or personalty. In Great Britain under the Royal Marriages Act (1772) such a marriage is invalid in public law. A morganatic marriage and a regular marriage cannot exist at the same time, so that the Church regards the morganatic marriage as a perfect one. The custom origi¬ nated in ancient German law, is prevalent among the princes and high nobility of that country and is also in force among the royal families of Europe.

MORGANFIELD, Ky., city, county-seat of Union County, on the Illinois Central Railroad,

about 30 miles southwest of Evansville, Ind.

It is in an agricultural region, in which tobacco is an important product. The principal in¬ dustrial establishments are tobacco factories. Hour-mills, carriage* factories, brick yards and lumber-mills. It is the seat of Saint Vincent's Academy (R. C.). The city owns and operates the waterworks. Pop. (1920) 2,651.

MORGAN'S RAID INTO INDIANA AND OPIIO. In the middle of June 1863 General Bragg ordered Gen. John H. Morgan, with 2,000 picked mounted infantry and four guns to move from Tennessee into Kentucky, break up the railroad upon which General Rosecrans depended for supplies, capture Louis¬ ville, destroy the public works and return to Tennessee as quickly as possible. Morgan de¬ termined to exceed his orders and make a raid north of the Ohio. On 2 July, with 2,460 men and four guns, he set out from Burkesville, crossed the Kentucky River in the face of Union troops guarding it, and marched north¬ ward, followed by all the Union detachments within immediate call. He passed through Co¬ lumbia, after a sharp skirmish with about 300 Wolford's Kentucky cavalry, in which he lost about 40 in killed and wounded, and on the 4th reached Green River at Tebb's Bend, and demanded the surrender of Col. O. H. Moore, who, with about 300 men of the 25th Michigan, was guarding the bridge at that point. Moore replied that the Fourth of July was not a good day to surrender, and was in¬ stantly attacked with artillery and musketry. After a hard fight of three hours, in which Moore had six killed and 23 wounded, Morgan was repulsed, with a loss of 36 killed and 46

wounded, and drew off, crossing the river below the bridge. On the 5th he defeated and cap¬ tured the small garrison of Lebanon and marched by Bardstown to Brandenburg, on the Ohio, where he arrived on the morning of the 8th, and seizing two steamboats began crossing his command. His passage was disputed by a gunboat and by militia with a field-piece on the Indiana shore, but by the morning of the 9th his whole command was in Indiana. Twenty-four hours later General Hobson, with 2,500 cavalry and mounted infantry and four guns, crossed the river in pursuit, and for 17 days hung upon Morgan's heels. Indiana and Ohio were aroused and turned out their militia by thousands. After crossing the Ohio, Morgan rode north through Corydon, where he was resisted by militia, who were soon overpowered. He then pushed on to Salem, where he captured nearly 400 militia, then through Lexington and Paris to Vernon, near which place on the even¬ ing of the 11th he encountered a stiff resistance from about 1,200 militia under Colonel Love. Under cover of darkness he withdrew from Love's front, and pressing on through Dupont and Sumansville, crossed the Indiana line on the 13th to Harrison, Ohio, and concentrated his command preparatory to making his way across the Ohio into Kentucky, detaching parties to burn bridges and confuse the pursuit, and im¬ pressing fresh horses. Under cover of a feint on Hamilton he marched by night a few miles north of Cincinnati, moving directly east, closely pursued next day by Hobson, who was marching 40 miles a day, and threatened from all di¬ rections by the militia. Turning toward Berlin,

where the government had a large number of animals, he was confronted by a small body of militia under Colonel Runkle, lost much precious time in threatening an attack, drew off closely followed by Runkle, and after dark of the 18th reached the banks of the Ohio, a short distance above Pomeroy, near Buffington Bar and Blennerhasset's Island, where from the first he had planned to escape. His pursuers were closing in on him from every direction. On the west Hobson was hanging on his rear; General Judah, who had been withdrawn from Kentucky, had landed his division at Ports¬ mouth,

and was marching up from the south¬ west ; regiments were coming down the river from Parkersburg; and gunboats patroled the river and watched the fords. Early in the morning of the 19th Morgan endeavored to cross the river, but was speedily checked. He was attacked in rear by the head of Hobson's column, Judah's cavalry struck him in flank and two gunboats opened upon his front. A severe engagement cost him about 120 killed and wounded, and more than 700 of his officers and men surrendered. Morgan with the re¬ mainder escaped up the river, where he at¬ tempted to cross to Belleville by swimming his horses. Three hundred men, under Colonel Johnson, had crossed when a gunboat stopped the remainder of the column, Morgan himself returning to the Ohio shore and with about 800 men retreating inland. He had lost all his aitillery and trains. He pressed on northeast through Athens and Washington, marching 35 miles a day, burning bridges behind him, with General Shackelford and 500 men close upon his rear and skirmishing with it. Near Saline-ville on the 26th Shackelford's advance cap¬ tured 250 men, and later in the day he was intercepted near New Lisbon and Beaver Creek, and surrendered with 364 officers and men. The Union loss in the campaign July 2-26 was 19 killed, 47 wounded and 8 missing. Consult 'Official Records* (Vol. XXIII) ; Duke, 'His¬ tory of Morgan's Cavalry* ; Senour, 'Morgan and His Captors) ; The Century Company's 'Battles and Leaders of the Civil War* (Vols. Ill and IV).

E. A. Carman.

MORGANTE MAGGIORE. The 'Morgante Maggiore) of Luigi Pulci (1432-84), begun in 1460 and completed in 1483, is the first of the great Italian humoresque poems dealing with the material of the Old French epic, with the adventures and adventurers of the court of Charlemagne, with chivalry and deeds of valor, with Saracens, witches and magic, with all that distinguishes men from cowards and loyalty from treachery in a world of strong arms and generous appetites, good humor and simple passions. It is a reworking of an earlier popular poem called the 'Or¬ lando, > with a few elements borrowed from another poem of the same cycle called the 'Spagna.* Pulci thus obtained the traditional schematic plot of the Italian chivalric tale: the struggle between the house of Clermont and the treacherous descendants of Ganelon, resulting in the slander of Orlando, his flight to the Orient, his adventurous battles with the Saracens, his return to Paris to raise the in¬ evitable siege by the Saracens, his reconciliation with Charlemagne and ultimate vengeance on

his enemies at court. Pulci is more faithful to the spirit and the substance of the Carolingian tale than either of his great successors, Boiardo or Ariosto, who utilized the more fantastic and sentimental legends of the Round Table to such an extent as wholly to transform the character of chivalric romance. The earnestness of the popular legend passed over directly into the 'Morgante,* to constitute the solid base for its pervasive humorism, on which the author then erects an original comic structure of his own, with not a few deliberately satiric elements. Neither Petrarchism nor classical models were strong enough in their influence on Pulci to alter or to vitiate this humorous attitude toward his subject. The reader willingly re¬ members three salient figures from the 'Morgante Maggiore) : that of the giant Morgante himself, whose size and corresponding appetite for food have a jolly time getting along in this world made for smaller people; that of the half-giant Margutte, liar, thief, glutton, blasphemer, and all-around rascal of perennial good-nature, the most popular personage in the rambling story; and finally that of the devil Astaroth, who treats learnedly on orthodox theology, and among whose many feats of magic the most famous and startling remains his discovery of a new Western world some years before the voyage of Columbus. Save in its best episodes, the 'Morgante* is no longer much read. Popular in its own day, it helped to fix the direction of the efforts of Boiardo and especially of Ariosto, who used the chivalric legends as vehicles for an art more personal and powerful than that of Pulci. There is an English translation by Roscoe.

Arthur Livingston.

MORGANTOWN, N. C., town, county-seat of Burke County, on the Southern Rail¬ road, about 80 miles west of Salisbury. In the vicinity are gold and silver deposits. It has lumber and cotton-mills, flour-mills, machine-shops and tanneries. It is the seat of the North Carolina School for the Deaf and Dumb and of the State Hospital for the Insane. It is a favorite health resort for people threatened with pulmonary diseases. Pop. 3,000.

MORGANTOWN, W. Va., city, county-seat of Monongalia County, near the northern boundary of the State, on the Monongahela River which is navigable throughout the year, and on the Baltimore and Ohio, the Monon¬ gahela River Railroad and the Morgantown and Kingwood Railroad, 100 miles south of Pittsburgh. Electric trolley lines with a city loop system reach all suburbs, in a region noted for extensive coal and oil fields, glass-sand de¬ posits and limestone quarries, with abundant water power used for electrical manufacturing purposes. Chief of the manufacturing indus¬ tries is the Sabraton plant of the

American Sheet and Tin Plate Company established in 1908, employing 900 people with a payroll of over $1,000,000 a year; 12 glassworks employ 2.500 hands with an annual payroll of $2,040,- 000; and there are important brickworks, while coal is obtained from 40 mines; all producing a large, export and local trade. Besides eight flourishing building and loan associations, Morgantown has six banks with an aggregate capital and surplus beyond $1,3503)00 and de-

posits of upward of $4,500,000. The city has gas and electric-light and power plants. Mor¬ gantown's greatest industry is the West Vir¬ ginia State University founded in 1868; its staff is about 200 people, its annual enrolment of regular students reaches 1,200, and of summer students in the agricultural schools 1.400. The library contains over 44,000 volumes. The university, in addition to the Morrell and Hatch funds appropriated by Congress, received from the State for 1919-20 appropriations of $1,250,- 000. Six commodious elementary and secondary schools and a high school furnish a perfect educational system. The leading religious denominations are represented by fine churches, including three for the colored population. Cheat River nearby is a summer resort of much scenic beauty and. residential suburbs include Westover, Sabraton, Star City, Riverside and Granville. The first settlement was made in 1766 by Nicholas Decker, soon followed by the Morgan family, from whom it takes its name. Morgantown was incorporated in 1828 and re¬ ceived a city charter in 1901. Pop. (1920, U. S. official) 12,117.

MORGARTEN, mor-gar'ten, Switzerland, a hill two miles west of Rothenthurm, on the margin of the lake of Egeri, on the confines of the canton of Zug, memorable as the scene of the battle of 15 Nov. 1315, in which a small body of Swiss mountaineers from Schwvtz, Uri and Unterwalden, ill armed and undis¬ ciplined, totally vanquished an Austrian army of 20,000 under the Archduke Leopold, sent by Frederick the Fair to avenge the seizure of the abbey of Einsiedeln the previous year. < This was the first victory achieved by the Swiss in their struggle for freedom.

MORGENSTERN, mor'genstern, Lina (Bauer), German writer and reformer: b. Bres¬ lau, 25 Nov. 1830; d. 1909. She did much social

work in Berlin after her marriage (1854) to Dr Theodor Morgenstern. She was leader of the woman's Verein (1860-66) in their farther¬ ing the cause of the Froebel Kindergarten, and (1866) she founded the Verein Berliner Volks-kuchen (public kitchens). In 1868 she staited the Kinderschiitzverein, for the protection of children; in 1869 she founded an institute for the training of young women in the useful arts; in 1873 the Berlin Hausfraruenverein (house¬ wives' league) for protection against extor¬ tionate prices and adulteration; it existed till 1883. In 1880 she established a woman's soci¬ ety for the rescue of immoral girls, placing them in schools to teach housework and farm¬ ing. She wrote (Das Paradies der Kindheit5 (Berlin 1865; 6th ed., Regensburg 1904); (Die Volkskiichen) (4th ed., Berlin 1882) ; (Der Beruf des Weibes5 (1869); (Die Frauen des 19 Jahrhunderts) (1888-91); <Hilfsbuch zur Grundung, Leitung und Kontrolle von Volkskiichen> (3d ed., 1900), besides several works on the systems of economical cooking. Since 1874 she published Deutsche Hausfrauen Zeitung and from 1888-94 a monthly publica¬ tion entitled Fur junge Madchen.

MORGENTHAU, mor'gen-thou, Henry, American lawyer, merchant and ambassador . b. Mannheim, Germany, 26 April 1856. He came (1865) to the United States and was educated at the New York public schools, studied at the

College of the City of New York and was graduated at Columbia Law School, receiving the degree of LL.B. He became partner in the law firm of Lachman, Morgenthau and Goldsmith, New York (1879-99), was president of the Central Realty Bond and Trust Company (1899-1905), and of Henry Morgenthau Com¬ pany (1905-13), dealers in realty. He was a director in the Underwood Typewriter Com¬ pany, American Metal Company, and Equitable Life Assurance Society, and president of the Herald Square Realty Company. As a Demo¬ crat he has taken a very active place in his party and was chairman of finance committee of the Democratic National Committee 1912, 1916-20. He was Ambassador to Turkey (1913-16) and at the outbreak of war took charge of the interests in Turkey of Great Britain, France, Italy, Russia, Belgium, Monte¬ negro, Serbia, etc., rendering invaluable as¬ sistance to these nations. He is president of the Free Synagogue, Bronx House (Settle¬ ment), and director of Mount. Sinai Hospital.

MORGHEN, Raffaello, raf-fa-el'lo mor¬ gen, Italian engraver: b. Florence, 19 June 1758; d. there, 8 April 1833. He received his early

instruction in his art from his father. Filippo, and his uncle, Giovanni Elia, and was afterward placed as a pupil under the cele¬ brated Volpato, whom he assisted in engraving the pictures of Raphael in the Vatican. The print which represents the miracle of Bolsena is inscribed with his name. He settled in Flor¬ ence about 1793 as professor of copper-plate engraving in the Academy of Art. Here the grand-duke employed him to engrave Leonardo da Vinci's <Last Supper, > which is painted on the wall of the refectory in the Dominican con¬ vent at Milan. This picture is faded and ef¬ faced, and the drawing which was made from • it for Morghen was by no means worthy of the original; so that, though the engraver has given to the world an admirable print, he has failed in giving a correct idea of the work of Leonardo. In 1803 he was chosen an associate of the French Institute; and in 1812 was in¬ vited to Paris by Napoleon, who treated him with flattering kindness. Among the most re¬ markable of the other numerous works of Morghen may be noticed the 'Transfiguration5 from Raphael; a 'Magdalen5 from Murillo; a (Head of the Savior5 from Da Vinci; the (Car of Aurora5 from Guido; the 'Hours5 from Poussin; the (Prize of Diana5 from Domeni-chino; the (Monument of Clement XIII5 from Canova; 'Theseus vanquishing the Minotaur5; portraits of Dante, Petrarch, Ariosto, Tasso, *etc.*

MORGIANA, mor-gi-a'na, a female slave figuring in "Ali Baba and the Forty Thieves,55 a story in the 'Arabian Nights Entertainment5 (q.v.).

MORGUE, morg (Old French, to look at solemnly), a place or building in large cities where the bodies of unknown persons who have perished by accident, murder or suicide are ex¬ posed, that they may be recognized by their friends. If not claimed within a certain period they are either buried or given over to medical institutions for dissection purposes. The name arose from the building in Paris, dating from the 5th century, devoted to this purpose.

mOrike

MORI, Arinori, mo’re a-re-no’re, Japanese statesman: b. Satsuma, 1848; d. 11 Feb. 1889. He was educated in England ; as charged’affaires in Washington arranged the postal con¬ vention between Japan and the United States; served as plenipotentiary in Peking and in London; and was Minister of Education from 1885 to his death. He was an extremely cul¬ tured man, with progressive educational ideas. On the day of the proclamation of the Japanese Constitution he was assassinated by a Shinto fanatic for violating a shrine at Ise by lifting the curtain with his walking stick.

MORIAH, mo-ri’a, Palestine, the hill on which the temple of Jerusalem was built (2 Chron. iii, 1), and by many authorities believed to be the mount on which Abraham was com¬ manded to sacrifice his son Isaac (Gen. xxii, 2).

MORICE, Adrian Gabriel, Canadian clergy¬ man, ethnologist and author : b. Saint Mars-sur-Colmont, Mayenne, France, 27 Aug. 1859. He was educated at Oisseau, Sion and Autun, France, joined the Oblate Order in 1877 and three years later was sent to British Columbia. In 1882 he was ordained to the priesthood, and for the following three years labored as mis¬ sionary to the Chilcotin Indians at William’s Lake. From 1882 to 1906 he was stationed at Stuart’s Lake, B. C. , was then transferred suc¬ cessively to Kamloops 1906, Saint Boniface 1908, Winnipeg 1909, Duck Lake, Sask., 1910, and Winnipeg 1911. Since 1911 he has been lecturer in anthropology at the University of Saskatchewan. During his missionary career he mastered a number of Indiaft languages and compiled dictionaries and grammars of Chil¬ cotin, Sekanais and Nahanais. He invented the Dene Syllabary and printed books in that lan¬ guage. He made maps during his wanderings up and down British Columbia. For one of these the Geographical Society of Pans awarded him a silver medal and another map was published by the provincial government. He is a member of the American Anthropo¬ logical Association, the Historical Society of Saint Boniface, the Ethnological Committee of the British Association for the Advancement of Science, corresponding member of the Cana¬ dian Institute, the Geographical Society of Quebec and of many others in Canada and abroad. He is the author of (Au pays de l’ours noir) (1897) ; (History of the Northern Inte¬ rior of British Columbia*. (1904 et seq.) ; (Aux sources de l’histoire manitobaine) (1907) ; (Dictionnaire historique des Canadiens et des Metis frangais de l’Ouest* (1908) ; his¬ tory of the Catholic Church in Western Can¬ adaˆ (2 vols., 1910). He collaborated in Encyclopaedia of Religion and Ethics> and in (The Catholic Encyclopedia.*

MORICHI, a palm. See Murichi.

MORIER, mo'ri-er, James Justinian, Eng¬ lish diplomatist, traveler and novelist: b. Smyrna, about 1780; d. Brighton, March 1849. He was educated at Harrow, England, and en¬ tered (1807) the Persian diplomatic service and returned (1809) to England via Turkey, making a journey that became celebrated and a description of which he published under the title of (A Journey through Persia, Armenia and Asia Minor to Constantinople in the

years 1808 and 1809* (1812). Returning

(1810) to Teheran as secretary of legation he made his journey (1815) back to Europe through Asia Minor and published another book entitled (A Second Journey through Persia* (1818). After a trip to Mexico he settled in England and devoted himself to a literary life. Among his works are the Oriental novels (Hajji Baba of Ispahan> (1824; new ed., 1914), perhaps his best work; (The Mirza* (1842) ; (Zohrab the Hostage* (1832) ; (Ayesha, the Maid of Kars* (1834).

MORIER, Sir Robert Burnett David, Eng¬ lish diplomatist: b. Paris, 1826; d. Montreux, 16 Nov. 1893. He was graduated (1849) at Balliol College, Oxford, entered (1851) the diplomatic service and served as attache at the embassies of Vienna and Berlin. In 1865 he was ap¬ pointed secretary of the embassy at Athens, then at Frankfort, becoming (1871) charged'affaires at Stuttgart, and (1872) at Munich. In 1876 he was made English Minister at Lis¬ bon, and at Madrid 1881-84, was appointed Ambassador at Saint Petersburg, 1884-93. In 1888 he was in a bitter conflict with Count Herbert Bismarck, who accused him of fur¬ nishing Marshal Bazaine with information as to the German advance over the Moselle at the outbreak of the Franco-Prussian War. Later it was proven that spies of the French govern¬ ment had obtained the information from other sources and that Bismarck's dislike was really caused through his knowledge of the diplomat's brilliant work. He was created K.C.B. (1882), privy councillor (1885), G.C.B. (1887), D.C.L. Oxford (1889).

MORIKE, me'ri-ke, Eduard, German lyric

poet and short-story writer : b. Ludwigsburg, Wiirttemberg, 8 Sept. 1804; d. Stuttgart, 4 June 1875. His father was Kreis Medical Councillor Karl Friedrich Morike, d. 1817; his mother Charlotte, nee Bayer. He attended the Latin school at Ludwigsburg, the seminary at Urach (1818), where he made the acquaintance of Wilhelm Hartlaub and Wilhelm Waiblinger; and the divinity school at Tubingen where

he came into contact with Ludwig Bauer, David Friedrich Strauss and F. T. Vischer. After completing his studies at these theological in¬ stitutions, he spent the greater part of his life as a country pastor in various parts of Wiirttemberg. His longest incumbency was at Cleversulzbach (1834-43), where he associated with Justinus Kerner, Hermann Kurz, Uhland and Karl Mayer. From 1851 to 1866 he taught literature at the Stuttgart Katharinenstift, re¬ ceiving the title of professor in 1856. His first literary work was the short novel of artist life, (Maler Nolten,* which passed through many revisions and was printed in its final form after his death (1877). His shorter stories are more finished artistically, especially (Mozart auf der Reise nach Prag* (Stuttgart 1856). As a lyricist, no other Suabian poet attains his simple yet perfect form. His ob¬ servations of life and of nature are realistic, and his depth of feeling sometimes approaches Goethe's. Some of his poems have even be¬ come favorites among the people, especially the ballad (Schon Rotraut,* opening with the line: (Wie heisst Konig Ringangs Tochterlein?*

Jacob Wittmer Hartmann.

MORILLO, mo-rel'yo, Pablo, Spanish gen-cral : b. Fuente de Malva, Spain, 1777 ; d. Mad¬ rid, Spain, 27 July 1838. He enlisted in the navy in 1797 and was engaged at Trafalgar in 1805; but when the French invaded Spain he left the navy to enter the army and rose to the rank of major-general in 1814. In 1815 he was sent to South America to subdue the revolu¬ tion in Venezuela and Colombia, and after varying fortunes, during which he made for himself a name as a cruel and tyrannous gen¬ eral, perceiving defeat to be inevitable, he asked to be relieved but was compelled to sign a truce with the victorious Bolivar before sail¬ ing for Spain. He was appointed to com¬ mand the garrison at Madrid, and in 1822 be¬ came captain-general of Galicia, which he sur¬ rendered to the French. He retired in disgrace to Rochefort, France, but returned to Spain in 1832 and led an army against the Carlists. Dur¬ ing his exile in France he published his <Memoires) (1826).

MORIN, mo-rah, Arthur Jules, French mathematician and engineer: b. Paris, 19 Oct. 1795; d. there, 7 Dec. 1880. He was educated at the Ecole Polytechnique in Paris and at the ficole d' Application at Metz, and was for a time professor of mechanics in the latter insti¬ tution. In 1819 he became lieutenant in a bat¬ talion of engineers and later accepted a profes¬ sorship at the Conservatoire des Arts et Metiers in Paris of which he became director in 1847. He held the rank of general in the army and was a member of various military boards, and his researches and inventions were of great scientific value. He published (Aide-memoire de mecamique pratique) (1838) ; (Salubrite des habitations) (1868), *etc.*

MORIOKA, mo-re-o'ka, Japan, a town in the island of Hondo, 40 miles from the coast, and 339 miles by rail with Tokio. It is the capital of the prefecture of Iwate, in the north¬ erly province of Rikuchu, has manufactures of silk, copper and other ware, and is celebrated for its fine fruits and vegetables (many of these of American origin) and preserves. Mount Iwate (6,800 feet) is in the vicinitv. Pop.

36,012.

MORISCOS, mo-re'skos, Spanish term ap¬ plied to those Moors who accepted Christianity. After the fall of Granada (1492) many of the Moors returned to Africa. But most remained in Spain, permitted under pretense of conver¬ sion to Christianity and lived, under the name of Moriscos, as industrious, peaceful inhabitants, till they were driven to revolt by the cruel persecutions under Philip II (1568-70) and over 100,000 of them were exiled; the few remain¬ ing being now found in the mountains of Gran¬ ada after Philip III (1609) deported another 500,000. Consult Rochau, (Die Moriscos in Spanien) (Leipzig 1853) ; Boronaty y Barra-china, (Los moriscos espanoles y su expulsion* (Valencia 1901) ; Lea, (The Moriscos of Spain* (Philadelphia 1901).

MORISON, George Shattuck, American civil engineer: b. Bedford, Mass., 19 Dec. 1842; d. New York, 1 July 1903. He was graduated from Harvard in 1863, and was admitted to the bar of New York in 1865. In 1867-73 he was engaged in engineering in Kansas, Michigan and Indiana, and then returned to New York,

which he thereafter made his headquarters. He was an expert on

railroad conditions and be¬ came famous as a bridge builder; constructing five bridges across the Missouri and 10 over the Mississippi, the greatest of these being the bridge at Memphis, Tenn., which has a single truss span of 790 feet. He was a member of the Isthmus Canal Commission (1898).

MORISON, James Augustus Cotter, Eng¬ lish biographer and essayist: b. London, 1832; d. 26 Feb. 1888. He was graduated at Oxford in 1859, was a Positivist in philosophy, was one of the most brilliant contributors to the Satur¬ day Review and one of the founders of the Fortnightly Review. He wrote (Life and Times of Saint Bernard) (3d ed.. 1877) ; brief biographies of Gibbon, Macaulay and Madame de Maintenon ; (The Service of Man: An Essay toward the Religion of the Future) (2d ed., 1887), which he regarded as his best work. His knowledge of French literature and history was profound.

MORISON, Robert, Scottish botanist: b. Aberdeen, Scotland, 1620; d. London, 10 Nov. 1683. He was graduated from the University of Aberdeen in 1638 but having borne arms as a Royalist in the Civil War, was obliged to take refuge in France when the cause of Parlia¬ ment triumphed, and took the degree of doctor at Angers in 1648. From 1650 to 1660 he was superintendent of the garden formed at Blois by Gaston, Duke of Orleans. After the Res¬ toration he was appointed by Charles II one of his physicians and botanist royal, and in 1669 became professor of botany at Oxford. His strong point as a botanist was in classification. His chief work is (Oxford University History of Plants) (1680). Consult Pulteney, (Sketches of the Progress of Botany * (1790) ; Sachs,

(History of Botany) (1906) ; Tournefort, Ele¬ ments de Botanique> (1797).

MORISONIANS. See Evangelical Union.

MORISOT, mo’re-so, Berthe (Madame Eugene Manet), French painter: b. 1840; d. 1895. As great-granddaughter of Fragonard she inherited from this great French painter his gracefulness, his spirited elegance and other fascinating qualities. Her natural talents she placed under the influence of Corot, Renoir, Degas and Manet. Having married Eugene Manet, brother of the great painter, she ex¬ hibited with the ˆImpressionists,** but always signed her pictures Berthe Morisot, delicately respecting Manet’s great name. She acquired her own reputation by distinguished and beau¬ tiful coloring and dash. She was as much ad¬ mired for her beauty as for her talent. A French critic sums up her qualities as follows: <(A11 her work is bathed in

brightness, in azure, in sunlight; it is a woman's work, but it has a strength, a freedom of touch and an origi¬ nality, which one would hardly have expected. Her watercolors, particularly, belong to a superior art: some notes of color suffice to indicate sky, sea or a forest background and everything shows a sure and masterly fancy, for which our time can furnish no analogy. A series of Berthe Morisot's pictures looks like a veritable bouquet, whose brilliancy is less due to the color-schemes which are compara¬ tively soft (gray and blue) than to the absolute correctness of the values. A hundred canvases

and perhaps 300 watercolors attest this talent of high mark. Normandy coasts, scenes with pearly skies and turquoise horizons, radiant gardens of Nice, fruit-laden orchards, girls in white dresses, with big hats wreathed in flow¬ ers, young women in ball-dresses and flowers are the favorite themes of this artist.®

MORITZ, mo'rits, Karl Philipp, German author: b. Hameln, 15 Sept. 1756; d. Berlin, 26 July 1793. He was born of poor parents and became one of the most extraordinary figures in the Sturm und Drang (Storm and Stress) period. After distressful attempts to gain a living he caught the attention of a patron in Hanover and entered the gymnasium to reach quick promotion, but soon accepted an engagement as actor under Ekhof at Gotha, failing in which he returned to study (1776) at Erfurt; but tiring again he joined the Herrnhuter (Moravians) at Barby, and studied theology at Wittenberg (1777) ; then taught philanthropy at the Potsdam military orphan¬ age, soon again to take to wandering. Teach¬ ing in Berlin, he made a reputation as writer, preacher and poet, and went to England ; then became professor at the Kolnisches Gymna¬ sium; next tried editing the Vossische Zeitung to make it proletarian, but failed. Later, he traveled to Italy (1786) where he met Goethe, who made a favorable influence on his mind, and on his return to Germany he took up residence as Goethe's guest at Weimar. Duke Karl August aided him to a membership in the Berlin Academy of Sciences and he be¬ came (1789) professor of antiquities at the Berlin Academy of Art. He wrote

much of his life's vicissitudes into his works, notably,

(Anton Reiser) (Berlin 1785-90), an autobi¬ ographical novel; (Andreas HartkopP (ib. 1786), also contains other elements from his life. Other important works are (Versuch einer deutschen Prosodie) (Berlin 1786; later ed., 1815) ; (Ueber die bildende Nachahmung des Schonen) (Brunswick 1788; Heilbronn 1888) <Gotterlehre) (Berlin 1791 10th ed., 1851) ; (Reisen eines Deutschen in England* (ib. 1783) ; (Reisen eines Deutschen in Italien) (ib. 1792-93). Consult Dessoir, (Karl Philipp Moritz als Aesthetiker* (Berlin 1889) ; Eibisch, Hugo, (Anton Reisers kritische Autobiog¬ raphy (Leipzig 1909).

MORLAIX, mor-la, France, capital of an arrondissement in the department of Finistere, picturesquely situated on two hills on the river Dossen, rendered navigable to the town. It is the junction of the West Railway and has two churches dating from the 15th and the 16th centuries, besides ancient wooden houses, a commercial court of justice, chambers of commerce and of agriculture, a college, theatre, museum, hydrographic school, *etc.* Its indus¬ tries consist of a tobacco factory, hardware, leather and candle factories, besides import trade in coffee, lumber, stearic acid, fertilizers, wine, brandy, petroleum. It has also an export trade in butter, grain, cattle, eggs, vegetables, fish, *etc.* In 1911 its population was 15,262. It is the birthplace of the generals Moreau and Souvestres.

MORLAND, mor'land, George, English painter: b. London, 26 June 1763; d. there, 29 Oct. 1804. His father, himself a painter, gave

the boy a severe early training in art, and his proficiency was such that his productions found ready purchasers, while at 10 he exhibited in the Royal Academy and became famous as a copyist of Dutch interiors. Soon after he re¬ belled against the strict discipline of his father's house, and entered upon a career of dissipa¬ tion, in the company of stable-boys, money lenders, pimps and pugilists, supporting himself, meanwhile, by the pictures which he painted with amazing facility. So great was his pro¬ ductivity, that he was able to paint one or two pictures daily, and on one occasion completed a large landscape containing six figures, in six hours. The demand for his work was so great that dealers would take them before the oils had dried. In 1786 he took up his residence at Kensal Green, where he changed his mode of life and married the sister of James Ward, the animal painter, and William Ward, the en¬ graver. Here he worked hard, and the moral subjects, after the manner of Hogarth, which he

favored at this period, were engraved and became very popular. Soon again, however, he drifted back into his old habits, and, as his pictures were eagerly sought by the dealers, he was able for some time to carry on his reckless career. He had to make many changes of residence to avoid his creditors ; and at length, in 1799, he was arrested for debt, but ((obtained the rules of the Bench,® took a house within the bounds and continued to practise his art up to his release in 1802. In his later days he suffered from a palsied hand. Under arrest for debt, he died in a sponging-house. His epitaph for himself was, <(Here lies a drunken dog.® The art of Morland is char¬ acterized by a picturesque representation of rural life in its homelier aspects, his rustic story being always happily conceived and skil¬ fully told. He is one of the first genre and animal painters of the English school, and his reputation has increased of recent years. He painted about 4,000 pictures, 192 of which were engraved during his lifetime. Six of his best paintings are in _ the Kensington Museum, and the (Farmhouse Stable) in the National Gallery is sometimes considered his master¬ piece. The New York Historical Society pos¬ sesses his (01d English Sportsman* and (Dogs Fighting) ; 'the Metropolitan Museum the (Mid¬ day Meal* and (Weary Wayfarers> and the Corcoran Gallery, Washington, (The Farm¬ house.* Consult Collins, W., (Memoirs for Picture) (1803) ; and memoirs or biographies by Dawe (1807) ; Gilbert and Cuming (1907) ; Richardson, Ralph (1895) ; Williamson, G. C. (1904) and Wilson, D. H. (1907).

MORLAND, Sir Samuel, English inventor and diplomat: b. Sulhampstead-Bannister, Berks, 1625 ; d. Hammersmith, 30 Dec. 1695. He studied at Winchester School and. at Magdalen College, Cambridge ; was a tutor at Cambridge in Pepys' day; and about 1650, devoted himself to diplomacy. Cromwell sent him to Sweden in 1653; and in 1655 to the Duke of Savoy, to pro¬ test against the persecution of the Waldensians, in whose history he became deeply but none too intelligently interested, his history of the Evangelical Churches of the Valley of Piedmont* (1658), relying as it did to some extent on documents that were forgeries, being absolutely misinformed and unreliable. He was

close in the secrets of Cromwell, and upon learning of Sir Richard Willis' plot against l harles revealed it to that prince. He then became privy to Charles' schemes, and was re¬ warded after the Restoration with a baronetcy. He then withdrew from public life, devoted himself to mechanical experiments, was one of the first to demonstrate the utility of steam power for propulsive purposes, improved the fire-pump or fire-engine, the lineal predecessor of the steam-engine, and invented a speaking trumpet. He wrote on cryptography, mathe¬ matics and mechanics.

MORLEY, mor'li, Edward Williams,

American chemist: b. Newark, N. J., 1838. He was graduated from Williams College, Williamstown, Mass., in 1869. He was elected to the chair of chemistry in Western Reserve Col¬ lege, Hudson, Ohio, (later Adelbert College, Cleveland), in 1869 and became professor emeritus in 1906. He was also professor of chemistry at Cleveland Medical College in 1873-88 and he has been connected with various scientific societies. He retired in 1906 and re¬ moved to West Hartford, Conn. He is the in¬ ventor of an 'improved apparatus for gas analysis and has published (Atomic Weight of Oxygen > (1895). Some of his scientific papers relate to atomic weight of oxygen; densities of oxygen and of hydrogen ; variations in the amount of oxygen in the air; vapor density of mercury from 0° to 100° ; analyses of igneous rocks.

MORLEY, Frank, American mathemati¬ cian : b. Woodbridge, England, 9 Sept. 1860. He studied at Kings College, Cambridge, obtaining (1898) the degree of Sc.D. He was master of Bath College, England (1884-87), becoming (1887-88) instructor, then (1888-1900) pro¬ fessor of pure mathematics at Haverford Col¬ lege, Pennsylvania. He has been, since 1900, professor of mathematics at Johns Hopkins. He was editor of the American Journal of Mathematics, and wrote (Introduction to the Theory of Analytic Functions) (1898). In collaboration with Prof. James Harkness, he wrote (Elementary Treatise on the Theory of Functions) (1893).

MORLEY, Henry, English author: b. Hat¬ ton Garden, London, 15 Sept. 1822; d. Carisbrooke, Isle of Wight, 14 May 1894. Educated at King's College (London), he practised med¬ icine in Somerset and Shropshire; taught at Manchester and Liverpool ; was editorially con¬ nected with Dickens' periodicals, Household Words and All the Year Round ; was for a time editor-in-chief of the Examiner ; and in 1865 was appointed professor of English litera¬ ture in University College,

London. In 1878 he received a similar chair at Queen's College, London ; and in 1882-90 was principal of Uni¬ versity Hall, London. As a popular lecturer on literature he was much in demand. He edited (Morley's Universal Library) (1883-88); Cas¬ sell's National Library* (1886-90) ; and the (Carisbrooke Library* (1889-91) ; published biographies of Palissy (1852), Jerome Cardan (1854) and Cornelius Agrippa* (1856) ; and wrote (English Writers * (1887 et seq.) ; a

smaller work on the same subject, (First Sketch of English Literature) (1873), a much-used manual and * Early Papers and Some Memoirs >

(1891). He was an enthusiast in the popu¬ larising of good literature. Consult the (Life) by Solly (1898).

MORLEY OF BLACKBURN, Viscount (John Morley), English author and statesman: b. Blackburn, Lancashire, 24 Dec. 1838. His father, a surgeon of good professional repute, was a Yorkshireman, and his mother a North¬ umbrian. He was straitly reared : ((the rigors of Sabbatical observance forced on us a literary diet that neither enlightened the head nor melted heart and temper.® His early education was obtained at an Independent school in his native town, from which he went to University College School, London, where Joseph Cham¬ berlain had preceded him, and then to Chelten¬ ham College; there he won a scholarship at Lincoln College, Oxford, where he lodged in the rooms at one time occupied by John Wesley, the founder of Methodism. It had been in¬ tended that in due course he should take orders in the Church of England; but his life at Oxford had shaken his foundations. Although never formally a Positivist, he was profoundly influenced by the teachings of Comte; and in political economy he became a disciple of John Stuart Mill, and imbibed the ((pure milk of the Millite ward® from the master himself. After graduation (1869) he embarked on a journal¬ istic career, and in 1873 he was called to the bar of Lincoln's Inn, of which he was elected a bencher in 1891. He was on the staff of the Saturday Reviezv and afterward edited the Literary Review (later the Parthenon) . He suc¬ ceeded George Henry Lewes as editor of the Fortnightly Review in 1867, and during his reign, which terminated in 1882, , the magazine became noted, not only for its high literary standards, but for the diffusion of radical ideas in things temporal, and in things spiritual for its pro¬ nouncedly aggressive agnosticism. His contrib¬ utors included the most illustrious names in the letters and controversies of the time. Mor¬ ley also became reader for the publishing house of MacMillan, and edited the English Man of Letters)

series. In 1880 he became editor of the Pall Mall Gazette; and in that capacity be¬ gan his long association with the Irish Home Rule cause, which throughout has been his chief political preoccupation; and he opposed the policy of coercion in Ireland which at this period found favor with the Liberal leaders. Morley had before this made two unsuccessful attempts to enter Parliament : in 1869 for Black¬ burn ; and in 1880 for Westminster; and in 1873 had begun the friendship with Joseph Chamberlain which was to endure through life and the political identification with him which was finally to break in 1886. In 1883 he was returned for Newcastle-on-Tyne at a by-elec¬ tion, and his connection with journalism ter¬ minated. After the conversion of the Liberal party to Home Rule he accepted the post of Chief Secretary for Ireland on the formation of the brief Gladstone Ministry of 1886 — an ap¬ pointment that was acceptable to the Irish Na¬ tionalists, because, unlike his leader and the ma¬ jority of his colleagues, he had no political ((past» to wipe out; and he became the trusted intermediary in the difficult and delicate nego¬ tiations between the Irish members and the Cab¬ inet leading up to the introduction of the first and second Home Rule Bills. After the defeat

of the measure of 1886 he, with the exception of Gladstone, came to occupy the chief place in the task of converting the English people to yield to the Nationalist claims. He again ac¬ cepted the post of Chief Secretary in the Glad¬ stone and Rosebery cabinets (1893—95) ; and on him fell to a large extent the task of adjusting and of piloting the Home Rule Bill of 1892 through the House of Commons. At the gen¬ eral election of 1895 he was defeated in the con¬ test at Newcastle-on-Tyne — largely because of his refusal to vote for a statutory eight-hour day for miners; and in the following year he was elected for the Montrose Burghs — a seat he held until his elevation to the peerage in 1908. Between 1899 and 1903 he was half with¬ drawn from politics while engaged in the colos¬ sal task of writing the <Life) of Gladstone; but he condemned the diplomacy that had led up to the South African War and was proBoer in his sympathies. From 1905 to 1910 he was Secretary for India in the Campbell-Bannerman and

Asquith cabinets, his tenure being note¬ worthy for reforms in administration and the introduction of Indians into the Councils of India; and throughout his term his relations with the governor-general, Lord Minto, were markedly cordial. After his resignation in 1910, he accepted the lighter post of Lord President of the Council, which he continued to hold un¬ til his retirement from public life on the out¬ break of the Great War in August 1914, with the participation in which by Great Britain he was out of sympathy. Morley held for 30 years a conspicuous place in British public life; but, as was to be expected from his training and earlier work, he never became a great Parlia¬ mentary debater. But the transparent honesty of conviction which had earned for him the sobriquet of ((Honest John,® the absence of overstatement and of superlatives, the profound thought and fine literary texture which marked his speeches, ensured for his utterances full reports, and they had considerable educative effect on the country. His tenure of the crucial Irish office — the most wearing and thankless of all posts and the grave of many reputations — was rendered only less difficult because he was in sympathy with Irish aspirations ; and he was an undoubted success at the India office, where failure might have been anticipated. But his place in public life is secondary to his rank as an author. His writings include essays, studies of the French encyclopedists and politi¬ cal biography, and they bear the stamp of a rich, full, matured and balanced mind, which illuminates everything it touches. His works include (Edmund Burke) (1867); (Critical Miscellanies) (1871, 1877) ; <Voltaire> (1871); (The Struggle for National Education) (1873) ; (Rousseau) (1874) ; (On Compromise> (1874) ;

(Diderot and the Encyclopedists > (1878) ;

(Burke> (1879); (Studies in Literature) (1891);

(Oliver Cromwell5 (1900); and the standard and definitive <Lives) of Cobden (1881), and of Gladstone (1903) ; the last named one of the greatest biographies in the English language. His latest work, { Recollections } (2 vols., 1917), covers his entire life. While not abating one jot from his characteristic views the volumes are written in a large and gracious spirit, and contain many intimate and delightful sketches of the most distinguished figures in letters and public life of his time.

Many nonors have come to him. He has been a trustee of the British Museum since 1894; was elected (in succession to Lord Acton) an

honorary Fellow of All Souls, Oxford, in 1902; was one of the first recipients of the Order of Merit founded by King Edward VII in 1902; has been the chancellor of Manchester University since 1908; and holds numerous honorary degrees. He visited the United States in 1868 and 1904, on the last occasion as the guest of Mr. Andrew Carnegie; on the death of Lord Acton, Mr. Carnegie bought and presented his valuable library to Mr. Morley (1902), who in turn gifted it to Cambridge University; and in 1909 Mr. Carnegie gave Manchester Univer¬ sity $50,000 to establish a chemical laboratory to be named after his friend. Consult Cecil, (Six Oxford Thinkers> (London 1909).

MORLEY, Margaret Warner, American

educator and author: b. Montrose, Iowa, 17 Feb. 1858. She was graduated from the Normal Col¬ lege of New York in 1878 and has since taught in the Oswego Normal School and in the normal school at Milwaukee, Wis. She was for a time engaged in Armour Institute as teacher of biology. She has published (A Song of Life) (1891); (The Bee People) (1899);

(Wasps and Their Ways' (1901) ; (The Insect Talk) (1903); ˆButterflies-and Bees> (1905); (Grasshopper Land) (1907) ; (Donkey John of the Toy Valley5 (1909); (The Apple-Tree Sprite5 (1915) ; and other works intended to familiarize young people with science.

MORLEY, Samuel, English philanthropist: b. Homerton, England, 15 Oct. 1809; d. near Tunbridge, Kent, England, 5 Sept. 1886. He en¬ gaged in hosiery manufacture in Nottingham and amassed a large fortune, which he used in philanthropic enterprises. He represented Bris¬ tol in Parliament in 1868-85 and upon his retire¬ ment was offered a peerage which he declined. In Parliament he supported various religious and social reforms and was opposed to capital punishment. He was one of the chief proprie¬ tors of the London Daily News, and was in¬ strumental in reducing its price to one penny.

MORLEY, Thomas, English composer: b. 1557; d. London, about 1664. He may have been trained as a choir boy in Saint Paul's; was a pupil of Byrd; studied music at Oxford; from

1591 to 1592 was organist of Saint Paul's; in

1592 was appointed gentleman of the Chapel Royal and in 1598 he was given the exclusive right of printing books of music and selling-ruled paper. He is best known by his (Booke of Aires5 (1600), which

contains the page's song in Shakespeare's (As You Like It5 ((It was a Lover and his Lass5), with the original music. Modey's (Plaine and Easie Introduc¬ tion to Practicall Musicke5 (1597), in dialogue form, is the earliest regular trea'tise on music published in England.

MORLEY, England, municipal borough in West Riding, Yorkshire, between Leeds and Dewsbury. It has two Gothic Anglican churches as well as others of different denominations, a very modern town-hall and a park. Its import¬ ant industries are woolen goods, textile machin¬ ery, coal mining, stone quarrying, *etc.* Domes¬ day Book mentions Morley. The borough was incorporated in 1885. The population in 1911

JOHN MORLEY

■ > '. .. .

k < *•. , . % . 1 A

»V T - -■ JV

•“ ..b

■

*

MORMON CRICKETS — MORMONS

463

waf 24,282. Consult Smith, (Morely and Modern > (London 1886).

Ancient

MORMON CRICKETS, Western names tor two species of longhorned, wingless, mi¬ gratory (Anabrus simplex , and A. purpuras-c-eni\' which are especially destructive at times in .Montana and Idaho. See Grasshoppers.

MORMONS, a popular pseudonym for The Church of Jesus Christ of Latter-Day Saints, a religious body founded bv Joseph Smith (see Smith, Joseph) at Fayette, N. Y., 6 April 1830. Only six persons took part in the formal organ¬ ization of the Church as a body corporate, such being the minimum requisite under the laws of the State, but the entire number of adherents at the beginning comprised only a few more. The founder averred that in 1823 he was visited by an angel, who revealed to him the repository of certain records, engraved on plates of gold, buried on the side of a hill near Palmyra, N. Y., and said by the angel to contain the his¬ tory of the aboriginal peoples of the Western Continent. In 1827 these plates were delivered by the angel into the custody of Joseph Smith, with the assurance that through divine assist¬ ance he would be enabled to translate the rec¬ ords, to which labor he was specially appointed. With the plates were two stones set in bows of silver, and these, according to the angel's state¬ ment, were the Urim and Thummim, the power to use which constituted the special attribute of the seers of ancient days. Smith avowed that by the aid of these instruments under the inspiration of God he was able to read the an¬ cient inscriptions, which consisted of characters said in the body of the record to be Reformed Egyptian and to dictate an exact rendering thereof in the modern tongue. In 1830 he pub¬ lished an F;nglish translation of the plates under the title (The Book of Mormon, y and the work has been distributed by millions of copies through later editions in English and in numer¬ ous foreign languages. In every copy appear as separate affidavits the "Testimony of Three Witnesses® and the <(Testimony of Eight Wit¬ nesses,® in which the signers solemnly affirm their personal knowledge as to the plates, the engravings thereon and the genuineness of the translation; and it stands as a remarkable fact that although most of these witnesses aposta¬ tized from the Church, or were excommuni¬ cated, and though they developed bitter animos¬ ity against Joseph Smith, everyone of them stoutly maintained, even unto death, the truth of his testimony concerning the (Book of Mor¬ mon. } The book sets forth that in the first year of the reign of Zedekiah, king of Judah, 600 b.c., an Israelitish prophet named Lehi, to¬ gether with his family and parts of other fam¬ ilies, migrated from Palestine to America under divine direction. In the New World the colony multiplied rapidly; but in course of time the people were rent by dissension and formed two

opposing nations, known in the record as Ne¬ phites and Lamanites. The former, named after their first chief, Nephi, a younger son of Lehi, cultivated the arts of civilization, built cities in South, Central and North America, and through succession of duly appointed recorders kept a history of their doings. This historical record as later abridged in part and summarized by Mormon, one of their prophets, is the original of the (Book of Mormon. } The Lamanites,

named after Lehi's eldest and rebellious son, Laman, led a nomadic life, neglected agricul¬ ture and productive industry and relied for sub¬ sistence upon war and the chase. They came under the predicted curse of darkness, specifi¬ cally marked by a ruddy skin, and their degen¬ erate posterity are the American Indians. The enmity of the Lamanites toward the Nephites culminated in the utter extermination of the latter at about the close of the 4th century, the final struggle being waged in the region now known as northern New York and near the Hill Cumorah, in which the Nephite records were in modern time disclosed to Joseph Smith. The Book of Mormon story, therefore, is seen to cover a period of approximately a thousand years. The Nephites were observers of the Law of Moses, a copy of which together with other Old Testament Scriptures had been brought by Lehi and his colony from Jerusalem. The birth, earthly ministry, death and resurrec¬ tion of Jesus Christ were predicted by Nephite prophets; and the (Book of AIormon) contains the record of the personal visitation of the res¬ urrected Christ to these ((sheep® other than of the Jewish fold, soon after the Lord's ascen¬ sion from Olivet. Among them the Christ es¬ tablished His Church, prescribing the same or¬ dinances, such as baptism by water and of the Spirit, the sacrament of bread and wine, etc., as were instituted among the Jews and ordain¬ ing a body of 12 disciples to whom He gave commission to preach the Gospel and admin¬ ister the ordinances thereof. Mormon's son, Moroni, finished the record of his people about 420 a.d. ; and the angel who in 1823 revealed the depository' of the plates to Joseoh Smith an¬ nounced himself as that same Moroni, the last prophet and historian of the ancient nation. Years after the first publication of the (Book of Mormon, > a story purporting to explain the modern origin of the book, as a plagiarized and altered version of a work of fiction, attracted some attention; but the theory has been aban¬ doned as utterly untenable. See Book of Mor¬ mon.

From the day of its organization in 1830 the Church grew with surprising rapidity; and from that time to the present every year has witnessed an increase in membership and an expansion of

propaganda. A temporary gath¬ ering centre was established at Kirtland, Ohio, where the first temple was reared. This build¬ ing, an imposing structure as judged by the standard of the time, was dedicated in ‘ 1836. As early as 1831, however, the Mormons had begun to establish themselves in Jackson County’, Mo., which region they still regard as the central place of the land of Zion. Persecu¬ tion was waged against the Church from its beginning.. Both in Ohio and Missouri the peo¬ ple met violent opposition. In 1833 they were driven from Jackson County, under cover of a charge that they were abolitionists. They sought refuge in Clay County, but their sojourn there was brief. In 1838 Gov. Lilburn W. Boggs of Missouri issued an exterminating or¬ der against all Latter-day Saints, and they were forcibly expelled from the State. In sorry plight the people turned again eastward and settled in Illinois, making the little village of Commerce in Hancock County their headquar¬ ters. There they founded the city of Nauvoo,

the phenomenal growth of which attested at once the industry and skill of the people and the vitality of their organization. Nauvoo was chartered by the State with liberal provision for local government. A university and a mili¬ tary organization were provided for, and both institutions were successfully established. The city flourished and in time numbered 20,000 in¬ habitants. A temple was reared, in proportions and beauty of architecture far surpassing the earlier structure in Kirtland. In 1844 a few apostates from the Church started a newspaper at Nauvoo with the avowed purpose of assail¬ ing the prophet and exposing alleged misdeeds. Only one issue of the paper was published. The city council of Nauvoo promptly declared the printing establishment a nuisance and ordered its immediate abatement. In the seizure by of¬ ficers of the law the printing plant was wrecked. Smith was blamed for this by his enemies and they secured the issuance of a warrant for his arrest. As he was the officially recognized com¬ mander of the Nauvoo Legion, a duly consti¬ tuted unit of the militia, the imminence of a military clash was exploited and public opinion in the State became intensely

antagonistic. The governor of Illinois induced Smith to sur¬ render himself under assurance of safeguard against mobocratic violence. The prophet was imprisoned at Carthage, where on 27 June 1844 a mob broke into the jail and shot to death Joseph Smith and his brother Hyrum, and wounded John Taylor, one of the prophet's party.

Even this outrage failed to bring about the end of Mormonism. Joseph Smith was suc¬ ceeded in the leadership of the Church by Brigham Young (see Young, Brigham), who, early in 1846, was impelled through the vio¬ lence of persistent persecution to leave Nau¬ voo with his people. They set out for the West. A party numbering 143, led by Young, started in the spring of 1847, and on 24 July arrived in the va'dey of the Great Salt Lake, which region the leader declared to be the land of promise to the Saints. To ordinary view the promise was most uninviting. The pio¬ neer band placed a dam across the little stream later known as City Creek and flooded a small area of the hard-baked soil. After the plant¬ ing the land was again watered. Thus was in¬ augurated the system of modern irrigation in America. The first crop raised by the colonists was small and the next was partly destroyed by an invasion of crickets; but the people pushed out into the remoter parts of the val¬ ley and beyond; and within a few years the wilderness — a part of the Great American Desert — was blossoming as a flower garden. The site of the present Salt Lake City was sur¬ veyed, streets laid out, the Temple block was marked by boundaries and other reservations for community use were made. Brigham Young returned to Council Bluffs, Iowa, where the main body of his people had established temporary headquarters. The migrating hosts followed the route of the pioneer band, travel¬ ing in well-organized companies; and people still living in the smiling vales of Utah and contiguous States relate their experiences of having crossed the plains afoot, guiding ox teams or pushing handcarts by dint of strenu¬ ous effort. Great Salt Lake City, as the new

settlement was first called, became at once im¬ portant on account of its position on the route of wagon trains between the Missouri River and California; and as within two years from the time of the pioneer arrival, the gold fever was raging, travel was heavy. As a result of the wonderful genius for organization, man¬ agement and well-disciplined activity exhibited by the Mormon colonists, and owing to their success in irrigation, the soil, inherently fertile and lacking only water and skilled cultivation, yielded abundantly and the city became the chief source of supply to the transcontinental travel¬ ers. When settled by the Mormons the region was under Mexican sovereignty.

After its ces¬ sion to the United States in 1848, under the Treaty of Guadeloupe Hidalgo, the settlers pe¬ titioned for admission to the Union as a State ; the request was denied, but in 1850 the Terri¬ tory of Utah was formally established. Brig¬ ham Young was appointed governor and Con¬ gress made appropriations to the new Terri¬ tory for public buildings and a library. In 1857 Alfred Cumming was appointed to succeed Brigham Young as governor, and Cumming with other Federal appointees was sent to the West along with ˆJohnston's army » a military expedition authorized by President James Bu¬ chanan, and sent ostensibly to suppress a ((Mor-mon rebellionˆ that had no existence except as a popular opinion based on false reports. The expedition met with difficulties on account of the inclement season, and through determined opposition on the part of the Utah settlers to having an armed and hostile force sent against them in time of peace, when, as they claimed, they were guiltless of any overt act against the United States government. A peace commis¬ sion was sent to Utah in 1858 and the people, who had already begun to move away from their homes (which they had prepared to burn if the invading soldiery attempted any depreda¬ tions) were induced to return. Brigham Young, though no longer governor, exercised great in¬ fluence in the Commonwealth. Many mission¬ aries were sent out by the Church and the mem¬ bership increased with great rapidity. Brig¬ ham Young died in 1877 and John Taylor suc¬ ceeded him in the presidency of the Church. Taylor had been with the Smiths at the time of the assassination in Carthage jail and he him¬ self had been shot and dangerously wounded by the mob. John Taylor died in 1887; and, after an interval, Wilford Woodruff became presi¬ dent of the Church. He was a remarkable man, 82 years old when made president, and lie retained his phvsical and mental vigor until his death, which occurred in his 92d year. In 1890 President Woodruff issued his famous manifesto, which placed a definite injunction against plural or polygamous marriage, which practice had been inaugurated under prescribed regulation by Joseph Smith at Nauvoo. In 1896 Utah became a State, and in the following year the 50th anniversary of the entrance of the pio¬ neers into Salt Lake Valley was impressively celebrated. Lorenzo Snow became president of the Church following the death of President \ oodruff in 1898. He was in his 85th year at the time and died three years later. He was succeeded by Joseph Fielding Smith, a nephew of Joseph Smith, the martyred prophet, and son of Hyrum Smith, who had met death with

his brother Joseph. After an administration covering 17 years and marked by unprecedented expansion in all phases of Church activity, Jo¬ seph F. Smith died on 19 Nov. 1918, a few days after his 80th birthday. On 23 Nov. 1918 Heber J. Grant, the senior member of the apos¬ tolic body, was made president of the Church on the second day of his 63d year.

From the seemingly insignificant beginning of six the membership of the Church has now risen above half a million. In Utah and ad¬ joining States, as also in Canada and Mexico, the people are organized according to resi¬ dence into stakes, each of which comprises sev¬ eral wards; and outside the area so included, the whole of this country, as also many for¬ eign lands, are covered by missions. The the¬ ology of Mormonism is epitomized in the fol¬ lowing exposition :

The Articles of Faith of the Church of Jesus Christ of Latter-Day Saints.

1. We believe in God, the Eternal Father, and in His Son, Jesus Christ, and in the Holy Ghost.

2. We believe that men will be punished for their own sins, and not for Adam's transgression.

3. We believe that through the atonement of Christ, all mankind may be saved, by obedience to the laws and ordi¬ nances of the Gospel.

4. We believe that the first principles and ordinances of the Gospel are: (1) Faith in the Lord Jesus Christ; (2) Re¬ pentance; (3) Baptism by immersion for the remission of sins; (4) Laying on of hands for the gift of the Holy Ghost.

5. We believe that a man must be called of God, by prophecy, and by the laying on of hands, by those who are in authority, to preach the Gospel and administer in the ordinances thereof.

6. We believe in the same organization that existed in the Primitive Church, viz.: apostles, prophets, pastors, teachers, evangelists, *etc.*

7. We believe in the gift of tongues, prophecy, revela¬ tion, visions, healing, interpretation of tongues, *etc.*

8. We believe the Bible to be the word of God, as far as it is translated correctly; we also believe the Book of Mormon to be the word of God.

9. We believe all that God has revealed, all that He does now reveal, and we believe that He will yet reveal many great and important things pertaining to the Kingdom of God.

10. We believe in the literal gathering of Israel and in the restoration of the Ten Tribes; that Zion will be built upon this (the American) continent; that Christ will reign personally upon the earth; and, that the earth will be re¬ newed and receive its paradisical glory. _

11. We claim the privilege of worshiping Almighty God according to the dictates of our own conscience, and allow all men the same privilege, let them worship how, where, or what they may.

12. We believe in being subject to kings, presidents, rulers, and magistrates, in obeying, honoring, and sustaining the law.

13. We believe in being honest, true, chaste, benevolent, virtuous, and in doing good to all men; indeed, we may say that we follow the admonition of Paul. We believe all things, we hope all things, we have endured many things, and hope to be able to endure all things. If there is anything virtu¬ ous, lovely, or of good report or praiseworthy, we seek after these things. — Joseph Smith.

The presiding council of the Church is the first presidency, consisting of the president and his two counsellors, each of the three being an ordained high priest. The president is offi¬ cially designated as ((prophet, seer, and reve-lator0 to the Church. Next in authority is the council of 12 apostles, and in addition there are patriarchs, high priests, seventies, elders, bishops, priests, teachers and deacons, the or¬ ganization operating as a theocratic system. Auxiliary organizations are maintained as helps in government; these comprise relief societies, Sunday schools, young men's and young ladies' mutual improvement associations, primary as¬ sociations for the children and religion classes • for supplying religious and ethical instruction as a supplement to the secular teachings of the

public schools. A system of church schools is operated for those who prefer denominational training, and these institutions range from the kindergarten to the normal school and college. The practice of plural

marriage was a feature of the Church from the time of Joseph Smith's presidency to that of Wilford Woodruff. In 1862 the Federal government legislated against the system, but the constitutionality of the law was contested by the Mormons on the ground that it was in effect an infringement on reli¬ gious freedom. More stringent laws followed, and numerous prosecutions resulted. Many members of the Church suffered fine and im¬ prisonment rather than abandon the wives with whom they had covenanted under Church sanction. In 1887 the Mormon Church was disincorporated by Congress and the greater part of its property was confiscated by the gov¬ ernment. In recognition of the final decision of the Supreme Court that the laws forbid¬ ding a plurality of wives were constitutionally valid, the Church in general conference as¬ sembled adopted as a binding rule the Wood¬ ruff manifesto ; and except for sporadic cases' of violation of this rule of action, plural mar¬ riage has ceased to be an issue in Mormon af¬ fairs. In 1898 Brigham IT Roberts was elected to Congress on the Democratic ticket, but a protest followed on the charge that he was living in polygamous relations, and on the rec¬ ommendation of an investigating committee of the House of Representatives he was denied a seat in Congress. In 1904 an effort was made to unseat United States Senator Reed Smoot, on the charge that he, being a member and an official of the Mormon Church, did in effect abet and encourage the practice of plural mar¬ riage, and that he was disloyal to the Federal government. Both charges failed and the sen¬ ator was confirmed in his place in the upper house of Congress.

Salt Lake City, which is still the headquar¬ ters of the Mormon Church, and both capital and metropolis of the State of Utah, is famed for its beauty of situation, its wide and excel¬ lent streets and its many imposing structures. * The great tabernacle, a building begun in 1864 and completed in 1867, is oval in plan, 250 feet long, 150 feet in greatest width and over 70 feet high from floor to ceiling at the centre. The roof is a great dome of latticework con¬ struction and is self-supporting, the vast span being without a single pillar. As - first con¬ structed the enormous beams and trusses, en¬ tirely of wood, were held together by wooden pegs and rawhide thongs, for in that day iron spikes were unobtainable. The seating capacity of the building is over 9,000; but, with aisles and other standing space occupied, assemblies of nearly 11,000 are not uncommon. The great organ in the tabernacle is of worldwide fame, and the choral service is scarcely less renowned. The temple is built of solid granite, with walls eight feet thick in the first story and six feet above. This building was begun in 1853 and was dedicated in 1893, the time occupied in its

construction being 40 years to the day. It is of composite architecture, with dimensions of 186 feet length, 118 feet width and 210 feet from ground to highest pinnacle. There are three other temples in Utah, one in Canada and one in Hawaii. The temples are used in ordi-466

nance work and not for worshiping assemblies in general. A characteristic of Mormon prac¬ tice is the rendering of vicarious service in baptism and other ordinances for the dead; and this labor is performed only within tem¬ ples erected and dedicated for the purpose. Or¬ dinances for the living are likewise adminis¬ tered in these structures; and the distinctive ceremony of (<celestial marriage® is confined to the temple administration. This order of marriage involves a covenant between the par¬ ties for time and all eternity, and not only until death shall them part. No marriages are sol¬ emnized in the temples or elsewhere among the Mormons except such as are authorized by the license of the State. See Salt Lake City • Utah.

MORMYRIDiE, mor-mir'i-di, from the Greek mormyros, sea-fish. They are known as the African-beaked fish of the pike family, but, by Professor Cope, applied to the Scyphophori. They have the narrow parietal bones of the skull distinct both from one another and from the supraoccipital and they have the special dis¬ tinction of having the pteratics (on each side of the parietals) large, funnel-shaped and en¬ closing a cavity expanding externally and cov¬ ered by a lid-like plate of bone. The anterior vertebrae are simple and unmodified and the gill cover has a sub-opercular bone. Scales cover both body and tail, but the head is naked and barbels are absent on muzzle. The cen¬ tral portion of the upper jaw is formed by the united premaxillae and the sides by the maxillae. A small slit represents the gill open¬ ing and there are no false gills. The air bladder is simple. The beaked fishes are di¬ vided into two groups, the Nile having 11 species.

MORMYRUS, a fish of the Nile (Mormy - ms petersi), regarded as excellent for the table, and caught with line and hook. Its lower jaw is extended into a fleshy appendage and its characteristic form is depicted on an¬ cient Egyptian wall-paintings and carvings. 'It represents a group of malaeopterous noc¬ turnal North African river-fishes allied to the pikes.

MORNAY, Philippe de, fe-lep de mor-na, Seigneur du Plessis-Marly, French states¬ man: b. Bully, Normandy, 5 Nov. 1549; d. La Foret-sur-Sevre, 11 Nov. 1623. He was brought up a Huguenot; entered Coligny's service; escaped to England at the time of the Massa¬ cre of Saint Bartholomew; returned to France in 1573, and took up arms for the Huguenots; was captured at the siege of Dormans and afterward ransomed, and joined the army of Henry of Navarre, who used not only his sword but his pen and his diplomatic gifts, made him a member of his council and ap¬ pointed him governor of Saumur. After Henry became Henry IV of France and a Catholic, Mornay was the sole Huguenot leader and was even styled the ((Huguenot pope® by his enemies. He retired to Saumur (where he founded a Protestant university) soon after the Edict of Nantes, in the negotiations leading up to which he had taken a leading part. Mornay wrote, among other controversial works aimed now at pagans or atheists, now at the Roman Catholic Church, (De l'EucharistieP urging the

Calvinistic view of the Lord's Supper as op¬ posed to transubstantiation (1598). His 'Memoirs pour servir a l'Histoire de la Reformation en France, > re-edited in 1824, is a valuable source for the history of the period. His wife's memoirs (.1824) detail his life down . to 1606. Consult also Ambert, (Duplessis-Mornay> (Paris 1847), and Baird, (The Hugue¬ nots and Henry of Navarre* (New York 1886).

MORNING-GLORY, an annual twining or

trailing vine (/ pomcea purpurea) or some re¬ lated species (a native of South America), popular as a garden ornament all over the world and often found escaped to the fields and roadsides. The vine is sometimes 10 feet tall, with large roundish heart-shaped leaves and large delicate ephemeral flowers of very various forms and colors. The seed may be sown in any garden soil well exposed to the sun, where the plants may be expected to grow the following year. They self-sow readily. If the soil is very rich they increase so fast as to make an excellent screen for a low porch by midsummer. See Convolvulaceˆe ; Ipom/EA.

MORNINGSIDE COLLEGE, in Sioux City, Iowa; coeducational; founded in 1894, under the auspices of the Methodist Episcopal Church. In 1916 the school had 35 professors and instructors and about 708 students. There were 28,000 volumes in the library; the grounds, building and apparatus were valued at $157,000; the income was

$33,000, not in¬ cluding benefactions. The collegiate courses lead to the degrees of A.B., B.S. and Ph.B.

MORNY, mor-ne, Charles Auguste Louis Joseph, Due de, French politician: b. Paris, 23 Oct. 1811; d. there, 10 March 1865. He was a half-brother of Louis Napoleon (afterward Napoleon III), a natural son of Queen Hor- (ense and Count Flahault. He was for a time in the army, then tried commercial speculation and finally politics. He became a deputy in 1842, took a prominent part on the side of Napoleon III in the coup d'etat of 1851, and. was a conspicuous figure under the Second Em¬ pire, during which he was Minister of the In¬ terior (1851—55) , president of the Corps Legislatif (1854-65), and was sent on a special embassy to Saint Petersburg (1856-57) and was created duke in 1862. Possessed of a certain sort of ability, he employed it with perfect unscrupulousness for the advancement of his per¬ sonal interest. Alphonse Daudet (who for a time served as one of his secretaries) has por¬ trayed him as the Due la Mora in (Le nababP Consult the biographies by Castille (Paris 1910) an<ˆ ˆ°ˆe> (English trans., New York

MOROCCO, mo-roko, or MAROCCO, a

sultanate or empire and French protectorate of northwest Africa, known to its inhabitants only by its Arabic name Moghrebel-Aksa, «The Ex-tieme West.® It is bounded on the west by the Atlantic Ocean, north by the Mediterranean Sea, northeast by Algeria and east and south by (he Sahara, the boundary in the southwest be-ing formed by the Wady Draa, while elsewhere there is no definite line of demarcation between oi n r»ˆencˆ Sahara and Morocco ; area, about 219,000 square miles. The rulers of Morocco exercised sovereignty at one time over Twat,

:,r 1 ouat and several other oases in the heart of the desert; they even carried their victorious arms across the desert to Timbuktu. Within recent times, however, they have had little or no power south of Atlas, the great chain which traverses the country diagonally northeast to

southwest throughout its whole extent. Mo¬ rocco has three capitals or imperial residences, at one of which the sultan and his army reside at uncertain intervals and for indeterminate periods. These are Fez (pop. 100,000), Makinas or Mequinez (30,820), Marrakesh, bet¬ ter known as the City of Morocco (50,000 to 80,000). Besides these the principal coast towns are Tangier (46,000, 11,000 European) ; Tetuan, a little way up the Martil River; Larache (El-Arish) ; Rabat and Sallee, on opposite sides of the Bu-Ragreb River ; Casablanca or Dar-al- Baida (75,000, 31,600 European) ; Mazagan, Saffi and Mogador. The empire is divided into districts named from the occupying tribes; an¬ other division is into provinces or districts, fluctuating and very unequal in number, some¬ times confined to a single town, sometimes em¬ bracing an extensive territory, administered each by a kaid, whose chief duty it is to collect the imposts.

Topography. — Physically considered, Mo¬ rocco falls naturally into four regions: 1. The great range of Atlas, from southwest to north¬ east, composed of two or more parallel chains. (See Atlas). 2. Er-Rif or the north¬ ern maritime district, comprising the chains of mountains which rise at no great distance from the Mediterranean Sea. 3. The wide belt of fertile plain, intermixed with gentle hill and valley, which lies between the two preceding regions. 4. The plains and valleys southeast of Atlas. The most remarkable natural feature is the great mountain system extending from northeast to southwest. This system — the Atlas — composed of several parallel chains, contains the most elevated points known in North Africa. Miltsin, a peak distant about 30 miles southeast from the city of Morocco, has a height of 11,400 feet, while another peak, Jebel Ayashin, is estimated at 14,600. Adjoin¬ ing the central chain are several tablelands of great extent, consisting of irregular plains, and at a little distance from it north extends the maritime chain now called Er-Rif, and formerly the Atlas Minor. Its general height is from 2,500 feet to 3,500 feet.

Hydrography. — The rivers flowing from the north side of the Atlas have generally the shorter course, but are well supplied with water ; those running south, however far they may extend, are dry in summer, at least in their lower courses. The Muluya, rising in a principal knot of the Atlas flows in a north¬ easterly direction to the Mediterranean with a course of 350 miles and receives many tribu¬ taries. Of the rivers which run into the desert the most easterly the Ghir has a course south¬ east, occasionally traceable for 300 or 400 miles. The Ziz, which, with its numerous affluents, waters a very fertile and populous country, is wholly spent before it attains half that length. The Draa which rises in the central and most elevated portion of the range of Atlas (lat. 31° to 32° N.), first runs south for nearly 200 miles,

forms Lake Ed-Debaya, and then, turning west, enters the ocean in lat. 28° 18ˆ N., after a course

of 700 miles. The lower portion of its bed, however, is periodically quite dry. Lake Ed-Debaya, formed by the floods of the Draa, is reported to be very large; but it disappears annually, and gives way to richly cultivated fields. The fresh-water lake of Gebel el Akhdar (Green Mount) lies about 30 miles north of Morocco. The coast offers few good harbors; of these Tangier and Mogador, or Sweira, are the best ; the rest are but open roadsteads at the mouths of rivers.

Natural Resources, *etc.* — The extent of the mineral wealth possessed by Morocco is not known with any accuracy. Copper, iron, and lead are obtained in larger or smaller quan¬ tities. The flora of Morocco includes the esculent oak and cork oak; in the higher re¬ gions of the Atlas the cedar and Aleppo pine, with many varieties of oxycedrus and juniper yielding fragrant gums; also the date-palm and the dwarf-palm east and south of the Atlas ; and near the coast the Eleodendron argan, which yields an excellent oil. Among the wild animals are lions, panthers, ounces, wild boars, gazelles and several species of large antelope, especially the bubalus. The locust makes its appearance in May, when it lays its eggs. The young brood come forth a month later in count¬ less multitudes, and in another month they take wing, consuming all vegetation in their prog¬ ress and spreading desolation over the fields. They are gathered and eaten in large quantities. The ostrich is found on the south frontiers of Morocco.

Climate. — The climate west of Atlas is much more temperate than might be expected under such low latitudes. This is due to the circum¬ stance that a lofty chain of mountains, covered in some parts with perpetual snow, intercepts the hot winds from the deserts of the interior, so that the equable and refreshing sea-breezes prevail throughout the year. Hence the ex¬ tremes of temperature lie within moderate lim¬ its ; the thermometer rarely falling below 40° F. in the winter, while it does not rise above 95° in summer. In the region east of the moun¬ tains intense cold is felt in winter, while in summer the heat of the plains is insufferable.

Agriculture. — The agriculture of Morocco was in the lowest possible condition and the annual production calculated barely to supply the wants of the country; though with proper cultivation and under an enlightened govern¬ ment Morocco will become one of the most productive countries in the world. Unfor¬ tunately, until the French

protectorate was established, owing to oppression and extortion, there was nothing but discouragement for any¬ one attempting to reap advantage from these re¬ sources. The cereal crops are wheat barley and maize; but durrah or millet (Sorghum vulgare) constitutes the chief support of the population, though beans, the esculent arum, and even canary seed are much eaten by the poorer classes. Cotton growing was introduced in 1911. The vine was cultivated only near towns for the sake of the fresh grapes and for the raisins ; but now the outlook for this prod¬ uct is promising. All the fruits of the south of Europe are cultivated to some extent. Large numbers of the inhabitants lead a pastoral life, subsisting wholly on the produce of their herds and flocks, or else on game and the wild fruits of the forests. The chief wealth of the tribes

scattered over Morocco consists in their herds and flocks. The spirited small horses, for which the country was famous in ancient times, are still numerous, particularly in the southern provinces. Horned cattle are numerous, partic¬ ularly in the northern districts. The bulls are generally tractable and are employed in the labors of the field — bullocks being little known. The sheep are supposed to number at least 45,000,000; while the goats are estimated at 10,000,000 or 12,000,000, and goat-skins consti¬ tute one of the principal articles of export.

Manufactures and Commerce. — In general among the rural population, each family sup¬ plies all its own wants. In the towns, however, some manufactures are carried on. Fez makes and exports great quantities of the cloth caps which bear the name of that city. The tanners of Mequinez and other places have a great repu¬ tation, and Morocco carpets are much esteemed in Europe. The commerce is partly carried on with the adjacent countries, partly with Euro¬ pean states. From the Sudan are obtained ivory, gold-dust, ostrich feathers, asafcetida, gums, Guinea pepper and slaves. Of the whole of the commerce with Christian states nearly half is carried on with Great Britain. The ex¬ ports consist of beans, peas, almonds, goat¬ skins,

eggs, wheat, wool, wax, *etc.* ; the imports, of cottons, sugar, wine and flour. The French have constructed 1,500 kilometers of roads. A railway has been completed to Fez and another connecting Casablanca to Marakesh is under way, vdfile a line to link up with the Algerian railways has been completed as far as Taza. Postal services have been introduced, there are several wireless stations, and in 1916 there were 4.185 miles of telegraph, exclusive of military lines. Imports (1915), about $54,900,000 ; ex¬ ports, $12,834,000. The number of vessels en¬ tered at Moroccan ports in 1915 was 4,319, of a total tonnage of 1,963,540 tons.

Money, Weights and Measures. — Spanish dollars and pesetas, as well as Moorish coins minted for the Government in France are cur¬ rent, but of fluctuating value. The common currency consists of floos (two two-third cents) the blankeel or muzoona of siz floos equaling approximately 16 cents; the okia or ounce of four blankeels. about 64 cents, and the miktal of 10 ounces equaling 76 cents. The kintar of 100 rotals for native produce is equal to about 168 pounds; the kintar for imported articles about 112 pounds. The drak of eight tomins is equal to about 22 inches. The mudd dry meas¬ ure bv which grain is sold equals 1 17/60 bushels ; the kula of 28 rotals, by which oil is sold wholesale, equals 47 pounds in weight, or 53 pints by measure.

Government. — The sovereign or Sultan of Morocco, styled by Europeans emperor, bears the title of Emir el Mumenin, or Lord of the True Believers. He is ordinarily called by his subjects simply Seid-na — Our Lord. He is absolute in the strictest sense; the lives and properties of his subjects are at his disposal; from him alone proceed the laws, which he makes and unmakes at his pleasure. The im¬ perial revenues are derived from imposts on property, from duties on imports and exports, from monopolies and from fines or confisca¬ tions. Under the sultanate regime every office was directly or indirectly purchased, small sal¬ aries or none were paid, the holders recouping

themselves by plunder and oppression, tem¬ pered by the fact that at any moment they may be forced to disgorge to the Sultan, or in de¬ fault be left to rot in the loathsome Moroc¬ can dungeons, or be beaten or tortured to death. All justice was bought and sold. Yet, owing to the religious fanaticism of the people, and the mutual jealousies of the European powers, especially France, Great Britain, Germany, Italy and Spain, these unsatisfactory conditions were until recently preserved. See post, under Gov¬ ernment.

Population. — For an estimate of the popula¬ tion of Morocco there are no certain data. One of the most recent calculations estimates it at 5,000,000. An important element of weak¬ ness in the social and political constitution is to be found in the several distinct races, which, so far from uniting, repel one another. The Berbers are the oldest inhabitants of the coun¬ try, and they devote themselves to agriculture rather than to pastoral pursuits. The Arabs form the bulk of the rural population in the plains; some of them are cultivators, and some are Bedawi. In the towns along the coast are found the Moors, a people now physically dis¬ tinct, whose origin as a distinct race cannot be satisfactorily explained. Their chief physical characteristic is their corpulence and they are more indolent and much less social than the Arabs. A considerable number of Jews is to be found in all the commercial towns of Mo¬ rocco, where, in spite of the oppressions to which they are subjected, they often accumu¬ late wealth, being the sole dealers in bullion and holders of capital. To these various in¬ gredients of a checkered population must be added the negroes and their posterity of every shade, who are particularly numerous in the southern provinces. The civilization of Mo¬ rocco had sunk to a low condition. The educa¬ tion given at the schools in the chief towns, and completed at the University of Fez, does not go beyond the theology of the Koran ; but un¬ der French rule progress has been made. The public libraries, once famous, are now dis¬ persed ; true science is unknown, and whatever monuments of art are to be found in the king¬ dom point to the time when literature and art flourished under the Arababian dynasties in Spain. Music is the onlv art for which the Moors are said to manifest a decided taste, but they have not as yet arrived at any profi¬ ciency in it.

History. — In the Mauri of ancient writers it is easy to recognize the Moors of modern times. These people were supposed to have come from Asia, and particularly from Palestine, but their origin is doubtful. The Berbers are believed to be the representatives of the race that inhabited the country in the earliest historical times. After being for more than four centuries a part of the Roman empire, and >in the later period of its sway veneered with a corrupt Christianity, “Mauritania Tingitana® fell (429 ad.) into the hands of the Vandals, who in¬ troduced the piratical habits which afterward became so characteristic of the coasts of Bar¬ bary and Morocco. They held it till 533, when Belisarius having defeated them, it became sub¬ ject once more to the Eastern empire. But in the latter part of the 7th century the Arabs spread over North Africa, and having taken possession of Mauritania, penetrated to the

borders of the desert. About this time the Jews were expelled from Spain by decree of the Council of Toledo (694 a.d.), and sought refuge inˆ great numbers on the shores of Africa. Near the close of the 8th century a Sherif or descendant of Mohammed named Edris obtained such an ascendency over the Berber tribes that they made him their sover¬ eign, with the title of Imam. His son and suc¬ cessor founded in 807 the city of Fez. In 1035 the warlike sect of the Morabites rose into existence on the borders of the desert. In 1055 their chief was proclaimed sovereign of Moghrebel-aksa. His grandson and successor crossed the mountains and in 1072 laid the foundations of the city of Morocco, which thus arose with the remarkable dynasty of the Mo¬ rabites. The expulsion of the Moors and Jews from Spain (1440-1501 a.d.) added 800,000 souls, it is said, to the population of Moghrebel-aksa. In the middle of the 16th century a new' dynasty commenced with the descendants of the Sherif Hosein. The fifth of this family, commonly called Hamed Sherif el-Mansu (1579-1603), made himself master of the whole of Moghrebel-aksa, and pushed his conquests through the desert as far as Timbuktu and Kagho. His reign is regarded as the golden age in the history of Morocco. The ninth and last Moroccan dynasty was that founded in 1648, by Mulai Sherif el Fileli, or King of Tafilelt. In 1814. the slavery of Christians was abolished and piracy was prohibited in 1817. Several complications arose with France, caused by the plundering of French vessels by pirates, but in each instance the emperor gave com¬ pensation. In 1859-60 there was a war with Spain, owing to attacks made by some of the wild tribes upon the Spanish territory; it re¬ sulted in a cession of land and an indemnity of $20,000,000 to Spain.

The Sultan Abdul Aziz IV succeeded his father El Hasan III, in 1894, when he was 14 years of age, and he had a difficult task with his turbulent people. On 18 Mav 1904, Rais-Uli. a prominent chieftain, captured and held for ransom, the Hon. Ion Perdicaris, an American subject, and his stepson Mr. Varley, an Eng¬ lish subject. The ultimatum of the United States Secretary of State, John Hay, <(Perdicaris alive or Rais-Uli dead," a naval demon¬ stration of American warships and representa¬ tions from European courts, compelled the Sultan to comply with Hay's demands, and the captives

were released. The Sultan's weak¬ ness became more and more apparent to the insurgent tribes of northern and central Morocco, and contempt for the rights of foreigners, with utter lawlessness prevailed throughout the kingdom. At the ports, espe¬ cially Tangier, the property of Europeans, and even their lives, were in jeopardy. To safe¬ guard the loan of $10,000,000 which had been advanced to the Sultan, the French government arranged for the appointment of a French financial adviser, with agents, to undertake the control of the Customs; it was also arranged to police Tangier with French-Algerians, and a French military mission proceeded to Fez. Bv the Anglo-French Agreement of 8 April 1904, France as the nation whose dominions bordered on Morocco, was to be unhindered by Great Britain in guarding the tranquility of that kingdom, in return for allowing Great

Britain freedom of action in Egypt; moreover, freedom of trade was guaranteed for 30 years in Egypt and Morocco. In October 1904 a Franco-Spanish Agreement was also arranged, which recognized the terms of the Anglo-French Agreement, the maintenance of the territorial integrity of Morocco, the neutraliza¬ tion of the coast between Melilla and the Sebu River, the preponderating right of France to give the Sultan military, economic and financial assistance, and modified the limits of the Span¬ ish sphere of influence. In January 1905 the reforms submitted by the French government were - received with marked disfavor by the Sultan and by his Council of Notables. This was thought later to have been due to German diplomacy, which under the terms of the Mad¬ rid Convention of 1880, refused to recognize the agreements made by France with Great Britain and Spain concerning Morocco.

In 1880 the Madrid Convention with Mo¬ rocco, bearing the signatures of Austria, Bel¬ gium, Denmark, Germanv, France, Great Brit¬ ain, Italy, Morocco, the Netherlands, Portugal, Spain, Sweden and Norway, and the United States, had established the right of protection in Morocco, and the 17th article of the treaty reads : (<The right to the treatment of the most favored nation is recognized bv Morocco, as belonging to all the Powers represented at the Madrid Conference."

The German opposition was further empha¬ sized by the visit of the German Emperor, William II to Tangier, 31 March 1905, when he assured the Sultan of his intention to uphold the integrity of the Moroccan kingdom and the equality of Germany's commercial and economic interests in the country. A special German mission was sent

to Fez, and British and Span¬ ish missions also proceeded to the Moorish capital, ostensibly to support the French policy. The Sultan and his advisers, 28 May 1905, re¬ fused to entertain the proposed reforms and advised an international conference of the Powers to deliberate on the Moroccan situation. After protracted negotiations between France and Germany, which were shadowed by rumors of probable war between the countries, and in which the resignation of M. Delcasse, the French Minister of Foreign Affairs, and the downfall of the Rouvier Ministry were inci¬ dents, a program was arranged to place be¬ fore the International Conference. Algeciras in Spain, opposite Gibraltar, was chosen as the meeting place.

Various reasons were assigned for the un¬ expected raising of the Moroccan question by Germany; among these were — alarm at the apparent isolation of Germany in European politics, at the increase of French influence in North Africa, and at the consummation of an agreement which implied a further terri¬ torial division of Africa by private arrange¬ ment between two powers, regardless of Ger¬ man and other economic rights.

The various countries signatorv to the Mad¬ rid Convention of 1880 sent delegates to Alge¬ ciras, and the conference was opened 16 Jan. 1906. The presence of the United States repre¬ sentatives was explained as safeguarding the nation's commercial interests in Morocco; with the political aspects of the conference, arising solely from the strained relations between Ger¬ many and France, wherein a casus belli might

be found, the United States agents were spe¬ cifically instructed not to participate. The meetings of the conference lasted until 31 March 1906, when after strenuous opposition and counter-proposals on the part of Germany, supported only by Austria, against the French program, supported by Great Britain, Russia, Italy, Spain, Portugal, the United States, Bel¬ gium and Holland, an agreement on all points was reached. The French program maintained that the police, under the Sultan's orders, should be commanded by French and Spanish

officers and sub-officers nominated to the Sultan and appointed by him, and that the Inspector-General of the Police should report to the Sultan. Germany made a series of proposi¬ tions in opposition to this general plan, seeking to bring the whole Moroccan business prac¬ tically under the control of the European con¬ cert, requiring those Powers directly acting in Morocco to take a European mandate, and to be subject to the interposition of the other Powers, of which Germany would be an im¬ portant one. Matters had almost reached a deadlock when a proposition relative to a mixed police force for the ports in dispute was brought forward by Ambassador White, under instruction from President Roosevelt, and in¬ troduced by the Russians, provided a solution for the existing difficulties. The division and the policing of the ports of Morocco was ar¬ ranged as follows : Spain to police Tetuan and Earache; a Franco-Spanish mixed police to be established at Casablanca and Tangier, and a French police force alone to have charge of Mogador, Saffi, Mazagan and Rabat. The re¬ sult of the conference was virtually a victory for France, which retained the preponderance of influence in the financial affairs of the king¬ dom, and lost little of what was demanded with regard to the policing of the country.

In 1907 Dr. Marchand was killed by natives at Marrakesh, and this was followed by French occupation of Udja, on the Algerian border. In 1908 Mulai Hafid succeeded to the throne. In 1909 and again in 1911 — the Riffians made attacks on the Spaniards in the neigh¬ borhood of Melilla, which were ultimately de¬ feated. In July 1911 the German government dispatched the cruiser Panther to Agadir in southern Morocco, where German financiers had acquired considerable concessions. The local chiefs were entertained on board the ves¬ sel and promised German support in any re¬ sistance they might make against French para-mountcy in the country. The result was a threatened European conflagration : Great Brit¬ ain _ assured France of her support, and for a time the situation was tense. Negotiations were entered into between France and Ger¬ many, which lasted for three months, and the result of which was the drawing up of two agreements (4 Nov. 1911), the one practically recognizing a French protectorate in the coun¬ try but obtaining for German interests absolute equality in economic and commercial matters, with the cession to Germany of 250,000 square kilometres in the northern French Congo. In April 1912 the Sultan recognized the French protectorate, which has also been recognized by Great Britain, Germany and other great powers. General Lyautey was appointed resi¬ dent general, with both civil and military powers. In that year Mulai Hafid abdicated

in favor of Mulai Yusuf, the present Sultan. Spanish rights in the Spanish Northern Zone have been conceded, and it is administered by a Khalifa chosen by the Sultan. A zone in the district of Tangiers 140 square miles in extent, has been created.

After the outbreak of the Great War in August 1914 the French army of occupation, amounting to 85,000 men, was required else¬ where; it was decided to withdraw troops from the interior and to hold only the towns on the coast, and a mobile column was organized to keep order. Disturbances were created at the outset, inspired by German agents in the Span¬ ish zone. About 30,000 Moors have fought in Europe, and thousands have filled places in munitions and other industries in France.

Bibliography.— Aflalo, M., <The Truth about Morocco5 (London. 1904) ; Berard, V., (L'Affaire Morocco5 (Paris 1906) ; Brives, A '

(Voyages au Maroc> (Algiers 1909) ; Dawson, A. J., (Things Seen in Morocco5 (London 1904) ; Desroches, G., <Le Maroc, son passe, son present, son avenir5 (Paris 1913) ; Doutte, E., <Missions au Moroc5 (ib. 1914) ; Fraser, I. Foster, (The Land of Veiled Women5 (Lon¬ don 1911) ; Holt, G. E., (Morocco the Piquant5 (ib. 1914) ; Kerr, R., (Morocco after Twenty-five Years5 (ib. 1912) ; Loti, Pierre, <Mo rocco5 (ib. 1914) ; Mackenzie, D., (The Khalifate of the West5 (ib. 1911) ; Meaken, B„ (The Moor¬ ish Empire5 (ib. 1899) ; and <-The Land of the Moors5 (ib. 1901); Morel, E. D., ˆMorocco in Pffiˆmacy5 (ib 1912) ; Playfair and Brown, Bibliography of Morocco5 (1892); Richet E E., * Voyages au Maroc5 (Paris 1909) ; Spils—

hurg, A. G., (The Toumaline Expedition5 (Lon¬ don 1906).

or MAKKAKESH, the second capital of the sultanate of Morocco (q.v.) on the *north side of an extensive and fertile plain 1,500 feet above sea-level, about 96 miles from Mogador, its port on the Atlan¬ tic, and 230 miles southwest of Fez, the chief capital of the empire. It has an excellent situation in sight of the Atlas Mountains, from which cool streams are always flowing and is noted for its genial and healthful climate. It commands the trade routes across the mountains but the city has long been hastening to decav' chiefly the result of war, plague and wretched government.* It is encircled by a lime and earth wall nearly six miles in circuit, between 20 and v>(J feet high, with square towers every 50

paces and pierced by nine gates, but all in a ruinous condition. A large portion of the immense space within the walls is occupied by ill-kept gardens, open areas, and «soks,55 or market¬ places ; the eight large cemeteries are outside the walls. In the bazaar and merchants' quarter a considerable local trade is carried on with the country people, the mountaineers from the neighboring Atlas and with Sus, Tafilet, Maza¬ gan, baffi and Mogador. Morocco possesses many mosques, one of which, the Kutubia, has a tower after the model of the Hassan in Rabat and the Giralda in Seville, 320 feet high On the south of the city stands the palace, now seldom occupied by the sultan, comprising a space of about 1,500 yards long by 600 yards

nea,5 j s Jews' quarter (El-Millah), a walled enclosure of about one and one-half miles in circuit, one-half of it nearly in

Galita I.

Lb real!

Carthagena

VKellbia fc-nzel Temiru

Qrcinacla]

[uelva

•Mata a. •iGoleti

Cape St. Vincent

3Iakga;

*ˆNobeL

Gulf of

Uammamei Herˆuˆa -

Csusa

‘ 90 /’MaiBOi) v Carree | -*sCp° ufarjif£

Sfcl#,

Cadiz

5«ˆTeaez

‘\01rrtf4;

led Zenat i.fj.

Ttfthtfjjun,

[on astir Tebulba

JVjdehdia

c f£a’.akla‘ \ˆCheba

Gibraltar ~

ˆreUta

)ali«C.C. Negro

3-Tetuanˆ

ieutia

Ain Yagout ?/®k.

C. Spartel. (NEUTRAd j TahaddartT, ArziJl 97? _HoumafP| Tchunmic/
i \ \

r

I.MKs;

EkDjewg;

7- ‘i£aP”7.V v-uuaact

?4rˆ = r°Tiaret

GoudjiU®

da A °ˆij_MdakoU Chellala,

*ekr-£/ Taguin’ ,vEi Guettar o Ain Guetif Vrˆit iniaˆJ

, A A/ ˆ

‘ _JlC Tcˆaaid > VcT 1 HˆˆTTemseni jv,hai

ˆbes I H;iee

lGilma;

iP*e r «

Ain BanioU Mdo\ikal

.Saadaltt-Sl;

W-Ai ,<

‘ x’ …

1 ffl f u.* SKmsse a ° /

ˆffanizaVˆ

.RXENAn keaab I.

rˆ-Ahgruf’

[Rokbet e] ‘ Ferkan

Trnria ˆ ° V°Franchettiˆ«W

iSaida, BadiSf’

WeasMp N«raiidjaˆjc l’aˆJoiner vTek|rtˆ*F ‘*’»<-!i-ˆ ‘S.ˆAJA HboTlai

. Onarbi

iddart

fDoura-Laki

iSaff.-aJ,,,;

Q’n%£ˆ.

<ˆKnaI8 r8.

:i Nadour

Negnnef—

a tytas Tolob \

2»Ay»i&» v*®

ˆwQi’dfref 1

i art out a

31 ell e <1! all

O . f’Jz oMamouna Sa leV ˆraTatelfel :

G«bes

.ounit Soul

Mainoura

|Tvadjerouna ,

W Nili°\^

Si%.Tiig:i j#’^Sssciˆ \ * ? q5ˆ1

%a < \ Zebbacha Berr%ˆ§>:

JSJ* 5 Sr ..A S.WˆK

TfaBuj

‘^Ain Sfissifa1

. V - \ CWiott el Jerjy

ˆ 3ir GettarX -ˆbott ˆbiˆr u rlana °<wSi V Br

“S’WacSA bwT ®:

-Megarin (Wells) *vj Saadana

A’ukc<’>-«]“•. Bu G

lemacin jiebaya Vo 0

El Areqi% ‘ ara ‘Br.‘Ech Ghadba I » bi i ° (Wells) gerrezof °| El\Ogla

°Bir en Nezla.

El Gborrafa\

ˆMarsurii

Meuedaˆ \Ta ’W ul alaa

f \ # Sˆittˆhjy(||.fi

idlina ; %

1 1 aVtmi arp id

Vi

‘. IJa-mmfir <

—/p iOTTlfer h o i

*■■ ‘.:-< a •-■ Mj.-h -

!Dar e Jlladium

, Retcjn li. ˆ

/ f

. Ch.dfruflalt fG’U,erarA% o

ˆ El’AJay ‘ iira°,

satatf’ ˆ ˆ loNufyaiM’, JdˆloMtrs’ e |j I rˆAinMnsi

-Azainor

I Sidi lbrahfm0 ‘

J > ar On Id Selepˆi? ::.a ,, I ˆalidjojˆ

I C. Can tin Saffi

-ufraTUˆedimSˆWXalMˆI : — f— JFathˆˆm* > ?,’

louna

m Ki im

f M

.cˆSubˆt

j - -

iSalaoutn’ i*-y ?- -• xJ

” ’-fffar Darsen % 1 W®(WeIt8) %■

‘an tin

.jfeenjNuj-‘

.Ghardaia’sSS

°E1 Djeˆaal

if0iaafr 388cu

j/Armi-f ‘

fSebkcL:Sajian’

ˆ Uni) el ffajaj ODaya%l Khala DUm et’Tjn

ˆ?;alut

＞emira

Arinnat

:i Meng’pbjiˆ

| Guetmiai -Agnlji uagoˆ

idoroˆwj

JSrgusa‘

0B01leiJladj

llpuissatl

- - ”” \Vureltt

\ HibouKhenissaˆS,

＜‘C Berghaojii rr» o ,, ,,

3« . „m el Hadjarjl

\Tj)aia～Korhid:yr el Kihal V\

Bir Monteser V .lioviba

Zenilet elUarcaa ˆ

Hi il/amoi

ˆ oTec ibˆpkbtari’ˆ

MflRAKESH tA

Mt-vr,, ,r - UijaM ˆ

Ghourˆ.

(Htili)

jRaknet el Hale)

:1 Biodb

Jm Belltairano

[V c ji.Bottlne

curtauti

+ ohour.M-atima

\ Tiaret” Gliourd Maatproerˆ

*- 4 El Merkh / ■

of a CUV

I es-Sohoudl ˆlyiˆames

-ty Rf’jit-AicheP

* u„ j

/, .1 Hi Tamesguid

ˆ tfif Djeme l * (PTeiis)

Jweim?

I aˆ;1aiBen

Ain Taiba

UezTa

(WellsY

2en-Addrouk

;m*ˆrib-in|

rHi Mokhanza

‘Meltegatˆel Ouidane Mouinoah

-~i＝ ” x. • T ° m -m ■-

＜4ˆ1,*? f|si Talel Tlerda

A.ghrad cl Berkinˆ 1 TEi Khali el Tessecra ,..5ixinl

y*(El Memeha]

Tablet

ben-AShman

Braliim

Mekkam Si

El Qolea V

Zenatai

fBillou Tall 0 (Wells)

Hi Oudjen ° (Wells)

lˆgpharaia j’fir’ Beni Semguin

> lanou

duafil

Abbes

Mimsina

Hi Inhalr

Tabelkosa

El Hamid

ersim

q _ Adghar ,

IS] Harib

Hachana

Jli-el-Heida

*\ InTagguino

dNˆ

TaKantas

[e)mk / ’Tlmimo’un

6 O jlat Tinejiouk (Wells)

Uled Said/ | Sfbka Gurarc

eJ > YaW Js zdini’at

Hi Monlleh Matallaliˆ insokki

T.l Biodho

o Sibicia

Share!

-led Raffia’s TinrharKft.

Tamlelt

Tamessl]

Tedjldkan

inijasun

Talaˆ

H)eldoon

;‘fe4ssinintf

B adjourn

Magara (Wells)

Aoule

Jlassl Mesmuerm,

Ufran

Bir el Hamalin

31a es Sifer®

o-Adsolth;

Tadjent

q(Wells)

•Inken

Sandt/Ms

ofBdey.en

Voufe! Bir

Itieha

l’. A am mad a A. Beth a

(erara

[arga

bermo

Tebalbalet

o (Wells)

lotM&nrcJiaf

% I

iamentlt

3)aya el Chadra1

Courtry of the A ijemor

Sneissa

Inlalen

Tichma

IV Sul ub

”“VsareV&

‘S4 ‘ ./-ill’ I/s ‘

Alne el Badjodj

SobbafA

\ (CcUaract)0ˆ

(0)0-, >

Tanout

Jnifek

fDoulJUen

ALGERIA, TUNIS

AND MOROCCO

oAkabli J

Taourirt

< tdl ˆret.ˆ.ˆiver

Idjeran

jBoufBernous o (Wells)

3‘j#’ •* fc’i ˆKbanguetˆ,’ ˆel Hadid |

Ifenik

fc. djpubari

Tlntoi

oIBr.Hadjadj

Sebka

\ KHassian m «»• Ij cˆTlaiebinTl-fˆ

■it

’ll Tarz Oulli

Djerdeiy » t / \

ZTilciijjin A

usf

0 Tthodaii™”

Tafessach A) a

Xsebkba d’AnmagHor|

mine

_Ahoiihax

Statute Miles, 60 = 1 Inch.

nGUat

da»|i

LZarza3#a ; j Wfs, Te<

O c! :Atch an

rt Sghiraˆ

Taouri

Kilometres, S>? = 1 Inch,

rmtefn

Hebirl

fed j el Imra]

Djanet’

Hm el Hadjadj if Wells)

Rand, McNally & Co, ’a Indexed Atlas of the World Map of Algeria, Tunl8, and Morocco. Copyright by Rand McNally A Co.

‘Tamadal

■A medji 1

/

-

•

■

,

…

ruins, thronged to suffocation and excessively filthy. There are several tanning and leather¬ dyeing establishments of considerable extent, though of late years European goods have been gradually displacing native manufactures. The population varies according to the presence or absence of the sultan, his court and army. Mo¬ rocco was founded in 1072 by the Emir Yusef ben Tachefyn, and reached the summit of its prosperity in the 13th century and was. famous as a seat of learning. In those days it is af¬ firmed to have contained more than 700,000 in¬ habitants. During several centuries it suffered from civil wars, and was sacked bv the rebel¬ lious Berbers more than once. Pop. estimated at from 50,000 to 80,000; Jews, according to one computation, totaling 17,000.

MOROCCO, or MAROQUIN, a fine kind of leather, prepared from the skin of the goat, originally brought from the Levant and the Barbary States, but now manufactured in most other countries. The colors most commonly communicated to it are red (by cochineal) and yellow (by the Avignon or yellow berries'). Kano, in British Nigeria, is an important centre of production. Split calf and sheepskins are used in the production of good imitation (French morocco) for binding, the peculiar graining of the genuine article being imitated by machinery See also Leather.

MORON, mo'ron, or MORON DE FRON-TI2RA, Spain, town in the province of Seville, situated at the foot of the Sierra de Moron on the Guadira and on the Ultrera-Moron Railway. It contains the ruins of an ancient Moorish castle of great strength; the French destroyed it on their evacuation in 1811. The industrial resources are limited chiefly to the production of olive oil and its red hematite mines and marble quarries. Pop. 17,099.

MORONG, Thomas, American botanist: b. Cahaba, Ala., 1827 ; d. 1894. He went in boy¬ hood to Massachusetts, and was graduated at Amherst College in 1848. After studying law he pursued a course in theology at Andover, leaving the seminary in 1853. He had early developed taste for botany, and in 1888 . he began a voyage which led

to valuable botanical collections made in explorations in Argentina, Chile and Paraguay. Returning in 1890, he became curator of the Columbia College her¬ barium. With N. L. Britton he published (An Enumeration of the Plants Collected by Dr. Thomas Morong in Paraguay, 1 888-90. >

M6RONG, mo'rong, Philippines, capital of the province of Rizal, Luzon, situated on the bay Lagoon (Laguna de Bay), 19 miles south¬ east of Manila Point.

MORONI, Giovanni Battista, jo-van'ne bat-tes-ta mo-ro'ne, Italian painter : b. _Bonda, near Albino, 1525; d. Bergamo, 5 Feb. .1578. He painted many altarpieces and historical com¬ positions, some of which are to be found in the Brera Library at Milan, others in villages of the province of Bergamo. He was, however, most especially celebrated for his portraits which are lifelike and arrest the attention by their startling projection and lucid color tone. Many of them are to be met with in Italy. There are three examples in the Berlin Museum and five in the London National Gallery, amongst

which is (The Tailor, > a masterpiece. There are also portraits in Boston, Philadelphia, Bal¬ timore and the Metropolitan Museum, New York.

MOROS, mo'roz, Mohammedan Malays in¬ habiting the southwestern part of the Philip¬ pines, chiefly the Sulu Archipelago and the islands of Palawan and Mindanao ; various sub¬ divisions include the Illanos, Samales, Joloanos, Maguendanaos, *etc.* Mohammedanism was propagated among the Moros in the 14th cen¬ tury by Malays from the island of Borneo, and is the prevailing religion. The Moro alphabet, which is still retained in writing, shows distinct traces of Arabic origin introduced by Arabic teachers of the doctrines of Islam. The Moros are governed by their local chiefs, dattos or sultans under a form of primitive feudalism.

They have no-system of laws as such. The penal passages of the Koran, taken in connec¬ tion with local customs, are referred to as the Titab; the local customs being mainly interpre¬ tations or even evasions of the Koran. Land is held in common, the dattos claiming sections as their own ; in some localities, a ((Master of the Field® allots plots of ground to individuals for permanent or temporary occupancy. Such real estate may not be alienated without permission having first been obtained from the authority granting residence thereon. Slavery and

po¬ lygamy prevail among them ; and they have for many years engaged in piracy and predatory expeditions against the neighboring Filipinos. They remained unconquered by the Spaniards until the era of modern firearms, and were still an inexhaustible source of trouble when the sovereignty of Spain terminated. Their religion and peculiar customs, as well as their spirit of independence, have made the govern¬ ment of their country one of the greatest prob¬ lems of the United States occupation of the Philippines. The Sulu Archipelago in 1901 was placed under military supervision and govern¬ ment in accordance with a treaty made by the United States representative and the sultan of Sulu, who has relinquished his authority (see Sulu). In 1903 a law.was passed bv the Philip¬ pine Commission providing government for the Moro country of Mindanao and adjacent islands. This act provides that the civil gov¬ ernor of the Philippine Islands shall appoint for the Moro Province a governor and other officials who were to form the legislative coun¬ cil, which was empowered to organize educa¬ tion, create a form of local government, estab¬ lish courts and enact laws providing for the abolition of slavery and the suppression of all slave hunting and slave trade. The Moros were informed in 1900 that slaves who sought the protection of the United States garrison would be considered free and their freedom enforced. The datto at Zamboanga in 1901 abolished slavery among his followers. In 1903 the legislative council of the Moro. Province passed a law prohibiting slave hunting in all the province, which law was immediately con¬ firmed by the Philippine Commission. The order for disarmament of the Moros, made in September 1911, is being systematically carried out, but led in 1913 to a rebellion which was not' quelled till they had been pursued and conquered in the mountain fastnesses of Bagsak in Northern Jolo. In 1914 the department of

Mindanao and Sulu was created. Pop. 154,706. See Philippine Islands.

MOROSAURUS, a genus of sauropodous dinosaurs (q.v.), with an extremely long and flexible neck and small body; found fossil in the Upper Jura beds of Wyoming and Colorado. It was related to

Brontosaurus.

MOROSINI, Andrea, an-dra'a m5-ro-se'- ne, Venetian historian: b. Venice, 13 Feb. 1558; d. there, 29 June 1618. He was educated in belles-lettres at Padua, and from 1583 was in the service of the state. In 1600 he entered the senate, later was three times elected to the Council of Ten and in 1598 was made official historiographer of the republic to continue the work of Paolo Paruta. He was given access to the state papers as far as 1594. His (History of Venice from 1521 to 1615, appeared in 1623 (2d ed., 1719), and has been esteemed for its accuracy and elegant Latinity.

MOROSINI, Francesco (called the Pelo—

ponnesiac), Venetian soldier: b. Venice, 1618; d. Napoli di Romagna, 6 Jan. 1694. He was a leading military commander of his day, and four times made generalissimo of Venetian forces. His career was almost a continuous struggle with the Turks. In 1656 he became governor of Candia, but in 1669 was compelled to surrender the island to Mehemet Koprili. His sobriquet was gained by later victories in the Morea. From 1688 he was doge of Venice. Daru ((Histoire de la Republique de Venise) 1819; 4th ed., 1853) calls him <(the last of the Venetians.®

MORPETH, England, market town in the municipal borough of the same name in North¬ umberland County and located on the Wansbeck. It has two Anglican and one Catholic church, a town-hall (dedicated 1869), a large prison, ruins of a castle, *etc.* It has an iron foundry, brewery, tanneries, etc., and does con¬ siderable trade in grain. Nearby are the ruins of the Newminster Abbey, dating from 1138. The neighboring village of Mitford also has interesting ruins of a 12th century castle and Bothal Castle dating from the 14th century is on the northern bank of the Wansbeck. North of Morpeth is a 15th century <(peel® tower. Its population in 1911 was 7,433.

MORPHEUS, mor'fus, in classical mythol¬ ogy a minister of the god Sommus, sometimes called the god of sleep. He is generally repre¬ sented as a slumbering child, of great corpu¬ lence, wearing wings, and holding a vase in one hand, and in the other some poppies.

MORPHINE, an alkaloid occurring in opium, and constituting from 3 to 20 per cent of the crude drug depending upon where it originated. It has the chemical formula GiHtfNOa + H20. In the crude opium mor¬ phine exists in the form of two salts — the meconate and sulphate of morphia; and as both of these salts are soluble in water

their recov¬ ery from the opium is of the simplest. In the preparation of morphine the opium is digested with water at 100° F., common chalk is added, and the solution is evaporated to a small bulk. Calcium chloride in slight excess is then added, to precipitate the meconic acid that the extract contains, and after filtration the solution is

evaporated. Calcium meconate separates out first, after which crystals of the hydrochlorides of morphine and codeine are deposited. The latter crystals are redissolved in water and decomposed with ammonia, the morphine with a little codeine being thereby precipitated while most of the codeine remains in solution. The codeine is separated from the morphine by dis¬ solving it with ether. Morphine dissolves in 10,000 parts of cold water, and in 500 parts of boiling water. It is also readily soluble in hot alcohol, but is insoluble in ether, benzene and chloroform. It is bitter and very poisonous, and crystallizes in small rhombic prisms, or needle-like crystals. Morphine acts as a base toward acids, and numerous salts of the alka¬ loid are known. In medicine, morphine is usu¬ ally administered in the form of the sulphate or some other salt. When morphine is heated with hydrochloric acid in a closed tube, for two or three hours at a temperature of about 290° F. it loses a molecule of water and it be¬ comes converted into another alkaloid which has the formula C17H17NO2, and is known as ((apomorphine.® Apomorphine is also poison¬ ous. Its salts, when administered in small doses, however, do not act as a narcotic, but as a powerful emetic. Special attention has been paid, by chemists, to the positive identifi¬ cation of morphine, owing to the frequent im¬ portance of such identification in medical juris¬ prudence. The subject is full of technical difficulties, especially when (as is commonly the case) morphine, if present, is mingled with large quantities of animal tissue, from which it must be separated before the tests are ap¬ plied. Many such tests are known, of which the following are the most familiar: (1) A neutral solution of a ferric salt, when added to a neutral solution of a morphine salt, gives a blue color which is destroyed by heat, by alcohol and by acids. (2) If iodic acid and starch are added to a weak solution of a mor¬ phine salt, and a weak solution of ammonia is floated upon the mixture, a brown ring below a blue ring will be formed at the bounding surface that separates the liquids from each other. Consult Autenrieth, W. (Warren's trans¬ lation), laboratory Manual for the Detection of Poisons and Powerful Drugs? (Philadelphia

1915).

t MORPHOLOGY, the division of biological science which deals with the form of parts and organs of animals and plants, from Gr. morphe, form, and logos , doctrine, the term being equiv¬ alent to <(science of form.® The investigation of the structure of living organisms is the only true method by which we may become ac¬ quainted with their relations to each other, singly or in groups. Morphology thus lies at the foundation of physiology, and all true sys¬ tems of classification and explanations of serial development. Goethe was the inventor of the term and was the first to direct attention to relations in structure presented by living beings. See Plants, Anatomy of; Plants, Morpho¬ logical Evolution of.

MORPHY, mor'fi, Paul Charles, American

chess-player: b. New Orleans, La., 22 June 1837 ; d. there, 10 July 1884. He showed his fondness for chess at a very early age, and at 12 had defeated many of the local amateurs. At the College of South Carolina he studied

law for several yearst occasionally playing a game. In 1857 at the first American chess con¬ gress held in New York, he had no difficulty in defeating his strongest opponents. During the next year, in England, he successfully met such players as Bird, Boden and Lowenthal, and astonished the world of chess by playing as many as eight games simultaneously and with¬ out the board. His playing in Paris, where he won five .games out of eight against Harrwitz, and exhibited his blindfold skill, was equally surprising. In 1859 he returned to the United States and here met the famous German player Anderssen, winning 7 out of 11 games. Being now admitted to the bar, Morphy began to practise law in his native city; but his mental powers had been so impaired by the strain of his blindfold chess-playing that he not only gave that up but relinquished chess entirely, and a little later abandoned all intellectual work. Morphy's skill at chess appeared to partake of the quality of genius. His brilliant achieve¬ ments were not

the result of long or deep de¬ liberation, yet displayed all the elements usually observed when mental strength and quickness are sustained by profound study. Consult Lowenthal, (Morphy's Games of Chess > (1860).

MORRELL, Imogene Robinson, American artist : b. Attleboro, Mass. ; d. Philadelphia, 22 Nov. 1908. She was married to Abram Morrell in 1869. She studied art in the United States and Europe and was a pupil of Adolf Schrodter at Diisseldorf and of Couture at Paris (1864). In 1874 she returned to America, opened a studio at Washington as a portrait and his¬ torical painter, and there established and be¬ came first president of the Washington National Academy of Fine Arts (1879). Some of the more notable paintings are (The First Battle of the Puritans) ; (Washington Welcoming the Puritan Trains at Newburgh, N. YP ; (Portrait of General John A. DixP

MORRILL, mor'il, Anson Peaslee, Amer-can politician : b. Belgrade, Maine, 10 June 1803 ; d. Augusta, Maine, 4 July 1887. He at first engaged in business in his native town, then in 1833 was sent to the State legislature; was sheriff of Somerset County 1839ˆ10, and in 1850 land agent. In 1853 he was an unsuc¬ cessful candidate for governor on the Prohi¬ bition and Free-Soil tickets, but the following year he was elected as the first Republican governor of Maine, and later was a delegate to the convention which nominated Fremont. In 1860 he was elected to Congress, but de¬ clined a re-election.

MORRILL, Justin Smith, American sen¬ ator: b. Strafford, Vt., 14 April 1810; d. Wash¬ ington, D. C., 28 Dec. 1898. He received a good primary and secondary education, was a merchant and then a farmer; was first elected to the House of Representatives in 1854. In 1867 was transferred to the Senate, in which he was long chairman of the committee of finance. With his 12 years in the lower house and 31 in the upper, he was more closely con¬ nected with Congress than any other man of his time, and was styled <(The Father of the Senate.® His college bill of 1858, for the cre¬ ation of seats of learning in newly-settled States, has, with supplemental legislation, re¬ sulted in the erection of some 70 colleges. He introduced the war revenue tariff of 1861,

commonly called the Morrill tariff, and during his later years consistently opposed the re¬ monetization of silver. Senator Morrill wrote (The Self-Consciousness of Noted Persons) (1886). Consult G. W. Atherton, (The Legis¬ lative Career of Justin S. MorrilP (Washing¬

ton 1901).

MORRILL, Lot Myrick, American pol¬ itician : b. Belgrade, Maine, 3 May 1813 ; d. Augusta, Maine, 10 Jan. 1883. He was educated at Waterville College (now Colby University), studied law and was admitted to the bar in 1839, when he went to Augusta and established a law practice. He took an active part in poli¬ tics, in 1853 was elected to the legislature, and in 1856 was chosen president of the senate. He was governor of his State 1858-60, and in the latter year was elected to the United States Senate, where he proved himself an indefati¬ gable worker. He favored the resumption of specie payment and was an authority on finan¬ cial, naval and Indian affairs. In 1876 he retired from the Senate to become Secretary of the Treasury under President Grant, and dur¬ ing his administration of that office constantly urged the return to specie payment. He de¬ clined an appointment to a foreign mission under President Hayes, and in 1887 became col¬ lector of customs at Portland, Maine, in which office he died.

MORRILLTON, Ark., capital town of the county of Conway, 50 miles by rail from Little Rock. It has manufactures of cottonseed oil, furniture, woolens, lumber, etc., and has a fair trade-in cotton and cattle. The town owns its electric light and waterworks, and in 1920 had a population of 3,010.

MORRIS, Benjamin Wistar, American Protestant Episcopal bishop: b. Wellsborough, Pa., 30 May 1819; d. Portland, Ore., 8 April 1906. He was graduated from the General Theological Seminary in 1846 and held succes¬ sive rectorates in Sunbury, Manayunk and Ger¬ mantown, Pa. He was consecrated missionary bishop of Oregon and Washington in December 1868, and on the division of the diocese in 1880, became bishop of Oregon. He has published (Presbyterian, Baptist and Methodist Testi¬ mony to Confirmation (1860).

MORRIS, Charles, English song writer: b. 1745; d. near Dorking, Surrey, 11 July 1838. In 1764 he entered the 17th foot, with which he served in America, later exchanged into the Irish Dragoons and then into the 2d life-guards, in 1785 was made bard of the Beefsteak Soci¬ ety, and before its gatherings sang many of his wittiest efforts. He was a boon companion and associate of Fox and the Prince Regent. His humor and vivacity led Curran to say, <(Die when you will, Charles, you will die in your youth.® He wrote hundreds of songs, many being political ditties for the Whigs ; and a post¬ humous volume, (Lyra Urbanica) (1840) col¬ lected them. His (A Reason Fair to Fill my Glass) was praised by Moore and set to music by Charles Dibdin.

MORRIS, Charles, American naval officer: b. Woodstock, Conn., 26 July 1784; d. 27 Jan. 1856. Entering the navy in 1799, he partici¬ pated in the war with Tripoli, was an actor in the recapture of the Philadelphia, in the harbor of Tripoli (1804), being the first to gain her

deck when she was boarded. At the outbreak of the War of 1812 he was serving as executive officer of the Constitution ; he was wounded in the engagement of Old Ironsides with the Guerriere (August 1812) ; and afterward suc¬ cessfully commanded the John Adams until, being blockaded by a British squadron in Pe¬ nobscot River, he was compelled to destroy his ship to save her from being taken by the enemy. In the war with Algiers (1815) he commanded the Congress, and it was he who, in the Bran¬ dywine, carried Lafayette home to France (1825). After serving for some years as naval commissioner and as supervisor of the United States Naval Academy he became chief of the bureau of ordnance and hydrography, which position he held till the time of his death. Consult his Autobiography5 (1880).

MORRIS, Charles, American author: b. Chester, Pa., 1 Oct. 1833. He was educated in Chester, engaged for a short period in teach¬ ing; for a considerable time was manager in a manufacturing concern ; and since 1878 has devoted himself to literary work. His publica¬ tions include A Manual of Classical Literature) ; (The Aryan Race) ; Civilization, an Historical Review of its Elements5 ; (Historical Tales) (12 vols.) ; (The War with Spaing <Our Island Empire) ; (Man and his Ancestor5 ;

(Famous Men and Great Events of the Nine¬ teenth Century) ; (Home Life in All Lands) ; a series of histories of the United States;

(History of the World5 and (History of Penn¬ sylvania,5 for school purposes; (The Old South and the New5; <rThe Story of Mexico5; ˆHeroes of America5 (4 vols.) ; (The Nations of Eu¬ rope5 ; (Famous Days and Deeds in Belgium and Holland,5 and various others. He also compiled (Half Hours with the Best Authors5 (18 vols.) ; elocution,

Oratory and Entertain¬ ment5 (4 vols.) ; (The Famous Orators of the World5 ; (Handy Dictionary of Biography,5

etc. He edited (Winston's Universal Diction¬ ary5 ; (The International Dictionary5 ; ˆWin¬ ston's Cumulative Encyclopedia5 ; and did edi¬ torial work on <Lippincott's Biographical Dic¬ tionary,5 and Chambers5 ; (Twentieth Cen¬ tury,5 and other encyclopedias.

MORRIS, Clara, American actress : b. To¬ ronto, Canada, 1849. After early study in Cleve¬ land, she became leading lady in Wood's Theatre, Cincinnati, Ohio, and in the winter of 1869-70 joined Augustin Daly's Fifth Avenue Company, New York. She at once achieved success in emotional roles and afterward made many tours throughout the United States.. Her lead¬ ing roles include Camille5 ; Alixe in the Countess de Sommerive5 ; (Mercy Merrick5; (Miss Multon5 ; Cady Macbeth5 ; (Leah the For¬ saken5 ; and Cora in C'Article 47.5 After her retirement from the stage she wrote much for periodicals and published in bookform (A Silent Singer5 (1899); <My Little Jim Crow5 (1900) ; A Pasteboard Crown,5 fiction (1902) ; (Stage Confidences5 (1902); Che Trouble Woman5 (1904) ; Che Life of a Star5 (1906) ; Ceft in Charge5 (1907); (New.East Lynne5 (1908) ; (Dressing Room Receptions5 (1911). She was married to F. C. Harriott in 1874. In her later years she was afflicted with blindness.

MORRIS, Sir Daniel, British colonial ex¬ pert: b. Loughor, Glamorgan, 26 May 1844. He was educated at Cheltenham, at the South Ken¬

sington Royal College of Science and at Trin¬ ity College, Dublin, where he received high honors. He was assistant director of the Royal Botanic Gardens of Ceylon in 1877 ; investi¬ gated and checked the coffee-leaf disease; be¬ came director of the Botanic Department of Jamaica in 1879; was commissioner in the West Indian Imperial Department 1898-1908 ; a member of the Canadian and West Indian Trade Commission 1909-10; and was scientific adviser in tropical agriculture to the Colonial Office 1908-13. He was created K.C.M.G. in 1903. Among his publications are (Cacao: How to Grow and How to Cure it5 (1882) ; Agricultural Resources of Saint Helena5 (1884) ; (The Vegetable Resources of the West Indies5 (1888) ; (Sisal Industry of the Baha¬ mas5 (1896) ; and (Cantor Lectures on Plants yielding Indiarubber5 (1898).

MORRIS, Edward Joy, American author: b. Philadelphia, Pa., 16 July 1815; d. there, 31 Dec. 1881. He was graduated from Harvard in 1836

and was admitted to the bar in 1842. He was a member of the Pennsylvania legislature in 1841-43 and of Congress in 1843-45, and in 1850 was appointed to a mission in Naples where he remained four years. He was again in Congress as a representative of Pennsyl¬ vania in 1858-61, and from 1861-70 was Min¬ ister to Turkey. He published (Notes of a Tour through Turkey5 (1842) and numerous translations.

MORRIS, Edward Parmelee, American

Latinist, best known as a Plautine scholar : b. Auburn, N. Y., 1853. He was graduated at Yale in 1874, studied at Leipzig and Jena, was pro¬ fessor of Latin at Williams 1885-91, and since the latter date at Yale, and edited the following plays of Plautus: ˆostellaria,5 (Pseudolus5 (1890), and (Captives and Trinummus5 (1898) ; Horace's (Satires5 (1909) and (Epistles5 (1911) ; (Sentence-Questions in Plautus and Terence5 ; (The Subjunctive in Plautus5 and Principles and Methods in Syntax5 (1902).

MORRIS, George Perry, American jour¬ nalist: b. Montclair, N. J., 18 Feb. 1864. He was educated at Rutgers College and Johns Hopkins University, and in 1891 was associate editor of the Boston Congregationalist. In 1888-90 he was on the editorial staff of the New York Mail and Express, on the Boston Congre¬ gationalist in 1891-1907 and on the staff of the Boston Herald 1907-11. Since 1911 he has been on the staff of the Christian Science Monitor. He has published (The Norwegian Company System5 (1894) ; (Historic Towns of New Eng¬ land5 (1898). He is a contributor to various magazines, especially character studies of living notables in Review of Reviews.

MORRIS, George Pope, American jour¬ nalist and poet : b. Philadelphia, 10 Oct. 1802 ; d. New York, 6 July 1864. With Samuel Wood-worth (q.v.), in 1823, he founded the New York Mirror, a weekly journal of literature, after¬ ward published as the New Mirror and the Evening Mirror, in which many of the early waitings of Bryant, Poe, Halleck, Willis and other American authors first appeared. In 1845 Morris established the National Press, which in the following year became the Home Journal, and which, with the assistance of N. P. Willis (q.v.), he continued to edit almost to the end

of his life. _ He wrote <BriarclifT,) a popular drama (1825) and edited (American Melodies) and (with Willis) (The Prose and Poetry of America5 (1845). His <Poems) (final collec¬ tion, 1860) included ((Woodman, Spare that Tree" ; ((A Long Time Ago" ; ((My Mother's Bible" ; and other well-known pieces.

MORRIS, George Upham, American naval officer: b. Massachusetts, 3 June 1830; d. Jordan Alum Springs, Va., 15 Aug. 1875. He was ap¬ pointed midshipman in the navy in 1846 and received steady promotion. In 1862 he was made lieutenant-commander and assigned to the Cumberland, and was in temporary com¬ mand of her when she was attacked by the Merrimac in Hampton Roads. The gallant seamanship displayed by Morris on this occa¬ sion evoked the admiration of the country. He refused to leave the ship and stood at his post as she went down, but was rescued by some of his men. He afterward had command of the gunboat Port Royal and was engaged on the James River, at Fort Darling, and later at Fort Powell and at Grant's Pass. He was promoted commander in 1866 and retired in ill-health in

1874.

MORRIS, Gouverneur, American states¬ man: b. Morrisania, N. Y., 31 Jan. 1752; d. there, 6 Nov. 1816. He was graduated in 1768 from King's College (now Columbia Univer¬ sity) ; after study of the law was licensed in 1771 to practise as an attorney; did excellently well at the bar ; and during the earlier difficul¬ ties between Great Britain and the American colonies maintained a conservative attitude and was eager to effect a compromise. Finally, however, he identified himself with the patriot cause and was elected from Westchester County to the provincial congress of New York (1775). In this assembly he became the leader of the patriotic party and made an able speech favoring the adoption of the recommendation of the Continental Congress that the colonies establish new governments. A delegate to the constitutional convention of New York, he was chosen to the committees for drafting a plan for the constitution — in which Livingston and Jay were also prominent — and for establishing a State fund. In 1777-80 he was a member of the Continental Congress, and almost immedi¬ ately upon taking his seat was appointed one of a committee of five to visit Valley Forge and examine the condition of the troops. Early in 1779 he was made chairman of the important committee for receiving

communications from our ministers abroad, and from the envoy of France. In this capacity he drew up the draft of instructions to the ministers which was adopted by Congress and formed the basis of the Treaty of Peace with Great Britain. In February 1780 he began the publication in the Pennsylvania Packet of a series of essays on American finances, in which he endeavored to show the wisdom of the colonists submitting to a reasonable taxation and outlined a scheme for such assessment. These essays influenced his appointment in 1781 as assistant financier to Robert Morris, a post he successfully filled until 1785. He was really the founder of the national coinage, though his plan was later mod¬ ified by Jefferson and Hamilton; he introduced the decimal notation and devised the word <(cent" to indicate one of the lesser coins. In

1787 he was a delegate to the constitutional convention, and there he advocated a strongly centralized government, and finally revised the draft of the instrument. He was in France in 1788-91 for the transaction of private business, witnessing the stirring events of the French Revolution, and of which he kept a diary, and in 1791 was appointed by Washington a con¬ fidential agent to treat with Great Britain re¬ garding certain unfulfilled articles of the treaty of peace. In 1792-94 he was minister to France, and in 1800-03 was United States Senator, fill¬ ing a vacancy. He supported the Louisiana Purchase, but opposed the abolition of direct taxes and of the judiciary system. In 1810-13 he was chairman of the Erie canal commission; in the entire plan for this waterway, which he wished to make large enough for ships, he was a leader. He was keen in intellect, an excellent orator and rendered notable services to America. During the War of 1812 his ultra-Federalist views led him into positions that were extravagant and unwise. He pronounced funeral orations on Washington, Hamilton and Clinton ; published pamphlets and addresses ; and latterly contributed to newspapers political satires in both prose and verse. Consult Sparks, (Life5 (1832) ; Roosevelt, (Life) (1888: Ameri¬ can Statesmen5 series) ; Morris, A. C., (Diary and Letters of Gouverneur Morris) (1888).

MORRIS, Gouverneur, American novelist, great-grandson of the preceding: b. New York, 7 Feb. 1876. He was graduated from Yale in 1898 and has published A Bunch of Grapes) (1897); (Tom Beauling) (1901); Aladdin O'Brien5 (1902) ; (The Pagan'a Progress) (1904); (The Footprint and Other Stories) (1908) ; (Putting on the Screws5 (1909) ;

(Spread Eagle, and Other Stories) (1910) ; (The Voice in the Rice5

(1910) ; (It and Other Stories) (1912) ; (If You Touch Them They Vanish5 (1913); (The Incandescent Lily and Other Stories) (1914); (Seven Darlings5; (When My Ship Comes In) (1915) ; (We Three > (1916).

MORRIS, Harrison Smith, American au¬ thor: b. Philadelphia, 4 Oct. 1856. He was edu¬ cated in the public and private schools, and early began to do literary work. From January 1899 to 1905 he was editor of Lippincotfs Maga¬ zine. He is versed in the history of art, and was managing director of the Pennsylvania Acad¬ emy of Fine Arts, in Philadelphia, from 1893 to 1905. He has written A Duet in Lyrics, 5 poems, with J. A. Henry (1883) ; (Tales from Ten Poets5 (1893) ; (Madonna and Other Poems) (1894) ; a continuation of Lamb's (Tales from Shakespeare5 (1893) ; (Lyrics and Landscapes5 (1908) ; a (Life of William T. Richards5 (1912) and has edited (In the Yule Log Glow5 (1892) and (Where Meadows Meet the Sea5 (1892). He was president of Wharton Steel Company (1909-17), and has been chairman of the committee on ways and means of the National Academy of Design, New York; was commissioner general of the United States of America to Roman Exposition of 1911 and decorated with Grand Cordon of Crown of Italy. He is a member and former vice-president of the National Institute of Arts and Letters; member of the American Philosophical Society and in 1915 became president Contem¬ porary Club, Philadelphia.

MORRIS, Sir Henry, English physician: b. Petworth, Sussex, 7 Jan. 1844. He was educated at Epsom College and University College and studied medicine and surgery at Guy's Hospital, London. Established in practice, he delivered the Cavendish lecture (1893), Hunterain lectures (1898) and was Bradshaw lecturer at the Royal College of Surgeons (1903), since which he has dis¬ tinguished himself frequently on the lecture platform. He was former surgeon and lecturer in anatomy and surgery at Middlesex Hospital Medical College, examiner in surgery at Uni¬ versity of London and in anatomy at University of Durham. He was for six years chairman of

the Court of Examiners of Royal College of Surgeons, president of the Royal Society of Medicine (1910-12) and Royal College of Surgeons (1906-09). He was created baronet 1909. Among his literary works are (Anatomy of the Joints of Man' (1879) ; Surgical Dis¬ eases of the Kidney and Ureter' (1885) ; gynecology' (1891) ; (Injuries and Disease of the Genital and Urinary Organs' (1895) ; ^Treatise on Human Anatomy' (1898; 4th ed., 1907). His (Treatment of Inoperable Cancer' (1902) and Suggestion in Relation to the Treatment of Disease' (1910); {Looking Back; Christian Science Refuted' (1909), all contrib¬ uted to his reputation.

MORRIS, Henry W., American naval officer: b. New York, 1806; d. there, 14 Aug. 1863. He entered the navy in 1819 and in 1828 was made lieutenant. He was on duty in New York and various other stations from 1839 until 1855, when he was fleet-captain in the Mediter¬ ranean under Commodore Stringham. In 1861 he superintended the completion of the Pensa¬ cola, and in 1862 took command of her, suc¬ cessfully passed the Confederate fortifications on the Potomac and took a distinguished part in the battles at Fort Jackson, Fort Saint Philip and Chalmette. He guarded New Orleans after its capture, but failing health necessitated his return to the North, where he soon after died. He was promoted commodore in 1862.

MORRIS, John, English Jesuit: b. Ootaca-mund, India, 1826; d. 1893. He studied (1845) at Trinity College, Cambridge, became (1846) a Roman Catholic, was ordained (1849) to the English mission, and became vice-rector of the English College, Rome (1852-55). Returning to England he was appointed secretary to Cardi¬ nal Wiseman and to his successor Cardinal Manning. He entered the Society of Jesus in 1867, was rector of Saint Ignatius College, Malta (1877-78), was made professor of canon law and church history at Saint Bruno's College, Saint Asaph (1879) and was rector at Ro-hampton 1880-86. He wrote (Condition of Catholics under James' (1871) ; (The Troubles of our Catholic Forefathers' (1875) ; Car¬ dinal Wiseman's Last Illness' (1871); (Life and Martyrdom of Saint Thomas Becket' (2d ed. 1885). Consult Pallen, J. H., (Life and Letters of Father John Morris' (London 1896).

MORRIS, John Gottlieb, American Lu¬ theran clergyman: b. New York, 14 Nov. 1803; d. Lutherville, Md., 10 Oct. 1895. He was grad¬ uated from Dickenson College in 1823 and stud¬ ied theology at the Princeton and Gettysburg seminaries, receiving his license to preach in 1826. He founded the first English Lutheran

church of Baltimore and was in charge of it from 1827-60, after which he held various im¬ portant charges. He was chiefly instrumental in the founding of the College for Women in Lu¬ therville and of the town. From 1834 until his death he was lecturer at Pennsylvania College, and he also lectured in the Smithsonian Insti¬ tution at Washington. He was prominently connected with scientific and religious societies, and founded the Lutheran Observer in 1831 which he edited until 1833. He was librarian of the Peabody Institute at Baltimore, 1860-64. Among his many publications are Catechu¬ men's and Communicant's Companion' (1831) ; (Life of John Arndt' (1853); (Fifty Years in the Lutheran Ministry' (1878); (Memoirs of the Stork Family' (1886), *etc.*

MORRIS, Lewis, American statesman: b. New York, 1671; d. Kingsbury, N. J., 21 May 1746. He practised . law in New York, was judge of the Superior Court of New York and New Jersey in 1692, became one of the gov¬ ernor's council and a member of the assembly, and drew up and presented to Queen Anne the complaint against Governor Cornbury formu¬ lated by the assembly. From 1710 —38 he was chief-justice of New York and New Jersey, in 1731 was acting governor of New Jersey, in 1738 was prominent in effecting the separation of New Jersey from New York, and from 1738 until his death was governor of New Jersey.

MORRIS, Lewis, American patriot, one of the signers of the Declaration of Independence: b. Morrisania, Westchester County, N. Y., 1726; d. there, 22 Jan. 1798. After being graduated at Yale College in 1746 he engaged in farming on a very extensive scale on his paternal estate at Morrisania. He took strong ground against the act of Parliament compelling the inhabit¬ ants of the province of New York to furnish with supplies the foreign troops quartered upon them. He was elected to the Congress of 1775, was a member of the committee to devise means for supplying the colonies with muni¬ tions of war, and after the close ot the session was sent west to detach the Indians from the British. In 1776 he resumed his seat in Con¬ gress, and signed the Declaration of Independ¬ ence, although his estate was at that time in the hands of the enemy. As a consequence his manor was laid waste and his family expelled. In 1777 he was succeeded in Congress by Gouverneur Morris, his half brother, but afterward served in the State legislature. The latter part of his life was spent at Morrisania. He was one of the boldest and most zealous promoters of the Revolution.

MORRIS, Sir Lewis, Welsh poet: b. Car¬ marthen, Wales, 23 Jan. 1833; d. London, Eng¬ land, 12 Nov. 1907. He was graduated from Jesus College at Oxford, studied law and was admitted to the bar of Lincoln's ■ Inn in 1861, practising until 1881. Was deputy chancellor of University of Wales and prominently asso¬ ciated with the cause of education. In 1895 he was knighted. His verse was fluent, the utter¬ ance of simple truths in unaffected language, and it was very popular, but deficient in strength, his (Epic of Hades' (1876-77) going through many editions. Other volumes of his verse are (Songs of Two Worlds' (1871-75); (Gwen: a Drama in Monologue' (1879); (The Ode of Life' (1880) ; (Songs Unsung' (1883) ;

(A Vision of Saints> (1890); (Harvest Tide' (1901) ; (The Life and Death of Leo the Armenian) (1904); (The New Rambler: From Desk to Platform' (1905), *etc.*

MORRIS, Mary Philipse, American Tory: b. Philipse Manor, New York, 1736; d. York, England, 1825. She was one of the famous Philipse family, daughter of the second lord of the Manor, Frederick Philipse. A beautiful brunette, she is the original of Cooper's heroine in (The Spy,' and was long said to be one of George Washington's loves; but the story that she rejected him is untrue. Two years after meeting Washington she married George Morris (1758), an English officer, with whom she lived in what was afterward Washington's head¬ quarters and the Jumel house. Her property was confiscated at the opening of the Revolu¬ tion and she went to England. Her surviving children, being free from attaint according to the ruling of the English Attorney-General, sold their rights to John Jacob Astor for $100,000, and the British government paid them more for their losses.

MORRIS, Robert, American financier and statesman, a signer of the Declaration of Inde¬ pendence : b. Liverpool, England, 31 Jan. 1734; d. Philadelphia, 8 May 1806. He came to the colonies about 1747 and entered at Philadelphia the counting-room of Charles Willing, mer¬ chant; in 1754 formed a partnership with Thomas Willing maintained until 1793; acquired a very considerable fortune for the America of

that time; and despite his strong loyalty to England, opposed the Stamp Act and signed the non-importation agreement of 1765. In Octo¬ ber 1775 he was elected to the provincial as¬ sembly, and in 1776-78 was a member of the Continental Congress. On 2 July 1776 he voted against the Declaration of Independence and on 4 July absented himself; but on 2 August he was one of the signers. When hostilities be¬ gan his services became of increasing value. When Congress fled from Philadelphia to Balti¬ more on 12 Dec. 1776, Morris was left in charge of its affairs, and when it reassembled at Baltimore on 20 December was made with George Clymer of Pennsylvania and George Walton of Georgia a committee for the execu¬ tion of Continental business. Morris did all that was done. Most of the business of the colonies during December and January was transacted by him ; he prepared American ships for sea, assumed charge of incoming freights and supplied Washington with money. On 20 Feb. 1781 he was elected superintendent of finance. He found the treasury in a disordered state through a vastly depreciated paper cur¬ rency, and at the lowest point in the fortunes of the Continent?1 army borrowed money on his own credit and was the instrument in the difficult task of financing the war. He pre¬ sented to Congress a plan for the organization of the Bank of North America, accepted 28 May; and himself subscribing $39,200 worth of shares. The bank was incorporated 31 Dec. 1781 and began operation 7 Jan. 1782. Morris resigned January 1783, but on request did not retire until 1 Nov. 1784. He was a member of the Pennsylvania assembly in 1776-78. 1778-79, 1780-81, 1 785—87. In 1787 he was a member of the convention that framed the United States Constitution. He declined the Secretaryship of

the Treasury, and was United States Senator from Pennslyvania in 1783-95. With James Greenleaf and against Washington's advice, he entered land speculation, held vast territories, especially in the western half of New York State in anticipation of immigration after the war, and purchased in the new city of Wash¬ ington 6,000 lots at $80 each, and agreeing to build yearly 20 brick houses. Largely through the defaulting of his partner he was compelled to make an assignment, and was imprisoned for debt at Philadelphia from 19 Feb. 1798 to 26 Aug. 1801. The influence of his credit, his ability in raising loans and his financial skill were of the utmost importance to the strug¬ gling cause of the Revolution; and it is gen¬ erally admitted that he was a momentous force in Washington's administration and fully earned the title of the ((Financier of the Revo¬ lution." Consult Sparks, (Diplomatical Corre¬ spondence of the Revolution' (1829-30) ;

the (Life' by Sumner (1892) in the (Makers of America' series ; Rolles, financial Administra¬ tion of Robert Morris' (1878), and Oberholtzer, (Robert Morris: Patriot and Financier'

(1903).

MORRIS, Thomas, American statesman: b. Augusta County, Va., 3 Jan. 1776; d. Bethel, Ohio, 7 Dec. 1844. He removed in 1795 to Columbia, Ohio, and was employed by the Rev. John Smith, the first senator from Ohio. He fixed his residence in 1800 in Clermont County, studied law, was admitted to the bar, was a member of the State legislature from 1806 to 1830, was a judge of the State Supreme Court (1815-21), and in 1832 was elected to the United States Senate as a Democrat, where he distinguished. himself as an opponent of slavery and was engaged in important debates with Calhoun and Clay in defense of the right of petition and of the duty of the general govern¬ ment to discourage slavery. His anti-slavery sentiments rendered him distasteful to the Democratic party, by which he had been elected, and he permanently retired in March 1839. In 1844 he was nominated for Vice-President by the Buffalo convention of the Liberty party, on the ticket with J. G. Birney (q.v.) for Presi¬ dent. Consult the (Life' by F. B. Morris

(1856).

MORRIS, William, English poet and artist: b. Walthamstow, Essex, 24 March 1834; d. Ham¬ mersmith, London, 3 Oct. 1896. He was edu¬ cated at Marlborough College and Exeter Col¬ lege, Oxford, where he began a lifelong friend¬ ship with Edward Burine-Jones. Both were at¬ tracted by the Anglo-Catholic revival, and in¬ tended to enter the Anglican priesthood, but early abandoned that resolve, and was for some nine months a pupil in the office of the noted architect, George Edmund Street. In 1856 he founded The Oxford and Cambridge Maga¬ zine, to which he contributed often, and which he published at his own expense for the year it was issued. Two years later (1858) appeared (The Defense of Guinevere and Other Poems,' in the pages of which the temper of the Middle Ages may be said to find its most accurate mod¬ ern interpretation. In 1867 he published the (Life and Death of Jason,' an epic of 17 cantos in heroic couplets, which showed him to be a teller of stories par excellence. By this time he had definitely entered upon his career

of weaver anew of old tales from classic or mediaeval sources, and the next year (1868) ap¬ peared the first volume of (The Earthly Para¬ disê a series of stories retold from classical and mediaeval originals, but with a mediaeval setting. A second and third volume followed in 1869 and 1870, the entire work comprising 24 tales with the addition of interludes and pre¬ ludes and 12 lyrics of the months. In (The Earthly Paradise,* as in the <Jason,) Morris took Chaucer for his master as well in the structure of his verse as in what may be termed the processional nature of his descriptive pas¬ sages. Three verse forms are employed by him, the seven-lined decasyllabic stanza known as the Chaucerian heptastich, the four-foot couplet and the heroic couplet. (The Earthly Paradise) includes some 40,000 lines, but when once the reader has fallen under the poet's sway his leisurely manner will not be found wearisome. In (The Lovers of Gudrun,* one of the tales of (The Earthly Paradise, *Morris had already turned to Iceland for a theme and in (The Story of Sigurd_the Volsung and the Fall of the Niblungs) (1876) he returned to Icelandic myth for his subject. The poet regarded this poem as his masterpiece and in the opinion of not a few critics it ranks as almost the greatest, if not the greatest epic of the 19th century. In his hands the ancient myth becomes alive and throbs with all the intensity of primeval pas¬ sion. Besides these works Morris published also in verse (Love is Enough, or the Freeing of Pharamond* (1872) ; (The TEneids of Virgil done into English verse) (1875), in which the metre adopted is that of Chapman's Homer; (The Odyssey of Homer done into English verse) (1887); (The Dream of. John BalP (1888), and (Poems by the Way> (1892).

In 1859 Morris married Miss Jane Burden. In 1861 he founded the firm of Morris, Mar¬ shall, Faulkner and Company and began the manufacture of wall-paper, stained glass and artistic furniture, and to his labors in this par¬ ticular is traceable much of the reform which English and American trade has experienced in household art during the last generation. In 1890 he established the Kelmscott Press at Hammersmith, and there published exquisitely printed editions of Chaucer, Beowulf and other works, as well as of his own writings. Still

another side of his nature was shown in the trend of his human sympathies. He had long been known as poet and craftsman, but from 1885 he was active as a social reformer, lectur¬ ing frequently to workingmen in halls or in the open air, and helping to support the Common¬ wealth, a Socialist journal. It is not wholly easy to understand this side of his nature, for intensely democratic as he became, in theory at least, he was an equally intense lover of that very beauty which a social upheaval would de¬ stroy. The ugliness of much of modern life led him to Socialism, but he was thoroughly sincere in his attitude, illogical as it may seem to many. However difficult it may be to ad¬ just satisfactorily to our minds the attitude of the poet-Socialist with the character of his work as a craftsman, which was offered to the world at prices practically prohibitory for the majority of persons, it is an unquestionable fact that the world is a pleasanter, wholesomer world for his having lived in it. He helped

his generation to perceive that there is no necessary alliance between utility and ugliness ; he raised the standard of household taste, and as a poet he was one of the most melodious of his time. In his later years he essayed a form of composition in mingled prose and verse greatly enjoyed by many, though perhaps not wholly to the taste of those who liked him best as the author of (The Earthly Paradise) and <Sigurd) — a series of romances beginning with (The Tale of the House of the Wolfings) (1889), and succeeded by (The Roots of the Mountains* (1890) ; (News from Nowhere) (1891) ; (The Story of the Glittering Plain* (1891) ; (The Wood beyond the World* (1894); <The Well at the World's End* (1896); (The Water of the Wondrous Isles* (1897), and (The Story of the Sundering Flood* (1898). With Erikir Magnusson, the Icelandic scholar, he published (The Story of Grettir the Strong* (1869) ; (Volsunga Saga* (1870), and (Three Northern Love Stories and Other Tales* (1875). Still other works by him are (The Decorative Art* (1878) ; (Hopes and Fears for Art* (1882) ; (Signs of Change* (7 lectures, 1888) ; with Belfast Bax, Social¬ ism: Its Growth and Outcome* (1893); Architecture, Industry and Wealth* (1903). Morris received a tentative offer of the laure-ateship on the death of Tennyson, 'but his so¬ cialistic theories would have suited ill with the post, and he indicated that it would not be ac¬ ceptable to him. He was a devoted admirer of mediaeval architecture, and his account in the (Earthly Paradise* of the front of Peterbor¬ ough cathedral is one of the finest descriptions of an architectural feature to be found in Eng¬ lish literature. He wrote the excellent mono¬ graph on (Mural Painting J in the ninth edition of the Encyclopaedia Britannica.* See The Earthly Paradise. Consult the < Lives* or studies

by Cary (1902) ; Clutton-Brock (1914); Jackson, Holbrook (1908); Mackail (1899); Noyes, Alfred (1909); Vallance (1897) ; Riegel, (Die Quellen von William Morris's Dichtung, (<The Earthly Paradise,** in Erlanger Beitrage zur englischen Philologie (1890); Warwick, (William Morris, (His Homes and Haunts* (1912) ; (Collected Works of William Morris* (20 vols., London 1913) ; and Saintsbury, (Corrected Impressions*

(1895).

MORRIS, William O'Connor, Irish jurist

and author: b. Kilkenny, 26 Nov. 1824; d. 3 Aug. 1904. He was educated at Oxford, was admitted to the Irish bar in 1854 and has been a county court judge from 1872. He is the author of (Great Commanders of Modern Times*; <Napoleon* ; (Moltke* ; (Irish His¬ tory*; (Hannibal* ; Hreland: 1798-1898*; <The Great Campaign of Netfson* ; <The Campaign of 1815* ; and (Memories and Thoughts of a Life* (1895).

MORRIS, an island at the entrance to Charleston Harbor, S. C., south of the main channel. It is east of James Island, nearly a mile south of Fort Sumter and about a mile and a half from Fort Moultrie. At Cummings Point, on the north end of the island, three small batteries took part in the bombardment of Fort Sumter, 12-13 April 1861. Later Bat¬ tery Wagner was constructed on the south end of the island and the batteries on the north end

were strengthened and called Battery Gregg. Attempts were made, in 1863, by the Union forces under Admiral Du Pont and General Hunter, to secure possession of the island, and later by Admiral Dahlgren and General Gil¬ more. A landing was made on 10 July and on the 11th and 18th an encounter took place, and a regular siege began. See Fort Sumter.

MORRIS, Ill., city and county-seat of Grundy County, 59 miles southwest of Chicago, on the Illinois River, the Illinois and Michigan Canal, the proposed Lakes to Gulf Deep Water¬ way, the Chicago, Rock Island and Pacific Railroad ; the Chicago, Ottawa and Peoria and the Fox and Illinois Union electric interurbans. The first settlement was made in 1834, and in 1857 the town was incorporated. The sur¬ rounding country is a fertile agricultural region in which there are large bituminous coal fields and beds of clay used for brick and tile. In¬ dustries . include a paper mill with box-board factory in connection, oat meal mill, large tan¬ nery, cut glass, heavy hardware, novelties, fac¬ tories and flour mills. Three national banks containing highest per capita deposits of any in State in towns of 5,000 class. Morris is the seat of one of the largest sheep feeding and shearing yards between Chicago and western ranges. The town is the seat of Saint Angela's Academy. It has a new, all modern high school building and four new modern ward schools. Also has large parochial school. Pop. 4,563.

MORRIS, Minn., village, county-seat of Stevens County, on the Great Northern and Northern Pacific railroads, about 160 miles west by north of Saint Paul. Good water power is obtained from the Pomme de Terre River which is near. The chief product of the surrounding agricultural region is wheat. The principal manufactures of the village are flour and dairy products. The three local banks have combined resources of $1,200,000. There are several grain elevators, flour mills, cement works, fanning mill plant, tiles, elevators, creamery, stock yards and lumber and brick yards. The village has two good schools, a high school, general hospital, parochial school, seven churches, two theatres, an armory, fire hall and a public library. It is also the seat of the West Central School of Agriculture and of Assump¬ tion College (R.C.). The value of all taxable property is $650,000. The government is vested in a commission of three with city manager. The municipal receipts average about $35,000. Pop. 2,500.

MORRIS DANCE, or MOORISH DANCE, supposed to have been derived from the Moriscos in Spain, was formerly danced at puppet-shows, *etc.* It was introduced into Eng¬ land in the reign of Edward III, when John of Gaunt returned from Spain. In the May-games morris-dancers formed an important part with Robin Hood, Friar Tuck, Little John and the Hobby Horse were introduced as characters in the dance. In the reign of Henry VIII the morris-dancers were dressed in gilt leather and silver paper, and sometimes in coats of white and spangled fustian. Suppressed by the Puri¬ tans it survives in the north of England.

MORRIS PARK, a once famous New York racetrack.

MORRIS PLAN, The. The Morris Plan of industrial loans and investments takes its name from a Southern lawyer, Arthur J. Mor¬ ris, formerly of Norfolk, Va., but now of New York. Over 100 companies were organized to operate this plan within the nine years ended 23 March 1919; the capital invested was about $12,000,000, and the amount of money lent to about 660,000 borrowers was near $100,000,000. Loans are now running at the rate of $36,000,- 000 a year. The urgent though unvoiced de¬ mand for a special banking institution for the benefit of the industrial class — such as had existed on the continent of Europe for over half a century — was first met in this country by the Fidelity Savings and Trust Companv, of Norfolk, modestly capitalized at $20,000, which began the operation of the Morris Plan on 23 March 1910. The Plan itself may be briefly described as follows :

A man needs a small sum of money to tide him over some urgent financial difficulty. Be¬ ing unknown at the commercial banks and having no securities he can borrow on, he has to rely on the generosity of a friend, trust to the tender mercies of a loanshark, or seek re¬ lief at the counter of a Morris Plan company. Here, if his application is granted, for each $50 borrowed he pays $1 toward the cost of investigation, and gives a promissory note signed by himself and two friends who, as co-makers, guarantee his honesty and earning capacity. This note is discounted at the legal rate of interest, and for each $50 of his in¬ debtedness the borrower agrees to pay $1 a week toward the purchase of a certificate of investment equaling the amount of his loan. At the end of 50 weeks he has paid for this certificate in full, and two weeks later he may cash it at the company's office and pay off his note, which is then due. He has not had to pawn his watch or mortgage his furniture, and instead of paying a ruinous rate of interest to a disreputable money-lender he has dealt with honest people who have treated him fairly and squarely. When his debt is paid he may, if he wishes, subscribe for one or more of the company's certificates of investment, bearing interest at 5 per cent from date of payment, and pay for the same either with cash down or on the instalment plan; and these certificates will be available as security for future loans, in which case no endorsements will be neces¬ sary. Many a man who begins as a borrower ends by becoming an investor in interest-bear¬ ing Morris Plan certificates; but one does not have to be a borrower in order to buy them.

Most Morris Plan loans are made to wage-earners or small-salaried workers, but many are made to individuals, firms or small corporations to extend their business.

The first Morris Plan companies were or¬ ganized in the South, but to-day there are more of them in Massachusetts than in any other State, North Carolina coming second. They extend in the Atlantic States from Manchester, N. H., to Atlanta. Ga., and westward to New Orleans, Detroit, Chicago, Minneapolis, Denver, and the Pacific Coast. The New York Com¬ pany, first capitalized at $100,000 and now at $1,000,000, began business on the last day of 1914; Cleveland's $500,000 companv on 8 March 1916; the Boston company, similarlv capitalized, three months later; Chicago's $1,000,000 bank

began on 27 Julv 1917, and the half-million dollars Detroit and Los Angeles companies date from the closing months of 1917. The officers and directors of these companies are chosen from among the most representative bankers and other business men in each community, and local interests own a large majority of the stock in every case. A minority interest — varying in amoun\ but usually substantial — is held by the Industrial Finance Corporation, a Virginia institution with headquarters in New York, capitalized at $3,700,000, and having as its president Gen. Coleman du Pont and as its vice-president and general counsel Arthur J. Morris from whom the Plan takes its name. The purpose of this corporation is to organize Morris Plan companies in response to the de¬ mand from all parts of the United States, and to standardize and facilitate their operations. Early in 1919, the local companies began op¬ erating the Morris Plan of Retail Trade Ac¬ ceptances, by which retail dealers in articles of general utility are relieved of the burden of acting as bankers for customers requiring time for the liquidation of their accounts. This natural development of the original loan-and- investment idea will vastly increase the business done by the Morris Plan banks.

A recent development is the formation of The Morris Plan Insurance Societv to insure borrowers for the amount of their loans throughout

the period of their indebtedness. From November 1917, when it began operat¬ ing, to 31 March 1919 this Society issued over 28,000 policies for more than $4,000,000 of in¬ surance.

Joseph B. Gilder,

Secretary of the Industrial Finance Corporation.

MORRISON, Arthur, English author: b. 1863. He was for a number of years secre¬ tary to a charity-trust in London's East End, and there made the studies utilized in his (Tales of Mean Streets) (1895), and (The Child of Jago> (1896). He wrote also (Martin Hewitt, Investigator5 (1896), detective stories; <The Dorrington Deed-Box) (1897) ; (To London Town5 (1899) ; <The Hole in the WalP (1902) ; (The Red Triangle5 (1903); (Divers Vanities5 (1905); (Green Ginger5 (1909); (The Painters of Japan5 (1911), and he has collaborated in the production of three plays.

MORRISON, George Ernest, British trav¬ eler and Sino-expert: b. Geelong, Victoria, Australia, 4 Feb. 1862 ; d. 30 May 1920. He was educated at the Melbourne and Edinburgh uni¬ versities, receiving (1887) degrees M.D. and C.M., crossed Australia on foot (1882-83) and crossed from Shanghai to Rangoon by land (1894) ; as special correspondent for The Times (London) he traveled from Bangkok, Siam, to Yunnan City, China, and round Tonquin (1896), and in the same capacity crossed Manchuria from Stretensk, Siberia, to Vladivostok (1897). He was in Pekin during the Boxer siege (1900) and was present at the Japanese triumphal entry into Port Arthur (1905). In 1907 he again crossed China from Pekin to the French border of Tonquin and thereafter did much travel and exploration in China and Russian Turkestan. On account of his great store of knowledge of Chinese topography and politics he was made political adviser to the President of the Chinese Republic in 1912. He wrote

(An Australian in China: being the Narrative of a Quiet Journey Across China to Burma5

(1895).

MORRISON, Henry Clay, American Methodist. (South) bishop: b. Montgomery County, Tenn., 30 May 1842. He was educated in the public schools and after teaching for several years entered the

ministry in 1865. He has held important charges in Louisville, Ky., and Atlanta, and was missionary secretary in 1890-98 when he raised $140,000 for the Board of Missions. He was appointed bishop in 1898, and has been five times elected to the General Conference.

MORRISON, James Dow, American Prot¬ estant Episcopal bishop: b. Waddington, N. Y., 1844. He was graduated from McGill Univer¬ sity, Montreal, in 1865, took orders in the Episcopal ministry and after holding rectorates at Herkimer and Ogdensburg, N. Y., was consecrated first missionary bishop of the dio¬ cese of Duluth in 1897. In 1907 he organized the diocese of Duluth of which he became first diocesan bishop. He has published fundamen¬ tal Church Principles5 (1899); (Suffragan Bishops5 (1910), and also sermons and ad¬ dresses.

MORRISON, John Frank, American army officer: b. Charlottesville, N. Y., 20 Dec. 1857. He was graduated from the United States Mili¬ tary Academy and commissioned 2d lieutenant, 20th Infantry in 1881. During his service as a subaltern and captain he was noted as a student of tactics and an authority on general military science. He served in the Santiago campaign and later in the Philippines with distinction. In the Russo-Japanese War he was selected for service as an observer and accompanied Gen¬ eral Kurski through the campaign from the Yalu to Liao Yang and Mukden. On his re¬ turn home in 1905 he was detailed as a student to the. nascent Army War College and in the following year went to Leavenworth service schools as instructor. In 1907 he became chief of the department of military art in that in¬ stitution. The drastic reforms and reorganiza¬ tions he there carried out led to a high degree of efficiency under his administration. During 1912 and 1913 he was sent to Hawaii and the Panama Canal Zone to plan the defenses of those places. He served on the Mexican border in 1914 as colonel and in 1915 was sent on a mission to China. At the end of 1915 he was promoted to brigadier-general, and to major-general in 1917. In Januarv 1918, shortly after his return from a tour of observation and inspection in France, he was appointed to the newly-created office of Director of Train¬ ing. . His teaching has revolutionized Ameri¬ can infantry drill regulations; a number of his lectures have been collected and published among them being Seventy Problems: in¬ fantry tactics, battalion, brigade and division5 (1914); <A Study in Troop Leading,5 *etc.* (in collaboration with E. L. Munson: 1911 and 1918); (Training Infantry5 (1914).

MORRISON, John Tracy, American law¬ yer and politician: b. Jefferson County, Pa., 25 Dec. 1860 He was graduated from the Univer¬ sity of Wooster, Ohio, in 1887, and from the law department

of Cornell University in 1890. In the latter year he moved to Caldwell, Idaho,

where he established his law practice. In the campaign of 1896 he was secretary of the Re¬ publican State Committee, and in 1896 and 1900 Republican candidate for Congress, but was not elected. From 1897 to 1900 he was chairman of the State committee, and governor of Idaho

1903-5.

MORRISON, Robert, English missionary and Orientalist, the founder of Protestant mis¬ sions in China: b. Morpeth, Northumberland, 5 Jan. 1782; d. Canton, China, 1 Aug. 1834. He learned the trade of boot-tree maker. After studying at Hoxton Academy and the Mission¬ ary Academy, Gosport, he was ordained in 1807 and as an agent of the London Missionary Society he embarked for Canton. In 1808 he was appointed translator to the Easit India Company's factory at Canton, and in 1810 be¬ gan to print the New Testament in Chinese from a text which he had carefully revised. In 1811 he completed a (Chinese Grammar,* published in 1815. In 1814 he completed the New Testament, and with the assistance of Dr. Milne, who had ioined him in 1813. the trans¬ lation of the Old Testament which was com¬ pleted in 1818 and published in 1823. In 1815 he completed a (Chinese Dictionary,* published (1815-23), at the expense of the East India Company. Dr. Morrison and his colleagues superintended very extensive printing opera¬ tions for the diffusion of tracts and Scripture portions among the Chinese, and he founded in 1818 the Anglo-Chinese Missionary College at Malacca. Besides the works mentioned he wrote (Horae Sinicae, or Translations from the Popular Literature of the Chinese*. (1812) ; (Dialogues translated from Chinese into Eng¬ lish (1816) ; (A View of China for Philologi¬ cal Purposes,* (1817), and several educational works in English and Chinese. Consult his (Memoir* (1839) ; Townsend, {Robert Mor¬ rison } (1888).

MORRISON, Theodore Nevin, American Protestant Episcopal bishop : b. Ottawa, . Ill., 18 Feb. 1850. He was graduated from Illinois College, Jacksonville, Ill., in 1870, studied for the ministry at the General Theological Semi¬ nary, and took priest's orders in the Episcopal Church in 1874. After being rector of Saint Paul's Church, Pekin, Ill., 1873-76; and of the Church of the Epiphany in Chicago, 1876-99, he was consecrated bishop of Iowa in Febru¬ ary 1899.

MORRISON, William Ralls, American lawyer: b. Monroe County, Ill., 14 Sept. 1824; d. 30 Sept. 1909. He was educated at Mc-Kendree College, Lebanon, Ill., and served in the Mexican War. In 1852-54 he was clerk of the Circuit Courts of Monroe County, and in 1854 was elected to the State legislature; was admitted to the bar in 1855 and he continued in the legislature until 1859, holding the speaker-ship in the latter year. He served in the Civil War 1861-63, receiving the rank of colonel, and being present at the battle of Fort Donelson. He was a member of Congress from 1863-65 and 1873-87. He introduced the Morrison tariff measure providing for drastic tariff reductions, but it was defeated by a small majority. He was defeated as a candidate for senatorial hon¬ ors in 1885 by one vote. From 1887 to 1897 he served as member of the Interstate Commerce

Commission, of which he was chairman after

1891.

MORRISON, Ill., city, county-seat of Whiteside County, on the Chicago and North¬ western Railroad, about 120 miles west of Chicago and 12 miles east of the Mississippi River. It is situated in an agricultural and stock-raising region. The industrial establishments are furniture and carriage factories, school furniture and refrigerator, stove, range and furnace factories, flour mills and creameries. It has considerable trade in dairy products, live¬ stock and manufactures. There are three banks with combined resources of $2,015,217. The value of all taxable property is placed at $3,000,000. The city has a public library, a museum, courthouse, county offices, city hall, two common schools, a high school and a gaol. Pop. 3,000.

MORRISTOWN, N. J., city, county-seat of Morris County, on the Delaware, Lackawanna and Western, the Morristown and Erie and the

Pennsylvania railroads ; also Morris County Traction Company line from Elizabeth to Lake Hopatcong 40 miles ; about 20 miles west of Newark. It is situated in an agricultural region in which market gardening and fruit growing receive considerable attention. It was settled in 1709-10 and was called West Hanover. In 1740 the name was changed to Morristown in honor of Lewis Morris (q.v.) then colonial governor of New Jersey. It was incorporated in 1865. It is about 700 feet above sea-level and overlooks a beautiful section of country. The place figured prominently in the Revolu¬ tion ; in 1777, from Januarv to May, and from December 1779 to Tune 1780, Morristown was Washington's headquarters. The old Ford mansion, which he occupied, is now owned by the ((Washington Association** who preserve here numerous mementoes of Revolutionary and pre-Revolutionary times. It was here that Samuel F. B. Morse (q.v.) and his associate, Alfred Vail, worked on the electric telegraph experiments about 1837. The shaft of the Savannah, the first steamboat to cross the At¬ lantic, was cast at the old Speedwell Iron Works. Morristown is largely a residential city; its climate, scenerv and easy access to the cities of New York, Jersey City, and Newark make it a most desirable location for the homes of city business men. It has con¬ siderable trade and ships considerable quanti¬ ties of flowers, fruit and vegetables. Some of the prominent buildings are the Young Men's Christian Association and the Young Men's Catholic Association buildings, and All Souls' and the Memorial hospitals, post office, Vail Museum, a new high school, new public library and lyceum. There is a beautiful and well-kept park, in which a soldiers' monument has been erected. A monument marks the site of Fort Nonsense, erected by Washington. The city has public and parish schools. At Morris Plains, about four miles northeast of the city, is a State hospital for the insane, which has accommodation for about 1,500 patients, and which cost about $3,000,000. Government is vested in a mayor and council. Pop. 12,548. Consult Tuttle, (Historv of Morristown) ; Colles, (Authors and Writers Associated with Morristown) (1893) ; Sherman, (Historic Mor¬ ristown } (Morristown 1906).

MORRISTOWN, Term., city and county-seat of Hamblen County, 42 miles northeast of Knoxville, on the Southern and the Knoxville and Bristol railroads. It has manufactures of Hour, wagons, agricultural implements, furni¬ ture, mantels, hosiery, brooms, concrete blocks, leather, medicines, hardwood tops and panels, canvas gloves, harness, monuments, lumber, *etc.* It is also a large poultry and stock market, and the zinc, iron and lead mines and marble quarries in the vicinity add to the importance of its industrial interests. Its annual shipments are valued over $3,000,000. It is the largest poultry shipping point in the South. It is the seat of the Morristown Normal and Industrial College for negroes. During the Civil War Morristown was the scene of two engagements. On 10 Dec. 1863 Colonel Garrard's Union cavalry brigade attacked Gen. W. E. Jones' cavalry brigade in works here, and drove it out of them and from the town. Four days later Col. W. J. Palmer, commanding the Anderson (Pa.) cavalry, had a skirmish near the town with a part of General Martin's cavalry brigade of five regiments, and withdrew leaving Martin in possession of the place. On 28 Oct. 1864 the town was held by Gen. John C. Vaughn's brigade of Confederate cavalry. Vaughn was attacked that day by Gen. A. C. Gillem, with a brigade of Union Tennessee cav¬ alry. Vaughn was falling back to a more favorable position, when Gillem charged his right and centre and stampeded the entire brigade, which fell back in disorder to Russell¬ ville. Gillem took 224 prisoners, including 19 officers, four guns and caissons, part of the ammunition train, and about 300 stand of small arms. The Union loss was eight killed and 18 wounded. Pop. (1920) 5,881.

MORRO (mor ro) CASTLE, a former

Spanish fort at the entrance to the harbor of Havana, Cuba ; also the name of an imposing fortification on the cliffs overlooking Santiago Bay. It was in sight of this fort and under fire of its guns that Lieutenant Hobson and seven men of the United States navy, on 3 June 1898, sank the Merrimac at the entrance to the harbor to prevent the Spanish fleet Torn escaping. See Cuba; Havana; United States — Spanish-American War.

MORROW, Thomas Vaughan, American eclectic physician: b. Fairview, Ky., 14 April 1804; d. Cincinnati, Ohio, 16 July 1850. Edu¬ cated at Transylvania University of Lexington, Ky., and graduated in medicine from the Re¬ formed Medical College of the City of New York. He was the pioneer promoter and or¬ ganizer of medical eclecticism in the West. He established the Reformed Medical College of Ohio at Worthington, Ohio, 1830; the Reformed Medical School of Cincinnati in 1842; the Eclectic Medical Institute at Cincinnati, Ohio,

in 1845; was editor of the first eclectic medicai journal, and author (with Dr. I. G. Tones) of Jones and Morrow's 'Practice of 'Medicine* (eclectic). Dr. Morrow was the first president of the National Eclectic Medical Association

MORROW, William W., American jurist: b. near Milton, Ind., 15 July 1843. He was educated in the public schools of Illinois and California, and was admitted (1869) to the bar >nd became assistant United States attorney for

California (1870-74). He was (1879-82) chair¬ man of the Republican State Central Com lit-tee, and (1880-83) attorney of the State Board of Harbor Commissioners. From 1881-83 he was counsel for the United States before French and American Claims Commissions, and (1882-85) before the Alabama Claims Commis¬ sion. He was chairman of * the California Delegation of the Republican National Con¬ vention, 1884, and member of the 49th and 5 1 st Congresses (1885-91). From 1891-97 he was United States district judge of the Northern District of California, and judge of the United States Circuit Court and United States Circuit Court of Appeals, 9th Judicial Circuit, since 1897. In 1905 he was the incorporator of the American National Red Cross Society.

. MORS, or MORSOE, Denmark, the prin¬ cipal island of the Limfjord in the northwest of Jutland, 23 miles long, 11 miles broad and with an area of 140 square miles. Capital, Nykjobing (pop. 6,918), on the east coast. It reaches a maximum altitude of 250 feet and its shores are marked by precipitous cliffs Pop. 24,270.

MORSE, mors, Edward Sylvester, Ameri¬ can naturalist and Orientalist : b. Portland, Me., 18 June 1838. He was educated at the Law¬ rence Scientific School, Harvard University; taught . zoology and comparative anatomy at Bowdoin College 1871-74, and at the Imperial University of Tokio, Tapan, 1877-80; and in this way added to his reputation as a zoologist a remarkable intimacy with Chinese and Japan¬ ese art, especially ceramics, and with the folk¬ lore and early archaeology of the two countries. His collection of Japanese pottery is now in the Boston Museum of Fine Arts; it keeps his name and he is its curator. In 1881 Morse became director of the Peabody Academy of Sciences, of which he was one of the founders. He is now president of the Boston Society of Natural History. He wrote (Early Stages of Terebra- /Uo3a\ ˆ70) ; (Embryology of Terebratulina > (1872), and other studies showing the non-molluscous character of the

brachiopods; (First Book in Zoology* (1875, and in German and Japanese versions) ; (Earlv Races of Man in Japan > (1879) ; ‘Tapanese Homes and their Surroundings* (1886); ‘Glimpse of China and Chinese Homes* (1902); ‘Mars and its Mystery * (1906), and many papers on zoology, ethnology and archaeology.

MORSE, Harmon Northrop, American chemist: b. Cambridge, Vt., 15 Oct. 1848. He was graduated (1873) at Amherst College and took the degree of Ph.D. (1875) at the Uni¬ versity of Gottingen. He became assistant in chemistry (1875-76) at Amherst College, then (1876-91) associate professor of chemistry at Johns Hopkins, and professor off analytical chemistry and adjunct director of the chemical laboratory (1891), and is now professor of in¬ organic and. analytical chemistry and director of the chemical laboratory. He was given the degree LL.D. by Amherst 1915. Special work has been done by him in investigating osmotic pressure. He wrote ‘Exercises in Quantitative Chemistry > (1905).

MORSE, Harry Wheeler, American phys¬ icist: b. San Diego, Cal., 25 Feb. 1873. He was

graduated (1897) at Leland Stanford Jr. Uni¬ versity, and took the degree of Ph.D. (1901) at the University of Leipzig. He was instruc¬ tor of physics (1902-10), assistant professor (1910-12) at Harvard and professor of chem¬ istry at the University of California (1912-13) and from 1913 has had charge of scientific work for the Western Precipitation Company, Los Angeles. He translated Ostwald’s Letters to a Painter on the Theory and Practice of Painting (1906) and is joint author of (Ostwald’s and Morse’s Elementary Chemistry* (1907), and author of (Chemistry and Physics of the Lead Accumulator * (1912). Numerous monographs on spectroscopy, fluorescence, diffusion, electro¬ chemistry, etc., are from his pen.

MORSE, Hosea Ballou, American author¬ ity on Chinese affairs : b. Brookfield, N. S., 18 July 1855. He was graduated (1874) at Har¬ vard University and was appointed in the same year assistant in the

Imperial Chinese Customs service, being promoted (1887) to deputy com¬ missioner and (1896) commissioner. From 1903-07 he was statistical secretary (commis¬ sioner of customs) to the inspector-general of customs, retiring 1909. By Imperial decree (1885) he was sent on a special mission con¬ nected with the terminating of the Franco-Chi- nese War, and fulfilled special duties (1885— 87) connected with the reorganization of the subsidized China Merchants' Steam Navigation Company. In 1889 he was appointed special commissioner to arrange for opening Hunan Province to foreign trade. For his numerous services he has received (by Imperial rescript) The Decoration of the Double Dragon, III division, 2d class (1885); Double Dragon 1st class (1903) ; Order of Chia Ho, 3d class, Re¬ public of China (1916). He has written (The Currency of China) (1906) ; (Trade and Ad¬ ministration of the Chinese Empire) (1908, new ed. 1913) ; (Guilds of China* (1909) ; (In¬ ternational Relations of the Chinese Empire*

(1910-18).

MORSE, Jedidiah, American Congregationalist clergyman and geographer: b. Woodstock, Conn., 23 Aug. 1761; d. New Haven, 9 June 1826. He was graduated from Yale in 1783; studied theology under Jonathan Edwards; was pastor at Charlestown, Mass., from 1789 to 1820; and spent his last years in New Haven. He was intensely orthodox ; established in 1805 the Panoplist, a religious journal combating Universalist views; and was an able and suc¬ cessful teacher. He wrote (A Compendious History of New England,* with Elijah Harris (1804); (Annals of the American Revolution* (1824), and a series of excellent biographies.

MORSE, John Torrey, American historian: b. Boston, 9 Jan. 1840. He was graduated at Harvard in 1860, and was lecturer on history there from 1876 to 1879. For two years he was associated with Henry Cabot Lodge in the edi¬ torship of the International Review. Served on board of overseers of Harvard University for 11 years and was member of the Massachu¬ setts legislature in 1875. He also studied and practised law in Boston for a time and wrote treatise on <Law of Banks and Banking* which has now reached seventh edition; also (Law of Arbitration and Award.* His literary work has been chiefly in historical biography, and he has edited the American Statesmen* series,

which is ranked among the best biographical works for the interpretation of American his¬ tory. For this series he has written (Abraham Lincoln* (1893); (Benjamin Franklin* (1889); (John Adams* (1884); (John Quincy Adams* (1883) ; and ˆThomas Jefferson* (1883) ; his other works include (Life of Alexander Ham¬ ilton* (1876) ; and (Life and Letters of Oliver Wendell Holmes* (1896) ; also (Life and Let¬ ters of Colonel Henry Lee* (1905).

MORSE, Richard Cary, American clergy¬ man : b. Hudson, N. Y., 19 Sept. 1841. He was graduated (1862) at Yale and took (1865) the degree of A.M., when he studied theology at Princeton and Union Theological seminaries (1867). From 1867-69 he was assistant editor of the New York Observer and was ordained (1869) to the Presbyterian ministry. He was general secretary of the international commit¬ tee Y. M. C. A. (1869-1915), continuing as con¬ sulting general secretary. His work has been connected with the supervision and extension of the Y. M. C. A., especially in North America; but his labors have taken him on tours to India, Australia, China, Korea, Japan, the Philippines and Russia. He has written (Robert R. Mc-Burney, a Memorial* (1899) ; (Polity of Young Men's Christian Associations* (1904) ;

(Fifty Years of Federation of the Y. M. C. A.* (1905); (History of the North American Y. M. C. A.* (1913).

MORSE, Samuel Finley Breese, American inventor and artist : b. Charlestown, Mass., 27 April 1791 ; d. 2 April 1872. He was the eldest son of the Rev. Jedidiah Morse (q.v.). After graduating at Yale in 1810, he visited England with Washington Allston (q.v.) to study paint¬ ing. In 1813 his first attempt at sculpture, a (Dying Hercules,* won for him the gold medal of the Adelphi Society, and he received the same from the hands of the Duke of York. He returned to New York in 1815, and in 1824— 25 organized an association which became the present National Academy of Design. He was its first president and continued in office for 16 years. He again spent three years in study in Europe, and then returned to New York to take the professorship in the University of the City of New York.

Morse had always been fond of the study of chemistry and natural philosophy, and it became at last a dominant pursuit with him. In conse¬ quence of his intimacy with Prof. J. Freeman Dana, who was lecturing in the same institution on the electromagnet, Morse became interested in electrical matters, and in 1832, while return¬ ing home from Havre on the packet ship Sully, he first conceived the idea of the telegraph. But though thus early devised, yet circum¬ stances

prevented the complete construction of the first recording apparatus in New York until 1835, when he exhibitetd it at the New York University building. In 1837 he made. another and more perfect exhibition, and filed his caveat at Washington. He now considered his apparatus sufficiently perfected for commercial introduction, and in 1838 he asked Congress to construct an experimental line from Washing¬ ton to Baltimore to show its practicability. From the skepticism of many and the ridicule of others, Morse's request was not acted upon by Congress, and, disappointed and almost dis¬ heartened, he repaired to England in hopes of

getting some foreign government to aid him. I he result of this visit was a refusal to grant him letters patent in England, and the obtaining of a useless brevet d' invention in France. For four years he struggled and put up with many privations, and, as if it were designed to try him up to the last moment, no recognition of the matter was taken till the last night of the Congressional session. He retired to bed dis¬ heartened and discouraged before the session was closed. But in the morning — the morning of 4 March 1843 — he was startled with the announcement that the desired aid of Congress had been obtained in the midnight hour of the expiring session, and $30,000 placed at his dis-

ˆ)0ja,ˆ-nˆ0r-experiment between Washington and Baltimore. In 1844 the work was com¬ pleted, and demonstrated to the world the prac¬ ticability and the utility of the Morse system of the electromagnetic telegraph. The first message, w What hath God wrought?® was sent from the United States Supreme Court room Vi the Capifcd at Washington to Baltimore, 24 May 1844. From that day the telegraph was a success.

Honors were showered upon him by Euro¬ pean sovereigns and governments. Probably no Ameiican has ever received so many marks of distinction. In 1848 Yale College conferred on him the complimentary degree of LL.U., and in the same year he received the decoration of the Nishan Iftichar in diamonds from the sul¬ tan of

Turkey. Gold medals of scientific merit were awarded him by the king of Prussia (set in a massive gold snuff box), the king of Wurtemberg, and the emperor of Austria From the emperor of the French he received in 1856 the cross of chevalier of the legion of honor; in 1857 from the king of Denmark the cross of knight of the Dannebrog; and in 1858 from the queen of Spain the cross of knight commander of the Order of Isabella the Cath¬ olic*. The sum of 200,000 francs was presented to him jointly by the principal governments of Europe. It has been said that much of this money was spent in the ceaseless litigation and lawsuits in which he was involved in the de¬ fense of his patent rights.

Professor Morse also had the distinction of laying the first submarine telegraph line, which was done in New York harbor in 1842. He likewise set up the first daguerreotype appara¬ tus and was associated with John W. Draper in taking the first daguerreotypes in America.

A letter from Professor Morse to the Secretary of the Treasury in 1843 seems to contain the earliest suggestion _ of the possibilities of an Atlantic cable. His last public act was the unveiling of the statue of Benjamin Franklin m Printing House Square, New York. Con¬ sult Prime, <Life of S. F. B. Morse5 (New York 1875) and Morse, E. L. (son), <Samuel Finley Breese Morse, his Letters and Journals5 (2 vols., Boston 1914).

MORSE, Sidney Edwards, American jour¬ nalist and inventor, son of Jedidiah Morse (q.v.) and brother of S. F. B. Morse (q v.) * b. Charlestown. Mass., 7 Feb. 1794; d. New York. 24 Dec. 1871. He was graduated at Yale in 1811; studied law; established the Boston Record er in 1815 and the New York Observer m 1823, the pioneers of American religious journalism; invented a flexible piston-pump in

1817 and the cerographic method of printing maps in 1839; improved a bathymetre for deep-sea soundings ; and, like his father, was an able and successful geographer. His (New System of Modern Geography5 ran to half a million copies.

MORSE, Sidney H., American sculptor and editor: b. Rochester, N. Y., October 1832; d. San Mateo, Tla., 18 Feb. 1903. In youth he worked at marble-cutting and acquired a taste for sculpture. Later he studied at Antioch Col¬ lege and afterward began to preach in Uni¬ tarian pulpits in the West; still later made further preparation for the ministry at Har¬ vard, and for some time was settled in Haver¬ hill, Mass. From 1865 to 1872 he was editor of the Radical, a worthy successor of the famous Dial. Morse counted among his friends and contributors Emerson, A. B. Alcott, Samuel Johnson, Samuel Longfellow and many others prominent in literature and reform. When he discontinued the Radical he turned with en¬ thusiasm to sculpture and produced many not¬ able works. He made a bust of Emerson, which is in the Second Church, Boston, the present edifice of the society to which Emerson min¬ istered (1829-32), and another of the same sub¬ ject, regarded by Emerson's friends as the best extant. His other subjects include Channing, Parker, James Martineau, Walt Whitman, Car¬ lyle, Thomas Paine, Lincoln, Holmes and Presi¬ dent Cleveland. Morse wrote much for peri¬ odicals and attained fame as a lecturer. One of his poems, (Sundered, 5 is to be found in Emerson's (Parnassus. 5

MORSHANSK, mor-shansk', Russia, cap¬ ital of the government Tombov, on the navi¬ gable river Tsna and on the Syfran-Vyasma Railway. It has a gymnasium for girls, a city bank and factories producing tobacco, soap, tallow, spirits, etc., besides doing a lively trade in grain. Its population in 1911 was 31,802.

MOR.SOE, mors'e-e. See Mors.

MORTALITY, a term applied to that branch of investigation which determines the proportion of the number of persons who die in any assigned period of life or interval of age, out of a given number who enter upon the same interval, and consequently the proportion of those who survive. Tables showing how many out of a certain number of infants, or persons

°-ua ?*ven age' die successively in each year till the whole become extinct, are generally called tables of mortality. There is no fixed

number of lives upon which such tables are based, but the observation of a large number is indispensable to accuracy, and the larger the number that can be duly observed the greater will be the degree of accuracy attained. It must a ways be borne in mind, however, that a strict observation of a moderate number will yield truer lesults than a looser induction from a larger number. The basis of such calculations must be an accurate register of the number of births and deaths, and in the case of the latter, at what ages, in a given district or extent of country.

In Great Britain the bills of mortality, or abstracts from parish registers, were long the only means of arriving at these results; but being found very imperfect and unsatisfactory, they were supplanted in 1836 by a general regis-

tration. The results furnished by such tables are very various and of great interest. The registers, if kept with sufficient accuracy and minuteness, enable us to determine the propor¬ tion of deaths, not only at different ages and in different regions, but at different seasons, in persons of different occupations and habits, in towns or the country; and thus afford valu¬ able materials for the science of political econ¬ omy. Although much more attention has been paid to this subject in recent times, yet the observations have not been so extensive nor so accurate as is desirable.

Although the collection of regular statistics of mortality is of recent origin, the subject has always excited much interest, and many general facts have been collected regarding it. The tendency of mortality to diminish with the progress of civilization has been satisfactorily established by statistics. The average rate of mortality is affected by regular or constant causes, such as race, climate, age, sex, profes¬ sion, social position, density of population, political institutions, habits, etc., and by such irregular or occasional causes as war, famine, pestilence, etc., but notwithstanding the inter¬ ruption of these occasional causes a constant tendency to a mean has been found to exist in any given state of society. The fact that the tendency of

population to increase or diminish is quite independent of the rate of mortality was first established by Malthus, who showed that the increase of population depended on the facility of procuring the means of sub¬ sistence and not on the duration of life. The mortality in the United States, for example, is greater than in England, yet the population of the United States doubles itself in 25 years and that of England in 43 years, while in vari¬ ous European countries which have a lower mortality than the United States, the population will not double in a century.

Some statists have attached considerable im¬ portance to the effects of race on population. It is extremely difficult, however, to establish anything in regard to race independently of circumstances and social habits. It has been shown, for example, that the average mortality among the Jews in Prussia is less than among the Christians, that the mortality varies greatly among the various races who inhabit the Aus¬ trian Empire, being least among the Germans, and that a similar difference prevails in the de¬ partments peopled by various races in France, but all such evidence is open to the most obvious exceptions. The influence of climate on mor¬ tality is inseparably associated with that of migration. It cannot be established that any climate, except perhaps the extremes of heat or cold, moisture or dryness, is in itself exception¬ ally favorable or unfavorable to human life, but change of climate is frequently adverse to it.

The most remarkable fact in respect to age is the great mortality which commonly takes place among children under five years of age. This is especially remarkable in large towns, but is not wholly confined to them. Although the diseases to which infancy is liable may naturally account for part of this excessive mortality, the greater part of it must be at¬ tributed to ignorance and want of due care in the training of children, partly arising from the unfavorable circumstances in which, through the too rapid increase of population, they are

brought into the world. This is both directly and indirectly a considerable cause of the extra mortality of large towns and other dense cen¬ tres of population. The question whether city or country life is most conducive to a low rate of mortality is still undecided. Direct statistics prove nothing, as the death rate of towns is raised by immigration from the country and other causes. In regard to sex it is established that women live longer than men, and that among men the married live longer than the single. The condition of life in respect of poverty or wealth is known to have a consid¬ erable influence on

mortality. Dividing France into two classes, rich and poor, the annual mor¬ tality was found to be 1 in 46 in the former and 1 in 33 in the latter. This gave to the rich an average duration of life of 57 and to the poor one of 37 years. See Longevity; Vital Statistics.

MORTAR, a calcareous cement used in building. It differs in its characteristics accord¬ ing to the nature, proportions or treatment of its constituents. The proportions vary from one and one-half to four or five of sand to one of lime. Hydraulic mortar is made from certain limestones which include in their composition so large a proportion of iron and clay as to enable them 'to form cements which have the property of hardening under water and are called hydraulic limestones. The proportions of clay vary in different quarries, and often in the same from 8 to 25 per cent. See Cement; Lime.

MORTAR, or MORTER, a vessel of iron, porcelain or stone used by pharmacists and others in preparing powders and other medi¬ cines. Also a piece of ordnance. See Ord¬ nance.

MORTAR, utensil employed by the Indians of America and other semi-civilized races for the grinding or mashing of grains and other substances used as food or for other ends. The Indian mortar naturally had a different name in each tribe, and some of these names were familiar to the whites. A survival of these Indian mortar names is the metate of Mexico (q.v.) derived from the Aztec word metal. The mortar has many forms ranging from a flat stone to a deep receptacle of stone, bone or wood in which the grain or other sub¬ stance is reduced by pounding or grinding to a floury or plastic state. Throughout the area occupied by the Pueblo Indians in the United States, and in Mexico, Central America and the greater part of South America, and especially in Colombia, Venezuela and the Pacific Coast countries the grinding of grain, seeds, nuts, roots and other substances is done on a flat stone, generally rectangular in form. For the most part the grinding is performed by means of a stone muller more or less cylindrical in shape, which is rarely used as a roller, the sub¬ stances being crushed between the metate and the muller by pressure and rubbing. This was the process used throughout the great corn belt stretch from Arizona to southern Chile at the time of the discovery of America; and throughout this vast region it is the process generally in use to-day, more especially among the Indians and mestizos for reducing corn and other substances to a condition for cooking.

Forms of Mortars. — Throughout other

parts of North America there were many forms of mortars distinctly different from those in use in the region already indicated, but closely related to one another in shape. Among the Iroquois and other northern and eastern tribes of the United States and parts of Canada the natives made use of wooden mortars hollowed into the top of a block cut from the trunk of a tree. In this hollow, which was of considerable size and depth, the corn or other substance was put, in a dry or wet condition, and pounded into a more or less fine powder or into a soft, semi-liquid mass, by means of a long wooden pestle, with a pounding surface at both ends. The remains of very primitive mortars in many parts of the American continents show the various processes through which the modern mortars have passed to reach their present per¬ fection. Originally a rough unworked flat stone was used as a grinding surface and an unshaped rounded stone served to do the pounding. From this primitive utensil to the carefully shaped metate of the Mexican or the handsomely carved and hollowed mortar of the Alaskan and British Columbian tribes is a long step which bridges a lengthy period of cultural develop¬ ment. In the granite rock of California mor¬ tars in the shape of excavations are frequently found on the sites of old Indian villages. Some of these are very primitive in form, while others, evidently of a much later development, are care¬ fully shaped and seem to follow a regular plan of structure. It is probable that the flat stone metate form and the hollow mortar form both originated in pounding grain on a flat sur¬ face, the two natural methods of preventing the loss of the pulverized grain being to reduce the pounding to rubbing or rolling, and to pound the grain, in a deepish hole, as was done in the California granite rock. The tribes of the great forest area of the North, having no hollow rock beds or stones easily worked, hollowed out the ends sections of tree trunks or sides of logs by means of fire which also hardened the inner surface of the mortars, dried the wood and made them very durable. In regions where stone and wood were not available, bone, rawhide and other materials were converted into mortars for the grinding of food materials. In the whale country some of the races addicted to whale hunting used the vertebrae of that animal for mortars. Some of these are still employed. In the Eastern States of the United States primitive mortars made of hollowed but otherwise unshaped boulders are

frequently encountered; and similar mortars are formed in California, side by side with other globular mortars, which are evidently but a more artistic development of the boulder form. A further evolution of the artistic form was reached when stones were quarried from the rocky bed, shaped to exact pre-determined form and proportions and frequently decorated with conventional forms, mystic signs or figures of household gods.

The pestle took upon itself as many shapes and designs as the mortar, and like relation of the latter to the metate, it was first cousin to the muller, both of which had their origin in the rough, unworked stone used by primitive man to pound or crush his food, and other objects. Some pestles were heavy and several

feet long; others were short instruments which could be used with one hand. Metates and mortars were of many shapes, sizes and designs, and their uses were almost as varied as their forms.

Uses of Mortars. — Indians, throughout the buffalo country, put the buffalo meat into a rawhide bag which they placed in a hole in the earth with the open mouth upward. While here they pounded the meat into shape for pemmican. Some Indians placed their shallow mortars in closely-woven baskets considerably larger than the mortars so that the grain that fell from the latter, in the process of grinding or pulverizing, might be saved. Others of the Pueblo Indians placed a basket-shaped hopper in the mouth of the mortar to prevent the pounded grain from hopping out. It is probable that very large (<mortar holes® found in rock were also used as boiling pots, in which the heated water was obtained by dropping superheated stones into the hole. The large wooden portable mortars of the forest-region Indians were generally set on the ground so as to make them firm and steady. The ordinary metate of Mexico and Central America has generally four legs upon which it stands steadily. In many cases these give it an artistic appearance. Most of these metates are made of lava rock, especially in the districts where lava is plentiful. Metates are made of rocks of different grades of coarse¬ ness. Thus it is possible, by passing ground grain from one metate to another, to finally obtain a flour as fine as the finest turned out by the best modern mill machinery. Fine metates and mortars are also made from granite, limestone, sandstone and other rocky material. Perhaps the most artistic develop¬ ment of the mortar is to be found among the Haida Indians of Alaska, who probably learned their art from Asiatic tribes. Not only are mortars of a great variety of forms and designs but they

are also of many sizes, ranging from tiny little vessels to huge excavations. The rea¬ son is that they were put to a variety of uses. The smaller mortars were employed as recep¬ tacles in which to grind paints, medicines, shells, tobacco and other substances used in medicine, personal decoration, ceremonies, incantations and dances. All the grinding of corn and other food products was almost universally done among the American Indians by women ; but in the case of the ceremonial substances, especially those considered of a sacred nature, where the efficacy of the charm, ceremonial use or medi¬ cine depended upon the manner in which the grinding was done, this work was generally left to the medicine men, who were learned in all the ceremonial forms and traditions of the tribe;

Bibliography.— Hodge, ‘Handbook of Amer¬ ican Indians) ; Morehead, Prehistoric Implements) ; ‘The American Indian in the United States) ; Morgan, ‘League of the Iroquois) ; Nordenskjold, (Cliff Dwellers of the Mesa Verda5 ; Schoolcraft, ‘The Indian Tribes of the United States) ; Thurston, ‘Antiquities of Tennessee. y

MORTARA, mor-ta’ra, Edgar, Jewish boy whose forcible removal from his parents by the orders of the archbishop of Bologna in 1858 aroused great excitement in Europe and led to protests from several powers, but the Pope

declined to interfere. The plea made in justi¬ fication of the act was that Mortara had been early baptized into Christianity by a Roman Catholic maid-servant. The Roman Catholic authorities, however, declined to return him; and despite the many protests in the matter, he remained, of his own choice in 1870, with the Church and entered the Augustinian order. Consult (The True Story of the Jewish Boy, Edgar Mortara* (1860), and Vollet, (Edgar Mortara> (1881).

MORTARA, mor-ta’ra, Italy, capital of the province of Pavia, on the Arbogna, also chief town of the Lomellina, and junction of the Novara-Mortara-Alessandria, the Mortara-Milano and the Vercelli-Mortara-Pavia and the Mortara-Casale railways. It has a Gothic church (San

Lorenzo) and the Santa Croce convent church, also a theatre, gymnasium and technical school. It has manufactures of ma¬ chinery and hats and does considerable trade in its rice and cheese products. The Austrians under Duke Albrecht won a battle here against the Piedmontese in 1849. It had a population of 10,468 in 1911 for the entire commune.

MORTE D'ARTHUR. This great English collection of Arthurian romances, written be¬ fore 1470 by Sir Thomas Malory, as one of the cardinal books whose influence has reached beyond any mere personal fame. Personally, indeed, Malory has remained almost unknown. Even the probability that this 15th century gentleman and soldier served with Richard, Earl of Warwick, pattern of chivalry, was re¬ covered only 25 years ago ; but 400 years have proved the vitality of his book. After inspir¬ ing the conduct of noble English youth for generations, it was reinterpreted in Tennyson's most popular poem, (The Idylls of the King) ; and, surviving so unusual a competition, it is still reprinted, read and loved. Yet as a trans¬ lation, in great part from known French sources, it is not in our modern sense original. Therefore the reasons for its fame are the more significant as going to the roots of permanent literary interest. The first reason, of course, is style. Writing in the early days of English prose, Malory has the dignity and ease of such early historians as Froissart; but his even and leisurely pace does not preclude the force of direct diction. This rare combination of dignity with simplicity has been sufficient to preserve his work without any great strength of struc¬ ture, any compelling movement of the whole. The (Morte d'Arthur) is not composed as a whole, not planned to lead us on stage by stage to a culmination. True, the closing books are felt as the tragic conclusion of Arthur's chivalry in a world of violence ; but with many of the preceding stories it has no specific connection. Rather Malory worked as the mediaeval ro¬ mancers from whom he drew had worked be¬ fore him. Collecting all the well-known stories — and a few less well known — that had come to be associated with the great name of Arthur, he used them much as he found them; and he told each for itself. Though he sometimes suggests complication of plot or development of character, he never worked for these in the ways of the modern novelist. The Renaissance had but touched England; and its literary ideas, even if they had been prevalent, would hardly have moved so thorough a medievalist as

Malory. He turned away from the actual wars of the Roses to the legendary wars of Arthur's knights because of his intense sympathy

with the ideals of a passing chivalry. He is far more medieval than Chaucer. Though in style he has his own distinction, in composition he is the typical medieval transmitter.

Every one of the stories that he thus brought together has a long history. Many of them reach far back into folklore. Most of them before they came to him had been told over and over again. The successive versions, their relations, their combination, the transference of a tale from Gawain to Percival and then to Galahad, the building up of a cycle of Grail stories and the attaching of this to the Arthurian cycle — all these have claimed much scholarly investigation and still offer problems as difficult as they are significant. But of this Malory was no more aware than the thousands of readers who have gone to him, not for history or folk¬ lore, nor for psychology or drama, but for the solace and inspiration of high adventure.

Beginning with the perennial story of the prince wondrously born and sent in the nick of time to claim the crown, right wrong, and establish a kingdom of justice, courtesy, and honor, he ends with the traditional hope that the same king, though in his stricken age borne away to the Isle of Avilon, may yet return to reign. Only to the latter books belongs prop¬ erly the title (Morte d'Arthur,* which is borne also by several mediaeval poems. Between the young prince smiting the stone with his miracu¬ lous sword and the old king fighting his last battle against treason in the dim West, what a store of quests and deliverances, what a goodly array. Balen and Balan still show a primitive wildness in spite of the faint hint of the coming Grail; and the fairies, though crowded to the back of the stage by the stir of chivalry, still peep from their Celtic twilight. Morgan le Fay is dangerous in revenge. The Lady of the Lake gives the magic sword, and to her at the last it returns. Merlin the wizard, after all his triumphs of wisdom and skill, ((was assotted and doted on one of the ladies of the lake.® But these are only old echoes. The stories are of chivalry; of Beaumains, youth proving its unconquerable force; of Tristram and Iseult, the immortal lovers, and Guenever, the queen mistress who drew the peerless Lancelot across steel and fire and even across loyalty; of Gawain, his earlier fame tarnished, but still the courteous; of a hundred good knights who sought wild paths and frightful risks and stiff battles because they must make life an adventure.

Following these old adventures with ad¬ venturous hearts, readers have always been glad that they are numerous, and have not missed in the thronging of Malory's stories that unity which he did not seek. From the conquest of Rome to the earliest adventures of Lancelot,

from Beaumains to Tristram, Malory goes leisurely, but always with zest; and by the way he pauses for yet other stories. The (Morte d'Arthur* is a storehouse of romance. And above all the other quests, above the errant fighting throng, shines the supreme quest of the Holy Grail, the great romance of the Mass. Malory's aim, then, was not that modern literary distinction which comes from

originality of composition; it was to make men love the high things that he loved. His work was to him the handing on of the great tradi¬ tions of chivalry. Caxton, who printed it in 1485, well calls it a ((noble and joyous book.®

Charles Sears Baldwin.

MORTEN-MULLER, morhen-rniil'ler, Norwegian painter: b. Holmestrand, Christianiafiord, 29 Feb. 1828; d. 1911. He began to study art in Diisseldorf (1847) first under Tide-mand and Eude, and later as a pupil in the academy under J. W. Schirmer. He removed to Stockholm in 1850, but in 1866 opened an art school in Christiania under government patronage. He returned to Diisseldorf in 1871 and devoted himself to setting forth the wild scenery of his native country in a series of vast canvases. Fiord, valley and mountain height are represented with fine imaginative yet truthful line and color. The most noteworthy of his landscapes are (Norwegian Landscape) and (Entrance to Hardangerfiord) (both in the National Gallery of Christiania) ; (A Fir For¬ est) (in the Gallery at Hamburg) ; (Romsdal-fiord,* with historical figures put in by Tide-mand (1876) ; (Start of the Fishing-boats by Night) ; (Waterfall and Pine Forest) (1879);

(Fisherman's Cot in Christianiafiord) (1880);

< Woodland Lake by Moonlight* (1892). His works combine romantic picturesqueness with color power of startling realism. In 1874 he was appointed court painter and member of the Stockholm Academy.

MORTGAGE, mor'gaj (((dead pledge®), in law, the conveyance of property, movable or immovable, as security for the payment of a debt on the condition that if the debt be duly paid the conveyance shall be void. The term is applied: (1) To the act of making such a

conveyance; (2) to the deed by which such conveyance is made; (3) to the rights thereby conferred on yhe mortgagee. He who makes the mortgage is the mortgagor; he for whose benefit it is made is the mortgagee. Whatever may be sold may be mortgaged. Mortgages may therefore cover chattels or real estate. Mortgages must be in writing, either in one single instrument containing the whole case or in two, one containing the conveyance, the other the condition of the conveyance, this last doc¬ ument being the "defeasance.® A deposit of titledeeds, with a verbal agreement, creates an equitable mortgage in some States which recog¬ nize this proceeding as a mode of securing a debt. The different States regulate the time in which mortgages are to be recorded, in order to protect innocent purchasers, but an unrecorded mortgage is good as against the mortgagor or any purchaser knowing of its existence at the time of his purchase. The tendency of courts now is to regard a mort¬ gage as a lien rather than a conveyance of the land, and it is now generally regarded as a mere security for the payment of a debt. In those States which recognize chattel mortgages (or mortgages of personal property), a record of the same within a specified time is required to render them valid as against other claim¬ ants. See also Foreclosure.

MORTGAGE BANKS. See Banks and Banking — World's System.

MORTIER, mor'jya', Edouard Adolphe Casimir Joseph, Duke of Treviso, French

marshal: b. Cateau-Cambresis, 13 Feb. 1768; d. Paris, 28 July 1835. He entered the army in 1791, fought in the campaigns of 1792 to 1795, was brigadier-general in 1798 on the fields of South Germany and Switzerland, and be- * sieged (1803) Hanover, being raised (1805) to rank of marshal. In the war with Prussia he commanded the army against the Swedes and was victorious at Anklam (1807), whereupon he agreed to an armistice at Schlatkow (18 April). He commanded the left wing of the army in the battle of Friedland and was cre¬ ated Duke of Treviso (1808), to be given in that year command in Spain, where he won the battle of Ocana (1809). He commanded the young Guards in the Russian campaign and also in 1813. In 1814 he, together with Marshal Marmont, defended Paris,

but submitted to Louis XVIII and was made a peer of France. By March 1815 he had again joined the forces of Napoleon, thereby losing his title of peer, on the latter's defeat and the second Restoration. He was elected (1816) member of the Chamber of Deputies and retained the place till the end of 1818. In 1819 the dignity of the peerage was restored to him, being made hereditary in 1824. He was made chief chancellor of the Legion of Honor (1834) and became Minister of War and president of the council in the same year. He was killed (1835) by the infernal machine of Fieschi at the king's side as he was passing along the Boulevard du Temple, Paris. Monu¬ ments have been erected in his memory in his native city and also Lille.

MORTIFICATION. See Gangrene.

MORTIMER, mor'ti-mer, John Hamilton,

English artist: b. Eastbourne, Sussex, 1741; d. 1779. After studying under Sir Joshua Rey¬ nolds, he carried off the first prize of the So¬ ciety of Arts, London (1763). He was elected R.A. in 1779. A bold and vigorous draughts¬ man and a good colorist, he was fond of dra¬ matic scenes in which there was an element of the terrible. His style and manner are well ex¬ emplified in the pictures 'Battle of Agincourt* • 'Voltigern and Rowena* ; (Hercules Slaying the Hydra) ; now in the South Kensington Museum. He was very successful as an etcher and designed stained glass for Salisbury Cathe¬ dral and Brasenose College, Oxford.

MORTIMER, Roger, 8th Baron of Wig-more and 1st Earl of March, English noble: b. about 1287 ; d. Smithfield, 29 Nov. 1330. He had been convicted of treason in the reign of Edward II and pardoned; but notwithstanding the king's clemency took part in the rebellion of the Earl of Lancaster, and was made pris¬ oner in 1322. Having escaped from the Tower, where he. was confined, he went to France and at Paris in 1325 met Queen Isabella, who had been sent thither by Edward to negotiate a treaty. Fascinated by his pleasing .address, the queen was soon known to be living in guilty intimacy with the exile, and, having secured the person of her young son, began to mature plans with Mortimer and the other leaders of the barons for getting possession of the kingdom. Mortimer went with her to England in 1326 ; the king was deposed and his son Edward III proclaimed in his stead, and for some years Isabella and her paramour governed the realm in the name of the young prince. Mortimer is popularly regarded as responsible for the

death of the dethroned monarch in his prison (1327). The failure of the Scottish expedition in 1327, and the ((shameful peace** with Scot¬ land in the following year, had wounded the pride of the English people. The nobles wearied of his arrogance and Edward resolved to take the sceptre into his own hands. While the queen and Mortimer were in Nottingham castle during the session of Parliament at that town, the king and Lord Montacute with at¬ tendants entered by night through a subter¬ ranean passage and carried off the earl. The king summoned a new Parliament to meet him at Westminster, and on 26 November Mortimer was condemned by this Parliament and ex¬ ecuted three days later.

MORTMAIN, mort'man, in English law, lands held by a corporation were said to be held in mortmain (mortua manu, by dead hand), because they were then not alienable. The expression has particular reference to es¬ tates held by religious and eleemosynary cor¬ porations in England. At one time half the land in England was vested in religious houses. As early as 1279 the English Parliament began to deal with the evils arising from the transfer of lands to religious corporations ; the lords of the soil were deprived of escheats or other feudal profits : <(a dead hand yieldeth no serv¬ iced In 1736 by the Mortmain Act the power of devising land by will to charitable purposes was destroyed. The law on this subject was consolidated by the Mortmain and Charitable Uses Act (1888), under which no bequest for a charitable purpose was to involve the ac¬ quisition of land. The Act of 1891 enacted that land may be devoted to any charitable use, but it must be sold within a year from the tes¬ tator's death, unless the time be extended by certain authorities. It also permits the acquire¬ ment of land directed to be acquired for a charity if the court or the charity commission¬ ers consent. A large number of acts from 1841 onward have exempted from mortmain restric¬ tions land bequeathed for school sites, burial-places, places of worship, literary and scientific institutions, public parks, but maximum limits are imposed in several cases.

The old English statutes of mortmain have not been regarded as in force in the United States except in Pennsylvania, where the dedi¬

cation of property to superstitious uses, and grants to a corporation without statutory li¬ cense, are forbidden. In some States the right of religious corporations to hold land, and the power to make, devise or bequeath land to religious societies or charitable purposes, is restricted.

MORTON, Charles, English-American Puritan divine : b. Pendavy, Cornwall, 1627 ; d. 1698. He studied at Wadham College, Ox¬ ford, was appointed (1655) rector of Blisland, but his puritanic tendencies caused his eject¬ ment in 1662. He was made master of the dissenters' school at Stoke Newington, London (1685), where Daniel Defoe was numbered among his pupils. Prosecutions by the ecclesi¬ astical courts caused him to migrate (1686) to New England and he became minister of the first church at Charlestown, Mass. He was prosecuted for a seditious sermon (1687) but acquitted. He got into close connection with Harvard and was given (1692) the management

of the inward affairs of the college with the title of vice-president. His succession to the college's president, Increase Mather, seemed likely but for his death. He approved the prosecutions for witchcraft at Salem. Consult Quincy, Josiah, (History of Harvard Univer¬ sity } (Cambridge, Mass., 1840).

MORTON, or MOURT, George, Puritan colonist: b. York, England, about 1585; d. 1628 (F). He affiliated himself with the Puri¬ tans in 1600 and settled in Holland, but was for some years previous to 1620 London agent for the Puritans. Authorities disagree as to his career, some placing his emigration to America in 1620 while others fix it at 1623, and the same uncertainty prevails as to his death, the dates varying from 1624 to 1628; there is no con¬ clusive evidence as to whether it occurred in England or America. For many years he was credited with the authorship of Mourt's (Rela¬ tion or Journall of the beginning and proceed¬ ings of the English Plantation at Plimoth,* published in London in 1622. Careful investiga¬ tion, however, seems to prove conclusively that the authorship must be credited to Winslow and Bradford, and that at most only a small portion of it can be claimed by Morton. The work, which is regarded as the most authentic history of the times in existence, has been sev¬ eral times reprinted. Consult (Mourt's Rela¬ tion, } with introduction and notes by Henry Martyn Dexter.

MORTON, Henry, American scientist : b. New York, 11 Dec. 1836; d. there, 9 May 1902. He was graduated from the University of

Pennsylvania in 1857 and became professor of physics and chemistry at the Episcopal Academy of Philadelphia in 1860. His lectures in 1863 at the Franklin Institute in Philadel¬ phia attracted attention throughout the United States and Europe by reason of his brilliant and unique experiments. He was one of the found¬ ers of the Philadelphia Dental College in 1863 and its first professor of chemistry, and in 1864-70 was resident secretary at Franklin In¬ stitute, where he continued his lectures. _ In 1867 he was appointed professor of chemistry at the University of Pennsylvania, and in the same year became editor of the Franklin Insti¬ tute Journal. He conducted the photographic branch of the United States eclipse expedition to Iowa in 1869, and in additon to securing several excellent photographs of the eclipse, proved that the bright line of the sun's disc adjacent to the moon is due to a chemical ac¬ tion in the process of developing the plate and not to diffraction as had hitherto been held by the best scientists. In 1870 he was chosen pres¬ ident of the newly-founded Stevens Institute of Technology, and under his direction the faculty was selected and the course of instruc¬ tion formed. His management of the institute made it one of the leading technological schools of the country; he gave it the benefit not only of his great learning but also several munificent gifts in the establishment and endowment of various necessary departments. His reputation as a scientist became worldwide and his serv¬ ices as a chemical expert were eagerly sought in litigation. From 1878-85 he was a member of the United States Lighthouse Board and in 1876-81 he was president of the American Chemical Society. Besides writing numerous

papers on electricity and fluorescence, he as¬ sisted in the preparation of 'The Student's Practical Chemistry } (1868).

MORTON, James Douglas, 4th earl of, regent of Scotland : b. Dalkeith, Scotland, about ISSO; <J, Edinburgh, 3 June 1581. He married a daughter of the third earl and succeeded to the earldom on the death of his father-in-law, in 1553. He became Lord High-Chancellor of Scotland 10 years later, but fled to England in 1556 on account of his

share in the murder of Rizzio. He was soon pardoned and on Bothwell's abduction of Queen Mary joined the confederated lords against him. He stood sponsor for James VI at his coronation, and led the van at the battle of Langside (1568). He again became one of the leading opponents of Bothwell ; was chancellor, and in 1572 regent of the kingdom. Having made himself many ˆenemies by maladministration, he resigned, but recovered authority not long after. His ene¬ mies, however, at length proving too strong for him, he was charged as accessory to the murder of Darnley, tried, condemned and be¬ headed by the decapitating instrument he him¬ self had introduced into Scotland.

MORTON, James St. Clair, American sol¬ dier: b. Philadelphia, Pa., 24 Sept. 1829; d. Petersburg, Va., 17 June 1864. He was gradu¬ ated from West Point in 1851, was appointed to the engineering corps and in 1855-57 was assistant professor of engineering there. He was in charge of the Chiriqui expedition in Central America in 1860, and later superin¬ tended the work on the Washington aqueduct. In 1861 he was in command of the fortification

. Tortugas, and in May 1862 was appointed ■chief engineer of the Army of the Ohio. In October 1862 he was promoted brigadier-gen¬ eral and was transferred to the Army of the Cumberland as chief engineer in command of the bridge-brigade. He built the entrenchments around Murfreesboro, Tenn., and was en¬ gaged in the battles at Chattanooga and Chickamauga. He was chief engineer of the Ninth army corps in the Richmond campaign of 1864, and was killed in the battle of Peters¬ burg. He published (An Essay on Instruction in Engineering* (1856); 'Memoir on Fortifi¬ cation (1858) ; 'Life of Maj. John Saunders, of the Engineers* (1860), *etc.*

MORTON, John, English prelate: b. Mil-borne, Saint Andrew, Dorsetshire, England, about 1420; d. Knoll, Kent, 15 Sept. 1500. He studied at Balliol College, Oxford, and subse¬ quently became principal of what is now Christ Church College. He adhered with great fidelity to Henry VI and the house of Lancaster, but nevertheless Edward IV made him master of the rolls and bishop of Ely (1478). Richard III imprisoned him, but he escaped to Flanders and under Henry VII became archbishop of Canterbury and chancellor (1486). It was he who suggested the union of the house of Lan¬ caster and York by the marriage of Henry with Elizabeth of York, daughter of Edward IV. In 1493 he became a cardinal.

MORTON, John, one of the signers of the Declaration of Independence: b. Ridley, Dela¬ ware County, Pa., 1724; d. April 1777.

After working for several years as. a surveyor he began the practice of law. In 1764 he was

elected to the general assembly of Pennsylvania, of which he became a conspicuous member, serving for a number of years and being speaker from 1772 to 1775. In 1765 he was a member of the Stamp Act congress; in 1766 became sheriff in his county, and was shortly afterward appointed one of the judges of the Supreme Court of Pennsylvania. He was al¬ ways an earnest advocate of the rights of the colonies and warmly supported the Revolution¬ ary War. In 1774 he was elected a delegate to the 1st Continental Congress, and was a member of that body till his death, taking active part in its debates and in the framing of the Articles of Confederation. He gave the cast¬ ing vote of Pennsylvania in favor of the Declaration of Independence, the four other delegates present from that State being equally divided as to the measure, and affixed his sig¬ nature to the Declaration. •

MORTON, John Maddison, English dram¬ atist: b. Pangbourne, 1811; d. 1891. He was educated in France, then held a clerkship in Chelsea Hospital, London (1832-40). In 1881 he became a Charterhouse brother when in sore need of a pension. He wrote farces, showing exceptional facility in the adaptation of French dialogues to suit English taste. While he was a prolific writer of plays little survives for recent presentation except his ever-popular 'Box and Cox* (1847). Consult 'Dictionary of National Biography* Vol. XXXIX (London 1894).

MORTON, Julius Sterling, American agri¬ culturist and statesman: b. Adams, N. Y., 22 April 1832; d. Lake Forest, Ill., 27 April 1902. He was graduated from Union College in 1854 and removed to Nebraska City in 1855, where he was editor of the Nebraska City News. In 1856-57 he was a member of the Territorial legis¬ lature, and in 1858 secretary of the Territory. Upon the resignation of Governor Richardson in 1858 he acted as governor, and in 1893-97 was Secretary of Agriculture under President Cleveland. He was the originator of Arbor Day and an active member of various agricul¬ tural and horticultural societies.

MORTON, Levi Parsons, American banker and politician: b. Shoreham, Vt., 16 May 1824; d. Rhinebeck, N. Y., 16 May 1920. In 1843 he established a mercantile business at Hanover, N. H. ; in 1850 entered the banking business in Boston ; and later removed to New York, where in 1863 he founded the large banking firm of Levi P. Morton &

Company (later Morton, Bliss & Company), which assisted in floating the government war loan during the Civil War. He also established a branch of his firm in London, and the Morton Trust Company of New York, and gained a reputation as an able financier. He was elected to Congress on the Republican ticket in 1878 and served one term (till 1881) ; he was then appointed United States Minister ter France, where he remained till 1885 ; in this capacity he secured legal status in France for American corporations. In 1888 he was elected Vice-President of the United States, and made an especially able presiding officer in the Senate. In 1894 he was elected governor of New York State, serving for one term ; in the last year of administration he urged in a special message the abolition of the

ward-trustee system of school government in New York city public schools, and signed the bill which enforced this reform. In 1896 he was New York State's candidate for the Presidency at the National Republican Convention. After retiring from public life he resumed his bank¬ ing operations and became a director in several insurance companies.

MORTON, Nathaniel, American historian: b. Leyden, Holland, about 1613 ; d. Plymouth, Mass., 29 June 1685. He was of English descent, came with his father to Plymouth in 1623, be¬ came an inmate of Governor Bradford's family and his public assistant, and from 1645 until his death was secretary of the colony. In com¬ pliance with the request of the commissioners of the New England colonies, he compiled (1669) and published his principal work, (New England's Memorial, or a Brief Relation of the Most Remarkable and Memorable Passages of the Providence of God Manifested to the Plant¬ ers of New England.) For nearly two cen¬ turies, or until Bradford's 'History of Ply¬ mouth } was discovered in 1855, Morton's work was the principal authority, on the matters it dealt with. He compiled it largely from Brad¬ ford's manuscripts and Edward Winslow's journals. 'New England's Memorial > was sev¬ eral times reprinted in the American colonies, and was also reproduced in England. Besides

various other works, Morton was also the author of (A Synopsis of the Church History of Plymouth (1680).

MORTON, Oliver Perry, American states¬ man : b. Salisbury, Wayne County, Ind., 4 Aug. 1823; d. Indianapolis, 1 Nov. 1877. He studied law, was admitted to the bar in 1846, began the practice of his profession in Centreville, Ind., and became a circuit judge in 1852. He was an anti-slavery Democrat, but, after being read out of the party for his refusal to support the Kansas-Nebraska bill, became one of the leaders of the new Republican party, and was defeated as its candidate for governor in 1856. Four years subsequently he was elected lieu¬ tenant-governor, and when, in January 1861, Governor Lane was elected to the national Senate, Morton became governor. His active loyalty to the government did much to sustain the administration during the trying times of the Civil War. At its outbreak he at once sent troops to the field, but in the next year was greatly hindered in his efforts by a hostile legis¬ lature and subsequently by the efforts of a secret, disloyal society known as the Knights of the Golden Circle. Several plots at his assassi¬ nation were hatched. Nevertheless he sur¬ mounted all obstacles, and his services to the nation were thankfully recognized by its chiefs. He was elected a United 'States senator from Indiana as a Republican in 1867, serving till 1877, and in the latter year was a member of the Electoral Commission. Consult 'Life,* by Foulke (1899). After the close of the Civil War he had been stricken with paralysis in his lower limbs, but his intellectual powers rose above his physical disability, and he con¬ tinued until his death one of the most eloquent, forceful and dominating figures in public life. The fact that he sometimes addressed the Senate standing supported by two canes earned for him the waggist sobriquet of the (<Devil on Two Sticks.®

MORTON, Paul, American financier and

politician : b. Detroit, 22 May 1857 ; d. New York, 1911. He attended the Nebraska public schools, and at the age of 16 started his com¬ mercial career as office boy in the land office of the Burlington and Missouri River Railroad, at Burlington, Iowa; after several promotions he entered the employ of the Chicago, Burlington and Quincy Railroad, rising from clerk to chief clerk, then successively assistant general freight agent, general passenger agent, and general freight agent. In 1890 he became vice-presi¬ dent of the Colorado' Fuel & Iron Co., for six years, when he accepted the vice-presidency of the Atchison, Topeka and Santa Fe Railroad, greatly distinguishing himself

in railroad and public affairs. He influenced great advances in the railroad system, and was a true friend and advocate of the rights of the employees in large corporations ; also favored publicity as assisting in the work of the investing public and productive of honesty in management. Until 1896 he had been very stanchly Demo¬ cratic but the ((silver question® won him over to the Republican party. In 1904 he was ap¬ pointed by President Roosevelt Secretary of the Navy, but he retired (1905) to become president of the Equitable Life Assurance Society of New York. He thoroughly reorgan¬ ized the corporation's system and advanced to fruition many measures that brought about uniformity in tariffs and stability in executive departments of insurance. His death occurred suddenly and unexpectedly as he was, unaccom¬ panied, passing between the different public offices in the course of business.

MORTON, Samuel George, American anat¬ omist : b. Philadelphia, Pa., 26 Jan. 1799; d. there, 15 May 1851. He studied medicine at the University of Pennsylvania and in Edinburgh; began to practice in Philadelphia in 1824; was immediately prominent in the Academy of Natural Sciences being its secretary 1825 and its president 1850; became professor of anatomy in .Pennsylvania College in 1839; and made special studies of ethnology, craniology and plant physiology. His valuable collection of skulls, numbering 1,500 specimens (900 human), led him to urge the diverse origin of the human race. He contributed to Silliman's Journal, and published 'Crania Americana) (1839) ; (Crania Egyptica) (1844), and 'Illustrated System of Human Anatomy> (1849). Consult 'Life* by Meigs (1851).

MORTON, Thomas, English prelate : b. York, 1564; d. 1659. He studied at Saint John's College, Cambridge, receiving the de¬ grees M.A. (1590), and D.D. (1606), becoming a Fellow and university lecturer in logic. He became one of the chaplains of James I and (1606) dean of Gloucester, was transferred (1609) to deanery of Winchester, to canonry of York (1610) and was made bishop of Ches¬ ter in 1616. He was translated to Litchfield and Coventry (1618), in which fields he devoted his endeavors to win over the Nonconformists and recusants. In 1632 he was appointed to the see of Durham, holding the position canoni¬ cally till his death, though Parliament decreed his deprivation in 1647. He had been im¬ peached (1641) on the fall of Charles I, but was released after four months' imprisonment without trial, and was again imprisoned in 1645

because he refused to surrender the seal of Durham. After being driven (1648) from Durham House, London, he ultimately resided at Easton-Maudoit with Sir Christopher Yel-verton. Most of his written works were de¬ voted to exposure of Romish fallacies. His three most noted works are(Apologia Catholica) (1605); (Catholic Appeal > (1609); (Causa

Regia 5 (1620).

MORTON, Thomas, English colonist in America: b. England about 1575; d. Agamenti-cus (or Acomenticus), Me., 1646. He was an attorney of Clifford's Inn, London, of a some¬ what doubtful reputation, and seems to have practised mainly in western England. In 1622 he landed in New England, where he remained three months ; and in 1625 returned with Wol¬ laston's Company. Wollaston soon after left for Virginia, and in the summer of 1626 Morton assumed control over those of Wollaston's fol¬ lowing that remained. The settlement, Mount Wollaston (now Braintree, Mass.), near the coast, he called Mare Mount (Merry Mount) ; and in the spring of 1627 he erected a Maypole, and with the ˆsalvages® proceeded to hold May-day to the scandalizing of their Puritan neighbors of Plymouth. Contrary to law, he supplied the Indians with firearms and in¬ structed them in their use; and he was a rival of the Plymouth settlers in the fur-trade. He was accordingly arrested by Capt. Miles Standish and sent back to England (1628). But in August 1629 he was again in New Eng¬ land. In August or September 1630 he was a second time arrested and banished. He pub¬ lished, in 1637, (New English Canaan,5 which Nathaniel Morton ((New England's Me¬ morial 5) denounces as (<full of lies and slanders, and full fraught with profane calumnies,55 but which as a satire is sometimes not unamusing, and contains information of interest regarding local features and the Indians. When he ven¬ tured back to New England (1643) he was imprisoned for about a year while evidence for a libel suit was being collected, and was finally let go on payment of a fine of $500. Nathaniel Hawthorne's (The Maypole of Merry Mount5 (in (Twice-Told Tales,5 1837) and J. L. Mot¬ ley's (Merry Mount5 (1849) are based on Mor¬ ton's career.

MORTON, William James, American phy¬ sician : b. Boston, 3 July

1845. He is a son of W. T. G. Morton (q.v.), whose name is con¬ nected with the first anaesthetic use of ether. He was educated at the Boston Latin School, Harvard University and Vienna. On his graduation there, in 1872, his thesis on (<Anaesthetics,55 gained him the Boylston prize. He practised medicine at Bar Harbor, Me., and in Boston; went to Kimberley, South Africa, where, besides practising his profession, he en¬ gaged in diamond-mining. Settling in New York he became editor of the Journal of Nervous and Mental Diseases; from 1882-85 was adjunct professor of nervous diseases at the New York Post-Graduate Medical School; served as neurologist to the New York Infant Asylum, 1887-90; and was afterward professor of nervous diseases and electrotherapeutics at the New York Post-Graduate School. As an authority in electrotherapeutics he has won wide recognition, and by his mechanical device for establishing the ((static induced current55 of elec¬

tricity — the <(Morton current55 of the scientific world — has supplied a means for producing the X-ray, and rendered a service of great prac¬ tical value to medicine and surgery. Indicted in January 1912, in association with Julian Hawthorne and others, on a charge of fraudu¬ lent use of the mails in the promotion of bogus mining companies, conviction followed nearly a year after; he was sentenced to 12 months' imprisonment, but was released in October 1913, pardoned by the President and reinstated in his profession.

MORTON, William Thomas Green, Amer—

can dental surgeon : b. Charlton, Mass., 19 Aug. 1819; d. New York, 15 July 1868. He estab¬ lished himself in the practice of dentistry in Boston, and there in March 1844 became a stu¬ dent of medicine in the office of Dr. C. T. Jackson (q.v.), the scientist. In November 1846 he obtained a patent for the process of anaesthesia by what he called Uetheon,55 now known as ether. Jackson claimed the discovery of ether¬ ization previous to the winter of 1841-42, and Morton's patent was contested by both Jackson and Horace Wells, another of Jackson's pupils. Morton communicated his knowledge of the process to Dr. J. C. Warren, and anaesthesia by ether was made public through an operation performed by Warren at the Massachusetts General Hospital 16 Oct. 1846. The French Academy of Sciences investigated the matter and decreed a Montyon prize of 2,500 francs to Jackson for the discovery, and another of like amount to Morton for the application of the discovery to surgical operations. In 1852 a bill appropriating $100,000 as a national testi¬ monial to Morton was introduced in

Congress, but failed, as it did also in 1853 and 1854. Tes¬ timonials accrediting to him the application of ether as an anaesthetic were signed by the medi¬ cal profession in Boston (1856), New York (1858) and Philadelphia (1860). Consult Wevman, ˆTrials of a Public Benefactor5

(1859).

MORTUARY CUSTOMS. See Burial; Dead, Disposal of.

MORWITZ, mor'vits, Edward, German-American journalist: b. Dantzig, Prussia, 12 June 1815; d. Philadelphia, 13 Dec. 1893. After thorough training in the sciences and medicine at various German universities, he was gradu¬ ated in 1840 from Berlin University, where he became an assistant physician and wrote (The History of Medicine5 (1848-49). In 1843 he practised his profession at Conitz, Prussia, but after the Revolution of 1848 settled in the United States. In 1853 he bought the German Democrat of Philadelphia and in 1855 issued a German political weekly, The United States Journal, followed in the same year by a Ger¬ man Sunday paper, The New World. He gave great support to the Union during the Civil War, and assisted in the raising of troops and the placing of government loans. In 1862 he took a leading part in establishing the Ger¬ man Press Association of Pennsylvania, and in 1870 organized the movement to raise funds for aiding German soldiers in the Franco-Ger¬ man War, about $600,000 being received for that purpose. He at one time owned or con¬ trolled about 300 newspapers, both German and English, and was a powerful factor in welding together the German population of the State.

He invented a breech-loading gun before leav¬ ing Germany.

MOSAIC, an imitation or reproduction of a painting or ornamental design, formed gener¬ ally by means of pieces of opaque glass of dif¬ ferent colors; also by colored stones (espe¬ cially marbles and

precious stones) placed side by side, and attached by being bedded in a ce¬ ment. The art originated in the East, but re¬ ceived its perfection from the Greeks, and was thus conveyed to the Romans. In Italy many floors ornamented with mosaic work have been found among ancient ruins. Afterward, when the art was revived in Italy, the Venetian school becoming very celebrated, Clement VIII, in the 17th century, had the interior of the dome of Saint Peter's decorated with this kind of work. The art was largely employed for copying painting by famous artists, and thus rendering permanent their original freshness and beauty. The Roman school of inosaicists is still the most famous, though excellent works have been produced in recent times by Vene¬ tian and also by Russian artists. There is a studio for the production of mosaics in the Vatican at Rome. The most important works ex¬ ecuted here in recent times are a series of por¬ traits of the popes. In the most costly mosaics precious stones have been cut to furnish mate¬ rials ; but in common works of this art enamels of different colors, manufactured for the pur¬ pose, are the material employed. Roman enam¬ els are made of small rods of opaque colored glass. In the first place cakes of glass are made of every variety of color and shade likely to be required. As many as 10,000 shades are said to be in use. These cakes are drawn out into rods thicker or thinner, according as they are to be used for finer or for coarser work, a great number being mere threads. They are kept in bundles, and arranged in sets corre¬ sponding to their colors. For a work of mod¬ erate size a piece of dark slate or marble is prepared by being hollowed out like a box and filled with plaster of Paris ; upon this plaster the artist draws the design or pattern, and the workman proceeds with his work by removing small squares of the plaster, and filling in these with pieces cut from the glass rods, the pieces being fixed in their places bv a cement. Gradually, in this manner, all the plaster is re¬ moved, and a picture is formed by the ends of the pieces of colored glass. It will easily *be understood that this is a very slow process, and there are large pictures that have taken as many as from 12 to 20 years to produce. When mosaic pictures are to be viewed near at hand they are polished perfectly smooth with a flat stone and emery, and present a glossy surface similar to that of paintings in oil. When they are to be viewed at a distance the surface is left rough, when they present an appearance similar to pictures in fresco. Inlaid works, of agate and other costly stones, are executed on the same principle as mosaic, except that the stones are larger, and cut to the shape of dif¬ ferent parts of the object to be represented. Works of this class are known as Florentine mosaics. Flowers and ornamental designs are the chief objects of this branch of the art. A mode has been invented of sawing the plate with the mosaic pictures into two or

three sheets, and thus increasing the number of works produced at one time. Consult Barwell

and Druitt, (Mosaics and Stained Glass) (New York 1909) ; Furnival, W. J., (Leadless Deco¬ rative Tiles> (Stone, Staffordshire, 1904).

MOSANDRIUM, or MOSANDRUM

(Jfrom K. G. Mosander, a Swedish chemist), supposedly a new rare earth metal, whose oxide was thought to have been discovered in 1878 by Lawrence Smith, in specimens of the mineral samarskite obtained from North Carolina. It was afterward shown to be a complex substance containing ‘ terbium, samarium, dysprosium, traces of praseodymium and neodymium and probably gadolinium.

MOSASAURIA, an order of marine reptiles of the Upper Cretaceous Period, typical of the reptilian subclass Pythonomorpha. They were of worldwide distribution and their remains occur so plentifully in the western United States as well as in the Old World that their structure is thoroughly known. They were large predaceous marine lizards, resembling the modern monitors in many features, but reach¬ ing in many species the size of crocodiles — larger in some cases, but no skeletons are known indicating a greater length than 45 feet. They had four limbs with all the bones well developed but enclosed in a mitten of flesh and skin, forming paddles, which, with their great tails, must have made them powerful and agile swimmers. <(Their cup-and-ball vertebrae indi¬ cate great flexibility of the body, their sharp teeth denote ability to capture slippery prey, and the structure of the lower jaw shows that they probably ate in a hurry and swallowed their food entire. … In the mosasaurs, as in the cormorants, among birds, there is a sort of joint, in each half of the lower jaw, which permits it to bow outward when open ; …

if the reader will extend his arms at full length, the palms touching, and then bend his elbows outward, he will get a very good idea of the action of a mosasaur’s jaw® — Lucas. The mosasaurs were of three types, namely, Tylo-saurince, resembling gavials, with a long slender beak or exension of the snout beyond the teeth, and long paddles strengthened with numerous phalanges ; Plate car pince, short¬ headed, very long-tailed reptiles, including Platecarpus, Prognathosaurus, Brachysaurus and some other genera; and Mosasaurince. The last were the typical mosasaurs, apparently the most completely marine and powerful and per¬ fected of the race. The

two genera are Mosasaurus and Clidases. None survived the close of the Cretaceous. Consult Zittell-East- man, (Textbook of Paleontology) (1902), in which will be found detailed and illustrated descriptions of various forms, and many refer¬ ences to the literature of the subject.

MOSAYLIMA, mo-sa-le'ma, or MOSEI-LEMA, Arab prophet and rival of Mohammed (q.v.) : b. early in the latter half of the 6th cen¬ tury; d. 633. He seems to have been a prophet in the tribe of Bani Hanifah, in Nejd, before Mohammed arose; and his name Rahman, ((the merciful,® one of Mohammed's favorite titles for Allah, may be held proof that he claimed to be the Messiah. Tradition says that Moham¬ med scornfully refused Mosavlima's suggestion that they should share the spiritual leadership of the earth ; but modern criticism makes it more probable that the Prophet compromised with him considerably, and it is even suggested

that Mohammed wished to make him his suc¬ cessor by testament, but was prevented by his attendants as he was dying. A break between Abu Bekr, the caliph, and Mosaylima came speedily; perhaps Mosaylima even openly op¬ posed Islam. At any rate in the 11th year of the Hegira, his forces though far superior in numbers were met and defeated by Khaled, the Sword of God.

MOSBY, moz'bi, John Singleton, American lawyer and soldier : b. Edgemont, Powhatan County, Va., 6 Dec. 1833; d. Washington, 30 May 1916. He was graduated at the University of Virginia (1852), admitted to the bar (1855) and was practising law at Bristol, Va., when the Civil War broke out. He enlisted as private in the Confederate army and was later promoted adjutant of the 1st Virginia Cavalry. In two months' time, however, he was reduced to the ranks. Mosby, undaunted, then offered his services as scout to Gen. James E. B. Stuart, and in that capacity guided Stuart's cavalry in a desperate raid on McClellan's army on the Chickahominy in June 1862. In 1863, after en¬ during a short captivity, he went to Richmond and recruited an independent body of fighters which soon became famous under the name of Mosby's Partisan Rangers. This small cavalry command, of

which he was colonel, became a terror to the Union troops and did much damage in cutting off means of communication and destroying supply trains, capturing outposts, *etc.* They adopted a guerrilla style of warfare and operated through Virginia and Maryland. Sub¬ sequently his force was pressed into the regular Confederate army as the 43d battalion of Vir¬ ginia cavalry, and served till the cessation of hostilities. His men were dispersed and con¬ cealed when not engaged in raiding, and he had in force a perfect system of reassembling them at the shortest notice. At Chantilly (16 March 1863) he defeated a much larger force than his own. Probably his most brilliant exploit was the capture of Brigadier-General Stoughton, United States army, at Fairfax Courthouse, in the same month. To accomplish this he made a raid inside the Federal lines. At Danesville (1 April 1863) he successfully defended himself against a force sent especially to capture him. He harassed the rear of Grant's army, in its advance on Fredericksburg, to such an extent that Grant was forced to send a special detail to protect his communications and supplies. . One of Mosby's most important raids resulted in the capture of Sheridan's entire supplv train, which he surprised near Berryville.

Mosby was commissioned captain in March 1863, major two weeks later and colonel some time after that. His regiment was disbanded 21 April 1865, and he again took up the practice of law, settling at Warrenton, Va.

Mosby became a Republican after the War and supported General Grant for the presidency. It is said he originated the phrase <(the solid South? He was United States consul to Hong¬ kong 1878-85, afterward practised law in San Francisco, Cal., and was assistant in the De¬ partment of Justice at Washington 1904-10. He delivered a lecture in Boston, on Stuart's Cavalry, in December 1886, which was after¬ ward published in book form and entitled (War Reminiscences) (1887). He also wrote (The Dawn of the Real South } (1901). Consult

Crawford, (Mosby and His Men) (1867) ; Scott, J., (Partizan Life with Mosby) (1867) ; Williamson, (Mosby's Rangers) (1896).

MOSCHELES, Felix, British portrait painter: b. London, 8 Feb. 1833; d. Tunbridge Wells, January 1918. He was the son of Ignaz Moscheles, the distinguished pianist and com¬ poser, and the lifelong friend of the great Mendelssohn. Felix was educated at King's College, London, and was then sent to Ham¬ burg and Karlsruhe. His childhood was spent amid a circle of literary and artistic celebrities, including

Mendelssohn, Joachim, Malibran, Lablache and Dante Gabriel Rossetti. In later years the list was extended by many of the most famous characters of the age. In 1846 his father migrated to Leipzig to take over the directorship of the Conservatoire. Here Felix was taught drawing and architecture. In 1850 he went to Paris to pursue his art studies, ar¬ riving in the days of the Republic which fol¬ lowed the flight of Louis Philippe, and he wit¬ nessed the coup d'etat which placed Napoleon III on the throne. A lucky arrest brought Moscheles into touch with *Mme.* Achille Fould, whose husband was then at the head of affairs, and who was a friend of the Moscheles family. The young artist was introduced into the best circles of Parisian society. At the Atelier Gleyre, where he studied, he made the acquaint¬ ance of Du Maurier, afterward the famous Punch artist. Moscheles pursued his later studies in Antwerp, where Alma-Tadema, Maris, Neuhuys and Heyermans were his fel¬ low-students. He afterward opened a studio and settled in London, where he and Du Maurier formed a merry circle with Poynter, Whistler, Stacy Marks and Charles Keene. In 1862 he painted a portrait of Mazzini, which after the latter's death he offered to the Italian nation, but the offer was refused. Moscheles had long been interested in the question of uni¬ versal peace and international arbitration. He discussed this subject with President Cleveland during a visit to America in the '80's, when he crossed the Atlantic with Henry Irving, carrying an introduction from Robert Browning. He painted Cleveland's portrait and later one of Browning, which is now in the Armour Institute, Chicago. Among his works are studies of Gounod, Rubinstein and Sir H. M. Stanley. He exhibited in Antwerp, Paris and London, and published two volumes of autobiography, (In Bohemia with Du Maurier* and (Fragments of an Autobiography? besides editing Mendelssohn's letters to his parents. He was president of the International Arbitra¬ tion and Peace Association and of the London Esperanto Club.

MOSCHELES, Ignaz, German pianist and composer: b. Prague, 30 May 1794; d. Leipzig, 10 March 1870. Of Jewish parehtage, studied under J. D. Weber, director of the Prague Con¬ servatory of Music, and afterward under that of Albrechtsberger and Salieri, at Vienna. On the completion of his studies he made a success¬ ful, professional tour in Germany, and in 1820 arrived at Paris, where he met with an ex¬ ceptionally enthusiastic reception and afterward made tours of other continental capitals. In 1825 he settled in London, where he was pro¬ fessor of music at the Royal Academy for 21 years. Here he had Thalberg for a pupil, as

lje had formerly, in Berlin, had Mendelssohn. At the latter's request he went from London to Leipzig where he was professor of music in the conservatory there from 1846 till his death. Among his finest compositions may be men¬ tioned his Concertos Nos. 3, 4 and 5, the Con¬ certos Fantastique and Pathetique; his great Sextett and Trio; his Sonatas Caracteristique and Melancclique ; and his studies. Consult (Aus Moscheles Leben) (1872) ; (Briefwechsel mit Mendelssohn-Bartholdy) (1888).

MOSCHEROSCH, mo'she-rosh, Johann Michael, German satirist: b. Willstadt, near Strassburg, 5 March 1601 ; d. 4 April 1669. He was a descendant of an Aragon (Spanish) family and studied at Strassburg, after a short stay in France was appointed (1626) master of the court for the Duke von Leiningen-Dachsburg, then acted as district magistrate (1630) for Count von Criechingen and (1635) for the young Protestant Duke Bogislav von Croy at Finstingen-on-Saar. Between war, looting, famine and pestilence life was a series of disasters. In 1643 he was transferred to Benfelden, then a Swedish fortification, as mem¬ ber of the council of war, to become secretary of. state at Strassburg. In 1656 he was ap¬ pointed counsellor of war and of the Church for the Duchy Hanau, next entering the service of the Elector of Mayence and, from 1664, under the Landgravine of Hesse. He was ad¬ mitted to the Fruchtbringende Gesellschaft, in 1645, with the surname <(Der Traumende® (the Dreaming One), his principal work (Wunder-lichen und wahrhaftigen Gesichte (Visionen) Philanders von SittewalD having been pub¬ lished in 1640 (revised editions, Strassburg 1642-43). It is clearly a keen satire of his times laid down on the lines of Quevado's <Suenos.> Consult Nickel's (Mosch rosch als Padagog> (Leipzig 1883) ; Pariser, <Beitrage zu einer Biographie von Moscherosch) (in Miinchener Dissertation 1891): Martin,

(Johann Michael Moscherosch> (in Jahrbuch der Gesellschaft fur lothringische Geschichte und Altertumskunde , Vol. Ill, Metz 1891).

MOSCHUS, mos'kus, Greek bucolic poet of Syracuse in Sicily, flourished about 150 b.c. Four idyls form the whole of the remains of

Moschus, which exhibit great elegance of style and delicacy of conception. The E7t iratpioq fttwvoc ((Lament for Bion}) was imitated by Shelley in <Adonais.) A translation by J. M. Edmonds was published in 1912. The works of Moschus have commonly been edited with those of Bion (q.v.) and Theocritus (q.v.), and the three have been well translated by Andrew Lang (1889). See Theocritus, Bion and Moshus, Idyls of.

MOSCOSO DE ALVARADO, Luis de,

loo-es' mos-ko'so da al-va-ra'do, Spanish ad¬ venturer: b. Badajoz, Spain, about 1505; d. Peru, about 1560. He served under his kins¬ man Pedro de Alvarado in his expedition to Guatemala in 1529 and in 1534 accompanied him to Peru where he was for two years a follower of Pizarro, and then returned to Spain to live in luxury for several years on the pro¬ ceeds of his services. In 1538 he attached him¬ self to De Soto's expedition to Florida and upon the latter's death in 1542 took command and after many hardships succeeded in returning to Mexico. He was honored bv the viceroy, Mendoza, and in 1551 accompanied him to Peru

where he was entrusted with important com¬ mands until his death.

MOSCOW, Idaho, town, county-seat of Latah County, on the Northern Pacific, Oregon and Navigation Company's railways, about 95 miles south by east of Spokane, Wash. The chief industries of the country around Moscow are lumbering, farming, stock-raising, mining and fruit-growing. Considerable grain and vegetables are raised. The chief manufactures of the town are lumber, flour and machine-shop products. The University of Idaho and the State Agricultural College are located in Mos¬ cow. Pop. 3,956.

MOSCOW, Russia, capital of the Soviet Republic since 14 March 1918, and from Peter the Great to Nicholas II the second capital of the old Empire, situated in a highly cultivated district on the Moskva, 400 miles direct by rail southeast of Petrograd. It is the capital of a gov¬ ernment of the same name (area, 12,847 acres; pop. 3,662,900), and was especially esteemed by the Russians as the place of the coronation of the tsars, the favorite residence of many of the no¬ bility, the commercial emporium of central Rus¬ sia and western Asia, and a principal seat of Rus¬ sian manufactures. It is the holy or white mother city in the creed of the people, and no tsar would omit visiting it at least twice a year, or presenting in the city his eldest son after he

has reached his majority.

As a general rule the temperature ranges from a winter mean of 14° F. to a summer mean of 66°, the annual mean being 40°. Sec¬ tions of the city are walled. A considerable portion of the enclosed space is unoccupied by buildings, has an undulating surface and is traversed by the navigable Moskva, which is crossed by five bridges, and entering at the mid¬ dle of the west wall makes a series of ser¬ pentine windings, in the course of which it re¬ ceives the Iaousa and the Neglina, and leaves (he city at the southeast corner. The river is frozen, for five months of the year. The general view of the town, as seen from Spar¬ row .Hill, an. eminence on the southeast, is peculiarly striking and picturesque. Its hun¬ dreds of churches and convents, surmounted by gilt and variously colored domes and spires, its imperial and other palaces, its boulevards, gardens, ponds and, above all, the high walls and numerous stately towers of the Kremlin or citadel, produce, an effect unequaled by any other European city. It formerly comprised five principal, divisions : the Kremlin, Kitaigorod, Byeloigorod, Semlyanigorod and the Sloboden or suburbs.

Public Buildings, *etc.* — The Kremlin, situ¬ ated on the north bank of the river, forms the centre of the town, and in it are found the principal civil and ecclesiastical buildings. The Kremlin has always been held in al¬ most superstitious veneration by all Russians. (<Above Moscow there is nothing but the Krem¬ lin ; above the Kremlin, nothing but the skv.w Here in the first place is to be seen the Great Palace, a lofty building in a mixed stvle of architecture, erected in 1838ˆ19, having the Treasury, forming a sort of wing, on the right, while also connected with it is the Terem or old palace of the tsars, belonging to the 16th and 17th centuries. The Cathedral Square, on

the summit of the Kremlin, contains the Us-penskiy Cathedral (cathedral of the Assump¬ tion), in which the emperors are crowned, built in 1475-79, a clumsy building with heavy pillars, which support five cupolas, these, like the walls, glittering with grotesque frescoes of sacred subjects, painted on a golden ground; another cathedral here is

the Archangelskiy Cathedral (of the Archangel Michael), founded in 1333 and rebuilt in 1505-09, containing the tombs of many tsars down to Peter the Great ; a third is the Blagovieshchenski Cathedral (of the Annunciation), founded in 1397. The arse¬ nal is an immense building lining one side of the northern angle of the Kremlin, the opposite side being occupied by the senate. The chief attraction is the upper story of the treasury, containing the crowns of the early tsars, several thrones, warlike trophies and miscellaneous curiosities ; the arsenal contains an immense quantity of weapons and arms, the cannon taken from the French during their retreat and numerous other military trophies. Near the centre of the buildings of the Kremlin is the tower of Ivan the Great, which rises to the height of 322 feet, contains numerous bells and is surmounted by a gilded dome, on which the cross is displayed above the crescent. The great Tsar Kolokol, or king of bells, the largest in the world, stands at the bottom of the tower on a granite pedestal, to which it was raised in 1832, after having remained for more than a century buried on the spot where it had fallen while an attempt was being made to hoist it. The Kremlin also contains a bronze statue of Alexander II (1898). Outside of it the chief buildings are the cathedral of Saint Vassili (Saint Basil), one of the strangest specimens of architecture anywhere to be met with, having no less than 20 gilded and painted domes and towers, all of different shapes and sizes ; and the temple of the Saviour, built (completed 1883) to commemorate the French retreat, at a cost of $10,000,000, and which is regarded as the most beautiful church in Rus¬ sia. Other buildings worthy of notice are the great riding school, the Gostinnoi Dvor or principal bazaar in the Kitaigorod, a colossal building of three stories, where the leading wholesale merchants carry on their business ; the Riadi, in the same quarter, occupied by handsome shops. Among the principal educa¬ tional establishments is the university, the largest in the country, founded in 1755 by the Empress Elisabeth; it consists of four faculties, is attended by nearly 10,000 students and has a library of about 400,000 volumes, an observa¬ tory and botanical garden. A popular univer¬ sity, bearing the name of its founder, Gen. Alphonse Shaviavsky, was opened in 1908. The gallery of art contains 2,000 pictures, mainly Russian, bequeathed by the brothers Tretiaka. There are several good museums, the largest and most important being the Ru-miantzof, in a fine building, with library and reading-room. The foundling hospital, in which children are received without questions being asked, supports annually 5,000 children, 1,500 being in the institution at one time. The num¬ ber of the open and planted spaces throughout the city is great, but otherwise the streets are narrow, uneven and crooked, lined by mean-looking brick and wood houses. Beside the

imperial palaces in the Kremlin are the

Petrofskoi Palace and gardens outside of the Saint Petersburg gate, the principal fashionable resort during the summer season, and the palace of the Empress Elisabeth ; and among the favorite pleasure grounds are the beautiful gar¬ dens of the Kremlin and the Galitzin garden on Sparrow Hill. Moscow is the residence of two archbishops and of the governor-general of the province.

Manufactures, Commerce, Communica¬ tions. — Moscow is the second manufacturing city in the empire, and of late years its indus¬ trial and commercial activity has greatly in¬ creased. The manufacturing establishments

give employment to more than 125,000 workmen and annually turn out goods to the value of about $150,000,000. The principal establish¬ ments are for textile fabrics, chiefly cotton, woolen and silk, besides manufactures of met¬ als, railway trucks, looms, fibrine, paper, leather and other articles. The enamelware in¬ dustry owes its beginning to an American, Henry Hiller. The machinery employed in the factories is generally of the most improved

description, and though partly made in the city largely comes from Britain and elsewhere. From its central position Moscow is the great entrepot for the internal commerce of the em¬ pire and toward which six railway lines con¬ verge. Great facilities for this commerce are given by water communication, which extends on one side to the Baltic, on another to the

Caspian and on a third to the Black Sea; and

by the railways to Saint Petersburg, Yaroslav, Nijninovgorod, Siberia, *etc.* In winter the traffic over the snow in sledges is enormous. Tea, silk, indigo and cotton are important ar¬ ticles of trade.

Administration, *etc.* — Moscow is under the immediate charge of a general governor and a military governor. It is the seat of important civil and criminal courts, and of various super¬ intending boards of police, manufactures, trade, *etc.* ; and has a number of literary, scientific and other societies of different kinds. Pop. (1891) 822,397; (1897) 977,269, with suburbs 1,035,664; (1913) 1,817,100, nearly all Great Russians of the Orthodox Greek Church, males greatlv preponderating.

History. — Moscow is said to have been founded in 1147 by George Dolgoruki, Prince of Kiev. Its nucleus was the Kremlin, which at first was nearly surrounded by a palisade, and formed an important military station. For a long time it continued to be a dependency of the principalitv of Vladimir; and in 1238, when Batou-Khan devastated Russia, it was sacked and burned. In 1293 it was again sacked, and the inhabitants were dragged away into slavery by Khan Nagai. Ivan Danilovitch of Vladimir took the title of grand prince of Moscow in the early part of. the 14th century and from that time it remained the seat, of government until early in the 18th, when the admin¬ istration was transferred by Peter the Great to Petrograd. Moscow was plundered by the Lithuanians and the Tartars of Tamerlane in the latter part of the 14th century, and was nearly, consumed by fire in 1536, in 1547 and again in 1571, when the Tartars set fire to the suburbs, a large part of the pomilation perish¬ ing on that occasion. During the insurrections caused by the pseudo-Demetrius (1605-12), when the Poles and Cossacks took the city, it

was again partly destroyed. In 1812 it was entered by the French under Marat on 14 Sep¬ tember, and on the 15th by Napoleon, who took up his residence in the Terem Palace in the Kremlin. The city, deserted by its inhabitants, was set on fire by order of the governor, Count Rostoptschin, compelling Napoleon to leave on 19 October and to take his final departure on the 23d, and resulting in the disastrous retreat of the French army. The greater part of the city was then destroyed, notwithstanding the efforts of the French to stay the progress of the flames. It was rebuilt within a few years. The railway to Petrograd was opened in 1851. The chief of modern events are the coronations in 1856 of Alexander II and in 18% of the late Nicholas II, at the latter cere¬ mony 2,000 people being crushed to death, and hundreds injured, during the distribution of gifts. On 17 Feb. 1905 the Grand Duke Ser¬ gius was assassinated in the Kremlin, and there were revolutionary disturbances in that and the succeeding year. On 14 March 1918 the Peo¬ ple's Commissioners (the new Russian Soviet Government) left Petrograd for Moscow, which thus became the

centre and capital of the New Russia. Consult Wirt Gerrare, (The Story of Moscow> (London 1900) ; Grove, H. M., (Moscow) (New York 1912).

MOSEILIMA. See Mosaylima.

MOSELEY, moz'li, Edward Augustus,

American lawyer: b. Newburyport, Mass., 23 March 1846; d. Washington, D. C., 18 April 1911. He engaged for several years in both the East and West Indian trade. He then studied law, was admitted to the Massachusetts bar1 and was also a member of the State legislature for several terms. His chief interest was in the lessening of danger in railroad travel, and he became the leading authority in the United States on all measures or appliances for procuring the safety of railroad employees and travelers. Largely for this reason he was appointed secretary of the Interstate Commerce Commission at the time of its formation. His efforts in obtaining and enforcing the Safety-Appliance Law gained him testimonials from all the railroad men's organizations in the United States, and the formal thanks of the Commonwealth of Massachusetts. He pub¬ lished Arbitration as applied to Railways and their Employees) ; (Safety Appliances on Railroads) ; (One Hundred Years of Interstate Commerce Law) (1900); (The Transportation Question as Affecied by the Cullom BilP (1900) ; (Federal Supremacy* (1907).

MOSELEY, Henry, English mathematician: b. Newcastle-under-Lyme, 1801 ; d. Bristol, 1872. He was graduated at Saint John's College, Cam¬ bridge, and after studying theology was or¬ dained a priest of the Church of England. From 1831-44 he was professor of natural and experimental philosophy and astronomy at King's College, London, and was one of the first inspectors of schools to be appointed (1844). He was appointed canon of Bristol in 1853, next becoming chaplain to the queen. He was given the degree LL.D., hon. causa, Cambridge, 1870. Among his best-known works are (A Treatise on Mechanics, Applied to the Arts) (1834); Astro-Theology* (1838; 3d ed., I860); (Lectures on Astronomy) (1839; 4th ed.,

1854) ; (The Mechanical Principles of Engineer¬ ing and Architecture) (1843), much in use to this day as a textbook and frequently re-edited and revised.

MOSELLE, mo-zel (German, Mosel), a European river which rises in France at a point over 2,400 feet high on the western side of the Vosges and close to the old German boundary. After flowing northwest, through the depart¬ ment of Meurthe-et-Moselle, it proceeds northeast through Lorraine into Rhenish Prussia. After passing Treves in a remarkably winding course, it falls into the Rhine at Co¬ blenz; total course, about 314 miles. It is navi¬ gable from its junction with the Meurthe. Its principal affluents are, in France, the Valogne, Meurthe, Seille, Madon, Math and Ornc, and beyond France, the Sarre, which joins it above Treves; and the Sure, Kill and Elz. Of these affluents the Meurthe, Sure and Sarre are navigable. The fortress of Metz protects the valley of the Moselle, which forms the natural line of communication between France and Ger¬ many. The valley is famous for its fertility; the lower part for its vineyards. In the early days of the Great War in the fall of 1914, the German army of the Moselle took part in the attempted march on Paris.

MOSELY COMMISSIONS, two delega¬ tions known as the Industrial and the Educa¬ tional, which visited the United States in 1902 and 1903 to study conditions and methods in their respective branches, for comparison with those of Great Britain.

The Mosely Industrial Commission made a tour of the United States from November 1902 to January 1903, to investigate manufacturing, industrial and commercial lines, which in inter¬ national competition had seriously affected the commerce and free trade policy of Great Britain. It was financed by Mr. Alfred Mosely (b. Bris¬ tol, England, 1855), a diamond merchant whose relations with American mining and other engi¬ neers in South Africa had developed the desire to discover the sources of their success, the comparative causes of Great Britain's industrial decline, and to evolve a plan whereby Ameri¬ can methods could be introduced into the United Kingdom for the rehabilitation of its economic and industrial status. A suggestion to invite British trade-unions to select a representative from each to form a commission to study American industries and the condition of the workmen was acted upon, most of the unions electing as representative their general secre¬ tary. Twenty-three formed the commission and were given a free trip to the States, with ex¬ penses paid for nearly three months. Each man was pledged to study conditions carefully and to answer fully on his return a series of tabu¬ lated questions.

Mr. Mosely and the delegates made a circu¬ lar tour in which they were afforded every op¬ portunity to inspect some of the largest manu¬ factories in the United States. They visited Niagara, Buffalo,

Cleveland, Chicago, Dayton, Pittsburgh, Philadelphia and New York, as one party, while individual members also took trips to other points. The. chief results of their ob¬ servations were published in the (Reports of the Mosely Industrial Commission> (London, April 1903).

Some of the conclusions arrived at were : The American workman for two and one-half days' work receives renumeration equal to that of the British for a week; the American is more temperate than the British; he lives longer; is more thrifty, and after a few years frequently retires with his savings to an easier occupation, usually farming or market-gardening. Labor saving machines were more in evidence in America than in the United Kingdom, but, there was a considerable difference of opinion among the various delegates as to what could be learned from America in their respective trades, for instance, the shipbuilding and brick¬ laying in England were considered superior to those of America. To the question <(Are there greater opportunities for the workingman to rise in America than in England?® <(Yes,® came as a unanimous answer. The average workman was considered as good in one country as the other, the difference was to be found in conditions. In Great Britain generations of workers toil in a confined area, and have be¬ come hidebound by inherited labor traditions; increased production to them does not mean in¬ creased wages — hence a lack of incentive. In the United States, the stimulating climate and abundance of undeveloped resources tend to a constant striving for direct results through the simplest means, _ whence the wonderful devel¬ opment of machinery, manufacturing equipment, output, increased wages, general prosperity and well-being of the American workmen, together with a unity of feeling between employers and employees along the lines of increased produc¬ tion, which is not to be found in England. The organization of capital and labor in the United States produced a great impression on the del¬ egates, and the advantages of the Civic Fed¬ eration to bring together these two great and active factors in production on all disputed questions, and at the initial stages to avert strikes by arbitration, were fully recognized as those of a model organization

worthy of imme¬ diate adoption. The freedom accorded to re¬ ligious belief and the excellent public school education of the States elicited the warmest praise from the commission, the advantage given to all the American youth being fully apparent.

The success of the Industrial Commission led to the organization of the Mosely Educa¬ tional Commission to the United States, October-December 1903, in which 26 prominent British educators took part at the invitation of Mr. Mosely to investigate :

1. The development of individuality in the primary schools.

2. The social and intellectual effects of the wide distribution of secondary education.

3.. The effect of specific instruction given (a) in business methods; (b) in applied science.

4. The present state of opinion as to the value of professional and technical instruction of university rank, designed with special refer¬ ence to the tasks of business life.

As in the work of the Industrial Commis¬ sion the conclusive deductions drawn were wholly in favor of the system of education in the United States which was described as prac¬ tical, enlarged, enlightened, up-to-date and scientific. Consult Mosely, (Reports of the Mosely Educational Commission t© the United

States of America, October-November 1903 1 (London 1904).

C. Leonard-Stuart, Editorial Staff of The Americana.

MOSEN, mo'zen, Julius, German poet : b. Marieeney, in Vogtland, Saxony, 8 July 1803; d. Oldenburg, 10 Oct. 1867. He was educated in the Plauen Gymnasium, studied law (1822) at Jena, travelled through Italy and then worked for some time under an attorney at Markneukirchen. In 1834 he settled at Dres¬ den, taking up the practice of law, and soon becoming noted as an author. He became (1844) dramaturgist at the Oldenburg Hofthe-atre, but incurable sickness greatly deterred his activities after 1848 and he was pensioned in 1850. He first came into prominence through his epic poem (Das Lied vom Ritter Wahn) (Leipzig 1831), a very ancient Italian legend redressed in a liberal form. His (Ahasver) (Dresden 1838) contains more of philosophy than poetry; but in his

<Gedichten) (Leipzig 1836; 2d ed., 1843) he shows national radiance in a string of ballads as (Die letzten zehn vom vierten Regiment/ (Andreas Hofer/ <Der Trompeter an der Katzbach/ *etc.* In narra¬ tive form we have the novelle (Georg BenloC (Leipzig 1831), JBilder im Moose) (ib. 1846). His great ambition was centred in dramatical writing, but these works are too saturated in abstract rhetoric. Of his best might be men¬ tioned (Cola Rienzi/ (Die Braute von Flo-renz/ (Wendelin und Helene/ (Kaiser Otto III,> all of which are to be found in Theater (Stuttgart 1842), the latter being the most im¬ posing. His talented work, (Die Dresdener Gemaldegalerie) (Dresden 1844), should also be quoted. His works in eight volumes has been published under the title (Samtliche Werke) (Oldenburg 1863) and a fuller edition, includ¬ ing biography, was published in six volumes by his son (Leipzig 1880). Consult his (Errinerun-gen/ extended by Zschommler (Plauen 1893) ; CTulius Mosen, eine biographische Skizze) (Oldenburg 1870) is anonymous.

MOSENTHAL, mo'sen-tal, Joseph, Ger¬ man-American musician : b. Cassel, German, 30 Nov. 1834; d. New York, 6 Jan. 1896. He studied music in Germany and in 1853 removed to the United States where he was organist and choir director of Calvary Church, New York, 1860-87. He conducted the famous Men¬ delssohn Glee Club in New York in 1867-96 and played the violin in several leading orches¬ tras there. . He composed both church and secular music, among which are the psalm (The Earth is the LordV and part songs for <Thanatopsis,> (Music of the Sea/ (Blest Pair of Sirens/ *etc.*

MOSENTHAL, Salomon Hermann von,

German dramatist: b. Cassel, 14. Jan. 1821; d. Vienna, 18 Feb. 1877. He studied at the Uni¬ versity of Marburg and in 1851 obtained a position under the Austrian government. His best-known dramas are (Deborah* (1850) ; the original of (Leah the Forsaken* and (Sonnen-wendhof* (1856), which were translated into English, Danish, Hungarian and Italian. He wrote also <The German Actors) (1863) ; (The Mayor of Altenburen) (1868) ; <Maryna> (1871); the tragedies (Duweke* (1860); <Pietra) (1865), *etc.*

MOSER

MOSES

MOSER, mo'zer, Gustav von, German dramatist: b. Spandau, Prussia, 11 May 1825; d. 1903. He obtained a military education and after serving in the Prussian army resigned in 1856 to devote himself to literature. He pro¬ duced more than 100 successful comedies and farcical comedies, sometimes in collaboration; several of his works have been well received in English translations. Among his plays may be named (Das Stiftungsfest* (1873); 'Ultimo* (1873) ; (Der Bibliothekar) (The Private Sec¬ retary) (1878) ; (Der Veilschenfresser) (1876) ; (Krieg im Frieden) (1880). A uniform edition of his plays was published 1873-94 in 22 volumes. Consult the biography by Hans von Moser (Weimar 1908).

MOSER, Johann Jakob, German jurist and publicist: b. Stuttgart, 18 Jan. 1701; d. there, 30 Sept. 1785. He received his education at the University of Tubingen; in 1720 became teacher of law there, and in 1729 was appointed to the full professorship. In 1736 he became a director of the university at Frankfort-on- theOder, but in 1739, having fallen into dis¬ favor with Frederick William I, was compelled to resign. He then founded the academy at Hanau for the education of the young nobility in political science; and he suffered imprison¬ ment for five years at the instance of the Duke of Wiirttemberg, his patron. He is credited with being the first to publish a systematic ac¬ count of European international law. He was a prolific writer, his books numbering over 500, the most important of which are Deutsches Staatsrecht* (53 vols., 1737-54, with additions of 2 vols. 1766-75, and 3 vols. 1781-82) ; <Lebensgeschichte) (1783). Consult the biography by Wachter (Stuttgart 1885).

MOSER, Justus, German historian and humorous writer: b. Osnabriich, 14 Dec. 1720; d. there, 8 Jan. 1794. He studied jurisprudence at Jena and Gottingen; in 1747 became attorney for the government, and for 25 years during the minority of Duke Frederick of York acted as his legal adviser, and was afterward ap¬ pointed a judge. His most important work is 'Osnabriichische Geschichte* (2 vols., 1768; 3d ed., 1820; Vol. Ill, edited by Herbert von Bar, 1824). Of his humorous writings perhaps the most striking is 'Harlekin,* in which he at¬ tacks hypocrites and pedants of all kinds. He also published some valuable essays on local topics entitled 'Patriotische Phantasien) (4 vols., 1774-86). An edition of his complete works was published by Abeken

in 10 volumes (Berlin 1842-43).

MOSES. Hebrew leader and legislator, the story of whose life and work is given with such singular clearness and strength in the Pentateuch, is one of those rare names that have stamped themselves permanently on the world's history, so that we turn again and again to the simple record of his career and achievements with an interest that never lags. With all his Oriental background and the fact that his concern was primarily with his own race to lead them from bondage to freedom, there is so much breadth and suggestiveness in the laws that bear his name, his moral statutes being at the basis of modern civilization, al¬ though promulgated 3,000 years ago, that he continues a familiar and fassinating figure to all eyes.

Traditiona* Data. — The Biblical account, with its rapid, stirring recital, which attains at times a kind of dramatic effectiveness, tells of his birth, how his mother, in dread of Pharoah's mandate which consigned all Hebrew children to be thrown into the Nile, concealed him for three months, then set him in an ark of bul¬ rushes on the river's banks, where Pharoah's daughter discovered him and had him reared as her son (Ex. xi, 1-10). His days of ease were not to last. Not all of Egypt's luxurious life and his own hopes of future power as possible occupant of the throne could dull his innate racial sense of duty. Seeing an Egyp¬ tian attacking a Hebrew, he interferes and slays the aggressor, hiding the body in the sand. Then the next day he sees two Hebrews quarreling, and when he tries to separate them, one taunts him with slaying the Egjrptian. In fear of further discovery and of death by Pharoah, he escapes to the peninsula of Sinai, dwelling with the priest of Midian, whose daughter he marries. Then follow 40 years as a shepherd, when occurred the episode of the burning bush on Mount Horeb. Now began his mission — it was his task, divinely appointed, to return to Egypt and redeem his brethren from slavery (Ex. iv, 1-9, 20). How he was met and aided by his brother Aaron, how he gained a hearing with his brethren, how Pharoah's heart was hardened against the de¬ parture of the Hebrews, until, after a series of successive plagues, the Egyptians in their terror bade the Israelites make every haste to leave, are steps in a thrilling drama that has served as material for preacher, poet and play¬ wright, with its incidents to-day as fresh as when first read or narrated. Now began the long 40 years' march, but the Israelites had not advanced very far, they moved slowly, being accompanied by their wives and children, their flocks and herds, when Pharoah and his army started in pursuit (Ex. xiv, 8-9). How the panic and despair of the people are changed to

exultation as the waters recede and Pharoah's hosts are drowned in the Red Sea, while the wanderers are saved, is another of those thrilling episodes immortalized in Miriam's Song of Triumph, that belongs to the highest strains of Hebrew poetry. Then the people are led by Moses through the wilderness to Sinai or Horeb, where he received the Ten Com¬ mandments and the Law and God enters into a covenant with Israel (Ex. xix et seq.). After this culminating incident, so vividly re¬ lated, Moses continues his leadership and am¬ plifies his message from Sinai with many de¬ tails as to the tabernacle, the priests, the en¬ campments. Cautiously now he marches for¬ ward to Kadesh, from whrch place the spies or scouts were sent to Canaan, the ultima thule of the people's journeyings. How charac¬ teristic — they refuse to advance in their alarm at the report of the spies, and were con¬ demned to remain in the desert until that gen¬ eration had passed away (Num. xiii-xiv). Nothing is extenuated in the flaming record — every act of weakness, of rebellion, of dis¬ obedience with its invariable penaltv, all are frankly and unflatteringly told. Moses re¬ sumes the march eastward, making friends and foes on the journey, but receives warning that he will not be allowed to lead the people across the Jordan as he would die on the eastern side

(Num, xii). He gathers the tribes in conse¬ quence and gives them a farewell address, which is embodied in the book of Deuteronomy. He repeats the Law, adds his wise counsel, warns of the consequences of disloyalty and adjures the people to be faithful with an elo¬ quence and persuasiveness that give his words perennial force. Then after a final blessing of the multitude, he ascends Mount Nebo to the summit of Pisgah, and dies in his 120th year. The place of his sepulchre is unknown (Deut. xxxiv), doubtless for good reasons as one familiar with the history of similar founders of religions can readily understand.

Character of the Laws. — The open pages of the Pentateuch relate the character of the laws of Moses with a minuteness of detail that leaves little, if anything, untold. The code, embracing 613 statutes, covers

the entire re¬ quirements of priesthood, community and indi¬ vidual. While his training and early life in Egypt influenced, in many ways his legislation, the distinctive features are vital, with their emphasis on a purer and more rational divine belief and their elements of a democracy after which later nations in certain respects have modeled their systems. Despite the elaborate forms of priesthood and sacrifices, concessions to a people not ready for a loftier attitude, from our 20th century point of view, although our later day civilization still needs balance wheels, and holds fast to signs, symbols, forms, ceremonies of its own, the essential truths of the Mosaic laws, its insistence on personal equality and personal morality, cannot be out¬ grown. Its spirit of broad humanity, its con¬ sideration for the old and the young, the slave and the enemy, the fruit tree and the animal creation, its health and food regulations full of suggestions to the modern physician and dietitian, all these show a wisdom in their author that accounts for his fame and the fact that so many of the Mosaic laws are still ob¬ served by the great majority of the people to whose ancestors the code was given.

Moses in the Legends. — It was to be ex¬ pected that in course of time legends should arise as to the character of Moses and the vari¬ ous episodes in his career. In rabbinical litera¬ ture, these have assumed a variety, a grandeur and a poetical beauty that account for their hold on the imagination for centuries to our day. To the average English reader Rev. S. Baring Gould's 'Legends of the Patriarchs and Prophets) will be found stimulating. Dr. Ginzberg's 'Legends of the Jews,* with its ex¬ haustive chapters, will satisfy the more critical reader, although there is no attempt to elaborate the stories which are*narrated with sober exact¬ ness. If it was denied the people to know his sepulchre and render him worthy post mortem honors, they had full license to draw upon their imagination and adorn the memory of so great a prophet, leader and lawmaker by spinning the web of fairy tales, in apt Orental fashion so dear to the Semitic mind and in which the Occidental no less delights even if he assumes a more worldly-wise air. These legends stretch over his entire history from birth to death and seek to interpret in their own imaginative way, which is often far from being forced or un¬ natural, the scenes and incidents that he en¬ counters, which so readily adapt themselves to

the story-teller's mood as well as to the teach¬ er's vision. It is not necessary in the limited space at command to dwell at any length on the mass of legends so quotable and stimulating. The Hellenistic stories of Moses, if more limited, have a quaint interest of their own.

The Mohammedan are obviously distortions or exaggerations of the rabbinical, although oc¬ casionally the treatment is original. Moses plays a part, too, in apocalyptic literature.

Modern Critical View.— Since Astrue in 1753 published his view of the composite char¬ acter of the book of Genesis, due, as he stated, to the use by Moses of certain documents in its elaboration, the critics have waged a long con¬ tinued battle as to the question of authorship, which has its piquant features and is still being contested almost as hotly as a-century ago. The fact, too, that a parallel to the story of the birth of Moses and his experience in the bulrushes of the Nile is found in the cuneiform library of Assurbanipal and told of Sargon, a Babylonian king who ruled, it is said, about 3800 b.c., is not without its suggestions. The etymology of the name Moses, too, has given rise to much speculation, although the Biblical account has still its doughty defenders. However, what¬ ever the criticisms as to name, authorship, date, whatever the differences in details, the preva¬ lent opinion as to the man himself is one and the same, as a great historical figure, who added unity and strength to a nation, after setting it free, and under Providence, shaped its destinies and gave it the essentials of a religious and civil code of laws, which later ages developed. The verdict of the great ma¬ jority of scholars from Wellhausen to Kittel, from Budde to McCurdy, from Cornill to Barton and Paton, is conclusive. Just as the story of the Exodus has been confirmed by modern investigation step by step on the long journey across the Desert, so the historical character of Moses stands out in clear relief after the fullest and most exacting analysis and research by the modern scholar and critic.

Bibliography.— Driver, ‘Introduction to Literature of the Old Testament (New York 1897) ; Ginzberg, ‘Legends of the Jews) (Vols. II and III, Philadelphia 1909-13) ; Ottley, ‘A Short History of the Hebrews* (Chap. Ill, New York 1901) ; Warrington, George, ‘When was the Pentateuch Written ?* (London and New York).

Abram S. Isaacs.

MOSES, Bernard, American historian and political economist: b. Burlington, Conn., 27 Aug. 1846. After graduating from the Univer¬ sity of Michigan in 1870, he went to Europe for further study, receiving his Ph.D. from Heidel¬ berg in 1873. In 1875 he became professor of history at Albion College, but since 1876 has been professor of history and political economy at the University of California. His more im¬ portant works are ‘Politics) (with W. W. Crane) ; ‘Federal Government in Switzerland* ; ‘Democracy and Social

Growth in America) ; ‘Establishment of Spanish Rule in America > (1898) ; ‘The Spanish Dependencies in South America* (1914) ; ‘The Government of the United States) (1906). The volume on ‘South America on the Eve of Emancipation* (1908) was later rewritten and embodied in the larger work on the Spanish dependencies. In March

1900 he was appointed a member of the United States Philippine Commission, and served in this capacity three years in the Philippine Islands. In 1908 he was a delegate from the United States government to the Pan-Ameri¬ can Scientific Congress held in Santiago de Chile; in 1910 he was delegate to the Inter¬ national Conference of American States at Buenos Aires; and in the same year he was Envoy Extraordinary and Minister Plenipo¬ tentiary on special mission to Chile in connec¬ tion with the centenary celebration of that country.

MOSES, George Higgins, American diplo¬ mat and public official : b. Lubec, Me., 9 Feb. 1869. He was graduated at Dartmouth College in 1890 and since 1898 has been president of the Monitor and Statesman Company of Con¬ cord, N. H. In 1890-91 he was secretary to the governor of New Hampshire, and from 1893 to 1906 was secretary of the State Forestry Commission. Mr. Moses was a member of the Concord board of education in 1902-03, 1906-09 and after 1913. He was delegate-at-large to the Republican National Convention of 1908 and 1916. From April 1909 to November 1912 he was Envoy Extraordinary and Minister Plenipotentiary of the United States to Greece and Montenegro. In November 1918 Mr. Moses was elected United States senator to fill the unexpired term of two years, occasioned by the death of Senator J. H. Gallinger, defeat¬ ing John B. Jamison, Democrat, by a majority of 998.

MOSHEIM, Johann Lorenz von, yo’han lo’rents fo*n mos’him, German Protestant theolo¬ gian : b. Lubeck, 9 Oct. 1694; d. Gottingen, 9 Sept. 1755. He studied and taught at Kiel; be¬ came professor of theology at Helmstedt in 1723, abbot of Marienthal in 1726 and professor (1747) and university chancellor (1755) at Got¬ tingen; was a notable preacher and an erudite theologian and church historian of liberal

lean¬ ings; and wrote (Institutions Historiae Ecclesi-asticae (1755, translated into English by Mac¬ laine) ; (Institutions Historiae Christianae)

(1763); < Attempt at an Impartial and

Thorough History of Heresies) (1748-50); (Morals of the Holy Writ) (1770-78) ; *etc.*

MOSHER, mo'zher, Eliza Maria, American physician: b. Cayuga County, N. Y., 1846. She was graduated from the University of Michi¬ gan in 1875, and studied at the School of Medi¬ cine in Paris from 1879-80. She was resident physician at the Massachusetts Reformatory for Women in 1880-81 and director of the institution in 1881-83. In 1883 she went to Vassar College as professor of physiology and resident physi¬ cian ; from 1886-96, she was engaged in gen¬ eral medical practice in Brooklyn, N. Y., and then became professor of hygiene in the de¬ partment of literature, science and arts, and women's dean at the University of Michigan, holding this position till 1902 when she returned to her practice in Brooklyn. She has been lec¬ turer at the Chautauqua Summer School of Physical Education since 1888. She is the author of 'Health and Happiness) (1911).

MOSKVA, mosk-va, Russia, an affluent of the Oka, a tributary of the Volga, which rises in a marsh in the east of Smolensk, flows east to the city of Moscow and thence 112 miles

southeast to the Oka, which it joins near Kolomna after a total course of 305 miles. It is connected with the Volga by the Moskva Canal. It is navigable from its mouth to Mos¬ cow except between November and April when it is frozen. The battle of Borodino or Moskva, between the French under Napoleon and the Russians under Kutusoff, was fought on its banks (7 Sept. 1812.)

MOSLEM, or MUSLIM. See Moham¬ medanism.

MOSLER, moz'Ier, Henry, American artist: b. New York, 6 June 1841; d. 21 April 1920.

A student of wood-engraving, he was draughtsman on a Cincinnati comic weekly (1885), studied with James H. Beard (1859-61), and was art correspondent for Harper's IV eekly with the Army of the West 1862-63. Realizing the need of study he followed art at Dusseldorf and Paris (1863-66). Returning to Europe in 1874, he resided for many

years in France, was ap¬ pointed a Chevalier of the Legion of Honor in 1892 and was a successful exhibitor and prize winner at many exhibitions at home and abroad. His specialties are portraits, figure paintings and groups of figures.

MOSQUE, mosk (Arabic mesjid, Italian moschea), a Mohammedan house of prayer. The form of the oldest mosque was that of the Christian basilica, which however became modi¬ fied in the progress of Mohammedan archi¬ tecture. Mohammedans borrowed or adapted their ideas of architecture from the nations on whom they imposed their faith ; the famous mosques of Turkey resemble the Byzantine architecture of Constantinople, and certain of those in India the temples of the Jains. Domes and minarets in course of time became em¬ blematic of the more characteristic and ornate examples of Moresque or Saracenic art; but these are non-essentials, for in poor communi¬ ties a bare whitewashed room may suffice for the public worship of the faithful. The mosques of the Arabs often include, in a quadrangular area, an immense number of col¬ umns ranged in files, the multiplicity and extent of which impress the mind of the beholder with surprise and admiration. These columns are, in numerous instances, the rich spoils of antique monuments. Mosque architecture possesses no fixed rules, deeming lightness and elegance alone to be the fundamental laws of archi¬ tecture. In these Mohammedan churches we find neither altars, nor paintings, nor images, but a great quantity of lamps of various kinds, which form the principal interior ornament, and some sentences from the Koran written on the white walls. The buildings are often quad¬ rangular in plan, and have an open interior court, where are fountains for ablutions. In the southeast of the building there is a pulpit for the imam; in the direction in which Mecca lies (the Kibleh) there is a niche toward which the faithful look when they engage in prayer. Opposite the pulpit there is a platform surrounded by a parapet, with a desk on which is placed the Koran for the purpose of reading to the congregation. On Fridays the five daily prayers, obligatory on the faithful every day, are recited in the mosque by the whole con¬ gregation, together with additional prayers. It is not customary for women to enter the mosques; atnd when they do they are placed

separately from the males. The chief officer of the mosque is the nadir, under whom are two imams, muezzins who call the people to prayer, *etc.* These in addition to their religious vocation generally pursue secular callings. It is usual to cover the floor of the mosque with carpets, but there are no seats. On entering a mosque, the faithful remove their shoes. The building is never closed; and while nothing could exceed the devotion of the congregation gathered together in worship, at other times the mosques serve as convenient meeting-places, and in which wayfarers may accommodate themselves. They also serve as schools and seats of learning. Thousands of students are regularly in attendance at the most famous of these, the Azhar Mosque in Cairo. The mosques are maintained for the most part by endowments in land. The finest of the mosques of Constantinople and of the world is that of Saint Sophia, at one time a Christian church. In addition to schools, the imperial mosques have frequently hospitals and kitchens for cooking food for the poor.

MOSQUERA Y ARBOLEDA, mos-ka'ra e ar:b6-la'da, Tomas Cipriano de, Colombian politician and President : b. Popayan, 20 Sept. 1798; d. Coconuco, 7 Oct. 1878. After three years of service in the patriot army he was captured by the Spaniards, when he was only 18, but he escaped at Jamaica, returned to the army and in 1829 was made general by Bolivar, who made him also envoy to Peru. After Bolivar's death Mosquera traveled in North America and Europe. He became a senator in 1833; was President of New Granada 1845-49; in 1859 led the federalist revolt against Ospina, adopted a federal constitution by 'which the name of the country was changed from New Granada to the United States of Colombia, and became dictator of the new federation. His power was checked by a revolt led by Canal, with whom Mosquera in 1862 came to terms. Under the constitution then adopted Mosquera was elected President in 1863 and in 1866; the latter term was cut short by a successful revo¬ lution due to the President's arbitrary use of power. He was banished to Lima for four years, but upon his return again entered politics, was governor of Cauca and became a member of Congress. He was strongly anti-clerical ; and wrote on the geography of New Granada, and a valuable life of Bolivar (1853).

MOSQUITIA, mos-ke-te'a. See Mosquito Coast.

MOSQUITO (diminutive of the Spanish mosca, a fly), a name applied to insects of the dipterous family Culicidce. Mosquitoes are cosmopolitan, only a few oceanic islands, deserts and mountain tops

being free from them. Frequently they occur in vast swarms, and they abound equally in arctic regions, as Alaska and Greenland, and in the tropical swamps of Africa and South America, while at many intermediate points they are intolerable pests. Vertically they range from the seashore to altitudes of at least 13,000 feet. While many species are local, others are very widely dis¬ tributed. Typical mosquitoes have the follow¬ ing characteristics : The mouth is provided with a prolonged, suctorial, piercing proboscis ; the greater part of the body and head and portions of the wings and legs are covered with scales

which determine the color pattern; the compli¬ cated venation of the wings is also highly characteristic. These features distinguish mos¬ quitoes from the related midges (Chironomidce and Cecidomyidce) and the black flies (Si-mulidcB) ; and from the crane-flies (Tipulidee) which inspire most of the stories of gigantic mosquitoes. Not less than 22 genera and 350 species are now known. The species are based largely upon differences in the form and ar¬ rangement of the scales and the resulting coloration, the form of the foot-claws, *etc.*

Development. — The typical life-history of a mosquito is as follows : The eggs are depos¬ ited at night in or (rarely) near shallow water, usually fresh but in the case of a few species brackish or salt. After one or a few days they hatch into legless, aquatic larvae, popularly known from their activity as <(wig-glersA These have the mouth provided with small jaws for browsing at the bottom, and with brushes of hairs whose movements induce currents in the water and bring to the mouth floating particles or minute plants and animals which serve as food. The thorax is more or less swollen, and the abdomen slender and nine-jointed, with the last, or anal, segment bearing two pairs of leaf-like appendages and a more or less conspicuous fan of spreading hairs. On the dorsum of the eighth segment is a pair of spiracles, or breathing-pores, usually borne at the end of an elongated tube or siphon. By their active wiggling the larvae come frequently to the surface and breathe, and then sink by gravity lazily to the bottom. After one or more weeks the larvae molt finally and transform into pupae, which have the head and thorax closely united, and the latter greatly enlarged, with the form of the future legs and wings apparent. At the tail end is a pair of fin-like expansions; while the respiratory organs, instead of being near the end of the abdomen, have the form of a pair of large mouthed tubes or funnels on the dorsum of the thorax. Like the larvae the pupae are active wigglers, but, unlike them, are buoyant and naturally float at the surface with the

respiratory funnels uppermost and exposed. When alarmed they display much activity and wiggle violently toward the bottom. The imagoes escape from the pupal investments at the surface, and windrows of cast-off skins are thrown up at the water's edge. The males, which transform first, hover in little clouds and are sought by the females. In the males the antennae are broad and feather-like, in the females slender and simply hairy. The dura¬ tion of the period of aquatic life varies with the species and temperature; in our common Culex pnngens it may be only 10 days, so that many generations may be produced during a favorable season. The winter may be passed in any stage from egg to adult, all of which are extremely resistant to cold, apd the aquatic stages capable of withstanding repeated freez¬ ing and thawing. The hibernating imagoes, which are found in houses and other sheltered places, may become active on warm days and in the case of Anopheles, at least, are chiefly fertilized females. Mosquitoes have many natural enemies. The aquatic stages are preyed upon by carnivorous fishes, water-newts larvte of dragon-flies and aquatic beetles and leeches. Vast numbers of the flying insects are destroyed by night-hawks and bats, and during

MOSQUES

1 Mosque at Delhi, Lidia

2 Pool in Shaivite Temple, Madura, India

II i t \ I if if ■

.

‘

MOSQUITO

the day they are pounced upon by dragon-flies, hornets and other carnivorous insects, and snapped up by swallows and swifts as they skim the grassy meadows. Of their parasites the recently discovered worm, Agammomermis cxilicis, is considered to exert an important checking influence in some years.

Mosquitoes are weak fliers and usually seek shelter when the wind blows, so that railroad trains, ships and wagons are far more effective than their own wings in accomplishing their dissemination.

Notwithstanding that the chief human in¬ terest in mosquitoes arises from their blood¬ sucking habits, yet the taste for blood is cer¬ tainly an acquired one and a relatively unim¬ portant factor in the lives of the majority of

mosquitoes. The normal food of both sexes of many species, and the only food of the males of nearly all, consists of the juices of flowers, fruits and other plant parts. In a few species a meal of blood by the female seems requisite to the maturation of the eggs, but this is decidedly exceptional. Most of the species are active chiefly at night, but a few, like Stegomyia fasciata, in which also both sexes bite, are most vicious during the early afternoon. The bites of all species are not equally irritating, prob¬ ably the result of dissimilar qualities of the salivary secretion which is poured into the wound to facilitate the blood flow. Ammonia and glycerine allay the irritation. Besides the warm-blooded birds and mammals, mosquitoes attack fishes, frogs, turtles and even other in¬ sects.

Until within a few years mosquitoes were regarded merely as intensely annoying pests, but since the definite discovery of their rela¬ tion to disease-transmission their momentous importance has been recognized. Besides sev¬ eral diseases of the lower animals three serious human maladies — malaria, yellow fever and elephantiasis — have been definitely traced to their agency, and they are suspected of others.

Kinds and Characteristics. — Within the limits of North America nine genera and up¬ ward of 30 species are known to occur.

Illustrations are here given of the three va¬ rieties which assume importance through their relations to the human race : the Culex, or gut¬

ter mosquito, the Anopheles, or swamp mos¬ quito, and the Stegomyia, or cistern mosquito.

Culex pungens prefers the gutter and may be likened to the sparrow among birds ; it is noisy and numerous, and always hungry.

Fig. 2.

The male insect (Fig. 1) presents a rather bushy headdress, by ‘which it may be easily distinguished from the plainer but more danger¬ ous female. Male mosquitoes are not blood¬ suckers, but vegetarians ; for the reason that the male insect cannot pierce the skin and must, therefore, subsist on food more easily obtained.

The feeding organ of the mosquito, called the proboscis, is composed of seven parts (Fig. 2), which together form the organ by means of which the blood is reached and through which it is obtained.

In the male insect the stylet, or piercing in¬ strument, is adherent to the neighboring parts and cannot move sufficiently to puncture the skin.

The female insect (Fig. 3) is plain as com¬ pared with the male. The palpi, those projec¬ tions on either side of the central proboscis, are much shorter in the female ; and the organs to the outer side, the antennae, are not as beauti¬ fully plumed. The female of the Culex is very annoying, but is not known to transmit disease in this country, though it is suspected of convey¬ ing dengue fever. In eastern tropical countries a species of the Culex is connected with the dis¬ ease known as elephantiasis.

The Anopheles is the spotted-winged swamp mosquito, responsible for malaria in the human. A peculiarity of this mosquito is its long, thin legs, and the dark spots on the wings are char¬ acteristic. The same general difference in the headdress of the sexes obtains, save that the palpi are about equally long in both, as may be seen by comparing the

pictures (Figs. 4 and 5).

MOSQUITO

The Stegomyia is for the South by far the most important mosquito; not because it is most numerous, but because it is the natural conveyer of yellow fever. It has been called

the tiger mosquito because of its striped ap¬ pearance. It is a most beautifully marked mos¬ quito and very dainty. It is essentially a domestic insect and is found only in inhabited localities. It is a day mosquito, and, resting on a dark background, such as a black coat or dress, presents a particularly striking appear¬ ance, the white bands on the legs and the pecu¬ liar marking of the back easily distinguishing it from any other (Figs. 6 and 6a).

The antennae of all male mosquitoes are more hairy than those of the female. Some of these hairs respond to sound by a vibratory motion; they are, therefore, auditory. These

are the ears of the insect and it is believed that the male flies to the female guided by her song, adjusting the direction of his flight by turning his head until both antennae are equally af¬

fected, when the object of his search is directly in front. The song of the insect is not pro¬ duced solely. by the buzzing of its wings, but also by the vibration of a peculiarly constructed

chitinous process situated near the breathing apertures along the sides of the insect and set in motion by respiration. This is the famous yellow fever mosquito, which has been the great¬ est and most

persistent enemy the South has

ever had, costing many thousands of lives and many millions of dollars, but which is at last, happily, conquered, if we but use the weapons that have been put in our hands by the patient searchers for truth in the field of science.

Mosquitoes cling to surfaces as a cat clings to the bark of a tree. A mosquito cannot rest on a perfectly smooth perpendicular surface ; a

fly can. A fly s foot is a sucker; a mosquito's toot is a claw (Fig. 7). Mosquitoes resting upon window panes would seem to deny this, but a window pane, very shortly after a thor¬ ough cleaning, may collect enough moisture and dust to form a film over the glass sufficient, though invisible, to afford a firm hold for the insect.

Hits T H R & tPO&HTnON andof CiUiLEX'and

Fig. 8.

The resting position of Anopheles is pecu¬ liar in that the head, body and tail present a straight line, at an angle with the resting sur¬ face, while in the Cnlex and Stegomyia the body is bent as you observe in Fig. 8.

The eggs of C. pungens (Fig. 9), the gutter mosquito, are cone-shaped and float on end, being glued together in large masses to main¬ tain this position in the water. The number deposited by a single mosquito varies from

Fig. 9.

50 to 400, and they hatch in from one to three days, varying according to temperature and en¬ vironment. When a sufficient time has elapsed to complete the hatching process, the larva (Fig. 10) or wiggle tail issues from the shell and begins to feed on the vegetable and animal matter contained in the water.

In its growth the larva sheds its skin several times before the pupal stage is reached — -in

Fig. 10. Fig. 11.

from 7 to 10 days. Mosquito wigglers get along apparently without air, when the surface of the water is covered with ice, and it is possible that they get air then, in the same way that fish do. This would account for their not being de¬ stroyed by surface freezing of the water. Ento¬ mologists must decide whether or not the larvae have gills or some organ analogous to the gills

of the fish. The wigglers of some mosquitoes may be frozen in ice and hibernate until liber¬ ated by warmer weather.

The pupal stage in mosquito life corresponds to that of the chrysalis in the transition of a caterpillar into a butterfly (Fig. 11). The pupa does not ieed. In about two days it becomes an imago, which is the technical name for the com¬ pleted insect whose life begins with the ovum or egg.

The shell of the pupa breaks at its highest point and the completed mosquito issues, being supported by the floating shell until its wings spread for flight (Fig. 12).

The kind of mosquito that issues from the shell of the pupa depends of course on the kind of egg which has been deposited and hatched in

the water.

The life cycle of Cnlex, the gutter mosquito, is from 10 to 15 days. Do not mistake the life

UtViKignUtelPvM-

Fig. 12, Fig. 13.

cycle for the length of life ; mosquitoes may live as adult insects for many months, and some fe¬ males must hibernate through the winter to furnish eggs for the next summer's supply.

Eggs of Anopheles (Fig. 13), the swamp mosquito, are boat-shaped and float singly on the surface of stagnant pools. They are depos¬ ited in numbers between 40 and 100. The bot¬ tom of the floating egg is marked somewhat like mosquito netting, the pattern being raised. The

of -Ano»nc.i.l»>

Fig. 14. Fig. 15.

top of the egg is smooth, black in color and partly covered by a transparent membrane which stands out from the surface of the top and sides, permitting intervening spaces of air, which float the egg like a lifeboat. The egg hatches in from three to four days.

The larva of Anopheles (Fig. 14) may be readily distinguished by its position at the sur¬ face of the water, as well as by its general ap¬ pearance, differing from that of either Culex or Stegomyia. You will observe that the neck of the Anopheles larva is very slender, and that the head is turned upon the body. This is be¬ cause the Anopheles larva finds its food on the surface and gathers it by the constant motion of little broom-like processes projecting from the sides of the mouth, and furnished for this purpose.

The breathing tube, you wiH observe, pro¬ jects from the back or upper surface of the larva, near the tail end. To get its mouth to the surface while maintaining its position for breathing, requires that the head should be turned half round on the body, an impossible position to any but the thin-necked Anopheles larva.

The larva becomes a pupa (Fig. 15) in about 12 days. In about five more days the pupa is a full-grown mosquito.

Eggs of Stegomyia (Fig. 16), the yellow fever mosquito, float singly upon the surface, of the water and are deposited in numbers varying

Fig. 16.

TLOomt'iw

Fig. 17.

from 5 to 75. They hatch in from 10 hours to 3 days, according to climatic and other conditions. The shell is marked like mosquito netting, the white pattern being raised and somewhat sim¬ ilar to that of the Anopheles egg, and on the sides are air-chambers which float it.

The larva (Fig. 17) is very similar in ap¬ pearance to that of the Culex, and its position in the water is also similar to Culex and unlike Anopheles.

In about six days the pupa (Fig. 18) de¬ velops and in a day or two the mosquito begins its flight.

The larvae of all mosquitoes have a breath¬ ing-tube near the end of the tail and the pupae have a pair of breathing-tubes projecting from the body near the head.

The insect, both in the larval and the pupal

fU?* 0/

Fig. IS.

stage, requires air, to obtain which the breath¬ ing-tubes at frequent intervals protrude from the water surface into the air above.

The life cycle of the different mosquitoes varies, as to duration of the formative periods, according to conditions favoring rapid devel¬ opment ; and no hard and fast rules can be laid down as absolute in this regard. It may be said, however, that the cistern mosquito breeds, approximately, in one week, the gutter mosquito in two weeks and the swamp mos¬ quito in three weeks.

Observe how both the larvse and the pupae rise to the surface to breathe. This necessity suggested that they could be destroyed by pouring oil on the water surfaces so as to cut off the air. It is estimated that about two

tablespoonsful of ordinary kerosene will spread and film the water surface of an average cis¬ tern, and the oil will positively not affect the taste or healthfulness of drinking-water. The placing of oil upon drinking-water for the de¬ struction of mosquitoes is not a new idea, for it was suggested as early as 1812 and has been practised for many years.

How Mosquitoes Transmit Disease.

Mosquitoes and Malaria. — Malaria is one of the greatest scourges to which man is sub¬ ject. Its cause is fully established to be a minute unicellular animal parasite or hsemos-poridium of the class Sporozoa (q.v.), living within the red blood-corpuscles and introduced by the bite of a mosquito. Each well-marked variety of malaria has its especial causal para¬ site, which passes through a complicated life-cycle. (See Malaria). The parasites enter the blood of the mosquito as minute slender sporozoites. When mature the sporozoites are freed into the body-cavity by the rupture of the wall of the sporocyst, when they migrate to the salivary glands, penetrate their walls and reach the proboscis through the salivary duct. When a mosquito harboring the parasites in this stage bites a susceptible human being, some of the

spores pass into the blood with the sa¬ liva and induce an attack of malaria, mild or severe according to their number and other conditions. The malarial organism once intro¬ duced into the human system may continue to multiply indefinitely by the asexual method un¬ less destroyed by drugs or some reaction of the organism, but that it can be transferred natu¬ rally to another person only through the inter¬ mediation of a mosquito and the intervention of the sexual generation. Properly speaking, man is the intermediate, the mosquito the final or definitive host, though the latter appears to suffer no ill consequences from the presence of the parasite. In pernicious tropical mala¬ ria, or sestivo-autumnal fever, the period for the complete development of the characteristic sporozoites (Laverania malarice) in the mos¬ quito is seven or eight days, but owing to the vast number of parasites of different broods present in the blood and their overlapping stages of development the exact time of schiz¬ ogony is doubtful. Tertian and quartan fevers, the two best differentiated types of mild or be¬ nignant malarial fevers, are caused by related parasites known respectively as Plasmodium vivax and P. malarice , which differ from Laver¬ ania chiefly in the replacement of the crescent stage by an immediately spherical gametocyte. Asexual sporulation recurs in the first form at intervals of 48 hours, and in the latter of 72 hours, corresponding with rhythm of the fever's paroxysms. Daily or other intermediate recurrences are due to double or triple infec¬ tions, in which the different broods sporulate on alternate days or in other combinations.

It was not until 1880 that Laveran, a sur¬ geon in the French army, discovered the amcebulae in the blood of malarial patients in Algiers ; the development of the sexual genera¬ tion in the mosquito and its relation to Laveran's parasite were traced by Ross in 1897-98, while to the Italian zoologist Grassi is due the first clear demonstration of the effectiveness of preventive measures directed at the mosquito.

Our scientific knowledge of the subject was almost entirely created within the five years subsequent to 1898, and workers in many coun¬

tries are constantly adding details. That sev¬ eral species of Anopheles, and especially A. maculip ennis , are the chief, and so far as known the sole disseminators of all types of malarial fever, is absolutely and thoroughly demon¬ strated from every standpoint.

Mosquitoes and Yellow Fever. — In the case of yellow fever our knowledge is in a very different and less satisfactory state. The rela¬ tion of mosquitoes to this disease was suspected by Dr. Finley as early as 1881, but his theory excited little interest until, upon the occupation of Cuba by the American navy, a Yellow Fever Commission of inquiry, headed by Major Reed, was appointed. By a series of very careful ex¬ periments it has been established that mos¬ quitoes are agents in the dispersal of this dis¬ ease, and at the same time the old view of in¬ fection by contact and the old practice of isola¬ tion and fumigation for prevention have been nearly repudiated. The particular species of mosquito which transmits yellow fever is Stegomyia fasciata, an especially fierce biter in the early afternoon, which is found in the tropical parts of both hemispheres, and in America as far north as Virginia.

The germs of the disease may be taken by the mosquito only during the first three or four days of the fever; after that time the blood of the patient cannot infect the mosquito. The germs require about 12 days to migrate from the stomach of the insect to the salivary glands, from which they may be injected through the mosquito's biting organ into the human blood stream. Mosquitos, after becoming infectious, are capable of inoculating the disease into the human at intervals of three days (period of feeding) for practically an indefinite time.

The adaptation of protective measures to this important discovery renders the prevention or suppression of an epidemic very simple, the¬ oretically. Screening the patient from mos¬ quitoes during the first four days of fever (be¬ fore the diagnosis), or killing all mosquitoes in the room before the 12th day after their possi¬ ble infection, will certainly prevent a second case.

Agency in Other Diseases. — Elephantiasis or filariasis, like malaria, results from the pres¬ ence in the blood of an animal parasite, but one of a very different nature. The adult males and females of the Filarici, which is a slender nema¬ tode worm, live together in the subcutaneous lymph vessels and produce enormous numbers of living, minute embryos which swarm in the blood, usually passing into the superficial capil¬ laries at night and retreating to the deeper ves¬ sels by day. This peculiarity first led Manson to suspect the mosquito as a means of distribu¬ tion and as a result of his studies and those of

Bancroft and others on the Filaricc of man and the dog, it is now known that when infected blood is swallowed by Culex fatigans and ‘other mosquitoes the embryos pass through certain stages of development within the intestine and malpighian tubules and then migrate through the body-cavity and tissues to the proboscis, from which human infection occurs. About three weeks are required to complete the devel¬ opment within the mosquito, and a year before the worms become sexually mature in the final

host. Elephantiasis is a dreadful and prevalent disease in tropical countries, and is frequent in the Southern States, but rare in temperate climates.

The mosquito is suspected of being instru¬ mental in the spread of leprosy and other dis¬ eases, and undoubtedly many important discov¬ eries await the investigator in this field.

Restraining Local Pests of Mosquitoes. — The possibility of the control or complete ex¬ termination of mosquitoes has received serious attention from zoologists, physicians and sani¬ tary engineers, and is encouraged by local and national governmental grants. Wherever the problems have been carefully considered, as in New Jersey, Long Island, the Connecticut coast and Winchester, Va., in this country, much has been already accomplished toward the mitigation of the pest. As to measures, the complete destruction of all breeding-places by the draining of swamps, pools and ditches is the most effective and permanent. This must be supplemented by emptying or suitably protect¬ ing by screening against the access of gravid mosquitoes all artificial vessels, such as pails, rain barrels, cisterns, privies and drains, which contain standing water in which mosquitoes may breed. A most effective and simple meas¬ ure for local application is to pour a small quantity of kerosene upon the surface of the water of possible breeding-places. This spreads as a delicate film which deters the larvae and pupae from coming to the surface to breathe, so that they quickly suffocate, and at the same time kills or drives off females which come to lay their eggs. The application should be re¬ peated at intervals of two or three weeks. Small fishes and the other natural enemies named above may be introduced into breeding-places to good purpose. The usual methods of ridding houses of mosquitoes by fumigation with sulphur dioxide gas ; of preventing their entrance by thorough screening; and of pro¬ tecting the person by the application to the skin of oil of citronella and other substances have a certain protective value. The most ap¬ proved application is a mixture of one

ounce each of oil of citronella and spirits of cam¬ phor with half an ounce of oil of cedar. The effect will last longer if incorporated with vase¬ line. It has been shown by the experiments of Grassi and others that this method alone is suf¬ ficient to grant immunity from malaria to in¬ habitants even of such fever-scourged districts as the Campagna of Rome. For the medical treatment of malaria we have a powerful specific in quinine, which is most effective at the time of the paroxysms, when the sporulse are free in the blood plasma and most susceptible to the action of the drug. See Malaria.

Bibliography. — Doty, A. Ft., (The Mosquito: Its Relation to Disease, and Its Extermination* (New York 1912); Herms, W. B., (Malaria: Cause and ControP (New York 1913) ; How¬ ard, L. O. (et al.), (The Mosquitoes of North and Central America, and the West Indies) (4 vols., Washington, D. C, 1914-17) ; Smith, J. B., <The Mosquito Investigation in New Jersey* (New York 1905) ; American Mosquito Exter¬ mination Society Wear Books) (New York 1904 onward) ; Mosquito Extermination Com¬ mission of Hudson County, N. J., (Annual Re¬ ports* ; United States Agricultural Department 'Farmers* Bulletin 444 (Washington 1911) ;

California Agricultural Experiment Station (Bulletin 178) (Sacramento 1906) ; Connecticut Agricultural Experiment Station (Bulletin 173) (New Haven 1912) ; New Jersey Agricultural Experiment Station 'Bulletin 276} (New Bruns¬ wick, N. J., 1915).

MOSQUITO BEE, one of the small,

gregarious, stingless honey-bees of the genera Trigona and Melipona, which make very large combs of bitterish honey in the tropical forests. Their stings are blunted and are never used as a weapon. Ordinarily they place these deposits in hollow trees, but sometimes suspend them from branches, protected from enemies in vari¬ ous ways.

MOSQUITO BLIGHT, a disease of Oriental tea-plants resulting from the attacks of great numbers of plant-bugs of the family Capsidce.

They breed upon the plant and young and old suck its juices.

MOSQUITO COAST, or MOSQUITIA,

Central America, an extensive region on the Caribbean Sea, still unexplored, forming the eastern seaboard of Nicaragua; area, 26,000 square miles. It is inhabited by Mosquito In¬ dians. For a considerable period it was gov¬ erned, under British protection, by a native chief, but in 1860 it was made over .to Nicara¬ gua. (See Clayton-Bulwer Treaty). In 1894 it was incorporated with Nicaragua and is now known as the department of Zelaya. Capital, Bluefields.

MOSQUITO FLEET, in the navy, a term given to what is known as “the second line of defense,® which is used in protecting the forti¬ fications and harbors along the coast line, and, like the insect for which it is named, annoys the enemy in every way, at the same time pre¬ venting the possibility of a blockade. A fleet of this kind was organized during the Spanish-American War in 1898, and was composed of all sorts and kinds of ships to the number of about 130.

MOSQUITO LAGOON, Fla., a salt water lagoon on the east coast 30 miles long by one mile wide, separated by a sandy strip of land, half a mile to five miles wide, from the ocean, and connecting with the latter by Mosquito Inlet and Haulover Canal, navigable for boats of very shallow draught. It connects also on the north with Halifax River and on the south with In¬ dian River. Fish and oysters are plentiful in its shallow waters, but mangrove swamps, sand and coral banks obstruct navigation even by the smallest boats.

MOSS, Frank, American lawyer: b. Cold Spring, N. Y., 16 March 1860; d. 5 June 1920. He was educated in the College of the City of New York. In 1897 he was president of the board of police in New York and was counsel to the ((Lexow Investigating Committee.” In 1899 he was leading council for the ((Mazet Investigating Committee,® thereafter was con¬ nected with the Society for the Prevention of Crime and was professor of medical jurisprudence in the New York College and Hospital for Women. As assistant district attorney of New York he was associated with the prosecution of Lieut. Charles Becker for the murder of Herman Rosenthal. He is the author of (The American Metropolis* (3 vols.,

1897).

MOSS, Lemuel, American Baptist clergy¬ man: b. Owen County, Ky.,

27 Dec. 1829; d. New York, 12 July 1904. He was graduated from the University of Rochester in 1858 and became pastor of the First Baptist Church of Worcester, Mass., in 1860, and thereafter held professional and editorial posts. He was presi¬ dent of the University of Chicago in 1874-75 and of the University of Indiana in 1875-84. He was president of the American Baptist His¬ torical Society in 1895-1900. He published ‘Annals of United States Christian Commis¬ sion (1866) ; (A Day with Paul,* *etc.*

MOSS-ANIMALS, or BRYOZOA. See

POLYZOA.

MOSS-BUNKER, a common name about New York for the menhaden (q.v.). It is one of many forms of the Dutch name “mars-banker® for the scad, ignorantly applied by the early Hollanders, and has been misspelled and mispronounced in a great variety ot ways. A detailed account of this matter will be found in Goode’s ‘Fishery Industries of the United States* (Sec. I, 1884) as a part of the history of the menhaden.

MOSS-PINK. See Pinks.

MOSS SIDE, England, town in Lancashire, near Manchester, of which it really forms a part. It has a great cotton-goods industry. Among its public works are the Saint Edmund’s Gothic Church (1882), a free library, slaughter¬ houses, etc., and the tramways are owned by the city, while gas, electric light and water¬ works are the property of a Manchester cor¬ poration. In 1911 there was a population of

33,100.

MOSS TROOPERS, in English history, bands of marauders infesting the districts which divided the English and Scottish terri¬ tories before the union in 1707. They were rarely heard of after that year. The name was derived from the character of the country over which they conducted their nefarious opera¬ tions.

MO.SSAMEDES, mos-sa’ma-dez, Africa, capital of the most southerly district of Portu¬ guese West Africa, situated on a small bay, in a rainless, sandy, desolate neighborhood, but with healthy climate and palm-lined streets. It has a government building and does an in¬ creasing trade with Portugal, having connec¬ tion by a steamship line with Oporto. It has a population of less than 5,000, nearly half white

men.

MOSSES (Musci), a class of cryptogamous plants, forming with the liverworts (Hepatic®) the group Muscinea or Bryophyta. The only plants likely to be wrongly called mosses are the foliose liverworts, and these are readily distinguished by their two-ranked nerveless leaves, their four-valved capsule and certain other characters. A germinating moss spore gives rise to a filamentous body called a protonema, from which buds arise and develop into the leafy shoots which constitute the true moss-plants. After a time the reproductive bodies are formed at the tips of certain shoots. The antheridia, or male reproductive organs, are club-shaped and contain cells which after¬ ward develop into the antherozoids. These antherozoids, when liberated from the anther-idium, move about until they come in contact

with an archegonium, or female reproductive body. The fertilized archegonium is then car¬ ried upward on a slender filament or seta, and now forms the fruit or capsule, usually closed by a lid or operculum, and often covered by a sort of hood called a calyptra. When ripe the capsule opens and liberates the spores, which by germination begin the life-history again. Mosses may also reproduce themselves asexually by the formation of buds or gemmce. There are no true roots in mosses and the leaves are of very simple structure. New ones are con¬ tinually springing from old shoots, so that in bogs the top remains growing while the under¬ layers die and the deeper ones slowly change into peat. Some 5,000 species of mosses are known, of which about nine-tenths belong to the order Bryacece. This order comprises the two suborders, Cleistocarpce , with an indehiscent capsule, including the genera Phascum, Ephe-merum, etc., and Stegocarpce, in which the cap¬ sule opens by a lid. The stegocarpous mosses, again, may have the capsule either terminal (Acrocarpce) or lateral (Pleurocarpce) , the former group including, among others, the genera Grimmia, Fissidens, Polytrichum, Ortho¬ trichum, Dicranum, Mnium, Bryum and Fu,- naria, and the latter, Hypnum, Leskea and

Climacium. There are three other orders of mosses, namely, Sphagnacece, or Bog-mosses, with only one genus, Sphagnum ; Andreceacece, with the single genus Andreaca, and Archi-diacece, with the genus Archidium. Mosses are of little or no economic value, but they form an important part of the natural covering of rocks and serve to prepare the way for higher forms of plants. Consult Campbell, (Mosses and Ferns* (New York 1895) ; Grout, A. J., (Mosses with a Hand-Lens) (2d ed., New York 1905) ; Hale, E. H., (Flowerless Plants* (New York 1909) ; Strasburger, (Textbook of Bot¬ any) (1903).

MOSSES FROM AN OLD MANSE, title of Nathaniel Hawthorne's second collection of tales and sketches (1846). The Old Manse, Hawthorne's Concord home, is described in the opening chapter of the hook. The remaining contents include many of Hawthorne's most famous short sketches, such as (The BirthMark, *(Roger Malvin's Burial* and /The Artist of the Beautiful. > These bear witness to his love of the mysterious and the unusual; and their action passes in a world of unreality, which the genius of the author makes more visible than the world of sense.

MOSSLEY, England, town in Lancashire, located on the Tame and the Huddersfield Canal. It contains great woolen factories and foundries and has among its public buildings a modern Gothic church, handsome town-hall in a park, besides markets, gasworks, *etc.* Its population in 1911 was 13,205.

MOST, most, Johann Joseph, German-American anarchist: b. Augsburg, Bavaria, 5 Feb. 1846; d. Cincinnati, Ohio, 17 March 1906. He learned bookbinding and traveled on the Continent in the pursuit of his trade. Later he was editor of the Freie Presse at Berlin and in 1874-78 member for Chemnitz in the Reichstag. Expelled from the Socialist ranks in Germany, he went to London, where he founded Die Freiheit, an anarchistic sheet, in 1879. In 1881 he was arrested and sentenced

to 18 months' imprisonment for printing an article approving of the assassination of the Emperor Alexander II, and upon his release came to the United States. He continued Die Freiheit in New York. In 1901 he was arrested for a seditious editorial in his journal after the assassination of President McKinley and sentenced to a year's imprisonment, com¬ mencing June 1902. He published several anarchistical writings, such as (Whv I Am a Communist* (1890) and Town With the Anarchists) (1901).

MOSTAGANEM, mos'ta-ga-nem', Algeria, capital of the arrondissement in the province of Oran, located on the Bay of Arzeu. It has a branch of the Oran-Algiers Railway and is connected also with the military station Tiaret. It is situated on a steep cliff 280 feet above the Mediterranean Sea and has a deep-water har¬ bor into which steamers enter. The Ain Safra River feeds water power here to flour mills, and it does considerable export to Europe in wine, wool, cattle, grain, figs, *etc.* It is situ¬ ated on the ruins of an important city of the old Roman period and was flourishing in the 16th century under the Berbers, but lost its prestige till the French in 1833 captured the site and built up its industries. In 1911 it had 21,087 inhabitants in the commune.

MOSTAR, mos'tar, Bosnia, former capital of Herzegovina, now belonging to the circuit of Mostar. It is a station on the Bosnian Sara-jevo-Mostar-Metkovic State Railway and is picturesquely situated along the cliffs from Podvelez and Ham in the narrow valley of the Narenta. The latter is spanned by an imposing, single-arched, stone bridge. The town is built of stone and was formerly strongly fortified with its star-batteries and walls. It has 25 mosques, two Oriental-Greek and one Roman Catholic church, besides a convent of the Sisters of Mercy. Its industries consist of arms, leather and tobacco factories and wine culture. There are several Catholic and ortho¬ dox schools, a trade school, high gymnasium, fruit and wine-culture schools, *etc.* It is the seat of a Catholic and a Greek bishop. Its pop¬ ulation in 1910 was 16,369.

MOSUL, mo'sool, Mesopotamia, capital of a vilayet and sanjak of the same name, on the right bank of the Tigris, 220 miles northwest of Bagdad. A stone bridge continued by a bridge of boats crosses the river to the site of ancient Nineveh. The town is surrounded by decayed walls, and has houses of stone and brick, mosques, shrines, Christian churches, con¬ vents, *etc.* Formerly a place of much commer¬ cial importance, it has greatly declined, mainly owing to diversion of traffic due to the opening of the Suez Canal, but it still carries on some trade, especially in gall-nuts. _ Muslin is named from this town. Population about 80,000, mostly Mohammedans, but including about 7,000 Christians and 1,500 Jews. The vilayet has a population of 351,200.

MOSZKOWSKI, mosh-kof'ske, Moritz, Polish composer and pianist: b. Breslau, 23 Aug. 1854. At 19 he began to appear in public after studying at Dresden and Berlin. His success was immediate and striking and he made frequent concert tours. He has resided chiefly in Berlin and Paris. He is a talented composer; his opera (Boabdil* was

presented at Berlin in

1892-his other works include a ballet, (Laurie ; a symphonic poem, <Jeanne d Arc ; some (Danses espagnoles) for the piano or violin , and the two orchestral series called Les Nations.*

— MOTA-PADILLA, mo'ta pa-del'ya, Matias de la, Mexican historian: b. Guadalajara, Mex¬ ico 1688; d. 1766. He was a lawyer, and dur¬ ing the latter part of his life a priest, he wrote, among other .works History of the Conquest of New Galicia (1870-/1,).

MOTET, or MOTETT, a vocal composition in harmony, set to words generally selected from sacred writings. Like the madrigal, the motet was at first set to words of a profane character, and there are ecclesiastical decrees extant forbidding its use in church.

MOTH, any insect of the order Lepidoptera

not included among the butterflies (q.v.). Moths have antennse of many forms, and on account of this variability are often grouped in a section Hetero.cera, but their antennae are rarely swollen at the end, or "clubbed,® and never in the North American forms. _ They are farther dis¬ tinguished from butterflies by their wings be¬ ing horizontal when at rest, and by their being seldom seen on the wing except in the even¬ ing or at night, although certain species ot moth fly in the brightest sunshine, and some butterflies appear at twilight. In most cases there is a peculiar arrangement of interlocking spines (frenulum and retinaculum) by which the hind wings are kept in contact with the front wings during flight. The pupae are never angular; are mostly smooth and dark-colored; and are often enclosed in a cocoon, which the larva spins before it passes into the pupal stage. Moths are in general larger than butterflies and more hairy or downy in character. A Brazilian giant measures nearly a foot from tip to tip, and there is a gilded species smaller than a pin's head. Similarly they present as great a variety of outlines and as much beauty (with less gaudiness) as do the butterflies; and they interest the

philosophical naturalist by ˆ ex¬ traordinary adaptations to conditions which many of them present, and which have come about in the development of the “ace Some o the most extraordinary examples of sexual of protective coloration (q.v.) and resemblance, of mimicry (q.v.) and of curious armaments, are to ‘be found among these creatures, whose small size, weakness and edibility, especial y when in the larval condition, render essentia means of concealment and of passive defense. Nevertheless caterpillars of moths, as well as of butterflies, furnish a large part of the food of birds and of various other insect-eating ani¬ mals • and in the adult state they are seized by night-flying birds, by lizards, monkeys, turtles, and by some predatory insects and spideis. The eggs of moths are laid upon the proper food-nlant of the species, and are various in form, ranging from that of a sphere or a cylinder to that of a disc, often with the surface beautifu y sculptured or ornamented. Each has a micro-pyle or lidded opening from which the larva escapes. They are laid by most species of tem¬ perate regions in the. early summer and the fife-cycle of the insect is completed before the end of the season ; but some moths oviposit in the autumn, when their eggs remain quiescent

through the winter, or, in some cases, hatch in time for the larva to partly grow, then hiber¬ nate and complete their development the follow—

mgTheTaˆvae or caterpillars of moths, like those of butterflies, hatch as very minute objects but rapidly grow, shedding their skins (see Molt¬ ing) at intervals to permit of enlargement, until some attain a length of six or seven inf*es. Most moth-larvae molt five times, but some

oftener and a few less times. } . , f

The larval condition is the insect s period ot feeding and growth, some species taking no food whatever in adult life. The vast majority feed upon green vegetable food, leaves most of all; and are among the worst foes ot our parks, orchards and gardens, attacking culti¬ vated plants in a great variety of ways. A few larvae,® remarks Holland, “feed upon woody tissues, and bore long galleries under the bark or in the wood of trees. (See Mot , Leopard; Moth, Brown-tail; Moth, Gypsy). Others feed upon the pith of herbaceous plants.

A number of species feed upon the inside o growing furits. Only a very few species are known to be carnivorous. The household moths

(Tinea) are well known on account ot the injury they work among clothes, carpets, furs *etc.* Other species attack grain, meal, flour, hay, tobacco, dried herbs drugs and a variety of stored products ; other bore into timber, or damage human property in some other way. Some recompense is obtained, how¬ ever, from the silkworms (q.v.), the moths whose cocoons furnish silk. > , .

There is considerable variety in the torm of the caterpillars of moths, but most are worm-like, and the structure and appendages resemble those of butterfly caterpillars (q.v.). The great majority possess besides the six minute thoracic legs the usual four pairs ot «prolegs,» or false feet, in the middle of the body, and a fifth pair on the hindermost (loth) segment (somite) of the body, which in real¬ ity are clasping organs needed for clinging to twigs in the process of molting. In some (numerous geometrids, noctiiids and psychids) these prolegs are reduced in number, and in the geometrids they are placed in only two pairs on the 9th and 13th segments, and these larvae can progress only by looping the body upward (see Measuring-Worms). Other va¬ riations of this feature exist, as the sucker-like pads of the Megalopygidce and Cochlidiida.

“The bodies of the larvae of moths,® to quote Holland, “are covered with tubercles, the loca¬ tion and arrangement of which have in recent years received considerable attention from students, and are thought to furnish a clue to the lines of descent of certain families These tubercles sometimes carry only a single hair m other cases they carry large tufts of hairs; they may be small and inconspicuous, or they may be developed until they assume the form ot great spines, horns, or bulbous projecticms.

Some moth caterpillars exhibit bright and beautiful colors, and move_ about fearlessly, protected by thorny projections, or nauseous exudations, or by hairs which possess severe stinging properties. Others present striking ex¬ amples of protective resemblance and mimicry, in color or form or attitudes, or all three re¬ spects. While many are solitary in their habits

FOLIAGE-EATING MOTHS

1 Pepper Moth, with larva and pupa

2 Red Underwing, with caterpillar

3 Pine Moths, with caterpillar

4 Group of Geometrid Moths

5 Currant-worm Moth (Abraxas)

6 Gipsy-moth, illustrating development

7 Black Arches Moth, in various stages

others are gregarious, forming “armies® and “processions® during their feeding life which disperse when the time for pupation arrives.

Many moth-larvae enter the ground and sur¬ round themselves with an earthen cell in which to transform into and pass the pupal stage. Others spin cocoons in great variety, usually formed more or less of silk, and well protected against both the weather and enemies. Some are hidden away under leaves, beneath loose bark, in the crevices of rocks or old stumps or fastened to the branches of trees. As a rule the cocoons are whitish or brown in color, never ornamented with the bright silvery or golden spots characteristic of the chrysalids of many butterflies. Escape from the tough silken kind of cocoons is aided by a copious saliva which dissolves or cuts the silk, so that the newly-born insect may wriggle out.

The anatomy of the moths is substantially the same as that of butterflies, but in these heterocerous families the head is not so prom¬ inent. The eyes, however, are often larger and better, as would be expected of insects mainly crepuscular in their habits ; and some have the suctorial apparatus in high perfection, so that many of the hawk-moths and noctids can poise upon whirring wings, and inserting the long proboscis suck nectar from flowers with¬ out alighting ; and these take a considerable part in the cross-fertilization of plants. On the other hand, in the bombycine moths and their allies, the proboscis is small and some of them have no mouth-parts or ability to feed at all. “They are simply animate winged reservoirs of reproductive

energy, and, when the sexual func¬ tions have been completed, they die.®

The antennae of moths assume a great va¬ riety of forms. They may be simple or branched, thread-like, furiform, spatulate or like broad feathers; and those of the males fre¬ quently differ from those of the females. In an attempt at classification various subdivisions have been proposed, but lepidopterists no longer make artificial groupings of the families, whose inter-relationships seem very uncertain. Most of the families, of which about 50 are recog¬ nized by modern systematists, are represented in America, but several families are confined to the Oriental regions, and a few are exclusively African. The criteria principally used in sep¬ arating families are found in the character and arrangement of tubercles, and in the structure of the wings. The lowest are the very small moths called Micropterygidce, with bronzy golden wings, whose larvae show striking af¬ finities with the caddis flies, and feed in damp moss. The large yellowish-brown "swift® moths (Hepialidce) come next, whose larvae and incomplete pupae live underground and feed on roots ; followed by the Zygcenida *or burnet moths, which are small day-flying* insects adorned with bright metallic colors. Their larvae feed openly on various plants, and spin elongated cocoons. The tropical Chalcosiidce and Limacodiidce are allied to them ; also the large, day-flying, brilliant tropical castniids, which have clubbed antennae like butterflies. The small family Mcgalopygida, of hairv American moths, are singular in having seven pairs of prolegs. The Psychidce are a small but universally distributed family characterized by the extreme degradation of the wingless fe¬

males; the caterpillars live in portable cases made of sticks, grass, etc., and are called "bas¬ ket worms® (q.v.). The Cossidce are large moths, unable to feed, most numerous in the tropics and exemplified in Europe by the well-known gnat and leopard moths (qq.v.) ; only two species are North American; and the Sesiidce are the clearwings (q.v.), resembling wasps. In the T ortricidcs is found a very large assemblage of small species known as leaf-rollers (q.v.), plentiful in the United States and embracing many pests, as the codling moth, *etc.* Another immense family of evil repute is the Tineidce, represented by the clothes-moth, flour-moths (qq.v.) and the like, which damage woolen goods, furs and stored products of every kind, as well as feed upon plants, some of them performing an essential work in cross-fertiliza¬ tion, conspicuously the yucca-moths (q.v.) ; there are thousands of species. The plume-moths (q.v.) come next, followed by a series of families having obtect pupae, which never emerge from the cocoon

until the final molt. Among these are the Pyralida , a huge and varied family, having nearly 800 beautifully marked species in the United States alone, and largely destructive to cultivated plants. Repre¬ sentatives are the grape-leaf-folder, print-moth, sugar-beet moth, clover-hay worm, snout-moths, grass-moths, corn-stalk borer, bee-moth, leaf-crumplers, dried-currant moth and others, many of which are elsewhere described in this work. The egger-moths, tussock-moths (qq.v.) and some minor families are nearly related to the pyralids. The gayly colored tiger-moths (q.v.) carry the list to the owlet-moths (q.v.), which belong to the cosmopolitan nocturnal group Noc-tuidce , and these are followed by several fami¬ lies,. chiefly belonging to the Old World. Then come the Sphingidce (see Death's-head and Hawk-Moth), familiar all over the world; and the great assemblage of small, plainly but ex¬ quisitely colored geometrids (see Measuring-worm). Closely related are the tropical UraniidcF, which contain large and magnificent green and gold tropical species — the glory of the forests of Brazil and the East Indies. Many of these, as of the Oriental family Epicopiidce, are "tailed® and simulate the papilionid butter¬ flies in many ways. Next to these are placed the silkworm moths (Bombycidcz) , and several families of large tropical moths, leading up to the great Saturnians (Saturniidce) , scattered over most of the warmer parts of the world; among them is the great Attacus atlas of India, the largest of all Lepidoptera, and many of the largest and most notable of American cocoon¬ making species, such as the Ailanthus silk-moth, the Cecropia, Polyphemus, Luna and several others well known and elsewhere described.

Bibliography. — The literature relating to moths is very extensive. The most complete and scientific account of the families, technically considered, is found in Hamson's <Catalogue) of the moths of the world, published since 1898 by the British Museum. The Smithsonian In¬ stitution published simultaneously a (List> of North American species 'by H. G. Dyar. The textbooks of Packard and Comstock give suffi¬ ciently full accounts of structure; and Carpen¬ ter's Unsects and their Structure) (1899), and Sharp's <Insects) (Vols. T and II, of Cambridge Natural History) (1895-99), contains a resume

of general information and of modern views as to relationships, phylogeny, *etc.* A good refer¬ ence hook for the British species is Newman L VV., and Leeds, H. F., <TextBook of British Butterflies and Moths> (Saint Albans 1913). 1 he best general illustrated descriptive work on North American species is W. J. Holland's <The Moth Book) (New York 1903), which contains a3* extensive classified list of books relating to the whole subject, including the splendid mono¬ graphs of American families by Packard, Grote, Smith, Beutenmiiller, Hulst, Dyar and others! Among the more or less popular works treat¬ ing °f the moths are Dickerson, Mary C Moths and Butterflies) (Boston 1901) ; Robertson-Miller, Edith, (Butterfly and Moth Book> (New York 1912); Stratton-Porter, G., <Moths of the Limberlost) (New York 1912).

MOTH, Brown-tailed, a moth (Euproctis chrysorrhoa) of the family Liparidce, accident¬ ally imported from Europe in 1890 or 1891, and nearly related to the gypsy and tussock moths. Its color is white, with the hinder end of the abdomen brown. The caterpillars de¬ foliate trees and have done much damage throughout the greater part of New England, as well as become an annoyance by their flying hairs which irritate the skin; but the insect is not so much feared as is the gypsy moth. This moth lays in midsummer about 250 eggs underneath the tip of a leaf, and covers them with its hairs. . The larvae appear in early autumn and begin to eat the green substance of leaves, skeletonizing them ; they also feed on apples and pears. In mid-autumn they form cases of bits of leaves, attach them to twigs by silken strands, pass the winter in them, complete their growth the following spring, feeding on foliage, flowers and fruit, and then pupate in June and* emerge in midsummer. JLhe larvae may be killed by arsenical sprays. Another mode of control is the destruction of their cocoons in the winter. They are easily transported with twigs or Christmas trees or nursery stock and these should always be in¬ spected. See Gypsy Moth. Consult any work on agricultural entomology.

MOTH, Gypsy, or Gipsy. See Gipsy-moth.

MOTH, Leopard. See Leopard Moth.

MOTHER ANN. See Lee, Ann; Shakers.

MOTHER CAREY'S CHICKEN, any of

several small oceanic petrels (q.v.) ; specifically, in the Mediterranean and Atlantic, the storm-petrel (Procellaria> pelagica) often seen about ships, especially in wild weather, and looked upon with superstitious dread by sailors. Its manner of paddling along the surface of the waves suggested the name petrel, namely, little Peter (the Apostle), afterward transferred to the whole group; and the “Mother Carey® is supposed to be a queer Anglicization of the Latin Mater Cara (“Dear Mother,® an appella¬ tion of the Virgin). These little petrels are about six inches long, sooty black, with white rumps and a little white on the wings. Thev breed numerously on all northern coasts, as about Newfoundland, Labrador, North Green¬ land and the British Isles, wherever suitable places can be found, occupying holes in the face of earth banks, like bank-swallows, and

rarely approaching or leaving their nests, each with a single white egg, except at night.

MOTHER OF CITIES, the euphemistic local title for Balkh (q.v.), central Asia.

MOTHER GOOSE’S MELODIES, the

well-known collection of nursery rhymes. In 1860 a story was started to the effect that “Mother Gooseˆ was a Boston woman ; and she was identified as Elizabeth Goose, widow of Isaac Vergoose, or Goose, and motherin- law of Thomas Fleet, a Boston printer, who issued a collection of the (Melodies) in 1719. It is now conceded that ((Mother Goose® be¬ longs to French folklore and not to English tradition. Charles Perrault (q.v.), b. Paris, 1628, was the first person to collect, reduce to writing and publish the (Cortes de Ma Mere l’Oye,> or (Tales of Mother Goose, > though he did not originate the name; and there is no reason to think that <(Mother Goose® was a term ever used in English literature until it was translated from the French equivalent, “Mere 1 Oye.®

MOTHER-OF-PEARL. See Pearl.

MOTHER OF PRESIDENTS, in Ameri¬ can history, a name given to Virginia because that State has given eight chief executives to

ˆej-ˆnˆon’ namely; Washington, Jefferson, Madison, Monroe, Harrison, Taylor, Tyler and Wilson.

MOTHER OF STATES, in American his¬ tory, a name given to Virginia, from the fact that out of the original colony of Virginia were formed the States of Kentucky, Ohio, In¬ diana, Illinois and West Virginia.

MOTHERS' CLUBS, organizations of women in various American cities designed to bettei the condition of the home and aiming to formulate improved methods for the moral training, and education of children. They are active in promoting playgrounds, children's clubs, *etc.* The most prominent of these so¬ cieties is the New York Mothers' Club. There is a New York State Federation of these so¬ cieties which holds annual meetings.

… . - r — nuiiui ui me

origination of Mother's Day belongs to Miss

Anna Jarvis of Philadelphia. Her mother died in 1906 On Sunday, 9 May 1907, she told a mend whom she had invited to remember with her the anniversary of the death of her mother of her desire to dedicate a day to all mothers.. Before the next anniversary came she had interested many individuals and' organ¬ izations in the observance of the second Sun¬ day in May as Mother's Day. As a result of her efforts, Philadelphia observed the day, 10 May 1908 Miss Jarvis then became the mis¬ sionary of, the idea. She wrote thousands of letters to influential men in all >valks of life bhe interviewed many public men and pleaded for the observance of the day. Since 1912 the governor of Texas has observed the day ny pardoning a number of prisoners on that day. State after State has adopted its observ¬ ance. In May 1913 Pennsylvania made it a . tate holiday. On 10 Mav 1913 a resolution passed the Senate and the House of Representa¬ tives to make the second Sunday in Mav a national holiday, "dedicated to the memory of the best mother in the world, jˆour mother.®

MOTHS DESTRUCTIVE TO FOLIAGE

1. Gypsy Moth (Porthetria dispar), female; a, male; b, feeding caterpillar; c, pupa. 2. European Processionary Moth; a, feeding caterpillar. 3. Lackey Moth. 4. Tiger Moth and its "woolly bear" caterpillar. 5. Tussock Moth; a, caterpillar and cocoon with pupa. 6.

Psilura Moth (Psilura monacha), female; a , male; b, eggs, young caterpillars and pupa, on the under side of a piece of bark; c, feeding caterpillar. 7. Pine Moth (Gastropacha), female: a, feeding caterpillar and cocoon; b, eggs.

Miss Jarvis has been the means of organizing a national and an international organization to further the promotion of the observance of the day. It began to be observed in England as early as 1913. The second Sunday in May is observed in all churches irrespective of creed, and the previous Friday is observed in all the public schools. The previous day is observed in business establishments. It is observed ((through some distinct act of kindness, visit, letter, gift, or tribute to show remembrance of the mother to whom general affection is due.® It is also observed as Father's Day, and <(is designed to perpetuate all family ties.® Its slogan is in honor of ((the best mother who ever lived.® The badge of the dav is a white carnation.

MOTHERWELL, mut'h'er-wel, William, Scottish poet and antiquary: b. Glasgow, 13 Oct. 1797 ; d. there, 1 Nov. 1835. Educated at Edinburgh and Paisley, at 15 he was appren¬ ticed to the sheriff-clerk of the latter town, and in 1819-29 was sheriff-clerk depute. It was while in this situation that he did his best work both as poet and ballad-collector. He was precocious, and planned his ballad, <Jeanie Morrison,) at the age of 13. After editing the collection of songs called the (Harp of Ren-frewshire) (1819), he compiled the more im¬ portant collection of ballads published in 1827, under the title of (Minstrelsy: Ancient and Modern, > with a historical introduction and notes. This brought him to the notice of Scott. He became editor first of the Paisley Adver¬ tiser (1828-30) and then (1830) of the Glas¬ gow Courier. He published in 1832 original (Poems: Narrative and Lyrical. > In 1835 he collaborated with Hogg in an edition of Burns. In the same year he was summoned to London to give information to a special Parliamentary committee; here his health broke down and he died not long after. Some of his lyrics are familiar in anthologies.

MOTHERWELL, Scotland, a police and municipal burgh and

manufacturing town in the county of Lanark, 12 miles southeast of Glasgow. It is of comparatively recent origin, and takes its name from three farms called High, Low and North Motherwell, which again derived their names from an adjoining spring, which in Roman Catholic times was dedicated to the Virgin Mary, and called the Well of our Lady, or Mother's Well. The inhabitants are chiefly employed in the neighboring coal¬ mines, iron and steel works, foundries and engineering shops. Motherwell has several churches, a town-hall, public park, good water supply, electric light, *etc.* Pop. 40,380.

MOTHERWORT, a labiate plant (Leonu - rus cardiaca) with rigid branched stem about three feet high,, flowers in crowded axillary whorls, white with a reddish tinge, upper lip of corolla shaggy, calyx with spreading teeth; leaves with long petioles, lower ones palmately cleft, upper ones three-lobed. The plant, with two or three related species, frequents waste places, and is not uncommon in North Amer¬ ica, where it has been introduced from Europe. An infusion of it was formerly much employed in chest diseases.

MOTIF, mo-tef. See Leitmotiv.

MOTION. See Mechanics.

MOTION (from the Latin motio and the verb movere , to move). In legal practice it means an application to a court by one party in a cause, or his counsel, seeking a rule he considers necessary in the case or to obtain relief in summary manner from an injustice. This may be made in a written application or orally. In cases where the object of the mo¬ tion may be granted on request and without a hearing it is a motion of course, such as an ex parte application; if notice is required for other party it is a motion on notice. A motion made on matter of fact has to be supported by an affidavit that such facts are true. There are also motions for decree and for judgment, *etc.* See Decree; Judgment.

MOTION, in music, is a term used to ex¬ press a change of pitch in successive sounds, when they are allotted to a single part or voice, or to groups of parts or voices which sound simultaneously. In a single part the motions are classified according to whether the succes¬ sive steps do or do not exceed the limits of a degree of the scale at a time; in the for¬ mer case it is called (<disjunct® and in the latter

ˆconjunct® motion. When motions of different parts sounding together are independent it con¬ stitutes counterpoint, in which cases, according to their relations, we get ˆcontrary,® (<similar® and ((oblique® motions. ((Contrary® motions have their parts converge or diverge, one rising as the other falls. ((Similar® motions either rise or fall together; while the (<oblique® de¬ fines one part only moving up or down, the other standing still.

MOTION PICTURES. See Moving Pictures.

MOTION PICTURES, Censorship of.

See Moving Pictures, Censorship of.

MOTLEY, mot'll, John Lothrop, American historian: b. Dorchester, Mass., 15 April 1814; d. near Dorchester, England, 29 May 1877. His education was obtained at Harvard, from which he was graduated in 1831, and at the universi¬ ties of Berlin and Gottingen, between which he divided two years (1832-33). His first pub¬ lished writings were contributions to Willis' American Monthly Magazine and (<verses in the corner of a paper called the Anti-Masonic M'ir-rorA His first book, the two-volume, semi-autobiographical (Morton's Hope) (1839), met with a generally unsatisfactory reception; and, according to Holmes, the North American Re¬ view (<dropped a small-print extinguisher upon it.® He went to Saint Petersburg in the autumn of 1841 as secretary to the American legation, but after a brief residence returned (1842). His first important attempt in history was a 50-page article, nominally a review but really a narrative, on Peter the Great, in the North American for October 1845 (in bookform in the <Half-Hour) library). His further literary work during this period includes notable essays on Balzac (July 1847) and the (Policy of the Puritans) (October 1849) in the North American; and a second effort of fiction, (Merry Mount) (1849), certainly an advance on the first, and rewarded by a nearly 20-page notice in the North American, but clearly not a success. But so early as 1846 he had been gathering material for a history of Holland. Having learned that Prescott, then at the height of his reputation, was busy upon the (History

of Philip IIP Motley had a conference with Prescott, who urged him to continue, even though the two works would unavoidably cover the same ground. For the year 1849 he was a member of the Massachusetts house of repre¬ sentatives; and he often humorously referred to his experience when an extensive and, as he fancied, impregnable report prepared by him as chairman of the committee on education was triumphantly demolished by George S. Bout-well (q.v.), then a young representative from Groton. From 1851 until 1856, the year of the appearance of the (Rise of the Dutch Republic, y he was in Europe, continuing his investigations at Berlin, Dresden, The Hague and Brussels. When, after 10 years' labor, the great work was at last ready for the press, it had to be pub¬ lished at the author's expense. It was received with almost universal praise by public and critics — Froude writing, (<one of the earliest as well as one of the most important recogni¬ tions0 — and definitely established Motley's fame. It was widely translated, Guizot super¬ intending the French version and writing the introduction. Motley was in America in 1856-58, but then returned to Europe. In 1861 he wrote two letters, then of great timeliness and importance, to the London Times, setting forth to the English nation the structure of the United States government, the causes of the Civil War and the results involved. From 1861 until his resignation in 1867 he was United States Minister to Austria, and his official dispatches in this post were highly praised by John Jay, his successor. He re¬ turned to the United States in 1868, in 1869 was appointed Minister to England by Grant, but in 1870 was suddenly recalled. This action by the government was never explained with any degree of satisfaction. The correspondence between Motley and Fish, Secretary of State, is to be found in a publication of the State De¬ partment (1871). It would appear that Holmes' verdict that Motley was greatly wronged is the correct one. Sumner said : ((How little Mr. Motley merited anything but respect and courtesy from the secretary is attested by all who know his eminent position in London and the service he rendered to his country.0 Motley continued writing until 1873, and in 1875 paid a visit to the United States. His other two famous works are the (History of the United Netherlands, from the Death of William the Silent to the Twelve Years' Truce, 1609 J (1860) and (The Life and Death of John of Barneveld, Advocate of Holland: with a View of the Primary Causes of the Thirty Years' War> (1874). They confirmed his rank as a great historian ; some of the best Dutch critics thought the <Barneveld) his chief publication. His style is precise and brilliant; his narratives are full of movement, his portraitures vivid. Consult Holmes, O. W., (John Lothrop Mot¬ ley: A

Memoir) (Boston 1898) ; Bassett, J. S., <The Middle Group of American Historians) (New York 1916); Curtis, G. W. (ed.), (Cor¬ respondence of John Lothrop Motley) (New York 1889) ; Mrs. S. St. J. Mildmay (Motley's daughter), (John Lothop Motley and his Fam¬ ily: Further Letters and Records* (New York

1910).

MOTMOT, a bird of the tropical American family Momotidce, allied to the kingfishers and todies, of which about 20 species are known, all

in the genus Momotus. They inhabit the for¬ ests, as a rule, and are usually solitary in the daytime, perching with the head drawn between the shoulders, solemn and still except for an occasional melancholy croak from the repeti¬ tion of which they derive their name, originally French and pronounced mo-mo. They are most lively at early morning and in the dusk of evening, pursuing insects in short flights ; they also eat fruits, lizards and snakes, which are tossed into the air from the point of the bill and swallowed; they sometimes devour the eggs of other birds. The nest is made in holes of trees or banks of earth. The motmots are birds of brilliant plumage, with one striking peculiarity. The two middle feathers of the long-tail are much prolonged and are always more or less denuded of vanes on both sides of the shaft except near the tip, giving a racket¬ like shape to the feathers. This seems to be the result of a habit in the bird of gnawing its feathers, which begins as soon as their growth outreaches the other rectrices. The best-known species is the Brazilian motmot (M . brasil-iensis), about the size of a blackbird, of a deep rich green color, with bluish forehead, violet back of head and black crown. One of the Mexican species (M . cceruliceps) occa¬ sionally crosses the line into the United States. Consult Belt, (Naturalist in Nicaragua) (Lon¬ don 1888) and Zoologica (Vol. I, No. 5, New York 1910).

MOTOR, a machine for utilizing some power, as gas expansion or an electric current, to do useful work. The meaning of the word <(motor ° is similar to the commonest meaning of ((engine ,° but the application of the words is different. We have become habituated to re¬ serve the word engine for a steam-engine or large stationary gas-engine. The word motor came into common use with the commercial development of electricity. The makers of the first electric machine that was marketed for delivering power chose to call it an electric

motor, and since then a reversed dynamo has always been a motor. Then came Daimler's perfecting of the <(petrol° engine, for use on bicycles, which is now technically called an in¬ ternal combustion engine, but popularly called a motor. The developments of this are the automobile motor, the aviation motor, Liberty motor, *etc.* Motor is now being used as a verb, as <(to motor into town.0 It has become fixed in the language.

MOTOR AREAS, those portions of the brain in which are located the cells that govern the voluntary muscles of the body. The motor areas are confined more distinctly to the cortex or outer surface of the brain on either side of the fissure of Rolando, making up the areas known as the anterior central and posterior central convolutions. In these areas are nu¬ merous motor cells, the stimulating of which results in bodily motion. From these motor cells the impulse passes inward through the substance of the brain. The motor cells may be isolated from adjoining surface area by ex¬ cision, with no effect on the control of the specific motion. When these surface areas are removed or injured there follows an impaired function of the muscle corresponding to the cells or the fibres interfered with. The motor area in the right side of the brain controls the

voluntary muscles of the left side of the body and the right hand and leg are controlled by the left side of the brain. The tracts ot fibres that come from one side pass the middle line at the lower level of the medulla, the decussation of the pyramids. The motor area itself is sub¬ divided into irregular areas or centres as they are loosely called — an arm-centre, a leg-centre, *etc.* In these more or less clearly delimited areas the cells governing the voluntary muscles of a leg or an arm are grouped. In much the same manner the nerves of the muscles of the face and of the eyes, tongue, etc., have their locations of origin in certain portions of this general motor area. There is, however, no evi¬ dent relation between the size of a cortical area and the size of the mass of muscle which is con¬ trolled thereby. Thus the cortical area for the face and head is much larger than for the leg area

which controls the many times greater bulk of the leg muscles. Irritation of the motor area usually causes excessive muscular move¬ ments or convulsions and destruction results in loss of motor power or paralysis. The experi¬ ments from which these facts are drawn were performed upon rabbits, dogs and monkeys. Some few of them have been confirmed in the course of surgical practice upon human patients. (See Brain; Convulsions ; Paralysis). Consult Howell, W. H., (American TextBook of Physiology) (Philadelphia 1903).

MOTOR BOATS, power boats equipped with internal-combustion engines, as distin¬ guished from boats propelled by steam power. They divide into several groups or types: (1)

or sets of engines varying from 50 to 300 or more horse power.

The hulls are built in several styles — round-bottom, flat-bottom, V — bottom, tunnel-bottom, etc., and with widely varying types of bow and stern. Of the former, the prevailing types are the straight, round, dory, spoon and clipper bows ; of the latter, the square, round, transom, fantail and torpedo sterns. A straight bow has the most elegant appearance, but a round bow rides better and is preferable. A transom or V-shaped stern makes the fastest and driest boat. Open boats of the launch class have a few feet of deck forward and aft, with a narrow strip along the gunwales, and a five or six-inch coaming around the cockpit. They are often fitted with a spray shield of canvas or a (<buggy-top® sun and rain shield. Larger boats are protected by an awning top carried on a frame overhead, or by a fixed (<standing-roof® which is commonly fitted with side cur¬ tains of canvas, making a weather-tight in¬ closure, but dangerous in a high wind. Boats 25 to 30 (or more) feet in length usually have a cabin of some sort. This may be of the <(raised deck® or <(hunting cabin® type, inclosing the bow for several feet back, or a c(glass cabin® inclosure toward the middle of the hull. The last is liable to make the boat top-heavy unless it has considerable width of beam.

At the Paris Exposition of 1889 there was exhibited a boat with a Daimler motor, this being among the first of the motor boats. As this form of motor was developed and im¬ proved for automobiles and aeroplanes, manu-

Six-cylinder Internal Combustion Engine for Motor Boat. M —

Overhead view; B — End: A — Side; I — Intake; E — Exhaust; L — Lever; F — Flywheel; C — Cylinders; CC — Crank Casing.

the gasoline launch, commonly 20 to 30 feet long; (2) speed boats, sometimes called dis¬ placement speed boats, more or less decked over and with high-powered engines: they often run up to 40 feet in length; (3) hydroplane boats, having stepped planes in the hull and designed to slide on the water rather than through it; (4) cruisers, virtually pleasure yachts, using gasoline motor engines instead of steam engines and usually built with a view to speed. These last are commonly 60 to 100 or more feet in length, and they carry engines

facturers adapted it to boats, and the internal combustion or gasoline engines built for motor boats are quite as efficient as those constructed for automobiles and motor vehicles. Not hav¬ ing the same weight restrictions, they are usually of heavier construction, and they are built up to large sizes. As arranged for motor boats, the internal-combustion engine is simpler than for automobiles. No radiator is required to cool the cylinders, the water-jacket of the cylinders being supplied by a continual current of fresh water taken in from beneath the hull ;

and no change-gear for various speeds nor differentials are needed. The engine may be direct-connected to the propeller-shaft. Motors of two to six cylinders are in common use. In small boats the gasoline or fuel tank is placed forward to get it high enough to feed the car¬ buretter by gravity. The exhaust is carried to a water-cooled muffler and thence outboard. The crank-shaft is run fore and aft and is coupled to the propeller shaft. The latter has thrust-bearings with steel balls to relieve the friction. The propellers are made with two or three blades and special forms of spiral blades are made for shallow and weedy water. Some 20-foot motor boats are made to run in one foot of

water, the propeller being placed in a tunnel in the hull. Some propellers have adjustable blades, which can be positioned so as to rotate either right-hand or left-hand, though the driving is in one direction. This adjustment therefore fits the boat for either forward or backward motion. The more common method, however, is to have the propeller-shaft geared to the engine by a lever-operated reversing gear.

A familiar type of six-cylinder internal-combustion engine for motor boats is shown, in the diagram. The cylinders are cast in pairs and placed upright, as in an automobile, with

the two-cylinder two-cycle motor having the same effective power as the four-cylinder four¬ cycle motor. For the ordinary motor boat no engine is better than the three-cylinder two-cycle motor. It runs with a minimum of vibra¬ tion, and is of less dead weight for the power developed than any other. The ignition system is another fundamental feature upon which the motor boat operators and builders divide in opinion. The two systems in use are the make-and-break, and the jump-spark systems. Few who have had a serious amount of experience with both will hesitate to choose the make-and-break as the easiest to get along with in all circumstances. Most motor ‘builders recognize this condition, and nearly every make of motor may be had with either system. Cabin motor boats, as a rule, are equipped with a storage battery, and a generator attached to the pro¬ peller shaft to keep it charged, thus providing the boat with a lighting system, and affording current for a searchlight to aid the pilot in making landings after dark.

Rowboats, canoes, dories and other small craft may be turned temporarily into motor boats by attaching to them a portable detach¬ able motor made for such purpose. These little engines range from one horse power upward, and are provided with one or two cylinders, the

Diagram Illustrating the Principle of a Hydroplane Bnat.

the inlet pipes on one side and the exhaust on the other. The crank-shaft is cased in below. At one end is the flywheel, the reversing lever at the other. A 12-horse-power engine in a 30-foot boat may drive it 10 miles an hour or more; with 20-horse-power, 16 to 18 miles may

be attained. Racers with 30 to 60 horse-power motors make 30 to 35 miles an hour, meaning in each case statute miles. Over considerable distances the speed shown is much less. For instance, in the Philadelphia-Havana 1,200-mile ocean race in 1910 the winner averaged less than eight miles an hour.

The small open boats employ mostly engines with one or two, and occasionally three cylin¬ ders. In these small engines the bore and stroke are about the same. In the larger en¬ gines, the stroke usually exceeds the bore by 20 to 30 per cent. The displacement speed boats commonly employ four-cylinder to eight-cylinder engines, while hydroplanes are built with four-to six-cylinder engines, up to 65 horse power or more. The large cruisers com¬ monly install several motors tandem to get the desired horse power. In small boats the usual motor is of the two-cycle type; in the larger boats the four-cycle type is common, but by no means universal. The four-cycle motor is more economical of gasoline, and from a me¬ chanical point of view is superior as a machine, but it is much more complex than the two-cycle motor, and is nearly twice the weight —

latter type being more dependable. The motor is self-contained, and is simply clamped upon the stern board of the boat. It will drive an ordinary round-bottom rowboat six to seven miles an hour.

The hydroplane boat is of a distinct type, having a flat bottom or hull in the first instance, then a step being introduced in the hull, this being called a biplane hydroplane. This step construction involved a division in the bottom or hull, so that the forward half was a “step** lower than the aft half, this step being perhaps two inches high. This worked well, and the multiplane or multistep type was introduced and generally followed, as securing the best re¬ sults. In its natural position the first plane of the hull is on the water level, and as the boat gathers speed the bow rises, and the entire boat is more or less lifted out of the water, tending to skim on top instead of to drag through the water, like other boats. But in o-rder to rise upon the surface the speed must be very great ; a slow boat will not ˆplane.® The highest au¬ thentic record up to 1 Jan. 1918, is that of the W hip -P o’ -Will which averaged 69.39 miles per hour for six one-mile spurts on Lake George, 6 Nov. 1917; and made its fastest mile in 51.55 seconds- — a rate of 70.15 miles per hour. Other fast records for 1917 were by Miss Detroit II, 61.72 miles per hour; and Miss Minneapolis, 49.27 miles per hour.

Motor boat races are held regularly at

MOTOR BOATS

1 30-foot runabout

2 40-foot cruiser

Monaco and many European water resorts ; also m the United States, on the Hudson, off Marblehead, off Block Island, on the Mississippi and the Great Lakes. In the 1917 motor-boat race from. New York to Albany and re-turn, a distance of 235 miles, the winner was Luctta with a record of 29 hours, 38 minutes, 26 seconds. In the Miami-to-Palm Beach, Fla.', race in 1917, Raven III completed the 70 miles m 1 hour, 47 miles, elapsed time. Consult Durand, W. F., 'Motor Boats) (London 1907) • Hobbs, E. W., 'Model Power Boats } (London 1912) ; Russell, T. H., 'Motor Boats: Construc¬ tion and Operation> (Chicago 1910) ; Verrill, A. H., 'Book of the Motor Boat) (New York

1916).

MOTOR CAR. See Automobile.

MOTOR CYCLE, a two-wheeled vehicle resembling the bicycle, propelled by an internal combustion engine slung in the frame between the wheels. The operator sits astride the frame on a saddle and steers the vehicle by handle-bars after the manner of the bicyclist. The engine, now usually of two-cylinders, is air-cooled. The power is conveyed to the rear through a trans¬ mission gear box by a shaft or sprocket chain. The later models of these machines dispense with the pedals which were employed to start the engine in the earlier machines. The right foot-rest of the modern machines carries a toothed sector which is used to turn the engine shaft in starting. The control and operation ele¬ ments of the vehicle are analogous to those of the automobile. They comprise fuel throttle and spark controls, usually operated from the hand grips, clutch and speed gear shift levers, fuel and oil tanks, high tension magneto, car¬ buretor, muffler, *etc.* A side car is frequently added, which virtually makes the machine

a tricycle. Its comparative lightness, low cost of maintenance, light fuel consumption, has made it very popular. It is extensively used by traffic regulation officers on much-frequented highways.

MOTOR FUELS. See Chemistry, Prog¬ ress of.

MOTOR TRUCK, a heavy type of auto¬ mobile developed for carrying truck or freight. At first they were called auto-trucks, and were simply stout automobiles, with wagon bodies, suiting them to carry goods. Because of the great weight on the rear tires these were doubled literally, two tires being placed on each rear wheel. For a few years truck-builders gave their attention mainly to bodies, building them to suit all sorts of trades, but employing a cheap heavy automobile chassis and motor. As the automobile proper was improved for speed, it became less suited to use for a truck, where slow speed and large carrying capacity were demanded. Heavy, slow-running motors were then designed, but the old chain-drive for the rear wheels was adhered to. Though this chain was called “silent® it was a noisy affair, and the entire motor truck of that date (about 1910) looks very crude now. In 1914 and 1915 the war demand for motor trucks aroused American builders to construct more efficient models, and the result is that now there are on the American market well over 100 makes of motor trucks, that wholly outclass the older types. The great majority run from one to

six tons. A few 7-to 10-ton trucks are being built. For motors the four-cylinder is most common, though many six-cylinders are em¬ ployed. There is no demand for a large number of cylinders, as in automobile and aviation motors. The typical motor-truck motor is often called an “engine® by the trade, because its design resembles small stationary and marine engines. Practice as to clutches varies, but the disc type predominates, this being well adapted to the slow speeds and heavy rower transmission of the truck, though poorly adapted to a racing automobile. Roller-bearings are universal, Tim-kin and Hyatt being the familiar types. The chain drive has almost wholly given, way to the improved worm drive, described and illustrated under automobile (q.v.). The four-wheel drive is increasing in popularity and numbers. Wheel bases tend to grow greater. The shortest seen on any 1918 truck was 124 inches on a small truck and 135 on a 6-ton truck, while the larger trucks of the best makes ran up to 163 to 180 inches wheel base.

The number, of motor trucks in use in the United States in January

1918 was estimated by the editor of Motor to be 435,000. The number of commercial cars built in 1917 was 181,348, but these are not all properly desig¬ nated as motor trucks, for many of them are light wagons for city express work. The light traffic is being taken care of in large measure by an attachment to the Ford car. A truck frame and rear wheels are arranged to be hitched on to the fore-wheels and motor of a Ford car; any sort of a wagon body can be placed on top. This combination has a carry¬ ing capacity of 1/ tons, utilizes heavy artillery wheels, 34 x V/2, including solid tires. The wheel base is 128, the loading space over nine feet long, and it sells for only $390 ready to attach to any Ford. This cheap truck is rap¬ idly driving out the horse, and the estimate is that 2,000,000 horses have at this date (1918) been released from servitude in the United States by the near half-million of motor trucks in use.

The wonderful tests to which motor trucks were subjected in the Great World War have been a prominent factor in the development of superior machines. Manufacturers have met the strain and built better than they ever built before, producing machines that stood amazing rough usage, on broken ground, in the rear of the Allied armies. The demands of the Brit¬ ish and American governments for certain types developed the artillery type of truck, adapted to army conditions. Thousands of these machines were built in the West, and made their way to the Atlantic seaboard for shipment under their own power. On several occasions the great Lincoln highway witnessed processions of them miles in length, all going over to help win the war.

A considerable number of electric motor trucks have been built, and they operate very satisfactorily. Their traveling range is limited to about 50 miles, after which the batteries have to be recharged. The electric light and power companies, which charge the batteries, have not generally cared to cater to this busi¬ ness, so the electric trucks are not common, though they have been adopted by some large concerns.

A large heavy road motor truck is a good deal like a locomotive to

care for. Before starting on a tour the driver must look it all over to make sure that everything is in work¬ ing order. In making down grades he must remember cliat he has a great weight behind him and cannot lock the brakes and expect to stop. He must slow down his engine and use it as a resistance, and apply his brakes gradu¬ ally. The use of heavy motor trucks involves trailers, which may be likened to small open freight cars designed to be drawn by the big truck, serving as a road locomotive. This com¬ bination gives us the long-sought independent train that can run on any fairly good road. It is beginning to be used, and will before many years be common on certain American high¬ ways given up mainly to trucking, for this heavy traffic surely means that the highways of the future must be separated, that fast driving automobiles and slow-moving heavy trucks with trains of trailers may not have to occupy the same route and interfere with each other. In some sections of the country this ideal has been partially realized'.

MOTORS IN WARFARE. The various motors employed in military aeronautics, cul¬ minating in the (<Liberty motor, ® and the various motor trucks produced under specifications ap¬ proved by the War Department Motor Trans¬ port Board were so constructed that the various units entering into the construction, including the engine, transmission, axles, springs, univer¬ sal joints, frame, radiator and fan, were inter¬ changeable as far as possible. This interchangeability of parts led quickly to the standardiza¬ tion requirements of the government which put an end to the complicated engineering, purchas¬ ing and manufacturing problems, to say nothing of the enormous cost of the finished products, due to lack of uniform manufacturing limits and patterns.

The Liberty airplane engine and the war trucks are not examples of standardization in the commercial sense, but of military designs dictated by war needs. The standardization by the government of the necessary designs of all kinds of self-propelled vehicles operable on land, sea or in the air, was one of the factors in deter¬ mining the outcome of war. The so-called sub¬ marine chaser is another recent war product. The designs and construction of motors used in many of these submarine chasers constitute some of the most important problems of automotive en¬ gineers. The production of the boats by stand¬ ardized processes has been a great achieve¬ ment. The development of small stationary or semi-portable units for the operation of the wireless set, the searchlight, pumps, isolated electric lighting plants and machine tools in portable repair shops, is another of the matters handled by automotive engineers. These ma¬ chines perform highly important functions in the great military organizations

of modern times and those responsible for their design and oper¬ ation deserve equal credit with those who have contributed to the more spectacular forms of modern warfare. The United States standard army truck is not a commercial 3-ton truck, but an excellent 5-tonner and its engine axles and transmission is commonly used for 5-ton as¬ sembled trucks. Its outstanding characteristics are exceptional power ; good springing, making

the riding almost as good as that on a passenger car; reasonable economy of fuel; ability to handle cold air and poor fuel without the least difficulty in starting and ease of steering and control. The complete truck with body, top, and equipment weighs a trifle over 10,000 pounds, and the chassis with driver's seat and in running condition scales 8,600 pounds. The engines have detachable heads and complete pressure lubrication is used. The following is a summary of principal points: (1) the engine has four 4 Y\ by 6 cylinders, cast in pairs, with detachable heads; (2) much attention has been paid to the cooling and lubrication problems ; (3) force-feed lubrication is used throughout and the oil is doubly strained; (4) two entirely separate ignition systems, one battery, the other magneto, are used; (5) the crankcase, including the bell housing and the oil pan, is aluminum, three-point support being used; (6) the crank¬ shaft is very rugged, and is notable for its large intermediate bearing, as long as the rear one; (7) the governor is the steel-ball type, and so enclosed and sealed that it cannot be tam¬ pered with ; (8) there is a dry disc clutch, a four-speed horizontally arranged change gear, a work drive, a full floating rear axle and Hotch¬ kiss drive.

There are two methods of transporting heavy artillery; one to pull the piece; the other, to carry it in one or two loads. Both have their advantages and disadvantages. It is naturally easier to pull the gun than to load it on the truck, but the pulling of the gun on the road behind a truck results in considerable wear and tear on the pieces. To reduce the latter, truck¬ pulling pieces do not go faster than from seven to eight kilometers per hour, and a great deal of care is taken to prevent injury to the recoil apparatus of the gun by collision, *etc.* Carry¬ ing the gun has the great advantage of permit¬ ting the truck to make from 10 to 15 kilometers speed. It is necessary to differentiate between these methods of movement and the movement of heavy tractor artillery. This latter artillery is actually formed in requirements and groups and includes all the necessary tractors and trucks for its complete unit and for the first supply of ammunition. The tractors of the group are all of the 4-wheel driven type instead of the 2-rear

wheel driven, as is the case with all other tractors.

Edward S. Farrow,

Consulting Military and Civil Engineer.

MOTRIL, mo-trel', Spain, town in the prov¬ ince of Granada, somewhat over a mile from the Mediterranean Sea. It is in itself a port but the anchorage harbor, Calahonda, to the southeast, is more important The climate is very mild and its industries consist of sugar plantations, wine-culture, sugar mills ; cotton also is grown to some extent. There are also iron foundries, soap works, *etc.* Pop 18,444.

MOTT, Alexander Brown, American sur¬ geon: b. New York, 31 March 1826; d. Yonkers. N. Y., 12 Aug. 1889. He was educated privately by Professor Darling of the University Medical College and at Columbia College Grammar School, then (1836) went to Europe for five years continuing his education. Although a Quaker he entered West Point, resigning at his father's desire and became secretary of Commo¬ dore Morris in United States naval quarters on

the Mediterranean. He next took up commer¬ cial life (1845) visiting Turkey, Greece, Italy aud Austria for a Marseilles firm. Continuing the study of medicine at Havre, he returned to New York and was graduated (1849) at New York Medical College, at the University of Pennsylvania (1850) and Castleton Medical Col¬ lege. In 1853 he became visiting surgeon at Saint Vincent's Hospital and was attending sur¬ geon (1855-63) to the Jewish Hospital. He was one of the founders of Bellevue Medical Col¬ lege. During the Civil War he was medical director (1862-M) at New York and (1864-65) inspector of the department of Virginia and was mustered out of the service in 1866 with rank of brevet-colonel. From 1872 he was professor of clinical and operative surgery till his death at Bellevue Medical College. He wrote (Sur¬ gical Operations) (1856—57) ; Advantages of Clinical Teaching) (1868), and other works.

MOTT, James, American abolitionist: b. Cowneck, L. I., 20 June 1788; d. Brooklyn, N. Y., 26 Jan. 1868. He was a teacher in a Friends' boarding school in Dutchess County, N. Y., at 19, where he later married Lucretia Coffin. In 1810 he went to Philadelphia, Pa., and en¬ gaged in mercantile business. He was a staunch friend of William Lloyd Garrison (q.v.), as¬ sisted in the organization of the Philadelphia Anti-Slavery Society in 1833 and attended as a delegate the World's Anti-Slavery convention in London in 1840. He was a determined sup¬ porter of the cause of woman's rights and in 1848 presided over the first woman's rights convention at Seneca Falls, N. Y. From 1865 till his death he became interested in the foun¬ dation of Swarthmore College.

MOTT, John Raleigh, American Y. M. C. A. leader: b. Livingston Manor, N. Y., 25 May 1865. He was graduated (1888) at Cornell Uni¬ versity when he was made chairman of the executive committee of the Student Volunteer Movement. Since 1895 he has also been general secretary of the World's Student Christian Fed¬ eration and is now chief executive of the National War Council of Y. M. C. A. associa¬ tions. On the retirement of Woodrow Wilson from the presidency of Princeton College he was offered the position but did not accept it. In 1916 he was appointed by President Wilson member of the joint commission for settlement of differences between Mexico and the United States and he was a member of the mission to Russia, headed by Elihu Root, in 1917. He has written (Strategic Points in the World's Con¬ quest (T897) ; (Evangelization of the World in this Generation' (1900) ; (Christians of Reality) (1902); (The Pastor and Modern Missions) (1904) ; (The Future Leadership of the Church' (1908) ; (The Decisive Hour of Christian Mis¬ sions' (1910) ; (The Present World Situation' (1914). In 1910 he had conferred on him the degree LL.D. by the University of Edinburgh and in 1911 the same degree by Princeton Uni¬ versity.

MOTT, Lewis Freeman, American edu¬ cator: b. New York, 29 Sept. 1863. He was educated in his native city and was graduated (1883) at the College of the City of New York, where he became tutor (1884-94) of English and (1894-97) instructor, then assistant pro¬ fessor and professor. He was elected (1911)

president of the Modern Language Association. His profound studies of English and Romance literature and folk lore assisted him to the ma¬ terial of many lectures and he has written (The System of Courtly Lore' (1896) and Provengal Lyrics' (1901). He has been editor of the

City College Quarterly since 1906.

MOTT, Lucretia Coffin, American aboli¬ tionist and woman's rights advocate: b. Nan¬ tucket, 3 Jan 1793; d. near Philadelphia, 11 Nov. 1880. With her parents, Thomas and Anna Coffin, she removed to Boston in 1804, and two years later became a pupil in a Quaker boarding school at Nine Partners, N. Y., where James Mott (q.v.), whom she subse¬ quently married was a teacher. In 1817 she opened a small school, but soon gave it up and became recognized as (<an acknowledged minis¬ ter." She joined the Hicksite branch of the Quakers upon the schism of 1827. In 1833 she joined in the formation of the American Anti-Slavery Society, as whose delegate she went to the London World Convention in 1840, from which all women were excluded. The result was the woman's rights movement, in which Mrs. Mott became a leader, taking a prominent part in establishing the convention held at Seneca Falls in 1848. Consult Hallowell, A. D., and (Letters of Lucretia and James Mott'

(1884).

MOTT, Valentine, American surgeon : b. Glen Cove, L. I., 20 Aug. 1785; d. New York, 26 April 1865. He was graduated (1807) at Columbia College when he went to England to continue his studies in medicine at the post¬ graduate courses of London and Edinburgh. In 1809 he returned to New York and was given the chair of surgery at Columbia College, contin¬ uing to hold the position when Columbia Col¬ lege was merged with the College of Physicians and Surgeons. In 1826 he with the entire body of his colleagues resigned on account of offen¬ sive actions of the trustees and they founded Rutgers College. The latter institution, in 1830, had to close from defects in its charter and he returned to the College of Physicians and Sur¬ geons as professor of operative surgery and surgical and pathological anatomy. Ill health caused him (1835) to resign to visit Europe twice, finally returning in 1841, after having gained high honors for work done in the old country. He was elected president of the medi¬ cal faculty of the University of the City of New York while still practising as surgeon in New York Hospital, till 1850 when he spent a year in Europe. In 1851 he was appointed professor of operative surgery and surgical anatomy again at the College of Physicians and Surgeons for a year when he resigned and was made emeri¬ tus professor for the rest of his life. On his death his fine library went to New York Acad¬ emy of Medicine. He gave but little time to literary composition, one of his most extensive works being his (Travels in Europe and the East'

(1842). He supervised a translation of Velpeau's operative Surgery,' writing its preface. In ˆTransactions' of the New York Academy of Medicine were published numerous addresses and lectures. He also wrote a (Sketch of the Life of Dr. Wright Post' and a (Eulogy on his friend Dr. John Wakefield Francis' (1861). ˆMott's Cliniques' (1860) is an abstract of his later clinical lectures.

Consult Gross, S. D., (Memoir of Valentine Mott) (Philadelphia 1868).

MOTTIER, mot'tyer, David Myers, Amer¬ ican botanist : b. Patriot, Ind., 4 Sept. 1864. He was graduated (1891) at Indiana Univer¬ sity, then took the Ph.D. degree at the Univer¬ sity of Bonn in 1897 and at Leipzig in 1898. He was (1891-93) instructor of botany at Indiana University and associate professor (1893-98), then professor from 1898. He was elected president of the Indiana Academy of Science in 1907. He has written (The Practical Lab¬ oratory Guide for First Year in Botany) (1902) ;

(Fecundation in Plants) (1904), as well as a number of technical papers on botany.

MOTTLED OWL, a small horned owl

(Megascops , formerly Scops, asio), which, in one or another geographical variety, occurs numerously all over the continent, except in the colder parts of Canada. Very similar species are known in Central America and in Japan. It is only 9 or 10 inches long, with large facial discs, two small erectile horns and a short rounded tail. Its plumage is a mottling of gray and rustred. These little owls are nocturnal and are almost blinded by daylight glare. They come out in the dusk of evening, and from sunset to darkness, or all night when the moon is shining, is heard their low, musical, trilling cry — one of the pleasantest of bird voices ; yet in some evil way the name screech-owl was long ago fastened upon this bird. Its eggs are five to seven, pure white. The food of the mottled owl is chiefly small rodents and insects, and occasionally, in spring, small birds; they destroy a vast

number of insects and mice hurtful to the farmer and gardener. Books upon American birds abound in facts as to their habits.

MOUCHEZ, moo-sha, Amedee Ernest Barthelemy, French astronomer: b. Madrid, Spain, 24 Aug. 1821 ; d. Wissous, France, 25 June 1892. He was educated in the French Naval Academy and remained in the navy until 1878 when he was appointed chief of the Na¬ tional Observatory. He had previously shown himself a brilliant scientist and particularly dis¬ tinguished himself in coast surveys of Algeria and Brazil as well as in the observation of the transit of Venus in 1874. He bent all his energies to the improvement of the observatory, introduced several innovations of value, and was the originator of the international photo¬ graphic chart of the heavens. In 1880 he was appointed rear-admiral. He wrote (Cotes du Brezil (1869-76) ; (La Photographic astrono-mique et la carte du cieP (1877) : (Rio de la Plata* (1873; 3d ed., 1891).

MOUFLON, moof Jon, or MUSIMON, a

wild sheep (Ovis musimon) of Corsica and Sardinia, where it wanders about the summits of the mountain ranges in small flocks, and offers excellent sport. It is a question whether this species ever existed on the mainland, one opinion being that it arose in the isolation of the islands ; but most naturalists believe that it formerly existed in Spain. The rams are about two and one-quarter feet tall at the withers, and have very large coiled horns, but the fe¬ males are hornless. The long mane-like hair that covers the neck and chest of the rams is gray, but the remainder of the coat is mainly

rustred above and white on the ventral sur¬ faces. A similar “mouflon” inhabits Cyprus ; and the Barbary aoudad (q.v.) is often called ((ruffed mouflon.® Consult Aflalo (Sport in Europe } (London 1901).

MOUKDEN. See Mukden.

MOULDING or MOLDING. See

Foundry P’ractice.

MOULDS. See Fungi.

MOULE, mool, Handley Carr Glynn, Eng¬ lish bishop : b. Dorchester, Dorsetshire, 1841 ; d 8 May 1920. He was educated at Cambridge

University, took orders in the Anglican Church, and was an assistant master at Marlborough College 1865-67. From 1873 to 1876 he was dean of Trinity College, Cambridge, and he was first principal of Ridley Hall, Cambridge, 1881-99. He was nine times select preacher at Cambridge and once at Oxford, was Norrisian professor of divinity at Cambridge 1899-1901 and in the last-named year was consecrated bishop of Durham, succeeding Bishop B. F. Westcott (q.v.). He has published many de¬ votional and expository, works, among which are a series of commentaries on the Epistle ;

(Thoughts on Christian Sanctity* ; (Ephesian Studies) (1900) ; (The Secret of the Presence *(1900); (Thoughts for the Sundays of the Year* (1901); (The School of Siiffering) (1905) ; (Christus Consolator* (1915) ; (The Call of Lent) (1916).

MOULIN, an opening from top to bottom of a glacier, by means of which a stream flowing on the surface of the ice plunges to the bottom and Hows on as a subglacial stream.

MOULIN ROUGE, moo'lafi'roozh, Paris, the (lRed Mill,® noted dance-hall on the right bank of the Seine, in the Montmartre district. Since the notorious Jardin Mabille, in this sec¬ tion, went out of existence the Moulin Rouge has been the favorite resort for can-can and other gay dances of the Parisians.

MOULINS, moo'lan', France, capital city of the department of Allier, on the right bank of a river of the same name, which is spanned here by a beautiful bridge, built in 1763. It is the junction of the Lyons and Orleans rail¬ ways, and1 contains the old Gothic cathedral, built in 1465-1507 and finished by Viollet-le-Duc in 1861, and holding a triptych by Ghirlandajo among other art treasures. Here also are an ancient monastery church with monument of the executed (1632) Duke Henry II of Mont¬ morency, a modern Gothic Sacred Heart (Jes¬ uit) Church, the 1 5th century clock-tower, ruins of the 14th century castle of the dukes of Bourbon, a palace of justice, town-hall, *etc.* Its industries include factories for woolens, tools, agricultural instruments, paper, bells, hats, oil and vinegar. It is the seat of .a bishop and has a court of assizes, a chamber of commerce and two lycees, besides a seminary, two divin¬ ity colleges and museums of natural history, art and anticiuities. There are also a large li¬ brary and theatre. Pop. 21,990.

MOULTON, mol'ton, Ellen Louise Chand¬ ler, American poet: b. Pomfret, Conn., 10 April 1835; d. 10 Aug. 1908. She was married to William U. Moulton, a Boston publisher, in 1855 (d. 1898) She had a

wide literary acquaintance both in this country and in Eng-

land where she spent a part of every year for many seasons. Her weekly receptions both m Boston and London were the resort of many literary and artistic persons. She published such books for children as (Bedtime Stories *(1873-80), while tier other writings include 'Some Women's Hearts) (1874); (Miss Eyre trom Boston* (1889); (In the Garden of Dreams*; (Lyrics and Sonnets* (1890); (Lazy Tours in Spain and Elsewhere* (1896); (At the Wind's Will,* verse (1899), *etc.* Her lyrics are extremely musical and as a sonneteer she ranks high.

MOULTON, Forest Ray, American astronomer: b. Le-Roy, Mich., 29 April 1872. He was graduated (1894) at Albion Col¬ lege and took (1899) the degree Ph.D. at the University of Chicago. He was appointed (1898) associate in astronomy of the University of Chicago, becoming (1900) instructor and (1903) assistant professor, associate professor of astronomy (1908) and professor (1912). He has been associate editor of Transactins of the American Mathematical Society since 1907 and research associate at Carnegie Insti¬ tute since 1908. He has written (Celestial Me¬ chanics* (1902) ; (Introduction to Astronomy* (1905); (Descriptive Astronomy> (1911);

(Periodic Orbits* (1913), besides contributing numerous articles to the mathematical and astronomical periodicals.

MOULTON, Richard Green, Anglo-Amer¬ ican educator: b. Preston, England, 5 May 1849. He was graduated from the University of Lon¬ don in 1869 and at Cambridge University in 1874, since when he has been associated with the university extension movement of various American and English universities. He was connected with the University of Chicago from its foundation in 1892 until 1919. From 1901 he was professor of literary theory and in¬ terpretation and head of the department of general literature. He is author of the follow¬ ing works: (Shakespeare as a Dramatic Artist* (1885) ; (Shakespeare as a Dramatic Thinker* (1907) ; (The Ancient Classical Drama* (1890) ; (The Literary Study of the Bible* (1896) ; (A Short Introduction to the

Literature of the Bible* (1901) ; (The Modern Reader's Bible* (1895-1907) ; (World Literature* (1911) ; (The Modern Study of Literature, an Introduction to Literary Theory and Interpretation* (1915).

MOULTRIE, molTri, John, English poet and clergyman : b. London, 1799; d. 1874. He was educated at Eton and was graduated (1822) at Trinity College, Cambridge. He abandoned his law studies to be ordained (1825) in the church and went to Rugby (1828) as rector, while Thomas Arnold was head master of the school and with whom a close friendship grew lip, as his poems testify. He wrote (My Broth¬ er's Grave* (1820) ; (Godiva* (1820), which is considered his best work. His collective works were published in 1876.

MOULTRIE, William, American soldier: b. South Carolina, 1731 ; d. Charleston, S. C., 27 Sept. 1805. He early allied himself with the military forces of the colonies and in the war with the Cherokees in 1761 the confidence of his fellow citizens in his ability was shown by his selection as captain of the body of troops raised to defend the frontier against the

Indians. At the outbreak of the American Revolution in 1775 he was appointed colonel of the 2d colonial regiment and he also served as member of the South Carolina provincial congress in that year. He was engaged in the seizure of the public arsenals and the construc¬ tion of fortifications around Charleston, and in March 1776 was ordered to construct a fort on Sullivan's Island. This he made of the only material at hand, palmetto logs, and when Gen¬ eral Lee made an inspection he expressed his disapproval of the work, considering it totally unfit for the purpose of defense and advised its abandonment. Moultrie, however, continued the work and when an attack was made by the British fleet under Sir Peter Parker the rude fort successfully withstood all assaults and was. subsequently named for its brave commander. He was promoted to the rank of brigadier-general in recognition of his services and given command of the forces in South Carolina and Georgia. So complete had been the defeat of Parker, however, that Charleston was not again attacked until 1779 when the British availed themselves of the absence of a large share of the Continental force and attacked the town. The return of General Lincoln saved the city, but in the spring of 1780 a third attack by land and sea compelled capitulation. Moultrie was held a prisoner for two years and though offered rank and money to enter the British army remained loyal to the cause of the colonies. Release came in 1782, when he was

exchanged for Burgoyne, and though promoted to the rank of major-general it was too late for him again to engage in active service. He was elected governor of South Carolina in 1785 and in 1794, and published in 1802 (Memoirs of the Revolution.*

MOULTRIE, Fort. See Fort Moultrie.

MOUND BIRDS, a group of Australasian gallinaceous birds remarkable for the large mounds which they build as incubators for the eggs. See Megapodes.

MOUND BUILDERS AND MOUNDS.

Two terms that have been inseparably con¬ nected by investigators into the history of these early earthen pyramidal, terraced and mound structures of the North American Indians. In the broader sense, mounds, especially in their connection with mound builders, include not only pyramidal structures and mounds proper,, but also walls, forts, embankments and like artificial structures especially those built of earth. Archaeological investigators also include among the mounds the accumulations of debris which grew up near ancient centres of popula¬ tion through the gradual increase of dump, heaps or other long continued deposits.

The ancient American mounds seem to have been destined for a variety of uses; some of them were burial places, others foundations for edifices, still others served as fortresses, while the most pretentious were used for sacrificial and other religious purposes. From the Cana¬ dian border to southern Peru stretch pyramids (generally truncated), terraces and tumuli of various forms, sizes and modes of structure. That the builders of the various sections of this vast chain of artificial structures were re¬ lated ethnologically, racially or by political con¬ tact has never been clearly proved and may never be. At one time it was popular to main-

tain that the builders of the great American mounds were a people

distinct from the In¬ dians inhabiting the United States territory at the time of the first contact of the Europeans and the aboriginal Americans. Bryant sang of the myterious lost race, and romances and sober scientific works were written about them. Now scientific criticism has swung to the op¬ posite direction and not only is the existence of such a race denied but it is claimed that an¬ cestors of the modern American Indian were the mysterious mound builders. But the last word has by no means been said upon the sub¬ ject. The fact that Indian chiefs were found with their dwellings erected upon the summits of mounds is no proof that they built the mounds. Even if they did build small mounds as bases for their dwellings or as burial places for their dead, this again is no proof that their ancestors built vast structures like Cahokia, whose very existence presupposes politically organized society and the command of vast supplies of labor for long periods of time. As the Indian races of the North Ameri¬ can continent seem to have been, for ages, given to migrations, the chances are rather against than for the modern theory that the ancestors of the modern United States Indians built the older and more monumental of the great mound structures, which must have served a race much further advanced in political and social organization than those to whom their construction has been attributed by those who hold the modern origin theory.

Shapes and .Sizes. — The mounds are gen¬ erally conical, hill-like structures, though some of them approach more or less closely to the true truncated pyramidal form and these vary, in the United States, from a few feet in height to over 100; and1 southward, throughout Mexico, Central and South America, very formally con¬ structed pyramidal mounds exist that are over 100 feet in height and of vast proportions. The mounds of the United States which stretch from Canada to the Gulf of Mexico, down the Mississippi Valley and1 far across the plains on either side present a wide variety of forms. Conical, square-based, octagonal and other shapes add variety to the construction of the mounds proper; and forms of serpents and other reptiles, mammals and birds of gigantic size add to the impression of the civic culture of the races who conceived and constructed them. There can be little doubt that the more spectacular of these vast earthen structures were intimately connected with the religious beliefs of their builders. Eagles, panthers, serpents and other animal forms from 500 to 1,000 feet in length are among these mound structures, which include representations of many animals later known to have been totem signs among the American Indians over a very wide extent of territory. For this reason the theory has been advanced that these animal mounds were representations of tribal totems; and as such,

probably served as emblems worshiped as protecting tribal deities.

Great Serpent Mound. — Of these animal form structures one of the largest and most noted is the Great Serpent Mound in Adams County, Ohio, which contains 1,350 feet of wall and is so constructed that it might, at one time, have formed a defensive work. The central fold's of the serpent make two fort-like en¬

closures open only at the back; while the coil of the tail, which is whorl-shape, is especially well arranged lor deiensive purposes, the swollen head and neck, the outline of which is formed of earthen walls, constitute a very extensive fort-like structure, divided in two parts by a wall similar to that of the rest of the structure. Within the larger of these two divisions is an oval enclosure of considerable extent formed by earthen walls similar to those of the rest of the edifice. In the outer wall of the head section is an opening leading into the larger subdivision ; but the other sections and the oval enclosure are without openings of any kind. The whole structure is admirably laid out for defensive purposes. It may, and prob¬ ably did have a three-fold purpose, defense, totemic representation and religious significa¬ tion. The wall is now only five feet high, but it may have been originally somewhat higher.

Situation of Chief Mounds. — In the United States there are still a vast number of mounds ; and in the State of Ohio there were, at one time, thousands. The smallest of these, how¬ ever, have disappeared or are rapidly being leveled to the ground by the ploughman. Some groups of mounds, like those that formed the basis for a part of the city of Saint Louis, Mo., have been leveled and built up over. In Wis¬ consin are large numbers of mounds represent¬ ing the forms of animals, while in Tennessee are smaller mounds which were used for burial purposes, as is clearly proved by the stone graves they contain. Some of these seem to have been either community, tribal or family burial places, as considerable numbers of graves have been found in a single mound. Burial tumuli were also erected in Illinois, Minnesota, Mississippi, Indiana, Florida, Wisconsin, Vir¬ ginia, Kentucky and Missouri. The mountain ranges seem to have set a limit to the mound builder activity which did not extend to the east of the Alleghenies, North Tennessee and North Carolina. Some of the mounds of the mound-building regions were old when they first became known to the white explorers, but how old is not known. Indian races in various parts of America were still occupying mounds a century after the discovery of America and some of them were constructing them both for burial

purposes and as foundations for build¬ ings ; but it seems to be uncertain whether any of these later constructions were used for re¬ ligious purposes. Some tribes are also known to have built, in historical times, miniature mounds in their great council houses, ap¬ parently as a part of a religious ceremony. This calls to mind the fact that the Mixtecas and Zapotecas represented the sacred mound as the ‘ symbolical presentation of the ((heart of heaven. w

Among other tribes the custom obtained of collecting the bones of the dead, cleaning them carefully and burying them in a common grave over which a mound was erected.

It is evident from the great variety of mound structures that they could not have all been constructed by the same tribe or race and that the erection covered a very considerable period of time most of which was comprised in the later Stone Age of which some of the mounds show some beautiful workmanship; but nothing in metal except that introduced info them later of European make, and a few things

probably obtained by barter from southern races.

Cahokia Mound is the largest prehistoric artificial earthwork in the United States. It is in Madison County, not far from Saint Louis; it lies in the American bottoms and is sur¬ rounded by a number of smaller mounds which Brackenndge, who visited Cahokia and the complete mound neighborhood in 1811, asserts then numbered 45, exclusive of a great many smaller elevations. These probably did not in¬ clude the mounds that existed at one time on the site of Saint Louis, Mo., and which gave that city the title of the ((Mound City.55 The Cahokia truncated pyramid, for such it really is, measures about 1,000 feet from north to south, 72 5 from east to west, and 100 feet high at its greatest elevation. But the level top of the mound is not all at the same elevation. In fact one section of it is only 30 feet high, another is over 60 feet, while a third and fourth are slightly lower than the summit. The total Cahokia terrace measures about 200 feet by 500 feet. It thus affords considerable space, nearly two and one-half acres, which was orob-ably used as a foundation for edifices. The base of Cahokia covers 17 acres, or over 40 per cent more than Cheops, the greatest of the Egyptian pyramids. Situated in the midst of a very

populous district, and commanding the great “bottoms55 _ from which rose scores of mounds of all sizes, Cahokia must have pre¬ sented an inspiring sight in the days of its prosperity and might. The great pyramid was constiucted of earth, which was taken from the country surrounding it, as is evident from the depressions in the soil. Cahokia is sometimes called Monks Mound because it was occupied foi a considerable time, from the beginning of the 19th century on, by Trappist monks, who had a vegetable garden on the top of the mound. Next to Cholula (q.v.), Cahokia is the largest based artificial pyramid in North America.

Etowah Mound, a large prehistoric mound three miles southeast of Cartersville, in Bartow County, Ga. Like the Cahokia mound it is situated on a river, bottom and is surrounded by several smaller mounds of which it seems to have been the centre of community or civic life. Etowah is a quadrilateral, truncated pyramid much like Cahokia in form. It is over 60 feet high with a base length on one side of 380 feet. On the south side of the mound broad inclined roadway leads un to within 18 feet of the summit. This incline once was pro¬ vided with wooden steps. The truncated top of the mound measures 170 by 176 feet. On the east side there is also a narrow slide reaching from the top to the bottom. The base of the pyramid coyers nearly three acres. In excava¬ tions made in some of the surrounding mounds, stone images and copper plates have been en¬ countered. Earthenware, copper, celts, pipes and stone objects suggestive of a fair degree of culture were also unearthed.

Elephant Mound, a well-known mound of massive form originally believed to represent some prehistoric animal probablv an elephant.

It is situated about four miles south of Wyalus-ing, Wis., on low ground a few feet above the level of the high-water mark of the Mississippi. The dimensions of this mound, which is badly disfigured through cultivation, is given as fol¬

lows by the Bureau of American Ethnology; length 140 feet, height about four feet, width across the body to the lower end of the hind leg 72 feet. The bureau, upon careful examina¬ tion, decided the mound was intended to repre¬ sent a bear.

Port Ancient, a prehistoric American mound fortification in Warren County, Ohio, and on a headland nearly 300 feet high overlooking the Miami River. The fortress itself is divided into two unequal portions

known as the (<01d ForO and the <(New Fort55 and altogether it en¬ closes a space of about 100 acres. The wall, for the most part, is constructed of clay but it is underlaid, in many places, with stone. This great wall is nearly 19,000 feet or more than three and one-half miles long and from 6 to 10 feet high and contains as much earth as the gieat pyramid of Etowah. Not far to the east of the “New Fort55 are two mounds, and within the fort itself were other small mounds which evidently served as burial places. Most of the property covered by Fort Ancient has been secured by the State of Ohio by which it has been made a park and reservation placed in the care of the Ohio Archaeological and Historical Society.

Grave Creek Mound, near Moundsville, W. Xu”’ *t\ • junction of Grave Creek and the Ohio River, is one of the best known of prehis¬ toric Indian mounds. It is conical in shape with a base diameter of 320 feet, and a dish¬ shaped depression at the top. During excava¬ tions made in 1838 two burial vaults were un¬ covered, one at the base and the other 30 feet above. The lower contained two skeletons and the upper, one. Buried with the skeletons were several thousand shell beads, mica ornaments, stone objects and several copper bracelets.

Newark Works, near Newark, Ohio, an ex¬ tensive group of prehistoric Indian construc¬ tions of a complicated nature. They are situ¬ ated on an elevated plain from 30 ‘to 50 feet above the river bottom and are composed of walls, circles, squares, an octagonal enclosure, ditches, mounds and avenues covering about tour square miles. Two groups two miles apart are connected by avenues bordered by walls. The western group contains a large walled octa¬ gon and a square connected by a walled passage¬ way; and the eastern group contains another large circle connected with a large square by a wide walled avenue. While the square enclosures have, each, several entrances, the circles have only one each and that leading into the square. The larger circle has a diameter of over 1.000 feet, and embraces within its circuit the fair grounds of the Licking County Agricultural Society.

B:bliography.— Allen, ‘Prehistoric World) (1815) ; Hodge, ‘Handbook of American Indians) (1912) ; Drake, ‘Pictures of Cincinnati > (1815) ; Lapham, ‘Antiquities of Wisconsin5 (1885) ; Howe, historical Collections of Ohio5 (1898); MacLean, (The Mound Builders5 (1897); Moorehead, ‘Fort Ancient5 (1890); Peet, ‘Emblematic Mounds5 (1878) ; Shepherd ‘Antiquities # of Ohio5 (1887); Squier and Davis, (Ancient Monuments of the Mississipoi Valiev5 (1847); Thomas, ‘Burial Mounds of the Northern Section of the United State?5 (1887) ; ‘Mound Explorations5 (1894).

MOUND CITY, Ill., city, county-seat of Pulaski County, on the Ohio River, and on the Illinois Central and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, about 200 miles south of Springfield and eight miles north of Cairo. It is in an agricultural section, but the principal industries are connected with manufacturing and trade. The chief manufac¬ tures are furniture, pumps, staves, headings and other lumber products, boxes, trunks, ice, foundry and machine-shop products. It has considerable trade in its own manufactures and in farm products, and has one of the largest preserving and canning factories in the United States. A National Cemetery, located here, con¬ tains 5,310 graves, of which 2,732 are unknown dead. Pop. 2,837.

MOUND CITY, Mo., city in Holt County, on the Chicago, Burlington and Quincy Rail¬ road, about 40 miles north by west of Saint Joseph. It is situated in a fertile agricultural region in which farming and stock raising are the chief occupations. Its principal manufac¬ tures are milling, canned fruits and vegetables and dairy products. Its trade is in farm prod¬ ucts and livestock. In the vicinity are numer¬ ous mounds belonging to the age of the Mound Builders (q.v.). Pop. (1920) 1,472.

MOUNDSVILLE, W. Va., city and county-seat of Marshall County, and the seat of the State Penitentiary, on the Ohio River and on the Baltimore and Ohio and Ohio River railroads, about 12 miles south of Wheel¬ ing. It is situated on a point of land, about three miles wide, at the confluence of the Big and the Little Grave creeks. It was once called Grave Creek Flats, and at first there were two small villages called Elizabethtown and Moundsville. The present name is on account of the Mammoth Mound in the centre thereof, one of the largest ancient mounds in the United States. In the vicinity are other mounds classed as the Grave Creek group of mounds. The Mammoth Mound is connected with a series of earthworks of ancient construction and is 820 feet in circumference at the base, 63 feet in diameter at the summit and about 70 feet in height. It is now owned

by the State and beautifully cared for. In the cham¬ bers have been found a stone tablet, the hiero¬ glyphics thereon are yet undeciphered ; the stone was sent to Europe for the purpose of determining the meaning of the marks and returned and is now in Smithsonian Institution, Washington, D. C. Shell beads, ornaments made of mica, others carved in stone, copper bracelets and other ancient articles have also been found. Moundsville is in an agricultural and coal region and the industries are con¬ nected with farming and coal mining. It manu¬ factures also glass, enameled ware, bricks, lamps, ceilings, brooms, whips, cigars, clothing, flour, feeds, leather, *etc.* Pop. (1920) 10,669.

MOUNET, moo'na', (Jean) Paul, French actor, brother of Jean Mounet-Sully : b. Ber¬ gerac, Dordogne, 1847. He studied medicine and received the degree of doctor of medicine ; first appeared in (Horace) at the Odeon in 1880. In 1889 he first played at the Comedie Frangaise, of which he was made societaire in 1891. He also served as professor at the Conservatoire de Paris and was made a chevalier of the Legion of Honor. His reputation was made

in (Les Erynnyes,' <L 'Arlesienne,' Othello, 5 batrie,' Camlet,' (La Furie,' .'Anthony,' <Le Roi,' 'L'Enigme,' (Le Dedale, and (CEdipe Roi.'

MOUNET-SULLY, moo'na su-la, Jean (Jean Sully Mounet), French tragedian: b. Bergerac, 1841 ; d. Paris, 2 March 1916. His precocious attraction to the theatre was resisted by his family and it was not until he became of age that he entered the Conservatoire, where he won the first prize for tragedy, and made a successful first appearance at the Odeon in 1868. During the Franco-Prussian War he was an officer in the Gardes-Mobiles. In 1874 he became a member of the Theatre Frangaise and remained in the company until he became its dean. Nature had endowed him with a most expressive face, a voice which had a convincing tone and a gift of gesture. He was made a chevalier of the Legion of Honor in 1889, and was decorated with the <(Palmes Academiques." His chief successes, although he essayed (Ham¬ letˆ were in the tragic roles of French classic drama. His production of 'Oedipe Roi' at the old Roman theatre of Orange was his most notable achievement. It was repeated in Paris in 1888 and in New York some years later. With Barbier, he wrote (La Vieillesse de Don Juan' (1906) in which he played the title role. Consult Brander Matthews 'The Theatres of Paris) (New York 1880).

MOUNT, William Sidney, American painter: b. Setauket, Long Island,

26 Nov. 1807; d. there, 19 Nov. 1868. He studied at the Na¬ tional Academy, N. Y., and became a member in 1832. His power as a genre painter was first proved by ‘Corn Husking) although he had aroused interest by his ‘Raising of the Daugh¬ ter of Jairus) (1828) and a number of striking portraits, including a full-length of Bishop Onderdonk. He may be looked upon as the founder of the American school of genre, and is particularly happy in his treatment of negro cnaracteristics. He has a genuine sense of humor and his bargaining for a Horse) (New York Historical Society) ;• baffling a Goose) (Metropolitan Museum) ; ‘A Long Story’ (Corcoran Gallery, Washington) : ‘Coming to the Point’ (New York Public Library) are real pictures of American life.

MOUNT AUBURN, a celebrated burial-place in Watertown, Mass., covering over 100 acres. Here are the graves of Longfellow, Lowell, Sumner, Phillips Brooks and other well-known men.

MOUNT CARMEL, Ill., city, county-seat of Wabash County, on the Wabash River, and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Southern railroads, about 35 miles northwest of Evansville, Ind. The place was settled in 1818 and in 1868 was chartered. It is in an agricultural section ; but the good water-power has contributed to¬ ward making it a manufacturing city. The chief public buildings are the courthouse, public library and High School building. The chief manufactures are flour, paper, lumber, furni¬ ture, lumber products, strawboard, machinery supplies, shafting, pulleys and dairy products. It has the railroad shops of the ((Big Four” rail¬ road. There is considerable trade in manu-

factored articles, farm products and livestock. Pop. 6,934.

MOUNT CARMEL, Pa., borough in Northumberland County, on the Pennsylvania, the Philadelphia and Reading, and the Lehigh Valley railroads, about 45 miles north by east from Harrisburg. It is in a mountainous region in the midst of valuable coal fields, and nearby are a number of large anthracite mines. The manufactures are mining

implements, miners' lamps, hats, caps, cement blocks, men's clothing, flour and cigars. There are also a planing mill, silk and knitting mills, foundries, meat packing plant and wagon works. The borough has an extensive trade in lumber and coal. Pop.

(1920) 17,469.

MOUNT CARROLL, Ill., city, county-seat of Carroll County, on the Chicago, Milwaukee and Saint Paul Railroad, about 25 miles south¬ west of Freeport and 10 miles east of the Mississippi River. It is situated in an agricul¬ tural and stock-raising region, and in the vicinity are deposits of iron ore. It is the seat of the Frances Shimer School, and it has a high school and Carnegie library, Caroline Mark Home for Aged Ladies. The water-supply sys¬ tem is the property of the municipality. Pop.

(1920) 1,806.

MOUNT CLEMENS, Mich., city, county-seat of Macomb County, on the Clinton River, and on the Grand Trunk Railroad, about 22 miles northeast of Detroit. Electric railroad lines connect the city with Detroit and the towns along the coast. The first settlement was made in 1802 ; and the original plan of the vil¬ lage was made in 1818 by Christian Clemens. This first plat consisted of 60 lots now in the business centre of the city. The cooperage business was most important in the early days ; the staves and heads for oil casks and barrels being made in Mount Clemens and shipped to large oil firms in New Bedford, Mass. Then Mount Clemens was considered the most im¬ portant place in Michigan ; but with the decay of whaling and whale-oil industries, the cooper¬ age business declined and the town was at a standstill for several years. In 1865 a company prospecting for oil sank a well at Mount Clemens. After going to a depth of about 1,300 feet they abandoned all hope of oil, but found salt instead. Soon a new company was formed for the purpose of manufacturing salt, but the enterprise did not prove a success be¬ cause of the quality of the salt. In 1868, ap¬ parently by accident, the discovery was made that the water from the salt wells possessed remarkable medicinal properties and since then the place has had a steady growth which is increasing each year. Large sanatoriums, hotels and bathing places have been built to accom¬ modate the thousands of people who annually visit the place seeking health. The mineral waters, classed as

sulpho-iodo-chromo-salines, as they come from the wells are about 50° F., and very rich in mineral salts, chiefly chloride of sodium and chloride of magnesium. About 30 different chemical ingredients constitute their make up. The beautiful residences, broad, well-kept streets and grounds, the long lines of shade trees, the parks, the drives, all make the place most attractive. Gratiot avenue is virtu¬ ally a continuation of the avenue of the same name in Detroit. Both avenues are parts of

what was once the government road made in 1840 and extending from the fort in Detroit to the fort at Port Huron. The churches and schools compare favorably with others in the State. Mount Clemens has considerable manu¬ facturing and commercial interests. Some of the manufacturing establishments of the city are a carriage and wagon factory, agricultural implement works, beet-sugar factory, machine-shops, a large pottery, an automobile spring factory, a bath tub factory and a cooperage works. The government of the city is admin¬ istered under the law of the State for the cities of the fourth class. The water-supply system is the property of, and is operated by the municipality. Pop. (1920) 9,488.

MOUNT COOK, or AORANGI, New

Zealand. See Cook, Mount.

MOUNT DESERT, de -zert' or dez-ert, an island off the coast of Maine, the largest be¬ longing to the State, part of Hancock County. It is separated from the mainland by Western Bay, Mount Desert Narrows and Frenchman's Bay. It is about 15 miles long and 12 miles wide ; area, about 100 square miles. The coast¬ line is very irregular; the chief indentations are on the north, Eastern Bay; on the south, Somes Sound, a fiord which extends into the centre of the island, and Southwest Harbor. On the west are Seal Cove and Western Bay. Bartlett's Narrows on the west separates Bart¬ lett and Mount Desert Islands. On the south Cranberry Passage separates Great Cranberry Island from Mount Desert. The irregularity and nature of the coast-line, and the separation of the island from the mainland is due to sub¬ mergence of the land and weathering. The surface is mountainous, along the northern coast is a line of rugged cliffs, and Green Mount, in the interior, is over 1,000 feet in height. Several fresh-water lakes beautify the island and add to its attractiveness. Long Pond, Eagle Lake, Jordan's Pond, Echo Lake and Seal Cove Pond are the principal bodies of water lying wholly within the interior.

The principal harbors are Bar Harbor, Southwest and Northeast harbors. Bar Har¬ bor in Eden township is a popular summer re¬ sort and connected by a ferry to the Maine Central Railroad and by steamboat lines with Rockland, Portland, Boston and other Atlantic ports. There is a naval coaling station on the north shore of Eastern Bay. In Frenchman's Bay are five rocky islands called the Porcupines, and about 20 miles south, in the open ocean, is Mount Desert rock, on which is built a light¬ house.

The first authentic account of this island was given by Champlain (q.v.), who gave it the present name. In 1608 M. De la Saussaye and the Jesuit Fathers Lallemant, Masse, Quentin and Biard, together with 25 colonists from France, established on Somes Sound a colony which they called Saint Sauveur. Eight years later the colony was destroyed by a party of Englishmen from Virginia. The first perma¬ nent settlement was made by Abraham Somes, who, in 1761, built a house at the head of the sound which still bears his name. The town of Mount Desert was incorporated in 1789; Eden, in 17%; Cranberry Isles, in 1830, and Tremont, in 1848. The population of the several towns ' is about as follows: Mount Desert, 1,569;

Eden, 4,441; Cranberry Isles, 399; Tremont, 1,116. Consult Fairfax, (At Mount Desert* ; Street, c Mount Desert, a History* (Boston

1905).

MOUNT ETNA. See Etna, or .Etna.

MOUNT EVEREST. See Everest,

Mount.

MOUNT FOREST, Canada, a town in Wellington County, Ontario, on the south branch of the Saugeen River, on the Canadian Pacific and

Grand Trunk railways, 40 miles northwest of Guelph. Its industrial establish¬ ments include flour, grist, saw and woolen mills, and it has manufactures of iron, agricultural implements, carriages, leather, pottery and bricks. Pop. 1,839.

MOUNT GILEAD, Ohio, village, county-seat of Morrow County, on the Whetstone River, and on the Cleveland, Cincinnati, Chi¬ cago and Saint Louis and the Toledo and Ohio Central railroads, about 40 miles north by east of Columbus. It has considerable trade in farm and dairy products, and it is a distribut¬ ing centre for quite a section of the country. The industries comprise hydraulic machinery works and a concrete sewer-pipe plant. The three local banks have combined resources amounting to $1,310,000. The value of taxable property is $2,500,000. The chief buildings are the opera house, fire house, mayor's office and the high and grammar schools. The govern¬ ment's receipts and expenses amount to $20,000. There are an electric-lighting plant, water-supply system, sewer system and disposal plant. Pop. (1920) 1,837.

MOUNT HOLLY, N. J., town, county-seat of Burlington County, on Rancocas Creek, and on the Pennsylvania Railroad, seven miles south of Burlington City and 18 miles east of Philadelphia. It is in an agricultural section but its industries are chiefly manufacturing. The industrial establishments are foundries, large shoe factories, shirt-waist factories, a hammock factory, machine-shops, hosiery and tapestry mills, leathergoods works and can¬ neries. There are two banks and two trust companies. The value of the town's taxable property is $2,300,000. The government's re¬ ceipts and expenses amount to $26,000 approxi¬ mately, annually balancing the account, except¬ ing bond issues. The town has improved and well-lighted streets and sidewalks. It has the Children's Home, the Burlington County Hos¬ pital and the Burlington County Lyceum of History and Natural Science, founded in 1876. The library connected with the lyceum contains about 7,000 volumes. Some of the other prom¬ inent buildings are the churches, schools and county buildings. Pop. 5,900.

MOUNT HOLYOKE (hol'yok) COL¬ LEGE, a college for women at South Hadley, Mass. It was founded by Mary Lyon (q.v.) ; chartered in 1836 and opened in 1837 under the name of Mount Holyoke Female Seminary. From the first it has had a reputation for thor¬ ough scholarship ; the curriculum was gradu¬ ally enlarged and the entrance requirements raised until a full college course was given and ihe old seminary course entirely superseded. In 1888 the name was changed to Mount Hol-voke Seminary and College; and in 1893 to Mount Holyoke College. Formerly three de¬

grees were given, A.B., B.S. and B.L. ; but A.B. is now the only degree conferred. The course is arranged in two years of required and two years of elective work; the curriculum in addition to other subjects may include courses in education, biblical history and literature, music and art; a limited amount of technical work in the two latter courses may count to¬ ward the degree. Provision is also made for graduate work leading to the degree of A.M., and for special work for teachers. Graduates are entitled to fellowships in the American School of Classical Studies at Athens, and in the similar school at Rome; also to the ad¬ vantages of the Zoological Station at Naples and the Marine Biological Station at Wood's Hole, Mass. Entrance to the college is by ex¬ amination, or by certificate from approved schools. The campus now includes over 150 acres ; the principal buildings are Mary Lyon Hall, which occupies the site of the original building destroyed by fire in 1896, the Dwight Memorial Art building, Lydia Shattuck Hall for the physics and chemistry departments, the Lyman Winston Hall for the other sciences, the Skinner Recitation Hall, the observatory, the gymnasium, the Student-Alumnae Hall which contains a large auditorium and offices for the college organizations and publications and for the alumnae secretary, seven large and four small residence halls, and the library which contained in 1915, 58,200 volumes; there are also plant _ hou-ses and botanical gardens. Full attention is given to physical training; regular gymnasium work is required for the first three years of the course, and there is pro¬ vision for basket ball and tennis. In 1915 the productive funds of the college amounted to $1,390,219.15, the income for the vear was $372,- 939.39; the students numbered 791, the faculty 93 with a staff of 27 assistants, and the total number of graduates, 4,870.

MOUNT OF OLIVES. See Olives,

Mount of.

MOUNT PLEASANT, Iowa, city, county-seat of Henry County, on the Chicago, Burling¬ ton and Quincy Railroad, about 120 miles east by south of Des Moines and about 28 miles west of the Mississippi River. It is in an agri¬ cultural region in which considerable attention is given to raising horses and livestock. Large limestone quarries are in the vicinity. It was settled in 1834 by Pressley Saunders; incor¬ porated in 1838, and chartered in 1851. The chic i industrial establishments are flour and lumber mills, planing mills, brick and tile ˆyaids, potteries, wagon and carriage factories, plain elevators, repair shops and machine shops. It has considerable trade in grain, lime¬

stone, horses and livestock. It is the seat of the Iowa Wesleyan University (M.E), founded in 1844, and until 1911 of the German Theolog¬ ical College (M.E.), founded in 1873. It has 13 churches, a conservatory of music, a high school, public and parish schools, and ‘ a Carnegie free public library. The State Hos¬ pital for the Insane is located here. The gov¬ ernment is vested in a mayor and council of eight members, all of whom hold office two years. The city owns and operates the electric-light plant and the waterworks. Pop. 4,078.

MOUNT PLEASANT, Mich., citv, county-seat of Isabella County, on the Chippewa

Copyright, 190n) |,y Detroit Photographic Co.

River, and on the Pere Marquette and the Ann Arbor railroads, about 70 miles north by west of Lansing. It is in an agricultural and lumbering region, but the city has considerable manufacturing. The principal industrial estab¬ lishments are brick and tile works, condensed milk factory, chemical works, lumber and flour mills, foundry, machine shops, woolen goods factory and furniture works. A Government Indian School and the Central State Normal School are in this city. Pop. (1920) 4,819.

MOUNT RAINIER NATIONAL PARK.

See Rainier, Mount.

MOUNT SAINT ELIAS. See Saint Elias, Mount.

MOUNT SAINT MARY’S COLLEGE,

a Roman Catholic school, founded Emmi’tsburg, Md., in 1808. It was chartered by the legisla¬ ture of Maryland, and the charter was ampli¬ fied in 1916, to enable the college to carry on its work more efficiently. There are 360 students in the scientific and classical

courses. The faculty consists of 37 professors and instructors. The institution is under the direction of the secular clergy, who also have charge of a theological seminary, in which 75 seminarists, belonging to various dioceses, are prepared for the priesthood. The library has 30,000 volumes. The property is valued at $400,000, approxi¬ mately.

MOUNT-STEPHEN, George Stephen,

Baro-n, Canadian financier : b. Dufftown, Banff¬ shire, Scotland, 5 June 1829. He removed to Canada in 1850 where he engaged in mercantile business and became wealthy. He was after¬ ward president of the Bank of Montreal and was conspicuous in promoting the completion of the Canadian Pacific Railwav for which service he was knighted by the queen in 1886. He returned in 1888 to Great Britain and in 1891 was created Baron Mount-Stephen after a mountain in Canada which had been named after him. In 1887 he gave $500,000 for the founding of the Royal Victoria Hospital of Montreal; Sir Donald Smith (later Lord Strattcona) contributing an equal sum.

MOUNT STERLING, Ill., town, county-seat of Brown County, on the Wabash Rail¬ road, about 70 miles west by north from Springfield. A fertile agricultural region surrounds the town, and coal and clav deposits are in the vicinity. The chief manufactures are tile, brick, flour, wagons and dairy products. The town owns and operates the waterworks. Pop. 1,986.

MOUNT STERLING, Ky., city, county-seat of Montgomery County, on the Chesapeake and Ohio Railroad, about 31 miles east of Lex¬ ington. It is in an agricultural region, and has considerable manufacturing. Its chief indus¬ trial establishments are flour and planing mills, a distillery, machine shops, a glove factorv and furniture works. It has several private schools, good public schools and a public librarv. ‘ Pop

3,932.

MOUNT UNION COLLEGE, in Alli¬ ance, Ohio, coeducational, founded in 1846 under the auspices of the Methodist Episcopal Church as Mount Union Seminary, and char¬ tered as Mount Union College in 1858. It was the first consistently coeducational college in the United States. In 1911 Scio College, of Scio, Ohio, was amalgamated with it. Its

courses lead to the degrees of A.B.. B.S., Ph.B. and B.L. In 1919 there were connected with the school 20 professors and instructors and 316 students. Summer courses are provided for the long vacation.

MOUNT VERNON, the estate of George Washington, in Fairfax County, Va., on the right bank of the Potomac, 15 miles below Washington, D. C. The original name of the estate was Hunting Creek, and it contained about 800 acres. When it came into possession of Lawrence Washington, the brother of George, he changed the name to Mount Vernon, in honor of Admiral Vernon of the British navy. The house is of wood, erected on a bluff 200 feet above the river. It is a two-story house, 96 feet long and 30 feet deep. The main part was built by Lawrence Washington in 1743 and the wings were added by George Washington; the estate came into possession of George Washington in 1752 after the death of his brother. In 1859 the house and 200 acres of land around it was bought by the Mount Ver¬ non Ladies' Association ; the purchase money was $200,000, raised in great part by Edward Everett. Since then the Association has re¬ stored the house as nearlv as possible to what it was in the lifetime of George Washington. A high piazza extends along the front of the house, and the six rooms on the ground floor contain many objects of historical interest con¬ nected with the life and times of Washington. The key of the French Bastille, the furniture used by the family, in the piazza the tiles which were brought from the Isle of Wight, and many other relics are objects of attraction to visitors. In the garden are a number of trees planted by Washington, and in the coach-house is his carriage. The room at the south end of the first floor is the one in which Washington died. In 1831 the body of Washington was re¬ moved from the old family vault to a tomb, a plain brick structure, which is near a wooded ravine, a short distance from the house. Be¬ hind an iron grating mav be seen the two sarcophagi which contain the remains of George Washington and his wife, Martha.

The estate was willed by George Washing¬ ton to Bushrod Washington, and at the death of the latter it came into possession of John A. Washington, from whom the Ladies' Associa¬ tion purchased the house and adjacent grounds. Consult Lossing, (The Home of Washington* (New York 1865) ; Page, T. N., (Mount Ver¬ non and its Preservation (New York 1910) ; Wilstsch, P.. (Mount Vernon, Washington's Home and the Nation's Shrine* (New York 1916) ; Wineberger, (Home of Washington at Mount Vernon* (Washington 1866).

MOUNT VERNON, Ill., city, county-seat of Jefferson County, on the Southern, Wabash, Chester and Western, Chicago arid Eastern Illinois, and the Louisville and Nashville rail¬ ways, about 115 miles south by east from Springfield, 76 miles east of Saint Louis. The site for a city was first marked in 1819, and city lots laid out in 1840, and incorporated as a city in 1872. It lies in the north edge of the great Southern Illinois coal field, having one mine and is surrounded by splendid agricultural country, producing corn, oats, wheat, hay, fruit and vegetables. It has a plant for producing 22 wooden and 18 steel freight cars per day^

its chief manufacturing, constantly operating to near full capacity. Its other manufactures are cut-glass, cotton hoisery, ice-cream, railroad cross-ties, preserving, concrete, brick, flour, bread and pastry, mattresses. Dairying is fast becoming the chief industry on the farm. Its chief public buildings are the county court¬ house, State appellate courthouse, Federal post office, six grammar schools employing 52 teachers and a high school employing nine teachers. The city spends on school main¬ tenance annually $48,000. There are 12 prin¬ cipal churches, some of them very excellent edifices. The government is under a charter under the general statute of the State, with mayor and 12 councilmen who hold office for two years. Pop. (1920) 9,815.

MOUNT VERNON, Ind., city and county-seat of Posey County, on the Ohio River near the mouth of the Wabash, and on the Chicago and Eastern Illinois and the Louisville and Nashville railroads. It is in a rich agricultural region in which principal crops are corn, wheat and hay. Coal is plentiful in the near vicinity and the city is underlaid with two good veins of bituminous coal. It lies on a large flat top bluff of over four miles frontage, one of the very few places on the Ohio River never en¬ dangered by high waters. The principal in¬ dustries are flour mills, hominy mill, straw board plant, foundry and machine shop and products, lumber and lumber products. It has seven churches, five public schools, including an accredited high school, and one parochial school, a modern courthouse and a Carnegie-Alexandrian free public

library. The three banks have a combined capital of $200,000 and a surplus of $100,000, do an annual business of $10,000,000 and annual clearings are $1,000,000. The government is vested in a mayor and a council of six members, each of whom holds office four years. Pop. 5,284.

MOUNT VERNON, N. Y., city in West¬ chester County, on the Bronx River and Hutchinson River, an arm of Pelham Bay, and on the New York, New Haven and Hartford, and the New York Central and Hudson River and New York, Westchester and Boston rail¬ roads, adjoining New York city on the north, and about 13 miles from the Grand Central sta¬ tion in New York. Electric lines connect Mount Vernon with New Rochelle, Yonkers and a number of the villages and cities in the vicinity. Rapid transit lines from New York city extend almost to Mount Vernon (1903) and the present plans provide for the extension of the lines into the heart of the city. Mount Vernon is really a residential suburb of New York; a large part of the city is restricted for residential purposes. It was founded in 1852 and in 1892 was chartered. It has several industrial estab¬ lishments and considerable trade, chiefly in the products of market-gardens and as a distribut¬ ing centre for the nearby sections of county. The Westchester Lighting Company is located here. It has about 1,000 employees, and fur¬ nishes for many places in Westchester County, light, power and heat for public and private uses. The streets and avenues are well-paved and well-kept. The handsome lawns and gar¬ dens and the great number of shade trees make the citv most attractive. Some of the prom¬ inent buildings are the Mount Vernon Hos¬

pital, the Lucas Building, Proctor's Theatre, new high school, new police building, new post office, fine church and school buildings. It has a public library founded in 1896, and the build¬ ing donated by Andrew Carnegie, at a cost of $50,000, was begun in 1903. The water, electric-light and sewer systems are all well organized and are being improved and extended to meet the needs of a growing city. The government is administered under the original charter, which provides for a mayor who holds office two years and a council. The mayor appoints, subject to approval by the council, all the ad¬ ministrative officers except the board of edu¬ cation, comptroller, assessors and receiver of taxes, who are elected by the people. Pop.

(1920) 42,726.

MOUNT VERNON, Ohio, city, county-seat of Knox County, on the Kokosing River, and on the Cleveland, Akron and Cincinnati and the Baltimore and Ohio railroads, about 40 miles northeast of Columbus and 85 miles southwest of Cleveland. It is in an agricul¬ tural region and near the natural gas belt. The chief industrial establishments are a foundry, the Corliss engine-works, flour and lumber mills, bottle works, large glass plants, Pennsyl¬ vania Railroad repair shops and bridge works. It has considerable trade in manufactured articles and in farm and dairy products. The Hiawatha Park, the courthouse, the library and fine church and school buildings, all contribute to the attractive features of the place. The city owns and operates the waterworks. Pop.

(1920) 9,237.

MOUNT WASHINGTON. See Wash¬ ington, Mount.

MOUNTAIN ASH, Wales, a coal and iron-mining town of Glamorganshire, five miles south of Merthyr-Tydfil. The principal build¬ ings comprise the parish church of Saint Margaret, the Workman's Hall, a library and reading-room, *etc.* Pop. 42,246.

MOUNTAIN ASH, QUICKEN TREE, or ROWAN TREE, popular names for a small European tree (Sorbus aucuparia) of the order Rosacea, and, bv extension, for two American species. The European species is an erect, graceful tree about 30 feet tall ; bears ash-like, odd-pinnate leaves ; corymbs of small yellow¬ ish-white flowers followed by globular orange colored acid fruits (pomes). It is frequently planted for ornament and seems to thrive upon any soil except that which is very heavy or very light, or poorly drained. It does well in the cold north beyond the range of most fruit trees, and there the fruits are often made into preserves. The hard, compact wood is used for turning, cabinet work, *etc.* In Europe its twigs are highly prized by the superstitious as charms and as guardians against evil sprites.

The American species (S. americana) , which resembles the preceding, ranges from Labrador to the mountains of North Carolina and from there irregularly northwestward to Manitoba. With the exception of its wood, which is light and inferior, it is used like the first species. The elder-leaved species (S. scopulina) ranges from Pennsylvania and Michigan to Labrador and an allied species extends in eastern Asia as far south as Japan. Its flowers and fruits are larger than those of the previous species

and its leaves are more like those of the elder. In the southern part of its range it is only occa¬ sional ; in the northern, common. Both Ameri¬ can species are frequently reduced to shrubs.

MOUNTAIN BEAVER. See Sewellel. MOUNTAIN BLACKSNAKE, MOCK¬ ING BIRD; PLOVER, SHEEP, *etc.* See

Blacksnake; Mocking-bird; Plover; Sheep, *etc.*

MOUNTAIN CLIMBING, formerly re¬ garded as exploration or adventure, now rec¬ ognized as one of the hardier outdoor sports. At first regarded as extremely perilous, moun¬ tain climbing or mountaineering now claims hundreds of thousands among its devotees. The effort, endurance and skill required by the sport are in themselves physical virtues which carry their own rewards. Far beyond this is the profound mental invigoration from associa¬ tion with nature in her most majestic phases and awe-inspiring moods. Mountain climbing may be properly viewed as of two distinct classes, according to the goal to be attained — the low mountains, or the high mountains. The ascent of the lower mountains like the White Mountains, the Adirondacks, or the Carolina mountains is a very common amusement for summer visitors in such regions, and demands no special adaptability. The slight rarefaction of the air at the elevation to which these sum¬ mits reach do not seriously affect the untrained climber. But for elevations higher than 10,000 feet above the sea-level a special type of phys¬ ical development is required, and as a rule a long and persistent cultivation becomes neces¬ sary. There are a few individuals who are naturally fit, possessing the requisite qualifica¬ tions without preliminary training. They are of the class who have at sea-level a pulse beat below the normal — about 60 beats to the min¬ ute. This slow pulse will have risen to not more than 70 or 75 beats per minute at 10,000 feet elevation, while a normal pulse beat of 70 at sea-level will rise to 90 or 95 at 10,000 feet, with the consequent distress, requiring frequent and prolonged rests. But aside from this pecu¬ liar physical disposition other qualifications are needed to make a successful and

exultant mountaineer — a delicate sense of balance, cool-headedness, fearlessness, imperturbability, be¬ sides superabundant muscular strength. The course of training to which an ambitious mem¬ ber of the British Alpine Club submits him¬ self begins with rock and crag climbing among his home mountains; and then follow progres¬ sively the Swiss mountains, the Caucasus, the Southern Alps of New Zealand, the Siberian Atlas or the mountains of Chinese Turkestan, and last, the Himalayas. It is a fact, however, that several of the high Himalayas do not de¬ mand as much real climbing as mountains much lower, for in not a few cases mules may be taken in the Himalayas to heights of 18,000 to 20,000 feet, leaving comparatively little toil to the mountaineer. On the more rugged mountains the ascent of 3,000 feet elevation is regarded as a full day's work.

While there are several rumored ascents of mountains which have gained through repeti¬ tion a certain historical position, it is generally accepted that the pioneer of mountaineering as it is understood to-day was Jacques Balmat, who, with Michel Paccard, at the instigation of

the scientist de Saussure, made the ascent of Mont Blanc in 1786. The following season Balmat piloted Professor de Saussure and a party safely to the same summit. Ascents of other Alpine peaks were soon recorded, but they were almost exclusively by explorers for scientific information. Amateurs began to be¬ come interested in the sport soon after 1850, and a party of English tourists succeeded in as¬ cending Mont Blanc without a native guide in 1856. But the systematic and scientific climb¬ ing of mountains had its growth from the for¬ mation in 1857 of the first Alpine Club in Lon¬ don, which was organized to enlarge ((the com¬ munity of feeling among those who in the life of the High Alps have shared the same enjoy¬ ments, the same labors and the same dangers.®

Alpine Clubs. — Alpine clubs and mountain-climbing societies have since been organized in nearly all continental countries. The European clubs and societies have an aggregate member¬ ship of over 120,000; the consolidated German and Austrian clubs having 75,000; Italian, 14,- 000; French, 6,000; and Swiss, 12,000.

Climbing Records. — The records of moun¬ tain climbers cover all nationalities and various years from Balmat (1787) to Dr. Stuck (1912). The highest point thus far climbed in foreign lands was

24,583 feet by the Due d'Abruzzi in 1909 in his climb of Mount Bride in the Hima¬ layas. He did not reach the summit, some 600 feet higher. Previous to this feat the record had been held by W. W. Graham, who in 1883 reached a height of 24,015 feet. In North America, the Duke of Abruzzi and his party reached a height of 18,024 feet on Mount Saint Elias in 1897. In South America, S. Vines climbed 22,860 feet to the summit of Aconcagua in the Andes in the same year. In 1903 Mrs. Workman accompanied her husband, Dr. W. H. Workman, to the summit of Lungma in the Himalayas, a height of 22,868 feet. In the United States the more recent notable ascents have been that of the South Peak of Mount McKinley on 7 June 1912 by Dr. Hudson Stuck and H. P. Karstens — a height of 20,300 feet; and that of Mount Blackburn (16,140 feet) by Miss Dora Keen on 19 May 1912.

The Bureau of Associated Mountaineering Clubs of North America was organized in May 1916 by nine clubs and societies. Seven more clubs joined the association during the year, and in 1917 the combined membership was about 12,000. The societies included in the association were :

The American Alpine Club, of Philadelphia and New York; the American Civic Associa¬ tion, of Washington, D. C. ; Appalachian Moun¬ tain Club, of Boston and New York; British Columbia Mountaineering Club, of Vancouver; Colorado Mountain Club, of Denver; Explo¬ rers' Club, of New York; Fresh Air Club, of New York; Geographic Society, of Chicago; Geographical Society, of Philadelphia; Green Mountain Club, Inc., of Rutland, Vt. ; Hawaiian Trail and Mountain Club, of Honolulu; The Mazamas, of Portland, Ore. ; The Mountain¬ eers, of Seattle; Prairie Club, of Chicago; Sierra Club, of San Francisco and Los An¬ geles; and the United States National Parks Service Club, of Washington, D. C. The Al¬ pine Club, of Canada, while not a member, is affiliated with the association.

The object of the association is declared to

be to unify effort in the preservation of natural scenery, including also bird and animal life, trees and flowers ; the creation and development of national parks and reservations; and the opening of mountainous regions with trails and shelters.

Accidents. — In the Alpineˆ countries, thou¬ sands of Swiss, Italians and Tyrolese have be¬ come professional guides, and their skill ex¬ ceeds that of the most scientific of learned Al¬ pine club members. Hundreds of lives among both visitors and guides have been lost in the Alps, but this fact does not appear to deter thousands of others from making ascents each year. Accidents in mountain climbing rarely occur when guides are employed and reason¬ able precautions are taken. Occasionally a foothold seemingly secure gives way; but more frequently the fall occurs because the climber is overtired, or has started too quickly, without the necessary training. Over-exertion of either body or mind is always to be avoided. The use of the alpenstock and the ice-axe in mountain climbing, as well as general directions for mak¬ ing an ascent and descent, are fully set forth in a manual prepared under the auspices of the London Alpine Club, entitled 'Dent's Moun¬ taineeringˆ

The bibliography of mountain climbing is very voluminous, and is eagerly sought after by a large number of persons debarred by phys¬ ical inability from engaging in the rigorous ex¬ ercise, but who are none the less ardent moun¬ taineers at heart. The following named vol¬ umes are only the more prominent of those published in recent years. The extensive li¬ brary of the American Alpine Club was re¬ cently placed in the custody of the New York Public Library, which compiled and printed a complete list of the books and pampnlets, to be had upon application.

Bibliography. — Abraham, G. D., Complete Mountaineer) (London 1907) ; 'On Alpine Heights and British Crags) (Boston 1916), and 'Swiss Mountain Climbs > (London 1912) ; American Alpine Club, 'Alpina Americana* (Philadelphia 1907-14) ; Appalachian Mountain Club, 'Guide to Paths in the White Mountains and Adjacent Region* (Boston 1916) ; Bell, T. M., (The Wilds of Maoriland) (London 1914) ; Belloc, H., (The Pyrenees) (London 1909) ; Bent, A. H., 'Equipment for Mountain Climbing> (Boston 1916) ; Bowman, I., 'The Andes of Southern Peru) (New York 1916) ; Browne, B., 'The Conquest of Mount McKin¬ ley } (New York 1913) ; Burlingham, F.. 'How to Become an Alpinist* (London 1914) ; Bur¬ pee, L. J., 'Among the Canadian Alps) (New York 1914) ; Coleman, A. P., 'The Canadian

Rockies: New and Old Trails) (Toronto 1913) ; Conway, Sir W. M., ‘The Alps from End to End) ˆLondon 1905) ; Cook, F. A., ‘To the Top of the Continent* (New York 1908) ; Du Faur, F., ‘The Conquest of Mount Cook) (London 1915) ; Farrer, R., and Compton, E. H., ‘The Dolomites) (London 1913) ; Filippi, F. de, ‘Karakoram and the West Himalayas) (London 1912) and ‘Ruwenzori* (London

1909) ; Freshfield, D, W., ‘Exploration of the Caucasus) (2 vols., London 1902) ; and ‘Round Kangchenjunga) (London 1903) ; Gribble, F., ‘The Early Mountaineers) (London 1899) ; Hamer, S. H„ ‘The Dolomites) (London

1910) ; Holtz, M. E., and Bemis, K. I., ‘Glacier

National Park: Its Trails and Its Treasured (New York 1917) ; Kilbourne, F. W., ‘Chroni¬ cles of the White Mountains) (Boston 1916) ; King, C., ‘Mountaineering in the Sierra Ne¬ vada* (New York 1907) ; Lewis, T. H., and Munson, S. G, (The Upper Engadine) (Lon¬ don 1907) ; Mills, E. A., ‘The Rocky Mountain Wonderland) (Boston 1915), and ‘Your Na¬ tional Parks) (Boston 1917) ; Morley. M. W., ‘The Carolina Mountains* (Boston 1913) ; Muir, John, ‘Our National Parks* (Boston 1909), and ‘The Mountains of California* (New York 1911) ; Mumm, A. L., ‘Five Months in the Himalayas) (London 1909) ; Neve, E. F., ‘Beyond the Pir Panjal* (London 1912) ; Peck, A. S., ‘A Search for the Apex of America) (New York 1911) ; Ross, M., ‘A Climber in New Zealand) (London 1914) ; Turner, S., ‘My Climbing Adventures in Four Continents) (London 1911) ; Workman, F. B., and W. H., ‘Peaks and Glaciers of Nun Kun* (London 1909), ‘The Call of the Snowy His-par* (New York 1911), and ‘Two Summers in the Ice Wilds of Eastern Karakoram * (Lon¬ don 1917).

MOUNTAIN EBONY. See Bauhinia.

MOUNTAIN-FEVER, or MOUNTAIN-SICKNESS. The term mountain-fever was applied formerly to a fever accompanied by de¬ bility, diarrhea, etc., which occurred quite fre¬ quently (and now occurs occasionally) in the mountains, especially those in the western part of the United States. It is now generally con¬ ceded that this form of fever is essentially ty¬ phoid, modified by the effects of extreme alti¬ tude. The term mountain-sickness (sometimes used synonymously with mountain-fever) means a condition produced by the action of rarefied air upon organic functions, especially in persons who exercise considerably. The fact that the same symptoms are caused in per¬

sons who climb mountains to the height of sev¬ eral thousand feet and in those who ascend in balloons to twice as great a height is accounted for by the exhaustion caused by the climbing. The intake of oxygen is diminished in high alti¬ tudes ; the pulse is quickened, and the body-temperature raised to 100°-101° F. Difficulty in breathing, headache, vertigo, nausea and vomiting are likely to occur. Hemoptysis is rare, although it is found in tuberculous pa¬ tients who have sought health in the mountains. Rest and acclimatization are the remedies and oxygen has been given to offset the diminution of it in the air. It is also administered through the stomach in the shape of chlorate of potash, the aim being to keep up the normal constitu¬ tion of the blood which at high altitudes is not so readily freed from carbon dioxide on ac¬ count of the inadequacy of the lungs to ex¬ hale it.

MOUNTAIN GOAT. See Rocky Moun¬ tain Goat.

MOUNTAIN LAUREL, or AMERICAN LAUREL, a shrub of the genus Kalmia of the order Ericacece. The few species which are natives of North America and Cuba are mostly shrubby, evergreen and highly orna¬ mental, especially when in flower, the blossoms being usually in terminals corymbs or axillary umbels, individually of medium size, white, pink or purple. On account of their beauty and

hardiness most of the species are very popular for planting in parks and private grounds even in the northern States and southern Canada. They do well in ordinary garden soil if not too clayey, but thrive best in peaty or sandy soil, particularly in partial shade. They require plenty of moisture and will do well even in marshy soil. The best known species is prob¬ ably K. latifolia, most frequently known by the above names and also as calico-bush and rhodo¬ dendron. It ranges from New Brunswick to Ohio and southward to Florida. Sheep-laurel (K . angnstifolia) , also known as wicky and lambkill, extends from Labrador southward to Georgia. These two species are the most con¬ spicuous flowers in the Alleghany Mountains during the early summer. K. polifolia, also found in the East, is common in the Rocky Mountain

region from Alaska to California. The deciduous species K. hirsuta and cuneata range southward from North Carolina. They are less planted in the north than the first two species.

MOUNTAIN LIMESTONE, a term com¬ monly used in England of the stratum in southern England and Wales at the base of the carboniferous deposits. The phrase was also used for a time of the subcarboniferous lime¬ stones of American plains, but has now been dropped. It contains many fossils, especially crinoids and some important fossil fish. Its commercial value, apart from its being a bearer of lead and zinc ores, lies in its use as building stone, since it is capable of a high polish, and for the preparation of lime.

MOUNTAIN LION. See Cougar.

MOUNTAIN MAHOGANY, the sweet or black birch. See Birch.

MOUNTAIN MEADOWS MASSACRE, in American history, a massacre of Western emigrants, near Mountain Meadows, Utah, in September 1857. The emigrants numbering 140 souls were on the way from Arkansas and Missouri to Southern California. While in camp in the valley of Mountain Meadows, in Washington County, they were attacked by In¬ dians and it is alleged by Mormons disguised as Indians. They held their ground for three days, when under promise of protection by John D. Lee, a Mormon and Indian agent, they left their barricade of wagons; where¬ upon the attack was renewed and every person of the 140 slaughtered excepting 17 young children. These were distributed among Mormon families but were afterward restored to their relatives by the United States govern¬ ment. The Mormons have always been blamed for the massacre. Lee was executed for the urder in 1877, but a number of his codefend¬ ants were acquitted. Lee in his confession as¬ serted that the massacre was ordered by Brig¬ ham Young and .other Mormons high in au¬ thority, but the facts are not certain. Consult Confessions of John D. Lee) (Saint Louis 1891) ; Bancroft, H. H., ˆHistory of Utah* (San Francisco 1889) ; Linn, (Story of the Mormons* (New York 1902).

MOUNTAIN TEA. See Gaultheria.

MOUNTAINS. A high elevation of land is called a mountain; a low elevation, a hill. The application of the term ˆmountain® varies in different localities. In the low lands, where

the elevations are not numerous, and do not reach a great height, a

rise of ground of about 100 or 200 feet is called a mountain; while in a mountainous country an elevation of 1,000 feet, or less than 2,000 feet, is often called a hill. Prominent parts of mountains or isolated moun¬ tains are called peaks. Some of the common names applied to the parts of a peak, or moun¬ tain, are summit, base, slope, crest, pinnacle, needle, knob. A series of connected mountains form a ridge, range or chain ; if the mountains extend a considerable length, the whole is called a range or chain ; if short, a ridge. A group of parallel ridges or ranges, or of ridges or ranges near together, usually resultants from similar causes, is called a mountain sys¬ tem; and several systems combined form a cordillera. An elevation with a level-topped area of considerable extent is calF'i a plateau and is usually associated with mountains. Many of the highest mountains of the world rise thousands of feet above the basal plat¬ form of the plateau. The mesa is a large level-topped section of the plateau; the butte is a small section. Valleys, lower land than plateaus, exist between the ridges, ranges or systems. A wide valley is often an interior basin. The interior basin area of Australia is over 51 per cent of the whole area; of Africa, 31 per cent; of North America, 32 per cent and of Eurasia, 28 per cent. (See Great Basin; Valleys). Low, narrow places in mountain ridges and chains are called passes. The depressions among the mountains contrib¬ ute in a great measure to a solution of the causes which have determined the kind and lo¬ cation of the vast elevated land masses of the earth.

Mountains have been variously classified, but the following outline embraces most of the important classes which have been described.

1. Folded Mountains. — These make up the great mountain systems of the world, and usually consist of very thick sedimentarjˆ rocks which by lateral compression have been thrown into more or less closely compressed series of folds or flexures. When first folded, the up arches or anticlines constitute mountains, the troughs or synclines form valleys. Such a situation is found in the Jura Mountains, in Switzerland. In other cases the folds may have been completely worn awav to a plain and uplifted. Erosion has then etched out the softer rocks, leaving the edges of the harder rock layers projecting. In such cases the ridges may be the syncline, the flanks of the fold, or the anticline, wherever the hard layer of rock may happen to be. This latter is the history of the Appalachian Mountains. Mountains are frequently regions of intense igneous activity, and the cores of ranges are often occupied bv enormous bodies of granitic rock which have melted their wav into the sediments, as in the case of the large batholith core of the Sierra Nevada Mountains, in California. The cause of the compression which produces such folds is by no means

clear. By some it is attributed to the fact that the supposed molten interior of the earth cools and contracts and that as a re¬ sult the crust, in accommodating itself to the smaller nucleus is forced to crumple. Others believe that great wedge shaped blocks of the earth's crust settle toward the centre, and so crowd one another that crumpling is produced

at the borders of the blocks. Whatever may be the cause, the fact remains that some enormous force causes lateral thrust, throwing the rocks into great folds and producing thus all the great mountain systems of the world. See Folds.

2. Fault Mountains. — Sometimes great breaks occur in the earth's crust, one side of the fracture dropping hundreds of feet, and leaving the elevated block as a mountain. Many of the ranges of western Utah and Nevada are of this origin. See Faults.

3. Volcanic Mountains. — Mountain ranges aro rarely formed by volcanic action alone, but isolated peaks are often of this origin. Vol¬ canic cones, great piles of lava and ash, form one type, of which Mount Shasta is one of our best-known examples. Recently formed cones are often beautifully symmetrical, as are those of Hood and Shasta. But as soon as activity ceases, denudation sets in, the cone becomes gashed with valleys, and in course of time only the harder central plug is left as a volcanic neck. Such plugs are common in the Puy region of central France, and the Mount Taylor region of New Mexico. Sometimes masses of igneous rock are intruded under sedimentary beds in the form of laccoliths (q.v.), arching up the beds to form elevations such as the Henry Mountains in Utah. Many regions of folded mountain's also have numerous volcanic peaks, as in the case of Mount Hood and other cones on the folded Cascade Range. See Batholiths; Cone; Laccolith; Volcano.

4. Residual Mountains. — When great areas are uplifted bodily without folding, they form plateaus. When such a plateau is greatly dis¬ sected, it becomes mountainous in topography, merely because

some parts are not worn away as fast as others. These are residual moun¬ tains, or mountains of circumdenudation. The Allegheny plateau is a region of this type.

Whatever may be the cause which makes the uplift on the earth's surface, denudation be¬ gins as. soon as the peak appears, and formation and destruction are conjoint agents in making the mountains what they are on the surface of the earth. Before the process of folding is completed the elements have begun their work of shaping and sculpturing, but the destructive agents at first work more slowly than the con¬ structive. The chief agents of changes after formation are frost, wind and water. The position of a mountain gives some idea of its rock structure, and its rock structure and form tell something of its age. The presence of hard rock in a mountain is often shown by the upright peak whose faces may be compara¬ tively bare, but which points up, resisting wind and water. Pike's Peak is granite rock. The White Mountains. N. H., have many hard rocky peaks; the Matterhorn, in the Alps, is a hard crystalline rock, and some of the Alaska peaks are examples of almost unyielding formations that appear to defy the ages. Remarkable ex¬ amples of the sculpturing of the mountains by water are shown in the gorges in the Rockv Mountains, the removal of soft layers leaving the hard rocks standing like gigantic castellated ruins. The high, sharp pointed peaks and the irregular rugged surfaces indicate that the mountains are not among the oldest of the earth. The Adirondacks, with their low,

rounded tops, their comparatively uniform slopes, show that long periods have passed since their formation ; erosion and weathering have removed mudi of the ruggedness and sharp an¬ gularities that once existed. Along the Atlantic Coast east of the Appalachian Mountains the low round hiils are remnants of what were once high mountains. If given sufficient time, erosion will reduce the highest mountains to low featureless plains.

The mountains of the world are distributed with remarkable uniformity. The longest and highest ranges of North and South America face the Pacific Ocean, and extend almost due north and south. The longest and highest ranges of Eurasia extend nearly east and west. Starting from the highest plateau in the world, Pamir, in Asia, there are extending west, mountain ranges which are continuous through Europe to the Atlantic, and, also, with but few low depressions, along the eastern coast of Africa to Cape of Good Hope. Passing east from the plateau of Pamir are lofty mountain ranges

extending to the northeastern part of Asia, which crossing to Alaska, unite with the great ranges which skirt the western coast of the Americas. The highest mountains in the world are the Himalayas ; the highest peak, Mount Everest, is fully 29,000 feet high.

High mountains exist on the bed of the ocean. A number belonging to the submerged Atlantic continent have been located, and their elevation determined. Some of the most promi¬ nent are Mount Chaucer, located in 1850, in lat. 42° 50', long. 28° 50', crest 284 feet from the surface; Mount Sainthill, in lat. 42° 50', long. 42° 20', discovered in 1832, height about 11,000 feet. Another important submarine mountain is the Laura Ethel, discovered in 1878, its crest about 216 feet below the surface. A group of submarine mountains, in lat. 43°, long. 22° 30', has been named Edward the Seventh Range. Other Atlantic peaks are Tillot-ston, Bright, Placentia and some in lat. 45° and long. 48°. Mount Placentia is only about 30 feet below the surface.

The mountains of the world are the great depositaries for the world's mineral wealth. The large proportion of the valuable metals in general use in the world have been obtained from the mountains. This is probably due to the close relation between mountains and igneous activity. (See Ore Deposits). Moun¬ tains affect the climate by protecting from cold winds or by preventing the ocean breezes from cooling the interior of countries in tropical regions, and by controlling in a great measure the rainfall. (See Condensation). The flora and the fauna, so dependent upon climate, are modified greatly by the mountains. The ele¬ vations are the great water-reservoirs of the world; they store almost the whole supply of water which falls on the earth's solid surface and distribute it in channels throughout the land. Lakes and springs are common in moun¬ tains. These elevated land masses of the earth have been most important in determining the history of the world. They are natural bound¬ aries, they have protected the weak from the strong, the civilized from the savage, and many sturdy, powerful . races of to-day owe their early preservation in a great degree to the mighty natural barriers which stood between

them and a stronger and more ferocious race. The mountains of the world have affected the literature and art of the world, and these influ¬ ences are still felt wherever a mountain uplifts its crest.

Bibliography. — Reade, T. M., (The Origin of Mountain Ranges* (London 1886) ; Willis, B., Thirteenth Annual Report, United States Geological Survey, Washington, D. C. (1893) ; Russell, I. C., Fourth Annual Report, United States Geological Survey (1884); Geike, (Mountain Architecture*; Geikie, J., foun¬ tains, their Origin Growth and Decay* (New York 1914)); (Earth Sculpture *; Reclus, (The History of a Mountain* ; Elie de Beaumont, (Notice sur les Systemes de Montagnes) (Paris 1852).

MOUNTAINS OF THE MOON. See

Moon, Mountains of the.

MOUNTED POLICE. See Police.

MOURNING. In most nations from the earliest ages it has been the custom of bereaved persons to testify their grief for the loss of friends or relatives by some external change of dress and deportment. The eastern nations and the Greeks cut off their hair, the Romans al¬ lowed the beard and hair to grow, in mourning. Different colors have been adopted as badges of grief; the ancient Egyptians wore yellow; the Ethiopians, gray;. the Roman and Spartan women, white, which is still the color of grief in China, Japan and Siam; in Turkey, blue and violet ; and in the other European countries, black is used for this purpose. Some have at¬ tempted to trace the associations by which the colors acquired their character to natural causes ; but it must be allowed, with little suc¬ cess. The Jews, in sign of grief at the loss of their relatives, rent their garments, tore out their hair and wore coarse garments of a dark color; they went barefoot, neglected their per¬ sons and performed other acts of penance. The term of mourning with them was from 7 to 30 days. Among the Greeks and Romans it was the custom to lay aside all ornaments of dress, to abstain from the bath and all indulgences. The kings of France mourned in violet. Among the ancients, as among the moderns, public mournings were common on the death of the sovereign or of a distinguished public benefac¬ tor. The period of mourning differs in differ¬ ent countries, but in all is generally regulated by the nearness of relationship between the sur¬ vivors and the deceased. In Scotch law a widow has a claim to mournings for her husband where his estate or rank

requires mourning in point of decency. Mournings for such of the deceased's children as are to be present at the funeral also form a privileged debt. In the United States the customary period of mourning for widows is one year.

MOURNING-CLOAK. A butterfly. See

Camberwell Beauty.

MOURNING-DOVE. See Dove.

MOUSCRON, moos'kron, Belgium, town in the province of West Flanders on the French border and located on the Ghent-Tournai and the Oudenarde-Mouscronn railways, 32 miles distant from Ghent. It has a customs station, episcopal college, cotton and woolen goods factories, a brewery, *etc.* In 1910 it had 22,122 inhabitants,

MOUSE, a small rodent mammal of the family Murides, the larger members of which are called rats, hamsters, lemmings, voles (qq.v.), etc.; specifically, the house-mouse (Mus mus cuius) , originally Asiatic, but universally domesticated. The family is an extremely large one, embracing some 300 well-established spe¬ cies, and is distributed over the whole world ex¬ cept the islands of the Pacific. A mouse is the only native mammal of Australia besides the dingo, (q.v.) not a marsupial. The members of this family vary in size from some smaller than a house-mouse to the bigness of the Amer¬ ican muskrat (q.v.) ; and exhibit much diversity in form, especially in respect to the limbs, which in woodland and aquatic species are usually of nearly equal size, but in those that dwell on prairies and deserts are far from it, the hind-legs there becoming immensely en¬ larged and serving as almost the only means of safety (by leaps), while the fore-legs are of little use except as hands in holding the food. It is a characteristic of mice, as of squirrels, to lift the food to the mouth and gnaw it while the animal sits up on its haunches. The pollex (thumb) on the fore feet is a mere wart-like rudiment; but the hind feet have five full toes, and in some aquatic species these are connected by webs forming swimming feet. The skull is shapely, the nose is long, pointed, hairy, keenly sensitive to odors, and protected by remarkably long tactile hairs (whiskers) ; the eyes and ears are usually large, for these animals are mainly nocturnal in habits; and the teeth are peculiar in that the lower incisors are compressed and pointed, and the molars (usually three on each side) are rootless. The tail in nearly all rats and mice is long, always thinly haired, often naked or scaly, and in such aquatic species

as the muskrat is compressed into a powerful scull¬ ing oar. Most species burrow or make their homes in holes; a few are arboreal. The near¬ est relatives of the group are the dormice, mole-rats, jerboas and pouched rats or gophers, a list which shows that the word “mouse** and (<rat** is popularly applied to many small rodents outside the Murides. This family is divisible into 10 sections — Murines, or typical Old-World mice; Hydromyines ; Phyncomyincs ; Gerbillines ; Otomyines ; Dendromyines ; Lophiomyines ; Mi¬ crotines, or voles; Sigmodontines, or hamsters; and Nsotomines.

The first subfamily contains the various rats (q.v.), the house-mouse, the delicate harvest-mouse and more than 100 other species of Eu¬ rope and Asia, which agree in having wide up¬ per molars-marked by three series of tubercles and in other distinctive peculiarities. The house-mouse has been a denizen of men’s habi¬ tations probably ever since housekeeping began, finding there safety from many natural enemies, opportunities and materials for nest-making, and plentiful daily food. It accompanies mankind wherever he goes, and soon replaces in frontier houses the local wild mice which for a time at¬ tempt to imitate its domestic habits. These mice are about three inches long, the tail meas¬ uring one and one-half inches more. The gen¬ eral color js bluish or dusky brown, but is sub¬ ject to variation and influenced by cilmate, food and other external conditions. Albino or “white” mice, with pink eyes, are kept as pets, also black and piebald ones; and these breeds

are easily maintained by selective breeding. Such pets are readily tamed and taught simple tricks. Certain individuals, known as (<singing mice,® make, especially at night, a pleasing whistling noise, like feeble chirpings of a ca¬ nary-bird. The same sound has been heard from wild-mice, and is believed to result from an asthmatic condition rather than to be a normal musical utterance. The fecundity of mice is excessive. From six to ten young are produced in a litter, and this species brings forth several times in the year. In about a fortnight the young are able to shift for themselves, although born in

a helpless condition. This illustrates how sometimes, under especially favorable conditions, mice may multiply far beyond normal num¬ bers and overrun the country as a devastating plague, instances of which are mentioned under Field mouse. The two most common European types, the long-tailed brown field-mouse (M. sylvaticus) and the diminutive harvest-mouse (M. minutus) are farmers' pests, destroying large quantities of grain. The harvest-mouse is one of the smallest of mammals and constructs a beautiful and elegant little nest of the blades of grass or corn, entwined round and supported by the stalks of the corn or wheat. A similar smaller species in South Africa weighs only a quarter of an ounce. These outdoor species hibernate during winter and lay up an autumnal store of grain in their nests and burrows — a matter in which great diversity of habit exists elsewhere in the family.

American native mice are all of one or the other of the remaining subfamilies, or else do not belong to the Muridce at all. The short¬ tailed meadow-mice (see Field-mouse), the neotomas (see Wood-rat), lemmings (q.v.), and their allies are elsewhere described. The most of our smaller mice belong to the sub¬ family Sigmodontince , characterized promi¬ nently by having cheek-pouches, and represented in the Old World by the hamsters. Five genera and about 75 so-called species have been cat¬ alogued, but probably further study will greatly reduce the number. Onychomys is a rather short-tailed, fossorial genus of the plains region and northern Mexico. Sigmodon is another genus of Florida and the Southwest, taking its name from the sigmoid form of the cusps of the molars ; Reithrodontomys embraces several very small burrowing brown mice of the same re¬ gion ; and Oryzomys includes the large, hand¬ some <(rice-field mouse® of the Southern States (O. palustris). The fifth genus, Peromyscus, contains the most numerous and familiar of the long-tailed field-mice. These are the <(wood-mice,® <(deer-mice® and ((cotton-mice,® more familiar under the old name Hesperomys, and commonly represented by the white-footed mouse (P . americanus, or H. leucopus), which occurs all over the more temperate parts of the continent. This species is somewhat larger than the house-mouse, and is yellowish brown above, darker on the back, the lower parts of the body and tail and the upper surface of the feet white; the young are dark slaty; the eyes and ears are large, and the fur long and soft. It is nocturnal in its habits, as active as a squir¬ rel, nesting in trees, in the fields, in barns and houses, and making a dwelling resembling a covered bird's nest; it feeds principally on grain, seeds, nuts and insects ; and in newly

settled districts comes into dwellings and gran¬ aries and is as mischievous as the house-mouse. Species with similar habits are a beautiful golden-haired southern one (P. aurcolus) ; the large, dark-brown, gray-bellied cotton-mouse (P . gossypinus) , very numerous in the South Atlantic States ; the ((red-backed® or Michigan mouse (P. michiganensis) of the North Central States, and several others.

Biblography. — Coues and Allen, Mono¬ graph of the Rodentia) (Washington 1877; ; Merriam (and others), (North American Fauna) (Washington 1889 and subsequently) ; Stone and Cram, American Animals) (New York 1902) ; Ingersoll, (Wild Life of Orchard and Field) (New York 1902) ; and the books of Audubon, Godman, Kennicott, Merriam, De Kay, Baird, Coues, Herrick and other natural¬ ists.

Ernest Ingersoll.

MOUSE-BIRDS, a group of peculiar birds of central Africa, constituting the family Coliidce and the suborder Colii, and also known as colies. They are of small size, grayish colors, marked with darker tints and in some species with touches of brighter colors; have finchlike beaks, crests, short, weak wings, very long tails and remarkably strong feet. They are active, but fly little, spending their lives mostly in creeping about the branches of trees in a way that with their dun colors strongly sug¬ gests the behavior of mice. They are fond of hanging head downward, and at night gather in bands that roost together in hanging postures as closely as they can crowd. Their food con¬ sists mainly of fruit; and they place their cup¬ shaped nests in low trees and bushes.

MOUSE-DEER. See Chevrotain.

MOUSE-EAR, the name of various small plants, suggested by the shape and appearance of the leaves: (1) a borage of the genus Myo-sotis, more generally known in the United States as (<forget-me-not® or sometimes <(scorpion-grass,® small furry herbs, growing in damp and shady places through the temperate regions and bearing clusters of minute blue and white, f(ydlow-eyed® flowers. (2) The marsh cudweed or wartwort (Gnaphalium uliginosum). (See Cudweed). (3) One of the wound-worts (Stachys germanica). (4) Any of several chick-weeds (q.v.) , especially the widely scattered Cer - astium vise o sum. (5) The cats-foot, orplaintain-leaved everlasting (Antenneria plantoginafolia) . (6) A European hawkweed (Hieracium pilo-sella). (7) The cruciferous plant Sisymbrium T haliana.

MOUSE-LEMURS. See Chirogale; Le¬ mur.

MOUSTERIAN STAGE, a period in the history of Paleolithic man in southwestern Eu¬ rope when men had made considerable advance¬ ment in the arts of working in flint and other stones, and in the graphic arts. See Stone Age.

MOUTH (oral or buccal cavity), primarily the nearly oval cavity at the commencement of the alimentary canal or digestive tract, into which food is taken, and from which the voice issues. In humans the mouth is the source of much gratification of the unconscious libido (q.v.) in children, a remnant of the nursing days; and in adults for this reason, the habit

MICE

1 Harvest Mouse

2 Hamster

3 Barbary Mouse

4 Jerboas

5 House Mouse

6 Brown Rat

*

‘ *•>

• -t

4-*

4

MOUTH — MOVING PICTURES

535

ol taking into the mouth, or chewing anything not food is to be regarded as a survival into later days of a characteristically infantile trait. A possible exception to this is kissing which is customarily retained in most civilized races as an expression of affection.

MOUTH, Diseases of the. The principal diseases of the mouth may be classified as fol¬ lows : Inflammation of the mucous membrane and its results ; epulis, gumboil, ranula, sali¬ vary calculus and salivary fistula.

Inflammation of the Mouth (Stomatitis). — This disorder is usually caused by local irri¬ tants, such as scalding drinks, corrosive sub¬ stances, jagged teeth or tartar. Suitable reme¬ dies are : Cooling and demulcent washes, soft food, building up of the strength and removal of tartar or other sources of irritation. Inflam¬ mation invading the mucous follicles, usually in debilitated children or from the irritation of teeth or as the result of an eruption (herpes) is follicular stomatitis.

It is attended with thin spots of white exudation, but there is no breach in the surface of the mucous membrane. The patient swallows with difficulty; the mouth is hot and tender ; the submaxillary glands may be swollen. The remedies are as above given, with the addition of a disinfectant to the mouth¬ washes. The terms aphthae and thrush (q.v.) are given to a stomatitis, usually follicular, at¬ tended by curd-like exudations with ulceration beneath the exudates (ulcerative stomatitis). The disease may be conveyed to the nipples of the nursing woman. In true aphthae the exuda¬ tions are due to a microscopic fungus, the O'idium albicans. In treatment the child is to be carefully fed, its mouth kept clean and dis¬ infected and the bowels regulated. Borax or tincture of myrrh, well diluted, is a good mouth-wash. Do not use honey. Canker re¬ fers to isolated superficial ulcerations of the mucous membrane, usually the result of de¬ bility and dyspepsia. Remedy these two con¬ ditions and touch the spots occasionally with nitrate of silver. Gangrenous stomatitis (noma) or cancrum oris means a more or less sloughing ulceration, usually upon the gums or cheeks. The breath is fetid; there is great swelling with soreness, high fever, marked de¬ bility, *etc.* It may follow measles or some other debilitating blood-disease. The treatment re¬ quires a physician.

Epulis. — This is a smooth round or lobular tumor springing from some portion of the alveolar processes and the periosteum coyering ihem, usually from the lower jaw. It is more frequent in women, and may be caused by irritation from decayed teeth.

Gumboil. — The gum-disease so named is a circumscribed inflammation of the mucous membrane or of the periosteum covering a portion of an alveolar process, caused usually by a decayed tooth. Wash the mouth fre¬ quently with hot water, have the boil lanced or cause it to discharge by applications of hot figs (boiled in milk) and have sources of irri¬ tation removed.

Ranula. — This term denotes a cystic forma¬ tion in the mucous membrane beneath the tongue, sometimes originating in the duct of a sub-lingual or submaxillary gland. It is either congenital or acquired. Treatment consists in the excision of the cyst, generally through the

mouth and rarely through an incision under the jaw.

Salivary Calculus. — Such is the name given to a concretion, mainly of phosphate of lime, formed in the duct of one of the salivary glands, but rarely in the glands themselves. Sometimes it forms around a

foreign body, such as a seed or a bit of food or tartar, and sometimes produces a ranula.

Salivary Fistula. — A fistula of this charac¬ ter is an abnormal canal opening upon the cheek, and arising from the duct of the parotid gland as the result of ulceration.

MOUTON, moo-ton', Alexander, American politician: b. Bayou Carencro, La., 19 Nov. 1804; d. near Lafayette, La., 12 Feb. 1885. He was graduated from Georgetown College, Dis¬ trict of Columbia, and in 1825 was admitted to the bar. He was elected to the State legis¬ lature in 1826 and in 1831-32 he was speaker. He was presidential elector in 1828, 1832 and 1836, and was elected to the United States Sen¬ ate in 1837. He was governor of Louisiana in 1843-46, and later presided over various con¬ ventions, but retired to plantation life at the outbreak of the Rebellion in 1861, upon failing to be elected to the Confederate senate.

MOVABLE BRIDGES. See Bridge Con¬ struction, Modern Methods of.

MOVEMENT-CURE. See Swedish Move¬ ment Cure.

MOVILLE, Ireland, town and seaport in the county of Donegal, at the mouth of Loch Foyle. It is a port of call for the Glasgow-New York steamers of the Anchor and Allan lines, as well as a favorite bathing resort. Pop.

1,016.

MOVING PICTURES are produced by lantern projection on a screen, of a series of pictures in such rapid succession that the eye sees them as one continuous representation. The possibility of such pictures depends upon what might be considered a defect of the human eye, known as the ˆpersistence of vision® — the technical name for the lingering on the retina of an impression received, after the excitation which produced the impression has passed. This lingering of the impression is sufficiently long to tide over the gap of one-sixtieth to one-eightieth of a second during which there is no picture on the screen. So that if the mechanism of human vision was per¬ fect the illusion of the moving nicture would be impossible.

It has been determined by experiment that the duration of the persistence of vision aver¬ ages one-fiftieth of a second and it was cal¬ culated that 14 pictures per second would be needed to produce

a continuous impression upon the eye — assuming each (picture to occupy the screen for three-fourths of its allotted share of the second, the other fourth being the gap of darkness while the film was moving for¬ ward to the next picture. With the improve¬ ment of the exhibiting mechanism, however, the number of pictures per second was in¬ creased to 16, the length of time each is on the screen being one-twentieth of a second, and the dark gap between being reduced to one-eightieth of a second. In this way the presen¬ tation has been made much smoother and the former unpleasant flickering eliminated.

MOVING PICTURES

The fact that moving pictures are projected on a screen by means of an optical lantern (q.v.) has already been referred to. This lantern with the film moving mechanism is called the kinetoscope or kinetograph (and nu¬ merous other names). The lantern part is of the same general type as the magic lantern, being equipped with a brilliant light (usually the electric arc) and a projection lens by which the image is enlarged upon a screen. The moving-picture lantern, however, is a very highly complicated apparatus as compared with the magic lantern, for, instead of the simple lantern-slide pushed into place in the field of the lens of the latter and left there as long as desired, the kinetograph mechanism must bring its long series of thousands of pictures one by one into place with the most exquisite accuracy, opening the shutter when the picture is ready and closing it while another is being moved into place, #and all at a speed so rapid that the human eye is unable to follow the motion.

One of the requirements arising from this great rapidity of movement is that the indi¬ vidual pictures must be very small — a large picture could not be moved fast enough with¬ out the destruction of the film on which the pictures are carried. These physical conditions have resulted in fixing the workable size of .the kinematograph pictures at one inch in length by three-fourths of an inch in height. The magnification of this little picture on the screen is therefore about 10,000 times its original area — which suggests the extreme perfection in the picture itself as well as in the projection appa¬ ratus.

These little pictures are arranged con¬ tinuously one above another on a strip of per¬ fectly transparent horny material resembling celluloid. The strip is one and three-sixteenths of an inch in width and may be any length de¬ sired — generally ranging from 120 feet to 1,000 feet. The pictures occupy the centre of the strip and in the margins on both sides are square-cut perforations by which the movement of the strip in ‘the lantern is accomplished through sprocket wheels and hooks.

The pictures themselves are produced by photography, on a coating of sensitized gelatine spread upon the strip of film, and the pictures are photographic positives printed from nega¬ tives on a similar strip made in a special mov¬ ing-picture camera which will be briefly de¬ scribed farther on in this article. For exhibi¬ tion with the lantern the film is rolled on a spool or reel and fed in a loose loop by a series of sprocket wheels and idlers to the ˆgate,® as it is called, through which the light passes to the screen. The gate carries a mask which cuts down the size of the picture actu¬ ally illuminated and projected to fifteen-sixteenths of an inch in length and eleven-sixteenths of an inch in width. The film is pressed against this mask firmlv but gently by delicately acting springs. The movement of the film is downward through the gate and is accomplished by a pair of hooks just below the gate, framed together so that they will accurately engage the perforations in the margin of the film, one hook of the pair on each edge of the film. These hooks are oper¬ ated by a revolving cam which causes them to move forward into the perforations; then to move downward, pulling the film with them

just the height of one picture; then to move backward out of the perforations, and then up¬ ward to their first position. The cam is so fixed that the pull downward on the film oc¬ cupies about one-fifth of the complete cycle of the movement of the hooks. During that pe¬ riod of one-fifth of the time allotted to one picture — one-sixteenth of a second — the shutter which revolves in front of the projec¬ tion lens shuts off the light from the screen for the eightieth of a second ; when, the next picture being in position, the shutter allows the light to pass to the screen for four-eightieths of a second — the entire operation being re¬ peated for the next picture. And thus the operation goes on, 16 times per second until the film has all been run. As the pictures run 16 to the foot of film, a short film of 120 feet, containing 1,920 individual pictures, will be run off in two minutes. A 1,000-foot film, with 16,000 individual pictures, will occupy nearly 17 minutes. As the film which has been shown passes the hooks it is gathered by sprocket

wheels and passed to a receiving reel on which it is wound for storage and from which it must be rewound before it is in proper order for another exhibition. The entire mechanism of the lantern is operated by the handle turned by the operator. In some instances electricity has been used in place of hand power, but the latter is relied on in the great majority of cases. Fig. 1 shows the relative arrangement of the carbons, the condensing system of lenses, the gate with the film passing downward through it from the full reel box to the empty one, pro¬ pelled by the sprocket wheels. The projecting lens is shown between the reels. The drawing is skeletonized in order to show simply the essentials of the moving picture lantern.

A comparatively recent contribution to the steadiness of the picture on the screen is the narrow, transparent violet vane placed on the shutter frame opposite the opaque sector. In spite of the brevity of the dark gap there was a certain letting down of brilliancy noticeable to the eye toward the close of the dark gap which was emphasized when the light came on again in full force, and these closely following con¬ trasts proved very tiring to the sight. The violet vane, by cutting into the high brilliancy,

POWER'S CAMERAGRAPH, WITH MOTOR DRIVE

reduces the representation to a slightly lower •ut more uniform illumination. Other import¬ ant accessories of the lantern are the heat screens, which stop a large proportion of the intense heat rays inherent in the condensed light from reaching the film and injuring the pictures. One ingenious device provides for the complete intercepting of the light and its contained heat unless the film is passing through the gate at a speed sufficient to protect it. Another closes this ((fire shutter, » as it is called, instantly in case the film breaks.

\ hen all is said, however, the exhibition of moving pictures is simplicity itself as compared

seem to vie one with another to thwart the design of the camera man.

The camera which has been designed to overcome all these external difficulties and many others peculiar to moving-picture work is a marvel of ingenious adaptation and me¬ chanical skill.

Of supreme importance in the kinetograph camera is the lens, which is so designed as to admit the largest amount of light consistent with sharpness of definition and with the short¬ est pi acticable focus. The factors of the lenses usually employed in taking moving pictures are for the focal length, 2 to 3 inches and for the

Fig. 2. — Sectional Diagram of the Moving Picture Camera.

with the intricacies of making them in the first place. The processes of photography in any case require for success an extreme nicety of adjustment of many factors. It is a praise¬ worthy feat to secure a single excellent (<snap-shot.® The task of the moving-picture photog¬ rapher is to take thousands of pictures of such uniformity as to appear one continuous view, and of such excellence in definition and depth of focus as to be capable of magnification 10,000 times and still be satisfactorily sharp and clear. And all this is to be done often where the lighting is beyond control, where the only available position for the camera is one that no photographer would willingly choose, and where swarming crowds of bystanders

working aperture f/3.8 to f/3.1. One promi¬ nent lens house has produced a lens of 3ˆ-inch focus and a working aperture of I'd. 9, with which have been made some very successful films under the most adverse conditions of lighting. It is not to be understood that the lens is habitually used at its full aperture. This is the rule only in extreme cases of under¬ lighting. The usual aperture employed in good light is f/16. Next in importance to the lens is the shutter which must be capable of adjust¬ ment with the utmost nicety to control the length of time the light transmitted by the lens is to act on the sensitive film.

The shutter makes one revolution for each picture taken, that is, ordinarily, one-sixteenth of a second.

The larger part of the disc of the shutter is opaque, one section being cut away to admit the light to the film as it passes the gate. This cut-away sector is adjustable in size of open¬ ing, so that for quickly-moving subjects the actual time of exposure may be reduced to a very small fraction of a second. With moving pictures, however, extreme sharpness of the sub¬ jects in motion is not a necessity, a slight blurring being rather an aid to the general optical illusion.

The interior of the camera otherwise re¬ sembles in fittings the exhibition lantern, ex¬ cept that everything about it is in light-tight compartments. A large reel carries the sensi¬ tive film before it is exposed and another takes it up afterward. The hook contrivance for moving the film at the gate and the arrange¬ ment of sprocket wheels and idlers to keep it in motion are practically the same, and the entire mechanism is worked by the crank turned by the camera man. Fig. 2 shows the actuating mechanism which operates the film, without the gear-wheels which connect it with the driving crank. F, F, represent the film cases, the upper one full of new film. The sprocket wheels, S, S, turn so as to keep the film in loops with no strain on the hook H. L is the lens with the pivoted shutter behind it and T is the focusing tube. Other devices, however, are attached to the head of the heavy tripod which carries the camera while it. is being operated. There is a gearing which swings the camera around slowly on a horizon¬ tal plane, and so enables the camera man to make a panoramic view or to follow a moving subject with his lens. A finder at the side of the camera gives him continually the exact view which is being impressed upon his moving film. For a view which lies above or below the plane on which the camera is standing there, is a tilting device by which the horizon of the pic¬ ture is kept in a level position. Both of these movements are made by cranks at the left of the operator and turned with his left hand..

In making usual exposures the exposing crank is turned steadily and

with skilled uni¬ formity 120 times a minute, each turn of the crank making eight exposures on the film. The exposed film is removed from the camera in the dark room and wound upon a ((pin frame.® This is a square frame, generally of brass,, with diagonal and semi-diagonal spokes radiating from the centre, each studded with pins slightly longer than the width of the film. Starting at the centre of the frame the film is wound around and around in an ever-widening spiral which offers free play between the coils for the developer. Before compounding the developer a test is made upon a few inches of film clipped from one end, and according to this test the developer is prepared with such developing agents as promise the best results. The develop¬ ing agents usually employed are metol and hydroquinone in combination. . Glycin and eikonogen are also used. The pin frames with their coils of film are immersed edgewise in an upright bath. The development aimed at is one that will give the widest contrast of highest light and deepest shadow, with a full range of intermediate values in soft gradations. Hydro¬ quinone is depended on to give the first quality and metol the second. When thoroughly fixed

and washed the negative is wound upon a laigc revolving drum to dry.

The positive film used in the exhibiting lan¬ tern is made from the negative by a photo¬ graphic printing process. This positive film is perforated exactly like the negative film, but is coated with a much slower emulsion and con¬ tains a larger proportion of silver chloride salts, so that the development of the positive produces blacks of greater opacity, yielding pictures of more contrast and brilliancy. The negative and the unexposed positive film are placed face to face, the perforations matching, in the printing camera and are pulled down¬ ward together by the hook mechanism through a gate, in front of which is an artificial light, commonly an incandescent electric lamp. A re¬ volving shutter at the gate cuts out the light while the film is being moved and makes the exposure while it is stationary, at the rate of from five to eight exposures per second; and this is kept up until the negative film has all been printed. Another reel of positive film may then be attached and another printing made — and so on for as many positives of that sub¬ ject as are required. It is to be noted in pass¬ ing that no two negatives can be relied on to require exactly the same amount of light in printing. Skilled judgment must determine the speed and opening of the shutter which will produce the best results.

The development of the positive film is con¬ ducted in exactly the same fashion as with the negative film, but the light used is much

stronger. An orange light is perfectly safe with a positive film. The progress of the de¬ velopment is closely watched by examination before the light, and the process is stopped when the necessary density is obtained — a mat¬ ter to be determined by the trained judgment of the operator. The film is then rinsed, fixed and hardened and washed absolutely free of hypo before drying. There may be, if desired, further treatment by tinting or toning to pro¬ duce certain scenic effects. In tinting the whole film is passed bodily through a bath of some dye which imparts its color to the gelatine pellicle, but does not alter the black of the silver deposit. For example, a blue hue is given for a moonlight effect, pink for sunrise; yellow-brown for lamplight ; red for firelight, *etc.* In toning the silver deposit itself is chemically changed in color, the clear part of the film re¬ maining unchanged. Some beautiful effects in sepia, green, indigo, etc., are thus produced.

The greater part of the films produced and exhibited at the present time are those which delineate what might be called picture-stories. Along with a large number of comic and farcical subjects there are pretentious panto¬ mimic plays — of the type known as <cphoto-plays® (q.v.). Some of these have -engaged the talents of actors and actresses in the front rank of their profession. In addition to these pre¬ sentations of theatrical proportions, vast im¬ aginative and historical pageantries have been <(staged® out of doors, with thousands of per¬ formers and a wealth of artificial scenic acces¬ sories running in value to many thousands of dollars — all to produce the one master nega¬ tive. In not a few cases whole companies of performers have been transported to some far-distant locality in order to secure the appro-

pnate “local color” for the film-play. The moving-picture mechanism lends itself readily to aii endless variety of trick pictures, through the facility with which a film may be cut and joined to another set of pictures, showing no break on the screen. For example, a magician may be seen to touch the (<villian” with his wand, and instantly he becomes a mammoth wriggling caterpillar — through the simple join¬

ing of the two distinct films. As films may be run backward as well as forward the most re¬ markable extravaganzas may be produced. A wall may be seen to build itself from a pile of bricks — the picture actually taken having been the demolition of the wall. A picture of a man climbing down a fire-escape rope may be shown on the screen as one climbing up the rope.

While the majority of films are made for purposes of entertainment, the moving picture has an extensive use in the commercial world by salesmen of machinery and mechanical ap¬ pliances, who are thus enabled to show their products at work in any part of the country where they may fill a need. Much educational work has been done with the aid of the films; manufacturers have used them to display fash¬ ions in dress ; social organizations for the spread of their peculiar propagandas; and charitable institutions to arouse interest in their work. In scientific research it has also played a large part. The combination of the microscope and the moving picture camera has revealed an entirely new field of interest in the invisible world. The growth of plants has been studied by a series of exposures lasting over several weeks in the opening of a flower, and covering months in the growth of a stalk of corn. In securing these films the exposures are not made continuously as in ordinary camera work. In the case of the corn, which may take 90 days to mature, the separate exposures are made at such intervals as to give a film of perhaps 2,880 pictures in all, which will occupy the screen for just three minutes in its exhibition. The tele¬ photo lens has also been combined with the moving picture apparatus, permitting pictures to be taken at a distance from the subject. Thus the actions of wild birds and animals have been recorded. Some of the most interesting films have shown the emerging of the butter¬ fly from its chrysalis; the silkworm spinning its cocoon ; a snake shedding its skin ; a war of enemy tribes of ants ; and many such incidents.

A very important application of the moving picture idea is the study of the movements of highly skilled mechanics at their work, particu¬ larly in factories. A tiny electric light is at¬ tached to the hand, or other moving part, and its trace on the moving picture film affords a diagram from which wire forms or guides are constructed. Unskilled workmen are taught by these forms^ to learn the motion which gives greatest efficiency in production. The introduc¬ tion of a clock into the picture permits the measurement of the actual time consumed in making each movement or part of a movement, with the accuracy of one-millionth part of an hour. The moving picture camera has also been used to study the movements of expert type¬ writers and piano players. In surgery it is used to observe defective or abnormal motions

after operations; and the makers of artificial limbs

use it to secure the nearest possible counter¬ feit of the normal movements of sound mem¬ bers.

The moving picture business has settled into a triplex organization: (1) the producers of the picture films; (2) the exchanges, or distributing middlemen; (3) the exhibitors. In the United States in 1915 there were 248 firms and studios registered as film producers; 1,364 exchanges; and 15,046 exhibiting houses of all types. The recent tendencies have been toward the com¬ binations of the larger producing companies, and the establishment of the new combines of branch houses throughout the country, acting as distribution centres. And many of the former middlemen have become producers on a small scale.

figures as to the attendance at the moving picture theatres cannot be given with any de¬ gree of accuracy. The number of the smaller houses, those seating about 300, is constantly diminishing, but the continued building of larger houses keeps the seating capacity about the same as in the days of the multitudinous “nickelodeon.” It is officially reported (for pur¬ poses of taxation) that the gross annual in¬ come of the moving picture theatres aggre¬ gates $275,000,000.

A considerable factor in the business of pro¬ ducing films is the large export trade. In spite of the many difficulties in such traffic on ac¬ count of the war, the high-water mark in film exportation was reached in 1916, when 136,141,- 137 feet of film pictures, valued at $6,051,031, were sent abroad.

Bibliography. — American Motion Picture Directory, 1914-15; Bennett, C. N., (The Hand¬ book of Kinematography) (London 1911) ; Croy, ‘How Moving Pictures are Made* (New York 1918) ; Dench, E. A., (Making the Movies) (New York 1915); Hulfish, D. S., (Motion Picture Work* (Chicago 1915) ; Jones, B. E., (The Cinematograph Book) (London 1915) ; Lomas, H. M., (Picture Play Photography) (London 1914) ; Talbot, F. A., Practical Cine¬ matography and Its Applications* (London 1913) ; Horstmann, H. C. and Tousley, V. H., (Motion Picture Operation (Chicago 1914).

Richard Ferris,

Editorial Staff of The Americana.

MOVING PICTURES, Censorship of.

Since the beginning of the 20th century the development of the film-drama, or moving pic¬ ture, has revolutionized amusements in America. With low prices, the attendance has become enormous, and the influence upon so¬ ciety is more portentous than either that of the church or the spoken drama. For millions of people the moving-picture supplies the place of sermons, books, pictures and travel. In the early years of its development the selection of subjects for presentation was made by the pro¬ prietors, who were not averse to presenting horrible crimes and indecent scenes.

The early film dramas were very simple and very crude from a dramatic 'viewpoint. They were followed by plays of some depth dealing with the questions of the day. These were followed in turn by plays showing the features and ramifications of the white-slave traffic, drug addicts, robberies, *etc.* Many of these failed utterly to teach the moral lesson which could be the only excuse offered for their presenta-

tion ; on the contrary, competent authorities pointed out the grave dangers inherent in such crude, bold presentations of depravity and crime. The evil became so great that a private society in New York looked into the matter and after consultation with the producers of films persuaded them that the approval of a board of censors would enhance the demand for a film.

In 1909, therefore, was organized the National Board of Censorship (now the National Board of Review) in New York City at the demand of many exhibitors of films. This board was a voluntary group from the Peoples' Institute. No member had any financial or other connec¬ tion with the moving-picture business, being drawn instead from professional and business men and women, social workers and others in¬ terested in civic and social betterment. The members serve without compensation ; there is, however, a paid secretary and clerical staff. Over 100 members serve on the censoring com¬ mittee, and on an average review 25 films, averaging 5,000 feet, each day, and requiring, if exhibited successively on one machine, 41 hours and

40 minutes for presentation. The film is viewed by one or more members of the censoring committee of the board in the pro¬ ducer's studio, after which the film is approved in toto or recommendations are made in regard to certain scenes, which are thereafter elimi¬ nated altogether or revised so as to remove the objectionable features pointed out by the re¬ viewers. At the end of every film so reviewed there is attached the legend ((Passed by the National Board of Review.® Its work in the years following its organization proved so suc¬ cessful that exhibitors the country over highly appreciated it and the board increased its scope, soon becoming national in. extent, in¬ creasing its control over the film output in all parts of the United States and co-operating with small local boards in various cities. Its work at present is so organized that it passes upon over 95 per cent of all films produced, and of this amount about 90 per cent receive the board's immediate approval. The board is unofficial and merely recommends changes or alterations deemed desirable in a film, but it possesses no legal power to enforce its recom¬ mendations. The necessity for a board with broader powers has influenced several States to pass legislation to this end, but in every case the constitutionality of such legislation has been questioned, its opponents maintaining that cen¬ sorship is un-American, and the aims of such legislation are secured by the ordinary police power governing public morals, *etc.*

The work of the national board, however, has given fairly satisfactory results, its uni¬ form system of passing upon photo-dramas giving it a decided advantage over local boards or State commissions, the latter seldom work¬ ing in harmony. The need for a Federal board with broad powers has been emphasized in recent years, and certain parties have car¬ ried on an agitation with a view of securing Federal legislation for its creation. An at¬ tempt of this kind in 1915 met with signal fail¬ ure. Producers and exhibitors have main¬ tained a firm front of opposition against cen¬ sorship of any kind, on the ground, as stated above for the local bodies, that the police and municipal authorities are already possessed of

adequate powers to deal with questionable or immoral plays. Among the churches, the Ro¬ man Catholic has instituted a board which pub¬ lishes regularly a list of approved photo-plays, condemning the baser kind by silence. In many cities ordinances are in force requiring the li¬ cense of moving-picture houses and empower¬ ing the police or municipal authorities to close such houses as continue to exhibit pictures which have been condemned by the board of censors. On 31

July 1912 an act of Congress was passed prohibiting the interstate transpor¬ tation of films representing prize fights. The license plan has so far proved inadequate to protect public morals and many cities are fol¬ lowing the example of Chicago, where the chief of police appoints a committee which passes on all films shown in that city.

MOVING PLANT, an East Indian legumi¬ nous plant (Desmodium gyrans), remarkable for the motions of its pinnate leaves. The large terminal leaflet becomes more or less horizontal under the influence of light and heat, and is depressed during darkness or cold. Besides the movement of rising and falling, it has also a lateral oscillatory motion with a period of two to four minutes, so as to occupy an oblique position relative to the leafstalk. The smaller lateral leaflets, of which there are one or two pairs, also exhibit jerking movements, approach¬ ing and retiring from each other, and these mo¬ tions proceed to a limited extent during dark¬ ness. Gray describes 20 species of Desmodium in the flora of the United States, without men¬ tioning that any of them exhibit such move¬ ments.

MOWAT, Sir Oliver, Canadian statesman: b. Kingston, Ontario, 22 July 1820; d. Toronto, 19 April 1903. He was educated in Kingston and Toronto, studied law in Kingston and be¬ gan practice in that city, afterward moving to Toronto. He took high rank in his profession, especially as an equity lawyer. In 1856 he was appointed Queen's Counsel, and from that date until 1859 he served as a member of a commis¬ sion appointed to revise and consolidate the statutes of Canada and Upper Canada. F«rom 1857 to 1864 he was in the legislative assembly of United Canada, and in 1858 was provincial secretary. In 1863-64 he was postmaster-gen¬ eral, and in the latter year he served in the Quebec Conference, as one of the Fathers of Confederation from Upper Canada. From 1864 to 1872 he was vice-chancellor of Upper Canada, in the latter year, on the urgent solicitation of the Liberal leaders in the province, retiring from the bench to reenter political life. From that date until 1896 he was premier of Ontario, hold¬ ing office with conspicuous ability for 24 consecutive years. In his first session (1873) he passed the Municipal Loan Fund Act, which put an end to the financial muddle caused by frenzied municipal aids to railway construc¬ tion at an earlier period. To him is largely due the credit of the revision and codification of the provincial laws, embodied in (The Revised Statutes of Ontario, 1877.) He was brought into conflict with Sir John A. Macdonald on the question of provincial autonomy, Mowat re¬ garding the provincial legislature as sovereign within its own sphere, and his reading of the British North America Act was in this connec¬ tion borne out on repeated occasions by the

Imperial Privy Council, notably in the On¬ tario boundary dispute. In 1896 he entered the Laurier ministry as Minister of Justice and was president of the senate. In 1897 he was appointed lieutenant-governor of Ontario. Altogether, Mowat gave 45 years to the public service. He was created K.C.M.G. in 1892. Consult Biggar's (Life of Sir Oliver Mowat) (2 vols., Toronto 1905).

MOWATT, Anna Cora. See Ritchie, Anna Cora Ogden Mowatt.

MOWBRAY, mo'bra, George W., Ameri¬ can inventor: b. Lewes, England, 1815; d. North Adams, Mass., 21 June 1891. He studied chem¬ istry in England, came to America in 1853, worked in the California gold-mines until 1858' in the Pennsylvania oil-country until 1868, and then at North Adams, where he perfected the commercial use of nitroglycerin, and invented a smokeless powder. He was consulting chem¬ ist to the Maxim and Nordenfelt Arms Com¬ pany.

MOWBRAY, H(arry) Siddons, American artist: b. Alexandria, Egypt, 1858. He was brought to the United States in early childhood and educated in North Adams, Mass. He stud¬ ied one year at West Point In 1878 he entered the studio of Bonnat, Paris, and subsequently settled in New York as a figure painter and decorator. He is a member of the Society of American Artists, was the first director of the American Academy at Rome, and was elected a National Academician in 1891. He is especially noted for his mural decorations in the library of the University Club, New York, and else¬ where. He was awarded the Clark prize by the National Academy in 1888.

MOWBRAY, J. P., a pseudonym of An¬ drew Carpenter Wheeler. See Wheeler, A. C.

MOWER, Charles Drown, naval architect: b. Lynn, Mass., 5 Oct. 1875; educated in the Lynn public schools. After serving for four years in the offices of Arthur Bundy and R. B. Crowinshield, naval architects, at Boston, he went to New York to take the position of designing editor of The Rudder , the yachting magazine. In the seasons of 1903-04' he

was official measurer of the New York Yacht Club, measuring the yachts Shamrock III and Re¬ liance for the American cup races of 1903. Is a member of the Society of Naval Archi¬ tects and Marine Engineers, and of many yacht clubs. Among his works are (How to Build a Motor Launch> (1900); (How to Build a Knockabouˆ (1901); (How to Build a Racing Sloops (1901); (How to Build a CruiseU

(1903).

MOWER, mo'er, Joseph Anthony, Ameri¬ can soldier: b. Woodstock, Vt., 22 Aug. 1827; d. New Orleans, 6 Jan. 1870. He was educated in the common schools and Norwich University, enlisted as a private in the Mexican War and in 1855 was commissioned 2d lieutenant. He was promoted captain in 1861 and for bravery in action was made major in 1862. He soon passed through all the ranks up to that of brig¬ adier-general, and in 1863 commanded a brig¬ ade at Vicksburg. In 1864 he was in charge of a division under General Banks in Louisiana and he accompanied General Sherman in his Georgia and Carolina campaigns and received promotion to the rank of major-general. He

remained in the army after the war with the permanent rank of colonel, and was in command of the department of Louisiana at his death.

MOWRER, Frank Roger, ex-consul-gen¬ eral ; b. Xenia, Ohio, 7 July 1870. He received the title of LL.B. at Cornell in 1894 and was admitted to the bar the following year. In 1897 he decided to enter the consular service, in which he continued for 12 years, holding many important posts in that period of time. The record of his service is as follows: Marshal of the consular court at Yokohama 1897-99, from which he retired by operation of the treaty ; marshal at Canton, 1899—1900; consul at Antigua, from January to October 1901 ; at Ghent, Belgium, 1901-06; consul-general at Abis Ababa, Abyssinia, 1906-07; consul at Leghorn, Italy, from April to June 1907; consul-general at Copenhagen, Denmark, 1907-09, from which he resigned in the latter year and returned to the United States.

MOWRY, mo'ri, William Augustus, Amer¬ ican educator and author : b. Uxbridge, Mass. 13 Aug. 1829; d. 22 May 1917. He was edu¬ cated at Brown _ University and in 1862-63 was a captain in the Federal

army. He was principal of the English and Clas¬ sical school in Providence in 1864—84 and in 1884-85 edited the Journal of Education. In 1886-91 he was editor of Education, and from 1887 to 1905 was president of the Martha's Vineyard Summer Institute. Among his writ¬ ings may be mentioned (Nathaniel Mowry and His Descendants* (1878) ; 'Richard Mowry: His Ancestors and Descendants) (1878); 'Studies in Civil Government* (1887); Ele¬ ments of Civil Government* (1890) ; (Talks with My Boys) (1892); 'A History of the United States* (1896) ; 'The Uxbridge Acad¬ emy: a Brief History) (1897); 'First Steps in the History of Our Country* (1898); 'Ameri¬ can Inventions and Inventors) (1900); 'Mar¬ cus Whitman and Early Oregon* (1901) ; 'The Territorial Growth of the United States) (1902); 'American Heroes and Heroism* (1903); 'American Pioneers* (1905); 'Essen¬ tials of United States History *(1906) ; 'Rec¬ ollections of a New England Educator* (1908) ; 'Descendants of John Mowry of Rhode Island* (1909) ; 'Camp Life) (1914), also many papers, addresses, magazine, book and encyclopedia articles.

MOXOM, Philip Stafford, American Congregationalist clergyman: b. Markham, Canada, 10 Aug. 1848. During the Civil War he served as ' captain's boy** (1862), then enlisted in the Illinois cavalry in 1863, and served till 1865. At the close of the war he entered upon a course of study at Kalamazoo College, Mich., and later studied at Shurtleff College, Ill. (1868-70). Being ordained to the Baptist min-jtsry in 1871, he studied at Rochester Theolog¬ ical Seminary from 1875 to 1878, and was grad¬ uated from Rochester University in 1879, with the degree of A.B. From 1879 to 1885 he was pastor of the First Baptist Church of Cleveland, Ohio; and from 1885 to 1893 at First Baptist Church of Boston, where he gained a reputa¬ tion as a preacher of marked power. In 1894 he joined the Congregationalists and became pastor of the South Congregational Church at Springfield, Mass. In November 1915 he

resigned and became pastor emeritus. From 1894 to 1897 he was

university preacher at Har¬ vard, and has preached frequently at other uni¬ versities and colleges. He delivered the centen¬ nial address on the 100th anniversary of the birth of Browning, in the Brooklyn Institute, 7 May 1912. He was at the World's Parliament of Religions, and presented a paper on Ummortal-ity} ; he was also at the World's Peace Con¬ gress, and has been delegate to several inter¬ national peace congresses. He attended the first Ecumenical Council in the interest of inter¬ national amity at Constance, Baden, in August 1914, which was broken up by the war, but reassembled in London. He has written (The Aim of Life) (1894) ; (From Jerusalem to Nicaea, the Church in the First Three Centuries) (1895); (The Religion of Hope) 0896).

MOXON, mok'son, Edward, English pub¬ lisher and verse-writer: b. Wakefield, 1801; d. 3 June 1858. Going to London (1817) he entered (1821) the service of the Longmans, publishers. A volume of his verses appeared in 1826, and he started as a publisher in 1830, bringing out Lamb's (Album Verses) as his first publication. He became publisher for Barry Cornwall, Southey, Wordsworth, Tenny¬ son, Monckton, Milnes, Landor, Browning, *etc.* His second volume of poems appeared in 1837 and both were published together in 1843 and

1871.

MOYOBAMBA, mo-yo-bam'ba, or MO-YABAMBA, Peru, capital of the department of Loreto, on the Mayo River, 50 miles north¬ east of Chachapoyas. It is noted for its manu¬ factures of Panama hats. It occupies an isolated position on a gravelly plateau intersected by deep ravines. Its chief communication is by river with Brazil, the Mayo as an affluent of the Huallaga connecting with the Amazon. Pop.

2,000.

MOZAMBIQUE, mo-zam-bek', South Af¬ rica, formerly the entire colony of Portuguese East Africa (q.v.) ; now one of its provinces and its capital town. The town of Mozambique is situated upon a small coral island near the coast. It contains the governor's palace, a cathedral, a hospital, a prison, warehouses, *etc.* The harbor is secure. Pop. 8,000. The popula¬ tion of the province in 1910 was about 362,000.

MOZAMBIQUE CHANNEL, the pas¬ sage between the east coast of

Africa and the island of Madagascar, about 1,050 miles long from northeast to southwest, 530 miles wide at its southern entrance, about 250 miles wide in the centre and nearly 600 miles wide at the northern entrance, where lie the Comoro Islands. The harbors of Mozambique and Beira are on its west shore%

MOZARABIC LITURGY, the liturgy used by the Mozarabs, or <(spurious Arabs,® that is, the Christians who submitted to the Moorish government, in Spain, while retaining their own religion. This office is sometimes styled <(Officium Gothicum® or <(Isidori Missale,® because it was in vogue during the Gothic domination and was first revised by the great and learned Isidore of Seville in the 6th cen¬ tury. In Toledo after the gradual adoption of the Roman missal throughout Spain during the 11th and 12th centuries, Ximenes, cardinal arch¬

bishop of the see, revised in the 16th century the ancient office and built the beautiful chapel at the west end of the cathedral where the old Gothic ritual is still observed. It is supposed from the Greek affinities of its form, that the original liturgy was brought from Asia Minor by the Goths who dwelt south of the Bosporus in the 5th century. Consult editions by Lesley (Rome 1755) ; Lorenzana (Rome 1804) ; Migne, (Patrologia Latina) (Vol. LXXXV and Vol. LXXXVI) ; also a new edi¬ tion (Toledo 1875). Consult also Hammond, C. E., (Ancient Liturgies) (Oxford 1879) and Neale, J. M., (Essays in Liturgiology and

Church History) (London 1863).

MOZART, mo'zart (Ger. mo'tsart), Johan¬ nes Chrysostomus Wolfgangus Theophilus,

Austrian composer: b. Salzburg, Austria, 27 Jan. 1756; d. Vienna, 5 Dec. 1791. With this somewhat harsh combination of names Mozart was baptized on the day following his birth. His parents were Johannes Georg Leopold Mo¬ zart, and his wife, Anna Maria.

Until 24 years of age Mozart led a wander¬ ing life, being taken on several tours by his father, who, while himself fully appreciating the child's genius, chafed under the continuous disappointments resulting from the fact that it was not productive either of the appreciation or financial returns which it so richly deserved. But later the musical world recognized his pow¬ ers, nor has there since his death been any

stint of praise for his marvelous achievements. Mo¬ zart's genius was not merely the brilliant flash of a meteor, dazzling the world for a brief mo¬ ment and then gradually flickering out. He did not earn his title of ˆmusician of musicians® through one sublime effort in early life. Of him, perhaps more than of any of the other great composers, it may be truly said that his powers steadily increased as he grew older, a statement borne out by the fact that three of his greatest works were composed during the last year of his life.

Nor is this high estimate of his worth con¬ fined to those of the laity who since his time have been capable of appreciating his wonder¬ ful genius. All men, including his fellow artists, paid sincere homage to him as supreme in sev¬ eral of the departments of the musical art. Thus Rossini, on being asked who was the greatest musician, first replied <(Beethoven® ; but when the question was put ((What of Mo¬ zart?® he answered (<Mozart is not the great¬ est, he is the only musician in the world.® Again, Gounod in an address before the Acad¬ emic des Beaux Arts in 1882 expressed his deep admiration for Mozart in the following words : ((Oh, divine Mozart, … bounteous

nature had given thee every gift; grace and strength, fulness and sobriety, bright sponta¬ neity and burning tenderness,' all in that per¬ fect balance which makes up the irresistible power of thy charm, and which makes of thee the musician of musicians, greater than the greatest, the only one of all.®

This sounds like high praise, and that was what Gounod meant it to be. And so through¬ out the ages men will continue to recognize the genuine fire of genius which animated his com¬ positions and which found its expression not only in his inimitable perception of the relation between the human feelings and the realm of

tones, or in his inexhaustible power of inter¬ preting widely different types of character, but above all in the superb beauty of proportion and balance which pervades his creations. Mo¬ zart was not only a brilliant composer, however, for he was also a remarkable performer

on the piano, organ and violin. Haydn said that he could never forget Mozart's playing, for (<it went to the heart.®

The number of separate published works ascribed to Mozart is 626, while he is also said to have written 294 compositions which were unfinished or unpublished. When only three years old Mozart showed evidences of his mu¬ sical genius, perceiving which his father taught him minuets on the harpsichord and at four years he commenced composing. His first ap¬ pearance in public was in September 1761, as a chorister in some theatricals held at the Uni¬ versity of Salzburg. In his 6th year he com¬ posed his first published work — a (sonata pour claveginP When seven years old the Mo¬ zart family visited Paris, Wolfgang playing the violin and organ at several churches en route. Here he composed a Kyrie, his first sacred piece. Later in the year they went to London, where the boy's playing, and especially his power of improvising, excited the greatest ad¬ miration. In 1764, while in London, he pro¬ duced 10 sonatas for the clavier and violin, six of which, dedicated to the queen, were brought out early in the following year. In January 1766, Wolfgang gave two concerts in Amster¬ dam, at which all the instrumental work was of his own composition. Later, on the occa¬ sion of the installation of the Prince of Orange as stadtholder, he composed a con¬ certo named (Galimathias musicumP After several months of travel the family returned to Salzburg in November. Here they remained till September 1767, Wolfgang devoting himself to study and composition. He composed a part of a sacred cantata for the archbishop of Salz¬ burg, a Passion-cantata, his first concertos for the piano, and a Latin comedy, (Apollo et Hya-cinthusP In September he was again in Vienna, his father being attracted there by the approach¬ ing betrothal of the Archduchess Josepha to King Ferdinand of Naples. Here much jealousy and intrigue was displayed, and although Mo¬ zart composed an opera, (La Finta SimpliceP at the request of the emperor, it was not given a performance. Mozart, however, had the satis¬ faction of producing privately his operetta en¬ titled (Bastien und BastienneP He also com¬ posed an offertorium and a trumpet concerto to be used at the consecration of a new church at the Waisenhaus.

After the return of the family to Salzburg Mozart was in 1769 appointed concertmeister, and a performance of (La Finta Simplice) was then arranged. He next composed two masses, and the Johannes Offertorium for a priest in the monastery at Seeon. Preparations were now made for a tour of Italy, the family arriving at Milan at the end of January 1770. While in Rome he visited the Sistine Chapel to hear Al¬ legri's (MiserereP On his return he wrote down the entire work from

memory, a feat which did much to spread his fame abroad. They next visited Naples where his concerts were brilliantly attended. In Bologna he was honored by election to the (Accademia dei Filar-monicci,) his test piece being an antiphon for

four voices, which he composed in about half an hour.

His first opera (Mitridate Re di Ponto) was composed and produced in Milan, where it was performed 20 times. In Padua, on his way home, Mozart was commissioned to compose an oratorio, perhaps (Betulia LiberataP which was first performed in Lent, 1772. His stay at home was brief, for his friend Count Firmian, who had met him when in Milan, commissioned him to write a dramatic serenata to celebrate the nuptials of Archduke Ferdinand with Princess Maria of Modena. On 17 Oct. 1771, the per¬ formance of (Ascanio in Alba) was given with very gratifying results. The next month saw Mozart in Milan again and hard at work on his opera (Lucio Silla,) which was at length pro¬ duced at the Milan opera house with great suc¬ cess. On reaching home Mozart composed four symphonies, three divertimenti for a wind or¬ chestra, a grand concerto for two violins and a mass, and in the following year two masses, a grand litany, two vesper psalms, an offertorium, a bassoon-concerto, four symphonies, two serenatas, *etc.* The next visit was to Munich where young Mozart was engaged to compose an opera for the carnival of 1775, and on 13 January (La Finta Giardiniera) was produced. From that time to September 1777 Mozart, now a young man of 21, devoted himself to compos¬ ing and the list of his pieces is very extensive. Later in the year he visited Mannheim with his mother, and while there had his first love affair, the young lady being Aloysia, second daughter of Fridolin Weber, a prompter and copyist. His father, on hearing of it, ordered them away to Paris, where they arrived in March 1778. Here he composed several pieces, including a gavotte, a quartette for flute and strings, and some parts of a (Miserere, } which were produced without even the mention of his name. On 3 July of this year his mother died. Again we find him in Salsburg in mid-June 1779, during which year he wrote the music to Geb-ler's drama (Konig ThamosP the operetta <ZaIde,> several sonatas dedicated to the Elec-tress of Bavaria, an aria for Aloysia Weber, whose love for Mozart had, however, grown cold, and a number of minor pieces, for which he had received commissions. His first great opportunity came in 1780 when he received orders to furnish an opera for the Munich carnival. It was entitled Udomeneo, Re di CretaP and had its first performance on 29 Jan. 1781. Mozart now received a summons to Vienna from the archbishop, who,

however, seems to have treated him as a menial. Finally severing his official relations, he took lodgings with the Webers. During the summer he wrote an opera for the National Singspiel (German) founded by the emperor in 1778, and in spite of many obstacles (Entfiihrung aus dem SeraP was produced by the emperor's express order on 16 July 1782.. A month later he made Con¬ stance Weber his wife.

Mozart's marriage seems to have brought with it a succession of difficulties. Constance was a poor manager and Mozart was as yet without any fixed appointment. He gave a series of subscription concerts which were well attended, and during six weeks played at 17 concerts besides five of his own arranging. In July 1783 he took his wife to Salsburg to pre¬ sent her to his father, and in August produced

a mass in the Peters Kirche, which he had composed in honor of his wife, who sang the soprano part on that occasion. During the lat¬ ter part of 1785 Mozart was engaged on one of his masterpieces, an opera based on Beaumar¬ chais' comedy entitled (Le Mariage de Figaro.5 The first public performance of the opera ((Le Nozze de Figaro5) took place on 1 May 1786, and the triumph of the composer was complete. In 1785 Mozart wrote (Davidde Penitente5 for the Society of Musicians and some music for the vaudeville piece (Der Schauspiel-Direktor5 was also produced. In 1787 Mozart and his wife visited Prague in response to an invita¬ tion from Count Thun. Here it was decided that he should compose another opera, which he did for the small sum of 100 ducats. (Don Giovanni5 was the result and its first perform¬ ance was given on 29 Oct. 1787. Returning to Vienna in November, he was appointed Kam-mer-compositor with a salary of 800 gulden.

The year 1788 was a very busy one for Mo¬ zart. In six weeks he wrote his three last and finest symphonies (in C, E fiat and G minor), as well as several pieces for the piano, arranged five fugues from Bach's (Wohl-temperirte Clavier) for string quartette, and added wind parts to Handel's (Acis and Galatea,5 (Mes¬ siahˆ <Ode to St.

Cecilia's Day5 and Alexan¬ der's Feast. > In 1789 Mozart was offered the post of kapellmeister at the Prussian court. The salary was 3,000 thalers, but in spite of the comforts which this comparatively large in¬ come would have insured, Mozart declined rather than forsake his (<good Kaiser.® Arriv¬ ing in Vienna on 4 June, and being in much trouble, partly on account of his wife's con¬ stant illness, he informed the emperor of the offer of the King of Prussia, and tendered his resignation. The emperor exclaimed : (<What, Mozart, are you going to leave me?® Mozart replied, <(Majesty, I throw myself upon your kindness — I remain.® The emperor then or¬ dered him to compose a new opera, which un¬ der the title (Cosi fan tutted was produced on 26 Jan. 1790.

During the last year of Mozart's life, as already stated, he composed three of his great¬ est works, two of which must be always reck¬ oned among the highest of musical creations, namely, the opera (Die Zauberflote) and the (Requiem, 5 which latter he was commissioned to compose under very mysterious circum¬ stances. Mozart's health had now become much impaired and he was greatly depressed. He be¬ lieved that he was writing this 'Requiem5 for himself. The third notable composition of this year was the opera (La Clemenza di Tito,5 composed for the coronation of Leopold II at Prague, which took place 6 September, the opera being performed on the same evening. His recent exertions and excitement proved too much, however, for his remaining strength, and on 5 Dec. 1791, he died of malignant typhus fever. He was buried in a pauper's grave in the churchyard of Saint Marx.

Bibliography. — Criticism : Dent, E. J., (Mozart's Operas: A Critical Study5 (London 1913) ; Hirsch, Paul, 'Katalog einer Mozart-Bibliothek5 (Vienna 1906) ; Kochel, Ludwig von, 'Chronologisch-themptisches Verzeichniss sammtlicher Tonwerke W. A. Mozarts5 (Leip¬ zig 1862 ; revised and corrected by Paul, Graf Waldersee, ib. 1905) ; Komorzynski, E. von,

(Mozarts Kunst der Instrumentation5 (Berlin 1906) ; Sachs, Curt, (Mozarts Brief e 5 (Berlin 1911); Schiedermair, Ludwig, 'Die Brief e Mo¬ zarts und seiner Familie5 (2 vols., Munich 1914) ; Storck, Karl, ' Mozarts Briefe in Aus-wahl5 (Stuttgart 1906) ; Lady Wallace (trans¬ lator), 'Mozart's Letters 1769-91 5 (London 1865). Biography: Bellaigue, Camille, Mo¬ zart5 (Paris 1906) ; Beyle, 'Vies de Haydn, de Mozart et de Metastese par de Stendhal5 (1887) ; Breaksfeare, (Mozart5 (London 1902) ; Elson, (Great Composers and their Work5

(1898) ; Gehring, F. E., ‘Mozart5 (New York

1911) ; Grove, ‘Dictionary of Music and Mu¬ sicians5 (Vol. II, pp. 379-406, 1898) ; Holmes, Edward, ‘Life of Mozart, Including his Cor¬ respondence5 (New York 1912) ; Hubbard, <Little Journeys to the Homes of Great Musi¬ cians5 (Vol. I, London 1901) ; Jahn, Otto, ‘W. A. Mozart5 (Leipzig 1856-59; revised and en¬ larged by H. Deiters, 2 vols., Leipzig 1905 ; trans. by Pauline D. Townsend, 3 vols., London 1891) ; Niemtschek, ‘Leben Mozarts5 (1798) ; Nissen, ‘Biographie W. A. Mozarts5 (Berlin 1828) ; Nohl, Ludwig, ‘Mozart’s Leben,5 revised by P. Sokolowsky (3d ed., Berlin 1906; Eng. trans. by Lady Wallace, 2 vols., London 1877) ; id., (Mozart nach den Schilderungen seiner Zeitgenossen5 (1880) ; Nottebohm, (Mozartiana5 (1880) ; Oulibischoff, (Mozarts Leben und Werke5 (1859) ; Pohl, ‘Mozart und Haydn in London5 (1867) ; Schurig, Arthur, ‘W~A. Mozart, sein Leben und sein Werk5 (2 vols., Leipzig 1913) ; Storck, Karl, ‘Mozart, sein Leben und Schaffen5 (Stuttgart 1908) ; Von Wurzbach, ‘Mozartbuch5 (1869) ; Wilder, Victor, (Mozart5 (2 vols., New York 1908) ; Wyzema and Saint-Foix, (W. A. Mozart, sa vie musicale et son oeuvre5 (2 vols., Paris

1912) .

R. I. Geare,

National Museum, Washington, D. C.

MOZART, mo’tsart or mo’zart, Leopold, German composer : b. Augsburg, Bavaria, 14 Nov. 1719; d. Salzburg, 28 May 1787. He be¬ came kapellmeister to the archbishop of Salz¬ burg. He wrote voluminous amounts of music, and published a justly famous (Violin School5 (1756), the first theoretical and practical guide to that instrument and long the only one. It passed into numerous editions. He was the father of Wolfgang Amadeus Mozart (q.v.).

MOZDOK, moz-dok’, Russia, town in the province of Terek in the government of the Caucasus, located on the left bank of the river Terek. Its manufactures are candles, soap, leather, tiles, brandy, etc., and it has a good trade in coarse woolen and cotton goods, sheep, horses, silks, *etc.* In the neighborhood are vineyards, silk-growers, vegetable gardens, *etc.* It holds agricultural markets twice yearly, with a considerable cattle exchange. In 1911 it had a population of 17,068,

made up of Ka-bardines, Tchetchens, Georgians, Armenians, etc., besides Russians.

MOZIER, mo'zher, Joseph, American sculptor: b. Burlington, Vt., 1812; d. Faids, Switzerland, 1870. He was a merchant in New York from 1831 till 1845, when he retired and went to Rome to open a studio to practice as sculptor. He produced quite a number of figures, the best known being (Pocahontas, 5 (The Wept of Wish-ton Wish,5 'Rizpah,5 in

Metropolitan Museum; (Rebecca at the Well,' (Jepthah's Daughter,' Undine,' (Queen Esther,' (Truth,' (Silence,' (The Prodigal Son,' *etc.* The latter, his most ambitious work, k in the Pennsylvania Academy of Fine Arts, and his (I1 Penseroso' is in Horticultural Hall, Fairmount Park, Philadelphia.

MOZLEY, James Bowling, English cler¬ gyman : b. Gainsborough, Lincolnshire, 15 Sept. 1813; d. 1878. He was educated at Grantham and was graduated (1838) at Oriel College, where he became a close acquaintance of New¬ man, Pusey, Froude, *etc.* He participated in the "Oxford Movement," but could not accept the Roman communion and some other features. He was elected (1840) a Fellow of Mag¬ dalen and became joint editor of the Christian Remembrancer, resigning in disagreement with the Gorham decision. He was one of the Guardian's first adherents and became vicar of Shoreham in 1856. In 1869 he was made canon of Worcester and was created regius professor of divinity at Oxford in 1871. He wrote (A Treatise on the Augustinian Doctrine of Pre¬ destination' (1855); (The Primitive Doctrine of Baptismal Regeneration' (1856) ; (A Re¬ view of the Baptismal Controversy' (1862) : (Lectures on Miracles' (1865), the Bampton Lectures. His, (Essays, Historical and Theo¬ logical' (1878), were published in two volumes, and his sister's biographical comment in the preface.

MOZOOMDAR, mo-zoom'dar, Pratap Chandra, Hindu reformer : b. Calcutta, India, about 1840; d. 1905. He joined the association of the Brahmo-Somaj (q.v.) organized for the purification of Brahmanism,

and edited at Cal¬ cutta the Theistic Quarterly Review and The Interpreter, published by that organization. In 1874 he visited England and in 1883 the United States, being received with honor by leading men of both nations. In 1893 he made a second visit to the United States to attend the World's Parliament of Religions, before which he read a paper on the Brahmo-Somaj. He wrote (The Faith and Progress of the Brahmo-Somai ' (1882); (The Oriental Christ' (1883) ; (Life and Teachings of Keshub Chunder Sen' (1887), and articles for English and American periodicals. His influence in India was never great despite his great acclaim outside his na¬ tive land.

MOZYR, mo-zer, Russia, a town in the government of Minsk, on the Pripet River and on the Brjansk-Brest Railway. It has three orthodox and one Roman Catholic Church, also a synagogue. It has suffered much from depredations of the Tartars and was consumed by fire in 1609 and 1864. It has manufactures of hardware and leather and considerable trade in lumber and cattle. Pop. 10,729.

MR. MIDSHIPMAN EASY, published in 1836, is probably the best known of the many sea novels by Capt. Frederick Marryat. This spirited and entertaining story deals with the life of John, otherwise known as Jack Easy, from the time of his birth to his settlement in life by marriage and inheritance of an import¬ ant estate. A youth of fine qualities, he is spoiled at home by his mother and educated in ideas of equality by his father. Much against

their will he is sent to sea as midshipman at an early age and at the end of four years re¬ turns quite cured of odd ideas and with a fine record for bravery. His exciting and humorous adventures in the service of the royal navy make up the bulk of the book, which gives a lively picture of sea actions and a sailor's life on shore and on board ship. The galaxy of characters, part serious, part comic — Captain Wilson, Sawbridge, Mesty, Biggs, Oxbelly and many -others — is an especially good one. The deeper purpose of the novel is to show the more humane and chivalrous side of naval war¬ fare and to set forth the finer traditions of the service.

William T. Brewster.

MUCH ADO ABOUT NOTHING.

(Much Ado about Nothing' is first mentioned in August 1600 and was

printed in the same year. It is not referred to in Meres's famous list of Shakespeare's plays in 1598, unless indeed -t is to be identified with the mysterious comedy, (Love's Labour's Won,' which Meres includes among Shakespeare's works. That (Much Ado,' in some less finished form than we now have, had been staged as early as 1598 under the title of (Love's Labour's Won,' is a bare possibility which hardly warrants speculation, but there is this to be said in its favor: it occu¬ pies among the comedies of Shakespeare's full maturity a position very analogous to that which Love's. Labour's Lost,' has among the early comedies. Each of these plays, when compared with others of the same period (with (The Two Gentlemen of Verona' and (A Midsummer Night's Dream' or with (As You Like It,' 'Twelfth Night,' and 'All's Well that Ends Well') impresses the reader as a drama of the intellect rather than of the heart. Intrigue and wit overbalance romance in both, and personal planning largely takes the place of delectable chance. Benedick and Beatrice are finished studies which seem to have developed out of the sketches of Biron and Rosaline in 'Love's Labour's Lost.' It goes with what has been said that this is a play of prose rather than poetry, of epigram rather than sentiment. Only a quarter of the lines are in verse, and this verse is seldom notable. The unfailing charm of the comedy lies in the infinitely brilliant superficiality of Beatrice and Benedick, the two arch-enemies of romance — in the unemo¬ tional cut and thrust of their badinage; and, next, in the ludicrous realism of the constables, Dogberry and Verges. All testimonies agree that this comedy is one of Shakespeare's most complete successes. It is also a remarkable evidence of the author's versatility, for it proves that he could execute with unsurpassed spirit and skill a type of play for which his other greater works would indicate that he had little natural inclination. 'Much Ado about Nothing' is the only one of Shakespeare's major dramas which one can imagine that Congreve or Sheridan might have written. On the stage it has always been triumphant. When compared with its special corrivals among Shakespeare's comedies — the more romantic (As You Like It' and 'Twelfth Night' — it impresses one as suited rather more to the theatre and rather less to the study. About a quarter-century after the poet's death, it was selected by

Leonard Digges among the special examples of Shakespeare's drawing power:

" Let but Beatrice

And Benedick be seen, lo, in a trice

The Cockpit, Galleries, Boxes, all are full." (1640)

David Garrick was a famous Benedick, and nearly all the greatest actresses have found opportunities for added laurels in Beatrice. The source of this play is relatively unimportant, for the greatest parts of it — the clownery of the constables and the figures of Beatrice and Benedick — seem to have sprung spontaneously from Shakespeare's brain. That part of the plot, however, which concerns Hero, Claudio and Don John is paralleled in several earlier works, in Spenser's (Faerie Queene) (Bk. IV, ii), in Ariosto's (Orlando Furioso) (Bk. V), and particularly in the 20th tale of Bandello's Italian novelle (printed 1554). It appears to have been from the last (possibly in the French or in some now unknown English version) that Shakespeare drew his hints ; but the dramatist, besides altering the material in details, so sub¬ ordinates it to the newer themes that it is likely to impress modern taste as either repellent or uninteresting.

Tucker Brooke.

MUCIC ACID, CeHioOs, an organic acid formed by oxidizing milk sugar, or galactose, gum arabic and certain other substances, by the action of dilute nitric acid. It crystallizes in colorless tablets which are insoluble in alco¬ hol, slightly soluble in cold water, and rather freely soluble in boiling water; though when boiled with water it becomes converted into an isomeric substance known as <(paramucic acid.® Mucic acid melts at about 410° F., does not re¬ duce Fehling's solution, and combines with ammonia and with metallic and organic bases to form an extensive series of salts.

MUCILAGE, a solution of gum in water, In chemistry, the gum of seeds and roots. The name is also given to commercial adhesive gum made from gum arabic or dextrin. Mucilages, in pharmacy, are water preparations of sub¬ stances dissolved in water, used to suspend in¬ soluble ingredients or to bind them together in a mass.

MUCIN, an albuminous proteid substance, which is an important constituent of the con¬ nective tissue of the animal body, and which

gives to the mucous membranes their character¬ istic sliminess. It may be isolated by extrac¬ tion with lime water (or with pure water), and subsequent precipitation with acetic acid, in ex¬ cess of which mucin is insoluble. Mucin is not precipitated by heat nor by tannic acid. It is, however, precipitated by alcohol, or by saturat¬ ing its solution with common salt, or with mag¬ nesium sulphate. When boiled with strong sul¬ phuric acid, mucin yields leucine and tyrosine.

MUCIUS SCiEVOLA. See Scasvola.

MUCKER, nickname of certain mystic fanatics who were thus popularly derided as <(canting hypocrites.® The adjective is of an¬ cient origin and did not connote a specific sect until it was applied to the followers of Johann Heinrich Schdnherr and later Johann Wilhelm Ebel in Konigsberg. Schdnherr, who was the son of a Prussian non-commissioned officer, and was educated under the theological faculty

of the University of Konigsberg, combined odd ends of the Kantian philosophy with gleanings from the Bible into a dualistic neo-Gnosticism. Ebel, a Lutheran pastor, was a convert of his, and in 1826 was joined by Johann Diestel, an¬ other pastor. The doctrine, which involved peculiar views as to the sexual relations, spread among fashionable circles in Konigsberg. In 1835 Count Finckenstein, a former convert, ac¬ cused Ebel and Diestel of immorality. They were unfrocked, but were not convicted of ac¬ tual immorality. Consult Mombert, J. I., (Faith Victorious) (New York 1882) ; Dixon, W. H., Spiritual Wives) (London 1868). See Ebelians.

MUCORACEiE, the molds. See Fungi.

MUCOUS MEMBRANE. The mucous membranes line passages and cavities which communicate with the exterior of the body, where they become continuous with the skin. They constitute the lining of the alimentary canal or tract, which begins at the mouth and ends at the anus, a distance of about 27 feet, and is the passage through which the food for nutrition of the body is introduced, digested and taken up for the preservation and health of the body. They also form the lining of the nose, the throat, the middle ear, the various sinuses communicating with these cavities, the eyes, and of the respiratory apparatus, which comprises the lungs, the windpipe or trachea, and the larynx. The kidneys, the ureter, the bladder, the testes and the urethra in the male, and the Fallopian tubes, womb, vagina and vulva of the female are all lined with mucous membrane, together with the

membrane of the ducts of glands which open upon it. In the female it becomes continuous with the peritoneum at the fimbriae of the Fal¬ lopian tubes. The surface of the mucous membranes of the body is subjected to the con¬ tact of various matters, such as the food, the air, and the different glandular secretions and excretions. They are protected from undue irritation by a viscid liquid called mucus (q.v.), which constantly bathes their surface, and are also well supplied with blood-vessels and nerves. The mucous membranes are not of a single origin, but may be derived from ectsderm, as is the case with the lining of the mouth, entoderm, as with the greater part of the digestive tract, or mesothelium, as in the urogenital ducts. A mucous membrane consists of an epithelium, or layer of lining cells ; a con¬ nective-tissue basement-membrane, which may be hyaline and apparently homogeneous ; and a further connective-tissue support or tunica pro¬ pria. It usually is invaginated into glands, and may be evaginated into villae, as in the case of the stomach and intestine. For the diseases of the mucous membrane, see the respective or¬ gans or systems concerned.

MUCUS, a semi-fluid substance, of a viscid, tenacious character, produced by the various mucous membranes of animals, and found cov¬ ering the exposed surface of such membranes. Thus it is produced in the mucous membrane lining the nose, the mouth and throat, the gullet, stomach, large and small bowel, the air-tubes of the lungs, the kidneys, ureter, and bladder, the gall-bladder, the ducts of glands, the bile-ducts, *etc.* In all these situations it serves to lubricate

the membrane over the surface of which it is spread, and to protect the delicate surface from the action of irritating agents. Its viscid char¬ acter prevents it being readily removed, and thus enables it more effectually to discharge its protective function. It is to be noticed that many of the mucous membranes have special glandular structures embedded in them, which produce special secretions, not mucus, such as the mucous membrane of the stomach and bowels, whose secretions have special properties connected with the digestion of the

food. The saliva from the mouth is a mixture of mucus and the special secretion from the salivary glands, which acts on the starchy elements of lood. Other mucous membranes have no such special structures, and only mucus is secreted by them, such as the mucous membrane of the nasal passages. Mucus is secreted by glands situated deep in the mucous membrane, and such glands are found in the mucous mem¬ brane of the nose ; similar glands of very mi¬ nute form are found scattered thickly in the mucous membrane of the mouth, and are found of considerable size in the back part of the tongue, in the gullet, and other situations. But mucus is also produced by single epithelial cells, lining mucous membranes. The form of epithe¬ lial cell called the <(goblet cell** is believed to be a mucous-secreting cell, and it is found in large numbers lining the mucous membrane of the air-passages, the stomach and bowels. So that by their agency the special digestive secre¬ tions of stomach and intestines contain a large admixture of mucous material. Pure mucus is transparent, but it is usually turbid from the presence of foreign materials, and epithelial cells from the secreting membrane. Its chief ingredient is mucin, a derivative from albumin¬ ous bodies, consisting of carbon, hydrogen, oxy¬ gen and nitrogen, but, unlike albumin, contain¬ ing no sulphur. It is held in suspension by water, forming an opaque liquid, but is not dis¬ solved by it. Besides mucin, mucus contains small quantities of proteid substances and salts, chiefly common salt. Water constitutes nearly 94 per cent of its bulk. From fluids containing it in suspension, such as bile, it may be pre¬ cipitated in a flocculent stringy mass by alcohol. Heat does not coagulate it ; and it is dissolved by weak solutions of alkalies and alkaline earths.

MUD (or PEAT) BATH, in which the body is immersed in mud or peat. At Eger, Bohemia, black mud is heated to a temperature of 100°. It contains sulphate of soda, iron, lime, alumina and ulmic acid. The body is immersed for 15 minutes, after which the patient goes into water to remove the mud. Such a bath may be of use in chronic skin diseases, rheu¬ matism, gout, *etc.*

MUD-BUFFALO, a name, in the leather trade, for the Indian buffalo (Bos bubalus) as found in a wild or semi-wild condition in the Malay Peninsula, where they frequent swamps and are shot for the sake of their hides. These hides are not tanned, but are sent green to India, Europe and America to be used in the making of loom-pickers, mallets, gears and other tools used in cotton-milling. They become harder than wood, and are tougher and more elastic.

MUD-CAT. See Catfish.

MUD CRACKS, cracks formed in mud surfaces by shrinkage due to drying. The sur¬ face of the mud flat is usually broken up into polygonal blocks, by cracks varying from a few inches to several feet in depth. These are also known as sun cracks, and are com¬ monly formed in the muds of flood plains and deltas, and on playa (q.v.) surfaces. They are often filled with drifting sand and preserved in the sediment as the rock solidifies. For a discussion of their geological significance, see the section on Structure, in the article on Geology.

MUD-EEL, the amphibian Siren lacertina, which has persistent gills but no hind legs. It resembles the Proteidse (q.v.) in many ways. See SirenidaJ.

MUD-FISH, the name of various fishes found in muddy water, or fond of burrowing in the ooze of swamps. The Nile bichir and its relatives, the reed-fishes of the slug¬ gish African rivers, are so called; also the lepidosiren and other dipnoans, which grovel on muddy bottoms. In the United States, the name belongs to some small mud-minnows (q.v.), and to a curious fish (Amia calva) of the Mississippi Valley, known as dogfish, bow-fin and by various other names. This, like the bichir and the reed-fish, is a ganoid (q.v.). It is a rather shapeless, dark-colored, exceed¬ ingly hardy fish, reaching a length of two feet and a dozen pounds in weight. It is carnivorous, feeding voraciously upon crayfish, small mollusks and anything it is able to seize and swallow; and it greedily seizes a baited hook and then fights gamely for its life, so that it is a favorite with anglers, though hardly fit to eat.

MUD-HEN, or MARSH-HEN, a sports¬ man's name for any of several rails, gallinules, coots and similar birds which make their home in marshes; it is most often given in the North to the. Gallinule (Gallinula galeata), a bird of the rail family, much like the British water-hen (G . chloropus) , and common in the marshes about the Great Lakes and Mississippi Valley, where its duckings resound in summer from every reedy marsh. It is about a foot in length, olive-brown on the back, dull black on the under parts and with a red bill. It is migratory; but the Southern States have a smaller and more handsome mud-hen in the resident purple gal¬ linule (Ionornis martinica) .

MUD-MINNOW, or DOGFISH, one of

the smaller fresh-water carnivorous fishes of the pike family, the Esocidae and the genus Umbra related to the Alaskan blackfish (

Dallia). It lives in muddy bayous, and among weeds at the bottom of clear but sluggish streams, often burrowing in loose mud. There are two North American species: Umbra limi of the interior, and U . pygmcea of the eastern coast; and one in Austria. Such a distribution increases the probability that this is of (<an archaic type, characteristic of some earlier fish-fauna. ** The mud-minnows reach a length of about four inches and are valued as live bait, since they will long endure with vigor impale¬ ment on the hook.

MUD-PUPPY, or WATER-DOG, a mem¬ ber of the Proteidce (q.v.). In this country usually Necturus maculatus, a large newt com¬ mon in the eastern Mississippi Basin. For its

development and metamorphoses, see Embry¬ ology.

MUD-SHAD (Dorosoma cepedianum), the hickory or gizzard shad. This fish grows to a length of about 15 inches, is silvery blue in color, and occurs throughout the Mississippi Valley and in great abundance from Cape Cod to Mexico.

MUD-SKIPPER, a minute tropical fish of the goby family and genus Periophthalmus, which is accustomed to go ashore and skip about the space between tide-marks, exploring the rocks, roots of trees, etc., for food, and skipping about like grasshoppers. Some curious qualities distinguish these little creatures, which are found from West Africa to Japan, and make them highly interesting to naturalists. Consult Day's <Fishes of India5 (1878) and other works on the natural history of the Eastern seas.

MUD-TURTLE, or MUD-TORTOISE,

any fresh-water turtle usually found in muddy places. In the United States, the ordinary mud-turtle is Cinosternon pennsylvanicum, which has a grayish-brown smooth shell, and a dark-colored head, with light dots. See Box-turtle.

MUD-WASP, one of the many kinds of solitary wasps which fabricate out of wet clay cell-like receptacles, variously shaped and placed, in which to store their eggs and the provision for the larvae. See Wasp.

MUDDOCK, Joyce Emmerson, English journalist and author : b. Southampton, England, 28 May 1843. He has been connected with several London journals and beside publishing some 52 volumes under the nom de guerre of (<Dick Donovan® is the author of many other works, among which are (Basile the Jester5 ; (The Great White Hand5 ; (Fair Rosalind,5 and (Pages from an Adventurous Life. 5

MUDGE, Enoch, American Methodist cler¬ gyman : b. Lynn, Mass., 28 June 1776; d. 2 April 1850; the first Methodist clergyman reared in New England. He became an itinerant clergy¬ man of the Methodist Church in 1793, and in 1793-99 traveled on his duties about Maine until hardships affected his health, and he was settled at Orrington (1799-1816). During this period he was twice elected to the legislature, where he obtained the repeal of a law imposing a tax on other denominations for the benefit of the Congregationalists. Having resumed itineracy in 1816, he was stationed at Boston, Lynn, Portsmouth, Newport and other places. From 1832 until his retirement from active life in 1844, he was pastor of the Seamen's Chapel at New Bedford. He was a member of the Massachusetts Constitutional Convention in 1819. He contributed much to the press, and published in bookform (Camp-Meeting Hymn-Book5 (1818) ; (Notes on the Parables5 (1828) ; (Lynn,5 in verse (1830), and (Lectures to Sea¬ men5 (1836).

MUDIR, moo-der', the title of a Turkish or Egyptian official ; the governor of a province.

MUEZZIN, mu-ez'in, in Mohammedan countries the beadle -of the mosque, whose duty it is to summon the faithful to prayer at the assigned periods by public proclamation from the minaret (q.v.). His call is the azan, ai*d

is sounded five times each day. The call is <(God is most great [four times] ! I bear witness that there is no god but one God [twice] ! I bear witness Mohammed is the apostle of God [twice] ! Come to prayer [twice] ! Come to sal¬ vation [twice] ! God is most great [twice] ! There is no god but God [twice] !® In the morn¬ ing call the words ((Come to salvation !® <(Prayer is better than sleep!® are repeated twice.

MUFTI, the title of a high Turkish official: who assists the judge or cadi by interpreting the law of the Koran, of Moslem tradition and of other legal sources. The Grand Mufti or Sheikh-ul-Islam (see Sheik) is one of the interpreters of the Koran, by whose decisions the cadis have to judge. The phrase, ((in mufti® meaning, (<not in uniform ; in civilian dress,® is an Anglo-Indian expression, referring to the loose robes of the Moslem mufti.

MUGGER. See Marsh-Crocodile.

MUGGLETONIANS, a religious sect founded (1610) by Lodowicke Muggleton in London. He claimed that he and his cousin John Reeve, a tailor like himself, were the two witnesses who should "prophesy a thousand two hundred and three score days, clothed in sack¬ cloth® (Rev. xi, 3). He was 40 years old when he received this commission through visions and mysterious voices. (The Divine Looking Glass5 (1656) contains an exposition of the teachings of the Muggletonians who deny the doctrine of the Trinity and believe in a material God, who suffered on the cross. Penn's (The New Wit¬ nesses proved old Heretics5 (1672) was a re¬ ply to the attacks of Muggleton. This Muggletonian bible was republished 1846 by a few remaining adherents of the sect. Consult Jessopp, A., (The Coming of the Friars5 (1888).

MUGWORT, an ornamental and culinary herb. See Artemisia.

MUGWUMP, in American politics, a term originating during the Presidential campaign of 1884 between Grover Cleveland and James G. Blaine. It was applied by a New York news¬ paper to such members of the Republican party as refused to support their party nominee, James G. Blaine, and advocated the election of Grover Cleveland in the interest, they claimed, of civil service reform. The word belongs to the Al¬ gonquin dialect of the Indian languages and is used by John Eliot in his translation of the Bible to translate the Hebrew word Alluph, a "leader.® Eliot used it in the sense of "big chief,® a term more comprehensible to the In¬ dian mind than that which appears in the King James' version — "duke.® The word was spelled "Mugquomp® in the singular, and "Mug-quompaog® in the plural. It appears in many places throughout the Algonquin translation of the Old Testament.

MUHARRAM, (Ar. muharram, sacred, from horama, to forbid), moo-har'am, the first month in the Mohammedan year. The tenth day is known as the day of Ashura, and was originally made by Moham¬ med the great fast of the year, in imitation of the Jewish Day of

Atonement, which is cele¬ brated on the tenth day after New Year's Day. Later on this came to be replaced by the fast-month of Ramadan. Nowadays among the Sunnites the day of Ashura is only a voluntary

fast. The Shiites mourn on this day in memory of the martyrdom of Husein (q.v.) at Kerbela.

MUHLBACH, miil'baH, Luise. See Mundt, Klara.

MUHLBERG, mul'berk, Prussia, town in the government circuit Merseburg, and the dis¬ trict Liebenwerda. It is located on the Elbe, has two Evangelical churches, court of justice, inland-revenue office, *etc.* Its industries con¬ sist of a sugar factory, sawmills, brick kilns, besides commerce in lumber and grain and ship¬ ping. It is noted in history through the victory of Emperor Charles V over John Frederick, Elector of Saxony, in 1547. Pop. 3,345.

MUHLEMAN, mul'man, Maurice Louis, American author: b. near Alton Ill., 27 Nov. 1852; d. 12 June 1913. He was graduated from the law school of Columbia University in 1879 and was appointed to the United States treasury-service in 1872. In 1888-1901 he was deputy assistant treasurer of the United States. He has published (The Money of the United States* (1894) ; (Monetary Systems of the World) (1896); (Treasury System of the United States) (1907) ; (Banking Systems of the World) (1908) ; (A Plan for a Central Bank) (1910) • Governmental Supervision of Banks> (1911).

MUHLENBERG, mu'lenberg, Frederick Augustus Conrad, American Lutheran clergy¬ man and politician; son of Heinrich Melchior Muhlenberg (q.v.) : b. Trappe, Pa., 1 Jan. 1750; d. Lancaster, Pa., 4 June 1801. He was edu¬ cated in Halle, Germany, and returning in 1770 was ordained to the Lutheran ministry. In 1773-76 he had charge of a Lutheran church in New York and then removed to Pennsylvania where he held several pastoral charges. He was a hearty sympathizer with the cause of the colonies and though not participating in the war aided his countrymen politicallv and ulti¬

mately abandoned his pastoral work for a polit¬ ical life. He served in the Continental Con¬ gress and was speaker of the first House of Representatives under Washington, and in 1795 his was the deciding vote which rescued the Jay treaty from defeat.

MUHLENBERG, Gotthilf Henry Ernst,

American Lutheran clergyman and botanist: b. Trappe, Pa., 17 Nov. 1753; d. Lancaster, Pa., 23 May 1815. He was a brother of F. A. C. Muhlenberg and son of Heinrich Melchior Muhlenberg (qq.v.), and was educated with him in Halle, Germany. He returned to America in 1770, was ordained to the ministry and became an assistant to his father who was in charge of a Lutheran church in Philadelphia. He served in various charges until 1779 when he accepted a call to Lancaster where he re¬ mained until his death. In addition to his pastoral duties he distinguished himself as a scientist and took first rank as a botanist. He published (Catalogus Plantarum Americae Septentrionalis) (1813) ; (Descriptio Uberior Graminium* (1817), *etc.*

MUHLENBERG, Heinrich Melchior,

German-American clergyman, organizer of the Evangelical Lutheran Church in America : b. Eimbeck, Hanover, 6 Sept. 1711 ; d. New Provi¬ dence (now Trappe), Montgomery County, Pa., 7 Oct. 1787. He was educated at the Univer¬ sity of Gottingen (1735-37), studied theology

there (1737-38) and at Halle (1738-39), was ordained in 1739, and from 1739 to 1741 was deacon of the church at Grosshennersdorf, Upper Lusatia. On 6 Sept. 1741 he was called as missionary to the Lutheran congregations of Pennsylvania, located at Philadelphia, New Providence (now Trappe), and New Hanover. At that time there was a large number of Lutherans in America ; but they were unorgan¬ ized and without pastors, and such religious meetings as they had were conducted by lay¬ men. Muhlenberg, who arrived at Charleston, S. C., 22 Sept. 1742 and at Philadelphia. 25 November, was well qualified for the work of effecting union and order. He at once entered on the duties of his charge, and preached his first sermon in Pennsylvania in an unfinished log-building at New “Hanover, 28 November. Though Muhlenberg’s local pastorship was largely restricted to the three congregations which had summoned him, his activities were really those of a bishop. He traveled over a wide extent of territory, preached at Lancaster, York and other places in Pennsylvania, in New

York, and also occasionally in New Jer¬ sey, Maryland and among the Salzburger Lutherans of Georgia. ((There was probablv,** thinks Stoever, (<not a Lutheran church, in his day, in this country in which he had not officiated.® He was at first looked upon as an intruder by Zinzendorf and other Moravians, with whom he was for a time involved in con¬ flict. But so successful was he in his labors that by 1745 there was real need for the rein¬ forcement from Halle, consisting of the Rev. Peter Brunnholtz and the catechists Kurtz and Schaum. The first church edifice at Philadel¬ phia, Saint Michael's, was completed in 1743, and on 25 June 1769 Zion's Church, then con¬ sidered the largest and finest in the United States, was dedicated there. On 14 Aug. 1748 the first Lutheran synod in America was or¬ ganized under the direction of Muhlenberg, who became its president. In 1754 Muhlenberg prepared the (Kirchen Agende,* a directory for public worship, and in 1762 reorganized the Philadelphia congregation under a constitution which became the basis of that of most con¬ gregations later established. He identified him¬ self with the American cause in the Revolu¬ tion, and was in consequence subjected to many annoyances, particularly when Pennsylvania was the scene of war (1777-78). He was a linguist of high rank, versed in Hebrew, Greek and Latin (in which he made an address at the synod of 1750), and proficient in English, Dutch, French, Bohemian and Swedish. His large foreign correspondence appeared at Halle in 1787. Consult (Die erlaubte Klage iiher den Abschied treuer Knechte Gottes) (1788), a memorial sermon by J. H. C. Helmuth (with biographical sketch) ; Stoever, (Memoir of the Life and Times of Muhlenberg* (1856) ; Mann, (Life and Times* (1887), considered the best.

MUHLENBERG, John Peter Gabriel,

American patriot: b. Trappe (then New Provi¬ dence), Montgomery County, Pa., 1 Oct. 1746; d. near Philadelphia, 1 Oct. 1807. He was the son of H. M. Muhlenberg (q.v.), the founder of the German Lutheran Church in America. He was educated for the ministry, was for a time pastor of German Lutheran churches at New Germantown, N. J., and Bedminster, N. J. In 1772 he went to Woodstock, Va., and

finding that in order to enforce the payment of tithes he must be ordained in the Episcopal Church, he was ordained priest in England. He was chairman of the Shenandoah County committee of safety, and 1774 a member of the Virginia house of burgesses. At Washington's request he became a colonel in the Continental army. His last sermon was upon the duties men owe their country; and saying, <(There is a time for all things — a time to preach and a time to fight — and now is the time to fight,55 he stripped off his gown after the service, ap¬ peared in full uniform, called for recruits and enrolled about 300 of the parishioners. He participated in several battles, was made briga¬ dier-general in 1777, and major-general at the close of the Revolution. After the war he re¬ moved to Pennsylvania, where he was elected a member of the supreme executive council, and in 1785 bcame its vice-president. He served as representative in Congress from 1789 to 1795, and from 1799 to 1801. In 1801 he was elected United States senator, but soon resigned and was appointed supervisor of the revenue for the district of Pennsylvania. From 1803 till his death he held the office of collector of the port of Philadelphia. Consult Muhlenberg (H. A.), <Life) (1849).

MUHLENBERG, William Augustus,

American clergyman : b. Philadelphia, 16 Sept. 1796; d. New York, 8 April 1877. He was graduated (1814) at the University of Pennsyl¬ vania and was ordained deacon (1817) of the Episcopal church and priest three years later, becoming assistant to the rector, Bishop White, of Saint Peters and Saint James parishes. In 1821 he went to Lancaster, Pa., becoming rector of Saint James Church and established there the first public school in the State outside of Philadelphia. He went to Flushing, L. I. (1828), and founded a Christian high school (later Saint Paul's College), he remaining principal till 1846, when he was appointed rector of the church of the Holy Communion, New York City, erected by his sister. He started collecting a fund for the erection of a church hospital out of which Saint Luke's Hospital was built (1858) on 54th street between Fifth and Sixth avenues and he became its first pastor and superintendent, which positions he held till his death. His last very useful work was in founding Saint Johnland Christian in¬ dustrial community on the north shore of Long Island. In 1843 he organized the first Protes¬ tant sisterhood in the United States. He wrote several well-known hymns including (I Would Not Live Alway5 : (Like Noah's Weary Dove5 ; (Shout the Glad Tidings.5 His chief works published are (Evangelical Catholic Papers5 (1875-77, 2 vols.) ; (Christian Education5

(1831). Consult Ayres, Sister Anne, (Life and Work of William Augustus Muhlenberg5

(1880).

MUHLENBERG COLLEGE, in Allen¬ town, Pa. ; founded in 1867 under the auspices of the Lutheran Church. In 1915 there were connected with the college 16 professors and instructors, and about 354 pupils. There were in the library 20,741 volumes. The courses of study lead to the degrees of A.B., B.S. and Ph.B.

MUHLHAUSEN, mul'how-zen, France, a

town of Alsace-Lorraine. See Mulhausen.

MUHLHAUSEN, Prussia, town of Sax¬ ony, in a fertile district on the Unstrut, 29 miles northwest of Erfurt. It has two interesting old churches, an old town-house, a gymnasium, various technical, commercial and other schools, hospitals, an orphanage, *etc.* It manufactures woolen and cotton or mixed goods, hosiery, cigars, leather, cycles, sewing-machines, wooden wares, furniture; and carries on tanning, dye¬ ing, malting, brewing, *etc.* The Anabaptist Munzer, a leader in the Peasants' War, had his headquarters here, and was executed near by in 1525. The town became part of the King¬ dom of Prussia in 1815.

MUHLHEIM, mulTlm. See Mulheim.

MUIR, mur, John, Scottish Sanskrit scholar: b. Glasgow, 5 Feb. 1810; d. Edinburgh, 7 March 1882. He was educated at Glasgow University and at Haileybury College, whence he passed into the Bengal Civil Service in 1828. He remained in India 25 years, filling various offices in the revenue, educational and judicial departments. His fame will rest on his Orig¬ inal Sanskrit Texts on the Origin and History of the People of India, their Religion and In¬ stitutions,5 illustrated (1858-70). The first volume discusses the legendary accounts of the origin of caste ; the second, the primitive homes of the Hindu ; the third, the opinions of Hindu writers on the Vedas; the fourth, the contrast between Vedic and later Hindu theology; and the last the cosmological and mythological con¬ ceptions of the Indians in the Vedic age. In 1862 he founded a chair of Sanskrit and com¬ parative philology in the University of Edin¬ burgh, following out the plans of

the Associa¬ tion for the Better Endowment of Edinburgh University, of which he was the main originator.

MUIR, John, American naturalist and ex¬ plorer: b. Dunbar, Scotland, 21 April 1838; d. Los Angeles, 24 December 1914. He came to America in 1849 with his father, who settled near Fox River, Wis. ; entered the University of Wisconsin when 22; and after a special course of four years commenced his lonely journeys through Canada, Eastern and Western United States, the West, and the South, that made him a botanist and a geologist. In 1868 after visiting the Yosemite Valley, he made it his main central camp for 10 years while studying the forests, glaciers, etc., of the Sierra Nevada. He discovered in the High Sierra 65 residual _ glaciers. He made his first trip to Alaska in 1879, discovered Glacier Bay, and Muir Glacier, named after him, and explored some of the upper courses of the Yukon and Mackenzie rivers; in 1880 accompanied the DeLong search expedition to the Arctic, and in 1903-04 traveled in the Caucasus, Siberia, Manchuria, Japan, India, Egypt, Australia and New Zealand. He has written much for news¬ papers and periodicals, urging the ’formation of national parks — both the Sequoia and Yo¬ semite are in great part due to his efforts — and has published (The Mountains of California5 (1894), and <Our National Parks5 (1901). He was a member of the American Academy of Arts and Letters, and received honorary de¬ grees at Yale and the universities of Wisconsin and California. Among his works are <Stickeen5 (1909); <My First Summer in the Sierra5 (1911); (The Yosemite5 (1912) ; <Story of my Boyhood and Youth5 (1913); and the

posthumous (Letters to a Friend) and Unpub¬ lished Prose and Letters) (1915).

MUIR, Sir William, Scottish administra¬ tor and Arabic scholar: b. Glasgow, 1819; d. 11 July 1905. He attended lectures at the uni¬ versities of Edinburgh and Glasgow and at 18 entered the Bengal civil service, where lie at¬ tained distinction. He became secretary of the government of the Northwest orovinces and member of the Revenue

Board, and during the mutiny was in charge of the Intelligence De¬ partment at Agra. He was lieutenant-governor of the Northwest provinces 1868-74, and financial minister to the government of India 1874-76. Returning to England he sat on the Council of India, 1876-85, was elected principal of the University of Edinburgh, 1885-1900. He has published (Life of Mahomet) (1858-61; abridged ed. 1877) ; (Annals of the Early Cal¬ iphate) (1883) ; (The Coran, Its Composition and Teachings, and the Testimony it Bears to the Holy Scriptures) (1877) ; (Extracts from the Koran) (1880); (The Early Caliphate and Rise of Islam) (1881); (The Mohammedan Controversy) (1897).

MUKDEN, mook'den, MOUKDEN, or

FUNG-TIEN-FU, capital of Manchuria and of the province of Shinking, situated on the Hun, a tributary of the Liau River, about 500 miles northeast of Peking. Its port is Newch-wang, about 120 miles distant, near the Gulf of Liao-Tong. It is the cradle of the Manchu race, and until recently was known by its old Chinese name of Sin-Yang, its Manchu name of Mukden — or ˆFlourishing Capital® — given to it by its conqueror nearly 200 years ago, being used only in official documents. It is a station on the Russo-Chinese Railroad, and is surrounded by walls laid out in regular parallelograms between one and two miles each way, and built of squared stone or brick, thick and massive at the base and tapering gradually to the top. These walls are 40 feet in height, 21 feet in width, and are protected at the top by an eight-foOt crenelated parapet. Outside these walls there is a wide moat, and then come the suburbs, which extend for a mile or more on all sides. These again are enclosed by walls, which are constructed of mud. In the heart of the town is an inner wall, three miles in circuit, enclosing the emperor's residence, the government offices, courts and other build¬ ings connected with them, which are arranged on a plan similar to those of Peking. In 1631 the Manchu monarchs made Mukden the seat of government, and succeeding emperors have done much to enlarge and beautify it. At Muk¬ den are the tombs of the Manchu emperors, and the royal burying ground is ornamented with stone images of elephants as ponderous as some of the carved shapes that mark the graves of Egyptian kings. Other interesting relics of the past in the envifons of the city are the Temple of Heaven and the Temple of Earth, both of which were built by Tai Tsung, and the remains of which are still to be seen.

Like all the cities of Manchuria, Mukden is laid out on a regular plan not unlike Amer¬ ican towns. The main street runs due north and south, and the second best crosses it at right angles, while parallel to

these run a series of alleys teeming with an industrious popula¬ tion.

The city suffered greatly during the uprising of the Boxers in 1900, and was used by the Russian army under Kuropatkin as a base of supplies during the Russo-Japanese War. It was captured (March 1905) by the Japanese army in one of the greatest and most remark¬ able battles of modern history. Pop. about 250,000. See Manchuria.

MUKHTAR PASHA, mookh-tar' pash'a (Ghazee Ahmed), Turkish general: b. Brusa, Turkey, 1832. He was educated in the military schools in Brusa and in Constantinople and entered upon a military career. He served in the Crimean War, taught at the military school, became the military instructor of Prince Yusuf Iseddin, the favorite son of Sultan Abd-ul-Aziz, and was second in command of the expedition to Yemen in 1870, receiving the full command and the rank of field-marshal in 1871. In the campaign of 1860 in Montenegro he played a conspicuous part and thereafter received steady and rapid promotion. He became a full gen¬ eral in 1870 and in 1873 was appointed minister of public works. In the wars of Bosnia, Her¬ zegovina and Montenegro in which he com¬ manded he displayed great generalship, gaining 20 victories and never suffering defeat. The cam¬ paign of Kars-Erzerum in 1877 went against him and he was defeated by the Russian general Melikoff after a brilliant engagement for which he received the highest Turkish military title, (<Ghazee.)) In 1878 he was made grand master of the Turkish artillery, in which capacity he subdued the Cretan insurrection in that year, and in 1885 was designated to the post of Turk¬ ish High Commissioner in Egypt. He re¬ mained there about 10 years, and then returned to Constantinople. He was one of the commis¬ sioners in 1912 to arrange for a peace with Italy and to pacify Albania. In July 1912 he became Grand Vizier, but resigned in October.

MULA, moo'la, Spain, town in the province of Murcia, on a branch of the Segura. It has ancient castle ruins, but is chiefly known on account of its iron and sulphur natural hot baths. Pop. about 11,922.

MULBERRY, a genus (Moms) of trees of the order Moracecu (q.v.), of which 100 species have been described, but only five are now rec¬ ognized. The mulberries are characterized by the possession of leaves variable in form even upon the same twigs; monoecious flowers in axillary catkins ; and multiple blackberry-like fruits formed by the coherence of the pistillate flowers which became fleshy as they swell. They are natives of the mild parts of Asia, Europe and America,

whence they have been taken by man to similar regions throughout the world. In the Old World various species are of economic importance, principally because their foliage supplies the food of the silkworm, and their fruit a dessert and . a wine. The wood of most species is of inferior quality, but that of one species, the red mulberry (M. rubra), is fine-grained, strong and useful for shipbuilding. The trees are readily propagated by means of seeds, layers, cuttings or by graftage. They thrive upon almost any soil; even on rocky hillsides and gravelly lands, but succeed best upon arable soil in which they may be planted from 20 to 40 feet apart, and culti¬ vated like other orchard fruits until they have full possession of the ground. The fruits,

which are borne in great profusion, are too soft for market purposes, and usually too sweet for preserving alone. They are generally shaken from the trees upon sheets. Pigs are very fond of them.

The following are the most important spe¬ cies. The white mulberry (M . alba) is the silkworm mulberry, and has produced most of the named American varieties valued for their fruit, but not those esteemed in Europe. The black mulberry (M . nigra) is the European ˆdesserU species, and is little used for the feed¬ ing of silkworms. The red mulberry (M . rubra) is a native American tree to be found from Massachusetts to Nebraska and south¬ ward to the Gulf States. It has produced sev¬ eral good dessert varieties, the fruits, of which are characterized by greater acidity than those of the Old World sorts. It seems to be ill adapted to the feeding of silkworms. The so-called Russian mulberry is a variety of the white. It produces inferior fruits but is valued in the Plains States for wind-breaks, for which purpose its ability to resist extremes of drouth, cold and neglect specially fit it. All the above species have produced horticultural varieties, some variegated, others weeping, which are planted more for ornamental purposes than for fruit.

Another important species is the Indian (M . indica) which is used in silk culture and for its fruit, which is of fine flavor. It is cultivated in India, China and other countries of the East.

The allied paper-mulberry (Broussonctia papyrifera) is a native of Eastern Asia. This tree is of a moderate size, bearing leaves which are either simple or divided into lobes, more or less deep, rough above and hairy beneath. It was originally from India and Japan, but is now very commonly cultivated in Europe, and succeeds even in the more northern parts. The islanders of the Pacific make a kind of cloth¬ ing from the bark of this tree in the following manner: Twigs of about an inch in diameter are cut and deprived of their bark, which is divided into strips, and left to macerate for some time in running water. After the epider¬ mis has been scraped off, and while yet moist, the strips are laid out upon a plank in such a manner that they touch at the edges, and two or three layers of the same are then placed upon them, taking care to preserve an equal thickness throughout. At the end of 24 hours the whole mass is adherent, when it is removed to a large, flat and perfectly smooth table, and is beaten with little wooden clubs till it has attained the requisite thinness. This kind of cloth is easily torn, and requires to be washed and beaten many times before it acquires its full suppleness and whiteness. The natives dye it red and yellow, and also make a similar cloth from the bread-fruit tree, an allied plant; but that from the mulberry is preferred. The paper wrhich is used in Japan and many other countries in the East Indies is made from this plant. For this purpose the annual shoots are cut after the fall of the leaves, tied in bundles, and boiled in water mixed with ashes; after which the bark is stripped off by longitudinal incisions, and deprived of the brown epidermis. The mark of the more tender shoots is sepa¬ rated from the rest, as it furnishes a white paper for writing, while that produced by the

remainder is coarse and gray, and serves for wrapping or similar purposes.

MULCH, any material kept in a loose con¬ dition at the surface of the soil for the purpose of checking evaporation, conserving moisture, protecting plant-roots or low-growing plants from frost or heat, preventing puddling and washing of the soil, retarding growth in spring, keeping the surface soil open, supplying plant-food, protecting fruit or flowers from dirt, and keeping down weeds. The materials most fre¬ quently applied are straw, marsh-hay, leaves, litter and brush; but the most widely important mulch is the surface soil itself, kept powdery by frequent tillage, given especially after rains when it is desirable to break the crust formed upon the surface. Since mulches keep the soil beneath them moist by breaking the capillary, they are of particular advantage in dry cli¬ mates ; but since the vegetable

mulches, such as straw and leaves, cannot be used in summer where the land must be cultivated and since they supply hiding places for insects, they can rarely be used advantageously in fruit planta¬ tions, in which they are often also a positive detriment because they encourage the growth of roots near the surface. In climates liable to extremes of temperature this position of the feeding roots is often disastrous to the crop if not to the plants themselves. Except, there¬ fore, for winter protection, when such seems to be necessary, the soil itself is generally best. But the depth of the powdery layer will depend largely upon the climate, character of the soil, and kind of crop ; in arid regions, with light soils, and with deep-rooted plants, the soil-mulches are usually deeper than with the re¬ verse conditions.

MULDER, mool'der, Gerardus Johannes,

Dutch chemist and physician : b. Utrecht, Hol¬ land, 27 Dec. 1802; d. there, April 1880. He w7as educated at the University of Utrecht and became professor of botany and chemistry there (1840-68), but first practised medicine in Am¬ sterdam for some years. He was also for a short time professor of chemistry at Rotter¬ dam. He became known chiefly through his researches on the proteids, and advanced the belief in a hypothetical substance which he called protein. This he believed to be the es¬ sential nitrogenous constituent of food, existing in animals, and derived ready-formed from plants and vegetables. The publication of this theory involved Mulder in a controversy with Liebig, who from the first doubted the exist¬ ence of protein as an independent chemical compound. The whole theory has been aban¬ doned, and the word protein is now used to indicate the first element in compounds. His principal work < Chemistry of Vegetable and Animal Physiology) has been translated into English by Fromberg, and his ˆChemistry of Wine,> by Bence Jones. He also wrote (Chem¬ ical Researches* ; (De Voeding in Nederland*; (De Voeding van den Neger in Suriname,* and his posthumous autobiography (Levensschets* (1881; 2d ed. 1883).

MULE, in zoology, a term loosely used as synonymous with hybrid, more usually applied to the produce of a male ass with a mare, the mule proper, and to the hinny, the offspring of a stallion and a she-ass. The mule does not

attain maturity as soon as the horse, but is useful a much longer period. As a beast of burden it is in some respects preferable to the horse; it is easily fed, is equally good for car¬ rying and drawing, its less sensitive skin en¬ ables it to support, exposure to the weather; like ‘the ass, it enjoys comparative immunity from disease, and it is as surefooted as a goat. Mules have been known from the earliest ages; there are frequent references to them in Scrip¬ ture and in Greek and Latin literature. Ken¬ tucky, Missouri and Kansas take the lead in mule-raising in the United States, and the small Mexican mule is a very useful animal. France is the most important mule-raising country in Europe ; then come Italy, Spain and PortugaJ, where they are used for pack and draft. They are largely employed as draft animals in war¬ fare. Fecundation of the hybrid-female by the male ass or the stallion is not very rare, though she rarely throws a living foal. Consult Feget-meier, <Horses, Asses and Zebras) (London, 1895), and publications of the United States Department of Agriculture. (See Hybridity). In 1910 there were 4,480,140 mules in the United States, valued at $564,766,397. The average value per head was $126.06. For further sta¬ tistics see Livestock, American.

MULE DEER, or BLACKTAIL, a deer

of the western United States (Odocoileus hemionus), remarkable for its disproportion¬ ately large ears. Its common name “blacktail® among the hunters is due to the black color of the terminal part of the tail, distinguishing it from the “whitetail® or eastern deer (q.v.) ; but is better reserved for the Pacific Coast species. (See Blacktail). This deer is rather larger than the eastern one and is a deer of the rocky plains, and especially of the mountains, which it climbs in summer as high as it can go, pasturing upon alpine slopes and resting upon the summits of cliffs and ledges where it has a wide outlook. Its gait is very distinctive, also, consisting of a series of jerking bounds very effective on declivities, but looking strange on a level plain. The character of the sport afforded by this deer depends much upon the kind of country in which it is hunted, the method of pursuit being very different in the chaparral of southern California from that fol¬ lowed among the broken plains of Montana. When hiding in summer it will often wait until almost touched before starting off. In winter it gathers into herds and wanders among sheltering hills and vales. It is therefore the characteristic deer of the Rocky Mountain re¬ gion and was formerly exceedingly numerous and one of the principal sources

of food and clothing for the Indians. Originally the species occurred commonly as far east as the plains and prairies extended; but was early extermi¬ nated in the central Mississippi Valley; and from about 1875 to 1895 was the object of persistent slaughter by hide hunters. At the beginning of the present century, therefore, it had nearly disappeared from the plains south of the upper Missouri, was scarce in the central Rockies and numerous only in the less fre¬ quented parts of the Northwestern States and adjoining provinces of Canada. Its hide makes the best tanned deer-leather (buckskin) and its flesh is excellent. The mule deer is not much taller than the Virginian deer, standing about

three feet four inches high at the shoulder, but is heavier and of coarser build. The ears are very large and thickly haired, the tail round¬ ish and white with black tip. The coat is dull yellowish in summer, palest in the southern desert varieties, but becomes bluish gray with the autumnal molt ; face between the eyes dusky, elsewhere white; throat, abdomen and inside of the legs white; antlers forking equally and each prong again bifurcating. Consult Baillie-Grohman, <Fifteen Years' Sport and Life in the Hunting Grounds of Western America) (1900) ; Caton, (Antelope and Deer of America* (1877); Lydekker, (Deer of all Lands) (1898) ; Roosevelt (and others), (The Deer Family) (1902).

MULE-KILLER. See Mantis.

MULE MACHINE, a spinning-machine in which the rovings are delivered from a series of sets of drawing rollers to spindles placed on a carriage, which travels away from the rollers while the thread is being twisted and returns toward the rollers while the thread is being wound. It was invented by Samuel Crompton, of Bolton, England, and perfected in 1779. The combination which gave rise to the term mule was the junction of the drawing rollers of Arkwright with the spinning jenny of Hargreaves. The object of the machine is to deliver the roving with the required degree of attenuation and twist it as delivered. For this purpose the spindles, instead of being sta¬ tionary, are placed on a movable carriage which is wheeled out to twist the threads and wheeled in again to wind on the spindles.

MULE AS A WORK ANIMAL, The.

The use of mules for doing the work of the world is almost as old as history. The his¬ torical records that have come down to us re¬

counting the exploits and industrial achieve¬ ments of the more civilized peoples of the earth have all mentioned the mule. The impression which one gathers from reading the opinions of the earlier peoples is that the mule was highly regarded, particularly as a burden bearer.

So far as the writer has been able to deter¬ mine, there are no unfavorable reports of the work of mules. On the other hand the unani¬ mous opinion of those who have had most to do with the utilization of mules is that they are in many respects the most efficient and satisfactory work animals employed by mankind.

In more modern history the evidence of the value of mules is still more thoroughly recog¬ nized. The number of mules in the United States has increased rapidly. One hundred years ago the mule was not generally used as a draft animal except in a few Southern States. At the present time the mule is used to a greater or less extent in every State of the Union. He is particularly valued in the South, in the Middle West and the West. In these great agricultural regions the mule has won a place in competition with horses and he will not be replaced unless we should ultimately come to a type of farm practice which will make it possible to employ mechanical motors exclusively for agricultural production.

The favorable opinion of mules as work ani¬ mals is not due to any accident nor indeed to any peculiar psychology of those who have used the mule largely in their industrial occu-

pations. There are certain outstanding quali¬ ties characteristic of the mule which single him out from among other types of draft animals and have made him what he is to-day — un¬ doubtedly one of the most popular and econom¬ ical of draft animals.

The mule is recognized as possessing unusual endurance, exceptional courage, surefooted¬ ness, steadiness and is exceptionally free from excitability and harmful nervousness. The mule is also given credit for

the possession of an unusual amount of instinctive wisdom which protects him against many of the dangers and accidents to which horses are subject.

No draft animal so far developed has the endurance of the mule under all kinds of hard working conditions. In the excessive hot cli¬ mate of the tropics mules will work steadily day after day without injury to themselves and will accomplish an astonishingly large amount of productive labor. Under similar conditions horses are far less efficient and indeed it is plain that under many such conditions horses are entirely unable to accomplish the work. On the arid plains and in the desert regions of the world the endurance of the mule has been recognized and particularly where the trails are rocky the mule outlasts any other draft animal.

A part of the endurance of the mule is due to his temperament, a part to his sound, thor¬ oughly good feet and a part to his instinctive food habits. The mule is not so well adapted to the sandy stretches of the arid regions be¬ cause his small, somewhat pointed foot causes him to sink more deeply into the sand than flat-footed horses. The mule is surefooted. Over the dangerous trails of the mountains the mule rarely meets with an accident. He is wise in selecting his foothold and will carry the rider or pack safely along precipitous trails where under similar conditions horses would be unsatisfactory.

On the farms, particularly of the Middle West and the South, the mule is more eco¬ nomical. The statement is frequently made that the mule requires less food for the per¬ formance of a given amount of work than the horse. This is the general opinion among farmers experienced in the use of mules. In¬ vestigations on this point are not numerous and are not thoroughlv convincing, but in the main the conclusion that mules will consume less food than horses is probably true. It is certainly true that mules will thrive on a coarser character of fodder. They will thrive under conditions which would be impossible for horses.

The mule will rarely if ever injure himself by over-heating, over-eating or drinking wdien he is too hot. Under similar conditions horses are frequently injured and their usefulness greatly diminished.

This interesting hybrid, descended from the ancient wild ass of the deserts, has inherited a certain type of wisdom which protects him from the dangers incident to civilization. The mule avoids accidents. On the farms of Mis¬ souri where mules attain their highest develop¬ ment the risk from rearing young mules, so far as acquiring blemishes

is concerned, is much smaller than the risks from similar accidents among young horses. This is an economic fac¬ tor wdiich is clearly recognized and one which constitutes an argument for the increased profit

in the raising of mules. In the earlier use of mules in this country the small, active, hardy mule of good quality was universally favored. In more recent years with the larger use of heavy farm machinery, larger mules have been in demand. At the present time (1919) the large draft mule of good quality sells for the highest price on the market. The draft mules are not only used in the cities for heavy haul¬ ing but farmers also now more often demand the heavy mule than in former years. The smaller mules, known on the market as ((cottonw mules, are more generally sold in the South. The draft mules are sold in the mining regions, for city drayage and on larger farms of the Middle West. The ˆsugar® mule is a larger mule than the ˆcotton® mule and is de¬ manded in the cane-growing regions of the South. The demand for large draft mules has caused the breeders of jacks and jennets to produce a large jack of good quality. This animal mated to the mares belonging to the principal draft breeds of the United States is the source of the draft mules of America. These draft mules may perhaps lack somewhat in quality as compared with the smaller, more active mules of earlier history but they do pos¬ sess a pow7er and efficiency in the hauling of heavy loads which is comparable to the similar power of great draft horses so long used on the city streets.

This brief article on the value of the mule as a work animal would not be complete with¬ out recognizing the great value of the mule in war. During the great European War the Allies made large use of the mule in transport¬ ing artillery and supplies, particularly in carry¬ ing supplies to the front. The mule because of his courage and steady, reliable subservience was dependable under fire and could be used where horses could not be employed.

The rearing of mules has come to be as much an art based upon scientific principles of breed¬ ing as has the production of any other class of domestic animals. While it is true that the mule is a hybrid and always sterile, the prin¬ ciples of breeding which may be applied in his production are more complicated and involve the successful breeding of two distinct species, it is nevertheless true that the value of the mule for industrial purposes is to-day as largely dependent upon the skill of the breeder as is the breeding of cattle, horses, sheep or swine.

Frederick B. Mumford, Dean and Director of the College of Agricul¬ ture, University of Missouri.

MULFORD, Elisha, American Episcopal clergyman and philosophical writer : b. Mont¬ rose, Pa., 10 Nov. 1833; d. Cambridge, Mass., 9 Dec. 1885. He was graduated from Yale in 1855 and subsequently studied .theology, law and philosophy. He entered the Episcopal min¬ istry and held several rectorates, but from 1881 lived in Cambridge, Mass. He wrote (The Nation) (1870), a treatise on the philosophy of the State, and (The Republic of God) (1881), relating to the philosophy of religion. From 1881 till his death he taught at the Episcopal Theological School at Cambridge, Mass.

MULHALL, Michael George, Irish statis¬ tician: b. Dublin, Ireland, 1836; d. Killiney, Ire¬ land, 12 Dec. 1900. He was educated in the

Irish College at Rome, and in 1861 went to -Buenos Aires, where he founded the Standard, the first English daily paper in South America. He gained a wide reputation as a statistician, and in 1880 made a calculation of the census of the United States for 1900 which came within 95,000 of the number given by the census report in that year. He was a frequent contributor to the Contemporary Review, and published (Rio Grande do Sul and Its German Colonies> (1873) ; (A Dictionary of Statistics) (1883) ; (Fifty Years of National Progress,' 1837-87 > (1887) ; 'Industries and Wealth of Nations) (1896), *etc.* His wife, Mrs. Marion Mulhall, wrote 'Between the Amazon and the Andes) (1883); (Celtic Sources of Dante's Divine Comedy.)

MULHAUSEN, mul'how-zen, or MUHLHAUSEN (French, Mulhouse), France, a town oi Alsace-Lorraine, on the Ill River and the Rhine-Rhone Canal, 66 miles by rail south¬ west of Strassburg, and 18 miles northwest of Basel, Switzerland. It is an important commer¬ cial and manufacturing centre, cotton spinning being one of the largest industries. The town carries on calico printing, dyeing, the spinning of woolen and worsted yarn, the manufacture of machinery, railway material and numerous other industries. Its industrial importance

dates from 1746,. .when a cotton-factory was estab¬ lished. It is noted for its model dwellings for the working classes in the ((cite ouvriere,® work¬ ingmen's colony, on the northwest, founded by Mayor Dollfus in 1853. A migration to the suburbs., however, left the artisan colony in the occupation of small tradesmen. Miilhausen is first mentioned in 717 ; it became an imperial free city in 1273, and in the 15th century entered into an alliance with the Swiss, which lasted till 1798, when it became French. It was included in the cession of Alsace to Germany in 1871. In the great European War (q.v.) it was the scene of considerable military activity. Pop. about

95,000.

MULHEIM, mul'him, or MUHLHEIM,

Prussia, two towns of the Rhine province: (1) Mulheim-on-the-Rhine, with a bridge spanning the river, is almost opposite Cologne. The town has manufactures of machinery, cables, wire ropes, wagons, velvet, silk, chemicals, *etc.* From 1914, the town with Cologne suffered from the operations of Allied aviators during the great European War. Pop. 53,500. (2) Miil—

heim-on-the-Ruhr, 14 miles north of Dfissel-dorf, has coal and iron mines, iron foundries, manufactures of iron-ware, machinery, glass, woolen and cotton goods, and a considerable trade in sandstone, building materials and coal. The Ruhr is crossed here by a chain bridge and a railway bridge. Pop. about 112,500.

MULHOLLAND, mul'liol'and, William, American hydraulic engineer: b. Belfast, Ire¬ land, 11 Sept. 1855. He was educated at the Christian Brothers' School, Dublin. Coming to the United States, he became superintendent and chief engineer of the waterworks of Los Angeles, Cal., from 1886. He devised the plans and estimates, then superintended the con¬ struction of the Los Angeles aqueduct to bring to the city water from the Sierra Nevada Mountains, a distance of about 250 miles, at a cost of $24,500,000. He has been consulting

engineer on many projected water supply and irrigation plants.

MULITA, a small armadillo, with head and ears like those of a mule, native to south¬ ern South America.

MULL, Scotland, an island of Argyllshire, the largest of the Inner Hebrides next to Skye. Its length is 35 miles; greatest breadth, 30; su¬ perficial area, 347 square miles. It is irregular in shape, and the large bay on the west side contains a number of islands, including Ulva and Staffa. Iona lies off its southwest extrem¬ ity. The island is rugged and mountainous; Benmore, the highest mountain, is over 3,000 feet above the level of the sea. The principal village is Tobermory; pop. about 1,000. Be¬ tween the island and the mainland, on the north¬ east, is the Sound of Mull, from one to three miles wide.

MULLANY, mul-la'ni, James Robert Madison, American naval officer: b. New York 26 Oct. 1818; d. Bryn Mawr, Pa., 17 Sept. 1887.' He was appointed to the navy as midshipman in 1832 and received steady promotion, becom¬ ing lieutenant in 1844. He served with dis¬ tinction in the Mexican War, and at the out¬ break of the Civil War in 1861 was promoted commander. He commanded the Oneida in the battle of Mobile Bay and performed valiant service with her on that occasion, losing his left arm. He was commissioned commodore in 1870 and rear-admiral in 1874, and until 1876 was in command of the North Atlantic squadron, and in conjunction with General Emory and General Sheridan at New Orleans protected American interests on the Isthmus of Panama. From 1876 until 1879, when he was retired from active service, he was governor of the naval station at Philadelphia.

MULLANY, Patrick Francis. See Azarias, Brother.

MULLEIN, a genus of biennial and peren¬ nial herbs (Verbascum) of the natural order S crophulariacece. The species, of which more than 100 have been described and more than 30 are cultivated, have tap roots, woolly foliage in rosettes during the first year, and terminal spikes or racemes of small, usually yellow, flowers which appear from midsummer until late autumn. Some species were formerly re¬ puted medicinal. In America they are usually considered as weeds, but in Europe they are valued as ornamental plants, particularly for mixing with shrubbery and planting in the rear of flower borders. Though natives of the Mediterranean region, some species are known in England as American flannel or velvet plant. The best-known species in the United States are probably the moth mullein (V . blattaria), the common mullein (V . thapsus), the white mul¬ lein (V. lychnitis) , and V. phlomoides, which are all common in pastures and uncultivated fields.

MULLER, mii'ler, Adam Heinrich, Ger¬ man economist: b. Berlin, 1779; d. 1829. In his 19th year he went to the University of

Gottingen, where he at first occupied himself with theology and then became a student of jurisprudence, in which he was a pupil of Hugo. He afterward sought to complete his education by the private study of the natural sciences, which he had previously neglected.

He early formed a close intimacy with Fried¬ rich Gentz, his elder by 15 years; and this con¬ nection exercised an important influence both on his material circumstances and his mental development in after life. The two men dif¬ fered widely in character and in their funda¬ mental principles, but agreed, at least in their later period, in their practical political aims, and the friendship was only terminated by death. Muller's relations with the Junker party and his cooperation with them in their oppo¬ sition to Hardenberg's reforms made any pub¬ lic employment in Prussia impossible for him. In 1805 he was in Vienna, where he became a convert to Roman Catholicism, and through Gentz was brought into relations with Metternich, to whom he was useful in the preparation of state papers. In 1806-09 he was in Dresden, being occupied in the political education of Prince Bernhard of Saxe-Weimar. In 1813 he entered the Austrian service, and in 1815 ac¬ companied the Allies to Paris. He was en¬ nobled by the emperor in 1820. In 1827 he settled a second time in Vienna, and was em¬ ployed in the state chancellery. He was one of the principal literary instruments of the reac¬ tion and took part in framing the Carlsbad resolutions. He was distinguished as a writer not only on politics and economics, but on literature and aesthetics. His principal work is his (Elemente der StaatskunsD (1809), which contains the substance of a course of lectures delivered at Dresden to statesmen and diplo¬ matists. In political economy he represents a reaction against the doctrines of Adam Smith, whom, while he highly commends him in certain respects, he censures as presenting a one-sidedly material and individualistic conception of so¬ ciety, and as being too exclusively English in his views. Muller's leading idea is that of the organic unity and cdntinuity of the state and of social institutions in general. Some of his higher tendencies, freed from much of their alloy, are reproduced in the writings of the historical school of German

economists. Other works by Muller are (Die Theorie der Staats-haushaltung und ihre Fortschritte in Deutsch¬ land und England seit Adam Smith* (1812) ; (Versuch einer neuen Theorie des Geldes* (1816) ; (Vermischte Schriften iiber Staat Philosophic und Kunst) (2 vols., Vienna 1817) ; and (Von der Nothwendigkeit einer theolo-gischen Grundlage der gesammten Staatswissen-schaften und der Staatswirthschaft insbeson-dere) (1819). Consult biographical notice of Mischler in (Allgemeine Deutsche Biographie.*

MULLER, Charles Louis, French painter: b. Paris, 22 Dec. 1815; d. there, 10 Jan. 1892. He was the pupil of L. Cogniet, Baron Gros and others in the Ecole des Beaux-Arts, and in 1850 was made director of the manufactory of Gobelin tapestries. His fertility in the pro¬ duction of historic pictures and portraits was amazing. Among them are <Heliogabalus> (1841); <Primavera> (1846) 5 (May-day > ; (Lady Macbeth > ; and his masterpiece, (The Last Victims to the Reign of Terror) ; the last two being in the Luxembourg; Wive l'Empereur* (1855); (Marie Antoinette) (1857) ; (A Mass During the Reign of Terror* (1863) ; (The Madness of King Lear) (1875) ; (Mater Dolorosa> (1877). He executed the frescoes of the Salle d'Etat in the Louvre, and

as a painter is more to be commended for clever drawing and composition than for his somewhat flat and mediocre coloring. In 1864 he became a member of the Institute.

MULLER, Friedrich, called ((Maler Mul¬ ler, or "Muller the Painter,** German artist and poet: b. Kreuznach, 13 Jan. 1749; d. Rome, 23 April 1825. Some of his etchings, animals, compositions in the Flemish style, pastoral scenes, etc., were remarkable for their original-itv and freedom. He deserves more credit as a poet, for at a time when German poetry had degenerated, Muller helped to give a new im¬ pulse to German literature. His best works, <Nible,) <Faust) and (Genevieve,* are char¬ acterized by richness, warmth and elevated de¬ lineation of character, though sometimes wild and disconnected.

MULLER, Friedrich Max (known as Max Muller), English philologist: b. Dessau, Ger¬ many, 6 Dec. 1823 ; d. Oxford, 28 Oct. 1900. His father was Wilhelm Muller (q.v.), a famous German lyrist, and his maternal great-grand¬ father Basedow, the eductional reformer. His bringing up was in his mother's hands, as his father died when the boy was four. He studied in Leipzig, at the Nicolaischule ; had some thoughts of becoming a musician, but entered the University of

Leipzig in 1841, and there, under the leadership of Hermann Brochaus, devoted himself to Sanskrit, publishing a Ger¬ man version of the (Hitopadesa* in 1844; worked under Bopp in philology and Schelling in philosophy at Berlin for a year; in 1845 went to Paris, where Burnouf suggested to him an edition of the (Rig Veda) ; and in 1846 went to England and interested the East India Com¬ pany in this work, which he undertook at the expense of the company. He was in Paris in 1848, and brought to Palmerston, in London, the first news of Louis Philippe's flight from Paris. In the same year he settled in Oxford, where the (Rig Veda) appeared, with Sayana's commentary, 1849-74. He became deputy Taylorian professor in 1850, and Fellow of All Souls' in 1858; but in 1860 was defeated in his candidacy for the chair of Sanskrit by Monier Williams, after a fierce fight on the part of his opponents, who objected partly to his foreign birth and partly to his very free and unorthodox religious views. The result for linguistic science was unfortunate, as it turned Max Muller from the narrow field of Sanskrit, in which he easily outranked his contemporaries, to comparative philology and the science of re¬ ligion, in which his achievements were less ex¬ act and scholarly, to say the least. In 1868 he became professor of comparative philology at Oxford. He was made a privy councillor in 1896. His greatest single work was as editor of the (Sacred Books of the East,* a series of English versions of Oriental scriptures, to which he contributed three volumes, and which was begun in 1879 and is not yet complete. He is possibly even better known as a popularizer of the first principles of linguistic science, so that he became in the lay mind the main exponent of this science, whereas his grasp of its detail was inadequate, and many of the etymologies he advanced showed that he was not conversant with the strict rules of phonetics. But the charm of his style, his general grasp of so large a subject, and his admitted pre-eminence in San-MULLER

skrit, make interesting and valuable, if not abso¬ lutely authoritative, reading of <The Science of Language* (1861-63) ; (Essays on Language and Literature,) and < Biographies of Words* (1888), all of which have passed through new editions. Max Muller's works on mythology and religion also have a higher repute among general readers than with the specialist, but it cannot be denied that they did much good in stimulating research, as the (Sacred Books* did in

supplying a field for such research. In this class of writings mention should be made of the (Essay on Comparative Mythology* (1856); (Introduction to the Science of Re¬ ligion } (1873) ; (The Origin and Growth of Religion* (1878); 'Natural Religion* (1889); (Physical Religion* f 1891) ; (Anthropological Religion* (1892); (Theosophy, or Psychological Religion* (1893); the 'Essays on Mythology and Folklore* in the 4th volume of (Chips from a German Workshop* ; and ' Contributions to the Science of Mythology* (1897). His ver¬ sions from the Sanskrit and the Pali have been alluded to; (A History of Ancient Sanskrit Literature* (1859), and a (Sanskrit Grammar* also should be mentioned, and it should be borne in mind that it is in this field that the scholar spoke with authority. From his youth Max Muller was interested in philoso¬ phy; he wrote an excellent version of Kant's v Critique of Pure Reason* (1881); also 'The Science of Thought* (1887), urging that thought was inconceivable without language, and the Oriental studies, (Three Lectures on the Vedanta Philosophy* (1894), and (The Six Sys¬ tems of Indian Philosophy* (1899). An en¬ tirely different side of the man is disclosed by (My Indian Friends* (1899), which shows much of his broad and charming personality; or by (Deutsche Liebe* (1857), a romantic and popu¬ lar story translated into French, Italian and Russian, and appearing in English in two ver¬ sions, one American, unauthorized and very suc¬ cessful, and a later one (1873) bv Mrs. Max Muller. He also edited his father's poems (1868), and Scherer's (History of German Lit¬ erature.* His collected works, including the four volumes of (Chips from a German Work¬ shop* (1867-75), appeared 1898 et seq. Consult his own (Auld Lang Syne* (1898), and (My Autobiography* (1901); his wife's 'Life and Letters of Max Muller (1902) ; and Whitney, W. D., 'Max Muller and the Science of Lan¬ guage* (New York 1892).

MULLER, Georg Friedrich, German-Eng- lish philanthropist: b. Kroppenstadt, Prussia, 27 Sept. 1805 ; d. Bristol, England, 10 March 1898. Entering the University of Halle as a student of theology in 1825, although he had fallen into irregularities of life, he was converted before the end of that year, and in the following year began to preach and teach. In 1829 he went to London, whither the Society for Promoting Christianity Among the Jews had invited him, settled at Teignmouth as pastor of Ebenezer Chapel, where he gave up pewrents and substi¬ tuted box-collections, finally refusing a salary and depending on voluntary gifts. In 1832 he joined Henrv Craik, a prominent member of the sect of Plymouth Brethren, in ministerial work at Bristol. In 1835 he published a pro¬ posal for the establishment of an orphan home, which took shape in 1836 at Bristol. The ex¬

periment was successful, the work grew from year to year, and by 1875 no less than 2,000 chil¬ dren were lodged, fed and educated without other financial maintenance than that received in donations from all parts of the world. The orphanage was moved in 1849 to Ashley Down, a suburb of Bristol. With his wife Muller made evangelistic tours in Europe, America and Asia. He published ‘A Narrative of Some of the Lord’s Dealings with Georg Muller* (1837). Consult biographies by Pierson (New York 1899) ; by Warne (New York 1911).

MULLER, Johann Friedrich Theodor,

yo han fred’rin ta‘6-dor (better known as Fritz Muller, and also known as Muller-Desterro), German naturalist: b. near Erfurt, 31 March 1821 ; d. 1897. After studying at the universities of Greifswald and Berlin, he went to South America in 1848, and settled on the island of Santa Catharina, Brazil, living there the ordinary pioneer’s life until appointed (1856) to teach natural history and mathe¬ matics in the Desterro gymnasium. From 1874 he was engaged for a time as collector for the museum at Rio de Janeiro. His published papers on crustaceans, insects, worms, jelly¬ fishes, etc., were many, most of them appearing in the ‘Annals* of the Rio de Janeiro Museum, Wiegmann’s (Archiv fur Naturgeschichte,* and similar publications. In his (Facts for Dar¬ win* (1 864) , a book written under the stimu¬ lus of Darwin’s ‘Origin of Species,* he made valuable applications of Darwinianism in new fields, and won reputation among men of science for the originality and fertility of his observa¬ tions and deductions. Among the more im¬ portant pieces of work which he did were re¬ searches on mimicry (q.v.) and the first clear statement of the theory of recapitulation (q.v.).

MULLER, Johann Gotthard von, German engraver : b. Bernhausen, near Stuttgart, 4 May 1747 ; d. Stuttgart, 14 March 1830. After study¬ ing under Guibal, the painter, he turned to en¬ graving, and in 1770 went to Paris, where, under Willie, he studied for six years, and after winning several prizes was elected to member¬ ship in the French Academy. Returning in 1776 to Stuttgart, he taught there for nine years. While there he was called to Paris to engrave a portrait of Louis XVI. This is re¬ garded as his most important work, next to which may be ranked his ‘Battle of Bunker Hill,* after Trumbull; ‘Madonna della Seg-giola,* after Raphael, *etc.* He was knighted in

1818.

MULLER, Johannes, German physiologist : b. Coblenz, Prussia, 14 July 1801; d. Berlin, 28 April 1858. He studied, from 1819, at Bonn and Berlin, started service (1824) as private dozent of physiology and comparative anatomy at Bonn, and became assistant professor (1830), then (1833) professor of anatomy and physiol¬ ogy at Berlin. His first important works, (Zur vergleichenden Physiologie des Gesichtsinns* (Leipzig 1826) and 'Uber die phantastischen Gesichtserscheinungen5 (Coblenz 1826), are of a subjective philosophical tendency, the first concerning the most important facts as to human and animal sight; the second sounds depths of difficult psychological problems. He soon became the leader in the science of the morphological treatment of zoology as well as

of experimental physiology. To his active re¬ searches (1830) are due the foundation of the Bell law concerning the work of the roots of the nerves of the spinal marrow, the settlement of the theory of reflex action, the more exact knowl¬ edge of the blood's constitution, lymphs, chyle, *etc.* He even investigated the vocal organs and sound expression, producing fundamental work on the sense of hearing. He finished his great work (Handbuch der Physiologie des Menschen5 (Coblenz 1833-40; 4th ed., 1841-44) in Berlin. It has been translated into English under the title (Elements of Physiology5 (1837-43). The work discloses an entire knowledge of physiology, including comparative organology and medical histology from their microscopical and chemical viewpoints. The work was epoch-making. From 1833 he issued numerous treatises on comparative and patho¬ logical anatomy and systematic zoology. Of such should be cited (Der verglichende Anatomie der Myxinoiden) (Berlin 1835-41) ; (Beschreibung der Plagiostomen) (ib. 1838— 41), in collaboration with Jacob Henle; (Ueber den Bau und die Grenzen der Ganoiden und das natiirliche System der Fische) (ib. 1844) ; (Ueber die Larven und die Metamophose der Echino-dermen5 (ib. 1849). His (Ueber den feineren Bau der krankhaften Geschwfilste5 (ib. 1838), which was

never finished, was a pioneer for microscopical research in patho¬ logical anatomy. From then on he worked al¬ most exclusively in the realm of comparative anatomy and brought forth numerous re¬ searches concerning the lower animals. He took 19 trips to the Baltic and North Sea, the Adriatic and the Mediterranean to investigate salt-water life. It is declared of him that he was the most versatile, fruitful, genial and lucky investigator of modern days, and he maintained his vitality till the end. He never questioned the rights of philosophy or even faith nor positive religion, but no single being has done more toward placing physics and chemistry in their correct place in physiologv and establishing the true method in contract with the errors of natural philosophy, spiritual¬ ism and orthodoxy, for all time. From 1834 he published Archiv fur Anatomie, Physiologie und wissenschaftliche Medizin. In 1899 a bronze statue was erected in his memory at Coblenz. Consult his biographies by Virchow (Berlin 1858) and De Bois-Reymond (ib.

1860).

• «

MULLER, Johannes von, German-Swiss historian: b. Schaffhausen, 3 Jan. 1752; d. Cas-sel, 29 May 1809. He studied at Gottingen, and in 1772 became professor of Greek at the gym¬ nasium at Schaffhausen, and published (Bellum Cimbricum,5 his first work. He lived and taught in Geneva 1774-80, where he began his (Allgemeine Geschichte5 (3 vols., 1810), and published the first volume of his (Geschichte der Schweitzer.5. From 1781 to 1786 he taught history and statistics at the Collegium Caroli-num at Cassel. In 1786 he became librarian and councillor of state to the Elector of Mainz. Here he wrote his ˆGeschichte der schweizer-ischen Eidgenossenschaft) and several other works. In 1792, when Mainz was taken by the French, he went to Vienna, where the Emperor Leopold nominated him a member of the Privy Council. In 1804 he left Vienna for

Berlin, where he was appointed historiographer of the Hohenzollern family. He also published (Ueber die Geschichte Friedrich P ; (Ueber den Untergang der Freiheit der Alten Volker) ; (Versuch fiber die Zeitrechnungen der Vorwelt.5 After the battle of Jena, he was appointed by Napoleon (1807) Secretary of State in the new kingdom of Westphalia. His (Sammtliche Werke5 appeared in 27 volumes (1800-17) ; (new ed., 40 vols., 1831-35). Consult lives by Heeren (1820) ; Doring (1835) ; Monnard, in French (1839), and Thiersch

(1881).

MULLER, Julius, German theologian : b. . Brieg, Prussia, 10 April 1801 ; d. Halle, Ger* many, 27 Sept. 1878. He was educated at Bres¬ lau and Gottingen, and abandoned the study of law for theology. He was opposed to the Ra¬ tionalists, and in 1825-31 was in charge of sev¬ eral small parishes. In 1831 he was preacher at Gottingen University, and in 1834 was elected professor of theology there. From 1835-39 he was professor in Marburg, and for the re¬ mainder of his life filled the chair of theology at Halle. His greatest work is (Die christliche Lehre von der Sfinde5 (1829; trans. Edinburgh 1868), and among his other books are (The Evangelical Union) (1854); (Dogmatische Abhandlangen) (1870), *etc.*

MULLER, Karl Otfried, German archae¬ ologist and philologist: b. Brieg, Silesia, 1797; d. Athens, 1 Aug. 1840. The son of a field preacher, his education began at the gymnasium of his native town. He was then sent to Bres¬ lau, and afterward went to Berlin, where, as a pupil of Bockh, he devoted himself to the study of the life and art of the ancients. After pub¬ lishing the (7Egineticorum Liber5 (1817) he was appointed instructor in the Magdalum at Breslau. Here he made an elaborate analysis of Greek mythology, separating allegorical in¬ ventions from true history. In 1819 he was made professor of philology and in 1823 be¬ came professor ordinarius at Gottingen. He was a great traveler, and his writings embrace the whole circle of antiquity. His intention was undoubtedly to concentrate the results of his whole life of scholarly activity in his great work, (Geschichte hellenischer Stamme und1 StadteP He only completed two volumes, however: Vol. I, (Orchomenos und die Minyer5 (1820), and Vol. II, (Die Dorier5 (1824). One of his best-known works, <A History of the Literature of Ancient Greece,5 a translation by Lewis and Donaldson from the author's manu¬ script, was published in London in 1840, and the contmuator, Donaldson, published another edition in 1858. His (Kunstarchaologische Werke,5 in five volumes (1872-73), is a valu¬ able work. Mfiller's <iEschylus's Eumenides5 (Gottingen 1833) was the object of a pro¬ found controversy in which Gottfried Her¬ mann and his followers attacked him with great bitterness. Karl Mfiller was also prom¬ inent as an editor. Consult the biography bv F. Ranke (1870).

MULLER, Morten. See Morten-Muller.

. MttLLER, Victor, German historical painter: b. Frankfort, 29 March 1829; d. Munich, 21 Dec. 1871. Beginning his artistic career at the brankfort art school, he continued it at Antwerp and ultimately went

to Paris (1849), where he stayed for 11 years, dili-

gently studying the methods and manner of Couture, Delacroix and Courbet. He settled in Munich in 1865, and for the castle of Kronberg in the Taunus painted a series of scenes from the history of Baron Hartmuth von Kronberg. He also produced his famous (Hero and Leanderˆ Following these works came Cam¬ let with Horatio in the Churchyard* ; 'Ophelia*; (Romeo and Juliet,* and his last and unfinished work, < Faust on a Stroll. *Among his other works are (Wood Nymph* ; (Tannhauser in Venusberg* ; <A Scene from Les Miserables. *His last finished picture was a ˆFlower Girl.* All of his works are distin¬ guished by a certain literary or poetic char¬ acter which appeals to the fancy like a strain of lyric music, although the coloring sometimes runs in its vividness to the verge of extrava¬ gance.

MULLER, Wilhelm, German poet : b. Des¬ sau, 7 Oct. 1794; d. there, 30 Sept. 1827. He studied at Berlin, but the war of 1813 called him from his books, and he was present as a volunteer in the Prussian army at the battles of Liitzen, Bautzen, Hanau and Kulm. In 1814 he returned to his studies at Berlin. His jour¬ ney to Italy (1819) produced his ingenious work (Rom, Romer und Romerinnen> (1820), and on his return to Germany he became teacher of Latin and Greek in the newly-estab¬ lished school at Dessau, where he was also ap¬ pointed ducal librarian. In 1824 appeared his 'Gedichte aus den hinterlassenen Papieren eines reisenden Waldhornisten.* His (Lieder der Griechen) (1821-24) celebrate the awakening of an oppressed nation, its struggle and its victory. His (Lyrische Spaziergange* (Leipzig 1827) displays the same truth to nature, freshness and fire and the same harmony of language which characterizes his other poems. Many of his poems imitate with utmost perfection the true German Volkslied. Several of the (Muller-lieder*. are familiar through Franz Schubert's remarkable musical settings. His (Bibliothek deutscher Dichter des 17. Jahrhunderts) (1822-27) is a valuable collection of the best lyric poems of that period. His works were col¬ lected in five volumes (1830). He was the father of Prof. Max Muller,

the well-known philologist. A critical edition of his works ap¬ peared at Berlin in 1906. Consult Hako, B., (W. Muller, Leben und Dichten) (Berlin

1908).

MULLER, Wilhelm Max, American Ori¬ entalist: b. Gleissemberg, Germany, 15 May 1862; d. 12 July 1919. He studied at the uni¬ versities of Erlangen, Leipzig, Berlin and Munich, obtaining the degree Ph.D. at Leipzig. In 1888 he became a resident of the United States, but spent much time making researches in Egypt (1904, 1906 and 1910) under the aus¬ pices of the Carnegie Institution. He was pro¬ fessor in the Reformed Episcopal Seminary at Philadelphia after 1890 and assistant professor of Egyptology at the University of Pennsyl¬ vania. He wrote (Asia and Europe after the Egyptian Monuments) (1893) ; (The Love Poetry of the Ancient Egyptians > (1899), both of which are in German; (Egyptological Re-sea'rches> (1906-10) ; (Mythology of the Ancient Egyptians* (in (Mythology of all Races, *1918). He was also a contributor to the Encyclopaedia Biblica,* (Jewish Encyclopaedia* and joint

editor of (Gesenius Hebrew Dictionary>

(1905).

MULLER, mul'ler, William James, Eng¬ lish painter: b. Bristol, 28 June 1812; d. there, 8 Sept. 1845. He studied painting under J. B. Pyne, and first exhibited in the Royal Academy in 1833, his picture being entitled <The De¬ struction of Old London Bridge — Morning.) In 1833-34 he visited Germany, Switzerland and Italy, and in 1838 Greece and Egypt; while in 1843 he accompanied the Lycian expedition under Sir Charles Fellowes, bringing back many sketches and pictures of Oriental life and scenery. He lived for some time in London, but returned to Bristol in later life. His pic¬ tures, though not numerous, are of exceptional power and merit, among the more notable being the (Baggage Wagon *; (Dredging on the Med¬ way J ; (The Slave Market*; and the <Salmon-weirP He painted both in watercolor and in oils, and was remarkable as a colorist. Con¬ sult the (Memoir) by Solly (London 1875).

MULLER-URY, Adolfo, Swiss-American portrait painter : b. Airolo, Switzerland, 28 March 1864. He was educated at the public schools and at Sarnen and became a pupil of Deschwanden at Stans, Switzerland, after which he entered the Munich Academy and then went to Paris to study under (1881-83) Cabanel. From 1883-85 he worked at Rome and came to the United States in 1886. He has done numerous canvases on religious subjects but his paintings are mostly portraits, among which figure Pope Pius X, several car¬ dinals, Bishop Kennedy (1907), some English nobility and other European personages. In this country he has painted among other por¬ traits those of President McKinley, General Grant, Senator and Mrs. Depew, Senator Hanna, J. Pierpont Morgan, J. J. Hill, Mrs. Woodrow Wilson' (1916), President Wilson (1917), *etc.*

MULLET, the name of several distinct kinds of fishes having external similarities. (1) The red mullets or surmullets are a group of elongate marine fishes of moderate size, re¬ nowned for the delicacy of their flesh, and the esteem in which they were held by the ancients. They with the goat fishes (Upeneus) and others form a family Mullidce, with five genera and about 40 species, found in all tropical seas, and some species straying northward. Jordan, who classifies them in the suborder Berycoidei, re¬ marks : ((The family is a very natural one and not closely related to any other.** It resembles the barracudas (P olymixiidco) in having two long unbranched erectile barbels at the throat, which are of service in exploring the muddy bottom along which these fishes creep and search for animal food, mainly small crusta¬ ceans. The best-known species is that of the Mediterranean (Mullns barbatus), which is a small fish, rarely exceeding six inches in length, and is carmine red on the upper parts and sil¬ very white on the lower surface. This is the fish held in so high esteem by Roman epicures, and reared in ponds where they were attended and caressed by their owners, and taught to come to be fed at the sound of the voice or bell of the keeper. Specimens were sometimes sold for their weight in silver. Pliny instances a case in which the sum of about £60 sterling was

paid for a single fish; and an extraordinary ex¬ penditure of time was lavished and wasted upon these slow-learning pets. Juvenal and other satirists descanted upon the height to which the pursuit of this luxury was carried as a type of foolish extravagance. Hortensius, the rival of Cicero, we are told, had a canal of water constructed below the festive table, in which the mullets were allowed to swim, and from which they might be carried to table, and thence to the fire to be cooked and dressed. Apicius invented a mode of drowning or suf¬ focating these fishes in a certain sauce or pickle, which process was said to add highly to their flavor. A similar fashion prevailed of old in England with regard to lampreys, which were drowned in wine previously to being cooked and eaten. This mullet is still esteemed as an article of food, the flesh being white, fat and nutritious. They are caught mainly in nets and are hawked about the streets of Italian cities, not under the old Latin name ˆmugli,® but by one from the Greek, “trigleA The roes are preserved as condiment called botargo and re¬ sembling caviare.

A closely related fish, the striped red mullet or surmullet (M. cephalus), is caught abun¬ dantly about the British Islands and along the continental coast, and is seen sparingly in the local markets. By some naturalists these mul¬ lets are thought to be only the females of the Mediterranean species. A smaller form of the same species is frequently taken on the eastern coast of the United States. Another genus (Mullolides) is represented in the Gulf of California by a single species.

(2) The gray mullets are a group of spinv-rayed marine fishes forming a family (Mugili-dce) of the suborder Percesoces, allied to the silversides and barracudas. They are oblong fishes of moderate size, without a lateral line, very numerous in species common in all warm parts of the world, and often appearing in vast schools, so that they may be captured by whole¬ sale in large nets. Though the flesh is not so good as that of the red mullets it is nutritious, and many species are economically important. These mullets are short-finned, small-mouthed, bottom-feeding fishes, subsisting chiefly upon the little animals or organic matter found in sand and mud ; and they have a special strain¬ ing apparatus in the pharynx for the purpose of preventing objects of too large size from en¬ tering the stomach, or foreign substances get¬ ting into the gill-chamber; after grinding a mouthful between the pharyngeal bones (for teeth are absent or feeble) the mineral matter is rejected. Another peculiarity of the mullets is to be found in the structure of the oesophagus and stomach, the former being lined with long thread-like papillae, while the latter has its sec¬ ond portion furnished with muscular walls like the gizzard

of a bird, but not divided. The common species is the striped or liza (Mugil cephalus) which seems to be almost cosmopoli¬ tan, as it is known not only on both Atlantic shores but abundantly from California to Chile. It is one to two feet long, dark bluish above, sides silvery, with conspicuous dark stripes along each row of scales. A smaller, more thoroughly marine species, dark olive and with¬ out streaks, is the white mullet or liza blanca (M . Curema), numerous on both American

coasts. Several other species are taken in the Gulf of Mexico and southward, one of which (M . gyrans) has the curious habit of swimming round and round at the surface in schools, and is called whirligig mullet.

(3) In the Mississippi Valley, several suck¬ ers (q.v.) of the family Catostomidce are called mullets in reference to their mullet-like appear¬ ance and behavior.

Consult Gunther, (Study of Fishes) (1880) ; Goode, ˆFishery Industries,* sec. 1 (1883) ;

(American Fishes) (1888); Jordan and Evermann, (American Food and Game Fishes *

(1902).

MULLIGAN LETTERS, in American po¬ litical history, a series of letters written by James G. Blaine (q.v.) to Warren Fisher, a business associate, which it was alleged proved legislative corruption upon the part of Blaine in the matter of bills in Congress concerning the Little Rock and Fort Smith and the North¬ ern Pacific railroads. The letters were ob¬ tained by one James Mulligan, a clerk of Fisher, who appeared as a witness before a Congres¬ sional committee appointed to investigate Blaine. On 5 June 1876 Blaine secured these letters and read them before the House, after defying the committee to compel him to sur¬ render them. The letters were freely used as campaign documents in the Presidential con¬ tests of 1876 and of 1884, by Blaine’s enemies. Consult Peck, <Twenty Years of the Republic (New York 1906).

MULLINGER, mul’ling-ger, James Bass,

English historian : b. Bishop Stortford, Eng¬ land, 1834. He was graduated from Saint John's College, Cambridge, in 1866 and in 1881 — 83 was lecturer at Bedford College, London. In 1885-95 he was lecturer on history of educa¬ tion to the Teachers' Training Syndicate at Cambridge and in 1890-94 lecturer on ecclesias¬ tical history at Trinity College, Cambridge, since when he has been librarian and lecturer in history in Saint John's College. He has published, among other works, Cambridge Characteristics in the 17th Century) (1867); (The Schools of Charles the Great* (1876) ; (The Age of Milton) (1897) ; (History of Saint John's College, Cambridge) (1901) ; and wrote the article (Popedom* for the ninth edition of the Encyclopaedia Britannica.*

MULLION, in architecture, a vertical divi¬ sion between the lights of windows, screens, *etc.* The term is also applied to the division between the panels in wainscoting.

MULOCK, mu'lok, Dinah Maria. See

Craik, Dinah Maria.

MULOCK, mu'lok, Sir William, Canadian educator and politician: b. Bond Head, Ontario, 19 Jan. 1844. He was graduated from the Uni¬ versity of Toronto in 1863 and 1868 was ad¬ mitted to the bar. He was first elected to the Parliament of Canada in 1882 and was vice-chancellor of the University of Toronto from 1881 until 1900 when he resigned. He was Postmaster-General of Canada from 1896 to 1905 and was instrumental in establishing the penny postal rate with other parts of the em¬ pire. He was Minister of Labor 1900-05. Be¬ sides his public duties he is connected with many large financial interests.

MULREADY, mul'red-i, William, Irish

genre painter: b. Ennis, County Clare, 1 April 1786; d. London, 7 July 1863. He went to Lon¬ don while yet a child, and there his talent for art came under the notice of Banks, the sculptor, who assisted him in

his education, and in 1800 he became a student of the Royal Academy, where he first exhibited in 1804. In 1806 ap¬ peared his (Hampstead Heath* and in 1809 (Returning from the Ale House) and (The Carpenter's Shop.* He was elected an asso¬ ciate of the Royal Academy in 1815, and to full membership in the following year, an honor won by cThe Fight Interrupted.* Although purely English in his education, subjects and general treatment, Mulready's pictures, in color and characteristic care of detail, have often suggested comparisons of him with the Dutch painters. While popular in character, his work never descends to the merely vulgar or sensa¬ tional, his representations of common life being properly dignified by the fidelity and thorough¬ ness of his art. Besides those already men¬ tioned, his best known works include (Giving a Bite* (1836) ; (Snow Scene> (1842) ; Choos¬ ing the Wedding Gown* (1846) ; (The Bathers> (1857) ; and (The Wolf and the Lamb.* His illustrations to (The Vicar of Wakefield) were very successful. Mulready became most widely known through the ornamental design which he furnished in 1840 for the postal envelope de¬ vised by Rowland Hill (q.v.). Nearly all of Mulready's best pictures are now the property of the English nation. Consult Stephens, (Memorials of Mulready) (London 1867).

MULTAN, mool-tan', or MOOLTAN,

India, an ancient city of the Panjab, capital of a district, 190 miles southwest of Lahore, and four miles from the present left bank of the Chenab. It is surrounded by a dilapidated wall, upward of three miles in circumference. It is an important railway centre. The principal manufactures are silks and fine cotton fabrics, while coarse cotton cloth is also produced for home consumption. Multan has an extensive foreign trade with the countries west of the Indus, and a large banking business is carried on by its merchants. The fortress built in 1640 stands to the north on a mound of earth on the site of the old city. The vicinity is covered with a vast quantity of the ruins of tombs, mosques and shrines. Many of these have been substantial edifices. The tombs of Bhawal Hakk, Shams i Tabriz and Rukn ul Alam and the Hindu temple of the Narasingh Avatar of Vishnu are the most important. There is an important cantonment one and one-half miles east of the city. Multan is one of the most ancient cities in India. It was taken by Mahmud of Ghazna in 1005 ; by Pir Mohammed for Tamerlane in 1398. After many vicissitudes it fell into the hands of the Sikhs, from whom it was taken by the British in 1849. Pop.

99,243.

MULTIPLE SERIES. See Series.

MULTIPLE STARS. See Double Stars.

MULTIPLICATION. See Algebra, Defi¬ nitions and Fundamental Concepts; Arith¬ metic; Mathematics.

MULTITUBERCULATA, a group of fos¬ sil mammals of small size, first appearing early in the Mesozoic and disappearing with the Paleo—

cene. They were so called from the many tuberculated surfaces developed upon the molar teeth. They were reptilian and are considered the earliest of the mammals, and were probably egg layers. Little is known of the structure of these animals except as to the lower jaws and teeth. The character of these last had sug¬ gested that these forms belong near the Mono-tremata (q.v.) in the subclass Prototheria (q.v.). The propriety of the term and the characteristics of the group are discussed by Beddard, in (Mammalia* (1902).

MUMBO JUMBO, an African (Mandingo) superstition ; a bogie, hideous and malignant, who is the terror of negro women and children.

MUMFORD, James Gregory, American physician: b. Rochester, N. Y., 2 Dec. 1863; d. 1914. He was educated at Saint Paul's School, Concord, N. H., and was graduated (1885) at Harvard and received the M.D. diploma (1890) from the Harvard Medical School. He started medicine and surgery practice at Boston in 1890, was appointed (1892) surgeon to Carney Hospital and (1894) to out-patients of the Massachusetts General Hospital. He served successively as assistant in surgery (1C°5) and instructor in surgery (1902) at Harvard Med¬ ical School, and became (1905) visiting surgeon of the Massachusetts General Hospital. He wrote (Narrative of Medicine in America) (1903) ; (Clinical Talks on Minor Surgery) (1903) ; (Surgical Aspects of Digestive Dis¬ orders * (1905), besides contributing numerous articles to the surgical and medical periodicals. He wrote the introductory article on (History of Surgery) for Dr. W. W. Keen's (System of Surgery. >

MUMMICHOG. See Killifish.

MUMMIUS, mum'i-us, Lucius, Roman con¬ sul : flourished about

185-130 b.c. He served as praetor in Spain in 146 b.c., conquered Greece, where he burned and pillaged her finest cities, sending the art treasures of Corinth to Rome. According to Cicero, he did not retain any of the plunder. He was made governor of Achaia with the surname Achaicus, and a triumph was held in his honor. In 141 he was reelected consul. He later became a censor, but of his last years and death little is clearly known.

MUMMY (Arab, mumia), specifically a dead body preserved from putrefaction by embalm¬ ing with bitumen or other asphaltic substances. The wider use of the term includes bodies pre¬ served in a dry state by any process. The custom of thus preserving the bodies of the dead has prevailed in several countries. Hum¬ boldt found mummies in Mexico, and in Peru the bodies of the Incas were rudely embalmed and dried. The Guanches, or aboriginal in¬ habitants of the Canaries, removed the entrails of the dead, dried the corpse in the air, covered it with aromatic varnish and, wrapping it in goat skins, kept it in a wooden case. These mummies, of which thousands have been found, are light in weight, of a yellow color and have a strong aromatic odor. But it was among the ancient Egyptians that the art and practice of embalming the dead were carried to the great¬ est extent and highest perfection. From Egypt the practice spread southward alono-both coasts of Africa and to India, Malavsia. Polynesia, Australia and Arabia. On the Western Con-662

tinent it reached Peru, Colombia and Mexico and also Alaska. In the last-named country it may have been sporadic for it was first in vogue there about 1720. All the dead of Egypt, including many animals, were embalmed in some manner, partly, it is supposed, from re¬ ligious motives and partly for sanitary reasons. The notion formerly prevalent that the Egyp¬ tians preserved the body in order to keep it in a fit state to receive the soul when it should have passed through its allotted transmigrations is inconsistent with the facts that tombs were sometimes sold to later occupants. The origin of embalming among the Egyptians has been attributed to their first merely burying in the sand, impregnated with natron and other salts, which dried and preserved the body, which nat¬ ural process they afterward imitated, drugs and bitumen being later improvements. Compara¬ tively few mummies of children have been discovered in Egypt, though even

those just born were embalmed. Embalming was prac¬ tised by the Hebrews to some extent. Joseph commanded the physicians to embalm his father and in the time of Christ it was <(the manner of the Jews® to bury the body ((wound in linen cloths with spices.® The practice continued in Egypt from 4500 b.c. till the 7th century, and was common among the Greeks there, and even among the early Christians. It seems to have fallen gradually into disuse. See also Embalm¬ ing; Egypt. Consult Meany, E. S., (Alaskan Mummies) (Seattle 1906) ; Pettigrew, J. J., (A History of Egyptian Mummies) (London 1834) ; Smith, G. E., (The Migration of Early Culture) (Manchester, England, 1915).

MUMMY WHEAT, a variety of wheat said to have been produced from grains found in an Egyptian mummy, but there is no good reason to believe the legend. It has long been in general cultivation in Egypt and neighboring countries in Africa. The spike is compound

MUMPS, a popular name for a contagious epidemic inflammation and enlargement of one or both parotid salivary glands, occurring usu¬ ally in youth, males being more frequently affected than females. In some localities it disappears for years, in other places it is en¬ demic. Epidemics usually occur in the spring or fall. One attack generally gives immunity. The period of incubation is from 7 to 20 days. The disease is sometimes preceded for a few days by malaise, loss of appetite, irritability and feverishness. Its onset is marked by stiff¬ ness and pain about the jaws, followed by heat, pain and swelling about the lobe of the ear, earache and tinnitus aurium, fever (100°- 104° F.), more or less rigidity of the neck, with distortion of the side of the head and difficulty in chewing, swallowing and talking. The in¬ flammation is usually at its height by the third day of the disease, and the disease has sub¬ sided generally by the 7th or 10th day. Very seldom is there any suppuration of the affected gland. In some cases the subsidence of the gland inflammation is followed by pain and swelling of the testes of the male, and of the ovaries, vulva and breasts of the female, the complication being more common in males than in females. Occasionally a meningitis super¬ venes. Not infrequently a middle ear catarrh follows, leading to total deafness. The term mumps is sometimes applied to a parotiditis

following a local injury, diseases of the mouth, diphtheria, occlusion of the salivary duct by a foreign body, *etc.* There is a secondary symp¬ tomatic or metastatic form of mumps which sometimes follows dysentery, scarlet fever, smallpox, measles, *etc.* The parotid gland in

this form of mumps tends to suppurate. The best treatment for mumps consists in rest, pref¬ erably in bed, the giving of saline laxatives and soft food, relieving the fever, and securing sleep by mild remedies and keeping the face warm with flannel or some other agreeable application. In cases of slow convalescence tonics should be given.

MUN, men, Albert, Count de, French poli¬ tician : b. Lumigny, Seine et Marne, 23 Feb. 1841; d. 1914. He was graduated (1862) at Saint Cyr, and entered the army and fought in the Franco-Prussian War (1870-71), to be¬ come a captain and ordnance officer of the gov¬ ernor of Paris. He devoted himself to the Ultramontaine party and founded the Catholic Labor Circles. Owing to the complaints of the Liberals concerning such activities on the part of an officer he resigned (1875) his commis¬ sion and, with the aid of the Clerical party, was elected (1876) as deputy. He took his place among the extreme <(Rights,® representing both Church and monarchy. He led mass-meetings to agitate for the union of Church and State and social reform in the Catholic sense. In 1897 he was made member of the Academy. In 1913 he advocated the abolition of the Three-Year Military Law, but when war broke out next year his eloquent oratory was exerted exhorting his fellow-citizens to show courage and persistence. His speeches were issued in collective form (Paris 1888-1904) in seven volumes. He wrote (Les congregations religieuses devant la Chambre) (1903) ; (Con-tre la separation (1905) ; (L'heure decisive*

(1913).

MUN, Thomas, English merchant and po¬ litical economist: b. London, England, June 1571 ; d. there, July 1641. He engaged in mer¬ cantile business when very young, was inter¬ ested in the Mediterranean trade and in 1615 was a director of the East India Company. As a writer on economics he presents really the first clear and systematic treatment on the sub¬ ject and his is admitted to have been of great influence. He published (A Discourse of Trade, from England into the East Indies.* in 1621, and his greatest work, (England's Treasure by Foreign Traded was published posthumously in

1664.

MUNBY, Arthur Joseph, English poet : b. Bulmer, Yorkshire, England,

22 Aug. 1828; d. Ripley, Surrey, 29 Jan. 1910. He was graduated at Trinity College, Cambridge, in 1851, and was admitted to the bar of Lincoln's Inn in 1855. He was the author of (Verses Old and New,* which contains the much admired pastoral poem <Doris) (1865) ; Dorothy1* (1880), which has been widely circulated in 'the poet's own coun¬ try and in America; (Vestigia Retrorsum* ((Steps Backward,* 1891); <Vulgar Verses, by Jones Brown * (1891), mostly in dialect;

(Susan* (1893) ; (Ann Morgan's Love) (1896) ; (Poems, Chiefly Lyric and Elegiac) (1901) ; <Relecta) (1909).

MUNCH, moonH, Peter Andreas, Scandi¬ navian historian: b. Christiania, Norway, 15

Dec. 1810; d. Rome, 25 May 1863. He was educated at the University of Christiania and studied deeply the old Norse language and an¬ tiquities. In 1841 he was appointed professor of history at the University of Christiania. He was accorded the unusual privilege of access to the papal archives in Rome, where he spent much time in study. His principal work is (History of the Norwegian People) (1852-63). Munch published several works of a linguistic character, and, repudiating the term ((Icelandic,*) maintained that the so-called Ice¬ landic literature was really Old Norse. He also translated several of the Old Norse sagas. A collection of his essays was edited by Gustav Storm (1873-76).

MUNCH, Peter Andreas, Norwegian poet: b. Christiania, 19 Oct. 1811; d. near Copen¬ hagen, 27 June 1884. He was originally a stu¬ dent of law, but became an editor (1841-46) and professor in the university (1866) at Christiania. Among his writings are (Sorg og TrosU ((Grief and Consolation)), of which seven editions have been printed;

(Ephemera) (1836); (King Sverre's Youth) (1837), a drama; (The SingerJ (1838); (Poems Old and New) (1848) ; (Pictures from North and

South) (1848), in prose; (New Poems) (1850) ; (Lord William RusselP (3d ed., 1888), a tragedy, and (An Evening at Giske) (1855), a historical drama. Munch translated into Nor¬ wegian many works from such authors as Tennyson and Walter Scott, and wrote some popular Norwegian songs.

MUNCH-BELLINGHAUSEN, munk-bel'- lmg-how'zen, Eligius Franz Joseph, Freiherr von, also known under the pseudonym Fried¬ rich Halm, Austrian dramatist and short-story writer: b. Krakau (Cracow), 2 April 1806; d. Vienna, 22 May 1871. He came to Vienna in 1811 and began studying law there in 1822, making the acquaintance while a young student of such prominent literary men as Bauernfeld, Lenau, Seidl, *etc.* In 1826 he entered the em¬ ploy of the Austrian government as a lower official and remained in the bureaucracy from that time until his death, his chief positions be¬ ing custodian (later director) of the court li¬ brary and general superintendent of the Vienna Hofburgtheatre. As a dramatist, Halm's posi¬ tion in German literature is that of a con¬ structor of correct dramatic outlines, often banal in their conventionality, which are always surrounded with resounding rhetoric and a peculiar union of romanticism and pessimism, together with occasional real feeling. His first play, (Griseldis) (1835) had a great stage suc¬ cess and passed over most of the stages of Ger¬ many. There followed a number of less suc¬ cessful productions: (Camoens) (1837);

(Adept,) tragedy (1838) ; Umelda Lamber-tazzi,) tragedy (1842). His greatest success and his best-known play is (Der Sohn der Wildnis) (1842; known on the English stage as Ungomar)), although (Der Fechter von Ra¬ venna) (1857) also was very popular. Of his short stories the best are (Die Marzipanliese) and (Das Haus an der Veronabrucke.) His works have 'been published: *Werke) (8 vols., Vienna 1856-64; 4 additional vols., 1872) ; (Ausgewahlte Werke) (4 vols., Leipzig 1904* another ed. by Bong, Berlin 1910). Consult Schneider, (Friedrich Halm und das spanische

Drama) (Berlin 1909) ; Schachinger, R., (Brief wechsel zwischen M. Enk und Halm) (Wien 1890) ; Pachler, F., (Die Jugendjahre Halms) (Wien 1877).

MUNCHEN (miin'Hen) GLADBACH. A

town in the Prussian Rhine province.

MUNCHHAUSEN, miinh'how-zen, Hier¬ onymus Karl Friedrich, Baron: b. Boden-werder, Hanover, 1720; d. there, 1797. He was a German soldier and served in his youth as a cavalry officer in the Russian army. He was possessed of an adventurous and dare-devil spirit and an imagination that knew no bounds. He told the most wonderful stories of his adventures in the Turkish campaign of 1737-39, and soon became famous as the most unique exaggerator that ever lived. The tradi¬ tion of the baron's story-telling is supported by the evidence of a clergyman, who says that in his old days the officer used to relate his most surprising adventures <(in a cavalier manner, with a military emphasis, but without any pas¬ sion and with the easy humor of a man of the world, as things which required no explanation or proof.® His tales are thought to have been first compiled by Rudolf Erich Raspe, a man of letters, who, being compelled to flee from his position as curator of the museum at Cassel to England on account of a charge of embezzle¬ ment, was engaged in London in literary pur¬ suits, and is generally believed to have pub¬ lished anonymously an English edition of the stories under the title of (Baron Munchausen's Narrative of his Marvelous Travels and Cam¬ paigns in Russia) (1785). A second edition, enlarged and ornamented, was published at Ox¬ ford in 1786 under the title of (The Singular Travels, Campaigns, Voyages and Sporting Adventures of Baron Munnikhouson, commonly pronounced Munchausen; as he relates them over a bottle when surrounded by his friends.) A third edition, published by Kearsley in Lon¬ don the same year, bore the title of (Gulliver Revived.) The story passed through many edi¬ tions by differenthands, gaining more and more accretions each time, whether in form of bor¬ rowings from Lucian or of topical Huts® on Baron de Tolt, Montgolfier, the first balloonist, or Bruce, the explorer of the Nile. One of the best editions is that by Shore 0872), illus¬ trated by Dore, with additions by Theodore Gautier. It is said a large proportion of the hunting tales are derived from Henry Bebel's (Facetiae) (1508), while other incidents are bor¬ rowed from Castiglione's (Cortegiano) and Bil-dermann's (Utopia,) which are included in Lange's (Deliciae Academicae5 (1765). Consult Miiller-Fraureuth, <Die deutschen Lugendich-tungen auf Munchausen) (1881). See Adven¬ tures of Baron Munchausen, The.

MUNCHHAUSEN: A Story in Arabes¬ ques: a satirical romance by Karl L. Immermann (q.v.) originally published in four vol¬ umes in Diisseldorf during 1838-39. The eponymous hero is presented as the

nephew of the famous prevaricator, while the author has also taken at least a part of his ideas from (Don Quixote) in attaching to the hero a droll serviteur who closely resembles the materialistic Sancho Panza. Other influences are traceable in the work, notably of Riickert's translation of Hariri's (Makamen,) Swift's (Gulliver's

Travels) and (Gil Bias.1* The story may be described as a formless mass of episodes played in Westphalian villages. The ((New Miinch-hausen® is a traveller like Humboldt ; like Gulliver, he sojourns among and converses with animals ; like Gil Bias he serves as kitchen boy ; like Cagliostro he lives indefinitely on re¬ juvenating medicine. He appears in different roles, and in each character successfully ex¬ ploits the credulity of his audiences. As a disinterested financier and company promoter he is eminently and humorously successful.

MUNCIE, mun'si, Ind., city, county-seat of Delaware County, on the White River, and on the Central Indiana, the Lake Erie and Western, the Cleveland, Cincinnati, Chicago and Saint Louis, the Chesapeake and Ohio of Indiana, Fort Wayne, Cincinnati and Louisville and other railroads, about 56 miles northeast of Indianapolis. There are six interurban lines. A belt railway encircles the city and furnishes intercommunication among the lines which enter the city. Muncie is situated in an agricultural region and in a natural-gas belt. The chief manufacturing industries are iron and steel works, glass works, machine shops, canneries, pulp and paper mills, manufactories for silver and silver-plated goods, wagon and carriage works and flour mills, automobiles and auto¬ mobiles parts, motors, pianos, toys and gloves. Other articles manufactured are gas-engines and gas fixtures, knit underwear, glass-jars, lawn mowers, silverware, wheels, boilers, iron bed¬ steads, caskets and undertakers' supplies. There is a large trade in the manufactures of the city, and in coal, farm products and live¬ stock. The city is the seat of the Eastern branch Indiana State

Normal Institute. The city has good public and parish schools, good modern high school, a public library which has over 35,000 volumes, a city hospital, courthouse and a number of fine churches. The govern¬ ment building cost over $80,000 and the public library building $50,000. The present form of city government is on the Federal plan, consist¬ ing of a Mayor and aldermen elected under the ward system and with the usual executive branches. Pop. (1920) 36,524.

MUNDE, mun'de, Paul Fortunatus, Amer¬ ican gynecologist: b. Dresden, Saxony, 7 Sept. 1846; d. New York, 7 Feb. 1902. After coming to the United States in 1849 he attended the Boston Latin School and then studied medicine at Yale. He left before completing his course, entering the Union army as medical cadet in 1864. He was afterward graduated from the Harvard Medical School in 1866 and went to Germany, where he enlisted in the Bavarian army. He was decorated by the emperor with the Iron Cross for heroism in saving the lives of patients from a burning hospital near Paris. After devoting himself to study and practice in hospitals in Berlin, Heidelberg, Paris, Lon¬ don and Edinburgh he took up his residence in New York in 1873, and practised obstetrics and gynecology. He was appointed professor at Dartmouth Medical College and in the New York Polyclinic in 1882. He edited (1874-92) the American Journal of Obstetrics, and was president of the American Gynecological Society in 1897-98. Among his works are (Minor Surgical Gynecology) (1880); (Appendix to

the Midwifery of Cazeaux and Tamier* (1884); (Pregnancy and the Puerperal State5 (1887), and (Diseases of Women7 (1891).

MUNDELEIN, George William, American Roman Catholic archbishop: b. New York, 2 July 1872. He studied first at the De La Salle Institute and later at Manhattan College, after which he began his theological course at Saint Vincent's Seminary, Beatty, Pa., completing it at the Urban College of the Propaganda in Rome. Ordained to the priesthood in Rome 8 June 1895, he became assistant secretary, to Bishop McDonnell of Brooklyn, N. Y., being appointed diocesan chancellor in 1897, which office he held for 12 years. In 1903 Father Mundelein was named censor of the Liturgical Academy; in 1906 was elevated to the rank of domestic prelate and in 1908 received from the Propaganda the degrees of licentiate of sacred theology and doctor of divinity. Monsignor Mundelein was consecrated titular bishop of Loryma and auxiliary bishop of Brooklyn 21 Sept. 1909 and on 15'

Dec. 1915 was promoted to the archiepiscopal see of Chicago, receiving the pallium at the hands of Archbishop John Bonzano, Apostolic Delegate to the United States, 9 Feb. 1916. Archbishop Mundelein is a distinguished liturgist and theologian and a linguist of marked ability and as metropolitan of the ecclesiastical province of Chicago is shepherd of over 1,150,000 souls.

MUNDEN, mun'den, Prussia, town in the government district Hildesheim, located on the confluence of the Werra and Fulda with the Weser. It is the junction of the Hanover-Elze- Cassel and the Nordhausen-Munden state rail¬ ways. The neighborhood has romantic forests and contains two Lutheran churches, the Blasu-kirche dating from 1263 has a monument to Erich II of Brunswick, besides a Catholic, a Reformed church and a synagogue. There are also an ancient castle with a museum, an Im¬ perial academy of forestry, a gymnasium, a realprogymnasium, *etc.* Its industries include rubber works, wooden and lead ware, leather, tobacco and cigar factories, also factories pro¬ ducing cellulose, artificial manures, glass-paper, a sugar refinery, boiler factory, *etc.* Consider¬ able commerce is carried on in lumber and ship¬ ping. In 1910 it had 10,991 inhabitants.

MUNDT, moont, Klara Muller (((Muhlbach, Luise®), German novelist: b. Neubran-denburg, January 1814; d. Berlin, 26 Sept. 1873. She was married to Theodor Mundt (q.v.) in 1839. She was an extremely prolific writer of popular historical novels, which though quite without merit in point of style are by no means wanting in descriptive excellence. They were all published under the pen name of <(Luise Muhlbach® and have had as many eager read¬ ers in this country and England as in the writer's own land. Among them are (Queen Hortense5 (5th ed., 1861) ; (Emperor Joseph II and his Court5 (9th ed , 1866) ; (Marie An¬ toinette and her Son5 (1867); (Emperor Alex¬ ander and his Court5 (1868) ; (Mohammed Alt and his House5 (1871) ; Frederick the Great and his Court5 (8th ed., 1882).

MUNDT, Theodor, German author: b. Potsdam, Prussia, 19 Sept. 1808; d. Berlin, 30 Nov. 1861. He was the husband of Luise Muhlbach. He studied at the University of

Berlin, and in 1842 became privat docent there. In 1848 he was appointed professor of litera¬ ture and history at the University of Breslau, and in 1850 was recalled to Berlin as university librarian and professor. He belonged to the <(Young German® school, was a Radical in poli¬ tics and favored the emancipation of women. His writings include (Madonna, Unterhaltung mit einer Heiligen) (1840), a memoir of Char¬ lotte Stieglitz; the novels, (Thomas Miinzer,) <Carmela) (1844) ; (Mendoza, der Vater der Schelme) (1847) ; (Die Matadore) (1850) ; the critical and historical works, (Kunst der Deutschen Prosa) (1837) ; (Geschichte der Ge-sellschafC ; (Geschichte der Weltliteratur) ; (Geschichte der Literatur der GegenwarC (1852) ; and political sketches included in (Pariser Kaiserskizzen) (1856) ; (Paris und Louis Napoleon) (1858) ; Utalienische Zustande) (1859-60). He also published Luther's (Politische Schriften^ and with Varnhazen von Ense edited Knebel's letters and posthumous works.

MUNGER, Theodore Thornton, American Congregational clergyman : b. Bainbridge, N. Y., 5 March 1830; d. 12 Jan. 1910. He was graduated at Yale in 1851, and at Yale Theologi¬ cal School in 1855. He held pastorates at Dor¬ chester, Mass., 1856-60; Haverhill, Mass., 1862-70; Lawrence, Mass., 1871-75; San Jose, Cal., 1875-76. He was for several years pastor at North Adams, Mass., resigning in 1885 to be¬ come pastor of the United Church, New Haven, Conn. He was prominent in his denomination as well as an active supporter of municipal reform. He published (On the Threshold* (1880); (The Freedom of Faith> (1883); (Lamps and Paths) (1883) ; (The Appeal to Life* (1887); 'Horace Bushnell* (1899); (Character Through Inspiration *, *etc.* Con¬ sult Bacon, B. W., 'Theodore Thornton Mun-ger, New England Minister* (New Haven

1913).

MUNGO, Saint, or KENTIGERN, the

patron saint of Glasgow: b. Culross, about 518; d. Glasgow, 13 Jan. 603. He was baptized and brought up by Saint Serf, the head of a mon¬ astery at Culross. His name, Kentigern or Cyndegyrn (from ken and tigearna) , means head lord, and it is said that it was exchanged by the brethren of the monastery for Mungo, the beloved, on account of the affection they bore him. On leaving Culross Kentigern took up his abode as a missionary priest near the site of the present Glasgow.

Here he was chosen bishop, but having troubles with the king of the Strathclyde Britons afterward took refuge at Saint David's in Wales, and while in that re¬ gion founded a religious establishment under a follower named Asaph, which afterward became the seat of the bishopric of Saint Asaph. Red-derech, king of the Strathclyde Britons, recalled him to Glasgow, where he acquired a character of great sanctity. The city arms of Glasgow are associated with various legends concerning Saint Mungo, and the cathedral is supposed to be built on the site of his monastery. The par¬ ish of Saint Enoch, in Glasgow, is so called from a corruption of his mother's name (The-neu). A life, written by Jocelyn of Furness about 1180, was published in Pinkerton's 'Vitae Antiquae Sanctorum Scotiae.* Consult Rhyr, J., 'Celtic Britain (London 1904) ; Skene, (Celtic Scotland* (Edinburgh 1877).

MUNGOOS, or MONGOOSE, an ich¬ neumon (Herpestes griseus), common in many parts of India, and closely akin to the Egyptian species ichneumon (q.v.). The mungoos is a burrowing, nocturnal, weasel-like animal, tawny yellowish-gray, 16 or 17 inches long, and with a long thick terete tail. It kills numerous birds, sucking their blood and leaving the body un¬ eaten. It also with great adroitness seizes and kills many snakes, the formidable cobra in¬ cluded, usually avoiding the serpent's stroke by its quickness. Its excitement and ferocity in these encounters is almost indescribable. It is, however, commonly domesticated as a mouser in the Orient, and has been colonized in various parts of the world to destroy vermin, usually with sad results; hence the bringing of a living one into the United States has been forbidden by law since 1902. This animal was introduced into Jamaica and some other islands of the West Indies about 1872, and later in Hawaii, in the expectation that it would overcome the plague of rats in the sugar plantations. It did so, but it multiplied excessively, killed off poul¬ try and insect-eating birds, reptiles and mam¬ mals, which were useful. Many of these ani¬ mals changed their habits somewhat to accom¬ modate themselves to the novel enemy, and the mungoos does not now multiply so rapidly as at first, and does less damage. The same experience was had elsewhere, and has warned other countries to avoid a repetition of it. Con¬ sult Blanford, (Fauna of British India; Mammals) (1889) ; Morris, (The Mungoos on Sugar Estates in the West Indies) (London 1884) ; and The Field (London, 13 July 1895) ; Lyd-deker, Richard, 'Royal Natural History* (Lon¬ don 1896) ; Cambridge Natural History) (New York 1904 et seq.).

MUNICH, mii'nik, or MUNCHEN, miin'- hen, Germany, the capital of Bavaria, one of the most beautiful cities in Europe, lies on an extensive but uninteresting plateau, about 1,700 feet above sea-level, on the left bank of the Isar, with suburbs on the right, the river being crossed by nine bridges. The original nucleus of the town was at one time surrounded by walls and ditches, and entered by lofty turreted gates. The ditches have been filled up and the walls removed, but three of the old gates, with their loopholed and embattled flanking towers, still remain. In the older part of the town there are many old houses, irregular both in size and form, and of quaint but not unpicturesque arch¬ itecture. This quarter, though it contains the government offices and many public edifices, is surpassed, both in extent and magnificence, by the new town, which has risen chiefly to the north and west, with almost unexampled ra¬ pidity and splendor, due to the art-loving pro¬ clivities of King Ludwig I and his successors, who spent over 7,000,000 thalers in beautifying the city, and adorning it with buildings of al¬ most every style of architecture, wide and hand¬ some streets, and squares and gardens deco¬ rated with statues and other monuments. Near the centre of the city, between the Max-Joseph- Platz and the palace gardens, is the royal palace, consisting of an old central building of vast extent and two modern wings. From this great pile run at right angles to each other the two finest streets in Munich — the Maximilian-strasse and the Ludwigstrasse. The chief pub-566

lie buildings are the old town-house and the new, the latter in the Gothic style, considerably enlarged in 1899; the old palace and the Herzog Max Burg, now used as public offices ; the post office; the central station (1880) ; the chief cus¬ toms house (1876-79) ; and the new palace of justice (1897). Buildings connected with art embrace the gallery of sculpture, or Glyptothek. an edifice of the Ionic order, containing a series of the finest ancient and modern sculptures; the Old Pinakothek or picture-gallery (1826-36) another beautiful edifice, containing one of the richest collections of pictures in the world ; the New Pinakothek, adorned externally with fres¬ coes and containing only paintings by recent masters ; the academy of arts, an imposing building in the renaissance style; the academy of the plastic arts (1885) ; the Schack Gallery of paintings (1894), named from its donor; the Schwanthaler and Kaulbach museums, *etc.* The Crystal Palace

(1854) is used for the an¬ nual art exhibitions. Other collections are the Hof-und-Staats Bibliothek, with 1,100,000 printed volumes and over 50,000 MSS. ; the old Bavarian national museum, now used for art collections; the new Bavarian national museum (1899), *etc.* The German Museum is in all probability the finest museum of technology and the physical sciences in the world. The chief theatre is the Royal and National Theatre, with a lofty Corinthian portico. Munich is rich in monuments, which adorn its squares, gardens and public promenades. Among the chief are the monument of Maximilian II, with his statue 26 feet high, and the colossal bronze statue of <(Bavaria,® 65 feet high. It is a hollow female figure, designed by Schwanthaler and cast from foreign cannon. From the head a fine view of the city and the Alps is obtained. It stands on a low eminence in front of the <(Hall of Fame,® a Doric building of horseshoe shape, contain¬ ing busts of notable Bavarians. The <(Gate of Victory,® in imitation of the arch of Constan¬ tine at Rome, and the Propylsea, in imitation of that at Athens, should also be mentioned. There is a fine statue of Maximilian I by Thor-waldsen, and statues of Schiller, Gluck, Schelling, Fraunhofer and Gartner, a bronze monu¬ ment to the Bavarian soldiers who died in the war with Russia and a monument to the chem¬ ist Liebig. The Hofgarten is a garden near the palace, finely planted, and surrounded by an open and richly ornamented arcade ; the so-called English Garden is an extensive and beautiful park. The cemeteries of Munich are noteworthy for their artistic tombs, probably the most beautiful in Europe. The ecclesias¬ tical buildings, include the cathedral or Frauen-kirche, founded in 1488, a vast pile, entirely of brick, with two lofty towers, terminating in domes 333 feet high ; Saint Michael's or the Jesuits' Church (1583), a handsome Italian structure; the church of the Theatines, another Italian structure, beneath which are the burial vaults of the royal family; the church of Saint Louis, a modern building of brick, faced with white marble, decorated externally with statues by Schwanthaler, and internally by the finest frescoes of Cornelius; the church of All Saints; the basilica or church of Saint Boniface; the Mariahilf church on the right side of the river; the three Protestant churches; and the Jewish synagogue. At the head of the educational in¬ stitutions is the university. (See Munich, University of). Closely associated with it are the university library with 600,000 volumes and 2,500 manuscripts, together with 3,000 incunab¬ ula; the Collegium Georgianum (1494), a priests' seminary; the Maximilianeum (1852), *etc.* There is also a high school of technology and numerous other high class institutions for educational purposes. The industrial develop¬ ment of Munich lags behind its

aesthetic devel¬ opment. Its stained-glass works, iron, brass and bell foundries, lithographing and engraving works and manufactories of optical and mathe¬ matical instruments and various artistic articles, are, however, deservedly noted. Still more famous are the enormous breweries of Bavarian beer, which annually produce about 49,000,000 gallons, of which 37,000,000 are consumed in the city itself. The brew-houses and beer-gardens are world famous. Munich carries on a large trade in grain and in objects of art.

In 1158 Henry the Lion raised the Villa Munichen from its previous obscurity by estab¬ lishing a mint and a salt-emporium within its precincts, the name (also appearing as Forum ad Monachos) being derived from the monks who owned the site. In the 13th century the dukes of the Wittelsbach dynasty selected Munich for their residence and fortified the town. In 1327 the old town was nearly de¬ stroyed by fire, and was rebuilt by the Emperor Louis the Bavarian ; it was not until the fortifi¬ cations were razed at the close of the 18th cen¬ tury that the limits of the town were enlarged to any extent. The true history of modern Munich is the account of its artistic develop¬ ment in the 19th century, closely identified with which are Klenze and Gartner the architects, Schwanthaler the sculptor, Cornelius and Kaul¬ bach, the painters, and Wagner the composer. The modern Munich school of painting, headed by K. von Piloty, W. Diez and Griitzner, is characterized by marked realism in color and detail, in contrast to the romanticism of the older masters. The elevated site of the city and the neighborhood of the Alps render it liable to sudden changes of temperature, some¬ times ranging over 20° in 24 hours. The popu¬ lation in 1801 was only 48,885; in 1915 it was 630,000; from 30.4 per thousand in 1871 the deathrate fell to 20.5 in 1904.

The university, the Academy of Fine Arts, and the Conservatory of Music, under the leadership of men of worldwide reputation, and the splendid facilities of the city in its theatres, museums and galleries, its handsome buildings and healthful location, attract thou¬ sands of visitors to Munich every year.

The municipal budget of Munich is about $4,500,000. The debt is not far from $40,000,000, but the city has almost twice the sum invested in public property. The city is governed by 2 burgomeisters, 40 magistrates and about 70 councilmen.

MUNICH, University of, German univer¬ sity, located in Munich, Bavaria. It had its beginning in the Studium Generale of Ingolstadt, founded by the Emperor Ludwig, with a special bull of approval by the Pope, Pius II, in 1459. The University of Ingolstadt opened its

doors in 1472; and after more than three centuries of continuous struggle and growth, and during which time it remained in the faith and under the influence of the Church of Rome,

it was removed by Ludwig Maximilian in 1800 to Landshut. In 1826 it was reorganized and transferred to Munich, where with increased facilities it has grown steadily in attendance and influence. The university has faculties of theology, law, medicine, philosophy, political science, etc., and numerous seminars and clinics, a botanical garden, museums, laboratories and an observatory; and has access to the libraries, museums and art treasures of the city. The university library contains 600,000 odd vol¬ umes, besides many manuscripts, pamphlets and records. The professors and instructors num¬ ber more than 200 and more than 7,500 students are in average attendance. The annual income averages $250,000, in large part contrib¬ uted by the government. Affiliated with the university are the Collegium Georgianum, for the education of Roman Catholic priests, founded in 1494, and the Maximilianeum, a sec¬ ondary school, founded in 1852.

MUNICIPAL ACCOUNTING IN THE UNITED STATES. Definitions — The term “municipality,® when used herein, is a generic designation of all public corporations formed by or for a community with powers of local gov¬ ernment, by whatever name or designation known in the several States of the Union. Chief Justice Marshall defined a municipal cor¬ poration as (<such only as is founded by the gov¬ ernment for public purposes where the whole interests belong to the government.® “Municipal accounting® is the adaptation or application of generally recognized principles and methods of accounting to the conditions, business and re¬ quirements of municipalities — the art or sci¬ ence of analyzing, classifying, recording, sum¬ marizing and elucidating facts relative to finan¬ cial transactions.

Objects of Municipal Accounting. — Its

function or purpose is to make possible the pro¬ duction, from the accounts of a municipality, of complete, accurate and prompt information and statements of the financial results of its opera¬ tions for any given period and of its financial condition at any given time, and to supply all other information which accounts can supply for the orderly and prosperous administration of municipal affairs.

Like accounts of private affairs, a munici¬ pality’s accounts should provide the data for thinking about the business at hand, the devel¬ opment of plans, the determination of policies and the judgment of results. If a municipality’s accounts comply with these requirements, two aims will be satisfied: (a) administrative offi¬ cers will be aided in performing their duties and in executing the trust imposed upon them, and (b) the public can pass intelligent judg¬ ment as to the fidelity, efficiency and economy of their chosen officials.

Similarity between Private and Municipal Accounts. — The thought is not infrequently expressed that municipal accounting differs widely from private accounting; that each in it¬ self constitutes a separate science bearing little or no relation to the other. That thought is a fallacy. There is no difference in purpose, method or principle between private and public accounting. The distinguishing features of each, which are sometimes thought to be fundamental differences, relate only to the subjects concern¬ ing which information is needed. For instance, municipalities seldom, if ever, engage in busi¬

ness for profit. They exist to render service at cost. Hence profit and loss accounts are un¬ common. On the other hand, individuals, part¬ nerships and private corporations are not sub¬ ject to the special limitations placed upon the administrative action of municipal officers by the terms of appropriation acts and legislation generally, and, hence, they seldom maintain ap¬ propriation accounts. But these variations should not conceal or obscure the fact that the principles and rules of municipal and private accounting are identical. Furthermore, since municipal business may be administered eco¬ nomically or improvidently, or efficiently or in¬ efficiently, and thereby affect the interests of its proprietors directly by limiting the service ren¬ dered or increasing service cost, there is as much necessity of applying accounting princi¬ ples to municipal business transactions as to private affairs of the same nature.

History. — It is not known just when and where municipal accounting originated. Reli¬ able authorities disclose that the Athenians maintained a rather well-developed system. Rome's plan was based upon and adhered closely to the system employed in private busi¬ ness of the time. Great Britain, from which municipal accounting methods in this country were very largely borrowed, copied or adopted, is said to have had a system as early as the 12th century.

Prior to the 16th century, little if any thought or attention was given to the permanency of accounting records. That was true of private as well as of public accounts. When a transac¬ tion was concluded and the account closed, the record was thought of no value and was de¬ stroyed. The history of municipal accounting in the United States may, for the purpose of discussion, be divided in three eras. Naturally, no sharp line of demarcation separates them ; nevertheless, they stand out with sufficient clarity and are as follows:

(1) The period from the settlement of the country to and including the decade immedi¬ ately following the close of the Civil War. Within that epoch, accounts of municipalities were maintained, with few, if any, exceptions, merely to show the flow of cash into and out of the municipal treasury. It may with propriety be characterized as the age of ((receipt and dis¬ bursement® accounting.

(2) The last quarter of the 18th century. Within that series of years public thought in re¬ lation to better processes of accounting for mu¬ nicipalities quickened. Serious consideration was by no means universal. The efforts were sporadic rather than general, but at the close of the century sentiments had, to a considerable degree, crystallized and in a general way the movement assumed measurable

success and tan¬ gible form. It is, for the lack of a better term, characterized as the period of “awakening.®

(3) The third epoch comprises the first 18 years of the 20th century. Within those years rapid and substantial progress was made in se¬ curing, in a great number of municipalities, de¬ cided and materially improved methods of ac¬ counting developed along comprehensive, logical lines. The period of “accomplishment® is a suitable designation for that time.

Development. — In England, no impetus characterized the action toward municipal ac¬ counting reform until at or near the middle of

the 19th century, and it was some years later before energetic thought and attention was ad¬ dressed to the subject by or on behalf of Amer¬ ican municipalities. And then the movement was tardy, inactive, sluggish. The principal reasons which contributed to the attitude of in¬ difference and retarded the development of the work in this country are as follows :

(a) The country was relatively new, the population very largely rural, the form of or¬ ganization comparatively simple, the scope of municipal activity exceedingly narrow, the tax rates insignificant when compared with present-day standards and accounts matters of indiffer¬ ence.

(b) Absolute necessity — the mother of in¬ vention and progress — did not force attention to the desirability of better methods. Improve¬ ment in private accounting methods did not de¬ velop of its own volition nor was it prompted by the unstimulated energy of those engaged in keeping private business accounts. It was forced on them. Competition and strife in every line of business endeavor made it impera¬ tive that the head of a business enterprise should have available every essential financial fact concerning the business. To fail to have it resulted in the loss of funds or, frequently, the bankruptcy of the concern. The compelling need which business experienced did

not af¬ fect municipalities in the same way. They could not become insolvent. If their officers were wasteful, extravagant or inefficient and the treasury was emptied, the matter could be remedied by raising more taxes. If the same governmental service cost twice as much in one place as in another, that fact was not known, and, if known, it would have mattered little be¬ cause actual competition was non-existent.

(c) The prevailing form of government usually provided for the election of the chief fiscal and accounting officers by popular vote, and, as was to be expected, they were more fre¬ quently selected by reason of their popularity and vote-getting ability rather than for their talent in and knowledge of municipal finance and accounting. More often than otherwise, those officials entertained something akin to contempt for new, advanced or improved ac¬ counting ideas. Where such feelings were ab¬ sent, they displayed a complacent attitude to¬ ward established methods, due, no doubt, to the thoughts that tenure of office was insecure; that the holding of public office was a reward for political service ; that to attempt to revise the accounts would entail a tremendous amount of hard work; that no money compensation or re¬ ward in the form of thanks or praise would be forthcoming; and, in short, that the easiest course was to let matters drift as they had in the past, take the compensation and honor inci¬ dent of the position and at the end of the term deliver the office to the successor in much the same condition as it was received.

(d) And, finally, the taxpayers — the stock¬ holders in the corporation — demanded no bet¬ ter methods, no more accurate, detailed and scientific statement of financial facts showing sources of revenue, objects of expenditure and the financial condition of their common busi¬ ness. The business man of capacity and af¬ fairs had been too busy with his personal mat¬ ters to devote time and thought to the con¬

cerns and activities of government. That was left to the officers selected by the political or¬ ganizations and their recognized heads.

Viewed in the perspective, it seems that in this era accounts were kept with one principal or primary object in mind — that of showing whether or not the fiscal officer had stolen money. In form, they indicated the liability of that officer to the municipality and appear to have been predicated on the assumption that' the municipality would keep its own accounts. They utterly failed to display essential finan¬

cial facts relative to revenues and expenses, what was owned, due or owed, or to tell any of the material stories concerning fiscal trans¬ actions which accounts should relate.

During the second period, very material changes are observed. The country grew in population and wealth. The population com¬ menced to drift from rural to urban. Tax rates mounted higher and higher. The activi¬ ties of municipalities were increased in variety and magnitude and, correspondingly, the finan¬ cial transactions assumed proportions and im¬ portance which necessarily called for careful and accurate accounting. It was realized that to the old use of accounts as a means of test¬ ing the honesty of fiscal officers must be added their employment as a means of testing and measuring the efficiency of the work of all of¬ ficers. There developed a general demand for municipal reform. Business men were chosen to fill important posts in municipal governments and, as was to be expected, they sought more comprehensive financial statements which would disclose more clearly the financial condi¬ tion of their respective municipalities. Further¬ more, civic organizations, of which the National Municipal League was one of the pioneers, sprang into existence, and they in conjunction with accountants employed in municipal work consistently and persistently advocated better accounting methods.

However, little was actually accomplished by way of changes within the period, but much was achieved in awakening and quickening thought. While the need was real, the response was not immediate, for, as has been seen, the municipal corporation, unlike a private busi¬ ness concern, could not enter the bankruptcy courts even though it possessed all the elements of insolvency. As in the previous period, mu¬ nicipal accounts were little more than cash¬ book entries and treasury statements. But the foundation upon which to build more substan¬ tial and appropriate systems was laid and the way paved for the rapid development in the period which followed.

It remained for the years intervening since the commencement of the 20th century to wit¬ ness actual changes in accounting proce¬ dure. The demand for better accounting and the necessity of providing a system which would furnish exact knowledge of details and summaries of results in aid of better adminis¬ trative direction and control induced some of the larger cities (Chicago, New York, Boston, Philadelphia and others), and a number of the smaller and other municipal corporations, to employ professional accountants to install im¬ proved accounting systems and to audit their accounts periodically. The accountants aimed, and to a measurable extent succeeded, to make

the accounts disclose (a) the current cost of government, (b) the revenue provisions to meet that cost, (c) the property (other than cash) owned and (d) a complete statement of debt obligations. The plans worked out in each municipality were studied by officers and ac¬ countants having to do with the affairs of oth¬ ers. The movement was contagious. At the beginning of the year 1919 there was scarcely a city having a population of more than 30,000, in which some improvement in accounting pro¬ cedure had not been made.

In a very considerable number of municipali¬ ties, centralized financial control and account¬ ing are facts. Unit cost records, monthly de¬ partmental reports, uniform classification of receipts and expenditures, established fund ac¬ counts and subsidiary records and ledgers are actually being maintained or produced.

However, great as the improvement has been, there are relatively few municipalities in this country which are able to compile a com¬ plete financial statement, including a balance sheet, revenue and expense statement, records of city property and equipment, accurate and scientific sinking-fund records and other data, comparable to those obtained by up-to-date private business. (Consult National Municipal Review, Vol. VI, p. 715).

Some indication of the backwardness of cities is gleaned from the 1913 report of the auditor of the city of Cleveland. He said : ftI have the honor to present for the first time in the city's history, a general and detailed bal¬ ance sheet from our general ledger.® Cleve¬ land was at that time, in population, the sixth city of the United States. What was true of Cleveland prior to 1913 is equally true of many sizable. American municipalities at this writing.

Uniform Accounting. — Coincident with the actual betterments made in the methods of keeping municipal accounts, there developed the movement for securing reasonable uniformity. The origin or development of the movement may be attributed to no one person, group of persons or association but interest in the whole subject was

intensified as well as extended through the discussions and recommendations of numerous associations, national, State and local, of which the following are some of the more important: National Municipal League, League of American Municipalities, American Society of Municipal Improvement, United States Census Bureau, Bureau of Municipal Research, various State bureaus organized ex¬ pressly for the purpose and an army of city clubs, business organizations, citizens' and tax¬ payers' associations, civic organizations and pub¬ lic-spirited individuals.

In this relation it is worthy of mention that the uniform accounting idea was not of Amer¬ ican origin. In 1871, by act of the English Parliament, a <(local government board® was created for the express purpose of establishing in counties, municipal corporations and towns, uniform systems of accounts, of complete au¬ dits of accounts and of uniform reports to the government of the financial operations and con¬ dition of local governmental units. The larger German cities, although not compelled by any statute, had for years maintained substantial uniformity of accounting methods which af¬ forded excellent facilities for comparing costs of administration, maintenance, *etc.*

State Supervision. — The first step in this country toward State supervision of municipal accounts and accounting appears to have been taken by Minnesota in 1878, when an act was passed creating the office of public examiner, with power to audit the accounts of State and county officers and to enforce a correct and uni¬ form system of bookkeeping in counties.

Minnesota's action was followed by Massa¬ chusetts in 1879, when it placed the accounts of certain county officers under the supervision of the savings bank commissioner. Later, in 1887, there was established the office of comptroller of county accounts. Without following the va¬ rious amendments to the Massachusetts statute, it may be said that it does not confer power on State authorities to force or compel the estab¬ lishment of uniform accounting methods. It does require the State to install such systems when . invited or requested by municipal au¬ thorities to do so. Substantial progress and valuable and constructive work has been done in that State without finding it necessary to en¬ act mandatory legislation. The power of sug¬ gestion and moral suasion has met with re¬ markable success.

The Wyoming constitution of 1892 made the office of State examiner

of county accounts constitutional. That official has the gener..l su¬ pervision over such accounts and a well-organ¬ ized bureau has been in existence since Wyo-oming first became a State.

Other States which have enacted similar legislation are North Dakota, South Dakota, Ohio, New York, Iowa, Washington, West Virginia, Wisconsin, Rhode Island, Idaho,, North Carolina, Nebraska, New Hampshire and New Jersey. In but few of the States has State supervision been completely inaugurated and established. In some of them the authority is to examine accounts ; in others, to establish uniform accounting practices and, in some few, the measure of supervision is limited to certain classes of accounts, as is the case in New Jer¬ sey where the commissioner of accounts exer¬ cises jurisdiction in respect to sinking fund accounts only. Perhaps the most comprehen¬ sive statutes are those enacted in Ohio and New York.

The Ohio law was passed in 1902. It con¬ fers upon the auditor of the State jurisdiction to establish a uniform system of accounting, auditing and reporting for all counties, cities and towns in the State.

The New York act confers upon the comp¬ troller of the State, except in-respect of first-class cities and counties wholly contained within such a city, authority (a) to cause the accounts of each county, city, town and village to be inspected and examined periodically, as he may deem necessary; (b) to formulate, pre¬ scribe and install uniform systems of account¬ ing in several groups of municipalities; (c) to require of fiscal officers of municipal corpora¬ tions annual reports upon blanks prepared and furnished by him, and (d) to tabulate the sub¬ stance of such reports in comparative statistical form so arranged as to reflect the financial condition of each corporation, its sources of revenue and the purposes and objects for which its funds have been expended.

Although these States have assumed super¬ vision over municipal accounting, it does not follow that each municipality is keeping its

accounts according to a uniform plan. Perhaps the situation in New York is typical of that ex¬ isting in other States. No municipality of any considerable size in New York remains unin¬ fluenced by the work undertaken by the State comptroller. Nevertheless, of 1,500 municipali¬ ties in the State, uniform systems are being suc¬ cessfully operated in no more than 300 of them. The work moves slowly because of the limited number of men employed and for the further leason that in smaller municipalities the officers are reluctant to have their accounting methods revised.

Who Should Keep Accounts. — Generally

speaking, every office and department of a municipal corporation which collects or receives money or which is authorized to expend or authorize the expenditure of public funds should keep accounts thereof. In every mu¬ nicipality there is a chief fiscal officer. He may be called comptroller, auditor, accountant, treas¬ urer, chamberlain, commissioner of finance, commissioner of accounts or any one of a num¬ ber of names. Just what official is the chief fiscal officer depends entirely upon the provi¬ sions of the governing law and in that respect it is to be deplored that such laws do not al¬ ways outline with clarity who the principal fiscal functionary is. But that official, by what¬ ever designation known, keeps or should keep complete records of all fiscal transactions of the corporation. It is frequently found that the elements of authority or duty necessary to vest in a single office power adequate to consti¬ tute the incumbent thereof the chief fiscal officer of the governmental unit are distributed be¬ tween two or more offices.

Municipal governing laws are by no means perfect, particularly the older ones. They are especially deficient along accounting lines and in relation to the formulation of financial plans (budgets). It is not so many years since laws were prepared by members of the legal pro¬ fession, who, as a rule, had little knowledge of and less patience with accounting requirements and orderly financial planning.

It is at this point that the fiscal officer en¬ counters the first serious obstacle if he is de¬ sirous of modernizing his accounting methods. In private enterprise it is comparatively simple to obtain authority to make changes in methods or even to reorganize the accounts completely. The situation is different in a municipality. It has no sovereign power What authority it possesses is derived from enactments of the State legislature. Frequently it is found that the law requires certain specific procedure which is not the best course or method to fol¬ low, or that well-nigh insurmountable legal provisions

prevent doing in a direct, orderly, business-like manner that which accounting principles require. In fact, in very many cases the obstacles encountered have the effect of discouraging officials, impairing their enthusiasm and retarding the development of better ac¬ counting systems.

The first step in reorganizing the accounts of a municipality is to study its laws and ordinances, and sometimes that discloses the impracticability of undertaking the task until changes are made in the applicable laws and ordinances. It is evident that from time to time municipal laws must be changed by amend¬

ment and repeal until sound accounting prin¬ ciples shall be matters of law as well as of necessary business procedure.

Rudiments of an Adequate System. — Ac¬ countants are quite generally in accord respect¬ ing the goal or aim to be attained in municipal accounting, but they are not in agreement as to all details or methods of reaching results. In a measure, that is because of the different con¬ ditions existing in the various classes of mu¬ nicipalities or in municipalities of the same class operating under different laws. Nevertheless, it is possible to state with assurance that an appropriate system of municipal accounts must embrace certain elements. While it is not pos¬ sible in limited space to make the outline in¬ clusive of all features the following is believed to include the important characteristics.

Bookkeeping. — That the accounts, summa¬ ries, schedules and reports supply the informa¬ tion necessary to intelligent judgment and ap¬ praisal of results the accounts should be kept according to the double entry plan of book¬ keeping. The single entry system is the more primitive but it exhibits in the form of a final statement one relation only — that of asset and liability. The double entry system discloses not only that relation but presents a classified sum¬ mary of operations. The final summaries under a single entry system exhibit proprietary con¬ ditions. Under the double entry plan it is con¬ venient and practicable to show whether or no the municipality has rendered the best service of which it is capable at the least cost, and whether its proprietary interests have been pro¬ tected against the misuse and infidelity of its officers.

Terminology. — It is of vital importance that correct terminology be employed. It should be uniform in all departments of a municipality,

and, if uniform terms be used by all municipal corporations, that greatly adds to the useful¬ ness of final summaries, statements and reports. The terms to be employed should be selected with care. The Federal Census Bureau early realized the importance of establishing proper accounting terminology and for years has in¬ corporated in its report of the statistics of cities what is believed to be the best accounting terminology obtainable.

Centralization and Co-ordination. — To have a complete system of accounts requires that every transaction be recorded. That should be done in the bureau where the transaction arises and, if possible, by the person in charge thereof. To utilize this record and to adapt it to the purposes of control, the various transac¬ tions must be classified and summarized and finally brought into statements of account in a central office. That should be the office of the chief fiscal officer of the corporation. When that plan is followed, reports and statements from the general ledger will reflect the opera¬ tions and the condition of the municipality as a whole in such manner as to serve the purposes of officials and the public.

Not infrequently is it found difficult, if not impossible, to procure central accounting and to obtain co-ordination between the accounts of the chief fiscal officer and those of municipal departments. Usually that is caused by one or both of two conditions: (a) The governing lay may not require centralized control ; and

(b) departmental officers may not be in sym¬ pathy or harmony with the plan and execute it with indifference. In such cases a campaign of education may be necessary in order to pro¬ cure a change of condition.

Annual Budget. — The arrangement of cur¬ rent accounts by the fiscal officer necessarily follows the budget classification. A properly constructed annual budget usually reflects more of the business side of a municipal government than any other single document. It should be the financial program. Appropriations for expenditures are in the

nature of allowances or drawing accounts. Expenditure appropria¬ tions should be correlated with the revenues • intended to meet expenditures. From an ac¬ counting point of view, the annual budget affords the most satisfactory method yet found for gaining centralized control over municipal expenditures. Generally speaking, a proper sys¬ tem of municipal accounting can be obtained only when a well-arranged and properly con¬ structed budget has been adopted.

The reorganization of a city's accounts should be undertaken at the time of the prepa¬ ration of the annual budget.

Revenue and Expenditure Accruals. — True stories concerning the operations of a munici¬ pality cannot be told nor the effect of its fiscal activities accurately reflected unless the ac¬ counts show accruals of revenues and of ex¬ penditures as well as encumbrances of appro¬ priations. The money actually received during a given period does not accurately measure revenue and the cash disbursed does not cor¬ rectly state the cost of conducting the business of the corporation. The system should afford means of showing the financial condition of the municipality at all times. To accomplish this, there must be records which disclose not merely undisbursed balances of appropriations but, as well, the obligations incurred upon contracts and open market orders. In short, it should show what is owing the municipality as well as what the municipality owes.

Grouping of Accounts. — To secure correct information relating to the financial condition of a municipality, it is essential that the accounts, reports and balance sheets provide for a proper presentation of the facts by grouping the ac¬ counts ; this for the reason that it is necessary to guard against the use of particular funds for purposes other than those intended. Otherwise, there is danger of having applied capital, trust or sinking funds to the payment of expenses incurred for current administration, operation or maintenance.

The grouping of accounts is not an arbitrary classification of them. All obligations entered into by a municipal corporation and all trans¬ actions recorded in its accounts pertain to some particular fund. Therefore, to assemble ac¬ counts in independent balancing groups is in formal recognition of the fact that every ac¬ count naturally falls within pne of several groups.

Into just what groups the accounts of a given municipality should be divided depends entirely upon the character of its business and the nature of the funds held. The comptroller of the State of New York, in a uniform system formulated for cities of the third class (those having

a population of 50,000 or less), allocates the accounts to the following groups: (1) cur¬

rent accounts; (2) assessment accounts; (3) capital and sinking fund accounts ; (4) trust accounts.

The current group includes those in which are recorded transactions relating to budget ex¬ penditure appropriations and revenues appli¬ cable to meet them, together with the financing done respecting those transactions. It is in¬ tended primarily to keep the record of current operations separate and apart from all other transactions. The distinction between current operations and all others is regarded as im¬ portant and one which should be maintained in order that the results of current activities may be reflected simply and intelligently.

The accounts forming this group are closed at the end of the year into a current surplus or deficit account, thereby indicating how the financial plan actually worked out. If there is an excess of revenue over expenditure, it will be shown by a credit balance in the current surplus account. If the expenditures on an accrual basis exceed revenue accruals, then a debit balance will result, reflecting what is in fact a current deficit.

The assessment group includes all accounts relating to assessment work, the levy and col¬ lection of assessments, the financing of cost and assessments remaining uncollected.

The capital group embraces the accounts pertaining to bond issues for construction pur¬ poses (excluding assessable work) and the ex¬ penditure of the proceeds of such issues. There is also included accounts showing the value, appraised or assessed, of the municipality's property.

While the accounts for sinking fund trans¬ actions are included in this group, that is be¬ cause in cities of the third class sinking fund transactions are not numerous. If in any mu¬ nicipality those transactions are of volume, a separate group of accounts should be estab¬ lished.

The trust group contains the accounts of all funds or properties held in trust, including pen¬ sion funds.

Classification of Accounts. — Having as¬ sembled the accounts of a municipality into logical groups, it then becomes necessary to further

classify them to show ‘the channels or sources from which money is received and the purposes and objects for which it is expended. In this, as in other matters, uniformity should prevail and uniform terminology be employed.

With reference to receipts, a classification is not difficult. The groups other than the cur¬ rent accounts group will be arranged according to the nature of the transactions occurring. In the current accounts division, receipts will be divided into two general classes: (a) revenue and (b) non-revenue.

The revenue receipts may then logically be classified as (1) General property taxes; (2) special property taxes; (3) interest and penal¬ ties on taxes; (4) licenses and permits; (5) fines and forfeits: (6) interest and rents; (7) gifts and donations; (8) sales of prop¬ erty; (9) departmental earnings, *etc.*

In the non-revenue class will be found cur¬ rent loans, transfers, refunds, advances and such other classes as may occur in the mu¬ nicipality.

Respecting expenditures in the current ac¬ counts group, the situation is more difficult. Iv

is very aptly stated in the January 1917 issue of the Municipal Research Bureau, that ex¬ penditures should be classified in as many dif¬ ferent ways as there are stories to be told concerning costs. The following four methods are then indicated:

(<1. Total cost incurred by organization units — to mark the lines of official responsibility and the jurisdiction of each spending officer.

«2. Total cost incurred, classified by func¬ tions — for determining questions of policy having to do with service rendered as well as to be rendered, and laying a foundation for appraisal of results.

((3. Cost of things classified by objects ex¬ pended or used in carrying on the work ; such as personal service,* Supplies, *Materials,*

(equipment^ etc.— to lay the foundation for considering the amounts to be appropriated to buy things needed.

((4. Total cost classified by character, that is with a view to determining what part is for current expenses, what part for capital out¬ lays, *etc.* — ‘to lay the foundation for consider¬ ing financial policy.®

It is not probable that any municipal cor¬ poration is grouping its expenditures in the four ways indicated. > In many of them, a twofold classification is followed — that is, by governmental function and by purpose or object of expenditure.

In the New York State comptroller’s system for third-class cities, arrangement by govern¬ mental function is as follows: (L) General government; (2) protection of person and property; (3) conservation of health ; (4) sani¬ tation and promotion of cleanliness; (5) high¬ ways; (6) charities and corrections; (7) edu¬ cation; (8) recreation; (9) public utilities — non-commercial; (10) miscellaneous; (11) mu¬ nicipal indebtedness; (12) construction and permanent improvements (financed from tax moneys or current revenues) ; (13) public

utilities — commercial.

His classification by purpose or object of expenditure is as follows: (a) Salaries and wages: (b) traveling expenses; (c) office ex¬ penses; (d) printing and advertising; (e) pur¬ chase of equipment; (f) maintenance of equip¬ ment; (g) materials and supplies — (.g-1)

specify; (g-2) specify; (g-3) specify; (h) re¬ pairs by contract or open market order; (l) light, heat and power ; (j) rent; (k) insurance; (1) pension fund contribution; (m) other ex¬ penses — (m-1) specify; (m-2) specify.

The foregoing are based upon the classifi¬ cation worked out by the National Municipal League (Proceedings of 1899, pp. 116-123), as modified and adopted by the Census Bureau in many municipalities.

Stores’ Accounts. — In order to ascertain the precise cost of administration for a given period, it is necessary to take into account, as an offset to charges against appropriations, fhe cost of materials and supplies not used. The best method is that of keeping a running in¬ ventory account of materials and supplies, lo do that necessitates keeping stores accounts, in which case requisitions are issued when stock is called for by a department, and then ex¬ pense may be charged and the appropriate stores account credited with the supplies

so furnished.

IN THE UNITED .STATES

If accounting requirements only were to be considered, it would be advisable for each municipality to adopt this plan. However, the size and the experience of the personnel of ac¬ counting offices in average municipalities has thus far rendered it impracticable to adopt such a system.

Substantially the same result may be attained by taking an inventory of materials and sup¬ plies on hand at the end of a fiscal year and by placing their cost on the records. Of course, the fiscal officer should audit the inventories and open an account for materials and supplies by debiting “materials and supplies® and credit¬ ing “inventory surplus.® The materials and supplies account will be temporary, to be opened at the end of the year and closed at the beginning of the next following year or as soon thereafter as the budget shall have been adopted, by reversing the entry or by charging against appropriations provided for the pur¬ chase of the particular class of materials and supplies shown by the inventories to be on hand. In the latter case, the charges against appropriations, less the inventory value of ma¬ terials and supplies not consumed, will ac¬ curately reflect the total of actual expenses for the year. This plan corresponds with the prac¬ tice prevailing in business concerns that do not keep running inventory accounts.

Unit Costs. — A noted railroad man, now de¬ ceased, will long be remembered for his ad¬ vocacy of the principle of Hon mile cost.® The application of that idea may well be extended to many municipal functions. It would be of great interest and value if officials and taxpay¬ ers might know the cost per unit of street pav¬ ing, sewer construction, street lighting, water pumping and filtration, etc., and the per-capita cost of public education and of maintaining patients in public institutions per day, week or month. Unit costs are the most significant bases for comparison and of great administrative value.

Commercial Public Utilities. — Municipalities are more and more engaged in commercial en¬ terprises. Municipal water and lighting sys¬ tems are common. Others are being added yearly. It is thought that a municipal water plant should maintain its departmental accounts in substantial conformity with the system adopted by the American Water Works Asso¬ ciation, and that other public utilities,

when operated by a municipality, should conform their accounting methods with the requirements of public service commissions in those States having such commissions, or with systems em¬ ployed in private business of like character, if State supervision has not been established.

Municipal accounting has a pronounced effect on municipal government. Improved ad¬ ministration is sure to result from better ac¬ counting. Efficient administration is impossible without an adequate accounting plan. A suit¬ able, adequate System of accounts in a munici¬ pality will enable the authorities to judge re¬ sults of past operations, and plan and admin¬ ister future activities with the assurance that they are acting intelligently. It will permit the taxpayers to appraise the accomplishments of an administration and to form accurate con¬ clusions respecting the ability, the efficiency and the economy of their chosen officials.

Bibliography.— Eggleston, D. C, (Munici¬ pal Accounting* (New York 1914) ; City Busi¬ ness, Metz Fund Handbook (New York 1913) ; American Water Works Association (Pro¬ ceedings 1912) ; Deming, H. E., (Uniform Mu¬ nicipal Accounting and Home Rule* (Proceed¬ ings, National Municipal League, 1905) ; Fair-lee, J. A., (Essays in Municipal Accounting and Home Rule* (Proceedings, National Municipal League, 1905) ; Munro, W. B., <A Bibliography of Municipal Government in the United States* (Cambridge 1915) ; Public Service Commission, New York State, (Uniform Systems of Ac¬ counts for Gas and Electric Corporations* (New York 1908) ; Travis, Eugene M., New York State Comptroller, cUniform System of Accounting for Cities of the Third Class* (Albany 1917).

Mark Graves,

Director, Bureau of Municipal Accounts, State

Comptroller’s Office, Albany, N. Y.

MUNICIPAL APPROPRIATIONS. See

Appropriations, American System of; Bud¬ gets, American.

MUNICIPAL ART SOCIETIES, organ¬ izations in the various large cities of the United States, devoted to the promotion of municipal art, and the making of the city beautiful. The ends of these associations are pursued by plant¬ ing trees, restricting billboard advertising, es¬ tablishing small parks and playgrounds in the congested districts, improving as far as possible the architecture of public buildings and in gen¬ eral making the city as artistic a unit as pos¬ sible without hampering the commercial or utilitarian activities of the city. Among these organizations are the Municipal Art Societies of New York, Chicago, Cincinnati and Balti¬ more; the American Park and OutDoor Asso¬ ciation; the Fairmount Park Association, *etc.* In several of the larger cities, as New York and Chicago, there are now official municipal art commissioners having supervision over pub¬ lic buildings, monuments, *etc.* (See Art, Amer¬ ican; City Planning; Parks, Public). Con¬ sult Mawson, T. H., (Civic Art* (London 1911) ; Robinson, C. M., (Modern Civic Art* (New York 1903) ; id., (The Improvement of Towns and Cities* (8th ed., ib. 1913) ; Munici¬ pal Affairs (Vol. II and III, ib. 1898-99).

MUNICIPAL BUDGETS. See Budgets, American; Appropriations, American System of.

MUNICIPAL BUSINESS MANAGER.

See City Manager; Plan of Government.

MUNICIPAL CHARTERS. See Munici¬ palities.

MUNICIPAL COLLEGES AND UNI¬ VERSITIES. The United States. — The pas

sion for free public education in the United States has carried well beyond the original in¬ tention. At first only the elementary school was free; tuition was free, and the schools were maintained by public taxation. Secondary education was then conducted by private acad¬ emies and higher education by privately en¬ dowed colleges and universities. But before the free elementary school had become univer¬ sal, free high schools were opened and main¬ tained in the more progressive communities and by the close of the 19th century the free public high school was practically the uniform policy

of public education in every State of the Union. Opposition to such free secondary education in tax-supported schools has almost entirely dis¬ appeared. The newer States have gone beyond this and have .established universities, sup¬ ported entirely by taxation and offering free tuition to residents of the State. This has strengthened the theory that all education in a free State should be at public expense, college, university and professional education.

The municipal college and university has grown out of the city high school in response to the public demand for higher education. High school work in modern languages, in mathematics and some of the sciences, overlap the college program in the freshman year. It is an easy step, therefore, to add college work to the high school program. Baltimore, Phila¬ delphia, Charleston, Los Angeles, Cincinnati, Toledo, New York City, are cities where munic¬ ipal colleges are now in operation. Cincinnati has developed a municipal university with the usual departments of medicine, law, dentistry, education and engineering, in addition to the College of Arts and Sciences. Toledo is de¬ veloping a university along similar lines. New York City, on the other hand, has confined its efforts to the development of the college as distinct from the university idea. This is the municipal college in its perfect form since it is entirely supported by public taxation and ad¬ mits as students only residents of the city of New York. Its equipment, costing upwards of $5,000,000, was likewise provided out of munici¬ pal funds. Other municipal colleges and uni¬ versities have received private endowments in addition to municipal appropriations. The University of Cincinnati received a large pri¬ vate gift and is less typical of public higher education for that reason. The public high schools, sometimes called the ((Peoples' Uni¬ versities,** are fitted to develop into municipal colleges at the demand of the people. In the United States, colleges and universities fre¬ quently reflect local characteristics ; for ex¬ ample, the University of Pittsburgh, the Uni¬ versity of Chicago, the University of Denver, University of Buffalo, University of Rochester; but they must be carefully distinguished from municipal universities since they are not main¬ tained by the cities where they happen to be located, nor is the student body wholly or even largely drawn from such city.

England. — England has developed a type of municipal college but they are not tax sup¬ ported and therefore are not municipal institu¬ tions in the truest sense. Nevertheless, al¬ though on private foundations and maintenance, many of these English colleges are of local character, reflecting the local industries, local ideals, local pride. Thus the Sheffield College reflects the cutlery interests by its excellent ((School of Metallurgy.** The College of Leeds reflects the textile

industries by its ˆSchool of Textiles.** Birmingham, Liverpool and Manchester have local universities. The University of London has a long and honorable record. A. R. Brubacher.

MUNICIPAL CONTRACTS. See Mu¬ nicipalities.

MUNICIPAL DEBTS. One of the most striking facts in modern American city de¬ velopment is the appalling increase in municipal

indebtedness. Startling figures upon this sub¬ ject have been compiled by the United States Census Bureau. Municipal and country debts increased 76 per cent from 1890 to 1902. From 1902 to 1913 they had increased 113.2 per cent and had reached the enormous net total of $3,475,954,353, or more than twice the com¬ bined indebtedness of the Federal and State governments. At the end of the fiscal year 1915 there were 146 of the cities in the United States which had a population of more than 30,000, whose total indebtedness exceeded that of the national government by $1,155,758,406 or 106 per cent. In these cities the per capita debt had increased from $44.71 in 1903 to $77.86 in 1915. That this increase in indebtedness has not been uniformly rapid, however, is shown by the fact that in Rhode Island the debts of cities, towns and villages increased less than 1 per cent between 1902 and 1913, while in Cali¬ fornia there was an increase of 986.1 per cent during the same period.

An accurate statement of the causes of this increase in municipal indebtedness does not reflect credit upon the soundness of our munic¬ ipal finance. After the Civil War American cities very generally embarked upon programs of reckless expenditures for various municipal services and utilities. These were paid for by the issuance of bonds. These bonds were too frequently issued for terms much longer than the life of the improvements or property for which they are to pay. Cities also entered upon the unwise policy of borrowing to meet the cur¬ rent expenses of the city. Inefficient methods of municipal accounting contributed to the gen¬ eral financial chaos. State supervision was too often inadequate to the task of preventing the

floating of ill-advised municipal loans. To all these factors should be added the general reck¬ lessness and optimism of municipal adminis¬ trators who were never depressed by the con¬ sciousness that money once borrowed must ulti¬ mately be repaid.

The conviction that municipalities cannot be trusted to borrow money without restraint while not new has in recent years grown stronger. This is clearly evidenced by the in¬ creasing number of restrictions placed upon the borrowing power of the American city which may be thus summarized :

Restrictions upon Municipal Indebtedness. — (1) A city must not incur debts beyond its delegated powers. The power to borrow must either be given in express words in the city charter or it must be implied from some power which is specifically granted. Without such positive authority debts incurred by the city are absolutely void.

(2) Municipal debts may be contracted only for public purposes and not for the benefit of private individuals or groups. This restriction is the logical result of the well-established rule of constitutional law that taxes may be levied only for purposes which are public, inasmuch as the city's debts must ultimately be paid by taxa¬ tion.

(3) Limits upon the amount of municipal in¬ debtedness which may be incurred are found in the statutes or constitutions of most States. These restrictions specify that city debts must not exceed a certain per cent of the value of all the taxable property, all the real property

or must not exceed the annual income of the city. These percentages vary greatly, running up to 18 per cent in the constitution of Virginia. The establishment of a debt limit in a State constitution does not confer upon cities any power to create an indebtedness up to that limit and the State legislature may, by statute, im¬ pose additional restrictions in its discretion. Any debts contracted by the city beyond the limits so set are void and persons who loan money to municipalities must learn at their peril whether the city, in issuing the bonds they buy, has exceeded its debt limit. Both con¬ stitutions and statutes sometimes provide that in determining whether the total indebtedness of a city exceeds the limits set, debts incurred for certain special purposes shall not be in¬ cluded. The debts so excluded are those con¬ tracted for the purchase or construction of public utilities such as waterworks or lighting plants from which the city expects to derive revenue. There is a difference of opinion as to the wisdom of

this policy. It has been urged that bonds issued for these revenue¬ bearing projects should be counted in comput¬ ing the city's debt unless such bonds are secured merely by liens or mortgages on the properties in which the money was invested and do not constitute general liabilities upon the credit of the city. In short if the bonds will be paid ulti¬ mately Out of money derived from taxation they should be viewed in the same light as debts incurred for any other purpose.

(4) Statutory or constitutional provisions frequently require that bonded debts shall be contracted only after a vote of the people reg¬ istered in a special election upon the question. Such a referendum may be required for the creation of any debt, or of such debts as would be in excess of a specified amount, or of debts which are to run for more than a certain length of time. In some cases two-thirds or more of the voters must approve the proposed debt ; in other instances only taxpayers or property-owners are allowed to vote.

(5) Maximum period of years to constitute the life of the debt is often stipulated. These limits are frequently placed at from 20 to 30 years but in some cases the term will vary with the purpose for which the debt is incurred. By vote of the people, above mentioned, the length of the debt term may be extended in a few instances.

(6) One of the most common restrictions upon municipal indebtedness is that which com¬ pels the city when incurring a debt to levy a direct tax annually during the life of the debt for the purpose of paying the interest and of accumulating a fund out of which to pay the principal at maturity. Such a fund is known as a sinking fund. This fund must not lie idle but must be profitably invested by the city.

These restrictions upon the power of Ameri¬ can cities to borrow money have been of some use in preventing financial recklessness on the part of cities, but in general the policy of set¬ ting up hard and fast restrictions of general application to all cities is unsatisfactory. There is an unfortunate lack of elasticity. Some cities cannot borrow as much as they need; others borrow more than they need. A debt limit based on assessed prpperty values is an incen¬ tive to raise the assessments unduly. There are

no general legislative or constitutional restric¬ tions upon the power of English, French or German cities to borrow. Instead municipal debts in those countries are supervised as to purpose, amount, interest-rate and methods of repayment by administrative authorities of the central government. This administrative con¬ trol is exercised in England by the local gov¬ ernment board, in France by the prefect, in Prussia by the provincial authorities. By this method the city's debts are adequately regulated but by a means elastic enough to meet the needs of the individual city.

Kinds of Municipal Debts.— Municipal debts may be classified in several ways. A debt may be funded , in which case it is represented by interest-bearing bonds issued for a definite period, and with some definite provision for re¬ payment at maturity, or it may be a floating debt, not secured by bonds, usually small in amount, and with no special scheme provided for its repayment. The latter comprises usually the short-time obligations which the city incurs in special emergencies in connection with the current needs of administration. The floating debt is usually funded when it becomes large in amount. The bonds representing the funded debt of the city are usually negotiable and are sold in the financial market like the securities of private corporations. They usually bear re¬ citals stating the authority under which they were issued and other facts tending to show their legality. If these recitals are false for the purpose of floating an illegal bond issue, the courts will refuse to allow the city to escape paying its just debts by setting up the falsity of its own statements. This is known as the doctrine of estoppel by recitals. The gross debt of the city is the sum total of all its funded and floating debts. The net debt is the amount of the gross less the amount of such sinking funds as have accumulated for the ultimate re¬ payment of the funded debt.

Methods of Borrowing. — A city may fol¬ low one of two policies in borrowing money. First, it may issue sinking-fund bonds, all of which mature at the same time, and which are to be paid out of a fund gradually created for the purpose. This plan has thus far been most often used. It has, however, several disadvan¬ tages. It requires the setting aside of a cer¬ tain part of the city's income each year and the investment of that money. Sometimes through miscalculations, carelessness or dishonesty the funds are not properly invested. Sometimes the annual stipend is not paid into the sinking fund as it should be. The second method of borrowing is by issuing serial bonds. These bonds mature at different times in such a way that a fixed proportion of the debt will fall due each year and must be retired. The

advantage of this plan is that there is no necessity for a sinking fund with the problems it creates and there is no way for the city to escape its an¬ nual payment short of absolute default of the bonds which annually mature. The weight of opinion now favors this plan.

Bibliography. — Cooley, (Handbook of the Law of Municipal Corporations* (Chap. 19, 1914) ; Dillon, (Municipal Corporations) (Chap. 20, 5th ed., 1911); George, R. E., (Municipal Finance) (1916) ; Munro, (Bibliography of Municipal Government (pp. 413ˆ116, 1915) ;

Munro, (The Principles and Methods of Munic¬ ipal Administration (1917) ; United States Bureau of Census, (County and Municipal In¬ debtedness, 1913, 1902 and 1890> (1915) ; United States Bureau of Census, financial Statistics of Cities > (1915).

Robert Eugene Cushman,

Associate in Political Science, University of Illinois.

MUNICIPAL GOVERNMENT. In

March 1897, as a tribute to the growing public interest in the city problems, (Bibliography of Municipal Administration and City Conditions) was published as the first number of the quar¬ terly magazine, Municipal Affairs. Even at that time the list of books and articles dealing with the various aspects of city government drew its lengthening trail through no less than 224 octavo pages. It is well nigh beyond the power of the imagination to see to what length a similar bibliography of municipal administra¬ tion prepared in 1916 would run. The extraor¬ dinary interest in municipal government ex¬ hibited during the past 20 years in this country has been the result of certain fundamental facts. America has been rapidly changing from a rural to an urban nation, so that the propor¬ tion of the people who are members of munici¬ pal corporations has greatly increased. Further¬ more, the rapid development of facilities for transportation and communication has made the cities of the country assume an importance in the public interest even surpassing their im¬ portance on the basis of population. Finally, the older cities, having grown to be great with little conscious guidance and with no adequate recognition of the obligations imposed upon a municipal corporation by the very nature of urban life, or of its inherent privileges, have during this period made a virtue of necessity in beginning to take thought for the civic prob¬ lems of the present and the future.

1. Origin of Municipal Corporations. — It is not possible to draw an exact line between rural and urban conditions, and it is a fact that municipal government in its more complex and commanding forms is the result of a gradual de¬ velopment from the simple military government of the army post or the simple rural government of the agricultural town. When a community has reached the stage where it is willing to organize a municipal government it is ready to take a long step away from the Anglo-Saxon individualism so well expressed by the old saying that ((the ˆEnglishman's house is his castle.® It is, of course, true that political gov¬ ernment in any of its forms means a curtail¬ ment of individualism. But the phenomena of city government marks a distinct advanced stage in this process. Let the man who believes that he has an inalienable right to (<do that which seemeth good in his own eyes® and to <(do as he pleases with his own,® beware of the city! The utmost development of social con¬ trol to .be found in the latest city planning scheme is inherent in the first formal recogni¬ tion of the fact that the conditions of urban life make necessary a special form of govern¬ ment. People cannot live close together with¬ out submitting their individual whims and fancies to community control. In this fact the city has its origin.

2. Relation of Municipal Corporations to State and National Government. — It is the theory of American law that sovereignty, as manifested through the colonial and subse¬ quently through the State governments, pre¬ cedes both in time and authority the powers which are manifested in the operation of municipalities. In other words, the city, al¬ though it is a normal development of the eco¬ nomic and social needs of the people, acquires no governmental powers except as they are granted by the sovereign state. Thus the direct control of the States over the municipal cor¬ porations within their borders is theoretically complete, even to the point that municipal gov¬ ernments might be abolished altogether and their functions discontinued or transferred to central authorities of the State. This theoreti¬ cally helpless position of the cities has subjected them to many abuses, particularly at the hands of the State legislatures, with

the result that one of the most potent reform movements con¬ nected with city government has been the move¬ ment for municipal home rule. The purpose of the home rule movement is not to create imperia in imperils or to remove the cities from the jurisdiction of the States in their sov¬ ereign capacity. It is rather to give the cities in each Commonwealth a constitutional status and to this extent to curtail the general gov¬ ernmental powers conferred upon the legisla¬ ture. Municipal home rule in various forms has already been embodied in the constitutions of the following States: Missouri, 1875; Cali¬ fornia, 1879; Washington, 1889; New York, 1894; Minnesota, 1896; Colorado, 1902; Oregon, 1906; Oklahoma, 1907; Michigan, 1908; Ari¬ zona, 1912; Ohio, 1912; Nebraska, 1912; Texas, 1912. The chief purposes of municipal home rule are to enable cities (1) to frame their own charters and thus choose their own forms of government; (2) to prevent legislative inter¬ ference with municipal affairs by means of local and special legislation; (3) to exercise police control over their inhabitants in accord¬ ance with the dictates of local public senti¬ ment ; and (4) to determine what co-operative functions shall be undertaken by the com¬ munity. It is noteworthy that of the large cities of the country, Saint Louis, Cleveland, San Francisco, Kansas City (Mo.), Seattle, Portland (Ore.), Denver, Saint Paul and Toledo, are living under charters framed and adopted by their own people, subject in some cases to subsequent ratification by the legisla¬ ture. Detroit, Cincinnati and Minneapolis are only deterred from having home rule charters by their inability thus far to devise any that are satisfactory to themselves. Many of the States not enumerated above have provisions in their constitutions forbidding the legislature to pass local or special acts amending city char¬ ters or interfering in the internal affairs of cities.

In theory the national government has no control whatever over the forms or functions of municipal government. In practice, however, the Federal government exercises considerable indirect control over cities through its control of interstate commerce and the use of the post roads, as well as through its control over navi¬ gable waters and the development of natural resources such as water powers. Still more

important in practical effect is the judicial con¬ trol exercised by the Federal courts over the actions of municipal governments affecting con¬ tracts and property rights. The Federal gov¬ ernment, of course, has complete control of the city of Washington, and at the beginning of President Wilson's administration it was sug¬ gested that an effort should be made to make Washington distinctively a model city to

which all the other cities of the country could look for the latest and best development ˆ in admin¬ istrative machinery and municipal practices. In fact, the Federal government has for many years endeavored to co-operate with cities throughout the country, particularly in the development of a uniform system of accounts and the publication of uniform statistics and in the establishment of uniform standards for the tes'ting and control of the gas supply. These activities, however, are purely advisory.

In the extra-legal aspects of the relations between municipal government and the State and national governments, the political issues which have their origin in municipal problems are becoming very important. In the early stages of the municipal reform movement in this country, it was thought necessary to sepa¬ rate municipal elections from State and national elections so that the voters would not be con¬ fused by political issues and by the exigencies of party strife in the selection of their local officials. Prof. Frank J. Goodnow, the eminent authority on administrative law, was a pioneer in trying to work out a proper delimitation of the spheres of local and State government in order to find a basis for an intelligent home rule program. This task, however, proved to be one of very great difficulty and in spite of the continued efforts of scholars in the univer¬ sities, reformers in the National Municipal League and other organizations, and public offi¬ cials in various associations for the promotion of home rule, no exact definition of the proper scope of municipal government thus far devised has yet met with general acceptance. In fact, while the sentiment for municipal home rule has been slowly finding expression in constitu¬ tional and statutory provisions, conditions have been growing up which make cities necessarily more and more dependent upon each other and upon the State and nation. A theory of home rule which might have been considered adequate 20 or 30 years ago would now be subject to important modification, in view of the fact that urban interests and urban problems have, as it were, overflowed the boundaries of the munici¬ palities and have become, especially in the more densely populated Commonwealths of the East, closely identified with State interests and State problems. The old demand for the separation of State and local elections and politics has thus lost much of its force. With the election of United States senators by direct vote of the people the chief link that formerly tied the State government to national politics has been broken so that at the present time the more logical line of separation as to elections and political issues is between municipal and State on the one hand and national on the other, but even here a solidarity of interests is arising, notably in connection with the development of water power

and the conservation of natural resources, which tends to make undesirable any

hard and fast separation of political organi¬ zations and issues among local, State and national.

3. Relation of Cities to County and Town¬ ship Government. — Counties are in the main divisions of the State established for con¬ venience in the administration of State laws through the agency of locally elected officials. The functions of the county usually include the prosecution of criminals, the keeping of records relating to the title of property, the adminis¬ tration of the Inheritance Law, the care of the poor, the supervision of public education and the planning and execution of certain major improvements such as important highways, bridges and drainage schemes. The primary functions performed by counties are universal ones, and the absence of any strict adminis¬ trative control by the State government over county affairs, together with the original preva¬ lence of the fee system through which many of the county officers have received their compen¬ sation, has made county government all but universally the football of politics, and county officials everywhere the main cogs in the ma¬ chine of one or the other of the two principal parties, according to whether the one or the other has been in control in particular counties. These conditions tend to establish a situation very embarrassing to municipal government in those counties where, through urban develop¬ ment, the vast majority of the electors are also electors of one city. Side by side with the in¬ crease in the complexity of the activities of the city, the expensiveness and political im¬ portance of county government grow. The re¬ sult is a duplicate system of local government, with extravagant expenses and no end of polit¬ ical interference. Under these circumstances, movements have taken place in many of the States for the consolidation of city and county governments wherever large cities have sprung up. Wherever this consolidation has been established the county functions have been taken over by the city government and thus the city, in a sense, has been taken out of the

regu¬ lar administrative organization applying to other portions of the State. The most notable instances in which this consolidation of city and .county government has been partially or completely established are New York City (which includes five counties whose affairs are partly under the jurisdiction of the central board of estimate and apportionment and partly still conducted by county administrative offi¬ cials), Philadelphia, Saint Louis, Baltimore, San Francisco and Denver. In Virginia all the cities, large and small, are separate from and independent of the counties within which they are located.

So far as township government is concerned, cities often remain subject to it until they be¬ come large enough to absorb all of one or more townships, when the functions of the several town governments included within the city limits are usually taken over by the city and the separate township organizations abolished. The infinite confusion and difficulty that re¬ sults from the persistence of a multitude of different local governmental bodies occupying in whole or in part the same territory is per¬ haps best illustrated by the experience of Chi¬ cago, where until comparatively recent years even' the assessments of property forming the

basis for municipal taxation were made by independent assessors elected by the dif¬ ferent towns surviving within the city limits, with the result that all the assessors com¬ peted against each other to keep down the assessments of their particular towns. The re¬ sult was that Chicago struggled along for many years trying to operate its municipal govern¬ ment under a constitutional limitation of its debt based upon a low percentage of its as¬ sessed valuation, although that valuation was in fact only 8 or 10 per cent of full value. The experience of cities points to the conclu¬ sion that in the interest of efficiency and economical government all local functions and all administrative functions performed by locally elected officials within the limits of the city should be consolidated with the city gov¬ ernment.

4. Relation of Cities to Each Other. —

Theoretically all cities, even those of the same State, are independent political units, having no formal relations with each other, and responsi¬ ble either to their own people or to the people of the State as represented in the central gov¬ ernment. However, with the enormous increase in urban population, particularly in the Eastern States, cities have in many cases begun to crowd each other. Sometimes two or more communities which started out as

independent urban units have actually grown together as far as their industrial and social life is con¬ cerned without as yet being consolidated polit¬ ically. In other cases, the extraterritorial needs of a great urban community for water supply, drainage, transportation and harbor facilities or electric power have brought cities into contact with the interests of other cities whose locations may be quite remote. For example, around the city of Boston has grown up a group of cities which, while politically in¬ dependent of each other and of the metropolis, are all actually interdependent, so far as water supply, drainage and park development is con¬ cerned. The result in this case has been the establishment by State authority of metropoli¬ tan districts under the control of State com¬ missions whose duties arc to co-ordinate and promote the interests of all the constituent cities in the matters subject to their jurisdic¬ tion. This form of cooperation is in effect partial consolidation through State initiative. As another illustration we may take the city of Newark, N. J., which is closely surrounded by a group of overflow cities, all combined to¬ gether so far as public utilities are concerned, by one semi-private agency, the Public Service Corporation of New Jersey, which operates the street railways, the gas plants and the electric light and power works in all of them. In this case the control over these utilities which the individual cities have necessarily in large measure lost is exercised not through a metro¬ politan district nor through a federation of the cities concerned, but through a State board of public utilities having jurisdiction throughout the limits of New Jersey. In Ohio a few years ago a group of cities centring around Akron and Canton, all served by the transit system of the Northern Ohio Traction and Light Com¬ pany entered into what was called the ((InterCity Traction League'* for the purpose of as¬ sembling their complaints against the traction company, co-ordinating their remedies and

uniting to present their demands to the public service commission of Ohio. In California a few years ago an act was passed by the legis¬ lature enabling cities to federate and establish districts coterminous with the areas served by particularly utilities for the purpose of

acquir¬ ing and operating such utilities. Cities through¬ out the country have found it to their interest to combine informally in organizations for the study of municipal problems and the inter-cJtiange of experience. Notable among these are the League of American Municipalities and The Utilities Bureau. In many States also leagues of municipalities have been formed which often have their nucleus in the municipal reference departments of the State universities and thus give to their constituent members the benefit of the research and constructive sug¬ gestions of modern applied scholarship.

5. Influence of Increase of Population upon the Development of Municipal Prob¬ lems. — While cities remain small and are sur¬ rounded by wide stretches of agricultural ter¬ ritory, it is only the simplest communal needs, such as water supply, drainage and police and fire protection, that go to make up the neces¬ sary functions of city government as dis¬ tinguished from rural local government. As cities grow larger, however, and as more cities spring up primarily dependent upon the same outside areas for water and food supplies, the original city problems became more complex and their solution more difficult. Furthermore, cities as they grow not only spread over larger areas but become more congested at their centres. Wherever cities become so large or so crowded that the open spaces of the country are no longer readily accessible to children and that even play-spaces under the crowded con¬ ditions of urban life are at a premium, the nature of the problems of the city government undergoes a radical change. Size and conges¬ tion transform the environment of the home and thereby make necessary a whole series of municipal functions, centring in the problems of health, recreation and education. It is with relation to these problems that cities have been prone to neglect their duty and to post¬ pone the expenditure of thought and money necessary if the inherent and fundamental dis¬ advantage surrounding human life in large and congested cities is to be in any reasonable meas¬ ure overcome. The trouble is increased by the fact that as cities grow bigger the value of land mounts high and only the few who are relatively rich can afford to own their own homes unless, indeed, their less well-to-do fellow citizens seek remote suburbs. In any case the vast majority of the down town popu¬ lation will be made up of renters. Also, as the city gets larger, the community life changes. It is no longer possible for every citizen to be acquainted with the majority of his fellow citizens. Instead, he maintains his acquaintance with the comparatively few who are associated with him in his work or in his social or re¬ ligious activities, and such associations become less and less neighborhood

affairs. The result is that the citizen gradually becomes more and more dependent upon the newspapers and upon the official party organizations for the knowl¬ edge and leadership by which his civic activities must be guided. Moreover, the increase in the

size of a city and the enormous changes in the value of the land upon which it is built and in the size and profitableness of its industries tend to separate the population more and more into classes. The rich become very rich and for the most part live in the most beautiful and exclusive districts of the city, while the poor become very poor and live crowded to¬ gether in the slums. There are abnormal con¬ trasts between splendor and squalor and the public opinion of the community becomes more inert and less intelligent; it becomes less re¬ sponsible to the ordinary demands of citizen¬ ship and reacts with greater passion and reck¬ lessness upon the extraordinary ones. Urban life creates enormous commercial, industrial and social values. Those who first flock to a city, eager for these economic and social ad¬ vantages, overlook to a large extent the counter¬ vailing disadvantages inherent in social con¬ gestion and for a long time, through ignor¬ ance, carelessness or greed, refuse to pay the necessary costs of overcoming these disad¬ vantages. As a result the problems of the city are cumulative, so that after it has reached a certain size and finds that it must try to re¬ move these neglected disadvantages at whatever cost, it begins to feel the pinch of civic poverty and is never able fully to catch up with its work. The unpaid judgments of civilization that have been piling up against it can no longer be escaped, and this fact combines with many others to make municipal functions in large cities extremely complex and extremely expensive. The law diminishing returns as ap¬ plied to agriculture may be considered to apply also to the activities of municipal government Beyond a certain point, which is determined primarily by the size of the city, the community gets a diminishing return for every dollar spent, but since the necessity is increasing the number of dollars to be spent increases by a geometrical progression.

6. The City Plan. — The first conscious con¬ structive act of a community organizing itself into a city logically should be the development and adoption of a city plan, to utilize to the greatest advantage the site occupied by the city and to guide the city's growth for the future. It would be an error to say that this funda¬ mental duty has been universally and com¬ pletely neglected by the cities of America; for in a number of cases, of which Washington and Detroit are notable examples, city plans have been laid down at the beginning

and more or less closely adhered to in their larger out¬ lines. Moreover, the laying out of a single street, the construction of a harbor, the de¬ velopment of a sewerage system or of a municipal water supply, is in itself an act of city planning. Where most cities have lament¬ ably failed is in the fact that they did not at the beginning exercise wise prevision and lay out a comprehensive plan of development when it was possible to do so. The purpose of the city plan is fundamental and complex. Every city has certain advantages of site which ac¬ count for its existence. Through its location it establishes its relations with the outside world, upon which it is absolutely dependent not only for its growth and riches, but for its very life. As the sites of cities are of infinite variety and as the city plan must be made in

every case with regard to the particular site, it is futile to attempt to work out a uniform city plan good for adoption by all cities. The plan must utilize the site by developing all its inherent physical advantages as a terminal for transportation and traffic, by removing so far as possible, even at great expense if need be, its inherent disadvantages and by opening convenient thoroughfares for all kinds of traffic. The importance of providing great radial highways reaching out into the surround¬ ing country can scarcely be overestimated in the case of cities largely dependent upon direct communication with their agricultural environs. Where a city is situated upon navigable waters the development of the harbor and of the water front terminals in convenient relation to the distributing land arteries within the city or reaching out from it is one of the greatest factors in a good city plan. In this connection it may be noted that of the 28 largest cities in the United States, all but four or five have the advantage of navigable waterways and owe their greatness in considerable measure to them. Under modern conditions, since the rail¬ roads have become the great land highways of the civilized world, the provision of adequate rights of way and terminal facilities for them is perhaps the most important single factor in the city plan, at least so far as it relates to the industrial and commercial growth of the city. But the city plan has

other functions besides establishing convenient means of communica¬ tion with the outside world. It is also to provide for the internal convenience of city life. Upon it depends whether the streets shall be wide or narrow, straight or crooked; whether street railway lines shall be conveniently laid out for rapid and comfortable transit ; whether swamps shall remain undrained and hills undeveloped ; whether there shall be playgrounds for the children and parks for all ; whether available lakes and beaches shall be developed to their maximum usefulness ; whether there shall be civic centres adorned with beautiful and con¬ venient structures, or whether public buildings shall be dropped hit and miss about the city without reference to dignity of approach or convenience of usej whether skyscrapers and hovels shall nestle aganst each other or through proper zoning and restriction of the heights of buildings, each section of the city shall be utilized to the maximum without the egregious inconsistencies so often character¬ istic of unregulated development ; whether the homes of the people shall be constructed with reference merely to the rents that can be extorted from the unfortunate or with reference to comfort, sanitation and the pro¬ vision of adequate sunshine and fresh air. City planning in its broadest meaning com¬ prehends all the fundamental and permanent civic improvements which are ordinarily paid for out of bond issues or special assess¬ ments, as distinguished from the current operations of the city government, the expenses of which are paid out of taxes and other annual revenues. One of the most important and most difficult problems of the city plan is the adoption of adequate measures to control the development of suburban communities at the time outside of the city limits but which sooner or later will inevitably be brought in. This is an extraterritorial problem and the city

cannot solve it in any reasonable measure un¬ less it receives from the State drastic extra¬ territorial powers, and in the exercise of such powers through a permanent agency brings all suburban land subdivisions and other basic im¬ provements under strict control and into har¬ mony with a plan which the city itself has worked out for the development of the larger community of which it is the centre.

7. The Disposal of Wastes. — The primi¬ tive method for the disposal of sewage and liquid wastes is based upon the fact that water runs down hill. Most cities, up to comparatively recent times, have drained off their surface waters and their sewage as best they could into the nearest available stream or body of water that would carry it away or absorb it, but the obviously diastrous results that come to a city from

pouring its sewage into its own water supply early led to the taking of some precau¬ tions against this particular civic blunder. For a long time, however, every city was careless of the welfare of communities further down the stream which often were dependent upon the same river for their drinking water. At one time it was the theory that sewage-laden water would purify itself by running a few miles, so that the down-stream communities need not be. afraid, but the immense increase in urban pop¬ ulation and the consequent increase in the vol¬ ume of sewage has compelled cities willingly or unwillingly to spend enormous sums of money to carry their sewage for away or to establish purification plants for treating it before the in¬ nocuous effluent is permitted to run into rivers or other bodies of water. The disposal of wastes, however, includes much more than sew¬ erage. It includes the collection and final dis¬ position of garbage, ashes and household wastes, the removal of dead animals and the provision of cemeteries or crematories for the disposal of the human dead. These problems are far from simple and their complexity multiplies as cities become large. Ashes and cinders, if not mixed with garbage or other household wastes, may be profitably used for filling in and even as material for the construction of certain im¬ provements, such as roadways and sidewalks. Garbage is one of the most persistent nuisances of the city. The efficient handling of the gar¬ bage problem requires the close cooperation of the individual householder with the civic au¬ thorities. The health of the community, espe¬ cially during the warm months, requires that the garbage should be kept isolated from the time of its production to the time of its final disposition. This means tight cans, covered wagons and prompt cremation or reduction. But the very process of cremating it or of re¬ ducing it is so offensive that cities often find difficulty in securing proper and convenient lo¬ cations for the garbage works. Cemeteries and crematories are very often established and maintained by private organizations, but in every case the city must see to it that the ceme¬ tery is not located so as to endanger the pub¬ lic water supply or otherwise affect the com¬ munity's health.

8. The Public Water Supply. — It is the

custom in the country and in very small vil¬ lages for each householder to develop his own domestic water supply by means of a well. But in some locations individual wells are extremely expensive and in any case villages do not be-

*

come very populous before the danger from the general use of well water is recognized on account of the possibilities of its contamination. No general sewerage system is possible until a public water supply under pressure has been developed and so the very inability of the young communities to dispose of their sewage increases the danger of their primitive water supply and hastens the time when a public sup¬ ply must be developed. As cities grow larger and the volume of water required for domestic, industrial and public purposes becomes greater than any suitable supply available in the imme¬ diate vicinity, it becomes necessary to build aqueducts and pipe lines to distant watersheds and to spend enormous sums of money to pro¬ tect the purity of the supply, to bring it to the city and to distribute it to the people for its various uses. If mountain water is available, it can generally be delivered by gravity and needs no special treatment for purification. If water has to be taken from rivers or lakes it re¬ quires. expensive pumping machinery to lift it from its natural level and force it into the dis¬ tributing mains under pressure. If the public water supply has to be taken from the ground it requires the construction of infiltration gal¬ leries or series of wells, often very deep and expensive, with elaborate collection works and often double sets of pumping machinery to make it available for use. If the only available water supply is in its natural state impure or otherwise unsuitable for domestic or industrial uses, it has to be treated by filtration or by the use of chemicals to render it safe and suitable for use. It is noteworthy that of all public utilities the water supply is the only one (if we except sewerage) which has come to be gener¬ ally recognized in the United States as appro¬ priate for municipal ownership and operation. Many cities, especially the small ones, are still served by private water companies ; neverthe¬ less, the public investment in water supply far outweighs the private investment. It is some¬ times suggested that water, which, like air and sunshine, is provided by nature for the necessi¬ ties of all living creatures, including man, should be as free as air and sunshine to the denizens of cities. While there is something to be said in favor of this proposal, nevertheless water differs from air and sunshine in that it has to be collected, stored and distributed and in some cases really manufactured by the purifying process in order that it may become available for use. It is, therefore, the general policy of those cities which furnish the water supply to sell it as a commodity to consumers,

thus pay¬ ing the expenses of the installation and opera¬ tion of the waterworks. This practice involves the city in the difficult problem of rate-making and the establishment of rules and regulations for the curtailment of use and waste. Even if water were to be furnished free to the con¬ sumers it is obvious that they could not be per¬ mitted to use it extravagantly or to waste it without limitation. Such a policy might bank¬ rupt in a little while the richest city in the world. As a means of distributing the costs of the water supply justly among the various consumers and as a means of curtailing waste, the metre system has been adopted in many cities. The administration of the metre system involves large expense for frequent inspection,

reading and testing of metres and for repairs and renewals. The city is thus confronted with all the difficult problems involved in the con¬ struction and operation of a public utility and the maintenance of amicable commercial rela¬ tions with all its citizens. The water supply is vital, not only for the health and convenience of domestic and business consumers, but also for public purposes, particularly for use in the ex¬ tinguishment of fires, for the flushing of sew¬ ers and the sprinkling of streets. Without an adequate water supply, fire protection is im¬ possible. The double purpose for which water is provided involves the city in the question of the proper distribution of costs between the in¬ dividual consumers and the city at large. In many cities all the expenses of the waterworks are charged against private consumers and no allowance is made the water department on ac¬ count of the water and other facilities fur¬ nished for fire protection, street-sprinkling and other public purposes. Where this system pre¬ vails the consumers of water, a prime necessity of life, are in effect indirectly taxed for the benefit of the city at large. The adjustment of this problem involves one of the most import¬ ant and difficult problems of municipal account¬ ing. Certainly a city cannot afford not to keep its books in such a way as to enable the public to tell what the water supply costs, what its actual revenues are and what is the fair value of the services, if any, which it renders with¬ out charge.

9. Protection Against Fire and Flood. — -

To persons living in separate houses in the country, the danger of loss by fire is always present, but it is a danger that arises in most instances from the carelessness of the house¬ holder or his family. But when great numbers of houses are crowded together in a city, every man’s home is endangered by the carelessness or misfortune of every

other man. Nothing can be more terrible than a great conflagration such as the fires that at different times have swept Chicago, Boston, Baltimore and San ‘ Francisco. It is probably true that not a large city in the United States would escape such a conflagration for a month, certainly not for a year, if it were unprotected by elaborate fire¬ fighting machinery and facilities and a trained force of fire-fighters. The fire department is the most picturesque of all municipal depart¬ ments. It appeals most to the imagination of the entire community, because city dwellers are more or less conscious all the time that it stands between them and disasters which are ready to spring upon them in any unguarded moment. Fire protection is primarily designed for the protection of property values, the accu¬ mulations of invested wealth making up the homes, the offices, the factories and other equip¬ ment, which together constitute the tools of city life. In order that fire protection may be adequate, the organization of the fire-fighting men and machinery has to be correlated with the right kind of a water supply. Not only must the total supply of water for the city be sufficient to meet all emergencies, but the “dis¬ tributing mains must be of such a size and ,be so correlated and fire hydrants must be so placed that the volume of water potentially necessary for the extinguishment of a large fire shall be available upon the instant at any point where

perishable buildings stand. In the smaller towns which cannot afford powerful fire en¬ gines, it is important that the water pressure in the mains should be sufficient to raise streams to the tops of the tallest buildings in the place. In places where powerful fire engines are pro¬ vided, the most important thing is to have a suf¬ ficient supply of water available at every hy¬ drant outlet. The engines will do the rest. In the very greatest cities it is sometimes deemed necessary to install a separate system of water mains designed exclusively for high-pressure fire service. However, the effectiveness of fire protection does not depend altogether upon the supply of water available for extinguishing fires after they get started. It is most neces¬ sary in cities that measures be taken to prevent fires. One of the first of these

measures is the establishment of a central zone called the ((fire limits,® within which property owners are not permitted to erect buildings which are easily combustible. This control of structures be¬ comes very drastic in some of the great cities and extends far beyond the mere question of the materials to be used in construction. It in¬ cludes provisions for the supervision of elec¬ trical wiring and for the approval of the plans for the. interior construction of buildings. Fire prevention also requires the prohibition of the storage of combustibles except in approved places and according to approved methods. The fire department, in order to be efficient, must be ready to give almost instantaneous service. For this purpose it is necessary to establish a com¬ plete system of fire signals with fire-alarm boxes scattered through the city. For the pro¬ tection of life in connection with possible fires the city has to see that fire escapes are placed upon all non-fireproof buildings above a cer¬ tain height in which people live or are em¬ ployed. It also has to establish rules in regard to the location and opening of exits in public buildings, in regard to the operation of motion-picture shows and in regard to many other things which, if left to themselves, are likely to increase the fire hazard.

While the dangers of fire are constant, many cities are so situated with reference to the nat¬ ural flow of waters that they are in periodic danger of destruction or serious damage from floods. The maximum flood may not come oftener than once in 50 years, but if it comes and no provision has been made to safeguard the city against it, its ravages may be so great as to more than justify the expenditure of the enormous sums necessary to protect the city against its recurrence. The flood danger does not generally affect cities situated on the seacoasts or on the shore of a large lake. It is in¬ terior cities, wholly or partly built in river val¬ leys, such as Dayton, Columbus, Cincinnati, Kansas City and New Orleans, that are most likely to be overwhelmed by uncontrolled fresh¬ ets. To guard against flood dangers levees may have to be built, river channels blasted out and straightened, lowlands filled in or natural waters impounded in storage reservoirs. In fact, a city may find itself so situated that by its own unaided effort and expenditures it is wholly impossible to protect itself against flood dangers. It may be most economical and in some cases absolutely necessary, if a city is to be protected at all, for it to secure and exer¬

cise extraterritorial powers, perhaps for the building of dams scores of miles away in the hills.

10. Protection Against Crime and Vice. —

The crowding of a great many people together into a single urban community multiplies almost infinitely the number of points of social con¬ tact, every one of which is potentially a temp¬ tation to vice or crime. Both personal inter¬ ests and property interests are constantly clashing in the swirl of city life. All the weak spots in human nature are tried out. Out of these conditions grows the necessity for the po¬ lice department, the magistrates' courts, the juvenile courts and the city prisons.

11. Protection Against Pestilence. — City dwellers are not only subject to cumulative dan¬ gers from the uncontrolled outbreaks of the visible forces of nature, but through their close contacts become an easy prey to the ravages of contagious and infectious diseases, ranging from chicken-pox, measles and mumps through scar¬ let fever, typhoid fever and diphtheria to the most terrible diseases, such as smallpox, tuber¬ culosis, syphilis, cholera, yellow fever, bubonic plague and infantile paralysis. Without the control established through the sanitary code, the sanitariums, the. hospital facilities and medi¬ cal attendance furnished by the city, and with¬ out the universal vigilance of an efficient health department in educating the people in hygienic methods of living and in protecting them from the nuisances created by the carelessness of oth¬ ers, a great city would become a mere charnel house. It is indeed the glory of efficient mod¬ ern city government that in many instances it has transformed cities from the deadliest to the safest places of abode for human beings. In certain matters relating to physical health, city governments have overcome the natural disadvantages of city life and have turned them into positive advantages.

12. Protection Against Poverty and Mis¬ fortune. — City life raises the standard of liv¬ ing and also increases the cost of living. Rents for even modest homes mount high. Milk and meat, fruits and vegetables have to be brought from far and pay tribute to a complex dis¬ tributing organization, which means high prices to the ultimate consumers even though the orig¬ inal producers received little for their products. The stress of city life tends to multiply mis¬ fortunes. Those who ((lose out® in the game lose more heavily and become more helpless than they do in rural communities. The re¬ sult is that one of the great functions of mu¬ nicipal government is to provide means for succoring the poor, shielding the unfortunate, caring for the aged and giving homeless chil¬ dren a start in life. The performance of this function requires the maintenance of a multi¬ plicity of public institutions, including hos¬ pitals, lodging houses, children's homes,

em¬ ployment agencies, almshouses, *etc.* Even the employees of the municipality itself have to be protected from helpless poverty in old age by means of municipal pension systems.

13. Control of Housing. — At the beginning of this article it was pointed out that the very recognition of the necessity for the incorpora¬ tion of a city is pregnant with the idea that unrestricted individualism must give way to social control invading what many regard as

the sacred domains of personal liberty and indi¬ vidual property rights. Perhaps there is no branch of municipal activity that illustrates this tendency so well as the control which comes to be more and more necessary as cities grow, over the character of the houses built for the people to live in. This control is embodied first in the building code; then in the tenement house law; then in the adoption of districting plans and limitations upon the height of build¬ ings. The exercise of this control brings the city government, representing the public inter¬ est, into direct conflict with the most powerful individual motives. The passionate greed that seems to be developed most readily in the soul of the landlord class where the growth of a community is pouring riches into its lap, op¬ poses with almost fanatical persistence the re¬ strictions upon housing which are absolutely necessary to provide for every living apart¬ ment enough sunshine and fresh air, with safety from fire and disease and sufficient space for the children to play in.

14. Education. — Under whatever conditions people may live, their children in a democratic country have to be educated. The ((little red schoolhouse® is one of the traditional symbols of the freedom and intelligence of America when it was a predominantly rural nation. Nevertheless, the characteristics of urban life are such as to place upon the public school system an infinitely greater burden than it has to bear in the country. With the curtailment of the opportunities for both work and play in and about the home, the functions of the public school system multiply. It is no longer suffi¬ cient for the school to teach the three R's, leav¬ ing the children to get all of their education

other than book learning from other sources, but in addition to a much more complicated book learning than that deemed necessary in the little red schoolhouse of the past, the mod¬ ern city school has to take care of the health of the children, to give them physical training, to control and direct their play and to teach them how to work. The school even has to assume the burden of teaching the girls how to sew and to cook and the boys how to drive nails and saw wood. Under the conditions of American city life, other educational functions are thrust upon the public schools by reason of the presence in the community of large num¬ bers of foreign-born adults who need to be taught the English language. This involves the establishment of evening schools. Moreover, the absence of opportunity for the wholesome employment of children during the vacation periods leads to the establishment of school gardens and summer schools. Cities also have to provide great libraries with local branches and elaborate organization for the stimulation and direction of the reading tastes of the chil¬ dren and the young people. This multiplicity of activities comprised under the general term education places upon municipal government one of its heaviest financial burdens. The schools are always calling for more money and the importance of education, which may be termed the process of reproducing citizenship, assumes constantly a greater and greater place in the public mind. In fact, the school system in a great city becomes so overwhelmingly im¬ portant through the accumulation of the subtle

influences which the conditions of city life bring to bear upon children that it is hard to give adequate expression to the significance of this function.

15. Recreation. — For children recreation is a necessary part of education and the play¬ grounds that become necessary under city con¬ ditions are often connected with the publir schools. But the alchemy of congestion has such a strange and far-reaching effect upon hu¬ man beings that it becomes necessary for the community as a whole to provide and regulate in large measure even the amusements of the adult population. All cities provide public parks ; many provide open air concerts ; many maintain public baths and bathing beaches ; some maintain athletic fields and recreation centres, provide public auditoriums and operate municipal theatres. Museums, zoological and botanical gardens, aquariums and art galleries are frequently maintained at the expense of the municipality. City life is characteristically gay. The hours of labor are relatively short and the amount of available leisure relatively great. It is a common adage that

<(the Devil finds mischief for idle hands to do,® and every urban community organized as a municipal corpora¬ tion finds that it cannot afford to ignore the Devil's activities. Thus more and more the problem of the control of leisure presses in upon the great city for solution. The recent stupendous development of the <(movies® as a means of recreation in cities and the obvious need for some community control over the char¬ acter of the films exhibited, have led some ad¬ vanced thinkers to propose the municipalization of recreation as the next most important step in the development of municipal functions. The advocates of this program maintain that recre¬ ation is a necessity of life for urban populations and that it should be provided as a community function and thus be removed from the realm of private greed and exploitation. Foremost among the specific measures proposed by this group of reformers is the intensive use of the public schoolhouses as meeting places and com¬ munity centres.

16. Franchises and Control of Public Util¬ ities.— Perhaps there is nothing more charac¬ teristic of urban life than the development of those co-operative services commonly called public utilities, such as water supply, gas and electric light, heat and power, street railways and telephones. The modern city as a great co-operative unit could not exist as it is without these utilities and these utilities themselves could not exist except through the use of the public streets, which are rightly regarded as the common property of all the people, the very symbols of democracy and civic freedom. In America the habit of individualism has been so strong and community life in cities has been so poorly organized and so devoid of initiative that the actual construction and operation of most of these great utilities has been left in private hands. Waterworks are an exception. 'Also a few cities own and operate gas plants and many of the smaller cities maintain municipal electric plants. New York and Boston have built rapid transit subways at public expense, but they are equipped and operated by private companies under long-term leases. San Fran¬ cisco and Seattle have within the last few

years constructed certain street railway lines which are now being operated in partial com¬ petition with the privately owned street railway systems in these cities. Baltimore, Erie and one or two smaller cities have built systems of electrical conduits which are rented out to the public service corporations having wires in the streets. In so far as public utilities have been recognized as a direct municipal function, they involve the expenditure of enormous sums of money in the acquisition or construction of plants, the maintenance of great operating de¬ partments with multitudes of employees and the collection of vast revenues. By way of illustration, the department of water supply, gas and electricity of the city of New York operates a water plant representing a total investment of about $350,000,000, employs over 2,000 persons in the operation of this plant and levies and for the most part collects over $13,000,000 per annum of water rates. So far as. public utilities are still regarded as a semi¬ private function, their presence imposes upon the city government the heavy responsibility of granting franchises and of attempting to regu¬ late on behalf of the general public the rates at which the people shall be served and the character and extent of this service. It is in connection with these matters that many of the most important civic struggles take place, and more and more the issues involved in the ownership and regulation of public utilities tend to affect and even dominate the policies of municipal government.

17. Municipal Revenues and Taxation. — The multiplication of the functions of govern¬ ment necessarily results in a tremendous in¬ crease in the cost of government. The city of New York makes annual appropriations of about $200,000,000, or nearly four times the amount appropriated each year by the state of New York. Municipal revenues are derived from many sources, but the one most import¬ ant source is the taxation of land. Indeed, it is the great increase in the value of land arising as a city grows that enables it to meet the ex¬ penses incident to growth. It is the general practice in American cities to levy taxes on property, theoretically upon all property but practically for the most part upon real estate. Land cannot run away at all and buildings can¬ not do so without extreme difficulty. In most American cities personal property is subject to taxation but on account of the difficulty of detecting and appraising it the great bulk of personal property values escapes direct taxation. Another means of securing revenues for pub¬ lic improvements is the so-called special as¬ sessment or what in England is referred to as the ((betterment tax.® It is the theory of spe¬ cial assessments that the particular improve¬ ments for which they are levied have a direct effect in increasing the land values in the vi¬ cinity and that therefore the

owners of the land should pay for the improvements. Spe¬ cial assessments are most frequently levied for the opening, grading, paving and widening of streets and for the construction of sewers. Sometimes also they are levied to pay the cost of parks and water main extensions. Another source of revenue is the general business license tax, a form of tax quite prevalent among the cities of the South. Every city, however, col¬ lects some revenue from various kinds of li¬

cense fees. In some of the States, cities get subventions from the State government, usually for the benefit of the schools. From water¬ works or other utilities operated by the city, large revenues are obtained, and in some in¬ stances a city gets a great deal of money from the public service corporations through the form of franchise taxes.

18. Municipal Debt and Debt Limits.— A city's wants are never satisfied. Its needs out¬ run its income. Expensive improvements have to be constructed which are destined to last and be of service for many years. The citizens of a growing city hard bestead to get rich and at the same time pay the increasing cost of the government, generally feel that a portion of the burden of paying for such improvements should be passed on to the next generation, which, it is expected, will continue to have the benefit of their use. Therefore, it has been customary for cities to borrow the money re¬ quired to make the so-called permanent im¬ provements, and in times of rapid growth when the demand for additional investment is great and the expectation of future orofit keen, a strong temptation arises to pile up municipal debts needlessly and to postpone the payment of expenses which in fact ought to be paid out of current revenues. The danger of municipal bankruptcy is regarded as so serious that the State seldom, even in the adoption of home rule amendments to the constitution, gives the city authorities power to incur debt without limitation. In fact, it is a well established, though not universal policy of the States, to limit mu¬ nicipal indebtedness by direct constitutional pro¬ visionsˆ and where this is not the case the legis¬ lature is often given specific authority by the constitution to pass general laws limiting municipal indebtedness and sometimes limiting the tax rate. Frequently the issuance of mu¬ nicipal bonds is made subject to approval by a majority of the people at an election. The establishment of debt limits has in many cases proved embarrassing to cities. The exigencies of municipal development have seemed to re¬ quire in many cases the borrowing of all the money that can be borrowed up to the debt limit. The real purpose of a debt limit is to keep within reasonable limits the tax

burden upon property, for obviously the borrowing of money is merely the postponement of taxation. Bonds that are issued fall due after a while and have to be paid, and in the meantime in¬ terest charges add to the annual burden of the taxpayers. . The fundamental purpose of debt limitation is served when bonds issued for self-sustaining activities of the citv government, such as waterworks, docks, rapid transit sub¬ ways, electric-light plants, etc., are exempted from the debt limit, for a city's financial strength and civic prosperity is not measured by the smallness of its debt, but by the excess of its assets over its indebtedness and of its revenues over its current obligations. A debt limit that is inflexible and gives no leeway to a city to embark upon public utility enterprises is one of the most effective means of tying the city's hands and hindering the full development of its functions. In fact, municipal ownership and operation of public utilities as an ultimate policy is quite generally recognized, but cities are prevented from entering upon the realization of this policy, or even preparing for it, bv the

stringent financial limitations often placed upon them. In a few States, of which Michigan and Ohio are examples, cities are authorized to ac¬ quire public utilities and to issue bonds there¬ for, against the general credit of the city, if this is possible within the debt limit, and if this is not possible, then against the utility property itself. The State of Washington has gone even further and permitted the issuance of public utility certificates under ordinances pledging the utility revenues, not the utility plant, to the bondholders and thus making interest charges a first lien upon the gross earnings, so that if earnings are insufficient for all purposes the city will have to come to the rescue, not through the payment of interest on bonds, but through the payment of operating expenses of the utili¬ ties. The very great additional sums paid in the form of interest where long-term bonds are issued has led to the advocacy in some quarters of the ˆpay-as-you-go® policy, under which non¬ revenue producing public improvements, if not paid for through special assessments, will be paid for directly out of annual revenues. It is urged that by the

adoption of a proper program of improvements so that the expense will be spread along quite evenly year by year the city will save a great deal of money by this policy. It has been generally customary for cities to establish sinking funds when bonds are issued for the purpose of accumulating a sufficient amount of money to pay these bonds when they fall due. The difficulties and dangers in¬ volved in the management of great trust funds like these have led to the adoption in some in¬ stances, of the serial bond plan in accordance with which an issue of bonds to provide funds for a specific purpose will be divided into as many parts as the number of years which are reckoned to be the life of the improvement, and equal numbers of them are made to fall due each year up to the limit of such estimated life. In connection with special assessments it is customary, in order to make the payment of the assessments levied against benefited property easy, to allow the property owner a certain pe¬ riod of years for completing the payment of his assessment. Under this plan he is expected to pay an equal amount each year until the whole is paid, and in the meantime the city issues so-called assessment bonds to cover the cost of the improvement, these bonds to be payable out of the assessments as they are paid.

19. Participation of Citizens in Municipal Government. — As cities grow and their func¬ tions become complex and technical it is more and more necessary that there should be per¬ manency in the municipal service. At the same time the city government requires more and more the cooperation of all the citizens. To secure efficiency in municipal administration and to encourage intelligent young men and women to enter the public service, the merit system has been devised by which the appoint¬ ments to subordinate positions are made as a result of competitive examinations and city em¬ ployees are protected from arbitrary removal for political or personal reasons. Where the merit system is in vogue a special commission is established to administer the civil service laws and regulations. _ This is one of the most difficult tasks of municipal administration and its difficulty increases as the functions of city government increase and the number of city

employees multiplies. The administrative and civic importance of the merit svstem becomes evident the moment we think of the vast num¬ ber of men and women engaged in the city service as policemen, firemen, school teachers, clerks, inspectors and laborers. It is not suffi¬ cient, however, that the city government should be able to draw freely upon the business re¬ sources of the community for the

permanent work of administration. The activities of the city touch all of its citizens in an infinite va¬ riety of ways and the success of municipal gov¬ ernment depends upon the loyal interest and support of the community at large. Without civic intelligence and civic spirit a great city with a democratic political organization cannot maintain efficient government. Often citizens f$el that the city government is a distant, un¬ responsive power over which they have no con¬ trol. It is for the purpose of developing and maintaining active interest among the citizens themselves and of giving them the complete control over the policies of their government which democracy demands, that such devices as the direct primary, the preferential ballot, nomination by petition, the recall, the referen¬ dum and the initiative have been made use of in many American cities. The problem of how to facilitate the intelligent participation of all the citizens in municipal government remains the crucial problem of American democracy. See City Manager Plan of Government; Executive.

Delos F. Wilcox.

Franchise Expert, Author of (The Government of Great American Cities P *etc.*

MUNICIPAL HOME RULE.— Munici¬ pal home rule is the term applied to the power possessed by many American cities to frame and adopt their own charters. It is a power which must be conferred upon municipalities by a provision of the State constitution since the courts have held with practical unanimity that a grant of home rule by the State legislature would be an unconstitutional delegation of legislative power.

The constantly increasing demand for home rule which cities in the United States are making is due to the numerous and serious evils that seem to be the inevitable result of the practically complete supremacv over mu¬ nicipal affairs which the legislatures enjov in three-fourths of our States. In the absence of restrictions in the Federal or State constitu¬ tion the power of the legislature over the city is absolute. Legislatures have not hesitated to exercise this power. They have withheld from cities powers necessary to their development. They have interfered directly and unjustifiably in municipal matters. They have too often treated the revenues, contracts and offices of cities as the legitimate spoils of partisan politics. The problems of municipal government and ad¬ ministration have been left for solution to men competent neither in experience nor training to solve them. Furthermore, the necessity under which cities have labored of seeking continu¬ ously for extensions of power or other modi¬ fications of

their charters has resulted in swamping the legislative calendars with an enormous mass of> business, local in signifi¬ cance, to the exclusion of more important mat¬ ters of State-wide concern.

It is these evils which municipal home rule

aims to abolish by allowing cities to deal with¬ out interference with their own affairs. It is also urged that a valuable political education is received by the citizens who assume the re¬ sponsibilities of home rule, while at the same time the system tends to divorce State and local politics, a result greatly to be desired.

Municipal home rule does not, however, set the city free from all State control. A mu¬ nicipality is not only an agency of local self-government, but it is also a part of the admin¬ istrative machinery of the State government. Complete freedom of action for the city is as undesirable in this latter capacity as it is de¬ sirable in the former. The city must serve as the unit through which must be secured the enforcement of State laws relating to health, safety and the suppression of crime, the efficient conduct of elections, the promotion of educa¬ tion and philanthropy, and in all these matters it must be subject to State control. The neces¬ sity for the steady flow of State revenue ren¬ ders desirable restrictions upon municipal ex¬ travagance in matters of taxation and borrow¬ ing. Municipal home rule, therefore, means merely the right of the city to control its own destinies in matters municipal or local in signifi¬ cance and not the right to interfere with those problems which must concern the welfare of the State at large. To define accurately which functions of the citv are municipal in character and which have this State-wide significance has been found to be a practical problem of great difficulty.

The home rule provisions of State constitu¬ tions vary in character. Sometimes home rule is given to all cities, sometimes only to those of a certain population. These provisions have usually been self-executing, but in a few cases the legislature has acted for the purpose of making the grant of home rule effective. Usually the home rule

charter is framed by a popularly elected charter commission and be¬ comes effective upon the approval of a majority of those voting upon it. There are, however, cases in which an extraordinary majority of the voters is required or even the subsequent approval of the governor or legislature. These special restrictions are exceptional. Home rule charters commonly provide for their own amendment by means of initiative petition. They are not subject to change at the hands of the State legislature.

In 1918, 12 States in the United States had constitutional provisions giving some or all of their cities municipal home rule. These States and the dates of the home rule grant in each are as follows : Missouri (1875) ; California (1879) ; Washington (1889) ; Minnesota (1896) ; Colorado (1902); Oregon (1906); Oklahoma (1908); Michigan (1908); Arizona (1912); Ohio (1912) ; Nebraska (1912) ; Texas (1912) ; Consult Arndt, (The Emancipation of the American City) (1917) ; Beard, (The American City) (1912); Fitzpatrick, E. A., (Experts in Municipal Life) (1916) ; Goodnow, (Municipal Home Rule) (1895) ; McBain, (The Law and Practice of Municipal Home Rule* (1916) ; Munro, (The Government of American Cities) (revised, 1916).

Robert Eugene Cushman,

Associate in Political Science, University of Illinois ,

MUNICIPAL HOUSING. See Tene¬ ment House.

MUNICIPAL LAW. In England and America municipal law means the national law or the law of the land, both public and private, in contradistinction to external or international law. The municipal law of America is de¬ rived from that of England, which has had a continual development extending over 13 cen¬ turies. Largely influenced at times by Roman law, both civil and canon, it has retained some¬ what the character of the Teutonic system in which it had its origin. By English colonists it reached all quarters of the earth and in the modern world it is the great rival of Roman law. For the first five centuries after Christ Britain was ruled by Roman imperial law after which it was banished by the invading hordes from the coast of the North Sea. With these came their tribal customs, which we find formu¬ lated in the C(dooms® promulgated by the Eng¬ lish kings from the 7th to the 11th century and by the Danish ruler of England, Canute. These laws, more properly ˆfolk-laws,® are largely made up of provisions for punishing breaches of the peace and setting fines as penalties for private wrongs. In the 8th and 9th centuries many of the Roman Church laws were introduced, especially the laws of mar¬ riage, deeds and wills, but even these were largely modified to conform to local usages and custom.

With William the Conqueror the law of the Franks, also Teutonic in origin, but highly de¬ veloped in Normandy, was introduced to Saxon England. The two systems were now in prac¬ tice — the Anglo-Saxon for the English and the Norman for the conquerors — while special en¬ actments after the Norman spirit governed the interrelations of the two races. The two sys¬ tems were gradually merged with the Norman law taking precedence because of its technical superiority. Down to the days of the Tudors the language of the laws was Norman-French. The common law was developed partly by legis¬ lation (royal charters, provisions, assLes, stat¬ utes), but mainly by judicial decisions. Eccle¬ siastical law still exerted considerable influence, having received independent jurisdiction from the Conqueror. This jurisdiction churchmen sought to extend, but were checked by several statutes. In family law, however, they re¬ mained supreme as also in the administration of estates, and from the canon law are mainly

derived these branches of modern English law. Judicial lawmaking sprang up toward the close of the Middle Ages, some judges boldly over¬ riding the common law by virtue of the powers they believed as inherent in the Crown. Since the 18th century, both in England and America, the courts have practically confined themselves to administering the law as established by pre¬ vious decisions. On the Continent of Europe the term municipal law has been often employed to designate a local law, as of a citv or prov¬ ince, in contrast to the national body of law; at present the term usually designates a city law in contrast to the national law. In the United States within recent decades a great body of legislation concerning cities has grown up, and the terrn municipal law has come to be the usual designation of such legislation. See Equity; Common Law; Canon Law; Municipality; Cities, Government of; and

consult Brunner, Heinrich, (Quellen des Englischen Rechts) (Eng. trans. by Hastie, Edin¬ burgh 1888) ; Maitland, (Materials for English History* (in Political Science Quarterly, Vol. IV, 496, 628) ; Stephen, (New Commentaries) (7th ed., London 1874). For American law consult Kent. (Commentaries) (12th ed., Bos¬ ton 1873) ; Holmes, O. W., Jr., (The Common Law) (ib. 1881) ; Carter, Modification of Our Common Law* (New York 1884) ; McQuillin, Eugene, 'Treatise on the Law of Municipal Ordinances) (Chicago 1904) ; Whitlock, Brand, 'On the Enforcement of Law in Cities) (Indianapolis 1913).

MUNICIPAL LEAGUE, National, an in¬ terstate organization, made up of individual members and affiliated with State and local as¬ sociations for the purpose of promoting better government in cities. It was founded in New York in 1894; the league is non-partisan in politics, but seeks to promote its ends by the enactment of sound municipal laws, charters, etc., by the election of able and efficient men to public office, by correcting abuses in the exist- • ing administration of city departments, as police, vice control, *etc.* Its annual conferences are of great value in that it promotes the ex¬ change of views between municipal workers and experts. At the 1915

meeting a model charter was issued, which has since been adopted by several municipalities. At present there are committees on franchises, State mu¬ nicipal leagues, city management, municipal in¬ formation and county government. Consult 'Proceedings of the National Municipal League*. (Philadelphia, annually, 1894-1910) and the National Municipal Review (Baltimore, bi¬ monthly).

MUNICIPAL OWNERSHIP is a term broad enough to include the ownership by a municipality of any. form of property. Usage has limited. its meaning., however, to the owner¬ ship by cities of certain well recognized types of public utilities or services such as water, gas, electricity and street railway transporta¬ tion. Municipal ownership is usually thought of. as including the municipal operation of the utilities owned, the ownership and operation being popularly regarded as inseparable. It is, however, not uncommon for municipally owned utilities to be leased and operated by private corporations. In the following paragraphs mu¬ nicipal ownership and operation will be dis¬ cussed as a single policy and system.

In recent years the number and variety of enterprises to which municipal ownership has been extended throughout the world have greatly increased. This extension has been more striking in Europe than in the United States. A survey made in 1906 showed that in the towns and cities of Prussia 33 different kinds of undertakings were in public hands. Needless to say most of these were enterprises which are almost universally regarded in this country as improper fields for municipal activ¬ ity. The following may be mentioned as ex¬ amples : abattoirs and stockyards, warehouses, breweries, hotels, canning factories, mines, bakeries, mills, fisheries and livery stables. In the United States municipal ownership has usu¬ ally been confined to undertakings which have some or all of the following characteristics : (1) those which are natural monopolies, in

which competition is cither impossible, imprac¬ ticable, or highly inconvenient, such as supplies of water, gas or electricity; (2) those which are dependent upon securing special privileges and rights from the public, such as the right of eminent domain and the right to occupy the streets with tracks, pipes, poles and wires; (3) those which produce commodities or services of which the city itself must necessarily be a heavy consumer, such as water for various municipal purposes and electricity or gas used for public lighting; (4) those which directly concern the health of the city or its general safety, as water, the purity of which directly affects the public health and which

is also necessary for fire protection and street flushing; (5) those which subserve the public welfare directly but which private capital cannot always be relied upon to provide at sufficiently low cost, such as public recreational facilities of various kinds or commercially unprofitable transportation facilities such as some of the municipal ferries in. New York. There is a marked tendency in this country to emulate the cities of Europe and enlarge the scope of municipal ownership. Recent years have witnessed experiments in the direction of the municipalization of ice plants, fuel yards, theatres and opera houses, although in none of these cases has the city made any effort to monopolize the field. It seems clear that we may expect a continued expansion in the field of municipal ownership. At present however, municipal , ownership in the United States is confined in the main to the systems for supplying water, light, power and trans¬ portation.

Cities which have embarked upon municipal ownership ventures have almost always been led to do so by force of certain concrete facts existing in individual cases rather than by any dispassionate and logical analysis of conflicting arguments. It has required no argument to convince indignant citizens that under private ownership of the city's vital utilities rates were high, service was poor, equipment was out of date, stock was watered and that public utility corporations were an influence for evil in local government and politics. Efforts to correct these abuses by legislation or by administrative control have usually proved ineffective and mu¬ nicipal ownership has been resorted to, fre¬ quently without much examination of the argu¬ ments for or against it, on the assumption that it would succeed where all else had failed. And it may be said, whatever criticisms may be raised by persons looking on from the outside, that the cases in which municipal ownership has proved unsatisfactory to the cities which have adopted it are few indeed. It should not be inferred from the foregoing that there has been any dearth of arguments on either side of the question of municipal ownership. In spite of the extension of. municipalization al¬ ready alluded to it remains one of the most debatable and hotly contested issues in the whole field of municipal policy. The arguments in favor of municipal ownership may be sum¬ marized as follows: (1) A broadening of the scope of municipal activity will stimulate in¬ terest on the part of the citizens in civic affairs by giving them a direct and immediate con¬ cern in what the city is doing. Civic pride and interest will produce civic efficiency. At the

same time a higher grade of public officer will be attracted into the service of the city by the necessary creation under municipal ownership of places of dignity and importance. (2) The city will enjoy better service from publicly owned and operated utilities than from those privately owned. The primary motive of the public utility corporation is to make a large profit, frequently on watered capitalization. Expenditures made to improve the service ren¬ dered mean a reduction in these profits and are, therefore, not made when they can be postponed or avoided. Under municipal owner¬ ship the ambition to make profits is absent. The city could afford to invest the profits of the business in necessary improvements of service. It could make needed extensions of service into undeveloped parts of the city at a temporary loss which could be met from the proceeds from the rest of the system. It is untrue that the city would display less initiative than would private; capital in the management of these enterprises. In fact the reverse would be true. Experience has shown that the desire to remain in the undisturbed possession of generous rev¬ enues has completely killed the business initia¬ tive of many public utility companies, which, secure in their monopolistic franchise rights, have shown little or no enterprise. (3) Mu¬ nicipal ownership has been shown by experi¬ ence to be financially successful. It gives the city a substantial surplus or enables it ma¬ terially to reduce rates and in many instances it has done both. The case of Glasgow, Scot¬ land, is frequently cited. The city took over the horse car lines in 1894. The lines have been electrified and extended from 64 miles to 197 in 1913. The number of passengers has in¬ creased from 57,104,647 to 311,480,086 during the same period. The fares have been reduced. Under a system of zoning the average rate per mile is .44d under municipal management as against .89d under private control. The hours of labor of employees have been reduced and their wages raised. At the same time the enter¬ prise has proved a source of income to the city and in 1913 after deductions for operating ex¬ penses, depreciation, interest on capital, sink¬ ing fund charges, etc., there was a balance of £33,000 to be turned over to the ((Common Good.® San Francisco embarked upon the mu¬ nicipal ownership and operation of about seven and one-half miles of street car line in 1913. The end of the first year showed a net profit of $45,000 as well as better service, and im¬ proved conditions of labor. The mileage has since been increased and promises to keep on growing. Examples of

this sort could be multi¬ plied at length. (4) Municipal ownership would remove one of the most fruitful sources of cor¬ ruption in municipal government. Bribery and dishonesty thrive where there are privileges to be dispensed and public service companies have not hesitated to resort to these methods in their efforts to ward off unfriendly control and regulation or to secure new franchises and concessions. Even when actual corruption has not been resorted to these private interests have felt the need of tbuilding up a political influ¬ ence for the purpose of protecting themselves from all sorts of governmental interference. Municipal ownership would strike at the root of this evil by removing the incentive and oppor¬ tunity for corruption. It is furthermore urged

that under an adequate civil service system mu¬ nicipal ownership would entail no danger of a political machine composed of the employees of the publicly owned enterprises. (5) The mu¬ nicipalization of public utilities would give the city the power to avert strikes and labor troubles which under private ownership occur so frequently and with such disastrous results to the public welfare and convenience. Lack¬ ing the motive of exorbitant profits the city would be able to meet the reasonable demands of its employees fairly and improve the con¬ ditions under which they work.

The following arguments are advanced by the opponents of municipal ownership: (1) It is a fundamental mistake for the government to engage in enterprises which can satisfactorily be carried on by private capital and manage¬ ment. The municipalization of public utilities is socialistic and subversive of sound economic doctrine. (2) The weakness, inefficiency and corruption which have been so prevalent in the government of American cities demonstrate conclusively the incompetence of municipalities to assume the burdens and responsibilities of municipal ownership. Under such a system, with numerous men to be employed and costly materials to be purchased the opportunities for dishonesty and mismanagement would be far more numerous and alluring than at present. (3) Even if cities could be kept free from cor¬ ruption they would still be unequal to the problems of efficient administration of so com¬ plex an undertaking. The city would be as¬ suming in relation to its public utilities the posi¬ tion' of owner, consumer and public, and it is highly probable that the city's interests as pro¬ prietor of the enterprise would be sacrificed to its interests as consumer and as the public. The almost universal popular prejudice against paying high salaries to public officials would prevent the securing of thoroughly competent men to

manage these businesses for the city. At the same time the pressure in the direction of securing sinecures in the public management of these systems coupled with the fact that peo¬ ple who work for the public are usually less industrious and efficient than those who work for private employers would tend to impede further the efficiency of municipally owned services. (4) Municipal ownership would so overburden the municipality with duties that not only would the operation of the public utilities be less satisfactory than under private control but also the efficient conduct of the other affairs of the city would suffer by being overshadowed and crowded out. (5) Serious difficulties would arise from the creation of a large body of municipal employees who would enjoy an enormous potential political influence. They would be a ready-made nucleus for a powerful political machine of great solidarity. In European countries this problem has some¬ times fyeen met by the disfranchisement of the employees of the city' but it will not be seriously argued that such a solution would be open to the American city. (6) Experience in many in¬ stances has shown conclusively that municipal ownership is a failure in operation. In this connection the experience of Philadelphia in the public ownership and operation of her gas plant is usually referred to. The city took over this utility in 1841 and retained it until 1897 when it leased the plant to a private cor-588

poration. The history of the public ownership and control of this enterprise is a story of almost incredible corruption and mismanage¬ ment. Other less conspicuous instances are cited of cases in which, due to mismanagement or financial failure, municipally owned plants have been turned back again if not to private ownership at least to private operation. It is pointed out furthermore that not only has the success which has attended municipal owner¬ ship in Europe been greatly overrated but that, even if admitted, it does not serve as an argu¬ ment for municipal ownership in this country since the determining conditions surrounding such enterprises are strikingly different here from what they are abroad. It must not be assumed that the argument for or against mu¬ nicipal ownership is equally strong in the case of every type of public utility. There are spe¬ cial considerations in connection with certain enterprises which have a bearing upon the de¬ sirability of municipal ownership which may be briefly commented upon. The argument in favor of the municipalization of

the city's water supply is stronger than for the municipal owner¬ ship of any other service or utility. Many critics who oppose the system generally favor its application to waterworks. There are sev¬ eral reasons why this is true. First, the health of the city is dependent upon an adequate sup¬ ply of pure water. The city should control the conditions which relate so directly to its disease and death rate. Second, the city itself is the largest consumer of water, taking usually about 10 per cent of the entire supply. The city must have water for fire protection, sewers, street sprinkling and cleaning, public buildings, parks and fountains. Third, many social, industrial and business enterprises and interests depend upon the adequacy and cheapness of the water supply. The prosperity of the city may be deeply involved in the policy which controls the supply and price. As a result of these considerations a large majority of the water¬ works plants here and abroad are under public management. In 1915, 156 of the 204 cities of the United States having a population of 30,000 or more had municipally owned water plants. Only seven of the 62 cities of 100,000 popula¬ tion or more and not a single city of 300,000 or over still allowed their waterworks to re¬ main in private hands. The two most interest¬ ing cases of publicly managed water systems are, perhaps, those of New York City and Los Angeles. The new Ashokan reservoir and aqueduct opened in 1917, brings water for a distance of more than 100 miles to the city of New York and when entirely completed will have a capacity of 500,000,000 gallons per day. The Los Angeles system will bring water from the mountains 260 miles away. The adminis¬ tration of municipally owned waterworks seems to have been satisfactory. It should be remem¬ bered, however, that apart from the gigantic engineering projects just mentioned there are no serious technical problems connected with the systems to test severely the administrative capacity of the city.

The increase in the number of municipally owned lighting and power plants in the United States is much less marked than in the case of waterworks. Here private ownership is the rule and not the exception. Twenty-one of the 204 cities having a population of 30,000 or

more in 1915 had municipal ownership of com¬ mercial light and power. Some others sup¬ plied merely their own needs for public light¬ ing. It has been estimated that of all the towns and cities of this country over 1,500 have elec¬ tric lighting plants under municipal ownership and management but that more than twice that number still retained private ownership and control. It is usually in the smaller municipali¬ ties that public ownership is found. The most important

exceptions are the cities of Chicago and Detroit. It will be noted that, with the exception of public street lighting, the sup¬ plying of electricity and power bears no inti¬ mate relation to public health or safety while at the same time the business itself is highly technical in character. These facts doubtless have some bearing upon the limited extent to which electric lighting has been municipalized. Municipal ownership is still less common in the United States in the field of municipal gas supply than in that of electric light and power. Wheeling, W. Va., seems to have had the first municipal gas plant, the policy of mu¬ nicipal ownership being instituted in 1851. At the present time the total number of such plants under municipal management is less than 40. Only five of the 204 cities having a popula¬ tion of 30,000 or more in 1915 have municipally owned gas plants. Of these Richmond, Va., is the largest. It is probable that municipal¬ ization in this field Has' been thus limited in extent because of the costly equipment neces¬ sary to the business as well as the difficult scien¬ tific problems incident to its conduct. In the field of municipal ownership of transportation facilities there have been no important ventures in this-country. It has been noted above that San Francisco has recently undertaken the mu¬ nicipal ownership and operation of one of its street car lines. New York and Boston own their subways but they are operated by private corporations. There are provisions in many modern franchises which will make the acquisi¬ tion of the street car lines by the city possible at some future time. It is highly probable that the next few decades will see considerable ex¬ pansion of municipal ownership and operation in this field. Thus far American cities have been deterred from embarking upon such ventures not only by the difficulties and complexities of administration but also by the financial ob¬ stacles such as municipal debt limits which have made it impossible for municipalities to acquire the ownership of such costly properties.

The foregoing paragraphs point to the con¬ clusion that the practicability and desirability of municipal ownership vary with the kind of public utility to which it is applied and that the relation of such services to the public health and safety, the inherent difficulty and complex¬ ity of their management, and the amount of capital investment needed for the enterprise are all factors which have -a direct influence upon cities in determining the advisability of ventur¬ ing into the field of municipal ownership. It has not yet become profitable nor illuminating to multiply statistics regarding municipal own¬ ership in American cities for two reasons. The first is that the facts regarding private owner¬ ship which should be available for purposes of comparison are usually withheld by private corporations

which do not encourage such in¬ trusion into their private affairs. The second

reason is that municipal accounting in this coun¬ ts is so chaotic, confused and non-uniform as to render almost meaningless most of the com¬ parative financial statements which have thus far been issued. There are few fields of in¬ quiry in which less reliance may safely be placed upon published statistics. This situation will doubtless be remedied in time and even now some reliable facts regarding municipal owner¬ ship are being collected and published from time to time by the United States Census Bureau.

In Great Britain municipal ownership has been dewloped far more extensively than in the L mted States. The public ownership of waterworks is practically universal and, al¬ though profits are not primarily aimed at, these

untS uf-em to making a fair net return to the public treasury. There are a large num—

s 01 owned gas plants, between

and 300, including those in about half of the largest cities. The municipalization of elec¬ tricity and power is even more common. These ventures have proved of some profit to the city and have at the same time frequently made possible reductions in the rates of service. The most striking facts regarding municipal owner¬ ship in Great Britain, however, are those re¬ garding the tramways. In 1914, 171 of the 286 tramways in British cities were municipally owned and 115 remained in private hands. The public management was proving profitable in practically every case. The reason why munic¬ ipal ownership should be so prevalent in the local transportation systems of Great Britain is found in the extreme rigor of governmental control exercised over the public utility cor¬ porations as well as the subsidies these private companies were obliged to pay into the public treasury. The result was so marked a reduc¬ tion of monopoly profits that

private corpora¬ tions in many cases were not unwilling to dis¬ pose of their businesses at a fair figure.

Several striking facts may be noted regard¬ ing the municipal ownership of public utilities in Germany. First, the process of municipali¬ zation has gone further in that country than elsewhere in the world. This is true both as to the kinds of projects publicly owned and as to the extent of the public ownership of any one utility or service. In 1911 the statistical report upon German municipalities showed that of 87 towns having a population of over 50,000, 77 owned their waterworks, 72 gasworks, 67 elec¬ trical works and 47 tramways. There are up¬ wards of 40 kinds of services which are in the hands of the municipality in some or all of the German cities. In the second place, the German cities systematically aim at profits in the management of publicly owned enterprises. Practically all German cities use their public utilities as a means of reducing taxes. In 1912 the gas plant in Berlin gave a surplus of over $2,000,000 to be applied in this way. In the third place, there are some German towns in which the profits from publicly owned utilities and sendees are so large that they defray all the costs of government and pay yearly divi¬ dends to the individual citizens. Cases in point are the small towns of Klingenberg, Seeburg and Enkirch.

It may be said in conclusion that while mu¬ nicipal ownership will remain a debatable policy there seems to be an irresistible movement throughout the progressive countries of the

world in the direction of its adoption. While this movement may be less rapid in the United States than elsewhere it is worthy of note that in many instances the threat of municipal own¬ ership has had the salutary effect of producing better conditions in the administration of pri¬ vately owned public utilities.

Bibliography. — Beard, cThe American City > (1912) ; Bemis, (Municipal Monopolies' (1899); Darwin, (Municipal Trade, The Ad¬ vantages and Disadvantages' (1903); Dawson, (Municipal Life and Government in Germany' (1914); Fairlie, (Essays in Municipal Admin¬ istration' (1908); Howe, (European Cities at Work' (1913); Howe, (The British City' (1907); James, Municipal Functions) (1917); King, Regulation of Public Utilities^ (1912); Meyer, (Municipal Ownership in Great Britain' (1906); Munro, (Principles and Methods of Municipal Administration ' (1916); (Municipal Year Book' (British, annual) ; Rational Civic Federation, Municipal and Private Operation of Public

Utilities' (1907) ; Parsons, (The City for the People' (1901); Porter, (The Dangers of Municipal Trading' (1907); Rowe, (The Prob¬ lems of City Government' (1908); Shaw, (The Common Sense of Municipal Trading' (1904) ; Stevens, , (A Bibliography of Municipal Utility Regulation and Municipal Ownership' (1918) ; United States, Bureau of The Census, finan¬ cial Statistics of Cities' (1915) ; Whinery, Mu¬ nicipal Public Works' (1903); Zueblin, < Amer¬ ican Municipal Progress' (Revised, 1916).

Robert Eugene Cushman, Associate in Political Science, University of Illinois.

MUNICIPAL REFORM ACTS, English.

The body of laws passed by the English Parlia¬ ment since 1833 dealing with municipal fran¬ chises, suffrage charters, *etc.* In the 14th and 15th centuries the municipal suffrage fell gradu¬ ally more and more into the hands of restricted bodies of men. Notorious abuses crept into the system and the Parliamentary Reform Act of 1832 left the municipalities well nigh untouched as regarded charters, suffrage, *etc.* In 1833 a royal commission made an extended report on existing abuses, showing that most municipali¬ ties were ruled by venal cliques, funds were wasted or worse, public service was negligible, municipal courts were corrupt, *etc.* New legis¬ lation based on the commission's report was enacted in 1835 known as the Municipal Corpo¬ ration Act, under which 178 boroughs were re¬ formed and about 125 others created. The more flagrant abuses were corrected and means were provided by which other abuses might be elimi¬ nated. The franchise was extended to all prop¬ erty owners and occupiers of property of £10 ($50) valuation or over and a uniform system of administration was provided under which an elected council of a size proportionate to the population of the borough was made into a bi¬ cameral body, the upper chamber to be com¬ posed of aldermen elected by the council. The mayor was to be chosen from among the coun¬ cilors or aldermen by vote of both these bodies. In great part these features still con¬ stitute the municipal constitution of England, although various modifications have been made by subsequent act of Parliament. The Consoli¬ dated Municipal Code was passed in 1882 and six years later cities and towns with 50,000 or

over population were constituted distinct coun¬ ties, with municipal councils discharging the functions ordinarily exercised by county coun¬ cils. Consult Chalmers, M. D., (Local Governments) (London 1883) and Shaw, (Municipal Government in Great Britain> (New York

1901).

MUNICIPAL SAVINGS BANKS. See

Banks and Banking — World's Systems (Ar¬ ticle 3).

MUNICIPAL WATER SUPPLY. See

Hydraulic Engineering; Municipal Govern¬ ment; Water Supply.

MUNICIPALITIES. Municipalities are as old as civilization itself. The story of the nations of antiquity that flourished in the val¬ leys of the Nile, Tigris and Euphrates is in large part the narrative of what went on in the imposing cities of Thebes, Memphis, Baby¬ lon and Nineveh. History gives us little ac¬ curate knowledge of these populous centres of the ancient world and the student of municipal government gains little from a scrutiny of the autocratic systems by which they were ruled.

Greece. — Real city life may be said to have been born in Greece. Largely due to geographi¬ cal and topographical conditions which made community isolation inevitable, ancient Greece never became a unified nation. It was merely a geographical term applied to a group of inde¬ pendent, usually self-governing cities with the areas of land adjacent to them. The Greek city-state was the sole unit of government. The city was the state and the state was the city. A man was a foreigner in any city but his own. There were no distinctions between the duties and functions which in modern times we call national or state and those which were municipal. It is therefore perfectly proper that we should derive our words ˆpolitics,® Apoliti¬ cal,® and the similar terms by which we de¬ scribe our public policies, institutions and con¬ cerns from polis, the Greek word for city. The Greek cities differed widely in government. In Sparta the governing power remained consist¬ ently autocratic or oligarchical,

while in other Greek cities, notably Athens, the form of gov¬ ernment fluctuated between autocracy and de¬ mocracy.

Rome. — Early Italian history, like that of Greece, is the record of the development and struggles of a large number of city-states. The history of Rome as a nation is the history of the conquest or establishment of numerous cities bound together into one gigantic, unified system by the dominating power of Rome. As in Greece, city life and national life tended to merge. The government of the city of Rome itself, beginning with monarchy, progressed through various stages of democracy and rep¬ resentative government which were never com¬ pletely lost even under the autocratic forms of the empire. There was little in the government of the cities outside of Rome, however, which could be called truly popular, and such demo¬ cratic features as existed in the earlier period tended to diminish or disappear as the empire became more centralized. The political and civil rights conferred by Rome upon these trib¬ utary cities were usually made the basis for the imposition of heavy taxation. It is from the word municipium applied by the Romans to

these dependent and partially self-governing cities that we derive our word municipality. In complexity of organization and in diversity of functions it may be safely said that municipal government and life at Rome at the height of its development rivaled that of the modern metropolis.

Mediaeval Cities. — During the ftdark ages® municipalities seem to drop out of sight for the time being. The remnant of their powers and functions which was not lost in the general chaos was taken over largely by the Church. The development of the feudal system in Europe, beginning with the 10th century, was destined to exert an important influence upon the life and position of municipalities. Its im¬ mediate result was a diminution of their already weakened power. The feudal lord who lived upon his estate in the country held the cities within his domain as vassals, exercising over them the same feudal prerogatives as over the individuals on his land. In spite of feudal oppression the mediaeval cities prospered as centers of trade and commerce. With pros¬ perity came wealth and with wealth came the power to bargain or to fight with the feudal barons. Many of the larger cities of Italy, i.e., Florence, Venice, and Pisa, were able to pur¬ chase something like independence, while the cities of northern Europe more frequently freed themselves by the sword. This was true of the powerful free cities of northern Germany, which during the

11th and 12th centuries ce¬ mented their commercial interests in the for¬ mation of the Hanseatic League. When the struggle for municipal rights was won either by barter or in battle tlie cities secured the fruits thereof in a written treaty of peace or bill of rights called a charter. These charters, limited as they frequently were in the scope of the municipal freedom they guaranteed, may be said to have laid the foundations for modern constitutional government.

England. — English municipalities were sub¬ jected to the same feudal oppression which the more prosperous towns on the Continent suffered. They were not at first incorporated and had few political or civil rights and little if any self-government. They were small in area and population. London which was the metropolis then as now had about 40,000 in¬ habitants at the beginning of the 1 5th century. As feudalism lost its grip these towns or bor¬ oughs became incorporated, and gained in power and independence usually because the extension of privileges made easier the collec¬ tion of taxes by the feudal lord. It was for this mercenary reason that Edward I gave the English boroughs representation in the his¬ toric national parliament called in 1295. The political power which the cities thus acquired was of great potential value to the Crown in the struggle it was then waging with the nobles. The establishment of the rule that no corpora¬ tion was lawful without royal sanction gave the Crown the chance it desired to dominate munic¬ ipal affairs and control the selection of the borough representatives in Parliament. Find¬ ing that popular elections afforded an uncer¬ tain basis of control, the Crown finally built up a sufficiently subservient municipal organi¬ zation by creating a mayor and council selected in the first instance by the king and endowed

with the power of self-perpetuation. It was not until the passage of the Municipal Corpora¬ tions Reform Act of 1835, made necessary by the inefficiency and corruption in municipal life, that English city government ceased to be oli¬ garchical and took on the general form it now bears — that of a representative governing body holding office

for short terms and elected by popular vote.

United States. — American municipal his¬ tory dates back to the chartered municipal cor¬ porations established in the English colonies in the 17th and 18th centuries. The oldest of these charters seems to have been the one given to New York in 1686. The charters were granted by the provincial governors and in the main the government consisted of a popularly elected board of councilmen and aldermen and a mayor appointed by the governor. Although not originally subject to the control of the colo¬ nial legislatures these municipalities finally became so and found itself under the neces¬ sity of applying to the legislatures for addi¬ tional grants of power, especially in the mat¬ ter of taxation. After the American Revolu¬ tion the state legislatures assumed that posi¬ tion of complete supremacy over American cities which they have ever since held.

Relation Between the City and the Cen¬ tral Government — England. — While cities are the organs for local self-government their functions do not end there, and the modern municipality finds itself bound to the state or nation within which it lies by a complex web of political, legal and governmental ties. The place of the city in the English administrative system may be sketched as follows : The city is a corporation created by Parliament. The municipality which desires a charter petitions for it and its petition is granted or rejected in accordance with a procedure which assures a fair consideration of the merits of the case. Needed amendments to the charter must be secured in the same way. The charters thus granted are similar in general outline but vary widely in the details of municipal organization and power. Powers are usually conferred upon English cities which are broad in scope and which create a system of local legislative au¬ tonomy. While Parliament remains the ulti¬ mate source of all English municipal authority there has never been a disposition on its part wantonly to interfere in the affairs of single cities after the fashion of American legisla¬ tures. This is due partly to the control over and responsibility for legislation in Parliament which is centred in the cabinet, making <(log-rollingˆ and ˆpork-barrelˆ legislation impos¬ sible; it is also due to the essential nature of English municipal organization, politics and tra¬ ditions which have prevented the English city from becoming the prey of partisan exploitation. Not only does the English national government exercise legislative power over the English city in the manner described but it also exerts an administrative supervision over it. The most important agency for this central administrative control is the Local Government Board. In a wide range of matters connected with munic¬ ipal debts, municipal ownership, poor relief, and health, it is necessary for the city to secure

the approval of this board for its projects. Ad¬ ministrative supervision of English cities is not

centralized in one department however, but the Board of Education, the Board of Agriculture, the Board of Trade and the Home Office have varying degrees of authority over the municipal activities falling within their respective juris¬ dictions. The result of this central adminis¬ trative control has been wholesome. There has been no serious infringement of municipal au¬ tonomy but a valuable check on municipal ex-tiavagance and inefficiency. The administrative agencies mentioned have been given wide pow-eis and have been able to settle many of the questions of municipal administration and power which in the United States have been tertile sources of ill-advised interference by the legislature in municipal affairs. In short, the English system may be said to be one of legislative decentralization, in view of the whole legislative power given to English cities, and administrative centralization.

United States — In this country the oppo¬ site punciple prevails, that of legislative cen-ti alization and administrative decentralization. Many of the most serious abuses in American municipal life have been due to the practically unrestrained and frequently abused power of the State legislatures over cities. Only too fre¬ quently has the American city been the prey of legislative exploitation and corruption. State legislatures have interfered in all kinds of municipal affairs. They have destroyed, en¬ larged or abridged municipal charters; ex¬ tended or narrowed boundary lines; abol¬ ished municipal offices in order that those created to replace them might be available as party spoils; imposed upon cities burdensome debts against their will ; bartered away munic¬ ipal franchise privileges ; and in countless ways contributed to the depravity and inefficiency which have too frequently been the shame of American cities. Among the efforts which have been made from time to time to prevent the abuses of special legislation affecting our cities the following may be mentioned : First, a gen¬ eral prohibition of such special legislation. Practically every State now forbids the incor¬ poration of cities except by general law. The criticism urged against forbidding all special legislation is that the prohibition, if broad enough to cover adequately the abuse of special legislation, does not leave power to deal with the peculiar problems of individual cities. Second, the classification of cities with the re¬ quirement that laws must apply to all the cities of the same class. It has been found easy to create classifications in which each important city was in a group by itself. Third, general municipal

codes, like that of Ohio in 1902, under which all cities are governed in accord¬ ance with a general and uniform scheme. This plan has not been found elastic enough to meet the needs of cities of varying size. Fourth, the municipal veto, by which a city is given the right to ward off legislative interference. This veto may be absolute, as in the case of Chicago, or it may be. merely suspensive, as in the case of the cities in the State of New York. Fifth, the optional charter plan. This creates a series of model charters providing different forms of city government suitable to varying municipal conditions. A city may select whichever form it chooses and be governed under it. Sixth, municipal home rule (q.v.), which is now com-592

monly regarded as the only adequate 1 emedy for the evils of State interference in munici¬ pal affairs. There is in the United States prac¬ tically no State administrative _ control over cities. There are no State administrative agen¬ cies which supervise municipal activities and there seems to be little disposition to create them. In a few instances there has been some degree of administrative supervision in the mat¬ ters of education, health, civil service, elections, public utilities, and liquor sales, but these cases are very rare. There have been instances in which the State has taken direct charge of vari¬ ous municipal functions, such as police protec¬ tion, and operated them by state appointed offi¬ cers, but this is very different from central ad¬ ministrative supervision over municipal activi¬ ties. It is possible that some scheme compar¬ able to the one in England already described would aid us in the solution of some of our problems of municipal administration.

Municipal Charters. — Allusion has already been made to the charter of the municipality which serves the purpose of a constitution. It is the document which the city receives from the State legislature setting forth the form of municipal organization, the measure and limits of the city's power. It is granted by the legis¬ lature either by special act or in accordance with general laws, or, in the case of cities enjoying home rule, it is framed by the city itself. There are at least two respects in which the charter of a municipality differs from that of a private corporation. A private corporation becomes such by its own volition and no group of citi¬ zens can be compelled to incorporate against its wish. The State, however, has power to organize a

community into a municipal corpora¬ tion against the protest of every inhabitant of the district involved. In the second place, a charter given by the State to a private corpora¬ tion is a solemn and binding contract which without mutual consent cannot subsequently be revoked or altered by the State, the obligation of which cannot be impaired without violating the provisions of the Federal constitution. The charter of a municipality is not a contract and the legislature, unless restrained by special pro¬ visions of the State constitution, may amend it or abolish it at its discretion. It stands on the same footing as any other piece of legislation.

Municipal Powers — Character and Con¬ struction. — No rule of law is more firmly es¬ tablished in this country than that the powers of a municipality are not residuary but are dele¬ gated and limited. These powers may be found in the charter of the city, in the general laws of the State, or in the self-executing clauses of the constitution; but they must be found posi¬ tively set forth somewhere. Not only are munic¬ ipal powers delegated but they are also con¬ strued with utmost strictness. No clearer or more adequate statement of the character and extent of the powers of the American city can be found than the classic words of Judge Dillon: <(It is a general and undisputed propo¬ sition of law that a municipal corporation possesses and can exercise the following powers and no others: First, those granted in express words; second, those necessarily or fairly im¬ plied in or incident to the powers expressly granted; third, those essential to the accomplish¬ ment of the declared objects and purposes of

the corporation — not simply convenient, but indispensible. Any fair, reasonable, substantial doubt concerning the existence of power is re¬ solved by the courts against the corporation, and the power is denied.”

Ordinance Power. — One of the powers which is invariably granted in a municipal char¬ ter is the power to pass ordinances which shall have the effect of law. The legislature may not, under our State constitutions, delegate its legislative power; but since a city is regarded as an administrative subdivision of the State the courts have uniformly held it to be proper to endow it with a share of the State’s legislative power. The power to pass ordinances is hedged about by many limitations express or implied, which may be summarized as follows : First, where the procedure to be followed in passing an ordinance is set forth in the charter it must be rigidly adhered to or the ordinance will be held void. Second, ordinances must not be

passed in excess of the power delegated to the city. Third, there must be no violation of the provisions of the National or State constitutions or statutes. Fourth, since every power is granted to a municipality under the implied con¬ dition that it will be reasonably exercised, any ordinance will be held void vyhich is regarded as unreasonable by reason of its being oppress¬ ive, discriminatory, unduly restrictive of trade, in contravention of common right or public policy. The invalidity of part of an ordinance does not vitiate the entire ordinance if the valid and invalid portions are separable.

Power of Taxation. — The power of the American city to tax must be given either by express or implied grant. It is usually specific¬ ally conferred in the charter, but if not it will be implied from the grant of other powers for the exercise of which revenues are necessarv. When not limited by the provisions of the State constitution the State legislature has complete control over the city's power of taxation. It may in its discretion extend, curtail or revoke it in general or with reference to special taxes. It is subject in the exercise of this power to one restriction. It may not take away the power of a city to tax when such taxing power is the only means of paying an existing debt. The amount of the taxes which a city may raise for municipal purposes may be left to its discretion, but very commonly the city tax rate is limited either by the statutes or constitution of the State. The city's power to tax, like that of the State, can be exercised only for public purposes, a limitation which does not interfere with the ordinary activities of the city but which has raised some difficult problems in connection with some of the newer commercial activities of American municipalities. The rules governing the procedure of assessment and collection of municipal taxes are usually set forth in the city charter and must be strictly followed. The courts will compel a city against its will to ex¬ ercise its taxing power to satisfy the claims of its creditors.

Police Power. — The power to pass ordi¬ nances for the protection of the public health, safety, morals and general welfare of the mu¬ nicipality is commonly conferred upon cities by express grant. It may be implied, however, from a general grant of power to pass ordi¬ nances. It is under this authority that munici-

palities make enactments relative to the preser¬ vation of peace and order, sanitation, fire pro¬ tection, regulation of amusements and occupa¬ tions and the control of vice. When exercised by the city the police power is subject to all the usual constitutional restraints against arbi¬ trary and discriminatory enactments, and in addition police ordinances are held void if they are unreasonable even though they violate no constitutional clause. The city is incapable of parting with its police power by the making of any grant, concession, exemption or contract. Its police ordinances may deal with subjects already covered by State law provided the ordi¬ nance does not conflict with the statute. The power to pass police ordinances carried with it by implication the authority to establish and enforce reasonable penalties. Such ordinances may be enforced either by penalties inflicted upon individuals or by summary destruction of private property which is held to be a public nuisance.

Municipal Contracts. — The power to make contracts is given to all municipalities by ex¬ press grant or by implication. Such contracts have the same general legal character as con¬ tracts between individuals but the city must be exceedingly cautious not to exceed its power. If the procedural requirements in the city char¬ ter are not complied with the contract is void. Where cities enter into contracts for the secur¬ ing of services or goods it is commonly re¬ quired that the city must call for sealed bids based upon plans and specifications and that the contract must be let to the lowest respon¬ sible bidder. If it can be clearly shown that a city did not have the requisite authority to make a given contract such a contract is com¬ pletely void. Cities are, however, bound by the principles of common honesty and in cases where its ‘Contracts are illegal because of hidden defects of procedure or non-compliance with other formal requirements the city may still be bound. It may elect to ratify such contracts and ignore the irregularities, or, under what is known as the doctrine of estoppel, it may be prevented by the courts from setting up its own illegal acts for the purpose of freeing it¬ self from its just obligations. The contracts of a municipality are enforceable in court like other contracts and neither the city nor the State legislature may by ordinance or statute impair their obligation.

Miscellaneous Powers. — The American municipality enjoys several powers which do not call for elaborate discussion. It may ap¬ propriate and spend money for purposes within its authority and in accordance with the pro¬ cedure outlined in its charter. It may, within these same limits, acquire, manage and dispose of property. It may

construct public improve¬ ments and in so doing may use the power of eminent domain and levy special assessments. Its power to incur debts, own and operate public utilities and services and grant fran¬ chises are treated in separate articles. See Municipal Debts ; Franchises ; Public Util¬ ities ; Assessments..

Liability of Municipalities. — Since a munici¬ pality is not a government possessing sover¬ eign powers it is not, like the State, immune from suit without its consent. On the other hand, since in the performance of many func¬ tions it is an agent of the State its legal lia-VOL. 19 — 38

bility is not as wide as that of a private corporation. The rules governing the civil liability of the city are, accordingly, complex. In the first place, its liability upon all con¬ tracts which it has legally made is absolute and may be enforced in the usual ways. Secondly, the city is not liable in damages for the torts or legal wrongs resulting from the performance of its governmental powers and functions. This immunity rests partly on the theory that the city performs these functions as an agent of the State which is immune from suit, and partly on the theory that it is contrary to public policy to expose the revenues of the city to the heavy drain which an unrestricted liability would entail. This immunity extends to the injuries resulting from the negligence or mis¬ conduct of the city's officers and agents, or from the faulty construction, repair or main¬ tenance of its property when used for govern¬ mental purposes. By governmental functions or powers are meant those pertaining to the protection of public peace, health, safety, edu¬ cation, charity, etc., in contrast to the com¬ mercial or quasi-private enterprises on which modern cities may embark. The municipality is never liable, furthermore, for the tortious acts of its officers when they have exceeded their legal authority. In such a case the in¬ jured person may sue the officer individually and recover damages. The State legislature may create by statute municipal liability which would not otherwise exist. In the third place, the municipality is liable in tort for the injuries resulting from the performance of non-govern¬ mental or commercial functions, i.e., the opera¬ tion of revenue-earning utilities, as well as from the use of property not used for govern¬ mental purposes. Furthermore, a legal obliga¬ tion rests on the city to exercise reasonable care in keeping its streets, highways, bridges, viaducts, etc., safe for ordinary use and it is accordingly liable for the injuries resulting from a breach or neglect of this duty. On the whole the modern tendency seems to be to broaden rather than to curtail the civil liability of the municipality.

Consult Cooley, (Handbook of the Law of Municipal Corporations) (1914); Dillon. (Mu¬ nicipal Corporations > (5th ed., 1911); Fairlie, (Municipal Administration (1910) ; Goodnow, (Municipal Problems) (1897) ; Munro, (The Government of American Ci ties > (Revised 1916) ; Munro, (The Government of European Cities (1909).

Robert Eugene Cushman,

Associate in Political Science, University of Illinois.

MUNJISTIN (purpuroxanthin carboxylic acid), an orange-coloring matter closely allied to purpurin and to alizarin, which occurs in munjeet (East Indian madder), and has the formula . Ci4Hr, (OH)202.COOH. It may be changed into purpuroxanthin by boiling with al¬ kalis ; also by heating it above 448° F., its melt¬ ing point. It dissolves in boiling alcohol, sepa¬ rating again, upon cooling, in the form of brilliant golden flakes. Munjistin gives an orange-yellow color when used as a dye with aluminum mordants, which, however, is not fast either as to light or soap. With iron mordants it gives a brownish purple, which is fairly permanent. Munjistin is one of the compo-

ncnts of commercial ((purpurine,5> also known as ((Kopp's purpurine.55

MUNKACS, mun'kach, Czecho-Slovakia, town in the county of Bereg, located on the La-torcza River and on the Batyu-Munkacs-Lavo-czne-Stryj state railway. Its industries consist of vineyards, coarse cloth making, spirit distiller¬ ies, petroleum refining, lumber, cattle and grain trade. In the vicinity the noted <(Hungarian diamonds55 (rock crystal) are mined. Close by are productive alum and iron mines. Built on a high rock in the plain is the historic fortress, usually utilized as a state prison, that was first built in* 1359. It was surrendered (1688) to the Austrians after withstanding a siege of three years under the brave leadership of Helen Zriny, wife of the patriot Emmerich Thokolys. Franz Rakoczi II (1703) was defeated here by the Austrians under Nigrelli and the place was surrendered (1708) to the latter. Alexan¬

der Ypsilanti was imprisoned here from 1821— 23, and the famous painter Munkacsy was born here. Pop. about 17,240.

MUNKACSY, moon'kache, Michael, Hun¬ garian painter: b. Munkacs, Bereg County, Hungary, 10 Oct. 1846; d. Endenich, near Bonn, 1 May 1900. His real name was Lieb, but he is known only under the assumed name derived from that of his birthplace. Beginning life as a carpenter, he met the strolling portrait painter, Szamossy, in Gyula, who was so much struck by the artisan's interest in art that he gave him painting lessons. Munkacsy proceeded to paint portraits and genre pictures, taking his subjects from common country life. One of these early canvases, (A Country Idyll, 5 was purchased by the Art Union of Pesth. He eventually put himself under the instruction of the battle-painter, Franz Adam, at Munich. He made rapid progress and the Hungarian government awarded him the first prize for genre paintings thrice in succession and he was thus enabled to take up his residence at Diisseldorf and to study under Knaus and Vautier. The first great picture he painted was (The Last Day of a Condemned Man, 5 (in the col¬ lection of Mrs. W. P. Wilstach, Philadelphia) exhibited in the Paris Salon in' 1870. This was followed in 1871 by <Wartime) (an episode in the Hungarian war. The succeeding year he made Paris his home and his pictures began to attract growing attention. He painted many small genres of singular power and character, such as (Going to School5 ; (The Kitchen Poli¬ tician^ (The Butter Woman5 ; (The Pawn Shop5 (1874) (Metropolitan Museum, New York) ; (The Workshop5 (1875) ; but as his strength and mastery of his art grew he rose to loftier subjects, religious and historical. In 1877 he painted (Milton in his Blindness Dic¬ tating Paradise Lost,5 to which was awarded the gold medal at the Paris Exposition. It is now in the Public Library, New York. Great as was the sensation created by this picture, a historic genre of remarkable coloring in gray and black and of profound insight and power of characterization, an even deeper impression was produced by his (Christ Before Pilate5 (1882), which some critics consider the greatest religious picture of its century. This vast can¬ vas is startling in its freshness of conception, its living action, the mingled grandeur and pathos which the artist has infused into his

treatment of the central figure, as well as its masterly composition and technique. It has been exhibited in all quarters of the civilized world and was bought by John Wanamaker of Philadelphia for $120,000. It was followed by his dramatic (Christ on Calvary,5 the religious intensity of which is heightened by the accurate fidelity to differing

national types with which the spectators of the Crucifixion are portrayed ; a piece of realism whose suggestiveness is ob¬ vious. In 1886, he produced (The Last Mo¬ ments of Mozart,5 now in the collection of Gen. Russell Alger, Detroit, Mich. The pres¬ ent owner paid $50,000 for this pathetic pic¬ ture, in which the composer is listening to his still uncompleted requiem, sung at his bedside by his favorite singers, the night before his death. The last three years of his life this painter suffered from mental alienation and closed his days in a sanitarium. In addition to the works already mentioned, (The Music Room5 and (The Two Families5 are in the Metropolitan Museum in New York; (The Prowlers of the Night5 is in the Pennsylvania Academy, Philadelphia, and (The Story of the Battle5 is in the Walters Gallery, Baltimore. Consult Tait, T. R., (Michael Munkacsy5 (in American Art Review, Vol. II, Boston 1881).

MUNKAR. See Mohammedanism.

MUNN, Charles Clark, American novelist: b. Southington, Conn., 1848; d. 8 July 1917. Bred on a farm which he left at 17, for 30 years he was engaged as a commercial traveler. From 1910 he was editor of the Commercial Travelers' Magazine. He was the author of several popular novels, including (Pecket Is¬ land5 (1900); (Uncle Terry: a Story of the Maine Coast5 (1900) ; (Rockhaven5 (1902) ; (The Hermit5 (1904); <The Girl from Tim's Place5 (1906); (Boyhood Days on the Farm5 (1907); (Myrtle Baldwin5 (1908); (The Castle Builders5 (1910) ; (The Spice of Life5 (1911) ; (The Heart of Uncle Terry5 (1915) ; (Camp Castaway5 (1916).

MUNN, George Frederic, American ar¬ tist :b. Utica, N. Y., 1852. He began his early studies in art under Charles Calverly, the sculptor and also in the National Academy of Design, New York. Afterward he entered the art schools at South Kensington, England, and there won a gold medal, the first award of the kind to an American. His clay model of the Farnese Hercules won the award. He also was the winner of a silver medal at the Royal Academy for life drawing, and in 1876 entered the studio of George F. Watts. He traveled in Brittany, where he painted and sketched and was a frequent exhibitor at the Dudley Gallery, London, and elsewhere. Among his best-known works are (Wild Flowers,5 (Roses,5 (Meadow Sweet5 and (A Sunny Day in Brittany.5 Consult Munn, Margaret Crosby and Cabot, Mary R., <The Art of George Frederic Munn,5 with an Introduction by Sir Johnston Forbes-Robertson (New York 1916).

MUNN, Orson Desaix, American pub¬ lisher: b. Monson, Hampden County, Mass., 11 June 1824; d. New York, 28 Feb. 1907. He was

educated at the academy in Monson, was a clerk and country storekeeper there until 1846, and then bought the Scientific American, which he made one of the leading scientific papers of the

country. Other periodicals owned bv him were the Scientific American Supplement (1876-)

and Architects9 and Builders' Edition (1885-), now American Homes and Gardens. He was also head of Munn and Company, patent solicitors.

MUNOZ, mu-noth, Juan Bautista, Spanish historian: b. near Valencia, Spain, 1745; d. Madrid, Spain, 1799. He was graduated from the University of Valencia in philosophy, being influenced more by the views of the enlighten¬ ment than by the official scholasticism and was appointed in 1779 historiographer of the Indies and was instructed by the king to write a history of America. This work was pub¬ lished under the title (Historia del Nuevo Mundo> in 1793, and though completed only to 1500 is highly valued. Its publication was for¬ bidden by the Council of the Indies, but per¬ mitted by Charles IV, notwithstanding its ex¬ position of the barbarity of the Spaniards to the natives. Of his manuscripts many are now in the Academy of History at Madrid, but unfortunately many others are scattered.

MUNRO, mun-ro, Neil, Scottish novelist: b. Inverary, Scotland, 3 June 1864. He has published (The Lost Pibroch: Celtic Tales and Sketches) (1896) ; (John Splendid, > a High¬ land romance (1898) ; (Gilian the Dreamer) (1899) ; (Doom Castle) (1901) ; (The Shoes of Fortune* (1901) ; (Children of the Tempest* (1903) ; (The Clyde* (1907) ; (Fancy Farm* (1910) ; (Ayrshire Idylls J (1913) : (The New Road> (1914).

MUNRO, Robert, Scottish archaeologist : b. Ross-shire, 21 July 1835; d. 18 July 1920. He was educated at the University of Edinburgh and was a physician at Kilmarnock till 1886 when he turned his attention to archaeological researches. He was a member of many learned

societies at home and abroad, and published An¬ cient Scottish Lake Dwellings) (1882) ; (The Lake Dwellings of Europe) (1890) ; (Rambles and Studies in Bosnia, Herzegovina and Dal¬ matia* (1895) ; ˆPrehistoric Problems) (1897) ; (Prehistoric Scotland and its Place in European Civilization* (1899); (Man as Artist and Sportsman in the Palaeolithic Period) (1904) ;

(Archaeology and False Antiquities) (1905) ; (Palaeolithic Man and Terremare) (Munro Lec¬ tures, 1912) ; Prehistoric Britain* (1914) ; and with others, (The Glastonbury Lake Village.*

MUNRO, Wilfred Harold, American his¬ torian: b. Bristol, R. I., 20 Aug. 1849. He was graduated (1870) at Brown University, receiving (1873) the A.M. degree. He served (1870-71) as master at De Veaux College, Niagara Falls, as associate principal of Saint Mark's School, Salt Lake City (1871), and spent 1873 in South and Central America. From 1875-79 he was principal at Le Roy (N.Y.) Academic Institute and was president of De Veaux College from 1881-89. He studied at the universities of Freiburg and Heidelberg (1890-91), when (1891-99) he became associate professor of history and director of university extension at Brown University, to be made professor of European history (1899-1911), then emeritus professor. He has written (The Story of Mount Hope Lands, a History of Bristol, R. IP (1880) ; (The Most Successful American Privateer) (1913); 'Legends of

Mount Hope* (1915) ; 'Tales of an Old Seaport) (1917). He was editor of the 'Works of W. H. Prescott > (22 vols., 1905-06), and of the 'Record Book of the Rhode Island So¬ ciety of Mayflower Descendants) (1911).

MUNRO, William Bennett, American po¬ litical economist: b. Almonte, Ontario, Canada, 5 Jan. 1875. He was graduated (1895) at Queen's University, Canada, receiving the de¬ grees M. A. (1896) there, LL.D. at Edinburgh (1898), Ph.D. at Harvard (1900). He studied (1900-01) at the University of Berlin and was (1901-04) instructor of history and political science at Williams College, then, successively, instructor in government (1904-06), assistant professor (1906) and since has served as pro¬ fessor of municipal government at Harvard University. He has been president of the Har¬ vard Co-operative Society, university editor of Harvard Graduates' Magazine, and director of the Cambridge Trust Company. He has writ¬ ten 'Canada and British North America* (1904) ; 'The Seigniorial System in Canada* (1907) ; documents Relating to the Seigniorial Tenure*

(1907) ; ‘The Government of Euro¬ pean Cities > (1909) ; ‘Initiative, Referendum and Recall* (1911) ; Government of American Cities) (1912) ; (Bibliography of Municipal

Government (1914) ; Principles and Methods of Municipal Administration (1916).

MUNROE, mun’ro’, Charles Edward,

American chemist and expert on explosives: b. Cambridge, Mass., 24 May 1849. lie was graduated at Harvard (1871) ; was assistant in chemistry there for three years; professor of chemistry United States Naval Academy (1874 — 86) ; chemist to United States Naval Tor¬ pedo Station (1886-92) ; professor of chemistry and dean of faculty of graduate studies of George Washington (formerly Columbian) Uni¬ versity, Washington, D. C., 1893-1918 ; emeritus afterward. He was expert special agent on chemical industries for the United States Census of 1900, 1905 and 1910; consult¬

ing explosives expert United States Bureau of Mines since 1907 ; president of the American Chemical Society (1898) ; president Cosmos Club (1913 and 1914) ; received the decoration of the Order of the Medjjdje from the Sultan of Turkey (1901) ; has invented a smokeless pow¬ der; and is the author of various monographs on chemistry, notably of explosives.

MUNROE, Henry Smith, American min¬ ing engineer: b. Brooklyn, N. Y., 25 March 1850. He was graduated (1869) at Columbia and re¬ ceived (1877) the degree Ph.D. He was (1870-71) assistant geologist of the Ohio State Geological Survey; assistant chemist, United States Department of Agriculture (1870-72) ; assistant geologist and mining engineer of the Geological Survey of Yesso, Japan (1872-75). In 1875-76 he was professor of mining and geology at the University of Tokio;.then suc¬ cessively adjunct professor of surveying and practical mining (1877-91) ; professor of mining (1891-1915), and emeritus professor in 1915 at Columbia University. He was also dean of the faculty of applied sciences (1897—99) and mem¬ ber of the university council (1895-1915). He was manager (1881-84), then vice-president (1890-92) of the American Institute of Mining Engineers, and was (1908-09) president of the Mining and Metallurgical Society of America

and (1909) president of the Society for the Promotion of Engineering Education.

MUNROE, Kirk, American writer of ju¬ venile stories: b. Prairie du Chien, Wis., 15 Sept. 1850. He was educated at the public schools, then studied at Cambridge, Mass., and Harvard. He became the first editor of Har¬ per's Round Table (1879-82) and is editor of Eminent Men of Our Time. Of the large num¬ ber of juvenile works from his pen might be selected: (The Flamingo Feather*; Derrick Sterling*; (The Golden Days of ,49) ; (Dory-mates> ; (With Crockett and Bowie) ; (Cab and Caboose) ; (Big Cypress* ; (The Fur Seal's Tooth) ; <Campmates) ; (Canoemates* ; (Raft-mates J ; (At War with Pontiac) ; (Under the Great Bear* ; (Forward March* ; (The Belt of Seven Totems) ; (The Outcast Warrior* ; (The Mikado.*

MUNSEE INDIANS, an American tribe of the Delaware family, originally one of the three great divisions of that race. They were sometimes called the Wolf tribe of the Dela¬ wares. They resided along the Delaware River, and in New York, Pennsylvania and New Jersey. During the Revolution many of the Munsees removed to Canada, where at Thames, Ontario, there are some survivors. At Green Bay, Wis., is another tribal remnant and a third remnant is found in Kansas ; in all, less than 100 in the United States. See Delaware In¬ dians.

MUNSELL, Joel, American printer : b. Northfield, Mass., 14 April 1808; d. Albany, N. Y., 15 Jan. 1880. He established himself in Albany in 1827, and was publisher and editor of the New York State Mechanic from 1841 to 1843. At various times he was the pub¬ lisher of the Unionist , the Albany Daily State Register, Morning Express and Statesman, and other journals. Munsell made a close study of the art of printing, in its history and appli¬ cation, and his collection of works on the sub¬ ject, the largest in America, was in part pur¬ chased by the State for the New York State Library. He contributed papers to the trans¬ actions) of the Albany Institute, of which he was a founder, and published (Outlines of the History of Printing) (1839) ; < Annals of Al¬ bany* (1849-59) ; (Every-Day Book of History and Chronology *(1856) ; (Chronology of Paper and Paper-Making* (1857; enlarged 1870) ; and (Manual of the First Lutheran Church of Al¬

bany, 1670— 1870) (1871)

MUNSEY, mun-si, Frank Andrew, Amer¬ ican publisher : b. Mercer, Me., 21 Aug. 1854. After receiving a common school education he became manager of a telegraph office in Augusta, Me. He went to New York in 1882 to become editor and publisher of The Golden Argosy, a juvenile weekly, which he afterward changed into a monthly for adults under the style of The Argosy. Munsey's Weekly ap¬ peared in 1889 and after issuing this for one year he transformed it also into a monthly, calling it Munsey's Magazine. He now owns The Argosy, The Railroad Man's Magazine, and the All-Story Weekly and the dailv news¬ papers New York Sun and Baltimore News. He was a pioneer in the publication of cheap illustrated magazines, Munsey's being the first magazine to be sold at ten cents

a copy. He is a member of many clubs in New York City and elsewhere and is the author of several books: (Afloat in a Great City) (1887) ; (The Bov Broker* (1888) ; (A Tragedy of Er-rors) (1889); <Under Fire) (1890); and (Der-ringforth) (1894).

MUNSON, James Eugene, American in¬ ventor: b. Paris, N. Y., 12 May 1825; d. 1906. He was educated at Amherst College and in 1857 removed to New York, where he was court stenographer for 30 years. He invented the <(Munson System" of shorthand, a machine for operating the typewriter by telegraph and a type-setting machine. He published (The Com¬ plete Phonographer* (1866); dictionary of Practical Phonography *(1874; 2d ed. 1906); (The Phrase-Book of Practical Phonography) (1889) ; (A Shorter Course in Munson Phonog¬ raphyˆ (1901 ; 2d ed. 1912) ; (Phonographic Dic¬ tation Book* (1904), *etc.*

MUNSON, Thomas Volney, American

horticulturist and plant breeder: b. on a farm near Astoria, Ill., 26 Sept. 1843; d. Denison, Tex., 21 Jan. 1913. His early education was obtained in the rural district schools, followed by a course in an academy at Lewiston. He subsequently took a course in a commercial col¬ lege after which he entered the University of Kentucky, whence he was graduated in 1870. Shortly after completing his education he married and removed to the vicinity of Lin¬ coln, Neb. In 1873 he became interested in the improvement of the various species of the native American grapes and planned to do systematic work in the way of developing new varieties by cross-pollenation and hybridization.

The experiments thus undertaken were doomed to failure because of climatic rigors and a visi¬ tation of the Rocky Mountain locusts. Undis¬ mayed, he sought a new location, settling at Denison, Tex., in 1876. There climatic condi¬ tions were much more favorable to the prosecu¬ tion of such experiments and, moreover, wild grapes were much more abundant and more profuse in variety than in Nebraska. He en¬ gaged in the nursery business and in the breed¬ ing new varieties of grapes and also growing them upon a commercial scale. During the ensuing 25-year period, he produced and ex¬ perimentally fruited no less than 150,000 new varieties of grapes, many of which were far superior to those hitherto in common cultiva¬ tion. Only the very best of these were selected for propagation and dissemination and so rigid and" exacting was the process of elimination that but 50 varieties were retained for intro¬ duction and cultivation as a permanent addi¬ tion to American viticulture. He became rec¬ ognized as a botanist as well as a viticulturist, a volume entitled (Native Trees of the South¬ west > having been prepared under the direc¬ tion of the United States Department of Agri¬ culture and a similar thesis being submitted in 1883 for the master's degree at the Kentucky Agricultural College. But his specialty was the grape and he became the recognized authority on the native wild grapes of North America. His horticultural and scientific work in hybrid¬ izing and perfecting the American grapes won recognition abroad as well as at home. In appreciation of his service in producing and introducing resistant stocks with which to re-MUNSTER — MUNTJAC

stoie the phylloxera infested vineyards of r ranee, the hrench government conferred upon him the diploma and decoration of the Legion of Honor, with the title of ((Chevalier du Merit Agricole,® in 1888. He wrote Classification and Generic Synopsis of the Wild Grapes of North America* (issued as Bulletin No. 3 of the Division of Pomology, United States De¬ partment of Agriculture, Washington, 1890). The most complete botanical display of the whole grape genus ever made was prepared by Mr. Munson and exhibited at the World's Columbian Exhibition at Chicago in 1893 and has since been preserved by the United States Department of Agriculture at Washington. He was the founder and for many years the presi¬ dent of the Texas Horticultural Society and vvas a member of a number of learned socie¬ ties, including the American Horticultural So¬ ciety,

the National Agricultural Association of France, the American Pomological Society, the American Breeders' Association and the Amer¬ ican Association for the Advancement of Sci¬ ence. His volume foundations of American Grape Culture* (1909), embodied the practical results of more than 30 vears of patient, pains¬ taking investigation, experimentation and ob¬ servation and must long remain the leading treatise of its class. His work, which may be justly said to have been monumental in its sig¬ nificance and beneficence, was continued until his death.

MUNSTER, Ireland, the southwest and largest of the four provinces of that country, bounded on the north by Connaught, on the east by Leinster, and on the west and south by the Atlantic Ocean. It has an area of 9,532 square miles and is divided into the counties of Clare, Cork, Kerry, Limerick, Tipperary and Waterford. Pop. 1,035,495, 94 per cent Roman Catholics.

MUNSTER, mun'ster, Prussia, the capital of Westphalia, a city and episcopal see, in a plain on the Aa, at the junction of several railways and on the Dortmund-Ems canal, 78 miles northeast of Cologne. The site of its mediaeval ramparts has been converted into promenades. The principal edifices are the 13th century cathedral, the church of Saint Lambert, the Rathaus, exchange, museum, thea¬ tre, the Pauline Library, several educational, benevolent and charitable institutions, *etc.* The manufactures include woolen, linen and cotton goods, leather, sugar, starch, beer, *etc.* Mun¬ ster originated in a monastery around which a settlement arose in the 12th century ; it was long governed by martial bishops. The most notable event in its long history occurred in 1532-35 when the city fell into the hands of the Anabaptists (q.v.). Pop. about 90,000.

MUNSTERBERG, miin'sterberg, Hugo, German-American psychologist : b. Dantzic, Germany, 1 June 1863; d. Cambridge, Mass., 16 Dec. 1916. He was graduated at the Dantzic Gymnasium in 1882, and pursued post-graduate studies in physiology, philosophy, natural sci¬ ences and medicine until 1887. He received the degree of Ph. D. at Leipzig in 1885 and that of M.D. at Heidelberg in 1887. After this he was instructor and assistant professor of psy¬ chology in the Universitv of Freiburg at Baden, Germany. In 1892 he came to America at the

invitation of Harvard University, Cambridge, Mass. He was professor of experimental psy¬ chology and director of the Psychological Lab¬

oratory in Harvard from that time until his death. His scholarly work was partly psycho¬ logical, partly philosophical. After 1900 he gave special attention to the new field of applied psychology, in particular to the application of psychology to education, medicine, law, com¬ merce and industry. He was a member of the Psychological Association (president 1898), of the Philosophical Association (president 1908), the Washington Academy, of the American Academy of Arts and Sciences, *etc.* He was organizer and vice-president of the International Congress of Arts and Sciences at the Saint Louis World's Fair 1904, vice-president of the International Psychological Congress in Paris 1900, vice-president of the International Philo¬ sophical Congress at Heidelberg 1907, *etc.* In 1910—1 1 he was Harvard exchange professor at the University of Berlin and during that year founded the Amerika-Institut in Berlin. Dur¬ ing the whole period of his American stay he worked for the improvement of the relations between the United States and Germany, writ¬ ing in America for a better understanding of Germany and in Germany for a higher appre¬ ciation of America. The outspoken views of Professor Miinsterberg on the issue of the War of 1914 raised storms of controversy about his head. He appeared as probably the most emi¬ nent supporter of German policies in America, and as such was most bitterly condemned by the Entente Allies and their friends, while to the pro-Germans he appeared almost an idol. While supporting German policies, Professor Miinsterberg denounced many of the activities of the Teutonic hyphenates in this country. He condemned the forming of an alien party within the United States as <(a crime against the spirit of true Americanism,® and said that its results would reach far beyond the time of the war. Professor Miinsterberg's early writings in Ger¬ many were exclusively devoted to experimental psychology. During his sojourn in America he published the following works, some of which have been translated into many languages : Psychology and Life* (1899) ; 'Grundzuge der Psychologies (1900); 'American Traits* (1902); 'Die Amerikaner* (1904 ; revised 1912) ; 'Principles of Art Education* (1905) ; 'The Eternal Life* (1905); 'Science and Idealism* (1906) ; 'Philosophic der Werte* (1907) ; 'On the Witness Stand* (1908); 'Aus Deutsch-Amerika* (1909) ; 'The Eternal Values5 (1909); 'Psychotherapy* (1909); 'Psychology and the Teacher* (1910) ; 'American Problems* (1910); 'Psychologie und Wirtschaftsleben* (1912); 'Vocation and Learning* (1912); 'Psychology and Industrial Efficiency* (1913); 'American Patriotism* (1913) ; 'Grundziige der Psychotechnik* (1914) ; 'Psychology and Social Sanity* (1914) ; 'Psychology, General and Ap¬ plied* (1914) ; 'The War and America* (1914) ; 'The Peace and America* (1915) ; 'The Photo¬ play, A Psychological Study* (1916). He was also a large contributor of

psychological and philosophical articles in the scientific magazines and of social, political and practical psychologi¬ cal articles in the popular periodicals.

MUNTJAC, a small East Indian deer rep¬ resenting the genus Cerviilus, which resembles

the nuisk-deer in many points, especially in hav¬ ing, in the male, long sharp upper canine teeth, or tusks, which are effective weapons. These little deer, only 20 to 22 inches in height in¬ habit hilly jungles, and have lyrate, single¬ pronged antlers, mounted upon remarkably tall pedicels. The females have no antlers. Several species are known, of which the most familiar is the Kakar or barking-deer (C. muntjac) of Indian sportsmen, whose loud resonant cries may be heard at a surprising distance, and which is a favorite not only because it exercises skill in its pursuit, but gives excellent venison. Allied species are found in China and the Malay archipelago, and fossil related genera existed in Eu¬ rope in Tertiary times. Consult Kinloch, (Large Game Shooting) (1885).

MUNTZ, munts, Eugene, French art critic: b. Sulz, Alsace, 1845; d. Paris, 30 Oct. 1902. He studied at the Lycee Bonaparte, Paris, and then went (1873-76) to the French School at Rome, when he was appointed librarian at the Lcole des Beaux Arts, Paris, to become (1880) curator of the library, archives and of the Museum. He made a number of trips to Germany, England and Italy for research. Among the most important of his many works are (Les arts a la cour des Papes pendant le XV et le XVI siecle) (1878-98, 4 vols., awarded prize of the Academy of Fine Arts) ; (Raphael, sa vie, son oeuvre et son temps) (1881, 3d ed., 1899), also a short biography of Raphael (1901); (La tapisserie) (1882; 5th ed., 1903); (La Renaissance en Italie et en France a 1'epoque de Charles VHP (1885) ; (Tapisserie, broderies et dentelles) (1890) ; (La mosaique chretienne pendant les premieres siecles) (1893) ; (Florence et la Toscane) (1897; new ed. 1901) ; (Leonard de Vinci* (1898). Under the title cBibliotheque internationale de 1'arU under¬ taken in collaboration writh foreign

critics and published since 1881, he brought out a number of monographs which he called (Les precur-seurs de la Renaissance, > which were followed by (Les collections des Medicis> (1887) and later (Les historiens et les critiques de Raphael > (1884) and (Etudes sur l'histoire de la peinture et de l'iconographie) (2d ed. 1885). He also collaborated with Guiffrey in (Histoire generale de la tapisserieP He was made a member of the Institut de France. Consult Girodie, Eu¬ gene Miintz) (Strassburg 1902).

MUNZER, miint'ser, Thomas, German re¬ ligious fanatic: b. Stolberg, about 1490; d. Frankenhausen, 15 May 1525. He claimed that he was in direct communion with the Holy Spirit, and advocated communism, denouncing all existing governments. His violence brought him into conflict with Luther as well as with the Catholics. He preached at Zwickau in 1520, and at Prague in 1521, promulgated his doc¬ trines at Allstedt in Thuringia in 1523, and ex¬ cited the people to revolt against the authorities. In Miihlhausen (1524) he gained the unquali¬ fied support of the populace, deposed the city council and appointed a new one, suffered the monasteries and houses of the wealthy to be sacked, and proclaimed a community of goods. He was now joined by another fanatic named Pfeifer, with his troop of rapacious followers, and this circumstance with the news that 40,000 peasants had assembled in Franconia, and plundered and burned 150 castles of the nobles

and 23 monasteries, inflamed his zeal, and he joined in what was termed the ((Peasants' War,® intending to exterminate <(the godless princes and priests.® Leaving Pfeifer governor in Miihlhausen, he proceeded to Frankenhausen, and rekindled the ardor of the townspeople. The dukes of Saxony, Philip and Brunswick, and other rulers sent a force against the insur¬ gents; Miinzer was totally defeated after an obstinate struggle, was taken and executed. (See Peasants' War). Consult Merx, (Thomas Miinzer und Heinrich Pfeiffer) (Gottingen 1889) ; Seidemann, (Tho-nas Miinzer* (Leipzig 1842) ; Strobel, G. T., (Leben, Schriften und Lehren Thoma Miintzers) (Niirnberg 1795) ; Wolfram, G., (Thomas Miinzer in Allstedt } (Jena 1852).

MUNZINGER, moont'sing-er, Werner, Swiss explorer : b. Olten, Switzerland, 4 April 1832; d. Africa, 14 Nov. 1875. He was edu¬ cated at Bern, Munich and Paris. He engaged in mercantile life at Alexandria, Egypt, in 1852-53. He participated in several expeditions of exploration into Abyssinia, and later became British and then

French consul, and finally governor under the Khedive at Massowah in Egyptian Abyssinia. In 1870 he made an expe¬ dition into southern Arabia. In 1872 he became Pasha and governor-general of the eastern Su¬ dan. He was killed in 1875 while leading an expedition against Abyssinia. Among his works are (Ostafrikanische Studien) (1864) ; (Vocab-ulaire de la Langue Tigre (1865).

MURADABAD, moo-ra-da-bad', India, city and capital of the district of Muradabad in the United Provinces, on the Ramganga River, situated 50 miles north by west of Ba¬ reilly. The city has an extensive commerce in rice, sugar, wheat and other products of the surrounding district and has cotton factories, printing establishments and manufactories of engraved brass ware. Its most notable archi¬ tectural feature is the great mosque erected in 1631. There are also Saint Paul's Church (Church of England), and the American Meth¬ odist Church founded in 1874. Rustam Khan founded Muradabad in 1625; the ruins of his early fortifications are still visible. The city is governed by a council of 23 members, of whom five are appointive and the remainder elected. A cantonment is located on the out¬ skirts of the city to the northwest. Pop. 81,168.

MUR2ENA, a very large marine eel or moray of the family Murcenidce. (SeeMoRAYs). There can be little doubt that the murcena of the Roman feasts often translated ((lamprey,® was one of the true eels. It was held in the highest esteem. Pliny tells of the enormous sums of money and the great care which were spent on the cultivation of the muraena. The artificial fish-pond of Lucullus waˆ said to have been sold for about $200,000 ; and one Hirrius is said to have furnished Caesar with 6,000 muraenas alone for a regal entertainment given to the people. These fishes were kept as pets by the Roman nobility. See Mullet.

. MURAL CIRCLE, in astronomy, an in¬ strument consisting of a circle carrying a tele¬ scope and mounted against a wall ; whence its name. The telescope revolved in the plane of a meridian. It was formerly employed in observa¬ tories to measure the zenith distances of stars,

and thus their declination. The mural circle is now superseded by the Meridian Circle.

MURAL PAINTING, that branch of in¬ terior decoration which has for its object the adornment of the walls of buildings by paint¬ ing, as distinguished from mosaic, wainscoting, sculpture, tapestry and all other kinds and means of adornment. By extension the term in¬ cludes also the painting of vaults and ceilings. It is not commonly used of mere painting with uniform flat color, but only of such painting as involves systematic decorative design, whether pictorial or by means of conventional patterns and ornament. In its highest develop¬ ment it is the most exalted, spiritual and im¬ aginative form of decorative art, and indeed of painting in general, and has enlisted the genius of the most gifted painters of all time.

General Purpose and Principles. — Mural painting is not an independent art, like the painting of easel pictures, but an art intimately allied with architecture. Its function being that of enhancing the beauty of the structure to which it is applied, the decorator must sub¬ ordinate his invention to the architectural con¬ ditions and character of the building and of the spaces he is to adorn. He must consider the size, scale and proportions of the room; its architectural style, features and divisions; its conditions as to lighting; the distance from the spectator's eye of the various surfaces he is to paint; and thus to make his paintings contribute to the dignity and effectiveness of the completed structure. This requires a knowledge of architecture and a sympathetic attitude toward the architect's purpose, and the best results are secured when the architect and painter have collaborated from the begin¬ ning. Usuallv, however, the building is (<turned over® to the decorator only when completed, and the artist must do his best with the condi¬ tions thus created for him in advance. He is least hampered when the interior surfaces as¬ signed him (for nearly all mural painting is of interiors) are broad and simple, as in the Arena Chapel at Padua by Giotto and the Sistine Chapel at Rome by Michelangelo and others; but the truly great artist can triumph over such architectural complexities as the great ceilings in the Ducal Palace at Venice and the richly paneled vault of the Camera della Signa-tura at Rome.

In general, the mural painter has to deal with two distinct elements of design: the pic¬ tures which form the chief part of most deco¬ rative schemes, and the framework, borders and other adjuncts of conventional ornament by which they are both related to and separated from the architectural members and features of the structure. There are many subordinate spaces too small for pictures,

which may be en¬ riched with arabesques and patterning in color and thus harmonized with the greater decora¬ tions. There are, indeed, many interiors which offer little opportunity for pictorial decoration but abundant scope for painted ornament, as in many French Renaissance buildings of the 16th— 18th centuries. Such decoration requires a thorough mastery of ornament in the various historic styles and calls for decorative fancy rather than for the higher forms of artistic inspiration.

The subjects treated by the mural painter may be broadly divided into the historical, the

allegorical and the fanciful, varying according to the purpose of the building or room to be decorated. In the first class may be included not only actual historical events, but scenes from legendary lore and such Scriptural scenes as are narrated in the Bible as actually occur¬ ring, without regard to questions of scientific historicity. In the second class we may include all allegorical and symbolic representations and such Scriptural subjects as are prophetic, apocalyptic or abstract. Subjects of the third class belong to the lighter phases of the art as applied to houses, ball-rooms, theatres, etc., and may include fanciful landscapes, pastorals, genre subjects and the like. The highest reach of the art is attained when a great master handles such tremendous ˆallegories® as (Paradiseˆ the (Last Judgment,* (The Redemption,* (The Triumph of Christianity, * as in the frescoes by Michelangelo in the Sistine Chapel, or the extraordinary paintings by Sargent in the Bos¬ ton Public Library. Even maps havˆ been used as mural painting, e.g., those covering the walls of the famous Gallery of Maps in the Vatican (1581), and those painted on the upper part of the walls of the great waiting-room of the Pennsylvania Terminal in New York.

Whatever the subject and whatever the sur¬ face on which it is painted, it may be handled in either of two ways : either so as to recog¬ nize the hard and impenetrable wall or vault which it adorns, or so as to ignore it and, as it were, make the spectator forget its exist¬ ence or at least its impenetrability. In the first kind, the colors are more or less flat, the figures are formally disposed and appear to be as nearly as possible in one plane, and there is little effect of light-and-shade (chiaroscuro) or perspective. Such are the engraved paint¬ ings on Egyptian temple-walls and columns, nearly all mediaeval paintings and, in a measure, some of those of the modern Puvis de Chavannes (q.v.). One feels that these are paint¬ ings on a wall. To the second class belong many Pompeiian paintings and nearly all

those of Renaissance and modern times, in which perspective, both geometric and aerial, and all the resources of realistic representation, of distance and the third dimension, combine to create an illusion of actuality and space; to <(break through the wall® as the painters say. But even in such paintings a certain formalitv of composition and an evident recognition of the shape of the space occupied may serve to distinguish them as real mural decorations rather than easel pictures framed and hoisted into their places on wall, or ceiling.

Methods and Technic. — Four processes or methods of producing mural paintings have predominated in the history of the art: Fresco, Tempera (or painting in distemper), Encaustic and Oil painting.

Fresco was the process most generally em¬ ployed in the Early Renaissance, in the Middle Ages and to some extent in antiquity. In fresco painting the pigment, mixed1 with water, is applied to a specially prepared surface of wet plaster, which it penetrates so that when the plaster sets the picture is incorporated in its substance and to some extent encased in a thin coating of carbonate of lime. Only, so much of the picture can be painted at a time as will cover the plaster before it hardens, after which the unpainted remainder of the

plaster must be cut away. Thus each day's work must be complete in itself, there can be no retouching or correction on that portion ex¬ cept in distemper, which is less permanent. ((Buon fresco® is pure fresco, untouched with tempera, and such are the greatest works of the later masters in fresco. The mediaeval and early Renaissance painters (and probably also the Greco-Romans) used tempera retouching quite freely. But even with tempera retouching fresco-painting is a difficult process ; and the work must be done in place, not in the studio, and to paint a damp ceiling while lying on one's back is no easy task. Oil painting has al¬ most completely driven out this most permanent and monumental style of painting, in which most of the greatest works of the Italian Re¬ naissance were executed. See Painting.

Tempera, or painting in distemper, is a process of painting on dry plaster with pig¬ ments carried by some slightly glutinous me¬ dium, like white of egg or honey, or gum, mixed with water. The work must be done in place, like fresco, but is easier of execution and permits of retouching and correction ad libitum. It is far less permanent than fresco, being likely to scale, peel or powder off. It was, however, much used in antiquity, and the so-called “frescoing® or painted decoration on walls and ceilings of ordinary modern houses and apartments is done in distemper.

Encaustic is painting on a surface prepared with wax, and employs either distemper pig¬ ments which after painting are covered with a coat of melted wax, or pigments mixed with melted wax on a hot palette. It is a difficult and meticulous process, which was used by the Romans for certain details of their mural a coat of melted wax, or pigments mixed with occasionally by modern artists, F. C. Crowninshield among them, but has no decided advan¬ tage over oils sufficient to counterbalance its difficulties.

Oil painting, which employs linseed oil as the carrying medium of the pigment and tur¬ pentine as a dryer, appears to have been first developed in Flanders in the 15th century and thence to have been carried to Italy, where it finally supplanted all other processes, first for easel pictures and altarpieces, and later, in the hands of the great Venetian painters, for mural decorations of the greatest magnificence. Oil painting has many advantages ; it can be executed in the studio, upon wood, copper or canvas, the latter being usually employed; it is the most brilliant of all kinds of painting and lends itself to the greatest variety of technic, and can be indefinitely corrected and retouched. For these reasons it is the preferred process of nearly all modern muralists. Its disadvan¬ tages are that it cannot be executed directly on plaster, even specially prepared for it, with any prospect of permanence; and execution in the studio often leads to disappointing results when the work is in place; moreover it is liable to darken with age and to suffer from deteriora¬ tion of the canvas. Yet many of the great Venetian masterpieces are as brilliant to-day — or nearly so — as when painted over 300 years ago. Sometimes the painted canvas, instead of being mounted on a stretcher, is “glued® to the wall by the use of thick) white lead and oil. This method is called “marouflage® by the

French. It can only be used upon walls abso¬ lutely protected from dampness.

Two other processes deserve mention, hav¬ ing been used with some success in Germany and England respectively : water-glass and spirit fresco. The first requires special prep¬ aration of the wall-plastering, which is then primed with a thin coat of lime mixed with a special preparation made in Germany, and when dry is successively treated with ferro-silicic acid and two coats of water-glass (potas¬ sium silicate). The colors, specially made for this process, are laid on with water, and the finished painting when dry is sprayed with a fixative. It is said to be ill adapted to very damp climates, but has been successfully used, even for outdoor wall-paintings, in Paris as well as in Germany. The ((spirit fresco® proc¬ ess invented by Gambier Parry and employed by him in the House of Parliament, makes use of wax and certain gums, melted and dissolved in turpentine, as a medium both for sizing the plaster and for carrying the pigment. The wall, thus sized, is primed with white lead and gilder's whitening, and when dry can be painted upon with colors mixed with the medium, as if with oils. The painting can thus be cor¬ rected and touched up without danger, and the result appears to be satisfactory as to perma¬ nence.

Exterior Mural Painting. — The Egyptians, Greeks and Pompeiians, all executed painted decorations on walls exposed to the weather. In dry climates like those of Egypt, Greece and southern Italy, tempera painting upon carefully prepared stucco is fairly durable. Modern efforts to produce such durable out-of- doors paintings on plastered walls have rarely been successful. Hittorff's decorative paintings on the faqade of Saint Vincent de Paule in Paris (1846) , quickly faded and peeled, although sheltered by a portico. Kaulbach's great ex¬ terior (<frescoes® on the New Pinacothek at Munich have fared better; they were presum¬ ably executed in water-glass. The danger to such paintings lies not merely in alternations of dry and damp, heat and frost, but also in the acid fumes from factories, coal-smoke and gas¬ works in modern cities, so that ceramic tiles and mosaic are now generally preferred as the means for color and pictorial effects on the exteriors of buildings. The Germans, it is true, frequently paint ornamental designs on their stuccoed fagades, but these decorations have to be periodically renewed. No really successful process has ever been devised for painting directly on stone or marble, exposed to the weather. The ancients always covered even marble surfaces with a thin coating of very fine lime stucco, sometimes called "mas¬ tic,® before applying their polychromatic deco¬ rations.

Historical Summary.— The articles Inte¬ rior Decoration and Painting summarize briefly from different points of view the general history of which that of mural painting is a part. From these the reader may gather some idea of its progress from the prehistoric cave paintings

through the Egyptian and Greek civilizations, the brilliant and fantastic Pom¬ peiian and Roman developments, and the sol¬ emn religious representations of the early Christian and Byzantine churches, to its partial

eclipse, outside of Italy, in the Gothic period. It was largely displaced in Byzantine art by the more brilliant art of mosaic, and in the Gothic period by that of stained glass, although the painting of conventional patterns on walls, columns and vaults never entirely ceased. It was in Italy, pre-eminently the land of color-decoration, that mural painting was revived in the 13th century by Cimabue, and carried to a marvelous perfection in the 14th century by Giotto and his followers, in the church of Saint Francis at Assisi, the Arena Chapel at Padua and the churches of Santa Croce and Santa Maria Novella at Florence. Another school was early developed in Sienna, and the Tuscan artists were widely employed even in distant cities. In these works, which were anticipatory of the Renaissance, an effort after realism took the place of the Byzantine character of conventional formality of the earlier artists. With the 15th century other ˆschools® (i.e., styles of painting led by one or more great artists and their followers) developed in north-ren Italy, in Umbria, Rome and later in Venice. The human body was studied; artists painted from models; an increasing mastery of light-and-shade and of perspective made possible a corresponding increase in realism. The ear¬ lier pictures symbolized or suggested facts and events ; the later ones show the artists' effort to picture a scene as he imagined it would have appeared to an actual spectator. This completely changed the character of all mural painting; the flat wall or ceiling or curved vault was more and more ignQred, and the distinction between mural decoration, in its strictest sense, and easel pictures painted, merely to fit a given space, was less and less insisted on. Distance, perspective, relief and living action were more and more perfectly repre¬ sented. But the decorative sense was never lost and the grandeur of the composition, its harmony of line and of color, and the absolute beauty of the result, are in many cases so admirable that one cares not at all to think about

t/he wall or the vault. The highest de¬ velopment of this art in fresco was reached in Rome in the first half of the 16th century, espe¬ cially in the Vatican. For majesty and solemn significance the paintings in the Sistine Chapel are unapproached; for richness and splendor those of Raphael in the Stanze, especially the Camera del'la Segnatura* are unsurpassed. For decorations of a lighter sort,. Raphael in the Vatican Loggie, and with his pupils in the Farnesina Palace and the Villa Madama and Giulio Romano at Mantua, revived the. old Ro¬ man practice of combining mural painting with delicate stucco-relief. In Venice the. art of painting in oils received its most brilliant de¬ velopment as applied to the decoration of walls and ceilings at the hands of Titian, Paolo Veronese and Tintoretto in the Ducal Palace. Churches throughout Italy were made splendid with frescoed vaults and painted ceilings. The art declined after 1600, but many brilliant works in both mediums were still executed, and Tie¬ polo (1693-1770) in Venice, Wurzburg and Madrid, temporarily revived the art with paint¬ ings of a marvelous bravura of conception and

execution. _ , . . , .

In modern times the French have led in mural painting; no considerable public, build¬ ing is erected without providing for interior

mural paintings by the greatest artists (Opera House by Baudry; Hotel de Ville by various artists ; Sorbonne and Pantheon by Puvis de Chavannes and others). In England there has also been a notable revival in the last 50 years; men like Gambier Parry, Cope, Dice, Lord Leighton, Sir E. J. Poynter, and of late es¬ pecially Frank Brangwyn, have executed notable decorations in fresco, spirit fresco and oils in both public and private buildings.

In the United States previous to 1876 there was no mural painting worthy of the name, though in the National Capitol a group of second-rate Italian painters had for years been employed in decorating the dome. In 1876 Mr. John LaFarge was commissioned to decorate the interior of Trinity Church, Boston, and gathered about him a group of young artists to assist him, many of whom later reached dis¬ tinction. This was the first work of American artists in this field, and for many years there¬ after it remained almost alone. But in 1891— 93 for the Columbian Exhibition at Chicago a number of artists, now well known, were em¬ ployed to paint decorative compositions in the various buildings, and a few years later, in the Boston Public Library

and the Congressional Library at Washington, more inspiring oppor¬ tunities were given to artists like E. A. Abbey, J. S. Sargent, E. H. Blashfield, Kenyon Cox, Elihu Ved'der, Gari Melchers, W. deL. Dodge, W. H. Low, H. Walker, E. Simmons and others, for permanent and monumentally important works. Since then such opportunities have been multiplied tenfold in State capitols, courthouses, libraries, theatres, hotels and private houses, and the number and the skill of American mural painters have both increased greatly. See articles Interior . Decoration and Painting, also those on particular phases or styles of art and on particular artists, e g., Giotto, Michelangelo, Perugino, Raphael, Tiepolo, Titian, *etc.*

Bibliography. — The best general accounts of the art of mural painting are by F. Crownin-shield, (Mural Painting) (Boston 1887), and A. L. Baldry, Modern Mural Decoration) (London 1902). For original documents on historic methods and processes, Mrs. Merrifield, (The Arts of Painting) (London 1849). For early mediaeval painting, N. H. J. Westlake,

(History of Design in Mural Painting … to the 12th Century) (London 1915). Consult also W. and G. Audsley, cLa Peinture murale decorative dans le style du moven-age> (Paris 1881); J. D. Crace, <The Art of Colour Decora¬ tion (London 1912) ; P. Gelis-Didot, (La Peinture decorative en France> (Paris, n.d.) ; L. Gruner, <Fresco Decorations and Stuccoes of the 15th and 16th Centuries in Italy > (Lon¬ don 1854) ; J. I. Hittorff, (Le Temple d'Ern-pedoe … ou 1 'architecture polychrome, etcP (Paris 1851), and for American work, E. H. Blashfield, (Mural Painting in America* (New York 1913), and in S. Isham, (The Historv of American Painting* (chapter XXV, an excel¬ lent brief account of mural painting in America). See also the bibliographies under Interior Decoration and Painting.

Alfred D. F. Hamlin,

Professor History of Architecture, Columbia

University.

MURANO, moo-ra'no, Italy, town in the province Venice and situated on an island in its

lagoons, one and a half miles north of Venice. It contains the very ancient basilica, San Donato Cathedral, which was repaired as early as the 12th century; a 16th century Renaissance church (San Pietro Martire) with its altar painting by Bellini. The town has for centuries been world-renowned for its glass industry (see Glass), the wonderfully artistic delicate blown-glass ware being highly valued in the collections of connoisseurs. It also has a glass-industries museum. The noted Venetian pearls also are manufactured here. Consult Molmenti, (Le isole della Laguna Veneta) (Venice 1895).

MURAT, mii-ra, Joachim, French mar¬ shal and sometime king of Naples: b. Bastide, Lot, France, 25 March 1771 ; d. Pizzo, Calabria, Italy, 13 Oct. 1815. He was the son of a pros¬ perous innkeeper of La-Bastide-Fortuniere, near Cahors, France, and had a remarkable career. While studying for the priesthood at Toulouse he enlisted in a cavalry regiment but was soon dismissed for insubordination. He served in the constitutional guard of Louis XVI ; then entered the 12th regiment of mounted chasseurs and rose by his zealous Jacobinism to the rank of lieutenant-colonel. He attached himself to Napoleon in 1795, and followed him to Italy and to Egypt. In these campaigns he frequently distinguished himself, and in 1799 Napoleon ap¬ pointed him general of division. He clung close to the great leader and returned to France with him from the disastrous Egyptian campaign. At a time when everything depended on prompt action he rendered Napoleon most valuable serv¬ ice by dispersing the Council of Five Hundred at Saint Cloud, on the memorable 18th Brumaire. In gratitude and as a reward Napoleon entrusted him with the command of the Con¬ sular Guard, and shortly after (20 Jan. 1800) gave him his youngest sister, Caroline, in mar¬ riage.

Murat had command of the cavalry at the battle of Marengo and expelled the Neapolitans from the Papal States. In 1803 he was made a member of the Corps Legislatif, and in 1804 was the governor of Paris. On the establish¬ ment of the Empire Murat became one of the popular idols, and was showered with honors. He was made marshal of the empire, grand-admiral, and prince of the imperial house. His services in the campaign of 1805 against Aus¬ tria, in which he entered Vienna at the head of the army, were rewarded in 1806 with the grand-duchy of Cleves and Berg. He partici¬ pated in the battles of Austerlitz, Jena, Eylau and Friedland. In the war of 1806 with Prussia, and of 1807 with Russia, he commanded the cavalry, and in 1808 he

commanded the French army which occupied Madrid, and quelled the insurrection there in May. He expected to re¬ ceive the crown of Spain, as Charles IV had invested him with royal authority; but Na¬ poleon, who destined Spain for his brother Joseph, placed him on the throne of Naples, 15 July 1808. He then took the title of Joachim I. Ferdinand IV (q.v.), however, continued to rule in Sicily under English protection. Murat proved a beneficent king and instituted some reforms, but he was, after all, but the tool of Napoleon. He shared the hardships and re¬ verses in the disastrous Russian campaign of 1812, and returned to Naples discouraged and discontented. In 1813 he again fought for Na¬

poleon, whose cause he deserted after the battle of Leipzig. He entered into a treaty with Eng¬ land and Austria in 1814 which guaranteed him his throne on condition that he would join the coalition against Napoleon. He pretended to keep this treaty by attacking Eugene Beauharnais in a half-hearted manner. He took up arms again in 1815 for Napoleon; but being defeated by Generals Neipperg and Bianchi he was forced to leave Italy, and took refuge in Toulon. His offers of aid were spurned bv Napoleon. After the overthrow of Napoleon he escaped to Corsica, declining the offer of an asylum in Austria which was made to him by Metternich, and set sail for the Neapolitan territory with a view to the recovery of his kingdom. He foolhardily landed at Pizzo on 8 October, but was immediately captured, tried by court-martial, condemned and shot. Murat was vain, unstable and full of ambition. As a cav¬ alry leader his dashing bravery inspired his men with almost superhuman courage. As king, he proved himself sincerely eager to initiate genuine reforms, and did much to abolish banditry. Consult Attridge, A. H., ‘Joachim MuraC (New York 1911); Espitalier, A., ‘Napoleon and King Murat, 1808-15) (New York 1911) ; Helfert, ‘Joachim Murat, seine letzten Kampfe und seine Ende> (Vienna 1878) ; Johnston, C. H. L., ‘Famous Cavalry Leaders) (Boston 1908) ; Johnston, R. M., ‘Napoleonic Empire in Southern Italy) (2 vols., New York 1904) ; Lumbroso, A., ‘Correspondance de Joachim Murat* (Milan 1899) ; Murat, Count, (Murat, lieutenant de l’empereur en Espagne) (Paris 1897) ; Romano, G., ‘Ricordi muratiani* (Pavia 1890) ; Sorel, A., ‘L’Europe et la revolution frangaise* (8 vols., Paris 1885-92).

MURAT, Napoleon Achille, French Amer¬ ican author: b. Paris, 21 Jan. 1801; d. Was-ceissa, Leon County, Fla., 15 April 1847. He was the

son of Joachim Murat, king of Naples, and before his father's overthrow bore the title of Prince of the Two Sicilies. When his father lost the throne he sought refuge in Aus¬ tria, where he received his education. In 1821 he came to the United States, and after an ex¬ tended tour through the country bought a large estate and settled near Tallahassee, Fla., where he devoted himself to farming and literary work ; he also gave largely to and was active in philanthropic enterprises. He became a Linited States citizen, and in 1824 was made alderman of the city of Tallahassee, in 1825 mayor and in 1826 postmaster. He accom¬ panied Lafayette during most of his visit to the Linited States, and at that time was introduced to Catharina Dudley, a grandniece of Washing¬ ton, whom he afterward married. He refused many offers of political advancement, and lived quietly on his estate. In 1828 he published in the Paris Revue Trimestrielle a series of let¬ ters on political parties in the United States, which were later published as (Lettres d'un Citoyen des Etats Unis a ses Amis d'Europe* ; in 1838 he published (Esquisses morales et politiques sur les Etats Unis d'Amerique* ; and 'Exposition des Principes du Gouvernement republicain tel qu'il a ete perfectionne en Amerique* (Exposition of the Principles of Republican Government as Perfected in Amer¬ ica). This latter work was very popular

among those of republican sympathies in Europe, was translated into several different languages and passed through over 50 editions. Consult MacConnell, (The Prince and Princess \chille Murat in Florida) (Century Magazine , New York 1893).

MURAT, Napoleon Lucien Charles,

Prince of Ponte Corvo, French politician, second son of Joachim Murat: b. Milan, 16 May 1803; d. Paris, 10 April 1878. He left Italy for Austria with his mother in 1815; started for the United States in 1824 to join his uncle Joseph, but was shipwrecked on the Span¬ ish coast, and held prisoner for a time; arrived in Boston in 1825 ; and in 1827 married an heiress of Bordentown, N. J., Georgina Fraser, who was soon afterward reduced to school teaching for her living. Murat

returned to Paris in 1848, sat in the Constitutional Assem¬ bly and in the Legislative Assembly (1849), was Minister to Turin (1849-50), had his debts paid and received a pension of $30,000 a year under Napoleon III, and in 1859-60 made a feeble claim to the crown of Naples, but re¬ ceived no support from France. His vote in the Senate, where he sat from 1852 to 1870, for the terliporal power of the Pope, alienated from him the French Freemasons, whose grand¬ master he had formerly been. He retired to private life after the revolution of 4 Sept. 1870.

MURATORIAN FRAGMENT, or CA¬ NON OF MURATORI, a fragment from an ancient Bible treatise discovered in the Am¬ brosian Library at Milan by Lodovico A. Muratori and published (1740) in his <Anti-quitates italicaeP It contains an imperfect list of the books in the New Testament, and is con¬ sidered highly important as testimony of at least a list of some of the works considered canonical at the time of writing, which is sup¬ posed to be late in the 2d century. The much-damaged documentary fragment is in barbaric Latin, probably translated from the Greek. The books are named in their order and start with mention of the Gospel of Saint Mark on its first line which is broken and prob¬ ably contained mention of Matthew as Saint Luke's Gospel is mentioned as third. Saint John, the Acts, 13 epistles of Saint Paul are cited (omitting Epistle to the Hebrews), the Revelation of John, Jude, two epistles of John (James is omitted, also Peter), but the Apoca¬ lypse part of John and that of Peter are ac¬ cepted, as is also Wisdom of Solomon as being written by his friends. A translation is to be found in H. W. Gwatkins, Selections from Early Christian Writers) (New York 1893) and Lietzmann's (Kleine Texte fur theologische Vorlesungen, No P (Bonn 1902). Consult Kuhn, (Das muratorische Fragment (Zurich 1892) ; Tregelles, (Canon Muritorianus) (Ox¬ ford 1867).

MURAVIEFF, moo-ra-ve-ef', Russian noble family, originally settled in the grand-duchy of Moscow, but in 1488 receiving from Ivan Vassilievitch holdings in Novgorod. Its chief members are Nikolai Jerofeyevitch, d. Montpellier 1770, governor of Livonia and au¬ thor of the first Russian algebra. Mikhail Nikititch, b. Smolensk, 25 Oct. 1757; d. Saint Petersburg, 29 July 1807; was chosen tutor to the grand-dukes Alexander and Konstantin in 1785, rector of the University of Moscow

(1796), and Secretary of State to the Ministry of Public Instruction (1801) ; and wrote a man¬ ual of ethics, which is classic in Russia

(1810, 1815). Nikolai Nikolaievitch, son of the governor of Livonia: b. Riga, 1768; d. Moscow, 1 Sept. 1840; was educated at Strassburg; en¬ tered the navy 1788; was captured in 1790; was transferred to the army in 1796; and from 1797 to 1823, with the exception of service .against Napoleon in 1812-14, he was at the head of a private military school near Moscow, which was bought by the government in 1816. His son, Alexander Nikolaievitch, b. 1792; d. Moscow, 1864; was sent to Siberia for his part in the conspiracy of 1825 ; was pardoned ; served in the Crimean War and became major-general; and as governor of Nijni Novgorod did much for the abolition of serfdom. Another son, Nikolai Nikolaievitch, b. Saint Petersburg, 1793 ; d. there, 4 Nov. 1866; entered the army at 17; served in the Caucasus; was sent to Khiva 1819; distin¬ guished himself in the war with Turkey, 1828-29, and in the Polish campaign, 1831 ; in 1832 treated with Mehemet Ali ; was disgraced and retired in 1838, but reinstated in 1848; and in 1855 commanded the army in the Caucasus, taking Kars. He wrote a valuable book about his travels in Khiva (1822), and on the cam¬ paign in the Caucasus in 1855 (1876). His brother, Mikhail Nikolaievitch, b. 1795; d. Syrez, near Luga, 10 Sept. 1866; f ought against France (1812-13) ; took part in Decembrist up¬ rising and was jailed for five months; became major-general in 1830; was military governor of Grodno; was a member of the Council of State, 1850—62; opposed the emancipation of the serfs ; used such cruelty in putting down a student rising in 1861 that he was forced to resign ; but in 1863 was sent to Wilna as gover¬ nor-general, and won from the Poles the name of the Hanger or Executioner by his pitiless severity; and in 1866 was president of the com¬ mission which examined Karakasoff, who at¬ tempted to assassinate Alexander II. His mem¬ oirs were published by his grandson, Mikhail Nikolaievitch, b. 7 April 1845; d. 21 June 1900; Ambassador to Berlin (1885), to Copen¬ hagen (1893) ; and from 1897 to his death For¬ eign Minister. He did much to solve the Cre¬ tan question, published the invitaton to The Hague Peace Conference (1898), and for¬ warded Russia's interests in China. Another Nikolai Nikolaievitch, Count Muravieff Amursky, b. Saint Petersburg, 1809; d. Paris, 19 Nov. 1881 ; fought in the war with Turkey, 1828-29; became governor-general of eastern Siberia in 1847 ; in 1858 concluded the Treaty of Aigun with China, by which

Amur was ceded to Russia, and thus won

the title Amursky; and in 1859 arranged a treaty with Japan at Yeddo. The last 20 years of his life were spent in Paris. The Muravieff-Apostol branch of the family, so called because of its intermarriage with that of Apostol, a Cossack hetman, is most prominently represented by

Ivan (1769-1851), who translated Aristo¬ phanes, Horace, Sheridan, etc., into Russian ; and by his son Sergei (1796-1826), who took

part in the conspiracy of 1825 and was exe¬

cuted in Saint Petersburg.

MURCHISON, mer'ki-son, Sir Roderick Impey, Scottish geologist: b. Tarradale, Ross,

Scotland, 19 Feb. 1792; d. London, 22 Oct. 1871. He was educated at the military college in Great Marlow and at the University of Edin¬ burgh ; entered the army in 1807 and served under Wellington in the Peninsular campaign, but retired from the army with the rank of captain of dragoons in 1815. He then took up the study of science at the advice of Sir Humphry Davy and spent years in scientific investigations, particularly in that of geology. In 1825 he became a member of the Geological Society of London, of which he was president in 1831-32 and in 1842-43. His investigations ex¬ tended through France, England and Wales and he reclassified Palaeozoic rocks, giving to his new system the name Silurian in 1835. He also identified the Devonian system. In 1841 he was commissioned by Emperor Nicholas to make a geological survey of Russia and was engaged in that work until 1844, making discov¬ eries which enabled him to present to the scien¬ tific world the Permian system. He was one of the founders of the British Association for the Advancement of Science and presided over it in 1846. He was several times elected presi¬ dent of the Royal Geographical Society and from 1862 until his death was continuously re¬ elected. In 1855 he was appointed director of the British Geological Survey. He was knighted in 1846, became a knight commander of the bath in 1853 and a baronet in 1863. The Emperor of Russia conferred on him the grand crosses of Saint Anna and of Saint Stanislaus. He published (Geologv of Cheltenham) (1834); (The Silurian System' (1839);

(Geology of Russia in Europe and in the Ural Mountains' (1845);

Geological Atlas of Europe' (1856), *etc.* Consult Geikie, (Memoir of Sir Frederick Murchison' (1875).

MURCHISONITE, a flesh-red variety of the mineral orthoclase, which exhibits golden-yellow reflections when viewed from certain directions. It occurs at Dawlish and Exeter, England, and is named for its discov¬ erer, Sir Roderick I. Murchison.

MURCIA, mer'shi-a (Sp. moor'the-a), Spain, the capital of the ancient kingdom and modern province of same name, 30 miles north¬ west of Cartagena, on the Segura, which divides the town into two unequal portions, connected by a handsome bridge. The city is surrounded by a brick wall and is entered by three principal gates. The streets are generally broad, straight and well paved. Among the public buildings the most important is the cathe¬ dral, its principal fagade a fine combination of Corinthian and composite architecture. It was begun in 1353. In the plaza stands the capa¬ cious episcopal palace, built in 1752, one of the finest edifices of its class in Spain, and in close proximity to it the colleges of Saint Fulgentius and Saint Isidore, which form one range of buildings. The bishop takes his title from Car¬ tagena, from which town the see was trans¬ ferred. The other public edifices and institu¬ tions consist of the College of Saint Leander, which is an academy of music connected with the. cathedral ; the hospital of Saint John, with which is connected a hospital for convalescents; a house of refuge, a foundling hospital, the town-house, an institute for advanced educa¬ tion, a school of design, an ecclesiastical semi¬ nary, several nunneries, a bullring, two theatres,

an old Moorish granary and a good botanical garden. There are manufactures of coarse cloths and baize of different colors; of silk-stuffs, especially taffeta and plush ; linens, hats, gloves, saltpeter; also silk spinning-mills, dye-works, potteries, tanneries, soap-works and about 30 flour-mills. Considerable commerce is carried on in silks and other manufactures, as well as in grain, *etc.* Pop. about 125,000.

MURDER. See Homicide.

MURDOCH, mer'dok, James Edward,

American actor: b. Philadelphia, Pa., 25 June 1811; d. Cincinnati, Ohio, 19 May 1893. He made his debut as an actor in Philadelphia in 1829, playing Frederick in <The Lover's Vow,' and in 1833 acted with Fanny Kemble during her American tour. In 1838 he appeared in

, New York as Benedick in (Much Ado About Nothing.' He played Pythias to Edwin For¬ rest s Damon and in 1842 retired from the stage to study. He reappeared in New York in 1845 as Hamlet and for 15 years played with considerable success in the United States and England. During the Civil War he devoted himself to caring for the wounded soldiers and in giving entertainments for their benefit. Later he became professor of elocution at the Cincinnati College of Music. His best roles were Hamlet, Mercutio, Benedick and Claude Melnotte, in which he had few equals. He published with William Russell Grthophonv* (1845) and (The Stage) (1885).

MURDOCK, Joseph Ballard, American rear-admiral: b. Hartford, Conn., 13 Feb. 1851 He was graduated (1870) at the United States Naval Academy, then served (1870-74) on the North and South Atlantic stations and was carrying out coast surveys from 1875-79. From 1880-1903 he was instructor of physics at the naval academy. During the Spanish-Amer- ican War he was executive officer of the Panther and became a commander in 1901 captain in 1906, rear-admiral 1909. He com¬ manded the Rhode Island in the cruise of the fleet (1907-09) around the world and was com- ˆdant at the navy yard, New York, from 1909-10, having command of the second divi¬ sion Atlantic fleet (1910-11), and was commander-m-chief, United States Asiatic fleet (1911-12), retiring 1913. He wrote (Notes on Electricity and Magnetism > (1884) and con¬ tributed articles on the same subject to Pro¬ ceedings of the United States Naval Institute and for Van N ostramd's Magazine , *etc.*

i MURDOCK, Victor, American legislator: b Burlingame, Kan., 18 March 1871. He was educated at the common schools and at Lewis Academy, Wichita, and became managing edi¬ tor of the Wichita Daily Eagle (1894-1903) He was elected a Republican to the 58th Con¬ gress in 1903, reelected for 59th to 63d Con¬ i', losses (1905-15) for the 8th Kansas district and has been a member of the Federal Trade Commission since 1917. In 1918 he was ap-pomted member of the Meat Commission of the L mted States government. He became an insurgent in his party and joined the Pro-gicssi\cs and was chairman of the Progres¬ sive National Committee from 1914-16.

i William, Scottish inventor:

jOW Ml ' near °ld Cumnock, 21 Aug 1754; d. Sycamore Hill, near Soho. 15 Nov

MUREX

1 Calcar triumphans

2 Conus imperalis

3 Harpa ventricosa

4 Murex tenuispinus

5 Murex inflatus

6 Fusus longicauda

7, 8 Australium imperiale

1839. He went in 1777 to Birmingham, where he obtained employment in the famous engi¬ neering establishment of Boulton and Watt, at Soho, near that town. A demand for Watt's pumping engines came from the Cornish mines and Murdock was soon sent thither to super¬ intend the erection and fitting of these engines. In 1800 he was made manager of the works of Boulton and Watt, being afterward admitted as a partner. He retired in 1830. His invention of coal-gas lighting remains his most conspicu¬ ous achievement. He began in 1792 his experi¬ ments regarding the illuminating properties of. gases produced by distilling wood, peat and coal. In 1800 he had an experimental gas apparatus in operation at Soho and in 1802 gas was employed when Soho, London, was illumi¬ nated upon the news of the Peace of Amiens. In 1803 the Boulton and Watt foundry was regularly lighted by that means. In February 1808 Murdock read before the Royal Society a paper detailing his investigations. Gas¬ lighting fell into the hands of promoters and in 1809 Murdock was compelled to publish a vindication of his claims in (Letter to a Mem¬ ber of Parliament.) It has been asserted that he invented the steam locomotive but the three engines he made came to nothing.

MUREX, a genus of g;asteropod mollusks typical of the family Muricidce, resembling the whelk; shell spiral, rough, with three or more ranges of spines simple or branched. Murices are remarkable for the beauty and variety of their spines. They were in high esteem from the earliest ages on account of the purple dye that some of them yielded. M. pomuni , which is not so spiny as some of its congeners, is found on our coasts from Cape Hatteras to Texas. It is two to three inches long. The oyster-drill (Urosalpin.x cinerea), which uses its buccal ribbon to bore into oyster shells, is closely allied to Murex. See Purple Shell.

MUREXIDE, in chemistry, the hydrogen-ammonium salt of a hypothetical acid called (<purpuric acid,® the acid itself not being known in the free state. Murexide has the chemical formula CsH-iNsOefNHO , H20, and about 1855 it was largely used as a dye. The colors that it gives are fast so far as light is concerned, and are quite brilliant ; but they tarnish quickly when exposed to sulphur dioxide gas, and hence are more or less fugitive in houses where coal gas is burned. As a dye, murexide has now been replaced by coal-tar colors (q.v.). It may be prepared by oxidizing a mixture of uric acid with nitric acid, evaporating to dryness and moistening the reddish residue with ammonia or ammonium carbonate. The beautiful purple red of murexide is at once developed. (This reaction is used in urine analysis as a test for uric acid). Murexide crystallizes in short four¬ sided prisms, brownish red in color with green and yellow iridescence, dissolves in water to a beautiful purple solution, the color changing to blue upon the addition of potash. The commercial supply of murexide, when it was used as a dye, was prepared from the uric acid of guano. A dye similar to murexide, and perhaps identical with it, was obtained by the ancients from a gland of the murex, or ((purple-fish,® whence the name <(murexide.®

MURFREE, mer'fre, Mary Noailles

((<Charles Egbert Craddock®), American novelist: b. Murfreesboro, Tenn., 24 Jan. 1850. Her early years were spent in Murfreesboro to which after some years in Saint Louis she returned in 1890 and her careful studies of life in the mountains of Tennessee, where her sum¬ mers have usually been passed, are reflected in nearly all of her books. Her earliest short story appeared in the Atlantic Monthly in 1878 and was followed by others over the signature (<Charles Egbert Craddock.® Until her identity was revealed in 1885 they were supposed to be the work of a masculine writer. She has pub¬ lished (In the Tennessee Mountains* (1884); (The Prophet of the Great Smoky Mountains , (1885); (Down the Ravine) (1885); (The

Story of Keedon Bluffs) (1887) ; (His Van¬ ished Star* (1894) ; (The Phantoms of the Footbridge) (1895) ; (The Mystery of Witch-face Mountain *(1895) ; (The Young Mountain¬ eers } (1897) ; (The Story of Old Fort Loudon* (1899) ; (A Sceptre of Power) (1903) ; (Storm Centre* (1905) ; (The WindfalP (1907) ; {The Fair Mississippian> (1908) ; (The Story of Duciehurst* (1914). See In the Tennessee Mountains.

MURFREESBORO, mer'frez-bur-o, Tenn., city, county-seat of

Rutherford County, on the Nashville, Cincinnati and Saint Louis Railroad, about 33 miles southeast of Nashville. The first settlement was made in 1811 and in 1817 it was incorporated. It was the capital of the State from 1819 to 1826. It has had a commis¬ sion government since 1915. In Murfreesboro are the Middle Tennessee State Normal School and the Tennessee College for Young Ladies (Baptist), founded in 1906. It is in an agri¬ cultural section in which cotton is one of the principal products. The city has a number of manufacturing establishments, chief of which are flour and lumber mills, tanneries cotton gins, cotton compresses, machine-shops, red cedar ware factories and carriage factories. On the site of the Stone River battlefield, near the city, is a national cemetery which contains the graves of 6,150 soldiers, 2,333 of unknown dead. (See Stone River, Battle of). It is the birthplace of the author, Mary Noailles Murfree (q.v.). Pop. (1920) 5,367.

MURGER, Henri, on-re miir-zhar, French poet and novelist : b. Paris, 24 March 1822 ; d. there, 28 Jan. 1861. He entered a lawyer's office, but left it and was for a time secretary to the Russian Count Tolstoi. Of his career in 1838-48 almost nothing is known. He was a member of an informal club or clique of un¬ conventional and impecunious young artists and authors, which was named ((Bohemia® and the associates <(Bohemians® — a name famous in general literary history. He contributed a great mass of (<copy® to numerous periodicals, and~at last made a reputation by his (Scenes de la vie de boheme* in which he appears as Rodolphe (1848). This was dramatized in 1849, in collaboration with Theodore Barriere, and served as the basis of Puccini's opera, (La Boheme* (1898). He then found sufficient to do, wrote dramas for the Luxembourg Theatre and articles for the Revue des Deux Mondes. Other works are (Scenes de la vie de jeunesse) (1851); (Le Pays Latin* (1852); (Le dernier

rendezvous* (1852); and (Les buveurs d'eau* (1854). Many of his lyrics are very beautiful and have been translated by Andrew Lang in (Ballads and Lyrics of Old France* (London 1872), and his prose works,

especially his mas¬ terpiece, are characterized by rare humor and pathos. His general influence, however, was unhealthy, and he personally sank into the depths of dissipation and died in a charity hos¬ pital. When a monument was lately erected to his memory there was a considerable amount of protest. Consult the appreciation in Saintsbury's (Essays on French Novelists* (1891) and that by his fellow Bohemians in (Les nuits d'hiver* (Paris 1862). See Boheme, La.

MURGHAB, moor-gab', a river of central Asia, which rises on the northern frontier of Afghanistan, in the Paropamisus Mountains, and after a northwestward course of nearly 400 miles loses itself in the desert sands sur¬ rounding the oasis of Merv.

MURIACITE. Same as Anhydrite (q.v.). MURIATIC ACID. See Hydrochloric Acid.

MURICHI, or MORICHI, a South Amer¬ ican palm of the genus Mauritia (M . flexuosa), also known as ita-palm ; it is nearly related to the biiriti (q.v.) or wine-palm. These palms reach a height of 100 to 150 feet and grow along the Orinoco River, forming great forests near its mouth. It furnishes to the Indians of that region almost everything; and during much of the year, when the lowlands adjacent to the river are flooded, they dwell among its branches, like monkeys, for want of dry land upon which to rest or travel. (<At the time of the inundations,** says Humboldt, (<the tufts of the fanleaved murichi present the appear¬ ance of a forest issuing from the bosom of the waters. The navigator, traversing at night the branches of the Orinoco delta, sees with sur¬ prise the crowns of these palms lighted up by large fires. These are the habitations of the Guaranis suspended from the trunks of the trees. These people stretch mats in the air, fill them with earth and on this bed of wet clay light what fires they require for household pur¬ poses. For ages they have owed their liberty and political independence to the treacherous and miry, nature of their soil, which they traverse in seasons of drought and over which they alone know how to pass in safety; to their isolation in the delta of the Orinoco, and to their living in the trees.** Consult von Humboldt, (Voyage aux Regions Equinoxi-ales,* Vol. VIII (1807-27).

MURID.ZE, the family of mice and rats (qqv.) .

MURILLO, mu-ril'd (Sp. moo-rel'yo), Bartolome Esteban, bar-to'lo-ma as-ta'ban, Spanish painter: b. Seville, 31 Dec. 1617; d. there, 3 April 1682. He began his art educa¬ tion under Juan del Castillo, and in 1642 sought wider experience in Madrid, where his towns¬ man Velasquez was enjoying a brilliant career. By the latter he was

dissuaded from a contem¬ plated visit to Rome and secured facilities for studying in the Royal Galleries and in the Escorial. Here he placed himself for three years under the inspiration of Ribera, Titian, Rubens, Vandyke and Velasquez himself. In 1645 he returned to Seville where he undertook

to paint 11 separate pictures for the cloister of Saint Francis in illustration of Franciscan his¬ tory. These works proved the foundation of his renown. The principal pieces of this series are (Saint James Distributing Alms* (now in the Academy Fernando, Madrid) ; the so-called (Angel Piece* (in the Louvre) ; (The Death of Saint Clara* (in the Dresden Gallery). These strike the note of the early Seville school, be¬ ing warm in tone, and exhibit Murillo as draw¬ ing his types of beauty from the lower orders of the Spanish people. Of even more trans¬ parent coloring are his (Saint Leander and Is¬ idore* in the sacristy of the cathedral at Madrid; (The Birth of Mary* (in the Louvre) ; and the (Vision of Saint Anthony* (in Seville Cathedral, 1656) ; both of these latter belong to the middle period of his artistic develop¬ ment. In 1665 he began his four pictures for the church of Santa Maria pa Blanca, among them being his (Church Triumphant* ; (The Im¬ maculate Conception* (in the Louvre) ; and (The Foundation of the Church of Santa Maria Maggiore at Rome* (in the Madrid Academy). In 1668 he painted his (Madonna Hovering in the Clouds Surrounded by Eight Saints of Seville* (in the chapter-house of Seville Cathe¬ dral) ; and about 1670 his (Holy Family with Elizabeth and The Infant Baptist* (in the Louvre). His most brilliant period was be¬ tween 1670 and 1680; and in 1674 he had com¬ pleted the eight vast pictures illustrating the c Corporal Works of Mercy.* These were in¬ tended for the church of the Caridad Hospital, and are remarkable for splendor of coloring and strength of design; the faces are lifelike in expression and the composition and per¬ spective faultless. His (Saint Elizabeth of Hungary Nursing the Sick* (in the Madrid Museum) belongs to this period. In 1676 he executed 20 pictures for the Capuchin mon¬ astery at Seville, 17 of which are now in the local museum. It was at this time he painted the famous (Immaculate Conception* which Marechal Soult took to France and sold to the nation for 615,000 francs. It is now in the Louvre, and is the work by which this painter is most popularly known. While Murillo was engaged at Cadiz in painting (The Betrothal of Saint Catherine* for the high altar of the Capuchin Church, he fell from the scaffolding and died as the result of his injuries. The work was completed by his pupil Osorio with no par¬ ticular success.

Murillo left about 400 pictures, including his devotional paintings and the many repre¬ sentations of the (Immaculate Conception,* one of his favorite and characteristic subjects. His most important works in the United States are the altarpiece in the cathedral of Saint Peter's at Cincinnati and <Gallegas at the Window* in the Widener collection, Philadelphia. He was the greatest of Spanish religious painters be¬ cause his Madonnas are real Spanish women and only raised by the magic of his brush into sainthood or apotheosis. But he was a great genre painter also. He knew the gypsies and beggars of Spain as well as he knew the saints. He could paint landscape and portrait, flowers and fruit, maidens and children of that Seville which he loved so well and never left for France or Italy. Unswayed by the influence of the dazzling schools of Tuscany or Flanders

he has confined himself to Spanish faces, to ppamsh atmosphere and scenery, and has real¬ ized a manner and color of his own. If he sacrificed in this way anything of vigor or variety he gained far more in originality, sin¬ cerity, verisimilitude and an individuality which is truly national.

Consult Calvert, A. F., (Murillo, a biography and appreciation* (New York 1907) ; Hurll E. M., (Murillo) (Boston 1901) ; Tubino, F. M., (Murillo, su epoca, su vida, sus quadros) (Se¬ ville 1864) ; Lefort, P., (Murillo et ses eleves* (Paris 1892).

MURLIN, Lemuel Herbert, American clergyman: b. Mercer County, Ohio, 16 Nov. 1861. He was graduated (1891) at De Pauw University and studied (1896) at the Univer¬ sity of Pennsylvania and (1897) at Clark Uni¬ versity, then in Europe (1898). He received the degree B.D. at Garrett Biblical Institute (1899). He was teacher at the public schools and in Fort Wayne College (1877-86), pastor of churches in Fort Wayne, Knightsville and Vincennes, Ind. (1886-94). From 1894-1911 he was president of Baker University, Bald¬ win, Kan., and president of Boston, Mass., Uni¬ versity from 1911. During 1909 and 1911 he was acting pastor of the American Church at Berlin. He has been a member of the General Conferences of the Methodist Episcopal

Church in 1900, 1904 and 1916 and of the Ecumenical Conferences at London (1901) and Toronto

(1911).

MURMANSK, a new town in the extreme northwest of Russia, on the Kola Peninsula and the northern terminus of the Kola-Petro- grad Railroad. Situated on a sheltered, ice-free harbor on the Murman Coast, the town has sprung into existence and importance during the European War. In appearance it resembles a Klondike mining camp; its position, 150 miles north of the Arctic Circle, gives it a severe winter temperature of 30° below zero. The population, stated to be about 7,000 (1918), live in roughly-built frame shacks and are largely composed of refugees from Finland as well as Russia. With the defection of Russia as an active participant in the war, the Allies ceased using Archangel as a port for unloading pro¬ visions and war materials and as the only line of communication with the former Russian government. To this circumstance is due the rise of Murmansk. With the spreading anarchy promoted by the Bolsheviki and the German en¬ croachments on Russian territory during 1917 and 1918, the town grew in importance and value as a strategical point to the Allies. In the absence of an effective government in Rus¬ sia, the isolated position of Murmansk and its long distance from the centres of turmoil enabled the Allies to keep in unofficial communi¬ cation with the country. According to an American correspondent, the Murmansk Bol¬ sheviki lived on excellent terms with the Allied naval and military men, owing to the fact that they derived nearly all their supplies from British and American vessels. Money was stated to be of little value; food, shoes, cloth¬ ing and tobacco could purchase any local product, such as furs and live reindeer. See Russia; War, European.

MURNER, moor'ner, Thomas, German satirist and opponent of the Reformation : b.

Strassburg, 24 Dec. 1475; d. about 1536. He studied at the principal universities of Europe, devoting himself particularly to theology and philosophy, and early gained a reputation for ability, marred however by a quarrelsome dis¬ position. He led an unsteady life, preaching for some time at Frankfort-on-the-Main and other places, but incurring generally the dis¬ pleasure of his congregations by the coarse per¬

sonalities of his sermons, and was successively expelled from Freiburg, Treve and Venice. He became one of the most virulent opponents of the Reformation. Some of his writings against the Reformation were burned by order of the Diet of Worms; and he was compelled to flee to Switzerland, whence he was in time like¬ wise expelled. The latter part of his history is not known. In 1506 he had been crowned as poet laureate by the Emperor Maximilian; and his (Narrenbeschworung) (1512), of which his (Der Schelmenzunft* (1516) may be regarded as a continuation, is one of the most remark¬ able imitations of Sebastian Brant's celebrated satirical poem entitled Warrenschiff.* He wrote (Chartiludium logice,* *etc.* (1507), and other Latin works ; prepared a German version of Virgil and other translations; and was also regarded as the editor of (Eulenspiegel.* But he is chiefly remembered by his writings against Luther and the Reformation. His most cele¬ brated satirical work is entitled Won dem grossen Lutherischen Narren> (1522; new ed., 1848). Consult Goedeke, (Murners Narrenbeschworung) (1879); Kawerau, <Thomas Murner und die Kirche des Mittelalters) (1890); Lappenburg, (Murners EulenspiegeP (1854) ; Ries, W., (Quellenstudien zu Murners satirisch-didakitschen Dichtunzen) (Berlin 1890) ; Schatz, H., (Stemmungen und Effekte in Murners Dichtungen) (Kiel 1909).

MUROM, moo'rom, Russia, town in the government of Vladimir, located on the Oka and Kovrov-Murom Railway. It has a cathe¬ dral, theatre, city bank, high school, *etc.* Among its industries are large linen weaving factories and trade in grain. This was a very important trading town in the 10th century. Its population is about 18,616.

MURPHEY, Archibald De Bow, Amer¬ ican jurist: b. Caswell County, N. C., 1777; d. Hillsboro, N. C., 3 Feb. 1832. He was gradu¬ ated from the University of North Carolina in 1799 and was for the three succeeding years pro¬ fessor of ancient languages there. He studied law and was admitted to the bar in 1802 and established a large practice. He was a member of the State senate in 1812-18 and proved him¬ self an able legislator, advocating internal im¬ provements and working earnestly to enlarge and improve the educational system of the State. In 1818 he was a judge of the Superior Court and in 1819-20 was a justice of the Supreme Court of North Carolina. He published (Memoir of Improvements Contemplated and the Resources and Finances of the State> (1819); (Reports of Cases in the Supreme Court of North Carolina in 1804-13 and 1818-19> (1821-26), *etc.*

MURPHY, Arthur, British dramatist: b. Clooniquin, near Elpin, County Roscommon, Ireland, 27 Dec. 1727; d. 18 Tune 1805. He was educated at the Roman Catholic College of

Saint Omer, France, and was subsequently em¬ ployed in a London banking house. His first drama, which appeared in 1756, was entitled (The Apprenticed In 1758 appeared (The Up¬ holsterer, > a farce directed against politicians, which proved very successful, followed by (The Orphan of China) ; (The Way to Keep Him> ; c All in the Wrong } ; (The Citizen } ; cThe Old Maid) ; (Three Weeks after Marriage) ; (Zenobia) ; (The Grecian Daughter,* *etc.* At various times in his life he engaged in political controversies, and edited journals op¬ posing Mr. Fox, the first Lord Holland and Wilkes' North Briton. He also edited the works of Fielding, wrote an essay on Dr. John¬ son, translated Tacitus, and wrote a (Life) of Garrick. His plays are his best performances, and some of them, including (The Way to Keep Him) and (Three Weeks after Marriage,* long kept the stage.

MURPHY, Charles Francis, American politician: b. New York, 20 June 1858. He ic-ceived a public school education, and early in life began to take an interest in politics. As organizer and member of the Sylvian Club and through his fame as an athlete he gained a wide personal acquaintance. He opened a series of saloons which he held to be practically poor men's clubs. He showed decided talents as a political organizer and in 1891 became the Tammany leader of his assembly district. In 1897-1901 he was a commissioner of docks and ferries in New York, served for a time as chairman of Tammany Hall and on the retire¬ ment of Richard Croker in 1902 succeeded him as chief. In 1903 and 1905 he led his party to victory in the mayoralty campaigns, which elected George B. McClellan as mayor. In 1904 Murphy opposed the nomination of Alton B. Parker for the Presidency and in 1906 sup¬ ported William R. Hearst for governor, the latter's defeat being regarded as a severe de¬ feat for Murphy. In 1909 the Tammany Hall nominee for mayor, W. J. Gaynor, was the only successful candidate on the Democratic ticket, the Fusionists having captured the remaining offices. Many thought that this reverse would compel Murphy's retirement, but to the despair of the political prophets he continued as chief. In 1910 the election of John A. Dix to the governorship was supposed to be due to Murphy's influence with the

up-State Demo¬ crats and that as a result his power had become paramount in the Democratic party throughout the State. The succeeding years brought sharp criticism to Tammany and its leader because of several scandals regarding highway and canal contracts. Boss rule now became a State issue and his opponents held up Murphy as an ex¬ ample of everything vicious in the boss system. This, however, came with a bad grace from Republicans, themselves the most notorious up¬ holders of the system. In 1912 Murphy sup¬ ported Wilson after the nomination of the lat¬ ter although he favored Harmon and Clark in the early stages of the convention. He was a presidential elector the same year. In State politics it appears that Murphy, took little part in the nomination of Sulzer; friction developed after election and Tammany was by many be¬ lieved to have been the real factor in the im¬ peachment and removal of Sulzer in 1913. The mayoralty campaign of 1913, in which Edward F.. McCall was the Tammany nominee, was ex¬

ceedingly bitter, and Murphy was violently as¬ sailed by the Fusionists. He remained im¬ perturbable, however, and retained the position of chief despite the defeat that year and that in the gubernatorial contest of 1914. In 1917 the Tammany candidate for mayor, Judge Hy-lan, was elected by a great majority and Murphy's leadership continued unimpaired. Mr. Murphy's philanthropies are extensive, but he refuses to have his charitable activities advertised, and this side of his character is known to comparatively few persons.

MURPHY, Francis, American temperance evangelist: b. Wexford, Ireland, 24 April 1836; d. Los Angeles, 30 June 1907. During the Civil War he served in the Union army. In 1870, at Portland, Me., he began the organization of temperance reform clubs, which were estab¬ lished in all parts of the State, and of which he was the first president. He made his head¬ quarters in Pittsburgh, Pa., where, after his first address, in 1876, the pledge was signed by 45,000 people; and before long the signatures secured throughout the United States in response to his endeavors numbered as many as 10,000,000. His labors were also carried into England with noteworthy results. During the Spanish-American War he served as chaplain in the United States army.

MURPHY, Franklin, American manufac¬ turer and politican : b. Jersey City, N. J., 3 Jan. 1846; d. Newark, N. J., 24 Feb. 1920. In 1856 the family removed to Newark which had been the home of his ancestors from its original settlement in 1656. He enlisted in the Federal army in 1862 at the age of 16 as a member of Company A, 13th New Jersey

Volun¬ teers. This regiment was assigned to the 12th, afterward the 20th, corps, which constituted a part of the Army of the Potomac and which was afterward transferred to the west, becom¬ ing part of Sherman's army in his march to Atlanta and the sea. At the close of the war he established at Newark a varnish business which has since become widely known. He began his political career in the early '80s, occupying various minor city and State offices until 1901, when he was elected governor of New Jersey for three years. -His term as governor was noted for the passage of the first State primary law (not the open primary as invented later), improvement in the child labor laws and general improvement in labor legisla¬ tion, a tenement-house law and a law requir¬ ing banks to pay interest on deposits of State moneys. He was chairman of the Republican State Committee for 20 years, beginning with 1892, and was a delegate to many Republican national conventions, and also was a member of the National Committee from 1900. He was commissioner to Paris Exposition of 1900. Mr. Murphy was a member of the Society of the Cincinnati, of the Colonial Wars and the Sons of the American Revolution, of which latter he was president-general. He was a member of the board of managers of the National Soldiers' Home, and at one time president of the board. In the National Republican Convention of 1908 he received 158 votes for Vice-President. He was a member of the Essex County, N. J., park commission for 20 years, and continued actively interested in the affairs of his home city of Newark and his State.

MURPHY, Henry Cruse, American poli¬ tician and historian: b. Brooklyn, N. Y., 5 July 1810; d. there, 1 Dec. 1882. He was graduated at Columbia in 1830, studied law, was admitted to the bar in Brooklyn, became city attorney there and in 1842 was elected mayor. In 1843 he was elected to Congress; was a delegate to the New York Constitutional Convention in 1846; and in 1847 re-entered Congress.

In 1852 he was a candidate for the Democratic nomina¬ tion for President. From 1857 to 1861 he served as United States Minister to Holland. He became well known as a journalist, being for some time editor of the Brooklyn Eagle; and through the publication of his studies in the colonial history of New York valuable documents were brought to light. He trans¬ lated from the Dutch De Vries' (Voyages from Holland to America, 1632 to 1644 > 0853), and his other publications include <Henry Hudson in Holland: Origin and Objects of the Voyage which Led to the Discovery of the Hudson River> (1859) ; (Jacob Steendam, Noch

Vasater) (1861) ; (Anthology of the New

Netherlands) (1865), and cThe Voyage of

Verrazzano) (1875).

MURPHY, John Benjamin, American sur¬ geon : b. Appleton, Wis., 21 Dec. 1857; d. 11 Aug. 1916. He graduated (1879) at Rush Medical College, Chicago, and practised medi¬ cine (1879-82) at Chicago, then studied (1882-84) in Germany, to resume his practice in Chicago. He was head of the department of surgery and clinical surgery at Northwestern University Medical College and chief surgeon to Mercy Hospital, but (1908) joined the United States medical corps as 1st lieutenant. He invented the anastomosis button which simplifies the technique in abdominal operations and reduces the fatalities. He has written (Gunshot Wounds of the Abdomen* ; (Actino¬ mycosis Hominis,* he was the first in America to recognize the disease; (Original Experi¬ mental and Clinical Research, > which illus¬ trates the use of his anastomosis button; Sur¬ gery of the Stomach.) For his great services he was decorated with many honors, such as LL.D., University of Illinois (1905). and Catholic University of America, Washington ; M.Sc., University of Sheffield. England (1908), *etc.* He edited (General Surgery) for the "Practical Medicine Series® from 1901.

MURPHY, John Francis, American painter: b. Oswego, N. Y., 11 Dec. 1853. He came to New York in 1875 and educated himself in art, giving especial attention to landscape painting. His first picture to appear in the National Academy of Design was exhibited in 1876, and since 1887 he has been a National Academician. His painting (Tints of a Vanished Past) gained the Haligarten prize (1885). In 1887 he was awarded the Webb prize by the Society of American Artists, of which he is a member. He also received a gold medal at Charleston (1902), and in 1910 the Inness medal.

MURPHYSBORO, Ill., city, county-seat of Jackson County, on the Big Muddy River, and on the Mobile and Ohio, the Saint Louis Valley and the Illinois Central railroads, about 140 miles south ot Springfield. It is sit¬ uated in an agricultural section, and nearby are coal-fields, timber and building stone. The chief industrial establishments are foundries,

machine-shops, flour and lumber mills and brick and tile yards. There is a large trade in farm and dairy products, coal and lumber. Murphysboro has a commission form of gov¬ ernment. Pop. (1920) 10,411.

MURRAIN, loosely, any widely prevailing and contagious disease among domestic ani¬ mals. The term is applied to various specific disorders in different localities, but more par¬ ticularly to the epizootic diseases, especially those of cattle. Still more strictly it is limited to the plague commonly known as the foot-and- mouth disease (aphthous fever), which attacks cattle and other animals, causing loss of appe¬ tite, febrile disturbance, lameness, vesicular eruptions on the feet and in the mouth, etc., with frequent complications. See Anthrax ; Cattle-Plague; Rinderpest.

MURRAL, one of the snake-headed, or walking, fishes of India (Ophiocephalus maru-lius), regarded as one of the best fresh-water table-fishes of the East. It abounds in rivers and inland waters, especially the “tanks® so nu¬ merous in Madras, and may reach a weight of 20 pounds, although usually far smaller than that. It is caught with live bait, not rising readily to a fly, and affords excellent sport to skilled anglers.

MURRAY, mur’a, Alexander, American naval officer: b. Chestertown, Md., 1765; d. Philadelphia, 6 Oct. 1821. In 1776 he received a commission in the then half-organized navy, and while waiting for sea duty entered the army, serving (1776-77) as lieutenant and cap¬ tain in the 1st Maryland regiment, and partici¬ pating in the actions and operations near New York. Toward the end of 1777 he was given commapd of the Revenge, with letters of marque; was captured by the British, ex¬ changed, served with distinction on the Trum¬ bull; was again captured and exchanged ; then took command of a privateer, and served later on the Alliance. In 1798, on the reorganization of the navy, he was appointed captain and dur¬ ing the difficulties with France commanded the Montezuma. Transferred to the Constellation, he served in the Mediterranean during the war with Tripoli, in which

he initiated actual hos¬ tilities by attacking a flotilla of the enemy. Af¬ ter that war he was mainly engaged in shore duty at Philadelphia until his death.

MURRAY, George Gilbert Aime, British classical scholar: b. Sydney, New South Wales, 2 Jan. 1866. He was taken to England in 1877 and educated at Merchant Taylors' School, London, then studied at Saint John's College, Oxford. He was made (1888) a Fellow of New College, Oxford, and was professor of Greek at Glasgow University 1889-99. Since 1908 he has been regius professor of Greek at Oxford University. Numerous degrees have been conferred on him, as LL.D., Glasgow, D. Litt., Birmingham, D. Litt., Oxford, F.R.S.L., *etc.* In 1914 he was appointed trustee of the British Museum. He has written <History of Ancient Greek Literature) (1897) ; (The For¬ eign Policy of Sir Edward Grey* (1915) ; (Rise of the Greek Epic* (1907-11) ; (Four Stages of Greek Religion> (1913) ; (The Rhesus of Euripides* 0913) ; (The Alcestis of Euripides> 0914). He was part author of (Liberalism and the Empire) (1900). His plays (Carlyon

Sahib" (1899) and Andromache) (1900) have been successfully performed on the stage. Of his verse translations for which he is noted are ˆippolytus,* <Bacch3e,) (Trojan Women, y Plectra,* (Medea. > For (Iphigenia in Tauris,* which appeared at the Court Theatre, London, the highest comment of the critics was worthily gained. (Trojan Women) and <Iphigenia) have been played on the boards of American colleges and also al fresco.

MURRAY, George Henry, Canadian poli¬ tician: b. Grand Narrows, Nova Scotia, 7 June 1861. He was educated in Grand Narrows and in Boston University and was admitted to the bar in 1883. He was appointed to the legisla¬ tive council of Nova Scotia in 1889, but re¬ signed in 1891, and in the same year became a member of the provincial cabinet without port¬ folio, under the Hon. W. S. Fielding, and in 1896 became premier and provincial secretary of Nova Scotia under a Liberal administration. He was elected to the Dominion Parliament in 1897, where he still (1917) sits.

MURRAY, Grenville, (“Eustace Clare”), English journalist: b. 1824; d. Passy, France, 20 Dec. 1881. He was a natural son of Richard Grenville, second Duke of Buckingham. He was in the diplomatic service from 1851 to 1868, but was guilty of irregular practices, and was generally in discord with his superiors or with British residents. From 1869 he lived in France, where he was Paris correspondent of the Pall Mall Gazette and the Daily News, and an early contributor to the Cornhill. He was one of the ablest journalists of his time and the initiator of “yellow” methods in Eng¬ lish newspapers, being horsewhipped by Lord Carrington in 1869 for a libel that appeared in The Queen’s Messenger, a paper he conducted. He lived in Paris as the Comte de Rethel d’ Aragon, using the title of his wife, a Spanish woman. A voluminous writer, among his works were (The_ Roving Englishman,* chap¬ ters of travel (1854) ; Embassies and Foreign Courts* (1855) ; <The Member for Paris> (1871); (Young Brown* (1874); <Turkey) (1877) ; (The Russians of To-Day* (1878) ; (Under the Lens: Social Photographs) (1885)-.

MURRAY, James, Scottish soldier: b. about 1725; d. 1794. He was a son of the fourth Lord Elibank, and about 1740 entered the army; came with his regiment to America in 1757; at the siege of Louisburg (1758) com¬ manded a brigade; and in the battle on the Heights of Abraham (13 Sept. 1759) led the left wing of the army under Wolfe. In 1760 he held Quebec against superior numbers of the French, in the same year served with Am¬ herst in the reduction of Montreal and was made governor of Quebec. From 1763 to 1766 he was governor of Canada; in 1774 became governor of Minorca ; was compelled to sur¬ render Fort Saint Philip to the French, in 1782, after a heavy siege, and upon returning to Eng¬ land was court-martialed and acquitted.. In 1783 he was made a full general in the British army. Consult Parkman, (Montcalm and Wolfe* (1884, 1898).

MURRAY, James Augustus Henry, Scot¬ tish philologist and lexicographer; b. Denholm, near Hawick, Roxburghshire, 1837; d. 26 Tuly 1915. He was graduated B.A. of London Uni¬

versity, from 1855 till 1858 was an assistant master in Hawick Grammar School, becoming in the latter year master of Hawick Academy, for a few years was foreign correspondent to the Oriental Bank in London, and from 1870 till his removal to Oxford in 1885 a master at Mill Hill School. Meantime he had become well known as a philologist. He was president of the Philological Society in 1878-80 and 1882-84. On the death of Dr. Furnival, Dr. Murray became in

1879 general editor of the (New English Dictionary on Historical Princi¬ ples,) the great work issued under the auspices of the Philological Society from the Clarendon Press, Oxford. He was assisted by a staff of from 20 to 30 editors, and thousands of volun¬ teer assistants, who read every book published before 1500 a.d. and the principal books since that date, thus obtaining many millions of il¬ lustrative references for use in the work. He had almost completed the tenth and last volume, T to Z, when he died. His aims in connection with this Vast undertaking are embodied in an address to the Philological Society in 1879. Other works by him are (A Week among the Antiquties of Orkney) (1861) ; (Dialects of the Southern Counties of Scotland (1873) ; Syn¬ opsis of Paley's Horce Paulines * (1872) ; (The Romance and Prophecies of Thomas of Ercil-doune> (1875) ; the article (English Language) in the Encyclopaedia Britannica) (9th ed.), and many papers on the archaeology, natural history, geology and language of the border counties of Scotland. In 1884 he was awarded a civil list pension of £27 0 per annum. In 1900 he was appointed Romanes lecturer at Oxford and he was knighted in 1908.

MURRAY, or MORAY, James Stuart,

Earl of. See Stuart, James.

MURRAY, Sir James Wolfe, British lieu¬ tenant-general : b. 13 March 1853. He was edu¬ cated at Harrow, then entered military service at Woolwich and joined (1872) the Royal Ar¬ tillery. He became colonel in 1899, served (1895) in the Ashanti campaign and in Natal (1899-1900), to become (1903-04) quarter¬ master-general in India. He was master-gen¬ eral of the Ordnance from 1904-07, commanded the 9th division in India from 1907-11, then commanded in South Africa in 1914. He was created K.C.B. in 1900. From 1914-15 he was 1st Military Member of the Army Council.

MURRAY, John, American clergyman, founder of American Universalism : b. Alton, Hampshire, England, 10 Dec. 1741 ; d. Boston, Mass., 3 Sept. 1815. He was brought up in Ireland, where he joined the Methodist con¬ gregation and did some preaching, but in 1760 went to England, came under the influence of James Relly and was excommunicated by Whitefield. He came to America in 1770; preached in Newport, Boston and Portsmouth his peculiar doctrines, which agree with mod¬ ern Universalism only in the belief of universal salvation, but otherwise held to the dogma of the Trinity, of personal devil and of the in¬ carnation ; and at the outbreak of the Revolu¬ tion was chaplain of a Rhode Island brigade for a short time, during which his resignation was demanded by the orthodox chaplains

in the arm)'-. He formed a Universalist church in Gloucester, and in 1783 recovered property be-MURRAY

longing to his parishioners which had been seized by the parish authorities, who acted on the ground that the Universalists had no cor¬ porate existence; the success of this suit was a distinct advance in congregational freedom in New England. At his death he was in charge of the Universalist Society of Boston. He wrote (Letters and Sketches) (1812) and an (Autobiography,5 continued and edited by his wife (1816).

MURRAY, John, English publisher: b. London, 27 Nov. 1778; d. there, 27 June 1843. John Murray the second was the son of John MacMurray (1745-93), a descendant of the Murrays of Atholl, who commenced business as a publisher in London in 1768, dropping the prefix to his name. He began business in 1799, early attained success and became the friend of, as well as publisher for, some of the chief writers of the day, including Byron, Moore, Rogers, Campbell, Crabbe, Washington Irving, George Borrow and Benjamin Disraeli. He started the Quarterly Review in February 1809 in opposition to the Whig Edinburgh Re¬ view, of which Gifford, S. T. Coleridge and Lockhart were editors, and Scott and Southey contributors. By 1817 the Quarterly was a great success. In 1824 Murray was involved in the controversy with Moore regarding the destruction of Byron's (Memoirs 5 ; and in 1826 undertook the publication of the Representative, a daily newspaper, which, after running six months was. discontinued at a loss of $130,000. Consult Moore, (Life of Byron5 (1830), and Smiles, CA Publisher and his Friends5 (1891). The third John Murray (1808-92) was the projector of the famous series of guidebooks that bears the firm's name. He was present at the Theatrical Fund banquet at Edinburgh in 1827 when Scott avowed himself the author of (Waverley.5 The fourth John Murray (b. 1851) is the present head of the firm.

MURRAY, Sir John, Canadian scientist : b. Coburg, Ontario, 3 March 1841 ; d. Kirk¬ liston, near Edinburgh, 31 March 1914. He was educated at Edinburgh University. In 1867 he accompanied for biological purposes an expedition to Spitzbergen and Greenland, and from 1871 to 1876 he served under Sir Wyville Thomson as one of the

scientific staff of the Challenger expedition. From 1876 till 1882 he was chief assistant editor of the scientific re¬ ports published in connection with that voyage, and in the latter year became editor-in-chief, liberally supporting the work out of his own means. He defrayed the expenses and accom¬ panied the Michael Sars expedition to the north Atlantic (1910), the literary fruits of which were (The Depths of the Ocean5 (1912) and (The Ocean: a General Account of the Science of the Sea5 (1913). He was killed in an auto¬ mobile accident. He was knighted in 1898. Besides editing the Challenger reports he wrote a large number of papers on geographical, oceanographical and biological subjects, and at his own expense established oceanographical laboratories in Scotland.

MURRAY, John Clark, Canadian educator: b. Paisley, Scotland, 19 March 1836. He was educated in the universities of Edinburgh and Gottingen, and in 1862 accepted the chair of philosophy in Queen's University, Kingston, Canada. Since 1872 he has been professor of

moral philosophy in McGill University, Mont¬ real. He has published (Outlines of Sir W. Hamilton's Philosophy5 (1870); (The Ballads and Songs of Scotland5 (1874) ; (A Handbook of Psychology5 (1885) ; (An Introduction to Ethics5 (1901), *etc.*

MURRAY, John O'Kane, American histo¬ rian: b. Glenariffe, Ireland, 12 Dec. 1847; d. Chicago, Ill., 30 July 1885. He removed to the United States where he became a physician and author of some repute. His most import¬ ant work was a (Popular History of the Catholic Church in America5 (1876), and among his other books are (The Catholic Heroes and Heroines of America5 (1878); (Lessons in English Literature5 (1883), *etc.*

MURRAY, Lindley, American gramma¬ rian, son of M. L. Murray (q.v.) : b. Swatara, Lancaster County, Pa., 22 April 1745 ; d. Holgate, near York, England, 16 Feb. 1826. He studied law (1761-65) and practised as a bar¬ rister; but after the Revolution quitted the bar for a commercial speculation, and having realized a fortune went, in 1784, to England for reasons of health and settled at Holgate, near York. His (English Grammar5 (1795) met with a truly enormous success, being almost universally introduced as a textbook in England and the United States, and for years was regarded as the standard authority. It passed through nearly 50 editions in its orig¬ inal form. A corrected edition by the author was published in 1816, and his abridgment (1818) of this went through 150 editions, each of 10,000 copies. His work was

far from accurate, however, and was soon superseded ; but it freed a difficult subject from chaos. He wrote English Exercises,5 the (Key5 and (English Reader5 (1799), and a (Spelling Book5 (1804) which went through 50 editions. He was also a botanist and his gardens were renowned. In 1787 he published (Power of Religion on the Mind.5 Consult Egle, (Life5 (New York 1885), and an autobiography edited and continued by Frank (1826).

MURRAY, Mary Lindley, American hero¬ ine : b. Pennsylvania; d. New York, 25 Dec. 1782 (O. S.). She is known through an inci¬ dent of the Revolution. On 15 Sept. 1776 the British line of march passed her residence, <(The Grange,55 a small country-seat at Murray Hill, New York. Putnam, having evacuated New York, was at the same time marching along the Bloomingdale road near the North River, intending to join Washington at Harlem Heights. Howe thought by marching across the island to cut off the American retreat. He was, however, invited, with his officers, to luncheon at ((The Grange55 by Mrs. ‘ Murray, accepted and remained more than two hours, during which time Putnam escaped. A bronze tablet in commemoration was placed in the parked enclosure on Park avenue below 37th street on Evacuation day (25 Nov.) 1903.

MURRAY, William, Earl of Mansfield. See Mansfield, William Murray, Earl of.

MURRAY, William Vans, American diplo¬ mat : b. Maryland, about 1762; d. Cambridge, Md., 11 Dec. 1803. He received a classical education and after peace was declared in 1783 he went to London and studied law. He re¬ turned to the United States in 1785 and estab-

li shed a law practice in Maryland. In 1791-97 he served in Congress where he gained a reputation as a learned and skilful legislator, and in 1797 was appointed by Washington Min¬ ister to the Netherlands. He was envoy to France in 1800 and was chiefly instrumental in concluding the treaty between the United States and that country. He then returned to the Ministry at The Hague and remained there until

1801, when he retired from public life. He published (The Constitutions and Laws of the United States.7

MURRAY, the largest river of Australia, rising in the Australian Alps, its sources being partly in New South Wales, partly in Victoria. It flows for a long distance westward, forming the boundary between these two colonies, then passes into South Australia, where it takes a southern direction and falls into the Indian Ocean at Encounter Bay, 39 miles southeast of Adelaide, after passing through a large shal¬ low sheet of water called Lake Alexandrina. Its total length is about 1,300 miles. Its chief affluents are the Murrumbidgee and Darling. It is navigable by light draft steamers in the wet season for the greater part of its course to Albury, 190 miles northeast of Melbourne.

MURRAY BAY, or MALBAIE, Canada, the county town of Charlevoix County, Quebec, on a bay of the Murray estuary, near the north bank of the Saint Lawrence River, 90 miles east of Quebec. It has lumber industries and its dependent suburbs, Pointe a Pic and Cap a l'Aigle, at each end of the bay, are popular summer resorts, the surrounding country being very attractive and affording angling, rowing, bathing and other facilities. Steamboats con¬ nect with Quebec. During the Revolutionary War Murray Bay was a station for United States prisoners of war. Pop. about 1,500.

MURRAY'S TRANSLATIONS OF EURIPIDES. George Gilbert Murray, since 1908 regius professor of Greek at Oxford University, was born in Sydney, N. S. W., in 1866, went to England in 1877 and became professor of Greek at Glasgow in 1889. Besides his work as a translator, he has edited a criti¬ cal edition of Euripides, and is the author of (A History of Greek Literature,7 (Four Stages of Greek Religion,7 (Euripides and His Age7 and many essays on ancient and modern subjects. His translations of Euripides include the (Hippolytus,7 the (Bacchae,7 the (Trojan Women,7 the (Electra,7 the (Medea, 7 the Uphigenia in Tauris,7 the (Rhesus 7 and the ˆlcestis.7 Like Browning's version of the (Alcestis7 in Balaustion's Adventure (1871), Way's translation of Euripides entire (1894 — 98) , revised and republished in the (Loeb Classi¬ cal Library7 (1912), and Verrall's editions and essays in the ˆrehabilitation77 of Euripides, be¬ gun in 1881 and continued for 30 years, Mur¬ ray's work in Euripides is at the same time a manifestation of revived interest in the ancient dramatist and a factor in his reinstatement as a great artist. His translations are distin¬ guished (1) by the rendering of the iambic trimeter of the episodes into English rhymed heroics instead of the traditional blank verse; (2) by variety and grace of metre in the choral parts; (3) by the use of stage directions which contribute remarkably

to the reader's imagina¬ tion ; (4) by a poetic fancy which so suffuses

the whole with color and spirit as to give it a creative quality rare in translation, and (5) by flowing and harmonious language of great charm. The employment of rhymed heroics instead of blank verse, which is the natural vehicle of drama in English as the iambic tri¬ meter is of drama in Greek, may be criticised as interfering with spontaneity and accuracy, and it may be said also that the use of rhyme in both episode and chorus lessens the distinct¬ ness of separation between the two in the orig¬ inal ; but the loss in these respects is not great, and is more than compensated by the richness of fancy resulting from the translator's ingen¬ ious conquests of the difficulties presented by rhyme. Murray is at once poet, scholar and dramatist, and his translation is in marked contrast with that of uninspired scholarship alone.

Grant Showerman.

MURRE, mer, or MURRELET, an auk

(q.v.) of the genera Uria cepphus, and related groups ; a guillemot. They are small, black-and-white, web-footed, diving, fish-eating birds, which abound on all rocky northern coasts, breeding on sea-fronting ledges, where each pair produces a single, large, pyriform, variously colored egg, which is not placed in a nest but incubated in turn by the parents, who lift it from the ground upon their webbed toes and warm it between their downy legs. Several diminutive and handsomely ornamented species of the coasts of the north Pacific are called murrelets. Consult Baird, Brewer and Ridgway, (North American Water-Birds7 (1884); and the writings on Arctic ornithology of Fielden, Nelson, Turner, Murdock, *etc.*

MURRINE VASES are antique vessels, distinguished for costliness of material and beauty of execution. They were brought by Pompey from Asia to Rome, and bore an im¬ mense price. Some antiquarians have supposed them to have been made of a mineral of the class of sardon} oc or agate, or of a kind of porcelain or glass.

MURRUMBIDGEE, mur-um-bid'je, Aus¬ tralia, a large river of New South Wales, ris¬ ing in the Gourock Range above Numeralla, about 40 miles from the Pacific Ocean. It flows at first northward, but the greater part of its course is westerly; and after receiving the Lachlan from the north, near Nap Nap, it turns toward the south to join the

Murray below Balranald. It is navigable only in the wet season for 500 miles by light-draft steamers. Length about 1,300 miles.

MURSHIDABAD, moor-she-da-bad', India, the administrative town of a district of Bengal, 116 miles north of Calcutta, on the Bhaghirathi, a branch of the Ganges. It is a straggling col¬ lection chiefly of mud houses occup3ung an ex¬ tensive area, but has several substantial brick buildings, chief of which are the beautiful Nawab's palace dating from 1837, the imambara and a Moslem mosque. Two miles south of the city is Motijihl or Pearl Lake and the site of the historic palace of Suraj-ud-Dowlah. On the opposite bank of the river connected by a ferry is Azimaganj containing the old cemetery of the Nawabs, a mausoleum, mosque, *etc.* The city js noted for its ivory carving, its embroid¬ ery in gold and silver lace, silk weaving, and

the manufacture of hookah pipes and musical instruments. It is still a busy centre of trade but less so than during the 18th century when it was the capital of Bengal and a very pop¬ ulous city, the rise of Calcutta causing its de¬ cline. Pop. about 16,000; with Azimganj 30,000.

MUSA, Ibn Nusair, moo'sa lb'n noo-sir', Arabian general: b. 640 a.d. ; d. 716 or 717. He became (704) governor of North Africa which he conquered in its entirety as far as the ocean between 706-709. He sent (711) Tarik to Spain but the expedition was so successful he became jealous of his assistant officers and hindered the expedition while he started himself (712) with an army which carried everything before it. He was recalled and had a most brilliant triumphal procession through Africa to Da¬ mascus, where the caliph, Suleiman, accused him of great embezzlements, deprived him of his command, and he was either condemned to pay a heavy money indemnity, or, as other writers say, was put to death. Consult Burke, (History of Spain* (Vol. I, 1895) ; Cambridge Medieval History > (Vol. II, New York 1913).

MUSACEZE, the banana family, a group in the Order S citaminece , comprising the largest of herbaceous plants, generally destitute or al¬

most destitute of true stems, yet resembling trees in appearance, and sometimes rivaling palms in stateliness, the long sheating bases of the leafstalks combining to form a false stem. The blade of the leaf has many fine parallel veins proceeding from the mid-rib to the margin. The flowers are congregated on spadices, which are protected by spathes. The fruit is either a three-valved capsule or fleshy. The species are not numerous ; they are natives of warm climates, in which they are widely dis¬ tributed, and are of great value to the inhabit¬ ants of tropical countries; the fruit of some, particularly of the genus Musa, being much used for food, while the fibres of the leaves are employed for cordage and for textile purposes. See Banana ; Fibre.

MUSZEU.S, mu-se'us, in Greek mythology, a poet, seer and priest, said to have been the son of Eumolpus and Selene, or, according to others, the son and pupil of Orpheus. He was the reputed author of a number of poems, oracles, purificatory verses, hymns, etc., of which we possess but a few fragments, and those of doubtful authenticity. A later Musseus, who flourished about the end of the 5th century a.d., was the author of a beautiful little poem in Greek, entitled (Hero and Leander.* See Hero; Hero and Leander.

MUSCARDINE. The common European dormouse (q.v.).

MUSCARINE, a coal tar color introduced bv Durand and Hueenin, and having the em¬ pirical formula CisHjsNsChCl. It is a brownish violet powder, slightlv soluble in cold water, but dissolving readily in hot water with the formation of a violet-blue solution. Powdered zinc decolorizes its aqueous solution, but the color returns on exposure to air. Muscarine produces a blue color upon cotton that has been mordanted with tannin and tartar emetic.

MUSCARINE, an alkaloid having the chemical formula CbHigNO*, and occurring in certain mushrooms, notably in the «fly agaric" (Agaricus tnuscarius). It is also formed in

the putrefactive decay of flesh. It may be ob¬ tained in the form of deliquescent _ crystals which are without taste, and insoluble in ether, though readily soluble in water and in alcohol. Solutions of the alkaloid are strongly alkaline, and precipitate ferric and cupric salts in the form of hydrates. Muscarine is exceedingly poisonous. It contracts the pupil of the eye, slows the pulse by prolonging the diastolic state of the heart, and induces salivation, vomiting, intestinal spasms and

general muscular weak¬ ness, followed by death. Atropine acts as an antidote to muscarine by producing antagonistic physiological processes. The <(fly agaric" takes its name from the fact that flies that alight upon it are killed, either by the muscarine or bv another alkaloid, neurine, which the fungus also contains.

MUSCAT, mus-kat', MUSKAT, or MAS-KAT, Arabia, the capital of Oman, on the Gulf of Oman, commanding the entrance to the Persian Gulf. It is a fortified seaport of con¬ siderable commercial and strategical import¬ ance ; the seat of the Imam or Sultan of Mus¬ cat; by arrangement it has a British political resident and since 1898 is used as a coaling station by France. Its appearance by no means corresponds with its wealth and importance. Large buildings are few, and the sultan's pal¬ ace (a plain edifice), the governor's house, and a few minarets, alone rise above the mass of flat-roofed huts or houses. The streets are ex¬ tremely narrow and its situation at the foot of high cliffs, and nearly surrounded by bare rocks, renders it one of the hottest places in the world. A sufficient supply of water is ob¬ tained from wells about 40 feet deep. About three miles distant is the town of Matrah with docks for building and repairing shipping. As it stands in an open plain, exposed to the sea-breeze, it is cooler than Muscat, so that many of the wealthier merchants of the latter place have their dwellings at Matrah, and spend oply the hours of business in the neighboring city. The combined population of Muscat, Matrah and intervening villages has been variously estimated at 25,000 and at 60,000.

Muscat was occupied by the Portuguese un¬ der Albuquerque in 1507. In 1651 it fell again under a Mohammedan ruler. In the latter half of the 18th century it attained, under a ruler who bore the religious title of Imam, consider¬ able importance as a seaport. In 1808 Seid Sa'id succeeded to the sovereignty, having as¬ sassinated his cousin, Bedr. His sovereignty embraced also a stretch on the east coast of Africa, extending from the neighborhood of Cape Delgado northward as far as the equator. In like manner a large portion of the coast of the Persian Gulf acknowledged his sway, so that, including Oman and the African islands Zanzibar, Monfia or Mafia, and Pemba, the coasts ruled by him, for the most part only com¬ mercially, could not have had an extent of less than 3,000 miles. In 1840 Seid Said removed the court and seat of government from Muscat to Zanzibar, and in 1856 died on the return voyage from the former place. His son Meied succeeded him as Sultan of Zanzibar and ruler of the African territory, and another son ac¬ quired Muscat. Sevyid Turki became ruler of Muscat in 1871, and on his death in 1888 a son succeeded him.

MUSCATEL, a name given to certain sweet and strong French and Italian wines, white or red. The white Riveralt and red Bagnol wines from Roussilon, the Carigliano and Lacryma Christi of Naples, and the Lunel from the Pyrenees are among the most famous.

MUSCATINE, mus-ka-ten, Iowa, city, county-seat of Muscatine County, on the Mis¬ sissippi River, and on the Iowa Central, the Chicago, Rock Island and Pacific and the Chicago, Milwaukee and Saint Paul railroads, about 30 miles below Davenport and 140 miles east by south of Des Moines. It is at a bend in the river where the waters change from a westward to a southward current. As usual along the west bank of the Mississippi, the city is on high bluffs which command an extended view, of the river. It was first settled in 1833, and in 1839 was incorporated. It is situated in a fertile agricultural region in which there is considerable wood land. Muscatine Island, just below the city, is noted for its water¬ melons. The chief industries of the city are connected with the manufacturing of foundry and machine-shop products, oatmeal, flour, pickles, brick, tile, boxes, canneries, buttons, sheet-iron, boilers, engines, packing cases, wagons, carriages, pottery, rolling-mill prod¬ ucts, canned goods, lead works and lumber. It has considerable trade in its manufactured articles, farm and dairy products, hogs, lumber and fruit. Muscantine has good public and parish schools and several private schools. It has the public Musser Library. It has also several charitable institutions. The govern¬ ment is vested in a mayor, who holds office two years, and a council. The school board, police judge, treasurer, assessor and wharfmaster are chosen at a popular election by the people. The waterworks are owned and operated by the city. Pop. (1920) 16,068. Consult Richman, I. B. (ed.), (History of Muscatine County) (2 vols., Chicago 1911).

MUSCHELKALK, mush'el-kalk, a Ger man name, signifying shell lime, applied to geological beds, of middle Triassic or New Red Sandstone period, occurring in the Alps, in northwestern Germany, Alsace and Lorraine, Swabia, Franconia, Hesse, Thuringia and upper Silesia. The name is due to the many fossil remains of Cephalopods, Encrinites and

Mollusca in general found in the limestone mass of these beds. The Muschelkalk is divided into lower, middle and upper. The beds contain valuable minerals such as salt, marl and gypsum.

MUSCIDiE, mus-cT'di, family of flies from the Latin musca, a fly. The most familiar ex¬ amples are the house-fly and the blow-fly. They belong to the order diptera and their wings have the characteristics of the family, being naked, furnished with a single pair; the pro¬ boscis is used for sucking, ending in two fleshy lobes. The flagellum of the antennae is gen¬ erally plumed with hairs on both sides (the tsetse, however, on one side only). Upper sur¬ face of thorax has a transverse suture and the feet have a pair of. adhesive pads. Their presence is almost universal, as they thrive in the cold northern latitudes as well as in tropical climes. The eggs are laid and hatched in filth. The species reaches a large and varied assortment.

MUSCLE-READING, a form of observa¬ tion whereby one who is specially trained may, by careful study of muscular movements, in¬ terpret many wishes that are present in others. This is possible because all wishes, to be ex¬ pressed, primarily involve muscular or glandu¬ lar activity. Even though the wish, when con¬ scious, is repressed, muscular reactions regis¬ tering such repressions are always present and can be detected by a keen and practised ob¬ server. Thus a person who is told to think steadily, bearing in mind a certain number, un¬ consciously says that number over and over to himself, making thereby very minute muscular formations of the lips and muscles of the face. These can be seen and read by a skilled person, and thus is explained the common trick of many so-called clairvoyants. This tendency of rrfotor expression of mental images is very pro¬ nounced in some people. They involuntarily go toward or away from a hidden object, and a blindfold person can often find these objects by carefully noting the degree of muscular re¬ sistance or acquiescence in their search for such objects. This parlor trick takes much practice, a quick sense and much concentration, but does not involve any ((thought-trans- ference,» or «mind-reading.» Some people be¬ come very skilful in this type of observation, and all may acquire a certain amount of skill by careful watching. Much of the so-called in¬ tuition of women is in reality muscle-reading. They are on the lookout for certain forms of muscular reaction, and can thus guess at what is going on in the minds of others. Their con¬ stant contact with small children, who character¬ istically show what they are thinking about, through their muscles of expression, is a school of experience for them. Man oozes his secrets at his finger tips. The popular song

which says «Every little movement has a meaning of its own* contains more truth than fiction. (See Emotion). Consult Jastrow, American Jour¬ nal of Psychology (Vol. IV, p. 398) ; Preyer, (Die Erklarung des Gedankenlesens) (1886), and Pact and Fancy in Psychology > (1900) ; Kempf, (Autonomic Functions of the Person¬ alˆ (1919) ; Freud, Psychopathology of Everv-Dav LifeP

MUSCLE-SENSATION, a loose and vague phrase, otherwise muscle-sense, to express the sum of sensations that come from the joints, skin, muscles and tendons in the act of making muscular movements. It is also applied to a generalized dull sensation which results from the stimulation of a muscle, either from elec¬ trical discharge or from fatigue following the long-continued stimulation of either a volun¬ tary or involuntary muscle. The perceptions of muscular sense are usually grouped wnder (1) those of posture, the sensations occurring while standing, sitting or maintaining some un¬ usual position being characteristic and recog¬ nizably different for each relative position of limbs; (2) those of the passive movement, in which a limb is moved by another person; (3) those of the active movement; (4) those of resistance to movement. The case of passive muscular sense is not to be confused with that of the so-called static sense, which is a sensa¬ tion of change of direction, which one gets while being transported through space, or turned or inverted, and is mediated through the

semi-circular canals of the ear. The muscle-sense is of much importance in imparting in¬ formation concerning the relative position of the different members of the body, and its loss in this particular (asterognosis) constitutes a valuable symptom in the diagnosis of certain nerve disorders. The muscle-sense is all-important in maintaining bodily equilibrium. Each joint in the body possesses a varying de¬ gree of delicacy in this function of equilibrium. Thus the shoulder-joint is considered to be 40 times as delicate in this respect as the joints of the fingers. Angle of bending and speed of movement are both important in the interpreta¬ tion of these joint-sensations. Muscle-sense in all its bearings has close relations to accuracy and

skill in all limb-movements, as seen in musical performances, marksmanship, ball-play¬ ing, billiards, golf, etc., in all sports and games requiring delicate muscular adaptations. The muscle-sensations may become a seat of a great deal of autoerotic pleasure, even exclusive of merely genital masturbation, as may be seen in certain forms of dancing. In persons who take an undue interest in athletics there is fre¬ quently in addition to the exhibitionistic mo¬ tive a large factor of gratification of the lebido (q.v.) through merely muscular contractions, the development of muscular strength feeding the unconscious desire for power and superiority in a sphere which frequently excludes real social aims. Consult Henri, (Annee Psychologique) (Vol. V, 1899, with full bibliography) ; Bald¬ win, dictionary of Philosophy and Psychol¬ ogy J ; Schafer, (Physiology > (1900) ; Kempf, (The Autonomic System and the Personality) (New York 1919).

MUSCLES. The organs called muscles are made up of a collection of muscle-cells, which have for their function the accomplishment of bodily movements. These movements may be gross, as in walking, or very minute, such as take place in the contracting movements of the arteries or veins; they may be voluntary, brought into action by wishes and called ˆwilled® impulses made possible by the brain structures, or they may be involuntary and brought about by acting through the vegetative nervous system (q.v.). The muscular move¬ ments necessary in writing are illustrative of the voluntary type; the heart-beat, of the in¬ voluntary variety. In point of evolutionary de¬ velopment the involuntary movements may be said to have preceded the voluntary, and hence in regard to complexity of structure the invol¬ untary muscle-cells are simpler than the muscle-cells that perform voluntary movements, and to these two types of cells students of minute anatomy have given the names of unstriped or involuntary muscle, and striped or voluntary muscle. The muscular tissue of the heart is of intermediary character. It is a striped involun¬ tary muscle. Muscle-tissue, like protoplasm, is strongly contractile, but unlike ordinary pro¬ toplasm, which can contract in all directions, muscle-substance can contract in only one di¬ rection. The simplest type of muscle-substance is seen in many lower animals. In these the muscle-cells are elongated spindles with sharp¬ ened points and with a single elliptical to rod¬ shaped nucleus, situated about the middle of the fibre. They show a faint longitudinal striation, vary in length from 40 to 500 microns (1-600,

1-50 of an inch) in length, and 3 to 8 microns (1-8000, 1-3000 inch)

in diameter. These muscle-cells in man correspond to the unstriped muscle-cells, are bound together in bundles or flattened plates by an inter-cellular cement-substance and are found more particularly in the walls of the intestine, the trachea, bronchi, blood-vessels, bladder, ureter, uterus, in many of the organs of the body, and in glandular structures. They have a rich blood-supply and a nervous net¬ work of sensory terminal filaments, as well as fibres from the vegetative (old term was sympa¬ thetic) nervous system. The pains of an intes¬ tinal colic, of a gallstone, of childbirth, are all due to forcible contractions of these involun¬ tary muscle-cells in the respective organs. The more prominent muscles of the body, such as those that move the various bones, the muscles proper and such as are eaten as roast beef are of the striped variety. These are a modifica¬ tion of the simple spindle-cells. In man they originate in the mesoderm, muscle-sub tance commences to form in the interior of some of the cells ; these elongate, many nuclei are formed and the final result is a bundle of much elongated cylindrical cells 12 centimeters (2 inches) long and from 10 to 100 microns (1-2500 to 1-250 inch) broad. Each cell is covered by a special sheath, the sarcolemma, and within is made up of very intricate and minutely structured protoplasm, the most strik¬ ing feature of which is its banded or striated appearance; hence the name striated. Just within the sarcolemma a number of flattened elliptical muscle-nuclei are found. In insects striped muscle-tissue can be studied to best ad¬ vantage. Occasionally branched forms of striated muscle are found. Blood-vessels are numerous in striped muscle and lymphatics and nerves are also abundant. Special types of nerve-endings and muscle-plates,. are character¬ istic of voluntary muscle. Striped muscle is probably a combination of types of muscle. The sarcoplastic substance is thought of as of un¬ striped muscular origin, and it is probably in¬ nervated! by the vegetative nervous system. This type of innervation is that which keeps its metabolism in order, and also contrib¬ utes to what is known as muscle-tonus. The emotions act through this part of the muscle probably. The other part of the muscle, called the anisotropic disc, is probably innervated by the sensori-motor system and is that part of the muscle which carries out willed or wished actions.

Heart-muscle differs from ordinary striped muscle by having shorter oblong cells, which are branched. There is no sarcodemma and the cells contain but one or two nuclei, which are situated in the centre of the muscle-substance. Blood-vessels, lymphatics and nerves are plenti¬ ful in the heart-muscle.

Groups of these muscle-cells, with connective tissues, tendons and fat, make up the gross muscles of the human body. The voluntary muscles

are all attached to bony structures; the involuntary muscles are found in the softer parts. Contraction and expansion are the ex¬ pressions of their functions, each set of muscles being provided with antagonists, and it is char¬ acteristic that in response to pleasure-giving stimuli movements of expansion. result, whereas under painful stimuli contraction is marked. Modern psychological theories have been

founded on this fundamental principle, emo¬ tional states being interpreted as being founded on visceral muscular activities. The forms of external stimuli that can cause muscular action are usually classed as mechanical, chemical, thermal and electrical. Excess of stimulus brings about a condition of fatigue in muscle. This is accompanied by diminished muscular power, by pain or discomfort, by diminished reflex excitability and by vague symptoms in the body indicative of some perversion of metabolism.

Muscles are classified in various ways, ac¬ cording to structure or according to their func¬ tion, or by their positions and situations in the body. For example, some muscles are attached to bones, which they move after the fashion of levers. Such muscles are said to arise or take origin from definite points of bones and are generally inserted into bones by tendinous pro¬ longation of the muscular substance. The in¬ sertion is the moving point, and the origin the fixed point of the muscle. The tendons of muscles vary in length and breadth. They rep¬ resent inelastic bands of fibrous tissue, the fibres of which insensibly merge into and become continuous with their attached muscular fibres. When the tendinous fibres of muscles become greatly broadened out, so as ‘to form fibrous webs or membranes, which separate or enclose muscles, or which afford extensive surfaces for their attachments, the term aponeuroses is then applied to them. Such aponeurotic expansions are seen in the terminations of the muscles of the abdominal wall, in the scalp and in other situations. The limit or extent of the action of a muscle is determined by the length of its fibres, whilst its degree of force or strength depends on the number of the fibres. Other muscles are not attached to bones as levers, but on

the contrary surround and enclose cavities, which they limit or expand as required. Such hollow muscles are exemplified in the heart and uterus, in the muscular fibres of blood-vessels, in the muscles of the digestive tract, in the iris of the eye, *etc.*

The nature, mode and effects of muscular action may be briefly considered in connection with the present subject. The muscles which have the most active functions are those most abundantly nourished. Every action on the part of a living being results in the production of a certain amount of waste material, evinced by perceptible differences in the chemical com¬ position of the tissue. And when it is remem- • bered that the nervous and vascular supply of muscle is also concerned in muscular work and waste, the entire question is seen to assume aspects of a very intricate and complicated nature. Increased exercise of muscles — as seen in gymnastic exercises, or in the exercise of certain trades (for example, the arms of the blacksmith and the lower limbs of the ballet-dancer) — demanding increased nutrition, results. in the increased growth of the muscle and in the formation of new tissue. This re¬ sult, it: is evident, can take place only when the nutrition of the tissue keeps pace with or slightly outstrips its waste and wear.

The property of contractility distinctive of muscular tissue, and through which its func¬ tions are manifested, is generally, though not always or invariably, brought into action through the stimulus of the nervous system, or

more widely speaking, through stimuli con¬ veyed to the muscular fibres through the nerves. The subject of the various kinds of muscular actions involves both physiological and me¬ chanical considerations. The voluntary muscles thus constitute moving powers for the bones as levers; and in the living body examples of the three kinds of levers which mechanical science distinguishes are found. In the familiar action of the biceps muscle, which flexes or bends the fore upon the upper arm, is seen an instance of a lever of the third kind, in which the power (represented by the insertion of the muscle on the radius or bone of the fore-arm) is placed between the fulcrum (at the elbow-joint) and the weight (in the hand). The lever of the second order may be illustrated by the raising of the body upon the toes, as in the act of making a step forward in walking. Here the weight (represented by the body pressing on the ankle) is placed between the fulcrum (formed by the fixed toes) and the power rep¬ resented by the muscles of the calf. The head moving on the spine illustrates a lever of the first

order; the fulcrum being represented by the atlas vertebrae, the power bv the muscles of the neck and the weight by the heavier por¬ tion of the skull situated in front of the spine. See Anatomy.

Smith Ely Jelliffe, M.D.,

Editor (Journal of Nervous and Mental Disease.)

MUSCLES, Diseases of. Very little is known of the diseases of muscles themselves. Muscle-tissue, in common with other types of tissue, undergoes certain forms of degeneration, fatty, mucoid, gelatinous, calcareous, etc., but of the diseases of the muscular tissues them¬ selves there are few well-defined types. The reason for this lack of definite information bearing on diseases of the muscles is largely due to the close relationship that the nervous system bears to the muscular system. This renders it almost impossible to distinguish be¬ tween a disease of the muscle and a disease of the nerve structures which are distributed to that muscle. Thus, at the present time, it is held that many of the forms of muscular atrophy and some of the forms of muscular dystrophy are forms of the diseases of the nerv¬ ous mechanism of the muscle rather than dis¬ ease of the muscle itself. In former times these were classed as diseases of muscle.

Myositis, simple inflammation of the volun¬ tary muscles, is a form of acute or subacute inflammation in the muscle, due probably to some . infectious organism. It is characterized by stiffness of the muscles and with swelling in the muscle-substance. It is usually progres¬ sive, the muscles of the body becoming stiff, hard and fragile, and undergoing fatty degen¬ eration. Myositis is probably a very rare affec¬ tion, and it is not yet known whether it is a primary or a secondary condition. Ordinary muscular spasms or muscular cramps are in rJaliK localizeci neuralgias in the muscle, and should be considered as of nervous rather than muscular origin. Lumbago is one of the con¬ spicuous examples of a neuromuscular affec-tmn. It is probably located in the sarcoplasm of the muscle, and results from disturbance of the vegetative nervous system control of the muscle. It may be a result of emotional upsets.

or follow undue exercise. Myoclonia or Fried¬ rich's disease, and myotonia, or Thomsen's dis¬ ease, are two forms of disease affecting the muscular system that have certain superficial resemblances to hysterical affections, and al¬ though regarded by many as of purely muscular origin, there are many reasons for believing that these diseases are of the neuromuscular type. In myotonia the disease usually comes on in childhood ; the muscles become stiff, and the children are noted for being clumsy in their movements. The contractions, as in the hand, for instance, commence very slowly and are performed almost automatically, and when the patient desires to loosen his grasp of an object the muscular response is slow, the contraction often persists or the patient may be scarcely able to open his hand. In much the same man¬ ner walking is affected ; the patient starts with difficulty ; one leg seems to be stiff and halts ; but after a few moments of limbering up, as it were, the patient may be able to walk more or less briskly. The disease is chronic, and is probably related to a defect in the vegetative reflex arc mechanisms acting chiefly through the sarcoplastic elements. It may be emotional but is probably related to faulty muscle meta¬ bolism of endocrinous bases.

Myoclonia occurs chiefly in patients of bad nervous condition, and consists in clonic con¬ tractions of the muscles of the extremities. These contractions somewhat resemble chorea. Associated muscle-groups seem to be involved in myoclonia, whereas in chorea the contrac¬ tions are extremely irregular. The disease is probably most closely associated with the con¬ vulsive tics and is probably due to some affec¬ tion of the motor cortex. Treatment is diffi¬ cult but the psychogenic element may be reached by psychoanalysis.

Myositis ossificans is a very rare chronic affection of muscles, during which the muscles become harder and harder, and finally develop bone-like transformations, so that the patient becomes like the ossified man of the circus. As a matter of fact most of these cases drift into museums and circuses. Very little is known as to the cause of the disease, and treatment is unavailing. Consult Jelliffe and White, dis¬ eases of the Nervous System) (3d ed., 1919).

MUSCOGEE, Okla. See Muskogee.

MUSCOVITE, or COMMON MICA, a

native silicate of aluminum, potassium and hy¬ drogen, occurring in crystals that belong to the monoclinic system, though usually

hexagonal or rhombic in general form, and distinguished by the facility with which it may be split into thin laminae. Muscovite-also occurs in massive forms and in scaly aggregates. It occurs in various colors, and has a lustre that is vitreous or pearly. It is transparent or translucent, with a hardness of from 2 to 3, and a specific gravity of from 2.8 to 3. It is a very com¬ mon mineral and is an essential constituent of granite, gneiss and numerous other rocks, The transparent varieties, when obtainable in ■ considerable size, are used for the manu¬ facture of gas-burners chimneys, for cov¬ ering the windows of stoves and the <(peep-holes® of furnaces, and for other purposes where transparency must he combined with in¬ fusibility and with a considerable power of re¬ sisting the prolonged action of heat. Consid¬

erable quantities of it are mined in Bengal and in Switzerland, and fine deposits occur in many parts of the United States. Perfectly trans¬ parent plates a yard in diameter are sometimes found at Grafton, N. H., and similar specimens also occur in the western part of North Caro¬ lina. Pulverized muscovite is employed in the preparation of certain kinds of paint and in the manufacture of insulating material for use about electric machinery. Muscovite is not af¬ fected by acids, but decomposes upon being fused with the alkaline carbonates. The name “muscovite® is derived from the older popular name “muscovy-glass,® which is supposed to refer to the fact that the Russians used it for window-panes. See Mica.

MUSCOVY DUCK, or MUSK-DUCK.

See Duck. _

MUSCULAR SYSTEM, Development of.

Two main forms of muscle-tissue (see Muscles) exist in the human body, the striated muscle-tissue, which makes up the muscles of the bony framework of the body, and which responds to willed or wished impulses passing through the brain structures, and also to vege¬ tative stimuli of the unstriated muscle-tissue, which chiefly responds to automatic stimuli of unconscious nature by means of the vegetative or sympathetic nervous sjˆstem. Some control of vegetative functions may be exercised by conscious processes. (See Nervous System). The heart-muscle is regarded as an interme¬ diate form, resembling striated muscle-tissue, but in its development more nearly allied to the more primitive unstriated muscle-tissue. Non-striated muscle-tissue is

formed by a direct transition of certain cells in the middle ger¬ minal layers (see Embryology) or mesenchyme At first these muscle-fibres are irregularly dis¬ tributed, but later they are collected into small bundles or into layers, and become associated with the individual organs with which they functionate. Striped muscular tissue develops from the same layer, but the details of develop¬ ment, as is the case in the histogenesis of the heart-muscle, are extremely complicated. The cells at first develop a mesh-like structure or reticulum. This reticulum develops small discs, which later become small columns of muscular tissue. The columns at first develop at the periphery of the cell, and gradually fill in around the nucleus, which in the heart-muscle lies in the centre of the cell, whereas in the muscles of the skeleton the nucleus is pushed to one side, or disappears, new nuclei appearing just beneath the sarcolemma-sheath. The skeletal muscles develop in regular order from the different segments (somites) of the mesoderm. In the early stages the distribution is very symmetrical, but later it becomes ex¬ tremely uniform by reason of the irregular welding of different segments of the bony skeleton. There remains, however, a regular association of the muscular myotomes and their embryonic nerve supply, and the homologies of structure may be traced by the nerve-supply, although the muscles themselves may have shifted from their original position. This is a question of highly technical nature, but has many practical bearings in modern medicine. Thus the great broad muscle of the back, the latissimus dorsi, which arises from the seventh and eighth cervical segments, but later migrates

and is fastened all the way down the spine as far as the crest of the hip-bone, is supplied by a nerve which also develops from the seventh and eighth cervical nerves. The de¬ velopment history of each skeletal muscle can thus be traced by means of its nerve-supply. The whole process is one of extreme intricacy and should be studied in special monographs.

Evolution of Muscular Tissue. — As in the development of the muscular system in man there has been a gradual evolution of the

plan of muscular arrangement, so in the animal series there has been a gradual development of a muscular system from the very simplest types of contractile protoplasm. Even in plants definite movements may occur which may be very slow or very rapid. Yet no muscular tissue proper has ever been found in plants. Many of the lowest plants, the Alga, are motile and are provided with vibratory cilia, but these minute hairs, although capable of rapid motion, cannot be regarded as muscular organs. In the contracting protoplasm of the lowest animals, the rhizopods, although movements take place, there is no muscle-tissue. Nor is muscle-tissue found in the next higher group, the Infu¬ soria, although very actively moving forms are known, for example, the familiar microscopic animal Paramecium. The bell-animalcules, Vorticella, Stentor, etc., have stalks that coil and uncoil with great rapidity, but they con¬ tain no muscle-tissue proper. They do, how¬ ever, contain what are termed myronemes, and spironemes, which are longitudinally striated and have as many functionate as muscular organs. In another genus of infusorians (Bursaria) there is a contractile band about the body of the animal. It has been regarded as a true sphincter muscle. It has not the structure of the developed unstriped muscle-cell. In the closely allied sponges (Porifera) certain elon¬ gated cells with rod-shaped nuclei are found, and may be considered the ancestral forms of the unstriped muscle-cell, although it is not un¬ til the group of the Coelenterates is reached that true unstriped muscular tissue is present in its more advanced forms. In many of the hydroids a form of external neuromuscular cell is found. This is a type of cell half nerve, half muscle, but not resembling true muscular tissue. In the jelly¬ fishes of this order both neuromuscular tissue and true unstriped muscle-fibres are found. In the sea-anemones unstriped muscle is abundant. It is mostly developed, however, from the ex¬ ternal layers of the body, and thus embryologi-cally is not comparable to the muscle-tissue that in practically all the animals higher than the coelenterates is formed in the middle ger¬ minal layers of the developing animal. In one of the higher coelenterates, the common water-hydra, some muscle-cells are found imbedded in the deeper tissues of the body, thus fore¬ shadowing the higher type of muscular tissue. In the next great family of animals, the Echinodermata, to which the sea-urchins, star¬ fishes, and sea-cucumbers belong, unstriped muscular tissue is common, but no evidence of striated or striped muscle is yet present. In the worms the muscular tissue is unstriped and abundant. In the mollusks, the foot of the soft clam, the muscle of the oyster, are made up of unstriped muscle fibres. A higher order, the Arthropods * or Crustaceans, including the

crabs, lobsters, etc., contains a well-developed muscular system, which is made up of striated muscle, practically the first appearance of this type of muscle in the animal kingdom. In these animals, moreover, there is a type of de¬ velopment of the muscles that anticipates the regular segmented type, metameres or myo¬ meres, of higher animals.

From the crustaceans onward both types of muscle-tissue are found. In the low verte¬ brates, selachians and fishes, typical heart-muscle cells, striated and with centrallying nuclei, are found. Consult McMurrich, devel¬ opment of the Human Body,* with full bibliog¬ raphy (1902) ; Parker, (The Elementary Ner¬ vous System* (1919); Bayliss, (General Physi¬ ology.* See Anatomy.

Smith Ely Jelliffe, M.D., Editor (Journal of Nervous and Medical Dis¬ ease.)

MUSCULUS, Wolfgang, German scholar and Protestant theologian : b. Dieuze, Lorraine, 1497; d. Bern, 30 /vug. 1563. He entered the Benedictine Abbey of Lutzelstein and was or¬ dained priest. He was converted to the Prot¬ estant faith by Luther's writings, withdrew from his order in 1527 and in 1531 became pastor of a church at Augsburg. In 1536 he assisted at the Wittenberg assembly, and in 1540 was ap¬ pointed by the Augsburg senatus a delegate to the ecclesiastical conferences at Worms and Ratisbon. He subsequently became professor of theology at Bern. Among his works are (Commentarii in Genesin* (1557) ; and an edi¬ tion of Polybius.

MUSES, goddesses of the liberal arts and sciences; originally nymphs of inspiring foun¬ tains. Different accounts are given of their origin. There is also a great difference in their names and attributes. The most cele¬ brated are the daughters of Zeus and Mnemo¬ syne. According to Homer they lived upon Olympus. At first three Muses only were known: Melete (meditation), Mneme (memory, for the immortalizing of great deeds), and Aoide (song, for the accompaniment of story). Four Muses are sometimes mentioned as the daughters of Zeus and Plusia, namely, Melete, Aoide, Arche and Thelxinoe. At other times they are said to have been seven, at others eight in number. Nine Muses are also enu¬ merated as the daughters of Pierus, king of Emathia ; but these are usually held to be dif¬ ferent from the nine Muses who ultimately came to be generally recognized in Greece ; and although the genuine Muses are sometimes called Pieridae, they are said to have derived the epithet not from Pierus but the district of Pieria. The names finally recognized as those of the Muses were Clio,

Euterpe, Thalia, Melpomene, Terpsichore, Erato, Polyhymnia, Urania and Calliope. Among .the adventures of the Muses their three contests with the Sirens, with the daughters of Pierus and with the bard Thamyris, in all of which they were victorious, are particularly famous. The cus¬ tomary occupation of the Muses was singing and dancing. Separate attributes were not till a comparatively late period assigned to the individual Muses. Calliope became the Muse of epic poetry. She was the most distinguished among the Muses, the protectress of kings, whom she endowed with eloquence and song.

MUSEUM OF ART — MUSEUMS

Clio became the Muse of history; Euterpe of lyric poetry and music, particularly of wind-instruments; Thalia of comedy; Mˆlopomene

, tragedy , Urania of astronomy ; Erato of lyric and erotic poetry; Polyhymnia of the sublime hymn; and Terpsichore of the dance. They are commonly represented as beautiful virgins, adorned with wreaths of palm leaves, laurel, roses or the feathers of the Sirens! They dance in a circle, together with Apollo, who in later times was styled Musagetes, or leader of the Muses. Their worship extended from Greece to Italy. In Rome they had a separate temple, and a grove was sacred to them. The swan, the nightingale and the grasshopper were also sacred to them.

MUSEUM OF ART, Metropolitan. See

Art, Metropolitan Museum of.

MUSEUMS are institutions for the preser¬ vation, study and display of natural objects, or of those made by man, while as a sequence of study comes the publication of information thus derived. The word museum originally signified merely a grove or other locality sacred to the Muses, but with the development of the museum the word has undergone a parallel course of evolution until it has come to have its present meaning. The next use of the term was for an institution devoted to the study of philosophy, literature and art, but not including the preser¬ vation and display of objects; in this sense it was

applied to the famous Museum of Ptolemy Soter at Alexandria. While this was in the nature of a university, there is some reason to believe that collections of plants and animals were attached to the institution so that it may be regarded as the prototype of the more modern botanical and zoological garden. In modern sense public museums are of compara¬ tively recent establishment, and as educational factors, of later date than art galleries and libraries, although like these having their be¬ ginnings in the gratification of the desires of private individuals. The origin of the art museum is to be found in the collections of statuary, paintings and other works of art, made by kings, nobles and men of wealth ; the germs of the modern museum of natural his¬ tory were the cabinets of miscellaneous curi¬ osities brought together by students, merchants, or men of leisure. Many of these collections subsequently developed into important public museums, the most striking example, and the one most frequently cited, being the British Museum (q.v.), which was the final outgrowth of the cabinet and library of Sir Hans Sloane. In the United States the Museum of Compara¬ tive Zoology, at Cambridge, Mass., has grown from the collection made by Louis Agassiz (q.v.) for his own use, until it has become one of the most important museums in this country. Even the United States National Museum, if not the direct outgrowth of a private collection, was indirectly due to the labors of individuals, for its nucleus is to be found in the specimens gathered by the National Institution (later the National Institute), a body organized with the avowed purpose of directing the bequest of James Smithson (q.v.) and engaging in pur¬ suits in accordance with its terms.

The lineal successors of the cabinets of pri¬ vate collectors were the museums of scientific societies where specimens were gathered for

purposes of study and display, and while these still exist they have largely given place to mu¬ seums supported by the State or municipality. Private collections are more numerous than ever, but these are rarely formed with any in¬ tention of displaying their contents to the public, although there are some notable excep¬ tions, as in the museum of the Hon. Walter Rothschild at Tring. Ultimately, however, a large proportion of these private collections find their way to public museums through the liberality of their owners, or by bequest.

Another step toward the establishment of public museums was the formation of collec¬ tions of objects of more or less popular inter¬ est and their exhibition to the public on the payment of a fee. Notable

examples of these abroad were those of Sir Ashton Lever and Charles Bullock, which flourished in London during the latter portion of the 18th century and first part of the 19th. It is interesting to note that one of the earliest cabinets formed in the United States, that of Mr. Arnold, of Norwalk, Conn., was sold to Sir Ashton Lever, while later on the ((Leverian Museum* was sold and its specimens scattered among the great museums of Europe.

Early American Museums.— In this country the principal recent museums of this character were the Boston Museum and Barnum's Mu¬ seum in New York, in both of which the idea of amusement predominated, the first named being a rather incongruous introduction to a theatre. Both, however, contained some really valuable specimens of natural history and Bar-num was among the first to exhibit living fishes. Of a very much earlier date and more scien¬ tific in their aims were the museums conducted by Charles Willson Peale and his son, Rem¬ brandt Peale, in Philadelphia, established in 1785 as the Philadelphia Museum, and from 1822 to 1828 installed in Independence Hall. This museum is of particular interest from the fact that many of Peale's ideas as to the ar¬ rangement and educational value of museum collections were in advance of his time. In his use of painted backgrounds and the addition of nests and eggs to the exhibits of mounted birds we have the germ of the elaborate habitat groups shown in modern museums.

The modern <(dime museum* with its ex¬ hibit of ((freaks* is a survival of this phase of museum development, and the catalogues of some celebrated old collections will show that they comprised many very similar objects, as well as those of real value from a naturalist's standpoint.

Government Museums.— The final step in the establishment of public museums, the transferral of collections from private to govern¬ mental ownership, may be said to date from the founding of the British Museum in 1753. At first admission was by ticket and limited to 30 persons per day; in 1810 the museum was made accessible to the public for three days a week, and not until 1879 was it open to the pub¬ lic daily. The United States National Museum was only formally created in 1876, although so early as 1846 the government possessed collec¬ tions which were in the custody of the Smith¬ sonian Institution. Exploration has done so much for museums that it may almost be in¬ cluded among the causes that have led to their

formation. The colonization of America brought to Europe many examples of new plants and animals, while the Dutch East India voyages did the same for southern Asia, and it is surprising to see how large a number of species from these regions was described by Linnaeus and others so early as 1760.

In more recent times the Wilkes Exploring Expedition of 1838-42 and the government sur¬ veys for a route for the Pacific Railroad had a very decided influence on the origin and growth of the United States National Museum, and there is scarcely an institution that has not been benefited in a similar way. It is but a step from expeditions in which scientific re¬ sults were subordinate to practical ends to those undertaken solely for scientific purposes, and the systematic exploration of our Western Ter¬ ritories for fossils by such institutions as the American Museum of Natural History and the Carnegie Museum, and by Yale, Princeton and other universities, has become a matter of al¬ most daily news. Another most important factor in the development of museums has been national or international exhibitions. These have had a direct effect in bringing to¬ gether collections illustrative of natural or in¬ dustrial resources, and a more indirect in¬ fluence in stimulating methods of arranging and displaying such material. The London Exhibi¬ tion of 1851 led to the establishment of the South Kensington (now Victoria and Albert) Museum, and the ethnological museum of the Trocadero was one of the outcomes of the Paris Exposition of 1889. Our own Centennial Exhibition was the direct cause of the erection of a building for the United States National Museum and of the founding of the Pennsyl¬ vania Museum of Art, while from the Chicago Exposition came the Field Columbian Museum, the Chicago Art Institute and the Philadelphia Commercial Museum. Other causes play minor parts in influencing the lines of growth of mu¬ seums both small and great. Thus the extensive colonial possessions of Great Britain have been largely instrumental in making the vertebrate collections of the British Museum, the great¬ est in the world, while the museum at Leyden is not far behind owing to the former extensive commerce of Holland. In the United States the large deposits of fossil vertebrates in the West, their general accessibility, the imposing appearance of many of the

specimens and the important results to be derived from \heir study have given a great impetus to the for¬ mation of palaeontological collections, while special attention has been given to the prepara¬ tion and exhibition of this class of material. The display of fossil vertebrates in the Ameri¬ can Museum of Natural History is unrivaled, and other notable exhibits are to be found in the Museum of Yale University, and in the Carnegie, Field and United States National museums. The National Gallery of Art and the Freer Collection, installed in a building of its own, both forming parts of the United States National Museum, were respectively the gifts of William T. Evans and Charles L. Freer.

Popular Display of Specimens. — What may be termed the popularizing of museums has but recently taken place, and while the display of objects has always been regarded as one of the functions of museums, it is a branch which

has received particular attention only during the past 30 years. Originally the larger part of the specimens of birds and mammals were placed on exhibition, but it became evident that this meant the injury or even loss of many, and that the public cared little for large mo¬ notonous series of stuffed animals. At present the number of objects on exhibition is rela¬ tively small compared with those in the re¬ serve or study series, and there is a very gen¬ eral effort to display at least a part of the speci¬ mens amid their natural surroundings. The influence of the private collector has probably had much to do in bringing about this change, and the British Museum, under the adminis¬ tration of Dr. Gunther, was the first of the great museums to introduce groups of birds, with their natural surroundings, as a part of ijs exhibition series. These were largely added to under the directorship of Sir William Flower, who took great interest in the problem of rendering museums attractive and instruc¬ tive, while, following this example, the Ameri¬ can Museum of Natural History took the lead in this direction in the United States. To the museum of Leyden, Holland, however, be¬ longs the credit of having before this departed from the tradition that mammals must be stuffed in stiff and formal attitudes and caused some to be mounted that bore some resemblance of life. Change in the character of the exhibits has been accompanied by equal changes in the matter of labeling and to some extent in the publications issued by museums, so that from being merely storehouses of material for the benefit of a few they have become great schools of instruction for the many.

School Work of Museums. — In direct line with what may be termed passive educational work by means of carefully arranged and well-labeled exhibits is the active participation of museums in the work of public schools of all grades by means of circulating loan collections, the giving of lectures at museums or sending lecturers to the schools, and the loaning of series of lantern slides to illustrate such subjects as natural history, geography, history or tech¬ nology, and in this connection motion pictures have been found most helpful.

The initiative in this line seems to have been taken by the Buffalo Academy of Sciences in 1872 and the Davenport Academy of Sciences in 1878, in both cases by means of lectures given at the museum. The Public Museum of Mil¬ waukee appears to have been the first to loan definitely selected material ; the American Mu¬ seum of Natural History, under the administra¬ tion of Professor Bickmore, the first to give systematic courses of lectures more or less cor¬ related with school work. This latter institu¬ tion was also the first to establish a depart¬ ment of public education (instruction) for the sole object of co-operating with the public schools.

Following in the lead of these institutions, or acting independently, many other museums have actively engaged in school work, notably the Commercial Museum of Philadelphia, Chi¬ cago Academy of Sciences and the Educational Museum of the Saint Louis public schools. This last, the first to be devoted exclusively to school work, though founded by the board of education in 1904 as an outcome of the exposi-

li°n of that year, is a museum of distribution rather than of exhibition, its work being the loaning of specimens, charts, models and similar objects to the public schools.

Classification. — Museums may be grouped or classified by their contents, or according to the purposes for which they were established Following the first method Dr. Goode has di¬ vided them into museums of art, history, an¬ thropology, natural history, technology

and commerce. A museum may be established for any of these great subjects as a whole or for one of the many branches in to which they may be subdivided. Thus a museum of natural his¬ tory may comprehend both animals and plants, or one of the other of these primary divisions ; it may include the animals of a single continent, a single geographical region or be restricted to those of one locality; it may be devoted to some large group, as mammals, birds or insects, to some minor division, as birds of prey, butter¬ flies, etc., and may 4>r may not include fossil species. Technology may be greatly subdivided, and while the favorite and more striking sub¬ jects are shipbuilding and railroads, there are also museums of hygiene and textile fabrics, while the United States National Museum con¬ tains collections illustrating the development of electrical apparatus. And technology may tres¬ pass on art in the matter of ornament, or, like art, be included in a historical collection illus¬ trating the progress of mankind or of one nation.

According to the purposes for which they are founded Dr. Goode distinguishes national museums ; local, provincial or city museums ; college and school museums ; professional or class museums; and museums or cabinets for special research owned by societies or individu¬ als. This scheme of classification is open to the objection that it confuses purpose with owner¬ ship or administration, since, for example, na¬ tional and municipal museums are not merely for the display of objects found within their boundaries, but for those belonging to the na¬ tion or city.

College and school museums have for their immediate purpose the formation of collections that shall aid students in understanding various problems connected with science, technology or art, but they are usually extended beyond this and become more or less general in their char¬ acter. This has been the case with the museums of Harvard and Yale universities and is notably true of many foreign museums, such as that of the Royal University of Prussia, which is the national museum. The professional museum is for the illustration of some special occupa¬ tion or line of research such as mining, medi¬ cine or even psychology, which has a museum at Florence founded by Mantegazza. The largest institution of this kind is the Museum of the Royal College of Surgeons, London, which has developed from the private collection of John Hunter.

The Army Medical Museum, Washington, had its inception during the Civil War as a museum of pathology and military surgery, but its scope has been so extended that it offers a fairly comprehensive history of the progress of medicine and surgery. The library

established in connection with this museum has grown to be the first medical library in the world.

Modern European Museums. — Europe nat¬

urally has the greatest number of governmental museums, the capital of almost every state claiming at least one museum of natural his¬ tory and an art gallery, and often anthropologi¬ cal and technological collections as well. Paris, with some 30 museums, probably leads in the matter of national collections, while Berlin and Vienna have respectively about 20 and 15 museums. Turkey forms a notable exception to the above statement, for Friedlander's Directory contains no mention of a Turkish museum, although a commercial museum has been estab¬ lished at Constantinople. Great Britain has the largest number of local museums, those devoted to the preservation and display of objects illus¬ trating the natural history and archaeology of the immediate vicinity, and, as a whole, these are better administered than those of other countries, great care being devoted to labeling, arranging and otherwise making the collections interesting and instructive to the public.

Europe in general and Germany in particu¬ lar possess many technological museums devoted to the illustration of such subjects as mining, pottery making, weaving, shipbuilding, machine construction and operation and similar topics. Perhaps the most important of these is the Deutsche Museum of Munich, which among other exhibits has a considerable number of working models of such machines as locomo¬ tives, so constructed that a large number of the parts is visible, and may be set in motion by the visitor.

Modern American Museums. — There are now nearly 600 museums in the United States, about three-fourths of them attached to col¬ leges or under the supervision of societies, but comparatively few of these are active or im¬ portant. Nearly half of the whole number are entirely or chiefly devoted to natural history and about 10 per cent to art, though this pro¬ portion seems on the increase and the past dec¬ ade has witnessed the establishment of several important museums of art. A considerable num¬ ber of museums are general in their character, including both art and natural history.

About 25 per cent of our museums include or are devoted to history, but here again few are active, though there are noteworthy excep¬ tions, such as the Essex Institute of Salem, Mass., and the Historical

museums of Chicago and Buffalo, the latter of which makes a specialty of publication.

The United States is strangely poor in tech¬ nological museums or even in extensive tech¬ nological collections, though these are steadily on the increase. There is, for example, no museum of naval architecture in this country, the nearest approach to it being the collection of the United States National Museum, in which certain phases of the subject are well repre¬ sented.

Our oldest existing museum, as well as the first public museum in America, is the Charles¬ ton (S. C.) Museum, founded by the Charles-Town Library Society in 1773, later incorpo¬ rated in the College of Charleston and recently passing to municipal control, thereby taking on a new lease of life. Next to this is the Pea¬ body Museum of Salem, the successor of the East India Marine Society Museum, founded in 1799; it also includes the natural history col¬ lections of the Essex Institute.

The Museum of Comparative Zoology, Har¬ vard University, holds the first place among college museums. It is not confined to zoology, as its name might imply, but covers the entire field of natural history. The mineralogical col¬ lection dates back to 1793 and is probably the oldest of its kind in America, while the botanical section includes the Gray Herbarium. • The nucleus of the Museum of Comparative Zoology was the private cabinet of Louis Agassiz, which was purchased by subscription for $12,000 in 1852. In 1858 an allowance was made for the maintenance of the museum and in 1859 the State of Massachusetts assumed an interest in the institution, at the same time appropriating $100,000 for its increase; $71,000 was also raised by private subscription. In 1876 the State assigned its rights to Harvard College and since that time the museum has been maintained by the university, although the great increase in its collection was principally due to the liberality of Alexander Agassiz, who expended over $1,000,000 for that purpose. An im¬ portant museum of anatomy is attached to the Harvard Medical School. The Museum of

Yale University contains the Marsh collection of fossil vertebrates, comprising many types* as well as the largest collection extant of fossil footprints, while brachiopods and sponges are well represented. In other departments are a fine series of modern corals and many rare ar¬ chaeological specimens. The Museum of Yale University is temporarily in storage and there is no immediate prospect of a new building — nevertheless the collections exist. The Museum of Princeton University possesses large and im¬ portant collections of fossil mammals from Patagonia and our Western States, a good col¬ lection of North American birds and many ex¬ amples of ancient and modern art. The Museum of Archaeology, University of Pennsylvania, has the best collection of Babylonian antiquities in America and is also particularly strong in America archaeology; also attached to the uni¬ versity is the Wistar Institute of Anatomy. To Amherst College belongs the Appleton Cabinet of fossil footprints, containing the specimens de¬ scribed by Prof. E. Hitchcock, and the Univer¬ sity of Kansas is rich in Cretaceous vertebrates and large North American mammals. On the Pacific Coast Stanford University and the University of California both have museums ; at present these are largely working collections, but both have art collections apart from these.

The most important as well as oldest museums under the control of scientific societies are those of the Academy of Natural Sciences, Philadelphia, and the Boston Society of Natural History; the first dating from 1812, the latter from 1831, although it was the successor of the Linnsean Society, founded in 1814. Each con¬ tains large collections of birds comprising many types of species described by our earlier orni¬ thologists, such as Wilson, Bonaparte, Cassin and Lawrence. The academy has the largest collection of mollusks in America, and one of the largest in the world, including many types of Tryon, Say and Pilsbry. These two insti¬ tutions may be looked upon as the predecessors of public, scientifically arranged museums in the United States, the majority of our museums being of very recent origin.

There are few museums in the United States

directly owned or administered exclusively by municipalities, as are public libraries, almost the only one being the Public Museum of the city of Milwaukee, but there are many to which the city has contributed or does contribute, either by grants of land, erection of buildings or an¬ nual appropriations for financial support, and there is a growing tendency toward this co-op¬ eration between city and

citizens as the educa¬ tional value and practical importance of museums are recognized. About 15 per cent of our museums belong in this class, including many of the largest and most active, the chief among them being the American Museum of Natural History.

There is, however, a large and constantly growing number of State museums, that of New York standing first, while those of Ohio, Illi¬ nois and Pennsylvania are most important. The scope of these State institutions is somewhat general, comprising natural history and history, this latter being usually treated in a somewhat desultory way.

In the category of museums supported by endowment or by private funds and municipal aid are to be found all the art museums in the United States, not one having been established by the national government or that of any State. Local museums are practically lacking in the United States; for most of the smaller museums, even, make the attempt to. cover the same ground as the larger institutions when they could achieve much better results by con¬ fining their attention to the immediate vicinity. In conclusion it may be said that while public museums are not so numerous in the United States as might be expected from the size, re¬ sources and wealth of the country, the last 25 years has not only witnessed a great increase in their number but in the growth and educa¬ tional efficiency of those already established.

Bibliography. — For detailed information as to museums and their administration, cases, labels and the arrangement of exhibits, consult (Museums Association, Report of Proceedings, etc.5 (London 1890 to 1900) ; since that date ‘Journal of the Museums Association and ‘Proceedings of the American Association of Museums) from 1907; the museums of the United States are listed in ‘A Directory of American Museums, 5 published by the Buffalo Society of Natural History, 1910; those of Great Britain and her colonies in ‘Directory of Museums in Great Britain and Ireland5 Lon¬ don 1911). For the history of the Smithsonian Institution, United States National Museum, classification and administration of museums, consult ‘A Memorial of George Brown Goode5 (Report of the United States National Museum for 1897, Part 2, Washington, D. C.).

A work in three volumes on ‘Museums, their History and their Use, with a Bibliography and List of Museums in the United Kingdom, 5 by Dr. D. Murray, has been published by James Maclehose & Sons, Glasgow.

The volume of museum literature in the shape of reports, bulletins,

general guides and special leaflets is to-day very considerable and many museums issue regular periodicals for the in¬ formation of their sustaining members and the

PUˆ5C-Frederic A. Lucas,

Director . American Museum of Natural His¬ tory.

MUSGRAVE, William Everett, American physician: b. Farmington, Tenn., 12 Sept. 1869 He was graduated (1901) at George Washing¬ ton University and became (1902-09) patholo¬ gist of the Bureau of Science at Manila, P. I., then chief of clinics and later director of the Philippine General Hospital and dean of the College of Surgery, University of the Philip¬ pines. He was (1903-04) president of the Ma¬ nila Medical Society and (1905-06) president of the Philippine Islands Medical Association. He is editor of the Bulletin of the Manila Medi¬ cal Society.

MUSH, moosh, Armenia, the chief town of the Mush samak, vilayet of Bitlis, 79 miles south of Erzerum, near the Kara-su, the eastern affluent of the Euphrates. It is built on a plateau 4,800 feet above sea-level, rising on the south side of a mountain-girt and fertile plain. It is an ill-built, unclean town, peopled by Turks and Armenian Christians. It has Gregorian and Roman Catholic bishops and an American Protestant mission and schools. A thriving trade is carried on in the tobacco, grape vine, wheat and other agricultural prod¬ ucts of the adjacent plain. Mush is mentioned by Xenophon and Moses of Khorene, and came into prominence in 1894, owing to the massacre of Armenians at Sasun in the neighborhood. Pop. about 20,000.

MUSHROOM, a popular term loosely ap¬ plied to many species of higher fungi, especially such as have a cap (pileus) upon an erect stalk. Primarily, the mushroom is Agaricus campestris (see Fungi), the only species cultivated upon a commercial scale. Though more than 700 spe¬ cies of mushrooms have been proved edible within the last half century, and though many others will doubtless be proved

harmless, the novice should be cautious in trying new species. Each unfamiliar kind should be subjected to rigid examination first by smell, and malodorous ones discarded ; then by taste, a small piece being nibbled but not swallowed. If no ill re¬ sults follow in the course of several hours, a small piece may be swallowed. If no evil effects follow, but the flavor raw is unpleasant, cooked morsels may be cautiously tried, and results noted. Each individual must decide what species agree with him, because some systems will not endure kinds innocuous to others. Nervous fear of fancied bad symptoms must be con¬ trolled, or real illness may be induced by the imagination.

Several species are popularly reputed viru¬ lent which do not produce any marked effect upon the health for several hours, and which are widely feared as deadly. Since the two commonest of these (Amanita muscaria and A. phalloides) are often mistaken for the common mushroom, the novice should never gather any toadstools in the woods under the impression that they are the proper mushroom, which grows in pastures, lawns, etc., and not in shady places. Further, all species with yellow or white gills should be avoided until known to be edible. The common mushroom has pink gills when young, and purplish-brown or black gills when mature.

Several of the thousand species of the genus Agaricus are valued for food, but the common mushroom (A. campestris) is the most import¬ ant. It is occasionally found in open and

grassy glades ; never in the deep forest, but most frequently in old pastures and lawns, especially in autumn, but often when conditions are favorable during the summer. It grows about three inches tall, has a fleshy cap about three inches broad, generally white, sometimes reddish or brownish above and pink beneath. Its stem does not rise from a cup-like base as does that of Amanita phalloides. It is generally gathered in the ˆbutton” stage, that is, before the cap has expanded. Among its near relatives the best known is probably the horse mushroom (A. arvensis) which is much larger, whiter above, lighter below, the gills being white when young, but otherwise resembling the common species.

Success in mushroom growing seems to de¬ pend more upon the individual grower than upon t-he method, since two growers may each succeed equally with very different methods. The essentials seem to be decaying organic matter in abundance, uniform but not excessive moisture and equable rather low temperature. The most

popular places for cultivating this plant are caves, abandoned mines and quarries, cellars, pits and similar places, where the tem¬ perature is naturally suitable or may be arti¬ ficially controlled. The beds are usually made by spreading a layer of well-rotted manure and loam over a firmly packed deep layer of fresh horse-manure. After the violent heat of fer¬ mentation has passed and the temperature has fallen to or below 90° F., the mushroom

ˆspawffi* is planted. This spawn consists of the mycelium of the fungus in bricks (English) or flakes (French) made of equal parts of horse and cow manure and loam ; it is a commercial article and its manufacture constitutes a busi¬ ness distinct from mushroom growing. After sowing, the bed is kept moist by mulching with straw or covering with mats which are replaced in about 10 days with a layer of loam about two inches deep. In America the mushroom is rarely cultivated out of doors; in Europe it often is, the temperature and moisture there being more favorable. It is frequently found growing wild in sufficient quantities to make commercial shipments profitable.

Besides the species already mentioned, sev¬ eral common American species are among the most desirable edible fungi. Coprinus comatus, the horse-tail or shaggy-mane mushroom, grows sometimes six inches tall, has a nearly cylindri¬ cal white shaggy cap with often black scales and white gills when young, but these turn black and liquefy with age. It is commonly found in lawns, waste places, rubbish heaps, etc., from midsummer until the coming of frost, especially after showers. C. atramentarius, the ink-cap, resembles the preceding in general appearance and places of growth. C. micaceus, the glisten¬ ing coprinus, is a brownish species smaller than the preceding. It grows upon decaying wood. Lepiota procera, the parasol mushroom, and L. naucina t the smooth lepiota, grow in lawns, pastures and occasionally in gardens. They have white spores and a ring on the stems, to which the gills are usually not attached. Cantharellus cibarius, the chantrelle, grows about three inches tall, measures nearly as much across the cap, has an irregular top-shaped yel¬ low or orange cap and has much-branched gills. It grows upon the ground in woods. Maras-624

mi us oreades, the fairy ring or champignon, is a small cream-colored or reddish species, which tends to grow in circles upon lawns and pastures. It is rather tough and solid, but is valued for Its nutty flavor and its drying quali¬ ties. Its gills are alternately long and short. Lactarius deliciosus has an orange cap, an orange milky juice and with age shows greenish tints where bruised. Boletus edulis, the edible pore-mushroom, has a yellowish or brownish cap, with convex tubes which change with age from white to greenish yellow. It is commonest in chestnut, pine and oak woods during autumn. Fistulina hepatica, the liver-fungus, grows upon decaying wood, is stemless and of irregular form, red, succulent and fibrous. It is often called beefsteak-fungus on account of its edible qualities. Morchella esculenta and several rela¬ tives, popularly known as morels, are of various colors, but usually grayish or yellowish. The top somewhat resembles honeycomb, which makes them easily recognized. They delight in potash and are common where the land has been burned over or wood-ashes have been thrown; also in orchards and woods. Lycoˆer-don giganteum and other species of puff-balls, which are common in pastures, are considered among the best edible fungi if used while still white. They are more or less globular in form. The species mentioned sometimes attains a diameter of several feet.

Mushrooms are often said to be equal to meat in nutritive qualities, but these statements are not warranted by analysis, which show that fresh mushrooms contain about 88 per cent of water, 3.5 per cent of protein, 6.0 per cent of nitrogen-free extract, and generally less than one per cent each of fat, fibre and ash. The protein content is therefore less than one-fifth that of porterhouse steak, less than one-third that of dressed codfish and but little more than one-fourth that of hens' eggs. Indeed, accord¬ ing to analysis, they seem to be inferior to most vegetables. Their chief value is therefore in their flavors, which vary with individual species as much as among higher plants. They are eaten by various animals (see Fungus-Eaters).

Bibliography. — Falconer, (How to Grow Mushrooms) (1892) ; Falconer, (Farmers' Bulle¬ tin No. 57, 5 United States Department of Agri¬ culture, Washington 1897 ; Farlow, (Some Edible and Poisonous Fungi,5 in United States Depart¬ ment of Agriculture Year Book (1894) ; Peck, ˆMushrooms and their Uses5 (1897) ; Dallas and Burgin, (Among the Mushrooms5 (1900) ; Atkinson, (Studies of American Fungi5 (1900) ; Mcllvaine, (One Thousand American Fungi5

(1900).

MUSHROOM GNATS. See Fungus-Eaters.

MUSIC is the science of combining tones in melodic, rhythmic and harmonic order, so as to excite the emotions or appeal to the intel¬ lect. For untold ages it was purely emotional. With its development as a science, in the Mid¬ dle Ages, it appealed almost entirely to the intellect, this species of music culminating shortly before 1600. At the present time that music is considered best which appeals both to mind and emotion. It is the combination and equipoise of these two factors which causes Beethoven to be considered one of the chief

masters, and the music of Wagner, with all its intensity of passion, to appeal also to the men¬ tal processes by its peculiar treatment of Leit¬ motiv en.

Spencer and Huxley suggested imitations of nature (bird-songs, etc.) as a possible com¬ mencement of emotional music. Palaeolithic man had his music, even instrumental music, as may be deduced from a primitive flute of reindeer's horn, found in a cave which was in¬ habited during the Stone Age. Many prehis¬ toric horns of metal have been unearthed among the relics of the Bronze Age.

From two or three notes the scale grew into various intricate and widely differing forms. The five-toned (pentatonic) scale is the most primitive now in use among civilized nations. It was chiefly employed by the Chinese, even 4,000 years ago, but is also used in some hymns ((There is a Happy Land5) and in many Scot¬ tish songs, such as (Ye Banks and Braes,5 or (Auld Lang Syne.5

About 600 b.c. Pythagoras (see Pythago¬ ras) established the proportions of the inter¬ vals, and Music, always an artificial and a human product, was given a natural foundation. (See Mode; Interval). It may be doubted whether harmony existed at all in the ancient world. It is absolutely certain that the Chinese, who were well advanced in the art in ancient days, and who formulated many acoustical prin¬ ciples before the time of Pythagoras, used melody without supporting harmonies. It is possible that the Greeks had a crude accom¬ paniment of drone bass to some of their songs. The Scriptural music, loud ecstatic, and of an improvisional character, is a blind alley and does not lead to modern development of any kind. The music of both the old and new Testaments was orally transmitted and is not to be traced. Ancient Rome copied the Greek music but without fully understanding it. Rome conquered Greece but could not assimi¬

late its culture, and in the first centuries of our era the musical art was retrogressing. The influence of the Christian Church stayed the decadence and gave a new direction to the art. Ambrose (about 340-398) . and Gregory (540-604), stemmed the tide of decay and rescued some part of the ancient systems or modes. The power of music in the early Christian ritual is not only shown by the praises of the Fathers of the Church, but by the fact that the Emperor Julian in 361 endeavored to found a musical conservatory in Alexandria to educate boys to sing in the pagan rites as his adver¬ saries were singing in the Christian churches. The Roman influence now extended the Gre¬ gorian chants all over the civilized world. Boethius (475-524) had written a treatise on the Roman system which became the misty textbook of the earliest days (see Boethius). In 790 Pope Adrian sent singing teachers into France with missals illustrating the Gregorian modes. An antiphonarium was left at Saint Gal-len which still exists and proves the earnestness of the musical mission. The music of this early period, however, is still very vague to us, since no practical notation existed. The musicians of this epoch sometimes employed alphabetical letters as notes (which could be deciphered) but more frequently a system of lines, curves, dots and dashes, called the

Ncunies, which were only to aid the memory of one who had learned the song orally, but meant nothing definite to anyone who had not thus studied it.

A step forward was made by a monk named Hucbald, in Saint Amands, who improved the notation somewhat by using a staff (it is very doubtful if he invented it) and by writing cer¬ tain rules regarding the union of different parts in music simultaneously. The reform seems, at first, to be a very great one, meaning nothing less than the birth of part-music, the evolution of a new science ; but, when one knows that these parts were simply consecutive fifths or fourths, or other equally harsh progressions, one can only marvel that the men of the Middle Ages bore it so patiently. The new system was

called the Organum, since it was often played upon the great wind instrument which had dis¬ appeared when Rome went down, and reap¬ peared in Europe in the reigns of King Pepin and the Emperor Charlemagne.

A much greater reformer than Hucbald came upon the scene about 1000 a.d. Guido, an excel¬ lent monk of Arezzo, founded the system of sight-reading, by establishing a vocal scale on the syllables still in use. He noticed that the hymn to Saint John (patron saint of singers) rose step by step from C to the following words :

(C) UT queant laxis,

(D) REsonare fibris,

(E) Mira gestorum

(F) FAmuli tuorum.

(G) SOLve polluti

(A) LAbii reatum,

Sancte Johannes

causing his choir-boys to memorize the syllables from the melody of their chief hymn, he soon taught them intervals by this simple means, and his treatise (<De ignoto cantu® was the first practical mode of singing “an unknown song” (that is, a song unknown before to the singer), in short, the birth of sight-singing. It must be confessed, however, that Guido’s claims to this tremendous discovery have been contested, and that every point connected with the rise of the science of music is more or less wrapped in vagueness and doubt.

We come to somewhat firmer ground a little later when notes of definite length are intro¬ duced. Franco of Cologne may be credited with the first clear treatise upon such a sys¬ tem (he calls it (<Ars Cantus Mensurabilis®) in the first half of the 13th century.

And now there came a recession from the evil-sounding fourths and fifths that had ex¬ isted in the 10th century, and from some equally harsh progressions that were countenanced long after this. The troubadours in France and the minnesingers in Germany had brought forth secular music that broke many of the old rules yet sounded infinitely better than the more “regular® music. The musical canons of the ecclesiastics began to broaden. Marchettus of Padua and Jean

de Muris, both in the middle of the 14th century, began to urge new progres¬ sions and the consecutive fifths were tabooed, only to reapper copiously in the most modern works of the 20th century.

It will be impossible in an outline sketch to give all the attempts that were made in evolving the new science, from the 11th to the 14th cen —

turies. Suffice it to say that out of these ef¬ forts there grew the first real school of compo¬ sition, and instead of its having birth in Rome, it was born in the Netherlands and in Flanders. Yet the Flemish school at once gave its serv¬ ices to the Church, and many of its greatest representatives in its earliest stages went to Rome as servants of the Catholic cause. The Flemish school may be called the true begin¬ ning of the science of music, since now, for the first time, a race of composers existed who worked according to definite rules in the pro¬ duction of intricate counterpoint, and were able to impart their knowledge to their pupils. William Dufay was the first of this line of composers. His epoch is mistakenly given in many histories as falling in the 14th century, but the researches of F. X. Haberl have proved that he was born shortly after 1400. He died 27 Nov. 1474. The chief of his contemporaries were Hobrecht, Eloy, Brasart and Binchois, who have, however, left little more than their names, and even of Dufay very little music is extant.

The first great teacher of the school was John Ockeghem or Ockenheim (about 1430-1513), and among his pupils was the first great contrapuntist of that time, practically the first great composer that the world had ever pos¬ sessed, — Josquin Des Pres, — whose music Martin Luther delighted in. Des Pres was born about 1440 and died either in 1515 or 1521. Other pupils of Ockeghem were De la Rue, Brumel and Agricola. All the music of the foregoing composers was purely intellectual, but with Des Pres we find the first glimmer¬ ings of emotion mingled with the musical mathematics, and he taught that dissonances could be used to express passionate feeling.

The greatest figure in the Flemish school, however, is Orlando Di Lasso (1520-94), who composed works which are beautiful even to modern ears. The Flemish school ended with this culmination. It had existed about two cen¬ turies and in that time it had brought forth the science of composition and some 300 composers.

There was, however, another country which helped greatly in this result. The first musical dictionary ever written, by John Tinctor (1476), gives the credit of the invention of counterpoint to the English, and a manuscript of a canon for six voices, in the British Museum, would seem to show that there were very skilful composers in England as early as in the 13th century. This canon “Sumer is icumen in®) ascribed by some to John of Read¬ ing, in 1250, by others to a much earlier date, is a surprisingly advanced work for its epoch. A mysterious figure looms up as an English contemporary of Dufay, in John Dunstable, but of the music of this Englishman (who died about 1458) very little is known, only a few fragments remaining.

Contemporaneous with the later Flemish writers one finds a few Italian composers form¬ ing a school of their own. The first of the old Italian school was Costanza Festa, a Florentine, who died in 1545. But the one great master in this field was Palestrina (born probably in 1524 — there is much doubt about the date of birth, — and died 1594), who was without doubt the greatest composer up to that time. He com¬ bined the Flemish ingenuity with a lofty dig-

nity and sometimes (as in his <Improperia>) with emotional power.

The year 1594 was an epoch year in music. The Flemish school ended in that year, with Di Lasso’s death; the Italian school lost its chief master in Palestrina ; a revulsion against the in¬ tellectuality of music took place, — and the first opera was written.

We pause here, therefore, to sum up a few other points in musical evolution that had pre¬ ceded this important date.

Although the chief scientific music of the world had been ecclesiastical up to this point, the troubadours in France, and the minne¬ singers in Germany, had turned the attention of cultured minds to the beauties of secular sing¬ ing. Instrumental music was as yet a Cinder¬ ella among the arts. The strolling jongleurs and

wandering minstrels amused the people, and sometimes the nobility, with displays of skill upon various instruments, combined with juggling tricks. They were generally under the ban of the law and led a very precarious exist¬ ence. Troubadours and minnesingers wrote mel¬ ody only, without harmony.

One of the trouveres of France, — Adam de la Halle, — in the latter half of the 13th century, had written a musical play, entitled (Robin et Marion, > which was the precursor of light opera. It is the earliest popular work of which we have any record, but it was written by ear, and not by any teachable rules. Venice, partly through the efforts of Flemings, partly through Italian influence, had become a centre of organ¬ playing. Adrian Willaert (1480-1562), a Flem¬ ing, had become organist of St. Mark's in Venice and drew many pupils thither, among them Di Rore, Zarlino and Andrea Gabrieli. The last-named taught his nephew, Giovanni Gabrieli, who became one of the noblest com¬ posers of the Venetian school. He was born in 1557 and died in 1613. Zarlino taught many German pupils, and through the Venetian school of organ-playing. Germany for the first time came in close musical touch with Italy. Zarlino taught Scheldt, Praetorius and Scheidemann, while the elder Gabrieli had Hans Leo Hassler as a pupil. Zarlino and Willaert were the first to agitate for a tempering of the musical scale (see Temperament), but its establishment came much later through the wisdom of Bach.

Claudio Merulo (1533-1604) established the organ toccata, probably the earliest form of technical instrumental display in the modern sense. One other form of scientific secular music had arisen, thanks to the Netherlanders ; the madrigal, an unaccompanied vocal compo¬ sition displaying the most intricate counterpoint had come into vogue, and Willaert and Di Lasso had achieved triumphs in this school. Luca Marenzio (1556-99) had also done good work in this field. But the most charming madrigal composers were to be found in Eng¬ land, where this style of singing met with especial favor. It is customary to vaunt the glory of the Elizabethan poets, but if the tremendous name of Shakespeare be eliminated, the excellence of the contrapuntists at this time rivals that of their literary brethren. Tallis, Weelkes, Wilbye, Morley, Farrant, Byrd, Bull, Ford, etc., may well be cited as balancing Beaumont, Fletcher, Massinger, Marlowe, Jon-son, *etc.*

Music-printing (see Printing) had also been established, in 1502, by Petrucci of Fos-sombrone, and caused the compositions of all these men to spread from country to country with great rapidity.

The change from the old school of pure counterpoint to a more emotional style, from intricate choral works to solos both vocal and instrumental, had its first practical demonstra¬ tion in 1594 (some place the date two years later), by the composition and performance of the first opera, entitled (Daphne.) The work was the outcome of the efforts of a coterie of cultivated amateurs who began their meetings in Florence, and endeavored to bring into music something of what they supposed it to have possessed in ancient Greece. The men who were active in this movement, which caused the renascence of music, were Giovanni Bardi (Count Vernio), Vincenzo Galilei, Strozzi, Mei, Rinuccini, Caccini and Peri. Their first opera met with great success, but their second, — <Euridice) — was an epoch-making work, since it contained in embryo an entirely new mode of musical treatment. Counterpoint was re¬ placed by monody, solo singing began, and recitative allowed musical declamation to take the place of intricate tonal construction. The libretto was the work of Rinuccini, while the music was written by Peri and Caccini in two versions, that of the former being the better.

The new school spread quickly to all coun¬ tries, only in France its progress was checked by the power of Lulli, who devoted himself chiefly to ballet-music. The latter was largely introduced into Moliere's plays and obtained the favor of Louis XIV, who sometimes ap¬ peared himself in the dances.

The opera was not the only form of the period of phenomenal musical activity which marked the closing of the 16th century and the beginning of the 17th. The oratorio also had its beginning in this wonderful era. Filippo Neri (1515-95), who has since been canonized by the church, was an enthusiast in the mattei of good church music and at his church in Rome he frequently had religious meetings apart from the regular services, in which he portrayed Scriptural subjects in the shape of musical plays. His friend Palestrina often assisted in this pious work, and may have had a hand in the development of the great sacred form. As these entertainments did not take place in the body of the church, but in the Oratory (Ora¬ torio), the origin of the name of this form will readily be seen.

But the real establishment of the form came with Emilio del Cavaliere (1550-98), who wrote a large work in the new style, entitled (L'Anima e CorpoP This was first performed in 1600, probably in the church where Neri had labored,' and was given upon a stage, with costume and action, exactly as it it were an opera. Although both Neri and Cavaliere were dead, such minute directions were left regarding the mode of pre¬ senting the work that one may presume that the

intentions of the composer were thoroughly carried out. This first oratorio was so en¬ tirely in the new school of monody and decla¬ mation that one may doubt as to whether the es¬ tablishment of opera is not in a large degree to be credited to Del Cavaliere.

Besides the opera and oratorio, instrumental

forms were established at this time as well. Dancing is the mother of instrumental form, ihe dances of Spain had gradually made their way into France and exerted a strong influence upon classical music. In an effort to obtain contrasts several of these were joined together in one large composition, which was at first called a partita, but afterward became a suite.

Free instrumental forms also sprang from the organ toccatas already alluded to. Fresco-baldi (1588-1653) was to Rome what Willaert had been to Venice half a century before. Fres-cobaldi has been called the father of true organ¬ playing. He improved the toccata and called it sonata (a sounding-piece, — that is, an instru¬ mental piece), to distinguish it from the cantata, — the singing piece. Corelli (1653-1713) gave to the old sonata a form, which, although much less important than the later, classical shape, had yet within itself the elements of the noble form. Its first movement was a large three-division shape, exposition, development and re¬ capitulation; and this led to the Sonata-Allegro, the first movement-form of the classical sym¬ phonies and sonatas, the form of many noble overtures.

Amid all these remarkable advances the fugue remained rigid and lifeless, a survival of the old intellectual problem-music. As yet the fugue was little more than a canon, a continu¬ ous imitation of a given melody. It waited its liberator — Bach.

During the century which followed we find Italy combining contrapuntal skill with the less educated enthusiasm which marked the early operas, and such men as Monteverde (1568— 1643) and eventually Alessandro Scarlatti (1659-1725) make of the new school

something far better than its founders had dreamed of. Stradella, Carissimi, Lotti and Rossi added to the advance of the great new school which was to cause Italy to be justly called the “Mother of Music.® The school was established in Eng¬ land too by Henry Purcell (1658-95), who even introduced the Italian musical signs and ex¬ pression-marks into his native country. Pur¬ cell, who was the greatest musical genius that England ever produced, founded his own Eng¬ lish operas upon the Italian models, but his works had characteristics entirely their own and extend all the way from the melody of (Lilli-burlero) (the revolutionary song of 1688) to the loftiest anthems and brightest operas.

In France the great Lulli (1633-87) was bringing forth the most dainty and graceful bal¬ lets. In Germany Reinhard Keiser (1673-1739) began the 18th century by endeavoring to form a German school of opera, but the Italian operas soon resumed their sway.

In Germany, also, the effect of the numerous students who had gone down to Venice in the 16th century and the beginning of the 17th, was beginning to make itself felt. Luther’s influence had established the chorale as a sturdy root whence much sacred music was to grow. Per¬ haps the three men who most helped the growth of Germany’s sacred music in its earliest post-Lutheran stages were the “three Ss,® — Schutz (1585-1672), Scheidt (1587-1654) and Schein (1586-1630), who not only helped Italian music in the Fatherland, but elevated the style of or¬ gan-playing far above anything that Italy had done. Musical settings of the Passion began to

appear in Germany, and the oratorio took a nobler path than in Italy, even before the ap¬ pearance of Bach and Handel. To Germany also was due the new arrangement of part music, which took the melody out of the tenor voice, where it had always been in the Flemish and old Italian music, and placed it in the soprano, a change due to the choral-singing of the 16th and 17th centuries.

Out of the great musical epoch at the be¬ ginning of the 17th century there came also a radical change of notation. The notation of Franco of Cologne had ‘been improved by the invention of many additional rhythms and the employment of smaller notes. In the music of Palestrina and of Orlando di Lasso, that is to say up to 1594, one finds some half-dozen tonalities (keys) employed, and notes and rests down to 16ths. But one does not yet discover a rational division of music into measures. This great advance came shortly after 1600, with the

new monody, the declamatory music of the early operas, and with this came also, for the first time, the use of terms of tempo and of expression. Even the grouping of notes was invented in the latter part of the 17th century, so that this epoch saw the establishment of the greater part of our present notation system. Music of the better class, printed after 1700, is without any very important difference from that printed to-day.

And now the procession of the tone-masters who are prized by the modern world begins. Bach (1685-1750) and Handel (1685-1759) were so exactly contemporaneous that many speak of them as if they had been the Siamese twins of music. Yet their influence was very divergent. Bach leaned toward the old school of pure counterpoint ; Handel was impelled toward modern dramatic effects. They faced different ways. Handel led toward orchestral experi¬ ments and was more directly melodic than Bach. We owe to him the noblest form of oratorio, which, by the way, he did not attempt seriously until after his 50th year.

To Bach we owe debts far more varied and even greater. He reconciled the old diatonic style of composition with the newer more mod¬ ulatory school ; by his great organ works and his clavichord fugues he founded modern tech¬ nique; he was the father of the best school of organ-playing; he composed the greatest mass (that in B minor) which the world possesses, and also the noblest Passion music, and he was absolutely the inventor of freedom of modula¬ tion. Before his time, by what is called “mean temperament,® it was possible to modulate into some three or four major and minor keys. Bach in 1 722 gave to the world the first book of his “Well-tempered Clavichord.® the com¬ poser’s declaration of independence — “We hold that all keys are created free and equal!® (See Temperament). In 1740 he wrote the second book, riveting the great reform.

Opera in the meantime had lost its opening splendor. Intoxicated by the success of the new style of music the composers began to be¬ lieve that poetry was a secondary matter in the wedding of the arts, and in allowing their music to pursue an independent path all dra¬ matic purport was soon lost. A reformer was needed and he soon came. Gluck (1714-87) began a crusade against the meaningless char¬ acter of many of the beautiful melodies of the

Italian opera. In 1776 his opera of <Orpheus> (which still holds the stage) began the dramatic school of operatic music. Beethoven followed in this path, and Mozart managed to reconcile melodic grace and dramatic content.

In carrying this sketch to its conclusion we must now trace three intertwining paths — piano music, orchestral music and operatic and other vocal music. Naturally we shall be able to allude only to epoch-making composers.

In 1709 Cristofori, an Italian, invented the pianoforte. The instrument was at first neg¬ lected. Bach thought it fit only for rondos. Mozart used the spinet, as did Haydn. It was Beethoven who first turned the tide toward the new instrument. Instrumental technique grew up in the train of the new invention. Domen¬ ico Scarlatti (1683-1757) led toward a piano style while writing for the spinet. In 1752 Philipp Em. Bach published the first valuable book of technique, which could be applied to the piano, to the clavichord, or the spinet.

The classical piano sonata grew gradually from a combination of the ideas of the suite and of the first movement of the old sonata as established by Corelli. Haydn first established it, Mozart improved it and Beethoven brought it to its culmination. The symphony was but a larger form of sonata, for orchestra, and the same process of evolution took place. Seldom has a form reached its zenith more quickly; from the first symphony, composed bv Haydn (in three movements and for eight instruments only) in 1759, to the tremendous ninth sym¬ phony of Beethoven, composed in 1824, is but 65 years, yet these years contain all that is pertinent to the birth, growth and climax of every form of sonata, — in which we include classical chamber music, string quartettes, quintettes, etc., and orchestral works such as symphonies and concertos.

Just as there was a most significant musical epoch from about 1590 to 1620, so we find the “classical period,® from about 1775 to 1825 to present not only a marvelous amount of crea¬ tive energy, hut a change in the musical taste of the world, a transformation of the scope and style of music. Only the opera went on ‘s uninterrupted path. Yet here, too, there were some changes.

Beethoven (1770-1827) was an instrumental, an orchestral composer, par excellence. His one opera, (Fidelio, > great art-work though it was, exerted no special influence upon any school of composition. Mozart (1756-91) im¬ proved the style of the Italians in opera, but did not actually strike out a new path. His (Don Giovanni, > for a long time the master¬ piece of the world in the operatic form, was but a culmination of what Italy had already at¬ tempted. Rossini (1792-1868) with a per¬ nicious habit of creating the most beautiful melodies whether they fitted the text or not, set back the hands of the clock of musical progress, as far as opera was concerned, for a good half-century.

The first ringing note of the newer and truer school of dramatic opera was heard when Von Weber (1786-1826) in 1820 completed his ˆreischutz,* an opera built upon the sure foundation of the folksong, a dramatic work, thoroughly wedding its poetry and music.

The sacred forms, during the classical epoch, did not change materially. Beethoven wrote a

most intricate mass, but it was only an echo of Bach with his great polyphonic B minor mass. Mozart composed, almost upon his death-bed, a noble requiem, but it was only an addition of operatic flavor to the requiems that had pre¬ ceded. Cherubini (1760-1842) wrote a couple of requiems that were as great as any of the school — but were not in any sense innovations.

Piano and orchestral works advanced the most in the classical half-century. The vastest piano-work existing to-day is probably Beetho¬ ven's B flat sonata, Op. 106.

The orchestra, in the modern sense, had its birth in the classical half-century. Bach and Handel made only outline sketches of their orchestral works, leaving much for modern com¬ mentators to fill in. But when Havdn came to England, in 1791, he directed a complete orches¬ tra and he published complete orchestral scores, an epoch in the history of orchestral develop¬ ment. Mozart had, however, before this time, written a large number of symphonies in com¬ plete score, many of which were published at a later period. Although the modern orchestra and the full score had their origin in this re¬ markable epoch, the art of conducting came later. Mendelssohn and Berlioz may be named as the first really great conductors in the mod¬ ern definition of the word. The use of the baton in conducting only

became established after 1800.

One other important evolution must be added to the work of the 50 years which form such a golden epoch of musical creation. The songs of Europe, such as had any real worth, were almost altogether folksongs, melodies which grew up as the briar rose bv the wayside of art, not the careful product of great composers, but the spontaneous voice of the people. The songs of the composers were gen¬ erally dull and artificial things, made so, per¬ haps, by the fact that the poets were not con¬ cerning themselves with short and lyrical forms. But when Goethe and Heine, in Germany, be¬ gan writing beautiful lyrical poems, the song-composer was sure to follow soon. Franz Schubert (1797-1828) was the genius who evolved the ˆied,* the artistic song which, however short, was yet a complete and perfect whole; as a tiny Meissonier painting is as per¬ fect in its way as the largest canvas. Schubert added glorious works to the symphonic reper¬ toire, his piano-works practically founded the “Minuet-form,® yet he thought vocally, and his most spontaneous and most important works we consider to be his (Lieder,> which songs began a new school.

We may now follow the three distinct mu¬ sical paths, — vocal forms (including opera), piano music and orchestral music, — each by it¬ self, to the present time. Continuing the song development, we find Schumann (1810-56), and Robert Franz (1815-92) following in the foot¬ steps of Schubert and bringing the miniature vocal form to perfection. The operatic form took a wide deviation.

The work of Rossini was baleful only in the fact that it paid no heed to the weddine of words and music in dramatic unity. In light operas Rossini was a model, and his (Barber of Seville* is a masterpiece. Once, and once only, he proved that he could write a trulv dramatic opera, and produced <William Tell.* Donizetti (1797-1848), Bellini (1802-35), and others, fol-

9 0 U NO D

a Mendelssohn

V\AVD/VJT

Schubert,

Rdi

CELEBRATED MUSICIANS

MUSIC

629

lowed his lead and wrote charmingly, hut un¬ truthfully. France compromised and united prettiness and some degree of dramatic feeling in the works of Gounod (1818-93) and of Ambroise Thomas (1811-96). The real reform, however, of this mesalliance of poetrv and music was made by Richard Wagner (1813—

83) .

Wagner's combat and triumph have been too recent to require detail here. We need only state that his theories of opera, or (<music-drama® as he preferred to call it, were:

1 • The abolition of a set form (that is, ending as one began), and the

use of any shape that the poem suggested,

2. Absolute unity of the entire work. No division into songs, duets, choruses, with applause between and some¬ times even encores.. Continuity from beginning to end.

3. The music is always to interpret the poetry. Its entire character is to be dictated by the words: “ Music is Truth.” “ In the wedding of the arts Poetry is the man, Music the woman “Poetry must lead, Music must fol¬ low ; Music is the handmaid of Poetry are a few of VVagner’s apothegms.

4. Abolition of mere tune and the substitution of a melodic recitative, called the “ Melos.”

5. Absolute freedom of modulation. Not necessarily a fixed tonality to any work or part of it. “ Swimming in a sea of tone.”

6. Excellence of libretto. No book is fit to be used for the text of an opera unless it would make a successful drama by itself.

7. A constant use of the Leitmotif (a musical figure expressing a definite meaning) by which the orchestra speaks a language that can be comprehended, somewhat like the chorus used to do in the old Greek tragedies. (See Leit-Motif.)

These are not all of the theories that Wag¬ ner evolved, but they are the most important. They did not spring into being at once. One sees a few of them in ˆannhauser,* more in (Lohengrin, } but the fulness of his reforms is first revealed in (Tristan und Isolde.*

Wagner’s work has influenced all the mod¬ ern opera composers. Verdi (1813-1901) had begun his career in Italy almost upon the lines of his predecessors. Thanks to his genius he soon began to carve out a better vein for him¬ self. In his (Aida* he began to lead Italy to a much finer and truer school of opera than it had ever possessed. In <Otello) and (FalstafP while carefully discarding the ˆLeitmotif® he seems to arrive at almost all the other Wag¬ nerian conclusions, although his Italian per¬ sonality prevents any great resemblance in re¬ sults. In France, Bizet (1838-75), the best of French operatic composers, was starting upon a similar path with (Carmen } when death inter¬ rupted his career. America has begun to add to the repertoire. Paine and Chadwick began the modern work, but important operas have since been composed by Horatio Parker, Nevin, Cadman, Gilbert, Herbert, Converse, Damrosch and others.

Tracing the piano path from the time of Beethoven we find three great (<Cs® in tech¬ nical writing— Czerny (1791-1857). Clementi (1752-1832) and Cramer (1771-1858). These led to a modern technique and this bore fruit in two different directions. Liszt (1811-86) became the king of the piano and brought its technical power to a point that had never been suspected before his time. Chopin (1809-49) came as the poet of the piano and gave to the instrument its most beautiful phases of ex¬ pression. A host of piano composers have sprung up in every civilized country, Russia furnishing a great number.

In connection with the rise of technique we

may speak of the advance in other branches of music. Italy had great singing schools in the 18th century, and some of the most famous vocal teachers. Nicolo Porpora (1686-1766) was the most eminent of these, and had as pupils some of the most renowned singers of his day, among them Farinelli (Carlo Broschi) who was reputed to be unrivaled in flexibility and in power. Pistocchi was another of the famous teachers of this epoch and his most famous pupil,— Senesino, — disputed the palm even with Farinelli, in England in Handel's time. Vocal technique could scarcely go further than it advanced in the 18th century, although the 19th furnished such singers as Catalani, Malibran, Mario, Rubini, Lablache, Jenny Lind, and later such artists as Jean De Reszke, Adelina Patti, and, in the dramatic school, Materna, Tietjens, *etc.*

In violin technique the chief advance was begun in the 17th century, when Corelli (1653-1713) was the most prominent teacher of Italy. At about this time, too, the golden period of violin making began and the Amatis, Stradi-varius and the Guarnerii made the name of Cremona (the city in which they worked) famous all over the world. The king of all violinists, speaking entirely from the standpoint of virtuosity, was Paganini (1784-1840) who advanced technique so far that even to-day the greatest living violinists are unable to conquer all of the difficulties which he left as a leeacy to the world. Since his time the sceptre has passed to Joachim (1831-1907), who held it for many years, but in his old age, saw it con¬ tended for by a host of advanced players. Paganini influenced violin music toward mere virtuosity, while such players as Joachim, Wil-helmj or Wieniawski combined musical feeling with technique in their work. In recent days Ysaye and Kreisler take the lead in this field.

Orchestral advance has been absolutely phe¬ nomenal since Beethoven made his develop¬ ments in tone-coloring. Berlioz (1803-69) was the first to improve upon the great pioneer's work and achieved remarkable results by his various experiments with new combinations. Wagner carried the art of orchestration still higher in his operas, and since his death a whole host of great tone-colorists have arisen. Rus¬ sia has contributed very much to this advance, and it is not an absurd prophecy to predict that the Slav may attain the orchestral supremacy of the world in the near future. Tschaikowsky (1840-93) appears to be the greatest genius in this field that Russia has yet produced.

In Russia, however, there was, at the end of the 19th century, a decided movement toward a national school, headed by the so-called «Big Five® — Rimski-Korsakoff, Borodin, Cui, Mous-sorgsky and Balakireff, and such composers as Rachmaninoff, Glazounoff, Tanaieff, Scriabine and Stravinsky have helped the orchestral ad¬ vance, the two latter being especially radical and ultra-modern in style.

France has also advanced greatly in the or¬ chestral field thanks chiefly to the naturalized Belgian, Cesar Franck (1822-90), who taught many of its chief composers of recent days and himself wrote many noble works. Massenet, Saint Saens, D'Indy, Charpentier, Pierne, Cha-brier and many others have advanced the or¬ chestral standard or have written what may be called symphonic operas. There is much free-

dom of form in the neo-Gallic school. Debussy (1862-1918) and Ravel have established a new school of orchestral treatment, the former being remarkable in delicacy and subtle coloring as well as for the frequent employment of a scale consisting entirely of whole tones.

Germany has developed chiefly along the Wagnerian lines, not an unmixed blessing when applied to purely orchestral music. After Beethoven there came a period of dulness in the symphonic field. Mendelssohn (1809-47) wrote much symmetrical orchestral music, but

in spite of his melodic grace and symmetrical style he was not of the stuff of which epoch-men are made. It was Schumann (1810-56) who led the campaign against following too slavishly the classical paths and through this the romantic school and the freer sonata forms came into modern music. Brahms (1833-97) by his great symphonies and other sonata forms has proved, however, that the classical school does not merely belong to a by-gone epoch. Richard Strauss (1864 —) has followed the Wagnerian system in all of the theories given above. He has exhibited overwhelming skill in both operatic and orchestral works, and occa¬ sionally genius, but <(Richard, the second® has not yet rivaled his predecessor in the Dower of his ideas, although he may be classed as a very important living composer. German music has gravitated rather toward skill than poetry in its recent manifestations, and Mex Reger and many others have striven for very large scores and many instrumental complexities.

Under the lead of Richard Strauss the chief modern orchestral tendency is toward "Pro¬ gramme-music,® instrumental music, wdiich by means of its title or program notes gives a definite picture. Along with Berlioz, Franz Liszt (1811-86) was the founder of this school of work. It is beginning to dawn upon the world that Liszt's orchestral works were fully as important as his piano compositions. He has led to great brilliancy of tone-coloring, and in his 'Poemes Symphoniques,5 to freedom of form and dramatic power.

England too has heard the modern voice and her precise and correct contrapuntal school as represented by Mackenzie, Stainer and others, has given way to a much freer and bolder ex¬ pression as shown in the works of Elgar, De¬ lius, Bantock, Holbrooke, *etc.*

Even Italy is influenced by the orchestral tendencies of the present and the operas of Puccini, Wolf-Ferrari, Mascagni and Leon¬ cavallo, and the cantatas of Bossi, no longer give the voice great preponderance over the or¬ chestra and no longer treat the latter as a mere accompaniment. One Italian, Ferruccio Bu¬ soni, has plunged headlong into the German school of advanced orchestral works of freest form.

Scandinavia deserves great credit for the nationalism of her best music. As in Russia, her chief composers endeavor to reflect the spirit of their native folk-music in their clas¬ sical works. Grieg (1843-1907) was the chief founder of this style, but Sinding and Sibelius have given important works in the same vein and the last-named has recently attempted the most free and radical modes of modern ex¬ pression.

America has been especially fertile in the

orchestral field. The real classical beginnings were made by John K. Paine, and a little later by George W. Chadwick, but at present Foote, Converse, Carpenter, Hadley, Schelling, Gil¬ bert, Cadman and many others are writing in the largest forms. MacDowell's (1861-1908) orchestral works, as well as his piano compo¬ sitions, have a place in the standard repertoire of all nations, and Horatio Parker has com¬ posed the first great American oratorio — 'Hora Novissima.5

Women composers are more numerous now than at any previous epoch in the world's his¬ tory. Ethel Mary Smyth, in England ; Mrs. H. H. A. Beach, in America ; Augusta Holmes (1847-1903), in Paris, and many others, have composed good works in the largest musical forms.

It is difficult to prophesy what the future may bring in musical development. Music is the most changeable of arts. Like language it is an invention of man, and even if founded upon natural laws it is still an artificial and, therefore, a changeable product. There is at present a decided tendency toward great com¬ plexity and cryptic expression ; heavy scores and epic prolixity are constantly in evidence. Whether this is but a passing phase time only can show. Conservative musicians are aghast at the many bold experiments which are being attempted. We believe, however, that when the experimental stage is passed the tremendous orchestral skill that has been won will be re¬ tained, but that it will be again combined with the melodic grace and beauty of the older mas¬ ters, and that Beethoven's apothegm will be re¬ established — aMusic, even when picturing something ugly, must itself remain beautiful.®

Bibliography. — Ambrose, 'Geschichte der Musik) ; Aubry, 'Troubadours and Trouveres5 ; Baker, bibliographical Dictionary of Musicians) ; id., 'Music of North American In¬ dians5 ; Baltzell, dictionary of Musicians) ; Banister, (Musical Analysis) ; Bie, (History of Pianoforte Music5 ; Breakspeare, (Life of Mo¬ zart5 ; Brendel, 'Geschichte der Musik5 ; Bla-serna, bound and Music5 (acoustica) ; Dick¬ inson, (The Study of Musical History5 ; D'Indy, 'Beethoven5 ; Dunhill, 'Chamber Music5 ; Elson, A., (The Book of Musical Knowledge5 ; (Club Programmes of Many Na¬ tions5 ; 'A Critical History of Opera5 ; 'The Orchestral Instruments and their Use5 ; Elson, L. C., (Errors and Disputed Points in Music5 ; 'The Curiosities of Music5 ; 'The Great Com¬ posers and their Work5 ; (The History of Ger¬ man Song5 ; 'Our National Music and its Sources5 ; 'Theory of

Music5 ; ‘The History of American Music5 ; Engel, (The Music of Most Ancient Nations5 ; Fetis, ‘Histoire generale de la musique5 ; Finck, bichard Strauss5 ; id., bongs and Songwriters5 ; id., (Wagner and His Works5 ; Fletcher, ‘Indian Story and Song from North America5 ; Forsyth, Orchestra¬ tion5 ; Grove, dictionary of Music and Musi¬ cians5 ; Hadow, btudies in Modern Music5 ; Henderson, ‘How Music Devoleped5 ; ‘The Story of Music5 ; Hood, (History of Church Music in New England5 ; Hopkins, (The Organ, Its History and Construction5 ; Hughes and Elson, ‘Contemporary American Composers5 ; Huneker, ‘Liszt5 ; Krehbiel, H. E., ‘A Book of Operas5 ; id., ‘A New Book of Operas5 ;

id., ‘How to Listen to Music’; id., (Music and Manners in the Classical Period) ; Lavignac, (Musical Education’ ; Maitland, (English Music in the 19th Century’ ; Matthews, ‘The Great in Music ‘ ; id., ‘How to Understand Music’ ; Miller, ‘Science of Musical Sounds’; Niecks, ‘Life of Chopin’; Newman, ‘Wagner, the Man and the Musician’ ; Newmarch, ‘Russian Opera’ ; Paine (ed.), ‘Famous Composers and their VVrorks’ ; Parry, ‘Bach’; id., ‘The Evolution of the Art of Music’ ; Pauer, ‘Dictionary of Pianists’ ; Pole, ‘The Philosophy of Music’ ; Pratt, ‘History of Music’ ; Prout, ‘The Orches¬ tra’ ; Riemann, ‘Dictionary of Music’ ; ‘Schu¬ mann, Life and Works’ ; Rimbault, ‘The Piano¬ forte, its Origin, Construction, etc.’ ; Rambos-son, ‘Harmonies du son’ ; Rowbotham, ‘His¬ tory of Music’ ; id., ‘Troubadours and Courts of Love’ ; Reissman, ‘Geschichte der Musik’ ; Stainer and Barrett, ‘Musical Dictionary’ ; Streatfield, ‘Masters of Italian Music’ ; id., ‘The Opera’ ; id., ‘Hundel’ ; Schumann, ‘Music and Musicians’ ; Sonneck, ‘Early American Opera’ ; id., ‘Early Concert Life in America’ ; id., ‘The Star-Spangled Banner’ ; Thayer, ‘Beethoven’ (German) ; \yeitzmaun, ‘History of Pianoforte’ ; Williams, ‘The Story of Notation’ ; Zalim, ‘Sound and Music’ (Acoustics).

Louis C. Elson,

Instructor at Neiv England Conservatory of Music, Lecturer and Author.

MUSIC, Children's, a somewhat ambiguous phrase which may be applied to music written specially for children or music produced by them. As used in this article, the term covers the broad, educational phase of the subject as to what may and should be done to make the noblest of the arts an important factor in the child's spiritual development. The purpose of this article is, therefore, to point out the neces¬ sity for intelligent treatment of children's music and to outline some ways and means by which the musical side of a child's nature may be developed fully and naturally. The need of such an encyclopaedic article is obvious. There is hardly a subject that is so shamefully over¬ looked and so little understood by parents and others as the educational and cultural signifi¬ cance of music. Even in our schools, where better consideration and fuller comprehen¬ sion might be expected, music teaching falls far short of its cultural possibilities. In our homes, naturally, the state of music and musi¬ cal instruction is generally worse, due largely to the mediocrity of the average music teacher. "It is doubtful," says one of our foremost mu¬ sical educators, "whether there is any subject of instruction which is taught so carelessly, sc ignorantly, so improperly, and by so many peo¬ ple who are by nature and training unfit to teach, as music."

But methods of teaching, save in their gen¬ eral educational aspect, do not come within the scope of the present article. These and the various other technical phases of music and music-teaching are adequately treated under their appropriate headings.

The Educational Value of Music. — Quite apart from such general considerations as have long been adduced in support of music's claims as the purest, the noblest and the most univer¬ sal of the arts — which, of course, cannot be

enumerated here — there are several very' weighty reasons why music is peculiarly fitted to serve as the first art in the education of the young. One of these is found in the fact that music, although the most abstract (subjective) of all the arts, is the only ar.t that can be ap¬ prehended in early childhood. The normal human infant sings and is susceptible to song long before he can talk or walk — certainly very long before he is sufficiently sensitive to color vibrations and other complex sensory im¬ pressions. Thus, at an age when children can neither draw nor mold nor read nor write, they can enter the kingdom of beauty through music. "By singing, and by singing only," says Mr. T. W. Surette, "a little child of five may come in contact with a pure and per¬ fect form of beauty." Just because music is an abstract art,

an art which has no necessary ob¬ jective reference (like painting and sculpture, for instance), it lends itself so admirably to the expression of that idealism with which every normal child is endowed by nature.

Another important educational advantage possessed by music is its great socializing tend¬ ency. For very young children music means, or should mean, primarily singing; and singing for them should imply, principally, groupsing¬ ing. Now, such singing, be it the spontaneous duets of the nursery or the more conscious choruses of school and other assemblies, is a decidedly social activity requiring a degree of cooperation and self-abnegation not called forth by any other abstract. When children sing in unison — and adults, too, for that mat¬ ter — their natures tend to lose much of their angular, anti-social individuality. Incidentally, such exercises afford invaluable practice in concentration and co-ordination — concentra¬ tion of attention and co-ordination of eye, ear and mind — which promote a degree of men¬ tal alertness and precision hardly result from participation in any other cultural art.

A third reason for the educational pre-emi¬ nence of music — and many others could be given, did space permit — is found in the fact that, being the purest of the arts, music is, in the words of Montesquieu, “the only one of the arts which cannot corrupt the mind.” That this is another very important educational ad¬ vantage goes without saying. For, however young or immature a child may be, its mind cannot be debased by bad music in the manner of “spicy” stories or obscene pictures. Music as such is neither moral nor immoral, as has been repeatedly pointed out ; it is wwmoral. It is not before music is wedded to some other means of expression (language, acting, etc.) that it as¬ sumes any definite meaning. If the result of such union proves to be ethically undesirable, the objectionable element is not the music, which is not definitive like sculpture or painting, but the concrete medium with which it happens to be united. Even in the sad case of “rag-time,” the “dime-novel of music,” as it has been aptly called, the harm lies more in the vulgar and highly suggestive words than in the meretri¬ cious melody. Thus, while cheap and noi¬ some music, if long persisted in, may pervert a child’s musical taste, it cannot undermine its morals. The loss in the former case is nega¬ tive; in the latter, positive. The first belongs to the sphere of aesthetics ; the second, to that of ethics. It is this negative quality of music,

the ideal of all art, that makes it so well suited to serve as the first and foremost cultural art in the spiritual education of the young — an art which, properly presented, enlarges a child's sympathies, broadens its emotional ex¬ perience, gives greater play to its innate ideal¬ ism and increases its capacity for joy in num¬ berless ways.

The Need for Early Music-Training. — In

view of the great educational, social and cul¬ tural importance of music, its neglect in our homes is as inexcusable as it is unaccountable. Yet, so general is this neglect that most chil¬ dren grow up to manhood and womanhood without ever becoming really musical. Even «of the thousands of people who consider them¬ selves musical,® say two prominent American writers on music, <(it is surprising how few have any real appreciation of it.® But if American adults are, as a class, unmusical, while American children are for the most part musical — and both are facts generally admitted by musical educators — the fault can lie only in the wasted musical opportunities of childhood. ((If the natural taste of our children for music were properly developed,® says a distinguished musi¬ cal authority, <(they would continue to practice it and to find pleasure in doing so.® This neg¬ lect is chargeable partly to our homes, whose prevailing music is still of a cheap and vulgar character and where music-making is rarely pursued as a family function, and partly to our schools, where musical education is still apt to be considered as an extra subject for the tal¬ ented few rather than as the rightful heritage of the many. That the other fine arts fare no better in this respect does not, of course, im¬ prove the musical situation in the least.

Just because music is, as already stated, the only art-form accessible to very young children, neglect to cultivate it properly in the home is far more irremediable than is the case with any other art. Yet, how rare is the American home in which music-making is pursued as a family function or in which children may naturally acquire a love for musical art. Even in intelli¬ gent homes — and intelligence in other depart¬ ments of art does not necessarily argue musical understanding or appreciation — music is still regarded too much in the light of a fashionable accomplishment, and not as an indispensable part of a thorough education.

If children are to grow up with any greater fondness and appreciation for music than the average adult manifests — a desultory liking, at best — there must be a fuller realization among parents and educators of the need for proper musical education. In other words, until parents come to understand the true mis¬ sion of music and afford their children ade¬ quate means for its realization, no real prog¬ ress can be made in this direction. <(The mat¬ ter cannot be safely left to the schools,® says Mr. Surette, ((as at present constituted.® It is the home, therefore, that must radically change its attitude toward art in general and music in particular, if the present generation of music-tasters is to be succeeded by a new generation of true music-lovers.

Ways of Promoting a Child's Musical De¬ velopment. — Coming now to the consideration of ways and means by which the musical edu¬ cation of children may best be promoted, it

must be said at the outset that environment and example play a far greater part than precept and instruction. That much' music and morals have in common. Musical homes are the great¬ est promoters of a child's musical development, while unmusical parents are apt to be its great¬ est hindrance. In general, it is as wise to ex¬ pect music-loving children in unmusical homes as tropical fruit in the frigid zone. But as most children are potentially musical, develop¬ ing a child's musical taste and understanding is a question of allowing this potentiality to be realized — that is, of supplying the proper ob¬ jective and subjective stimuli.

((The surest and most rational method of teaching children to know and to like music,® says Thomas Whitney Surette, ((is through per¬ sonal experience and contact with good music.® This can be done in at least three ways: Cl) By singing and hearing beautiful songs, which train the ear and cultivate good musical taste ;

(2) by learning to play good music on some standard instrument, which gives one a deeper insight into musical form and structure ; and

(3) by cultivating the art of intelligent listen¬ ing, which enlarges one's musical understanding and familiarizes him with musical literature. In other words, the three specific aids to musi¬ cal development are — singing , playing and in¬ telligent listening. We shall consider each of them in the order given.

(1) Just as musical educators insist that a child's musical education

should begin in the cradle, they keep on reiterating that singing is the best means for this early training. A mother's sweet lullaby is the time-honored and unexcelled child's song-primer. ((The baby should hear soft, melodious, correct singing every day,® says Dr. Frank Damrosch. ((If the parent cannot supply this, so much the worse for both parent and child. The next best thing is to get a nurse who can sing nurs¬ ery songs correctly. It is as important as any other qualification necessary for the proper care of the child. The singing of good, simple songs to children in their earliest years is one of the most valuable means for inducing not only a correct musical ear, but also a love for music as such. A child brought up in this way will never be tone-deaf, and will probably sing be¬ fore it can talk — certainly long before it learns to talk correctly.® That singing is the only rational foundation for a child's musical education is the opinion of every prominent musical educator. <(Singing by ear spontane¬ ously and without technical instruction, but rather for the joy of doing it, and for the formation of taste on good models,® writes an¬ other eminent musical authority, (<is the proper beginning of all musical education.® Singing beautiful songs is not only the best preparation for an intelligent understanding pf the master-works of musical literature, but a positive joy in itself, a supreme joy to every normal child. <(The joy which a child gets in reproducing beautiful melodies,® this writer points out, <(is like no other experience in life. In the process of doing so, its whole being — body, mind, heart and soul — is engaged. The song, for the moment, is the child. There is no pos¬ sible realization of the little personality com¬ parable to this… . Through this [singing] children can feel a beauty and order and se-MUSIC, CHILDREN'S

quence which their minds are incapable of grasping? Hence, whatever instrument a child is to take up later, the first essential is to learn to sing songs intelligently and for the joy of the thing.

As young children are so impressionable and their memories so tenacious, their songs cannot be chosen with too much care. The cheap arti¬ ficial vulgarities that pass by the name of music — those coarse, unimaginative conglom¬ erations in which rhythmic excitement is the common substitute for musical ideas — must be as rigidly excluded from our homes as are foul air and tainted food. The

effect of the former may be less apparent or immediate, but it is just as pernicious and more irretriev¬ able. (<Artificial and false methods? says Mr. Surette, (<are less harmful to children than the poor, vapid and false songs by means of which the taste is slowly and surely disintegrated? On the other hand, the influence of good songs is even more indelible. ((In all the reminiscences of days gone by? wrote Phillips Brooks, ((there is nothing that so haunts the spirit as the songs to which we were accustomed in childhood? Yet, the great majority of parents — parents • who may be deeply concerned over the cut of their children's clothes and the style of their shoes — do not give a moment's thought to the kind of songs their children are singing. Cer¬ tainly, children's music deserves as much at¬ tention as their manners or morals; and the task of selection or exclusion is a compara¬ tively easy one, if begun early enough, since most children whose ears have not been de¬ bauched by abominable <(rags® instinctively pre¬ fer good songs. That much musical taste seems to be theirs as part of their natural en¬ dowment. So much the greater is the parental crime in allowing it to become debased.

For the first stage of a child's musical edu¬ cation, which should be as spontaneous and as informal as possible, the traditional folk¬ song affords abundant and most appropriate material. ˆFolksong,® writes a distinguished musical authority, ((was the beginning of what we call (melody? and the best specimens of it are quite as perfect within their small range as are the greatest works of the masters.® Its simple but beautiful melodies, the common her¬ itage of the ages, are musically invaluable both as a means and as an end. As a means, they prepare children for an intelligent appre¬ ciation of the compositions of the great music masters, which, according to some musical edu¬ cators, many adults deprived of such prepara¬ tion can never attain to. How great is the debt of these musical m'asterpieces to the old folk¬ songs and dance tunes may be judged from the fact that even the symphony, the highest and purest form of music, pays its everlasting tribute to their melodic fertility and rhythmic diversity.

But this educational value of folksongs, great as it is, would hardly justify their ex¬ clusive use with children if their own charms were insufficient, since nothing so effectually kills musical interest in young children as dull, non-pleasurable singing exercises. It is as an end in itself, and not as a means to some other end, that the singing of folksongs, folk-ballads, and folk dance tunes makes so strong an appeal to both young and old. <(Whatever has at any time appealed to the best emo¬

tions and moved the hearts of a people,® says Dr. Claxton, Chief of the United States Bureau of Education, (<must have for their children and their children's children political, historical and cultural value. This is especially true of folk¬ tales and folksongs.® Thus, while cultivating good musical taste and storing up musical melo¬ dies to be recognized as old acquaintances later, these folk-tunes establish most enduring ties between the generations of men.

(2) If a child's songs have been wisely chosen from infancy and his singing has been made a pleasurable experience to him, he should show by the time he is seven whether he is really musical or not. In the latter case, the informal period of musical training has been no loss, but a clear gain to the child; in the former eventuality it has been a most rational preparation for the second period — the more formal one — which is to involve one or an¬ other of the standard musical instruments.

The choice of a musical instrument should never be haphazard; it must be made very carefully and intelligently, and always with full regard to the particular aptitudes and powers of the learner. Musical educators greatly de¬ plore our unfortunate custom of selecting in¬ struments regardless of their fitness for the individual child who is to learn to play upon them. Says one of them: ((The majority of the children who have private instruction in music take lessons in pianoforte playing® because ((it has become a custom ; the pianoforte is an article of domestic furniture; pianoforte play¬ ing is a sort of polish to a cursory education.

… It is the line of least resistance; there are plenty of teachers of pianoforte playing, but few teachers of music, so parents accept that which is available.® Parents who have the best musical interests of their children at heart will do well to consult some reputable, disinterested musical educator as to the choice of an instru¬ ment. In view of the deplorable vogue of the piano and the even more deplorable dearth of intelligent piano players, this costly and pon¬ derous instrument should be viewed with special suspicion. Its indiscriminate choice is said to end fatally for nine-tenths of our music pupils, pupils whose painful fingering leaves them nothing but a sad memory of much valuable time needlessly wasted. Everything else being equal, therefore, almost any standard musical instrument would seem to be preferable to the piano for non-professional purposes. The lat¬ ter should be chosen <(only when a child pos¬ sesses a certain amount of that physical co¬ ordination which is absolutely essential to play¬ ing the pianoforte.® In the interest of chamber music, a most excellent aid to amateur music study, preference might well be given

to the violin or the violoncello. Certainly in homes really musical such variety will be sought as will promote the cultivation of chamber music. If such musical foresight were more common, our children would pursue music with greater enthusiasm and profit; while our family circles could become intimately acquainted with the masterpieces of sonata literature which are now a closed book to them. With such convenient and inexpensive means for building up correct musical taste in our very homes, so-called un¬ musical children would become as rare as un¬ musical parents are now common. Only then might we all cease worshiping mere virtuos-634

ity or technique and learn to love music for its own sake. Only then shall gross incapacity to appreciate music be classed with other forms of ignorance as being equally discreditable.

As to the age at which a child is to begin formal music study opinions differ. An au¬ thority already quoted in this article thinks seven the earliest age; another (Albert Lovignac) makes six the lowest limit; while others place it anywhere from five to 10. (<I shall

never advise allowing a child that is not to be exhibited as a phenomenon at shows and cir¬ cuses,® writes Professor Lovignac, ((to study any musical instrument whatever before the age of six at the earliest .® Of course, it is not a child's age that should be considered, but his musical readiness and responsiveness. Only when a child has gone through the singing stage of musical development — that is, when a child has been singing beautiful songs for several years and has had his musical instincts developed thereby — is he ready to take up instrumental music with pleas¬ ure and profit. <(I question the wisdom,® says Mr. Surette, ((of forcing children to play who are not qualified to do so ; and I think playing should, in any case, be postponed until the musi¬ cal faculties are awakened by singing.® Be¬ fore this awakening comes, no real musical edu¬ cation is possible — and the sooner parents and teachers recognize this fact, the better for all concerned. (<A great deal of nonsense is talked nowadays,® says a writer on the human side of music, ((about the necessity for taking the fingers when they are young and supple. I believe that, generally speaking, they are quite as young and supple as is necessary at four¬ teen or fifteen; and that a single hour of prac¬

tice, reinforced by the enthusiasm of one who has his eyes fixed on the enchanted castle — the lure of chamber music parties and amateur symphony orchestras — is worth fifty hours of forced and grudging grind. … A large amount of needless indifference to good music and even active hatred for it is caused by putting chil¬ dren at dry piano scales and Czerny-with-the metronome before ever they have developed a single spark of enthusiasm for the classic beauty to which the excellent Czerny is such an ob¬ vious and supple finger-post. To do this is to teach them to regard the choicest portions of musical literature as all of a piece with the lit¬ erature of the spelling-book.®

Not less important perhaps than the choice of an instrument is the selection of a music teacher. Elsewhere in this article an authori¬ tative opinion was cited as to the sad state of present-day music teaching. In view of this, parents should exercise special caution in en¬ gaging music teachers for their children. With¬ out much circumspection in this regard they are more likely to encounter the incompetent instructor, who blights a child's love for music, than the real music master who encourages and promotes its growth. The harm done by medi¬ ocre music teachers — teachers who understand neither their art nor the child they undertake to teach — is both positive and negative. Their employment is absolutely inexcusable and never fails to lead to remorse and disappointment on the part of those misguided parents who share the fallacy that any kind of teacher will do for musical beginners. The fact is that the best

teacher is none too good for the earlier stages of music study, for «cheap teachers® may lay such a faulty and insecure foundation as will make all future musical progress well-nigh im¬ possible. In other words, they prove a most wasteful economy and must be studiously avoided by every well-intentioned parent and guardian.

In order that such may know what the qualifications of a good music teacher are, the following summary (from Dr. Frank Damrosch's (Some Essentials in the Teaching of Music*) is here appended in full. (<He must be a person of culture and good breed¬ ing; a good musician, able to play with ample technical skill, accuracy, intelligence and taste; thoroughly grounded in the history of music; equipped with a wide knowledge of musical literature and ac¬ quainted with the standard compositions in every field of musical art; and, finally, he must have high art ideals and be able to arouse and maintain them in his pupils.® And, it should be added, the more such a man knows about the other arts, about the science of education and

about the psychology of childhood, the bet¬ ter a music teacher he will make. Unless par¬ ents can provide such private instruction in music as these qualifications promise, the musi¬ cal education of their children were better en¬ trusted to a reputable school or conservatory, where the professional standards are apt to be above those prevalent among private music teachers, with their proneness to overindulge the whims and tastes of their unmusical em¬ ployers.

With good musical instruction — instruc¬ tion that places greater emphasis on apprecia¬ tion than on execution — and with parents in¬ telligent enough not to clamor for tangible and quick results — results measured by mechanic¬ ally acquired repertoires — the child's musical education is most auspiciously begun. Even though the child does not acquire a wonderful technique, it will be sure to acquire that which transcends in value all mere dexterity — real understanding of music itself. Even if a child acquires but the ability to read music at sight, it gets an educational advantage comparable to the ability to read verbal language, an advantage which means an open door to the world's musi¬ cal literature. But under proper encouragement and intelligent guidance, even children who may not be destined to become good musicians will grow up to be true music lovers, a far greater attainment, as we shall see presently, and one really worth striving for.

(3) Whether a child pursues his musical stud¬ ies in the instrumental field or not, his musical appreciation should go on developing through intelligent listening. The latter is certainly as good a means for developing one's musical fac¬ ulty as drawing a bow or manipulating a key¬ board. Indeed, it is owing to our unfortunate emphasis on <(executive ability® as the sole test of musicality that there are far more perform¬ ers than real music-lovers in the wrorld. But until this emphasis is shifted from performing music to its appreciation, the progress of music education can have no firm basis. Music, as the noblest of the arts, must never be confused with mere titillation of the ear and finger gymnas¬ tics ; and any view of music is erroneous which places technical dexterity — at best a means to

an end — above the end it is to serve. “Pieces well played,® the everlasting desideratum of parents, may be more tangible results of music study than appreciative listening, but the latter is a surer and more permanent means to life¬ long musical enjoyment. <(The capacity properly to listen to music” says H. E. Krehbiel, dean of American musical critics, <(is better proof of musical talent in the listener than skill to play upon an instrument or ability to sing acceptably when unaccompanied by that capacity. It makes more for that gentleness of emotion, thought and action which in the highest sense of the term it is the province of music to promote. And it is a much rarer accomplishment.® Moreover, it should be remembered that not all can be per¬ formers of music. “Distaste or inability in the matter of learning to play the piano,® savs Pro¬ fessor Macpherson, “is hardly to be regarded as a proof either of an unmusical nature or of a dislike for music. … In the case of literature, we should not go to the length of depriving children of good books if they were to prove themselves unable to recite, or unfit to write verses; why, then, starve them musically simply because, from comparable reasons, they prove themselves unable to reproduce with any de¬ gree of success the musical literature on the piano ? … I am convinced that we shall never create a community of really intelligent listen¬ ers until we realize that ‘their ‘training should consist of something more than the abortive struggles at the keyboard, which at present too often pass as musical education in many schools and private families.®

Every child, therefore, should be given fre¬ quent opportunities to hear good music, vocal and instrumental. This course alone, consist¬ ently and judiciously pursued, might make the younger generation more musical; for “being musical,® it should be remembered, “does not necessarily lie in performing music, but is a state of being which every individual who can hear is entitled by nature to attain to in a greater or less degree.® While a theoretical knowledge of music undoubtedly enhances one’s pleasure in listening to it, such knowledge is no more essential to real musical enjoyment than the ability to perform. Just as exquisite enjoyment may be experienced in viewing a beautiful landscape without any knowledge of botany or geology, so great pleasure may be derived from hearing the world’s musical mas¬ terpieces without any technical knowledge of their structure or form. Yet, true musical appreciation is not passive, like simple sensa¬ tions, but calls for active cooperation on the part of the listener. “Music,® says Prof. Dick¬ inson, “like all fine art, demands

an active ex¬ ercise of the will, as well as a sensitiveness to physical elements and a vague response to sug¬ gestion… . An earnest mind cannot be

satisfied with a pleasure, however pure and ele¬ vating, that quickly dissolves, leaving no resi¬ due to be worked over by the memory.®

Musical appreciation can and should be cul¬ tivated from earliest childhood. The need for such special cultivation arises from the well-known fact that every art requires habituation to its peculiar language, forms and lines of excellence. Repeated impressions and frequent associations are the indispensable conditions for

the study of all art. “Just as one cannot take in at a glance the artistic beauties of a Whistler portrait or the linguistic beauties of a Miltonic poem,® says Mr. Surette, “so one needs con¬ stant experience in hearing music to learn to appreciate all the melodic depth and inventive¬ ness of the works of Brahms, Bach and Bee¬ thoven.®

Like the drama, music has been too much regarded as a pastime — too much as our diver¬ sion rather than as our spiritual salvation — even among intelligent listeners. Therefore, whatever else children learn about music, they must learn to regard it an art that is far above mere recreation and amusement; as an art that appeals to the intellect as well as to the emo¬ tions ; as an art whose pleasureableness grows upon one with the degree of serious attention he brings to it; and, finally, as an art the proper understanding of which is just as great a men¬ tal achievement as an understanding of the higher forms of literature or the abstract sci¬ ences — certainly a far higher achievement than learning to play an instrument without distinc¬ tion or to sing without musical taste.

But musical appreciation grows slowly; it cannot and must not be forced. Children should be allowed to absorb the best music un¬ consciously at first. They should not be ex¬ pected to appreciate compositions that are far beyond _ their stage of musical development. Cramming a Beethoven symphony into a young child’s ears is just as judicious as cramming Miltonic poetry down his throat. Both must bide their time. Although children can grasp and aesthetically comprehend music far beyond their ability to perform, tfiere are, of course, obvious limits which wise parents and teachers will do well to bear in mind. But, unless chil¬ dren are forced in their musical education, there is no danger in their hearing musical compositions

that transcend their understand¬ ing. If a child is musical, much of this musi¬ cal experience will bear fruit later; if not, no harm can come of this premature exposure to its elevating influence.

The non-technical means and objects, then, of musical education for children are — to sum up in the words of another — “observation, dis¬ crimination, reflection ; cultivating the memory for musical phrases and melodies, disciplining the senses, enlarging the scope of the imagina¬ tion, and nurturing the sense of beauty. By such a process we attain in some measure to that joy which is one of the chief objects of art in general and of good music in particular.®

Bibliography.— Owing to the dearth of lit¬ erature bearing directly on this subject, a few magazine articles, entered alphabetically under the names of the periodicals, are included in the following list of references: Atlantic Monthly, Children’s Music* (March 1916) ; Britan, (The Educational Value of Music) in (The Philosophy of Music) (New York 1911) ; Brower, (Home Help in Music Study* (ib. 1918) ; Craftsman, (Music and Our Children* (October 1915) ; Damrosch, Come Essentials in the Teaching of Music* (New York 1916) ; De¬ lineator, (Giving the Children an Ear* (Octo¬ ber 1911); Dickinson, <The Education of a Music Lover) (New York 1911) and (Music and the Higher Education (ib. 1915) ; Educa¬ tion, (The Cultural Value of Music) (Novera-

her 1911); Farnsworth, Education Through Music5 (New York 1909); Journal of Peda¬ gogy, (The Musical Interests of Children’ (October 1898) ; Krehbiel, (How to Listen to Music5 (New York 1906) ; Lavignac, < Musical Education5 (Singleton’s translation, ib. 1903) ; Macpherson, (The Musical Education of the Child5 (Boston 1916) ; Mills, <The Study of Music as a Means of Education5 in (Music and Education’ (London 1905) ; Monthly Musical Record, (The Children and their Music’ (Au¬ gust 1916) ; Musical Leader, (Music as Part of a Child’s Education (May 6, 1915) ; Patterson, (How to Listen to an Orchestra5 (London 1913) ; Proceedings of the National Education Association, (Musical Appreciation — How it is to be Developed5

(1912) ; Schauffler, (The Musical Amateur — A Book on the Human Side of Music5 (Boston and New York 1911) ; and Surette and Mason, (The Appreciation of Music5 (New York 1907).

David A. Modell.

MUSIC, Education in. The question as to the effect of music on the moral life and char¬ acter of the individual is one which has been discussed from time immemorial, but regarding which no definite conclusions have yet been reached. The Greeks had an exalted opinion of the art in this respect: it had wonderful powers of molding the nature of man, far beyond anything to be observed to-day. Conse¬ quently it played an important part in their scheme of education. But Greek music, we must remember, included poetry and dancing, and thus occupied a position of eminence which would not have been warranted by the exercise of mere tonal art. Furthermore, the scales of Greek music were intimately connected with certain fixed aspects of life. One, for example, was used for martial and patriotic purposes, another for religious ceremonies, and a third again for the expression of feelings of love. Thus the scales became imbued with a power and significance which were not their own, but were drawn from the circumstances with which they were associated.

In more recent times the eulogy of music has been less pronounced, yet the art is still heralded as a positive moral and educational agent. Luther was emphatic in his praise of it, and advocated its employment in the training of youth. Herbert Spencer taught that it had the function of developing the emotional element of speech, and since speech is a means of arousing feelings in others, of enhancing sympathy. Ac¬ cording to Mr. Haweis it is an efficacious method of exercising and disciplining the emo¬ tions. Opposed to these views, however, we have the opinions of other thinkers who doubt the moral value of music, or even regard its effects as deleterious. Edmund Gurney denies any direct effects at all, though he makes full allowance for the indirect. Hanslick grants a certain elemental power over the emotions, but insists that this stands in inverse ratio to the in¬ dividual's culture. Tolstoi seems to detect an influence for evil rather than good ; while Wil¬ liam James, though not referring especially to music, shows how the frequent evaporation of emotions without results in conduct, — and this characterizes many musical emotions, — pro¬ duces a tendency toward evaporation in general, and so weakens the moral fibre.

In explanation of the divergences of opinion it may be pointed out that there are temporary and permanent effects to be considered. There is no doubt that music can produce momentary expansions and elevations of spirit - — and it may be that these were held in mind by its champions — but it by no means follows that such ebulli¬ tions are of lasting value. Indeed, it is even possible, according to James, for good emotions to work harm if they do not issue in corre¬ sponding actions. Then again, as already indi¬ cated, there may be differences of opinion ac¬ cording as one considers the art in its narrower sense or includes the circumstances with which it is associated. A succession of tones by itself may not be good or bad, but the words, danc¬ ing and general circumstances in connection with which it is heard may be good or baa, and tfyeir moral quality may be transferred to the tones themselves.

This is not the place to go into the details of the arguments which seek to establish the moral quality of music. It must be confessed, however, that many of these arguments are of a vague and general character, and are more convincing as evidences of the fervor and en¬ thusiasm behind them than as demonstrations of the propositions which they seek to establish. To speak in eloquent words about beauty and harmony, as if the mere hearing of a major triad were sufficient to bring peace into a man's troubled spirit, is little more than a rhetorical flourish. It is a case where the proverb about cup and lip is decidedly applicable. As well try to prove that the constant exhibition on the stage of the dire results of sexual immorality will engender chastity among actors. A mere reference to the life of the foremost composer serves as a refutation of such lines of proof. For though Beethoven's career may have been picturesque and heroic, it was certainly the op¬ posite of harmonious both subjectively and socially.

A rational way of approaching the problem is the empirical one of recourse to experience. We may ask: are the musical nations and indi¬ viduals superior to the unmusical? The reply must certainly be in the negative. The Italians, Germans and Slavs are musical, the French less so, and the English rather unmusical, yet there is no corresponding agreement in the scale of ethical valuation. Likewise there is no corre¬ spondence between the moral value of individ¬ uals and their taste for the art of tones. People with no musical ear whatever may be upright and reliable, people who are susceptible to the art given to weaknesses and vice. The situa¬ tions are complicated, to be sure, and there may be antagonistic influences which obscure the ac¬ tion of music, but in the absence of proof that this is so we are compelled to say that the facts do not favor the assumption of a definite and pronounced effect like that in question.

We must conclude, accordingly, that the prop¬ osition regarding a directly moral or educative effect of music is still lacking demonstration; indeed, the evidence that we have seems rather to be of a negative character. But this does not apply with the same force to the indirect effects, or detract from the total value of the art. To begin with, music affords a pure and high species of pleasure. And why should this not be sufficient? Do we expect the rose to

teach us a moral before being legitimized, or the clouds to deliver a sermon? Pleasure may n˚t ex.haust the meaning of existence, as the utilitarians would have us believe, but it sub¬ serves a highly important function in the scheme of creation. Its anticipation by the individual is one of the chief incentives toward action, and its actual enjoyment of the greatest impor¬ tance as a relief from toil and fatigue. Further¬ more, since pleasure will and must be enjoyed, any exercise of it in pure and refined forms — as in music — ought to be welcomed, taking the place, as it does, of the more noxious kinds of enjoyment into which people are constantly tending to fall. Here the recourse to experi¬ ence may be of help. The English may not be inferior to other peoples in a profound ethical sense, as indicated, but they are notoriously given to intemperance, while on the other hand they are emotionally somewhat too sober. Is it unreasonable to suppose that these conditions would be remedied if, like continental peoples, they took more interest in music and art? In addition to producing pleasure, music serves as a framework and beautifier of social activities. It embellishes the play, dignifies the commence¬ ment exercises, graces the household meeting of friends, lends emotional power to the wor¬ ship of God. This influence may at times ac¬ quire considerable importance. Of Luther, in¬ deed, it was said that he won as many adherents through his chorals as through his religious teachings. Finally, where immediate rather than remote effects are desired, as in the on¬ ward rush of battle, music may even produce direct dynamic results of great power.

So then, there is enough reason for the culti¬ vation and teaching of

this art, even without the direct effects of which we have spoken. Music is and will remain an important element in the life of the individual and community. Nor will the phonograph, wonderful though it is, ever quite replace its personal exercise. We shall always require artists to create new records; there is a pleasure flowing from actual singing and playing that is unique; and the social effects of cooperation in the rendition of pieces can likewise be obtained in no other way. Indeed, to judge from the outlook at present, music is going to gain in recognition rather than lose. Provisions are being made for its cultivation on a scale more extensive than ever before. In the past, public instruction has been confined largely to singing in class. And this, in fact, may be the best way to arouse that sympathetic glow of feeling which it is a func¬ tion of the art to foster. But higher attain¬ ments of course demand individual instruction. Hitherto this has been gained chiefly through outside lessons, or, in the case of prospective musicians, conservatories of music. Both of these methods have disadvantages. In the con¬ servatories there is practically no education apart from music, to the disadvantage of gen¬ eral culture. And with the outside lessons there is too little incentive for the rigid prosecution of music itself. As the work in school is sup¬ posed to fill the child's time, it follows that he has no energy left for extra studies. Or if he attempts to do justice both to his school work and his lessons, it is the health which is likely to suffer. Under the circumstances the rational thing to do is to make provision for music in

the school curriculum itself, even when taken outside of school hours, and allow it to count toward graduation. And this, in fact, is begin¬ ning to be done. Several cities of our country have already adopted the plan suggested, it has the sanction of prominent educators, and there seems but little doubt that it will spread until it has become universally established. The re¬ sult will be a great impetus toward the cultiva¬ tion of the art. Those who possess talent in this direction will have time and opportunity to develop their powers. Music will no longer be considered as a mere accessory in the educa¬ tion of youth, but will take its place in worthy co-ordination by the side of all those other studies that go to the fashioning of educated men and women.

Albert Gehring.

Author of (The Appreciation of Music? *etc.*

MUSIC, The Psychology of. Psychology as applied to music can be

considered from the point of view of the listener, the performer and the composer.

I. So far as the listener is concerned, the object of the science is to give a thorough analysis of the process involved in hearing music, and account for the accompanying pleasure. Beginning with the impact of the sound waves on the ear, it must be shown in the first place how that organ is physically affected. The elementary conscious effects must then be elucidated, whereupon associative relations will be traced, and higher intellectual and emotional reverberations accounted for. Such a treatment, to be sure, is at present a mere desideratum toward which we are mov¬ ing, but the complete realization of which is still a long way off.

Only in regard to the first stages of the process have, we reached anything like fairly satisfactory insight. Helmholtz's great work on Sensations of Tone, while perhaps not final in every particular, has established certain acoustic facts which are fundamental and will always remain as a basis of musical aesthetics. In general, Helmholtz's treatise deals with the subject of partial tones, combinational tones and beats. Partials, he has shown, accompany most tones of a musical character, and are the source of their differences of timbre. Dis¬ sonances are explained as the result of rapid beats, while consonances owe their purity of sound to their comparative freedom from the same. Minor chords are accompanied by com¬ binational tones that are foreign to the har¬ mony, and hence produce a veiled, mysterious effect. The relative harmoniousness of differ¬ ent chord positions is also dependent on the absence or presence of foreign elements. Many other propositions receive elucidation from Helmholtz, but the reader who would learn about them is referred to his classic work itself or the well-known translation of the same by Ellis.

The higher and more psychical reaches of the matter have been approached with con¬ siderable skill by various writers, although the results are by no means as clear and incon¬ trovertible as the more elementary ones of Helmholtz. Among the valuable dissertations to be mentioned are Gurney's Power of Sound, Stumpf's Tonpsychologie, and an essay in

Lazarus' Leben der Seele entitled Die Wirkimg der Musik.

A central problem of musical psychology and aesthetics is that of accounting for the pleasure derived from the art. Among the theories that have been invoked for this pur¬ pose, two of the best known, though they like¬ wise belong to the most untenable, are those of Darwin and Spencer.

According to Darwin, music is the result of sexual selection. Those of our pre-human ancestors who could sing best were chosen as mates by the opposite sex. The emotions of love, rivalry and combat incident to the breed¬ ing season were thus associatively welded to the perception of tones, so that we, in listening to music, have called up ((vaguely and in¬ definitely the strong emotions of a long-past age."

According to Spencer, on the other hand, the art owes its stirring power to its sugges¬ tions of excited and emotional speech. The cadences of music are an intensification of those of language, and arouse the correspond¬ ing emotions in exaggerated form.

Later writers on the subject have for the most part either ignored these theories or cast them aside. And it must be admitted that they do not take account of the vast complexity of the subject with which they deal, nor afford much in the way of positive proof.

There is no doubt, for example, that the pleasure we derive from the art is due to a variety of causes. These may be reduced to five : the elementary power of tone, form, as¬ sociation, symbolization and sympathetic agi¬ tation through parallelism of tonal process. All of these contribute to the final result. There is an effect of tones which is purely physiological in nature, and insusceptible of further analysis. Structural beauties are a source of distinct delight, especially in compo¬ sitions of an elaborate character. Associations are involved, symbolizations play their part, and there are numerous points of resemblance be¬ tween the flow of tones and the flow of thought and feeling. It would seem, however — and here Darwin and Spencer may be right — as if the peculiarly unique and intense enjoyment afforded by music when it thrills us to the core must likewise be due to a unique cause, or it may be unique combination of causes. What this is has so far not been satisfactorily ex¬ plained. However, the most promising sug¬ gestions are those which have been offered by the

“symbolistic” and “parallelistic” theories. The theory of Schopenhauer is fascinating and in some respects highly plausible, but it is metaphysical in nature and so does not fall within the scope of the present article.

A further problem, from the point of view of the listener, is that of the moral effect of music on the individual, which would branch out into the broader questions of its social effects and its place in the life of the com¬ munity. The question why some people are susceptible to emotional stirring by tones, while others are callous, is an interesting branch of the general problem of musical enjoyment, which likewise has not yet received a satisfac¬ tory solution.

II. From the point of view of the per¬ former the task of psychology is to describe

accurately the physical and mental processes operative in the rendition of compositions; more especially the easiest and most effective processes by which the desired results may be achieved. The practical benefit of such knowl¬ edge would lie in its help to musical pedagogy. With adequate insight of this kind it would be possible to show wherein the numerous “methods” are both valuable and faulty, and prescribe the best method for any particular case.

A psychology of “learning,” applied to music, would elucidate the quickest and most effective means of mastering particular compositions and attaining general proficiency. Tests would also be valuable as aids in the work of the teacher. With their assistance it would be possible to determine on the spot whether a student had talent or not ; likewise what his weak and strong points were, and what kind of treatment he would accordingly require.

So far, not much has been done along these lines. The educational psychology of music has, for various reasons, lagged behind that of other branches of pedagogy, both in its theo¬ retic results and the disposition made of these results. It is a rare thing for a prospective teacher to acquaint himself with the conclusions of psychological research ; and to tell the truth, the material *at his disposal is by no means ample.

III. The methods and habits of composers in creating their works furnish material for many interesting anecdotes, but these would gain scientific value only in case they yielded a better understanding of the

laws governing musical inspiration in general, and thus enabled us to produce at will the conditions favorable for such inspiration.

Of greater general interest, at present, is the question of the manner in which a composi¬ tion reflects the individuality of the composer, as well as the nationality to which he belongs and the age in which he lives. There must be exact marks by which the emotional qualities of a man can be detected in his works, and exact laws according to which a mood or per¬ manent state of mind transmits itself into a composition and gives k a characteristic stamp. Likewise there must be a relation between the nature of a composition and the nationality and era of which it is the product. To a con¬ siderable degree such relations have been noted, and they belong to the most interesting facts of musical psychology. There is hardly a doubt, for example, that the rapid tempos of Haydn and Rossini are a reflection of the buoyant, sprightly nature of these men, while the slower and more massive progressions of Beethoven evince a heavier temperament. Similarly the sharp dissonances and syncopations of the lat¬ ter composer must be an expression of his tem¬ peramental explosions and tragic moods. There are relations between the nature of a country's songs and its dances and inflections of speech, resemblances between the music of a period and the contemporaneous literature and art. But most of the foregoing correspondences are spo¬ radic and fragmentary, and have not so far been systematized into general laws. Knowing the nature of a man, we can in many instances detect traces of that nature in his works, but we are net as yet able to reverse the procedure

mereWn? W - the man ˚n the basis

mciely of his compositions.

p,roblem. wbich up to the present as defied solution is that of the

apparent in¬ capacity of the feminine sex for the task of composition. There is hardly a more peculiar problem in the entire psychology of sex. The plea that woman has had no chance is not ten¬ able for the girls that study music far out¬ number their masculine competitors. And yet though there is no dearth of reproductive ar¬ tists, — singers and instrumentalists, — there is not a single woman composer of primary im¬ portance. Literature has produced many amous novelists and poets, art has contributed several noted painters, but the domain of musi¬ cal composition seems to be a field which has been all but untrodden by the members of the feminine sex.

The psychology of music, then, represents a realm of problems and mysteries. It is a region of beginnings rather than attainments, borne of the problems, bound up with the hid¬ den and subconscious aspects of mentality, may be slow of solution, some perhaps may never be solved Most promising are those which deal with the reproductive mastery of the art. The questions of pedagogy, indeed, are not so in¬ tricate but that a thorough analysis may be ex¬ pected at a day which is not too remote. The advantages will be varied. There will be a sifting of the fit from the unfit. Those who obviously have no talent for performance will leave this task to their more favored brethren, and save their energies for congenial pursuits. The talented, on the other hand, will have their labors facilitated by an accurate methodology. There will be a saving of nervous wear and tear, and greater results will be achieved in a shorter time.

Albert Gehring,

Author of (The Appreciation of Music,' *etc.*

MUSIC-BOX. See Musical Instruments, Mechanical.

MUSICAL DRAMA. See Drama; Music.

MUSICAL ELEMENTS AND TERMS.

Music is the science or art which treats of tones produced by the mathematically regular vibra¬ tions of resonant bodies, in

contradistinction to a confusion of irregular vibrations created by noise or a jumble of sounds.

Modern music, therefore, considered on its technical side depends upon a perfected sys¬ tem of mathematics and acoustics, evolved through centuries of gradual development, an evolution sketched in the historical and de¬ scriptive article on Music in this work, to which refer, as also to Greek Music; Mode; Modula¬ tion; Temperament; Well-Tempered Clavier, and related subjects.

By its manipulation of space and time in the process of development, the whole science of music has resolved itself into the mathematical measurement, combination and distribution of sound waves. Tones, considered simply as to their duration, are magnitudes of time, which stand in a descending geometrical progression the exponent of which is 2:1, V2, Vi, %, Vl6, %2, *etc.* The time is expressible in fractions (%, 14, %, 16, %, %, etc., time), which

indicate in numbers how many parts of time (O) are contained in each bar. In space, tones

can be considered as magnitudes of sound, and their distances from each other in the scale are expressed in numbers, which have refer¬ ence to a mathematical division of the space between two sounds, adopted as limits (the octave, the third, seventh, etc.). Similar pro¬ portions exist between the various voices, the soprano or treble, bass, etc., and between the various keys. In instrumental music, the depth and height of the tones depend upon the pro¬ portions of the thickness, length and lightness ot the chords, the quality, diameter and dis¬ tance of the openings in wind instruments and the like ; and all these proportions are deter¬ mined and measured according to mathematical rules. Middle C, shown in the scale farther on, has about 132 vibrations to the second, and is produced by sound waves from eight to nine feet apart. Waves at half that distance apart, produce a tone one octave higher, half that again the next higher octave, and so on. In large organs C four octaves below middle C, Tth vibrations per second, is reached, but the effect is imperfect. The piano reaches a4 with 3,520 vibrations per second, and sometimes 5 with 4,224 vibrations. The highest note taken in the orchestra is probably a5, on the piccolo, with 4,752 vibrations. The practical range in music is from 40 to 4,000 vibrations per second, # embracing seven octaves. The human ear is, however, able to compass 11 ?Aˆ/VeS’ notes vibrations ranging from

16J4 up to 38,000 in a single second of time.

As may be gathered from the preceding paragraphs, the simplest form of musical sound is the Tone, distinguished by the three proper¬ ties of length, pitch and power. These three properties constitute the elemental departments of music: rhythmics, treating of the length of tones, the structure of phrases, sections and periods; melodics, treating of the pitch and succession of tones; and dynamics, treating of the power or force of tones, and the manner or form of delivery.

Tones are represented by characters called Notes, named by some nations, including the English-speaking races, after the first letters of the alphabet, A, B, C, D, E, F, G; and, by Latin nations generally after syllables, as Do, Re, Mi, Fa, Sol. La, Si. Notes by their posi¬ tions on the Staff of five lines give the pitch of the tones, and indicate their length by their form. The notes in common use are the

WHOLE-NOTE WAlf-NOTE QUARTER EIGHTH SIXTEENTH THIRTYSEC0N»

r r 9 p %

the names indicating the relative length of their tones. In modern music, the Whole-note, occupying all of an allotted amount of time,' is regarded as the unit, although a character representing a tone twice as long as the Whole-note, and called a Breve or Double-note (Cˆ) is sometimes used.

Rests, — characters used to indicate silence,— correspond in length of time to the notes which they represent, as indicated by their names :

WHOLE-REST HALF-REST QUARTER EIGHTH SIXTEENTH THIRTY-SECOND

- - i ort y ? f

A Dot placed after a note or rest increases the duration of either by one-half ; two Dots

increase by three-fourths, the second dot adding one-half the length of the first.

A curved line (ˆ), called a Tie or Bind, placed over or undef two notes of the same pitch, indicates that they represent a single tone equal to their united lengths; the curved line drawn over two or more notes which differ in pitch, is called a Slur, and indicates that these notes are to be sung or played legato, that is, smoothly and fluently.

The Pause (ˆ) or Hold is placed over or under a note and indicates a prolongation of the sound according to the judgment of the performer.

Three equal notes may have their length diminished or reduced by placing the figure 3 above or below them; so marked they are termed Triplets, and their length equals two of the same kind.

To facilitate interpretation and performance, musical compositions are divided into short sections of equal duration calleu Measures and Parts — into measures by single bars and into parts by double bars. If a part is to be re¬ peated, dots, called Repeating Dots, precede the double bar. (See characters at end of article).

The regular succession of these parts is called Meter, and this mathematical division of sounds by means of measures, metrical divisions and notes, is called Time. The time of each measure is the same as that of every other measure in the part and is determined by two figures, in the form of a fraction placed at the beginning of the piece, or at the beginning of a part. The Numerator of the fraction indicates the number of beat counts into which the meas¬ ure is divided; the Denominator indicates the form of note which will represent the beat. Thus % shows that there are six beat counts in the measure and that an eighth-note will fill each beat.

According to the division of the Measure into parts, it is respectively called Double, Triple, Quadruple or Sextuple measure. Each kind of measure may have several varieties, according with the length of the notes expressed by the denominator of the fraction. For ex¬ ample : —

DOUBLE. TRIPLE MEASURE. QUADRUPLE MEASURE

,8rri lirrri nrrrri

LM lirrri lirrrri

‘* 1 igccrl Igeeeel

Accent — the life of Rhythm — is a stress given to certain parts of the measure. In Double and Triple measures, the first part is accented ; in Quadruple measure, the first and third parts; in Sextuple measure, the first and fourth parts. In measures containing two ac¬ cents, the first is the principal and stronger.

Rhythm, defined in its broadest application, is the swing and sweep of a musical composi¬ tion, emphasized by the accents ringing out in their proper places, and attaining a series of climaxes in the special stress given to each metrical division of the work.

A Syncopated Note is one that begins on an unaccented part of a measure and continues on an unaccented part, giving the not unpleasant hiatus or jump to the rhythm, characteristic of much of the popular modern American music.

The length of the beats in each measure is indicated by certain Italian words, the chief of which are adagio, allegretto, allegro, andante, andantino, largo, larghetto, lento, moderato, presto, prestissimo, the definitions of which will be found in the table of musical terms incor¬ porated with this article.

In the elemental department of melodics, fhe staff is used to represent the relative posi¬ tion and pitch of tones. The staff consists of five lines and four spaces, each line and space being called a degree. Added lines, called Ledger or Leger lines,, are used to represent tones which are too high or too low to be represented upon the staff. They may be placed above and below the staff to any extent de¬ sired, as they are simply a continuation of the staff, the note immediately above or below the staff being in a space. The lines and spaces of the staff are named from the lowest upward, first line, first space, etc., the added lines and space? above or below also being respectively enumerated first line above or first line below, *etc.*

Each degree or line and space is desig¬ nated by one of the first seven letters of the alphabet, determined by the character of the Clef. The Clef is the character placed at the beginning of the staff to show how the letters are to be applied. The Clefs in common use are the G or treble clef marking the position of G on the second line of the staff, and the F or bass clef marking the position of F on the fourth line of the staff. In four-part songs, the soprano and alto are written in the

treble, and the tenor and bass in the bass clef. The C on the first line below the treble staff, and the first C on the first line above the bass repre¬ sent the same tone which is known as Middle C.

The staff as here represented embraces the compass of every singing voice, and extends over a range of 31 notes, or four and a quarter octaves.

Voices are usually considered under three divisions for the male: bass, baritone and tenor; and four for the female sex, contralto, alto, mezzo-soprano, and soprano. The usual range of the bass is from E below the bass clef (phenomenal voices sometimes descending to lowest C) ascending two octaves to f ; baritone from G on first line of bass clef, two octaves

&

#3

t=t

i — i~

$

TT

Jot

W

± ±

fcl

t=t

?,tf,‘FGABCD E F G A B c d © f g a b c’ d’ ‘e’ f’ g’a’Vc”d”e”

JLf

SBXTOTUt KBASVKI. .

r r r r f r|

c t c C 5 c

MUSICAL ELEMENTS AND TERMS

641

to g; tenor, from C, two octaves to c ; con¬ tralto, the deepest female voice, from F lo c”, or two and one-half octaves; alto, two oc¬ taves, from F to f ; mezzo-soprano, from A to a’; and soprano from c (middle C) two octaves to c”, which is also indicated as c2. Following natural and mathematical laws the tones of the female voice are an octave higher than those of the male, therefore a soprano solo sung by a tenor is rendered an octave lower than the notes in which it is written.

Besides the treble and bass clefs, others are used by certain orchestral instruments,, as the alto clef for the viola, marking the position of C on the third line, and the tenor clef used for the trombone and marking the position of C on the fourth line.

The different vocal and instrumental parts are commonly represented by two or more staves, united by a Brace, and called a Score.

The Absolute Pitch of Tones, that is the pitch independent of scale relationship, is des¬ ignated by the letters naming the degrees of the staff ; as A, B, C, D, E, F, G. The position of these letters is fixed and

unchangeable while the clef remains unchanged.

The difference of pitch between any two tones, as from A to B, from A to E, from C to G, etc., is called an Interval, and in the regular succession of the natural tones, there are two kinds of intervals, larger and smaller. The larger intervals are called Tones and the smaller semitones. In the major scale the semitones occur between the third and fourth notes and between the seventh and eighth notes, the other five notes of the scale representing each a tone. These two half-tones in the octave afford in¬ finite variety in music. Were the eight natural sounds in the octave equidistant one from another, there being no semitones, the keys would differ only in acuteness and not in qual¬ ity, as now. Between any two tones of the staff having the interval of a step, another tone may be inserted, dividing the step into two half-steps. These inserted tones are represented on the degrees of the staff by the aid of characters called Sharps and Flats. Thus, a tone inserted between C and D, is named C sharp, or D flat.

A Sharp #, placed on a degree, raises the

pitch of a tone a half-step; a Flat, b, placed on it, lowers the pitch of a tone a half-step be¬ low that named by the letter. The power of a sharp or a flat may be canceled by a char¬ acter called a Natural, ft. A Double Sharp, % is used on a degree affected by a sharp, to repfesent a tone a half-step above the one af¬ fected by the sharp; its power may be can¬ celed by a sharp and natural, A Double Flat, bb, is used on a degree affected by a flat, to represent a tone a half-step below the one affected by a flat; it may be canceled by a flat

and natural bft.

The Signature of a Staff is the part between the clef and the fraction; it is named from the number of sharps or flats which it contains, and indicates the key in which the composition is to be sung or performed. If there is no sig¬ nature, the key is that of C or its relative minor A, and the notes correspond with the white keys of piano or organ. A sharp or flat in the signature applies not only to the degree on which it stands, but also to all others which

represent the same pitch. A sharp, a flat or a natural, placed outside the signature, is called an Accidental, as appearing accidentally in the measure, and applies only to the degree on which it stands. If not

canceled, its influence extends no farther than the measure in which it appears, except when the last note of a measure is flat or sharp, and the first note of the following measure is the same letter; then, if it is syncopated, the influence of the accidental extends to that note.

The Relative Pitch of Tones is indicated by a Scale, or Tone Ladder. The Diatonic Scale, generally called the Scale, consists of a regular succession of intervals from the keynote to the octave, 1st, 2d, 3d, 4th, 5th, 6th, 7th, 8th or octave, by a compromise called Temperament (q.v.), it having been found most agreeable to join to the seven sounds of one group, the first of the next higher, making eight in all. The keynote is the first note in the scale. This scale is also called the Major scale to distinguish it from another scale, having its semitones in different order, and called the Minor scale. In the compass of the scale there are five whole tones or degrees, and two semitones or half¬ degrees. Commencing on C, that is making C one of the scale, these semitones are found between the third and fourth and seventh and eighth degrees and between the first and third degrees are found two whole tones, marking the distinctive feature of the ˆMajor® or greater third. All music written on the scale when so constructed is said to be in the major keys; and this scale can only be formed from notes following this natural order. There is, however, another series of notes, equally well fitted for expressing musical ideas, which is formed by commencing on A instead of C or the equivalent note of any other Major key-tone. In this scale the semitones always fall between two and three and five and six, between the first and third degrees, there being not two whole tones, but only a tone and a half, mak¬ ing the ((minor}) or lesser third. All music written on a scale so constructed is said to be in the minor key, and is often most im¬ pressive. The Minor scale has various forms. In the Natural form as already shown, the half-steps occur between two and three, and five and six, and is formed from the Major Scale, by taking the last two notes above and placing them below. The Harmonic form dif¬ fers from the Natural form by the introduction of sharp-seven. The Melodic form in ascend¬ ing has sharp-six and sharp-seven, while it usually descends by the Natural form. The Minor scale, based upon six of the Major scale, is called its relative minor; and the Major scale, based upon three of the Minor scale, is called its relative major. The signa¬ ture of a minor piece of music is the same as its relative major, the additional sharps or flats being introduced before the proper notes in the piece. Thus, a minor piece in the key of E has the signature of G major, that is F$, and Dfi is used instead of D.

The keynote is One of the scale, and is called the Tonic. As already explained a minor third above the tonic characterizes the Minor scale;

a major third, the Major. The Fifth of the scale is the Dominant; the Fourth, the SubDominant. The key of a piece of

music is the fundamental tone, or one of the scale in which it is written, and is indicated by the signature. The key of C has no sig¬ nature. The other key signatures are G, one sharp — F$; D, two sharps — F$, Cjj A, three sharps — F$; C#, G$; E, four sharps — F||, C$;

G#, D#; B, five sharps — F#, C#, G#, D{j, A#; Fjf, six sharps — F#, Cjf, G$f, D#, A#, E#f; F, one flat — B(7 ; B|? , two flats — B[? , E[? ; E[? , three flats — Bf7 , E(7, A|?; A[?, four flats — Bp, Ep, Ap, Dp; Db, five flats— Bp, E|p, Afc>, Dp, Gp; Gp, six flats — Bp, Ep, Ap, Dp, Gp, Cp. Notice that beginning with C the dominant or fifth note of each scale forms the tonic or keynote of the next scale, and thus interweaves the 11 scales into a completed circle.

An interval is the difference of pitch be¬ tween any two notes in the scale. Unisons are of the same pitch. A major second consists of a step; a minor second of a half-step. A major third consists of two steps; a minor third of a step and a half-step. A perfect fourth consists of two steps and a half-step; an augmented fourth of three steps. A perfect fifth consists of three steps and a half-step; a diminished fifth of two steps and tWo half¬ steps. A perfect sixth consists of four steps and a half-step; a diminished sixth of three steps and two half-steps. A major seventh consists of five steps and a half-step; a minor seventh of four steps and two half steps. A perfect octave consists of five steps and two half-steps. These are called diatonic intervals, as they are all found in the diatonic scale. Other intervals, called chromatic intervals, may be formed by the use of sharps and flats. When the lower note of the two representing an interval is placed an octave higher, or the upper one an octave lower, the interval is said to be inverted. The degrees of an interval arc counted upward, unless the opposite is stated; and the degrees occupied by the notes, as well as the ones between them, are counted.

The Chromatic Scale is a regular succession of semitones, the tones

named from those of the diatonic scale or the letters of the staff, the intermediate ones taking their names from one or the other of the tones between which they occur, with the addition of the word ˆsharp® or ((flat.® Thus the tone inserted between C and D, when named with respect to absolute pitch, is called C sharp or D flat; and with respect to relative pitch is called sharp one or flat two.

Passing Tones not essentially belonging to a melody are often introduced, and are usually represented by small notes.

A Chord is a pleasing combination of tones sounded together, and Harmony (q.v.) is a succession of chords, according to the rules of progression and modulation.

Dynamics or the power of tones and the manner or form of their delivery constitute the third elemental department of music. The power of tones is usually indicated by words, marks of expression, characters and abbrevia¬ tions, mostly of Italian origin, affixed in the positions desired on the composition by com¬ poser, editor or technical interpreter.

The following alphabetical list includes the dynamic marks of expression, together with the terms which indicate the relative time move¬

ment of a composition, and certain other terms and phrases, commonly used in music. Im¬ portant terms treated separately in this work, under their respective titles, are designated by the reference (see special article). Terms which are practically in anglicized form and self-explanatory are omitted.

A. (It.) — By, for, from, to, at, in.

Abbandone, Abbandono, con (It.) — With self-abandon¬ ment; despondingly.

A battuta (It.) — In strict or measured time.

A bene placito (It.) — At pleasure as to time.

Absatz (Ger.) — A section, cadence or phrase.

A capella (It.) — In the church style.

A capriccio (It.) — At will, agreeable to fancy. Accellerando (It.) — With gradually increasing velocity of movement.

Accent. — (See special article).

Acciaccatura (It.) — A grace note forming a species of arpeggio.

Accidents or Accidentals. — Occasional sharps, flats and naturals, placed before notes in the course of a piece. Accompaniment; Acoustics. — (See special articles).

Adagio (It.) — A very slow degree of movement, demanding much taste and expression in the performance.

Adagio assai or molto (It.) — Very slow and expressive. Adagio cantabile e sostenuto (It.) — Very slow, singing and sustained.

Adagissimo (It.) — Extremely slow.

A deux (Fr.); A due (It.) — For two voices or instruments. A deux temps (Fr.) — Two equal times or measure-notes in a bar, such as in the Valse a deux temps, with six steps to every two of the ordinary waltz.

Ad libitum (Lat.) — At will or discretion. This expression implies that the time of some particular passage is left to the pleasure of the performer; or that he is at liberty to in¬ troduce whatever embellishments his fancy may suggest. Affettuoso, Affettuosamente, or con Affetto (It.) — With tenderness and pathos.

Afflizione, con (It.) — Sorrowfully, with affliction. Affrettando, Affrettate (7/.) — Accelerating, hurrying the time.

Agitato, con agitazione (It.) — With agitation, anxiously. Al, All', Alla (It.) — To the, or occasionally, in the style of. Allegremente (It.) — With quickness.

Allegro (It.) and derivatives. — (See special article).

All' improvista (It.) — Extemporaneously, without premed¬ itation.

Al Segno, Al Seg., or the character '$• signifies that the performer must return to a similar character in the course of the movement, and play from that place to the word Fine, or the mark over a double bar.

Alt, Alta (It.) — Higher; as Ottava Alta, an octave higher. Altissimo (It.) — Extremely high as to pitch.

Alto (It.) — In vocal music indicates the counter-tenor or highest male voice. In instrumental music, it also indicates the tenor part.

Amabile (It.) — Amiably.

Amoroso, Amorevole, or con Amore (It.) — Affectionately, tenderly.

Andante (It.) — This term often modified, both as to time and style, by the addition of other words, broadly implies a movement somewhat slow and sedate, but in a gentle and soothing style.

Andantino (It.) — Somewhat slower than andante. Animato, con Anima, Animoso (It.) — With animation; in a spirited manner.

Anleitung (Ger.) — An introduction, a term often occurring in the titles to German publications.

Anthem. — A composition in the sacred style, of English origin, the words of which are generally selected from the Psalms.

Antiphone. — Responses made by one part of the choir to another, or by the congregation to the priest.

A piacere; A piacimento (It.) — At the pleasure of the per¬ former. (See Ad libitum).

Aplomb (Fr.) — Self-contained; steady; exactitude as to time. Appassionato, Appassionamento (It.) — With intensity of feeling.

Appoggiatura (It.) — A grace note or note of embellishment which as a passing tone precedes an essential tone on an accented part of a measure.

A QUATRE MAINS (Fr.) ; A quatro mani (It.) — For four hands. A pianoforte duet.

Ardito (It.) — Boldly, energetically.

Aria (It.) — An air, or song. Arioso (It.) — In the style of an air; vocal, melodious.

Arpeggio (It.) — An imitation of the harp produced by playing the notes of a chord in rapid succession, instead of altogether.

Assai (It.) — Very, extremely.

A tempo. — In time.

Attacca, Attacca Subito (It.) — Attack suddenly or com¬ mence immediately.

MUSICAL ELEMENTS AND TERMS

643

Audace, con (It.) — With boldness.

A una corda (It.) — On one string.

A vista (It.) — At sight; A prima vista, at first sight. Bar; Barcarole; Bass; Beat. — (See special articles).

Begleitung (Ger.) — An accompaniment.

Belli cosamenti, Bellicoso (It.) — In martial, bellicose or warlike style.

Bellezza, con (It.) — With beauty of expression.

Ben (It.) — Well; as ben marcato, in well-marked time.

Bene placito (It.) — At will.

Bis (Lat.) — Twice; indicating that a passage, distinguished by a curve drawn over or under it, must be performed twice.

Bolero; Bravura (It.) — (See special articles).

Breve. — A note twice the length of the semi-breve or Whole Note, seldom used in modern music.

Brillante (It. and Fr.) — An expression indicating a showy and sparkling style of performance.

Brio, Srioso, con Brio (It.) — With fire, brilliancy and spirit.

Brise (Fr.) — ■ Sprinkled, broken into an arpeggio, in treating of chords.

Buffo, Buffa (It.) — Comic; as opera buffa, a comic opera.

Cadence; Cadenza. — (See special articles).

Calando (It.) — Gradually diminishing in tone and quick¬ ness; becoming softer and slower by degrees.

Calcando (It.) — Pressing on, hurrying the time.

Calmato (It.) — With tranquility, repose.

Calore (It.) — With much warmth and animation.

Canon. — (See special article).

Cantabile (It.) — In a graceful and singing style.

Cantata; Canticle. — (See special articles).

Cantilena (It.) — The melody, air or principal part in any composition; generally the highest vocal part.

Cantor (It.) — A singer; (Lat.) A precentor. Cantoris — The name given to the north side of the cathedral, the left side facing the altar occupied by the cantor or precentor, and opposite to the side occupied by the decani, or dean and priests.

Cantus (Lat.) — A song, chant, or melody; Cantus Firmus. the plain-song or chant.

Canzonet. — (See special article).

Capella, alla (It.) — In the church style.

Capo (It.) — The head or beginning.

Capriccio; Capriccioso (It.) — In a fanciful, capricious style.

Carol; Cavatina; Chant; Choir; Chorale; Chromatics; Clef. — (See special articles).

Coda (It.) — A few bars added at the close of a composition, beyond its natural termination.

Col, Coll', Colla (It.) — With; as col arco, with the bow.

Colla Parte (It.)' — Implies that the accompanist must follow the principal part in regard to time.

Commodo, Commodamente (It.) — Quietly, with composure.

Common Time; Con; Concerto; Concord; Counterpoint. — (See special articles).

Da Capo or D. C. (It.); Diapason; Diatonic; Dilettante; Discord; Dissonance; Dolce; Dominant — (See special articles) .

Dal. (It.) — By: as Dal Segno, from the sign; a mark of repetition.

Decani (Lat.) — See Cantoris.

Deciso (It.) — With decision, boldly.

Decrescendo (It.) — Gradually decreasing in quantity of tone.

Delicatemente, Delicato. — Delicately; con delicatezza, with delicacy of expression.

Dextra (Lat.) — The right hand.

Diminuendo or Dim. (It.) — Diminish gradually the quantity or intensity of tone.

Divertimento (It.) — A short, light composition, written in a familiar and pleasing style.

Divoto (It.) — Devoutly, in a solemn style.

Elegamente; Elegante (It.) — With elegance.

Empfindung (Ger.) — Emotion, passion.

Energico, Con Energia or Energicamente (It.) — With energy.

Enharmonic. — (See special article).

Espressivo or con espressione (It.) — With expression.

Extravaganza. — (See special article).

Falsetto; Fandango; Fantasia; Fifths; Figured Bass; Fugue; Fundamental Bass. — (See special articles).

Forzando or Forz, or FZ. — • Implies that the note is to be marked with particular emphasis or force.

Fretta, con (It.) — With speed; hastily.

Fuoco, con, Focoso (It.) — With fire, intense animation.

Galop; Gamut; Gavotte; Gregorian Chant. — (See special articles) .

Gebunden (Ger.) — Tied or connected in regard to the style of playing or writing.

Giocosamente; Giocoso; Giojoso (It.) — Humorously; joy¬ ously; with sportiveness.

Giusto (It.) — In just and exact time.

Glee. — A composition for three or more voices, generally in a cheerful style.

Glissando, Glissicato (It.) — In a gliding manner.

Grandioso (It.) — In a grand and elevated style.

Grave (It.) — A very slow and solemn movement; also a deep, low pitch in the scale of sounds.

Graziosamente, Grazioso, or Con Grazia (It.) — In a flowing and graceful style.

Gusto, Gustoso, or Con Gusto (It.) — With taste, elegantly.

Harmonics; Harmony. — (See special articles).

Hauptsatz (Ger.) — The principal subject or theme.

Hauptstimme (Ger.) — A principal part.

Homophony. — In unison.

Imponente (It.) — Imposingly, haughtily.

Intermezzo (It.) — An interlude; intermediate, placed be¬ tween two others.

Interval; Intoning; Inversion. — (See special articles).

Istesso (It.) — The same, as istesso tempo, the same time.

Key; Kyrie. — (See special articles).

Largo (It.) — A very slow and solemn degree of movement. Larghetto, slower than largo. Larghissimo, extremely slow.

Leading Note.— The seventh note of the scale of any key, when at the distance of a semitone below the key note.

Lebhaft (Ger.) — Lively.

Legato (It.) — In a smooth and connected manner. Lega-tissimo, exceedingly smooth and connected.

Leggiero or Con Leggierezza (It.) — With lightness and facility of execution.

Lento (It.) — In slow time. Lentando, with increased slowness.

Loco (Lat.) — Implies that a passage is to be played just as it is written in regard to pitch; it generally occurs after 8va alta or 8va bassa.

Lusingando (It.) — Soothingly, persuasively.

Lustig (Ger.) — Gay, sportive.

Madrigal; Magnificat; Major; Matins; Mazurka; Measure; Melody; Melodrama; Metronome; Minuet; Mode; Modulation; Motif or Leitmotif; Music. — (See special articles) .

Ma (It.) — But: as allegro MA non troppo, quick but not too much so.

Maestoso (It.) — With majestic and dignified expression.

Main (Fr.) — Hand: as main droite, main gauche, or M.D., M.G., the right or left hand in piano music.

Mano (It.) — Hand; mano dritta, the right hand; mano sinistra, the left hand.

Marcato (It.) — In a marked and emphatic manner. Mar-catissimo, very strongly marked.

Marziale (It.) — In a martial style.

Meno, or Men. (It.) — Less; as men. presto, less quick; men. forte, less loud; men. piano, somewhat softer; meno vivo, with less spirit.

Messa di voce (It.) — A swelling and diminishing of the voice on a long holding note.

Mesto (It.) — Mournfully, sadly, pathetically.

Mezza voce (It.) — With moderation as to tone; rather soft than loud.

Mezzo (It.) — In a middling degree or manner; as mezzo forte, rather loud; mezzo piano, rather soft.

Mezzo Soprano (It.) : — A female voice of a lower pitch than the soprano or treble. A C clef for this voice used to be placed on the second line of the stave.

Molto (It.) — Very, extremely; as, molto allegro, very quick; molto adagio, extremely slow.

Mordente (It.) — A beat or transient shake.

Morendo (It.) — Gradually subsiding in regard to tone and time; dying away.

Mosso (It.) — Movement; as piu mosso, with more move¬ ment, quicker; meno mosso, slower.

Moto, or CON moto (It.) — With motion, agitation, energy and animation.

Nachdruck (Ger.) — Emphasis, accent.

Nocturne. — (See special article).

Non (It.) — An adverb of negation, generally associated with troppo; as non troppo presto, not too fast.

Notation.— The art of representing musical sounds and their various modifications by notes, signs, terms, *etc.*

Offertory; Opera; Opera Buffe; Oratorio; Orchestra; Organ; Overture. — (See special articles).

Obligato or Obligati (It.) — A part or parts of a composi¬ tion indispensable to its just performance, and which can¬ not be properly omitted.

Octave; Ottava. — An interval of eight notes.

Pastorale; Pianissimo; Piano or Pianoforte; Polonaise; Prelude.— (See special articles).

Parlando; Parlante (It.) — In a speaking manner; ac¬ cented, as if with words in a declamatory style.

Pesante (It.) — With weight and importance, impressively.

Piacere (It.) — Will, pleasure; as a piacere, at the performer's pleasure in regard to time.

Pietoso (It.) — With pity, compassionately.

Pitr (It.) — More, an adverb of augmentation; as piu presto, quicker.

Pizzicato or Pizz. (It.) — In violin or violoncello music, the twitching of notes with the finger, instead of playing with the bow.

Poco (It.) — A little, rather, somewhat. Poco a poco, by degrees, gradually. Pochetto, Pochettino, a little, as ritard. un pochettino, play somewhat slower.

Poggiato (It.) — Dwelt upon, impressive.

Poi (It.) — Then; as piano poi forte, soft, then loud.

Portamento (It.) — The manner of sustaining and conduct¬ ing the voice. A gliding from one note to another.

Presto (It.) — Very quick. Prestezza, con, with rapidity, quickness. Prestissimo, the most rapid degree of move¬ ment.

Primo (It.) — First; as tempo primo, in the first or original time.

Quasi (It.) — In the manner or style of; as, quasi allegretto, like an allegretto.

Quieto (It.) — With calmness or repose; quietly.

R. or R.H. — Indicates the right hand in pianoforte music.

Rallentando (It.) — A gradual diminution in the speed of the movement, and a corresponding decrease in the quan¬ tity of tone.

Recitatif (Fr.) — (See special article).

Resolution. — The concord which necessarily follows a pre¬ ceding discord.

Retardando, Ritardando, Ritardato, Ritenente, Ri-tenuto (It.) — A gradual retarding and decrease in the speed of the movement.

Rhythm. — The theory of musical cadence, as applied to melody, more broadly defined in the first part of this article, to which refer.

Ricercari (It. plu.) — Difficult exercises, usually fugal, for the voice or for some instrument.

Ricordanza (It.) — With recollection, remembrance.

Rinforzando, Rinforzato, rinf. or rf. (It.) — With addi¬ tional tone and emphasis.

Rondeau or Rondo; Round. — (See special articles).

Rubato or Robato (It.) — Robbed, borrowed. Tempo rubato is applied to a style of performance in which the interpreter, to express some emotional mood, holds some notes longer than their legitimate time, curtailing others of their proportionate durations in order that, on the whole, the aggregate value of the bar may not be disturbed.

Sanctus; Saraband; Serenade; ‘Solfaing; Solfeggio; So¬ nata; Soprano; Stabat Mater; Symphony; Syncopa¬ tion. — (See special articles).

SCHERZANDO, SCHERZANTE, SCHERZO, SCHERZOSO, Or SCHERZ

(It.) — In a light, playful and sportive manner. Scher-zandissimo, in an exceedingly playful style.

Sciolto (It.) — With freedom and boldness.

Sdrucciolato (It.) — Sliding or gliding the finger along the keys, or strings of an instrument.

Segno or $ (It.) — A sign; as al segno, return to the sign; dal segno, repeat from the sign.

Segue, Seguito (It.) — Now follows, or as follows; segue il coro, the

chorus follows; segue la finale, the finale now follows. It is also used in the sense of in similar or like manner, to show that a subsequent passage is to be played like that which precedes it.

Sempre (It.) — Always; sempre staccato, always staccato or detached; sempre forte, always loud; sempre piu forte, continually increasing in force.

Senza (It.) — Without; as senza pedale, without pedals.

Senestra (It. from Lat. sinistra). — The left hand.

Sforzando, Sforzato or Sf. (It.) — Implies that a par¬ ticular note is to be played with emphasis and force.

Sino or Sin' (It.) — As far as.

Smorzando (It.) — A gradual diminution as to tone.

Solmi z ation. — The same as solfaing.

Sospirando (It.) — Despondingly, with apprehension.

Sostenuto or Sost. (It.) — Sustained, continuous in regard to tone.

Sotto (It.) — Below, under; as sotto voce, in an under tone.

Staccato (It.) — Implies that the notes so marked are to be played distinct, short and detached from one another. Staccatissimo, very detached.

Strepito, Strepitoso, Stentato (It.) — In a noisy, bois¬ terous manner, for some particular effect.

Stretto (It.) — The knot. That part of a fugue in which the subject and answer succeed one another at a very short interval of time. In modern music it is sometime used to imply an acceleration of the time near the close of the piece.

Stringendo (It.) — Accelerating the degree of movement.

Tarantella; Temperament; Tempo; Theme; Tone; Treble; Trio; Triplet. (See special articles).

Tanto (It.) — Not so much; not too much.

Teneramente, Tenero, or Con Tenerezza (It.) — Ten¬ derly.

Tenuto, Tenure, or Ten. (It.) — Implies that a note or notes must be held on, sustained or kept down the full time.

Through Bass or Figured Bass.— A bass part with figures placed over the notes which indicate the harmony to be played to each note, and serve as a guide to the accom¬ panist.

Toccata (It.) — A composition of indefinite form and rapid movement somewhat in the style of the fantasia (q.v.).

Transposition. — Changing from one key to another for performance or transcription.

Traurig (Ger.) — Sad.

Tremolo (It.) — The reiteration of a note or chord with great rapidity so as to produce a tremulous kind of motion.

Trill or Tr. — A shake.

Tutti (It. plu.) — All. A term used to point out those passages where all the voices, or instruments, or both, are to be introduced.

Va (It.) — Go on; as va crescendo, continue to increase in loudness.

Variamento (It.) — In a varied and free style of execu¬ tion.

Veloce or Con Velocita (II.) — In rapid time. Velocis-simo, with extreme rapidity.

Vibrato, Vibrante, Vibrate (It.) — With a strong vibrating quality of tone.

Vistamente (It.), Vite, Vitement (Fr.) — With quickness.

Vivace, Vivamente, or Con Vivacita (It.) — With brisk¬ ness and animation.

Vivo, Con Vivezza (It.) — Lively, vivaciously.

Vocalize. — To practis ? singing on the vowels.

Volante (It.) — In a light and rapid manner.

VoLANTfj (Fr.) — Will, pleasure, as a volonte, at will.

Volta (It.) — Time of playing a movement; as prima volta, the first time of playing.

Volti subito or V. S. (It.) — Turn over the page quickly.

Voluntary. — An organ piece, generally consisting of two or three movements calculated to display the capabilities of the instrument and the skill of the player, and used before or after service, or during the offertory.

Zoppo (It.) — In a halting or limping manner. A style of melody in which a long note is always placed between two short notes.

/

Characters indicating the various degrees of loud and soft :

Crescendo or gradual increase of tone.

Decrescendo or gradual decrease.

Indicates first a crescendo, then a decrescendo.

Indicates first a decrescendo, and then a crescendo.

Marks' of accent and expression:

Indicate a stress or marked accent on any single note or chord. The ab¬ breviations rf. sf. sfz. fp., or even f over a single note are also used for the same purpose.

Dashes indicate notes struck staccato or ? T T f very short, that is, not held their full value.

Dots, notes struck short, but not in so marked a way as the preceding.

Curves and dots. Notes still less staccato.

Slur, or legato mark.

J

Graces. — Indicates the appoggiatura, whether superior or inferior.

CVS Turn.

Z

CVS

CM5

(t

Inverted turn.

Turn with the note above made flat. Turn with the note below made sharp.

tr or

shake.

»»»»»»»»»»»»■» -v

The vibration or close shake.

I

Indicates that the chord before which it is placed must be sprinkled or arpeggioed.

Characters used to separate a movement into its component parts or strains, marks of repe¬ tition, *etc.* :

Bar lines, dividing a movement into small equal portions o£ dur¬ ation.

Double bar, indicating the limit of a measure.

Double bar, with a repetition of the preceding strain.

Double bar, with a repetition of the following strain.

Double bar, with a repetition of the strain on each side.

The close, or character indicating the end of a piece of music.

Consult: Baker, T., dictionary of Musical Terms> (New York 1902) ;

Bowman-Weitzman, (Manual of Musical Theory* (New York 1876) ; Hughes, R., (The Musical Guide) (New York 1903) and (Music Lovers' Cyclopedia) (Garden City 1912).

Charles Leonard-Stuart, Editorial Staff, Encyclopedia Americana ; former editor of (The ShophaD ; associate-editor, c Dictionary of Music) ; < Library of Musical Classics, y *etc.*

MUSICAL FESTIVALS, series of per¬ formances with large choral and orchestral auxiliaries usually held in large cities yearly or bi-yearly. While musical festivals were of periodical occurrence among the ancient Greeks at Delphi during the Olympic celebrations (see Greek Music), their first mention in modern history is at Bologna, Italy, in 1515, when at an interview between Francis I, king of France, and Pope Leo X, the musicians of both courts united for a performance. Musical festivals were also known in Rome, France, Bohemia, Austria, etc., but in the modern acceptance of the term the great musical festivals date from the Handel Commemoration in London (1784—87). Festival performances of Handel's ora¬ torios were subsequently given in Berlin and other Continental cities. In the United States the better-known entertainments of this kind are the Cincinnati, Ohio, the Worcester, Mass., and the Bethlehem, Pa., musical festivals. See Oratorio.

MUSICAL INSTRUMENTS, mechanical devices from which musical sounds are pro¬ duced by the vibration of strings, the movement of air-columns in tubes and the vibration of solid and hollow bodies of resonant materials. Of very ancient origin, their earliest forms were probably derived from suggestions offered by inanimate nature. The earliest authentic record of a musical instrument giving a com¬ plete diatonic scale is that of a flute of Egyp¬ tian origin ; but it is more than probable that the first instruments were those of percussion, such as drums, cymbals and gongs, which were suggested by the clapping of the hands, the stamping of the feet and the resonance of hollow trees under the impact of blows. These were followed by the wind instruments, such as whistles and flutes, suggested by the sighing of the wind through standing reeds and bam¬

boo grooves. They were first used, probably, for hunting purposes; subsequently, to express human emotions and for purposes of amuse¬ ment.

When the human ear learned to recognize variations of pitch and to

distinguish tune from time, the twanging of bowstrings probably sug¬ gested the stringed instruments, such as the harp, lute and lyre.

These three stages of the development of musical instruments are very clearly established by existing examples of gongs of stone and flutes of bone, found among the flint imple¬ ments of the ancient cave-dwellers and in the tracings of the later forms — stringed instru¬ ments, in the sculpture of ancient Babylonia, Egypt and Greece. It is impossible, however, to determine the exact origin of any one of the higher classes, such as those of the third stage ; since even that of the lyre is ascribed by Egyptian and Greek mythology to the god Toth (Hermes), thus throwing the entire ques¬ tion of origin beyond the pale of written history.

Prehistorical forms of musical instruments have their counterparts among the many savage tribes and nations of civilized mankind who inhabit the various parts of the world at the present time. African Kaffirs, the Caribs, Peruvians and Indian races of the American continents and the wild inhabitants of Aus¬ tralia, New Zealand and the other Polynesia Islands, use various forms, of gongs, flutes and harps. The war trumpets of the Maoris are of remarkable power, the sounds of which are capable of being heard at a distance of several miles. Among the more highly civilized na¬ tions, the Chinese possessed a system of music and its instruments centuries before the birth of the Greek and Roman empires. The inven¬ tion of these is ascribed to a traditional em¬ peror, Kai-tien-chai, who ruled about 2500 b.c. The eight instruments he made are supposed to reproduce the sounds of eight substances — tanned skin, stone, metal, clay, strings of silk, wood, bamboo and calabash or gourd. They consisted of drums, musical stones, bells, clay whistles or flutes, called “hiuen,® the “kin,® a form of lyre with seven strings, the “che,® of 25 strings, and the “siao,® a pan-pipe of 16 bamboo pipes bound together. All of them are used at the present time, together with the “cheng,® an elementary reed organ equipped with a calabash, which supplies the necessary resonance. Trumpets and banjoes are also used, and a stringed instrument on a frame resembling a mallet, the sounds of which are of the most execrable character. Its value in an orchestra appears to be quite beyond the ap¬ preciation of any but a Chinese ear. They have two scales corresponding to the white and black keys of the modern piano, and, although by employing both of these scales, they could reproduce modern Occidental music, they ap¬ pear to be satisfied to confine themselves to the five-note scale, and produce a slow music overlaid with a great amount of noise and clatter, through which it is impossible to dis¬ tinguish the underlying truly musical notes of great rhythmic beauty.

Almost all of the Chinese instruments, slightly modified, are used by the Japanese. The “kin® and “che® are represented by the “koto,® of 6 to 13 strings. They have also the

((samisen® of three strings, which are plucked by a plectrum, and the <(kokiri,® an elementary violin played with a horse-hair bow. Their orchestra is usually composed of one large drum, two small drums, two little bells, a pair of modern clappers and a flute, which is the only one of the seven capable of giving more than a single tone. Bells and metal in other forms, such as chains and gongs of various sizes, are extensively used in all Oriental coun¬ tries to produce metallic music. In Pegu, Siam and Burmah, arrangements consisting of 20 bells united in one instrument, which is sounded by being struck with a stick, are frequently employed. The Javanese bells, usually arranged in sets of 12, when heard at a distance sound like an orchestra of stringed instruments.

In Hindustan and all of the countries con¬ tiguous to that great peninsula, the principal in¬ strument is the <(vina,® a form of guitar. It consists of seven long metal strings strung on a hollow bamboo body, at each end of which a gourd is fixed to increase the resonance. It has a finger-board like that of the guitar, upon which the frets are stuck with wax by the per¬ former. The strings are tuned at large inter¬ vals, and its full, delicate tone is capable of rendering rapid and brilliant passages. It reached its highest state of perfection in the 17th century, when the Hindu, Djivan Sha’h, became renowned as its most famous player. Some of the other important Hindu instru¬ ments are the <(magoudhi,® also of the guitar type; the ((serinda,® with three strings of spun silk; and the ((ravanstron,® a two-stringed vio¬ lin. The two last named are played with a simple bow. They also use a great many vari¬ eties of drums, gongs and bells.

Among the Singalese, the favorite instru¬ ment is a drum commonly known as the <(tom-tom,® a name which literally signifies its pe¬ culiar quality of music. It is made in various sizes, and consists of a short cylinder of wood from four to six inches high and one to four

feet in diameter, with sides one-half to one inch in thickness, over which a skin is mounted. Before using, they are heated to a high tem¬ perature to increase the tension of the skin, and are then played upon by the hands, the blows being delivered in rapid succession on the edge of the drum. The performers are always women, and the test of the ability of a player depends upon the amount of noise produced and the duration of a continuous play.

With the westward advance of civilization, the development of Arabian music produced the ((rehab,® an instrument of two strings, which were at first plucked like those of a guitar. It was subsequently played with a bow, and is supposed to be the progenitor of the modern violin. Other Arabic instruments are the <(lute® ; the <(canon,® a stringed instrument: the <(dulcimer,® with strings tuned in sets of three — a system adopted in the modern piano ; the ((zamar,® the prototype of the modern oboe; the <(nefye,® a form of trumpet ; the kettle¬ drum and various kinds of flutes.

The Egyptians used harps, guitars, mando¬ lins, several forms of lutes and the lyre, as early as the beginning of the 18th dynasty. Their percussion instruments were large and small drums with sides of baked clav, over which the skins were stretched. Like the Sin¬ galese ((tom-tom,® they were heated prior to

being played upon. Metallic music was pro¬ duced by the ((sistrum,® a set of metal bars which were struck or shaken rhythmically. Al¬ though their instruments were often employed in orchestral combinations, it is impossible to determine whether they were played in harmony or merely in unison.

While the Egyptians showed great genius in the invention and adaptation of musical instru¬ ments, those of the ancient Hebrews were bor¬ rowed almost entirely from other nations. They used the (<kinnor® or harp, and the ((asor,® an instrument of 10 strings, both of which were forms of lyres ; the <(neble,® a modification of the Arabian dulcimer, and the <(timbrel,® a small tambourine or hand drum. They also used flutes and trumpets, the guitar and the sistrum. Their organs were simple sets of pan-pipes, which varied in the number of pipes set up and tfie number of tones given by each pipe. The most famous of these is the one mentioned in the Talmud as set up in the Temple at Jerusa¬ lem. It is stated that its sound could be heard at a distance of 10 miles. Its name, <(magre-pha® (fire-shovel), leads to the inference that it might have been operated by the

pressure of],ot air, or even steam, like some of the various forms of eolipiles.

The ancient Greeks employed the music pro¬ duced from stringed instruments, by striking or plucking, as an accompaniment to the recitation of their epic poems, the chants of their religious ceremonies and in connection with martial evo¬ lutions. Their most important instrument was the ((kithara,® a lyre of seven strings, which were sounded by being plucked with a plectrum. They also used several kinds of single and double reed flutes, in the playing of which they acquired surpassing skill. In the rendering of refined music, trumpets were discarded at a very early date, but continued in use for mili¬ tary purposes and at the public games, down to a comparatively late period.

The music of the early Romans was merely an imitation of the Greek art, but their repre¬ sentative instrument was the <(tibia,® a wind instrument of the flute type. Stringed instru¬ ments played with two bows were unknown among them, and the historical statement that (<Nero fiddled while Rome burned® must cer¬ tainly be relegated to the domain of myths.

For a long period of time after the fall of the Roman Empire the decadence of the art of music limited the use and retarded the develop¬ ment of musical instruments. During the Dark Ages the musical thread was continued by bands of strolling players, whose efforts were of the most superficial character, and music thus re¬ mained latent until the 12th century, when the poetry of the ((troubadours® in Provengal litera¬ ture was converted into the emotional songs of the ˆtrovieres®. and the German ((minnesingers,® and required instrumental music for ac¬ companiments. Those brought into use again were several forms of lutes, violins and bag¬ pipes, which were played upon proficiently by the <(jongleurs,® some of whom played also upon psalteries, organistrums,. guitars and tambours with great skill. These instruments were made in unique forms, especially the organistrums, which were lutes operated by wheels and keys.

Under the impulse of the Renaissance, a large number of other instruments were devel¬ oped, such as flutes, flageolets, clarinets, trom-

1 Wurst fagott

2 Basset horn (nineteenth century)

3 Oboe (France. Camus, eighteenth century)

4 Transverse flute

5 and 6 Double flutes

7 Flageolet (French, nineteenth century)

8 Double flute

9 and 10 Flutes a bee

11 Clarinet (Italy, early nineteenth century)

12 Clarinet (France)

13, 14, 15, 16 and 17 Transverse flutes with keys

18 Flute polyphonique (Italy, seventeenth century)

19 Serpent

20, 21 and 22 Trombones 23 Serpent (made in England, 1820)

MUSICAL INSTRUMENTS

1 Alto viol, with six strings and pegs (made in

France, eighteenth century)

2 Baryton (Viola di Bordone, 1779)

3 Pochette D'Amour (France, eighteenth cen¬

tury)

4 Mandora (made in Italy, eighteenth century)

5 Lyre guitar (eighteenth century)

6 and 7 Guitars 8 and 9 Lutes

10 Theorbo (made in Italy, eighteenth century)

11 Harp Lute (1800. Light London)

MUSICAL INSTRUMENTS

647

bones and various forms of monochords, their development keeping pace with the evolution of music up to its higher forms ; but it was not until about the end of the 16th century that any attempt was made to combine them into a definite orchestra, the development of which is

coincident with that of the opera.

The first approximation to an orchestra was the group of instruments employed in connec¬ tion with the production of Cavalieri's oratorio, (La Rappresentazione dell' Anima e del Corpo,* at Rome in 1600; but the first definite orchestra was the one that accompanied the first opera ever performed in public — Peri's' <Euridice) — at Florence, in the latter part of the same year. It was composed of a harpsichord, a guitar, a viol da gamba, a theorbo or large lute and three flutes. In both cases the combination of the instruments was designed to afford the sim¬ plest possible accompaniment to the dramatic recitative; but a few years later Monteverde noted the individual peculiarities of the several instruments, and introduced a new system of orchestration by Which the number of pieces was greatly increased and the instruments given a score practically free from the limitation of the vocal parts. His opera, ˆrfeo,* produced at Mantua in 1608, was accompanied by 36 pieces, 22 of which were stringed instruments, mostly viols, thus making them the foundation of the orchestra. With the evolution of the dramatic work to higher forms, better accom¬ paniments were required, and the preponderat¬ ing viols were superseded by violins, during the earlier part of the 18th century, while later on, during Handel's time, Lully introduced flutes into the French orchestra to double in unison the parts of the stringed instruments. The strengthening of the violins is shown to a marked degree by the orchestras of Scarlotti and Lyrenzi, as many as 20 violins entering into their composition. Up to this time, how¬ ever, the real art of writing for the strings was unknown. The works of. the elder Bach, probably the greatest master of part writing, and those of Handel, subsequently reorches¬ trated by Mozart, show a great lack of appre¬ ciation of tonal coloring, and it remained for Haydn to lay the true foundations of the mod¬ ern science of instrumentation. He dispensed with the obsolete instruments employed bv his predecessors and arranged five combinations by the skilful use of which are produced the great orchestral effects of the present time. They are (1) the complete string band, composed of two violins, violas, violoncellos and contra¬ basses; (2) the string band supported by wind instruments playing in unison with the string parts; (3) the string band supported bv the wind instruments in the free parts; (4) the string band with wind instruments playing in the separate passages; and (5) the string band supported by and contrasted with a complete wind band.

The instruments entering into these com¬ binations in a modern orchestra may be con¬ veniently arranged into four general groups, according to the means employed to produce their sounds, and in the order of their respec¬ tive importance, as follows: (1) stringed in¬

struments; (2) wind instruments; (3) instru¬ ments of percussion; (4) instruments operated by keys arranged in a keyboard.

The stringed instruments may be subdivided into two classes: (1) bowed instruments, or those in which the sound is produced by draw¬ ing a horse-hair bow across the strings ; and (2) those in which the sound is produced by twanging the strings with the fingers, or with a plectrum of bone or ivory. To class 1 be¬ long the violins, violas, violoncellos and the double bass. Plate I shows typical forms of some of the 18th century makes.

The violin is the most important instrument in an orchestra and the first violinist ranks next to the conductor himself, and ought to be a performer of the greatest ability and fully capable of playing the obligato passages that occur frequently in modern scores. It is the most personal of all instruments, because of the wide range of vibrations which may be utilized, rendering it capable of expressing every human emotion from sadness to merriment and from the deepest love to the utmost frenzy of hate; its use in the orchestra is varied, continuous and extensive. In the violin quartet the next im¬ portant instrument is the second violin, which, being played in a lower part of the accordance, gives the difference of sound heard between itself and the first violin. The viola or tenor takes the third place and is a fifth lower in the accordance, the open notes being C and G below, and D and A above, middle C. It is played exactly like the violin, and its part in the score is notated in the alto clef. It has a wonderfully beautiful and peculiarly plaintive and melancholy tone quality. The fourth place is filled by the violoncello or bass viol. Its strings are tuned in fifths, one octave lower in pitch than those of the viola, the accordance being C below and C, D and A in the bass clef. It has a compass of three and a half octaves, and its tone color, like that of the violin, is capable of expressing with surpassing faithful¬ ness all the human emotions. Its harmonies are rich and full ; the ˆpizzicato,ˆ especially telling in effect, while the tone of the A string is the most suitable of all instrumental music for passionate expression. The contrabass or the double bass is used to double the part of the violoncello an octave deeper. While the violoncello is the bass of the stringed instru¬ ments, the contrabass is the bass of the whole orchestra. They are of two tyoes, those with three strings tuned in A, D, below G in the first space in the bass clef, and those with four strings tuned in E, A, D and G, in ascending order, an accordance rendered necessary by the works of modern composers. Its tone is gruff and ponderous, unfitting it for use as a solo instrument, but it is

used with great effect to give an ominous significance in solo passages, and in imitating such effects as the rumblings of a thunder storm, frequently employed by many of the great composers.

To class 2 belong the mandolin, guitar and banjo, instruments of a few strings, and the harp and zither, instruments of many strings. Of these the harp is the most important. Of very ancient origin, probably Assyrian, it has been used by the musicians of almost all of the ancient and modern nations. The ((minnesingers® employed it in combination with the guitar to accompany the songs of the trouba¬ dours. In 1720 Handel introduced harp parts in one of the choruses of the oratorio of (Esther.) Gluck employed it to play the part

of the lyre in the hands of Orpheus. Mozart wrote a concerto for it in combination with the flute, and Wagner introduced eight of them in the closing scene of (Das Rheingold,* their shimmering music giving an indescribable splen¬ dor to the entrance of the gods into Valhalla. The great musical value of the harp is its sympathetic tone quality and the power of its full-sounding <(arpeggios® or sweeping chord effects. Almost all of the music written for the pianoforte can be reproduced effectively on the harp, but it is almost incapable of rendering the chromatic passages. It is the only instru¬ ment of this class that forms a part of a regu¬ lar orchestra, the mandolins and zithers being used only in the orchestration of large com¬ positions. The tones of the guitar are espe¬ cially suitable as an accompaniment for the human voice and are notably used for this purpose by Rossini in Almaviva's air in the (Barber of Seville.*

As previously stated, wind instruments were introduced into the orchestra by Lully merely to double in unison the parts of the stringed instruments ; but since then various changes and improvements have been made by eminent flutists and skilful flute-makers, especially those of the 19th century, until their importance is hardly exceeded by that of the stringed in¬ strument.

They may be divided into two classes, ac¬ cording to the materials of

which they are made: (1) wood-wind, and (2) brass instru¬ ments. Many of both classes are of the trans¬ posing type — instruments in which the sounds actually produced are a key either above or below that in which the composition is written. To the wood-wind band belong the flute, pic¬ colo, flute a beck, horn or cor anglais, bas¬ soon, double or contra-bassoon, flageolet and the clarinet. They are usually made of wood, and sometimes of ivory and silver; but their particular tone qualities do not depend so much upon the material of which they are made as upon their form and the elasticity of the sides of the tubes. The flute, which is the most facile of them all, has a full chromatic com¬ pass from middle C to G, two octaves above the treble clef C, a range of three octaves. This compass is partly obtained by altering the pressure of the blowing, all of the notes below D in the treble being produced by the normal pressure, while the harmonics D in the treble clef and A and B above it are attained succes¬ sively by over-blowing. In the orchestra the flute goes with the violins, its pant in the score being written at the top in G clef. It is also used to sustain the long notes of the other wood-wind instruments, and, being the closest approximation of artificial sounds to the human voice, is used effectively in the conversational passages, and enhances the characteristic charm of orchestral music. In the form of the ((piccolo,® or octave flute, it is more frequently employed to double the melody in the highest octaves and to accentuate brilliant points of effect in the score. It is exactlv an octave higher than the flute proper, and is very shrill in the over-blown notes, so that, unless very carefully played, tends to vulgarize the music. Other forms are the D-flat or minor ninth transposing piccolo; the flute d'amour, a minor third below the ordinarv flute; the E-flat or Offeree,® and the fife. The last named, in its

old cylindrical form, gave low, piercing notes, and was extensively used in military music, but it has been entirely superseded for that purpose at the present time by a small flute, still called a fife, which forms a component part of a mod¬ ern fife and drum corps.

Next in importance to the flutes is the fam¬ ily of oboes, represented during the 16th and 17th centuries by the little schalmey, the discant schalmey, the alto, the tenor and the pommers. The modern oboe was evolved from the discant schalmey, and is a double-tongued reed instru¬ ment. Its fundamental sounds are reproduced an octave higher by over-blowing, its scale be¬ ing thus increased to two partially chromatic octaves, which are made completely chromatic by the use of keys which permit the lengthening of the air column in the lower

tones, and the introduction of other partial tones than the first harmonics in the higher notes. Like the flute, it has only the soprano register — B-flat below middle C to F above the treble clef, about two octaves and a fifth. The basis of the scale is D major, and its place in the orchestra is be¬ tween the flute and the clarinet. A modern orchestra employs two oboes — the non-trans¬ posing treble oboe, for which the music is writ¬ ten in G clef, and the (<cor anglais,® a trans¬ posing instrument, the mournful sounds of which are especially suitable to accentuate the depressing effect of the sad or serious dramatic passages.

The bassoon is the bass of the oboe and ful¬ fils that function to the entire wood-wind band. It was evolved from the pommers, bombards, tenors and basses of the 16th century, and possesses advantageous tonal characteristics and adaptability. It has a compass of three oc¬ taves — from B-flat, an octave below that in the bass clef, to B-flat in the treble clef — and is usually played with the violoncello, the united tones of the two instruments being very effec¬ tive. The contra-bassoon is an octave below the violoncello and is the deepest instrument of the orchestra. Its compass extends as far as B-flat, next to the lowest note of the piano¬ forte. It is but rarely used, although its grand sounds, like those of a great organ pipe, may be used effectively, as in the grave-digging scene of Beethoven's ˆidelo,* and in Handel's anthems, written for the coronation of George II in 1727. Although a wood-wind instrument, it is now also made in brass with a reed mouth¬ piece. The sarrusophones, invented by Sarrus of France, comprise a complete family of this type. They are larger than the corresponding wooden oboes, and are therefore louder in tone and' are extensively used in military bands. Other forms of double-reed instruments are the ˆcormorne.® made of wood and cylindrical in shape, with the lower end turned up like a shepherd's crook. The name is derived from the German Krummhorn, and the French call it the 'tournebout. It has a bleating tone. The familiar Highland bagpipe, and various forms of oboe instruments equipped with reservoir of air and furnished with drones enclosing single reeds, such as the ((cornemuses,® and the "musettes,® complete the series.

Of the single-reed instruments, the ((clarinet® is the most important. It was invented by Christopher Denner of Nuremberg, in 1690, and embodies the very ancient principle, that of the

squeaker® reed, which is commonly made by children even at the present time.

Of the several forms of clarinets those in A-and B-flat are used by the modern orchestra, while, the. B-flat and .E-flat instruments are used in military bands, in which their functions correspond to that of the violins in the orches¬ tra. The C clarinet with its shrill tone is seldom used. Their color varies according to the register. The ordinary notes are eloquent, heroic and tender; in the lower register they become spectral, and impressively sombre in the bass. Although the last instrument introduced into the orchestra, all the great composers wrote for it, and considered it favorably. With Mozart it was one of the leading instruments of the orchestra, and in his beautiful E-flat symphony, written in 1788, clarinets are em¬ ployed even in the place of the oboes.

. As in the case of the double-reed wood¬ wind instruments, in which the mouthpiece is used with a metal tube and gives the sarrusophone, the adaptation of the clarinet-reed to a brass tube gives the family of ˆsaxophones,® invented by Adolph Sax ‘in 1846. They re¬ semble the clarinets very closely in shape ; have q full, rich, penetrating tone-color, and are ex¬ tensively used by the military bands of France and Belgium, and have also been used with great advantage in the French orchestras.

Of the ((brass instruments,® the most import¬ ant are the horns, cornets, trumpets, trombones and tubas. Two other forms, the ophicleide and the serpents, though frequently employed in the older orchestral scores, are now obsolete, having been entirely superseded by the tuba.

There are two important differences between the wood-wind and the brass instruments. In the former the tones are produced by vibrating air-columns, or by vibrating single or double reeds,- and alterations of pitch are accomplished by shortening the air-columns, while in the lat¬ ter the vibrations utilized are those of the play¬ er’s lips, which are pressed against a round, cup-like mouthpiece, and the air-column is lengthened to alter the pitch. The brass instru¬ ments are capable of giving a much larger num¬ ber of partial tones naturally than the

flutes, oboes and clarinets, which use only a few notes of the harmonic series, and derive such partial tones from the fundamental tones, or from the overtones. Horns and cornets furnish roman¬ tic tone-coloring, and are effectively used in connection with forest and hunting scenes, while the trumpets are employed to express brilliant martial passages depicting heroic deeds. Trombones and tubas are grand, sonorous tubes which afford a solemn and menacing tone-color to the splendor of a full orchestra, and are also advantageously used to depict coarse and brutal scenes. All of them are valuable components of modern military bands. Plate II illustrates various types of wind instruments, developed from their original forms into perfect instru¬ ments during the latter part of the 18th and the earlier part of the 19th centuries.

The instruments of percussion are those which are incapable of giving many , tones, or playing definite melodies, like the stringed and wind instruments already described. They are of two classes — those that give an actual tone, such as the kettledrums, glockenspiel and xylo¬ phone; and those without any definite pitch, such as the bass and small drums, tambourines,

cymbals, castanets and triangles. Of these, the kettledrums are the most important, and, to¬ gether with the cymbals, are extensively used to emphasize military effects ; while the others serve to express those that are purely rhyth¬ mical. For detailed descriptions of all of the instruments mentioned, see special articles under their respective titles; also Orchestra, Instru¬ ments of the. For descriptions of keyed in¬ struments, see articles on the Organ and the Pianoforte.

Bibliography. — For further detailed infor¬ mation consult Elson, (Orchestral Instruments and their Use) (Boston 1903) ; Hawkins, Gen¬ eral History of the Science and Practice of Music) (London 1875) ; Hofmann, (Katechis-mus der Musikinstrumente) (Leipzig 1890) ; Vidal, (Les Instruments a Archet) (Paris 1878), and Schletterer, (Die Ahnen moderne : Musikinstrumente) (Leipzig 1882).

MUSICAL INSTRUMENTS, Mechanical.

The record of inventions and devices in this field shows a great variety of shapes, sounds and methods of operation. One of the most famous in this class of music-producers was Barnum’s steam calliope, used for many years in circus processions. Organs of all sizes and shapes, set in motion by the occasional turning of a crank or pressing a button, are

widely used for purposes of public entertainment. Swiss music boxes with cylinders and American music boxes with discs are embraced in the same class. There are also mechanical banjos, violins, zithers, mandolins and trombones.

Progress of the Piano-Player. — Since the advent of the first piano-player, a few years ago, rapid strides have been made in the cre¬ ation and production, by purely mechanical methods, of classical and popular music. The perforated paper roll, passing over a perfo¬ rated wooden cylinder, so that a current of air may pass at stated times, still forms a leading feature of the automatic idea in many pianos. See Piano.

The earliest efforts of those who undertook to create and introduce mechanical harmony effects yielded crude, unsatisfactory and un¬ promising results. Progress was blocked at every turn by practical difficulties not contem¬ plated in theoretical calculations and ex¬ periments.

First Products.— Among the first products of the mechanical piano-playing movement was an odd-appearing, seemingly over-elaborate ac¬ cumulation of rubber-tubes, strikers, bellows and pedals, nearly all of these contrivances and accessories being fixed to a wooden frame and inserted in the back part of the piano, between the frame-posts. It was found impracticable to include all necessary material without increas¬ ing the size of the piano proper. This was accomplished by adding several inches to the piano's depth.

Portable Players. — - Notable among the next succeeding stages of piano-player development was the invention and perfecting of a movable and easily-portable player, having cylinder, per¬ forated rolls and pedal action. About half the regular piano width and only a trifle higher than the keyboard, this ˆsupplement® can be moved at will to the centre of the piano, in front. Operation of the pedals results in the bringing of any one or more of a series of

hammers or strikers in direct contact with the key surfaces, speed and force being regulated by several thumb-pieces projecting from the player top or side. Players of this description, with many variations, are still in use but have been partially superseded by more elaborate contrivances.

Interior Players. — After many costly ex¬ periments, covering several years, an interior player, which has been very successful thus far and promises to evolutionize the whole industry of piano-making, was perfected. It was found possible to minimize the parts in such a way that practically the entire player apparatus, ex¬ cepting, of course, the pedals, could be placed above the keyboard in front of the action and behind the fallboard, the latter hiding it com¬ pletely from view. Thousands of these pianos containing mechanical players have been made and sold. Makers of pianos of all grades have / accepted this interior player, with modifications, as permanent, and it is becoming a standard feature in regular piano styles.

Electricity Introduced. — In the interval between the perfecting of “movable® and “in¬ terior® piano-players, an enterprising practical New York electrician and piano-action maker secured certain important player rights and privileges and set to work on the problem of electrical operation. Experiments, extending over several years, were finally successful. Electrical attachments were devised and intro¬ duced in such a manner as to make it possible for any person or firm, in any part of the world, having a simple electrical connection, to start and stop the player at will. The advance in usefulness of the mechanical piano-player thereby reached a stage where it only needed the occasional insertion of a perforated roll to produce, without any further physical effort whatever, perfect musical effects, including cor¬ rect tempo and proper expression.

Continuous Rolls. — Since that time, con¬ tinuous rolls have been devised to admit of several tunes being played successively without any interference on the part of the person who applies the electrical connection and turns on the current. The electrical-attachment device just referred to, with numerous variations, is now largely in use throughout the United States, Canada and other countries for the en¬ tertainment of guests, travelers and others in restaurants, hotels, saloons, railroad stations and similar public resorts. Some are operated by use of an electric button conveniently placed at tables, hotel desks and in private apartments. Others start by the insertion of a coin in a metal slot at the side of the instrument.

The manufacture of pianos in the United States gives employment to

24,000 persons, and piano materials 10,500 more. Organs and organ materials employ 3,300; other musical instru¬ ments and materials 2,000. These figures do not include phonographic machines for repro¬ ducing music. The musical instrument industry centres mainly in Indiana, Illinois, Massachu¬ setts, New Jersey, New York and Michigan.

MUSICAL SAND, beaches which emit musical tone or other sound when the sands are pressed under foot or struck together in a bag. They occur throughout the world, notably in the peninsula of Sinai, on the great musical moun¬ tain of Jebel Nagous; near Colberg in Po¬ merania; on the East Prussian coast; in the

United States, where there are such sonorous beaches on the Atlantic, on the Wisconsin River (near Kilbourn City, Wis.), on the Mississippi (opposite Carondelet) and on the Pacific Coast ; in Hawaii, where there are “Barking Sands® on the southwest coast of Kauai; in Africa (Liberia and West Griqua-land) ; in Botany Bay, New South Wales; and in Brown’s River Bay, Tasmania. The sound is a mere squeak unless the sand is very dry; then it is musical. Hence the common expla¬ nation that the sound is due to the “rubbing together of millions of clean sand-grains very uniform in size® is less likely than the hy¬ pothesis that it is caused by the oscillation of the particles which are prevented by elastic air-cushions from actual contact.

MUSK, or MUSCOVY, DUCK. See

Duck.

MUSK-DEER, a small deer-like animal

(Moschus moschiferns) of the subfamily Moschino? differing from typical deer in the absence of antlers in either sex, in having only one lachrymal orifice, in the presence of a gall¬ bladder, and, in the male, of the musk-bearing glands to which the animal owes its name. Other peculiarities are the smooth brain, long tusks (canines) of the upper jaw of the male and the character of the feet, where the “false hoofs® come to the ground. These and other characters led Flower to declare it “an un¬ developed deer® — a representative of an an¬ cient type.

The musk-deer is of small size, about 20 inches tall, grayish, marked with obscure stripes on the fore quarters and neck, thick-legged and ungraceful in form, but agile in movement. The species is confined to the highlands of Tibet and northward, where they frequent the pine

woods, going to the heights above them in summer. They dwell alone or in family parties, are timid and secretive, feeding rarely except at night, and then subsisting partly on roots dug with their great teeth.

The males alone yield the musk secretion, which is furnished by a glandular sac or pouch situated on the abdomen, and averaging the size of a hen's egg. The secretion is resinous and unctuous, and becomes granular and of a dark color when dried. About 190 grains is stated to be the average quantity obtained from a single animal. When the musk-sac is first opened the odor is said by Tavernier to be so powerful that it causes the mucous membrane of the nose to bleed. The bag or "pod® is cut out by the hunters and its orifices are tied, nevertheless the contents are often found much adulterated. The substance also reaches the market in a granular form, having been scraped off rocks where it has been deposited by the animal. The best comes by way of India and China, and is known as Tongking musk; a poorer quality comes from Siberia. Formerly musk had some value in medicine, but now is used almost wholly by perfumers ; and the de¬ mand is so great that the animals are now com¬ paratively rare, and the price of musk-pod has greatly advanced over former rates.

A somewhat similar secretion is possessed by many other mammals and reptiles, and in some cases, as of the muskrats (q.v.), is very strong, especially in the mating season. The biological significance of it, no doubt, is sexual

1 Musk Deer

2 Musk Ox

attiactiom A similar odor belongs to certain

P , ˆ /TConsult Flower and Lydekker, (Mam¬ mals > (London 1902).

M/USK-°X’ a singular ruminant (Ovibos m os chat us) , now confined to the Actic regions of North America, but once circumpolar, and in Pleistocene times an inhabitant of all Eu¬ rope and in America as far south as Kentucky. In general appearance it much resembles a large hairy sheep. Its body is clothed in long, brownish hair, with a warm undercoat of wool’ very thick and tufted on the neck and shoul¬ ders, and elsewhere long and flowing, so that it hangs down almost to the feet. A lighter sad¬ dle-shaped patch marks the middle of the back. The tail is short and invisible. The legs are short and strong, and the hoofs of unequal size and shape, the outer being much broader than the inner one. The horns are broad at the base, covering the forehead and crown, much as do those of the Cape buffalo, then curve down¬ ward between the eye and the ear and then upward and backward. The average size of the male is that of a small domestic ox. This animal seems intermediate in structure between oxen and sheep, having part of its characteris¬ tics bovine and the other part caprine. A thorough exposition of its anatomy by Dr. Lonnberg may be found in the Proceedings * of the Zoological Society of London for 1900. The musky odor which belongs to them is not emitted by any special gland, but seems a gen¬ eral emanation, and is not very strong.

In habits these animals are gregarious, each herd numbering from 20 to 30 members. They migrate in winter from the most northern and exposed places to those farther south, or where food is more accessible, and are constantly hunted by the Esquimos as an important source of food. To this is added much destruction by fur-traders, whalers and explorers, and their numbers are much diminished. Their present winter range is rarely south of the Barren Grounds (q.v.),

between Hudson Bay and Great Slave Lake. Their food consists of moss, lichens, herbage and twigs of the dwarf willows and birches which grow in parts of their country. They are extremely wary, and their hunting requires great skill and endur¬ ance. Their flesh is good, their hides very use¬ ful and from their wool might be woven an admirable cloth could it be obtained in sufficient quantity. Consult books by Arctic explorers and Allen, J. A., <(Ostogenetic and Other Vari¬ ations in Muskoxen (American Museum of Natural History, Memoir, Vol. I, N. S., New York 1913) ; Grinnell, Wister and Whitney,

(Bison, Musk-Ox and Sheep) (New York

1904).

MUSK PLANT, a popular name for sev¬ eral unrelated plants. The one most cultivated in the United States is Mimulus moschatus, of the family Scrophulariacece, a native of the Western States. It is very popular in cool greenhouses and window gardens and, being hardy, in damp, shady places out of doors. In Europe the name is most applied to Eurodium moschatum of the family order Geraniacece, a native of the Mediterranean region, growing in gardens from annually sown seeds. The name is applied in the West Indies to Guarea grandi-folia, which is also known as musk wood, and

to Trichilia moschata, also called musk tree. This last popular name is also applied to a Tas¬ manian tree (Olearia argophylld) . An East Indian plant (Euryangium sumbul) is probably best known in the markets as musk root. Its starchy roots are used as a substitute for musk in perfumery.

MUSK-SHREW. See Muskrat, Indian.

MUSK-TURTLE, or STINKPOT. See

Mud-turtle.

MUSK-WOOD, a tree (Guarea grandifo-lia) of the family Meliacece, so called in the West Indies because the bark smells so strongly of musk that it may be used as a perfume. Although the tree attains timber size the wood contains a bitter resinous substance which unfits it for many purposes. The bark of several trees of this genus is used as an emetic and purgative.

MUSKEGON, mus'ke'gon, Mich., city, county-seat of Muskegon County, at the mouth of the Muskegon River, on Muskegon Lake, and on the Grand Rapids and Indiana, the Grand Trunk, the Pere Marquette, and the Grand Rapids, Grand Haven and Muskegon Electric railroads, about 95 miles northwest of Lansing and 38 miles northwest of Grand Rapids. Lake Muskegon, upon which the city is situated, is connected with Lake Michigan by a channel 300 feet wide and of sufficient depth for large ves¬ sels. This gives the city an excellent harbor for lake steamers, which connect it directly with all the important lake ports. The harbor is clear of ice all the year. Muskegon was first settled in 1834, although a temporary trading post was established here in 1812. It was in¬ corporated as a village in 1861 and chartered as a city in 1869. The chief manufactures are furniture, curtain rollers,. refrigerators, flour, beer, knit-goods, paper, pianos, iron products, automobile engines (Continental) and auto parts, many large foundries in malleable steel and gray iron products, electric cranes, leather and cutlery. It has a large trade in lumber, the manufactures of the city, fruit, celery, vege¬ tables and farm products. The city has been greatly favored by the numerous donations of one of its own citizens. He has presented a public library, a gymnasium, an art gallery, a manual training school, an endowed hospital and a square upon which has been erected a soldiers' monument, and several bronze statues. The government is vested in a mayor, who holds office one year, and a council. The waterworks are owned and operated by the city. Pop. (1920) 36,570.

MUSKET, a small hand-gun with which in¬ fantry soldiers were formerly armed. When first introduced, early in the 16th century, it was discharged by means of a lighted match, and was so heavy that it had to be laid across a staff to be fired. To make use of it the sol¬ dier required to carry a slow-burning match with him which was apt to be extinguished in wet weather. The wheel-lock followed, the chief feature of which was a wheel made to revolve by means of a spring, and to cause sparks by friction against a flint. The next im¬ provement was the flintlock proper (about 1625), in which sparks were produced by one impact of a piece of flint on the steel above the priming powder. Musketeers were soon intro-

duced into all armies, and in the beginning of the 17th century infantry consisted of nikemen and musketeers, and all changes in regard to the relative proportion of the two arms were always in favor of the latter. Ihe flintlock musket was introduced into the British army toward the end of the 17th century, and was the British musket of the days of the Peninsu¬ lar war and Waterloo, known familiarly as (< Brown Bess.® It was superseded by the per¬ cussion musket in 1842, this musket being in turn superseded by the rifle. See Arms and Armor; Fire Arms; Rifle.

MUSKETRY, the science and art of shoot¬ ing small arms (q.v.), particularly the musket or rifle (q.v.).

MUSKHOGEAN (musk-ho-ge'an) STOCK. See Creeks.

MUSKELLUNGE, MASKINONGE, etc., the great pike (Lucius nobilior') of the lakes of the interior of North America. See Pike.

MUSKINGUM, musking'gum, a river of eastern Ohio with a course of about 120 miles wholly within the State. It is formed by the junction of the Tuscarawas and the Walhond-ing at Coshocton in the county of the same name, and it flows in a general southeast direc¬ tion through a fertile valley to Marietta, where it joins the Ohio. The chief towns on its banks are Zanesville, McConnellsville and Marietta. It is navigable for 90 miles to Dres¬ den. The Ohio and Erie Canal follows its course as far as Zanesville.

MUSKINGUM COLLEGE, in New Con¬ cord, Ohio, founded, under the auspices of the United Presbyterian Church, in 1837. In 1917 there were connected with the institution 30 professors and instructors, and about 760 pupils. There were about 7,500 volumes in the library. The courses lead to the degrees of A.B. and B.S.

MUSKMELON. See Melons.

MUSKOGEE, mus-ko'ge, or MUSCO¬ GEE, Okla., city and county-seat of Muskogee County, on the Missouri, Kansas and Texas, the Missouri, Oklahoma and Gulf, the Midland Valley and the Saint Louis and San Francisco railways. It is situated 45 miles from the eastern border of Oklahoma and about . 130 miles from Oklahoma city, in a fertile

agricul¬ tural region well adapted to the cultivation of wheat and other cereals and to cattle-raising. There are also abundant supplies of oil and natural gas. Industrial activity is manifested in the oil refineries ; in the manufacture of oil-well supplies, of hardware, mattresses, cotton goods and agricultural implements ; in the cor¬ rugated iron and steel works and the railway shops. Noteworthy are the educational , estab¬ lishments: the high school, Saint Joseph's Col¬ lege, Bacon University, *etc.* Other features are the new post-office building, waterworks, the property of the city and valued at $1,000,-000; public parks (100 acres) and fair grounds; Carnegie library and the Town and County and Traveling Men's clubs. Muskogee is the headquarters of the government Indian agent. The commission form of government was adopted for the city in 1910. Pop. 30,277.

MUSKOGI INDIANS. See Creeks.

MUSKOKA, mus-ko'ka, Can., a county of Ontario, bordering on Georgian Bay, the name also being borne by a beautiful lake and river, and comprehensively applied to the extensive region, 4,000 square miles in extent, lying be¬ tween Georgian Bay on the west, Lake Nipissing on the north, Ottawa River on the east and Lake Simcoe on the south. The capital of the county is Bracebridge, on the Grand Trunk Railroad. The region with between 800 and 1,000 lakes and smaller bodies of water, chief of which are Muskoka, Rosseau and Joseph lakes, all abounding in fish and studded with beautiful islands ; several rivers and picturesque waterfalls, notably High Falls and South Falls on the Muskoka River and Bridal Veil Falls on the Shadow River, and extensive forests filled with game, is a paradise for sportsmen. It is one of the most popular summer resorts in Canada, and is visited annuallv by 30,000 people. During the summer steamboats ply on the prin¬ cipal lakes connecting with the Grand Trunk, Canadian Northern and Canadian Pacific rail¬ roads.

MUSKRAT, or MUSQUASH, an aquatic

rodent (Fiber zibethicus) numerous throughout North America, and yielding a valuable fur. It is a member of the rat family (Murida, q.v.), and is, in effect, a gigantic vole or meadow-mouse, with a tail flattened sideways into a powerful swimming instrument, and fringed with stiff hairs ; the hind feet are set obliquely to the leg; the ears are very small and buried in fur, the muzzle is blunt and furry; the palms and soles are naked and fringed with hairs. The average total length is about 21 inches, of which the tail is more than a third, measuring as

long as the body without the head. The color varies above from almost black to pale brown; sides of head and body chestnut-brown; under-fur bluish gray; feet dark brown; tail black. Those of the Rocky Mountain region are smaller and paler than Eastern ones. The musky odor of these animals is due to a thick fluid secreted in two small glands near the generative organs, which imparts a taint to the flesh that makes it unpalatable to most persons.

These animals reside along small streams, and in swampy places generally, being, most abundant around Chesapeake Bay and in the marshy lakes of the upper Mississippi region and northward to Hudson Bay. Where the banks have some elevation they form extensive burrows, which have entrances below the sur¬ face of the water, and gradually ascend till they terminate in a chamber above the level of high water. These burrows are most frequently made under the roots of trees, or in other situ¬ ations of difficult access. The excavations are of great injury to artificial embankments along canals and rivers, by permitting the water to undermine and to make large breaches in them, and in some parts of the country they do seri¬ ous damage to canal embankments and river-dikes. When, however, these animals inhabit low and marshy situations, they construct con¬ ical houses usually surrounded by water, not unlike those of the beaver but smaller, com¬ posed of reeds, etc., mixed with clay. These houses have subterranean passages leading to them, and are inhabited by many individuals during the winter; but in the warm weather they desert them entirely, and dwell in pairs in

a bank-burrow while they rear their young, lhe houses contain a large, smooth-walled chamber , above the water-line; and when frozen are sufficiently solid to form a protection against all but the largest carnivora ; ‘but they are usually destroyed and swept away in the spring floods, so that a new house is erected every season.

The muskrat feeds mainly upon aquatic vegetation, especially the rootstocks and basal parts of stems, and is especially fond of the pond-lily. These it brings to the shore to eat, almost always during the

night, for it is es¬ sentially nocturnal, although often seen abroad in the daytime. It is very fond of mussels, and brings great quantities of these ashore, al¬ ways, when possible, at the same place, so that piles of their shells accumulate to indicate favorite feeding-spots. In summer the musk¬ rats feed on shore-herbage somewhat, and fre¬ quently go some distance to get a meal of growing corn, garden vegetables or fallen fruit. They are accused also of occasional fish-catch¬ ing, and are unwelcome in waters devoted to fish-culture. Because of the commercial value of its fur and of its destructiveness in some places, or for amusement, the muskrat is in¬ cessantly persecuted by man, as well as preyed upon by many natural enemies — minks, wolverines, foxes, wildcats, badgers, wolves, birds of prey, water-moccasins, snapping-turtles, pikes and others, which capture many young and some adults. Nevertheless they are so secretive and so prolific, and have found so many advantages in the civilized parts of the country, that they survive even in the most thickly settled districts, and are likely to main¬ tain their numbers indefinitely. They produce from three to nine young at a birth, and often breed two or three times a year.

The fur of the muskrat is dense and soft, but inferior to that of the beaver. It was for¬ merly little esteemed, but during the last cen¬ tury has come more and more into use, begin¬ ning with a demand early in the 19th century for making ((beaver® hats. When this industry was ended by the introduction of silk hats the demand diminished, but revived again, until, about 1870, London was receiving about 4,000,-000 skins annually besides some 500,000 con¬ sumed in America and 1,500,000 sent to Ger¬ many, principally Leipzig. The price, then be¬ gan to fall, but the product amounted in 1906 to about 5,170,000 pelts. The best ((no. 1 black® skins averaged in London, in 1910, about 42 cents.

<(Muskrat fur,® according to a recent author¬ ity, (<is used more extensively in Europe than in America, the Russians and Germans being especially large consumers. It is employed in making gloves, collars, caps, capes, muffs, trim¬ mings, linings, etc., and is made up either nat¬ ural, plucked, plucked and pointed or plucked and dyed black or various shades of brown. Large quantities are used as linings for over¬ coats and long wraps, from 40 to 60 being necessary for each garment. Sometimes the under parts are used separately for this pur¬ pose, the natural white color being quite effec¬ tive. The skins of young animals are especially suited for linings. The unplucked skins are frequently dyed to imitate mink, and sold as (Alaska mink/ (water mink) or (black mink. >. ®

Muskrats are taken by shooting, spearing in

winter (through their houses, or through the ice), or, most numerously, by trapping. Ordi¬ nary steel traps are used, placed under the water inside a broken house, or in a runway or landing place, baited with an apple, or bit of parsnip., and often scented with musk or an aromatic oil, and fastened by a heavy chain so arranged, if possible, as to lead the animal to drown itself in its struggles. In certain dis¬ tricts, as along Chesapeake Bay, men make a regular business of trapping muskrats in win¬ ter; and even own, or rent, large spaces of marshland for that purpose. See Murids.

The books of Audubon, Godman, Hearne, Richardson, Merriam and all general writers on American mammals should be consulted; also Herrick, /Mammals of Minnesota) (Minne¬ apolis 1892) ; Stone and Cram's (American Animals> (New York 1902) ; Hollister, N., (Systematic Synopsis of the Muskrats* (United States Biological Survey, North American Fauna, No. 32, Washington 1911); Lartz, (The Muskrat* (United States Depart¬ ment of Agriculture Farmers' Bulletin No. 396, Washington 1910) ; and the files of the American Naturalist and of Forest and Stream.

MUSKRAT, Indian, a name among the British residents in India for a shrew (Croci - dura c&rulea), about the size of the common rat, which comes into houses at night hunting for cockroaches and similar insects, and makes its presence known by occasional shrieks. This animal emits a peculiarly strong and penetrating odor of musk, which clings to everything the little beast touches, and arises from two large muskglands beneath the skin of the side of the body a short distance behind the forelimbs.

MUSKWAKI INDIANS. See Sac and

Fox Indians.

MUSLIM, or MOSLEM. See Moham¬ medanism.

MUSLIN, a fine cotton fabric. The name is said to be derived from the city of Mosul in Mesopotamia. The texture of muslin is usually plain, but sometimes adorned with figured pat¬ terns. The manufacture of muslin was intro¬ duced into Europe from India about the end of the 17th -century, and it is now largely carried on both in Great Britain and in France.

MUSQUASH, a name in the Canadian Northwest for the local muskrat (q.v.).

MUSSEL-PECKER, a bird, the oyster-catcher (q.v.).

MUSSELBURGH, mus'l-bur-o, Scotland, a town and seaport of Midlothian six miles east of Edinburgh, on the Firth of Forth, at the mouth of the Esk, which divides it into two parts, Musselburgh proper and Fisherrow. It has noted golf-links, a bridge of Roman origin, and a curious old tollbooth built in 1590, out of materials from the celebrated chapel of Loretto, Pinkie House, a fine Jacobean man¬ sion, in which Prince Charles Edward slept the night following the battle of Prestonpans, and Loretto School, a famous establishment, are in the burg. David Macbeth, the author of (Mansie Waugh/ was a native. The chief manufactures are leather, paper, twine and fishing-nets by machinery. Coal is mined in the neighborhood, and there are a number of

market gardens. There is a large fishing popu¬ lation located in Fisherrow. The battle of Pinkie, in 1547, was fought in the vicinity. Pop. (1911) 15,938.

MUSSELS, Fresh-water. See Fresh¬ water Mussels.

MUSSELS, Marine. The marine mussels belong to a family (Mytilidce) of bivalve mollusks which have the anterior retractor muscles very small, the posterior large and the two valves of the shell equal and covered by a thick horny layer. Numerous species occur in all seas, and, because of the comparative delicacy of their flesh, and their habit of forming im¬ mense beds, many are of commercial import¬ ance. Foremost in this respect is the edible mussel (Mytilus edulis) which has a smooth, dark-colored, wedge-shaped shell with the umbos or beaks exactly at the hinge end. This species is circumpolar in its distribution, and on our Atlantic coast extends southward to North Carolina. Wherever rocky reefs, piles or other suitable objects for attachment occur at low water, combined with currents for bringing

food, this mollusk multiplies into extensive colonies. In Europe it is valued much more highly than in this country, where it is chiefly used for bait, although considerable quantities are canned in New York. Under certain con¬ ditions mussels seem to be poisonous. Besides the fisheries on natural beds this mussel is regularly cultivated in France by methods akin to those used in European oyster culture. The genus Modiola, containing the so-called horse-mussels, is distinguished by the more oblong shell inflated toward the hinge end, from Which the umbos, though close, are quite distinct. The best-known one (M . modiolus) is a large species distinguished by the nearly, unribbed surface and the coarse hairy epidermis. It has nearly the distribution of the Mytilus , and abounds in the north on rocky shores at low water and below to a considerable depth. Modiola plicatula is distinctly ribbed and has a thinner epidermis. This is an American species which ranges from Nova Scotia to Georgia and is extremely abundant at low water on the mud¬ flats of the New Jersey coast, where it is doubt¬ less effective in the upbuilding of sedimentary areas. These two species are less valued . for food than the Mytilus, but are largely utilized in certain localities as fertilizers. Consult Goode, (Fishery Industries of the United States,' Sec. 1 (1884) ; Cooke, <Mollusca)

(London 1895) ; or any other work on mollusks.

MUSSET, mii-sa, Louis Charles Alfred

de, French author: b. Paris, 11 Dec. 1810; d. there, 2 May 1857. His father was a man of letters who held several important ministerial posts. Alfred's home environment did much to engender a literary spirit. He was educated at the College Henri Quatre, where he won a prize for his essay on the (Origin of our Feelings. ' After this, he tried to study law and medicine, but became dissatisfied and gave himself up entirely to literature. At Paris he met the famous literary men of the day, among them Hugo, Merimee and Sainte-Beuve, who inspired him to write verse and plavs. He began com¬ posing rhymes and in 1830 appeared his first volume of poems, (Contes d'Espacne et d'ltalie,' a parody on the latest works of the romanti¬

cists which gained him a great reputation. In 1830 his play <La Nuit Venitienne' proved a failure. This discouraged de Musset so much that he refused to write plays for production until the public should demand them. There followed a new collection in 1831 entitled (Poesies Diverses,' and in 1833, a third, bear¬ ing the general title (Un Spectacle dans un Fauteuil' in which the chief pieces are a comedy of

light and delicate grace called (A quoi revent les jeunes filles,' and a poem (Namouna) written after the manner of Lord Byron. The success of this volume led to his connection with the Revue des Deux Mondes in which he published (Andre del Sarto' (1833) and (Caprices de Marianne' (same year). In this play, which for many years en¬ joyed a distinguished place in the repertory of the Theatre Frangais, he combines the best features of the romantic and classic schools of drama. It combines swift action with high loftiness of theme and thought; blends comedy and tragedy with Shakespearean excellence. (Rolla' was the next piece to appear in the Revue. In the same year, 1833, de Musset con¬ ceived a violent passion for George Sand, and accompanied her to Italy. But the liaison which was only the attraction of genius for genius lasted but two years. The story is told in his volume (Lui et elle,' by de Musset and (Elle et lui, ' by George Sand. But the affair affected de Musset profoundly. It emphasized a deep melancholy strain in his nature and a morbid sensitivity which appears in his later writings. In Italy he wrote (Ou ne badine pas avec l'amour.' In 1835 there appeared (Lucie' ; (La Nuit de Mai' ; (Le Chandelier' ; (Une Lettre a Lamartine' ; (L'Espoir de Dieu' and other poems. His (Confession d'un enfant du siecle' (1836) is an autobiographical novel, containing the analysis of his state of mind; his moody introspection, his revolt from all the unpleasant necessities and labor of life. It contains also an interesting account of his reac¬ tions to Bonapartism, and a true story of his unfortunate liaison. Among his other works are (Stances a Madame Malibran,' a volume (Comedies et proverbes' reprinted from the Revue des Deux Mondes (1840) ; (Nouvelles,' a play (Un Caprice' performed at the Theatre Frangais in 1847, which succeeded by the truth of the characters and the charm of the dialogue, rather than by its regard for stage customs. In 1848 (I1 ne fait jurerde rien' was suc¬ cessfully played at the Theatre Frangais. His last plays (Bettine' and (Carmosine' were written between 1848 and 1851. De Musset was made librarian of the Department of the Interior in 1836, of which post he was afterward de¬ prived, and of the Department of Public Instruc¬ tion in 1855. In 1852 he was admitted to the French Academy. He has been ranked after Hugo as the third French poet of the 19th cen¬ tury. His wit, his fine satiric power, his many and diverse moods mark him a man of genius. A monument was erected to him on the Place du Theatre Frangais in 1906. Consult biog¬ raphies by Paul de Musset (1877; Eng. trans. by H. W. Preston, 1887) ; Barine, Arvede, in c Grand ecrivains frangais.' His correspond¬ ence with George Sand was published in 1904. See Night of May, A; One Must Not Trifle with Love.

MUSSEY, Reuben Dimond, American sur¬ geon: b. Pelham, N. H., 23 June 1780; d. Bos¬ ton, 21 June 1866. He was graduated at Dart¬ mouth in 1803 ; studied medicine at the Univer¬ sity of Pennsylvania; practised in Salem, Mass. ; taught in the Dartmouth Medical School 1814-20 and 1822-38, at Bowdoin 1833— 35, at Ohio Medical College 1837-50, and at Miami Medical College, which he founded, 1851-58; and spent the last eight years of his life in practice in Boston. He was a famous operator, the first to remove the shoulder blade, or to tie both carotid arteries, and successful in his operations for stone, for removing ovarian tumor, for strangulated hernia, and in sub¬ cutaneous deligation in varicocele. Mussey wrote (Health : Its Friends and Its Foes)

(1862).

MUST, the juice of the grape, which by • fermentation is converted into wine. In the wine countries this unfermented sweet must is distinguished from the sour must or unripe wine of a year old.

MUSTANG. See Bronco.

MUSTARD, a genus of annual, biennial and perennial herbs (Brassica) of the family Brassicacece. The species, of which about 100 have been described, are characterized by yel¬ low four-petaled flowers and linear or oblong pods containing one row of seeds. All are noted for their more or less biting flavor for which some are valued as esculents. Strictly speaking, cabbage, kale, cauliflower, turnip and other similar vegetables are mustards, but spe¬ cifically the name is restricted to a few species of which the following are the most important : Black mustard (B . nigra) so called from its dark brown seeds, white mustard (B/alba), the seeds of which are yellowish, Indian mustard (B . ramosa) , and charlock (B. arvensis). These are all cultivated for their seeds which when ground constitute the popular condiment, mustard. Sometimes flour and turmeric are added to the

mustard to dilute and color it. The young plants are often eaten like spinach or as a salad. They may be easily obtained from seed sown in any garden soil.

MUSTARD GAS, a persistent though not deadly poisonous gas, first used by the Ger¬ mans, at Ypres in 1917, as a very powerful weapon of war, and is officially known as yel¬ low cross gas. Its chief effects are on the eyes and lungs. The eyes inflame and become very sore, the lids swell and blister, but no per¬ manent injury to the eyes takes place, although the victim may be temporarily blinded. The effects developed in the lungs are equally pain¬ ful and consist of severe inflammation and bronchitis, which if not well looked after may develop into pneumonia. ˆDuds® collected dur¬ ing the European War show that the mustard gas liquid is a chemical called dichlorethyl sul¬ phide , a liquid that gives off its vapor slowly. Respirators and the blanket protection of dug-outs keep out the gas, but if a dug-out gets a direct hit with a mustard gas shell, it must be left empty for some days, as the liquid cannot be removed by ventilation with either fires or fans. In battery positions the most annoying feature of the mustard gas is the length of time it persists. In the shell holes it is partly de¬

stroyed by sprinkling with chloride of lime. The British invented a method for firing a large number of drums of gas simultaneously. These drums are used chiefly against the front¬ line troops and are generally filled with pure phosgene. See Medical Science and the War; Medicine, Recent Progress in; Poison Gas.

MUSTARD OIL, a volatile, pungent, color¬ less, irritating oil formed in mustard seed when crushed and wet. See Oil of Mustard.

MUSTELIDiE, a family of small carniv¬ orous mammals classified between the dogs and the bears, and traceable in geological history back to early Eocene time. The special charac¬ teristic of the family is the reduction of the mo¬ lar teeth in the upper jaw to a single one. The dentition in general resembles that of the cats. The family is divisible into five subfamilies: Weasels (Mustelinae) , otters (Lutrinae), badgers (Melinae), skunks (Mephitinae) and sea otters (Enhydrinae) and thus include the ermine, mink, fisher, sable, marten, polecat and wolverine. The habitat is worldwide outside of Australasia and Mada¬ gascar, but it is in the subarctic and temperate regions of the Northern Hemisphere that the Mustelidae are most numerous and produce the most valuable pelts. The sea otter and the skunks are exclusively American. All are small animals, the largest (the sea otter and the

wolverine) being about three feet long. They are characterized by strength, nimbleness and especially bloodthirstiness, and in general have slender bodies, rather short legs, round heads, powerful jaws and strong teeth. They possess anal glands which in some genera, as the skunks, are highly developed, enabling them to discharge at will, as a means of defense, an acrid, malodorous fluid. Some of the Mus¬ telidae are arboreal, but most are terrestrial, living in burrows. Their food consists of small mammals, birds, birds' eggs, crustaceans, fish and insects. Their lust for killing seems to bear no relation to their food requirements; for example, a mink, gaining access to a chicken house, is likely to kill as many fowls as it can seize. The trapping and hunting of the Mustelidae has long been an important in¬ dustry in both Europe and North America. Consult Coues, E., ˆur-Bearing Animals) (Washington 1877) ; Ingersoll, E., (Life of Mammals > (New York 1909).

MUT, moot, in Egyptian mythology, a god¬ dess of heaven and queen of earth, the wife of Ammon and the mother of Chons. Her name signifies ˆmother.®

MUTA NZIGE, moo'ta nze'ga, Africa, the local name for a lake discovered by Stanley in 1876, explored by him in 1889, and renamed the Albert Edward Nyanza (q.v.).

MUTANABBI, moo-ta-nab'be, Arabic Abu }t Tayib, Arabian poet: b. Kufa, 915 a.d. ; d. Sept. 965. He studied in Syria and, for a pe¬ riod, proclaimed himself a prophet, whence the title ((el Mutanabbi® (the one who would be a prophet). From 948 he resided at Aleppo under the patronage* of the Prince Saif ed Daula and from 957 he lived in Egypt, Bagdad and Persia. He was killed hy Bedouin robbers near the Tigris. His greatly admired <Diwan) consists of a collection of 289 poems and shows

great talent and national spirit besides richness of language, but there are defects of exaggera¬ tion in poor taste and certain flattery that is lowering to the general dignity of the verses. Dieterice edited the

work, together with the (Commentary *of Wahidi, who died 1075, under the title (Mutanabbii carmina) (Berlin 1861) ; and that of (Ukbari, who died 1219, was published at Calcutta, _ Cairo and Bulak with other (Commentaries.) Hammer-Purgstall translated (poorly) the (Diwan) (Vienna 1824). Consult Bohlen, (De Motenabbio* (Bonn 1824) ; Dieterici, (Mutanabbi und Sei-fuddaula) (Leipzig 1847).

MUTATION THEORY, a hypothesis of organic evolution which accounts for develop¬ ment by sudden changes or Heaps** rather than by slow and successive degrees ; sometimes styled saltatorial evolution. It is illustrated by <(Sports** (q.v.), — sudden aberrations from the normal, more familiar in botany than in zoology, but often occurring there. This mode of evolution has always been regarded as ef¬ fective to some degree, but its general applica¬ tion was urged by Prof. Hugo De Vries, of Amsterdam, in his work (Die Mutationstheo-rie,* published in 1901. Professor De Vries showed that the objections urged against the Darwinian theory on the ground of the pro¬ digious length of time needed for the develop¬ ment of species could be explained away by a due regard to the phenomena of mutation. He showed that new species are produced in this way not only on a single occasion, o* with sin¬ gle individuals, but repeated continually and in large numbers. In the field of botany to which Professor De Vries' investigations were con¬ fined, he established the fact that mutations take place in the seed, independently of the vicissitudes of growth in the field, and in ac¬ cordance with certain apparent laws. The new species which results from mutation remains constant but exhibits a tendency to throw off an ever increasing series of variations. Con¬ sult De Vries, H., (Species and Varieties* (Chicago 1906) ; Lock, R. H., (Recent Progress in the Study of Variation.*

MUTHER, moo'ter, Richard, German art historian: b. Ohrdruf, Germany, 25 Feb. 1860; d. 1909. He was educated in the University of Heidelberg and the conservatory of Munich and devoted his attention to the history of art in which subject he was professor at the Uni¬ versity of Breslau since 1895. He has published (Anton Graff* (1881); (Meisterholzschnitte aus den Jahrhunderten* (1887); (<Gesc.hichte der Malerei des 19ten Tahrhunderts* (1893; Eng. trans., (History of Modern Painting,* 4 vols., 1907) ; (Geschichte der Malerei* (5 vols., 1899-1902 ; Eng. trans. by George Kriehn, 2 vols.,

1907).

MUTINY (Fr. mutin, refractory, stubborn; mutiner, to rise in arms).

Two hundred years ago the word mutiny was often used in de¬ scribing insurrection or sedition in civil society; but it is now applied exclusively to certain offenses by sailors and soldiers. Properly it is the act of numbers in resistance of authority; but by statutes, certain acts of individuals are declared to be mutiny. The act of Congress of 3 March 1835 defines mutiny or revolt in the following language:

If any one or more of the crew of any American ship of vessel on the high seas, or on any other waters within the maritime and admiralty jurisdiction of the United otates, shall unlawfully, wilfully, and with force or by fraud, threats, or other intimidations, usurp the command of such ship or vessel from the master or other lawful commanding omcer thereof; or deprive him of his authority and command on board thereof; or resist or prevent him in the free and lawful exercise thereof; or transfer such authority and command to any other person not legally entitled thereto; every such person so offending, his aiders and abettors, shall be deemed guilty of a revolt or mutiny and felony.

The same statute provides for endeavors and conspiracies to excite mutiny. In construction of the act it has been held that mere disobedi¬ ence of orders by one or two of the seamen, without any attempt to excite a general resist¬ ance or disobedience, and insolent conduct or language toward the master or violence to his person, if unaccompanied by other acts showing an intention to subvert his authority as master, ‘are not sufficient to constitute the offense of endeavoring to excite mutiny. An indictment t for this crime, it is said, must set forth a confederacy of at least two of the men to refuse to do further duty, and to resist the lawful commands of the officers. The offense of making a revolt was by the act of April, 1790, punishable by death. By the act of 1835, it is punished by fine not exceeding $2,000, and by imprisonment and confinement at hard labor for not more than 10 years, according to the nature and aggravation of the offense; while attempts to excite a mutiny are punishable by fine not exceeding $1,000, or by imprisonment not exceeding five years, or by both. Mutinous conduct in the army and navy is provided for by the acts of 10 April 1806 and of 23 April 1800. By the former, ((any officer or soldier who shall begin, excite, cause or join in any mutiny or sedition, in any troop or company in the serv¬ ice of the United States, or in any party, post, detachment, or guard, shall suffer death, or such other punishment as by a court martial shall be inflicted.** Under the latter, (<if any person in the navy shall make, or attempt to make any mutinous assembly, he shall, on conviction thereof by a court martial, suffer death.** These laws are embodied in the present

articles of war and articles for the government of the navy, except that death is not now mandatory in the navy. The law of mutiny in Great Britain is in general similar to the United States statute, except that the penalty of death is not imposed.

MUTOSCOPE, a mechanical apparatus for exhibiting instantaneous pictures of moving ob¬ jects taken by the kinetograph or similar instru¬ ment. Photographic prints from the series of pictures thus obtained are mounted in consecu¬ tive order around a cylinder standing out like the leaves of a book. When this cylinder is slowly revolved, the picture cards being held back by a stop, and allowed to snap past the eye one by one, as one thumbs the leaves of a book, an apparently moving picture is the result. See Cinematograph ; Moving Pictures.

MUTSU, mut'su or mut's', Munimitsu, Count, Japanese statesman: b. Wakayama, 1842; d. Tokio, 24 Aug. 1897. After six years' foreign services and as governor of the prov¬ ince Kanagawa he was appointed (1874) secre¬ tary of the senate. He suffered a long im¬ prisonment, from 1878, for participation in the Saigo Rebellion, but was pardoned in 1882 and

Vas again employed in foreign affairs by the state. Fromˆ 1888-90 he was Ambassador to the United States, then becoming Minister of Agriculture in the Japanese Cabinet. During the Ministry of Marquis Ito (1892-96) he was Minister of Foreign Affairs, being a member of the peace plenipotentiary party that arranged the treaty with Li Hung Chang at Shimonaseki, for which he was rewarded (1895) with the title of count. In 1894 he negotiated a treaty with Great Britain in which the latter renounced extraterritorial jurisdiction from July 1899. Lung troubles enforced his retirement from political activity in 1896.

MUTSUHITO, moo-tsu-hee-to, the 121st in the line of mikados or emperors of Japan and, according to the impersonality ruling in all Japanese history, posthumously called after the year-period, the Meiji

Tenno : b. Kyoto, 3 Nov. 1852, 2d son of the Emperor Komei (1831-67), declared heir-apparent 10 July I860; succeeded to the throne January 1867; inaugu¬ rated as sovereign, with the three imperial sym¬ bols, mirror, jewel and sword, 31 Oct. 1868; married 28 Dec. 1868 to Haruko, then 19, and the 3d daughter of the noble of the 1st rank Ichijo. No children were born of this union, but of the issue from imperial concubines, four sons and four daughters survive in 1918. From the first, brought up amid sounds of battle and in sight of the war fires of contending clansmen in Kyoto, as the old and new forces struggled for mastery, and, happily, early surrounded by men of vision and liberal minds, some of whom had been in Occidental countries, Mutsuhito was from the first in hearty and active sympathy with modern progress and civilization. One of his first public acts was to take the famous charter oath of five principles. In one of these he promised a national deliberative assembly, and in the other to seek for talent through¬ out the world for assistance in relaying the foundations of his empire. He became a shrewd judge of men and motives and a lover of peace. He signed in autograph the treaties, entered warmly into measures of reform and in erecting memorials to the martyrs and those who had advocated mikadoism and unity of government, traveled all over the empire to see his people, paid unique honors to his wife in public and private, and was a laborious servant of the nation. By personal tastes and habits thoroughly Japanese to the end of his days, he was a cosmopolitan in mind and sympathies, and his character as well as his office turned the scale in great crises, when grave debate was held by rival statesmen in his presence. Every word of the text of the constitution of 1889 was, during the two years of deliberation, dis¬ cussed before him. Most notable and fiercely debated was the guarantee of religious liberty. His reign was marked by many wonderful events and a most extraordinary outburst of intellectual, industrial and military energy. On the 25th anniversary of his marriage, memorial postage stamps were issued and the empress was notably honored, marking a new era in the history of Japanese womanhood. The days of his last illness saw a prayer-meeting that was national and without regard to creed or class, all gods being petitioned, and the general sor¬ row was sincere and profound. His mauseo-leum in Kyoto cost over $1,000,000. His conVOL. 19 — 42

sort, a true helpmeet and of finest character, followed him in death 8 April 1914. Both sov¬ ereigns were notable poets. From about 1870 the Japanese ceased to use the ancient poetical term mikado and adopted the native term tenshi, or tenno (son of heaven, or heavenly

king), or emperor, as best according with the new status of Japan as a world-power. Consult Griffis, (The Mikado's Empire) (1909), and cThe Mikado: Institution and Person) (1915) ; and Mrs. Fraser's (Letters from Japan* (1899).

MUTTON-BIRD, a sailors' name for the shearwater (q.v.).

MUTTRA, is the northwestern district of the Agra Division, United Provinces, lying be¬ tween lat 27° 14' and 27° 58' N., and long. 77° 17' and 78° 13' E., with an area of 1,445 square miles. It lies on both sides of the Jumna and in the centre of the western bor¬ der ; the Arvallis Mountains extend in the form of a low range of hills. There are no rivers besides the Jumna, but there are canals, wells and marshes. The climate is hot and dry, with extremes of temperature. There is very slight rainfall. Muttra contains 14 towns and 837 villages. The population has been frequently devastated by famine, but better road facilities and irrigation have lessened these difficulties. About 90 per cent of the people are Hindus and less than 10 per cent are Mussulmans. The principal crops are millets, pulse, cotton, wheat, barley and sugar cane. The administration is under a member of the Indian Civil Service and three deputy collectors. According to Ptolemy, Muttra was the capital of the ancient kingdom of Surasena and was an important religious centre, as the many antiquities dis¬ covered here testify. It was sacked by the Mah¬ mud of Ghazni in 1019, but played only a slight political part. It was revived during the Bud¬ dhist period as a centre of faith. Its history was merged into that of the Jats of Bharatpur, and after changing hands several times came under British dominion in 1803. In 1857 it mutinied but was put down in the same year and has since remained friendly. Consult (Gazetteer of India) (Vol. XVIII, Oxford

1908).

MUTUAL BANKS AND COOPERA¬ TIVE SOCIETIES. See Banks and Bank¬ ing — World's Systems.

MUYSCAS, mu-e'ska. See Chibchas.

MUZAFFAR-ED-DIN, moo-za-fer'ed-den', Shah of Persia: b. Teheran, 25 March 1853; d. there, 9 Jan. 1907. He wras governor of Azerbaijan; succeeded his father, Nasr-ed-Din (q.v.), 1 May 1896. Influenced by European civilization, he showed great tolerance toward the Christians, and did much to reform the internal administration of

Persia by lightening taxes and by establishing a parliamentary gov¬ ernment. He visited Europe several times.

MUZAKOVA, mu-zha-ko'va, Johana. See

Svetla Karolina.

MUZIANO, moot-se-a'no, Girolamo, com¬ monly known as Bressano, Italian painter : b. Aquafredda, near Brescia, 1528; d. Rome, 27 April 1592. He was a pupil of Romanino (see Romanino Girolamo) and of Titian at Venice, and subsequently imitated Michelangelo. He was a skilled mannerist who could paint in

any style while possessing none of his own. The Academy of Saint Luke was founded at his instigation. Among his most successful pictures are (The Taking Down from the Cross, > in the Borghese Gallery, Rome; (The Gift of the Apostolic Keys,* in the Vatican. There are also some frescoes of his still to be seen in the Vatican.

MY PRISONS ((LE MIE PRIGIONP),

one of Italy's most noted books, was written by Silvio Pellico (1789-1854) and published in Turin in 1832. The work is autobiographical, relating the 10 years' experience of the author, charged with conspiracy and condemned by the Austrian government, first to death and subse-sequently to 15 years of imprisonment in the prisons of Venice and Spielberg, near Briinn in Austria. The work itself is of the simplest character, written, as he says in his preface, to comfort unfortunates like himself by show¬ ing that under the most unfavorable conditions humanity is not as black as it is painted. Had Pellico aimed directly to expose the inhu¬ manity and cruelty of the Austrian govern¬ ment, as might have been expected he would have done, his effort would likely have fallen far short of what he actually accomplished in doing just that in this pathetic tale of his sufferings borne with the utmost Christian resignation. No hatred nor vindictiveness to¬ ward his arrogant persecutors escapes the

unfortunate victim. In fact it is just here that the recital is most open to criticism. The patient sufferer is too submissive, too long-suffering. Inoffensive and saintly as he is, that virility, which, because founded on righteous¬ ness, must ever command respect, is conspicu¬ ously lacking in him. His sad story awakened throughout Italy the most profound sympathy. Its moral effect may be compared to Chateau¬ briand's (Genie du christianisme,* which was worth an army to Napoleon. Pellico's (Le inie prigionP was, as Caesare Balbo, who counseled the author to write the story, has said, worse for Austria than losing a battle. It is not primarily as an author that Pellico's place is secure in the hearts of his countrymen, for his literary work as a whole is rather common¬ place, but as a Christian martyr upon whom an odious enemy has placed a crown of thorns. From the time of the appearance of this story, the hateful domination of Austria was judged and condemned by the fairminded not only of Italy but of Europe. Nothing has ever been written better adapted to cause and to per¬ petuate feelings of hatred toward a despicable tyrant. And even to-day the influence of (Le mie prigionP on Italian sentiment toward Austria is abiding. Many translations of (Le mie prigionP have appeared in many languages and English versions are easily procurable in the large libraries.

James Geddes, Jr.

MYCALE, mik'a-le, Asia Minor, the classi¬ cal name of the modern Samsun, a mountain of south Ionia, with the promontory of Cape Santa Maria opposite the island of Samos as its seaward termination.

MYCENiE, ml-se'ne, Greece, an ancient city of Argolis in the Peloponnesus, six miles northeast of Argos, built on a steep hill domi¬ nating the passes to Corinth. Its ruins since Schliemann's excavations in 1876 have yielded

an abundance of archaeological treasure of the greatest value and interest, illustrating the dis¬ tinctive Mycenaean period of civilization, which preceded the culminating era of Hellenic cul¬ ture. Mycenae is said to have been founded by Perseus, and before the commencement of the Trojan War was the residence of Agamemnon, in whose reign it was regarded as the leading city in Greece; it was also the scene of the domestic tragedies of the house of Atreus (q.v.). It declined in importance after the invasion of the Dorians, but its cyclopean walls, citadel and other features, chief of which are the Lion's Gate, and the vaulted building of megalithic architecture called the Treasury of

Atreus (q.v.), stood through succeeding cen¬ turies, and still stand, as monuments of its ancient .grandeur and importance. Consult Schuchhardt-Sellers, (Schliemann's Excavations) (1891) ; Hall, (The Oldest Civilization of Greece * (1901) ; Tsountas and Manatt, (The Mycenaean Age) (1897).

MYCORRIZA is a general name for a group of subterranean fungi that spread their growing, feeding part (mycelium) through the loose damp soil (humus) of the floor of a forest or woodlot. They are symbiotic with a great variety and number of green-leaved plants, including forest trees of several families. The first root of one of these affected plants, just born from the seed, remains free, but as fast as the lateral roots push out they are enveloped in the mycelium of the fungus, and their rami¬ fications become entangled in it as they spread, and this connection continues throughout life. Wherever a root or rootlet extends under¬ ground the fungus accompanies it. The mycelial filaments may form a dark-brown, felt-like coating over the whole surface of the root, or, in other cases, depending on the species, may make a network of spider-web- like mesh. At various points the spore-produc¬ ing hyphae proceed outward through the soil from the mycelium; they look like rootlets and seem to perform a similar service. This mycelium (called <(spawnw by mushroom grow¬ ers) represents an unknown number and variety of species of fungus, and it abounds in the humus of forests and uncultivated heaths where the top-soil is the result of vegetable decay. The coating of roots by this mycelium is to be seen wherever plants .grow, but it does not affect every kind of plant. It is restricted to the flowering plants, among them all the Pyrolacece, Vaccinea? (whortleberries), and Ar-butae, and most if not all the heath family (Ericacecu) , rhododendrons, daphnoids, a great number of conifers and all the Cupuliferce — a group that includes the oak, beech, alder, chestnut and many other forest trees ; also many isolated trees, as willows and poplars, and the genista and several other familiar garden herbs.

This association of the mycorrhiza with the flowering plants is in each case a partnership of mutual benefit. Covering the root with a mantle it prevents, it is true, the absorbing pores from performing their function of with¬ drawing from the soil the dissolved elements that constitute the food of the plant, but in compensation the fungus takes on itself this function, absorbing the required nutriment and delivering it to the plant. It is enabled to do

this because the mycelium has the power of secreting (<those special enzymes, or ferments which render soluble the organic ingredients they touch. ® In return for this service it re¬ ceives from the plant-root nourishment for itself, which has been elaborated in the leaves and distributed to every part of the plant, in¬ cluding its uttermost rootlet. This, indeed, is only following the custom of all fungi, which, having no chlorophyl with which to derive nourishment from the air through chemical dissolution and recombination, must get it from vegetable sources. This association of the mycorrhiza with plant-roots is therefore really a parasitism, yet it seems not only harmless but decidedly beneficial — in fact, those plants participating in this association will not do well, and perhaps will fail to grow at all, in a soil wholly free from suitable mycorrhiza. Hence the special value of the addition of wood-mold to garden or window-pot soil is that it brings with it this advantageous, and sometimes in¬ dispensable, mycorrhiza mycelium.

Ernest Ingersoll.

MYDDELTON, or MIDDLETON, Sir Hugh, British contractor : b. Galch Hill, Den¬ bigh, Wales, about 1560; d. 10 Dec. 1631. He was by trade a goldsmith, banker and cloth-maker of London, but became (1597) an aider-man of Denbigh, then was elected member of Parliament for that town in the years 1603, 1614, 1620, 1623, 1625 and 1628. The lack of water supply for the rapidly growing city of London induced the Parliament to pass a bill for the construction of the ((New River® to tap the springs in Hertfordshire, and he con¬ tracted to carry out the undertaking. Power¬ ful opposition from the landed proprietors forced him to call in the king's aid and James I paid half the cost in return for half the prof¬ its. The canal, begun 1609, was completed in 1613 and was then 38 miles long, 20 feet wide, with a depth of but four feet. Until after his death the project was unprofitable and he lost considerably though the New River Company later became, after his death, one of the most profitable undertakings of centuries, its shares (known as ˆKing's® and <(Adventurers®) being broken up in 30-second parts, bring immense dividends to this day. In 1617 he made consid¬ erable profit in the exploitation of lead and silver mines in Cardiganshire. He was created a baronet in 1622.

MYELITIS (from Greek fiyeUg\ mar¬ row), an inflammation, attended with more or less softening, of the substance of the spinal cord. It may be acute or chronic and is a rare disease. Some of the maladies formerly ascribed to chronic myelitis are now known to be due to chronic induration and thickening (sclerosis). The most common causes of myelitis are: irritation of the cord by fractured, dislocated or diseased vertebrae, by the pres¬ sure of a tumor, or by hemorrhage into its sub¬ stance. The disease is aggravated by intem¬ perate habits. It begins usually with pain or other uncomfortable sensations in the spine or extremities, and fatigue, followed by an uncer¬ tain gait, paralysis and very frequently death. There are four different forms of the disease according to the position of the inflammation, which may be in the midthoracic region, the most common form, or in the lumbar or lum¬

bosacral region, in the cervical region or it may, instead of affecting only a certain definite locality such as those already mentioned, in¬ volve a number of small areas in the whole length of the cord and brain. This form is called disseminated myelitis. If the inflamma¬ tion involves the upper part of the cord above the origin of the respiratory nerves, respiration is interfered with and death results from as¬ phyxia. This is, however, exceedingly rare. If the inflammation exists lower down, in addi¬ tion to the loss of motor power in the extrem¬ ities the bladder and rectum may be paralyzed, the evacuations are discharged involuntarily and death occurs from exhaustion. The tend¬ ency of the inflammation is to spread. Treat¬ ment consists of salvarsan and mercury for the cases of syphlitic origin. Absolute rest in bed must be required, an air or water bed being preferable as bed sores are very likely to occur.

MYERS, Abraham C., American Confed¬ erate soldier: b. in South Carolina, 1811; d. Washington, D. C., 20 June 1889. When a boy he removed to Louisiana, was appointed to West Point, and in 1833 was graduated and entered the army. He served several years on the frontiers, in the War with Mexico, and then entered the quartermaster's department as lieu¬ tenant-colonel. When Louisiana seceded, Myers resigned and was soon appointed Con¬ federate quartermaster-general with the rank of colonel. Myers rendered great service to the Confederacy in organizine its transporta¬ tion and supply departments. On 10 Aug. 1863 he resigned. His life after the war was un¬ eventful.

MYERS, Henry L., American legislator: b. Cooper County, Mo., 9 Oct.

1862. He was educated at private schools and practised law (1885-93) at Boonville and West Plains, Mo., then at Hamilton, Mont., from 1893. From 1895-99 he was prosecuting attorney for Ra¬ valli County, Mont., becoming Democratic member of the Montana senate 1899-1903. He was (1907-11) district judge of the 4th Judi¬ cial District of Montana, becoming (1911-17), United States Senator for Montana, to which position he was reelected for the present term

(1917-23).

• MYERS, Jerome, American artist: b. Petersburg, Va., 20 March 1867. He received his first art education in Cooper Union, New York, and also at the Art Students' League. In 1903 he won a Saint Louis Exposition bronze medal. His (Night MissioiP is in the New York Metropolitan Museum of Art and other works are in leading galleries of private collections. His favorite subjects are taken from local sources, New York's ((East Side® especially.

MYGALE, the technical and book-name of the Theraphosidae a species of trap-door spider (My gale avicularia) which has been known to catch small birds and kill them. It is a native of India, Australia, Africa and South America. It is the largest of all the spiders, being very stout, dark brown or black in color, and its thick legs covered with hairs mingled with longer bristles. It builds its nest in trees. Similar species are brought into our ports in bunches of bananas. These spiders are noc¬ turnal in their habits and feed usually on in-

sects, but they do not hesitate to attack any liv¬ ing creature which seems unable to resist them. The fact that the bird-spider will actually kill birds and suck their blood was asserted by Madam Meriam in 1705. Her statements were received with doubt, but long after were veri¬ fied by Bates. The specimen he observed on the Amazon River was nearly two inches in length, the legs expanding seven inches. He saw the monster on a tree-trunk beneath a deep crevice in the tree,

across which was stretched a dense white web. <(The lower part of the web was broken, and two small finches were entangled in the pieces; one was quite dead, the other was still living and was smeared with the filthy liquor or saliva exuded by the monster.® The natives call them aranhas carangueijeiras, or ˆcrab-spiders.® The hairs on the body and legs come off when touched, and ((cause a peculiar and almost maddening irritation.® This, Bates thinks, is not due to any poisonous quality residing in the hairs, but to their being short and hard, and thus getting into the fine creases of the skin.

MYIASIS, a diseased condition in humans caused by the larvae of flies. House-flies may affect the skin of man by depositing eggs in wounds and on ulcerations, or may invade the external cavities of the body. The eggs hatch, and the maggots cause much local irritation and symptomatic fever; or in the case of the bot¬ fly (q.v.), penetrate the skin deeply and pro¬ duce large abscesses. The maggots, as a rule, do not penetrate other tissues. The principal flies that infect wounds, etc., are the flesh-fly (blue-bottle), blow-fly, screw-worm fly, which deposits its eggs in the noses of persons who sleep unprotected during the day, and house-fly (qq.v.). Internal myiasis may result from swallowing the eggs of flies in raw vegetables containing them, and sometimes eaten in salads, when the resulting larvae are got rid of by vomiting or purgation. Consult Howard, (The Insect Book* (1901).

MYLITTA, mi-lit'ta, an Assyrian goddess, identified by the Greeks with Aphrodite. She was, as goddess of the moon, the female prin¬ ciple of generation.

MYLODON, the ((ground sloth,® a genus of extinct edentate mammals, of sloth-like structure and large proportions, the remains of which occur along with those of the Megathe¬ rium and Megalonyx, in the recent or post-Tertiary deposits of South America and also scattered widely over the United States from Pennsylvania on the east to Oregon on the west. In size the Mylodon robustus — the most familiar species — attained a length, in some in¬ stances, of 11 feet. A large piece of the very thick hide of one of these mylodons, found in a cave in Patagonia, shows that they were cov¬ ered with a dense coat of yellow-brown furry hair, similar to that of the brown bear of the Rocky Mountains. See Ground-Sloths; Me¬ gatherium.

MYNA. See Mina-birds

MYOPIA, mi-6'pi-a, nearsightedness. See Astigmatism; Color Blindness; Eye; Eye Strain ; Vision, Defects of.

MYOSIN, or MYOSIN-FIBRIN, a sim¬ ple proteid substance, usually classed as a globulin (see Globulins), which separates

from muscle plasma after death, in the form of a clot, which is analogous to the clot of fibrin that is formed under similar circumstances in blood. Its average composition is carbon, 52.28 per cent; hydrogen, 7.11 per cent; nitrogen, 16.77 per cent; sulphur, 1.27 per cent, and oxygen, 22.03 per cent. It does not exist in the living muscle, being there represented by two other proteids called myosinogen and paramyosinogen, respectively. The stiffening of the muscles after death (technically known as the <(rigor mortis®) is due to the formation of the myosin-fibrin and myogen-fibrin clots in the cells of the muscles. Myosin is insoluble in water, but dissolves in dilute saline solutions. It is soluble also in dilute acids and alkalies, which convert it promptly into albuminates. Consult Hammarsten, O. (Mandel's transla¬ tion), (A Textbook of Physiological Chemis¬ try* (New York 1908).

MYOSOTIS. See Mouse-ear.

MYRES, mirz, John Linton, English clas¬ sical scholar: b. Preston, Lancashire, 3 July 1869. He was educated at Winchester and studied at New College, Oxford. From 1895— 1907 he was tutor at Christ Church and lec¬ turer in classical archaeology (1903) at Oxford University, junior proctor (1904-05), secretary to committee for anthropology (1905-07) and examiner in final classical school (1906-08). From 1907-10 he was Gladstone professor of Greek and lecturer in ancient geography at the University of Liverpool, then Wykeham pro¬ fessor of ancient history at Oxford. He trav¬ eled through Greece and Asia Minor, con¬ ducted excavations in Cypress (1894 and 1913), and reorganized the Government Museum (1894). He has written (A Catalogue of the Cyprus Museum* (1899), in collaboration with Dr. Ohnefalsch-Richter ; (A History of Rome) (1902) ; (The Dawn of History) (1911) ; Hlandbook of Cesnola Collection of Antiquities) (in Metropolitan Museum of Art, 1914). He also wrote many papers on an¬ thropology, geography and archaeology for the scientific periodicals.

MYRIAPODA, a group formerly classified among the arthropodan animals, but now bet¬ ter known. It includes the groups of Chilopoda, or centipedes, and the Diplopoda, mille-peds or galley-worms. The features common to all are the elongate worm-like body consist¬ ing of a head and behind this the trunk of numerous similar leg-bearing

segments, not di¬ vided into thorax and abdomen. They are all habitants of dark and obscure places, — under logs and stones and the bark of trees. All but two species are terrestrial ; those two are semi-aquatic, living between the high and low-water levels on the seacoast. Closer analysis shows that the chilopods are related to the Crustacea while the diplopods are allied to the worms. In the chilopods the head bear? a pair of groups of simple eyes, a pair of antennae and three pairs of jaws (mandibles, maxillae, labium), while the first pair of trunk appendages be¬ comes connected with the head and serve as poison-jaws. The trunk-segments are all sim¬ ilar, and each bears one pair of legs, the num¬ ber of segments ranging from 15 to 170 or more. The body-segments are flattened and the reproductive openings are at the hinder end of the body. Most of the chilopoda are carnivoro

ENTOMOLOGY, MYRIAPUiM AND ARACHNIDA

Fig. 1 Tiger-moth 2, 3, 4 Winter-moth — Male, Female, Caterpillar 5, 6 Apple-roller 7, 8 Honey-moth 9 Clothes-moth 10 White-plume Moth 11 Ringed Gnat 12, 13 Breeze-fly and Larva

16 Anthrax 17 Bombylius 18 Vermileo 19 Volucella 20 Stratiomys 21 Syrphus 22 Tachina 23 Bot-fly 24 Blue-bottle 25 Forest-fly 26 Flea 27 Beetle-bug

30 Common Bug 31 Reduvius 32 Water-flea 33 Bank-scorpion 34 Water-scorpion 35 Water boatman 36, 37 Cicada and Larva 38 Burrowing Cicada 39 Frog-hopper

41 Psylla Genista e 42 Cochineal, a Male; b Female 43 Louse 44 Crab-louse 45 Scutigera < 6 Scolopendra 47 Millepede 48 Centipede 49 Pill-worm 50 Scorpion 52 Tarantula 53 Weaving Spider 54 Scorpion Spider 55 Mining Spider 56 Garden Spider 57, 58 Hunting Spider 59 Scarlet-mite 60 Water-mite

14 Hawk-fly 28 Wood-bug 29 Phytocoris 40 Centrotus Cornutus 51 Book-scorpion

ous and ferocious and are very quick in move¬ ment. The most noticeable members of the group are the centipedes (Scolopendridce) of the tropics, some of which are nearly a foot in length and have considerable poison powers. See Centipedes.

In the diplopoda the head bears but two pairs of jaws (mandibles and lower lip or gnath-ochilarium), while the trunk-segments are usu¬ ally circular in section, and each, except a few near the head, bears two pairs of legs, an ex¬ ception to the otherwise universal rule among arthropoda of a pair of legs to a somite. The range of segments is even greater than in the chilopods, there being nine in Pauropoda and 200 in some Polyzoinda ?. The reproductive organs lie ventral to the intestine, and the ex¬ ternal openings are a little behind the head. The Diplopoda live mostly upon decaying vege¬ tation and are extremely slow in movement. For protection they rely upon the very thick and hard walls of the bodies, and in some species upon peculiar stink glands which open on the sides of the body. See Milleped.

Fossil Myriapods appear in the Devonian rocks and they are found in all parts of the world to-day. Most of the American species are described in Bollman's (Myriapods of America) (United States National Museum,

1893).

MYRICIN, a substance formed by the com¬ bination of palmitic acid with an organic rad¬ ical known as amyricyl.® It has the chemical formula C30H61.O.CO.C15H31, and occurs in bees¬ wax, forming the chief portion of that part of the wax which is insoluble in alcohol. Myricin melts at 162° F., is readily saponified by alco¬ holic potash, and may be obtained in the form of feathery crystals by deposition from its solution in ether.

MYRISTIC ACID, an organic acid occur¬ ring in the form of a glyceryl ether in nutmeg butter, from which it may be prepared by saponification and subsequent distillation at a pressure materially below that of the atmos¬ phere. It is a component also of butter, wool fat, cocoanut oil and oil of quince seed. It has the chemical formula C13H27.COOH, and is insoluble in water. It is very soluble in hot alcohol, however, from which it separates, upon cooling, in the form of lustrous laminae, melt¬ ing at 129° F., and 'boiling at 250° F. It may be prepared by melting stearolic acid with potash. A number of compounds of myristic acid with the metals are known, as well as sev¬ eral ethers and other organic > compounds. Myristic acid gives their characteristic name to the myristica fats of which it forms the pre¬ dominating part as trimyristil glyceride.

MYRMECOPHILY, in its broadest sense, signifies a condition of friendship with ants, and includes the subject of the various insect and other guests kept or entertained in their nests by ants. The side of it to fie considered now, however, is the relation of certain plants to ants, when this relation is, or is supposed to be, of mutual advantage. Such plants are termed myrmecophilous and . are of great variety, especially in the tropics. That ants inhabit all sorts of cavities in trees and large vascular plants, such as cacti, is well known, and often they dig out the pithy interior or otherwise modify these cavities into homes

fully adapted to their requirements. ((The rigid vegetable tissues are an excellent protection against enemies,® as Wheeler points out, (<and the cavities are moist, dark and free from molds, so that they make perfect nurseries for the larvae and pupae.® It is a matter of com¬ mon knowledge also that in most cases the plants thus utilized furnish a good deal of food-material for the ants. The great mass of ob¬ servations bearing on this matter have been interpreted by many naturalists to support the view that many plants have developed as an adaptation through natural selection elaborate structures to be used as ant-lodgings or even to furnish these insects with food-substances in order to attract certain pugnacious ants whose stings are formidable, because they will pro¬ tect the plants from leaf-cutting ants or other leaf-destroying enemies. In this alleged symbiotic arrangement the insects profit by the supply of special food-material growing on the plant and return the service by warding off harm; and it is said that mutual adaptations have occurred between the chosen kind of plant and the species of ant that inhabits its ap¬ pointed cavities. The great body of facts col¬ lected by Fritz Muller, Schimper, Belt, Semper,

Beccari and others are accepted, and some of their interpretations are admitted, but recent students of the matter regard the theory as far overstrained and doubt that true symbiosis can be shown to exist in any case. The latest and fullest treatment of the matter will be found in William M. Wheeler's (Ants) (New York

1910).

MYRMIDONS, mer'mi-donz, a former people on the southern borders of Thessaly, who accompanied Achilles to the Trojan War. They were said to have received their name from Myrmidon, a son of Zeus and Eurymedusa, the daughter of Cleitos, whom Zeus deceived in the disguise of an ant. He was married to Peisidice by whom he became the father of Antiphus and Actor. For Hiacus, a descendant of this branch, Zeus changed the ants of the island of ZEgina to men. This legend was the origin of the belief that the Myrmidons emi¬ grated to Thessaly under the leadership of Peleus.

MYROBOLANS, the dried fruits of vari¬ ous species of East Indian trees, all having more or less astringent properties. They are used for dyeing and tanning, especially the latter. The trees are of the genus Terminalia, family Combretacece, the chief being the belleric myrobolan (T. bellerica) , and the chebulic (T . chebulica) .

MYRON, Greek sculptor: b. Eleutherae, a seaport of Boeotia, about 450 b.c. He was, along with Phidias and Polycletus, a pupil of Agela-das, the founder of the Peloponnesian school of sculpture, and made his renown at Athens as a versatile and masterly worker in bronze, silver and every other art material. He exe¬ cuted statues of gods, heroes and especially of athletes, many of which were set up in the temples at Delphi and Olympia. The most celebrated among them was that of swift-runner Ladas, and the Discobolus, or hurler of the discus, a work of art highly admired by the Romans, as is proved bv the manv Italian copies of it made in marble, the finest of which is that now in the Lancelotti Palace, Rome. On

medals, basins and reliefs there are still ex¬ tant copies of his Athenian work, (Athene Throwing Away the Fluted *etc.* A marble copy of his (Marsyas) is in the Lateran Mu¬ seum at Rome, and one in bronze is to be seen in the British Museum. He was equally suc¬ cessful in the representation of animals. His (Cow) in the market at Athens was the sub¬ ject of many a laudatory epigram and was brought to Rome in the time of Cicero. Myron gave a somewhat exaggerated slenderness to the human form, which he modeled with ex¬ quisite beauty and anatomical accuracy, but was not a master of facial expression.

MYRRH, a popular name for a gum resin produced by Commiphora myrrha of the family Burseracccc ; also for a garden plant Myrrhis odorata of the family Apiacecc. The resin is obtained from Arabia and adjacent Africa from a small, prickly, stunted, gray-barked tree which bears few small denticulate leaves and smooth, brown, egg-shaped drupes as large as currants. The drops, granules or tears which in com¬ merce are brown, red or yellow are at first rather oily, vellowish and soft, becoming brittle with age. They have a pleasing balsamic odor and lasting, bitter, aromatic taste. From earliest times they have been used for making incense and other perfumes and have been reputed useful in medicine, especially for cleansing the mouth and sweetening the breath.

Myrrh, the garden plant, also known as sweet cicely, has been cultivated for ages as a sweet herb for flavoring salads and culinary preparations. It is little grown in the United States except by people of rather recent Euro¬ pean ancestry.

MYRTACE.7E, a family of trees and shrubs, the myrtle family, comprising about 70 genera and more than 2,000 species widelv dis¬ tributed in warm climates, but sparingly in temperate. It is one of the most important families of economic plants. Some of the species, such as pomegranate (Punic a grana-tum), guava (Psidium spp.), luma and ugni (Myrtus) yield important fruits; some such as cloves (Eugenia sp.), allspice (Pimenta) , fur¬ nish highly valued spices; and still others, espe¬ cially species of Eucalyptus, are leading timber trees of the world. The species are character¬ ized by simple, entire leaves generally dotted with glands; perfect flowers in racemes or sometimes cymes, and various kinds of fruits. See Myrtle. .

MYRTLE, a popular name for several unre¬ lated plants of which the following are prob¬ ably the best known: Crape myrtle (Lager -

strccmia indica) of the family Lythracece ; run¬ ning myrtle (Vinca spp.) of the family Apocynacecc ; sand myrtle (Leiophyllum spp.) of the Ericacccc. When unqualified the name generally refers to various species of Myrtus of the family Myrtacecc. The common myrtle (M . communis) is an evergreen shrub native of the Mediterranean region and western Asia, whence it has been introduced into gardens throughout the warmer temperate climates of the world for its foliage and flowers. It was used in Greek festivals as sacred to Venus and as the symbol of beauty and vouth. Its aro¬ matic leaves and berries were formerly used in medicine and its bark in tanning, uses still made of them to some extent in southern

Europe. The small leaved myrtle (M. micro-phylla) , the luma (M . luma) and the Chilean guava (M . ugni) yield edible fruits, for which they are planted in South America and to some extent in California.

MYRTLE TREE. See Beech.

MYSIA, mish'i-a, Asia Minor, a name an¬ ciently applied to a district which varied greatly in extent at different periods. The name first occurs in the legend of Telephus, who became king of Mysia. Under the Persian Empire Mysia was the name of the section between Lydia on the south and the range of Ida on the north. It was united with the region on the north and with Lydia in forming a single satrapy. After the overthrow of the Persian Empire by Alexander the Great, Mysia fell to Lysimachus (311 bc.). Subsequently it formed p'art of the Graeco-Syrian kingdom, then of the kingdom of Pergamus, and finally, in 133 b.c., was bequeathed with the rest of the kingdom of Pergamus, by Attains III to the Romans, by whom it was made a part of the province of Mysia. When the divisions of Asia Minor were settled under Augustus, the name of Mysia was given to the whole of the northwestern district, bounded on the north bv the Propontis (Sea of Marmora), east by Bithvnia and Phrygia, south by Lydia and west by the 2Egean Sea. Under the later empire Mysia was erected into a separate proconsular province and received the name of Hellespontus. The inhabitants were thought by some ancient writers to be of Thracian or Lydian descent.

MYSORE, mi-sor', or MAISUR, mi-soor', India, the dynastic capital of the native state of the same name, 250 miles west by south of Mad¬ ras, in a valley 2,450 feet above sea-level, dominated on the southeast by Chamundi Hill 1,040 feet higher, with a temple on its summit. It is on the Mysore State Railway. Modern enterprise on European methods

has greatly improved the town. The streets are broad and regular, the houses intermingled with trees and temples, and there are several fine modern pub¬ lic buildings, including the British residency. The fort built in European style, and separated from the town by a promenade, encloses the maharaja's palace, and the dwellings of his officials.

MYSORE STATE, or MAISUR, a native state in Southern India, lying between lat. 11° 36' and 15° 2' N. and 74° 38' and 78° 36' E. Its area is 29,433 square miles ; the greatest length north and south being about 230 miles; east and west about 290 miles. It is bounded by Madras districts on all sides except on the northwest where it is bordered by two Bombay districts and toward the southwest where Coorg intervenes. It consists of an undulating table land, much broken up by chains of rocky hills and scored by deep ravines. Its* form is that of a triangle with the apex to the south at the point where the western and eastern ghat ranges converge in the group of the Nilgiris. The general elevation rises from about 2,000 feet along the north and south to about 3,000 feet at the watershed which separates the basin of the Kistna to the north from that of the Cauvery to the south. Isolated rocky peaks called ((droogsM appear on all sides at an eleva¬ tion of from 4,000 to 5,000 feet. The drainage

of the country finds its way east to the Bay of Bengal and there are three great river systems; the Kestna on the north, the Cauvery on the south and the Penner, Ponnaiyar and Palar on the east. None of these is navigable, but they are sometimes used for floating lumber. They support an extensive system of irriga¬ tion by means of channels formed by immense dams, these channels tracing a course of more than 1,200 miles. There are no natural lakes in Mysore, but by embanking streams, tanks or reservoirs of all sizes are formed numbering some 30,000. Mysore is divided naturally into two regions : the hill country or Malnad on the west — a picturesque mountain land, with fine forests — and the open country on the east comprising the greater part of the state, known as Maidan or Bayalshlme, where the towns are located. The products of the country vary with the

water supply and nature of the locality. The level plains of black soil in the north grow cotton or millets ; the tracts in the south and west are covered with plantations of sugar¬ cane and rice; the lands irrigated from tanks yield coco-nut and areca palms ; the red soil in the east produces ragi and dry crops; the central parts covered with areas of coarse grass relieved by shady groves, are good for grazing. The principal mountain ranges besides the Ghat ranges are the interior range, from 10 to 20 miles wide running between 77° and 77° 30' E. to the frontier; and a corresponding range in the west. The highest point is Mulainagiri, at an elevation of 6,317 feet. Granites and granite gneisses of the Achaean occupy the greater por¬ tion of the state and traversing these are metamorphic schists of Pre-Palseozoic Age. There are other more recent deposits. Granite exists in large irruptive masses. Wild animals and reptiles are abundant in the forests and streams of the south. Large fish are found in the west.

There are three seasons, rainy, cold and hot. The country is visited by two monsoons, the southwest, from June to November, followed by the cold season. The temperature ranges from 64° to 84° in the rainy season; and from 51° to 80° during the cold season. In the hottest season it ranges from 66° to 91°, rarely reaching 96°. The rainfall varies from 19 inches in the north centre to 360 inches on the crest of the Western Ghats.

Mysore yields 95 per cent of the gold of India. Iron is found in small quantities and asbestos is an undeveloped industry. The manufactures consist of fabrics, silk and car¬ pets, gold ornaments, copper vessels. Sandal wood carving is extensively carried on. Coffee, cotton-ginning, bricks, tiles, etc., are also among the manufactures. A system of railways radi¬ ates from Bangalore; the length of the rail¬ way open to traffic in Mysore is about 500 miles. For postal services, Mysore is now part of the Madras circle. There are Mysore state savings banks and life insurance companies. Famine, due to lack of rainfall, has often car¬ ried off many of the people, but measures have been taken to alleviate this condition, such as the extension of railways, irrigation and plans for relief work.

The government is vested in His Highness the Maharaja, a chief justice and a court of three judges. The capital is at Mysore City,

but the administrative headquarters are at Bangalore. The administrative districts of the state are Bangalore, Kolar, Tumkur, Mysore, Hassan, Spimoga and Chitaldroog. The officer in charge of a

district is called the deputy commissioner who has a staff of assistants. The villages have local government under a patel, a hereditary office. A representative as¬ sembly meets once a . year, when the annual statement of finances is made. The govern¬ ment of India is represented by a resident. There are military systems, lesser courts, sys¬ tems of land tenure and revenue, police depart¬ ments, *etc.* Education was at first introduced by European missionaries and has been devel¬ oped into a fine public system. There are now about 3,800 schools of all grades with some 125,000 male and 25,000 female students. Hos¬ pitals and asylums are also provided in the larger cities. The population of the entire dis¬ trict according to the most recent census is 2,871,572. Hindu castes predominate the Lingayats forming the strongest sect. There are about 50,000 Christians, about 8,000 of whom are white. The principal cities are Ban¬ galore, Mysore, Kolar, Tumkur, Channapatna, Davangere and Tarikere.

The authentic history of Mysore as gathered from inscriptions, begins after the invasion of Alexander the Great in 327 b.c. After his re¬ tirement the north of Mysore came under the rule of the Andhra of Satavahana dynasty, ex¬ tending down to the 2d century b.c. The various parts were under petty local princes who were frequently at war with each other, until in ‘the 14th century the territory became a part of the Ballala Kingdom of Delhi, after the invasion of the Mohammedans. After their downfall a new Hindu sovereignty arose at Vijayanagar on the Tungabhadra. In 1565, this dynasty was defeated at the battle of Talikota and petty chieftains again divided up the state. The most important of these, the wedeyar of Mysore, seized the fort of Seringapatam in 1610 and founded the present state. Under Deva Raja it became a powerful kingdom. In the 18th century this dynasty was overthrown by the Mohammedan Hyder Ali, who, after a brief but brilliant reign, was defeated at Sering¬ apatam in 1799, and the government was left to an infant descendant and an unscrupulous regent, Purnaiya. The British government took over the administration in 1831. In 1867, it was determined to permit the native rule, under British surveillance. In 1881, Maharaja Chamarajendra took the rule of the state, main¬ taining the standard of administration. In 1902 the ruler was vested with full powers. Con¬ sult ˆImperial Gazetteer of India) (Vol. XVIII, Oxford 1908).

MYSTERIES (Latin mysterium, from Greek mystes, initiate) — in ancient history, were among the Greeks, and afterward also among the Romans, secret religious assemblies, in which no uninitiated person was permitted to take part. They originated at a very early period. They seem to have had a double object — first, that of handing down

the traditions re¬ lating to the divinities in whose honor they were celebrated; and secondly, that of teaching and practising religious rites. The true value of the mysteries did not lie in dogmatic teach¬ ing, but in the moral improvement apparent in

the votaries, in the comfort the rites gave in the present life, and the hopes they inspired for the world to come. The most important Greek mysteries were (1) the Eleusinian; (2) the Samothracian, which were celebrated in honor of the Cabeiri in all the places where these divinities were worshiped. (3) The Dionysia, at Rome called Bacchanalia, which were cele¬ brated in honor of Dionysus or Bacchus. These latter mysteries were of so licentious a char¬ acter that they were first forbidden in Thebes, and afterward in all Greece, as prejudicial to the public peace and morals. This was like¬ wise done in Italy by a decree of the Roman senate in 186 b.c. (See Bacchus). (4) The Orphic, consecrated to Dionysus Zagreus, the son of Zeus and Persephone. (See Orpheus). See also Miracle Plays.

Eleusinian Mysteries were generally held by the Greeks to be the most sacred of all the mysteries; and their great secrecy, intricate ritual and dramatic features were undoubtedly strongly influential in shaping the form of the ritual for many succeeding secret orders. They were connected with the worship of Demiter and Cora at Eleusis in Attica ; and they appear to have had their origin in the ceremonies con¬ nected with the birth and death of the grain spirits. Demeter, in the ceremonies of initia¬ tion through which the candidate had to pass in order to become a member of the mysteries society, finally bestows agriculture upon man. The. mysteries seem to have had degrees sug¬ gestive of the degrees in modern secret socie¬ ties. All candidates had to become members of the society of the Lesser Mysteries at Agrae (near Athens), before they could enter that of the Greater Mysteries at Eleusis; and six months had to elapse between the two initia¬ tions. At both initiations the candidate made his own personal offerings or sacrifices to the gods, accompanied by fasting and other cere¬ monial practices in the nature of purifications; after which he wandered, or

was led, through dark and intricate passages until finally he emerged into the presence of the deity upon whom streamed the light. As the Lesser Mysteries were celebrated in the early spring and the Greater Mysteries in the fall, the first probably represented the coming to life of dead nature and the latter the death of vegetation. A sacred peace declared some days previous to the opening of the ceremonies and continuing several days after their close permitted the pilgrims to the shrines and the candidates to come and go in peace, without any fear of molestation. The public ceremonies of the Greater Mysteries began with the bringing from Eleusis to Athens of certain sacred relics to be placed in the Eleusinia; the following day the celebrants put in an appearance and on the third day all the initiates (Mystae) marched in procession to the Phalerum beach where they performed the necessary ceremonial bathing which was symbolical of purification. This was followed by two days devoted to offerings pre¬ sented at various shrines throughout Athens. Early on the morning of the next day the relics were returned to Eleusis, escorted by a great religious procession, in the midst of which was the image of Iaccus. This occupied all day. The following four days and nights were given up to the secret ceremonies of the mysteries,

under the direction of the Hierophant, the Dadouchos (torchbearer), ■ the Hierokeryse (herald) and the officiating priest. Eleusinian mysteries were also celebrated in various other places in Greece proper and outside of it, among these being Megalopolis, Phlius and Andania (in Messenia). The mysteries undoubtedly dated back to considerable antiquity, far as the earliest notice wre have of them, they are pos¬ sessed of an organized priesthood and the cus¬ tom of choosing the Hierophant from one family (the Eumolpidae of Eleusis), and the Dadouchos from another (the Kerykes). It it-probable that these families, in early times, derived their family names from their offices, as the Jewish priests did.

Samothracian Mysteries. These which were originally two, were known as those of the Cabeiri. In the course of time they became four, Axieros, Axiokersa, Axiokersos and Kasmilos., in popular phraseology ; though the grammarians identified them, respectively, with Demeter, Persephone, Hades and Hermes. It seems probable that they were the survival of tribal deities belonging to the same great family religion.

Gradually as time went on these mysteries, which had much of the spectacular and the mysterious which always appeal to humanity, spread throughout Greece, in their own form and under their own

name or in the shape of evident imitations or of other closely related tribal mysteries. The worship of the Egyptian moon and mother goddess, Iris, which had early been introduced into Greece, spread rapidly throughout all the land round the Mediter¬ ranean and later into the cultured sections of western Asia. With this worship came foreign mysteries, which seem to have originated in the same form of nature worship as the native Greek mysteries. Other foreign mysteries, ap¬ parently also of similar origin, were introduced into Greece and appear to have taken root there. The Greeks seem to have been very fond of these semi-religious, semi-social myste¬ ries and most of the prominent citizens appear to have belonged to one or more of them, much as people to-day belong to secret societies. The mysteries, however, had a deep meaning for the Greek, which the modern secret society does not have for its members.

Bibliography.— Aurich, (Das antike Mvster-ienswesen in Seinem Einfluss auf das Chris-tenthum5 (Gottinger 1894) ; Fairbanks, (A Handbook of Greek Religion) (New York 1910) ; Farnell, L. R , <Cults of the Greek States5 (Oxford 1906) ; Foucart, (Recherches sur l'origine de la nature des mysteres d'Eleusis5 (Paris 1895) ; Gardner, E. A., (New Chapters in Greek History5 (London 1892) ; Gruppe, O., (Griechische Mytolpgie und Re¬ ligions geschichte) (Munich 1906) ; Harrison, T. E.,. (Polegomena to the Study of Greek Re¬ ligion } (Cambridge 1908) ; Lang. A., <Mvth, Ritual and Religion 5 (London 1887) ; Lobeck' C. A., (Aglaophamus5 (Konigsberg 1829) ; Mommsen, L„ (Feste der Stadt Athens5 (Leip¬ zig 1898) ; Nebe, (De Mysteriorum Eleusin-iorum Tempore et Administratione Publica5 (Halle 1886) ; Petersen, (Der geheime Got-tesdienst bei den Griechen5 (Hamburg 1848) ; Rohde, (Psyche5 (Leipzig 1902) ; Stube, (Bil-derkreis von Eleusis5 (Leipzig 1870-72) ;

Tucker, F. G., (Frogs) of Aristophanes (Lon¬ don 1906).

MYSTERIES OF UDOLPHO, published in 1794, is the best known of the several novels of Mrs. Ann Radcliffe (1764-1822). The book was exceedingly popular at the time, the author receiving the unusual sum

of £500 for it, and it was translated into French. Though the novel to-day is usually cited as an example of the florid, romantic style of the later 18th century, it is as a matter of fact an interesting and in many respects a powerful novel. It tells the romantic history of a young French lady, Emily d'Aubert, a heroine of much sensibility, but of considerable character, who has many trying and mysterious adventures in France and in Italy, and her marriage to the hero, Valan-court. The plot is an intricate and eventful one and the story deals with kind parents, un¬ kind relatives, fine feelings, rude behavior, ruf¬ fians, and with mysteries, both of character and of circumstance, 'which are ultimately explained as natural. Perhaps the most distinguished parts of the book are the fine and often beauti¬ fully poetical descriptions of nature. The char¬ acters are less interesting in that nearly all seem to the modern reader to be unreal and melodramatic. The novel contains many good poems by Mrs. Radcliffe in the 18th century style. The tale is high in its class, but was, of course, overshadowed by the greater power and popularity of the Waverly novels, which owe something to it.

William T. Brewster.

MYSTERY OF EDWIN DROOD, novel

by Charles Dickens. It was the last work by this noted author and was never finished. Only eight numbers appeared, which were published in 1870, the year of the author's death. Numer¬ ous conjectures as to the outcome of the plot started or have been published from time to time, but his notes for the continuation of the work lead little toward unraveling his intent.

MYSTIC SHRINE, Ancient Arabic Order of Nobles of the, an order said to have been founded at Mecca in the year of the Hejira 25. The American order is composed only of Knights Templar and 32d degree of the Ancient and Accepted Scottish Rite, Masonic Order. The governing body is the imperial council with 101 subordinate branches called temples. The membership in America amounts to 200,- 500. See Masonic Fraternity.

MYSTICISM, mis'tT-siz'm, a term derived from the Latin mysticus, Greek iivotlk.65 mystical, secret, from fJ-vornS a mystic, one initiated into mysteries, and from fivljiv , to close the lips or eyes. Mysticism has for many minds a repel¬ lent sense, owing, as a recent writer has acutely observed, to its association with the delusions of visionaries and the extravagance not only of gnostics and Neoplatonists, but of many so-called Christian mystics, who, misled by a resemblance in

terminology and statement, as well as in practice and discipline between the false and the true, have failed to observe a difference of infinite movement in principle and substance, and have striven to mingle into one system utterly antagonistic elements. Against extravagances such as these common sense has justly rebelled, while philistinism has found in them a pretext for making a clean sweep of

everything that would seem to raise religion above the plain man's apprehension and crit¬ icism.

For many, mysticism means simply an aban¬ donment of all attempt to reconcile the <(religious sentiment® with intelligent thought, a deliberate yielding of one's self to any un¬ checked and unverifiable fancy or speculation which seems to interpret the vague yearning of the soul after a transcendent being. Or it suggests a morbid quietism effected by a com¬ plete deadening of the affections and stupefac¬ tion of the mind, an Oriental contempt not only for everything material and natural, but even for all desire and existence; thus giving a Buddhist interpretation to the Christian disci¬ pline of self. Or at best the term stands for the exalted state of a few saint-like beings who have attained to a preternatural state of com¬ munion with the Deity, a state that has no practical interest to the ordinary mortal. But merely to tabulate the countlessly divergent senses associated with the term, not only in common usage but by authors of high repute, would exhaust the limits of the present article. The reader interested in the matter can consult some such work as that of Mr. Inge, men¬ tioned below. One reason for the great dis¬ crepancy of usage has been already suggested. The confusion results mainly from the fail¬ ure to view mysticism objectively in its ultimate meaning and relations, its origin and finality; an omission on which has followed a confusion of a primary and an essential prop¬ erty of human nature with one or other of its merely contingent modifications or partial tend¬ encies ; and thus abnormal and insane phe¬ nomena have come to be associated with a term which radically expresses the deepest movement and loftiest aspiration of man's being.

Like all other words of similar structure, the term mysticism connotes both a tendency or a realized experience, and a theory conversant therewith. For the sake of brevity the former acceptation may be here subsumed under the latter. The finality inherent in all creation — a tendency so imminent in nature that the effort to explain it away by reducing it to merely mechanical motion is impugned by the very ideas and terminology in which the attempt is conceived and

expressed — reaches its highest expression in man's nature. Whether it be viewed as a process of natural selection, an adaptation to environment, a part of the strug¬ gle for existence, or under any other biological metaphor, this tendency to a purpose is as essen¬ tially — nay, surpassingly more so — a property of man as it is of any of the lower forms of life, vegetable or animal. If it be asked what is this purpose, this goal to which man ever presses, the answer may be given in terms of universal significance, that ultimately it is the realization of the plan of the universe. To this end, however, man strives unconsciously, and in a certain sense mechanically and involun¬ tarily. Proximately, on the other hand, man is forever seeking self-realization, the develop¬ ment of his total self. This self, however, is perfected only in and by the. exercise of its highest activity, and that activity can reach its complete perfection only when directed to and exercised on its highest object. Now man's

highest activity to which all other forms of energy within him are subordinate is mental, intellectual and volitional, and the highest object answering thereto is the True and the Good. The true as perfective of the intellec¬ tual side of human nature is identified with the Good as it satiates the appetitive or conatiye side, and both are concretely realized only in the Supreme Being, the Infinite, the Absolute, God. Now the mystic is one who, whether ex¬ plicitly or implicitly, recognizes this essential relation of his nature to God and strives to adjust his life accordingly. It may of course be said that this is a conception of mysticism in the abstract, as seen from some transcendent viewpoint of man's personality, but not of mysticism in the concrete, as it occurs in actual life and history. In some measure this may be admitted. On the other hand it is the con¬ ception realized in those who have lived it # out in the sanest form and the most perfect degree, and is inapplicable only in the case of those who directing their energies to some one or other partial object; to an object answering to only individual tendencies of their nature, to the neglect of the demands of their complete selves, have thrown their lives into disorder and confusion and have brought mysticism into

obloquy and derision.

It is almost impossible to make any classi¬ fication of mysticism that shall be adequately comprehensive. For the purposes of this article it will suffice to consider it as a rationalistico-natural or purely philosophical, and as a Chris¬ tian-theological or primarily religious experi¬ ence and theory; though these distinctive quali¬ fications are far from being mutually exclusive; on' the contrary they overlap at more than one point. Christian mysticism is substantially philosophical and of course rational ; but it in¬ troduces a supra (not contra) rational element. On the other hand what is here called rationalistico-philosophical mysticism may and does with many of its disciples include Christian doctrine and practice, and in so far may claim the latter title. For the rest the distinction will become plainer from what follows.

I. Rationalistic Mysticism. — As a philo¬ sophical theory this attributes to the human mind the natural ability to rise to an immedi¬ ate intuition of the Absolute, that is, God, and therein and thereby to an intuition of all truth. This immediate vision whilst reflective and con¬ templative is not attained so long as the mind remains on the lower level of ordinary dis¬ cursive reasoning. Such thought being, it is claimed, confined to the sensible, to empirical phenomena, cannot attain to higher ideal truth. To contemplate the Absolute, man must with¬ draw his mind from the world of sensuous phenomena, inhibit all discursive activity, and concentrate his mental energy. As the mind escapes from the mists of earth the rising light of a higher vision is felt. In that vision the lower cognitive powers become inactive, the very consciousness of self is obliterated and the mind is absorbed in ecstasy. The ecstatic state is a condition pre-required for the contempla¬ tion of the Absolute. This state, however, is attained only through ascetic practices and he alone who reaches its heights is enabled to con¬ template pure ideal truth and manifest it to others as he has perceived it. In ecstasy, more¬

over, the mind becomes interpenetrated, even identified with God. Nay more, ecstatic vision is one and the same with the act in which the Deity contemplates His own self : <(the eye with which the ecstatic sees God is the eye with which God sees Himself.® Philosophical mys¬ ticism thus terminates in pantheism.

II. History. — The birthplace of this form of Mysticism is the Orient. Brahmanism (q.v.) is a finished mysticism. For it Brahma is the sole

existent. What is is Brahma, and what is not Brahma is nothing. Things mun¬ dane are distinct neither from Brahma nor from one another. They are simply modifica¬ tions of Brahma. So long as the mind con¬ ceives of them as distinct it is in a state of delusion. From this delusion it must free itself by penetrating into the vision of the unity of all things in Brahma. To this end man must perform works of penance and sacrifice, cut himself loose from the sensile and sensuous world, and by concentration of his entire phys¬ ical energy absorb himself in the All ; that is, lay aside all self-activity and allow the One alone to work within him. Then will the light of vision rise on his mind and in everything he shall see the Brahma, the eternal self-existent One, the All. Oriental mysticism was trans¬ planted to the West by the Neoplatonists in the form of emanational pantheism. God is here the primal One and the primal Good; from Him emanates directly the vov f (Nous) wherein are contained the ideas of all things and from which proceeds the world-soul. The human mind is in turn an emanation from the world-soul and, remaining essentially in¬ cluded therein, it lives in essential connection with the Nous even as the latter remains in essential union with the primal One. Thus is the soul enabled to rise to an immediate vision of the primal unity. Sense cognition is simply a dream of the soul from which it should withdraw and sink itself in its centre, the Nous; and as the latter is essentially the uni¬ versal Nous revealing itself in the human soul and absorbed in the contemplation of the pri¬ mal One, therefore is the human soul likewise through the indwelling Nous able to reach this same contemplation of the original unity ; and when it arrives at this state all images, thoughts and even self-consciousness disappear and the subject enters the state of ecstasy.

This mysticism more or less modified played its part in later times. Aside from the Persian Sufi, who in the Middle Ages cultivated mys¬ ticism within the pale of Islam, there appear among the Christian people of the West tenets that strongly suggest the Indian and Neopla¬ tonic mysticism, for example, with Meister Eckart (q.v.) and the school of German Mys¬ tics emanating from him. Eckart is at present defended against the charge of panthesim ; nevertheless it is undeniable that his mysticism touches very closely on the boundary line that separates the Christian from the pantheistic world-view. Eckart distinguishes two factors ; the (<basis® (Fiinklein, spark) and the powers of the soul, analogously to his distinction in God between the basis or Aground® and the divine persons. The Aground® of the soul he places in essential union with the <(ground® in God. There is something in the soul, he says, that is identified with God, that is one with

and not simply united to Him. It is uncreated. Inis something is the "spirit® the ground or basis of the soul. Here the ((ground of God is my ground and my ground is God's ground.® Now this divine spark in the soul he continues, is the organ of mystical contemplation. The "powers ' °f the soul do not reach God imme¬ diately. If man is to see God, the vision must be mediated by a light which is God Himself. And this light shines in the "ground® of the soul. Therefore does the soul see in the "spirit® God's pure essence as it is in itself. The "spirit® or "ground® of the soul penetrates into that "ground" in God, in which the latter is pure simple unity neither Father nor Son nor Holy Ghost. There, in this its "ground,® the spirit seeks God, there to know and love Him without medium or veil. There is "my eye and God's one eye, one vision, one know¬ ing, one love. The eye whereby I see God, is the same eye wherein God sees me. In order, however, to reach this vision of God in His "essence® (ground) man must first of all for¬ sake all sin by genuine repentance. Next he must withdraw from all outward things, from himself and his "powers® and concentrate him¬ self entirely within the essence of his soul; and having reached this state he must "leave® him¬ self to God, hold himself passive and allow God alone to work within him. (Gottlassen-heit.) Then will there arise in the essence of his soul (ground) a heavenly light. In this light God reveals to man the entire "ground® of the Deity; the whole essence of God be¬ comes revealed to man. The soul likewise flows into God; its essence and life passes over into the essence and life of God; man is deified, is born a son of God; just as is the Eternal Word.

Subsequently the mystical Theosophists Valentine Weigel and Jacob Bohme built on the teaching of Luther who was in close sympathy with the "German Mystics,® a form of mysti¬ cism which in many respects surpassed what most men will call the extravagance of Neopla¬ tonism. A few expressions of Bohme will suffice in this connection. The soul he teaches has its source and origin in the essence of the God¬ head ; in its "ground® the light of God is en¬ kindled. Now in and by this divine light the soul is enabled to enter

into the very heart of the Deity and to see therein without any inter¬ mediate the primal generation of God in the three principles of being, and the process of be¬ coming of all things. As I then, he says, earnestly uplifted myself to God, the spirit of God broke through me and my spirit broke through unto the inmost generation of the Deity and in this light did my spirit see all things. The influence of Bohme is seen later in the philosophy of Schilling (q.v.).

Neoplatonic mysticism modified by Protes¬ tant doctrine reappears in the 17th century in the mystical speculations and practices of the Cambridge Platonists Cudworth, Henry More and John Smith. Other noteworthy mystical writers in England during the same century were George Herbert, Francis Quarles, Henry Vaughan, and in the following century William Law.

III. Christian Mysticism. — A recent writer has greatly simplified this subject by defining mysticism as “the love of God,® and he quotes

in confirmation an author whose genius and amiable personality have endeared him hardly less to those who differ from him in religious belief than to those who venerate him as Saint Francis de Sales. Speculative theology, he says, tends to the knowledge of God. Mystical theology to the love of God, — mental prayer and mystical theology are one and the same thing. They are neither more nor less than the loving intercourse which the soul holds with God. In this sense every Christian whose practice accords with his profession is more or less of a mystic and differs from the highest mystic, the saint, not in his mysticism but in the degree of his mysticism. The term, how¬ ever, is usually restricted to the higher degree of unitive insight. This simplification of the subject will doubtless be mistrusted, mostly by those who insist on associating all mysticism with mystery and in placing both if not against at least above reason. They should, however, remember that all even human love in a measure transcends reason. Feeling, instinct, sympathy, antipathy, telepathy, likewise, how quickly and far they elude psychological dissection ! It may well be then that in the intimate com¬ munion of God with the soul which He per¬ meates there are psychical acts and states of which reason and common sense can give no distinct account, “upraising strains that from the memory slip and fall away,® as was the case in Dante’s experience. But while mystical phenomena have in common with many ordi¬ nary psychical, especially emotional, experiences that they escape rigorous analysis, they lend themselves equally with their familiar analogues to a philosophy and even a certain though higher

psychology. This statement will of course be a commonplace to those who are familiar with the great masters of mystical theory, such as Saints Dionysius, the so-called Areopagite, Augustine (‘Confessions, 5 Engl, trans.), Bernard (Engl, trans.), John of the Cross (Engl, trans.), Thomas a Kempis, or the more modern authors mentioned below. For the benefit, however, of those who are not thus informed a very brief summary of the principles of Christian mysticism is here sub¬ joined.

1. As in the macrocosm, the world of living organisms, the law is universal that all life emanates from life, omne vivuni ex vivo, and as in the scale of their various kingdoms the higher raises up and assimilates the lower the latter receiving an essentially new and greater perfection from the former, so in the micro¬ cosm, the minor world of the human individual. Here, too, life is from life and life is from above; and the perfection of the lower consists in assimilation to the higher.

2. Beyond the natural life in man, the soul or mind, Christian Mysticism discerns a super¬ natural life consisting radically in a principle of activity higher than that of man’s purely mental and volitional operations and consequently en¬ ergizing in higher forms of thought, belief, hope, aspiration, love, *etc.*

3. The existence and supernatural character of this life and its activities are accepted in the first instance on faith, the data of this belief being found in the Bible, especially the New Testament. The foundations of this faith it is claimed are rational and the workings of the

higher life are confirmed by experience and attested by manifest effects.

4. Essentially and objectively this higher life consists in the vivifying operation of the Divine Spirit within the human soul ; accident¬ ally and subjectively it consists in the respon¬ sive cooperation of man’s mental activities with the Divine influences.

5. The reception of this higher life is nor¬ mally conditioned by certain spiritual disposi¬ tions and lines of conduct — notably of faith, love, prayer, repentance and self-discipline. The soul is thus prepared by alienation from carnal and inordinate propensities and rendered more sensitive to higher stimuli.

6. According to the degree of the soul s cooperation with the indwelling Spirit of God the former becomes proportionately assimilated to the latter. The soul thus passes from what is known as the purgative to the illuminative stage of mystical life.

7. This assimilation culminates in the act of contemplation which is distinguished from med¬ itation in that it is not elicited with mental strain and does not apprehend its object, the divine presence or cognate truths, by inference ; but in consequence of the immanent light simply gazes intuitively thereon; contemplatio pertinet ad simplicem intuitum veritatis, as all the mystics teach. The clarity of this act or state of vision begets sentiments of admiration, contemplatio est perspicuce veritatis jucunda admiratio, as Saint Augustine says, and fills the consciousness with joy and rapture. The facul¬ ties are herein not merely passive, for contem¬ plation is a vital activity, though the divine influence is the primary source of its elevation and application to the corresponding truths. The Church censured the teaching of the Span¬ ish mystical writer Molinos on the question of the soul's passivity in contemplation, — a theory which was taken up by Madame Guion in France, and eliciting Fenelon's (q.v.) sympathy, entailed the well-known controversy with his great contemporary Bossuet (q.v.).

8. The unitive or contemplative state in so far as it is susceptible of psychologocal analysis is essentially intellectual, the mind being ab¬ sorbed in intuition ; it is, however, no less essen¬ tially volitional and in the sanest sense emo¬ tional, the whole adhesive power of the soul being drawn out in love of the object contem¬ plated. Obviously, however, the two forms of en¬ ergy — intellectual and emotional — act and re¬ act upon one another and in the intenser states of mental absorption entirely interfuse, all psy¬ chical differentiation being obliterated and the entire field of consciousness bathed so to say in light and love of the object contemplated. With the intellectual activity is generally though not always associated representations of the imag¬ ination wherein the object contemplated is symbolized. The object-matter of contempla¬ tion is primarily God or some of his attributes. Secondarily it may be any divine manifestation in the created, inanimate or animate order, above all in this respect the humanity of Christ. With many of the mystics the suggestion of the

divine perfections reflected from almost any object in nature was enough to lift them at once to a condition of wrapt contemplation.

9. The strictly contemplative condition varies in duration from moments to several hours,

dependently on preternatural and natural con¬ ditions. In the highest stage it may become practically habitual and yet leave a normal residue of attentional energy amply sufficient for all the demands of every-day life. Often¬ times it is associated with extraordinary psychi¬ cal phenomena such as ecstasy, supernal reve¬ lations, visual or auditory — states wherein the mind sometimes though . not always loses con¬ sciousness of self and of all else save the object contemplated. These are not, however, as many suppose, essential properties of mystical experience, but are rather effects resulting from the absorption of the psychical energy. An as¬ serted similarity of these states to the well-known phenomena transpiring under the various forms of somnambulism, obsession, divided personality and the like, has led many psychologists to confound all mystic states with abnormal psychoses. The subject here opened out is a large one. The reader will find it fairly discussed in (The Psychology of the Saints. > Suffice it to note with M. Joly that the true mystical state as realized in the saints' ex¬ perience is not a "disintegration® of the powers of the mind; it is an aggregation of the closest possible kind, which derives its strength from a higher principle under the control of which it forms and sustains itself. It is not a "narrowing of the field of consciousness® bur rather the opening out of a wider field, at the cost, if we may use the expression, of a nar¬ rowing of the field of passing sensations and empty illusions. Neither is it a division of the personality® although it certainly evokes what may be called a dew personality,® and that at the cost of great sacrifice and much suffering. This dew personality® is not a medley of divided and disordered parts. It exhibits a cohesion, a strength and a unity above anything else which psychology can show us. This dew personality® also retains whatever was best of the original personality and these sur¬ viving elements combine peacefully with the new.

10. None the less the Saints, the typical mystics, were fully alive to the fictitious sem¬ blance of purely natural, both normal and ab¬ normal, subjective states to genuine mystical experience and writers on the subject have laid down certain signs for discerning the true from the false. 'Usually they point to the <(fruits of the Spirit® as enumerated by Saint Paul (Gal. 5, 22) ; dharity, joy, peace, patience, benignity,

goodness, longanimity, mildness, faith, modesty, continency, chastity.® The essence of all these fruits of true mysticism is self-denial, love of self-sacrifice and humility; only where such dis¬ positions are habits can the subject be said ((to walk by the Spirit.® This mental attitude the mystics observe shows itself in subjection of the will to God and to lawful authority, a care to avoid self-obtrusiveness, a tenderness of con¬ science, zeal for self-control, deep interior peace even in the midst of misunderstandings and persecutions. On the contrary, they say, where the opposite signs prevail, self-conceit, obstinacy, an appetite for singularity, morose¬ ness, refusal of humiliation, sentimentality in devotional observances, unrest and such like — all being indications of pride, vanity or some form of sensuality — there the subject, though seemingly wrapt up to the third heaven, will be

found to be the victim of an active or a passive delusion.

11. from the foregoing principles it should be inferred that Christian differs essentially from purely rational mysticism in the primacy it gives to divine influence in mystical experi¬ ence. The uplifting and sustaining of the in¬ tellect and will in communion with God are due not in the first instance to purely innate endowments but to a transcendent light and energy. Christian mysticism as a theory ig¬ nores or pretermits none of the ascertained facts and legitimate inferences of psychology and philosophy, but it claims to supplement this knowledge with principles and deductions of a religious and theological character. The higher influences thus postulated though distinct from are nevertheless continuous with the normal psychical life of the mind, just as the higher mental powers are themselves distinct yet not severed from the sentient and organic activities. Thus genuine mysticism by its sharp distinc¬ tion between the mental activities and the im¬ manent Deity steers clear of pantheism. The terms ˆdeification,® identification with God and the like in which mystical writers speak of the contemplative state are meant to express the close union of the soul with God but not a unity or substantial

identity.

IV. History of Christian Mysticism. — Mysticism as an experience is as old as human¬ ity. The patriarchs Abraham, Isaac, Jacob, Moses, are described in the Bible as men who while not exempt from human failings, lived more or less habitually in converse with God, while the prophets from Samuel to the Baptist passed much of their lives in the abiding reali¬ zation of the divine presence. The unitive or highest form of mystical life culminates in Christ, who though of necessity perpetually con¬ scious of His Divine Personality nevertheless frequently retired from human association to commune with His Father in the solitude of the mountain or desert. Christ became for all future time the pattern of the mystical life while His Personality, deeds and words have formed ever since the chief subject-matter whereon the genuine mystical mind has been nourished. As his example and teachings spread abroad and the realization of their power deepened in the Christian consciousness the tendency to devote more and more of life to mystical contemplation increased. Spontane¬ ously and gradually at first and accelerated afterward by the pagan persecutions which drove numbers of the early Christians into the deserts the eremitical and subsequently the mo¬ nastic state grew up and developed, at first in the East and in Egypt and later on throughout western Europe. Monasticism (q.v.) was and is essentially an institution established as a means to facilitate and conserve the contem¬ plative life. Some of the religious orders were founded almost exclusively for this end. Oth¬ ers, and these the majority, aimed at combin¬ ing the contemplative with the active life, a so-called mixed status wherein the cultivation of an abiding consciousness of the Divine Pres¬ ence should fructify and energize in labor for human welfare. How successfully this aim was accomplished is told in the history of monas¬ ticism and the biographies of such men as the Gregories, Basil, Benedict, Bernard, the Fran¬

cises, Dominic, Borromeo, Loyola; and of such women as Hildegarde, the Elizabeths, the Cath¬ arines, Teresa and other well-known heroes and heroines, of human as well as of divine charity ; all of whom drew inspiration and en¬ ergy for lives of continued self-sacrifice from an almost uninterrupted communion with the Unseen.

Though monastic retirement and discipline facilitate and foster the genesis of mystical habits, they are by no means essential thereto, as is patent from the case of numberless men and women who in every age have successfully united a high degree of contemplation with every

variety of secular occupation. Here again the lives of the true mystics, the Saints, show that the cultivation of an abiding converse with God culminating frequently even in deep mystical union is compatible with all the duties and reasonable demands of social life.

V. Mystical Theology. — It is with mys¬ ticism as with every other human experience, theory follows on life. Speech precedes gram¬ mar, thought logic, conduct Ethics. Pnmum est vivere deinde philosophari. As mystical tendencies and habits spread and strengthened, there gradually grew up a mass of facts and in¬ ferences which constituted in time the body of a mystical theory, or what is known as mys¬ tical theology, and which took its place in the evolution of Christian doctrine as a sequent of moral theology. Mystical experiences were analyzed and systematized, principles induced therefrom and clarified in the light of Biblical and Patristic teaching, and practical rules for discernment and guidance in the mystical life were formulated; the whole developing by de¬ grees into an organized science or discipline. The writers eminent in the formative stage of mystical theory were Saints Basil, Gregory of Nyssa, Gregory of Nazianza, Chryostom, John Climacus, Cassian, Gregory the Great, Ambrose and Augustine. The first systematic work on the subject was that of Dionysius, the so-called Areopagite. In the intense intellectual ferment that followed the triumph of Christianity the Neoplatonists endeavored to set up against Christianity a world-religion whose controlling tenet it was that the universe is simply a phe¬ nomenon of the divine life, the human indi¬ vidual a manifestation of the divine essence, God coming to consciousness in man. Dio¬ nysius opposed this teaching, vindicating the Christian doctrine that in the union of the human soul with the Deity it retains its dis¬ tinct entity. During the Middle Ages the works of Dionysius became for the mystical writers what the (Sentences) of Peter the Lombard was to the Scholastics, a text for the numer¬ ous commentaries of eminent writers such as Hugh and Richard of Saint Victor, William of Paris, Bonaventure, Dionysius the Carthusian, Gerson and others. The Scholastics, likewise, especially Aquinas, based their treatment of mystical phenomena on the Areopagite. The influence of Neoplatonism (q.v.) lingered, how¬ ever, in the writings of Erigena, even though he translated the works of Dionysius.

A tinge of Neoplatonism moreover clings to the 14th and 15th century writers, Tauler, Suso and Ruysbroek, who theorized more in the interests of an intellectual union with God, while the most eminent teacher of practical

mysticism — union of will — was at this time Thomas of Kempen. In the subsequent cen¬ turies practical mysticism is systematically represented by Saints Teresa, John of the Cross, Francis de Sales and Ignatius of Loyola. The works of these writers have for the most part been translated into English. Among the later mystical authorities may be mentioned Louis of Blois, John of Avila, Louis of Gran¬ ada, Louis da Ponte, James Alvarez, Alphonsus Rodriguez, Nieremberg, Lancicius, Surin, God¬ inez, Scaramelli, Benedict XIV and Schram.

Bibliography. — Joly, ‘Psychologie des Saints> (English trans.) (1898) ; Tyrrell, ‘Faith of the Millions > (1901); Ullathorne, ‘The Endowments of Man> (1880); Devine,

< A Manual of Mystical Theology* (1903); Inge, W. R., (Christian Mysticism* (1899) ; id., ‘Studies of English Mystics) (New York 1906) ; id., ‘Personal Idealism and Mysticism (ib 1907) ; Recejac, ‘Bases of the Mystic Knowledge* (1899); James, ‘Varieties of Re¬ ligious Experience * (1902) ; Royce, ‘The

World and the IndividuaP (1902) ; Gorres, ‘T)ie Christliche Mystik* (1836-42) ; Ribot, ‘La Mystique Divine* (1904); Migne, ‘Dictionnaire de Mystique Chretienne* (1858) ; Von Hugel, Friedrich, ‘The Mystical Element in Religion) (2 vols., New York 1909) ; Wetzer iWelte und, ‘Kirchen-Lexicon* (1893).

F. P. Siegfried,

Saint Charles Seminary , Overbrook , Pa.

MYSTROPETALON, a genus of leafless root-parasites constituting the tribe Mystro-petalece of the order Belanophorece. It contains two South African species. It is known by the two or three free stamens, cubical pollen-grains, and the two-lipped staminate and bell-shaped pistillate flowers. The stem is sheathing cov¬ ered by imbricated scales; the flowers in dense heads or spikes. They are monoecious, the male flower being on the upper and the female on the lower part of the spike. The fruit is a rounded achene.

MYTENS, mi'tenz, Daniel, Dutch painter: b. The Hague, about 1590; d. Holland, 1642. He went to London, England, and was wel¬ comed at the court of James I; he was ap¬ pointed painter royal by Charles I and was much favored by the king and aristocracy. Many of his portraits, which are bold and spirited in conception, broad in treatment and of admirable color, are in Hampton Court. When Van Dyck came to England he gradually eclipsed in royal favor the glory of his pre¬ decessor, who returned to Holland.

MYTH, a general name for certain kinds of folklore stories, historic tales setting forth the processes of nature, or beliefs about religion, custom, tradition, etc., and differing from fable (q.v.) and from legend (q.v.). See Mythology.

MYTHICAL ISLANDS, imaginary islands described in popular fable, romance and song, supposed to have existed in all ages in the sev¬ eral oceans of the world. The Islands of the Blessed were creations of the Greeks, who there placed the homes of all who had been first mentioned by Plato, and situated in the realm of eternal bliss. The lost Atlantis was first mentioned by Plato, and situated in the same part of the world. The fairy isle of Ava¬ lon is a feature of Celtic mythology, presenting

an exact counterpart to the Greek Island of the Blessed. The mythical land of Saint Brendan is also of Celtic origin and was thought to lie off the west coast of Africa, where, even as late as the 18th century, frequent expeditions searched for it. I he Island of Seven Cities was also long sought for, and its settlement is ascribed in legends to the Christian refugees from the Iberian Peninsula, who had been driven out by the Mohammedans. Marco Polo's 'Cipango) was probably Japan. Probably the best known mythical lands or islands during the Age of Discovery were the island of Bimini, in the Bahamas, and the island of Brazil.

MYTHO, MITHO, or MITO, French Indo-China, a town of Cochin-China, on the northernmost branch of the Mekong delta, about 50 miles by rail southwest of Saigon. Mytho is an important trading centre for the produce of Cambodia and Annam, and the rail¬ way from Saigon was the first built in the country. It has a college and a hospital. Pop.

30,000.

MYTHOLOGY. (Latin mythologia; Greek fivdog, a myth, and A an account), includes the whole body of myths of a nation ; the ex¬ planation, comparative study and interpretation of these myths. In the popular acceptation of the term, mythology, however, is used to sig¬ nify the religious conceptions of races expressed in the form of tales and other accounts of their deities. This is a very restricted part of the broad field of mythological activity; for myth¬ ology covers the whole sphere of activity of races before the knowledge of the laws of na¬ ture came to replace the exercise of the imagi¬ nation in the explanation of natural phenomena. It includes physical, historical, philosophical and religious myths, generally so intermingled and interdependent that it is often difficult or impossible to separate the one from the others, since the imagination was the great source from which they all sprang either as a whole or in part. Owing to this constant play of the imagi¬ nation, such history as primitive races pos¬ sessed rapidly became myth, and the myths as¬ sumed the form, appearance and intent of his¬ tory. During the pre-scientific ages, the great¬ est of all virtues was credulity in the scientific, philosophical and religious beliefs of the mass of one's fellows. Thus creed became a synonym for religion, or the true religion. To-day the Pueblo Indian speaks of one who holds to the faith of his ancestors, as "the true believer.® How Primitive Man Thought. — Man has apparently, since ever he began to reason, tried to explain the natural phenomena which most impressed him ; and his success has always been in proportion to his scientific knowledge. At the beginning of his investigation of the phenomena of nature he was handicapped by an absolute ignorance of all natural law, and he was forced to reason from his experiences, much as the hieher forms of animals do to-day. To him all life meant activity of some kind, generally translated into motion, and conversely, all activity meant life and volition. Thus when the sun, the moon and the other planets ap¬ peared and disappeared or changed form or position in the sky or appearance, they did so by their own volition. Behind the rushing of the wind, the fierce heat of the sun, the blight¬ ing cold of the north, the thunder of the clouds,

the destructive fury of the hail and the light-nmg the insatiable greed of the fire, the reviv¬ ing ioice of water and of the midnight mists and summer showers were so many powerful intelligences, human in every respect except in their magic power, working each his sovereign W1 , , ,° Prlmitive man peopled the physical

world about him with a multitude of beings es¬ sentially like himself in their ambitions, desires, motives, loves and passions. These he classi¬ fied unconsciously according to their apparent swiftness, strength, cunning and constancy, the primitive virtues by which he set great store, and the impenetrable mystery by which they “were surrounded. These were the supernat¬ ural people in contradistinction to the human race, which belonged to the natural people. But it is necessary to understand in what sense the word supernatural is here used. It never im¬ plies beings in any sense different from man himself except in the power of their magic. Even the form in which a supernatural being appeared was not of great moment, since he generally had the power to exchange his shape for another at will. The Sun-father, the Moon-mother, the Thunder-man, Morning-star, the great hunter, the Spirit of the Northland, the Summer-queen, the four great Wind Spirits, the ghostly spirits that rode upon the tempests, the dark beings from the underworld, the bright beings who peopled the Cloud-land, the Sky-land and the Sunland were essentially hu¬ man ; and each lived in strict conformity with his surroundings and attributes. The Sun-father and the Moon-mother inhabited a shin¬ ing wigwam in the Sky-land, the Frost-spirit a yellow ice tepee in the far North, on the outer border of the world. The Great Spirit sat far up upon the mountain and smoked his pipe ; the four winds blustered and quarreled and had ambitions and loves, hatreds and jealousies es¬ sentially human. The waters moved, rippled and roared; the trees swayed and whispered; the leaves rustled; the clouds raced across the sky or lazily disported themselves in the sun. All displayed animation which made them fel¬ low-actors with man on the stage of human ac¬ tivity. Into this curious world so unlike our own scientific age, the study of mythology in¬ troduces us. Here all nature is not only alive but instinct with the motives that move hu¬ manity to action ; and no explanation or inter¬ pretation of mythology which fails to keep con¬ stantly in mind primitive man’s ignorance of the laws of natural phenomena, and its effects upon his religious, scientific and philosophical views can be effective.

The Spirit of the Myth.— To understand the spirit of the myth one must learn to live over again the age which produced it. Without this,

the practice of minute analysis of myth forms and derivation of myth names, the divi¬ sion of mythical stories into historical, scien¬ tific, religious and folktales and the minute grubbing of the ordinary scientific methods are of little avail. The study of mythology, like that of history, requires the power of imagina¬ tion coupled with the patience and the trained methods of the scientific mind. However well the division of myths into classes may serve the uses of scientific study, the farther investiga¬ tion is carried into the past the more all classes of mythological stories come into contact, min¬

gle or blend with one another and reveal to us man trying to solve the primitive problems pre¬ sented to the race. He develops these problems as he sees them and he explains them in con¬ formity with his mode of science. In the very infancy of experimentally acquired knowledge he began to record his racial or tribal experi¬ ences in the form of stories, songs, symbols, dances and fixed ceremonies coupled with mys¬ tical formulae and incantations. However un¬ reasoning these may seem to the scientifically trained mind of to-day, they were nevertheless perfectly reasonable to primitive man who pro¬ pounded them. The primitive myth-maker, which is but another name for the primitive philosopher and scientist, noticed that the sun moves away from the equator in the winter and that then the. days are shorter and the nights longer, and he invented a legend or tale to ac¬ count for it. This tale conformed in every re¬ spect to the belief of himself and the people of his day. The sun was a great and powerful be¬ ing. The night spirit grew jealous of him and came and persuaded the people that the sun was an impostor, that he was not at all powerful since he allowed himself to be driven daily across the sky in the self-same track. So the people mocked the sun and taunted him with his impotence, whereupon he became angry and vowed to leave them in darkness. As he moved farther and farther to the north and the days became shorter and colder and the frost spirits seized upon all the land and froze over the lakes and rivers, the people became terrified and made sacrifices and offered dances and music to the Great Spirit, who finally relented and came back to them. But to remind them of the fact that he is all powerful and to make sure they shall never forget the insult they offered him, the sun goes north for a part of each year and shortens the days and lengthens the nights. In this myth the sun is essentially hu¬ man and he acts as an all-powerful kindly hu¬ man being would do, especially in a primitive age, were he insulted. To the primitive mind the scientific fact around which the story is woven was satisfactorily explained by the story itself. The existence of summer and winter is accounted for by a similar nature

myth and though the two myths explain what is prac¬ tically the same phase of nature, yet to primitive man there was no inconsistency in the stories simply because to him the gradual re¬ treat of the sun northward and the coming of winter were two distinct events in no way con¬ nected with each other. Nor for him was the coming of summer dependent on the going away of winter, though the events happened to be coincidental, for both summer and winter were powerful beings each of which acted of his own volition. An Algonquin myth brings them together through the Great Spirit who went northward, with the spirit of summer in his. hunting-jacket, and routed the spirit of win¬ ter out of his ice tepee and brought the summer to the northland.

Man and Nature — To primitive man all nature was a struggle, not of elements, but of wondrously powerful and intelligent beings who were so real to him that they may be said to have formed as active and concrete a part of his existence as his household, his friends and his enemies. About these beings of his

imagination ho built up a mass of traditionary lore which was carefully handed down from father to son. In this lore he grouped and clas¬ sified these supernatural beings ; and to each he attached myths to explain their attributes, pow¬ ers, functions and affections. Quite philosophi¬ cal were these myths from the point of view of their creators. * The earth received the seed and the sky sent the water that made it grow. The union of the two gave birth to the plant. Thus the earth and the sky became wife and husband. The sun was the greater light that ruled the day, the moon the lesser light that ruled the night, so in many theologies the for¬ mer was the husband and the latter the wife, while the morning star, which appears with the sun, was their offspring. However, frequently in northern mythologies, where the light of the sun loses its great power for a part of the year, the latter frequently becomes the wife and the moon the husband. The moon governed the night, the season when the mists most fre¬ quently descend upon the land. So she be¬ comes the goddess of fertility and as such is closely connected with all the water and vege¬ tation deities. In Egypt Egyptian women

prayed to Isis, the moon goddess, that she might look kindly upon

them and bless them and make them fruitful. Roman women about to be married invoked Juno, the queen of heaven, that she might make them bear chil¬ dren ; and Greek women made the same prayer to Hera, the mother of the stars, the queen of heaven, the moon goddess, the great deity of growth and fertility. Among the Aztecs and other cultured races of America, Indian women prayed the moon to make them fruitful; and offerings are still presented to the moon throughout Indian America with the same end in view. So strong is this belief that the In¬ dian of Latin America frequently associates the name of the ancient moon goddess with that of the Virgin ; and so powerful has the influence of the Indian become that not only Indian but also educated white women go to certain shrines of the Virgin to pray that they may be blessed with children. Indian women still hold up their new-born children to the moon-mother that she may bless them and make them, in their turn, fruitful. Being the patroness of growth, birth and fertilitv the moon became the deity of doc¬ tors and of medicine, and among Egyptians, Indo-Europeans, Aztecs, Mayas, Zapotecas and Mixtecas alike she took a kindly interest in peo¬ ple of feeble mind or those afflicted with skin or other scrofulous diseases. She was also the pro-tectoress of young children and animals both in Europe and America. She was the goddess of hunters and is frequently represented as armed for the chase. A close examination of all these functions and attributes of the moon goddess will show that they are closely related, interde¬ pendent and that the one naturally grew out of the others. The moon, in most of the In¬ dian mythologies of America, was ajso the mother or the grandmother of the winds or some of them, who are themselves the bringers of the fruitful rains and mists. Here again the mythology is consistent.

Growth of Myths. — Examples might be given ad infinitum, but the foregoing are suf¬ ficient to show that the mythologies of most ancient races represented systems of thought,

of philosophy and religion which followed what were then rational lines of reasoning to those holding them and passing them on to succeed¬ ing generations. These ancient myths were at once religious, philosophical and scientific in that they contained within themselves the re- . ligious, philosophical and scientific knowledge of the race or what passed for such. Behind all mythologies are broad, general principles which lead, everywhere, to similar results. This accounts for the similarity of apparently unrelated myths in widely different parts of the earth, a similarity more marked in the nature myths. The comparative study of myths is of as much importance in the

development of the science of mythology as is the comparative study of languages in the development of the science of philology; since the general laws that govern the making of myths seem to pro¬ duce as closely related results as those that govern the formation of languages. Fairy tales, folktales, historical, philosophical, religious and scientific myths are continually running into one another. Often one short tale contains all these elements. Hence the field of study is not only very extensive, but the lines of thought are continually crossing and recrossing one an¬ other. Out of this confusing maze have come many theories, explanations and systems of mythology, most of them defective in that they have failed to survey the whole field and to take into account its broad general significance. Mythologies are like rolling stones, they take new forms as they move onward ; and when they come to rest they gather extraneous mosses, which disfigure them often to such an extent as to hide their original forms. These changes are due to both external and internal influences, to action and reaction. Dissimilar myths are often found side by side apparently unaffected by one another; others are blended, while still others are so confused from long con¬ tact with one another that their original functions and attributes are not clearly discernible. Tribal influences, captives, slaves, foreign teachers and philosophers, servants, broken-down mytholo¬ gies and the myths of subject people all have had their part in the shaping of the myths of nations. The constant rising and dying of re¬ ligious, scientific and philosophical ideas, throughout the long unwritten history of man's progress toward civilization molded and shaped his myths; so that it is safe to say that how¬ ever primitive myths may seem to us, there are probably no primitive myths in existence, since, man even in his lowest stage of development to-day, has passed far beyond the condition of his ancestors when they first began to formu¬ late their philosophy of the world about them in the stories that we have named mythology. In the days when the Romans had conquered the civilized nations surrounding them, Rome had already become the meeting-place of creeds or mythologies as had Atheps in the days of Paul. And often there, the same deity was worshiped in separate temples and under sep¬ arate guise. There were temples to Juno and Luna, both moon deities, to Hera the Greek goddess of the moon and Isis the Egyptian moon divinity. Each was the sovereign lady of the sky. And when Christianity stepped in and drove out the heathen deities, her triumph was only partial, for the converted heathen could

not so easily forget his past. To his new Chris¬ tian saints he attributed the powers and vir¬ tues of his ancient gods. Upon the Virgin, as the lady of heaven, he lavished all the adoration given to the moon divinities, and he long loved to depict her as standing upon the crescent (the symbol of the moon). Thus the mythologies of the past have followed us into the present. In art, achitecture, literature, philosophy, sci¬ ence, their names and influence greet ns at every turn ; for the dead past has not buried its dead. To-day the Christianized Indian throughout Latin America, in his Christian devotions, thinks as frequently in terms of his ancient gods as of his new faith. To the Virgin he at¬ tributes the power to send the rain, to fertilize the earth, man and beast ; and he still puts food on the graves of the departed that they may have provision for their journey to the future world. Once a year, on the ((dia de los muer-tosˆ (day of the dead), when the dead are popularly believed to revisit the earth, he deco¬ rates their resting-places in like manner. Thus the present teaches that the mythologies of the past were constantly being modified and changed while they were exerting their influ¬ ence upon dying or supposedly defunct myth¬ ological systems. This is the same principle that was at work when Greece, Rome, Egypt, Assy¬ ria, Arabia, Persia, India and the broken-down mythologies of the races who preceded them, acted and reacted upon one another. To these must be added the modifying influences of the Celt and the Arab, the German and the Mongol, who each, in his own way, left his mark upon the mythologies of northern Africa and south¬ ern Europe and Asia.

Classes of Myths. — Myths fall into several more or less well-defined classes : myths of origin, myths of the stars and the sky-land, folk¬ tales, myths of the future world and of an¬ cestors, and myths relating to or explaining the elements. Origin myths account for the creation of the universe, of man, the other animals and plants; for the customs and habits of animals, trees and plants and for their pe¬ culiar markings and characteristics ; for the origin of tribes and races and for their racial names, tokens and customs. Under this head come the culture gods, the inventors and be-stowers upon humanity of the arts, trades and sciences, of which they naturally became the patron divinities. The myths of the sky-land and the stars, as the name indicates, deal with the solar, stellar and lunar stories and their re¬ lationship to one another and to the other dwellers in the skv-land.

They are, in manv mythologies, closely related with the creation and the culture myths. The moon-mother as the fructifier an'd the goddess of medicine is in the category of the culture heroes, of whom she is generally the mother or grandmother or near ancestor. The sun, as the vivifier, the sender of life and death, has a close relation¬ ship with the deities of vegetation. The myths of the future woidd deal with the mystery of death and connect the earth with the sky, the sun-land and the underworld. They include tales of the life beyond the grave, of visits of mortals to the land of the dead and of their adventures in the future world. Very varied are these myths among different peoples; and yet they are frequently wonderfully similar in

widely separated localities. They range from simple primitive tales to long heroic, circum¬ stantially told stories in which the hero gen¬ erally meets with many superhuman difficulties on his visit to the land of the dead. Closely connected with these tales are the ancestor myths, which form such an important part of the mythologies of many races. Myths relating to or explaining the elements are many and varied. The deified winds become the culture gods ; the thunder, the great thunder-bird. The woods, clouds, mountains and streams are popu¬ lated with spirits belonging to the elements who, for the most part, are kindly disposed toward man and spend their time in helping him, when so inclined. In the Indo-European mythologies the sky was populated with a great host of supernatural and powerful beings and the mythologies of the more cultured of the American races were almost as liberal in their colonization of the aerial regions.

To these classes of myths already enu¬ merated must be added the vast body of folk¬ tales which may be related to none of them, some of them, or all of them. Many races have numerous folktales, part of which may have once belonged to a now displaced and broken-down mythology. Side by side with these are often found moral tales which ap' pear never to have had mythological significa¬ tion or connection. These tales are quite plenti¬ ful among many of the American races, and those possessed by the Pueblo Indians are espe¬ cially numerous and rich in incident. Tales of adventure linked to magic and consisting of a series of superhuman acts find a place among the Algonquin, the Ojibway, the Plains Indians and numerous of the Pacific tribes. These tales approach more closely to the European story than probably any other class of American tales. The characters in these stories are gen¬ erally mythological in origin, however much they may seem to have lost their primal signifi¬ cation. Thus in the Indian story of Chacopee the Giant Killer, the hero who lives all alone in the heart of a great

forest with his grand¬ father, follows a white rabbit who shows him a village of cannibal giants and tells him he has been born into the world to destroy them. He gives Chacopee a magic white feather for plume, a bag, a magic cord and a magic pipe. When Chacopee smokes the pipe out of it come the souls of the dead slain by the giants, who are frightened by them. With the aid of the cord he trips up the giants one after another, kills them and wins a race he runs with each of them except the grandfather-giant whom he is enabled, with the aid of the rabbit's charms, to defeat, after numerous adventures, all of a miraculous character. In most civilized or semi-civilized races the folktales are likely to be the largest body of popular stories in the language because they have been fashioned not only from long ages of folktales, but from the broken down myths and creeds of their an¬ cestors and the races who preceded them. Folk¬ tales are especially plentiful among the Mon¬ golian and Indo-European races. To this class of story belong the imaginative Celtic fairy tales. Folktales of a more primitive class are very plentiful throughout Africa and Polynesia ; and many of a higher and more interesting type exist among the American Indians, some of which bear a curious resemblance to the

folktales of nothern Europe and northwestern Asia.

Transformation. — The pre-scientific world firmly believed in transformations. This was the natural outcome of the personification of all nature. The wind was a person, vet he became invisible; the sun, also a person, hid himself, as did the moon and the morning star, behind a mask. The spirits of the forest whispered or roared or chatted, but they could not be seen by human eyes, either because they were hidden within the trees or because they had actually changed themselves into trees. The rivers, the mountains, the clouds were persons ; but be¬ cause of this power of self-transformation they could not be seen by earth-beings. If spirits could hide in trees and other moving things they could just as easily hide in sticks and stones. So inanimate objects, the residence of such spirits, became fetiches

and wonder-work¬ ing charms. Thus all nature, animate and in¬ animate, to the ancient myth was the abode of life, active, free and powerful as human life itself. All these different possessors of life might, on occasions, have the power of self¬ transformation. The simple fact of their ap¬ pearing in some other than the natural human form was sufficient proof of their power of self-transformation. There were also, accord¬ ing to the belief-of the mythological ages, other powerful beings who, in addition to possessing the ability to transform themselves, could be¬ stow upon another the power of transforming himself. This was generally accomplished through the presentation of some wonder¬ working fetich which enabled the owners to effect self-transformation. Thus the hunter, in the Algonquin tale of the (Wolf-Man,) takes from the breast of the wolf-man himself a pow¬ erful amulet, which enables him to transform himself into any form he desires. Though the wolf-man pursues him and overtakes him at sun-down each day for six days in succession, he outwits him each time by his transforma¬ tions and succeeds finally in drowning him by the same means on the seventh. In the tales of (The Witch and the Wind-Man) the Mole-man shoots his magic arrow into the cloud on which his brother, the wind-man, is riding and drives it backward with terrific force. This he does several times until finally he wins the race against him. In the same tale the Old Witch changes herself into a monster white rabbit and thus lures the nine brothers to her den; but the wind-man rides the wind into the cave of the supernatural people and rescues the brothers before the witch has had time to get them fattened enough to eat. Many similar Indian tales are built about the supernatural power of self-transformation. Nanabozho, the great culture hero of the Algonquian races, under his many tribal . names, is an adept at trans¬ formation; and in nearly all his adventures in which he takes the leading part he makes use of it. The heroes of the Plains Indians are constantly subjecting themselves to self-trans-formation. Everywhere throughout Indian America the belief in transformation is strongly exemplified in the mythology and folk¬ tales. Witches, wizards and other evil-disposed beings had the power of self-transformation, and unnumbered are the myths, legends and folktales in which they figure. In the rivers and the lakes and pools were other evil-dis¬

posed spirits who delighted in luring people to death. These characters are well known in Latin and Greek mythology; but just as pic¬ turesque tales are told of them in the stories of other races. Under the name of the Malinche, the water siren shows herself as a beautiful woman on the tops of certain moun¬ tains in Latin America and lures

men to her only to tear them in pieces. As the Llorona or (<Crying one8 she inhabits pools, lakes and rivers where she cries .like a lost child in the night and draws her victim on to his death ; for when he falls into the water she drags him down ; .so that there is no chance of escape for him. Or she may change herself into a <(fool's-light8 and lead some unfortunate into a bottom¬ less swamp where death is equally certain. In all these stories self-transformation is the chief motive.

Ritual, supplying as it does the means Whereby the correct relation to the various superhuman powers may be properly main¬ tained, forms a very considerable part of mythology. Since the beings to be worshiped or propitiated are varied in attributes and pow¬ ers the ritual and ceremonies dedicated to them must be varied also. In an age when the virtues of magic, charm, song, incantation, ceremonial dancing and instrumental music were firmly believed to be effective means of protection against adverse powers or of attracting the favorable attention of divine beings, extraordi¬ nary importance was placed upon the literal rendering of ritual and all other ceremonial forms. This belief helped to preserve ritual myths in a substantially unchanged form for generations ; and many partially broken down myths repeated by primitive and other races are the survivals of the stories that once formed part of or went with rituals to explain them or to account for them.

See Greek Mythology ; Roman Religion ; American Mythology; Mexico — Mythology; Persian Mythology; Myths and FolkTales; Nursery Lore; Egyptian Religion and So¬ ciology; FolkTales and Myths of the American Indians; Nature Worship.

Bibliography. — Anderson, R. B., (Norse Mythology J (Chicago 1889) ; Bancroft, H. H., (Native Races* (New York 1875) ; Brinton, D. G., (Religion of Primitive Peoples) (New York 1897) ; Cox, G. W., (Mythology of the Aryan Nations) (New York 1903) ; Cornyn, J. H., (E1 Modo de Pensar del Hombre Primi-tivo) (Mexico City 1913) ; (Around the Wig¬ wam Fire* (New York 1919) ; Dowson, J., (A Classical Dictionary of Hindu Mythology* (London 1878) ; Ehrenreich, P., (Die Alle-gemeine Mitologie) (Leipzig 1910) ; Fisk, Tohn, (Myths and Myth-Makers* (New York 1900) ; Frazer, J. G., (The Golden Bough* (New York 1907-13) ; Gray, L. J., ˆhe Mythology of all Races) (New York 1916) ; Grimm, J., <Deutsche Mytologie) (Berlin 1878; London 1888); Harrison, J. E., (Prole£omena to the Study of Greek Religion* (Cambridge 1908) ; Hartland, E. S., (Legend of Perseus> (London 1896) ; Hopkins, E. W., (Religions of India) (Boston 1895) ; Howett, A. W., (Native Tribes of Southeast Australia* (London 1904) ;

Jastrow, M., (Religion of Babylonia and Assyria) (Boston 1898) ; Keary, C. F., (The Dawn of History) (New York 1902) ; Lang, Andrew, (Myth, Ritual and Religion* (London 1867) ;

Custom and Myth> (London 1884) ; <The Making of Religion> (1898); Maunhardt, W., 'Antike Wald und Feld-Kulte> (Berlin 1887) ; Muller, Max, (Lectures on the Sciences of Lan¬ guages' (London 1871) ; Contributions to the Science of Mythology' (London 1897) ; Re¬ tt011*. P. L., (Religion of Ancient Egypt) (Lon¬ don 1880) ; Roscher, W., (Lexikon der Griechische Mytologie und Religion > (Munich 1906) ; Rydberg, V., (Teutonic Mythology ' (London 1889) ; Spencer, H., Principles of Psychology' (New York 1900); Squire, C, (Mythology of the British Isles> (London 1907) ; Tylor, E B Primitive Culture'. (London 1873) ; Van Gennep, (La Formation des Legendes) (Paris 1910) ; Wundt, W., (Mythus und Religion) (Leipzig 1908).

John Hubert Cornyn, Birmingham Southern College.

MYTHOLOGY, American. See Ameri¬ can Mythology.

MYTHS. See Mythology.

MYTILENE. See Mitylene.

MYXEDEMA, a peculiar state of the nerve tissues of the body causing many nutri¬ tive changes in the body. Its cause is a loss of function of the thyroid gland (q.v.) and a resulting diminution in the supply of its secre¬ tion to the blood. It is strictly a fibrosis of the thyroid. The disease was first described by Sir William Gull of London in 1873. A similar condition results from removal of the gland by operation. Women are the principal sufferers, furnishing 80 per cent of the cases. Myxedema is found in cold climates, and prob¬ ably most frequently in Europe; in certain dis¬ tricts for instance in Switzerland, France and Italy, it appears to be endemic. It is believed that certain mineral constituents in the water in these regions is the cause of the endemic cretinoid degeneration, as the water was brought from a distance to a

certain goitrous region in Rupperwill and the disease disap¬ peared. The onset of the disease is gradual, and the symptoms are loss of activitv, sensi¬ tiveness to cold, falling of the hair, decay of teeth and nails, rough, dry skin, spongy gums, diminution of perspiration, yellow tint and swelling of the face, paleness of the mucous membrane, subnormal temperature, constipation, albuminuria, impairment of sight and hearing, headache, slow intellection, hallucinations and,

in some cases, a hypothyroid psychosis. A most striking symptom is the oedema, which de¬ velops principally in the loose subcutaneous tissues, appearing like a considerable swelling. The face, the back of the hands and the upper limbs first present enlargement; but in time it involves the whole body. The thickening and enlargement of the face renders the patient un¬ recognizable.

What has been called infantile myxedema by some writers is characterized by a failure of the child to develop bone in the normal man¬ ner, the result being a fat dwarfish individual. The dentition is imperfect and the anterior fontanelle does not close for many years.

Treatment consists in the administration of thyroid gland and of tonics. Grafting of a partial or entire thyroid gland taken from an animal into the subcutaneous tissue has not been very successful. Internally a glycerine ex¬ tract of sheep's thyroid is given, or a dry ex¬ tract, or an emulsion may be made and used hypodermically. This treatment was first sug¬ gested by Murray, of Newcastle-upon-Tyne, in 1891. Ihe remedy must be used cautiously, especially if cardiac or vascular disease exists. Thyroid may cause vomiting, diarrhoea, fever, profuse perspiration, headache, glandular swell¬ ings and prostration. The dose should be graduated so as to avoid these symptoms of poisoning. After many months of treatment the disease disappears. The dose should then be diminished, but the patient must continue to take thyroid all her life, lest the myxedema re¬ turn. (See Cretinism ; Thyroid Gland). Con¬ sult Gull, (On a Cretinoid State Supervening in Adult Life in Women' (in Clinical Society's (Transactions, } London 1874) ; Gimlette, (Myxoedema and the Thyroid Glands' (London 1895) ; Jelliffe and White, (Diseases of the Nervous System' (3d ed., 1919, <Endocimo-pathies').

MYXOSPORIDIA, or fish psorosperms, are Protozoa belonging to the class Sporozoa. They are characteristic fish parasites, occurring on the gills, in the skin and muscles, and free in swimming bladder, gall

bladder and urinary bladder. Serious epidemics and common dis¬ eases among fishes are due to their excessive multiplication under favorable circumstances. The spores which are produced in large num¬ bers in the protoplasm of their bodies contain 1, 2 or 4 polar capsules with a coiled thread like the nematocysts of the hydra.

N

Nthe 14th letter of the English and sev¬ eral other alphabets is classed as a dental-nasal consonant; it is pro¬ nounced when a voiced sound is emitted through the nose while the tip of the tongue is in contact either with the front upper teeth or with the front of the palate; the posi¬ tion of the tongue, whether touching the teeth or the palate, distinguishes the n of one lan¬ guage from that of another; the n of English speech is produced by placing the point of the tongue against the palate just behind the gums. When n is followed by a gutteral either the n and the gutteral form one nasal sound, as in ring, or the n becomes distinctly gutteral and the gutteral retains its own sound-value, as in rink; but when the n and the gutteral belong to dif¬ ferent syllables, as in the words engage, include, concave, unkind, the n usually retains its pure sound; yet the rule has many exceptions recog¬ nized by orthoepists, who while they regard the n of syncarpy, syncretist, as pure, mark the n of syncope and many other words as nasal, equal to ng. In words ending with n preceded immediately by l or m, the n is silent : kiln, hymn ; in the beginning of a word a consonant preceding n is silent : know, gneiss, mnemonic, pneumatic. In many words is seen an intrusive n, as in passenger, messenger, though the words from which these are formed, passage, message, have no n. The initial n of newt, nickname, and a few other words is the n of the indefinite article which became inseparably attached to ewt, ekename, *etc.* ; conversely, by dropping the initial n in the forms nadder, nauger, napron became adder, auger, apron. The alphabetical character n has remained al¬ most unaltered in shape from Phoenician to English. See Alphabet; Phonetics.

N-RAYS, a supposed form of new radiation discovered by M. Blondlot, while experimenting upon the polarization of the X-rays. The rays were said to be invisible, but could be de¬ flected, and by means of appropriate screens could be seen, and were marked out in great detail by Blondlot and his followers. These rays were declared to be susceptible to the attraction of gravitation ; and were decided to lie in

wave-length between the shortest electro¬ magnetic rays and the longest of Rubens rays. Many interesting discoveries were supposed to be made concerning the N-rays; they were de¬ tected as issuing from various objects in a state of tension or torsion, such as a cane forcibly bent; a stick of crystallized sulphur; compressed rubber; ice at zero; or a piece of tempered steel : the rays disappeared when the temper was drawn. An eminent French physi¬ ologist asserted that he had seen these rays is¬ suing from muscles, when active, and from nerves after death. One curious thing about

the supposed rays was that, while some of the observers could see them clearly, others were quite unable to see them, nor could their in¬ struments detect their operation. Blondlot and his disciples asserted that this was due to the fact that those who were unable to see the rays possessed defective vision, and that, while th'e rays really existed, only those peculiarly endowed could perceive them. Two other forms of these rays were announced, the Ni-rays and the NVrays. These rays were be¬ lieved in for several months by an increasing number of eminent scientists, though doubt as to their existence had begun to be aroused, when experimenter after experimenter failed to detect them. Finally, after a prolonged series of experiments the conclusion was reached that these rays were subjective in character and had no real existence. A sum¬ mary of the very voluminous literature pub¬ lished on the subject may be found in the Journal of the Franklin Institute (Vol. CLXIV, Philadelphia 1907).

NABAL, in Biblical history (1 Samuel xxv), the name of an Israelite of the tribe of Judah. David, having afforded protection to Nabal and saved his flocks and herds, his property and even his life when in danger, some time after sent to him to supply his troops with provi¬ sions. This Nabal refused; on which David, stung with the ingratitude of the man, vowed to take summary justice on the ungrateful Jew and exterminate his family; and taking with him 400 men set out for the residence of the mercenary Hebrew. Abigail, Nabal's wife, hearing of her husband's conduct and David's resolve, collected such provisions as the army required, and, attended by a train of servants, set out to meet the approaching king. Her beautiful person, combined with the excuses she made for her husband's conduct, so softened the heart of David that he accepted her gifts, averted his wrath, and Nabal having

been “smitten by the Lord® a few days after, David married his widow.

NABATAEANS, a Semitic race of neople whose kingdom extended from Damascus on the north to. Al-Hajr (Hegra) on the south. They were in possession of the country as early as 312 b.c. for Antigonus and afterward his son Demetrius tried in vain to conquer them. Judas and Jonathan had relations with them at the time of the Maccabean struggles (1 Macc. v, 25; ix, 35). The Edomites were forced up into southern. Judah bv them. They are chiefly known by inscriptions, written in Aramaic, which seems to establish the fact that they were either of Aramaic origin directly, or of Arabaic extraction later influenced by the Aramaic. These inscriptions give information concerning the rulers, but since they are mostly

funerary, they furnish no other historical data. 1 heir commerce was very important, as their capital Petra (q.v.) was on the route from Pgypt to central Arabia. A temple to their native deity was found at Puteoli, an Italian port — which indicates the presence of a Naba¬ taean colony there and points to the extent of their vast trade. A coinage of the country dating from the 2d century b.c. bears the names of the rulers. These, with their approximate dates, are Malchus I (145 b.c.); Obodas I (97-85 b.c.) ; Aretas III (85-62 b.c.); Obodas II; Aretas IV (2-50 a.d.) ; Malchus II (50-70

a. d.); Rabel (70-95 a.d.). There are also coins of Alexander Jannaeus, Hasmonean king of Judea, who captured some of the trans-Jordanic cities and struck coins in them. The Naba¬ taeans were very powerful in the 1st century

b. c., but lost Hauran and Peraea to Herod, re¬ taining fortresses on the edge of the desert. Under Augustus the country became a Roman dependency and lost its warlike nomadic char¬ acter. Some later inscriptions have been found which are in Arabic, but the word Nabataean is generally used as synonymous with Aramaean. (For their alphabet see plate under Alphabet). Their national temple was at Al-

Hijr, and the chief gods seem to have been Dusares, Manat, Kais, Allat and Hobal. Consult Cooke, G. A., (North Semitic Inscriptions) (pp. 214-262, 1903) ; Head, (Historia NummorunP (pp. 685-686, 1887) ; Vincent, F. H., (Les Na,bateens) (in Revue Biblique, pp. 567-588, 1898) ; Momm¬ sen, Provinces of the Roman Empire* (pp. 160-171, 1887) ; Schiirer, (History of the Jew¬ ish People) (Vol. I, Eng. trans., New York

1896).

NABOB, or NABAB, the title applied to the administrator of a province ruled by the viceroy. The name was also given to unofficial wealthy natives as a term of derision.

NABOB, The, a novel by Alphonse Daudet, published in 1877. This is one of the most highly finished of the author's works. It is a romance of manners and observation.

NABONASSAR, nab-6-nas'ar, Era of. See

Babylonia; Nebuchadnezzar.

NABONIDUS, nab-6-ni'dus, or NABO-NADIUS (Babyl. Nebiina'id), last king of Babylon (555-538 b.c.). He was elevated to the throne by his fellow-conspirators in the murder of Prince Labossoracus (or Laborosoachard) . Soon after his accession he concluded with Lydia and Egypt an offensive and defensive alliance against the Persians under Cyrus. He then greatly strengthened the defenses of his capital. It was not, however, until 539 b.c. that Cyrus, who had already defeated the impetuous Croesus, marched upon Babylon. Nabonidus followed the traditional Oriental strategy in opposing his foe. He fought a battle within sight of Babylon, was utterly defeated, and then, while most of his army found safety within the great walls, he himself with a small force entered Borsippa, an important town southwest of Babylon ; possibly hoping by this movement to force Cyrus to divide the Persian host. His stepson, Belshazzar (Bil-shar-uzur), familiar through the scriptural narrative in Daniel, and apparently cosovereign, conducted ihe defense of Babylon. After the fall of the capital, Nabonidus surrendered, was kindly

treated by Cyrus, and even made governor of the province of Carmania. Some of his in¬ scriptions show that he was a personage of

historical interest. See Belshazzar; Cyrus.

NABOPOLASSAR, na'bo-po-las'sar, Baby¬ lonian king, founder of the New Babylonian empire. He was a Chaldaean, not of the kingly line, and erected an independent kingdom in Chaldaea in the second quarter of the 7th cen¬ tury b.c., thence extending his power to Baby¬ lon about 626. With his ally, Cyaxares of Media, he conquered Nineveh about 606, which brought about the destruction of the Assyrian Empire. 1 he Chaldaean Empire became under him the greatest power in the Euphrates Valley. He died about 605 b.c., leaving the empire to Nebuchadnezzar, his son. Nabopolassar im¬ proved the irrigation of the country round Babylon and did much to beautify the city. Consult Rogers, (History of Babylonia and Assyria* (1900) ; and likewise the histories of Hommel, F. (Berlin 1885) ; Winckler, H. (Leipzig 1892) ; Sayce, A. H. (London 1900) ; Johns, C. H. (ib. 1911).

NABOTH, an Israelite, owner of a plot of ground in Jezreel, during the reign of Ahab, king of Israel, about 897 b.c. This plot lay on the eastern slope of the hill of Gilboa and in addition to this he owned a vineyard. The palace of Ahab immediately adjoined this vine¬ yard, which became an object of the king's de¬ sire and he offered to purchase it or give an¬ other in exchange for it. When Naboth refused to part with the "inheritance of his fathers, » Ahab was bitterly disappointed, but his wife sent a warrant in Ahab's name, sealed it with his signet and caused Naboth to be appre¬ hended, brought to Samaria, tried for blas¬ phemy and treason on the testimony of two suborned* witnesses and stoned to death with his sons. Their mangled remains were devoured bv the dogs and swine and the blood from their wounds ran down into the large tank or reser¬ voir which still is seen on the slope of Samaria. This crime brought down the curse of Elijah upon the guilty couple (2 Kings ix, 2-26), which was fulfilled soon after in the fate of both. See Ahab, Jezebel.

NABU. See Nebo.

NABUA, na'bwa, Philippines, a pueblo of the province of Ambos Camarines, island of Luzon, situated in the southern part of the province, on the Buhi River, 20 miles southeast of Nueya Caceres. It is in a marshy region where rice is grown, and is connected with the neighboring towns by a good road. It is a military and telegraph station. Pop. about

19,000.

NABULUS, na-boo-loos', or NABLUS,

nab-loos', Palestine, the ancient Schechem, and one of the chief cities of Samaria, 30 miles north of Jerusalem, on the highest part of the fertile and fruitful pass between Mounts Ebal and Gerizim, leading from the Mediterranean to the Jordan. It is a busy trading and indus¬ trial centre, the seat of a governor, the see of a Greek bishop, and is visited by great numbers of pilgrims attracted by the tombs of Joshua and Joseph, Tacob's Well and the Tree of the Sanctuary, three miles south on the road to Jerusalem. As a Canaanite city it was de¬ stroyed by Abimelech, a son of Gideon the

judge. Rehoboam was crowned king of Israel here, and during the Greek occupation Justin Martyr was born here. It figured conspicuously during the Crusades. It was the religious centre of the Samaritans (q.v.), whose descendants inhabit the southwest quarter of the town. Pop. about 20,000.

NACHTIGAL, naH'te-gal, Gustav, German explorer in Africa: b. Stendal, 23 Feb. 1834; d. at sea near Cape Palmas, 19 April 1885. He studied medicine; became a military surgeon; in 1861 went to Algiers; in 1863 became surgeon to the army of the Bey of Tunis; and in 1868 was sent with presents from the king of Prus¬ sia to Sultan Omar of Bornu in recognition of kindness shown to German explorers. His journey through Tibbu and Tibesti was over country hitherto untraversed by a European. He arrived at Kuka in 1870, thence explored Borku, Kanem and the country south of Bornu and on his way back to Cairo passed through Wadai. The years from 1875 to 1882 he spent in Germany arousing national interest in Ger¬ man colonization. He entered the consular serv¬ ice in 1882, becoming consul to Tunis, and in 1884 was German commissioner for the annexa¬ tion of Togoland, Kamerun and Liideritzland. He died on his way back to Europe. Nachtigal's work marked a distinct era in the explora¬ tion of northern Africa and even more notably in German

colonial policy. He wrote (Sahara und Sudan) (1879-89). His letters are collected in Berlin, (Erinnerlingen an Gustav NachtigaP (1887). Consult also the life by Ruhle (1892).

NACIMIENTO MOUNTAINS. A prom¬ inent ridge in Sandoval County, N. Mex., lying between the headwater of Puerco and Jemez rivers. The length is about 40 miles and highest portions have an altitude of about 9,500 feet. To the north they merge into Sa*n Pedro Mountain. The rocks are uplifted granite with limestones, sandstones and volcanic tuffs on the flanks. Copper ore is mined on west slope at San Miguel and Senorito.

NACOGDOCHES, nak-6-do'chez, Tex., city, county-seat of Nacogdoches County, on the Texas and New Orleans, the Houston and the East and West Texas railroads, about 120 miles north by west of Beaumont and 130 miles north by east of Houston. It is in a rich agricul¬ tural region, in which the chief products are cotton and tobacco. A government experiment station for testing the tobacco is located here. The industrial interests of the city, outside the government station, are connected chiefly with the preparation of cotton and tobacco and lum¬ ber for market. Nacogdoches was first settled by Spaniards in the early part of the 18th cen¬ tury; it was first a mission, the headquarters for the converted Indians of the surrounding region. It figured in the United States quarrel with Spain over the Spanish possessions in the Southwest. Magee and Gutierrez captured it in 1812 when it came into the possession of the United States. Pop. 3,546.

NACRE. See Mother of Pearl.

NACRITE, a class of white unctuous min¬ erals possessing a pearly shining lustre. They are usually found with mica slate and also oc¬ cur native in granite and gneiss, crystallizing in four-sided prisms. The constituents are usually alumina 28.844, silica 64.440, with varying por¬

tions of lime and the protoxides of iron and manganese. Nacrite is found in various locali¬ ties, notably near Brunswick, Me., and in some parts of Ireland.

NADAL, Ehrman Syme, American author: b. Lewisburg, W. Va., 13 Feb. 1843. He was graduated from Yale in 1864 and was a secre¬ tary of the United States legation at London, 1870-71 and 1877-84. He has

published (Im¬ pressions of London Social Life) (1875); As¬ says at Home and Elsewhere) (1882) ; (Zwei-bach or Notes of a Professional Exile > (1895).

NADCHES INDIANS. See Creeks.

NADEN, Constance Caroline Woodhill,

English poet : b. Edghaston, Birmingham, 24 Jan. 1858; d. London, 22 Oct. 1889. She studied at the Mason College, Birmingham, in 1881-87; became interested in sociological problems and lectured with effect. She was an investigator of Spencer's system of philosophy and became the advocate of a doctrine, taught also by Dr. R. Lewins, called ˆHylo-Idealism,® an attempt to furnish a metaphysical system reconciled with the science of modern times. She is chiefly remembered for her volumes of (Songs and Sonnets of Springtime) (1881) and (A Modern Apostle and Other Poems) (1887). The poems were commended for their promise by Glad¬ stone in a review in the Speaker.

NADIA, na'de-a, or NUDDEA, India, town and district of Bengal: (1) the town, capital of the district, on the Bhagirathi River, 54 miles north of Calcutta, is a place of sanctity, the seat of native Sanskrit schools and was the residence of the last independent Hindu king of Bengal in 1203. Pop. 14,105; (2) the dis¬ trict has an area of 2,982 square miles. The Ganges here known as the Padna skirts its northwestern boundary and from it branch the three <(Nadia rivers, the Bhagirathi, Jalangi and Matabhanga, which irrigate the district and are valuable thoroughfares for communication and trade. Its capital is Krishnugger.

NADIR, in astronomy, that point of the heavens which is diametrically opposite to the zenith or point directly over our heads. The zenith and nadir are the two poles of the hori¬ zon ; the zenith, nadir and centre of the earth are in one straight line.

NADIR SHAH, na'der sha, or TAMASP KULI KHAN, king of Persia: b. Khorasan, 1688; d. Fethabad, 19 June 1747. He was of Turkish blood and poor family; early showed his cunning by his attempts, while in the service o\ different governors of Khorasan, to get this province for himself, but was unsuccessful. Putting himself at the head of a band of rob¬ bers he got possession of several strongholds in Khorasan; and in 1726 entered the service of Tamasp II, for whom he checked the Afghans and defeated the Turks and from whom he re¬ ceived four provinces. When Tamasp was de¬ feated at Hamadan by the Pasha of Bagdad and was forced to cede the provinces on the Arauxis to the

Turks and to make a disgraceful peace, Nadir dethroned him, put his son Abbas III in his place and took the regency upon himself. The lost provinces were won back from the Turks and in 1736 upon the death of Abbas Nadir came to the throne, invaded Afghanistan and conquered it, took most of India from

the grand mogul, Mohammed XIV, pillaged Delhi and was everywhere so successful that his empire reached from the Indus and Oxus to the Euphrates and Caspian. He made peace with the Turks in 1746, but was assassinated by the officers of his guard, who were weary of his brutal cruelty. Consult Maynard, (Nadir Shah > (1885).

NAEGELE, na'ge-le, Charles Frederick,

American painter: b. Knoxville, Tenn., 8 May 1857 ; d. about 1912. He studied figure and por¬ trait painting under C. Myles Collier, William Sartain and William M. Chase in New York. He has received many awards in competitive exhibitions and has painted portraits of Peter Cooper, Charles L. Tiffany, ex-Governor Ros¬ well P. Flower, Gen. Joseph D. Bryant, Gen. Edwin A. McAlpin, John W. Gates and

others. For his oil painting (Divinity of

Motherhood,* he won a gold medal at Boston.

NZENIA, or NENIA (Latin), a funeral song among the ancients, sung generally by

women. Naenia was also the goddess of

lamentation.

NZEVIUS, ne'vi-us, Gneius, early Roman poet : b. probably in Campania between 274 and 264 b.c. ; d. Utica, Africa, 204 b.c. or 202 b.c. He wrote in the old Saturnian verse an epic on the First Punic War; but was better known as a dramatic writer, particularly for his comedies. Most of his plays, of which the earliest was produced in 235

b.c., were translations or adap¬ tations from the Greek. His attacks on the Me-telli, of the Roman nobility, provoked their anger and he was banished from the city and retired to Utica. Fragments only of his works have come down to us. These have been edited by Klussmann, Vahlen and most recently by Ribbeck ((Fragmenta Scaenicorum Romano-rum5).

NZEVUS, a birthmark, port-wine mark or mother's mark. This disfigurement, which oc¬ curs most frequently on the head and trunk, but mav also appear on the extremities, is es¬ sentially an enlargement of the minute veins or venous capillaries, which are dilated and anasto¬ mose or unite among themselves to form a vascular patch generally of a deep-red color. The lesion is confined to the upper layer of the true skin. No pulsations are observable in the naevus, but if the circulation in the neighbor¬ hood is obstructed in any way, turgescence is seen and the color deepens. The familiar name of <(mother's mark" or ((longing mark," is ap¬ plied to naevus from a former belief that the lesion was the result of fear, fright, unnatural longing or some such irritation acting upon the mother's constitution and communicating its ef¬ fects to the unborn child, in the shape of this mark. Naevus, apart from questions as to its exact cause, appears to be invariably congenital in its nature. After birth it usually enlarges and after attaining a certain size may remain to constitute a permanent lesion or it may be absorbed with or without inflammatory action. The name birthmark is in some cases a mis¬ nomer because the naevus may appear at dif¬ ferent periods of life. Naevus has been treated in various ways, by excision with the knife, ligature, caustics, *etc.* The ligature has until recently been most commonly employed for its removal, threads being passed under the base

of the naevus and tied so as to produce strangu¬ lation of the vessels. Electropuncture and elec¬ trolysis have also been much used, but the best of all discovered means is the use of carbon dioxide snow, a cone of which is made and pressed upon the naevus for a quarter or half a minute. This causes a blister, which dries and come off, leaving no scar. In cases where a naevus is of limited extent and does not pro¬ duce disfigurement or where from its situation it may not be seen at all in ordinary circum¬ stances, the surgeon's advice generally is to let it alone. In subcutaneous naevus the lesion is more deeply seated. Subcutaneous naevus gen¬ erally accompanies the more superficial form, but may bleed spontaneously and weaken the patient unless removed.

NAFA, na’fa, NABA, or NAVA, Japan, the principal seaport town of the Liu-Kiu Is¬ lands, on Okinawa. It is on the west coast of the island, and carries on a considerable export trade in silk, cotton and sugar. Pop. about

50,000.

NAFELS, na’fels, Switzerland, parochial village in the Canton Glarus, junction of the Ziirich-Glarus-Linthal and the Nafels-Weesen railways. Its industries are chiefly cotton spin¬ ning, printing and structural iron material, be¬ sides agriculture. It was here that, on the 9 April 1388, 400 Glarus natives defeated 6,000 Austrians, a feat still commemorated yearly. In 1799 Suwarov was defeated by the French under Molitor here in the Russian attempt to force a way into France. Its inhabitants num¬ bered 2,818 in 1910. Consult Heer, G., (Zur 500 jahrigen gedachtnissfeier der Schlacht by Nafels* (Glarus 1888).

NAFTIA, naf’te-a, Lago, or LAGO DEI PALICI, Sicily, a historic lakelet of volcanic origin, in an ancient crater over 900 feet in cir¬ cumference, near Palagonia, in Catania. Its nauseating naphtha-like emanations are fatal to birds and small animals; its waters thick and greenish, and in a frequent state of ebullition from the under-pressure of escaping carbonic acid gas. The lake was regarded with super¬ stition by the ancients, and here the Siculi, the earliest known inhabitants, had a temple to two chthonic gods, the Palici of the Romans, which was the seat of the conspiracy and revolt against Rome 104 b.c. Consult Freeman, E. A., his¬ tory of Sicily } (Vol. I, Oxford 1891).

NAGA, na’ga, Philippines, (1) a pueblo of the province of Cebu, situated on the east coast, 12 miles southwest of the town of Cebu. It is a port of call for steamers and coasting craft going to Cebu by the southern passage, and is on the east coast road. Pop. 16,884. (2) The

former name of Nueva‘ Caceres (q.v.).

NAGA, in Hindu mythology, the name given various deified serpents, which are represented as the sons of the Muni Kasyapa and his wife, Kadrii. Their king is Sesha, the sacred serpent of Vishnu.

NAGA, INAYA or BfCOL RIVER, a

river of southern Luzon, Philippines, rising in the mountains of the province of Albay, within four miles of the Pacific Coast and flowing

northwest to Bato Lake, on the boundary be¬ tween Albay and Ambos Camarines. Passing through the lake, it continues its northwest

course across Ambos Camarines, and empties into San Miguel Bay. It is navigable to Nueva Caceres for vessels of 150 to 200 tons.

NAGANO, na'ga-no, Japan, a city of Hondo, 96 miles northwest of Tokio. It has an active trade in silks, woolens and other tex¬ tiles, and is a noted Buddhist pilgrim resort, visited for its celebrated Zenkoji Temple, dat¬ ing from the 7th century.

NAGASAKI, na-ga-sa'ke, Japan, capital city of the province Hizen and one of her principal and deepest seaports on the wesi coast of the island Kiushiu, located at the end of a long narrow bay and beautifully sur¬ rounded by high hills on three sides, and pro¬ tected on the west side by the island Taka-boko, from whose steep heights many hundreds of Christians were once thrown to death; The town has narrow streets and a Chinese quarter in its rear; the foreign quarter is roomy and clean. It contains a hospital, school of medi¬ cine, lunatic asylum, arsenal, prison, botanical gardens and modern waterworks. Its consider¬ able imports consist of cotton, wheat, flour, whale-meat, sugar, beer, machines and railway equipment, petroleum, cement, coal, bone for fertilizer, *etc.* Of exports the chief commodi¬ ties are raw silk, tea, sea-products (except fish), furs, salt, vegetable wax, paper, *etc.* It has steamboat connections with Korea, China, Hongkong, Vladivostok and North America. The harbor was first opened to the Portuguese (1639) and up to 1859 was opened to the Dutch and Chinese only but the treaty of 1858 ren¬ dered it accessible to all foreign commerce. Pop. 161,000.

NAGCARLAN, nag-kar-lan', Philippines, a pueblo of the province of Laguna, Luzon, situ¬ ated in the centre of the province between the headwaters of the Santa Cruz and the San Diego rivers, 12 miles south of Santa Cruz. It is on the road between Majayjay and San Pablo. Pop. 13,000.

NAGEL, na'gel, Albrecht Eduard, German ophthalmologist; b. Danzig, 14 June 1833; d. Tubingen, 24 July 1895. He studied medicine at Konigsberg and Berlin and established a practice in Danzig in 1856. In 1864 he was privatdocent at Tubingen and 1874 he became professor of ophthalmology there. He devel¬ oped the theory of the identity of the retinas. He edited the (Mittheilungen aus der ophthal-miatrischen Klinik in Tubingen* after 1880, and published (Das Sehen mit zwei Augen) (1861) ; (Die Anomalien der Refraction und Accommo¬ dation des Auges) (1880); (Die Vordbildung zum medicinis-hen Studium* (1890).

NAGEL, na'gel, Charles, American lawyer and cabinet officer: b. • Colorado County, Tex., 9 Aug. 1849. He was educated at Saint Louis and studied Roman law and political economy (1873) at the University of Berlin, when he was admitted to the bar and practised at Saint Louis. He was (1903-05) member of the firm Finkelnburg, Nagel and Kirby, and (1903-05) of Nagel a.nd Kirby. From 1885-1909 he was lecturer at Saint Louis Law School and was member of the Missouri house of representa¬ tives from 1881-83. He was (1893-97) presi¬ dent of Saint Louis city council and (1908-12) member of the Republican National Committee. President Taft made him (1909) Secretary

of Commerce and Labor, which position he retained during the life of that admin¬ istration. In 1872 he was given the degree of LL.B. by Saint Louis Law School, and was made LL.D. (1911) by Brown University, Villanova University, Pennsylvania, and Wash¬ ington University, Saint Louis.

NAGELI, nage-le, Karl Wilhelm, Swiss botanist : b. Kilchberg, near Zurich, 27 March 1817; d. Munich, 10 May 1891. He studied in Zurich, Geneva and Berlin; began (1842) the teaching of botany in Zurich ; became extraor¬ dinary professor at the university there in 1848, full professor in 1852 at Freiburg, and at Zurich three years later. Afterward he held the professorship of botany at Munich. His most important work for science was in the physiology and morphology of plants. His writings deal chiefly with morphological and-cytological subjects, and the transformation of species is fully treated in his (Merchanisch-physiologische Theorie der Abstammungslehre' (1883). Most of his publications appeared first in scientific journals, those contributed to the Royal Bavarian Academy of Sciences being published as three volumes of (Botanische Mitteilungen* (1861-81).

NAGLEE, nag'le, Henry Morris, Amer¬ ican soldier: b. Philadelphia, 15 Jan. 1815; d. San Francisco, 5 March 1886. Entering the Union army early in the Civil War, he par¬ ticipated in the Peninsular campaign of 1862, and in the following year was appointed to the command of the 7th Army Corps and of the District of Virginia. He retired from the army in 1864, and later went to California, where he cultivated a vineyard at San Jose, and gave his name to a well-known brandy. •

NAGOYA, na-go'ya, Japan, the chief town of Owari province, in the island of Hondo, near the head of Owari Bay, 92 miles by rail east of Kioto. It was formerly a city of great importance, being for a time the capital of the empire. It is still the fourth city in Japan in respect of population and an important centre for the production of pottery and fancy ware, silk and cotton goods, and other manufactures. The chief edifices are the 17th century castle of Owari with its valuable art collection, and the Higashi Hongwanji Buddhist temple. Pop.

(1920) 429,990.

NAGPUR, nag-or nug-poor', or NAG-PORE, India, a city, district and division of the Central Provinces. (1) The city, capital of the district and division, and also of the Central Provinces, 520 miles by rail east of Bombay, although at an elevation of 1,100 feet above sea-level, occupies an unhealthful situation on the banks of the Nag. The municipal limits in¬ clude, besides the town proper, the native suburb of Sitabaldi, the European station of Sitabaldi, the small suburb of Takli, and a con¬ siderable area of land under cultivation. In the centre rises Sitabaldi Hill, crowned with the fort, which is garrisoned by a small detachment from the British regiment at Kamptee, nine miles distant. There are some Hindu temples and mausolea built in the best style of Mahratta architecture, and several schools. The chief manufactures are cotton and woolen cloths. There is a trade in wheat and other grain, salt, country doth, European piece and miscellane-

VIEW OF HARBOR AND CITY OF NAGASAKI, JAPAN

.

˚US goods, silk, etc., and coal is obtained from a bed at a depth of 200 feet, which is estimated to contain 17,000,000 tons. Here, in 1817, a - British force of 1,350 men defeated a Mahratta army of 18,000 men. Nagpur was formerly the seat of a line of rajahs, which became extinct in 1853, when their territory was annexed to the British dominions. Pop. 101,415. (2) The district of Nagpur has an area of 3,483 square miles; pop. about 800,000; (3) the division of Nagpur, divided into five districts, has an area of 23,521 square miles. Fruits, vegetables, cot¬ ton, rice, maize oilseed and oranges are culti¬ vated. The locality is also rich in minerals, coal, antimony, ochre, gold being extensively mined. Theˆ territory was annexed by the British in 1853, previous to which it had been part of the Mahratta kingdom under the rule of the rajahs of Berar. Pop. 3,109,838.

NAGUILIAN, na-ge-le'an, Philippines, a pueblo of the province of Union, Luzon, situ¬ ated on the Bauang (or Baoang) River, four miles from the mouth and 10 miles southeast of San Fernando. Pop. 11,885. A small town (pop. 2,200) in the province of Isabela, Luzon, has the same name.

NAGYAGITE, a sulpho-telluride of lead and gold with about 7 per cent of antimony, with the formula AmPbˆSbaTerSiT. Besides these elements it often contains traces of cop¬ per and silver. It is found native in foliated masses and is hence sometimes called ((foliated tellurium,® also granular. It crystallizes, but rarely, in tabular diametric forms and its specific gravity is 6.85 to 7.2. It melts easily under the blowpipe and burns with a blue flame. In color it is blackish lead gray, and exhibits a brilliant metallic lustre. It is found in Colo¬ rado andˆ Virginia, but derives its name from Nagyag, Transylvania, where it was first found.

NAG YB ANYA, noj'y'-ban'ya, Hungary, a royal free town formerly known as Frauenstadt (Magyar Aszonypataka), located in the county Szatmar on the Szatmar-Nagybanya and the Nagybanya-Zsibo railways. It was at one time fortified, is handsomely built, and contains beautiful squares and a Minorite monastery. Its industries consist of mining and fruit cul¬ ture, the manufacture of linens and cotton fabrics, pottery and alcohol, besides having considerable trading. The mines produce gold, silver, lead and copper. Pop. about

30,000.

NAGYKAROLY, noj'y'-ka'rol-y', Hungary, city in the county Szatmar, on the Debreczin-Szatmar, the Magykaroly-Zilah and the Nagy-karoly-Csap railways. It has a handsome church, a Piarist monastery, the Karolyi Palace and park. Its industries consist chiefly of the manufacture of coarse peasant linen and woolen cloths,, leather, art furniture, decorative locks, bricks, besides its electricity, wine and tobacco works.. Its population in 1910 was 43,692 for the commune. This has been the seat of the Karolyi family since the 14th century.

NAGYKIKINDA, noj'y'-ke'ken-da, 0r GROSS-KIKINDA, Jugo-Slavia, city in the county Torontal, junction of the Szegedin-Temesvar and the Gross-Kikinda-Gross-Bec- sterek railways. It has a modern town-hall, obergymnasium, court of justice, *etc.* Its chief trade is in grain, cattle and milling. It was at one time the principal location of a privileged

Serbian district. Its inhabitants in 1910 amounted to 32,987, consisting of Serbians, Ger¬ mans, Magyars, *etc.*

NAHANT, na-hant', Mass., town, in Essex County, on Massachusetts Bay. It is on a penin¬ sula, which extends into the bay about four miles. The surface is uneven, the east coast rugged, in some places bold cliffs are along the shore; the west coast is low and more regular. There are two small villages in the town, one Nahant, the other Little Nahant. The whole peninsula is a residential section ; many of the handsome dwellings are the summer homes of Boston men. Nahant is four miles from Lynn, the nearest railroad station, and about 10 miles northeast of Boston. Formerly it was part of Lynn, but in 1853 it was made a separate town. Pop. 1,184. Consult Hurd, (History of Essex County, MassP (Philadelphia 1888).

NAHR-EL-ASI, nar'el-a'se. See Orontes.

NAHUA (na'wa) INDIANS, a Central American collective name given to the Indian tribes which were the most powerful in Mexico at the time of the Spanish Conquest. See Aztec Confederacy.

NAHUA MYTHOLOGY. See Mexican Mythology; Yucatan; Palenque; Quetzalcoatl ; Maya ; Cholula.

NAHUEL-HUAPI, na-wal' wa-pe', or TIGER LAKE, Argentina, a lake on the boundary between the territories of Neuquen and Rio Negro, on the east slope of the Andes. It is 75 miles long, 10 miles broad and has

an area of 300 square miles, dotted with several islands. It is fed by numerous mountain tor¬ rents and is drained by the Limay affluent of the Rio Negro. In 1690 the lake was discovered by Jesuit missionaries.

NAHUM, na'hum (Hebrew for ((rich in God's comfort®), one of the 12 minor Hebrew prophets of the Old Testament, whose only rec¬ ord is the book, attributed to 607-606 b.c., that bears his name, a reference in Nehemiah vii, 7, as (lRehum® being a copyist's error. Nahum is described as ((The Elkoshite,® either the son of a man named Elkosh, or native of a village of that name in Galilee, the location of which is uncertain. Saint Jerome states that the village in Galilee which bore the name of Elkesi in the 4th century a.d. was the prophet's birthplace, and the Galilean village Capernaum, signifying the (<village of Nahum,® has also been vaguely speculated upon. The tomb of the prophet is pointed out at Alkush near Mosul — ancient Nineveh — and his life has been associated with the great city, the destruction of which he prophesied. His book entitled (The Burden of Nineveh. The Book of the Vision of Nahum the Elkoshiteˆ should be compared with that of Jonah which illustrates the remission of God's judgments, while Nahum describes their execution, in a style full of animation, fancy and originality, and at the same time clear and rounded. His language throughout is classical and in the purest Hebrew, belonging to the sec¬ ond half of Hezekiah's reign, or to the time im¬ mediately following the defeat of Sennacherib before Jerusalem. Nineveh was at that time the capital of the great and flourishing Assyrian Empire. It was a city of vast extent and pop¬ ulation ; the centre of the principal commerce of the world. Its wealth, however, was not

altogether derived from trade. It was a <(bloody city,® ((full of lies and robbery,® chap, iii, 1. It plundered the neighboring nations; and is compared by the prophet to a family of lions, which ((fill their holes with prey, and their dens with ravin,® chap, ii, 11, 12. At the same time it was strongly fortified, its colossal walls, 100 feet high, with their 1,500 towers, bidding defiance to all enemies. Yet so totally was

it destroyed that, in the 2d century after Christ, not a vestige remained of it; and its site was for centuries a matter of doubt and uncertainty. The book is surpassed by none in sublimity of description. It consists of a single poem which opens with a superb vision of God's coming to judge the nations, vs. 2-8. Then follows vs. 8-14, an address to the As¬ syrians describing their confusion and over¬ throw; vs. 12-13 parenthetically consoling the Israelites with promises of future rest and re¬ lief from oppression. Chapter ii depicts in vivid colors the siege and capture of Nineveh by its foes, the Medes and Chaldaeans, and the consternation of the inhabitants. Chapter iii describes the utter ruin of the great city and the various contributing causes. The fall of No-Ammon, Thebes in Egypt in 668 b.c., about half a century before, under the judgment of God, is cited, vs. 8-10, to illustrate the pun¬ ishment coming on the Assyrian Empire and the deliverance and restoration of Israel. With a wide view of the working of Providence, an avoidance of all moral or homiletic utterances, this powerful prophecy advances with majestic unity from its noble prcemium to its close. Consult Davidson, A. B., ((Nahum, Habbakuk and Zephaniah® in Cambridge Bible) (1896) ; Driver, S. R., (<Nahum® in (Century Bible) (1906) ; Smith, G. A., (The Book of the Twelve Prophets) (2 vols., 1876-77) ; Haller, «Nahum® in <Die Religion in Geschichte und GegenwarD (1913) ; also the numerous commentaries, not¬ ably by Bickell, Billerbeck and Jeremias, Gun-kel, Marti, Norvack, Wellhausen, *etc.*

NAIADACEZE, a small family comprising one genus, Naias, of submerged fresh-water plants, differing from the Fotarnogetonacece (q.v.) in having the flower declinous, with one stamen and one ovary. There are about 12 species and varieties found generally over the world. In the United States some members of the family are found in the fresh-water lakes and ponds from New York to Florida, others in the Mississippi Valley and others still in California.

NAIL, an elastic horny plate on the upper or dorsal surface of the end of a finger or toe, as in man and monkeys. Hoofs, claws, talons, sheath-horns and the bills of birds are analo¬ gous. Nails and claws of all kinds are modi¬ fications of tfie epidermis, identical in forma¬ tion and mode of growth. The root of the nail rests in a matrix which is a fold of the dermis, particularly rich in vascular papillae from which the nail-cells are produced. The pink color of a healthy nail is due to the blood beneath. The little white area toward the root of a nail, called lunula from its crescentic shape, has less blood under it. When nails are de¬ stroyed new ones will be formed if the matrix is uninjured. Nails are a support and a defense to the ends of the fingers and toes, assist in picking up small objects, and if healthy and

in good condition add comeliness to the parts to which they are attached. To most animals possessing them they are of great importance, giving a needed rigidity to fingers and toes, and adapting them to a great variety of neces¬ sary utilities, as firmly seizing and holding prey (perfected in the retractile apparatus of feline claws), scratching, digging, searching crevices for food and as formidable weapons. In horses, cattle and other ungulated animals, they enclose some or all the digits and are called hoofs (q.v.). In the sloths the nails assume a relative size and are used as a chief means in arboreal progression. In the Amphibia — as in some toads, efts, etc.— the nails are repre¬ sented in their simplest form and appear as mere thickenings of the skin at the extremities of the digits.

In man the nails appear about the third month of foetal or embryonic life. After birth the nails of the hand grow at the rate of about one millimeter per week, those of the foot about one millimeter per month.

The health of the nails is affected, as is that of the skin, by local or general diseases. They may become thickened (hypertrophy) as the re¬ sult of inflammation or a degeneration of nerves; diminished in size (atrophy) from trau¬ matic influences; malformed as the result of disturbed function of the matrix; degenerated from faulty nutrition and discolored in various diseases, the discoloration probably being in the tissues beneath. Nail-biting is a bad habit not only leading to a morbid condition of the nails themselves but also sometimes being an indica¬ tion of some types of nervous disease. The nails are also subject to parasitic diseases. A hang-nail is a sliver of skin attached at one end; it should be cut off close to the point of at¬ tachment. The familiar white areas on the nails are considered to be injury received by the nails in being manicured. The painful af¬ fection called ingrowing nail usually occurs in the great toe, not through alteration in the nail itself, but from constant pressure of the adjacent soft parts against its edge by a tight shoe. The irritation often results in the for¬ mation of an ulcer, extremely sensitive, and sub¬ ject to continual aggravation from the embedded nail, and in some cases necessitates a slight operation to excise a portion of the nail and the nail fold.

NAILS, headed spicules of metal, varying in size from those a little larger than ordinary pins to those several inches in length and from 1/40 to x/\ of an inch in thickness. Up to the beginning of the 19th century they were made by hand as a household industry in various countries. In England, Birmingham was the centre of the industry, at

one time giving em¬ ployment to over 60,000 persons, and requiring a weekly supply of 200 tons of nail-rods from the ironworks of that district. In the United States, New England held a corresponding po¬ sition and is even to-day the centre of the in¬ dustry in America, with Taunton, Mass., as the great tack-making centre of the world. Almost all of the nail output of England was consumed at home and similar conditions obtained in the United States, France and Germany.

Hand-made nails were known as wrought or forged nails and were made from metal plates rolled to the required thickness and then

slit by slitting-rollers into nail-rods or split-rods of various sizes, corresponding to the re¬ quired size and character of the nails to be forged and were sold to the nail-makers in bundles. The hand-nailer's outfit consisted of a forge for heating the nail-rods, an anvil (a small cube of steel), a hammer resembling that of a file-cutter (the face being sloped toward the handle), and a few <(swages® (stamps or dies for producing ornamental or stamped heads).

To make a nail, a nail-rod was heated on the forge, hammered on the anvil and a por¬ tion of it the length of the required nail was cut off on a chisel attached to the anvil. The head was shaped in a vise which gripped the shank of the nail and had a counter sunk in the jaws of the vise into which the head was ham¬ mered to shape it. Various forms of heads were produced by employing different kinds

Principal Forms of Nails.

?

of counters. These forged or wrought nails included at least 300 different types, with at least 10 sizes in each type, representing a total of over 3,000 different names. The retail terms — fourpenny, sixpenny, tenpenny, *etc.* — were not only indefinite in themselves, but varied in different countries and even in differ¬ ent localities of the same country. Therefore, nails were generally designated by terms defin¬ ing their use, as deck, scupper, pail, mop, hurdle, etc., or according to the forms of their heads, as clasp, rose, diamond, etc., or the shape of their points, as flat, sharp, spear, *etc.* Their thickness was expressed as fine, barbed and strong, and their length in inches, generally in connection with the weight (expressed in pounds) of 1,000 of the nails referred to. The principal forms of these old-time English nails are illustrated by the accompanying drawing and their uses may be briefly stated as follows: (1) <(Rose-sharp® and ((fine-rose® : the former used for coopering, fencing and other rough work employing hard wood ; the latter, with broad spreading heads of greater holding power, used in pine and other soft woods. (2) <(Flat-point rose® : used in wood liable to split by the wedge-like action of sharp-pointed nails. They were driven with the edges of their flat points across the grain of the wood and not only avoided splitting but also held more firmly. (3) ((Clasp® nails : commonly used by carpenters in deal and similar woods. The edges of their heads projected downward and, when driven below the surface of the wood, held tightly by clasping a portion of it altogether, and also allowed a plane to pass over them in finishing work. (4) ((Clout® nails, with flat circular heads and round sharp-pointed shanks : used for nailing ironwork and other substances to wood. (5) ((Counter-clout® nails, with counter¬

sinks under their heads, and chisel points : ex¬ tensively used by wheelwrights and smiths. (6) ((Fine-dog® and <(strong-dog,® with solid, slightly countersunk heads, round shanks and speared points : used for nailing down stout ironwork, in which the heads are not required to lie flush with the face of the metal. (7) <(Kent-hurdle® and rtGate® nails, with broad thin rose heads, flat shanks and good

spear-points : used for nailing together and clenching the oaken bars of hurdles, fences and gates. (8) (<Rose-clench® nails, w ith points cut square : used in nailing wood-sheathing and the manufacture of pack¬ ing cases and boxes, in which the soft wood is liable to split unless bored before being nailed. The square heads of the nails punch out their own holes by driving a portion of the wood before them. The term (<clench® wras derived from the mode of their employment in boat¬ building, where they were clenched by hammer¬ ing down or by riveting the end over a ((rove® (a diamond-shaped metal plate), thus drawing the planks together firmly. (9) ((Horseshoe® nails, with square or countersunk heads : made of the best refined iron and capable of being drawn out fine without breaking in the hoof. (10) ((Brads and tacks®: a class of small very useful nails, employed for a variety of purposes too numerous to mention. The latter wrere some¬ times made so small that 1,000 did not exceed 20 grains in weight. In the United States nails are designated as to kind as wrought, cut and wire nails; as to type by the purpose for which they are to be used, as lath nails, shingle nails, *etc.* ; and as to surface, as smooth, barbed, *etc.* In sizes they range from the two-penny (2-d) to the sixty-penny (60-d) nails. Above these sizes they are called spikes ; below them, brads. The smooth wire two-penny nails run almost exactly 1,000 to the pound; of larger sizes the count runs about as follows : three-penny, 600 ; fourpenny, 300 to 450, according to gauge of ware; five-penny, 275 to 400; sixpenny, 175 to 300; eight-penny, 100 to 150; 10-penny, 70 to 90 ; 12-penny, 65 ; 16-penny, 50 ; 20-penny, 30 ; 40-penny, 18; 60-penny, 11. Six-inch spikes run about nine to the pound and 12-inch spikes three to the pound. For many years nails have been marketed by the keg containing 100 pounds. Through the use of a recently devel¬ oped packing machine, which, through the agency of magnetism, arranges the nails in parallel, nails are in the market in cardboard cartons from 10 pounds upward and in large quantities in wooden boxes which occupy only half the space required by the ((keg® with its helter-skelter contents. The small nails or brads are usually packed in telescope contain¬ ers, holding from one-quarter pound up to one pound.

The credit of inventing nail-making ma¬ chinery appears to belong to the United States, a patent having been granted in 1786 to Ezekiel Reed, of Bridgewater, Mass., for a <(cut-nail® machine. About the beginning of the 19th century nail-making machines had been gener¬ ally introduced in England, but the first English patent was granted to John Clifford in 1790. In making cut nails strips of metal of a breadth and thickness corresponding to the length and thickness of the required nail and about a foot in length are heated to a black heat and

fed into the machine end first. A sheer cuts off the

nail-blank, which in falling is clutched at the neck and held until a moving die strikes its upper end and forms the head; it is then liber¬ ated and passes out into the trough. In small nails the taper of the shanks and points is ob¬ tained by cutting the nail-blanks alternately, the metal strip (of uniform thickness) being turned over after each cut so that the points and heads are taken from the opposite sides of the blank; while in the larger nails the metal strip is rolled so that its cross-section corresponds to the re¬ quired taper. These machines turn out nails at a rate of 10 to 1,000 per minute, according to the size of the nails. Cast nails are pro¬ duced by the ordinary process of molding in sand. They are relatively brittle, but are cheap, and are used for rough purposes, such as lath¬ ing and in the manufacture of stout boots and shoes. Wire nails were first made in France, hence sometimes called ((French flails.® They were used in the woodworking trades and up to 1850 were made by hand. The wire was cut into the required lengths; a wire-blank was pinched in a vise, with a small portion project¬ ing, which was flattened into a head by a jew blows of the hammer. Subsequently machines were invented into which the wire was fed and the cutting, heading and pointing were per¬ formed automatically.

In the United States William Hersel, of New York, produced the first hand-made wire nails in 1850. Shortly afterward French ma¬ chines were imported, but they were soon super¬ seded by those of American make, which were awarded medals over those of French and Ger¬ man manufacturers at the Centennial Exhibition in 1876. The new industry, however, was of slow growth. Up to 1885 there were about 25 firms engaged in it, but since then these nails have been widely adopted in the manufacturing trades. The United States Census of Manu¬ factures for 1914 reported 64 establishments devoted exclusively to the manufacture of nails, tacks and spikes. The factories employed _ a total of 2,644 wage-earners to whom was paid annually in wages the sum of $1,507,689. The aggregate capital invested was

$7,883,371. The value of the year's production was $7,198,600, of which $3,604,281 had been added by manufac¬ ture. In addition to this product, however, the steel rolling mills of the country made nails to the value of $1,469,780 and railroad spikes to the value of $4,201,388; brass and bronze fac¬ tories made brass nails to the value of $40,262, the wire mills made wire nails to the value of $23,368,633; and other metal¬ working establishments made a value of $321,256. The aggregate output of these con¬ cerns not classed as nail-makers is thus shown to be $29,401,319 — more than four times the output of the recognized nail industry. With the exception of horseshoe nails, which to a considerable extent continue to be made by hand, from fine grades of wrought iron, all nails are now made of mild steel by machines. In the United States the production is in ex¬ cess of the consumption and American wire nails, especially, have been exported to Euro¬ pean and other countries in increasing quan¬ tities for several years. The money value of the export of 1891 was but $420,697, while that of recent years has exceeded $5,000,000 annually. Consult Smith, B., (Wire: Its Manufacture and Uses) (New York 1891) ; Swank, J. M., his¬

tory of the Manufacture of Iron in All Ages) (Philadelphia 1892).

NAIN SING, Hindu explorer: b. Numaon; d. Morabad, 1 Feb. 1882. He received from a military officer, Colonel Montgomerie, instruc¬ tion and stimulus for the work of exploration, which he afterward carried on in central Asia, first in Cashmere and Ladak (1856-57), and later in Tibet, making a journey (1865ˆ66) to Lhasa (q.v.), which won him recognition from the Royal Geographical Society. This was fol¬ lowed by other important journeys, chief of which was that across the Tibetan Plateau (1874-75), of which he was the first explorer. The Geographical Magazine (London 1876) published an account of this journey, with a map.

NAINI TAL, India, a town of the United 'Provinces in the district of Kumaon. It has a beautiful situation beside a lake, 6,409 feet above sea-level, between spurs of the Himala¬ yas, 70 miles north of Bareilly. It is a popular health resort, the summer headquarters of the provincial government, and has a military con¬ valescent hospital. A disastrous landslip here in 1880 destroyed 150 lives. Pop. about 14,000.

NAIPALI (ni-pa'le) LANGUAGE, a dia¬ lect spoken in Nepal, India. It resembles the Hindu. The literature of the language is very scanty.

Consult Turnbull, A., (A Nepali Gram¬ mar and English-Nepali and Nepali-English Vocabulary) (Darjeeling 1887).

NAIRNE, narn, Carolina Oliphant, Bar¬ oness, Scottish poetess : b. Gask, Perthshire, 16 Aug. 1766; d. there, 26 Oct. 1845. Her father was a staunch Jacobite, and named her after the young Pretender. In 1806 she was married to her cousin, William Murray Nairne, who in 1824 became Baron Nairne. Her poems were issued in 1846 as (Lays from StrathearnP and in 1869 Charles Rogers edited a volume entitled (The Life and Songs of the Baroness Nairne,) of which a revised edition appeared in 1886. Among her poems are several of the most pop¬ ular Scottish songs, such as (The Land o' the LeaP ; (The Laird o' Cockpen5 ; (Caller Herring (The Auld House> ; (Charley is my Darling. } Consult Oliphant, K., (Jacobite

Lairds) (Grampian Club 1870).

NAIROBI, nl-ro'be, British East Africa, capital city of the province Ukamba, a station of the Uganda Railway, and 327 miles by rail northwest of Mombasa. It is located on the Athi plains at the foot of the Kikuyu hills. It has a town-hall, Protestant, Catholic, Moham¬ medan and Hindu places of worship, schools, hospital, waterworks, *etc.* Its bazaar is the centre of a thronging populace of traders. The European inhabitants find their dwellings in the higher lands. Pop. about 30,000.

NAIRS, na'arz, a Mohammedan caste in Malabar, who have peculiar marriage customs, polygamy and polyandry thriving side by side.

NAKED BAT, strangest of all chiroptera is the chiromeles torquatus or collared bat of the Malayan region. It measures five and one-quarter inches in length exclusive of the tail and has 26 teeth. Except the collar of thinlv- ˆpread hairs surrounding the neck the puckered skin is practically naked. Its muzzle is long and pig-like but the most curious characteristic

of this repulsive creature is the deep pouch on the underside of the body below the arm-pits existing in both sexes and holding the young while suckling These strange creatures are found on the islands of Java, Sumatra and Bor¬ neo in dense forests where they repose till the sun reaches the horizon.

NAKONG, na-kong, one of the four species of harnessed African antelopes. It inhabits the swamps of Central and South Africa and East /‘rCa . an<ˆ *s known also as the sititunga (i ragelaphus spckei). This species has the dis¬ tinctions of having a perfectly uniform grayish brown color, while the young are faintly striped and spotted, the hair being more silky and longer than the others ; the horns, forming nearly two complete turns, are smooth, slender and strongly ridged. The male stands about three foot seven inches. They go in pairs never m herds. They are highly prized by the natives as game.

NAKSHATRA (Sanskrit, <(Celestial lumi¬ nary® or ((star®), in the Vedas simply means a star, but later was used of what in the mythological astronomy of India are called mansions of the. moon, in which that planet periodically rests in its course through the heavens; these were small clusters of stars or asterisms, 27 or 28 in number. They were mythologically personi¬ fied as the daughters of Daksha, wives of the moon. Their introduction into the Hindu sys¬ tem has been variously accounted for. Consult Thibaut, G., (Astronomie, Astrologie und Mathematik* ; (Grundriss der Indo-Arischen Philologie und Altertumskunde) (Strassburg 1899). B

NAKSKOV, nak’skov, Denmark, seaport town on the west coast of the island of Laaland, on Nakskov Fiord and on the Nykjobing-Naks- kov Railway. Its chief industries are the manu¬ facture of sugar and machines, a trade in grain, besides its shipbuilding and shipping. It was once fortified and was captured by the Swedes in 1658. Its inhabitants in 1911 numbered 9,480.

NALA, na’la, in Hindu mythology, a leg¬ endary king of ancient India, whose love for Damayanti, the daughter of Bhima, king of Vidarbha, and the adventures arising therefrom, forms a celebrated episode of the (Mahabharata) (q.v.), as also of a separate poem, the ˆalodaya,* attributed to Kalidasa. Consult Macdonell, A. A., (A History of Sanskrit Literature} (London 1900).

NALTUNNETUNNE (nal-tu-na'tu-na') INDIANS, an American tribe of the Athapas¬ can family, formerly residing on the Pacific Coast south of Rogue River, in southwest Ore¬ gon, between the Tututni on the north and the Chetco on the south. They had no separate villages, and spoke a dialectic variation of the Tututni language. Their tribal name signifies ((people among the mushrooms.® A few de¬ scendants of the race now live on the Siletz reservation, Oregon.

NAMALAND. See South West Africa.

NAMANGAN, na-man-gan', Russian Tur¬ kestan, a town of Ferghana, on the Sir-Daria, near the confluence of the Narin, about 50 miles northeast of Khokand. It is in a rich oasis, and is the trading centre for the surrounding no¬ madic tribes. Near it naphtha and coal are

found. The principal industries are soap and leather manufactures. Pop. 78,942.

NAMAQUALAND. See South West Africa.

NAMAS. See Hottentots.

NAMAYCUSH, the great lake-trout (q.v.).

NAMES of persons in the very earliest ages no doubt had some significance and mean¬ ing, but no record is handed down to us. The Old Testament names are almost all original, that is, given in the first instance to the individ¬ ual bearing them, and either originated in some circumstance of birth as an expression of some religious sentiment, thus — Jacob (supplanter), Isaac (laughter), Isaiah (salvation of -he .van), *etc.* The names of women had equal significance: Rachel (ewe), Hannah (favor), Deborah (bee), *etc.* In Old Testament times the name was often changed on the occasion of an important event in one's life, Abram be¬ coming Abraham, Jacob becoming Israel, and so on. Neither the Hebrews, Egyptians, Assyr¬ ians, Babylonians, Persians nor Greeks had sur¬ names ; and in the earliest period of their his¬ tory the same may be said of the Romans. In course of time, however, every Roman citizen had three, the praenomen or personal name, which was placed first, and commonly written with one or two letters, for example C. for Gaius, Cn. for Gneius, M. for Marcus, Q. for Quintus, and so on. Then followed the nomen, the name of the gens or clan, as Cornelius, Julius, Fabius, from the Cornelian, Julian and Fabian gentes. Lastly came the cognomen or family name, as Cicero, Caesar, Scipio, *etc.* Con¬ querors

were occasionally complimented by the addition of a fourth name or agnomen, com¬ memorative of their conquests, as Coriolanus, Africanus, Germanicus, *etc.* While the earliest Greek names were expressive of some quality in high estimation, as Callimachus (excellent fighter), Apollodorus (gift of Apollo), the Roman names were less dignified and ambitious in their origin; thus Porcius (swineherd), Cicero (vetch grower) ; some from personal peculiarities, as Naso (longnosed), Paulus (little), Crassus (fat), Codes (one-eyed). Celtic and Teutonic names had often equal sig¬ nificance, as Gottfried (God's peace), Conrad (bold in counsel), Bertha (brightness), Ethel (noble), *etc.* Times of great public excitement have had a very considerable influence in modi¬ fying the fashion in names. Thus the English Puritans preferred Old Testament names and such as directly expressed religious sentiment. Among the Scottish Covenanters Old Testa¬ ment names were also prevalent. At the French Revolution the names of the most famous Greek and Roman republican heroes were in general favor. Among primitive races, names of famil¬ iar objects were first given to clans, local groups, and finally very loosely to individuals.

The principal of the modern system of per¬ sonal nomenclature now adopted in most coun¬ tries in Europe is to have one name for the individual (Christian or baptismal name) joined to a second name which is common to the family to which he belongs (surname). It is impossible to state with any degree of certainty when this system became general. No instance is known, we believe, of any Anglo-Saxon fam¬ ily bearing a surname from generation to gen-

eration. They were introduced by the Norman adventurers, but were for centuries confined to the upper classes. Surnames became general in Scotland about the 12th century. In some of the wilder districts of Wales they can hardly be said to have been adopted even yet. The principal sources from which surnames are de¬ rived are personal characteristics, rank, or pro¬ fession, localities, animals, or natural objects, and patronymics. Thus from the first source, personal

characteristics, we have Black, Brown, Grey, Green, Whyte ; Little, Long, Short, Broad-head, Lightfoot, Cruickshank. From rank 01-prof ession we have King, Prince, Pope, Bishop, Abbot, Prior, Stewart or Stuart, Smith, Wright, Carpenter, Taylor, Baker or Baxter, Weaver or Webster, Falconer, Fletcher (arrow-maker), Glover, Bowman, Chapman or Marchant, Mil¬ ler, Brewer or Brewster, Shepherd. From lo¬ calities, animals or natural objects, come Hill, Dale, Wood, Forest, Brookes or Burns, Grove, Shaw; Bird, Lyon, Hogg, Crabbe, Fox, Roe¬ buck, Bull; Stone, Tree, Flint, Steele. From patronymics are derived Andrews, Anderson, Alexander, Sanderson, Sandison; James, Jame¬ son, Jamieson; Jones, Johnson, Jonson, Jackson ; Williams, Williamson, Wills, Wilson; Thom, Thomson ; Roberts, Robertson, Robinson. Surnames in many other languages are derived from like sources; thus Black, Whyte, Brown, are with the Germans Schwartz, Weiss, Braun; with the French, Lenoir, Leblanc, Lebrun; the Gaelic prefix Mac, the Irish O', the Norman-French Fitz, the German affix -shon or -son, the Scandinavian -sen, the Russian -vitch, are all equivalents of the English affix -son. The He¬ brews, as already stated, had no surnames proper, nor had the Arabians ; but to distinguish two men of the same name the former used the form Solomon ben David (Solomon son of David), and the latter Abraham ibn Esra (Abraham son of Esra). The Welsh used the word ap in the same way; Evan ap Richard (John son of Richard). In most nations the wife changes her surname on marriage to that of her husband; in Spain, however, she retains it, while the son may adopt either the paternal or maternal name. In Great Britain a man may now change his Christian name and surname without an act of Parliament, royal license or even public advertisement ; but there is no law to compel third parties to use the new name. In the United States names can only be changed by special act of State legislatures.

Nicknames of persons are most difficult to classify owing to the great variety of origins. Physical peculiarities, complimentary (as Strongitharm), derogatory, as Spindleshanks, Sheepshanks, Crookshanks, Heavisides, *etc.* ; mental attributes, as Grave, Stern, Wise, Sage, Moody, Proud, Courteous (Curteis), on one hand, and on the other Blythe, Gay, Foolhardy, Jolly, Meek, etc.; nicknames from complexion and color of the hair, as Black, White, Brown and Browning, Ruddy, Readman, Hoare, Grey, etc.; nicknames from peculiarities of dress, Curtmantel, Shorthose, *etc.* ; from social posi¬ tion, as Bastard, Lacklands and so on ; from the animal and vegetable kingdoms, from birds and fishes. Then compounds were made by ap¬ plying a sobriquet to a Christian name, as Micklejohn, Littlejohn, Brownjohn; if he was a comely, well-made fellow, he was Properjohn.

These names appear again in Norman guise, as Grosjean, Petijean, Bonjean, from which comes Bunyan — so that when we speak of good John Bunyan we are (perhaps unconsciously) only translating the name of <(the inspired tinker* See National Nicknames. Consult Barber,

(British Family Names> (1894); Bardsley,

(Dictionary of English and Welsh Surnames } (1901) ; Innes, Concerning Some Scotch Surnames) (I860); Yonge, (History of Christian Names) (1863).

NAMOUNA, na-moo-na', in Persian myth¬ ology, an ever young and beautiful enchant¬ ress, born long before any other created thing, yet still retaining all her youthful attractiveness. The idea probably originated in the observa¬ tion of the changes of nature, the dying of vegetation and its renewal. The same concep¬ tion has been held concerning the moon for the same reason. Among various American Indian tribes a very similar myth prevailed. The Navajos personified nature in their god¬ dess Estsanatlehi, ((the woman who rejuvenates herself.* When she grows to be an old woman she becomes a young girl again. She is always changing but she never dies. She was the mother of the twin war gods by the sun. These sons destroyed the alien gods and bad spirits and aided the sick suffering from witchcraft. The power of her two sons over witchcraft would seem to connect Estsanatlehi with the moon and also with the sun of whom the moon is generally the wife.

NAMUR, na'moor (Fr. na-miir'), Bel¬ gium; (1) a city, capital of the province of the same name, at the confluence of the Sambre and Meuse, 35 miles southeast of Brussels. The old fortifications have been razed since 1866 with the exception of the picturesque cita¬ del dating from 1784, built upon steep rock, high above the confluence of the rivers. A cordon of five large and four small modern forts now defend the town. The town is beautifully situ¬ ated and well built, with spacious streets and several handsome squares. Frequent sieges and bombardments destroyed almost all its ancient buildings. Among those of more recent times are the cathedral dedicated to Saint Aubin, one of the most handsome modern churches of Bel¬ gium ; the church of Saint Loup, the church of Notre Dame, the Hotel de Ville and the belfry tower. Namur is the seat of a bishop; it pos¬ sesses a chamber of commerce, a royal athe¬ naeum, a public library, a museum, an agricul¬ tural society, normal and various other schools and numerous

benevolent institutions. Namur is famous for its cutlery, its leather-works and its iron and brass foundries. The trade is greatly favored by the two navigable rivers. Steamers ply on the Meuse; and railways com¬ municate with Brussels, Mons and the French frontier. Namur dates from the 7th century, under the names of Namucum, Navinucum Castrum and Namon. It was' taken by Louis XiV in 1692, and retaken by William III of England in 1695. Pop. before the World War, about 33,000. The Germans occupied Namur on 23 Aug. 1914. (2) The province is bounded

on the north by Brabant, northeast by Liege, east by Luxembourg, south and southwest by France and west by Hainaut; greatest length, north to south 57 miles ; greatest breadth, 37 miles; area, 1,413 square miles. The surface

is greatly diversified, well watered bv the Meuse, with its tributaries, the Lesse and the Sambre. About one-half of the whole surface is cultivated. The chief vegetable productions are the ordinary cereals, oilseeds, chicory, fruit and medicinal and dye plants. In some places the vine is cultivated. The extensive forests furnish good timber and the prevailing carboniferous strata yield coal, iron, limestone, *etc.* The industry of the province, both manu¬ facturing and commeicial, is largely developed. Namur was an independent country as early as the 10th century. At the close of the 12th cen¬ tury it came into the possession of the counts of Hainaut, and early in the 13th century fell to Peter of Courtenay, emperor of Constan¬ tinople. It was sold by his son Baldwin to Guy of Dampierre, Count of Flanders, with whose descendants it remained till 1420, when it was purchased by Philip the Good. Duke of Burgundy, for 132,000 gold ducats, and after¬ ward shared the fate of the other Burgundian states. Pop. before the war, about 365,000, nearly all of whom speak Walloon. See War, European.

NAN-CHANG-FU, China, the chief town of the province of Kiangsi,

176 miles southeast of Hankow, on the Kan-Kiang, near its en¬ trance into the Po-yang. It is noted for its porcelain industries. Pop. 150,000.

NANA, a novel by Emile Zola, one of the Rougon-Macquart series, which appeared in

1880.

NANA SAHIB, na'na sa'hib, Mahratta leader of the Sepoy Rebellion : b. near Cawnpore, 1825; d. Nepal, about 1859. His real name was Dhandu Panth, and he was the adopted son of the last Mahratta peshwa of Poona, whose great wealth he inherited, but whose annual pension of about $400,000 was not continued to him by the British government. He lived as a native prince, moving in Euro¬ pean society, and when the Sepoy mutiny broke out he secretly encouraged it, but openly of¬ fered aid to the English. He marched on Delhi at the head of native troops; promised the English a safe conduct from Cawnpore, but shot or drowned all of them but four; and before leaving the city killed all Europeans, women and children included, that he found in the city and threw their bodies into the famous well of Cawnpore. He fled to Nepal, was re¬ peatedly defeated by the English, who ulti¬ mately drove him out of the English province, and was not heard of after 1859. Consult Lan-don, P., 'Under the Sun, Impressions of In¬ dian Cities with a Chapter Dealing with the Later Life of Nana Sahib) (London 1906) : Burgess, J., 'The Chronology of Modern India, 1494-1894* (Edinburgh 1913).

NANAIMO, na-ni'mo, Canada, a city of British Columbia, on Departure Bay, on the east coast of Vancouver Island, opposite Van¬ couver on the mainland, with which it has daily steamer service. Its harbor is deep and safe, though often closed by ice in winter. It is connected with Victoria, 73 miles from Vic¬ toria by the Esquimault and Nanaimo Railway. The coal mines at Nanaimo and in the vicinity produce more than 1,000,000 tons a year. It exports large quantities of coal, lumber and herring. It also has extensive freestone quar¬ ries, large sawmills and is the centre of

a great fruit-growing district. It is the seat of a United States consular agent. Pop. 8,300.

NANAK, na’nak, NANEK, or NANUK,

Hindu religious leader, founder of the sect of the Sikhs: b. Talwandy (now Nankana), in Lahore, 1496; d. Kirtipur, 1538. A member of the warrior caste, he early associated with Kabir, leader of a monotheistic sect, and came under other mystical influences. He traveled to all the holy places of India, made the pil¬ grimage to Mecca and Medina, and as a result of his studies of Brahmanism and Islam wrote the ‘ Adi-Granth,* which frequently quotes Ka¬ bir, and in ˆgeneral is a mixture of the Vedas and the Koran. This gospel he preached through India; it became the national religion of the Sikhs and was proclaimed by Nanak’s successors from Labona down to Govind Sinh, who died in 1708. The (Adi-Granth) preaches

worship of one god, the equality of man, the duty of loving all men and the need for frequent ablution. See Sikhs.

NANCREDE, C(harles) B(eylard) Guer—

ard de, American surgeon: b. Philadelphia, Pa., 30 Dec. 1847. He was educated at the Uni¬ versity of Pennsylvania and at Jefferson Medi¬ cal College; began practice in Philadelphia; and after 1889 was professor of surgery and clinical surgery and surgeon of the university hospital at the University of Michigan, retiring in 1913. In the Spanish-Americpn War he served as surgeon at the front and in 1908-09 was president of the American Surgical Asso¬ ciation. He is the author of ‘Principles of Surgery> (1899; 1905); ‘Essentials of Anat¬ omy) and is a contributor to Wood’s ‘Hand¬ book of the Medical Sciences) (1887); ‘The International Encyclopaedia of Surgery) (1881-95) ; ‘Cyclopaedia of the Diseases of Children (1890); ‘Cyclopaedia of Diseases of Nose and Throat) (1893) ; ‘Dennis’ ‘System of Surgery) (1895) ; ‘American Practice of Surgery> (1908) , *etc.*

NANCY (Fr. non-se), France, the capital of ancient Lorraine, of the former department of Meurthe and since 1872 of the department of Meurthe-et-Moselle, situated in a fertile plain, near the left bank of the Meurthe, 218 miles east of Paris, on the railway to Strassburg. It is divided into the old and the new town, has extensive suburbs and is strongly defended by isolated “forts d’arret.** The old town is irregularly built, with streets narrow and wind¬ ing; but has several fine public buildings. The new town has straight and spacious streets, in¬ tersecting each other at right angles, and trav¬ ersed by tramways; the houses, almost with¬ out exception, are handsome. The Place Stan¬ islas, surrounded by several fine public build¬ ings, and communicating, by a triumphal arch, with the Place Carriere, has a

fine statue of Stanislas Lesczynski, king of Poland, who passed the latter years of his life here as Duke of Lorraine and bestowed upon the town many of its finest modern embellishments. There are statues also to General Drouot, Thiers and other notabilities. The Cours Leopold, occupy¬ ing the highest part of the town, and finely planted, is the principal promenade; another is the Pepiniere, a large planted area. Among the chief edifices are the cathedral, a modern structure in the Italian style; the church of Saint Epvre, with a lofty tower and a fine

portal, one of the finest specimens of modern Gothic in France; the church of the Cordeliers, built in 1484, and containing the tombs of sev¬ eral dukes of Lorraine; the 19th century churches of Saint Peter, Saint Vincent and Saint Leon; Hotel de Ville (17th century); ducal palace, an elegant specimen of flam¬ boyant Gothic, with a fine porch (16th cen¬ tury) ; public library; seven handsome gates or triumphal arches. Nancy is the see of a bishop and the headquarters of the 20th Army corps. At the head of its educational institutions is the celebrated university founded at Pont-a- Mousson in 1572 and removed to Nancy in 1768; it has faculties of law, philosophy, natural science, mathematics, medicine and a school of pharmacy; Nancy also has a lyceum, a botanical garden, a school of forestry, a theological semi¬ nary, *etc.* The manufactures consist of broad¬ cloth and other woolen stuffs; cotton and cot¬ ton yarn, hosiery, lace, all kinds of embroidery, stained paper, tobacco, *etc.* There are also ironworks, dye-works, breweries and tanneries. In a battle fought under its Walls, the Duke of Burgundy (Charles the Bold) was defeated and slain by Rene II, Duke of Lorraine, in 1477. On 12 Aug. 1870 it surrendered to the Ger¬ mans, by whom it was occupied until 1 Aug. 1873. The population was largely increased by the influx of Alsatians after the annexation of Alsace to Germany. During the great Euro¬ pean War, Nancy was a centre of great mili¬ tary activity. Under the personal command of Kaiser Wilhelm II, who arranged to make a triumphal entry in the ancient Lorraine capital, beginning 6 Jan. 1916 with a bombardment by 15-inch guns at a distance of 16 miles, the Germans unsuccessfully besieged the city for several days. (See War, European. Pop. about 120,000.

NANDUS, a Brazilian name for the South American ostrich or rhea. See Rhea.

NANEK, or NANUK. See Nanak.

NANINI, na-ne'ne, Giovanni Maria, Ital¬ ian composer: b. Vallerano, Italy, about 1540; d. Rome, Italy, 11 March 1607. He studied music in Rome and opened there the first Ital¬ ian public school of music. He was appointed Maestro di Cappella at Santa Maria Maggiore in 1571. In 1577 he became a member of the Pontifical Choir, and in 1604 maestro of the Sistine Chapel. His compositions are of great value; among them are (Hodie nobis Ccelorum Rex) ; < Cento cinquanta sette Contrappunti e CanonU His manuscript works are preserved in the private collections of the Sistine Chapel and the Vatican Library. His published com¬ positions take various forms : motets, madri¬

gals, canzonets as well as Church music. They are of the Palestrina period. Consult Radi-cotti, G., (Giovanni Maria Nanini > (Pesaro

1906).

NANKEEN, or NANKING CLOTH, a

sort of cotton cloth, which takes its name from the city of Nanking, where it was originally manufactured. It was formerly imported ex¬ tensively from China, but has generally been superseded by other fabrics. It is now imitated in most other countries where cotton goods are woven. The English manufactures have now so completely driven the Chinese from the mar¬ ket that large quantities are shipped from that country to Canton.

NANKING, nanking (officially Kiang-ning, that is, Southern Capital), China, capital of the province of Kiangsu, and vice-regal headquarters for the three provinces of Kiang¬ su, Kiangsi and Ngan-hui, near the south bank of the Yang-tse-Kiang, 560 miles south by east of Peking. It is 18 miles in circum¬ ference and is surrounded by a wall 40 feet high. The principal streets are of moderate width, clean, well paved and lined with hand¬ some stores ; but the houses are, in general, mean, and only one story high. The part of the city occupied by the Manchus is separated by a wall from the Chinese town. There are extensive manufactures of fine satin and crape, and the cotton cloth which foreigners call nankeen derives its name from this city; paper and ink of fine quality, and beautiful artificial flowers of pith paper, are produced here. Nan¬ king is celebrated also for its scholars and literary atmosphere, having many large libra¬ ries. Nanking was the capital of the Chinese Empire frm 1368 to 1403, but when the seat of government was transferred to Peking it lost its importance and a great part of its popula¬ tion, while about a third of its area is now un¬ occupied. The only remarkable remains of royalty are the sepulchral Ming statues situated near the walls. The famous porcelain tower of nine stories and 260 feet in height, completed in 1432, was destroyed during the Taiping Rebellion. The city was held from the spring of 1853 to July 1864 by the Taipings, who made it their capital. At its capture bv the rebels and recapture by the Imperialists it suffered severely. By the French treaty of 1858 Nan¬ king was made a

treaty port, but never at¬ tained any importance as such, owing to the vicinity of Chinkiang-fu. Pop. estimated at

300,006.

NANNA, nan'na, in Scandinavian mythol¬ ogy, the wife of Balder and the goddess of immaculate purity. Her name means "Blos¬ som® and she was the daughter of Nip, which means "Bud,® and a goddess. In the myth of the (Death of Balder the Beautiful, > his wife, Nanna, falls dead by the side of the corpse of her husband and is placed upon the bier with him that she may accompany her beloved even in death. When Hermod visited the land of the dead to gain the freedom of his brother, he found Nanna ministering to him as he lay sick and pale on a couch. Balder wished Her¬ mod to take Nanna back with him; but she refused to leave her husband. Balder, is the personification of life-giving light and his wife, Nanna, is the personification of vegetation which dies when the great light giver, the Sun, goes on his winter journey to the south. Bal¬ der is generally called the "radiant god of sunshine® ; and his wife, like the classical Pro¬ serpine, goes down into the underworld.

NANNACUS, or NANNAKOS, according to a Greek legend, the king who predicted Deucalion's flood.

NANNING, China, city in the province Kwangsi on the Yu-Kiang River, the chief southern tributary of the Si-Kiang. It is sur¬ rounded by a strong wall and lies in a plain en¬ closed by hills. Before the Taiping revolution the place was of much greater importance but still has a considerable trade in opium and met-

als cariied on with Canton, Yunnan, *etc.* It has a population estimated at about 40,000.

NANSEN, Fridtjof, fret'yof nan'sen, Nor-vˆegian Arctic explorer: b. Great Froen, near Christiania, 10 Oct. 1861. He studied at Chris¬ tiania University and in 1882 made an Arctic voyage in a sealing vessel in order to have op¬ portunities of studying animal life in the higher latitudes. On his return he was appointed cu¬ rator of the Bergen Natural History Museum. In 1888 he crossed Greenland from sea to sea a little north of latitude 64°, an account of this journey being published in England in 1890, under the title (Across Greenland.* He re¬ turned in 1889 and was appointed curator of the Museum of Comparative Anatomy in Christiania University. In 1893 he sailed on board a spe¬ cially built steamer (the From) in the expecta¬ tion that, entering the Polar ice in the neighbor¬ hood of the New Siberian Islands, he would be drifted by a current over the Pole and would come out on the east side of Greenland. This expectation was based on the fact that articles belonging to the Jeannette, an Arctic expedition vessel lost in 1881, had drifted in about three years from Bering Strait across the Polar re¬ gions to Greenland. After being carried to lat. 83° 59', he left the Fram and crew, and with a single companion, Lieutenant Johansen, and with sledges, dogs and kayaks, took the ice. In this way he reached a higher latitude than any previously attained, 86° 14' (8 April 1895), and then turned southwestward to Franz Josef Land. There he spent the winter of 1895-96, and on 17 June 1896 fell in with members of the Jackson-Harmsworth expedition, with which he returned to Varde. The Fram, under Captain Sverdrup, had reached lat. 85° 57', and had been for four months fast in the ice. Nansen was re¬ ceived everywhere with the greatest enthusiasm and medals and other honors were conferred upon him, including a professorship of zoology in Christiania University. In 1897 he published an account of his voyage, which appeared in Eng¬ lish as (Farthest North,* the most interesting of all narratives of Arctic travel. A translation of a work by him on (Eskimo Life* was published in 1893. His further works include (Northern Mists* (1911) ; and (Through Siberia* (1914). He was strongly favorable to the separation of Norway from Sweden (on which he wrote a volume) and was Minister for Norway at Lon¬ don 1906-08. In 1906 the Grand Cross of the Victorian Order was conferred on him. On his return to Norway he became professor of oceanography at Christiania University. Con¬ sult Dolman, F., (Dr. Nansen: the Man and His Work* ; Brogger, W. C., and Rolfsen, N.,

(Fridtjof Nansen) (London 1861-92; trans. by Archer, ib. 1906).

NANSEN, Hans, Danish statesman : b. Flensburg, 28 Nov. 1598; d. Copenhagen, 12 Nov. 1667. He entered (1621) the service of the Danish Icelandic Company and made many trading voyages to Iceland. In 1644 he was made burgomaster of Copenhagen, and from 1658-60, during the storm and stress period, his city's trust in his abilities enabled him to obtain from Frederick III the anti-aristocratic reform of 1660. The resulting absolute mon¬ archy is said to have been contrary to his wishes, but he retained his honors, going largely into commercial life and omitting poli-vol 19 — 44

tics. Consult Nielson, Oluf, HCjobenhavns Histone* (Vol. Ill, Copenhagen 1877).

NANTERRE, nan'tar, France, town in the department of Seine and arrondissement of Saint-Denis, located at the foot of Mount Vale-rien and on the West Railway, a few miles from Paris. Its chief industry is the manufacture of chemicals. This is the traditional birthplace of Saint Genevieve and the Revolution hero Henriot was born here. Pop. 21,350.

NANTES, nants (Fr. naht), France, capi¬ tal of the department of Loire-Inferieure, and an important commercial port, on the right bank of the Loire, where its receives both the Erdre and the Sevre, 248 miles by rail west-southwest of Paris. The Loire here forms a number of islands, two of which are among the finest quarters of the town, and are con¬ nected by several bridges. The situation, on an important navigable river, within 40 miles of the ocean, is advantageous for commerce and has been enhanced since 1891 by the con¬ struction of a ship-canal to Saint Nazaire, at the mouth of the Loire, and by considerable expenditure in harbor improvements since 1914. Nantes is so well placed and so regularly, and in some parts so splendidly built, that it justly ranks as one of the finest towns in France. It has a number of elegant squares ; and its quays, which line the banks of the rivers, extend nearly five miles. The notable public edifices are the cathedral, in the flamboyant style, dating from the 15th century; the handsome modern church of Saint Nicholas in the Gothic style of the 13th century, with a tower 278 feet high ; the celebrated ducal castle, an edifice of the 14th century, partly modernized in the 16th, flanked with massive round towers; the palace of jus¬ tice or law courts, a large and handsome build¬ ing; the Hotel de Ville; the exchange, restored and enlarged in 1891 ; the museum of natural history; and the new museum (1897) ; the large picture gallery; public library of 102,000 volumes ; chapter-house, and

Hotel Dieu or infirmary. Nantes is the see of a bishop; it has courts of first resort and commerce, a chamber of commerce and exchange, a college, diocesan seminary and secondary ecclesiastical school ; a secondary school of medicine and a hydrographical school of the first class. The manufactures consist of blankets, serge, flan¬ nel, printed stuffs, canvas, ships' boilers and machinery, cordage, chemical products, glue, ship biscuits, *etc.* ; there are also cotton mills, sugar refineries, iron works, glass works, bleach fields. Sardines and preserved meats are im¬ portant _ articles among its industrial products. The shipbuilding docks are of great extent. Nantes carries on a large foreign trade, ves¬ sels of 1,700 tons being able to reach the town. The trade includes a variety of articles both for the home, the colonial and the foreign markets. Before the conquest of Gaul by the Romans, Nantes was the capital of the Nan-netes. In 1445 it valiantly withstood a siege of 60 days by the Huns. During the 9th century it was thrice taken by the Normans and almost entirely ruined. In 1118, when it had again be¬ come prosperous, an accidental fire reduced the greater part of it to ashes. During the English wars in France it suffered much, repeatedly falling into the hands of opposite parties. For a long time it formed one of the most valuable

possessions of the dukes of Brittany, but in 1499 the heiress of the dukedom, Anne of Brittany, who was born here, having married Louis XII, it passed with the rest of her pos¬ sessions to the Crown of France. The most memorable event connected with the history of Nantes is the famous edict (see Edict of Nantes) issued by Henry IV, 30 April 1598, securing the Protestants in the free exercise of their religion, and making them eligible to all civil and military employments. This edict was revoked by Louis XIV in 1685. The noyades or drownings of the monster Carrier during the Revolution were perpetrated here. (See Carrier). Pop. about 171,000.

NANTES, Edict of. See Edict of Nantes.

NANTEUIL, Robert, nan'te'y. French cop¬ perplate engraver: b. Rheims, 1630; d. Paris, 1678. His father-in-law, Nicolas Regnesson,

was his first instructor and in 1647 he went to Paris and worked under the eye of Philippe de Champagne (q.v.). Louis XIV appointed him designer and engraver to the king. He em¬ ployed in his work a simple line which grew gradually thicker at the shade point and died away toward the high light in faint and fainter stipple points ; in this way he produced the fine color values which characterize his engravings. In his portraits, of which about 200 exist, he exhibits powerful modeling and lifelike draw¬ ing. They include portraits of Louis XIV, Anne of Austria, Madame de Sevigne and other renowned persons. Some of these latter works are after the paintings of Lebrun, Du Chastel and others. He also executed some excellent pastels. Consult Loriquet, (Robert NanteuiP (1886); Metcalfe, (Prints and Their Makers5 (New York 1912).

NANTICOKE, nan'ti-kok (Nentigo, "tide¬ water people®), a former American Indian tribe of the Algonquian family residing, when first discovered by the whites, on the east shore of the Nanticoke River, where according to Smith their principal village, also called Nanti¬ coke, was situated in 1608. Their language was very closely related to that of the Delaware. They were great fishers, trappers and hunters and according to tradition they had, at an earlier period in their history, gone southward in search of game, when their old hunting grounds had become too densely populated for a no¬ madic race. Tradition also says that a league ex¬ isted between the Nanticoke and other tribes covering a large extent of territory, for many generations. Already in 1642 the Nanticoke had been declared enemies of the Maryland colony; but in 1678 a treaty was made with them ; and 20 years later reservations were set apart for them. About 1725 they began to move north¬ ward gradually, going up the Susquehanna and finally settling at Oswego, Chenango and Chug-nut in the State of New York. A part of the tribe, however, under the name of Wiwash, re¬ mained behind in Maryland. Some of those in New York State amalgamated with the Iro¬ quois; but most of them, feeling the pressure of civilization, went west into Ohio and Indiana and there joined the Delawares about 1784.

Among all the neighboring tribes the Nanti¬ coke Indians had the reputation of being great magicians ; and they were greatly feared on this account. A head chief ruled over all the vil¬

lages, thus binding* together the interests of the tribe or tribes composing the Nanticoke people. Apparently this chief was sometimes a woman. They fortified their towns against the enemy. In the

“Nanticoke Confederacy® were included the Nanticoke proper, Arseek, Cuscarawaoc, Nause and Sarapinagh and perhaps Ozinies and other sub-tribes. In southern Delaware there are still numerous half-breed Nanticoke.

NANTICOKE, Pa., borough in Luzerne County, on the Susquehanna River and on the Delaware, Lackawanna and Western, the Cen¬ tral of New Jersey and the Pennsylvania rail¬ roads, about 80 miles north by east of Harris¬ burg. The town of Nanticoke was surveyed, plotted and streets laid out in 1793. It is situated in an anthracite coal region in Hanover and Newport township, and has extensive water power which is utilized in manufacturing. ‘The industry contributing most to the wealth of the town is coal mining. This is the greatest coal deposit and the richest mining district in the world. The chief manufacturing estab¬ lishments of the city are mining and agricul¬ tural implement works, large hosiery mills, knitting factories, canning factory, flour and grist mills, lumber mills, silk mills and cigar factories. It has considerable trade in coal and its own manufactures. There is an excel¬ lent school system with 12 modern school build¬ ings. The government is administered under the original charter which provides for a burgess, who holds office three years, and a council. Pop. (1920) 22,614.

NANTUCKET, Mass., town, county-seat of Nantucket County, embracing the islands of Nantucket, Tuckermuck and Muskeget. It is about 25 miles from the mainland of the State and 100 miles southeast of Boston. On the north is Nantucket Sound, on the east and south the Atlantic Ocean and on the west Muskeget Channel, which separates it from Martha’s Vineyard. The main island, Nantucket, is about 15 miles long, and averages about two miles in width. The area of the whole town is about 60 square miles. The most populous part of the town is along the north shore of the largest island. There are several villages in the town; the largest, Nantucket, on Nantucket harbor, was founded in 1673. The first settlement was made in 1659 by a colony in charge of Thomas Macy, at the place called Madeget. Nantucket is a famous summer resort; the island is dotted with handsome summer villas. The residents claim that the climate is antagonistic to asthma, hay fever and malaria. At one time Nantucket was the headquarters of a great whaling in¬ dustry, but the chief industries of the pres¬ ent are agriculture and fishing. A flourishing coastwise trade is carried on by a number of the islanders. Muskeget Park is one of the attractions. The town has a public library (the Athenaeum), and the Coffin High School. At the “town meeting® the administrative officials are annually elected. Pop. 2,797. Consult Hinchman, (Early Settlers of Nantucket5 ; Worth, H. B., (Nantucket

Lands and Land-owners5 (Nantucket 1901-10) ; Duglas-Lithgow, Nantucket5 (New York 1914).

NANTYGLO (nan'ti-glo) AND BLAINA,

bla'na, England, town in Monmouthshire near

Abergavenny. Its importance lies in its large coal-mining and iron industry. Pop. 15,395.

NAON, na-5n', Romulo S., Argentine diplo¬ mat : b. Buenos Aires, 17 Feb. 1875. He studied at the University of Buenos Aires and later became professor of philosophy at the Colegio Nacional de Buenos Aires, then pro¬ fessor of constitutional law and member of the directive council faculty of law and social sciences. He entered political life (1902) as representative of the National Congress and was reelected (1906), becoming Minister of Justice and Public Instruction (1908). He was (1911-14) Envoy Extraordinary and Minister Plenipotentiary to the United States and in the latter year became the first Ambassador of Argentina to the United States. He was re¬ elected (1912) to the National Congress but resigned to remain with the United States. In 1917 he resigned his office because his country's government refused to declare war against Germany. He served as general secretary of the Argentina delegation to the second Hague Peace Conference, was a member of the A. B. C. (Argentine-Brazil-Chile) Peace Con¬ ference (1914) at Niagara Falls, to avoid war between the United States and Mexico, a dele¬ gate at the Pan-American Conference (1915). For his valuable services he has received numer¬ ous decorations. He has written several works on political science and constitutional law, and has received, among other diplomas, that of LL.D. from the universities of Pittsburgh, Yale, Harvard and Brown.

NAOROJI, now'ro-je, Dadabhai, first In¬ dian member of the British Parliament : b. Bom¬ bay, 4 Sept. 1825; d. 2 July 1917. The son of a Parsi priest, he was educated in the Bombay school, later the

Elphinstone School and College, where he was the first native professor of mathematics and natural philosophy (1854). In 1855 he went to England, where he after¬ wards, for the most part, resided. In 1867 he as¬ sisted in founding the East India Association; through his efforts in 1870 the civil service was opened to native Indians ; and he accomplished much for the improvement of Indian finance and industries. He became Prime Minister to the Prince of Baroda in 1874; from 1875 to 1887 he held important municipal and legislative posi¬ tions ; and in 1886 and 1893 was president of the Indian National Congress. For many years he was president of the London Indian Society. From 1892 to 1895, as a Liberal, he represented Central Finsbury in the House of Commons, and in the latter year was made a member of the royal commission formed to inquire info Indian expenditure, *etc.* He published Eng¬ land's Duties to India) (1867);. (The Wants and Means of India) (1870) ; articles collected in 1887; (Poverty and Un-British Rule in

India* (1901), and (The Rights of Labour)

(1906).

NAPA, na'pa, Cal., city, county-seat of Napa County, on the Napa River and on the South¬ ern Pacific Railroad. It is in an agricultural region in which large quantities of fruit are raised, and in the vicinity is an extensive de¬ posit of cement rock. It was settled in 1847 and in 1863 was incorporated. The city has excellent transportation facilities as the Napa River is navigable, thus making direct water

communication with San Francisco and other cities. The chief manufactures are gloves, leather and shoes. There is a large trade in fruit, Portland cement (made at Napa Junc¬ tion), and the manufactures of the city. The scenery around Napa is beautiful; some of the attractions are the petrified forests, the mineral springs and the Napa Redwoods. It has the State Hospital for the Insane. Pop. 6,757.

NAPANEE, Canada, a port of entry and the county-seat of the united counties of Len¬ nox, Addington and Ontario, 24 miles west of Kingston, on the Bay of Quinte, about seven miles from the mouth of the Napanee River. It is the terminus of the Quinte and Napanee Railroad and is on the Grand Trunk and Cana¬ dian Northern railroads. It has flour-mills, factories, brick and tile works, motor boat

and carriage works, and is the centre of a rich agri¬ cultural district. Pop. 2,807.

NAPERVILLE, na'per-vil, Ill., city in Du Page County, on the Du Page River and on the Chicago, Burlington and Quincv Railroad, about 28 miles west of Chicago. It was settled in 1830 and in 1857 was incorporated. It is in an agricultural region. It is chiefly a resi¬ dential city, the seat of the Northwestern Col¬ lege, established in 1861 under the auspices of the Evangelical Association. It has good pub¬ lic and parochial schools, the Nichols Library, a theological seminary, Y. M. C. A. building, the. Edward Tubercular Sanatorium, Saint Pro¬ copius Bohemian College, a convent and orphan¬ age. The citv's manufactures include couches and davenports, flynetting, gloves, ice, butter, ice-cream, *etc.* There are two large nurseries also in the city, which is under the commission form of government. Pop. 3,830.

NAPHTALI, naf'ta-ll (Hebrew, "wrest¬ ler®) , the seventh son of Jacob by Bilhah, Rachel's maid, one of the 12 patriarchs and eponymous founder of one of the 12 tribes of Israel. The territory of Naphtali lay to the northwest of the Sea of Galilee; of this tribe was Barak, the hero and deliverer of Israel in the days when Deborah, the wife of Lapidoth, judged Israel. This frontier tribe was exposed t.o the incursions of the adjoining heathen, and is specially mentioned in the Song of Deborah as among those who "jeopardized their lives under the death® in the battle against Jabin the Canaanite king. Tiglathpileser when he over¬ ran the north of Palestine carried off the whole population to Assyria, after which Naphtali disappears from history. The district became famous under the name of Galilee as the home of Jesus Christ and most of his apostles. Capernaum, Tiberias, Magdala and Chorazin lay within the ancient boundaries of the tribe of Naphtali.

NAPHTHA, in the commercial sense a prod¬ uct of the fractionation of crude petroleum, ob¬ tained by the redistillation of benzine, being the heavier constituent after the benzoline has dis¬ tilled over. It is also called "mineral naphtha.® Another commercial article is "solvent naphtha,® a somewhat similar liquid obtained in the frac¬ tionation of coal-tar, distilling over between the temperatures of 250° and 330° F. In the chemistry of the ancients the term included all inflammable liquids, especially the more fluid sorts of asphalt or bitumen ; the word which is of Persian origin and signifies "moist® being

first used of the Persian product and then ap¬ plied more generally. In modern usage and among chemists the term is applied to any volatile inflammable liquid product of organic decomposition, as the distillation products from peat, wood, indiarubber, bones, *etc.* These vary in density from 0.67 to 0.72, and in gravity from 90° to 60° Beaume. American petroleum naphtha constitutes from 6 to 20 per cent of the crude petroleum. Russian petroleum is only 5 or 6 per cent naphtha. Scotland produces a naphtha called shale-spirit, being 4 or 5 per cent of the crude shale oil, and rather heavier than most other naphthas, but not so heavy as the coal-tar naphthas, which vary in specific gravity between .850 and .950. Caoutchine is another name for indiarubber naphtha. The uses of naphtha are various, the lighter grades being utilized as detergents in the cleansing processes preparatory to dyeing, and in the dry cleaning of clothes and gloves. The coal-tar naphthas are largely employed as solvents in making indiarubber goods. The Scotch shale-spirit is the liquid component of a wood preser¬ vative. Naphtha is also used very largely as a solvent in the extraction of oils from oil seeds, and of essential oils in the manufacture of per¬ fumes and essences.

NAPHTHA-POISONING. While the vapors, and even the ingestion of naphtha in small quantities, have not been found poisonous to human beings, the fumes resulting from the burning of naphtha are deadly if in admixture with the air in a confined place. This poison¬ ing effect is due to the large proportion of car¬ bon monoxide — about 7 per cent — contained in the residual gases. A proportion of one-tenth of 1 per cent in the air renders it dan¬ gerous to the majority of persons. A consider¬ able number of fatal accidents have been caused by ‘breathing the exhaust gases from a gasoline¬ burning automobile in the restricted space of a small garage. See Petroleum-poisoning.

NAPHTHALENE, or NAPHTHALIN,

a coal-tar product consisting of carbon and hydrogen, with the chemical composition CioHs and a certain chemical similarity to benzene.

Its peculiar chemical composition may be repre¬ sented Ity the

graphic formula known as the condensed benzine rings, as below. These are generally written without the letter symbols, as at b.

Naphthalene is prepared from the middle or ((carbolic® oil obtained in the distillation of coal¬

tar between the boiling point temperatures of 410° and 460° F. The naphthaline crystallizes out on cooling, is then centrifugalized, pressed, warmed, stirred with caustic soda and, after the addition of sulphuric acid and several wash¬ ings with hot water, is either sublimated or distilled. Physically, naphthalene is a white solid, with brilliant, leafy crystals, melting at 175° F. to a colorless liquid, which boils at 425° F. It burns with a sooty flame and pitchy odor. It is insoluble in cold water, slightly soluble in water at a higher tempera¬ ture and easily soluble in the essences, in boil¬ ing alcohol or in ether. Naphthalene forms a multitude of various compounds, mostly by simple addition; the most important are the various sulphonic acids, such as CioHiSOaH + H20, used in the manufacture of dyes. The nitro-derivatives of naphthalene are also ex¬ tensively used as intermediates in dye-making. Under the popular name of (<moth balls® or ((coal-tar camphor,® naphthalene is used to keep moths and other insects from clothes. It vaporizes slowly with no residue, and is useful to some extent as a disinfectant and deodorizer. Consult Tinkler, C. K., and Challenger, F., <The Chemistry of Petroleum and Its Substitutes, > (New York 1915).

NAPHTHOL, in chemistry, a substance de¬ rived from naphthalene in the same way that phenol is derived from benzene.— that is, by replacing one of the hydrogen atoms of the

(a)

t a)

H

ti

C

C

tb)

(b)

nc,

1

hC

f f”

(b)

c Ch

lb)

c

c

H

w

l eO

C zO

hydrocarbon by a molecule of hydroxyl, OH. Its chemical name is hydroxynaphthalene. The empirical formula for naphthalene being CioHs, the corresponding formula for naphthol there¬ fore is C10H7.OH. In benzene the substitution can be made in only one way, because the mole¬ cule of that substance is chemically symmetri¬ cal, its hydrogen atoms being all similarly re¬ lated to one another, and to the carbon atoms. In naphthalene, however, two essentially dif¬ ferent kinds of substitution are possible, ac¬ cording to the position of the hydrogen atom that is replaced. This will be understood by reference to the structural formula of naphtha¬ lene, as presented herewith. The hydrogen atoms in the positions marked <(a® are more directly associated with the central pair of car¬ bon atoms than are those in the positions marked (<b® ; and we must therefore admit that two

chemically different naphthols are possible, according as the hydrogen that is replaced by hydroxyl is an ((a® atom or a <(b® atom. These two naphthols are in fact known, and to dis¬ tinguish them from each other the prefixes

“alpha” and “beta” are attached to the name. Thus “alpha-naphthol” is the compound ob¬ tained by replacing one of the “a” hydrogen atoms by OH, and ((beta-naphthol)) is the com¬ pound obtained by a similar replacement of a ((b)> atom. Both of the naphthols resemble ordi¬ nary phenol (or carbolic acid), and both are used as antiseptics and’ also in the preparation of certain of the coal-tar colors. The naphthols ex¬ ist in coal-tar in very small quantities in the fractions made at a high boiling point and may also be prepared by the action of fuming sul¬ phuric acid upon naphthalene, followed by treat¬ ment with sodium hydroxide. In the making of a naphthol the sulphuric acid treatment is con¬ ducted at a temperature ranging from 175° to 190° F. For B-naphthol the temperature is kept at 390° F. Alpha-naphthol crystallizes in short lustrous monoclinic needles, which melt at 201° F. and boil at 543° F. Beta-naphthol crystallizes in flat plates or tablets, melts at 253° F. and boils at 547° F. Both are slightly soluble in hot water, and both dissolve freely in alcohol, ether and benzene. The solution of A -naphthol in water has a violet color; that of B-naphthol a yellow color. The naphthol derivatives of most value in the arts are their sulphonic acids, and di-sulphonic acids, and the tri-sulphonic acid of A -naphthol, and chromo-trope acid or chromogen ; all used in the pro¬ duction of coal-tar dyes.

NAPHTHYL, a hyrocarbon radical C10H7, occurring in the compounds and derivatives of naphthalene. It is a merely hypothetical group as it appears only in compounds. If its existence be assumed, naphthalene (CioHs, or C10H7.H) is merely its hydride; naphthol or naphthyl alcohol in the same way might be con¬ sidered a hydrate of naphthyl, since its formula may be written Ci0H7OH. Dinaphthyl (C20H14) is a carbide formed by the action of heat upon naphthalene; it is a solid and is fusible at 154° C.

NAPIER, na'pi-er, Sir Charles, British naval commander, cousin of Sir Charles James and Sir William Napier (q.v.) : b. Merchiston Hall, Stirlingshire, 6 March 1786; d. Merchis¬ ton Hall, Hampshire, 6 Nov. 1860. At 13 he entered the navy as a volunteer and in 1805 was promoted lieutenant. In 1807 he became commander, and from the gallantry he dis¬ played in the pursuit of three French line-of- battle ships in 1809 was shortly after made post-captain. He was then put on halfpay and joined the British army in Portugal where he took part in the battle of Busaco. In 1814 he was dispatched to the United States, and led an expedition against Baltimore. In 1827 he received the command of the Galatea, in which he was employed on the coast of Portugal and the Azores. Becoming acquainted with the Duke of Terceira and other Constitutionalists, he accepted the command of their fleet, and by his defeat of the Miguelites in a naval engage¬ ment effected the relief of Oporto and the es¬ tablishment of Donna Maria on the throne. For his services the Portuguese government-cre¬ ated him Count Cape Saint Vincent and nomi¬ nated him admiral-in-chief. He soon returned to England and in 1839 was ordered to the Mediterranean, where, upon the outbreak of the war between Mehemet Ali and the Porte,

and the cooperation of Britain with Russia and Austria on behalf of the latter power, he performed some of his most gallant exploits, including the storming of Sidon and the cap¬ ture of Acre. Having blockaded Alexandria, he concluded on his own responsibility a con¬ vention with Mehemet Ali, by which the latter and his family were guaranteed in the heredi¬ tary sovereignty of Egypt on resigning all claim to Syria. In 1841 he was elected mem¬ ber of Parliament for Marylebone, and proved himself a warm advocate of liberal measures and naval reform. In 1847, while in command of the Channel fleet, he compelled the emperor of Morocco to grant compensation for the in¬ juries inflicted by him on British commerce. On the commencement of the Crimean War he was nominated to the command of the Baltic fleet, but in this capacity had few opportunities for striking a decisive blow, which at the time somewhat disappointed his country. Sir Charles Napier was an author as well as a commander and published (The War in Por-tugaP (1836); (The War in Syria) (1842); (The Navy, its Past and Present State* (1851). Consult Elers Napier, (Life and Correspond¬ ence of Admiral Sir Charles Napier* (1862) ; Williams, H. N., (The Life and Letters of Ad¬ miral Sir Charles Napier, K.C.B.* (London

1918).

NAPIER, Sir Charles James, English sol¬ dier and administrator: b. London, 10 Aug. 1782; d. Oaklands, near Portsmouth, Hamp¬ shire, 29 Aug. 1853. He entered the army as ensign in his 12th year and within four months was gazetted lieutenant. Having become cap¬ tain in 1803, he accompanied his regiment to the Peninsula and distinguished himself at Coruna, where he had the rank of major, and where, after receiving five wounds, he was taken prisoner. In 1810 he returned to the Peninsula and fought at Busaco. After obtain¬ ing the rank of colonel and taking part in most of the leading events of the Peninsular campaigns, he returned to England on the con¬ clusion of peace. He was in the United States during the War of 1812, and after his return took part in the storming of Cambrai in 1815. From 1822 to 1830 he was governor of the island of Cephalonia, where he pleased the inhabitants better than the authorities at home. In 1841 he sailed for the East to assume the chief military command within the presidency of Bombay. He was shortly afterward called to Sind in consequence of the determination of Lord Ellenborough, then governor-general, to punish the ameers for alleged misconduct dur¬ ing the Afghan war. This policy was ably carried out by Napier, first by the splendid victories of Meanee (17 Feb. 1843) and Hy¬ derabad (24 March) and afterward by the administration of Sind as a conquered province, of which Lord Ellenborough made him gov¬ ernor. He retired in 1841, but during the Sikh war of 1848-49 he sailed once more for the East as commander-in-chief of all the forces in India. Having taken a step which subjected him to an unceremonious rebuke from the Marquis of Dalhousie, the governor-general, he resigned and returned to England the next year. Consult Bruce, (Life of General ST Charles Napier* (1885) ; Butler, ‘Sir Charles Napier > (1890).

NAPIER

NAPLES

CD 4

NAPIER, John, Scottish mathematician : b. Merchiston, near Edinburgh, 1550; d. there, 4 April 1617. He was educated at Saint

Andrews, traveled in Europe, returned to a life of proprietorship and leisurely study, and pub¬ lished in 1593 his (Plaine Discovery of the Whole Revelation of Saint John,) which was an original work, without a predecessor in its line. For a time he busied himself with devis¬ ing instruments of war, such as burning-glasses for firing hostile vessels ; a piece of artillery for destroying everything round the arc of a circle; and a round metal chariot, from which shot might be fired through small openings while the enemy became ((abased and altogether uncertain.® Sir Thomas Urquhart ((The Jewel, } 1652) says that the artillery was tried on a Scottish plain with the slaughter of many sheep and cattle. His great work, (Mirifici Logarithmorum Canonis Description appeared in 1614. This explained the nature of logarithms (q.v.), then styled ((artificial num¬ bers,® and supplied the table for their appli¬ cation. It astonished Europe and deeply in¬ terested Kepler, who helped ta extend the use of logarithms. With Henry Briggs, Napier devised the new canon in which 0 represented the logarithm of unity and 10,000,000,000 that of the entire sine. His (Mirifici Logarith¬ morum Canonis Constructio) (1619) explained the method of constructing the table ; and the <Rabdologia) (1617) was a description of enumeration by bone or ivory rods, which, known as ((Napier's rods,® were widely em¬ ployed in Europe for assistance in multiplica¬ tion, division and the extraction of the square and cube root. Consult Napier, Mark, (Mem¬ oirs) • (1834).

NAPIER, Robert Cornells, Lord Napier of Magdala, English soldier: b. Ceylon, 6 Dec. 1810; d. London, 14 Jan. 1890. Educated at the Military College, Addiscombe, he entered the Bengal Engineers, and during the second Sikh war (1848) was present as chief engineer at the siege of Multan, and after its fall took part in the battle of Gujarat. When the Mutiny broke out in 1857 he was appointed chief of the staff to Sir James Outram, and in the second relief of Lucknow he constructed the engi¬ neering works which enabled Sir Colin Camp¬ bell to capture the city. In the Chinese cam¬ paign of 1860 he was second in command, and in 1865 became commander-in-chief of the Bombay army. He commanded in 1868 the expeditionary force against King Theodore of Abyssinia, defeated the king's forces, released the English prisoners and stormed the moun¬ tain fortress of Magdala (April 1868). For his services in this short but brilliant campaign he was rewarded with a peerage and a pension. Subsequently he was appointed commander-in¬ chief in India (1870), governor of Gibraltar (1876) and constable of the Tower (1887). At his death he was buried in Saint Paul's with military honors. Consult Markham, his¬ tory of the Abyssinian Expedition) (1869), and Escott, (Pillars of the Empire) (1879).

NAPIER, Sir William Francis Patrick,

British soldier and author, brother of Sir Charles James Napier (q.v.) : b. Kildare, Ire¬ land, 17 Dec. 1785; d. Scinde House, Clapham, Surrey, 12 Feb. 1860. At 14 he entered the army with his brothers Charles and George,

took a distinguished part in the Peninsular campaigns, receiving seven decorations for the share borne by him in as many principal ac¬ tions, including Busaco, Salamanca, the Nivelle and Orthez. Some years later he began his celebrated (History of the Peninsular War* (6 vols., 1828-40). It furnishes the best and most interesting record-existing of the mo¬ mentous transactions which it chronicles, though from its opposition to the prevailing politics of the day its merits were at first insufficiently appreciated. In 1841 he was advanced to the rank of major-general, was appointed lieuten¬ ant-governor of Guernsey the following year and in 1848 created a K.C.B. Criticisms on his brother's proceedings in India called him forth as his champion, and produced successively the (Conquest of Scindeˆ (1845) ; (History of Sir Charles Napier's Administration of Sande* (1851) ; and (Life and Opinions of the Late Sir Charles Napier) (1857). He also wrote (English Battles and Sieges in the Peninsula. } Consult <Life) by Lord Aberdare (1864).

NAPIER OF MAGDALA. See Napier, Robert Cornelis.

NAPIER. The chief town and port of the district of Hawke's Hill, east coast of North Island, New Zealand. It is the centre of a large district of squatters and is rather wealthy for its size. Being a peninsula, it has excellent harbors. Its bay ranks with that of Naples for picturesqueness. The exports are wool and frozen meats. The town has freezing plants and a number of other prosperous industries. Its exports were recently valued at £1,532,422 ; the imports at £467,837. Napier is a famous winter resort.

NAPIER'S RODS, in mathematics , a set of rods contrived by John Napier in 1617 for the purpose of facilitating the numerical oper¬ ations of multiplication and division.

NAPLES, na'plz, Italy, the capital of the province of Naples, and previously of the for¬ mer kingdom of the Two Sicilies (q.v.), the largest city and most important seaport of the kingdom, situated on the celebrated Bay of Naples, 150 miles by rail southeast of Rome. Its

site is of singular beauty, occupying an area about five miles long and three miles broad, on the north side of the nearly semi-circular bay, partly along the shore and partly climbing the adjacent slopes. It is bounded on the one side by the picturesque heights of Posilipo and on the other by the lofty, volcanic mass of Vesuvius (q.v.). The environs are densely peopled, among neighboring towns and villages being Portici, Resina, Castellamare, Casoria, Pozzuoli, etc., and the classic sites of Herculaneum and Pompeii (qq.v.), all connected by rail. The bay, 20 miles wide, and extending inward 10 miles, with a coast line of about 35 miles, has Cape Miseno as its northwest extremity, off which lie the islets of Procida and Ischia; Campanella Point forms the southeast extrem¬ ity, with the beautiful isle of Capri lying be¬ yond. The city is divided into two unequal parts by a steep ridge projecting from the height on which stands the castle of Saint Elmo, and terminated by a rocky islet surmounted by the Castello dell' Ovo. The largest and most ancient part of Naples lies to the east of these heights. This now forms the business quarter

and is intersected from north to south by the main street, the Via di Roma. The western and more modern part of the city, the fashion¬ able quarter, has a superior situation, and com¬ mands magnificent views; the chief street in this quarter is the Corso Vittorio Emanuele, nearly three miles long. The streets are mostly well paved with lava or volcanic basalt, and the houses are large, lofty and solidly built, and have flat roofs. Since the cholera epidemic of 1884 a plan of municipal improvement on an extensive scale has been carried out, including a new water supply, a modern sewerage system, the destruction of the narrow streets, alleys and lanes, the former abodes of filth, misery, vice and crime, and the building of new quarters, with wide thoroughfares and modern houses. There are few remains of ancient times, but there are five castles, dell' Ovo, Nuovo del Carmine, Capuano, Saint Elmo, the gates Porta del Carmine and Capuano, all of mediaeval con¬ struction, and Virgil's tomb.

Among the chief public edifices is the cathe¬ dral, dating from 1272, a

large Gothic building erected on the site of two temples dedicated to Neptune and Apollo. It is held in high venera¬ tion in consequence of possessing the relics of Saint Januarius or Gennaro, including the phial of his blood which liquefies periodically in a miraculous manner. Other edifices are the church De' Santi Apostoli, said to have been originally founded by Constantine the Great on the site of a temple of Mercury; the church of Saint Paul, built in 1817-31 in imitation of the Pantheon at Rome; the Palazzo Reale (Royal Palace), a building of great size in the lower part of the town ; the palace of Capo di Monte, situated on a height in the outskirts ; the old palace, where the courts of justice now hold their sittings; the Galleria Umberto I: the Palazzo dei Pubblici Studi, formerly occupied by the university, but now converted into the Museo Nazionale, a museum containing not only a valuable library of over 600,000 volumes and pamphlets and many rare manuscripts, but also the older and more recent collections be¬ longing to the Crown, the Farnese collection of paintings and sculpture from Rome and Parma, and an unequaled collection of gems, bronzes, vases, etc., chiefly obtained from the excava¬ tions of Pompeii and Herculaneum. Naples has a university, dating from 1224, and attended by over 5,000 students ; many other educational institutions, including the celebrated zoological station with marine aquarium and laboratory, and numerous hospitals and charitable foundations. It is the see of 3.n archbishop and an important naval and military station, with an arsenal and gun works. The manufactures in¬ clude steel and engine works, woolens and cot¬ tons, silk known as gvos dc N Qplcs, glass, china, soap, chemicals and macaroni, their products being largely exported, other exports being gloves, perfumery, artificial flowers, paper, olive oil, wines and fruits. The imports include manufactured goods, Colonial produce, iron, coal and cotton yarns. The harbor affords magnificent anchorage, the depth at the end of the mole being 65 feet and at the arsenal 26 feet In 1915 8,913 ships entered; total ton¬ nage, 7,603,106 tons. Naples is an important point for transatlantic emigrants.

Naples is one of the most densely popu¬ lated cities of Europe, and one of the features

of the city is its unique population, which swarms incessantly in the thoroughfares, where throngs of sellers, buyers and idlers intermingle with asses, mules, hand carts and vehicles, daz¬ zling the eye with their brilliant variety of costume, and the expressiveness of their frantic gestures and attitudes, while the ear is stunned by the shrill cries of the itinerant dealers, the songs of the improvisatore and the

high-pitched patois of the seething crowds. The Marinella, an open beach fronting the east part of the city, was formerly the abode of the lan-zaroni, a class which has now lost its distinctive features, the term being now generally applied to_the fishermen.

Naples was founded by a Greek colony from the town of Cumae many centuries before Christ. It took the name of Neapolis ((<New City®) to distinguish it from a still older Greek city adjoining called Parthenope. It passed to the Romans in 290 b.c. In 536 a.d. it was taken by Belisarius, and was pillaged by Totila in 542. In 1130 the Norman Robert Guiscard united the south of Italy and the adjacent island of Sicily into one political unity, Naples being recognized as the metropolis. It was afterward successively under the sway of the emperors of Germany and the kings of France and Spain. Under the latter it became the capital of an independent kingdom, but having been brought within the vortex of the French Revolution, was handed over by Napoleon, first to his brother Joseph, and then to his brother-in-law Murat. The Congress of Vienna having restored the legit¬ imate sovereignty, Naples received back its fortner masters. After a long period of mis¬ rule they were ejected by Garibaldi in 1860, and Naples was then incorporated into the kingdom of Italy. Pop. 697.917

The province of Naples covers an area of 351 square miles; pop. 1,360,324.

NAPLES YELLOW, or NEAPOLITAN YELLOW, a permanent orange-yellow pig¬ ment much used in oil painting and in glass and porcelain painting. It is essentially an antimonate of lead with an excess of lead oxide. It is prepared by fusing at a moderate heat, for two hours, a mixture of chemically pure tartar emetic, lead nitrate and sodium-chloride. When cooled the common salt dis¬ solves, leaving a fine yellow powder.

NAPO, na'pd, Ecuador, an affluent of the Amazon, which rises on the north side of Coto¬ paxi, and after a southeasterly course of about 800 miles, forming for a considerable distance the boundary between Colombia and Ecuador, joins the Amazon just beyond the eastern boundary, at Corocha, Peru. It is navigable nearly 500 miles for steamers ; it flows through a region rich in mineral and vegetable wealth, but comparatively destitute of inhabitants.

NAPOLEON I, emperor of the French: b. Ajaccio, Corsica, 15 Aug. 1769; d. Longwood, Saint Helena, 5 May 1821. He was descended from the Italian family of Bonaparte (q.v.), of which the Corsican branch through him became the historic representative. Napoleon

Bona¬ parte was the son of Charles Bonaparte, an ad¬ vocate of some repute, and of Letitia Ramolino, whose family were Florentines. Of 13 children born to them, he was the fourth, and was the second son. At 10 he was sent to the military school of Brienne, where he remained till 1784.

His school companions regarded him as taciturn and morose ; but as he was a Corsican, speaking very little French, and poor as well as proud, his conduct is doubtless to be ascribed as much to his circumstances as to his temperament. Toward those who, like Bourrienne, showed him sympathy, he was susceptible of strong and lasting attachments. From the annual report of the school it appears that he ˆdistinguished himself in mathematics, was tolerably versed in history and geography, weak in Latin, general literature, and other accomplishments; of regu¬ lar habits, well behaved and studious, and en¬ joying excellent health.® His favorite author was Plutarch. In' October 1784 he repaired to the military school at Paris to complete his studies for the army; and in September 1785 received his commission as second lieutenant in the artillery regiment of La Fere. Soon afterward he was promoted to be first lieuten¬ ant in the regiment of Grenoble, then stationed at Valence. While here he devoted some at¬ tention to literature, gaining a prize offered by the Lyons Academy. He had the intention of describing an excursion he made to Mont Cenis in the style of Sterne's (Sentimental Journey, > then much in favor on the Continent ; but a much more suitable task was a (History of Corsica, } which he began and communicated to Paoli, then living in exile in London.

Meantime the Revolution was rapidly devel¬ oping. Many of Napoleon's fellow-officers at Valence openly took part with the Royalists, but he chose the popular side, though in a quiet and undemonstrative way as he had little liking for the turbulence of mobs. On 6 Feb. 1792* he became captain of artillery by seniority and, being in Paris the same year, he witnessed the insurrections of 20 June and 10 August. He was accompanied by his friend and

biographer, Bourrienne (q.v.), who relates that on one of these occasions, when Napoleon saw the mob break into the Tuileries and force the king to don the red cap, he exclaimed, ((It is all over with that poor man! A few discharges of grape would have sent all those despicable wretches fleeing!® Soon after he left for Corsica, where Paoli then held the chief com¬ mand. The excesses of the Septembrists and Terrorists, however, induced Paoli to break with the Convention and seek the assistance of England. This brought him into conflict with Napoleon, who adhered to the Convention, which so exasperated the Corsicans against him that after a few skirmishes he was driven from the island along with his whole family. He made a short stay at Marseilles, where he published a small pamphlet, <Le Souper de BeaucaireP Republican in sentiment, but not Jacobinical, as has been asserted. He then set out for Paris, where he spent a part of the sum¬ mer of 1793; and in September of that year was sent, with the commission of lieutenant-colonel of artillery, to assist in the reduction of Toulon, then in the hands of the English. The place was captured 19 December entirely through his strategic genius; and in the following February he was. made a brigadier-general of artillery. Later in the year he was sent to Genoa to examine the state of the defenses of that city and to ascertain the political disposi¬ tion of its inhabitants.

In the beginning of 1795 he was again in Paris in search of employment, but in spite of

his known abilities W&3 hot at first successful: In his letters to h'iS brother Joseph, Written about this tittle, he coinplains of poverty and ennui, and seems to have thought Of OffCiring his services to the sultan of Turkey: .On the 13th Vendthttiaife tV (5 Oct. 1795), when the sections of Paris had risen against the Con¬ vention, Napoleon, named by Barras (q.v.), was commander of the 5,000 troops provided. fbt its defense. Although he had had biit a night lit which to make arrangements for the dispersion of the populace, when the National Guards, as the defenders of the sections were called, ad¬ vanced to the number of 30,000 along the quays of the Seine, the Rue Saint Honore and the other approaches to the Tuileries, they found every point securely guarded. To their feeble musketry fire Napoleon replied bv murderous discharges of grape. In less than ail hoiir Of actual fighting victory was secured for the Convention, which recognized the Vaiue.of the young victor's services by appointing him td the command of the Army of the IttterioL

About this time he made the acquaintance of Josephine Beauharnais,

to whom he proposed marriage and was accepted. The ceremony took place 9 March 1796, and less than a week afterward he had to depart to assume the com¬ mand of the Army of Italy, which for three or four years had been carrying on a desultory warfare against the Sardinians and the Austrians amid the defiles of the Alps and the Ligurian Apennines. His army consisted of only 40,000 men, and even those were badly fed and clothed, while the Allies Could oppose him with a much larger force. In the end of March he set out from Nice and came up with the Allies at Montenotte, and inflicted on them a disastrous defeat (11 April), This victory separated the Sardinian from the Austrian army, and Napoleon, determined to crush them in detail, pursued the former and beat them at Millesimo (13th and 14th), and then fell on the latter at Dego (14th and 15th).

This opened up for him both the route to Turin and to Milan. Napoleon lost no time; the Sardinians who were retiring upon Turin, were overtaken and beaten at Mondovi (22d), and compelled to sue for peace; and the Austrians, who were falling back on Milan, were signally defeated at the battle of Lodi (10 May). On the 15th he entered Milan, where heavy contributions were levied on the state, and the principal works of art were seized and sent to Paris. Naples, Modena and Parma hastened to conclude a peace; the Pope was compelled to sign an armistice; and the whole of northern Italy was in the hands of the French. Mantua was the next object of attack. Wurmser, at the head of large Austrian rein¬ forcements, advanced through the Tyrol to its defense; he was defeated at Castiglione 5 August and again at Bassano' 8 September, which compelled him to take refuge behind the walls of Mantua. Not yet disheartened, Austria sent a third army in two divisions under Mar¬ shal Alvinczy and General Davidovich. This for a while held the French in check, but on 15 November a battle was begun at Arcole, which after three days of hard fighting, gave the vic¬ tory again to the Frenqh, and decided the result of the campaign. In January 1797, Alvinczy opened a fresh campaign by advancing at the head of 50,000 troops from Roveredo to the

NAPOLEON BONAPARTE

After a Painting by Paul Delaroche

relief of Mantua, but was completely routed by Napoleon on the 14th at Rivoli ; and on 2 Feb¬ ruary Wurmser was compelled by famine to surrender at Mantua. On the same day Na¬ poleon put an end to the armistice with the Pope, and invaded the states of the Church, beat the papal troops on the Senio, and took in Quick succession the towns of Faenza, Ancona, Loretto and Tolentino. On the 19th the Pope was compelled to conclude a peace by which he surrendered Avignon, Bologna, Ferrara and the Romagna to France. Napoleon next entered the Tyrol, driving before him the Archduke Charles, who had undertaken another invasion of Italy. An armistice was agreed upon,. 7 April, and Austria gave territory and indemnity to France, receiving Venetia in return. This closed the great Italian campaigns, in which Napoleon, by ingenuity of plan, celerity of movement and audacity in assault, far out¬ generaled all his antagonists.

In December 1797 Napoleon returned to Paris ; the enthusiasm of the Parisians was immense, and the festivals in his honor innu¬ merable. About this time the Directory seems to have had the intention of invading England, and had brought an army together for that pur¬ pose. The command was conferred on Napo¬ leon, who at first professed to favor the design, but who well knew its impracticability. It has been thought by many that this proposal was merely a feint to cover the real design of the Directory, namely, the invasion of Egypt, as a preliminary step to the conquest of British India. By 10 May 1798 an army of 36,000 men was collected and embarked at Toulon in a fleet commanded by Brueis (q.v.). A body of scientific and artistic explorers accompanied it. On 9 June the French landed at Malta, and the next day took possession of the island, in which they left a garrison. Ten days after the fleet resumed its voyage, reaching Alexandria on 1 July, and that city being taken, Napoleon and the army advanced on Cairo. Here they en¬ countered a large body of Mamelukes, which, after a long and bloody struggle, known as the

battle of the Pyramids, they repulsed. Many of the surrounding tribes thereupon submitted to the French, who thus for a while held a seeming possession of the whole of Egypt. Thinking himself secure in his conquest Napo¬ leon immediately set about reorganizing the civil and military government of the country; but fortune was preparing for him a terrible reverse. The English admiral Nelson, who had long been in pursuit of his fleet, found it moored in the Bay of Abukir, and, with the ex¬ ception of four vessels which contrived to es¬ cape, utterly destroyed it.

All means of return to Europe for the French were thus cut off, and to add to their misfortunes the sultan declared war against them, and a short time after serious disturb¬ ances broke out in Cairo, which were only suppressed by horrible massacres. Napoleon resolved to meet the Turkish forces assembling in Syria. In February 1799 he crossed the desert with about 13,000 men ; took El-Arish and Gaza, and stormed Jaffa, where a great number of Turkish prisoners were deliberately massacred. On the 17th he reached Acre, which was defended by a Turkish garrison under Djezzar Pasha, assisted by Sir Sydney Smith and a small body of English sailors and

marines. After 60 days he gave up the siege and returned to Egypt, leaving the whole coun¬ try on fire behind him. He re-entered Cairo 14 June, having lost 4,000 men in the Syrian ex¬ pedition. About the middle of July the sultan landed a force of 18,000 at Abukir, which Na¬ poleon attacked and almost annihilated on the 25th. His position was far from agreeable, however; he had signally failed in the great objects of his expedition, and besides news had reached him of disaster to the French arms in Italy and of confusion in Paris. On 22 August he embarked in a frigate and 9 October landed at Frejus, having narrowly escaped capture several times by the British Mediterranean cruisers. He arrived in Paris in time to take advantage of the political intrigues then rife. The credit of the government was wholly gone and its authority over its generals impaired. A revolution in the government 18 June had not made new directors more competent than their predecessors. Another change became neces¬ sary. Napoleon Secured the cooperation of Moreau and the other generals then in the capital, and abolished the Directory on the 18th and 19th Brumaire (9-10 November). A new constitution was then drawn up, chiefly by the Abbe Sieyes, under which Napoleon was made first consul. As, however, he had the power of appointing to all public offices, of proposing all public measures in peace and in war, and the entire command of all administrative affairs, both civil and

military, he was virtually ruler of France.

From this time Napeoleon's policy developed itself more distinctly; its objects were to estab¬ lish order at home and to humiliate the enemies of the nation ; but personal aggrandizement was an end scarcely less conspicuous. With sagac¬ ity, activity and boldness he undertook to re¬ form civil affairs. He recruited the national treasury by various expedients, repealed the more violent laws passed during the Revolu¬ tion, such as punishment for matters of opinion, reopened the churches and suppressed the Ven-dean insurrection by a series of decided but conciliatory measures. But he was well aware that his genius was essentially military, and that his most striking triumphs were those won on the battlefield. He offered Austria, England and Turkey, in theatrical phrases, terms of peace, which were rejected. He resolved to strike a blow first at Austria by a renewal of the glories of his former Italian campaign. An army of 36,000 men was concentrated with un¬ paralleled rapidity and secrecy on the shores of the Lake of Geneva. On 13 May 1800 he began his daring march across the Great Saint Bernard, and almost before the Austrian gen¬ eral Melas was aware, had entered Milan (2 June). After several unimportant skirmishes he encountered the Austrians at Marengo (14 June), where he achieved another brilliant vic¬ tory, which put all the Piedmontese fortresses, for the second time, in possession of the French.

Having established provisional government at Milan, Turin and Genoa, he returned to Paris 3 July. As his general, Moreau, had de¬ feated the Archduke John in the decisive battle of Hohenlinden (3 December), Austria was re¬ duced to sue for peace, and on 9 Feb. 1801 signed the Treaty of Luneville, which was

mainly based on that of Campo Formio. Treaties were subsequently concluded with Spain, Naples, the Pope, Bavaria, Portugal, Russia, Turkey, and finally 27 March 1802, the Peace of Amiens. Thus it seemed as if a uni¬ versal cessation of hostilities were about to mark the history of Europe, and allow Napo¬ leon the opportunity to crush the insurrection of the blacks in San Domingo. An army was sent out

under Leclerc, some 20,000 of which were swept away by disease or the sword; the blacks were provoked by brutal cruelties to still more fearful massacres, in which about 60,000 whites perished. Toussaint l'Ouverture, an able and courageous negro who had made him¬ self the leader of his unfortunate countrymen, was seized during a truce and carried to France, where he died in prison.

But the great occupation of Napoleon was the improvement of the interior affairs of the nation. A general amnesty allowed all the emigres to return home; the Legion of Honor, a new order of knighthood, was established. Considerable attention was paid to such depart¬ ments of education as tended to promote effi¬ ciency in the public service. Mathematics and physical science were encouraged at the ex¬ pense of philosophy, ethics and social and po¬ litical science. All prefects of departments and all mayors of cities were appointed by Napo¬ leon, so that not a vestige of provincial or municipal freedom remained. On 2 Aug. 1802, Napoleon was proclaimed by a decree of the Senate consul for life, a step confirmed by a plebiscite of 3,000,000 votes. A senatus con-sultum issued some days after, reconstructing the electoral bodies and reducing the tribunate to 50 members, showed, however, that Napoleon was not yet satisfied with the authority he was clothed with, and many persons saw in the movement a step toward still more absolute power. It is to this period that the greatest of his services to France belongs. He assembled the first lawyers in the nation, under the presi¬ dency of Cambaceres, to draw up a code of civil laws. See Code, Code Napoleon.

Meanwhile the state of Europe was begin¬ ning to look serious. Disturbances in Switzer¬ land in the early part of 1802 induced Napoleon to resort to an armed mediation in its affairs; in August of the same year Elba was incorpo¬ rated with France, Piedmont 11 September and Parma in October. England regarded these proceedings an an infringement of the Treaty of Amiens, and as remonstrances were inef¬ fectual, there was in a short time a resumption of hostilities. On 18 May 1803, England de¬ clared war against France, having laid an em¬ bargo on all French ships in British ports. France retaliated by a decree that all English¬ men found on her territory should be detained as prisoners of war; and General Mortier was sent to occupy Hanover, as belonging to Great Britain. While these events were taking place a conspiracy for the overthrow of the first con¬ sul and the re-establishment of the Bourbons was discovered and thwarted. Napoleon pre¬ tended to see an accomplice of the conspirators in the Due d'Enghien, and caused him to be arrested in neutral territory, brought to Vin¬ cennes and, after a mock trial, shot. Napoleon now seems to have thought it necessary that he should

assume the imperial dignity. An appeal

was made to the nation, and upward of 3,000,- 000 votes were given in favor of conferring on him the title and prerogatives of emperor, while less than 3,000 were against it. On 18 May 1804 Napoleon assumed the imperial title; and in order that due solemnity should not be want¬ ing, he requested Pius VII to perform the cere¬ mony of his coronation. The Pope assented and went to Paris 2 December. He was only allowed to perform part of the ceremony, how¬ ever, as Napoleon snatched the crown from the pontiff's hands and placed it on his own head, performing a like office for his consort, Josephine. On 26 May 1805 he was also crowned king of Italy in the cathedral of Milan; and Eugene Beauharnais, his stepson, was appointed viceroy. He created a nobility with sounding titles; surrounded himself by a brilliant court; established all the etiquette of royalty ; and introduced many practices marked by ostentation and parade.

Meanwhile the Northern powers listened to the solicitations of England, and united in a coalition against the new emperor. Russia, Austria and Sweden all joined in the charges of aggrandizement laid against Napoleon by the English government; but Prussia, tempted by him with the promise of Hanover, could not be brought to enter the coalition. The emperor abandoned his design of making a descent on England, broke up the camp at Boulogne, and concentrating his widely scattered forces at Mainz, September 1805, he marched at once across Bavaria at the head of 180,000 men, and compelled the Austrian general Mack to capitu¬ late at Ulm, with 23,000 men (20 October). On 13 November he had reached Schonbrunn, near Vienna, where he received news of the victory of Nelson at Trafalgar, over the united fleets of France and Spain. Entering the Austrian capital, he made rapid preparations to meet the combined armies of Russia and Austria, then concentrating on the plains of Olmutz. On 2 December the three armies, each commanded by an emperor, met at Austerlitz. The struggle was desperate and long but at last victory was won by Napoleon. The rout of the Allies was complete. The Austrian emperor instantly sued for peace, giving up to France all his Italian and Adriatic territories. The Russian emperor retired behind his own frontiers, and Hanover was handed over to Prussia. As the king of Naples had received English and Rus¬ sian troops into his dominions, Napoleon con¬ strued this act into one of direct hostility. In February 1806 a French army occupied the Con¬ tinental' part of the Neapolitan States, of which Joseph Bonaparte was declared king on the deposition of their former sovereign. The Ba¬ varian republic was

transformed into a king¬ dom dependent on France and given to another brother of the emperor, Louis,' who took the title of king of Holland. Various districts in Germany and Italy were erected by the con¬ queror into dukedoms and bestowed on his most successful generals.

But the most important change of all was the formation of the Confederation of the Rhine on 12 July, and the dissolution of the old German Empire. On the death of the English Minister, Pitt, and the accession of Fox, nego¬ tiations were entered into for the cessation of hostilities between France and England, and as

propositions were entertained toward the resto¬ ration of Hanover, the eyes of the Prussians were at once opened and war, however hazard¬ ous, was determined on and was declared on 8 October, the emperor being already at Bam¬ berg directing the movements of his troops, which had remained in Germany. On the 14th Napoleon met the enemy at Jena, and inflicted on them a severe defeat; while his general, Davout, added on the same day to the French triumph by the brilliant victory of Auerstadt. On the 27th Napoleon entered the Prussian cap¬ ital. After garrisoning all the important for¬ tresses and reducing such towns as made a show of resistance, he issued the celebrated Berlin decree (see Continental System), di¬ rected against English commerce. This policy nearly ruined the commerce of France and the other European nations, while it increased the prosperity of England. Her fleets and cruisers swept the seas; nothing could be obtained from the colonies save through her, and the Conti¬ nental merchants engaged in an extensive smuggling trade with the British, which it was impossible to prevent.

After the capture of Berlin Napoleon marched north against the Russians, who were advancing to assist the Prussians. He called on the Poles to rise, but was answered with little enthusiasm. At Pultusk, 28 Dec. 1806, and at Eylau, 8 Feb. 1807, he met with severe checks, and retired on the line of the Vistula; in the course of a few months, however, having received heavy reinforcements, he once more took

the offensive. On 14 June was fought the battle of Friedland, which was so disastrous to the Russian arms that Alexander was com¬ pelled to sue for an armistice. The Peace of Tilsit was concluded 7-9 July, and by it the king of Prussia received back half of his do¬ minions, and Russia undertook to close her ports against British vessels. The duchy of Warsaw was erected into a kingdom and given to the king of Saxony; out of the Prussian territories west of the Elbe the kingdom of Westphalia was formed and bestowed on Jer¬ ome, Napoleon's youngest brother; and Russia obtained a part of Prussian Poland, and by se¬ cret articles was allowed to take Finland from Sweden. Soon after the Peace of Tilsit was signed Napoleon entered into a war against Portugal, as that nation had refused to respect the Berlin decree, and Junot was sent to occupy Lisbon (30 Nov. 1807). The Pope refusing to carry out the Continental blockade and to rec¬ ognize Joseph Bonaparte as king of Naples, Rome was occupied 2 Feb. 1808. The adminis¬ trative affairs of Spain having fallen into inex¬ tricable confusion, Napoleon sent into that kingdom an army under Murat, who with dif¬ ficulty took possession of the capital and by the Treaty of Bayonne Charles IV resigned the Spanish crown, which was given to Joseph Bonaparte, Murat (q.v.) receiving the vacant sovereignty of Naples.

The great body of the Spanish people cose against this summary disposal of the national crown, and England assisted them with im¬ mense supplies. Thus began the Peninsular War (q.v.), which lasted seven years. The Spaniards were at first successful; a French squadron was captured by the English at Cadiz, 14 June; General Dupont surrendered at Bay-

len, 22 July, with 18,000 men; Junot was de¬ feated 21 August by Sir Arthur Wellesley at Vimeira. But Napoleon rushed to the scene of action in October at the head of 180,000 men, and entered Madrid in spite of all resistance by the Spaniards, 2 December. The British troops which had advanced to the aid of the Spaniards were driven back on Coruna, where they made a successful stand, but lost their general, Sir John Moore, 16 Jan. 1809. In the meantime Austria, alarmed at the aggressive policy of Napoleon, who had seized Tuscany and the states of the Church, and determined to profit by his absence in Spain, again declared war, and got together an effective army under the Archduke Charles. Napoleon hurried into Ba¬ varia, encountered the archduke at Eckmuhl (22 April), and completely defeated him; on 13 May he again entered Vienna. Reorganiz¬ ing his shattered army, Charles likewise ad¬ vanced toward Vienna on the opposite bank of the

Danube. The French seized the island of Lobau, threw a bridge across the river and at¬ tacked the enemy at Aspern and Essling on the 21st and 22d, but were repulsed and thrown back on the island, which they proceeded to for¬ tify, waiting the arrival of Eugene with the Army of Italy. On 5 July they debouched on the left bank of the Danube, and on the 6th the Austrians were crushed at Wagram. This enabled Napoleon to dictate his own terms of peace, which were agreed to on 14 October at Schonbrunn. On the preceding day an unsuc¬ cessful attempt was made to assassinate him by a young German enthusiast named Staaps Whether the subsequent marriage with the daughter of the Austrian emperor was in course of negotiation at Schonbrunn is doubtful, but soon after his return to Paris Napoleon in¬ formed Josephine of his determination to di¬ vorce her. He seems to have arrived at the conclusion that he could only put an end to the machinations of the old legitimate dynasties by intermarriage. Josephine, too, had borne him no children, and he was ambitious of perpetuat¬ ing his power in his family. On 16 December an act of divorce was passed by the commis¬ sioners of the Senate, and by proxy 11 March (formally 2 April) 1810 he was married to the Archduchess Maria Louisa. The fruit of this union was a son, Napoleon Frangois Charles Joseph, born 20 March 1811, and proclaimed in his cradle king of Rome. See Reichstadt, Duke of.

The years 1810-11 were the period of Napo¬ leon's greatest power. On the north he had annexed Holland, Friesland, Oldenburg, Bre¬ men and all the coast-line as far as Hamburg, and on the south Rome and the southern papal provinces. His empire thus extended from the frontiers of Denmark to those of Naples, with Paris, Rome and Amsterdam as its first, second and third capitals, and it was divided into 130 provinces, having a total population of 42,- 000,000. He may also be said to have exer¬ cised almost unlimited control in Spain, the Italian kingdoms, Switzerland and the Con¬ federation of the Rhine (q.v.). But now the tide began to turn. Russia found it impossible to carry out the Continental blockade without permanent injury to her great landowners; Sweden, which had accepted Bernadotte, one of Napoleon's generals, as king, was in a like

predicament. The Berlin decree was frequently evaded, which involved Russia particularly in fresh complications, and in view of the war now inevitable that nation formed an alliance with Sweden. In May 1812 Napoleon de¬ clared war against Russia, and determined in spite of the dissuasion of his most prudent gen¬ erals to invade the country. On 16 May Napo¬ leon was in Dresden making arrangements for the great Russian campaign. The army he organized for it has been estimated at from 640,000 to 680,000 men, inclusive of Prussian, Austrian, German, Polish and Swiss auxiliaries. An army of 300,000 Russians, under Barclay de Tolly and Bagration, assembled on the banks of the Niemen to oppose him. On 24 June he crossed that river at Kovno, and the Russians retired step by step before him, deliberately wasting the country, carrying off all supplies and avoiding as far as possible general engage¬ ments. The French, however, pushed rapidly forward, overtook and routed the rear guard of Barclay's army at Ostrovno, 25 July, and on the 28th occupied Vitebsk. On 16 August the Rus¬ sians made a stand at Smolensk against an ad¬ vanced division of the French army, and when the latter entered the city on the 18th it was in ruins.

Both the opposing armies now took up their march toward Moscow. Kutusoff, who had succeeded Barclay, resolved to dispute the pas¬ sage of the Borodino. An obstinate battle en¬ sued 7 September, which cost the French nearly 30,000 men, and their opponents about double that number. On the 15th Napoleon entered Moscow, which had been deserted by its inhabit¬ ants, and which was nearly destroyed by a fire that began on the same night and lasted five days. The baffled French were compelled to seek shelter in the desolate surrounding country. Napoleon vainly attempted to negotiate with Alexander ; it was impossible to pursue the Rus¬ sians farther; nothing remained but retreat. The French army was now reduced below 120,000 men. For some time the weather was favorable, but the winter set in earlier than usual, and with extraordinary severity.

The line of retreat, too, led through the very districts which had been wasted on the advance. Swarms of mounted Cossacks incessantly har¬ assed the French, now sadly demoralized by cold, famine, disease and fatigue. When the invaders left Smolensk (14 November) they numbered only 40,000 fighting men, and when they had fought their way over the Berezina (27th) there remained but 25,000. At Smorgoni Napoleon quitted the army (5 December), leav¬ ing Murat in command.

Napoleon reached his capital on the 18th and immediately ordered a fresh conscription, still determined on prosecuting the war. But. the spirit of Europe was now fairly roused; kings, ecclesiastics and people rose unanimously against the devastator of the Continent, the ter¬ ror of whose name had been destroyed by his disastrous reverse. A sixth coalition, consisting of Prussia, Russia, England, Sweden and Spain was formed, which early in 1813 sent its forces toward the Elbe. Napoleon had still an army of 350,000 in Germany. For some months he was everywhere victorious. On 2 May he defeated the Allies at Liitzen, and on the 21st at Bautzen. He reached Breslau 1 June, and on

the 4th concluded a six weeks' armistice, which gave the Allies time to reorganize and concen¬ trate their forces and, what was of equal conse¬ quence, to gain over Austria. The campaign was reopened 16 August. The Allies advanced on Dresden, where Napoleon had his head¬ quarters. The battle which ensued (see Dres¬ den, Battle of) 26-27 August was another dearly bought victory for the French, who were now so outnumbered that their chief was com¬ pelled to fall back on Leipzig. There he was completely hemmed in, and in the great (<Battle of the Nationsˆ (Volkcrschlacht), as this battle of Leipzig is called, fought 16-19 October, he was completely defeated. The retreat across the Rhine was almost as disastrous as that from Moscow.

On Napoleon's arrival at Paris, 9 November, he succeeded in obtaining from the Senate, in spite of the opposition in the legislative body and the prevalent discontent of the people, a decree for a conscription of 300,000 men. With a fertility of resource and a genius for combina¬ tion almost miraculous, he was able to enter on another campaign, which was this time to be conducted in France. From January to March he confronted the combined hosts of the Allies, inflicting defeat after defeat on them. But numbers were against him; a new and formidable enemy, Wellington, was rapidly advancing on the capital from the south. On 30 March the Allies, after a severe engagement, captured the fortifications of Paris, and on the 31st Alexander and Wellington entered the city amid the acclamations of the people.

On 6 April Napoleon abdicated at Fontaine¬ bleau in favor of his son. He was allowed the sovereignty of the island of Elba, with the title of emperor, and a revenue of 6,000,000 francs. After bidding his army adieu he departed for his new abode, landing from the British frigate Undaunted at Ferrajo 4 May, and Louis XVIII was restored. After a residence of 10 months, most of which was spent in intriguing with the Republicans and his own adherents, he made his escape from the

island, and landed at Frejus 1 March 1815, with an escort of 1,000 of his old guard. As soon as his arrival was known Ney and a large part of the army joined him, and he made a triumphal march on Paris, which he reached on the 20th. Louis was driven from his throne without a shot having been fired. The Allies were startled at the astounding event. Their armies once more marched toward the French frontier. Napoleon, hastily reorganizing the government on a rather more liberal basis than that of the empire, and having made vain attempts to open negotiations for peace, adr vanced to meet them. On 15 June he crossed the Sambre at the head of 130,000 men to attack the English and Prussians under Wellington and Bliicher. On the 16th he defeated Bliicher at Ligny, while at Quatre-Bras the English were held in check by Ney. The Prussians made an orderly and leisurely retreat, pursued by a divi¬ sion of the French army under Grouchy.

In order to preserve his communication with the Prussians, Wellington fell back upon Water¬ loo, where he was attacked by Napoleon on the 18th. The British held their ground obstinately during the greater part of the day, and in the evening, when Bliicher, who had outmanoeuvred Grouchy, came up, the French were completely

ciushed, and Napoieons power forever broken The retreat was a disorderly flight. The Allies marched without opposition on Paris. On the 22d Napoleon again abdicated in favor of his son; but being threatened by Fouche, who had assumed the direction of the government, and seeing no hope of escape from France, he sur¬ rendered at Rochefort to Captain Maitland of the British warship Bellerophon, claiming the hospitality and protection of the British govern-mcnt. Captain Maitland was instructed to de¬ tain him as a prisoner, and then transfer him to the Northumberland, which was to convey him to the island of Saint Helena, where he was to be confined for the rest of his life, according to a convention signed at Paris, 20 August, between Great Britain, Austria, Russia and Prussia. He landed there 16 October. In July 1816 Sir Hudson Lowe was sent out as governor of the island. From the very first Napoleon seems to have

quarreled with that officer, and he appealed to the sympathy of the world through reports of the ill treatment he was subjected to. The governor had no power to remedy the chief causes of the prisoner's complaint. In Septem¬ ber 1818 .Napoleon's health began to fail. He refused medicine, would not ride, toward the end of 1820 grew worse and died at last of cancer of the stomach. On 8 May 1821 he was buried on the island ; but in 1840, in accordance with his own wishes, his remains were removed to Paris, and there, under the dome of the Hotel des Invalides, they found their final resting-place. See Waterloo, Battle of; Na¬ poleon's Tomb ; France, History of.

Bibliography.— Thiers, 'History of the French Revolution (1823-27) and (History of the Consulate and Empire* (1845-61); Scott, (Life of Napoleon (1827); Bignon, 'Histoire de France sous Napoleon (1829-50); Thibau-deau, (Le consulat et l'empire) (1834-35) ; Lan-frey, 'History of Napoleon (1869-75); Jung, 'Bonaparte et son temps) (1880-81); Ropes, 'The First Napoleon *(1885) and (Campaign of Waterloo) (1893) ; Fournier, 'Napoleon I, eine Biographie) (1886-89) ; Sargent, 'Napoleon Bonaparte's First Campaign* (1894) and Cam¬ paign of Marengo) (1897). For the relations of Napoleon with the United States, Adams, (History of the United States, 1801—1 7 5 (1889-91) should be consulted. The 'Correspondance de l'Empereur Napoleon P (1858-70) is a main source of original documentary history. Of works of a more personal character, dealing with the life of Napoleon from various points of view, among the more important are those of Bourrienne, Talleyrand, Mctternich, Remusat, Marbot, Montholon, Pasquier, Segur, Las Casas, O'Meara, Sachet, Messena, Marmont and Roe-derer. As recent writings of another sort bear¬ ing on Napoleon's personal history, those of Levy and Mason deserve particular notice. The work of Rose, 'Life of Napoleon P (1901), is the latest complete biography in English. Channing's essay on Napoleon, and Emerson's chapter in Representative Men,* as well as Carlyle's pictures in 'Heroes,* are still worthy of attention.

NAPOLEON II, son of Napoleon I. See Reich start, Duke of.

NAPOLEON III (Charles Louis Napo¬ leon Bonaparte), emperor of the French: b. Paris, 20 April 1808; d. Chiselhurst, England,

9 Jan. 1873. He was the son of Louis Bona¬ parte (q.v.), king of Holland. He was taken by his mother, Queen Hortense, to Switzerland in 1816, was educated at the gymnasium of Augs¬ burg and the military school at Thum, joined the unsuccessful Italian revolt against

papal rule in Romagna, and by a conspiracy at Strassburg on 30 Oct. 1836, was declared emperor. He was arrested and sent without trial to the United States, returned to Switzerland in 1837, lived in London in 1838-40, and on 6 Aug. 1840 landed at Boulogne for a fresh attempt against Louis Philippe. This time he was imprisoned in the fortress of Ham, under a life sentence ; but he contrived his escape 25 May 1846. Dur¬ ing this time he had leisure for the exercise of his literary abilities, and the result was the works 'Aux manes de 1'EmpereuP ; frag¬ ments Historiques) ; 'Analyse de la Reveries politiques* ; 'Reponse a M. de Lamartine) ; 'Extinction du Pauperisme* ; besides contribu¬ tions to the 'Dictionnaire de la.Conversation,* and several articles to democratic newspapers. On the outbreak of the Revolution of 1848 he hastened from England to Paris, and in a letter to the provisional government declared that he came to serve under the republican flag (28 Feb. 1848). On the day following he issued another letter announcing that as the govern¬ ment deemed his presence in Paris dangerous he would immediately quit the country. He accordingly returned to London, where he served as a special constable on the occasion of the great Chartist demonstration of April (1848). In the election of September he was put forward by Paris and three other depart¬ ments. He returned to Paris and on 26 Sep¬ tember took his seat.

He at once commenced through his zealous associates his candidature for the Presidency. On the day of the election, 10 December, it was found that out of 7,500,000 votes Louis Na¬ poleon had obtained 5,434,226. On the 20th the prince-president, as he was now called, took the oath of allegiance to the republic. For a time the greatest harmony seemed to be re¬ established; the President selected his ministers from the ranks of the various political parties, and strove to gain a majority in the assembly by the adoption of a strictly conservative policy. On 2 Dec. 1849 was formed a new ministry, the members of which were merely tools of the President. It was evident that a crisis was ap¬ proaching. At last on 2 Dec. 1851 the coup d'etat came. Paris was overawed by the army; there was needless butchery in the streets; re¬ ports of approval by Paris of this course were sent to the provinces. The empire was re¬ established in Louis Napoleon by a vote of 8,000,000 to 640,000. On 29 Jan. 1853 the new sovereign married Eugenie Marie de Montijo, Countess de Teba. In 1854 Napoleon, in con¬ junction with England, entered the Crimean War in the interest of Turkey against Russia — a war which was carried on by all the parties with great vigor, until a peace was concluded, 30 March 1856, the terms of which were the neutralization of the Black Sea, the abandon¬ ment by Russia of her protectorate of the Danubian

principalities and a rearrangement of frontier territory between Russia and Turkey, to the advantage of the latter power. (See Crimea, History). About the beginning

of the year 1859 it was evident that another European war was imminent. Northern Italy was groaning under the Austrian yoke ; Sar¬ dinia demanded a separate government for Lombardy and Venetia, which Austria refused to grant. War was declared between that country and Sardinia about the end of April, and Napoleon took up arms in favor of his Italian ally, Victor Emmanuel. The two allied sovereigns took the field in person. Monte¬ bello, Magenta, Marignano and Solferino were brilliant victories for the Allies. By the terms of the Peace of Villafranca, Austria ceded Lombardy to Italy, and the provinces of Savoy and Nice were given to France.

A second distant expedition was undertaken, but had not a like success. Toward the end of 1861 France, England and Spain agreed to dispatch a joint expedition to Mexico for the purpose of exacting redress of injuries of long continuance inflicted on the subjects of the re¬ spective allies, .and the enforcement of pecuni¬ ary claims, which were obstinately contested by the Mexican government. The extravagant de¬ mands of M. de Soligny induced the English and Spaniards to believe that Napoleon had some ulterior object in view, and they withdrew from further intervention (April 1862). The French army continued the quarrel alone. On 10 June General Bazaine led his troops into the Mexican capital amid many demonstrations of enthusi¬ asm. An imperial form of government was ini¬ tiated, and Maxmilian (q.v.), Archduke of Aus¬ tria, was placed at its head with the title of emperor. The United States considered this a piece of treachery, and after the Civil War dispatched Sheridan with troops who speedily put an end to French aggression and Mexican instability. Maximilian's death caused Na¬ poleon's policy to be viewed with suspicion in France. The emperor opened the Suez Canal, entertained Europe at the World's Exposition, rebuilt and greatly beautified Paris. But France lost slowly in prestige, and there was a decline of

administrative integrity.

On the conclusion of the Austro-Prussian War of 1866, Napoleon, jealous of the growing power of Prussia, demanded a reconstruction of frontier, claiming, by way of compensation for his non-intervention in the quarrel, Prus¬ sian territory on the Saar, a claim peremptorily refused. The ill-feeling between the two na¬ tions was increased in 1867, when the king of Holland signified his intention to cede Luxem¬ burg to France. The cession was strongly re¬ sisted by Prussia, and at the London conference (7-11 May) the neutralization of the duchy was agreed to by treaty under the guarantee of the Great Powers. It could no longer be con¬ cealed, however, that a rupture between France and Prussia was imminent, and in 1870, on the Spanish crown being offered to Leopold of Hohenzollern, Napoleon demanded that the king of Prussia should compel that prince to refuse it. Notwithstanding the subsequent renuncia¬ tion of the crown by Leopold, war was declared by France (19 July). (See Franco-German War). On the 28th Napoleon set out to take the chief command. After Sedan, he had a per¬ sonal interview with King William, who as¬ signed to him Wilhelmshohe, near Cassel, as a place of residence during his captivity One of the immediate consequences of this disaster was

a revolution in Paris. Gambetta, Jules Favre and several other members of the Corps Legislatif proclaimed a republic and the dethrone¬ ment of the emperor (4 September). The em¬ press and her son secretly quitted Paris and repaired to England, where they took up their residence at Camden House, Chiselhurst. Here they were rejoined by the emperor, when he regained his freedom in March 1871, and here he remained till his death.

Napoleon III was rather a student and lit¬ terateur than a statesman. He was not an efficient administrator and was most unfor¬ tunate in his advisers and subordinates. At the time of the Franco-German War he appears to have been quite deceived as to the military strength of France and its readiness for the conflict. Besides the literary works already mentioned, Napoleon III is the author of an uncompleted (History of Julius Caesar) (1865— 66), and various productions collected and pub¬ lished in 1854-69 and 1873. (See France; His¬ tory Since 1815). Consult Gottschalk (1871); von Sybel (1873), and Jerrold (1877) for biography; also Hugo, (Histoire d'un Crime* (1877) and various standard histories of modern Europe; also De la Gorce, (Histoire du second empire) (4 vols., Paris 1885-98) ; Simson, (t)ber die Beziehungen Napoleons III zu Preussen und Deutschland)

(Freiburg 1882) ; Ebeling, (Napoleon III und sein Hof) (Co¬ logne 1891-94) ; Imbert, A. L., (The Court of the Second Empire* (Eng. trans., 1898) ; Hugo, (Napoleon the Little } (Eng. trans., 1909).

NAPOLEON, Eugene Louis Jean Joseph,

Prince Imperial of France, only son of Na¬ poleon III : b. in the Tuileries, Paris, 16 March 1856; d. South Africa, 1 June 1879. He fought for the Imperial arms in the Franco-German War of 1870-71, but when disaster seemed imminent was sent to join his mother in Eng¬ land, whither she had fled. He was proclaimed Napoleon IV by his adherents in 1874. In 1879 he joined a British expedition against the Zulus in South Africa and was killed in am¬ bush. He was buried beside his father at Farnborough, England. Consult Barlee, Ellen, (Life of Napoleon, Prince Imperial of France) (London 1889) ; Martinet, A., (Le prince im¬ perial* (ib. 1895) ; Barthez, E., (Empress Eugenie and her Circle* (New York 1913).

NAPOLEON, Joseph Charles Paul,

Prince, a son of Jerome Bonaparte. See Bona¬ parte, Jerome.

NAPOLEON, Ohio, village, county-seat of Henry County, on the Maumee River and the Miami and Erie Canal, and on the Lima North¬ ern and the Wabash and Detroit railroads, about 38 miles southwest of Toledo. Its chief manufactures are flour and dairy products as well as windmills, tanks, threshing machinery, separators, flour, *etc.* It has considerable trade in farm and dairy products and livestock. The village owns and operates the electric-light plant and the waterworks. Pop. 4,132.

NAPOLEON, a piece of French money valued at $4 or 20 francs. See Louis d'Or.

NAPOLEON GUN. See Artillery.

NAPOLEON LE PETIT, le pe-te («Napoleon the Little®), the title of Victor Hugo's

satire on Louis Napoleon. (Brussels

NAPOLEON'S TOMB, the burial-place of Napoleon Bonaparte under the dome of the lnvalides in Pans. It has the form of a cir¬ cular crypt 20 feet deep and 36 in diameter, open at the top. The tomb was designed by Visconti, and on the walls are 10 marble re¬ liefs by Simart. The sarcophagus is 13 feet long, 6l/2 wide, 14ˆ4 high, cut from a single block of red porphyry, 67 tons in weight, sur¬ rounded by 12 victories by Pradier. The in¬ scription above the entrance to the crypt is taken from Napoleon's will: «I desire that my ashes shall rest on the banks of the Seine, in the midst of the French people that I have loved so well.® Two adjoining tombs are those of the emperor's friend, Duroc, and his com¬ panion, Bertrand. Napoleon's remains were brought here in 1840 from Saint Helena.

NAPRAPATHY, nap-rap'a'the, the science of drugless healing, in contradistinction to the treatment of disease by surgery or medi¬ cine. It is founded upon the researches of Dr. Oakley Smith, who contended that human ail¬ ments are traceable to sprained or diseased ligaments connected with the spinal column, thorax and pelvis. It is claimed that by over¬ coming these, with scientific manipulation, which relieves the pressure upon the nerves and the arterial system, most of the diseases of the human body cannot only be overcome but a permanent cure effected. It is also claimed that diseased conditions incurable by older methods yield to naprapathic treatment.

NAQUATEZ (na'kwa-tez) INDIANS.

See Creeks.

NAQUET, na'ka', Alfred Joseph, French chemist and social reformer: b. Carpentras, 6 Oct. 1834; d. Paris, 10 Nov. 1916. In 1867 he came into prominence, losing his professorship in the faculty of medicine in Paris and being condemned to 15 months' imprisonment for his share in the activities of a secret society. In 1869 he fled to Spain after the publication of his book, (Religion, propriete, famillePHe returned September 1870 and in the Revolu¬ tion became Secretary of National Defense. Soon after he was elected to the Chamber of Deputies and began agitation against the French marriage laws. His agitation for the re-estab¬ lishment of divorce resulted in the law of 1884, and in 1886,

through his continued efforts, di¬ vorce became legal after three years of definite separation, on the demand of one of the par¬ ties concerned. Besides a professional work, (Principes de chimie fondes stir les theories modernes) (1865; 5th ed., 1890; Eng. trans. 1868), he wrote numerous works on social questions, including (Le divorce) (1877; 2d ed., 1881); (La loi du divorce) (1903); (L'Hu-manite et la Patrie) (1901); (L'Anarchie et la collectivisirP (1904); (Desarmement ou alliance anglaise) (1908).

NARAKA, or NURUK, in Hindu mythol¬ ogy, a term equivalent to the English word hell. In Naraka there are 28 divisions, in which sinners of as many different classes are confined and subjected to tortures correspond¬ ing to the gravity of their offenses.

NARBADA, nar-ba'da. See Nerbudda.

NARBONNE, nar-bon, France, the chief town of an arrondissement in the department of Aude, in a beautiful hill-girt plain, eight miles from the Mediterranean and 36 miles by rail east of Carcassonne, and commanding the entrance into Spain by the southwest. Boule¬ vards occupy the site of the mediaeval ram¬ parts removed since 1865. The town, traversed by the Robine Canal, has dark and winding streets lined with ill-built houses and is gen¬ erally unattractive. It is, however, of historical interest as the Roman Narbo Martius, their earliest colony (118 b.c.) beyond the Alps. It flourished under Tiberius, its schools for a long time rivaling those of Rome. About 309 a.d. it became the capital of Gallia Narbonensis, and had its capitol, forum, theatre, aqueducts, triumphal arches, etc., of which there are few remains owing to the vandalism of Francis I in using them as building materials. In 412 it was taken by the Visigoths, in 719 by the Saracens, from whom it was recovered by Pepin in 759, to fall a century later to the Northmen. During the 11th and 12th centuries it was a prosperous manufacturing city, but subsequently deteriorated owing to the silting of its harbor. Its port, La Nouvelle, is 13 miles distant by canal. The principal edifices are the Romanesque church of Saint Paul Serge (1229) ; the quondam cathedral of Saint Just (1272-1332), only the fine Gothic choir of which, 131 feet high, has been completed; and the former archbishop's palace, now the city hall, in which are a good museum, a li¬ brary and a picture gallery. A seminary and hydrographical school are among its educa¬ tional institutions. The white heather honey of Narbonne maintains its ancient celebrity; the wine is chiefly used for blending purposes, its production being now carefully supervised by the oenological station

founded in 1894. The manufacture of bricks and tiles, sulphur re¬ fining, cooperage and the distillation of brandy are among its industries. Pop. 28,173.

NARCISSISM, nar-sis'sizm'. In the newer analytic psychology Narcissism is the stage in the development of the human psyche, when the ego derives the gratifications of its libido (q.v.) from the projections of its own mental states. In the development of the child the autoerotic pleasures derived from merely mas-turbatory sources in different parts of the body give way, in the average individual near or after the time of puberty, to a need for gain¬ ing satisfactions from activities exercised upon the world of external reality and not upon self. In the love life of the individual this change from autoerotism to the final selection of the love object of the opposite sex passes through a stage called Narcissism. Thus the child takes pleasure in or pain from the treatment it gets from other people in contradistinction to the adult satisfaction of giving pleasure or inflicting pain on other people. That is, the child, re¬ ceiving as it does the pleasure at first solely from its own states and activities, learns event¬ ually through experience to associate pleasur¬ able and painful sensations with certain ex¬ ternal happenings; e.g., from having burned itself it associates pain with the sight of a stove or a match, and from having gotten pleas¬ ure from eating jam, it associates the pleasure

with the jam. Or, if it eats too much, and is of the proper grade of intelligence, it may as¬ sociate unpleasant feelings with jam. At any rate there is here a projection (see Mechan¬ isms, Mental) of the really subjective pleas¬ ure or pain feeling, which is thereby attributed to the jam as a quality which jam uniformly has. This process, which is psychological, but not logical, is the same as that carried out when the child forms a concept of another person. Therefore the concept of this other person than itself is made up of feelings which really belong to the child but which it irrationally attributes to other persons.

The intermediate transitional stage in the development is where the

individual not merely regards his own body as a source of gratifi¬ cation (pure erotism) but with absolute naivete looks upon his own personality or some other which he identifies with himself in the same light as he will later regard the true object love. That is, the autoerotic satisfaction comes from an exercise of the child's own body on itself or, as is seen in day-dreaming, or ro¬ mancing of almost any kind, from an exercise of its own mind with its own mental ma¬ terial, uncorrelated with external reality. In the Narcissistic stage of the development of the human psyche the young person shifts from a crassly subjective form of gratification of the libido to a more objective form, without, however, realizing the actual differences be¬ tween the projections of his own mind and the concrete facts of the characters of other people. The narcissistic youth finds some other per¬ son to love, but naively endows that other with his own qualities, not making, or per¬ haps not able to make, the necessary discrimi¬ nations between what he thinks the other is and what the other really is. Thus a young person will find some other personality at¬ tractive and suppose that because some ele¬ ments of the other are agreeable, the rest of the elements are so, and be very much dis¬ turbed, if not disordered, at the occasional out¬ croppings of uncongenial traits. Just as in the legend of Narcissus, who is fabled to have fallen in love with his own reflection which he perchance saw in a pool, and later to have pined away in ungratified desire for the being he saw but could never touch, so the ordinary person of to-day may, through constitution or lack of proper training, become a modern Narcissus, who desires merely the gratification of his projected unconscious wishes. He thinks his own thoughts will be given external reality simply by wishing for it, either unable or unwilling to see the discrepancy between his essentially autoerotic desires and the actual na¬ ture of external reality. The average child is taught by experience to derive satisfaction from exerting the limit of his ability upon ex¬ ternal reality in order to make it conform to his wishes, and to take so much pleasure from the exertion that there will be no pain from the necessary disappointment of his wishes. This the fabled Narcissus never did, but tried again and again to embrace the beautiful being in the pool, where the average youth would have seen the impracticability of such action.

The subject of Narcissism is extremely im¬ portant in the modern analytical explanation of the mental disease paranoia. In this disease,

which is characterized by a systematized suspi¬ cion and delusion of persecution, the subject takes unconsciously and crystallizes the atti¬

tude expressed by Narcissism. The process of mental development which shows how vitally important in the usual development of the psyche is the next and last step to adulthood, may be outlined somewhat as follows : The various phases of the situation have been illus¬ trated by the development of the implications of the simple statement (<I love him," supposing, for the sake of illustration, that the subject (<I" is a male. If the idea represented by the sen¬ tence is followed out in real life, there results a more or less veiled homosexuality and the lack of adaptation of the individual to external reality is not so great as if the idea <(I love him" is completely repressed into the unconscious. The idea (<I love him" in the ego of a male, how¬ ever, particularly if thus repressed, is always in¬ evitably transformed, by virtue of the prin¬ ciple of ambivalence into ((I hate him," and the inference from that is readily made to <(He hates me," which is the basis on which this type of paranoid trend is built. Men who have this buried homosexuality in their unconscious are helpless without analysis, be¬ cause they do not know of the existence of it and can never find it themselves. Therefore persons who are unduly suspicious of those around them have frequently the germ of a very serious mental disease, the cure of which requires a very special technique and the pre¬ vention of which would be of the utmost im¬ portance. Narcissism is thus seen to be an unconscious subjective homosexuality, differing from other forms of autoerotism in being ap¬ plicable only to the whole individuality instead of to parts of it, and by reason of its total applicability being the cause of the tendencies which, when allowed to become extreme, lead to paranoia or paranoid states, as well as to alcoholism and various drug addictions. Con¬ sult Jelliffe and White, (Diseases of the Hu¬ man System) (1917).

NARCISSUS, nar-sis'us, in Greek mythol¬ ogy, the son of the river god Cephissus. Nar¬ cissus was of surpassing beauty, but excessively vain and inaccessible to the feeling of love. Echo pined away to a mere voice because her love for him found no return. Nemesis deter¬ mined to punish him for his coldness of heart, and caused him to drink at a certain fountain, wherein he saw his own image, and was seized with a passion for himself of which he pined away. The gods transformed him into the flower which still bears his name. See Echo; Mythology.

NARCISSUS, a genus of plants of the order Amaryllidacece (q.v.). The species, num¬ bering from 16 to about 50, according to dif¬ ferent authors, have bulbous roots, narrow grass-like leaves, and generally white or yellow flowers borne singly or in small clusters and protruding from a dry spathe at the summit of a leafless scape. Because of their hardiness, ease of cultivation, habit of blooming in early spring, beauty and fragrance, many of the species and their

numerous hybrids and varie¬ ties have been general garden favorites for centuries. A few produce their blossoms in the autumn (for example, N. serotinus, N. ele -

r/atis and N. viridiHorus) ; but they are rarely cultivated. Some are useful for winter forcing, especially the polyanthus narcissus (N. taxetta)] with its popular forms the (<paper white® and the (<Chinese sacred lily.® In general, the gar¬ den species succeed best in well-drained gar¬ den soil of medium texture and richness. The bulbs should be planted in autumn about five inches deep and three inches apart, and should not be disturbed until they appear to be failing, perhaps after three years. Then when the foliage has died down the clumps may be dug, the bulbs divided, cleaned and stored in a cool dry place until planting time. Among the most popular species are the poet's narcissus (N . poeticus), also known as pheasant's eye, the jonquil (N . jonquilla) , and N. taxetta mentioned above. The Lent lily (N . pseudo-narcissus) , or daffodil, is also one of the most widespread and hardy. See Daffodil.

NARCOSIS, or NARCOTISM (Greek, (<stupor®), insensibility more or less profound, the result of absorption by the blood, and sub¬ sequent action on the brain, of certain drugs in poisonous amount, or of certain excretory ele¬ ments, as in uraemia.

NARCOTICS (from Greek vapKovv, to be¬ numb), substances which have the property of stupefying. In small (medicinal) doses they either quiet undue irritability of the nervous system, producing sleep and relieving pain or spasm, or they excite or stimulate the normal

irritability. Op'um and alcohol, for example, are sometimes used as ((bracers.® Narcotics are too frequently used for slight ailments or fan¬ cied ones because the repeated or habitual use of small doses is dangerous, as it is apt to ex¬ cite a craving for and the use of larger or poisonous doses. (See Poisons). Poisonous doses produce stupor, coma and sometimes con¬ vulsions and death. Though the effects of most of the narcotics resemble more or less those of opium each narcotic affects the system in a peculiar way. Belladonna, for example, dries the throat, dims the vision, dilates the pupils of the eyes (opium contracts them), and produces delirium. Some narcotics produce constipation, others do not. Some act prin¬ cipally upon the brain, others on the alimentary canal or bronchial tubes. The principal narcotics are opium (with its alkaloids, such as morphia, codeine and thebaia, and preparations of it — paregoric, laudanum, etc.), belladonna, camphor, hyoscyamus or henbane, caffeine, chloral hydrate, alcohol, Indian hemp, hops, bromide of potassium and stramonium. There is also a group of chemical organic compounds which are narcotics, such as paraldehyde, sulphonal and trional. Narcotics should be used with extreme caution, as the susceptibility to their poisonous effects varies in different per¬ sons. Of late years the market has been flooded with so-called paincures, carminatives, cordials, soothing-syrups, etc., warranted to be harmless, but which are in fact narcotics, in mixtures more or less agreeable to the taste, but none the less liable to do harm. Children are more susceptible to the influence of narcotics than adults, hence the risk of giving them to children is greater. See Anesthetics; Analgesics; Coal Tar; Hypnotics; Tobacco.

NARCOTINE, an alkaloid which forms from 5 to 6 per cent of the opium from Asia vol. 19 — 45

Minor and a larger proportion of the opium from India and Persia. It has the chemical formula C22H23NO7, and acts as a narcotic poison. It may be prepared as follows: The morphine content of the opium is first dissolved out with water — in which narcotine is almost entirely insoluble. The residue is then ex¬ hausted with dilute hydrochloric acid, forming narcotine hydrochloride. The alkaloidal bases that the extract contains are precipitated by the addition of caustic potash. The precipi¬ tated bases are then redissolved, and the solu¬ tion is treated with oxalic acid to precipitate the papaverine that it contains, after which the filtered solution is treated with ammonia to throw down the narcotine. The precipitate so obtained is purified by recrystallization from alcohol. A simpler method, but more expen¬ sive, is to boil the

opium with ether in which the narcotine dissolves. Narcotine was the first alkaloid obtained from opium, of which it con¬ stitutes from 1 to 8 per cent by weight. It is almost insoluble in cold water, moderately soluble in alcohol and in ether, and readily soluble in chloroform. It crystallizes in trimet¬ ric prisms, or in radiating needle-like forms, which melt at 345° F. Aqueous solutions of the alkaloid are neutral, and solutions in other menstrua are but feebly alkaline. Narcotine (unlike the other alkaloids that opium contains) appears to exist in opium in the free state, and not in the form of a salt. Its salts do not crystallize readily, their aqueous solutions are acid, and are decomposed when evaporated, with separation of free narcotine. A larger dose of narcotine is required to produce the same effect as a given quantity of morphine or codeine.

NARD, a plant, spikenard. See Aralia.

NARES, narz, Sir George Strong, English vice-admiral and Arctic explorer : b. Aberdeen, 1831 ; d. 15 Jan. 1915. The son of a naval offi¬ cer, he was educated at the Royal Naval Col¬ lege and entered the navy in 1845. After serv¬ ing on the Australian station he was appointed mate on the Resolute in the Arctic expedition of 1852-54, taking part in some long sledge journeys, covering 665 miles in 69 days and later 586 miles in 56 days. He next served in the Crimean War ; on the Mediterranean sta¬ tion ; and lieutenant in charge of cadets, for whose instruction he wrote (The Naval Cadet's Guide) (1860), afterward published under the title of Seamanships In 1866-67 he surveyed the coasts of Australia ; in 1869 the Gulf of Suez, and from 1872 to 1874 commanded the Challenger on a deep-sea exploration round the world. In 1875 he was placed at the head of the North Polar Expedition, consisting of H. M. S. Alert and Discovery, with the object of reaching the Pole via Smith's Sound. Leaving the Discovery in Lady Franklin Bay, Nares proceeded in the Alert along the western shore of Robeson Channel, reaching the then highest latitude (82° 27') and long. 61° 22'. The sun disappeared for 142 days from 12 Oct. 1875 ; on the return of daylight, a sledge ex¬ pedition of 53 men attempted a ((dash® to the Pole, returning after 72 days, suffering in¬ tensely from the cold and scurvy. They had planted the British flag in lat. 83° 10′ 26″ N. Returning home in Oct. 1876. Nares was em¬ ployed in various duties till 1878, when he was

sent in the Alert to survey Magellan Strait, South America. He was created K. C. B. in 1876. For 18 years he was next engaged at the Board of Trade as professional officer of the harbor department ; then he became Acting Conservator of the River Mersey, retiring in 1886. He published a number of reports on his voyages.

NAREW, na'ref, river in northern Poland rising in the government of Grodno out of the swamps of Byelovyezh and becoming navigable near Tikozyn, it flows past Lomza and Pultusk entering the Bug below the latter town. It has a length of 271 miles. The Niemen is connected with this river by the Augustowo Canal.

NARIAKI, Daimyo, of Mito, a member of the Gonsanke, or three princelv Tokugawa families of Kiushiu, Owari and Mito, who ranked first among the territorial nobility of Japan. He flourished in the middle of the 19th century, and was noted as the leader of the seclusion policy of Japan. While working hard to improve the military and educational sys¬ tems and to stir up her warlike spirit which the long years of peace had greatly diminished, he recognized that his country must soon be called upon to take her place among the nations of the world, yet he deliberately proclaimed the doctrine of the seclusion of Japan, in the mean¬ time working strenuously to transform Japan along the lines of the very civilization and cul¬ ture he pretended to be fighting. Nariaki's personality was the strongest and his intel¬ ligence the keenest, in his day, in Japan, and he soon was able to make his cry of the "expulsion of the barbarians® that of the whole coun¬ try. History shows that he was, by far, the best informed man in his day, in Japan, on "foreign ways.® He fully appreciated the im¬ portance of providing Japan with the armaments and sciences of the western nations ; and as early as 1849 he had begun spending compara¬ tively large sums of money in the manufacture of arms along the latest European models. Against all opposition he prepared Japan for her wonderful leap into the arena of western civilization, while, all the time he was mis¬ understood at home and abroad. Consult Okuma, Count Shigenobu, (Fifty Years of Japan* (English trans. by Marcus B. Huish, London 1909).

NARINO, na-re'no, Antonio, Colombian politician: b. Bogota, Colombia, 1765: d. Leiva, Colombia, 13 Dec. 1823. He was educated in the college of San Bartolome in Bogota and entered the magistracy. His writings of a revo¬ lutionary character brought him into trouble

and in 1795 after a tedious trial he was trans¬ ported to Spain under sentence of 10 years' penal servitude. Escaping in 1797 he returned to his own country but was again imprisoned and not released until the Revolution of 1810, when he joined the patriot army. He was elected President in 1811 and later dictator. On the outbreak of civil war Narino defeated the Federalists, and then resigning his dictatorship marched against the Royalist forces in the south. His success was followed by defeat at Pasto in 1814 when he was captured and sent a prisoner to Spain. He was held a prisoner until 1820 when he returned to his own country. In 1821 he was elected senator, but declined the

vice-presidency in 1822, and ill-health compelled him to retire soon after his appointment as commander-in-chief in 1823.

NARNI, nar'ne, Italy, town known to the ancients as Nequinum and later as Narnia. It is located in the province Perugia on a cliff beneath which, in a deep ravine, flows the Nera (the ancient Nar). It is on the Rome-Foligno Railway, is seat of a bishop and has a cathedral dating from the 11th to 1 5th centuries, be¬ sides other churches erected from the 9th to the 15th century. Here are also ancient dwellings and castle, a town-hall dating from the 13th to 16th century, strong remains of a Roman bridge (of Augustus), an ancient aque¬ duct, *etc.* Its industries number leather and rubber-ware factories and oil presses. This is the birthplace of the Emperor Nerva and of Pope John XIII. Pop. 12,943.

NARO, na'ro, Italy, town in the province Girgenti, Sicily, on the coastal river Naro, 12 miles from Girgenti. It has a castle dating from the Middle Ages and Early Christian catacombs. In the vicinity are large sulphur pits. The population in 1911 was 13,802.

NARRAGANSETT (nar-a-gan'set) BAY, an inlet of the Atlantic Ocean, extending into the State of Rhode Island about 28 miles. At its entrance, from Sakonnet Point to Point Judith, the bay is about 8 miles wide. One of its channels, on the east, is called Sakonnet River, and the chief arms of the bay are on the east, Mount Hope Bay, on the west, Greenwich Bay. The principal rivers which enter the bay are, at its head, Providence River, from the east Taunton, from the west Pawtuxet. The largest island in the bay is Rhode Island, and others are Conanicut, Prudence and Hog. Sev¬ eral places of importance are on the shores of the bay, chief of which are Providence at the mouth of the Providence River, Newport on Rhode Island and Fall River, at the mouth of the Taunton. Narragansett Bay is of great importance to the

State, as it gives opportuni¬ ties for commerce and transportation. The first explorers of the northeast coast of the United States mention this bay. Consult Bacon, E. M., (Narragansett Bay* (New York 1904).

NARRAGANSETT INDIANS, an Amer¬ ican tribe formerly occupying the territory now comprised in the State of Rhode Island and the eastern part of Long Island. Shortly after the arrival of the pilgrims they manifested symp¬ toms of hostility; and as an expression of sentiment Canonicus, their chief, sent to Ply¬ mouth a bundle of arrows wrapped in the skin of a rattlesnake ; to which Bradford, the gov¬ ernor, replied with the same skin filled with powder and shot. This significant retort se¬ cured, if not the good-will, at least the peace¬ ableness of the sagacious chief. In the Pequot War they aided the colonists, but not unani¬ mously. In the winter of 1675, during King Philip's War, that chief having taken refuge with the tribe, the colonists, apprehending that they would join his cause, made a secret attack upon their principal fort, killing about 1,000 warriors, destroying all their provisions, and ex¬ posing those who escaped to cold and famine, of \vhich very many died. The Narragansetts from this time waged incessant war with the whites. They have now entirely disappeared as

a race, although some of their descendants of mixed blood are to be found in one or two localities in Rhode Island.

NARRAGANSETT PIER, R I a fa.

mous summer resort, in Washington County, on Narragansett Bay, and on the Narragansett Pier Railroad, a connecting line with the New York New Haven and Hartford Railroad, about 10 miles from Newport and 28 miles from Provi¬ dence. The railroad was built in 1876 and extends from Kingston Station to the «The Pier, ' a distance of about 12 miles. A steamer plies daily during the season between Newport and ((The Pier.® The chief attractions are the climate and the scenery.

Narragansett Heights, about three miles distant, are about 400 feet above sea-level and the colored rocks nearby and the long beach are attractive. There are a number of fine hotels, handsome cottages and excellent bathing houses and pavilions. The place was settled in 1675, and the same year an engagement took place nearby between the colonists and the Narragansett Indians. Gen¬ eral Winslow, who commanded the colonists, about 1,000 in all, captured 600 Indians and killed 300. The loss of the whites was about 150 wounded and 85 killed. The pier, from which the place takes its name, was built in 1815. Pop. of town 1,500.

NARRATIVE POETRY. The telling of a story in verse is in modern times rather ex¬ ceptional than normal, owing to the extraordi¬ nary rise in importance of prose fiction. But in early periods narrative poetry was the most abundant and important kind, owing to the primitive tendency to devote poetry largely to objective purposes, in contrast with the subject¬ ive tendency of modern poetry. For the vari¬ ous types, see under Literary Forms.

The Ballad. — In general this is the most primitive type of narrative poetry, and is as¬ sumed to have existed among practically all peoples, though in many instances no early ex¬ amples have survived. This proportionately large disappearance of early ballads is due to their belonging to the period of oral composi¬ tion and transmission, as distinguished from that of written literature; and this oral element is the fundamental characteristic of the type. It is connected, too, with the element of song; for the primitive ballad may always be assumed to have been sung. A surviving evidence of this is the frequent appearance of a refrain, perhaps originally joined in by the whole company of persons present at the ballad singing. Closely connected with these characteristics is the com¬ munal spirit of the old ballad: the form arises from a state of society when the individual poet is of relatively slight importance and when the content of poetry is not the experiences and feelings of the individual singer but those of the group. Hence in the ballads we do not look for individuality of style; of this their uni¬ versal anonymity is a sign. Their language is simple, unsophisticated, but conventional, marked by abundant repetition yet by rapidity of narrative method, — in a word, the language of an age, as Ten Brink put it, whose poetry is (<oscillating perpetually between reminiscence and improvisation.ˆ Very many of the ballads, if not all, had their origin in the versifying of a real fact, gathering up mythical elements in

the manner of popular tradition. Often there are many different versions of the same story, some differing only in details, others in essen¬ tial elements, such as changes from super¬ naturalism in the direction of realism, or variants characteristic of particular localities or social groups.

Of ancient ballads of Greece and Rome no remains survive, though evidence of their nature is thought to be traceable in elements of the ancient epics. Macaulay, in his (Lays of An¬ cient Rome,' made a brilliant but rather sophis¬ ticated attempt to conceive the matter and spirit of ballads of the early Roman people. Of the Latin races the Spanish branch has pre¬ served the greatest number of ballads, some of those still extant dating from the early 11th century; most famous are those concerned with the story of "the Cid," in the 12th century. Of French balladry the remains are more frag¬ mentary. The early Germans are known to have made abundant use of ballads, and a col¬ lection of them was made under the direction of the Emperor Charlemagne ; a surviving frag¬ ment of a "Hildebrand song® is supposed to date from the 8th century. Later, in the 15th and 16th centuries, a new era of German bal¬ ladry developed; and toward the end of the 18th century modern scholars, led by Herder, began the systematic collection of the ballads of the race. There are also rich remains of the ballads of the Scandinavian peoples, dating from the 11th, 12th and 13th centuries; a collection was made in Denmark as early as 1591, while one of the greatest of modern ballad collections is that of the Danish scholar Grundtvig. The Slavic peoples have preserved an abundant bal¬ lad tradition, and some of them, notably the Serbians, are to this day in the ballad-making and ballad-singing period. Of the early English ballads no remains are preserved; but there are numerous survivals of the mediaeval and modern periods of ballad-making, both in Scotland and England, beginning perhaps in the 13th century and extending as late as the 18th. The Robin Hood group includes the most famous of these, — a cycle thought to have originated in the 13th century. A monumental collection of the Eng¬ lish and Scottish ballads was made by the Amer¬ ican scholar F. J. Child.

The revived interest in balladry character¬ istic of the romantic movement in the late 18th century led to the writing of various modern adaptations and imitations, of which one of the most famous is the German poet Burger's bal¬ lad of (Lenore,' which was translated by Wal¬ ter Scott. Wordsworth and Coleridge also adapted the ballad form to two different types of narrative verse found in their volume of 'Lyrical Ballads' (1798), — types represented respectively by Coleridge's (Ancient Mariner' and Wordsworth's <Lucy Gray.' Finally,

one must note the distinction between these ballads which in one way or another hark back to the old folk poetry and the so-called ballad which is characteristic of the age of printing, and was abundantly produced, in doggerel verse, in the 16th and 17th centuries; these compositions, which are usually destitute of literary value] are sometimes called (<broadside ballads," from the most common form of their printing.

The Epic. — This type may be viewed as an elaboration of the ballad, developing similar

material more formally and at greater length, and representing a state of society more highly organized, socially and politically. Frequently a definite racial or national spirit underlies the epic, its subject, as Hegel expressed it, being some action which ((includes the whole life of a nation and the history of an epoch." Like the primitive ballad, the primitive epic belongs to the period of oral transmission, but is associated with recitation rather than song, and with the art of professional entertainers, such as the German scop and the French jongleur. In some of the more elaborate ballads, notably the expanded ballad called (A Gest of Robin Hood,' one may see something of the transition to epic elaboration and individual art-composi¬ tion ; and certainly when we reach the full epic form, though it is still representative of com¬ munal material and interests, we recognize the skill of highly developed individual workman¬ ship, giving unity and form to great masses of material. It is customary to distinguish between the folk-epic, based originally on ballad tradi¬ tion, and showing comparatively little of the spirit of the individual artist, and the art epic, consciously and imitatively developed by a poet of a literary age. Of the former the conven¬ tional example is the Greek (Iliad' of Homer, dealing with the hero Achilles and the Trojan War; of the latter, the Roman (Hineid' of Vir¬ gil. But the distinction cannot be maintained with accuracy, since there is indefinite gradation from the communal to the individual method. Thus the Greek Odyssey,' on the wanderings of Ulysses, which is traditionally attributed to the

same poet as the (Iliad, ' shows far less of the national and communal, and more of the in¬ dividual, spirit. Other epics of the more or less primitive type are the <Mahabharata) of India, based on the mythologic legends of the Hindu people; the German stories of the (Nibelungen' and (Gudrun,' dating from the 13th century; the' French chansons de geste, or heroic songs, abundant in the 11th and 12th centuries, of which the chief is the (Song of Roland'; the Spanish (Poem of the Cid,' of the 12th century; and the old English (Beowulf,' in its present form dating from the beginning of the 8th cen¬ tury, but representing an earlier period and Scandinavian rather than English matter. The old Norse lays of the (Elder Edda' approximate epic form, but in unity and elaboration the prose (Saga of the Volsungs' is nearest, for the Scan¬ dinavians, to the true epic. Epics half way, in a sense, between the primitive and the sophisti¬ cated type, are the Indian (Ramayana,' the Per¬ sian (Shah-Nameh' (made by the court poet Firdausi from primitive epic material), and the Finnish (Kalevala' (compiled by the modern philologist Lonnrot). To the same hybrid class belong the partly compiled, partly composed Celtic (<epics" of Tames Macpherson, (Fingal' and (Temora' (1762-63), based on more or less genuine materials from the Scottish Highlands, attributed to a traditional bard named Ossian.

The imitative or art epic has been well rep¬ resented in every literature which came under the influence of the classical tradition. For Greece itself there was a considerable number of these poems, commonly called the ((epic cycle," whose authors undertook to complete the epic treatment of national material left un¬ touched by Homer; and, in the Alexandrian

age, the (Argonautica' of Apollonius of Rhodes. For Rome, as we have seen, the great example is the (H£neid,' which remains the most successful reproduction by art of the spirit of the folk epic; for Virgil celebrated a theme of national significance at the moment when the national life of the Romans was at its height. Later Roman epics were the cPhar-salia' of Lucan and the (Thebais' of Statius. In the mediaeval period the epic form, like all literary forms, was turned to the service of the Church, and there was a considerable produc¬ tion of Christian epics, beginning with the (Historia Evangelical of Juvencus, in the 4th century. Highly characteristic, too, of this era are narrative poems of allegorical or symbolic type, having something of the dignity and elaboration of the epic but without its usual themes or methods ; one may note examples as different as the great (Divine Comedy' of Dante and the English poem of <Piers Plow¬ man.' The Renaissance was

followed by vari¬ ous experiments in formal epic, such as the (Lusiad' of Camoens in Spain (1572) and Tasso's (Gerusallemme liberata' (1581) in Italy. In the 18th century Voltaire attempted to revive the glory of the form in his (Hen-riade' (1723). In Germany the most notable modern epic is Klopstock's biblical (Messias' (1773) ; there is also a 19th century version of the Nibelungen epic by Wilhelm Jordan. In England the Renaissance poets were rather less interested in the epic than those of the Conti¬ nent, though Spenser doubtless regarded the allegorical narrative of his (Faery Queene' (1590-96) as in the epic tradition; and the same thing is true of historical poems like Warner's < Albion's England' (1586), Daniel's (History of the Civil Wars' (1595), and Drayton's (Mortimeriados' or (Barons' Wars' (1596, 1598). It was reserved for Milton to make the only really vital application to English poetry of the old epic method, in his (Paradise Lost' (1667), a work dealing with the supreme con¬ flict of the whole human race instead of a spe¬ cial branch of it. Cowley had already pro¬ duced a biblical epic in the (Davideis' (1656), and Davenant an historic epic in the (Gondi-bert' (1651), — both highly praised in their time, but now considered unreadable. Equally lacking in vitality were the English epics of the 18th century, such as Blackmore's (Alfred' (1723); Glover's (Leonidas' (1737), and Wil¬ kie's (Epigoniad' (1757) ; on the other hand the taste of this age for the epic form found expression in Pope's famous translation of Ho¬ mer. In the early 19th century the epic method was revived by Southey in a series designed to represent the great religions of the world : ˆhalaba,' (Madoc,' (The Curse of Kehama,' and (Roderick' (1801-14). The taste of the modern period, however, turned very definitely either to romance or realism, both of which found expression in Byron's great satiric-ro- mantic-realistic epic of (Don Juan' (1819-24). Something of the old epic method was again revived by Tennyson for his rather mysteri¬ ously termed (Idylls of the King' (1859-85), and — with far more regard for the primitive tradition — by William Morris in (Sigurd the Volsung' (1876). But the finest example in modern poetry of classical epic style is found in the episodical (Sohrab and Rustum' of Matthew Arnold (1853), — a version of a brief

portion of the Persian (Shah-Nameh.* Once more, at the opening of the 20th century, a vig¬ orous effort has been made to revive the na¬ tional epic, in the (Drake* of Alfred Noyes.

Finally, we may note that in every period there have been burlesque or satiric epics, tak¬ ing their point from the very dignity of the traditional form in contrast with the triviality or meanness of its new application; such are the ancient Greek < Battle of the Frogs and Mice,* Butler's <Hudibras) (1662) ; Boileau's (Lutrin) (1674), and Pope's <Rape of the Lock* and <Dunciad) (1712 and 1728).

The Metrical Romance. — This type of nar¬ rative poem is especially characteristic of the mediaeval period, or, more generally, of the age of chivalry as distinguished from that of primi¬ tive heroic life and literature. Between many of these poems, however, and the epic, the line is a very doubtful one. The greatest represen¬ tatives of the type are found in Chrestien de Troyes, a troavere of France in the late 12th century, and two German poets of the early 13th century, Gottfried of Strassburg and Wol¬ fram of Eschenbach, of whom the former re¬ wrote the story of Tristan and Isolde and the latter the story of Parsifal. But besides these, in every country of western Europe, there were uncounted nameless authors both of individual poems and of those which go to make up the great ((cycles" like those of Arthur, Tristram, Gawain and other popular heroes. It is com¬ mon to divide these romances according to the geographic source of their material, which is thus classified as <(Matter of France," <(Matter ot Britain" (that is, the primitive Celtic region, whether continental or insular), (<Matter of the Orient," *etc.* But in the actual authorship and distribution of the romances, linguistic, racial and geographic lines play comparatively little part, a good portion of them having become the property of all the European peoples of their age. Like the epic, these romances represent the age of recited poetry and of professional entertainers; Scott's (Lay of the Last MinstreP at once describes the type and exemplifies the way in which he came to pass from the study of the early romances to the writing of modern originals. In England the finest of the ro¬ mances are as late as of the 14th century; not¬ ably, for the more popular sort, the (Sir Gawain and the Green Knight* of a genius whose name has been lost, and for the more literary, the (Troilus and Criseyde) of Chaucer, in which a familiar episode of the old Trojan war story is treated with an interest in charac¬ terization and in realistic humor which make it anticipatory of the modern novel. On the bor¬ der, again, between the mediaeval and the mod¬ ern spirit was the popular Italian romance of the Renaissance, Ariosto's ˆOrlando Furioso> (1515). In the neo-classical period, especially the 18th century, this loose and unauthenticated

type of poetry was naturally regarded with little favor, and for equally obvious reasons it was enthusiastically revived by the representa¬ tives of the ((romantic revival." In England the metrical romances of Scott, already re¬ ferred to, were the most important results of the movement, especially (Marmion* and (The Lady of the Lake) (1808 and 1810). : In the introduction to (The Bridal of Triermain,* Scott distinguished the form from epic poetry as being free from all rules save <(those which

good sense, good taste and good morals apply to every species of poetry." In the later 19th century it was again revived by William Mor¬ ris in various imitations of the work of med¬ iaeval romancers ; while in Germany a notably successful specimen was Scheffel's (Trompeter von Sackingen* (1853).

The Tale, *etc.* — In all periods, and especi¬ ally in modern times, narrative poetry tends to overrun the bounds of fixed types, and to appear in forms which may be vaguely called metrical tales or otherwise. In classical liter¬ ature the most influential example of this form is the (Metamorphoses* of Ovid, whose mate¬ rial sifted down into a great part of mediaeval and Renaissance poetry. In the mediaeval pe¬ riod the supreme example is the Canterbury Tales* of Chaucer, which drew upon every type of story material, combining sentiment and humor, realism and romance. In the Renais¬ sance the Ovidian type of narrative poem is represented by Marlowe's (Hero and Leander) and Shakespeare's (Venus and Adonis) and (Lucrece.* Dryden's <Fables) (1700) are a landmark in another period, but are largely ver¬ sions of tales by earlier poets. Like the met¬ rical romance, the poetic tale was abundantly revived in the period of the romantic revival, sometimes with a view to the attainment of realistic simplicity, as in Wordsworth's (Michael* or (in Germany) Goethe's Her¬ mann and Dorothea,* sometimes with a prefer¬ ence for highly romantic elaboration, like (The Eve of Saint Agnes) of Keats. Byron's ((tales," nine in number, published between 1813 and 1823, went far to supplant the popularity of Scott's metrical romances, and in some cases might very well be called by that name them¬ selves. Space does not permit the tracing of the varied development of the less defined types of narrative poetry through the 19th cen¬ tury. Perhaps the most remarkable experiment made in that period was Browning's (The Ring and the Book) (1868), in which a single story is told 10 times over, in a series of monologues supposed to be uttered by various persons con¬ cerned. Tennyson, on the other hand, told the story of (Maud* (1855) in a series of mono¬ logues and lyrics supposed to be

uttered by a single person, forming a ((monodrama." Both these works are characteristic of the trend of narrative poetry in modern times, toward sub¬ jective and spiritual qualities, as opposed to the objectivity of the increasingly rare epic method. On the other hand, the early 20th century has seen some return to the more objective tale in the Elizabethan narratives of Alfred Noyes's (Tales of the Mermaid Tavern* and the realis¬ tic contemporary narratives of John Masefield, notably (Dauber.*

Bibliography. — For the nature and develop¬ ment of the more primitive types of narrative poetry, consult Gummere's (The Beginnings of Poetry > (New York 1901) and (The Popular Ballad* (Boston 1907) ; Ker's (Epic and Romance) (London 1897) ; Hart's (Ballad and Epic) (Harvard Studies and Notes, Boston 1907) ; Saintsbury's (The Flourishing of Ro¬ mance and the Rise of Allegory) (London 1897) ; Billings's (Guide to the Middle English Metrical Romances) (New York 1901) ; Scho¬ field's 'English Literature from the Norman Conquest to Chaucer* (New York 1906) ; the introductions to the translations of 'Beowulf*

and the (Song of Roland) in the (Riverside Literature Series) (Boston) ; and the volume of (Arthurian Chronicles) in 'Everyman's Li¬ brary.) On the Greek epic, consult Lang's 'Homer and the Epic) ; on epic poetry in gen¬ eral, Dryden's Preface to his translation of Virgil and Clark's 'History of Epic Poetry) (Edinburgh 1900) ; on English narrative poetry, Dixon's 'English Epic and Heroic Poetry) (London 1912).

Raymond M. Alden,

Professor of English, Leland Stanford Junior University.

NARRENSCHIFF, nar'en-shif, Das ('The Ship of Fools)), Sebastian Brant's celebrated work (1494). See Brant, Sebastian.

NARROWS. See Trellised Drainage and Stream Piracy. _

NARROWS, The, a narrow part of New York Bay, a channel which connects Upper New York Bay with Lower New York Bay, and separates Long Island and Staten Island. At the south entrance of The Narrows are two forts, Fort Hamilton on Long Island and Fort Wadsworth on Staten Island. See map of Greater New York and vicinity under New York.

NARSES, nar'sez, Byzantine general : b. Ar¬ menia, 472 ; d. Rome, 568. He was a eunuch when he entered the imperial household in Con¬ stantinople, of which he soon became chamberlain. His ability soon advanced him to the office of treasurer to Justinian, who sent him to Italy in 538 to keep an eye on Belisarius. Narses was recalled in 539 and in 551 succeeded Belisarius as commander-in-chief in Italy and speedily drove thence the Franks and Goths, and re-established Byzantine control. He took possession of Rome and was appointed prefect of Italy in 554. In spite of his able, adminis¬ tration he was removed by Justinian's succes¬ sor, Justin II, on the ground of his avarice which caused him to levy severe taxes on the people. Legend says that he was insulted by the Empress Sophia upon his dismissal, and that he thereupon went over to the Lombards. He was equally famous as general and states¬ man. Consult Hodgkin, 'Italy and Her Invad¬ ers) (1885-95, Vols. IV and V) ; Bury, 'Later Roman Empire) (Vol. I, 1889) ; Gibbon, E., 'Decline and Fall of the Roman Empire) (Lon¬ don 1898) ; 'Cambridge Medieval History) (Vol. II, New York 1913).

NARTHEX (Greek, a reed, hence any oblong figure), the term used in ecclesiastical architecture to designate the westernmost divi¬ sion of an ancient Greek church, running like a cloister from the north to the south wall. It was a vestibule, separated from the nave proper by a screen or railing, beyond which catechumens and those under Church censure or penance were not permitted to advance. It had three doorways, one on the west as well as one in the northern and southern walls. The western was the principal entrance and was known as "the beautiful)) or "royal gate.)) The doors leading through the screen into the nave were named according to the classes who used them, "the priests' gate,® "the men's gate," *etc.* The narthex was also used for funerals and public meetings; baptism was celebrated there and the font, which had formerly been

in a building adjoining the church, was also placed in the narthex. There was sometimes an inner and an outer narthex. Consult Bing¬ ham, 'Christian Antiquities*; Siegel, 'Chnst-liche Alterthiimer) ;

Walcott, ‘Sacred Archae¬ ology.)

NARUSZEWICZ, na-roo-sha’vTch, Adam Stanislaw, Polish historian and poet : b. Pinsk, Lithuania, 20 Oct. 1733; d. Janow, Galicia, 8 Julyt 1796. He became a Jesuit in 1748; taught in the Jesuit schools in Vilna and Warsaw; and after the suppression of the Order became bishop of Smolensk, and later of Lutsk. His poetry, consisting of translations, odes, fables, epigrams, satires and idylls, was first published in 1778. In prose, he translated Tacitus, wrote a biography of Chodkiewicz (1781), composed a history of Crimea (1787), and on the sug¬ gestion of his patron, King Stanislaus Augustus Roniatowski, wrote his greatest work, a history of Poland down to 1386 (1780-86, new ed. 1859-60), which, because of its style and its protest against the abuses of a monarchy or an aristocracy, won him the name of the Polish Tacitus.

NARVA, nar’va, Esthonia, an important manufacturing town on the river Narova, 100 miles southwest of Petrograd. It contains several Greek and Lutheran churches, has a fine town-hall, a castle, two gymnasia, a theatre and technical schools in connection with the cotton and woolen mills nearby. Cotton and lumber are the principal items of trade. The town was founded by the Danes in the 13th century, and after being held briefly by the Russians passed to the Swedes in 1581. Peter the Great took it in 1704. Here, on 30 Nov. 1700, was fought a battle between 8,000 Swedes under Charles XII and 80,000 Russians under General Dolgorouki. The Russians were be¬ sieging Narva, and after driving in 10 large bodies who occupied advanced positions, Charles boldly attacked their entrenched camp. After a brief cannonade the Swedes stormed the Russian trenches, and although the Rus¬ sian artillery stood to their guns, the defend¬ ers were driven out in disorder after three hours of hard fighting. The Russians lost 18,000 men in the trenches and many more in the open fight; the Swedes only lost 600. Pop. 35,000, Germans, Esths and Russians.

• NARVACAN, nar-va-kan’, a pueblo of the province of Ilocos Sur, Luzon, situated 13 miles southeast of Vigan, the provincial capital. It is on the main road and one of the most im¬ portant towns of the province, being next the capital in population. Pop. 19,500.

NARVAEZ, nar-va-eth’, Panfilo de, Span¬ ish soldier in America: b. Valladolid, about 1470; d. near mouth of Mississippi River, November 1528. He came to America about 1498, settled first in Santo Domingo and then in Cuba, where from 1512 until his death he was under Velasquez in the command of an auxiliary force in the conquest of the

island. The disobedience of Cortes in Mexico, whither he had been sent by Velasquez, led the latter to send Narvaez in 1520 to supersede and pun¬ ish Cortes. This expedition was entirely unsuc¬ cessful. Narvaez landed at Vera Cruz in April; was defeated in May at Cempoala by the army of Cortes; lost one eye in the battle, and was deserted by the remnant of his army, which

joined Cortes. He was captured, but soon re¬ leased; returned to Spain, where he was ap¬ pointed governor of Florida in 1526, and sailing from Cuba m March of 1528, landed at-Apa¬ lachee Bay, lost half his men on the march in¬ land, retreated to the shore, where he found that his ships had been destroyed, and having built boats, sailed westward along the coast, only to be shipwrecked with all but four of his men. Consult Bourne, E. G., (Spain in Amer¬ ica J (New York 1907) ; Alvar Nienez Cabeza de Vaca, (Relacion) (in J. F. Jameson's, ed., (Original Narratives of Early American His¬ tory* (Vol. II, ib. 1907).

NARVAEZ, Ramon Maria, Duke of Va¬ lencia, Spanish general, and statesman : b. Loja, Andalusia, 4 Aug. 1800; d. Madrid, 23 April 1868. He entered the army in 1815; fought against the French and in 1822 assisted in putting down the uprising in the Royal Guards; lived in retirement at Loja from 1823 until the death of Ferdinand VII in 1833; in 1836 defeated the Carlist leader, Gomez ; and in 1838, after clearing La Mancha of brigands, was made captain-general of Old Castile. He led an insurrection against Espartero, in 1840, his old chief, but was beaten and fled to France, where he joined the party of Maria Christina. He returned to Madrid in July 1843; Espartero left the country; and from May 1844 to February 1846, and from October 1847 to January 1851 Narvaez was Prime Min¬ ister, in recognition of his services to Maria Christina. In 1845 he was made grandee of Spain of the first class and Duke of Valencia. He began by changing his policies to the more conservative form, revising the Liberal consti¬ tution of 1837. He held the same post in 1856-57 and 1864-65, being Minister to Paris and Vienna in the intervals. During the mili¬ tary

rising of 22 June 1866 Narvaez commanded the loyal soldiery, and in July succeeded the de¬ feated O'Donnel as Ministry President and Minister of War. A Liberal in early life he became more and more conservative and spent his last years in attempting to keep Isabella on the throne. Consult Mazade, (Les revolutions d'Espagne* (Paris 1869) ; Pirala, A., (Historia contemporanea* (Madrid 1871-79).

NARVIK, nar'vTk, Norway, small town on the Ofoten Fjord, with beautiful mountainous surroundings. It is also known as Victoria-havn, and is the terminus of the Ofoten Rail¬ way which transports an enormous tonnage of Swedish iron ore. It is used by the tourists visiting the lovely Lofoten Islands. It is a station for coastwise trading steamers. Pop. about 4,643.

NARWHAL, a large porpoise which in¬ habits the Arctic Ocean. It belongs to the family Delphinidce and was named Monodon monoceros by Linnaeus. Its most striking char¬ acteristic is the possession by the male of a very long, straight, spirally-grooved tusk, which projects forward from the left side of the upper jaw in line with the axis of the body. When full-grown the narwhal has a length of about 16 feet. The head is rounded, the back has a very low ridge instead of a fin and the pectoral fins are short and broad. The color of the body is gray above and white below, everywhere mottled and spotted with gray and black. The young are darker colored, while

old individuals are often nearly white through¬ out. The vertebral formula is as follows: Cervicals, 7; dorsals, 11; lumbars, 6; caudals, 26; total, 50. The cervical vertebrae, unlike those of other true porpoises, except the beluga or white whale, are all free. The skull is de¬ pressed, with a broad rostrum.

The massive tusk or maxillary tooth of the narwhal is developed only in the male, and with rare exceptions, only on the left side of the jaw. Normally the corresponding tusk or tooth of the right side remains concealed in the maxillary bone during life. In females neither tusk is visible. All other teeth are want¬ ing in adults of both sexes. Occasionally,, both tusks are developed in males and in females as well. About 16 such heads have been pre¬ served, including one from Prince Regent In¬ let, in the National Museum, Washington. The largest narwhal tusks are about eight feet long, with a girth of about nine inches at the base. They are hollow for a considerable proportion of their length.

The tusk is a secondary sexual character like the antlers of the stag, the spurs and comb of the cock, *etc.* It has been suggested that the narwhal makes use of the tusk to break the ice, to transfix its prey, or in combat, but these ideas lack confirmation.

When first introduced into Europe, the true origin of the tusks not being known, they were supposed to be the horns of the mythical uni¬ corn. For a considerable time they were highly prized on account of their reputed medicinal properties, and are still made use of in China as a drug.

Narwhals occur in large herds or schools among the ice of the Arctic Ocean, northward of lat. 65° N. Thev migrate to higher latitudes as the ice recedes and return in the fall. Very rarely individuals stray southward along the coast of Europe as far as Scotland.

The narwhal resembles the btuiga or white whale in many important characters, not shared by other porpoises, and forms with it a sepa¬ rate subfamily, the Delphinapterince.

NASBY, naz'bT, Petroleum V. See Locke,

David Ro.ss.

NASCENT STATE, in chemistry, the state or the peculiar reactionary power possessed by an element at the instant of liberation from a compound or combination in which it has pre¬ viously existed. At the moment an element is liberated from a compound of which it has been a constituent it acquires a higher power of chemical reaction than it displays some time after its liberation. One theory of the nascent state of an element is that the molecules at the instant of liberation are separate and independ¬ ent; and that an appreciable length of time is required for their final arrangement; and that while they are in this free state they possess an extraordinary power of reaction, which power is otherwise exerted and expended in the act of molecular arrangement. For in¬ stance, it has been advanced by some chemists and physicists that hydrogen in a nascent state is made up of single atoms, while hydrogen in a gaseous state is composed of molecules, each molecule containing two atoms. Another theory is that nascent hydrogen is simplv hydro¬ gen under great pressure, for a mere increase in pressure wiU make ordinary hydrogen act

like nascent hydrogen. Thus many substances, such as aldehyde, will combine with nascent hydrogen which utterly refuses gaeous hydro¬ gen.

NASCOPI (na-skope) or NASCAPEE, INDIANS, a Labrador tribe, the most north¬ easterly known branch of the Algonquian family. They formerly occupied the interior tableland extending from Lake Mistassini to the Atlantic Ocean.

NASEBERRY, the fruit of Sapota achras, one of the finest West India fruits. The bark of the tree has astringent and febrifugal prop¬ erties. See Sapotaceˆ.

NASEBY, naz'bl, England, a village of Northamptonshire, 12 miles northwest of Northampton (pop. 456), on the north side of which, on 14 June 1645, Fairfax and Cromwell, commanding 'the Parliamentary troops, defeated Charles I and his army, taking 5,000 prisoners and capturing the royal cannon and baggage. An obelisk marks the site. Pop. about 700.

NASH, Abner, American politician: b. Prince Edward County, Va., 8 Aug. 1716; d. Philadelphia, Pa., 2 Dec. 1786. He studied law and removed to New Berne, N. C, where he practised successfully and in 1774 he was a member of the first provincial congress of North Carolina. He served as member of the council which framed the State constitution in 1776 and was speaker of the senate in 1779. He was governor of the State from 1779-81 and in 1782-86 sat in the Continental Congress.

NASH, Francis, American soldier: b. Prince Edward County, Va., 10 May 1720; d. German¬ town, Pa., 7 Oct. 1777. He was a brother of Abner Nash (q.v.), and early removed to North Carolina, where he was clerk of the Superior Court of Orange County. He was a member of the assembly in 1771, 1773-75. He served under the Crown with a captain's commission, but resigned and was a member of the pro¬ vincial congress which met in 1775 when he was appointed lieutenant-colonel in the Con¬ tinental army. In 1777 he was commissioned brigadier-general by the Continental Congress and at once joined Washington, under whom he commanded a brigade and was mortally wounded at the battle of Germantown.

NASH, George Kilburn, American poli¬ tician: b. York Township, Medina Countv, Ohio, 14 Aug. 1842; d. 28 Oct. 1904. A de¬ scendant of Thomas Nash, he was educated at Reserve University and at Oberlin College (1862-64), studied law and was admitted to the bar in 1867. He was editor of the Ohio State Journal, and in 1879-82 was prosecuting attorney of Franklin County, Ohio. He estab¬ lished a law practice in Columbus in 1883-85. In 1880-83 he was attorney-general of Ohio and in 1883-85 served as member of the State Supreme Court commission. In 1880-81 and 1897 he was chairman of the Republican execu¬ tive committee. In 1899 he was nominated for governor, was elected in November of that year and reelected in 1901, his second term expiring in January 1904.

NASH, Sir John, English architect: b. Lon¬ don, 1752; d. East Cowes Castle, Isle of Wight, 13 May 1835. He studied and practised archi¬ tecture under Sir Robert Taylor; then retired

from business until 1793; and upon his re-entry into the profession gained much royal and noble patronage. He laid out Regent's Park and the street leading up to the park, now called Regent street; remodeled Buckingham Palace and altered the Brighton Pavilion. He was particularly fond of single facades, of projecting colonnades and of a plentiful use of plaster and stucco. The use of cast-iron girders was principally introduced by Nash, who patented several varieties. Personally he was an estimable man, but unpopular . because of George IV's display of favoritism toward him.

NASH, Richard, called Beau Nash, Eng¬ lish leader of fashion: b. Swansea, Wales, 18 Oct. 1674; d. 3 Feb. 1762. He studied at Jesus College, Oxford, was for a time in the army, but finding military discipline not to his liking, entered at the Inner Temple. In 1705 his skill in gaming took him to Bath, which in 1703 had become a much frequented watering-place. He determined to improve the provincial character of the spa, and soon became a self-appointed but arbitrary master of ceremonies. He was known as the <(King of Bath55 and his rule was celebrated in prose and verse. His code in¬ cluded the prohibition of swords within his realm, a restriction which tended toward that consideration for the public peace which was then growing in England. His vanity grew with his power ; he appeared in a monstrous cream-colored beaver and invariably journeyed by post-chariot with three span of grays, foot¬ men and outriders. Gambling was prohibited by law in 1740, and Nash, by 1745, had lost his trade. The town granted him an annuity of £10 a month. Goldsmith wrote

his life (1762). Consult also Jerrold, C., (Beaux and the

Dandies> (New York 1910).

NASH, or NASHE, Thomas, English

satirist and dramatist: b. Lowestoft, Suffolk, 1567; d. 1601. He studied at Cambridge in 1586, spent some time on the Continent, and before 1588 came to London. In 1589 he pub¬ lished his (Anatomie of Absurdities In the literary warfare carried on between the Puri¬ tans and bishops Nash took an active part in behalf of the latter. Under the pseudonym ((Pasquil55 he published the tracts (A Counter-cuffe Given to Martin Tunior) (1589) and (Pasquil's Apologie5 (1590). In 1592 he issued his powerful satire on contemporary society,

(Pierce Pennilesse his Supplication to the DivellS His (Christes Teares over Jerusalem5 (1593) followed in repentant mood, and he affected to dismiss satire, in which, he said, he had (<prodigally conspired against good houres.55 His notable work of picaresque fiction, (The Unfortunate Traveller, or the Life of Jack Wilton5 (1594) to a certain extent anticipated Defoe. Involved in a paper war with Gabriel Harvey, who had boasted of having put him to silence, he thereupon published (Have with you to Saffron-Walden, or Gabriel Harvey's Hunt is Up5 (1596), brimming with scorn. Nash also wrote plays, in whole or in part. He completed, unsatisfactorily (1594), Marlowe's (Dido.5 His (Summers' Last Will. and Testa¬ ment5 (1593), comedy, was first published in 1600. A play, (The isle of Dogs,5 led to his imprisonment for attacks contained in it. He died having, as one epitaph put it, (<never in

his life paid shoemaker or tailor.® Nash's per¬ sonality was somewhat unique in Elizabethan literature. His prose was vigorous and his verses were at times those of a poet His works were edited by Grosart (1883-85).

NASHUA, nash'u-a, N. H., city, one of the county-seats of Hillsboro

County, on the Nashua River and on several branches of the Boston and Maine Railroad, about 33 miles south by east of Concord and 38 miles north¬ west of Boston. The first settlement was made in 1655 and in 1673 it was incorporated by Massachusetts as Dunstable township. In 1746 it was reincorporated by Massachusetts, and in 1836 it adopted the name Nashua. It received its city charter in 1853. It is an important manufacturing city; the water power is ob¬ tained from the Nashua River by means of a canal three miles long, 60 feet wide and eight feet deep. The chief manufactures are cotton goods, paper, shoes, iron and steel products, edge tools, hardware, saddlery, refrigerators, registers, sash, doors and blinds, ice-cream freezers, stationary engines, caskets and fur¬ niture. It has a United States fish hatchery, city and county buildings and several fine church buildings; Saint Francis Xavier (R. C.) is the largest. There are excellent public and parish schools and two academies. A new char¬ ter which provides for a mayor and 15 aider-men has been in force since 1913 and is work¬ ing well. City elections are held entirely separate from State and national elections. The school board is chosen by popular vote. Pop.

26,000.

NASHVILLE, Ill., city, county-seat of Washington County, on the Illinois Southern and the Louisville and Nashville railroads, about 110 miles south by east of Springfield. It is in an agricultural region, in which there are large coal fields. The chief manufactures are flour, dairy products and agricultural and mining implements. Coal mining and cattle raising contribute to the industrial wealth of the city. Pop. 2,209.

NASHVILLE, Tenn., capital of Tennessee, the second largest city in the State, and county-seat of Davidson County, 186 miles southwest of Louisville, Ky., and 234 miles northeast of Memphis. Nashville is on the Cumberland River and the Nashville, Chattanooga and Saint Louis, Louisville and Nashville and Tennessee Central railroads.

Topography. — The city has an area of 18.2 square miles and is regularly laid out on gradu¬ ally rising ground, sloping back from the river to an elevation of 654 feet above the sea. The streets are wide and well paved, about 242 miles of thoroughfare being covered with mac¬ adam and about 39 miles paved with granite, brick and bitulithic pavement. Around the city in every direction are the green hills of Middle Tennessee, where there is much commercial timber and

mineral wealth. The soil in the vicinity produces every fruit and vegetable not absolutely confined to the tropics. The average rainfall for 31 years has been 48.82 inches; the average winter temperature 39° and summer temperature 79° ; mean temperature for the year 59°.

Government. — Nashville has a commission form of government, of five commissioners, of

whom the mayor, commissioner of police and public welfare is chairman. The other com¬ missioners are commissioner of finance and street lighting; commissioner of streets, paving and sewers ; commissioner of waterworks, street sprinkling and alleys; commissioner of fire and buildings. The various other officers are elected by the city commissioners, who also serve as a board of civil service commissioners ; the vacancies on the park commission, however, are filled by the surviving members of that commission which is self-perpetuating. The city expends annually $2,000,000 for mainte¬ nance; the principal items being $467,000 for schools; $2,000 for interest on debt; $213,000 for police department and $230,000 for water¬ works. The waterworks are owned by the city; the system which comprises 200 miles of mains cost over $2,000,000. The electric lighting plant is also owned hy the municipality. Over $1,000,000 has been expended in recent years on a new and improved sewer system. The street railways operate over 95 miles of track, all converging at a central transfer station.

Buildings. — Prominent among the noticeable structures are the State capitol, costing $1,500,- 000; United States Government building; Davidson County court house; the city hall: Tennessee School for the Blind; Tennessee In¬ dustrial School ; the State penitentiary ; the Parthenon; city hospital; Confederate Sol¬ diers Home; Vendome Theatre; the Union depot; Hermitage hotel; Stahlman building; Independent Life building and the various churches and educational institutions.

Education. — There is no city in the South as prominent in educational interests as Nash¬ ville. Here is the seat of the Vanderbilt Uni¬ versity; the University of Nashville; George Peabody College for Teachers; Ward-Belmont College; Boscobel College; Watkins Institute; Buford College; Nashville Bible School and many others; Saint Cecilia Academy; Fisk University; Roger Williams University; Wal¬ den University. The State Library contains 40,000 volumes. The Carnegie Library cost $100,000 and has a fine rapidly increasing num¬ ber of

volumes. The Tennessee Historical So¬ ciety has a large and valuable library, many rare manuscripts, portraits, *etc.* The public schools are of the highest rank : and embrace, in additioin to the ordinary studies ranging into the high school education, departments of in¬ dustrial education, stenography, typewriting, bookkeeping.

Parks and Cemeteries. — Nashville has 480 acres in parks. In the park surrounding, the State capitol building is the tomb of James K. Polk (q.v.) and an esquestrian statue of Andrew Jackson. The Hermitage, the former home of Jackson, is 10 miles east of the city. To the north is the National Cemetery where are buried 16,643 soldiers who fell in the Civil War. A Centennial Park has been made on the grounds of the Tennessee Centennial Expo¬ sition of 1897, and the former history building is now a museum and art gallery. In the park is a fine monument honoring James Robert¬ son, the founder of Nashville. Watkins Park is to the west. Shelby Park, to the east of the city, is a natural shaded tract with a river frontage. Glendale Park, to the south, is a place of unrivaled beauty. There is also here

Mount Olivet Cemetery, with the beautiful Con¬ federate soldiers' monument, and the Cumber¬ land Driving Park.

Manufactures. — The industries of Nashville, which are more extensive than any other city in the State, had in 1919 aggregate capital of $115,000,000, and manufactured products valued at $1 50,000,(300. The manufactures include flour, gristmill products, lumber and timber prod¬ ucts, fertilizers, cotton goods, clothing, harness, saddlery, soap, stoves, ranges, hollow ware, coffins, shoes, candles, tobacco, wagons, car¬ riages, confectionery, printing, clothing and cars. There is a large export trade and extensive wholesale traffic in drygoods, boots and shoes, groceries, drugs, hats millinery, paper and hardware. The wholesale trade is estimated at over $250,000,000 annually. Al¬ most at the doors of Nashville, and tapped by every line of railroad entering the city, are apparently inexhaustible fields of coal of the highest grade. The bountifulness of the sup¬ ply is attested by the fact that during the pro¬ longed

anthracite coal strike, when coal was selling at almost prohibitive prices in every other section of the country, there was no advance in the price of coal in Nashville.

History. — The city was settled in 1780 by a band of pioneers under the leadership of James Robertson. It was named in honor of Gen. Francis Nash, a distinguished officer in the Revolutionary War, and was called Nash-borough until 1784. During the early years of its existence Nashville was repeatedly attacked by the Cherokees and other Indian tribes. It was chartered as a city in 1806; was the seat of the State legislature in 1812-15, and became the permanent State capital in 1843. The Federal army occupied the city in 1862 and around the city in 1864 wras fought one of the greatest battles of the Civil War. (See Nash¬ ville, Battle of.) In 1896 the State cele¬ brated the centennial of Tennessee's admittance into the Union, and a great industrial exposi¬ tion was held here the following year.

Population. — Nashville in 1830 had a popu¬ lation of 5,566; (1850) 10,165; (1860) 16,988;

(1870) 25,865; (1880) 43,350; (1890) 76,168;

(1900) 80,865; (1910) 110,364; the 1910 total included 2,993 persons of foreign birth and 36,523 of negro descent; (1920) 118,342.

Will R. Manier,

Secretary, Commercial Club of Nashville.

NASHVILLE, the name of a Confederate privateer that left Charleston in 1861 on a cruise to England and captured booty to the amount of $3,000,000. In March 1863 she was sunk by a Federal ironclad in the Savannah River.

NASHVILLE, Campaign and Battle of. When General Sherman's picked army of 62,000 left Atlanta 15 Nov. 1864 for the March to the Sea, the Confederate army under Hood, strengthened by Forrest's cavalry, was on the Tennessee River in the vicinity of Tuscumbia and Decatur, with S. D. Lee's corps across the river and in advance of Florence. Active prep¬ arations were making for a move on Nashville with the Ohio as a possible objective. Gen¬ eral Thomas had been sent to Nashville six weeks before to organize a force to resist Hood. Toward the last of October the Twenty-third corps, Schofield's, and the Fourth, D. S. Stan¬ ley's, were ordered to Thomas, who sent them

under General Schofield to Pulaski, with orders to delay Flood as long as possible to allow of the needed concentration and organization at Nashville* This infantry force at Pulaski ag¬ gregated 18,000 effectives, one division of the Twenty-third corps being detached, and was further strengthened by four brigades of cav¬ alry under Gen. James H. Wilson. Forrest's force of Confederate cavalry was four times Wilson's. General Sherman thus describes the force with General Thomas at Nashville at the time of Hood's advance on Pulaski : ((General Thomas was at Nashville with Wilson's dis¬ mounted cavalry, and a mass of new troops and quartermaster's employees amply sufficient to defend the place.® Of the sound men sent back to Thomas by General Sherman when he was fitting out a perfect army for the March to the Sea, he lost 15,000 from expiration of service, or from furloughs previously granted, within a week after Hood's advance from Florence. In place of these 15,000 Thomas re¬ ceived 12,000 newly enlisted recruits. To secure Chattanooga Sherman telegraphed General Steedman, who held the place with a small force: ((You must organize and systematize the hospitals and men sent back to Chattanooga® ; and to a suggestion that he might make use of some of the convalescents he was receiving from Atlanta he replied: (<So far, all such detachments reported from the front are with furloughs and are awaiting transportation home.®

Under such conditions General Thomas was working most energetically at Nashville to or¬ ganize an army to meet Hood, while General Schofield, with his inferior force, was holding against him with the utmost stubbornness to gain time for Thomas.

Hood was baffled in his attempt to inter¬ cept General Schofield at Pulaski and Columbia, Schofield reaching the latter place, forming solidly before Hood, who arrived 27 November, and holding him there to the limits of possibil¬ ity. Again, by skilful work, Schofield reached Franklin in advance of Hood, marching his troops at night within rifle-shot of the enemy's lines at Spring Hill. Here Hood threw his army on masse upon Schofield, who had taken position around the town. The attack was de¬ livered at 4 p.m., and lasted into the night. It was one of the most desperate assaults of the Confederates on any field, and most depressing for them in its results, five general officers being killed, six wounded and one captured. (See Franklin, Battle of.) The night of the 30th Schofield withdrew to Nashville, and the morning of 1 December Thomas' army was united.

A part of A. J. Smith's veteran division arrived at Nashville during the battle of Frank¬ lin, but not in time to be sent to General Scho¬ field. The rest of his division, and General Steedman's division from

Chattanooga also arrived 1 December.

Hood advanced the day after the battle of Franklin and established his lines in front of Nashville 2 December. Not until Hood ap¬ peared before Columbia with the entire army that had confronted the three armies under Sherman, re-enforced with Forrest's 10,000 cav¬ alry, and the fact appeared that Schofield was fighting a gallant, almost desperate game to

NASHVILLE, TENN

1 Jackson Monument

2 Vanderbilt University, Science Hall

*

NASHVILLE, BATTLE OF

hold him hack while Thomas was working energetically to organize his forces, did the S?tho”tlcs at Washington and City Point realize that ihomas had been left with wholly inade¬ quate means. In reply to a telegram from General Grant in which he was directed not to let Forrest get off without punishment,® Gen¬ eral Thomas, 24 November, thus stated his real condition.

Your despatch of 4 p. m. yesterday just received. Hood’s entire army is in front of Columbia, and so greatly outnumbers mine at this time that I am compelled to act on the defensive. None of General Smith’s troops have arrived yet, although they embarked at Saint Louis on Tuesday last The transportation of Generals Hatch’s and Grierson’s cavalry was ordered by General Washburn I am told, to be turned m at Memphis, which has crippled the only cavalry I had at this time. All of my cavalry was dismounted to furnish horses to Kilpatrick’s division, which went with General Sherman. My dismounted cavalry is now detained at Louisville, awaiting arms and horses. Horses are arriving slowly, and arms have been detained somewhere en route for more than a month. General Grierson has been delayed by conflicting orders in Kansas, and from Memphis, and it is impossible to say when he will reach here. Since being placed in charge of affairs in Tennessee, I have lost nearly fifteen thousand men discharged by expiration of service and permitted to go home to vote. My gain is probably twelve thousand perfectly raw troops. Therefore, as the enemy so greatly outnumbers me, both in infantry and cavalry, I am compelled for the present to act on the defensive. The moment I can get my cavalry, I will march against Hood, and if Forrest can be reached he shall be punished.

This created a feeling at Washington and City Point approaching a

panic. It was feared that Hood might avoid Thomas, cross the Cum¬ berland and carry out President Davis' plan to have him push on to the Ohio. This fear was redoubled when the necessity appeared for Scho¬ field to retire from Franklin. It was not so clearly seen that his stubborn holding against Hood had saved the situation which Sherman created. Instead of leaving Thomas, who up to that time had never lost a movement or a battle, to deal with Hood as his full knowledge of the situation might suggest, it was insisted that he should at once attack. The straits of the situation were recognized at City Point, and the day after Schofield's arrival Grant tele¬ graphed : <(Arm and put in your trenches your quartermaster's employees, citizens, etc.® The fourth day Thomas was peremptorily ordered to attack. He camly went on with his energetic preparations to deal a final blow to Hood. His despatches, clearly showing his situation and his active work, were ridiculed by Stanton and Halleck, and Grant repeated his orders to at¬ tack, and next directed Halleck to relieve him, first with Schofield, and next with Logan, and Grant himself started to take general direction, although Thomas had explained that while he had the troops ready to attack, a sleet-storm had covered the country with a sheet of ice upon which neither men nor horses could move, but that the moment it melted he would attack. When Logan reached Louisville he was met with the news of an overwhelming victory.

The two-days' battle, 15 and 16 December, was remarkable for its perfection of plan, and for the fact that in its progress to the end this plan was closely followed.

The Confederate main and advanced lines were intrenched qn bold hills about two miles from the city. Their advanced salient was es¬ tablished within three-eighths of a mile of the Union centre. The Union lines extended from the river above the city to the river below it. The Confederate lines were compact be¬

tween the Murfreesboro Railroad at their right and the Hillsborough Turnpike, which ran south from the centre of the city, across the Union centre. Thus the Confederate lines covered less than half of the Union position. Cheat¬ ham's corps was on the right, Lee's corps formed the centre, and Stewart's corps the left.

More than half the inner line was held by quartermasters' employees under Quartermas¬ ter-General Donaldson, and the rest of that line by new troops under Gen. J. F. Miller. Gen. A. Ji Smith's corps held the

right of the advanced Union line, Gen. T. J. Wood's line the centre and General Schofield the left. General Steedman's division was in echelon to the front on the left. The night before the battle General Schofield's corps was moved to the left and front, of Wood's line, and prepared to take prominent part in turning the Confederate left. The morning of the 15th fog veiled the rapid formation of Union forces in front of their works.

The battle began at 8 o'clock by a success¬ ful aˆacL by General Steedman's division upon the earthworks commanding the extreme left. This attracted the enemy's attention to that quarter. About 10 o'clock Smith's corps moved against Hood's left, and Wilson's cavalry corps of 9,000 horsemen and 3,500 dismounted men swung off in its wide circuit against the left and rear of the Confederate works, one division extending to the river below the city, and forc¬ ing back Hood's cavalry reserve under General Chalmers. Forrest's main body had been sent to attack Murfreesboro. Smith's corps moved obliquely against the Confederate left flank and took it in reverse. Schofield by a wide detour, penetrated still further to the rear. At the same time Wood assaulted in front. Wilson's troopers carried earthworks, captured 27 guns and swept squarely into the rear of the Con¬ federate left. These movements compelled its withdrawal for two miles. The next after¬ noon the same tactics were continued by Smith, Schofield and Wilson, while Wood on the Union centre, and Steedman on the left, pushed forward to Hood's new line. This had been reformed with Cheatham on the left, Stewart in the centre and Lee on the right. The Union lines began the attack upon Hood's position at 3 o'clock with an unsuccessful assault by two brigades from Wood and one from Steedman upon the Confederate right. Soon after 4 o'clock Smith and Wood's corps on the front, with Schofield operating on their right and against the Confederate left flank, attacked in force, soon carrying the entire line. This at¬ tack and its results General Hood thus de¬ scribed in his official report : ((The position gained by the enemy being such as to enfilade our line caused in a few moments our entire line to give way, and our troops to retreat down the pike in the direction of Franklin, most of them, I regret to say, in great con¬ fusion, all efforts to reform them being fruit¬ less.® Here 54 guns in position were captured. There was immediate and hot pursuit for nine days, led by Wilson's cavalry, when the rem¬ nant of Hood's forces crossed the Tennessee, having suffered a loss during his campaign of over 13,500 prisoners and 72 guns, and here the Union pursuit ended. Over 2,000 deserters came into the Union lines.

The result vindicated Thomas' insisting upon waiting for the remounting of his cavalry, since Wilson with his troopers formed an essential and controlling element in the battle and in a pursuit which were designed to disintegrate an

army. £

The records do not show the number ot men with which Hood reached Tupelo. He claims that there were 18,500 left there after 3,000 were furloughed. He further says that of 14,000 that left Tupelo to join Gen. J. E. Johnston in North Carolina 9,000 deserted. General Johnston's reports show that when Hood's forces reached him they numbered 3,953 officers and men. Thus, after Nashville, Hoods splendid force of Confederate fighters did not again appear as an army on the theatre of war.

Even this complete victory, defeating the contemplated advance of the Confederate army to the Ohio, did not fully allay the panic at Washington lest Sherman's movement to the sea should prove to have left the Central West without sufficient protection, and while every possible effort in pursuit was being put forth in horrible weather, General Halleck thus tele¬ graphed Thomas:

Permit me, General, to urge the vast importance of a hot pursuit of Hood's army. Every possible sacrifice should be made, and your men for a few days will submit to any hardships and privations to accomplish the great result. It you can capture or destroy Hood s army General oherman can entirely crush out the rebel military force in all the Southern States. He begins a new campaign about the first of January, which will have the most important results if Hood's army can now be used up. A most vigorous pursuit on your part is, therefore, of vital importance to General Sherman's plans. No sacrifice must be spared to obtain so important a result.

General Thomas, nagged beyond endurance, put an end to this style of despatches by the following reply:

Your despatch of 12 m., this day, is received. General Hood's army is being pursued as rapidly and as vigorously as it is possible for one army to pursue another. We can not control the elements, and you must remember that, to resist Hood's advance into Tennessee, I had to reorganize and almost thoroughly equip the force now under my com¬ mand. I fought the battle of the 15th and 16th instant with the troops but partially equipped; and, notwithstanding the inclemency of the weather and the partial equipment, have been enabled to drive the enemy beyond Duck River, crossing two streams with my troops, and driving the enemy from position to position without the aid. of pontoons, and with but little transportation to bring up supplies of provisions and ammunition. I am doing all in ixiy power to crush Hood's army, and, if it be possible, will destroy it. But pursuing an enemy through an exhausted country, over mud roads completely sogged with heavy rams, is no child's play, and can not be accomplished as quickly as thought of. I hope, in urging me to push the enemy , the department remembers that General Sherman took with him the complete organization of the Military Division of the Mississippi, well equipped in every respect, as regards ammu¬ nition, supplies, and transportation, leaving me only two corps, partially stripped of their transportation to accommo¬ date the force taken with him, to oppose the advance into Tennessee of that army which had resisted the advance of the army of the Military Division of the Mississippi on Atlanta, from the commencement of the campaign till its, close, and which is now, in addition, aided by Forrest's cavalry. Although my progress may appear slow, I feel assured that Hood's army can be driven from Tennessee, and eventually driven to the wall by the force under my command. But too much must not be expected of troops which have to be reorganized, especially when they have the task of destroying a force, in a winter's campaign, which was able to make an obstinate resistance to twice its numbers in spring and summer. In conclusion, I can safely state that this army is willing to submit to any sacrifice to crush Hood's army, or to strike any other blow which may contribute to the destruction of the rebellion.

This changed the tone of despatches from Washington and City Point. Grant and Stan¬ ton sent congratulations, and Grant, in his

official report, after setting forth his impatience and apprehensions that Hood would go north, said of Thomas: <(But his final defeat of

Hood was so complete, that it will be accepted as a vindication of that distinguished officers judgment.® H. V. Boynton.

NASHVILLE, CHATTANOOGA AND SAINT LOUIS RAILWAY, The. The first advocate of the building of the Nashville and Chattanooga Railroad, the first railroad com¬ pleted in the State of Tennessee, was Dr. James Overton, a man of far-reaching sagacity, daunt¬ less courage and great faith in his well-matured convictions. In 1843, he offered himself a can¬ didate for the legislature, basing his canvass on the promise that he would do all in his power to secure the construction of a railroad from Nashville to Chattanooga, to connect with the proposed Western and Atlantic Railroad, char¬ tered to be built from Atlanta to Chattanooga, thus creating a large link in a great trunk line to extend from the Atlantic Coast to the Mis¬ sissippi River. At that period, Chattanooga, or Ross Landing as it was then called, was but a small trading point in a wild, mountainous region, lately vacated by the Indians. Dr. Overton, with a keen foresight, however recog¬ nized that this was the focus to which the lines of traffic from the Southern States must con¬ verge, and he believed that if connections should be opened between that point and Nash¬ ville the latter place would be able to control the large cotton trade of Georgia and Alabama. These arguments made little impression on the minds of the people, however, and Dr Overton was not only defeated but the title (01d Chat¬ tanooga® was applied to him by those who derided his scheme as the impracticable dream of a visionary. Two years after the defeat of Dr. Overton the necessity for other outlets from Nashville besides the Cumberland River brought the subject of railroads under agita¬ tion again, and, through the pressure of many influential citizens of the State, the legislature passed an act on 11 Dec. 1845 incorporating a railroad from Nashville to Chattanooga. In 1847 this act was amended to permit the town of Nashville to subscribe the sum of $500,000 for the benefit of the road, and «to raise money on loans by pledging the faith of the corpora¬ tion; by pledging a portion of its taxes; by mortgage or otherwise to an amount not ex¬ ceeding what might be demanded for the calls on the stock.® The town of Murfreesboro, Tenn., also subscribed $30,000; the city of Charleston, S. C., $500,000; and the Georgia Railroad and Banking Company of Augusta, Ga., $250,000. The balance of an approximate capital stock of $2,000,000 was subscribed by individuals in Nashville and along the line of the proposed road. Shares of stock had then a par value of $25 each and in many instances the subscriber paid for his stock by actual work on the line or in materials furnished. The State also gave material assistance by lend¬ ing its endorsement to the bonds of the com¬ pany issued from time to time on completed miles of road.

The first general meeting of the stockholders was held in the City Hall at Nashville on 24 Jan. 1848. V. K. Stevenson, who had so earnestly labored in the interest of the road, was elected the first president. Other presidents of the

road to date are as follows : Michael Burns, 17 Feb. 1864 to 15 Aug. 1868; E. W. Cole, 15 Aug. 1868 to 15 Sept. 1880; J. D. Porter from the latter date to 10 Sept. 1884; J. W. Thomas, Sr., from then to 12 Feb. 1906; J. W. Thomas, Jr., 28 Feb. 1906 to 17 Dec. 1913; Maj. E. C. Lewis, 19 Dec. 1913 to 1 April 1914; and John Howe Peyton from the latter date to the pres¬ ent time. The first contract for any of the actual construction was let in August 1848 for cutting the tunnel under the Cumberland Moun¬ tain. Construction on other parts of the line began the latter part of that year. The first train ran from Nashville to Antioch on 13 April 1851, and when, on 4 July of the same year, a train arrived at Murfreesboro the event was made the occasion of a great celebration, people from all the country round being on hand to greet this sign of progress. By April 1852 the road had reached Bridgeport, Ala., on the Ten¬ nessee River, from which communication was immediately established with Chattanooga with the aid of steamboats; but the entire line, 151 miles in length, was not completed until Febru¬ ary 1854. At that time the equipment of the road consisted of 17 engines, bearing names instead of numbers, among which were the Tennessee, Nashville, Chattanooga, Governor Sevier and Governor Blount; 11 passenger cars and 164 freight cars. The iron rail used in track was purchased in England and delivered at Nashville for about $45 per ton. In Novem¬ ber 1871 the company acquired by purchase from the State of Tennessee the railroad prop¬ erties of the Nashville and Northwestern Rail¬ road Company, a line extending from Nash¬ ville, Tenn., to Hickman, Ky. In 1873 the name of the corporation was changed from that granted in the original charter, ((The Nashville and Chattanooga Railroad Company,® to <(the Nashville, Chattanooga and Saint Louis Railway.® The Western and Atlantic Railroad, extending from Chattanooga, Tenn., to Atlanta, Ga., is leased for 29 years from 27 Dec. 1890. The Paducah and

Memphis division, extending from Paducah, Ky., to Memphis, Tenn., with a branch from Lexing¬ ton to Perryville, is leased from the Louis¬ ville and Nashville Railroad Company for 99 years from 14 Dec. 1895. The several branches of the present system were built under separate charters, some of them by independent corpora¬ tions. The parent company, therefore, operates its present mileage under the charters granted originally to the various corporations which have been merged from time to time into its line.

The total number of miles of line operated at present are approximately: main track, 1,230.76; second track, 54.10; spur track and sidings, 482.53. Its main line extends from Hickman, Ky., through Nashville and Chatta¬ nooga, Tenn., to Atlanta, Ga., and from Mem¬ phis through Jackson, Tenn., to Paducah, Ky. At the latter point physical connection has been made with the great system of the Chicago, Burlington and Quincy Railroad by means of about 12 miles of line of the Paducah and Illi¬ nois Railroad Company and a double track bridge across the Ohio River opposite Metropo¬ lis, Ill. It also reaches the great cotton man¬ ufacturing city of Huntsville, Ala., while other ramifying branches extend to various mining

centres, agricultural districts and timber regions. To-day the road has few superiors, whether we consider the excellence of its road¬ bed ; its admirable equipment ; the beauty and historical interest of its scenery, or the fertility of the country through which it passes, while its strategical position in relation to the com¬ merce of the land is not surpassed by that of any other railroad system in the South. At many of the termini of its divisions it connects with a cluster of railroad systems that run to every point of the compass. It is also brought in closest touch with the great river trade of the Mississippi and its tributaries at several points, reaching the Mississippi River at Mem¬ phis and Hickman, Ky. ; the Ohio River at Paducah, Ky., and the Tennessee River at Johnsonville, Tenn.; Bridgeport, Ala.; Hobbs Island, Ala. ; Guntersville, Ala., and at Chat¬ tanooga, Tenn. It strikes the Cumberland River at Nashville and crosses the Chattahoochie River near Atlanta, Ga. The company in a recent statement reported its capital stock was $16,000,000; funded debt, $10,122,000; invest¬ ment in road, equipment, etc., $37,707,297.02. The average yearly gross revenue is more than $12,000,000. Since beginning operations it has paid cash dividends of 185 per cent on its cap¬ ital stock and in 1873 it gave the stockholders a stock dividend of 200 per cent. A majority of its capital stock has been held since about 1880 by the Louisville and Nashville Railroad Company, but its stockholders

number above 600, located in 26 different States and three foreign coun¬ tries. About 260 of its stockholders are women. According to the same statement its equipment consisted of 273 engines, 10,919 passenger, freight and work cars, two steamers and three transfer barges. Its roadbed for the main line is of full rock ballast and the weight of steel rails thereon is from 80 to 90 pounds to the yard.

During the Civil War the line of railroad was in charge of the Federal military authori¬ ties from 7 March 1862 to 15 Sept. 1865. Most of its equipment, however, was moved South at an early period in the war and operated on the rails of other lines in the interest of the Confederacy. Many important battles of the Civil War were fought along the line of its road and the territory contiguous thereto and its scenery is rich in historical interest. The corporation has maintained in an unusual de¬ gree the good will of the communities which it serves and is endeavoring to the utmost to ad¬ vance the development of the country along its lines.

NASHVILLE, University of, in Nashville, Tenn., a coeducational institution founded in 1785 by the State of North Carolina as David¬ son Academy. In 1806 after Tennessee had been founded, the name was changed to Cum¬ berland College, and in 1826 to the University of Nashville. The school was closed during the Civil War. The trustees of the university and of the Peabody Education Fund united. in 1875 in establishing a normal school for the training of teachers, which has since become, through cooperation of the university, a separate cor¬ poration — George Peabody College for Teach¬ ers (q.v.). Montgomery Bell Academy, the preparatory department, has six instructors and about 200 pupils. The other collegiate depart-

ments, both literary and medical, have been dis¬ continued. The library contains over 2,000 vol¬ umes, and the grounds, buildings and furnish¬ ings are valued at $150,000; the productive fund is about $106,500; and the annual income about $10,000.

NASHVILLE CONVENTION, in Amer¬ ican history, a convention of

delegates from the Southern States held at Nashville, Tenn., 10 June 1850, called to consider the slavery question and the encroachments of Northern abolitionists. The Wilmot Proviso and the Mis¬ souri Compromise were disapproved, but reso¬ lutions of open resistance advanced by Texas, South Carolina and Mississippi were voted down. The convention, which was never gen¬ erally popular, met again in November and again moderate resolutions were adopted. For text of the resolutions adopted at both meetings consult Harper's Encyclopedia of United States History) (Vol. VIII, New York 1915).

NASIK, na'sik, or NASSICK, India: (1) the capital of a district of Bombay on the Godavari, 31 miles from its source, and 100 miles northeast of Bombay. It is the headquar¬ ters of Brahmanism in the Deccan and one of the most sacred of Hindu pilgrim resorts; the banks of the river here are crowded with temples and shrines. Nasik is the Nasica of Ptolemy and was anciently a Mahratta capital. It has noted manufactures of brass and cop¬ per work, paper and cotton. Interesting relics of the religion were found in the Lena caves excavated in the 2d or 3d century a.d. Pop. about 35,000. (2) The district has an area of

5,940 square miles; pop. about 825,000.

NASMYTH, na-smith, Alexander, Scottish painter: b. Edinburgh, 9 Sept. 1758; d. there, 10 April 1840. He chose portrait painting as his specialty; became Allan Ramsay's pupil and subsequent assistant and accompanied that artist to London. He returned to Edinburgh (1779) ; and traveled in Italy (1782), where he devoted himself to landscape and historical painting. Among his works is the famous portrait of Burns in the London National Gallery; the large Eiver Scene) owned by the Society of Arts; <The Port of Leith) (1824); and (The Lawn Market> (1824) ; in 1822 he published 16 scenes described by Sir Walter Scott. His landscapes are finely composed and very impressive, though he is inferior as a painter to his son Patrick (q.v.). His style is simple, rarely striving for grand effects. His scenes are naturally pic¬ turesque and well chosen. His coloring is some¬ what weak and his execution of a neat and de¬ tailed rather than a vigorous character. The Nasmyths were an artistic race and between 1829 and 1866 no less than six woman painters of the family exhibited in London.

NASMYTH, James, Scottish engineer: b. Edinburgh, 19 Aug. 1808; d. South Kensington, 7 May 1890. He was the son of Alexander Nasmyth (q.v.). After study at Edinburgh University, he went to London in 1829, offered his services to Maudsley, founder of. a well-known engineering firm, and was appointed as¬ sistant in his private

workshop. There he re¬ mained till 1831, when he returned to Edin¬ burgh and constructed a set of engineering tools with which he began business in 1834 at

Manchester. Here he was so successful that he had soon to erect a large new workshop at Patricroft near Manchester, where he became famous as a machine constructor and inventor. Chief among his inventions was the steam-ham¬ mer, designed in 1839 and in 1842 patented in an improved form. The first hammer was con¬ structed from a view of Nasmyth's sketches by Schneider at Creuzot, in France, about 1841; but the first British one was erected by Na¬ smyth at Patricroft in 1843. Among Nasmyth's further inventions are a nut-shaping machine, a hydraulic punching-machine and a flexible shaft for driving small drills. In 1856 he retired from the firm of Nasmyth, Gaskell and Com¬ pany, which which he had founded, and devoted himself to the study of astronomy. He was the first to observe the mottled appearance of the .sun's surface known as "willow-leaves® or ((rice grains® (1860). He is author of < Remarks on Tools and Machinery > in Baker's Elements of Mechanism* (1858) ; (The Moon Considered as a Planet, a World and Sattellite) (1874), with James Carpenter, and an autobiography edited by Dr. S. Smiles (1883, latest ed. 1895).

NASMYTH, Patrick Milner, Scottish painter: b. Edinburgh, 7 Jan. 1787; d. Lambeth, London, 17 Aug. 1831. He studied under his father and developed a great talent for land¬ scape, though he labored under the difficults of ill health and a crippled right hand which neces¬ sitated the use of the left in painting. He came to London in his 20th year and made his rep¬ utation by his first picture exhibited at the Royal Academy, (A View of Loch Katrine* (1809). He invariably painted en plein air, and in his last sickness was raised on his bed that he might watch through the window the violent thunder¬ storm that was raging outside and in the prog¬ ress of which he expired. His pictures are highly valued and his (View in Surrey* sold in 1892 for $13,125.

NASO, na'so. See Ovid.

NASR-ED-DEEN, nas'r-ed-den', Shah of Persia: b. 24 April 1831; d. 1 May 1896. He was not the eldest son but the ability and in¬ fluence of his mother induced his father, Mo¬ hammed Mirza, to proclaim him his heir and he succeeded to the throne in 1848. His accession was disputed by the reformer, El Bab, but the new Shah crushed the

opposition mercilessly and became the ablest ruler that Persia had had in many years. He studied European methods of warfare and proved himself a master of finance. He crushed the insurrections which broke out in various provinces and by his occu¬ pation of Herat in 1856 provoked a war with Great Britain which was concluded in 1857. In 1873-78 and in 1889 he visited western Europe and endeavored to establish more friendly re¬ lations with England, soon, however, returning to his friendship with Russia. He favored prog¬ ress and Western civilization in so far as it did not conflict with his despotic rule and under his reign the telegraph through Persia connect¬ ing Europe and India was built. He was assas¬ sinated in 1896. Consult Morgan and Burger, (Nasr-ed-Din, Schah und das moderne Persia) (Dresden 1889) ; Greenfield, J., (Die Verfassung des persischen Staates) (Berlin 1904) ; Jackson, A. V. W., (Persia Past and Present* (New York 1906).

NASSAU, nas'sow, Joan Mauritz van

Count of Nassau-Siegen, Dutch general and statesman: b. Delft, Holland, 17 June 1604 d Cleves, Prussia, 20 Dec. 1679. He was governor-general of the Dutch possessions in Brazil in 1637-44 and had a brilliant and prosperous administration He defeated the Spanish and Portuguese and upon his return to Holland was made lieutenant-general of cavalry; in 1647 he was governor of Cleves and in 1665 commanded the army of the Netherlands. In 1671 he was madˆe field-marshal and led the forces against Louis XIV in the Spanish Netherlands He be¬ came governor of Utrecht in 1674. Consult Driesen, (Leben des Fursten J. Moritz von Nassau-Siegen) (Berlin 1849).

NASSAU, nas a, the capital of the Bahama Islands (q.v.), situated on the north coast of New Providence, the largest island of the group. The town is built on a steep hill, is well laid out and has fine government and other public buildings and handsome residences. The

cli¬ mate is mild and healthful and Nassau is a popular winter health resort for Americans and West Indians. There is a good harbor and an active general trade is carried on. The United States is represented by a consular agent. It was founded by the English in the 17th century, destroyed by the French and Spaniards in 1703 and rebuilt in 1718. It was fortified 20 years later and opened to free trade. Pop. 10,000, chiefly colored.

NASSAU, Germany, a former independent duchy, now as Wiesbaden, forming a district of the Prussian province of Hesse-Nassau (q.v.). The chief town is Wiesbaden (q.v.). The fam¬ ily of Nassau, the elder branch of which reigned till 1866, dates from the 10th century. The younger branch inherited in 1544 the prin¬ cipality of Orange, and as the princes of Orange took an important place in European history. The reigning Duke of Nassau sided against Prussia in 1866 and his duchy was in¬ corporated with Prussia. (See Prussia; Ger¬ many). On the extinction of the male line of the Orange branch by the death of William III of Holland, in 1890, the Duke of Nassau became Grand-Duke of Luxemburg.

NASSE, nas'se, Erwin, German political economist: b. Bonn, 2 Dec. 1829; d. there, 4 Jan. 1890. . He was educated in Bonn and became prominent as an economist. In 1869-79 he served in the Prussian Lower House and in 1889 became a member of the House of Peers. He founded and was president of the Verein fur Socialpolitik. He published (f)ber das preussische SteuersystenP (1861) ; (t)ber die mittelalterliche Feldgemeinschaft in England) (1869); (Agrarische Zustande in England)

(1884).

NASSICK. See Nasik.

NAST, Thomas, American caricaturist: b. Landau, Bavaria, 27 Sept. 1840; d. Guayaquil, Ecuador, 7 Dec. 1902. His mother brought him to this country in 1846. He was employed as doorkeeper in Bryant's Art Gallery, Broadway and 13th street, New York, where he spent his spare time copying the paintings. For six months he studied in a drawing class, then be¬ came a draughtsman for Frank Leslie's. In 1860 he was sent to England to draw for the Illustrated News the Heenan-Sayers prize fight;

in 1861 drew sketches of the Italian campaign; in 1862 joined the Harper's Weekly staff and by his clever cartoons soon became famous. But with his purely political and personal cari¬ catures dating from 1871-73, when he attacked the Tweed Ring in New York City, drew the money-bag head of Tweed and the first Tam¬ many tiger and largely contributed to the de¬ feat of the Ring, he came to new fame and power. He bitterly opposed Greeley in 1872, Tilaen in 1876 and Hancock in 1880, urging against each of these nominees his inevitable connection with Tammany Hall. In 1884 he attacked the Republican candidate for the only time, but with unusual bitterness. He left Har¬ per s Weekly in 1887 and in 1894 became a member of the staff of the Pall Mall Gazette. In May 1902 he was appointed United States consul at Guayaquil, where he died of yellow fever. For several years he published (Nast's Almanac,' with his own illustrations to text by various authors and illustrated (Pickwick Papers) and 'Pictures from Italy.' Nast did some oil-painting, especially of scenes in the Civil War. He was a great caricaturist, as realistic as the French masters in his groups and as dignified as Tenniel in his single figure cartoons. Consult Paine, A. B., 'Thomas Nast: His Period and His Pictures' (New York 1904) and 'Life and Letters of Thomas Nast) (ib. 1910).

NAST, William, American clergyman and editor: b. Stuttgart, Germany, 15 June 1807; d. Cincinnati, Ohio, 16 May 1899. He was edu¬ cated at Blaubeuren and studied theology at the University of Tubingen, but became a rationalist and took up literary work till 1828. He then came to America and was tutor at Duncan's Island, Pa., becoming (1830) librarian and instructor of German at West Point Mili¬ tary Academy. Resigning (1832), he became instructor of German, Greek and Hebrew at Kenyon College, Gambier, Ohio. He next (1835) joined the Methodist Episcopal Church and was appointed missionary evangelist for Cincinnati. Continuous persecution made his labor hopeless during his travels in the State and he returned (1838) to Cincinnati and founded the first German Methodist society in the United States, thus becoming the originator of German Methodism which now is in every State and extends to Germany and Switzerland. In 1839 he founded Der christliche Apologete at Cincinnati, a German organ of the Methodist Episcopal Church, being its editor for 53 years. Many German publications of the Church were edited by him. He wrote 'Wesley's Sermons,) 'Das Christentum und seine gegensatze' (1883) ; 'A Commentary on the New Testament — Mat¬ thew, Mark and Luke) (1864); (The Smaller and Larger Catechism' (1868).

NASTURTIUM, the Indian cress (Tro - pceolum majus), a climbing

annual plant, native of South America, with pungent fruits and showy orange flowers: or T. minus, a smaller species. See Tropˆeolum.

NASUA. See Coati.

NAT TURNER'S REBELLION, in

American history, a term applied to a negro in¬ surrection at Southampton, Va., in 1831. The rebellion was led by Nat Turner, a negro slave, who believed himself chosen by God to free thg

colored race. At an appointed time he set out with several hundred followers, going from house to house with the intention of killing all white persons. Before the authorities dispersed the rebels 55 persons were killed. The faithful¬ ness of many of the slaves saved the lives of many whites. Many States enacted more stringent laws governing slaves, free negroes lost their privileges, suspects were killed or mal¬ treated and the manumission movement received a staggering blow. See Turner, Nat, and con¬ sult Drewry, W. S., (The Southampton Insur¬ rection } (Washington 1900), and Weeks, (The Slave Insurrection in Virginia* (in Magazine of American History — New York, June 1891).

NATA, na'ta, in Mexican mythology, the name of a former legendary prophet, who in the "Age of Water® (Atonatiuh) escaped with his wife, Nena or Xochiquetzal, from the gen¬ eral destruction of mankind by the deluge, in a boat made from the trunk of an ahuehuete, or Mexican Cyprus tree, or according to another version, either in the hollow of the tree or on the trunk of the tree itself. The proper name of this legendary Nahuatl Noah is "Coxcox,® the term "Nata® being apparently corelative with "Tata,® the "old father,® or uncle or sim¬ ply the "old one.® The legend of Coxcox was common not only to all the Nahuatl tribes, but it was recounted bv the Zapotecas the Mixtecas and other cultured races of Mexico. Accord¬ ing to this flood legend, Coxcox and his wife landed at Mount Colhuacan (Place of the Colhuas) ; and their children increased very

rapidly; but they were all born dumb. Finally a dove took pity on them and gave them the power of speech. But they all spoke different languages. Of the descendants of Coxcox or Nata, 15 chiefs spoke the same tongue or nearly so; and from these were descended the differ¬ ent tribes of the Nahua race. According to a Michoacan version of the same myth, their deluge hero who was called Tezpi escaped in a large boat with his wife, his children and numerous animals and various kinds of grain for seed. According to still another version of this story, the people drowned in the deluge did not die but were turned into fishes ; for the earth-ocean and the sky-ocean drew near to one another and they were overwhelmed in the down-pour of the sky-waters into the earth-waters, which swallowed up even the highest mountains for an Aztec century (52 yearn).

NATAL, na'tal, Africa, an original province of the Union of South Africa, formerly a separate colony on the southeast coast, bordering on the Indian Ocean and bounded by Portuguese East Africa, the Trans¬ vaal and Orange River colonies, Basutoland and Cape Colony. Including Zululand, annexed in 1897, it has an estimated area of 35,019 square miles. In January 1903 the former Transvaal districts of Vryheid, Utrecht and part of Wak-kerstroom were transferred to Natal.

Topography. — The chief natural boundary on the land side is formed by the Drakensberg Mountains, separating it from the Orange River Colony and Basutoland. The Tugela River separates Natal proper from the Zulu country; on the southwest the Umzimkulu and Umtam-vuma partly separate it from Cape Colony. The 400 miles of coast-line contains the mouths of numerous streams, but is destitute of creeks

and bays, having only one sheltered anchorage at Port Natal (on which stands the seaport Durban), a fine circular bay completely land¬ locked, capacious enough to contain whole fleets and deep enough within to float the largest ves¬ sels. The surface is finely diversified, rising by successive terraces from the shore toward the lofty mountains on its western frontiers. The chief summits are Champagne Castle, 10,357 feet; Mont aux Sources, about 10,000 feet, and Giant's Castle, 9,657 feet. From the main chain numerous transverse branches proceed nearly ar right angles and form a series of minor water¬ sheds, separating the different streams. The mountains descend very gradually on the west and may be regarded as the abutments of a very elevated tableland, but they present pre¬ cipitous fronts to the east and are so broken by chasms and ravines that they were at one time regarded as impassable.

Hydrography. — Natal has a great advan¬ tage over most of the districts of South Africa in its abundance of perennial streams, though these are all too shallow to be navigable, while many flow through precipitous ravines and rockv gorges. The most important rivers are the Tugela, which has a course of about 150 miles, its tributary, the Buffalo or Umzinyati, being also a considerable stream; the Umvoti, Umgeni and Umkomanzi, farther to the south and the Umzimkulu, which partly separates Natal from Cape Colony.

Geology and Mineral Resources. — The

prevailing stratified rocks are sandstone and slate, often thrown into confusion and pierced by igneous rocks, particularly basalt, greenstone and porphyry, which assume the form both of continuous ridges and isolated hills and often cover extensive areas. The mineral productions are principally coal, iron-stone, limestone and marble. Coal is worked and is used on the railways and the iron-stone is also being util¬ ized. About 3,000,000 tons is the normal annual output of coal and of gold about 2,000 ounces. There are rich goldfields in Zululand.

Climate. — The climate on the whole is ex¬ tremely salubrious. On the coast the range of temperature is from 47° to 88°, giving an average in summer of 76° and in winter of about 55° ; in the interior, at the town of Pieter¬ maritzburg, the mean temperature of July, the coldest month, is 55° ; of February, the hottest, 80ˆ4°; and of the whole year, 67°. During the rainy season (October to March) thunder show¬ ers are of almost daily occurrence. Long droughts are almost unknown.

Vegetation. — Under such a climate, and with a soil of considerable fertility, vegetation is obviously vigorous. Timber-trees everywhere exist in sufficient numbers for the wants of the colony and on the western frontiers as well as elsewhere form considerable forests, for the most part unencumbered by the underwood which prevails in Cape Colony.

Fauna. — The wild animals include the leopard, hyena, tiger-cat, antelopes, jackal, ant-bear and porcupine. The hippopotamus has still his haunts in several of the rivers and there are numbers of small crocodiles; while snakes, some of them venomous, are also plentiful. The birds comprise the vulture, several varieties of eagle and the secretary-bird, *etc.*

Agriculture. — In the level districts of the interior, wheat, barley, oats,

beans and vege-

tables of almost every description have been largely and successfully grown ; but the chief crop everywhere is maize, of which even two

l°nmnmPS !l”aiscd in the year. About 2,000,000 muids (200 lbs.) is the average annual output. In many parts the vine thrives well, various fruits are cultivated and could be produced in unlimited quantities. In the coast districts, where the climate is tropical, the sugar¬ cane is cultivated with success. In similar localities tobacco, arrowroot, ginger, bananas, pine-apples, etc., also grow well. Tea has begun to be cultivated with good prospects and coffee is also grown to a small extent.

Commerce, etc.— The total value of ex¬ ports amount to about $25,000,000, wool being by far the largest, others being gold, sugar, coal ; the imports are valued at about $60,000,000, mostly manufactured goods. The railways, which belong to the government, have a length of 1,053 miles and extend into the Orange River Colony and Transvaal. Separate trade returns are not available since the establish¬ ment of the Union.

Constitution and Government. — Natal, which had been annexed to Cape Colony in 1844, was placed under separate government in 1845 and under charter of 15 July 1856 was erected into a separate colony. By this charter partially representative institutions were established and, under a Natal Act of 1893, the colony obtained responsible government. The province of Zululand was annexed to Natal in 1897. The dis¬ tricts of Vryheid, Utrecht and part of Wakker-stroom, formerly belonging to the Transvaal, were annexed to Natal in 1903. In 1910 the colony was merged in the Union of South Africa. The seat of the provincial government is Pietermaritzburg. There are an administra¬ tor appointed by the governor-general for five years and a provincial council of 25 members elected for three years, each council

having an executive committee of four, the administrator presiding at its meetings. In the Union Assem¬ bly at Cape Town Natal has 17 members.

Education. — With the exception of higher education, which is under the control of the Union, education comes under the provincial administration. There are three government high schools, two preparatory schools, 73 gov¬ ernment primary schools, two government art schools, one agricultural and trades school, five government Indian schools, two government schools for colored children, besides 107 gov¬ ernment-aided schools and 163 government-aided farmhouse schools for European chil¬ dren. Also there are two technical institutes, 34 Indian schools, 302 native schools and 17 colored schools, all of which receive govern¬ ment aid, and a considerable number of private schools in the province. Three of the aided schools are secondary schools for girls. The aggregate number of European pupils in regu¬ lar attendance at the government and inspected schools was 19,892 in 1916; the average daily attendance 86 per cent of the number on the registers. At the government high and prepar¬ atory schools there is an average dailv attend¬ ance of 1,274 pupils. About 1,500 children at¬ tend private unaided schools and it is estimated that only a very small percentage of white chil¬ dren are receiving no education. The direct government expenditure on schools for 1916

was $628,300 (excluding expenditures for fur¬ niture, buildings, but including maintenance), bees paid by pupils in government schools in the same year amounted to $114,445. The num¬ ber of European children receiving gratuitous education was 3,695. The 302 schools for natives had a total enrolment of 21,700 and re¬ ceived in 1916 grants in aid aggregating $107,935 and the 34 Indian schools had a total enrolment of 4,438, for which a grant of $28,295 was ex¬ pended.

History. — Natal owes its name to having been discovered on Christmas Day, 1497, by \ asco da Gama. In 1823 a small English set¬ tlement was formed on Port Natal. Subse¬ quently large numbers of discontented Boers from the Cape Colony entered the country as settlers. A treacherous massacre of part of the Boers by Dingaan, chief

of the Zulus, , in 1838, led to hostilities, in which Dingaan was ulti¬ mately driven beyond the frontiers.. In 1839 the Boers proclaimed themselves an independ¬ ent republic, also declaring their determination to establish diplomatic relations with European powers. The establishment of a hostile settle¬ ment at the only port between Algoa and Dela-goa bays, and at a valuable entrance from the coast to the interior of South Africa, was sc obviously incompatible with British interests that a force was dispatched from the Cape and after some fighting the Boers submitted, except a discontented section, who retired beyond the Drakensberg range. The territory was pro¬ claimed British in 1843. It formed an integral part of the Cape Colony until 1856, when it was erected into a separate colony. Its prosperity has been affected by the Kaffir troubles, as well as by the British complications with the Trans¬ vaal Boers ; and in 1899-1900 it suffered severely in the South African War (q.v.). There was a Zulu insurrection in the Tugela region in 1906, thousands of the natives losing their lives in the subsequent fighting. By referendum in 1908 Natal determined to join the Transvaal, but in the following year was admitted as an original province of the Union of South Africa. Pop. 1,108,754, including 1,011,645 native or colored and 97,109 Europeans.

Bibliography. — Barnett and Sweeney, (Na-tal : The State and the Citizen) (New York 1904) ; Doyle, A. C., (The Great Boer War) (London 1900) ; Holden, W. C., (History of the Colony of Natal, South Africa) (London 1855) ; Brooks, H., <NataP (London 1887) ; Ingram, J. F., (History of Natal and Zululand) (ib. 1897) ; Kermode, W., (NataP (ib. 1882ˆ : Holt, H. P., (Mounted Police of NataP (Lon¬ don 1913) ; Bosman, W., <The Natal Rebel¬ lion of 1906) (ib. 1907) ; Robinson, (A Life¬ time in South Africa* (ib. 900) ; Russell, (Na-tal> (ib. 1900).

J. B. McDonnell.

NATAL, Brazil, the principal seaport and capital of the state of Rio Grande do Norte, on the right shore of the Potengy River near the Atlantic, 150 miles north of Pernambuco. Notwithstanding the sand-bars at the entrance to the harbor, considerable export trade is car¬ ried on chiefly of cotton, sugar, rubber, hides, lumber, etc., about $1,000,000 annually. The United States is represented by a consular agent. Natal was originally called Cidade dos Reis. Pop. 15,000.

NATALIE, nat'a-le, a queen of Serbia: b. 14 May 1859. She is a daughter of Pierre Ivanovitch Keschko, a Russian officer, and mar¬ ried Prince Milan, afterward king of Serbia, in 1875. The marriage turned out unhappily and the union was broken in 1888, when Milan obtained a divorce. The king abdicated in the following year, and Natalie, returning to Bel¬ grade, the Serbian capital, resided there for a time with her son, King Alexander, enjoying the favor of the people; but in 1891, at the re¬ quest of the National Assembly, left the coun¬ try on account of political interests. Becoming reconciled to Milan in 1893, she resumed her former relations with the royal family; and returning to Belgrade in 1895 she was greeted by the people with every token of popularity. Her residence has since been chiefly in Biarritz, France; and after the assassination of King Alexander (1903) the political authorities at Belgrade decreed that she should not again enter the Serbian kingdom. She became a Ro¬ man Catholic in 1902.

NATATORES, an obsolete group of birds, the swimmers, artificially allied by Illiger on their likeness in pursuing an aquatic life, but structurally having relationships with several natural orders. Similar illogical groupings in the same by-gone but once popular classifica¬ tion were Clamatores, the screamers; Scan-sores, the climbers ; Cursores, the runners, *etc.*

NATCHEZ, nach'ez, Miss., city, county-seat of Adams County, on the Mississippi River, and on the Yazoo and Mississippi Valley, the Mississippi Central, the Natchez and Southern and the Saint Louis, Iron Mountain and South¬ ern and Louisiana and Arkansas railroads, 297 miles by rail and 470 miles by river from Memphis, and 214 miles by rail and 265 miles by river from New Orleans. It has steamer connection with all the Mississippi River ports. The country surrounding Natchez is chiefly devoted to livestock and agri¬ culture; cotton is the principal product. The principal industries of the city are packing plants, box factory, cotton mills, broom fac¬ tories, oil mills and candy factories. It has ice factories, planing mills, foundries, machine shops and furniture factories. Natchez has a large trade in cotton, shipping each year thou¬ sands of bales. Considerable rice and sugar¬ cane are shipped from this port. The city has a Confederate Memorial Park, Baker Grand Theatre, Duncan Memorial Park and public buildings, Institute Hall, several excellent hotels and a large

number of handsome residences. It is the seat of Jefferson Military College; Natchez Institute; and Natchez College (col¬ ored) ; has good public and parish schools, the Fisk library and the Carpenter Public Library. Natchez has one Associated Press paper. There are four orphanages, a charitable hos¬ pital, three sanatariums and a number of private schools. The government, in accordance with the charter of 1877, is vested in a mayor, who holds office two years, and a council. The school board are elected by the council. The waterworks are municipal property. The city is built on a bluff about 200 feet above the river. On this bluff was located the first settle¬ ment, by Bienville, who built here Fort Rosalie in 1716. The place was destroyed and many of the inhabitants murdered, in 1729, by the

Natchez Indians. The fort came into posses¬ sion of the English in 1763, when the name was changed to Fort Panmure. In 1779 the Span¬ iards took possession, and in 1793 the United States became undisputed owner of lands east of the Mississippi, which included Natchez and much of the adjacent territory. From 1798 to 1820 Natchez was the capital of Mississippi; in 1803 it was incorporated as a city. During the Civil War the city suffered considerable loss of property and damage. In 1862 Commodore Porter shelled the city, and in 1863 Federal troops took possession and retained control un¬ til peace was declared. On a bluff just outside the city limits is a national cemetery and an observatory affording extensive views. Pop.

15,000.

NATCHEZ, na-chaz, Les, a romance by Chateaubriand, published in 1825-26, many years after the author first planned it. The work was written during his exile in England, long after his journeyings in America, of which country it contains his views as well as setting forth his psychological speculations and philoso¬ phy of life.

NATCHEZ INDIANS. See Creeks.

NATCHITOCHES, nach-i-toch ez, an American Indian tribe formerly living along the banks of the Red River, in Louisiana. They were driven from their homes by the Natchez and united with the Caddoes in 1731. They made homes in rough dwellings covered with sod. Certain phases of their religious practices demanded human sacrifice.

NATCHITOCHES, nak-i-tosh’, La., town, parish-seat of Natchitoches

Parish, on a short stream which flows into the Red River, and on the Texas and Pacific Railroad, about 150 miles in direct line northwest of Baton Rouge. The town is on the site of what was once a French trading post established in 1714. It is situated in an agricultural region in which the chief products are sugarcane and cotton. Consider¬ able attention is given to stock-raising. The principal industries of the town are connected with the shipment of the agricultural products and livestock. It is the see of a Roman Catho¬ lic bishop, and there is a State Normal School and Saint Mary's Academy (R. C.) ; it has a high school, public and parish elementary schools. Pop. 2,600.

NATHAN, Hebrew prophet in the time of David and Solomon. He was in his dav the latest direct descendant and representative of the school of the prophets under Samuel. Saint Jerome mentions a Jewish tradition which iden¬ tifies him with the eighth son of Jesse, but there is no ground for this supposition. His earliest appearance in the history of David is as the king's counsellor, first advising the building of the temple and then after a vision announcing that the time had not yet come (about 1010 b.c.). His power, eloquence and tact as a prophet are shown by his exquisite apologue of the ewe lamb which brought David to a sense of his guilt in the case of Bathsheba (1000 bc.). On the birth of Solomon the prophet named the child Jedidiah, <(friend of the Lord,® and was entrusted with his education. When the end of David's reign approached Nathan advocated the succession to Solomon, counseled Bathsheba to secure it, and rebuking the in¬ difference of the king obtained his presence

and assistance at the inauguration of his suc¬ cessor (9/7 b.c.). Nathan's sons occupied high posts m the new court, Nabud being «the king's friend® and principal officer or chamberlain, while Azariah was over the ˆtwelve officers which provided victuals for the king and his household." It was in accordance with the counsels and suggestions of

this prophet that David, the year after his son's accession, crowned the work of his life, as poet, musician and promoter of a rich temple ritual, by in¬ troducing into public worship an orchestra of Levites. Eccles. ix, 14-16, a passage attributed to Solomon, is evidently an imitation of 2 Sam. xii, 1-4, which shows how the influence of Nathan was perpetuated in the literature of succeeding ages. In I Chron. xxix, 29, and II Chron. ix, 29, he is mentioned as historian of the reigns of David and Jonathan He died about 935 b.c., and his grave is still pointed out at Halhul, five miles north of the ancient Hebron. An echo of his parable of the rich man with many flocks is found in the Koran Sura xxxviii, 20-25.

NATHAN, George Jean, American dra¬ matic critic and magazine editor: b. Fort Wayne, Ind., 15 Feb. 1882. He was educated at Cornell University and entered journalism in 1904. In 1906 he became dramatic critic to the Bohemian Magazine, in 1908 to Harper's Weekly, and in the same year to The Smart Set. Since 1906 he has contributed articles on the current drama to many other magazines, and has also written for a newspaper syndicate. In 1914 he became part owner of The Smart Set and joint editor with H. L. Mencken (q.v.). His publications in¬ clude (Europe After 8.15. *with H. L. Mencken and W. H. Wright (1914) ; (Another Book on the Theatre) (1916) ; (Bottoms Up) (1917) ; (Mr. George Jean Nathan Presents* (1917) ; (A Book Without a Title* (1918) ; (The Popular Theatre* (1918); (Comedians All* (1919); (The American Credo,* with H. L. Mencken (1920) ; (Heliogabalus,* a play, with H L. Mencken (1920). Another play (The Eternal Mystery,* was produced in 1913. Nathan's criticism is marked by a pungent and original style, an in¬ dependence of all academic standards, and an extensive knowledge of dramatic literature, par¬ ticularly the foreign. His reviews are fre¬ quently republished in France, and he has been praised by Gordon, Craig as the ablest of American dramatic critics.

NATHAN, Maud, American reformer: b. New York, 1862. She was educated at private school and Green Bay, Wis., High School. In 1880 she married Frederick Nathan; was speaker before the International Congress of Women, in London (1899), at Berlin (1904) and International Peace Congress, New York (1907), and International Conference of Con¬ sumers' Leagues, Geneva (1908). In 1908 she was also a delegate at the International Con¬ gress for Labor Legislation, Lucerne (1908), since which she has preached and lectured in the principal cities of the country. She was a delegate to the International Woman Suffrage Convention at Stockholm (1911) and at Buda¬ pest (1913) and numerous other conferences abroad. She has been president of the Con¬ sumers' League of New York (1897-1917) and

vice-president of the National Consumers' League.

NATHAN THE WISE. Lessing's imme¬ diate occasion for writing (Nathan der Weise* (<(Nathan the Wise,** 1799) was the necessity of finding a form, to which the censor could take no exception, for final utterance of some sentiments on the subject of personal religion which he had very much at heart. During a controversy with the Pastor Goeze in Hamburg he had had abundant experience of the Pharisaical . intolerance of the Lutheran ortho¬ doxy of his day ; and, on the other hand, his dear friend Moses Mendelssohn gave him an example of one of the gentlest, most enlight¬ ened of spirits in a member of a despised and persecuted sect. The idea of a dramatic poem on the subject of (Nathan* goes back, how¬ ever, some 25 years before this time.

The central motif Lessing adapted to his purposes from one of the stories of Boccaccio ((Decameron,* first day, third novel) : Saladin, desiring to extort money from the Jew Mel-chizedek, invites him to declare which is the true religion. The Jew begs leave to tell a story: a father, possessed of a precious ring and having three sons equally dear to him, causes two rings to be made so nearly like the true one that he himself can hardly tell which is which, gives each son one ring, and nobody can decide who is heir of the original. So it is with the three principal religious faiths. Les¬ sing's version attributes to the true ring the special virtue of making its wearer acceptable in the sight of God and man, provided he wears is confident of that effect. Proof, then, for each son that his ring is genuine will appear in the use that he makes of it. The moral is obvious: faith is the working out of salvation, not the possession of the truth. And from this follows a sufficient principle of conduct : act so as to deserve, and the right that you earn is right indeed, so far at least as any human being can judge. Translated by Ellen Frothingham (New York 1892), and by E. K. Corbett (Lon¬ don 1883). Edited by G. O. Curme (New York 1898) and by J. C. Robertson (Cam¬ bridge, England 1912).

William G. Howard.

NATHANAEL, one of the earliest believ¬ ers in and follower of Christ. He was a native of Cana in Galilee and attached himself to Jesus on becoming convinced of the Messiah-ship of the son of Mary by his miraculous in¬ sight and power of reading the heart (John i, 46-49). On the hypothesis that he was one of the 12 he has been identified with Bartholo¬ mew, but on insufficient grounds. There is a tradition

that Nathanael was the bridegroom at the marriage at Cana, and Epiphanius im¬ plies that he was one of the two disciples whom Jesus overtook on the way to Emmaus.

NATHORST, nat'horst, Alfred Gabriel,

Swedish scientist: b. Waderbrunn, near Nykop-ing, 7 Nov. 1850. He studied at Lund and Upsala, served (1874) as privat docent in geology at Lund and (1873-84) as geologist on the royal Swedish geological research, becoming (1885) intendant of the palaeontological plant collection of the Stockholm Riks Museum. In 1870 and 1882 he was exploring in Spitzenber-gen and (1873-84), in south and central Sweden. In 1883 he accompanied the Nordenskiold expe¬ dition to Greenland and (1898) led an Antarctic

expedition. His researches in the field of glacial flora fossils were very fruitful. He wrote (Jordens historia) (Stockholm 1888-94) ; (Sveriges Geologi) (ib. 1892-94) ; (Zur fossilen Flora der PolarlandeD (ib. 1894 —) ; (Tva somrar, i Norra IshafveC (ib. 1901) ; (Polar-forskingen) (ib. 1902). He also edited (1895— 98) the periodical Ymer.

NATICA, a genus of sea-snails, forming the type of the family Naticidce. The shell is globose in form, the spiral portion being minute aˆd indistinctly marked, smooth and porcelain¬ like and its aperture of large size and semi¬ circular form. The animal appears large in proportion to the shell, the foot especially being extensive. The mantle-lobes partly conceal the shell, and an operculum is always present. Most of the genera of this family are marine, and the white, chalky N. heros is a familiar species all along the eastern coast of the United States, and lays its eggs in a collar-shaped mass of glutinous material mixed with sand which often excites the curiosity of the stroller by the sea¬ side. This shell is the one most frequently chosen by our hermit-crabs. It may attain a diameter of three and a half inches and a length of five inches. South of Cape Cod noticon duplicata is common. Consult Arnold, (The Sea-Beach at Ebb Tide> (1901).

NATICK, na'tik, Mass., town in Middlesex County, on the Charles River and on the Boston and Albany Railroad. The head of Cochituate Lake, one of the sources of the water supply of Boston, is in the northwest part of the town. The place was founded by John Eliot (q.v.), and from 1651 to the time of the founder's death it was used chiefly as a home for converted Indians. In 1781 it was in¬ corporated as a town. The chief manufactures are shirts, men's clothing, boots, shoes edge tools, boxes, baseballs and supplies for athletic games. A monument in honor of John Eliot is in one of the public parks and a soldiers' mon¬ ument in another park. Some of the educa¬ tional institutions are the Morse Institute, the Walnut High School for young women and the Bacon Public Library. Pop. 10,907. Consult Hurd, (History of Middlesex' County, Massˆ ; Bacon, (History of Natick. >

NATION. See Nationality; National¬ ism.

NATIONAL ACADEMY OF DESIGN.

An American association devoted to the fine arts, membership in which is limited to 125 painters, 25 sculptors and 25 architects and en¬ gravers. In 1906, joined by the Society of American Artists (q.v.), the National Academy became affiliated with Columbia University and the Metropolitan Museum of Art. The school of design conducted since 1825 in connection with the academy, in recent years is located at Amsterdam avenue and 109th street and is open for instruction from October to May; the home and exhibition building of the so¬ ciety is at 215 West 57th street. The instruct¬ ors in the school are selected from the gov¬ erning council of the academy, which consists of its officers and six members. The average annual attendance of students is between 200 and 300. The annual exhibitions of the Na¬ tional Academy are features of the art life of the metropolis, interest being focussed on the

awards of the Inness gold medal for the best landscape, the Hallgarten prizes respectively of $300, $200 and $100, and the Clarke prize of $300. First known as The New York Draw¬ ing Association, a secession in 1825 of young artists from the first academy of arts in New York founded in 1802, the present name was adopted in 1828 when the society composed of 30 members with Prof. S. R. Morse (q.v.) as president, was incorporated. Consult Cum¬ mings, T. S., (Historic Annals of the National Academy of Design) (Philadelphia 1865) ; Catalogues of the Annual Exhibtions (New York 1826, to date).

NATIONAL ACADEMY OF SCI¬ ENCES, The, an American institution, founded in 1863 and consisting of ˆmembers elected from among the most distinguished scientific men of the United States ; analogous to the Royal Society of London.

NATIONAL APPROPRIATIONS. See

Appropriations, American System of ; Bud¬ gets, American.

NATIONAL ASSOCIATION OF COR¬ PORATION SCHOOLS, The. In 1911 The

New York Edison Company established a com¬ mercial school to correct faulty fundamentals of employees of that company; to train em¬ ployees in the duties they were then perform¬ ing, and for more advanced work. As the movement progressed there was publicity in

the New York press which resulted in a large number of inquiries from members of indus¬ trial institutions throughout the United States' as to : (1) Why the school was established.

(2) What was taught in the school. (3) What results had been attained.

The volume of such requests led to the con¬ clusion that there was need for a clearing¬ house to which those interested might con¬ tribute and from w'hich they might secure in¬ formation. This plan was discussed by the organizer and a few acquaintances who were interested in the subject of better education and better training for the workers of the United States.

After several months of preliminary effort an organizing convention was held at New York University on 24 Jan. 1913; 35 industrial institutions sent delegates. A provisional or¬ ganization was perfected and officers chosen.

On 4 April following the executive com¬ mittee met, declared the charter closed and The National Association of Corporation Schools was a reality. In the fall of 1913 the first an¬ nual convention was held in the Hall of Edu¬ cation of the National Cash Register Company at Dayton, Ohio, and in 1914 the annual con¬ vention was held in the auditorium of the Curtis Publishing Company in Philadelphia. The 1915 meeting was held at the Hotel Ban¬ croft in Worcester and in 1916 convention at the Carnegie Institute of Technology in Pitts¬ burgh. In 1917 the association met as the guests of the Larkin Company at Buffalo. The 1918 convention was scheduled to be held in Chicago, but upon the entrance of the United States into the World War the association pledged its members and its resources to the government. Because of the peculiar fitness of membership nearly all of the active workers were taken into government service in some

capacity, which prevented the meeting at Chicago.

The commercial school established by The New York Edison Company

was not the first corporation school in the United States. There are different claims as to where the first school of this character was held. The Penn¬ sylvania Railroad Company, prior to the Civil War, held conferences at its Altoona shops, and the Werner Book Publishing Company of Akron, Ohio, held conferences of its salesmen. Other industrial institutions have come forward with claims of having established schools, but the most authentic information regarding edu¬ cational activities on behalf of employees of an industrial institution indicates that the first school to be called a school, inaugurated by an industrial institution was held by the National Cash Register Company in April 1896. This school has been convened more or less consecu¬ tively from that time on down to the present date.

The growth of the Association has been steady, and now embraces in membership a total of 117 industrial institutions, including over 70 different branches of the industries of the United States.

NATIONAL ASSOCIATION OF MAN¬ UFACTURERS, The. A convention, con¬ sisting of several hundred representative Amer¬ ican manufacturers, met in Cincinnati, Ohio, 22 Jan. 1895, and provided for the organization of a national association of manufacturers. At the first annual convention of the Associa¬ tion held in Chicago 21 Jan. 1896, the name ((The National Association of Manufacturers of the United States of America® was adopted, a preamble setting forth the objects of the Association was published, and a constitution was adopted. The constitution has been re¬ vised, elaborated and amended several times to cover the constantly expanding activities of the Association, and in 1908 a new constitution was adopted.

The general objects for which the Asso¬ ciation works are: (1) the promotion of the industrial interests of the United States; (2) the fostering of domestic and foreign com¬ merce; (3) the betterment of the relations be¬ tween employers and their employees; (4) the education of the public in the principles of individual liberty and the ownership of prop¬ erty; and (5) the support of legislation ad¬ vancing development along the lines above de¬ fined, and opposition to legislation retarding it.

To the individual manufacturer the Asso¬ ciation offers its trained and practical assist¬ ance in supplying accurate and reliable infor¬ mation on pertinent subjects, and organized protection against abuses and unlawful and unjust exactions, unbiased mediation in cases of dispute, and the furtherance of cordial rela¬ tions between the several members.

The foreign trade department has been highly organized in three divisions devoted to (1) Latin-American trade; (2) Russian trade and (3) Far-Eastern trade; and in six bureaus devoted to general information; foreign buy¬ ers; credits; translations; trademarks and pub¬ licity. These are in charge of a staff of ex¬ perts in the several lines, and are in constant communication with a corps of over 2,000 cor¬ respondents located in every city and town of

commercial importance in all foreign lands. To the individual member of the Association the foreign trade department offers quotations and suggestions from foreign markets; con¬ fidential reports on foreign trade opportunities ; advice as to advertising, financing foreign ac¬ counts, foreign collections, *etc.* ; reports on the financial standing of foreign firms; translations of foreign letters ; information as to the cus¬ toms duties of all countries and shipment thereto ; registration of trademarks, *etc.*

The law department is devoted strictly to matters which pertain to the. pursuits of the Association, and aims to keep its members fully abreast of all decisions and interpretations of the law which can in any way affect their business interests.

In the home department the Association has a number of committees specializing on health and safety ; industrial betterment ; industrial publicity ; industrial education ; immigration ; banking and currency; trade acceptances; uni¬ form State laws and foreign trade.

Through its business corporation, ((The National Manufacturers' Company,® the Asso¬ ciation publishes a monthly magazine under the title American Industries, and issues periodic¬ ally The American Trade Index containing alphabetically paragraphs concerning the busi¬ ness and products of its several members. These are indexed in several foreign languages and are sent to prominent merchants and buy¬ ers in foreign countries. Nearly 44,000 copies of this index have been thus distributed.

The membership consists of individuals, firms and corporations actually engaged in manufacturing. The executive officers, the president and the treasurer are elected annually by ballot and the secretary is appointed an¬ nually by the executive committee. The execu¬ tive committee consists of the president, the treasurer, secretary, a vice-president from each of the 12 States having the largest recorded membership in the Association upon election day of

its annual convention, and six members at large elected by the executive committee as thus constituted. The members paying the same annual dues, $50, are exactly similar in voting power in the annual conventions, and the democracy of management is still further se¬ cured by the choice of vice-presidents by the different State delegations attending the annual convention. The entire income of the Associa¬ tion is expended in the interest of its members; the president, vice-presidents and the directors serve without compensation. The Association maintains an extensive reference library at its general offices in New York City.

NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TU¬ BERCULOSIS, The, an organization com¬ posed of prominent American physicians who are especially interested in preventing the fur¬ ther spread of consumption. The headquarters are at 105 East 22d street, New York.

NATIONAL BANKING ACT. See Banks and Banking.

NATIONAL BANKING SYSTEM. See

Banks and Banking — National Banking System.

NATIONAL BANKS. See Banks and Bankinc — National Banking System (Arti-

cle 9) and Bank Organization and Manage¬ ment.

NATIONAL BOARD OF HEALTH, The, a Federal body, instituted by Act of Con¬ gress, 3 March 1879, to consist of 11 members — one army surgeon, one navy surgeon, one medi¬ cal officer of the marine hospital service, one officer of the Department of Justice and seven physicians from civil life appointed by the President. Industrial development had ren¬ dered all sections of the country interdependent in matters of health, and isolation was no longer possible. At the period of the passage of the Act of Congress there were only State and local systems of quarantine in existence in the United States, and Congress did not re¬ gard them as adequate to meet all the emer¬ gencies that had arisen or that might arise in the

prevention of the introduction of contagious and infectious diseases from foreign countries. The Act was designed to establish a complete and effective system of quarantine to the United States. National authority was re¬ quired to secure : (1) International sanitary cooperation; (2) the collection and distribu¬ tion of sanitary information; (3) the prepara¬ tion of maritime sanitary regulations; (4) the enforcement of maritime sanitary inspections in foreign ports; (5) the erection and mainte¬ nance of refuge stations ; (6) the aid of State authorities; (7) the organization of quarantine where none exists; (8) the power to add neces¬ sary rules to any deficient quarantine. A fur¬ ther act (2 June 1879) defined the powers and duties of the Board and transferred to it the quarantine work formerly conducted by the Marine Hospital Service. This Act limited the duration of the Board to four years so that it expired by limitation 2 June 1883. Its work was carried on during 1884 and 1885, when, the appropriation being exhausted, its activities ceased.

The work is now performed by the Bureau of the Public Health Service under the direc¬ tion of the surgeon-general, and as a part of the Treasury Department. Consult Allen, (Rise of the National Board of Health) (1899).

NATIONAL BOUNDARIES. See

Boundaries of the United States.

NATIONAL BOUNDARY CHANGES.

For the decisions and awards of the Peace Conference relating to the various nations, see War, European.

NATIONAL BUDGETS. See Budgets, American ; Appropriations, American System

OF.

NATIONAL CEMETERIES are burial

grounds, instituted by Act of Congress, for the interment of United States soldiers and sailors who have fallen in battle or all men and women who have died in the regular or volunteer military or naval service of the United States after having been mustered out or honorably discharged. The presentation of the commission warrant, letter of appoint¬ ment, certificate of discharge or pension cer¬ tificate, provided there be no dishonorable charges connected therewith, are sufficient evi¬ dence for interment. Wives of officers

and en¬ listed men may be interred in national ceme¬ teries, according to certain regulations. Na¬

tional cemeteries are under the charge of the quartermaster-general, who is represented by the officer of the corps nearest to the cemetery. There are 84 cemeteries, all of which are within the continental limits of the United States, ex¬ cept one in Mexico. The following is a list

of national cemeteries :

Alexandria, La.

Alexandria, Va.

Andersonville, Ga.

Andrew Johnson, Greenville, Tenn.

Annapolis, Md.

Antietam, Sharpsburg, Md. Arlington, Va.

Balls Bluff, Leesburg, Va. Barrancas, Fla.

Baton Rouge, La. Battleground, Washington, D. C.

Beaufort, S. C.

Beverly, N. J.

Brownsville, Tex.

Gamp Butler, Ill.

Camp Nelson, Ky.

Cave Hill, Louisville, Ky. Chalmette, La.

Chattanooga, Tenn.

City Point, Va.

Cold Harbor, Va.

Corinth, Miss.

Crown Hill, Indianapolis, Ind.

Culpeper, Va.

Custer Battlefield, Grow Agency, Mont.

Cypress Hills, Brooklyn, N. Y.

Danville, Ky.

Danville, Va.

Fayetville, Ark.

Finns Point, Salem, N. J. Florence, S. C.

Fort Donelson, Dover, Tenn. Fort Gibson, Okla.

Fort Harrison (Varina Grove, Va.).

Fort Leavenworth, Kan.

Fort McPherson, Maxwell, Nebr.

Fort Scott, Kan.

Fort Smith, Ark. Fredericksburg, Va. Gettysburg, Pa.

Glendale, Va.

Grafton, W. Va.

Hampton, Va.

Jefferson Barracks, Mo. Jefferson City, Mo.

Keokuk, Iowa.

Knoxville, Tenn.

Lebanon, Ky.

Lexington, Ky.

Little Rock, Ark.

Loudon Park, Baltimore, Md. Marietta, Ga.

Memphis, Tenn.

Mexico City, Mexico.

Mill Springs, Nancy, Ky. Mobile, Ala.

Mound City, Ill.

Nashville, Tenn.

Natchez, Miss.

New Albany, Ind.

Newbern, N. C.

Philadelphia, Pa.

Poplar Grove, Petersburg, Va.

Port Hudson, La.

Quincy, Ill.

Raleigh, N. C.

Richmond, Va.

Rock Island, Ill.

Salisbury, N. C.

San Antonio, Tex.

San Francisco, Cal.

Santa Fe, N. Mex.

Seven Pines, Va.

Shiloh, Pittsburg Landing, Tenn.

Soldiers' Home, Washington, D. C.

Springfield, Mo.

Saint Augustine, Fla. Staunton, Va.

Stone River, Murfreesboro, Tenn.

Vicksburg, Miss.

Wilmington, N. C. Winchester, Va.

Woodlawn, Elmira, N. Y. Yorktown, Va.

NATIONAL CITY BANK OF NEW YORK, The, chartered 16 June 1812, under ((An Act to incorporate the stockholders of the City Bank of New York,0 was directly related to the dissolution of the first Bank of the United States, the charter of which, dated 1791, had expired in 1811, and was not extended, owing to political opposition to the Bank of the United States. The closing of the bank creating a need for a new strong banking insti¬ tution in the metropolis, the directors of the City Bank of New York arranged that the holders of stock in the Bank of the United States might exchange that stock, upon equi¬ table terms, for stock in the City Bank, and this offer was availed of to the extent of 10,000 shares, or $500,000 par value, of City Bank stock. As this comprised more than a majority of the original capital, the City Bank may be fairly said to have been a direct off¬ spring of Alexander Hamilton's Bank of the United States. It opened for business in the banking-room that had been occupied by the New York branch of the Bank of the United States, at 52 Wall street, and remained in that location until it moved in 1908 into its present home, a handsome modern structure with a perfect equipment at 55 Wall street. 'The authorized capital of the bank was $2,000,000

in shares of $50 each, but it commenced busi¬ ness with $800,000 of capital paid up. Upon the establishment of the national banking sys¬

tem the bank surrendered its State charter and entered the new system as The National City Bank of New York. The efforts of successive management have always been energetically directed toward broadening and perfecting the service of the institution for the accommodation of the rapidly expanding business interests of the United States. Accordingly, in the half-cen¬ tury ending 1 Jan. 1921, the bank's surplus increased 6,000 per cent, its deposits 14,100 per cent and its total resources 14,800 per cent. The statement of condition 30 June 1921 showed capital $40,000,000, surplus and undivided profits $64,460,411.14, deposits $609,665,823.04 and total resources, the greatest of any bank in the Western Hemisphere, $868,046,166.25.

The bank has been active in developing American foreign trade, and was the first American national bank to establish foreign branches. With the International Banking Cor¬ poration, which it owns, The National City Bank now has more than 75 branches in all parts of the world.

In June 1921, following its absorption of the Commercial Exchange National Bank, The Na¬ tional City Bank opened three branches in New York City. During the previous 109 years, its sole place of business in New York City had been at its head office, located in Wall street.

In 1911 the directors of the bank declared a special dividend of $10,000,000, this sum be¬ coming the capital of The National City Com¬ pany, which buys and offers for sale select issues of bonds and short term notes. All of the stock of The National City Company is owned by the stockholders of The National City Bank of New York.

More than 7,000 employes are required to do the work of The National City Bank, The Na¬ tional City Company and the International Banking Corporation in all parts of the world. Connected with the clerical force is the City Bank Club organized in 1904, and now number¬ ing practically all employees as members.

NATIONAL CIVIC FEDERATION, The, an American organization, founded 16 Dec. 1901, the outgrowth of a number of local con¬ ventions representing capital and labor. Its purpose is to seek, by an organization of the best thought in the country, a solution of indus¬ trial problems; to assist in the enlightening of public opinion through study and discussion of national questions ; and to promote progressive social and industrial legislation when it seems desirable. It is entirely non-partisan in prin¬ ciple, considering such topics as

imperialism, trusts, tariff, taxation, etc., with a view of ob¬ taining the clearest understanding of them. The Federation is controlled by a national executive committee of three factors : the pub¬ lic, represented by the church, the bar, the press, statesmen and men of affairs ; employers, represented by large manufacturers, corpora¬ tion heads and officials of employers' organiza¬ tions; and labor, represented by official mem¬ bers of labor organizations. This committee, numbering 54, meets annually, or at such other times and in such localities as may be deemed advisable. Its membership consists of men from all parts and of all occupations of the

country, including a large number prominent in the various pursuits of life.

In the natural expansion of its activities the work of the Federation has been very highly organized under nine general departments, as follows: (1) Trade Agreement Department,

devoted to the advancement of industrial peace ; (2) Industrial Conciliation Department, dealing particularly with actual or threatened strikes or lockouts, the adjustment of labor disputes by arbitration and the creation of definite con¬ tractual relations between employers and em¬ ployees; (3) Industrial Economics Department, devoted to the study and discussion of the prac¬ tical phases of economics as applied to indus¬ trial problems ; (4) Industrial Welfare De¬ partment, with the duty of promoting sanitary working conditions, technical training, housing of employees, the conduct of insurance and pension systems and savings and loan opera¬ tions, etc.; (5) Public Employees Welfare Department, devoted particularly to the eco¬ nomic benefit of that much neglected class of workers ; (6) Public Ownership Commission, assigned to the study of the results of public ownership of public utilities in all countries ; (7) Immigration Department, concerned with the questions arising from immigration, gov¬ ernmental regulations and safeguards of the country at large, and individual localities in particular; (8) Political Reform Department, devoted to the teaching of practical non-parti¬ san politics, the enlightenment of voters and the promotion of active participation in civic and national politics; (9) Woman's Depart¬ ment, in which nearly all the members are women who are actively interested in industrial enterprises as stockholders, and in active wel¬ fare work, such as prison reform, rural better¬ ment, community nursing and the like.

Under the general departments there are committees almost without number assigned to carefully deliminated lines of investigation and operation, their members selected especially for notable aptitude in their specific subjects. With the entrance of the United States into the great war, the Federation has found an entirely new series of problems presenting, and its member¬ ship has furnished well-equipped minds to at¬ tack them intelligently and effectively.

Within recent years the work of the Fed¬ eration has been intensively developed by the organizations of State councils all over the country, to aid in unifying laws on intrastate matters and to further co-ordination of State and Federal legislation on subjects of public welfare.

At the present moment the industrial eco¬ nomics department has under way a compre¬ hensive survey of social and industrial condi¬ tions under 26 separate committees, each com¬ posed of members specializing in the particular phase of the investigation to which they are

assigned. , .

The chief mission of the National Civic Federation being educational, one of its most important functions is to give publicity to its labors. This duty is assigned to a bureau of publicity, which besides issuing large numbers of pamphlets and leaflets for general distribu¬ tion conducts a monthly magazine, The Na¬ tional Civic Federation Review, in which is preserved the records of results achieved by the several committees.

NATIONAL CONFERENCE OF CHARITIES AND CORRECTION, an

American association composed of State boards of public charities and various charity organiza¬ tions. The national conference is held each year in some city determined upon at a preced¬ ing meeting. At these conferences papers are read and general subjects embraced under char¬ ity and correction are discussed. The Confer¬ ence publishes its Proceedings and a National Bulletin annually, and maintains a bureau of information on all subjects concerning charities and corrections.

NATIONAL COVENANT, a league formed by Scotch Presbyterians in 1638. See Covenant.

NATIONAL CONVENTION, in France, a legislative body constituted in the hall of the Tuileries 17 September and formally opened 21 Sept. 1792. The third assembly of the deputies elected by the French people after 1789 decreed the suspension of the king 10 Aug. 1792, and voted the election of this National Convention. Its first act was to make France a republic by abolishing the throne, and this was followed by the trial and sentence to death of the king. In¬ ternal dissensions arose between the Jacobin or Montagnard party and the Girondists, resulting in the overthrow of the latter. The convention sent thousands of its political opponents to the guillotine, and the Reign of Terror under the dictatorship of Robespierre was followed by his downfall and the suppression of the Jacobins. The convention then existed till a new con¬ stitution was organized, and the executive directory was installed at the Little Luxem¬ bourg, 1 Nov. 1795. The Chartists in England formed a national convention in 1839. In the United States a national convention is the meeting once in four years of a political party assembled to select a Presidential ticket. See Election.

NATIONAL CONVENTIONS. See

Convention, Political.

NATIONAL DEBTS OF THE WORLD.

Debt incurred by the nations has developed with startling rapidity in recent years. National debts in the year 1700 were, as nearly as can be determined, about $1,000,000,000, and in 1800 approximately $5,000,000,000. By 1900 they had grown to $31,000,000,000. At the beginning of the great European War in 1914 they were about $45,000,000,000, and in 1921 were approxi¬ mately $325,000,000,000.

The first great increase in national indebted¬ ness of the modern period was that caused by the Napoleonic Wars, which in 15 years in¬ creased the national debts of the world from $2,500,000,000 to over $7,000,000,000. From 1814 down to the middle of the century, a period of comparative peace, the growth of the national debts was slow, the total of all the debts of the countries for which statistics are available having been in 1850 approximately 9 billions, a net increase of but about 2 billions in 35 years. Then came the heavy expenses of our own Civil War, also of the Crimean, Franco-Prussian and other

wars, and by 1874 the world's total stood at 22ˆ4 billion dollars. By 1900 it was 31 billions, and at the beginning of 1914 45 billions. Then with the demands of the European War upon the nations participat¬

ing the already large total was practically quintupled, advancing from 45 billions in 1914 to about 225 billions in 1919, and this does not include the large sums of paper currency issued by the warring nations to meet such part of their current requirements as they were unable to provide by bond issues.

While wars are usually looked upon as the great cause of the rapid growth of national in¬ debtedness in the past century, a careful con¬ sideration of the history of this growth shows that much of the increase prior to 1914 was due to other causes. In the 40 years between 1874 and 1914, in which national indebtedness grew from 22j4 billions to 45 billions, there were few costly wars. The great European nations increased their standing armies and navies, this armed peace adding greatly to their expenses and in some cases to their indebted¬ ness. There were, however, other causes. The period was one of great activity in develop¬ ment of the new areas of the world. South America, Africa, Canada, Mexico, Australia and New Zealand show a rapid development in that period, in railways and other trans¬ portation facilities, and a large proportion of such development was met by the governments, which necessarily contracted large loans for that purpose. In many of the European coun¬ tries great railway systems were developed at government expense, which necessitated large borrowings. The railways of the whole world in 1874 were about 150,000 miles, and in 1914 over 700,000 miles, of which about one-third was government owned. Telegraphs, owned in most countries by the government were in 1874 but 300,000 miles and in 1914 1,500,000 miles. Many public improvements other than railways and telegraphs were also made at public expense. Harbors were deepened, rivers made navigable, interoceanic canals created, great and costly buildings erected and as the debt grew, so did the burden of interest.

Other causes, however, contributed largely to the (<debt habitw among nations. Among these contributive factors were the increase of world money, and increase of wealth, which made borrowing by nations comparatively easy when contrasted with earlier conditions. Down to 1848 the world's production of gold was but about 12 million dollars per annum, in 1860 it was 122 millions per annum, in 1900 it amounted to 254 millions and in 1913 to 460 millions. The

total money of the world, gold, silver and uncovered paper, as estimated by competent authorities, was in 1800 about 2*4 billion dollars, in 1850 a little over 4 billions, but by 1900 had grown to 12 billions, and in 1913 was 18 billions. The world's money — gold, silver and uncovered paper — practically trebled in the 40 years in which the national debts doubled and this increase in available currency encouraged the borrowing habit among nations. With the entrance upon the European War the issues of paper currency rapidly in¬ creased, the paper money issued by 15 respon¬ sible governments of the world during the war period aggregating $36,000,000,000; and during lhat same period national debts increased $180,- 000,000,000, bringing the total national indebted¬ ness up to $225,000,000,000 in 1919.

The quantity of available wealth to which nations might appeal was another temptation.

Borrowing became comparatively easy. It is quite impossible, of course, to accurately measure the wealth of the entire world, especially at the earlier dates under consideration, for even at the present time we can only estimate the wealth of a score of the principal nations, but an examination of the wealth figures of a few countries for which data for earlier years can be had shows an extremely rapid growth in the last 40 years, and suggests that the available wealth of the world upon which the nations requiring loans were able to draw had very greatly increased during that period in which they developed great debts for other than war purposes. The wealth of the United King¬ dom, for example, is estimated as having been about 30 billion dollars in 1865 against 90 bil¬ lions in 1914; that of France is estimated at 25 billions in 1865 and 65 billions in 1914. Thus the wealth of these two fairly representative coun¬ tries of Europe, speaking in broad terms, trebled in the half century immediately preced¬ ing the World War. In the case of the United States, a newer country and having special facilities for the increase of its wealth through the development of its producing powers, the rate

of growth has been much greater, in¬ creasing from 16 billion dollars in 1860 to ap¬ proximately 200 billions in 1914, our own wealth having been in 1914 fully 12 times as much as in 1860, a rate which could not of course be applied to the world as a whole. In certain other countries, Canada, Australia, South Africa and parts of South America, the gain was also rapid, but the rate of growth of the world's wealth is fairly exemplified by that of France and Great Britain, and it seems probable that the world's available wealth practically trebled in that 40-year period, in which the nations of the world were doubling their na¬ tional indebtedness in times of comparative peace.

The purposes to which the increase in debts was devoted are not difficult to find. A half century ago the world was calling for railroads, steamships, interoceanic canals, better harbors, waterways on land, telegraphs and ocean cables to further facilitate intercommunications and the interchange of merchandise and its equiva¬ lent, money and credits. About one-third of the railways of the world are now governmentally owned, and have been largely paid for by borrowed money. Of the 220,000 miles of rail¬ way in Europe about 120,000 are government owned ; of the 70,000 in Asia, 45,000 belong to the governments of the countries in which they exist; of the 28,000 miles in Africa about 17,000 are owned by the governments of the respective colonies into which that continent has been divided or by the governments of the countries controlling those colonies; of the 23,000 miles in Australia over 20,000 were con¬ structed by the government, while of the 360,- 000 miles in America only about 10 per cent are government owned. A large part of the railways of Russia, Germany, Austria-Hungary, Italy, Egypt, India, Japan, Australia, New Zealand and the Dutch East Indies are owned and in most cases operated by the respective governments. All of the telegraph lines of the world, except those in the United States, are owned by the governments of the countries in which they operate. When we add to this the cost of the great undertakings in water

transportation, interoceanic canals, harbors, in¬ land canals and the deepening of rivers it will be apparent that the mere matter of transporta¬ tion has absorbed a very considerable part of the indebtedness accumulated in the half cen¬ tury prior to 1914.

While much of the growth of national debts between the great war periods was for legiti¬ mate improvements in transportation and world progress, it must be admitted that the prepara¬ tions for possible wars had much to do with the large national expenditures

which en¬ couraged the debt habit. During the 40-year period of debt making without war the coun¬ tries of Europe built up and maintained as a permanent part of their establishments enor¬ mous standing armies, which not only with¬ drew large numbers of persons from the pro¬ ductive industries, but required large sums of money for their equipment and maintenance, and at the same time they greatly enlarged their navies, and this was undoubtedly one of the important causes of the very large increase in the. world's accumulation of indebtedness during the period 1874—1914, in which world debts doubled in a time of comparative peace. The 1913 debts of the European countries were in round terms $32,000,000,000, Asia $4,000,- 000,000, South America $2,300,000,000, North America $2,100,000,000, Africa $1,500,000,000 and Oceania $2,000,000,000. Of the world's national debts in 1874, which aggregated at that time about 22Y billion dollars, about 15 billions were, owned by European countries, and the remainder distributed among the other grand divisions, that of North America alone being approximately 3 billion dollars.

Of the 45 billion dollars of national debts in existence at the beginning of the year 1914 about 34 billion dollars were owed by the coun¬ tries which entered the war. France stood at the head of the list with an indebtedness of $6,346,000,000; Germany (including the German states), $5,027,000,000 ; Russia, $4,536,000,000; Austria-Hungary, $3,869,000,000; United King¬ dom, $3,486,000,000; Italy, $2,921,000,000; Aus¬ tralia, $1,433,000,000; Japan, $1,241,000,000; United States, $1,028,000,000; Portugal, $948,- 000,000; Belgium, $826,000,000; Turkey, $624,- 000,000; Canada, $483,000,000; New Zealand, $438,000,000; Rumania, $316,000,000; Bulgaria, $135,000,000. This list of countries whose total debts at the beginning of the war were $33,- 657,000,000 includes only those which actively participated in the fighting, and in the war period they practically sextupled their indebt¬ edness as shown by the tabular statement which follows this discussion.

The relation of national debts to national wealth is of course of great importance, but can only be discussed in very general terms, owing to the fact already mentioned, that no country other than the United States takes a wealth census, and figures on the wealth of other countries are at the best only estimates; while figures as to income of a country are therefore estimates based on estimates. Accepting esti¬ mates which have been made of the wealth of the principal countries in 1919 it would appear that the ratio of debt to wealth in 1919 would be in case of the United States about 8 per cent, Great Britain, France and Italy 33 per cent. The per capita indebtedness of the prin¬

cipal countries in 1919 is; United States, $223;

Great Britain, $790; France, $800; Germany, $675; Italy, $350.

Practically all of the loans made bv the great nations of Europe have been issued bv the gov¬ ernments at less than their face or par value. The first of the British war loans in the great European War (that of November 1914) which bore an interest rate of 3l/2 per cent was issued by the government at 95 per cent, or at 5 per cent below par ; a part of the third was issued at par and a part at 95 per cent. The German loans were issued at slightly below par, 9 ll/2 per cent in some cases, 98 per cent in others and 99 per cent in one instance ; those of Italy at from 90 to 97 per cent of their face value, while in the case of France the first National Defense Loan bore an interest rate of SJ/2 per cent and was sold by the government at 88 per cent of its face value, and in the second loan, which bore an interest rate of 5 per cent, the issue was made at 88 per cent while a still later loan was issued at about 70 per cent of its face value, the Austria-Hungary loans which bore interest at the rate of Sl/2 per cent in most cases were issued at from 93 to 97 per cent of their face value. As a result of this the amount of money which European governments have actually received upon their loans issued since the beginning of the war is nearly 3 billion dollars below the par value of the securities issued, upon which par value the present generation must pay full interest while the later generations who meet the principal of the bonds will have to pay approxi¬ mately 3 billion dollars more, than was received by the governments which issued them. The United States is in fact the only one of the great nations making popular loans in behalf of the war which actually sold its bonds at their full face value. And many of the securi¬ ties of the European countries sold at less than par have also been paid for in a paper cur¬ rency more or less depreciated.

A very large proportion of the national loans issued by governments other than the United States in former years were also sold by the issuing governments at less than their face value, ‘in most cases at from 2 to 5 per cent below par.

Loans made by the United States govern¬ ment have usually been issued at their full face value. In the very early days there were a few exceptions to this general rule. A 22-year bond issued in 1796 was. sold at 87ˆ2. per cent of its face value; a 16-million dollar issue in 1813 was sold at 88 per cent; another in August of that year at 11ˆ4 per cent discount, and in 1814 sundry issues at a discount of 20 per cent. Again in 1842 there was one small issue at 9 ?y2 per cent, and in 1861 two larger issues at 89 per cent of their face values. Dur¬ ing the Civil War apparently all of the numer¬ ous bond issues made by the government were sold at par, and in a few cases above par, but were paid for in the depreciated currency of that period — greenbacks— which were accepted at their face value.

Of the world's national debts which existed at the beginning of 1914 a large part were held in Europe, and practically all of those issued after 1914, aside from those of the United States, were taken in Europe. Of the total of the world's national debts at the begin¬

ning of 1914, 45 billion dollars, about 32 billions were the obligations of European governments, approximately 4 billions those of Asiatic gov¬ ernments, 2J4 billions South American, 2 billions Oceania and lBt billions Africa. Practically all of the European government issues, amounting to 32 billion dollars, were then held in Europe, most of them in the countries by which they were issued, except in the case of Russia, Italy, Spain, Portugal and certain of the Balkan States. A very considerable proportion of the Russian securities aggregating about A}/2 billion dollars at the beginning of the war were held in France, Germany and Great Britain, and this was true to a considerable extent of those of Italy, Spain, Portugal and the Balkan States. Of the South American securities, a large pro¬ portion were held in Great Britain and France. Those of North America were chiefly held at home; those of Asia in part in Great Britain, Prance and Germany, but a considerable share was held in Asia, while those of the British colonies in Africa and Oceania were largely held in Great Britain. Practically all of the great loans made by the European countries since 1914 (with the exception of the $500,000,- 000 marketed by the British and French in the United States) were placed among the people of the country issuing them, in the form of (<popular loans, though some parts of the early Russian loans were probablv taken in Great Britain and France. This fact, that most of the obligations of the nations are held by their own people, is the one mitigating feature of the enormous increase in national indebtedness of today. The payment of the debts will not send out of the country the money so paid, while

the greatly increased interest payments are also distributed among home population.

National Debts of the World.

1700 . $1,000,000,000

1790 2,300,000,000

1820 . 7,400,000,000

1848 . 8,400,000,000

1862 . 13.500.000,000

1872 . 22,500,000,000

1882 . $26 , 300 , 000 , 000

1900 . 31,200,000,000

1913 . 43,850,000,000

1917 _ 120,000,000,000

1921 _ 325,000,000,000

National Debts of the Principal Countries Participating in the European War of 1914.

COUNTRIES

United States… Great Britain … British colonies:

Canada .

Australia… .

1913

$1,103,000,000

3,444,000,000

544,000,000 182,000,000 1,470,000,000 487,000,000 614,000,000 6,346,000,000 4, 537,000,, 000 2,921,000,000 156,000,000 1,194,000,000 1,044,000,000 843,000,000 223,000,000

$25,108,000,000

1919

$26,116,000,000

37,985,000,000

1,796,000,000 1,420,000,000 2,225,000,000 756,000,000 774,000,000 34,842,000,000 *25,750,000,000 15,600,000,000 4,000,000,000 41 , 150,000,000 25,799,000,000 1,485,000,000 486 , 000 , 000

$220,184,000,000

India .

New Zealand. . South Africa. .

France .

Russia .

Italy .

Belgium .

Germany .

Austr ia-H ungary

Turkey .

Bulgaria .

Totals .

The above figures do not include debts of the German states, the Australian colonies prior to incorporation as the Commonwealth of Australia, or the separate pre-war debts of the Austrain Empire and Hungarian kingdom.

♦October, 1917.

O. P. Austin,

Statistician, National City Bank, New York.

NATIONAL EDUCATION, Systems of.

See Education, National Systems of.

national EDUCATION ASSOCIA-1 ION, since 1870 the name adopted for the Su V0? , , .Teˆcher.s' Association founded at hiladelphia, Pa., in 1857, an organization com¬ posed of teachers and other persons interested in education. Its purpose is the discussion of topics relating to the education of the whole people, to the end that the profession of teach¬ ing may be elevated in its character, that its interests may be advanced and that the cause that it represents may be promoted in the United States. The Association exists as a body corporate of the District of Columbia, under the name of the National Education Association of the United States, by virtue of an act of incorporation passed by Congress and approved by the President 30 June 1906.

Section 2 of the act provides that ((This cor¬ poration shall include the National Council of Education and the following departments, and such others as shall be created by organization or consolidation, to-wit : the departments (1) of superintendence; (2) of normal schools; (3) of

elementary education; (4) of higher educa¬ tion; (5) of manual training; (6) of art edu¬ cation; (7) of kinder education; (8) of music education; (9) of secondary education; (10) of business education; (11) of child study; (12) of physical education; (13) of natural science instruction ; (14) of school administra¬ tion; (15) the library department; (16) of special education, and (17) of Indian educa¬ tion, the powers and duties and the number and namesof these departments and of the National Council of Education may be changed or abol¬ ished at the pleasure of the corporation, as pro¬ vided in its by-laws. })

The membership consists of three classes: active, corresponding and associate members. Any eligible person may become an active mem¬ ber upon application endorsed by two active members by paying an enrolment fee of $2 and the annual dues of $2 for the current year. Teachers and all who are actively associated with the management of educational institu¬ tions, including libraries and educational pub¬ lications, are eligible for active membership. Only active members have the right to vote and to hold office. All active members are en¬ titled to a volume of the Proceedings. Cor¬ responding members, whose number shall not exceed 50 at one time, shall be eminent edu¬ cators not residing in America. They shall be elected by the board of directors and shall receive the volume of Proceedings without the payment of any fee. Associate members pay an annual fee of $2 and may receive the volume of Proceedings by formal application. The board of trustees consists of four members, elected by the board of directors for a term of four years and the president of the Association, who is ex officio a member during his term of office. The details of officers and of manage¬ ment may be found in full in the Proceedings (1906 et seq.). The several departments engage in the special work of education which their names indicate. The National Council of Edu¬ cation is a deliberative body, whose functions need brief elaboration. One of them is the proposal to the board of directors of suitable subjects of investigation and research and the recommendation of the amount of money that should be appropriated for that purpose. When

the board of directors authorizes special studies and investigations the council selects the mem¬ bership of the committees to make them. Sev¬ eral important reports have issued from such committees and may be obtained by correspond¬ ence with the secretary of the Association. The council consists of 60 members, selected from the membership of the Association. The board of directors annually elects five members and the council the same number, each to serve for six

years and until their successors are elected. All members become honorary members on the expiration of the terms for which they are elected. They are privileged to attend the ses¬ sions of the council and participate in its dis¬ cussions. No State is entitled to more than eight members.

— The Association was organized in 1857 as the National Teachers' Association. It was an extension of the State association idea to the country at large. To T. W. Valentine, president of the State Teachers' Association of New York, belongs the credit of initiating the movement. In conference with D. B. Hagar, of the Massachusetts Association, a call for a convention was agreed upon and prepared by the latter in 1856, in pursuance of which a small number of men gathered in Philadelphia 26 Aug. 1857. At this meeting the National Teachers' Association was founded with Zalmon Richards of Washington, D. C., as president. There were 43 members enrolled but 12 States and the District of Columbia were represented. At the Indianapolis meeting of 1866, the word (<person» was substituted for ˆgentleman," in the section defining eligibility for membership. Women were thus admitted to full membership. Meetings were held annually in the different States and before 1870 all discussions were held before the whole Association as a body. In that year the department feature of the Association was introduced and the name changed to the National Education Association. Some of the departments had existed previously as independ¬ ent associations. This was true of the depart¬ ment of normal schools, formerly the American Normal School Association, and organized at Norwich, Conn., in August 1858 and of the department of superintendence, which was previously the National Association of School Superintendents, organized at Harrisburg, Pa., in August 1865. Although the Association drew its membership from all parts of the country the attendance at its meetings was small, never reaching the 400 mark in the first quarter cen¬ tury of its existence. The 1884 meeting was the turning point in the fortunes of the organiza¬ tion. The financial difficulties had been ex¬ tremely embarrassing. It had been impossible to print the addresses without contributions from liberally disposed members. The presi¬ dent for that year, Thomas W. Bicknell, con¬ ceived a plan of enlisting the interest of the railway people and the days of poverty were a matter of history. The enrolment reached 2,729. The Association was freed from debt and a permanent fund started. While the num¬ ber varied widely in succeeding years, it has steadily increased, the most remarkable record being that at the Boston meeting of 1903, at which 34,983 members were enrolled.

The movement to secure a permanent mem¬ bership was inaugurated at the Denver meet-

ing in 1895. The old scheme by which one could purchase a life membership for $20 and a life directorship for $100 was abolished. In its stead, the present plan of the payment of annual dues, whether in attendance at the meet¬ ing or not, was adopted. In consequence the society now has a permanent membership of about 10,000 active, and a far greater number of associate members. Since 1898 a permanent secretary is employed by the board of trustees. He is chosen for a term of four years. Refer¬ ence has been made to the special studies that have been conducted in an exhaustive way by committees composed of experts in the sub¬ jects under consideration. They are among the most notable publications of the Association. The following reports, among others, have been widely circulated and have had no little influ¬ ence in determining policies in the fields which they cover: of the Committee of Fifteen on (Elementary Education5 ; of the Committee of Ten on Secondary Studies5 ; of the Committee of Twelve on (Rural Schools5 ; of the Com¬ mittee on (Salaries, Tenure of Office and Pen¬ sions of Teachers,5 on (Taxation as Related to Public Education.5 The permanent invested fund of the Association amounts at present to $188,500, yielding a net revenue of $7,178. The annual receipts in a recent year amounted to $42,529; the expenses, $37,158. Consult /His¬ tory of the National Education Association of the United States5 (Washington, D. C.,1892) ; the (Annual Report,5 Proceedings,5 etc., of the Association ; the most important publications on pedagogy now in the United States; the (Reports5 of committees referred to above.

NATIONAL EXPANSION. See United States, Territorial Expansion ; Annexation ; Colonies and Colonization.

NATIONAL FARMERS' ALLIANCE.

See Farmers' Alliance.

NATIONAL FORESTS. See Forestry in the United States.

NATIONAL GALLERY, The, the Brit¬ ish national art gallery; a collection of paint¬ ings, in Trafalgar Square, London. It orig¬ inated in a collection formed by Mr. Anger-stein, consisting of 38 pictures, 29 by old masters and 9 by British painters, and purchased with public funds in 1824 for $280,000 as the nucleus of a national gallery. Since that time the col¬ lection has been greatly enlarged by purchases out of funds provided by Parliament, as well as by bequests and gifts. Of the latter the most munificent has been that of Mr. Vernon in 1847, a collection of 157 works of English painters. Another highly valuable section is that of the pictures and drawings by Turner bequeathed to the nation at his death in 1856. In 1871 a valu¬ able prize was secured by the purchase for $375,000 of Sir Robert Peel's collection, con¬ sisting of 77 paintings and 18 drawings. In 1885 Parliament voted $350,000 for the purchase of a single picture, the (Ansidei Raphael,5 together with $87,500 for another, Van Dyck's (Charles I on Horseback.5 The National Gallery now comprises over 1,200 pictures and though spe¬ cially strong in examples of the British school of painting, foreign masters are fully repre¬ sented. The various early and late Italian schools are extensively illustrated ; there are good examples of the chief representatives of

Italian art, as Raphael, Correggio, Paul Veronese. There are also good examples of Murillo and Velasquez and the Spanish school, and the great Dutch and Flemish painters, Rem¬ brandt, Rubens, Van Dyck, etc., are well repre¬ sented. The original building of the National Gallery dates from 1838 but has since had ad¬ ditions to accommodate the increasing collection.

NATIONAL GEOGRAPHICAL SOCI¬ ETY. See Geographical Society, National.

NATIONAL GOVERNMENT AND CORPORATIONS. See Corporations, Legal.

NATIONAL GRANGES. See Grangers; and Granger Cases.

NATIONAL GUARD. See Militia.

NATIONAL HYMNS. A national hymn as usually understood is the official song ren¬ dered on ceremonial occasions, fetes and other public gatherings. It is sometimes an air (with¬ out words) that is recognized by the govern¬ ment, a march played by bands and

orchestras to stimulate patriotism and loyalty to the ruler. While the oldest of national hymns now extant date back less than five centuries, lines breath¬ ing the spirit of patriotism were written by Horace and other poets of ancient times. The national song is intimately related with and probably grew out of the folksong. Words and music should convey something of the na¬ tional temper, should voice the aspiration of a people and express to some extent the ideas that a nation stands for. Love of fatherland and pride in one's country are the keynotes of many national anthems. In some of them re¬ ligious feeling is blended with patriotic senti¬ ment. The tune as well as the lyric should be by a native composer. In Europe the writers of national hymns have usually been enlisted in the service of institutionalism. Their pro¬ ductions have been often inspired by devotion to church and state, also by love of home. Con¬ sidering the lack of poetical merit in most na¬ tional songs, their influence has been very great. Wars and revolutions have sometimes called them into being and in these especially the note of freedom is emphasized.

Argentina. — (Oid, mortales, el grite sa-grado5 (1810) (Hear, O mortals, The Sacred Call.5 Music is by D. V. Lopez.

Austria. — The Austrian national hymn in the days of the empire, (Gott erhalte unsern Kaiser,5 or, according to the monarch's name, (Gott erhalte Franz den Kaiser,5 was written in 1797 by Laurence L. Haschka (1749-1827) ; music by Joseph Haydn (1732-1809). A stanza is quoted :

God preserve our Franz in glory, Franz our Emp'ror good and great !

High in wisdom, famed in story, we his praises celebrate; Love of subjects young and hoary bind his crown of regal state,

God preserve our Franz in glory, Fran® our Emp'ror good and great !

Belgium. — The Belgian national hymn is (La Brabangonne5 (the Song of the Braban-tines) ; music by Francois van Campenhout (1780-1848). The words were written by Jenne-val, a French comedian, who was playing in a theatre of Brussels when the rising took place which resulted in Belgium's independence from Dutch rule in 1830. The refrain plays on the word <(orange,55 referring to the reigning house

ot Change in the Netherlands. The first stanza is appended :

w°uM have thought the arbitrary And scheming despot wbuld bring force?

Against us comes a sanguinary

Princeling, with shrapnel in his course.

done, o'er Belgians comes a change.

No more with Nassau shameful pact shall be. the grape-shot's shattered the orange Upon the tree of liberty.

Three other versions of (La BrabanQonne> were written — that by Lonlay in 1848, another by Campenhout and one by Hymans in 1852 — relating to the political situation in those years.

Bohemia. — Bohemia has two well-known national songs, the (War-song of the Hussites) (dating back to about 1460) and (My Fatherland, } composed centuries ago. The names of author and composer are forgotten. The first stanza of this favorite national ditty is:

Where is my house? Where is my home?

Streams among the meadows creeping,

Brooks from rock to rock are leaping,

Everywhere bloom spring and flowers,

Within this paradise of ours;

There, 'tis there, the beauteous land!

Bohemia, my fatherland !

Bolivia. — Words by J. I. de Sanjines and music by B. Vincenti.

Brazil. — Words by Medeiros Albuquerque and music by L. Miquez.

Burma. — (Kayah Than> (Sound the Trum¬ pet).

Canada. — (The Maple Leaf Forever, > words and music by Alexander Muir.

Chile. — Dulce Patria) by Carnicer.

Costa Rica. — (De la Patria) by M. M. Gu¬ tierrez.

Denmark. — The Danish national hymn, (Kong Christian stod ved hojen mast) (King Christian stood beside the mast), was written by Johannes Evald (1743-81) ; music adapted from an old air by John Hartmann (d. 1793), a German who settled in Copenhagen in 1768. Longfellow's version of this spirited poem is well known.

Ecuador. — (Salve, O PatriaP

Egypt.— (Salaam EffendD (March of the Khedive).

Finland. — Wart Land* (Our Land). Words by J. L. Runeberg; music by F. Pacius.

France. — The history of (La Marseillaise,* the most famous of all national hymns, is dealt with elsewhere. See Marseillaise.

The national hymn of the Second Empire (1852-70) was (Partant pour la Syrie) ; words by A. de Laborde and music by Queen Hortense.

Germany. — Germany's national hymn, Die Wacht am Rhein* (The Watch on the Rhine), is treated under that head (q.v.). A national song very popular among Germans is Deutsch¬ land fiber Alles,* written in 1841 by August H. Hoffmann (1798-1874), generally known as Hoffmann von Fallersleben. It is sung to the music of the Austrian national hymn. The first stanza of Das Lied der Deutschen) is thus translated :

German Empire over all things, over all things in the world, When for safety and defiance its proud banner is unfurled, From the Maas unto the Memel, from the Etsch to sea

waves curled —

German Empire over all things, over all things in the world !

The Prussian national hymn is (Heil dir im Sie-gerkranz* (Hail to thee laurelcrowned), writ¬ ten in 1790 by Heinrich Harries (1762-1802).

It is sung to the tune of (God Save the King.* A general favorite is <Preussenlied) (Song of the Prussians), written in 1830 by Bernhard Thiersch (1794—1855) ; melody composed in 1839 by H. A. Neithardt (1793-1861). The Bavarian hymn is (Heil unserm Konig, HeiP (Hail to our monarch, hail).

Great Britain. — • The British national hymn, (God Save the King,* was composed in 1739 by Henry Carey (1692-1743), who was partly in¬ debted to others for the words. He borrowed and rewrote the air from the French. The music has been adapted for the national hymns of the United States, Switzerland, Prussia and other German states. Welsh. — (Hen Wlad Fy NhadaiP (Land of my Fathers), was written by Evan James; melody by James James. The first stanza, as translated by Eben Vardd, is as follows :

The land of my fathers, the land of my choice,

The land in which poets and minstrels rejoice;

The land whose stern warriors were true to the core.

While bleeding for freedom of yore.

Among the patriotic songs of various parts of the British Empire are (The Song of Aus¬ tralia* (words by Mrs. C. J. Carleton and music by Carl Linger) and Canada's (Maple-leaf Forever) (music by A. Muir).

Greece. — The Greek national hymn is the war song, (Sons of Greece, come, arise, > which dates back to the days of the Greek struggle for independence (1821-29). Byron translated it.

Guatemala. — Words by P. Molina and air by R. Alvarez.

Hebrew. — The songs of the Hebrew na¬ tionalists is Datikva.*

Honduras. — Music by L. Campos.

Hungary. — Among the patriotic songs of Hungary the one most frequently heard is (Is ten aldd meg a Magyart* (Lord, bless the Hungarian) by F. Koseley, which is wed to a striking melody. The renowned (Rakoczy March,* by an unknown composer, has even greater power over Hungarians.

Ireland. — The patriotic songs of the Irish have for their themes episodes in the glorious but tragic history of the race. A song still popular is (The Wearing of the Green,* dealing with the rebellion of

1798. In the latter half of the 19th century it was supplanted somewhat in popular favor by T. D. Sullivan's (God Save Ireland* (1867)'. The new century and the new nationalism have produced the stirring call to freedom in the native tongue, (Sinn Fein Linn Fein mar Iadsan,* now only rivaled by the popular ballad, <Who Fears to Speak of Easter Week,* dealing with the rising of Easter Week (24 April-1 May 1916).

Italy. — The only national air of Italy is Gabetti's (Marcia Reale Italiana) (Royal Italian March), played on all official occasions. The famed Garibaldi's (Hymn * (q.v.) is a martial strain, and the other patriotic songs are sec¬ tional.

Japan. — The Oriental national airs are very simple. That of Japan (Kimi Ga Yo WaJ by Hayashi Hiromori, contains four lines :

Let Mikado's empire stand

Till a thousand years, ten thousand years shall roll,

Till the sand in the brooklets grow to stone,

And the moss these pebbles emeralds make.

The Japanese have borrowed G. F. Root's (Battle Cry of Freedom.*

Mexico. — The Mexican national hymn, 'Mexicanos, al grito de guerra) (Mexicans, at the cry of war), was written by F. G. Bocane-gra; air composed in 1853 by James Nuno.

Mohammedan. — Some Mohammedan coun¬ tries of Africa have sultans' hymns. The na¬ tional air of Liberia is by Olmstead Luca.

Montenegro. — (Onward! Onward P

Netherlands. — Holland has two national songs that are often sung on public occasions — 'Wilhelmus van Nassouwe-* (dating back to about

1568) and ‘Wein Neerlandsch BloedP The latter hymn, by H. C. Tollens (1778-1856), begins :

Let him in whom old Dutch blood flows,

Untainted, free and strong;

Whose heart for Prince and country glows,

Now join us in our song;

Let him with us lift up his voice,

And sing in patriot band,

The song at which all hearts rejoice,

For Prince and Fatherland!

The Boer national hymn is by Catherine F. Van Rees, who wrote both words and music. There are three stanzas, of which the first runs as follows :

Know’st thou a race, of freemen bred,

Who broke the tyrant’s might;

Who burst their bonds and fought and bled For freedom and for right?

Come, burghers ! Raise the flag on high That led to victory;

The hour of bondage has gone by —

Free men, free men are we !

There are two stanzas in the national hymn of the Orange Free State; words by H. A. L. Hammelsberg and music by W. F. G. Nicolai.

Nicarauga. — Music by Bias Villatas.

Norway. — The Norwegian national hymn is (Sang for Norge* (Song for Norway), writ¬ ten in 1859 by Bjdrnstjerne Bjornson. Three stanzas of this admirable lyric have been trans¬ lated by Rasmus B. Anderson. The first is:

Yes, we love with fond devotion Norway’s mountain domes,

Rising storm-lashed, o’er the ocean,

With their thousand homes;

Love our country, while we're bending Thoughts to fathers grand,

And to saga-night that's sending Dreams upon our land.

Another patriotic song is 'Sonner af Norge) (Sons of Norway), by H. A. Bjerregaard (1792-1842); music by C. Blom (1782-1861).

Persia. — (Salmati Shah.* Music by A. Le-maire.

Peru. — (Somos libres, seamoslo siempre) (We Are Free, Let Us Be So Forever).

Poland. — Besides the Polish song referred to under Russia (below) the Poles have a na¬ tional song entitled 'God for Poland. *

Portugal. — Portugal's national hymn is the (Hymno Constitucional,* written about 1861 by Dom Pedro I, emperor of Brazil. LJpon the accession of Don Carlos I (21 Dec. 1889), a new national air was composed by H. M. Jurior.

Rumania. — In 1861 the Rumanian govern¬ ment offered a prize for the best national hymn, which was won by V. Alexandri's stanzas, 'Traeasca Regale) (Long live the king) ; music by E. A. Hiibsch.

Russia. — The former Russian national hymn, (Bozhe Zaria Chrany) (God preserve the Tzar), written by Jukovsky, is a prayer. The air by Alexis Lvoff dates from 1830, when Nicholas I ordered it sung as the national an¬ them. The revolt of 1830 produced the stirring

battle song by Wybitski, 'Poland's not yet dead in slavery,* which has been called the Polish national hymn.

Salvador. — 'Saludemos la Patria) (Let Us Hail Our Country). Words by J. J. Canas; music by J. Aberle.

Serbia. — Serbia has two: 'Rise, Oh Ser¬ biansˆ and (God in His Goodness,* set to mu¬ sic by D. Jenko.

Spain. — The Spanish national air is the fine (Hymno de Riego,* by Huerta (1803-80).

Sweden. — The Swedish national hymn is 'Ur Svenska Hjertans) (From the depths of Swedish Hearts) ; words by Strandberg; music by

Lindblad. Equally popular is ‘Fosterjor-den) (Land of my Birth), by Richard Dybeck (1811-77); melody from Jemtland (a province in western Sweden) arranged by J. N. Ahl-strom. C. T. Hanson’s translation is :

Oh, ancient beloved Northland of my birth.

The happiest of nations though lowly,

I greet thee, most beauteous land upon earth,

Thy green hills, thy sun, thy heaven blue and holy.

The thought of thee brings back the days that are gone.

The same in thy royal beauty ever,

O’er all lands and seas thy sweet name is borne.

Oh, I would live among thy hills forever !

Switzerland. — The Swiss national hymn, (Dem Vaterland) (To the Fatherland), by J. R. Wyss (1781-1830), is sung to the tune of ‘America.* The first stanza of this inspiring lyric is

Call’st thou, my Fatherland?

See us with heart and hand Vowed to thee, all !

Helvetia, hail to thee!

True still thy sons shall be,

Like them Saint James did see Leap at war’s call !

Turkey. — Turkey has no national hymn. Each sultan has an imperial air composed in his honor. There are several Ottoman war songs full of national feeling.

United States. — The national anthem of the United States is the ‘Star Spangled Banner) (q.v.) written in 1814 by Francis S. Key. The melody is that of an old drinking song. Other patriotic songs that divide honors with it are : ‘Hail, Columbia) (1798), by Joseph Hopkinson (1770-1842), sung to music composed by Fyles in 1788; and S. F. Smith’s ‘America,* written in 1832 to fit the air of ‘God Save the King.* It is now generally conceded that ‘Yankee Doodle* is the true national American air. Its origin is obscure. The most probable

account ascribes to the tune an English origin and the words of Dr. Shuckburgh, an army surgeon, about 1755, soon after which, during the American Revolution, it came extensively into vogue. Other popular American national songs are ‘John Brown’s Body) and ‘Dixie. >

Uruguay. — ‘Himmo Nacional de la Republica Oriental del Uruguay.)

Venezuela. — ‘Gloria al bravo pueblo * (1811) (Honor to a Brave Nation). Words by V. Salvias, music by J. Sandaeta.

Consult Bantock, G., ‘Sixty Patriotic Songs of All Nations* (Boston 1913) ; Smith, ‘Music of the Waters* ; Smith, ‘Stories of Great National Songs*; Fitzgerald, ‘Stories of Fa¬ mous Songs*; Sousa, J. P., ‘National Patriotic and Typical Airs of All Lands> (Philadelphia 1890); Kappey, ‘Songs of Eastern Europe’; Engel, ‘Study of National Music) ; White, ‘National Hymns. *

NATIONAL IDEALS IN THE WAR.

In the strain of the great war the national ideals of all the peoples were severely tested. Articles of political faith previously accepted without much question were challenged to de-fend themselves in the face of a new criticism and of directly antagonistic ideals. And this warfare of ideals was no mere <(battle of the books® ; it was fought with machine guns and heavy artillery, with dreadnaughts and sub¬ marines, with battle-planes and poison gases. Once again, as so often in the past, men asked themselves what were the essential principles for which they were ready to make the su¬ preme sacrifice? Thus the war made necessary a thorough reconsideration of national ideals.

President Wilson’s war message was read to Congress almost exactly 52 years after the sur¬ render of Lee’s army at Appomattox. More than half a century, therefore, had passed since the last conflict which seriously tested the morale of the American people. With few ex¬ ceptions the generation which knew at first hand the real meaning of

that struggle — what it involved for the civilian as well as the soldier — had passed away. Among those in youth and middle life, there was little appreciation of the responsibilities and the sacrifices by which the national fabric had been established and maintained. Furthermore the issues of the great war were such as to demand of the citi¬ zen a quite unusual capacity to see the interest of his country in matters lying beyond his ordinary horizon, an ability to take long views, which has rarely, if ever, been demanded of any democratic community. The rights of the United States had indeed been seriously in¬ vaded, but the enemy seemed very far off. It was not enough to depend upon the primitive instinct which calls men to the defense of their own home against a pressing danger. The patriotism of Americans was not stirred, like that of France, by hostile armies upon the actual soil of their country. The appeal was rather, in a quite unusual degree, to perma¬ nent, as distinguished from immediate, interests, to ideal, rather than purely material, gains.

National Ideals on the Eve of the War. — The foundation of American political thought is the old English tradition of self-government and representative institutions — the right of the people to a share in their own government. With the coming of independence, this ideal was broadened into a more absolute doctrine of popular sovereignty, now interpreted to mean literally that governmental authority of every kind musi proceed directly or indirectly from the qualified voters. In the century that fol¬ lowed, the application of this principle was car¬ ried much farther than was expected or desired by the founders of the republic. Notwith¬ standing important variations in practice, the orthodox American doctrine came to be that of individual manhood suffrage. Restrictions based on color disappeared in theory, if not in practice. A large number of women had al¬ ready secured the suffrage by State action be¬ fore 1914 and the movement for equal suffrage by an amendment to the Federal constitution was gaining headway.

In other respects also 20th century Ameri¬ can democracy is far more radical than that of the fathers. The framers of the early State governments and of the Federal Constitution

were much occupied with the dangers, as well as the advantages, of popular government. Their remedy for ultra-radicalism was the sys¬ tem of ˆchecks and balances® and the frequent use of indirect elections, notably in the Federal Constitution. The President was to be chosen by electors exercising a real discretion ; sena¬ tors were elected by the State legislatures, who also had in many instances the

choice of gov¬ ernors and other State officers ; even State constitutions were put into effect without rati¬ fication by the voters. Gradually the scope of direct action by the voters was extended. Pres¬ idential electors became merely counters ; gov¬ ernors were everywhere chosen by popular vote; 2nd even that safeguard of conservatism, the Senate of the United States, was brought with¬ in the scope of the same principle. From elec¬ tions the principle was extended to nominations through the system of direct primaries for the choice of party candidates and committees. The voters also sought to exercise a closer control upon the process of legislation by the initiative and referendum ; and there have been numerous protests against judicial action declaring un¬ constitutional measures approved by public opinion. In short, American democracy of the 20th century is far more absolute in its scope, more impatient of restrictions upon the im¬ mediate execution of the popular will than that of 1776 or 1789.

With this advance in political democracy there has developed a different way of thinking about the sphere of government in general. The radical democrats of the 18th century were chiefly anxious to free individual energy from the restraints imposed by the old arbitrary governments. America seemed a land of bound¬ less resources; on the frontier, especially, equal¬ ity of opportunity seemed to ensure the main¬ tenance of a democratic society as well as a democratic government. By the end. of the 19th century this optimistic faith in laissez-faire was much shaken. The free play of individual en¬ ergy brought unexpected results, antagonistic to democracy rather than favorable to it. Re¬ sources, apparently inexhaustible and open to every one, were seen to be limited after all, and more and more coming to be concentrated in the hands of a comparatively few individ¬ uals and corporations. To conserve these re¬ sources and ensure their use in the public inter¬ est, democratic control must be extended more largely, in the economic, as well as the politi¬ cal, sphere. Many men who might otherwise have clung to the old laissez-faire type of de¬ mocracy were reconciled to the new policies by realizing that in the long run democracy in government rests upon some approximation to equality and democracy in the social order. Undue concentration of economic power must in the end produce an undesirable distribution of political influence. This new type of de¬ mocracy found expression in statutes regulat¬ ing commerce, industry, transportation and labor conditions ; also in many new adminis¬ trative divisions, charged with the oversight and control of individual and corporate business.

Not only was the new democracy more ready to use governmental

agencies for the promotion of economic and social ends ; it was also adjusting itself to greater centralization. The State sovereignty idea, already weakened by the Civil War, was even more seriously

undermined by the industrial development of the next half century. The great corporations which controlled transportation, commerce, manufactures and finance could not be dealt with on a purely state basis without endless confusion. As interstate organizations of capi¬ tal were confronted by interstate organizations of labor, it became increasingly evident that labor problems must receive national rather than merely local or state solution. Thus American democracy was becoming more and more nationalistic.

The transformation which modern science and its application to industry had brought about in the nation was also powerfully affect¬ ing the international position of the United States. Though independence had been achieved through a foreign alliance and largely because of certain conditions in European poli¬ tics, the founders of the republic were soon convinced that the safety of their political experiment could best be secured by political isolation. In 1823 the danger of intervention in American affairs by the reactionary govern¬ ments of Continental Europe produced the Monroe Doctrine, setting forth the republican ideals of America, disclaiming interference with monarchical Europe, but insisting that the European system should not be further ex¬ tended to any part of the American hemisphere.

This tradition of isolation was still the orthodox American theory on the outbreak of the European War; but it was maintained with increasing difficulty and with some incon¬ sistencies as the 20th century opened. Steam navigation, the ocean cable and wireless teleg¬ raphy increased the number of international problems for which the United States was forced to assume some responsibility. The Spanish War and the acquisition of island possessions in the Pacific brought new relations with the European powers which had similar interests there and in eastern Asia. We were presently taking a large part in

international counsels for the protection of China. While still expressly reserving the principle of the Monroe Doctrine, the United States took an active part in The Hague Conferences and even in the fateful conference of Algeciras on Afri¬ can affairs. American intervention hastened the close of the Russo-Japanese War and American public opinion followed with deep interest and sympathy the proposals for a new world organization to establish the reign of law for nations as well as for individuals.

America and the World War. — So mat¬ ters stood at the outbreak of the European War. The President's proclamations of neu¬ trality were quite in accord with traditional policy. Even when the invasion of Belgium showed Germany's cynical disregard of inter¬ national law, American interest and responsi¬ bility in the matter were apparently very re¬ mote. The assumption of such responsibility by the government would have been possible only if the nation as a whole had clearly understood the issues of the European conflict, thus cre¬ ating a unified public opinion. This was obvi¬ ously not the case in 1914. The strongest body of American opinion favored the cause of the Allies, but the pro-German element was ag¬ gressively and highly organized. The largest group of all, especially west of the Alleghanies, was composed of those who could hardly real¬

ize what was happening in Europe and thought chiefly of America's protection from the horrors of European warfare. Under these circum¬ stances, many even of those who sympathized with the cause of the Allies were convinced for the time being that the government must remain neutral. There was also among the more idealistic elements a strong desire that America, by holding somewhat aloof, should leave itself free to exercise a mediatory in¬ fluence in the interest of a lasting peace.

The abandonment of the neutrality policy came by a very gradual process, which is partly reflected in the speeches of President Wilson, especially during the year 1916. The develop¬ ment of the President's policy was undoubtedly much too slow for those who had felt from the beginning that France and England were guard¬ ing democracy and international justice against the militaristic traditions of the Central Em¬ pires. On the other hand, his gradual assump¬ tion of American responsibility in the inter¬ national crisis was, up to the date of his war message of 2 April 1917, somewhat in advance of the great body of American opinion. He had, however, by that time so far won the con¬ fidence of this uncertain group, both as to his

understanding of the international situation and the political ideals toward which he was work¬ ing, that it was willing to accept his leadership.

The direct menace to the United States of German methods and German aims was brought home more and more by the recklessness of the submarine warfare ; by the intrigues of German agents in the United States and the acts of vio¬ lence instigated by them ; by their persistent appeals to the separate consciousness of the German-born element ; and lastly by their ef¬ forts to disturb the friendly relations of the United States with Latin-America. From a strictly nationalistic point of view, these things fully justified the President in asking and Con¬ gress in voting the declaration of war in April

1917.

There was, nevertheless, an important group which was not satisfied by any purely national¬ istic conception of the issue. These men were patriotic, but American loyalty meant to them not only the defense of immediate national in¬ terests but allegiance to American ideals. In the Civil War Lincoln had summoned to the preservation of the Union not merely the senti¬ ment of American patriotism but the devotion of those who valued America as the chief rep¬ resentative in the world of democratic ideals — of government by the people. On that ground also he asked the moral support of European liberals, especially the British working-classes. More and more the great European War seemed to involve equally momentous consequences for civil liberty. The victory of a highly organ¬ ized military monarchy like Prussia over the democracies of western Europe was likely to discredit democracy as the le$s efficient form of government and thus exert a reactionary in¬ fluence on political thinking everywhere. This issue was clarified when the Revolution of March 1917 overthrew the Russian autocracy and the conflict became more distinctly than before one of the free nations against the most aggressive exponents of the monarchical tra¬ dition. So President Wilson was able to rein¬ force the nationalistic appeal by raising the larger issue. As Monroe's message asserted the

interest oi the United States in the preservation of the Latin-American republics, so Wilson, dealing with a world far more closely knit to¬ gether, made his plea, that the “world® should ((be made safe for democracy.®

In his presentation of war aims, the Presi¬ dent also appealed to the growing sentiment among thoughtful men everywhere, nowhere stronger than in the United States, for some escape from national egoism and international anarchy. . Such men followed with sympathy the President’s, stubborn refusal to be drawn into an imperialistic policy toward Mexico ; they defended his extraordinary patience in the face of German aggression ; and they hoped to the last that the United States, without actu¬ ally entering the war, might contribute some¬ thing to the establishment of a just and lasting peace. The clearest expression of this idea that America must accept a more definite re¬ sponsibility for the establishment of a new in¬ ternational order is to be found in the Presi¬ dent’s speech to the Senate of 22 Jan. 1917. The time had come, he said, ((to lay afresh, and upon a new plan, the foundations of peace among the nations.® (<It is inconceivable,® he continued, “that the people of the United States should play no part in that great enterprise. To take part in such service will be the op¬ portunity for which they have sought to pre¬ pare themselves by the very principles and purposes of their policy and the approved prac¬ tices of their government ever since they set up a new nation in the high and honorable hope that it might in all that it was and did show mankind the way to liberty.® It must be said, however, that this emphasis on the larger responsibility of the United States aroused the antagonism of certain senators who urged the danger of abandoning the traditional policy of isolation.

A few days later the German government by its announcement of practically unrestricted submarine warfare not only declared virtual war against the United States but proclaimed its entire lack of sympathy with the inter¬ national ideals of which the American Presi¬ dent had become the chief exponent.

Phases of Public Opinion. — When Con¬ gress, acting upon the recommendations of the President declared war on the Ger¬ man Empire, there was still opposition in Congress and in the country at large, an opposition more serious indeed than is indi¬ cated by the overwhelming majorities in Jboth houses (72 to 6 in the Senate and

373 to 50 in the House). This is shown by a study of the Congressional debates and by reports from vari¬ ous sections in the press and elsewhere. In this as in many other cases it was inevitable that even a democracy should depend in some meas¬ ure upon the guidance of its chosen repre¬ sentatives and especially of the executive. . It is equally evident, however, that the decision once made soon received a more general and effective support from public opinion than any similar decision in the history of the country. There was not at any time after the outbreak of the war an opposition comparable in relative strength to that of the Tories in the War of Independence, of the Federalists in 1812 or the (< Copperheads® in the Civil War. Those who supported the war did so on various grounds — some undoubtedly as a simple matter ol acqui-VOL. 19 — 47

escence in a decision already made. A more definite analysis of opinion brings out certain other facts of interest.

The war and the nature of the ideals for which the United States was fighting were not a distinctly party issue. The pro-German ele¬ ment had some influence in both the leading parties before the war but became almost negligible after its outbreak. Much the same thing may be said of the pacifist element, which, sympathizing with Wilson's international peace program, had accepted his conclusion that the first step toward such a goal must be the military defeat of the Prussian oligarchy.

To the Socialists the war brought a moie difficult problem. They had always emphasized the solidarity of the working class interests as more important than strictly nationalistic aims. Nevertheless, after the outbreak of the Euro¬ pean War, the majority of the Socialists in Europe supported their respective governments. In the United States, however, the majority wing of the Socialist organization persisted in its opposition to the war as a measure conceived in the interest of the capitalistic classes. This majority, made up of various elements, included genuinely idealistic pacifists, advocates of revo¬ lutionary socialism who were ready to fish in troubled waters and a distinctly pro-German group, which was possibly the leading factor in determining the position of the party. On the other hand a considerable group of Social¬ ist intellectuals® dissented from the party de¬ cision and left the party. It is impossible to analyze accurately the Socialist vote in recent elections so as to determine the strength of pro-Germanism and pacifism as distinguished from economic discontent.

Before the outbreak of the war the senti¬ ment in favor of American participation was most evident in the Northeastern States among the educated classes of that section who were most closely connected with the allied nations of Europe by various ties, economic, social, in¬ tellectual. This was in part, at least, the obvi¬ ous effect of geographic proximity. On the other hand, the large cities of the East fur¬ nished considerable centres of pacifist and Socialist opposition, especially among their im¬ perfectly Americanized immigrant population. In the Middle West the unification of public opinion on war issues was delayed by the pres¬ ence of a strong German element, by a some¬ what antiquated type of anti-British feeling and a certain lack of interest in international rela¬ tions. The last consideration naturally operated with still greater force in the rural areas of the South and in the States of the Far West. When, however, the war had actually begun the hearty acceptance of it as a great national enter¬ prise was nowhere more striking than in many of the areas where the opposition had at first seemed most serious.

The attitude of labor was seen from the first to be one of crucial importance. How far would it accept the Socialist view that this was a <(Wall Street War® in which the working class had no real interest? Fortunately for the coun¬ try, the leaders of organized labor as a whole accepted the President's definition of the con¬ flict as a war for democracy and depended upon his influence to safeguard their interests. There was some opposition to the policy within the ranks of organized labor, but the policy of the

leaders was in general carried out. With the extreme radical wing of the labor movement, represented conspicuously by the I. W. W., the situation was quite different. Recruited outside the ranks of union labor from comparatively ignorant unskilled workers, and to a large ex¬ tent from recent immigrants, it was easy for the leaders to draw their followers into un¬ patriotic and anti-social forms of opposition. Probably this opposition would have been much less formidable if the employing class had laid more emphasis on constructive measures and

less on mere repression.

In short, the war has revealed to an even greater extent than could have been expected the national unity of the American people. Most striking of all has been the loyalty of the great majority of the foreign-born population, including even those of German ancestry, not only to the national government, but to the ideals for which America stands among the nations.

National Ideals in the Conduct of the War. — The national temper was revealed not only in the decision which brought America into the war, but no less clearly in the measures adopted to secure its effective prosecution, es¬ pecially when these measures involved a radical departure from normal American practice. It was seen from the outset that American partici¬ pation in the war must involve cooperation with the allied governments, to an extent be¬ yond precedent since the days of the American Revolution. To make such cooperation cordial and effective, it was necessary to use every pos¬ sible means to remove antiquated prejudices and promote a better mutual understanding between the United States and its European associates. This new spirit of international cooperation was promoted by the exchange of special missions between the United States and the allied govern¬ ments, — notably the French Mission of Marshal Joffre and M. Viviani and the British Mission headed by Mr. Balfour, the British Foreign Secretary. The first thought of many Ameri¬ cans was that the part of this country would be chiefly financial and naval. Such cooperation was indeed given at once and on a large scale. It soon became evident, however, that the rais¬ ing of a great American army for service abroad was also an urgent necessity. How was such an army to be raised? Notwithstanding the previous national* tradition in favor of the volunteer system, public opinion rapidly took shape in support of the selective draft as the most democratic method of enlisting the citi¬ zenship of the country for the national defense. No less important were the measures adopted to secure the necessary economic support for the armies in the field. Funds for the use of the United States and the Allies had to be secured through national loans, unprecedented in amount and requiring the cooperation of millions of people who had never before in¬ vested in government bonds. The success of the Liberty Loans was a striking example of what may be accomplished through the co-oper¬ ation of volunteer service with governmental agencies. The effect on the national morale was no less important than the financial return. Never before had so large a number of citizens become conscious partners in a great national enterprise.

In earlier wars, notably in the Revolution, the War of 1812 and the Civil War, the govern¬ ment, fearing the effect of heavy taxes on public opinion, had depended too largely on loans and paper money, weakening the national credit and depreciating the currency. As to the precise proportion of war costs in the Great War, to be raised respectively by taxes and loans, there were sharp differences of opinion; but there can be no doubt in any case that the Americans of 1917-18 set a new national record of willing¬ ness to carry the necessary burden of war taxes.

The successful prosecution of the war re¬ quired not only the financial cooperation of governments, but acceptance by the American people of a new responsibility for the food supply of the allied nations which the sub¬ marine warfare had brought dangerously low. To secure this result it was found necessary to organize through the Food Administration a governmental control of commerce in food products, as for instance by fixing the price of wheat, which went squarely against traditional American ideals. On the other hand, the gov¬ ernment depended largely on appeals to the patriotism of producers, middlemen and con¬ sumers to stimulate production and lessen un¬ necessary consumption. The result was seen not only in an increase of food exports to the Allies, but again, as in the case of the Liberty Loans, in the awakening of a new sense of civic responsibility.

The spirit of civic cooperation was shown also in the support of various auxiliary agen¬ cies, such as the Red Cross, the Y. M. C. A., the Knights of Columbus and various other or¬ ganizations, religious and philanthropic. All of these agencies required and secured for their operations voluntary gifts on a scale which be¬ fore the war would have been thought improb¬ able. It is in these various forms of voluntary cooperation even more than in any formal votes that the future historian will find the best evidence of national solidarity in support of the war aims of the United States.

No honest historian of national ideals can leave out of the record the darker shades of the picture. War unquestionably develops the spirit of self-sacrifice, but it also gives new opportunities to those who are willing to profit by the necessities of the nation. The problem of the profiteer is as old as war itself and is writ large in the record of earlier wars. In the present war this danger to the national morale was perhaps more clearly foreseen than ever before and appropriate safeguards were carefully considered; it was hardly reasonable to expect that it would be avoided altogether.

It soon became apparent that the necessities of war reconciled public opinion to extraordi¬ nary extensions of governmental authority. Step by step Congress authorized the taking over by the Federal government of various kinds of business — the railroads, the telegraph and tele¬ phone service, and to a large extent the shipping business. Through the War Industries Board and the Food and Fuel Administrations the gov¬ ernment controlled to a large extent the produc¬ tion and distribution of products, directly or in¬ directly related to the efficient prosecution of the war. In the exercise of all these functions, the government did not escape sharp criticism, some just and some unjust; but oublic opinion

accepted these radical changes with surprising composure. This comparative unanimity was partly due to the conviction that the measures in question were intended to meet a temporary emergency. None the less, they were in line with certain tendencies existing before the war began, and may have a permanent influence on the political philosophy of the American people. As in the period of the Civil War, the stress of a great national crisis had not only developed the authority of the national government as a whole ; it had also immensely expanded the au¬ thority of the President as the chief agent of the national will. The people and their repre¬ sentatives in Congress had in large measure accepted his judgment on the main issues of international policy, and American confidence in this leadership was strengthened by the Presi¬ dent's new position as the most generally ap¬ proved spokesman of the Allied nations. In the carrying out of national policies also an extraordinary concentration of authority in the President was necessary in order to secure united and efficient action. Not only was he the commander-in-chief of the army and navy, but he directed through officials responsible to him the immense powers of the Food, Fuel, Railroad and Wire Administrations and the War Industries Board. To the statesmen of 1789 the concentration of such power in an American President would have been unthink¬ able ; yet it is, in the main, only the application to new conditions of the war powers, whose la¬ tent possibilities were revealed in Lincoln's ad¬ ministration during the Civil War. Then as now they were accepted, not as desirable in them¬ selves, but because concentration for executive purposes is in time of war one of the

necessary measures by which the National Democracy is to achieve its ends. It must not be forgotten, however, that while the sentiment of nationality has been greatly strengthened, it is a national¬ ism increasingly conscious of international re¬ sponsibilities, and ready to sacrifice not only material resources, but even those points of prestige which often prevent effective coopera¬ tion among allies. Striking examples of this spirit of international comity are the decision to allow American troops to be brigaded with those of the Allies, and the active part taken by the United States in securing the final ac¬ ceptance of a unified military command. These were decisions of the President as commander-in-chief but they were cordially supported by public opinion.

Finally in the background of American thought during the war were the great problems of reconstruction, the growing recognition among thoughtful men of new problems, politi¬ cal, industrial, educational and ethical, which cannot be met by routine methods and purely emotional modes of thought — which demand on the contrary the effective use of all our intellectual and spiritual resources.

Bibliographical Note. — President Wilson's (State Papers and Addresses,* Review of Re¬ views (1918) also in various other forms; pub¬ lications of the Committee on Public Informa¬ tion, the Congressional Record, especially January-May, 1917. Consult also Baker, fron¬ tier of Freedom* : Root, (The United States and The War* ; Lodge, (War Addresses, 1915— 17* ; Spargo, (Americanism and Social De¬

mocracyˆ Various aspects of public opin¬ io11 may be followed in the Nation, The A ew Republic , New York Times Current His-l®ry > Titerary Digest, 1 he American Year Book. See also Bullard, A., (Mobilizing America,* and, for suggestive discussions of American ideals on the eve of the European War the following: Eliot, American Contributions to Civilization *; Roosevelt, (American Ideals* ; Hart, (American Ideals ; Croly, (The Promise of American (c • antˆ (Progressive Democracy) ; Smith,

ˆPint of the American Government ; Lodge, The Democracy of the Constitution ; Mahan, America's Interest in International Relation.* D . EyARTs B. Greene,

RrofesSor of History , University of Illinois.

NATIONAL LEGISLATIVE ASSEM¬ BLY. See Constituent Assembly.

NATIONAL LIBRARY (BIBLIO¬ THEQUE NATIONALE) OF FRANCE,

one of the world's most famous libraries. Some of its historians find its origin in the books of Charlemagne and Charles the Bald but this is doubtless mere legend. Saint Louis is said to have formed a collection in the '13th century, but whether his books are among those of the Bibliotheque Nationale is not known. At any rate, the real founder of the Royal Library was King John, who bequeathed his collection of manuscripts to his successor Charles V, who transferred it from the Palais de la Cite to the Louvre. The first librarian of record was Claude Mallet, the king's valet de chambre, who made a sort of catalogue Hnventoire des Livres du Roy nostre Seigneur estans au Chastel du Louvre.* Jean Blanchet made an¬ other list in 1380 and Jean de Begue one in 1411 and another in 1424. Charles V was a patron of learning and encouraged the making and col¬ lection of books. It is known that he employed Nicholas Oresme, Raoul de Presle and others to transcribe ancient texts. This first collection of the King's Library was sold by Charles VI to the English regent of France, the Duke of Bedford, who transferred it to England in 1424. It was apparently dispersed at his death in 1435. Charles VII and Louis XI did little to repair the loss of these books, but the invention of printing resulted in the starting of another col¬ lection in the Louvre. Louis XI added to this characteristically by confiscating libraries that struck his fancy, as also did Charles VIII, who seized the collections of the kings of Aragon. Louis XII, who had inherited the library at Blois, incorporated the latter into the Bibliotheque du Roi and further enriched it with the splendid Gruthuyse collection and with plunder from Pavia. Francis I transferred the collection in 1534 to Fontainebleau and merged it with his private library. During his reign, fine bindings became the craze and many of the books added by him and Henry II are masterpieces of the binder's art. Under librarianship of Amyot, the collection was transferred to Paris during which process many treasures were lost. Henry IV again moved it to the College de Clermont and in 1604 it was housed in the Rue de la Harpe. The appointment of J. A. de Thou, the famous historian and bibliophile, initiated a period of development that made it the largest and richest collection of books in the world. He was succeeded by his son who was replaced,

when executed for treason, by Jerome Bignon, the first of a line of distinguished librarians of the same name. Under de Thou, the library was enriched by the collections of Queen Cath¬ erine de Medici. The library grew rapidly dur¬ ing the reigns of Louis XIII and Louis XIV, due in great part to the interest of the Minister of Finance, Colbert, one of the most indefati¬ gable collectors of books. The quarters in the Rue de la Harpe becoming inadequate, the li¬ brary was again moved, in 1666, to a more spa¬ cious house in Rue Vivienne. The Minister Louvois took quite as much interest in the library as Colbert and during his administration a mag¬ nificent building to be erected in the Place Vendome was planned. The death of Louvois, however, prevented the realization of this plan. Louvois employed Mabillon, Thevenot and others to procure books from every source. In 1688 a catalogue in eight volumes was compiled, and under the administration of Abbe Louvois, the Minister's son, the library was thrown open to all scholars. Abbe Louvois was succeeded by the Abbe Bignon, or Bignon II as he was termed, who instituted a complete reform of the library's system. Catalogues were made which appeared from 1739-53 in 11 volumes. The collections increased steadily by purchase and gift to the outbreak of the Revolution, at which time it was in grave danger of partial or total destruction, but owing to the activities of Renouard and Van Praet it suffered no in¬ jury. The Revolution appears to have bene¬ fited the library for many of the books of the emigres and the suppressed religious institu¬ tions found their way to the shelves of the Bibliotheque Nationale, as it was now called. Furthermore an administrative organization was established that is the basis of its present sys¬ tem. Napoleon took great interest in the li¬ brary and among other things issued an order that all books in provincial libraries not pos¬ sessed by the Bibliotheque Nationale should be forwarded to it, subject to replacement by ex¬ changes of equal value from the duplicate col¬ lections, making it possible, as Napoleon said, to find a copy of any book in France in the National Library. Napoleon furthermore in¬ creased the collections by spoil from his con¬ quests, a good share of which, however, was restored after his downfall. During the period from 1800 to 1836, the library was virtually under the control of Joseph Van Praet, to the development of which he consecrated the whole of his energies. At his death it contained more than 650,000 printed books and some 80,000 manuscripts, many of them of exceeding rarity. His work has been

carried on by Taschereau, Delisle and Marcel Homolle under whom the collections have grown to their present size of 4,050,000 volumes, 11,000 manuscripts.

NATIONAL MUSEUM. See United States National Museum.

NATIONAL NICKNAMES, the collec¬ tive names of a people or nation, usually orig¬ inating with the people themselves. John Bull was first given to the people of Great Britain by John Arbuthnot in his (Law is a Bottom¬ less Pit. } He also gave the names Nicholas Frog to the Dutch and Jean Crapaud (toad) to the French people. John Chinaman is a popular name for the Chinese; Taffy for the Welsh ; Jean Baptiste and Canuck for the French

Canadians, and Ivan Ivanivitch for the Rus¬ sians; Paddy for the Irishman; Jacques Bon-homme for the French peasant; Sawney for the Scotch, and Blackamoor and. Sambo for the negro in America.

In the United States the two popular na¬ tional names are Brother Jonathan and Uncle Sam. The former was first used. General Washington, on assuming command of the New England Revolutionary forces, was in great straits for arms and war material. The gover¬ nor of Connecticut, Jonathan Trumbull, was a man of excellent judgment and an esteemed friend of Washington. In the emergency, Washington said, (<We must consult Brother Jonathan." This expression was repeated on other difficult •occasions and became a conven¬ ient name for the whole people. The name Uncle Sam is an extension of the letters U. S. '(United States), printed or stamped on the government property. It was first used in Troy, N. Y., in 1812, when certain goods pur¬ chased for the government and branded U. S. were officially inspected by Samuel Wilson, whose nickname was uUncle Sam." The coin¬ cidence of initials suggested the application of this nickname to the government. In-the World War, the names given to the soldiers of the various countries were English, Tom¬ mies ; American, Sammies ; German, Boches or Fritz; French, Poilus.

NATIONAL PARKS AND MONU¬ MENTS. The former are large tracts of pub¬ lic lands in the central and western parts of the United States retained, maintained and im¬ proved by the Federal government for such purposes as are mentioned in the National Parks Service Bill, creating in the Department of the Interior <(a service to be called the National Park Service, which shall be under the charge of a director who shall be appointed by the Secretary." That service ((shall promote

and regulate the use of the Federal areas known as national parks, monuments and res¬ ervations," the object being ((to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unim¬ paired for the enjoyment of future genera¬ tions." National monuments, on the other hand, are defined in an act approved 8 June 1906, entitled ((An act for the preservation of American antiquities" as historic landmarks, historic and prehistoric structures and other objects of historic or scientific interest that are situated upon lands owned or controlled by the government of the United States.

There are at present 16 national parks. The oldest, Hot Springs, was created in 1832 ; the most recently created, the Hawaiian and the Lassen, date from 1 Aug. 1916 and 9 Aug. 1916, respectively. The following list gives, beside the name of each, its location, date of creation, area in square miles and distinctive characteristics :

Hot Springs, 1832, middle Arkansas, V/t square miles. There are 46 hot springs pos¬ sessing curative properties ; many hotels and boarding-houses ; 20 bathhouses under public control.

Yellowstone, 1872, northwestern Wyoming, 3,348 square miles. A greater number of gey-

00

.5

o

c

> >

£ >

'O

t >

c

X

o

<u

X

>.

w

<u

N

V

<U

o

o

X

o

o

u

<U

W

c

0J

a >

J3

P.

o

6 ˆ

c

o

c

w

o

Cll

< u

IS

c

< 3

e

o

■4~»

o

T3

OS

o

o

pC

u >

w y-1

C3

« W

NATIONAL PARKS AND MONUMENTS

741

sers than in all the rest of the world; also boiling springs, mud volcanoes, petrified for¬ ests; grand canyon of the Yellowstone, re¬ markable for its coloring; large lakes, streams and waterfalls ; wilderness inhabited by deer, elk, bison, moose, antelope, bear, mountain sheep, beaver, etc — the greatest wild animal and bird preserve in the world; altitude, 6,000 to 11,000 feet.

Yosemite, 1890, middle-eastern California, 1,125 square miles. The

valley is famous for its beauty; there are high cliffs, waterfalls, three groves of big trees, high sierra, large areas of snowy peaks, the ˆwaterwheel® falls ; and here, as in several other national parks, good trout fishing.

Sequoia, 1890. middle-eastern California, 2 37 square miles. The big tree national park, con¬ taining 12,000 sequoia trees over 10 feet in diameter; mountains and precipices.

General Grant, 1890, middle eastern Califor¬ nia, 4 square miles. This was created to pre¬ serve the “General Grant tree,® 35 feet in diam¬ eter; it is six miles from Sequoia National Park and under the same management.

Casa Grande Ruin, 1892, Arizona, 24 square mile, a prehistoric Indian building.

Mount Rainier, 1899, west-central Washing¬ ton, 324 square miles. The largest accessible single-peak glacier system, containing 28 gla¬ ciers, some of large size, 50 to 500 feet thick; also sub-Alpine wild-flower fields.

Crater Lake, 1902, southwestern Oregon, 249 square miles ; the lake, extraordinarily blue, lying in the crater of an extinct volcano. The sides are 1,000 feet high; the lava formations are interesting.

Wind Cave, 1903, South Dakota, 16ˆ2 square miles, a natural cavern with passages or gal¬ leries 90 miles in aggregate length.

Sully’s Hill, 1904, North Dakota, 6ˆ4 square miles, a wooded hilly tract on Devil’s Lake.

Mesa Verde, 1906, southwestern Colorado, 77 square miles ; most notable and best pre¬ served prehistoric cliff dwellings in the United States.

Platt, 1906, southern Oklahoma, 1*4 square miles ; sulphur and other springs possessing curative properties.

Glacier, 1910, northwestern Montana, 1,534 square miles. This is a rugged mountain re¬ gion of Alpine character. In it are found 250 glacier-fed lakes of romantic beauty; 60 small glaciers ; peaks of unusual shapes and precipices of great height.

Rocky Mountain, 1915, north-middle Colo¬ rado, 358 square miles ; embracing a snowy range with peaks from 11,000 to 14,500 feet in

altitude in the heart of the Rockies. Here are seen remarkable records of the Glacial Period.

Hawaiian, Hawaiian Islands, 56 square miles ; including three volcanoes and a lake of blazing lava.

Lassen, 1916, California, 106 square miles. This includes a volcano — the onlv one in the United States that is still potentially active.

Purposes Served by National Parks. — The Secretary of the Interior writes that there is no reason why the United States should not make its public health and scenic domain as available to all its citizens as Switzerland and Italy make theirs. The aim is to open the na¬ tional parks thoroughly by road and trail <(and give access and accommodation to every de¬

gree of income® ; accordingly renewed efforts are promised, “to outfit the parks with new hotels which should make the visitor desire to linger rather than hasten on his journey.® The Secretary’s comment on the Yellowstone Park concludes : “Its great size, its altitude, its vast wildernesses, its plentiful waters, its favor¬ able conformation of rugged mountain and sheltered valley and the nearly perfect protec¬ tion afforded by the policy and the scientific care of the government have made this park, since its inauguration in 1872, the natural and inevitable centre of game conservation for this nation. There is something of significance in this. It is the destiny of the national parks, if wisely controlled, to become the public labora¬ tories of nature-study for the nation.® From them specimens may be distributed to the city and State preserves, as is now being done with the elk and may be done later with the antelope. The report of the general superintendent and landscape engineer of national parks for 1915 contains the observation that the first step in the consideration of a general policy for the administration of the national parks is the determination of just what functions they per¬ form. The general superintendent expresses the opinion that “the fostering of recreation purely as such is more properly the function of the city, county and State parks.® We must note the clear distinction between the character of such local parks and those which are na¬ tional. . The latter form a class that should be of national interest; and in the category of national parks no reservation should be found that is of local interest only. The national parks should serve three functions : The stimulating of national enthusiasm or patriot¬ ism, the furthering of knowledge and health and the diverting of tourist travel to the

scenic areas of the United States. The claims of the national parks upon the attention of tourists and others are thus summarized: ((In Yellow¬ stone are the geysers, in Yosemite the highest of waterfalls, in Sequoia the largest and oldest trees on earth, trees that were 3,000 years old when Christ was born. In Wind Cave Na¬ tional Park is a cave that comprises over 90 miles of sparkling passages. At Arkansas Hot Springs and Platt National Park are medicinal waters that have dispelled the pain of legions of sufferers. In Mesa Verde National Park are the crumbling dwellings of a forgotten race.®

The National-Monuments. — There were 30 ((national monuments® (as above defined) at the close of 1917, two which formerly existed having been eliminated by the creation of Las¬ sen National Park. Their names, State and areas (in acres) are given in the following list: Devil's Tower, Wyoming, 1,152; Monte¬ zuma Castle, Arizona, 160; El Morro, New Mexico, 160; Chaco Canvon, New Mexico, 20,629; Muir Woods, California, 295; Pin¬ nacles, California, 2,080; Tumacori, Arizona, 10; Mukuntuweap, Utah, 15,840; Shoshone Cavern, Wyoming, 210; Natural Bridges, Utah, 2,740; Gran Quivira, New Mexico, 160; Sitka, Alaska, 57; Rainbow Bridge, Utah, 160; Lewis and Clark Cavern, Montana, 160; Colorado, Colorado. 13,883: Petrified Forest, Arizona, 25,625; Navajo, Arizona, 360; Papago Saguaro, Arizona, 2,050; Dinosaur, Utah. 80; Sieur de Monts, Maine, 5,000; Gila Cliff Dwellings, New

Mexico, 160; Tonto, Arizona, 640; Grand Can¬ yon, Arizona, 806,400; Jewel Caves, South Dakota, 1,280; Wheeler, Colorado, 300; Oregon Caves, Oregon, 480; Devil Postpile, California, 800; Mount Olympus, Washington, 299,370; Big Hole Battlefield, Montana, 5; Cabrillo, California, 1. Of these 30, the first 20 are ad¬ ministered by the Interior Department, the next eight by the Agricultural Department and the last two by the War Department.

An article entitled (Our National Parks* in the Scientific American, 11 Nov. 1916, includes an observation on the commercial value of tourist traffic: (<It is estimated that in time of peace Switzerland's annual

revenue from tourists is $150,000,000, that of France $600,000,- 000. It is claimed that Americans have spent $500,000,000 a year in travel abroad. The pine woods of Maine are estimated to bring a rev¬ enue of $40,000,000 each year on account of the visitors they attract. Every dollar, there¬ fore, which is spent by the nation on national parks may be considered an investment on capital account which is likely to brine in a very satisfactory return upon the money invested.® (See also separate articles Casa Grande Ruin; Crater Lake; General Grant; Hot Springs National Park; Yellowstone National Park, etc.). Consult Yard, R. S., (The Book of the National Parks) (New York 1919).

NATIONAL PORTRAIT GALLERY, British, an institution that owes its origin to the zealous and enlightened efforts of Earl Stanhope. A board of trustees was appointed late in 1856, and by the end of the following year 23 portraits had been secured — some of them purchases and others gifts. The diffi¬ culty of the trustees is to guard against im¬ proper admissions in the way of donation, and therefore no donation can be accepted unless approved of by at least three-fourths of the trustees present at a meeting. At present the National Portrait Gallery contains over 2,000 portraits, under the varieties of paintings, busts, medallions, *etc.* Its treasures were for a time accommodated in the Bethnal Green Museum, but a new building, erected for it mainly by private munificence (funds being provided by W. H. Alexander), beside the National Gal¬ lery, was opened in 1896. The arrangement of the portrait is chronological, beginning with Richard II (1366-40). The large picture of the (<Reform Parliament® hands in the lower exhibition hall, while the portraits exhibited include representative works of Van Dyck, Gainsborough, Reynolds, Raeburn, Lawrence, Watts and other great masters.

NATIONAL REPUBLICAN PARTY, in American history, the name taken by the Republican elements which under the leadership of John Quincy Adams and Henry Clay opˆ posed the Presidential candidacy of Andrew Jackson in 1828. Clay, their candidate in 1832, was defeated and the party never again rallied.

NATIONAL ROADS. See Roads and

Highways.

NATIONAL SOCIETY OF THE SONS AND DAUGHTERS OF THE PILGRIMS, The. Organized at Providence, R. I., Monday, 21 Dec. 1908, by 10 gentlemen, most of whom were of Mayflozver ancestry. The plan and purposes of the Society originated with Thomas W. Bicknell of Rhode Island, who had, for a

year, consulted with men and women of Pil¬ grim ancestry in several States as to the needs and work of such a society. The term “Pilgrim® was used in the broad sense to include all those who settled in any one of the American colonies, between 1607 and 1700. This period the English historian Green calls the “Pilgrim Century® in the great western transAtlantic settlement. During that century, many thou¬ sands of the yeoman class, with a sprinkling of nobility, crossed the ocean and made per¬ manent homes on the eastern coast of America, between the Saint Lawrence and the Gulf of Mexico, and their descendants, numbering many millions, are located in all the States of the Union.

The objects of the Society are to perpetuate the memory and to foster and promote the prin¬ ciples and virtues of the Pilgrims; to publicly commemorate, at stated times, principal events in the history of the Pilgrims, and to erect durable memorials of historic men and events; to encourage the study and research of Pilgrim history, especially as related to the foundation of civil government on the principles of soul liberty; to foster and to establish such depart¬ ments of study and of organization as shall seem best to promote social rights, civic virtue, industrial freedom, political equality, the su¬ premacy of just laws, the value and sacredness of the ballot, the purity of the home, temperate and godly living, and the dependence of indi¬ viduals, communities, states and nations on the guidance of Almighty God, as taught by the Pilgrims. Any person of good moral character, in lineal descent from Pilgrim ancestry in any colony prior to 1700, is eligible to membership. The officers are a governor-general, a deputy governor-general for each State, seven assist¬ ants, a secretary-general, a treasurer-general, a captain, an elder, an historian and a board of commissioners of seven members, of which the governor-general and the secretary-general are members, ex officiis. These officers constitute the General Court of the Society. They are elected annually in the month of December of each year, hold office for one year or until their successors are elected. The secretary-general, who is the executive of the General Court, iselected by that body.

Local chapters and State societies are formed under the direction of the secretary-general. The headquarters of the National Society are in Providence, R. I. Thomas W. Bicknell, the founder of the Society, is the secretary-general.

NATIONAL SOCIETY FOR VOCA¬ TIONAL EDUCATION, New York City, an association to aid in the evolution of sound aims, methods

and practices and to promote the further development of practical vocational education for agricultural, commercial, home¬ making and industrial occupations. It was the first national organization to promote interest in publicly supported vocational education, and until 1918 its title was the National Society for the Promotion of Industrial Education. Through its earlier conventions and publica¬ tions it crystallized the public opinion that led to the enactment of legislation in the States which pioneered the development of public vocational schools. Its organization is demo¬ cratic. Its membership includes industrial man¬ agers, educators, labor leaders, social workers..

manufacturers and other public-spirited men and women. See Vocational Education.

NATIONAL SOLDIERS' HOMES. See

Soldiers' Homes.

NATIONAL SONGS. See National Hymns.

NATIONAL OR STATE GUARD. See

Militia.

NATIONAL TRANSCONTINENTAL RAILWAY (Canadian Government Railways). This railway is the eastern section, extending from Moncton to Winnipeg, of a railway span¬ ning the continent, the western section of which, from Winnipeg to Prince Rupert, is called the Grand Trunk Pacific Railway. The entire system was the joint enterprise of the Canadian government and the Grand Trunk Railway. Owing to the inability of the Grand Trunk Pacific Company to operate the eastern sec¬ tion it was taken over by the government as part of the government railways in 1915. The great bridge across the Saint Lawrence River above Quebec, completed in 1917, is on this line. In the year ending 30 March 1917 re¬ ceipts from passengers were $5,916,550; operat¬ ing expenses $7,883,177; cost of line $152,802,-

746. The length of lines operated is 2,009 miles. For an account of the enterprise see Grand Trunk Pacific Railway. -

NATIONAL UNION, an American fra¬ ternal and beneficial organization, incorporated in 1881 under the laws of Ohio. In 1917 there were 702 councils and 57,817 members in the order. Over $150,000,000 in insurance is car¬ ried by the members and $44,476,088 has been paid out in death benefits since its organization. The headquarters of the Order are located at Toledo, Ohio.

NATIONAL UNIVERSITY. History.—

The proposition to establish a national uni¬ versity was first made by George Washington. He discussed such a university in his first Presidential message to Congress and from his private fortune bequeathed $25,000 to the na¬ tion as a basal sum around which a national university might be built. President Madison likewise urged upon the Congress the wisdom of establishing such an institution. Three of his Presidential messages deal with the matter. John Quincy Adams returned to the subject in a message to Congress, urging upon that body the consummation of Washington's plans. Congress was hostile to the plan. Jefferson opposed it. In 1811 a Congressional committee reported against a national university, pro¬ nouncing the scheme unconstitutional. Since then the proposal has been revived by several Presidents and by many statesmen but without favorable results, in spite of the George Wash¬ ington endowment • fund and a popular sub¬ scription fund of $30,000, which was paid in in 1795.

In 1869 the National Education Association espoused the cause of a national university by appointing a nermanent committee of the asso¬ ciation to promote the plan. Through this com¬ mittee the subject was kept alive for more than 30 years. In 1899 a majority of the committee was composed of university presidents and rendered a report calling for Federal aid, but vigorously opposing Federal control of national education and declaring against a university

maintained by the Federal government at the national capital. In 1907 the National Associa¬ tion of State Universities pronounced in favor of organized facilities for research in the sci¬ entific departments of the Federal government, but opposed a national university as a degree-conferring institution.

Educational and Research Facilities in Washington. — The various

bureaus, depart¬ ments, libraries, literary and scientific collec¬ tions, museums, etc., maintained by the Federal government in Washington in themselves con¬ stitute valuable facilities for university re¬ search. They are equipment for university work. While these facilities are not organized in in¬ stitutional form, they are open to investigators by resolutions passed by Congress in 1892 and again in 1901. The Act of 1901 provides:

“ That facilities for study and research in the government departments, the Library of Congress, the National Museum, the Zoological Park, the Bureau of Ethnology, the Fish Commission, the Botanic Gardens, and similar institutions hereafter established shall be afforded to scientific investi¬ gators and to duly qualified individual students and gradu¬ ates of institutions of learning in the several states and territories, as well as in the District of Columbia, under such rules and restrictions as the heads of the departments and bureaus mentioned may prescribe.”

The resources for study at the national capi¬ tal are very great. The Library of Congress ranks high among the libraries of the world. The Smithsonian Institution has great value to the scientific student. In addition to depart¬ mental records and collections in various fields, there is the Corcoran Art Gallery, the Patent Office, the Geological Survey, the Medical Mu¬ seum, the National Museum and various scien¬ tific bureaus, which together constitute an edu¬ cational equipment far greater in value than that of any one organized educational institu¬ tion anywhere in the world. Its value has been roughly estimated at $75,000,000. In a real sense this vast equipment is part of the equip¬ ment of every university in the United States in so far as such university makes use of it. In its best sense this is a national university where research is carried on under most favor¬ able circumstances; its equipment is maintained by the national treasury; but the seal of ap¬ proval for scientific achievement is granted in the form of degrees conferred by the univer¬ sities located in the various States.

A. R. Brubacher.

NATIONAL WEALTH. See Wealth of Nations.

NATIONAL WOMAN’S CHRISTIAN TEMPERANCE UNION. See Woman’s Christian Temperance Union. •

NATIONAL WORKSHOPS. See Ate¬ liers, Nationaux.

NATIONALISM, the Historical Devel¬ opment of.

I. Introductory Definitions.

No concepts in history, politics or sociology are to-day more important or evident, and, yet, at the same time, more difficult to define than the terms nationality and nation. To the writer it seems that a nation is a culturally homo¬ geneous social group, which is at once con¬ scious and tenacious of its unity of psychic life and expression. Some writers, especially Ernest Renan, have -emphasized the ˆwill® or desire to live together as the essence of a na¬ tion, but as more profound students, particu¬ larly the sociologists, have made clear, this will

to live in, and to preserve the unity of, the group exists only where there is a very high degree of cultural and psychic likeness and unity. The most fundamental basis and char¬ acteristic of a nation, then, is cultural homo¬ geneity, from which the will to exist in conti¬ guity naturally proceeds. If such a group is at the same time politically organized within a given territory it may then be designated a national state. The term nationality is fre¬ quently used to describe a culturally homogene¬ ous group which has not yet attained complete national and political unity, but it seems that this view only brings a confusion of terms. Rather, the term nationality should be used as a gen¬ eral descriptive and collective expression some¬ what analogous to the broader meaning of the term politics in relation to a study of the state. It is a generic and comprehensive concept which refers to and describes that variable en¬ semble of physical and psychic elements which generate the cultural homogeneity and group self-consciousness and solidarity forming the foundations of a nation. The dynamic ex¬ pression of the cultural and political activities and ambitions of a nation or national state is most usually and logically known as national¬ ism. While frequently used in the invidious sense, indicating political or cultural aggres¬ siveness, such an implication is not essentially involved in the definition, even if it is normally to be observed in the practical operation of nationalism. In the static or analytical sense, nationalism is conventionally used to designate the

modern political system or order, based as it is upon the unit of the national state. The history of nationalism then is essentially the tracing of the rise and development of the nation and the national state.

The history of the development of nations and national states is a most complicated prob¬ lem. So difficult is it to determine just when tribal or pre-political society ends and political society begins and so many and deep-seated are the aspects of psychic life and cultural charac¬ teristics which are carried over from the tribal period into the political, that it is well-nigh im¬ possible to say. that one can fix any definite period as marking the origin of nations. One can scarcely agree with Israel Zangwill that the tribally organized Jews of ancient Pales¬ tine constituted a national state in the sense in which that term would be used to describe the Germany of Bismarck and Treitschke and Reventlow, or the Italy of Crispi and Carducci and Sonnino, and, yet, it is not easy to deny the force of his criticism of those writers who find nations to be wholly a phenomenon of very recent origin. Rather, it is best to agree that modern nations have their constituent psychic elements deeply rooted in the tribal past and that the history of nationalism and of nation¬ building is essentially the tracing of the ex¬ pansion of cultural entities and of the sociolog¬ ical centres of emotional fixation; in other words, the record of the expansion and ration¬ alization of ˆherd-instinct® As human society has undergone tremendous transformations in the period from the gradual breakdown of trib¬ al society to the 20th century, there are differ¬ ences of corresponding scope and significance between the nature and the mode of expression of group psychology and culture in tribal society and in the national states of to-day. The most

profound and far-reaching of these contrasts are connected with the conversion of the basis of group solidarity, from the standpoint of social control, from blood-kinship, real or assumed, to a definite territorial habitat, and with the development of what is conventionally known as Apolitical society.® The distinctions will ap¬ pear clearly only upon the careful historical analysis of the development of the constituent principles of the nations of to-day. It is this fact that renders such a survey of vital import¬ ance, entirely aside from the specific content of the historical facts enumerated.

II. A Brief Historical Sketch of the Stages in the Origins of Nationality and Na¬ tions Previous to the Rise of the Modern National States.

1. Tribal Society. — It is now generally

Agreed among students of cultural anthropology that the earliest well-defined units of social or¬ ganization were either the village and local group, or the clan, both of which were normally grouped with others of the same type in a larger and looser entity — the tribe. While much of the psychology of tribal relationships and ac¬ tivities has been carried over into modern so¬ ciety, the contrasts between tribal society and the modern national state are many and obvious. Tribal society was primarily based upon blood-kinship, either real or assumed, and tribal re¬ lations were personal rather than political. Force, custom and blood-feud were the founda¬ tion of tribal juristic concepts and methods. The (<instinct of the herd® had a much fuller sway over the group than it has at the present day. Cultural solidarity was more intense and there was little personal individuation, except that which set off a few leaders from the mass of the group. An intense religious loyalty and attachment to all the symbols of group unity were ever present and evident. So great was the domination of the group over the individual that some eminent students, such as Durkheim and his school, have even gone so far as to claim that all of the categories of religion, thought and knowledge in the primitive group were de¬ rived from the expressions of, and reactions to, group life and activities. Indeed, Durkheim finds that the essence and foundation of religion is but the psychic exuberance or stimulation from group life and activities and Trotter holds the ((instinct of the herd® to be the primordial and all-pervading psychic force controlling man from the origin of the race to the present day. Whatever may be the exaggerations of these writers in matters of detail, it is generally agreed that the struggle for the preservation and ex¬ tension of group solidarity has been the basic factor and process in the evolution of mankind, and it was . inevitable that the psychic traits developed in this process would become grounded deep in the mental life of humanity. The tremendous importance of this discipline in group life for the subsequent development of humanity has been admirably summarized by Professor Hankins: <(Man is in fact funda¬ mentally social by nature. He has never lived in isolation but always in groups. Lacking special organs of defense he found strength, as did the ants and the bees, in group solidarity. Consequently the struggle for existence on the human plane has been fundamentally a struggle of group with group. Since his survival turned

largely on the perfection of his gregarious in¬ stinct, there has been achieved in man a keen sensitiveness to the call of the group. This erd instinct, as Trotter calls it, is, therefore, the \ erj basis of human society and the most profound aspect of man's social nature It is for the group what the instinct of self-preserva¬ tion is for the individual. It is aroused only in times of stress and danger; group fear in some form is essential to its development \ when awakened it not only grips every tribesman in an atmosphere of electrified suggestibility, but stirs within his bodily mechanism the internal secretory apparatus whose products are essen¬ tial to deeds of valor. It is in its strength and vigor an assertion of the group will to live, and is therefore as deep and mysterious and indeed as permanent as the eternal nisus of nature, the insistent push of everything that throbs with life and energy.® Further, tribal groups were relatively small, asLXompared to modern political aggregates, and were little attached to any par¬ ticular territory. While such groups often held with great tenacity to particular areas on ac¬ count of special economic advantages, such as better fishing or hunting grounds, it was the economic phases of the attachment rather than the purely territorial which played the predomi¬ nating part. There was little hesitancy in leav¬ ing a particular locality to follow migrations of game or fish. This matter has been well sum¬ med up by Professor Robinson: ((Patriotism, the love of one's terra patria, or natal land, is a recent thing. During far the greater part of his existence man has wandered over the earth's face as a hunter and can hardly have had any sweet and permanent associations with the tree or rock under which he was born. But the fore¬ runners of territorial emotion were the group loyalties of the tribe, clan, family and totemistic group, in whatever order and with whatever peculiarities these may have originated and come to exist side by side.®

2. Early City-States. — The transition from tribal groupings and modes of life to the city-state, the earliest type of political organization, was gradual and slow. The chief contrast between tribal society and that of the proto-historic city-states was that in the latter the basis of group and individual relations was gradually coming to be political and terri¬ torial, rather than purely personal and con¬ sanguineous. For many and diverse reasons, groups tended to consolidate about certain vantage points determined by considerations of fortification and

protection, religious signifi¬ cance, economic superiority and better poten¬ tialities for robbery and brigandage. Stability replaced the earlier nomadic life, and the habi¬ tat became more or less permanent. The early city-states did not, however, at all resemble the modern urban centres of life and industry. Life was still primarily agricultural, and the ((city® was little more than a citadel surrounded by the homes of the peasants who would retire within the walls in time of danger. As trade developed and the division of labor between city and country was established, the early city-states assumed more of a commercial character and the coming of foreign merchants produced those problems of assimilation and the exten¬ sion of citizenship which were the chief force in breaking down the remaining vestiges of

tribal society and in creating the origins of the modern political order. A few historical or semi-historical instances of this specific and all-important change from tribal to civil society have been preserved in historical records. Such were the occupation and retention of ancient Palestine by the Jews and their subsequent choice of a king; the constitutional reforms of Cleisthenes in Attica at the close of the 6th century b.c. ; the alleged reforms of Servius Tullius in early Rome and the subsequent con¬ stitutional struggle between the patricians and plebeians; and the breakdown of Teutonic tri¬ bal society and the establishment of political relations in the interval between Arminius and Alaric — the transition which Paul Vinogradoff has called ((one of the most momentous turning-points in the history of the race.® Important as were the city-states of antiquity as a stage in political and social evolution, they were soon submerged in the great patriarchal empires which arose in the ((state-making age® through the superior force and aggressiveness of one of these cities which compelled the submission and enforced the subjection of others. The ancient Egyptian Empire was a product of the forcible subjugation of the numerous city-states of the Nile Valley; the Babylonian, Assyrian and Per¬ sian empires were built up out of the progres¬ sive amalgamation of the city-states of the valleys of the Tigris and Euphrates and the coast of Asia Minor. Only the cities of an¬ cient Hellas retained their independence long enough during the historical period to give any adequate conception of the type of cultural soli¬ darity and political reactions which character¬ ized the antique city-state. Here personal and kinship relations had been replaced by the in¬ stitution of citizenship, based upon residence and naturalization instead of blood-relationship or elaborate initiation ceremonies designed to confer the sanction of artificial relationship. Groups were

generally more populous and civil¬ ization more advanced than in tribal society. Most of the psychic characteristics of tribal life, however, were, if in a modified degree, present in the civilization of Athens, which may be taken as the most advanced product of the ancient city-state civilization. Group solidarity was still intense. The elements of common culture were prized even to the extent of being vested with a sacred significance. Ceremonies, costumes, legal and political forms and prac¬ tices, moral codes, religious festivities, and even amusements were tinged with the divinity of their alleged origin. The gods were limited to the group and were regarded as wholly solici¬ tous for the welfare of the particular political and social entity. The attitude toward for¬ eigners was well exemplified by the well-known contrast between <(Greek and Barbarian,® in which Aristotle was able to find a justification for the subjection of inferior peoples to the Greek ((genius® for governing. The group leaders passed after their death into the realm of the gods or supermen and their magnified and exaggerated prowess became a most highly prized group possession. In addition to these phases of group solidarity and symbolic unity, which had their roots in tribal psychic life, a new attachment to territorial possessions arose when fixity of habitat had become the rule. Not only were particular sacred places, such as

Olympus and Delphi, prized and venerated, but the whole habitat of the group was valued as a special gift from the gods. Aristotle found that the fortunate situation of the Greeks in their geographical habitat served sufficiently to explain the “superiority® of Greek genius. The ancient city-states seemed well on the way to¬ ward transforming group life from the tribal to the modern national basis and had made notable advances in that direction. Had their progress not been arrested by the development of the great patriarchal empires, mentioned above, the national state in its completeness might have been a product of antiquity. For better or worse, however, this was not to be, and even Athens itself was swallowed up in the imperial domains of the Macedonian con¬ queror after its African and Asiatic prototypes had long before bowed to the might of Thebes, Memphis,

Babylon, Nineveh, Ecbatana, Sardis and Susa. James Bryce has admirably de¬ scribed the general absence of anything ap¬ proaching a national cultural or political union before the conquests of Rome: ((Men with little knowledge of each other, with no experi¬ ence of wide political union, held differences of race to be natural and irremovable barriers. Similarly, religion appeared to them a matter urely local; and as there were gods of the ills and gods of the valleys, of the land and of the sea, so each tribe rejoiced in its peculiar deities, looking on the natives of other coun¬ tries who worshipped other gods as Gentiles, natural foes, unclean beings. Such feelings, if keenest in the East, frequently show themselves in the early records of Greece and Italy; in Homer the hero who wanders over the unfruit¬ ful sea glories in sacking the cities of the stran¬ ger; the primitive Latins have the same word for a foreigner and an enemy; the exclusive systems of Egypt, Hindostan, China are only the more vehement expressions of the be¬ lief which made Athenian philosophers look upon a state of war between Greeks and bar¬ barians as natural, and defend slavery on the same ground of the original diversity of the races that rule and the races that serve.®

3. The Patriarchal Empires of Antiquity. — The formation of the extensive and auto¬ cratic patriarchal empires in what Bagehot has somewhat loosely called “the nation-making age® was one of the most important and sweeping transformations in the political and social evolu¬ tion of humanity. Paradoxical as it may seem, they both stifled, and promoted, the growth of nations and nationalism. Their development was invariably brought about by the cumulative extension of the power and prestige of some more powerful and aggressive city-state at the expense of its neighbors. This very process naturally produced an enormous inflation of group pride and egotism on the part of the conquering city. Also, while subject cities were severely treated and their national culture sternly repressed, nothing makes a group so proud and tenacious of its cultural characteris¬ tics and possessions as persecution, and the con¬ querors unwittingly only intensified the particu¬ larism and local pride of such subject communi¬ ties as maintained and preserved their corporate existence. The history of the ancient empires is little more than a record of constant war¬ fare produced by the attempt of the ruling city

and dynasty to repel and suppress the revolts of subject cultural groups. This process of an¬ cient empire-building culminated in the expan¬ sion of imperial Rome, in its task of absorbing most of the then-known world and of bringing into existence the ideal “reign of

universal peace® and uniform law. It is probable that the process of Roman expansion marked the nearest approximation to the spirit and methods of aggressive nationalism that was witnessed before the dynastic wars surrounding and ac¬ companying the development of the modern national states. The crude and almost tribal expression of collective egotism in “international® policy; the public theory that all her wars were “defensive® and that Rome was al¬ ways threatened by aggressive states ; the alleged conviction that the gods were always favorable to these defensive wars; the control of diplomatic and military policy by the landed ((Junker® aristocracy — the Senate: the ambi¬ tion for private or family glory in war, as mani¬ fested by Claudius in the first Punic War and by Flaminius in the second Macedonian War; the ((surplus population® argument for expan¬ sion; the <(scrap of paper® attitude toward treaties as evidenced in the second Samnite War; the harsh and brutal treatment of con¬ quered populations, extending to the devasta¬ tion of fields, the burning of cities and the enslaving of populations ; the insatiable greed for further expansion ; the disregard of the “rights of small nationalities** — all of these as¬ pects of Roman expansion, which are so famil¬ iar to students, sound exceedingly modern and seem quite capable, with some few changes of names, of furnishing the proper categories for the analysis of the development of the German Empire from the acquisition of Brandenburg in 1415 to the present momentous collapse of 1918. While this process of the formation of empires was most influential in creating the tradition of the glory of territorial expansion which was to serve as an important impulse to the aggressive¬ ness of the modern national and territorial state, it should not be forgotten that there was a most radical difference between the political and cul¬ tural basis of such a political entity as the Ro¬ man Empire and the German Empire of the present day. Though there was a uniform and universal political system, there was no cultural homogeneity or common sentiment of loyalty, which are the indispensable foundations of the national state. Only the citizens of Italian Rome felt any emotional thrills of patriotic re¬ action at the triumphal processions of the con¬ quering emperors or generals and at the recita¬ tion of the Virgilian epic of the growth of the Pax Romana, Though the subject peoples might formally acquiesce in the apotheosis of the Roman emperor and render a lip reverence and allegiance they preserved openly or secretly their admiration for their own heroes and leaders and retained their deeper loyalty and allegiance to their own pantheon. A common spontaneous patriotism and a general loyalty to the sovereign imperial state was quite unknown in the ancient empires, and the cultural homo¬ geneity which must precede the political expres¬ sion of national life was as remote from reali¬

zation. Even the prevailing political philosophy-Stoicism — decried the sentiment of nationalism and patriotism, and lauded the notion of the

KrWf˚f u-an a?d the cosmopolitanism ot world-citizenship. Mr. Bryce thus denicts

the nature and operation of theRoman imperial system so different from the modern political order based on the national state : «No quarrels of race or religion disturbed that calm, for all natiorml distinctions were becoming merged in the idea of a common Empire. The gradual extension of Roman citizenship through the eolomeu the working of the equalized and equal¬ izing Roman law, the even pressure of the government on all subjects, the movement of population caused by commerce and the slave traffic, were steadily assimilating the various peoples… . From Rome came the laws and language that had overspread the world ; at her feet the nations laid the offerings of their labor: she was the head of the Empire and of civili¬ zation, and in riches, fame and splendor far outshone, as well the cities of that time as the tabled glories of Babylon or Persepolis.® Had Rome continued to exist with an improved method of imperial administration and eco¬ nomics for 2,000 years after her «fall,» it might have been possible for her to have welded her diverse subject populations into a single loyal and unified national unit, but the experiment wras not allowed. In 378 a.d., the Teutonic barbarians from the North, who had been grad¬ ually filtering into the empire for three cen¬ turies, broke their leashes and started on their migrations, which submerged the ancient world in the return of pre-classical barbarism and produced a Clovis, a Charlemagne and an Otto the Great to repeat the tasks of an Agamemnon, an Alexander and an Augustus. The ancient world, then, passed without producing the com¬ plete parallel of the modern national state, but it laid the psychological and political basis upon which it could develop, though it must not be forgotten that the growth of the modern na¬ tional state has been to a large degree a progress sui generis, primarily

independent of ancient impulses, even if influenced by ancient models. The psychological contributions of Rome to modern nationalism and the continuity of Roman egotism and jingoism with modern mili¬ tarism and patriotism have been eloquently stated by Professor Muzzey in the following citation: “The Roman spirit was bequeathed to Europe. Beneath all the art and letters, all the industry and commerce, all the advance in humanity throughout European history, that Roman idea remains. When the old nations speak of patriotism they mean the memory of their glorious wars. War has been their con¬ stant occupation and preoccupation. Not a generation that has passed since Virgil, but has paid its terrible toll on the field of carnage to the ideal of pacifying the world by arms. It is not alone Germany, with the celebration of its men of blood and iron from Otto the Great to Otto von Bismarck. The French too, re¬ joice in the Napoleonic legend. They have their glorious wars of the Grand Monarque. They bow before the white plume of Henry of Navarre, and thrill to the echo of Roland’s horn at Roncesvalles. The English have their proud memories of Agincourt and Blenheim and Crecy and Waterloo and celebrate their Napiers and Nelsons and little <(Bobs.® All these nations of old Europe have their glorious traditions of war, and each one can find enough

victories in the uninterrupted course of slaugh-ter_ through the Christian Ages to justify its belief in its own invincible prowess — nay, even in its divine mission to rule the rest. The R.oman ideal still lives in them all. Great Caesar’s ghost still walks as at Philippi. He stalks, gaunt and terrifying, before the chan¬ celleries at London and Berlin, at Vienna, Paris and Rome.®

4. The Middle Ages. — The political, social, economic and cultural conditions of the <(Middle Ages® were no better adapted to the produc¬ tion of the national state than was imperial antiquity. *The unit of political organization and administration was the domain of the feudal lord, which varied greatly in extent, but never in any way approximated identity with any* cultural or national entity. Usually the domain was but a small isolated element in the feudal hierarchy, and it made for political decentralization and local immunity rather than for national unity. The centre of social life was the infinite number of isolated and minute mediaeval manors and the many small and scat¬ tered mediaeval towns. The units of agrarian and urban industry, the manors and the towns, respectively, were isolated, self-sufficient and narrowly selfish and provincial, and were wholly unadapted to providing any firm eco¬ nomic foundations for national unity. The

pivotal points in mediaeval cultural activity were the towns, but they were too few, too poorly connected with others by the way of communi¬ cation and too much governed by the spirit of localism and jealous isolation to be able to bring into being any degree of that general cul¬ tural homogeneity, so all-essential to the ex¬ istence of any degree of national unity.

Not only were these local units of the mediaeval period ill-adapted to the creation of nations and national states, but there operated from the other extreme powerful forces and institutions making for a continuance of that universalism which had characterized the Roman Empire. Indeed, it has usually been held that universalism and cosmopolitanism were the dominant ideals of the "Middle Ages® — a sentiment best summed up in Dante's (De MonarchiaR with its vision of a church and empire universal. Set off against the actual political diversity and localism of the feudal system was the political symbol of unity and cosmopolitanism — the Holy Roman Empire. Whatever its actual weaknesses, its symbolic power over the mind of Europeans was suffi¬ cient to cause so ardent a nationalist and so blase an advocate of Realpolitik as Frederick the _ Great to bow before it, even in the days of its declining strength. A universal moral and religious control over mediaeval life was provided by the Roman Catholic Church, whose growth has been described by an eminent au¬ thority as "the rise of the new Rome.® With its control over the religious, and to a large extent the mental, life of the mediaeval period through its elaborate hierarchies for adminis¬ tration and for the control of the sacraments, the mediaeval church, with the aid of the in¬ quisition against heresy, brought about a degree of psychic unity throughout Europe never be¬ fore equalled. Under its greatest popes, such as Innocent III, the Church also exercised a degree of control over European politics never

matched by any emperor of the period. The three leading crowned heads of Europe were in turn disciplined by Innocent. The learning of Europe was no less markedly universal. The Church prescribed a

single theology for all western Europe, which was embodied in the (Book of Sentences) of Peter Lombard and the (Summa Theologica) of Thomas Aquinas. As theology was regarded throughout the mediaeval period as the “queen of the sciences, and edu¬ cation was chiefly in the hands of the church¬ men, the realm of learning was no less unified than that of the spiritual world. Again, there was a striking unity of language and literature during the period. While the vernacular lan¬ guages and literatures began to appear in the 11th and 12th centuries, Latin was, during the greater part of the Mediaeval Age, the language of politics, business and learning throughout western Europe. The literature read by the vast majority of those who were able to read was not less uniform than the language; the Bible, the works of the leading “Fathers,® the few theological manuals extracted from them, and the crude Latin ‘encyclopedic compilations by Isidore and Rhabanus Maurus and their like, were almost the only books read until the prose and verse of the vernacular languages began to appear at the height of the mediaeval period. Mr. Bryce in the following brilliant passage characterizes the remarkable unity which was at least symbolically brought to the mediaeval period by the church and empire universal: “It is on the religious life that nations repose. Because divinity was divided, humanity had been divided likewise; the doctrine of the unity of God now enforced the unity of man, who had been created in his image. The first lesson of Christianity was love, a love that was to join in one body those whom suspicion and prejudice and pride of race had hitherto kept apart. There was thus formed by the new re¬ ligion a community of the faithful, a Holy Empire, designed to gather all men into its bosom, and standing opposed to the manifold polytheisms of the older world, exactly as the universal sway of the Caesars was contrasted with the innumerable kingdoms and republics that had gone before it. The analogy of the two made them appear parts of one great world-movement toward unity; the coincidence of their boundaries, which had begun before Constan¬ tine, lasted long enough for him to associate them indissolubly together, and make the names of Roman and Christian convertible. Ecumeni¬ cal councils, where the whole spiritual body gathered itself from everv part of the temporal realm under the presidency of the temporal head, presented the most visible and impressive examples of their connection. The language of civil government was, throughout the West, that of the sacred writings and of worship; the greatest mind of his generation consoled the faithful for the fall of their earthly com¬ monwealth, Rome, by describing to them its successor and representative, the (City which hath foundations, whose builder and maker is God.> »

In spite of this unique prevalence of the universal and the uniform in fact and sym¬ bol during the mediaeval period, however, forces were working beneath the surface that were, to rend asunder this artificial unity for centuries.

As early as the Strassburg Oaths of 842 there could be detected the first beginnings in the differentiation of those vernacular languages which were to lay the literary basis for na¬ tional diversity and rivalry. Moreover, it should not be forgotten that in a curiously in¬ direct and obscure, but nevertheless real, man¬ ner the mediaeval period furnished a psycho¬ logical impulse to the growth of nationalism by its influence on the .“Romanticists® many centuries later. It was in part from an im¬ perfect understanding of the Mediaeval Age that this school obtained its sentimental impulse, which operated powerfully in the creation of the new nationalism during the French Revolu¬ tion, and its notion of the unique and indige¬ nous nature of national character, which formed the basis of much of 19th century nationalistic philosophy and historical literature. The re¬ vival of Roman law in western Europe in the 12th and following centuries became a powerful instrument making for royal supremacy and the rise of the dynastic state. The new com¬ merce with the East, which had been built up by the Italian cities in the period of the Cru¬ sades, was to produce the Italian city-states, which first successfully defied the principle of imperial unity and were the harbingers of the repetition of that process on a vastly greater scale in northern Europe, when the opening of the new trade routes with the East and West should usher in the “Commercial Revolution® and with it the dawn of the Modern Age.

III. The Commercial Revolution and the Rise and Development of the Modern Dynas¬ tic National States. — In October 1492 Co¬ lumbus landed on San Salvador in the Bahamas and in May six years later Vasco de Gama reached Calicut on the coast of India, and the two most significant steps had been taken in bringing about that great revolution in com¬ merce, thought and politics, which, in the totality of its dynamic reactions on European civilizaztion, was to produce the modern world and to initiate that process of national develop¬ ment, differentiation and rivalry which has since persisted without abatement and is not likely to be suspended until a supernational organization shall have been erected with power to curb aggressive nationalism and vested with a function for mutual service which will at¬ tract the loyalty of the several component parts of the general world organization.

The older generation of historians, under the spell of the exaggerations and incomplete knowledge of Burckhardt and Symonds, were wont to regard the origin of the modern state system as the product of the so-called “Renais¬ sance,® or, guided by the enthusiasm of Ranke and Schaff for the Lutheran revolt, conven¬ tionally dated the emergence of nationality from the Protestant revolt and its resulting political adjustments in the Peace of Augsburg and the Treaty of Westphalia. A more pro¬ found study of modern history by such writers as Brandi, Cunningham, Shepherd, Cheyney, Robinson, Abbott, Beard and Bolton has re¬ vealed the fact that both “Renaissance® and “Reformation,® in their broadest aspects, were but phases or results of that great transforma¬ tion which marks the origin of the modern world and the national-state system — the “Commercial Revolution.® By this is meant

not only the discoveries, the revival of trade and the intervention of capital,® but also the reactions of these innovations upon the whole basis of European civilization. The permanent intellectual progress which followed the so-called “revival* of the 15th century was not so much the result of the resurrection of an antique culture as it was the product of the new psychic reactions which came from the contact of cultures and the intellectual curiosity stimulated by the discoveries. The modern in¬ tellectual world grew out of the work of Gali¬ leo, Kepler, Newton, Boyle and Lavoisier, and not out oi that of Petrarch, Bruni, Poggio and Boccaccio. Not less disruptive of older doc¬ trines has been the result of more critical re¬ search upon the deeper significance of the “Ref¬ ormation.® After three centuries of befogging the real issues at stake under the mask of theological controversy, scholars have at last come generally to accept the doctrines of Slei-dan, the greatest of contemporary authorities, that the Protestant revolt was primarily the result of the political and nationalistic ambitions of the North German princes, who found Lu¬ ther’s theological rebellion a timely ((moral and religious issue® under which to hide their secular ambition to secure political independ¬ ence from the Holy Roman Empire. The suc¬ cessful

impulse to the religious wars that won the day for Protestantism came not from the zeal of the German princes for the triumph of “justification by faith,® but from their eager¬ ness to attain unto the “cuius regio eius religio® clause of the Peace of Augsburg (1555) and the recognition of their full political sover¬ eignty by the Treaty of Westphalia (1648).

The chief impulse that the Commercial Rev¬ olution brought to the growth of national states came from the rise of the middle class and their alliance with the monarchs in the attempt to destroy the anarchy and decentral¬ ization of the feudal system. Hitherto the kings had been compelled to depend upon the feudal lords for the administration of law, the provisions of royal funds and the military pro¬ tection of the realm. It can scarcely be sup¬ posed that the feudal lords would render effec¬ tive aid to any policy designed to limit their powers or terminate the political order to which they owed their existence. There was, there¬ fore, no possibilitv of bringing about that all¬ essential step in political progress, the destruc¬ tion of mediaeval feudalism, until a new class had arisen with sufficient strength to furnish the kings with the loyal aid necessary to cope with the recalcitrant upholders of the old order, and until a source of royal income had been pro¬ vided which would enable the kings to hire loyal officials and armies without reiving for their financial support upon feudal taxes. Both of these all-important prerequisites for the growth of administrative centralization political concentration and the rise of the dy¬ nastic national state were supplied by the Com¬ mercial Revolution. A loyal officialdom, op¬ posed to the feudal aristocracy, appeared in the new “Noblesse de la robe® — the middle class merchants and lawyers that filled the royal offices, and, through the “intervention of capital® coming into the royal treasuries from the national share in the profits of the new commercial and industrial enterprises, the kings were provided with the all-essential financial

power to hire their own officialdom and to support a national army independent of the feudal lords. Then began that relentless war of the national monarchs against their old feudal rivals which extended from the acces¬ sion of Henry VII of England in 1485 to the close of the last century. While this process involved a great development of royal absolu¬ tism and tyranny, as an inevitable accompani¬ ment of the growth of national and dynastic centralization, the movement as a whole was one of the most important in the historv of the political development of humanity. All the horrors of the domestic tyranny and foreign wars which have accompanied the rise of na¬ tional states

since 1500 have been the price which mankind has paid through the waste¬ ful economy of nature in attaining to that stage of national independence and self-gov¬ ernment which had to precede the ultimate goal of internal democracy and international con¬ cert, alliance or federation. Expensive as the process has been, students of the history of civilization unanimously recognize that the evolution of the national state and of large political aggregates had to be brought about before the basis could be provided for an in¬ telligent, amicable, just and nracticable ar¬ rangement between the states of the world. An international order arising directly out of the feudal system is inconceivable.

The emergence of the national dynastic state in modern times was first manifested in the case of England, due to the appearance in 1485 of a shrewd and vigorous monarch in the person of Henry VII, and to the fact that in England alone had the feudal nobility been gracious and self-effacing enough to prepare their destruction by a war of self-extermination — the War of the Roses (1455-85). Henry VII filled the royal coffers by taxing the feudal nobles through the use of "Morton's Fork® and other ingenious devices, haled recalcitrant and rebellious feudal lords before the Court of the Star Chamber, and encouraged the new com¬ merce by treaties such as the "Intercursus Magnus® and by subsidizing such explorers as the Cabots. His son, Henry VIII, broke with Rome and gave a religious basis to the growing English nationalism. Elizabeth profited by the labors of her father and grandfather, and her reign witnessed the first great cultural expres¬ sions of English nationalism, as well as the emergence of England as a leading naval and colonizing nation. By the close of the Tudor period (1603) England had become a highly centralized dynastic national state. Feudalism in its political aspects had passed, and the mid¬ dle class had so developed its political strength that a half-century later it was able to demon¬ strate its superiority over the Crown. After brief but brilliant development of Portuguese nationalism (1498-1580), Spain was next in the order of national development. Charles V had been an imperialist rather than a nationalist . and had hoped to revive the Mediaeval Empire, but his son and heir in Spain, Philip II (1555—98), was a true Spanish nationalist and pro¬ ceeded to attempt to bring unity not only to Spain but to the Spanish possessions in the Netherlands. His over-ardent nationalism, however, brought disruption rather than cen¬ tralization, and in 1567 the Dutch, led by Wil¬ liam the Silent, broke into active revolt. The

new Dutch national state declared its inde¬ pendence in 1581 and secured the European confirmation of its action at Westphalia in 1648. A century after England had emerged from civil war with a strong national monarch at the head of the state, Henry IV, the founder of the French Bourbon dynasty, came forth victorious over his opponents in the civil wars and was crowned king in 1589. Caoturing not only Paris but France by a <(mass,)) he began with his great minister, Sully, the building of the dynastic national state in Frai ce. His work was cut short by his untimely death at the hand of the assassin, Ravaillac, but his work and plan was carried on with vigor and determination by the great ecclesiastics and statesmen, Richelieu and Mazarin, until, by the time of the suppression of the Fronde in 1651, the feudal system as a dominating political power in France had passed away. The fruit of the work of Henry, Sully, Richelieu and Mazarin was appropriated by Louis XIV, in whose reign France reached not only the height of her dynastic centralization, but at¬ tained to the cultural primacy of Europe. The Thirty Years' War (1618-48) brought with it a multitude of nationalistic movements and demonstrated the fundamental political nature of the Protestant revolt. The stirrings of national ambitions in Bohemia (1618-20) and in Denmark (1625-29) were speedily repressed, but Sweden forged to the front as a great national state (1630-32) and maintained her position until it was lost through the insane ambitions of her warrior king, Charles XII (1697-1718). The Treaty of Westphalia first gave general European recognition to the grow¬ ing national state system and to the existence of independent national sovereignty. It brought diversity rather than unity, however, to Ger¬ many and necessitated the postponemeit of German unification until the latter part of the 19th century, when this anachronistic and be¬ lated process was to disturb the peace of the world. But if a unified national German state was not the product of this general period of the development of dynastic national states, there appeared the dynasty and the state which were ultimately to bring centralization and unity to Germany-Prussia under the Hohenzollerns. After having developed from robber barons into wealthy city magnates of Nurem¬ berg in southern Germany, the Hohenzollerns appeared upon the north European stage through the purchase of the mark of Branden¬ burg by Frederick Hohenzollern from the bank¬ rupt Emperor Sigismund in 1415. Through fortunate marriage arrangements thev secured the possession

of Prussia in 1618. The bas.s of the Prussian bureaucracy and military sys¬ tem was laid bv Frederick William the Great Elector (1640-88) and the process was carried to completion by Frederick William I (1713— 40). Starting with these contributions of his ancestors, Frederick the Great (1740-85) was able by diplomatic duplicity and military genius to raise Prussia to the rank of a first rate European power and to create that German political dualism which erected a final barrier to German national unification until Austria had been humiliated and ousted in 1866. In the latter part of the 17th century Poland had attained to a degree of power which enabled her to save Christendom from the Turk in 1683,

but unfavorable geographical situation, ethnic, religious and social diversity, and unrestrained feudal anarchy prevented Poland from attain¬ ing permanent national unity and condemned her to a steady decline and then to a century and a half of dismemberment and servitude. Even semi-Asiatic Russia did not remain im¬ mune in this general European process of national differentiation and centralization. Under her barbarous and brutal, but able, Tsar, Peter the Great (1696-1725), political power was centralized, a national roval armv was es¬ tablished, European manners and customs in¬ troduced and Russian foreign policy given a westward orientation. By 1721 the Baltic provinces had been taken from Swe ’en and the all-important ((window to the west® secured. While neither Prussia nor Russia were seri¬ ously affected directly by the Commercial Revolution, the growth of nationalism in these states during the 17th and 18th centuries was indirectly almost wholly a result of the political reactions of this great economic movement. In both states the nationalistic policies were adopted as a direct and obvious imitation of the ad¬ ministrative and military methods of the monarchs of the new order of national states. The Great Elector aped the policies, methods and measures of Richelieu, Mazarin and Louis XIV, and Frederick I took as his model Wil¬ liam III of England. Peter the Great learned from England and Holland the secrets of the new industry and commerce, while from Louis XIV he obtained his pattern for political cen¬ tralization and military reorganization. Bv the middle of the 18th century, then, national states had been created in most of Europe. Only in Germany, Italy and the Balkans was this process postponed until the next century, with results so disastrous to humanity at large.

The growth of nationalism during the period of the Commercial Revolution was forwarded by other forces than political centralization. The narrow and selfish nationalistic commer¬ cial policy, known as

ˆMercantilism,® which de¬ veloped more or less universally after 1500 as the general body of economic and commercial doctrines which governed European trade and industry until the middle of the 19th century, operated strongly in the way of increasing national consciousness, self-interest and jeal¬ ousy, and was a potent stimulant to interna¬ tional friction. Commerce during this period became little better than a collective or national piracy, in which the ˆrights® of other nations were ignored or denied. In addition to this powerful economic impulse to nationalistic and militaristic policies, a strong intellectual in¬ fluence arose in the remarkable development of vernacular literature after the spell of the classical revival, known as <(Humanism,® had passed. Italy produced Machiavelli, Guicciar¬ dini, Ariosto and Tasso; France, Rabelais, Montaigne, Corneille, Moliere-and Racine; Spain, Cervantes, Lope de Vega and Calderon; Portugual, Camoens, Miranda and Ferreira; England, More, Spenser, Shakespeare, Jonson, Marlowe, Bacon and Milton ; Germany, Sachs, Ayrer, Opitz and Fleming. Even Holy Scrip¬ ture was no longer a unifying force in litera¬ ture, but in the translation of Luther and the King James Version became a powerful vehicle in the development, popularization and im¬ provement of the vernacular language and a

Subtle and effective force making for national¬ istic divisions. 1 he vernacular literature not only gave literary expression to the growing differentiation of national cultures, but con¬ stituted a national possession of first-rate im¬ portance, which served as a patriotic inspiration tor the generations to come. When the re hgious divisions created by the Reformation coincided with national boundaries they con¬ stituted a formidable psychic force making for national cohesion and self-satisfaction. Before the end of the 18th century, then, Europe had ceased to be either feudal or imperial and had come to be primarily national in political organization, economic policy and intellectual tastes and expression. What was further needed to perfect the nationalistic system was the psychological thrill furnished by the French Revolution and its results, and the provision of a real nervous system for the new nationalism in the improved or revolutionized

methods of communication and transportation which came as a part of the Industrial Revolution.

IV. The French Revolution, the Napo¬ leonic Period and the Popularization of National Sentiment in Europe.

The Commercial Revolution was not only the most potent force leading to the creation of the dynastic national state, but, curiously enough, it also contributed more than anything else before the Industrial Revolution to its ulti¬ mate downfall. The middle class, which it created and advanced in power and prestige, in time turned against the kings in the more progressive countries of western Europe, destroyed the dynastic state and brought into being that control by the middle class which was to prepare the way for the growth of 19th century democracy. The nature and significance of this all-important revolt of the middle class against the dynastic state is effectively set forth by Professor Hayes in the following illuminating citation :
<(Driven on by insatiable ambition, not content to be lords of the world of business, with ships and warehouses for castles and with clerks for retainers, the bour¬ geoisie placed their lawyers in the royal serv¬ ice, their learned men in the academies, their economists at the king's elbow, and with restless energy pushed on to shape state and society to their own ends. In England by the close of the 17th century they had helped to dethrone kings and had secured some hold on Parliament, but on the Continent their power and place was less advanced. For the 18th century was still the grand age of monarchs, who took Louis XIV as the pattern of princely power and pomp. (Benevolent despots> they were, these monarchs meaning well to govern their people with fatherly kindness. But their plans went wrong and their reforms fell flat, while the bourgeoisie became self-conscious and self-reliant, and rose up against the throne of the 16th Louis in France. It was the bour¬ geoisie that started the revolutionary cry of 'Liberty, Equality, Fraternity,) and it was this cry in the throats of the masses which sent terror to the hearts of nobles and kings. Desperately the old order — the old regime — defended itself. First France, then all Europe was affected. Revolutionary wars convulsed the Continent. Never had the world witnessed wars so disastrous, so bloody.® Along with the

destruction of the dynastic aspect of the early national state, there came an intensification and popularization of national sentiment quite unknown in the earlier autocratic form of political organization.

As in England there was witnessed the first emergence of the dynastic national state, there also the middle class first came into power, r e Pri™arily to the more complete influence of the Commercial Revolution there than else¬ where In 1649 the English middle class be¬ headed a would-be autocratic king and 40 years later they completed the process of putting the middle class in political control by driving his son into exile when he attempted to ignore the constitutional barriers to the exer¬ cise of unlimited royal power. In France the bourgeoisie® did not triumph until a century later. In 1614 they had been too weak to defy the monarch and the feudal nobility, but in 1789 and the following years they gave object¬ ive evidence of their increase of power d'ur-mg the previous century and three-quarters by crushing both royalty and nobility and estab¬ lishing themselves as the supreme power in the state. Threatened by the exiled French aristocracy and their foreign sympathizers, the Revolutionists, held together by the new shib¬ boleth of fraternite, arose as a "nation in arms® to defend their freshly won liberty against the champions of the old regime. A vast change took place in the nature of national sentiment as a result of this popularizing force of fraternity. At the close of the 17th cen¬ tury Louis XIV had held that the state and the monarch were one and the same; at the close of the 18th bourgeois officials were declaring that the nation had a glorious existence quite independent of the king. Professor Hayes has well expressed the importance of this new Revolutionary watchword of "Fraternity® in the process of popularizing the sentiment of nationalism. «Of all the political and spiritual elements in the 'old regime* of the 19th cen¬ tury, one of the most stubborn and impressive was the growth of nationalism. Taking definite form in the days of the French Revolution, under the fair name of fraternity, it appeared as a revolt of a self-conscious people in behalf of their individual liberty and equality against the tyranny or inefficiency of contemporaneous divine-right institutions. By the French idea of fraternity every European country was soon affected, so that formerly latent sympathies were galvanized into a most lively sentiment, and theorists from the domains of history or philosophy or even of economics could find popular approval fpr their solemn pronounce¬ ments that people speaking the same language and sharing the same general customs should be politically united as nations.® As a result of the 23 years of general European war follow¬ ing 1792, the national sentiment of well-nigh every European country was

transformed from the autocratic and dynastic type to a popular form, generallv diffused through the whole body politic. This came about either directly, where Napoleon conquered and carried the French reforms, or indirectly, as a defense re¬ action against the great military genius of the time by the other states which found it neces¬ sary to arouse a similar patriotism in their citizens in order to cope with Napoleon. The French Revolutionary patriotism was carried

directly from France into the Rhine provinces, Italy and Poland and appeared as a defense re¬ action in the Germanies, particularly Prussia, in Spain and her colonies and, to a lesser de¬ gree, even in England and Russia. No state in Europe wholly escaped the wave of patriotic enthusiasm that swept over Europe from 1792 to 1815. The remarkable contribution of Napo¬ leon to the growth of nationalism in modern European history, through giving a wide¬ spread dissemination to the forces and tenden¬ cies of his time, is thus stated by Professor Robinson : “So long as states were composed of subjects rather than of citizens, the modern emotions of nationality could scarcely develop. Nationality, in our meaning of the term, is a concomitant of another mystical entity, democracy. The French Revolution began, it is true, in a period of philosophic cosmopolitan¬ ism, since that was the tradition of the philosophes, — and the French armies undertook to liberate other peoples from their tyrants in the name of the rights of man, not. of nations. But Napoleon, in a somewhat incidental and left-handed fashion, did so much to promote the progress of both democratic institutions and of nationality in western Europe that he may, in a sense, be regarded! as the putative father of them both. His plebiscites were empty things in practice, but they loudly ac¬ knowledged the rights of peoples to decide on vital matters. He was a friend of constitu¬ tions — so long as he himself made them. Then his attempt to seat brother Joseph on the Span¬ ish throne produced a really national revolt, and led to the Spanish constitution of 1812 and all its later revivals and imitations. In Italy he stirred a desire for national unity and the expulsion of the foreigner which had been dormant since the days of Machiavelli’s hope¬ less

appeal. He is the founder of modern Germany. He succeeded in a task which had baffled German emperors from the days of Otto the Great; for in 1803 he so far consolidated her_disrupted territories that the remaining states, enlarged and strengthened, could in time form a strong union and become a great inter¬ national power. His restrictions on the size of the Prussian army after his. victory at Jena suggested to Scharnhorst, Gneisenau and Boyne a subterfuge which made Prussia the military schoolmaster of Europe, and cost the millions of lives since offered up in the cause of na¬ tionality." To these European effects of the influence of the Napoleonic period upon the growth of nationalism should be added the contagion of this process which extended to America. The rise of national independence in Latin America was immediately related to the influence of Napoleon upon Spain. As Mr. Fisher has said: <(If the South American democracies value their independence, statues of Napoleon might with propriety be raised in the squares of Valparaiso and Buenos Ayres." The naval and commercial aspects of the strug¬ gle between England and France greatly stimulated that development of national unity in the United States which was involved in the preparation to meet the insults to this country and the ravages on its trade. Finally, the pur¬ chase of Louisiana, made possible by Napoleon, was the greatest nationalistic event. in the first half century of our history as an independent state. So great was the momentum which the

popularized sentiment of nationality gained that not even Metternich, the most astute states¬ man of the first half of the 19th century, could check it. In spite of his temporarily successful efforts to leave Italy and Germany mere "geographical expressions" in 1815, the arrange¬ ment he produced was cast to the winds by those great nationalistic statesmen Cavour and Bismark in the unification of Italy and Ger¬ many, while the national sentiment . surged violently, if with less success in gaining full political expression, in Greece, the Balkans, Bohemia, Poland and Hungary. But the French Revolution, as the final political and national¬ istic expression of the Commercial Revolution, only gave the initial impulse to this new or democratic phase in the development of nationality. A much more profound revolution was already in process of development in the factories and mines of England, and the great¬ est transformation in the history of the race was there being prepared, which could not fail to have a far-reaching reaction upon the growth of national sentiment and the activities and at¬ titudes of the national states.

V. The Industrial Revolution, National Imperialism and the Latest Stage in the Evolution of Nationalism.

The term “Industrial Revolution” was given by W. S. Jevons and Arnold Toynbee to the great series of mechanical inventions that fol¬ lowed the introduction of John Kay’s “flying shuttle” in 1738 and have completely trans¬ formed the economic, political and social, as well as most of the intellectual, foundations of civilization. The general significance of the Industrial Revolution has been eloquently set forth by Professor Shotwell in the following quotation : “It has brought into existence a vast working population, embodied in iron and steel, drawn from mines and forests, from steam, gas and electricity by the mysterious genius of the human brain. It has transformed the face of nature and the life of the whole world. These are not mere economic facts. They form the largest and most wonderful chapter in the history of mankind. What is the Renaissance or Reformation, the empire of Charlemagne or of Caesar, compared with this empire of mind and industry, which has pene¬ trated the whole world, planting its cities, as it goes, binding the whole together by railroad and telegraph, until the thing we call civiliza¬ tion has draw.n the isolated communities of the old regime into a great world organism, with its afferent and efferent nerves of news and capital reaching to its finger tips in the mar¬ kets of the frontier. A nickle spent for thread in Uganda sets the spindles going in Man¬ chester. Fellaheen by the Nile may be starv¬ ing because the cigarette factories are building marble palaces for their owners on the banks of the Hudson.” Following as a result of the industrial conditions necessitated by the me¬ chanical inventions came the “factory system” and the growth of the modern industrial cities, with all of their attendant social and economic problems. This meant not only a concentra¬ tion of the industrial population in the newly-created manufacturing cities, but also the com¬ pletion of the process of separating capital from labor and the creation of the interrelation

between them that has colored the social and economic history of the

last century. Socially and politically the most important results of this sweeping transformation were the great increase in the number and strength of the middle or capitalistic class and the creation of the industrial proletariat. The struggle between these classes and . of both of them against the landed aristocracy has been the centre of the political history of the last hundred years and the chief dynamic force in the growth of political democracy. The development of means of the communication of intelligence, through the railroad, telegraph, telephone and cheap newspapers, made possible a real psychological unity within each nation, broke up local isola¬ tion and completed the process of popularizing national sentiment and perfecting national self-consciousness. It made the various national manifestations of ˆherd-instinct® more com¬ municable, more responsive and more liable to sudden and hysterical explosions. So funda¬ mentally primitive was the general level of thought and interests on the eve of the Indus¬ trial Revolution that the sudden development of the means of communicating these through¬ out the modern national state tended to give to national thought and emotion the same nar¬ rowness and self-satisfied provincialism that had earlier prevailed on a smaller scale. There¬ fore, it is not surprising that Professor Robin¬ son finds that <(Our ancient tribal instinct evi¬ dently retains its blind and unreasoning char¬ acteristics despite the fact that we are able nowadays, by means of newspapers, periodicals, railroads and telegraphs, to spread it over vast areas, such as are comprised in modern states like Germany, France, Russia and the United States.® The worldwide extension of the new mechanism of communication also rendered jingoistic expressions in foreign countries bet¬ ter known and more likely to arouse national antagonisms. Finally, as will be evident from the following discussion, the Industrial Revolu¬ tion was the most influential force impelling the great modern national states to undertake the building up of new colonial empires in the era of modern imperialism since 1870.

The European Revolutions of 1848 seemed to bring to a focus the two great principles of the first half of the 19th century — nationality and democracy — which had been produced by the combined action of the French and Indus¬ trial Revolutions, and for the moment gave promise of making possible the dream of the European liberals that a political order might be created which would give full recognition to both of these aspirations. The enthusiasm thus stirred among the nationalists and demo¬ crats in Europe during these momentous years has been eloquently set forth by Mr. Bryce: ((So the sympathy, both of America and of Britain, or at least of British Liberals (among whom was then to be found a great majority of the men of light and leading),

went out when, in 1848, the crash of the Orleans Mon¬ archy in France had shaken most European thrones, to the Italian revolutionaries, to the Polish revolutionaries, to the Czechs in Bo¬ hemia, to the Magyars in Hungary, who, under the illustrious Kossuth, were fighting in 1849 for their national rights against Hapsburg tyranny, to the German patriots who were try¬ ing to liberalize Prussia and the smaller king-VOL. 19 — 48

doms, and bring all Germans under one free constitutional Government. Men hoped that so soon as each people, delivered from a foreign yoke, became masters of their own destinies, all would go well for the world. The two sacred principles of Liberty and Nationality would, like twin guardian-angels, lead it into the paths of tranquil happiness, a Mazzinian paradise of moral dignity and liberty, a Cobdenian para¬ dise of commercial prosperity and international peace.0 But the tragic sequence of events in 1848-49 proved that nationality and democracy could then scarcely co-operate in harmony; national jealousy and particularism weakened the cause of democracy and ultimately led to the temporary downfall of both before political reactionaries and antinational imperialists. The liberals of 1848 believed that when tem¬ pered with democracy nationality would be di¬ vested of its chauvinistic and aggressive quali¬ ties and would insure the coming of perpetual peace, but, as Professor Blakeslee has made clear, neither history nor theory can justify this view : ((During the past century the great democracies have been making war, threatening war, and preparing for war, much of the time against each other. Their history shows clearly enough that if their neighbors had also been democratic this change alone would not have prevented wars. Nor is the outlook for the future encouraging. Democratic nations are still willing to fight to defend their national interests and policies ; they demand their due share of oversea trade, concessions and colo¬ nies — if they are a commercial or expansionist people — no less insistently because they are democratic. But the interests and policies of one nation conflict with those of another; what one democracy regards as a due share of over¬ sea trade, concessions, and colonies is an undue share to its rival. Each democracy becomes an excited partisan of its own view, ready to back it by force of arms; and the natural re¬ sult is, as it always has been, wars and rumors of wars. There are enough conflicts in na¬ tional policies to-day to lead to a dozen future conflicts, even if all the world should be demo¬ cratic. There is Japan's insistence upon con¬ trolling China; our own Monroe Doctrine, when interpreted in a domineering or selfish spirit; England's Persian Gulf policy; the anti-oriental policy of the United

States and the British self-governing colonies; the expansionist policy of all the Balkan statesj and the Entente policy, formulated at the Paris Conference, of dis¬ criminating against the trade of the Central Powers after the present war shall be over. Unless present conditions are changed, the democratic nations of the world, with their conflicting interests, would find it difficult to maintain world peace, for the next century, even if they wished to maintain it. History, present conditions, and the logic of the situ¬ ation show that democracy alone will never make the world ‘Safe. It is only by a definite concert of states that we may secure a reason¬ able promise of obtaining a permanent inter¬ national peace and of becoming a non-mili- taristic world.® The following discussion will show that the more perfect recognition and realization of nationality has as yet achieved even less than democracy to produce the politi¬ cal millennium ; rather it has seemingly merited Lord Acton’s indictment that (<there is no prin-754

o’ pie of change, no phase of political specula¬ tion conceivable which is more comprehensive, more subversive, more arbitrary than nation¬ ality. Its course will be marked with material as well as moral ruin, in order that a new invention may prevail over the works of God and the interests of mankind.®

The 19th century witnessed the belated com¬ pletion of national unification in two major European states — Germany and Italy — through the efforts of Bismarck and Cavour in the dec¬ ade and a half following 1855. These states¬ men, in deep sympathy with the national aspi¬ rations of their countrymen, gathered together under their leadership the various forces work¬ ing in this direction and succeeded in giving concrete and effective expression to the gen¬ erally diffused impulse to political unification. In a very real sense they may be regarded as having carried to completion the forces and tendencies first aroused in their respective states by the reactions to the French Revolu¬ tion and the Napoleonic conquests and states¬ manship. Not only were the patriotic tenden¬ cies, at the head of which they put themselves, originally set in action by the Revolution and Napoleon, but also the main obstacle to na¬ tional unification which had to be overcome in both states was the antagonism of that invet¬ erate and implacable enemy of Napoleon and the (<French

Ideas® — the anachronistic empire of the Hapsburgs and Metternich. The work of Cavour and Bismarck marked a significant stage in that incessant warfare against the mediaeval imperial concepts and practices which had begun at Westphalia in 1648, was carried on at Utrecht and in the creation of the Con¬ federation of the Rhine, and finally ended in the utter collapse of that obsolete and oppress¬ ive political structure in the autumn of 1918, as a result of the growth of national senti¬ ment among its subject peoples and the blow to its military prestige by the collapse which marked the close of the ((War of the Nations.® Force, chicanery, duplicity and intrigue were employed about equally by both Cavour and Bismarck in achieving, their justifiable ambi¬ tions, but the resulting political systems cre¬ ated were widely different. <(Blood and iron® and Realpolitik were used by Cavour merely as a means to the end of creating a liberal and pacific state and a parliamentary govern¬ ment, while with Bismarck they became ends in themselves and were used to repel the very liberalism and democracy which Cavour had established. The temporary vindication of brute force and autocracy in Germany, as a result of the success of Bismarck from 1862 to 1871, gave them tremendous prestige in the newly-formed empire and served to give color to the subsequent history of Germany and the world.

In addition to these larger national states which have appeared upon the European map since 1815, a number of smaller nations have attained in part, at least, to statehood. Greece attained independence in 1829; Belgium gained its independence in 1830 and its neutral¬ ization in 1839 ; Luxemburg became an inde¬ pendent neutralized state in 1867 ; Serbia, Rumania and Montenegro were recognized as states in 1878; Norway separated from Sweden in 1905 ; Bulgaria took advantage of the Euro¬ pean confusion and tension of 1908 to declare

her complete freedom from Turkey; and in 1913 Austria perversely created the independent Albanian state to block Serbia from an outlet to the sea. But in spite of this considerable addition to the ((family of nations® in Europe, national aspirations were by no means satisfied by 1914. Not only did the political map fail to coincide with the national boundaries in the case of every one of the European national states created during the 19th century, but there were great historic nations like the Poles, the Irish, the Czechs of Bohemia and the Finns which were denied any independent political existence. Had the psychology of peoples been the same in 1914 that it was a century and a half before, this condition of incomplete na¬ tional independence would have produced no very great problem, for

potential nations as distinct in race, language and historical tradi¬ tions as they were at the beginning of the 20th century had long lived without complaint when subjected to the oppression of alien peoples. But the perfection of the dynastic national state, the psychological contagion generated by the French Revolution, the defense-reactions pro¬ duced by the Napoleonic conquests, the effect of the democracy brought into being by the Industrial Revolution, and their net result in arousing the quiescent <(herd-instinct® and in giving it a nation-wide field of operation made any attempt to deny national aspirations a forlorn hope. A boisterous and intolerant chauvinism had developed in the greater states of Europe which inevitably reacted upon the (<repressed nations® and aroused similar senti¬ ments and ambitions there. This tendency was powerfully forwarded by the attempt of the great national states to crush out by persecu¬ tion the national aspirations of the subject nations within their boundaries. Germany op¬ pressed the Poles; Russia the Finns, Letts, Lithuanians, Poles and Ruthenians ; Austria the Czechs, Slovaks, Poles and Serbs ; Hungary the Rumanians, the Ruthenians and the Croats ; and Turkey portions of most Balkan nations and the embryonic nations of Asia Minor. Further, these lesser or (<oppressed® nations fol¬ lowed the example of the greater states in arousing an interest in national history and literature and thereby stimulated their hopes for independence by centering attention upon the past glory of their peoples, be it as remote as classical times or the early Middle Ages. Nothing could thwart this force — not even the oldest monarchy in Europe nor the mightiest military state which the world has yet seen. The general nature of the friction and dis¬ satisfaction felt in the Europe of 1914 over the failure of the political divisions to coincide with the national groupings has been admirably summarized by Professor Hazen in the fol¬ lowing synoptic outline :

<(1. Dissatisfaction in Germany on the part of

a. The people of Alsace-Lorraine;

b. The Poles of Eastern Prussia;

c. The Danes of Northern Schleswig.

2. Dissatisfaction in Denmark over

a. The position of the Danes in North¬ ern Schleswig.

3. Dissatisfaction in Austria-Hungary on the part of

a. The Czecho-Slovaks ;

b. The Rumanians of Eastern Hungary;

3. Dissatisfaction in Austria-Hungary on the part of — Continued

c. The South-or Jugo-Slavs;

d. The Italians of the Trentino, Istria,

and Trieste.

4. Dissatisfaction in France over

a. Alsace-Lorraine.

5. Dissatisfaction in Italy over

a. Italian Irredenta — Trentino, Istria, Trieste.

6. Dissatisfaction in Serbia over

a. The oppression of millions of Serbs

by Austria-Hungary;

b. Lack of outlet to the sea.

7. Dissatisfaction in Rumania over

a. The oppression by Hungary of mil¬ lions of Rumanians.

8. Dissatisfaction in Bulgaria over

a. The boundaries laid down by the Treaty of Bucharest, 10 Aug. 1913.

9. Dissatisfaction in Greece over

a. Turkish rule of millions of Greeks.

10. Dissatisfaction pf the Poles over the fact

a. That Poland does not appear upon the map of Europe, but has been divided among and incorporated with the three partitioning powers of the 18th century, Russia, Prus¬ sia and Austria.

11. Dissatisfaction in Russia on the part

a. Of the Poles;

b. Of the people of Finland, etc.®

To these, obviously, should be added the dis¬ satisfaction felt by the Irish nationalists, who, in spite of the eloquent appeals of O'Connell and Redmond and the sympathy they aroused in Gladstone and the English Liberals, were denied their aspiration for ((home rule.® Joined to these sources of friction and unrest produced by the imperfect realization of pa¬ triotic aspirations among oppressed national groups, there were deep-seated and ominous rivalries among the great national states of Europe over purely European national prob¬ lems. From 1870 to 1914 France was mourn¬ ing over her ((lost provinces,® draping the Strassburg Statue and perpetuating the cere¬ monials of (<revanche,® while Bismarck alleged that Germany was maintaining and increasing her great armament solely as a protection against the contemplated French war of ((revanche,® so fiercely urged by Deroulede and his fellow patriots. In spite of a formal alli¬ ance, Austria and Italy were fundamentally at odds over the solution of the problem of ((Italia Irredenta.® The <(Mittel-Europa® plan of Germany and Austria was diametrically op¬ posed to the Pan-Slavic scheme of Russia as well as to the national aspirations of the Bal¬ kan states. Finally, England's jealousy over Russian longing for Constantinople, which had led her into an aggressive and costly war in 1854-55, was never removed until the mutual loot and partition of Persia was consummated in 1907.

But ominous and troublesome as were the rivalries of national states in Europe over con¬ tinental problems, these were as nothing com¬ pared with those which arose from the struggle over the opening up of backward countries for investment and the planting of colonies in lands beyond the sea. From the period of the close of the Napoleonic

wars to 1870 there had

been a decided decline in imperialistic enter¬ prises. Under the reign of “economic liberal¬ ism® European countries even went so far as to discuss the very desirability of colonies, and Richard Cobden and his followers believed that the British Empire was quite as much an Eng¬ lish liability as an asset. But the results of the Industrial Revolution put an end to this amiable ((cosmopolitan dream® of the Cobden-ites and produced the revival of the old Mer¬ cantilists policy in the shape of a new scramble for the remaining unappropriated parts of the earth, which could be utilized as colo¬ nies and markets for the greatly increased volume of manufactured products. The re¬ lation between the great increase of pro¬ duction, caused by the various phases of the Industrial Revolution, and the new national imperialism has been admirably stated by Pro¬ fessor Schapiro in the following passage : “Toward the end of the 19th century there took place a new Industrial Revolution, the results of which were almost as startling as those of its predecessor a century before. The application of science to industrj’- through the extraordinary development of the chemical and physical sciences, the better organization of business enterprise through combination, the larger use of capital and the opening up of new sources of raw material in Asia and Africa increased many fold the production of goods. Gigantic plants, equipped with scientific labora¬ tories, worked by armies of laborers, and capi¬ talized by millions of dollars, brought together in syndicates and trusts,* displaced the small factories, or (mills, } as they were still called. It is estimated that the average increase in the commerce of all the countries of Europe during the 19th century was over 1,200 per cent… . The Industrial Revolution at the beginning of the 19th century transformed the economic life of Western Europe only; the new Industrial Revolution at the end of the century caused Europe to burst her indus¬ trial bonds and to encompass the entire world in its influences. The new industrialism mul¬ tiplied production so enormously that markets had to be sought outside the limits of the home country. As competition for the home market within the leading industrial countries became very keen, the eyes of the captains of industry were naturally turned to the many regions that were at the same time densely populated and industrially undeveloped. The vast populations of Asia and Africa were so many potential customers for the business men of Europe. What fabulous profits awaited those who got the opportunity of clothing and shoeing the teeming millions of Chinese and Hindus !® This process of national expansion overseas, in its second or recent phase, set in about 1870, when the effects of the

Industrial Revolution had been felt in England and France and were beginning to be experienced to an ever greater degree by Germany. France turned to Africa and Asia, and in Tunis, north central Africa, Morocco and Indo-China sought compensation for the territorial loss of Alsace-Lorraine and investment opportunities for her growing body of capitalists. To obtain a more complete con¬ trol over the routes leading to India, Disraeli bought the large block of Suez Canal stock in 1875 and started Great Britain on her second

experiment in empire building, which added to her already extensive territorial possessions, Egypt, the Sudan, South Africa, Nigeria, south¬ ern Persia and Tibet. Russia extended her sphere of political and economic control in the Far East in the region of Manchuria, and also in the district about the Caspian Sea, including the northern half of Persia. Germany sought her <(place in the imperialistic sun® by coloniza¬ tion in Africa and in the islands of Oceania and the Pacific, and by an attempt at the eco¬ nomic control of Asia Minor and Mesopotamia through her Berlin-Bagdad railroad project. Italy, after an unsuccessful attempt to get con¬ trol of Abyssinia, was compelled to remain con¬ tent with Somaliland and Eritrea until she was able, 15 years later, to wrest Tripoli and Cyrenaica from Turkey. Finally, nearly all of the above-mentioned states participated in the economic, if not the political, partition of China. The conflict of ambitions in this process of European expansion created many centres of international friction. Germany and England clashed over the distribution of territory in South Africa and over the control of the Per¬ sian Gulf. France and Germany precipitated three European crises over their disputes con¬ cerning Morocco. France and England nearly went to war over the territory surrounding the source of the Nile. Russia went to war with Japan over Manchuria and Port Arthur, and came to an agreement wdth England concerning Persia only by a mutual division of spoil in the agreement of 1907. In addition, this new imperialism served to stimulate national pride and aggressiveness on the part of the great national states of Europe through the develop¬ ment of the ((mapitis® psychosis, namely, the enthusiasm or chagrin felt by the

citizens over the success or failure of their respective states in covering the map of the world with the brilliant colors designating their colonial possessions. Finally, the struggle for markets and the desire to protect national trade and economic interests led to the practical institution of a neo-Mercantilistic era of protective tariffs. Beginning with the Bismarckian tariff bill of 1879 there ensued a general European move¬ ment toward nationalistic protective tariffs so high that they would have caused even Fred¬ erick List to gasp with astonishment if not with dismay. Only England escaped from this tendency to introduce what practically meant an economic war between the various conti¬ nental European states. In this manner were economic and political events in and out of Europe contributing to the stimulation of jingo¬ ism and international distrust and suspicion in the generation preceding the coming of the calamity of 1914. The writings or speeches of Peters, Reventlow, Rohrbach, Tannenberg, Delcasse, Barres, Rhodes, Kipling, Maxse, Lea, D'Annunzio, Crispi, Sonnino, Pobiedonostsev, Von Plehve, Berchtold and Tisza presented to the world evidence of the various grandiose pro¬ grams of national expansion and served to stir up mutual suspicion and antagonism. That this dangerous state of mind in Europe was most marked in Germany was probably due more than anything else to the delayed nature and the forcible methods of her national unification, to her rapid and unprecedented economic de¬ velopment since 1870 and its resulting impulse

toward imperialistic expansion, and to the fact that the Astigmatic® discrepancy between rela¬ tive European prestige and relative extent of colonial possessions was most marked in the case of Germany. The diplomacy of the latter part of the 19th century and the beginning of the 20th was very poorly adapted to meeting this difficult task of reaching a peaceful adjust¬ ment of conflicting international claims. While there can be no doubt that diplomatic theory and practice made great strides in advance dur¬ ing the last century, it is equally certain that it was still essentially Machiavellian, and, as Mr. Weyl has well expressed it, was still con¬ trolled by ((the approved diplomatic type, the aged, bemedaled, chilly, narrow and conser¬ vative, Excellency, very gentlemanly, very as¬ tute, fundamentally stupid.®

The prospect of a peaceful settlement of the disputes between the European states over Euro¬ pean and imperialistic problems was greatly di¬ minished by the vast armaments which were cre¬ ated and increased, ostensibly in the interest of preserving peace, but actually, as subsequent events have proved, to encourage an aggressive

nationalistic policy of expansion and annexation. In its origin this militaristic movement dates back to the French Revolution. In 1793 France first introduced the policy of conscription on a general scale and confirmed this practice by law five years later. To prepare for the War of Liberation and to evade Napoleon's arbitrary limitation of the Prussian army to 42,000 men, the Prussian military leaders, Scharnhorst, Gneisenau, Boyne, Grolmann and Clausewitz, introduced into Prussia the system of universal liability to military service in the years follow¬ ing 1808. Austria, in the attempt to cope with Napoleon, tended in the same direction under Archduke Charles and Count Stadion. After 1815 there was a decided slump in military senti¬ ment and activity, associated to some degree with the prevalence of ((economic liberalism® and its cosmopolitan tenets. The first military revival was the work of Napoleon III, who assured France and Europe that «the Empire meant peace,® but gave practical proof that it meant a restoration of the military traditions of his illustrious uncle. But the Napoleonic restoration of the militarism of a half century earlier was much less consequential for the world than the contemporaneous developments across the Rhine. To revenge Olmiitz and humble Austria, King William I of Prussia planned to reorganize the Prussian army as it had been in the great struggle against the first Napoleon. Calling to his aid, in 1862, the most sinister figure in the history of modern mili¬ tarism, Otto von Bismarck, he was able to carry out not only his army plans, but also his fond ambition to defeat Austria. Extending the new system to the North German Confederation, Bismarck was able to crush France and bring about the long desired unification of Germany. Having "vindicated® the policy of "blood and iron® by three victorious wars Bismarck fas¬ tened militarism upon Germany with a deadly grip by a series of laws passed between 1873 and 1887,. and the military octopus grew until it culminated in the preposterous act of 1913. The Prussian system, with its great prestige, set the military pace and example for the rest of con¬ tinental Europe. France adopted the Prussian

s> stem 111 1872, and most of the other Great Powers, as well as the

lesser Balkan states, did the same in the decade of the “seventies.” Even Turkey, in 1883, invited Von der Goltz to reor¬ ganize the army of the Sultan on the German plan. Nor was the increase in armament lim¬ ited to land forces; the great extension of the new colonial enterprises and the development of a larger merchant marine seemed to demand new and larger navies. In view of Great Brit¬ ain’s greater colonial possessions and trade it was but natural that she should begin the move¬ ment for larger sea forces. In 1889, Great Britain passed an act providing for a vast in¬ crease in her fleet and initiated that policy of keeping her naval strength far in advance of any rival state. Not until 1898 did Germany’s interest in “Weltpolitik” lead her to attempt to rival Britain on the seas, but in that year there was passed the first great German naval act, which was supplemented by other more preten¬ tious increases in acts of 1900, 1906 and 1912, which served to arouse British alarm and en¬ mity and to make an Anglo-German concord extremely improbable. Nor were England and Germany alone in this process. All the leading powers, (but especially France and Russia, fol¬ lowed their lead. With these great war ma¬ chines at hand, the European states were little inclined to submit their conflicts and disputes to what were regarded by the jingoistic patriots and imperialists as the pusillanimous and igno¬ ble methods of diplomacy and arbitration.

Accompanying these political and economic forces making for a greater prevalence of jin¬ goism in the last generation of European his¬ tory, there were psychological causes operating which were not less effective in promoting na¬ tional aggressiveness and mutual hatred, suspi¬ cion and contempt. Anthropological fallacies, growing out of Gobineau’s grotesque (Essay on the Inequality of the Human Races) (1854) and Max Muller’s hasty generalizations in his (Lectures on the Science of Language) (1861) led to an inflation of racial egotism, the inten¬ sification of racial misconceptions and the fatal if fruitless search for the original “Aryan” bearer of civilization among the nations of Europe. That writers more patriotic than sci¬ entific could find certain and irrefutable evi¬ dence for the original habitat of the primordial “Aryan” in France, Germany, Italy and Russia is sufficient evidence not only of the hopeless scientific confusion, but also of the disastrous patriotic ardor that invited the search. Pseudo-Darwinian sociology represented war as the supreme principle making for social progress, as the struggle for existence had advanced bio¬ logical evolution. This distortion of half-truth by Gumplowicz and his school was eagerly seized upon by the military and ultra-patriotic writers, such as Moltke, Bernhardi and Von der Goltz in Germany, Deroulede and Barres in France, Lord Roberts, Wyatt, Cramb and

Maude in England, and Lea, Maxim, Mahan and Gardner in America, to give a semi-scientific cloak for their class and clique interests and ambitions. Super-patriotic his¬ tory, literature and philosophy magnified the past glory and the future heritage of each na¬ tion and proportionately disnaraged the past and future of their rivals. The emotional im¬ pulse from “Romanticism” led to a greatly in¬ creased interest in the study of national his¬

tory. This was augmented by the patriotic en¬ thusiasm accompanying the growth of national¬ ism following the French Revolution and the Napoleonic Era. Every country began the compilation of gigantic collections of the sources of national history, of which the (Monumenta Germanise Historica,” the “Documents inedits” and the “Rolls Series” were only the most notable among many similar enterprises. National narrative histories breathing forth a fiery and defiant patriotic ardor were produced bv Giesebrecht, Droysen, Treitschke and Sybel ; Michaud, Raynouard, Mignet, Lamartine, Guizot, Thiers, Michelet and Martin; and Free¬ man, Stubbs, Froude, Carlyle, Macaulay and Napier. Literature became even more chau¬ vinistic. Houston Stuart Chamberlain, build¬ ing on the risky foundations of the anthropo¬ logical fallacies of Gobineau, Posche and Penka, was able to discover that almost with¬ out exception every important figure in history since the beginning of the Christian era had been a German. Even Saint Paul, Dante, Giotto, Michael Angelo and Raphael were in¬ cluded by this undaunted exponent of “Kultur” under the caption of “We Teutons!” Nisard detected the very essence of Reason, herself, in the spirit of French literature. Maurice Barres found that French culture was a precious and indigenous product of Celtic blood, to which neither Roman nor Teuton had contributed in the slightest degree, and he advocated its pres¬ ervation by making it the centre of a near Japanese cult of ancestor-worship. Leon Daudet found that nations other than the French exhibited undoubted stigmata of mental and moral decline or deficiency. Rudyard Kip¬ ling, the poet of “Saxondom” and British impe¬ rialism, indulged in frenzied injunctions to his countrymen urging a greater assumption of the “white man’s burden” throughout the non-European world. Carducci made the heroes of Italian unification the theme of the greatest of modern Italian poetry, while d’Annunzio wrought himself up into a neoplatonic ecstasy over the necessity of reclaiming Italia Irre¬ denta. Patriotic state education taught un¬ questioning loyalty to state or dynasty as the first principle of moral conduct, carefully ob¬ scured any questionable occurrences or policies in the national past and frowned on criticism and progressive reform proposals.

Slowly, but surely and wilfully, Europe was preparing for the cataclysm of August 1914. As Professor Sumner long before predicted, the vast arma¬ ments that had been prepared with the avowed purpose of defense alone invited the transfor¬ mation of nationalistic and military philosophy from the advocacy of a purely "defensive war" into an exposition of the virtues and necessity of a "preventive war." That this process of the cumulative growth of national egotism and aggressive militarism was undoubtedly most marked in Germany has not obscured the fact that she was separated from the other Euro¬ pean national states in this respect by a dif¬ ference in degree rather than in kind, and that she was able to bow the necks of her citizens under the burden of the military octopus pri¬ marily because of the welcome evidence that her neighbors gave to the German military class that they were not unwilling to submit the "rectitude" of their cause to the "test of arms." Nationalistic aqd ultra-patriotic intoxication

rather than unique Teutonic perversity "applied the match to the European powder-house® in 1914, and if Germany was the only nation which had lost rational and moral self-control, none of her opponents could present an unchallenged record of total abstinence.

While the rise of modern nationalism has been most conspicuous in Europe, this should not obscure the fact that similar forces have produced analogous developments elsewhere, most notably in America and Japan. To an astonishing degree the growth of national unity and of national sentiment in both of these more recent cases of the rise of nationalism has been the product of the same general circumstances and conditions which promoted the develop¬ ment of nationalism in Europe, though in most respects these influences did not have a wholly indigenous origin and expansion, as in Europe, but were introduced from abroad.

Of the American examples of the rise and growth of nationalism that of the United States has, of course, been the most significant. As Professor Cheyney has so convincingly pointed out, the settlement of

the United States was quite as much connected with the economic impulses arising from the Commercial Revolu¬ tion in Europe as it was with the religious re¬ volt from Catholicism and the Established Church of England. Even more consequential were these new commercial forces in promoting unity among the colonists. A century of mutual ignoring of British commercial restric¬ tions had given the 13 colonies a strong com¬ mon motive for unified action in opposing the proposed enforcement of these long dormant Mercantilistic restrictions — a motive which Professor Schlesinger has recently shown to have been far more powerful than any theo¬ retical or legal abstrattions involved in the colonial movement of resistance to British im¬ perial power. In addition to these economic foundations of the shaping of American na¬ tional sentiment there was a fundamental socio¬ logical process in operation which has been aptly termed by Professor Becker ((the begin¬ nings of the American people.® A widely dif¬ ferent geographical, social, political and eco¬ nomic environment acting upon a population originally psychologically variant from the great mass of Englishmen, tended inevitably to create in the colonies a people who became, generation after generation, more and more divergent from their kinsmen across the At¬ lantic. Not only were these environmental in¬ fluences working to produce an essential dis¬ similarity between Englishmen and Americans, but through the fundamental uniformity of the American social environment there was being created a homogeneous and united American people and the beginnings of a national self-consciousness. The American Revolution, initiated by the enterprising and recalcitrant merchants and debtor landlords and carried to success by their courage and audacity and by the not disinterested aid of the French, fur¬ nished a unifving force of very great potency for a temporary period, but the reaction in the period of the Confederation for the time being threatened a lapse into anarchy and dismem¬ berment. Thanks, however, to their desire for financial, stability and security, the vigorous capitalistic class, led by that great constructive statesman of early nationalism, Alexander

Hamilton, turned the tide of political opinion and practice from separatism and provincialism to nationalism and unity. Their work was car¬ ried on by the strongly nationalistic decisions of the great judicial figure in the growth o.f American nationalism, John Marshall, whom not even Jefferson's enmity could remove. Indeed, the Jeffersonian Republicans, when they came into power in 1800, ceased their neg¬ ativism and accepted most of the nationalistic program which they had criticized with such vigor and acrimony when carried

into operation by Hamilton and Adams. Jefferson could pur¬ chase Louisiana, Madison could be won for war with Great Britain, and Monroe could formu¬ late a nationalistic foreign policy. Nationalism in America thus took its origin from the reac¬ tions of the Commercial Revolution on the western world ; as in Europe, it was completed by the Industrial Revolution. The new facto¬ ries in the north created an industrial interde¬ pendence between the various sections of the country and attracted an immigrant population with no sectional sentiments. The new canals and railroads led to the initiation of that great nationalistic enterprise of the 19th century in America — the conquest of the West, studied with such fruitfulness by Professor Turner and his disciples. While the territorial addi¬ tions of the middle of the century were tem¬ porarily a cause of sectional dispute and fric¬ tion, they ultimately became a matter of na¬ tional pride and common interest. Though negro-slavery and the accompanying states-rights movement threatened to disrupt the em¬ bryonic nation, the success of the North in the Civil War demonstrated by the verdict of phys¬ ical force that Webster, rather than Calhoun or Hayne, was right in his interpretation of the nature of the federal union. A permanent po¬ litical sanction for nationalism was provided by the Fourteenth Amendment. Events and tendencies since the Civil War have been even more conducive to the development of national unity than those of the preceding half-century. An Industrial Revolution, like that which af¬ fected New England in the first half of the 19th century, has come to the South and the sharp sectional division of economic characteristics and interests has now been greatly lessened. The further development of railroads, telegraph and telephone lines, and other means of rapid transportation and almost instantaneous com¬ munication of intelligence have made this ex¬ tensive country a national economic and psy¬ chological unity to a degree unknown in 1789 even in the meagre territory along the Atlantic seaboard with which the United States started its political existence. The intersectional in¬ vestment of capital has produced a real finan¬ cial unity. A national literature has been pro¬ vided by such writers as Irving, Brvant, Cooper, Longfellow, Lowell, Whitman, Tho-reau, Emerson, Hawthorne, Poe, Clemens, Howells and Riley. A collection of the sources of national history was planned and partially executed by Peter Force, and a national his¬ torical epic, eulogizing the American past, was created by the writings of Bancroft, Palfrey, Fiske, Holst and Burgess. A “glorious^ for¬ eign war at the close of the centurv gave a great stimulus to the completion of’ national development, and elaborate national expositions and public projects, such as the Panama Canal,

furnish a successive series of impulses to unity. Many pessimistic publicists believed that the great influx of foreigners in the last 50 years threatened national disruption as seriously as the sectional divisions of the middle of the last century, but the experience of the United States in the Great War has definitely dis¬ proved their forebodings and demonstrated that whatever the general results of immigration, they have not brought national disintegration. The participation of the United States in the late (<War of the Nations® produced a welling-up of exuberant national sentiment and intole¬ rant patriotism which caused even the older allied and enemy European nations to gasp with astonishment. But while national devel¬ opment in the United States has been the most notable exemplification of this process in the western hemisphere, it has not been the only one. Canada, in spite of a titular connection with Great Britain, has developed a very marked spirit of national self-consciousness, while a century of independent political exist¬ ence has created a strong feeling of national pride and unity in the various states of Central and South America. Nationalism, then, seems as well established in America as in Europe.

There can be no doubt that the most spec¬ tacular rise of nationalism in a 19th century state was witnessed in the case of Japan. After having welcomed European adventurers and missionaries in the middle of the 16th century, Japan suddenly turned against the newcomers, murdered them or drove them from her shores and returned to immobility and isolation for three centuries. This artificial aloofness was broken down following 1853 by commercial concessions obtained first by the United States and then by European states. At first, the feudal princes opposed the entry of foreigners and their civilization, but the more far-sighted among them recognized that Japan could hope to compete with the states of Europe and America only by adopting at least the superior mechanical features of their advanced civiliza¬ tion. By the Revolution of 1867-68 and its immediate results, this reforming element abol¬ ished the Shogunate, brought the Mikado out of an inactive retirement, terminated

feudalism, reorganized the army along European lines, and accepted the industrial methods and proc¬ esses which had been produced by a century of economic development in Europe and America. Within a period of less than 40 years Japan passed from a mediaeval feudal state to a modern industrial nation, though, as in the case of Germany, this change was limited to the mechanics rather than the philosophy of mod¬ ern civilization. In no modern state is there such an intense devotion {tp national ideals as is to be found in Japan. The veneration for the past practically reaches a condition of an¬ cestor worship, while patriotism is in a very real sense the official religion of Japan. When to these conditions there is added the abnor¬ mally rapid economic evolution of Japan, it is not difficult to recognize why she has been re¬ garded as the "Germany of the Far East.® By successful wars against China (1894-95) and Russia (1904-05) japan has become the great world powTer of the Pacific, has acquired im¬ portant territory on the mainland of Asia and has endeavored to erect and maintain a Japa¬ nese "Monroe Doctrine® in China and the Far

East. The present-day exponents of interna¬ tionalism seem likely to find Japan the most tenacious adherent to the old order of aggress¬ ive nationalism and imperialism, but it must be frankly admitted that Japan's contact with the diplomacy of the western world could scarcely have taught her that the day of candor, hon¬ esty and generosity has yet arrived in the field of international relations. The rise of the new Japan stimulated the great inert mass of China. Stung by the defeat of their coun¬ try by the microscopic Island Kingdom, the progressive Chinese patriots attempted to guard against another humiliation at the hands of the Japanese by imitating the Japanese adoption of western civilization. While this movement was temporarily obstructed by the reactionary ele¬ ment in the country led by the Dowager Em¬ press, the liberals overthrew the obstructionists by the Revolution of 1911-12, established a Chinese republic and welcomed western indus¬ try and culture. While this remarkable trans¬ formation was too rapidly consummated to re¬ main secure and unchallenged, it has persisted to a remarkable degree in spite of temporary setbacks, and China seems well on her way toward development into a modernized na¬ tional state. In conclusion, it should be noted that no observations on the rise of nationalism in the Far East can ignore the remarkable evi¬ dences of national self-consciousness in Aus¬ tralia and New Zealand which were brought out by the recent World War.

The disastrous "War of the Nations,® which has just ceased, was not

only a product of obsessed nationalism, but also brought with it an unprecedented inflation of national egotism and intolerant patriotism. Never before had a general war occurred when the mechanism for disseminating both information and propaganda . was so highly developed or so ruthlessly utilized. The slavish eulogy of national culture and his¬ tory and the obscuring of national faults and mistakes, which had been so prevalent in the half century before the war, were as nothing compared with the tryannical censorship and unabashed organized propaganda of every state immediately engaged in the conflict. The greater strictness of the German censorship and the more sinister and extensive nature of German propaganda were, no doubt, indicative of the deeper conviction of ultimate .guilt on the part of the Teutonic military autocrats, but no warring state escaped from these activities with an enviable record. Each of the opposing groups of powers represented the gigantic con¬ flict as a sort of Persian eschatology — a strug¬ gle between the forces of light and darkness, a clash of the powers of righteousness and iniquity. Within each state an attempt was made to sustain morale by a curbing of all criticism of the "war aims® of the government or its allies and by a carefully planned presen¬ tation and reiteration of the past and present criminal record of the opposing, states. So powerful and all-embracing was this tidal wave of patriotic defense-reactions that it engulfed not only the "man on the street,® but even the most eminent scholars and publicists, some of . whom in the past had seen great virtue in the cultural complex of the enemy. This disheart¬ ening spectacle doubtless reached its climax in the "manifesto® of the German professors, but in no state were the intellectual classes im-760

mune from the contagion of fervid patriotism, while those who maintained their poise were contcmptonsly derided as (<fiabby highbrows® by their over-excited colleagues and critics. The astonishing effect of the wartime patriotism upon the public mind and its stimulating in¬ fluence in creating a supernationalism has been brilliantly and accurately set forth by Professor Hankins in the 'following citation : (<Patriotism, like nationality, is not readily definable. It signifies loyalty to one's nation and implies the obligation to serve and defend it. It is thus a passion which all normal men feel, and which in time of our country's peril commands our in¬ stant loyalty. Of all the emotions that move men to action it is the most

capacious. When it is aroused there is no other social force comparable to it in the completeness with which it dominates all other springs of action in all sorts and conditions of men. It lifts the average man up out of the concerns of a work-a-day world into the noblest spirit of devotion ; it quickens the pulse of the sluggard, reforms the wayward, forces generosity from the stingy, arouses the plodder to dreams of heroic deeds, gives courage to the cowardly, and makes the hearts of the shrewd and crafty wolves of society swell with an ostensible love of country. In its face local feuds are for¬ gotten ; the bitter struggles of parties and classes are submerged; differences of creed, of social status, and even of race are obliterated. Under these circumstances only the group leaders may speak. The citizen must offer himself in silence as a willing sacrifice on the altar of his country in whatever manner those in authority may dictate. Even honest criticism is anathema; the conscientious objector, who in times of peace is praised as a courageous man who dares to stand against the world for what he believes right, is denounced as a sneaking coward and herded into prison. The individual rights of free speech, press, and assembly so essential to democratic government, so zealously guarded during peace, and so boastfully dis¬ played to an admiring world on the national holida3rs, not only cease to exist but are even denounced and proscribed as inimical to the public safety. The noble sentiments of tolera¬ tion are fiercely denounced, as is also individual variation from type which is vigorously de¬ fended during peace under the ideals of indi¬ vidual liberty and initiative. Every social in¬ stitution is brought into line; all organs of public opinion send forth a constant stream of uniform suggestions; the appeal is made through church and lodge and every customary association, until the members of the social group coalesce into a solid sociality that sur¬ passes the fondest imaginings of the utopian Socialist. It is not unnatural that such a titanic social force should stir men's emotional nature to its depths ; and especially during war, for war hallows every cause. At such times pa¬ triotism, like a resistless and mysterious genius, fills the entire fabric of society with its magical power. Few individuals escape its enchant¬ ment, and almost no one dares brook its hostil¬ ity. While it ennobles the soul with the sublime spirit of self-sacrifice, it compels men to dilute the honesty of their thoughts; makes cowards of all but the most stalwart souls by forcing them to substitute the worse for the better reason and the lower ideal for one they feel to

be higher. Under its guise every sort of sin¬ ister human purpose thrives, for anything which can be made to appear patriotic is in¬ stantly and deeply approved. Any counsel of moderation is pounced

upon as enemy propa¬ ganda, while the advocates of internationalism are accused of silly sentimentalism and treason. To encounter a suspicion of lack of patriotism creates a greater defilement than the violation of an ancient taboo. As in the days of witch¬ craft, suspects are whipped, tarred and feathered or hanged, or like the distinguished list in (Who's Who in Pacifism and Radicalism* are immolated on the altar of militarism amid the shouts of the mob and the secret glee of the patriots who find the established social system the best of all possible systems. In other words, patriotism gives full sway to fear, unbridles the lusts and brutalities of savage man, in¬ tensifies our innate suggestibility, and subordi¬ nates the mind to every sort of delusion and deceit. Unfortunately there is no printed guide for the proper conduct of human affairs, and so deep is the mystery of social processes that only the ignorant and the simple have complete con¬ fidence in their solution of social problems. In times of stress therefore the social mind finds refuge in those torrents of instinctive emotion which arise from the deepest recesses of human nature and which propel the social group like a rudderless vessel before the ocean winds. Patriotism makes of national thought (not a cerebration but a contagion, not an activity but an epidemic.* » When one reflects that it was in the midst of such a psychological setting that the Peace Conference had to carry on its work it need cause little surprise that many of the liberal and generous sentiments expressed by the allied leaders have vanished in thin air and that the result of their work .bears very evident traces of revenge, a lust for spoil, and rampagious nationalism. These de¬ fects, together with the crop of newly emanci¬ pated nations, will furnish enough problems to tax the ingenuity of the statesmen of future generations.

VI. Nationalism and Internationalism. —

While one cannot be blinded to the fact that the untold misery of the wars of the last four centuries has been caused primarily by unre¬ strained nationalism, dynastic, middle class and democratic, it would be equally futile to deny that the growth of national states has been a necessary step in the development of a perma¬ nent and peaceful adjustment of international relations. Expensive as the process has been, national wars seem to have been but the price paid in the wasteful natural economy of political evolution for the allˆnportant growth of na¬ tional and political aggregates which must al¬ ways precede the ultimate alliance, federation, partnership or leaguing together of nations. Further, the very evils and excesses of national aggression have, in the past, forced upon the world's attention well-meant schemes for ending war and providing for peaceful methods of adjusting national claims. The destructive Thirty Years' War produced

the proposals of Emeric Cruce (1623), Hugo Grotius (1625), and Sully (1638). The dynastic wars of Louis XIV stimulated the growth of international law and invited the pacific plans of William Penn (1693) and the Abbe de St.

Pid-re (1712). The reaction against the Seven i ears War, as exemplified in the cosmopoli¬ tanism and rationalism of the latter 18th cen¬ tury, brought forth the discussions by Voltaire Rousseau and Bentham. The French Revolu¬ tionary Wars stimulated Kant's proposal for a federation of republics, and the Napoleonic baptism of blood led to Alexander's theological proposition for the assurance of international peace and to Castlereagh's more practicable, if less noble, scheme for periodic European congresses of nations when questions should arise which threatened the peace of Europe. The (<concert of powers,® which thus originated, proved unequal to coping with the aggressive nationalism of the last 40 years, the promising beginnings in international organization pro¬ vided at the Hague Conferences proved ineffect¬ ive, and it has required the most expensive and deadly war in human history to drive statesmen into even a half-hearted determina¬ tion to take effective steps to prevent the re¬ currence of such a disaster in the future. When an adequate and workable international organi¬ zation arises designed to curb aggressive and unscrupulous nationalism and to diminish the opportunities for future wars, the most com¬ plicated and perplexing problem in the history of political organization will have been solved and the authors of the enterprise will take their place on the level of the greatest statesmen of all time.

The history of modern Europe, however, from the passage of the (<Statutes of Laborers® in the later 14th century to the present day is strewn with the wreckage of political attempts to resist, restrain or control great economic, social or psychological tendencies, forces and movements. A permanent and enduring part¬ nership of nations must anticipate and forward economic fair dealing, social democracy and cultural assimilation. An abiding and effect¬ ive international

organization has to-day a much better prospect of success than ever be¬ fore in human history, not only because it has as a psychological stimulus the fresh memory of the horrors of the most frightful military cataclysm in the record of human development, but also because there now exists for the first time in such a crisis a real physical, economic and intellectual internationalism which can serve as the foundation for an international political organization. Paradoxical as it may seem, that same Industrial Revolution which, in its immediate effects, greatly forwarded national development at home and imperialism abroad, also laid the basis for a practical international¬ ism. The growth of world trade and financial and commercial interdependence have furnished a set of economic motives for pacific adjustments, while the improvement of means of transporta¬ tion and the communication of intelligence, and the internationalization of science and culture have prepared the way for that growth of in¬ tellectual unity and harmony and that develop¬ ment of likemindedness and sympathy which Professor Tenney rightly regards as the all¬ essential antecedents of any enduring and effectual world organization. But it would, nevertheless, be futile to hope that mankind is far enough advanced in its development to trust merely to the natural course of political evolution for the speedy attainment of world

order and permanent peace. Only by the exercise of the utmost thoughtfulness, can¬ dor, tolerance and conciliation will it be possible to bring into existence an inter¬ national spirit and political organization which will possess any assurance of ter¬ minating physical conflict among nations. Ex¬ uberant nationalism, political and economic, will have to be curbed before international order can exist. Mr. Morrow has well pre¬ sented the political adjustment which must be made between nationalism and internationalism ; “We must not, however, deceive ourselves. It is most important clearly to recognize that we are trying to get two things. If we want world peace at whatever price, we can take our eyes away from liberty and think only of order, and the principle of nationality will go by the board. If we want unrestricted liberty at what¬ ever cost, we can think only of the separate national states and the price will be the aban¬ donment of a League of Nations. The recon¬ ciliation of these twro aims — world order and individual liberty — is the problem of the Peace Conference. We must go at our task with open eyes. We must start by admitting that we cannot get something for nothing, that if national states are vital to the orderly de¬ velopment of the world, we must sacrifice some world order for the sake of the development of national characteristics ; that if world order is so vitally essential that we must

have it, then we must sacrifice some of the power and rights of national states in order to insure a greater measure of world order. This is the recon¬ ciliation which the Peace Conference must try to make.® Political relations have, however, tended normally to be but the reflection of the deeper economic conditions and forces, and, just as economic unity has always proved the most effective impulse towards political harmony, so economic separatism and suspicion will threaten the dissolution of any political entity. There¬ fore, it seems clear that any permanent and effective international political or juridical or¬ ganization must rest upon a basis of economic trust and fair dealing. This phase of the prob¬ lem has been forcibly set forth by Professor Hankins : <(The great stumbling block to in¬ ternationalism is today the outworn tradition of Mercantilism. This familiar doctrine holds that the nation is the trading unit, that conse¬ quently it profits most when it sells much and buys little, and that consequently each nation ought to shut itself up behind trade barriers and, like a hermit empire, prevent the intrusion of the cheap goods of other nations. With the overthrow of the dynastic state nothing now seems to have so firm a hold in popular tradition and hence so close a connection to the galvanic batteries of patriotism as this hoary tradition. … If we are to have a lasting peace, then this illusion must also pass into the limbo of outworn creeds ; and the peoples of the earth, freed from local .fears under the protecting security of a superstate, can become rivals in exploiting the earth rather than each other and mutually enrich each other by a free exchange of their products. Far more certain than the proposed super-alliance of nations as a guarantee of future peace as well as prosperity among men would be a Zollverein of all industrial nations. Likewise

the most prolific source of international jeal¬ ousy and suspicion in the future seems likely to be trade discriminations, differential tariffs, unfair control and distribution of raw materials and shipping facilities, and other efforts to maintain the economically self-sufficient na¬ tional state. The immediate problem is the formation of a League of Nations as the means of allaying fear. The problem of the future is the

removal of trade barriers and the estab¬ lishment of' an international economic organi¬ zation of the world. Only thus will the super-rational sanction of nationalistic patriotism be transmuted into a supreme loyalty to humanity.® When these necessary cultural, political and economic prerequisites of a permanent peace have been secured, and then only, can one hope for a just and effective world order, for, as Professor Giddings has well said: <(A league to enforce peace must be composed of nations that will both keep faith with one another and practically act in cooperation with one another against the law-breaker. Practi¬ cally these requirements can only be met, and will be met, only if the component nations of the league share a common civilization and hold a common attitude towards questions of right, liberty, law and polity.®

Bibliography. I. Definition and Analysis of Nationalism. — Bryce, J., Pssays and Ad¬ dresses in Wartime 5 (Chap. VII) ; Dalberg-Ac- ton, J. E. D., (History of Freedom 5 ; Garner, J. W., (Introduction to Political Science)

(Chap. II) ; Giddings, F. H., (The Respon¬ sible State) ; Hankins, F. H., Patriotism and Peace5 ; Krehbiel, E. B., Nationalism, War and Society5 (Parts I— II) ; Lieber, F., (Fragments on Nationalism and Inter¬ nationalism5 ; Matthews, S., (Religion and

Patriotism5; Muir, R., Nationalism and Internationalism5 (pp. 37-57) ; Perla, L., (What is National Honor 5 ; Robinson, J. H., (What is National Spirit ? } (Century Magazine, 1916) ; Rose, J. H., Nationality in Modern History) (Lecture VIII) ; Russell, Bertrand, (Why Men Fight5 ; Ruyssen, T., (The Principle of Na¬ tionality5 (Publications of American Asso¬ ciation for International Conciliation, 1916-17) ; Seton-Watson, R. W., et al., (The War and Democracy5 (Chaps. I— 1 1) ; Trotter, W., (The Instinct of the Herd in Peace and War) ; Zangwill, I., (The Principle of Nationalities.5

II. Nationalism Before the Commercial Revolution. 1 .Tribal Society. — Boas, F., (The Mind of Primitive Man5 (Chaps. IV, VIII) ; Chapin, F. S., (An Introduction to Social Evo¬ lution5 (Part II) ; Durkheim, E., (The Ele¬ mentary Forms of Religious Life) ; Giddings, F. H., Principles of Sociology5 (Book III) ; Goldenweiser, A. A., (The Social Organization of the Indians of North America) (in Journal of American Folklore, 1914) ; (Totemism, an Analytical Study) ; Hobhouse, L. T., (The Ma¬ terial Culture and the Social Institutions of the Simpler Peoples5 ; Lowie, R. H., (Social Organization5 (in American Journal of Soci¬ ology , 1914) ; Marett, R. R., (Anthropology5 ; Marvin, F. S., (The Living Past5 (Chap. II) ; Oppenheimer, F., <The State5 (Chap. II)

; Rivers, W. H. R., (The Todas) ; (Kinship and Social Organization5 ; (History of Melanesian Society) ; Roscoe, J., (The Baganda) ; Smith, W. R., (The Religion of the Semites5 ; Sumner,

W. G., Polkways) ; (War and Other Essays5 (Chap. I) ; Tylor, E. B., < Anthropology5 ; Wis-sler, C., (The American Indian.5

2. The Ancient City-State. — Botsford, G. W., <Hellenic Civilization5 ; (Hellenic History5 ; Bury, J. B., (A History of Greece5 ; Coulanges, Fustel de, (The Ancient City5 ; Farnell, L. R., Cults of the Greek States5 ; Fowler, W., (The City-State of the Greeks and Romans5 ; Friedlander, L., Town Life in Ancient Italy5 ; Grant, A. J., (Greece in the Age of Pericles5 ; Harrison, J. E., (Ancient Art and Ritual5 ; Primitive Athens5 ; Prolegomena to the Study of Greek Religion5; Themis5; Hawes, H. B., Crete, the Forerunner of Greece5 ; Keller, A. G., 'Homeric Society5 ; King, L. W., (A His¬ tory of Sumer and Akkad5 ; Lang, A., (Homer and his Age5 ; 'The World of Homer5 ; Mahaffy, J. P., 'Social Life in Greece5 ; 'A Sur¬ vey of Greek Civilization5 ; Mafvin, F. S., (The Living Past5 (Chap. IV) ; Myres, J. L., (The Dawn of History5 ; Ridgeway, W., 'The Earliest Age of Greece5 ; Seignobos, C., (An¬ cient Civilization5 (Chaps. VIII-XIX) ; Sey¬ mour, T. D., 'The Homeric Age5 ; Zimmern, A., 'The Greek Commonwealth.5

3. The Ancient Patriarchal Empires. — Ar¬ nold, E. V., (Roman Provincial Administra¬ tion5 ; Breasted, J. H., (A History of Egypt5 ; (A History of the Ancient Egyptians5 ; 'The Development of Religion and Thought in An¬ cient Egypt5 ; Bryce, J., 'The Roman and British Empires5 ; Bury, J. B., (A History of the Later Roman Empire5 ; (ed.) 'The Cam¬ bridge Mediaeval History5 (Vol. I) ; Dill, S.,

(Roman Society from Nero to Marcus Aure¬ lius5 ; Poman Society in the Last Century of the Western Empire5 ; Erman, A., (Life in An¬ cient Egypt5 ; Ferrero, G., 'The Greatness and Decline of Rome5 ; Fowler, W., Pome5 ; 'So-cial Life at Rome in the Age of Cicero5 ; 'The Religious Experience of the Roman People5 ; Frank, T., Poman Imperialism5 ; Goodspeed, G. S., 'A History of the Babylonians and Assyrians5 ; Hall, H. R., (The Ancient History of the Near East5 ; Hayes, C. J. H., 'An Intro¬ duction to the Sources Relating to the Ger¬ manic Invasions5 ; Hogarth, D. G., (The An¬ cient East5 ; Holm, A., (A History of Greece5 (Vols. III-IV) ; Jastrow, M., (The Civilization of Babylonia and Assyria5 ; King, L. W., (A History of Babylonia5 ; Mahaffy, J. P., Alex¬ ander's Empire5 ; Marvin, F. S., (The Living Past5 (Chaps. Ill, V) ; Maspero, G. C. C., (Life in Ancient Egypt and

Assyria5 ; ‘The Dawn of Civilization5 ; ‘The Struggle of the Nations5 ; (The Passing of the Empires5 ; Meyer, E., ‘Geschichte des Altertums5 ; Momm¬ sen, T., (History of Rome5 ; Provinces of the Roman Empire5 ; Pelham, H. F., ‘Outlines of Roman History5 ; Petrie, F., ‘A History of Egypt5 ; Reid, J. S., (The Municipalities of the Roman Empire5 ; Robinson, J. H-, (The New History5 (Chap. VI) ; Rogers, R. W., ‘A His¬ tory of Babylonia and Assyria5 ; Sayce, A. H., Pabylonians and Assyrians5 : (Social Life among the Assyrians and Babylonians5 ; Schil¬ ler, H., ‘Geschichte der romischen Kaiserzeit5 ; Seignobos, C., ‘Ancient Civilization5 (Chaps. III-VII. XX-XXVII).

4. The Middle Ages. — Adams, G. B., Civi¬ lization During the Middle Ages5 ; Political History of England5 ; Bemont and Monod,

‘Mediaeval Europe5; Bryce, J., ‘The Holy Roman Empire5 ; Bury, Gwatkin and Whitney (eds.), ‘The Cambridge Mediaeval History5; Cross, A. L., (A History of England and Greater Britain (Chaps. I-XVII) ; Cunning¬ ham, W., ‘Western Civilization in its Economic Aspects5 (Vol. II) ; Davis, H. W. C., ‘Mediae¬ val Europe5 ; ‘England under the Normans and Angevins) ; Eichmann, E., ‘Kirche und Staat5 ; Emerton, E., ‘Introduction to the Middle Ages 5 ; ‘Mediaeval Europe5; ‘The Beginnings of Modern Times) ; Fisher, H. A. L., ‘The Mediaeval Empire) ; Flick A. C., ‘The Rise of the Mediaeval Church) ; Giesebrecht, W., ‘Die Deutsche Kaiserzeit5 ; Giry and Reville, ‘The Emancipation of the Mediaeval Towns5 ; Green, A. S., ‘Town Life in the Fifteenth Century5 ; Green, J. R., (A Short History of the English People5 ; Gregorovius, F., ‘A History of the City of Rome in the Middle Ages5 ; Hahn, L., ‘Das Kaisertum5 ; Henderson, E. F., ‘A His¬ tory of Mediaeval Germany5 ; Hodgkin, T., ‘Italy and Her Invaders5; Lavisse, E. (ed.), ‘Histoire de France5; Lavisse and Rambaud (eds.), ‘Histoire Generate5; Luchaire, A., ‘Manuel des institutions frangaises5 ; ‘His¬ toire des institutions monarchiques de la France5 ; McKechnie, W. S., ‘The Magna Carta5 ; Masson, G., ‘The History of Mediaeval France5 ; Munro, D. C., ‘A History of the Mid¬ dle Ages5 ; Munro and Sellery, ‘Mediaeval Civilization5; Oman, C., ‘The Dark Ages5; ‘England Before

the Norman Conquest5; Paetow, L. J., ‘A Guide to the Study of Mediaeval History5 ; Robinson, J. H., ‘A His¬ tory of Western Europe5; Round, J. H., ‘Feudal England5; Seignobos, C., ‘The Feudal Regime5 ; ‘Mediaeval and Modern Civilization5 (Chaps. I-XV) ; Shotwell, J. T., ‘The Middle Ages5 (in Encyclopedia Britannica, 11th ed.) ; Thorndike, L., ‘A History of Mediaeval Europe5 ; Tout, T. F., ‘The Empire and the Papacy5; Vickers, K., ‘England in the Later Middle Ages5 ; Vinogradoff, P., ‘Roman Law in Mediaeval Europe.5

III. The Commercial Revolution and the Rise of the Modern Dynastic National State. — Abbott, W. C., ‘The Expansion of Europe5 ; Cheruel, P. A., ‘Histoire de France sous la ministere de Mazarin5 : ‘L’Histoire de l’administration monarchique en France5 ; Cheyney, E. P., ‘The European Background of American His¬ tory5 ; Cunningham, W., ‘Western Civilization in its Economic Aspects5 (Vol. II, Book V) ; ‘The Growth of English Industry and Com¬ merce5 (Vol. I, Book V) ; Dalberg-Acton, Leathes, Prothero and Ward (eds.), ‘The Cambridge Modern History5 ; Day, C., ‘A History of Commerce5 (Part III) ; Droysen, J. G., ‘Geschichte der preussischen Politik5 ; Faguet, E., ‘An Introduction to Literature5 ; Fisher, H. A. L., ‘Political History of Eng¬ land, 1485-15475 ; Fletcher, C. R. L., ‘Gustavus Adolphus5.; Froude, J. A., ‘History of Eng¬ land from the Death of Wolsey to the Defeat of the Spanish Armada5 ; Gairdner, J., ‘Henry VII5 ; Gardiner, S. R., ‘History of England, 1603-42 5 ; ‘The History of the Commonwealth and the Protectorate5 ; ‘The Thirty Years’ War5 : Gindley, A., ‘A History of the Thirty Years’ War5 ; Green, J. R., ‘A Short History of the English People5 (Chaps. VI-VIII) ; Hanotaux, G., ‘Origine de l’institution des in-tendants5 ; Hassall, A., ‘The Balance of-Power5 ; Hayes, C. J. H., ‘Political and Social History of Modern Europe5 (Vol. I) ; Hender¬ son, E. F., ‘A Short History of Germany5 (Vol. I) ; Hume, M., ‘Spain, its Greatness and Decay5 ; Innes, A. D., ‘England under the Tudors5 ; ‘Ten Tudor Statesmen5 ; Jamison, E. (et al.), ‘A History of Italy5 ; Johnson, A. H., ‘Europe in the 16th Century5 ; Kluchvesky,

V. O., ‘A History of Russia5 ; Lavisse, E. (ed.), ‘Histoire de France5 (Vols. VII f) ; Lewinski-Corwin, E. H., ‘The Political History of Poland5 ; Leadam, J. S., ‘Political History of England, 1702-1 760 5 ; Leger, L., ‘A History of Austria-Hungary5 ; Lodge, R., ‘Politica1 History of England, 1660-17025 ; Marriott and Robertson, ‘The Evolution of Prussia5 ; Mon¬ tague, F. C., ‘Political History of England, 1603-16605 ; Muir, R., ‘The Expansion of Europe5 (Chaps. I-IV) ; Perkins, J. B., ‘France under Richelieu and Mazarin5 ; ‘France under the Regency5 ; ‘France under Louis XV5 ; Phillips, W. A., ‘Poland5; Pollard, A. F., ‘Factors in Modern History5; ‘Henry VIII5; ‘History of England from the Accession of Edward VI to the Death of Elizabeth5 ;

Ram¬ baud, A., ‘History of Russia5 ; Ranke, L., ‘A History of Prussia5 ; Ritter, M., ‘Deutsche Geschichte in Zeitalter der Gegenreformation und des Dreissigjahrigen Krieges5 ; Robertson, C. G., ‘England under the Hanoverians5 ; Robinson and Beard, ‘Development of Modern Europe5 (Vol. I) ; Robinson, J. H., ‘The Reformation5 (in Encyclopedia Britannica, 11th ed.) ; Seebohm, F., ‘The Era of the Protes¬ tant Reformation5 ; Seignobos, C, ‘Mediaeval and Modern Civilization5 (Chaps. XVI-XXVI) ; Stefansson, J., ‘Denmark and Sweden5 ; Tilley, A. A., ‘The Literature of the French Renaissance5 ; Trevelyan, G. M., ‘Eng¬ land under the Stuarts5 ; Tuttle, H., ‘History of Prussia5 ; Wakeman, H. O., ‘The Ascend¬ ancy of France5 ; Ward and Waller (eds.), ‘Cambridge History of English Literature.5

IV. The French Revolution, the Napo¬ leonic Period, and the Popularization of National Sentiment in Europe. — Aulard, A., ‘Political History of the French Revolution5 ; Bourne, H. E., ‘The Revolutionary Period in Europe5; Dalberg-Acton (et al.), ‘The Cam¬ bridge Modern History5 (Vols. VIII-IX) ; Denis, E., ‘L’Allemagne, 178Q-18105 ; Fisher, H. A. L., ‘Napoleon5 ; ‘Studies in Naooleonic Statesmanship5 ; Fournier, A., ‘Napoleon I5 ; Haiisser, L., ‘Deutsche Geschichte, 1785—1815 5 ; Hayes, C. J. H., ‘A Political and Social His¬ tory of Modern Europe5 (Vol. I, Part III) ; Hume, M., ‘Modern Spain5 (Chaps. I-IV) ; Johnston, R. M., ‘The French Revolution5 ;• ‘Napoleon5 ; ‘The Napoleonic Empire in Southern Italy5 ; Madelin, L., ‘The French Revolution5; Matthews, S., ‘The French Revolution5 ; Oman, C., ‘History of the Penin¬ sular War5 ; Oncken, W., ‘Das Zeitalter der Revolution5 ; Paxson, F. L., ‘The Independence of the South American Republics5 ; Phillips,

W. A., ‘The Confederation of Europe5 ; Rose, J. H., ‘Nationality in Modern History5 (Lectures II-IV) ; ‘The Revolutionary and Napoleonic Era5 ; ‘The Life of Napoleon I5 ; Seeley, J. R., ‘The Life and Times of Stein5; Seignobos, C., ‘A History of Contemporary Civilization5 (Chaps. I-VIII) ; Sorel, A., ‘L’Europe et la revolution frangaise5 ; ‘Stern. A.. ‘Geschichte Europas5 (Vol. I) ; Sybel, H.f ‘Geschichte der

Revolutionzeit von 1789) ; Thayer, W. R., ‘The Dawn of Italian Independence> (Vol. I) ; Treitschke, H., (History of Germany in the Nineteenth Century) (Vol. 1).

V. The Industrial Revolution, National Imperialism and the Latest Stage in the Evolution of Nationalism. — Andrews, C. M., (The Historical Development of Modern Europe) ; Ashley, P., (Modern Tariff History* ; Bassett, J. S., ‘A Short History of the United States5 ; Becker, Johnson, Dodd and Paxon, (The Riverside History of the United States5 ; Blakeslee, G. H. (ed.), ‘Japan and Japanese-American Relations5 ; ‘Recent Developments in China5 ; ‘Latin America5 ; (The Problems and Lessons of the War5 ; Bogart, E. L., (Economic History of the United States5; Bracq, J. C., ˆFrance under the Third Repub¬ lic5 ; Brinkley, F., ‘A History of the Japanese People5 ; Coman, K., ‘The industrial History of the United States5; Dawson, W. H., ‘The Evolution of Modern Germany5 ; Debidour, A., (Histoire diplomatique de l’Europe5 ; Denis, E., (La Boheme depuis la Montagne-Blanche5 ; Dewey, J., ‘German Philosophy and Politics5 ; Dickinson, G. L., (The European Anarchy5 ; Dimnet, E., (France herself Again5; Dominian, L., ‘The Frontiers of Language and Nationality in Europe5 ; Douglass, R. K., (Europe and the Far East5 ; Farrand, M., (The Development of the United States5 ; Fife, R. H., (The German Empire Between Two Wars5 ; Fish, C. R., ‘The Development of American Nationality5 ; ‘American Diplomacy5 ; Gibbins, H. D. B., ‘Industry in England5 ; Gibbons, H. A., (The New Map of Europe5 ; (The New Map of Africa5 ; (The Reconstruction of Poland and the Near East5 ; Gooch, G. P., ‘History and Historians in the Nineteenth Century5 ; Guilland, A., ‘Modern Germany and Her Historians5 ; Hanotaux, G., Contemporary France5 ; Harris, N. D., ‘Intervention and Colonization in Africa5 ; Hart, A. B. (ed.), ‘The American Nation: a History5; Hayes, C. J. H., ‘A Political and Social His¬ tory of Modern Europe5 (Vol. II) ; Hazen, C. D., ‘Europe Since 1815 5 ; Headlam, J. W., (Bismarck and the Founding of the German Empire5 ; Henderson, E. F., ‘A Short History of Germany5 (Vol. II) ; Hirst, F. W. (ed.), (Porter’s Progress of the Nation5; Hobhouse, L. T., ‘Democracy and Reaction5 ; Hobson, J. A., ‘The Evolution of Modern Capitalism5 ; ‘Imperialism5 ; Hornbeck, S. K., Contempo¬ rary Politics in the Far East5 ; Howard, E. D., (Recent Industrial Progress in Germany5; Johnston, H. H., ‘A History of the Coloniza¬ tion of Africa5 ; Common-Sense in Foreign Policy5 ; Keller, A. G., Colonization5 ; Keltie, J. S., ‘The Partition of Africa5; King, B., (A History of Italian Unity5 ; King and Okey, ‘Italy To-Day5; La Gorce, P., ‘Histoire du second empire5 ; Latourette, K., ‘The Develop¬ ment of China5 ; (The Development of Japan5 ; Leroy-Beaulieu, P., ‘De la colonisation chez les peuples modernes* ; Lavasseur, E., ‘Histoire des

classes ouvrieres et de la industrie en France de 1789 a 18705 ; Mantoux, P., (La revolution industrielle en Angleterre5 ; Mariott, J. A. R., ‘England Since Waterloo5 ; ‘The Eastern Question5 ; Maurice, C. E., ‘The Story of Bohemia5 ; Mavor, J., ‘An Economic His¬ tory of Russia5 ; McLaren, W. W., ‘A Political History of Tapan5 ; McMaster, J. B., ‘A His¬ tory of the People of the United States5 ; Mil¬

ler, W., ‘The Ottoman Empire5 ; Moore, J. B., ‘Principles of American Diplomacy5 ; Morel, E. D., ‘Ten Years of Secret Diplomacy5 ; Mur¬ dock, J., ‘A History of Japan5 ; Nippold, O., ‘German Chauvinism5 ; Oberholtzer, E. P., ‘A History of the United States since the Civil War5 ; Ogg, F. A., ‘The Economic Develop¬ ment of Modern Europe5 ; ‘The Governments of Europe5 ; Osgood, H. L., ‘The English Colonies in the Seventeenth and Eighteenth Centuries5 ; Reinsch, P., ‘World Politics at the End of the Nineteenth Century5 ; Rhodes, J. F., ‘A History of the United States from the Compromise of 18505 ; Robinson and Beard, ‘The Development of Modern Europe5 (Vol. II) ; Rose, J. H., ‘Nationality in Modern His¬ tory5 (Lectures V-IX) ; ‘The Development of the European Nations5 ; Schapiro, J. S., ‘Modern and Contemporary European His-t6ry5 ; Schlesinger, A. M., ‘The Colonial Merchants and the American Revolution5 ; Schmitt, B. E., ‘England and Germany, 1740-19145 ; Scott, J. F., ‘Patriots in the Making5 ; Seton-Watson, R. W., ‘The War and Democ¬ racy5 ; ‘Racial Problems in Hungary5 ; ‘The Southern Slav Question5 ; ‘The Rise of Nationality in the Balkans5 ; Seymour, C., ‘The Diplomatic Background of the War5 ; Seignobos, C., ‘History of Contemporary Civiliza¬ tion5 (Chaps. IX-XX) ; ‘A Political History of Modern Europe5 ; Shepherd, W. R., ‘Latin America5 ; Schuster, W. M., ‘The Strangling of Persia5 ; Slater, G., ‘The Making of Modern England; Skrine, F. H., ‘The Expansion of Russia5 ; Svbel, H., ‘The Founding of the German Empire5 ; Sykes, P. M., ‘A History of Persia5 ; Taylor, A. H. E., ‘The Future of the Southern Slavs5 ; Thayer, W. R., ‘The Life and Times of Cavour5 ; Toynbee, A. I., ‘Nationality and the War5 ; Turner, F. J., ‘The Rise of the New West5 ; Veblen, T., ‘Imperial Germany and the Industrial Revolution5 ; Ward, A. W., ‘Germany Since 1815 5 ; Zimmermann, A., ‘Die europaischen Kolonien5 ; ‘Geschichte der deutscher Kolonialpolitik.5

VI. Nationalism and Internationalism. — Addams, J., ‘Newer Ideals of Peace5 ; Amer¬ ican Association for International Concilliation, Bulletins 113, 131, 134, 135; Balch, T. W., ‘The Nouveau Cynee of Emeric Cruce5 ; Bassett, J. S., ‘The Lost Fruits of Waterloo5 ; Bentham, Jeremy, ‘A Plan for an Universal and Perpetual Peace5 ; Bolce, H., ‘The New Inter¬ nationalism5 ; Bourne, R., ‘Towards an Endur¬ ing

Peace5 ; Brailsford, H. N., ‘A League of Nations5 ; Butler, N. M., ‘The International Mind5 ; Darby, W. E., ‘International Tribu¬ nals5 ; Dickinson, G. L., ‘The Choice Before Us5; Duggan, S. (ed.), ‘The League of Na¬ tions5 ; Faries, J. C., ‘The Rise of Internation¬ alism5 ; Fried, A. A., ‘The Restoration of Europe5 ; Goldsmith, R., ‘The League to En¬ force Peace5 ; Hobson, J. A., ‘Towards Interna¬ tional Government5 ; Howe, F. C., ‘The Only Possible Peace5 ; Hull, W. J., ‘The Two Hague Conferences5 ; Kallen, H. M., ‘The League of Nations, To-Day and To-Morrow5 ; Kant, Immanuel, ‘The Idea of a Universal History5 ; ‘Eternal Peace5 (translated by Hastie) ; Krehbiel, E. B., ‘Nationalism, War and Society5 (Part III) ; Lane, R. N. A. (Norman Angell), ‘The Great Illusion5 ; ‘The Political Conditions of Allied Success5 ; Marburg, T., ‘A League of Nations5; Mead, E. D. (ed.), ‘The Great De-NATIONALIST — NATIONALITY

sign of Henry IV> ; Morrow, D. W., (A Soci¬ ety of Free States> ; Minor, R. C (A Re¬ public of Nations* ; Muir, R., Nationalism and Internationalism*; Ogg and Beard, National Governments and the World War* (Part IV) • Penn, William, (A Plan for the Peace of Eu¬ rope > ; Phelps, E. M. (ed.), < Selected Articles on a League of Nations* ; Phillips, W. A., <The Confederation of Europe> ; Reinsch, P. S., (Public International Unions) ; Rose, J. H.j Nationality in Modern History* (Lecture X) ; Saint-Pierre, C. I. C., (A Project for Set¬ tling an Everlasting Peace in Europe* ; Sayre, F. B., Experiments in International Adminis¬ tration } ; Scott, J. B., (An Essay on a Congress of Nations by William Ladd> (especially the introduction) ; Tenney, A. A., (Theories of Social Organization and the Problem of Inter¬ national Peace* (in Political Science Quarterly, 1915) ; Veblen, T., (An Inquiry into the Nature of Peace and the Terms of Its Perpetuation ; Woolf, L. S., (International Government.*

Harry Elmer Barnes,

Professor of History, Clark University, Wor¬ cester, Mass.

NATIONALIST, in British politics, a term applied to the Irish political party whose pro¬ gram includes a partial separation of Ire¬ land from Great Britain. The party was or¬ ganized by Isaac Butt, and alter his death was ably led by Charles Stuart Parnell. After the death of the

latter it was split into factions but was reunited in 1899 under the leadership of John E. Redmond. Its principal services to the Irish nation have been the settlement of the land troubles and the establishment of institu¬ tions for the higher education of Catholics. The party, however, failed to keep in touch with the younger generation in Ireland; more and more it came to resemble the great par¬ ties of England; only men who pledged docility to its leaders received its support at elections. The cleavage between people and party became apparent soon after the outbreak of the war in 1914, and after the revolt in 1916 the sup¬ port of the masses was withdrawn altogether. At the various by-elections since held through¬ out the country the party's candidates have been defeated by the Sinn Fein candidates. Its power is gone, and a general election would see it disappear forever. The reasons are not far to seek; as a party it has outlived its use¬ fulness ; it is no longer truly representative of the people; new men and new principles clamor for recognition and will not be denied.

NATIONALITY. Nationality is both an ethnic and a legal term. As an ethnological concept it has reference to the racial status of an individual or group. Thus we speak of an individual possessing German, Polish, Italian or Greek nationality, without regard to his citi¬ zenship, for the terms citizenship and national¬ ity are not synonymous. In general, people who have a common ethnic origin, who speak the same language and who have a common literature belong to the same nationality al¬ though they may be citizens or subjects of dif¬ ferent states. Thus we find large numbers of persons of Polish nationality in Germany, Aus¬ tria, Russia and other states; Germans in large numbers are found not only in Germany, but in Austria, Switzerland and other countries; per¬ sons of Jewish nationality are widely scattered

over the world and are citizens or subjects of many states. States and nations are, therefore, by no means identical ; some states, like Aus¬ tria, Hungary, Russia and Switzerland, em¬ brace within their territorial limits various nationalities. On the other hand a nation may extend beyond the limits of a single state. Thus the French nation embraces practically the whole of the French Republic and the larger part of Belgium. The Germanic nation ex¬ tends beyond the limits of the German empire into Austria and Switzerland. The tendency of modern times is in the direction of identifica¬ tion of states and nations, that is, toward the organization of states with boundary lines which coincide with those of nations, this on the principle that the

bringing of peoples hav¬ ing a common ethnic origin and language under the same state organization conduces to na¬ tional unity and stability. The organization of the German and Italian states along national lines during the last century was in accord with this tendency. Disregard of this principle, as for example, by the Vienna Congress in 1815 which undertook to reorganize the states of Europe without regard to considerations of nationality, has led to unfortunate results. Ex¬ perience teaches that ethnic homogeneity is one of the most powerful sources of political strength and writers are not lacking who main¬ tain that everywhere the boundaries of states and nations should be coterminous, that is, every nation should be organized into a sepa¬ rate and distinct state and that no state should embrace within its territorial limits more than one nation or nationality. In accordance with this theory the Polish nation which was until recently embraced within the limits of three different states has been brought under a single state organization ; the Danish, French and Polish parts of Germany have been detached and united to the states to which ethnically they properly belong or organized into new states; the Italian portions of Austria have been united to the Italian state and so on.

As a term of municipal and international law nationality has reference to the status of an individual as a member of a particular state. In this sense the term is synonymous with citi¬ zenship (see Citizenship and Education) though not invariably, for an individual may for certain purposes be a ˆnational® of a par¬ ticular state without being a citizen or subject in the full sense of the term. The term may also have reference to the national status of a ship or cargo. Thus the liability of a ship or cargo to capture during war depends upon its nationality just as the right of an individual to the protection of a particular government or his liability to military service depends upon his nationality.

The nationality of an individual is deter¬ mined by municipal or state law while that of a ship or cargo is regulated for the most part by the rules of international law. As a conse¬ quence of the former principle it may and does frequently happen that two or more states lay claim to the allegiance of the same person. In that case the individual possesses a double na¬ tionality. Likewise it may happen that an indi¬ vidual is without any nationality at all, that is, he is staatlos or heimatlos, as the Germans say. Cases of dual nationality arise from the exist-

ence of two conflicting systems for determining nationality. These two systems are known as the jus soli and the jus sanguinis. According to the former rule nationality is primarily de¬ termined by the place of birth ; according to the latter, by the nationality of the parents. The jus soli rule grew up in Europe during the feu¬ dal period and in time it became the general law on the subject on the continent of Europe. In the later Middle Ages, however, it was largely superseded by the jus sanguinis rule which originated in the Roman law. Accord¬ ing to the strict principle of the jus soli all per¬ sons born within the jurisdiction of a particular state, regardless of whether the parents be citi¬ zens or aliens, are deemed to be citizens of that state. Likewise all children born abroad, even though their parents be citizens, are regarded as aliens. On the other hand, according to the strict principle of the jus sanguinis all persons born within the jurisdiction of a particular state, of parents who are aliens, are themselves aliens, while those born abroad of citizen pa¬ rents take the nationality of their parents (or rather that of the father, in case of legitimate children, and that of the mother, in case of ille¬ gitimate children).

The jus soli principle is the basis of the law of Great Britain and the United States; the jus sanguinis rule prevails in Germany, Austria, France, Hungary, Switzerland and other states. Few states, however, apply either principle ex¬ clusively. Thus according to American law children born abroad of fathers who are citi¬ zens of the United States and who have them¬ selves resided here are deemed to be citizens of the United States. Likewise, according to British law, children born abroad of British subjects are treated as natural-born British sub¬ jects. Thus both countries, although following in general the doctrine of the jus soli , have adopted the jus sanguinis principle for deter¬ mining the status of children born abroad of citizen parents. In many other states a mixed system prevails. Thus according to French law while all children born of French parents any¬ where in the world are deemed to be French citizens, those born in France of alien parents and not domiciled in France at the age of their majority are regarded as foreigners. A child, therefore, born' in the United States of French parents would be a citizen of the United States jure soli, but a citizen of France jure sanguinis. We have here a case of double nationality,

due to the existence of conflicting rules by which citizenship is determined. In practice the con¬ sequences of such conflicts are usually avoided by the policy of states in refraining from as¬ serting their claims in such cases so long as the person whose nationality is in dispute re¬ mains outside their jurisdiction. To avoid cases of double nationality it would be neces¬ sary to assimilate all the various systems for determining national character, an ideal which, however desirable, is not likely to be realized.

In time of war the national character of an individual may not be the same as that of his political character. It may be that of his domi¬ cile or his place of business. Thus if he is domiciled in an enemy country or has a house of trade therein he may for certain purposes be an alien enemy to his own country.

Concerning the test for determining the na¬

tionality of ships in time of war there has been much diversity of opinion. The continental European view has generally been that national character in such cases should be determined by the nationality of the owner; English and American opinion, however, has regarded the flag which the ship is entitled to fly as the proper test. The question was considered at the London Naval Conference of 1908-09, and a compromise was reached by the adoption of the rule that the nationality of a vessel should be determined by the flag which it is entitled to fly (article 57) and that the enemy or neutral character of goods found on board an enemy vessel should be determined by the neutral or enemy character of the owner (article 58). During the recent World War, however, the British government rejected the former rule and put into effect the rule that the neutral or /enemy character of a vessel should be deter¬ mined by the nationality of the owner. See also Allegiance and Citizenship in the United States. For bibliography see article Citizenship in the United States.

James W. Garner,

Professor of Political Science, University of

I HlflOtS.

NATIONS, Battle of the («Volker-schlacht®), in the Napoleonic wars, the battle fought at Leipzig, 16—19 Oct. 1813, in which Napoleon, with about 190,000 men, was defeated by the Allies numbering from 200,000 to over 300,000 at different stages of the conflict. The French

loss is estimated at 40,000 killed and wounded, and 30,000 prisoners ; that of the Allies at 45,000 killed and wounded. The libera¬ tion of Germany is practically dated from this event. See Napoleon I.

NATIONS, Law of. See International Law.

NATIONS, League of. See War, Euro¬ pean : Peace Treaties.

NATIVE BEAR, the Australian koala (q.v.).

NATIVE COMPANION, an Australian name for a large local crane (Grus australa-sianus) peculiar to that island-continent.

NATIVISM, that theory which bases some tangible part or phase of our knowledge on the inborn nature of mind and not on sense-experi¬ ence alone. It is opposed to empiricism (q.v.), which finds in sense-experience the origin of all knowledge. While the distinction between truths of reason and truths of sense dates from Heraclitus, or even earlier, Plato was the first to make nativism a leading tenet of his philoso¬ phy. Over against the knowledge of sense, he maintained the existence of a knowledge of ideas due to a recollection, stimulated indeed by sensory experience, but reaching back beyond birth. Aristotle's views as to the origin of knowledge, though not greatly emphasized, seem to be essentially of the' same nature as those of Plato. The Stoics were the first to use the word innatus or truths, applying it primarily to the moral law. The realists of the Middle Ages, holding as they did that univer¬ sal have a separate existence, were practically driven to nativism. unlike the nominalists, who maintained that nothing is in the intellect which was not previously in sense. In modern times nativism and rationalism have gone hand in hand, and Descartes, Spinoza and especially

Leibniz believed in the existence of innate ideas such as those of God and of the self. Locke opposed this opinion, and pointed out that the new-born child does not possess a ready-made stock of ideas. Kant maintained a theory of knowledge essentially nativistic, but departed

from his predecessors in not making knowledge consist in the possession of representative ideas and in holding that the phase of knowledge independent of sense — the knowledge of pure form — is not so much congenital as extra¬ temporal. The modern discussion of evolution¬ ism has given a new turn to nativism, in that some writers, such as Spencer, have upheld the view that the knowledge of the individual is in a large measure inherited racial experience. However, according to Weismann's theory of evolution, acquired characterictics cannot be inherited, so that racial experience can have no direct effect on the individual. The innate substratum of the mind, on this theory, is the result of the accumulation of fortuitous varia¬ tions which have been able to survive through special fitness. Neither this view nor Spencer-ianism are in the original sense forms of na¬ tivism, since the sort of innate knowledge which the classical nativism maintains is the same in nature for all minds.

It is not essential for nativism to maintain that the new-born babe actually has certain con¬ ceptions perfectly formed, or that he will form them without any sensory stimulus. An item of knowledge may be innate even if it requires experience to evoke it. For this reason Locke's refutation of Leibniz will not hold water. On the other hand, to be an antithesis to empiri¬ cism, the nativist must maintain, not merely that the general nature of man is a condition of all sensory experience, for the empiricist would agree with him in this, but that some phase of knowledge, such as that of necessary truths, is peculiarly dependent on the nature of think¬ ing minds themselves. Consult Aristotle, (De Anima) ; Locke, (Essay on the Human Understandingˆ ; Kant, (Kritik der reinen VernunfD ; Leibniz, (New Essays) ; Locke, (Essays on the Human Understanding) ; Mill, J. S., (A System of Logic) (London 1843) ; Moore, G. E., article on (Nativism and EmpiricisnF in (Baldwin's Dictionary of Philosophy and Psychology) (new ed., New York 1911); Plato, (Meno) ; ˆhaedo* ; (Theaetetus) ; Zeller, (Stoics, Epi¬ cureans and Sceptics } (tr. London 1892).

NATIVITY, in astrology, the theme or figure of the heavens, and particularly of the 12 houses, at the moment when a person is born, supposed to indicate his future destinies, and synonymous with horoscope. See Horo¬ scope; Astrology.

NATORP, na'torp, Paul Gerhard, German scholar: b. Diisseldorf, Germany, 24 Jan. 1854. He was educated in Berlin, Bonn and Strassburg and accepted a professorship in Marburg in 1885. He wrote (Descartes' Erkenntniss-theorie> (1882); (Platos StaaD (1895); <Platos Ideenlehre) (1903) ; (Socialpadogigik) (3d ed. 1909) ; (J. H.

PestalozzP (2d ed., 1910) ; (Die logischen Grundlagen der exakten Wissen-schaften) (1910); (Philosophie : ihr Problem und ihre Probleme > (1911) ; (HofFnungen und Gefahren unserer Jugendbewegung) (1914).

NATROLITE (from “natron,” native car¬ bonate of sodium), a native hydrous silicate of

sodium and aluminum, having the chemical for¬ mula NazALSLOio 4-2H2O, and crystallizing in slender prismatic forms belonging to the ortho¬ rhombic system. It is transparent to translu¬ cent, and usually white (or nearly so), with a vitreous lustre, a hardness of from 5 to 5.5, and a specific gravity of from 2.20 to 2.25. It occurs in cavities in basaltic rocks, and in seams in granite, gneiss and syenite. It occurs in many parts of Europe, and fine crystals are found in southern Norway. In the United States the mineral occurs in Connecticut, New Jersey and Arkansas, and also in the Lake Superior region. It is likewise found in Nova Scotia. Natrolite takes a good polish, and has been used as a gem stone.

NATRON, a carbonate of soda or mineral alkali, Ka2CO3l0H2O. It is produced from the ashes of several species of marine plants and is also obtained by evaporating the waters from ‘ sˆftle mineral springs. It is also found as an elnorescence in the ground. It occurs in nature, but only in solution, and is generally found in an impure state, being mixed with other sodium salts, such as the sulphate and chloride. The soda lakes of Egypt have supplied great quanti¬ ties of this substance for many centuries; it was used by the ancient Egyptians as an important ingredient in their embalming fluids. A similar but impure hydrogen sodium carbonate is found deposited by evaporation on the shores of the Caspian and Black seas, also on the banks of alkali lakes and springs in California, particu¬ larly in the neighborhood of San Bernardino.

NATTER, Heinrich, Austrian sculptor : b. Graun, Tyrol, 16 March 1846; d. Vienna, 13 April 1892. He was five years apprentice to a sculptor in Meran and subsequently was taught drawing at Augsburg by Johann Guyer, a famous painter of humorous genre. Subse¬ quently he studied with great profit under Max Widnmann (q.v.), the sculptor, in the Munich Academy. Weak health compelled him to travel and he visited Riva on Lago de Garda and Venice, until the war of 1866 called him to active military service. He afterward took up his residence at Munich, where he made his reputation by his portrait

busts, sepulchral statues, a colossal statue of the god (Odin > (1873) and the head of a (Sleeping SatyrP A career of wider activity opened for him after his settlement in Vienna, where, besides numer¬ ous bust portraits and monuments, he executed the statue of Zwirigli for Zurich; the statue of Haydn for Vienna; the portrait statue of Laube and Dingelstedt for the municipal theatre of that city; and the statue of Walter von der Vogelweide for Bolzano (1889). His statue of Andreas Hofer, which is his masterpiece, was unveiled after the sculptor's death on a height near Innsbruck. A poetic delicacy of concep¬ tion and a certain lifelike expression, oftener found in painting than in sculpture, are the characteristic features of his work. His liter¬ ary remains were published by L. Speidel, under the title (Kleine Schriften) (1893).

NATTERJACK, an Old World toad (Bufo calamita), light-brown in color, spotted with patches of a darker hue. It does not leap or crawl like the common toad, but rather runs, whence it has the name of walking or run¬ ning toad. It has a deep and hollow voice.

audible at a great distance, and is often found in dry situations.

NATTIER, na-te-a, Jean Marc, French painter: b. Paris, 1685; d. 1766. He was the pupil of Jean Jouvenet, won the Academy prize in 1700 and became professor of the Academy in 1752. His fame as a portrait painter was increased by the visit he paid to Antwerp in 1715 to paint likenesses of Peter the Great and his wife Katharine I ; he also painted the por¬ traits of many of their suite. So great was his skill in portraying the fine ladies of his day that he has done as much to immortalize such faces as those of Marie Lesczynska, Henriette de France, Madame Adelaide, Madame de Chateauroux, Madame de Flavacourt and many others of the court of Louis XV, as Rigaud (see Rigaud, Hyacinthe) had done for Bossuet, for Louis XIV, his courtiers and other leading men of the period. His subjects are usually treated as mythological themes. Speci¬ mens are to be found in the Louvre, Dresden, Stockholm and the various museums of Paris and London. The Princess de Conde as "Diana® is in the Metropolitan Museum in

New York. Consult (Masters in Art5 (Vol. Ill, Boston 1902) and Pierre de Nolhac, (Nattier, pientre de la cour de Louis XV) (Paris 1910).

NATTY BUMPPO, the central figure in Cooper's (see Cooper, J. F.) stories: (The Pioneers) (1823), in which he appears as "Leather¬ stocking,® a name lent to the series as the (Leatherstocking Tales) ; (The Last of the Mo¬ hicans } (1826), in which he is known as

"Hawkeye® and "Le Longue Carabine® ("The Long Rifle®) ; and (The Pathfinder5 (1840) and (The Deerslayer) (1841), in which his re¬ spective sobriquets furnish the titles of the volumes. Lounsbury (<Life) of Cooper, 1884) has called him "one of the few original char¬ acters, perhaps the only great original char¬ acter, that American fiction has added to the literature of the world.®

NATUNA (na-too'na) ISLANDS, East Indies, a chain of islands in the South China Sea, extending northwest from Cape Api, Borneo, and belonging to the Dutch. The prin¬ cipal islands are Great and South Natuna is¬ lands and Stokong. The aggregate area is estimated at over 800 square miles. The islands are mountainous and densely forested ; the chief products are cocoanuts, fish, rice and maize. Pop. 9,000, mostly Malay fishermen.

NATURAL BRIDGE and NATURAL ARCH. A natural bridge has been defined as a "natural stone arch that spans a valley of erosion. A natural arch is a similar structure which does not span a [true] erosion valley.® These forms are produced in numerous ways. Most of our larger natural bridges are the re¬ sult of the cutting through of the necks of deeply-entrenched meanders (q.v.), so that the river cuts off an oxbow, just as on a typical modern flood plain, except that the meander is in a deep gorge or valley and cuts through the narrow neck of rock underneath the sur¬ face. (See Meanders). This is the origin of the famous Pont d'Arc in France. The group of natural bridges in Southern Utah are also of this type. The most noted of these are the Augusta, Edwin, Caroline and Rainbow bridges. The Augusta Bridge has a height of 265 feet,

a span of 320 feet, a thickness of arch of 83 feet and a width of roadway of 35 feet.

In limestone regions, solution along joints may form long tunnels, or, if only part of the tunnel roof remains, natural bridges. Some¬ times in case of waterfalls, part of the water, before reaching the brink of

the fall, may work down through a joint in the bed and come out below the fall. If this passageway enlarges sufficiently to accommodate all the water of the stream, the former fall may be abandoned, leaving its old crest line as a natural bridge. The famous natural bridge of Virginia is per¬ haps of this or similar origin. It is 236 feet high, has a span of about 50 feet and a thick¬ ness of arch of about 40 feet. Other natural bridges are formed by various other means, as by wind erosion undercutting ridges in deserts, wave erosion along shore lines, the falling in of parts of roofs of caves, leaving part of the roof as a bridge and many other minor causes. Consult Cleland, (North Amer¬ ican Natural Bridges5 (in Bulletin of the Geo¬ logical Society of America, Vol. XXI, 1910, pp. 313-338).

NATURAL GAS. See Gas, Natural; . Mineral Production of the United States.

NATURAL HISTORY, in its widest sense, that department of knowledge which compre¬ hends the sciences of zoology and botany, chemistry, natural philosophy or physics, geology, palaeontology and mineralogy. It is now, however, commonly used to denote collectively the sciences of botany and zoology, or these to¬ gether with geology, mineralogy and palaeon¬ tology, exclusive of physics and chemistry, and it is sometimes restricted to denote the science of zoology alone.

NATURAL HISTORY OF SELBORNE, The, a celebrated work by Gilbert White (q.v.), published in 1789. Its material consists of White's letters to Daines Barrington and Thomas Pennant (qq.v.), in which the writer describes outdoor life in the little Hampshire village which his works made famous and inter¬ esting alike to students of nature and to lovers of good books, among which the (Natural His¬ tory5 ranks as a unique classic of science and of letters.

NATURAL LAW. See Law, Natural.

NATURAL LEVEES, embankments built by a river on either side of its channel. When a river is in flood and overspreads its flood plain, there is a constant checking of velocity where the moving water of the channel comes into contact with the stagnant water of the adjacent plain. At this point on either side, the greater part of the river's load of mud and sand is dropped, until a ridge is built up on each side, known as a natural levee. By this process the Mississippi has raised its course many feet above the general level of its flood plain.

NATURAL NUMBERS. See Algebra.

NATURAL PHILOSOPHY. See Phys¬ ics.

NATURAL RESOURCES. See Con¬

servation of Natural Resources.

NATURAL RIGHTS. See Law, Natural.

NA I URAL SELECTION, the doctrine advanced by Charles Darwin and almost coincidentally by Alfred Russel Wallace (q.v.), to account for the divergence of animal forms and their gradual separation into distinct species and groups, by a process akin to the selective mating practised by men in rearing and perpetu¬ ating breeds of domestic animals. It forms the basis of Darwin's hypothesis of organic de¬ velopment by descent, and depends upon the fact that variations constantly appear in ani¬ mals, and may in some degree be perpetuated. These variations may be minute fluctuations on either side of a mean, a little more of one character and a little less of another; or they may be sudden steps of considerable magni¬ tude ; in other words, they may be continuous or discontinuous. They may visibly affect only one character at a time, or they may affect many parts of the organism at once, as if there were a general movement to a new position of organic equilibrium.

(2) Living creatures are involved in a mani¬ fold and intricate struggle for existence, vary¬ ing greatly in its form and in its intensity, and due to a variety of causes. It is necessitated especially by two facts : first, that two parents usually produce many more than a pair of off¬ spring, and that the population tends to outrun the means of subsistence ; and, secondly, that organisms are at the best only relatively well adapted to the external conditions of their life, which moreover are variable. The ((struggle® may be for food or foothold, for mates or prop¬ erty, for self-preservation or for the welfare of the young, including much more than an inter¬ necine scramble around the platter which con¬ tains the necessaries of life; the phrase is appli¬ cable as regards relative length of life, vigor or constitution,

success in having offspring, and so on.

(3) In this struggle for existence the rela¬ tively less fit organisms are weeded out or elim¬ inated, and sometimes only a small proportion of those born survive to become adults or re¬ productive. But it must be clearly understood that elimination does not necessarily involve sudden death or no offspring; it may simply in¬ volve, in the first instance, a slightly shorter, less successful life, or a smaller, less vigorous family. Yet whether the eliminative process be gentle or severe, the result is the same — that the relatively more fit variants tend to survive; and since many variations are demonstrably transmissible from generation to generation, and may, through the pairing of similar or suitable mates, or in other ways, gradually increase in amount, the eliminative or selective process works toward the establishment of new adapta¬ tions and new species.

The three steps in the argument are thus : (1) The occurrence of transmissible germinal variations is a fact of life; (2) the struggle for existence is a fact of life; and (3) the elimina¬ tion of the relatively less fit is a fact of life. The result has been, and is, the rise and prog¬ ress of new adaptations, new varieties, new species, new types.

A formidable objection to the selection the¬ ory, first clearly stated by Prof. Fleemino' Tenkin, is that variations of small amount and sparse occurrence would tend to be swamped out by intercrossing. In human or ˆartificial® selection, the breeder takes measures to prevent VO. 19 — 49

this by pairing similar or suitable forms, but what in nature corresponds to this action of the breeder? Various suggestions have been made in answer to this objection. Thus Weismann says : ((The necessary variations from which transformations arise must in all cases be ex¬ hibited, over and over again, bv many indi¬ viduals,® and in his ingenious theory of Ger¬ minal Selection he has suggested the internal mechanism by which this result may come about.

But the answer at present most relied on is that worked out by Romanes, Gulick and others — the theory of isolation (q.v.). The theory of isolation emphasizes the great variety of ways in which, in the ordinary course of nature, the range of intercrossing may be re¬ stricted, for example, by geographical barriers, by differences in habit, by psychical likes and dislikes, and by those remarkable reproductive variations which cause mutual sterility between two sections of a

species living on a common area.

Another point that has been brought out by De Vries (q.v.) is that variations are not necessarily minute at the start, and that new species may spring into existence at once by what he calls a mutation. Of course, the later history of such a species is conditioned by nat¬ ural selection.

We have given a statement of the theory of natural selection very much as it might have been given in 1859, when Charles Darwin and Alfred Russel Wallace enriched biology by their independent exposition of the selection idea; but since then our knowledge oˆ the nature and origin of variations has greatly in¬ creased, the analysis of the various modes of inheritance has become much more precise, the difficulty of proving any instance of the trans¬ mission of (<an acquired character® or direct somatic modification is generally acknowledged, and we have recognized the value of a second directive factor in evolution, namely, isolation. It may be said that the theory of natural selec¬ tion is now being subjected to more severe and more dispassionate criticism than it had to en¬ counter in the early Darwinian days, when the validity of the general evolution idea was the central subject of discussion.

Thus there is a demand for some serious attempt to measure the intensity of the struggle for existence in typical cases, and for evidence that the absence of a particular variation in cer¬ tain members of a stock does really determine their elimination. In other words, evolutionists have awakened to the necessity of testing nat¬ ural selection in relation to actual cases.

Lastly it should be noted that the doctrines of Lamarck, which were that use-and-disuse, inheritance of acquired characters, and other factors were more potent than natural selection, have been revived and strengthened by a school of naturalists who insist that they must at least be held to have had an important share in the phenomena of biology.

Bibliography. — Darwin, (Origin of Species* (6th ed., 1882) ; (Descent of Man* and other works; Wallace, (Natural Selection) (1869; revised ed., 1891) ; Darwinism* (1889) ; Hux¬ ley, (Lectures on Evolution) and other works; Gray, <Darwiniana) (1876) ; Weismann, As¬ says upon Heredity) (1892) and other works; Romanes, (Darwin and After Darwin) (1892— 95) ; Osborn, ˆFrom the Greeks to Darwinˆ

(new ed., 1909); Morse, (Is Darwin Correct?* (London 1911), and the writings of Allen, Bates, Bateson, Beddard, Belt, Brooks, Cope, Forbes, Gadow, Haeckel, Hyatt, Lankester, Mor¬ gan, Packard, Poulton, Semper and zoologists generally. See Darwinian Theory; Evolution.

NATURAL THEOLOGY, or NATU¬ RAL RELIGION, that knowledge of God's existence and nature which mankind learn from observation of the world of nature. Biblical theology, or, as it is more commonly called, "revealed religion,® is the knowledge of God's nature and operations derived from revelation ; and revelation is impossible unless we first postulate a personal God. Thus natural theol¬ ogy is the foundation of any system which pro¬ fesses to give an account of the Suoreme Being as well as of man's origin and destiny.

Method of Natural Theology. — The first proposition postulated in this department of speculation is that every effect requires a cause (q.v.). One of the self-contradictions of Lucretius is contained in his axiom ex nihilo nihil fit ("nothing can come from nothing®), after pronouncing which he proceeds in Lis at¬ tempt to prove that the order and uniformity of nature proceeds from nothing, that is, ran¬ dom disorder, the fortuitous concourse of atoms. Unless it is admitted that certain events and phenomena are invariably connected as cause and effect, there can be no science of natural theology, which is based upon the assumption that causation is a fact, the truth of which is accepted among the intuitive be¬ liefs of the human mind.

How far a Science. — As Natural Theology claims for its domain the physical, intellectual and moral nature of man as well as the world of nature in the midst of which he is set, it starts out by saying with Natural Science that the present constitution of things had a be¬ ginning. Plants and animals did not always exist on this planet. The questions arise, Whence did they come? How came man here? The theory that individual species as at present existing was the original form of organic life on the earth has now been abandoned, and two other theories have replaced it: (1) That ani¬ mals and plants have been produced by forces eternally and necessarily inherent in matter (see Naturalism) ; (2) that nature is the product of a personal being,

acting with deliberate de¬ sign. In the history of recent speculation we come upon a suspensive judgment in this ques¬ tion; on the other hand Positivists (see Posi¬ tivism) have ruled it out from the field of human speculation. Suspensive reasoners do not profess to know because thev declare the matter unknowable. This is agnosticism (q.v.) and its adherents style themselves agnostics. On the other hand, observers of nature have re¬ marked in the works of nature an analogy with and a resemblance to the works, contrivances and methods of human artificers. They have accordingly reached a belief in a transcendentlv great and powerful maker who has originated all things. The existence of man as an indi¬ vidual person has been taken as testimony, to the existence of an infinite and eternal being as the one supreme God. It has also been averred that anti-intuitionalists destroy the basis of all knowledge and science and that a physicist who denies causation sweeps away the foundation on which his system is reared.

Main Arguments. — (1) It is claimed that the idea of God's existence is innate in every human being and is as necessary a fact of con¬ sciousness as his own personal identity. In the most rudimentary and debased tribes is found this sense of a Supernatural Power. Lubbock and others deny to some degraded races this innate idea; it is sometimes added that deaf-mutes are in the same mental con¬ dition. It does not, however, follow because an idea has not been expressed in language that it is, therefore, not present in the mind. The mind may not have been explored by the sub¬ ject; the readiness with which belief in the supernatural is accepted by savages and children is one reason for the belief that the response they make to communications on this subject springs from previous divinations of the con¬ sciousness in realizing itself. If this idea is not innate it is certain that the faculties of the human mind are such that the study of nature, man, and the obligations of life bring each indi¬ vidual face to face with the notion of God. Descartes, Leibnitz and others aver that the capacity of the human mind to entertain the conception of a being perfect and omnipotent, proves the existence of a reality which corre¬ sponds to such a conception ; but their argu¬ ment has not satisfied metaphysicians such as Reid and Stewart and, through the metaphysical subtilties involved in it, must be laid aside as a popular argument. (2) The study of nature and of history, that is, of man as a physical, intel¬ lectual and moral being, furnishes material for arguments from design, teleological arguments as they are sometimes called (see Teleology). This is the simplest and most obvious form of argument to be put forth in Natural Theology and has been put forth

in all ages. Socrates constantly stated it; Cicero enforced it among his Roman followers. Although on the first publication of Darwin's and Wallace's theory of evolution it lost its place of imoortance in Apologetics, it was soon perceived that the theory of Natural Selection in fact multiplied many fold the evidences of design and ordina¬ tion, and raised the level of intelligence to a higher plane. In consequence Natural Theol¬ ogy has recently been revived and stated with renewed force. The laws of Natural Selection and Survival of the Fittest must have had a lawgiver, and the discovery of additional links in the chain of causation does not necessarily destroy its continuity. The argument now in¬ cludes the concept that the world is not a fin¬ ished product, but is even now in process of evolution. The Hebrew writers constantly re¬ fer to the power and goodness of Jehovah as evidenced both in the works of nature, the events of historv and the faculties of mankind. Saint Paul begins his Epistle to the Romans with this argument against the degraded pagan¬ ism of Rome; the Fathers have enforced it over and over again. Paley's (Naitiral Theolotry* has been a most important statement of the argument from design which has been enlarged in its application bv Chalmers, Tulloch, Mc-Cosh and Agassiz. The argument from design can of course only prove the existence of a Creator of the world. Man alone is conscious of a Creator, who, however, need not be the self-existent God, but once grant that man has a maker, and it would at once follow that a su¬ preme self-existent God exists who is the

l"irst Cause. Consult Xenophon, ˆMemora¬ biliaˆ Plato, (Laws X> ; Cicero, 'De Natura Deorum) ; Descartes, (Principia Philosophise); Leibnitz, 'Theodice> ; Paley, (Natural Theol¬ ogy > ; Chalmers, 'Natural Theology*; Mc-Cosh, J., 'Christianity and Positivism) (New York 1875) ; Seeley, J. R., 'Natural Religion) (Boston 1882) ; Robinson, E. K., vThe Religion of Nature) (New York 1906) ; Shearman, J. H., 'The Natural Theology of Evolution) (New York 1916) ; Thackray, E., 'The Revela¬ tion of God in Nature and Man* (London

1916).

NATURAL TONES are tones produced by the natural alteration of nodal points in wind instruments by pressure only. See Harmonics.

NATURALISM, a term which, in the his¬ tory of philosophical thought, has received a variety of meanings. In general it refers to that which is in accordance with nature. But the sense in which the term nature may be used is not by any means a constant but a variable, and as this sense varies we will find a set of corresponding meanings for naturalism itself. Nature may be considered as that which is the opposite of the artificial, the conventional or the traditional. Regarding nature from this point of view, the term naturalism will be em¬ ployed in much the same sense as that in which Rousseau used it in his plea for a return to nature in matters philosophical, religious and political. Or nature may be regarded as the external reality which furnishes the material of all our sensations; naturalism will then signify in the Lockeian sense that which is original and fundamental in knowledge as opposed to that which is the result of the operations of the human understanding. Again, nature may sig¬ nify the basis of natural affections and dis¬ positions as opposed to the fundamental prin¬ ciples of conduct which are revealed in the “dry light of reason.® In this sense Shaftes¬ bury uses nature and naturalism in contrast to the rationalistic ethic of his day. Naturalism also has been used as a term to characterize such a philosophical system as that of Giordano Bruno, which identifies God with nature, and does not distinguish between the Creator and his works. In the midst of this confusion of meanings, however, the present day discussions in philosophy have established a determinate usage which for the most part is uniformly recognized, and consistently employed. This usage is quite different from any of the phases which have been mentioned, and may be de¬ fined somewhat as follows: Naturalism signi¬ fies a method of interpreting the subiect matter of philosophy, which insists that all phenomena whatsoever are to be explained according to the laws of nature, that efficient causes only are to be regarded, while all considerations of final causes are to be rigorously excluded, as well as those alleged ideal implications of reason which postulate some metaphysical necessity as a mode of interpreting physical phenomena.

In this sense naturalism, as regards psychol¬ ogy, grounds all psychical phenomena upon a purely sensationalistic basis; there is no sel f in the sense of an organizing power and unitary centre in the midst of the various states of consciousness; the spiritual elements of

con¬ sciousness are regarded as incidental, and deter¬ mined at the last analysis by the cosmic proc¬ esses. As a theory of knowledge, there is no

place for an idealistic construction of the data of experience. In ethics, naturalism is a sci¬ ence of what is and not of what ought to be. It allows a science of ethics but not of meta¬ physics. It cosmology essays an explanation of the universe in terms of the laws of nature which inductive research may have discovered, but it has no concern or interest as to the ques¬ tion whether “through the ages one increasing purpose runs.®

A system of naturalism, however, is not necessarily a philosophy of materialism any more than it is necessarily pantheistic, although it must be acknowledged that naturalism and materialism are often used as synonymous terms. It is not used in the present day as a term opposed to supernaturalism, as it is essen¬ tially a philosophical term and not used in a theological sense. It does not deny a super¬ natural reality in the theological sense; it is merely not interested in the questions which turn upon a beyond and above as regards human thought and human activity.

The antithesis which the term naturalism suggests does not lie in this direction. To understand the significance of naturalism, and it must be understood in order to appreciate in any adequate measure the philosophical prob¬ lems of the day, the exact antithesis which is implies must be clearly apprehended. The anti¬ thesis is between an explanation of the phe¬ nomena of existence which can be expressed solely in terms of the laws of nature, and all explanations on the other hand which involve fundamental thought necessities as essential factors. The antithesis is between the natural and the rational, between the natural and the spiritual. This usage of the term we find in such a book as that of Balfour’s ‘Grounds of Belief,* or in Ward’s ‘Naturalism and Agnos¬ ticismˆ or in Sorley’s ‘Ethics of Naturalism.) When Mr. Balfour’s book was first published he was severely criticised in some quarters for his use of the term naturalism. This evoked much discussion, which has served to establish a definite and determinate sense in which the term may be used. A most able and satisfac¬ tory defense of Mr. Balfour’s usage of the term is to be found in the work of Prof. Andrew Seth, entitled ‘Man’s Place in the Cosmos.* One of the essays is ‘The Use of the Term Naturalism, * and it is one of the best discussions to which any student of the subject can be referred. Without doubt, the element of variability which has attended the

history of this term has been to a large extent, if not al¬ together, removed, and a constant significance has resulted which conforms to the general usage of the present time; and the significance is the one which it has been the endeavor of this article to present.

John Grier Hibben, President, Princeton University.

NATURALISTS, American Society of,

an association numbering 230 active members, organized in 1883, for the purpose of bringing together persons interested in topics of natural history.

NATURALIZATION, the act of renounc¬ ing allegiance to one government and acquiring the rights of citizenship under another. In its broadest sense it signifies the act of adopting a foreigner into the body politic and of clothing

him with the privileges of citizenship. This may result from the annexation of territory, the marriage of an alien woman to a citizen, the naturalization of the parents of children, the purchase of real estate in some countries, serv¬ ice in the army and the navy, *etc.* In a more restricted sense the term has reference to the issuance of a certificate of citizenship by a court or an administrative officer after the fulfilment by the applicant of certain prescribed conditions. With a few exceptions the rights of the natural¬ ized person are equal in all respects to those of the native-born citizen ; thus in the United States, while the civil rights are the same, the Constitution excludes the naturalized citizen from the offices of President and Vice-Presi¬ dent. In Great Britain a naturalized subject en¬ joys all the political and civil rights of a native-born subject except that when he is in the ter¬ ritory of his original state he is not entitled to protection unless the consent of his orginal gov¬ ernment to be naturalized abroad was obtained. The British naturalization commission of 1901, however, recommended that this exception be abolished. The government of the United States makes no such exception in the case of naturalized

citizens. They are protected equally with naturalized citizens in their country of ori¬ gin whether the consent of their governments to emigrate was obtained or not. The act of be¬ coming naturalized, however, does not abrogate the claims of the government under which the person concerned had previously lived and which were operative at the time such person changed his allegiance, especially in the case of attempts to avoid compulsory service in the army of the native country, and the laws of the United States do not afford protection for aliens who simply become citizens of this coun¬ try for the purpose of escaping such service. But a distinction is made between the obliga¬ tions of military service that have accrued at the time of emigration and those which have not. In the latter case the government insists that the citizen cannot be held by his original state to a performance of the obligation.

The majority of treaties with other countries call for a continuous residence of five years before admission, the notable exception being Great Britain, with whom the treaty allows of interexchange of citizenship with no stated period of residence. Treaties of this nature were negotiated with the North German con¬ federation, and also with Bavaria, in 1862, but the Bavarian treaty will not allow of natives, who have emigrated to other countries before serving the required time in the army, again becoming permanent residents until they are 32 years of age; but if a certificate of immigration be granted by the terms of this treaty, natural¬ ization does away with the military obligation. Such treaties were also made in 1868 with Ba¬ den, Belgium, Bavaria, Hesse, Mexico, the North German confederation, and Wurtem-burg; in 1869 with Sweden and Norway; in 1870 with Austria and Great Britain; and in 1872 with Denmark. At present all states ex¬ cept Russia and Turkey allow their citizens or subjects to expatriate themselves voluntarily and to adopt a new allegiance. The two latter states, however, refuse to recognize the legality of naturalization certificates granted to subjects by foreign governments without their consent

previously obtained. Other states attach cer¬ tain conditions to the exercise of the right of expatriation. The laws of the United States, however, declare it to be an inalienable right of all peoples and the consent of the government is not required.

In the United States, Congress by the Con¬ stitution has exclusive power over the natural¬ ization of citizens, and the power cannot be exercised by the individual States, but this does not prohibit the State

from granting the rights and privileges of State citizenship, such as vot¬ ing at State elections, holding offices, *etc.* See Naturalization Laws; Citizenship in the United States; Aliens; Allegiance; Nation¬ ality.

NATURALIZATION LAWS, acts placing foreign-born persons in the same legal position as natural-born citizens. The conditions under and the manner in which an alien may be ad¬ mitted to become a citizen of the United States are prescribed by the United States Revised Statutes.

Declaration of Intentions.— The alien must declare upon oath before a Circuit Court or a District Court of the United States or a Dis¬ trict or Supreme Court of the Territories, or a court of record of any of the States having common-law jurisdiction and a seal and clerk, two years at least prior to his admission, that it is, bona fide, his intention to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign prince or state, and particularly to the one of which he may be at the time a citizen or subject.

Oath on Application for Admission. — He must at the time of his application to be ad¬ mitted declare on oath, before some one of the courts above specified, ((that he will support the Constitution of the United States, and that he absolutely and entirely renounces and abjures all allegiance and fidelity to every foreign prince, potentate, state or sovereignty, and par¬ ticularly, by name, to the prince, potentate, state or sovereignty of which he was before a citizen or subject, which proceedings must be recorded by the clerk of the court.

Conditions for Citizenship. — If it shall ap¬ pear to the satisfaction of the court to which the alien has applied that he has made a declaration to become a citizen two years be¬ fore applying for final papers, and has resided continuously within the United States for at least five years, and within the State or Terri¬ tory where such court is at the time held one year at least; and that during that time (<he has behaved as a man of good moral character, attached to the principles of the Constitution of the United States, and well disposed to the good order and happiness of the same,® he will be admitted to citizenship.

Titles of Nobility. — If the applicant has borne any hereditary title or order of nobility he must make an express renunciation of the same at the time of his application.

Soldiers. — Any alien of the age of 21 years and upward who has been

in the armies of the United States, and has been honorably dis¬ charged therefrom, may become a citizen on his petition, without any previous declaration of intention, provided that he has resided in the United States at least one year previous to his application, and is of good moral character.

(It is judicially decided that residence of one year in a particular State is not requisite).

Minors. — Any alien under the age of 21 years who has resided in the United States three years next preceding his arriving at that age, and who has continued to reside therein to the time he may make application to be ad¬ mitted a citizen thereof, may after he arrives at the age of 21 years, and after he has resided five years within the United States, including the three years of his minority, be admitted a citizen ; but he must make a declaration on oath and prove to the satisfaction of the court that for two years next preceding it has been his bona fide intention to become a citizen.

Children of Naturalized Citizens. — The children of persons who have been duly natu¬ ralized, being under the age of 21 years at the time of the naturalization of their parents, shall, if dwelling in the United States, be considered as citizens thereof.

Chinese. — The naturalization of Chinamen is expressly prohibited by the Laws of 1882. Under the naturalization laws now in force, only <(white® persons and persons of ((African nativity and of African descent® are eligible to naturalization. Japanese, Burmese and Ha-waians have generally been held by the courts not to be included within either category and therefore not eligible. Indians are excluded under the general laws but they may and often have been naturalized by special acts or by treaty. They may also acquire citizenship by taking up public land and separating themselves from their tribes. Polygamists and anarchists are debarred from naturalization by recent acts of Congress.

Protection Abroad to Naturalized Citizens.

— The Revised Statutes of the United States declare that (<all naturalized citizens of the United States while in foreign countries are entitled to and shall receive from this Gov¬ ernment the same protection of persons and property which is accorded to native-born citizens.®

The Right of Suffrage. — The right to vote comes from the State, and is a State gift. Naturalization is a Federal right and is a gift of the Union, not of any one State. In nine States (Arkansas, Indiana, Kansas, Missouri, Nebraska, South Dakota, Texas, Oregon and Wisconsin) aliens who have declared their in¬ tention to become citizens are allowed to vote equally with naturalized or native-born citizens. By an act of Congress passed in 1906, 90 days must elaspe before naturalization and the exer¬ cise of the right to vote. This law was de¬ signed to prevent the wholesale naturalization of foreigners in the large cities for the pur¬ pose of making voters of them for the forth¬ coming election. The Federal naturalization laws apply to the whole Union alike, and pro¬ vide that no alien may be naturalized until after five years' residence except in the case of aliens who have served in the army and been honor¬ ably discharged, in which case one year's resi¬ dence suffices. Even after five years' residence and due naturalization he is not entitled to vote unless the laws of the State confer the privilege upon him, and he may vote in several States six months after landing, if he has de¬ clared his intention, under United States law, to become a citizen.

In Other Countries.— In France a foreigner

who has obtained permission to become domi¬ ciled in France is entitled to letters of declara¬ tion of naturalization after three years' resi¬ dence. Also, by the French Naturalization Act, 1889, a foreigner who has resided in France for 10 years may at once be naturalized without preliminary ceremony. In Germany naturaliza¬ tion can be conferred only by the higher ad¬ ministrative authorities ; the applicant must show that he is at liberty, under the laws of his native country, to change his nationality, or, if he is a minor, that his father or guardian has given him the requisite permission, that he is leading a respectable life, that he is domi¬ ciled in Germany, and that he has the means of livelihood. In all countries a married woman is held to be a citizen of the .state of which her husband is for the time being a subject, and the naturalization of a father carries with it that of his

children in minority. In countries where military service is compulsory naturalization in fraud of this either is pro¬ hibited or renders the offender liable to im¬ prisonment', if he returns, and forfeiture of all property subsequently acquired in his native country. In Great Britain five years' residence is necessary, except where the applicant is in the service of the Crown the certificate is granted by one of the secretaries of state. But the British government, unlike that of the United States, will not protect a naturalized subject within his state of origin unless he has ceased to be a citizen or subject thereof in pursuance of its laws or of a treaty stipula¬ tion. Thus a Russian or Turkish subject natu¬ ralized in Great Britain will not be accorded the protection of the British government upon return to his native state if the consent of his government to naturalization in a foreign country was not obtained. Certain privileges of British nationality may be acquired by the issue to an alien of letters of denization granted by the Crown ; and for this no previous resi¬ dence is required.

Naturalization by Incorporation. — Citizen¬ ship has often been conferred on large bodies of inhabitants by the annexation of territory as a result of cession or conquest. It was in this way that the inhabitants of Louisiana, Florida, Texas, Alaska and Hawaii became citizens of the United States. For other modes of acquiring citizenship, also modes by which citizenship may be lost. See Citizenship in the United States. See also Allegiance; Aliens; Nationality.

Bibliography. — See the authorities cited in the article on Citizenship in the United States.

NATURE GODS. See Nature Worship; Mythology; American Mythology.

NATURE PRINTING, a modern process for obtaining impressions directly from objects themselves and printing therefrom. In one method the object which must have a tolerably flat surface such as a fern frond, is placed be¬ tween a steel plate and one of heated lead and subjected to a strong pressure, forming an exact intaglio copy in the lead from which im¬ pressions are taken. The plate is too soft for practical purposes, but it is generally copied by electrotyping on a copper plate if it is to be used many times. The process was invented in 1849 by Alois Auer, director of the state

printing establishment of the Austrian Empire. In 1854 he published a detailed account of this method of printing.

NATURE STUDY, an educational means of training the mind of the pupil, by direct ob¬ servation, to a knowledge and love of the com¬ mon things about him. Nature study attempts to aid, in the most effective way, through the natural and inherent instincts of all children, the perfect development of the child nature, in accordance with the natural laws of that devel¬ opment. It aims at taking into account the various activities, interests, likes and dislikes of children, their love of activity, their desire to hear, to see and to handle things ; to investi¬ gate all that they come into contact with and to ask questions about everything that interests them. Nature study accepts the fact that this almost constant activity is the one great law of the child's development, physically and men¬ tally; and it acts upon it. It attempts to direct this activity into the most useful and interest¬ ing channels so as to secure for the child the greatest pleasure in doing, with the greatest benefit from the deed accomplished. It seeks to give him direct contact with things rather than to know them by descriptions of them. It makes prominent use of the fact that the human being is essentially an imitator and that the child, especially, is possessed of an irresistible desire or impulse to do what he sees his elders or his companions doing. All these are classed as nature motives ; and nature study makes use of them to the exclusion of motives that are merely artificial. In other words, it works on the assumption that every normal child is born with an instinctive desire to investigate things and sensations, and through this investigation and the experience gained thereby, to get a knowledge of his environment.

A second quality as strongly a part of the child nature as his irresistible impulse to inves¬ tigate is his strong social instinct. This enables him to identify himself with those about him and wTith all their various interests and to real¬ ize his relationship to them; and it creates in him a desire to conform to the social judgment of his associates, that is to public opinion. Nature study attempts to develop the life of the child along the lines of its proper relation¬ ship to nature; that is, to mankind and the world about him. Another prominently de¬ veloped instinct of children is the desire to be useful and helpful. Nature study attempts also to make use of this and ail

other instincts and tendencies of the child so as thus to be able to lead him along the path of development that nature has destined for him and, in this way, infuse a real interest into his work through the inspiration of a desirable object to be attained. Nature study may, therefore, be said to be an element of practically every subject of study in which the child succeeds in becoming interested. The sawing of a board or piece of wood in¬ terests the young child, apart from the actual act of sawing. The nature of the wood; the motions of the person sawing; the teeth of the saw; the saw-dust; the severed pieces of wood; the picking up and carrying of the wood from one place to another ; all these actions are naturally related to the child's life; and they are, hence, proper subjects of nature study, just as much as animals, trees and flowers and

their actions, colors, forms, sizes and relation¬ ships are.

Nature study recognizes the fact that child life and school life, to a very considerable de¬ gree, reflect the life of the community and exhibit the child growing naturally and rapidly into the more extensive life of that community. It attempts to so direct these natural child interests as to enlarge the childish vision and to prepare the child for the coming greater activities of adult life, through proper percep¬ tion and correct thinking and reasoning. Its sphere is, therefore, the whole field of ani¬ mate and inanimate life, in which the child gams his early self-education, largely by obser¬ vation ; for with him literally ((seeing is believ¬ ing® ; and to this may be added tasting, touching and handling, which nature study helps him to do effectively, intelligently and with added pleasure.

History. — Nature study, as a name, is quite recent, but as an actual fact it is old in a part of its development at least. However, it re¬ mained for recent advocates of nature study to give it a permanent place upon the curricu¬ lum of the public schools, and later, the high schools and colleges. Socrates and Aristotle advocated and employed methods in teaching very much like those insisted upon by the modern teacher of nature study. But probably their methods were but echoes of a very general and widely extended custom of nature study. The American Indians, over practically the whole extent of the two continents, had sys¬ tems of instruction fitted, in the case of each tribe or nation, to its own peculiar condition and racial requirements. But in every case this instruction was carried on very largely along the lines laid down by the modern ad¬ vocate of nature study. In the case of the North American Indians, the young brave had practically all his

instruction in the haunts of nature where he learned to know all about the wild animals of the forest, the birds, the fishes, the trees, the winds, the weather, the seasons and the manifestations thereof. In short, his life was as close as it possibly could be to nature. Even among the Aztecs, the Mayas and the more cultured races of Mexico, Central America and the west coast of South America, the system of instruction was essentially the same for the great mass of the people, who were kept very much nearer to nature's heart than they are to-day. So nature study is little more than getting back to the earlier methods of instruction which was still very much alive when the Great Teacher said: ˆConsider the lilies how they grow; they toil not, they spin not; and yet I say unto you, that Solomon in all his glory was not arrayed like one of these.® At the beginning of the Christian era the phil¬ osophers of the Roman Empire were in the habit of teaching their pupils in the open ; and traveling teachers frequently went about from place to place, at times accompanied by pupils who formed a following; and thus accom¬ panied, they taught on the open market places, in front of the temple and other public places where the masses were accustomed to congre* gate. This custom was undoubtedly the sur¬ vival of a very much earlier and more general custom in which nature teaching must have . played a prominent part, if we are to judge from

survivals of this very ancient open air teaching in many southern countries to-day and of real nature study and teaching among such semi-barbaric and semi-civilized races as have de¬ veloped systems of instruction fitted to their several needs.

The Renaissance brought forth teachers who strenuously advocated more natural methods in teaching, not only languages but all other sub¬ jects. Of these men the most prominent, the greatest and most farseeing was Rousseau, some of whose more advanced ideas are but beginning to be realized to-day. Pestalozzi, Froebel and their followers and the modern kindergarten teachers have all been working closer and closer to the goal of nature study whose principles they have been

following, con¬ sciously or unconsciously. The revolution in teaching was bound to come with the Renais¬ sance; but it came very slowly. Men were too busy with the new learning to bother them¬ selves about the methods of acquiring it. The thing itself was to them all important. But as the novelty wore off, teachers began to think about ways of teaching. Hundreds of methods were put upon the market, all echoes and re¬ echoes of one another, with here and there a glimmer of new light. But the light, though not very apparent, was really there, though hidden by many clouds of prejudice, custom, habit, misunderstanding and ignorance. The cry of men like Agassis, Rousseau, Ollendorf, Pestalozzi, Froebel, Berlitz and the whole school of natural method teachers was to get nearer to nature, to have teaching of languages conform to the natural methods by which a child acquires his mother tongue. While these men were builders, they were necessarily anar¬ chistic, to a very considerable degree. They were bent upon sweeping out of existence the old methods which had failed to accomplish what they were intended to accomplish. They were largely anarchistic in their methods also. Let us teach as the child teaches himself, they said. Let us gather facts and impressions from nature just as we come into contact with her, «any old way,® provided we accomplish what we aim at. The result was that practically all these “natural methods® were anything but “natural.® They followed no line of develop¬ ment or plan; because natures methods prc-sented themselves to these natural method

teachers as evolutionary. . , f

Just when these unscientific methods ot teaching had begun to bring discredit upon their authors and more scientific teachers had begun to protest and to replace the somewhat discredited “nature method® designation with that of direct method, teachers of natural sciences in the public schools discovered that the term was still a good one for their pur¬ poses. “Let us get nearer to nature in < our teaching,® was their cry; and they shouted it as enthusiastically as though it had not been al¬ ready worn threadbare. Science had just been introduced into the public schools and colleges of the country. The science teachers of the lower grades went through the same experi¬ ences as the language teachers in getting nearer to nature. The early teachers, in their protest against the too exact and dry methods of the regular science teachers, protested against any method whatever. If teachers would only get nearer to nature everything would be all ngnt,

they preached, for nature, in her kindness, would take care of them.

These educational anarchists were soon, however, replaced by men of larger vision, who saw the possibilities of nature teaching if it were only organized and made to follow scientific principles and taught according to properly worked out plans by means of contact with nature supplemented by well organized laboratories of natural objects. This, however, was not done without protests from the ultra wing of the nature study teach¬ ers, who talked about the restraints of the unnatural technical science teaching and pleaded for what they denominated the natural, untram¬ meled development of the child's faculties from the child's point of view. In this there was a small amount ot truth and a large amount of misconception of the true functions of teach¬ ing. Their cry was a protest against the dry, formal teaching of the school room; and it served its purpose. It quickened the science teacher into action ; and nature study methods entered many a science room, many a labora¬ tory, greatly to the improvement of science teaching, and in fact, of teaching in almost every department of school and college life. Nature study was applied to literature, and literature to nature study. The oupil was taught to see the beauties and laws of nature at work in the truest of nature poems, and these poems were read, by nature teachers, as supple¬ mentary to their regular studies. This evolu¬ tion shows two distinct phases, which have been indirectly indicated,— the tearing away from the old methods of teaching; and later on, the building of the new nature study structure scientifically upon the bases of the old.

Modern Development. — Nature study made its appearance as such in the latter quarter of the 19th century; and it was due, as has al¬ ready been said, to the introduction of the teaching of science and vocational studies into the public schools. The common school teacher, finding it difficult to teach pupils science in the orthodox college manner, had recourse to the practice of using concrete examples and of making use of nature herself for the explana¬ tion of her moods and phases. This practice gradually grew until, .in 1889, considerable at¬ tention became fixed upon it owing to the fight made by numerous teachers of elementary science in behalf of more interesting methods of presenting it to younger pupils. In this latter year W. S. Jackman planned a general course in nature study for the ward schools of Pittsburgh, which he was destined to carry out in Cook County Normal School, to which he went in the fall of the same year. Two years later his notes were published for the use of teachers and schools under the name of "Nature Studies for Common Schools.® They were much along the lines laid down several years before by Sheldon in the State Normal School at Oswego, N. Y. This movement in 1889 was noticeable in various educational centres in the Eastern

States, notably in Massachusetts. In the latter State A. C. Boyden took the lead and for 10 years lectured and gave model lessons in educational institutions all over the State on nature study. He succeeded in creating a great deal of interest in the subject and in establish¬ ing centres of nature study with committees or societies, which met frequently. His methods of using printed outlines and illustrating les-776

sons was pretty generally followed ; and it was not long before it was improved upon. A special committee on nature study, meeting monthly in Boston, helped to direct the work by arranging courses of study and doing other im¬ portant services for the cause. These pre¬ pared courses were distributed all over the State, and they helped to greatly increase the interest in nature study and to extend its field of influence.

Materials of Study and Organization. — In

the early stages of nature study there was little attempt at the scientific organization of the materials used in teaching. As we have seen, outlines of study were formed for the guidance of teachers in their work; but they were largely suggestive and had little of the scientific about them. But gradually, as the practice of nature spread, extending to the high schools and colleges, trained teachers of science applied their methods of organization to it; and nature study gradually took form and shape as a scientific study, in which the proper relationship between the pupil, the teacher and the materials and objects used in teaching were specified and defined. This called into being large and well-appointed nature study labora¬ tories and took possession of vacant or avail¬ able used pieces of land for experimental pur¬ poses in the growing and observation of plants of many kinds by the pupils under the direction of teachers. It made use of excursions into the woods, fishing, hunting and boating trips and camping out parties. Soon a corps of trained nature study teachers sprang into being; and these, in their turn, as a result of experi¬ ence gained in their work, proceeded to further organize the subjects, activities and province of nature study. The laboratory teacher, from his inside experiments, helped the work of the nature study teacher doing his work on the out¬ side. Now there is scarcely a summer

camping school that does not have its nature study director. The pupils are encouraged to form laboratories or museums of their own made during their nature studies. The school labora¬ tories for nature study contain mounted insects, birds, animals, preserved plants, parts of trees, shrubs, plants, in fact Samples of everything pertaining to nature in which the child may be made to take a natural interest. These are supplemented by geological and other speci¬ mens, models of a large number of objects of different kinds, drawings, photos, pictures, paintings, plans, designs and castings. These are again supplemented, in the larger towns and cities, by visits to art and other museums, great libraries, factories and other industrial plants, zoological gardens, parks, agricultural farms, truck gardens, hot houses, and in fact any and all places of human activities in which the pupils might be interested.

These and numerous other means of direct contact with nature and human activities and their results in manufactured forms are corre¬ lated with art study. The pupils are taught to draw, paint or color, photograph, model and represent in various ways the objects with which they come into contact during their nature study classes. Many schools make a permanent exhibition of this work; and some of these exhibits show very encouraging re¬ sults, with some really beautiful and talented

work. This correlated art work can, and often is made very extensive, including, for instance, the artistic arrangement of flowers, flower beds, borders, etc., the selecting of flowers and their arrangement in gardens so as to secure the blending of colors, observation of the habits of wild and domestic animals and the study of the lives of reptiles, fishes, and, in fact of all kinds of animal life. In other words, nature study is made to lead up directly to the scientific studies of the class-room. See Kindergarten ; Froebel; Rousseau; Pestalozzi.

Bibliography.— Bailey, L. H., (The Nature Study Idea) (New York 1903) ; (Garden Mak-ing) (New York 1909) ; Comstock, A. B., (Handbook of Nature Study for Teachers and Parents) (Ithaca 1911) ; Cummings, H. H., (Nature Study) (New York 1908) ; Gosse, P. H., (Romance of Nature History) (New York 1905) ; Hodge, (Nature Study and Life) (Boston 1902) ; Hall, C. A., <Open Book of Nature} (New York 1911) ; Holly, F. L., (Nature Study) (New York 1909) ; Jackman, ‘Nature Study* (New York 1899) ; ‘Field Work in Nature Study* (New York) ; Lange, D., ‘Nature Study HandBook) (New York 1899) ; Munson, P. J., ‘Education Through Nature Study) (New York 1904) ;

Scott, C. B., ‘Nature Study and the Child* (Boston 1901).

John Hubert Cornyn, Birmingham Southern College.

NATURE WORSHIP. The worship of the heavens, the planets, the elements, the mani¬ festation of all forms of life, vegetable and ani¬ mal, including the personified life attributed to inanimate objects. Nature worship, though probably everywhere occasioned by the natural impulse of man to fear the terrific manifesta¬ tions of nature and to show great respect for the powerful and the mysterious, has taken many different by-paths in the development of the various human races and families. The early investigators into the phenomena of nat¬ ural religons failed to recognize this diversity of development, and they proceeded to build universal theories on divergent growths. Hence all of their theories have either partially or completely fallen by the wayside, or have sur¬ vived the test of time only as a diminutive part of the original whole. Yet the work of the early investigator has not been done in vain; for, inasmuch as he has thought deeply he has set others thinking. Concerning no part of the extensive field of mythology have more diver¬ gent theories been advanced than nature wor¬ ship. By various writers the origin of worship has been traced to ancestor deification, to the fructification engendered by earth and sky, to the fear inspired in primitive man by the lightning, storms and winds, to the fearful ravages of mysterious all-powerful beings who brought diseases and death. Others claim that the first worship of man was given to powerful and cunning animals and especially to the serpent. Still other writers have maintained that man’s first gods were his own ancestors; while others see him worshiping the glory and majesty of the sun and the mystic beauty and mvsterious healing powers of the moon. Others have traced his first religious ideas to the rains and the mists and have placed his primitive gods on

the mountains amid the sources of the streams or in the clouds, the home of the rains.

To these early mythological investigators it never seemed to occur

that man's early concep¬ tions of this nature were not at all religious in the modern acceptation of the terms; that they grew out of fear and mysterious dread. This primitive religious conception continued one of the strong features of man's worship far down into the monotheistic age of religion. Meta¬ phorically the Jehovah of the Hebrews was a god of mysterious might who rode upon the winds and planted his footsteps upon the storm. At the sound of the horns of the priests of Israel walled cities fell down, just as the forests of old fell before the whistles of the wind gods. The fervid poetry of the greatest of the Hebrew poets is fairly alive with images borrowed from the polytheistic nature worshipers who sur¬ rounded them or with whom the race came into contact during its periods of exile. In this He¬ brew poetry every phase of nature seems alive, as it is in the Greek and Roman, Egyptian, Babylonian and Indian poetry. In primitive Hindu literature and in the poetic imagery of China and Japan nature appears as one great wliole deified in different yet, in many respects, suggestively similar ways. Among the Amer¬ ican Indians the deification of the more striking forms of nature is everywhere evident. These primitive ideas became conventionalized, elab¬ orated, amalgamated with other ideas and they long continued to act upon and to be reacted upon by society. A primitive belief was that people were drowned because spirits hidden in the depths dragged them down. The wind was supposed to cry like a lost child. The combi¬ nation of the two made the Llorona of Spanish lands in Europe and America, who, crying like a lost child, leads the unwary, after nightfall, into a pool or bog where she or her attendants catches him by the legs and drags him down to death. Many primitive nature myths and unions of myths have become much more complicated than the Llorona. In fact little in nature wor¬ ship even among the most primitive races now existing is to be found in anything like its orig¬ inal form. Hence the analysis of nature myths is a very complex and difficult matter. Yet the general conception of how primitive man thought is not difficult to understand.

Society and Nature Worship. — Although apparently simple, all modern manifestations of worship, however primitive, are in reality very complex; for society and its beliefs have, for long ages, been continually acting and reacting upon one another. In the more primitive soci¬ ety existing to-day, the medicine-men are uni¬ versally believed to possess spiritual or magical powers. They are generally the medium be¬ tween the people and the powers of the material universe and of the future world. They thus bear, in a sense, a divine character which be¬ longs to them through the natural logic of their official position. Here we see, in the early stage of its

development, one of the powerful factors in the organization of primitive beliefs of the nature worshipers into organized and compli¬ cated mythology. The governing class, consist¬ ing of priests or medicine-men, chiefs and lead¬ ing warriors, early learned to claim descent from their nature gods, about whom they began to invent and relate the stories which we now

call myths. The sun became the great ances¬ tor of the Peruvian priests and nobility, of the Mixteca warrior class, as of the ruling body of other great races, the most noted of which was the Egyptian. Once this relationship had been attained the glorification of the sun became the glorification of the ruling powers and the con¬ sequent subjugation of the masses to them. Ritual, ceremony, a highly organized and dis¬ ciplined priesthood and religious society fol¬ lowed; and of this the governing class soon be¬ came the head. Among the Toltecs in Mexico, Quetzalcoatl the wind god became the ruling deity and his superior priests, who were always chosen from the nobility, were believed to be his representatives upon earth and his lineal, blood descendants. The royal family and the nobles also represented themselves as god-born. Very frequently the king was also high priest of the nation and as such he was known as the Quetzalcoatl, or the chief of the gods. The principal races of Chiapas and Yucatan also be¬ lieved themselves to be descended from the wind god, while the Mixtecas and several tribes of Guatemala called themselves <(Children of the Sun.® The latter wore upon their breasts and backs the yellow symbol of the sun. In Persia and Egypt the complicated court life cen¬ tred on the belief of the classes and the masses in the divine origin of the priesthood and the nobility and their descent from Re, the sun god. Thus the relation of religious primitive be¬ lief to the rulers of the people developed a com¬ plicated religio-political condition that finally became very complex in its nature. Out of this condition grew the acknowledged relationship of the hierarch)" of the gods. This was the birth of the gredt religious systems of Persia, Babylonia and Egypt, which continued to grow more complex until their ultimate decline and disappearance. This, too, is more or less the path followed by the great religions of antiquity, all of which bear plainly the marks of primitive nature worship. The development of a religious theocracy gave very specified functions to the most prominent of the deities. Thus Thoth, the Egyptian wind god, being the original messen¬ ger god, became the carrier of souls ; and the moon goddess, Isis, the mother of medicine and the healing art. Thoth, as the bearer of moist¬ ure and rains and the generator of growth, be¬ came the culture god, the patron of

learning and the judge of good and evil in men's lives. All these conventionalized ideas of Thoth and Isis are very far removed from primitive man's conception of the wind and the moon as fac¬ tors in his life. The great changes that took place were due to the peculiar organization of Egyptian society and the antiquity of her civ¬ ilization.

Animism. — Primitive man undoubtedly held beliefs that we can scarcely comprehend to-day. One of these has been termed animism, a des¬ ignation that appears to mean different things to different investigators and writers using it. It has been variously defined as belief in souls, spirits and magic power.

All recent investigation tends to show that primitive man made practically no distinction as to animation or life, between himself and the active elements of nature around him. The sun, moon, stars, winds, clouds, thunder and lightning were beings like himself who had at

their command very superior magic power. The stories of all Indo-Europeans and the American Indians are filled with myths depicting the con¬ tests in magic that took place between their dei¬ ties and nature heroes. The Indian stories es¬ pecially present characters essentially human, so human indeed that they are frequently deceived and duped not only by man himself but also by the lower animals and even at times by inani¬ mate things. These hero characters are neither divinities, nor souls, nor spirits in the modern acceptation of the terms. They are simply the wielders of magic power. Therefore, when cer¬ tain writers on mythology talk glibly about the religious emotion in the presence of nature giv¬ ing birth to animism, they are speaking about the past in terms of to-day, forgetful of two facts. The first of these is that even races as far advanced in civilization as the Indians of southeastern Canada and the United States seem to exhibit no appreciation of the beauties of na¬ ture, as nature itself. The second is, that reli¬ gious emotion is the result of the teachings of organized religion, exercised consciously or un¬ consciously to stir up such

feelings. Fear and terror of any object inspired respect in all ages of the past as they do to-day. Out of these primal elemental feelings combined with that of admiration, ancient religious beliefs and sys¬ tems were built up slowly from primitive nature beliefs. The belief in souls and spirits, as things apart from the existence of humanity, came very much later in the religious development of hu¬ manity.

Transmigration. — Intimately connected with animation is the belief in transmigration. In fact the one presupposes the other; and both seem to belong to certain stages in the social de¬ velopment of all society. The wind was a most powerful agent of destruction, the mysterious beings hidden in the clouds shouted with their thunderous voices and shot forth their darts of fire. Other beings sent forth the rain from the heavens and the mountains. Yet they all re¬ mained invisible as did the spirits that moved the trees and the water ; therefore, they must possess the power of rendering themselves in¬ visible, reasoned the nature worshipper. The same mode of reasoning accounted for spirits in everything and endowed the personified ele¬ ments, planets and phases of nature with the magical power of taking upon themselves other bodily forms at will. Out of this idea of trans¬ migration grew the Hindu belief in reincarna¬ tion, which, in the case of Vishnu (q.v.), was carried to an almost unlimited number of bodily changes, each one bringing with it a new exist¬ ence upon earth. Among many fairly civilized races there still exist in the masses at least a belief in spirits that inhabit trees, rocks, lakes, rivers, mountains, hills, clouds, caves and winds; and this belief teaches us how nature worship grew up and long continued to claim the un¬ questioned faith of humanity. The belief that human souls may be transmigrated into the bodies of animals, and vice versa, is still held by many races and peoples, and the ghost or disembodied spirit has but recently retreated from the stronghold of science; and so recent is its departure that a goodly body of so-called scientists are gravely experimenting with and seeking data as to its existence and habits.

Another development of animism and trans¬ migration was the belief in guardian spirits

which seems to have been almost universal. Very early in his social development man is found attempting to subject to his will and his uses, by his magic, the various mysterious pow¬ ers of nature. Dances, charms, incantations, amulets, magic potions and other primitive means were made use of to this end. Amulets, believed to be powerful, were carried about on the body for self-protection and the wearer made efforts to get some supernatural being to become his protector. Often this being was supposed to reside in the fetish he carried upon his person. These developed by a complexed society became, in the course of time, household gods, probably through totems. Later society made patron saints to replace the grosser con¬ ceptions of heathenism. But all hail back to nature worship with its belief in transmigrating spirits, which has been father to ghosts, fairies, pigmies and a host of good and of evil-disposed supernatural beings.

Taboo. — Connected with these supernatural beings, which later became classed as gods, demigods, ghosts, or non-natural beings, were many tabooes or restrictions on the actions of humanity with respect to these nature spirits. The taboo might be a restriction from doing a certain thing at a certain time or under a cer¬ tain condition; or it might enjoin the perform¬ ance of a certain act or ceremony under like conditions. The custom of observing tabooes added, in the course of time, a species of ven¬ eration and of sacredness to the act and to the object of the taboo. Thus acts intended origi¬ nally for the protection of the tribe, through continued repetition, grew to be part of the most sacred ceremonies. Thus the tabooes of the nature worshipers seem to have played a very prominent part in the building up of their most revered religious rituals. The taboo was closely associated with the tribal totems and with tree and other worship.

Through long years of association with na¬ ture worship particular places, days, epochs, trees, streams and persons were looked upon as sacred and, as such, subject to taboo. The em¬ perors of the Aztecs and the Peruvians, at the time of the discovery of America, were believed by their people to be so sacred as to be almost gods; and around them clustered as many cere¬ monial tabooes as about the temples of their most revered deities. But in each case these tabooes reacted upon the ruler himself, plac¬ ing many restrictions upon his actions in public and in private. Moctezuma II might not place his foot upon the bare earth lest his divine char¬ acter be thus soiled. So he was carried about in a palanquin by official royal bearers, while other attendants spread before him a gorgeous carpet to protect his imperial feet from con¬ tamination when he left the palanquin. He might wear a suit of clothes but once, and if state or other reasons required a

change of ap¬ parel a dozen times a day, it also demanded a completely new outfit. But while to wear a suit of clothes twice would defile the emperor, the representative of the gods, it was likely to bring special heavenly blessings to anyone of noble birth wearing it. So Moctezuma's cast-off clothing was eagerly sought and proudly worn by the highest nobility in the empire. In Peru it was taboo to make the vessels of the temple of the sun in the capital of any other material than gold whose shining color represented the

radiant face of the deity; while all the fur¬ nishings of the moon goddess were required to be of silver. This latter example well illus¬ trates the extreme growth of naturalistic ideas from commonplace, natural associations to taboo of the most rigid sacred character. About these nature tabooes grew up many legends to account for them or to explain them. The Pe¬ ruvians asserted that gold was formed from the tears of the sun god; the Mixtecas declared that it was the sacred excrement from his shin¬ ing body. The Colombian Indians in the neigh¬ borhood of Bogota inaugurated their new em¬ peror into office by painting his naked body completely with gold dust, thus symbolizing that he was the direct representative of the sun, the great racial father upon earth. Such complicated ceremonies with their rigid, un¬ compromising tabooes, imply a long-developed civilization or culture built upon nature wor¬ ship.

The Nature Gods. — Nature worship, which, as has already been said, had its origin in the fear of the destructive forces of nature and a desire to placate them, or in respect for virile qualities in the same, grew in time, as man be¬ came more civil in his habits, to be a very com¬ plicated institution. Under the Aztecs, Mayas, Quiches, Zapotecas, Mixtecas, Pueblo Indians and Peruvians in America and among the great civilized nations of Europe, northern Africa and southern and western Asia, in the pre-Christian era, nature worship had become organized, in each case, into a most complicated religio-philo- sophical system which defined the attributes and sphere of action of each of the deities and ex¬ plained his relationship to the

gods as a whole, to the state, to the priesthood, to the nobility and to the masses. This called for an exten¬ sive classification and cataloguing of the nature deities. This had already taken place in the religious systems of all the great civilized na¬ tions in pre-Christian days. Naturally, under such a system, where almost every phase of ani¬ mate nature was represented by its special deity, the list of the gods became very great. Yet they all came under a few primary divisions. The upper religions were occupied by the sun, moon and other planets, by the dawn and the darkness, the clouds, the thunder and the light¬ ning, the winds of the four quarters of the heavens and their accompanying night spirits or wind spirits. In most nature religions these re¬ gions were divided into the upper heavens, in¬ habited by the sun, moon, planets and gods of dawn and darkness ; and the lower heavens, the home of the clouds, winds, rain gods and other deities of the elements. The earth was the home of the deities of growth and fertility and the general habitat of the household penates and guardian spirits ; while the regions within the earth or beyond the borders of the natural world, that is out on the great elemental ocean which, in most mythologies, surrounded the earth, were the regions of death and decay. Within the earth, too, quite frequently were the regions of birth. These ideas and divisions sprang naturally out of nature worship. At death all things go back into the earth; at birth all the vegetable kingdom evidently comes out of it. This was one of the patent facts that first appealed to the imagination of myth-mak¬ ing primitive man. There was a tendency to

divide the deities of these divine regions into beneficent and malevolent beings. Thus arose the idea of the warring of the nature gods.

The Functions of the Gods. — Nature wor¬ ship, originating independently, as it undoubtedly did, in different quarters of the world, naturally developed along different lines among people racially and linguistically different. But as the origin of the pantheistic conceptions that distin¬ guished it were essentially the same, there is a striking similarity in the functions and attrib¬ utes of the nature gods everywhere. The earth, which gives birth to all things, is the universal mother; the sky, which sends the fructifying rains, is the husband of the earth and the great nature father. The sun, with his vivifying rays is the father of growth. The winds, with their ceaseless movements and their great speed, be¬ come the messengers of the gods, the bringers of culture and the purifiers or healers. But there are beneficent winds and harmful winds, gentle winds and destructive

winds. Those working in the interest of man are represented as in a constant struggle with those seeking to harm him. This feature of nature worship is strongly evident in many myths. In the Mexi¬ can mythology Quetzalcoatl, the beneficent east wind is represented as the culture hero struggling with Tetzcatlipoca, the black spirit of the night, or the night wind. Hiawatha fought and defeated the Great Pearl Feather, the wind that broods over the pestilential marshes; and he fought his own father Mud-jikierwis, the west wind and the father of all the winds of heaven, who finally shares his kingdom with him, making him the Keewatin, the northwest wind, the home wind.

The Serpent in Nature Worship. — Every¬ where the serpent drags its tortuous length through the habitat of the nature gods. Many explanations of its presence there have been presented by students of mythology, but most of these explanations have been unfortunately fanciful or manufactured to fit preconceived theories. The serpent is inseparably associated with the wind gods. Sometimes, he is a kindly deity; at others he is the spirit of malevolence. This is a natural development of nature and in no way demands a supernatural explanation since it fits in with the nature of the winds. Quetzalcoatl (q.v.), the great culture hero of Mexico, Yucatan and Guatemala, was repre¬ sented as a plumed serpent, and the serpent formed the most conspicuous decoration of his temples. Yet others of the Mexican wind gods also bore the sign of the serpent. The robe of the mother of the gods was represented as con¬ sisting of interwoven snakes. The serpent was frequently intimately connected with the deities of fruition and birth, probably because the wind gods were also thus connected. But the de¬ stroying force was also represented as a winged serpent in many parts of the world. This is but another form of the evil wind. This latter conception gave birth to the dragons of de¬ struction bearing with them fire or lightning as their destroying agents. From this conception to that of the evil one, the old serpent, the per¬ sonified force of evil as found in the Persian and other related religions, is but a step. Christianity and the Hebrew faith borrowing the imagery of the nature religions have made it vividly familiar to us.

In Roman and Greek mythologies, the gods of healing are associated with the serpent and not the least of these is Apollo. This associa¬ tion of the serpent with the gods of birth and healing explains their relationship to public wor¬ ship which has produced so much discussion and investigation and has given birth to the so-called theory of serpent worship. With the Chinese, as with the Toltecs, the wind god (in the case of the Chinese in the shape of a dra¬ gon) became a sort of world divinity, the great wisdom, the universal benefactor. As the fruc¬ tifying rain bringer, the serpent represented kindly forces ; as the rain preventer his tend¬ encies were evil.

The Cross in Mythology. — Throughout all primitive America and in many of the mythol¬ ogies of the eastern hemisphere the world was divided into four quarters over which ruled one of the winds, all of which were frequently rep¬ resented as so many serpents or dragons. Quetzalcoatl, the Toltec culture god, sailed away to the unknown land on a raft of snakes, or in a boat moved by supernatural serpents, which were at once symbolical of his origin as a wind god and his office as the greatest cul¬ ture hero of the American races and the symbol of divine wisdom and earthly progress. Being the symbol of fertility, the serpent naturally be¬ came that of the so-called pallic worship which was also symbolized by the cross, as the rep¬ resentative of the four quarters of the earth in which lived the winds and the rain gods. In pre-Columbian times the cross was the sym¬ bolical representation of the activity of the winds as the bearers of fertility throughout Mexico, most of Central America and the Pue¬ blo and some other Indians of the United States. In the form of the swastika (the four-footed cross with the ends bent, generally at right angles), the cross became the symbol of good fortune and (among the American In¬ dians) of generation. The Cretan mother god¬ dess, the great deity of fertility, is represented, in her surviving statues, with snakes coiled about her waist and arms ; and she was wor¬ shiped in the temple of the sacred cross. Throughout Crete, where her worship seems to have had a very important place, the cross was looked upon as a sacred symbol. Like the rain gods of Mexico and Central America, the mother god of Crete was worshiped on the tops of the hills and the high places from whence descended the fructifying waters. Like the tla-locks and other gods of the rain cross she was connected with death and life, more especially the latter. In the course of time the cross, es¬ pecially in America, came to form a very im¬ portant part of the decoration of temples and sacred places in pre-Columbian days. The trail of the cross, like the trail of the serpent, runs across Mexico and Central America and a very considerable part of the United States.

Fire. — Along with sunshine, rain, air in motion and regeneration, fire early became for man one of the sacred elements. To him it symbolized (among many races) the sun, the great generator and the source of all heat. By the use of fire it was possible for him to greatly enlarge his range of diet, to fell the huge for¬ est trees and shape his canoes from them.

It enabled him to shatter great masses of rock and to shape them roughly to his ends.

Later on it enabled him to smelt metals and to attach them to his car of progress. As it was hurled from the cloud it became symbolical of the power that hurled it. As it was vomited forth from the volcanoes, it came to signify the titanic forces of the underworld and became inseparably connected with punishment for of¬ fenses connected with the infernal regions, in various mythologies. From these primitive be¬ liefs later religious systems borrowed much of their systematized ideas of the nature of fu¬ ture punishment.

The Future Life. — As the beneficent beings who brought their favors to the earth occupied the upper air; and as there, too, is the home of the sun, the moon and the planets which were supposed to strongly influence human life for good or evil, very many races looked upon these regions as the home of their future life. Some beliefs held that the souls of the dead went to the sun, others to the moon, still others to the great cloud land, a mid-region between the earth and the home of the superior deities. Some races placed the future world in the far north or northwest, in the region of the north¬ ern lights, whose brilliancy probably suggested the idea. Among many Indian tribes the rain¬ bow was believed to be the bridge that spanned the great gulf separating the earth ocean and the sky ocean. Numerous other American tribes believed that the dead went to some great underground region. But all the nature reli¬ gions presented the future life as essentially the same as that upon earth though surrounded by happier, because more fortunate conditions. Communication was not only possible between the earth and the future world but the rainbow bridge had been climbed or the great gulf had been frequently crossed in the magic stone canoe by the mortal heroes of nearly every United States Indian tribe. Some legends de¬ pict the tribal hero as scaling the heights of heaven on the back of a great bird, or in the wicker-car of the star or sun-maidens or in nu¬ merous other manners; for to the nature wor¬ shiper the universe was one great whole, the parts of which were not essentially different from

one another.

Theories of Nature Worship. — At the head of the early naturalistic school is Max Muller. He maintains, with the disciples of his school, that the worship of nature was the primary religious efforts of man; and he attempts to prove his position by means of comparative mythology. His theory, which applied only to the Indo-European races, was carried to an absurd limit by many of his school. E. B. Tylor looks upon the worship of the dead as the earli¬ est of human cults and Herbert Spencer takes the same ground. The latter derives from this source all other forms of worship. Tylor traces the history of the so-called animistic faith, while Spencer displays its evolution. Wundt maintains that religion finds its origin in the primitive belief in human souls and in an early animism out of which a belief in magic and fetishism grew. Dunkheim believes that the totemic principle, or belief in mysterious power (the mana or magic power) is the source of all religion. All of these investigators have hit upon certain important truths, but no one of them has been able to grasp the significance of the wide field of mythology, for they all have made cate-NAUCRATIS — NAUMACHIA

gorical statements upon which they have built up elaborate theories.

Bibliography.— Brinton, D. G., (Myths of the New World) (Philadelphia 1896) ; Buck-land, A. W., Anthropological Studies) (Lon¬ don 1891) ; Chantepie, de la Saussaye, P. D., (Lehrbuch der Religionsgeschichte) (Freiburg 1887) ; Crooke, W., (Popular Religion and Folklore of Northern India) (London 1896) ; Durkheim, Emile, (La vie religieuse) (Paris 1912) ; Fergusson, J., (Rude Stone Monuments) (London 1872) ; Frazer, J. G., (The Golden Bough > (London 1907-13) ; Goblet d'Alviella, E., (La Migration des symboles) (Paris 1891) ; Jastrow, M., (Religion of Babylonia and Assy¬ ria } (Boston 1898) ; Lang, A., (Custom and Myth) (1884) ; (Myth, Ritual and Religion> (1899) ; (The Making of Religion* (1898) ; Le-fevre, A., (La religion) (Paris 1892) ; Moorehead, W. K., Primitive Man in Ohio) (New York 1892) ; Muller, M., 'Natural Religion> (London 1898) ; Sayce, A. H., 'Religion of Ancient Egypt and Babylonia) (Edinburgh

1902) ; Spencer, Principles of Sociology* (1876) ; Tylor, E. B.,

Primitive Culture) (Bos¬ ton 1903) ; Waring, Porms of Solar and Na¬ ture Worship) (London 1874) ; Wundt, W., ‘ Volkerpsychologie, Mythus und Religion.)

John Hubert Cornyn, Birmingham Southern College.

NAUCRATIS, na’kra-tis, Egypt, an ancient Greek colony, the remains of which are near Nebireh, 50 miles by rail southeast of Alexan¬ dria. It existed as early as the ‘beginning of the 7th century b.c., and was approached by a navigable canal in the western part of the Delta, near the Canopic branch of the Nile. Its chief period of splendor was during the reign of Amasis II, 570-520 b.c., under whom it was recognized as the official capital of the Greeks in Egypt. Its site was rediscovered in 1884 by Prof. Flinders Petrie. Subsequent excavations have uncovered the remains of buildings de¬ scribed by Herodotus, the Hellenium, temples to Apollo, Aphrodite, the Dioscuri, etc., and there have been valuable finds of early Greek pottery and other archaeological treasures. Con¬ sult Petrie, W. M. F., ‘Naucratis* (1886) ; Gardner, E. A., (Naukratis IP (in Egyptian Exploration Fund, Publications, Vols. Ill, VI, London 1886-88) ; Hogarth, in British School at Athens, Annual (ib. 1898-99) ; id., (Naukratis,

1903) (in Journal of Hellenic Studies, Vol. XXV, ib. 1905).

NAUCYDES, na-si’dez, Greek sculptor. He flourished in the first quarter of the 4th century b.c. His birthplace was Argos and he was the pupil of the Elder Polycletus of the Peloponne¬ sian school of sculpture. He carved a chrys¬ elephantine statue of Hebe for the temple of Hecate at Argos ; a bronze statue of Hecate ; a Hermes; several statues of Victory: a portrait of the poetess Erinna ; ‘Phryxus Sacrificing the Ram) (for the acropolis at Athens), and a Discobolus. The younger Polycletus was his pupil.

NAUGATUCK, Conn., town and borough in New Haven County, on the Naugatuck River, and on a division of the New York, New Haven and Hartford Railroad, about 40 miles south by west of Hartford and 25 miles north¬ west of New Haven. In 1844 it was incorpo¬

rated as a town and as a borough in 1893. The chief manufactures are rubber goods, paper boxes, knit goods and machine-shop products. It has considerable trade in farm products. It has the largest plant for reclaiming old rubber in the world, also a very large factory for the production of heavy acids used in the brass and rubber industries, and

a large chemical plant for the production of chemicals formerly imported. It is well supplied with schools; it has besides the public and parish elementary schools, the Whittemore High School, the Salem School, Saint Francis Academy (R. C.) and the Whittemore Memorial Library. The government is vested in a board of wardens and burgesses, who hold office one year, and who appoint all the administrative officials except the board of education, the members of which are chosen by popular vote. Pop. 15,000.

NAUGATUCK, na'ga-tuk, a river in Con¬ necticut, has its rise in the northern part of Litchfield County and flows south, about 60 miles, and enters Housatonic River at Derby. It flows through a mountainous part of the State and supplies water power to many mills and factories. Waterbury is the chief city on its banks.

NAUHEIM, nou'him, Germany, town near Frankfort-on-the-Main, in province of Ober-hessen, on the Usa, at the northeast foot of the Taunus, and on the Cassel-Frankfort State Railway. It is world renowned for its saline baths, where the visitors are afforded a magnifi¬ cent Kurhaus, Inhalatorium, extensive park elaborately laid out, *etc.* Here are three Evan¬ gelical, a Catholic and an Anglican church, synagogues, a high school, *etc.* The medicinal waters are rich in iron, table-sa't and carbonic acid, and are, therefore, available for drinking as well as bathing, and for export, and are used in cases of rheumatism, disease of the spinal marrow, gout, obesity and feminine troubles, and especially for diseases of the heart. Before the World War this was one of the most popular bath resorts in Europe, at¬ tracting as many as 34,000 patients per annum. Pop. 5,694.

NAULETTE, no-let', a large cavern in Bel¬ gium, near Dinant on the Lesse in the com¬ mune of Furfooz. Here, in 1866, was found the lower jaw of a human, together with the bones of the elephant and rhinoceros. The human remains were assigned to the Mouster-ian epoch.

NAUMACHIA, na-ma'ki-a, or NAU-MACHY (from the Greek naus, a ship, and mache , a fight), among the Romans a public spectacle, representing a naval action. Caesar was the first who exhibited a spectacle of this sort, which soon became the favorite amuse¬ ment of the Roman people. > Buildings were erected by the emperors, specially adapted for the purpose. They resembled the amphitheatres, and like them were at first built of wood. Domitian erected one of stone. A naumachia, built by Augustus, was 1,800 feet long and 200 wide, and was capable of containing 50 ships with three banks of oars, besides many small vessels. They were suddenly laid under water by

means of subterranean canals, so that the ships were raised at once from the dry floor before the eyes of the spectators. These sea-

fights were exhibited with the same splendor and reckless disregard of human life which characterized the gladiatorial combats. Titus exhibited a sea-fight in which 3,000 men were engaged and ships almost equal in number to two real fleets were shown in combat by Domitian. The crews generally consisted of gladia¬ tors, prisoners or condemned criminals.

NAUMANN, now'man, Johann Friedrich,

German ornithologist: b. Ziebigk, Germany, 14 Feb. 1780; d. there, 15 Aug. 1857. He studied with his father, who was an ornithol¬ ogist, and became professor and inspector at the Ornithological Museum of the Duke of Annalt-Kothen. His most valuable contribution to the science of ornithology is the (Naturgeschichte der Vogel Deutschlands) ((Natural History of the Birds of Germany*), published in 1822-24; he prepared the illustrations for this work, making the plates for more than 500 copper engravings. He also wrote (Taxi-dermˆ (1815) ; (t)ber den Haushalt der nbrd-lichen Seevogel Europas) (1824); and, with Buhle, (Die Eier der Vogel Deutschlands und der benachbarten Lander* (1819-28). A statue of him was erected at Kothen in 1880, and the German Ornithological Society named its official organ in his honor, N aumannia.

NAUMANN, Johann Gottlieb, German

composer: b. Blasewitz, near Dresden, 17 April 1741 ; d. Dresden, 23 Oct. 1801. Thanks to the interest of a rich Swedish amateur, Weestrom, he was taken to Italy when 16, and there studied under Tartini. He became court com¬ poser at Dresden in 1765, and kapellmeister in 1774, a post to which he returned in 1786, after six years in Stockholm, where he organized the royal orchestra. His music, including operas, oratories and symphonies, was essentially Ital¬ ian in style and is no longer popular. Consult the biography by

Nestler (1901).

NAUMANN, Karl Friedrich, son of J. G.

Naumann (q.v.), German mineralogist: b. Dresden, 30 May 1797; d. there, 26 Nov. 1873. He was educated at Freiburg, Jena and Leip¬ zig, and in 1821 made a scientific tour in Nor¬ way. He was an instructor in the University of Jena in 1823 and professor at Leipzig in 1826. From 1826 to 1842 he was professor of crystallography at Freiburg, and from 1842 t-11 shortly before his death held a professorship at Leipzig. Among his works are (Anfangs-griinde der Krystallographie* (2d ed., 1854) ; 'Elemente der Mineralogie) (12th 'ed., 1885).

NAUMANNITE, in mineralogy, is the name given to a native selenide of silver and lead found in the Harz Mountains and so called from K. F. Naumann (q.v.). This mineral contains about 26 per cent of selenium, 65 per cent of silver and 6 per cent of lead; in some samples a great part of the silver is replaced by lead. Specific gravity about 8.0. Color and streak iron-black.

NAUMBURG, nowm'boorg, or NAUMBURG-ON-THE-SAALE, za'le, Germany, a town of the Prussian province of Saxony, on the Saale, near the junction of the Unstrut, 28 miles southwest of Halle. Its chief edifice is the restored cathedral, which has four lofty lowers, one the gift of William II, erected in 1894. The town has some manufactures and a

considerable wine trade. Glass and porcelain painting is also an extensive industry. It be¬ came an episcopal see in 1029. In the 15th and 16th centuries several treaties were concluded at Naumburg, and the town was of great strategical importance during the Thirty Years' War and the wars of 1806 and 1813. Pop.

26,962.

NAUPLIA, na'pli-a, Greece, a fortified sea¬ port town, capital of the monarchy of Argolis, at the north extremity of the Gulf of Argos, 25 miles by rail south of Corinth. It was oc¬ cupied by the Venetians in the 13th century and was taken by the Turks in 1540. From 1824 to 1835 it was the capital of Greece, but declined in importance after the removal of the court to Athens. It is of some importance commercially because of its fine harbors. Pop. about 15,000.

‘ NAUPLIUS, na’pli-us, in Greek mythology, the son of Neptune and father of Palamedes. He is said to have revenged the death of his son by deceiving the Greeks by false beacons, as they returned from Troy, and causing their vessels to be wrecked.

NAUPLIUS. See Larva.

NAUSEA (Latin from Greek vavmat sea¬ sickness), a sensation of sickness and distress, of which the leading characteristic is squeam¬ ishness of the stomach. The disturbance, how¬ ever, extends to the entire system. In severe cases languor affects every part ; the pulse is small ; the skin moist and pale ; the flow of saliva increases, and if vomiting does not im¬ mediately accompany the sensation the appre¬ hension of it is painfully present. The causes of nausea are many: blows upon sensitive parts, mental shocks, hysteria, pregnancy, irritation or tumors of the abdominal or the pelvic viscera may produce it. as may also the early stage of zymotic disease or epilepsy, diseases of the brain, *etc.* See Vomiting.

NAUSHON, na-shon’, the largest of the Elizabeth Islands (q.v.), off the southeast coast of Massachusetts.

NAUTCH, nach, in India, a dance per¬ formed by the dancing girls attached to the temples, called Nautch girls or Nautchee, who are brought up and trained to all the arts and allurements of their profession. It is probably a survival of the ancient custom of sacred prostitution. They move with slow, undulatory movements of the body, while the feet are but little used. They correspond to the bayaderes (q.v.) of the south of India.

NAUTICAL SURVEYING. See Hydro¬ graphy; Surveying.

NAUTICAL TRAINING SCHOOLS.

Schools for training young men in the science of navigation, in the study of marine engineer¬ ing in all its various branches, in practical sea¬ manship — in all the necessary matters pertain¬ ing to the operation of vessels at sea, have long been established both in the United States and in foreign countries. These nautical schools have for their definite object the train¬ ing of young men who desire to follow the sea as a profession, to enable ‘them to become officers in the Merchant Service and to provide highly trained, efficient officers for the auxil¬ iaries and reserve of the naval forces. Euro-

pean countries, especially England, France and Belgium, have for many years conducted suc¬ cessfully such institutions. In the last few years Japan, Brazil and the Argentine republic have also developed institutions for this purpose.

In the United States, although there have been but three, practical nautical schools for this purpose, viz., the New York State Nautical School, the Massachusetts Nautical School and the Pennsylvania Nautical School, they were all of very high order. The schools were main¬ tained on seagoing vessels, usually all sail-rigged with auxiliary power. The course em¬ braced two years and included cruising to for¬ eign waters. During the winter time, when the school-ships were moored at the wharves, theo¬ retical instructions were given and the routine was somewhat similar to a school ashore, but during the summer months practical training under actual conditions prevailing at sea was given and every operation of the ship was combined with intensive study for the purpose of enabling the cadets to obtain proficiency.

Upon graduation from either the New York State Nautical School or the Massachusetts Nautical School (the Pennsylvania Nautical School having been discontinued some few years back) the cadet is entitled to apply for a third officer's or third assistant engineer's certificate. After three months' service at sea he can obtain a second officer's license; after another year's service as second officer on deck he can get his license as first officer, and a year thereafter he can qualify for his master's license.

The coming development of the American Merchant Marine will necessitate an expansion of the nautical school idea in order to enable it to meet the demand for trained personnel. During the war emergency dire necessity caused the Shipping Board to inaugurate emergency schools for the hasty training of officers and engineers,' which at the time served to meet the paralyzing deficiency then existent. The Shipping Board schools provided for three months' study, and could in no way be com¬ pared to the thoroughness of the education provided <by such institutions as, for instance, the New

York State Nautical School, which latter has been in existence since 1876.

The success of the New York State Nautical School, as well as the Massachusetts Nautical School, as reflected by services rendered by their graduates in all branches of the Merchant and Naval Service "during the World War has impelled, among others, the States of Oregon, California and Maine to establish similar schools to be maintained by the various States.

The Federal government contributes toward the maintenance of the schools by an appro¬ priation granted to reimburse the State in part for the expense of maintaining the school and by loaning suitable vessels, and also, when possible, designating naval officers as in¬ structors. It is hoped that within a short time the Federal government will take a larger in¬ terest in this very vital question.

The opportunities thus presented to young men between the ages of 16 and 20, who enter these institutions, who can obtain their licenses as third officers at the age <?f 19 and who in time of war obtain commissions in the Naval Reserve Force when they reach the age of 21,

are unlimited; numbers of young men have risen to command of ocean-going ships within a period of eight years.

Louis Weickum,

Secretary, New York State Nautical School.

NAUTILUS, a marine cephalopod of the genus Nautilus and family Nautilidce, a few living species of which are the only survivors of the order or superorder Tetrabranchiata, which including both the nautiloid forms and the ammonites (q.v.) is divided into no less than 22 extinct families, so abundant were they in past ages. The nautiloids began in the Cambrian, _ became greatly differentiated and abundant in the Silurian and Carboniferous, and by the close of the Palaeozoic Age had become almost entirely extinct. The more com¬ plex ammonites, on the other hand, reached their full development only during the Meso¬ zoic Age. The shell of the pearly or chambered nautilus, described below, is typical of the armature of the group. It is at first simple, but as the animal grows becomes coiled in a flat spiral and divided by internal trans¬ verse septa into a succession of chambers, the last one of which is occupied by the ani¬ mal. This

process is continued until about 36 chambers have been formed, all but the last filled with gas which gives a certain buoyancy, but does not enable the animal to come to the surface. Externally the shell is porcella¬ neous ; internally is a layer of mother-of-pearl. The septa are perforated by an opening, through which a membranous tube or siphuncle passes from the posterior end of the animal to the apical or first chamber of the spire. Among other anatomical peculiarities the animal has four gills and four kidneys, calcareous instead of horny beaks, a funnel composed of two lobes instead of one tube, small stalked imperfect eyes and no ink bag. Quite unique are the tentacles, which number about 90. On each side of the head are a hood tentacle, two ocular tentacles and 17 brachial tentacles, and around the mouth four groups of 12 or 13 labial tentacles.

The best-known species is Nautilus pompilius which, with two others, inhabit the Indian Ocean and tropical parts of the south Pacific. They live exclusively on or near the bottom in relatively deep waters, are gregarious, more or less migratory and nocturnal. Although fond of any animal matter, they feed chiefly on prawns. In swimming they dart quickly back¬ ward for short distances, with the tentacles either radiating or held together and stiffly projecting from the mouth of the shell; but they are inactive and rest most of the time on the bottom. Little is known of their breeding, which is supposed to take place in deep holes. The eggs are very large; including the capsule they measure nearly one and a half by three-fourth inches. They are attached singly by the base, and the capsule is irregularly folded and fenestrated longitudinally in a most peculiar manner This species is very abundant in about 60 fathoms of water in the Philippines, and large numbers are captured by the fishermen in bamboo fish traps or baskets constructed on the principle of the lobster pots in use on the New England coast and baited with any kind of animal offal. The shells are somewhat used in the arts, but the flesh is little esteemed for food, as is that of the native species by the

Fiji Islanders. Consult Willey, Zoological Results* (Part VI, Cambridge

1902), and La-caze-Duthier, (Arch. Zoologie Experimentale*

(1892).

The ((paper nautilus® is a very different animal, for which see Argonaut.

NAUTILUS, in hydraulic engineering, a diving-bell (q.v.) requiring no suspension. Water admitted through the cock into pipes flows into the exterior chambers, causing the apparatus to sink. The workmen enter through an aperture at the top, closed bv an air-tight cover, and can in still water move the machine in any required direction by stepping on the ground and pushing. Air is condensed in a reservoir at the surface to a degree somewhat greater than the condensation due to the depth, and passes through a pipe into the chambers rendering the machine specifically lighter than water and enabling it to lift stones or other objects below. A gauge indicates the amount of lifting power attained as the air is admitted.

NAUVOO, na-voo', Ill., city in Hancock County, on the Mississippi River, about 30 miles below Burlington, Iowa. It is situated in an agricultural and fruit-growing region in which grapes and berries are the chief products. The principal industries are connected with the manufacturing of wine and the shipping of wine and fruits. It is the seat of Saint Mary's Acad¬ emy (R. C.). Nauvoo was founded by the Mormons (q.v.) in 1840, and in 1846 it had a population of 15,000. It had mills, factories, stores, schools, *etc.* Its most conspicuous build¬ ing was a temple built of white limestone, 130 feet long and 90 feet wide. The temple was not completed when the Mormons were expelled in 1846; in 1848 it was partially destroyed by fire, and in 1850 it was further ruined by a tornado. A company of French Socialists, called Icarians, took possession of Nauvoo in 1850 and remained until 1857. The <(Nauvoo Legion,® a Mormon military organization, which embraced all the boys and men between the ages of 16 and 50, was founded here in 1840, and in 1857 was reorganized in LTtah. At the last muster, in 1870, it had a membership of 13,000. Pop. 1,020.

NAVA, na'na, a seaport of Japan. See Nafa.

NAVAJO (nav'a-ho) CHURCH. This name is given to a remarkable spire of white sandstone rising from the top of the red cliffs just west of the continental divide a short dis¬ tance east of Gallup, N. Mex. It

is visible for several miles from Santa Fe Railroad near ˆWingate station.

NAVAJO INDIANS. An important tribe of the Athapascan stock of Indians, now on a reservation of about 9,503,763 acres in north¬ eastern Arizona, northwestern New Mexico and southeastern Utah, at an average elevation of 6,000 feet above sea-level. According to Fray Alonso Benavides (1630), the word ((Navajo® means (<sementeras grandes,® <(great planted fields,® and the name was never applied to the Navajo by themselves, their own tribal designation being <(Dine.® There is no evidence that the Navajos were seen by the Spanish ex¬ plorers of the Southwest in the 16th century, although the latter passed through their present territory in 1540, 1583 and 1598; it is therefore

believed that at this early period they were an insignificant agricultural tribe, but gradually in¬ creased in population largely through the adop¬ tion of natives of both allied and other stocks during succeeding years. Their territory is en¬ tirely within the arid region and their lands are chiefly desert; but in the canons and about the bases of the mesas that abound in their terri¬ tory, horticulture is practised through deep planting in the sandy soil, while in the valley of the Rio San Juan, which is the largest stream in their country, farming is carried on to a greater extent. Agriculture, however, forms but a meagre part of the Navajo's sub¬ sistence, his livelihood being gained principally from the flocks and herds, of which, in 1902, there were 380,000 sheep and 67,000 goats, the former of which, besides furnishing the chief food supply, netted $150,000 in wool and blan- 'kets. These blankets, which have become cele¬ brated, are woven by the women on simple looms and in pleasing and sometimes intricate designs of various colors. Formerly native dyes of rare delicacy of tone were employed, but in recent years these have given way to glaring aniline colors, and the decorative pat¬ terns have also been largely modified to meet the demands of the white man, so that as speci¬ mens of aboriginal handiwork very few of the Navajo blankets now woven are comparable with those formerly made. The Navajos also weave belts, garters and saddle-girths, and make a few excellent baskets, mostly for ceremonial use. Some of the men are expert silversmiths.

Although more closely related in language to the Apaches than to any other tribe, the Navajos are greatly mixed, embodying elements of Pueblo, Shoshonean, Yuman and even of Spanish blood ; hence there

is perhaps a greater variety in their physical features than among most Indian tribes.

The typical Navajo dwelling is a conical framework of logs or sticks covered with brush, bark or grass, and earth, with a smoke-hole at the apex and a doorway in one side. Rude shel¬ ters with open fronts are erected for use in summer. If a person dies in a house the latter is believed to become haunted and is hence forth tabooed.

Dr. Washington Matthews, United States army, who has studied the inner life of the tribe, discovered the existence of 51 clans, grouped into about a dozen phratries, which latter, however, are probably not homogeneous organizations as among • some Indians. A Navajo belongs to the clan of his mother, and a man may not marry a woman belonging to his own clan ; or, as a rule, one of his own phratry. The religion of the Navajo is elaborate and complicated. They have a great many cere¬ monies, most of which are performed for heal¬ ing the sick, but others are conducted to ensure success in planting, harvesting, building, war, nubility, marriage, travel and for bringing rain! Sacrifice, elaborate dry paintings with sand and pigments, masquerade, dancing, prayer and song are the elements of the ceremonies, the gods being personated by the masked performers.

Almost from the beginning of the 17th cen¬ tury the Navajos were enemies of the sedentary tribes and of the Spanish colonists, and although they were never so predatory and warlike as their Apache cousins, the Spanish villages and

Pueblo settlements suffered almost continuously from their raids up to the time of the conquest ot ATew Mexico by American forces in 1846, followed by the establishment of military posts throughout the Southwest. Treaties were made with the tribe in 1846, 1848 and 1849, but they were of no avail in keeping in check their dep¬ redations, which continued at intervals until 1858, expeditions meanwhile being led against them. In the year last named the Navajos killed a negro servant at Fort Defiance, as a direct result of which it

became necessary to wage warfare against the Indians from August until December, during which 50 Navajos were killed and a large number of sheep and other stock lost. Another treaty was signed, but dur¬ ing 1860 the depredations continued, and an¬ other expedition was led against them, but with¬ out success. In April the natives boldly attacked Fort Defiance, but were repulsed. In the winter of 1860-61 an active campaign was made against them, and although practically their only loss was in sheep, they were compelled to sue for peace in February 1861, when an armistice of a year was agreed to, during which the troops were withdrawn. In a dispute over a horserace at Fort Fauntleroy (near the present Fort Win¬ gate), New Mexico, a dozen Navajos were brutally killed. Emboldened by the withdrawal of the troops on account of the Civil War, the Indians resumed their raids, which they contin¬ ued almost uninterruptedly until 1863, when Col. Christopher ("Kit®) Carson began opera¬ tions against them and a plan was formulated to transfer the Navajos from their old haunts to Fort Sumner, at the Bosque Redondo, on the Pecos River, in eastern New Mexico. It was determined that all who refused to go after 20 July would be regarded as hostile and be treated accordingly, yet by the close of the year only 200 prisoners were at Fort Sumner or on the way thither. Early in 1864 Carson made a cam¬ paign to the Canon de Chelly, in the heart of the Navajo country in northeastern Arizona, where he killed 23 and captured over 200 of the In¬ dians. This taught the latter a lesson, so that by the close of 1864 more than, 7, 000 of the tribe were held as prisoners at the Bosque Redondo. These were increased to 8,491 in 1865, but it was supposed that this number did not represent more than half of the tribe. The experiment, however, proved a failure, so that after the death of about a thousand of the Indians, the escape of others and an expenditure of about a million dollars in their support in a region ill-adapted to their progress, the remainder, num¬ bering 7,304, were removed to their old country in July 1868, an appropriation of $422,000 hav¬ ing been made in that year to give them a new start. Since that time the Navajos have been peaceable and industrious. They make good laborers and are slowly developing agricultural pursuits. In 1902 they had 8,000 acres under cultivation, which yielded 1,200 bushels of wheat, 700 bushels of oats, etc., and 3,000 bushels of corn. They earned in addition a quarter of a million dollars by the product of their labor, and besides the sheep and goats above 'mentioned owned 47,260 horses, mules and burros, and 8,000 cattle. There are also four sectarian mis¬ sions and two mission schools on or near the reservation. In 1890 a partial census showed 17,204 Navajos; that of 1900, over 20,000; and vol. 19 — 50

a rough estimate of the Indian office in 1906, over 28,500. Since then the tribe is believed to have increased.

Bibliography. — Hollister, (The Navajo and his Blanket* (1903); Hrdlicka, ‘Observations on the Navajo *(American Anthropologist, Vol. II, 1900) ; Hughes, J. T., ‘Doniphan’s Expedi¬ tion* (Cincinnati 1848) ; James, G. W., ‘Indian Blankets and their Makers* (Chicago 1914) ; Lipps, O. H., ‘The Navajos) (Cedar Rapids, Iowa, 1909) ; Mathews, C., ‘The Indian Fairy Book> (New York 1856) ; Matthews, W., ‘The Night Chant* (New York 1902) ; ‘Navajo Legends > (New York 1897) ; ‘Navajo Myths, Prayers and Songs* (Berkeley 1907) ; ‘A Two-faced Navajo Blanket* (American Anthropolo¬ gist, \To. II, 1900) ; Mindeleff, ‘Navajo Houses) (Report, Bureau of American Ethnology 1901). Consult also ‘Handbook of American Indians North of Mexico* (Bureau of American Eth¬ nology, Bulletin 30, Washington 1910).

F. W. Hodge,

Smithsonian Institution, Washington, D. C.

NAVAJO MOUNTAIN. A prominent peak rising high above the Arizona Plateau in the extreme southern part of San Juan County, Utah. Its altitude is 10,416 feet. It has rarely been ascended by white men. It is a short dis¬ tance south of the rim of Glen Canyon of the Colorado River and from its summit a great view is obtained of the upper part of the Grand Canyon region, the Henry Mountains, the Ver¬ milion Cliffs, and other features of the high plateaus. It is forest clad, several springs issue from its sides and in its north slope are the great Rainbow and Owl natural bridges. The mountain is due to a dome-shaped uplift of the sedimentary rocks and the top is capped by Dakota sandstone. Consult Gregory, H. E. (in United States Geological Survey, Water Supply Paper 380, and professional paper 93).

NAVAL ACADEMY, United States, the

most important naval school in America, es¬ tablished at Annapolis, Md., in 1845, by a special act of the Congress. The origin of this tech¬ nical educational institution was due primarily to the efforts of George Bancroft, Secretary of the Navy. The academy was opened 10 Oct. 1845, with Commander Franklin Buchanan as superintendent. For a time during the Civil War the school was removed from Annapolis to Newport, R. I. The Bureau of Navigation of the Navy Department has direct supervision of the academy.

Admission of Students. — There are received at the academy three midshipmen for each senator, member or delegate of the United States House of Representatives, two for the District of Columbia and 15 at large. The appointment of midshipmen at large and for the District of Columbia is made by the Presi¬ dent. In addition to the above the law author¬ izes the appointment of 25 enlisted men each year to be selected as a result of a competitive examination of enlisted men of the navy and marine corps who have been in the service at least one year and who are under 20 years of age by 15 August of the year it is desired to enter. The mental and physical requirements for these candidates are the same as for other candidates for midshipmen. One midshipman is also allowed from Porto Rico, who must be

a native of that island. The appointment is made by the President on the recommendation of the governor of Porto Rico. The Secretary of the navy, as soon after 1 June in each year as possible, must notify in writing each sena¬ tor, representative and delegate in Congress of any vacancy that may exist in his district. The nomination of a candidate to fill the vacancy is made on the recommendation of the member or delegate by the secretary Candidates must be actual residents of the districts from which they are nominated. They enter the academy immediately after passing the prescribed ex¬ aminations and are required to sign articles binding themselves to serve in the United States navy eight years (including the time of pro¬ bation at the Naval Academy), unless sooner discharged. All candidates are required to be citizens of the United States and must at the time of their examination for admission be be¬ tween the ages of 16 and 20 years. A candi¬ date is eligible for examination on the day he becomes 16 and is ineligible on the day he be¬ comes 20 years of age. The pay of a midship¬ man is $600 a year, beginning at the date of admission. The course for midshipmen is four years. Examinations on the ground covered are held at the end of each academic term. During the summer midshipmen of the first, second and third classes go to sea for about three months. Midshipmen after graduation are commissioned as ensigns in the navy and occasionally to fill vacancies in the marine

corps and in certain of the staff corps of the navy.

The Course of Study.— When a midship¬ man graduates he must be a seaman, an engi¬ neer, a true marine engineer, well acquainted with steam, electricity and ordnance, and a navigator and surveyor and he must have a fair knowledge of his own language with some acquaintance with French and Spanish. To achieve this in four years he must be welt grounded in the rudiments; he must have good health and he must work hard. The course must be progressive and the instructors com¬ petent and in sufficient numbers to be able to instruct — not merely to examine and hear lessons. Even then the work of studying would be too hard for the average youth were it not for the fact that much of the practical work is good out-of-door exercise and the hard brain work is well-balanced with plenty of physical exercise and healthy amusement. The instruc¬ tion for the fourth class, that is for the first year, completes the study of algebra and includes trigonometry and descriptive geometry. In English it includes rhetoric and something of the art of writing English and also public speaking. French and Spanish and mechanical drawing are begun. It is a necessity for a naval! officer to be able to read a drawing and to make a good working sketch. The naval architect,, the marine engineer and the ordnance engineer has each his special methods in drawing with which the midshipman must become familiar. Accordingly he starts drawing with the begin¬ ning of his course. All his professional work during this year is practical and is given him during the drill period. The academic year opens on 1 October and closes about 1 June; then comes the practice cruise, which is devoted almost entirely to practice professional work

with some little study of the theory of pro¬ fessional subjects. The cruise ends about 1 September when the midshipmen have a month's leave to visit their homes. Academic life be¬ gins again on 1 October. During the third-class year the midshipmen complete their study of geometry and also mathematics with the ex¬ ception of mechanics, a branch of appliecffnathe-matics, which is studied during the first term of the succeeding year. They have trigonome¬ try, analytic geometry, conic sections, differ¬ ential and integral calculus. In English they study naval history and constitutional law. They continue the study of French and Span¬ ish and mechanical drawing and take up the study of elemetary physics and chemistry. Their practical work is continued during the drill period and on the practice cruise at the end of the academic year.

‘ Second Class Men. — After the month’s leave they take up their life at the academy as second-class men and now begin to take up the study of professional subjects. In the de¬ partment of mathematics they study mechanics and hydromechanics. They continue the study of English, French and Spanish and begin the study of ordnance, navigation and electricity and magnetism and lay the foundation for engineering in studying the principles of mech¬ anism with marine engines and boilers. The practical work continues during the drill pe¬ riod and has advanced progressively so that the midshipmen are well prepared for the pro¬ fessional subjects of this and the following year. This is their last practice cruise and by far the most important one, as they are now carefully instructed in their duties as officers. They are required to perform the work of officers at sea in handling the ship and manag¬ ing the motive power, both steam and sail. They must work hard at practical navigation with instruments and charts. In their last year as first-class men they continue the study of French and Spanish, while the periods assigned to English are devoted to public speaking and during the first term they have a course in physiology and hygiene. All other studies are professional. They have seamanship and naval tactics, ordnance and gunnery, navigation, com¬ pass deviations and surveying, engineering mate¬ rials, designing and naval construction and electrical engineering. The practical work goes hand in hand with the theoretical during the drill period. The first class are the officers of the regiment of midshipmen and under supervision perform much of the work of offi¬ cers.

Athletics. — To discuss the training of mid¬ shipmen at the Naval Academy without men¬ tioning athletics would be to leave out a most important factor in their character training. Boating, football, baseball, fencing, track ath¬ letics and gymnasium work are. all encouraged. The various competitive games are a source of amusement to all and of healthy exercise to many. Courage and skill are gained and self-denial must be practised by those who train for the Various sports and athletics furnishes one of the most important aids in training a youth to become an officer.

Academy Buildings. — In 1895 was com¬ menced a new and improved plan of construc¬ tion and reorganization of the school buildings

Apparatus for Indoor Training in Handling a Full-rigged Ship

at Annapolis. The new buildings are largely due to the efforts of two men — the superintendent at that time, Capt. Philip H. Cooper, now rear-admiral, and Col. R. M. Thompson, who graduated in 1868 and was in 1895 a mem¬ ber of the board of visitors. The board rec¬ ommended the rebuilding of the Naval Acad¬ emy and the energy of these two men pressed the scheme upon the government. The depart¬ ment was induced to order a board to consider and recommend a comprehensive plan for all the necessary buildings and Colonel Thompson persuaded the New York architect, Ernest Flagg, to consult with the board and with Cap¬ tain Cooper. A set of artistic plans resulted, recommended by the board and approved by the department. But the Spanish War inter¬ fered and it was not till 1898 that an appropri¬ ation became available and the cornerstone of the new armory was laid by Rear-Adm. F. V. McNair, who had succeeded Captain Cooper as superintendent. The plan as viewed from the sea front shows the midshipmen quarters extending 729 feet, flanked on one side by the armory and on the other by the gymnasium. These buildings are at right angles to the direction of the midshipmen's quarters, are 428 feet long and similar in appearance. They are connected by colonnades with the quarters. This gives from the sea a harmonious group of buildings extending in a northeast and southwest direction for 1,278 feet with the high roof of the main building of the midship¬ men's quarters as a centre. Thirteen hundred feet in a northwest direction, with the main line of buildings parallel to and facing the first group, is the academic building with the chem¬ istry and marine engineering buildings on either flank and with the high

roof of the academic building in the centre and balancing the group to the southeast. Between these two groups, facing the Severn River and forming the west side of the rectangle, is the chapel with the superintendent's house and the administration building on either side. The fourth side of the rectangle is formed by the basin. From the steps of this basin and facing the chapel is the best view. Oq either hand is a handsome group of buildings with the dome of the chapel as the centre. The new buildings involved an out¬ lay of approximately $10,000,000.

NAVAL AERONAUTICS. The import¬ ance of the aeroplane in naval warfare is great and varied. It is most useful in scouting, in locating and bombing enemy ships and sub¬ marines and in spotting gunfire (observation of the fall of the shots). A squadron of battle cruisers with guns of large calibre, whose fire is controlled by aeroplanes, can defeat an equal or greater number of dreadnoughts that are without this means of fire control. While the military aeroplane made great advancement in efficiency during the European War of 1914-18, comparatively little progress was made in the design of naval aeroplanes and in the develop¬ ment of their tactics. This was evidently due to the fact that nearly all the air operations took place over land and when over sea in lo¬ calities where flight could originate from smooth water. Real naval aeroplanes must be of the types that can operate from floating bases far from smooth water. The first problem in naval aviation is, obviously, getting into the air and

the hydro-aeroplane, or aeroplane that starts and finishes its flight on water, cannot get into the air unless the water is considerably smoother than in average conditions on the open sea. Hydro-aeroplanes must attain an air speed on the surface that is equal to the low-flying speed limit before they can have suffi¬ cient lift to get into the air under control, this speed for the various types ranging from 40 to 60 miles per hour. With satisfactory means of getting into the air at sea, good operation is assured in nearly all kinds of weather; but, if flights must originate from the surface of water then the naval aeroplane becomes a fair weather apparatus having but little naval value except in operations near the coast. In naval aviation the problem of finishing the flight is not as difficult as that of getting into the air and is of much less importance.

For work with a fleet three types of aero¬ planes are usually required — the high speed fighting aeroplane, the medium speed torpedo¬ carrying aeroplane and the slow-speed spotting aeroplane. The high-

speed fighting aeroplane is a machine with a maximum speed of about 100 miles per hour, carrying one or more guns for attack on other aeroplanes and bombs for attack on dirigibles; it is a fast climber and is designed with little stability so as to be sensitive in its control and thus have good manoeuvring qualities. The principal duties of this machine are to protect the torpedo carriers and spotting aeroplanes, to attack enemy torpedo carriers and spotting machines and to destroy or drive in the enemy's air scouts and dirigibles. On account of its high speed this machine has only a small radius of action when carrying the pilot and observer. On special occasions it can be used as a one-seat machine either to increase climbing ability or to increase its radius of action. The medium-speed torpedo-carrying aeroplane is a machine with a maximum speed of about 80 miles per hour, designed primarily to carry a torpedo or an equivalent weight (about 1,800 pounds) of high explosive bombs. It has only a small radius of action when carry¬ ing its torpedo or when loaded with bombs, but without these weights it can take on an equiva¬ lent weight of fuel and thus add five or six hours to its cruising radius. The principal duty of this type is torpedo attack on the enemy's battle fleet or troop ships, a function of the naval aeroplane that deserves a most important consideration in naval battle tactics. Aero¬ planes of this type must have proper escorts of fighting machines to counteract the enemy's best means of defense or attack by his aircraft. This type when carrying extra fuel instead of its torpedo or bombs can be used for scouting and in this condition must be armed for pro¬ tection in case of a possible contact with the fighting types of the enemy. The slow-speed spotting machine is a machine with a maximum speed of about 60 miles per hour. Its chief duty is spotting for control of gunfire and for this reason provides for long endurance and consequent slow speed. This type of aeroplane is most important in naval operations because at long-range firing it is absolutely necessary to control fire by spotting inasmuch as the naval range is inaccurate at long ranges and even when the exact distance of the target is known there are disagreements in the sight

bar ranges and actual ranges that must be cor¬ rected by spotting observations, these disagree¬ ments increasing with the range. When ships are matched in speed and gunpower, those having aeroplane fire control have a positive advantage over those that control from the tops. This type of aeroplane, and especially the medium-speed torpedo-carrying type, perform the important duty of patroling the fleet when cruising in war time. On this duty some of the machines carry bombs and guns for attack on submarines.

During the European War airships were used most effectively by the navies in scouting work, locating mine fields, discovering sub¬ marines and communicating information to their own vessels either by signal or by radio. Air¬ ships are remarkable scouts and under ordinary conditions, in a few hours, can explore an im¬ mense horizon and inform surface warships by radio as to conditions for miles around. A fleet covered by a sufficiently large flotilla of such scouts can navigate with a practical certainty of avoiding surprise from a hostile or superior force. As to effectiveness the airship has a great advantage over the aeroplane in long-sustained flights, especially over sea. The aero¬ plane must land immediately in case of a mis¬ hap such as a stalled engine, a fractured pro¬ peller blade, etc., while an airship, on the con¬ trary, can remain afloat and make repairs. Every well-balanced fleet should include a flo¬ tilla of airships. In the European War when it became necessary to build up a system of pro¬ tection against submarines, the warring nations pressed into service thousands of small vessels, destroyers, trawlers and submarine chasers ; and as fast as they could obtain them they put into service seaplanes and dirigibles to co-operate with the ships in locating and capturing and destroying hostile submarines and in convoying ships, protecting them from submarine attacks. The usual evidence of the submarine's presence is the wake of the periscope. This wake can¬ not easily be seen from ships, but can always be clearly seen from airplanes. For one thing the aviator is not troubled by the reflection of the rays of light which interfere with the vision of the person on a ship. The aviator, flying at a height of from 1,000 to 5,000 feet, has a range of vision of many miles and the whitish wake of the periscope is clearly visible, against the dark surface of the waters even in cases where the sea is fairly rough and white caps are showing. Whatever the future develop¬ ment may be, the basis of any air service is its two-seated observation squadrons who do the work of observation, both visual by day and by night and photographic infantry liaison and artillery adjustment. A squadron of airplanes of this type must be provided for every divi¬ sional corps staff and army staff. The plans announced call for coast defense squadrons and

observation and bombing squadrons. Inas¬ much as the coast defense squadrons under army control are not expected to operate far beyond the range of the coast defense guns, all work further at sea is the duty of the navy. It is impossible to develop a comprehensive and efficient system of naval aeroplane tactics un¬ less there are material and personnel sufficient to permit working with the fleet in large groups. These and many other problems must be worked

out in peace time and the personnel carefully drilled, especially in the co-ordinating features of their work. Because of the high speeds and the great number of units dealt with in naval aeronautics, there is no branch or department of service work where thorough co-ordination is more vital to success. The art of flying is a comparatively insignificant part of a naval aviator's attainments. When in command of an aeroplane he must not only be an expert flyer but he must also be well versed in the whole subject of naval aeroplane tactics as well as being an expert seaman and navigator. See Aeronautics, History of; Aeroplane; Mili¬ tary Aeronautics.

Edward S. Farrow,

Consulting Military and Civil Engineer.

NAVAL ARCHITECTS AND MARINE ENGINEERS, Society of. The Society of N'aval Architects and Marine Engineers was organized under the laws of the State of New York 10 May 1893, its object being the promo¬ tion of the art of shipbuilding, commercial and naval. In furtherance of this object, annual meetings are held for the reading and discus¬ sion of appropriate papers and interchange of professional ideas, thus making it possible to combine the results of experience and research on the part of shipbuilders, marine engineers, naval officers, yachtsmen and those skilled in producing the material from which ships are built and equipped. Annual meetings have been held each year since the organization of the Society, the 25th annual meeting being held this year 15 and 16 November. Classes of mem¬ bership consist of members, associates, juniors, honorary members and honorary associates and benefactors and permanent members. Its membership comprises all the leading naval architects and marine engineers in the United States as well as the other leading countries of the world. The papers and discussion are com¬ bined in volumes 'which are forwarded to the members as part of their membership as soon as they are compiled and edited. These vol¬ umes comprise valuable books of reference and are also on the shelf of all the leading

libraries in this country.

NAVAL ARCHITECTURE deals with the designing and development of the nautical qualities of ships as distinguished from their construction, which belongs to shipbuildng. The existence of naval architecture as an art prob¬ ably dates back to the first development of man, but its elevation into a science can scarcely be recognized until the 19th century, as a part of the advance in all mechanical sciences during that period. During the 18th century, and even earlier, some Continental mathematicians had devoted attention to the subject and developed various theorems concerning floating bodies which were likewise applicable to ships. Throughout this period the French were the acknowledged leaders in the development of knowledge relating to such matters. So much was this the case that it seems to have been not unusual for other countries to reproduce the models of French men-of-war, thereby admit¬ ting the excellence of the French type and pay¬ ing deserved tribute to the labors of the naval architects of that country.

Perhaps the most notable attempt, however, to place naval architecture upon a logical and

scientific basis, prior to 1800, was that of the famous Swedish naval architect, Chapman (1721-1808), who, during his long career, achieved special eminence in his profession and wrote a number of treatises relating to various features of naval architecture. One hundred years ago each nation, and, indeed, each master builder, carefully guarded as valuable secrets the methods and theories pertaining, to the sci¬ ence of naval architecture, which had been de¬ duced from experience or which had been handed down by those who had conducted previous investigations. This state of affairs, indeed, extended well into the 19th century, but with the rapid development of iron shipbuilding, which started about the middle of that century, came a rapid advance in naval architecture and dissemination of knowledge upon the sub¬ ject, until, to-day, in the leading shipbuilding countries of the world will be found schools de¬ voted to

this subject; and the products of the naval architect's skill differ only in compara¬ tively minor respects, whether turned out from British, European, American or Japanese ship¬ yards.

The primary object of the vast majority of all ships is to-day, as throughout the past, trans¬ portation, and the problem is only affected in its details in order to conform to the require¬ ments of the articles carried, be they men, mer¬ chandise, or, in the case of men-of-war, armor, armament and other appliances for rendering the vessel efficient as a fighting machine. The foregoing statement is quite as true of the hum¬ ble 10-knot collier, which will carry in coal twice the weight of her hull, machinery and outfit, as of the trans-oceanic passenger liner wThich carries a comparatively small amount of cargo but a large quantity of bunker coal to enable it to make a high speed, and provides luxurious accommodations for numerous pas¬ sengers. It is true also of the man-of-war, which carries a proportionately large crew and a fair amount of cargo in the shape of consum¬ able stores, coal and ammunition, besides a considerable weight of armor, heavy arma¬ ment, and the necessary military adjuncts re¬ quired by the special service upon which em¬ ployed. Considering, then, all ships as bearers of burdens, there are two essential characteris¬ tics which they must show : They must be able to go from point to point at an appropriate speed and with all reasonable safety for ship, cargo and crew. Ability to keep the sea under all the usual conditions of its intended service is indis¬ pensable for every ship, and we will now con¬ sider briefly the detailed factors entering into the problem.

Buoyancy. — When a ship is entirely water¬ borne, the weight of water which it displaces is exactly equal to the weight of the ship itself and everything contained in it. To float at all, the volume of the enveloping surface of the ship must be greater than the volume of water which equals in weight the displacement of the ship. Clearly, for safety, there must be a margin, or reserve of buoyancy, in the ship over and above the buoyancy equal to its weight. The percentage of reserve buoyancy varies widely according to the type of vessel, passing from approximately zero in the case of diving, or submarine, boats (when in condition to dive), to as much as 100 per cent or more in the case

of passenger vessels with large deck areas and high sides. In certain types of men-of-war, notably the large cruiser class, the percentage of reserve buoyancy is also very high. In the case of men-of-war, the reserve buoyancy is practically fixed by the design ; but, in the case of

merchant vessels, and particularly cargo car¬ riers, which are subject to overloading, the re¬ serve buoyancy is now practically determined by the marine insurance companies. The business of insuring ships and their cargoes is a large and important one, but is carried on by a com¬ paratively small number of very powerful com¬ panies or associations, and these companies, for their own protection, have a well-equipped, scientific and technical staff and have prescribed conditions affecting the safety, or seaworthiness, of ships, which must be complied with in order to obtain insurance at a reasonable rate. In England, the Board of Trade, which is the de¬ partment of the government charged with au¬ thority over matters relating to shipping, has acted in conjunction with the large insurance companies in laying down requirements for re¬ serve buoyancy, these authorities being still further assisted by representatives of the na¬ tional associations of naval architects. The actual amount of reserve buoyancy required varies somewhat with the size and type of ves¬ sel, and likewise with the character of the serv¬ ice, the maximum amount being required for vessels engaged in winter service in the north Atlantic Ocean. Speaking broadly, the objects aimed at in the load-line requirements are to obtain the greatest possible carrying capacity, compatible with safety of the vessel under all conditions of weather, after making provision for minor casualties which might still further reduce the reserve of buoyancy.

Structural Strength. — Buoyancy, however, is not the only requirement for seaworthiness of a ship. It is essential that the ship should be strong enough to withstand the stresses due to the action of the waves. In this direction, also, the insurance companies have taken a prominent position, and laid down minimum requirements acceptable for merchant vessels. Strength is obtained not only by the use of the best mate¬ rials but by the disposition of the material used* in such manner as to best accomplish the de¬ sired results. The methods used in determin¬ ing the strength of ships are very similar to those used in determining the strength of other structures, such as bridges, but there is an es¬ sential difference due to the fact that it is prac¬ tically impossible to determine the maximum load to which a ship may be subjected. It is comparatively easy to calculate the strength of the hull structure, knowing the disposition of the weights and buoyancy of the vessel. The stresses upon each part of the vessel's structure, when floating in still water, may be determined with accuracy; but the maximum stress will occur, not in still water, but among waves, and while we know that, whatever the motion of the sea, the buoyancy of the submerged portions of a ship must equal the total weight of the vessel and its contents (subject to minor

corrections, due to the dynamic effect of the motions of the ship itself), it is obviously impossible to foresee the possible combinations and contours of waves to whose action the ship may be subjected and the consequent distribution of buoyant forces

and structural stresses. Hence, the naval archi¬ tect, in determining the structural requirements of a ship so far as they affect its strength, must be guided largely by experience. If he provides strength equal or superior to that of ships of the same type and not very dissimilar in size, which have shown no weakness in service, he has reasonable assurance that he is safe. But, when dealing with vessels of a novel type or size beyond precedent, the skill and judgment of the designer are taxed to the utmost to accu¬ rately estimate in advance and provide against the maximum stresses that may occur in service. In this respect, also, the accumulated experience of the marine insurance societies has been of great value in determining adequate strength associated with weight of structure which is not excessive, and which will permit a maximum de¬ velopment of carrying and other desirable qual¬ ities. The natural tendency of such societies, however, is to make sure of adequate strength, necessarily giving to weight and cost merely sec¬ ondary consideration ; so that whenever a novel type of ship is put forward, there is apt to be a period of discussion and unsettlement. The builders and owners naturally desire to provide only the minimum strength necessary, in their judgment, for complete seaworthiness, while from the point of view of the insurer, if any error is made it should be positively on the side of excessive strength. As the results of experi¬ ence accumulate, these questions adjust them¬ selves, but with the rapid development in the size of ships, and the variations in types which have been witnessed since the last quarter of-the 19th century, shipbuilders and the insur¬ ance societies have not been entirely in accord on such questions.

Stability. — In addition to the elements of adequate buoyancy and strength, there must be considered an equally important factor in the seaworthiness of the vessel, — namely, stability. This quality is all-

important in rendering the vessel safe and enabling it to resist the capsizing effect of wind and waves. The stability prob¬ lems which must be solved by the naval archi¬ tect are practically peculiar to his profession. Sailing vessels, to avoid capsizing, must be •handled with skill, and sail must be reduced in ample time to avoid the disastrous consequences of undue wind pressure. Steamers of the pres¬ ent day carry practically no sail, and are liable to be capsized by the sea only. But with them, too, there is room for skill in handling with reference to the direction of the waves, *etc.* It is the duty of the naval architect to provide a vessel, in either case, which, when handled with ordinary skill, will be stable under all probable conditions of wind and weather. The general feature of the problem of stability are com¬ paratively simple, and may be readily under¬ stood by considering a ship floating in still water. Under these conditions, the whole weight of the ship may be regarded as concen¬ trated and acting downward through its centre of gravity. The upward forces of buoyancy may also be regarded as concentrated into a single upward pull through an imaginary point called the mctacentre. With the ship at rest, the downward pull through the centre of grav¬ ity must be exactly equal to the upward pull through the metacentre. Evidently, if the meta¬ centre is directly below the centre of gravity,

there will be unstable equilibrium, since any slight accidental deflection of the centre of grav¬ ity would result in further deflection, the forces of buoyancy and gravity acting as an upsetting couple; if, however, the centre of gravity is below the metacentre, the resultant of the down¬ ward pull through the centre of gravity and the upward pull through the metacentre produces a righting moment tending to return the ship to the upright position. The name ˆmetacentre® is supposed to have originated from the Greek word (<meta,® meaning ((limit® or (<goal® beyond which the centre of gravity cannot pass. Pos¬ sibly it would have been more logical if the metacentre had been called the centre of buoy¬ ancy, thereby causing the nomenclature of the centre of buoyant forces to correspond more exactly to that of the centre of gravity. But in the naval architecture, the centre of buoyancy is the name given to the centre of gravity of the volume of water displaced by the immersed portion of the ship. The line of action of the resultant upward forces of buoyancy must ob¬ viously pass through the centre of buoyancy, and it therefore follows that the centre of buoy¬ ancy and the metacentre are always found in one vertical line. The metacentre is not a fixed point but rises and falls as the ship inclines, owing to the varying shape and proportions of the immersed portion of the hull, and in every ship there is finally found

an angle of inclina¬ tion at which the metacentre is found directly below the centre of gravity. For inclinations greater than this, there is a tendency for the ship to capsize instead of right itself. The in¬ clination at which this occurs is called the cap¬ sizing angle, and the angular range through which the vessel can be inclined without cap¬ sizing is called the <(range of stability.® Gener¬ ally speaking, the less the freeboard (or height of side above water) the smaller the range of stability. In .practice, the range of stability necessary for safety is affected somewhat by the initial metacentric height, or the distance between the centre of gravity and the metacen¬ tre when the ship is upright. The greater this distance the greater the effort required to heel the ship, and hence the range of stability may be made less with safety. In practice, with any type of ship the range of stability can seldom be safely made less than 50 degrees, and, in the majority of cases, should be much more. It is frequently over 100 degrees for vessels of high freeboard. For safety alone, it is not always necessary that, initially, when in the upright position, the metacentre should be above the centre of gravity. If the metacentre is slightly below the centre of gravity, the vessel will heel over a few degrees to one side or the other until it reaches an inclination at which the metacen¬ tre rises above the centre of gravity and the vessel becomes stable again; if the freeboard of the vessel is high and the range* of stability is great, such a vessel may be perfectly safe. Sev¬ eral of the large transAtlantic liners are pur¬ posely designed with comparatively small initial metacentric height, as such a condition permits the vessel to respond less quickly to wave ac¬ tion and causes easy and slow rolling.

Rolling. — Closely associated with the ques¬ tion of stability is the question of rolling in a seaway. When a vessel is floating in disturbed water the effect is to change the relative loca-

tion of the centre of buoyancy so that the meta-ceiwie shifts to one side or the other of a verti¬ cal line through the centre of gravity, causing a tendency to heel or roll the vessel until the mctacentre again

becomes immediately above the centre of gravity. Moreover, by this time the vessel has acquired certain angular velocity so that it swings beyond the position of equi¬ librium. An analysis of the theory of the roll¬ ing of ships at sea would be too complicated to be instructive in an article of this character, but, as in the case of stability, there are certain broad, underlying principles. These would be comparatively simple if in a floating body of ship-shape form the metacentre were fixed. In the case of a floating circular cylinder, such a condition does exist, the metacentre being fixed and remaining always at hte centre of the cyl¬ inder. In such a case, the motion of a ship rolling is very closely analogous to what It would be if the vessel were suspended on pivots at the height of the metacentre. In such an im¬ aginary case, in conformity with the well-known principles covering the motion of compound pendulums, the closer the metacentre is to the centre of gravity the longer the period of oscil¬ lation, and the further the metacentre from the centre of gravity the shorter the period of oscil¬ lation. In actual ships floating in water, how¬ ever, the question is complicated by the vary¬ ing position of the metacentre and the resistance of the water, which, in the absence of new dis¬ turbing causes, rapidly brings rolling ships to rest. But the fact remains that vessels of large metacentric height are inclined to roll very quickly, while those of small metacentric height are sluggish in their rolling motion. When floating among waves which are large as com¬ pared with the vessel, the vessel of great meta¬ centric height tends to float like a board, keeping its deck fairly parallel to the surface of the water; while the vessel of small metacentric height will at times be found rollling toward the wave crest instead of away from it, — a very undesirable condition with low freeboard ves¬ sels. In practice, vessels vary widely in their periods of oscillation. For a large vessel, per¬ haps the shortest period met with in practice would be that of a low-freeboard monitor, which, on account of its large metacentric height, may make a single roll from extreme inclination in one direction to the extreme in the other in from two and one-half to three seconds, while a large vessel of small metacen¬ tric height may take as much as 20 seconds to the single roll. While rolling through small angles, say under 10 degrees, the motion of a vessel is practically isochronous, that is to say, the period or time of completing a roll varies but little with the angle. This ceases to be true when vessels reach large angles of roll, say 30 degrees or more. If there did not exist a re¬ tardation of roll in heavy rolling there would be grave danger of vessels, otherwise perfectly safe and seaworthy, being capsized by an ac¬ cumulation of roll, every passing wave adding a little to the amplitude of roll — well illustrated bv the fact that with properly-timed impulses comparatively small forces will give large

oscillations to a swinging weight. In actual practice, the skilled seaman can do much to limit excessive rolling by shaping the course of the vessel so as to produce complete lack of

synchronism between the period of the ship and that of the waves. The naval architect, how¬ ever, in the original design of the vessel util¬ izes the resistance of the water and provides ˆbilge® or (<rolling keels,® which aid materially in preventing heavy rolling. Bilge keels are projections at the bilge of the ship, approxi¬ mately from one foot to three feet in depth, and extending usually for about half the length of the vessel and so situated when practicable as to offer maximum resistance to rolling. When properly fitted, bilge keels will often reduce the maximum angle of rolling, under adverse con¬ ditions, to less than half what it would be with¬ out them.

Speed and Resistance of Ships. — It has

already been pointed out that an essential char¬ acteristic of all ships is mobility. The speed of a ship is a simple, concrete fact, readily appreciated by anyone and comparable with the speed of other ships; therefore, in many cases, it is considered the most conspicuous and im¬ portant quality of a ship, whether man-of-war or passenger steamer. The keen interest taken by the general public in the speed records of passenger steamers engaged in trans-oceanic service fully illustrates this fact. The present accepted methods of determining the power necessary to drive a given ship at a given speed, and, conversely, the form of ship best adapted to be driven by a given power, are of rom-paratively recent development and largely due to the late William Froude, who, through an elaborate series of experiments, established the truth of the fundamental laws upon which are based the present theories of the resistance of ships. The resistance of a given ship, mov¬ ing at a given speed, is made up of three main factors: first, the skin friction of the water on the surface of the ship. This is dependent only upon the surface exposed and the speed of the ship. It varies slightly with variation of form, due to this variation affecting the velocity of the water over the hull, but this variation is too slight to be taken account of in practice. The second element of resistance is what is called <(wave-making resistance,® due to the fact that a ship in moving through water pro¬ duces waves and the force required to produce these waves proportionately reduces the power available for propulsion and thus, in effect, in¬ creases the resistance to the motion of the ship. The third element is what is called ((eddv making,® due to eddies of the water behind square

corners of the hull and attachments, such as stern-post, propeller strut, *etc.* The eddy¬ making resistance is, however, comparativelv small. The skin frictional resistance, of a ship can be readily calculated with sufficient accu¬ racy from the results of experiments upon the friction of plane surfaces drawn through water at known speeds. Mr. Froude demonstrated that the remaining resistances (wave and eddy making) of a full-sized ship could be estimated with great accuracy from a careful determina¬ tion of similar resistances experienced by a small model of a ship when towed at a speed corresponding to the desired speed of the ship, the corresponding speeds of model and ship being in the ratio of the square roots of their linear dimensions. For a ship S00 feet in length, and a small model 20 feet long, the ratio of linear dimensions is 25 ; so that the actual speed of the model corresponding to 20

knots for the ship, would be 20 + \/25, or four knots. By model experiments, also, it is com¬ paratively easy to investigate the general effect of changes in shape and dimensions of vessels without having recourse to experiments with full-sized ships. The principles applied in passing from models to full-sized ships were also applied by Mr. Froude in passing from one full-sized ship to another, — being quite applicable if the two ships are similar, and applicable with fair approximation if the two ships are reasonably similar in proportions and shape.

Model Basins. — Experimental model basins are now found in nearly all shipbuilding coun¬ tries. That of the United States is located at Washington. It is about 500 feet long, and, at its maximum section, the water is about 42 feet wide and 14 feet deep. Wooden models 20 feet long, made by special machinery, are used in this experimental work, the model being towed back and forth through the water by an elec¬ trically-actuated carriage which spans the basin. W hen erected in 1899, this was the largest ex¬ perimental basin in the world. Later experi¬ mental basins built in Germany, however, are somewhat longer but not so deep or wide. From data obtained with models

towed in the experimental basin, the effective horse power, as it is called, necessary to tow the full-sized ship without engines, is determined with great accuracy. It is therefore necessary to estab¬ lish, from actual trials, the relationship be¬ tween this effective horse power and the indi¬ cated horse power which the ship's engines must exert. This ratio depends upon the fric¬ tion of machinery, efficiency of propellers and to some extent upon the shape of the stern of the ship and other minor factors; it is found, in practice, that it ranges from .50 to .60, although there is seldom reason why it should not be made as great as .55, a lower value being usually due to mistakes in design of hull, unsuitable propellers or some such cause. The tabulated data obtained from ex¬ periments with models in the experimental basin, supplemented by progressive trial data taken under actual seagoing conditions, from the full-sized ships, have in recent years greatly aided the naval architect and the engineer in their design work.

Materials Used in Shipbuilding. — As the

development of naval architecture has been largely influenced by the materials used in ship construction, brief allusion to these materials seems appropriate. The material used in the construction of ships underwent, broadlv speak¬ ing, two changes during the 19th century; a change from wood to iron, which dates approxi¬ mately from about the middle of the century, and a change from iron to mild steel, which dates from about 1880. Wood is still used as material for shipbuilding, many coasting ves¬ sels, for instance, in the United States and else¬ where being still built of wood; but the number and importance of wooden ships as compared with those of iron and steel is diminishing yearly, and, at the present date, it may be said that the only structural material of importance for the construction of ocean-going ships is steel. Open-hearth steel, suitable for ship¬ building purposes, with an ultimate tensile strength of about 60,000 pounds to the square inch and an elongation of an 8-inch specimen

of from 20 to 25 per cent before rupture, was introduced between 1870 and 1880. It was practically unknown in the United States in 1880. The contractor for the first steel vessels of the new navy, which were contracted for in 1883, had to make special arrangements for the domestic manufacture of the steel needed in his work, and had to pay for it at that time about seven and one-half cents per pound. The growth oT the manufacture of this material in the United States since that date, however, has been astonishing, mild steel of nearly the

same characteristics as that used for ships being used in large quantities for bridges, houses and other structures, so that, about 1900, its price had fallen as low as one and one-half cents per pound, as compared with seven and one-half cents per pound some 15 years earlier. The qualities of the steel used in ‘shipbuilding vary little in the different ship¬ building countries, being prescribed, as a rule, for merchant ships, by the marine insurance societies. For men-of-war, a somewhat higher .grade of material is prescribed, and the inspec¬ tion is rather more rigid. The use of nickel-steel, too expensive for commercial vessels, but very superior for armor plates and guns, gives an added strength of 30 per cent over open hearth steel. It retains its fibrous struc¬ ture under strains and shocks where carbon steel crystallizes and crumbles. Coincident with the development of iron and steel as materials for shipbuilding, there began to develop an in¬ crease in the size of ships, due to the greater strength of the material of construction, and probably also to the fact that the use of steam instead of sails for propulsion made it possible to increase the propulsive steam power of the large ships when it would not have been pos¬ sible to add correspondingly to their sail area. The tendency toward an increase in size has been very marked since 1885, until now ships have reached sizes and dimensions limited only bv the draft of water and the docking and wharf facilities available in the ports to which they trade.

The urgent necessity of quickly replacing the shipping destroyed by the German sub¬ marines, while it did not and could not alter the basic principles of naval architecture, called for adaptations which departed widely from the practices of the period preceding the Great War. The lack of shipyard facilities and of highly trained shipbuilders led the men in charge of the government program to enlist the structural iron workers of the country in the great problem of producing ships. The u fabricated ship” thus came into being, designed in such fashion that its parts could be con¬ structed by the makers of steel bridges, tanks and frames for skyscrapers. Wherever angles could take the place of familiar bends and curved surfaces the change was made, and quantity tonnage was thus expedited, although the new models were less speedy than the more scientific hulls of former years. The structural shops were able to do nearly all the punching, shearing and bending of the plates, and only the assembling and rivetting and the expert fashioning of bow and stern was done in the shipyards. Another effect of the emergency was the standardization, of types of vessels to be built. When the Shipping Board began its work there were many different types of

a esscls under construction in the shipyards of the country. The government representatives speedily recognized that much labor was lost m this diffusion of effort and a few types were selected and all agencies concentrated on the utmost possible production of these typical ships. The standard cargo vessel was a single screw steamer of 9,600 tons deadweight, 395 feet in length, 55 feet molded beam and 34 feet molded depth; the engines, geared turbines of

2.500 horse power, and the fuel, oil. Another type was the combined passenger and cargo vessel, arranged for use as a troopship, carry¬ ing 2,700 troops and 7,000 tons of supplies. This type with a displacement of 20,900 tons was 522 feet in length, 62 feet beam and was equipped with twin screws driven by two sets of four-cylinder triple expansion reciprocating engines. Its speed was 14 knots which could be increased to 15 knots in emergencies. Another selected type was the 10,000-ton oil tanker, 435 feet long and 56 feet beam, equipped with a single screw, triple-expansion engines and oil-burning boilers. A revival of wooden ships resulted in the production of 3,600-ton vessels, 286 feet in length and 46 feet beam. A partic¬ ular type of architectural design gave them the title of ((Ferris ships, }) after their designer. While not wholly a development from war con¬ ditions the production of the Diesel ships was stimulated by the demand for ocean tonnage, and these, too, were standardized in the interest of rapid multiplication, the selected type being of. 9,600 deadweight tons with turbine engines driving twin screws. The compactness of the Diesel engines gave these vessels the advantage of 13 to 14 per cent larger carrying capacity for an equal displacement, and operated with a smaller crew and at a higher comparative speed. Another architectural development was the re¬ inforced concrete ship, successfully built up to

3.500 tons, and with designs approved up to

7.500 tons. The fact that only $60,000 worth of steel was needed in a 5,000-ton concrete ship as compared with $300,000 worth in an all-steel ship led to earnest effort in this direction. A special form of concrete lighter than wood and impervious to water was developed by

the archi¬ tects in charge, and the completed ships were found to be unusually free from the vibration common to all-steel vessels. Composite ships of wood and steel were also planned and built to meet the emergency caused by the war.

The present state of development of naval architecture is probably best illustrated by ex¬ amining the characteristics of some of the most recent products of shipbuilding skill in this country as exemplified in the principal char¬ acteristics of the United States battleship Idaho, commissioned in March 1919, and the new troop¬ ships mentioned above, which are representative of our latest American designs. Commercially, it is found that the large steamer will carry freight or passengers cheaper at the same speed, or faster for the same cost, than the small steamer. The large man-of-war, on the other hand, is able to carry a much greater weight of armor and armament and can maintain. a higher sustained sea speed than is practicable in a ves¬ sel of small displacement. See Warships.

Bibliography. — Biles, J. H., (The Design and Construction of Ships) (2 vols., New York 1908-11); Carmichael, A, W., ˆPractical Ship

Production* (New York 1919) ; Holms, A. C., ‘Practical Ship Building) (2 vols., London 1916) ; Kelly, R. W., and Allen, F. J., (The Shipbuilding Industry* (Boston 1918) ; Pea¬ body, C. H., (Naval Architecture* (New York 1904) ; Steele, J. E., (Naval Architecture) (Cambridge 1917) ; Robinson, R. H. M., (Naval Construction * (Minneapolis 1909) ; Atwood, E. L., (Textbook of Theoretial Naval Architecture) (London 1911).

W. L. Capps,

Chief Constructor, U. S. Navy, D. W. Taylor,

Chief Constructor, U. S. Navy,

NAVAL AUXILIARY VESSELS. When the United States became an active participant in the European War it became at once necessary to provide for meeting the demands for vessels for various naval auxiliary uses. Congress, in anticipation of the situation which did arise when the United States became a belligerent, included in the Naval Appropriation Act, approved 4 March, 1917, under the naval emergency fund provisions which were construed as giving the department the right to commandeer vessels needed for naval use in war. To safeguard the interests of the government and avoid as far as

possible the payment of unreasonable prices for the vessels so acquired the department ar¬ ranged for and organized a Board of Appraisal for Merchant and Private Vessels, three mem¬ bers of whom were at the time of their ap¬ pointment civilians especially qualified by edu¬ cation, previous occupation and experience, and possessing a reputation for knowledge of values of vessel property and for disinterestedness which the department felt would be recognized by owners of vessels sincerely desirous of co¬ operating with the department without taking advantage of the exigencies of the situation. These men were commissioned as lieutenant-commanders in the Naval Reserve Force. The three other members designated by the depart¬ ment for this board were from the list of regular officers of the navy, one a senior line officer, one an officer of the Constructive Corps of the navy and one a line officer with special engineering experience and knowledge. The board was directed by the department to ap¬ praise and fix the fair value of each piece of vessel property which the department con¬ sidered acquiring, either by purchase or by charter, and the values so fixed were used by the department in its negotiations with the own¬ ers of the property. In no case was any vessel property acquired by the navy if the demands of the owner were materially at variance with the findings of this board as to the fair value of the property. The department found a gen¬ eral wish to co-operate on the part of owners and acquired a number of vessels in this way. This spirit of cooperation was especially noticeable among the owners of yachts and other pleasure vessels, a large number of which were required almost immediately after the entry of the United States as a belligerent. It has since been charged that some young owners of such craft were in this way enabled to escape induction into the aimy.

It became apparent, however, that the powers granted under the naval emergency fund pro¬ vision of the Naval Appropriation Act were

not sufficient to fully meet the situation, and Congress included in an act making provision to supply urgent deficiencies in appropriations

for the military and naval establishments, etc., approved 15 June 1917, provisions granting broader powers under which possession of property needed by the navy for prosecution of the war might be taken possession of by the department subject to the payment of just compensation to the owners, which compensa¬ tion the act in question provided should be fixed by the President.

Information as to the property taken, its age, the character of the maintenance thereof, the betterments made thereto, the date on which the property was taken by the Navy Depart¬ ment and the condition of the property at the time it was taken, was supplied to the board, in most cases fully, by the Navy Department. At the hearings granted interested parties, they were permitted to present evidence or informa¬ tion regarding the property which had been taken, supplementing or modifying the infor¬ mation supplied by the Navy Department. In special cases the board made investigation of these matters directly or through agents where this course seemed necessary to the proper per¬ formance of the duties of the board. In preparation for the deliberations by which the board arrived at the prices or just compensa¬ tion, the board procured all possible informa¬ tion from every available source regarding: (a) The opinions of experts regarded by the board as disinterested as to the value of the property under consideration; (b) the testi¬ mony of experts produced by the interested parties, as to the value of the property under consideration; (c) the prices at which similar property of like character to that under con¬ sideration had been sold at or about the time-the property under consideration was taken by the Navy Department and the conditions sur¬ rounding these transactions; (d) the avail¬ ability of the property for commercial use; (e) the demand for property of like character for commercial purposes; (f) the original cost of the property; (g) the value of the property under normal conditions; (h) the cost of the property to the owner up to the time the prop¬ erty was taken: (i) the time when the property was acquired by the owner, the use to which the property had been put by the owner and the gross and net earnings of the property in the hands of the owner for a period of from three to five years before possession was taken by the navy; (j) the cost to reproduce the property taken and the time required for such reproduction.

In time of war or during the existence of a national emergency, members of the Naval Reserve Force of seagoing profession who have been employed in American vessels of mer¬ chant marine of suitable type for use as naval auxiliaries are required to serve only in vessels of the merchant ship type, except in cases of emergency, to be determined by the senior officer present, when said officer may in his

discretion detail them for temporary duty else¬ where as exigencies of service may require. Officers in the Naval Auxiliary Reserve exercise military command only on board ships to which they are attached and in the naval auxiliary service. The annual retainer pay of members

in this class after confirmation in rank or rat¬ ing is for officers one month's base pay of the corresponding rank in the navy, and for men, two months' base pay of the corresponding rating in the navy. All naval auxiliary vessels are grouped in districts and each group is placed under a commandant of the district, who is a naval officer of rank and experience. In this way the department is able through the various commandants of districts to carry out problems involving patrol and defenses of the coast, mine sweeping, communications, information, indus¬ trial developments, housing facilities, com¬ mandeering vessels, etc., in a very efficient manner.

Edward S. Farrow,

Consulting Military and Civil Engineer.

NAVAL CONSTRUCTION. See Naval

Architecture.

NAVAL CONSTRUCTORS, officers of the United States navy, detailed to look after the designing, building and repairing of warships. New types of ships are adopted after recom¬ mendations of the General Navy Board and chief of operations. The chief constructor and assistants in the Bureau of Construction and Repair of the Navy Department work out the design and details in consultation with the chiefs of Bureau of Steam Engineering and Ordnance. At every navy yard there is gen¬ erally a naval constructor on duty. These offi¬ cers are chosen from Naval Academy grad¬ uates and are prepared for their work by special education at technical schools. Latest statistics enumerate 51 naval constructors, five captains, five commanders, 23 lieutenant-commanders and 18 lieutenants ; assistant constructors number 24, including 14 lieutenants and 10 junior lieu¬ tenants.

NAVAL EDUCATION. Thorough edu¬ cative and systematic study constitute the base rock foundation in the grasping of the prin¬ ciples of the art of war, naval or military. No navy nor army can hold its own that fails to keep abreast of sciences that relate themselves to naval or military needs. The educational policy of the most modern navies is based on the fact that the seamanship of the future is

dependent on the increasing utilization of the data of science, whether in mechanics, chem¬ istry, physics, electricity, marine engineering or naval construction. Constant experimentation and adaptation, discovery and invention, readi¬ ness to abandon the outworn and willingness to try the untried, must go hand in hand with a growing navy, especially with a navy that is itself a vast educational and training school. The new demands, however, do not imply multiplication _ of -studies so much as greater thoroughness in fundamentals. Science is one, though its branches are numerous and rami¬ fying. _

United States. — Recent acts of Congress and laws increasing the number of midshipmen have largely increased the attendance at the Naval Academy and other naval institutions. The number of midshipmen coming from the enlisted personnel is increasing, and it is to be hoped that the day will soon come when most, if not all, appointments to the Naval Academy will come from the ranks. When a prereq-

n i site to appointment as midshipmen at the Naval Academy is actual practical sea service m the enlisted ranks, the navy will more and more attract the youths who love the sea and have the taste and the qualifications for the naval service. The Naval Academy was estab¬ lished by George Bancroft in President's Polk's administration. His state papers were models, and the Secretary of the Navy is remembered as scholar and writer as well as a secretary with a vision. Bancroft felt the need, as did John Paul Jones and Matthew Fontaine Maury and other naval leaders, of an institution to educate young men for the navy, but it re-main-ed for Bancroft to translate their dream into the Naval Academy. The efficiency of the navy of to-day is largely, if not chiefly, due to the character of the instruction and the high standards that prevail at the Naval Academy.

The United States Naval War College was formally established at Coaster's Harbor Island m Newport Harbor, Rhode Island, in 1884. Recently an applicatory system of study, similar to that in use at the

Army War College and at the service schools, was introduced at this col¬ lege and endeavors are now being made to cul¬ tivate in the minds of the officers of the navy the habit of systematic reasoning in approach¬ ing tactical or strategical problems, such as is given by an “estimate of the situation.® An effort is also being made to develop a form of “campaign orders® modifying the field order torm to suit all needs and varying conditions. Cooperation in time of war is greatly aided if each service has some personal acquaintance with the other. This acquaintance can be best brought about by the exchange of visits and hospitalities among officers afloat and ashore, and by the exchange of officers in attendance at the service schools and war colleges. The last is deemed of the greatest importance, as thereby selected officers who in time of war may exercise high command or staff duty are thus brought in touch, in a professional way, with the sister service. They find out what may be most probably expected from the other service in time of war; they learn something of the methods and professional opinions of the officers of the other service; and if at the war colleges, they assist in the preparation of the war plans. This interchanging of officers is most fruitful of good results. Army officers are detailed to attend the summer conferences at the Naval War College and navy and marine officers are designated to attend the Army War College and marine officers attend the army service schools at Fort Leavenworth. Along the same line is the detailing of officers of the Coast Artillery corps to attend fleet target practices.

Beyond the training of seamen and firemen, which is the principal general purpose of the stations above mentioned, is the matter of training mechanics, radio operators and many other specialists who must be skilled craftsmen as well as good sailors. There are schools for cooks, also, for well-prepared food is regarded as important enough to justify training in cookery. These men, whatever their origin or previous experience, must be further trained by and for the navy, first in discipline and second in their trades. A plumber, carpenter, electrician, coppersmith, machinist or what not, skilled in his trade as practised in civil life,

has much to learn before he can efficiently ply his trade on board a naval vessel. Prior to the European War, artisan recruits were trained in the naval trade schools maintained for this purpose. These schools were at once expanded as far as conditions permitted, but with the enormously increased demand the schools could not be made large enough to supply the re¬ quirements if the entire course of training

were conducted in such schools. In conjunction with the establishment of the Students' Arm/ Train¬ ing corps by the War Department, the Navv Department established naval units in over 90 educational institutions of collegiate grade. The object of these naval units is to extend to ambitious students the opportunity to continue their education along the usual channels, at the same time electing . special naval subjects. In addition, the student is under constant super¬ vision and receives military drills and instruc¬ tion.

At the naval training station, Great Lakes, III, is maintained one regiment of about 4,000 men, known as the public works regiment. The officers and petty officers are men of excep¬ tional engineering knowledge or practical abil¬ ity, and the regiment is so organized that a complete force of any required size, with its engineer officers, foremen, expert mechanics, journeymen and helpers can be quickly as¬ sembled as a unit and sent anywhere to under¬ take emergency construction or repair work involving structural steel erection, woodwork, masonry work with all pipe fitting, plumbing, electrical and similar accessories. Drafts from this regiment are replaced by recruits who are kept in training, both practical and bookwork, to increase their knowledge of their trade. At New London is a ship salvage organization officered by professionals in this line of work, at which men are trained and organized into salvage crews. This is in itself a training school for a wide variety of trades, including diving and the handling of high explosives.

For the benefit of men who enter the navy with some knowledge of or experience in a trade, or special vocation, the navy maintains trade-schools as follows: The Navy Electrical School for the instruction of electricians, both general and radio; the Artificer School for ship¬ wrights, shipfitters, carpenters, blacksmiths, painters, etc.; the Yeoman School for stenog¬ raphers, typewriters and bookkeepers ; the Com¬ missary School for cooks, bakers and com¬ missary-stewards; the Hospital-Corps Training Schools for the instruction of men in nursing, first-aid, drugs, etc.; the Coppersmith School; the Machinist School; the Aeronautic School; the Musician School;- the School for Diving; the Torpedo School and the class for instruc¬ tion in gasoline engines. Not all of these trade schools are open to men on their first enlist¬ ment. Some, such as the machinist school and the torpedo school, are open only to men of good record upon re-enlistment. All the schools are conducted, however, for the benefit of en¬ listed men of the navy who desire to fit them¬ selves for more responsible duty and better pay. In most instances, the training obtained in these schools will stand the men in good stead in civil life should they decide, after a few enlistments, to remain out of the navy. Former bluejackets, who

owe their success to the training they received while in the navy,

may be found in nearly every large industry bolding enviable positions.

In addition to the practical instruction im¬ parted at the training stations and in the navy trade schools, a course of academic instruction is conducted throughout the naval service. Every recruit is examined as to his educational needs and, if he is deficient in any common school studies, he is assigned to such classes as will supply the education he lacks. The ac¬ ademic instruction does not stop at the training stations, but continues on board ship; and if a young man shows a willingness to advance himself, he is given every encouragement and is afforded an opportunity to demonstrate his ability.

England. — Made up of diverse elements, the English system of naval education has a certain unity throughout, which is due solely to the fact that the whole is practically under one head. Except for the gunnery training and the seamanship, which is instilled by some process on board ship, the whole training of officers is under the direction of the director of studies at Greenwich. His control does not go so far as the devising of a general plan ; that is a matter for the Admiralty. From the time the young man of 12 or 13 passes his ex¬ amination for a cadetship down to his last volunteer course as a captain, through the Britannia, the course afloat, the sublieutenants' collegiate course and the subsequent voluntary studies, his education is under the Admiralty rules, and it is managed with all the wisdom and judgment that the rules will permit. The importance of this single head for the whole system cannot be overestimated. The expedi¬ ents adopted with reference to the higher edu¬ cation of voluntary students and the admirable courses of instruction for officers who have taken up one branch of the service, do much to remedy the inherent defects of the system ; and the promotion in two grades by selection excludes the most incompetent officers from positions of great responsibility.

France. — The following establishments are included in the general system of education of officers of the French navy: The Polytechnic School, Medical Schools, Torpedo School, Ma¬ chinists' School, Gunnery School and Artillery School. The Polytechnic School, founded in 1799, is the preparatory school for the scientific branches of the public service and is under the control of the Minister of War. Its organiza¬ tion is military, with a general officer of the army at its head. The pupils of this school are carefully selected at the start and the ex¬ amination for admission ensures a high stand¬ ard of preliminary attainment. The success of this school is so remarkable its influence on the public service of France has become a matter of history and it has taken a place among the very first of schools of its class in the world. In the Naval School of Brest, the methods of instruction adopted are similar, in a general way, to those of other French schools and col¬ leges and resemble nothing in America. Reci¬ tation in the ordinary sense does not exist and textbooks are almost unknown. A few books of reference are used, including the nautical almanac and the admirable series of manuals published under the authority of the Ministry of Marine. The main feature of the system of instruction is the cours, or lecture. The Engi¬

neers' School (constructors) at Cherbourg is simple in its organization. It is under the gen¬ eral supervision of the Prefet Maritime and is inspected from time to time by the inspector-general of the corps of engineers. At its head is a constructing engineer as director. As the profession of naval construction is a favorite branch among the higher graduates of the Polytechnic, coming usually after mines and roads and bridges, the pupils are selected men and distinguished in a higher degree by earnest¬ ness, intelligence and thorough scientific attain¬ ments. They enter the school of application at the age of 20 or 21. The Torpedo School at Boyardville has two objects, the training of officers and men for the torpedo service and the performance of experiments for the de¬ velopment and perfection of the materials of this branch of maritime warfare. The two functions are largely performed by the same officers. The School of Machinists at Toulon was established by the decree of 13 Feb. 1879, and took the place of the two schools that formerly existed for a similar purpose at Brest and Toulon. The pupils at the school consist of firemen artificers, candidates for promotion to quartermaster machinists ; of quartermasters and machinist pupils, candidates for second masters, and of second masters, candidates for first masters. Admission to the school is ob¬ tained after passing a double examination.

Germany. — The Naval Academy and Naval School at Kiel form really two establishments united under one government. The academy is devoted to the higher education of officers who have shown marked ability and who come as voluntary students. The school, on the other hand, is attended by midshipmen or acting sub¬ lieutenants and by cadets, and its courses are compulsory for all officers. At the academy and school the direction of all matters relating to instruction rests with the committee on studies, consisting of five members, who have extraordinary powers in regard to examina¬ tions. The regulations governing attendance at lectures and exercises are exceedingly precise and strict. There is also at Kiel the School of Engineers and Pilotage.

Italy. — The Royal Naval School of Italy is composed of two divisions, the first at Naples and the second at Genoa, the Naval School be¬ ing considered as preparatory to that of Genoa. The general system of education is similar to that of France, there being a gunnery school (established by royal decree in 1873), a torpedo school (established in 1874) and a school for engineer mechanicians (establishd in 1862 at Genoa). The restraints imposed in general by discipline at Italian naval schools are numer¬ ous and severe. The students have no standing as officers and are simply designated as pupils. The scale of punishments ranges from the ex¬ treme of pettiness to the extreme of severity.

The true goal of the training at the Naval War College and naval schools is efficient co¬ ordination of effort or unity of action. This unity can be realized only through co-ordinate thinking of all persons in a naval service. The navy is a collection of individual minds, and if these minds are untrained the resultant is intellectual chaos. The intellectual acts of a naval officer in command of a force should fol¬ low after methodical thought in the following order: A clear grasp of the intention of in-

structions; a careful examination of all con¬ ditions bearing on the situation ; a determina¬ tion of intention ; the communication of this intention to subordinates. The best training, as now admitted by all

nations, large and small, having navies, is in war. If it were not for the stimulus of necessity, all effort in the world would come to an end. The Naval War Col¬ lege created an artificial war, at first called the war game and later known as chart manoeuvre. I his last term is a happy one, for it accentuates the fact that the strategist's real field of oper¬ ations is the chart and is in keeping with Jomini's definition of strategy — «War on the map.® A further consideration will show that ordinary navigation is merely «sailing on the chart.® The war game or map manoeuvre was a notable factor in the wonderful successes achieved by German arms against Austria in 1866 and France in 1870. The map manoeuvre is truly the subcalibre method of training naval strategists. See Naval Intelligence.

Edward S. Farrow,

Consulting Military and Civil Engineer. NAVAL GUNS. See Guns, Naval.

NAVAL INSTITUTE, United States, an

organization founded in 1873 at Annapolis, Md., by the officers of the Naval Academy. It issues bi-monthly Proceedings on naval affairs. It is regarded as one of the most important pub¬ lications on naval affairs, because of the broad knowledge of its contributors. Each year the institute offers a life membership, a gold medal and a prize of $200 for the best essay or paper of interest to the naval service. The present membership includes a large portion of the officers of the navy.

NAVAL INTELLIGENCE. The Office of Naval Intelligence is charged with the collec¬ tion and dissemination of such technical infor¬ mation at home and abroad as will be useful to the various bureaus of the Navy Department in the formulation of plans for war and in the development of personnel and material. The exigencies of war impose new and important duties upon naval intelligence. In peace the function of this agency is to keep in touch with naval problems, naval expansion and naval interest in all the countries of the world, so that the President, the naval administration and the responsible naval leaders in Congress may have access to the latest information with reference to naval affairs abroad. Its reports from naval attaches in the leading countries and from other sources furnish the General Board, the Chief of Operations and the bureaus data which give them the benefit of what has been learned or put into practice in other countries. During war its duties increase many fold — in touch with the naval districts and branch offices — it does a most important work in protecting naval and other plants making war material, preventing

sabotage and in keep¬ ing an eye on alien enemies or others with a destructive propensity. A staff of vigilant and discreet confidential officers and civilians are on the alert to ferret out spies and other dangerous characters and secure their arrest. Close cooperation is had with the Department of State, War, Justice, Treasury and Labor, and, in addition, with the War Trade Board, the United States Shipping Board and the Alien Property Custodian. The interchange of

information and the results of investigations with these departments of the government are most effective and valuable to the prosecution « of war.

A detailed account of the work of this office should not be stated as it is of a highly con¬ fidential character, but, generally speaking, the scope of its activities include observation, in¬ vestigation and report of all subjects affecting the navy and the prosecution of war from a naval point of view. It includes naval oper¬ ations at sea and on land, the status, changes and progress of the material and personnel of foreign navies and a close counter espionage watch at home. This latter includes the inves¬ tigation of unauthorized radio stations of alien enemies and suspects, of matters connected with the cable and mail censorship which affect the navy, the protection of water fronts and ves¬ sels, and of plants having contracts with the Navy Department, with a view of safeguarding those plants against sabotage. The guarding of ships while in port and the guarding against the danger from enemy agents among the pas¬ sengers and crews are largely performed by the Office of Naval Intelligence. See Naval Communication Service.

NAVAL LAW. See Law, Military.

NAVAL MANOEUVRES. See Army and

Navy Manoeuvres.

NAVAL MILITIA. The first naval militia organization in the United States was estab¬ lished in the State of Massachusetts as a part of the organized militia on 29 March 1890. Other seacoast and lake States soon followed. In 1891 there was included in the Naval Militia Act, as passed by Congress, an appropriation of $25,000 for ((Arming and Equipping Naval Militia.® This constituted the first Federal appropriation available for the purchase of arms, equipment, *etc.* Appropriations have been included annually in the Naval Act since

that time. Ships were loaned to the organization and material and equipment issued by the vari¬ ous bureaus of the Navy Department for train¬ ing purposes, the details being carried on by the ((Office of Naval Militia.® The States them¬ selves purchased clothing and equipment. Some equipment was loaned by the War Department. Annual practice cruises were made and the training of the naval militia gradually pro¬ gressed. In February 1914 ((An Act to Pro¬ mote the Efficiency of the Naval Militia and for other Purposes,® commonly known as the ((Naval Militia Act,® became a law, and is the act under which the naval militia has since operated. In accordance with this act, the Division of Naval Militia Affairs was estab¬ lished in April 1914, by taking over all work formerly performed by the (<Office of Naval Militia.® A National Naval Militia Board, composed of naval militia officers, representing the north Atlantic, south Atlantic, Pacific and Great Lakes regions, convenes in Washington as often as necessary and is freely consulted in all important naval militia matters. Inspec¬ tions of all naval militia organizations and divisions are made annually by officers of the navy, to determine whether or not the divisions are sufficiently armed, uniformed and equipped to participate in the allotment of Federal funds for the ensuing year. The first of these in¬ spections was made in the spring of 1914, and

as a result several divisions were disbanded. A board of naval officers formulated examina¬ tions for officers and enlisted men and stan¬ dardized, in accordance with the National Militia Act, the qualifications of the naval militia personnel. This board met in Wash¬ ington and, assisted by the National Naval Militia Board, formulated a report published in the form of a general order, which established the units of organization, distribution of per¬ sonnel and other matters which in accordance with the act the Secretary of the Navy was authorized to prescribe — the unit of organiza¬ tion being the division (battalion). Aeronautic divisions and marine sections were authorized, while brigade and battalion organizations were maintained for administrative and other pur¬ poses. By the Act of 3 March 1915 a naval reserve force was authorized consisting of six classes: (1) The Fleet Naval Reserve, (2)

the Naval Reserve, (3) Naval Auxiliary Re¬ serve, (4) Naval Coast Defense Reserve, (5) the Volunteer Naval Reserve, (6) the Naval Reserve Flying Corps. The Fleet Naval Re¬ serve is composed exclusively of ex-officers and ex-enlisted men of the navy who have left the service under honorable conditions and who are citizens of the United States. Men who have served one enlistment creditably and re¬ ceive an honorable discharge may enroll in the fleet naval reserve with pay at the rate of $50 per annum. Those with eight years and less than 12 years naval service may enroll with pay at $72 per annum. Those with 12 years or more naval service enroll with pay at $100 per annum. Men who have served in the navy for 16 years or more may transfer to the naval reserve at one-third of their base pay plus all permanent additions thereto ; and men with 20 years or more may transfer to the reserve at one-half their base pay plus all permanent addi¬ tions thereto. In addition to these rates of pay men who enroll in the reserve receive an increase of 25 per cent for each re-enlistment. It is required of them, however, that they shall serve at least three months on active duty during each four-year period and re-enroll within four months. Men who transfer with 16 or 20 years' service are allowed a further increase of 10 per cent for extraordinary hero¬ ism in line of duty; and those with 20 years' active service are given a further credit of 10 per cent, provided their average marks in con¬ duct for 20 years or more shall be not less than 95 per cent of the maximum. Men trans¬ ferred to the fleet naval reserve, upon com¬ pleting 30 years' service, including active and reserve, be retired with the pay they are then receiving plus the retired allowances. Men who enroll in the reserve may be retired after completing 20 years' service in the reserve and receive in lieu of their pay a cash gratuity equal to the total amount of their pay during the last term of their enrollment. Members of the fleet naval reserve may be examined for war¬ rants and commissions in the reserve. Men who enroll in the reserve with four, eight or 12 years' active service are given a clothing allowance, each enrollment amounting to $30, which amount is increased to $60 in time of war or national emergency. As with all organized militia, the naval militia, even with the laws of 1914 and 1915, could not, under the Constitution, be called into service as such ex¬

cept for limited duties, such as to repel invasion. It could not be used outside the territorial limits of the United States. It is evident that, with such restrictions, militia could hardly meet the requirements of the navy in a foreign war, and to overcome this difficulty the <(National Naval Volunteers® were created in the act ap¬ proved 29

Aug. 1916. Under this act members of naval militia organizations were authorized to volunteer for ((any emergency,® of which emergency the President became the sole judge. By joining the navy as volunteers instead of being called as naval militia, militiamen can be used for any naval duty, free from the re¬ strictions imposed on the naval militia as such. The value of this law became apparent as soon as the United States entered the European War. Practically every one in the naval militia at once volunteered and was sent to duty, thus giving the country the services of the trained men who otherwise could not have been used until the country was to be invaded. In the same bill that created the national naval volun¬ teers, other laws were enacted that are of vital importance to the navy and country. That bill carried nearly all of the legislation that was needed to give the navy the personnel required for war. It provided organizations that in peace and at minimum cost prepared personnel for war, and the form of the laws was such that the personnel could be expanded to meet almost any emergency. Among the other im¬ portant measures, the bill (1) provided for the United States naval reserve force; (2) in¬ creased the enlisted personnel of the regular navy to 68,700 and provided for further in¬ crease by the President to 87,000; (3) provided for the automatic increase of officer personnel in each corps to correspond with increases in enlisted men ; (4) provided for naval flying corps, for special engineering officers, for tak¬ ing over the lighthouse service by the navy in time of war, *etc.* The creation of the United States naval reserve force was a wise pro¬ vision. The only training in peace times of reserve man power for the navy was in the naval militia, and even under the acts federal¬ izing it the naval militia met only to a minor extent the deficiencies in personnel for com¬ batant ships alone. It in no way met the re¬ quirements for personnel for auxiliaries, avi¬ ation, technical duties, *etc.* A much broader plan was necessary if the navy was to have sufficient man power and of the proper quali¬ fications for war service. The naval reserve force legislation gave the navy the broad organ¬ ization by which a reserve could be formed. The purpose of the reserve force is to enroll and train in peace time all kinds of personnel which in time of war or when the President de¬ clares a national emergency to exist can be called to the colors and thereafter be used in any capacity in the navy. This, act became a law only a few months before war came and when only the very first steps to create the re¬ serve had been taken. Nevertheless the law was so wisely drawn that the force could be rapidly built up even in war time. While it provided for the naval reserve force that has stood the country so well in war, the act fur¬ ther provided for war by increasing the per¬ manent enlisted strength to 68,700 and per¬ mitting its further increase to 87,500, in the discretion of the

President. As the permanent

navy is the foundation of the naval structure, these increases, made when they were, put the na\ \ in a position to expand on a sound basis, and especially so as in the same bill provision was made to automatically increase officer per¬ sonnel when the enlisted personnel strength was increased. Up to the passage of this act the number of officers allowed for the navy was numerically fixed by law. Even though enlisted strength increased, officer strength could not be increased except by special legis¬ lation to that sole end. It is apparent mat such a plan of increases was cumbersome and difficult, and upon the recommendation of the department a law was enacted in this bill that automatically changed the number of officers whenever the enlisted strength was changed. All corps and all grades in each corps were provided for in this legislation, so that now, when increases in ships of the navy occur, it is only necessary to authorize the enlisted per¬ sonnel to meet those increases and the officers' personnel becomes immediately provided for. Had this provision not been in force when war was declared the navy could not have carried on its part in the war so quickly and so suc¬ cessfully. See United States Naval Reserve Force.

Edward S. Farrow,

Consulting Military and Civil Engineer.

NAVAL MINES. Naval mining is logic¬ ally divided as follows: (1) Coastal mining, which denies to an enemy suitable ports, unde¬ fended or nearly so; (2) advance base min¬ ing; (3) off-shore or strategical mining; (4) battle or tactical mining, during an engagement between fleets. Coastal mining, outside of areas which are defended by coast fortification guns, does not require large or speedy vessels. Tugs, trawlers and light draught vessels, with naval reserve crews may be advantageously employed for this purpose. These vessels are provided with searchlights and suitable guns in order that they may properly guard their own mine fields. Advance base mining is the log¬

ical or legitimate duty of the active naval force. For this purpose an organized unit is supplied, consisting generally of several mine ships, six or more seagoing tugs, and two net layers. The mining ships are armed with a sufficient num¬ ber of guns of proper calibre to defeat any attempt of raiding cruisers from interfering with the work establishing the advance base ashore and the laying of mines for the protec¬ tion of the harbor. These ships are provided with all facilities to lay and pick up mine fields. The tugs are employed for sweeping areas which are to be used for fleet manoeuvres or to sweep a channel to insure that hostile mines have not been planted. The sweeps, made of wire hawsers and chain, are hung between two tugs so that the bight of the sweep is dragged across the area to be swept. When the sweep fouls a mine it drags it from its moorings and explodes it. The net layers are used for laying submarine entangling nets across the entrance . of a harbor or about a fleet when at anchor in an open roadstead. In mining the channels of an advanced base, mines are laid in the principal channels and as a rule are distantly controlled or exploded by observers ashore, when an

enemy ship is sufficiently near them. Off-shore or strategical mining is done for the purpose of refusing or denying certain waters to the enemy. A sufficient number of mines are laid to make a venture by an enemy fleet extremely hazardous. For this mining, mine-laying ves¬ sels of considerable size and good speed are required, being accompanied by a mine depot ship and tugs. When occasion demands very high speed, scout cruisers or even destroyers should be used. High speed can be given min¬ ing vessels only by sacrificing mine capacity. In strategical mining a supporting force should always accompany the mine force to protect it from interference by enemy fast cruisers which might arrive before the mining has been com¬ pleted. All hostile obstructions should be guarded against continuously. Battle or tacti¬ cal mining, during an engagement between fleets, is accomplished by vessels of very high speed with characteristics on the order of scout cruisers, but with decks arranged to carry sev¬ eral hundred mines. The mines are laid in such localities during, the progress of the battle that may be in the line of advance or retreat of the enemy. When an area is properly mined, one of the principal aims of the fleet is to force the enemy over the mine field. Battle mines may be either fixed or floating; but when off soundings, floating mines only can be used.

The United States has two mining branches. One branch is under the coast artillery and is employed as an element in the fixed defenses of

the coast and the mine fields are covered by guns in fixed positions. The other branch is under the navy and forms a part of the active fleet. The control of the fixed mine defense belongs with the control of the fortifications and the control of the fixed land defenses and mine fields belong to the navy in order to in¬ sure complete cooperation between the mobile and fixed defenses of the coast. The fleet for its own safety should dictate the location of mine fields. As a rule the navies of Europe control the coast fortifications and the fixed mine fields.

Generally speaking, there are two types of mines — fixed and floating. The fixed or sta¬ tionary submarine mine is fired by contact, elec¬ tricity, timing device or fuse. Such mines are rugged in. design and may contain large charges of explosives. They are placed in position by submarines and other especially equipped mine¬ laying vessels. Such mines are provided with anchoring devices and are deposited, if possi¬ ble, in harbors and channels of the enemy or in the paths of ocean travel. Floating mines differ from fixed mines in that they ˆre unan¬ chored, and unless guard boats are at hand to warn friendly vessels of their proximity, may be as dangerous to friend as to foe. Such mines must be, according to laws, of war, de¬ signed to become inoperative within a few hours or days — after being set adrift. They are often cast adrift in pairs, connected by a line about 100 feet long. If a ship runs be¬ tween the two mines they are drawn alongside the ship, and exploded. See Submarine Mines.

Edward S. Farrow, Consulting Military and Civil Engineer.

Vol. 20, NAVAL OB TO ORLEANS

Americana

P

d.

§

Z

11

$

4

%

i

1

i

i

1

I

i

I

I

i

i

i

1 1

THE

ENCYCLOPEDIA

AMERICANA

JT

IJSˆKT

Umiveesal

MgOWLEDCEj

In Thirty Volumes

1922

. f , •• /• * . %.•

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEW YORK. CHICAGO

S

Copyright, 1919

BY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 18 (9 22

AS543J 7

(

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XX

ALLEN, ERIC W., A.B.

y f Dean of the School of Journalism, University of Oregon

OREGON

ANDREWS, E. BENJAMIN, D.D., LL.D.*

Late Chancellor of The University of Nebraska

OREGON QUESTION, THE

BAXTER, FLORUS R.

Chief Chemist of the Vacuum Oil Company

OIL ‘

BEETS, HENRY, LL.D.

Editor-in-chief, “ The Banner ”

NETHERLANDS — RELIGIOUS CON¬ DITIONS

BENNETT, CHARLES E., Litt.D.

Late Professor of Latin, Cornell University

ODES OF HORACE ORATIONS AGAINST CATILINE

BERRY, GEORGE RICKER, Ph.D., D.D.

Professor of Old Testament Interpretation and Semitic Languages, Colgate University

OBADIAH, BOOK OF

BJERREGAARD, C. H. A.

Librarian, Astor Branch, New York Public Library

NEO-PLATONISM

NEW-THOUGHT

BOUCKE, EWALD A., Ph.D.

Professor of German, University of Michigan

NORWEGIAN LANGUAGE NORWEGIAN LITERATURE

BRETT, AGNES BALDWIN

New York City

NUMISMATICS

BREWSTER, WILLIAM T., A.M.

Professor of English, Columbia University

NEWCOMES, THE NEWMAN, JOHN HENRY OLIVER TWIST

BRUCE, ANDREW A., A.B., LL.B.

Chief Justice of Supreme Court of North Dakota

NORTH DAKOTA

BUCHANAN, J. S., LL.D.

Dean of the College of Arts and Sciences, University of Oklahoma

OKLAHOMA

CALDWELL, H. W., Ph.B., A.M.

Professor of American History, University of Ne¬ braska

NULLIFICATION

CARMAN, E. A.*

General, United States Army

NEW MARKET, BATTLE OF NORTH ANNA, OPERATIONS ON THE OLUSTEE, OR OCEAN POND, BATTLE OF

OPEQUON, BATTLE OF THE

CARMAN, HARRY J.

Department of History, Columbia University

ON LIBERTY

CLARK, WALTER, A.B., A.M.

Chief Justice Supreme Court, North Carolina

NORTH CAROLINA

CLELAND, HERDMAN, F., Ph.D.

Professor of Geology, Williams College

NEOLITHIC PERIOD

COCHRANE, CHARLES H.

Of the Staff of Newspaperdom

NEWSPAPER

COLBY, JAMES FAIRBANKS, LL.B., LL.D.

Editor of “ Manual of Constitution of New Hamp¬ shire ”

NEW HAMPSHIRE

COOPER, LANE, Ph.D.

Associate Professor of English Language and Litera¬ ture, Cornell University

ON CONCILIATION WITH AMERICA

CORNYN, JOHN HUBERT, B.A., LL.B.

Birmingham Southern College

NURSERY LORE OBJECT TEACHING

CROSS, WILBUR L., Ph.D.

Professor of English, Yale University

NOVEL, THE

- Deceased,

Contributors to Volume XX — Continued

DARTON, N. H.

Geologist, United States Geological Survey

OIL SHALE

DEWEY, MELVIL, LL.D.

Author of “ Decimal Classification and Relativ Index ”

OFFICE LABOR SAVERS

DICKINSON, THOMAS H., Ph.D.

Associate Professor of English, University of Wis¬ consin

NEW WAY TO PAY OLD DEBTS, A

DOLE, NATHAN HASKELL, A.B.

Author, Editor and Translator

obl6mof

DOLSON, GRACE NEAL, Ph.D.

Professor of Philosophy, Wells College; Author of “ The Philosophy of Nietzsche ”

NIETZSCHE, FRIEDRICH WILHELM

DOUGLAS, D, S.

Editorial Staff of The Americana, Toronto

ONTARIO, CANADA

DOW, CHARLES M., LL.D.

Author of “ A History of the State Reservation at Niagara “

NIAGARA

DU BOIS, W. E. B., Ph.D.

Author of “ The Souls of Black Folk; ” “ The Negro,” etc.

NEGRO IN AMERICA, THE

DUNN, WALDO H., M.A., Litt.D.

Professor of English, College of Wooster, Wooster, Ohio

NELSON, LIFE OF

EATON, ARTHUR W. H., A.B., A.M.

Author of ” The History of Kings County, Nova Scotia, Heart of the Acadian Land,” “ The Church of England in Nova Scotia,” etc.

NOVA SCOTIA

EGGERT, CARL E., B.Ph., Ph.D.

Formerly Assistant Professor of German, University of Michigan

OBERON

EISELEN, FREDERICK CARL, Ph.D., D.D.

Professor of Old Testament Interpretation, Garrett Biblical Institute

NUMBERS, BOOK OF

ESTES, DAVID FOSTER, D.D.

Professor of New Testament Interpretation, Colgate University

NEW TESTAMENT THEOLOGY

FARROW, EDWARD S., C.E.

Consulting Military and Civil Engineer

NAVAL TACTICS

FERRIS, RICHARD, C.E., Sc.D.

Editorial Staff of The Americana

NEGATIVES

FLEMING, WALTER L., Ph.D.

Professor of History, Vanderbilt University

NEW ORLEANS

FROST, EDWIN B., A.B., A.M.

Director of Yerkes Observatory, University of Chicago

OBSERVATORY

GARNER, JAMES WILFORD, Ph.D.

Professor of Political Science, University of Illinois

NEUTRALITY

GAUSS, CHRISTIAN, Litt.D.

Professor of Modern Languages, Princeton Uni¬ versity

NUIT DE MAI

ORIGINS OF CONTEMPORARY FRANCE, THE

GEHRING, ALBERT, A.M.

Author of “ The Appreciation of Music,” etc.

NUMERICAL NOTATION

HAGAR, GEORGE J.

New Jersey Historical Society

NEWARK, NEW JERSEY

HANFORD, JAMES H., A.M., Ph.D.

Associate Professor of English, University of North Carolina

ODE TO DUTY

ODE ON A GRECIAN RUN

ODE TO A NIGHTINGALE

HARRY, JOSEPH E., Ph.D.

Lecturer on the Greek Drama at the Sarbonne: Author of “ The Greek Tragic Poets,” etc.

CEDIPUS REX ORESTEIA, THE

INGERSOLL, ERNEST

Zoologist, Editor and Author

NIDIFICATION

ORGAN

ISAACS, LEWIS M., Ph.B., LL.B.

Musical Critic and Composer

NIBELUNGEN RING, THE OPERA

OPERA, NATIONAL DEVELOPMENTS THEIR INFLUENCE AND TREND ’ ORATORIO

Contributors to Volume XX — Continued

JELLIFFE, SMITH ELY, M.D.

Editor* of “ Journal of Nervous and Mental Dis¬ eases ”

NERVOUS SYSTEM NERVOUSNESS

ORGANOTHERAPY, OR OPOTHERAPY KAINS, M. G., B.S., B.S.A., M.S.A.

Horticultural Consultant

NURSERY

ORANGE AND ORANGE CULTURE

KLEIN, HENRI

Editorial Staff of The Americana

ORDERS (ROYAL) AND DECORATIONS

LANGWORTHY, CHARLES FORD, D.Sc., Ph.D.

Department of Agriculture, Washington, D. C.

NUTRITION OP FARM ANIMALS NUTRITION OF MAN

LEE, FRANCIS B.

Editor-in-chief of “ New Jersey as a Colony and as a State and

HAGAR, GEORGE J.

New Jersey Historical Society

NEW JERSEY

LE GALLIENNE, RICHARD

Author, Critic and Reviewer

ORDEAL OF RICHARD FEVEREL

LEONARD-STUART, CHARLES, B.A.

Editorial Staff of The Americana

NETHERLANDS, LANGUAGE, LITERA¬ TURE AND SCIENCE OF THE NETHERLANDS SCHOOL OF PAINT¬ ING, THE

NEW SOUTH WALES

NEW TESTAMENT CHRONOLOGY

NORWAY

ORGAN

LINDENKOHL, ADOLPHUS

Late of the United States Coast and Geodetic Survey

OCEAN, THE OCEAN CURRENTS

LING, GEORGE H., Ph.D.

Dean of the Faculty of Arts and Sciences, University of Saskatchewan

NUMBERS, THEORY OF

LITTLEHALES, GEORGE W., C.E.

United States Hydrographic Office

NAVIGATION

OCEANOGRAPHY

MAAS, ANTHONY J., S.J., Very Rev.

Professor of Hebrew and Sacred Scripture, Wood- stock College

NEW TESTAMENT CRITICISM

McDonnell, j. b.

Editorial Staff of The Americana

NEW ZEALAND

McGrath, p. t.

Editor of “ The Evening Herald,” Saint Johns, N. F.

NEWFOUNDLAND, THE ATLANTIC FISHERIES DISPUTE

MEADER, JOHN R.

Editor and Author

ORDERS, RELIGIOUS

MIMS, EDWIN, Ph.D.

Professor of English, Vanderbilt University

OLD CREOLE DAYS

MUNROE, CHARLES E., S.B., Ph.D.

School of Graduate Studies, George Washington University

NITROGLYCERINE NOBEL, ALFRED BERNARD

NASHER, I. L., M.D.

Author of “ Geriatrics: Diseases of Old Age and their Treatment ”

OLD AGE, DISEASES OF

NORCROSS, CHARLES A.

Director of Agricultural Extension, University of Nevada

NEVADA

. . Vi ,

PANARONI, ALFRED G., B.S.

Instructor in Romance Languages, College of the City of New York

ORLANDO FURIOSO ORLANDO INNAMORATO

PETERS, JOHN P., D.D., Ph.D., Sc.D.

Author of ” Nippur or Explorations and Adventures on the Euphrates,” etc.

ORIENTAL RESEARCH

PHILLIPS, WENDELL C., M.D.

»

Surgeon to the Manhattan Eye, Ear and Throat Hospital

NOSE AND THROAT, DISEASES OF

PICKERING, WILLIAM H.

Astronomical Observatory, Harvard University

NEBULAE, THE

RISTEEN, ALLAN D., Ph.D.

Director of Technical Research, The Travelers In¬ surance Company, Hartford, Conn.

NITRIC ACID

Contributors to Volume XX — Concluded

RYAN, DANIEL J.

Author of ” A History of Ohio;” “ The Civil War Literature of Ohio,” etc.

OHIO

SCHMIDT, NATHANIEL, A.M.

Professor of Semitic Languages and Literature, Cornell University

NEHEMIAH NEHEMIAH, BOOK OF

SHELDON, ADDISON E., A.B., A.M.

Secretary of the Nebraska State Historical Society and Director of the

Legislative Reference Buieau

NEBRASKA

SHERMAN, STUART P., Ph.D.

Professor of English, University of Illinois

ON THE SUBLIME AND BEAUTIFUL

SHOREY, PAUL, Ph.D., LL.D.

Professor of Greek, University of Chicago

ODYSSEY, THE ORATION ON THE CROWN

TUCKER, MARION, Ph.D.

Professor of English, The Polytedhnic Institute of Brooklyn

ODE: INTIMATIONS OF IMMORTAL¬ ITY FROM RECOLLECTIONS OF EARLY CHILDHOOD ODE TO THE WEST WIND

VAN DOREN, CARL, Ph.D.

Associate in English, Columbia University

OMOO: A NARRATIVE OF ADVEN¬ TURES IN THE SOUTH SEAS

WALSH, JAMES J., Ph.D., M.D., LL.D., Litt.D.,

bc.D.

Author of “ The Thirteenth Greatest of Centuries ”

NINETEENTH CENTURY, THE NINTH CENTURY, THE

WARD, HENRY B., Ph.D.

Professor of Zoology, University of Illinois

NEMATHELMINTHES

NEMATODA

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature,” etc.

ON NE BADINE PAS AVEC L’ AMOUR

WIENER, LEO

SHUMWAY, D. B., B.S., Ph.D.

Professor of German Philology, University of Penn¬ sylvania

NIBELUNGENLIED, THE

SINGLETON, ESTHER

Author of ” Orchestra and Its Instruments ”

Professor of Slavic Languages and Literature _ Harvard University

NIGHTS LODGING, A ODE TO GOD, THE

WILCOX, MARRION, A.B., LL.B.

Co-editor Encyclopedia of Latin-America

NICARAGUA NICARAGUA CANAL

ORCHESTRA ORCHESTRA MUSIC

SMITH, DAVID EUGENE, Ph.D., LL.D.

Professor of Mathematics, Teachers’ College Columbia University, New York

NUMERALS

SMITH, WILLIAM BENJAMIN, Ph.D.

Tulane University, New Orleans

NEW TESTAMENT PROBLEMS

STANOYEVICH, MILIVOY S., M.A., M.L.

Slavonic Department, University of California

OLD CHURCH SLAVONIC LANGUAGE AND LITERATURE

WILLISTON, SAMUEL W., M.D., Ph.D.

Walker Museum, The University of Chicago

ODONTORNITHES

WINCHESTER, CALEB T., L.H.D.

Professor of English Literature, Wesleyan Uni¬ versity

NIGHT THOUGHTS, OR THE COM¬ PLAINT

NOCTES AMBROSIAN,®, THE

WOODSON, CARTER G.

and" History"* Quarterly J°urnal of Negro Life

NEGRO EDUCATION

WRIGHT, CHARLES H. C., B.A., M.A.

Professor of French Language and Literature, Harvard University

NOTRE-DAME DE PARIS

SULLIVAN, JAMES, Ph.G.

State Historian, State of New York.

NEW YORK STATE

WRIGHT, HERBERT F., Ph.D.

Sometime of the Department of Latin, The Catholic University of America.

ON THE SUBLIME

KEY TO PRONUNCIATION

a far, father

a fate, hate

a or a at, fat

n

a

a

a

ch

e

e or e

e

e

e

ff

1 or 1

*.

1

J

kw

air, care ado, sofa all, fall choose, church eel, we bed, end

her, over: also Fr. e, as in de ; eu, as in neuf ; and oeu, as in boeuf, coeur; Ger. d (or oe), as in okonomie.

befall, elope

agent, trident

off, trough

g gas, get

gw anguish, guava

h hat, hot

h or h Ger. ch, as in nicht, wacht

hw what

I file, ice

n

him, it

between e and i, mostly in Oriental final syllables, as, Ferid-ud-din

gem, genius quaint, quite

Fr. nasal m or n, as in embon¬ point, Jean, temps

ng

nk

Span, n, as in canon (can'yon), pihon (pen'yon)

mingle, singing

bank, ink

no, open

o or 6 not, on

o

01

corn, nor atom, symbol book, look

oil, soil ; also Ger. eu, as in beutel

6 or oo fool, rule ou or ow allow, bowsprit

s

sh

th

fh

u

satisfy, sauce show, sure thick, thin father, thither mute, use

u or u but, us

u

pull, put

ii between u and e, as in Fr. sur,

• Ger. Miiller

v of, very

y (consonantal) yes, young

zh

pleasant, rose azure, pleasure

‘(prime), ” (secondary) accents, to indicate syllabic stress

% ,t ■ ‘ :

rn (.! ,U .n«qa i! > ,ri s-t

(«o iu>q)

»•

tfxii Ji d ±.t

8«

.A ...

tort

nj Jon 6 -j o

70i. M OJ

,

‘

.

■ j jto ii

rx. n-nyj 6 ?

c’ 6 1. . , ■ .I-

l-.’.m-,1 j! i rn.) , U: li > v Jio

ti‘7q«T/Dd , //OHk WO -JO 00

»«#a .vj jj

■ !H fi 1 0ˆ-: . h

■ Ao ni w

~nu* ’wod- niHj ,ˆouiJ

, ; > jj

‘

i ft

.

i’i K.lJ Jlr

Hpi v • , –

AAˆO’X ! : . d ; > .1 • ...

•* I Jiu 0

ii

*’ f < *fi ,-v i; (t/iinjS0i) < .cr-o)

aeo,

‘JWtJBit Iq .91 wen.

- « “Ji-‘Oi ,t ! > !.

■

aeor – oiddll ■. a

.

-

mb*Jbu-bno

gyntoji tm

• ■o: ;t

j rrj k -to

Naval observatory, The

United States. A government in¬ stitution located on Georgetown Heights, Washington, D. C., and constituting a division of the Bureau of Navi¬ gation of the Navy Department. Its functions are to make and publish observations of the sun, moon, stars and planets for use in compil¬ ing the American Ephemeris and Nautical Al¬ manac and the American Nautical Almanac ; to make general astronomical observations; to furnish the country and adjacent oceans with correct time, enabling navigators within radio reach of the naval radio station at Radio, Vir¬ ginia, to find their positions without dependence upon uncertain chronometer rates, and ocean survey parties to get daily longitude data; to purchase, inspect, repair (or supervise repairs to) and issue all navigational instruments, in¬ cluding gyro-compasses, chronometers and sounding apparatus, for the navy, the navy aero service, the coast guard and the light house service, and, during the Great War, for vessels constructed by the Shipping Board and trans¬ ports taken over by the government; it serves as a longitude station. In the winter and spring of 1913-14 the Naval Observatory, by means of the naval radio station at Radio, Vir¬ ginia, and in co-operation with the Paris Ob¬ servatory and the Eiffel Tower radio station, made the first transatlantic radio longitude de¬ termination.

The observatory comprises a group of build¬ ings erected on the present site in 1893, the main building containing the offices of the as¬ tronomical, nautical instrument, time service and Nautical Almanac departments. A national observatory was planned as early as 1810 but Congress always refused to appropriate for one. It was mainly due to the efforts of Capt. J. M. Gilliss, U.S.N., that the foundation of a Naval Observatory was finally laid. On 6 Dec. 1830 a bureau for the care of naval instru¬ ments and charts was established by the navy commissioners in the western part of Washing¬ ton. Lieutenant Goldsborough, U.S.N., was the first officer in charge and in the small circular building built for the use of the depot he mounted the first instrument — a portable tran¬ sit instrument of 30-inch focal length, made by Richard Patten of New York. In 1833 Golds¬ borough was succeeded by Lieutenant Wilkes, U.S.N., who removed the depot

to a building on Capitol Hill on the west side of North Capitol street, between B and C streets north. This

building was 14 x 13 x 10 feet, and contained, besides the original instrument, a transit in¬ strument of three and three-fourths-inches aper¬ ture and 63 inches focal length, a Borda's circle, a sidereal clock and a 3.5 foot achromatic port¬ able telescope by Jones.

Systematic astronomical observations did not begin until 1838 when the Wilkes expedi¬ tion started for the South Seas. In that year Wilkes resigned the superintendency to assume charge of the expedition and turned over the direction of the Naval Observatory to Gilliss. In the summer of 1838, by order of the Secre¬ tary of the Navy, Gilliss purchased a portable achromatic telescope of three and one-fourth inches aperture and 42 inches focal length, an Ertel meridian circle of four and five-tenths inches aperture, with circles 30 inches in diam¬ eter, one of which was graduate 1 to three min¬ utes, a sidereal clock and a mean time clock.

It was not, however, until 12 years after the founding of the Bureau of Charts and Naval Instruments (1830) that a suitable build¬ ing was provided for use as a Naval Observa¬ tory. In 1842 an act was passed by Congress (approved 31 August) appropriating $25,000 for such a building and as it had been mainly due to the efforts of Gilliss that the appropri¬ ation was made, he was directed to visit the principal observatories of America and Europe for information respecting plans. The build¬ ing, occupying a site of 17.85 acres between 23d and 25th streets west, and from E street north to the Potomac, was completed in Sep¬ tember, 1844, by Gilliss, and Lieutenant M. F. Maury, U.S.N., placed in charge. The instru¬ ments and. clocks were removed from Capitol Hill and installed in the new buildings, and further euipment was purchased, consisting of a nine and six-tenths-inch achromatic equa¬ torial, a meridian transit of five and one-third- inch aperture, a prime vertical transit instru¬ ment of four and nine-tenths-inch aperture, a mural, circle with a telescope of four and one- tenth-inch . aperture, and a circle five feet in diameter divided to five minutes and read by six micrometer microscopes, a comet seeker of four- inch aperture, magnetic and meteorological in¬ struments and books. Berlin, Paris, Greenwich and Vienna observatories presented some 200 rare volumes as a nucleus for a library. This li¬ brary has grown to one which now consists of 29,000 volumes and 5,800 pamphlets, and stands to-day second to Pulkowa only. The published observations comprise more than 50 large

quarto volumes. The Nautical Almanac Office was established in 1849 and in 1894 it became a department of the Naval Observatory and since then the American Ephemeris and Nauti¬ cal Almanac has been issued as a part of the work of the observatory.

On 3 March 1849 Cong ress appropriated $10,000 to pay Dr. Locke of Cincinnati for the construction and use of a magnetic clock, a fillet chronograph, and a cylinder chronograph, which at that time embraced the essential fea¬ tures of those now in use. On April 20, 1861, Maury resigned the superintendency, after hav¬ ing made hydrographic researches which have made his name famous. On the 23d Gilliss as¬ sumed charge of the Naval Observatory, instill¬ ing new life in the astronomical work and gradually raising the usefulness of the observ¬ atory as a national astronomical institution. Since August 1865, in accordance with the plan originated by Professor Harkness, the observ¬ atory has transmitted time signals daily except Sundays and holidays (since 1913, daily) over the telegraph lines running into the chrono¬ meter room. In 1865 a new Pistor and Martin's meridian circle of eight and fifty-two hundred- ths-inch aperture replaced the smaller Ertel cir¬ cle and in 1873 the famous twenty-six-inch equa¬ torial refractor by Alvan Clark and Sons was placed in position. At that time it was the largest refractor in existence, and with it Prof. Asaph Hall discovered the satellites of Mars in 1877.

In 1881 a new site on Georgetown Heights was purchased by Congress, appropriations for new buildings were made in 1886, and in the early part of 1893 the buildings were so far com¬ pleted as to permit of the transfer of the in¬ struments from the old building. The new build¬ ings occupy a site of 67.78 acres on the heights about 275 feet above the Potomac River and comprise one office building and a number of detached buildings for the principal instru¬ ments. The main building has a tower for the smaller equatorial on its western end and still further west an adjoining meridian transit room, while on its eastern end is the library. The clockhouse, with vault is 410 feet north¬ west of the main building and it is flanked on the east and west by connecting observers' rooms which contain the chronographs. Di- ' rectly east of the east observer's room is the east transit house containing the 9-inch tran¬ sit circle and directly west of the west ob¬ server's room is the west. transit house contain¬ ing the 6-inch transit circle. About 50 feet north of the clockroom is the prime vertical transit house and 175 feet south is the dome of the 26-inch equatorial with two rooms connect¬ ing for astronomers' use. Situated 275 feet

northwest of the clockhouse is a sheet-iron building with movable roof for the alt-azimuth instrument and connected with it by a platform is. another building of sheet-iron louvre work with removable roof for the photographic zenith tube. The horizontal photoheliograph is mounted 400 feet southeast of the clock¬ house and about 200 feet southeast of photo¬ heliograph is the photographic equatorial build¬ ing. The main building, the 26-inch equatorial building, the clockhouse with the adjoining ob¬ servers' rooms are of white marble, but the other buildings are largely of metal.

In regard to equipment, the 9.6-inch equa¬ torial refractor has been replaced by a telescope having a 12-inch object glass made by Clark and mounted by Saegmiiller and occupying a 26-foot dome on the tower at the west end of the main building. The 26-inch equatorial is provided with a mounting by Warner and Swasey and a filar micrometer of the highest grade furnished by the Repsolds. This micro¬ meter is constructed of iron and steel and pro¬ vided with a printing arrangement for regis¬ tering the settings of the micrometer screw. The dome is 45 feet in diameter and the hydrau¬ lic elevating floor has a range of motion of 12 feet. The 4.5-inch Ertel transit is mounted in the meridian transit house at the west end of the main building. The 8.5-inch object glass of 12 , feet focal length in the Pistor and Martin's meridian circle was replaced by a 9.14- inch Clark object glass of 107 inches focal length and the instrument was otherwise modi¬ fied. Other instruments added to the equip¬ ment are; a steel meridan circle with a 6-inch object glass provided with two circles 26 inches in diameter graduated to two minutes; a steel alt-azimuth with a 5-inch object glass by War¬ ner and Swasey, the diameter of its vertical and horizontal circles being 26 inches each, graduated to two minutes ; a photographic equatorial with a pair of 10-inch photographic lenses which were figured at this observatory and placed in the central part of the old mount¬ ing of the 26-inch equatorial, the 9.6-inch tele¬ scope being used for guiding purposes; in 1915 the International Geodetic Association loaned the naval observatory their 8-inch photographic zenith tube which was used for the determina¬ tion of variation of latitude. This instrument has been set up and continuous observations are being made with it.

The following continuous routine astro¬ nomical work is now being carried on at the naval observatory; the 6-inch and 9-inch transit circles are being used to determine the posi¬ tions of the fundamental and intermediary stars suggested by the Permanent International Com¬ mittee on the Photographic Chart of the Heavens; the series of observations 1893-1912 made with the prime vertical transit instru¬ ment for the determination of the nutation con¬ stant,, the aberration

constant and the variation of latitude are being discussed and prepared for publication; the equatorial telescopes are used principally for the observation of the satellites of the planets, comets, asteroids and the occul- tations of stars by the moon; the alt-azimuth is being used for the determination of the declinations . of fundamental stars; the photo¬ graphic zenith tube is used for the measure¬ ment of variation of latitude; the photographic equatorial is devoted to systematic observa¬ tion of a zone of asteroids; and daily photo¬ graphs of the sun are being taken with the photoheliograph. Consult Skinner, (Washington Observations' 1871, Appendix IV).

NAVAL ORDER OF THE UNITED STATES, an association composed of a Gen¬ eral Commandery and commanderies in the States of Massachusetts, Pennsylvania, New York and Illinois and in the District of Colum¬ bia. The General Commandery meets trien- nially on 5 October, and the State Command¬ eries meet annually in November. The parent commandery, that of Massachusetts, was or¬ ganized at Boston on 4 July 1890. The General Commandery was established three years later, on 19 June 1893. The members of the order are officers and the descendants of officers who served in the navy and marine corps in any war or in any battle in which the said naval forces of the United States have participated. It has about 500 members.

NAVAL RESERVE. See Naval Militia.

NAVAL SCHOOLS, institutions for the training of naval officers. In the United States the Naval Academy at Annapolis, Md., is the most important school of this character. In Great Britain the chief naval school is the Royal Naval College at Greenwich. See Naval Academy, United States.

NAVAL SIGNALS. See Signals, Naval.

NAVAL STORES, or SHIP STORES, a

general term used in commerce and in the merchant marine, for certain products of the pine tree, including spirits of turpentine, resins, pitch, tar, etc. The term is a misnomer in these days of steel and iron ships, as nine-tenths of the product are used in other industries rather than in shipping. The name naval stores is de¬ rived from the consumption in early days of large quantities of pitch and tar in ship yards and on board of vessels. Nine-tenths of the naval stores

used throughout the world come from the long-leafed pine belt of the Southern States. The pine belt includes a vast territory commencing in North Carolina, near the Vir¬ ginia State line, and extending southward to Florida, along the Atlantic Coast line. The belt is from 5 to 100 miles wide and includes the States of North Carolina, South Carolina, Geor¬ gia, Alabama, Mississippi and Louisiana. The territory embraces about 130,000 square miles. The other tenth of the world's supply comes from France and Austria.

Turpentine. — Spirits of turpentine is de¬ rived from the sap of the long-leafed pine and in its crude state is of a fine white color. Upon exposure to the air it becomes dry, hard and brittle, thus forming resin. From 200 acres of pine jtrees there is obtained the first year about 280 barrels of crude turpentine, or dip ; and 70 barrels of what is known as scrape. This dis¬ tilled will give 2,000 gallons of spirits of tur¬ pentine and 260 barrels of resin. In the fourth and last year of the sap flow this output is re¬ duced to 1,000 gallons of turpentine and 110 barrels of resin. By a later process of wood distillation the old dead tree-logs may be made to yield large quantities of resin, tar and turpentine. In the days of the Civil War tur¬ pentine sold at $1.75 to $1.90 a gallon, as against the normal price of 28 or 30 cents ; and inferior resin sold as high as $4 a barrel, the normal price being about $1.90. These Civil War prices were largely duplicated in the time of the Great World War when the building of many wooden ships called for increased quan¬ tities of tar. See Turpentine.

Pitch. — The ordinary pitch of commerce is

derived from a dry distillation of resin, and is largely used in calking wooden ships. See Tar.

Tar. — The variety of tar known as wood tar which is made from the pine sap (see Tar) is produced almost entirely in North Carolina. A cord of pine wood will produce 40 gallons. Wilmington, N. C., is the headquarters for the world's supply of tar and crude turpentine.

Statistics. — The city of Savannah, Ga., is one of the largest markets in the world for naval stores. These form a large share of the foreign commerce of the city, which before the war totaled $70,000,000 annually.

NAVAL TACTICS. Before hostile fleets are brought into contact (this word indicating the dividing line between tactics and strategy) there are a number of questions to be decided, covering the whole plan of operations through¬ out the theatre of war. Chief among these are the

proper function of the navy in war; its true objective; the point or points upon which it may be concentrated ; the establishment of supply and coal depots ; the maintenance of communications between the home base and these depots ; the military or naval value of commerce-destroying as a secondary opera¬ tion of war and how it can be most efficiently conducted. All these are strategic questions and it is particularly in the field of naval strategy that the teachings of the past have a value as illustrative of principles and as pre¬ cedents. This is less true as to tactics when the fleets come into collision at the point or points to which strategic considerations have brought them.

The fighting order of navies is a line, which is called more properly a column because the ships are ranged one behind the other. If the arrangement of the guns, from van to rear, is regarded it will be seen, that they really are deployed on a line fronting the enemy. It is commonly known as an attack on van or rear, because of the columnar formation of the ships, but it is really a flank attack. Whichever flank is chosen, the attack on the other is essentially refused, because the numbers devoted to it are insufficient to press an attack home. The culmination of the sail era — Trafalgar — was fought on these lines. Nelson was a thought¬ ful and daring tactician and expressed reasons for attacking one flank rather than another, under different conditions in which the fleets presented themselves ; but, speaking generally, the rear was the better to attack, because the van could not come as soon to help the rear as the rear could the van. There are two primary elements of naval strength, one purely defen¬ sive and the other equally offensive. The de¬ fensive element comprises well fortified bases sufficiently equipped for the service of the fleet and strategically located; an efficient home base of supplies ; sufficient merchant tonnage to serve the needs of war; the protection of all lines of communication to strategical bases and the successful patrol of important trade routes; and the efficient control of all these activities by a system of quick and ready communication. The offensive element is the. fleet which must be ((well rounded out,® comprising capital ships (battleships and battle cruisers), scouts, destroyers, mine layers, submarines, aeroplanes, airships and auxiliaries. It must be trained, adequately manned with trained men, have its

magazines well stocked with ammunition, its storerooms and fuel spaces filled for weeks or even months should it be necessary to wait

upon the high seas for its opponent. The bat¬ tleship of to-day is the lineal descendent of the “Triremes* of Actium and the “Ships-of-the-Line* of Trafalgar and is intended to play the principal role in naval warfare. It carries guns of the largest calibre, is protected by steel armor and is regarded as the embodiment of the sea power of a nation. In a modern fleet the following types of ships should exist in co-operation with the battleships : battle cruisers, armored cruisers, protected cruisers, scout cruisers, destroyers, submarines, repair ships ammunition ships, supply ships, fuel ships! destroyer tenders, submarine tenders, hospital ships, mine depot ships, mine-laying ships, gun¬ boats, tugs and miscellaneous craft. The battle line, composed of those vessels upon which the maximum calibre guns are mounted contains the concentrated fighting strength of the nation. By many naval strategists the true solution of the service of security and information for the fleet lies in utilizing only vessels that can lie in the battle line. This reduces scouting to a limited area about the fleet. This theory de¬ cides against scout cruisers unless their use¬ fulness in the tactical battle line can be proved valuable. England and Germany have success- fully employed scout cruisers for mine laying and to support destroyers in an attack upon the enemy battle line. The battle line must not be shorn of gun power. The solution is to sacri¬ fice armor for speed in the types of ships to be used as scouts.

Naval operations, excepting raids against coast defenses, presuppose naval superiority by the attacker. Such operations may include one or. more of the following: blockade, recon¬ naissance, demonstration, raid, bombardment and run-by. No matter how complete and de¬ tailed may be the. information with which a naval commander is supplied when operations are projected, it must be verified and brought up to date by reconnaissance. The information usually desired is the location of batteries searchlights, stations and mine fields, arcs of fire, range and dead angles of batteries, land¬ ing places for troops, and to locate and chart landmarks for aiming points and compass courses. Reconnaissances may be made by day or night, at close or long range, and may be preliminary or in force. The latter are made when the coast defense commander will not dis¬ close information In any other way. Recon¬ naissances usually begin at. long range, with the hope of getting the desired information at small cost. A demonstration has for its ob¬ ject, to harass and wear out the garrison, to force expenditure of ammunition, or to cover some other operation. Raids are attacks upon more or less .exposed elements of the defenses, such as mine fields, obstructions, stations, searchlights and detached batteries. A bom¬ bardment is an attack upon the fortifications with intent to destroy or seriously cripple them, with a

view to a run-by, wherein the fleet or a part of it forces its way past the fortifications and attacks the city, naval base or fleet they protect. The. tactical grouping of armament is made to obtain its most prompt and powerful destructive effect in action. Tactical control begins with the fortress commander, and ex¬

tends down through fire and battery com¬ manders to the individuals. It depends to a large extent upon efficiency of communications, which fact is recognized by making the battery the basic tactical unit and providing a general defense plan for use when communications fail. The employment of the armament in defense against all forms of attack will depend upon many conditions, one of the chief being the state of the ammunition supply and the pos¬ sibility of replenishing it. The fortress com¬ mander must be able to analyze quickly and accurately the intentions of the fleet com¬ mander, and must employ all the force neces¬ sary to defeat them, keeping the fleet at a re¬ spectful distance with his mortars, and disclos¬ ing the least possible information consistent with defeating the enemy's intentions. Unless he has an ample ammunition supply, he must conserve his ammunition and make each shot count. He must be able to determine quickly which is the main effort of the hostile fleet and concentrate all necessary armament upon it. He must know the power of his armament and the general character of the ships he is at¬ tacking in order to assign his armament most usefully.

There are two general methods by which battle control may be exercised : The general defense plan and the individual control. The general defense plan seems simple, and is easily and quickly put into operation. It is well thought out long in advance, and carries writ¬ ten instructions. But it is difficult to decide in advance just what the enemy will do, so al¬ though the general defense plan is valuable and important, it can be considered only as sub¬ sidiary to individual control, which is the proper and correct way to exercise battle tac¬ tics. The fortress commander estimates the situation, decides upon the intentions of the enemy, and gives appropriate orders to the fire commanders, and during, the course of the ac¬ tion gives such additional orders as the changes in the situation warrant. Long-range actions are now the predominant feature of all naval engagements. During the Russo-Japan¬ ese War, the stronger party, as a rule, forced a decision at short range, while now the en¬ deavor is made to strike the decisive blow at long ranges. To accomplish this, advantage is taken of superior speed and greater range of guns. Such tactics are based upon the experi¬ ences from the Japanese War, and have been confirmed during the European War. A ship can be put out of action solely by shelV-fire, which ruins its power of navigation, destroys its

fire-control apparatus, and ravages the whole ship with fire and explosions. The fight off the. Falkland Islands illustrates this in a Vi?rˆ manner. Thus it would appear

that the battle cruiser, which, with superior speed, is able to force the engagement at long range, has a good chance against the “dread-nought, whose heavier armor protection is of no added advantage at such ranges. Admiral Rojestvensky said, after the Russo-Japanese V\ ar, that the deadliest enemy of the battleship was the wall of . fire created by the incessant bursting of projectiles. The European War has largely confirmed his opinion. In most re¬ ports expressions like “the vessel caught fire later on followed by explosions* can be read It must be borne in mind, however, that tht

more important ships which were sunk by fire during this war were of an older date and have not_ benefited from the experiences obtained during the war as to the value of the fire-ex¬ tinguishing apparatus. In spite of all technical progress and care in the manufacture of am¬ munition thei;e seems to have been a consider¬ able number of non-bursts, although the per¬ centage is smaller than during the Japanese War, where it is reported to have been 65 per cent. As on land, a characteristic feature of war on sea is the huge consumption of ammuni¬ tion, which far exceeds all calculations. The effect of high explosive shells bursting within 10 metres of the ship’s bottom is said to be as dangerous as a direct hit below the water line. High water-columns around a vessel caused by bursts on impact make the gunlayer’s task a difficult one. The indirect fire of the Canopus off the Falkland Islands, and of the Queen Elizabeth at the Dardanelles, shows that long- range fire, in connection with aeroplanes and balloon observation, is a great advantage. The lack of success in the naval operations on the coasts of the Adriatic and the Aegean resulted from the fact that ships of war are constructed and armed primarily to fight other ships and not to reduce permanent sea-coast defenses; their proper functions in the former operations are those of convoy, bombardment, disembarka¬ tion, blockade and the like. All militarv tech¬ nical literature shows that ships cannot con¬ tend successfully with high shore batteries. Ships are not armed to execute high angle fire. Their armament is of three kinds: large calibre for use against heavy armor; medium calibre for use against light armor and superstructure ; and small calibre for use against minor craft. The life of the large guns is very limited. No mortars or howitzers are carried.

To bring curved fire to bear on coasts' forts it is neces¬ sary for ships either to fire from a long dis¬ tance with their greatest permissible angles of elevation or to come in close to the shore, drop anchor and give the vessels a list sufficient to secure the required elevation of the guns. In the first case the fire will be inaccurate and in the second the ships will be exposed to the danger of very effective short range fire from the forts and also of going aground. The best way to resist an operation of disembarkation and bombardment is with a fleet acting offen¬ sively against the hostile fleet. If this is not possible recourse must be had to mobile forces sent to the threatened point.

After sufficient strategical and tactical scout¬ ing, the actual battle between the two battle lines will begin with a long range duel ; first with battle cruiser, as in the recent Jutland en¬ gagement, and afterward battle line against battle line, the battle cruisers leading their battle lines and protecting its head from destroyer attack. Destroyers, supported by scout cruisers, dash in against the head of their enemy's column after it is under the gunfire of the opposing battle line. From this point on each force, without orders and often without signal, carry out a prearranged tactical battle plan, the part each type is to play having been studied during the years of peace before the war began. The object of battle is to seek position and strike. Tactics is used to seek position in order to strike. Gunnerv does the striking. It is always difficult to define clearly naval strategy and tactics, yet these must be

clear in mind before the principles of naval war can be grasped. Strategy in distinction from tactics may be said to be the field of war from the point of view of one wishing to attain an object, while tactics is the field of war from the point of view of the executor. Strategy is the idea seeking materialization, a thought seeking its means of execution, while tactics gives the materialization of the idea and the means of carrying out the desires or wishes of the thought. Tactics is the servant of strategy in all naval operations, and a tactical problem without a strategical setting is like a quotation without the context.

Edward S. Farrow, Consulting Military and Civil Engineer.

NAVAL VETERANS, National Associa¬ tion of, a patriotic society founded by dele¬ gates from the various associations of naval veterans throughout the Union at a meeting held in the city of New York, in January 1887.

Any officer, appointed or enlisted man who has served in the United States navy, United States Marine corps or United States Revenue

Marine service during any portion of the time between 12 April 1861 and 25 Aug. 1865, who has not borne arms against the United States, or been convicted of any infamous crime, and who has been honorably discharged or resigned by an honorable acceptance of resignation, is eligible to membership in this association. There are local associations under the national charter, a paid membership of about 7,000, and 3,000 contributing members.

NAVAL WAR COLLEGE, United States.

See Naval Academy, United States.

NAVARINO, na-va-re'no, or PYLOS, pi'- los, Greece, a seaport town on Navarino Bay, on the southwest coast of the Morea. Its offi¬ cial name is Pylos (q.v.), ancient Pylos, the city of Nestor, now called Palaeokastro and Palaeo-Navarino, being at the north extremity of the bay. The Bay of Navarino was the scene of a great sea fight between the Athenians under Cleon and the Spartans, 425 b.c. From 1492 to 1821, the town was in the possesion of the Turks, when it was taken by the Greeks. The Turks recaptured it in 1825, and retained it until on 20 Oct. 1827 in Navarino Bay the Turkish and Egyptian navy of 89 ships was annihilated by 24 ships of the combined British, French and Russian fleets under Sir Edward Codrington, the British admiral, and brought about Greek independence. Pop. (est.) 3,000. Consult (Memoir of Sir Edward Codrington^ by his daughter (1873) ; Baedeker, K., (Greece J (4th Eng. ed., Leipzig 1909).

NAVARRE, na-var' (Sp. Navarra) , Spain, a northern province, formerly, with a portion of the department of Basses-Pyrenees, France, constituting the ancient kingdom of Navarre. The province has an area of 4,055 square miles; the surface generally is mountainous and bleak, but in the valleys, and along the river banks, the soil is fertile, producing wheat, maize, bar¬ ley and oats. The principal rivers are the Ara¬ gon, Arga, Ebro and Bidassoa. The mineral wealth comprises iron, copper and rock salt. The chief towns are Pamplona, the capital, Tu- dela, Olite and Estella. Pop. of province 316,- 914. Navarre was inhabited at an early period bv the Vascones, the progenitors of the Basques and Gascons. The Vascones were expelled by

the Romans. It was seized by the Visigoths in 470, invaded by the Saracens early in the 8th century, and fell under the sway of Charle¬

magne in 77 8. It became an independent state in 855. In 1035 Navarre was divided into three kingdoms — Navarre, Aragon and Castile. The first two became united in 1076, and again sepa¬ rated in 1134. In 1285 it became an appanage of France, but recovered its independence in 1328. Ferdinand conquered it in 1512. The estates of Navarre took the oath of allegiance to him in 1513, and it was incorporated with Castile in 1515. After this act of spoliation, there remained nothing of the ancient kingdom of Navarre beyond a small . territory on the north side of the Pyrenees, which was sub¬ sequently united to the crown of France by Henry IV of Bourbon, king of Navarre, whose mother, Jeanne d'Albret, was granddaughter of Queen Catherine; and hence the history of Navarre ends with his accession to the French throne, in 1589, the French monarchs, however, until Charles X, being called also King of Navarre. Consult Bordenave, Nicholas de, (Histoire de Bearn et Navarre) (Paris 1873) ; Lagreze, G. B. de, (La Navarre frangaise* (2 vols., ib. 1881—82) ; De Oloriz, Hermilio, (Re- sumen historico del antiguo reino de Navarra* (Pamplona 1887) ; De Moret, Tose,

NAVARRETE, na-var-ra'ta, Juan Fernan¬ dez, Spanish painter: b. Logrono, about 1526; d. Toledo, 1579. He was known as ((E1 Mudo,** the mute, being deaf and dumb. He imitated the monk painter of the Milanese school, Fra Vicente; he then de¬ voted himself almost entirely to the* study of Titian, whose style and coloring he reproduced so successfully that he became known as the (

NAVARRO, na-var'o, Madame. See An¬ derson, Mary Antoinette.

NAVARRO, Nicolas Eugenio. Venezuelan educator: b. Margarita, Venezuela, 14 Nov. 1867. He was educated at the Episcopal School and the Central University of .Caracas; was or¬ dained to the Catholic priesthood in 1890 and for nine years was engaged in parochial duty in the archdiocese of Caracas. From 1902 to 1905 he was professor of dogmatic theology and Sacred Scripture and since the latter year has served as rector and professor at Central University, Caracas. He was sent abroad by the. Venezuelan government to obtain a foun¬ dation of Capuchin friars for Venezuela. Dur¬ ing the anti-religious manifestations of 1896 he was an able defender of the religious orders. In 1899 he accompanied Bishop Duran as sec¬ retary to the Plenary Council of Latin America, at Rome, and in 1912 accompanied Archbishop Castro to the Eucharistic Congress at Vienna. In 1911 he was nominated deputy to the Con¬ gress of Municipalities in celebration of the

centenary of the independence of Venezuela. He published (Tres

refutaciones con motivo de otras tantas conferencias patrocinadas por la Masoneria de Caracas* ; (E1 incidente del Asilo de providencia* ; (Los conventos y las garan- tias constitucionales de los Venezuelanos* ; (Editoriales en La Religion . **He is director of La Religion, and is a contributor to Anales de la Universidad Central; the Co jo Ilustrado. and to (The Catholic Encyclopedia.**

NAVARRO, Pedro, Spanish general: b. Spain, 1446; d. Naples, Italy, 1528. He was engaged with Gonsalvo de Cordova in the Naples campaign of 1500 and made such skilful use of mines as to influence largely the out¬ come of the war. For this service he was created Count of Alvetto and given command of a naval expedition against the Moors. He was taken prisoner by the French in 1512 and despairing of being ransomed he joined the French army. In an attack upon Naples he was again captured and died soon after. Con¬ sult (Martiu de los Heros* in (Colecci6fi .de documentos ineditos para la historia de Espana* (Vol. XXV, Madrid 1854).

.ˆAVAS DE TOLOSA, Las, las na'vas da to*lo sa, Spain, a village of Jaen province, 38 miles by rail north of Jaen, which owes its ce¬ lebrity to the defeat near here of the Moorish army under Mohammed ibn Abdallah 16 July 1212, by the Spanish troops commanded by Alfonso VIII, assisted by an army of French and English crusaders. In the vicinity also, a battle was fought between the Spanish and French in 1812.

NAVASOTA, nav'a-so'ta, Tex., city in Grimes County, on the Navasota River, near its outflow into the Brazos River and on the Hous¬ ton and Texas Central and the Gulf, Colorado and Santa Fe railroads, 70 miles northwest of Houston and 29 miles south-southeast of Bryan. It has a substantial city hall and high school, the Atchison Institute, wagon factory, cooper¬ age, creamery, oil-mill, etc. Pop. (1920) 5,060.

■ NAVASSA, na-va'sa, West Indies, a small island off the southwest coast of Haiti; about two miles long and one and one-half miles wide; altitude, 300 feet. High bold cliffs bor¬ der nearly all the shore. In 1857, Peter Dun¬ can, an American, discovered on this island a deposit of guano estimated to amount to 1,000,000 tons. According to an act of Congress, passed 18 Aug. 1856 relative to the discovery of guano deposits on unclaimed islands, it was decided that the island of Navassa should be considered ((as appertaining to the United States.** Consult D'Invilliers, (Phosphate De¬ posits of the Island of Navassa* in Bulletin of the Geological Society of America (Vol II no 75-84, 1891). V

NAVE, in Gothic architecture, that part of an ecclesiastical edifice to the west of the choir, and in which the congregation assemble; the part of a church between the aisles.

NAVESINK (nav'e-sink) HIGHLANDS,

a low range of hills, in Monmouth County' New Jersey, south of Sandy Hook, and at the mouth of Navesink River. Mount Mitchell the highest point, is nearly 300 feet above sea-level On an elevation, 195 feet, stands a lighthouse with two towers 100 feet apart and 53 feet in height.' In each tower is a fixed white light

The Highlands are an important landmark to ships approaching <(The Narrows,® and the re¬ gion in this part of New Jersey is a favorite resort for residents of New York.

NAVICULAR DISEASE. See Horse, Care and Diseases of the.

NAVIDAD, La, la na-ve-dad', the name of a fort built by Columbus in 1493 on the coast of Haiti, and which was the first Spanish set¬ tlement in the New World. Here he left a company of between 30 and 40 men, but on his return in November of the same year found they had all been killed by the Indians and the fort destroyed. See Columbus.

NAVIGABLE RIVERS. See Rivers.

NAVIGATION. Navigation comprehends that branch of knowledge by means of which the geographical position of a ship is ascer¬ tained and kept account of throughout a voy¬ age. It enables a mariner, come from the other side of the world, to steer his ship for the port of destination before ever it has hove in sight. The subject is usually discussed in two parts, called respectively Navigation and Nautical Astronomy.

Navigation, in the limited sense, treats of determining the position of the ship by means of measurements made with reference to the terrestrial surface. It comprises ˆpiloting,® the process of conducting a ship in channels and harbors and along coasts where landmarks and aids to navigation, like lighthouses, beacons and buoys, are available for fixing position and where the depth of water and the dangers to navigation are such as to require a constant watch to be kept upon the

ship's course and frequent changes of heading to be made, and <(dead reckoning,® the art by which the geo¬ graphical position at any moment is deduced from the direction and amount of the ship's progress from a point of departure whose lati¬ tude and longitude are known.

Nautical Astronomy is that part of naviga¬ tion, in its comprehensive sense, which treats of determining the geographical position of the ship from observations of celestial bodies. As the method of piloting cannot be employed out of sight of land, the navigator at sea must find his geographical position either by dead reck¬ oning or by the observation of the sun, moon, planets and stars ; the latter method is the more exact, but, since it is not always available, the former must often be depended upon.

Of fundamental importance in navigation is the nautical chart — a miniature representation upon a plane surface, in accordance with some definite system of projection or development, of a portion of the navigable waters of the world. It generally includes the outlines of the adjacent land, together with the surface forms and artificial features that are useful as aids to navigation, and sets forth the depths of water, especially in the near approaches to the land, by soundings that are fixed in position by accurate determinations according to the meth¬ ods of hydrography. Except in charts of har¬ bors or other localities so limited that the cur¬ vature of the earth is inappreciable on the scale of construction, a nautical chart is always framed over with network of parallels of lati¬ tude and meridians of longitude, in relation to which the features to be depicted on the chart are located and drawn, and the mathematical

relation between the meridians and parallels of the chart and those of the terrestrial spheroid determines the method of measurement that is to be employed on the chart and the special uses to which it is adapted. A navigator, pilot¬ ing his ship in sight of objects whose locations are shown upon the chart, may determine posi¬ tion by (a) corrected cross-bearings observed by compass upon two known objects, (h) the distance and corrected compass bearing of a known object, (c) the corrected compass bear¬ ing of a known object and the angle measured by sextant between two known objects, (d) two compass bearings of a known object separated by an interval of time together with the com¬ pass course and the distance passed over by the ship during that interval, (e) angles measured by sextant between pairs of three known ob¬ jects. Although the choice of method is gov¬ erned by circumstances, the resulting position is always found by plotting on the chart. Fi¬ nally, in connection with the identification

of the ship's position by means of the chart, the useful application may be mentioned of taking soundings by means of the lead and line and noticing the correspondence of the charted depths with the series of observed soundings. In some parts of the ocean, even many miles from land, quite serviceable locations result from this practice. Specimens of the materials of the ocean bottom can also be brought up by filling a recess in the end of the sounding lead with grease to which such materials will ad¬ here, and, at times, these specimens also afford information of value, for the charts always specify the kind of bottom existing in various parts of the ocean.

Positions ascertained by dead reckoning are usually less exact than those determined by bearings or angles upon terrestrial objects, as well as those determined by observations of celestial bodies, because the accuracy of dead reckoning is affected by the imperfections aris¬ ing in determining the precise direction and distance sailed. The deduced course and dis¬ tance may differ from the course and distance actually made good by reason of bad steering, faulty estimates of the speed, unknown cur¬ rents, and outstanding errors in the deviation of the compass caused by the ship's magnetism and in the variation of the compass caused by the earth's magnetism. Notwithstanding these recognized defects, dead reckoning is an in¬ valuable aid to the mariner, affording him a means of plotting the position of the ship at any desired time in the interval between astro¬ nomical observations for finding geographical position ; furnishing an approximate position at the moment of taking astronomical observa¬ tions and thus proving to be a great conven¬ ience in computations based upon those obser¬ vations ; and finally, affording the only avail¬ able means of determining the location of a ship at sea during those periods of clouded sky, often several days in duration, when the obser¬ vation of celestial bodies is precluded. The beginning of dead reckoning, called <(taking a departure,® consists in finding the position of the ship before losing sight of the land and preferably while natural and artificial objects remain in good view, by the methods of pilot¬ ing, and then using the latitude and longitude of this position, obtained from the plottings on the chart, as the origin for dead reckoning; or

else, as in cases where the bearing and distance of an object on land of known latitude and lon¬ gitude has been chosen, using the position of this object as the origin of reckoning and the reversed direction of the

bearing, with the dis¬ tance, for the first course and distance, thus treating the proceeding as if the ship had started from the object on shore and sailed to the position where the bearing was taken. Each time that a new position is determined, the tak¬ ing of the departure is performed anew.

A complete record of data appertaining to the navigation of the ship is kept in a journal called the logbook. The various compass courses along which the ship has ad¬ vanced from the point of departure are set down in a column, and aside of each, in adjacent columns, are written the values of the devia¬ tion and the variation by which the compass course is corrected to find the true course of the passage, and, yet further, aside, of each true course, the distance which the vessel has advanced in that direction. With each true course enter the traverse table — a tabulation, for the values from degree to degree of the acute angles of a plane right-angled triangle, of the relative lengths of the hypotenuse (called distance), the side opposite the tabular angle (called departure), and the side adjacent to this angle (called difference of latitude)— and find in the distance column of the table, oppo¬ site to the value of the distance given by the dead reckoning, the corresponding values of the departure and the difference of latitude. These are written in four appropriate columns annexed to the dead reckoning form to the right of those above mentioned. These columns are headed Northing, Southing, Easting and Westing, in order to classify the differences of latitude according to whether the advance of the ship has been to the northward or to the south¬ ward upon the course considered, and the dif¬ ferences of departure according to whether the advance of the ship has been to the eastward or westward. When the position of the ship is required, add up all the northings and all the southings and subtract the lesser sum from the greater to obtain the resultant difference of latitude to the northward or the southward and also add up all the eastings and all the

westings and subtract the lesser of these sums from the greater to obtain the resultant de¬ parture to the eastward or the westward, and hence the difference of longitude to the ‘ east¬ ward or the westward. Since the number of nautical miles in the departure is equal to the product of the number of minutes of arc in the difference of longitude multiplied by the cosine of the middle latitude of the traverse, the con¬ version of departure into difference of longitude may be, and usually is, made by means of the traverse table — entering the table with the middle latitude in the place of the angle of the course and, opposite to that number in the lati¬ tude column which equals the number of miles of departure, finding the difference of longi¬ tude in

the distance column.

Then the difference of latitude is applied to the latitude of the last determined position or point of departure, which will give the lati¬ tude by dead reckoning. With the middle lati¬ tude, find the difference of longitude corre¬ sponding to the departure, and, applying this to the longitude of the last determined position or point of departure, the result will be the longitude by dead reckoning. The process is illustrated by the following example:

On 3 April 1918, at 1 p.m., took departure, Cape Henry Lighthouse (lat. 36° 55′ 35″ N long 76° 00′ 27″ W.) bearing (per ship's com¬ pass) 293 , distant 10 miles, ship's head east (p. s. c.) ; deviation 3° E., variation from chart o W. 1 hence ran till 8 a.m. next day as fol-
A > WSL ˆe9uired the course and distance by D K. from the lighthouse, and the latitude and longitude of the position reached :

COURSES (p.S.C.)

Distance

Dev.

Leeway

Wind

73°. . .

60

20

10

10

130

+3°

+6

+3

A

3°

3

3

3

3

Nly

Nly and Ely Ely

Nly and Ely Sly and Ely

118 .

160. . .

319. . .

26 .

+3

To illustrate the application of the various corrections, each course will be considered sepa¬ rately, and corrections applied one at a time, though in practice the algebraic sum is ap¬ plied mentally.

Bearing of Lt. (p. c.) Deviation .

Magnetic bearing. V ariation .

True bearing of Lt . Departure course . .

Course (p. c.). Leeway .

Course through water. Deviation .

Magnetic course. Variation .

True course.

DEPARTURE COURSE

293°

+3

296

—6

290

110

Course (p. c.) .

Leeway .

1st

course

2d

course

73°

+3

118°

+3

Course through water .

Deviation .

Magnetic course .

Variation .

76

+3

121

+6

79

— 6

127

—6

True course .

73

121

3d course

4th course

5th course

160°

+3

319°

—3

26°

—3

163

+3

316

—6

23

+3

166

—6

310

—6

26

—6

160

304

20

NAVIGATION

9

Having corrected the various courses, enter them in a traverse form and proceed with the solution.

The whole data should be in the tabulated form, and the above corrections would be made mentally, in ordinary practice.

or to have the means of measuring the distance she might sail, unless he should find methods independent of the dead reckoning for ascertain¬ ing his geographical position at sea. In this condition astronomy is ready to assist him and to afford him the means by which his latitude

WIND

Courses (p. s. c.)

Var.

W.

Dev.

Leeway

True courses

Distances

Nly .

Nly and Ely .

Ely .

Nly and Ely .

Sly and Ely .

73°

118

160

319

26

True bea —6°

—6

—6

—6

—6

ring of Lt. rev< +3°

+6

+3

—6

+3

irsed =

3°

3

3

3

3

110°

73

121

160

304

20

10

60

20

10

10

130

Difference of latitude

Departure

N.

S.

E.

W

17.5

5.6

122.2

3.4

10.3

9.4

9.4

57.4 17.1

3.4

44.5

8.3

145.3

23.1

23. 1

131.8

8.3

8.3

122.2

123.5

D. Long.

156.6

Lat. left = 36° 55′ 35″ N.

Difference in lat. = 2° 02′ 12″ N.

Long, left = 76° 00′ 27″ W.

Difference in long. = 2° 36′ 36″ E.

Lat. in = 38° 57′ 47″ Nf

The true course and distance made good may be found by entering the traverse table with the resultant departure, 123.5, and dif¬ ference of latitude, 122.2, and finding the cor¬ responding course, 45°.3, and distance, 173.7 nautical miles.

Supposing the voyage to be directed to Nan¬ tucket Lightship, in lat. 40° 37′ 05″ N. and long. 69° 36′ 33″ W., the true course and dis¬ tance to that destination may now be deter¬ mined :

Long, in = 73° 23′ 51″ W.

and longitude may be ascertained for the pur¬ pose of defining his position on the globe. The improvement of the instruments, the methods and the tables of nautical astronomy have been the constant solicitude of many generations. The altitude or angular distance above the visible horizon where the sea and sky meet may be accurately measured by means of the sex¬ tant, an instrument for measuring the angle between two objects by bringing into coin¬ cidence at the eye of the observer rays of light

Lat. of Nantucket Lightship. .

.... 40°

37′

05″ N.

Lat. in .

57′

47″ N.

Difference in lat .

. — 1°

39′

18″

99′ . 3

Middle lat .

47′

26″

Long, of Nantucket Lightship . 69° 36′ 33″ W.

Long, in . 7 3° 23′ 51″ W.

Difference in long . = 3° 47′ 18″ E.

Middle long . = 227’. 3

Converting this difference of longitude into departure, by entering the traverse tables with the middle latitude, 39° 47′ 26”, in place of a course, and the difference of longitude 227′ .3, in the distance column, the number in the latitude column shows the departure to be 174.6 nautical miles.

The difference of latitude, 99.3’, and the departure 174.6, found in juxtaposition in the traverse tables, indicate the true course to be 60 Yi degrees and the distance 201 nautical miles. Or, the same result may be found by measure¬ ment of the length, by the latitude scale, and the direction, with reference to the meridian lines, of the straight line drawn upon the nautical chart from the geographical position marked by the latitude and longitude by dead reckoning to the position of the representation of Nan¬ tucket Lightship.

But it would be of imperfect avail to the mariner to know the course which his vessel may make with respect to the sphere,

received directly from the one and by reflection from the other, the measure being afforded by the inclination of the reflecting surfaces. By reason of its small dimensions, its accuracy, and, above all, the fact that it does not require a permanent or a stable mounting but is avail¬ able for use under the conditions existing on shipboard, it is a most important instrument for the purposes of the navigator.

At the instant of taking an observation of altitude, the time at the meridian for which the ephemerides of the celestial bodies are tabulated must become known ; and this is given by the chronometer, a portable timepiece of superior workmanship, differing from an ordinary watch

in having the force of its mainspring rendered uniform by means of a variable lever. Owing to the fact that on a sea voyage a chronometer is exposed to many changes of temperature, it is furnished with an expansion balance, formed of a combination of metals of different expansive qualities, which produces the re¬ quired compensation. In order that its working may not be deranged by the motion of the ship in a seaway, the instrument is carried in gim¬ bals. As the regularity of the chronometer is essential for the correct determination of a ship’s position, it is of the greatest importance that every precaution be taken to ensure the accuracy of its indications. There is no more

certain way of doing this than to provide a vessel with several of these instruments — pref¬ erably not less than three — in order that if an irregularity develop in one, the fact may be revealed by the others. The American- Ephemeris and Nautical Almanac is divided into three parts as follows: Part I, Ephemeris for the meridian of Greenwich, gives the ephemerides of the sun and moon, the geo¬ centric and heliocentric positions of the major planets, the sun's co-ordinates and other fun¬ damental astronomical data for equidistant intervals of Greenwich mean time; Part II, Ephemeris for the meridian of Washington gives the ephemerides of the fixed stars, sun, moon and major planets for transit over the merid¬ ian of Washington, and Part III, Phenomena, contains predictions of phenomena to be ob¬ served with data for their computation. Tables are also appended for the interconversion of mean and sidereal time and for finding the lati¬ tude and azimuth by an altitude of Polaris.

The American Nautical Almanac is a smaller book made up of extracts from the ((Ephemeris and Almanac" just described, and is designed especially for the use of navigators, being adapted to the meridian of Greenwich. It con¬ tains the position of the sun and moon, to¬ gether with the ephemerides of the planets Venus, Mars, Jupiter and Saturn, and the ap¬ parent places of 55 stars for the first of each month and the Greenwich mean time of transit at Greenwich for each of these stars, also the mean places of 110 additional stars; solar and lunar eclipses are described, and the tables for the interconversion of mean and sidereal time and for finding the latitude by Polaris are included.

The elements dependent upon the sun and moon are placed in the first part of the book, arranged according to hours, days and months of the year. The right ascension of the mean sun for the entire year is given at one opening, also the mean time of sidereal noon at Green¬ wich ; the declination of the sun, equation of time, the right ascension and declination of the moon and the moon's horizontal parallax and semi-diameter are given for every even hour throughout the year. They must be taken from the almanac for some definite instant of Green¬ wich mean time. In computations from obser¬ vations that depend upon the time of the sun's meridian passage, at which instant the local ap¬ parent time is 0 hours, and the Greenwich appar¬ ent time is equal to the longitude, if west, or to 24 hours minus the longitude, if east, it becomes necessary to correct the equation of time for longitude, before it is applied to the Greenwich

apparent time to obtain a Greenwich mean time for use in taking out other desired data. This Greenwich mean time is sufficiently correct for all practical purposes as the equation of time never changes more

than 1.3 seconds in an hour. The Ephemeris, being computed for the Green¬ wich meridian, contains the right ascension, de¬ clinations, equation of time, and other elements for given equidistant intervals of Greenwich time. Hence, before the value of any of these quantities can be found for a given local time it is necessary to determine the corresponding Greenwich time. Should that time be one for which the Nautical Almanac gives the value of the required element, nothing more is necessary than to employ that value. But if the time falls between the almanac times, the required quan¬ tity must be found by interpolation. The al¬ manac contains the rate of change or difference of each of the principal quantities for some unit of time, and, unless great precision is required, the first differences only need be regarded. In order to use the difference columns to advan¬ tage, the Greenwich date should be expressed in the unit of time for which the difference is given. Thus, for using the hourly differences, the Greenwich time should be expressed in hours and decimal parts of an hour ; when using the differences for one minute, the time should be in minutes and decimal parts of a minute.

. Every celestial body is at a given instant of time in the zenith of some point on the earth's surface; this point is called the geographical position of the body; for the sun, it may be called the subsolar point, for any other heavenly body, the subastral point. The theory being the same for all bodies, the method, as applicable to the sun, will be described. The sun being in the zenith of a given place, one-half of the earth will be illuminated (neglecting refraction), and the other half . will be in darkness ; the dividing line, called the circle of illumination, will be everywhere 90 degrees from the subsolar point. To an observer any¬ where on the circle of illumination, the sun will be in the, horizon ; at the subsolar point, the sun will be in the zenith, and therefore its altitude will be 90 degrees. If the observer is at any intermediate point between the circle of illumination and the subsolar point, he will have the sun above his horizon and at an altitude between 0 degree and 90 degrees. If a plane be passed through this interme¬ diate position, parallel to the circle of illumina¬ tion, its intersection with the earth's surface will trace out the circumference of a small circle, at every point of which, at the given instant, the _ sun will have the same altitude. This circle is called a circle of equal altitudes with respect to the sun, and the sun's zenith dis¬ tance, at the given instant, is the same at all points of the circle. Since the distance of the observer's zenith from the celestial body, in min¬ utes of arc, is the same as the observer's dis¬ tance in sea miles from the body's geographical position, and in the case of the sun from the subsolar point, when an observer measures the altitude of the sun, the

complement of which is its zenith distance, he actually finds his distance in sea miles from a known spot on the earth and hence locates himself on a circle of position or circle of equal altitude. The geographical position of a celestial body is located by its lat-

ltude and longitude like any terrestrial point ; the latitude being the body's declination, the lon¬ gitude the body's Greenwich hour angle, or number of hours elapsed since the body was on the meridian of Greenwich. In the case of the subsolar point, the latitude equals the sun's declination, and the longitude the Greenwich apparent time. If the subsolar point be located on a terrestrial globe and a circle, whose radius equals the observed zenith distance of the sun, is drawn on the globe, with the subsolar point as a centre, the observer will be somewhere on the circumference of this circle ; since the sub¬ solar point bears in a given direction from him, his position is approximately in the opposite direction from the subsolar point, so that the sun's azimuth at the time of the observation indicates the part of the circle on which the observer is situated; and his position would be fixed, if, haying the above data, he should find a second circle of equal altitudesr projected from observations of a second celestial body, or from observations again of the sun after a lapse of sufficient interval of time, the observer's posi¬ tion remaining unchanged. However, this graphic method cannot be used for the reason that it is impracticable to carry a globe of such dimensions as to admit of accurate results.

The circles of equal altitude will appear on the Mercator chart as shown in the accom¬ panying figure, being drawn out toward the north and south points on account of the ex¬ pansion of the scale of latitude of the Mer¬ cator projection. These curves are called <(Curves of equal altitudes." The right-hand side of the figure in which Si is the geographi¬ cal position of the body observed shows the curves at intervals of 10 degrees. It will be noticed that all these curves cross the paral¬ lels of latitude and meridians of longi¬ tude at different angles. Near the north and south points the curves run about east and west with the parallels of latitude, and a large error in longitude makes but a slight error in lati¬ tude ; near the east and west points the curves run with the meridians and a large error in latitude makes but a slight error in the result¬ ing longitude.

Suppose that on an afternoon in April an observer at sea on the north

Atlantic Ocean observes the true altitude of the sun's centre to be 50 degrees, the Greenwich mean time of observation being 1 hour, 15 minutes, 30 seconds. From the Nautical Almanac the sun's cor¬ rected declination is 10° N., the equation of time 0 minutes, 06 seconds, additive to mean time. The Greenwich apparent time is there¬ fore 1 hour, 15 minutes, 36 seconds. Hence the latitude of the subsolar point Si is 10° N. and its longitude 1 hour, 15 minutes, 36 seconds west, or 18° 54′ W. From this point Si as a centre the curve of equal altitudes with radius of 40 degrees will be the right-hand curve NXS on the Mercator chart. This curve tells us the fact that the observer is some¬ where on its circumference, However, if the bearing of the sun at the instant of sight is given, the quadrant containing the position is indicated. If, in the example, the sun bears southward and eastward, the ship is in the northwest quadrant. Again, suppose that after the lapse of 3 hours, 24 minutes, 24 seconds a second observation shows the sun's altitude to

be 40 degrees. During this interval the sun in its diurnal path will have passed to the west¬ ward at the rate of 15° of longitude per hour, carrying with it its system of curves of equal altitudes. The Greenwich apparent time be¬ comes 4 hours, 40 minutes, or the longitude of the subsolar point S2 is 70°. The declination is N. 10° 03′ 01", or the latitude of S2 is N. 10° 03′ 01", the zenith distance is 50°, the curve on the Mercator chart is N'XS', and the ship is somewhere on this curve. We now know that at the first observation the ship was on the right-hand curve NXS and at the second observation she was on the left-hand curve N'XS', therefore if the ship did not change her

position in the interval between the observa¬ tions, she was at one or the other of the two points (X or Y) in which the curves intersect, and the one which was the observer's position depends on the sun's bearings at the times of observation. If the observer, whose position is somewhere on the right-hand curve, can be sup¬ posed to make an instantaneous change of posi¬ tion through a distance of n sea miles directly toward or directly away from the geographical position Si, on a great circle passing through Si, the sun's altitude will be increased or di¬ minished by n minutes of arc ; if the course is kept at right angles to the bearing of the sun, he will keep on his original curve of alti¬ tude; if the course is at intermediate angles, the altitude will be changed proportionately to the product of the distance run in sea miles multiplied by the cosine of the difference be¬ tween the azimuth of the celestial body and the course of the ship; and the observer will be on another circle of equal altitudes, belong¬ ing, however, to the same system of circles, that is, the system having Si as a centre.

In going then from a point on one circle of equal altitudes, which was the ship's posi¬ tion at the first altitude, on a certain course and distance made good, the observer arrives at a point on another circle of equal altitudes, of the same system, however. The altitude at this latter circle corresponds to what would

have been observed there at the instant of the first observation. The circle of position can then be found after a run to the place of a second observation, either by reducing the first altitude to what it would have been at the place of the second observation at the time of the first observation ; or by taking a point in the first curve, representing the ship's approximate position, laying off the course and distance made good in the interval from it to a second point, and then drawing, through this second point, a curve parallel to the corresponding part of the first curve of altitude. The inter¬ section of this transferred curve with the curve of altitude of the second observation will give the ship's position at the time of the second observation. This general method is known in modern navigation as <(Sumner's double altitude method.®

Ordinarily it is inconvenient to plot the representations of the circles of equal altitude on a Mercator chart on account of their oval form; but upon other projections, like the stereographic, in which angles remain true and in which the scale is uniform within the limits of tolerance, the circles of equal altitudes ap¬ pear as circles upon the chart and may easily be described when the zenith distance of the observed body is not large. And this con¬ venient and satisfactory method of finding the position of the ship may also be employed with the Mercator projection in low latitudes within the extent through which the scale remains practically uniform. In certain cases, as may happen in the tropics, the sun may be observed when close to the zenith, say within a degree or so; the subsolar point located by its latitude and longitude (the latitude being the sun's dec¬ lination and longitude the Greenwich apparent time of observation) ; and that portion of the circle near the ship's dead reckoning position drawn with the true zenith distance as a radius. After the sun's azimuth has altered from 25 degrees to 30 degrees, and under such circum¬ stances it will do so in a very short time, draw a second arc as the result of a second obser¬ vation. Transfer the first arc for the run be¬ tween sights and the intersection of the trans¬ ferredˆ arc with the arc corresponding to the second observation will give the ship's position

with satisfactory accuracy. In using the method of double altitudes, there should be a change of bearing of the sun between observations of at least two points ; of course, the nearer the change is to 90 degrees the more nearly the resulting lines of position run at right angles to each other and the more clearly will their intersection be indicated. The principles of the Sumner double altitude method, as explained in the case of the sun, apply as well to any other celestial body; but, as a general thing, when one star may be observed others are available, so that two may be observed at one time and the ship may be located at one of the two intersecting points of the resulting circles of position. Suppose two stars are observed at the same moment at a given place; that one, whose subastral point is Si (see Fig.), has an altitude of 50 degrees and bears southward and eastward, and that the other, whose sub- astral point is S2, has an altitude of 40 degrees and bears southward and westward. The re¬ sult of the first observation locates the ship on the northwest arc of the circle of position

NXS, the result of the second on the northeast arc of the circle N'XS', and, therefore, at their northern intersection X. Such observations are known as simultaneous observations; for these observations bodies should be so selected that the resulting circles or lines of position will intersect at an angle not less than 30 degrees.

Simultaneous observations are preferred to double altitude observations, since from the former the position of the ship may be obtained at once without an interval of waiting and with¬ out the errors which arise from the uncertain¬ ties of the course and distance obtained when there is a change of position; besides, a third line may be obtained and the fix from two lines either verified or disproved, the fix being veri¬ fied when the three lines have practically the same point of intersection. In the figure, the circumference of a circle of position is repre¬ sented as having been laid down from S2, the geographical position of the observed body, as a centre with a radius S2X equal to the zenith distance of the observed celestial body; but it is evident that a small arc of the circum¬ ference, not differing sensibly from a straight line within the limits of uncertainty in the ship's reckoning, may be determined in the fol¬ lowing manner from a neighboring geograph¬ ical position, as at P, inside or outside of the circumference and at or near the position of the ship as given by dead reckoning: (1) Find the great-circle distance (zenith distance) and bearing (azimuth) of the geographical position of the observed 'body S2 from the observer's assumed position P ; (2) take the difference, in minutes of arc (nautical miles), between this zenith distance S2P due to the observer's as¬ sumed position, and the zenith distance S2X

found from the true altitude resulting from observation; (3) lay off this difference, which is called the altitude-difference, or intercept, fiom the assumed position P either away from or toward the observed celestial body accord¬ ing as the true altitude by observation is less or greater than the altitude at the assumed position, and through the point thus reached draw a line at right angles to the bearing. The line so drawn will evidently be a tangent to the circumference of the circle of position, and will be so nearly coincident with this circum¬ ference throughout such length as the Sumner line need have, in all those cases in which the zenith distance is as great as 10 degrees, that the tangent itself may be taken as the true line of position. . Obviously the only trigonometrical computation that occurs under this method is in calculating the length and bearing of the great-circle arc joining the position P, which is assumed or known from the dead reckoning with the geographical position, S2, which is al¬ ways in a latitude equal to the declination of the observed celestial body at the instant of obser¬ vation and in a longitude equal to the hour angle of the body from the prime meridian (Greenwich). In the case of the sun the Greenwich hour angle is expressed by Green¬ wich apparent time, and in the case of any other celestial body the Greenwich hour angle is found by adding together the Greenwich mean time and the right ascension of the mean sun as ascertained from the Nautical Almanac for the instant of observation; and from this sum subtracting the right ascension of the observed celestial body.

Being strictly in the nature of calculating the great-circle distance and course between two points whose latitudes and longitudes are given, these computations may be made accord¬ ing to the rules of trigonometry ; but in practice it is unnecessary to do so, since various alti¬ tude and azimuth tables give the distance and azimuth or true bearing, on the globe or on the celestial sphere, of any place from every other place, and consequently the altitude and azimuth or zenith distance and bearing that any celestial body would have at any given time to an observer situated in any given geographical position. So that an observer in a geographical position as yet unknown, about to measure the altitude of a celestial body for the purpose of deducing geographical nosi- tion, may assume beforehand a geographical position in the region of his station and find from the tables the altitude and azimuth which the celestial body would have if observed from the assumed position ; and then, comparing the altitude so taken from the tables with the true altitude obtained by measurement, may

at once find the Sumner line by laying off from the assumed geographical position along the direc¬ tion of the bearing an intercept, called the alti¬ tude-difference, and drawing through its ex¬ tremity a line at right angles to the bearing. After finding the altitude-difference or inter¬ cept, the simplest procedure consists in laving it off on the chart from the assumed position and drawing the Sumner line through its ex¬ tremity, but if, for any reason, this process is not desirable, the latitude and longitude of the extremity of the intercept, which is a point on the Sumner line, called the C(computed point,® may be found by the use of the Traverse Tables. The exact position of the observer on the Sumner line is, of course, indeterminate from one observation, unless either the latitude or longitude of the observer's position be known beforehand, but the computed point will always be nearer to the actual position of the observer than the dead reckoning or assumed position is. To obtain a fix, that is, to find the actual position, it is necessary to determine the intersection of the first Sumner line with another line of position, which may be another Sumner line or a line of bearing or any other line containing the ship's position at the same time.

Reverting to the example in which the posi¬ tion by dead reckoning was found to be in lat. 38° 57′ 47″ N. and long. 73° 23′ 51″ W., let it be supposed that an observation of the altitude of the lower limb of the sun, bearing eastward, was measured by sextant to be 32° 52′ 50", by an observer elevated 30 feet above the level of the sea, when the chronometer showed the Greenwich mean time to be 1 hour, 30 minutes, no seconds after noon on 4 April. The true altitude of a celestial body at any place on the earth's surface is the altitude of its centre, as it would be measured by observer at the centre of the earth, above the plane passed through the centre of the earth at right angles to the di¬ rection of the zenith. The observed altitude, as measured at sea, may be converted to the true altitude by the application of the following- named corrections: Index correction, dip, re¬ fraction, parallax and semi-diameter. The cor¬ rections for parallax and semi-diameter are of inappreciable magnitude in observations of the

fixed stars, and with planets are so small that they need only be regarded in refined calcula¬ tions. Excepting the index correction, which appertains to the particular instrument with which the measurement has been made, the cor¬ rections named are found tabulated in nautical works for the convenience of navigators. Since the dead reckoning is uncertain, let it be as¬ sumed that the ship has arrived in lat. 39° N. and long. 73° 30′ or 4 hours, 54 minutes W., then the hour-angle of the sun eastward of this meridian would be the difference be¬ tween the longitude and the Greenwich mean time, or

3 hours, 24 minutes.

Entering the table of simultaneous altitudes and azimuths of celestial bodies under lat. 39° and declination 5° 30′ N., being the sun's declination as ascertained from the Namtical Almanac for Greenwich mean time, 1918, 4 April, 1 hour, 30 minutes, the altitude and azimuth that the sun's centre would present at the hour angle 3 hours, 24 minutes east of the meridian to an observer in lat. 39° N. and long. 73° 30′ are found to be 33° — 10.2′ in altitude and N. 112.4° E. in azimuth. But the altitude of the sun's lower limb as measured by the sextant, being corrected by adding 9° 16', the amount of the combined corrections taken from the tables, shows the true altitude of the sun"s centre at the in¬ stant of observation, in the actual position of the ship, to be 30° 2.1'. Consequently the ship is located on a line running 112.4° ±90° or N. 22.4° E. and S. 22.4° W. through a point dis¬ tant from the assumed position (39° N. 73° 30′ W.) by the amount of the altitude-differ¬ ence (33° 10.2'-33° 02.1'), 8.1 nautical miles, laid off in the direction of the azimuth, N. 112.4° E.

Or, the Sumner line may be defined by its direction, N. 22.4° E. and S. 22.4° W., and the geographical position of the (

Difference

Difference

Course,

Distance,

latitude

Departure

longitude

112°. 4

8. 1

S.

E.

E.

3.08

7.49

9.64

Lat. of assumed position . 39° 0(y 00″ N.

Difference in lat . 3′ 05″ S.

Lat. of computed point .

. 38°

56′

55″ N.

Long, of assumed position .

.... 73°

30′

00″ w.

Difference in long .

9′

38″ E.

Long, of computed point .

. 73°

20′

22 “W.

To conclude the illustration of the proceed¬ ings leading to the definite determination of the geographical position of the ship from observa¬ tions of celestial bodies another observation must be chosen, giving a second Sumner line whose intersection with the first line, after the first line has been transferred parallel to its original direction by an amount in direction and distance represented by the true course and distance of the ship’s advance during the inter¬ val between the observations, will denote the

required position. Let a meridian altitude of the sun.be chosen for this purpose, showing the true altitude of the sun's centre, bearing south, to be 56° 10′ 00″ at the instant of its culmina¬ tion in transit over the meridian of the ob¬ server on 4 April after the ship had proceeded 40 nautical miles on the true course N. 60° E. from the position at 8 a.m. The Sumner line giyen by the noon observation of the sun will coincide for a short length with a parallel of latitude, since its direction must be at right angles to the bearing of the sun, which, being to the southward of the observer on his meridian, would have an azimuth of 180 degrees from the north point at the time of observation. The declination of the sun at the instant of observation, as ascertained from the Nautical Almanac , at Greenwich mean time, 1918, 4 April, 4 hours, 50 min¬ utes, is 5° 34′ north of the equator, and since the sun is 33° 50′ south of the zenith of the observer, as shown by the remainder found by subtracting the sun's true altitude from 90 de¬ grees, the declination of the zenith of the observer must have been 5° 34′ + 33° 50′ or 39° 24′ north of the equator. The declination of the zenith being equal to the latitude of the place, the parallel of latitude on which the ship was located at the time of the noon observation must have been 39° 24′ N.

Transferring the computed point of the Sumner line determined from the morning ob¬ servation by the amount of the ship's run to noon :

Difference

Difference

Course,

Distance,

latitude

Departure

longitude

60°

40

N.

E.

E.

20

34.6

44.6

Lat. of computed point . 38° 56′ 55″ N.

Transfer in lat . 20′ 00″ N.

Transferred computed point. . .

16′

55″ N.

Long, of computed point .

20′

22″ W.

Transfer in long .

44′

36″ E.

Transferred computed point . . .

35′

46″ W.

The first Sumner line transferred to the time of the second observation is therefore a line passing through a position in lat. 39° 16′ 55″ N. and long. 72° 35′ 46″ W. in a direction N 22.4° E. and S. 22.4° W. The change of longitude for each minute of change in lati¬ tude, in passing along a Sumner line, called the longitude factor of the line, is tabulated in works on navigation; and it is by consulting such a table that the longitude factor of this line is ascertained to be 0.53. The difference of latitude between the latitude at noon and the latitude of the transferred computed point (39° 24′ 00″ — 39° 16′ 55”) is 7′ 55″

or 7.9', and this, being multiplied by 0.53, gives the product 4.2', which is the difference of longitude to be subtracted from the longi¬ tude of the transferred computed point in order to find the longitude of the noon position of the ship. Hence, the longitude at noon is 72° 35 .46 — 4′ 12 i or 72° 31′ 34"; and the noon position from the astronomical observations is:

39° 24′ 00″ N. and 72° 31′ 34″ W.

From this position the course to the destina¬ tion should be determined anew. The routine of a day's work at sea consists in working the dead reckoning, an a.m. Sumner line and azimuth taken when the sun is in its most favorable position for the purpose, a meridian altitude or the sun (or, when clouds interfere at noon, a sight for latitude as near the merid¬ ian as possible), and a p.m. Sumner line and azimuth. This represents the minimum of work, and it may be amplified as circumstances render expedient; but no part of it should ever be omitted unless cloudy weather renders its performance impossible. The current may be found by comparing the noon positions as ob¬ tained by observations and by dead reckoning; and the day's run is calculated from the differ¬ ence between the day's noon position by ob¬ servation and that of the preceding day. To "current® is usually attributed all discrepancies between the dead reckoning and observations ; but it is evident that this is not entirely due to motion of the waters, as it includes errors due to faulty steering, improper allowance for the compass error, and inaccurate estimate of the vessel's speed through the water.

The compass error is obtained in connection with the morning and afternoon observations by ascertaining the sun's true bearing from the azimuth tables and comparing it with the bear¬ ing observed by compass. The variation indi¬ cated by the chart is taken away from the total error and the remainder is the deviation of the compass for the ship's heading at the time of the observation.

By performing the work that has just been described a good position is obtained at noon each day, which, in a slow-moving ship with plenty of sea room, may be considered suffi¬ cient; but conditions are such at times as to render it almost imperatively necessary that a more frequent determination of the latitude and longitude be made. If the ship is near the land or in the vicinity of off-lying dangers, if she is running a great circle course requiring fre¬ quent changes, if she has just come through a period of foggy or cloudy weather or if the in¬ dications are that she is about to enter upon such a period, or if she is running at high speed, it is obviously inexpedient to await the coming

of the next noon for a fix. The re¬ sponsibilities resting upon the navigator require that he shall earlier find his ship's position ; and generally speaking, the greater the speed made by the ship the more absolute is this re¬ quirement. The key to all such determinations will lie in the Sumner line. The mariner must keep in mind two facts: First, that a single observation of a celestial body can never, by itself, give the point occupied by an observer on the earth s surface ; and, second, that whenever any celestial body is visible, together with enough of the horizon to permit the measuring of its altitude, an observer may thereby deter¬ mine a line whidh passes through his own posi¬ tion on the earth's surface in a direction at right angles to the bearing of the body. See Astronomy ; Compasses ; Hydraulic Engi¬ neering; Latitude; Longitude; Log; Mete¬ orology ; Sextant ; Sounding.

Bibliography.— Bowditch, Nathaniel, Amer¬ ican Practical Navigator) (New York 1802- rev. ed. ,1911); Chatterton. E. K.. (Philadelphia 1913) ;

Coffin, J. H. C., Navigation and Nautical As- tronomy) (New York 1902) ; Gill, James, (Text-Book on Navigation and Nautical As¬ tronomy) (New York 1905) ; Knight, A. M., 'Modern Seamanship) (6th ed., ib., 1914); Muir, W. C. P., Navigation and Compass Deviations) (rev. and enlarged ed., Annapolis 1918) ; Pitt-Rivers, A. H., (Early Modes of Navigation) (in (Evolution and Culture,) Ox¬ ford 1906) ; Poor, C. L., Nautical Science in Its Relation to Practical Navigation) (New York 1910) ; Walker, Asa, Navigation) (Balti¬ more 1888).

George W. Littlehales, United States Hydrographic Office.

NAVIGATION, Freedom of. See Seas,

Freedom of the.

NAVIGATION ACT, an important act passed by the British Parliament in 1651 for the protection of British shipping and commerce. In relation to early American conditions the act provided that all colonial trade should be carried on in ships built and owned in England in the colonies (a provision which stimulated colonial shipbuilding), and that, in the case of many specified goods, trade should be with England only. The act was largely rendered inoperative by colonial smuggling. The efforts at last made to enforce the rule were among the chief causes of the Revolution.

NAVIGATION LAWS, as adopted by the United States in 1792-93, have been in oper¬ ation since that date with few changes or revi¬ sions. The laws contain the following provi¬ sions : No vessel, unless entirely built in this country and wholly owned and officered by Americans, is considered an American vessel having the right to be protected by the Amer¬ ican flag. No foreign vessel is permitted to en¬ gage in the American coasting trade, the same extending from Atlantic to Pacific ports. American vessels are no longer considered as such if even a partowner (with a few excep¬ tions) resides abroad for a short time. Trans¬ fer of an American vessel to foreigners pro¬ hibits it from ever again sailing under the American flag. If an American vessel makes any repairs in a foreign port, duty must be paid on the value of all such repairs on her return to this country. The repairing of foreign ves¬ sels in our ports, with foreign materials, is placed under restriction. A tax of six cents per ton of their burden, called a tonnage tax, is imposed on all vessels (except fishing and pleasure vessels) engaged in trade to ports not in North or Central America and a few other specified places, the maximum aggregate tax in any one year not exceeding 30 cents. For¬ eign vessels pay the same tax, but if one of the officers of an American vessel is a for¬ eigner, it is forced to pay an additional tax of 50 cents. Materials for the construction of vessels for foreign trade may be imported free of duty, but the duty must be paid if the vessel engages for more than two months a year in the coasting trade. American vessels may unload at any port of delivery in the customs district, but foreign vessels can only discharge their cargoes at a port of entry, which is a certain designated port in each customs district in the United States. Exceptions are made when they are laden with coal, salt or similar mer¬ chandise in bulk. See Admiralty and Mari¬

time Jurisdiction; Maritime Law; Merchant Marine in the United States.

NAVIGATOR ISLANDS. See Samoan Islands.

NAVILLE, na-vel, Edouard Henri, Swiss Egyptologist: b. Geneva, 14 June 1844. He was educated at the University of Geneva, at King's College, London, at Bonn and at Paris ; went to Egypt in 1869, and there made import¬ ant discoveries; was appointed editor of the Nook of the Dead) by the London Congress of Orientalists in 1875, and in 1886 published (Das Aegyptische Todtenbuch der 18. bis 20. Dynastie) ; and in 1891 became professor of Egyptology at Geneva. He wrote volumes on the store city of Pithom (1885), on Goshen (1887), on Osorkou IPs festival hall (1892), (Deir el Bahari) ; (Les amis de la paix dans l'Afrique du Sud) (1901) ; (La Religion des anciens

Egyptiens) (1906; Eng. trans., (The Old Egyptian Faith,) 1909) ; (Papyrus fune- raires de la XXIe dynastie) (1912).

NAVY, History of the. From a period earlier than authentic history, the Greeks began to exhibit a spirit of naval enterprise, and as long as their independence remained the various states into which both the mainland and the islands of Greece, as well as their Asiatic colo¬ nies were divided, rivaled each other in plant¬ ing colonies and pushing their commerce in all directions. These states had also their arma¬ ments, and fought fiercely with one another, as well as wjth their foreign foes. The Athe¬ nians, Corinthians, Rhodians, even single cities like Chalcis and Megara, became renowned for their naval strength, and naval battles play a conspicuous part in the history of Greece. In the Persian invasions of Greece the size and power of the Persian fleets also forms a notable circumstance, and the great battle of Salamis (480 b.c.), in which Themistocles defeated the fleet of Xerxes, was the turning-point of the last Persian invasion. The smallness of the Greek galleys, and the superior size and num¬ ber of those of the enemy, render this battle remarkable. The details of the tactics em¬ ployed in it, and even the position of the rival fleets, are still matters of critical disputation.

But centuries before the rise of any naval power in Greece, Phoenicia (q.v.) had, cer¬ tainly as early as 1100 b.c., a powerful fleet to protect its commerce and colonies through the Mediterranean from the attacks of pirates.

Among the Phoenician colonies arose one which in enterprise, ambition and power eclipsed the parent state. Carthage, the rival of Rome, rose to her high rank among the na¬ tions of antiquity purely in virtue of her naval commerce. In her long struggle with Rome it was mainly the wealth acquired by commerce which enabled her to maintain the conflict. The Carthaginians also stimulated the Romans to enter upon naval enterprise. A Carthaginian vessel which had been cast on the coast of Italy furnished the model for their first fleet, which consisted of 100 quinqueremes and 20 triremes. This fleet is said to have been built in 60 days. Duilius, who commanded it, wisely distrusting the seamanship of his improvised sailors, con¬ trived a means of *approximating his first con¬ test with the Carthaginians as nearly as pos¬ sible to a land fight. By the use of grappling irons peculiarly contrived the Roman vessels

were firmly attached to those of the enemy, and a struggle ensued, in which superior force and determination alone could influence the result. Thus the first great naval battle of Rome, fought off the Lipari Islands, 260 b.c., by the fleet of Duilius against a Carthaginian fleet of superior size under a leader named Hannibal, resulted in a complete victory, which was cele¬ brated by a triumph at Rome.

The Ancient Galley, the war-ship of the Greeks, was a narrow vessel about 100 feet in length. It was admirably fitted to move rapidly in smooth water, and the numerous rowers gave great impetus to the attack of the beak, which was its principal means of aggression. The bow curved inward, forming a circular beak, which was faced with iron ; or else it receded suddenly, having a single sharp point like a ploughshare, projecting at the surface of the water, and intended to open the side of an antagonist. Frequently the beak was formed to represent a lion, tiger or other ravenous beast calculated to inspire terror. It was always sur¬ mounted by the national emblem ; thus an owl stood on the prow of an Athenian galley; a cock on a Phoenician or Carthaginian ; and the eagle on a Roman. Here or at the stern were also placed the ensigns and standards, and trumpeters standing beside them sounding their shrill blasts to inspire courage at the moment of onset. From the bow to the stern there ex¬ tended a flooring or deck, which served as a battle-field for the mailed and heavy-armed sol¬ diers. The stern was covered with a circular shed or pavilion, richly carved and decorated with streamers and trophies. Under this was placed the tutela, representing some patron deity, to which sacrifices and prayers were of¬ fered, and which was held so sacred as to fur¬ nish a sanctuary to whoever took refuge there. From this elevated station, too, the commander surveyed the fight and directed the efforts of his followers. There were two distinct classes of officers and men in each galley. The com¬ mander of the soldiers was supreme, and under him the pilot, who took his station abaft, at the side of the steersman, directed all necessary evolutions and manoeuvres. The pilot was as¬ sisted in the command of the sailors by his mate, and by the boatswain or encourager of the rowers; while a musician marked the meas¬ ure of the stroke, and by the harmony of his voice and instrument inspirited the rowers when weary with toil. The rowers were fre¬ quently, as in more modern times, malefactors chained to the oar. Javelins and arrows were discharged in showers from the deck, or from turrets at the bow and stern. As a protection from these a curtain of hides was used, from behind which the soldiers discharged their mis¬ siles in return, and thrust with long spears used only at sea. In the centre were engines from which rocks were projected of size sufficient to sink a ship; and masses of iron called

dolphins were projected from the mast-heads to break the bottom of the enemy's vessel. But the chief means of offense was the attack of the beak, and to make it with advantage it was generally desired to gain the wind. Combustibles were also cast from ship to ship, and peculiar devices due to the ingenuity of the particular command¬ ers adopted on special occasions. The line of battle was usually triangular, the admiral's ship being at the angle in advance, and the line of

storeships forming the base. Before encoun¬ tering it was usual for the admiral to pass in a small boat throughout his fleet, haranguing his followers, and urging them to do their duty. Thus inspirited a shout of anticipated triumph would pass from ship to ship, and when the gilded shield was at length displayed as a signal for battle, the shrill trumpets sent forth their blasts, and the combatants rushed to the en¬ counter, rending the air with shouts and war songs. The battle won, the victors returned to port, towing their prizes, their ships being deco¬ rated with fragments of the wrecks, themselves crowned with laurel, and singing paeans to Apollo. The richest of the spoils was reserved as* an oblation to the gods, and broken or some¬ times entire galleys were placed in the precincts of the temples. Little change was made by the Romans in their mode of warfare down to the time of the fall of the empire. The emperors of Constantinople had still a fleet of galleys propelled by rowers.

Navies of the Middle Ages. — On the fall

of the Roman Empire naval enterprise declined, but only for a brief period. The honor of re¬ viving it is disputed by the French and the Italians. To the latter chiefly belongs the honor of leading the way in the development of modern European commerce, but for the growth of naval armaments we must look also to the north of Europe. Charlemagne had a considerable fleet both on the Mediterranean and the ocean ; but already in his time, and even in that of his predecessors, the settled states of Europe had begun to become subject to the piratical excursions of Northmen and Danes, which were afterward directed so per¬ sistently against England, and continued for several centuries to disturb its government. In the meantime the Italian republics of Venice and Genoa began to restore the commerce of the Mediterranean, and to open up communica¬ tions with India by the Red Sea and the Per¬ sian Gulf. The Pisans and Florentines fol¬ lowed, and in the time of the Crusades the chief naval armaments of the Christians were sup¬ plied by the Italian cities. The successors of Charlemagne did not follow his example in maintaining a regular fleet, yet Saint Louis was able to transport his own army to Africa and to defend his coast against the English, but Philip le Bel had recourse

to the Genoese against the English. The great naval battles of these times were fought among the Italian re¬ publics, or by them against the Turks, with whom they alternately traded and made war. After the epoch of the Crusaders we have a period which in one aspect of its development might be called the epoch of commerce and especially of mercantile navigation. The honor of leading the way in this new epoch belongs to the Portuguese. They were followed by the Spanish, the English, the Dutch, the French and ultimately by all the other nations of Europe, according to their means and opportunities. The Spanish navy reached its highest power in the time of Charles V and Philip II. Francis I attempted the revival ©f the French marine and it was. vigorously undertaken by Richelieu. The administration of Colbert revived both the mer¬ cantile and national navy, and the latter at¬ tained its chief strength and highest glory in the reign of Louis XIV, when it opposed/ and sometimes not unsuccessfully, the united navies

of England and Holland. The navy of Holland became powerful almost from the time of the national independence, and contended with suc¬ cess alternately against the fleets of England and France. Some of the most hotly contested naval battles on record have been fought be¬ tween the English and Dutch fleets.

Cannon are said to have been first used in naval warfare by the Venetians against the Genoese in 1370, a considerable time after their invention.

The Battle of Lepanto. — The famous battle of Lepanto, which was fought between the Christian powers and the Turks 7 Oct. 1571, may be considered as representative of the first stage of the transition from the earlier mode of warfare. The Christian fleet was collected in the port of Messina in September 1571. It was contributed by the powers who had joined in the Holy League. The Spanish fleet con¬ sisted of 77 Spanish, 6 Maltese and 3 Savoyard galleys under Don John of Austria, who com¬ manded the joint fleet; there were 12 papal galleys, under Marc Antonio Colonna; and 108 Venetian galleys and 6 galeazzi under Sebastian Veniero. The Turkish fleet, consisting of 300 vessels, under Capudan-pasha, Musinsade Ali, lay in the Gulf of Lepanto. Though the Turks were more numerous, the Christians were bet¬ ter armed and equipped. Their soldiers wore coats of mail and helmets, and were provided with firearms. The Turks defended them¬

selves with leathern shields and had bows and arrows in place of guns. The prows of the Christian galleys were less open and better de¬ fended than those of the Turks. The admirals, according to ancient custom, led the van. Both parties moved to the assault, but the wind changing at the moment favored the Chris¬ tians. The admiral's galleys closed after a brief cannonade, and grappled each other. The Spaniards boarded three times and were thrice driven back. A reinforcement of 200 men enabled them to return again to the assault with decisive effect and an indiscriminate slaughter of the Turks took place. The head of Ali was exhibited on a pole to his followers. The battle after this only waxed fiercer, and the Turks fought with the courage of despair. So intense did the struggle become that the galley slaves in both fleets joined in the contest; but while the galley slaves of the Christians, who con¬ sisted of criminals, fought on their own side in hope of earning a pardon, those of the Turks, who were Christian slaves, rose against their masters. Over 1 5,000 Christians are said to have been relieved from servitude by the vic¬ tory. The Turks lost besides 224 ships and 30,000 men.

Modern Navies. — The improvements deter¬ mined by the use of artillery were chiefly an in¬ crease in the size and offensive strength of the ships, and a relative diminution in the number of men. Oars were abandoned for sails. Bat¬ tles were fought and ships manoeuvred by the sailors, and the marines or organized body of soldiers became a mere auxiliary force, avail¬ able as sharpshooters and for land engagements. Two leading qualities now stood forth as the most important object to be attained in the con¬ struction and equipment of vessels for war — strength of offensive armament and speed and facilities of manoeuvring. These qualities did vol. 20—2

not now first acquire importance, but they gained in relative importance at the expense of a previously preponderating element of equip¬ ment, namely, the number of fighting men available for assault at close quarters. Two classes of vessels, according to the preponder¬ ance of one or other of these qualities, thus came to constitute the chief strength of modern fleets. The ship of the line, or first-class war-vessel, carried the strength of offensive equip¬ ment to the utmost limit practicable without sacrificing seagoing qualities. The frigate, only excelled in strength by a line-of-battle ship, was built and rigged with every artistic appli¬ ance to secure speed. Even line-of-battle ships were sometimes made too heavy for effective service, and facility of movement could not be altogether neglected with impunity; but the great point in a first-class vessel was the weight of broadside and a hundred or more guns on three decks were commonly carried. In a pitched battle it was the line-of-battle ships that bore the brunt of

the fight and decided the day. The frigates scoured the seas on special missions, escaped from the enemy's line-of-bat¬ tle ships by speed, destroyed his privateers and protected the commerce of their own state. During all the great European wars these were the leading types of vessels employed. The tactics of naval warfare during this period, allowance being made for the different means of offensive, did not differ materially from the ancient methods. To gain the wind of an adversary, to break his line and to engage him at close quarters with superior force, were still the main objects to be pursued. But a change took place when steam was introduced as a means of propulsion and iron as a material for the construction of vessels. Vessels clad in iron and steel armor superseded the oak-built ship of the former epoch. Improvements in the size, range and destructive power of projectiles effected a new revolution, or succession of rev¬ olutions, in the science of naval armaments, and the broadside gave way to a small number of powerful guns. The struggle between these new developments of offensive and defensive force still goes on, and the introduction of gun¬ boats, torpedo boats, submarines, torpedo de¬ stroyers, scout and battle hydroplanes and other craft have made naval warfare a new and peculiar science, totally different from the naval warfare of the past.

Bibliography. — Clowes, (Royal Navy 5 ; El¬ kin, (Naval Battles) ; Garbett, (Naval Gun- nery* ; Graviere, (Les Derniers jours de la marine a rames) (1885) ; Hoff, (Elementary Naval Tactics) ; James, (Naval History of Great Britain* ; Longridge, (Naval Guns* ; Mahan, (The Influence of Sea Power upon History, 1660-1783) (1890) ; (The Influence of Sea Power upon the Frence Revolution and Empire > (1892) ; (Life of Farragut* (1892) ; Nelson, (The Embodiment of Sea Power of Great Britain* (1896); Hnterest of America in Sea Power, Present and Future) (1897) ; Wes¬ sons of the War with Spain* (1899) ; (From Sail to Steam) (1907)); Mets, (Naval Heroes of Holland) ; Rawson, (Famous Naval Bat- tles) ; Wilson, Hronclads in Action, 1855 — 1895. >

NAVY BOUNTY. See Bounties.

NAVY DEPARTMENT, an executive de¬ partment of the government of the United States, created by Congress 30 April 1798, charged with the administration of the navy, with a cabinet officer at its head who is styled Secretary of the Navy. He is nominated by the President from

civil life, with the advice and consent of the Senate. Previous to the passage of the Act of 1798 naval affairs were administered by the War Department. The assistant secretary is also appointed by the President from civil life. Naval officers with¬ out executiye authority assist the Secretary and keep him informed as to details of the department. Certain specific duties devolve upon the . Secretary by law and in regard to these he is not subject to the direction of the President, as is the case generally, since the Constitution makes the President the com¬ mander-in-chief of the navy. An annual re¬ port is made to the President by the Secretary. The assistant secretary is charged with the supervision of docks, navy yards and the marine corps. Since 1880 the department has had a judge-advocate-general, whose duty is to re¬ ceive, revise and record courts-martial proceed¬ ings, examination board findings, inquiries, etc. There is also a general board, composed of the admiral and 13 other officers, by whom plans are formulated for naval construction and operation. In 1862 eight bureaus were estab¬ lished within the department, with a chief at the head of each appointed by the President from among the naval officers. These are the bureaus of Naval Operations; Yards and Docks; Navigation; Ordnance; Construction and Re¬ pair; Steam Engineering; Supplies and Ac¬ counts ; Medicine and Surgery. The first named is charged with the formulation and preparation of plans of operations of the fleet; the Bureau of Yards and Docks, the chiefs of which must be civil engineers, has charge of all public works at naval yards or elsewhere, and furnishes estimates for construction and supplies ; the Bureau of Navigation issues orders to individual commanders in the navy, whom it holds responsible for their fulfilment. It also has charge of education at the Annapolis Academy, at the various naval stations and on board naval vessels, the War College, etc., and keeps records of service and issues the Annual Register. The Bureau of Ordnance has charge of torpedo stations, proving grounds and naval magazines. It supplies explosives and ammuni¬ tion and supervises the manufacture of armor- plate for all naval vessels. All ships of the navy are designed, built or repaired by the Bureau of Construction and Repair in co-operation with the Bureau of Ordnance. The Bureau of Steam Engineering designs and has constructed all propulsion engines and auxiliary mechan¬ ism for naval vessels, all signal apparatus, v.g., wireless equipment, etc., coaling stations and oil tank reserve supplies. The Bureau of Supplies and Accounts has charge of the pur¬ chase of supplies, their storage and care, preparation of contracts, interpretation of new laws, relating to naval affairs, etc. Hospitals, hospital ships, laboratories, technical schools for medical and nurse corps, are under the Bureau of Medicine and Surgery. An office of Naval Intelligence is also maintained by the depart¬ ment with six

officers and an officer of marines

whose duty it is to prepare and publish infor¬ mation regarding naval affairs abroad and at home. A naval observatory is maintained at Washington, D. C., whence issues regularly the Nautical Almanac. The marine corps is in charge of an officer who is responsible directly to the Secretary of the Navy. See Cabinet; Naval Education; Naval Militia; Navy, His¬ tory of the; United States — Navy, and consult (Annual Reports of the Secretary of the Navy} (Washington, D. C.) ; Encyclo¬ pedia of American Government (Vol. II, New York 1912) ; Fairlie, (National Administration of the United States) (1905); Learned, H. B., (in Naval Institute Proceedings, Vols. XXII, XXIII, 1906-07).

NAVY LEAGUE OF THE UNITED

STATES, The, an organization formed in 1902 for the purpose of upbuilding the Amer¬ ican navy and issuing in its interests a monthly bulletin, The Navy League Journal. The League has a membership of 10,000; its headquarters are in Washington, D. C. ; of similar organiza¬ tions in Europe the German Navy League built up a considerable membership of nearly a mil¬ lion. The British Navy League, with sections in all the British colonies, has nearly as many members, and is a great power in Great Britain. The French Navy League, with a former Presi¬ dent of the republic as its president, has the support of the most influential, people of France.

NAVY MANOEUVRES. See Army and

Navy Manceuvres.

NAVY REGISTER, a government publica¬ tion issued annually by the United States Navy Department. It gives a complete list of the officers of the navy and the marine corps in order of their rank, lists of retired officers, resignations, dismissals, deaths, ships in service and other important naval information. Other governments issue somewhat similar registers.

NAVY OF THE UNITED STATES.

See United States, Navy of the.

NAVY YARD, a water-frontage usually including large storehouses, machine shops, wharves, piers and dry docks used by the gov¬ ernment for building and repairing warships, keeping naval stores, etc., under the control of the Navy E)epartment of the government. In

Great Britain the term dockyard is generally used, and on the Continent the word arsenal. In England the royal dockyards are at Chatham, Sheerness, Portsmouth, Devonport and Pem¬ broke, besides the Deptford and the Woolwich storeyards. There are also royal dockyards at Haulbowline in Cork Harbor, at the Cape of Good Hope, Gibraltar, Malta, Halifax, Ber¬ muda, Antiqua, Jamaica, Sierra Leone, Trin- comalee, Singapore, Hongkong, Esquimalt (Vancouver's Island), Fernando Po, Sydney and Shanghai. The greatest naval centres of France are Cherbourg, Brest, Lorient, Roche¬ fort, Toulon and Bizerta in Tunis. Germany has three ports of war, Kiel, Dantzig and Wil- helmshafen. Trieste and Pola are the Austrian naval harbors. Russia has Cronstadt and Se¬ bastopol at home and Vladivostok in the Amur territory. In the United States the principal

navy yards are located as follows: New York (Brooklyn, N. Y.) ; Mare Island, Cal.; Nor¬ folk (Portsmouth, Va.) ; Portsmouth, N. H. (Kittery, Me.) ; Boston (Charlestown, Mass.) ; League Island (Philadelphia) ; Washington, D. C. ; Puget Sound and Pensacola, Fla. Besides the navy yards there are several naval stations, the important ones being at Boston, Mass ; Newport, R. I.; Indian Head, Md. ; Norfolk, Va. ; Key West, Fla.; New Orleans, La.; Bremerton, Wash. ; Port Royal, S. C. ; Ports¬ mouth, N. H. ; Philadelphia, Pa. ; Cavite, Philip¬ pines ; San Juan, Porto Rico; Tutuila, Samoa; Guam, Ladrones; Guantanamo, Cuba, Pearl Harbor, Hawaii; Sitka, Alaska, and Yokohama, Japan. At most of these stations high power radio stations have been erected. In the early history of the United States navy, nearly all the vessels were built and equipped at the navy yards. The six wooden frigates used in the Civil War were thus constructed, but the modern steel warships have been built chiefly by contract, by private builders. The Brooklyn navy yard has been long the most prominent, having four very commodious dry docks, where the largest size of battleships can be accommo¬ dated. The important departments are for manufacturing and repairs, including the hull and machinery divisions, public works, store¬ keepers, yards and docks, inspection, accounting and pay, and medical and surgery. The num¬ ber of employees before the war averaged about 6,000.

NAWA, na'wa, or NABA, Japan, sea¬ port at the southern end of the island Okinawa one of the Liukiu .group. It is enclosed in a coral reef and was opened to trade with China in 1894. A Japanese line of steamers trades between here and Kobe, the principal exports being

sugar, cotton, silks, etc. Pop. 47,600.

NAWANAGAR, capital of state of same name in India. See Nowanagar.

NAXOS, nak'sos, or NAXIA, nak-se'a, Greece, an island of the ˆEgean Archipelago, the largest of the Cyclades, lying east of Paros; length, 18 miles; breadth, 12; area, 170 square miles. It is hilly, beautiful and extremely pro¬ ductive, yielding fruit, wine, oil, silk, wheat and barley, while the higher grounds afford pastur¬ age for cattle. Cheese, honey and wax are exported, as well as wine, oil, fruit and grain. There are prehistoric quarries of granite, mar¬ ble and serpentine ; and emery exists in abun¬ dance, being exported in large quantities. The chief town or village is Naxos (pop. 2,000), near the northwestern part of the island, on a small bay with a harbor and insecure roadstead. In ancient times Naxos was celebrated for its wine, and played a prominent part in the legends of Dionysus or Bacchus, who is said to have found Ariadne here after she was de¬ serted by Theseus. It was anciently inhabited by Ionians who had emigrated from Athens. In 490 b.c. it was ravaged by the Persians. Having joined the Delian League, it revolted in 469 b.c. In 1207 it became the seat of a Venetian dukedom, and was captured in 1579 by the Turks. As a result of the war with Turkey in 1912-13 Naxos was occupied by Greece, and by the treaties of London and Athens it was given to her permanently by the Powers. Pop. about 20,000.

NAZARENE, nazˆa-ren', a designation of Jesus Christ. It appears in two forms in the Greek, Nazarenos and Nazoraios, both derived from Nazareth. Though this designation oc¬ curs 19 times in the New Testament the author¬ ized version only twice renders it <(Nazarene® (Matt, ii, 24; Acts xxiv, 5), elsewhere by the words ((of Nazareth.® The demoniac uses it in addressing Jesus in the synagogue at Caper¬ naum (Mark i, 24; Luke iv, 34) ; the people to Bartimaeus (Mark x, 47; Luke xviii, 37); the soldiers who apprehended Jesus (John xviii, 5-7) ; the servants at his trial (Matt, xxvi, 71; Mark xiv, 67) ; Pilate in the superscription (John xix, 19) ; the disciples on their way to Emmaus (Luke xxiv, 19) ; Saint Peter (Acts ii, 22; iii, 6; iv, 10); the false witness against Stephen (Acts iv, 14) ; the ascended Jesus (Acts xxii, 8), and Saint Paul (Acts xxvi, 9). At first it was applied to Jesus as naturally in¬ dicating his 'birthplace. The Galileans were not highly esteemed; their dialect was not pure, being faulty in pronunciation ; the population had blended with the heathen; they were seditious, hence the accusation against Saint Paul as <(ring-leader of the Nazarenes.® Naza¬ reth was a small, obscure town of Galilee, hence Nazarene became a term of reproach and is still used by Arabs as a general designation for Christians. See Nazareth.

NAZARENES, a primitive sect, called also Nazarˆeans, originally regarded as Christians, but classed by Epiphanius UHseres,* xxix) as heretic and as judaizing. In those times there were so many Judaizing Christians that it is difficult, if not impossible, to distinguish the Nazarenes from the other sects. Jerome (Ep. lxxxix ad Augustinum) applies to them the term <(Minaeans,® a word which recalls ((Min® often used in rabbinical literature to designate heretics, mostly Christians who still followed Jewish customs — the two special sects being either Ebionites or Nazarenes. In the Koran, Christians are called Al-Nasara, from Nazarelt. The Mandaeans still term themselves ((Naso- raya.® The last of the Church Fathers to refer to the Nazarenes was Theodoret, who also con¬ fuses them with the Ebionites. Consult Hilgen- feld, (Die Ketzergeschichte des Ur Christen- tums) (pp. 441-445, Leipzig 1884) ; Krauss,

NAZARENES, nickname of a certain school of German painters who, not only in coloring and technique, but in representation of ideas, professed to reproduce the method and style of Italian painters of the 14th and 15th centuries, Giotto, Fiesole, Perugino. The leaders in this movement were Overbeck, Schadow, Veit, Schnorr and Carolsfeld, who founded at Rome ((The Congregation of the Brothers of Saint Isidore.® Schnorr and Schadow later on left the brotherhood. A similar movement in Eng¬ land was initiated by the Pre-Raphaelites (q.v.). Consult Janson, (Deutsche Praraphaeliten* (in Zeitschrift filr bildene Kunst, Leipzig 1901).

NAZARENES. See Ebionites.

NAZARETH, naz'a-reth (ancient Nassra, that is, ((flower® ; modern En-Nasirah, en na- se'ra), Palestine, a city noted for being the home of Jesus Christ. It is about 20 miles in direct line from the Mediterranean Sea, 15

miles from the Sea of Galilee and 70 miles north of Bethlehem (q.v.). The distance to Bethlehem by the usual route is 110 miles. The city is built in the form of an amphitheatre, in a valley which is 1,115 feet above the level of the sea and surrounded by hills. On the south is the plain on which the Nazarenes threshed their wheat, and farther away is the plain of Esdraelon. From the summit of the hills which surround the city a fine view of the surrounding country may be obtained.

The Nazareth of the time of Jesus extended farther up toward the summit of the hills (Luke iv). The place was the home of Mary the mother of Jesus, and of Joseph, the hus¬ band of Mary. The city is not mentioned in the Old Testament; but it is referred to several times in the New Testament (Luke i, 26; John l, 46, and other places). The streets are nar¬ row, but well paved; the houses are principally pf stone. The house in which Jesus lived was held in esteem in the early ages of Christianity, but when the place came into possession of the Moslems, Christians who approached the village were in great danger. At the time of the Cru- sades. (q.v.) the place was ornamented and kept in good order, but again in 1291 the Mos¬ lems gained possession and the village declined The Franciscan Fathers erected a church and monastery in Nazareth in 1300, but they were expelled in 1362. They returned in 1468, but were obliged to leave in 1542, and returned in 1620. They are now in Nazareth and under their auspices the Church of the Annunciation and several other churches and chapels have been built. The Fathers give hospitality to all travelers who visit the place. The pilgrim house is called ((Our Lady of America,® as it was erected by the contributions of Roman Catholic Americans. The house in which the Holy Family lived is said to be now in Loretto (q.v.), in Italy. Some of the points of interest are the church of the Annunciation, the foun¬ tain of the Virgin, the workshop of Saint Joseph, the church of the schismatic Greeks, church of the United Greeks and the mensa Christi (table of Christ). Tradition relates of the. last mentioned, that it is the rock upon which Jesus Christ took a repast with his dis¬ ciples. Saint Francis of Assisi visited Nazareth in 1219; and Saint Louis, king of France, and his wife, visited it on 25 May 1251. The Fran¬ ciscan Fathers have a school for boys and the Ladies of Nazareth a school for girls. There is one hospital in charge of Brothers of Saint John of God, a school for boys under the Brothers of the Christian Schools and a free dispensary and home for the aged in charge of Sisters. The population is estimated to be about 11,000, of whom 2,400 were Roman Cath¬ olics (including three rites), 4,000 . schismatic Greeks, 250 Protestants and 4,000 Moslems. Strange as it may seem, there are no Jews in Nazareth. The city was taken by Australian cavalry on 20 Sept. 1918. Consult Baedeker K ‘Palestine and Syria> (Leipzig 1906) ; Conden -nTieint Work in Palestine> (London 8?7); Buhl, Franz, ‘Geographic Palastinas® (Freiburg 1896) ; Sanday, W., ‘Sacred Sites of the Gospels> (Oxford 1903) ; Scrimgeour F T ‘Nazareth of To-day> (Edinburgh 1910) * Ramsay, Sir W. M,, ‘Education of Christ* (new ed., New York 1911) ; De Hamme (trans¬ lated by Rothier), ‘Ancient and Modern Pales-

tine) ; De Vogue, ‘Les eglises de la Terre- Sainte> ; Roger, ‘La Terre-Sainte) ; De Hamme, ‘Guide-Indicateur des sanctuaires et lieux historiques de la Terre-Sainte* ; Stanley, A. P., ‘Sinai and Palestine) (new ed., New York 1903) ; Smith, G. A., ‘Historical Geogra¬ phy of the Holy Land* (ib. 1904) ; Guerin, V.. ‘Galilee) (Paris 1880).

NAZARETH, Pa., borough in Northampton County, on the Delaware, Lackawanna and Western and the Lehigh and New England railroads, about five miles north by west of Easton and 100 miles northeast of Harrisburg. It is near large anthracite coal fields and has considerable manufacturing. The chief indus¬ trial, establishments are cigar factories, cement works, paper and hosiery mills, lumber and planing mills, carriage works, foundry, machine shops, lace factory, guitar factory, creamery and large brick and coal yards. There is con¬ siderable trade in manufactures and coal. It is the seat of the Nazareth Hall Military Acad- an(f has Gray Cottage and the historic W hitefield House. There is an Indian monu¬ ment about 180 years old and the borough ex¬ hibits what is believed to be the oldest piece of fire apparatus in the United States — a fire- engine imported from England in 1791. Pop (1920) 4,288. P-

NAZARETH, Sisters of Charity of. See

Orders, Religious.

NAZARITE, an Israelite who bound him¬ self or herself to the service of Jehovah by a special vow, the obligations of which are stated in Numbers vi, 1-21. The word is derived from a Hebrew root meaning separation and is some¬ times translated in the Greek version of the Septuagint by a word that means sanctified or consecrated. The principal stipulations of the vow bound the Nazarite to abstinence from wine or strong drink and from eating of grapes, and forbade him to cut or shave off the hair of his head, or to touch a dead body. The duration of this vow according to Jewish canons could not be less than 30 days ; though some took the vow for life. Samson, Samuel and John Baptist are mentioned in Scripture as perpetual Nazarites, of which there were two classes, those who were permitted to diminish their hair when it became too heavy, if they were willing to bring the three appointed sacri-

rCec’jˆjUm’ v*’ ; and those who were

forbidden to diminish their hair, but could touch a dead body, as Samson did the jaw-bone of an ass, without being defiled.

The institution of Nazaritism was intended to typify the separation and restraint of a holy life. The growth of the hair indicated the viril- lty ofheroic virtue; the flowing locks symbol¬ ized childlike simplicity, power, beauty, liberty and the unchecked employment of human fac¬ ulties in the service of God. Maimonides speaks of the dignity of the Nazarites as being equal to that of the high-priest ; according to Eusebius the historian (Hist. Eccles. ii, 23), Nazarites were the only Israelites, excepting the high-pnests, who were permitted to enter the Holy of Holies. Parents could dedicate their prospective children to the life of a Nazarite. No community life or separation from the engagements and enjoyments of do¬ mestic or social life was entailed by the vow, whose special object appears to have been to

set forth symbolically among the people, in the person of separated devotees, useful and im¬ pressive lessons of submission to the law of holiness. The Nazarite law was closely de¬ veloped in post-Biblical times. A Mishua treatise, Nazir, is devoted chiefly to the laws in Num. vi, 1-4. Consult Michaelis, (Law of Moses > ; Bahr, (Symbolik des Mosaici Cultus) ; Driver, (The Books of Joel and Amos) (in the Cambridge Bible for Schools and Colleges, 1897) ; Gray, (The Nazarite) (in Journal of Theological Studies, 1900, I, 201 et seq.).

NAZARITES, a sect of Christians in Hun¬ gary, numbering about 80,000. They profess to go back to the New Testament for their belief and practice; reject Sunday as a holy day of rest, though for convenience adopt it as the day of public worship, which any man of good standing in the church can hold, as they have no separated and ordained ministry. They ob¬ serve Baptism and the Lord's Supper as sacra¬ ments, but refuse to take an oath or to serve in war. They believe in the Trinity, but reject transubstantiation and infant baptism. When a Nazarite is drawn in the conscription a sub¬ stitute is provided either by his relations or the parish to which he belongs. The sect found an entrance into Hungary through two journey¬ man locksmiths, Denkel and Kropacsek of Szegedin in 1839; the locksmith Henesei be¬ came its apostle and it rapidly grew from 50,000 members to its present number. The simple social life, charity and peacefulness of this sect puts them on a level with the follow¬ ers of George Fox in English-speaking countries.

NE TEMERE DECREE, a decree issued 2 Aug. 1907 by the Congregation of the Coun¬ cil of the Roman Catholic Church, and

which went into effect at Easter (19 April) 1908. This decree, binding on all Catholics through¬ out the world, pronounces marriages of Catho¬ lics null unless celebrated before a duly quali¬ fied priest, or the bishop of the diocese, and at least two witnesses. The law binds also in the case of marriages in which either of the parties is or has been a Catholic. Its aim primarily is to prevent more efficiently hasty and clandestine unions and to render it easier for ecclesiastical courts to decide as to the existence or non- existence of a promise to marry. In Germany parties to mixed marriages do not come under the decree.

NE2ERA, ne-e'ra, in Greek mythology, a name given to various nymphs ; also a maiden mentioned by Horace, Virgil and Tibullus, as well as in Milton's

NEAGH, na (local, na'ah), Lough, Ireland, in the province of Ulster, is the largest lake of the United Kingdom. It is situated about 12 miles west of Belfast, is 48 feet above sea-level, 18 miles long, has an average breadth of 10 miles, a maximum depth of 102 feet and an area of 153 square miles. It is well stocked with trout, char, pullen and other lake fish. It receives the waters of the Upper Bann, Black-water and Callan, and is drained into the North Channel by the Lower Bann. The lough is connected by canals with Belfast, Newry and the Tyrone coal-field.

NEAGLE, na'gl, John, American painter: b. Boston, Mass., 4 Nov. 1796; d. 1865. He was practically a self-taught artist although after

his marriage with the daughter of Thomas Sully he received instruction and encourage¬ ment from that painter. Applying himself to portrait painting he rapidly grew in favor with connoisseurs and was made director of the Pennsylvania Academy (1830), and in 1835 first president of the Artists' Fund Society of Phila¬ delphia. Many of his most important works are at Philadelphia, where his parents had set¬ tled shortly after his birth. The full-length of (1826), and the portraits of Rev. Joseph Pilmore, Henry Clay and George Washington are strong in drawing, harmonious in coloring and strikingly charac¬ teristic.

NEAL, nel, Daniel, English Non-Con¬ formist clergyman and historian of the Puritans : b. London, 14 Dec. 1678; d. Bath, 4 April 1743. He studied at the Merchant Taylors' School, at a Dissenters' theological school in Little Britain, in Utrecht for two years and in Ley¬ den for one; was assistant and then pastor of a congregation which met first in Aldersgate street and later in Jewin street; and wrote (History of New England) (1720), which won him the honorary degree of M.A. from

Har¬ vard, and the great (History of the Puritans) begun by John Evans but practicallv the work throughout . of Neal (1732-38). The latter book won him a high reputation with the Non- Conformists, but is not free from bias. It brings the history of English Dissent down to 1689. Consult the (Life of NeaP by Toulmin

(1793).

NEAL, David Dalhoff, American painter : b. Lowell, Mass., 20 Oct. 1838; d. 2 May 1915. He began his studies at the Munich Royal Academy, where he gained- the Great Medal. There he studied under Wagner. In 1869-76 he studied under Piloty. After 1879 he prac¬ tised chiefly portrait . painting. He painted many historical-romantic pictures and among them (Mary Stuart and Rizzio) ; (Oliver Crom¬ well Visits John Milton, > in the Cleveland Pub¬ lic Library; (Nuns at Prayer) ; (In the CrypD ; (Retour du Chasse,* etc. Among his portraits may be mentioned those of Adolph Sutro, Rev. Mark Hopkins, Judge Hoffman of California, D. O. Mills, Whitelaw Reid and Teackle Wal¬ lis, in the Athenaeum Club, Baltimore. There is little in his work that is distinctly American, his ideals and technique being of the Munich school.

NEAL, John, American author: b. Portland, Me., 25 Aug. 1793; d. there, 21 June 1876. He had little schooling; was a clerk in Boston; re¬ moved to Baltimore in 1816, began to practise law and write, fiction. He contributed largely to British periodicals, lived in England 1823— 27, being secretary to Bentham part of that time, and was the first successful American author abroad. He was (1838) one of the earliest speakers in behalf of woman's suffrage, was attracted successively by phrenology, mes¬ merism and spiritualism, and probably intro¬ duced gymnastics into America. Neal was the patron and guide of several younger writers, notably Edgar Allan Poe. Under the name Jehu O'Cataract he wrote a bombastic poem (Battle of Niagara* (1818). His novels include

' Brother Jonathan5 (1825), and (Rachel Dyer) (1828). He wrote the most of 'Paul Allen's American Revolution,) and much else with "marvelous rapidity.® Consult his 'Wandering Recollections of a Somewhat Busy Life)

(1869).

NEALE, Edward Vansittart, English re¬ former : b. Bath, England, 1810 ; d. 1892. He was educated at Oxford and became a Chris¬ tian Socialist. He founded the first co-opera¬ tive store in London and was instrumental in the establishment of numerous co-operative societies, mills, etc., and visited America in 1875 in the interests of his work and collected his observations in a paper called the Coopera¬ tive News.5 He published die Characteristic Features of Some of the Principal Systems of SocialisnP (1851); (The Mythical Element in Christianity) (1873) ; (A Manual for Cooper- ators> (1881), in collaboration with Thomas Hughes.

NEALE, John Mason, English clergyman and hymn-writer: b. London, 24 Jan. 1818; d. East G-rinstead, Sussex, 1866. He was gradu¬ ated from Trinity College, Cambridge, in 1840; became Fellow and tutor of Downing College in that year, and from 1846 until his death was warden of Sackville College, East Grinstead. His ecclesiastical views were those of the most advanced wing of the High Church party. In 1839 he was a founder of the Cambridge Cam¬ den Society, later the Ecclesiological Society, and in 1854 established at Rotherford the sister¬ hood of Saint Margaret, transferred in 1856 to East Grinstead. In rebuilding Sackville College chapel in 1850 he added ornaments denounced by Gilbert, bishop of Chichester, who inhibited him from officiating in the diocese, but the in¬ hibition was removed in 1863. Neale is said to have known 20 languages. His greatest work was in hymnology. A translator of Latin and Greek Christian hymns he has perhaps never been equaled. Fully one-eighth of ‘Hymns Ancient and ModenP (1878) is by him. Chief among his renderings are ‘Mediae- val Hymns and Sequences) (1851) ; ‘The Rhythm of Bernard of Morlaix5 (1858), and ‘Hymns of the East Church5 (1863). From the (Rhythm) have been adapted the familiar ‘The World is Very Evil,5 (Brief Life is here our Portion,5 ‘For thee, or dear, dear Coun¬ try,5 and Jerusalem the Golden.5 He wrote also an important ‘History of the Holy East¬ ern Church5 (1847-51) ; ‘History of the Jews5 (1841); ‘Stories for Children from Church History5 (1850) ; ‘Theodore Phranza, or the Fall of Constantinople5 (1857), and others. In 1884 a selection from his writings was pub¬ lished. Consult Tulian, dictionary of Hymn¬ ology5 (pp. 785-790, 1892).

NEANDER, na-an’der, Johann August Wilhelm, German theologian and church his¬ torian: b. Gottingen, 17 Jan. 1789; d. Berlin, 14 July 1850. A Jew, whose name was originally David Mendel. Upon his profession of Chris¬ tianity in 1806 he assumed the name Neander (“new man55). After studying at Halle under Schleiremacher and at Gottingen, he became professor at Heidelberg in 1812, and in 1813 at Berlin. At Berlin he lectured until his death, largely on church history,

but also on ethics, New Testament exegesis and systematic theol¬ ogy. His lectures were notable and his literary

activity great. He was the founder of modern church history, and beyond doubt the chief in that field in the 19th century. He viewed Christianity, not like either Supernaturalists or Rationalists, as a scheme of doctrine, but as a divine force ; and its history as the study of human history in terms of that force. His principal work is the (General History of the Christian Religion and Church5 (‘Allgemeine Geschichte der christlichen Religion und Kirche5) (1825-52), translated by Joseph Torrey (12th ed., 1881), and more widely circulated in England and the United States than in Ger¬ many. This survey is based on a most careful use of the sources, and is marked by rigorous analysis. Neander’s style here, as elsewhere, is somewhat involved at times, but free from pretentiousness. Schaff terms Neander <(a giant in learning and a saint in piety.55 He wrote further ‘Julian the Apostate5 (1812; Eng. trans., 1850) ; (Saint Bernard5 (1813) ; ‘Memo¬ rials of the Christian Life in the Early and Middle Ages5 (1822; Eng. trans. by Ryland, 1852) ; ‘History of the Planting and Training of the Christian Church5 (1832; Eng. trans. by Ryland, 1842) ; ‘The Life of Jesus Christ5 (1837; Eng. trans. by McClintock and Blumen- thal, 1848), and other works. Consult Schaff ‘Saint Augustin, Melanchton and Neander5 (1886) ; Wiegand, ‘Life5 (1890) ; Harnack, A., ‘Rede auf August Neander5 (Berlin 1889).

NEANDERTHAL, Prussia, a valley or ravine near the village of Hochdal, between Diisseldorf and Elberfeld, which came into prominence in 1857 by the discovery in a lime¬ stone cave, at a depth of 60 feet, of the remains of a prehistoric man, of a hitherto unknown type. The peculiar dolichocephalic formation of the skull induced several anthropologists to regard it as typical of a separate race of cave dwellers, while others explained the abnormal¬ ity as caused by disease during the lifetime of the individual ; it is now regarded as a repre¬ sentative of the most ancient of European dolichocephalous people, of whom various remains have been found subsequently in Bo¬ hemia, France and England. See Anthro¬ pology.

NEAP-TIDES, from the Anglo-Saxon “nepflod,55 low tide, are those which happen when the moon is nearly at the second and fourth quarters. The neap-tides are the lowest in the month as compared with their opposites, the spring tides. See Tides.

NEAPOLIS, ne-ap‘6-Hs, Macedonia, the town where Saint Paul, as mentioned Acts xvi, 9-11, commenced his evangelizing work in Europe. It was the port of Philippi eight miles to the west, and was

situated on Kavala Bay, near the site of modern Kavala in Turkey.

NEARCHUS, ne-ar'kus, officer of Alex¬ ander the Great. He was a native of Crete and went to Amphipolis in the reign of Philip at whose court he formed a friendship with Alex¬ ander. Under the latter he was made gov¬ ernor of Lycia and other provinces in Asia Minor in 330 b.c. and about 329 b.c. accom¬ panied Alexander in the Indian campaigns. In 326-5 he commanded the great fleet built by Alexander at Hydaspes and conducted it from the Indus to the Persian Gulf, discovering on his way the mouths of the Euphrates and the

Tigris. Upon the division of the empire which followed Alexander's death, Nearchus was made governor of Lycia and Pamphilia by Antigonus. He wrote an account of his voy¬ age, which has been preserved in Arrian's 'Indica.* Consult Plutarch, (Vita Alexandri* ; Vincent, (Voyage of Nearchus to the Eu- phrates) ; McCrindle, J. W., 'Invasion of India by Alexander the Great * (new ed., London

1896).

NEARCTIC REGION, one of the primary faunistic divisions of the earth (see Zoogeog¬ raphy) according to the widely accepted scheme of Schlater and Wallace. It embraces all North America ; as far south as the highlands of Mex¬ ico carry northern climatic conditions. The differences between its fauna and that of the northern parts of the Old World (Palaearctic Province) are, however, not sufficient, in the view of many students, to justify so primal a distinction; and the later tendency is toward uniting the Nearctic and Palaearctic "regions** into one under the name Holarctic region, or Arctogaea. It is distinguished from the Palae¬ arctic province by the absence of the true mole, the scarcity of goats and sheep and the ab¬ sence of flycatchers and the true starling.

NEARING, Scott, American sociologist: b. Morris Run, Pa., 6 Aug. 1883. He studied (1901-02) at the University of Pennsylvania Law School, took (1905) the degree B.S. and (1909) Ph.D. He was (1906-14) instructor of economics, then (1914-15) assistant professor at the University of Pennsylvania and in¬ structor of economics at Swarthmore (Pa.) College. From 1915-17 he was professor of social science and dean of the College of Arts and Sciences at Toledo University. He was made chairman (1917-18) of the People's Council

of America. After expressing strong views on the attitude of certain university trus¬ tees, he was dismissed by the University of Pennsylvania. Much newspaper and public dis¬ cussion arose from the event. In 1918 he was defeated in the New York elections as Socialist candidate for Congress for the borough of Manhattan. He has written 'Economics* (1908), in collaboration with F. D. Watson; 'Social Adjustment (1911) ; 'Solution of the Child Labor Problem* (1911) ; 'Wages in the United States,* 'Woman and Social Progress* (1912), with his wife; 'Special Religion) H913) ; 'Social Sanity* (1913) ; 'Financing the Wage Earner's Family,* 'Income* (1915); 'Poverty and Riches* (1916). He has also written manv articles to the journals and mag¬ azines.

NEARSIGHTEDNESS. See Vision, De¬ fects OF.

NEATH, neth, South Wales, municipal bor¬ ough and shipping port in Glamorganshire at the mouth of the Neath, seven miles northeast of Swansea, and on the Great Western and the Rhondda and Swansea Bay railways. It con¬ tains among its chief buildings eight churches, technical schools, the Gwyn Hall, town-hall, corn exchange and a busy market. The ruins of a castle and abbey dating from the 12th cen¬ tury exist on the east bank of the river. Its industries consist chiefly of copper smelting, tin-plate, galvanized iron and steel works, steam-engine works, iron and brass foundries,

brick and tile works, textile and chemical man¬ ufacturing. It has municipal water and gas works, slaughter-houses, traction lines, ceme¬ tery, library, etc. The park known as Victoria Gardens also belongs to the city. The town is said to be built on the site of ancient Nidum. Pop. 17,600.

NEAT'S-FOOT OIL, an oil obtained from the feet of the common ox.

NEBENIUS, na-ba'ne-us, Karl Friedrich, German statesman : b. near Landau, Rhenish Palatinate, 1784; d. 1857. After studying law at Tubingen, he made himself acquainted with the Napoleonic methods of administration as a volunteer assistant to the prefect at Besangon, but would not accept a place in the French service. He became in 1807 private secretary in the Baden Ministry of Finance, in 1823 first councillor and in 1838 first president of the Ministry of the Interior. He supported a lib¬ eral policy, but the Absolutist party under Blittersdorf gained the ascendancy and he re¬ signed office in 1839. He declined an offer from Frederick William IV of a high position in the Prussian service. On the fall of Blittersdorf he became again in 1845 Minister President. He retired in July 1849 and suffered in his

last years from failing eyesight. Nebenius was the leader of reform in Baden for nearly 40 years, constructing the new constitution of the state in 1818, creating its railways, remodeling its taxation, introducing the metric system of weights and measures, organizing the system of popular instruction and regenerating the higher teaching, especially in the University of Heidel¬ berg, of which he was curator. But his name is chiefly associated with his energetic and suc¬ cessful efforts for the establishment of the Zollverein. He studied its conditions, concili¬ ated its opponents and devised a tariff for the general adoption of its component states so that he has been justly called its intellectual founder. He wrote 'Der offentliche Kredit* (1820; 2d ed., 1829) and 'Der Deutsche Zoll¬ verein, sein System und seine Zukunft* (1835).

NEBO, ne'bo, Palestine, the biblical name of Jebel Neba, 2,643 feet high, a few miles east of the north end of the Dead Sea, the mountain of ancient Moab whence Moses viewed the Promised Land, and where he died (Deut. xxxii, 49; xxxiv, 1). The name seems to be the same as that of the Babylonian god. See Nebo.

NEBO, the patron deity of the city of Bor- sippa in Babylonia. The word Nebo is related to the Hebrew Nabhi, "Prophet.** Nebo seems to have been the principal god of Babylon be¬ fore the reign of Hammurabi (q.v.) about 2200 b.c. He was considered a chthonic deity and the regulator of procreation and the life of the newborn. He was worshiped as the god of wisdom, largely on account of the dominance of the priestly school at Borsippa. This wis¬ dom had to do with astrological matters and with writing, and in the capacity of the god of writing Nebo was considered as lord of the tables of fate. As Nebo was regarded as the son of Marduk, who was considered as the tiue arbiter of human fate, Nebo became the scribe of his father. . The homage of Nebo to Marduk was symbolized in the New Year celebration. The temple of Nebo in Borsippa wras known as E-Zida, and a similarly named

sanctuary existed in the temple of Marduk ai Babylon. Nebo was identified with the planet Mercury. Tashmit was the name of his con¬ sort. The Assyrians worshiped Nebo rather than Marduk as the representative of Baby¬ lonia. Traces of Nebo worship are found in Arabia, as in the name of the Nabataeans (q.v.), and especially among the Mandaeans, where Enba is Jesus, the false Messiah. The name

Nebo is a component of many biblical names, such as Nebuchadnezzar, Nebushar-adan, Nebu- shasban and Abednego. Consult an article by Condamin in Huby, J.,

NEBRASKA, ne-bras'ka (by act of its legislature, 4 April 1895, styled <(Tree Plant¬ ers' State®), a north central State admitted to the American Union 1 March 1867, is bounded on the north by South Dakota, on the west by Wyoming and Colorado, on the south by Colo¬ rado and Kansas, on the east by Missouri and Iowa. The Missouri River separates it from Missouri, Iowa and South Dakota on the east and northeast. Capital, Lincoln. Area, 77,510 square miles, of which 702 are water. Pop.

(1920) 1,296,372.

Topography. — Nebraska is in the centre of the great grassy plain stretching from Hudson Bajr to the Gulf of Mexico. Its dominant sur¬ face characteristic is an undulating prairie sloping upward from the Missouri River to the foothills of the Rocky Mountains with an aver¬ age rise of about eight feet to the mile. About three-fourths of its area is a rich prairie in¬ cluding all the central and southern part of the State. <(Mountain Nebraska® is comprised in an area about 100 miles square in the north¬ west corner. Here the Pine Ridge and the Wild Cat Range rise to altitudes of 4,000 to 5,000 feet, partly covered with pine and cedar and deeply divided by canyons and mountain valleys. Below the higher peaks lie table-lands interspersed with groves of pine, forming the <(park country.® The highest point in the State, 5,300 feet, is near the Wild Cat Range in Ban¬ ner County. In the extreme northwest corner is a section of <(Bad Lands,® fantastic hills and terraces nearly destitute of vegetation, exhib¬ iting great variety of colored earths and rocks. These regions of northwest Nebraska are pic¬ turesque and scenic to a high degree. Nearly level elevated plains with altitude of about 4,000 feet, whose principal areas are called Box Butte plains and Cheyenne plains, lie east and south of the mountain foothills. East of these high plains a sandhill region of 15,000 square miles extends like an open fan diagonally, the handle in the southwest corner of the State and the open fan in the central northern part. These sandhills are covered with grass and in¬ clude many rich, well-watered valleys. The typical prairie slopes gently from the sandhills toward the Missouri River broken by a range of low hills running parallel to the river.

River Systems. — Three river systems, the Niobrara, the Platte and the Republican, all flowing southeast into the Missouri River, dom¬

inate the drainage system of the State. The Platte is the central and principal one. Its val¬ ley is the leading feature of Nebraska's geog¬ raphy and topography. From five to 20 miles in width, it is a natural route with easy grades and undulating landscape from the Missouri River to the Rocky Mountains. The overland trails, the Union Pacific Railway and the Lin¬ coln Highway have each made use of the nat¬ ural advantages of this valley for a great cen¬ tral route across the continent. The sources of the Platte are in the continental divide of the Rocky Mountains in Wyoming and Colorado, and its extreme length is about 700 miles. The channel of the Platte for a large part of its course is from half a mile to a mile in width, with "water ranging from a few inches to sev¬ eral feet in depth and with thousands of islands of all sizes giving beauty and variety to its course. The Niobrara River rises in the plains of eastern Wyoming and flows for about 450 miles east to its junction with the Missouri. Its upper course is through gently sloping plains, its middle section through a wild and picturesque canyon bordered by rugged pine- clad hills abounding in rapids and cascades ; its lower part through a widening valley. The Re¬ publican River rises in the high plains of east¬ ern Colorado and runs for about 200 miles east through the southern tier of Nebraska counties until, turning south into Kansas, it unites with other streams to form the Kansas River. Be¬ sides these principal rivers there are the Loup and Elkhorn, with their tributaries, rising in the central sandhills region and flowing south¬ east to unite with the Platte. They are re¬ markable for the clearness and purity of their waters, for the regularity of their volume throughout the year and for their undeveloped water power. The Great and Little Nemaha rivers drain the southeastern corner of the State, uniting with the Missouri very near the State line. The Big Blue, Little Blue and the West Blue rivers are part of the Republican system draining the south central counties. The White River is a beautiful mountain stream in the extreme northwest for about 40 miles through Nebraska before it turns north into South Dakota. Scattered over the sandhill sec¬ tion is a multitude of small lakes, which have been the homes and breeding-places of water- fowl for centuries.

Water Supply. — The State has an abun¬ dant supply of pure water found in the val¬ leys at depths ranging from 10 to 50 feet and upon the table-lands at from 50 to 250 feet. The great majority of wells are less than 100 feet in depth. The underground waters are found in beds of sand or gravel which under¬ lie nearly the entire State and thrbugh which the water moves slowly in a volume so great that pumping does not exhaust the wells. This water supply is partly from the melting snows of the mountains, partly from the seepage of the rivers and

partly from the rainfall which is rapidly absorbed by the porous subsoil. Break¬ ing the prairie and irrigation have increased this absorption so that the water-table is in many places nearer the surface than it was be¬ fore white settlement. Artesian wells are found in 40 counties. The deepest artesian well is at Nebraska City, 3,000 feet, while the best known, the test well, is the salt basin near

NEBRASKA.

Estimated population, 1,271,375

COUNTIES

Pop.

Pop.

20,900 .

Adams .

M 8

10,783 Howard .

. . L 6

14,003 .

Antelope .

M 4

16,852 Jefferson .

.08

Arthur .

F 6

10,187 Johnson .

. .Q 8

(Pop. incl. in

9,106 Kearney .

,.L7

McPherson Co.)

3 692 Keith .

. .F 6

1,444

Banner .

.B 6

3,452 Keyapaha .

. J 3

1,672

Blaine .

.J 5

1,942 Kimball .

,.B6

13,145

Boone .

M 5

18,358 Knox .

. .N 3

6,131

Box Butte .

.C 4

73,793 Lancaster .

. .P 7

8,826

Boyd .

. L 3

15,684 Lincoln .

. H 7

6,083

Brown .

.J 4

1,521 Logan .

...15

21,907

Buffalo . .

K 7

2,188 Loup .

,.K5

12,726

Burt .

Q 5

2,470 McPherson .

. .G 6

15,403

Butler .

• Q 6

19,101 Madison .

. .N 5

19,786

Cass .

• Q 7

10,379 Merrick .

. .M 6

15,191

Cedar .

.O 3

4,584 Morrill . . .

. . C 5

3,613

Chase .

.F 7

8,926 Nance .

. .N 6

10,414

Cherry .

.G 4

13,095 Nemaha .

. .R 8

4,551

Cheyenne .

,C 6

13,019 Nuckolls .

. .M 8

15,729

Clay .

,N 8

19 323 Otoe .

Q 7

11,610

Colfax .

O 5

10,582 Pawnee .

13,782

Cuming .

P 5

2,570 Perkins .

. .F 7

25,668

Custer .

. J 6

10,451 Phelps .

. .K 7

6,564

Dakota .

.P 4

10,122 Pierce .

8,254

Dawes .

.C 3

19,006 Platte .

. .N 5

15,961

Dawson .

.J 7

10,521 Polk .

. ,N 6

1,786

Deuel .

. E 6

11.056 Redwillow .

...18

11,477

Dixon .

,P 4

17,448 Richardson . . . .

. .R 8

22,145

Dodge .

P 5

3,627 Rock .

. . K 4

168,546

> Douglas .

Q 6

17,866 Saline .

.07

4,098

Dundy .

.F 8

9,274 Sarpy .

. .Q 6

14,674

Fillmore .

.N 8

21,179 Saunders .

. . .P 6

10,303

Franklin .

L 8

8,355 Scotts Bluff . . . .

. B 5

8,572

Frontier .

.17

15,895 Seward .

..0 7

12,083

Furnas .

. . J 8

7,328 Sheridan .

. .E 3

30,325

Gage .

.P 8

8,278 Sherman .

. .K 6

3,538

Garden .

. E 5

5,599 Sioux .

. . .B 4

3,417

Garfield .

.L 5

7,542 Stanton .

...05

4,933

Gosper .

. . J 8

14,775 Thayer .

,.N8

1,097

Grant .

.F 5

1,191 Thomas .

H 5

8,047

Greeley .

L 5

8,704 Thurston .

...P4

20,361

Hall .

.L 7

9,480 Valley .

...L5

13,459

Hamilton .

.M 7

12,738 Washington . . .

. . ,Q 6

9,578

Harlan .

.K 8

10,397 Wayne .

...04

3,011

Hayes .

.G 8

12,008 Webster .

. . . L 8

5,415

Hitchcock .

.G 8

2,292 Wheeler .

...L5

15,545

Holt .

.L 4

18,721 York .

. . . N 7

981

Hooker .

G 5

Incorporated Cities,

Towns, and Villages

210

Abie .

. .P 6

712 Blue Springs . .

...P8

647

Adams … .

.P 7

359 Bradshaw .

...N7

1,045

Ainsworth .

. .J 4

308 Brady .

...16

1,584

Albion .

.M 5

465 Brainard .

...06

447

Alexandria .

.O 8

541 Bridgeport . . . .

...C5

371

Allen .

,.P4

175 Bristow .

. . . L 3

3,105

Alliance .

.D 4

434 Brock .

...R8

1,066

Alma .

.K 8

2260 Broken Bow . . .

. J 6

256

Amherst .

.K 7

457 Brownville ....

...R8

145

Anoka .

. . L 3

353 Bruning .

...N8

351

Anselmo .

. .J 5

245 Bruno .

...06

700

Ansley .

.K 6

278 Brunswick ....

...M4

901

Arapahoe .

. .J 8

315 Burchard .

...Q8

618

Arcadia .

.K 6

113 Burr .

• • Q 7

645

Arlington .

. .Q 6

915 Burwell .

231

Arnold .

.16

550 Butte .

1,379

Ashland .

184 Byron .

...N9

404

Ashton .

. .L 6

364 Cairo .

810

Atkinson . . .

.K 4

765 Callaway .

250

.K 8

1,029 Cambridge .

... I 8

2,729

Auburn .

.R 8

573 Campbell .

...L8

2,630

Aurora .

, .N 7

393 Carleton .

249

Avoca .

382 Carroll .

394

.K 7

500 Cedar Bluffs . . .

...P6

142

Ayr .

.M 8

576 Cedar

742

Bancroft .

. .P 5

Rapids .

118

Barada .

.R 8

119 Center .

228

Barnston .

. .P 8

2,428 Central City. . .

...N6

Fil 1

..18

296 Ceresco .

. .J 4

2,687 Chadron .

...D3

597

Battle Creek . . . .

, .N 4

266 Chapman .

...M7

261

Bayard .

. .C 5

329 Chappell .

...E6

77

Bazile Mills .

,N4

560 Chester .

1 fl 9G7

P 8

605 Clarks .

...N6

975

Beaver City . . . .

. .J 8

647 Clarkson .

...05

542

Beaver Crossing

. .O 7

233 Clatonia .

P07

.07

1,065 Clay Center . . .

AQA

. .P 5

414 Clearwater . . . .

...M4

247

Belden .

..0 4

185 Cody .

...G3

400

Belgrade .

.M 6

535 Coleridge .

596

Bellevue .

.R 6

1,508 College View. . .

...P7

397

Bell wood .

.0 6

160 Colon .

475

Belvidere .

..0 8

5,014 Columbus .

336

Benedict .

,.N7

323 Comstock .

538

Benkelman .

. .F 8

198 Concord .

457

Bennet .

. .Q 7

387 Cook .

276

Bennington ....

. .Q 6

201 Cordova .

3,170

Benson .

,.Q6

90 Cornlea .

196

Berlin .

. .Q 5

364 Cortland .

(543

Bertrand .

1,096 Cozad .

948

Bethany .

,.P7

274 Crab Orchard. .

...P5

‘494

Bladen .

. .L 8

339 Craig .

•2,584

Blair .

. Q 5

1,323 Crawford .

1,264

Bloomfield .

. .N 3

1,373 Creighton .

554

Bloomington . . .

. .K 9

338 Creston .

761

Blue Hill .

. .L 8

2,404 Crete .

Pop.

610 Crofton . N 3

580 Culbertson . H8

613 Curtis . 17

474 Dakota . Q 2

207 Dalton . D6

268 Danbury . 19

380 Dannebrog . M 6

32 Darr, Dawson . J 7

484 Davenport . N 8

2,177 David City . 0 6

340 Dawson . R8

220 Daykin . 0 8

782 Decatur . Q 5

609 Deshler . N 8

675 Dewitt . P 8

506 Diller . P8

217 Dixon . P 4

661 Dodge . P 5

399 Doniphan . M 7

610 Dorchester . 0 7

305 Douglas . Q7

339 Dubois . Q 8

216 Dunbar . R7

1,023 Dundee, Douglas .. Q 6

184 Dwight . 0 6

360 Eagle . Q 7

254 Eddyville . J 7

1,080 Edgar . N 8

334 Edison . J 8

302 Elba . L6

606 Elgin . M 5

240 Elk Creek . Q 8

291 Elkhorn . Q 6

620 Elm Creek . K 7

635 Elmwood . Q 7

464 Elwood . J 8

838 Emerson . P 8

204 Endicott . P 8

403 Eustis . J 7

440 Ewing . M 4

916 Exeter . N 7

5,294 Fairbury . 0 8

1,054 Fairfield . M 8

921 Fairmont . N 7

3,255 Falls City . R 8

462 Farnam . I 7

1 94 Filley . Q 8

343 Firth . P 7

I, 526 Florence . R 6

324 Fort Calhoun . R6

203 Fort Crook, Sarpy . Q 6

122 Foster . N 4

949 Franklin . K 8

9,925 Fremont . Q6

1,261 Friend . O 7

1,638 Fullerton . M 6

177 Garrison . 0 6

1,741 Geneva . N 8

1,376 Genoa . N 6

627 Gering . . B 5

275 Germantown . 0 7

718 Gibbon . L 7

181 Gilead . O 8

304 Glenville . . . M 8

920 Gordon . E 3

1,730 Gothenburg . 17

353 Grafton . N7

12,826 Grand Island . M 7

358 Grant . F 7

845 Greeley . L 6

387 Greenwood . P7

344 Gresham . 0 7

484 Gretna . Q 6

111 Gross . . L 3

690 Guide Rock . M8

205 Haigler . F 8

168 Hallam . P 7

383 Hampton . N 7

496 Hardy . N 9

186 Harrison . B 3

1,413 Hartington . 0 3

1,102 Harvard . M7

II, 021 Hastings . M 7

2,680 Havelock . P 7

408 Hay Springs . D 3

1,778 Hebron . N 8

272 Hemingford . D 4

391 Henderson . N 7

238 Hendley . 18

345 Herman . Q5

332 Hershey . H 6

388 Hickman . P7

450 Hildreth . K 8

414 Holbrook . 18

3,030 Holdrege . K8

323 Holstein . L8

397 Homer . Q 4

741 Hooper . P 5

262 Hoskins . 0 4

233 Howard City, Howard j

M 6

800 Howell . O 5

150 Hubbard . Q4

295 Hubbell . 0 8

1,176 Humboldt . R8

868 Humphrey . 0 5

410 Huntington, Hamil¬ ton . M 7

262 Hyannis . F5

402 Imperial . F8

681 Indianola . 18

171 Ithaca . P 6

290 Jackson . P4

308 Jansen . 0 8

Pop. _

273 Johnson . Q8

168 Julian . R 8

471 Juniata . M 7

6,202 Kearney . L 7

657 Kenesaw . L 7

319 Kennard . Q 6

454 Kimball . B 6

514 Laurel . 0 4

475 Lawrence . M 8

197 Lebanon . 18

567 Leigh . O 5

86 Leshara . Q 6

127 Lewiston . Q 8

2,059 Lexington . J 7

394 Liberty . P 8

46,516 Lincoln . P 7

465 Lindsay . N 5

329 Linwood . 0 6

403 Litchfield . K6

245 Lodgepole . D6

781 Long Pine . J 4

284 Loomis . ••• . J 8

115 Lorton . Q 7

778 Louisville . Q 7

1,128 Loup City . L 6

205 Lushton . N 7

583 Lynch . M3

865 Lyons . Q 5

3,765 McCook . H 8

369 McCool Junction ..N 7

1,708 Madison . N 5

124 Madrid . G 7

178 Magnet . 0 4

214 Malmo . P 6

290 Marquette . N 7

291 Martinsburg . P 4

480 Mason City . K 6

289 Maxwell . H 6

443 Maywood . H 7

330 Mead . P 6

388 Meadow Grove . . . N 5

162 Memphis . P 6

459 Merna . J 6

254 Merriman ..... F 3

716 Milford . '...07

260 Millard . Q 6

330 Miller . K 7

336 Milligan . 0 8

338 Minatare . C 5

1,559 Mlnden . L 8

640 Mitchell . B 5

109 Monowi . L 3

282 Monroe . N 6

346 Morrill . B5

196 Morse Bluffs . P 6

222 Murdock . Q 7

300 Naper . L 3

195 Naponee . K 8

5,488 Nebraska City . . ; . R 7

1,566 Neligh . N 4

978 Nelson . M 8

325 Nemaha . R8

436 Newcastle . P 3

850 Newman Grove . . . N 5

268 Newport . a 4

822 Niobrara . N 3

6,025 Norfolk . O 5

1,105 North Bend . P 6

519 North Loup . L6

4,793 North Platte . H 6

237 Oak . N 8

631 Oakdale . M4

1,073 Oakland . Q 5

245 Oconto . J 6

427 Odell . P 8

643 Ogalalla . F6

373 Ohiowa . 0 8

165,470 Omaha . Q6

2,089 O'Neill . L 4

285 Ong . N 8

532 Orchard . M 4

1,960 Ord . L 5

942 Orleans . J 8

1,105 Osceola . N 6

567 Osmond . 0 4

574 Overton . K 7

593 Oxford . J 8

380 Palisade . H 8

373 Palmer . M 6

334 Palmyra . Q 7

230 Panama . Q 7

624 Papillion . Q 6

1,610 Pawnee City . R8

179 Paxton . G 6

804 Pender . P4

950 Peru . R 8

533 Petersburg . N 5

274 Phillips . M 7

1,200 Pierce . 0 4

471 Pilger . P4

941 Plainvlew . N 4

388 Platte Center . O 6

4,287 Plattsmouth . R7

257 Pleasant Dale 07

252 Pleasanton . K7

438 Plymouth . 0 8

396 Polk, Polk . N 6

1,000 Ponca . P 3

246 Posen, Howard ...L6

394 Prague . P 6

122 Preston . R9

158 Primrose . M 5

163 Prosser . L 7

214 Ragan . K 8

Xongitude~W est from

Greenwich.

Ouster

Garretson

‘yMTorlliington

SiouxsF alls Jc.

MIL.

[Stickney

Alexandria

Ellsworth

Kiouxl’a]

IManon Jc.

Sibley

Winner’

Dallas

Canton<\<ˆ

Olivet

beelVr.

I Centerville

Priiuglmr

:otland Jc.

Boneetee

gar;’»wm

Albany 0

.Fairfax

/Mansfield \Waysidf

Mauricej

oHIire A

«sjparkS

Jfordez ‘

interprisa »

K E Y A P A H Aioa

in view © Plnecamp3 Simpson

ˆ 1 Meadville0 _

cBilling

‘ˆAdaton

hhadron0

bXjndalL

uin

-Annear Saratoga Aj ˆ Slocum * J jf£ce

(\ «/oder-

TnacherX ?e .ArahiaV Q 8\m«on y

Wood Jake

ˆBordeaux

\/Rushville

Cherokee

T raw ford \Coxville |Rutland ‘ I

• v o Hough

ˆDooley

VP X T jElfevPolnt

5Tii rkioood > I iraSIeˆCeL i

ˆ jSidprara Ctoffc>n<$fr

/kortll® ConPtapc

I J Hai

troDir T I

LLdrews

infield

Bailey

L . .

51. Jeter

A)&

^-Pdleridg

ColcUjsei

Hinchley.

.Oasis

K VerdigA

WUant / j5*

Snake oj5e\vey Lake

Matteson

i«m4 I

^^Aloui City Y

\loui Cy. f

V^l)a\kc > \ta City

WMY& Jt

‘HQraefS \ * XE(

Correction}

,‘BazIle Millk Creightonw*’

•Moornan ° Cilicia oLula

i Marple _

o’ o-

- .«***$ a?

vyMara) a . o Jeatf,

Qltnalyin j

Ida Grove

ˆPullman

-ˆ■°Chamber8

Harold’ *

no [“Francis

[emingford

＞Boxbutte

oBlackrool

, Hammond Ss’den ＜＞ r o 8 j brant

laˆanjji

Pacora.’

o Hewitt Curly Canton.0

•Stoner

-Dandale

I

■WinaiJeST. tVavn

Curie- ‘

AoV

ComptonSv

Midvale

[Thurston &A” ＞nn|

LhurstIon

V＞ Walt hill om ‘ Rosall

, ˆAltonJV E |

loskins o V- f n ˆ\t.etVoeo’

QlfoVk *N. 1 > \ —

Carpenter

Letan

■•Deloit

“I

Q R A M T J

Lucky Valley l o Benavra

Baoorott

Decatur

laldwej

H»lg*

JThelma

fi Bonner Angura

E R Branch

° Sudan Ilejwardˆ

Em Tick Warnervilloj ’KaevillBQ jster I

uj. _ u _ ITm i n i 5 n

Madison r-

• Kaiah

WHEEL E RˆL- r-

e) ˆcJArc

. Bartlett p

Deweyc

Orlando

1 Pawlet

‘s Cleman •

AlfTON

f Pdtersburgi M A D I S N

Lofrtto_Uf4V\v ?Hai

ˆ , b dno n

.Spk lding \L o*

V . i Albion »rimroBe I

‘S > t 8t. Eˆwar ˆvCedai R&c

V anoe

.Mumper

J aston (

inrwell _

tflyTla rsˆ

Melbeta

lonierey o,

oMooru

■oSummir

Nortbport

Imcotf

*Hull

llAHHˆyS onf* M wˆyPXogan ‘V

Hcry°’ fa

E/ fidi ssour n/aT)ey

o. S-> I h>j »Vlv,9“\hoUD

Garden®

MUbui

.Kent

Hooiier A ns ;lmos

Calora

ARTHUR

©Arthur

! C 0 L

«• I °Boht4 \ **Jit** >tt r.VTkrnor _.l7-. . “Ploa

. _ .% =T E ‘!• ™

PVToodvllle

Vi Moorofe lOcopea

Hai risburg <

B0A N “lf kEB% Flowerfield Ileath

«ta 0mlc«s’>

Me PHERSOM Tryon®

Lenu

Forks

gGREELEytfl

Jal. i lot**0 . O’Connd Yroc‘11 \P Pysooti. \Brarton! ?A/\ W olbaonV I

YVoLpoki.

’Palestine

y °Gfcratium

,‘V A L L E\

\Mira Cr.0 North! “Jail LOUP.

kE N I

■’V’V Hutchiijson

‘Lillian* Coburgˆv

Bound Valley Vs

Daleo \Merna Elton ® \

Klump \ WeiHMt* .

° * \ Qt’,» o -Aroei

f s E’fl Rl

Rroken Ho.’vNj We*ur~X+~J a{ yo o ˆ Spring V. >jj±inga ton\

ˆJriumgh Berwyn \xffuzlcy ajxUoMcKiniey- ˆAmI

LodlV Mason CityVˆ

Oco\rgeˆ\° Upton OconteV £omVˆo2Vj,brd0Litch Hedfernˆ v., Scandia ° .

F

ˆMaphUm %| II. M R Zr.A Cr.

Stapleton

[ogan

Glcnrose

i Dalton o HenrJ

We:

E N N’E

r Marlowe

JSertorp ,

• 0 Laura/

Ia > °

rc HEY

L potleI”otA°° I

Gandy

Genoa’

Beotia J i

WooJburn

D.uncanp-

Qˆs > ˆkˆTea/f W ateV

lon_lLˆiˆVaho(ˆ

L/ ll. z‘l Ithara

Tullei

■Me Alpine \ Dannevirl

Alyrtle 01 ˆ

•’* ˆ Willard „ Tali

ˆJˆySoanaulK

Bertha

Milldal

£?■ Kowanda

ialsfield\

Cushing]

i /noil

4 u Ms linaha

i Elba’ Ashton .

Keystone

lleTne

WyleTue Ta, JV

yT Matte ˆ ˆ

eˆAˆclfle-JcyWy/ ‘latUSmoutBAˆrˆe ˆoW Bluff

aJFa\rtiexv

Kauffman ˆGifford

＞renzo

lazard’

Lg-fgYˆJiilesburg

RES.

SEDGWICK

～‘renangol

Cotloniooofl Sprii

Mercer

ˆ•Eddrvillir

. r I hot s j

～WatU

Benedictˆ

-Buffalo

• ‘PleuAˆitonˆg

~Teake*f* P

ˆWatertown

‘\Amher8t<

‘Bouslot

Somerset

Buchanan

9

Thebe 0 !

°Butlerxv

e? Sheltoi

BluevaˆTˆg;

//Sterling

CA\STER

Blanche « Catheritle

Moorefield” — – ^^Curtis (

FRO ˆ T HER .lOTTihurp

l*‘es/f >n*er StoekvilleV Drajino

‘ Stricklai d

[am burg

Lamar

:iwood! 0 . –

ˆTVeatmarl < jff«3o»o

SSLp h0e l P s

PEfSˆY80ˆ,???’.

’Cmljlf „ UroJoYcerˆ’ –

f vj I SacvMtntˆSsˆ . 1. o＞-4tlanta ＜3＞

Kciu-fVxˆvˆX

Juniam*

ˆAaD ,A

Prlnij

Tinperlal

ATCH1-

fSON

lartlaod,

tARME

ˆ-l.lohntont

AubnriiU

;n |e i)i\a

Treedoi

/StT*®» \ iMlslfiyJ

Osh urn

all

lamo\mn JUiawatha A I °

• Callisan

W Ragai

»A R LA

iT)*rord Je. S \v Huntley ＞» ˆYSL’arter /

Tevtrly

1 \ ” r/^ Lawrence”

I ‘a°*U®°0‘ XnK/i

S\TiE R^NNelson/A

/vyjtock fo r3 y\P,

\ H oi me” H \S\ BncchV

rc ■‘a — r’ – -1

^—4. ^-^A—inaiauo 1 a

^^dllcCook

REDW1LL0W

Banksville Lebanon^

• RAN KLT > I

’ranklln -^frertod ^p^publiaat

P^SaftiS

‘%‘””lalls

Cornell

> anburj

vPoJdji

i abeth^ N\|

lllaXftlharv cneca • 3 Aq WHS I AKA. \

Oberlin

Atwood

Francli

ROCK

JHahkato1

Greehleal,

| /Horton*

jeburg

Xenorj

0Wˆ N._ˆ

-/T i’iiraaˆ w ‘ I Concord . B| Crossing

pownsˆ

Holton i\A

Stockton ˆ

ˆestWoi eland.

fiver

larrison Cross

MUtonvale’

‘Jflllbrook

South

-

■41

w

NEBRASKAˆ

SCALE

Statute Miles, 38 = 1 Ineli.

10 20 30 40 50 BQ 70 _

• Bond McNally’s New 11 x 14 Map of Nebraska- Copyright b; Rand McNally & Co.

102“

NEBRASKA — Continued

Pop. Pop.

1,137

Randolph .

O A

447

Sutherland .

.G

6

1.359

Ravenna .

K 7

1,702

Sutton .

.N

7

236

Raymond .

P 7

285

Swanton .

P

8

1.686

Red Cloud .

M ?

842

Syracuse .

7

476

Republican City

. K 9

814

Table Rock .

u

8

246

Reynolds .

O 8

461

Talmage .

. R

7

156

Richland .

O 6

205

Tamora .

.o

7

456

Rising City .

n 6

121

Tarnov .

.u

5

369

Riverton .

. . L 8

1,748

Tecumseh .

• Q

8

129

Roca .

. . P 7

1,524

Tekamah .

■ Q

5

201

Rockville .

. .1, 6

112

Thurston .

. . P

4

155

Rogers .

. . P 6

901

Tilden .

.N

5

147

Rosalie .

. Q 4

445

Tobias .

.()

8

249

Roseland .

. .L 8

497

Trenton .

.G

8

661

Rulo .

. .S 8

228

Uehling .

Q

5

633

Rushville . .

. D 3

551

Ulysses .

.o

6

339

Ruskin .

. .N 8

209

Unadilla .

Q

7

391

Salem .

302

Union .

.R

7

651

Sargent .

. . K 5

3,200

University Place

. .P

7

2,152

Schuyler .

. P 6

390

Upland .

. K

8

328

Scotia .

. .L 6

520

Utica .

O

7

1,746

Scottsbluff .

. B 5

1,098

Valentine .

.H

3

891

Scribner .

810

Valley .

• Q

6

2,106

Seward .

. .P 7

560

Valparaiso .

. .P

6

503

Shelby .

.06

612

Verdel, Knox . . .

.N

3

1,005

Shelton .

. .L 7

403

Verdigris .

.M

3

429

Shickley .

. .N 8

406

Verdon .

. R

8

311

Shubert .

. . R 8

154

Virginia .

• Q

8

1.185

Sidney .

. ,C 6

293

Waco .

O

7

379

Silver Creek . . .

. .N 6

2,168

Wahoo .

. .P

6

1,196

Sioux .

. .Q 4

861

Wakefield .

. P

4

190

Smithfield .

. . J 8

175

Wallace .

G

7

314

Snyder .

810

Walthill .

■ Q

4

125

South Bend

. -Q 7

199

Waterbury .

. . P

4

South Omaha,

402

Waterloo .

Q

6

(Pop. included

in

327

Wauneta .

.G

8

Omaha.) .

. R 6

604

Wausa .

.N

4

637

Spalding .

297

Waverly .

. .P

7

671

Spencer .

. L 3

2,140

Wayne .

. P

4

463

Springfield .

. .Q 6

1,067

Weeping Water .

Q

7

216

Springview .

. . J 3

499

Western .

O

8

814

St. Edward .

. .N 5

200

West Lincoln,

148

St. Helena .

..0 3

Lancaster . . .

. P

7

1.336

St. Paul .

,.M6

432

Weston .

. .P

6

301

Stamford .

. . J 8

1,776

West Point .

. .P

5

1,342

Stanton .

..0 5

1,219

Wilber .

. ,o

8

228

Staplehurst ....

.0 7

382

Wilcox .

. K

8

300

Steele City .

. .P 8

385

Wilsonville .

.T

8

248

Steinauer .

. Q 8

399

Winnebago .

. .Q

4

430

Stella .

. .R 8

220

Winnetoon .

, .N

3

714

Sterling .

. Q 8

450

Winside . .

O

4

189

Stockham .

. .M 7

99

Winslow .

. P

5

232

Stockville .

...18

1,081

Wisner .

. P

5

238

Strang .

. -N 8

563

Wolbach .

M

6

367

Stratton .

. .G 8

198

Woodlake .

. I

3

1,355

Stromsburg .

. N 6

796

Wood River ....

. L

7

467

Stuart .

. K 4

2,613

Wymore .

P

8

321

Sumner .

. . K 7

258

Wynot .

. .O

3

2,106

Superior .....

. .N 8

6,235

York .

. .N

7

323

Surprise .

.06

353

Yutan .

Q

6

NEBRASKA

25

Lincoln, 2,463 feet in depth. There are two principal areas of deep artesian wells, one in the southeast, the other in the northeast. In the southeast a strong flow of water is found at depths ranging from 1,000 to 1,800 feet, in the carboniferous rock, sometimes impregnated with salt. Both Lincoln and Omaha have flow¬ ing wells from this formation. In the north¬ east, artesian water is found at depths ranging from 200 to 800 feet in the Dakota sandstone accompanied with high pressure. Such wells in Boyd and Knox counties furnish power for flouring mills and electric-light plants. The areas of shallow artesinn water are widely scattered. Flowing wells are found at depths ranging from 30 to 100 feet below hard beds of clay and furnish water for irrigation, for artificial lakes and for power and domestic pur¬ poses.

Climate and Rainfall. — The climate is characterized by mild, dry atmosphere, clear skies and perennial breezes. The chief factors in its climate are its middle latitude in the north temperate zone, its middle altitude between sea- level and mountain height, the wall of the Rocky Mountains on the west and the open plains stretching to the Gulf of Mexico and Arctic Ocean, from which is borne upon winds the greater volume of moisture which falls in the form of rain upon the State. The average temperature of the entire State through the year is 48.5°. At the altitude of 900 feet in southeast Nebraska the average is 52°, while at the altitude of 3,000 feet in northwest Nebraska the average of 45°. The fall in average tem¬ perature is at the rate of about 1° for each 38 miles north in most of the State. As a rule there are but two cold months in the year, January and February, with a mean average temperature of about 20°. Occasional cold waves carry the mercury to 10 and 20° be¬ low zero with rare cases of 40° below. In the main, the winters are dry and bright, with little snowfall. July, August and the first 10 days of September constitute the heated term with a mean temperature of 70° to 78° and with almost continual breezes. Killing frosts occur in the average year from 25 September to 10 May in the northwestern part of the Slate and from 5 October to 25 April in the south¬ eastern part of the State. The growing season for farm and

garden crops is thus about 160 days in the southeast and 130 days in the north¬ west. Records of rainfall in the Nebraska re¬ gion began at the United States military posts, Fort Laramie and Fort Kearney, in 1849 and are the oldest records in the plains and moun¬ tain region of the West. About 1866 sys¬ tematic rainfall records began in eastern Ne¬ braska and the Platte Valley. Allowance being made for the limited extent of the earlier ob¬ servations the record of nearly 70 years indi¬ cates an average annual precipitation for the State as a whole of 23.67 inches. At the Mis¬ souri River the average annual rainfall is 30 inches, decreasing at an average of 1 inch for each 30 miles west until an average of 15 inches is reached at the Wyoming border. The snowfall averages about 25 inches, equal to about 2 inches of water, leaving a little over 21 inches average rainfall. Compared with an annual precipitation of 35 to 40 inches in the eastern part of the Mississippi Basin this seems inadequate for agriculture. An important dif¬

ference exists in the fact that in Nebraska 46 per cent of the annual rainfall occurs in the growing months of May, June and July, en¬ abling crops to be raised with a far less pre¬ cipitation than in States farther east where a great part of the moisture falls in the winter months. This important discovery with refer¬ ence to precipitation and growing-crops was first published by Robert W. Furnas, secre¬ tary of the Nebraska Board of Agriculture, in 1873. The four winter months, November, De¬ cember, January and February are dry months having only 11 per cent of the total annual pre¬ cipitation. The rainfall for the crop season, April to August, inclusive, averages 16.18 inches for the entire State. Before the advent of the plow a large part of the summer rainfall ran off from the compact, thick sod which covered the greater part of Nebraska. Ploughed fields now absorb a large part of this run-off so that while the records show no material increase in the rainfall a far larger per cent remains in the soil. The average number of clear days in Nebraska is 193. Records kept for a number of years show that in the bright months of July and August the sun shines on an average three- fourths of the 15 hours it is above the horizon each day. A study of rainfall diagrams from 1850 to the present time shows, in that period, two groups of years with scanty rainfall, the first covering the years 1860-64, the second the period 1890-94. Throughout the remainder of these 68 years the rainfall is close to normal with eight years of large excess above normal. Prevailing winds are from the northwest from October to April; from the south and south¬ west during the remainder of the year. Aver¬ age hourly wind movement is nine miles per hour.

Farming and Stock-Raising. — Nebraska is the first State in the Union

in the production of prairie hay and grass. The largest hay-ship¬ ping station in the world is within her borders — Newport, Rock County. Nebraska is second in the production of alfalfa and winter wheat, third in the production of corn and third in the combined production of wheat, oats and corn

Yield

crops (1917) Acres Bushels per acre

Com . 9,240,000 249,480,000 27

Winter wheat* 3,063,756 65,365,691 21

Spring wheat . 246,557 3,407,890 14

Oats . 3,038,000 115,444,000 38

Barley . 213,000 5,644,000 26.5

Rye . 215,000 3,354,000 15.6

Buckwheat . 2,000 32,000 16

Flax . 5,000 28,000 5.5

Potatoes . 147,000 12,495,000 85

Hay . 1,590,000 Tons 2 , 544 , 000 Tons 1 . 60

- The 1917 crop of winter wheat was killed. Figures for the 1916 wheat crop are used as being more fairly indicative of Nebraska's annual production.

animals (1918) Number Value

Horses . 1,049,000 $105,949,000

Mules . 118,000 13,334,000

Cattle:

Milch cows . 703,000 55,186,000

Other cattle . 2,803,000 138,188,000

Sheep . 408,000 4,488,000

Swine . 4,200,000 102,480,000

for the 20-year period 1895-1916. Corn is the most valuable crop produced in the State both as a food product and as a source of agricul¬ tural wealth. Crop statistics compiled by the United States Department of Agriculture show

that in the 36-year period (1880-1915) the ap¬ proximate 1 December farm value of corn produced in Nebraska ($1,861,142,000), ex¬ ceeded the combined approximate 1 December farm value of wheat, oats, barley, rye and po¬ tatoes ($1,346,912,000). The acreage and pro¬ duction of principal crops for 1917 and live¬ stock for 1918 are shown in the preceding table having authority of the United States Depart¬ ment of Agriculture.

The native grasses of Nebraska comprise 113 species and constitute one of the peculiar assets of the State, attractive to the botanist and valuable to stockmen. One of the principal pop-corn areas in the United States is in Valley County. The number of farms in the State in 1916 was 151,176 of which 83,133 were farmed by owners and 68,043 by tenants. The increase in tenant farming is largest in the region of highest priced lands. Out of a totalˆ area of 50,000,000 acres, 44,300,351 acres are in farms and of these 14,209,364 are under cultivation. The total value of farm property by the United States Census of 1910 was $2,079,818,647, of which $1,614,539,313 was land value. The aver¬ age number of acres per farm was 297.8 and •the average value of land per acre $41.80. The value of land per acre nearly trebled in the 10 years between 1900 and 1910, and has nearly trebled again since 1910. The economic unit for maximum profit in food production in Nebraska agriculture increases in size with the introduction of improved machinery. At pres¬ ent it is about 160 acres in eastern Nebraska, 320 acres in the mixed farming regions of western Nebraska and 3,000 acres in the livestock region.

Fruit-Growing and Forestry.— Nineteen- twentieths of Nebraska was originally treeless prairie. Tree planting and cultivation is the first step in making a desirable home. It is estimated that over 500,000 acres have been planted to forest trees and about 100,000 acres to fruit trees and small fruit. The total area now covered by trees is between 1,000,000 and 2,000,000 acres. In 1917 the United States De¬ partment of Agriculture estimated Nebraska’s apple crop at 2,400,000

bushels. < Commercial orcharding is developing rapidly in the south¬ eastern quarter of the State, while cherries, apples, plums and small fruits flourish in every county.

Irrigation and Water Power.— The flow¬ ing waters of Nebraska are applied in two ways to production — the irrigation of land and the development of power. Irrigation is applied chiefly in the western third of the State where the rainfall is between 15 and 20 inches. Ir¬ rigating ditches were constructed as far back as 1856 but the development of the system fol¬ lowed the drought of 1890. The broad valleys of the Platte and the Republican are the prin¬ cipal irrigated areas. There are about 2,700 miles of canal with 1,100,000 acres under them, of which about one-third is cultivated. Al¬ falfa, sugar beets and potatoes are leading crops in the irrigated region. The largest ir¬ rigation projects are in the valley of the North Platte under canals constructed by the United States, deriving their waters from an immense reservoir called the Pathfinder, which stores the waters from the melting snows of Colo¬ rado and Wyoming to the amount of about one million acre feet. It is estimated that

about 300,000 horse power may be developed from the flowing waters of Nebraska streams. About nine-tenths of this power, which includes the most important sites, is now undeveloped. The conversion of water power into electricity for light and power purposes is making prog¬ ress in the more thickly populated portions of the State.

Dry Farming. — In the same region where irrigation is most largely practised the new methods and machinery known as the dry farming system are applied to land which can¬ not be irrigated. These methods include sum¬ mer fallowing and surface cultivation to im¬ pound the rainfall in the soil for growing crops. Experiments at North Platte have shown that crops draw moisture from a depth of six feet during the growing season. Phenomenal results have followed these new methods during the past decade and over a large part of the high plains production of cereals and alfalfa has been generally successful while land values have risen from $1 per acre to $50 and over.

Geology and Soil. — The geological struc¬ ture is of simple type. Nearly the entire sur¬ face of the State is covered with a mantle of soil, in many places over 100 feet in thickness. The upper section of this mantle is a black or brown alluvium from three to six feet deep. Beneath the alluvium, over the greater part of the State, lies a subsoil of loess clay varying in thickness from a few feet up to 100. This loess subsoil, porous, fertile and spongy, is one of the chief assets of agricultural Ne¬ braska, absorbing rainfall readily and giving it up to

growing crops. Beneath the loess sub¬ soil of the eastern part of the State lies a heavier clay and broken rock derived from the ice sheet which once covered this region and known as till or glacial drift. In the sand hill region the mantle soil is composed of sand and silt derived from Tertiary rocks broken down by action of water, heat and cold and blown by the winds into their present form and location. The rock formations which lie beneath this mantle of soil extend from the Rocky Mountains eastward. They are ex¬ posed in the west by the uplift of the moun¬ tains and in the east at a few places where water courses have cut valleys through them. Over the greater part of the State they are buried beneath the mantle of soil and sub¬ soil. The principal sedimentary rock forma¬ tions underlying the State, considered in the order of the oldest and deepest upward, are as follows : Carboniferous limestone and shale are exposed in many places in southeastern Nebraska. In the adjoining States, Iowa, Mis¬ souri and Kansas, thick beds of coal are found in this formation. Nebraska is at the western edge of coal-bearing strata with unimportant coal workings at two or three places. Lime¬ stone, rubble and clay are the chief products of the carboniferous here and their use for concrete, brick, road-building, smelting and sugar refining is rapidly increasing. Cretaceous sandstones and shales lie next above the car¬ boniferous and outcrop at a number of points in northeast and southeast Nebraska. The Dakota sandstone, the principal member of this group, is commonly rusty-red in color and carries a large water supply in which are found some of the most notable artesian wells. It

furnishes superior clay for brick-making and important sand and gravel pits. The Benton shales and chalk rock are above the Dakota sandstone. Fine exposures of such rock are found along the Niobrara and Republican riv¬ ers. The chalk rock is soft when first cut but hardens on exposure to the air and is used to a limited extent for building. It is now being developed in the manufacture of hydraulic cement. The Pierre shales are above Niobrara chalk rock and cover a large part of the State, in many places to a depth of 1,000 feet. They are alkaline and where exposed produce the soil called gumbo. In western Nebraska three distinct formations later than the cretaceous appear. These are the Oligocene clays and shales, the Arikaree Butte sands and clays and the Ogallala magnesia or mortar beds. The first is about 1,000 feet thick and appears ex¬ posed in the bad lands of the extreme north¬ west corner. The second is five or six hundred feet thick and gives rise to the remarkable buttes or isolated precipitous

peaks which are such conspicuous and picturesque features of the western plains. The third gives a rugged variation to the line where the high valleys pierce the table-lands and furnishes stone for building purposes and road work. The fossil deposits of northwest Nebraska are among the most remarkable in the world. The principal museums of the world have here secured some of their most valuable skeletons of the an¬ cient rhinoceros, tapir, sabre-toothed tiger and dinosaurus.

Manufactures. — The abundant supply of free farming land determined both labor and capital to agriculture until after 1890. By that time the best farming land to the furthest border had been taken by settlers. The great drought and hard times which followed drove thousands to the cities for temporary employ¬ ment. Since then manufacturing industries have steadily grown. The leading manufac¬ tures are those which rest directly upon agri¬ culture. The principal industry is slaughtering and meat packing. Milling grain products ranks next, butter and cheese-making third. The beet sugar industry has made remarkable progress in the past five years. There are now four factories, one at Grand Island in the central part of the State, three in sight of each other in the North Platte irrigated valley at Scottsbluff, Gering and Bayard. In 1917 the production of sugar beets amounted to 44,683 acres on which were grown 414,797 tons and a total product of about 110,000,000 pounds of sugar. Returns from all lines of manufactur¬ ing for 1914 are as follows :

Number of manufacturing establishments. . . 2,492

Proprietors and firm members . 2,472

Salaried employes . 6,079

Wage earners . 25 , 144

Primary horse power . 90,192

Capital . $121,008,000

Salaries . 7,118,000

Wages . 16,893,000

Cost of materials . 174,114, 000

Value of products . . • . 221,616,000

Values added by manufacturing . 47,502,000

Per cent of increase of value of products 11.4

The manufacture of potash and other salts from the waters of alkali lakes in the sand hills section of northwestern Nebraska began in an experimental way in 1912. The Great War cut off the supply from the Stassfurt

mines of Germany, the world's greatest potash source. ' The price of potash rose about 1,000 per cent. Nebraska's alkali lakes became the largest producers of potash for the American market. Several millions of dollars have been invested and the production for 1918 is esti¬ mated at 150,000 tons. About 2,000 men are employed in the industry and several towns have sprung up in the sand hills supported thereby.

Transportation, Communication, Etc. —

The first transcontinental railway in the world, the Union Pacific, has headquarters in Omaha, Neb.

Five great railway systems now traverse the State — Chicago and Northwestern, through the north ; the Union Pacific through the centre ; the Burlington extending into 76 of the 93 counties: the Rock Island and the Missouri Pacific in the southeast; only three counties in the State are without railroads within their borders. Outside the sand hills, railroad sta¬ tions are rarely more than 10 miles distant from any farm. Omaha and Lincoln are the chief railroad centres. The mileage of the principal railroads in 1916 was as follows :

Chicago, Burlington and Quincy . 3,601.16

Union Pacific . 2,104.60

Chicago, Rock Island and Pacific . 308 . 30

Chicago and Northwestern . 1 ,306. 29

M issouri Pacific . 483.93

Chicago, Saint Paul, Minneapolis and Omaha. .. 375.66

Saint Joseph and Grand Island . 131 . 62

Omaha Bridge and Terminal Railway . 17.57

Missouri Valley and Blair Railway and Bridge. . 2.86

Total . 8,331.99

In 1916 there were 389,991 miles of tele¬ phone wire in the State ; 204,042 telephone in¬ struments installed; 33,390 city subscribers and 42,221 farm subscribers. The total book cost of telephone systems shows $21,135,314; the gross earnings for the year were $5,003,209 and operating expenses $3,382,054.

The use of motor vehicles and good roads movements are transforming the transporta¬ tion business. The smooth prairies and moder¬ ate rainfall secure smooth highways at small cost. Nebraska is among the leading States in the Union in the number of motor vehicles per capita of population, having over 150,000 or one to each eight in population in the year 1918. There are about 300,000 miles of public highways. Three principal transcontinental motor highways cross Nebraska — the Lincoln Highway up the Platte Valley, the Omaha- Lincoln-Denver Highway across the prairies of southern Nebraska, the Meridian road running north and south from Winnipeg to the Gulf of Mexico. Numerous other motor highways are now chartered and marked upon posts and telephone poles. In 1911 the legislature made the first levy for a State aid bridge fund. This produces about $100,000 per year to defray half the cost of important bridges, the other half being borne by the counties where they are located. The legislature of 1917 appro¬ priated $640,000 for the biennium to be ex¬ pended in connection with the Federal ap¬ propriation for road construction in the State. This is in addition to the usual expenditures by counties, cities and road districts.

Revenue and Finance. — Under the Ne¬ braska constitution, adopted in 1875, the gen-

eral property tax is the principal source of State revenue. From 1875 to 1913 total ap¬ propriations for State expenses were about $70,000,000, of which $3,100,000 was collected as fees. Appropriations for the biennium ending 31 March 1919 are nearly $9,000,000. Revenues for the biennium ending 30 Nov. 1916 were $11,835,633.72. Under the Nebraska Revenue Law property is assessed at one-fifth its actual value. This valuation for 1917 was $500,873,- 016, of which $154,834,316 was personal and $346,038,700 was real property. The State has no bonded indebtedness. The bonded debt of subdivisions of the State in 1916 was $42,154,198.

Banks. — There are two systems of banks, State and national. Since the passage of the State Bank Guaranty Law in 1909 the number and the deposits of State banks have increased more rapidly than the national banks. The data for national banks in November 1916 was as follows :

Number of banks . 192

N umber of depositors . 213,826

Total deposits . $116, 506 , 000

Statistics of State Banks February 1918.

Number of banks . . 930

Number of depositors . 503,898

Total deposits . $250 , 500 , 824

Education. — Since 1880 Nebraska has been one of the three States with lowest percentage of illiteracy in the Union. In 1890 Nebraska was lowest with a percentage of 3.1; in 1900 Nebraska tied with Iowa with a percentage of 3.3; in 1910, Nebraska was 1.9 to Iowa's 1.7. For the school year (1917-18) there was in the State of school age (5-21 years), 387,394 children ; enrolled in school, 292,362 ; average daily attendance, 219,246. Average duration of school, 170 days. Data respecting teachers is as follows ;

Average

sex Number wage Total amount

Male . 1,448 $75 80 $1,057,104.57

Female . 11,249 53 10 5,754,657.67

Total . . . $6,811,762.24

The total expenditure of all kinds for sup¬ port of grade and high schools was $11,921,859. There were 91 city schools and 368 high schools accredited to prepare students for the State University. Pursuing higher courses of study in colleges and technical schools were 4,402 men and 3,037 women (1915). College students in law, 400; in medicine, 274; in engineering, 308; in agriculture, 255. There are four State normal schools — at Peru, Kearney, Wayne and Chadron, having a total of 111 teachers and 2,904 students.

The State University comprises the colleges of Literature, Science and Arts; Agriculture; Medicine; Law; Teachers; Graduate and Engi¬ neering, located at the city of Lincoln except the College of Medicine located at Omaha. The College of Agriculture, a school of agri¬ culture and an experiment station are lo¬ cated on the university farm campus with outlying experiment stations at North Platte, Scottsbluff and Valentine and a school of agriculture at Curtis all under government of board of six regents elected by the voters of the whole State. Statistics of the University

for the year 1917 are as follows: students, 3,141 men, 2,264 women ; instructors, 221 men, 73 women ; library, 144,000 titles. The income of the University for the year including exten¬ sion work and experiment stations was $1,548,- 349. The University received from the United States government an endowment of 45,426.08 acres of land and the agricultural college a similar endowment of 89,148.60 acres. Of these endowments there remain unsold 24,859.70 acres, valued at $175,000. The cash endowment aris¬ ing from the sale of this land amounts to $840,127.79. Under the present law no more of the land may be sold. The university farm campus consists of 320 acres, distant about three miles from the university city campus of a £)out 40 acres in the heart of Lincoln. There were 1,007 students enrolled in the mili¬ tary cadet battalion (1918). Nebraska's school land policy differs from that of other States in the Union. Under the act of 1897 no further sales of either common school, university or agricultural college endowment lands may be made, except for certain minor purposes. The common school lands granted to Nebraska amount to 2,978,095 acres. Of this there remain unsold 1,650,990 acres. From the lands already sold there is an endowment of $9,034,308, which is being constantly increased by payments on land sale contracts. The total common school endowment is estimated at about $12,000,000 from lands sold and the value of the remain¬ ing land is at least $20,000,000 more. It is the belief of those who champion the permanent leasing system that the increase in school land values arising from increased population should properly be appropriated for the education of school children.

There are about 30 denominational colleges, academies and about 200 parochial schools in the State. College degrees are granted by the following :

name Denomination Location

Bellevue College. . . Presbyterian . Bellevue

Cotner University . . Disciple . Bethany

Creighton . Roman Catholic . Omaha

Doane College . Congregational . Crete

Fremont Normal

College . Private management . Fremont

Grand Island Col¬ lege . Baptist . Grand Island

Hastings College. . . Presbyterian . Hastings

Luther College …. Lutheran . Wahoo

Nebraska Wesleyan

University . Methodist Episcopal. University Place

Union College . Adventist . College View

York College . United Brethren . York

Religion. — The latest United States census figures on religious affiliation are those of 1906. Considerable changes have occurred since then but not greatly altering the relative denomina¬ tional strength. The total number of church members was 345,803 ; total number of church buildings and of ministers each, about 3,500. The strength of the principal denominations was as follows: Roman Catholics, 116,917; Metho¬ dists, 64,352; Lutheran, 59,485; Presbyterian, 23,862; Disciples of Christ, 19,613; Baptist, 17,939; Congregationalists, 16,629; Protestant Episcopal, 6,903 ; United Brethren, 6,086; Latter Day Saints, 1,568. There is a difference in the basis of these membership figures as compiled by the denominations, the Roman Catholics counting as members all children baptized in the church while Protestant denominations do not.

Charitable and Penal Institutions. — In May 1918 the population of State institutions was as follows :

Hospitals for insane:

Hastings .

Lincoln .

Norfolk .

Penitentiary (Lincoln) .

Industrial schools:

Boys (Kearney) .

Girls (Geneva) .

Industrial Home for Women (Milford). Soldiers' and Sailors' Home:

Grand Island .

Milford .

Feeble-minded institute (Beatrice) ....

School for deaf (Omaha) .

School for blind (Nebraska City) .

Hospital for tuberculosis (Kearney) . . . Home for dependent children (Lincoln) Orthopedic hospital (Lincoln) .

1,152

782

634

311

219

100

103

445

109

572

173

55

84

42

63

Total

4,844

The total appropriations for their mainte¬ nance during the biennium ending 31 March 1917, approximately $2,800,000. All these in¬ stitutions are under the government of a board of control consisting of three members ap¬ pointed by the governor and confirmed by a two-thirds vote of the senate. Besides the board of control there is a State board of charities and corrections consisting of the gov¬ ernor, the State superintendent, and the State land commissioner with a chief secretary. This board has general power to investigate and report upon the condition of all penal and charitable institutions, public and private, State and municipal. There are 54 county poor- houses in the State with about 450 inmates. Under a Mothers' Pension Law enacted in 1913 about 3,500 cases of relief were cared for between July 1915 and January 1917, at an estimated cost of $200,000.

Libraries. — In the State are 117 public li¬ braries with 739,476 volumes. The first public library act was passed in 1875. In 1911 an act was passed providing for township and county libraries ; also an act appropriating $5,000 for libraries in the charitable and penal institutions of the State, except the school for the blind, and a trained librarian placed in charge.

The total number of persons upon the State's payroll is 2,568 of whom 825 are in State institutions, 351 in State departments and 1,743 in the State courts, normal schools, university and extension departments.

State and County Government. — The ores- ent constitution, adopted in 1875, is sometimes styled the ((Grasshopper Constitution,® because the grasshoppers and hard times of that period resulted in a very economical and restricted form of constitution. It is one of the few State constitutions requiring a majority of all the votes cast to adopt an amendment proposed by the legislature. A constitutional

convention to revise and amend the constitution convenes 2 Dec. 1919. It will consist of 100 members elected on a non-partisan ticket by the repre¬ sentative districts. The legislative body consists of a senate of 33 and a house of 100 members. Regular sessions convene in January of odd- numbered years. Members are elected for a period of two years and receive $600. The execu¬ tive departments and salaries are as follows :

Governor . $2,500

Lieutenant-governor (for two-year term) . 1 ,200

Secretary of state . 2 , 000

Auditor of public accounts . C 2, 500

Treasurer . 2, 500

Superintendent of public instruction . 2,000

Attorney-General . 2 , 000

Commissioner of public lands . ’ * ” 2 , 000

Each of the above is elected for a two-year term. The State treasurer is eligible to suc¬ ceed himself after two consecutive terms. The constitution forbids the creation of any other executive offices, with the result that the provi¬ sion has been avoided by the creation of numerous boards composed of some of the foregoing executive officers, with provision for the employment of secretaries who perform the new duties arising from social changes. In 1907 a railway commission consisting of three members elected by the people for a three-year term with a salary of $3,000 per year was added by constitutional amendment to the above list. The judicial department consists of seven judges elected by the people, holding office for six years at a salary of $4,500 per year. In addition there are three Supreme Court com¬ missioners at $3,000 per year appointed by the Supreme Court to assist it in preparing opinions. There are 18 districts in which are elected 32 district judges, each for a four-year term at a salary of $3,000 per year. There is besides in each county a county judge elected for a two-year term at a salary varying with the population of the county. County govern¬ ment may be under the township or the com¬ missioner system as the voters choose. There are now 28 counties under township and 65 under commissioner system.

Counties and County Seats

Adams, Hastings. Antelope, Neligh. Arthur, Arthur.

Banner, Harrisburg. Blaine, Brewster.

Boone, Albion.

Box Butte, Alliance. Boyd, Butte.

Brown, Ainsworth. Buffalo, Kearney.

Burt, Tekamah.

Butler, David City. Cass, Plattsmouth. Cedar, Hartington. Chase, Imperial.

Cherry, Valentine. Cheyenne, Sidney.

Clay, Clay Center. Colfax, Schuyler. Cuming, West Point. Custer, Broken Bow. Dakota, Dakota City. Dawes, Chadron. Dawson, Lexington. Deuel, Chappell.

Dixon, Ponca.

Dodge, Fremont. Douglass, Omaha. Dundy, Benkelman. Fillmore, Geneva. Franklin, Bloomington. Frontier, Stockville. Furnas, Beaver City. Gage, Beatrice.

Garden, Oshkosh. Garfield, Burwell. Gosper, Elwood.

Grant, Hyannis.

Greeley, Greeley Center. Hall, Grand Island. Hamilton, Aurora. Harlan, Alma.

Hayes, Hayes Center. Hitchcock, Trenton. Holt, O’Neill.

Hooker, Mullen. Howard, Saint Paul.

Jefferson, Fair bury. Johnson, Tecumseh. Kearney, Minden. Keith, Ogallala. Keyapaha, Springview. Kimball, Kimball. Knox, Center. Lancaster, Lincoln. Lincoln, North Platte. Logan, Gandy.

Loup, Taylor.

Madison, Madison. McPherson, Tryon. Merrick, Central City. Morrill,

Bridgeport. Nance, Fullerton. Nemaha, Auburn. Nuckolls, Nelson.

Otoe, Nebraska City. Pawnee, Pawnee City. Perkins, Grant.

Phelps, Holdredge. Pierce, Pierce.

Platte, Columbus.

Polk, Osceola.

Red Willow, McCook. Richardson, Falls City. Rock, Bassett.

Saline, Wilber.

Sarpy, Papillion. Saunders, Wahoo. Scott's Bluff, Gering. Seward, Seward. Sheridan, Rushville. Sherman, Loup City. Sioux, Harrison. Stanton, Stanton. Thayer, Hebron. Thomas, Thedford. Thurston, Pender. Valley, Ord. Washington, Blair. Wayne, Wayne. Webster, Red Cloud. Wheeler, Bartlett.

York, York.

Cities and Municipalities. — The first in¬ corporated city or village was Nebraska City, incorporated bv special act of the Territorial legislature 2 March 1855. Until 1864 each in¬ corporated municipality secured its charter by a separate act of the legislature. The commis¬ sion plan of government was provided by act of 7 April 1911, known as the Banning Act. The (

Omaha (including South Omaha) . 191,601

Lincoln . . > 54,934

Grand Island . 13,960

Beatrice . 9,664

Hastings . 16,647

North Platte . 10,466

Fremont . 9 , 605

Politics. — The struggle over the Nebraska- Kansas bill gave birth to the Republican party in 1854, but there was no Republican party organized in Nebraska until 1858. The Terri¬ tory was strongly Democratic until 1860 when the veto of the Free Homestead bill by Presi¬ dent Buchanan and the pro-slavery attitude of the Democratic party gave the Republicans con¬ trol which they held without interruption down to 1890. The fundamental political issue in the State from 1870 was railroad control. Failure to furnish a solution of the problem brought about factionalism in the Republican party. The Farmers' Alliance, beginning in 1881 as a social and educational organization, became in 1890 the leader of new economic issues and drove the Republican party from its position of supremacy in the State. The Farmers' Alli¬ ance movement became the People's Independ¬ ent, or Populist, party, which for the next five years was the chief rival of the Republican party in the State, the Democratic party being faction torn between its conservative elements following the leadership of President Grover Cleveland and J. Sterling Morton, and the Progressive or Free Silver element under the leadership of William J. Bryan, who was elected to Congress in 1890 and in 1892. The triumph of the free silver wing of the Demo¬ cratic party in 1896, accompanied by the nom¬ ination of W. J. Bryan for President, was followed in Nebraska by a fusion of Populists and Free Silver Democrats which elected an entire State ticket and both houses of the legis¬ lature that year, and continued in power until 1900 when the Republicans again carried the State. Continued fusion of the Populists with the Democrats aided in the gradual disintegra¬ tion of the former party. The nomination of a conservative Democrat for President in 1904 and the progressive policies of President Roose¬ velt drew a considerable portion of the Popu¬ lists into support of the Republican party. Be¬ tween the competition of the Bryan Democracy and Roosevelt Republicanism in the adoption of Populist principles and bidding for Populist votes the party rapidly went to pieces and dis¬ appeared about 1912. The split of the Repub¬

lican party in that year between Roosevelt and Taft gave the Democratic party a new lease of power in Nebraska as elsewhere which it held until 1918.

List of Governors.

TERRITORIAL

Francis Burt . 1854

T. B. Cuming (acting) . 1854-55

Mark W. Izard . 1855-57

T. B. Cuming (acting) . 1857-58

William A. Richardson . 1858

J. S. Morton (acting) . 1858-59

S. W. Black . 185ˆ-61

J. S. Morton (acting) . 1861

A. S. Paddock (acting) . 1861

Alvin Saunders . 1861-67

STATE

. .. Republican . 1867-71

. 1871-73

David Butler .

W. H. James (acting) Robert W. Furnas . . .

Silas Garber .

Albinus Nance .

James W. Dawes. . . . John M. Thayer.

James E. Boyd .

John M. Thayer. . . .

James E. Boyd .

Lorenzo Crounse …. Silas A. Holcomb . . . William A. Poynter . ,
Charles H. Dietrich .

Ezra P. Savage .

John H. Mickey …. George L. Sheldon . . , Ashton C. Shallenberger

Chester H. Aldrich .

J. H. Morehead .

Keith Neville .

S. R. McKelvie .

Republican . . .

1873-75

it

. 1875-79

«

. 1879-83

((

. . 1883-87

U

. . 1887-91

Democrat ….

. 1891*

Republican . . .

. 1891-92

Democrat ….

1892-93

Republican . . .

. 1893-95

Populist .

. 1895-99

it

. 1899-1901

Republican . . .

. . 1901 f

u

. . 1901-03

a

1903-07

a

. . 1907-09

Democrat ….

.. 1909-11

Republican . . .

.. 1911-13

Democrat . . . .

. . 1913-17

a

. . 1917-19

Republican . . .

1919-23

- Election contested and final seating delayed, t Elected United States Senator.

Population. — The population of State and Territory as shown by the

various censuses is as follows: 1885, 4,494; 1856, 10,716; 1870,

122,993; 1880, 452,402; 1885, 740,645; 1890, 1,062,656; 1900, 1,066,300; 1910, 1,192,214; 1920,

1,296,372. The census of 1880 was notoriously a

Per cent of total

Number population

Native whites of native parents . •. 642,075 53.8

Foreign born, foreign parentage and

mixed parentage . 539,015 45.2

Indian, Asiatic, African . 11,124 1.0

Foreign stock in Nebraska (in¬ cludes foreign bom, and native born with one or both parents foreign born).

Germany . . . .

Great Britain and Ireland, Can¬ ada (except French Canadians).

Scandinavia .

Austria and Hungary (chiefly

Bohemians) .

Russia (chiefly Germans, coming from German colonies in Rus¬ sia) . . .

Switzerland (speaking French,

German and Italian) .

France (includes Canadian-

French) .

Italy .

Greece . .

All others (includes other na¬ tionalities and native whites, whose

parents were bom in dif¬ ferent foreign countries) .

201,713

101,596

98,745

64,952

24,885

6,367

5,178

4,840

3,514

26,428

Per cent of total Pop.

16.9

8.5 8.3

5.5

2.1

.5

Per cent of

foreign

Total Pop.

37.5

18.9 18.3

12.1

4.6

1.2

.9

.9

.7

Totals

538,218 100

45.2

“stuffed® census. A great real estate boom and a pending prohibition amendment each de¬ manded a large showing of increased popula¬ tion from the Federal supervisors of the cen¬ sus, one as a basis for inflated real estate

C* > Cn

NEBRASKA

State Capitol at Lincoln

values, the other as a basis for an inflated anti- prohibition vote. It is a conservative estimate that this census added 100,000 to the actual population of Nebraska under pressure from these influences. A present tendency is toward an increase in population of the cities and a decline in the population of the country pre¬ cincts. Fourteen counties in eastern Nebraska show an actual falling off in population be¬ tween 1900 and 1910, due dhiefly to consolida¬ tion of farms made possible by improved ma¬ chinery, to the migration of younger people to the cities and older people to the towns where they form the class known as retired farmers living upon the rental of their farms.

A study of the elements of the present pop¬ ulation is shown in table on preceding page.

History. — Prehistoric. — In the Missouri River region and in the Bad Lands of the northwest are ancient aboriginal remains con¬ sisting of mounds, buried fire-places, flint work¬ ings and lodge circles. In 1804 Lewis and Clark described ancient earthworks found on Bonhomme

Island in the Missouri River. Since 1900 excavations have disclosed skeletons, pottery, bone and flint implements at depths of from 5 to 10 feet in many places. Articles found are of different type from those used by Nebraska Indians since the coming of white men. The discovery in 1906 at Long's Hill, eight miles north of Omaha, of human skulls with low cranial development in posi¬ tion indicating possible burial in pre-glacial time, raised the question of man in Nebraska before the ice sheet.

Indian Tribes. — The first white explorers found Nebraska occupied by the following tribes : Otoe, Omaha and Ponca along the Mis¬ souri River. The Otoe numbered about 3,000, the Omahas about 3,000, the Ponca about 2,000. All three were Siouan tribes speaking dialects of the same language. The Pawnee nation numbered about 10,000 and occupied the central part from the Loup rivers to the Republican. They were divided into four bands, the Skidi, Panimaha or Loups, the Chaui or Grand Pawnee, the Kitkehako or Republican and the Pitahauerat or Noisy. The Pawnee spoke an entirely different language from their Siouan neighbors. They were more advanced in the cultural arts and their folklore and music are among the most valuable contributions to American ethnology. The Cheyenne and Arap¬ ahoe tribes claimed the hunting grounds in southwestern Nebraska and eastern Colorado. They numbered about 3,000 and their language (Algonquin) indicates their relationship to the New England Indian tribes. The Brule and Oglala Sioux, numbering about 15,000, ranged over western Nebraska from the Black Hills to the Republican. Their language shows their kinship to the Otoe, Omaha and Ponca tribes of eastern Nebraska with whom they were fre¬ quently at war. Traditions, folklore and lan¬ guage indicate that the Siouan tribes of Nebraska migrated from the Atlantic seacoast, arriving in the Nebraska region between 1600 and 1700; that the Pawnee came from the south and southwest, reaching Nebraska about the time of Columbus' voyage, and that the Cheyenne and Arapahoe migrated from Canada to the buffalo plains in the 17th century. The total Indian population of Nebraska was about 40,000. The Pawnee, Otoe, Omaha and Ponca

tribes cultivated the soil and made permanent villages of earth lodges, subsisting partly by hunting and partly by agriculture. The Sioux, Cheyenne and Arapahoe tribes lived wholly by the chase and wild fruits; dwelling in skin tents. Warfare between these Nebraska tribes was perpetual, arising chiefly from contests over hunting ground and from love of adven¬ ture. The Pawnee, Ponca and Otoe tribes were removed to Oklahoma, the first in 1875, the second in 1877, the third in 1881. The Oglala and Brule Sioux gave up their Nebraska land in 1877 and are now permanently located on reservations in South

Dakota. The Cheyenne and Arapahoe Indians are located partly in Oklahoma and partly in Wyoming. At the last census there were 3,784 Indians remaining in Nebraska, all of whom are full citizens of the State. The Omaha tribe numbers 1,276, living in 1 hurston County. The Winnebago tribe, 1,063 in number, adjoin the Omahas, and were transferred to Nebraska from their old home in Wisconsin and Minnesota. The Santee Sioux number 1,155 and were transferred from Minnesota to Nebraska in 1863. About 290 Poncas returned from Oklahoma and reside at their old home on the Niobrara. The Sauk and Fox Indians occupy a small reservation in southeast Nebraska and northeast Kansas and number about 100.

1. Exploration. — Francisco Vasquez Coronado with a party of 30 horsemen reached the Nebraska-Kansas region in the summer of 1541 from the valley of the Rio Grande. He probably entered Nebraska although the con¬ troversy is unsettled. About the year 1700 French traders came up the Missouri and brought back reports upon the country and the tribes which were fairly accurate. French maps of this period show the various Indian tribes and principal streams. The first definite account of the region is given by the Mallet brothers who named the Platte River and crossed the State from northeast to southwest in 1739. France, Spain and England claimed the region, but the French influence predom¬ inated through navigation of the Mississippi and Missouri rivers. In 1762 France ceded the region to Spain. There were Spanish gov¬ ernors at New Orleans and Saint Louis, but the French population and language remained and the early place names in Nebraska are French. The Louisiana Purchase of 1803 brought Nebraska into the American Republic. Explorations under American auspices follow rapidly. The Lewis and Clark expedition in 1804; the Major Long expedition in 1819; the Lieutenant Fremont expeditions of 1842 and 1843, each added to information upon the re¬ gion. Major Long, who crossed the State from east to west, stated in his report ((it is almost wholly unfit for cultivation and of course un¬ inhabitable for people depending upon agricul¬ ture for their subsistence,® and placed the words <(Great Desert® upon the map prepared from his surveys. Before the close of the cen¬ tury practically all the region had 'been claimed as homes.

The fur traders, the early missionaries and travelers on the Oregon trail furnish the body of Nebraska history until 1854. Manuel Lisa, a Spaniard, was the leading fur trader and ruling spirit of Nebraska from 1807 until his death in 1820. Fort Atkinson, established in

1820 on the Council Bluff, the farthest west United States army post, 16 miles north of Omaha, upon the site of the present village of Fort Calhoun, had a garrison of several hun¬ dred men until it was abandoned in 1827. The American Fur Company established regular steamboat navigation of the Missouri in 1832, and among the passengers upon their steamer Yellowstone in 1832 was George Catlin, first painter of Nebraska Indians and scenery, and in 1833 Prince Maximilian of Germany who added both paintings and literature upon the region. The Oregon Trail, began in 1830 as a fur- trader's wagon track to the Rocky Mountains, was extended to Oregon by Nathaniel Wyeth in 1832, and by 1842 had become the great transcontinental highway, crossing Nebraska diagonally from southeast to northwest. Other trails, such as the California trail, the Denver trail, starting from different points on the Missouri River, crossed Nebraska, and for 40 years great trains of immigrants, military, freighters and fur traders were the prominent and picturesque features of Nebraska life. The first missionary to the Nebraska Indians was Moses Merrill who came to the Otoe tribe at Bellevue in 1833. In 1834 Samuel Allis and John Dunbar came as missionaries to the Pawnee, and in 1838 Father De Smet reached the Nebraska region as Catholic missionary. The record made by these missionaries and others forms a large part of our knowledge of Nebraska during this period.

Federal legislation made Nebraska from 1 Oct. 1804 to 4 July 1805 a part of the territory of Indiana with its capital at the town of Vin¬ cennes. From 4 July 1805 to 7 Dec. 1812 it was part of the territory of Louisiana with its cap¬ ital at Saint Louis. It then became a part of the territory of Missouri until 1821, when Missouri was made a State and Nebraska cut off and left outside any organized government. On 30 June 1834 Congress established the <(In- dian Country ," of which Nebraska was a part, excluding all white men except military and those having special permission from the gov¬ ernment.

The movement to make a Nebraska territory was part of the national movement to colonize and hold the Oregon country. In 1842 Lieut. Fremont mentions the principal river by its Otoe Indian name Nebraska (Ne-brath-ka) signify¬ ing "shallow water." In 1844 Secretary of War Wilkins suggests that the Platte or Nebraska River would very properly furnish a name to the territory. Stephen A. Douglas introduced the first bill to create Nebraska territory 17 Dec. 1844, followed by other similar bills in 1848 and in 1852. On 30 May

1854 the Ne- braska-Kansas bill creating the two territories became a law after a struggle over the exclu¬ sion of slavery, which disrupted political parties and churches and prepared the way for the Civil War.

Territorial Period. — The principal events of the territorial period (1854—1867) were the establishment of the capital at Omaha and the resulting bitter feud between the north and south Platte regions ; the creation of claim clubs, which undertook to control land settle¬ ment regardless of United States laws; the chartering of wild-cat territorial banks with an issue of $400,000 in paper currency; the growth

of a demand for a free homestead law; the pro¬ motion of Pacific Railroad schemes; the or¬ ganization and growth of the Republican party from 1858 on, and the Sioux-Cheyenne Indian War of 1864.

Statehood. — The first proposal for state¬ hood was defeated 5 March 1860 by a vote of 2,094 for to 2,372 against. On 19 April 1864 Congress passed an enabling act upon petition of the territorial legislature. A constitutional convention, held 4 July 1864, adjourned without action, a majority of the delegates being pledged against statehood. On 2 June 1866 a constitution submitted by the legislature was adopted by the vote of 3,938 to 3,838. At the same election the Republicans elected the State ticket and a majority of both houses of the legislature by nearly the same vote as that cast for the constitution. In this campaign the Democrats, led by J. Sterling Morton, opposed statehood, while the Republicans favored it. The real issue was the fight then on between President Andrew Johnson and Congress, and the question whether two United States sena¬ tors should be sent from Nebraska to aid Republican leaders in Congress in their con¬ troversy with the President. The bill to admit Nebraska under this constitution passed 27 July 1866, but failed to receive President Johnson's signature. In January 1867 Con¬ gress again passed an act to admit Nebraska but attached the condition that its legislature should first declare that the provision in the new constitution restricting suffrage to white men should not be enforced. President Johnson vetoed this act. Congress passed the act over his veto. The Nebraska legislature was con¬ vened in special session and accepted the con¬ dition on 20 February. On 1 March 1867 the President's proclamation admitted Nebraska to the Federal Union.

The capital was removed from Omaha and located 29 July 1867 upon an open prairie with the name of Lincoln. The sale of town lots supplied funds for the erection of a new Capi¬ tol building. The Union Pacific Railroad was completed to the west line of the State in 1867. A vast tide of immigration set in, largely com¬ posed of soldiers from

the Civil War. To in¬ sure settlement of the prairies where material for building fences was inadequate the legis¬ lature in 1870 passed the herd law. In 1871 Gov. David Butler was impeached and removed from office for misuse of public funds. On 4 Jan. 1872, upon motion of J. Sterling Morton, the State Board of Agriculture instituted Arbor Day, since then adopted in many States and countries. Grasshoppers in vast numbers vis¬ ited the State in 1874-75. The adoption of the new constitution 4 Nov. 1875 marks an impor¬ tant era in the State's development. Wars with the Sioux and Cheyenne Indians along the western border lasted from 1874 to 1877, end¬ ing with the surrender of the hostiles and their removal from Nebraska. The third great land¬ seeking migration began about 1880 and con¬ tinued for 10 years, taking up the desirable free land to the farthest borders. Conflicts be¬ tween the "grangers," as the homesteaders were called, and cattle men were a leading feature of this period, resulting in numerous tragedies.

In 1890 and again in 1894 drouth visited the State. The legislatures of 1891 and 1895 appro-

priated $450,000 to aid settlers. Thousands of homesteads were abandoned and real estate values struck bottom. During this period be¬ gan the cultivation of sugar beets and the erec¬ tion of beet sugar factories. Winter wheat and alfalfa became State-wide staple crops. The dairy industry of the State was greatly stimu¬ lated and encouraged by the introduction of cream separators on farms and the establish¬ ment of centralized creameries. Irrigation and dry land farming became general. The woman's club and the local library systems were estab¬ lished. Social and political ideas were recon¬ structed. It was a period of revolution. The Kinkaid Homestead Act enacted in 1904 pro¬ vided 640-acre homesteads for settlers in the sand hills region. Within 10 years about 8,000,- 000 acres were taken under this Act, practically all of the remaining free government land in the State. About the year 1900 a farmers' co¬ operative elevator movement began. A vigor¬ ous war with the large grain dealers and rail¬ road companies followed. The co-operative movement secured from the legislature of 1905 a law to give them shipping facilities which was affirmed by the Supreme Court. Since then the co-operative movement has steadily grown. About 1913 the farmers' union began a still wider organization for buying and selling co-operatively. This reached a membership of about 35,000 in 1918, carrying on a very large distribution business and promising great changes in the future.

In 1912 the State adopted an initiative and referendum amend¬ ment to its constitution and in 1916 it adopted a prohibitory amendment by a majority of nearly 30,000. The leading social and political questions in 1918 are the support of the war, woman suffrage, prohibition, development of water power and public ownership.

Nebraska War Activities. — Since the United States entered upon the World War up to 1 July 1919 Nebraska furnished to the army and navy approximately 47,800 men and' con¬ tributed $242,000,000 to' the five Liberty loans and war charities. Nebraska leads all other States in per capita contribution to war savings stamps and her membership in the American Red Cross is 585,156 or 49 per cent of the popu¬ lation for 1910 census.

Bibliography. — Barrett, (History and Gov¬ ernment of Nebraska* (Lincoln 1891) ; John¬ son, (History of Nebraska) (Omaha 1880) ; Hale, (Kansas and Nebraska) (Boston 1854) ; Morton, Ullustrated History of Nebraska1* (ed¬ ited by Witkins, 3 vols., Lincoln 1913) ; (The Nebraska Blue Book) (edited by Sheldon, Lincoln 1915—19) ; (The Reports of the various Executive Departments, especially those of the Auditor and of the Bureau of Labor and Statis¬ tics } ; Barbour, E. H., (Geological Survey of Nebraska) (3 vols., Lincoln 1900-16) ; Bengs- ton, N., (Geography of Nebraska) (Lincoln 1917) ; Sheldon, A. E., (History of Nebraska* (Lincoln 1913) ; Condra, G. E., Conservation and Soil Survey Reports) (1909-17); Daniel¬ son, E. R., (Secy.) (Reports of the State Board of Agriculture* (1860-1917).

Addison E. Sheldon,

Secretary of the Nebraska State Historical So¬ ciety and Director of the Legislative Reference Bureau.

NEBRASKA, University of, The, at Lin¬ coln, Neb., was founded by act of the legislature in 1869. Funds for the erection of the first building were provided by the sale of lots in the then new capital city of Lincoln. This first building, now called University Hall, was com¬ pleted in 1871, the lumber and part of the brick being hauled from the Missouri River in wagons. The College of Literature, Science and the Arts was opened 6 Sept. 1871, with a faculty of five professors and 90 students. The charter act contemplated six colleges, but an amend¬ ment in 1877 reduced the number to five, merg¬ ing the State Agricultural College and the College of Practical Science into the Industrial College. The board of regents, originally 12 members, but

now six, constitute the governing body. The University comprises the Graduate School (degrees, Master of Arts and Doctor of Philosophy) ; the College of Literature, Science and the Arts (degree, Bachelor of Arts) ; the Industrial College (degree, Bachelor of Sci¬ ence), which includes the School of Agricul¬ ture, the School of Mechanic Arts, and the School of Domestic Science; the College of Law (degree, Bachelor of Laws) ; the College of Medicine (degree, Doctor of Medicine) ; the School of Fine Arts; the School of Music; and the summer session. Each college and school has its faculty,, charged with the instruction and the immediate management thereof. Law and medicine are not organized into departments. The other colleges are so organized, having the following departments: agriculture; animal husbandry; animal pathology; astronomy and meteorology; bibliography; botany; agricultural chemistry; general chemistry; education (peda¬ gogy) J civil engineering; mechanical engineer¬ ing; electrical engineering; dairy husbandry; domestic science (household arts) ; mechanical drawing and machine design ; elocution ; English language; English literature; entomology and ornithology; forestry; geology (including palae¬ ontology and geography) ; Germanic language and literature; Greek language and literature; Roman language and literature ; Romance lan¬ guages; American history and jurisprudence; European history; horticulture; mathematics; military science and tactics; philosophy; phys¬ ics; physical education ; political economy and sociology; zoology., Nebraska students in the College of Literature, Science and the Arts and in the Industrial College pay no tuition. Non¬ resident students, also all students in the profes¬ sional schools and in the schools of fine arts and music, pay small tuition fees. All departments are open to both sexes on equal terms. A tax of one mill per dollar on the assessment roll of the State, together with interest income from land sales and land leases are the chief sources of revenue. The University receives the benefit of the Morrill Acts for the maintenance of in¬ struction in branches relating to agriculture and the mechanic arts, and of the Hatch Act, in aid of agricultural experimentation. Tire 10 buildings on the city campus, with their class rooms, laboratories, libraries and offices, house all the departments except the School of Agricul¬ ture, the work of which is done mainly at the university farm, and the College of Medicine, in which the last two years' work is given at Omaha. There are five buildings at the farm. This consists of 320 acres, a little removed

from the city campus. Here are located the departments of agriculture,

animal husbandry, animal pathology, dairying and horticulture. Abcfut 100 acres are laid out in experiment plats for field crops, fruit and vegetables. Herds of cattle, sheep and swine are owned, being used for experimentation. Four new buildings were recently erected, an administration building and a physics laboratory on the city campus, a hall of agriculture, a dairy building, shops, and a horticulture laboratory at the farm. The li¬ braries accessible to the students contain about 310,000 volumes. The latest statistics show an enrollment of 4,826 students and 281 professors and instructors. Nearly half of these were women, there being women in each department.

NEBRASKA CITY, Neb., city, county- seat of Otoe County, on the Missouri River, and on the Missouri Pacific and the Chicago, Burlington and Quincy railroads, about 45 miles in direct line east by south of Lincoln, and 52 miles below Omaha. It is in a fertile agricultural region. It is built on the site of old Fort Kearney (1848) and was laid out in 1855. It was incorporated in 1871 and chartered in 1891. The chief manufacturing establish¬ ments are flour and lumber mills, planing mills, a cannery, brick works, press-drill works, cigar, vinegar and pickle factories, windmill works, starch factory, foundries, machine shops and cereal mills. It has large grain elevators, cold storage buildings, lumber yards, stock yards, and packing and provision house. It is the seat of the State Institute for the Blind and the Academy of the Annunciation. It has a public library, a government building, city and county buildings, a number of churches, a high school, and public and parish elementary schools. There is a public monument to J. Sterling Mor¬ ton, whose home, Silver Lodge, has been hand¬ somely developed and contains a fine arboretum. The government is administered under the commission plan. Pop. (1920) 6,279.

NEBRASKA RIVER. See Platte.

NEBRASKA WESLEYAN UNIVER¬ SITY, The, is located at University Place, four miles from the capital city of Nebraska, has its own municipal government, and is connected with the city of Lincoln by lines of electric rail¬ way. The University is a denominational insti¬ tution of the Methodist Episcopal Church, or¬ ganized in 1887 as the result of an effort to unify the educational interests of the denomina¬ tion within the State. It consists of a College of Liberal Arts, an academy with courses fitted to the college curriculum, a Teachers' College, a School of Expression and a Con¬ servatory of Music. It is coeducational, and its standards for degrees are those required by the college senate of the denomination for its first class institutions. Its

first graduates were the class of 1890, which consisted of four members. Its present number of students is 950;' its professors and instructors 46. Its col¬ lege graduates number about 687 ; its library has 8,000 volumes; its buildings and grounds are valued at $225,000 ; its productive endow¬ ment is $295,000.

NEBUCHADNEZZAR, neb"u-kad-nez'ar (Nabu-Kudurriuzur, <(Nebo protect my domin¬ ion"), the most illustrious monarch of the New Babylonian or Chaldaean kingdom, son of Nabo-

polassar (q.v.). In the lifetime of his father he defeated as crown prince the Egyptian Pharaoh Necho at Carchemish 605 b.c., and as¬ cended the throne as his father's successor 604 b.c. He at once began his career of con¬ quest, subduing Syria, and laying Judah and its king, Jehoiakim, under tribute. In 598 he marched against Jerusalem and led away into captivity at Babylon Jehoiakim, the 18-year-old son of Jehoiakim, just as he had succeeded to the throne on his father's death. With the young king the most eminent rulers of the land were carried off, 10,023 in all, together with the costly spoils of the temple and royal palace. As Zedekiah who succeeded Jehoiakin in the latter's exile entered into a treaty with Egypt Nebuchadnezzar's army besieged and captured Jerusalem a second time, carrying off Zedekiah into captivity (586 b.c.). Nebuchadnezzar mean¬ while had strongly established his headquarters at Ribla in Coelo-Sydia. The remaining inhabit¬ ants of Jerusalem were taken as captives to Babylon, and the Jewish capital absolutely de¬ stroyed. For the 13 years between 585 and 573 b.c., the city of Tyre was besieged by Nebu¬ chadnezzar to no purpose ; in 572 b.c. he invaded Egypt and conquered it from Syene to the fron¬ tiers of Ethiopia. Pharaoh Hophra was de¬ feated and dethroned and from 569 to 536 b.c. a Babylonian army occupied Egypt. Besides his activity in these campaigns Nebuchadnezzar was tireless in efforts for the security of his realm, the welfare of his people, the adorning and fortification of his capital Babylon. He restored the ruined canal and cut another, the King's Canal. At Sippara he made a lake like Lake Moeris, 10 miles in circumference, which received and distributed the overflowing waters of the Euphrates, and he founded the city of Teredon at the mouth of that river. He built the Median wall as a defense to his kingdom, and completed the vast ramparts which his father Nabopolassar had begun. He beautified the royal residence with palace and temple build¬ ings, finished the tower of the seven planets at Borsippa, restored and decorated the royal palace of his father, and built a new palace on a height surrounded by hanging gardens for the pleasure of his Median wife, Amytis. This great work is said to have been completed in 15 days. Pie died after a reign of 43 years, 561 b.c., deeply deplored by his subjects, having

been on the whole a great and wise king.

NEBULiE, The, in astronomy, a term de¬ rived from the Latin, signifying little clouds. The nebulae may properly be divided into two distinct classes, the green and the white. The former are frequently very large and irregular in form, sending out sprays and streams in all directions, while the latter have often a spiral structure. The difference between the two classes is fundamental, and it is questionable even if they might not properly be designated by different names. The spectrum of the green nebulae consists chiefly of green and blue lines with sometimes a very faint continuous spec¬ trum, — their constitution is therefore obviously mainly gaseous. The spectrum of the white nebulae is continuous, with, in a few instances, evidence of very faintly marked bright and dark lines. Their nature is, therefore, uncer¬ tain, but probably they are made up largely of solid as well as gaseous matter. The green

NEBULiB

The Great Nebula in Andromeda M 74, Piscium H.V 44 Camelopardi

M 33, Trianguli M 77, Ceti

H.I 200, Leonis Minoris

•

.

nebulae are distributed in and near the Milky ‘uay; the white ones are located on either side, and are generally remote from it. In this re¬ spect they differ from the star clusters, which in other respects they somewhat resemble. \ hile the Milky Way shines chiefly by the light of the countless stars that it contains, a portion of its light is also due to enormous areas of green nebulous matter, which serves as a lumin¬ ous background to the stars themselves. Un¬ doubtedly the finest telescopic object in the sidereal heavens is the great nebula in Orion, which belongs to this class. It fills a large part of the constellation, and is the largest nebula known outside of the Milky Way. Next to it in size and also in magnificence is 30 Doradus, in the larger Magellanic Cloud. The Argus and Trifid nebulae are other fine specimens of this class. All these nebulae are obviously connected with a large number

of stars, and are possibly in process of dispersion from them. Frequently a single star will be connected with a nebular wisp ; in the well-known little group of the Pleiades nearly all of the larger stars have such nebulous streamers connected with them and many of the nebulous streamers connect star with star, the whole cluster being apparently full of nebulous matter. Recent observations indicate that this very faint nebulous matter shines principally by the light which it reflects from the brighter stars of the cluster and that it is largely or wholly in an opaque, non-lumin- ous condition.

There is a second division of the green nebulae. These have the same spectrum, but owing to a slightly different division of the light usually present a somewhat bluish appearance. These are known as planetary nebulae on ac¬ count of their rounded well-defined discs. The discs are generally somewhat diversified and contain sometimes one and sometimes two stel¬ lar nuclei. The largest and finest of the plan¬ etary nebulae is known as the Owl nebula in Ursa major. It is so called because it formerly somewhat resembled the face of an owl. For a few years it had two brilliant nuclei which corresponded with the two eyes. Later, first one and then the other of these disappeared, and now it has a single nucleus in its exact centre. If the planetary disc is too small to be distin¬ guished as such, the formation is designated as a stellar nebulae. When a nova or temporary star fades out, it is usually converted into one of these bodies. If the central portion of a planetary nebula is comparatively dark, it is then called a ring nebula. The best known ex¬ ample of this class is the ring nebula in Lyra. Many of the white nebulae exhibit a spiral struc¬ ture, and they often are of a double instead of a single spiral structure.

The largest and most brilliant white neb¬ ula in the heavens is the great nebula in An¬ dromeda. It is the only nebula indeed that is conspicuous to the naked e3re. The one best showing its spiral nature, however, is the Whirl¬ pool nebula in Canes Venatici. Often, as is the case with both of these objects, a secondary nucleus terminates one of the spirals. Smaller nuclei frequently occur at intermediate positions upon both spirals. If the solar system con¬ densed from a former large nebulous mass, it is likely to have been from an object such as one of these, but the solar nebula must have been very much smaller. Unlike the green

nebulae, the white ones are not associated with brilliant stars, but that they are sometimes con¬ nected with small ones is shown by the fact that in 1885 a small temporar- star suddenl}* ap¬ peared close to the centre of the nucleus of the great nebula in Andromeda; no less than eight new stars have thus appeared within spiral nebulae at various

times. It is certain that the association of these stars with the nebulous cloud cannot be accidental. While we have little evidence bearing upon the subject, it seems most likely that the white nebulae are condensing at present upon numerous nuclei located within them. What the size of these nuclei may be we have no knowledge.

A subdivision of the white nebulae consists of small faint elliptical bodies showing no detail. It is possible that if they were nearer to us, and were better seen, that they, too, would show a spiral structure. In closing this brief summary of our knowledge of the nebulae, we must refer to one most unexpected property that some of them have exhibited — that of variability. Three variable nebulae have ap¬ peared and disappeared in the constellation Taurus, but the best known example is that of the Trifid nebula, a large section of which, which was formerly dark, is now bright, and apparently a region which was formerly bright is now dark. This is probably due not to a shifting of the material itself, but to a change in its luminosity. The source of this lumi¬ nosity is unknown, but it may be suggested that the unknown gas which all the green nebulae contain in combination with hydrogen, and which is found nowhere else in the universe, may possess properties like radium, rendering the whole gaseous formation luminous until its original atomic structure is finally broken down. See Cosmogony.

William H. Pickering, Astronomical Observatory , Harvard University.

NEBULAR HYPOTHESIS, The. A the¬ ory of the method in which the development of the Solar System has taken place from an original nebula. It was first outlined in a some¬ what general and indefinite way by Swedenborg and afterward by Kant. It was, however, first presented in detail by La Place and is generally referred to as (

NECESSITARIAN. See Determinism.

NECESSITARIANISM, or NECES- SARIANISM. The doctrine of philosophical necessity which postulates that every event hap¬ pens according to immutable laws; that free¬ dom of will does not mean freedom from will ; the will is free to act according to its own nature, but all actions are related necessarily to hyperphysical causes and natural laws in a universal scheme of predetermined events, out¬ side the range of human knowledge and control. See Determinism; Free Will; Freedom of Will; Mechanism; Mechanism and Vital¬ ism; Mechanisms, Mental; and related references.

NECHES. nech’ez, a river in Texas, which has its rise in Van Zandt

County and flows southeast into Sabine Lake (q.v.). It traverses a fertile agricultural section of the State, and in its lower course passes through an oil region. Beaumont (q.v.) is on its bank a short distance

from the mouth. The Neches is about 350 miles long.

NECHO, ne'ko, or NEKAU, Egyptian king, the Pharaoh-Nechoh of the Bible: b. last half of the 7th century b.c. ; d. 595 b.c. He was son of Psammetichus I, succeeded him in 609, attempted to hold Syria after the collapse of the Assyrian empire, and in this campaign killed at the battle of Megiddo King Josiah of Judah, whose son Jehoahaz was made king dependent on Necho. He extended the boundaries of his kingdom to the Euphrates, but the later cam¬ paign was less fortunate for the Egyptian king, who was defeated at Carchemish in 604 by Nebuchadnezzar, and thus lost possession of Syria. Necho's internal rule was vigorous; he built a canal from the Nile to the Red Sea and sent out Phoenician sailors to explore the Afri¬ can coast. This fleet is said to have circumnavi¬ gated the continent. Consult Budge, (1902) ; Breasted, (A History of the Ancient Egyptians y (ib. 1908,.

NECK, that part of the body in the higher animals which forms the juncture of the head with the trunk. In man the neck is formed mainly of the muscles passing from the skull to the thorax, and of the trachea and the oesophagus. There are also the cervical or neck vertebrae, in man numbering seven, the same number being constant in nearly all the Mam¬ malia. The most notable exceptions are seen in the manatees and the two-toed sloth, having six neck-vertebrae ; while in the three-toed sloth nine cervical segments exist. In long-necked birds as many as 25 cervical vertebrae may be present. In fishes no neck or cervical region is distinguishable, and structures such as the gill- slits, which belong to the neck region of the mammal, are found in intimate collocation with cephalic organs such as the skull, and thoracic organs such as the heart. A cross-section of the neck at the level of the sixth cervical verte¬ bra shows in front near the middle line the two anterior jugular veins. Behind this come the sternohyoid and sternothyroid muscles, from the breastbone to the hyoid bone and the thy¬ roid cartilage of the larynx, respectively. Just laterally of the sternohyoid the omohyoid runs from the hyoid bone to the shoulder. Still more laterally the sternomastoid, the great cord that shows through the skin of the neck, runs from the breast-bone and collar-bone to the skull be¬ hind the ear. In the middle line the trachea or

windpipe, the collapsed tube of the oesophagus, and the vertebral column with the spinal cord within it follow one another from front to rear behind the sternothyroid. The space between the trachea and oesophagus, on the one hand, and the sternomastoid and sternothyroid on the other is filled anteriorly by the thyroid gland, posteriorly by a mass of connective tissue con¬ taining to the outside the internal jugular vein, to the inside the common carotid artery, and behind the vagus nerve. Between these struc¬ tures and the spinal column is the longus colli muscle, which helps in bending the neck. The external jugular vein lies just outside of the hind edge of the sternomastoid. Within the foramina in the transverse processes of the ver¬ tebrae run the vertebral artery and vein. Be¬ hind and to the side of the vertebral column lie the scaleni, the splenii, the complexus, the semispinalis colli, the levator anguli scapulae,

and the trapezius. The recti are also associated with the vertebral column. The entire front surface of the neck is covered with a thin layer of muscular tissue just underneath the skin, known as the platysma myoides.

Some of the muscles of the neck form tri¬ angles with the clavicle, the middle line of the neck, the hyoid and the jaw. These are useful to the surgeon in describing and locating the structures of the neck.

Besides the thyroid gland, the thymus is lo¬ cated in the neck. At the bifurcation of the carotid artery the carotid gland is found. The neck also possesses lymph glands, which are liable to tuberculous infection. In the lower animals especially — as in the horse or elephant — there is a strong band of fibres, forming the ligament nuchae, which suspends the head on the neck. In man, the head being balanced on the spinal column, this ligament is of compara¬ tively small size, and it extends from the occip¬ ital protuberance at the back of the skull to the spine of the seventh or last cervical verte¬ bra. The term neck is also used in anatomy to indicate any attentuated process or part of a bone which serves to unite or support parts of larger proportions; for example, the neck of the femur or thigh-bone, the neck of the hu¬ merus, of the radius, etc. See Anatomy ; Caro¬ tid Artery; Jugular Vein; Larynx; Thymus Gland; Thyroid Gland; Trachea.

NECKAR, nek’kar, Germany, an affluent of the Rhine, which rises in the Black Forest in Wurtemberg, near one of the sources of the Danube, and flows through Baden into the Rhine at Mannheim, after a course, including windings, of about 240 miles. The area of its basin is 4,150 square miles. It is navigable for small boats from Heidelberg near its mouth, so far as Cannstadt, but the actual navigation of the

river extends only to Heilbronn, up to which steamers ply.

NECKER, na -kar, Jacques (English, nek'er), French Minister of Finance: b. Geneva, Switzerland, 30 Sept. 1732; d. Coppet, near Geneva, 9 April 1804. In 1750 he went to Paris to enter the banking-house of his uncle, M. Vernet, and having become partner in a banking business, soon acquired an immense fortune. After giving up his business he held the post of Resident Minister at Paris, repre¬ senting his native town. Ambitious of literary distinction he produced his (Eloge de Colbert 1 (1773), which gained the prize of the French Academy. His (Essai sur la legislation et le commerce des grains) (1775) was violently at¬ tacked by the economists, owing to his ex¬ pressing himself in favor of restrictions on the exportation of corn. In July 1777 he obtained the post of Director-General of Finances. Mal¬ versation under the preceding reign had caused a great deficit to which the American war made additions. New taxes would have been unpopu¬ lar and Necker endeavored to meet the exigency by loans and reforms. The salon of Madame Necker (q.v.) became the centre of the liter¬ ary and political life of Paris. But the parti¬ sans of Turgot found fault with his innova¬ tions. In 1781 he published his (Compte rendu au Roi,* relative to his administration. This statement of the financial condition of the nation found favor with the people, but dis¬ pleased the court and Necker was dismissed in

May 1781. He went to Switzerland where he published his work Administration des finances) (1784). The errors and prodigality of Calonne, who next had the management of the state finances, increased Necker's reputa¬ tion; the latter returned to France in 1787, wrote against Calonne, who had accused him of being the author of the deficit, and was exiled in con¬ sequence. But in 1788 Necker was recalled as comptroller-general, he supported the convo¬ cation of the States-General, which was the wish of the nation and the giving a double representation to the tiers etat. When the court in a royal sitting, held on 23 June 1789, wished to annul the decision of the Third Estate, by which the National Assembly was constituted, Necker refused to appear in the sitting. On 11 July the advisers of the king succeeded in inducing him to give Necker his dismissal and to order him to leave the kingdom. No sooner was his removal known than all Paris was in a ferment. The storming of the Bastile followed (14 July) and symptoms of popular violence became so alarming that the king found himself compelled to recall the banished minister. His first

object was to restore tranquillity and se¬ curity of person and property. But as Minister of Finance he was obliged to propose measures unacceptable to the populace. His moderate opinions in regard to the administration of gov¬ ernment did not keep pace with the wishes of those who dictated to the people, notably Mira- beau. Under these circumstances he wrote to the Assembly, in September 1790, requesting his dismissal. His daughter, Madame de Stael (q.v.), has given a somewhat too favorable view of his character as a statesman in her (Considerations.) His ability, though consid¬ erable, was much overrated in his day. Among his other works are (De l'lmportance des Opinions Religieuses) (1788) ; (Reflexions presentees a la nation frangaise) (1792) ; (Du pouvoir executif dans les grands etats> (1792) ; (De la revolution frangaise) (1796); and (Dernieres vues de politique et de finances > (1802). A collective edition of his works was published at Paris in 1820-22 by his grandson, August de Stael Holstein. Consult Nourrisson, (Trois Revolutionaires : Turgot, Necker, et Bailly> (2d ed. 1886) ; Hermann, J., (Zur Geschichte der Familie Necker* (1886) ; Gomel, Charles, (Les causes financieres de la revolution franqaise: les ministeres de Turgot et de Necker) (Paris 1892).

NECKER, Susanne Curchod de Nasse,

French matron: b. Crassier, Switzerland, 1739; d. Coppet, Switzerland, 1794. She came of a French Protestant family and as a girl was noted for her beauty, wit and wide knowledge which so attracted the historian Gibbon that he wished to marry her. In 1764 she married Jacques Necker (q.v.) and in Paris her house soon became frequented by the most distin¬ guished men of the day, among them Buffon, Saint Lambert and Marmontel. She educated her daughter, the famous Madame de Stael in this atmosphere and devoted much time to phil¬ anthropic work, founding the hospital named for her. She wrote (Reflexions sur le Divorce) (1794) and

D'Arvor, (Madame Necker, 1737— 94> (Paris 1897) ; Gambier-Parry, M., (Madame Necker, Her Family and Her Friends * (Edinburgh

1913).

NECKER DE SAUSSURE, de so-siir, Adrienne Albertine, French writer: b. Geneva, Switzerland, 1765; d. 1841. She was married to Jacques Necker, a cousin of Madame de Stael with whom she was intimate. She published (Notice of the Character of Madame de Stael* (1820) and (L'Education progressive ou etude sur le cours de la vie) (2 vols. 1828-32) for which the Academy gave her the Montyon prize in 1832.

Part of the work was translated into English (Boston 1835).

NECROMANCER, The. See Ramirez, Ignacio.

NECROMANCY (Greek, nekros, dead, and manteia, divination), the divination of the future by questioning the dead under the belief that the. spirits or souls of the dead could be communicated with and could give information regarding the. future. This, like many super¬ stitious rites, it is supposed, is of the highest antiquity. Mention is made of necromancy in the Old Testament; for instance, in Deuteron¬ omy (xviii, 11), where it is forbidden. In the 28th chapter of the first book of Samuel the witch of Endor is related to have raised up Samuel to gratify the desire of Saul. In many parts of Greece there were oracles of the dead and necromancy was practised in the temples by priests or other religious persons. It was also practised in Thessaly, notorious for magic and sorcery. From the first the practice was con¬ demned by the Christian Church and during the Middle Ages necromancers were persecuted in all ways, imprisoned, tortured, burned. See Magic.

NECRONITE (Greek, <(a corpse®), a vari¬ ety of orthoclase feldspar occurring in granular limestone near Baltimore, Md. It is nearly white in color. and derives its name from the fact that it emits a fetid odor when struck.

NECROPOLIS (Greek, ((the city of the dead®), a term applied to the cemeteries in the vicinity of . ancient cities. In classical antiquity the name is given to a suburb of Alexandria, where the corpses were received and embalmed. Here Cleopatra applied the asp to her breast. Among the famous cemeteries of antiquity are those of Egypt at Ghizeh, the west bank of the Nile at Thebes, Beni Hassan and Abydos, the Etruscan tomb groups of Volci, Tarquinii and Capua, Italy, Petra in Syria. These ancient burial places are of prime importance to the archaeologist because of the rich yield of domes¬ tic utensils, tools, weapons and jewelry brought to light through the general custom of the ancients in burying such with the deceased.

NECROSIS (Greek, literally, <(a state of death®), in pathology, the death of a circum¬ scribed piece of tissue. In surgery, the term is specifically applied to the death of a bone, in part or in whole, but especially in mass. The part affected by necrosis, like a slough of the soft tissues, has no longer any organic connec¬ tion with the body. This dead portion, espe¬ cially when detached from the bone to which it belonged, is called the sequestrum. If the necrosis is confined to the superficial layers of the bone-substance, the operation of nature by

which the dead layers are thrown off is called exfoliation. The line of demarcation is the boundary between the living tissue and the dead. If it is the whole of the outer case of the bone that suffers, the periosteum or investing mem¬ brane sometimes remains healthy and deposits a lymph which rapidly ossifies and surrounds the diseased part with a healthy crust. The bones that most usually suffer from necrosis are those of the lower extremity, the tibia and femur ; necrosis of the soft parts is called gangrene (q.v.).

NECTANEBO I, nek-ta-ne'bo, king of Egypt : d. 364 b.c. The first king of the 30th dynasty he came to the throne in 382, formed an alliance with Evagoras of Cyprus against the Persians ; successfully met a Persian invasion in 374; was conservative in religion and restored many old temples. The British Museum possesses his sarcophagus. This great general was succeeded by Teher or Taho, who was sup¬ planted by Nectanebo II in 361, also a general and also an ally of the Greeks, with whose help he put down a pretender to the throne and for a time held the Persians off, only to succumb to them (343) after the defection of Mentor, one of his Greek generals. He left Egypt and fled to Ethiopia — or by a late and untrustworthy tradition to Macedonia where he seduced Queen Olympias and thus was the father of Alexander the Great. This story is evidently suggested by a longing for poetic justice to the king de¬ feated by the Persians, who in turn were crushed by Alexander. Egypt was a Persian province from 343 to 332, when it came into the control of Macedonia. Consult Wiedemann, (Geschichte Aegyptens von Prammetich I bis auf Alexander den Grossen) (Leipzig 1880).

NECTAR, a sweet liquid secreted by a glandular surface structure in a plant called a nectary; and the name is extended by botanists to any aborted part of a flower in the place be¬ tween the gyncecium and androecium (see Flower) where nectaries usually occur. Nectar varies in composition with the plant that pro¬ duces it, but consists mainly of water, with sugar and grape-sugar, with traces of other carbo-hydrates and proteids which give it flavor and odor. Nectaries may occur in many places and are of various forms. Those outside of flowers are mo$t often found at or near the base of the petiole or about stipules. Within flowers the nectar glands form a more or less contin¬ uous ring between the stamens and pistil ; or the disc itself may secrete a sweetish fluid; or other parts, as the petals (for example, in aco¬ nite) may become nectaries. In many cases the secretion

exudes directly from the surface and not from any definite pore or excretory opening.

Such structures belong mainly to seed-pro¬ ducing plants and serve the purpose of attract¬ ing insects whose visits are beneficial in effecting cross-pollination (see Flowers and Insects) as they go from flower to flower in search of this delectable food, which bees, wasps and others transform into honey. The nectaries on the outside of certain plants attract ants (q.v.) which protect the plant. The exudation of nectar is dependent on the little understood process of the secretion of sugar by the cells of the nectaries. The water of the nectar is then extracted from these cells by plasmolysis or osmotic action.

The terms nectar and nectary are derived from the name given by the Greek poets to the drink of the immortal gods on Mount Olympus. It was poured out by Hebe, the goddess of Youth, and conferred immortality. Homer de¬ scribes it as resembling red wine. It was joined with ambrosia, the immortalizing food of the gods, and like it was of most delicious odor.

NECTARINE, a smooth-skinned peach formerly regarded as two distinct species, which may be derived from the seed of a peach or from a peach bud by bud variation, and which, conversely, may produce a tree bearing peaches by either of the means mentioned. In all ways as an orchard fruit the nectarine is managed like'the peach, but is far less popular. Commer¬ cial orchards of this tree are planted in Cali¬ fornia, the product being mainly dried or canned. Consult Darwin, (Animals and Plants under Domestication5 (1868).

NECTURUS. See Proteids.

NEDJED, ned'jed, NEJD, or NEJED,

Arabia, the general name signifying ((elevated country,® applied to the central Wahabi king¬ dom in great part covered by the heights of Jebel Toweyk. The capital is Riad (pop. 30,- 000), a centre of Mohammedan orthodoxy and fanaticism. A great part of the region is sandy desert interspersed with fertile spots inhabited by Bedouins. The more elevated districts with towns and villages inhabited by the settled population, feed immense droves of camels and the best breeds of Arab horses. The climate is healthful. Politically it is a dependency of Jebel Shammar. The inhabitants are Wahabis, est. at 1,000,000. Consult Palgrave, (Central and Eastern Arabia5 (1865).

NEEDHAM, ned'am, Charles Willis,

American college president: b. Castile, N. Y., 30 Sept. 1848. He was graduated from the Albany Law School and in 1874-90 practised law in Chicago where he assisted in founding the University of Chicago. In 1890 he re¬ moved to Washington where he established a law practice and in 1897 began his connection with Columbian University (now George Wash¬ ington) of which he became president in 1902. He resigned this position in 1910, when he be¬ came counsel for the Interstate Commerce Commission. He is also professor of constitu¬ tional and interstate commerce law in the Washington College of Law and is the author of several pamphlets on education, law and jurisprudence and is a contributor to periodicals.

NEEDHAM, James George, American naturalist: b. Virginia, Ill., 18 March 1868. He was graduated in 1891 from Knox College, Galesburg, Ill., and studied later at Johns Hop¬ kins and Cornell. He was professor of biol¬ ogy at Lake Forest University from 1898 to 1906, and had charge of the New York Ento¬ mological Field Station after its establishment in 1899. He was called to Cornell in 1906 to initiate a new line of university studies in limnology and has been since 1914 professor of entomology and limnology in Cornell Uni¬ versity. He has written (Elementary Lessons in Zoology5 (1895) ; (Outdoor Studies5 (1898) ; (General Biology5 (1909) ; (The Natural His¬ tory of the Farm5 (1913) ; (The Life of In¬ land Waters,5 with J. T. Lloyd (1915).

NEEDHAM, John Turberville, English naturalist: b. London, England, 10 Sept. 1713; d. Brussels, Belgium, 30 Dec. 1781. He was a Roman Catholic priest and was in his later years director of the Academy of Sciences at Brus¬ sels. He published (New Microscopical Dis¬ coveries > (1745) ; (Idee sommaire, ou vue gen¬ erate du systeme physique et metaphysique sur la generation > (1780).

NEEDLE, a small instrument of steel pointed at one end and usually with an eye or hole at one end through which a thread is passed in sewing and stitching. The needle was known in very ancient times, its invention being ascribed by the ancients to the goddess, Bellona. The earliest instruments of this kind were fashioned of wood or fish-bones and did not have the eye, but were used after the manner of an awl. The skill in embroidery possessed by early peoples such as the Baby¬ lonians, Phrygians and Egyptians attest their acquaintance with a

needle of a highly-devel¬ oped type. In Pompeii both ordinary and sur¬ geon's needles have been found. The Chinese appear to have 'been the inventors of steel needles, which spread later throughout the Moslem world and reached Europe through the Moors. Nuremberg was the earliest seat of the needle-making industry in Europe, needle-makers being incorporated there as early as 1370. It was not until 1560 under Elizabeth that the manufacture of needles assumed any importance in England, and not until a century had passed did this industry reach important proportions. Toward the close of the 18th century mechanical processes had been per¬ fected for producing a steel rod of the length of two needles, which were subsequently cut and drilled by hand. In 1826 for the first time a stamping machine was used to drill the eyes but it was not until the 80's of the last cen¬ tury that machinery had displaced all the old hand processes. At the present time the proc¬ esses in manufacturing needles is in excess of 20. First comes the selection and gauging of the wire which is now coiled by winding it in a circle of 16 feet circumference. The coil is cut into exact halves by means of powerful shears. The next process is the cutting of the half-coils into two needle lengths. The wires, now of two-needle lengths and still somewhat curved, are now heated to a dull red and placed in bundles inside iron rings and are straightened by being rolled to and fro on a plate with a curved bar. They are next pointed at both ends, being advanced to the grindstone from a hopper on a pulley, the blanks are held to the face of the grindstone by a rubber-band arrangement. A current of air is employed to draw off the fine steel dust, which is highly injurious to the operators. The blanks are now fed to a machine which forms the flats for the eyes, which are now driven through by a punching machine. The double needles are next placed on two wires, are broken apart between the heads, other processes being used to remove the burr of the stamping and in general to grind the heads to the required shape, polish and temper the needles. Harden¬ ing is performed by dipping in cold oil after the needles have been raised to a red heat; the process of tempering is continued by moving the needles on a belt of wire gauze, traveling over gas flames. The needles are next rolled

under the finger on a smooth stone, and bent ones are removed. After being made into large parcels they are washed in order to remove all oil or emery powder still adhering to them. Fine quality needles have the eyes gilt. The eyes are polished with fine emery and flax thread. The whole needle is polished by being passed between leather-covered rollers, with re- taining-rollers above them. Another machine next lays the needles with their heads in one direction. Gauges are used for sorting the needles according to length. Lastly, they are put up in

small packets in a machine of the folding or envelope-making type.

In addition to the ordinary needle, special kinds are designed for sewing canvas, leather, upholstery, surgical operations, etc., and for sewing machines. Crochet needles have a hook at one end. Other hooked needles are used for hosiery and stockinet work. Sewing machine needles have a hook, eye or barb at the pointed end. A wax-thread needle of varying shape according to the nature of the work is used for leather. Some have hooks which pull the thread through a hole pierced with an awl. A welting-machine needle is a section of a circle in shape.

In the United States the manufacture of needles is a minor industry. The total value of products reported by the industrial census of 1914 was $2,556,888. If the quantity made in connection with other industries could be defi¬ nitely ascertained, it is likely that the total annual manufactures of needles would reach $3,000,000 in value. In the same year the value of hand-sewing, darning and shoe-machine needles imported into the United States reached $481,631. Consult the American Ma¬ chinist (Vol. XXX, New York 1907).

NEEDLE GUN, a primitive breech-load¬ ing bolt-action rifle, used by the Prussians in 1866 and by the Germans in the Franco-Prus- sian War. It was invented from 1824 to 1836 by one Von Dreyse, raised to the nobility in 1864. In 1841 it was first adopted by the Prus¬ sians. The firing-pin had to penetrate the pow¬ der-charge of the paper cartridge before it could reach the detonator at the base of the bullet. The range of the gun was short, even compared to contemporary muzzle-loaders, and especially as compared to the chassepot of the French. Much gas escaped at the breech. The needle gun was superseded by the Mauser. The calibre of the needle-gun was .607 inch, its weight without the bayonet 10 pounds and 4 ounces. With a charge of 75.15 grains of black powder, it propelled a 478 grain lead bullet at a muzzle velocity of 1,000 feet per second. It was sighted to 800 paces, or about 656 yards.

NEEDLE-ORE, the common name for aikinite also called aciculite and acicular bis¬ muth. It is a sulphid of bismuth, lead and copper, of formula 3Pb(u2)S.Bi2S3, and is found native in connection with gold in vari¬ ous localities. It has a dull metallic lustre and is of a blackish lead-gray color. Its hard¬ ness is 2.5, its specific gravity is 6.7-6.8. It occurs in embedded acicular crystals of needle¬ like formation and hence derives its name.

NEEDLEFISH, a marine gar of the genus Tylosurus (see Gar),

especially T. acns ,

NEEDLES, The, a group of small but very prominent peaks in the southwestern part of Mohave County, Ariz., which are conspicuous from the Santa Fe Railroad. They are near the bank of the Colorado River and are about 1,100 feet above the stream. They consist of volcanic rock.

NEEFS, nafs, more correctly, NEEFFS, Pieter, The Elder, Dutch painter: b. Antwerp, about 1578; d. there, between 1656 and 1661. He was a pupil of the painter of architectural views, Hendrik van Steenwijck (q.v.), began his ca¬ reer as a painter in the same department of art in 1605, and in 1609 was elected a member of Saint Luke's Guild of painters in Antwerp. His paintings are numerous, and he is well repre¬ sented in the Louvre at Paris, the Pinakothek at Munich, the Museum at Ghent, the Gallery at Dresden and other European collections. They are mainly interiors of churches, the gloom of the building being lit up with torches or tapers and are remarkable for aerial and linear perspective. The technique is delicate and highly finished. He generally secured the services of some other artist to introduce fig¬ ures in his views, among others Teniers, Franc- ken and Van Thulden.

NEENAH, ne'na, Wis., city in Winnebago County; on Lake Winnebago at its outlet, and on the Fox River; also on Chicago and North¬ western, Minneapolis, Saint Paul and Sault Sainte Marie, and Chicago, Milwaukee and Saint Paul railroads ; about 90 miles north by west from Milwaukee and 13 miles north of Oshkosh, the county seat. It is partly on Doty Island, through the centre of which an imagi¬ nary line separates it from its twin city, Me- nasha, the two cities being one in commercial interests but each having an independent munic- ipal government. Neenah was settled in 1843 and in 1850 incorporated as a village, and as a city in 1873. Fine water power is obtained from the Fox River. It is the centre of the paper manufacturing industry in Wisconsin and in addition has large plants manufacturing doors and other interior finish, shoes, knit goods, stoves, municipal castings, paper-mill rolls, castings and other requisites, cellu-cotton, fibre rugs, bags, flour, cotton waste, ruled and blank books, etc. It is the centre of a great dairying district and its exports of cheese run into millions of

dollars yearly. It contains the home offices of the Equitable Fraternal Union, Wisconsin's largest fraternal insurance society, and of the Jewelers' Fire Insurance Company, both doing business in practically every State in the Union. The city is most attractive for tourists, the hotels being among the best and most beautiful in the northwest. Fine public buildings, parks, churches, theatre, armory, splendid library, Kimberly High School and Theda Clark Memorial Hospital, two electric interurban lines, three banks, with resources over $3,000,000, two daily newspapers, well- paved streets and municipal water system stamp it as one of Wisconsin's most progressive cities. Pop. (1920) 7,171.

NEER, nar, Aart van der, Dutch painter: b. Amsterdam, 1603; d. there, 9 Nov. 1677. He became famous in his native city about 1640. He excelled particularly in moonlight effects among the canal scenery of Holland, as well

as in winter landscapes, skaters on the ice, fires or conflagrations. These midnight scenes of raging flame are sometimes filled with figures, which give them a powerful dramatic effect. His pictures are found in the galleries at Dres¬ den, Brussels, London, New York, the Schwerin Gallery, the Berlin Museum and in the museums of Amsterdam and Brunswick and the collection of Lady Wantage. He ended his days as an innkeeper.

NEERWINDEN, nar'vin-den, Belgium, a village in the province of Liege, 16 miles from Louvain, which gives its name to two battles fought in the vicinity: (1) on 29 July 1693 when the French under the Marshal of Luxem¬ bourg gained a victory over the English and Dutch allies under William III of Britain; (2) on 18 Mar. 1793 when the French under Dumou- riez were defeated by the Austrians under the Prince of Coburg. It was occupied by the Ger¬ mans in the European War in 1914.

NEES VON ESENBECK, nas fon a'zen- bek, Christian Gottfried, German botanist and natural philosopher: b. in the Odenwald, 14 Feb. 1776; d. Breslau, 16 Mar. 1858. He was long a practising physician, but became professor of botany successively at Erlangen (1818), Bonn, (1819), Breslau (1831), and Berlin (1848-52). He displayed much originality of thought in his (Naturphilosophie) (1841), forming Vol. I of his uncompleted (System der spekulativen Philosophies Among his other writings are (Handbuch der Botanik) (1820-21) ; (Bryologia Germanica> (1823-31). His specialty was cryp- togamous plants on which his chief work is (Naturgeschichte der europaischen Lebermoose'

(1833-38).

NEF, John Ulric, American chemist : b. Herisau, Switzerland, 14 June 1862; d. 1915. He was graduated from Harvard University in 1884 and at Munich. In 1887-89 he was profes¬ sor of chemistry in Purdue University, Lafay¬ ette, Ind., and in 1889-92 he was engaged at Clark University, South Atlanta, Ga. He be¬ came professor of chemistry in the University of Chicago in 1892 and since 1896 was head pro¬ fessor of that department. His scientific papers were published in the Annalen der Chemie.

NEGAPATAM, neg-a-pa-tam', India, a town and port of the Tanjore district, Madras. It has an active trade in rice, tobacco, cigars, hides, cotton goods, betel nuts and camphor with Ceylon, the Straits Settlements and Burma, and is the terminus of the South Indian Rail¬ way. It was an early settlement of the Portu¬ guese ; was taken by the Dutch in 1660, and by the British in 1781. Pop. about 70,000.

NEGATIVE QUANTITY. See Mathe¬ matics.

NEGATIVES, Development and Treat¬ ment of. The development of a negative must be considered as .beginning with the exposure of the plate in the camera (see Photography), for the change in the sensitive silver salts on the negative plate is begun by the action of the light which reaches them during exposure. With an insufficient exposure the negative can¬ not be developed. A nearly sufficient exposure can be ˆtinkered" into something of a negative from which unsatisfactory prints may be made, and in some cases these are the best which may be had under existing conditions. An over-ex-

posure can nearly always be saved and made to produce acceptable positives. The principles of development of both glass dry-plate and film photographic negatives are the same. They are usually developed in a photographic dark-room or in special small portable dark-rooms or in developing machines. Photographic dry plates have. spiead upon the surface a coating of a gelatine emulsion containing a certain amount of bromide of silver. The emulsion is flowed over the plate surface in a warm fluid condition, which, solidifies when cooled. Sensitized photo¬ graphic films are prepared by spreading the emulsion upon a transparent support resembling celluloid. When the prepared glass plate or film is exposed in the camera, the light acts

upon the gelatino-bromide of silver in such a way, it is believed, as to convert the bromide of silver in the film into a sub-bromide which becomes thereafter susceptible to the action of a reduc¬ ing agent known as the developer, in proportion to the amount of light to which it was subjected. The bromide of silver not acted upon by the light is not affected chemically by the developer. The chemical change which the developer in¬ duces in the sub-bromide of silver is a reduc¬ tion of the light-affected parts to metallic silver. Any substance which, will effect this reduction is known as a developing agent. There are new ones being added continually to the list. Most developers are derivatives of coal tar, the more common ones being pyrogallol, known as “pyro,® quinol, amidol, metol, ortol, adurol, glycin and eikonogen. While a solution of any of the de¬ veloping agents alone would in time reduce the exposed silver bromide to metallic silver, in practice, it is found best to combine the developing agent with an alkali, carbonate of soda, ammonia or carbonate of potash to hasten the action. The alkali is called the accelerator. To prevent a too rapid oxidization of the devel¬ oper, sodium sulphite is added and preserves the developer solution prior to the mixture with it of an alkali. For this purpose with certain de¬ velopers oxalic acid, as well as other acids of a similar character like sulphuric or sulphurous acids are added, which will keep the solution from oxidizing, evidenced by its discoloration. There are many different developing agents and many different formulae for making developing solutions. These differ but slightly from each other in their action ; the general method of use is the same. In compounding developers it is sometimes advisable to introduce a very small proportion of potassium bromide, or ammonium bromide, particularly in the development of plates known to be or suspected of being over¬ exposed. They are known as restrainers and have the power of retarding the action of the developer on the parts which received the least light, which is sometimes desirable. Instead of dissolving the bromide of potassium or am¬ monia in the developer, it is usual to prepare a weak solution of bromide in water, about five grains to five or eight ounces of water, and im¬ merse the plate in this solution for three or four minutes before developing, then remove and transfer the plate to the developing tray and pour upon it the normal developer. The preliminary bromide treatment checks the rapid¬ ity of development in the shadows and lower tones and helps to prevent an over-exposed plate from becoming flat or foggy,

In general to obtain the proper density in the film for most commercial plates, it has been found that four grains of pyrogallic acid, metol, ortol, glycin, pyro-catechin, adurol, eikonogen, diogen,

imogen, edinol and other similar developer agents, to the ounce of water, is about the right proportion. Bromide of potassium aids in increasing the density. In some cases where it is desired to secure thin quick-printing negatives full of detail the normal percentage of the developing agent to the alkali can be reduced one-fourth.

The method of developing plates or cut films in a dark-room is as follows :

The exposed plate or film must be removed from the holder in a dark room or a room illuminated only by a deep ruby-red colored light. The plate or film is then placed in a tray and the developing solution, previously pre¬ pared, poured over it in a smooth even flow. Perhaps an easier way to secure the even cover¬ ing with no dry spots is to tilt the tray till the developer is in one end, lay the plate into the tray touching the empty end first, and as the other end falls into the developer tip the tray in the other direction, flowing the developer with one progressive sweep over the plate. The developer at once begins its action although it is not immediately visible and should be kept in. motion by rocking the tray. In about a minute after immersion parts of the plate are seen to grow dark where the developer is changing to metallic silver the light-affected silver sub-bromide, the parts receiving the strongest light, such as the sky, being the first to turn dark. The operator watches the prog¬ ress of the change by. holding his plate up to the colored light from time to time.

In about four or five minutes, with a proper exposure and normal developer, all the sus¬ ceptible silver bromide has become metallic silver, forming the negative image of the ob¬ ject photographed. The silver is densest where the light has acted most vigorously on the sen¬ sitive film ; thinnest where there was the least light as in the shadows. When the image is fully developed so that no further details are desired in the shadows, the plate or film is well rinsed in water to remove the developer, and is ready for the second chemical step, called (‘fixing. ” In developing roll film the roll is unwound from the spool and the ends detached from the black paper backing. Holding the film by the two ends, it is first run back and forth from end to end through a deep tray of water two or three times and then through the tray of developer, back and forth, until finished.

The chemical commonly used for the fixing process is hyposulphite of soda — ˆhypo® in the photographic vernacular. To prepare the fix¬ ing solution, about one ounce of hypo is dis¬ solved in six ounces of water and the solution is. poured into a separate tray used solely for this fixing bath, and in this the negative is im¬ mersed. The action of

the solution on the negative is to dissolve away the unreduced silver in the plate or film, »a process requiring about five minutes. As the action of the fixer pro¬ ceeds, the milky appearance of plate or film is seen gradually to fade out. When all the soluble silver has been removed — indicated by the total disappearance of the whitish color — the negative is chemically complete and may be

exposed to light without injury. But it should be returned to the hypo for five minutes longer, as some invisible salts of silver require to be removed. The negative should now be re¬ moved from the “hypo,® rinsed in clear water and placed in a bath of alum and water for a few minutes. Instead of alum a formaline solu¬ tion may be used. These solutions toughen the gelatine so that it will not be readily marred or scratched in subsequent handling. The nega¬ tive should then be washed thoroughly in run¬ ning water for about an hour to eliminate all the hypo and alum. The washing process may be more effectively carried out by changing the water 10 times at intervals of five minutes.

If cold washing water can be had the first five changes should be made before the film is hardened in the alum bath. If a glass nega¬ tive, it may be immediately placed in a rack to dry and the drying hastened by placing the rack in a window or in front of an electric fan, every possible care being taken to prevent dust from settling on the wet negative.. In the case of film negatives, a short soaking in a glycerine solution, is advisable. This is to prevent the contraction of the gelatine side of the film, in drying, from curling the film. After removal from the glycerine solution, the negative, is dried without washing. With the “non-curling® (N-C) films the objectionable glycerine bath is unnecessary. Drying requires a number of hours under ordinary conditions.

Glass plate negatives are developed one at a time for the best results. Where time presses and fair results will answer, as. many as will cover the bottom may be placed in the develop¬ ing tray at once. Film may be developed in the entire strip of 2, 4, 6, 10 or 12 negatives, as the film cartridges are prepared ; or they may be cut apart and each exposure handled sepa¬ rately. The cutting apart may be done at any time after development has proceeded suffi¬ ciently to show the dividing line between the exposures on the film strip. The temperature of both developing and fixing solutions should be between 60 and 70°

F., as should the alum hardening bath. If the temperature of the solu¬ tions is materially higher, the gelatine emulsion softens unduly and may be lost. If the solu¬ tions are below 60°, development is retarded. In the case of over-exposure, whether acciden¬ tal or intentional the development ‘should be checked when the shadows begin to darken. That is the condition of highest contrast of dark and light obtainable with that exposure. If the negative is then too thin for a good print, a mild intensification will produce a very fine negative, particularly for making lantern slides.

Sometimes after development, negatives are found to be too “dense® to give good results in printing — that is, the metallic silver has formed too thick over the whole negative, or parts of it. This may be due to several causes, chiefly to too great a proportion of alkali in the developer, or too high a temperature. It may also occur with too concentrated a de¬ veloper. “Dense® negatives’ may be improved by what is called reducing. This is done by immersing the negative, previously washed with care, in a weak bath of ferri-cyanide of potas¬ sium, a small amount of hyposulphite of soda and water. This solution gradually dissolves

away the reduced metallic silver of the nega¬ tive image. When enough has been removed to make the negative of proper density, the reduction is checked by washing, and the nega¬ tive is dried in the usual way. Negatives may be reduced locally by applying the solution to the parts with a small brush. In place of ferr.i- cyanide of potassium, persulphate of ammonia without hypo can be used. The formula is as follows :

Persulphate of ammonia . 30 grains

Water . 4 ounces

Make a fresh solution each time and add two drops of nitric acid. The salt readily dis¬ solves. The negative if dry should be first soaked for half an hour in water and then be immersed in half the ammonia solution. Re¬ duction proceeds gradually. If the reduction is not complete in four minutes throw away the solution, and pour on the other half of the fresh persulphate solution. When the reduc¬ tion is sufficient, wash the negative under the tap and immerse for 10 minutes in a 10 per cent solution of sodium sulphite to check the action of the persulphate ; then wash and dry. This reducer is particularly useful for hard con¬ trasty flash light negatives as it works strongest on the high lights while preserving the details in the shadows.

Negatives are sometimes underdeveloped, owing to a very short exposure. In case the image has not impressed itself upon the plate it cannot be developed far enough to give good prints, not enough metallic silver having been formed. Such negatives may be “inten¬ sified,® which is a sort of redevelopment. A negative must be well washed to eliminate the hypo prior to the intensification process. There are different ways of accomplishing this with a variety of formulae. A common way is to im¬ merse the negative in a solution containing bi¬ chloride of mercury. This changes the dark negative image to a white color, the metallic silver in the film having been reduced to silver chloride by association with the mercuric chloride. The whitened or bleached negative is now transformed, after being well washed with water, by immersing in a bath of water and dilute ammonia or a solution of sodium sulphite and water, until the white color becomes brown or black. The action of the alkali changes the chloride to metallic silver again with the addi¬ tion of mercuric deposits. The negative now possesses greater opacity in the high lights and will yield more vigorous prints. But no process will bring out the wealth of detail secured only by a sufficiently long exposure, and while an underdeveloped plate may be improved by intensification it cannot be made a truly satis¬ factory negative. The intensifying process may be repeated by washing the film carefully after each step. Repeating the process causes the de¬ posit to become browner and thus more re¬ sistant to the passage of actinic light in print¬ ing. Another and much more important use of the intensifying process is in the thickening of the very thin image on overexposed plates. In such cases the development would have to be cut short to avoid fogging, and the image, while full of detail, would not have printing density. Judicious intensifying will in such circum¬ stances produce a perfect negative. Negatives may be intensified locally by applying the chemi-

cal solutions to the desired parts with a camel’s hair brush after soaking the negative in water.

How far to carry the development of glass plates or film is an important point in negative making. Some operators rely entirely on their judgment in the case of each negative, examin¬ ing it by the dark-room light to see when the desired density has been attained. The uncer¬ tainty of results in thus trying to stop develop¬ ment at just the right point resulted in the introduction of what is known as the ((factorial system” of development. This system is based on the

theory that a certain definite relation exists between the total length of time required for development, and the time elapsing between immersing the plate in the developer and the first appearance of the image. Different devel¬ opers have different factors according to their various actions. So, multiplying the time elaps¬ ing, from immersion in developer to appearance of image, by the factor of the developer used, gives total length of development needed. In these calculations the temperature of the de¬ veloper is a most important factor, also. The factor of any developer at a definite uniform temperature can be determined by experiments.

Underlying this ((factorial system" is the theory that in every case the time of exposure of plate or film alone determines the final qual¬ ity of the negative. The eminent authorities, Alfred Watkins and Hurter and Driffield, hold this view, which is being generally accepted. The graduation between light and shadow in the negative (not its general ((density" or <(thin- ness") really determines its printing quality; what this scale of graduation or ratio of con¬ trast is going to be eventually is fixed before the image makes its appearance in the devel¬ oper. But, if the operator knows before devel¬ opment of over or under exposure, he may influence the contrast in his negative somewhat by altering his developer. In view of the above, time development is now recognized by many workers as the correct way of develop¬ ment, the length of time to elapse between the immersion of plate or film into the developer to the completion of development varying with solutions of different compositions and their temperatures.

The Kodak developing machine, made for film only, is based on the principles of time de¬ velopment. With it film is developed without a dark room. Introduced in 1901, the Kodak developing machine became immediately popu¬ lar with film workers and has become the favorite method of development. The advan¬ tages of machine development are many. No dark room is needed ; the operations are simpler and therefore more likely to be suc¬ cessful. The general results are better than by the older development method. With the Kodak developing machine the operator of course does not have to depend upon his own judgment as to when development should cease. He times development, thus being certain of his results, assuming the exposure to have been correctly timed. The chemicals to be used with the ma¬ chine are prepared in powder form, needing only to be combined with water to form the proper solutions. The chemical principles of development in the Kodak developing machine and in the dark room are identical. The ma¬

chine itself is a light-tight metal box contain¬ ing a colored transparent apron. Its operation is as follows :

Kodak ‘Developing Machine.

The spool of film is inserted in the machine so that the black paper, which protects the roll of film from light in the cartridge, will lead from the top, as shown in cut, the transparent apron (F) having first been wound onto arbor (

TANK DEVELOPER.

Water . . . 4 ounces

Sulphite of soda . 300 grains

Potassium bromide . 15 “

Adurol . 105 “

Metol . . 15

Potassium carbonate . 750 “

This is the stock solution. For developing, 1 ounce of this is diluted with 16 ounces of water. It develops the film in 25 minutes at a temperature of 65°.

General Formula.

PYRO DEVELOPER.

1.

Pyrogallic acid . $ ounce

Sulphuric acid . 20 minims

Pure water . . ... 32 ounces

2.

Sulphite of soda (anhydrous) . .

Carbonate of soda .

Pure water . .

To develop take

Water .

No. 1 .

No. 2 .

3 ounces

2 32

2 ounces 1 ounce 1 «

EIKONOGEN DEVELOPER.

1.

Eikonogen .

Sulphite of soda (crystals) .

Water .

2.

Carbonate of potash .

Water .

To develop take

No. . .

No. 2 .

Water .

1 ounce 3 ounces 60 “

3 ounces

30 “

2 ounces

1 ounce

2 ounces

METOL DEVELOPER.

A.

Distilled or boiled water . .

Anhydrous sodium sulphite . . . . Metol . . .

B.

Distilled or boiled water .

Potassium carbonate C. P .

10 ounces 250 grains 50 “

10 ounces 1 ounce

For normal developer take 3 parts of A and add 1 part of B.

For over-exposure take 3 parts of A, add part of B, 4 parts of water and 10 to. 16 minims of a solution of potassium bromide,

1 to 10. . , .

Carbonate of soda can be substituted tor

carbonate of potash.

METOL-QUINOL DEVELOPER.

Make two solutions as follows, keep a long time:

Metol .

Hydroquinone .

Potassium metabisulphite .

Distilled water .

each will

50 grains

40

$ ounce 10 ounces

2.

Sodium carbonate (crystals) . 2 ounces

Distilled water .

For use mix equal parts. Bromide of potas¬ sium should be added in very small quantities in cases of great over-exposure.

EDINOL DEVELOPER.

240 grains

Potassium metabisulphite . . • • •

120

800 “

400

40

10 ounces

This is a one-solution developer.

For use

1 part of above is put into 7 parts of water. Can be used for several negatives. Is of a light straw color.

HYDROQUINONE DEVELOPER.

For those who have no conveniences for weighing and compounding formulas, a de¬ veloper which will always give excellent results with almost all dry plates and films on the market may be made by taking two packages of the Eastman hydroquinone developing pow¬ ders, mixing both sections of the hydroquinone in 8 to 10 ounces of water and adding only one section of the alkali powder. At a tem¬ perature of 70° F. this developer gives strong, virile negatives with fine clean

shadows and abundant detail.

FIXING SOLUTION.

Hyposulphite soda . . . 4 ounces

Water . . 16

ALUM BATH.

Saturated solution of alum allowed to settle and decant.

ACID FIXING BATH.

Into an 84-ounce bottle or jar put 56 ounces of warm water, 1 dram of sulphuric acid and 2 ounces of sulphite of soda crystals W hen these are dissolved add 16 ounces of hyposul¬ phite of soda. When entirely dissolved add a previously prepared solution of 1 ounce of chrome alum in 8 ounces of water. This keeps a long time and may be used over and over till exhausted.

TO MAKE farmer's REDUCER.

Dissolve 1 ounce ferri-cyanide of potassium in 9 ounces water, forming a 10 per cent solu¬ tion. Add enough of this solution to fresh hypo bath to make it a light straw color ihis acts very rapidly and must be used with great care. It reduces all parts of the plate alike, thus differing from the persulphate of am¬ monia reducer.

intensifier.

i.

Mercuric chloride .

Ammonium chloride . . .

Water . . .

1 dram 1 dram 4 ounces

2.

Ammonia (.880) . \ dram

Water . . . 4 ounces

Bleach in No. 1, wash well, and blacken in No. 2.

A milder but in many respects better inten¬ sifier is made by dissolving 4 ounces sodium sulphite in 20 ounces of water and adding 90 grains of the red iodide of mercury. The negative builds up steadily and is to be washed when done and dried. It may afterward turn whitish or yellow, but this will not injuie its printing qualities. •

Bibliography. — Steadman, F. M., (Unit Photography1* (New York 1914) ; Tennant, J. A., and Ward, H. S., (Dark Room Work* and (Developers and Development (New York

1912) ; Taylor, C. M., (Why My Negatives are Bad* (Philadelphia 1902) ; Wood, R. W., (Photography by Invisible Light* (New York

1913) ; (Photo-Miniatures, * Vol. XII, Nos. 139 and 143 (1915).

Richard Ferris,

n-f T'fo.0 A HIP VI C 'ClflCl.

NEGAUNEE, ne-ga'ne, Mich., city in Mar¬ quette County, on the Duluth, South Shore and Atlantic, the Lake Superior and Ishpeming and the Chicago and Northwestern railroads, about 12 miles west by south of Marquette. It was settled in 1846 and in 1873 was chartered as a city. It is in the iron region of the State and has within the city limits several productive iron ore mines. The ridge (Iron Mountain) upon which Negaunee is located is over ˆ>000 feet above Lake Superior. The chief indus¬ tries of the city are connected with the mining and shipping of iron ore. It has excellent pub¬ lic and parish schools. The city owns and operates the electric-light plant and the water¬ works. Pop. (1920) 7,419.

NEGLEY, neg'li, James Scott, American soldier: b. Liberty, Pa., 22 Dec. 1826; d. Plain- field, N. J., 8 Aug. 1901. He was educated at the Western University of Pennsylvania and served in the ranks through the Mexican War. At the outbreak of the Civil War he organized a brigade, was commissioned brigadier-general and joined the Army of the Ohio. He defeated the Confederates at Lavergne in 1862 and was

promoted to the rank of major-general for gal¬ lant conduct at Stone River. Commercial and railway enterprises engaged his attention after

the war and in 1869-73, 1875-77 and 1885-87 he was a member of Congress.

NEGLIGENCE, in law , is the failure to do something which a prudent and reasonable man would do under similar conditions, or the doing of something which such a man would not do. This involves in either case a violation of a legal duty, and a resultant damage to the person to whom that duty was owed. More¬ over, the person charged with negligence must have been under an obligation to exercise care or diligence either assumed by contract or im¬ posed by law. The third element of negligence is the legal damage to the one toward whom the person charged is bound to exercise care or diligence. Three degrees of negligence are recognized in law : Ordinary, the want of ordinary care or diligence; slight, the want of great care or diligence, and gross, the want of slight care or diligence. The standard of care or diligence required in a given case is usually a question of fact to be determined by a jury. When the evidence of the parties to a suit is not conflicting the court decides the question of the negligence of the defendant. In such cases it often happens that the plaintiff is non¬ suited because according to his own statement the injury for which he seeks legal redress was not caused by a negligent act or omission on the part of the defendant. In most jurisdictions, however, the jury, after instruction by the court in the law governing the case, determine whether the defendant exercised the care or diligence requisite in his case.

Negligence is not presumed by the law on the part of any one, hence the burden of prov¬ ing the fact rests with the plaintiff, except when the thing resulting from the negligence speaks for itself. An awning-frame falls from a window, injuring the plaintiff; in this case we have a situation which would not exist had the owner of the building taken even ordinary precautions for the safety of pedestrians. The presumption of proper diligence in his case is overcome and the plaintiff will recover dam¬ ages unless the defendant can show that, despite this circumstance, he was without fault. A general rule may here be stated : A person undertaking the performance of a special task requiring special knowledge or skill is liable if he fails to do all that a person equipped with such special knowledge could reasonably be expected to do in the case, due consideration being given to all the circumstances. If an automobile repairman undertake to put a motor in good running order he binds himself to do so with the care of the average motor repair¬ man. It is also held generally that the amount of care may vary with the apparent risk. For example, a man sets about burning brush or weeds upon his land and the fire, getting beyond control, spreads to his neighbor’s property. In passing upon his

act the circumstances of the dryness or dampness of the brush or weeds, the direction of the wind and the efforts, if any, made by him to confine the conflagration to his own property must be taken into account.

The duty of taking proper care or diligence is always relative, never absolute. Conse¬ quently negligence cannot exist where there is no duty to exercise care. An example of this

may here be stated : A man sets out poisoned meat on his lands in an effort to destroy marauding animals, such as coyotes, which are worrying his sheep, his neighbor's hogs break into his land and one or more of them eat the poison and die. This man was not negligent in a legal sense toward the owner of the hogs, for he was not bound to exercise even ordinary care toward trespassers, and the advent of the hogs upon his land was a trespass. His sole obligation toward trespassers was to abstain from wilful or wanton injury to his neighbor's stock. A licensor or one who permits others upon his property is obliged to exercise or¬ dinary care but this is often slight. Unguarded excavations, stairwells, etc., in a new building, the existence of which is known to the work¬ men, do not constitute negligence on the part of the contractor at common law and in most jurisdictions. The contractor is bound, how¬ ever, to warn his employees of new dangers confronting them, and, generally speaking, to render the place as reasonably safe as may be expected having regard to the ordinary exigen¬ cies of the work carried on there. In this con¬ nection it is proper to note the special legisla¬ tion obtaining in some jurisdictions under which the contractor is obliged to insure his employees against injury. See Workmen's Compensation Laws.

The third element of negligence must also be proved before the plaintiff may recover dam¬ ages. He must show that he has sustained legal injury as the result of the defendant's negligence. The act of negligence must always be the proximate cause of the injury sustained. A common illustration of this is afforded in the average railroad or steamship accident where numbers of passengers are made ill by the shock of such accident due to negligence on the part of the owners or the railroad company. In many jurisdictions no cause of action is per¬ mitted on the ground that such illness is not the natural consequence of the negligence. Action is permitted, however, in many States, for mental anguish, shock, etc., even when there is no attendant physical injury. There is frequently experienced considerable difficulty in determining whether the injury sustained by the plaintiff is the proximate or rdmote effect of the defendant's

negligence. The general test applied is whether there is an unbroken sequence of events forming an unbroken chain between the negligence and the injury. A master is responsible for the negligence of his servants, but in no case can redress be had where contributory negligence on the part of the plaintiff is proved. Negligence causing the death of a human being will subject one to criminal prosecution if such negligence is the proximate cause. In a factory fire in New York a few years ago 146 young girls lost their lives because, it was alleged, the factory proprietors had locked all the exits, thus de¬ priving the girls of egress to the stairways and fire escapes, the ordinary methods of safety under such circumstances. The proprietors were indicted for manslaughter and narrowly escaped conviction. They were, however, held liable in tort in civil actions by defendants and relatives. See Employer's Liability ; Master and Servant; Tort, and con¬ sult Barrow's (Handbook on the Law of Negli¬ gence } ; Beven, (Negligence in Law* (3 ed.,

Toronto 1908) ; Shearman and Redfield, (Treatise on the Law of Negligence) (5th ed., New York 1899) ; Thomas, E. B., < Negligence > (2d ed., ib. 1904) ; Thompson, S. D., 'Com¬ mentaries on Negligence> (7 vols., Indianapolis

1905-07).

negotiable bills of ex¬ change. See Banks and Banking — Com¬ mercial Paper.

NEGOTIABLE INSTRUMENTS, any

note, bill, contract or document which can be endorsed and transferred to a third party. In addition to negotiable paper, other written in¬ struments considered negotiable are deeds, in¬ surance policies, contracts, liens, judgments, etc. See Banks and Banking— Banking in the United States and Commercial Paper; Currency; Money.

NEGOTIABLE PAPER. See Negotiable Instruments.

NEGRI, nagre, Ada, Italian poet: b. Lodi, near Milan, 3 Feb. 1870. She became a school¬ teacher at Motta-Visconti, on the Ticino, and in 1892 published a small volume of poems, ˆatalita,* which in Italy aroused a general interest and by 1894 had passed through six

editions. She received from the city of Flor¬ ence an honorary stipend of $340 (1,700 lire) annually for a period of 10 years, and was ap¬ pointed an instructor in literature at the Scuola Normale of Milan. Her further work includes the volume (Tempeste) (1896) ; and (Mater¬ nity (1904). Much of her verse is an appeal for the working-classes. There is a German translation by Jahn of some of the poems. Consult Dornis, (La Poesie italienne contempo- raine) (1898) ; Guido Mazzoni in the (Nuova Antologia) (Rome 1893).

NEGRITOS, na-gre'toz, the aboriginal negroid race inhabiting the Philippine Islands at the time of their discovery by the Spaniards who gave them this name, signifying <(little ne¬ groes.® They are found also on the Andaman Islands and the Malay Peninsula. They are believed to have sprung from the Negrillos of Africa, and to have reached their present habitat by migration. The race includes the Mincopies of the Andaman Islands; the Man¬ tras and Sakaies of Malacca; and the Scho- baengs of the Nicobar Isles. Some ethnolo¬ gists include the Semangs, but it is objected to this that many of the latter are distinctly light in color, and the Negritos are black. In the Philippines they are called Aitas, Aetas or Itas. The Negritos of the Philippines may be consid¬ ered typical of their race and to be found in their greatest purity on Alabat Island, near Manila, and along the northeastern coast of Luzon, between Palawan and Cape Engano, and the interior woods of that section. The few families living upon the slopes of Mount Mari- veles are regarded as the typical specimens of the race, and variations from this type as due to mixtures with other races. In. the Philip¬ pines the Negritos have intermarried with the Ilongots of Luzon, the Mangayans of Mindoro and the Tagbanuas of Palawan and a great variation from type obtains. As a race they are of small stature, the men seldom more than four feet eight inches in height and the women four feet four inches. They have the brachy- cephalic or globular head form; their skin is

dark brown, almost black, and with a coppery hue ; the hair is brownish black, very abundant, bushy and tensely frizzed, but the beard is scanty; and their features resemble those of the negroes, though the lips are not so thick. They are of slight build with thin, calfless legs, and become potbellied with age. The reach of the arms exceeds the height by from one to five inches. They are true savages, depending for their food upon hunting, fishing and the digging of wild roots. Their food is generally devoured in a raw state, though sometimes scorched or seared. They do not build villages nor stable huts, but roam through the moun¬ tains in small bands of six or eight families, sleeping at night on the ground around a com¬ mon camp fire. They make baskets of a rude sort and their bows and arrows for

hunting, lances for warfare and, in some sections, blow- guns. Their only clothing is a girdle about the waist. For the rest they decorate the upper part of the body with a pattern work of scars formed by cuts with bamboo through the skin, into which is rubbed dirt to cause festering. They affect ornaments also; earrings, bracelets, anklets and necklaces, generally woven of palm fibre. Their intelligence is almost infantile in grade. They cannot count above five. They are exceedingly indolent and have never risen from their original low estate. They have few words in their language and their few customs are crude. They are cruel and often murder¬ ous, burying alive any one incurably sick or dangerously wounded. Their religion is one of ancestor worship, and they hold the graves of their dead in great veneration, and make long journeys to visit them. To this they add a short-lived worship of oddly shaped rocks and trees, shifting their reverence continually to newly-discovered objects. They have a few crude musical instruments, a sort of flute blown by one of the nostrils, and a stringed instru¬ ment of bamboo.

They are found only in the islands of Luzon, Panay, Palawan, Negros and Mindanao; and their number is estimated in the later United States reports as 20,000. Their origin and re¬ lationship to other races present many interest¬ ing ethnological questions which have not been satisfactorily settled; their geographical distri¬ bution, however, leaves little doubt that they were the original inhabitants of the Philippine Archipelago and at one time practically the sole possessors of the islands; they were probably driven back into the mountainous interior by invasions of primitive Malayans. See Phil¬ ippine Islands.

NEGRO, a name properly applied to the races inhabiting the continent of Africa, orig¬ inally between lat. 10° N. and 20° S. The term does not include the inhabitants of northern Africa, the Egyptians, Berbers, Nubians, Abys- sinians and others. Neither do the Hottentots in South Africa belong to the Negro race. The term Negro, therefore, is not synonymous with African, and is not a national appellation, but denotes an ideal type constituted by certain physical characters, namely, black skin, woolly hair, flat nose, thick everted lips and a progna¬ thous form of skull.

Out of Africa, Negroes are found in the United States, the West Indies, Brazil, Peru, the Cape Verde Islands and Arabia. They are

rare in Europe, Polynesia and Australia. Ne¬ groes were nearly unknown to the Hebrews and the Homeric Greeks ; the Egyptians, however, about 2300 b.c , became acquainted with Negroes through the conquests of their rulers, and rep¬ resented them on their monuments as early as 1600 b.c. ; for nearly 35 centuries the type has remained unchanged in Egypt. Negroes were unknown to the Greeks until the 7th century b.c., their Ethiopians being merely any people darker than the Hellenic, like the Arabs, Egyp¬ tians, Libyans or Carthaginians, none of which are Negroes.

The Negro race is divided naturally into two great divisions: (1) African Negroes, (2) Pap¬ uans or Melanesians. There are four sub¬ divisions of African Negroes, according to lo¬ cality: (1) West Sudan and Guinea; (2) Cen¬ tral Sudan and Chad Basin; (3) East Sudan and Upper Nile; (4) South Africa. Authori¬ ties estimate their number at 130,000,000, with probably 20,000,000 full-blood or half-caste ne¬ groes, either slaves or descendants of slaves, chiefly in tropical or sub-tropical America, and enumerate the following as the chief anatomical and physiological points in which the Negro differs most from his own congeners :

1. The abnormal length of the arm, sometimes reaching to the knee-pan.

2. Prognathism (Facial angle 70°, in Caucasian 82°).

3. Weight of brain, 35 ounces (in gorilla 20 ounces, average Caucasian (Europe or America) 45 ounces).

4. Full black eye, black iris and yellowish sclerotic coat.

5. Short, flat, snub nose, broad at extremity, with dilated nostrils and concave ridge.

6. Thick, protruding lips, showing inner surface.

7. Very large zygomatic arches.

8. Exceedingly thick cranium, enabling him to use the head as a weapon of attack.

9. Weak lower limbs, terminating in a broad, flat foot, with low instep, projecting and somewhat prehensile great toe, and “ lark heel.”

10. Complexion deep brown, blackish, or even black, not due to any special pigment, but to the greater abundance of coloring matter in

the Malpighian mucous membrane.

11. Short, black hair, distinctly wooly, not frizzly.

12. Thick epidermis, cool, soft and velvety, mostly hairless, and emitting a peculiar odor described as hircine.

13. Frame of medium height, thrown somewhat out of the perpendicular by the shape of the pelvis, the spine, the backward projection of the head and the whole ana¬ tomical structure.

14. The cranial sutures, which close much earlier in the Negro than in other races.

The native African Negroes display consid¬ erable ingenuity in the manufacture of weap¬ ons, in the working of iron, in the weaving of mats, cloth and baskets from dyed grasses, in the dressing of skins of animals, in the struc¬ ture of their huts and household utensils and in the various implements and objects of use in a barbarous state of society. Their religion consists in the worship of idols and fetishes, representing a supreme power which they all acknowledge ; they believe also in good and evil spirits, in witchcraft, charms and spells, omens, lucky and unlucky days, etc. ; they make fetishes of serpents, elephants' teeth, tigers' claws and many similar objects, and reverence wooden images and sacred things, which they think have received a peculiar power from their divinities to drive away evil spirits, and protect them from danger, disease and witchcraft. They make prayers and offerings to their idols, and have sacred songs, festivals, dances, cere¬ monies and places; they sacrifice animals and sometimes human victims, especially during funeral obsequies; they have their priests and holy men, who are also magicians and doctors.

They believe generally in an after life, with¬ out any distinct idea of retribution, and some tribes in the transmigration of the human soul into a gorilla, or other bird, beast, reptile or fish. Being very fond of music, they have many ingeniously contrived musical instru¬ ments, generally of a noisy character; they have a keen sense of the ridiculous and are of a cheerful disposition ; though cruel to their enemies and prisoners, and setting little value on human life, they are naturally kind-hearted, hospitable to strangers and communicative of their joys and sorrows; the females are re¬ markably affectionate as mothers and children, and as attendants on the sick, even to foreign¬ ers. They are less dirty in their persons and dwellings than most other barbarous races. For the history and development of the negro in America, see Negro in America and Negro Education.

Bibliography. — Bleek, (The Languages of Western and Southern Africa) (1856) ; Braw- ley, B., (The Negro in Literature and Art in the United States) (New York 1918) ; Cust, (Modern Languages of Africa) (1883) ; Keane, (Man, Past and Present* (1899); Johnston, (The River Congo) (1884) ; Junker,

NEGRO IN AMERICA, The. In 1910

there were in the United States and its de¬ pendencies 10,215,482 persons of Negro descent. They were descendants of the slaves brought from Africa to America in the 15th, 16th, 17th, 18th and 19th centuries. The demand for workmen in the mines and on the plantations of the Spanish West Indies was the primary incentive for opening the African Slave Trade to America. A small European slave trade from Africa had begun with the voyage of the Portuguese sailor, Antonio Gonzales, to the River of Gold in 1442. This trade was soon turned toward America when the Indians failed as workmen and it was encouraged by King Ferdinand and the Emperor Charles V. The Bull of Demarcation having debarred Spain from African possessions, she was compelled to secure her slaves through contract with the Portuguese and later with other trading na¬ tions. This contract for supplying the Spanish Indies with Negroes became to be a great com¬ mercial prize and the zeal with which the Por¬ tuguese, Dutch and English successively filled these contracts was the main means of trans¬ planting this race.

The African Slave Trade thus established cost Negro Africa 100,000,000 souls. It dis¬ organized Negro culture and industry, stopped the development of art, overthrew gov¬ ernments and was the cause of that modern stagnation of culture which has marked the Dark Continent since 1600.

Early Immigration.— The exact number of Negroes brought to America will, of course, never be known. Dunbar estimates that nearly 900,000 came to America in the 16th century, 2,750,000 in the 1 7th, 7,000,000 in the 18th and over 4,000,000 in the 19th, less than 15,000,000 in all. In the limits of the United States the growth of the black population has been steady and has even since the cessation of the slave trade far outstripped that of any other of the

original groups of Americans. In colonial times the slaves went mainly

to the W est Indies, and, although a few landed in Vnginia as early as 1619, they were not brought to the continent in large numbers until England se¬ cured the Spanish contract in 1713. At that time there were perhaps 50,000 Negroes in con¬ tinental America; by 1727 this had reached 75,000, and the subsequent increase is estimated by Bancroft as follows:

1750

1754

1760

1770

1780

220,000

260,000

310,000

462,000

511,000

Exact statistics as given by the census re¬ ports beginning in 1790 show the following fig¬ ures for Negro population within the limits of continental United States and excluding de¬ pendencies :

Date

Total

negroes

Per cent of

increase

Per cent of in¬ crease of whites

Per cent of total popula¬ tion

1 700

757,208

1 ,002,037

19.27

1800 .

32.33

35.76

18.88

19.03

18.39

18.10

16.84

15.69 14.13 12.66 13.12 11.93 11.60

10.70

1810 .

1,377,808

37.50

36. 12

1820 .

1,771,656

28.59

34. 12

1830 .

2,328,642

31.44

34.03

1840 .

2,873,648

23.40

34.72

1850 .

3,638,808

26.63

37.74

1 860 .

4,441,830

22.07

37.69

1870 .

4,880,009

9.86

24.76

1880 i .

6,580,793

34.85

29.22

1 890 .

7,488,789

13.79

26.68

1900 .

8,833,994

18.00

21.20

1910 .

9,827,763

11.20

22.30

The census of 1870 was defective and prob¬ ably that of 1890, also, which would explain the chief irregularities in the rate of increase of Negroes. The higher rate of increase of the whites is due to the large immigration.

History.— The history of the Negro in America up until 1863 is largely the history of slavery (q.v.). And yet he was not altogether the passive victim of the system. In the eai- Her days the tendency was to recognize him as a kind of feudal serf, not essentially different from the white serfs. Consequently, when freed, the free black had in many cases the right' to vote and intermarried with the white servant class. Gradually, however, a coloi caste arose which condemned a person of Negro descent to civil and legal inferiority, no matter whether he was technically a slave or not. The Negroes did not submit to slavery or caste restrictions wholly without a struggle. Before 1850, while the fire of African freedom still burned in the veins of the slaves, there was in all leadership or attempted leadership but the one motive of revolt and revenge,— typified in the terrible Maroons, the Danish blacks and Cato of Stono, and veiling all the Americans in fear of insurrection. The liberalizing tenden¬ cies of the latter half of the 18th century brought, along with kindlier relations between black and white, thoughts of ultimate adjust¬ ment and assimilation. Such aspiration was especially voiced in the earnest songs of Phil¬ lis, in the martyrdom of Attucks, the fighting of' Salem and Poor at Bunker Hill, the intellec¬

tual accomplishments of Banneker and Der- ham and the political demands of the Cuffes. Stern financial and social stress after the Revo¬ lutionary War cooled much of the pievious humanitarian ardor. The disappointment and impatience of the Negroes at the persistence of slavery and serfdom voiced itself in two move¬ ments. The slaves in the South, aroused un¬ doubtedly by vague rumors of the Haitian re¬ volt, made three considerable attempts at in¬ surrection, — in 1800 under Gabriel in Virginia, in 1822 under Vesey in Carolina and in 1831 again in Virginia under Nat Turner. In the free States, on the other hand, a new and curi¬ ous attempt at self-development was made. In Philadelphia and New York color-proscription led to a withdrawal of Negro communicants from white churches and the formation of a peculiar socio-religious institution among the Negroes known as the African Church, an organization still living and controlling in its various branches over a million of men.

Walker’s wild appeal against the trend of the times showed how the world was changing after the coming of the cotton-gin. In 1830 slavery seemed hopelessly fastened on the South, and the slaves thoroughly cowed into submission. The free Negroes of the North, inspired by the mulatto immigrants from the West Indies, began to change the basis of their demands; they recognized the slavery of slaves, but insisted that they themselves were freemen, and sought assimilation and amalgamation with the nation on the same terms with other men. Thus, Forten and Purvis of Philadelphia, Shad of Wilmington, Du Bois of New Haven, Bar- badoes of Boston and others strove singly, and together as men, they said, not as slaves; as “people of color,® not as “Negroes.® The trend of the times, however, refused them recogni¬ tion, save in individual and exceptional cases; considered them as one with all the despised blacks; and they soon found themselves striv¬ ing- to keep even rights they formerly had of voting and working and moving as free men. On the other hand, it was impossible to sup¬ press wholly the upward struggles of the free Negro or even of the exceptionally gifted slaves. When the war with England broke out, Negroes fought in the ranks ; they helped man the victorious ships in the struggle of 1812, and finally in the Civil War turned the scale of victory for the North at a critical point. The number of free Negroes was as follows:

1790

1800

1810

1820

1830

1840

1850

1860

1870

59 , 466 108,435 186,446 233,634 319,599 386,293 434 , 495 448,070 4,880, 009

Barred out of the labor market by slavery, on the one hand, and color prejudice, on the other, these Negroes were in a desperate condi¬ tion

; and even in the free States “black laws® curtained their civil rights. Nevertheless, they struggled bravely. In 1830 they held their first national convention in Philadelphia and began to agitate for civil rights and education, and to discuss schemes of migration to Canada and elsewhere. As the abolition movement grew it received substantial aid from free

Negroes; it was in a Negro church in Boston that the American Anti-Slavery Society was formed, and the first subscribers to Garrison’s Liberator came from a Philadelphia Negro, James Forten. Led by Remond, Nell, Wells- Brown and Douglass, a new period of self-as¬ sertion and self-development dawned. To be sure, ultimate freedom and assimilation was the ideal before the leaders, but the assertion of the manhood rights of the Negro by himself was the main reliance, and John Brown’s raid was the extreme of its logic. After the war and emancipation, the great form of Frederick Douglass, the greatest of American Negro leaders, still led the host. Self-assertion, es¬ pecially in political lines, was the main program, and behind Douglass came Elliot, Bruce and Langston, and the Reconstruction politi¬ cians, and, less conspicuous but of great social significance, Alexander Crummell and Bishop Daniel Payne.

Civil Rights. — As a slave, the Negro could be (1) sold or given away by his legal owners, (2) seized for debt, (3) separated from his family, (4) could own no property, (5) had no right to vote. (6) could not hold office, (7) nor could he testify in a court of law, save in suits for his own freedom. (8) He could not legally marry, (9) nor trade or make contracts. (10) He could not move about without permis¬ sion, (11) could be punished corporallv and even killed by the master in some cases and (12) was not permitted to learn to read and1 write. Being thus legally deprived of all essen¬ tial rights of manhood, he was utterly defense¬ less before the aggressions of the unscrupulous, even in matters of life and limb. Free Negroes in slave States, like Virginia and North Caro¬ lina, were disfranchised early in the 18th cen¬ tury; later their right to testify in courts was taken away, then the right to hold any office, and finally legal pressure was brought to bear in the shape of vagrancy laws and curtailment of economic freedom, so as to force them into slavery or drive them from the State.

The free Negroes of the North were very generally subject to codes of <(Black Laws® which varied from State to State. Those of Ohio as

adopted and amended in 1804, 1807, 1824, and later, prohibited Negroes from settling in the State unless they could show a certificate of freedom and give bonds guarantee¬ ing good behavior and self-support; a Negro was disqualified from testifying in court trials where a white person was a party, or to serve as a juryman in any case; his children were excluded from the public school ; finally he could not vote. Some States had less rigorous laws and tended to alleviate the position of the blacks; others tended toward greater restric¬ tions.

When the Civil War came, despite dis¬ claimer and compromise, the Negro was the central issue. The first pressing question was the treatment of fugitive slaves; Butler con¬ fiscated them as ((contraband of war,® Fremont sought to free all slaves and Halleck sought to catch and return them. Finally beginning at Port Royal, S. C., under Pierce and extending to Fortress Monroe, New Orleans, Vicksburg, Cairo and wherever these fugitives were massed, there grew up systems of controlled Negro labor under the guardianship of govern¬ ment officials. General Banks, for instance had vol. 20 — 4

90,000 ex-slaves under him in Louisiana, with 50,000 laborers under his guidance and an an¬ nual budget of $100,000. He made out 4,000 pay rolls a year, registered the freedmen, in¬ quired into and redressed all grievances, laid and collected taxes and established a public school system. Colonel Eaton in Tennessee, General Saxton in South Carolina and others had similar work in charge.

Meantime, missionary and freedmen's aid societies began sending money, clothes and teachers south, and there was a demand that the government take hold of this work, unify it and help make easier the transition of 4,000,000 persons from slavery to freedom. This was the genesis of the Freedmen's Bureau. This <(Bureau of Refugees, Freedmen and Aban¬ doned Lands® was established as a part of the War Department by the Act of 1865, and was modified and extended by the Act of 1866; the larger part of its functions ceased in 1869. General O. O. Howard conducted this Bureau and ((scarcely any subject that has been legis¬ lated upon in civil society failed at one time or another to demand the action of this singular Bureau.® The Bureau had in its period of greatest activity 900 officials scattered from Washington to Texas. Their work included (1) the relief of physical suffering caused by the war; (2) the overseeing of the beginnings of free labor; (3) the buying and selling of land for the freedmen; (4) the establishment of schools; (5) the payment of bounty money to Negro soldiers; (6) the administration of justice between white and black in the Bureau courts.

The Bureau distributed 21,000,000 free rations in 50 months, treated 500,000 patients in 60 hospitals and asylums, transported 30,000 fugitives back to the plantations, and made many thousands of contracts for the new free laborer. Little was done in the matter of fur¬ nishing the freedmen with land, as the confis¬ cated plantations were restored under the amnesty measures ; but aided by the ((carpet-bag® governments and the missionary societies a system of common schools and higher insti¬ tutions was founded and nearly $6,000,000 spent on it. The Bureau courts were not successful and the general attitude of the whites was bit¬ terly hostile to the institution. Such was the work, of the Freedmen's Bureau. To sum it up in brief, we may say: it set going a system of free labor; it established the black peasant proprietor; it secured the recognition of black freemen before courts of law; it helped to found the free public school in the South. On the other hand, it failed to establish good will between ex-masters and freedmen ; to guard its work wholly from paternalistic methods that discouraged . self-reliance ; • to make Negroes landholders in any considerable numbers. Its successes were the result of hard work, sup¬ plemented by the aid of philanthropists and the eager striving of black men. Its failures were the result of bad local agents, inherent difficul¬ ties of the work and national neglect. The Freedmen's Bureau expired by limitation in 1869, save its educational and bounty depart¬ ments. The educational work came to an end in 1872, and General Howard's connection with the. Bureau ceased at that time. The work of paying bounties was transferred to the Adju-

tant-General's office, where it was continued three or four years longer.

The Freedmen's Bureau really ended in the 14th and 15th Amendments to the Constitution (1868 and 1870) giving Negroes the right of suffrage. The last efforts of Charles Sumner were given to the Civil Rights Act of 1875, which forbade the exclusion of Negroes from public conveniences and places of entertainment on account of color. This was afterward de¬ clared an interference with the rights of the States by the Supreme Court, and,, therefore, unconstitutional. The matter of civil rights of Negroes is, therefore, to-day left to the States, and has resulted in widespread discrimination in the former slave States. Whites and Negroes are separated in schools, railway trains, hospitals, jails and graveyards by law, and by custom in hotels, theatres, lectures, libraries and churches, and often in street cars and

ele¬ vators. Beside this there is a tendency to limit all economic and social intercourse to the barest amount necessary among neighbors. Intermar¬ riage is forbidden and the concubinage of black women, though decreasing, is still considerable; and while it is very difficult to secure the pun¬ ishment of a white man who violates a black woman, the black man who is even accused of rape against a white woman is usually lynched before he has had a legal trial. These separat¬ ing laws and centrifugal tendencies have gone beyond reason, and the better thought of the South realizes it. In the future it is. probable that lynching will cease, and kindlFr inter¬ course be cultivated.

Political Rights. — Free Negroes voted in many of the colonies in early times, when other¬ wise qualified, but later the privilege was taken away, as in Virginia in 1723. In the free States they continued to vote, but later were restricted sometimes bv special qualifications, as in New York in 1821, or by limiting the suffage to whites, as in Pennsylvania in 1838. The 14th Amendment to the United States Con¬ stitution sought to penalize States which re¬ duced the electorate, and the 15th Amendment made discrimination on account of race and color in the qualification of voters illegal. These enactments were made necessary by the opposition of the South to the Freedmen's Bureau and the evident determination of the Southern legislatures to re-enslave the f reed- men to all intents and purposes by civil restric¬ tions, vagrancy laws and special legislation. The result of the Amendments was to throw the government of the Southern States largely into the hands of the freedmen during the years 1866-76. So, sudden increase of the electorate in any community would mean . a period of disturbance and difficulty, but with honest leadership the outcome might have been different. As it was, dishonest and self-seeking politicians from both North and South sought to use the ignorant Negro voters for their own ends, and much extravagance and some misgovernment ensued. Nevertheless, it has been truly said of these Negro govern¬ ments :

They obeyed the Constitution of the United States, and annulled the bonds of States, counties, and cities, which had been issued to carry on the war of rebellion and maintain armies in the field against the Union. They instituted a public school system in a realm where public schools had been unknown. They opened the ballot box and jury box to thousands of white men who had been debarred from them by a lack of earthly possessions. They introduced home

rule into the South. They abolished the whipping post, the branding iron, the stocks and other barbarous forms of punishment which had up to that time prevailed. They reduced capital felonies from about

twenty to two or three. In an age of extravagance they were extravagant in the sums appropriated for public works. In all of that time no man s rights of person were invaded under the. forms of law. Every Democrat's life, home, fireside and business were safe. _ No man obstructed any white man's way to the ballot box, inter¬ fered with his freedom of speech or boycotted him on account of his political faith.

And a Negro legislator of that period in South Carolina said in defense of his race that the men who criticised the extravagance of the period between 1869 and 1873 failed to mention

"Those imperishable gifts bestowed upon South Carolina between 1873 and 1876 by Negro legislators — the laws relative to finance, the building of penal and charitable institutions, and, greatest of all, the establishment of the public school system. Starting as infants in legislation in 1869, many wise measures were not thought of, many injudicious acts were passed. But in the administration of affairs for the next four years, having learned by experience the result of bad acts, we immediately passed reformatory laws' touching every department of state, county, municipal and town governments. These enactments are to-day upon the statute books of South Carolina. They stand as living witnesses of the Negro's fitness to vote and legislate upon the rights of mankind.

Nevertheless, by force and fraud the Negro governments were overthrown about 1876, and from that time until the present the Negro has been disfranchised either by physical compulsion or cheating at the polls or ingenious legislation. The effects of these methods were so unfortu¬ nate that there arose in the South about 1890 a movement to deprive the Negro of his vote by legal enactment. This has been practically ac¬ complished now in Mississippi, Louisiana, South Carolina, North Carolina, Alabama and Vir¬ ginia, and movements in that direction have been started in other States. The avowed ob¬ jects of these constitutional amendments have been (a) To disfranchise no white voter; (b) To disfranchise as many Negroes as possible. This has been accomplished by the following measures :

1. Illiteracy. — The voter must be able to read and write. (This discriminates against Negroes because the Negro public school system in the South is much poorer than that of the whites).

2. Property. — The voter must own not less than $300 worth of taxable property and pay taxes on it. (This of course, discriminates

against a poverty-stricken race of freedmen who could not legally hold property prior to 1863, and who to-day suffer in economic competition by reason of their color and training).

3. Poll Tax. — A voter must have paid his poll tax. (This is a source of discrimination only when it extends back for several years, as in Virginia).

4. Occupation. — A voter must have a regular occupation. (This is designed to shut out Negro laborers, and is a source of discrimination because of the difficulty of proving its truth).

5. Army Service. — Soldiers or their descendants may vote. (Thoroughly vicious like the preceding).

6. Character. — Persons of " good character " who " understand the duties of citizenship may vote." (This is a source of much discrimination and puts too much power in the hands of the registrars).

7. " Grandfather " Clause. — Persons who could vote 1 Jan. 1867 or their descendants may vote if registered within a limited time. (This is a thoroughly vicious attempt to admit ignorant white voters when the same class of blacks are barred).

8. " Understanding " Clause. — Persons may vote who " understand " a clause of the Constitution and can explain it when read to them. (Another indefensible provision designed to shut' out blacks arbitrarily by placing large powers of discretion in the hands of local registrars.)

Thus far States have adopted the above qualifications as follows :

Mississippi. — The literacy (1) qualification or the " understanding " clause (8) together with the poll tax (3) provision.

Alabama. — The army service (5) and character (6) clauses for persons registering prior to 1903; thereafter the literacy clause (1) and occupation clause (4), or the property qualification (2).

South Carolina. — 'For those registering before 1898, the literacy clause (1) except that writing is not required, or the understanding clause (8); after 1898 the literacy (1) or property (2) qualifications.

Louisiana. — Literacy (1) or property (2) clauses, ii addition to the "

grandfather ” clause (7) which originated here.

North Carolina. — Literacy (1) and poll tax (3) provisions, and “ grandfather ” clause.

Virginia. — For those registering before 1904, army service (5) or Property clauses (2); or literacy (1) and under¬ standing clauses (8). After 1904, poll tax clause (3) pro¬ viding the tax has been paid for three years, and literacy clause (1). Army service (5) excuses from the poll tax (3).

Georgia. — Literacy clause (1) or property clause (2) or Army service (5) or character clause (6).

The more flagrant provisions of these laws are unconstitutional and the “Grandfather® clauses have already been declared null and void by the United States Supreme Court. If the Negroes progress in the future as hitherto they cannot permanently be deprived of the suffrage.

Economic Status. — The occupations of Ne¬ groes according to the latest census report were as follows showing 71 per cent of total Negroes 10 years of age and over in gainful occupations:

Agriculture, etc . 2 , 893 , 380

Domestic and personal service . 1,112,182

Manufacturing and mechanical industries . 631,421

Transportation . 255,969

Trade . 119,491

Professional service . 67,245

Extraction of minerals . 61,129

Public service . 22 , 382

Clerical occupations . 19,336

This shows that most of the freedmen’s sons are farmers and servants, as one would expect.

Statistics of ownership of property show that in the Southern States Negroes owned 430,449 homes or 22.4 per cent of all the homes

which they occupy. The corresponding figure for 1890 was 18.9 per cent. If we consider particularly Negro farmers, we find that in the country districts of the South emancipation has been but partial, and that the Negro serf is still bound to the soil by peonage, plantation stores and a system of crop mortgages. Never¬ theless, Negro farmers operated in 1910, 893,370 farms with a total acreage of 42,279,510 acres. Of these farms 218,972 were owned by Negroes, or 24.5 per cent.

Colored owners increased 16.8 per cent dur¬ ing the decade from 1900 to 1910, and the land in these farms from 15,976,098 to 19,076,463.

Beside these independent farmers there are a vast number of Negro laborers, who raise the crops on the farms of the white farmers.

Negroes are just entering into lines of com¬ mercial business. There are 20,653 retail dealers, 953 undertakers, 336 bankers, 1,833 in¬ surance agents and officials.

A list of the principle specific occupations of Negroes in the United States follows:

Sex and Occupation.

Males . 3,i78,554

Farm laborers . 981,922

Farmers . 798,509

Laborers — building and hand trades . 166,374

Laborers — saw and planing mills . 91,181

Laborers — steam railroad . 86 , 380

Porters, except in stores . 51,471

Draymen, teamsters, and expressmen . 50,689

Coal mine operatives . 39,530

Laborers, porters, and helpers in stores . 36 , 906

Waiters . 35 , 664

Laborers — road and street building and repairing 33,914

Cooks . 32,453

Deliverymen — stores 30,511

Carpenters . 30 , 464

Janitors and sextons . 22,419

Barbers, hairdressers and manicurists . 19,496

Retail dealers . 17,654

Clergymen . 17,427

Longshoremen and stevedores . 16,379

Laborers — brick, tile and terra-cotta factories. . . 15 , 792

Firemen (except locomotive and fire department) 14,927

Lumbermen and raftsmen . 14,005

Laborers — blast furnaces and rolling mills . 13,519

Hostlers and stable hands . 12 ,965

Laborers — public service . 12 , 767

Brick and stone masons . 12,401

Garden laborers . 11,801

Laborers — domestic and personal service . 10,380

All other occupations . 500,699

Female . 2,013,981

Farm laborers . 967,837

Laundresses (not in laundry) . 361,551

Cooks . 205,939

Farmers . 79 , 309

Dressmakers and seamstresses (not in factory). . . 38, 148

Teachers — (school) . 22,441

Nurses (not trained) . 17,874

Chambermaids . 14,071

Laundry operatives . 12,196

Housekeepers and stewardesses . 10,021

All other occupations . 284,594

Social Condition. — The illiteracy of the Negro population 10 years of age and over has decreased as follows :

1870 .

Per cent

1880 .

1890 .

1900 .

1910 .

In the parts of the United States where deaths are regularly registered the death-rate of Negroes was 32.4 per 1,000 in 1890, 30.2 in 1900 and 25.5, in 1910. The corresponding figures in cities are 33.7, 31.1 and 27.5. In neither case do these figures apply to those rural districts where the Negro population is massed.

In 1914 the Negro death rate had fallen to 21.9 per thousand as compared with 13.1 for the whites. Comparison as to specific diseases shows these rates per 10,000 living:

White

Colored

Typhoid .

14.3

35.9

Malaria .

1.6

14.8

Whoopingcough .

9.2

32.0

Influenza .

8.6

18.8

Tuberculosis of the lungs.

115.2

363.8

Pneumonia .

122.0

220.8

Nephritis, etc .

98.8

168.5

The high record

for diseases

of the

lungs

shows a progressive

decrease.

1890

1900

1914

Consumption .

. 546.

11

490.6

363.8

Pneumonia .

97

349.0

220. 8

The Negro death rate is lower for Negroes than whites in measles, scarlet fever, diphtheria and cancer. Infant mortality among Negroes is still very high.

There were during the year 1910 112,436 colored prisoners committed and 103.267 dis¬ charged. On 1 Jan. 1910 there were 42,631 prisoners in confinement, of whom 41,729 were of Negro descent. Unfortunately comparisons with former census reports are impossible, ow¬ ing to differing methods, but the commitments for petty crimes of misdemeanors would seem high.

The home life of the Negro has greatly im¬ proved since emancipation. The one room cabin is slowly disappearing, the chastity of girls is being protected more effectively and the development of social classes and organiza¬ tions has received great impetus.

The habitat of the Negro population has shown no great change until the recent migra¬ tion northward. The centre of Negro popu¬ lation is in De Kalb County, Ala. South Caro¬ lina and Mississippi have over

half their popu¬ lation Negro; Louisiana, Alabama, Georgia and Florida have from 37J/2 to 50 per cent Negro; Arkansas, Virginia and North Carolina have from 25 per cent to 37? 2 per cent.

The Negro Population Sections in 1910.

South Atlantic . 4,112,488

East South Central . 2,652,513

West South Central . 1,984,426

Total South . 8,749,427

New England ….. Middle Atlantic . . . East North Central West North Central

66,306

417,870

300,836

242,662

Total North

1,027,674

Mountain . 21,467

Pacific . 29,195

Total West . 50,662

Since the Civil War the dearth of labor has caused a considerable migration from the South northward, estimated at a half million. The largest Negro cities are Washington, New York, New Orleans, Baltimore, Philadelphia, Memphis, Birmingham and Atlanta. They have from 50,000 to 100,000 Negroes.

In 1860 only 4.2 per cent of the Negroes were in cities of 8,000 or more inhabitants; in 1890 this had increased to 12 per cent, and in 1910 20.7 per cent were in cities of 10,000 or more; 27.4 per cent were in cities of 2,500 or more, and 72.6 per cent in rural districts.

The church census of 1906 showed 36,770 Negro church

organizations, with churches seating 10,481,738 persons, and property valued at $56,636,159. There were 3,685,097 church members. The largest churches are the Baptists (2,261,607 members) and the Methodists (M. E., 308,551 members; African M. E., 494,777

members; African M. E. Zion, 184,542 mem¬ bers; Colored M. E., 172,996 members).

Amalgamation of Blood. — The Negroes of America are not of pure Negro blood. There has gone on in the country first an intermingling of the various African tribes transported and, secondly, a large infusion of white blood. The census reports of this latter intermingling are admittedly far below the truth :

1850 . 405,751 mulattoes or 11.2% of all Negroes

1860 . 588,352 “ “ 13.2%

1870 . 585,601 “ “ 12.0%

1890 . 1,132,060 “ “ 15.2%

1900 . 2,050,686 “ “ 20.9%

Literature and Art. — The chief contribu¬ tion of the Negro to American art has been his beautiful and plaintive folkmusic. This music has been developed by composers like J. Rosamond Johnson and Harry Burleigh. Henry O. Tanner, the artist ; W. S. Braithwaite, the poet and critic ; Charles W. Chesnut, the novelist; and Kelly Miller, the essayist, are colored. Other distinguished Negroes have been Frederick Douglass, the Abolitionist; Paul Laurence Dunbar, the poet; Ira Aldridge, the actor ; Daniel Payne, the bishop, and Booker T. Washington, the educator.

References. — The history of the Negro prior to emancipation will be found in the

abundant literature of slavery. Official sources of information are the United States census reports, especially 1850-1900.

Bulletins of the United States Department of Labor, Publications of Atlanta University and Johns Hopkins University. The more im¬ portant single works are Frederick Douglass (Autobiography) ; Williams’ (History of the Negro Race) ; Washington’s (Up From Slavery*; Gidding’s < Exiles of Florida*; Chesnut’s (Marrow of Tradition* ; McCulloh’s (Human Way* ; Dunbar’s (Lyrics of Lowly

Life* ; Krehbiel's (Afro-American Folk Songs* ; Kelly Miller's (Race Adjustment*; Hart's (The Southern South*; Lynch's (Facts of Recon¬ struction* ; Johnson's (Autobiography of an Ex- Colored Man* ; Du Bois' (Souls of Black Folk.*

W. E. B. Du Bois,

Author of cThe Souls of Black Folk) ;

NEGRO DISFRANCHISEMENT. Ne¬ gros have been practically disfranchised in the States of Alabama, Kentucky, Louisiana, Mis¬ sissippi, North Carolina, Virginia, South Caro¬ lina and Georgia. The chief method used in disfranchising the negro in the Southern States has been and is a high educational test as a qualification for voting, which in¬ cludes the ability to interpret** any part of the State constitution. The so-called "grandfather clause,** by which any person who voted in or before 1867 or 1868 (the details of the law dif¬ fered in different States) was entitled to a vote, was nullified by the United States Supreme Court for the States of Maryland and Okla¬ homa on 21 June 1915. The first Constitutional Convention disfranchising the negro was that held in Mississippi in 1890, when the educa¬ tional qualification mentioned above was made part of the constitution of the State. Previous to that time the imposition of a poll tax was for some years effective in the Southern States. The other constitutional means of disfranchising the negro, to quote Prof. Charles A. Beard's Contemporary American History,* are ((a small property qualification** and "the wide extension of disfranchisement for crimes by including such offenses as obtaining money under false pretenses, adultery, wife-beating, petit larceny, fraudulent breach of trust, among those which work deprivation of the suffrage.**

NEGRO EDUCATION. The first prob¬ lem of the South was to enlighten the Negroes brought from the African wilds. In accepting the institution of slavery, intelligent masters were easily convinced that Negroes who had some conception of modern civilization and understood the language of their owners would be more valuable than wild men with whom one could not communicate. Not a few slave¬ holders, however, believing that slaves could not be enlightened without developing in them a love for liberty, maintained that the more brutish the bondmen the more pliant they be¬ come for purposes of exploitation. The atti¬ tude of the Southern white people toward the Negroes, therefore, had been variable, but the unbenevolent planters finally won the majority of Southerners to their way of thinking and determined that Negroes should not be elevated to the dignity of manhood.

The early advocates of the education of the

Negroes were masters who desired to increase the efficiency of their labor supply, sympathetic persons who wished to help the oppressed and zealous missionaries sent out for the propaga¬ tion of the gospel in the New World. Of these three classes the masters were the most effect- lve- The slaveholders, then, just as planters do now, dealt with the situation to suit them¬ selves regardless of public opinion and the law. W hen > measures were passed to prohibit the education of slaves some masters continued to teach Negroes in defiance of the hostile legisla¬ tion. Sympathetic persons, however, did not accomplish much. Like many of the North¬ erners whose interest in the Negro to-day is limited to an academic discussion of the race problem, these persons were content to dwell in practically free settlements far from the plan¬ tations on which the bondmen lived. The mis¬ sionaries were generally successful in teaching Negroes, especially after the removal of their greatest impediment through the abrogation of the unwritten law that a Christian could not be held a slave.. The French and Spanish Catho¬ lics, the Puritans, Anglicans, Quakers, Presby¬ terians, Methodists and Baptists shared this im¬ portant task.

This movement, however, was to develop into something more potential than that of merely enlightening the blacks to bring them into the church. The necessary impetus was supplied by the spreading of the nascent social doctrine incident to a general study of the po¬ litical philosophy of Milton, Blackstone, Baxter and Locke to justify the coming of the lowly to power. When Patrick Henry and James Otis demanded liberty for the colonists, Daniel Appleton, John Woolman, Anthony Benezet and Mathew Clarkson demanded the liberation of the Negroes' bodies that they might enjoy free¬ dom of mind. These reformers were somewhat successful. The frequent acts of emancipation which followed this change in the attitude to¬ ward persons of color turned loose upon society a large number of men whose chief needs were education and training in the duties of citizenship. The result was that friends of the colored people established throughout the country a number of schools which effected a material change in the condition of the blacks and served them so well that many of these institutions are intact to-day.

These new efforts made possible more sig¬ nificant achievements

throughout the country. Negroes became more useful as servants, some proved to be first-class artisans and not a few exhibited the power to rise in the business world. It was the day of Caesar, the doctor, Phyllis Wheatley, the writer of verse, Andrew Fuller, the mathematician, and Benjamin Ban- nekar, the surveyor and astronomer. Even slaves attached to the masters' homes learned the rudiments of education in schools main¬ tained for white children. A few bondmen were reading and writing French, Spanish and Ger¬ man. Some of them were associated with indentured servants in the teaching of white persons.

The more general advancement of the Negroes, however, was made in their religious development. The American Revolution ef¬ fected a remarkable change in the attitude of Christians toward the black population.

Negroes were extensively instructed by pious whites, many of them were taken into the church on the basis of equality and a few were trained to share the propagation of the gospel among the neglected classes. They so im¬ pressed their hearers that scores of them were invited to preach to white congregations. Among those who enjoyed this privilege were Jacob Bishop, sometime pastor of the First Baptist Church (white), Portsmouth, Va. ; John Chavis, Henry Evans, Ralph Freeman, Harry Hosier, Black Harry of Saint Eustatius, Lemuel Haynes and S. R. Ward.

These favorable conditions, however, did not continue in many parts of the South later than the second quarter of the 19th century. The rapid strides of certain Negroes and the tendency of some to organize insurrections could not but startle a large number of Southerners who easily found reason for eliminating them from the higher classes and making them tools in the hands of the rich planters produced by the industrial revolution. In the most Southern States, therefore, laws were enacted to reduce the negroes to the plane of beasts. These measures not only put an end to the helpful contact of the Negroes with white people but closed the colored schools and made it a crime for a Negro to teach his own child. Slaves once s'Ought as valuable because of their mental development were thereafter regarded as dangerous to the peace of the South. Hav¬ ing then no incentive to struggle upward, most slaves tended to become heathen-like, and Negroes brought in the rough from Africa found among their fellows in the Christian world nothing to encourage the pagan to live a better life. Ignorance of the fact that a degraded laboring class is an impediment to the economic progress of the country, the South paid this price to protect its pet institution.

Ambitious slaves and free Negroes could not suffer the humiliation which such a reaction entailed. Many of them, therefore, moved North and established settlements to which fugitive slaves learned to repair. The coming of these people to the North increased the number of progressive Negroes in that section, making possible greater achievements in educa¬ tion. In Washington and Baltimore, though not in the North but more liberal than the lower South, free Negroes accumulated suffi¬ cient wealth to make themselves comfortable and to provide for their posterity. Many be¬ came owners of property in Philadelphia as they had there the assistance and protection of the Quakers. In New York the economic progress of the free Negroes was referred to by the anti¬ slavery societies as the reason why they could provide better facilities of education for their children. It was not uncommon to find a prop¬ erty holder, a trader or merchant among the Negroes of New England. Later in the first half of the last century, however, less progress was noted. The change came when the intoler¬ able conditions in the South drove Negroes to Northern communities where, on account of the fear of being burdened by undesirables, some white people not only ceased to help them, but undertook to frighten them from that section.

The progress of the free blacks in favorable Northern communities, however, convinced r

few Southerners that the attitude of their sec¬ tions toward the uplift of the Negroes was wrong. Men of both sections, therefore, en¬ deavored to show that the South was its own tremendous handicap. Certain planters in North Carolina and Georgia began to advocate the repeal of the laws which prohibited masters from teaching their slaves to read. In North Carolina the matter ended with bringing a memorial on this subject before the legislature. The reform party of Georgia, however, carried the matter further. A bill providing for the repeal of the undesirable law was introduced in the legislature, piloted through the lower chamber and all but enacted in the upper house. These facts show that had not the Civil War broken out as early as it did the South would have for economic reasons taken other steps for the improvement of the Negroes.

The forces effective in the development ol Negro education since the Civil War have been the enterprise of the negroes themselves, their Southern friends and philanthropists of the North. Negro teachers who

had braved the dangers of disregarding public opinion and even of violating laws hostile to their education eagerly grasped the opportunities vouchsafed by the triumph of the Union forces. They at once became, so to speak, shining lights which had long lay hidden under a bushel. Many Negroes who, because of the persecution of those of their race known to be enlightened, had never posed as educated persons, were found to be well equipped for this important work of the remaking of the race through education.

More successful than these, however, were the teachers and preachers of the white race, who volunteered to work among the freedmen. At first there were teachers among the vic¬ torious Union soldiers, who gave the Negroes in certain parts of the South their first oppor¬ tunity for enlightenment. Then came the more effective work of the representatives of the numerous northern agencies intended to elevate the Negroes. Desiring to promote liberal edu¬ cation these workers established a number of schools, sometimes undertaking the work of colleges and universities, with a view to offer¬ ing the undeveloped mind of the Negro every opportunity for growth. Yet although having a common impulse and struggling to reach the same end, these agencies, to some extent, de¬ feated their own purposes through failure to systematize their efforts and co-operate with others in the field. Their most unfortunate blunder was to undertake to do for the Negro through education, in a generation, what it had not done for the white race in centuries.

There arose too a number of schools result¬ ing from the initiative of the Negroes them¬ selves. These, however, following in the foot¬ steps of the systems already in the field, pro¬ moted in many cases a reduplication of effort for special ends as they were too often founded by ambitious leaders and supported by Negro churches for denominational reasons. But these schools have been decidedly helpful, not only in the actual work done, but in showing the initiative of the Negro and his determina¬ tion to be educated even at his own expense ; they have been a factor in securing aid from others. Persons called upon to aid Negro educa¬

tion always give serious consideration to what the Negroes have done for themselves.

Along with these institutions worked also those established by the State. The Negroes themselves gave the South its first effective public schools during the Reconstruction period. As these systems, however, were democratic, giving equal facilities to the Negro and some¬ times even the privileges of the coeducation of the blacks and whites, this

work was undone, when the aristocratic whites regained control. These radicals, however, did provide for some sort of education of the Negro in segregated public schools. These schools have never been adequate to the crying need for the education of the masses, but as a result of the interest of certain liberal Southerners like Haygood, Curry, Ruffner, Northern, Vance and Dillard, they have been considerably improved. The Negro public schools, however, have always constituted an impoverished group, the sum spent on colored pupils per capita, even to-day, being $2.89, while that for the white schools is $10.32. Above these common schools the Southern States have established also 28 higher institutions, 16 of which are supported partly by the Federal government as land grant schools. The total income of these institutions to-day is $963,611 and the value of their prop¬ erty $5,727,608. The annual income of the land grant colleges is $544,520. The Federal government appropriates to their support $259,851 of this amount and the States $263,094.

These appropriations being inadequate, the Negro has had to depend in many cases on Northern philanthropy. The North, therefore, has been called on not only to send its sons and daughters as teachers of Negroes, but has purchased for them school property valued at $26,191,892 and contributes annually $2,645,577 to the support of their schools. The total annual income for current expenses in all col¬ ored private schools is now $2,026,460 and the value of the plant equipment and endowment of the same $28,496,946.

These schools as a whole, though inade¬ quately supported, rendered valuable service. A majority of the useful Negroes now serving their race effectively were trained in these in¬ stitutions. It was evident, however, that this educational system did not supply the needs of an undeveloped people. They were not suffi¬ ciently equipped to compete with the white in¬ stitutions in achievements in the literary world and failed to enable the Negro to solve the problem of their economic struggle. There¬ upon appeared Booker T. Washington, who in emphasizing the Hampton idea of education effected a revolution by dissociating it from leisure and luxury and connecting it with the life of the individual. The movement for the enlightenment of the Negro, therefore, has been well worth while, if it had done nothing more for the world's good than to produce Booker T. Washington, the only American who has ever revolutionized an educational system.

This leader's task in inducing the world to recognize the sanity of his educational pro¬ gram was not easy. There was a natural an¬ tagonism to be expected from those enthusi¬ astic white people who, believing that the Negro was to have special problems to solve, con¬

tended that the problem of promoting his gen-

o &

ci*al progress could be soon solved by their policy of educating him along traditional lines. It provoked, moreover, the fiercest opposition from the misguided talented tenth of the Negroes whose lack of foresight made them the irreconcilable enemies of Booker T. Wash¬ ington. The opposition of the Negro to Mr. Washington was not due so much to the work of the man himself as to the manner in which the South interpreted his educational theory. Misunderstanding the foresight of this great man, the South welcomed industrial educa¬ tion as an opportunity so to reconstruct the school system of the South as to make educa¬ tion mean one thing for the white man and another for the Negro, giving the white man the exclusive privilege of studying literature and philosophy, while the Negro should be taught to use his hands skilfully in the service of the superior class. Southern States soon ceased to appropriate money to the support of the academic education of the Negroes, divert¬ ing these funds to industrial education ; and Northern philanthropists, at first adverse to this policy, yielded to it in a generation. Di¬ vested of these misconceptions and shorn of its rough edges the theory brought forward by Booker T. Washington has been accepted by the world as a great lesson for the education of all men of all conditions.

Finally, one must naturally inquire as to what all of these agencies have accomplished. They have produced the majority of our teach¬ ers of Negroes, most of their preachers, many of their physicians, dentists and pharmacists, not a few of their lawyers and a considerable number of progressive business men. They have been a decided encouragement to thrift as is attested by the Negroes' ownership of 30,000,000 acres of land, valued, together with other property, at over $1,000,000,000, yielding the government a tax to support Negro schools and further voluntary contributions of one- half a million annually to the fund for the extension of the school term. They have taught the Negroes self-help, in that they not only assist but ha#ve been moved to take the initiative in establishing 153 schools themselves, with an annual income of $380,933, and property valued at $2,307,054. Above all, these institutions have reduced the illiteracy of the Negroes from 90 per cent to 30 per cent. In fact, during the last 50 years the Negro race has been actually remade by the work of these schools.

Bibliography. — For further information on negro education consult Woodson, C. G., (The Education of the Negro Prior to 1861); Jones, Thomas Jesse, (Negro Education, a Study of the Private and Higher Schools for Colored People in the United States) (Department of the Interior, Bureau of Education, Bulletin No. 38, 1916) ; Boston Educational Commis¬ sion, First and Second Annual Reports; The Frcedmen's Record, organ of the New Eng¬ land Society; Pierce, Paul S., (The Freed- men's BureatP ; American Freedmen's Union Commission, (Results of Emancipation in the United States of America) ; Alvord, J. W., (Reports on Schools for Freedmen) ; The American Missionary, organ of the American Missionary Association ; (American Union

Commission, Its Origin, Operations and Pur- poses) ; Conway, T. W., (Reports from the

Department of the Gulf) ; (Court of Inquiry in the Case of Gen. O. O. Howard, Proceed¬ ings, etcP ; Eaton, John, Jr., 'Reports on Col¬ ored Schools in Mississippi, Arkansas and Ten- nessee) ; 'Freedmen's Inquiry Commission, Reports of) ; The F reed-man; Washington, Booker T., (Future of the American Negro) ; id., (Education of the Negro) (new ed., New York 1911) ; Rust, R. S., (Educational Work in the South by the Freedmen's Aid Society of the Methodist Episcopal Church) ; (History of the American Missionary Association ; De Bow's Review (Vols. XXXIII-XL) ; National Freedman' s Relief Association Bulletin; War¬ ren, Joseph, (Reports of Schools in Mississippi, Arkansas and Western Tennessee* ; Howard, Gen. O. O., Commissioner of the Freedmen's Bureau,

Carter G. Woodson,

Editor of cThe Quarterly Journal of Negro Life and History J

NEGRO EXODUS, in American history, a term applied to the emigration of Southern Negroes to the West and Southwest in 1879 and 1880. During these years upward of 50,000 negroes, men, women and children, moved to Kansas, and as many more were scattered among the other Western States. So many of the emigrants were penniless and destitute that a Freedmen's Relief Association was organized among the citizens of Kansas. The movement proved so disastrous that emigration ceased at the close of 1880. The Negroes undoubtedly re¬ moved to the West to better their condition, but the charge was openly made that the movement originated with the Republican party, in order to ensure the election of Republican presiden¬ tial electors in doubtful States. The Nashville Colored

Convention (1879) endorsed the emi¬ gration, on the ground that the blacks suffered many disadvantages, both political and social, in the South. Consult articles by Greener, R. T., and Douglass, F., in Journal of Social Science (Vol. XI, Boston 1888), and Runnion, 'The Negro Exodus) (in Atlantic Monthly, Vol. XLIV, Boston 1879).

NEGRO FREE STATE. See Liberia.

NEGRO MELODIES. In slavery days the Southern negroes were noted for their field and cabin songs and dances. Many of their original plantation songs had been handed down from their African ancestors. The tunes, while melo¬ dious, had a range of a few notes, the major key predominating. They consist of a half recitative, half musical song, marked by a regu¬ lar tempo. Accents and chords are introduced, producing in many instances original and strik¬ ingly harmonious effects. Following the ances-

tral melodics came the tunes adapted from Baptist and Methodist hymns. After the war the Negro songs began to disappear and nonde¬ script Afric-European melodies, which eventu¬ ally developed into ragtime, became popular in both the North and South. This change was due to two causes: the desire of the freed slaves to throw aside all remembrance of slavery days and to the widespread develop¬ ment of modern Negro minstrelsy. Consult Rit¬ ter, F. L., (Music in America) (new ed., New York 1900) ; Edwards, C. L., (Bahama Songs and Stories) (ib. 1895); Marsh, J. B. T., (The Story of the Jubilee Singers and their Songs) (Boston 1880) ; Krehbiel, H. E., (Afro-Amer¬ ican Folk Songs> (New York 1913).

NEGRO MINSTRELS, a species of mu¬ sical entertainment of a quaint and simple kind, which originated among the negroes of the southern United States, and was first made popular at public entertainments by E. P. Christy, the originator of the troupes of imita¬ tion Negro musicians. The words of the songs are generally in broken English and the har¬ monies almost entirely limited to the chords of the tonic and dominant. The bones and banjo and tambourine are the chief accom¬ panying instruments, but minstrel troupes are usually accompanied by orchestras. Their entertainments are not now exclusively musi¬ cal, but include amusing interludes, dramatic sketches, dancing, acrobatic and similar per¬ formances.

NEGRO MONKEY, the name of several monkeys noted for the blackness of their coats ; especially a large long-tailed East Indian and Malayan langur (Semnopithecus maurus), which is reddish when young.

NEGRO PLOT, in American history, the name given to a local rebellion in New York City in 1741. On 18 March of that year a fire occurred in the chapel and barracks at Fort George at the Battery. It was generally be¬ lieved to be accidental, but charges were set afloat that it arose from a plot by the Negroes to burn the city. Eight other fires of a mys¬ terious nature within a month strengthened this belief, and later one Mary Burton, a servant, furnished testimony implicating a number of sailors and Negroes. Twenty-four whites and 154 Negro slaves were seized and imprisoned. Finally Mary Burton's accusations inculpated persons of prominence known to be innocent, the delusion instantly abated and the prisons were cleared of victims. It was charged that the Spanish were inciting plots among the Negroes through Roman Catholic priests. Four whites were hanged, 18 Negroes hanged, 14 burned at the stake and 71 transported. The Negroes had no counsel and were executed on insufficient evidence. Many confessed to save their lives and accused others.

NEGRO (na'gro) RIO. See Rio Negro.

NEGRO SUFFRAGE. See Aliens ; Elec¬ toral Qualifications; Woman Suffrage; Elections; Naturalization; Votes, Voters, Voting; United States — Suffrage.

NEGROPONT, ne'gro-pont. See Eubcea.

NEGROS, na'gros, Philippines, an island lying southeast of Panay, west of Cebu, and northwest of Mindanao, bounded on the north by the Visayan Sea, and on the south by the

Sulu Sea; length, 134 miles; greatest width, 33 miles; area, 4,839 square miles, with dependent islands, 4,994 square miles. It is the fourth island in size of the archipelago.

Topography.— A central mountain range, which divides the island into two almost equal divisions, extends from the extreme northern point to Caladias, only 14 miles from the south¬ ern coast; the spurs from this range extending east and west form large valleys. Near the northern end of the range is the Canlaon vol¬ cano, also known as Malaspina, 8,192 feet in height; and in the southern summits of the Sierra Dumaguete are two mountain lakes the larger five miles long,

the smaller two miles. A few miles southeast of the larger lake are the hot springs of Mainit, and near the coast near Dauen are several sulphur and thermal springs. There are no large rivers, but numerous small streams flowing through the valleys.

Industrial Resources. — The soil is fertile and the vegetable products abundant; they in¬ clude chocolate of excellent quality, sugar, cof¬ fee, rice, tobacco, wheat, cotton, hemp, corn, etc. There are also valuable forests in the in¬ terior. Important deposits of coal are found in both eastern and western Negros, and indica¬ tions of iron in the western part. The most important industry of the island is agriculture; the natives understand methods of irrigation, and use the numerous streams for this purpose ; next in importance are the fisheries ; turtle shells, sea cucumbers and sea shells are also gathered. Sugar and sugar sacks are manufac¬ tured, hydraulic machinery being used in the production of the former; in the eastern part of the island cotton pillows are manufactured, which are used on steamers. A wagon road or trail follows the coast, but there are few roads extending far into the interior; there are only two defiles through the mountain range. All the important towns are on the seacoast and most of the local trade is carried on by water.

People and Government. — The people of the coast are Visayans, and those of the moun¬ tains Panayanos; the chief language is Visayan. The island was occupied by United States troops in 1900, and operations were carried on against bands of outlaws and robbers. In 1899 a native constitutional convention was held at Bacolod, and a constitution framed and sub¬ mitted to the United States authorities, this being the first attempt to institute civil govern¬ ment in the Philippines. A temporary govern¬ ment was proclaimed in July 1899, and in 1901 the Philippine Commission divided the island into two provinces, Negros Occidental (west¬ ern), whose capital is at Bacolod and Negros Oriental (eastern), whose capital is at Duma¬ guete, and established civil government similar to that in other provinces. Pop. 460,000. Con¬ sult (Milan

1894).

NEGRUZZI, na-groot'se, Jacob, Rumanian author, son of Konstantin Negruzzi (q.v.) : b. Jassy, 11 Jan. 1843. He published his father's complete works ; was professor of commercial law at Jassy and after 1885 at Bucharest; founded in 1867 the periodical called Convor- biri literare for which he wrote verse, fiction and prose idylls ; and translated Schiller into Rumanian. His collected works were published at Bucharest (6 vols., 1894-96).

NEGRUZZI, Konstantin, Rumanian poet and author: b. Jassy, 1809; d. there, 1866. He studied in Jassy and Bessarabia,, edited Dacia Literaria (1840) with Cogalniceanu and Alec sandri, wras a leader in the Liberal party and a minister of Count Cusa, and wrote versions of Pushkin, Kantemir and Hugo: (The Sins of Youth,5 a volume in prose and verse; and the epics cAprodul Purice5 and (Lapusneanu.5 His complete works were published in 1873.

NEGUNDO, a genus of trees of the maple- family, represented by the box-elder (q.v.).

NEGUS, a beverage made of wine, water, sugar, nutmeg and lemon-juice: so called from Col. Francis Negus, the inventor, who lived in the time of Queen Anne. Negus is also the native title bestowed upon the sovereign of Abyssinia.

NEHALLENIA, in Scandinavian and early Germanic mythology, a goddess who presides over commerce and navigation. She is repre¬ sented in paintings and sculptures with a branch of fruit and at times with an oar in her hand.

NEHEMIAH (Heb. (

that Artaxerxes II Mnemon (404-359 b.c.) may have been Nehemiah's patron. The statement of Ktesias that the butler's office was given to eunuchs, consequently to foreign¬ ers, in the time of Mnemon, while in earlier times it was an honor accorded to Persian no¬ bles, seemed to support this view, though the possibility of an occasional exception to the rule must be granted. But the Aramaic papyri found in the archives of the Jewish military colony on the island of Elephantine, which mention the sons of Sanballat in Samaria as early as in 408 b.c., have rendered it exceed¬ ingly probable that the reference is to Arta¬ xerxes I. It would then be in the year 445 b.c. that he received his appointment as pecha, or governor, in Jerusalem. The occasion for his request to be given this position was a visit by his brother Hanani and some men of Judah. There is no reason for doubting that Hanani was literally a brother of Nehemiah. Batten has plausibly suggested that he only introduced the little company that had recently come from Jerusalem and acted as their spokesman. The conversation between the two brothers is sig¬ nificant. Nehemiah asks <(concerning the Jews who had escaped, remaining behind when the exiles were

carried away55 and Hanani answers that ((the survivors left in the province after the exile are l ft a miserable plight and objects of reproach, seeing that the walls of Jerusalem are broken down and the gates are gone, hav¬ ing been destroyed by fire.55 Neither Nehe¬ miah nor Hanani knows of any other Jewish community in Judaea than that remaining in the land after the catastrophe in 586 b.c. It has been urged by many scholars that some more recent destruction of the walls must have been meant, partly on the ground of the Aramaic documents in Ezra iv, partly because Nehemiah cannot be thought to have been so greatly ex¬ cited over the well-known destruction wrought by Nebuchadnezzar more than a century and a half before his time. But whatever may be the conclusion as regards the historic character of Rehum's letter and the answer by Artaxerxes, these documents have nothing to say about a violent destruction of already completed walls. Concerning such an event history is absolutely silent. Nor is there any cause for astonishment in the fact that the descriptions given by the men of Judah brought home very vividly to the prosperous Jewish official in Susa the con¬ dition of the city of his fathers, that the thought of the ancestral graves occasioned an outburst of intense grief and that the idea came to him of using the favor he enjoyed with the king to secure permission to repair the walls. It is difficult to see how this request could have been granted without any allusion either by Nehemiah or the king to a rebuilding of the walls by (

Having obtained leave of absence for a time and letters to the governors of Trans-Euphra- tene and the keeper of the king's forest, Nehe¬ miah set out with a military escort. Upon his arrival in Jerusalem he personally inspected the wall, and the account of his famous night-ride

is of great topographical value. He then re¬ vealed his project to the priests and the nobles. As soon as the work began, however, difficul¬ ties arose. Opponents appeared. Among them was Sanballat, the Horonite, probably governor of Samaria. It is not certain what his birth¬ place was. His name does not necessarily indi¬ cate that he was of a Babylonian family. In the Chaldaean and Persian periods, names of this type naturally found their way into Judaea and Samaria. He maintained close relations with the high-priestly family in Jerusalem, and married one of his daughters to a son of Jehoiada, the son of Eliashib. This Sanballat should probably be distinguished from the

gov¬ ernor of Samaria by the same name who, ac¬ cording to Josephus, (Antiquities, } xi, 302 ff., secured from Alexander permission to build a temple on Gerizim and installed his son-in-law Manasseh as high-priest. There was also Tobiah, ((the Ammonite slave, }) possibly a freed- man who had risen to an influential position, and Gashmu or Gushamu, the Arab, either a Nabataean from Idumaea or a descendant of the exiles deported from Hejaz to Samaria by Sargon. These men may have been officials under Sanballat. There is no intimation that they ever sent any troops against Jerusalem, or attempted forcibly to interrupt the work. But Nehemiah feared an attack and took all possible precautions against a surprise. He declined the request for an interview with Sanballat and Gashmu at Chephira in the valley of Ono, near Lydda. It is not impossible that they sin¬ cerely believed that Nehemiah planned to make Jerusalem independent and himself favored the prophetic enthusiasm that gathered about his name, and therefore sought to make a deal with him. Nehemiah, however, felt sure that they meant to do him mischief. . One cannot quite escape the impression that the doughty leader had many admirers among the prophets. It is altogether probable that some of them were hailing him as the coming king of Judaea. One of their number, Shemaiah, whom he consulted in his house, seems to have feared for his life and gave him an oracle advising him to seek refuge in the sanctuary. But Nehemiah's sus¬ picions were aroused, and he finally charged the prophet, who may have been altogether friendly, with an attempt to ruin him. There was appar¬ ently no love lost between him and the priestly class. They may have had no objections to the reparation of the walls, and may even have lent a hand in this undertaking. But the presence of a strong representative of the Persian gov¬ ernment, though of their race, could not be favorable to their ambitions. Another source of internal dissension was the condition of the laboring people. A levy of peasants had been drafted for the work. Leaving their farms and finding the food supply in the city insuffi¬ cient, they were facing starvation with their families. The prevailing distress gave the rich Jew an opportunity for profitable business. He was willing to take mortgage on farms and vineyards for ready cash that vanished quickly in a time of famine prices. But as he favored punctuality in the payment of all obligations, sons and daughters had to be sold into slavery. Deprived of his land, without bread for hungry mouths, pitted between money-lender and tax- gatherer, the poor farmer complained that

Jewish brethren, men of the same faith, should be his oppressors. Nehemiah finally called the aristocracy together, inquiring of them if they really demanded payment of debts at such a time, and at a

general meeting finely contrasted the readiness of the Jews in Persia to buy the freedom of those who were unfortunate enough to become slaves in heathen households and his own disinterested services to the com¬ munity with the cruel selfishness of the capi¬ talists in Jerusalem. Several well-to-do-citizens promised that the farmers would have the use of their fields and vineyards, and that they would not demand payment of interest for the time being. How well they kept their pledge we do not know; it is a relief not to be told. Nehemiah expresses the hope that God may not forget how good he has been himself. After 52 days of work, if the text is correct, the rep¬ aration of the wall was completed. According to v, 14, he remained as governor until the 32d year of Artaxerxes (433 b.c.). His character¬ ization of the former governors (v, 15), and his complete silence concerning Ezra, render it ex¬ tremely difficult to accept the view, widely held among critics, that he was immediately pre¬ ceded by Ezra who is thought to have arrived in 458 b.c. with a large company of exiles and a firman giving him extensive powers. Van Hoonacker's suggestion that Ezra arrived in Jerusalem after Nehemiah has been adopted by Lagrange, Schmidt, Wellhausen and Cheyne. Torrey considers Ezra as a wholly fictitious character created by the Chronicler. Well¬ hausen and Cheyne assumed that in Ezra vii, 8 the original text had some other figure than seven, possibly 27, so that Ezra's mission would perchance fall in 438 b.c. ; but this is not very likely and has no manuscript authority. In the light of the Elephantine papyri, it appears most probable that Ezra left Babylonia in the seventh year of Artaxerxes II Mnemon (397 b.c). Nehemiah's name did not originally occur in Nehemiah viii, 9, as it is not found in the earliest Greek version, 3 Esdras ix, 49.

Some time after his return to Susa, Nehe¬ miah found it possible to go back once more to Jerusalem. On this occasion he discovered that a large hall in the temple, formerly used for storing the gifts intended for Levites, singers and doorkeepers, had been furnished as a guest-chamber for Tobiah, and that these sub¬ ordinate officials, not receiving any share of the revenues, had retired to their farms in the country. He had Tobiah's furniture thrown out, re-established the Levites and provided for their support. He put a stop to the dese¬ cration of the Sabbath, and especially the selling of dry fish by Tyrian merchants on that day. When he found children who spoke the Ashdo-ditish dialect of their mothers, he cursed their fathers, beat them, plucked off their hair and made them swear not to marry their sons and daughters to foreigners. It is possible that Nehemiah x originally followed xiii and gives a list of those who took an oath in reference to this and some other matters. He also chased away the son of Joiada

who had married the daughter of Sanballat. But he did not force the men to drive away their foreign wives and children, as Ezra subsequently seems to have done. The individuality of Nehemiah is so marked that it is comparatively easy to eliminate

the subjective element in his narrative and to form an independent judgment of the men and occurrences he so graphically depicts. He had the virtues and defects of the man of affairs, the practical politician. He knew his ends and worked for them indefatigably. He was bold, enterprising, cautious, circumspect and shrewd! He had a sense of justice and sympathy with the oppressed of his own people. He flattered himself with knowing men, was inclined to read their characters through his suspicions and manifestly took some pride in his ability to escape their wiles. Pie felt in all sincerity that he was a pious man, and looked with some anxiety for the reward. He had convictions, and was faithful to them. But he was not an idealist like the prophets who scorned depend¬ ence on military strength and would have no walls to the city where Yahwe dwelt, or looked with disapproval upon sacrifices, holy days and petty national exclusiveness, dreaming of an Israel that should through its sufferings and its knowledge become a light to the nations. Nehemiah thought he knew the value of walls and gates, and was armed day and night; the temple cult, the Sabbath, circumcision and the separation of the chosen seed were to him of great importance. He was conscious of his merits and recorded them in order that Yahwe might remember what he had done for Israel. The walls he built seemed to have become, as Sanballat surmised, a means of developing inde¬ pendence and stirring up revolt. If there was a revolt under Ochus, bringing on a <(third captivity,)5 it was no doubt due to the confi¬ dence they gave. Two centuries later Sabbath observance had taken such root in the national life that Judaean peasants were willing to be slain rather than to take up arms on the sacred day. The language in which Nehemiah wrote continued to be cultivated in spite of Aramaic, Arabic and European tongues. The particular¬ ism he helped to foster made and unmade Judaism. But the love he bore for Jerusalem inspired a devotion that caused poets to sing, martyrs to confess, patriots to die and one of the great religions of the world to live.

Bibliography. — Smend, R.,

grapha of the Old Testament5 (Oxford 1913) ; Wellhausen, J.,

(Israelitische und jiidische Geschichte5 (7th ed., Berlin 1914).

Nathaniel Schmidt,

Professor of Semitic Languages cond Litera¬ tures, Cornell University.

NEHEMIAH, Book of. One of the

canonical books of the Old Testament. In Hebrew manuscripts and early printed editions it forms a part of the book of Ezra, and in the Greek Bible it also appears as the second part of Esdras B. Ezra-Nehemiah in the Hebrew Bible precedes Chronicles; in the Greek Bible, its daughter-version and the modern transla¬ tions this order is reversed, and the repetition of 2 Chron. xxxvi, 22-23 in Ezra i, l-3a by dittography renders it probable that this was the original sequence. Ezra was clearly grouped by Josephus among the prophets; the reduction of the canon did not lead to the com¬ plete rejection of the book that bore his name, but only relegated it to the miscellaneous writ¬ ings, while the importance still attached to him may have caused the transposition. Some manuscripts of the Latin Bible continued to treat Ezra and Nehemiah as one book; in the majority they were separated as 1 Esdras and 2 Esdras, and the later printed editions of the Hebrew text adopted the current distinction be¬ tween Ezra and Nehemiah. In most of the Greek manuscripts Esdras B is preceded by another book called Esdras A, and this is also found in the Old Latin, the Hexaplaric Syriac, the Ethiopic and the Armenian. Its position, exclusive use by Josephus and frequent em¬ ployment by Greek and Latin fathers indicate the authority it once enjoyed. Aside from some interpolations it is manifestly another translation of the Hebrew and Aramaic text of Ezra-Nehemiah, differing chiefly in the trans¬ position of some chapters and the loss of others. The most important departure from the Hebrew Ezra is found in the fact that Nehemiah vii, 73-viii, 13a immediately follows Ezra x, 44. Already Grotius, Whiston, Ewald and Lagarde maintained that the earliest Greek version has been preserved in Esdras A, and this view has been reaffirmed with weighty reasons by Howorth, Torrey and other scholars more re¬ cently. It has long been felt that the corre¬ spondence with Artaxerxes (Ezra iv, 6-23) in the Masoretic text is put of place and has a more suitable position in Esdras A, as well as that the story of the reading of the law (Nehemiah vii, 73-ix, 37) in reality belongs to the book of Ezra. As Esdras A ends in the midst of Nehemiah viii, 13, it is a matter of conjecture how much of what follows this verse preceded Nehemiah i, 1. Bertholet plaus¬ ibly argues that the list of those who entered into an agreement and the pledge they gave not to marry foreign women, to keep the sab¬ bath,

to allow the land to rest in the seventh year, to pay tithes and to institute certain re¬ forms (Nehemiah x) originally had a place after the reference to this pledge in Nehemiah xiii. If Esdras A represents the Old Greek version Esdras B is likely to represent Theodo- tion's recension, so that the case is similar to that of the book of Daniel.

It is generally recognized to-day that Chron- icles-Ezra-Nehemiah once formed a single work. The unity of these books seems to have been assumed already in the Babylonian Tal-

mild which declares : ((Ezra wrote his book and the genealogy of Chronicles so far as to him¬ self® ((Baba bathra, > 15a). This statement affirms the authorship of Ezra, but apparently intimates that there are interpolations in some passages, continuing the genealogies down to a later time. That Ezra was the author of the whole work remained the opinion of the mediae¬ val Jewish interpreters. The position of Chron¬ icles in the Greek and Latin Bibles and the separation of Ezra and Nehemiah tended to obscure the unity and lead to the assumption that there were three distinct authors. Spinoza rejected the Ezranic authorship, but felt so strongly that Ezra and Nehemiah (and also Daniel and Esther) were pervaded bv the same spirit and showed signs of a later age that he ascribed them to a writer in the Maccabsean period, while it is not clear whether heˆ also as¬ signed to him Chronicles. His opinion was followed bv Le Clerc in 1685. Some of the evidences that seemed to point to such a con¬ clusion were at an early time regarded by scholars as interpolations. Thus Nehemiah vii, 1-26 was explained by de Vence as having been composed by Simon the Just or some other in¬ spired writer later than the time of Ezra and Nehemiah. The fact that genealogies are brought down to the days of Alexander the Great, and in some versions even further, had to be accounted for. But the more thoroughly these books were studied, which had been so much neglected in earlier times that we have not a single patristic commentary, the more evident it became that as a whole they come, not from Ezra, but from the Chronicler whose hand is visible in all parts. Yet it is equally clear that this author copied extensively from already extant works. As he used the books of Samuel and _ Kings, and possibly other sources, in Chronicles, so he likewise made long extracts from various documents in Ezra and Nehemiah. Particularly is it obvious that he availed himself of memoirs written by Nehe- miah. Spinoza's suspicion that these are fic¬ titious was apparently aroused

by the high- priestly line being carried down to Jaddua and Darius the Persian in xii, 22, and the list in vii, copied from Ezra ii, whose genuineness he doubted. But when the passages are removed that can be shown not to have belonged to the memoirs, there remains a document so marked by its peculiarities of style and language, and so impressed with the stamp of a personality unique in his rugged strength and naivete, that it cannot be the creation of the Chronicler, whose idiosyncracies are always ready to dis¬ play themselves, but may with utmost confi¬ dence be ascribed to Nehemiah himself. ˆ To this document belonged chs. i, ii, iy-vn, 4, and without much doubt also , xlh, 4—31. Whether any part of in, x-xii with the. long catalogues had a place in it or as an original appendix to it is difficult to determine. . Even the use of the first person is not decisive in this matter. It has long been seen that vii, 73-ix, 37 cannot have belonged to it. That this sec¬ tion originally belonged to the book of Ezra is clear from the Greek Esdras A, where it im¬ mediately follows Ezra x, 44. Many scholars to-day believe that the list in Nehemiah vii represents a census of ((the children of the province® in the time of Nehemiah. The Chronicler evidently used only a part of

Nehemiah's memoirs. The remainder is lost, probably beyond recovery. Hence our ignorance as to his administration of 12 years, after the first two months, if the statement in v, 14 is accurately quoted from the memoirs, the possible disturbances during this period that may have left an echo in Ezra iv, the reason for his return to Susa and the date of his second mission to Jerusalem. It was probably after the events recorded in xiii that he wrote his account, and left in Jerusalem the copy which possibly the Chronicler used, perhaps two centuries later. With this autobiographical sketch a new branch of literature appears in Jewish life. It differs in its purpose from such works as Xenophon's (Anabasis) and Caesar s Commentaries. J Nehemiah does not seem to have written his narrative so much with a view to its effect upon his contemporaries, though he may to some extent have had in mind a defense of his administration against misrepresentations, as rather to set forth his deeds in a record that would remind Yahwe of the services he had rendered to his people. It is the memorial of a piety that is conscious of its worth and looks for its reward. His¬ torically the memoirs are of very great value. They are written in' a sober, orderly, matter-of- fact manner. Nehemiah informs his readers when the events took place. He describes the occasion that led him to request the privilege of visiting Jerusalem. He indicates what author¬ ity was given him. Very vividly he details the work done by him in rebuilding the wall, the opposition from without, the disturbing factors within, the successful completion of the task.

Then he relates the story of his return, the ejection of Tobia and the restoration of the Levites, the enforcement of the sabbath laws, his indignation against the men who had mar¬ ried foreign wives, the expulsion of Jehoiadas son and the purpose of his writing. His very peculiarities reveal a character that vouchts for the substantial accuracy of what he relates. Such a man as he cannot imagine facts, though he may be fanciful in the interpretation of them. We may differ from him in our judg¬ ment, but we can depend on it that what so deeply stirs his righteous wrath is not a cre¬ ation of his own brain, but a stubborn external reality. It is not his fault, but due to excision of a part of his text, insertion of foreign ma¬ terial and a long process of editing, that we are still ignorant in regard to manv things of which we would probably have first hand information if the complete work had been preserved.

Bibliography. — Commentaries by Beda Ven- erabilis, Saadia, Rashi, Ibn Ezra, Nicolaus Lyranus, Joseph ben Jahiah, Cajetan, Striegel, Sa, Mariana, Menochius, Munster, Vatablus, Sanctius, Crommius, Grotius, Clericus, Calmet, C. B., Michaelis, Rambach, J. C. F., Schultz, Maurer, Bertheau, Kamphausen, Keil, Barde, Neteler, Clair, F. W., Schultz, Oettli, Ryssel, Ryle, Siegfried, Adeney, Bertholet, Holzhey, Seisenberger, Davies, Holscher, Batten. Intro¬ ductions by Simon, Carpzov, Eichhorn, Jahn, Bertholdt, Herbst-Welte, Glaire, Havernick, De Wette, Davidson, Keil. Bleek, Kuenen, Vatke, Hupfeld (in manuscript), Kaulen, Cornely, Konig, Cornill, Driver, Budde, > Baudissin, Sellin, Gray, McFadyen, Gautier, Gigot, Moore, Fowler, Creelman. Spinoza, B., (Tractatus theologico-politicus) (Amsterdam 1670) ; Cleri-

H:1S> J-» (Sentimens de quelques theologiens de Holland* (ib. 1685) ; Zunz, L., (Die gottes-

i oˆo\tlCoen Vortrage der Juden* (Berlin 1852) ; Sayee, A. H., introduction to Ezra, i\ ehemiah and Esther* (Oxford 1887); Mar-EVj.rt> J-» (Fundamente der israelitischen und judischen Geschichte* (Berlin 1896) ; Fischer,

(Die chronologische Frage in den Biichern Esra und Nehemia* (ib. 1903) ; Kent, C. F., ˆIsrael's Historical and Biographical Narra¬ tives* (Boston 1905) ; Kennett, R. H., in ˆ Cam¬ bridge Biblical Essays* (Cambridge 1909) ; Jahn, C., (Die Bucher Esra und Nehemja* (Leipzig

1909), and the monographs cited at the end of the preceding article.

Nathaniel Schmidt,

Professor of Semitic Languages and Litera¬ tures, Cornell University.

NEHLIG, na-leg, Victor, French painter: b. Paris, 1830; d. about 1910. He came to the United States in 1856, after learning his art under Cogniet and Abel de Pujol, and opened a studio in New York, where he was made a member _ of the National Academy (1870). Since 1872 he resided in Paris. He was a very successful painter of history and genre, and among his best-known pictures are (The Bravo* (1870); (Armorer of the Old Time*; Ger¬ trude of Wyoming* ; (The Artist's Dream* ; (The Cavalry Charge of Lieutenant Hidden* (New York Historical Society) ; (Battle of An- tietam* (William Astor collection).

NEIDHART VON REUENTHAL, nit'-

hart foil roi'-en-tal, German poet of the 13th century. A Bavarian and a poor noble by birth he is famous for his peasant lyrics, satiric and unflattering in tone, which created a new style of (VII of Austria), with whom he went on the Egyptian Crusade of 1218-19. He died between 1240 and 1245, heartily hated by the peasants he ridiculed, who styled him <(Neidhart Fuchs.** His poems were edited by Haup (1858). A manuscript collection was made by Benecke (in Vol. II of (Beitrage zur Kenntris der altdeutschen Sprache,* Gottingen 1832). Consult von Liliencron, (t)ber Neid- harts hofische Dorfpoesie* (in Zeitschrift fur deutsclies Altertum, Vol. VI, Leipzig 1848) ; Bielschowsky, (Leben und Dichten Neidharts von Reuenthal* (Berlin 1891) ; Pfeiffer, (Die dichterische Personlichkeit Neidharts* (Pader- born 1903).

NEIGHBORS, Robert S., American pioneer and Indian service official: b. Virginia, 3 Nov. 1815 ; d. 13 Sept. 1859. Left an orphan in his youth, he drifted to the Southwest at the age of 19 and was living in Louisiana when the tid¬ ings of the fall of the Alamo appealed to his spirit of adventure and he went to Texas as a volunteer in the struggle of that common¬ wealth for independence from Mexico. He participated in the battle of San Jacinto and, after the end of the Texas Revolution, served with the Texas Rangers. He was a member of Kendall's Santa Fe Expedition, in 1839, and with his comrades was taken as a prisoner to the City of Mexico, where he was held a year before being released. Shortly after his return to his home at San Antonio, the Mexican gen¬ eral, Woll, invaded that place. Neighbors, who

was acting as clerk of the District Court (which was then in session) was captured and, with the other court officials and citizens, was car¬ ried to the Castle Perote, in September 1842, and was imprisoned until March 1844, when they were released at the urgent insistence of Gen. Waddy Thompson, the American Minis¬ ter. Early in 1845 he was appointed as the agent of the Republic of Texas for the Tonca-hua (Tonkawa) and Lipan tribes of Indians, a position which he filled to the satisfaction of his superiors as well as to the people of the two tribes. He assisted the United States treaty commissioners (Pierce M. Butler and M. G. Lewis) in negotiating the treaty with the Comanche and other Indian tribes on the Brazos, in 1846, and was one of the agents se¬ lected to accompany the delegation of chiefs which went from that important council on a visit to Washington. After his return from Washington he was appointed as special agent for the Indians of the tribes living in Texas, and filled the place acceptably until superseded by a partisan appointee of the Taylor adminis¬ tration, in 1849. He then served as a com¬ missioner of the State of Texas for the organi¬ zation of El Paso County, in the performance of which duty great tact and firmness were needed as most of the residents of that section had been Mexican' citizens and, consequently, hostile to Texas until a short time before. He was then elected to membership in the lower house of the fourth Texas legislature, where he served as chairman of the committee on In¬ dian affairs. In 1853 he was reappointed as supervising agent for the Indian tribes living at Texas and the following year aided Capt. R. B. Marcy in selecting two reservations on the Bra¬ zos River, upon which all Indians in Texas were to be settled. The dismissal of a jealous- hearted subordinate was followed by a delib¬ erate and systematically directed endeavor to prejudice and inflame the minds of the inhab¬ itants of neighboring counties against the In¬ dians living on the Brazos reservations. Vio¬ lence followed and the protection of United States troops had to be invoked to prevent the wanton extermination of the people of the sev¬ eral fragmentary tribes. Throughout this cri¬ sis, Agent Neighbors was zealous and efficient in the discharge of his duty and, in consequence, he incurred the increased hatred of a baffled malevolence which plotted his destruction. Having aided most effectively in the transfer of the Indians of the Brazos reservations to a new reservation on the Washita, in the Indian Territory, he returned to Texas and, though warned that his life was in danger, walked una¬ fraid into a settlement where cowardly assassins were thirsting for revenge because their wicked plots had been frustrated. There he was shot down, by a man to whom he was an entire stranger, and died a few minutes later, 13 Sept. 1859. He was a man of discernment and intelligence as well as great courage. He was quoted as an authority in

matters pertaining to the Comanche Indians by Schoolcraft in his¬ tory of North American Indians.* Consult Getter of Major [afterward General] George H. Thomas, 2d U. S. Cavalry* in Annual Re¬ port of the Secretary of War, 1859) ; (Annual Report of the Commissioner of Indian Affairs for 1859,* pp. 220-334.

6ˆ

NEILGHERRY (nel-ger'e) HILLS. See

Nilc.iri Hills.

NEILL, Charles P., American educator and statistician : b. Rock Island, Ill., 12 Dec. 1865. At an early date his parents moved to Texas and he found employment in a bank in Austin. He began his college studies at Notre Dame University, but later went to Georgetown Uni¬ versity, whence he was graduated in 1891 summa cum laude, the second student in 50 years to be so honored by that university. After graduating he returned to Notre Dame as in¬ structor for three years, and then entered Johns Hopkins University, in Baltimore, for post-graduate work in economics and history, meanwhile teaching in the Catholic University at Washington. In 1897 Johns Hopkins con¬ ferred the degree of Ph.D. on him, and from then until 1905 he was the head of the depart¬ ment of economics in the Catholic University. He was assistant recorder for the Anthracite Coal Strike Commission under Carroll D. Wright, and recorder for the Alabama Coal Strike Commission under Judge Gray. He was vice-president of the Board of Charities and Corrections of the District of Columbia, and in March 1905 was appointed Commissioner of Labor by President Roosevelt. Remained as Commissioner of Labor under President Taft and was reappointed by President Wilson. Resigned this position in 1913 to organize a labor and welfare department for the American Smelting and Refining Company, at New York City. Remained in that work until 1915, when he returned to Washington to organize a bureau of information for the Southeastern Railways.

NEILL, nel, Edward Duffield, American historian and educator : b. Philadelphia, 9 Aug. 1823 ; d. 26 Sept. 1893. He was graduated from Amherst in 1842, and later studied at the An¬ dover Theological Seminary. In 1848, having entered the Presbyterian ministry, he was set¬ tled as pastor of the first Protestant church es¬ tablished at Saint Paul, Minn. He served (1851-53) as superintendent of public instruc¬ tion for that territory, and as chancellor of the State University, 1858

—61. As army and hos¬ pital chaplain he served in the Civil War from 1861 to 1864, then till 1869 was an assistant pri¬ vate secretary, first to President Lincoln, and afterward to President Johnson. In 1869 he was for a short time consul at Dublin.. He was president of Macalester College, Saint Paul, 1873-84, and professor of history and literature there from the latter year until his death. His books included (History of Minnesota) (1858) ; (1885); and (Virginia CarolorunP

(1886).

NEILSON, nel'son, James Beaumont,

Scottish inventor of the hot blast in manufac¬ turing iron : b. Shettleston, near Glasgow, 22 June 1792; d. Queenshill, Kircudbrightshire, 18 Jan. 1865. His father was a millwright, too poor to give his son much education. The lat¬ ter worked at engines as a boy, acquired a little money by marriage, and in Glasgow, at 25 be¬ came foreman of the new gasworks, in connec¬

tion with which he opened a library, reading- room and lecture hall for the employees. His experiments with the hot blast date from about 1825; they were contrary to the theory of the ironmasters of the time who saw that the iron was more easily worked and better in winter and so attempted artificial refrigeration. The result, of course, was that no one would let Neilson use his blast furnace for a decisive test for a time. The method introduced (1828) by Neilson is thrice as cheap as the cold blast; hence the patent was constantly infringed and for 15 years he was involved in exhausting law¬ suits, which, with the exception of the great case against the Bairds of Gartsherrie, who refused to pay license for the hot blast, were mostly unsuccessful. In 1847 he retired to the Isle of Bute, and spent his last days at Queens¬ hill, where he established a workingman's in¬ stitute.

NEILSON, Lilian Adelaide, English act¬ ress, whose real name was Elizabeth Ann Brown: b. Leeds, 3 March 1848; d. Paris, 15 Aug. 1880. She worked in a mill at Guiseley and then as a nursemaid, and, upon learning the story of her birth, ran away from her mother, an actress, and went to London. There she was a bar-maid ; was educated for the stage through the efforts of a chance acquaintance; gave dramatic recitations from Shakespeare; and made her debut in 1865 as Juliet, possibly her best role. She played for several years in London with great success due to her beauty, her girlish grace, splendid voice and dramatic power, and appeared in New York in 1872. She was married to Philip Lee early in life and was divorced in 1877. Her roles included Isa¬ bella, Julia, Rosalind, Beatrice, Lady Teazle, Amy

Robsart in Andrew Halliday's Kenil¬ worthˆ and Rebecca in Halliday's HvanhoeP Consult Scott, (The Drama of Yesterday and To-day } (London 1899) ; Winter, William, (Other Days) (New York 1908) ; Marston, (Our Recent Actors) (London 1890).

NEILSON, Samuel, Irish politician, leader of the United Irishmen: b. Ballyroney, Sep¬ tember 1761 ; d. Poughkeepsie, N. Y., 29 Aug. 1803. After marrying the daughter of a rich merchant he went into the woolen business in Belfast. His part in politics became increas¬ ingly engrossing and in 1791 he suggested the organization of the United Irish Society, which was very successful, thanks to Wolf Tone. To assist this enterprise Neilson became editor of the Northern Star, of which he was sole pro¬ prietor in 1794, and which was suppressed in 1797 after his arrest for treason. He was re¬ leased in February 1798, rearrested almost im¬ mediately and was again released in 1802. He came to America in December 1802 and died in the next year. Consult Madden, (United Irish¬ men (1842-46), and the

(1804).

NEISSE, nis'se, Germany, a town in the Prussian province of Silesia and the govern¬ ment of Oppeln, on a river of same name, 47 miles by rail southeast of Breslau. It is a place of considerable strength, surrounded by de¬ tached forts and other works ; has some notable edifices, military and other important schools, and manufactures furniture, blankets, wire¬ netting, tapestry, cutlery, lace, and has an ex-

tensive trade in sugar, marble, vegetables and wood. Neisse was anciently the chief town of a principality and residence of a prince-bishop. It came into the possession of Prussia in 1741, when, after a valiant defense, it was taken by Frederick II. Pop. 25,938.

NEITH, ne ith, or NEITHA, in Egyptian mythology, a goddess who was worshipped es- Pecially as a local divinity in Lower Egypt. By the Greeks she was identified with Athene. She often appears as the companion of Phtha who as local divinity of the old capital of Memphis,' stood at the head of the pantheon of Lower Fgypt ; and on that account she is not unfre- quently styled the great Mother of the Gods.

• j iˆe Egyptian goddesses, she was

identified with Isis. Although mentioned at an early date she does not appear prominently until the 26th Dynasty. Her representation was a crowned woman, with sceptre and bow and arrows. Consult Budge, E. A. T. W., (The Gods of the Egyptians > (2 vols., London 1904) ; Flinders Petrie (ib.

1896) ; Mallet, (Le culte de Neit a Sais) (Pans 1889) ; Wiedmann, Alfred, (Religion of

ion7ˆnCient Egyptians > (Eng. trails., New York

1897) .

NEJD, or NEJED. See Nedjed.

. NEKRASOV, nek-ra'sof, Nikolai Alexeie- vitch, Russian poet: b. Podolia, 4 Dec. 1821; d. Saint Petersburg, 8 Jan. 1878. He was edu¬ cated in Saint Petersburg, where he left the army for the University against his father's wishes and was disowned by his family. By teaching and writing he made a bare livelihood. In 1847 he succeeded Bielinsky as editor of the Contemporary, which post he kept until 1866; and in 1868 became editor of the Annals of the Fatherland, in which most of his poetry appeared. He bitterly attacked administrative abuse, notably in his long poem, (Who Lives in Russia Happily ?) showing the discontent and the suffering in all classes. His satiric attacks on the bureauracy should be mentioned and the pathetic and powerful (Last Songs) (1877). Nekrasov's works- appeared in two volumes (Saint Petersburg 1909). Consult Newmarch, Rosa, (Poetry and Progress in Russia) (New York 1907, with translations) ; Wiener, r Anthology of Russian Literature) (New York 1903) ; consult also the lives by Pokrovski (Moscow 1906) and Pypin (Saint Petersburg 1905).

NEKTON, nek'ton, a term used to designate such of the minute surface-life of the sea (the plankton) as is able to swim against a current instead of merely floating with it. It therefore embraces the more active, and on the whole more advanced, class of lowly marine organ¬ isms. The term was introduced by Haeckel, but is not in very common use.

NELATON, na'la-ton', Auguste, French surgeon: b. Paris, 1807; d. Paris, 1873. From 1851 to his death he was connected with the medical faculty of Paris and until 1867 was professor of clinical surgery, and the year pre¬ vious he became physician to the emperor, two years later Senator and in 1869 a member of the Institute. The improvements he made in surgery gained for him an international

repu¬ tation. He wrote extensively on his subject of special study, surgery, not, however, to the

neglect of other aspects of the medical ques¬ tion. Among his more important works are ‘ Kecherches sur l’affection tuberculeuse des os) (1837) and (Elements de patologie chirur- gical> (1844-49).

NELEUS, ne’lus, in ancient Greek my¬ thology, a son of Poseidon and twin brother of Pelias. He was exposed but reared by a shep¬ herd. When they were grown, their mother lyro recognized them. The inheritance kingdom of her husband, Cretheus of Iolcus in Thessaly, caused a quarrel between the two brothers and Neleus withdrew to Pylos in Messenia. He refused to purify Hercules after the murder of Iphitus, and Hercules in vengeance killed all his sons but Nestor. It is said that he revived the Olympian games.

NELIGH, ne’lig, Neb., city, county-seat of Antelope County, on the Elkhorn River and on the Chicago and Northwestern Railroad, about 120 miles in direct line northwest of Eincoln and 150 miles in direct line northwest of Omaha. It is in a fertile agricultural sec¬ tion in which corn and wheat are the chief farm products. Considerable attention is given to raising cattle and hogs. It is the seat of Gates Academy, under the auspices of the Congregational Church, and has a public library, public parkv bathing beach, alfalfa and flour mills, grain elevators, creamery, marble and granite works, cement-block and brick works, etc. Pop. (1920) 1,724.

NELL GWYNN. See Gwynn, Eleanor.

NELLORE, ne-lor’, or NELLUR, ne-loor’, India, a town, the capital of a district of Madras, on the Pennair River, eight miles from its mouth in the Bay of Bengal, and 109 miles by rail northwest of Madras city. The prin¬ cipal industries are dyeing and rice-husking. Pop. 33,246. The district of Nellore, area 8,765 square miles, is famous for its breed of cattle. There is an extensive irrigation system in the district. Pop. 1,497,796.

NELSON, Aven, American botanist: b. Lee County, Iowa, 24 March 1859. He was gradu¬ ated from the State Normal School at Kirks- YJ He, Mo., in 1883 ; was instructor in Drury College, Springfield, Mo., 1883-85 ; principal of public schools, Ferguson, Mo., 1885-87; and since 1887 professor of botany in the University of Wyoming. He received the degree of M S. from Drury College in 1890; M.A. from Har¬ vard, 1892; Ph.D. from the University of Den¬ ver in 1904. As experiment station botanist he has published many bulletins, among

them the (Trees of Wyoming and How to Know ThenP (1899). The leading botanical journals have published from his pen several important series of papers on the plants of the West. He has published the following books:

NELSON, Cleland Kinloch, American

Protestant Episcopal bishop: b. near Cobham, Va., 23 May 1852; d. 13 Feb. 1917. He was

graduated from Saint John's College, An¬ napolis, Md., in 1872, studied theology at Berkeley Divinity School, Middletown, Conn., and was ordained to the priesthood in 1876. He was rector of the church of Saint John the Baptist at Germantown, Philadelphia, 1876-82, and of the church of the Nativity, South Bethlehem, Pa., 1882-92. In the year last named he was consecrated bishop of Georgia. He received the degree of Doctor of Divinity from Saint John's College in 1891 and from the University of the South in 1892. When on account of increasing responsibilities his juris¬ diction was divided in 1907, he chose the Dio¬ cese of Atlanta, the name adopted by the new portion set off. In 1904 Bishop Nelson was elected president of the Synod of Sewanee, comprising Southern dioceses.

NELSON, Henry Loomis, American jour¬ nalist: b. New York, 5 Jan. 1846; d. there, 29 Feb. 1908. After a course at Williams College, he studied law, was admitted to the bar in 1869, was Washington correspondent of the Boston Post in 1875-85, and editor of that journal in 1885-86. In 1894—98 he was editor- in-chief of Harper's Weekly, and from 1902 professor of political science in Williams Col¬ lege. He published (Our Unjust Tariff Law) (1884) ; (1896) ; (The United States and its Trade} (1902).

NELSON, Horatio, 1st Viscount, English naval officer: b. Burnham-Thorpe, Norfolk, England, 29 Sept. 1758; d. on board the Victory at Trafalgar at 21 Oct. 1805. He entered the English navy at 12 (1770). Three years after he went on an Arctic expedition under Commodore Phipps and on his return (1777) was made a lieutenant. Two years later he was promoted to the rank of post-captain. He was then sent to Nicaragua in command of a man-of-war, and took Fort San Carlos, in the San Juan River. In 1781-82 he made another expedition into the North Sea, but returned to the West Indies in 1782 and, placed in

command of the Boreas ; he was kept on this duty for five years, accomplish¬ ing much good from his vigorous attempts to prevent smuggling between the United States and the British colonies. Nelson's indomitable spirit in insisting upon enforcing the Naviga¬ tion Acts against all foreign nations brought him into conflict with his commander, Sir Rich¬ ard Hughes, and made him unpopular in com¬ mercial circles ; for a long time he was harassed with vexatious lawsuits. He was, however, upheld by the British government. It was while on this station that Nelson met and married the widow of Dr. Josiah Nesbit (11 March 1787). Six months after his marriage he returned with his wife to England and was placed upon the retired list. It has been hinted that through jealousy undue influence was brought to bear upon the Admiralty to keep him from active service. At any rate he remained in obscurity until all officers were recalled into active serv¬ ice on the outbreak of the war with the French Republic in 1792.

The year 1793 saw the real beginning of Nelson's career. He had attracted Lord Hood's attention, and at his solicitation was placed in command of the ship Agamemnon, 64 guns, and sent to join Lord Hood in the Mediterranean, where he rendered him valuable assistance at the siege of Bastia (May 1794). He partici¬

pated in the siege of Calvi and there had the misfortune to lose one of his eyes. While on this station he also served under Hotham and Sir John Jervis. While on a diplomatic mis¬ sion to Naples in September 1793 he met Lady Emma Hamilton, who was destined to be so closely identified with an important part of his life. In 1796 he was promoted to be commo¬ dore and was given a new command. On 25 Sept. 1796 orders came ordering the abandon¬ ment of Corsica and the Mediterranean, and Nelson sorrowfully left the field. He was, how¬ ever, shortly sent back to secure supplies which had been left on the island of Elba, and on re¬ turning passed through the whole Spanish fleet which had then joined the common cause of France. On the following day occurred the famous battle of Cape Saint Vincent (q.v.), 14 Feb. 1797. For his gallantry and skill in manceuvering his vessel he was made rear- admiral of the blue and appointed to the com¬ mand of the inner squadron at the blockade of Cadiz. His next service was an attack on the town of Santa Cruz, in the island of Teneriffe, in which he suffered the loss of his right arm. The wound refused to heal and he was obliged to return to England. He was decorated with the Order of the Bath by George III and at the same time awarded a pension of $5,000. On the 29th of March 1798 he again set sail and joined the Earl of Saint Vincent (Admiral Jervis) off Cadiz 30 April. The admiral sent him to watch the progress of the armament at

Toulon. Notwithstanding his vigilance, the French fleet which conveyed Bonaparte to Egypt escaped. Thither Nelson followed, and discovered the enemy's fleet moored in the Bay of Aboukir, where he obtained a complete vic¬ tory, all the French ships but two being taken or destroyed (1 Aug. 1798). This achievement was rewarded with the title of Baron Nelson of the Nile and an additional pension of $10,000. Nelson set sail from Alexandria 19 August and arrived at Naples 22 September. Here began the pitiable period of his career, which left an indelible blot upon his otherwise unblemished name. He came under the influence of Lady Hamilton, wife of the English ambassador. His criminal relations with that lady, with whom he lived openly after the death of her husband, led to his ultimate separation from his devoted wife. Her influence can be recog¬ nized in many of his public acts during the two years h £ spent under her spell in Naples. During this time he seemed to fall into a lethargy which for the time being made him forget his duty to Great Britain, and at one time he practically acted in the capacity of admiral of the Neapolitan navy. He did, how¬ ever, really get the Neapolitans to take up arms against the French, but their army was soon subdued and the Parthenopean Republic was established by Napoleon.

Finally Nelson seemed to awake to a new sense of diuy, being goaded by the appointment of a junior officer, Sir Sidney Smith, to an important command in the Levant, and also aroused by the exciting news that Admiral Bruix had escaped with the French fleet from Brest and was about to enter the Mediterranean. The imminent danger of the French regaining the naval supremacy of the Mediterranean set Nelson to work with all his old time vigor. In

the meantime Jervis had resigned his command and was succeeded by Keith, with whom he was at variance from the very start. He determined to take Naples before the possible arrival of the brcnch, and forthwith appeared before that city June 1799. Here he found Commodore C aiaccioli in command of a Neapolitan squad- i on which was in league with the Republicans who were in complete control. The forts of the city surrendered on 26 June and then fol¬ lowed Nelson's worst mistake. The Neapolitan admiral was not captured till 29 June, but Nel¬ son immediately ordered a court-martial and condemned him to death, thus violating the capitulation concluded 23 June. Caraccioli was cruelly hanged. The whole miserable affair has been attributed to the influence of Lady Ham¬ ilton, who was also the

favorite of the queen of Naples. It was little honor to Nelson that the despicable king of Naples, Ferdinand IV, soon after this created him Duke of Bronte.

Nelson's flagrant disobedience of orders shortly after this is also ascribed to feminine influence. He obstinately remained at Naples when ordered to join Lord Keith, who expected to meet the French fleet. This meeting, as a matter of fact, never took place, but a great victory might have been won had Nelson's fleet put in an appearance in time. This affair had a great deal to do with his quarrels with Keith and also his subsequent orders recalling him to England. He arrived home 6 Nov. 1800, hav¬ ing traveled overland with the Hamiltons ; soon after this the scandal of his life culminated in the final breach with his wife.

Nelson's promotion to the rank of vice- admiral was dated 1 Jan. 1801 and he was at once employed on an expedition to aid Sir Hyde Parker against the league of the Northern Con¬ federation. This league by its policy of armed neutrality was really aiding the French Repub¬ lic, and Nelson wished to strike first at Russia, but this policy was overridden, and Nelson con¬ tented himself with making a bold attack on the Danish fleet at Copenhagen. He completely annihilated the fleet and silenced the shore bat¬ teries 2 April. During the battle his attention was called to the fact that his ship had been signaled to cease firing. Placing a telescope to his blind eye he remarked : ((I really cannot

see the signal.® This remark added to his pop¬ ularity at home. For his success and gallantry upon this occasion he was created a viscount, and his honors were made hereditary in his family, even in the female line. He then took command of the squadron for defense against the contemplated French invasion of England and attacked the French flotilla off Boulogne 15 August. He then went back to Lady Hamil¬ ton in Merton Surrey and remained there dur¬ ing the Peace of Amiens. When hostilities recommenced after the Peace of Amiens, Lord Nelson was appointed to command the fleet in the Mediterranean, and for nearly two years was engaged in the blockade of Toulon. But in spite of his vigilance the French fleet got out of port (30 March 1805), and being joined by a Spanish squadron from Cadiz, sailed to the West Indies. The British admiral hastened to give chase and pursued them all the way to the West Indies and back again to Europe, one of the most exciting chases that ever took place in naval history. Villeneuve finally took refuge at Cadiz, but Nelson's object had been accom-

plished, for without his naval forces Napoleon could not carry out his plan of invasion and was now obliged to turn his attention to Aus¬ tria, which had in the meantime declared war. Nelson now had Villeneuve in a trap, but hardly expected him to leave the harbor. The French admiral, however, learned that Napoleon was contemplating relieving him of his com¬ mand because he would not fight. In despair, Villeneuve decided on desperate measures and the French and Spanish fleets sailed forth to meet the dreaded enemy, leaving the harbor 19 October, the French commanded by Ville¬ neuve, the Spaniards by Gravina. On 21 Octo¬ ber they came up with the British squadron off Cape Trafalgar. Then occurred the famous battle of Trafalgar, as desperate an engage¬ ment as ever took place upon the high seas. The engagement ended in a glorious victory for the British, but it cost them the greatest naval hero England ever produced. Nelson was mortally wounded early in the day and died efuring the afternoon. His remains were car¬ ried to England and he was buried with much pomp in Saint Paul's Cathedral 8 Jan. 1806. In 1 rafalgar square in 1849 a fine monument was erected to his memory.

Consult Southey, (Life of Nelson5 (1828); de Forgues, E., (Histoire de Nelson5 (I860); Jeaffreson, J. C., (Lady Hamilton and Lord Nelson5 (1888) ; (The Queen of Naples and Lord Nelson) (1889) ; Laughton,

Matcham, M. E., (The Nelsons of Burnham Thorpe5 (ib., 1911) ; Moorhouse, E. H., kel¬ son in England: A Domestic Chronicle5 (New York 1913).

NELSON, Julius, American biologist : b. Copenhagen, Denmark, 6 March 1858; d. 16 Feb. 1916. He was graduated at the Univer¬ sity of Wisconsin in 1881 and Johns Hop¬ kins University in 1888. He was appointed biologist of the New Jersey State Tuberculous Commission, which post he gave up after a year. From 1889-1916 he was professor of biology at Rutgers College and chief biologist of the New jersey agricultural experiment station. Professor Nelson was identified with the investigation of oyster culture in New Jer¬ sey, co-operating with the chief of the bureau of shell fisheries. _ He formerly was vice-presi¬ dent and consulting adviser of the Lederle Laboratories in New York.

NELSON, Knute, American legislator and public official: b. near Bergen, Norway, 2 Feb. 1843. In 1849 his mother brought him to the United States. He studied at Albion Acad¬ emy, and entered the Union army during the Civil War. He was wounded and captured by the Confederates at Fort Hudson, La. Tn 1867 he was admitted to the bar and in 1867- 69 served in the Wisconsin legislature. In 1871 he removed to Alexandria, Minn., and from 1872 to 1875 was attorney of

Douglas County.

In 1875-78 he was a member of the Minnesota senate and was a presidential elector in 1880. In 1882 he was elected member of Congress and was re-elected in 1884 a*nd 1886. Although a Republican in politics, he did not follow strictly party lines and frequently asserted his inde¬ pendence by voting for measures proposed by members of the Democratic party. From 1886 to 1892 he was engaged in the practice of law and acquired a vast knowledge of the laws re¬ lating to public lands and land cases generally. He became governor of Minnesota in 1892 and was re-elected two years later. His adminis¬ trations were deemed excellent by the people of the State and in 1895 he was sent to the United States Senate in succession to W. D. Wash¬ burn. _ He was elected for a full senatorial term in 1900, and was re-elected in 1906, 1912 and 1918. In the Senate Mr. Nelson intro¬ duced the bill creating the Department of Com¬ merce and Labor.

NELSON, Samuel, American jurist: b. Hebron, N. Y., 10 Nov. 1792; d. Cooperstown, N. Y., 13 Dec. 1873. He was graduated from Middlebury College, Vermont, in 1813, and in 1817 was admitted to the bar. He soon estab¬ lished a reputation which gained for him a large practice and in 1 823—3 1 he was circuit judge. In 1831 he became associate justice of the Supreme Court of New York and in 1837- 45 he was chief justice. He was appointed as¬ sociate justice of the Supreme Court of the United States by President Tyler in 1845 and in the famous Dred Scott case he sustained Chief Justice Taney in his decision that if Con¬ gress had authority to destroy slavery it had also power to establish it. He disapproved the intrusion of military power in what he con¬ sidered civil affairs, but maintained an unques¬ tioned loyalty during the Civil War. He was appointed by President Grant 2. member of the Alabama Arbitration Committee in 1871, and in 1872 he resigned from the bench.

NELSON, Thomas, American patriot: b. Yorktown, Va., 26 Dec. 1738; d. in Hanover County, Va., 4 Jan. 1789. He was the son of William Nelson, governor of Virginia 1770-71, and was educated at Eton and Trinity College, Cambridge, England. Returning to Yorktown in 1761, he was elected to the House of Bur¬ gesses, in which he served for several terms; and he also sat in the provincial conventions, 1774-75-76, in the last of which he introduced the resolution

instructing the Virginia delegates in the Continental Congress to move for a declaration of independence. Later (1775-77) he was himself a delegate to the Continental Congress and was a signer of the Declaration. He resigned on account of impaired health, but was soon (August 1 777) in command of the Virginia State forces, at whose head he re¬ mained until near the close of 1782. At the siege of Yorktown he ordered American gun ners to fire upon his own mansion, in which Cornwallis was believed to have his head¬ quarters. In 1779 he was again a member of Congress, and again resigned 'bv reason of ill health. During the next year on his own secu¬ rity he raised public moneys for Virginia and paid certain military arrearages out of his pri¬ vate funds. In 1781 he became governor of the State, succeeding Thomas Jefferson, but in a few months resigned. His patriotic generos¬

ity had improverished him and he saw his prop¬ erty sold for payment of public debts con¬ tracted on the security he had given, while his own days ended in circumstances of privation.

NELSON, William, American sailor and

soldier : b. Maysville, Ky., 1825 ; d. Louisville, Ky., 29 Sept. 1862. Entering the United States navy in 1840 he became lieutenant in 1855 and at the opening of the Civil War was put in com¬ mand of the gunboats on the Ohio with rank of lieutenant-commander. On leaving the navy, soon after he entered the army, became a briga¬ dier-general of volunteers and commanded the 2d division under Buell at the battle of Shiloh. In a quarrel with the Federal general, Jefferson C. Davis, he was fatally shot at the Galt House in Louisville.

NELSON, Wolfred, Canadian physician: b. Montreal, Canada, 10 July 1792; d. there, 17 Jffrie 1863. He was a surgeon in the British army in the War of 1812, but in 1837 he headed the rebellion decided upon in the meeting of the <(Four Countries.® He was captured and sen¬ tenced to imprisonment for life in the Ber¬ mudas, but the sentence was declared illegal and he was liberated. He lived in the United States in 1838-42, when he returned to Mon¬ treal ; served in Legislative Assembly of Canada in 1844-45, and in 1851 was made inspector of prisons. He was twice chosen mayor of that city. Consult Dent, J. C., (Canadian Portrait Gallery > (1880) and (Canada Since the Union of 184D (Toronto 1881).

NELSON, Canada, city and capital of Kootenay District, British Columbia, at an alti¬ tude of 1,769 feet, on the Kootenay River, of which Kootenay Lake is an expansion, and about 270 miles west of

Vancouver on the Canadian Pacific and Canadian Northern rail¬ ways. It is the centre of the noted Kootenay silver-mining region, and has large stamp-mills and smelters ; gold, copper, lead, zinc and coal are also produced in the vicinity. There are saw mills, machine shoos and boat yards. Steamships ply between Nelson and points on Kootenay Lake. The Doubhokors hold great areas in the district for fruit-growing. Pop. about 7,500.

NELSON, England, a municipal borough of Lancashire, about three miles northeast of Burnley and 30 miles north of Manchester. Among its chief municipal features are a free library, technical school and market hall ; it owns also its water, gas, electric-lighting plants and baths. It is a thriving cotton, worsted and silk manufacturing centre, and coal is worked. Pop. 39,479.

NELSON, a river in Canada, the largest in the province of Manitoba. It is an outlet of Lake Winnipeg; leaving the lake at the north end, it first flows north through several lakes to Split Lake, then northeast to Hudson Bay which it enters through Port Nelson. The volume of water it discharges is very large; it is a deep, swift-flowing stream, with many rapids and cascades along its course of about 425 miles. It is navigable for boats to about 130 miles from its mouth and for about 100 miles from Lake Winnipeg.

NELSON, Life of. The (Life of Nelson* bv Robert Southey, frequently referred to as the most perfect short biography in the lan-

guage, is one of the most famous of English lives. Since its publication in 1813 it has gone through edition after edition, and there is little evdence of decline in its popularity. In the face of these facts general readers need to be warned that the (Life} is great chiefly in the literary sense ; it is not an exhaustive and au¬ thoritative historical biography. Southey did not to any great extent go to original docu¬ ments for his materials. The

The greatness of the work arises from its human interest : it is a life in the truest sense of the word, not a collection of dry facts. Southey was not an expert in naval matters, and fortunately so ; he subordinated technical details and concentrated attention upon the plain narration of the events of Nelson’s life. The sweep of the narrative, rivaled by few books of adventure, is irresistible; one does not wonder that it has

long remained the favorite book of the English school boy. The style is in thorough keeping with the spirit of the nar¬ rative. Southey's style, well known as one of the best, if not the best, of English prose styles, in the (Life of Nelson) is exhibited to greatest advantage. It is simple, pure, limpid — adequate in every way to the task in hand. The danger in writing the life of a man like Nelson is the danger of running into extravagance, of over-emphasizing, of indulging in high-flown rhetoric. This danger Southey successfully avoids. It would be difficult to find a narrative more restrained, more dignified. And the strain with which it closes is a strain in the true Greek manner. The careful student will, of course, supplement the

Waldo H. Dunn.

NELSONITE. A dike rock consisting of ilmenite or rutile and apatite occurring in Nel¬ son County and other localities in Virgina.

NELSONVILLE, Ohio, in Athens County, on the Hocking River and on the Hocking Val¬ ley Railroad, about 60 miles southeast of Co¬ lumbus. It is in the vicinity of bituminous coal fields, and has a large trade in coal. Its chief manufacturing establishments are car-wheel works, mining-implement shops, foundry nd re¬ pair shops. The city owns and operates the Waterworks and electric-light plant. Pop. 6,440.

NELUMBO, a genus of aquatic plants of the family Nymphecacece, containing the East Indian lotus (N. nelumbo) and the Egyptian lotus (N . caerulea). The former serves many useful purposes in the East. The filaments are

there deemed astringent and cooling and are prescribed in burns, piles and menorrhagia ; the seeds are given to prevent vomiting, and to children as diuretics and refrigerants. The large leaves are made into bed sheets for fever patients; a sherbet made from the plant is given as a refrigerant in smallpox, etc. The rhizome, stalks and seeds are eaten by the Hindus, and furnish a preparation known in commerce as ((Chinese arrowroot.® A fibre derived from the stalk is used as a wick for lamps in Hindu temples, the plant being considered sacred. See Lotus.

NEMATHELMINTHES, round or thread worms, a phylum or branch of the Metazoa in which are brought together several groups having in common little more than the general external form and appearance. It is really a group of convenience, as closer study reveals such striking anatomical differences between groups that in fact their internal structure has no fundamental likenesses. In the phylum are ordinarily included three main classes: (1) Nematoda, or true roundworms; (2) Gordiacea or hairworms, and (3) Acanthocephala or proboscis roundworms. To these are often added the small and little known groups of the Gastrotricha and Chaetognatha.

All these display an elongated, approxi¬ mately cylindrical form, and a monotonous ex¬ terior. The body is not divided into segments and not provided with appendages.

The Acanthocephala have a roughened sur¬ face, at times with imperfect rings, and are carrot-shaped rather than strictly cylindrical.

They possess an anterior protrusible proboscis covered with rows of recurved hoods by which the worm attaches itself to the wall of the alimentary canal of the host; for they are ex¬ clusively parasitic and so highly modified for a parasitic existence that no trace of an alimen¬ tary system has been found in any stage of existence. The species are not numerous. They occur chiefly in fishes, though some species are found in reptiles and birds and a few in mammals, one (Gigantorhynchus gigas) being common in the pig. A few rare cases of parasitism in man are on record. The larval stages are passed in insects or worms and they attain the vertebrate or final host when the larval host is eaten. Thus during no part of the life history is the organism free living.

The Gordiacea or hairworms (q.v.) are very uniformly cylindrical with bluntly rounded ends and often slightly colored surface. During early life they are parasitic in the body cavity of insects, chiefly grasshoppers and locusts, whereas the sexually mature adult form is. free living in fresh-water bodies. Thev are often found in large numbers in shallow water along the shores of streams and lakes.

The Nematoda (q.v.) or true roundworms usually taper somewhat toward one or both ends so that they are spindle-shaped rather than cylindrical and at least one end is sharp-pointed. The external surface is colorless, ˆlistening and smooth, though often marked by delicate circu¬ lar striations. Many species are minute and live free in water, mud and soil. To the latter which are found in incredible numbers is ascribed an important role in the formation of fertile soils. The parasitic species are more varied in form and usually larger than the free- living types ; they pass commonly some stage

of their life history in the outer world during the period of transfer from one host to an¬ other. These free living larval stages resemble closely in size and structure the true free living species.

The Gastrotricha are minute free-living forms that occur among plants or in the mud of the shore or bottom. Most species are fresh-water inhabitants though some are found in the sea. They are not abundant or easily found and are relatively little known.

The Chaetognatha or arrow worms are found in enormous numbers in the surface re¬ gions of the open ocean. Their marked trans¬ parency

and delicate structure make them ob¬ jects of great beauty under the microscope. Because of their development and of their apparent metameric structure they” are now more frequently associated with the annelids or near them rather than with the roundworms as formerly.

Henry B. Ward.

NEMATOCYSTS (Greek v?/za, thread, KvoTig, bag, cell), peculiar structures occurring in the Ccelenterata (q.v.) and in a few members of other groups of animals (Turbellaria , Nemertinea, and possibly Protozoa) which serve as weapons of offense and defense. They are formed within specialized epidermal cells known as cnidoblasts. In structure a nemato- cyst is a cell one end of which is drawn out into a long tube, the thread, which is inverted

Two nematocysts; one en¬ tire, the other exploded.

into the body of the cell as the finger of a glove, may be turned into the palm. Connected with the cell is a hair-like structure, the cnido- cil, and when this is touched the nematocyst <(explodes.» The thread is forced out, carrying with it the fluid contents of the cell, which in its physiological action is much like formic acid. This is sufficient to kill small animals, to paralyze those of larger size. Some Ccelen- terates, like the Portuguese man-of-war, have nematocysts which can produce very disagree¬ able effects on man. Once exploded, a nemato¬ cyst cannot in general be used again. New nematocysts are continually being formed. . The layer which gives rise to them is not in all cases ascertained. From their structure and action nematocysts are also known as thread cells, nettle cells and cnidse.

NEMATODA, or true roundworms, a large rather uniform group of animals containing both free >and parasitic species. They are slender and often much attenuated whence the common name of threadworms. In length they vary from a few millimeters to a metre, but the diameter is relatively insignificant in all cases. The body is covered by a smooth, tough cuticula that is transparent and often relatively thick. It is very resistant to fluids so that the preservation of specimens is difficult. The outer surface may be marked by fine circular striae and sometimes carries bristles, hooks, spines or scales, especially near the anterior end, but it is always devoid of appendages and never manifests true segmentation.

A cross section shows that the greater part of the thickness of the body-wall is composed of a massive layer of longitudinal muscles. The

body cavity is spacious but not lined by a peri¬ toneal epithelium. It contains the alimentary and reproductive organs. The muscle layer is interrupted at four points by the so-called lines or areas of which the lateral are most conspicuous. They are thickenings of the hypoderm, elsewhere very thin, and appear usually in surface aspect as narrow bands. In some species these lines contain the minute excretory canals as well as nerve cords and ganglion cells. The nervous system is difficult to determine save for a ring commissure that encircles the esophagus; from it nerves pass anteriad and posteriad. Sense organs are present though few in number and simple in type.

The anterior end is provided with the mouth opening, about which is developed a series of lips and often a complicated buccal capsule. These features vary widely in different groups. The alimentary canal is a straight simple tube, starting with a prominent muscular esophagus that opens into a thin walled digestive mid-eiit, and terminating in a short, simple rectum. The anus is near the posterior end on the ventral surface.

The reproductive system has the form of a long slender coiled tube which is single in the male and double or Y-shaped in the female. In the former it opens into the rectum, form¬ ing a genital cloaca, whereas in the female it has a separate pore which may be in the centre of the body or near either end but has no con¬ nection with the alimentary canal. In both sexes the tube has regions slightly different in calibre and structure, corresponding to the germ producing and storing organs in other animals. Around the female sexual pore are found enlargements and near the male orifice papillae in number and arrangement character¬ istic of the species. In many forms the tail of the male carries cuticular expansions in the form of wings (alae) or a caudal bell with ribs like an umbrella, known as the bursa. In the male also one finds one or two, rarely three, chitinous spicules, needle-shaped copulatory or¬ gans, that often project from the cloaca.

The true nematodes are oviparous, but in some cases the ova are retained in the uterus so long that development is completed and they hatch out before being extruded so that living embryos are discharged from the uterine pore. All stages are known between the two extremes noted. When the eggs undergo development

externally they are provided with a thick re¬ sistant shell, but when they hatch in the uterus the shell is very thin. The development itself is very simple in that there is formed within the shell a minute worm

without complex changes in form. In most parasitic species this larval worm enjoys at least a brief period of free existence before it starts upon the parasitic life, and this time is passed in water or mud. From this habitat it is transferred by chance to a new host. This may be the host of the adult or it may pass first into an intermediate host and not reach the final host until later. In some cases the larvae are discharged into the tissues of the host in which the adult worms live and are transferred to a new host by the agency of a blood-sucking insect like the mos¬ quito, in the body of which the young parasite undergoes certain necessary changes prelim¬ inary to its entrance into a new final host. For instances of the complex developmental condi¬ tions that enter into the life history of particu¬ lar species see the accounts under Filaria, Hookworm, Loa, Trichina.

The Nematoda include species like Angio- stoma nigrovenosuni which lives now free in the mud of a pond and again parasitic in the lung of the frog, as well as consistent free-living species and still others that are highly special¬ ized parasites. Most parasitic species inhabit some part of the alimentary system, but others frequent the lymph or blood system, and there are those that confine themselves to serous cavities and the connective tissues. (See Filaria; Loa). No satisfactory system has yet been worked out for classifying the various types of nematodes. A few distinct groups designated commonly as families are recogniz¬ able, and in them can be placed the most impor¬ tant and best known genera and species. Among these families are the following:

Anguillulidse, small transparent free living forms having an esophagus with one or two bulbs at the posterior end. Male with two equal spicules. Female with double uteri, short ovaries reflexed, and few large eggs. The best known -forms are the vinegar eel and the paste eel, which are/ abundant and easily obtained.

Strongyloidea, male has broad, well de¬ veloped bursa with radial ribs. Buccal capsule usually well developed in both sexes, spherical, with serrate or dentate margin. This group contains a large number of dangerous parasites, among which the hookworms (q.v.) may be cited as representative both in general struc¬ ture and in parasitic habits.

Filaroidea, very long slender forms with sim¬ ple esophagus and without conspicuous lip or true buccal capsule. The bursa is replaced by caudal alae or is entirely wanting. The vulva is far anteriad and the eggs hatch in the uterus, so that living young are produced. The Guinea worm, Dracunculus medinensis, the African eyeworm (Loa, q.v.) and the blood filariae are important human parasites in this

group.

Spiruroidea, much like the Filaroidea save that the esophagus is double and the oral mar¬ gin often has two conspicuous lips. The species are parasitic in lower vertebrates and occur only rarely in mammals.

Ascaroidea, stout bodied, opaque forms of some size, with three lips around the oral open¬ ing. One lip is dorsal and two ventral. These

forms are oviparous. Here belong the stomach worm, Ascaris lumbricoides , and the pin worm, Oxyurias vermicularis, cosmopolitan human parasites known from remote antiquity; and many other species from other hosts.

Trichinellidse, with very long slender capil¬ lary, non-muscular esophagus, and intensive parasitic habit. Of this small group the trichina (q.v.) is a typical representative. The whip¬ worm, Trichuris trichiura, is the commonest of human parasitic worms and is spread over the entire earth. It is more abundant in warmer regions where nearly every individual is infested. (See Nemathelminthes) . Con¬ sult Braun, M., (Die tierischen Parasiten des Menschen5 (Wurzburg 1915) ; Fantham, Theo¬ bald and Stephens, (The Animal Parasites of Man5 (New York 1916) ; Geodoelst, L., Synop¬ sis de parasitologie5 (Bruxelles 1911) ; Ward and Whipple, (Fresh Water Biology) (New York 1918).

Henry B. Ward.

NEMATOGNATHI, a group of fishes, the cat fish (q.v.).

NEMATOPHYCUS, a genus of fossil brown algae, preserved in the early Palaeozoic rocks of the eastern United States and Canada, the stems of which were often several inches in diameter. Specimens hˆve also been found in Europe.

NEMCOVA, nyem’tso-va, Bozena (((Bar- bara Pankl))), Czech poet: b. Vienna, 4 Feb. 1820; d. Prague, 21 Jan. 1862. Her reputation was made largely by the collections, (National Tales and Legends) (1845-46), and Slovak Tales and Legends5 (1858). Her Sebrane Spisy5 ((Collected Works5) appeared at Prague (with a biographical sketch by Podlipska). One of the best of her original stories from common life was (Babicka5 which was pub¬ lished in a German version as (Die Gross- mutter5 in Reclam’s (Universalbibliothek.5 It was translated into English by Gregor in 1891. Consult Jakubec, (Geschichte der cechischen Litteratur5 (Leipzig 1907).

NEMEA, ne’me-a, Greece, a classic valley of Argolis, the site now marked by the village of Nemea, due north of Argos, on the railroad to the Gulf of Corinth. The vallev from north to south is from two to three miles long and more than half a mile broad. It possessed a sacred grove, with a magnificent temple to Zeus, and here biennially were held the celebrated Nemean Games (q.v.), one of the four great national athletic and musical festivals of the Greeks. Consult Gardiner, E. N., (Greek

Athletic Sports and Festivals5 (London 1910).

NEMEAN (ne’me-an or ne-me’an) GAMES, in ancient Greece, public games or festivals celebrated at Nemea (q.v.). The Argives were the judges at these games, which comprised boxing and athletic contests, as well as chariot- races. The conquerors were crowned with olive.

NEMERTINEA, a class of Platyhelminthes (q.v.) of which a few are terrestrial and a few occur in fresh water, but the great majority are marine. As a rule they have a flattened or rounded body without any processes and cov¬ ered on the outside with cilia. The mouth is on the ventral surface at the anterior end and the

vent at the opposite end of the body. The alimentary canal is straight ; in some with en¬ largements on either side at regular intervals. Above the alimentary canal is a peculiar pro¬ boscis which can be everted through an opening above the mouth, by means of which the animal captures its prey, which consists of other animals, largely of worms. There is no body-cavity, the body being solid from the intestine to the outer wall, except for the small tubes of the blood vessels and excretory organs. The sense-organs are the usually present eyes, which may number two or more, what appears to be an auditory organ, and also, in many, grooves upon the sides of the head which are usually regarded as organs of smell. The nervous system consists of a “brain® around the anterior part of the alimentary canal, from which three nerve cords (two lateral and one between the digestive tract and the proboscis sheath) run backward through the body. Some nemertines develop directly while others go through a complicated metamorphosis, assuming first the so-called “pilidium® form (see Larva), and later cast¬ ing of part of the body. In most cases the two sexes are in different individuals. The excretory system is much like that of the other Platyhelminthes in the possession of flame- cells.

Most nemertines are small, but some reach respectable dimensions. One species on the New England coast can stretch itself to a length of 15 feet or retract itself to two. The largest species (Linens longissimus) may extend to 90 feet.

NEMESIANUS, ne-me-si-a'nus, Marcus Aurelius Olympius, Latin poet of the close of the 3d century b.c., probably a Carthaginian. He won much fame by his verse at the court of Numerianus, who alone surpassed him in com¬ position; wrote on fishing ((Halieutica)), sail¬ ing ONauticaO and hunting ('CynegeticaO. only a part of the last poem being extant; and is supposed to be the author of four pastoral poems found in manuscripts, together with Cal- purnius' eclogues, and hence formerly attributed to Calpurnius. The peculiar movement of these pastorals has suggested the theory that the (Pervigilium Veneris) is by Nemesianus. All his extant works are edited by Bahrens (1879) ; the (Eclogas) by Schenkl (1885); and English version of the latter by Scott appeared in 1891. Consult Teuffel, W. S., (Geschichte der romischen Litteratur) (Vol. Ill, 6th ed., Leipzig 1913).

NEMESIS, in Greek mythology, the daugh¬ ter of Erebus and Night. Other accounts make her the daugther of Zeus and Necessity, or of Ocean and Night. She is goddess of retribu¬ tion, the tamer of the passions, the avenger, the enemy of pride and haughtiness; and she watches over the observance of the honors due to the dead, on which account a yearly festival in memory of the departed was called by the Greek Nemesia. In Rome she was worshipped by victorious generals and gladiators. Nemesis is represented under the figure of a majestic female clothed in a tunic. With the right hand she grasps a part of her garments over her breasts; in her left hand she holds a cup. On coins she appears drawn in a car by dragons, sometimes wearing a mural crown and rarely winged. The great number of coins and gems on which she is found proves her worship to

have been extensive and popular. The seat of her worship was at Smyrna in Iona, and at Rhamnus in Attica, where there were two temples, one containing the statue of the god¬ dess by Agoracritos, the pupil of Phidias, which is now in the British Museum. Consult More, P. E., (Nemesis or the Divine Envy> (in

NEMESIUS, ne-me'si-us, Greek philosopher : b. in the first half of the 4th century a.d. He became bishop of Emesa in Syria, and has been remembered chiefly through his treatise on (The Nature of Man,* which declares the freedom of the will, the supremacy of the spiritual powers, the indestructibility of matter. The book is thought to show some anticipations of the theory of the circulation of the blood. It has

been translated into various modern languages. It was edited by Matthaei (Halle 1802). Consult Christ-Schmid,

1913).

NEMI, na'me, Italy, a classic lake about 18 miles south of Rome, filling the crater of an extinct volcano, the sides of which are formed partly of basalt and partly of consolidated scoriae. The lake is 1,022 feet above the level of the sea and it has a circuit of five miles. Owing to its beauty, it is accounted the gem of the Alban Mountains and was celebrated by the Latin poets under the name of Lacus Nemorensis or Speculum Dianae — Diana's Mirror. On the northeast shore near the village of Nemi, a famous temple of Diana was situated, of which modern excavations have yielded interesting remains ; remnants of rafts or vessels used in the festival services of Diana and dating from the reign of Caligula, were also recovered from the bed of the lake in 1895. Consult (Notizie degli ScavP (Rome 1895-96) ; Frazer, J. Y., (The Golden Bough* (parts 1-3, 3d ed., New York 1911).

NEMOURS, ne-moor, Due de (Gaston de

Foix). See Foix, Gaston de.

NEMOURS, Louis Charles Philippe Ra¬ phael d'Orleans, Duke of, French soldier, second son of King Louis Philippe : b. Paris, 25 Oct. 1814; d. Versailles, 26 June 1896. He en¬ tered the army in 1826; gained little by the Revolution of 1830, since he had been a favorite with Charles X, who intended to marry him to the daughter of the Due de Berry; refused the crown of Belgium in 1831 ; served in the Bel¬ gian campaigns and in Algiers, where his bravery won him the grade of lieutenant-general in 183/ ; became heir apparent by the death of his brother, the Duke of Orleans, in 1842 ; but was so unpopular that he found it wise not to press his claims in 1848, but to remove to Eng¬ land. He returned to France in 1870, re-entered the army, from whose lists his name was struck by the anti-royalist measures of 1886, and spent his last years in retirement.

NEMOURS, France, a town in the depart¬ ment of Seine-et-Marne, 12 miles south of Fon¬ tainebleau on the Paris, Lyon, Mediterranee Railroad and the Canal du Loing. It contains churches dating from the 13th, 1 5th and 16th

I

centuries and a fine bridge erected in 1803. The old castle of Nemours, built in the 12th cen¬ tury, is memorable on account of the edict re¬ voking the privileges of the Huguenots, signed here by Henry III, 7 July 1585. Pop. about

5,000.

Nemours, with the surrounding territory, was erected into a duchy in favor of the Count of Evreux in 1404. In 1507 Louis XII be¬ stowed the duchy upon his nephew, Gaston de Foix, who was killed at the battle of Ravenna in 1512. From 1528 to 1689 the duchy was pos¬ sessed by the house o»f Savoy. In 1689 it was purchased by Louis XIV, who bestowed it upon the Orleans family. King Louis Philippe gave his second son the title of Duke of Nemours, and the titular dignity is still borne by a branch of the Orleans family. Pop. 4,681.

NENA (na'na) SAHIB. See Nana Sahib.

NENNIUS, nen'i-us, British historian: b. in the latter part of the 8th century. He is said to have lived in Wales and to have been the author of the chronicle, (Historia BritonumP or (Eulo- gium BritanniaeP reaching down to the 8th cen¬ tury. The manuscript, written in Latin, is in the British Museum and the work has been re¬ published several times. The best editions are those of J. Stevenson (1838) and Mommsen, in (Monumenta Germaniae Historical etc. (Vol. XIII, 1898). An English translation by W. Gunn was published in 1819. Ellis speaks of the work as that of ((a credulous compiler, though, from the antiquity of his materials, val¬ uable to an inquisitive historian.® His work gives the mythical account of the origin of the Britons, the Roman occupation, the settlement of the Saxons and closes with the 12 victorious battles of King Arthur. The writer has pre¬ served valuable fragments of earlier treatises which have been lost. The historical value of his work is not great, but in mythical and leg¬ endary matters it has a recognized importance. Consult Zimmer, H., (Nennius Vindicatus) (1893) ; Gross, C., (Sources and Literature of English History) (New York 1900).

NEO-DARWINISM. See Weismannism.

NEO-HEGELIANISM, the doctrine of a modern school of philosophy, which has repre¬ sentatives among English, Scottish and Amer¬ ican thinkers. They profess their belief in an eternal consciousness, of which the universe is the object; basing their conviction on the the¬

ory that in the world of thought consciousness and object are correlatives, and mutually im¬ plicated; and that the existence of the physical universe was prior to that of finite conscious¬ ness, and this latter is in some way correlated with physiological organisms. The most prom¬ inent Neo-Hegelian in England was Green (see Green, Thomas Hill), who may be said to be the founder, of English Neo-Hegelianism. Other prominent British Neo-Hegelians are E. Caird, Bosanquet, Bradley and Royce. See Hegel, Georg Wilhelm Friedrich.

NEO-KANTIANISM, the teaching of those who accept Kant's theory of knowledge, but re¬ fuse to acknowledge the doctrine of practical reason as the best guide in working out a met¬ aphysic. Among this school may be men¬ tioned F. A. Lange, P. Natorp and H. Cohen. See Kant, Immanuel. Consult any history of modern philosophy.

NEO-LAMARCKISM, the doctrine held by a school of modern naturalists, mainly American, that the results of organic evolution are due mainly to the principles and factors for¬ mulated by Lamarck (q.v.) and expounded in the article Lamarckism (q.v.), and not mainly to natural selection as asserted by the Darwin¬ ians. The modification and expansion of La¬ marck's theories, due to enlarged knowledge, constitute Neo-Lamarckism — a term first ap¬ plied by Prof. A. S. Packard, who with E. D. Cope and Alpheus Hyatt was among its fore¬ most exponents.

NEO-PLATONISM, the revival and mys¬ tical transformation of the Platonic philosophy, mainly through the speculations of non-Hel¬ lenic thinkers. The word has, however, two meanings. In the first and historic sense it de¬ notes the metaphysical theories which prevailed during the whole of the third and last period of Greek philosophy; and these theories and their several schools are usually spoken of as three in number: (1) The Jewish-Greek phi¬ losophy; (2) Neo-Pythagoreanism (q.v.) and (3) Neo-Platonism proper. In its general sense, Neo-Platonism was a syncretism of Ori¬ entalism, Judaism and Hellenism. The favor¬ ite subjects of discussion among Neo-Platon-ists were what they styled the dualistic oppo¬ sition of the divine amd the earthly; God as an abstract conception ; contempt of the world of the senses; various theories of intermediate beings, half human, half divine ; asceticism and the nature of enthusiasm as expounded in the so-called writings of Hermes Trismegistus (q.v.) and by the Christian Gnostics (q.v.). Near the Neo-Platonists stand Philo (q.v.), Aristobulus, the Essenes and Therapeutse (qq.v.).

Neo-Platonism in a narrower sense is the philosophy which originated with Plotinus and his school, and not with Ammonius Saccas (q.v.) as

an ancient tradition relates. Neo-Platonism was a last attempt made by Alexandrian think¬ ers to explain the dualism of appearance and reality. This attempt was made by a despair¬ ing leap beyond nature and reason; a solution was sought outside rationality, by a sort of in¬ tellectual suicide, and the attempts ended in the dreams of passive mysticism. It was taught that if we lose self-conscious thinking, the dis¬ tinction between subject and object disappears, and if we reach ecstasy, we attain (

Its historical movement has three stages. In its first or Roman stage Neo-Platonism was es¬ sentially a <(scientific® theory. Its main char¬ acteristic was the emphasis laid upon knowl¬ edge, the object of knowledge being God, and the aim of philosophy to conceive the divine essence immediately and with the innermost activity of the soul. In the second stage of Neo-Platonistic development appeared Iambli- chus' systematic theology of polytheism, which distinguished what is usually called the Syrian phase of Neo-Platonism. This theology stood in strong opposition to Christianity. In its

third stage, Neo-Platonism lost its identity and under this name we are presented with a mere scholastic recapitulation, in a dialectic way, of the whole of classical philosophy. This schol¬ astic and historic Neo-Platonism is represented by Proclus (q.v.) who reigned philosophically supreme at Athens until his school was closed by that edict of Emperor Justinian (q.v.) in 529 which was ((the official certification of the death of ancient philosophy."0 In almost all its stages Neo-Platonism was characterized by theurgy, magic and sorcery of all kinds, and Neo-Platonist teachers did not hesitate to call themselves hierophants and to make money by divination. In attempting to repair the rav¬ ages wrought in the Greek mind by a despair¬ ing Scepticism (q.v.) Plotinus propounded the theory that knowledge transcended reason; that the absolutely true could be comprehended immediately and intuitionally, namely, by ec¬ stasy. Such inner knowing was the beholding of ((the One® in itself; and a resolving of self into the absolute. The subject could not, it was taught, master the absolute by objective knowledge or through the medium of dialectic.

The Godhead, (

and reflection. The strongest incentive and most potent force in the elevation of human nature is love of the beautiful, the Platonic epug.

Neo-Platonism, together with Neo-Pytha- goreanism, which had preceded it, represents an effort of paganism toward reform and recon¬ struction in order to meet the supernaturalism, monotheism and universalism of the victorious Christianity which was everywhere pushing hard upon pagan thought and religion. In Iam- blichus (((the divine® or <(the famous hero® as Emperor Julian (q.v.) called him) Neo-Pla¬ tonism finds expressed *ts religion, and ex¬ pressed not so much according to Plato as ac¬ cording to Pythagoras (q.v.). Iamblichus cre¬ ated a fantastic pantheon in order to bring the entire world of gods into a system, in which he co-ordinated all cults, excluding Christian¬ ity, which was feared as a rival ; but this eru¬ dite religion failed to meet <(the desire of the nations® or ((the spirit of the times.® ftAny old \yoman of the Christians,® said Augustine, sar¬ castically, (

Neo-Platonism, as represented by Proclus, made a last supreme effort to retain an authori¬ tative position in the world of thought. Pro¬ clus attempted to systematize the entire histori¬ cal content of Greek philosophical thought, and place it upon a coherent and logical basis, but the effort was fruitless. A few feeble echoes of this teaching are perceptible in the writings of some of the Church Fathers, as for instance, Clement and Origen. Subsequent phases of philosophic speculation bear sometimes the im¬ print of Neo-Platonism. Attempts were made by Ficinus (1433-99), a celebrated Italian scholar, by Pico della Mirandola and other Florentines for its restoration. The English ((Halle 1864-67) ; and the larger Histories of Philos¬ ophy, such as those of Ueberweg, Wendelband and Zeller.

C. H. A. Bjerregaard, New York Public Library.

NEO-PYTHAGOREANISM, a Hellenistic school of philosophy which, after the custom of the times, attached to itself the name of Pythagoras, together with his numerical sym¬ bolism, although it drew much more largely from Platonic sources. It was founded in the 1st century b.c. by Nigidius Figulus, a Roman magistrate and its chief exponent was Appol- lonius of Tyana (q.v.), whose philosophical teachings took the form of a controversy with the Neo-Platonists. Neo-Pythagoreanism cou¬ pled the Platonic belief in the existence of real ideas with the theory that these are mental in nature — that is, that they are ideas, in the modern sensd, in the mind of God. The con¬ sequent dualism between a God purely mental in nature and an absolutely non-mental matter received such an ethical trend as to be strongly suggestive of an Oriental influence, though precedents for such a view may be found among the earlier Greek thinkers and indeed in the works of Plato himself. At any rate, many ideas even

more strictly Oriental in char-

acter were incorporated into Neo-Pythagorean- lsm. These were conjoined with a strong as- cetic trend, based apparently on the ethical dualism, yet reminiscent of the Stoic-Cynic tradition. Consult Zeller, (Die Philosophic der Griechen) (Leipzig 1880-81) ; Vacherot, (His- toire critique de l'Ecole d'Alexandrie (Paris

1846-51).

NEOCENE, in geology , a term used by the United States Geological Survey to include what Lyell called the Miocene and Pliocene periods. The word means ((new (or late) re¬ cent, and is contrasted with Eocene, «dawn (or early) recent.® See Tertiary.

NEOCOMIAN (Lat. N eocomum, Neu- chatel), in geology, a term applied to the lowest marine stages of the Cretaceous system, be¬ cause of its typical occurrence at Neuchatel in Switzerland. There and in southern France this formation, consisting of limestones and marls, is as much as 1,600 feet thick. The term corresponds to the English Wealden and lower greensand, and to the German Hils ; is little used in America, and in France is used broadly and strictly, Neocomian in the wider sense in¬ cluding the stricter Neocomian (made up of Hauterivian and Valanginian) , as well as Bar- remian and Aptian. Consult Pavlow, Quarterly Journal London Geological Society (Vol. LIII

1896).

NEODYMIUM, in chemistry, an element whose existence as a constituent of didymium (q.v.) was recognized by Auer von Welsbach. It occurs in cerite. It has the chemical symbol Nd and an atomic weight of 144.3, and is dis¬ tinguished from other constituents of di¬ dymium by yielding rose-colored salts. Its oxide has the formula Nd203. Pure neody¬ mium salts were first obtained by Demar- ?ay in 1898. Metallic neodymium melts at 840° C., has a specific gravity of 6.9, and decom¬ poses water slowly when cold and rapidly at the boiling point. Its properties are much like those of cerium (q.v.). Consult Kellermann, (Die Ceritmetalle und ihre prophore Legierun- gen) (Halle 1912).

NEOGENE (Greek, ˆlate-born,® <(late®), in geology, a term used by

Continental geolo¬ gists to include the Lyellian Pliocene and Mio¬ cene, that is corresponding with Neocene (q.v.), as used by the United States Geological Sur¬ vey.

NEOHIPPARION, a genus of primitive horses found fossil in the Upper Miocene and Lower Pliocene of the western United States. Complete skeletons have been obtained, and show this horse to have been a small pony with slender deerlike legs and three functional toes. It was probably the earliest kind of horse adapted to a grazing life in a desert region, and appears to have been *ery numer¬ ous and represented by two or more species.

NEOLITHIC PERIOD, The. The Neo¬ lithic (Greek neos , recent, and lithos, stone) Period was so named because in it man ground some of his stone tools, especially the celt or ax, whereas, Paleolithic man made only chipped implements. More important differences than these, however, distinguish the cultures of the two periods. Paleolithic man was a hunter and knew nothing of agriculture; he had no domes¬ ticated animals, not even a dog; he had not

learned to make pottery and, consequently, cooking as an art had not been acquired. Early in the Neolithic Period, on the other hand, man had domesticated the dog, cow, sheep, pig, horse and goat; he planted and harvested grains of various sorts; he had learned to spin and weave and make pottery.

Transition between the Paleolithic and Neolithic. — The meaning of the rather sharp break between the Paleolithic and Neolithic has given rise to much discussion. With the evi¬ dence now at hand one can do little more than speculate on the reasons for the seemingly sud¬ den change in Europe from the old to the new. As the climate of Europe changed and the ani¬ mals which Paleolithic man hunted disappeared, and as the population became too dense for the supply of food obtained by the chase, other means of securing food necessarily would be sought. Edible seeds would be gathered and stored and some of these, scattered by chance, would grow, and methods of cultivating them would speedily be devised. The domestication of animals was probably brought about by rear¬ ing the captured young of wild animals such as the sheep and goat, some of which were kept until grown and offspring born. The new re¬ quirements of a more sedentary life which would result from this readjustment would lead to the invention of ;new tools, or the better finish of old ones, and it is not surprising that Neolithic man early learned to grind and polish the edges of his stone axes. There is little evidence that the higher civilization of the .Neolithic was developed in Europe, but rather it is

probable that tribes of Neolithic people who had made progress in some other continent migrated to Europe and either absorbed the Paleolithic, inhabitants or destroyed them. If the Paleolithic inhabitants were absorbed peac- ably by. the new immigrants, the amalgamated population would necessarily adopt the mode of living best suited to the altered conditions of the environment, i.e., Neolithic methods. ((The gradual disappearance of the reindeer and other mammalia would henceforth necessitate a com¬ plete change in their manner of living. The nomadic hunter would soon sink into the herds¬ man, and the mechanic would readily lay aside his roughly chipped tools for those with finely ground and polished edges. On the other hand, should a few cave shelters in one or two favorite localities continue to be inhabited after the arrival of the Neolithic tribes on the scene there might be few traces of amalgamation to be found.® (Munro). It is evident that the newcomers would learn something from the inhabitants among whom they settled and that certain of their tools, and methods of making tools would . be acquired and retained in the new civilization.

Some authorities hold that the last phase of the Paleolithic, the Azilian (see Paleolithic Period), nearly bridges the gap between the two periods. If the inhabitants of Maglemose (Great Peat Bog) on the Island of Zeeland, Denmark, were Paleolithic people the gap is even more nearly filled. This station is a peat bog several hundred yards from the old shore of a lake which, on geological grounds as well as on the evidence of the flora and fauna, is shown to be older than the kitchen middens or shell heaps, which are generally considered to

be the oldest works of Neolithic man. One remarkable feature of the Maglemose remains is that the huts of the people were built on a huge raft or floating island. Many chipped flint implements have been found but none showing any trace of polish. No pottery has been discovered but many objects made of bone and staghorn, such as daggers, fish-hooks and harpoons.

Kitchen Middens or Shell Heaps.— It is

generally agreed that the shell refuse heaps, so well preserved in Denmark, were made by man near the beginning of Neolithic times. Some of the kitchen middens are as much as 10 feet thick, more than 900 feet long, and from 100 to 200 feet wide. They are composed

almost wholly of shells, with a few bones of fishes, birds and mammals, some fragments of pottery and a few flint implements. Everything in the heaps was brought to the spot by man. The most abundant species of shell-fish in the mounds are the oyster, the cockle (Cardium edule), the mussel (Mitilus edulis), and the periwinkle (Littorina littorea). Of these shell fish the oyster has disappeared from the neigh¬ boring waters, and the cockle and periwinkle are much reduced in size. Among the bones of wild birds which occur are those of the duck, goose and wild swan. The fact that the wild swan visits Denmark only in the winter is probably evidence that these ancient Neolithic fishermen did not migrate from one part of the country to the other at different seasons.

The flint implements of the kitchen middens consist of long flakes, 8-13 inches in length, some of which were used for knives; triangular axes, none of which are ground on the edges, awls and the so-called pick. Bone and horn tools, and, for the first time in man s prehis¬ tory, fragments of pottery also occur. The making of pottery was a momentous discovery for primitive man, since by its use he was en¬ abled to cook a greater variety of foods and to render others more digestible and palatable. It is to be noted that polished flints are absent in these early Neolithic deposits. Sites of huts inland have also yielded potsherds and unpol¬ ished stone implements but no polished flints. The similarity of some of the tools to those of the kitchen middens indicates that these re¬ mains are of the same age. The term Cam- pignian has been given to these remains, which are probably contemporaneous with the Kitchen Middens.

Lake Dwellings. — During the greater part of the Neolithic Period huts erected on piles driven into the mud of the shallow waters of the larger lakes of Switzerland were inhabited by man. The lake villages were connected with the shores by draw bridges and the inhabitants used large canoes dug from trunks of big oak trees. Lake dwellings were more common in Switzerland than in other parts of Europe, but Neolithic man also built them in Den¬ mark, Austria, and other countries. Lake dwellings were also used in Europe by men of the Bronze Age, and even at the present time houses built on piles driven into the mud of lakes and other bodies of water are occupied by the natives on the estuaries of the Amazon and Orinoco rivers by natives of New Guinea, Central Africa, Borneo and elsewhere.

A great deal is known of the life of the

Neolithic lake dwellers because of the excel¬ lent preservation of their implements and household utensils in the mud and peat of the lake

bottoms, where they fell after the de¬ struction of the dwellings by fire or where they were lost or thrown from the platforms upon which the wattled huts were built. Stone axes with wood or staghorn handles, arrow¬ heads, barbed harpoons of staghorn, fish hooks and needles of bone, and wooden utensils such as tubs, spoons, and plates have been unearthed. Cloth was made of wool and flax, and fish nets and fish lines of flax.

The pottery shows that the lake dwellers made utensils of clay of sufficiently good quality to withstand fire as is indicated by the soot which still coats the bottoms of some of them.

The lake dwellers cultivated wheat, barley, millet, and flax as is shown by the presence of these cereals in the mud among the piles. Loaves or cakes of unleaven bread made from wheat and millet have been discovered, and show the approach to a modern mode of life. Stable refuse on the lake bottoms beneath the ancient huts indicates that horses, sheep and cattle were domesticated and were stabled in the lake dwellings. The advantage of lake dwellings to Neolithic man consisted largely in the protection they afforded to their possessors because of their easily defended positions.

Burials. — The Neolithic people honored some of their dead by burying them with their most precious possessions under mounds of earth or stone, called barrows or tumuli. In Great Britain some of the barrows are 200-400 feet long and 60-80 feet wide and generally contain one or more chambers constructed of huge slabs of stone. In Great Britain there are two forms of the barrow, the long barrows which contain skeletons with long-headed or dolichocephalic skulls, and the round barrows which contain short-headed or brachycephalic skulls. Some barrows contain a single skeleton whereas others were family or tribal ceme¬ teries. In Denmark a single tumulus contained 70 burnt interments. Tumuli were also erected in the Bronze Age and many beautiful bronze implements have been discovered in them.

Dolmens are structures formed by great stone slabs set on edge and capped with one or more slabs forming a table-like structure. The size of some of these roof stones and the diffi¬ culty of placing them in position is realized when it is known that some of them weigh as much as 40 tons. Some of the dolmens were formerly covered with earth and stones which have since been removed either by man or by the natural process of erosion.

Classification.— An entirely satisfactory classification of the Neolithic in Europe has not yet been made, but that of Montelius for Sweden

seems to be well established. It is based on the variations in form of the chipped and polished ax heads or celts which were gradually evolved or introduced and upon geo¬ logical evidence. Beginning with the most re¬ cent deposits the classification is as follows :

Stage IV (Youngest). Axes of the thick or broad-headed type with relatively flat sides and nearly square cross-section at about the middle. Axes with shaft holes. Exquisitely chipped, broad-bladed, flint daggers with a narrower portion for a handle. In some places the burials were in stone cists.

ˆxes at > out the same as in Stage IV. Narrow-bladed flint daggers of beautiful workmanship. Graves with covered passages.

Stage II. Axes of the small or thin-necked type, almost rectangular in form and with strongly arched sides and square angles. Age of Dolmens.

A > r-?!age 1 (Next to Campignian and Kitchen Middens in age). Axes of the pointed-necked type, either rough hewn or polished. Triangu¬ lar in cross-section.

Climate and Geography. — The climate of Switzerland during Neolithic times seems to have been nearly, if not quite, as it is now as is shown by the seeds and fruits which have been preserved in the mud and peat under the lake dwellings. The wild species do not differ from similar species in the same region to-day and the cultivated grains are unlike those now grown in Switzerland in size only. The larger size of our cultivated cereals is doubtless the result of many years of selection.

The physical geography of Europe during Neolithic times did not differ greatly from that of to-day. Great Britain was separated from Europe by the English Channel as it is now. The fact that the cockles, mussels and peri¬ winkles of the shell heaps of Denmark are of full ocean size whereas those of the present Baltic are only about one-third the normal size is proof that the water has been freshened since then and indicates that the connection be¬ tween that sea and the ocean has been de¬ creased in width or depth by the elevation of the bottom and land near its entrance to the Atlantic. Raised beaches also prove that the coast of _ southern Norway has been raised about 225 feet since the beginning of the Neolithic Period. As one passes south along

the coast of Denmark the Kitchen Middens gradually approach the sea-level until in southern Jutland and Schleswig-Holstein they disappear altogether and are not found again until the coast of Belgium is reached. It is probable that men made Kitchen Middens along the shores south of Denmark, but that a lower¬ ing of the land has caused them to be covered with water. This belief is confirmed by the dredging of implements of Campignian Age near Koldin at a depth of 10 or 12 feet. Not¬ withstanding these minor differences the climate and geography of Europe during the Neolithic was very similar to those of the present.

Bibliography.— Avebury, Prehistoric Times) (London 1900) ; Dechelette, J., (Manuel

d'archeologie prehistorique celtique et gallo- romaine) (Paris 1908) ; Evans, Sir J., (Ancient Stone Implements of Great Britain> (2d ed., London 1897) ; Johnson, J. P., Stone Imple¬ ments of South Africa) (2d .ed., New York 1908) ; Masso, A., Pawn of Mediterranean Civilization (tr. by M. C. Harrison, New York 1911) ; Peet, T. E., (Stone and Bronze Ages in Italy and Sicily) (Oxford 1909) ; Osborn, H. F., (Men of the Old Stone Age> (New York 1916) ; Obermaier, Hugo, Per Mensch der VorzeiC (pt. 2 Berlin 1912) ; Classen, K., Pie Volker Europus zur jungern SteinzeiD (Stutt¬ gart 1912) ; Munro, R., Palaeolithic man and Terramara Settlements in Europe) (New York 1912).

Herdman F. Cleland, Professor of Geology, Williams College.

NEON. See Liquefied and Compressed Gases.

NEOPHYTE (Greek, ((newly planted or grafted on3?), originally applied to those newly initiated into the Eleusinian or other ancient Greek mysteries, of whom Plato says ((there are many wand bearers (the wand being the badge of the initiated) but few mystics.® The catechumens who had been just baptized were so styled in the early Church. These newly made Christians were considered less likely to stand firm against paganism than their older and more experienced brethren. Hence the term was slightly tinged with disparagement. Saint Paul forbade the ordination of the neophyte or novice (1 Tim. iii, 6), and the 3d Council of Arles (524) decreed that a year's probation was necessary for candidates for holy orders among the newly baptized. Yet Ambrose was elected bishop of Milan (374) when he was but a catechumen and was conse¬ crated soon after his baptism. Newly con¬ verted pagans or disbelievers are still styled neophytes t>y Roman Catholic missionaries and Gregory XIII

established a college at Rome (1622), the Propaganda, in which they might be educated and trained to preach to and con¬ vert the people of their own land.

NEOPLASMS. See Tumor.

NEOPTOLEMUS, ne-op'tol'e -mus (also called Pyrrhus), in Greek legend, the son of Achilles and Deidamia. Taken to Troy by Odysseus, he was one of the band who cap¬ tured the city by means of the wooden horse. He slew Priam and took to himself Andro¬ mache, the wife of Elector. He afterward went to Epirus, where he married Hermione, in con¬ sequence of which Orestes, her former lover, killed him at Delphi.

NEORNITHES, ne-or'ni-thez, or EUOR- NITHES, a sub-class of the class Aves (birds) embracing all known birds, fossil or recent, since the Jurassic Period, as distinguished from another sub-class Archceornithes, which con¬ tains, so far as yet known, only the archaeop¬ teryx (q.v.). The sub-class Neornvthes may be divided into three sub-divisions, namely, (1) Ratitce ; (2) Odontolcce ; (3) Carinatce.

NEOSHO, ne-o'sho, Mo., city, county-seat of Newton County, on the Kansas City South¬ ern, the Missouri and Northern Arkansas and the Saint Louis and San Francisco railroads, about 170 miles southwest of Jefferson City and 140 miles south by east of Kansas City. It was settled in 1839; in 1868 was incorporated as a town and received its city charter in 1878. It is near the lead and zinc mining region of Missouri. The chief manufacturing establish¬ ments are machine-shops, flour mills, foundry, agricultural implement works, repair shops and furniture factory. There is located here a gov¬ ernment fish hatchery which occupies 34 ponds. It is the seat of the Scarritt Collegiate Institute (M. E. Soutfi) and has a high school, elemen¬ tary schools and a public school library. The city owns and operates the water-supply sys¬ tem. Pop. 3,968.

NEOSHO, a river which has its rise in Morris County, Kan., in the central part of the State. Some of the small streams which form the head-waters have their sources near short streams that flow, north into the Kansas River.

The Neosho flows south by east and enters the Indian Territory at the

northeast corner. It continues an irregular course, mainly southeast, for a distance of about 40 miles, then turns southwest, which course is continued to its junction with the Arkansas River at Fort Gib¬ son. Its whole length is about 400 miles. Some of the cities on its banks are Council Grove, Emporia, Burlington, Iola, Humboldt, Erie and Oswego, all in Kansas.

NEOTENY. See Pˆedagenensis.

NEOTROPICAL REGION, or NEO- GZEA, one of the primary faunistic divisions in the zoogeographical scheme of Wallace and Sclater, embracing South America, Central America, as far north as the highlands of northern Mexico and the West India Islands.

It is perhaps the most sharply defined and sepa¬ rable of all the ˆregions,® but shows some ex¬ traordinary affinities with Australasia; hence some students of the distribution of animals have united it with those parts of the world in a still more comprehensive ˆprovince,® called the Notogaeic, in contrast with the Northern hemisphere as the Holarctic or Arctogaean prov¬ ince. It is characterized by the broad-no'sed monkeys, the vampire-bats, the many peculiar edentates, the absence of antelopes, sheep, goats, horses and oxen, the presence of a fairly large marsupial fauna, including deprotodont forms, several peculiar families of birds, the American ostrich, the dipnoan Lepidosiren and very many other peculiarities. See Zoogeography.

NEOZOIC (Greek, «late life®), in geology, a term introduced by Edward Forbes, but never in common usage, to include the Mesozoic and Cenozoic, between which he argued there was no such distinction as between them on the one hand and the Palaeozoic on the other. The word is sometimes used as an equivalent of Tertiary and sometimes as synonymous with Cenozoic.

NEPAL, ne-pal, NIPAL, ne-pal', or NE- PAUL, Asia, an independent kingdom, on the southwest slope of the highest part of the Him¬ alaya range, north of India, bounded on the north by Tibet, on the east by Sikhim and on the south and west by Bengal and the United Provinces of Agra and Oudh, British India. It lies between lat. 26° 25′ and 30° 17 N., and long. 80° 6′ and 88° 14′ E. ; is 500 miles long with a maximum breadth of 150 miles and has an estimated area of 54,000 square miles. The main portion of the country is a table-land from 3,000 to 6,000 feet above sea-level. Within its boundaries are the highest mountains in the world, Everest, Dhawalagiri, and on its eastern border, Kinchinjinga. From the mountains the land gradually descends southward, forming four distinct terraces, differing in climate and

vegetation. The Terai or southern lowland, well wooded and extensively cultivated, is traversed by numerous small streams. The most important rivers are the Karnali, the Gandak and the Kusi, all of which rise in Tibet and force their way through the Himalayas by deep and precipitous gorges to join the Ganges. The climate is on the whole temperate, except in the most elevated northern districts, where it is very cold. Magnificent forests of sal, sisoo and toon trees stretch along the declivi¬ ties of the lower hills into the adjacent plains. The forests higher up exhibit a greater variety, gradually assuming more and more of an Al¬

pine character. The principal products are rice, wheat, barley, pulse, potatoes, sugar-cane, buck¬ wheat, hemp, cotton, tobacco and madder. In the mountainous parts a valuable article of cul¬ tivation is a large species of cardamom, and in other places ginger is grown to a considerable extent. Pasturage is on the whole scarce and indifferent. The sheep and goats, however, have fine wool. Horses are imported from Tibet. The wild animals are elephants, black bears of great size, hogs, hog-deer, foxes, jackals and a few tigers. Fish abound in the streams of the Terai. The manufactures ot Nepal are confined chieflv to two kinds of coarse cotton cloth, called khadi and changa, of which the dress of the middle and lower classes of the people is made. Articles in copper, brass and iron are also manufactured in vari¬ ous places; likewise bells of a kind of bell- metal called phul, but considered inferior to those of Tibet; and also a very strong paper, remarkably well fitted for packages. Wood¬ carving and pottery are important industries, but appear to have declined in recent years. The trade of Nepal is chiefly carried on with British India and Tibet. From the former it imports Bengal cottons and muslins, silks and raw silk, carpets, English cutlery, etc.; and from the latter Chinese silk stuffs, paper, drugs, gold and silver, sheep, musk, skins of the musk- deer, etc. Its chief exports are the natural products of the country. Exports in normal years aggregate about 48,000,000 rupees and the imports about half that sum. Iron, lignite, cop¬ per, lead, zinc and gold are found and mining is carried on in a small way.

The government of the country is a military oligarchy with a maharaja as the nominal head, but a Prime Minister as its real ruler. The latter is assisted by a council, the members of which are chosen by him. The ruler acknowl¬ edges a certain amount of dependence on the Chinese government, but is in more real de¬ pendence on British authority. A British Resi¬ dent and a small body of British troops are stationed at the capital, Khatmandu, and British influence is gradually increasing. This is evi¬ dent in the more humane code of laws now in operation. The foreign relations are controlled by the British Indian government.

Revenue is obtained from taxes on land, mines, forest products and monopolies, also from customs. There is a good army of 45,000, consisting mostly of G'hurkas, who are able fighters. The population of the country is estimated at over 4,000,000. The inhabitants are chiefly Newars, a race probably of Mongolian and Chinese origin ; the dominating race is the Ghurkas (q.v.). In the east there is a considerable mix¬ ture of Hindus and Bhotias, the latter of Tibetan stock. .Other tribes of Nepal are the Limbus, Lepchas, Bokras, Kirantis, Murmis and Tharus. The languages spoken are of. the Tibet-Himalayan branch of the Indo-Chinese languages. Parbatya is the common tongue of intercourse. It is written in the Nagari char¬ acter. The Newars have a language peculiar to themselves. The prevailing religion is Hin¬ duism, but there are also some Buddhists. There is complete religious liberty. Educa¬ tion is in the hands of the clergy and is in a backward state. The majority of the popu¬ lation are illiterate. The upper classes send their children to the institutes of higher learn-

ing in British India. Most of the domestic servants are slaves. The country was formerly possessed by numerous independent rajahs, and extended west to the Sutlej ; Hiuen Tsang, a Unnese pilgrim, mentions a ruler of the 7th century, Anuwarma. Harisinha-Deva, rajah of Simraungarh, invaded and occupied Nepal in 10Z4. But about the middle of the 18th cen¬ tury the rajah of Ghurka began to extend his dominions by conquest, in which he and his successors were so successful that in less than oU years they had conquered the whole of Nepal and made themselves kings of that terri¬ fy > Subsequently (1816) a large portion of the kingdom was cut off by the British, who reduced its western limit to the river Kali in- the Sutlej. By the Kot massacre in 184b Jung Bahadur made himself master of the country and proved a firm but beneficent ruler;

• the British during the Indian Mutiny

in 1857 ; at his death in 1877 he was succeeded by his brother who reigned until his assassina- tion m 1885, when he was succeeded by Dhiraj Pirthvi Bir Bikram. The latter died in 1911 and the throne devolved upon his son, Tribhu- 'bana Bir Bikram.

Bibliography.— Ballantine, H., 'On India's Frontier, or NepaP (New York 1896) ; Bendall, C., History of Nepal and Surrounding King¬

doms * (in Asiatic Society of Bengal Journal, Vol. LXXII, Calcutta 1903) ; id., ‘Journal of Literary and Archaeological Research in NepaP (Cambridge 1886) ; Brown, P„ ‘Picturesque NepaP (London 1912); Boeck, Kurt, ‘Durch Indien ins verschlossene Land NepaP (Leipzig 1903) ; Hunter, ‘Imperial Gazetteer of India) (Vo!. X, Cambridge 1886) ; Landor, A. H. S., Tibet and NepaP (London 1905) ; Massieu, I., Nepal et pays himalayens5 (Paris 1914) ; Hodgson, B. H., ‘Colonization of NepauP (Calcutta 1857) ; id., ‘Essays on die Language, Literature and Religion of Nepaul and TibeP (London 1874) ; Oldfield, H. A., ‘Sketches from Nepaul, Historical and Descriptive) (Cam¬ bridge 1880) ; Waddell, L. A., ‘Among the Himalayas > (London 1898) ; Wright, D., ‘His¬ tory of NepauP (Cambridge 1877).

NEPENTHE, ne-pen’the (Greek, ne, a negative prefix, and penthos, sorrow), a magic potion or drug which was fabled by the poets to banish the remembrance of grief and to cheer the soul. The invention was attributed to the Egyptians. It was given to Helen in Egypt and has been variously identified with opium or some preparation of hemp.

NEPENTHES, a genus of pitcher-plants (qv.).

NEPHELITE, or NEPHELINE, a native silicate of aluminum and sodium, of the for¬ mula Na2Al2Si208, crystalizing in the hexagonal system and also occurring in massive forms.

It exhibits various colors and has a vitreous lustre, a hardness of from 5.5 to 6 and a specific gravity of about 2.6. It occurs in re¬ cent eruptive rocks, notably at Mount Somma, Vesuvius and at Hot Springs, Arkansas. Leu- cite, a similar mineral, is found in the same sort of place and contains potassium in place of sodium.

NEPHELIUM, a genus of fruit-trees. See Litchi.

NEPHI, ne’fi, Utah, city, county-seat of Juab County, on the San Pete Valley and the

San Pedro, Los Angeles and Salt Lake rail¬ roads, about 80 miles south of Salt Lake City. It is in a high valley in which there are a num¬ ber of good farms. The chief products of the surrounding country, all of which contribute to the prosperity of Nephi, are farm products, salt, gypsum, lumber and livestock. The city operates an electric-lighting plant and a modern water-supply system. Pop. 2,7 59.

NEPHOSCOPE, nef,6-scop/, an instrument for determining the apparent velocity and motion of clouds. It is in the form of a

horizontal mirror, with compass-points or degrees drawn on the mirror, or on the sur¬ rounding frame; with an adjustable sighting piece placed above the mirror. The sighting- piece serves as a fixed point for viewing the cloud shadow as it moves away from the centre of the mirror.

NEPHRECTOMY, ne'frec-to'me, the ex¬ cision or removal of a kidney. In cases of tuberculosis, calculi, multiple abscesses, pyo¬ nephrosis, hydronephrosis, sarcoma, wounds, tears and ruptures of the ureters, this operation may be called for. The removal of a single or horseshoe kidney is considered a fatal opera¬ tion. Before removing a kidney it is necessary to ascertain whether the remaining organ is capable of excreting its due amount of urine. Abdominal nephrectomy (anterior nephrectomy) is the excision of a kidney through an incision in the abdominal wall ; lumbar nephrectomy the most common method (posterior nephrectomy), an excision, through an incision in the loin.

Nephrorrhaphy, nephropexia, or nephropexy is the fixation of a movable kidney by sutures.

NEPHRITE. See Jade.

NEPHRITIS. See Cirrhosis; Kidneys.

NEPHROTOMY, ne'frot-o'me, incision of a kidney, an operation deemed necessary by the surgeon when it has been ascertained by ex¬ ploration with the aspirator-needle or otherwise that the kidney is the seat of any condition or disease which endangers the life of the patient. It is resorted to for the removal of calculi (nephrolithotomy), of tumors and for relieving congestion.

NEPHTHYS, nef'this, in Egyptian my- r° a sister of Osiris and Isis, wife

of iyphon, and mother of Anubis by Osiris Some consider her as the symbol of the Egyp¬ tian coast on the Mediterranean ; others as the personification of the five intercalary days of the Egyptian year, in which point of view they are called her children by Mercury, the Sun and Saturn; or as a protector of the dead from evil influences. This meaning comes from the legend of her mourning the loss of Osiris with her sister Isis. Consult Budge, E. A. T. (The Gods of the Egyptians) (Vol. II, London

A Js\J i J •

NEPID.S5. See Fresh-Water Insects.

NEPIGON, or NIPIGON, a lake in Can- scis, in the northwestern part of the province of Ontario; about 35 miles north of Lake Su- perior. It is 813 feet above Superior; about r 0 miles long and 45 miles wide ; its outlet is Nepigon River, which flows south and enters

Hon Supenor trough Nepigon Bay. Area, 1,730 square miles. The coast line is remark-

ably rocky and irregular, in some places form¬ ing lofty headlands; the total length of coast line is nearly 580 miles. It has a number of small wooded islands. Several streams enter the lake, and in the vicinity are a large number of small lakes, all of which, together with Nepigon, once formed a very large lake. The lake is a favorite place for sportsmen as it is well stocked with fish.

NEPOMUK, Johann, yo'han na'pd-mook, patron saint of Bohemia: b. Pomuk; about 1340; d. Prague, 20 March 1393. He rose to be a high ecclesiastical dignitary, and was put to death at the order of King Wenzel IV of Bohemia by being thrown into the Moldau

River. Differences as to Church policy and other reasons, often conflicting, are assigned for this procedure. But the most authentic account, compiled (1670) originally by Bohuslav Balbi- nus, a Jesuit, narrates the story as follows: According to Balbinus, Nepomuk obtained the degree of magister at Prague, eventually became almoner ot King Wenzel and confessor to

almoner to King Wenzel and confessor to

Queen Johanna and, after imprisonment and

torture, was put to death for refusal to divulge certain matter of the confessional. Balbinus dates the martyrdom in 1383, but the best sources make the ime as above given, 10 years later. Hajek of Labocan conjectured (1541) that there were twro Johns and this idea was assumed by Balbinus; but Dabrovski established (1787) the fact that here was but one. Abel ((Die Le- gende vom heiligen Nepomuk) 1855) presented the curious theory that John of Nepomuk was really the development of the Protestant hero, John Huss, into a Catholic saint. But this is altogether without foundation. Previous to his canonizaion by Pope Benedict XIII in 1729, Nepomuk had already been venerated as pro¬ tector against slander and danger by water. His day, 16 May,

is still observed in Bohemia as a time of high festival. Consult Frind, (Der geschichtliche Johannes van Nepomuk) (2d ed., 1871) ; and for the various contemporaneous accounts and the questions as to the existence of two persons of this name consult article <(John Nepomucene® in the (Catholic Encyclopedia) (New York 1910) ; also (Niirnberger in Jahres- bericht der schlesischen Gesellschaft fur vater- landische KulteU (1904).

NEPOS, ne'pos, Cornelius, Roman histo¬ rian: b. Upper Italy, about 100 b.c. ; d. about 24 b.c. His earliest writings consisted of verses and three books of < Chronica. > With the ex¬ ception of a geographical treatise, his remaining works were directed toward the study of man¬ ners, customs and character. Such are the five books of (Exemplar supposed to have been an account of the men who stood as types of the virtues of earlier Rome. Such, too, were the elaborate biographies of Cicero and Cato the Elder. But the most comprehensive of his pub¬ lications was the (De Viris Illustribus) ((Of Illustrious Men>) in probably 16 books, in which the lives of foreigners and of Romans were juxtaposed in a parallel arrangement. Of this there are extant the portion (De Excellen- tibus Ducibus Exterarum Gentium > ((0f

Prominent Foreign Generals*) and the biog¬ raphies of Cato and Atticus. The lives of Atticus and Cato have been uncontestably as¬ signed to Nepos, but until the edition of Diony¬

sius Lambinus (1569) the (De Excellentibus Ducibus } was supposed to be the work of a cer¬ tain Hfmilius Probus. Lambinus' verdict, based on both historical and stylistic grounds, has been almost universally accepted. The style of Nepos is too colloquial ; his matter is often lamentably inaccurate ; but the essays are in general well arranged and fair in their judg¬ ments. There are several good editions by Nipperdey (rev. by Lupus 1879), by Lindsay (New York 1895) ; Flagg (ib. 1895) and others. Consult Schanz, M.,

1909).

NEPOTISM, a system or custom prac¬ tised by several of the earlier popes of granting high honors, dignities, offices, pensions and the like to their family relations, generally their nephews; hence family favoritism of any sort.

'NEPTUNE, (1) in astronomy, the most dis¬ tant planet of the Solar system, its mean dis¬ tance from the sun being 2,795,998,000 miles, and its least distance from the earth 2,629,000,- 000 miles. The eccentricity of its orbit is .00872 ; its inclination to the plane of the

ecliptic is 1° 47'. The apparent diameter is about 2′ 7". The real diameter is estimated at about 36,000 miles, and it seems to have very little polar compression. Its mass is about 16J4 times that of the earth. The largest telescopes give us little information as to whether or not it has belts. A satellite of Neptune was discovered by Lassell of Liverpool in 1846. It is peculiar in revolving from east to west. Neptune re¬ volves round the sun in 164.6 years. The dis¬ covery of Neptune was an interesting piece of deduction based upon a known disturbance of the motion of Uranus. Leverrier, a French¬ man, proved that this disturbance could only properly be ascribed to some other, as yet un¬ located, heavenly body, and his computation of its probable situation led to its discovery by Galle of Berlin, on 23 Sept. 1846. Airy of England also computed its location about the same time. (2) In Roman mythology the god of the sea; son of Saturn and Rhea, and brother of Jupiter and Pluto. He is variously represented ; sometimes with a trident in his right hand, a dolphin in his left, and with one of his feet resting on part of a ship; at others in a chariot drawn by sea-horses, with a triton on each side. See Poseidon.

NEPTUNE, Temple of, the name of two ancient structures, one at Paestum in Lucania, and the other on the Campus Martius in Rome. The latter was erected by Agrippa 26 b.c. It was destroyed by fire 80 a.d., but was restored by Hadrian.

NEPTUNIAN THEORY (Lat. Neptu- nus, god of sea), in geology the view advanced by Werner (q.v.) that geological change is due entirely to the influence of water, the earth in the beginning having been covered with water, which hold- rock-material in solution. This hypothesis, also styled Diluvian Theory, was opposed by the Vulcanians, who held the igneous or so-called Plutonic theory. It is now recognized that though perhaps most rocks are of sedimentary origin, igneous rocks also form a large part of the crust of the earth. See Geology.

NERAC, na-rak', France, a town, capital of an arrondissement in the department of Lot-et-

Gaionne, 16 miles southwest of Agen, on the precipitous banks of the Baise. In its old castle, now a mere ruin, Henry IV, of whom there is a bronze statue in the town, spent part "1S and at an earlier period Calvin

and other reformers found an asylum with Margaret of Valois, queen of Navarre. The town has manufactures of coarse woolens, ship-biscuit, corks, coaches, cloth, beer, brandy, and trade in wine, grain and hemp. Pop. 6,300.

.. ˆERBUDDA, ner-bud'da, or NARBADA, nar-ba da, India, a river which rises in the Mai- kal range, 3,493 feet above sea-level, in the north of the Central Provinces, flows first west and northwest across the Amarkantak plateau, then west, inclining gently to the south, and after forming part of the boundary between the Central Provinces and Indore, falls into the Gulf of Cambay, after a course of about 800 miles. In the wet season it rises in some places 25 feet, and in others 70 feet above its lowest level. Though much obstructed by shelves and cataracts, it is navigated by boats to the falls of Daree, about 250 miles from its mouth. To the Hindus the river is a sacred stream, almost equal to the Ganges in sanctity. It is regarded as a meritorious act to walk from the sea to its source and back again along the banks of the river. There are valuable coal and iron beds in the valley near Hoshanga- bad, and a railroad skirts the river from Barhanpur to Sihora.

NEREIDS, ne're-idz, in Greek mythology, were sea nymphs, daughters of Nereus and Doris. They were 50 in number, and they had, like their father, the gift of prophecy and the power of assuming different shapes. They were specially the nymphs of the Mediterranean, and were distinguished on the one hand from the Naiads or the nymphs of fresh water, and on the other hand from the Oceanides or nymphs of the ocean. Few of them figure in legend as individuals, among them principally is Thetis, mother of Achilles. In art they are represented as observing the contests be¬ tween sea-deities, and a favorite portrait is that of the Nereids bringing the armor forged by Hephaestus to Achilles.

NEREIS, a marine annelid, one of many species, scattered throughout the world, of poly- chaet worms (see Polychˆta), of the family Nereides, which contains the most highly or¬ ganized of this group of animals — «the highest type of Annulate i® according to Packard. Their bodies are visibly annulated, flat and scaly. A distinct head is present, provided with a retrac¬ tile proboscis, which is usually armed with teeth or jaws. Eyes and tentacles are borne on the head. The locomotive appendages are very fully developed, and the respiratory or breath¬ ing organs, in the form of tuft-like branchiae or gills of rudimentary nature, are borne on the dorsal aspect of the body-segipents. The sexes are separate, the eggs are probably laid in masses between tide-marks, and the young at first appear as surface-

swimming ciliated bodies, but the stages of development have not been traced. The posterior segments of certain species of Nereis, when they contain generative products, become markedly unlike the anterior segments, and the animal comes to be known as a Heteronereis. This was formerly supposed to be a distinct genus. A typical and numer¬

ous species on the Eastern American coast is Nereis virens, which lives between tide-marks in holes in the mud. It secretes a viscid fluid lining its hole, up which it moves, pushing itself along by its bristles and liguke. At night probably, during the breeding season, they leave their holes and swim at the surface of the water. Some of these nereids are commensals. N. bilineata and N. succinea inhabit the tubes of a species of Teredo, and N. costae is found in the cavities of sponges. Consult Packard, 'Zoology* (1897); Arnold, (Sea Beach at Ebb Tide* (1901).

,. NEREUS, ne're-us, in Greek mythology, a divinity of the sea, the progenitor of the Ne¬ reids (q.v.). He is represented as an old man, with a wreath of sedge, sitting on the waves with a sceptre in his hand. Although repre¬ sented as always friendly to mortals and to gods, one memorable contest is preserved in tradition. Hercules had to wrestle with him, while he changed shapes many times, in order to learn the way to the Garden of Hesperides.

, NERI, na re, Filippo de' (known in Eng¬ lish as Saint Philip Neri) founder of the or¬ der of Oratorians (q.v.) : b. Florence, 22 July 1515 ; d. Rome, 26 May 1595. He was of noble family with rich connections, but his only aim m early life seemed to be that of self-discipline and the pursuit of learning. He deliberately sacrificed the favor of a rich uncle, who wished to make his nephew heir to his fortune, by secretly leaving him (1533) and taking up his residence at Rome as private tutor in a .gentleman's family. He sold his books in 1538 and gave the price to the poor, and ever afterward de¬ voted himself to the sick and to pilgrims. In 1548 he established the Fraternity of the Holy Trinity for the succoring of the sick and pil¬ grims, founding the hospice which later became one of the finest at Rome. He did not enter the priesthood until 1551 and in 1574, with Caesar Baronius and other priests, he founded the Oratorians of which he was styled "Father® up to 1592. His congregation received the ap¬ proval of Gregory XIII in 1575. He was the most popular saint in Europe since the days of Francis d'Assisi and of unprecedented in¬ dependence and originality in his life and utter¬ ances. Gothe has styled him "a saint with a sense of humor.® His motto was "spernere mundum, spernere se ipsum, spernere se sperni.®

(Despise the world, despise self, despise if de¬ spised). He was canonized in 1622, and in 1726 the day selected for his festival was the anniversary of his death. His letters (1751), poems (Rime Oneste, Vol. VIII), have been published. Consult Gallonio, ‘San Filippo dei Neri> ; Reiching,

NERINE, a genus of plants of the family Amaryllidacece (q.v.). The 10 species, which are all South African, are bulbous-rooted, have

narrow leaves which die down during the spring months, and leafless scapes which appear in late summer surmounted by umbels of strikingly beautiful six-parted flowers varying from scarlet through all tints to white, and seemingly covered with hoar frost. The most commonly grown species is N. sarniensis, the Guernsey lily. The bulbs should be planted in autumn in the greenhouse and given plenty of water and plant food until the leaves turn yellow when both may be gradually withheld, the pots laid on their sides, and the bulbs al¬ lowed to mature. In late summer, when the plants show signs of life, water may be given.

NERNST, nernst, Walther, German physi¬ cist : b. Briesen, West Prussia, 25 June 1864. He was educated in the leading universities of Germany and in 1889 became lecturer in chemistry at Leipzig. In 1891 he was called to the chair of chemistry at Gottingen where in 1895 he established an institute for physical chemistry. His invention of the Nernst in¬ candescent electric lamp has made him a promi¬ nent figure in the electrical world. He has written (Theoretische Chemie> (1898) ; (Ueber die Bedeutung elektrischer Methoden u. Theorien fiir die Chemie) (1901). See Elec¬ tric Lighting.

NERNST LAMP. See Electric Light¬ ing.

NERO, Lucius Domitius Ahenobarbus

(after his adoption by the Emperor Claudius called Claudius Caesar Drusus Germanicus), 6th Roman emperor: b. Antium (Latium), 37 a.d. ; d. 68 a.d. He was the son of Gneius Domitius Ahenobarbus and Agrippina, the daughter of Germanicus. His adoption was due to the mar¬ riage of his mother with the emperor. Soon after, when only 16, he married Octavia, daugh¬ ter of Claudius and Masselina 53 a.d. Agrip¬ pina wished to secure the succession to her own son to the prejudice of Britannicus, the son of Claudius. In this she succeeded,

and Nero became emperor on the death of Claudius in the year following 54 a.d. His tutors were able men, Burrus, the prefect of the Praetorian guards, and the philosopher Seneca (q.v.). For a short time he gave a promise of reigning well and allowed himself to be guided by his instructors, but it was not long before he gave himself to the greatest excesses and cruelty. His first crime was the poisoning of Britanni¬ cus, 55 a.d., whom Agrippina, having quarreled with her son, threatened to raise to the throne in place of Nero. He next caused Agrippina herself to be put to death, 59 a.d. The most distinguished victims of his cruelty, beside Britannicus and Agrippina, were his instructor Seneca, the poet Lucan, and his wives Octavia and Poppaea Sabina. <(My predecessors,® said he, <(did not know , the rights of monarchy. People may hate me, if only they fear me.® During his reign, in 64 a.d., a great conflagra¬ tion took place at Rome, which lasted for six days and seven nights, and when thought to have been extinguished, broke out and burned two days more. During this fire the most beautiful monuments of art and of history were burned to the ground. Nero was commonly suspected of being the originator of the fire, with a view of having a real representation of the burning of Troy; and although this sus¬ picion was admitted by Tacitus to be without

evidence and is regarded by modern scholars as almost incredible, it was so generally enter¬ tained at the time that Nero did his utmost to transfer the guilt of this action to the Chris¬ tians, whom he caused to be cruelly persecuted for it throughout the empire. He caused the burned part of the city to be rebuilt in a man- mer more splendid and magnificent than before. The most remarkable of hii buildings was the palace which he erected for himself in Rome, known as the Golden House. Several conspira¬ cies, formed against him in Rome, ended in the destruction of the conspirators themselves. He aspired to distinguish himself as a poet, actor, philosopher, musician and liberal patron of the arts. At last the revolt of Galba, his governor in Spain, succeeded. The Praetorian guards declared for Galba, and the Senate pronounced against Nero sentence of death. The tyrant anticipated the punishment which awaited him through requesting death by the sword, of an attendant. Consult Baring-Gould, (The Tragedy of the Caesars* (Vol. II, 1892) ; Tacitus, (Annales> (XIII-XVI) ; Suetonius, (Berlin 1872); Hen¬ derson, B. W., (Life and Principate of the Emperor Nero) (Philadelphia 1903).

NERO, Golden House of. See Golden House of Nero.

NEROLI, a perfume, extracted from the flowers of a small Italian orange tree. It is an essential oil, obtained by distillation from the

orange blossoms.

NERTCHINSK, ner-chinsk', Siberia, a town in the Transbaikalia Territory, on the Nercha, near its mouth in the Shilka, 570 miles east of Irkutsk. Although comparatively small it is an important trading centre for Russians, Mongols, Turcomans and Tunguses, and has a considerable export trade in the gold, silver, lead, tin and zinc of the surrounding mining region. Pop. about 11,000.

NERTHUS, ner'thus, in German mythol¬ ogy* a goddess, regarded as representing the earth. Her shrine has been supposedly discov¬ ered at Riigen.

NERVA, 13th Roman emperor: b. Narnia, Umbria, 8 Nov. 3 a.d.; d. 25 Jan. 98 a.d. He occupied posts of trust in the reigns of Ves¬ pasian and Titus. He became emperor at an advanced age, after the assassination of Domi- tian, 96 a.d. through the aid of Parthenius, chamberlain of the imperial palace, and Petro- nius Secundus, commander of the Praetorians. Nerva was a man of cultivated mind, with some poetical talent. His reign was beneficient. He recalled exiles, allowed no senator to be put to death, abolished several oppressive taxes, ob¬ served a strict economy for the relief of the poor and tolerated Christianity. But he was unable to put down the violence and insub¬ ordination of the Praetorian soldiers. Seeing, perhaps, that an element of greater energy was needful, he adopted, as successor, Marcus Ul- pius Trajanus (see Trajan), then commanding an army in Germany, whom he made cosover¬ eign. Consult Merivale, (History of the Ro¬ mans under the Empire1* (1865).

NERVAL, nar-val, Gerard de (properly

Gerard Labrunie), French author: b. Peris, 21 May 1808; d. 26 Jan. 1855. He was edu¬ cated at the Lycee Charlemagne, and made ont

of the first renderings (1828) of Goethe's 'Fausts In his (Poesies allemandes* (1830) are to be found translations from other Ger¬ man authors, such as Schiller, Uhland and Heine. He was a collaborator on various lit¬ erary periodicals; wrote verse, including El¬ egies nationales et satires politiques) (1827) ; a few dramas, among them (L'Alchimiste) with Dumas; and several volumes of prose, such as (Scenes de la vie orientale) (1848-50), and (La Boheme galante) (1855).

NERVII, ner'vi-i, an ancient people of Gaul, famous for the stand they made against Caesar's advance in 57 and 54 b.c. They sub¬ mitted to the Romans in 53 b.c.

NERVOUS DISEASES, disorders arising either from actual changes in the structure of nerve-fibres or nerve-centres, or from some irregularity of nerve-function without gross structural change. Thus nervous diseases may be due to inflammation or degeneration of nerve-substance; to the pressure on some part of the nervous system by tumors, effused blood or other fluid; to the death of some part by the cutting off of its blood supply, etc. ; to acci¬ dent or injury due to internal or external poisons or to violence ; or they may be the result of lowered nervous action as a part of general bad health. It is customary to speak of organic and functional diseases of the nervous system, meaning diseases in which structural changes are demonstrable, and those in which no such alterations can be seen by appropriate instru¬ ments of precision. While such a difference is perfectly valid from the practical point of view, from the more scientific standpoint no such distinctions can be maintained save on the most general grounds. A much more useful classifi¬ cation is to subdivide nervous diseases into (1) Vegetative, (2) Sensori-motor and (3) Psychical Nervous Disorders. By vegetative nervous disorders is meant interferences with the functions of the vegetative or sympathetic nervous system. This includes a vast group of disturbances of the functions of the viscera of the body, including endocrinopathies, or diseases of the endocrine glands.

Among the more important of these endo¬ crinopathies may be mentioned acromegaly, exophthalmic goitre, myxedema, Addison's dis¬ ease, various types of idiocy and imbecility, and a great variety of defect states in general.

Sensori-motor nervous diseases include dis¬ eases of the peripheral nerves, of the cranial nerves, of the spinal cord, of the mid-brain and cerebellum and of the brain itself. This group includes the great majority of so-called organic nerve diseases.

Psychical nervous disorders may be roughly grouped into three large classes — the neuroses and psychoneuroses, the psychoses and the de¬ fect states of various types.

Nervous diseases are extremely widespread in the community. It has been estimated that one in every 300 of the population is afflicted with some one of the psychoses ; one in every 500 has epilepsy, and it is common belief that the neuroses and psychoneuroses are on the

increase. About one adult individual in every 10 has spme form of a neurosis or psychoneurosis, mild or severe, as the case may be. Diseases of the nervous system are naturally increasing with the increasing population. Whether this vol. 2r) — 6

is a relative increase or not is not definitely proven. So far as the psychoses are concerned, there seems to be little doubt that they are not only relatively but absolutely increasing. With respect to this latter belief, however, it should be remembered that the increase in the material comforts afforded patients suffering from psy¬ choses is tending to encourage the community to send their semi-dependent members to insti¬ tutions and thus escape the individual cost of their care. This makes an apparent increase in the proportion of psychoses, for many cases in this manner enter into statistics which would not otherwise be counted. The complex con¬ ditions of modern civilization are causative in bringing about a certain amount of breakdown of the nervous system, and the keen compe¬ tition for subsistence and for luxuries also tends to increase these evils.

Nervous diseases present a greater diversity of symptoms than disease of any other organ- system of the body. Over 200 divisions have been made, and this number is subject to con¬ stant revision. The nervous system is the most highly developed and most intricate part of the body; hence nervous diseases present a greater complexity than any others. At the same time, so far as nervous diseases are concerned, their accurate determination is a matter of very pre¬ cise knowledge. This gives to the study of them a peculiar fascination. Nervous diseases are further characterized by their extreme se¬ verity. Other organs of the body, when dis¬ eased, recover their functions in a comparatively short time. Nerve-function, when disturbed, recovers very slowly. Chemically, nervous tis¬ sue is extremely complex and much time is necessary to reconstruct it after injury. This is particularly true for mental diseases. Years and months are necessary for recovery, when weeks and days are occupied in the restoration of non-nervous structures. Economically, nerv¬ ous diseases are of serious effect, fiequently depriving the community of wage-earners with¬ out eliminating them, so that they become burdens ; and they continue to swell their own ranks by the added stress they cause to the community which must support them. The great majority of chronic invalids are those suffering from nervous ailments. Idiots, im¬ beciles, the insane, epileptic, paralytic and criminal make up a large class of parasites. The study of economic conditions due to dis¬ orders of nervous structures is of wide and practical import. It is the largest and most im¬ portant chapter in social economics.

One of the most important agents in reduc¬ ing the amount of nervous disease is hygienic living, and a greatly increased amount of gen¬ eral information bearing on the part played by alcohol and other poisons in the development of nervous affections. It is highly desirable that in the primary schools, high schools and colleges, more attention should be paid to the education that fits people better for the con¬ ditions with which they are to struggle in after years. Physical exercise, gymnastics, open-air play, nature-study, general rules of hygienic eating, of hygienic clothing and the general principles of preventive medicine should enter into the curriculum of every school for both sexes. All this is being provided for wisely in most of the communities of the

United States, and there is every reason to suppose that coming generations will be much better fitted physically to stand nervous stress than their predecessors.

Textbooks on nervous disorders are numer¬ ous. A few of the more important recent works are here mentioned. Reference works : (Jahresbericht fiber die Fortschritte in der Neurologie und Psychiatries the most import¬ ant bibliographic work published. Nothnagel's ˆpecielle Pathologie und Therapie> contains the most recent series of monographs bearing on nervous disorders. Brourdel's (Traite de Medecin) is one of the best recent French col¬ lections. Albutt's (System of Medicine) is the best of the recent English systems. Valuable individual works on diseases of the nervous system are those of Gowers, Dejerine, Oppen- heim and Jelliffe and White. On mental dis¬ orders Ballet's (Traite de Pathologie Mentale) (1904) is one of the most comprehensive. Kraepelin, Weygandt and Ziehen are German authors in favor; White is an American au¬ thority; Maudsley, Mercier, Clouston and Bevan Lewis are among the foremost English writers of a generation past; Bianchi, in Italy, and Muratow, in Russia, are other well-known authors on nervous diseases. Consult Jelliffe and White, (Diseases of the Nervous System* (1919). See Brain; Mental Disease; Ner¬ vousness; Nervous System, Evolution of the; Neurosis; Nervous System, Traumatic Affections of the; Psychiatry; Psychosis.

NERVOUS SYSTEM, Evolution of the.

The nervous system is that part of the body which has developed most particularly the func¬ tion of adapting the different organs of the body

to their environment. It is the great regu¬ lator of all the physiological processes. It may be said to consist of two parts, that portion which has to do with the reception of impulses from without, in general spoken of as the sen¬ sory nervous system, and that portion which, in response to the incoming impulses, causes some form of adaptation in answer. Such adaptations are often of a muscular character, and the motor-nervous structures are concerned in bringing about such relationship. The human nervous system is fundamentally ar¬ ranged on this plan, but while theoretically so simple in organization, practically and anatomi¬ cally it is an extremely complex and complicated series of structures. This complexity is the re¬ sult of untold ages of development ; but a study of the nervous system in a number of the lower forms of life, as well as the study of the various nerve-structures of man himself in their development from the fetal stage, has enabled the student of the human nervous sys¬ tem to trace the gradual steps of its evolution.

Plants are considered not to possess any nervous structures, yet the protoplasm responds to many forms of stimuli in much the same manner as the protoplasm of more highly de¬ veloped living things. In a few plants, Venus' fly-trap, the sensitive plant, etc., there are found certain cells in the midribs of the leaf and in the stem, in which the protoplasm differs from that of other plants. They do not possess special nervous structures, but they are cells in which the protoplasm seems to possess special nervous conductive properties. In many of the lowest animals no known nervous structures

have been found, but even in the very simplest ' animals the prototypes or forerunners of human nerve-structures are known to occur. In these animals the simple nerve-unit or neuron is found. In its simplest form this neuron con¬ sists of a strand of nervous tissue, a nerve-fibre, in some portion of which an enlargement or nerve-cell (so called) occurs. From the nerve¬ cell (or station, as it were) the fibre usually passes out in two directions, becoming atten¬ uated in its passage and, branching or not, finally terminates in extremely fine processes (dendrites), which in different animals widely vary. One branch of this neuron is usually found in the periphery of the animal body, and may be spoken of as the incoming or sensory part of the structure; the other is frequently distributed to the muscles of the body. As the animals rise in the scale of complexity this most primitive condition becomes modified, and a neuron of distinctly sensitive nature develops, which is brought in contact by the end-filaments of the neuron-branches with a similar motor neuron.

Such simple arrangements are found in ani¬ mals of the very lowest

organization, polyps, sponges, etc. In higher animals collections of these neurons form ganglia. These ganglia, at first isolated, become co-ordinated and grouped until as in the insects, for instance, a double chain of ganglia is found from in front of the mouth to the anus, arranged along the abdomen. These ganglia are connected by cables of nerve- fibres, and to and from each ganglion sensory and motor fibres pass, and thus the entire nerv¬ ous system is brought into co-ordination. In thought it is but a step from the ventral double chain of ganglia in the insects to the solid spinal cord of the mammals wfith its ganglionic en¬ largements, constituting the medulla and brain (see Brain), but it has taken many ages to bring about this integration. Theoretically, the nervous structure of the lowest mammals, Amphioxus and Petromyzon, are of the simplest type, a trifle more advanced than the insect double chain; but in the study of the nerve-structures of these lowest forms glimmerings of the complex nervous system of man are to be found. The homologues of the much diversi¬ fied and complex spinal cord and brain in man are present in the primitive conditions in these animals.

While the development stages of the growth of the nervous system to its present complexity may be thus summarized, the details of the different forms are intricate, and only on philosophical grounds can they be thus described. In the lowest Infusoria there are few if any nerve elements known. In the bell- animalcules (V orticella, Stentor, etc.), a mixed form of neuromuscular cells is found. These possess the combined functions of these two types of tissue. In the sea-anemones and polyps similar nervous structures are found and small ganglionic masses are present. Starfish possess a comparatively complex nervous system. Each arm of the starfish has a small ganglion near the mouth, and a nervous cord passing down the arm. The ganglia are farther connected by special nerve-fibres, bringing about an integra¬ tion of nervous impulses. In the mollusks (snails, oysters, clams, etc.), the nervous system consists of a ring of ganglia surrounding the esophagus ; one above is larger and by some is

spoken of as a brain, but it is not homologous with the brain of mammals in any sense. Com¬ municating fibres pass to the foot and to the breathing apparatus. In the worms the nervous system is still more complex. An enlarged double bilateral ganglionic mass at the head of the animal constitutes the brain; special off¬ shoots pass to nervous structures in the eyes on each side; double cords pass backward, con¬

necting the brain with paired ganglia, which may be fused into one mass or may be separated and connected by commissural fibres. From the ganglionic enlargements fibres pass out to the periphery of the body. This form of nervous system represents in skeleton what the more complicated mammalian system is to become. It is bilateral and is segmented, or metameric. The bilateral character of the mammalian nerv- our system remains throughout, with but slight fusion ; the metameric character, however, un¬ dergoes many changes by the fusing together of ganglionic masses and their later distortion. The separate ganglionic mass in the worms en¬ tails greater individual independence. Thus if the head of a centipede be cut off, the legs will still cause the animal to run. Ants, flies and butterflies will move about aimlessly for some time after the head is cut off. The head-gang¬ lion in the ant is much more complex than in manv other insects, showing in some measure by its structure the more highly developed character of this animal's "brain-ganglion.® The transition from lower to higher types of nervous system is found in one of the lowest of the vertebrates, the Amphioxus. In the lower forms the ganglionic masses and their connecting cords are located for the most part in the lower or ventral portion of the body, and the ganglia and fibres are distinct. In the vertebrate type the nervous system becomes dorsal, and the ganglia and fibres become fused into a long cord, or cerebro-spinal axis, which lies protected in the bony cavities of the skull and spinal cord. Certain accumulations of ganglionic centres occur and give a varying form in the different animals, and throughout the entire cerebro-spinal axis there runs a small cavity. In the head, or cephalic end, the brain is located, the ganglion-cells, or gray matter, being usually situated on the outside of the mass, the connecting and collecting fibres, white matter, on the inside. In the lower or cord portion, the gray masses come to lie on the inside of the structure and are partly sur¬ rounded by the fibres (see Spinal Cord). The ganglionic masses in the cord remain isolated, but much shifted in their position, coming to assume in the highest types the character of rods or pyramids of gray matter embedded in the cord. From the entire nerve-axis fibres pass out and are regularly paired, bringing all parts of the body into close nervous contact bv intercommunicating nerve-fibres. In Am¬ phioxus only the foreshadowings of the ar¬ rangements in higher vertebrates may be seen, but the work of Edinger, Kupfer, His, Retzius and others has shown that most of the struc¬ tures of the higher animals are found in this low animal in their simplest forms. In the fishes the brain-hemispheres begin to show more advanced stages. The olfactory nerves and bulbs are very prominent. The optic lobes are small, and the presence of a cerebellum is only indicated. In the amphibians, frogs, toads,

salamanders and the reptilians, snakes, etc., the hemispheres are prominent, and a certain de¬ gree of complexity of their minute anatomy is evident. The olfactory lobes are still very large, the cerebellum is very poorly developed and the spinal cord is extremely simple in struc¬ ture. The pyramidal tracts are not yet char¬ acteristic, but fibre-systems are present, passing from the brain to the cord. The spinal cord remains, however, a somewhat independent organ. In the fishes a sensory spinal fibre- system is probably found. With the birds the more characteristic higher-type brain begins to show itself. Its hemispheres have convolutions resembling somewhat in type those of higher forms. The cerebellum is well developed, and shows the characteristic histological structure of more highly evoluted animals. The spinal cord has well-marked pyramidal motor tracts and a differentiated sensory tract. Finally in the mammals practically all of the structures of the human brain are present, although great variations in the size and complexity of the dif¬ ferent parts are to be noted. The brain of man differs from that of the lower animals not so much in the matter of size or weight, al¬ though it is relatively larg-e and heavy, as by reason of the almost infinite number of con¬ necting or association fibres. These bring all parts of the nervous system into relation, and permit of the endless variety of thought-con¬ structions that go to make up man in his social conditions. In man, moreover, the hemispheres become relatively much larger than the other parts of the brain, and by reason of their many fissures and convolutions make very wide areas in which countless nerve-cells develop. These hemispheres lie over the other parts of the brain. Throughout the entire animal series a certain evolution in localization takes place. Functions which in lower forms are general¬ ized, and can be assumed by any part of the nervous system, in higher animals become specialized, and are relegated to certain particu¬ lar organs. Thus it is found that in animals in which the sense of smell is extremely im¬ portant large olfactory lobes are present; and conversely, animals so situated as not to possess certain organs do not develop certain nervous structures. The eyeless animals of caves have usually small optic lobes; the footless dolphins show small pyramidal (motor) tracts in their spinal cords, etc.

In the nervous system are illustrated very thoroughly the general principles of evolution as seen in its broadest aspects, and the develop¬ ment of the richly convoluted and highly com¬ plex brain is the index of the superior mental power of the human race. Consult Beaunis, ‘L’Evolution du Systeme Nerveux) (1890), which gives a simple account of the general structural changes in the nervous system throughout animals; Parker, (The Elementary Nervous System >

(1918); Cajal, ‘The Nervous System* (trans. by Azoulay) ; Koelliker, ‘Handbuch der Gewebelehre des Menschen) (1896), for minute anatomy. For the most comprehensive works on the human nervous system, Dejerine, (Anatomie du Systeme Nerveux) (1900) ; Van Gehuchten. ‘Anatomie du Systeme Nerveux) ; Barker, (The Nervous System* ; Winkler, ‘Manual of Nervous Sys- tem) ; Jelliffe and White, ‘Diseases of the

Nervous Sy1stem) (1919). See Anatomy; Brain.

Smith Ely Jelliffe, M.D., Editor (Journal of Nervous and Mental Disease. }

NERVOUS SYSTEM, Traumatic Affec¬ tions of the. Accident and injury play a large role in the development of affections of the nervous system. The Great War has given rise to an enormous number of these traumatic disturbances. These forms of disease, or dis¬ order, may be grouped under two general heads, organic affections and psychogenic affections, the dividing line between some forms of each being very obscure. Affections of the peripheral nerves are among the commonest of the organic accidental injuries. Thus, pressure of a crutch under the arm, the use of the crutch being necessitated by a broken leg, often produces a paralysis of the muscles of the arm. Other forms of peripheral palsies result from wounds of the arm and forearm whereby a nerve is cut, either by an instrument that penetrates the skin or by a splinter of bone from a fractured limb. Paralysis of one half of the body (hemiplegia) sometimes follows severe injury to the head. Such injuries frequently result from football accidents, from falls during drunkenness, from collisions, from shell explosions, from bombs, from machine gun bullets, being thrown from a horse or vehicle, etc. Fractures of the spinal column often result in death, due to injury of the spinal cord ; and if death does not result immediately, paralysis of the entire body below the site of the fracture (paraplegia) results. Lesions of the nervous system resulting from gunshot injuries are very common in times of war and constitute a very important chapter in military surgery. Such injuries usually cause either paralysis of different parts of the body, resulting from division of the nerve-fibres, or severe neuralgic pain due to irritation of the sensory nerves. Occasionally epilepsy is caused by accidental injury to the head, especially injury to the child’s head during birth. One of the most interesting chapters in the history of traumatic affections of the

nervous system is that of <(traumatic neurasthenia,® or ((trau- matic neuroses.® These have been frequently classified under the head of (

munity who make it a business to sue railway and other corporations on the basis of alleged traumatic disease. Hysteria resulting from traumatism is of the same nature as ordinary hysteria, and is governed by the same: general laws of this disease when due to other causes. It is important to emphasize the fact, not only to the layman, but to the professional man, that traumatic neurasthenia and traumatic hysteria are real diseases, and that their consequences may be serious and disabling. Each case needs special treatment, and in all cases in which liti¬ gation occurs there should be thorough investi¬ gation by competent medical experts, as well as by trial by jury to determine the degree of dis¬ ability on its merits. Consult Hamilton, Rail¬ way Injury) ; Jelliffe and White, (Diseases of the Nervous System* ; Bailey, (Accident and Injury,* and numerous volumes on War Neuroses, all collected in bibliography of the Mental Hygiene Society of New York.

NERVOUSNESS. If one were to ask half

a dozen persons calling themselves nervous to define what they mean by their nervousness, he would find it hard to get thereby a general and comprehensive definition, for each would fail in describing his particular variety of nervousness. The nervous business man feels in a perpetual hurry. He is impatient and restless while wait¬ ing for his car or for his luncheon. He eats quickly, talks rapidly and when he has a chance to rest he fidgets. At night he tosses and thinks for an hour or two before sleeping; but, instead of thinking consecutively his ideas flash around in a distracting circle that leads to no conclu¬ sion. The nervous woman of leisure starts at the slightest noise; she feels bright and like herself during any exciting pleasure, but has the blues and is morbidly depressed when life is dull. She has headaches and moods in which she wants to scream. The overworked nervous student broods over his studies, cannot fasten his attention on his work, and what he has once known well he fears he has forgotten, and he expects to fail in his examinations. The young girl who is nervous about playing or re¬ citing before an audience finds that her heart beats furiously; her hands are icy and stiff, and when she sits down at the piano the notes dance wildly before her eyes. The nervous mother or housekeeper is troubled by her irritability. She is distracted, forgets where she puts things and cannot remember what she started to do. At night she excuses her ((good cry® as relief to her nerves.

All such people agree that nerves are the bane of modern civilization, and it seems to be taken for granted that nerves are a new de¬

velopment of the human anatomy. When na¬ tional comparisons are made, Americans will generally admit, in fact claim, that they are the most nervous of nations. To be nervous seems to imply the possession of a finer sensibility, a greater responsibility in affairs hnd a more strenuous and enviable mode of living. Hence the afflicted dwell with relish upon their symp¬ toms, with a lurking contempt for such as do not manifest the like.

To have nerve, however, is quite a different thing from having «nerves.» Nerve implies the ability to bring all one's powers under control of the will, to keep steady in trial and danger, calm when others are in panic, and buoyant

through any crisis This modern use of the word nerve and the common supposition that the nerves which play such pranks with man's mind and temper and disposition are all in some way under control of the will illustrates the vagueness of general knowledge concerning the nervous system and its relation to nervousness.

he absolute control of man's nerves is no more a thing of his will than is the growth of a plant. The power that he calls his will is but the steadily directed training of portions of his nervous system to act in a desired way ac¬ cording to certain decisions. The most pitiful sight in life is a man who «has no will,® who has noble impulses and high desires with no disciplined nervous machinery to carry them out. The men and women who are known to have that will pdwer which carries them through ordeals, and who are productive in their activities, are those who have been ac- customed to ((do noble things, not dream them all day long.® As all success in life, as well as every pleasure of mind or body, depends on a

r L"C°i_ndltloned nervous system, it is a matter of highest moment to know how to preserve train and care for one's ˆnerves.®

Not every man is born equal in his nervous equipment. . Some inherit an excellent nervous system, which thev may dissipate with unwise living, or may husband and improve. Others have very little vigor of the nervous system, but by careful training and right living they spend only what nervous force they can spare. With a poor heritage, in the strenuousness of city life, and sharing the prevalent ignorance concerning the nervous forces, a man may feel that by excessive work

he is making a brave and. noble struggle to succeed, when in reality he is spending his nervous capital, and at 40 will be a wreck.

Every spoken or written word, every plan every carefully executed order that takes thought, every act of attention and every bit of creative work means direction of energy. Rest, sleep, recreation, and pleasing work enable the nervous system, to renew in a few hours all that it has lost, with ability gained to do the same kind of work the next day with less of voluntary effort, and consequently less fatigue.

The slowly, accumulating nervous power that shows itself in increased accuracy and judg¬ ment makes men successful and prevents ner¬ vousness. Too. many girls and boys, in their student days, in their social or university careers., in their early business ambitions, are so anxious to succeed quickly that they spend more of their nervous capital than can come back to them in the time allowed for sleep and recreation, until finally they find themselves nervous bankrupts. (

In no part of the bodv are the effects of heredity so marked as in the nervous system, but most conclusions regarding this are based ˆ reasoning. It can never be shown

that, because two highly nervous, excitable or hysterical persons marry, their children must have the same strain; for a healthful environ¬ ment and good physical and mental training can overcome, the tendency to lack of nervous con¬ trol. Neither can it be assumed that the chil¬ dren of two calm, well-balanced persons, of good nervous force, will grow up to be like

their parents; for disease, overwork and dis¬ sipation may ruin the best nervous organization.

he chances are, however, that the same en¬ vironment and training which have helped to exaggerate the nervousness of parents will also surround and affect their children, as it is equally probable that the wise and healthful training which has developed good nervous stock in parents will be passed on to their off¬ spring.

Neurologists term this inborn tendency in the nervous system to give way under stress the neuropathic tendency, or nervousness. They niean that, while no actual nervous disease is inherited, yet under the stress of habits and environment the nervous system fails to meet the demands made upon it. A man with this neuropathic tendency who drinks even moder¬ ately usually becomes nervous and less capable where another might suffer almost no ill effects’ lwo students may

smoke cigarettes incessantly and one develop shaky muscles, an irritable heart, dyspepsia and nervous breakdown; the other feeling no ill effects. A certain percentage or telegraphers, typewriters, writers with the pen, pianists, tailors, ballet-dancers, etc., de¬ velop occupation-neuroses with muscular cramps and consequent disability, by reason of the extra burden put upon a deficient nervous inheritance.

. The inheritance of a sound nervous organiza¬ tion means that a child is born with sufficient nervous energy . to control its body and not so a.s stimulate it to excess. Perfect health in a mother during pregnancy means a valuable., asset, for her child's nervous system, bhock, fatigue, infectious disease in the mother may even stop the child's nervous development and cause the babe to be born an imbecile. A normal infant at birth has the mechanism of its nervous system definitely laid out though wholly undeveloped. All growth comes through repeated experiences, which begin with the first day of life, and on that day the training of the nervous system should begin. Clock-like regu- arity in the hours of eating and sleeping is the first step in the healthful training of an infant s nervous system. By control of the in¬ voluntary start on hearing loud sounds, a child may be so trained as to be spared much nerv¬ ousness when he grows up. Parents, by word and example, should teach their children to work with concentrated attention in spite of distracting sounds. It is the total lack of train¬ ing that makes it impossible for so many nerv¬ ous people to inhibit their reflex actions. They tremble, shudder, start, exclaim, are disturbed in their work, wakeful at night, simply be¬ cause they have always allowed their nerves to respond to trifling stimuli, instead 'of inhibiting the. responses. All mechanical actions all brain actions tend by repetition to become automatic. The muscle-worker rarely suffers from nerv¬ ousness. But in the brain-worker the estab¬ lishment of new connections bring great nerve- tire. . So the expenditure of nervous energy in . orming new nerve-connections, receiving new impressions, etc., tends to make the most agree¬ able occupations exhausting. Let it be remem- bered by the older generations, and taught to the younger, that the training and directing of nerve-force are vitally important to health' and efficiency, and that the great workers achieve their ends by that very quality of well-directed

energy which, if dissipated, degenerates into nervousness. See

Psychoneuroses; Nervous Diseases.

Smith Ely Jelliffe, M.D., Editor ‘ Journal of Nervous and Mental Disease. ’

NESBIT, nez’bit, E. See Bland, Edith Nesbit.

NESR, in Arabian mythology, an idol in the form of a vulture, worshipped by the tribe of Hemyer.

NESS, Loch, Ioh nes, Scotland, a lake of Inverness-shire, on the line of the Caledonian Canal. It is long and narrow, stretching south¬ west and northeast about 22 miles, with a fairly uniform breadth of about a mile and a maximum depth of 780 feet. Its northeastern extremity is about six miles from Inverness. Fort Augustus is situated at its southwest end. It occupies the centre of the valley of Glen- more and is enclosed by steep and often finely wooded hills, about 1,000 feet high. The out¬ let is by the Ness into the Moray Firth.

NESSELRODE, nes’sel-ro-de, Karl Rob¬ ert, Count, Russian statesman : b. Lisbon, 14 Dec. 1780; d. Saint Petersburg, 23 March 1862. His father was Russian Ambassador to Portu¬ gal, and the son also, at an early period, en¬ tered the diplomatic service, and in 1807 was made councillor of the Russian embassy at Paris. He succeeded in detaching Russia from the Austrian alliance and was present at the important conferences between Napoleon, Alex¬ ander I and the German princes, at Erfurt in 1808. He gained immense influence over Alexander’s mind; was made chancellor of the empire, and dictated its foreign policy; fol¬ lowed the emperor to France in 1814 and signed the Quadruple Alliance ; and took part in the Congress of Vienna. He was one of the chief formers of the Holy Alliance, which made Russia virtually supreme in Europe. He became Minister of Foreign Affairs in 1816 and took part at the congresses of Aix-la- Chapelle, Troppau, Laibach and Verona. Nes¬ selrode’s influence was considerably limited un¬ der Nicholas I and he strove in vain to avert the war which broke out in 1853. After the accession of Alexander II and the signing of the Treaty of Paris in 1856, Nesselrode retired from the Foreign Office, but continued in the Chancellorship, and also held a seat in the Min¬ isterial Council. His autobiography appeared in 1866.

NESSUS, nes’us, in Greek mythology, a centaur whom Hercules ordered to carry his wife, Deianira, across a river. The centaur ill-treated the woman, and Hercules shot him with a poisoned arrow. Nessus, in revenge, gave Deianira his tunic, saying whomsoever she gave it to would love her exclusively. Deianira gave it to her husband,

who was poisoned and, after enduring agony, threw himself on a fun¬ eral pile and was consumed.

NESTOR, Russian monk and author, of the 11th century. He was of the Cave Monastery at Kiev, and wrote an account of the martyrs Boris and Gleb, and a 'Life' of Theodosius, a former abbot of his monastery. For a long time he was regarded as at least the original author of the so-called 'Chronicle of Nestor,' the most important of the early authorities for

Russian history, but later investigations have proved the supposition erroneous. The 'Chron¬ icle,' perhaps the work of Abbot Silvester, gives an account of Slavonic history in the form of annals for the period 850-1110 a.d., the last 40 years being from a contemporary viewpoint. For the preceding time, use is made of the Byzantine historians, the Bible, the Apoc¬ rypha, traditions, biographies and legends of saints and the records of monasteries, etc. There are various translations into German by Schlozer (as far as 980 only) ; in his 'Russische Annalen' (1802-09) ; into French by Leger (1884).

NESTOR, in Greek legend, one of the heroes at Troy distinguished for his great age, experience and wisdom as well as for his mild and persuasive eloquence. These are the qual¬ ities Homer has attributed to him in the 'Iliad.' He was the son of Neleus, king of Pylos, and was born in Gerenia, in Messenia. He suc¬ ceeded his father as king of Pylos. In his youth and manhood he distinguished himself by many bold exploits, and early acquired the repu¬ tation of a prudent counsellor and persuasive orator. Though he had lived through two generations when the expedition to Troy was undertaken he nevertheless took part in it, and conducted the forces under his command in 20 vessels to Troy. On account of his extreme age he did not take a personal action in the en¬ counters before the city. The part which is attributed to him in the 'Iliad' is that of an experienced counsellor. He had several sons and daughters, but they are not distinguished in history. After Nestor had outlived three gen¬ erations he died quietly at Pylos, where, in the time of Pausanias, the inhabitants pretended to distinguish his dwelling and his grave.

NESTORIAN MONUMENT, a famous

archaeological stela, known locally as "Ching- chiaopi," erected in 781 a.d. at Sian-fu (q.v.) in northwestern China. It records the introduc¬ tion of Christianity in the Celestial kingdom by Nestorian missionaries in a.d. 631, under the name of the "Luminous Doctrine." This cele¬ brated tablet was erected at the zenith of Nes¬ torian Christianity in

China. It disappeared during the political and religious upheaval under the Emperor Wu-tsung about 845, which laid the city in ruins, and also marked the de¬ cline of Christianity in China, although in the 13th century Marco Polo refers to Chinese Christians as still maintaining their faith. In 1625, workmen digging in the Chang-ngan suburb uncovered the valuable record and it was restored by Father Semedo, S.J. The first translation of the inscription was published by Father Kircher, S.J., in 1636. Doubts as to its authenticity raised, among many others by Voltaire and Renan, and the charges of a "pia frauda — a pious fraud," laid to the Jesuit brotherhood, were disproved by Pere H. Hav- ret, S.J., in his exhaustive work, 'La Siecle chretienne 'de Si-ngan-fou' (1895). The stela, which is 10 feet high and weighs two tons, was re-erected embedded in a brick niche, and long stood as one of a row of five memorial tablets, exposed to the atmosphere, in the enclosure of a ruined temple. About 1891 a shed was built above it, but in 1907 the priceless monument was entirely unprotected when the Danish ex¬ plorer, Fritz von Holm, visited Sian-fu to try

Photograph presented by Dr. frits von Holm

THE ORIGINAL NESTORIAN MONUMENT OF A. D. 781

The picture represents the monument as it now stands, protected and under roof as a result of THE HOT M- NESTORIAN EXPEDITION TO SIAN-FU, 1907-1908, in the "Peilin" ("stone coppice") of Sian-fu near the south gate, fhe priceless monument was practically exposed to wind and weather from A. D. 1S25, when it was found, till 1907, when the Danish explorer, Dr. Frits v. Holm, M.R.A.S., visited it and had a limestone replica made. The tablet is 10 feet high and weighs two tons. The replica is in the MetroDolitan Museum nf Art in New York city

and procure the tablet in the interest of science, n this he was unsuccessful, but he obtained a perfect limestone replica, which was brought to iNew York and placed as a loan in the Metro¬ politan Museum of Art. In 1917 it was placed m the Lateran Palace, Rome. The local man¬ darins caused the original tablet to be removed to the

The inscription consists of more than 2,000 characters, Chinese and Syriac or Estrangelo. It records (a) an abstract of Christian doc¬ trine;

(b) the arrival in 631 of Nestorian mis¬ sionaries; how in 636 they were allowed to settle at Ch'ang-an, the ancient name of Sian-fu ; that in 638 an imperial decree was issued stating that Olipan, described as a Per¬ sian priest from Tats'in, bearing sacred books and images had arrived in 635; that he had presented a form of religion which his majesty the Emperor T'ait-sung, an eminent ruler, had closely examined and had found to be satis¬ factory in every particular; that henceforth it would be permissible to teach this new doc¬ trine within the boundaries of the empire. The establishment of a church and monastery to be served by 21 priests, built in the ((Ining fang — the court of justice and peace, was authorized. The emperor's portrait was tq be placed in the church. A description of the emperor's virtues and of the work of the church is added. The Syriac portion which brings the tablet to a conclusion gives the name of the reigning Nestorian patriarch, Man Hanan Ishua, that of Adam, bishop and pope of China, the names of the clerical staff and of 67 persons, including 61 in Chinese, the majority designated as priests. Consult Holm and Cams, (The Nestorian Monument* (Chicago 1909) ; Legge, J., (The Nestorian Monument of Hsi-an-Fu* (London 1888) ; Parker, E. H., (Studies in Chinese Reli¬ gion (London 1910) ; Yule, H., (Cathay and the Way Further) (2 vols., London 1866) ; William, S. W., (The Middle Kingdom* (Lon¬ don 1883) ; Williamson, A., (Journeys in North China) (London 1870).

NESTORIANISM, the theory of the In¬ carnation of Jesus Christ taught by the Nestor- ians or followers of Nestorius. Nestorius was a presbyter of Antioch who in 428 was made patriarch of Constantinople and was charged with teaching that there were two persons in Jesus Christ, of which one is the word of God, and the other the man Jesus, and that Mary his mother ought not to be styled mother of God (Theotokos) but mother of Christ (Chris- totokos). Cyril, patriarch of Alexandria, ac¬ cordingly accused him of teaching the dual per¬ sonality of Christ, a view which was formally condemned and anathematized by the Third Council of Ephesus, 431. He was deposed, driven from one place to another and died in obscurity in 440. The controversy lasted for two centuries. In 435 the Nestorians who had organized themselves into a church in Syria took refuge from the persecutions of the Orthodox church in Persia, Mesopotamia and Arabia, assuming the title of Chaldaean Chris¬ tians. At the Council of Seleucia (498) the Persian Church clearly formulated this dogma in opposition to the teaching of the Catholic Church. These views flourished in Antioch, Edessa and Nisibis and their adherents were

the fosterers of learning in history, philosophy and medicine and

under the Arabian domina¬ tion were often raised to high posts in the government. It spread even to China where a monument of the 7th century bears testimony of its existence. The Moslems treated the Nestorians with much toleration, probably as a means of keeping up a division of Christianity in the East. Nestorianism reached its most important period in the 13th century when it numbered 25 archbishops and about 200 bishops. The Catholicus was an important rival of Rome. With the fall of Bagdad in 1258 the Catholicus, as the head of the Nestorian Church is called, was driven from place 'to place, church organization was disrupted and discipline was maintained with ever-increasing difficulty. Tamerlane in the 14th century desolated the Nestorian Church throughout almost all Asia so that only a remnant escaped to the moun¬ tains of Kurdistan. Under Popes Alexander III, Innocent IV and Nicholas IV some at¬ tempt was made in the 16th century to effect a union with the Roman Church in consequence of which the United Nestorians separated from the main body of the Chaldsean Christians. These separatists (Uniats) are numbered at some 100,000, with 150 churches and 150 priests. They acknowledge the primacy of Rome but use a Greek liturgy and retain clerical mar¬ riage. Their patriarch has his see at Diar- bekir, Asiatic Turkey. They are usually called Uniat-Chaldaeans. The Non-United Nestorians in Mesopotamia, Persia and Syria celebrate the sacrament of baptism and the Lord's Supper but do not teach Transubstantiation ; they num¬ ber some 150,000 souls with about 300 churches, 12 bishops and about 250 priests. The Nes¬ torians of India are called Christians of Saint Thomas; in 1599 a little more than half their number acknowledged the primacy of the Ro¬ man see. These Uniats number about 200,000. The India Non-Uniats number about 150,000 at the present time. Consult Assemani, bib¬ liotheca Orientalis* (Vol. Ill, Rome 1728) ; MacLean and Brown, (The Catholicus of the East and his People) (London 1892) ; Hore, A. H., (Students' History of the Greek Church * (i'b. 1902) ; Adeney, W. F., (The Greek and Eastern Churches) (New York 1908) ; Schaff- Herzog, Encyclopedia of Religious Knowl¬ edgeˆ (Vol. VIII. ib. 1914) ; Wace and Piercy,

(Dictionary of Christian Biography and Litera- ture) (Boston 1911) ; Badger, (The Nestorians and their Ritual 5 (2 vols., London 1852) ; Rae, (The Syrian Church in India* (1892).

NESTORIUS. See Nestorianism.

NESTS OF BIRDS. See Birds, Nests of.

NET, an open fabric made of hemp, jute, flax and sometimes of cotton and other fibres. The open spaces are called meshes and in order that

these may retain their shape and size the fibres of which the net is made have to be knotted at the intersections. Nets were for¬ merly made only by hand, but an ingenious kind of loom has for many years been in use by which the operation of netting can be per¬ formed mechanically. Nets are used for a great variety of purposes, but chiefly for fish¬ ing. The three chief kinds of nets used in fishing are the seine, the drift-net and the trawl. The first two are very long in proportion to

iheir breadth and differ from one another only in the manner in which they are employed. T he seine has a line of corks along one of its long borders and a line of leaden weights along the other; so that when the net is thrown into the water it assumes a perpendicular position. The drift-net is not loaded with lead, but floats in the water. The trawl, again, is dragged along the bottom by the motion of the boat. Nets are also used to catch birds and animals, to protect crops from birds, the blossoms of trees from frost, etc. Wire nets or netting is also used for . domestic purposes.

NETHERLANDS, Kingdom of the, fre¬ quently called HOLLAND, a northwestern European country with a north and western coastline of 470 miles on the North Sea, its eastern frontier bounded by Germany and its southern by Belgium. It comprises the north¬ ern and smaller half of the numerous provinces formerly combined under the name Nether¬ lands or Low Countries, part of which is now included in Belgium. It received its general English name of Holland from its coastal provinces North and South Holland. From north to south the country has an extent of 150 miles, with a breadth from west to east of 120 miles throughout and a total land area of 12,582 square miles.

Political Divisions. — The Netherlands at the present day has nearly the original limits of the Seven United Provinces in the 16th cen¬ tury. The modern provinces are given in the accompanying table :

PROVINCES

Area in sq. miles

Population

1916

North Prahant, .

1,920

699 , 838

1,939

707,898

1,131

1,599,164

North Holland .

1 ,066

1,244,499

7.pHˆLid .

707

243 , 698

Utrfirfit .

525

320,913

TYi Poland .

1,243

380,526

1,295

426,010

Omni’ n pp.n .

881

355,154

l~)rpnt.ViP. .

1,028

196,505

T.imhiirp .

847

409,022

12,582

6,583,227

The duchy of Luxemburg (q.v.) was under the sovereignty of the king of Holland, until the death of ‘William III in 1890 dissolved this union. The most densely peopled province is South Holland (981 per sq. m.), and the least densely peopled is Drenthe (144).

Topography and Physical Features. — The Netherlands forms the most characteristic por¬ tion of the great plain of northern and western Europe. From the middle of Belgium, a few miles northeast of Brussels, the country be¬ comes a dead level, extending in monotonous sandy flats through Hanover, Jutland, Holstein and with little interruption through Prussia into Russia. The lowest part of this immense level and that which has most recently emerged from the sea is the country lying between the mouths of the Schelde and Ems. Within this distance the Rhine, joined by the Maas, Yssel and other rivers, enters the sea through a num¬ ber of arms and sluggish, winding channels. This delta in early ages was evidently liable to

perpetual change of form, as new mud-banks were deposited, old channels being blocked up and new ones formed. In addition to this the river floods, in forming a domain of alluvial deposits, had to contend with the sea, which washed away the accumulations of mud or covered them with sand, according to the vicis¬ situdes of weather and season. The soil of the Netherlands shows everywhere the proofs of this struggle between the ocean and the river, in the alternation of salt and fresh water de¬ posits. It therefore became a problem of ex¬ istence with the early inhabitants to secure the natural permanence of their territorial posses¬ sions, by embankments high and strong enough to protect them under ordinary circumstances from the waves ; by windmills on the embank¬ ments — a characteristic feature of Dutch land¬ scapes — they worked the pumps which drained the

enclosed lands. In consequence, the Neth¬ erlands has the appearance of an artificially constructed country, some portions of which are 16 feet below the surface of the sea and nearly all too low for natural drainage. The whole country is divided by dikes, some of them 60 feet high, which protect portions of land from the sea, lakes or rivers. These enclosed lands are called polders. On the chief dikes are roads and canals also joining the rivers, the canals generally large' enough to be navigable. There are no mountains nor rocks in the Netherlands, which is popularly described as a country with¬ out mountains, wild trees or natural springs. The only heights are the sand-hills, about 100 to 180 feet high along the coast of Holland; and a chain of low hills, of similar origin, per¬ haps, which extend from the middle of the province of Utrecht into Gelderland.

The principal coast features are the wide estuaries of the Schelde and of the Maas, the latter receiving the waters of the Rhine ; north of the Maas the Zuider Zee, which was formed by an irruption of the sea in the be¬ ginning of the 13th century and now covers an area of 1,200 square miles. Between the mouths of the Maas and the entrance of the Zuider Zee, a distance of 75 miles, the coast is chiefly formed of sand-hills or dunes, frequently 180 feet high, dreary and sterile to the last degree ; and separating, with their broad band of irre¬ claimable desert, the low fertile meadows on the one side from the waves of the ocean on the other. In a line with these dunes, stretch¬ ing beyond the mouth of the Zuider Zee, runs a chain of islands, namely, Texel, Vlieland, Ter- schelling, Ameland, etc., which seem to indi¬ cate the original line of the coast before the ocean broke in upon the low lands. The coast of Friesland, opposite to these islands, depends for its security altogether on artificial embank¬ ments. The Lauwers Zee, a deep bay on the confines of Friesland and Groningen, also owes its origin to an irruption of the ocean ; and again the Dollart, a gulf at the mouth of the Ems, between Holland and Germany, wajs formed about half a century later than the Zuider Zee and by a similar convulsion, which is said to have swept away 70 villages and 100,000 people. From the left bank of the Ems extends the Bourtang morass, a vast and irre¬ claimable peat marsh, partly in Germany, partly in Holland ; the Peel, a marsh of like nature but less extent, lies near the left bank of the Maas,

˚n the east . side of North Brabant. The work of reclaiming the waste is constantly going for¬ ward; in the provinces of North and South

Holland alone about 90 lakes have been drained. The principal of these was the Lake of Haarlem, the drainage or which, begun in 1839, was completed in 1852. The draining of large portions of the Zuider Zee has been be¬ gun.

Hydrography.— The chief rivers of the Netherlands are the Rhine, Maas, Schelde, Yssel, Vecht and Hunse. The Rhine is above half a mile wide where it enters the Nether¬ lands ; it soon divides, the south and principal arm taking the name of Waal and uniting with the Maas, while the north arm, communicating with the Yssel, takes the name of Leek; a branch from it named the Kromme (crooked) Rhein, winds by Utrecht to the Zuider Zee, while another very diminished stream called the Old Rhine flows from Utrecht by Leyden, to the sea at Katwijk. The Maas, entering the Netherlands from Belgium, receives the Roer; of the Schelde only the mouths, the east and the west, or Old Schelde, lie within the Dutch boundary. The Yssel and Vecht, flowing from Germany, both enter the Zuider Zee by mouths at no great distance asunder. The Hunse, rising in the Bourtang Marsh, flows through Groningen to the Lauwers Zee. The canals of the Netherlands are collectively more important than the rivers. The chief is the great ship canal, 26 feet deep and 197 wide, from Wijk, on the North Sea, to Amsterdam, and connected by locks with the Zuider Zee, opened in November 1877. This great canal shortens the distance between Amsterdam and the sea to about 15 miles. The North Holland Canal allows large ships to pass between Am¬ sterdam and the Helder, a distance of 40 miles, so as to avoid the intricate navigation of the Zuider Zee ; the Winschoten Canal, also for ships, 18 miles long, connects the Dollart with Groningen ; the Damster-Diep, of equal mag¬ nitude, runs from Groningen to the sea at Del- fzijl; another canal connects Harlingen, on the Zuider Zee, with Groningen ; the Nieuwer Sluis unites Utrecht with Amsterdam, while the latter city also communicates with Rotterdam. The Dutch canals are much used by passengers and the slowness of the trekschuyts or boats is com¬ pensated in some measure by their punctuality. In winter their frozen surface offers convenient roads to skaters and they are then traveled over with greater speed.

Climate. — The climate is extremely humid, changeable and disagreeable ; violent winds, with varying temperature, frequently blow from southwest or northwest and heavy sea-fogs are driven in which injure vegetation. The mean average annual temperature is 50° F. ; 35° in January and 65° in July; the average an¬ nual rainfall is 26 inches. The winter is severe and the sky is almost always overcast and troubled. The bright days hardly exceed 40 in the year. Low fevers visit the marshy dis¬ tricts in autumn, but the dry cold of winter

restores the peasant's health. Although the cli¬ mate is to strangers cheerless and depressing, its prejudicial effects on health are counter¬ balanced by good food and clothing and habit¬ ual cleanliness ; the Dutch give particular at¬ tention to these domestic safeguards, and, not¬

withstanding the ungenial climate in which thev live, longevity is not rarer among them than elsewhere.

Agriculture, etc. — Horticulture and agricul¬ ture have been developed to a high degree of perfection, although the latter holds a subordi¬ nate place in rural industry. The soil consists chiefly of alluvial deposits. Wheat, of excel¬ lent quality, is grown only in favored portions of the south provinces. Rye, oats and buck¬ wheat, with horse-beans, beet, madder and chicory, are more common crops; and tobacco is cultivated in the provinces of Gelderland, South Holland and Utrecht; flax in Zeeland and the environs, of Dortrecht, and hemp, oil¬ seeds and hops in various parts of the king¬ dom. Culinary vegetables are cultivated on a much larger scale for home use and also for the exportation of the seeds, which form an im¬ portant article of Dutch commerce. Dutch agriculture atones in thoroughness for what it lacks in extent. The farmers are highly skilled and to them many of the chief improvements in modern agriculture are due. The culture of flowers and especially of flowering bulbs has long been one of the most important industries of the country and is of ever-increasing im¬ portance. The chief centre of this industry is Haarlem and every year large quantities of bulbs of all kinds are exported to foreign coun¬ tries. It is in stock, and dairy produce in particular, that the rural industry of the Neth¬ erlands shows its greatest strength. Their horses are remarkable for size and strength and much sought after; and in the number and excellence of their horned cattle the Dutch stand equally high. The poultry-yard is also to the Dutch farmer a source of wealth. Bee- culture is likewise actively carried on, especially in Gelderland and Drenthe. The quantity of cheese and butter brought to market is enormous. About 2,100,000 acres are under cul¬ ture, nearly 3,000,000 are pasture land, over 150,000ˆ are devoted to gardens and orchards, some 620,000 are forest, about 1,500,000 are un¬ cultivated heath, fully 300,000 are water and morass and about 125,000 acres are occupied by dikes and roads.

Manufactures and Commerce.— Manufac¬ tures have never held a very important place, though the linen of the Dutch Netherlands has long held the first rank. The manufacture of woolen cloth centres in Leyden, Utrecht and Tillburg. The distilleries of Schiedam are well known; Gouda supplies tobacco-pipes, the best of their kind; and the

same praise may be be¬ stowed on the leather, the refined sugar of the Dutch, the pottery, bricks, tiles, glassware and many other articles intended for Continental use. Ship-building and the manufactures sub¬ sidiary to that industry are largely carried on in many places. Coal is mined in the province of Limburg, the mines chiefly belonging to the state; 2,262,148 tons were extracted in 1915, valued at $7,510,000. The commerce with the Dutch possessions in the East Indies, partic¬ ularly Java, is of great and continually increas¬ ing importance. The total exports of home produce and imports for home consumption, inclusive of bullion and specie, in a normal year were, imports $1,632,500,000 ; exports $1,285,000,000. The trade is chiefly with Great Britain and Germany.

Shipping, Navigation and Fisheries. — The

mercantile navy of the Netherlands numbers 786 vessels of 40 tons and # upwards ; 406 steamers of 716,192 and 380 sailing vessels of 44,473 ; making a total tonnage of 760,665. The vessels entered in 1917 were 2,184 of 5,260,832 tons ; cleared, 2,186 of 5,078,379 tons. The herring, oyster and other fisheries of the North Sea employed 6,151 vessels of all kinds, manned by over 23,800 seamen. The oyster fishery yields over 1,900 tons annually, while the value of the herring fishery is estimated at $1,273,085.

Railways, the Post Office, Telegraphs, etc — The total length of railways in the Neth¬ erlands is over 2,382 miles, which belong to private companies. The ˆrailways yield an annual revenue of $40,101,250; the expenditure is $30,772,920. The post office is well organ¬ ized and also yields a revenue in excess of the expenditure. The length of state _ telegraph lines in operation is about 5,172 miles. The canals have a length of 2,000 miles (see para¬ graph on Hydrography).

Money, Weights and Measures.— The guilder or florin, value 40 cents, is the chief denomination of money. Ten-guilder gold pieces are coined, but silver is chiefly in cir¬ culation. The French metric system of weights and measures has been adopted, the principal names being — the kilogram or pond, metre or el, gilometer or mijl, are or vierkante roede, hektare or bunder, stere or wisse, litre or kan, and hektolitre or vat.

Government, Finances, etc. — The king¬ dom of the Netherlands, as now constituted, is a constitutional monarchy. The executive pow¬ er lies wholly with the soyereign, who shares also in the work of legislation with the States- General. These consist of two chambers — the upper with 50 and the lower with 100 members — who assemble for deliberation and dispatch of business at The Hague (’Sgravenhage). The members of the upper chamber are elected by the provincial states from among the most high¬ ly assessed inhabitants of the various counties; the others are elected by ballot, at the rate of one deputy to every 45,000 souls. The govern¬ ment is strong and the administration in every department is simple and economical. The revenue of the Netherlands during the last few years has averaged about $56,000,000 per annum and the expenditure about $58,000,000. The debt of the state amounts to about $485,- 000,000, the interest on which forms the largest branch of the expenditure. The chief items of revenue are yielded by the excise and direct and indirect taxation. The army comprises some 150,000 men on a war footing, but only about 30,000 altogether in peace, and 1,500 offi¬ cers. It is formed partly by conscription and partly by enlistment. Substitution was abol¬ ished in 1898. The army of the East Indies is about 42,000 strong, the navy comprises 7 first-class iron-clads and 5 cruisers, besides a number of gun-boats, 36 torpedo-boats, train¬ ing-ships, 9 submarines, a submarine depot ship, 2 mine layers, etc.

Colonies. — In addition to her European territories the Netherlands possesses a wide ex¬ tent of colonies and dependencies in Asia and America, with which she carries on extensive commerce and which contribute materially to her greatness. Her chief Asiatic colonies are the Dutch East Indies (q.v.) comprising Java,

Sumatra, part of Borneo, Celebes and part of New Guinea, with Banca, Bali, Lombok, Sum- bawa, Flores and other islands in the Malay Archipelago ; while in America she possesses Surinam or Dutch Guiana, and the West In¬ dian islands of Curasao, Saba, Saint Eustatius, etc. Estimated area, 782,863 square miles ; pop. about 34,000,000.

Ethnology. — The stock to which the peo¬ ple belong is the Teutonic, the great majority of the inhabitants being descendants of the old Batavians. They comprise over 70 per cent of the population and are chiefly settled :n the provinces of North and South Holland, Zea¬ land, Utrecht and Gelderland. The Flemings of North Brabant and Limburg and the Frisians, inhabiting Friesland, Groningen, Drenthe and Overyssel, form the other groups.

Population. — As given in the paragraph P o- litical Division the total population in 1916 was 6,583,2 27, of whom 3,270,859 were males and 3,312,167 females.

Education. — In respect of education the Netherlands occupy a high place among the nations of Europe. In 1857 a non-denomina- tional primary instruction law was passed and in 1878 this law was supplemented by another containing more stringent regulations with the view of making primary education more gen¬ eral. In 1900 instruction was made obligatory. An act passed in 1889 diminished public instruc¬ tion and encouraged private instruction, which is now supported by the state. The cost of public primary education is borne jointly by the state and the communes, the former con¬ tributing to teachers' salaries and being respon¬ sible for one-quarter of the cost of founding or purchasing schools. Above the primary schools are the middle class, secondary and classical schools, a polytechnic institution at Delft, spe¬ cial colleges for agriculture, horticulture, etc. There are four public universities, namely, at Leyden, Utrecht, Groningen and Amsterdam, and also a private university.

Religion. — A majority of the inhabitants be¬ long to the Reformed Church and Roman Cath¬ olics also are numerous. The members of all religious denominations possess, by the Consti¬ tution, perfect liberty of conscience and social equality. The number of Protestants is over 3,068,000; of Roman Catholics, about 2,000,000; Jews, 104,000; other religions, 18,000; persons not belonging to any religious body, 115,200. The Reformed Church is Presbyterian in gov¬ ernment, while the Roman Catholics are ruled by an archbishop and four bishops.

History. — The south portion of the Low Countries belonged at the beginning of the Christian era to Belgic Gaul. (See Gaul). The north portion, inhabited by the Batavians and Frisians (q.v.), formed part of Germany. The south portion as far as the Rhine was held by Rome up to 400 a.d., after which it came under the rule of the Franks, as did also subsequently the rest of the dountry. In the 11th century the territory comprised in the present kingdoms of Belgium and the Nether¬ lands formed a number of countries, mar- quisates and duchies corresponding more or less with the modern provinces. By the latter part of the 15th century all these had been ac¬ quired by the Duke of Burgundy and passed to the house of Hapsburg on the marriage of the daughter of Charles the Bold of Burgundy

1 Bridge and Palace of Industry, Amsterdam

2 The Fishpond at The Hague

-

VC

• 2**

•

to the son of the Emperor Frederick III. On the abdication of Charles V in 1556 they passed to his son Philip II of Spain (q.v.). In conse¬ quence of religious persecution in 1576 Holland and Zeeland openly rebelled and in 1579 the five north provinces— – Holland, Zeeland, Utrecht, Guelders and Friesland — concluded the cele¬ brated Union of Utrecht, by which they de¬ clared. themselves independent of Spain. They were joined in 1580 by Overyssel and in 1594 by Groningen. After the assassination of Wil¬ liam of Orange, 10 July 1584, Maurice became stadtholder (governor). His victories at Nieu-port and in Brabant, the bold and victorious ex¬ ploits of the Dutch admirals against the navy of Philip II, the wars of France and England against . Spain and the apathy of Philip II, caused in 1609 the Peace of Antwerp. But Hol¬ land had yet to go through the Thirty Years' War before its independence, now recognized by all the powers except Spain, was fully se¬ cured by the Peace of Westphalia. In the mid¬ dle of the 17th century the United Netherlands was. the first commercial state and the first maritime power in the world, and for a long time maintained the dominion of the sea. The south provinces alternated between the rule of Spain and Austria till 1797, when they came under the power of the French Republic. In 1806 Louis Napoleon became king of Holland, but in 1810 it was incorporated with the French Empire. In 1814 all the provinces both of Hol¬ land and Belgium were united by the Treaty of Paris to form the kingdom of the Nether¬ lands. This arrangement lasted till 1830, when the south provinces broke away and formed the kingdom of Belgium. King Willem I at¬ tempted to reduce the revolted provinces by force but the great powers intervened, and finally matters were adjusted between the two countries in 1839. The king abdicated in 1840, and was succeeded by his son Willem II (1840- 49), he being again succeeded by his son Wil¬ lem III, whose reign on the whole was un¬ eventful.

Slavery was abolished in the Dutch West Indian possessions in 1863, slave-owners receiving compensation. In 1873 the Dutch be¬ gan a war with the Acheenese of Sumatra, and hostilities have lingered on ever since. In 1887 the Heemskerk Liberal .ministry passed a bill amending the Constitution.

On 23 Nov.. 1890, the king died, and was succeeded by his young daughter, Wilhelmina Helena Pauline Maria, under the regency of her mother, the Queen-dowager Emma. The year 1892 was marked by serious disturbances among the unemployed, and in 1893 the So¬ cialists carried on a vigorous propaganda. In 1896 the franchise was extended by a new bill, which received the regent's assent. Besides the unsuccessful war against the people of Acheen, in Sumatra, the Dutch in 1894 had to face also a revolt in the island of Lombok. A Dutch force met with a serious disaster here., but soon afterward General Vetter re-established the authority of the Netherlands. In 1898 Queen Wilhelmina attained her legal majority, and formally took up the reins of government. The most notable event of 1899 was the meeting of the great Peace Conference at The Hague. (See Hague Court). In 1900 primary educa¬ tion was made compulsory by law. In Febru¬ ary 1901, the queen married Prince Henry of

Mecklenburg-Schwerin. In 1908 there were dif¬ ficulties over Curagoa with Venezuelans, who seized four coast defense vessels. The affair was arbitrated in 1909 by the return of the ves- seL and by Venezuela paying an indemnity of $4,000. In 1913 the Coast Defense Bill appro¬ priating $5,000,000 for fortifying Flushing cre¬ ated European discussion, it being rumored that the project was instigated by Germany as a move against an English landing in the event of war. After the outbreak of the European War in 1914 the position of Holland was one requiring continuous vigilance against violations of its neutrality. It was distinguished by mag¬ nanimous assistance and charity extended to its oppressed Belgian neighbors, and by belligerent demands that strained perilously near rupture points. (For these events see War, Euro¬ pean — Neutral States in the). Consult Amicis, (1893) ; Barker, (Rise and Decline of the Netherlands) (1906) ; Bernard, (La Hollande Geographique, Ethnologique, etc.* (1900) ; Boulger, (Holland and the Dutch) (1913) ; Havard, (In the Heart of Holland> (1880) ; Meldrum, (Holland and the Holland¬ er (1880) ; Motley, (The Rise of the Dutch Republic (1858), and (History of the United Netherlands) (1869); Torchiana, H. A. V., (Holland, the Birthplace of American Political, Civic and Religious Liberty) (1915) ; Van Loon, (Fall of the Dutch Republic (1913) ; id., (Rise of the Dutch Kingdom 1759— 1813> (1915) ; Wharton, ˆHolland of To-Day) (1912).

NETHERLANDS, Language, Literature and Science of the. The literary language of the kingdom of the Netherlands is in English called Dutch, but by the people themselves is called Hollandsch or Nederduitsch, that is, Low Dutch. This name it receives in opposition to the Hochdeutsch or High Dutch, the literary language of modern Germany. Closely allied to the Dutch, so closely indeed as to be distin¬ guished from it only by some orthographic and other minor differences, is the Flemish (Valem- isch) language, spoken partly in the kingdom of Holland, but mainly in the Belgian provinces of East and West Flanders, Limburg, Antwerp and South Brabant. (See Flemish Language and Literature). Both languages belong to the Low German group of the Teutonic or Ger¬ manic branch of the Indo-European family of languages. The two languages, or rather dia¬ lects, are in fact in their early history identi¬ cal and the term Flemish is applied, on the one hand, to. the original form of both dialects and to the literature produced in it before it sep¬ arated into these dialects; and on the other hand to that one of the two dialects which is still spoken in the parts above mentioned, and to the literature produced in it. It is only in this latter application of the term that the Flemish lan¬ guage and. literature can be noticed separately. The non-literary Low-German dialects spoken in the Netherlands may be divided into the Fri¬ sian, an idiom which is gradually disappearing (it has a small literature — see Frisians); the Guelders dialect, or the so-called Lower Rhen¬ ish; the Gronineren dialect, to which also be¬ longs the Over-Yssel dialect, bearing a consid¬ erable resemblance to the German.

The common parent of the modern Dutch and Flemish was at one time supposed to be a development of the Old Frisian, but the general

view at the present day appears to be that the characteristic forms of the language of the Netherlands are at least as old as those of the Old Frisian, and that both languages are sep¬ arate developments of a still older original. The Dutch language resembles the German in its vocabulary and syntax, but is considerably simpler in its accidence. Its vowel sounds are broader than those of the Germans, and its gut¬ turals harsher. It possesses the same power of forming compound words from native materials as the German, and even to a greater extent, for while the German frequently borrows adjectives (for example) from foreign sources to corre¬ spond to nouns of native formation, the Dutch has for the most part such adjectives parony-mous with the nouns. Thus the Germans may use the word

Wissenschaftslehre for philosophy, but are obliged to adopt philosophisch for phil¬ osophical ; while the Dutch have Wijsbegeerte and wijsgeerig, both of native origin.

The oldest literary monument of the lan¬ guage of the Netherlands is, as far as can be as¬ certained, an ordinance of the town of Brussels dated 1229, although it is possible that a few of the poems which have come down to us, par¬ ticularly (Reinaert de Vos) (Renard the Fox) may belong to the second half of the 12th century. In the latter part of the 13th cen¬ tury the language was brought to a pretty High point of literary cultivation by Jacob yan Maer- lant (born 1235), author of the (Spiegel His- tori3e,) but not long after his date the language began to decay, owing to the introduction of French forms, words and idioms through the Burgundian domination (1363-1477). A few literary societies, called Rederijkerskamern, ap¬ pear to have striven against this result, but their efforts were not rewarded with any success until the struggle with Spain at the close of the 16th century produced a reaction among the popula¬ tion of the Netherlands in favor of their native language, a reaction which, however, proved permanent only in the northern Protestant prov¬ inces, which eventually succeeded in throwing off the Spanish yoke, and which now form the kingdom of the Netherlands. The chief speci¬ mens of the language belonging to the period intervening between Maerlant and the reaction at the close of the 16th century are the civic laws of Antwerp (1300), a few chronicles such as that of J. Van Clere and a translation of Boethius by Jacob Veit of Bruges (15th century).

The leaders in the restoration of the lan¬ guage of the Netherlands, or as we may now call it Dutch, to the dignity of a literary medium were Dirk Volkertszoon Coornhert and Filips van Marnix, both distinguished also as states¬ men who took a leading part in all the political and theological conflicts of the day. Coornhert (1522-90) was a poet and dramatist as well as a prose-writer; but while in his poems and dramas he rises little above the Rederijker of his time — of a society of whom at Amsterdam he was a member — his numerous prose works are still looked upon as works of merit. Marnix (1538-98), although inferior to the former in purity of language, obtained even greater re¬ nown by his

that before the final conclusion of peace (1648) the golden age of the Dutch national literature, which fills up the greater part of the 17th century, had begun. Energy, independence, vivacity and elevation of sentiment characterize the more important writers at the beginning of this period, among whom Hooft and Vondel hold the first place. Pieter Corneliszoon Hooft (1581-1647) brought the prose style to a high

degree of excellence, and Joost van den Vondel (1587-1679), the greatest of Dutch dramatists, performed the same service for the language of poetry, and made it peculiarly fit for the expres¬ sion of the sublime. Jacob Cats, familiarly known in Holland as (Father Cats5 (1577-1660), on the other hand, confined himself to the sphere of every-day life. His verses are marked by a careless ease, sometimes even slovenliness ; but his language is pure, a circumstance of some importance, since after the termination of the war, when the mind of the people had become toned down from the high pitch to which it had been raised by their struggle for freedom and independence, he became the special favorite of his countrymen, and had thus a large share of influence in determining the character of the national language. Among the other leading names in pure literature belonging to this period are those of Constantyn Huygens (1596-1686), father of the celebrated mathematician, a satirist, epigrammatist and didactic poet; Jacob van Westerbaan (died 1670) and Jan Van Hemskerk (died 1656), both erotic poets, the latter author of ˆinnedichten,5 in imitation of Ovid, and also of a poetic romance entitled (Bataavsche Arcadia5 ; Dirk Kamphuisen (died 1626), a cele¬ brated hymn-writer. No department of litera¬ ture received more attention than the drama during this period, and several authors who afterward distinguished themselves in other fields began their literary career as dramatists. Among these were Brandt (died 1685), who was also an historian and epigrammatist; Ondaan (died 1692), a political writer and lyrist; and Antonides van der Goes (died 1684), celebrated as a lyrist chiefly on account of his poem (De Ijstroom5 in which he sings _ the praises of Amsterdam. The principal writer of comedies was Bredero (1585-1618), whose language is that of the lowest of the people.

With the sinking of the national spirit which followed the conclusion of peace the national literature also began to decline, and its decline was hastened by its falling under French influ¬ ence, to a great extent in consequence of the large influx of French Huguenots after the rev¬ ocation of the Edict of Nantes (1685). In the crowd of feeble imitators of French originals which the 18th century produced in Hol¬ land, there are but few that can be singled out either as having kept themselves more or less free from that baneful influence, or as having shown unusual ability in what they performed under it. Among the former are the nature- poet Hubert Corneliszoon Poot (died 1733), the lyrist Jan van Broekhuisen (died 1707), and Pieter Langendijk (died 1756), a writer of com¬ edies; among the latter Lucas Rotgans (died 1710), author of a number of dramas and a tedious epic entitled (Willem III,5 Arnold Hoogvliet, Sijbrand Feitama, Nicolas Simon-szoon van Winter (died 1795), and the brothers Van Haren.

During all this period, however, the language

had maintained its purity almost uncorrupted, and again swept itself quite free from foreign taint when the literature took a more healthful development in the last quarter of the 18th century. The immediate cause of this change was the occupation of the Dutch with German literature, at that time energetically rising into prominence ; and the change was assisted sub¬ sequently by their becoming acquainted with English literature, and by the internal commo¬ tions and the dangers from without, which quickened the national spirit. The change was lirst discernible in the lyric poetry. Jacob Bel¬ lamy (1757-86) and Rijnvis Feith (1753-1824) show most plainly in this branch of poetry the influence of the Germans, while Pieter Nieuw-land (1764—94) formed himself more after the ancients. Willem Bilderdijk (1756-1831), ad¬ mirably gifted by nature, acquired by study and practice a wide knowledge of literature and a rare command of language, and shone in all departments of poetry, but was unable to breathe into his works any originality, owing to his rigorous adherence to the pedantic rules of Boileau, which prevented his rightly appreciat¬ ing English and German literature. J. F. Helmers (1767-1813), a poet of more warmth than Bilderdijk, won great applause by the de¬ scriptive poem (De Hollandsche Natie,> in which he glorifies his native country. The pleas¬ ing Hendrik Tollens (1780-1856) was as a lyrist the avowed favorite of his country, and his (Overwintering der Hollanders op Nova- Zembla) is regarded as the best descriptive poem in the Dutch language. Among the others whose productions have met with more or less acceptance are Cornelis Loots, Adriaan Loosjes, Ad. Simons, the original and humorous A. C. W. Staring van den Wildenborch, Bilderdijk's dis¬ ciple and eulogist Isaak Dacosta. by birth a Portuguese Jew, and J. J. L. ten Cate, an able translator of foreign poetry. An important service was rendered to the literature of 'his country by Jacob van Lennep (1802-68), who, incited by the example of Scott and Byron, in¬ troduced romanticism, and successfully repressed French classicism, by his masterly treatment of native tales and historical subjects in narrative poems. His chief followers are A. Bogaers, H. A. Meyer, B. ter Haar and N. Beets. The dramatic productions of this period are compara¬ tively insignificant. Prose, which since Brandt had sunk very low in Holland, was first raised again by Justus van Effen in his Hollandschen Spectator (1731-35), an interesting periodical in imitation of the English Spectator. The orthography of the Dutch language was very unsettled

formerly; but a uniform system vigor¬ ously opposed by Bilderdjik and others was adopted in the schools in 1804. About the be¬ ginning of the 19th century Van der Palm, De Borch, Siegenbeek and others acquired more or less distinction as historians; but the prose of Holland continued to be characterized by a somewhat strained rhetorical style till it was freed from its fetters by Geel and Van Lennep, the latter of whom wrote novels in lan¬ guage at once refined and popular. The novel¬ ists who rank next to Van Lennep are Oltmans (pseudonym Van den Hage), Mrs. Bosboom- Toussaint, Mulder, Hofdylc, Adele Opzoomer (pseudonym A. S. C. Wallis), Dekker, Daum (pseudonym Maurits), Van Rees, etc. Maarten

Maartens writes his novels both in English and Dutch. Besides these novelists by profession the dramatist Schiminel has done good work in the department of the historical novel, and the poet N. Beets has published, under the title of (Camera ObscuraP a series of sketches and tales illustrative of Dutch life overflowing with wit and humor. The list of recent Dutch prose writers also includes Weitzel, Lange, J. ten Brink, Gorter, Huet, Fruin (the Dutch Mot¬ ley), Vosmaer, Vissering, Pierson, Keller, the youthful poet Perk (1860-81), Emants, Kloos, Netoscher, Verwey, Pol de Mont, Couperus, Schaepmann, Borel, Van Hulzen, Van Eeden, Helene Swarth-Lapidoth, Van Deyssel, De Koo and Steijn Streuvels.

Dutch Science and Scholarship. — The

Dutch on the whole can point to higher names in the various branches of scholarship and sci¬ ence than in that of pure literature, a circum¬ stance which is no doubt partly due to the greater ease with which the results of such labors can become known and appreciated in translations than those of pure literature. Gans- fort and Agricola in Groningen were among the first who distinguished themselves as divines and scholars. Erasmus of Rotterdam made far greater progress. A still greater genius, Hugo Grotius, in the beginning of the 17th century devoted himself simultaneously to philology and antiquities, poetry, history, philosophy, theology and jurisprudence in all its branches. The northern provinces were long destitute of a uni¬ versity; that of Louvain, in Brabant, served for all the Low Countries. But the University of Leyden, founded in 1575 by Prince William I, soon exerted a beneficial influence over the whole united Netherlands. Men like Scaliger, Lipsius, Daniel and Nicolas Heinsius, Grono- vius, Spanheim, Arminius, Drusius, Coccejus, and others, made this university famous over all Europe. Universities were also founded at Franeker in 1585, at Groningen in 1614, Utrecht in 1636 and Harderwijk in 1647, and their competition with the University of

Leyden was very advantageous to science. Toward the end of the 17th century Huygens, Leeuwenhoek, Zwammerdam and Hartsoeker distinguished themselves in natural history and astronomy; Alb. Schultens, Tiberius Hemsterhuis, Lambert ten Kate and Hermann Boerhaave in medicine; and a series of distinguished men flourished, particularly at Leyden. Utrecht had its Wessel- ing, Duker, Drakenborch and Saxe. Among the jurisconsults Mathaeus, Huber, Noot and Voet are distinguished. The cultivation of the Dutch language was especially promoted by Lambert ten Kate, Sewels, Zeydelaar, Kramer and Van Moerbeek. In philology, history, geography, mathematics, natural philosophy and medicine, the Dutch distinguished themselves in the high¬ est degree, and their contributions to civil and public law are very valuable. They have always had men of the first distinction in ancient classi¬ cal literature. From these notes it will appear that efforts have been made to adopt the lan¬ guage to elevated purposes, and that they have been crowned with success. The prose of the Dutch has little euphony and elegance, but it is well adapted to express practical truths in a simple and popular manner. It would undoubt¬ edly have acquired greater, perfection if their philosophical and other writers had not often

made use of a foreign language. Erasmus, Lip- sius, Grotius, Wyttenbach and others wrote in Latin, and Francis Hemsterhuys in French. As with philosophy, so also with history. The sci¬ ences have flourished in the northern provinces, and kept pace with the progress of the times; but this is not the case in the southern prov¬ inces. The study of the law and of general jurisprudence is in a flourishing condition, and medicine has its notable exponents. The Dutch excel in mechanics and hydraulics. Consult Schneider, (Geschichte der Niederlandischen Litteratur) (1887) ; Jonckbloet, (Geschiedenis der Nederlandsche Letterkunde) (1873) ; Ten Brink, (Geschiedenis der Noord-Nederlandsche Letteren in de XIXe Eeuw) (1904) ; Kalft, (Geschiedenis der Nederlandsche Letterkunde> (Groningen 1906).

Charles Leonard-Stuart, Editorial Staff of The Americana.

NETHERLANDS, Religious Conditions

in. The religious situation of the Nether¬ lands is quite complex. Of the 6,583,227 inhabitants which the census of 1918 reported, over 2,000,000 belong to the Roman Catholic Church. They are found principally in the provinces of North Brabant and Limburg. The

Netherland Reformed Church (Hervormd), up to 1795 the State Church, and still receiving financial aid from the government, enrolls about 1,500,000 of the population. While a strong party _ in this body is strictly Cal- vinistic, especially the membership in the large cities, an influential element is decidedly liberal and practically Unitarian. Both Psalms and hymns are used in public worship. The gov¬ ernment of the Church, originally on presby- terial principles, has become considerably colle- gialistic. The General Synod is the highest Church court meeting annually; subject to it are provincial synods, composed of delegates from ˆclasses® or presbyteries. The local church is ruled by a consistory. The standards of the Church are the Netherland Confession of Faith, the Heidelberg Catechism and the Canons of Dordrecht, but preachers are not bound to ad¬ here to the letter of this Creed.

Connected with the Reformed Church as a particular synod is the Walloon Church, origi¬ nally composed of French Reformed refugees, and at present numbering some 10,000 members. The French language is used in public worship. Liberalism prevails in this body. There are 16 churches and 24 pastors.

In 1834 a number of the stricter Calvinistic people separated from the Netherland Reformed Church, forming the Christian Reformed Church, which in 1890 united with the Low Dutch Reformed Churches (Doleerend), which in 1886 had withdrawn from the Netherland Reformed Church. They are known as the Re¬ formed Churches in the Netherlands. Their official standards are those of-the old body, but faithfully adhered to. The Psalms, and a few hymns, are used in public worship. In 1916 the communicant membership was 180,632. There are about 700 congregations, 54 ˆclasses® or presbyteries and 12 particular synods. The General Synod meets every three years. The Theological School at Kampen and the Free University in Amsterdam educate their ministry. The Netherland Reformed Church has arrange¬ ments made for this purpose with the universi¬

ties of Leyden, Utrecht and Groningen. The Christian Reformed Church in the Netherlands, with about 45,000 communicants, is composed of those who refused to enter upon the union of 1890 above referred to. Its theological school is in Apeldoorn. This body is very con¬ servative, which is also the case with the <(Re¬ formed congregations ,® numbering some 40 local organizations, many of them in the prov¬ ince of Zeeland. Some <(Free Reformed® churches have their chief distinction in using an old version of the metrical Psalms. In church government they are independents.

The Remonstrant Brotherhood, originally composed of followers of Arminius, condemned at the Synod of Dordrecht, 1618-19, is a pro¬ nouncedly liberal body, enrolling 28 churches, served by 29 pastors. Its seminary is in Ley¬ den. The Evangelical Lutheran Church is a stion of the Lutheran Churches of Germany, the same as the Restored Evangelical Lutheran Church, which in 1791 separated from the older body because of its liberalism. The Evangelical Lutheran Church numbers 48 congregations, served by 60 ministers. Its seminary is in Am¬ sterdam. The Restored Evangelical Lutheran Church (8 congregations and 11 pastors), has a training school for its ministry in Utrecht.

The Mennonite Church, or Baptist Society, dates from Reformation days and is of Ana¬ baptist origin. Its 122 congregations are liberal in doctrine. Their seminary is in Amsterdam.

Anglican and Presbyterian churches are found in the chief seaports of the Netherlands. In various places are groups belonging to churches of American or English origin, such as Adventists, Baptists, Seventh Day Baptists, Apostolic Believers, Darbists, Irvingites, Mora¬ vians, etc.

Th o. Old-Catholic Church maintains a sepa¬ rate existence since the time of the Reforma¬ tion, although it is a dwindling body. In 1784 it numbered 50 churches with 79 priests ; at present there are 26 congregations with 27 priests.

Henry Beets.

NETHERLANDS SCHOOLS OF PAINTING, The, are comprised in the Dutch and the Flemish schools. The Flemish school was founded by the brothers Hubert and Jan van Eyck, who established themselves at Bruges, and attracted scholars from far and near. They flourished between 1370 and 1445. The Flemish school is distinguished by brilliant coloring; magical effect of the chiaroscuro ; carefully la¬ bored though often tasteless drawing; a strong yet natural expression, and boldness in compo¬ sition. Among the scholars of the Van Eycks was Hans Memling, an artist whose works are among the best of the early Flemish school. Among later masters of the same school are Quintin Matsys or Messys of Antwerp (died 1529), Luke of Leyden (died 1533), and wholly in the 16th century Francis Floris (born 1520; died 1570), called, on account of the great in¬ fluence he exercised on contemporary painting, the Flemish Raphael. Among his scholars were the two Francks, the two Pourbuses, and Mart, de Vos (born 1520). Other painters rather later in time are Spranger (born 1546) ; Henry Steenwyk, the painter of perspective (born 1550); Denis Calvert; the

brothers Paul and Matthew Bril; Van Ort (born 1557); and the

two Pieter Breughels, father and son; Roland Savery of Courtray (born in 1576). After all these came Peter Paul Rubens (1577-1646), the boldest painter of modern times; a man of in¬ exhaustible industry, of gigantic imagination and power of representation, to whom about 4,000 paintings are ascribed. With him the Flemish school reached its acme. Several distinguished painters follow: Frans Snyders (born 1579), whose hunting and animal pieces excel all others in boldness and truth; Josse de Momper (born 1580), a landscape-painter esteemed for his valleys and the distant views which they present; Pieter Neefs, the famous church painter; David Teniers, father and son, noted for their representations of peasants, guard- rooms, tap-houses and all kinds of low life; Caspar de Crayer (born 1582), who approaches in the expression and coloring of his historical paintings to Rubens ; Gerard Seghers, distin¬ guished as a historical painter; his brother Daniel, famous for flower and insect pieces. Jakob Jordaens (born 1594), however, excelled all those who make Rubens their model. Abra¬ ham Janssen and his pupil Theodoor Rombouts equal Rubens in coloring, but not in conception. The industrious JLuke van Uden executed the landscapes for Rubens' paintings, and his views of the sky at dawn are worthy the study of every artist. Anthony Vandyck (born 1599) obtained the name of the ((king of portrait painters.® He excelled Rubens in correctness and beauty of forms. Cornelius Schut, for whom Jan Wildens often painted the landscapes, distinguished himself as a historical painter; Adriaan Brouwer acquired fame by his excellent representations . of scenes from common life; Jan van der Meer by his pastoral pieces; Anton Francis van der Meulen by his battle pieces; Frans and Jan Milet, father and son, by their landscapes. Besides these there are the names of Jan Bol, Wenceslaus Koeberger, Hendrik Goltzius, Hendrik van Balen, Frans Hals, Wil¬ lem van den Nieuwelandt, Abraham Diepenbeck, Theod. van Thulden, Gerard Lairesse, Jan Frans van Bloemann, Jan van Cleef, Pieter Eykens, Robert van Oudenarde, Jan Anton van der Leepe, Jan van Breda, etc. #

The Dutch school is distinguished for a faithful copying of nature, great finish, good chiaroscuro, skilful disposition of color and delicate pencifing; but it is reproached with choosing often ignoble subjects and with incor¬ rectness of drawing. Its founder is Luke of Leyden (born 1494). Its most prominent art¬ ists are Otho van Veen, of

Leyden (born 1586; died 1634), who deserves mention also as the teacher of Rubens. Abraham Bloemart of Gorkum (died 1647) painted historical sub¬ jects, landscapes and animals in good taste. Cornelis Poellenburg of Utrecht (born 1586; died 1663) was peculiarly happy in painting small landscapes with figures. Worthy pupils of his are Daniel Vertange and Jan van Haens- berge. Johan Wynants of Haarlem (born 1600) is distinguished as a landscape-painter; and Jan Daniel de Heem, of Utrecht (born 1604; died 1674) for his faithful imitation of flowers, fruits, carpets, vases, etc. The high¬ est place belongs to Rembrandt (1606-69), whose masterly coloring atones for all his de¬ fects. In the delineation of common life the following are distinguished: Gerard Terburg of Zwoll (born 1608; died 1681); Pieter van

Laar (1613-73), the two Ostades, and Jan Steen (1636-89); in landscapes, Jan Both of Utrecht (born 1610; died 1650); Hermann Swaneveld of Woerden (born 1620; died 1690). Asselyn (born 1610; died 1680) painted battles, land¬ scapes and pastoral pieces with brilliant col¬ oring and a delicate pencil. Scarcely any painter drew more correctly, colored more beau¬ tifully and distributed light more truly than Gerhad Dow or Douw (born 1613; died 1680). John Fyt (born at Antwerp, 1625) was a good painter of beasts, birds and fruits; Gabriel Metzu, who worked in the style of Terburg, ex¬ celled him in softness of penciling. The land¬ scapes of Benenberg of Utrecht are full of life and freshness. Philip Wouvermans (born 1620; died 1668), the most famous painter of horses, produced battle and hunting pieces, horse-markets, travelers and robbers; and his paintings of all kinds are highly esteemed. The landscapes of Anton Waterloo, for which Weenix executed the figures, are sometimes cold, but please on account of the accuracy with which he represents light playing through foli¬ age and the reflection of objects in water. Berghem acquired the name of the Theocritus of painters; and perhaps Paul Potter is the only one who can dispute the superiority in repre¬ senting cattle with him. While Ludolf Back- huysen painted storms at sea with an effort as true as it is terrible, Frans Mieris distinguished himself by fine and accurate representations of many domestic subjects and Jan Pieter Slinge- land was hardly less accurate. Godfrey Schal- ken of Dort excelled in the illumination of night scenes. Excellent market scenes, animals and landscapes were painted by Karel du Jar- din. Albert Cuyp and Adriaan van de Velde painted landscapes and animals with almost un¬ equaled perfection. Hobbema is another ex¬ cellent landscape-painter. For the representa¬ tions of the beautiful solitudes of nature Jakob Ruysdael is celebrated and for quiet lovely moonlight scenes Van der Neer. No painter has painted

more delicately and with more finish, even in insignificant trifles, than Adriaan van der Werf. The flower-painters, Pieter van Hulst of Dort and Jakob van Huysum, are al¬ most unrivaled in this department. Other names are Cornelis Ketel, Bartholomew van der Heist, Albert van Everdingen, Gebrandt van den Hendrik Verschuuring, Maria van Ooster- wyk, Willem Kalf, Melchior Hondekoeter, Cor¬ nells de Bruyn, the two Houbraken, Rachel Ruisch, Cornelis du Sart, Jan de Witt, Cornelis Troost, Van Os, Van Spaendonck, Scheffer, Ommeganck, etc. About the beginning of the 19th century the classicism of France had a great influence on the Dutch historical school, as seen in the works of Kruseman, Pieneman, Navez and Van Bree. In genre painting the old models were still followed and good work was done by Jan Kobell and Eugene Verboeck- hoven ; Scheefhout and Schotel deserve men¬ tion as landscape and marine painters. A more natural and correct style followed the fall of the school of David in France, and Louis Gal- lait, Edouard de Biefve, Gustave Wappers, Nicaise de Keyzer and Hendrik Leys distin¬ guished themselves as historical painters. Flor- ent Willems and Alfred Stevens were genre painters. A. de Kuyff and Xavier de Cock painted excellent landscapes. Among modern Dutch painters were Alma Tadema and Josef

Israels. The former long resident in England, a baronet and member of the Royal Academy, was remarkable for the skill with which he treated subjects selected from states of civiliza¬ tion that have passed away, as from ancient Egypt, Greece and Rome. The genre pictures of ‘Israels, of Bisschop, of Mauve; the marine views of Mesdag, and the fine landscapes of the brothers Maris, are also well known. The artists of the Netherlands are still distinguished by the peculiarities of the two schools, the Dutch and the Flemish. The reproach of an almost exclusive adherence to common reality has been often made to the whole school of the Netherlands, but is confined by some to the Dutch; while the Flemish school, in its more elevated productions, has striven to represent a nobler nature. Both are criticized as some¬ what deficient in ideal beauty, but distinguished in the highest degree for faithful imitation of nature. Consult Caffin, C. H., (Story of Dutch Painting5 (New York 1911) ; Crowe and Caval- caselle, (Early Flemish Painters5 (London 1872) ; Hofstede de Groot, Catalogue Rai- sonne of the Works of the Most Eminent Dutch Painters of the 17th Century5 (New York 1908) ; Kugler, F. T., (Handbook of Painting — German, Flemish and Dutch Schools5 (London 1909); Marius, G. EL, (Dutch Paint¬ ers of the 19th Century5 (Philadelphia 1908) ; Rooses, M., (The

Dutch Painters of the 19th Century5 (1898-1905); < Art in Flanders5 (New York 1914) ; Van Dyke, J. C., (01d Dutch and Flemish Masters5 (New York 1896).

Charles Leonard- Stuart, Editorial Staff of The Americana.

NETHINIM, in Biblical history, the lowest order of ministers of the temple at Jerusalem. They were hereditary attendants on the Levites in the services of the temple and were to do the more menial part of the work. They en¬ joyed the privileges of the priestly caste and lived apart on the temple hill. Doubtless they were originally prisoners of war who were dedicated by their captors to menial religious service. It is supposed that the Gibeonites originally held a similar office (Josh, ix, 21-27). At the return from Babylon, 392 of these min¬ isters accompanied Zerubbabel (Ezra ii, 58; Neh. vii, 60), and 220 came with Ezra (Ezra viii, 17, 20) ; 612 of them in all. Consult Tacobs, J., (Studies in Biblical Archaeology5 ‘(London 1894) ; McNeile, H. H„ in Hastings and Selbie, dictionary of ‘the Bible5 (New York 1909).

NETHOU, na-too’, Pic de, Spain, the high¬ est point (11,169 feet) of the Pyrenees (q.v.).

NETSCHER, nets’Her, Caspar, Dutch painter: b. Heidelberg, 1639; d. The Hague, 15 Jan. 1684. He was taken to Holland in early childhood and as the adopted son of a physician early began the study of medicine, but eventually learned painting from Koster, a still-life painter of Utrecht, and from Ter- burg (q.v.) at Deventer; he also spent a short time during his student years at Bordeaux, France, but eventually settled permanently at The Hague. He was a genre painter who imi¬ tated the manner of Terburg and chose his subjects from aristocratic life. He sometimes, however, painted kitchen interiors and sheep, also portraits. His weakest work consists of small, delicately handled and enamel-like pic¬

tures of historical and mythological subjects, which are blemished by mannerisms. Almost every public gallery in Europe contains ex¬ amples of his numerous works, but the Dresden Gallery is particularly rich in his cabinet pieces, such as his (Lady at the Harpsichord > ; (The Doctor’s Visit5 ; (The Harp Player.5 The Rijks Museum, Amsterdam, possesses 16 por¬ traits.

NETTEMENT, net-man, Alfred Frangois,

French journalist: b. Paris, France, 22 July 1805; d. there, 15 Nov. 1869. He was educated at the College Rollin in Paris and entered

journalism. He founded U Opinion Publique and for his staunch support of the grandson of Charles X he was imprisoned by Louis Phil¬ ippe after his accession. He wrote (Histoire de la Revolution de j uillet 5 (1833) ; (Histoire de la litterature frangaise sous la Restauration5 (4852) ; (Histoire de la litterature frangaise sous la royaute de j uillet 5 (1854) ; (Vie de ma- dame de marquise de la Rochejacquelin5 (1858) ; (Histoire de la Restauration5 (8 vols., 1860-72).

NETTER, Thomas, also called WAL- DENSIS, English Roman Catholic clergyman: b. Saffron Walden, England, about 1377 ; d. Rouen, France, 2 Nov. 1430. He entered the Carmelite order and was graduated from Ox¬ ford, receiving ordination in 1394. He became provincial prior of the Carmelites in 1414 and strongly opposed the Lollard reform movement. He was confessor to Henry V and Henry VI and died while on a mission to Poland for the latter. He wrote (Doctrinale Fidei Ecclesise Catholicse contra Wiclevistas et Hussitas5 and the (Fasciculi Zizanorium Magistri Johannis Wyclif5 (ed. by Shirley, London 1858).

NETTLE, a plant of the family Urticacece, having unisexual flowers, the male and female on the same or separate plants : the male flow¬ ers with a 4-parted perianth and four stamens ; the female flowers with a 2-parted perianth and a tufted stigma; the fruit an achene. The species are herbaceous plants, shrubs or even trees, covered with stinging hairs, which pierce the skin when touched and emit an acrid juice, often causing much inflammation and pain. These hairs are stiff and terminate in a silicious point which penetrates an animal's skin, breaks off and sets free a poison, the nature of which is not understood. When a nettle is grasped in such a way as to press the hairs to the stem no stinging ensues ; but the slightest inadvertent touch of some of the species produces very severe pain. The stinging of the native nettles of Europe is trifling in comparison with that of some East Indian species. JJrtica crenulata is particularly notable for the severity of the pain which it produces, without either pustules or apparent inflamma¬ tion. The first sensation is merely a slight tingling, but within an hour violent pain is felt, as if a red-hot iron were continually applied, and the pain extends far from the original spot, continues for about 24 hours and then abates, but is ready to return to its original intensity on the application of cold water, and does not cease for fully eight days. Cold water has a similar effect in increasing or renewing the pain of all kinds of nettles. Still more formidable than this species is U. urentissima, the devil's leaf of Timor. The two most familiar species throughout America and Europe in waste places

aie the small virulent U. urens, and the less venomous common perennial species, the great nettle (U. dioica), often abundant, particularly near human habitations. The roots of nettles boiled with alum afford a yellow dye; and the juice of the stalks and leaves has been used to dye woolen stuffs a beautiful and per¬ manent green. The young shoots of U. dioica have been much used in some parts of Scotland and other countries as greens and their peculiar flavor is much relished by some, although, in general, the use of them is confined to the poor. They are valuable as antiscorbutics, but are gritty to the taste from the quantity of crystals (cystoliths) contained. Whatever it is that gives nettles their stinging power is dissipated by boiling and drying. The high value of nettles as food for swine is well known to the peasantry of many countries ; the great nettle is cultivated in Sweden for fodder of domestic animals; and nettles are also highly esteemed as food for turkeys. The seeds are extremely nutritious to poultry, and are given to horses by jockeys, in order to make them lively when they are to be offered for sale. The stalks and leaves are employed in some parts of England for the manufacture of a light kind of beer called nettle beer. The bast- fibre of nettles is useful for textile purposes. Yarn and cloth, both of the coarsest and finest descriptions, can be made of it. The fibre of U. dioica was used by the ancient Egyptians, and is still used in various countries. When wanted for fibre the plant is cut in the middle of summer and treated like hemp. Nettle-cloth, or grass-cloth, is a beautiful fabric made from rhea fibre. The fibre of U. cannabina, a na¬ tive of the south of central Asia, is much used; and from that of U. whitlavi both fine lace and strong ropes can be manufactured. The fibre of U. japonica is much used in Japan; that of U. argentea in the South Sea Islands and of U. heterophylla , a widely-diffused In¬ dian species, is of very glossy silky appearance and is manufactured into cloth in Assam. (See Fibre). The seeds and herbage of U. mem- branacea are used in Egypt as an emmena- gogue and aphrodisiac; and somewhat similar properties are ascribed to U. dioica. U. tn- berosa produces tubers, which are nutritious and are eaten in India raw, boiled or roasted. Australia produces a magnificent tree-nettle, U. gigas, abundant in some parts of New South Wales, ordinarily from 25 to 50 feet high, but sometimes 120 or 140 feet, with trunk of great thickness, and very large green leaves, which when young sting violently.

Many plants are so called, as the (

NETTLE-BUTTERFLY, a European but¬ terfly (Vanessa urticce), which feeds and lays its eggs on nettles ; other butterflies, including American species, have the same habit.

NETTLE RASH. See Urticaria.

NETTLE-TREE, a tree of the genus Celtis, especially in the United States the hack- berry (q.v.) ; and in Europe C. australis, com¬ monly planted as a shade-tree in France and Italy.

NETTLETON, net'l-ton, Alfred Bayard,

American soldier and journalist: b. Berlin, Ohio, 14 Nov. 1838. He was educated at Ober-

lin College and entered the Union army at the outbreak of the Civil War, rising from the ranks to be brevet brigadier-general. He studied law after the war and engaged in a journalistic career and in 1890-93 he was Assistant United States Treasurer. He wrote (Trusts or Competition (1900).

NEU BRANDENBURG, noi-bran'den- boorg, Germany, a town of the Free State of Mecklenburg-Strelitz, 16 miles northeast of Neustrelitz, near Lake Tollense. It was founded in 1248, and retains its picturesque mediaeval ramparts and gateways. Its chief edifices are the Belvedere Palace and a 13th century Gothic church. It has manufactures of pianos, ma¬ chines, paper, etc. It was founded by John I, Margrave of Brandenburg. Pop. 12,348.

NEU-LAUENBURG, noi low'en-boorg, formerly Duke of York Island, an island of the Bismarck Archipelago (q.v.) off the west coast of New Mecklenburg. Area, about 27 square miles. Pop. about 3,500.

NEU POMMERN, noi pom'ern. See New Pomerania.

IsIEUCHATEL, ne-cha-tel, or NEUF- CHATEL, Switzerland, the name of a canton, town and lake. (1) The canton in the west of the country, bounded by the cantons of Bern and Vaud, the lake of Neuchatel and France, has an area of 312 square miles. It lies in the midst of the Jura Mountains, four chains of which, running from northeast to southwest, traverse the canton and are sepa¬ rated by elevated, longitudinal valleys. The greater number of the numerous streams which water the canton flow into the Rhine; several are feeders of the Lake of Neuchatel mentioned below. Chief of the minerals is the asphalt of Val

de Travers. Grazing is extensively at¬ tended to; wine, absinthe, fruits, hemp and flax are produced. The manufactures are also important; the principal are lace, cotton, clocks and watches; a considerable industry is also carried on in cutlery, mathematical and philo¬ sophical instruments, chintz and other cotton stuffs. The famous Neuchatel cream-cheeses, however, are made, not in this canton as popu¬ larly supposed, but in France, at Neuchatel-en- Bray, a small Norman town, 25 miles southeast of Dieppe by rail. Neuchatel was an independ¬ ent principality as early as 1034. After various changes of masters it came into the hands of the old French family of Longueville (1504), which became _ extinct in 1707. The king of Prussia, as heir of the house of Orange, was then called to the sovereignty by the states of Neuchatel, and his title was confirmed bv the Treaty of Utrecht. In 1806 Prussia ceded it to France and the emperor conferred it on Marshal Berthier, afterward Prince of Neu chatel-Wagram. By the Peace of Paris it was restored, with additions, to Prussia. In 1814 the principality was received into the Swiss Confederacy and it was the only canton with a monarchial government, which it preserved till 1848. Its . last connections with Prussia were broken in 1857. The religion is Prot¬ estant (Reformed). The language is French; but German is also spoken. Pop. (1910) 13,128, mostly French Protestants.

(2) The capital, Neuchatel, is 24 miles west of Bern, on a steep slope above the northwest shore of Lake Neuchatel. ft has an old Gothic

church of the 12th century ; many charitable institutions ; a gymnasium or college, contain¬ ing a valuable natural history collection found¬ ed by Professor Agassiz, a native of the town, etc. It has various manufactures and an ex¬ tensive trade. Pop. (1910) 23,505.

(3) The Lake of Neuchatel (Neuenburger- see), 1,420 feet above sea-level, is 25 miles long, from three to six miles wide, with a maximum depth of 472 feet. The Thiele serves as its outlet and carries its water into the neighboring Lake of Bienne and thence into the river Aar which communicates with the Rhine. The lake is plentifully supplied with fish; steamers ply on its waters between Neu¬ chatel, Morat, Yverdun, Estavayer, etc. Traces of prehistoric lake-dwellers have been found here. Consult Bachelin, A., (Neuchatel and its Environs) (In

NEUENDORFF, noi’en-dorf, Adolph Heinrich Anton Magnus, American

musician: b. Hamburg, Germany, 13 June 1843; d. New York, 4 Dec. 1897. He came to the United States when 12, was educated in the public schools and pursued a course in music. At 15 he made his debut as a pianist and the next year he led a chorus and played in an orchestra. In 1864 he was musical director of the German Theatre, Milwaukee, Wis., and in 1865 he con¬ ducted the German grand opera in New York. He founded the Germania Theatre in 1872 and managed it for 11 years;, he assumed the leader¬ ship of the Philharmonic Society of New York in 1878, and later became director of the Metro¬ politan Orchestra. From 1884 to 1889 he was a concert director in Boston. His wife, Georgine von Januschowsky (1858-1914), was primadonna of the Imperial Opera, Vienna. He lived there from 1893-95, and returned in 1896 to become musical director of the Jewish Tem¬ ple Emanu-El in New York. Among his com¬ positions are (The Rat Charmer of Hamelin) (1880) ;

NEUHOF, noi'hof, Theodor von, Baron, German adventurer, King Theodore I of Cor¬ sica: b. Metz, 1686; d. London, 11 Dec. 1756. His father was a Westphalian noble in the French service; the son became page to the Duchess of Orleans; fought in the French and in the Swedish armies ; was employed by Count Goertz and then by Alberoni on diplomatic errands; married Lady Sarsfield, whom he de¬ serted, having stolen her diamonds ; lost all his property in Law's schemes; went to Florence in 1732; and there intrigued with some Corsican revolutionists, at whose invitation he landed in Corsica in 1736, with arms and equipment fur¬ nished by the Bey of Tunis, and was pro¬ claimed king. He was at first successful against the Genoese, who, however, were reinforced by the French during Neuhof 's absence in Hol¬ land; and he was defeated upon his return in 1738. After the withdrawal of the French in 1741, he made several attempts in 1743 to re¬ cover his kingdom and in 1749 retired to Eng¬ land, where he was iailed for debt, and was re¬ leased in 1756, thanks to a subscription raised by Horace Walpole. His son, Col. Frederick Neuhof, an English officer, wrote ˆemoires

pour Servir a l'Histoire de Corse) (1768). Consult Fitzgerald, (King Theodore of Cor¬ sica } (London 1890).

NEUILLY, ne-ye, or NEUILLY-SUR- SEINE, sur san, France, a town in the depart¬ ment of Seine, suburban to Paris, immediately north of the Bois de Boulogne. The fine 18th century level bridge by Perronet, across the river here, is an attractive feature, and the town is noted for its benevolent institutions, parks and a handsome residential section built chiefly on the site of the historic royal castle and park of Neuilly, destroyed during the Revolution of 1848. Neuilly also has factories of

several Paris establishments for the production of do¬ mestic commodities. Pop. 44,616.

NEUMANN, noi'man, Franz Ernst, Ger¬ man physicist and mineralogist: b. Joachimsthal, 11 Sept. 1798; d. Konigsberg, 23 May 1895. He studied at Berlin, and • became professor at Konigsberg in 1828. His „work in physics was of the greatest importance and he is reckoned the father of mathematical physics in Germany, and the founder of the modern theory of mineralogy by reason of his studies of the optical relations of crystals. He published a law of electrodynamics different from that of Ampere and from Grassmann's; determined the diffusivity of soils and of metals ; and studied the polarization, reflection and refrac¬ tion of light, induction currents, specific heat, etc. He established the law that the molecular heat of a compound is the sum of the atomic heats of the elements. This law is known by his name. He contributed to various scientific journals. Many of his lecture courses were edited and published by his pupils ; among; these are (Beitrage zur Theorie der Kugelfunktionen5 (Leipzig 1878) ; Uber ein allegemeines Prinzip der mathematischen Theorie inducerter elek- trischen Strome5 (Leipzig 1892) ; (Commenta- tio de emendanda formula, per quam colores corporum specifici ex experimentis methodo mixtionis institutis computuntur5 (Konigsberg 1834) ; (Die mathematischen Gesetze der in¬ ducerter elektrischen Strome) (Leipzig 1889) ; (Theoretische Untersuchung der Gesetze, nach welchen das Licht on der Grenze zweier vol- kommen durchsichtigen Medien reflectirt und gebrochen wird5 (Berlin 1837) ; (Vorlesungen fiber mathematische Physik) (Leipzig 1881-94). Consult the biography by Volkmann (1896), and Neumann, L., (ErrinerungsbUder von seiner tochter Luise Neumann5 (Tfibingen and Leipzig 1904).

NEUMANN, John Nepomucene, Roman Catholic bishop of Philadelphia: b. Prachatitz, Bohemia, 28 March 1811; d. Philadelphia, 5 Tune 1860. He was educated at Budweis and Prague; took orders; came to America as a missionary in 1836; engaged in work near Niagara for four years; in 1840 entered the Redemptorist Order; and became assistant pastbr of Sˆint James' Church, Baltimore, in 1842. He was again busied in mission work in Pennsylvania, Maryland and Virginia; was ap¬ pointed superior of the Redemptorist Convent in Pittsburgh, where he built the church of Saint Philomena; returned to Baltimore in 1847 as provincial of the Redemotorists in America; established the Sisters of the Holy Cross in this country ; and in 1852 became bishop of Philadelphia. He went to Rome in

1854 and assisted in the definition of the dogma of the Immaculate Conception. Bishop Neu¬ mann was a man of culture and of administra¬ tive ability, and did much for Catholic educa¬ tion in America. Consult the

NEUMANN, Karl Friedrich, German Ori¬ entalist : b. Reichmansdorf, Bavaria. 22 Dec. 1798; d. Berlin, 17 March 1870. He was edu¬ cated at Heidelberg, Munich and Gottingen, and after travels in India and China (1829-30) from which he returned with a great number of Hindu and Chinese books, was professor of Oriental languages at Munich 1831-52. He was a Liberal in politics, a circumstance which finally cost him the loss of his professorship. Among his many works are (Memoires sur le Vie et les Ouvrages de David Philosophe Armenien) (1829); (Asiatische Studien) (1837); (Ge- schichte der Vereinigten Staaten von Nord- amerika) (1863-66) ; (Hoen Schein, or the Dis¬ covery of America by Buddist Monks) (1874) ; (Geschichte des englischen Reichs in Asien) (1857) ; (Geschichte der armenischen Literatur)

(1836).

NEUMANN, Karl Gottfried, German mathematician, son of F. E. Neumann (q.v.) : b. Konigsberg, 7 May 1832 ; he studied at Konigs¬ berg, became instructor of mathematics at Halle in 1858, was made professor at Basel in 1863 and at Tubingen in 1865, and from 1868 to 1911 was professor at Leipzig. In 1868 he founded the Mathematische Annalen. His publications and special studies have been in the field of mathematical physics (following his father) and in higher analysis. Among his books are ˆTheorie der Besselschen Funktionen> (1867) ; ˆber die elektrischen Krafte* (1873, 1898) ; (Vorlesungen fiber die mechanische Theorie der Warme) (1875) ; (Untersuchungen fiber das lagarithmische ufid Newtonsche Poten¬ tial } (1879) ; ˆydrodynamische Untersuch-

ungen) (1881) ; (Vorlesungen fiber Riemanns Theorie der Abelsohen Integrate* (1884); (Allgemeine Untersuchungen fiber das New¬ tonsche Prinzip der Fernwirkungen) (1896).

NEUMAYER, noi-mi-er, Georg von, Ger¬ man meteorologist : b. Kirchheimbolanden, Bavaria, 21 June 1826; d. May 1909. He was educated at the University of Munich and went to Australia under tlie auspices of Maximilian II and there founded the Flagstaff Observatory at Melbourne, where he made valuable magnetic observations. He returned to Germanv in 1864 and promoted the German-African Company and organized several expeditions to the North and South Polar regions. He was long con¬ nected with the hydrographic bureau at Berlin and in 1876 became director of the Marine Ob¬ servatory at Hamburg. He wrote among other works (Die Beobachtungsergebnisse der deutschen Stationen im Systeme der interna- tionalen

Polarforschung) (with Borgen, 1886) ;

(Atlas des Erdmagnetismus* (1891) ; (Anemo- meter-Studien* (1897), and (Auf zum SfidpolP

(1901).

NEUMES, numz, in music, (1) signs or characters in early music indicating tones or phrases. A large number of these characters were used, being more or less complicated in form and meaning. This was the first step toward a graphic musical notation. (2) Me¬ lodic phrases sung to a single syllable, more

particularly at the end of a sentence or clause. (3) Modulation of the voice in singing. See Music.

NEUMUNSTER, noi'mfin-ster, Germany, a town in the Prussian province of Schleswig- Holstein, on the Schwale, 17 miles by rail south¬ west of Kiel. It is a well-built, busy manufac¬ turing centre, producing principally woolens, and also leather, paper, ironware, soap, etc. Pop. 34,555.

NEUQUEN, na-oo-kan', Argentina, a terri¬ tory in the western part of the republic, bounded on the west by Chile and on the east and south by the territory of Rio Negro. Its area is 42,345 square miles. The main range of the Andes Mountains crosses the western part from north to south, and numerous short ranges extend throughout the territory. The Rio Negro and its largest tributaries have their rise in Neuquen, and the Rio Colorado is on its north¬ ern boundary. The principal occupations are agriculture, mining silver and cattle-raising. The population is mostly Indians, but since 1884 a number of Chileans have settled in the territory. Pop. about 29,746. The capital is Neuquen (pop. 1,500).

NEURALGIA (Greek vevpov, nerve -hˆyoc, pain), severe paroxysmal pain, either along the course of one or more sensory nerves, or at the place of their distribution. In neuralgia proper no definite lesions are discoverable. Sometimes there is reason to believe that inflammation of the sheath of the nerve is the starting-point. Not infrequently there are well-defined points of tenderness (ascertained by palpation) over the affected nerve, especially where it emerges upon the skin from a bony groove or opening. Sometimes with the pain there is a twitching of adjacent muscles. Radiation of pain, neu¬ ralgic in character, to nerve-branches other -than those affected is quite common. Dental caries, for example, may produce supra-orbital neural¬ gia. and

uterine disease, occipital neuralgia. Neuralgic pains are described by the suf¬ ferers as cutting, burning, boring, lightning- like, crushing, etc. After a neuralgic attack the part affected has a feeling of discomfort and bruising. There is frequently also a sense of exhaustion, with a desire to sleep. If there are repeated attacks of neuralgia, pallor of the skin, followed by intense redness, by hyperaesthesia, or by loss of tactile sensibility in the part af¬ fected, horripilation and other evidences of vasomotor disturbances are not uncommon. When involving the facial branches of the fifth pair of nerves (the trifacial nerves) it is popularly called tic-douloureux. There are severe flashes of pain over the eyebrows, in the eyes, nose, lips, chin, teeth, etc.

The presence of neuralgia, especially with repeated attacks, usually indicates a weak state of the general system, which may follow long-continued fevers. It may occur during the progress of various acute affections. The causes of neuralgia are various : poor blood and malnutrition, pressure of a tumor upon a sensory nerve, irritation of the nerve from the swelling of an adjacent part, exposure to cold and wet, fatigue, mental emotion, the abuse of tea, coffee and alcohol, etc. The treatment varies with the nature of the different cases. Hot applications and anodyne liniments are often of value. As the pain is severe, persons

affected are too often tempted to resort to narcotics for relief. Such drugs should not be used without the advice of a physician.

The neuralgias of psychogenic origin, which are especially difficult to differentiate, though they constitute about 25 out of every hundred cases, are subject to mental treatment only. This may be of the dialectic variety as given by Dubois, of the emotional type such as that of Dejerine or recourse may have to be had to. a thoroughgoing psychoanalysis. As it is fruit¬ less to treat neuralgias of well-known organic origin with psychotheraphy, so it is senseless to attempt to do anything with drugs, surgery, hydrotheraphy, electricity or massage, in the case of a patient with a purelv psychogenic neuralgia. But the physician should be ac¬ quainted as far as possible with psychologic methods, because with a symptom so ambiguous as neuralgia frequently is, the slight opportu¬ nity he may have to do something with the patient through the mental method may help in the diagnosis, which might otherwise be for him impossible.

NEURASTHENIA (from Greek yevpov nerve + aoQeveia f weakness), a condition of nervous debility or exhaustion; popularly called nervous weakness, nervous prostration, etc. The term is now generally applied to a disordered condition of the nervous system manifested by various symptoms. It was originally used in 1879 by Dr. George M. Beard. Nervousness, so called, is manifested chiefly by undue sensitive¬ ness to external impressions. It frequently pre¬ cedes or progresses into nervous prostration. The distinction between hysteria (q.v.) and neurasthenia is not always plain, for the two affections frequently merge into one another. Neurasthenia is a neurosis, a functional de¬ rangement, usually lasting a considerable time, but generally recovered from under proper hygienic and medicinal treatment. No morbid anatomical changes are at present known. The disorder is caused sometimes by various func¬ tional and organic affections of the body, but in these instances there is probably a pre-existing basis of functional perverted action of the nerv¬ ous system. Neurasthenia so produced is known as symptomatic. When certain symptoms pre- dominate, distinctive terms are sometimes used ; for example, in acoustic neurasthenia, symp¬ toms of deafness ; in gastric neurasthenia, weak digestive action, gastric pain . (nervous .dys¬ pepsia) ; in cardiac neurasthenia, palpitations, irregular action of the heart, praecordial pain etc., symptoms simulating heart-disease ; and in cerebral neurasthenia, despondency, irrita¬ bility, moodiness, sleeplessness, restlessness and confusion of mind, especially in relation to figures.

Neurasthenia is about as common among men as among women, and occurs usually between the ages of 20 and 50, when worry and work are maximal. Signs, of a neurasthenic tendency are sometimes seen in young people (of a neu¬ ropathic or neurotic diathesis) ; namely, over¬ sensitiveness, precocity, insomnia, chorea, som¬ nambulism and night-terrors. In girls especially there are also headache, backache,, anaemia and lassitude. Sometimes neurasthenia marks the beginning of mental disease, such as melan¬ cholia. The causes of neurasthenia may be classified as predisposing (such as heredity and

a neurasthenic tendency), and exciting or ac¬ quired. Mental irritability and the loss of sell- controi in parents are causes. So also gout, syphilis, rheumatism and chronic alcoholism are conditions that transmit neurasthenic tend¬ encies. Improper mental and physical training of children, and too much coddling are often responsible for the affection. Among the ex¬ citing causes are injuries; severe mental and physical work for a length of time beyond the individual's power of endurance ; worry, espe¬ cially if associated with lack of rest, of pure air and of suitable food; and the excessive con¬ centration of the

thoughts upon one s self. Neurasthenia is sometimes spoken of as the American disease.® This is nonsense as neu¬ rasthenia is more frequent among people who have nothing to do than among those who are

busy.

, The symptoms of neurasthenia are many and various. The individual may appear to be in perfect health, but frequently has a worried look. There may be irritability of temper, fa¬ tigue without adequate reason, poor sleep, with exhaustion on waking, headache, with sense of weight or constriction, impaired memory, want of appetite, constipation, various forms of mus¬ cular weakness, muscular tremors and contrac¬ tions, an uncertain gait, a feeling of weariness, giddiness, pain along the spine (spinal irrita¬ tion) and in the joints, hypersesthesia, or paraesthesia (numbness and. tickling), sexual emissions and defects of sight and hearing. There is no capacity for sustained work. The recognition of mental and physical weakness causes the individual affected to become self- conscious, to distrust others, to have a feeling of isolation, to prefer solitude, to exaggerate trifling impressions, to dread the dark, and to suspect contamination from food, touch, etc. The chief causes of neurasthenia are acute in¬ fectious diseases, which cause a lowered nutri¬ tion of the bodily functions and various types of fantasy life, with conscious and unconscious masturbation. This last is the most frequent single cause of neurasthenia.

Treatment of this nervous disorder requires time and care. Treatment of the infectious and toxic types require rest and feeding. The change of the maladjusted sex life of the second type will cure or favorably modify the second type. Consult Jelliffe and White, (Diseases of the Nervous System* (1919). See Psycho¬ neuroses and Neuroses.

NEUREUTHER, noi’roi-ter, Eugen Na¬ poleon, German artist: b. Munich, 13 Jan. 1806; d. there, 23 March 1882. He began his studies at the Munich Academy, continued them at Paris (1830) and going subsequently to Rome (1838) fell under the influence of Cor¬ nelius (q.v.). In 1848 he was put at the head of the design department in the Royal Porce¬ lain Manufactory at Nymphenfiurg, a position which he held until the sale of that establish¬ ment in 1856. He was engaged from 1868-77 as professor of design in the Royal Institution of Industrial Art. His brilliant versatility is shown in his skill as a house decorator, etcher, painter and industrial designer. He designed the border illustrations for Goethe’s (Ballads and Romances) (1829-40) ; he published (Souvenir du 27, 28, 29 Jiullet 1830—31 } ; and (

Bavarian Shepherd’s Song with Illustrations*

(1834). In 1835 he painted scenes from Wie- land s Oberon) for the royal palace at Munich, bor the edition de luxe of Herder’s ; ; (The Villa Malta, } and a scene from (Hermann und Doro¬ thea. } He also furnished designs for the School of Industrial Art, and decorated the ceiling of the staircase and the cupola of the Polytech¬ nique at Munich with graffito painting.

NEURINE, CHOLINE, or SINCA- LINE, a basic chemical substance having the empirical formula C5Hi3N02, or the constitu¬ tional formula CH2 ,CH2.N (CH3)3OH. It occurs in putrefying flesh, in the fly agaric, in ergot, in beet-root juice and in the actively- growing parts of numerous plants. It may be prepared by boiling pigs’ bile or ox-brain with baryta, bleurine is a syrupy body with mark¬ edly basic properties and a strongly alkaline reaction. It is not poisonous, but may be con¬ verted by oxidation into muscarine (q.v.), to which substance the poisonous qualities of the fly agaric are commonly ascribed.

NEURITIS (N. Lat. from Greek vevpov ner ve + itis, a suffix denoting inflammation), in¬ flammation of a nerve. Multiple neuritis is the inflammation of several nerves together. Vary¬ ing with the cause, neuritis is infectious, toxic, traumatic, leprous, alcoholic, etc. The disorder may be acute or chronic, primary or secondary. It results from an inflammation, swelling and thickening of the nerve-sheath and its prolonga¬ tions. They may be associated with inflamma¬ tory and degenerative changes of the substance of the nerve. The principal symptoms of the disease are persistent burning pain, more or less severe, and a tenderness in the course of the nerve and at the points of its distribution. These are followed by or associated with mus¬ cular weakness or paralysis, numbness — loss of sensibility or hypersesthesia — and atrophy of muscles. The causes of various types of neuritis are numerous; for example, injury to a nerve, as in dislocations and fractures; extension of in¬ flammation from a neighboring part ; poisoning by lead, arsenic, mercury or alcohol, syphilis, cancer, diphtheria and infection. The simpler forms of the disease are usually recovered from, under treatment, in a few weeks, al¬ though recovery may be imperfect. In severe forms death may occur in from a week to 10 days, from paralysis of the inspiratory muscles, or after several weeks from exhaus¬ tion due to continuous

pain and bed-sores.

NEUROGLIA, the connective tissue found in many parts of the nervous system, differing very materially in its general structure from that found in other organs, wherefore it has received its special name. It is also sometimes designated as spider-cells, because of the many-branched processes which the cells possess. See Brain; Nervous System, Evolution of the.

NEUROLOGY, that branch of science which treats of the structure and functions of the nervous system. It deals with that system under all its aspects of form and condition, both in health and in disease, but especially with its pathological states, its hygiene and its

medical treatment. See Nervous Diseases ; Nervous System, Evolution of the; Nervous¬ ness.

NEURON. See Nervous System, Evolu¬ tion of THE

NEUROPTERA, the order of “nerve¬ winged® insects, so-called by Linnaeus from the abundant supporting rods or “nerves® which ramify in a network throughout the wings. Since its establishment the original largely arti¬ ficial group has been much restricted by the separation from it of large divisions. Typical Neuroptera have two pairs of large, equal, richly netted-veined, membranous wings, strong biting jaws, conspicuous, many-jointed antennae, a free prothorax and a complete metamorphosis. This order is of relatively slight economic im¬ portance, but the 8 or 10 families include many common and interesting American insects. See Ant-lion ; Corydalis ; Dobson ; Lacewing, etc.

NEUROSIS (Greek vevpov , nerve), an affection of the nervous system indicated by disordered sensation, volition, or mental expres¬ sion, without any recognized lesion of parts, and sometimes without a discoverable adequate cause. Many abnormal conditions are now con¬ sidered as neuroses; some of them result from nervous dyspepsia, shown by belching and eruc¬ tation, by spasm and atony of the stomach, due to increased or decreased peristalsis, etc. Car- dialgia and cardiospasm (functional disturb¬ ances of the heart) may produce such condi¬ tions. They are variously described, and in¬ clude accident-neurosis, a neurosis following a severe injury; traumatic neurosis, following a severe wound; cyclist’s neurosis, following ex¬ cessive bicycle-riding; alcoholic neurosis, due to overuse of alcoholics; occupation-neurosis (see Occupation, Hygiene of), indicated by spasmodic manifestations when attempting to perform movements

peculiar to the employment of the individual, as the cramps of writers, telegraphers, musicians, dancers, baseball play¬ ers, milkers, etc. ; angioneurosis, a neurosis of the blood-vessels of a part. Herpes zoster is spoken of as vasomotor neurosis, an exanthe¬ matous angioneurosis. Other neuroses are kinesioneuroses, indicated by disorders of motion ; sesthesioneuroses, indicated by dis¬ orders of the sensory apparatus, thermoneu¬ roses, or vagaries in heat perception, secretary neuroses, and mixed neuroses, including acro-neuroses, or disorders of the extremities, sex¬ ual neuroses, or disordered functions of the sexual apparatus, and psychoneuroses, in which mental derangement or disorder is concomitant with the physical disorder. Occupation neuro¬ ses are quite common ; the usual treatment con¬ sists of rest, change of occupation, electric and other massages, douches, etc. As a general rule drugs are administered only when necessary to relieve accompanying neurasthenia. Consult Church and Peterson, (Nervous and Mental Diseases) (8th ed., Philadelphia 1914).

NEUROTIC. As an adjective, this term signifies having relation to the nerves. Phy¬ sicians speak of neurotic individuals or sub¬ jects, neurotic ulceration, neurotic poisons, etc. As a noun the term was formerly chiefly applied in medicine to any substance — drug or poison — which acts especially on the nervous system, neurotics being classified as cerebral (morphine'

etc.), cerebro-spinal (as aconite), and spinal (as strychnine). This use of the word neu¬ rotics has become obsolescent, and the term is now mainly reserved for sufferers from nervous disease or excessive nervous activity.

NEUSATZ, noi'zats, or UJVIDEK, ooy'- ve-dak, Jugo-Slavia, a town in the district of Bacs, on the Danube opposite Peterwardein. During the Civil War in 1849 it was stormed and taken by the Imperial troops under Jellachich, and almost destroyed by the fire of the insurgents from the castle of Peterwardein. It was re¬ built and is now a thriving trading and educa¬ tional centre. It contains the Matica Srbska, which is the most important Serbian literary scientific organization in Hungary. It is the seat of a Greek Oriental bishop. Pop. (1910)

33,089.

NEUSE, nus, a river of North Carolina, which has its rise in the north central part of the State and flows southeast into the Atlantic through Pamlico Sound. Its mouth is an es¬ tuary about 30 miles long, and is 10 miles wide at its mouth. It is about 310 miles long and navigable for about 70 miles. A number of streams flow into the Neuse but it has no large tributary.

NEUSIEDLER SEE, noi'zed-ler-za (Mag¬ yar Ferto-Tava) , Hungary, a lake in the north¬ west, between the counties of Odenburg and Wieselburg, 30 miles southeast of Vienna. Its greatest length, north to south, is 23 miles, average breadth five mileˆ, circuit about 60 miles. It is saline and shallow, its greatest depth seldom exceeding 15 feet; on the east side it is lost in the great morass of Hansag. Large quantities of salt crystallize on its shores in summer, consisting of a mixture of com¬ mon and of Glauber salt. It contains abun¬ dance of fish, such as carp and pike, some of the latter being 70 or 80 pounds weight. Its frequent inundations occasioned great damage, till a canal was cut in 1800 to carry off its superfluous waters and discharge them into the Little Raab. The water several times has dis¬ appeared almost entirely. The last occasion was between 1865 and 1870, when crops were grown on its bed.

NEUSS, nois, Germany, a town of the Prus¬ sian Rhenish province, on the Erft, near its junction with the Rhine, 21 miles northwest of Cologne and four miles west of Diisseldorf. It has several fine churches, that of Saint Quirinus, founded in 1209, being a notable tran¬ sitional specimen from the Round to the Pointed style. The numerous industrial estab¬ lishments include flour and oil mills, iron foun¬ dries, machine works, woolen and cotton fac¬ tories, paper mills, etc. Pop. 37,224. The town is the Navaesium of the Romans. In 1474-75 Charles the Bold besieged the town. It was sacked by Alexander Farnese in 1586.

NEUSTADT, noi'stat, or WIENER- NEUSTADT, ve'ner-noi'stat, Austria, a town near the Hungarian frontier, on the Kerbach, 31 miles by rail, and by canal, south of Vienna. It retains its mediaeval walls and is dominated by the 13th century Babenburg ducal castle, converted in 1752 by Maria Theresa into a military academy and noted for its richly deco¬ rated Gothic chapel (1460), the burial place of Maximilian I. Locomotives and machinery,

sugar, woolens, cottons, ribbons, starch, leather, pottery, wire, etc., are among the manufactures. The city was founded in 1192 and was rebuilt after the great fire of 1834. Pop. 32,869.

NEUSTRIA, nus'tri-a, or WEST FRANCE, the name given in the times of the Merovingians and Carlovingians, to the western portion of the Frankish Empire, in contradis¬ tinction to Austrasia (q.v.), the eastern portion, the term being derived from ne (not) and Austria. The division took place at the death of Clovis in 511. Neustria lay between the Meuse, the Loire and the Atlantic Ocean ; after the cession of the northwestern portion to the Normans in 912, the name was applied to Normandy, but soon fell into disuse. (See Franks; France). Consult Longnon, Atlas historique de la France) (Paris 1889).

NEUTER, a term formerly applied in zoology to those animals — represented chiefly among the Hymenoptera — in which the char¬ acteristics of sex are either present in a rudi¬ mentary condition or may not be developed at all. They are infertile females. Their status is given in the accounts, in this work, of ants, bees, wasps, and termites.

NEUTRAL NATION, an American In¬ dian tribe of the Iroquois family, residing in the 17th century on the north shore of Lake Erie. The Aondironon, the Wenrehronon and the Ongniaahraronon were some of their con¬ stituent tribes. In 1626 Father Daillon tried to convert them to Christianity and was favor¬ ably received, but the Hurons spread false re¬ ports that he was a sorcerer. The French called them the Neutral Nation because they took no part in the long war between the Hurons and the Iroquois. The Hurons after¬ ward made war on the Neutrals and utterly destroyed them in 1651. Consult Hodge, F. W., (Handbook of American Indians North of Mexico) (Washington 1910).

NEUTRAL SALTS. See Salts; Neu¬ tralization.

NEUTRAL STATES. See War, Euro¬ pean — Neutrals and the War.

NEUTRAL TINT, in art, a pigment used in water colors, of a dull grayish hue partak¬ ing of the character of none of the bright colors. It is prepared by mixing together blue, red and yellow in various proportions.

NEUTRALITY, in international law, a term applied to the status of a state which maintains an attitude of non-interference in respect to an existing war between other states, rendering neither aid nor service to either bel¬ ligerent in his military operations. The doc¬ trine of neutrality constitutes a large and in¬ creasing part of the existing body of inter¬ national law, but in ancient and mediaeval times it occupied almost no place. Grotius, in the first important treatise on international law ever written, gave but an insignificant place to the

subject, ’whereas in any modern treatise it occupies a place hardly second to the law of peace or of war. Among the states of the ancient world the status of neutrality hardly existed. War rather than peace was the normal state of mankind and when it existed practi¬ cally all nations participated either as prin¬ cipals or allies. If one nation undertook to pursue a neutral policy it had few rights as

such which any of the belligerents felt bound to respect and consequently it was more often to its advantage to choose an able ally as a means of self-protection rather than to remain neutral.

It was among the flourishing maritime states ot the Mediterranean region, during the later Middle Ages, that the modern doctrine of neu¬ trality had its origin, and the first recognition of neutral rights was embodied in a famous maritime code, the <(Consolato del Mare,® which declared that the goods of a neutral were exempt from capture although found on an enemy’s vessel. This wise and liberal rule in time came to be adopted by -all the European powers and continued as a generally accepted principle of maritime warfare until superseded by the more liberal rule embodied in the Decla¬ ration of Paris of 1856. By the latter declara¬ tion, which was acceded to by all the nations of Europe and America except Spain, the United States and Mexico, the principle that free ships make free goods was adopted; that is, the goods of an enemy (contraband of war excepted) under a neutral flag, and neutral goods (contraband excepted) under an enemy’s flag, are free from capture. The United States refused to give its adhesion to the declaration for the reason that it was disinclined to sur¬ render the right of privateering, the abolition of which was also one of the provisions of the declaration. The United States assumed this position chiefly because of the smallness of its navy and the consequent disadvantage it would suffer in a war with the larger powers were it prohibited from increasing its naval strength by accepting the service of privateers. The government, however, proposed to become a party to the declaration provided a clause were added exempting private property from capture at sea the same as on land but it was never done and the United States has never formally given its adhesion. But as a matter of prac¬ tice it has observed the rules of the declaration quite as scrupulously as if it had been one of the signatory powers.

Several forms and gradations of neutrality are or were formerly

recognized. It may be qualified, as where the neutral state is bound by an interior agreement to furnish one of the bel¬ ligerents a contingent of troops or a sum of money; or absolute, as where the state abstains wholly from interference on the side of either belligerent ; or perpetual, as in the case of Bel¬ gium and Switzerland, whose neutrality and inviolability have been guaranteed by the pow¬ ers upon considerations which have to do with the preservation of the balance of power among European states ; or armed, as where several neutrals unite for the purpose of enforcing by armed intervention their views of neutral rights as against the aggressions of belligerent pow¬ ers. The most notable examples of such alli¬ ances were the armed neutralities of the Baltic powers in 1780 and 1800 for the purpose of enforcing against England the neutral doctrine that ((free ships make free goods.® It should be said that international law no longer recog¬ nizes the right of a state to maintain a quali¬ fied neutrality. If it is under prior treaty obli¬ gation to furnish one of the belligerents with men, money or ammunition, however trifling the quantity, it becomes an ally as soon as it undertakes to carry out the treaty stipulations

and is no longer entitled to be treated as a neutral. During the Franco-German War of 1870 the German government appealed to the government of Great Britain to prohibit the sale of arms or munitions to the French, on the ground of benevolent neutrality. Such a theory of neutrality cannot be accepted. Be¬ nevolent neutrality is no neutrality at all. It is assistance to the belligerent to which it is accorded.

The obligations and rights of neutrals are determined by the rules of international law, not by those of municipal law. They are now defined by two Hague conventions, Nos. V and XIII of 1907. These conventions contain an enumeration of the duties of both belligerents and neutrals, although it is expressly declared that the enumeration is not exhaustive. In this connection it should be observed that in judging of ˆ the violation of neutral duties a distinction is made between the acts of a state and those of individuals. The act of an indi¬ vidual in supplying a belligerent with arms or ammunition or in subscribing to his loans is not considered as a violation by the state of its neutral duties, although it might be a violation of municipal law. It is not sufficient that the neutral treat each belligerent with impartiality; he must abstain from giving aid to either ex¬ cept where the ordinary dictates of humanity require, for what might be equality of treat¬ ment in form might in effect amount to as¬ sistance to one side only. He must not lend either belligerent money, furnish him with troops or ships of war or any article suscep¬ tible of warlike use, or allow his territory to be made the basis of hostile operations or for the

organization and equipment of hostile expe¬ ditions, or as a recruiting ground for the en¬ listment of troops, or allow prizes to be brought into his ports and there adjudicated, or allow his subjects to aid in the preparation or organ¬ ization of a hostile expedition against a friendly power. . Troops of a belligerent, which are re¬ ceived in neutral territory, must be interned, and belligerent warships are forbidden to re¬ main in neutral waters longer than 24 hours. Likewise their right to make repairs and to take on supplies of coal and provisions is greatly restricted. In the three rules adopted by the Geneva Arbitration Tribunal in the case of the Alabama Claims (q.v.), it was declared to be the duty of neutral governments to use due diligence to prevent the fitting out and departure of such expeditions from their ter¬ ritory, to prevent their ports from being made use of by either belligerent for hostile pur¬ poses; and to exercise the same diligence in respect to all persons within their jurisdiction in order to prevent any violations of the fore¬ going duties. The substance of these rules is repeated in The Hague Convention No. XIII of 1907. On the other hand, it is not a viola¬ tion of neutral duty to discharge the duties of humanity to either belligerent as by allowing a belligerent vessel in distress to seek shelter in the neutral's port for the purpose of obtain¬ ing supplies or undergoing repairs or by fur¬ nishing asylum to a defeated and fugitive belligerent force. Nor is it at international law a violation of neutral duty when the citizens or subjects of a neutral government in the ordi¬ nary course of trade sell to a belligerent fire¬ arms or other supplies which the latter may

wish to huy. Likewise neutral persons may transport by ship to belligerents whatever they may want, subject, of course, to the right of the other belligerent to capture and confiscate such articles as may be deemed contraband of war. These are legitimate acts of trade un¬ affected by war, and neutral governments are not bound to interfere with them or assume responsibility therefor. Nevertheless, during the European War of 1914-18, the govern¬ ments of Austria and Germany complained of the action of the American government in per¬ mitting the sale and transportation for the use of the Entente Allies of large quantities of arms and munitions. The complaint was based on the view that since Austria and Germany had been deprived through the superiority of the British navy of access to American mar¬ kets, it was contrary to the spirit of neutrality for the American government to permit the furnishing of supplies to their enemies. It was also argued that the immense proportions which the traffic assumed, giving rise as

it did to the creation of new and extensive industries, gave a ((new aspect to the doctrine of neutrality.® The American government, however, declined to accept this view and the trade m arms and munitions continued without restriction. Ar¬ ticle 7 of The Hague Convention (No. V) of 1907 declares that a neutral power is not bound to prevent the export of arms or munitions for the use of belligerents. During the European War of 1914 — 18 Brazil and several neutral powers of Europe placed prohibitions on such traffic, but in the case of the latter powers the measure was not in pursuance of a neutrality policy but rather for the purpose of conserving their own supply of arms and munitions. Finally it is not a violation of neutral duty for one state to recognize the belligerency of an¬ other state at war or of a part of a state in rebellion against the established government. Nor is it a violation of neutral duty to recog¬ nize the independence of a revolted people when the revolt has reached such a stage as to give reason to believe that the revolutionists will establish their independence as a fact and maintain it.

The above enumeration of the duties of neu¬ trals indicates in a rough way the rights which belligerents are bound to respect in the conduct of their warlike operations. They may be com¬ prehended under the general head of complete immunity from the acts of either belligerent within their jurisdiction. No act of hostility may be committed by either belligerent within neutral territory nor within its territorial waters. Nor may a belligerent move his troops through the territory of a neutral state, al¬ though this well-established rule has occasion¬ ally been violated, notably by Germany in her invasion of Belgium in 1914. Under The Hague Convention No. V of 1907, belligerents are also forbidden to erect within neutral territory wire¬ less telegraph stations for the purpose of com¬ municating with belligerent forces by land or sea. Fugitive troops fleeing from an enemy may not be pursued in neutral territory nor may an armed vessel pursue and capture an enemy's vessel in neutral waters. As a means of enforcing its neutral obligations, it is cus¬ tomary for states to enact neutrality _ laws, so called, making it criminal for their citizens or subjects to do certain specified acts which are

considered to be violations of neutral duties, but such laws neither increase nor diminish the responsibility of the state enacting them. Con¬ sequently the state cannot plead the insufficiency of such laws or inability to execute its laws, in extenuation of its offense if it fails to enforce its neutral obligations. The foundation of the neutrality policy of the United States was laid during Washington's administration, when upon the outbreak of war between England _ and France Washington after a thorough consider¬ ation of our obligation to

France, under the treaty of 1778, issued a public proclamation announcing that the United States would re¬ main neutral and warned all citizens of the United States to abstain from giving aid to either belligerent. In the year following Con¬ gress passed a neutrality act which as modified in 1818 and again in 1828 constitutes in all essential particulars the neutrality law now in force. Some minor changes were made in 1915 and more recently a number of important modi¬ fications have been recommended by the At¬ torney-General with a view to strengthening the existing laws. These laws make it a mis¬ demeanor for any citizen of the United States to accept or exercise a commission to serve a foreign power in a war against a state at peace with the United States ; or to enlist or to induce another person to enlist or to go beyond the jurisdiction of the United States to enlist in such foreign service ; or to fit out, arm or augment the force of any armed vessel to be employed in such service ; or to provide the means for setting on foot any military expedi¬ tion against a friendly state. No belligerent vessel is allowed to provide itself with military supplies in the territory of the United States, and the President is authorized to use force to send out of our territorial waters any vessel not entitled to remain therein. The neutrality laws of Great Britain are embodied in the For¬ eign Enlistment Act of 1870 and besides pro¬ visions similar to those contained in the laws of the United States they contain detailed and stringent regulations designed to prevent the building or equipping in British jurisdiction of ships intended to be used in war against a friendly power.

See also articles on International Claims and Disputes; Geneva Arbitration; Interna¬ tional Law ; Paris, Declaration of. For ref¬ erences consult authorities cited under Inter¬ national Law.

James Wilford Garner,

Professor of Political Science, University of Illinois.

NEUTRALIZATION, in chemistry, the process by which a solution, originally acid or alkaline, is rendered neutral, or brought into a state in which it is neither acid nor alkaline. If the solution is originally alkaline, it is made neutral by the addition of an acid substance ; and if it is originally acid, it is neutralized by the addition of an alkali. A solution of caustic potash, for example, is strongly alkaline and turns red litmus paper blue almost instantly; but if hydrochloric acid is gradually added to it, the alkalinity becomes reduced in proportion to the quantity of acid added, until a state is finally attained in which the solution does not manifest either acid or alkaline properties, and does not affect the color either of red or of

blue litmus paper. It is then said to be ((neu- tralized, the neutralization being due to the fact that the potash has entered into combina- tion with the acid to form a salt (potassium chloride) which is neither acid nor alkaline. It more acid is added than is required to effect piecise neutralization, the excess renders the solution acid, and in order to make it neutral again caustic potash or some other alkali must be added. It is often highly important, in chemistry, to effect the precise neutralization of a solution, and a method of quantitative chem¬ ical analysis, known as ((volumetric analysis,® is largely based upon the determination of the quantities of certain standard acid and alkaline solutions which must be added to the given solution, in order to precisely neutralize it. See Chemical Analysis.

NEUVILLE, de ne-vel„ Alphonse Marie

de, French painter: b. Saint Omer, 31 May 1836; d. Paris, 20 May, 1885. While he was for a short time the pupil of Picot, he must be con¬ sidered largely a self-taught artist developing his talent under the direction of Delacroix. He made his first appearance as a battle painter with his (Episode in the Crimean War> (1859), followed by (The Trench of the MameloiP ;

(Zouave Guard) (Museum of Saint Omer) ;

(Chasseurs Crossing the Tchernaia® ; (The Bat¬ tle of San Lorenzo in Mexico. > Meanwhile he was producing numerous illustrations for per¬ iodicals and for Guizot's (Histoire de France. > He served as an engineer in the Franco-Prus- sian War, and the second period of his artistic activity began. He tickled the vanity and boastfulness of his countrymen by depicting in his glowing and energetic canvases the French as chivalrous heroes, the Germans as barbarians, and became the most popular war painter of <(Young France® and the artistic representative of Chauvinism. Among his works with this tendency are (Bivouac before the Village of Le BourgeD (1872, Museum of Dijon) ; (The Last Cartridge at Balan) (1873, familiar through its many reproductions), his panoramas of the bat¬ tles of C'hampigny and Rezonville (with De- taille, 1881, and numerous others frequently reproduced as photographs or engravings and thus widely distributed. He left many aqua¬ relles and drawings which were eagerly bought up.

NEUVILLE, Jean Guillaume, Baron Hyde de, French statesman : b. near Charite- sur-Loire, France, 24 Jan. 1776; d. Paris, France, 28 May . 1857. He was educated at the College Cardinal Lemoine, Paris, and early be¬ came an active agent of the exiled Bourbon princes. In 1799 he interviewed Napoleon with the purpose of restoring the throne to Louis XVIII, and later his estates were con¬ fiscated; but in 1806 upon his agreeing to exile himself to the United States, Napoleon restored them. With the accession of Louis XVIII in 1814 he returned to France and in 1815 was elected to the Chamber of Deputies. He was sent to the United States as Minister and consul-general in 1816-21 and was then made Ambassador to Portugal, and Minister of Marine (1828). In 1830 he became Secretary of the Navy. He wrote (An Historical Eulogy of General Moreau,* etc.

NEVA, ne'va (Russian, nye-va'), Russia, a river which flows from Lake Ladoga, and

after a westerly winding course of 43 miles has its outlet in the Bay of Cronstadt, an inlet of the Gulf of Finland. It is best known as the river on the delta of which Petrograd (q.v.) is built. The river carries to the sea an enormous volume of water from lakes Ladoga, Onega, Ilmen and others equal to that of the Rhine and the Rhone combined ; in places it is over 4,000 feet wide, elsewhere narrows to 180 feet, and at one or two points navigation is ob¬ structed by reefs and rapids; it is frozen over during five months of the year. The Neva connects with the Volga by the Ladoga Canal, and thus joins the Baltic with the Caspian Sea.

NEVADA, ne-va'da, Emma, stage name of Emma Wixon, American opera singer: b. Austin, Nev., 1862. She studied in Paris with Marchesi and made her first appearance in opera in London in 1880, as Amina in (La Son- nambulaP She sang with success in Paris, Italy and in the United States, where she toured in 1885. In 1885 she was married to Dr. Ray¬ mond Palmer.

NEVADA, ne-va'da, popularly known as <(the sage-brush State,® the name derived from the Spanish nevada, signifying ((snow-covered® : one of the Mountain Division States. It is bounded on the west by California; on the south by California and Arizona; on the east by Utah and Arizona, and on the north by Oregon and Idaho. The sixth in size among the States of the Union, Nevada has an area of 110,690 square miles of surface, 869 of which are water; extreme length north to south, 484 miles, and width, east to west, 321 miles. It lies between the 35° and 45° parallels of lati¬ tude, corresponding, -on the Atlantic Coast, with the northern boundary of Pennsylvania and the southern

boundary of North Carolina. The capital is Carson City.

Climate. — Due to its extreme length north and south and varied elevations, Nevada has a climatic range which is exceeded by but one other State, California. Southern Nevada is semi-tropical; central and northern Nevada, temperate, while certain high valleys and moun¬ tain elevations in northeastern Nevada are characterized by extreme winter cold. The atmosphere is clear, dry and almost cloudless. Precipitation occurs chiefly during the winter months and is intercepted largely by the higher mountain ranges. The valleys receive little rainfall.

Topography. — Nevada, for the most part, lies in the Great Basin, a plateau of about 4,0C0 feet elevation situated between the Sierra Nevada and Wasatch Mountains, none of the streams of which find their way to the sea but empty into inland lakes without outlets or are lost in the sands. A narrow strip along the northern part of the State drains into the Columbia and a portion of the southern part of the State into the Colorado River. There are numerous parallel ranges from 20 to 50 miles apart running north and south through the State, broken by passes, with long narrow valleys between. The valley elevations vary from 1,000 feet, in extreme southern Nevada, to a few val¬ leys in excess of 6,000 feet in the northeastern part. For the most part the valleys are be¬ tween 4,000 and 5,000 feet elevation. Some of the mountain ranges rise to 9,000 feet. The highest mountain is Wheeler Peak in White

Pine County, elevation 13,058 feet. Other noted peaks are Charleston Mountain, Pilot Peak, Mount Grant, Mount Rose. Freehs Peak, Job's Peak and Mount Jefferson, which are 10,- 000 to 12,000 feet. Forests are unevenly dis¬ tributed, with a few areas of commercial forests comprising white and yellow pine, firs, spruces and cedars of great size. In some places the hills are covered with dense growths of juniper, pinon and mountain mahogany. Deciduous native trees comprise the cottonwood, aspen, alder, elder, willow, choke cherry, etc. Aside from the several varieties of sage-brush which clothe the valleys and low hills, there are many native shrubs and bushes and a plant flora re¬ markable for its varied range. Some of the mountain scenery is picturesque beyond descrip¬ tion. The general landscape, however, other than in the comparatively few agricultural val¬ leys, presents great stretches of sage-brush, sandy or alkali wastes, bounded

by mountain ranges, the first impression of which is of un¬ utterable loneliness and desolation. This gives .place, in time, to the lure of the desert — the sensation of untrammeled freedom in Nature's immensity and delight in the diurnal panorama of the landscape's ever-changing coloration.

Rivers and Lakes. — The rivers are all comparatively small. The Humboldt, 350 miles in length, flows in a southwesterly direction through the northern part of the State and affords the pass through the mountains for the Southern Pacific and Western Pacific railroads. Other important streams are the Truckee, Car- son and Walker rivers. The Salmon, Owyhee and Bruneau rivers rise in northern Elko County and flow northerly into tributaries of the Columbia. The Rio Virgin and Muddy rivers, in southern Nevada, flow into the Colorado. A part of Lake Tahoe, one of the most beautiful mountain lakes in the world, is in Nevada. Pyramid Lake, so named from the pyramid-shaped islands of gray stone which rise picturesquely from its deep blue waters, is the largest lake. It is 35 miles in length with a water surface of 390 square miles. Other important lakes are Walker, Winnemucca, Ruby and Washoe. Several of these lakes are remnants of the ancient Lake Lahontan, which in geologi¬ cal times covered a large part of Nevada.

Geology. — The mountains of Nevada show formations of nearly every epoch from the Azoic to the late Jurassic, crumpled and up¬ lifted; ancient erupted rocks which accom¬ panied the Jurassic upheaval; modern eruptive rocks ranging in date from the late Miocene to the Glacial period, and uptilted strata of Cretaceous sedimentaries. The principal rocks are granite, sienite, andesite, dacite, basalt, limestone, slate, sandstone and quartzite. Nevada is one of the most important of the States in the variety, extent and richness of its deposits of precious and valuable metals and minerals. The comparative thinness of the detritus blanket on its mountain slopes has been an important aid to the prospector in discover¬ ing the outcroppings of ores.

History. — At the time Nevada was organ¬ ized as a Territory in 1861, the extreme western portion was locally considered a part of Cali¬ fornia, known as the ((Washoe Country,® al¬ though the civil government was under the jurisdiction of the Territory of Utah. Nevada was first visited by the white man in 1775, when

Francisco Garces, a Franciscan friar, stopped here on his way to California. Peter Ogden of the Hudson Bay Company in 1825 visited the Humboldt River, which for a time was called the Ogden. In 1826

Jedediah Smith crossed the State from west to east. Irving's Bonne¬ ville Papers> describes a visit by members of Captain Bonneville's party to Mary's River, now the Humboldt, about this time. Fremont explored parts of the State in 1843-44—45, dis¬ covering and naming Pyramid Lake, Lake Tahoe and the Humboldt and Truckee rivers. The first settlement was made by Mormons in 1849, at Genoa, where a trading post was es¬ tablished. Gold was discovered the same year at .Dayton, near Virginia City, by William Prouse. Placer mining on this gulch led, 10 years later, to the uncovering of the famous Comstock Lode, the richest deposit of precious metals ever found in the world. A petition for Territorial government was sent to Con¬ gress in 1857 and the following year a pro¬ visional government was formed at Carson City with Isaac Roop as governor. In 1860 another petition was sent to Congress and the Territorial delegate applied for admission. The Comstock Lode had now been discovered and a rush of miners from California occurred. Emigrants from the East on the Overland Trail across the State stopped to cast their fortunes with the new El Dorado. Other min¬ ing discoveries followed in rapid succession. Virginia City became over night a magic city of Aladdin and the ((Washoe Country® became the Mecca of the seekers of fortune the world over. At the outbreak of the Civil War the scanty citizens sent loyal troops to the front. In September 1863 an election was held for delegates to form a State constitution, but the proposition was defeated in January 1864. By the close of the Civil War Nevada had pro¬ duced $43,000,000 in gold and silver bullion which was of material assistance to the North. The adoption of the 13th and 14th amendments to the Constitution of the United States re¬ quired the vote of one additional loyal State, necessitating the admission of another State into the Union. . President Lincoln's choice fell upon Nevada. On his recommendation Con¬ gress, in March 1864 passed an enabling act. In July the constitution was accepted and Nevada became a State, 31 Oct. 1864, the only State admitted during the administration of the martyred President. The first telegram sent across the continent on the completion of the Western Union Telegraph line, in 1864, was from the Nevada legislature certifying the loyalty of the State. To save delay the con¬ stitution of Nevada was telegraphed to Con¬ gress for ratification under authority of a special resolution. It is significant that at this time California and Oregon were the only other States west of Kansas. In June 1868 the Central Pacific Railroad was completed and the golden spike which connected it with the Union Pacific driven near Iron Point, Nev. Sub¬ sequently the divisional point between the two railroads was established at Ogden, Utah. The Sutro Tunnel, designed for draining the Com¬ stock Lode, was completed in 1879, but not be¬ fore the (

NEVADA.

Estimated population, 106,734

COUNTIES

Fop.

Pop.

2,811

Churchill .

.E 5

7,513 Nye .

. IS

3,321

Clark .

L 12

3,415 Ormsby .

. B 6

1,895

Douglas .

.B 7

Pershing . . . .

. . . . D 5

8,133

Elko .

(Pop . incl .

in Hum-

9.369

Esmeralda .

. F 9

boldt Co.)

1,830

Eureka .

. J 4

3,045 Storey .

. B 6

6,825

Humboldt .

, E 2

17,434 Washoe .

. B 3

1,786

Lander .

.G 5

7,441 White Pine .

. K 6

3,489

Lincoln .

L 9

3,568

Lyon .

.0 6

Mineral .

.D 7

(Fop. Incl. in

Es-

meralda Co.)

Incorporated Cities, Towns, and Villages

2,466

Carson City .

.B 6

387 Searchlight..

1,650

Elko .

337 Silver City .

. B 6

2,055

Ely .

2,500 Sparks .

741

Fallon .

D 6

3,900 Tonopah .

. G 8

4,838

Goldfield .

.G 9

2,244 Virginia City

. B 6

1,204

Lovelocks .

• E 4

1,275 Winnemucca

. F 3

14,689

Reno .

682 Yerington . . .

I

E TWIN FALLS O i c

WClCYALLEy]

Rowland

ˆyhce J Mountain

N c«y

•Jacinto,

O 1 1 I

ˆBeulah

0Ia£bidge Pavlack O’Neil,

f’pperJM

Contact

/.N.lidnaWf^.

^ , “* Cy i rr,

Pla,t i • ‘ o _ ‘ ^

Whiterock

MaasacreyL.

(Joli Creek

Stiver

■Vi, /die 4 f)

oEdgemont

Aura

Charleston

RChel/Creok

(Paradise Valh

iV idd/ei Lake

Amos

‘Tuscaror’aJ

^•Jfuttle

^ 6«/Ullin V/Loray

•Midas

uthony \ Cobrej

rO45 i*r 9 Jr#3

^bunkil

Laurel e

er Zone! roc tori

V Pilot

Oflˆ/Tuido

TobarVsA*ˆ/

ˆVentosaV

tion.arˆˆ.0 ! ˆ ’beeoy

GOSHUTE >

ˆ , MTS?— /

Lamoille

•JvˆiHunter

fiction

rlach

ru}ˆh

o WiA ˆc|t

<0 ˆ. ,

? ..ˆUnionvllle

Seven Troughs

““w <,90?

Bullionˆ

u» Spruce

Raiaies

‘Mizpatv

ˆKumiva

sf Peak

Dillon Baileys /

Hilltop

Fitting

Kennedy

Vernon

‘Currie

CORTEZ

*\fl

Go&huteVA

iBlacVM Miner a

ifgjfi ucca

fe? ˆa/ce XlF

,S©rin#no

Cortez

Greens yf

Bridges/ˆ

Hobson

Alpha.

Tippet

＞Humbaldl

BubtoW

Tonkin

gp****?*

: / Humboldt

/Salt Marsh

Boyer

I U L

herry

’.owt~jL’araon,

Schellbourne

$t]Sa It , -jDeqoˆit]

Spring

Warm

Auruni.

Silver Creek iCatons

Oopperfiel

SIERRA

Shepards; Steptoe P. 0.°Ca

ˆVˆFalais/V ’ ˆ ‘ ‘

£> >lashe C> * j

Stillwater,/ˆ

o,“uhii?-ti, allon \ f£M

\ ‘ Wonder.

■| Carsanjyˆ Vi w

(J Lakeˆl AM.

? i *>z

ˆSteptoe.# •Glenn W*

/ Eurek.i

Austin

TruckeU

der8°D*\

Ledlie

VTOREY/

NEVAD-

Hamilton

Carroll

Glen broo k yfr****i

ftaGVnoay. P

fKay;° Buckskin/ Veringti

Bruner^

3 Black Horie

[Gardnerville

&Vhee! v Peak

Rawhide)

DOUGLAS

Dome

1SJ%. mlaniis

5″ \l|jKliol»n i: \ V Magnus

s-* ? V-

•«E R

- ^ ^/^Vy^VVThorm1 _

- VNN «* J ^ . , e<

“Y -t %.

Lund

Shoshone Z ˆ

Currant

[olbrook

> i,v,: noun a %

\‘ Mountainˆ t;l

to Shoshone

vrkleevllle

Geyser

Wlnchmal

Hiuthpriii

lv<-otw»ter/ˆ,AWl |T„

Ny / u iuckyboy

V

< K Au»™ . J3

Manhattan

EAVER

Atlanta

fjˆaˆTlle\ ˆRhodes l

Cbnopah Jo. Belleville/

‘Bridgeport

Je

Touopah

Filben

Sharpy;

Summit/

IcLeans

Basaltj

.MTS;

McSweeney Ym.

YOSEMITE

Salt Marsh

fCrsina

Fay

0

rJot‘1’1′

Mud Lake

WorthmˆtOfi 3ˆ’

Peak

?ˆfeinaca<

Xˆ/p’Salt pi Oh Ji J-~r Marsh >,C lu

ˆGoldfield

O PARK

sˆ»|,

Etna

[Ralstoi l VStonewall

Delamar

A>Ia rip o s a

Hbrnsilver

Bonnie Clare

Mbnola

Ancranl

Madera

j Beatty V.JjCcaˆW ˆ luold Cent

V“rraral..| /! .A

,\y. Bosewe”ˆ

lndepAjideiJee

Piedra

\ Acton

Kerma’n

Moapa

Owejiyo

lyron/

Ute/ Overtoil

eeiand

St. O Thomas

Auiargosa

> hvem

W,

$y Dry Ukoˆ ˆ■/Garnet Vapcx. a % *°Dike \ fir illey V ˆ

OwensSˆ irn Creek ‘a Tuic\

Johnnie,

.Visalia

Exeter

.Death Valley

r jc. >

kStrattoui

Tulare

Springville

Las Vegas

Bracken Pierce A

orcoran °

Portersville

Sloan

.Zabriskie

»Allensworth

NEVADA

descent

SCALE

Chloride

Ivan pall *\ Leastalk.

Johannesburg

Juau

Statute Miles, 42 = 1 Inch,

Caliente

Inginan

Rand McNally's New 11 i 14 Map of Nevada. Copyright by Rand McNally it Co.

Gold Hill, Tuscarora, Candelaria, Belmont and lybo; producing silver, gold and lead. Silver minrng was the principal industry. With the tall in the price of silver, due to the Demoneti- zation Act of 1873, mining suffered a decline which continued until the discovery of Tonopah by Jim Butler, in April 1900. At this date the population of Nevada had reached its lowest ebb, 42,335 people. With the decline of min- however, more attention began to be given to the possibilities for agriculture. It was found that the soils of the valleys were ex¬ ceedingly fertile and produced profitable crops under irrigation. Canals were constructed to divert the waters of the streams upon the lands until the limit was reached which could be re¬ claimed without the conservation of waters flowing to waste during the non-irrigation sea¬ son. This necessitated expensive impounding dams and canal systems. The United States Reclamation Act of 1902 was designed to supply Federal aid for such works, in many instances involving millions of dollars. The first reclama¬ tion enterprise undertaken was the Truckee- Carson project in Nevada, which has involved an expenditure in excess of $7,000,000. While but a comparatively small part of the land area of the State is susceptible of cultivation, due to limitation in quantity of flow of the streams, and this in great part is dependent on the progress of water-storage enterprises, it was early dis¬ covered that native forage plants grow in abundance on the public domain, afforded graz¬ ing for cattle and sheep. The range livestock industry thus rapidly developed, supplying not only a home market for forage crops produced on the farms but giving definite direction to the general trend of agriculture, namely, to the production of forage crops and livestock. Agriculture thus became responsible for a permanent, instead of ephemeral, industrial population and State development. It is the foundation of the prosperity of the present most important towns : Reno, Fallon, Elko, Winnemucca, Lovelock, Gardnerville, Minden, Yerington and Las Vegas. The population had increased to 81,875 in 1910, and decreased to 77,- 407 in 1920. Reno is the metropolis, population

12,016.

Political History. — The following execu¬ tives have served as governors of Nevada :

James W. Nye* .

. . 1861-1864

H. G. Blasdel .

a

. . 1865-1870

L. R. Bradley .

.. 1871-1878

John H. Kinkead .

. . . Republican .

. . 1879-1882

Jewett W. Adams .

. . . Democrat .

. . 1883-1886

C. C. Stephenson! . . . .

. . . Republican .

. . 1887-1890

Frank Bell! .

U

. . 1890

R. K. Colcord .

U

. . 1891-1894

John E. Jonesf .

. . . Silver Party .

. . 1895-1896

Reinhold Sadler! .

a u

. . 1896-1898

Reinhold Sadler .

u u

. . 1899-1902

John Sparksf .

. . 1903-1908

D. S. Dickerson! .

u u

. . 1908-1910

Tasker L. Oddie .

. . 1911-1914

Emmet D. Boyle .

. . 1915-1922

- Territorial governor. f Died in office.

! Acting governors.

William M. Stewart and James W. Nye were elected to the United States Senate at the first session of the legislature, in 1864. The former, including an intermission of 12 years, 1877-1889, served as United States senator from Nevada until. 1907, a span of 42 years, the long¬ est from beginning to termination of senatorial service in the history of Congress. John E. Jones, Republican, elected in 1873, to succeed

Senator Nye, served continuously until 1903, 30 years, when he was succeeded by Francis G. Newlands, Democrat. The latter was re¬ elected in 1909 and again in 1915. On his death in 1917, Charles B. Henderson, Democrat, was appointed to fill the vacancy. Other United States senators from Nevada were William M. Sharon, Republican, and James G. Fair, Demo¬ crat,. elected successively during the 12-year interim in the service of Senator Stewart. George S. Nixon, Republican, who in 1907 suc¬ ceeded Stewart, was subsequently re-

elected but died in 1914. William H. Massey, Republi¬ can, was appointed to the vacancy, but was de¬ feated at the ensuing election by Key Pittman, Democrat, who was re-elected in 1916. Follow¬ ing the Civil War and until the silver issue dominated all other political questions (1892-96) , Nevada was a safe Republican State. The new Silver party included both Republicans and Democrats and for four successive elections swept the State. The older parties then re¬ vived, the Democratic party absorbed the majority of the Silverites and remained in power until the election of 1904 when the State went Republican. Four years later it swung to the Democratic column. At present Nevada may be regarded as quite evenly divided politi¬ cally. A constitutional amendment giving suf¬ frage to women was adopted in 1914. Under the Initiative and Referendum section of the State constitution a ˆbone-dry® prohibition law was initiated and voted on in 1918. The State joined the Prohibition ranks on 25 Nov. 1918.

Government.— The State is governed by the original constitution of 1864, as since amended. The .most important amendments provide for the initiative and referendum and equal suffrage for women. The legislature con¬ venes biennially the third Monday in January of the odd years, and is composed of a senate of 16 members and an assembly of 37 mem¬ bers. Regular sessions are limited to 60 days ; special sessions to 20 days. Assemblymen serve two years, senators four. General elections oc¬ cur on the first Tuesday after the first Mon¬ day of even years. The executive department consists of a governor, lieutenant-governor, sec¬ retary, treasurer, comptroller, superintendent of public instruction, surveyor-general, attorney-general and State printer, who serve for four years. There is a Supreme Court, District Courts and justices of the peace. Members of the Supreme Court are elected for six years, district judges for four years. A system of county, township and municipal government is established by the legislature. Cities may be incorporated under special charter. State insti¬ tutions comprise the University of Nevada and hospital for mental diseases, at Reno; orphans' home, penitentiary and State printing office, at Carson, and home for juvenile delinquents at Elko. Taxation is under the supervision and control of a State tax commission which has direct assessment of public utilities and live¬ stock and general powers of equalization. Water rights are under the control of a State engineer. Employees in all hazardous indus¬ tries are protected by insurance assessed by a State industrial commission against such enter¬ prises. A railroad and public service commis¬ sion regulates the tariffs on interstate railroads and other public utilities.

Education. — The public school system is

supported in part from interest on the pro¬ ceeds ($3,220,000) of the sales of Federal lands granted to the State for educational purposes, and by direct taxation. The University of Nevada, in addition, receives Federal aid from the Hatch, Adams and Smith-Leyer funds. The valuation of university and public-school prop¬ erty is in excess of $3,000,000. Within recent years expensive modern school buildings have been erected, which will compare favorably with those found elsewhere. Education is com¬ pulsory. In 1918 the number of children of school age was 14,762, enrolment 13,915, and average daily attendance 10,884. Rural schools are provided wherever five or more pupils are found in a district. There is a high school in each county. Teachers are well paid and high standards maintained with respect to qualifica¬ tions. In 1917 there were 439 regular enrolled students in the university and 148 special and short-course students, total 587. The number of men students during the war decreased by reason of enlistments. There is a State Normal School connected with the university and branch normal schools in several counties. The public school system is controlled by a State board of education, a State superintendent of public instruction and five deputy district super¬ intendents. Manual training, home economics and agriculture are taught in the high schools. The agricultural extension division of the uni¬ versity (Smith-Lever) < conducts State- wide educational work in agriculture and home eco¬ nomics.

Churches. — The strongest denominations in the State are the Roman Catholic, Protestant Episcopal, Christian Science, Methodist Episco¬ pal, Mormon, Congregational, Presbyterian and Lutheran. Churches of all denominations are found in Reno, including the seat of the bishopric of the Protestant Episcopal Church. In the other towns, usually two or more. Prot¬ estant churches and the Roman Catholic are represented, according to sect and numbers of the various communicants.

Banking and Finance. — In the State, in 1918, there were 23 State banks and 10 national banks, with combined resources aggregating $35,994,000. Reno is the principal banking centre, having two national and four State banks; combined resources, $14,755,988.31; bank clearances for the 12 months ended 1 June 1918, $31,953,081.31. The total bonded debt of the State in 1918 was $300,000. The total as¬ sessed valuation of property, real and personal, $205,000,000, an increase of 233 per. cent in seven years, in

part due, however, to increased valuations under the Tax Commission Act of 1913. The State tax rate is 55 cents, and aver¬ age county rate $1.15, on each $100 valuation.

Transportation. — Nevada is crossed by three transcontinental railroads, the Southern Pacific and Western Pacific in the northern part and the Los Angeles and Salt Lake in the southern. Branch roads extend to all the prin¬ cipal towns and mining camps. The total operating mileage is 2,325, with 425 miles of sidings.

Commerce and Industries. — In 1910 there were 177 industrial establishments; capital in¬ vested, $9,807,000; value of products, $11,887,- 000, and number of employees, 2,670. A very substantial increase has since taken place. The principal articles of manufacture include rail¬

road cars, lumber and timber products, flour and grist, packing-house products, beet sugar, chemicals, confectionery, machinery, plaster, dairy products, etc. Cheap hydro-electric power, generated on the Truckee River and other streams, is distributed by wire lines throughout western Nevada for lighting and industrial purposes.

The recent census of manufactures reports 180 establishments, engaging 4,113 persons, of whom 179 are proprietors and firm members, 279 salaried employees and 3,655 wage earners. The primary horse power employed to operate these establishments is 18,748; the capital in¬ vested aggregates $13,590,803; the cost of ma¬ terials, $9,316,815; the value of products, $16,- 083,304, leaving the value added by manufacture $6,766,489. Of this sum $4,048,857 is paid in salaries ($470,921) and wages ($3,577,936), an average of $978 per annum for each wage earner, one of the highest averages in the country.

The relative importance of the leading in¬ dustries are given in the table below :

INDUSTRY

No. of estab¬ lish¬ ments

Wage

earn¬

ers

Value of products

Value added by manu¬ facture

Cars and railroad

repairs .

9

1,468

$2,260,964

$1,329,216

Slaughter-house

and packing .

4

91

1,853,270

249,115

Lumber and timber

5

176

476,058

290,455

Printing and pub-

375,047

lishing .

42

161

473 , 042

Butter .

11

21

446,876

73,727

Flour and grist

mills .

7

28

386,566

109,429

Bread and baking

products .

31

65

316,018

145,649

All others .

71

1,645

9,870,516

4,193,851

Mining. — The oldest, and at present the second most important, industry is mining. The discovery of the Comstock Lode and its effect

on the history of the State has already been detailed, as also something of the story of the rise and decline of mining preceding the dis¬ covery of Tonopah in 1900. The surface rich¬ ness of Tonopah inaugurated a new mining era which, followed by the discoveries of Goldfield, Manhattan, Round Mountain, Rhyolite, Raw- hide and other camps in southern Nevada in rapid succession, by 1907 developed nation¬ wide speculation in shares of the mining com¬ panies. Some of the mines justified expecta¬ tions, others did not. The great boom collapsed in 1907-08, leaving a train of disaster in its wake. The industry, however, weathered the storm and re-established itself on a better foun¬ dation. Discoveries of new mining districts occurred in other parts of the State, among which being National, Rochester and Gold Circle. The production of the mines, $19,778,- 939, in 1907, at the height of the boom, steadily increased to over $40,000,000 annually during the next decade. The great copper deposits at Ely were developed ; 10,000 tons of low-grade copper ores being treated daily at McGill in one of the largest copper concentration, plants in the West. Another important copper-produc¬ ing centre is Yerington. In addition to gold, silver and copper, the State contains large de-

posits of lead, tungsten, antimony, manganese, iron and salt. Nitrates have been found in paying quantities in certain of the old lake beds No coal of any commercial importance has been discovered, although there are veins of lignite which may yet prove of value. There are vast deposits of shales containing a high per cent of petroleum which may profitably be extracted. With all the discoveries so far made it is believed that the mineral wealth of Nevada has scarcely been touched. The total production of the Comstock Lode to 1918 was $400,000,000. The total mineral production of Nevada from the discovery of the Comstock Lode to 1918 exceeds $1,100,000,000. This vast sum has gone to enrich other States; very little of it to develop the permanent wealth of the State in which found. The owners of the dividend-paying mines are largely non-residents. The mining machinery, tools and explosives used, and the clothing, shoes, household uten¬ sils and most of the food required by the miners is imported. W hen the mine is worked out the miners depart. The mining town be¬ comes a «ghost city,® with the wealth invested in its buildings, hoisting and reduction works abandoned to the tax gatherer until marked off the list of the delinquent.

Agriculture.— The real foundation of the State’s economic wealth and

prosperity is agri¬ culture, not mining. By reason of climatic aridity, agriculture^ other than the grazing of livestock on the public ranges, is practically limited by the water supply of the streams. The exceptions are comparatively limited areas where the precipitation is sufficient to grow crops under dry-farming methods and certain valleys containing artesian sources of water supply. The acreage of improved land in farms in 1918 was 912,440, or but 1.4 per cent of the 70,841,600 acres within the State. When rec¬ lamation works are finally constructed to con¬ serve the entire flows of the streams, it is esti¬ mated that 600,000 additional acres of arable lands may be brought under irrigation. Arte¬ sian water occurs in a number of valleys at depths of from 100 to 1,000 feet below the surface. While this is being utilized to some extent, economic pressure and land scarcity has not, as yet, caused any extensive development of such underground waters for land reclama¬ tion. There are about 100 wells in the Las Vtgas Valley, several of which flow large streams, and about an equal number in other parts of the State. The valley soils for the most part are rich in plant foods and under irri¬ gation produce bountiful crops of alfalfa, grass hay, wheat and other grains, potatoes, sugar beets, orchard and small fruits, and vegetables. Forage crops are the principal staples, for which a constant local market is provided for wintering and fattening range cattle and sheep. Potatoes, onions and cantaloupes are exported. Due to excellent markets and the productive¬ ness of the soil, improved farm lands command comparatively high prices, $200 to $300 per acre not being uncommon in the more fertile valleys. Southern Nevada is semi-tropical. Experi¬ ments with the Egyptian long staple cotton have shown its adaptability to extensive areas in the Moapa and Las Vegas valleys. Almonds, figs, grapes, pomegranates, etc., thrive in this section, but little success has attended the grow¬ ing of citrus fruits. In the higher valleys of

northeastern Nevada, where the mean annual precipitation is between 12 inches and 15 inches, some success has obtained in the growing of wheat by dry-farm methods. Recent experi¬ ments with certain drought-resistant forage crops, in part native plants, in these valleys, indicate possibilities for very extensive dry- farm leclamation in connection with livestock. iwww^st public range lands, aggregating 50,- U00,000 acres, must be taken into consideration as a part of the State’s agriculture. Native grasses and other forage plants on this im¬ mense area afford subsistence 9 to 12 months in the year for approximately 480,000 beef cat¬ tle and 1,500,000 sheep. About 6,000,000 acres of the range lands are within National Forest Reserves. One of the great agricultural prob¬ lems demanding

attention is ‘the extension of Federal control over these open range lands in order that the native vegetation may be con¬ served from destruction by over-grazing and reseeding practised. Dairying is a profitable industry and is increasing. There are nine creameries and about 25,000 dairy cows. Dairy products to the value of $1,100,000 were pro¬ duced in 1917. The value of all livestock and livestock products, including poultry and eggs marketed in 1917, was $22,850,000; farm crops! $17,300,000; total, $40,150,000. Nevada farms are characterized by excessive acreage, both of improved and unimproved lands, as compared with other Western States. Until these great ˆranches® are subdivided into smaller and more intensively cultivated farms, the agricultural progress of the State will continue to be ma¬ terially retarded. Happily increasing land values and economic pressures are slowly bring¬ ing about such inevitable change.

Charles A. Norcross,

Director Agricultural Extension , University of Nevada.

NEVADA, Iowa, city, county-seat of Story County, on a branch of the Chicago and North¬ western Railroad, about 30 miles north by east of Des Moines. It is in an agricultural region in which stock-raising is a prominent industry. Its chief manufacturers are flour, brick, tile, lumber and dairy products. It has a large cold- storage plant, and considerable trade in dairy products, poultry, eggs, grain, flour and live¬ stock. The public library contains about 6,000 volumes. Pop. 3,000. *

NEVADA, Mo., city and county-seat of Vernon County, on the main line of the Mis¬ souri, Kansas and Texas Railroad and a divi¬ sion and hospital point on the Missouri- Pacific railroads; is about 130 miles southwest of Jefferson City and 100 miles south of Kansas City. It was settled in 1830 by a colony from the eastern part of the State, incorporated in 1866, and chartered as a city in 1883. It is in an agricultural and stock-raising region, and in the vicinity of the zinc and coal mines. Its manufactures are chiefly local. The number of men employed in railroad shops and manu¬ facturing establishments is about 1,000. The city has considerable trade in agricultural prod¬ ucts and livestock, and is a distributing centre for a large part of Vernon County. Nevada has electric lighting and electric street railway, abundant natural gas with excellent city water from artesian wells, ample fire protection and has a new courthouse, high school and post

office, complete sewage system and paved streets. Its educational institutions are public school, Cottey College for Young Women, opened in 1884, Saint Francis Academy (Roman Catholic), Carnegie Library and the Waltmer Institute of Suggestive Therapeutics established 1897. It has an orphan asylum, the State Lunatic Asylum, Artesian lake, parks and the Missouri National Guard rifle range. The three banks have a combined capital and a surplus of $400,000, and the Farm and Home Savings and Loan Asso¬ ciation of Missouri, strictly mutual with more than $3,252,000 resources, making it the largest organization of its kind in the State. The government is vested in a mayor and a council of 10 members, who hold office two years ; five councilmen are elected each year. Nevada has no saloons. Pop. (1920) 7,139.

NEVADA, University of, was founded at Elko in 1873, removed to Reno and opened in 1886. It is a part of the public educational system of the State, the only school of college grade in the State. Besides the regular col¬ legiate courses in classics, literature, general science, there are courses in civil, mechanical, electrical and mining engineering, and domes¬ tic science and agriculture. The Mackay School of Mines, endowed by Mrs. Marie Mac¬ kay and Mr. Clarence H. Mackay. of New York, specializes in mining education. The Nevada State Normal School is also under the direction of the State University. The Mackay School of Mines gives a prospectors short course each year which lasts for one month. In the College of Agriculture, short courses in agriculture and home economics are given in connection with farmers' week, which takes place once each year. There is a branch of school mines at Virginia City and another at the city of Tonopah. The University ad¬ ministers the following public service depart¬ ments : the State Hygienic Laboratory; Pure Food and Drugs and Control of Weights and Measures Laboratory; the State Mining Labor¬ atory; Veterinary Control Service, which ad¬ ministers the quarantine of livestock; Soil and Water Laboratory; conducts the Agricultural Extension Department under the Smith-Lever Act ; carries on experimentation in pumping for irrigation purposes ; conducts the Agricultural Experiment Station. The degrees conferred are A.B.» and B.S. and corresponding masters degrees for graduate work. Women are admit¬ ted and constitute scarcely half the number of students. Military drill for men is a part of the curriculum. The university is also the Land Grant College in this State. There are 52 members of the faculty and in 1916 there were 611 students registered. The biennial in¬ come for 1915-16 was a little over one-half million dollars.

N£v£, na-va, the granular snow-ice that results from the compacting of snow and that represents an intermediate stage in the forma¬ tion of solid glacial ice. See Glacier.

NEVERS, ne-var, France, the capital of the former province of Nivernais, now of the department of Nievre, picturesquely built on the slope of a hill 600 feet above sea-level, at the influx of the Nievre to the Loire, 159 miles southeast of Paris. It was the Roman Novio-dunum, and has been an episcopal see since 506; its 13th century cathedral has been re¬

stored since 1879; the 11th century Romanesque church of Saint Etienne is interesting. The stately courthouse, dating from 1475, was for¬ merly the castle of the Dukes of Nevers. The city contains a fine public garden, a bridge of 14 arches over the Loire, a mediaeval gateway, housing a museum of Gallo-Roman antiquities, a public library and a triumphal arch (1746) commemorating the battle of Fontenoy. Its first municipal charter dates from 1194. The industries comprise the manufacture of cannon, iron cables and chains, porcelain (introduced by Italians about 1565), etc. Pop. 27,706.

NEVERSINK HIGHLANDS. See Nave- sink Highlands.

NEVILLE, nev'il, Henry, English actor: b. Manchester, 20 June 1837 ; d. 19 June 1910. He achieved great success on the London stage, where he first appeared in 1860, and later took the chief role in re-named

1895).

NEVILLE, Richard, Earl of Warwick.

See Warwick, Richard Neville, Earl of.

NEVILLE'S CROSS, Battle of. See

Bruce, David.

NEVIN, nev'in, Ethelbert Woodbridge,

American composer: b. Edgeworth, Pa., 25 Nov. 1862; d. New Haven, Conn., 17 Feb. 1901. He obtained his musical education in Pittsburgh and in Berlin, and after three years spent in the latter city returned to the United States and opened a studio in Boston. He appeared in public occasionally but his reputation rests chiefly upon his compositions, which date from his 12th year. 'Narcissus,' which has a

world¬ wide popularity, was written when he was 13, and (0. that we Two were Maying' a year later. Other compositions are: (A Day in Venice' ; 'Cradle Song'; Milkmaid's Song' ; etc. Consult the 'Life' by V. Thompson (Bos¬ ton 1913).

NEVIN, John Williamson, American Re¬ formed (German) clergyman: b. Shippensburg, Pa., 20 Feb. 1803; d. Lancaster, Pa., 7 June 1886. He was graduated from Union College, Schenectady, N. Y., in 1821 and from Princeton Theological Seminary in 1826, where he re¬ mained for a few years as tutor. He was pro¬ fessor of Hebrew at the Presbyterian Theolog¬ ical Seminary at Alleghany City 1829-39, be¬ came president of the Mercersburg Theological Seminary in 1840 and was president of Marshall College 1841-53. His translation of Schaff's

Pa., and merged with Franklin College, Dr

MnrO, fier ' [ug as/ PreNSident of Franklin and ?fcha' College (q.v.) 186(ˆ76. He published Ihe Mystical Presence5 (1846);

nQyi7ˆnd ˆCmuis ?f the Heidelberg Catechism5

4 i -7) teXS1™' or the SPirit o£ Sect and ?c„hls": 0848) •, Consult 'Life' by Theodore Appel5 (Philadelphia 1889).

NEVINSON, Henry W., English jour- nanst He was a war correspondent of the Lon¬ don Daily Chronicle during the Graeco-Turkish ˆar of 1697 in the Transvaal, and Natal during the Boer War in 1899, and in Bulgaria and Al- bama m 1912-13. He has been on the staff of the Daily News and a writer for The Nation

/Tcxfnb ˆas Polished (Life of Schiller5

(1889); < Neighbors of Ours5 (1895); (In the VaHey of Tophet5 (1890); < The Thirty Days' War (1898); Ladysmith5 (1900);

/im?\ * rˆteace an < £ War in the Balance5 (1911); The Growth of Freedom5 (1912) *

(Essays in Rebellion5 (1913).

t HEVIS, West Indies, one of the Leeward Islands, belonging to Great Britain, two miles southeast of Saint Christopher, with which, since

1882, it is administratively connected. It is circular in form, rises in the centre to a wooded ancient crater (3,200 feet), and has an area of o0 square miles. The lower slopes are cultivated, the sugarcane being the principal crop; limes and oranges are grown to a small extent. The capital is the port of Charlestown. Nevis was discovered by Columbus in 1498 and colonized by England in 1628. In the 18th cen¬ tury it was twice taken and restored by the French, and it was a centre for the slave trade. Alexander Hamilton, the American statesman, was born on the island. Pop. 12,945.

NEW, Clarence Herbert, author: b. Brook¬ lyn, N. Y., 1862. He was educated at private schools and at the Polytechnic Institute of Brooklyn, N. Y. He twice traveled around the world, 1880 and 1891, and through South Amer¬ ica in 1884, as newspaper correspondent during part of the time. He was shipwrecked on the clipper ship Eric the Red, at Cape Otway, Aus¬ tralia, Sept. 1880. He practised as a construct¬ ing engineer, 1882-1886; and as editor, author and publisher from 1893. He edited Truth (New York 1895); Reel Life (1913-14); was manager of the New York and London Literary Press, and corresponding secretary of the Inter¬ national Hydrographic Association. He pub¬ lished (Franc Elliott5 (1895);

bear, but with one hand produces his work (averaging 50,000 words each month) upon a typewriter.

NEW, John Chalfant, American financier: b Vernon, Ind., 6 July 1831 ; d. 4 June 1906. He was graduated from Bethany College, Va., in 1851 and studied law, becoming clerk of Marion County in 1856. In the Civil War he served as quartermaster of Indiana until his election to the State senate in 1862. He was cashier of the First National Bank of Indianap¬ olis in 1865 and later its president. He was United States Treasurer in 1875-76 and served as Assistant Treasurer in 1882-84. He was ap¬ pointed consul-general at London in 1889 by President Harrison and was proprietor of the Indianapolis Journal.

NEW ALBANY, Ind., city, county-seat of Floyd County, on the Ohio River, and on the Baltimore and Ohio Southwestern, the Pitts¬ burgh, Cincinnati, Chicago and Saint Louis, the Chicago, Indianapolis and Louisville, and the Southern railroads, nearly opposite Louisville, Ky., and about 110 miles south of Indianapolis. It was laid out for a city in 1813, and in 1839 was incorporated. It is two miles below the falls in the Ohio River (see Louisville) and has. extensive water-power. Its chief manufac¬ turing establishments are pork-packing estab¬ lishments, tanneries, engine and boiler works, furniture factories, flour mills, rolling mills, lumber and planing mills and foundries. It has a

large trade in its manufactures, the farm prod¬ ucts of Floyd County, and in building material. Some of its prominent buildings are the gov¬ ernment building, the city hall, courthouse, the churches and the schools, hospital, new office building, business college. It is the seat of Saint Mary's Academy (Roman Catholic), Holy Trinity Academy (Roman Catholic); it has public and parish schools and a free pub¬ lic library. Within the city limits is a National cemetery in which are 2,908 graves, 676 of unknown dead. The government is administered under the charter of 1839

and provides for a mayor, who holds office four years, and a council. Some of the admin¬ istrative officials are appointed by the mayor and the others are elected by the council. Poo

(1920) 22,992.

NEW ALBION, the name given by Sir Francis Drake, in 1579, to the western coast of North America, when he landed at Bodega Bay, 40 miles north of the present city of San Francisco, and of which he took possession in the name of Queen Elizabeth. Humboldt and later writers restricted the name to the region between San Francisco and what is now the northern boundary of the State of Oregon.

NEW AMSTERDAM. See New York.

NEW ARCHANGEL. See Sitka NEW ATLANTIS. See Atlantis.

. NEW BEDFORD, Mass., city, fifth largest in population in the State of Massachusetts, one of the county-seats of Bristol County, on the Acushnet River and New Bedford Harbor, at the head of Buzzards Bay, and on the New York, New Haven and Hartford Railroad, 56 miles south of Boston. It is connected with Fall River, Brockton, Taunton. Wareham, On¬ set, Dartmouth and Westnort bv electric lines, and by steamers with New York, Martha's

Vineyard and Nantucket. It was settled in 1652 by John Cook and others from Plymouth, and was a part of Dartmouth until it was incorpo¬ rated in 1787. It received a city charter in 1847. It was once noted for the number of its inhabitants engaged in the whale fisheries, but since 1860 its whaling interests have de¬ creased and its manufacturing industries in¬ creased. The town occupied a prominent place in the Revolution, especially in sending out privateers, which

harassed the enemy and captured many of the British vessels. On 5 Sept. 1778 the town was attacked by a British fleet, captured and almost destroyed. The harbor is protected by Fort Rodman on Clark Point. A large lighthouse is on Palmer Island at the entrance of the harbor. The area of New Bedford is nearly 20 square miles. It is well laid out, the streets are clean and nearly all paved. Fine roads along the shore, good views of the sea and electric transit facilities into the surrounding country, all add to the attractiveness of the city. New Bedford stands as one of the leading cities in United States, as an industrial centre; ranking first in the manufacturing of fine cotton goods and fine cotton yarns. The number of cotton-mills em¬ ployees at the present time is about 38,000. The present capitalization of the cotton mills is in excess of $52,000,000, owning 68 mills ; more than 400,000 bales of cotton are used in the mills yearly. The capital invested in cotton mills is approximately $100,000,000. There is over $6,000,000 invested in other industries, including one of the largest twist-drill plants in the world, a rope factory, a copper-rolling mill, a large cut-glass works, a shoe factory, a toy factory, a paint mill and numerous other smaller industries.

New Bedford has about 36,800 feet of water frontage, about 8,016 feet of which has been developed and the wharves are reached by a channel 300 feet wide and 25 feet deep at mean low water and three miles long. .Ocean liners ‘engaged in coastwise shipping discharge car¬ goes at New Bedford. The importance and future possibilities of the port of New< Bed¬ ford as a shipping terminal was shown m the construction of the mammoth modern pier by the State of Massachusetts at a cost of $450,000, in addition to the land the pier occupies which was given by the city. A portion of the raw materials for the mills are now brought direct by water to the pier. The area of the pier is 113,000 square feet and the total floor areas of the pier sheds is 90,000 square feet. One section used for storage purposes has a floor space of 31,800 square feet and double railroad tracks under the shed will accommodate 24 cars. New Bedford has always been active in civic progress, and has a civil centre estab¬ lished with many fine buildings, including a new half-million-dollar postoffice, a new. county building, remodelled municipal building and one of the finest equipped libraries in New England. Further development of this civic progress includes a new modern hotel and a memorial auditorium. It also has. a public park system of seven parks, located in various parts of the city with a total area of approxi¬ mately 222 acres. The New Bedford Public Library, with 170,000 volumes, is . one of the first three public libraries in America and con¬ tains the finest collection of whaling prints and

Quakeriana in the world. Iwo privately-con- ducted museums, the Bourne Whaling Museum, with a completely rigged whale ship, and the Old Dartmouth Historical Society are visited annually by thousands of visitors to the city. New Bedford has a bi-cameral form of gov¬ ernment. The splendid public school system comprises 36 buildings and it also has 11 pa¬ rochial institutions. It also has one of the largest textile schools in New England, a State institution; the Swain Free School, an ad¬ vanced institution of art, a public industrial school and a private academy. Three national banks, two trust companies, as well as two savings banks are located in- New Bedford. The stock, deposits and surplus of New Bedford banks is about $58,000,000. New Bedfords drinking water stands high in the State list, coming from one of a chain of lakes lo miles north of the city. Pop. (1920) 121,217. .

There is a large foreign element, chiefly French-Canadian and Portuguese in the city, but all who have made permanent homes are American. Consult Ellis, L.. B., ˆHistory of Bedford: Industries, Institutions and Attrac- tions> (1889); Ricketson, D., (Historv of New Bedford) (New Bedford 1858) ; Old Dart¬ mouth Historical Society, (01d Dartmouth His¬ torical Sketches) (1903 et seq.) ; Pease, Z. W., (History of New Bedford) (1918).

NEW BERN, nu'bern (formerly New Berne), N. C., city, county-seat of Craven County, port of entry of the Pamlico district, at the confluence of the Neuse and Trent rivers, and on the Atlantic Coast Line and Norfolk- Southern railroads, about 100 miles in direct line southeast of Raleigh. It was settled in 1710 by a company of Swiss and Germans under Baron De Graffenreid. The place was named «New Berne" after Berne in Switzer¬ land. It was incorporated as a city in 1723. It soon became an important southern seaport, on account of its harbor. It was the capital of the Province of North Carolina for several years. It was one of the strongly fortified ports of the Confederacy. (See Newbern, Operations at, in the Civil War). The chief industrial establishments are lumber and plan¬ ing mills, grist mills, shingle, factories, fertiliz¬ ing works, ice factory, knitting mill, pickle works, turpentine distillery, shipyard, carriage factory, lime kiln, canning factory, and the Norfolk-Southern railroad shops, in all having 2,500 employees. There is an extensive trade in lumber, 'cotton, turpentine, vegetables and fish. The prominent buildings are, a govern¬ ment building (courthouse, custom-house and post office), the county courthouse, jail, Saint Luke's Hospital, Elks Temple and People's Bank Building, and the opera house. The edu¬ cational institutions are the public schools, sepa¬ rate for white and colored. There are 10 church edifices and others in contemplation. The three banks have a

combined capital of $152,000. The government is vested in a mayor, board of aldermen and a council of 12 mem¬ bers. The electric-light plant and the water¬ works are owned and operated by the city. About 95 per cent of the inhabitants are native born Americans. Pop. (1920) 12,198..

NEW BERN, Operations at, in the Civil

War. Roanoke Island (q.v.), N. C., was cap¬ tured by Genenral Burnside, 8 Feb. 1862, and

on 6 March he embarked his troops for an expedition against Newbern, a point of much military importance, at the confluence of the Neuse and Trent rivers, near the head of an extensive and navigable arm of the sea, and connected by railroad with Beaufort Harbor at Moorehead City. By night of the 11th the entire naval and land command was off the mouth of Slocum's Creek, south of the Neuse, and about 15 miles below Newbern. The approaches to the city had been obstructed by sunken vessels and a double row of piles in the river. Four miles below the city, on the southern side of the river and opposite the obstruction in the stream, was Fort Thompson, mounting 13 heavy guns. From the fort in¬ land was a line of rifle-pits and redoubts ex¬ tending about two miles to and beyond the Atlantic and North Carolina Railroad, and ter¬ minating on almost impassable ground. In the fort and on this line were 41 heavy guns and 19 field-pieces. The position was held by seven North Carolina regiments, a battalion of militia and three batteries of artillery, numbering in all some 5,000 men, under command of Gen. L. O'B. Branch. Burnside's troops, 13 reg¬ iments of infantry, about 9,000 men and 8 guns, were landed by noon of the 13th, and after a hard march in rain and deep mud bivouacked near the Confederate position, the naval vessels, under Commodore Rowan, moving up the river abreast of the infantry, and shell¬ ing the road and woods in advance. On the morning of the 14th the attack was made. Gen. J. G. Foster, with the 10th Connecticut and the 23d, 24th and 28th Massachusetts, moved up a country road on the right; Gen. J. L. Reno on the left, with the 21st Massa¬ chusetts, 9th New Jersey, 51st New York and 5 1 st Pennsylvania, moved along the line of the railroad; while Gen. J. G. Parke, with the 4th and 5th Rhode Island and 11th Connecticut, moved in the centre, on a country road, as reserve. Foster began the battle about 8 a.m. by an attack on Fort Thompson and the line near

it, maintained the brunt of the contest for some time, and was reinforced by Parke. Meanwhile, Reno had gained ground on the left, the entire division now became engaged and the Confederates, after a resistance of four hours, broke and retreated to Newbern, burn¬ ing behind them the railroad and turnpike bridges over Trent River. Burnside followed, crossed the Trent in boats, Branch retreating, and in the afternoon the Union troops oc¬ cupied the city, capturing many heavy guns and other material. The Union loss was 90 killed and 380 wounded. The Confederate loss was 64 killed, 101 wounded and 413 captured or missing.

Confederate Efforts to Recapture New¬ bern. — The fall of Newbern was a serious blow to the Confederates, but the necessities of the army in Virginia forbade attempt to regain it until after the close of the campaigns of 1862, when troops were sent to North Carolina, and 13 March 1863, Gen. D. H. Hill, who had been assigned to the command in the State, organized an expedition for its recapture. General Daniel's brigade moved from Kinston toward Newbern by the lower Trent road; General Robertson's cavalry brigade was sent by the upper Trent road; and General Pettigrew, with vol. 20—8

five North Carolina regiments and 15 guns, was ordered to approach the city near Barring¬ ton's Ferry, north of the Neuse, to attack two small gunboats in the river, and capture Fort Anderson, an earthwork on the river, opposite the city, garrisoned by 300 men of the 92d New York. At Deep Gully, a few miles out of Newbern, Daniel attacked five companies of the 25th Massachusetts, supported by two guns, and drove them in, but advanced no farther, as Pettigrew had failed. That officer, at day¬ light of the 14th, appeared in front of Fort Anderson and demanded its surrender, which was refused, and Pettigrew opened fire from all his guns and engaged the gunboats Hetzel and Hunchhback, which had been towed into position. The fire of the gunboats, with that of five guns of a battery of rifled guns from the other side of the Neuse, caused Pettigrew to withdraw and cover the movement of the 85th New York to reinforce the 92d. The casualties on either side were insignificant.

On 20 January 1864, General Lee ordered General Pickett, then at Petersburg, Va., to capture Newbern if upon examination he found it practicable, and authorized him to use four brigades of his command for the purpose, in addition to which he promised to assist him with Hoke's brigade of the Army of Northern Virginia. He gave detailed instruc¬ tions for the movement, and all the Confeder¬ ate forces in eastern North Carolina were to co-operate and retake Newbern, Plymouth, Washington and other coast towns. On the morning of 30

January the movement began from Kinston in three columns; General Bar¬ ton, with his own brigade, Kemper's, part of R.ansom's, 14 guns and 600 cavalry, was directed to cross the Trent, take the works in front of Newbern in reverse, and cut off communication with the place. Colonel Dear- ing was sent north of the Neuse with a cavalry force, two infantry regiments and three guns, to attack Fort Anderson. Col. J. T. Wood, with picked crews in boats, was to descend the Neuse, seize the Union gunboats and co¬ operate with Dearing in the attack on Fort Anderson. General Pickett, with Hoke's brigade, three regiments of Corse's, two of Clingman's, and 10 guns, was to advance by the Dover road. Newbern had been strongly fortified, and was held by 2,000 men, under Gen. I. N. Palmer, and three gunboats were stationed in the Neuse and Trent rivers. An outpost of 300 men of the 132d New York was at Bachelor's Creek, eight miles above New¬ bern. General Hoke, advancing by the Dover road, on 1 February, at Bachelor's Creek en¬ countered the Union outpost, which was driven in after a severe Federal loss, and Pickett with his column crossed the creek and advanced toward Newbern. The batteries opened upon him; he made no attack, but awaited the result of the co-operating movements. Colonel Wood, with 10 rowboats, carrying picked crews of 15 men each, armed with rifles and cutlasses, left Kinston at noon of 31 January, dropped down the river, and at 4 a.m. of 1 February arrived near the town; but, owing to a fog, he could not locate the position of the gunboats. He finally located the Underwriter, moored close in shore, near the wharf, and not more than 100 yards from three batteries; and at night he

boarded her, killing her commander and some of the crew and capturing a third of the re¬ mainder in a hand-to-hand conflict. The fires under the boilers of the vessel were very low, and in attempting to tow her out Wood was subjected to fire of artillery and infantry from the forts on shore, and therefore he set her on fire. Pickett waited for Barton's movement, which failed, and after a feeble demonstration he gave up the enterprise and withdrew to Kinston, after a loss of 45 killed and wounded. The Union loss was 326 killed, wounded and missing.

The third attempt on Newbern was made by General Hoke, who after his capture of Ply¬ mouth, N. C. (q.v.), 20 April 1864, moved against the place and demanded its surrender, and on being refused began a siege. Hoke was recalled to Kinston, 5 May, and ordered to

Petersburg, Va. Consult (Official Records > Vols. IX, XVIII, XXXIII, XXXVI and (Battles and Leaders of the Civil War* (Vol. I).

NEW BRAUNFELS, Tex., city, county- seat of Comal County, was laid out in the year 1845, at the foot of a range of hills, 48 miles southwest of Austin, the capital of the State, and 31 miles north of the city of San Antonio, on the International and Great North¬ ern and the Missouri, Kansas and Texas rail¬ ways. The Guadalupe River, the best water¬ power river in the State, forms the northeast¬ ern boundary of the city limits, and is well stocked with fish. The Comal, which is only about one and one-half miles long, also well stocked with fish, is formed by a great many springs gushing out of the mountain side, about one-half mile from the city courthouse and divides the city. The main streets of New Braunfels are 90 feet wide, all centring on Landa's Park in the heart of the city, known as one of the most beautiful natural parks in the United States. All of these different springs have their own courses and through Landa Park their channels converge into a large reser¬ voir from which the water is used for manu¬ facturing purposes. The city owns its own waterworks system, whence the city's supply is pumped out of two large springs which have a capacity of 3,000,000 gallons daily. The south eastern and the southwestern part of the county is composed of rich black land upon which is produced mainly corn and cotton. The north¬ eastern and northwestern part is mountainous, and is being used for cattle and other stock- raising purposes. The mountainous part of the county is full of wild game, and more deer are killed in Comal County every year than in any other county in the State. The scenery along the Comal and Guadalupe rivers is equal to that of Colorado.

New Braunfels in the year 1853 levied a tax of 30 cents on the $100 for the purpose of maintaining and establishing a free school sys¬ tem, and in 1856 was granted a charter for 20 years by the State of Texas authorizing the levy of a tax for educational purposes. An attempt to renew this charter at its expiration in 1876 failed because of its unconstitutionality. This system of taxation for school purposes attracted attention all over the State, and led to the constitutional provision authorizing the levy of a tax for school purposes. New Braunfels has the distinction of being the cradle

of the beneficent educational system of Texas, and has one of the most beautiful and modern school buildings in Texas. The industrial establishments include a large cotton oil factory, two large modern flour mills, the largest hydrated lime factory in the South, three rock crushers, a large collar factory, a whip factory and two large tanneries. New Braunfels has two newspapers, the New Braunfels

Herald, published in the English language, and the New Braunfelser Zeitung, published in the German language; the New Braunfelser Zeitung being established in the year 1852 under the editor¬ ship of Ferd. Lindheimer, a noted botanist, who devoted a great portion of his life to the study and classification of the plant life of Texas.

New Braunfels was laid out by a colony of German immigrants, who reached New Braun¬ fels in 1845 under the leadership of Prince Solms-Braunfels, under circumstances of con¬ siderable hardships, dangers and sufferings. They had to plow their small patches of ground with a gun hanging on the handle of the plow and guard their stock at all times against depre¬ dations by the Indians and Mexican bandits. Pop. about 4,000, of which 3,500 are of German descent, nearly all descendants of the old set¬ tlers, and 100 Americans, about 100 negroes and the balance Mexicans.

NEW BRIGHTON, bri'ton, Pa., borough,

in Beaver County, on the east bank of Beaver River, two miles from its junction with the Ohio and on branches of the Pennsylvania and the Pittsburgh and Lake Erie railroads, 28 miles northwest of Pittsburgh. It was set¬ tled in 1799 by the laborers employed to build Wolf's mill, — a flouring mill, laid out in 1818 and incorporated as a borough in 1838. Coal¬ fields and fire-clay beds are in the vicinity. It is in a section of the State in which manufac¬ turing and industries connected with coal are prominent. The good water power furnished bv Beaver River is utilized in a number of manufactories, chief of which are potteries, coffee mills, flour mills, wire, wall-paper, glass, rivet and nail factories, brick and sewer pipe works, twine factory, iron enameled bath-tub works, fire-engine keg and brass casting works. There are several churches and public and parish schools. It has the Beaver Valley Gen¬ eral Hospital, a public art gallery, a fine gov¬ ernment building and library and a park. The banks have a combined capital of over $1,150,000. The goyernment is vested in a burgess and a council of 12 members. About three-fourths of the population are native-born Americans. Pop. (1920) 9,361.

NEW BRIGHTON. See Richmond, Bor¬ ough of.

NEW BRITAIN, brit'n, Conn., city, in Hartford County, on the New York, New Haven and Hartford Railroad, • about 11 miles southwest of Hartford. It was settled in 1687 and remained a part of Berlin until 1850 when it was incorporated as a town. In 1871 it was granted a city charter. It is in an agricultural region, but is noted for its extensive manu¬ facturing interests. The chief manufactures are

stamped ware, hardware, foundry ajid ma¬ chine-shop products, knit goods, hosiery and cutlery. The trade is chiefly in the manufac¬ tured goods, but it is a distributing centre for

quite a number of the nearby villages. It has a paik area about 234 acres, well-kept streets and a large number of fine church buildings. It is the seat of a State Normal School and the .\ew Britain Institute. It has a school system second to none in a city of its size. In addition to a high school and grade schools it has a pre- vocational grammar and a vocational high school 1 he revised city charter of 1896 pro- \ides for a mayor, who holds office two years, aJhd. a council. Some of the administrative officials are appointed or elected bv the mayor and council. The sheriff, city clerk, collector, u easurei and auditor are elected bv popular vote. The city elects the school board. The city owns and operates the waterworks. Elihu Burritt (q.v.) was born in New Britain and lived here nearly all his life. Pop. (1920)'

59,316.

NEW BRITAIN. See New Pomerania.

NEW BRUNSWICK, Canada, a maritime province, lying mainly between the 45th and 48th degrees of north latitude and the 64th and 68th degrees of west longitude. It is bounded on the south by the Bay of Fundy, on the east by the Straits of Northumberland and Gulf of Saint Lawrence, on the north by the Bay of Chaleur and the province of Quebec, and on the west by the State of Maine. The length of the province from north to south is 230 miles and its greatest breadth 190 miles, and it has an area of 27,985 square miles (a little larger than Scotland) and a sea coast of about 600 miles.

Topographical Features. — Being a portion of the continent, it resembles in its topograph¬ ical features and climate the adjoining portions of Quebec and New England. It is a rolling country of no great elevation; its loftiest hills are in the northern and northwestern sections of the province and are an extension of the Appalachian Mountains. The scenery is pic¬ turesque and varied, but a large portion of the centre of the province consists of one vast forest.

The most marked feature of the eastern highlands of New Brunswick is a ridge of hills almost continuous from Maine to the Saint John River in Queens County, and eastward through Kings County ending in

Butternut ridge. This ridge rises 800 or 900 feet above the surrounding country and includes some high peaks, Prospect Mountain and Eagle Mountain near the Nerepis River, Mount Pleasant, Mount Porcupine and Red Rock Mountain in Char¬ lotte County, and Ben Lomond in the county of Saint John. This ridge runs parallel to the coast and is cut through in many places by rivers which flow into the Bay of Fundy east of the Saint John River. There are also five parallel ridges running in an easterly direction and rising to an average of 1,000 feet with valleys between. The highest of these ridges skirts the Bay of Fundy and contains Blooms¬ bury Mountain and the Quaco hills. It divides into two or more ridges in Albert County, in Caledonia Mountain and Shepody Mountain, the latter being 1,050 feet high. The triangular area of sandstone of the carboniferous period presents a comparatively level surface nowhere rising above 800 feet, the general level, espe¬ cially in the eastern part of the province, being below 300 feet. The highest land of the prov¬ ince is in the northern highlands. West of the

Saint John River, in York and Carleton coun¬ ties, it rises into several peaks and ridges to a height of 800 or 900 feet, while the general level is about 500 feet. East of the Saint John River the land rises to the watershed dividing the Tobique and other tributaries of the Saint John from the rivers which flow eastward. Mountains and broken ranges cross this tract of land in all directions and reach the Saint John Valley in the vicinity of Mars hill, which is 1,688 feet in height. The highest elevation in the province is Mount Carleton (2,600 feet).

The coast line of the Bay of Fundy is rocky and bold and indented with several fine harbors, the principal ones being Saint John, Letang and Saint Andrews. On the Bay of Chaleur and Gulf of Saint Lawrence, the shore is less rugged and the harbors are not so deep.

Hydrography. — Few countries are so well watered as New Brunswick. Lakes are nu¬ merous and there are many rivers and streams; some of them of large size. The Saint John, which flows into the Bay of Fundy, is 390 miles in length and drains 21,500 square miles of ter¬ ritory. Some of its tributaries are upward of 100 miles in length. Other large rivers are the Miramichi (135 miles), Restigouche, Peticodiac and the Saint Croix.

Soil. — The province presents a considerable diversity of soil. At its southern boundary there is a belt about 30 miles wide along the coast of the Bay of Fundy composed of granite and crystalline rocks, which are much disturbed and thrown up into ridges. North of this belt lies a large part of Sunbury, Westmoreland, Albert and Northumberland

counties and the whole of the county of Kent. The western area of this limit is in York County, west of Oro- mocto Lake, while its southern boundary ex¬ tends to near the mouth of the Peticodiac River and the northern boundary goes as far as Bathurst. Northwest of this sandstone area the rocks are principally slate and limestone with large deposits of granite appearing in dif¬ ferent places. These rocks are much disturbed and are thrown up at various angles forming high ridges and lofty peaks. The sandstones which occupy the middle and eastern part of the province are the newest rocks in New Brunswick. They belong to what is called by geologists the carboniferous period, because de¬ posits of coal are found in them. The rocks lie for the most part flat, or are spread out layer upon layer on the shores and bottoms of ponds and lakes in the form of clav, sand and gravel, carried down by streams and rivers and hardened, after the lapse of ages, into solid rock.

Minerals.— New Brunswick is inferior to Nova Scotia in respect to mineral wealth, but it possesses some valuable ores and abounds in excellent stone. Gypsum, coal and oil with nat¬ ural gas are successfully exploited. Coal is found in the southern portion of the province at many places and is being worked at Grand Lake and in two or three places in the county of Kent. The seams are thin, but close to the surface and easily reached. Albertite, which appears to be a form of petroleum, is found in the county of Albert, and with it other sub¬ stances termed bituminous, shale and also petroleum. Wells of the latter are being op¬ erated in Westmoreland. Natural gas is sold for distribution in Moncton and Hillsborough.

Iron is found in many portions of the province and has been worked extensively in the county of Carleton; but the most important deposit is in Bathurst County. Copper ore exists in large quantities and has been worked in Westmore¬ land County. Deposits of nickel, antimony, galena, manganese and graphite also exist:

New Brunswick is abundantly supplied with limestone, the most valuable deposit being in the county of Saint John. Gypsum is found in large quantities and is extensively quarried in the county of Albert. There are large quarries of granite in various parts of New Brunswick, at Hamstead, in the Nerepis Valley and near Saint George in the county of Charlotte. Marble is also found in some localities. Free¬ stone suitable for building purposes and for the manufacture of

grindstones and millstones is also found in many parts of the province. Slate is abundant, and there is clay for the manufacture of bricks in most of the counties. Mineral springs are numerous, the principal ones being in the county of Kings. Salt springs are also found in the same county, and are now being operated with profit. The value of the mineral products of the province, in 1916, is put down at $878,446.

Climate. — The climate, except on the coast of the Bay of Fundy, is similar to that of Que¬ bec and Maine. The winters are severe and in summer a high temperature prevails, but the climate is healthy and there are no diseases peculiar to the soil. Winter begins early in December and lasts until the end of March. The most charming season is the autumn, which lingers long. The cold weather does not become established until well on in November. The average rainfall is 30 inches and the aver¬ age snowfall 88 inches. The total precipitation, rain and melted snow, averages 44 inches.

Animal Life. — There is no country in North America in which game is more abun¬ dant than it is in New Brunswick. There was a time in the history of the province when, owing to unlawful methods of catching moose, they became scarce, but in recent years, under the protection afforded by the laws enacted by the provincial government, moose . are now abundant. The area of land in the interior of the province which is seldom trodden by human feet is so large that moose find there a splendid haunt, and the same is true with respect to other wild animals.

The caribou, which is a smaller animal than the moose and is allied to the raindeer of north¬ ern Europe, is also abundant in New Bruns¬ wick. Deer are so plentiful as to have become almost a nuisance, and their numbers continue to increase.

New Brunswick has a large number of fur¬ bearing animals, among which are the bear, the raccoon, the wolverine, the marten, the mink, the otter, the lynx, the muskrat, the wood¬ chuck, the fisher and the squirrel. The hare is also found in great numbers . all over the prov¬ ince. This animal turns white in winter.

Wild geese are abundant, and there are. no less than six species of wild ducks besides brant. The great haunts of wild geese and of brant are on the north shore, but wild ducks are to be found on the rivers all over the prov¬ ince. There are two species of partridge, al¬ though the proper designation of this bird is grouse Curlew, plover, snipe and woodcock

are also abundant and afford admirable sport. The great northern diver or loon is to be found in all the great rivers. In addition to these, there are two species of eagle, five species of hawks and four or five varieties of owls. These are but a few of the birds of New Brunswick, of which there are about 200 species in all. The government possesses a splendid collection of them, which can be seen at Fred¬ ericton.

New Brunswick is pre-eminently the land of the angler, for nearly all its great rivers abound in game fish. The salmon, the king of sporting fish, frequents all the tributaries of the Saint John below Grand Falls, such rivers as the Tobique being famed for that fish. Salmon also are found in all the rivers of the North Shore. The Nepisiguit, the Restigouche and the Mira- michi have a world-wide reputation as angling rivers. All the lakes of the province swarm with trout and furnish admirable fishing in their season. There is hardly a stream in the province in which trout are not to be found, and some of the rivers, such as the Tabusintac, are widely famed for the enormous numbers of fish which have been taken in them by sportsmen. In the early summer sea trout of large size swarm in all the rivers which flow into the Gulf of Saint Lawrence. In addition to these game fish other species, which are esteemed in Europe but attract little attention on this side of the Atlantic, such as chub and perch, are very abundant. Pickerel are also to be found in many rivers as well as eels, which frequently attain a large size.

Agriculture. — The leading industry of New Brunswick is agriculture, as the greater portion of its people are farmers. The province con¬ tains much excellent land, the. marshes at the head of the Bay of Fundy, the intervales of the Saint John and other large rivers, and the up¬ lands of the northern portion of the province being very fertile. Wheat is grown successfully in many districts, but not in sufficient quantities to supply the needs of the province. The larg¬ est crops are oats, potatoes, turnips and buck¬ wheat, all of which yield well. A great deal of attention is now being given to dairying. There are numerous cheese factories and cream¬ eries in the province which export their prod¬ ucts to England and other countries. The gov¬ ernment has a department of agriculture which attends to the needs of that important industry.

According to the statistics of 1916 the orov- ince had 889,220 acres under crop, of a value of $22,924,200. The product included 242,000 bushels of wheat, 45,000 of barley, 6,039,000 of oats, 1,206,000 of buckwheat, 7,488,000 of pota¬ toes, 3,165,000 of field roots and 850,000 tons of hay. The livestock consisted in 1917 of 65,169 horses, 100,221 milch cows, 89,456 other horned cattle, 103,877 sheep and

69,269 swine.

Lumbering. — The larger portion of the province is still covered by forests and lumber¬ ing is, after agriculture, the principal industry. This business is carried on on a large scale by operators, some of whom own the land upon which they cut their lumber, while others lum¬ ber on lands which they lease from the pro¬ vincial government, which still owns upward of 10,000 square miles of forest. The prin¬ cipal commercial wood is the spruce, which is sawn into deals and sent to England and the United States. Pine, which formerly abounded,

is now scarce. The other forest trees of com- mercial value are fir, hacmatac, maple, oak, elm, birch, beech, ash, butternut, poplar and hem-

1°v?oa value of the lumber cut in 1916 was *po,oo4,o97, for which Great Britain is the prin¬ cipal market. The abundance of wood of all kinds in New Brunswick at one time made it a great shipbuilding country and the ships of the province were known all over the world. This business has been destroyed by the introduction of steel ships and steamships, and the only ship¬ building now done in the province is the con- sti uction of small vessels for the coasting trade. The forests of New Brunswick are a large source of revenue to the government, the amount received for timber licenses and stump- age being in the vicinity of $420,000 a year.

The principal lumbering rivers of the prov¬ ince are the Saint John, Saint Croix, Resti- gouche and Miramichi and their tributaries. All the rivers of New Brunswick, of any size, contribute. something to the lumbering industry.

Sea Fisheries. — New Brunswick possesses a coast line on the Bay of Fundy, Gulf of Saint Lawrence and Bay of Chaleur of upward of 600 miles, and these waters abound in fish. Al¬ though less extensive than the fisheries of Nova Scotia, those of New Brunswick are very valu¬ able, the average product being about four and a half million dollars a year. The two greatest fishing countries are Charlotte and Gloucester, but Westmoreland, Northumberland, Kent and Saint John are also well to the front. The value of the fish caught in the province in 1916 was $4,737,145.

Manufactures. — The great manufacturing industry of New Brunswick is the conversion of the lumber of the province into deals, boards, clapboards, shingles and similar articles. This industry employs hundreds of saw mills and gives employment to many thousands of men. The province contains four pulp mills for the making of chemical pulp, its value in 1916 was $591,705. There are five cotton factories in New Brunswick and several iron foundries. The manufacture of nails is carried on exten¬ sively. Boots and shoes are made in a number of places, as are wrappers, paper boxes, woolen cloths, candy and soap. There are also furni¬ ture and carriage factories. The exports for the year to 31 March 1917 were valued at $206,173,927, and the imports at $19,993,584.

Revenue. — The revenue of the Province is mainly derived from subsidies received from the Dominion government and also from the receipts of the Crown Land Office. There is also a revenue from liquor licenses, succession duties, taxes on incorporated companies, fees of office and other sources, the whole amount¬ ing (1916) to $1,580,419 a year. The province expends yearly about $290,000 on education, $346,000 on public works, $47,000 on agriculture, $33,000 on game protection, $95,000 on the Provincial Hospital for Nervous Diseases, and $73,000 on the legislature and executive gov¬ ernment. The debt of the province, amounting to $9,000,000, has been largely expended on sub¬ sidies to lines of railway, the construction of permanent steel bridges for the highways and similar services. No direct taxes are levied on the individual by the provincial government.

Education. — The educational system of the province is based on the theory that the prop¬ erty of the community should support the

schools which are free and undenominational. The number of pupils attending the schools is upward of 66,000. There is a normal school at Fredericton for the education of teachers. Be¬ sides the common schools there are superior schools and grammar schools in each county and the cities have high schools which take the pupils to the threshold of the university. The University of New Brunswick, located at Fred¬ ericton, is maintained by an endowment granted bv the province, and is an efficient institution. There are also two denominational universities, Mount Allison at Sackville, maintained by the Methodists, and Saint Joseph at Memramcook, maintained by the Roman Catholics. Consoli¬ dated schools, which are formed by the con¬ junction of three or more school districts, have been established in several counties.

Religion. — There is no State church in New Brunswick, all

denominations being on an equal footing. The largest religious body is the Ro¬ man Catholic which, at the census of 1901, numbered 144,889. The Baptists come next, numbering 82,106. The adherents of the Church of England number 42,864, Presbyterians 39,- 207, Methodists 34,558.

Government. — New Brunswick, as one of the provinces of the Dominion of Canada, sends 11 members Jo the House of Commons and is represented in the Senate by 10 members. For provincial matters there is but one legislative body of 48 members, the Upper House having been abolished in 1892. Every male resident is a voter and responsible government prevails to the fullest extent. The lieutenant-governor is appointed by the government of Canada, but all power rests in the Executive Council or Cabinet, which depends for its existence on having a majority in the legislature. Of the seven members of the Executive Council six are heads of departments. The term of the legisla¬ ture is five years, but it may be dissolved at any time by the lieutenant-governor.

New Brunswick is divided into 15 counties, each of which is a municipality and is gov¬ erned by a body elected by the taxpayers which is known as the municipal council and which contains representatives from each parish. Each county is divided into parishes and the parish officers are appointed by the municipal council. There are also three incorporated cities in the province and a large number of incorporated towns, _ almost every small town having now a municipal government of its own. Liquor prohibition is in force.

Means of Communication. — New Bruns¬ wick contains nearly 2,000 miles of railway, the principal lines being the Intercolonial, which is owned by the government of Canada, and the Canadian Pacific. Moncton is the headquarters of the Canadian government railways. The Intercolonial Railway system connects Saint John, Fredericton, _ Chatham and other import¬ ant New Brunswick towns with Quebec and Montreal. The construction of the Intercolo¬ nial Railway was one of the terms upon which the maritime provinces agreed to enter confed¬ eration in 1867. The Canadian Pacific Railway has its Atlantic terminus at Saint John, and it connects that _ city as well as Fredericton, Woodstock, Saint Andrews and Saint Stephen with Moncton and the west. A large portion of the winter traffic of Canada and of the State of Minnesota passes over its road, through

New Brunswick to the port of Saint J °hn. where there are deep water

wharves and ele¬ vators. Several lines of steamships run be¬ tween Saint John and Great Britain during the winter. Vessels of a tonnage of 50,147 tons were owned in the province in 1916. T.he high¬ way roads of the province have a total length of upward of 12,000 miles and are well kept up by the department of public works. The bridges number upward of 4,000.

Cities and Towns.— New Brunswick con¬ tains three cities and a number of towns which are rising into importance. The largest of these is Saint John (q.v.), situated at the mouth of the river of that name. It is a large shipping port and lines of steamships run from it in winter to Great Britain, carrying the produce of western Canada to European markets. It has railway connection with the west by means of the Canadian Pacific and Intercolonial railways. Saint John is also a considerable manufacturing centre. Its population is about 53,000.

Frederioton, with a population of over 7,000, situated 84 miles up the Saint John River, is the capital of the province. It is the centre of an important agricultural, district and the seat of some manufacturing industries.. Moncton, which has upward of 11,000 inhabitants, man¬ ufactures to a considerable extent, besides being a great railway centre. . .

Chatham, at the mouth of the Miramichi River, is an important port for the shipment of lumber to Europe. Among the other towns of the province that are worthy of mention are Saint Stephen, Saint Andrews, Woodstock. Ed- munston, Sussex, Dorchester, Sackville, . Richi- bucto, Shediac, Newcastle, Dalhousie, Hillsbor¬ ough and Campbellton.

History. — The first European settlement in the province was made by De Monts and Cham¬ plain on Saint Croix Island, near the entrance to the Bay of Fundyin 1604. It was a part of the French Province of Acadia, and after the downfall of French power it was a part of Nova Scotia until the year 1784. Fort Latour, at the entrance of the Saint John River, was the scene of the contests between Latour and Charnisay for the mastery of Acadia and of the heroic deeds of Lady Latour. It was captured and destroyed in 1645. Fort Beausejour, at the head of Chignecto Bay, a stronghold of the French, was taken by the English in 1755. At the close of the War of the Revolution many loyalists who had taken the side of the king in the con¬ test came to New Brunswick and a number of the Loyalist regiments were disbanded in the province where their descendants still live. After the close of the Napoleonic wars, and again after the Irish famine of 1847,. large num¬ bers of immigrants came to the province. About

100,000 of the inhabitants are of French origin, descendants of the Acadians who settled in the country in 1634. The others are of the British races, the English predominating. The popula¬ tion of the province in 1911 was 351,889 (93.42 per cent of Canadian birth). James Hannay, Author of cNew Brunswick : Its Resources and

Advantagesˆ ; Revised by D. S. Douglas,

Toronto.

NEW BRUNSWICK, N. J., city, county- seat of Middlesex County, on the Raritan River, the Delaware and Raritan Canal and on the Raritan River and the Pennsylvania Rail-

road, about 25 miles north by east of Trenton, 30 miles west by south of New York, and 15 miles from the mouth of the river. It was set¬ tled in 1681, and until 1697 was called ((Prig- more's Swamp. w The name was changed to «Inion's Ferry, » and in 1714 it was again changed and called New Brunswick after the House of Brunswick. In 1730 it was granted a royal charter; in 1736 it was incorporated as a town, and in 1784 was chartered as a city. It was an active centre during the Revolutionary War, and was occupied by the British in the

winter of 1776-77. .

It is a manufacturing city, and has consider¬ able trade, with good shipping facilities by land and water. The chief manufacturing products are red cross supplies, cigars, automobiles, wall paper, rubber tires and tubes, linoleum, horse¬ shoe calks, hosiery, music wire, cigar boxes, etc. It- is the seat of Rutgers College (q.v.), the State Agricultural and Mechanical College and the Rutgers Preparatory School and Saint Agnes Academy. The Theological Sem¬ inary of the Dutch Reformed Church is con¬ nected with Rutgers. It has a new high school, built at a cost of $175,000; nine public schools, four parochial schools and a young ladies seminary; the Gardner A. Sage library contains about 50,000 volumes and the public library contains about 30,000 volumes ; the Saint Mary s Orphan Asylum and Home for the Aged is in charge of the Sisters of Saint Francis. There are two hospitals and also a hospital for incur¬ ables. The city is governed under the commis¬ sion form of government consisting of a mayor and four commissioners. It has a full paid fire department and motor-drawn apparatus. The board of* education is appointed by the mayor. It has 141 acres of public parks. The city owns and operates the

waterworks. Pop. 32,779.

NEW CAANAN, Conn., town in Fairfield County, on the New York, New Haven and Hartford Railroad and on Five Mile River, eight miles northeast of Stamford and six miles northwest of Norwalk. It is a beautiful resi¬ dential town and a favorite summer resort for New York business men. The surface is hilly, the altitude about 400 feet,, and the climate cool in summer and temperate in winter. W ell-kept roads extend into the country and to the beaches on the Sound. The principal industry is the manufacture of shirts and overalls. A handsome town hall, school, public library and reading room, the Mead Memorial Park and Brooks Sanitarium are prominent municipal features. Pop. (1920) 1,918.

NEW CALEDONIA.— An island belong¬ ing to France, situated almost in the antipodes of that country between 161° and 165° E. long, and between 20° and 25° S. lat., and this geographical situation became much en¬ hanced when the Panama Canal was opened. In fact, it is only necessary to glance at a map to realize that, placed between Australia and the Melanesian and Polynesian islands, New Cale¬ donia is on the route from Sydney to San Fran¬ cisco and Panama, passing by Fiji, Samoa, Tahiti and the Marquesas Isles on the one hand, and the route from New Zealand to Indo-China via the Solomon Isles, New Guinea, Java and Sumatra, or in other words, it is admirably placed, once it is properly developed, to become the emporium of the Pacific.

History. ‘The existence of New Caledonia was foreseen by Bougainville during a voyage round the world which he made in 1766 to 1769, but he did not endeavor to approach it and the honor of discovering the island fell to the famous explorer Cook in 1774, while returning from the New Hebrides which he had just explored. He approached it from the north¬ east at Balade, and gave it the name it still pre¬ serves on account of the resemblance of the country to certain parts of the coast of Scot¬ land It is practically certain that La Perouse visited New Caledonia in 1788 before being lost on the neighboring islands, but no trace has been found of his visit there. A little later in 1792-93 d’Entrecasteaux explored the island, but it was only in 1843 that the first Europeans settled there; these were the French Maristes priests which Le Bucephale brought there while returning from Tahiti. Several of their num¬ ber were massacred, as well as some French sailors. In order to avenge them Napoleon III caused the island to be

occupied by Rear-Ad¬ miral Febvrier-Despointes in September 1853. A penitentiary colony was established by decree of 1859 and in 1864 the first batch of convicts arrived there.

From a geographical point of view, New Caledonia, which has an area of about 20,000 squareˆ kilometers (7,722 square miles), forms part of an Oceanic continent, which has sunk gradually and of which there only remain a few high summits. If has the form of a very elon¬ gated ellipse, the greater axis of which inclines about 45° to the meridian. A very irregular but continuous mountain chain stretches from one end to the other of the island, which it separates into two parts; there are fairly high mountains like Humbolt and Panie, their altitudes being about 1,650 metres (5,406 feet). From this mountain chain extend numerous buttresses which form so many valleys, in each of which more or less important water courses flow — such as the Diahot — which never dry up in the mountain regions, being fed less by the infre¬ quent rainfall than by the moisture deposited by the clouds covering the higher parts.

By reason of its geographical situation, New Caledonia must be considered as a tropical country, though its climate is rather temperate than tropical ; moreover, it is healthy and Euro¬ peans can cultivate the land without risk.

Inhabitants. — The population is estimated at about 50,000, and the male inhabitants are known as Canaques. They belong to two dis¬ tinct races : Melanesians and Polynesians, who have, however, intermarried, thus creating in¬ termediary types.

Government. — New Caledonia is governed by a resident governor at Noumea, with the assistance of a privy council of the principal heads of departments and influential inhabit¬ ants; a general council is elected to supervise. The colony has no senator nor deputy but only a delegate elected to represent it at the higher council of colonies.

Commerce. — The exports in 1913 — the last normal year — amounted to 15,838,405 francs ($3,167,681), products from the land figuring for 13,745,028 francs ($2,749,005) in this total. If we deduct from this figure the value of guanos, 84,000 francs ($16,800), and of ores and minerals, 8,441,428 francs ($1,688,285), there remain 5,219,500 francs ($*1;043,900) for

the total of the other products of the country, i.e., agricultural, forestral and fisheries. Among the products of a vegetal origin, copra takes the first place and its exportation shows 2,960 tons of a value of

1,744,000 francs ($348,800) ; coffee figures next with 421 tons of a value of 1,027,- 000 francs ($205,400). The total cotton output gives an export figure of 269 tons of cotton seed, representing a value of 24,000 francs ($4,- 800), and 163 tons of cotton valued at 250,000 francs ($50,000).

Products, etc. — Among the cultivated plants giving aromatic essences are balm mint, whorl plant, and especially niaoube, which is abundant and is used in the production of an oil of which the colony could export considerable quantities. In 1913 the colony exported 3,565 kilograms (7,857 pounds) of volatile oil or essences, of a value of 19,290 francs ($3,858).

The natives cultivate especially maize, rice, manioc and numerous varieties of yams and potatoes,, and particularly taro. The forests contain many varieties of wood, of which nis- ouli, proper to New Caledonia, is mostly ex¬ ported; then come sandal wood and damara, which produces the resinous kaori gum; in 1913 26 tons of sandal wood were exported, repre¬ senting a value of 14,000 francs ($2,800), and 2,507 kilograms (5,524 pounds) of kaori of a value of 3,500 francs ($700).

The livestock comprises about 130,000 oxen. These are good animals for butcher's meat, weighing on an average 450 to 500 kilograms (900 to 1,100 pounds). The meat is mostly canned before being exported. In 1913 it was 436 tons. Among the fish products, mother of pearl figures for 1,005 tons representing 830,665 francs ($166,133 and sea-slugs for 23 tons valued at 23,750 francs ($4,750).

The mineral riches of New Caledonia com¬ prise nickel and chrome outcrops, cobalt, cop¬ per, lead, zinc, silver, gold. Antimony and mer¬ cury deposits are also said to exist in certain parts. The transformation in the colony of nickel ore into mats is now capable of commer¬ cial realization which speaks well for the future of New Caledonia.

Dependencies. — The Dependencies of New Caledonia are of little importance. The small Island of Pines, which serves as the central supply depot, is a madrepheric rock. The Loyalty Islands are covered with forests. The Huon Islands are not inhabited but have been exploited for their abundant deposits of guano and quantities of tortoises which frequent the pink sand banks. In the Chesterfield Island guano and mother of pearl is sought after, or whale and tortoise fishing. The New Hebrides (q.v.) are more important. Situated between 21° and 13° south latitude they are hotter and less salubrious than New Caledonia; they comprise some 40 island divided into two

groups : the Torres Isles and the Banks Isles at the north, and New Hebrides proper at the south. They cover 1,500,000 hectares (3,706,500 acres), and have a population of about 60,000 canaques and 250 Europeans.

Visited by Bougainville, Cook and La Perouse they were annexed at the same time as New Caledonia in 1853 and occupied by France in 1886. But as a result of protesta¬ tions by the Presbyterian missionaries, the small garrison was withdrawn and France signed agreements with England on 16 Nov.

1887 and 26 Jan. 1888 establishing the con¬ dominium of England and France. The Anglo- French agreement of 1904 provided for the establishment of a mixed commission to settle litigation concerning real estate and a com¬ mission of February 1907 established an Anglo- French Protectorate over the islands. The principal centre is Port Vila in commu¬ nication once a month with Noumea and Aus¬ tralia by a boat belonging to the Societe des Nouvelles Hebrides. The soil is of remark¬ able fertility; it is quite likely even that it re¬ serves many a surprise for mine prospecting. Finally, this archipelago possesses a consider¬ able reserve of labor.

The Wallis and Horn island since 1844 have been placed under French protection; their exportations consist of copra, kava roots, «fan)} matting, etc. These two archipelagos are only in intermittent communication with France by men-of-war which visit them every year. Consult Bernard, Augustin, (L'Archipel de la Nouvelle Caledonie* (Paris 1895) ; Blanc,

NEW CASTILE, kas-tel', Spain, an an¬ cient province, corresponding to the ancient Moorish kingdom of Toledo, and now form¬ ing the provinces of Madrid, Ciudad-Real, Cuenca, Guadalajara and Toledo, occupying nearly the centre of the peninsula within the basins of the Guandiana, Tagus and Jucar; it had an area of 28,010 squre miles, and the popu¬ lation of the region in 1910 was 2,150,000. With the province of Old Castile which bounded it on the north, and is now divided into the provinces of Avila, Burgos, Logrono, Palencia, Santander, Segovia, Soria and Valla¬ dolid, area, 25,490 square miles, pop. 1,850,000. New Castile formed the kingdom of Castile which was instrumental in expelling the Moors from Spain (q.v.).

NEW CHURCH. See Church of the New Jerusalem.

NEW-CHWANG, nu-chwang\ See Niu-

CHUANG.

NEW COLLEGE, Oxford, England, was founded in 1379 by William of Wykeham, bishop of Winchester and lord-chancellor of England, as the College of Saint Mary of Win¬ chester, the scholars to be recruited from the most promising pupils of the great public school of Winchester (q.v.). Its original estab¬ lishment comprised a warden, 70 fellows and scholars, 10 chaplains, 3 clerks and 16 chor¬ isters; its modern establishment comprises a warden, 28 fellows, 2 chaplains, 39 scholars, 8 lay clerks and 18 choristers. The scholar¬ ships are divided into two classes, Winchester and open. Forty church presentations are within its gifts. The college buildings are among the finest in Oxford, and originated the style of English college architecture ; the chief features are the hall, the chapel and the gar¬ dens. Among celebrities associated with the college are Vitelli, Grocyn, Archbishop Chichele, Bishops Waynflete, Lowth, Ken and Sydney Smith. Consult Rashdall and Rait,

NEW COMERSTOWN, kum'erz-town, Ohio, city, in Tuscarawas County on the Tuscarawas River, and on the Pennsylvania and the Pittsburgh, Cincinnati, Chicago and Saint Louis railroads, about 80 miles east by north of Columbus. It is in a fertile agricul¬ tural region, near bituminous and clay deposits. The chief manufactures are lumber and planing mill products, cigars, brick and dairy products. Pop. 3,389.

NEW CONNECTION, METHODISTS,

the first secession from the English Wesleyans, dating from 179/. The New Connection, com¬ prised the followers of Alexander Kilham (hence sometimes called Kilhamites), who, in 1795, published (The Progress of Liberty,* a criticism of the lax church discipline of the day, and in which he contended that the mem¬ bers of the various societies of Methodists and not the Conference should be the source of authority in the church, and claimed lay representation equal with ministers in the Conference. In 1796 he was expelled from the Conference, three other ministers joined him in the following year, and the body soon had 5,000 adherents. ~ It was never large _ in its membership, and in 1907 it joined with the United Methodists and the Bible Christians to form the United Methodist Free Church. The united church had in 1916 671 ministers, 2,727 churches and a membership of 157,852.

at. While Gen. T. E. Tohnston was at Win¬ chester, Va., 14 June 1861, he heard that Col. Lew Wallace, with the 11th Indiana regiment, had marched from Cumberland, Md., and driven a Confederate force from Romney. Believing it to be the advance of McClellan's column from West Virginia, Johnston ordered Col. A. P. Hill, with three regiments, to march on Romney, 45 miles, west, drive out Wallace, and destroy the bridges on the Baltimore and Ohio Railroad west of Cumberland. Hill reached Romney, but Wallace had fallen back to Cumberland. At night of the 18th Hill sent Colonel Vaughn, with four companies of in¬ fantry, to destroy the bridge of the Baltimore and Ohio Railroad over New Creek, guarded by about 200 local militia and two guns. Vaughn crossed the north branch of the Potomac, beyond which the Union troops had taken position, and put them to flight, captured the two guns and a set of colors, burned the bridge over the mouth of New Creek, and then pushed on to Piedmont, five miles westward, destroyed parts of the railroad and cut the tele¬ graph wires, and then returned to Winchester. Later the position at New Creek was fortified and garrisoned to protect the railroad bridge. On 4 Aug. 1864 it was held by Col. Robert Stevenson of the 154th regiment Ohio National Guard with his regiment, small .detachments of three other regiments, and eight guns, in all about 1,500 men. During the day Stevenson was attacked by Gen. John McCausland, who, returning from his raid on Chambersburg, had approached by way of Romney. After a severe fight of several hours McCausland withdrew toward Moorefield, leaving several dead and severely wounded on the field. The Union loss was 8 killed, 29 wounded and missing. On 27 Nov. 1864 New Creek was held by Colonel Latham, 5th West Virginia Cavalry, with about

700 dismounted cavalry, four heavy guns and three field pieces. On the morning of the 27th General Rosser with two brigades of cavalry, his own and Payne's, crossed Great North Mountain into Hardy County, surprised and captured Latham's pickets, charged over his works and captured his artillery and most of his command with but slight resistance. The prisoners taken numbered about 500, and with them their arms and some colors. Four of the seven guns, being heavy pieces, were spiked and left, the carriages being burned. All the government buildings, containing a large amount of ordnance, quartermaster and com¬ missary stores and 200 wagons, were burned,

and Rosser marched away with his prisoners, three guns, about 250 horses, also several hun¬ dred head of cattle and a large number of sheep collected from the farms of Hardy and Hampshire counties.

NEW CUMBERLAND, W. Va., town, county-seat of Hancock County, on the Ohio River, and the Pittsburgh, Cincinnati, Chicago and Saint Louis Railroad, about 35 miles north of W heeling. In the vicinity are coal mines and valuable clay beds. The chief manufac¬ tures are sewer pipe, tile, a semi-porcelain pottery, fire and paving brick, foundry prod¬ ucts and machinery. It has large mills where the fire clay, for use in the iron works, is pulverized. It has an extensive trade in coal and clay products. Pop. 1,816.

NEW DECATUR, de-ka'ter, Ala., city, in Morgan County, near the Tennessee River, and on the Louisville and Nashville Railroad, about two miles south of Decatur and 85 miles north by west of Birmingham. The first set¬ tlement was made in 1887, and in 1889 it was incorporated. It is an agricultural, lumbering and manufacturing section of the State. Its industrial interests are connected with the manufacturing and shipping of iron products, lumbering and farm products. It has a good trade in wool. It is governed by a mayor and council under a revised charter dating from 1899. Pop. (1920) 4,228.

NEW ENGLAND, a collective term ap¬ plied to the northeastern portion of the United States, comprising the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut. It extends from lat. 41° to 48° N., and from Ion. 67° to 74° W., with an aggregate area of 67,384 square miles and a population at present of about 7,000,000. It has a coast line of about 700 miles, without allowing for the smaller inlets, and constitutes a large part of the great peninsula which, in¬ cluding Nova Scotia, New Brunswick and parts of Lower Canada, is formed by the Atlantic Ocean, the Saint Lawrence, and the connected waters of Lakes Champlain and George and the river Hudson. It was originally granted for colonization by James I in 1606 to the Plymouth Company under the name of North Virginia, and received its present name from Capt. John Smith, who in 1614 explored and made a map of the coast. For the details of the geography and history of New England, consult the States respectively of which it is composed, and also the United States. Consult Palfrey, (History of New England. >

NEW ENGLAND, A Compendious His¬ tory of, by John Gorham Palfrey (q.v.). It

covers the time from the first discovery of New England by Europeans

down to the first general congress of the Anglo-American colo¬ nies in 1765, with a supplementary chapter giv¬ ing a summary of the events of the last 10 years of colonial dependence, and was pub¬ lished 1865-73.

NEW ENGLAND EMIGRANT COM¬ PANY, The, in American history, a corpora¬ tion organized at Boston in 1855 to control emigration to the Territory of Kansas in the interest of the anti-slavery party. The Emi¬ grant Company aided largely in making Kansas a free State.

NEW ENGLAND HISTORIC AND GENEALOGICAL SOCIETY, The, an as¬ sociation organized in Boston, Mass., in 1845 for historical research and the preserving of early New England records. Meetings are held every month and the membership is about 1,000. A quarterly magazine, The New England His¬ torical and Genealogical Register, was begun in 1847 and the Society also publishes the Bihli- opolist for circulation among its members. It issues also (Vital Records of Massachusetts Towns* ending at 1850. The library of the So¬ ciety contains 40,000 volumes, and in addition many pamphlets, relics, manuscripts and curios. The Society has a valuable collection of old prints and paintings.

NEW ENGLAND ORDER OF PRO¬ TECTION, an American fraternal and bene¬ ficial society organized in 1887 by members of the Knights and Ladies of Honor who sought an independent authority for New England. The central lodge is located in Boston. Mem¬ bership is confined to New Englanders. In 1917 it had six grand lodges, over 350 sub¬ lodges and 49,350 members. In 1917 it dis¬ bursed $1,114,110 in benefits, and $15,038,706 since its organization.

NEW ENGLAND PRIMER, a famous educational work, compiled by one Benjamin Harris, an English versifier and printer, who established a nondescript shop in Boston dur¬ ing the reign of James II. He first published (The Protestant Tutor,* and before 1690 the (New England Primer> as an abridgment of the earlier work. It is thought that in the 18th century about 2,000,000 copies were sold, yet of these less than 50 are known to be extant. These surviving copies represent about 40 editions. Only a small portion of the supposed 1st edition is in existence, this so-called Brad¬ ford Fragment having been discovered as waste in the binding of a later work. The con¬ tents of the (Primer* was variously altered in accommodation to religious and political changes. The alphabet rimes, with wood-cuts crude as themselves, are probably the best- known feature. One of the most curious of these illustrations shows Job literally covered with spots. The shorter Westminster Cate¬ chism is also included. P. L. Ford (q.v.) did much

to clear up the subject of the (Primer* by his historical bibliographical study, (The New England Primer: A History of its Origin and Development, with a Reprint of the Unique Copy of the Earliest Known Edition* (New York 1897). A reprint was issued (Albany

1899).

NEW ENGLAND SHILLING, the name

given to the first American colonial coins issued

in 1652. They were of the value of <(12d, 6d and 3d peeces,® stamped N E on the face and XII, VI or III on the reverse to denote the value. See Numismatics.

NEW ENGLAND THEOLOGY, a Cal-

vinistic school of theology, originated in New England by Jonathan Edwards (see Edwards, Jonathan). This school was controversially opposed to Arminianism (q.v.), and later to Unitarianism (q.v.). A new element was intro¬ duced into the theological atmosphere of New England by the preaching of Universalism (q.v.) by John Murray 1770. ‘The contro¬ versies of the early 19th century resulted in the crystallization of New England Theology into a complete system, comprising the tenets, that sin is voluntary; that depravity is inherited from Adam ; that repentance or turning to God can only result from preventing grace; that man has complete freedom of will; that holiness consists in unselfish love ; that certain persons are predestined to receive the grace of God which leads to repentance. Modern philos¬ ophy and criticism have dissolved the dogma¬ tism of this theology which is no longer taught in an unmodified form in Congregational semi¬ naries. Consult Boardman, E. N., (New Eng¬ land Theology) (New York 1899) ; Foster, F. H., (A Genetic History of the New England Theology > (Chicago 1907) ; Walker, W., ‘^His¬ tory of the Congregational Churches in the United States) (New York 1894).

NEW ESSAYS: OBSERVATIONS,

DIVINE AND MORAL, collected out of the

Holv Scriptures, Ancient and Modern Writers, both Divine and Human : as also out of the Great Volume of Men’s Manners: tending to the

furtherance of Knowledge and Virtue. By John Robinson (q.v.). (1624). A volume

of 62 essays, on the plan of Bacon's, but at greater length, and in ethical, religious and human interest more like Emerson's (Essays J in our own time: the work of an English clergyman and scholar, in exile at Leyden in Holland, under whose ministry and through whose counsel the Pilgrim Fathers developed religious liberalism and executed the earliest planting of New England.

NEW FOREST, England, a public pleas¬ ure ground covering most of the southwest of Hampshire. It measures 14 by 16 miles, and has an area of 144 square miles. Its name dates from 1079, when William the Conqueror made a «mickle deer-frith,® in so doing destroy¬ ing several hamlets. This afforestation, en¬ forced by the savage (

NEW FRANCE, Company of, or of the

Hundred Associates. Founded by Cardinal Richelieu in 1627 for the colonization of Can¬ ada and the conversion of the Indians to the Christian faith. The company was granted

feudal powers over the fort and town of Que¬ bec, and the whole of New France, extending, according to the charter, from Florida to the Arctic Circle, and from Newfoundland on the east to the great freshwater sea on the west; and was also given a monopoly of trade. Huguenots were to be rigidly excluded. Neither as a colonizing nor as a religious enterprise did the company fulfil its obligations, the ex¬ ploitation of the fur trade being its main con¬ cern. In 1645 it transferred its trading monop¬ oly to a local corporation, the Compagnie des Habitans, and in 1663 its charter was with¬ drawn and the Crown resumed control over the colony.

NEW FRANCE, or LA NOUVELLE FRANCE, la noo-vel frans, the original name given to Canada (q.v.) by the earliest settlers, wjio were Frenchmen.

NEW GLASGOW, glas'go or -k 6, Canada, town of Pictou County, Nova Scotia, on the East River, near its entrance into Pictou Har¬ bor, and on the Intercolonial Railway, 104 miles northeast of Halifax, eight miles south of Pic¬ tou, on the Northumberland Strait. In the vicinity are rich deposits of coal and iron, which contribute to make it an important centre for the manufacture of iron and steel, and it is the headquarters of the Nova Scotia Steel and Coal Company, which has 6,000 persons on its payrolls. It has shipbuilding yards, foun¬ dries,

machine shops, tanneries, glass and pot¬ tery works, and a considerable trade in coal, iron ore and manufactured articles. Pop.

9,000.

NEW GRANADA, gra-na'da, the name by which the republic now called Colombia (q.v.). was known for many years after its settlement by people from Granada, Spain.

NEW GUINEA, gin'i, or PAPUA, pap'-

oo-a or pa'poo-a, Australasia, a large island of the Melanesian region, the western and larger portion of which belongs to the Netherlands, while the eastern portion is divided into north¬ ern and southern sections, of which the former belonged to Germany until the European War, when it was placed under the administration of Australia by the Peace Treaty of 7 May 1919. The southern section belongs to Great Britain. The island, which after Australia and Green¬ land ranks third among the largest islands of the world, lies on the southwestern side of the Pacific Ocean, between lat. 0° 19′ and 10° 42′ S. and long. 130° 57′ and 150° 52′ E. Its length is about 1,490 miles; maximum breadth, 410 miles; estimated area, over 234,768 square miles. It is separated from Australia (Queensland) on the south by Torres Strait, from the northern territory of South Australia by the Arafuia Sea, and from the Moluccas on the west by Gilolo Passage. The island has a somewhat irregular form, but it may be described as con¬ sisting of a broad central portion from which proceed two narrower peninsulas, one in the northwest and the other in the southeast. The coasts are mostly lofty, but in the neighborhood of Torres Strait and to the west the shore pre¬ sents the appearance of a marshy flat, covered with dense forests. The outline is broken by many indentations, among the chief being the Gulf of Papua and M'Cluer Inlet on the south¬ ern side, and Great Geelvink Bay, Astrolabe

a > and Huon Gulf on the northern side. Many islands, large and small, lie off the coast,

Au- i whlcl are those of the Bismarck Archipelago formerly belonging to Germany off Kaiser Wilhelm Land, the northeastern section of New Guinea.

In the southeast of the island the mountain ranges rise in Mount

Albert to 13,250 feet, and in Mount Victoria to 13,121 feet; and in Dutch New Guinea there are still loftier mountains Mount Wilhelmina (15,830 feet) and Mount Carstensz (15,694 feet). The chief rivers are the Fly, in British territory, with its tributary, the Strickland; the Kaiserin Augusta, in the former German territory; and the Amberno, in Dutch territory, with a large delta. New Guinea has few indigenous mammals, and all these, with the exception of a species of pig and some mice, are marsupials and monotremes. It abounds in birds, among which are immense flocks of par- rots, pigeons and kingfishers, and the celebrated birds of paradise. There are also several re¬ markable species of bower-birds, belonging to the genus Amblyornis. The forests abound in enormous trees, including the camphor-tree ; and bananas, cocoanuts, sago, sugarcanes, rice, maize and yams are cultivated by the natives. On the west coast there are numerous Malay settlements, but the bulk of the inhabitants is composed of Papuans, a race resembling the negroes of Guinea. They are divided into nu¬ merous tribes chiefly in a neolithic stage of civil¬ ization, some of whom are of a friendly dis¬ position, while others are fierce and untractable, cannibals and head hunters, but gradually im¬ proving under Europeanizing and missionary influence.

The discovery of New Guinea is said to have been made by Abreu in 1511, but the first nav¬ igator who is known to have visited the island was another Portuguese, Jorge de Meneses, who touched on it in 1526. The present name was given to the island by the Spaniard Ynigo Ortiz de Retes, who sailed along its north coast in 1546. From the beginning of the 17th century much exploring work was done by the Dutch, especially along the west and south coasts of what is now Dutch New Guinea. Dampier in 1700 added to our knowledge of the south coast, and discovered Dampier Strait. In 1827 the Dutch formed a settlement at Triton Bay, but they soon abandoned it. The southeast coast was surveyed between 1845 and 1850 by Capt. Owen Stanley, and 1873 Captain Moresby ascer¬ tained the exact form of the southeastern ex¬ tremity. The naturalists were the first to make incursions into its interior, and among these Dr. A. R. Wallace, who visited it in 1858, was the pioneer. The missionaries came next, and mis¬ sion stations formed by Germans are maintained on the northeast coast and by the London Mis¬ sionary Society at various points on the south¬ east coast. Germany and the Australian colonies also began to take an interest in New Guinea, and the latter urged the British gov¬ ernment to annex the east part of the island, the west portion having long been recognized as Dutch. The delimitation and division of the island between Great Britain, Germanv and Hol¬ land was settled in 1885. That part of the island lying west of the 141st

meridian was assigned to Holland, and comprises 151,789 square miles; the north part of the rest of the island was as¬ signed to Germany, and the south to Great

Britain. The German territory, called Kaiser ‘ Wilhelm’s Land, contains about 70,000 square miles ; the English territory, 90,540 square miles. The German territory was occupied by Aus¬ tralian troops in October 1914.

The government of the British portion, known as the territory of Papua, is in the hands of an administrator, appointed by the Crown, assisted by an executive and a legis¬ lative council, and has since 1905 been under the government of the Australian Common¬ wealth. Land cannot be purchased except from the administrator. The deportation of the natives is forbidden, as is also the sale to them of firearms, intoxicating spirits or opium. The official centre is Port Moresby. The islands of Torres Strait, which are the seat of a valuable pearl-shell and trepang fishery, and which practically command the strait, have all been annexed to Queensland. A German chartered company whose object is to develop the resources of the country has stations in German New Guinea, where also the sale of firearms, gunpowder and spirits is forbidden. The. Dutch have, done little or nothing for their portion of the island. The population of the Dutch portion is estimated at 200,000; of the German, 530,000; of the British, 280,000. Consult Bevan, (Toil, Travel and Discovery in British New Guinea) (1890); Chalmers,

NEW HAMPSHIRE, one of the original States of the Union, located in the northeast¬ ern or New England division of the United States of America. Its name first was ap¬ plied to a part of its territory in a grant from the Plymouth Company to Capt. John Mason of Hampshire, England, in 1629. From its abun¬ dant granite it is locally and popularly called the (

Boundaries and Area. — New Hampshire lies between 70° 37′ and 72° 3 7 W. from Greenwich and between 42° 40′ and 45° 18′ N. lat. Its general outline is that of a scalene, almost a right-angled triangle, the right angle being at the southeast corner, with an east and west base — the southern boundary — of approximately 95 miles, a north and south perpendicular of 180 miles to its acute angle and a hypothenuse of 190 miles. The State is bounded on the north by the province of Que¬ bec, on the east by the State of Maine, on the southeast by the Atlantic Ocean and Essex County, Mass., on the south by the State of Massachusetts and. on the west by the State of Vermont, the divisional line being the west bank of the Connecticut River, and by the prov¬

ince of Quebec. The area of the State is 9,341 square miles, of which 9,031 square miles are land surface and 310 square miles are water.

. Physiography.— The surface of the State is in general rugged and picturesque. It pre¬ sents in close proximity the diversified features of high, rocky and steep mountains, long ranges of hills, large forests, fertile valleys,

numerous lakes and rivers, with a strip of sea- coast 18 miles in length. Topographically the State is divided by a mountainous ridge six or seven miles east of the Connecticut River and nearly parallel to its course whose crest sepa¬ rates the Connecticut and the Merrimac River basins, and by the White Mountains into four nearly equal parts, each of which has distinc¬ tive features. The southeastern division which is the largest lies south of the White Moun¬ tains and east of the crest of the mountainous ridge between the Connecticut and Merrimac River basins. It also is the lowest of these di¬ visions, three-fourths of its area away from the foothills on its northern and western bor¬ ders scarcely exceeding 500 feet above sea- level. Though it has many hills and much of its soil is sandy, it has a considerable tract of fertile land and is underlaid by gneissic or granitic rocks. Within its borders are nine of the 11 cities of the State and the largest num¬ ber of its manufacturing centres. The south¬ western division lies south of the White Moun¬ tains and west of the crest of the mountainous ridge which separates the Connecticut and Mer¬ rimac River basins. The width of this division varies from five miles near Orford on the north to 30 miles near New Ipswich on the south, and is traversed by numerous ranges of hills and fertile valleys. Near the divisional line between the Connecticut and Merrimac River basins are three isolated peaks of hard rock called monadnocks, which geologically re¬ semble those in the White Mountain division, two of them northwest of the central part of the State and the other near its southern bor¬ der, Cardigan, 3,100 feet; Kearsarge, 3,310 feet, and Monadnock, 3,186 feet above sea-level. The north-central division is entirely covered by the ranges and valleys of the White, Franconia and Sandwich Mountains, which together form one system of mountains. This division which contains very little cultivable soil extends from the Connecticut River to the Maine boundary and from Squam Lake on the south approxi¬ mately 33 miles to the transverse valleys of the Androscoggin and Upper Ammonoosuc and Johns rivers on the north. It has an area of 1,270 square miles and presents the most unique

physical features of the State in the White Mountains which contain the culminating ele¬ vation of the northeastern spur of the Appa¬ lachian or Atlantic Coast system of mountains. Mount Washington, 6,293 feet, the highest of the White Mountains, is the loftiest peak in the United States northeast of the Potomac River. The heights of the other neighboring mountains are Mount Adams, 5,805 feet; Jef¬ ferson, 5,725 feet; Clay, 5,554 feet; Monroe, 5,390 feet; Madison, 5,380 feet; Lafayette, 5,269 feet; Moosilauke, 4,810 feet. Geologically these mountains belong to the older or crystal¬ line belt of the Appalachian system and have the form of a group of monadnocks or isolated remnants of hard rock, gneiss or granite, which have withstood through a long geological pe¬ riod the erosion which has worn down the schists and other foliated strata which origi¬ nally surrounded them into bordering hills and the southeastern peneplain. The diversified and beautiful scenery of this region annually at¬ tracts tourists from all parts of the country and has given it the name of the ˆSwitzerland

of America.® The northern division lies north of the White Mountain district or the trans¬ verse valleys of the Androscoggin and Upper Ammonoosuc and Johns River valleys and is nearly coterminous with the northern county (Coos) of the State. Its surface is broken by undulating ridges and numerous rugged moun¬ tains whose altitude exceeds 2,000 feet above sea-level. A large part of it is covered with forests, but it contains along its valleys many tracts of great fertility.

River Systems. — There are five distinct water-shed areas drained by the Connecticut, Merrimac, Androscoggin, Saco and Piscata- qua rivers and their numerous tributaries. These streams contribute materially to the eco¬ nomic resources of the State through their abundant water power and to the fertility of their valleys.

- Lakes. — The lakes of this State are nu¬ merous. The largest, Winnepesaukee, situated in Belknap and Carroll counties, has an area of 71.75 square miles, exclusive of islands, of which it has 264. Other important lakes in order of size are Umbagog, 15.80 square miles ; Squam, 11.75 square miles, and Sunapee, 9.22 square miles.

Climate. — By reason of latitude, ocean proximity, high mountains and narrow valleys the climatic conditions of the State present great variety. In general the climate is rigor¬ ous, the snow covering the ground for four or sometimes five months of the year. The mean average temperature of the northern portion for the year is 41°; for the winter, 17°; for the summer, 65° ; of the southern part the mean average for the year is 45° ; for the winter 23° ; for the summer, 66.5°.

Precipitation. — The average precipitation is nearly 40 inches per year, quite evenly dis¬ tributed both as to area and period.

Soil. — The mountainous portions of the State are exceedingly rocky and have a thin gravelly soil. The less elevated regions are generally well watered and fertile, affording much excellent land for grazing and tillage. The productiveness of the soil is well above the average yield of the United States.

Population. — The original white settlers in different parts of New Hampshire between 1623 and 1776 with few exceptions were English folk who came directly from England or from the neighboring colonies of Massachusetts and Connecticut or Scotch-Irish folk from the north of Ireland. The total population probably did not exceed, in 1641, 1,000, and in 1771 70,000. According to the first census of the United States in 1790 the population of the State was 141,885. The most rapid increase of the popu¬ lation was during the next six decades. During the 60 years from 1790 to 1850 the absolute in¬ crease in population was 176,091 or 124.1 per cent, while during the 60 yea^s since 1850 the increase was 112,596 or 3$.4 per cent. In the last of these decades, 1900-1910, the increase of population was 18,984 or 4.6 per cent. By the 14th census in 1920 the population was 443,083, the average number of persons to the square mile being 48.9 per cent, making the State rank 19th among the States of the Union in the density of its population. The urban popula¬ tion in 1910 including that of all incorporated places of 2,500 inhabitants or more was 255,099

NEW HAMPSHIRE.

Kstimated population, 446,352

: m

Pop.

21,309

16,316

30 659

30,753

41,652

13,590 22,009 13,272 6.132 1.340 10.033 1 1,528

Belknap Carroll . . Cheshire Coos Grafton .

COUNTIES

L0

.17

O 3 I) 7 I 5

Bop.

126,072 Hillsborough . 0 5

53.335 Merrimack . M5

52,188 Rockingham . 0 8

38,951 Strafford . ms

19,337 Sullivan . ! ,MJ

Incorporated Cities,

Berlin . pg

Concord . Mo

Dover . .m 9

Franklin . l 0

Hanover . j 3

Keene . 0 3

Laconia . k 7

Towns, and Villages

3,059 Littleton . G5

78,283 Manchester . 0 7

27,327 Nashua ..... P 7

11,606 Portsmouth N10

9,119 Rochester . M 9

6,704 Somersworth . . . . M 13

NEW HAMPSHIRE

125

ˆ-2 per cent, and the rural population was 175,473 or 40.8 per cent.

. total population of New Hampshire

m 1910, 230,231, or 53.5 per cent, were native whites of native parentage; 103,117, or 23.9 per cent, were native whites of foreign or mixed parentage; 96,558, or 22.4 per cent, are foreign- born whites; and 564, or 0.1 per cent, are negroes. Of the urban population, 41 per cent are native whites of native parentage; of the rural, 71.5 per cent. Of the foreign-born white population of New Hampshire, persons born in Canada represent 59.9 per cent (those of French- Canadian parentage, 42.3, and all others, 17.6) ; Ireland, 11; England, 5; Russia, 4.5; Greece, 2.7 ; Austria, 2.5 ; Italy, 2.1 ; Sweden, 2.1 ; Ger- manv, 2.1 ; all other countries, 7.9.

There are 14 cities in New Hampshire whose aggregate population in 1920 was over 236,000, or over 50 oer cent of the total population. The population of each of these cities was as fol¬ lows : Berlin, 16,014; Clermont, 9,524; Concord, 22,167; Derry, 5,382; Dover, 13,029; Franklin, 6,318; Keene, 11,210; Laconia. 10.897; Man¬ chester, 78,384; Nashua, 28.379; Portsmouth, 13,569; Rochester, 9,673; Somersworth, 6,588.

Agriculture. — The leading industry of New Hampshire from the time of its first settlement to the last quarter of the 19th century was agri¬ culture, and although it now occupies a second place it is still of great importance. The soil along the seacoast and in the river valleys is fertile, while the upland farms require careful treatment to render them fairly productive. Ac¬ cording to the census of 1910, which supplies the latest reliable statistics, 56.2 per cent or nearly three-fifths of the entire area is devoted to ag¬ riculture and only the northern county, which contains nearly all the White Mountain division of the State, has less than two-fifths of its land area in farms. The number of farms has fluc¬ tuated slightly from decade to decade since I860 and in 1910 was 27,053 or 2,271 less than in 1900. These farms contained 3,249,458 acres, of which 929,185 are improved land

and 2,320,- 273 are unimproved. Between 1900 and 1910 the acreage of improved land decreased 147,694 acres or 13.7 per cent. This significant fact de¬ notes a readjustment of methods to meet the competition of the West. Cereals and crops re¬ quiring large areas have given place to the more intensive forms of agriculture, such as dairying, fruit-growing, poultry-raising, and in the southeastern part of the State market gar¬ dening.

The resulting character and present tend¬ ency of New Hampshire agriculture is indi¬ cated by the fact that in 1909 only 5.5 per cent of the total value of crops was contributed by cereals, while nearly one-half (49.1 per cent) was contributed by hay and forage, and over one-fifth (22.6 per cent) by forest products. The remainder, representing in value 22.8 per cent of the total, consisted mostly of potatoes, other vegetables, fruits and nuts. In 1910 the value of all farm property, including land, buildings, implements, machinery, domestic ani¬ mals, poultry and bees was $103,704,196, an in¬ crease since 1900 of $17,862,100 or 20.8 per cent; the value of the land in these farms was $44,- 519,047, an increase since 1900 of $9,020,287 or 25.4 per cent. In 1910 the average size of the whole number of farms in the State, 27,053, was 120.1 per cent acres, approximately one-

sixth of them being from 20 to 49 acres, nearly one-half between 50 and 174 acres, while those which exceeded 500 acres had increased between 1900 and 1910 by only six or less than 1 per cent. In 1910, of the total number of farms, 27,053, a total of 25,174 or 93.1 per cent were cultivated by owners and managers, and 1,879 or 6.9 per cent by tenants, and of the 24,493 oper¬ ated by persons owming all or part of the land, 18,119 or 74.4 per cent were free from mortgage, and 6,234 or 25.6 per cent were motgaged — 140 not being reported. In 1910 nine-tenths of the New Hampshire farmers were native whites and nearly one-tenth foreign-born whites, 1,697 of them being natives of Canada. A de¬ partment of agriculture established in 1870 was reorganized in 1915 and all the powers and duties previously exercised by the board of ag¬ riculture, the cattle commission, established in 1891, and the agent for suppressing the gypsy and brown-tail moths, were vested in a com¬ missioner of agriculture. A commission for the examination and licensing of veterinary surgeons, established in 1901, as well as effi¬ cient laws governing the inspection of cattle, of milk and other food products and the preven¬ tion of the adulteration and the commercial imposition of fraudulent and deleterious food¬ stuffs unite to promote agriculture as well as to conserve the public health.

Manufactures. — Throughout the colonial period these were limited to

the common house¬ hold industries, gristmills, sawmills and a few iron forges. During the first half of the 19th century the textile and several other important industries were begun, and, utilizing the abun¬ dant water power of the State, grew so rap¬ idly that before the close of that century manu¬ factures took the first place among the indus¬ tries.

According to the census of manufactures of the United States there were in New Hamp¬ shire, in 1914, 1,736 manufacturing establish¬ ments with a total capital of $156,748,853 whose product was valued at $182,843,863, the value added by the processes of manufacture, the best measure of the importance of the industry, being estimated at $67,850,428, and paying $40,- 642,393 to an average number of 78,993 wage- earners, of whom 70.4 per cent were males over 16 years of age, 29 per cent were females over 16 years of age and 0.6 per cent were under 16 years of age. In 1914 and 1909 the State ranked 29th and 28th, respectively, in value of products ; 20th in average number of wage- earners and 28th and 27th, respectively, in value added by manufacture. The relative import¬ ance of the four largest of these industries ar¬ ranged according to the value of their products in 1914 was as follows: The three most im¬ portant branches of the textile industry — cot¬ ton goods, including cotton small wares, woolen and worsted goods, and hosiery and knit goods — rank first with a product valued at $55,115,- 067 or 30.1 per cent of the total value of manu¬ factured products for the State and gave em¬ ployment to 34,529 or 43.7 per cent of the total average number of wage-earners. The boot and shoe industry ranks second, with a prod¬ uct valued at $46,694,765 and shows an increase of 18.4 per cent in value of products during the five-year period 1909-14. The paper and wood- pulp industry ranks third with a product val¬ ued at $17,708,138. The substantial growth of

this industry since 1899, the value of its prod¬ uct showing an increase of 144.4 per cent, is ex¬ plained by the forests of pulp wood, large water power and increased demand for print paper. Lumber and timber products rank fourth with a product of $16,554,468. This is one of the oldest and most important manufac¬ turing industries and has by far the largest number of establishments of any industry in the State. The increase in value of its prod¬ uct from 1909 to 1914, 8.3 per cent, as com¬ pared with its increase from 1904 to 1909, 32.1 per cent, probably was due to the fact that much of the lumber formerly

used in it is now being made into pulp to supply the growing demand of the paper industry. Among other important industries are foundry and machine-shop prod¬ ucts, leather, tanned, curried and finished, flour¬ mill and grist-mill products, tobacco and cigars, marble and stone work.

The general conditions of wage-workers in the manufacturing establishments of the State are shown by the following facts : In 1914 there were only 6,130 or 7.8 per cent of the total average number of wage-earners for all these industries combined employed in estab¬ lishments where the prevailing hours of labor were 60 or more per week; and the. majority of the wage-earners for all these industries combined and for many of them separately were employed in establishments in which the hours of labor were between 54 and 60 per week. The hours of labor of females and minors under 18 years of age employed at man¬ ual or mechanical labor, except in specified do¬ mestic, nursing, telephone and telegraph or farming occupations, are limited by. an act of 1917 to 10J4 hours during any one day and to 54 hours in any one week, or if employed on night work to 8 hours in any 24 or not more than 48 hours in any one week. An Employ¬ ers' Liability and Workmen's Compensation Act, 1911, provides for the protection of wage¬ workers engaged in manual or mechanical labor in employments classified as dangerous and en¬ sures them or their heirs compensation for in¬ juries occasioned by illegal acts, omissions or negligence of their employers or fellow-work¬ men resulting in death or disability. A bureau of labor, established in 1893, was reorganized in 1911, and a commissioner of labor, its ex¬ ecutive officer, is charged with the duty of en¬ forcing all laws relating to labor in mechanical and mercantile establishments.

Mining and Quarrying. — Gold, silver, lead, zinc and iron are found, but none of them in sufficient quantity to make their working profit¬ able. The total value of all mines and quar¬ ries in New Hampshire in 1909 amounted to $1,308,597. Of this amount granite quarrying, the principal industry, reported products valued at $1,205,84 1, which represented 92.1 per cent of the total. The estimated value of all the products of mines and quarries in 1913 was $2,218,925, of which amount the principal quar¬ rying industry, granite, reported products val¬ ued at $1,482,771, and the principal clay indus¬ try, brick, products valued at $462,534. The granite is used mainly for building and curbing and for monumental work. The principal quarries in the order of their importance are located in Hillsboro, Merrimac, Cheshire and Carroll counties. Other industries of this

group of minor importance are copper, mica and scythe-stones.

Forest Reservation and Public Parks. —

In 1893 the State after extended investigation into its natural resources by temporary com¬ missions established a permanent forestry com¬ mission to promote the conservation of those resources, to inquire into the effects of differ¬ ent methods of lumbering upon the timber sup¬ ply, water power, climate and scenery, the damages due to forest fires and to establish wherever possible without expense to the State public parks. This commission, which from time to time has been granted additional pow¬ ers, was reconstituted in 1911 and now con¬ sists of three persons appointed by the gov¬ ernor and council for a term of three years. Through the agency of this commission which appoints a State forester, New Hampshire within the last 25 years has secured the general adoption by its large lumber operators of scientific methods of forestry, adequate protec¬ tion against the waste of forest fires and by the establishment of public parks and forest reservations, particularly at the sources of its rivers, the permanent conservation of its water power and its more equitable distribution. To this last and most important result private persons, municipalities and voluntary associa¬ tions, such as the Society for the Protection of New Hampshire Forests and the Appalachian Mountain Club, have contributed numerous pub¬ lic parks and smaller reservations. The large State reservation is located in the heart of the White Mountains and to the northeast of the famous Crawford Notch. The White Moun¬ tain National Forest Reservation established pursuant to the Weeks Act of Congress, 1 March 1911, for protecting the headwaters of navigable streams of the United States, al¬ ready includes large tracts in both the White Mountain and northern sections of the State, and by the provisions of that act is receiving frequent additions. The acreage included in these different forest reservations and public parks at the end of 1916 was as follows:

State forests and reservations . . . 9 , 800 acres

Forests owned by towns and cities . 5 , 329 “

Municipal parks and forests . ; . 420 “

Appalachian Mountain Club reservations. . . 721 “

Society for Protection of New Hampshire

forests (Reservations in New Hampshire). . 2,269 “

Conway Commons (partial State and town

ownership) . ...• • ˆ > 000 “

Acreage of Reservations in New Hampshire

outside of National Forest . 22,539 “

White Mountain National Forest . ; . 365,000 “

Total acreage of reservations and parks in

New Hampshire . 387,539 “

The addition of these large tracts to the public domain and their virtual dedication to the pub¬ lic use not only ensures a large conservation of the natural resources but also increases the State’s attractions for tourists which long ago made it a summer play-ground, and has given it the name of the ˆSwitzerland of America.® Transportation. — The State has a good system of communications by highways and railways. The greatest mileage of both is in the central and southern or most populous parts and all their main lines except those in the Connecticut Valley converge upon the com¬ mercial centre of New England — Boston. In 1918 the total mileage of the highways of the State was 14,020 miles and of its railroad lines

1,2ˆ1 miles. Until the beginning of the present century the highways of the State, except a tew trunk-line toll turnpikes built and operated by private companies before the introduction of 1 u-r?a i were built by the towns through \nich they ran and supported by taxation of tieir inhabitants. In 1905 the State began the systematic improvement of its main highways, \ co-°Peration and at the joint expense ot the State and of its municipalities, and ap¬ pointed a State engineer of highways now known as commissioner of highways. As a re¬ sult of this policy and the repeatedly enlarged appropriations which during the interval have been made to give it effect, the State, in April b *o, had six trunk-line highways, three of them running from the Massachusetts State line northward; the Merrimac Vailey Road, from Nashua to the line between Woodstock and Lincoln in the White Mountains ; the West Side Road, from Winchester on the Connecti¬ cut to Colebrook on the same river; the East Side Road, from Seabrook through Pinkham and Dixville Notches in the White Mountains to Colebrook. Three of these trunk lines run east and west across the State ; the South Side Road from Walpole on the Connecticut River to

Portsmouth on the East Side Road; the Rockingham Road from Manchester on the Merrimac Valley Road to Salem on the Massa¬ chusetts State line; and the Ossipee-Meredith Road from the Merrimac Valley Road at Meredith to the East Side Road near the village of West Ossipee. These six trunk lines have a total mileage of 630 miles and are practically completed, and they for the most part follow the pre-existing town highways. The legisla¬ ture in 1915 authorized the designation for future improvement of 10 additional east and west or cross-State highways. These as estab¬ lished have a total mileage of 451 miles, of which 150 miles already have been built. The legislature of 1917 authorized the designation of six more cross-State highways for improve¬ ment. The expense of this reconstruction, ex¬ tension and improvement of the highways of the State since 1905 has been met by taxation and the issue of State highway bonds. The State makes an annual appropriation of $125,000 for the Department of State Highways, and from 1914 to 1916 inclusive it also appropriated $150,000 per year for trunk line construction, a total appropriation for trunk line and State-aid construction of $275,000. The legislature of 1917 assented to the provisions of the Federal Aid Act for the construction of rural post roads passed by the 64th Congress, and has undertaken to expend for such purpose each year a sum equal to the amount of such Fed¬ eral aid as it shall receive.

The first railroad in the State to begin operation was the Nashua and Lowell Railroad which was chartered in 1835. Between 1840 when the total railroad mileage of the State was only 22ˆ4 miles and 1883 the State granted numerous charters to railroad companies under which many short lines were constructed and with little public aid, State or municipal. In 1883 when the railroad mileage had increased to 1,041 miles, the State, reversing its earlier policy which assumed that competition between its railroads was essential for the public wel¬ fare, authorized the incorporation of railroads under the general law, and also their combina¬

tion and consolidation within specified limits and subject to stringent regulation. As a re¬ sult of this legislation, which was supplemented m 1889 by an act limiting the rates to be charged by all consolidating railroads to those “force in August 1883, the decade between 1880 and 1890 was marked by the combination and consolidation of the railroads within the State which left two of them, the Boston and Maine in the southeastern part and the Con¬ cord and Montreal in the central and northern part, practically dividing between them its en¬ tire railroad mileage. These two railroads thus in 1890 controlled 958 miles in the State, other railroads having control of only 168 miles. During the decade — 1890-1900 — the Boston and Maine Railroad

Company secured a practical monopoly of the railroad mileage of the State, by acquiring control over the Maine Central system by stock ownership in 1891, by leasing the Concord and Montreal Railroad in 1895, and the Fitchburg Railroad in 1900 In 1907 the New York, New Haven and Hartford Company secured temporary control over the Boston and Maine Railroad system, but, as the result of a suit begun by the United States to enfoice the Sherman Anti-Trust Law, was compelled to relinquish it in 1914. In 1916 the Boston and Maine Railroad Companv was, upon petition to the United States Circuit Court, declared bankrupt and was being admin¬ istered by a receiver when its control and ad¬ ministration was assumed by the United States, pursuant to its war policy, on 28 Dec. 1917.' The total railroad mileage of the State in 1917 was 1,221 miles distributed as follows: Boston and Maine Railroad, 1,020; Maine Central Rail¬ road, 100; The Atlantic and Pacific (Grand Trunk), 52.

Railroad and Public Service Commissions.

— In 1911 the State substituted fqr its Rail¬ road Commission, which was established in 1844, a Public Service Commission, which con¬ sists of three members appointed by the gov¬ ernor and council for a term of six years This commission has large supervisory and reg¬ ulative powers, not only over railroads, but other public utilities, and is given adequate au¬ thority to enforce its orders to secure safe and adequate services and facilities and just and reasonable rates.

Government.— The constitution of the State which took effect on 2 June 1784 still is in force except so far as it has been modified by subsequent amendments. The only mode it ' prescribes for making amendments is through a constitutional convention, the qualified voters being called upon every seven years to vote upon the necessity of summoning a convention to revise the constitution. If summoned the delegates to it are chosen in the same manner and upon the same basis of representation of town, cities and wards and unincorporated places as are the members of the lower branch of the legislature. No proposal of such a con¬ vention for the alteration of the constitution becomes a part thereof until it shall have been approved by two-thirds of the qualified voters present and voting on the subject. Constitu¬ tional conventions have been held in 1791, 1850, 1876, 1889, 1902 and 1912, which have proposed numerous amendments to the organic law of the State, but those which have been adopted have wrought comparatively small change in

the general structure of the government or the agencies by which it is administered.

Legislature. — By this constitution legisla¬ tive power is vested in a senate and house of representatives which together are. styled the General Court, and assembles biennially on the first Wednesday of January in the odd years. The senate is composed of 24 members repre¬ senting districts <(as nearly equal as may be® and ((by the proportion of direct taxes paid by the said districts.® The house of representa¬ tives is composed of members apportioned ac¬ cording to the population in towns, cities, wards and unincorporated places, one for a minimum population of 600 and one for each additional 1,200. Towns of less than 600 are entitled to one representative for such proportional part of the time as their population bears to 600.. The retention of the town as the political unit for representation and the increase of population and subdivision of towns since 1784 have united to give New Hampshire the largest house of representatives of any State in the Union. That body in 1917 consisted of 404 members. The members of both houses of the legislature are elected biennially in the even years in the month of November.

Executive. — The executive power is vested in a governor who is elected biennially on the same day as members of the legislature and whose term of office begins on the first Wednesday of the following January. Orig¬ inally if no person received a majority of votes cast for governor the senate and house of rep¬ resentatives by joint ballot elected one of the two persons having the highest number of votes for that office. In 1913 the constitution was so amended that the governor may be elected by a plurality of votes. An Executive Council con¬ sisting of five persons, one from each of five districts into which the State is divided, is elected biennially on the same day as the governor by ballot to advise the governor and it shares with him the power of ap¬ pointing all judges, the attorney-general, cor¬ oners and all officers of the navy and the militia, the governor and council having a negative on each other both in making nominations and ap¬ pointments. They also share the power of pardoning offenses except cases of impeach¬ ment, the power of drawing money from the treasury, except for specified purposes, for the necessary support and defense of the State and the protection of its inhabitants, and the power of removing judges upon the address of both houses of the legislature. Other executive officers, a secretary of state, a treasurer, a com¬ missary-general and a State printer are elected biennially by ballot of the two houses of the legislature in joint session. In case of a

va¬ cancy in the office of governor, the president of the senate and the speaker of the house of representatives in succession exercise the pow¬ ers and duties of that officer.

Judiciary. — The courts of the State are a Supreme Court, consisting of a chief jus¬ tice and four associates, having jurisdiction over issues of law ; a Superior Court, consisting of a chief justice and four associates, having jurisdiction for the trial of issues of fact, the judges of this court attending the. trial terms in a circuit of the shire towns which includes the entire State; 10 Courts of Probate, organ¬ ized with a judge and register for each county;

municipal courts (one in each city and town having not less than 2,000 inhabitants), having limited and preliminary criminal jurisdiction and jurisdiction of civil causes in which not more than $100 is claimed and the title of real estate is not in issue; justices of the peace, having preliminary and limited criminal juris¬ diction in towns and places where no municipal court is established and jurisdiction in civil causes to the amount of $13.33, provided the title to real estate is not involved. The public service commission, the tax commission, and county commissioners also have preliminary and limited judicial functions. Admission to the bar requires three years of actual and certi¬ fied study, followed by examination, both oral and written, before a standing board of ex¬ aminers appointed by the Supreme Court. Cer¬ tificates of graduation from law schools are not accepted in lieu of actual qualification, ascer¬ tained in the manner above stated. The Fed¬ eral Circuit and District Courts are held at Concord, where the office of their clerk is lo¬ cated, at Portsmouth and at Littleton..

County Government. — For administrative and judicial purposes the State is divided into 10 counties with county-seats and population as

follows :

Pop.

County Seat

Counties

1910

Belknap .

, .. 21,309

Laconia .

Carroll .

, .. 16,316

Ossipee .

Cheshire . .

. .. 30,659

Keene .

Coos .

. .. 30, 753 1

Colebrook .

Lancaster .

Haverill .

Grafton .

. .. 41,652

Plymouth .

1 Lebanon .

Hillsborough .

. . . 126,072 \

I Manchester . . . . [Nashua .

Merrimac .

... 53,335

Concord .

Rockingham .

... 52 , 18g j

Exeter .

[Portsmouth . . . .

Strafford .

. .. 38,951

Dover .

Sullivan .

. .. 19,337

Newport .

Pop.

1910

10,183

1,354

10,068

1,095

3,054

3,498

2,200

5,718

70,063

26,005

21,497

4,897

11,269

13,247

3.765

A board of three commissioners elected bi¬ ennially by popular vote are the executive officers of each county. These officials also have certain judicial functions relative to the laying of highways, the settlement of paupers and issues of fact referred to them for trial by the Superior Court. The members, of the legislature for each county, assembled in con¬ vention, are a legislative body for the county. Upon recommendation of the county commis¬ sioners they vote taxes for countv purpose? and direct their expenditure. Other countv officers are judges of probate and medical referees (coroners), who are appointed by the governor and council, and registers of probate, solicitors, registrars of deeds, treasurers and sheriffs who are elected biennially by popular vote.

Municipal Government. — Each of the 11 cities of the State now is governed under charters of the ordinary American form by a mayor and subordinate administrative officers and a common council.

Town Government. — The State is divided into minor civil divisions, towns and 23 unin¬ corporated places. The towns, which, as in the other New England States, are the territorial and political units or cells from whose multi¬ plication and union the bodv politic was de¬ veloped, now number 224. They are the small¬ est administrative units of the State and have

State Capitol at Concord

1 Star Island, Isles of Shoals

2 Bethlehem, White Mountains

large powers for local government, including those of general police, building and mainte¬ nance of highways, inquiry into need of poor relief, which is administered by the county, and the support of public schools. These towns retain their original form of pure democracies and are governed through a town meeting held annually in the month of March which elects town officers and votes all taxes for town pur¬

poses. These officers are three selectmen, who have general management for the year of town affairs and who also act as assessors, a treas¬ urer, town clerk, constable, school trustees and some minor officers.

Suffrage and Elections.— The constitution now provides that every male inhabitant who has reached the age of 21 years and who has resided in one town six months is entitled to vote, provided he is able to read the constitu¬ tion in the English language and to write. An amendment to the constitution adopted in 1913 provides for the disfranchisement of all per¬ sons who shall have been convicted of treason, bribery or any wilful violation of the election laws. Voting at all elections is by ballot and is limited to duly qualified electors whose names are inscribed upon a certified check list. The total number of males 21 years of age and over in 1910 was 136,668, representing 31.7 per cent of the population. Of such males, 56.1 per cent were native whites of native parentage, 13 per cent native whites of foreign or mixed parentage, 30.7 per cent foreign-born whites and 0.1 per cent negroes. Of the 41,956 foreign- born white males of voting age, 16,415, or 39.1 per cent, were naturalized.

Caucuses, Primaries and Conventions. — The State recognizes political parties and regu¬ lates them by general laws which include (1) a law prescribing the mode of holding raucuses and conventions in the larger cities and towns to nominate candidates to be voted for at city, town and school district elections, and1 (2) a Direct Primary Law which provides a uniform mode of making nominations of candidates for all town or city, county, State and national officers to be voted for at the biennial election held in the month of November in the even years, except presidential electors; prescribes the enrolment of party members by the regular supervisors of the check list; the conduct of the primary by the regular town or city elec¬ tion officers, and a State party convention for each party, to be held shortly before each bi¬ ennial election, to adopt a party platform, nom¬ inate presidential electors and effect an organ¬ ization for the following two years; and (3) a law prohibiting corporations to contribute to political parties, committees or individuals for any political purpose ; and (4) a corrupt and illegal practices act which prohibits the payment, gift or promise of anything of value by any political committee or candidate to pro¬ mote or defeat the election of anv party or person, except for specified purposes, and which fixes the maximum expenditure allowable for each of them; and (5) a law requiring pub¬ licity of campaign receipts and expenditures by all political committees and all candidates for national offices and important State offices, with an itemized statement of their campaign expenditures. A Presidential Primary Law

was enacted in 1913, which prescribes the mode of holding primaries for electing delegates to VOL. 20—9

the national conventions of political parties in each year thereafter when a President and a Vice-President of the United States are to be elected.

National Guard. — By the census of 1910 the total number of males of militia age, 18 to 45 inclusive, in New Hampshire was 90,357. The National Guard on 31 Aug. 1916 was com¬ posed of one regiment of infantrv of 12 com¬ panies, a coast artillery corps of four com¬ panies, a troop of cavalry, a battery of field artillery and a signal corps, a field hospital corps or detachment, with a total force of 97 officers and 1,609 enlisted men. The legis¬ lature by an Act Concerning the Militia, approved 5 April 1917, recognized its whole military establishment to conform to the provi¬ sions of the National Defense Act passed by Congress 3 June 1916. By this concurrent legislation the State militia now is divided into the unorganized militia, whose members are arranged according to age and marital condi¬ tion in four classes, with consequent liability to draft, and the National Guard, which while it shall receive the aid and support of the United States under the National Defense Act is governed by the laws, rules and regulations of the United States in respect to the number of its enlisted men and officers, its organiza¬ tion, uniforming, equipping, training, disci¬ pline, the qualification, appointment, commis¬ sioning and promotion of its officers, and the period and qualifications for enlistment and discharge of its enlisted men. The total num¬ ber of officers and men in the National Guard of the State when under the provisions of the National Defense Act it was drafted on 25 July 1917 into the service of the United States was 2,766.

Finance. — The report of the treasurer of the State for the fiscal year ending 31 Aug. 1917 showed a total of receipts and cash on hand of $4,159,714.96; disbursements for the same year of .$4,017,324.13, leaving cash on hand of $142,390.83. The net indebtedness of the State, 1 Sept. 1917, was $1,431,002.73, which showed an increase of its debt during the pre¬ ceding fiscal year of $362,048.71. The largest part of this increase was due to the general conditions caused by the European War and was anticipated by the legislature which on 27 March passed an act, amended 19 April, # to assist the United States government during the war and to provide for the public safety, and authorized an increase of the debt of the State to an amount not exceeding $1,000,000. The total inventory valuation of the State for 1916 reported by its Tax Commission was $410,- 150,583 and the average rate per $100 was $1.73. The increase in valuation between

1910 and 1916 was $166,771,312 and the decrease of the average rate per $100 was 32.

Taxation. — The State always has raised the largest part of its revenue by taxation of specific kinds of property, real and personal. It also has made use, and increasingly during the last quarter of the century, of license and other excise taxes, including special taxes on corporations, and. since 1905 has imposed a collateral inheritance tax. A tax commission known as a board of equalization was created in 1878, which, since its reorganization under its present name in 1911, consists of three members who are appointed by the Supreme

Court and commissioned by the governor for a term of six years. The duties of this com¬ mission include the formulation of inventories of all property subject to taxation, the assess¬ ment of railroad, telegraph, telephone, express and other specified corporate property, the gen¬ eral supervision over the administration of the assessment and taxation laws of the State and over all assessing officers, and every second year, beginning in 1912, the equalization of the valuation of the property in the several towns and cities in the State and in general the direc¬ tion of the enforcement of all the tax laws of the State and the recommendation of any changes in them which in their judgment may be desirable.

Banks. — The first bank in the State was the New Hampshire Bank which was chartered 3 Jan. 1792 and located at Portsmouth. In 1820 the number of banks was five, in 1840, 28 and in 1860, 51. During the next decade all but three of these State banks took advantage of the provisions of the National Banking Act of 1862 and became national banks. The condi¬ tion of all the reporting banks in New Hamp¬ shire, numbering 125, of which 55 were na¬ tional banks, on 20 June 1917 as appears by the report of the Comptroller of the Currency for 1917, was as follows: total resources, $187,- 027,000; loans and discounts, $90,231,000; in¬ vestments, $82,044,000; a total capital, $7,095,- 000; individual deposits, $153,801,000; United States deposits, $398,000; postal sayings de¬ posits, $521,000; a national bank circulation,

$4,822,000.

Savings Banks. — The first savings bank in the State was the

Portsmouth Savings Bank which was chartered 26 June 1823. In 1850 the number of such banks had increased to 12 when there were 13,000 open accounts averag¬ ing $125 for each depositor. In 1893 their number was 70, and there were 174,000 open accounts averaging $425 to each depositor. The total number of savings institutions in the State on 30 June 1917 was 67. According to the report of the State bank commission for 1917, the total amount of savings deposits in the savings banks, 56 in number, and the say¬ ings departments of trust companies, 11 in number, on that date was $124,160,974.19, an increase for the year of $7,154,377.78. This in¬ crease exceeded that of the previous year by nearly $1,000,000 and was the largest annual increase in 27 years, or since 1890. The gain during the year (September 1916-September 1917) was nearly equal to the total deposits of the 29 savings banks of the State at the close of the Civil War. The whole number .of depositors, 30 June 1917, was 256,676. an in¬ crease of 10,331 over the previous year; the average amount of each deposit was $483.73 and the average amount of deposits per capita for population of the State was $275.91.

Charities and Corrections. — The more im- ‘ portant agencies of the State established for the dependent and delinquent classes are: (1) The State Hospital for the Insane at Concord for paying patients, and since 1 Jan. 1909, for the care and support of all its insane paupers; (2) the School for Feeble-Minded at Laconia; (3) the Industrial School at Manchester; (4) the Sanitorium for Consumptives, opened in 1909 at Glencliff in the town of Benton in the White Mountains; (5) the State prison at Concord.

The management of these five institutions since 1907 has been vested in a board of trustees, con¬ sisting of the governor ex officio, and four other persons appointed by the governor and council for a term of four years, their superin¬ tendents being appointed by this board. A board of charities and corrections, created by the leg¬ islature in 1895, provides for the suitable educa¬ tion, training and support of orphans or friend¬ less or dependent or delinquent children, and since 1897 inspects all State and county chari¬ table or correctional institutions, including county almshouses. The minor children whose guardianship is the chief duty of this board are placed by it in the New Hampshire Home for Orphans at Franklin or in some of the other 18 like homes in the State, or in private fami¬ lies, and since 1907 this board has been aided in the discharge of its duties by a Juvenile Court. A Soldiers’ Home was established in 1890 at Tilton, for which the State makes an annual appropriation of $15,000 and toward whose sup¬ port the United States government pays $100 a year for each soldier in residence. This home is open for all dependent soldiers

honorably dis¬ charged, who have served in the army or navy of the United States in any of its wars.

Public Health. — A State board of health was established in 1881, which since 1889 also has served as a board of commissioners of lunacy and consists of the governor and attorney-gen¬ eral, ex officiis, a civil engineer and three phy¬ sicians. The active head of this board is its sec¬ retary, who is chosen by the board and is the registrar of vital statistics for the State. Its functions, enlarged from time to time, now in¬ clude the investigation in a State laboratory of hygiene of the causes of disease, and a variety of field work throughout the State, such as the inspection of foods, dairies, grocery stores, slaughter-houses and the supervision of the ad¬ ministration and enforcement of health laws by local officials.

Education. — Public education in New Hampshire probably began in 1647, when the Massachusetts Bay Colony, which had assumed jurisdiction over the four settlements then ex¬ isting in New Hampshire, ordained that every township should provide for its support. This law, re-enacted by the province of New Hamp¬ shire after its union with the Bay Colony was dissolved, continued in force with few changes until 1789, when the State, repealing all pre¬ vious legislation on the subject, substituted for it a law which required the selectmen of each town to assess annually their inhabitants at a specified rate for the sole purpose of keeping an English grammar school or schools for teaching reading, writing and arithmetic, and required the appointment of duly qualified teachers. The present school system has been built upon the basis of this statute. In 1791 and at frequent intervals since then the State provided for in¬ crease of the rate of taxation for school pur¬ poses; in 1840 for the establishment of graded schools, in 1848 for the opening of high schools, the law now requiring all towns not maintaining such schools to pay the tuition, though with State aid, of their pupils qualified to enter them in high schools or academies in neighboring towns; in 1848 for the establishment of teach¬ ers' institutes; since 1868 for the establishment of the office of superintendent of public instruc¬ tion whose incumbent has general visitorial, ex-

amining and supervising powers over all public schools; in 1870 for the establishment of a nor¬ mal school at Plymouth and in 1909 of another such school at Keene, and by numerous other acts for the

extension and improvement of pub¬ lic education. The present school law now makes the attendance of all children between the ages of eight and 14 compulsory, prescribes standard courses of eight or nine years in ele¬ mentary schools and four years in high schools, including studies which will enable their pupils to meet the standard entrance requirements for college, and provides free tuition, textbooks and school supplies for all pupils in both ele¬ mentary and high schools. From 1647 to 1805 the territorial unit for government and taxation for school purposes was the township; in 1805 when the dispersion of population throughout the towns had become general this unit was changed to a subdivision of the township known as the district, each town determining the num¬ ber of its districts. In 1885 the growth of the factory system and the trend of population to villages and cities led the State to re-establish its original town system for the administration and support of public schools. The amount raised by town taxation for public schools is supple¬ mented by the proceeds of a literary fund es¬ tablished in 1823 and derived from non-resident and savings bank taxes. This fund enabled the State to distribute to the towns in 1916 the sum of $43,277.65, or 65 cents per scholar. In 191 5— 16 the total amount expended for public instruc¬ tion, as reported by the Commissioner of Edu¬ cation of the United States, was $2,148,985, the number of pupils enrolled in the public schools was 67,461, or 15.25 per cent of the total esti¬ mated population in that year, which was 442,- 506, and 68.7 per cent of the estimated school population, which was 98,192 between- 5 and 18 years of age, and the number of teachers employed was 3,083, of whom 269, or 8.7 per cent, were males and 2,814, or 91.3, females, the average monthly salary of the males being $116.39 and of the females $51.05, or an average of $56.74.

In 1910 there were 16,386 illiterates in the State, representing 4.6 per cent of the total population 10 years and over, as compared with 6.2 per cent in 1900. The percentage of illiter¬ acy was 14.5 among foreign-born whites and 1.1 among native whites. For persons from 10 to 20 years of age, inclusive, whose literacy de¬ pends largely upon present school facilities and school attendance, the percentage of illiteracy was only 1.8. The State has many private sec¬ ondary schools, academies and institutes. Two of these are among the most famous in the country, Phillips Academy at Exeter, established in 1783, and Saint Paul's School at Concord, founded in 1855. There are three higher insti¬ tutions of learning. The oldest, Dartmouth College, located at Hanover on the Connecticut River, is the seventh oldest college in the coun¬ try and was chartered in 1769 for <(the educa¬ tion of Indian and other youth,® but soon ceased to have Indian

pupils except at rare intervals. In 1819, when it still was a wsmall college,® the United States Supreme Court in the celebrated case, Dartmouth College v. Woodward, 4 Wheat. 518, which involved the power of New Hamp¬ shire to change the college charter without the consent of its trustees, rendered judgment for the college and by its effects refounded it and

also confirmed the rights and priv..eges of all private corporations in the United States. (See Dartmouth College Case). Its subsequent growth, especially during the last quarter of a century, its enlarged endowment and multiply¬ ing educational facilities have united to make it one of the largest colleges in the country. The New Hampshire College of Agriculture and the Mechanic Arts was established in 1866, pursu¬ ant to the provisions of the Morrill Land-Grant Act of Congress of 1862, and since 1891 has been located at Durham near Portsmouth. It is the highest educational institution under the direct control of the State and is coeducational. It is supported by annual appropriations by the State, the proceeds of grants under different acts of Congress from the United States and the income from its endowment by a citizen of Durham, which in 1917 amounted to nearly $800,000. Anselm College established in 1895 at Manches¬ ter is a Catholic institution.

Libraries. — New Hampshire has been a pioneer in and sturdy supporter of the library movement. Perhaps the earliest mention we have of it is in connection with a lottery in Portsmouth in the year 1750 in aid of an asso¬ ciation library. From 1792 to 1883, 220 li¬ braries received special charters from the legis¬ lature. These were mostly private library cor¬ porations which have now given place to, or became merged in, the public library. The first free public library in the United States was es¬ tablished in Peterborough in 1833. The State was in 1849 the first to pass a law authorizing towns to aid in establishing and maintaining public libraries. This was followed logically by the second and third steps in the progress, namely, by the law of 1891 granting State aid to town libraries, and by the compulsory law of 1895, requiring every town to appropriate a certain proportion of its taxes for the support of a public library. In 1916 there were free public libraries in all except 12 of the towns of the State. The first legislative incorpora¬ tion of a State library association was by New Hampshire in 1889. The number of books contained in the public libraries and accessible to the public, exclusive of reports and pamphlets, is 900,000. The State Library now occupies a separate establishment and in 1916 had a collection of 155,226 bound volumes.

Religion. — The principal Protestant de¬ nominations are the

Congregationalists who aggregate approximately 20 per cent, the Bap¬ tists 17 per cent and the Methodists 12 per cent of all church members. The Roman Catho¬ lic population now is estimated to number ap¬ proximately 130,000, or 30 per cent of the entire population of the State.

History. — Three of the four original towns, Portsmouth, Dover, Exeter and Hampton, oc¬ cupied the interesting position of independent democracies between 1622, the year when Thom¬ son's indenture was drawn and the first settle¬ ment definitely planned, and 1643, when they had all become, by their own choice or the necessities of their situation, constituent parts of the Massachusetts Bay Colony. This was the first union with Massachusetts Bay, and was conditional on certain important privileges and guarantees accorded to these towns by the Massachusetts General Court. The history of the period of this union is in a large measure identical with that of Massachusetts Bay. In

1679 the Masonian heirs succeeded in procuring from the home government orders for the establishment of a separate province for these four frontier towns and other lands in New Hampshire. John Cutt, a merchant of Ports¬ mouth, was the first president, as the chief magistrate was then styled. The four towns were made a part of the dominion of New England in 1686. This government under Dudley and Andros survived only three years. From the spring of 1689 to the latter part of the winter of 1689-90 the New Hampshire towns governed themselves in the independent demo¬ cratic fashion of the first period of their his¬ tory. A second union with Massachusetts Bay was then effected and continued for two years. In 1692 the province government by royal com¬ mission was re-established and subsequently administered by appointees of the Crown until 1775. With the governor was associated a lieutenant-governor and a council appointed by the king. The legislative function was vested in a general assembly constituted of the gov¬ ernor, the council and the deputies, elected by freeholders. The right of veto was committed to the governor and the right of confirmation and disallowance of laws remained with the Crown. From 1699, when the Earl of Bellomont assumed the office of governor, to the termina¬ tion of Belcher's administration 1741, the prov¬ ince and Massachusetts had the same governor. The provincial assembly was continued until the departure of Gov. John Wentworth in 1775. A succession of conventions

beginning with that of 21 July 1774 finally resulted in the formal organization of a legislative body with a full representation of the people in view of the apparent necessity of establishing a new State government. The people of New Hamp¬ shire entered upon the active stages of . a national movement for independence with deliberation and unanimity. Perhaps no other colony was so free from the so-called Loyal¬ ist element as was New Hampshire. The “Association Test® put every man on record, either for or against the common cause. The original files are preserved, and the names of those who dissented or refused to take an un¬ equivocal position constitute a surprisingly short list.

The civil government of New Hampshire from the time of the departure of Governor Wentworth to the organization of a new form of government, 2 June 1784, under the con¬ stitution adopted in 1783, was purely legisla¬ tive. The constitution of 1776, the first adopted by any of the 13 States, by its own independent action, was a brief instru¬ ment and evidently intended to be temporary, or, as it was officially stated at the time, “to continue during the present, unhappy and un¬ natural contest with Great Britain.® It was adopted and promulgated on 5 Jan. 1776, by the fifth convention, chosen in. the latter part of 1775, and it was never submitted for acceptance or rejection to, or formally ratified by, the peo¬ ple. During the period of the Revolution the administrators of the New Hampshire govern¬ ment were embarrassed by a serious defection in the western part of the State, and particularly in Grafton County. Many of the leading men of the Connecticut River towns were from Connecticut, and their ideas of government were

naturally in accordance with their education and experience in the commonwealth from which they had emigrated. The form of government temporarily adopted by the Fifth Provincial Congress was not acceptable to the majority of the inhabitants of these towns. The group of towns which include Gunthwait (now Lis¬ bon) on the north and Lebanon on the south in Grafton County organized themselves into associations for purposes of civil and military government, and formally declined to recognize the new State government of New Hampshire. The contention of the “New Connecticut® party, so called, was, that upon the dissolution of political relations between the colonies and the mother country, and more especially in respect to the territory in controversy between New York and New Hampshire, the towns being the political units and the original source of political authority were invested with the right to determine for themselves the question whether to accord allegiance to one or the other of the disputing States, or to erect them¬ selves into an independent State.

They urged that inasmuch as the constitution of 1776 had never been submitted to the people, or to the towns for ratification, and had been accepted by a part of the towns only, it was operative only upon such as had elected to ratify its pro¬ visions. Their argument was presented with great skill and effectiveness, and although the movement ultimately failed to accomplish its purpose, its sponsors succeeded in making them¬ selves felt as a political force to be reckoned with ‘by three established States and the Con¬ tinental Congress as well as the prospective commonwealth of Vermont. In 1783 a new State constitution, modeled closely upon the Massachusetts constitution of 1780, was adopted. This first permanent constitution of New Hampshire which took effect 2 June 1784, ex¬ cept as modified by amendments proposed by the subsequent conventions of 1791-92, 1850, 1876, 1889, 1902 and 1912, still remains in force. In this critical period of American history (1783-89) when the Federal convention of 1787 framed and submitted to the 13 States for adoption the present constitution of the United States, it became the organic law of the new nation on its ratification by New Hampshire, the ninth State, on 21 June 1788. John Lang- don of New Hampshire was chosen president pro tempore of the first session of the United States Senate under the new Constitution, and to him fell the honor of informing Washing¬ ton of his election to the presidency. In the next decade soon after the Federalist party arose it secured political control in this State, but gave place to the Anti-Federalists, then known as Republicans — the Jefferson party of that day — from 1805 to 1813, except in 1809-10, when Jeremiah Smith, Federalist, broke in upon the succession as governor. Ip 1813, 1814 and 1815 the Federalists were again in control of the State. In 1816 they met with irretrievable defeat, and thereafter the Jeffersonian Republi¬ cans, who later were styled the Democratic party, remained in power, excepting in the brief period of a temporary reverse in 1846, until permanently overthrown in 1855 by the. Ameri¬ can party, more commonly called the “Know-nothings.® The first quarter of the 18th cen¬ tury was marked by ecclesiastical agitation. The

people of New Hampshire had become by the end of the colonial period almost entirely Con- gregationalists, and that denomination main¬ tained its ascendency as practically a state church during the following generation, the town ministers being called by the local church, approved in town meeting and sup¬ ported by public taxation. Universalists, Baptists, Methodists and Free Thinkers now

had become potent enough to assert themselves effectively in politics, and the contest against the state church reached its culmination in the so-called toleration act of 1819. Hosea Ballou, a New Hampshire minister, was the founder of Universalism in its modern form, and Benjamin Randall, another minister of this State, was the founder of the Free Baptist de¬ nomination. The latest addition to religious denominations by a resident and native of this State is that of Christian Science, the founder and chief exponent of which was Mary Baker Eddy. In 1819 the Supreme Court of the United States rendered its judg¬ ment in the historic Dartmouth College case (4 Wheaton, 518) which has been de¬ scribed as one ((in its effects more far-reaching and of more general interest than perhaps any other- judicial decision ever made in this country. M Through this futile at¬ tempt by the State to amend the charter of Dartmouth College for the purpose of reorgan¬ izing the government of that institution, an inviolability of charters of private corporations never before enjoyed was secured. Incidentally the case served to make prominent and to bring into view of the whole country the fact that in Daniel Webster, Jeremiah Mason, Jeremiah Smith, Ichabod Bartlett, and their compeers, there was at the bar of New Hamp¬ shire, and on the bench of her highest court, a group of jurists whose law learning and forensic ability could not be surpassed at that day in the whole country. In 1826 occurred the anti-Masonic uprising, which soon affected poli¬ tics, and for a time commanded serious atten¬ tion. The second quarter of the 19th century was remarkable for the number of men of New Flampshire birth and residence who held com¬ manding positions in shaping the destiny of the republic. The names of Webster, Cass, Wood¬ bury, Pierce, Kendall, Chase, Hale, Atherton, Clifford, Tuck and Greeley constitute a conspic¬ uous part of a long list that might be enumer¬ ated. The years between 1846 and 1861 were marked by the development of a strong reform sentiment, especially on the subjects of tem¬ perance and slavery. In the case of the former, the reform movement resulted in the prohibi¬ tory law of 1855, which became the accepted principle of liquor legislation until at length a reactionary sentiment expressed itself in the License Act of 1903. After 15 years experience under this act with its local option provision, the State again reversed its policy and enacted a ˆbone-dry® prohibition .law which took effect 1 May 1918. In the case of the latter the anti¬ slavery movement found many earnest and de¬ voted adherents, intense and uncompromising in their propaganda. The Freesoil vote had already appeared in 1841, and continued to be of more or less importance until 1856. Since 1856 when the Republican party secured con¬ trol of the State, with the exception of a signi-

Chief Executives.

John Cutt .

Richard Waldron .

Edward Cranfield .

Walter Barefoote .

Joseph Dudley .

Edmond Andros .

Simon Bradstreet .

John Usher .

William Partridge .

Samuel Allen .

Richard Coote, Earl

Bellomont . . . .

William Partridge .

Joseph Dudley .

Samuel Shute .

John Wentworth .

William Burnett .

Jonathan Belcher .

Benning Wentworth. . .

John Wentworth .

Matthew Thornton. . . .

Meshech Weare .

John Langdon .

John Sullivan .

John Langdon .

John Sullivan .

Josiah Bartlett .

Title Term

. . President . 1680-81

. . Deputy-President…. 1681-82

. . Lieutenant-Governor 1682-85

. . Deputy-Governor. . . . 1685-86

. . President-Governor.. 1686-87

. . Governor . 1687-89

. . Governor . 1689-92

. . Lieutenant-Governor 1692-97

. . Lieutenant-Governor 1697-98

. . Governor . 1698-99

of

. . Governor . 1699—1701

. . Lieutenant-Governor 1701-02

. . President-Governor.. 1702-16

. . Governor . 1716-23

. . Lieutenant-Governor 1723-28

. . Governor . 1728-30

. . Governor . 1730-41

. . Governor . 1741-67

. . Governor . 1767-75

. . President . 1775-76

. . President . 1776-85

. . President . 1785-86

. . President-Governor … 17 86—88

. . President-Governor… 1788—89

. . President-Governor… 1789-90

. . President-Governor… 1790-94

STATE GOVERNORS

John T. Gilman .

John Langdon .

Jeremiah Smith .

John Langdon .

William Plumer .

John T. Gilman .

William Plumer .

Samuel Bell .

Levi Woodbury . .

David M. Morrill .

Benjamin Pierce .

John Bell .

Benjamin Pierce .

Matthew Harvey .

Joseph M. Harper, Acting

Governor .

Samuel Dinsmoor .

William Badger .

Isaac Hill .

John Page .

Henry Hubbard .

John H. Steele .

Anthony Colby .

Jared W. Williams .

Samuel Dinsmoor .

Noah Martin .

Nathaniel B. Baker .

Ralph Metcalf .

William Haile . . .

Ichabod Goodwin .

Nathaniel S. Berry .

Joseph S. Gilmore .

Frederick Smyth .

Walter Harriman .

Onslow Stearns .

James A. Weston .

Ezekiel A. Straw .

James A. Weston .

Person C. Cheney .

Benjamin F. Prescott ....

Natt Head .

Charles H. Bell .

Samuel W. Hale .

Moody Currier .

Charles H. Sawyer .

David H. Goodell .

Hiram A. Tuttle .

John B. Smith. .

Charles A. Busiel .

George A. Ramsdell .

Frank W. Rollins .

Chester B. Jordan .

Nahum J. Bachelder .

John McLane .

Charles M. Floyd .

Henry B. Quinby .

Robert P. Bass .

Samuel D. Felker .

Rolland H. Spaulding

Henry W. Keyes .

John H. Bartlett .

Albert O. Brown .

Federalist .

1794-1805

Democrat-Republican

1805-09

Federalist .

1809-10

Democrat-Republican

1810-12

Democrat-Republican

1812-13

Federalist .

1813-16

Democrat-Republican

1816-19

Democrat-Republican

1819-23

Democrat-Republican

1823-24

Democrat-P. epublican

1824-27

Democrat-Republican

1827-28

Democrat .

1828-29

Democrat-Republican

1829-30

Democrat .

1830-31

Democrat .

1831

Democrat .

1831-34

Democrat .

1834-36

Democrat .

1836-39

Democrat .

1839-42

Democrat .

1842-44

Democrat .

1844-46

Democrat .

1846-47

Democrat .

1847-49

Democrat .

1849-52

Democrat .

1852-54

Democrat .

1854-55

American .

1855-57

Democrat .

1857-59

Republican .

1859-61

Republican .

1861-63

Republican .

1863-65

Republican .

1865-67

Republican .

1867-69

Republican .

1869-71

Democrat .

1871-72

Republican .

1872-74

Democrat .

1874-75

Republican .

1875-77

Republican .

1877-79

Republican .

1879-81

Republican .

1881-83

Republican .

1883-85

Republican .

1885-87

Republican .

1887-89

Republican .

1889-91

Republican .

1891-93

Republican .

1893-95

Republican .

1895-97

Republican .

1897-99

Republican .

1899-1901

Republican .

1901-03

Republican .

1903-05

Republican .

1905-07

Republican .

1907-09

Republican .

1909-11

Republican .

1911-13

Democrat .

1913-15

Republican .

1915-17

Republican . :

1917-19

Republican .

1919-21

Republican .

1921-

ficant and, with many of its participants, per¬ manent revolt from it in 1872, and numerous transfers of party allegiance during the Free-

silver agitation in 1896, party alignments have been quite strictly maintained. Since 1856, the Republican party has had control of every department of the State government and carried every State election except in the years 1871, 1874 and 1912. In 1916 the Democratic party though failing to secure control of any department of the State government carried the State for its nominees for President and Vice-President, Wilson and Marshall, by a plurality of 56.

Bibliography. — Belknap, (History of New Hampshire, 1623-1790) ; Sanborn, E. D., his¬ tory of New Hampshire, 1623-1830) (Man¬ chester 1875) ; Sanborn, F. B., (New Hamp- shire} (Commonwealth Series, Boston 1904) ; (New Hampshire State Library Annual Report) (with bibliography, Concord 1891) ; Provincial and State papers and various local histories and official reports. Colby, J. F., (Manual of Constitution of New Hampshire> (Concord

1912).

James Fairbanks Colby, Editor of Manual of Constitution of New Hampshire.

NEW HAMPSHIRE COLLEGE, opened in 1867, at Durham, N. H. The courses offered include the regular four years' courses in agri¬ culture, mechanical and electrical engineering, technical chemistry and general science, for completion of which the degree of B.S. is con¬ ferred; a two years' course in agriculture, and 10 weeks' winter course in agriculture and dairying. There is also a preparatory depart¬ ment, a department of education, and the State experiment station is connected with the college. Women are admitted to all courses but form a small proportion of the student body. The income of the college is derived from the Fed¬ eral land grant of 1862 and from Federal and State appropriations; in 1917 the students num¬ bered 653 and the faculty 63. The library con¬ tains 32,000 volumes.

NEW HANOVER, an island of the Bis¬ marck Archipelago (q.v.), about 40 miles long and 20 miles broad, northwest of New Ireland, or New Mecklenburg (q.v.), from which it is separated by Byron Strait.

NEW HARMONY, Ind., town, in Posey County, on the Wabash River, and on the Illi¬ nois Central Railroad, about 25 miles in direct line northwest of Evansville. The first settle¬ ment was made by a German community called Harmonists (q.v.), in 1815. In 1824 Robert Owen purchased the village and domain and the Harmonists returned to Pennsylvania. The next year Owen established a ˆPreliminary Society" and issued a general invitation to all <(the industrious and well disposed of all nations" to join the new community which was to be governed and conducted on new plans. All goods were to be held in common, but their use was regulated by age ; (

arose, three communities were formed of the original one, and soon after the "community idea" was abandoned. One of the leaders, Wil¬ liam Maclure, purchased part of the land and established an industrial school which also was a failure. Thomas Say was a member of the community and here was issued in 1830 Iris work on conchology. The geologist, David D. Owen, also resided here. The free library of the Workingmen's Institute, established in 1838, is in a most flourishing condition and contains about 16,000 volumes. The town has some manufacturing establishments, chief of which are flour and lumber mills and brick works; The electric-lighting plant is the property of the municipality. Pop. 1,126. Consult Lock- wood, G. B., (The New Harmony Communities) (New York 1905).

NEW HAVEN, Conn., city and county- seat of New Haven County, and the largest city in the State. It is popularly called "the City of Elms" from the magnificent elm trees planted there over 100 years ago. New Haven lies at the head of New Haven Bay, four miles distant from Long Island Sound. It is on the New York, New Haven and Hartford Railroad, 36 miles from Hartford and 74 miles from New York City.

Topography. — The city lies on a level sandy plain, bordered on the east and west by the West and Quinnipiac rivers. It has an area of 23 square miles. (

.Streets and Avenues. — Chapel street, the business promenade, extends in a northwesterly direction throughout the length of the city. The homes and dwelling-houses are generally surrounded by gardens, and many of them are almost hidden frorh view among trees. The number of magnificent elms with which the principal avenues are planted were mostly set out about the close of the 18th century by James Hillhouse, or through his influence and example. Early residents laid out the city with four streets running nearly north and south and four streets running east and west, thus dividing the city into nine squares each a quarter mile long, the central block being a

public square, and roadways were built at various angles, with (

Prominent Buildings. — Here is the seat of Yale University (q.v.), with its numerous halls, dormitories schools and special buildings which are celebrated in educational and historical an¬ nals. The Yale Campus, which lies directly west of “The Old Green,” is a rectangle con¬ taining two city blocks. A series of college buildings form an enclosed court about the

campus. Two of these buildings, Vanderbilt and Osborn Halls, are among the chief archi¬ tectural attractions of the city, though Woolsey Hall is the most beautiful of all the university buildings. The Sheffield Scientific School and the departments of law and medicine are a little removed from the campus. The Hopkins Gram¬ mar School, founded in 1660, is also located here. Other buildings and institutions are the Art School ; the Peabody Museum ; the State Normal School; the Hotel Taft; the Boardman Manual Training School; the Hillhouse High School; New Haven Hospital; Grace Hospital; Saint Francis Roman Catholic Orphan Asylum; The University Library (1,000,000 volumes) ; the Public Library, containing 117,000 volumes; New Haven Orphan Asylum and the Young Men’s Institute. Here are also the archives and libraries of the New Haven Colony Historical Society and the American Oriental Society.*

Churches and Schools. — New Haven has several churches, some of which were built as early as 1800. In the old burying ground in Grove street are the graves of Noah Webster, Theodore Winthrop, Eli Whitney, F. B. Morse, Timothy Dwight, Roger Sherman, Lyman Beecher and other celebrities. The churches are divided among the following denominations : Congregational, Methodist Episcopal, Protestant Episcopal, Roman Catholic, Baptist, Lutheran, Jewish, and Universalist, Unitarian and others. There are 55 public school buildings in the city, with a daily attendance of about 30,000. The school system is maintained at a cost of $850,000 annually.

Trade and Commerce. — New Haven up to the middle of the 19th century was an important shipbuilding centre, but this industry has grad¬ ually diminished. Shipbuilding interests were seriously crippled by the Embargo (q.v.) and the War of 1812. There is an excellent natural harbor here which has been improved and en¬ larged at State and Federal expense. New Haven has lines of steamships to New York

and is the commercial and distributing centre for a large section of the State. In manufac¬ turing New Haven ranks first among Con¬ necticut cities, and has many and varied indus¬ tries, including clocks, watches, hardware, fire¬ arms, ammunition, wagons, carriages, engines and boilers, automobiles, rubber goods, wearing apparel, iron foundries, machine shops, box fac¬ tories, wire work factories, canneries and pack¬ ing-houses. The headquarters and repair shops of the New York, New Haven and Hartford Railroad are also located here. According to the last census, New Haven industries represent a capital of $52,014,000 with an annual produc¬ tion valued at $51,071,000. Over 27,000 persons are employed in the 590 factories of the city and over $16,238,000 are annually paid in wages. The city has a dozen national banks, and numer¬ ous trust companies, State banks, savings banks and buildings and loan companies.

Government. — The city maintains munici¬ pal government under a special charter of 1897, which controls all municipal affairs, including the old school district of New Haven; but the 13th ward of New Haven, Westville, is inde¬ pendent of the city in the management of its schools. A mayor, elected every two years, is the city's chief executive, and he has the power to appoint a majority of the municipal adminis¬ trative officers. The city affairs are adminis¬

tered by a board of aldermen of 21 members, which appoints the assistant city clerk. The sheriff, city treasurer, collector of taxes, city clerk and comptroller are elected every two years by popular vote. The board of selectmen consists of seven members elected for the pur¬ pose of admitting electors to the voting privi¬ lege. The administration of the school district is in the hands of a board of education of nine members, appointed by the mayor. The fire and police departments of the municipality are man¬ aged by boards of commissioners, the latter bi-partisan. The central clearing house is the board of finance, which fixes the rate of taxa¬ tion and makes the appropriations.

Municipal Finances. — The assessed valua¬ tion of real and personal property is about $148,500,000, including exemptions. The pro¬ vided debt of the city amounts to $4,120,648. The city expends each year for maintenance and general expenses $2,300,000; of which the lar¬ gest item is $1,046,000 for schools; police de¬ partment, $256,453; fire department, $275,000; street cleaning and public works, $383,500; light¬ ing, $88,000; charity, $133,000.

History. — New Haven was settled in 1638 by a company of Puritans chiefly from London under Theophilus Eaton, their first governor, and

the Rev. John Davenport. It was a distinct colony until 1660, when after a protracted strug¬ gle it was united with Connecticut under the charter of 1662. It was incorporated as a city in 1784. In its earliest days New Haven was called Quinnipiac by the Indians. It was also called Roodenberg by some of the early col¬ onists. The Indian chief Momacguin sold a large tract of land here to the London company, receiving in return an assortment of coats, hatchets, spoons and knives. Treaties were signed by both parties, the Indians agreeing not to ((terrify, disturb or injureˆ the settlers, who in turn promised to protect the Indians, and allow them to hunt in portions of the ceded territory. Another tract 10 miles wide by 12 miles long was purchased six months later, and in June 1639 a fundamental and written consti¬ tution was adopted by the settlers. The privi¬ lege of voting and holding office was strictly limited to church members. In both civil and church affairs the Bible was the only recognized law.

Theophilus Eaton, the first governor of the New Haven Colony, was re-elected and retained the office until his death in 1658. The city of New Haven was incorporated in 1784 and Roger Sherman was its first mayor. He was mayor and United States senator when he died. The boundary of the Connecticut Independent Colony under its charter of 1662 embraced the towns of Milford, Stamford, Guilford and Branford known as the (

iae

and the first railroad entered the town in

1839.

Population. — In 1S00 New Haven had a population of 4,049; (1850) 20,345; (1870) 50,-

840; (1880) 62,882; (1890) 81,208; (1900)

108,027; (1910) 133,605; (1920) 162,519, includ¬ ing about 93,000 of foreign birth or parentage.

Bibliography. — Atwater, E. E., (History of the City of New Haven) (1887) ; Barber, his¬ tory and Antiquities of New Haven) (1870) ; Bartlett, historical Sketches of New Haven) (1897); Lambert, history of the Colony of New HaveiP (1838) ; Levermore, (Republic of New Haven > (1886); and ‘Papers of the New Haven Colony Historical Society) (1865-1902); New Haven Year Books and reports of its

Chamber of Commerce.

NEW HAVEN COLONY. See New

Haven, Conn.

NEW HEBRIDES, heb'ri-dez, a group of islands in the south Pacific, east of Australia, extending from lat. 13° to 20° S., and from long. 165° to 170° E. ; area, about 4,900 square miles. The largest ones are Mallicolo and Espiritu Santo (q.v.). Tanna has an active volcano; and in consequence probably of vol¬ canic action, Aurora, one of the most fertile, sank out of sight in 1871. Some of the group are of coral formation. They are all wooded and hilly, ebony and sandalwood being ob¬ tained; their chief products are maize, millet, yams, bananas, cocoanuts and sweet potatoes. The chief animal is a small pig, not larger when full-grown than a rabbit. The native in¬ habitants, belonging to the Papuan race, are in general degraded and very ferocious, except on Aneityum and others in the south of the group, on which cannibalism and headhunting were rampant until the advent of Presbyterian mis¬ sionaries in 1848, who achieved so marvelous a success as to excite the wonder and admira¬ tion of Protestant Christianity. There are also successful French Catholic missions on the is¬ lands. These islands, according to the Anglo-French convention of 1906, are under the joint control of a mixed commission of French and British officials. The population is decreasing; in 1916 it was about 70,000. They were dis¬ covered by the Portuguese in 1606, and named bv Captain Cook in 1774. Consult Elkington, (The Savage South Seas> (1907); Grimshaw, 'Fiji and its Possibilities5 (1907) ; and Paton's, 'Letters and Sketches from the New Hebrides. >

NEW HOPE CHURCH, Ga., the scene of an engagement during the Civil War between the forces of the Confederate Johnston and the Federals commanded by Sherman. The engage¬ ment was but one of the very many fought in Sherman's drive on Atlanta in the spring and summer of 1864. The engagement at New Hope Church took place 24 May 1864, and for a time the fighting was intense, the Confederates being protected by log barricades and having a good supply of well-posted artillery.

NEW IBERIA, i-be'rl-a, La., town, parish- seat of Iberia Parish, on the Bayou Teche, and on the Southern Pacific Railroad, about 100 miles in direct line west of New Orleans. A short railroad extends to Avery Island, where there is a valuable salt-mine. It is in a fertile agricultural section, in which the chief products are the pepper, from which

tabasco sauce is made, cotton, sugarcane, corn, rice, vegetables

and berries. It has considerable manufactures; some of the industrial establishments are ma¬ chine-shops, a knitting-mill, shipyards, foun¬ dries, wagons, brick works, soap factories, cot¬ tonseed-oil mills, factories for different lum¬ ber products and tabasco sauce factory. The town is in a section of the State mentioned by Longfellow in 'Evangeline' It has a govern¬ ment building, a city-hall and a large public market. Its educational institutions are the public and parish schools for white and colored children, a high school and a public high school library. The city, which has adopted the com¬ mission form of government, owns and operates the electric-light plant and the waterworks. Pop. (1900) 6,815; (1910) 7,499; (1920) 6,278.

NEW IRELAND. See New Mecklen¬ burg.

NEW JERSEY, the ((Garden State,® and one of the original 13, adopted the Federal Constitution by unanimous vote in conven¬ tion 18 Dec. 1787. The State is bounded on the north and east by New York and the Atlantic Ocean, on the south and west by Delaware and Pennsylvania. Of the 487 miles of total frontier, only 48 miles are defined by natural boundaries. Capital, Trenton. Area, 8,224 square miles, of which 710 square miles is water surface. The extreme length of the State is 166 miles, the narrowest portion being 33} 4 miles. Pop. (1900) 1,883,669; (1910) 2,537,167; (1915, State census) 2,8 44,342; (1920) 3,155,900.

Topography and Geology. — The topo¬ graphic features and geological structure of the State are intimately related and are explantory of the surface conditions. New Jersey is char¬ acterized as being on the Atlantic slope of the continent and is divided into four topographic zones: (1) Appalachian, including the Kitta- tinny Mountain and Valley. (2) Highlands. (3) Red sandstone or Triassic area. (4) Coastal plain.

The Appalachian zone includes the Kitta- tinny or Blue Mountain and the Kittatinny Val¬ ley, occupying the northwestern portion of the State. This range is level-topped, narrow, rough, rocky and heavily wooded. It extends across New Jersey from the New York State line, where it is known as the Shawangunk Mountain, to the Delaware River at the Dela¬ ware Water Gap. At High Point, near the northernmost point of the State, it is 1,804 feet high, which is the greatest elevation of the State. The Kittatinny Valley, 10 to 13 miles wide, is shut in by the Kittatinny Mountain on the northwest and by the Highlands on the southeast. It is characterized by high, rolling

hills and minor valleys, pleasing landscapes and beautiful farming country. This valley is continuous, on the northeast, with the valley of Orange County in New York, and to the southwest stretches away into the great Cum¬ berland Valley of the Atlantic slope of the continent.

The Highlands cross New Jersey in a gen¬ eral north-northeast and south-southwest direc¬ tion. The surface of this zone is hilly-moun¬ tainous, and is made up of several parallel ridges, separated by deep and generally narrow valleys. The latter are like the Kittatinny Valley — smooth — and are largely cleared and in farms. The mountain ranges are remarkably

NEW JERSEY. Estimated population, 3,080,371

COUNTIES

Pop. 1915

82,840 Atlantic . H 6

178,596 Bergen . C 8

74,737 Burlington . G6

163,221 Camden . G4

24,407 Cape May . J 5

59.481 Cumberland . 14

566,324 Essex . C7

43,587 Gloucester . H 4

5, 1,371 Hudson . D 8

4,697 Hunterdon . D 5

139,812 Mercer . E6

Incorporated Cities,

i 70 Absecon . 16

1 ! 21 Allendale . . B 8

203 Allenburst . F 9

642 Allentown . F 6

4

533 Alpine . C 9

479 Andover . C 5

1 4 007 Asbury Park . F 9

7 660 Atlantic City . 17

1 771 Atlantic Highlands E 9

3,009 Audubon . . G 4

323 Avalon . J 6

707 Avon by the Sea. F 9 77 Barnegat City .... H 8

492 Bayhead . F 8

69 S93 Bayonne . D 8

5,34 Beachhaven . H 8

2.453 Belmar . F8

1,823 Belvidere . C4

2,924 Bergenfield . C 8

2 450 Beverly . F 5

18,466 Bloomfield . . C 8

630 Bloomsbury . D 4

2,341 Bogota, Bergen ...C8

4,930 Boonton . C7

4,095 Bordentown . F 5

5,152 Boundbrook . D7

2,236 Bradley Beach .... F 9

620 Branch vllle . B 5

14,395 Bridgeton . -14

67 Brigantine . 17

8.928 Burlington . F 5

2,534 Butler . C7

3,409 Caldwell . C 7

106,233’ Camden . G4

2,513 Cape May . . . . J »

170 Cape May Point . . . J 4

4,137 Carlstadt . C 8

2,207 Chatham . U 7

,314 Chesilhurst . H »

1,729 Clayton . H4

4778 Cliff side . C 9

841 Clinton . D 5

I. 735 Closter . . . C 9

6,600 Collingswood . G4

922 Cresskill . C9

227 Deal Beach ..... .F 9

1,244 Delford, Bergen ...C8

588 Demarest . C9

8,971 Dover . C b

2,278 Dumont .

2,877 Dunellen . D7

356 East Millstone . . . . D 6 2,873 East Newark

Hudson . D 8

42,458 East Orange ..... C 8

4,576 East Rutherford

Bergen . G »

3,150 Edgewater. . . – - C»

2,181 Egg Harbor City . .H b

86.690 Elizabeth . D 8

1,143 Elmer . H 4

906 Emerson .

12,231 Englewood ..... . – C 9 532 Englewood Cliffs

Bergen . . • • -C 8

605 Englishtown . E7

538 Essex Fells . C 7

1,490 Fair Haven . E 8

4,016 Fairview . C 8

699 Fanwood . D 7

483 Fax mingdale . F 8

510 Fieldsboro . F6

2,635 Flemington . E 5

970 Florham Park . C 7

232 Folsom . .H 5

5,288 Fort Lee . C9

3,262 Franklin . B b

3,622 Freehold . F 8

983 French town . D4

14,429 Garfield . C 8

1,642 Garwood . D7

Gladstone . . . D 6

(Pop. included in Peapack.)

4,153 Glen Ridge . . C 7

1,689 Glen Rock, Bergen. C 8

II, 109 Gloucester City . -G4

6,322 Guttenberg . C 9

16,945 Hackensack ..... .C 9

2,976 Hackettstown . C 5

5,077 Haddonfield . G 5

2,297 Haddon Heights ..G4

2,890 Haledon . C 8

5,088 Hammonton . H6

843 Hampton . . . . D 5

551 Harrington Park

Bergen . C 8

Pop. 1915

144,716 Middlesex . E 7

107,636 Monmouth . F7

81,514 Morris . C 6

23,011 Ocean . G*

236,364 Passaic . B 7

30,292 Salem . . H 3

44,123 Somerset . D 6

25,977 Sussex . B 6

167,322 Union . D 7

44,314 Warren . C 5

Towns, and Villages

16.950 Harrison . D 8

47 Harvey Cedars. . .H 8 2.424 Hasbrouck Heights,

Bergen . C 8

733 Haworth, Bergen. .C 8

3,999 Hawthorne . C8

767 Helmetta . E 7

1,700 High Bridge . D 5

2,901 Highland Park

Middlesex . E 7

1,759 Highlands . E 9

2,592 Hightstown ..... .E 7

77,214 Hoboken . D 9

561 Hohokus . C 8

. Holly Beach . J 5

(Pop. included in Wildwood.)

234 Hopatcong, Sussex

B 6

1,341 Hopewell . E 6

16,039 Irvington. . . D 8

368 Island Heights . . . .G 8

1,865 Jamesburg . E 6

306,345 Jersey City . D 9

23,539 Kearney, Hudson. .C 8

997 Kenilworth . D 7

4,019 Keyport . E 8

4,600 Lambertville . E 5

791 LaTirel Springs. ...G5

174 Laval ette . G 8

2,132 Leonia . C9

1,150 Linden . D8

602 Linwood . 16

2,729 Little Ferry . C8

6,379 Lodi . £8

15,395 Long Branch . E 9

118 Longport . 17

5,628 Madison . C7

977 Magnolia . Go

1,817 Manasquan . F 8

50 Mantoloking . F 8

129 Margate City,

Atlantic . FL b

1,771 Matawan . E8

1,309 Maywood . C8

1.129 Mandham . C b

2,242 Merchantvllle . G 4

2,692 Metuchen . D 7

2.130 Midland Park . C 8

687 Milford . D 4

154 Millstone . E 6

1,902 MilltOWu . E 7

13,624 Millville . 1 5

652 Monmouth Beach

Monmouth . F 7

26,318 Montclair . C 8

728 Montvale . B 8

993 Moonachie, Bergen C 8 13,284 Morristown ..... .C 6

421 Mountainside. .... D 7

397 Mt. Arlington . C6

529 National Park .... G 4 614 Neptune City, At¬ lantic . H 6

1,680 Netcong. v. . C 5

408,894 Newark . D 7

25.512 New Brunswick … E 7 1,132 New Providence . .D 7

4.433 Newton . B 6

1,079 North Arlington

Bergen . C 8

664 North Caldwell

Essex . C 7

866 Northfield, Atlantic

H 6

834 North Haledon,

PoceiiiP r > i

6 037 North Plainfield . D 7

1,088 North Wildwood

Cape May . J-5

680 Norwood . C 9

7,987 Nutley, Essex . C7

628 Oakland . B 8

793 Oaklyn . G4

3,721 Ocean City . 16

600 Ogdensburg . B 6

323 Old Tappan .

Bergen . C 8

33,080 Orange . C 7

2,264 Palisades Park _ C 9

1,643 Park Ridge . B 8

71,744 Passaic . C8

138,443 Paterson . C8

1 ,346 Peapack . D 6

2,876 Paulsboro . G3

793 Pemberton . G 6

4,412 Penn Grove . H 3

944 Pennington . E 6

Pop.

41,185 Perth Amboy . D 8

15,605 Phillipsburg . D 4

2,577 Pitman . H 4

23,805 Plainfield . D 7

4,390 Pleasantville . I 6

1 ,204 Point Pleasant

Beach . ,.F9

1,400 Pompton Lakes. . .B 7 405 Port Republic . . . .H 7

5,678 Princeton . E 6

3,853 Prospect Park

Passaic . B 7

10,219 Rahway . D 7

1,973 Ramsey . B 8

4,028 Raritan . D 6

8,631 Red Bank . E8

1,187 Ridgefield . C9

5,416 Ridgewood . C8

949 Riverside . F 4

2,141 Riverton . F 4

2,224 Rockaway . C7

470 Rocky Hill . E 6

8,049 Roosevelt,

Middlesex . E 7

593 Roseland, Essex . .C 7 3,823 Roselle . .’ . ,D 8

4.327 Roselle Park, Union

D 7

1,583 Rumson . E 9

8,347 Rutherford . C8

555 Saddle River . B 8

6,953 Salem . H 3

1.327 Sea Bright . E 9

955 Sea Isle City . J 6

252 Seaside Heights,

Ocean . G 8

275 Seaside Park . G 8

4,906 Secausus . C8

604 Somers Point . I 6

6,038 Somerville . D 6

7,482 South Amboy . . . .E 8 1,108 South Boundbrook D 7 19 South Cape May,

Cape May . J 5

5,866 South Orange .... D 8

6,691 South River . E 7

683 Spottswood . E 7

1,393 Spring Lake

Beach . F 9

P.

1,028

Stanhope .

,C 6

613

Stockton .

.E 5

459

Stoneharbor ....

...16

9,136

Summit .

.D 7

Surf .

. H 8

1,251

Sussex .

..Bo

1,738

Swedesboro .

.11 3

2,999

Tenafly .

. .C 9

1,493

Totowa, Passaic.

. . I! 7

11,593 Trenton .

. . F 5

1 312

Tuckerton .

.H 7

24,776 Union, Hudson. . . .C 8 (P.O.Weehawken) 364 Upper Saddle River,

Bergen . C 8

491 Ventnor, Atlantic. H 6

2,643 Verona . . .C 7

6,531 Vineland . 15

4,071 Walllngton, Bergen

C 8

3,250 Washington . C 4

821 Wenonah . G 4

690 West Caldwell

Essex . C 7

1,068 West Cape May . . .J 5

8,147 Westfield . D7

43,139 West Hoboken. . .C 9 1,065 West Long Branch F 8 18.773 West New York,

Hudson . D 8

13,550 West Orange . C 7

1,535 West Paterson. . . .C 8

2,036 Westville . G 4

2,217 Westwood . C 8

2,591 Wharton . C 6

3,858 Wildwood ..... .J 5

317 Wildwood Crest. . .J 5

1,869 Woodbine . J 5

5,288 Woodbury . G 4

339 Woodbury Heights G 4 470 Woodcllfl, Hudson D 8 878 Woodlynne,

Camden . G 4

1,500 Woodridge,

Bergen . C 8

uniform in height. This division may be con¬ sidered as a seaward-sloping table-land, whose northwest side has an elevation of 1,000 to 1,500 feet above the ocean and its southeastern side 600 to 900 feet above the sea. In the northern part .there are several lakes elevated amid the mountains — Hopatcong, Greenwood, Macopin, Splitrock, Green; Wawayanada and Budd's being the more important of these natural upland sheets of water.

The Red Sandstone Plain or Triassic Area, also called the Piedmont plain, is bounded on its northern border by the Highlands. On the southeast, this third great topographic zone merges into the clays and marls of the coastal plain. It is 67 miles long and 30 miles wide at the Delaware River. The traprock ridges, known as Palisades, Watchung, Sourland, Cushetunk and other mountain ranges, rise abruptly above the general level of the sand¬ stone plain. They are generally forested, whereas the sandstone country is nearly cleared and in farms. These mountains rise 400 to 900 feet above sea-level. The drainage is largely by the Hackensack, Passaic and Raritan rivers and their tributaries.

The fourth zone, known as the coastal plain, includes all the country southeast of the Trias¬ sic sandstone area and borders the ocean. This zone is about 100 miles long from Sandy Hook to Salem City, and is 10 to 20 miles wide. The surface is hilly in part, but with gentle slopes, except where some of the streams have cut their way through its earthy beds and formed steep-sided stream valleys. The Navesink Highlands and the Mount Pleasant Hills are the highest lands in this zone. The drainage is by many tributaries westward into the Dela¬ ware and by the Atlantic Coast streams into the Atlantic Ocean. In the northwestern part of this zone there are clay beds and greensand marls, which make the outcrop on the surface in places ; on the southeast there are sands, clays and gravels and fringing the sea a narrow range of sand hills or coastal dunes. Within the coastal plain lie the ˆPines,® a wooded area of so great an extent as to contribute largely to the forest acreage of New Jersey. In lots of 10 acres and over, there are 2,070,000 acres of woodland, with only 2,000,000 acres of im¬ proved land in farms. The famous sea-wide re¬ sorts of the State fringe the coastal plain.

As set forth by Prof. John C. Smack, the geologic structure of New Jersey is so related to the topography that observations con¬ cerning the physical features give a satisfactory clue to such structure. All of the larger geo¬ logical formations of the United States, except coal, occur in parallel zones, as has been indi¬ cated. These formations extend from north¬ east to southwest and a section line across the State from Port Jervis southeast to the ocean crosses them nearly at right angles to their trend. The oldest geological formations in the State are the crystalline rocks of the High¬ lands. Granite, gneisses and other crystalline schistose rocks and beds of magnetic iron ore make up the mass of these mountain ranges. These rocks are generally much tilted in posi¬ tion, almost on edge and are also much faulted. They strike northeast and southwest and dip to the southeast or northwest. The iron ores and zinc ores which are mined in the State are found in these formations. The granite, gneiss

and crystalline limestone or marble, used in building, are also from these Highland forma¬ tions.

The Palaeozoic rocks are found in the valleys included in the Highlands, in the Kittatinny Valley and Kittatinny Mountain and in the Green Pond and Copperas mountains. Cam¬ brian, Silurian and Devonian are represented and the rocks are limestones, slates, sandstones and silicious conglomerates. The magnesian limestones and the slates constitute wide belts in the Kittatinny Valley, the Musconetcong, Po- hatcong, Pequest and other valleys. The Kit¬ tatinny Mountain mass consists of sandstones and conglomerates of the Oneida and the Me¬ dina epochs of the Silurian Age. In the valley of the Upper Delaware, west of this mountain, there are narrow belts of waterlime, Lower Helderbergand Upper Helderberg, fossiliferous limestones, with Marcellus shale as the highest member of the Devonian within the State. The Green Pond Mountain rocks also have been re¬ ferred to the Oneida horizon. The limestones and slates are the formations on which the rich wheat lands of Warren County and the dairy farms of Sussex are situated. Stone for build¬ ing, slate for roofing and flagging stone and limestone for lime and cement, are quarried in the Palaeozoic areas. Copper, lead and zinc ores and barite, limonite or brown hematite and glass sand have been worked in many local¬ ities.

The red shales and sandstones and the in¬ cluded trap-rocks of the northern-central part of the State are referred to the Juras-trias of Mesozoic time. The sandstone beds dip in gen¬ eral toward the northwest, at a low angle of inclination in the sandstone. The erupted trap- rocks form long ranges of steep-sloping hills or mountains, often

crescentic in form. A great deal of excellent sandstone for building and stone for road-making is quarried in this for¬ mation. Copper ores occur in the sandstone near the trap-rock or at their junction. Barite also has been mined in the sandstone at one locality.

The cretaceous rocks of the State include the clay district of Middlesex County and the green¬ sand marl developed in Monmouth County and thence southwest to Salem County. A large amount of clay is dug in the Raritan clay dis¬ trict. The greensand marl, dug in shallow pits generally and in numberless localities, has had a wide use locally as a fertilizer.

The formations of the coastal plain zone, later than the cretaceous beds, are greensand marls of the Eocene, clays and sands of the Miocene and the clays, sands and gravels of the post-Tertiary. They are recognized in a fourfold division and are known as Beacon Hill, Bridgton, Pensauken and Cape May for¬ mations. Clays and sands for brick, terra-cotta and pottery, marls for fertilizer, glass sands and gravel for road-building are dug in these formations.

In the northern part of the State there are surface formations of glacial epochs and the terminal moraine of the last glacial ice is traced from Perth Amboy by Morristown and Hack- ettstown to Belvidere on the Delaware.

Alluvial deposits of recent time are recog¬ nized in the river valleys and in the tidal marshes and in some of the fresh-water swamps.

Economic Geology. — To the early settlers the mineral wealth of the State was well known. Before the Revolution, copper, “bog® iron, brick clay and glass sand were exploited. At the present time New Jersey is the only State of any importance as a mineral producer in which the utilization of its clay resources constitutes the chief industry and represents over 50 per cent of the total value of all minerals produced. The clay products of this State, moreover, in¬ clude every variety of brick and tile and every variety of pottery produced in the United States as classified by the National Geological Sur¬ vey. The clay-working industry reached its

highest record in the calendar year 1912, when the total value of the clay products was $19,838,553, of which $10,902,633 was repre¬ sented by the output of the brick and tile es¬ tablishments and

$8,935,920 by the output of the potteries. The State ranked first in the pro¬ duction of china and sanitary ware; second in the value of pottery products; third in the value of all clay products; among the first five States in the production of most of the varieties of clay products. Clay for the manufacture of ordinary brick is dug in 20 out of the 21 counties of the State. Mercer County is the most important clay-working county. Its principal product is sanitary ware. Trenton is the centre of the pottery industry. Middlesex County, ranking second, is the prin¬ cipal producer of common brick, architectural terra-cotta, fireproofing tile (other than drain tile) and fire brick. Bergen County ranks third in the manufacture of common brick; Burling¬ ton, Camden, Gloucester, Mercer and Middle¬ sex counties produce fire clay; Mercer and Ocean counties, saggar clay; Camden, Essex, Monmouth, Morris and Union counties, pot¬ tery clay; and Middlesex County (at Wood- bridge, Sayreville and South Amboy), ball and slip clay.

Based upon the recoverable metallic con¬ tent of the ore mined New Jersey is one of the most important producers of zinc and zinc- ore mining is second in importance among the State's mineral industries. In the quantity of zinc contained in the ores mined, New Jersey ranks second among all the States, being ex¬ ceeded only by Missouri. The value of the metallic content of the zinc ore mined in 1912 was $9,626,191. In 1917 the State produced more zinc than all the other Eastern States, the total being nearly 57,000,000 pounds. The centre of this industry is the famous Franklin Furnace district in Sussex County, where mining has been carried on continuously for more than 60 years.

Third in importance among the mineral in¬ dustries is the manufacture of Portland cement, the plants in the vicinity of Phillipsburg, in Warren County, being the eastern end of the celebrated Lehigh district of Pennsylvania. The value of the output in 1912 was $3,052,098; in

1913, $3,638,755.

The principal quarry product is trap rock, used chiefly for road making and concrete, the Palisades region and especially Somerset, Pas¬ saic, Hunterdon, Essex and Hudson counties yielding the largest output. The total value of all stone quarried in the State in 1913 was $1,772,832, of which $1,359,931, or nearly 80 per cent, was that of the trap rock product. Lime¬

stone, used in the manufacture of cement, as rushed stone for concrete

and macadam and or blast furnace flux, is quarried chiefly in Sussex County, with smaller quantities in Hunterdon and Warren counties. Granite and sandstone are also produced in small quanti¬ ties, the former in Warren, Passaic and Sus¬ sex counties and the latter chiefly in Bergen and Mercer counties.

New Jersey is one of the four leading States in the production of molding sand, the output in 1917 having a value of $651,279; building sand yielded $545,437; and sand and gravel, $2,052,324. Building and molding sands are dug in many counties, particularly along the eastern borders ; fire sand for fire brick is produced in Middlesex County; filter sand in Burlington and Cape May counties; and glass sand in Camden, Cumberland, Gloucester and Middlesex counties.

Iron ore shipped from the mines in 1917 had a value of $2,341,160. Other commercial products of the State are occasional gems, lime, manganiferous zinc residuum, mineral paints, mineral waters, sand-lime brick, slate and talc.

The following shows the variations in the values of all mineral products in the most notable years: 1912, $37,195,940; 1913, $37,271,-

129; 1914, $31,756,503; 1915, $38,818,422.

Agricultural Interests. — Possessing a great diversity of soils and a somew'hat notable vari¬ ation in temperature, New Jersey has ever oc¬ cupied a distinctive position as an agricultural community. The average yearly temperature ranges from 49.6° in the Highlands to 53.0° on the sea coast. The average annual precipitation, including melted snow, is 47.18 inches in the Highlands and 45.92 inches on the sea coast. Aside from the staple crops the fruits of the State have a large sale in the nearby markets of Philadelphia and New York. Peaches and apples are extensively grown in the northern and northwestern portions of the State, while pears are cultivated in the midland counties. These fruits are common, however, in all sec¬ tions. The southern counties produce large acreages of strawberries, raspberries and black¬ berries, while cranberries are a staple product of boggy areas in Burlington and Ocean coun¬ ties. Grapes are grown extensively in the southern section of New Jersey, while plums, cherries and currants are common in all sec¬ tions. Huckleberries are of spontaneous growth and are gathered in large quantities. In truck farming, watermelons and cantaloupes, the Hackensack variety of the latter competing with the Colorado product, are grown on the large

plantations and small farms near Philadelphia and New York. Market gardening, owing to the reasonable price of land and extensive stone-road system and quick, cheap and safe transportation by rail and boat, is a profitable industry in New Jersey, more particularly in the vicinity of New York. Commercial floricul¬ ture gives to the State a pre-eminence. Dairy¬ ing is largely confined to the northern, central and southwestern portions of the State. The poultry farms of New Jersey are near the mar¬ kets of Philadelphia and New York. The forest lands, including stump and brush lands to mer¬ chantable timber, of the State occupy about 2,000,000 acres ; the cleared farm land about the

same acreage; 1,200,000 acres of forest land is coniferous, pitch pine on the uplands and white cedar in the swamps. This is the region known as the ˆPines,® extending from Lakewood on the north to Cape May County on the south and embracing a number of health resorts. The northeastern Highlands, with 210,000 acres, the Kittatinny Mountain with 58,000 acres, the Palisade Mountain with 11,000, are the remain¬ ing large forest areas. The forest products are worth about $4,000,000 annually. The State renders directly and indirectly great assistance to agricultural interests by the media of an agricultural college located in New Brunswick, experiment stations, a board of agriculture, grange and horticultural society. Reports, in¬ stitutes and lectures are the means of dissemi¬ nating information.

According to the United States census of 1910, the State had a total of 33,487 farms, comprising 2,573,857 acres, of which 1,8(ˆ3,336 were improved. The value of the land was re¬ ported as $124,143,167; buildings, $92,991,35 2; implements and machinery, $13,109,507; and livestock, $24,588,639 ; total value of all farm property, $254,832,665, an increase of $65,299,- 005 in 10 years. The staple crops in the pre¬ ceding year, in the order of production values, were hay, $7,627,402 ; corn, $6,664,162; potatoes, $4,979,900; wheat, $1,568,880; oats, $712,609; rye, $707,250; and buckwheat, $141,997. Small fruits had a farm value of $1,954,125. Crop reports for the calendar year 1917 showed: corn, 297,000 acres, 12,771,000 bushels, $21,711,- 000 farm value; wheat, 89,000 acres, 1,691,000 bushels, $3,602,000 value ; hay, 350,000 acres, 508,000 tons, $10,160,000 value; potatoes, com¬ mon, 98,000 acres, 11,172,000 bushels, $15,753,- 000 value ; potatoes, sweet, 24,000 acres, 2,300,- 000 bushels, $4,608,000 value; oats, 73,000 acres, 2,482,000 bushels,

$1,737,000 value; buckwheat, 16,000 acres, 288,000 bushels, $455,000 value ; rye, 69,000 acres, 1,276,000 bushels, $2,233,000 value. At the beginning of the year the live¬ stock on farms comprised : horses, 92,000, value, $13,708,000; mules, 4,000, value, $676,000; dairy cows, 155.000, value, $11,780,000; steer cattle, 74,000, value, $2,516,000; sheep, 29,000, value, $209,000; and swine, 163,000, value, $2,771,000; total value, $31,660,000.

Manufactures. — -The great manufacturing districts of New Jersey are located in the im¬ mediate vicinity of New York and Philadelphia. Within the limits of the city of Newark (q.v.) alone there are made a wider Variety of articles than in any other city in the United States. Newark is famous for leather, jewelry, hats and celluloid, Paterson for silks and loco¬ motives, Passaic for woolen and worsted goods, Jersey City for tobacco products and soap, Trenton for pottery of all grades, structural steel and iron and rubber goods, Camden for shipbuilding and chemicals, Elizabeth for sew¬ ing machines and shipbuilding, New Bruns¬ wick for hosiery, Perth Amboy and its vicinity for bricks and terra-cotta, Bridgeton, Millville, Vineland and smaller towns for glass. It should be noted here that the foregoing local¬ ized industries characterized the pre-war pe¬ riod. With the first shock of battles in Europe a very large number of industrial plants began engaging in the manufacture of war muni¬ tions and after the United States entered the war every plant that could turn out any such

products, irrespective of its original purpose, was rushed with war orders. A suggestion of this abnormal industrial activity is given in the article on the city of Newark. While much of the operations for the Entente Allies at first and for them and the United States later on was prudentially screened from the general pub¬ lic, it was no secret that many of the great man¬ ufacturing plants in the various cities of New Jersey were working incessantly to make the world safe and fit to live in. And among the many instances of most effective service in the StaT that rendered at the shipbuilding plant at Camden, where, on 5 May 1918, the steel naval collier Tuckahoe was launched just 27 working days after her keel plates were laid, is deserving of special mention.

A healthful development of the manufactur¬ ing interests of New Jersey is shown in a com¬ parison of the United States census reports for the operating years 1909 and 1914. According to the census of the former year there were in the State 8,817 manufacturing plants having annual products exceeding $500 in value and conducted on the factory system, which excludes small hand trades. These plants employed $977,172,- 000 capital, an increase of $499,870,000 in 10 years, and 371,265 persons; paid $720,033,000 for materials used in

manufacturing and $218,046,- 000 for services and yielded products valued at $1,145,529,000, an increase of $592,523,000 in 10 years. The industries and products of largest values were smelting and refining copper, $125,651,000; silk and silk goods, $65,430,000; foundry and machine shop products, $65,398,- 000; slaughtering and meat-packing, $37,583,- 000; woolen, worsted and felt goods, $33,939,- 000; and wire, leather, electrical supplies, to¬ bacco, chemicals and malt liquors. The census of manufactures in 1914 yielded the following summaries: Plants, 9,742; operatives, 431,003; invested capital, $1,352,382,000; paid for mate¬ rials, $883,465,000; paid for services, $280,984,- 000; and value of products, $1,406,633,000. In the period of 1909-14 the increase in the capital investment was 38.4 per cent and in the value of products, 22.8 per cent.

Oyster and Fish Industry. — Of the other industries, outside those of an agricultural and manufacturing character, the oyster and fish industry is most conspicuous. From the mouth of the Raritan River to Sandy Hook, from Barnegat Bay to Cape May and thence in Dela¬ ware Bay to Salem, are about 15,000 acres of productive oyster beds. From the famous Maurice River oyster beds alone $2,275,000 worth of these bivalves, exceeding in value the wheat crop of the State, has been shipped in a single year. From the Atlantic Ocean and Dela¬ ware Bay vast quantities of clams and fish of many kinds are sent to nearby markets. Shad and sturgeon, the latter furnishing caviare, are caught in Delaware Bay and river.

Communications. — The State is well equipped with transportation facilities. In 1917 it was served by nine great railroad systems, operating on 2,315 miles of track, exclusive of switching and terminal mileage. Besides their main lines these systems operated a consider¬ able number of small subsidiary lines. The main companies were the Pennsylvania; Dela¬ ware, Lackawanna and Western; Erie; Central of New Jersey; Lehigh Valley; Philadelphia and Reading; Baltimore and Ohio; West Shore,

Ontario and Western. The State was also entered by regular trains from New York City using the Pennsylvania and the Hudson and Manhattan tubes. In 1918, after the national government had taken over the railroad sys¬ tems of the country, there was a rerouting of a number of roads operating in New Jersey to speed up war

transportation necessities, a transfer of their regular lines being made to the Pennsylvania tunnels. Within the State are the two gateways, Jersey City and adjacent cities leading to Greater New York and Cam¬ den to Philadelphia. All the above com¬ panies have terminal facilities in Jersey City, Weehawken and Hoboken. Every railroad entering New York city from the west and south now lands its passengers in New Jersey. There are nearly 1,000 miles of cable, electric and horse railroad in the State, a large per¬ centage of the trackage being under the control of the Public Service Corporation. A continu¬ ous trolley service has been established be¬ tween Jersey City and Camden, uniting Phila¬ delphia and Greater New York. These roads have cost nearly $150,000,000. In conjunction with the counties, townships and cities and assessments upon abutting property-owners, New Jersey has aided in the construction of upwards of 1,000 miles of good roads penetrat¬ ing every section of the State and usable at all seasons of the year. In the apportionment of Federal funds to the States for the construc¬ tion and maintenance of public roads, under the Act of Congress, approved 11 July 1916, New Jersey was allotted $59,212.68 for the fiscal year ending 30 June 1917, increased to $177,357.22 for the fiscal year ending 30 June 1919, which was the third allotment. Under the law, the several allotments are based (D one-third in the ratio of area, (2) one-third in the ratio of popula¬ tion, and (3) one-third in the ratio of mileage of rural delivery and star routes. The Con¬ gressional appropriations were fixed at $1,000,- 000, to be apportioned annually up to and in¬ cluding the fiscal year ending 30 June 1926. The canal systems of the State embrace the Delaware and Raritan, extending from Borden-town to New Brunswick, and the Morris, ex¬ tending from Jersey City to Phillinsburg and uniting with the canal system of the Common¬ wealth of Pennsylvania. The total mileage is 173.34. The total valuation of railroad and canal property within the State for taxation was fixed at $357,308,543 for the year 1917, and on this valuation $5,754,337.59 was levied for State purposes and $2,439,143.59 for local uses — a total of $8,193,481.18, an increase in a year of $715 061.06.

State Institutions. — New Jersey has a group of educational reformatory and elee¬ mosynary institutions of which it may well be proud, especially as a number of them have served as models for other States. The State capitol is at Trenton, which was selected as the seat of government in 1790, and in its present form represents a number of additions. Trenton is also the seat of the State arsenal, State Hospital, a State Normal School, State Home for Girls, the State Prison and the State School for the Deaf. There are also a second State hospital at

Morris Plains, State normal schools at Newark and Upper Mont¬ clair, a State Home for Boys at Jamesburg, a Home for Disabled Soldiers at Kearny, a

Home for Disabled Soldiers, Sailors or Marines and Their Wives at Vineland, a Home for the Care and Training of Feeble-Minded Women at Vineland, a Training School for Feeble- Minded Children at Vineland, a State Village for Epileptics at Skillman, a State Reformatory at Rahway, a State Tuberculous Sanitarium at Glen Gardner, a Manual Training and Indus¬ trial School for Colored Youth at Bordentown, a State Reformatory for Women at Clinton and a State Colony for Feeble-Minded Males at New Lisbon. Other functions assumed by the State include an Agricultural College and Experiment Station at New Brunswick, in connection with Rutgers College, teachers' insti¬ tutes, school libraries, the preservation of fish, game and oysters, the care of the lives of employees in factories and workshops, an exten¬ sive geological survey, the preservation of his¬ toric sites, of the Palisades of the Hudson River and of public documents, and the removal of children from improper influences.

Seaside Resorts. — The diversified scenery and climate of the State has led to the estab¬ lishment of many resorts in all parts of New Jersey. Along the sea coast, Cape May has been noted as such for about a century, to be soon followed by Long Branch. Atlantic City reached in 1918 an organized existence of over 64 years and represented in growth and attrac¬ tiveness the most conspicuous example of mu¬ nicipal sea-shore development to be found in the world. Asbury Park and Ocean Grove were established about 1870. Within the last quarter of a century, practically every foot of beach-front from Sandy Hook to Cape May has been subjected to a greater or less degree of development. Schooley's Mountain was a popu¬ lar summer resort fully a century ago. Budd's and Hopatcong lakes have also had a long life of prosperity; Greenwood Lake, partly in New Jersey and partly in New York, is widely noted as a summer residential and bungalow centre ; and Lakehurst has become in recent years a well-known summer and all-year locality.

Education. — As early as 1662 a schoolmas¬ ter was settled among the Dutch landowners in what is now Jersey City; about 10 years later schools were erected in Newark, Wood- bridge, Amboy, Elizabethtown, Freehold and Piscataway, while in 1683 the Society of Friends at Burlington set aside rents from an island in the Delaware for the purposes of public edu¬ cation. In 1817, after nearly 20 years' agita¬ tion, the legislature created the first school fund. The management of the schools of the State is vested in a State Board of

Educa¬ tion appointed by the governor. This board appoints superintendents for each of the 21 counties of the State. Although the constitu¬ tion requires that the State shall provide free instruction for all children between the ages of 5 and 18, the State has extended the age from 4 to 20. Courses in kindergarten and manual training have been extensively adopted, particu¬ larly in the' large industrial centres.

In the school year 1916-17 the enrolment in the public schools was 540,287; the average daily attendance, 421,884; length of school year, 183 days; total number of teachers, 16,741; average monthly salary of teachers, $95.34; estimated value of all property used for public school purposes, $69,293,018; expenditures of

NEW JERSEY

1 Looking toward the Delaware Water Gap from Manunka Chunk

2 Falls of the Passaic, Paterson

.

‘ *

”

,

|R v<: '■ '

the year, for schools, $26,110,991. There were 1.49 public and 67 private high schools ; 6 pub¬ lic normal schools ; and 7 universities, colleges and technological schools. The latter com¬ prised Princeton University, at Princeton, opened in 1746; Rutgers College, at New Bruns¬ wick. opened in 1766; Seton Hall College, at South Orange, opened in 1856; Stevens Insti¬ tute of Technology, at Hoboken, opened in 1871 ; Saint Peter's College, at Jersey City, opened in 1878; PIpsala College, at Kenilworth, opened in 1893; and the College of Saint Elizabeth for Women, at Convent Station.

Of the many private schools in the State among the most conspicuous are Lawrenceville School (John C. Green Foundation), one of the most

famous in the country, Princeton Pre¬ paratory School, Peddie Institute at Hights- town, Pennington Seminary, all in the county of Mercer. Other schools are Saint Mary's Hall in Burlington, the West Jersey Academy and South Jersey Institute at Bridgeton, New¬ ark Academy, Hasbrouck Institute at Jersey City, Bordentown Military Academy, Blair Presbyterial Academy at Blairstown, Centenary Collegiate Institute at Hackettstown. There are theological institutions at New Brunswick, at Princeton, at Madison and at Newark.

Churches. — Throughout the colonial period of New Jersey three lines of religious activity were noticeable. In the eastern portion, the various phases of Calvinism were transplanted over-sea by the settlers. The Hollanders, the Scotch and many of the English emigrants, and the French Huguenots found a common bond of association in Calvinism. Ultimately Pres¬ byterianism, outside of the sphere of Dutch in¬ fluence, became dominant. In the western por¬ tion of the colony the Society of Friends held sway, with strength in Monmouth County, a part of the eastern portion. The Church of England never obtained a strong hold in the colony, its main congregations being at Bur¬ lington, Trenton, Perth Amboy, Elizabeth and Newark. During the middle part of the 18th century, Whitefield and Tennant, as Calvinists, and John Woolman, the apostle of the aboli¬ tion movement in America, paved the way for future changes. Following the Revolution, the Methodist Episcopal Church, with its demo¬ cratic teachings, recruited largely from the So¬ ciety of Friends and from many of the Pres- bytrian congregations. With the coming of the Irish and German emigrants into New Jer¬ sey, in the period of extension of transporta¬ tion systems (1830-60), the Roman Catholic Church made great advance.

In 1910, the United States Census Bureau, reporting the religious statistics of the country for 1906, credited New Jersey with 2,802 reli¬ gious organizations, having together 857,548 communicants, 2,875 church edifices, church property valued at $50,907,123 and 2,785 Sunday schools, with 42,613 officers and teachers and 404,095 scholars. The strongest denominations numerically were the Roman Catholic, 441,432; Methodist Episcopal, 106,505; Presbyterian (U. S. A.), 78,490; Baptist (U. and Nat. Con.) 64,- 238; Protestant Episcopal, 53,921; Reformed (in America), 32,290; Lutheran (Gen. Coun.), 15,323, and Congregationalism 8,460.

Banks and Banking. — The State legislature granted charters to two banks, one in Newark and one in Trenton in 1804. In 1812 a general

banking law was passed for the protection of depositors, the law

remaining in force until 1850, when other laws were passed. The legis¬ lature established a department of banks and insurance in 1891 and the banking law was again revised in 1899. Since 1880 New Jersey has been a favorite State for trust companies and for the organization of large corporations. Savings banks were first established in 1828. In 1876 a law was passed regulating these in¬ stitutions.

In 1913 Congress passed a National Banking Act and constituted a Federal Reserve Board which divided the country into 12 districts. The act made it obligatory on all National banks and permissible for all State banks and trust companies to acquire membership in the new organization. Under this act New Jersey was divided into two parts, all of the State north of Trenton being assigned to Federal Reserve District No. 2, of which New York is the central reserve city, and the rest of the State to District No. 3, of which Philadelphia is the central reserve city. The following is a summary of all banks in New Jersey reporting under the act of Congress in June 1917: num¬ ber of banks, 378; capital stock, $48,724,000; total resources, $971,426,000; surplus, $53,718,- 000; individual deposits, $776,665,000. The banks which had qualified to receive postal savings deposits had a balance to the credit of depositors on 30 June 1916, of $2,806,465, and on 30 June 1917, of $4,716,871.

In 1916 Congress passed an act providing for the establishment of a Federal Land Bank System for the special benefit of the agricul¬ tural portions of the country. The act divided the country into 12 districts, each with an executive centre. New Jersey, under this act, was apportioned to District No. 1, of which Springfield, Mass., was made the centre, and up to 31 Oct. 1917, loans had been apolied for in the State to the amount of $604,715. The mutual savings banks in the State on 30 Tune 1917 had 308,556 depositors and held $128,265,- 535 in deposits, and the stock savings banks had 39,100 depositors and held $16,045,585 in de¬ posits.

Finances. — The finances of the State are in most excellent condition, there being no bond issues for which interest and a sinking fund must be provided, nor is there a State tax' levied. The financial receipts of the State are largely derived from the tax on railroads and miscellaneous corporations which pay a large share of the total revenue. These figures show a steady increase in wealth and material pros¬ perity. Other important sources of revenue are State fees from the offices of the clerks in Chancery and Supreme Courts, the collateral inheritance tax, from the office of commissioner of banking and insurance, from the office of secretary of state, from the State

Prison and State Reformatory and from the ovster com¬ mission.

The net valuation for taxation of real and personal property listed by local assessors and county boards of taxation in 1917 was $2,888,- 117,700.86, an increase in a year of $191,803,- 690.33. The net valuation did not include bank and trust company stock, which was separately assessed at three-fourths of 1 per cent, and for 1917 was taxed $702,423.36 on a valuation of

$93,656,448.

NEW JERSEY

Population. — New Jersey began to obtain rapid growth in population about the year 1840; the absolute increase being the greatest in the decade from 1890 to 1900, due largely to the im¬ migration of foreigners and the suburban New York population. The growth of population is given by the Federal government census as fol¬ lows : (1790) 184,139; (1820) 277,426; (1850)

489,555; (1860) 672,035; (1870) 906,096; (1880) 1,131,116; ,1890) 1,444,933; (1900) 1,883 669;

(1910) 2,537,167; (1920, Federal census) 3,-

155,900. e , . . XT

Following is a list of the counties in New Jersey with their population for 1900, 1910

and 1920:

COUNTY

Square

Miles

1900

1910

1920

i

Atlantic .

567

46,402

71,894

83,914

Bergen .

Burlington. . . .

236

78,441

138,002

210,703

869

58,241

66,565

81,770

Camden .

222

107,643

142,029

iyu , 508

Cape May. . . .

256

13,201

19,745

19,460

Cumberland. . .

511

51,193

55,153

61,348

Essex .

127

359,053

512,886

652,089

Glouster .

326

31,905

37,368

48,224

Hudson .

43

386,048

537,231

629,154

Hunterdon. . . .

437

34,507

33,569

32,885

Mercer .

226

95,365

125,657

159,881

Middlesex ….

312

79,762

114,426

162,334

Monmouth.. . .

479

82,057

94,734

104,925

Morris .

475

65,156

74,704

82,694

Ocean .

583

19,747

21,318

22,155

Passaic .

198

155,202

215,902

259,174

Salem .

359

25,530

26,999

36,572

Somerset .

305

32,948

38,820

47,991

Sussex .

529

24,134

26,781

24,905

Union .

103

99,353

140,197

200,157

Warren .

362

37,781

43,187

45,057

Total ….

7,525

1,883,669

2,537,167

3,155,900

The largest cities in the State with their population in 1900, 1910 and 1920 are as follows :

1900 1910 1920

Newark . 246,070 347,469 414,216

Jersey City . 206,433 267,779 297,864

Paterson . 105,171 125,600 135,866

Trenton . 73,307 96,815 119,289

Camden . 75,935 94,538 116,309

Elizabeth . 52,130 43,409 95,682

Hoboken . 59,364 70,324 68,166

Bayonne . 32,722 55,545 76,754

Passaic . 27,727 54,773 63,824

Atlantic City . 27,838 46,150 50,682

West Hoboken . 23,094 35,403 40,068

East Orange . 21,506 34,371 50,587

Government. — The general government of the State is administered under a constitution adopted by the people in 1844, and amended by special elections in 1875 and 1897. Amendments to become a law, or a part of the constitution, must receive the approval of the majority of the members of two consecutively chosen legisla¬ tures of the State, and must then be submitted to the people. A majority vote of the electors of the State is necessary for adoption. Five years is the time that must elapse between the submission of amendments to the people. Duly qualified voters are male citizens who have re¬ sided in the State one year, and in the county five months. The law requires the registration of voters. State elections are held annually on the Tuesday after the first Monday in Novem¬ ber. In 1918 the State had 12 representatives in the Lower House of Congress.

Legislature. — There are 21 State senators composing the upper house of the legislature, one from each county, and the term of office is

th ree years. There are 60 members of the house of representatives, elected from the counties on the basis of population. The term of office of a member of the lower house is one year. The compensation of both senators and representatives is $500 per annum. The leigslature meets annually without limit of ses¬ sion. Revenue bills originate in the lower house.

Executive. — The governor is chosen by popular vote and for a term of three years; compensation $10,000. He cannot be re-elected without an intervening three years. He has power to call extra sessions of the leigslature, or of the senate without the representatives. He has the usual veto power which may be overruled by a majority vote of all the mem¬ bers of the legislature. He grants pardons and reprieves in conjunction with the chancellor and six judges of Errors and Appeals. The State treasurer and comptroller are appointed for three years at a joint session of the legislature. The governor, subject to the approval of the senate, appoints for terms of five years the sec¬ retary of state, attorney-general, clerk of Su¬ preme Court, clerk of the Court of Chancery, and keeper of the State prison.

Judiciary. — The constitution vests the judi¬ cial authority of the

State in a Court of Errors and Appeals in the last resort of all causes ; a Court for the Trial of Impeachments; a Court of Chancery; a Prerogative Court; a Supreme Court; Circuit Courts; and such inferior courts as may be established by law. The Court of Appeals consists of the chancellor, the justices of the Supreme Court and six judges, or a major part of them, appointed for six years. The lower house of the legislature has the sole power of impeaching, and the upper house tries all impeachments. The Court of Chan¬ cery consists of the chancellor and (1918) eight vice-chancellors. The Supreme Court consists of a chief justice and eight associate justices. Circuit Courts are held in every county, with eight judges in all. There are also 26 District Courts. The Special Court of Pardons consists of the governor, chancellor and lay judges of the Court of Errors and Appeals.

Local Government. — The counties and towns are governed under general laws, and special laws cannot be passed unless by amend¬ ment of the constitution. The justices of the peace are elected for five years by vote of the electors of the townships. The counties elect surrogates and clerks for terms of five years. The counties elect, also, sheriffs and coroners for three years, but such officers cannot be re¬ elected without an intervening three years. The cities and townships are required to have local boards of health. Up to the beginning of 1918 the commission form of government had been adopted by popular vote by the following cities and towns : Atlantic City, Bayonne, Belleville, Beverly, Bordentown, ITaddonfield, Hawthorn, Hoboken, Irvington, Jersey City, Long Branch, Millville, Newark, New Brunswick, Nutley, Ocean City, Orange, Passaic, Phillipsburg, Ridgefield Park, Ridgewood, Trenton, Vineland, and Wallington — 24 in all.

History. — Based upon the conclusions reached by a group of scientists of interna¬ tional reputation, it may be stated that Man, known as ‘ˆGlacial,® ˆArgellite,® and ((Palaeo-

lithic,® resided within the limits of New Jersey, at the close of the Age of Ice. The proofs offered are the presence of non-intrusive stone implements, remains of extinct quadrupeds, used by primitive man as food, and human skulls and bones, all of which have been found in and near the city of Trenton. At this point, a large deposit of river wash, particularly sand and gravel, indicates that at one time the mouth of the Delaware River was directly south of Tren¬ ton. In the

river wash the above mentioned evidences of human occupancy have been found. The culture point attained by these earliest in¬ habitants was probablv that reached by Man in the Stone Age in Europe.

The Indians whom the Dutch and Swedes found in New Jersey were known as the Lenni- Lenape, members of the great Algonquin family. They were comparatively few in number, scat¬ tered in shifting communities along the river valleys and the sea coast. Less warlike than the Indians of New England or of Virginia, the Lenni-Lenape, later known as the Dela¬ wares, made some progress in agriculture and in the elementary arts. With the Dutch and Swedes, the Indians maintained comparatively peaceful relations, although a traders and set¬ tlers' war in the Raritan Valley, before the com¬ ing of the English, is a matter of record. After the English conquest of 1664, the Indian, al¬ though kindly treated by the Society of Friends in West Jersey, and tolerated by the Calvinists in East Jersey, could not withstand the effects of European civilization. Consumption, small¬ pox, venereal diseases, and alcoholism drove him down to the depths. Distrustful of the efforts made by the missionaries, his personal liberty restrained by legislation and social cus¬ tom, the Indian was enslaved, and by inter¬ marriage with the negro, lost his identity. In 1758, most of the New Jersey Indians were re¬ moved to the first reservation ever established within the limits of the present United States — that located at Edgepelick, Brotherton or In¬ dian Mills in the <(Pines® of Burlington County. At the opening of the 19th century the Indians were removed to New York, and thence after various wanderings to Indian Territory. Lenni- Lenape of the full blood are now extinct in New Jersey.

Holland, politically and religiously free, and struggling with Sweden for supremacy as a world power, located upon Manhattan Island, her principal fort and trading post in the New World. Her navigators explored the coasts of New Jersey, and to one of the great rivers, the North, was given the name of Hudson. Cor¬ nelius Jacobsen Mey sailed up the Delaware, then known as the South River, and commemo¬ rated himself by the name Cape May. By dis¬ covery and occupancy Holland laid claim to the soil of New Jersey. From New Amsterdam, farmers and traders established themselves in what is now Hudson and Bergen counties. By 1650 colonist had penetrated the river valleys emptying into all the waters of the Greater New York Harbor. Settlements were attempted on the Delaware. The efforts of the Dutch, in the colonization of New Jersey, were only success¬ ful in the northeastern portion of the State, where the church, speech and lines of political thought of the fatherland firmly impressed themselves upon the community until recent years.

Gustavus Adolphus, in his scheme of Swed¬ ish colonization for North America, utterly dis¬ regarded the presence of the Dutch in New Jer¬ sey. For about 15 years after 1640, several groups of Swedish settlers occupied the valley of the Delaware, locating principally in the vi¬ cinity of Philadelphia. The communities of Swedes in New Jersey, isolated and neglected by the home government and harassed by the Dutch, finally submitted, with their associates in Pennsylvania and Delaware, to the domina¬ tion of Holland. From 1655 to 1664, New Jersey remained under the absolute control of Holland.

Recognizing the fact that Dutch control of the valleys of the Hudson and the Delaware separated New England from the southern col¬ onies, Charles II, king of England, granted to his brother, James, Duke of York, a vast do¬ main in North America, including much of what is now New England, New York and New Jersey. An English naval expedition, in the summer of 1664, sent to New Amsterdam, se¬ cured the capitulation of the Dutch. To John, Lord Berkeley and Sir George Carteret, two faithful adherents of the House of Stuart dur¬ ing the Protectorate, the Duke of York made a transfer of what is practically the territory of New Jersey.

In recognition of Carteret's defense of the island of Jersey, against the Cromwellian forces, the Berkeley-Carteret grant was called New Jersey. The policy of the proprietors was to attract _ settlement, which was accomplished by exploiting the natural advantages of the colony, granting a liberal frame of government and pro¬ viding for allotments of free or low-priced land. There was a very pronounced New England movement into the valleys of the Passaic and smaller streams, and by the introduction of so¬ cial, political and religious views of the Con-gregationalists, the eastern portion of the colony became a partial reproduction of New England itself. Within a few years Berkeley disposed of his interests to a company largely composed of members of the Society of Friends. A parti¬ tion being desirable, a line was run from Little Egg Harbor to a point near the Delaware Wa¬ ter Gap. Henceforth, after 1676, begins the political history of East and West Jersey. To Carteret fell East Jersey; while West Jersey became the property of the members of the Society of Friends. After 1676, the western portion of the State was open to English settle¬ ment, the dominant spirit being William Penn. The communities established in the Delaware River valley were isolated, and a plantation life, not unlike that of Virginia and Maryland, lack¬ ing certain religious characteristics, was devel¬ oped. The county in West Jersey became the political unit, as the town became the political unit in East Jersey. Both the Jerseys passed later under the domination of Boards of Propri¬ etors, who exercised broad governmental powers, and, until

the present, held title to unoccupied lands. From 1664 to 1702, when both boards relinquished governmental rights to the Crown, there was a constant spirit of popular unrest, and one complete and one attempted change in government. In 1673 New Jersey was recap¬ tured and occupied for a few months by the Dutch. When James, Duke of York, became King James II, he endeavored, by means of Sir Edmund Andros, to upset the proprietary gov-

ernments, the matter not being finally settled, favorably to the proprietors, until 1681. In the meantime, internal disturbances growing out of quit-rent agitations, affected the peace of the two proprietaries. The period from 1702 to the outbreak of the American Revolution was un¬ disturbed by any dramatic incidents. The growth of Philadelphia and New York, as commercial centres, tended to develop the agricultural in¬ terests of New Jersey. As early as 1710 the tend¬ ency to draw the active forces of the colony into the two cities was apparent, leading to Ben¬ jamin Franklin's famous aphorism, uttered soon thereafter, that New Jersey was like a cider barrel, tapped at both ends. The usual colonial quarrels between the Crown officers and the pop¬ ular branch of the legislature were reflected in New Jersey, as elsewhere. Landed interests dominated the governor's council, small property owners were disfranchised, business enterprises were restricted, if not prohibited, by legislation in Parliament, and by taxation, commerce on the high seas was suppressed by the navigation acts, metallic currency was withdrawn from the colony, — a score of causes, mainly economic, operated to produce the resort to arms.

While loyal to the Crown, there were, never¬ theless, mutterings of discontent, of ill-concealed defiance of law officers and a spirit of restless¬ ness, restrained by the wave of patriotism evoked by the French and Indian war, but which swept on with increasing force after the opening of the year 1770. The most notable events of this period, from 1702 to 1775, were the suppression of piracy in the vicinity of New York and Cape May; the establishment of a continuous land and water route from Philadelphia and New York; the erection of ferries and post roads; the appearance in the northern, central and western parts of the colony, of Huguenot, Scotch- Irish and Palatinate emigrants; the chartering of Princeton University and Rutgers College; the establishment of the first Indian reservation in the United States in Burlington County, the religious revival of George Whitefield, and the

promulgation of John Woolman's abolition doc¬ trine ; the massacres by the Indians in Sussex County, and the erection of a series of barracks, owing to their need in the French and Indian war, in various parts of the State. The open¬ ing of the American Revolution found New Jer¬ sey divided in sentiment. The Calvinistic ele¬ ment, represented so largely in East Jersey, took the initiative. The snirit of war, as in New England, appeared in the town meeting. The professional classes, the members of the Society of Friends and the large merchants were either opposed to war or were non-combatants. A minority awaited the results of agitation. The strength of the element loyal to the home gov¬ ernment may be shown from the fact that upon 2 July 1776, when New Jersey asserted her statehood, the constitution contained a proviso that the document should not be operative in case of a reconciliation between England and New Jersey. William Franklin, the last colo¬ nial governor of New Jersey, remained loyal to the Crown, and, banished from New Jersey, sought refuge among Tory sympathizers in New York City, becoming the adviser of those plan¬ ning movements of Tory invaders in the State. Largely conducted in the northern central por¬ tion of New Jersey, under the control of Crown

sympathizers, these raiders gained the name of <(Pine Robbers." During the Revolution, nearly 100 battles and skirmishes were fought upon the soil of the State. Most conspicuous were the battles of Trenton (26 Dec. 1776), Prince¬ ton (3 Jan. 1777), Red Bank (22 Oct. 1777), Monmouth (28 June 1778), and Paulus Hook (19 Aug. 1779). Among minor engagements of importance were the fights at Bound Brook (13 April 1777), Egg Harbor (15 Oct. 1778), Hancock's Bridge (21 March 1778), Tom's River (24 March 1782), the burning of Bordentown (8 May 1778), and no less than a score of engagements in and around Elizabeth and Newark and nearby territory. During the war occurred the ((retreat across the Jerseys" and Washington's two winter occupations of Mor¬ ristown. At the close of the war, New Jersey was sadly impoverished. Her spirit was dis¬ tinctively Federal. She participated in the An¬ napolis Convention, her representatives advo¬ cated the ((New Jersey plan" at Philadelphia, in the framing of the Federal Constitution, which she adopted without a dissenting voice. With the opening of the 19th century, New Jersey be¬ came a political storm-centre. As a Federalist leader, Alexander Hamilton had wielded a pow¬ erful influence in the State. He had been active in the establishment of the Society for the Im¬ provement of Useful Manufactures, out of which grew the city of Paterson, and had urged the development of Paulus Hook (the site of Jersey City). He was closely allied with the Federal elements until then in control of New

Jersey politics. Arrayed against him was Aaron Burr, son of the Rev. Aaron Burr, sometime president of the College of New Jersey, now Princeton University. The end of the antagon¬ ism between Burr and Hamilton came in a duel fought in 1804, at Weehawken, N. J. The activities in politics were reflected in indus¬ trial life. Before the second war with England, a chain of State banks was established, bridges crossed the rivers between Philadelphia and New York, steamboats were to be found upon the Delaware and Hudson rivers, highways were extended to every accessible part of the State, and the development of water power led to the establishment of many small factories. The sec¬ ond war with England blighted the prospects of growth. Although no engagements occurred upon her soil, New Jersey, as much for the pro¬ tection of Philadelphia and New York, as for her own interest, furnished militia to garrison forts on the Delaware and at Sandy Hook. The position of the State led to overland transporta¬ tion of military supplies between the North and South, for the reason that the Atlantic seaboard was blockaded by British fleets. From this con¬ dition and owing to the demand for good roads, the first railroad charter ever granted in the United States passed the legislature in the year 1815. This, in connection with the revival of agitation concerning internal waterways, led to the constructing of the Camden and Amboy Railroad arid the Delaware and Raritan Canal, now a part of the standard lines of the Penn¬ sylvania Railroad system across the State of New Jersey.

The development of the industrial era, fol¬ lowing the close of the War of 1812, broken by the panics of 1817, 1837 and 1857, marked the growth of Newark, Jersey City, Paterson, Eliza-

heth, New Brunswick, Trenton and Camden. I he period of social unrest characteristic of Jacksonian dominancy in politics led to the adoption of a new State constitution in 1844, pronounced reforms of a penalogical and chari¬ table character, the extension of the public school system and the growth of railroads. The Civil War found New Jersey ready to respond to the call for troops. To the cause of the Union she

Presidents of the Senate Who Served as Acting Governors During Temporary Ab¬ sence of Regular Governors :

William M. Johnson – Republican . 1900

Edmund W. Wakelee. . . “ . 1904

Joseph S. Frel in ghuysen. “ . 1909

Ernest R. Ackerman .. . “ . 1911

John D. Prince . “ . 1912

. John W. Slocum . “ . 1914

Walter E. Edge . “ . 1915

George W. F. Gaunt. . . “ . 1916-17

GOVERNORS OF NEW JERSEY ONLY

Lewis Morris . 1738-46

John Hamilton (president of the council) . 1746-47

John Reading (president of the council) . 1747

Jonathan Belcher . . . 1747-57

John Reading (president of the council) . 1757-58

Francis Bernard . 1758-60

Thomas Boone . 1760-61

Josiah Hardy . 1761-62

William Franklin . 1762-76

GOVERNORS OF THE STATE

William Livingston .

William Paterson .

Richard Howell .

Joseph Bloomfield .

John Lambert (acting)..

Joseph Bloomfield .

Aaron Ogden .

William S. Pennington..

Mahlon Dickerson .

Isaac H. Williamson _

Garret D. Wall (de¬ clined) .

Peter D. Vroom .

Samuel L. Southard. . . .

Elias P. Seeley .

Peter D. Broom .

Philemon Dickerson …. William Pennington. . . .

Daniel Haines .

Charles C. Stratton ….

Daniel Haines .

George F. Fort .

Rodman M. Price .

Wm. A. Newell .

Charles S. Olden .

Joel Parker .

Marcus L. Ward .

Theodore F. Randolph..

Joel Parker .

Joseph D. Bedle .

George B. McClellan. . .

George C. Ludlow .

Leon Abbett .

Robert S. Green .

Leon Abbett .

George T. Werts .

John W. Griggs .

Foster M. Voorhees (act¬ ing) . . .

David O. Watkins (act¬ ing) .

Foster M. Voorhees. . . .

Franklin Murphy .

Edward C. Stokes .

John Franklin Fort .

Woodrow Wilson .

James F. Fielder (acting) Leon R. Taylor (acting).

James F. Fielder .

Walter E. Edge .

William N. Runyon. . . . Edward I. Edwards. . . .

Federalist . . . .

. 1776-90

a

. 1790-92

u

. 1792-1801

Democratic- Republican. 1801-02

U

“ 1802-03

a

“ 1803-12

Federalist . . . .

. 1813

Democratic- Republican. 1813-15

U

“ 1815-17

Federalist . . . .

. 1817-29

Democrat . . . .

. 1829

U

. 1829-32

Whig .

. 1832-33

U

. 1833

Democrat . . . ,

. 1833-36

U

. 1836-37

Whig .

. 1837-43

Democrat . . . .

. 1843-44

Whig .

. 1845-48

Democrat . . . .

. 1848-51

a

. 1851-54

u

. 1854-57

Republican . . .

. 1857-60

U

. 1860-63

Democrat . . . .

Republican . .

. 1866-69

Democrat . . . ,

. . 1869-72

U

. 1872-75

• u

. 1875-78

u

. 1878-81

a

. . 1881-84

a

. 1884-87

u

. 1887-90

u

. 1890-93

u

. 1893-96

Republican . . .

. 1896-98

i(

. 1898

u

. 1898-99

u

. 1899-1902

H

. 1902-05

it

. 1905-08

u

. 1908-11

Democrat . . . .

. 1911-13

U

. 1913

a

. 1914

u

. 1914-17

Republican . . .

. 1917-19

M

. 1919

Democrat . . .

. 1919—

furnished 88,305 men, or within 10,501 of her entire militia, and for the organization, subsist¬ ing, supplying, supporting and transporting her troops she paid nearly $3,000,000. Following the war came a period of prosperity. The agri¬

cultural advantages of the southern portion of the State, first practically promoted at Vineland and latterly fully disclosed by the success of the Jewish settlement at Woodbine, revolutionized a large area south of Camden. The overplus of population of Philadelphia and New York sought permanent and temporary homes in New Jersey, while the industrial centres of the north¬ ern and eastern portions of the State grew with unprecedented rapidity. The present pros¬ perity of the State is largely due to the changes which have occurred in the last three decades.

Woman suffrage was permitted under the original constitution until 1807, when the legis¬ lature restricted the suffrage to white male citi¬ zens. School suffrage was granted to women in 1887; a full suffrage amendment to the consti¬ tution was defeated in a popular election in 1914; and a presidential suffrage bill was intro¬ duced in the senate, referred to the judiciary committee and reported unfavorably in 1916. Local option on the liquor traffic is permitted, with fees ranging from $100 to $1,000. Prohibi¬ tionists were unusually active in 1917-18, and several large communities voted ˆdry.® A new election law substitutes a blanket ballot for separate party ballots; voting machines have been discarded; a very rigid employer's liability law has been recently enacted ; grand and petit juries are now drawn by a chancellor's com¬ missioner and the sheriff of the county; the corrupt practices act has been amended with greater severity than before and juries may now recommend life imprisonment for first-degree murder instead of the death penalty as before.

After the United States entered the World War the rail and water advantages of its loca¬ tion quickly attracted the attention of the Na¬ tional government to the constructive oppor¬ tunities that New Jersey afforded. Large areas of the Hackensack meadows and the meadow land in the southern suburb of Newark were speedily acquired for extensive industrial plants. Great ship-building operations were undertaken in both sections; the shipyards at Camden were taken over, and the waters of Newark and Delaware bays and the Passaic and Hacken¬ sack rivers soon became the scenes of intensive war activities. A great army cantonment, Camp Dix, was established at Wrightstown, and an embarkation camp at Dumont, N. J., was quickly doing its <(bit}) in grand fashion.

Bibliography. — Carpenter, (The History of New Jersey) (1853) ; Cooley, (A Study of Slav¬ ery in New Jersey) (1896); Foster, (New Jer¬ sey and the Rebellion* (1868) ; Raum, (History of New Jersey) (1880) ; Salisbury, (The Physi¬ cal Geography of New Jersey* ; Whitehead, (East New Jersey under the Proprietary Gov¬ ernment (1846) ; (Archives of the State of New Jersey) (1880) ; Annual Reports of the New Jersey Geological Survey; Annual Reports of the New Jersey Agricultural Experiment Sta¬ tion ; Mellick, (The Story of an Old Farm* (1889) ; Mills, (Historic Houses of New Jer- sey) ; Lee, (New Jersey as a Colony and as a State) ; Scott, (The Influence of the Proprietors in Founding the State of New Jersey> (in (Johns Hopkins University Studies* Vol. Ill, No. 8 1885) ; (New Jersey) (in (American Com¬ monwealth Series,* Boston 1903) ; (New Jersey Historical Selections* ; Stockton, (New Jersey* ; Tarr and McMurray, (Physical

and Political

Gcography) ; Skinner, A. and Schrabisch, Max,

Hutchinson, H. P., (Story of New Jersey) (1914); Platt, C. D., (Ballads of New Jersey in the Revolution* (1915) ; Hawkes, E. W. and Linton, R., (Pre-Lenape Site in New Jersey) (1916) ; Armstrong, W. C., (Battles in the Jer¬ seys and the Significance of Each> (1916).

Francis B. Lee,

Editor-in-Chief of (New Jersey as a Colony and as a State^ ; Revised by George J. Hagar, New Jersey Historical Society.

NEW JERSEY, College of. See Prince¬ ton University.

NEW JERSEY FOREIGNERS, in Amer¬ ican humor, an allusion to New Jersey as a foreign country, and to New Jerseymen as foreigners; a saying handed down from the time when Joseph Bonaparte, ex-king of Spain and Naples, after the downfall of Napoleon, sought an asylum in the United States. As an alien he was obliged to obtain a special act of legislature to enable him to hold real estate. Pennsylvania refused, but New Jersey con¬ sented, and he established himself in princely magnificence at Bordentown. Hence men of other States used to declare that the Jersey- men, with their foreign prince, were foreigners.

NEW JERSEY PLAN, in American his¬ tory, a plan for a Federal Constitution proposed at the Convention of 1787 by William Pater¬ son (q.v.), of New Jersey. The resolution provided for the enlargement and correction of the Articles of Confederation; that Congress should remain a single body, and should regulate taxation and commerce, and should choose the executive; that requisitions from States should be continued; that a judiciary should be estab¬ lished; that naturalization should be uniform; that the executive should coerce refractory States or individuals; and other provisions of less importance. This plan was unfavorably reported from the committee to whom it was referred; but a compromise was ultimately effected.

NEW JERSEY TEA. See Ceanothus.

NEW JERUSALEM, the name given by the Apostle John in the book of

Revelation to heaven.

NEW KENSINGTON, Pa., the centre of a tri-borough composed of New Kensington, Parnassus and Arnold, in Westmoreland County, located on the Allegany River and on the Pennsylvania Railroad, 18 miles northeast of Pittsburgh. It is described as ((The Queen City of Y/ estmoreland County,® <(The Metrop¬ olis of the Allegheny Valley,® and industrially is known as the home of aluminum, having the largest aluminum mill in the United States. There are also two mills of the American Sheet and Tin Plate Company, the American Window Glass Company, one of the largest plants in the country, two large railway equipment plants, besides a number of other important industries exploiting the mineral and other wealth of the neighborhood, with an output of steel and iron manufactures, brick, white lead, lumber, furni¬ ture, etc. The borough is distinguished by its imposing public buildings, handsome residen¬ tial sections, fine schools, churches and benevo¬ lent institutions. The borough celebrated its

silver jubilee of 25 years of prosperity in 1916. Pop. (1920) 11,984.

NEW LEBANON, N. Y., town in Colum¬ bia County, 24 miles southeast of Albany, on the Rutland Railroad. The people are engaged in agriculture and manufacturing, the products being patent medicines, brooms, chairs, baskets, lumber and flour. Nearby are fine thermal springs around which a popular resort has grown called Lebanon Springs. Another ad¬ jacent settlement is the Shaker village, Mount Lebanon.

NEW LEINSTER, len’ster, or Hn’ster. See Stewart Island.

NEW LEXINGTON, Ohio, village, county- seat of Perry County, on the Pennsylvania and the Toledo and Ohio Central railroads, about . 50 miles east by south of Columbus. It is in an agricultural section and in the vicinity are coal fields and deposits of fire clay and natural gas. The manufactures are chiefly brick and other clay products. There is considerable trade in farm products, brick, clay and coal. It is the seat of Saint Aloysius Academy. The waterworks are municipally owned and oper¬ ated. Pop. (1920) 3,157.

NEW LIGHT, a fish. See Crappie.

NEW LIGHT and OLD LIGHT, the

names generally used to designate the two parties in the Presbyterian Church whose dif¬ ference of opinion in regard to the power of the civil magistrate in matters of religion caused the disruption of the

Associate Synods of Scot¬ land in the latter part of the 18th and the be¬ ginning of the 19th centuries.. The terms were again used for the two parties in the similar controversy in the Reformed Presbyterian Church in the United States which caused the division of that body in 1833. See Presbyterian Church in tpie United States.

NEW LISBON, or LISBON, Ohio. See

Lisbon.

NEW LISKEARD, lis'kard, Canada, 'town in Ontario, at the head of Lake Timiskaming and five miles north of Haileybury, on the Timiskaming and Northern Ontario Railroad. It is a growing town with a public library, hospital, foundries, saw-mills, grist-mills and brick-yards. It is provided with an electrical lighting system and waterworks. Pop. 3,000.

NEW LONDON, Conn., city, port of en¬ try, one of the county-seats of New London County, on the Thames River and on the Cen¬ tral Vermont and the New York, New Haven and Hartford railroads, about three miles from Long Island Sound and 50 miles in direct line southeast of Hartford. It has regular steamer connection with New York, with Greenport and Sag Harbor on Long Island and, in the sum¬ mer, with Block Island. A State-owned pier, for which the State appropriated $1,000,000 has greatly increased the facility of its fine harbor. When contemplated improvements are com¬ pleted, vessels of 37-foot draft can be ac¬ commodated.

In 1646 John Winthrop, the younger, founded Naumeag, and in 1658 the name was changed to New London. Prior to the Revolu¬ tion it was of considerable commercial import¬ ance and had established trade with the coast towns of the nearby colonies and with the West

Indies. During the war it suffered from at¬ tacks by the British. On 6 Sept. 1781 a British force under command of Benedict Arnold at¬ tacked the town, destroyed the wharves and many of the buildings and killed a number of people. The principal battle occurred across the river on Groton Heights. In memory of this attack, a shaft 127 feet high has been erected at the place (see Groton) where the massacre occurred, flhe town was incorporated in 1784. The first session of the Catholic Sum¬ mer School of America (q.v.) was held in New London.

New London has a number of large manu¬ facturing establishments, chief of which are machine shops, foundries, printing-press works, silk-mills, cotton-gin factory, brass and copper tube works, bedquilt factory and shipyards, submarine engine works, large, new Groton shipyards. Some of the historic places of inter¬ est are the Old Town mill, built in 1646, the schoolhouse where Nathan Hale was once a teacher, and the Hempstead House, Old Fort Griswold, George Washington House. A gov¬ ernment naval station is on the other side of the river now an important base for submarines. New London is the seat of the Internal Revenue Cutter School of Instruction located at Old Fort Trumbull. Also the seat of Connecticut College for Women opened for students in 1915. New London and vicinity is an important summer resort, several thousand visitors being added to its population during the season. It has beauti¬ ful country roads for autoing and is also the centre of the Connecticut lobstering and fishing industries. The annual boat race between Har¬ vard and Yale universities occurs on the Thames in June. It has a vocational high school, public and parish schools, the New London County Historical Society and Library and a public library. The government is administered under a charter of 1894, revised in 1905, which pro¬ vides for a mayor who holds office three years and a council. The school board is chosen by popular vote. Pop. (1900) 17,548; (1910) 19,659; (1920) 25,688. Consult < Historic New London) (in New England Magazine, Vol. V) ; Caulkins, (History of New London) ; Starr, (Centennial Sketch of New London.)

NEW LONDON, Wis., town in Waupaca County, 20 miles north of Appleton on the Wolf River and on the Chicago and Northwest¬ ern and the Green Bay and Western railroads. It has an electric-light plant, waterworks, a Carnegie library, school buildings and an at¬ tractive city hall. New London manufactures bee-hives, furniture and machinery. It also has a condensed-milk plant and lumber mills. Pop. (1920) 4,667.

NEW MADRID, Mo., city, county-seat of New Madrid County, on the Mississippi River and on the Saint Louis Southwestern Railroad, about 130 miles in direct line south by east of Saint Louis and about 50 miles below Cairo, Ill. It has regular steamboat connection with all the river ports. It was settled by Americans in 1788, when the Spanish owned east of the Mississippi. During the Civil War it was used as a Confederate station until 14 March 1862, when it was abandoned and became a Federal possession. It is situated in a productive agri¬ cultural region in which the principal crops are cotton, grain and fruit. Stock-raising is also important. It has extensive lumber interests.

The trade is chiefly in lumber, staves, veneer, grain, fruit, livestock and cotton. Pop. 1,908.

NEW MARKET, Battle of. In co-opera¬ tion with General Grant's Wilderness campaign and the movements of General Crook, who was marching from West Virginia on Staunton, Va., General Sigel, commanding the Union forces in the Shenandoah Valley, on 9 May 1864, marched from Martinsburg up the Valley pike with General Sullivan's infantry, General Sta- hel's cavalry and five batteries of artillery, in all about 6,500 men and 28 guns. He ar¬ rived at Woodstock on the 11th, his cavalry pushing on to Mount Jackson, where, on the 14th, it encountered some of Imboden's cavalry, forced it across the Shenandoah, and followed as far as New Market. Colonel Moop with parts of Sullivan's division and cavalry, joined the advanced cavalry at New Market late in the evening, and a skirmish ensued, in which artillery was used. Twice during the night strong demonstrations were made on Moor, which he repulsed. General Breckinridge, com¬ manding the Confederate troops in the valley, hearing of Sigel's advance, had collected at Staunton a force of 5,000 men, including the cadets of the Virginia Military Institute, with eight guns, and at daylight of the. 15th drew up two miles south of New Market to give battle. Moor had, besides 300 cavalry and two guns, two regiments of his own brigade and two of Colonel Thoburn's. Stahel came up in the morning and took command, and as it neared noon Sigel arrived with the rest of his army, and made disposition for battle. Moor was left in his advanced position, with his own two regiments and a small body of cavalry to hold Breckinridge in check, until Sigel could complete his dispositions, which were well made. Thoburn's brigade constituted the main line, along which were the batteries. The cavalry was behind the centre and on the left flank. The line extended across the pike on rising ground, another slope in front being held by Moor, Breckinridge formed line with Echols' brigade on the right and Wharton's on the left, the Institute Cadets and the 62d Vir¬ ginia between the two. Imboden's cavalry and a six-gun battery were on the extreme right. McLaughlin's artillery occupied a sharp ridge left of and parallel to the pike and opened furiously upon Sigel's guns, which as furiously responded. Breckinridge advanced, and Moor, being overlapped on both flanks, fell back in some disorder, and Breckinridge, without paus¬ ing, pressed on and attacked Thoburn, who, charging from his right, checked him, Sigel's guns using shell and canister with great effect. Meanwhile Imboden crossed Smith's Creek and, moving down its east bank, gained the top of a small hill opposite Sigel's left, placed his guns on it, and at short range opened a rapid fire upon Sigel's massed cavalry, which im¬ mediately fell back,

and Sigel ordered his en¬ tire line to fall back half a mile. Imboden's guns were now turned on the flank of the in¬ fantry, Breckinridge pressed on in front, and the contest was desperate and at close quarters, Von Kleiser's battery being particularly destruc¬ tive to the centre of Breckinridge's line held by the Cadets. An order to charge the battery was given, the Cadets and the 62d Virginia went forward in fine style, and with great loss cap¬ tured the battery; the rest of the line advanced,

and Sigel retreated, followed a short distance by Breckinridge. At Rude's Hill, nearly three miles from the field, Sigel halted and formed line; Breckinridge soon came up; there was an exchange of artillery firing; and at 7 p.m. Sigel abandoned Rude's Hill, crossed the Shen¬ andoah, burned the bridge, and continued his retreat down the valley to Cedar Creek, which was reached early in the morning of the 1 7 th. The Union loss was 93 killed, 482 wounded and 256 missing. The Confederate loss was 42 killed, 484 wounded and 13 missing. Consult (Official Records* (Vol. XXXVII) ; Pond, (The Shenandoah Valley in 1864) (New York 1883) ; The Century Company's (Battles and Leaders of the Civil War) (Vol. IV) ; Wise, (The Battle of New Market.*

E. A. Carman.

NEW MECKLENBURG, mek'len-berg, formerly New Ireland, the second largest island of the Bismarck Archipelago (q.v.), 35 miles northeast of New Guinea and to the northeast of New Pomerania, from which it is separated by Saint George Channel. It has an estimated area of nearly 5,000 square miles ; is mountainous and forested, with a fertile coastal belt; with the exception of a small European trading station on the north coast it is in¬ habited by wild Papuan tribes.

NEW MEXICO, the 47th State admitted to the LTnion (1912), lies between lat. 31° 20′ and 37° N. and long. 103° and 109° 2′ W. It is bounded on the north by Colorado, on the east by Oklahoma and Texas, on the south by Texas and Mexico, and on the west by Arizona. Area, 122,271 square miles (78,374,400 acres), of which one-third is public lands. The territory was organized 25 Nov. 1850, under act of 9 Sept. 1850. Capital. Santa Fe. .

Political Divisions.— The following table gives the counties, with their area, property as¬ sessment, population and county-seats :

Topography. — New Mexico occupies a lofty plateau which reaches its greatest eleva¬ tion in the north and west and slopes to the south and to the southeast, where lies the western part of the Llano Estacado, or staked plain, no part of the plateau being less than 3,000 feet above sea-level. The altitude of Santa Fe, in the north, is 6,998 feet, that of Albuquerque on the Rio Grande, near the middle of the State, 5,008 feet, while Carls¬ bad (formerly Eddy), on the Rio Pecos, is 3,122 feet. From the vast table-land, both east and west of the Rio Grande, rise numerous sierras and more or less isolated peaks belong¬ ing to the Rocky Mountain system. The Sangre de Cristo range of Colorado extends southward into New Mexico to lat. 35° 30', the various component ridges being the Culebra, Cimarron, Taos, Santa Fe, Mora, Las Vegas, Raton, etc. The principal peaks are Cerro Blanco (14,269), Truchas (13,150), Taos (13,- 145), Costilla (12,634), Baldy (12,623), Lake (12,380) and Mora (12,020). Southward from these and extending eastward are numerous isolated sierras — the Sandia, Manzano, Gal- linas, Jicarilla, Caballo, Oscuro, San Andres, Organ, Blanca, Capitan, Sacramento, Hueco, Guadalupe and many lesser mountains. West of the Rio Grande and within its immediate drainage is another broken sierra, extending southward from the Colorado line, its principal component groups being the Petaca, Valles, Gallinas, Nacimiento, Jemez, San Mateo, Mag¬ dalena, Socorro, Black, Mimbres, Florida and Potrillo mountains. In the northwest the Car- rizo, Tunicha and Choiska mountains, forming part of the continental divide, extend into the State from Arizona, as do the San Fran¬ cisco and Peloncillo ranges in the southwest ; while lying between the western boundary and the mountains of the Rio Grande area are the Zuni, Datil, Little Diablo, Black, Tularosa,,

COUNTY

Area (sq. m.)

Property

assessment

Remalillo .

1.214

$21,274,013

Chaves .

6,084

20,933,095

Colfax .

3,798

26,364,429

Curry .

1,406

10,513,508

De Baca .

2,340

6,967,123

Dnna Ana .

3,821

18,359,074

Eddy .

4,174

10,019,151

Grant ... .

7,428

29,701,777

Guadalupe .

3,024

11,719,638

Lea . . .

4,290

7,190,010

Lincoln .

4,779

10,176,380

Luna .

2,976

12,852,530

McKinley .

5 , 506

10,830,481

Mora .

2,571

10,089,236

Otero .

6,689

10,537,410

Quay .

2,905

13,076,074

Rio Arriba .

5,871

7,992,076

Roosevelt .

2,439

9,213,529

Sandoval .

3,871

6,054,720

San Juan .

5 , 476

4,414,443

San Miguel .

4,798

21,211,832

Santa F6 .

1 ,973

10,872,929

Sierra .

3,118

5,814,765

Socorro .

15,070

18,333,614

Taos .

2,252

5,136,781

Torrance .

3,369

10,112,270

Union .

5,370

16,018,961

Valencia .

5,659

15,169,042

Totals .

122,271

$360,961,891

Population

County seat

Popula¬ tion, 1918*

1910

1918*

23 , 606

34,000

Albuquerque .

20,000

16,850

21,000

Roswell .

9,000

16,460

22,500

Raton .

5,500

11,443

15,000

Clovis .

4,000

Ft. Sumner .

800

12,893

16,750

Las Cruces .

3,500

12,400

14,500

Carlsbad .

2,000

14,813

25 , 000

Silver City .

3,500

10,927

13,500

Santa Rosa .

1,031

Lovington .

500

7,822

9,000

Carrizozo .

1,200

3,913

7,000

Deming .

4,000

12,963

14,000

Gallup .

3,000

12,611

16,000

Mora .

1 ,000

7,069

9,500

Alamogordo .

2,000

14,912

18,000

Tucumcari .

3,000

16,719

17,500

Tierra Amarilla .

1,000

12,064

13,500

Portales .

1,300

8,579

9,300

Bernalillo .

800

8,504

10,000

Aztec .

700

22,930

30,000

Las Vegas .

8,000

14,770

15/750

Santa F6 .

7,000

3,536

5,000

Hillsboro .

500

14,761

17,000

Socorro .

1,750

12,008

13,000

Taos .

1 ,500

10,119

12,500

Estancia .

500

11,404

16,200

Clayton .

1,500

13,320

14,500

Los Lunas .

700

- Estimated.

NEW MEXICO. Estimated population, 437,015

COUNTIES

Pop.

Pop.

23.606

Bernalillo .

. . H 8

7,822 Lincoln .

. .L 11

16,850

Chaves .

3,913 Luna .

. . . Q 5

16,460

Colfax .

12,963 McKinley .

. . . G 4

11,443

Curry .

12,611 Mora .

De Baca .

.1 16

7,069 Otero .

(Pop. inel. in Chaves,

14,912 Quay .

. . H 18

Guadalupe and linos-

16,624 Rio Arriba . . . .

. . . D 9

evelt Cos.)

12,064 Roosevelt .

. . K 13

12,803

Dona Ana .

. . . P 8

8,579 Sandoval ....

. . . F 8

12,400

Eddy .

. P 17

8,504 San Juan ....

. . . D 8

14,813

Grant .

...03

22,930 San Miguel

. . G 14

10,927

Guadalupe .

.114

14,770 Santa Fe .

. G 10

H idalgo .

. . .P 2

3,536 Sierra .

...N5

(Pop. incl. in

Grant

14,761 Socorro .

...L5

Co.)

12,008 Taos .

..Dll

Lea .

. .() 19

10,119 Torrance .

...Ill

(Pop. incl. in Chaves

11,404 Union .

. D 18

and Eddy Cos.)

13,320 Valencia .

...14

Incorporated Cities, Towns, Etc.

14,025 Albuquerque . .

. . .H 9

2,204 Gallup .

. . G 2

1,883

Artesla .

..0 15

449 Hagerman . . . .

. .N 16

509

Aztec .

. . C 5

417 Hope .

.0 15

1.736

Carlsbad .

P 16

344 Lake Arthur. .

. N 15

791

Cimarron .

D 13

3,836 Las Cruces . . . .

. . . P 8

970

Clayton .

D 19

3,179 Las Vegas .

. . G 12

3,255

Clovis .

1,292 Portales .

. . K 19

280

Dayton .

.0 16

4,539 Raton .

. .C 15

1,864

Deming .

Q 5

6,172 Roswell .

. .M 15

242

Dexter .

. N 15

5,072 Santa Fe .

. .F 1 1

3.755

East Las Vegas

. .G 13

3,217 Silver City . . . .

...03

327

Elida .

. L 17

1,560 Socorro .

. . . K 8

517

Estancia .

Ill

550 Springer .

. .D 14

785

Farmington . . .

. . . C 3

409 Texico .

. . . J 19

484

Folsom, Union .

. C 17

2.526 Tucumcari . . . .

H 17

Simpson.

RIO GRANDE

Dolores

Uermosa

© Cortez

Durango

Berwind0’qˆ

•nglerilll

LJc.

Carbon Jc.

TrinitJa,

Primeroc

UTE

INDIAN RES.

ˆ 7\ Antonito

Teroio

iWooton

/ˆColinex or J/ Riverside P. y Oodar Hill Inoaˆor Rosing

i Pendleton’ Laplata

Vraoa

Devcys Pk,

% Brilliant1

ilia Pk. \ r»ir

Vyˆ/wbatˆJSjrf.ˆ0 ˆ>N LVchama P \v\ vniiow CreckˆR Horse L. *\ ‘WSjll Park Vie jo, ~~ 1 ‘

ˆ yQIierra Amarill s Horse Lake-Jc. ˆHopewell u’

XcFr R Vb Avf’jl’?”

Mp 1 Vado / rx LaTablasP > V-—9 ‘ — y/° CeUollftVallkitos0ˆ ‘

life (/v / V

W Sv fOanjllon V

HillcrestA

✓

uldcf Lokc £

J ICAR ILL A

c \ Tdwanda ,gcˆ .

rxjj’ulsbm

k* vYAmbpy’”’”- ˆ ”

no tea”

DIllcˆ an H„uten°<'r" i PrestoXˆ" .Kochlerˆ/'X

frˆIzte® ˆˆrlora Vista ˆBloomfield m“‘°°r

tebron Capulin*

8r Jo. X -0

„ A – ˆ X Jj&Antelope Pk’

rfScbomberg ‘I ...

Maxwell Pa,° MtˆijTVˆV?’ fFrenoh t?\(o Chico i

Shiprock

ortta Des MohiW >es_Moinesjr V X/ CorrumpS’

0 Cuatea

lˆVernador

No Ague ’ 0Tu8aB

Fun”®’

.Grande.

u ~ Moseaˆˆ S—

SUootoo Bin, peon «<; S&K, | j-ˆNJjrenvllU Ci*utu«iL!'* •

Ion – > — ˆZr ‘N.. ■»>

ˆ son~~—>-£sJc’ M ,i ˆ x Qiaˆ-nS.

|l Angels, Peakˆ NA

ˆ \ il?-

? El Huerfahiti’.’ˆ, §1 ■

%S&A

Galllnas I Peak

f o Valdez ˆˆHArln

A°rro,oHon«ˆlB|aok Cln

,<-'"\Ran obes of Taos So? TalrAˆy Black Like. •

DON ,.CARUOShH)LUS”

V*0 Or.

Taylor or

i Tailor Springs P.0.

tadu

Miami*

Springer

Rayadol

Colmor#

El Rito o. Ojo Caliente)

CEJiT,

Haynes

Thomas’

‘asamonte

.Vernon

“‘1 Been ham Clapham <

aV N\Hollando DehavenS M iera^y

.Abbott

\RESERVATL0Vy

Sedan

, Nolan

(j ^ ...CHUSCA

BfiSte

‘^P’edernal /J ^vYlaraeCW

, P0“K 0“W”%&il«ira?\)Tr.ll

PUCBLO,,,™1’*”’ » irrucha“^-

San I ldefon Bo¬ or IldefonzolP.O.

? Bio Oindo

Blan»L_Bucki}ian/!

c/o Oodtt c\Ouadaluplta n « |

J Lucero (

Naranjos

| Jar a-

||nXciemento

iy Buttel

leveland.

< gWf Hayden

‘ Coneo°*G Amlstado pomanener

r r VijI011® ’

- °8etfˆrlto\

-i y /ov

gulpbur Springs

/iiiNIt . ˆ“iˆChuska ,.X Peak .

Tohatchi _/r—/ˆX-

Cm SfaJTraohas Peaks ˆ “ujyA«sf

P ‘SColJo/ˆciXlA.S.i’o1

SAXTAirKˆˆsAi

r’f juTomJp’son Peak Spnr

Vciorieta cWpecos LiiS \ €g0

A 1 p/ˆXjmcaturˆ.ˆ B apr’ 1 ‘* s

1 O.lutso I s„dlˆOTX Mlfoal

/Bond1”*’

Optimo

/Shoemaker

J Albert

/ˆYIWˆ‘W

&hacro Me id

iierra Negra

! Mosquero V

Jaoona,

Mosquero R Cabezaˆ

Chaco

J V A LxA

.Canjon, «

oj ernes A

Penablanoa P

Cabezon |

. ˆjCabezori V W P,®ak

dWw

iGallegos

Donaolana

Gibson

GalluiKˆe- J’T; Defiance

Pass

A ega lllanca ˆZjdaldo

‘Koaarm’

Trementlnao‘1

Yarladeroˆˆ N

igate

Atarque]

ˆVlanuelito I FOR T WING.

Loo ft£S-

Liendre,

Canude

ant < -ua/i Anniston /

AlgQdonesˆˆKo?

. m Mr

BerualiIloˆ > - FELIPE I t i — qPlaoitas •

jCaudfa

San Mateo

Conchas Buxton o

4Pˆ

rZZUN ,

v u iiCUrk.

I /- 1 EJojk

oSan Pedro Jp Will lama , Hjer °/

South Mt,

ne

Venus –

o < >r\

ijasi’Min

iBlaewater |yn_

“Sandoval ,

’Chaperito

San Jon®

Zl) Norton A j”ple™.Y

A lamed;

Ziinl Buttes

An to i

‘Hshnf&i |

Albuˆiuercj

Barton ■

PUEBL’Q I LAGUN\ flBD. BBS,

/Stanley

Otto-1|\ˆ

|uerque|

Abaii

Blackrock

i®rvo Butte

lolonias*

Zuni

Piedra Plntada

El Morojor , p –

Inscription Rock £_A.

igantc) ˆBajar ito P Barr x p-/|l Padillas V.

, Plains

Pi.rrti-

I Cerrito del Lobo

I McIntosh

pAi Wlopeˆ1 ˆ =

[K&tauda pedernal

[R R A N C E

A»°

V — c®

P.drro.1

J\ ˆ ˆ-‘ˆRattlesnake ,n VWiHUl Indiol.ˆ

ˆ V * ; feHur.n/>l

l’rocresBoNv

.afa«l /V j

Helena!

r] Jˆgansril ˆ PreBton

.Gr”.b

.CEBOLˆO

Ch 11111

r Nortnˆ- A? Garcia q

A HaKI»

Ifleta

ˆPedernal Ml,

\Vo i dr o vi ° Ragl an dZˆ Hartford .V-, F«ut?i

cZ;-’ori*”-JA “Kilk

F ,rd\ ~3 > V afnrd.-jko nil ˆ XI.. fl*.“

7/oPeralU 7~~ 7l-os Lunas |p • Bosque Pk

I Tome H

Capillo PH.fe| i 0shaPk.40V

■hMadrone ‘’./W/i

iAiod«a ;dw.

Puerto dc fiddle®

Mosca Peak

1 IVIO \

Puerco’

0 Atarque

Old Crater

liaUesVr

.ryupA

% J Beletij “Jpralcs I,

[2”eo Cr

Extinct Voloanoˆ;

Winkle

> y I.concito ,

f7:uL.u.

Broom Mt,

Old Crater^

’E. \ augh i \ Mon

\,Oasaue

Sad ado Cardena3

S’; East view

i|-X PdAeoIto s ° HHU’UaTKP,

- %wZ-V’

a\Y ■ |

Datllo A\>s Mt.Mary Magdalene ^ Tres ^

Montopos’^ Kell^Z .. J? _ Cat Mt.fe

Bk»rdo xp

Cedar valeXZ Camaleon

e Quemado

’omince

l»ereno

^^Cama’Je*

Plnon Mt.

° MangaS

White Fla I

° Pearson r.VrrS C pton o o Ingram 0 Macl Lewiston Plateau or S

llu^lalu

Inglevllle

Lcmitar

[Socorro

lil dings _

Claudel]

RANGE-

Mesa

‘Dunlap

Delphos ?(, Mann

Liston,

Ti-colote

Kermit-P.O,

Horse. Mt,

Carter o”

Elida rr tUdlakec a*/L

Z’/Tomcro 5o>ˆJudaono 1 jNewhopc

I “Valley View

Jacks. Peak JICAˆ>LLA.MT9.

jicariila

Ancho,

LargoV’

I Roanoke

San Antonioi

Luna1

Jr Aragon

Cromer o r,8o0c Q RlcMuido0*“6*! 3 AUle”

, Cartilage 3 £

N. Oscuro

o 1. jr$%£ •

ˆ Uansonbergiˆˆ

!ittle San Pascuaj / iNsSˆ

|AV Mt. ~ ~

y** Oscuro Peak’ˆˆy Lava Butte ‘/ ˆ#1 Jakes

ava Crater. ..Alkali ,o{ ˆ>-Little – \ fWAf/Jz o° ‘Z f Peak

‘Rosedaleˆˆ.‘e <

> /- A

Elmendorf.

Dry Lake

Reserve a*!

“Whit-oaks ‘ˆ~pZT .

Robsart ˆ Encinc-ao ˆpCarriˆo Peak ˆ _ 0

CarrjzowJeGo. ,«j..av”.W Meek ZMvW’nlnut a. .®»ERqii’i,e*akT aTˆIndian Divideˆ JAR,TAS Arab*

>o|ftlogal P kˆZ.aP ‘ˆˆxinooln -Tvr °AJto yˆdA° *° cvVrvTinnie

‘ t _

Staked

Plains

“1 ° Eaglobill

‘atcm.

iicme

ˆ , -’‘San Mateovyˆ

Fluorine \ ° > Peak

Melcna.

Monticello

iRosweDj

Chloride

Caprock

■{L{°zoiToa (

— Mogollon Mtl’^ff/yl

vCrocker ^

U’lRiund Mtf/ Salinas Peak

!

Engle iX

phant iButte f \ ^ SflH-J Cutter! o’ ’■ yafrLakc*%

Fair View

PJcacho

Tatum o Scott o

Cuchillo

Reservoir

Salinas * Temporal

, Jacksoi

McDonald o Pla inview

Midway o I

Buckhorn o

.t

Purdy. Latr Eftke Arthurˆ

Stanbro*

Tularosa

Aleman o

Loviiigton,

YE as Palomasf!

| “KUphf

j .

ˆBcrry , LˆPt. |l

ˆ a c I ˆˆGr a m a

I

H«tofiˆv = d’jmoon ‘

ˆ > ˆltedejVl Detroit Huckett »ltTonuoo

Cerro Magdalena

Zj KearneyV

Alamogordo Jc.’

lAlauiogrordo’

ˆeViS&F Omlee ˆ

ˆyV < *v°

Lu7*)X’loudcroft II’/. Co* Canon

%&-iT9k Hendricks PkU p

Utoeˆ.Bˆte’ jfeet|u|lg

1 < W.B/vo4ˆw, |\SP

T wS..

a’*’*/^bf.rj\?Sh4t

Hurley |-8warj^

_ \ h) Apache Tejo?/’ t S

S^Lv,,, _

. C-^V-I j tv Cooks Pky4 Ja/wood StaXl / V

| dX-bpalding ‘ ,;%/gOO

^ P|aln*

‘Loxer Penaaoo

mgston^ “-f/q

./Coii***00′ ‘ /

Artesia i

oHope

f tbc Lakewood

Knowles

Dunken

If Rooks*

“Bobbs

Monument K,dl°,

Escondido

^ Pinon

Summit

Fort Selden 4, 5r

^ X.vU,l8burg O — 4 Organ0 ‘.-0 San A

» Q \ Dona Ana | ^

« .,,\ Las Cruces^,

MesillaPfc « – Isoledat

1 \ atate College | \Mesllla Park 5J « Ft, FiUmore > ■

m > NA Mesqni^ * / TellesJ^ f. S

p.,.W L* Me“° Y,Ceotri.leyal|€-y 1

^ 1 ” ‘ W?A. fton’SP h am ber i n o/ \ Ber ind^ y d/’Y0, • RutterV ° W^a Tuna oi

Avalon ll.a Huerta

turquoise

- „ a- e

lustine Pass J J aril la”

f

■a»yon y

itch f ‘t ± \ v

iisLordsljiirg,r

aXW > .Ulmorls ”•X^

Carlsbad

Ante‘0%

A ^

SbJt Lake | Alkali f4a <

‘Orogrande

k-^yOtisA^ ^vj0”0. Loving

Conrad

Elwood

Hawkins*^ i ^SpSepar ^JjJ ‘E Ladim.l Brockman I

ESkfltˆ’D

-ill’s – SJ . HondaleA iJJidwjˆf

Malaga1

lueon

Ooboa°

/JCTQRiˆ

Las Cornudasˆ

J’V’ Las’* Anlma*

fRodeo> V* Alkali zz, C – Flat ˆ

ysSouth Peak

iPeak

Orange

Tonerlin

” nterloo “orlc,a A f *Q y

s i%. Dr, i,n,#; yX1

‘Miner o’

Uachita

Victor!)

Delaware

fuBtodon

Mimbres

Slittlj

HAT Cl

Ysleta

HATCHER MTS,

Barstow

Lake 3e\ S. Marie

Medanos

NEW MEXICO

Los Medanos

SCALE

Statute Miles, 40 = 1 Inch.

10 20 SO 40 60

Martina

Rand McNally's 11 x 14 Map of New Mexiao. Copyright by Rand McNally A Co.

from Greenwich

Longitude West

NEW MEXICO

149

Mogollon, Pinos, Burro, Pyramid, Big Hatchet, Hachcta and Animas ranges, with many others of lesser note. See Boundaries of the United States.

Climate. — The climate is very dry and healthful, and has made the State justly celebrated as a resort for those afflicted with pulmonary troubles. The annual mean tem¬ perature ranges from 42.4° at Winsors, San Miguel County (8,000 feet), to 65° at Carlsbad, Eddy County (3,122 feet). The highestˆ tem¬ perature' averages approximately 112° at Carlsbad (25 June), and the lowest — 12° at Bluewater, Valencia County (2 Feb.). The total precipitation on the average ranges from 22.42 inches at Carlsbad, to 4.66 inches at Dem-ing, Luna County. Nearly half the precipita¬ tion (10.5 inches) at Carlsbad occurred in July. The greatest rainfall occurs between May and August, the least between February and April. The number of rainy days on the average ranges from 78 at Santa Fe to 18 at Albu¬

querque ; average, about 40 days. The prevailing winds are southwest, west, southeast and east. Although the summer temperature is sometimes high, especially in the southern part, owing to the dryness of the atmosphere the heat is never oppressive and the nights are always cool.

Rivers. — The streams of northeastern, eastern and central New Mexico flow into the Mississippi and the Gulf of Mexico, while those of the western portion empty into the Gulf of California. The largest river is the Rio Grande, which flows generally southwesterly from the Colorado boundary to lat. 33°, then southeasterly across the Mexican line. This river has several unimportant tributaries within the State — the Chama, Jemez and Rio Puerco from the west and several of even less significance from the east. The Pecos has its source in the Las Vegas Mountains, flows southeasterly, then generally southward, al¬ most paralleling the western escarpment of the staked plain, and southeasterly across the Texas border, finally joining the Rio Grande. The Canadian, with its several headstreams, diains northeastern New Mexico and passes out of the State in lat. 35° 25', forming a branch of the Arkansas. The western part is drained entirely by headwaters of the Colorado the San Juan, the Zuni and the Gila. The Rio Mimbres, which heads in the Florida Mountains, is, like all except the largest streams, non-perennial, and indeed even the channel of the lower Rio Grande is frequently dry.

Forests.— Several of the mountain ranges, particularly those of the north and in Lincoln and western Socorro, Grant and McKinley counties, are covered with timber, the most valuable being pine, although oak, juniper, cedar, birch, maple and other trees are common. The Pecos River, Lincoln and Gila River forest areas have been reserved by the United States, grazing of cattle is allowed undei cei tain conditions. Pinon and cedar are abundant in the foot-hills throughout the State; mesquite is foundi in the southeastern part, east of the Pecos, while the saguaro or giant cactus forms a feature of the landscape in the southern and southwestern parts, where there are also groves of oak and walnut. Along all the water¬ courses cottonwoods are abundant, and occa¬

sionally willows and sycamores are found. Yucca,' the roots of which are used as a substi¬ tute for soap, is everywhere abundant.

Agriculture.— In many of the valleys and mountain ranges (where the latter are not of exposed basalt are nutritious grasses — at least 14 varieties, mostly gramma, being found — affording fairly abundant food for the large flocks and' herds. Bear, deer, mountain lions,

wildcats and antelope (prong horn) are found in the mountains, and rabbits, hares, coyotes and prairie-dogs are common in the plains. The valley lands are fertile, but as the State lies wdthin the arid region, agriculture is con¬ ducted largely through irrigation. Irrigation in this State, until recent years, has been of a primitive character and was carried on by those dwelling here centuries ago, as evidenced by remains of ancient ditches, but the magnitude and possibilities of the system are not generally realized, and even yet the real irrigation sys- terns of New Mexico axe in their infancy, though certain sections have them well de¬ veloped. Throughout the State many dams have been built to conserve the flood water and a large acreage is thus made fertile. Govern¬ ment irrigation projects include the Elephant Butte Dam with a storage capacity of 2,680,000 acre feet ; and the Carlsbad System, which has reclaimed 24,500 acres of fertile land. The Stor- rie Dam, a private enterprise at Las Vegas, will irrigate 12,000 acres. The Mimbres Valley and the lower Pecos region have been reclaimed by the use of artesian wells. While possessing important mineral resources, New Mexico is pre-eminently an agricultural country, 41 per cent of the population pursuing gainful occupa¬ tions, being engaged in farming and stock-rais¬ ing. The following table shows the acreage, yield and value of crops in 1909 and 1910:

Number of farms in State. . . .

Approximate land area in State (acres) ••#•••••• ••••••••••

Improved land in farms (acres). Total acreage of farms in State. Average acreage per farm. . ...

Value of farm land and build¬ ings . . . . . .

Value of farm land .

Value of buildings .

Value of implements and ma¬ chinery. . . . ., .

Average value per acre or land

and buildings .

Average value per acre of farm land .

Number of farms irrigated. . . .

Acreage irrigated . • • • • •

Per cent of number of farms

irrigated . •••••••.•

Per cent of improved land m

farms irrigated .

Total cost of irrigation systems. Average cost of irrigation per acre .

1909

35,032

78,401,920

1,464,000

11,225,000

320

$111,430,000

98,496,000

12,934,000

4,101,000

9.93

8.77

11,399

459,114

32.5

44.0

$9,019,908

$13.97

1910

35,676

1,467,191

11,270,021

315.9

98,806,497

13,024,502

4,122,312

8.77

12,795

461,718

35.9

31.5

$35,000,000

$19.83

The principal crops for 1918 were: Corn, 2,594,000 bushels; oats, 1,914,000 bushels ; pota¬ toes, 810,000 bushels; spring wheat, 1,075,000 bushels; barley, 284,000 bushels; apples, 119,000 barrels; alfalfa seed, 140,000 bushels.

New Mexico is the third State in the Union in the number of sheep of shearing age, with 3,135,000 in 1916, being exceeded only by Montana and Wyoming. It produced, that year, 18,240,000 pounds of wool.

The returns for livestock for 1917-18 were as follows:

1917 1918

Horses . $7,075,344 $7,116,535

Mules . 821,092 857,246

Jacks . 58,415 44,606

Burros . 40,213 34,979

Cattle . 45,600,800 47,138,396

Sheep . 10,588,826 14,232,910

Goats . 477,240 696,051

Swine . 304,358 278,321

Mineral Resources. — The mining industry is important. From 1860 to 1890 $17,600,000 in gold was produced. The mineral output in 1916 was gold, $1,382,400; silver, $1,162,208; copper, $22,815,833; lead, $566,779; zinc, $4,900,467. Coal mining is extensively carried on. The output of coal in 1915 (mostly bituminous) was 3,817,940 short tons, valued at $5,481,361. The coal area lies chiefly in Socorro, McKinley, Santa Fe, Colfax and Rio Arriba counties, in the northern and western parts of the State. The coal-bearing formations aggregate 1,850,000 acres, of which about 40 per cent is probably productive. Iron, salt, gypsum, clay, soda, ochre, potash, mica, marble, molybdenum, tungsten and vanadium are also found, as are turquoise, garnets, opals and chalcedony. Mineral springs are abundant. The net value of all mineral output for 1918 was $17,313,890.

Manufactures. — The manufacturing in New Mexico is still in its infancy. There is a grad¬ ual increase from year to year. The last fig¬ ures furnished by the government show that the capital invested in 1914 was $8,984,000; cost of material was $4,430,000; value of the product manufactured was $9,320,000; value added by manufacturing was $4,890,000; sala¬ ries and wages paid amounted to $2,974,000.

A comparative summary for the State for 1909 and 1914 follows :

Census —

Per

cent of

1914

1909

increase,

1909-

1914*

Number of establishments.

368

313

17.6

Persons engaged in manu¬ factures .

4,594

4,766

—3.6

Proprietors and firm members .

325

288

12.8

Salaried employees .

493

335

47.2

Wage earners (average number) .

3,776

4,143

—8.9

Primary horse power .

15,668

15 , 465

1.3

Capital .

$8,984,000

$7 , 743,000

16.0

Services .

3,273,000

2,974,000

10.0

Salaries .

577,000

383,000

50.7

Wages .

2,696,000

2,591,000

4.0

Materials .

4,430,000

3,261,000

35.8

Value of products .

9,320,000

7,898,000

18.0

Value added by manu¬ facture (value of prod¬ ucts less cost of ma¬ terials) .

4,890,000

4,637,000

5.5

- A minus sign (—) denotes decrease.

Transportation. — The Atchison, Topeka and Santa Fe Railway and the El Paso and Southwestern Railway are the most important roads in the State. The total mileage of all roads is 3,709.8 miles. Passengers and freight are extensively handled by automobiles and trucks.

Finances. — New Mexico had a total as¬ sessed valuation in 1918 of $360,961,891, a

bonded debt of $3,385,500, a floating war debt of a quarter million and a tax rate which does not exceed $4 per $1,000. In 1918 there were 43 National banks with capital stock amounting to $2,765,000, resources, $45,000,000 ; 22 State banks with capital stock amounting to $2,615,- 987.20; resources, $19,110,102.22. Adding $7,500,000 to assessed valuation gives real value of all property on tax rolls. The bonded in¬ debtedness is as follows: State, 513,385,500; county, $2,972,335 ; city, town and village, $3,- 250,000; school districts, $1,800,000; total,

$11,407,835.

Population.— (1870) 91,874; (1880) 119,-

565; (1890) 153,593; (1900) 195,310; (1910)

327,301 (native, white, 255,609; foreign, white, 26,331 ; Indians, 20,573 ; negroes, 1,628; males, 175,245; females, 152,056); (1920) 360,350.

Illiterates formed 20.2 per cent of the total population in 1910, a reduction of 40 per cent from 1900. The new census shows a decided

decrease as a result of special efforts to reduce illiteracy in several counties.

Religion. — The population consists largely of Roman Catholics, who have an archbishop, a vicar-general, about 50 churches and more than 300 mission churches ; several academies for young women, a college, eight parochial schools, Indian boarding schools, day schools for In¬ dians, and academies for boys. The Baptists have 150 churches; the Methodists comprise 17 English-speaking and a number of Spanish¬ speaking congregations, together with a number of mission schools ; the Presbyterians 45 congre¬ gations, 30 preaching stations, 25 mission schools with 45 teachers and 1,562 pupils; the Mormons two churches with 277 members. Other Prot¬ estant denominations have about 20 congrega¬ tions, and the Hebrews five organizations and two synagogues.

Education. — The education system of New Mexico was not created until 1891. Prior to this time education had been taken care of by various churches. Those of outstanding im¬ portance were the Catholic, Methodist, Congre- gationalist and Presbyterian. While they and other churches have continued their interest in education, the State has developed a most com¬ plete and effective system. There are 1,325 schoolhouses, valued at $3,200,000 ; 3,158 school teachers ; 79,481 pupils enrolled ; annual expen¬ ditures $1,943,324. The State maintains the University of New Mexico at Albuquerque, the College of Agriculture and Mechanic Arts at Las Cruces, the New Mexico Normal Univer¬ sity at Las Vegas, the Normal School at Silver City, School of Mines at Socorro, Military In¬ stitute at Roswell, Spanish-American School at El Rito, Institute for the Deaf and Dumb and Institute for the Blind at Alamogordo. The expenditures for maintenance of these institu¬ tions is about $700,000 per year. The outstand¬ ing movement in education to-day is consolida¬ tion of districts and the creation of county high schools.

Penal Institutions. — The penitentiary at Santa Fe, the Reform School at Springer, are not only penal in their character but are consid¬ ered reformatory and educational as well.

Charitable Institutions. — The Miners' Hos¬ pital at Raton and the Insane Asylum at Las Vegas are State institutions. In addition thereto, the State contributes to the following

Capitol at Santa Fe

1 Pueblo de Taos, New Mexico

2 Pueblo Indian Dance at Taos, New Mexico

private institutions : Saint Vincent's Hospital at Santa Fe, Grant County Hospital' at Silver City, Sisters of Mercy at Silver City, Ladies' Hospital at Deming, Eddy County Hospital at Carlsbad, Sisters' Hospital at Albuquerque, Re¬ lief Society at Las Vegas, Gallup Hospital at Gallup, Saint Mary's Hospital at Roswell, Sis¬ ters of Loretta at Mora, Sisters of Loretta at Las Cruces, the New Mexico Orphan School at Santa Fe. The constitution permits appropri¬ ations to be made to the above institutions. Government sanatoria are at Fort Bayard and Fort Stanton, where soldiers and sailors from all parts of the country are treated for pulmo¬ nary tuberculosis. There are many private sanatoria in the State.

History. — For untold generations before the discovery of America, New Mexico was the home of sedentary tribes of Indians — the ancestors of the present Pueblos — as well as of nomadic predatory tribes. The former con¬ structed villages, principally of stone, on the mesas, in the shelves of rocky cliffs (see Cliff- Dwellers), and in the valleys. Their numbers considerably exceeded that of their descendants of to-day, but there is no reasonable ground for the generally popular belief that New Mexico ever contained a teeming sedentary aboriginal population, notwithstanding the hundreds of ruins scattered throughout its area, particularly west of the Rio Grande. There is definite his¬ torical as well as traditionary evidence that many of the pueblos occupied at the time of the. discovery of the Southwest were later aban¬ doned on account of Apache and Navaho raids, or by reason of epidemics, the failure of water supply, through superstition, or the efforts of early Spanish missionaries to concentrate the natives. Many ruined pueblos in the State may thus be accounted for; for although Coro¬ nado in 1540-2 recorded 64 inhabited villages, some of them extensive, only two (Acoma and Isleta) of the 17 which remain still occupy their 16th century sites. The recorded history of New Mexico dates from 1539, in which year Marcos de Niza, a Franciscan friar, accom¬ panied by a Barbary negro named Estevan, or Estevanico, traversed the country from Mexico to the Zuni Indian villages, then known as the "Seven Cities of Cibola,)} in the western

part of the State. Estevan, preceding Fray Marcos during the latter days of. the journey, was killed by the natives at their village of Hawikuh, one of the seven towns; Niza followed, viewed the pueblo from an adjacent height, and fled back to Mexico. In February of the fol¬ lowing year Francisco Vasquez Coronado, guided by Niza and accompanied by a large force, marched from Compostela, Mexico, to Cibola, storming and capturing Hawikuh (which he named Granada), in July. Expedi¬ tions sent out from here by. Coronado, resulted in the discovery of the Hopi or Moqui villages (called Tusayan) in northeastern Arizona, and the Grand Canon of the Colorado. In the au¬ tumn the army moved to the province, of Tiguex, in the vicinity of the present Bernalillo, on the Rio Grande, where winter quarters were established and whence parties were sent to visit the neighboring pueblos.

In the spring of 1541 Coronado crossed the Pecos River into the present Texas and north¬ ward through the buffalo plains to the Wichita settlements of Kansas — the <(Province of

Quivira® — where several months were spent in exploration; but gold, which formed the object of the dreary march, was not found. The ex¬ pedition returned to the Rio Grande and thence to Mexico in the spring of 1542, having spent nearly two years in the country. Two friars remained in New Mexico and one in Kansas, but these were killed by the Indians. New Mexico was visited in 1581 by Francisco San¬ chez Chamuscado, with a small escort and three Franciscans, the latter being left among the Rio Grande Pueblos. These were killed after Chamuscado's departure. Late in 1582 Antonio de Espejo, with a bodyguard, was authorized to explore the new province and to learn the fate of the missionaries. Following the route of Chamuscado up the Rio Grande, he reached Puala, or Puaray, near the present Bernalillo (the principal town of Coronado's province of Tiguex), where the friars had been slain, the Indians fleeing on his approach. From this point Espejo extended his travels to the pueblos of Sia, Jemez, Acoma and Zuni, and to the Hopi towns of Arizona, thence eastward to the Rio Pecos and back to Mexico. The next important event was the colonization of New Mexico by Juan de Onate, the first governor of the province, who reached the new country via the Rio Grande in 1598 with about 400 colonists, and established the town of San Francisco de los Espanoles, later known as San Gabriel, where Chamita, at the mouth of the Rio Chama, now stands. All the sedentary tribes were vis¬ ited and their vows of obedience and vassalage taken, and the country from eastern Kansas to the head of the Gulf of California explored between 1598 and 1605. In the latter year San Gabriel was abandoned and the seat of govern¬ ment moved

to Santa Fe, which dates from this time. During the following few years the new colony barely existed; in 1617 it had only 48 soldiers and colonists, although the mission¬ aries had been so zealous that 11 churches had been built and 14,000 natives baptized. In 1680 the Pueblos rebelled against Spanish authority, killed many missionaries and colonists, and laid siege to Santa Fe, where, the panic-stricken survivors had taken refuge in the adobe palace, which still stands. Governor Otermin finally succeeded in driving the Indians off with con¬ siderable loss, and in retreating down the Rio Grande to El Paso, Texas, with a thousand followers, leaving the natives in almost uninter¬ rupted possession of New Mexico until 1692. In that year Diego de Vargas reconquered the province, with great loss to the Indians, ena¬ bling its resettlement toward the close of the year by 800 colonists. In 1696 the Indians again revolted, killing five friars and 21 other Spaniards, and it was not until the close of the century that the Pueblos were entirely overcome.

Henceforward New Mexico grew in im¬ portance ; new towns were established in the Rio Grande Valley, which slowly increased in population despite the constant depredations of the Apaches and Navahos. Early in the 19th century a considerable trade sprang up between the province and the settlements along the American frontier, notably Kaskaskia in Illinois, and later Franklin and Independence in Mis¬ souri, which increased from $22,000 in 1822 to $750,000 in 1844. This was the beginning of the overland commerce via the famous Santa Fe trail, which came to a close when the Atchison,

Topeka and Santa Fe Railroad entered the Territorial capital in 1880. Mexico having thrown off the yoke of Spain in 1821, New Mexico became a Mexican province ; in 1824 it was made a Territory and in 1836 a depart¬ ment, remaining such until 1846, when it was taken possession of by General Stephen W. Kearny in the name of the United States. In 1848, by the Treaty of Guadalupe Hidalgo (q.v.), New Mexico, the boundaries of which were very indefinite, but which comprised Arizona north of the Gila (see Gadsden Pur¬ chase) and a part of Colorado, was ceded to the United States, and on 25 Nov. 1850 the Territory was organized through the agreement by Texas to the New Mexico boundary, under the act of Congress approved 9 September. In 1863 western New Mexico became the Ter¬ ritory of Arizona, and in 1865 a northern strip was annexed to Colorado.

New Mexico was the scene of several con¬ flicts during the Civil War, notably the defeat of the Federals under Canby by the Texans under Sibley at Valverde in February 1862. Santa Fe was occupied by the Union forces in March; Sibley took possession of it a week later, was forced to evacuate in April, after the defeat of the Confederates in Apache Canon. Unsuccessful efforts' for the admission of New Mexico as a State have been made for many years, notably in 1906 when Arizona voted adversely on the Statehood bill. On 16 June 1910 the Senate passed the bill granting statehood to New Mexico, among the last of the remaining territories. This bill specifically provides, however, that the proposed State hold no legislative sessions prior to the first of January 1912. It also stipulates that the State shall set aside 100,000 acres for a State penitentiary.

Statehood. — New Mexico made many ef¬ forts to attain statehood. The final effort began with the passing of an Enabling Act, ap¬ proved 20 June 1910, which provided for a con¬ stitutional convention which met at Santa Fe 3 Oct. 1910 and finished its labors 21 November. The constitution was ratified by a vote of 31,742 to 13,399, 21 Jan. 1911. On 21 Aug. 1911 the President signed the bill providing for the admission of New Mexico on the condition that it amend the article providing a method for the amendment of its constitution. This amendment was submitted to the people, ap¬ proved, and on 5 Jan. 1912 President Taft issued a proclamation admitting New Mexico as a State.

Governors Since Statehood: Wm. C. Mc¬ Donald, 15 Jan. 1912 to 1 Jan. 1917- E. C. De Baca, 1 Jan. to 18 Feb. 1917; W. E. Lind¬ sey, 18 Feb. 1917 to 1 Jan. 1919; O. A. Lau razolo, 1 Jan. 1919 to 1 Jan. 1921 ; M. C. Mechem, 1 Jan. 1921 to 1 Jan. 1923.

Frank H. H. Roberts,

President, New Mexico Normal University.

NEW MEXICO, University of, situated at Albuquerque, New Mexico, an institution of learning established 28 Feb. 1889, in an act passed by the territorial legislative assembly of New Mexico. The normal school of the Uni¬ versity was the first department organized and was opened 15 June 1892 for a summer term. In September 1892 the preparatory school was opened and in November 1893 the - commercial

school was added. In 1896 the gymnasium was erected and equipped. In 1899 the Hadley Laboratory, largely the gift of Mrs. Walter C.

Hadley was erected. In 1906 two dormitories in the Pueblo Indian style of architecture were built. In 1910-11 a school of music was ini¬ tiated. During the year of 1911-12, co-ordi¬ nate with the change in State government the institution became the State University of New Mexico. The seven buildings of the University of New Mexico are picturesquely situated on the mesa, or elevated plateau about a mile east of the city of Albuquerque overlooking the wide valley of the Rio Grande. They consist of the administration building, Rodney hall, science hall, the women's dormitory, the men's dormi¬ tory, the gymnasium, the dining hall and the powerhouse. During 1914-15 a psychological laboratory was established. In 1913-14 there was organized an extension division. The school of Latin American Affairs established (1915-16) is designed to aid in strengthening and developing the relations between the United States and Latin-America. The University has received an appropriation from the State legis¬ lature for expenses and repairs and an appro¬ priation of $40,000 for the construction of a science hall. The library contains about 13,000 volumes exclusive of pamphlets. Two Cecil Rhodes scholarships have been won by students. The annual income for general support is about

$50,000.

NEW MEXICO COLLEGE OF AGRI¬ CULTURE AND MECHANIC ARTS, co¬ educational State institution, founded by legis¬ lative act dated 28 Feb. 1889, which accepted the provisions of the Morrill Act of 2 July 1862. It is located near Las Cruces in the Mesilla Valley in the heart of the great region irrigated by the Elephant Butte Dam. It con¬ fers the degree Bachelor of Science upon gradu¬ ates in agriculture, home economics, civil engi¬ neering, electrical engineering, irrigation en¬ gineering, mechanical engineering, general science, vocational teaching. It has a large extension service, a faculty of 71, and a student body of about 300. It has done great service to the country in the training of <(fighting mechanics.®

NEW MEXICO NORMAL UNIVER¬ SITY, the largest educational institution in New Mexico, was created by act of the legis¬ lature 3 Oct. 1893. On 3 Oct. 1898, the institu¬ tion was opened at Las Vegas with 92 students. In 1899 the legislature reorganized the institu¬ tion, creating it the State Teachers College. It comprises four schools: Training school, high school, normal school and a State Teachers College. Three degrees are conferred : Bachelor of pedagogy, master of pedagogy, bachelor of arts in education. Twenty-two regular pro¬ fessors, with a number of assistants, are em¬ ployed. The attendance in 1917-18 was 1,283. The university property is valued at $200,000.

It controls nearly 400,000 acres and has an annual income of about $50,000. The faculty numbers 20 and the student enrollment is about 140. There are 12,000 volumes in the library.

NEW MILFORD, Conn., town, county- seat of Litchfield County, on the Housatonic River, and on the Berkshire division of the New York, New Haven and Hartford Railroad.

jj SasAettlcd in by John Noble from West- At-ir i aˆs” anˆ ter a colony from (Old) Milford, Conn., located at New Milford. It is situated in a hilly country which has consider- . able good farm land; tobacco is the great specialty. The extensive water power of the Housatomc is being utilized by means of a canal two miles long, which extends from Bulls Bridge to New Milford. The New Milford Bower. Company which owns the plant fur¬ nishes electricit} to towns at a considerable cnrfance\ ˆ tobacco warehouses have over xK) employees ; the wood finishing factory, 90 ; the hat factory, 285; upholstery works, 40; lime works, about 60. There are several other smaller manufacturing establishments. A lib¬ rary and Memorial Hall for the free use of the Grand Army veterans, the town hall, the churches, and schools are all fine buildings The educational institutions are good public schools, ingleside School for young women and Wean- tmong School for boys. The government is administered by three selectmen chosen annually by the people. Pop. (1920) 4,781.

NEW NETHERLANDS, neth’er-landz, the name given by the Dutch to the colony they established in America in 1626. A British fleet, under command of Richard Nicolls, captured the place in 1664; and by order of Nicolls, the Duke of York was made ruler and the name changed to New York. See New York.

NEW ORANGE, a name applied to New York in 1673, when the colony of New Nether¬ lands was retaken from England by the States-General of Holland. The name was used in honor of the Prince of Orange.

NEW ORLEANS, La., the seventeenth city of the United States in population and the largest in the Southern States, is located on the east bank of the Mississippi River in the delta region, 107 miles above the mouth. It lies along the river front for about 12 miles and extends back toward Lakes Borgne and Pontchartrain. Its total area, including the suburb of Algiers on the west bank of the Mississippi, is 196 square miles, of which about 65 square miles are improved. Other

suburbs — Westwego, Gretna, Amesville and Goulds- boro — do not belong to New Orleans. The boundaries of the city are coterminous with those of the parish of Orleans. Built originally along a great bend of the Mississipni River, it was called the (

• is from time to time taken into the city and surrounded by the levee. The climate is mild and damp, and the rainfall averages nearly 60 inches a year. The winters are short and the summers long. It is cooler in New Orleans than might be expected from its location, the temperature averaging 65° for 47 years, For

only 211 days in the last 43 years has it fallen below 32° and in only 11 days was it below 20°. On seven days in 43 years the tempera¬ ture has reached 100°. About once in 10 years there is a light snowfall; frost comes for about 30 days in December and January, but seldom enough to injure the plants and flowers.

Population. — The population of the city has increased from 17,242 in 1810 to 339,075 in 1910 (1920, 387,219). The most rapid growth was from 29,737 in 1830 to 102,193 in 1840, an increase in 10 years of 243 per cent. 1 he foreign element in the population has al¬ ways been large but in recent decades the pro¬ portion has been decreasing. In order of num¬ bers the foreign-born population is composed of Germans, Italians, Irish, French and English. The negro population is about 27 per cent of the total. The large native population of French or Spanish descent, called ((creoles,® has strongly influenced the social life, the man¬ ners and customs and the amusements of New Orleans. The original French inhabitants came from North France, from Acadia, from Haiti and San Domingo; the Spanish from Spain and Cuba and the Canary Islands during the Spanish control of the colony of Louisiana.

Streets and Buildings. — The streets in the old French city — the Vieux Carre — are nar¬ row ; in the newer American city they are wider, frequently with the centre or ((neutral ground® planted in palms or trees. The great names of b ranee and Spain still live in the street names of the old city — Chartres, Royal, Bourbon, Dauphine, Iberville, Bienville, Conti, Orleans, Toulouse, Dumaine, Carondelet, Galvez, Un- zaga and Miro. Canal street, the business and shopping centre, divides the Vieux Carre from the modern city. The French influence is seen in the architecture of the creole houses with their tiled roofs, courtyards, iron-railed bal¬ conies and in the galleries of the more spacious districts. So much of the French town was destroyed in the fire of 1794 that the public buildings have since shown a predominating Spanish influence. The old archbishop's palace

dates from 1737 and was formerly the first Ursuline Convent; Saint Louis Cathedral and presbytery were begun in 1795, and the Cabildo, the Casa Capitular , or government house, with adjoining buildings, was erected in the same year. Here in 1803 Louisiana was transferred to the United States. The Pontalba buildings on the Place d'Armes (now Jackson Square) are of later date, as is also the famous French Market (Halle des Bouchcries) . Of the newer structures the following are the most noted : the Custom House, built under the supervision of Major (later General) P. G. T. Beauregard, on a floating foundation of cypress iogs ; the United States Mint; the New Court House; the City Hall and Criminal Court buildings; the new Post Office, the Cotton Exchange and the buildings of Tulane and Loyola universities. The great business houses are on Canal or adjoining streets. Noted hotels are the Saint Charles, the Grunewald, the De Soto, the La¬ fayette and the Monteleone.

Parks. — New Orleans has only two large parks though it has smaller breathing places in the numerous (

reaches from the river to Saint Charles ave¬ nue and contains 249 acres. It was purchased by the city in 1871, in 1884-85 it was the site of the Cotton Centennial Exposition, and has been considerably improved only in recent years. In the 18th century it was a part of the plan¬ tation of Etienne de Bore, who in 1795 suc¬ ceeded in making granulated sugar from sugar cane. It is fitting that the Sugar Experiment Station of the State University is now located in the park, which also contains a large horti¬ cultural hall, one of the Cotton Exposition buildings. The park is shaded by immense live oaks and the grounds are well laid out and planted with tropical plants and flowers. City Park, of 216 acres, on the Metairie Road, was formerly a part of the plantation of Louis Allard, and under the great "Duelling Oaks® many encounters took place in ante-bellum days. In Heinemann Park, or the "baseball park,® the intercollegiate and other athletic contests take place. Near City Park are the Fair Grounds and the Jockey Club. The "squares,® "places® and "circles® are small, parklike places, with walks and seats, and adorned with fountains, shrubbery and statues. Among them may be mentioned Jackson Square, formerly the Place d'Armes, and the centre of the old city, in which stands an equestrian statue of Andrew Jackson, by Clark Mills; Lafayette Square, with the statues of Henry Clay, by Joel T. Hart, and of John McDonough, who left his fortune to establish public schools; Lee

Circle,' formerly Tivoli Circle, with the monument surmounted by a statue of Robert E. Lee, by Boyle; Margaret Place, with Margaret Haugh- ery's statue, commemorates the "patron saint® of New Orleans orphans; in Beauregard Square, formerly called Congo Square, the slaves once met to dance African dances and here bull¬ fights took place under Spanish rule. Other squares are : Annunciation, Clay, Fillmore, Douglas, McCarthy, Lawrence and Coliseum Place.

Cemeteries. — The cemeteries number about 40, some of the older ones being in the centre of' the city. On account of the marshy nature of the soil the dead are usually buried in vaults or tombs above ground. In all the cemeteries are noted commemorative monuments and statues. Old Saint Louis Cemetery dates from the founding of the city and its curious vaults, one above the other, are call "ovens.® Saint Louis No. 2 (1824), New Saint Louis and Saint Louis for colored people are, with Old Saint Louis, under Catholic control, as also is the Campo Santo of Saint Roch, with its wonder¬ working shrine, which is frequented by young girls on Good Friday. Three old Protestant cemeteries are Girod (named for a French Protestant mayor), Lafayette and Washington. On Metairie ridge are most of the modern cemeteries, the largest of which is Metairie. Here are the vaults of fraternal societies and the Confederate monuments and statues. Greenwood and the Firemen's Cemetery are nearby. At Chalmette is a national cemetery where nearly 30,000 Union soldiers lie buried.

Libraries and Museums. — The principal libraries of the city confain about 500,000 vol¬ umes. The largest collections are in the Pub¬ lic Library, with five branches; the State Library, consisting principally of law books, in

the new Court House; the Howard Memorial Library, a private foundation, which has a very complete collection of publications relating • to Louisiana and the Southern States ; and the libraries of H. Sophie Newcomb College and oi Tulane and Loyola universities. The State Museum, occupying the old Cabildo, has valu¬ able historical, archaeological and documentary collections relating to Louisiana, and a large exhibit of the agricultural and mineral resources of the State.

Educational Institutions. — In New Orleans there are 95 public schools, including three high schools, with an enrolment of 55,000, while the 125 parochial and private schools have 30,000 students. In the public schools are 1,500 teach¬ ers, and the public school property is valued at $5,000,000. Notable among the private and church schools are the Ursuline Convent, the oldest school in the Mississippi Valley; the Dominican Convent, the Newman Manual

Training School, the Metal Trades School and the College of the Immaculate Conception. A city normal school trains teachers for the pub¬ lic schools. The Delgado Vocational School, made possible by a bequest of a million dollars, is now being organized by the city school board. Among the private schools of higher grade for negroes are Leland University (Baptist), Straight University (Congregational) and New Orleans University (Methodist). The Baptists have recently established a college for white girls called the Baptist Bible Institute. Loyola University (Roman Catholic) is a new insti¬ tution of university grade, with academic and law departments. H. Sophie Newcomb Me¬ morial College is one of the leading colleges for women in the Southern States and is affili¬ ated with Tulane University. The latter is the oldest institution of college grade in the State. It is based on an old State foundation and was developed through the aid of a bequest of $1,000,000 by Paul Tulane. It now has aca¬ demic, engineering, law, pharmacy and medical departments, with an enrolment of 2,000 stu¬ dents. The Medical College of Tulane Uni¬ versity and the hospitals have made New Orleans one of the chief medical centres of the United States.

Charitable Institutions. — Chief among the charitable institutions is the Charity Hospital, an old Spanish foundation, now supported by the State and by private donations and staffed with nurses by the Catholic Sisters of Charity. It has accommodations for more than a thou¬ sand patients, and gives treatment to more than 30,000 patients each year. Other well-known hospitals are the Hotel Dieu (Catholic), Touro Infirmary (Jewish), Presbyterian Hospital, Eye, Ear, Nose and Throat Hospital, Flint- Goodrich Hospital for negroes, the United States Marine Hospital and 10 smaller institu¬ tions. There are 21 orphan homes, 10 homes for the aged and destitute, a private insane asy¬ lum, three homes for wayward women, the State Confederate Soldiers' Home and the Kingsley House settlement modeled after Hull House of Chicago. About 50 of the more than 100 charitable and beneficent institutions receive slight financial aid from the city.

Churches. — ■ There are more than 300 churches in New Orleans, of which two-thirds are for the whites and the others for negroes.

SMS?#

qqd f~ki ˆ B [3 ribˆˆ oroˆˆ

m WsaBIfrsoSm

snraps

<3sL«ataCP a®.Qa™^2G5 on®°^

^ffflpBaD s^srassllse

«Oav rt n a a p«ftj^J»rt-A?-fiSttf5

iEssirs

IgW

^»Bpaua^aC]auuti l! „

Wl^r U%m%^°^°o°oipQoS^

^mmrm£r^ir

«a

»»2

‘Mlfo,

w^rrwMMs§:

kMdmmmm

aMm^MMmmB3&

C|§<^xdolRjOOP

p||g^^\QanDnnDo

I1H®)® □ o □ □ □ b

■1 II II al<^JwnDD J

JFospitl

lHo5^mDDDD^[]D!i

IHHoO^ reoDOTosns

I ffnaoaaODDnooD#

II aPpaDaQ □□□□□□□

the Main Po

rtlon

NEW ORI

Mecaii

SCALE OF FEET.

0 500 1,000 2,000

EX. X PAC. DEPOT

SCALE OF METRES.

) 300 400 500

Explanation

“* OUTLINE MAP OF

it NEW ORLEANS.

l°Portion Shown nn Uaih Ha U in Solid Color.

Railroadsˆ _

Street Car Lines

Bud. McNally & Co.’* N i» 11 1 14 Map of the Main Portion of New Orleans.

Copyright. 1895, by Bud, McNally A Co.

■

.

‘ .

■

”

• !

.

‘

•

•

The piincipal denominations in orders of num¬ bers are Roman Catholic, Baptist, Methodist, 1 reshytenan, Episcopalian, Lutheran, Jewish and Christian Science.

Amusements and Social Life.— The festi¬ vals ot Mardi Gras are of French origin, but have been adopted by all nationalities, and are now so widely famed that thousands of visitors are attracted each year to the city. The first celebration was in 1827 when young creoles who had been at school in h ranee organized a masked street procession. The first of the pres¬ ent carnival clubs — the “Mystic Krewe of Comus®— was formed in 1857; in 1870 the Twelfth Night Revellers0 ; in 1872 «Rex» and the “Knights of Momus»; the <(Krewe of Pro¬ teus0 in 1882; the “Krewe of Nercus0 in 1895. Later-iormed organizations are the “Atlante- ans,» “EKes of Oberon ,° and the «High Priests of Mythras.0 The events of the Mardi Gras season begin on Thursday and end on Shrove Tuesday (Mardi Gras). There are balls, din¬ ners, street and river parades, and many unor¬ ganized carnival activities in which nearly the wLole population takes part, while business is almost suspended. There is much agreeable club life in the numerous organizations of New Orleans. The most noted clubs are the Boston, Pickwick, Chess, Checkers and Whist, Harmony (Jewish), Round Table, Stratford and the Era Club for women. There are numerous rowing, yachting, hunting, fishing and athletic clubs as well as Catholic and Protestant social and reli¬ gious organizations. The cuisine of New Or¬ leans has been made famous by many good cooks. Noted French restaurants are La Louisiane, Galatoire’s, Antoine’s and Madame Begne’s.

French opera was introduced into America through New Orleans and until recently the city had each season a troupe from France. But the wrar in Europe prevented the coming of the troupes and now. the tamous French Opera House has been given to Tulane University.

Health Conditions, Drainage, Sewerage.— For nearly a century Newr Orleans was known as one of the most unhealthy spots in North America. Before the Civil War there were almost annual epidemics of yellow fever, several severe visitations of cholera, and always mala¬

ria. But since 1860 health conditions have gradually improved and the death rate has steadily declined. Before 1860 the death rate per ˆthousand averaged 60 ; in 1900 it was 29 ; in 1905 it was 24; and in 1914 it was 17. The death rate for whites is always lower than for blacks; in 1914 it was 14 per thousand. This lessening death rate is due to the betterment of sanitary conditions during the last 50 years and in particular to the improvements made since 1900 in the water supply, the drainage and sew¬ erage and in the inspection of food supplies. The water supply, formerly taken unfiltered from the river and from rainwater cisterns, now comes from immense municipal filtration plants which purify 63,000,000 gallons a day. Mos¬ quito breeding cisterns have been abolished. Drainage and sewerage has been likewise im¬ proved. Owing to the flat and low situation of the city and the heavy rainstorms it was long considered almost impossible to dispose of sew¬ erage properly. Before 1900 open gutters were used, the streets were frequently flooded and standing water everywhere offered breeding

places for the yellow fever and malaria-bearing mosquitoes. But in 1903 the sewerage and water board put into operation a system which has completely transformed conditions. Instead of one system of sewerage as in most cities there are three systems in New Orleans, all aided by immense pumping stations to give suf¬ ficient fall. The first is for sewerage which is carried in 310 miles of pipes to the lower edge of the city and pumped over the levee into the Mississippi River ; ordinary drainage, which is only slightly polluted, is carried by pipes and large canals into Bayou Bienville and thence into Lake Borgne and the Gulf. The unpolluted rainwater is carried by a third system into Lake Pontchartrain. Twenty years ago water could be found at one to two feet from the surface; now it is from 5 to 15 feet. The mosquito has been almost driven away and fevers have greatly decreased. A visitation of the bubonic plague in 1914 caused the tearing down or the recon¬ struction of every building in New Orleans which was not rat-proof. Both the State and the city health authorities maintain the strictest inspection over food supplies, hotels and eating places. The picturesque French market and its several replicas still stand but are closely screened and rigidly inspected. Cholera comes no more, yellow fever epidemics gradually be¬ came lighter and last appeared in 1905. ‘New Orleans is now one of the most healthful of the large cities.

Railway and Harbor Facilities.— New

Orleans was established by Bienville as a gate¬ way to the Mississippi Valley, and until railways began to compete with water ‘transportation it was without a serious rival as the port of that region.

There are two ways to the Gulf — by the Mississippi River and by Lake Pontchar¬ train, and 13,500 miles of navigable rivers lead to its wharves. The rapid growth of the city before the Civil War was due mainly to the development of river and ocean transportation. Railway competition at that time was not im¬ portant. But the Civil War closed the port for five years and much of its trade was then lost to Eastern ports. Railways w'ere already, before 1860, connecting the Mississippi Valley with the Atlantic Coast, the bars at the mouth of the river hindered ocean-going commerce and river transportation was never again, after 1861, on a thriving basis, declining in fact to practically nothing where it now remains. Not until 1880 did the port of New Orleans do as much busi¬ ness as in 1860. Since then there has been a regular increase due to the development of ocean-going commerce and the building of rail¬ roads from the interior to New Orleans. Dur¬ ing the last 15 years the city has reached its former place of primacy as the greatest port of the South and one of the greatest in the United States. Much of this is due to recent perma¬ nent harbor improvements made at public ex¬ pense. The Eads jetties and later government dredging assure 35 feet of water at the passes to the Gulf. The harbor with unlimited an¬ chorage space is the river itself, 40 feet deep at the edge of the wharves and 200 feet in mid¬ stream which is here one-third to two-thirds of a mile wide. Wharf space owned by the public extends for 12 miles on each side of the river and is under control of the Dock Board, a State institution which has control over all harbor improvements. The Dock Board has

constructed eight miles of wharves and on them are six miles of steel sheds to protect cargoes from the weather. There is a public owned cotton warehouse with a capacity of 500,000 bales, a public owned grain elevator with a ca¬ pacity of 2,000,000 bushels, and privately owned elevators with a total capacity of 5,000,000 bush¬ els. The United States government has just completed on the wharves three huge ware¬ houses for general commodities, two of wThich will be turned over to the Dock Board. Ships load and unload anywhere along the eight miles of wharf, using the best mechanical devices. A belt railway, 50 miles long, publicly owned and operated, connects all railways, wharfs and about 80 industries, so that in transshipping the shortest distance separates the car and the ship. The coaling facilities are excellent. Under pri¬ vate control are the Stuyvesant Docks of the Illinois Central Railway, the Chalmette Railway and steam terminals of the Southern Railway, and the Algiers terminals of the Southern

Pacific Railway. The Inner Harbor or Indus¬ trial Canal connects the Mississippi River with Lake Pontchartrain and gives a fixed water level needed by certain industries, another ap¬ proach to New Orleans and the opportunity to industrial concerns to lease harbor frontage which cannot now be done on the river front which is owned by the State. The canal is six miles long, 300 feet wide and has a depth of 30 feet. The Dock Board has by State law 41 miles of river front under its control, and can indefinitely extend the harbor facilities. At Algiers, across the river, is the United States Naval Station with complete repair facilities and a dry dock which can raise vessels up to 18,000 tons. Three privately owned dry docks can accommodate vessels up to 2,000, 5,000 and 15,000 tons. Forty-five steamship lines sail from the port, a Japanese line being the latest established. Inland water transportation is al¬ most negligible, the inland waterways now serv- * ing principally ito keep down railway freight rates. Twelve railways, 10 of them trunk lines, enter the city, among them the Illinois Central, the Louisville and Nashville, the Southern and the Southern Pacific. The railways represent a mileage of 145,288 with 215 miles of terminal track. They reach New Orleans by easy grades and freight rates are nearly all on the basis of water competition. The railways coming in from the West have their terminals across the river. Railways and industries which do not own terminal facilities can enter on the public belt railway.

Commerce and Manufactures. — New

Orleans has long been the chief commercial city of the South and in normal times ranks next to New York in exports and im¬ ports. Before 1860 its prosperity was due largely to the fact that it was the best outlet for the products of the Mississippi Basin and to the development of water transportation. At one time it even looked forward to being a rival of London, but the bars at the mouth of the Mississippi River, the frequent epidemics of disease, the conservatism of the people, the losses due to the Civil War, the development of east and west railways in the upper Mississippi Valley, and the fact that the city was off the main lines of world trade, all combined to check its progress. Since 1870 many of the hindering conditions have been done away with, river

navigation and port facilities have been much improved, the city has become a great rail¬ way centre with low freight rates, and it is again one of the leaders in foreign and do¬ mestic commerce. It is favorably situated for the distribution of foreign commerce into the region west of the Appalachians and for exports from the same region, especially to Mexico, Central America, the West Indies and South America, The

opening of the Panama Canal has stimulated commerce with western South America and the Orient. In 1911 and again in 1915 the volume of foreign trade through New Orleans was exceeded only by New York. The war in Europe (1914-18) cut off tempo¬ rarily much of its former trade, and in 1918 it ranked as the sixth port of the United States. In 1914 the exports through the port of New Orleans wrere valued at $193,839,961, and the imports at $89,382,621 — a total of ($283,222,582; in 1918 the total was $418,536,295. 'New Orleans is the largest market in the United States for cotton and cotton-seed prod¬ ucts, rice, sugar, bananas, oysters and shrimp; the second coffee market ; and the largest lum¬ ber market of the South. As an export market for Western grain it is developing rapidly. The total distribution of commodities in 1918 was estimated in value at $1,130,000,000. The public grain elevators, and cotton warehouses which issue negotiable receipts for cotton, and the low port and transshipment charges, are re¬ sponsible for much of the city's commercial progress. Leading commercial organizations are the Cotton Exchange, whose statistics are the standard for the United States, the Board of Trade, Contractors and Dealers' Exchange, Stock Exchange, Sugar and Rice Exchange and the Association of Commerce with its 12 bureaus. As a manufacturing centre New Orleans is of less importance. In 1914 its manu¬ factured products were valued at $70,000,000; in 1918 at $140,000,000. The leading manu¬ factured products are sugar and molasses, rice, cotton-seed products, bags, tobacco, cotton goods, clothing, foundry and machine-shop products, canned goods and steel and wooden ships. There are nearly 1,000 manufacturing plants with an invested capital of about

$60,000,000.

Bank Resources. — Resources of the 15 most important banks amounted in 1918 to $235,126,824; deposits were $167,142,600. Clear¬ ings were, in 1900, $556,000,000; in 1910, $987,- 000,000; in 1918, $2,660,460,000. The 1918 clear¬ ings show the influence of the war as well as indicate increased wealth. Practically all the huge public improvements recently undertaken by the city and State have been financed by local banks.

Government. — LTnder the French and Span¬ ish regimes New Orleans was not a municipal¬ ity but was governed as a part of the colony of Louisiana. In 1805 it was organized as an American city under a charter , which recognized the fact that the city was merely a collection of villages and to each it gave almost inde¬ pendent government. Tn 1836 on account of the conflicting racial elements in the population a new charter provided for three almost sepa¬ rate

governments over the three districts or ˆfaubourgs® which had been combined into the city. A mayor and council exercised gen¬ eral supervision over the whole, but the plan

Jackson Square and Cathedral

was not satisfactory and 16 years later it gave way to the usual consolidated American city government with mayor and district council- men. In 1870 under the “reconstruction® regime a new charter provided for what is now knowm as “commission® government — a mayor and seven “administrators® being elected on a gen¬ eral ticket. This government, on account of its origin, was unpopular and in 1882 the city was again put under a mayor and district councilmen but with numerous appointive boards to attend to most municipal functions. There were boards for police, education, fire prevention, public debt, sewerage and drainage, Pˆks and streets, water, etc. The city was divided into 17 wards and seven civil districts, thus recognizing the seven towns or “fau¬ bourgs® which by this time had been united into the city of New Orleans. This form of municipal government lasted for 30 years and was superseded in 1912 by a “commission® government of a mayor and four other com¬ missioners elected on a general ticket. The administration was divided into five depart¬ ments each of which was headed by a commis¬ sioner: (1) Public affairs under the mayor; (2) public finance; (3) public safety; (4) pub¬ lic utilities; (5) public property. Numerous appointive administrative boards still exist and the division of the city into seven districts and 17 wards continues.

Public Finance. — The city still suffers from indebtedness placed upon it during the “carpet bag® days, which, however, has been consider¬ ablyˆ lessened. In 1910 the bonded debt was $32,500,000 and the floating debt about $1,000,- 000. Since then the bonded debt has been con¬ siderably increased on account of public im¬ provements. Much of the improvement, how¬ ever, more than pays the interest on the cost. The assessed value (75 per cent of property) was $221,000,000 in 1910 and in 1918 it was $442,874,412. The combined State and city tax rate on the true value of property amounts to 21 mills. The income from taxes is about $9,- 200,000, which is distributed as follows : For city administration, $3,000,000; for schools, $1,162,000;

for water and sewerage, $1,500,000; for interest on the bonded debt, $3,321,000; and any balance is divided between the city adminis¬ tration and the sewerage and water board.

History. — The present site of New Orleans was occupied by a village of the Houma Indians in 1699 when Bienville's expedition first ex¬ plored the lower Mississippi River. Bienville was impressed by the fact that the land here was the highest for many miles around and seemed to be above overflow. Moreover it was accessible not only from the river but also by way of the lakes lying to the rear. So in 1718 he established a French post here for the pur¬ pose of guarding the gateway to the lower Mississippi Valley, whence access to the in¬ terior for trade and for military expeditions was easier than from Biloxi or Mobile, the older French settlements. The new town was named Nouvelle Orleans in honor of the regent of France, the Duke of Orleans, and in 1722 it became the capital of the colony. The French town was laid out in the form of a rectangle — whence the name of the old part of the city — Vieux Carre. The sending over from France of the "cassette® girls (girls with dowry) in

1727 as wives for the colonists and the establish-

1.

ment of schools was an assurance of perma¬ nence to the colony. But neglected by the home government, the town and colony grew slowly. Settlers came from France and Canada, and some Germans were sent out by John Law of the Mississippi Company, but they were few in number, and at the end of the French regime in 1763 the city had less than 4,000 inhabitants. However, the Catholic Church was organized, teaching and missionary orders were established and trade with the Indians and some com¬ merce with the home country developed. By a secret treaty in 1762 Louisiana was ceded to Spain, but the latter made no effort to take possession until 1768. Meanwhile the colonists, dissatisfied with the proposed transfer, planned to ask for British protection, and in 1768 when Antonio de Ulloa, the first Spanish governor, came, he was driven out by a rebellion which was, however, ruthlessly suppressed the next year by Capt.-Gen. Alexandro O'Reilly. Spanish rule was firmer and more intelligent than the French, and the population was in¬ creased by immigrants from Spain, Acadia and the West Indies. But the colony remained dis¬ tinctly French, the Spanish authorities making no serious efforts to change its institutions. Great fires in 1788 and 1798 destroyed much of the Vieux Carre and resulted in the erection of better buildings. A considerable trade de¬ veloped, the stringent commercial regulations of Spain were seldom

enforced in Louisana, and in 1794 New Orleans was made a free port of deposit for the trade of the United States west of the Appalachians. The western Ameri¬ cans considered an open port at New Orleans of the utmost importance to them and when in 1801 Spain ceded the colony back to France a demand arose for the possession of the port by the United States. So in 1803 with the pur¬ chase of Louisiana, New Orleans, then a town of 10,000 inhabitants, became American, and in 1805 it was given the usual American city charter. The growth under American rule was rapid in spite of controversy among rival races and nationalities. For half a century it was_ the centre of activity of adventurers and soldiers of fortune who had designs in the West, and in Mexico and other Latin-American coun¬ tries. In 1812 the first steamboat from the Ohio region reached New Orleans, inaugurat¬ ing a long period of transportation activity on the inland waterways. In 1830 the second rail¬ road in the United States was opened from New Orleans to Milneburg on Lake Pontchar- train, and between 1850 and 1854 the city gained railway connections both to the east and west. In 1852 New Orleans was the third city in size in the United States. Its location has made it, in war time, a position of great military import¬ ance, and in 1815 the British under General Pakenham planned to seize it and thus to hold the gate to the Mississippi Valley. But on 8 Jan. 1815 the British army was defeated by the Americans under Gen. Andrew Jackson at Chalmette, just below the city. (See New Or¬ leans, Battle of). In 1861 with the forma¬ tion of the Confederacy, New Orleans became a centre of military and naval operations but the mouth of the river was soon blockaded by the Union fleet and in 1862 the city was captured by military and naval forces under the com¬ mand of Admiral Farragut and Gen. Benjamin Butler. (See New Orleans., Capture of, in

1862). During the remainder of the war it was under Union control. General Butler's rule was notoriously bad, but that of his suc¬ cessors was less objectionable. Although the city declined in population and wealth for a time after 1862, a slow recovery followed. New Orleans remained the capital of the colony and State until 1852 and was again the capital from 1865 to 1880. From 1867 to 1877 New Orleans was the stronghold of the ˆradical® or <(carpet- bag}) government of Louisiana, and the old Saint Louis Hotel was used as a state-house. The city was bankrupted by the corrupt ruling class and to this day it carries a heavy debt in¬ curred by the Reconstructionists. Canal street was the scene on 14 Sept. 1874 of a battle be¬ tween the conservative

whites and the radical forces, in which the latter were defeated and the state government overturned for a few days. In 1884-85 the Cotton Centennial Exposition was held in New Orleans. David C. Hennessy, chief of police, was murdered in 1891 by mem¬ bers of the Mafia, an Italian secret society; nine men arrested for the murder and acquitted in court were seized by a mob and lynched. Considerable diplomatic negotiations ensued between the governments of Italy and the United States. (See Italy, Diplomatic Re¬ lations of the United States with). During the last 20 years New Orleans has made its soundest and most rapid progress.

Bibliography. — (The Book of New Orleans and the Industrial South) (New Orleans 1919) ; Census of the United States, (Decennial Re-ports) (Washington) ; Fortier, Alcee, (Louisi- ana) (3 vols., 1914) ; Howe, W. W., (Municipal History of New Orleans* (in Johns Hopkins University Studies, Series VII, No. 4, Balti¬ more 1889); King, Grace, (New Orleans: the Place and the People* (latest ed., New York 1917) ; King and Ficklen, (History of Louisi¬ ana* (New Orleans 1893) ; Gayarre, A., his¬ tory of Louisiana) (New Orleans 1903) ; Martin, F. X., (History of Louisiana> (ib. 1882) ; Phelps, Albert.

Walter L. Fleming,

Professor of History, formerly of Louisiana State University, now of Vanderbilt Univer¬ sity.

NEW ORLEANS, Campaign and Battle

of, in the Warof 1812. On 15 Aug. 1814, after signing a treaty with the Creeks (see Horse¬ shoe Bend), Jackson went to Mobile, having been appointed commander of the Seventh military district. There he learned that on 25 July 1814, Maj. Edward Nicholls, with 110 British troops and three cannon, had appeared before Pensacola, Fla., accompanied by a British fleet under Capt. W. H. Percy. Though the Territory belonged to Spain, Nicholls seized Fort Barrancas at the entrance to the harbor, armed and clothed the Indians, and unsuccessfully endeavored to enlist the services of Jean Lafitte (q.v.) and his band of pirates

infesting Barataria Bay (q.v.), about 60 miles south of New Orleans. Nicholls also sent Percy with the Hermes, 22 guns, the Carron, 20, the Sophie and the Childers, 18 each, and a force of 60 marines and 120 Indians to capture Fort Bowyer, a battery at the entrance to Mobile Bay. At the fort, which was armed with 20 guns (of which only eight were serviceable), were 130 troops under Maj. William Lawrence. On

12 Sept. 1814 the ships opened fire on the fort while the troops attacked from the rear, but so superior was the American gunnery that the Hermes was soon cut to pieces, and was set afire by Percy ; the other ships and the troops withdrew, going to Pensacola. The total British loss was 232, of whom 162 were killed, while the Americans lost only four killed and five wounded. Jackson was intent on taking Pensacola and on 3 November, despite warn¬ ings that a large British force had left Ireland to take Mobile, New Orleans and the surround¬ ing country, started for Pensacola with 4,100 men. On his arrival he demanded that the Spanish governor surrender but the latter re¬ fused, whereupon, on the seventh, Jackson di¬ vided his troops into three columns, stormed the defenses of the towrn and quickly forced the Spanish to surrender unconditionally. The British then abandoned Fort Barrancas, where¬ upon Jackson returned to Mobile, then pro¬ ceeded to New Orleans, where he arrived 2 December, and found that, despite the proximity of the British expedition, the city was utterly unprepared to defend itself. Accordingly he caused fortifications and batteries to be erected at advantageous points ; stationed a few gun¬ boats at the bay of Saint Louis, 60 miles to the northeast of New Orleans; and sent messengers in every direction urging troops to hasten to his aid.

Meanwhile the British fleet arrived with the troops under Maj. Gen. Sir Edward Pakenham (q.v.). On 10 Dec. 1814 the troops were landed at Chandeleur Island at the entrance of Lake Borgne, but on entering the lake beheld six American gunboats under Lieut. Thomas A. C. Jones (q.v.) prepared to oppose them. Accord¬ ingly, on 14 December, 980 seamen and marines in 45 launches and barges attacked Jones' little flotilla and after a sanguinary contest destroyed them with a loss to themselves of 17 killed and 77 wounded, while the American loss was six killed and 35 wounded. This left only two vessels, the Louisiana and the Carolina, to dis¬ pute the British passage up the river. Hence, during the next week, 7,000 British troops were disembarked at Isle aux Poix in Lake Borgne and a force of about 1,700 troops under Col. William Thornton was sent in advance by Maj. Gen. John Keene, bivouacking in the open about six miles from the city. Learning of this, Jack- son, on the night of 23 December, took 2,131 troops and attacked from two different points on land while the Carolina slipped down the river and poured grape into the British ranks. The British were being slowly driven back when a fog arose, causing confusion in the American ranks, and as British reinforcements were arriving Jackson retired. In this battle the British lost 46 killed, 167 wounded and 64 missing, while Jackson's loss was 24 killed, 115 wounded and 74 missing. The British then

pushed forward so that by 25 December, 8,000

%

troops under Pakenham and Sir Samuel Gibbs were ready for battle, to oppose whom Jackson had altogether about 5,000 infantry.

Jackson took position about five miles be- lo\v New Orleans, lhe Rodriguez Canal about 10 tcet wide stretched across the plain from the river to the swamps and Jackson caused this to be deepened and a parapet thrown up be¬ hind it. The Louisiana lay about two miles below Jackson's line and the Carolina a mile further down the river. When the British ad¬ vanced they first had to drive away these two ships; on 27 December the Carolina was bom¬ barded with hot shot, set afire and destroyed, while the Louisiana, after sustaining a severe fire, escaped up the river. The British then con¬ tinued their march expecting little opposition, but soon, to their surprise, came upon Jackson's half-finished breastworks. On 1 Jan. 1815 the British turned their batteries on these works, but the Americans replied with such precision that the British soon deserted their guns with a loss of 76 killed and wounded and two miss¬ ing, while Jackson lost only 11 killed and 23 wounded. Failing in these attacks Pakenham waited until 6 January for the arrival of two fresh regiments under Maj.Gen. John Lambert, thus bringing his force nearly up to 10,000. On the night of the seventh Pakenham sent 1,200 troops under Thornton to attack the American works on the west bank, which were defended by 800 men under Col. David Morgan and Daniel T. Patterson's battery; while he himself was to assault Jackson's lines, General Gibbs attacking on the right, and Keane on the left, Lambert being in reserve. A motley array of sailors, regulars, creoles, pirates, negroes, Frenchmen, Kentuckians and Tennesseeans held Jackson's left, while the centre was defended by Carroll's brigade of 1,414 men, and the right by 1,327 men, Adair's Kentucky brigade of 325 men being held in reserve, the total on both banks and in reserve being a few over 5,000. Early on the morning of 8 January the British advanced, Gibbs' troops coming first under the American fire, which was so terrific that they broke and fled. On receiving reinforcements they renewed the attack but were again re¬ pulsed, whereupon Pakenham reformed them and himself led the third attack only to fall in front of his men, Gibbs, too, falling soon after¬ ward. Meanwhile Keane's division attacked Jackson's right near the river but was repulsed with great

slaughter and Keane was severely wounded, the command then devolving on Lam¬ bert who instantly withdrew the troops. On the west bank Thornton had routed Alorgan's troops, compelled Patterson to spike his guns, and advanced up the river a mile behind Jack son's lines, thus placing him in a precarious po¬ sition, but fortunately Lambert withdraw his troops and recalled Thornton, thereby saving Jackson. After the battle a truce of two days was arranged to bury the dead and until 18 January artillery fire was indulged in, but then the whole British army withdrew to a fortified position at the mouth of a bayou and on the 27th reimbarked in the ships off Chandeleur Island. Though variously stated, the most trustworthy authorities place the total British loss at 2,036 and the American loss at 71.

Meanwhile a few of the British vessels entered the river with the intention of reducing

the works at Fort Saint Philip and then co¬ operating in the attack on the city. They bom¬ barded the fort from 11-18 Jan. 1815, but as their shells had little effect they abandoned the attack. Still the British seemed loath to depart without striking a blow. Reinforced by 1,000 fresh troops, Lambert bombarded Fort Bowyer 8 February and sent troops to attack from the rear. Lieut.-Col. William Lawrence had only 360 men in the fort and, therefore, capitulated on the 11th. This ended the land fighting in the War of 1812, peace having already been declared. Consult Adams, Henry, (United States,) Vol. VIII, pp. 311-385; Armstrong, John, (Notices of the War of 1812, > Vol. II, pp. 157-170; Burgoyne, R. H., (Historical

Records of the 93d Sutherland Highlanders } ; Cooper, J. F., (Naval History, > Vol. II, pp. 142- 146; Cullum, G. W., (Campaigns of The WarP Chap. 8; Davis, P. M., (Official and Full Detail of the Great Battle of New Orleans) ; Fay, H. A., Official Accounts, > pp. 279-295; Gleig, G. R., Campaigns of the British Army at Washington and New Orleans } ; Hamilton, P-.J-, 'Colonial Mobile, > pp. 378-383; James, William, Military Occurrences, > Vol. II, pp. 341-533; King, Grace, (New Orleans, > pp. 219— 248; Maclay, E. _S., (History of. the NavyR \ ol. II, pp. 40-45; Latour, A. L., historical Memoir of the War in West Florida and Louisiana J ; Lossing, (War of 1812, > pp. 1017-1054; Phelps, A., (Louisiana, > pp. 267-283 ; Roosevelt, (Naval War of 1812, > pp. 343-348, 459—488 ; Trimen, Richard, (Regiments of the British Army ; Walker, Alexander, (Jackson and New Orleans > ; Wiley and Rines, (The United States, } Vol. VI, pp. 62-84; and biogra¬ phies of Jackson by Buell, Parton, Frost and Eaton.

NEW ORLEANS, Capture of, in 1862.

The Civil War engagement which resulted (24 April) in the taking of

New Orleans, was ac¬ tually fought 70 miles down the Mississippi. The great bend next below the city was com¬ manded by Fort Jackson on the west (north) bank and Fort Saint Philip on the east. Sup¬ posed to mount 150 guns each, they had in fact 109 together, over half of them only 24's ; and the garrison was largely Northerners and foreigners. The river was blocked by a chain buoyed by 11 steamer-hulks, and there were fire-raft and boats above. Farragut's fleet comprised 17 wooden vessels with 162 guns; besides six gunboats with 30 guns and 20 mortar-schooners with one gun each, under command of David D. Porter (q.v.). Bom¬ bardment on the. forts was opened 18 April; and on the night of the 20th a Union vessel hugging the bank got above the boom, and coming down with a full head and current, snapped the chain and left the channel free. After three days' more bombardment it was de¬ termined to pass the forts instead, in the dark, and on the morning of the 24th, about 2:30, the vessels steamed forward in two columns, Farragut leading one in the Hartford, Capt. Theodoras Bailey the other, while the mortar- boats shelled the water-battery commanding the approach to Fort Jackson. All but the last three of Farragut's column succeeded in pass¬ ing the boats before daylight made it impossible, the vessels' guns in turn driving the fort gun¬ ners from their posts. Above, the Confederate

flotilla of 17 vessels inflicted great damage, one Union gunboat being sunk, one badly crushed by a ram and the Hartford fired by a fire-boat. Nine Confederate vessels were sunk or captured, however, and the Union fleet pro¬ ceeded to New Orleans and compelled it to sur¬ render. On the 28th the forts also capitulated. It is due to history to add that of the 17 Con¬ federate vessels, 9 of which were rams and 2 ironclads, only 4 vessels and 12 guns were in such condition as to be capable of making a fight. If the materials of the force of John K. Mitchell, the Confederate commander, had been completed, his little fleet could have made a very creditable defense; but J. R. Soley, of the United States navy, truly says that no com¬ mander, taking hold of his vessels in their incomplete condition four days before the fight, could have made much out of them. Ihis vic¬ tory of Farragut's prevented Louis Napoleon from recognizing the Confederacy and raising the blockade, and hence was one of the most important of the war.

Joseph T. Derry, Author of (History of Georgia .)

NEW ORLEANS UNIVERSITY, in

New Orleans, La.; a coeducational institution for the education of young negroes, founded in 1873 under the auspices of the Methodist Episcopal Church. It has preparatory and col¬ legiate departments, and its courses lead to the degrees of A.B., B.S. and Ph.B. In 1913 there were connected with the school 40 teachers and 605 students. The library contains over 6,000 volumes, the grounds and buildings are valued at $250,000.

NEW PHILADELPHIA, Ohio, city,

county-seat of Tuscarawas County, on the Tuscarawas River and the Ohio Canal, and on the Pennsylvania and the Baltimore and Ohio railroads, about 100 miles northeast of Colum¬ bus and 90 miles south of Cleveland. It was settled in 1805 and incorporated in 1808. It is in an agricultural region, but its good water power and facilities for transportation have contributed toward making it a manufacturing city. Clay and coal are found in the neigh¬ borhood. Some of the manufactures are pressed, stamped and enameled goods, steel products, flour, woolen goods, brooms, canned goods, vacuum cleaners, tile, and wagons and carriages. Shorenbraun Springs and Tuscora Park, the public library, hospital, high school and orphans' home are of interest. The ma}'or is elected biennially and the council appoint or elect the administrative officials. Pop. 10,713.

NEW PHILIPPINES, fil'i-pinz or -penz, a name sometimes given to the Caroline Is¬ lands (q.v.).

NEW PLATO NISTS. See Neo-platon-

ISM.

NEW PLYMOUTH, New Zealand, the capital and seaport of Taranaki, North Island, 120 miles southwest of Auckland. The harbor is noted and from this port a great deal of the dairy produce of the neighborhood is shipped. New Plymouth is also a terminal of railway lines to Wellington and Napier. The town contains flourishing flour mills, for it is in the centre of a rich cereal district. T. here are also leather factories. Pop. 5,141. Consult * Australasian Year Book) (Melbourne 1906).

NEW POMERANIA, or NEU POMM- ERN, noi pom'ern, formerly New Britain, the largest island of the Bismarck Archipelago (q.v.), 50 miles distant from Kaiser Wilhelm's Land, New Guinea, Rock Island and the Dampier, and the Vitiaz straits, intervening. It is crescent shaped, 300 miles long, with a maximum breadth of 90 miles and an esti¬ mated area of 9,500 square miles. It is of volcanic formation, the mountains culminate in Mount Hurstein in the extreme west (6,000 feet) and they are mostly forested to the tops. The coastal belt is fertile. There is a German mission and trading station on the northeast coast. The inhabitants are savage Papuans.

NEW PROVIDENCE, one of the Bahama Islands (q.v.), northeast of Andros Islands and about 300 miles east by north of Key West. In 1629 the first English settlement on the Ba¬ hamas was made on New Providence. This island has the best harbor of any of the group. Nassau (q.v.), the capital of the islands, is on New Providence. Although this island, as all of the group, belongs to Great Britain, it is included in the Roman Catholic archdiocese of New York. Pop. 13,554.

NEW RED SANDSTONE, in geology, a term formerly used, in contradistinction to Old Red Sandstone (q.v.), of red shale, loam and sandstone lying above the coal measures. The nomenclature is faulty, being based only on a color distinction, and it is now recognized that the rocks formerly grouped under this name are at two very different eras, the Permian and Triassic (qq.v.).

NEW RIVER. See Great Kanawha.

NEW ROCHELLE, ro-shel', N. Y., city, in Westchester County, on Long Island Sound and on the New York, New Haven and Hart¬ ford Railroad, 16 y2 miles from the Grand Central Station in New York City. It has con¬ nection by New York, Westchester County and Bronx electric railroad, and trolleys with New York City and several of the villages and cities in the vicinity. It was settled in 1687 by Huguenots and was named after La Rochelle, France. It has a beautiful location and is considered a desirable residential city by a large number of the business men of New York. It has a well-kept park, over 60 miles of paved streets and Glen Island, Echo and Neptune bays are nearby. The prominent buildings are a number of old colonial edifices, several of the churches, especially Saint Gabriel's (R. C.), with its parish school building, both gifts of Adrian Iselin, the Masonic Temple, a hospital, Knights of Columbus and the city buildings. The water supply is exceptionally pure ; and the vital statistics show a low death rate. It is the seat of the Ursuline Seminary of Saint Teresa, founded in 1898, and it has several private schools, good public and parish schools and a public library which contains about 9,000 volumes. Thomas Paine resided here for some years, and it is the home of a number of well-known authors, editors and artists. Pop. 36,213.

NEW ROOF, The, a term used in early American history for the Federal Constitution.

NEW SALLEE, sa-la', Morocco. See Rabat.

NEW SARUM, sa'rum. See Salisbury.

NEW SHETLAND. See South Shet¬ land Islands.

NEW SIBERIA, or LIAKHOF (le- ah'of), ISLANDS, a group of islands in the Arctic Ocean, off the north coast of Siberia, between the mouths of the Lena and Indigirka, and administratively attached to the govern¬ ment of Yakutsk. The groujf includes Liakhof, Maloi, New Siberia, Thaddeus, Kotelnoi and Bennett Islands; the area is estimated at 20,480 square miles ; they are rocky, treeless, icebound all the year round, and uninhabited. Reindeer, foxes and white bears are found, and there is immense wealth in fossil ivory, the remains of mammoth, rhinoceros and buffalo. The first discovery was made by the Cossack Vaghin in

1712.

NEW SOMERSETSHIRE, in American history, a name given the territory extended to William Gorges in 1636, and comprising those settlements along the coast of Maine, which had not been included in the Ferdinando Gorges patent of 1631. William Gorges, a nephew of Ferdinando, was appointed first deputy-governor -of the district.

NEW SOUTH SHETLAND ISLANDS.

See South Shetland Islands.

NEW SOUTH WALES, Australia, the oldest Australasian colony of Great Britain and since 1901 one of the six original and the most populous, though not the largest state of the commonwealth, in the southeastern portion of the continent. It is separated from Queens¬ land on the north by an irregular line running southwest from Port Danger in lat. 28° 8′ S., till it meets the 29th parallel of latitude which forms the rest of the north boundary; on the east the Pacific Ocean is the boundary; on the south the Murray River, and a line running northwest from Cape Howe, lat. 37° 31′ S., separates it from Victoria; while on the west the 141st meridian forms the boundary between the state and South Australia.

The state has an area of 310,700 square miles divided into 141 counties. It is more than twice the size of the State of California and five times the size of England and Wales. A federal district of 900 square miles was set aside in 1911 for the new capital of the com¬ monwealth. See Canberra.

Topography. — The surface, more especially in the eastern and most populous portion, is much diversified, and presents, in its general features, a succession of hills and valleys, mountains and plains. The great dividing chain forming the great watershed of the state, with many summits varying in height from 3,000 to 6,000 feet, extends from north to south nearly parallel to the coast, at a dis¬ tance of from 30 to 50 miles inland or some¬ times more, and takes in the north the name of Liverpool Range, in the centre that of the Blue Mountains, and in the south that of the Aus¬ tralian Alps. The highest summit is Mount Kosciusko, in the southeast 7,328 feet. The space between the mountains and the sea is partly broken by spurs and ramifications, but descends from the west with more or less rapidity, and has a generally undulating surface, intersected by water-courses; in some places well wooded, and in others covered with dense

brush-wood. The coast line presents in general bold perpendicular cliffs of sandstone, in hori¬ zontal strata. Occasionally the cliffs are in¬ terrupted by low sandy beaches, some of which stretch to a considerable distance inland, and appear to have been covered by the sea at no very remote period. The indentations of the coast are remarkable for their number, and the excellent harbors which they form. Among them are Port Stephens, Port Hunter, Broken Bay, Port Jackson (on which lies Sydney), Botany Bay, Jervis Bay, Sussex Haven and Two-fold Bay.

Hydrography. — The most important rivers are the Murray, which is navigable as far as Albury (long. 147° E.) ; the Murrumbidgee and Lachlan, farther north, which after uniting fall into the Murray and the Darling, which flows from northeast to southwest through the whole extent of the state, and also falls into the Mur¬ ray. The Darling, in its upper course known as the Barwon, has among its more consider¬ able affluents the Bogan, the Macquarie, the Castlereagh, the Naomi, the Gwydir, the Mac- intyre and the Warrego. The Murrumbidgee is 1,350 miles long, the Darling 1,160, the Mac¬ quarie 750, the Lachlan 700. Notwithstanding the existence of those large rivers the western plains are but sparsely watered. The compara¬ tively narrow space between the mountains and the Pacific leaves little room for the develop¬ ment of large rivers. Many of them are for a great part of the year either altogether dry, or form a succession of deep ponds or water- holes instead of continuous streams. The chief are the Hunter, 300 miles, which falls into the fine port of that name at Newcastle, and is navigable for 50 miles above its mouth by small craft of 30 to 40 tons; and the Hawkes- bury, 330 miles, which falls into Broken Bay, and is navigable by vessels of 100 tons as far as Windsor, a distance of 140 miles. Others are the Shoalhaven, 260 miles; the Clarence, 240 miles, of which 70 are navigable ; the Macleay, 190 miles; and the Richmond, 120. Some of these rivers in the winter season cause disas¬ trous floods.

Geology and Mineral Resources. — In the

southeast, east and middle the prevailing rocks are Palaeozoic (Silurian and other), with gran¬ ite and other igneous rocks forcing their way to the surface, and in this region are chiefly situated the metalliferous deposits in which New South Wales is so rich. In the east Car¬ boniferous and Permo-Carbonife.rous rocks also occur extensively, and to these belong the large and valuable coal fields of the country. Valu¬ able sandstones also exist here in abundance. Cretaceous rocks extend over a wide area in the north and west, and the plains are mostly of Pleistocene origin. In connection with the

granite, _ limestone, both granular and foilated, occurs in abundance, and besides being often hollowed out into stalactitic caverns, sometimes passes into a beautiful close-grained marble, as white as that of Carrara.

The coal fields extend over an area of 10,000 acres, with more than 91 mines. The state ex¬ ports considerable quantities of coal to the west coast of North and South America. Cop¬ per ore of the richest quality and tin exist in large quantities, and iron is very generallv dis¬ tributed. Gold is found in all parts of the

stale; the value of the output in 1915 was $3,- 314,095, showing a considerable diminution; the total value of the output of gold since its dis¬ cover in 1851 until 1915 is $305,951,850. Most of the gold is sent to the mint for coinage. The combined value of the silver and lead out¬ put in the same year was over $11,547,090. Copper valued at *$1,172,185 was obtained in 1915. Several varieties of precious stones have been found, notably opals.

Climate. — As the area of the state extends over 110 degrees of latitude and contains a good deal of elevated ground, nearly every variety of climate is to be found. In the north the climate is tropical, while on the table-lands severe frost is not uncommon. The interior plains are very dry, and severe droughts occa¬ sionally kill millions of sheep, but the coast dis¬ tricts have abundant rains. Though the hot winds of the warm season are annoying, they are not unhealthful, while storms and electrical disturbances are comparatively rare.

Forestry, etc. — About one-fourth of the area of the state consists of forest lands, which in 1887 were taken under the care of the gov¬ ernment by the creation of a Forest Conserva¬ tion Department. The timber reserves, includ¬ ing state forests, cover an area of about 7,250,- 000 acres. For the Flora and the Fauna of the state, see Australia.

Agriculture and Stockraising. — The absence of water renders much of the land useless for agricultural purposes, but a large proportion is devoted to pasturage and grazing. In some places artesian wells have been introduced with good results. There is no great breadth of highly fertile land away from the river bank ; but the fertility of the land on. the margins of rivers is exceptional. Where liable to inunda¬ tion,

however, the year's harvest may be swept away in a few hours. Great reservoirs built along the river courses have greatly lessened the dangers of drought and inundation. The area under cultivation in 1915 was 4,808,627 acres, and the crops included wheat, maize, barley, oats, rye, millet, -potatoes, lucerne and artificial grasses, vines, orange-trees, sugarcane, some tobacco, etc. Dairy husbandry is becom¬ ing important, and butter is exported. Native fruits are neither numerous nor valuable, but the best of those of Europe are accli¬ matized. So well does the peach thrive, for instance, that farmers sometimes feed their pigs with the windfalls of their orchards. Other fruits include oranges, apples, pears, apricots, nectarines, cherries, plums, figs, grapes, melons, mulberries, gooseberries, currants, etc., and in the more northern parts the banana is abundant. The rearing of silkworms on the mulberry, which might be carried to an almost indefinite extent, has attracted attention. The grapevine is successfully cultivated, as well as the sugar¬ cane; considerable quantities of wine, brandy and sugar being made. The rearing of sheep (of which there are 32,583,000 in the state) and cattle are the chief employments of the people, 146,295 persons being engaged in agri¬ cultural and pastoral pursuits during the year ended 30 June 1915.

Commerce and Industries. — Wool is the most important article of export. The annual value of this export is not without fluctuation, but is again increasing. Wool exports in 1915 reached a total of $61,000,000. Other important

exports comprise coal, silver ore, silver lead, gold and coin, frozen and preserved meat, but¬ ter, tallow, leather, wheat and flour. The prin¬ cipal imports are wearing apparel, sugar, tea and hardware. The value of the total exports in 1916 was $204,791,580, of imports $166,898,-

485.

The manufacturing industries are naturally not of much imtlortance as yet, but they arc already very varied, and help to supply a con¬ siderable share of the home demand. In 1915 there were 4,188 miles of railway open, nearly all constructed by government, which has spent over $350,000,000 upon the railways.

Government. — The constitution of New Wales vests the legislative power in a parlia¬ ment of two houses, namely the Legislative Council and the Legislative Assembly. The former consists of not less tnan 21 mem¬ bers nominated by the Crown (52 in 1916), originally for the term of five years, but, subject to certain conditions, for life at the expiration of that period; and the latter of 90 members chosen by the

same number of constituencies. Members of the Assembly receive $1,500 per annum, and they, are entitled to travel tree by rail or tram in the state. As electors require no property qualification there is virtually universal suf¬ frage. The executive consists of a governor nominated by the Imperial Parliament, assisted by a Cabinet composed of Premier and Colonial Treasurer, the ministers for lands, public works, mines, labor and industry, agriculture, education and justice, and the attorney-general. The parliaments last for three years. Unless local acts supersede them the imperial laws are enforced. No enactment of the state legisla¬ ture becomes law till sanctioned by the gover¬ nor, and in some cases by the sovereign. The state sends six representatives to the federal senate, and 27 to the federal house of represen¬ tatives. For defense see Australia.

Population. — The population is 1,648,746, of whom 858,850 are males and 789,896 females, chiefly British-born subjects. The aborigines number about 2,012 and the Chinese 9,000. Sydney is the capital, and other urban centres are Broken Hill, Newcastle, Parramatta, Goul- burn, Maitland and Bathurst. Pop. (1910 est.)

1,700,000.

Religion and Education. — There is no estab¬ lished religion. Among the religious sects the Church of England, Roman Catholics, Presby¬ terians, Wesleyan and also Methodists, hold the chief places. The Church of England has 734,000 adherents, the Roman Catholics, 412,-013; the Presbyterians, 182,911; and the Meth¬ odists, 151,274. Education has been since 1880 controlled by a minister of public instruction. The public schools are classified as public pri¬ mary schools, superior public schools in the chief centres of population, evening schools, high schools for boys, and high schools for girls. Primary education is compulsory, and in state primary and superior public schools is free. Among the higher educational institutions are the Sydney Grammar School, and Saint Paul's, Saint John's and Saint Andrew's col¬ leges, and the Women's College, the colleges being all connected with the University of Syd¬ ney — an important institution, attended by 1,798 students, and granting degrees in arts, medicine, science and law. Technical education is ad-

ministered by a special branch of the depart¬ ment of public instruction. In 1915 there were 17 high schools, 1,992 public primary

schools and 520 provisional schools with 265,446 pupils. In addition there were 718 private schools, with 78,619 pupils and 3,682 teachers.

History. — New South Wales was discovered by Captain Cook in 1770, and founded as a penal settlement (at Botany Bay) in 1788, the convicts being – employed in road-making' and preparing the soil for agriculture. One of its early governors was the notorious Captain Bligh, who was deposed by the colonists in 1808. The most important events in its his¬ tory since convict immigration ceased in 1840 are the establishment of representative institu¬ tions in 1843; the erection of Victoria into a separate colony in 1850; the discovery in May 1851 of extensive gold tracts; the rush to the diggings, with consequent great increase in population and prosperity; and the incorpora¬ tion of the colony in the Australian common¬ wealth in 1901. The first railway, from Syd¬ ney to Parramatta, was opened in 1855. Among . more recent events are the Sydney Exhibition held in 1879, and the Intercolonial Conference held at Sydney in 1883. The colony celebrated its centenary in January 1888, and a special series of stamps of elaborate design was issued in commemoration of the event. .On 1 Jan. 1901 Svdney was the scene of the inauguration of the first governor-general of the new commonwealth, Lord Hopetoun. (See Australia; Australian Federation). Con¬ sult Griffin, (New South Wales, Her Com¬ merce and Resources> (1888); Hutchinson, (New South Wales; the Mother Colony of the Australias) (1896) ; (Official Year Book of New South Wales) ; David, T. W. E., (New South Wales) (London 1912).

Charles Leonard- Stuart.

Editorial Staff, c Encyclopedia Americana?

NEW SWEDEN, or NEW SWEDE- LAND, a name given in the 17th century to land lying between the Dutch colony of New Netherlands and the English colony of Vir¬ ginia. It included territory in what is now Delaware and New Jersey. It was settled in 1638 by a colony from Sweden; and in 1655 it was taken possession of by the Dutch.

NEW TESTAMENT. See Bible.

NEW TESTAMENT CHRONOLOGY,

the approximate dates of the events recorded in the gospels and other books of the New Tes¬ tament summarized according to the findings of • the best scholarship of recent years. The unity in diversity of the

different texts of the evan¬ gelists is synchronized by chapter and verse ref¬ erences to related incidents. Allowing for the preparatory incidents which led early chroni¬ clers to approximate the beginnings of the Christian Era at 9-8 b.c., the principal events may be outlined as follows :

B.C. 9-8. — Zacharias, priest at Jerusalem, husband of Elisabeth received a prophecy that he would be the father of John the Baptist, Luke i, 5-25. At Nazareth, Mary espoused to Joseph of the house of David, received a prophecy that she would be the mother of the Messiah, Luke i, 26-29.

B.C. 7. — Elisabeth, Zacharias' wife, made a similar prophecy to Mary, when the latter visited her for a stay of three months in a hill town of Judea, Luke i, 39-56.

B.C. 6. — John the Baptist was born, Luke i, 57-80.

B.C. 5-4. — The census at Jerusalem; the birth of Jesus at Bethlehem, Matthew i, 18-25, Luke ii, 1-7. The vision

and visit of the shepherds to the manger, Luke ii, 8-20. The circumcision of Jesus at Bethlehem, and his presenta¬ tion in the temple at Jerusalem, Luke ii, 21-24. Simeon and Anna's prophecies, Luke ii, 25-38. The visit of the Magi to Jerusalem and Bethlehem, Matthew ii, 1-12. The warning and flight of the Holy Family into Egypt; Herod's slaughter of the innocents; Matthew ii, 13-18; Luke

ii, 39-40.

B.C. 3-2. — Sojourn of Joseph, Mary and Jesus in Egypt and return to Nazareth, Matthew ii, 19-23.

A.D. 1-7. — Jesus accompanied his parents when they " went to Jerusalem every year at the feast of the Passover," Luke ii, 41.

A.D. 8. — " Jesus tarried behind in Jerusalem " without his parents' knowledge, and they returning " after three days found him in the temple, sitting in the midst of the doctors, both hearing them, and asking them questions," Luke ii,

41-50.

A.D. 9-26. — Jesus lived with his parents in Nazareth " and was subject to them . . . and Jesus increased in

wisdom and stature, and in favor with God and man," Luke ii, 51-52.

A.D. 26. — John the Baptist son of Zacharias, received the word of God in the wilderness and went " into all the country about the Jordan preaching the baptism of repentance for the remission of sins," Luke iii, 3; Matthew

iii, 1-12; Mark i, 1-8; John i, 1-28; Acts i, 5.

A.D. 27. — The baptism of Jesus by John in the Jordan, Matthew iii, 13-17; Mark i, 9-11; Luke iii, 21-22; John i, 29-34. The temptation of Jesus in the desert of Judea, Matthew iv, 1-11; Mark i, 12-13; Luke iv, 1-13; Jesus gains disciples at the Jordan and in Galilee, John i, 35-51. The marriage at Cana in Galilee, John ii, 1-12.

A.D. 28. — Jesus drives the traders out of the temple at the Passover, John ii, 13-25. Nicodemus a ruler of the Jews, confers with Jesus, John iii, 1-2). Jesus leaves Jerusalem but remains in Judea and baptizes: Further testimony to Christ by John the Baptist, John iii, 22-36. John is im¬ prisoned, and Jesus departs into Galilee and " from that time began to preach," Matthew iv, 12; xiv, 3-5; Mark i, 14; vi, 17-20; Luke iii, 19-20; iv, 14; John iv, 1-3. Jesus goes to Samaria, discourses with the Samaritan woman; and many Samaritans acknowledge "that this is indeed Christ, the Saviour of the world," John iv, 1-42. Jesus teaches publicly in Galilee, Matthew iv, 17; Mark i, 14-15; Luke iv, 14-15; John iv, 43-45. Jesus again visits Cana, where he heals the son of a nobleman lying ill at Capernaum, John iv, 46-54. Jesus letums to Nazareth " where he had been brought up; and, as his custom was he went into the synagogue on the Sabbath day and stood up for to read," then he began to preach and all " wonder¬ ed at the gracious words;" but as he proceeded " they were filled with wrath " and would have killed him " but he pass¬ ing through the midst of them went his way and fixed his abode in Capernaum," Luke iv, 16-31; Matthew iv, 13-16. The call of Simon Peter and Andrew, of James and John the sons of Zebedee, and the miraculous draught of fishes on the Sea of Galilee near Capernaum, Matthew iv, 18-22; Mark i, 16-20; Luke v, 1-11. The healing of a demoniac in the synagogue at Capernaum, Mark i, 21-28; Luke iv, 31-37. The healing of Peter's mother-in-law and others, Matthew viii, 14-17; Mark i, 29-34; Luke iv, 38-41. Jesus goes with his disciples from Capernaum throughout Galilee, Matthew iv, 23-25; Mark i, 35-39; Luke

iv, 42-44. The healing of a leper, Matthew viii, 2-4; Mark i, 40-45; Luke v, 12-16. The healing of a paralytic at Capernaum, Matthew ix, 2-8; Mark ii, 1-12; Luke v, 17-26. The call of Matthew, Matthew, ix, 9;

Mark ii,

13- 14; Luke v, 27-28.

A.D. 29. — Jesus goes to Jerusalem and at the pool of Beth- saida, heals the infirm man. Jesus subsequent discourse, John v, 1-47. The Pharisees censure the disciples for plucking ears of wheat on the Sabbath day, Matthew xii, 1-8; Mark ii, 23-28- Luke vi, 1-5. Jesus heals the withered hand on the sabbath day in the synagogue of Capernaum, Matthewxii, 9-14; Markiii, 1-6; Luke vi, 6-11. Jesus arrives at the sea of Tiberias, followed by multitudes, Matthew xii, 15-21; Mark iii, 7-12. Jesus retires to the mountain near Capernaum and chooses the 12 disciples; multitudes follow him, Matthew x, 2-4; Mark iii, 13-19; Luke vi, 12-19. The Sermon on the Mount, Matthew

v, 1-13; Luke vi, 20-49. The centurion's servant at Capernaum is healed, Matthew viii, 5-13; Luke vii, 1-10. The raising of the widow's son at Nain, Luke vii, 11-17. John the Baptist in prison sends disciples to Jesus, Matthew xi, 2-19; Luke vii, 18-35. The testimony of Jesus con¬ cerning John and the marvelous works of the day, Matthew xi, 20-30. Jesus eating by invitation with a Pharisee is anointed by a repentant sinful woman. The parable of the two debtors, Luke vii, 36-50. Jesus and the 12 dis¬ ciples make a second journey around Galilee, Luke viii, 1-3. The healing of a demoniac; The Scribes and Pharisees blaspheme; Matthew xii, 22-37; Mark iii, 19-30; Luke xi

14- 15; 17-23. The Scribes and Pharisees seek a sign J«us' comments, Matthew xii, 38-45; Luke xi, 16; 24-36 Jesus declares that the true disciples of Christ are his nearest relatives, Matthew xii, 46-50; Mark iii, 31-35; Luke viii, 19-21. Jesus prophesies woes against the

Pharisees and others at a Pharisee's table, Luke xi, 37—54. Jesus discourses to his disciples and the multitude, Luke xii, 1-59. The slaughter of certain Galileans; parable ot the barren fig tree; Luke xiii, 1-9. Parable of the sower, Matthew xiii, 1-23; Mark iv, 1-25; 'ˆV1, 4 '

Parable of the tares and other parables, Matthew xm, 21-53, Mark iv, 26-34. Jesus crosses the Lake of Galilee; incidents; the tempest stilled; Matthew vui, 18 2 / ; Mark iv, 35-41 ; Luke viii, 22-25. The two demoniacs of Gadara, Matthew viii, 28-34; ix, 1; Mark v, 1-21; Luke yin, 26-40. Levi's feast; Discourse on fasting; Matthew ix, lOyl/; Mark ii, 15-22; Luke v, 29-39. The raising of Jairus daughter; the woman

with an issue of blood; Matthew ix, 18-26; Mark v, 22-43; Luke viii, 41-56. Two blind men healed, and a dumb spirit cast out,. Matthew ix, 27 34. Jesus visits Nazareth and is again rejected, Matthew xm, 54-58- Mark vi, 1-6. The third journey around Galilee; the 12 disciples instructed and sent forth; Matthew ix, 35-38; x, 1, 5-42; xi, 1; Mark vi, 6-13; Luke ix, 1-6. Herod perplexed, believes Jesus to be John the Baptist who had been beheaded at his command for Herodias sake," Matthew xiv, 1-12; Mark vi, 14-29; Luke ix, / 9. The 12 disciples return, and Jesus retires with them across the lake; 5,000 people are fed; Matthew xiv, 13-21; Mark vi, 30-44; Luke ix, 10-17; John vi, 1-14. Jesus walks at night on the Sea of Galilee-Gennesareth, Matthew xiv, 22—26; Mark vi, 45-56; Luke vi, 15—21. Jesus' discourse to the multitude in the synagogue at Capernaum; many disciples turn back; Peter s profession of faith, John vi, 22-71. Jesus' discourse relating to eat¬ ing with unwashed hands; Pharisaic traditions; Matthew

xv 1-20; Mark vii, 1-23. The daughter of a Syrophemcian woman is healed, Matthew xv, 21-28; Mark vn, 24-30. A deaf and dumb man healed and several others; 4,000 people fed; Matthew xv, 29-38; Mark vii, 31-37; via, 1-9. The Pharisees and Sadducees near Magdala again require a sign; Matthew xv, 39; xvi, 1-4; Mark viii, 10-12. The disciples on the northeast coast of the Sea of Galilee warned against the Pharisees and Sadducees; Matthew

xvi 4-12; Mark viii, 13-21. A blind man healed at Beth- saida, Mark viii, 22-26. Near Caesarea Philippi, Peter a.nd the other disciples again profess their faith in Christ, Matthew xvi, 13—20; Mark viii, 27-30; Luke ix, 18 21. Jesus foretells his death and resurrection, a.nd the trials ot his followers, Matthew xvi, 21—28; Mark viii, 31— 38, ix, 1, Luke ix, 22-27. The transfiguration and the vision of Moses and Elias; Jesus' discourse with Peter, John and James; Matthew xvii, 1-13; Mark ix, 2-13; Luke ix, 28-36. The healing of a demoniac, whom the disciples could not heal, Matthew xvii, 14-21; Mark ix, 14-29; Luke ix, 37-43. Jesus again foretells his death and resurrection, Matthew xvii, 22-23; Mark ix, 30-32; Luke ix, 43-45. The provision of the tribute money at Capernaum, Matthew xvii, 24-27. The disciples contend who should be the greatest; Jesus counsels humility, forbearance and brotherly love, Matthew xviii, 1-35; Mark ix, 33-50; Luke ix, 46-50. Jesus goes to the festival of tabernacles; his final departure from Galilee; incidents in Samaria; Luke ix, 51-62; John vii 2-10. The 70 instructed and sent out from Samaria, Luke x, 1-16. Ten lepers cleansed in Samaria, Luke xvii, 11-19. Jesus

at the festival of tabernacles; his public teaching at Jeru¬ salem; Luke vii, 11-53; viii, 1. The woman taken in adultery, Luke viii, 2-11.

Further public teaching of Jesus; he reproves the Jews and escapes from their hands; Luke Viii, 12-59. A lawyer instructed; Love to a neighbor defined; Parable of the Good Samaritan, Luke x, 25-37. Jesus in 'the house of Mary and Martha at Bethany, Luke

x, 38-42. The disciples again taught how to pray, Luke

xi, 1-13. The 70 disciples return to Jerusalem, Luke x,

17-24. A man bom blind is healed on the Sabbath; Jesus' subsequent discourses; John ix, 1—41; x, 1—21. Jesus at the Festival of Dedication in Jerusalem; he.retires beyond the Jordan, John x, 22-42. The raising of Lazarus at Bethany, John xi, 1-46. . _ ,

A.D. 30. — The counsel of Caiaphas against Jesus; he retires from Jerusalem to Ephraim, John xi, 47-54. Jesus is followed by multitudes beyond Jordan; he heals the in¬ firm woman on the Sabbath; Matthew xix, 1-2; Mark x, 1; Luke xiii, 10-21. Jesus goes teaching and journey¬ ing toward Jerusalem; Pharisees warn him against Herod; Luke xiii, 22-35. Jesus dines with a chief Pharisee on the Sabbath ; incidents ; Luke xiv, 1-24. What is required of true disciples, Luke xiv, 25-35. Parables of the lost sheep; the prodigal son; etc.; Luke xv, 1-32. Parable of the unjust steward, Luke xvi, 1-13. The Pharisees reproved; par¬ able of the rich man and Lazarus: Luke xvi, 14-31. Jesus inculcates forbearance, faith, humility, Luke xvii, 1-10. The coming of Christ will be as sudden as the lightning, Luke, xvii, 20—37. The parable of the impor¬ tunate widow; the Pharisee and the publican; Luke xviii, 1-14. Jesus' teachings regarding divorce, Matthew xix, 3-12; Mark x, 2-12. Jesus receives and blesses little children, Matthew xix, 13-15; Mark x, 13-16; Luke xviii, 15-17. The rich young man; parable of the laborers in the vineyard; Matthew xix, 16-30; xx, 1-16; Mark xf 17- 31 ; Luke xviii, 18-30. Jesus for the third time foretells his death and resurrection, Matthew xx, 17-19; Mark x, 32-34; Luke xviii, 31-34. James and John make their ambitious

request, Matthew xx, 20-28; Mark x, 35-45. The healing of two blind men near Jericho, Matthew xx, 29-34; Mark x 46-52; Luke xviii, 35-43; xix, 1. The visit to Zaccheus the wealthy chief of the publicans at Jericho; the parable of the 10 pieces of money; Luke xix, 2-28. Jesus arrives in Bethany six days before the Passover, John xi, 55-57 ; xii 1 9-11. Jesus' entry into J erusalem amid public rejoic¬ ings 'Matthew xxi, 1-11, 14-17; Mark xi, 1-11; Luke xix, 29-44- John xii, 12-19. The barren fig tree; the cleans¬ ing of 'the temple; Matthew xxi, 12-13, 18-19, Mark xi, 12-19; Luke xix, 45-48; xxi, 37-38. The barren fig tree withers away, Matthew xxi, 20-22; Mark xi, 20-26.

Christ's mission questioned; parable of the two sons; Matthew xxi, 23—32; Mark xi, 27—33; Luke xx, 1—8. Par¬ able of the wicked husbandman, Matthew xxi, 33-46; Mark xii, 1-12; Luke xx, 9-19. Parable of the marriage of the King's son, Matthew xxii, 1-14. Insidious questions of the Pharisees and Herodians; tribute to Caesar; Matthew xxii, 15-22; Mark xii, 13-17; Luke xx, 20-26. Insidious question of the Sadducees; the resurrection; Matthew xxii, 23-33; Mark xii, 18-27; Luke xx, 27-40. A lawyer questions Jesus; the two great commandments; Matthew xxii, 34-40; Mark xii, 28-34. Christ is the son of David by the Holy Ghost; Matthew xxii, 41-46; Mark xn, 35-37: Luke xx, 41-44. Warnings against the evil example ot the Scribes and Pharisees, Matthew xxm, 1-12; Mark xn, 38-39; Luke xx, 45-46. Woes prophesied on the Scribes and Pharisees; Lamentations over Jerusalem; Matthew xxiii, 13-39; Mark xii, 40; Luke xx, 47. The widow s mite, Mark xii, 41-44; Luke xxi, 1-4. Greek visitors at the feast request through Philip of Bethsaida to see Jesus, John xii, 20-36. Comments upon the unbelief of the Jews, John xii, 37-50. Jesus on taking leave of the temple fore¬ tells its destruction and the persecution of his disciples, Matthew xxiv, 1—14; Mark xiii, 1—13; Luke xxi, 5—19. Christ's advent to be signalized by the destruction of Jerusalem and the overthrow of the Jewish state, Matthew xxiv, 15-42; Mark xiii, 14-37; Luke xxi, 20-36. The final hour of the coming of Christ; Exhortations to watchful¬ ness; The parables of the 10 virgins; and of the 10 talents; Matthew xxiv, 43-51; xxv, 1-30. Scenes of the judgment day described, Matthew xxv, 31-46. The rulers conspire against Christ; the supper at Bethany; the treachery of Judas; Matthew xxvi, 1-16; Mark xiv, 1-11; Luke xxn, 1-6; John xii, 2-8. Preparation for the Passover at Bethany and Jerusalem, Matthew xxvi, 17-19; Mark xiv, 12-16; Luke xxii, 7-13. The Passover meal; contention among the 12 disciples; Matthew xxvi, 20; Mark xiv, 17; Luke xxii, 14-18, 24-30. Jesus washes the feet of his disciples: John xiii, 1-20. Jesus indicates the traitor; Judas retires; Matthew xxvi, 21—25; Mark xiv, 18— 21; Luke xxii, 21—23; John xiii, 21-35. Jesus foretells the denial of Peter and the dispersion of the 12 disciples, Matthew xxvi, 31-35: Mark xiv, 27-31; Luke xxii, 31-38; John xii, 36-38. The Last Supper, Matthew xxvi, 26-29; Mark xiv, 22-25; Luke xxii, 19-20; 1 Corinthians xi, 23-25. Jesus' last discourse with his disciples, comforting them, promising the Holy Spirit, foretelling persecution, and assuring them of joy and peace, John xiv, 1-31; xv, 1-27; xvi, 1-33. Jesus' prayer with his disciples, John xvii, 1-26. The agony in the Garden of Gethsemane, Matthew xxvi, 30, 36-46; Mark xiv, 26, 32-42; Luke xxii, 39-46; John xviii, 1. Jesus betrayed and made prisoner, Matthew xxvi, 47-56; xiv, 43-52; Luke xxii, 47-53; John xviii, 2-12. Jesus taken before Caiaphas; Peter denies him thrice;

Matthew xxvi, 57-58, 69-75; Mark xiv, 53, 54, 66-72; Luke xxii, 54-62; John xviii, 13-18, 25-27. Jesus before Caiaphas and the San¬ hedrim, is condemned and mocked, Matthew xxvi, 59—68; Mark xiv, 55-65; Luke xxii, 63-71; John xviii, 19-24. The Sanhedrim lead Jesus away to Pilate, Matthew xxvii, 1, 2, 11-14; Mark xv, 1-5; Luke xxiii, 1-5; John xviii, 28-38. Jesus before Herod, Luke xxiii, 6—12. Pilate seeks to release Jesus; the Jewish rabble demand the release of Barabbas the thief; Matthew xxvii, 15-26; Mark xv, 6-15; Luke xxiii, 13-25; John xviii, 39, 40. Pilate yields Jesus to be scourged and mocked, Matthew xxvii, 26-30; Mark xv, 15-19; John xix, 1-3. Pilate, after again seeking to release Jesus, delivers him to be crucified, John xix, 4-16. Judas in remorse hangs himself, Matthew xxvii, 3-10; Acts i, 18-19.

Friday 7 April, 30 A.D. — The Crucifixion, Death and Burial of Jesus Christ, Matthew xxvii; Mark xv; Luke xxiii; John xix. The Resurrection of Jesus Christ, Matthew xxviii; Mark xvi; Luke xxiv; John xx. Christ's subsequent appearances. He is seen by Peter; then by two disciples on the way to Emmaus,' 1 Corinthians xv, 5 ; Mark xvi 12-13; Luke xxiv, 13-35. Jesus appears in the midst of the apostles at Jerusalem, Thomas being absent, 1 Corinthians xv, 5; Mark xvi, 14-18; Luke xxiv, 36-49; John xx, 19-23. Christ again appears, Thomas being present, John xx, 26-29. The apostles go to Galilee, Jesus appears to nine of them at the Sea of Tiberias, Matthew xxviii, 16; John xxi, 1-24. Jesus appears to the apostles and a gathering of about 500 brethren on a mountain in Galilee, Matthew xxviii, 16-20; 1 Corinthians

xv, 6. Christ is seen of James, then of all the apostles, Acts i, 3-8; John xv, 7. The Ascension at Bethany, Mark

xvi, 19-20; Luke xxiv, 50-53; Acts i, 9-12.

For the extension of New Testament Chronology, see Christian Doctrine, De¬ velopment of, and other special articles in this work on Bible; Biblical Criticism; Chris¬ tianity; Christology; Jesus Christ; Mary; on the hooks of the New Testament, and re¬ lated references.

Charles Leonard- Stuart, Editorial Staff of The Americana.

NEW TESTAMENT PROBLEMS. If

the importance of a writing be estimated by the influence it exerts and has exerted on the mind of men and on the history of the human

(more particularly the Caucasian) race, Homo Enro- pceus, and there seems to be no other standard nearly so just, then it must be admitted that the New Testament writings so far transcend all others as to form a class of their own. This affirmation need not be argued ; it is undisputed. Hence it becomes a matter of supreme interest to understand these writings, from which mod¬ ern no less than mediaeval history takes its start, its form, its color, and, in great measure, its inspiration. But no understanding is final or satisfactory that is not historical. The ques¬ tion of Zoology is not, ((What use have cattle for their horns ?}) but rather, ((How did cattle get their horns?® So, too, the primary query with the critic is not, (

The first inquiry that meets the student of any document concerns the text itself. Is this latter an original, or is it a copy? Or per¬

haps the copy of a copy? In either case, has it suffered any corruption, or is it a faithful tran¬ script? In case there be many discrepant copies — the case actually presented — there will arise many questions as to the comparative age and authenticity of these copies, as to their relations to each other, and it will perhaps be necessary to reconstruct the supposed original from the contradictory attestations of these witnesses. Such is, in general, the text problem of New Testament Criticism, one of the most highly complex that ever challenged the efforts of the human understanding.

The testimony, which is enormous in amount, exists in the form of manuscripts, both uncials and cursives in the supposedly original tongue (the. Greek), of translations, as Latin, Syriac, ZEthiopic, Armenian, Gothic, of citations by the early Christian writers, of lectionaries arranged for liturgical use, of capitulations and versifica¬ tions or divisions into chapters and verses, and so on. The problem of sifting and evaluating such a mass of evidence and striking the golden mean of truth would seem too difficult for hu¬ man intellect, especially as there is no secure foothold at any point, nor any sure way of testing our results as we proceed. In the end there is no court of final appeal, and the whole case must be left undecided. Under such cir¬ cumstances the marvel would seem to be that there should be any agreement at all, that there should not be as many minds as critics.1 How¬ ever, extremely numerous as are the points of diverse judgment, where adjudication seems hopeless, the number of agreements is still far greater, where critical opinions rest harmonious and undisturbed. Now it might be thought that this harmony would be extended and perfected by the discovery of new testimony, which of late years has proceeded apace, and by the deeper and minuter study of the long familiar evidence. But the fact is exactly the reverse.

Accumulation of depositions and profounder investigations have confirmed some critical judgments, but have shaken many others and completely overthrown not a few. The prob¬ lem is indeed becoming not less but more com¬ plicated with advancing knowledge, and the textual uncertainty was never before so great as it is now.

True it is that the last generation has wit¬ nessed the most brilliant attempts2 yet made to construct the most highly probable text. Those masterly scholars, Bishop Westcott and Dr. Hort, thought they might, by a careful study of the genealogy of the various witnesses, attach a coefficient of value to each one singly and in combination, and thereby determine the original text in the overwhelming majority of cases with a close approach to certainty. Plausible and seductive as was their argumentation, and thor¬ oughly accepted even now in many high quar¬ ters, it was yet fatally defective at many points and for several reasons, and can no longer command scientific assent. The ˆneutral® text which they posited as. best represented by the great Vatican MS. B, is a figment of the imag¬ ination. The deference paid to certain great

1 So Jerome's aphorism: tot enim sunt exemplaria pene quot codices, in his Preface to the Gospels, addressed to Pope Damasus.

2 As by Tischendorf, Westcott and Hort, Weiss, von Soden.

uncials was unwarranted. The testimony of the Fathers and the versions was undervalued. The depreciation of the so-called Western text was undeserved. The rash assumption that F was a copy of G was unfortunate.1 Closer study has shown decisively that at crucial points the witnesses upon which Westcott and Hort relied most confidently might all be misleading, and the MSS. most lightly esteemed might present the older reading. Even as the shepherd boy of old laid low the giant, so at any time may some neglected cursive or version or citation by the Fathers overthrow the most venerated uncial. Thus, the all-important word Pw//??, in Rom. i, 7, 15, is attested by nearly all the best au¬ thorities ; none the less it is an interpolation (Smith, J B L, 1901, Part I, p. 3 ff, Harnack, (Preuschen's Zeitschrift,1 1902, I, p. 83 f). So, too, the position of the Doxology at the end of Rom. xvi is witnessed by N B C D and the best versions; nevertheless the position at the end of xiv is certainly the older. The Epilogue (xv and xvi) is given by nearly every author¬ ity, but, in spite of all, it is proved to be

a later addendum; the Amiatinian and Fuldensian capitulations clearly point to its earlier absence.2

These examples also correct very usefully a prevalent notion that textual variations are after all merely trifles, like the fading line be¬ tween Imperfect and Aorist or the impalpable refinements of Greek syntax. On the contrary, they are sometimes blinding in their illumina¬ tion, in their revelation of the primitive struc¬ ture of our Scriptures.

Thus, the textual facts just stated involve a complete reconstruction of our notions about Romans, which now seems to be no Epistle and not addressed originally to Romans, but to be a compilation of moral and theological essays, first addressed to ((all those in love of God,0 afterward fitted out with Prologue and Epi¬ logue as it now stands.

So, too, the extremely important F and G variant in Rom. ix, 22, unnoticed even by the best commentators (as Godet, Sanday, Weiss, Lipsius, Hofmann), indicates clearly the pure Judaic original of this famous chapter; the Christian hand has been laid on lightly and deftly but transfigures into a cosmic theory what was at first only a Jewish patriot's ex¬ planation of the delay of divine vengeance upon <(vessels of wrath,0 the Pagan oupressors of his people — an observation more fatal to theolog¬ ical libraries than the torch of Omar. Consult (The Hibbert Journal,1 1, 2, pp. 328, 329.

Still another notion must be corrected. Let no one imagine that all or nearly all the vari¬ ants are mistakes or due to mistakes ; very many are visibly intentional. It was the an¬ cient habit, particularly of the Oriental, to com¬ pile and recompile, to edit and re-edit and re- edit again, and with sacred books this habit became almost an inviolable rule. No one dis¬ putes this fact in case of the Old Testament and the Apocrypha and the extra-canonical early Christian writings. It would be well- nigh miraculous if the New Testament Scrip¬ tures should offer exceptions. Before the es¬ tablishment of the Canon no sacred awe in-

1 Smith, 'The Pauline MSS. F and G,' Am. Jour, of Theo., July and October 1903.

2 Smith, ' Unto Romans,' J B L, Vol. XXI, 1902, Part II, pp. 117-169.

vested the canonics, there was no apparent reason why the favorite Scriptures should not be systematically modified to keep pace with the developing Christian consciousness, very much as our creeds are

altered nowadays.3

It is notorious that the Old Catholic heresy- hunters charged upon their opponents, Marcion, Valentinus and the rest, that these latter had corrupted the Scriptures to suit their own here¬ sies. The charge may often have been well- founded in the sense above defined, but it might undoubtedly have been retorted and was re¬ torted with equal justice by the heretics upon the Orthodox. The great master, Hort, has himself said, in speaking of the ˆDoxology0 : <(Indeed, (copies corrupted by Marcion1 need mean to us no more than (copies agreeing in a certain reading with Marcion's copy.1 . . .

On the whole, it is reasonably certain that the omission is his only as having been trans¬ mitted by him, in other words, that it is a genuine ancient reading.11 Wetstein's great word holds good: <(Various readings, almost all, are due to the zeal, ingenuity and guess¬ work of transcribers.11 Tischendorf admits: (

There is little reason then to hope for the establishment of a Received Text — the ignis fatuus of textual criticism, though not to de¬ spair of it be the last infirmity of noble minds. If such did not exist in the beginning, neither will it exist in the end. The discovery of new manuscripts, the collation of a few hundred more, will not bring the chaos to order but will make confusion worse confounded. Witness the publication of the Sinaitic Palimpsest in Syriac and the turning of attention to the famous Bezse Codex, called D : they have merely raised

3 In the same spirit King James' Translators, in their 'Address to the Reader,' wrote wisely and well.

4 As Holsten was led to observe — Holsten, the Doctor subtilissimus bf Protestantism, the matchless master of exegesis, whose imposing reconstructions of Paulinism, by their very perfection, constitute the reductio ad absurdum of the premises and methods he employs.

5 It is indeed plain on its face that a doctrine must in general antedate its literary expression, and when we find this expression in a highly composite, apophthegmatic form, we may be sure it has been forged on the common anvil beneath the alternate strokes of more than one hammer.

new problems, not settled the old. It is per¬ fectly just, then, and highly significant when Blass no longer quotes critical editions of the New Testament, but quotes the manuscripts themselves, never presuming to say what is the ((true text.® Such in theory at least is the position to which criticism must finally come. The critic's text, no matter how ingeniously or plausibly ((berichtigt,® is only the critic's text, not the <(true text,® after all.

And is such a mouse-like conclusion the only issue of the mountainous labors of centuries? Shall we know from year to year less and less what was the original autographic legacy, (

i Unless, perhaps, in the unicapitulars, as Philemon,

Jude, 3 John.

omnipresent that the great master, Friedrich Blass, has been driven to the assumption of two originals, an «-text and B~ text. The remark¬ able peculiarities of the Bezae Codex (D) had been noted by F. A. Borneman as early as 1848, but critics did not follow him in regarding it as presenting the older text; its eccentricities were ascribed to the copyist, who, like the villain in the play, was thought capable of any¬ thing. Tischendorf, Westcott-Hort, and Weiss base their texts of Acts essentially on B JNJ A C. It remained for Blass to show that this D was only one of many witnesses Jo a distinct Occidental text very widely ramified. It was as when one tugs mightily at. some ex¬ posed root of a tree: the earth begins to stir everywhere on that side of the tree. Blass was led to think that two manuscripts proceeded originally from Luke, one a memorandum (or draft) which he himself filled out into a book (the a-text or Antiochian form) for Theophilus. The draft, he thinks, remained as the /2-text, at Rome, where it was elaborated into the Occi¬ dental text (forma romana). This theory of Blass has not maintained itself; it is naive at many points, and it wrecks on many textual and other facts ; but it has proved extremely valuable as bringing clearly to light the sys¬ tematic differences of the manuscripts and showing how a critic with ultraconservative leanings (Blass dates Acts from 57-59 a.d.) is yet forced to the assumption of two primitive texts. Let one citation indicate the interval between them.

Acts xxvii, 1 («;-text) : <(And as it was determined for us to sail unto Italy, they were delivering both Paul and some other prisoners to a centurion by name Julius, of the Cohort Augustan.®

(/2-text):

((So therefore the governor decided for him to be sent to Caesar, and on the morrow, having summoned a certain centurion of the Cohort Augustan, by name Julius, he delivered to him Paul with the remaining prisoners.®

It remains to add that Blass has found it necessary to distinguish two texts, « and /?, in Luke's Gospel as well as in Acts.

The criticism of this eminent philologist, though not quite attaining the goal proposed, may be said to mark the beginning of the end of well-meant efforts to reconstruct the unital autographic originals of the New Testament Scriptures. The notably complex character of these latter comes out daily more and more clearly. The Baurian criticism had left the Apocalypse and the four chief Paulines as the primary and irresoluble literarv records of the Apostolic Age, by which all others were to be measured and appraised. Of this sacred pentagram it was the analysis of Vblter and Vischer that dissolved the first corner. These critics, especially the latter, have exhibited the Apocalypse as primarily a Judaic composition, itself highly composite, which has been inter¬ polated and Christianized by one or more Christian hands. The still deeper digging of Gunkel, Bousset, Zimniern and Jeremias has brought to light a considerable amount of ex¬ ceedingly primitive, even Babylonian, mythical material which had been cast into the alembic of the Apocalyptist. On the other hand, the extremely complex character o f (Romans) has come clearly into evidence. Spitta has found it

necessary to break it up into two Epistles ; the great Lightfoot, while rejecting the crude at¬ tempt of Renan, found himself constrained to propound a theory of a Shorter Recension. Volter surrendered the unity unconditionally, and Van Manen the Paulinity in his elaborate work on Paulus, though he had defended it against Loman. Steck also in his widely read and very readable Galaterbrief. More piercing was the analysis of Pierson and Naber in their remarkable V erisimilia, which in spirit and principle is the most advanced of European critical productions. Independentˆ of the fore¬ going, and following other methods, the present writer has exposed the concretional structure of Romans in a series of monographs, with sufficient clearness. It can hardly be doubted that similar results await the application of sim¬ ilar methods to Corinthians and Galatians. In¬ deed, it was said years ago in the Theol. Jahresb., "The 2 Cor. Letter will no longer hold

together.®

In Romans the presence of a large body of ancient Judaic originals seems now made out. The conservative, J. Rendel Harris, perceives that the list of sins (Rom. i, 29-31) is based upon an ancient Jewish Vidui (Confession for the day of Atonement).1 The same must, of course, be said of the similar list in 2 Tim. iii, 2-5. The searching analysis of Spitta and Mas- sebieau shows clearly that the Epistle of James is almost wholly Judaic, Christianized by a few insignificant interpolations.

The problem of discovering the original ele¬ ments, often Jewish, of the New Testament compositions, has been propounded only re¬ cently and has not yet advanced far toward solution. But the progress already made is most encouraging. That way lies truth — of this the day for doubt seems gone forever.

Closely connected with this quest is another, for the sources of the Scripture quotations at¬ tributed to the Gnostics by the Fathers. Thus far it has been held unsuspectingly that the Gnostics quoted from our Canonics or from parallel, still later sources. Inasmuch as the matter is of fundamental importance, it has appeared well to the writer to subject it to a minute and exhaustive investigation, which should include primarily Hippolytus, Irenseus, Tertullian, and Clement of Alexandria. As a result of this investigation, though not yet com¬ pleted, it may be declared that no evidence has yet come to light that the Gnostics ever used our Canonics ; on the contrary, it appears cer¬ tain that the Gnostics derived largely from sources now lost but certainly oresenting much of our present canonic matter in a cruder, more primitive, less elaborate form. By every token these sources contained this matter in far more natural connection than it appears in at present. The new light that is thus thrown upon the anharmonies and asyndeta of the New Testament is often surprising. The transfor¬ mations are often complete and effected in queerly ingenious manner. We now begin to feel the force of the oracle in Matt, xiii, 52: ((Every scribe discipled for the kingdom of the heavens is like unto a householder that brings forth from his treasure things new and things old? A few examples must here suffice. In Matt, xiii, 3-9, Mark iv, 3-9, Luke viii, 5-8, we read the Parable of the Sower. In Matt, xiii,

19-23, Mk. iv, 14-20, Luke viii, 11-15, it is care¬ fully expounded. The seed is declared to be ((the Logos of God,® the Sower is not inter¬ preted, but is left to be understood of the Jesus or indeed of any preacher of the Gospel. Critics, even the keenest, as Koetsveld, Jiilicher, Bugge, have never yet been able to satisfy even themselves

concerning the interpretation, still less concerning the expressed design of the parables, to blind the hearers. Jiilicher de¬ clares this latter to be impossible, especially for Jesus, and puts the dilemma sharply: “Either the Evangelists or Jesus.® No solution is found in the New Testament, but on turning to Hippolytus (Philosophumena, v. 8) we find given as a “saying® of the oldest pre-Christian Gnostics, the Naassenes, the following Allegory of Creation: “Forth went the Sower for to sow : And some fell by the wayside and were trodden down ; and some upon the stony places and sprang up (he says), and through not hav¬ ing depth were withered and died; and some fell (he says) upon the earth the fair and good and made fruity some a hundred and some sixty and some thirty. Who hath ears to hear, let him hear.® . . . Here the Sower is none other than God himself ; the seed is the Logos, the spermatic Logos, the seminal Reason of the Stoics ; the three classes are the elsewhere familiar Choics, Psychics, Pneumatics (all known to the New Testament), otherwise named the Captives, the Called, the Chosen. (A paper read by the writer before the So¬ ciety of Biblical Literature and Exegesis, New York, 28 Dec. 1904; “Der vorchristliche Jesus,®

107-135).

In the Gospels the phraseology has been ex¬ panded and enlivened, the Hebraism “in his sowing® (iv Tclcireipeiv avrov) has intruded it¬ self from the Lucan source, a 4th class has been inserted in the 3d (by Justin in the 2d) place, and the application made is entirely new.

In Matt, vii, 13, 14, we read the famous ex¬ hortation as to the gates : “Enter ye in by the narrow gate: for wide (is the gate), and broad is the way, that leadeth to destruction, and many be they that enter in thereby. For [how] narrow is the gate, and straitened the way, that leadeth unto life, and few be they that find it.® The passage is quite unconnected with its con¬ text; there is never any hint as to interpreta¬ tion ; it is a mystery even to Zahn ; it is im¬ possible in its present setting. But in Hip¬ polytus (op. cit., v, 8) we find the Eleusinian doctrine of the two gates : the one into the lower common life of flesh and soul, through which all enter at birth, the other into the higher life of spirit, through which onlv the initiates may fare ; then is given as a saying of “the Saviour® the following: “Concerning these (he says) expressly hath spoken the Saviour, that narrow and straitened is the wav that leadeth into life, and few are they that fare in into it ; broad though and wide the way that leads unto destruction, and many are they that thorofare through it.® The ‘ doctrine of the “Two Ways® was a favorite of antiquity but no nobler interpretation than this has yet been found. It must not be supposed that the use of

the term “The Saviour® (& Zurfp) presup¬ poses the Gospel or Christianity. The word is not a New Testament favorite, occurring (save jn Luke i, 47, ii, 11, Acts v, 31, xiii, 23) only in the so-called later Scriptures (19 times, 6

1 The Teaching of the Apostles, pp. 83-87.

times in Titus) ; it has been shut out, then, from the Gospel tradition, perhaps as a current heathen designation of gods or even kings. With the Gnostics it was greatly preferred, while the Fathers substitute for it the name Lord (K vptogf Dominus). Its Greek use goes back at least to ZEschylus and Pindar, and in its technical sense it was pre-Christian. The battle-cry of the Greeks at Cunaxa was <(Zeus lurrjp teal N lk7] » (Xen. Anab. I, 8. 16).

Again, the doctrine of judging the tree by its fruits finds large space in the Gospels. Thus Matt, vii, 16, aDo they gather grapes from thorns or figs from thistles ?® and Luke vi, 44, ((For of thorns they gather not figs, nor of bramble harvest grapes.® Here is an excellent answer to the oft-recurring question, which of two or more forms is the original? Plainly, both — and neither. They are variants upon an aphorism repeatedly met with in the classics. Says Plutarch, «We do not expect the vine to bear figs nor the olive clusters.® vvv de ttjv ag.‘rre’kov gvkcl

XIII (472, F). Ovid, too, (Aro Amatoria,* I, 747.

Siquis idem sperat, jacturas poma myricas Speret : et in medio flumine mella petat.

(

These classic parallels suggest the important question: How much of the New Testament exists under other form in profane literature? The question has not yet received complete an¬ swer, which could hardly fail to prove very illuminative.

From all of the foregoing it appears that we must not judge the New Testament bv the same standards we apply to the products of in¬ dividual genius. It is the life of ages and of whole peoples that is concentrated in that vol¬ ume. It is the gradual precipitate of the moral, religious and philosophic consciousness of three and a half

centuries — a time and two times and the dividing of a time — that is stratified in that wonderful book. To this slow deposit nearly the whole circum-mediterranean region would seem to have made contribution. Cer¬ tain it is that Rome and Athens and Ephesus and Antioch and Alexandria will, bear honor¬ able mention by the side of Palestine and Jeru¬ salem, not yet to include Persia and India.1 It is the mighty Mother, it is Universal Humanity, that has brought forth this prodigious birth through the long travail of a third of a millen¬ nium.

The new aspect under which the critical problem now appears effects a remarkable transvaluation of values. The great critical movement may be said to have begun, ineffectu¬ ally to be sure, in the great year 1792 with The Dissonance of the four generally received Evangelists, and ihe evidence of their respec¬ tive authenticity examined. By Edward Evan- son, A.M. — Ipswich. Evanson was bold enough to reject Matthew, Mark and John, along with

1 For Persia the monumental work of Cumont is funda¬ mental and exhaustive. Leaving aside the surmises and parallels of Seydel and Hopkins (“ Christ in India,” in his ‘ India Old and New,’ 1901), compare the circumspect dissertation of Van den Bergh van Eysinga, ‘ Indische in- vloeden op oude Christelijke verhalen’ (1901), and articles by Oldenberg in the Theologische Literaturzeitung and the Deutsche Rundschau. Consult Edmunds’ “ Buddhist and Christian Gospels ” (1905).

many of the Epistles, for reasons never sound but not always unworthy of serious attention. Of course, he held the spurious Scriptures to be later in origin. In 1820 (Probabilia de Evan- gelii et Epistolarum Joannis, Apostoli, indole et origine eruditorum judiciis modeste subjecit Carolus Theoph. BretschneiderP The author concludes at the end of 224 well-reasoned pages that the fourth Evangelist was <(certainly neither John the Apostle, nor a companion of Jesus, nor a Christian sprung from Palestine and living there, nor a born Jew, but some other Christian skilled in Alexandrine doctrine, a presbyter (as he himself professes in later epistles), who in writing it (exarando) made use of both tradition and a written book. Most probably he lived in Egypt . . .® The au¬

thor, who so modestly submitted this book to the judgments of the learned, afterward still more timidly recanted; nevertheless it brought (

This German Rationalism had not gone to such alarming lengths

without deadly violence no less to the spirit than to the letter of the sacred narratives, but it had been so insidious as to have remained almost unconscious of itself. It was Strauss who in his (Leben Jesu kritisch untersuchD (1835) rather roughly tore away the mask and showed the (

The influence of their penetrating researches was clearly seen a generation later in Strauss' second (Life of Jesus for the German People) (1864), less so in the brilliant romance of Renan, (La Vie de Jesus,) in which keen sym¬ pathy, lively fancv and perfect style vainly strove to supply the place of exact scientific criticism. Meantime another great voice in theology, Albrecht Ritschl's, had in his (Ent- stehung der altkatholischen Kirche) (1857) openly renounced the Baurian two-term for¬ mula, Paulinism versus Petrinism, as unequal to the expression of the facts, of early Chris¬ tianity, and had founded the Ritschlian School, whose leaf even in the fifth decade is still green.

Practically all of this high argument, stretch¬ ing through 70 years, has turned upon questions

of date and authorship. The gravamen of the Tubingen contention consisted in referring the bulk of the New Testament to the 2d century and construing it as pseudepigraphic and in some sense born of the Paulo-Petrine contro¬ versy, reflecting it, or solving it, or smoothing it away. On the other hand, the Conserva¬ tives, largely aided by Ritschlians, held more dr less firmly to the traditionary first cen¬ tury dates and authorship and minimized the antagonism between Jewish and Gentile Chris¬ tianity.

All this has now been greatly changed. Dates and authors are not indeed unimportant, but they are no longer of prime significance. This follows at once from the principles al¬ ready enunciated. If these much-debated com¬ positions be really so highly compounded, then their dates and authors are not nrecisely deter¬ minable. Even if it were possible to discover the ultimate or the penultimate reviser, the question would remain as to the extent of his own contribution to the final whole; the fact that he wrote 150 a.d. might very well consist with the fact that some or most of his material appeared even in written form 150 b.c. Thus the units of the New Testament compound seem dissolving under our hands like an atom of radium, but without

apparent loss of energy. With this regard the large enterprises of such as Volkmar and Zahn and Hilgenfeld are alike turned awry. At the same time, from, this higher viewpoint we can see the partial justi¬ fication of opposing theories, the half-truth in each term of the contradiction. Radicalism has been right in detecting indications of late origin in many or all of these canonic Scriptures; Conservatism has been equally right in em¬ phasizing the presence of more far older ele¬ ments. But neither the one nor the other has been justified in any inference from one part to its neighboring part, much less to the whole. Side by side in the faulted and folded strata of a mountain range we may find fossils sepa¬ rated by many thousands of years. Though the apocalyptic prophecies of Mark xiii be written before the catastrophe of Jerusalem, nothing follows as to the rest of the Gospel, which may have been written much later. Why may they not have been written at least in part, a hun¬ dred years earlier? They are not foretelling a second coming, but only The Coming of the Son of Man. Again, even if part of the paral¬ lels in Matthew and Luke do presuppose that catastrophe, which quivers still here and there in Matthew (Harnack, Chron., p. 654), it re¬ mains none the less true that these vivid pen- ci lings may be only later touches of a revising hand. The body of the picture may still be generations older. In studying these Scriptures we are exploring the tossed ruins of a world, and each fragment must stand on its own merits. Questions then of age and authorship must still present themselves continually, but not under the old familiar forms.

There are two elements in the New Testa¬ ment that are especially subject to considera¬ tions like the preceding: the philosophic, or rather theosophic,1 and the gnomic. _ These are present in large measure, even in portions mainly personal and narrative. With respect to

1 But we speak divine wisdom (Qeov GO(fiav) in mystery 1 Cor. ii, 7.

Loth it seems reasonably certain that the age is often very great. 4 he theosophic doctrines re¬ peat themselves under endlesslv varying forms in Gnosticism. This latter phenomenon is now referred with increasing positiveness and defi¬ niteness to the first Christian and even pre- Christian century. Its wide-reaching roots stretch themselves away back into the alluvium of the Tigris and the Euphrates (see Anz, (Ursprung des Gnostizismus)) . As an oifshoot or outgrowth or <(acute secularization® (Har¬ nack, D. G., I, 232) of Christianity, it is wholly inconceivable. The great historian of dogma himself annuls his own contention by recog¬ nizing a boundless extent of V orstufen (op. cit., p. 226, 231 f.) for his secularization. These prestages were

confessedly pre-Christian, or at the very latest syn-Christian, and since they contained demonstrably and indisputably in this form or in that nearly the whole body of New Testament theosophism and much more, it fol¬ lows irresistibly that the derivation of Gnosti¬ cism from Christianity is in every sense impossi¬ ble. The two historical products were prac¬ tically synchronous ; since many of the Gnostic central thoughts were certainly centuries pre- Christian, it may be possible to regard Chris¬ tianity as emerging from Gnosticism, 'but it is surely impossible any longer to regard Gnos¬ ticism as diverging from Christianity. To this general state of case there is explicit testimony in the book of Acts in chapter viii, 9-24, where Simon Magus is represented as an elder con¬ temporary of Peter and Philip. The first preaching of the Gospel in Samaria found him already preoccupying the ground, for many years he had been amazing the Samaritans, pro¬ claiming some doctrine about the (

ning of our era. There is no evading this argu¬ ment a fortiori; witness the utter bewilder¬ ment of Bunsen in his Tabulation ((Hip- polytus and his Age,5 I, p. 236), where he says the Gnostics (Hip's. I-IV) originated 70- 99 a.d., but the later Simon belonged to the first age (27 to 65) ! ! With this early dating, and only therewith, do all the phenomena corre¬ spond. Now in this archaic pregnosticism we find already present, however inchoate, a goodly company of the most important and characteristic New Testament ideas: the Son of Man (Humanity = bar-nasha), the Man from Heaven, Citizen of Heaven, the Father, the new Jerusalem, the Choics, the Psychics, the Pneu¬ matics, the Captives (Luke iv, 18; Rom. vii, 23), the Called, the Chosen, the Perfect, the Spirit, the new Birth, the Christ, he Jesus — all of these and more march in proud proces¬ sion through the pages of Naassenism. The name Jesus for the Son of God is used in one of their hymns, which we have no reason for supposing post-Christian, which Harnack and Preuschen declare to be ((ein naassenischer jedenfalls alter Psalm55 ((Die Ueberlieferung und der Bestand der altchristlichen Literatur,5 p. 168).

The momentous fact confirmatory is that all these notions are used in the New Testament as perfectly familiar, needing no explanation. This presupposes that these notions already had a history lying behind them. We may be per¬ fectly sure that they had been formed and de¬ fined and bandied about in frequent discussion long before they became encysted in apoph¬ thegms of the earliest Christian literature.

With respect to the gnomic element the case is quite as strong. The starry words of the New Testament are evidently stones that have been polished to perfection by the attrition of ages. That this literary peculiarity is due to the personality of Jesus cannot be maintained. For since he must have spoken in Aramaean, not in Greek, the forms we have could be only translations. As reproducing words actually used by him, the renderings of Dalman and others have little value. Jesus and the Baptist are thought of as strongly contrasted, almost antipodal; but the style of the one is hardly distinguishable from the style of the other. Both denounce the Pharisees as ˆgenerations of vipers55 (Matt, iii, 7, xxiii, 33), both use pre¬ cisely the same words about the Tree and the Fire (Matt, iii, 10, vii, 19). The variations found in the synoptic reports are precisely what might be expected in such anthologies. Let any one compare corresponding proverbs in sister languages or even different forms in the same language, for example, as given in Bartlett's dictionary of Quotations,5 and he will find almost exactly the same phenomena presented.

At this point the recent papyrus finds, with their new (Sayings of (the) Jesus,5 are of striking interest.1 Clearly they are but disjecta membra of a once imposing organism. Such Logoi (not Logia) undoubtedly existed in that elder day in countless number. Oblivion has swallowed them up, as it has swallowed up so much of ancient literature. Here and there some few have escaped and are seen rari nantes in gurgite vasto. The salvage of our canonics

1 The formula " (The) Jesus says " seems to stand on precisely the same footing as the Old Testament parallels, " Thus saith Jehovah," and the like. Against Soltau.

is like the Seven Tragedies of Sophocles — 7 out of 80! We may rejoice, however, in the belief that what has survived is the best — not all of it the best, nor all of the best, — but on the whole the most worth saving. The Chris¬ tian consciousness has sifted and resifted, has tested the spirits whether they be of God ; it has polished and refined, has set and reset the pre¬ cious stones, until the great citadel of its faith gleams and flashes like the bejeweled gates of the New Jerusalem.

Examples of the long-continued process of perfectionment lie open to behold in our Gos¬ pels. Thus, in Luke vi, 17 the Jesus descends into a plain and teaches a great multitude eagerly pressing upon him. But in Matt, v, 1 he withdraws from the multitude into <(the moun¬ tain55 (of new legislation) and teaches ((the dis¬ ciples55 only. In Luke vi, 20 he declares, ((Blessed the poor, for yours is the kingdom of God55;

but in Matt., (

The primary form of the angelic song (L. ii, 14), it is now admitted, was ((Glory on high to God, and on earth peace among men of (His) good will,55 that is, His people Israel. Surely it is not hard to forgive the scribe who, by the omission of a single letter, f, of the last word, transformed it into <(Glory on high to God, and on earth peace, among men good will.55

Once more, the zenith of moral sublimity, before which Rousseau justly exclaimed, “Soc- rates died like a philosopher but Jesus like a God,55 is attained in the prayer on the cross : ((Father, forgive them, for they know not what they do.55 Nevertheless, it is now bracketed by Lachmann and Westcott and Hort as a “Western55 interpolation. Finally, mark how the Lord’s Prayer as given in Luke (xi, 2-4) has been expanded and ennobled in Matthew (vi, 9-13).

Such examples, which may be multiplied indefinitely, may teach us how erroneous it is to suppose that the extra-canonic <(Sayings55 are less primitive, because less perfect in form and substance ; on the contrary, their comparative crudity far more reasonably argues their com¬ parative originality; “first blade, then ear, then full corn in the ear55 (Mark iv, 28).

‘ We come now still nearer the heart of the matter. In most of the foregoing we may hope for the general concurrence of critics, save such as Nosgen of Rostock. Few of the enlightened

would now deny that the general mind of (

This is certainly one of the most im¬ portant deliverances of recent criticism. The characterization of the prevailing investigation of the Gospels is perfect, but it is unfortunate that Wrede has contented himself with a bare negation, however unshakably established. (

early Christian consciousness they do not deny; how high it is to be rated is yet unsettled ; but after Wrede’s work it will never again be rated so low as before.

Nevertheless, all these critics up to this time are harmonious on one point, however dis¬ cordant as to others ; they will all agree with their great spokesman, Pfleiderer, that the end and aim of the

historical science of the New Testament <(is to understand Jesus as the origi¬ nating source of Christianity." How seriously historical science has taken this problem is above all evident in the great number of works, by men of first-class ability and intensely in earnest, bearing the title Life of Jesus or Life cf Christ. (Das Leben JesiP was the title of the great apocalypse of David Friedrich Strauss. Since then we have had Renan's, and Keim's, and Weiss's, and Hase's, and Holtzmann's and Reville's, and the like, not to mention Farrar's, and Geikie's, and Edersheim's. Even Volkmar, /\yho, in his (Marcus, > had, along with Hoekstra and Loman, broken the path since trodden by Wrede, resolving so much of the biography into symbolism, Lehrgediclite , and the like, even Volkmar must yet write his Jesus Nazarenus, sounding often like a recantation.1 More than one of these works was of signal ability. Keim's was pre-eminently able. But even where no formal (Life) was written, if the writer at¬ tempted any construction or interpretation of primitive Christianity, it was uniformly in terms of the Personality of Jesus. The consciousness of the Christ — that was the oldest Christianity, and, barring the acknowledged imperfection of the means and agents of transmission, that was the content of the Gospel as to us trans¬ mitted.

Here at least there is nothing in debate. Surely the problem has been clearly and defi¬ nitely conceived ; it has been firmly and reso¬ lutely grasped ; the materials for solution are not lacking in abundance ; the expenditure of the widest, deepest, exactest learning, of zeal and abilities of the highest order, has been prodigal, and the methods employed have been infinitely varied ; — what then, we may and we must ask, has been the net result? The answer can not be doubtful: absolutely nil! There is no exaggera¬ tion in this statement. Thus far it has been found utterly impossible to rationalize the Life of Jesus. Certain negative critical results have obtained more or less general recognition in critical circles, but they do not, however, apparently, help us in the least (or McGiffert's (The Apostolic Age," or the cognate treatises of Schurer, Hausrath, Weizsacker, Votaw and others, though lasting monuments of erudition, though brimful of

- – 'w ■ – – – —

1 A like remarkable refluence of critical consciousness made itself known in Loman, the Tiresias of the North, especially in controversy with Scholten. These keen critics, beside whom must be named their unhappy master, Bruno Bauer, had strange forebodings, extraordinary glimpses of the truth — they saw visions, they dreamed dreams. But their glittering structures lacked the solid foundation of scientific fact. No wonder then that they have sunk in a heap.

ingenuity and sagacity, though widely illu¬ minative and always pressing out further and further the bounds of our knowledge — all such are none the less disappointing as regards the capital point. In the last resort they are all equally impotent to make the Christian move¬ ment comprehensible or credible as an emana¬ tion from a personal focus, as a reaction from the Life and Death of the Man Christ Jesus. We might illustrate this fact by abundant cita¬ tion, but there is no need to carry owls to Athens. Not one but must in the end beg the whole question, must abdicate the whole task, by assuming some uniqueness in this Personal¬ ity, some absolute disparateness and incompara¬ bility with all other humanity. In other words, when under their inexorable analysis every trace of the miraculous1 has vanished alike from Gospels and Acts, from Epistles and Apocalypse, there remains unshaken in tre¬ mendous majesty the one supreme Miracle of Miracles, the Heart of Heart in the New Testa¬ ment, without Whom all other miracles are vain and contradictory, with Whom they ac¬ quire consistency and awful significance. The crumbling away of these outer parapets but lifts aloft into still bolder relief the impreg¬ nable strength of this inmost citadel.

The case then stands thus:

If Jesus be such a unique Personality as everywhere demanded by critical theory, in last analysis incomparable with the sons of men, then He was in some sense superhuman, it makes no difference in what sense, and neither His words nor His deeds are to be measured by the standard of men. Hence His miracles, one and all, remain miracles but cease to be wonders. We know of no reason why He should not have been born of a virgin, and walked on the waves, and raised the dead, and ascended into heaven, and endowed His disciples with any desirable spiritual gifts, and transmit¬ ted the Power of the Keys to an endless series of infallible vicegerents. Nay, it becomes ante¬ cedently highly probable that He would and did do alL this and much more ; we should reason¬ ably expect such a unique extra-natural being to do unique extra-natural things. We have no ground at all, then, for extruding or slurring or minimizing the non-natural element in the Scriptures, but every ground for retain¬ ing and accenting and even magnifying it. Ac¬ cordingly, the strictly orthodox view appears alone consistent and rational, the liberal theol¬ ogy must ultimately commit suicide, however skilfully it may postpone the denouement to the last page of the last chapter. The unescapable

question, ((What think ye of the Christ ?» must sooner or later precipitate the catastrophe. Greatly then as we admire and applaud the most enlightened scholarship of Europe _ and America, we must admit that at this critical pivotal point it has no standing before the bar of logic. This yea-and-nay criticism has now for years been bankrupt.

When so many winged hounds of Zeus thus find that their quarry forever eludes them, the suggestion is inevitable that there is something radically wrong in their method of pursuit, that

1 Even criticism in the bosom of the Church of England snares now but two or at most but four of the miracles: The Incarnation and the Resurrection, with their " incidents," the Virgin Birth and the Ascension. Consult the contro¬ versy in ' The Nineteenth Century and After.'

in some way their finest sense has betrayed them. We hold that the nature of their error is now at length an open secret. They have sought to explain Christianity as an emanation from a single individual human focus, as the reaction upon history and environment of a single human personality, they have sought <(to understand Jesus as the' originating source of Christianity® — they have failed and they must forever fail : for no such explanation is pos¬ sible, because no such origination was real. Over against all such attempts we oppose the fact that every day comes to clearer and clearer light, that now flashes continually into evidence around the whole horizon of investigation, the fact that was perceived nearly a decade ago, but whose effective proclamation called for the publication of a series of preparatory investi¬ gations, the fact that the Genesis of Christianity must be sought in the collective consciousness of the first Christian and immediately pre- Christian centuries, that in the Syncretism of that epoch of the amalgamation of faiths, when all the currents of philosophic and theosophic thought dashed together their waters in the vast basin of the Roman circum-mediterranean empire, was to be sought and found the possi¬ bility and the actuality of a new faith of Uni¬ versal Humanity, that should contain something appealing to the head and the heart of all men, from slave to emperor, a faith in which there should be no longer male and female, Jew and Greek, bond and free, but all should be one by virtue of a common Humanity of the ageless, timeless, spaceless Son of Man.2 Itis only as the outcome of this Syncretism, as the final efflores¬ cence of the Judseo-Greco-Roman Spirit, of the Asiatic-European Soul, that Christianity is wholly intelligible and infinitely significant,; the notion that it is an individual Palestinian prod¬ uct is the Carthago delenda of New

Testament criticism.

That the drift of the most advancing thought and the most penetrating research is all in the direction indicated, can not escape the notice of the reader of the most recent works of such as Pfleiderer, Gunkel, Bousset, Zimmern, Heitmueller, Dieterich, Seeberg, Wrede, Kreyenbiihl, Usener, and their peers. Such is the unmistakable trend of historico- religious investigation. But this latter is very slow, and naturally very slow, to cut loose from the ancient moorings, to weigh anchor and com- tnit itself to seas entirely unknown. Thus even Gunkel hesitated long (((nach langem Zaudern und manchen Erwagungen®) before publishing his (Zum religionsgeschichtlichen Verstandnis des Neuen Testamentes) (1903). He has there¬ in spoken out bravely the. great word (p. 95), <(Christianity is a syncretic religion,® even as Bousset had already declared: ((Judaism, how¬ ever, was the retort in which the different ele¬ ments were assembled® (Rel. des Judentums, p. 493). 3 Nevertheless, Gunkel tells us (

so vldg tov avdpuKOV— Bar-nasha = Human Being.

3 Most characteristically Bousset adds: “Then resulted through a creative miracle the new formation of the Gospel. “

inch beyond the elder standpoint. In the same spirit Wernle declares that “Paul’s utterance concerning Jesus was at bottom a myth, a drama, to which Jesus gave the name8 (329). None the less, Wernle still deduces Christianity from this uniquely but merely human Jesus.

The amazing state of case, then, is this : The most piercing criticism detects nearly the whole body of Christian doctrine and practice in the mixed religions of the day, even the sacraments themselves. None of this, it feels sure, ((can be derived from the teaching of Jesus; they show us how Christianity in its infancy was drawn into the chaos of Oriental religions® (Wernle). Nevertheless, it assures us that this teaching, this Jesus, remains the heart’s core of Christianity. When now we ask, what then was this teaching, what this Person¬ ality? the answer rendered is arbitrariness itself. Since the critic feels constrained to explain 99 per cent of Christian theory and practice as de¬ rived from Judaeo-pagan sources, as merely “transferred to Jesus,® he is at liberty to choose the remaining 1 per cent as he will ;

he makes of the teaching precisely what he thinks it ought to have been, he declares Jesus did or did not teach this or that, because it conforms or does not conform to his idea of Jesus! But whence this idea? Certainly not from the Gospels, for these are saturated through and through with “transferred® elements ; the only one that pro¬ fesses to be based on personal knowledge, the Fourth, is exactly the one that is rejected in toio as history, even by such a conservative critic as Harnack (“Especially the Fourth Gos¬ pel .... can not be used as an historic source in the ordinary sense of the word® — D. W. d. C., p. 13) ! No standard, then, is left but the caprice of the critic; he makes his own Jesus and conforms the Gospel thereto! If the Gospel contains contradictory or superfluous elements, they have been imported from the sur¬ rounding “chaos® ! If it omits certain necessary or desirable features, it was because the reli¬ gious consciousness of the writers was not free to assimilate them, but was bound fast by the historical conditions that obtained ! It is plain at a glance that nothing can ever come of such criticism, where the “poverty of the ascertained historical materials® is turned into endless im¬ aginary wealth by “the uncontrolled power of combination and divination® (Pfleiderer). The focus, the burning point of investigation, must then be this Personality, which is thus the irre- soluble residuum of the most inexorable analy¬ sis. But we may be absolutely sure that nothing can ever come of the arbitrary methods in vogue, all of whose airy constructions of the “Nazarene®

“Are but dust that rises up And is lightly laid again.”

Against every such theory of a unique deified Man, still more against the recent crudities of Kalthoff (Jesus merely a social-ethical Ideal!), while expressly holding important collateral questions in abeyance, it seems that criticism must now explicitly postulate the aboriginal Godhood of the Centre of Christianity, as ap¬ pears at least from these considerations:

1. The mere human Personality, which each critic postulates according to his own conven¬ ience, makes no great figure in the early propa¬ ganda. Neither in the book of Acts, nor in the

Epistles, nor in the oldest extra-canonic litera¬ ture, can the keenest eye detect the after-effect of “the Carpenter,® his words, his deeds, his life, his death; the Jesus, the Christ is every¬ where conspicuous, towering like the Matter¬ horn, but everywhere supremely as an object of worship, as an over-earthly supernal Being, as a God (The Outlook, 66, p. 686 f., 1900). The greatest early preacher, The Apostle, apparently cared little or naught for the earthly history, of

Jesus and preached him solely as a Divinity. When Harnack and the rest talk of “the im¬ pression that he made upon his disciples and which they propagated,® they forget the Pauline injunction not to be wise above what is written. Certainly, any such human Person as they as¬ sume must have made and left a regulative, overpowering and ineffaceable impression; the fact then that no such impression at all is any¬ where discernible, but quite the contrary, must teach us to revise their assumptions.

2. The preaching of C(the Jesus ® was seem¬ ingly pre-Christian. We have already men¬ tioned the occurrence of the name and the idea in “an ancient psalm of the Naassenes® (Har¬ nack), which we have no right to regard as post-Christian. It also occurs repeatedly, at least four times, in the (Zauberpapyri > lately brought to light, especially at line 3120 of the great Paris Papyrus edited by C. Wessely, in a long “Hebraic Logos® which shows no trace of Christian influence, which is expressly attributed to “the pure men,® and which the great master, Dieterich, positively ascribes to the (pre-Chris¬ tian) Essenes. At line 3119-20 we read

. opr’Gu ae Kara rot) QeoP t&v kflpiauv

’Ir/adv .... “I adjure thee by the God of the Hebrews, Jesus.®

As the end of controversy on this point we cite Acts xviii, 25, where of the learned and eloquent and zealous Apollos of Alexandria it is said, “He was wont to speak and teach accu¬ rately the doctrine of the Jesus (ehahei kul kSidaoKev arpifluQ ra nepi rod I paov) t knowing only the bap¬ tism of John .® The phrase italicized excludes all possibility of biographical reference to the Jesus of the Gospels, and shows incontestably that the cult of the Jesus was fervently propa¬ gated far and wide in ignorance of any earthly Life of Jesus.

3. The Epithet “Nazorean® (Nacrapaloc, Na£a-

palog, N atˆupalog, N. aˆaprjvdg) is not derived from Nazareth, a seeming topographic fancy, but is a divine appellative derived from the Old-Semitic stem NaSaR, meaning to keep, guard, preserve, frequent in the cuneiform inscriptions (na-sa- ru) as far back as 2250 b.c., constant in the Old Testament, where Nosrim means watchers, pre¬ cisely the term by which the Talmud designated the Christians (NaZoReans). The epithet Naz¬ orean would mean then Servator, almost the same as Salvator (Jesus), which are both used to render the Greek The Syriac form

Nasarya suggests, but does not' prove decisively, that the termination refers to the divine name Yah. So that Nasarya would mean Servator — Yah. Consult The Monist, January 1905, pp. 25-45, i(-Der vorchristliche Jesus? 42-70.

4. The "Nasaraioi® were certainly "before Christ® and "knew not Christ,® to quote Epi- phanius (Pan. Haer. xxix, 6). The name is the same as Nasarya (Syriac for Nazarene) and indicates that they worshipped God (Yah) un-

der a particular aspect or Person, namely, as Protector, Preserver (N — S — R). The no¬ tions of Servator (N aoap — aiog) and Salvator (Tˆaouc,) being hardly distinguishable, we nat¬ urally get the double title Jesus Nazarean. The fusion of this notion of Saviour with the more orthodox notion of Messiah (Chrestos)1 gave rise to the slogan of Paulinism, the Jesus — the Christ; this fusion was perhaps distinct¬ ively the work of Paul.

5. Primitive Christianity seems not unifocal but multifocal in origin and development. It does not emerge full-fledged at Jersualem and encompass the Mediterranean with the flight of an eagle. The <(astoundingly swift® (Heinrici) spread of the Gospel seems only apparent. In reality it seems everywhere in the air, a divine contagion. It springs up almost simultaneously in Jerusalem, in Antioch, in Damascus, in Alex¬ andria, in Rome, in Crete, in Libya, in Ephesus, in Corinth2 — wherever in the Dispersion the seed was sown. The book of Acts makes two attempts to explain this multifocal fact in ac¬ cord with its own unifocal theory. It assembles at Pentecost <(in Jerusalem, dwellers, Jews, de¬ vout men from every nation that is under heaven,® who, ((each one in his own dialect, heard them (the Apostles) speaking.® The other is found in the mighty persecution that arose against the Church in Jerusalem after Stephanos was crowned with martyrdom. c< All were dispersed except the Apostles.® But these were really the only or at least the principal offenders, the very ones that would have been dispersed first of all. Immediately after, the Church had peace, was builded up and multi¬ plied (Acts ix, 31), and, not many years after, the believers in Jerusalem number many myriads, all zealous for the law (Acts xxi, 20). The fact of multiplicity is clearly implied in these abortive attempts to trace it back to a higher unity. The other evidences are strewn through the book of Acts; they are scattered and broken lights,

but gathered up and focused by the lens of criticism they glow with sur¬ prising brightness.

These results, set forth and grounded in (Der vorchristliche Jesus) (1906-11), were re¬ inforced and greatly extended in JEcce DeusJ (1911-12), in which it was maintained ((Zwei- fellos mit Recht) — M. Dibelius in Harnack's (Theologische Literaturzeitung)) that:

6. Proto-christianity was a protest against idolatry, a crusade for Monotheism, the ((Eter- nal Gospel,® <(Fear God and give Him glory® (Rev. xiv, 6, 7), and as such swept round the Mediterranean in triumph. It was also held that :

7. Primitive Christianity was esoteric, heard in the ear, and only later proclaimed on the housetop.

8. Its language was largely parable and alle¬ gory and expressive symbols, representing the pagan world as a leper or blind or lame or deaf or even dead, or still more as possessed by demons (which symbolize heathen gods), and most pathetically as a sinful (adulterous) but repentant woman.

i The earlier form, see Blass Gram. d. nt. Gr. § 27, 4. Compare also Ps. xxxiv. 8, quoted by Clem. Alex., Adm. in Gent. 56 C. Sylb., "taste and see that Christos is God," where the Septuagint has Chrestos (good) is the Lord.

- 2 As is proved by microscopic scrutiny of Acts.

9. In the Gospel, sin is pre-eminently idolatry with its attendant vices; repentance is return (

Around these positions there has raged (since 1911 at least, till the outbreak of the World War) a very lively striie and there has grown up an extensive literature mainly in continental Europe, without, however, making any large addition to our knowledge. By odds the most notable volumes 'are the HCyrios Christos) of Prof. W. Bousset, reviewed in the Monist under the title (Polyxena Christiana, > and the (Agnostos Theos* * of Prof. E. Norden, both of which, under disguise of ˆcontroverting,® go far toward confirming the positions enumerated.

This later conception of Proto-christianity lifts it entirely out of the domain of mere morality into which the well-meant liberalism of the 19th century had sunk it, and restores it, under wholly new auspices, to its elder rank as the greatest, and in its central aspect, the final

religious revolution of the ages.

So far the investigation has been carefully made, and so much appears ((very probable.® Still other kindred inquiries are in progress, but of these the results must be awaited. Enough, however, seems established to show that the (

the inundated plains will blossom and brighten anew with abundant blessing.

Bibliography. — Aal, (Der Logos' (1896-99) ; Baldensperger, (Die messianisch-apokalyp- tischen Hoffnungen des Judentums' (1903); Blass, (Acta Apostolorum' (1895) ; Bousset, (Textkritische Studien zum Neuen Testament' (1894); Bugge, 'Die Hauptparabeln Jesu' (1903); Clemen, 'Paulus' (1904); Brandt, (Die Evangelische Geschichte' (1893) ; Cheyne,

(Bible Problems) (1905); Deissmann, 'Bibel- studien) (1895) ; Dieterich, 'Abraxas' (1891) ; (Nekyia) (1893) ; 'Eine Mithrasliturgie) (1903) ; von Dobschiitz, (Probleme des apos- tolischen Zeitalters) (1904); Drummond, 'An Inquiry, etc., into the Fourth Gospel' (1903) ; Feine, (Jesus Christus und Paulus' (1902) ; Fiebig, (Altj iidische Gleichnisse und die Gleichnisse Jesu' (1904); Friedlander, (Der vorchristliche j iidische Gnosticismus' (1898) ; Gregory, 'Textkiitik des Neuen Testamentes' (1900); Harnack, (Die Missions und die Ausbreitung des Christentums' (1902) ; Haw¬ kins, (Horse Synopticse' (1899) ; Heitmueller, (Im Namen Jesu' (1903) ; Hilgenfeld, 'Die Ketzergeschitchte des Urchristenthums' (1884) ; Holtzmann, (Lehrbuch der Neutestamentlichen Theologie' (1897) ; Julicher, 'Die Gleichnisre- den Jesus' (1899) ; Kreyenbiihl,, (Das Evangel- ium der Wahrheit' (1900) ; Lietzmann, 'Der Menschensohn' (1896) ; Lightfoot, 'Biblical Essays' (1893); Loisy, 'L'Evangile et L' Bglise (1902) ; (Le quatrieme fivangile' (1903) ; Loman, 'Quaestiones Paulinse' (1882- 86) ; (Nalatenschap' (1899) ; Van Manen, (Paulus' (1890); Mayor, 'Epistle of Saint James' (1892) ; Merx, 'Die vier kanonischen Evangelien' (1897); Nestle, 'Einfiihrung in das griechische Neue Testament' (1899) ; Pfleiderer, 'Der Paulinismus' (1873) ; 'Das Christusbild' (1904); Reitzenstein, 'Poiman- dres' (1904) ; Schmidt, C., 'Acta Pauli' (1905); Schmidt, N., in (Encyc. Bibl.'; Schmiedel, (Winer's Grammatik' (1894), 'En- cyc. Bibl.' passim ; Seeberg, 'Der Katechismus der Urchristenheit' (1903) ; Soden, (Die

Schriften des Neuen Testaments' (1902) ; Sol- tau, (Unsere Evangelien' (1901) ; Spitta, 'Ge- ischichte und Literatur des Urchristentums' (1893-96-1901); Usener, 'Religionsgeschicht- liche Untersuchungen' (1889) ; Weiss, (Die Offenbarung Johannis' (1904) ; Wendland, (in Preuschen's 'Zeitschrift,' 1904) ; Zahn, (Geschichte des Neutestamentlichen Kanons' (1888). Commentaries: Hand-Kom- mentar, Meyer's, Zahn's Schanz's, Inter¬ national Critical, Strack-Zdckler ; Encyclopaedia Biblica' (edited by T. K. Cheyne and J. S. Black, 1899) ; 'Dictionary of the Bible' (edited by J. Hastings and J. A. Selbie, 1898). Intro- troductions : Bacon (1902); Baljon (1893); Hilgenfeld (1875); Holtzmann (1892); Salmon (1885); Trenkle (1897); Weiss (1897); Zahn (1897) ; Julicher (1893).

Among more recent works should be men¬ tioned in first place Abbott's, E. A., 'Diates- sarica' (1900—17, a mass of microscopic philo- logic gleanings, garnered from unharvested fields often remote, a many-volumed work ex¬ ceedingly rich in premises but poor in conclu¬ sions, yet notable for its recognition of Sym¬ bolism in the Gospels) ; also Bade, F. W., 'The Old Testament in the Light of To-Day' (1915) ;

Barnes, A. S., 'The Early Church in the Light of the Monuments' (1913) ; Clark, A. C., (lhe Primitive Text of Acts' (1914); Clemen, C.,

' Religionsgeschichtliche Erklarung des Neuen Testamentes' (1909) ; Conybeare, F. C., 'Myth, Magic, and Morals' (1910); Eucken, R., 'Can We Still Be Christians' (1914) ; Gressmann, H., 'Der Ursprung der israelitisch-jiidischen Escha- tologie' (1905) ; Harnack, A., 'The Sayings of Jesus' (1908) ; Kautsky, K., 'Der Ursprung des Christentums' (1908) ; Loisy, A., 'A Propos d Histoire des Religions' (1911) ; Loofs, F., 'What is the Truth about Jesus Christ?' (1913); McCabe, J., 'The Sources of the Mo¬ rality of the Gospels' (1914); Minocchi, S., 'II Panteon — Origini del Cristianesimo' (1914) ; Moffatt, J., 'Introduction to the Litera¬ ture of the New Testament' (1914) ; Reitzen¬ stein, R., 'Die Hellenistichen Mysterienre- ligionen' (1910) ; Robertson, J. M., 'The His¬ torical Jesus' (1916) ; Schweitzer, A., 'Ge- schichte der Leben-Jesu-Forschung' (particu¬ larly pp. 444-642, on "Die neueste Bestreitung der Geschichtlichkeit," etc., 1912) ; id., 'Die Ge- schichte der paulinischen Forschung' (1911) ; many controversial articles in the Monist, the Open Court and elsewhere; von Soden, 'Ur- christliche Literaturgeschichte' (1905) ; Usener, H., 'Das Weihnachtsfest' (1910) ; Wernle, P., 'The Beginnings of Christianity' (1903) ; Dujardin, E., 'La Source du Fleuve Chretien' (tr. 1911) ; Whittaker, T., 'Priests, Philoso¬ phers and Prophets' (1911) ; Anon, 'Markus- Redaktoren' (Stockholm 1916). See also Bible,

Vol. Ill, p. 638.

William Benjamin Smith, Tulane University, New Orleans.

NEW TESTAMENT CRITICISM.

Triple Evidence. — Logicians distinguish be¬ tween metaphysical, physical and moral evi¬ dence for the things we know. Metaphysical evidence is based on the unchangeable essences of objects or on the analysis of our concepts; for example, the whole is greater than its parts. Physical evidence is based on the con¬ ditional stability of the laws of nature; for ex¬ ample, the sun rises in the east and sets in the west. Moral evidence is based on the testi¬ mony of a witness; it implies that we have the genuine words of the witness, and that the witness is endowed with the necessary knowl¬ edge and veracity. The New Testament does not furnish us either metaphysical or physical evidence ; we have to be content with moral evidence. And even this is not of the highest order. We do not listen to the words of eye¬ witnesses, but we have only a number of his¬ torical and doctrinal writings to consult. Again, we do not possess a single autograph of these writings; our New Testament text has been copied and copied again, edited and edited again, so that at present not a single verse reads exactly alike in all copies and editions. The very words of our witnesses seem to have become uncertain. Moreover, doubt has been raised as to the knowledge and the veracity of our New Testament writers; their evidence has been pronounced unreliable even in those passages in which their words are practically certain.

Criticism. — For these reasons the principles of criticism must be applied to the books of the New Testament. Lower or textual criticism.

will inquire into the genuineness of each verse and of every word of the New Testa¬ ment. Higher criticism will investigate the au¬ thenticity of the entire New Testament books, and will test their reliability. Meanwhile, let not the metaphysician and the scientist under¬ rate the evidence furnished by the New Testa¬ ment writings. It is the evidence on which his¬ tory is built ; even the abstract thinker is con¬ tent with this kind of evidence as soon as he leaves the region of speculation and enters into practical life.

Lower or Textual Criticism. — Lower or textual criticism strives to restore the original text of the New Testament. Its method con¬ sists

generally in a reversal of the process by which false readings have penetrated into the text. The original readings are suggested partly by the ingenuity of the critic, partly by the text of early manuscripts or of patristic quotations or again of early versions.

Original Manuscripts. — The original copies of our New Testament books must have been lost very early. No early Father appeals to the original manuscript in defense of his own pecul¬ iar reading of the text. Tertullian (de pre¬ script. 36) and Peter of Alexandria (de pasch. vii ; Migne, P. G., xviii, 517, 520) are no ex¬ ceptions. Tertullian's words concerning the Pauline Epistles do not necessarily imply the existence of the original copies ; and Peter's testimony is based on late authority. Neither can it be said that a fragment of Mark's origi¬ nal Gospel is still kept in Venice (Baron., Annal. ad ann. 485), and that the copy of Matthew's Gospel written by Barnabas is still extant in Constantinople (Assem., Biblioth. orient., ii, pp. 81 ff) ; for both relics are spurious.

Early Variations. — Some of the early ec¬ clesiastical writers are of opinion that the New Testament text was corrupted intentionally by the heretics. This view is expressed by Irenaeus (c. haer. i, 27; Migne, P. G., vii, 638), Dionysius of Corinth (Eus., H. E., iv, 23; Migne, P. G., xx, 388 ff.), Tertullian (c. Marc, v, passim), Eusebius (H. E„ v, 28 Migne, P. G., xx, 516), and Epiphanius (haer., xlii, 9 ff. ; Migne, P. G., xli, 708). We do not deny that heretical writers may have introduced one or another variant, but they cannot be held responsible for the great bulk of different readings. Nor are we at a loss to account for the early appearance of variations. (1) Oral tradition was prized higher in the earliest time of the Church than the written word. (2) The dogma of inspira¬ tion was not sufficiently well developed to de¬ mand a special amount of accuracy on the part of the copyists. (3) Most copyists did not work as official scribes of the Church, but tran¬ scribed the text for the use of private persons. (4) It must also be kept in mind that the scientific accuracy of later days was not a characteristic feature of the first centuries. (5) Finally, the copyists were fallible men, and as such they were not exempt from the various sources of accidental error to which all scribes are subject.

Earliest Witnesses for Variations. — Among

the earliest witnesses for the existence of variants in the New Testament text must be reckoned Polycarp, Hegesippus, Papias, the Elders of Irenaeus, Justin. Theodotus, the churches of Vienne and of Lyons, Marcion,

Ptolemaeus, Heracleon and Tatian. Nor can the variants, for the existence of which they testify, be regarded as mere accidental slips of memory. Polycarp's quotation of Acts ii, 24 (ad Philipp. 1, 2) disagrees with nearly all Greek codices and early visions, but it agrees with cod. D, the Vulgate, and several other versions. The dou¬ ble reading of this passage must then have ex¬ isted even in his day. Irenaeus (adv. haer. 30, 1 ; Migne, P. G., vii, 1203) appeals to ancient and accurate manuscripts in defense of a certain reading. Clement of Alexandria, too (Strom, iv, 6; Migne, P. G. vii, 1252), cites variants of certain passages. Various readings must there¬ fore have been quite common in the 2d cen¬ tury. In the 3d century Origen complains of the great diversity in the codices (in Matt, xv, 14; Migne, P. G. xiii, 1293), and during the course of the 3d century Jerome attests that the evil grew rather than diminished (ad Dam., praef. in evang.). After the 4th century the oc¬ currence of variants is attested by existing manuscripts, patristic quotations and faithful translations.

Incipient Stability. — It has been believed that Origen was the author of a revised text of the New Testament. But this opinion can hardly be reconciled with Origen's own words (in Matt, xv, 14; Migne, P. G. xiii, 1293). On the other hand, many learned men did not con¬ sider jt below their dignity to aid in the tran¬ scription of the sacred text. Eusebius and Je¬ rome (H. E. VI xxxii, 3; de vir. ill. 75) testify that Pamphilus had transcribed certain texts. Jerome again (ep. 34; al. 141) tells us that the priests Acacius and Euzoius had . been engaged in transcribing the sacred text in the library of Caesarea. In other passages Jerome shows his esteem for the manuscripts written by Adaman- tius and Pierius (in Matt, xxiv, 26; in Gal. iii, 1 ; Migne, P. G., xxvi, 181, 348), the latter of whom was one of Origen's successors in the presi¬ dency of the Alexandrian school ; but neither Jerome nor Eusebius can be cited as a witness for a text revision by either of Jerome's favor¬ ites (cf. Eus. H. E., vii, 32; Migne, P. G., xx, 732). True text revisions appear to have been edited by the Egyptian bishop Hesychius and the Antiochian priest Lucian. It is true that Jerome's words (ad Dam., praef. in evang.; de vir. ill. 77) are not as clear and definite as one might desire. Still they show that Hesychius and Lucian had paid considerable attention to the problem of the New Testament text. Hug, Eichhorn and W. Bousset have ventured to suggest that the work of Hesychius has been preserved in the so-called Alexandrian group of New Testament variants, while that of Lucian is variously connected with the Byzantine or the neutral group. But no proof for either view has thus far been advanced. It cannot be de¬ nied, however, that from the 4th or 5th century onward the variants in the New Testament crys¬ tallize into several types or forms, differing ac¬

cording to the country in which the respective manuscripts were written, the versions were made and the citations were employed.

Causes Which Effected the Stable Text Groups. — We have said that the different groups of variants were more or less attached to their place of origin. But loyalty to the cus¬ toms of particular places was not the only cause of the incipient text stability. The following considerations will suggest additional reasons :

(1) The local ecclesiastical authorities naturally insisted on having the transcriber copy the text current in each particular Church. (2) After the Church began to enjoy the blessings of peace under the reign of Constantine, the bish¬ ops had better opportunities to regulate the in¬ terior affairs of their respective dioceses (cf Sozom., H. E. i, 11; Migne, P. G. lxvii, 889). (3) Owing to Diocletian's decree concerning the destruction of sacred books, many copies of the New Testament had been destroyed during the late persecution, so that the number of the model texts was greatly reduced (Eus., H. E. viii, 2; Migne, P. G. xx, 745). (4) Finally, the Emperor Consta'ntine charged Eusebius with the transcription of 50 new codices which were donated to the various imperial foundations and thus became the model text for innumerable other copies (cf. Eus., Vit. Constant., iv, 34, 36, 37; Migne, P. G. xx, 1181 ff.). Here we have an explanation of the fact that the so-called Syrian or Byzantine group of texts attained such an overwhelming popularity.

The Written Text from the 4th to the 16th Century. — Though from the 4th century onward the particular churches had their own peculiar groups of variants which they propa¬ gated in preference to other readings, it must not be imagined that the lines of demarkation between these text-families are mathematically accurate. Suppose we denote by 1 the text pe¬ culiar to the Church A, by 2 that current in the Church B, by 3 that peculiar to the Church C, etc., then the text peculiar to the Church Z will not be entirely new, but in all likelihood it will be a mixture of 1, 2, 3 ; and the text of the Church Y will be a mixture expressed by 3, 2, 1, and similarly the text of the Church X will be the mixture of 2, 1, 3. And while the codices were thus propagated, fairly faithful re¬ productions of parts of the text were kept for us by Eusebius, Athanasius, Epiphanius, the two Cyrils, Basil, the two Gregorys, Chrysos¬ tom, Theodoret and Ephrasm. To these illus¬ trious men must be added Andrew of Cappa¬ docia for the 5th

century, Venerable Bede, John Damascene and Alcuin for the 8th, Photius for

the 9th, Suidas and Arethas for the 10th, Theo- phylactus, GEcumenius and Euthemius for the 11th and 12th, the Correctoria for the 13th and Laurentius Valla for the 15th. And this is by no means an exhaustive list of men and works important for textual or lower criticism.

New Testament Codices. — Greek manu¬ scripts are divided into uncials and cursives or minuscles. In uncial writing all the letters are large and divided. The other class of manu¬ scripts is called minuscule, because its letters are small ; it is called cursive, because its let¬ ters are linked together in a running hand. Broadly speaking, the manuscripts written be¬ fore the 10th century are uncial ; those written between the 10th and the invention of printing (1454 a.d.) are minuscule or cursive. Not counting eight manuscript psalters containing the text of the hymns found in the third Gospel, the New Testament uncials number 114; two of these belong to the 4th century, 15 to the 5th, 24 to the 6th, 17 to the 7th, 19 to the 8th, 31 to the 9th, 6 to the 10th. But only one of all these contains the complete text of the New Testa¬ ment ; four others contain the greatest part of it. Besides these five, there are 81 gospel manu

scripts (12 complete or nearly so, 14 partial ones and 55 fragmentary), 13 of the Book of Acts (five complete or nearly so, eight more or less fragmentary), five of the Catholic Epistles (four more or less complete, one fragment), 20 of the Pauline Epistles (seven more or less complete, 13 fragmentary). There are four complete manuscripts of the Apocalypse, and one defective one. Of the cursive manuscripts more than 1,200 contain the Gospels, more than 400 the Book of Acts, more than 500 the Pauline Epistles, more than 180 the Apocalypse. Be¬ sides, textual criticism knows more than 260 lectionaries with fragments of the Book of Acts and of the Epistles, and more than 950 evangelistaria, about 100 of which are uncial manuscripts. The investigation into the origin and the relationship of the various cursive man¬ uscripts is far from being complete. To facili¬ tate reference, the uncial manuscripts were de¬ noted by capital letters, either Latin or Greek or even Hebrew, while the cursives were indi¬ cated by Arabic figures. H. Fr. von Soden has changed this notation considerably. On the list arranged according to this improved plan, not merely the identity of Soden's 2,328 manuscripts is indicated, but also their age and contents ((Die Schriften des Neuen Testaments in ihrer altesten erreichbaren Textgestalt hergestellt auf Grund ihrer Textgeschichte) ; Bd. i.).

The Printed Text. — It was in 1516 that Erasmus published the first printed edition of the Greek New Testament text. He based his work on six manuscripts at most; of these Pone was complete and only one valuable. New and improved editions of the Erasmian text were is¬ sued in 1519, 1522, 1527 and 1535. Meanwhile, the polygot edition of Cardinal Ximenes, which had been prepared with much greater care and had left the press on 10 Jan. 1514, was pub¬ lished in 1522 (perhaps in 1520) ; but being lim¬ ited to 600 copies, it never reached a large cir¬ culation. Not to mention other reissues of these two main editions, Robert Estienne or Ste- phanus repeated in his third and fourth editions (1550, 1551) almost the pure Erasmian text, adding in the margin variants based on 15 man¬ uscripts and the polygot of Ximenes. The Eng¬ lish Authorized Version and the so-called Re¬ ceived T ext current in England follow the third edition of Stephanus. His fourth edition is the first Greek text divided up into verses. Among its numerous re-editors, Th. Beza and the Elze¬ vir Brothers deserve the first rank. The pref¬ ace of the second Elzevir edition, which ap¬ peared in 1633, contains the words atextum habes nunc ab omnibus receptum A Hence the reprints of this text, and there are more than 170, are simply called the Received Text. In brief, then, the Received Text is the text of the second Elzevir edition, which appears to be a repetition of the Bezan text. This latter is the fourth edition of Stephanus corrected according to several notes of Henry Stephanus, some an¬ cient versions and the Codex, Claramontanus. In its turn, the Stephanus edition is a repetition of the fifth Erasmian edition, and the latter is based on cod. 1 and 2 for the text of the Gos¬ pels, on code. 4 for the text of Acts, on cod. 7 for the Pauline Epistles, on cod. 1 for the text of the Apocalypse, in such a way, however, that the successive reprints of this highly composite text were slightly emended according to a few ether text sources.

Critical Apparatus.-— Robert Estienne (c. 1546) and Th. Beza (c. 1565) are rightly con¬ sidered as the pioneer collectors of an apparatus for the textual criticism of the New Testament. Br. Walton (c. 1657) and John Fell also co¬ operated at the building up of such an apparatus, but they were far surpassed by Mill (c. 1707), who collected about 30,000 variants out of more than 100 sources. Bengel (1687-1752) first di¬ vided the various readings into groups. He dis¬ tinguished between an African and an Asiatic or Byzantine type of variants. Semler (c. 1740) and Griesbach (1745-1812) distinguished three text groups : the former called his divisions the Alexandrian, the

Occidental and the Oriental or Byzantine family; the latter named his groups the Alexandrian, the Occidental and the Con- stantinopolitan. Eichhorn (c. 1820) and Hug (c. 1840) agreed with Griesbach, but Scholz (c. 1850) returned to the double division into Alexandrian and Byzantine readings. Tischen- dorf (1815-74) acknowledged four different types of text, an Alexandrian, a Latin, an Asi¬ atic and a Byzantine; Tregelles (1813-75) fa¬ vored again a dual division of texts, naming them the Constantinopolitan and the Alexan¬ drian group. Finally, Westcott and Hort intro¬ duced four text families : the Syrian, the Occi¬ dental, the Alexandrian and the Neutral. The Syrian text is the vulgate text in the Greek Church since the middle of the 4th century. It is supposed to be a revised edition of a pre-i Syrian vulgate text. This latter exhibits three peculiarities: one group of its variants is re¬ markable for paraphrases, interpolations, am¬ plifications and omissions ; this text constitutes the Occidental group. Another group of vari¬ ants is peculiar for its grammatical and schol¬ astic emendations, and this is called the Alex¬ andrian. A third set of variants, though pre- Syrian, shows neither the diffusiveness of the Occidental text, nor the nicety of the Alexan¬ drian; it is, therefore, called the Neutral group. Now, since the Syrian text figures as the vul¬ gate of the Greek Church after the middle of the 4th century, and since about a century must be allowed for the rise and passing away of the Occidental and the Alexandrian families, the Neutral type of variants must have been the common text during the course of the 2d cen¬ tury. But it cannot be maintained that these premises and conclusions are admitted by all textual critics.

Critical Editions of the New Testament. —

After the Received Text had become the cur¬ rent Greek text, it began to be regarded as quite sacred. Mill, Bengel and Wetstein collected va¬ rious readings differing from the Received Text, but they did not dare to introduce them into the body of the New Testament. It was Griesbach who first changed the Received Text according to the authority of various manu¬ scripts ; but not even Griesbach had the full courage of his conviction. Besides, he was not acquainted with some of the oldest manuscripts discovered after his time (c. 1777). We need not delay over some of the less important edi¬ tions published by Mace, Harwood, Matthaei, Alter, Scholz, Schott, Knapp, Tittmann, Hahn, Theile and others.

Lachmann (1793-1851) was the first who en¬ deavored to construct a new text out of the oldest manuscripts known to him. Believing it impossible to restore the original text, he tried

to reconstruct the readings that had been cur¬ rent in the Church during the course of the 4th century. For this purpose he confined his study to a few of the oldest manuscripts, together with a few of the Fathers, and the best codices of the Latin Vulgate. He simply counted the au¬ thorities in favor of each reading and then fol¬ lowed the majority. Though the text thus pre¬ pared is far better than the Received Text, it is based on too small a number of witnesses, on too slight a knowledge of the few manu¬ scripts actually used and on too mechanical a method of using them.

Tischendorf's services in the publication of manuscripts have probably done more to estab¬ lish textual criticism on a sound basis than any¬ thing else. Besides, he published at least eight (according to another method of reckoning, 21) editions of the New Testament. It is to be re¬ gretted that he did not use his material more consistently and scientifically. Between 1841 and 1849 he differs considerably from the Re¬ ceived Text; between 1849 and 1869 he ap¬ proaches quite closely to it ; but after 1869 he again diverges from it. His last, or eighth edition (1864—72), still remains the standard col¬ lection of evidence for the Greek text. The prolegomena (1884-94) to this edition are the work of Gregory; they give an account of the manuscripts, the versions and the patristic quo¬ tations.

Tregelles (1831-75) published two manu¬ scripts and collated many others with great ac¬ curacy, thus preparing his material for a revised Greek text. He based his edition exclusively on the most ancient authorities, but he used a larger number of them than Lachmann had done. Like his predecessors, he did not follow the principle of grouping in his new edition, so that the choice of his readings depends some¬ what on personal preferences. Alford, Light- foot, Weiss and others also have devoted a good deal of study to the New Testament text, but more with a view to its proper interpretation than its emendation.

Finally, Westcott and Hort have given us a new edition of the New Testament text based on the principle of grouping as explained under the preceding number. By adhering to the Neu¬ tral readings, they believe they reproduce the text current in the Church during the course of the 2d century. This edition has met with determined opposition, especially on the part of Scrivener and Burgon. These two scholars maintain that in the reconstruction of the Greek text all available authorities must' be considered, and the most ancient must not be given the sole right of being heard. J. B. McClellan, too, based his English version of the Gospels (1875) on a revision of the Greek text, in which inter¬ nal probability is taken as the most trustworthy

guide in the selection between variants. Other good editions of the Greek text have been pub¬ lished by Weymouth, Gebhardt, Nestle, Band- scheid and Hetzenauer.

Recent Discoveries. — In recent years quite a number of discoveries have been made which have an important bearing on the textual criti¬ cism of the New Testament. The Arabic text of Tatian's (Diatessaron) has come to light and was edited by Ciasca in 1888. The so-called second Epistle of Clement was discovered by Bryennios in 1875. In the last-named manu¬ script was also contained the Teaching of the

Apostles, but it was not made known till 1883. A fragment of the Gospel of Peter was discov¬ ered in 1886 by members of the French Archae¬ ological Mission, who conducted excavations in the cemetery of Akhmim, in Upper Egypt. The Sinaitic Syriac manuscript was discovered by Mrs. Lewis and Mrs. Gibson in 1892, during their visit to the monastery of Saint Catharine, on Mount Sinai. Part of the Codex Purpureus was brought to light in 1896 in the neighbor¬ hood of Caesarea. Finally, some Sayings of our Lord were discovered by Messrs. Grenfell and Hunt in 1896 and 1903 on the site of the an¬ cient Oxyrhynchus, in Egypt.

Results. — Confining ourselves to general statements, we may derive the following conclu¬ sions from what has been said:' (1) The mate¬ rial for the textual criticism of the New Testa¬ ment is constantly growing. (2) In Mill's time the number of variants in the New Testament was estimated at 30,000 ; in 1874 Scrivener counted at least 120,000 ; Schaff stated in 1892 that they did not fall much short of 150,000. (3) There are more variants than words in the New Testament; in fact, there are about 20 variants to each single verse and they increase with each new discovery. (4) Lower criticism shows that we need not be alarmed at the number of these variants and that the sub¬ stance of the New Testament is absolutely cer¬ tain. (5) Dr. Hort, who is surely good author¬ ity in this question, tells us that <(the amount of what can in any sense be called substantial variation . . . can hardly form more than

a thousandth part of the entire text.® (6) Kau- len enumerates only four passages in which the variants touch matters of faith : Mk. i, 1 ; Acts xx, 28; 1 Cor. xv, 51; and 1 Tim. iii, 16. But our faith is not

affected by these variants; the revealed truth contained in these four passages is sufficiently certain from other texts of the New Testament. (7) Our classical scholars are satisfied that we possess the true text of those classical works of antiquity that have come down to us, though our knowledge of these works depends on a mere handful of manu¬ scripts, while the manscripts of the New Testa¬ ment are counted by hundreds and even thou¬ sands. (8) The fact that our New Testament variants differ only in form, not in substance, excludes the hypothesis that it is the result of syncretism. The very defenders of this hypoth¬ esis seem to feel the difficulty; hence they de¬ clare that the New Testament presents (

Higher Criticism. — The name Higher Crit¬ icism (q.v.) implies that it deals with problems more important than those of the textual or lower criticism. These problems are the ques¬ tions concerning the integrity, the authenticity, the literary form and the trustworthiness of the various books. In the case of profane writings, these topics have been considered by a science called Literary Criticism. The higher critic ought to employ in his work not only the evi¬ dence of the literary work itself, but also ex¬ ternal evidence that may be at his command.

The internal evidence comprises the style of the book, the views of its authors, allusions to past or contemporary events, geographical and chronological data, religious, moral and po¬ litical principles, grammatical forms, lexico¬ graphical peculiarities ; in fact, all the details that offer a solid basis for comparing the work under consideration with other literary products of the same period of time or by the same au¬ thor. After all these elements have been con¬ sidered, the actual work of comparison can safely be undertaken.

Faults of Higher Criticism. — We do not

say that all higher critics are sophists, nor do we imply that sophistry occurs more frequently in higher criticism than in any other branch of human science ; we wish only to point out some faults that higher critics have actually com¬ mitted in their process of reasoning. (1) Many higher critics begin their work with a prejudiced or biased mind. While the orthodox inquirer £ares very little whether he has to admit a supernatural fact more or less, and is therefore free to follow' objective evidence, the unbeliever is pledged a priori not to admit any supernatural fact, seeing that a single fact of this kind would upset all his theories. If Christianity, they say, originated from Jesus, then he must have been superhuman. But nothing superhuman must be admitted at any cost. Hence Christianity must be considered as the

syncretism of its age, the last efflorescence of the Judaso-Greco-Roman spirit. And all this vague terminology blinds them to the fact that this hypothesis involves a greater miracle than they have sought to avoid. (2) The higher critics often infer a passe ad esse; they imagine that a certain fact can be explained according to a given hypothesis, and forthwith that hypothesis is upheld as the only explanation. History and common sense may go against their inference, but all this cannot make them change their point of view; stet pro ratione voluntas. (3) The higher critics often change the degree of certainty of their conten¬ tions as they go along. First, something may be true; next, it is probably true; again, it is certainly true; finally, they actually refer back to their preceding statement with the words, (

First Beginning of Higher Criticism. —

The name higher criticism is of comparatively recent origin, but its principles are very old. In the last century before Christ, Dionysius of Halicarnassus won great renown by his crit¬ ical acumen. In the early days of the Church, too, the books of Scripture were defended against the, attacks of a Porphyry and a Celsus by men like Clement of Alexandria, Origen, Eusebius and Jerome by an appeal to the prin¬ ciples that are employed by our present-day higher critics. It is true that during the course of the succeeding ages our great Christian scholars were imbued with too great a rever¬ ence for the inspired books to subject them to

the critical process applied in the case of pro¬ fane literature. Still, there were notable excep¬ tions even to this rule. The introductory treatises to the Bible as a whole or to its several books were applications of critical principles. Kichai d Simon (1638— 1712) applied the same in a pre-eminently masterful way in his famous work, (Histoires Critiques du Vieux Testament, du Texte et des Versions du Nouveau Testa¬ ment. J The erudite works of Dorn Calmet, too, give evidence of skilled critical inquiry.

The Age of Scoffers.— Though raillery is no longer the equivalent of argument, it is in¬ structive to review the attempts made to under¬ mine the authority of the Scriptures by means of this weapon. Among the scoffers Voltaire holds a pre-eminent place. The tradition that he copied his difficulties against the credibility of the Bible out of Dom

Calmet's works without either adding their solution or indicating his sources is too well known to need repetition. In his wake followed the French encyclopaedists. A panegyrist calls Voltaire the king who suc¬ ceeded Louis XIV, and who handed the royal sceptre over to Napoleon. Among his ministers figure such celebrated men as Diderot, D'Alem¬ bert, Buffon, Helvetius, D'Holbach, D'Argens, Lamettrie, Turgot, Condorcet, and in a way also Rousseau and Montesquieu. The king him¬ self had learned his trade among the Deists of England, whither he was forced to withdraw in 1726, and where he remained for about two years. Cherbury, Toland, Tindal, Woolston, Collins, Bolingbroke, Chubb, Whiston, Shaftes¬ bury, Whittey, Somers, Wharton, Shrewsbury and Buckingham figure among the principal apostles of English Deism.

Rationalism. — In Germany three forces had been at work to prepare the minds of the people for disbelief in the New Testament: First, the Wolfian philosophy had freed the mind from the strict letter of the Bible; secondly, the New Testament editions of Westein and Griesbach had shaken the readers' confidence in the in¬ spired text; thirdly, Bengel and Crusius had modified the current notion of inspiration, in¬ sisting more on the active part of the inspired instruments than on their passive condition. The public was thus ready to appreciate Les¬ sing's- publication of the fragments of Wolfen- buttelC the work of his deceased friend Sam¬ uel Reimarus (d. 1768). The first part of this work published in 1774 inculcated tolerance for the Deists; the second part appearing in 1777 was a general attack on revelation; the third part published in 1778 was directed against Jesus and his apostles, practically representing them as so many deceivers.

But this attack on the reliability of the New Testament was too brutal to become popular. Hence Paulus (1761-1851) proposed a hypoth¬ esis which removed the supernatural element from the New Testament as effectively as Rei¬ marus had done, and at the same time saved the veracity of the inspired writers. In his (Leben Jesu) (1828) he distinguishes two kinds of. supernatural elements in the Gospels; one kind is carried into the Gospels by the interpreters against the intention of the inspired writers; another kind is really intended by the sacred text. The former is removed by a proper method of interpreting the Bible; the latter must be regarded as the result of the subjective impression of the evangelists. They were rude,

uncultured fishermen and judged of the ex¬ traordinary phenomena in the life of their Master in a way that was neither scientific nor rational. In brief, according to Paulus, the writers of the New Testament are no longer deceivers, but they were incompetents.

Ihe reliability of the New Testament fared still worse in the (Leben JesiP published (1835, 1864, 1874) by Strauss (1808-71). He apparently saves both the veracity and the com¬ petency of the sacred writers, but he declares their work to be a mere collection of myths. The storm raised in Germany by this work is too well known to need further description.

Strauss had studied only the contents of the Gospels without paying due attention to the Gospels themselves. Ferdinand Christian Baur (1809-82) perceived 'this weak point in the work of his pupil, and endeavored to strengthen it. He believed that he had discovered the key to the history of early Christianity in the romance of the so-called Clementine Homilies. The op¬ position between Peter and Paul and their re¬ spective parties he traced back from these homi¬ lies into the books of the New Testament, in which the opposition between Petrinism and Paulinism was said to be either reflected or harmonized or again considered as past. Only the Apocalypse of John, the Epistles to the Galatians, to the Romans and to the Corinthi¬ ans were admitted as genuine; all the rest of the New Testament was pronounced pseudon¬ ymous, and relegated into the 2d century. Here we have the tenets of the Tubingen school.

Anti-Tubingen Movement. — Baur made several vital mistakes in his assumptions: (1) His fundamental thesis concerning the great opposition between Paul and 'the other apostles cannot be proved (cf. Weber, (Ratholikp 1898, pp. 193 ff. ; 1899, pp. 45 ff.). (2) Baur's prefer¬ ence for the four great Pauline Epistles was merely personal ; subsequent negative criticism has not spared their genuineness (cf. Bruno Baur, (Kritik der paid. BriefeP 1850-52; Steck, (Der Galaterbrief nach seiner Echtheit untersuchtP 1888; Pierson, (Der BergredeP 1878). (3) Baur was wrong in his utter neg¬

lect of early Christian tradition. The testimony of a Clement of Rome, an Ignatius, a Justin, a Marcion, an Irenseus and a Tertullian should not be set aside at the bidding of merely sub¬ jective considerations. Hilgenfeld, in his (FIis- torischkritische Einleitung in das Neue Testa¬ ment (1875), acknowledged the genuineness of several New Testament books rejected by Baur; Reuss, in his (Geschichte der heil. Schriften d. N. TP (1842), restores the origin of the whole New Testament, excepting 1 Pet to the 1st century. Similar conclusions were reached by Ewald, B. Weiss, Hofmann, Schulze, Godet, Zahn, Harnack and other writers. On the whole, our most recent critics admit that early Christian tradition ought to be respected, . and though the defenders of the gen¬ eral genuineness of the New Testament books encounter still strenuous opposition, as has been

seen on the occasion of the publication of Zahn's (Einleitung, > they are no longer charged with lack of scientific method.

Syncretism. — There are critics who main¬ tain that the striving to understand Jesus as the originating source of Christianity must prove abortive. They believe that <(the most enlightened scholarship of Europe and America

has no standing before the bar of logic. ® Ihe genesis of Christianity, we are told, ((must be sought in the collective consciousness of the first Christian and immediately pre-Christian centuries; in the amalgamation of faiths when all the currents of philosophic and theosophic thought dashed together their waters in the vast basin of the Roman circummcditerranean em¬ pire.® But how can organic unity develop out of heterogeneity? How can concord develop out of discord and opposition? The material elements which compose the plant or the brute beast exist before either plant or beast begin to live; but who will imagine that a horse or a cow will be the result of the dashing together of their respective material elements? More¬ over, Monsignor Batiffol (Revue bibliquc, January 1903) has shown that between 120 and 140 a.d. Marcion wrote a treatise proving that an opposition exists between the Law and the Gospel; at that early period, therefore, the Gospel was considered as possessing paramount authority. Again, Marcion appealed to Saint Paul in proof for the absolute newness and in¬ dependence of Christianity. At Marcion's time, therefore, there existed a Canon of the New Testament books. And why should the faithful have esteemed the Gospels and the Pauline Epistles higher than the Epistles of an Ignatius, unless they were convinced that these canonical writings contained the exact teaching of the Master? The authority of Christ's word had preceded the authority of the canonical books.

What is Christ? — Higher critics distinguish between the Christ of history and the Christ of Christianity. Harnack, Wrede and Staerk may be said to simplv rob Christianity of its Christ. Schmiedel, O. Holtzmann. Bousset and Schu- rer endeavor to link the Christ of history to¬ gether with the Christ of Christianity, but their explanations are unsatisfactory. The Abbe Loisy, too, distinguishes a triple Christ : first, the views of Christ concerning himself ; sec¬ ondly, the faith of the early Christian commu¬ nity concerning Christ ; thirdly, 'the Christology of "the New Testament. And if you ask on

what ‘the faith of Christianity is based, if not on the facts of history, there will be as many different answers as there are writers. So. that we rightly urge against our present-day higher critics the dilemma: Christ is either God, or what is He?

Bibliography. — A fairly complete list of the older literature belonging to this subject may be found in Reuss, ‘History of the New Testa¬ ment (Vol. II, p. 367 f.) ; O. von Gebhardt adds to the preceding a fairly complete list of the pertinent literature down to about 1896 in his ‘fJrtext und Ubersetzungen de Bibet which is a reprint of his articles on ‘Bibel- text und Bibelubersetzungen,) contributed to the ‘Realencyclopaedie,* pp. 16, 54 ff. A refer¬ ence to the contemporary literature may be found in the numbers of the Ecclesiastical Re¬ view under the heading ((Recent Bible Study.® Besides, the reader may consult Rose, (Studies on the Gospels > (authorized English transla¬ tion by Mgr. Robert Fraser, 1904) ; Lagrange, (La Methode Historique) (Paris 1904) ; La¬ grange, (Etudes sur les Religions Semitiques> (Paris 1905) ; Chauvin, ‘La Bible depuis ses Origines jusqu’a nos jours) (Paris 1903) ; Chauvin, ‘L’Enfance du Christ d’apres les Tra¬ ditions Juives et Chretiennes* (Paris 1904) ;

Chauvin, ‘Le Proces de Jesus-ChrisD (Paris

1904) ; Calmes, (Comment se sont formes, les Evangiles^’ (Paris 1904); Fonsegrive, (L’ At¬ titude du Catholique devant la Science) (Paris 1903)- Mesus-Christ, Est-il resucit

1905) ; Mechineau, (L’origine apostohque du Nouveau Testament (Paris 1903) ; Mechineau, ‘L’Autori’te humaine des Livres Saints * (Paris 1903) ; Colomer, (La Bible et les Theories Sci- entifiques) (Paris 1904) ; Saubin, (La Syna¬ gogue Moderne) (Paris 1903) ; Vallefi ‘Les Miracles de l’Evangile* (Paris 1905); Saubin, (La Dogme Chretien dans la Religion Juive) (Paris 1900)’; Saubin, ‘Le Talmud et la Syna¬ gogue Moderne> (Paris 1900) ; Paulus, ‘Les Juifs et le Messie* (Paris 1904).

Anthony J. Maas,

Professor of Hebrew and Sacred Scripture, Woodstock College.

NEW TESTAMENT THEOLOGY, that

branch of theological science which has for its peculiar task to” state, arrange and compare the ‘theological doctrines and conceptions found in the New Testament. While it might be combined with Old Testament theology under the name Biblical theology, yet the

differences in dates, language, style and contents between the Old Testament and the New are such that their respective theologies have usually been treated separately, although their methods are necessarily identical. It is also possible. to state the doctrinal teachings and theological conceptions of any individual author and even those found in any single work of any author, and such contributions to Biblical theology have often proved exceedingly valuable; but the his¬ toric unity of the New Testament renders it practically important that the teachings and views of the various New Testament authors should be so presented and compared as to give but a single impression of the whole.

Character and Relations.— – New Testament theology is strictly a historical science, neither attacking nor defending the conceptions which it finds, but merely stating, arranging and com¬ paring them. As a historical science it is con¬ nected with Ecclesiastical History and might be considered the first volume of the History of Christian Doctrine. But it demands such a mastery of the results of the sciences of Isa- gogics and Exegesis, on which it depends, that it is usually associated rather with interpretation, of which it might be reckoned the crown. It also presupposes and builds upon Old Testa¬ ment history and the history of the world in New Testament times, and in its turn it pro¬ vides much material for Dogmatics.

History. — The name Biblical Theology, which had earlier been employed to designate such a system of dogmatics as was based upon the Scriptures rather than upon either creeds or reason, was first used in its modern sense by Gabler in 1787, since which time the science in its application both to the Old Testament and the New has gradually developed. The first American work in the sphere, of New Testa¬ ment theology was published in 1870, and the first lectures in any American theological school are said to have been given in 1883. Since then it has received a steadily increasing amount of attention.

Difficulties. — The task of the New Testa-

ment theologian presents peculiar difficulties. It is impossible for him to increase the amount of the material with which he deals, however helpful for supplementing or verifying his con¬ clusions such increase might be. All expres¬ sion of thought is defective, and most of all is this true in theology, where upon words derived from the earthly and

the human is laid the. burden of declaring the heavenly and the divine.. Further, the teachings to be considered come in a form due to ancient ages, tongues and conditions, and accordingly accurately and adequately to restate in modern form thoughts which have thus come down in ancient garb cannot be easy. Then, since with few excep¬ tions the theological thoughts contained in the New Testament found expression solely for ends then immediately practical, it follows that the statements are often partial and incomplete, and the emphasis upon certain aspects of truth is only relative, and these statements must be read with constant reference to the thought of the age and the details of the local situa¬ tion to which they belong. Hence only with difficulty can the incomplete expressions of practical religious thought be fitted together to reconstitute such systems of doctrine as may be credibly attributed to the various New Testa¬ ment authors.

Grouping of the Books. — There is general agreement as to the grouping of the New Testament books according to the types of thought which they exemplifv. The teaching of Jesus demands attention first, if not as a stand¬ ard for the rest or as of superior authoritative¬ ness, as at any rate prior in time to the other New Testament teachings and as presupposed by them. The records of Christ's teaching are necessarily subdivided into the Synoptic and Johannine reports. The second group of docu¬ ments represents the type of Christian thought which developed amojig Christians of Hebrew descent and consists of the first part of the book of Acts, the letters of James and Jude, the two letters of Peter (which, however, show that there had been a development considerably beyond the primitive conceptions current in the Church), and such traces of apostolic or other early doctrine as may be noted in the Gospels. In the Pauline section the Epistles attributed to this Apostle fall naturally into four groups, which differ in theme and matter as well as in date and style. If any -of these letters should not be held to be Pauline in origin, they are yet so distinctly in harmony with Paul's. views that this would not change their place in the general classification, while the Epistle to the Hebrews is a natural pendant to the writings of Paul. The fourth group of New Testament writings consists of the 'books attributed to the Apostle John, consisting of his letters, of so much of the Fourth Gospel as is not the teach¬ ing of Christ and of the Revelation.

Teaching of Jesus in the Synoptics. — In the Synoptic reports Jesus began his teaching by echoing the proclamation of his forerunner, John the Baptist: <(The kingdom of heaven is at hand.® While from the beginning of this preaching he seems to have recognized that he himself was to be the head. of the promised kingdom, yet his own

conception of the char¬ acter and work of the Messiah was so differ¬ ent from the popular conception, so much loftier and purer, that he could not present

himself at once and unreservedly as the Coming King, for, had he immediately and unmistakably advanced his claim, political enthusiasm would have forestalled religious faith, and even on the part of true followers earthly ideals, ex¬ pectations and plans would have obscured and neutralized heavenly, as, indeed, to some ex¬ tent actually occurred in spite of caution and reserve. The name kingdom of heaven or of God, however, remained prominent throughout the teaching of Jesus, but in the latter part of it with an altered meaning. Convinced that he had nothing to hope from the leaders of the nation or the people whom they controlled for the kingdom of prophecy, which was in¬ tended to reach its spiritual ends through a local, national, political organization, Jesus necessarily substituted individual submission to the sovereignty of God, and retaining the name without the form, the kingdom which he strove to establish became in his teaching universal and spiritual.

While the state of individuals and society which he would establish thus took a new form in consequence of his rejection by his nation, the conditions of entrance, as well as the ulti¬ mate ends to be attained, remain unchanged. The first demand upon each and all is for re¬ pentance. As a morally transformed and thus fit nation should have met its King come at last, so only a soul turned from evil to good can receive the spiritual blessings which Jesus bestows. More and more clearly as antago¬ nism gave renewed opportunity, Jesus denounced sin and demanded from all without exception penitence and reformation, although in serene consciousness of sinlessness he ever held him¬ self apart from all confession of any evil on his own part.

With repentance as a reversal of moral tendency must come acceptance of himself as Supreme Master and absolute submission to him. His demand for self-denial is a demand for complete self-abjuration; his invitation, (

The fourth element in the teaching of Jesus which the Synoptists record relates to God. This teaching is almost never metaphysical, only religious and practical. The chief thought in it is God’s love. This love, which exceeds that of any earthly father for his child, is shown in the rising of the sun on the evil and the good alike and the coming of the rain on both just and unjust, and in care for sparrows, ravens and lilies, and finds its crown of per¬ fectness in kindness to the unworthy.

The climax of this teaching appears in the parables about rescue of the lost, in the third of which, usually called the ((Parable of the Prodigal Son,® this tender love of God is so winningly presented that it has given a very common name

for the love of God, so that all Christ's teach¬ ing is said by many to he dominated by the thought of God's ˆFatherhood,® a view which should be so held as to include the other con¬ ceptions of Jesus as to God's special relation of fatherhood to believers and his unique father¬ hood to Christ himself.

Teaching of Jesus According to John.*— In the Gospel of John the teaching of Jesus is presented with a superficial dissimilarity at first sight striking, but in essential consistency with the Synoptic reports. As the place of the ministry reported is largely the city of Jeru¬ salem instead of the open country of Galilee, as we have often hostile Pharisees for inter¬ locutors instead of disciples for reverent aud¬ itors, so of the four chief elements of the Synoptic teaching, the Kingdom, Repentance and Faith, his own unique supremacy and the fatherly Love of God, the kingdom is scarcely mentioned, repentance is ignored and faith given a different aspect and the paternal kind¬ ness of God is much less emphasized, while Jesus insists even more upon his own pre¬ eminence and shows it in new lights.

The two foci of the teaching reported in the Fourth Gospel are, as might be expected from the author's own statement of his pur¬ pose as stated at the end of his writing, the deity of Christ and the duty of Faith. All the discourses in the Gospel are selected with a view to showing Christ's self-revelation to the world on the one hand and to his disciples on the other. While his Messiahship is not here emphasized, there is presented instead a con¬ ception of a sons'hip based on a unique unity with God, combined with hints of pre-existence, suggestions and implications of divinity and, finally, a welcome by Jesus to the assertion of his deity.

The proper relation on the part of his dis¬ ciples, and, indeed, of all men, toward this personality who thus presents himself is not mere acceptance of statements about him and of truths relating to him, but further spiritual union with him by entering into relations to him, appropriation, in a word.

Judaic Teaching. — The earliest Apostolic teaching and the type of doctrine which seems long to have prevailed among the churches

which were of Judaic origin and cast was only to a very slight degree dogmatic and brought on no enlarged or corrected doctrines touching the nature of God or the character of men. Indeed, no New Testament authors ever approach these themes as if intending to com¬ municate fresh truth, hut rather to confirm and apply truth already commonly apprehended. The chief thought of the primitive Church was the place and rank of Jesus, and here even the earliest teaching of the Apostles is devel¬ oped in many respects beyond that of Jesus himself, a fact which is not surprising when it is remembered on the one hand that we cannot rightfully suppose that he exhausted the contents of his consciousness in even his frank¬ est disclosures to his disciples, and on the other hand he himself promised that the guidance of the Spirit whom he would send from God would result in larger knowledge than his own instructions had brought. While the name of the kingdom is dropped at once and perma¬ nently out of use, at the same time the Messiah¬ ship of Jesus is asserted, and it is insisted

upon that by his coming forth from the tomb re¬ embodied, which was the resurrection to which his Apostles testified, his Messiahship and Lordship were fully confirmed. While it was constantly recognized that Jesus was no less man than other men, he was regarded as dis¬ tinguished from other men, not only by his character of unique holiness, but also by his Messianic rank which gave him universal sov¬ ereignty and Lordship and, further, he was given the title Lord, which had been a familiar substitute for the most sacred of all the divine names. Theological discussions as to the na¬ ture, basis and conditions of salvation are not to be expected in such documents as represent Judaic Christianity, but it is plain that it was thought of as release alike from the conse¬ quences and the power of sin, provided, espe¬ cially in the former aspect, by the death of Christ, and to be obtained by repentance.

‘ Pauline Teaching.— The teachings of Paul are much fuller than those of the other Apos¬ tles, and in many places, owing to the doc¬ trinal controversies which evoked them, they approach somewhat closely to dogmatic form, while such was the diversity of the occasions out of which the letters arose and of the situa¬ tions of their first readers, that they cover nearly the whole field of Christian thought, Paul’s conceptions of the nature and attributes of God, of his sovereignty and his love, and of the ruined condition of sinful men, while frequently brought out with great distinctness, were in no sense peculiar to himself. His special topics are, besides the rank of Christ, his saving work, the duty of man in relation to it and the activity of the Holy Spirit in completing it. While Paul implies a general knowledge of the life and teachings of Jesus, he looked to Christ as far transcending in

na¬ ture and rank what might be inferred from these facts. In Paul's mind the unique fact of the resurrection of Jesus at once certified to his unique nature and relation to God and opened to him the way to supreme exaltation and universal dominion which would become fully his when he should return in glory to earth. He shared the divine essence; in his activities before his birth of a woman he created the universe and continues to uphold it, and to him worship is rightfully paid. The life and especially the death of Jesus were a part of the divine plan for the rescue of men from the state into which their sin had brought them. The death of Christ was clearly set forth by Paul as provided in the love of God as a basis indispensably prerequisite for the favorable treatment which he gives to every penitent: the blood of Christ was to Paul the ransom and propitiation by virtue of which redemption and reconciliation are secured for men. Paul was led by controversy to insist with peculiar urgency that Divine forgiveness and favor are conditioned or, faith alone, that is, that salvation does not primarily depend on the behavior of a man, but on his acceptance of God's gracious gift, but while faith alone is the condition of entrance on the Christian's state, yet the Christian life in its ideal involves nothing less than the perfect performance of every duty and this ideal is practically attained only by the aid and power of the Holv Spirit, whom he regards as possessing personal, divine

attributes, who is imparted to every believer and permanently dwells in him.

Teaching of the Epistle to the Hebrews. — The letter to the Hebrews makes no contribu¬ tion of special novelty to the theology of the New Testament. While somewhat unlike the thought of Paul in that it presents the Mosaic system as helpful preparatory to Christianity which supersedes it, the views which it presents of the transcendent rank and sacrificial death of Christ are in fullest harmony with Paul's. That Christ is a ((high priest,® that is, a repre¬ sentative of men before God, and that faith is an unyielding grasp on the invisible, are thoughts which are peculiar to the author of this Epistle.

Johannine Teaching.— The teachings of John relate themselves proportionally more to God himself than those of any other New Testament teacher, but his conceptions of the deity, like theirs, are mainly dynamic and ethical, rather than metaphysical. His thought seems to sum itself up in three words, life, light and love, which

suggest that God is the constant source of all power and joy; that he is spotlessly holy and tends unceasingly to mani¬ fest himself as such in and to his universe, and that his most central, essential and char¬ acteristic attribute is kindness and beneficence, unceasing and all-embracing. In the teaching of John the eternal Logos, or expression of God, became incarnate in Jesus, and thus pre¬ sents God to men ; and in turn by his death he became the ˆpropitiation® in virtue of which forgiveness is promised on condition of peni¬ tence and confession. The privilege and duty of Christians is fellowship with God, that is, by refraining from all sin to share his spotless holiness.

Bibliography. — Adeney, W. F., (The Theol¬ ogy of the New Testament y ; Bevschlag, W., (New Testament Theology* ; Bovon, J., (The- ologie du Nouveau Testament; Estes, D. F., (An Outline of New Testament Theology) ; Gould, E. P., (The Biblical Theology of the New Testament ; Holtzmann, H. J., (Lehrbuch der neutestamentlichen Theologie) ; Stevens, G. B., (The Theology of the New Testament ; Weiss, B., c Biblical Theology of the New' Tes¬ tament.)

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

NEW THEOLOGY, a term which has come into general use since 1875 to designate a movement inaugurated by the faculty of Andover Theological Seminary and of which the principles were set forth in Progres¬ sive Orthodoxy) (1886). At present the term has acquired a wider and deeper significance, comprising that body of theological thought which seeks to embody in divinity the accepted results of modern philosophical thought and more especially seeks to co-ordinate the evolu¬ tionary theory with theological interpretation. The new theology, therefore, accepts evolution both in spiritual and material things, applies the methods of the higher criticism to the Bible, of which it rejects a verbal inspiration. Dogma cedes its place to ethics and -sociological study and the miraculous is minimized or excluded altogether. The movement is general through¬ out Christendom, but there is much difference between its advocates and in general it might

rather be termed a tendency of theological thought rather than a school with fixed and avowed principles. Consult Campbell, R. J., (The New Theology) (London and New York

1908).

NEW-THOUGHT, an idealistic or meta¬ physical movement in the United States, a direct successor of New England transcen¬ dentalism, but much more practical and demo¬ cratic. The older idealisms were seclusive, but this one is preached and practised on the high¬ roads and carried into the minutiae of daily life, often assuming the forms of religion and philosophy. It boasts of being the greatest healer the world has yet seen and scorns the idea of being mere speculation. It is claimed that New'-Thought will not create any new religion or creed and that it will not formulate any new system of metaphysics. As regards religions, it is said by the representatives of New-Thought, that they are not desirable, be¬ cause they are based on will, not on thought, and because they demand obedience. As re¬ gards metaphysics, no system is wanted because life and thought cannot be confined in a system. The world needs illumination and freedom, not limitation.

The first apostles of New-Thought were P. P. Quimby of Portland, Me., Dr. W. F. Evans and their immediate disciples. The first preached it orally, the other by the pen. None of these, however, are its parents in any sense, nor are they quoted as authorities by any pres¬ ent-day followers or teachers. New-Thought is the modern expression of an inherent self- affirmation of the souk as old as the soul itself. New-Thought self-affirmation is intensely indi¬ vidualistic and has found its philosophy in Emerson's ˆelf-reliance.* In the Emersonian extreme and in Tennyson's

" Self -reverence, self-knowledge, self-control,

These three alone lead life to sovereign power,"

CEnone.

may be found its first principles. New- Thought people, however, identify the self with the <(Oversoul® and commonly prefer to quote the Biblical <(7 am (that I am)® as their motto and foundation. The revealed secrets of the ((I am® are to be read upon every page of their hundred and one serial publications. These (

New-Thought ontology teaches ((oneness of life,® that <(all life is one,® but the student searches in vain for any scholastic definition of these axiomatic teachings as also for the theo¬ logical dogma ((God is omniscient, omnipotent and omnipresent.® This last, the omnipresence of God, is taught to the exclusion of all other attributes. The bearing of these two doctrines

leaves, however, no doubt about their being in¬ herently pantheistic in character, and implying a pantheism in the direction of the Hegelian pan-logism. To New-Thought life, God and all other categorical terms are swallowed up by Mind or (

New-Thought is often confounded with Christian Science, but their difference can clearly be seen by their cosmology. The latter holds the Oriental doctrine that the world and its things are illusory, products of <(the mortal mind,® but New-Thought asserts the reality of the world and considers it an expression of God, the two being related as cause and effect. The central doctrines of New-Thought lie in psychology. They consist in asserting the su¬ premacy of mind over all other energies and in identifying it with the perennial stream of energy which permeates existence at large. Our mind is identical with the supreme mind, it makes us what we are and creates our conditions and environment.; by inherent love it overcomes all hatred, malice and sickness ; by inherent law it establishes itself as the world's law and by inherent order it rules everywhere. It keeps itself alive in love, law and order by constant affirmation of itself : ((I am, that I am !® In ethics, the New-Thought is of a decided opti¬ mistic tendency. Its program is the Emersonian ((don't bark against the bad, but chant the beau¬ ties of the good.® Evi-1 is not real, but only an imperfection which illumination dissolves. New-Thought is not iconoclastic, but fulfils the ends of creation in {(peace and good will.® If others do not know Reality and only worship ((an unknown God,® New-Thought people do v not think it right to use violence or even per¬ suasion ; growth and experience will bring truth.

New-Thought is intensely practical. It pro¬ fesses to heal sickness and to remove the sting of death. Sickness is error and is cured by right and wholesome thinking, and death is but a transition, a <(passing out® into another con¬ dition. If we always stood fast in right think¬ ing we should never die, but simply transform ourselves.

New-Thought ((circles of healing® are very common. They are found in every State in the Union, and in most cities followers of the cult can be found. It is estimated they exist by the million. The cult and its teachings have spread to Australia, Canada, England and many places on the Continent, especially France and Ger¬ many. The circles are not churches, but <(bethels® or ((houses of thought® for instruc¬ tion and meditations. Services on Sunday often begin with the singing

of ((Omnipresence, Omnipresence, Omnipresence, manifest Thyself in me!® by a few minutes of meditation for the concentration of mind before the discourse is given. Speakers are chosen without regard to creed or race, etc. Their main qualification lies in their experience of oneness with the Great All. At the circles, rooms are set apart for daily noon-hour meditation. In the rooms are also private classes for instruction, etc. The circles arc maintained by voluntary contributions, but

no teachers, excepting private class teachers, are paid.

New-Thought healers are many, but New- Thought teachers are many more. Experience has shown that no man or woman can heal for more than a very limited period of their lives. When they can heal no more, they teach others the method. The methods of healing run through the whole scale of impressing the <(new® thought by suggestion, hypnotism, faith or simple rationality. Healing is done also by (

A New-Thought convention was held in Chicago, 17-20 Nov. 1903, attended by many thousands. The following ˆprogressive® declaration of principles was adopted :

1. The New-Thought is the new interpretation of uni¬ versal and eternal Truth.

2. God — Universal Spirit, Mind, Principle — is omni¬ present, omniscient and omnipotent.

3. Man is the individual expression of God, possessing ‘ inherently and capable of manifesting all the aspects of

God.

4. Man unfolds to a continuously expanding conscious¬ ness and manifestation of these aspects, through right thinking and right living.

5. The consciousness of harmony is Heaven, here and now; in the realization of which abide peace of mind and health of body.

6. The essentials of the New-Thought are suggested by the words — Unity, Co-operation, Freedom, Brotherhood and Individuality.

Since then many attempts have been made upon forming a bond tieing the various societies together. Many still stand apart, but The In¬ ternational Ncw-Tliought Alliance, with James A. Idgerton as president, has been formed and its purpose, as published in The

Nautilus of November 1915, is as follows: (

C. H. A. Bjerregaard.

NEW ULM, Minn., city, county-seat of Brown County, on the Minnesota River, and on the Minneapolis and Saint Louis and the Chi¬ cago and Northwestern railroads, about 80 miles in direct line west by south of Saint Paul and 25 miles west by north of Mankato. It was set¬ tled in 1854 by a German land company, incor¬ porated in 1870 and chartered as a city in 1876. It was the scene of an Indian massacre in 1862. A monument has been erected to the memory of those who fell in the massacre. It is in a pro¬ ductive agricultural region in which there is considerable attention given to stock-raising. Its chief industrial establishments are flour¬ mills, breweries, cigar factories, a creamery, a cooperage, machine-shops, a pottery, green¬ houses, organ works, electric appliance works, shirt factories, brick and lumber yards and grain elevators. It has an extensive trade in farm products and livestock. There are several churches, and the educational institutions are public and parish schools, Dr. Martin Luther College, Saint Michael's Academy, a public school library and the Turnverein Library. The banks have a combined capital of over $200,000, and the annual business exceeds $15,- 000,000. The government, under a revised char¬ ter of 1891, is vested in a mayor, who holds office two years, and a council. The electric- light plant and the waterworks are owned and

operated by the city. The majority of the in¬ habitants are German or of German descent Pop. (1920) 6,745.

NEW WAY TO PAY OLD DEBTS, A.

— Though he wrote one play that has lasted to succeeding times, Massinger was not a dramatist of first rank. Coming to London 20 years after Shakespeare, he fell into the confusion of in¬ fluences of the most tangled period of English theatrical history. Of these the chief was al¬ ways that of Shakespeare. But this was sub¬ jected to the heavy pressure of Ben Jonson, a dramatist who had better repute for some years after Shakespeare's death than Shakespeare himself. (A New Way to Pay Old Debts* is the best regarded of Massinger's plays. The theme of the knave outwitted is one which Jonson might have used himself; it has indeed some points of similarity to

Middleton's (A Trick to Catch an Old One. > The characters are the well-known Plautine types, snobs, syco¬ phants, cheaters, usurers and gluttons. Instead of incorporating this as would Jonson in a form of railing and ridicule, Massinger adapts him¬ self to the school of Shakespeare as modified by Fletcher. Judged by itself, the style is excellent. It is lucid, flowing, eloquent. The construction is simple and well-fashioned. This does not dis¬ guise the fact that the method does not fit the theme. Of psychology there is none. The char¬ acters are symbols of mental traits handled to an arbitrary moral conclusion.

The play lives in memory for one of the chief acting characters of the old drama, the figure of the usurer, Sir Giles Overreach. Like Barabas in (The Jew of Malta,* Sir Giles is a double-dyed villain, who sets no limits to his avarice, treachery and blood-lust. The author permits him to escape due retribution, if such were possible, by going mad after a fashion dear to the hearts of play-goers of the day. This part is said to have been modeled upon life. All the other characters are profiles only.

(A New Way' was produced about 1625; it was published seven years later. Garrick re¬ vived the play in 1748, though he did not play Sir Giles. The role was played by Edmund Kean in 1827. The play has been at least twice translated into German.

Thomas H. Dickinson.

NEW WESTMINSTER, Canada, city in the province of British Columbia, situated on the north bank of the Fraser River about 16 miles from its mouth in the Gulf of Georgia, on the line of the Canadian Pacific Railway, Canadian Northern and the Great Northern Railway, of which it is the northern terminus, 12 miles from Vancouver and 75 miles from Victoria on the island of Vancouver. It is con¬ nected with Vancouver and surrounding district by an electric railway. The climate is mild and pleasant. The Fraser River Bridge connects the city with United States lines by way of the Great Northern Railway and with the south bank of the Fraser and its farming, poultry¬ raising, fruit and vegetable interests. The chief industries are lumbering, the salmon fisheries and their 40 canneries up the Fraser, oatmeal and woolen mills, machinery and boiler shops, foundry, furniture factory, fruit canning fac¬ tory, cold storage works, carriage works, cream¬ eries, shingle mills and car shops. The steamers ply up and down the river. There is deep

water (30 to 40 feet) all the way and large ships are loaded at the mills with lumber for all parts of the world. There is an Anglican and

a Roman Catholic cathedral, and the educational facilities include Columbia College. There is a free library. The electric-light, water and street railway systems are municipally owned. The city was founded in 1859 by Colonel Moody, and was the first capital of the colony of British Columbia, with the early designation of Queenborough. In 1860 municipal govern¬ ment was established. In 1873 New Westmin¬ ster was incorporated as a city. There was a widely destructive fire in September 1898. Pop. about 20,000.

NEW YEAR'S DAY. The observance of the first day of the year is of very ancient origin. The Romans on this day were accus¬ tomed to exchange greetings and make presents. New Year's under the Caesars was a great source of profit to the emperor and quite bur¬ densome to his subjects. The Church at first prohibited Christians from having anything to do with it, but at last made the day a Christian, festival, the Feast of the Circumcision. The Julian or Old Style Calendar was abandoned in favor of the Gregorian or New Style Cal¬ endar in 1582 in Catholic countries; but it was not until 1752 that the change was made in Great Britain. In Persia the year is supposed to begin on 21 March, and the day is one of uni¬ versal rejoicing. In Japan the new year is a season of much festivity and innocent mirth. Every portal is decorated, and each object of which the decoration is composed has a sym¬ bolic meaning. The usual form of the decora¬ tion is a green arch. Among the Chinese the day is the greatest festival of the year, and in France, French Canada and Scotland it is ob¬ served more than Christmas. The custom of bringing in the New Year is the occasion of much festivity in Germany and Scotland. A cus¬ tom similar to that of making New Year's calls is the sending of cards to one's friends on the day. After the restoration of the Bourbons it became fashionable in Paris to send bonbons on New Year's day, and in 1822 a thousand tons of them were sold in the two days preceding the festival.

The day was more or less observed amoncr the American Indian tribes. The Moqui cele¬ bration, called So-yal-u-na, is largely a presen¬ tation of a singular and elaborate mythic drama, divided into two parts, in which offerings are made to effigies of the great plume-headed serpent, the enemy of the sun, followed by a sun dance, in which the conflict between the sun and the inferior hostile gods is admirably portrayed by Moqui men personifying the vari¬ ous deities.

In the United States it has always been the custom of the Presidents to receive on New Year's day. In 1790, when New York was the seat of government, Washington held a recep¬ tion between the hours of 12 and 3 and was vis¬ ited by all the home and foreign dignitaries. He expressed the hope on that occasion that whatever change might take

place in the man¬ ners and customs of the city, the observance of New Year's day might never be given up. In New York and other cities there are watch- night and services in many churches and recep¬ tions in many clubs and drawing-rooms. The

formal custom of receiving New Year's calls has nearly become obsolete in our larger cities, it having been superseded by the regular after¬ noon and informal evening receptions, to which gentlemen take more kindly than to the old- fashioned New Year's party. The good old Knickerbocker custom is still maintained by some families. Some give formal dinners, and in the country carriage loads not infrequently go round from house to house making merry calls, picking up additions to the party and finally ending with supper at some hospitable house and in an evening with games, refreshed by apples, roast chestnuts, plum cake and sweet cider. The day was not observed in Colonial times with the formality which has marked its observation in later years. After the colonies had adjusted business affairs to the new date, the first of January grew in importance and in course of time became a legal holiday. (See Calendar). Consult Chamber's (Book of Days.*

NEW YORK (the «Empire State®), a State in the northeastern part of the United States, lying between lat. 40° 30′ and 45° T N. and long. 71° 50′ and 79° 46' W. ; bounded on the north by Lake Ontario, Saint Lawrence River and Canada; on the* east by Vermont, Massachusetts and Connecticut ; on the south by the Atlantic Ocean, New Jersey and Penn¬ sylvania ; on the west by Pennsylvania, Lake Erie and the Niagara River. Lake Ontario is west of the northern part of the State and New Jersey is west of the southern part of the State. Lake Champlain is on the boundary between New York and Vermont. The extreme length of the State from north to south is 312 miles; and from east to west 326 miles, or 412 miles including Long Island. The area is 49,170 square miles, of which 1,550 square miles are water surface. The State contains 30,476,800 acres of land, of which in 1910 22,030,36 7, a decrease from 1900, were in farms. It ranks in area the 26th among the States of the Union.

Topography.— About one-half the boundary of the State, exclusive of Long Island, is water. The chief inlet is New York Bay. Long Island, southeast of the mainland of the State is sep¬ arated from New Jersey by Staten Island Sound ; Staten Island, southwest of the main¬ land, is separated from New Jersey by Staten Island Sound, Arthur Kill and

Newark Bay. Both these islands have inlets along the coast, some of which are good harbors. Along the shores of Lake Champlain and Lake Ontario there are a number of small inlets. In the Saint Lawrence River, where it leaves Lake Ontario, are numerous islands, many of them well wooded and beautiful. The group is ‘ailed <(The Thousand Islands.® These islands are favorite summer resorts. Long Island on the south is a part of the coastal plain; the greater part low; the highest elevation is 382 feet. The eastern part of the State is mountainous, the ranges extending generally northeast and south¬ west. The central and western parts of the State are rolling or level land. The moun¬ tains belong to the Appalachian system. In the northeastern part of the State are the Adirondacks. Mount Marcy, the highest eleva¬ tion in the State, 5,344 feet, is a peak of of the Adirondacks. There are several peaks from 2,000 to 4,000 feet. These mountains

are covered with forests, largely pine. The Adirondacks extend along Lake Champlain south of the valley of the Mohawk and west nearly to Lake Ontario. They are noted sum¬ mer and health resorts ; more people visit the Adirondacks annually for health or pleasure than any other outing place in the country. These mountains toward the south become ranges of hills which slope to the Mohawk in the east and to the lake shore plain on the west. South of the Mohawk Valley the land again rises to what is known as Catskill Mountains. Some of the peaks amid the Catskills are fully 3,000 feet high. Slide Mountain, the highest peak, is 4,205 feet above the sea. The Shawan- gunk Mountains, more a plateau, are south of the Catskills. The highest part of the plateau is in the west back from the Hudson from 1,000 to 2,000 feet. On the southeast and north is a limestone escarpment, Helderberg Mountain,

, which in some places attains a height of several hundred feet. In the western part of the State and parallel with Lake Ontario are two well-defined terraces each about 200 feet in height. The Lower Terrace, called Lake Ridge, ex¬ tends from the Genesee River to the Niagara, and is from three to eight miles distant from Lake Ontario. This Lake Ridge marked at one time the southern shore of Lake Ontario, when the outlet of the lake was by way of the Mo¬ hawk Valley. The Upper Terrace, called Moun¬ tain Ridge, is about 30 miles inland, and ex¬ tends east and west almost parallel with Lake Ridge. The highest part of the plain or plateau portion of the State is in Otsego County, where it attains the altitude of 2,300 feet. ((Rock City,® Allegany County, upon a summit 1,400 feet above the surrounding valleys, consists o f a tract of 40 acres covered with rocks broken into layers forming streets and alleys.

Hydrography. — The waters of all the riv¬ ers of the State finally enter the Atlantic Ocean. They reach the ocean by way of the Saint Lawrence, Hudson, Susquehanna, Dela¬ ware and Mississippi rivers. The great valleys of the State are the Hudson and Mohawk val¬ leys, which divide the State into three sections, one east of the Hudson and south of Lake Champlain, one in the northern part of the State, almost surrounded by water ; Lake Cham¬ plain and the Hudson on the east, the Mohawk and Oswego rivers on the south and southwest and Lake Ontario and the Saint Lawrence River on the west and north. The remaining section embraces the central and western parts of the State. The main stream lying wholly within the State is the Hudson River (q.v.), which with its tributaries, the largest being the Mo¬ hawk (q.v.), has been a great aid in the de¬ velopment of the commerce of the State. Through the Mohawk Valley the Erie Canal extends, and bejˆond to the Great Lakes, thus making a continuous waterway from the ocean north to the Mohawk and thence west across the State. The northern part of the State is drained fjy rivers which flow direct to the Saint Lawrence. The largest are the Black, Oswe- gatchie, Grasse, Racquette, Saint Regis and Salmon. The Saranac enters the Saint Law¬ rence through Lake Champlain, and the Genesee and Oswego through Lake Ontario. The Sus¬ quehanna has its head waters in Otsego County, and the source of the Delaware is southeast of Otsego Lake. The Allegheny River, in the

NEW YORK.

Estimated population, 10,646,989

COUNTIES

Pop. 1915

183,330 Albany . H 18

40,216 Allegany . 15

615,600 Bronx . C4

90,641 Broome . I 12

72,756 Cattaraugus . 13

65,751 Cayuga . G 10

116,818 Chautauqua . II

59,017 Chemung . 19

36,648 Chenango . H 13

47,561 Clinton . A19

44,111 Columbia …….. I 19

30,074 Cortland . H 11

45,995 Delaware . 115

91,044 Dutchess . A 4

571,897 Erie . G 3

32.461 Essex . C 18

46,181 Franklin . B 17

45,625 Fulton . F 16

40,707 Genesee . F5

30,091 Greene . 117

4,491 Hamilton . E 16

64,109 Herkimer . F 15

81,009 Jefferson . C 12

1 798,513 Kings . D 3

25,947 Lewis . D 13

38,427 Livingston . G6

41,742 Madison . G 13

319,310 Monroe . . . . .F 6

61,030 Montgomery . G 16

116,825 Nassau . C 5

2,137,747 New York . C4

Pop. 1915

108,550 Niagara . F3

167,331 Oneida . F 13

213 992 Onondaga . G 11

54,628 Ontario . G 8

1 18,1 18 Orange . B 2

33,919 Orleans . F5

75,929 Oswego . E 11

48.534 Otsego . H 15

12,767 Putnam . B4

396,727 Queens . D 4

121,330 Rensselaer.. _ G 19

98,634 Richmond . D 3

46.903 Rockland . B 3

62,982 Saratoga . F 18

98,625 Schenectady . G 17

23,005 Schoharie . H 16

13.954 Schuyler . H 9

25,249 Seneca . G9

90,291 St. Lawrence .. . .B 14

83,630 Steuben . I 7

104,342 Suffolk . C7

38,189 Sullivan . A 1

25,549 Tioga . I 10

36.535 Tompkins . H 10

S5.367 Ulster . A 2

32,977 Warren . . E 18

46.955 Washington . F 19

53 476 Wayne . F8

321.713 Westchester . B 4

33.028 Wyoming . G 5

18.841 Yates . G8

Incorporated Cities, Villages, Etc.

1,571 Adams . D 11

1.754 Addison . I 8

754 Alton . I 13

1,856 Akron . F 4

104,199 Albany . H 18

5.988 Albion . F 5

777 Alden . G 3

212 Alexander . G 5

2,062 Alexandria Bay ..C 12

677 Alfred . I 6

1,327 Allegany . I 4

805 Altamont . G 17

390 Altmar . . E 12

2,780 Amityville . D 5

37,103 Amsterdam . G 17

405 Andes . 115

1,154 Andover . I 6

1 ,138 Angelica . I 6

1,194 Angola . H 2

1,057 Antwerp . C 13

1,568 Arcade . H 4

442 Ardsley

Westchester. . . . B 4

223 Argyle . F 19

1,925 Athens . I 18

2,013 Attica . G 5

37,385 Auburn . C 10

396 Aurora . G 10

1,083 Avoca . H 7

2,430 Avon . G 6

3,100 Babylon . D 6

1,201 Bainbridge . 113

3.220 Baldwinsville – F 10

4,344 Ballston Spa ... .G 18

550 Barker . F 4

13,350 Batavia . G5

4,173 Bath . H 8

11,555 Beacon . A 4

280 Belleville . D 11

499 Bellport . D<

1,031 Belmont…. . 15

639 Bergen . F5

53,973 Binghamton . I 12

857 Black River . D 13

940 Blasdell, Erie . G 3

394 Bloomingdale . .B 18

1,260 Bolivar . 15

1,909 Boonville . E 14

1,402 Brewster . ‘. . .B 4

1.221 Briar Cliff Manor,

Westchester . . . . B 4

258 Bridgewater . G 14

3,368 Brockport . F6

1,292 Brocton . HI

2.240 Bronxville . C4

400 Brookfield . G 13

885 Brownville . C 11

468,558 Buffalo . G 12

375 Burdett . H 9

1.241 Caledonia . G 6

1,727 Cambridge . F 19

2,181 Camden . F 13

840 Camillus . Gil

2,474 Canajoharie . G 16

7,501 Canandaigua . G 7

668 Canaseraga . H 6

3,849 Canastota . *12

749 Candor . I 11

2,314 Canlsteo . 1 6

2,624 Canton . B 14

1,102 Cape Vincent ... -C 11

3,871 Carthage . D 13

962 Castile . H 5

1,583 Castleton . H 19

390 Cato . F 10

5,371 Catskill . I 18

1,276 Cattaraugus . .13

373 Cayuga . G10

1,928 Cazenovia . G 12

720 Celoron,

Chautauqua .... I 1

481 Central Square ... F 1 2

1.279 Champlain . A 19

2,302 Charlotte . F7

1,196 Chateaugay . A 18

2,389 Chatham . I 19

682 Chaumont . C 11

720 Cherry Creek . 12

762 Cherry Valley ...G15

1.280 Chester . B 2

1,074 Chittenango . F 12

583 Church ville . F 6

1,879 Clayton . C 11

972 Clay ville, Oneida. F 13

660 Cleveland . F 12

1,664 Clifton Springs . . .G 8

1,264 Clinton . G 14

2,699 Clyde . F 9

2, 362 Cobleskill . H 16

958 Cohocton . H 7

25,211 Cohoes . G 18

274 Coldbrook,

Herkimer . F 1 5

935 Cold Spring . A 4

391 Constableville,

Lewis . D 1 3

2,634 Cooperstown ... H 14

695 Copenhagen .. . . D 13

515 Corfu . G 4

2,415 Corinth . F18

15,406 Corning . 18

2,658 Cornwall . B 3

13,069 Cortland . H 11

2,309 Coxsackie . I 14

659 Croghan . D 18

2,243 Croton-on-Hudson . B 4

1,645 Cuba . .1 5

869 Dannemora . * ... A 18

4,018 Dansville . H 7

1,743 Delhi . 115

4,932 Depew . G4

1,779 Deposit . I 13

604 De Ruyter . G 12

1,145 Dexter . C 11

4,030 Dobbs Ferry . C4

3,326 Dolgeville . F 16

326 Dresden . H 9

722 Dryden . H 11

1,236 Dundee . H 9

20,743 Dunkirk . H 1

845 Earl ville . H 13

3,445 East Aurora . G4

582 East Randolph. ...13 3,471 East Rochester. . . . F 7 1,607 East Rockaway,

Nassau . C 5

3,839 East Syracuse . . .F 12 777 Eastwood,

Onondaga . G 11

504 Edwards . C 14

439 Elba . F 5

475 Elbridge,

Onondaga . Gil

530 Elizabethtown ...C 19

3,073 Ellen ville . A 2

881 Ellicott ville . 14

316 Ellisburg . Dll

38,120 Elmira . 19

3,154 Elmira Heights,

Chemung . 19

(P.O. Elmira)

5,581 Endicott, Broome I 12 241 Esperance,

Schoharie . H 16

340 Fabius. Onondaga G 11

624 Fairhaven . F 10

3,556 Fairport . F 7

2,342 Falconer . II

1.856 Farmingdale . D 5

636 Farnham . H 2

1,779 Fayetteville .... .G 12

531 Fishkill . A3

Pop. 1915

1.771 Floral Park . D 4

1,120 Fonda . G 17

505 Forestport,

Oneida . F 13

740 Forestville . H 2

436 Fort Ann . E 19

828 Fort Covington . .A 17

3,662 Fort Edward ... .F 19

2,923 Fort Plain . G 16

4,213 Frankfort . F 14

441 Franklin . I 14

2,065 Franklinville . 14

5,328 Fredonia . H 2

7,463 Freeport . D 5

337 Freeville . H 10

1,199 Friendship . 15

11,908 Fulton . F 11

955 Fultonville . G 17

340 Gainesville . H 5

104 Galway, Saratoga F 18

2,253 Geneseo . G 6

13,71 1 Geneva . G 8

451 Gilbertsville . H 14

650 Glen Park,

Jefferson . C 12

16,894 Glens Falls . F 18

22,082 Gloversville . F 16

3,51 1 Goshen . B 2

4,164 Gouverneur . C 14

2,524 Gowanda . H 3

335 Grand-View-on-

Hudson, Rockland B 3

3,890 Granville . E 19

1,272 Greene . 112

4,533 Green Island,

Albany . H 18

(P. O. Troy)

3.735 Greenport . B8

2,315 Greenwich . F 19

1,445 Groton . H10

952 Hagaman,

Montgomery . .G 16′

2,744 Hamburg . G3

1,586 Hamilton . G 13

418 Hammond . B 13

1,560 Hammondsport . . . H 8

1,356 Hancock . J 13

432 Hannibal . F 10

991 Harrisville . C 14

5,461 Hastings-upon-

Hudson …….. C 3

5,418 Haverstraw . B 3

6,073 Hempstead . D 5

380 Henderson . D 11

9,577 Herkimer . F 15

607 Hermon . B 14

2,518 Highland Falls ...B 3

1,017 Hillburn . C 3

817 Hilton . F 6

596 Hobart . 115

339 Holland Patent ..F 14

1,780 Holley . F 5

2,871 Homer . Hll

1,258 Honeoye Falls _ G 7

5,406 Hoosick Falls …. G 19

14,685 Hornell . 17

1,949 Horseheads . 19

12,705 Hudson . 118

5,585 Hudson Falls. . . .F 19

405 Hunter . 117

8,900 Ilion . G 14

663 Interlaken . II 9

2,379 Irvington . C 4

15,848 Ithaca . H 10

36,580 Jamestown . 12

10,646 Johnstown . F 17

1,063 Jordan, Onondaga

G 11

1,795 Keeseville . B 19

1,700 Kenmore, Erie.. . .G 3 827 Kinderhook . H 18

26.771 Kingston . J 17

15,987 Lackawanna . G3

476 Lacona . Ell

750 Lake George .... E 19 1,977 Lake Placid ... . B 18

702 Lakewood . 12

5,094 Lancaster . G 4

‘2,060 Larchmont . C 4

2,402 La Salle . F 3

364 Laurens . H 14

1,870 Lawrence . D4

4,084 Leroy . G 6

5,400 Lestershire . J 12

741 Lewiston . F2

2,395 Liberty . A 1

922 Lima . G 7

463 Limestone . 14

347 Lisle . 112

13,451 Little Falls . F 15

1,307 Little Valley . 13

1,591 Liverpool . F 11

857 Livonia Station . . . G 7

19,879 Lockport . F 4

3,244 Lowville . D 13

832 Lyndonville . F 4

4,742 Lyons . F 9

863 Lyons Falls . E 13

887 McGrawville . Hll

1,147 Macedon . F 8

317 Madison, Madison G 13

7,404 Malone . A17

7,290 Mamaroneck . C 4

1,115 Manchester,

Ontario . G 8

1,304 Manlius . G 12

617 Manns ville . E 11

1,006 Marathon . H 12

991 Marcellus . G 11

648 Margaretville 1 15

Pop. 1915

795 Marlboro . K 17

4,614 Massena . A 15

595 Mayfield . F 17

1,201 May ville . II

8,208 Mechanicville . . . .G 18

6,079 Medina . F 4

313 Meridian, Cayuga G 10

1,474 Mexico . Ell

1,059 Middleburg . H 15

1,427 Middleport . F 4

15,810 Middletown . A 2

710 Middleville .r – F 15

560 Milford . H 14

1,252 Millbrook . A 4

890 Millgrton . J 19

2,318 Mineola . p . D 4

2.577 Mohawk . G 14

1,519 Monroe . B 2

957 Montgomery . A 2

2,132 Monticello . A l

1,281 Montour Falls . 19

522 Mooers . A19

1,393 Moravia . H 11

466 Morris . H 14

479 Morristown . B 13

582 Morrisville . G 1 3

305 Moscow,

Livingston . G 6

2,902 Mt. Kisco . B 5

3,884 Mt. Morris . H 6

37,009 Mt. Vernon . C 4

1,138 Naples . H 7

597 Nassau. Rensse¬ laer . G19

716 Nelliston, Mont¬ gomery . G 16

979 Nelsonville . B 3

6,468 Newark . F 8

808 Newark Valley ... I 11

1,131 New Berlin . H 13

29,603 Newburgh . A3

341 Newfield . I 10

1,459 New Hartford . . .G 14 213 New London,

Oneida . F 13

1,261 New Paltz . A 2

697 Newport . F 15

37,759 New Rochelle . C4

5,602,841 New York . D 3

2,634,224 Manhattan 575,876 Bronx 1,928,734 Brooklyn 97,881 Richmond 366,126 Queens

37,353 Niagara Falls . F 3

586 Nichols . J 1 1

1,874 North Pelham,

- Westchester. . . . B 4

2,527 Northport . C 5

4,877 North Tarrytown,

Westchester . . . . B 4 13,768 North Tonawanda.F 3

1,635 North ville . F 17

8,342 Norwich . H 13

1,879 Norwood . A 14

1,140 Nunda . H 6

4,291 Nyack . B 4

1,307 Oakfield . F4

335 Odessa . 19

16 718 Ogdensburg . A 14

515 Old Forge . E 15

16,624 Olean . 14

8,805 Oneida . F13

399 Oneida Castle …. F 13

10,962 Oneonta . H 14

126 Oramel, Allegany ..15

973 Oriskany Falls. . .G 13

13.705 Ossining . B 4

24,101 Osw-ego . E 10

579 Otego . H 14

591 Ovid . H 9

4.570 Owego . Ill

1.594 Oxford . H13

1,319 Painted Post . 18

408 Palatine Bridge . . G 16

2,469 Palmyra . F 8

352 Panama . II

521 Parish . Fll

4,506 Patchogue . D 6-

1 ,050 Pawling . A 4

18,530 Peekskill . B4

793 Pelham . C 4

1,115 Pelham Manor ....C 4

4,725 Penn Yan . H 8

5,009 Perry . G 5

1.375 Phelps . G 9

847 Philadelphia . C 13

2,060 Philmont . I 19

1,655 Phoenix . Fll

1,481 Piermont,

Rockland . B 3

344 Pike . H 5

646 Pine Hill . 116

1.376 Pittsford . F 7

12,873 Plattsburg . A 19

429 Pleasant Valley. . .A 4

2,464 Pleasantville . B4

315 Poland . F15

1,115 Port Byron . F 10

16,183 Port Chester . C4

583 Port Dickinson,

Broome . I 12

2,584 Port Henry . C 19

9,676 Port Jervis . B 1

753 Port Leyden . E 13

765 Portville . I 5

4,157 Potsdam . B 15

30,390 Poughkeepsie . A3

696 Prattsburg . H 8

339 Prospect . F 14

1,860 Pulaski . E 11

■

.

‘ .

■

”

• !

.

‘

•

•

•LongitudelWest fr.ora Greenwich!

T 0 R M 0 NV1

Cornwallˆ

°FalU Mil

•ouˆSkweiKle

> ** /.Ellen ville 1 V™.... Ca: OF i?Philljp«port ‘SC .New 111.

WMoiaˆ

Fro*ti«r’& . Ihateaugap 1

i A

\fhateaugay L.

„ c wouLice

ocrt-cctm C&>2T*t>\v

S U LˆCfll >arrow8burc L,/.5«. Tusten _ /. .(

k Venog e e ˆOalila!

»*T Brook0

lmFdr’d jfa

{SmitbsTalls1

DForrlsburg

IXorwich,

I2Uddlw*totvir

^^rishkrr

SKt«JSL“.

Hitcficss Jc. i > U T ‘S iCold Spring ‘ Lahopac Mine®

Ja»i Lake I Nfa‘ 3Iabopa

W. Cbazy

-fT Lisbon C < OgOfiuaburK

FlackVe XoJJsuvclVott-‘^ \CV Caotol

1 €rar$

Ringvine’jO

Prescott

k. rnkhhoirm^ T*

‘ XA^Unnlt*

‘otadab^ Hopkinlo n]

iriahidttf-

? ‘Suit Trout1,

fanjmva FdU Lak < * IK Pana/« > iW_ < ^

-Port Jervis)

jPHSsSSftSftf

“jpotsiat

Worley

irapUdfi,

&rakr»!P”T”t‘^

galmon River#

tilbury’ Medford . /*

^^iJttphacoB Mill/ n Lake Per u/

Lldi^Ilrook Markneasy^.

Union An gable C4a3m r/ertij EerronadV

rPce'Vikill)t> Yorktown JMˆotroio iCrutonLake |jCruir«r« < k \Croton-onJ

is

Inlonvillt

f Sife't F A.J R F IjiL D fl£atonai\ *■ *

_ . cBqutonvi Ho I ,

Mt. Kisco *» t- \ J

• jg fJjbrt? Jlr/ldgeport/ˆ

•poqna < / ˆ.y V • c*

•yfentvllla iM e-

FiifiirnSat

Brock vnieyN/gar

M orri/St owiwˆ *

Glˆ

Basse*

lA:PauJ Smiths I

FLitUe J River

talb J e..o

•PˆblColton

"errontujW

lniiwkbrookIU>ge!ˆ*ˆ1?la3ˆ(>

ˆvillo _ _ a ctAuSable Forks! V/

KK288"v$ t eyiiubo

«®h. k*£"Jv

BrandonV ;

Ray Pond ‘

yllermon

ˆ Bigelow BichriU* ax

sm»ttt.ea

Sw&rtswood

vhippt

A U\xandrfl njjiˆUarkˆ

■zmww

4 .

Kildare*;

Jlood/I

ndwoULq

TV’ _ Phibwold P. (A lr MooseJTead* ti/ltnxpRˆ

*”\ Oswegatenlo

“YNinW’tonfall*/

— ‘ B*>o(»oo’\iido* Granljg /Oswegatchie . /P^\L‘ 3ˆ o BU. fJnrnpn tff>r ,o. Qra3U>er>\£Ldkt 1 Offoroe Sho

JP lodStfiN

/a’cnrilfta

Matoon

Thereaa

1 landers

QNGˆ

I’ “Hj ‘ gOrec /Mt. ‘Ann JLake’

l ut3i

icw ^

honeJMiU/)

’isi&wM “^iiz&bG

*w*V.s! W ^U9t*°*

Uerwooi Minc’d lie

*[l*erT3villew re Bonaparte*

pWlWclj

*VStcTlin^*

IWCVatiifoi Bridge! % Xj Indiut^ “River

PtFVniiiBul

Blue

‘oiatwooa”

**LonyX\fi?<*

> ZNewhombj

Deerland 1 /

?tfslH arbonj

iaipi)

UChHeonP i

ohroonXalce

*Baldwin /|X_*

Cf/i _ _ (/”

o /Tdtnw3a^ Jyfo0 ™°<

‘Beaver River

8om«*vllie®-T'Mil > DLES]

'Raquettt

Totten v ilia

JJitMToose

Moose

Schrooni

. Boston l(

} (Low ville^s.

S \o Parkers ihiKker Mu liMturs^ W^troQfe«G > fi^8 > jJ Mouscvll oyp

rabael,

Lakes

rolnlei

Hilton.

i'^^Branti^h, '^jjBranrtny^ii

O?

^Li/onsdojl-

j^^Lo^JaacobxCyijp. ^jl//te@r*^Boonyille|

^ > r^C > 5?C AaW J

< 4 • > > • o^. iE/o'vT < *'

^TU

^ ^K^1' ^ ojfeteuben*j

Clemons

nboro i. \tc:ila«

jrfi/U'no*

Viuri7Q \V

Tbe QlcnV o(/amct ˆ

/SMlnnejiaba,

•oft Leydea’

•Speculator

-4 thoi > o] Thurman J

Ck = ˆ JTamptot Rji ttJlK.OranV. I

ife/Sa/ OMid.X

V °rˆ OranVm

jSmitbs Rasiu-. c idson Falls \ v$- ˆNJIebron ˆbflˆArgyUj H&fon o

jiduntj

WlflAi

‘ranxpf

Cake.

UiutWrfy

vl Minetto

Pleasant’

Ludestou Sto‘ »eco ‘YfpVsl

Sr j

(orehofue.

?rant

.«/ . CorlnthlVˆi:,ˆ JEetmburg I “Palmer

aHagss®«Jo.Vrj

urtˆi[OTiEio?a(\VilioB0ˆ/

■’»)■ “■”«* ^_ /‘C

ddje G rorn r.SurBtoga*^^ oaoTbLq VˆSpringi/ V’

jS) if/ii’fimflii I V

n

XS’ rgtittville , Sscv. Vˆ»,cj.ˆ:(Dix -ˆX” \

i>Patent O-oGray >ˆSPoland jf„ rxva y

XT _ _ _ 8 fi.ll.k,

crˆ-vlfrory

•A” rˆ-A –

v. (-KiSyort o.v’-T’*

y/ScUport r »T- Wa. g«J»lT‘ a.° uˆ. .

c/»f Garog» Xr v/hJ.A

“ˆjcn’SaSSi:

f#a.o ,

y) Marion ,

V*/V A

/ ‘”ˆNewoort’ 8»li*bur; lˆbMiddie villa (

“Clijftonj MontroaoJc. /

Jtiver

zunij,

ihKZoUc* m i

[a Och lo Io»l ˆ0ˆ0 O a diˆln gr LWC- a.S> Jflmesvillo’v IkaˆentnleTˆYMarcellus] Marietta J

iffpSib tˆSq, _ApUua gta.V

Welland

T_; clock v.

{) ‘ Valley Us.

/ Perry 1

‘ Mile Pratts’

.Bingloy O

Wprrl0»iUao j/j

‘ * Halo*

)oftD9-

[boro i

, ^^Tnyeltevllie wardsW *\ll4nlias j [alls, XL i \ Cazonncpito O

t niprfioar

.

0« WofldnitSEri. y.

‘Alexar.dor L.

‘Avon*

lolunibidt

ir~V

C^r/‘OrlcaiiT

o

Ifr’S^AluquinV

’Aes/i jTSQorham^i

rolcoml

Sr>E.I>IC“

O^Op^^^Jobnioo * *yr Hboal ck. Fall 4\ j , /wPetersbu rg Jc IvX ‘ p
Melrose a N

AV/atcrford . ffi

nil O/ZaynersriBs Ml “eˆ

1,/pLaasingburg o p. *■

[// • Oro7»oa M

Ul T-fte Petersburg// Ij-TC0ˆ Berlin’s/ /JR\E fˆS S fc L A I R /IroSsAVˆVs S-BcrUnV

fjlath’t: AarˆpKOJiicnkill’ •#

AXBJCKYN-Steplinl

llenssebieˆˆHˆ‘Vil! Payrki V* Luther0/’ / /

\®8leplieijlown C«n. J I ˆV/oiephon(ownp f L,, . Jfraina’doE. N.U/.

v*r* p&ˆZio O 54.—rJ o ‘ftvo.iwiL.G, ˆSpring tb-ia og

|Chcrri ValleyˆJLJV ‘

0tscjm ,8baTojrSpriIg8\ˆ

V V-foCrnt?JralUyJ \ Gu-uiˆe ntevfllc SewnrdA tiPfyj&o / HyndfviUt

y7* gS7)e>af urt _

[ccbaaics-

™ ˆy>7 WX.Lica M

>v»0?fefcw’te

:h*a \ o»alcj CViA’prjsburgl ’ark \ JohnsonburglU’ranS«.,;;,mx Wes? QSoutbL .Jf/. .ˆV;

ii*‘wV,rp«r)wi?j.™” %

kC°M«» lUlilland rASiWer Lake J.?A> ftaienwoA’i Jkvat/POaineavlllM”ˆ

j

e’A j *— £ichfls|

sffiffuJ

Edmeston ˆ

*Coopt**

,Id»e«on9 hˆcJ AVtcStti ˆ ”ijt.eM

wZ££°r Mii/r<

, r!®y Uurons/ fHolraeiVilIb So/

*f F Ohdgtia ˆ Ponˆsod iWit6o*W ˆ Qnyˆ> WUi ftockVellB MiW*

VcsiTk

*/L’nioat 1 ? 8pt». *

Luvanms

A urorat

ˆCHENECTJ

«8. Schenectsd /PrincolownJ

*lHnfe‘il/0 *ˆ*

Vˆgtlubbaxdsl ‘llamilloj

Woehtflle fX

George T\ tvˆ)

Xel/anonLvˆSfe

Mt&f EE

‘jea/XSˆGrove- lS’V\! O0jand V »ra/ Jl»eNair A

iNunda tVvr’ Jtiwaes’ TSp1*

*i-™/7rT> “i“ b7v?’ H”“i W \! _ *■.*

*Fillmore/A/oj – yaˆT_*

/ I cnnayiTragi?ˆˆ j

#// /BirdBallxˆ./jQrove XfcA / Hdughton 7ˆ ?uf”sX). up , iCafneadea XCeDlreArkporrˆotp J \ / . | ‘VjBirdaall St, Jj c*

. i> i V A \ <® .wf «xAlraondx53 v°T

vPˆokvi/jaˆˆAˆ I ‘ /

oSL nneth vfcaaloˆi

—A’lel’ I0nt.

w[/ntushtillo vi

PaSˆb»’0«»<

yyyMidˆtesex Anj

Hfff . J 9 Friend a/

r .YXA T EOj I v /PcnnYnnn/5

l/iraacA.Pf. yOd

Ppt’sourrfPL ,

yJg£

j /Earlvill

Buxton P’ybˆUi.pnrvilleO *1 iomer r ,a» / SmyronV I rˆtife, o9fiuih Otsel,/, 7 jl 0 t>l j

IdfTayldr /Norwich

Du am

kVh,«ˆKnoJ«Kˆ. tP«/ZrXA

r (j allupV A Ham oh/Sa fW/eo. Hlcadovida1eXsY0”f«i/ Srliohftrle Voorboes YrVˆjjoi fc Berne* JTeW ScotlandV>‘V« / Wolfhfllo JˆeuwoW ,

fere I Rcldsvilleo SefUci

_.iol ... -1 a.BˆUoberA

KAN ‘Indian Ficldl , ° Raveaa

o S. WeaterljL.

‘•tgˆStannt’jn ?/ ill

r“amOeaveKillZ ˆ Stnyressi

o° yˆF.dˆ

Yehˆ’ £’«

WeF*

\ E. Conror

J, Collins r

.Kings nsrry K ˆ.kOenoa, ibAtwatArT z.

Ichmomi V. .H O H A I mmit Middlcbun ra. f’ultonhamjf Jharlottevillo ~ 7ˆ 0 Jerome « p..

I. Cover

pir;

5Truuians®irf

hU

\% WilloriCri I L‘‘CRtfroli IBurdctt I \ XntdJ ArfT

IViitklii.vCJi’uY

Lakc\Rldge\ V /- , \ Grotonˆ LudAlowrllle 1 Haturllla

ˆ Blood*

iCobootott

\Waliaoe

3mrnk

[aryland4

3sUdU«kjd i

ˆWaicefllltV

ˆoEddy V-j jr 4 Ashford Jr Cadit’

% A R/a U C

A-t,v .■orEUicottaV.

lloy\blk \ Uumphrts

> \ °v”4 < ’•4*

CFredonia j£ Leona ;

Lilly Dale

[V°

JffedusaQ

fssengervil llYilletb] Mlarcnhoi

/XEtnaˆ ‘A’orna j Bc-semcra ABrookiuiV1,

Avocasˆ

JH award Toudee ‘

/Harford

‘Mac Li a?

Oxfoi

Coventry

lrisben/ˆ>

ikvenpor

Center

i fordo

fAAayton oV HttBBDgnsr Anybodys’

fanorkil

l ._CnaSlottt L SJoCtnltp JAloons

\ Cherry Cr.’]b81nel\lrV. Iff \ E/liagtonp

.RiclTfoˆd

k C rotor. j

ˆeUOridge –

»tbs«S t 0 h lI

fo = s$tei > $4

tsFa v\ > DuivfO rj D n rnA*, _ P.

BavonaV- Eerdajl t’Ti.y 1]

, a

.iy

yi«,tsA-Cooksl k,°‘o!3 > ’ “oltˆUnaiej lCat m fs«eljrf’

iGhont \, 9 SptnotrT? IJ/arUmtilltl [philmontf

lew Held? it rationˆ

Daabyl

M hi’-

Odwsav

ipV/Snjw

‘ Willsey W. l.° n bCamlor) • 1 ChcnW

X5Wc&l

rˆVolueiaO < Summerdali Chaut Shermanˆ Vina o 6V I

Trench Cr.

“Greene-

f £ < -'i dtiyilk O.-ˆ ° sˆtfa»o»«A'Q»

SSjneTpˆJ .

\ Bcldjootˆ Cˆ \ ˆPˆjbsboioˆ \ ˆLVuollow ‘

, > 0/// V;,j-

, Elmoa nelcht* lE M U N Gl

LKlmlra'^ ^'"N e°'n nnp Xxˆj/a

e dman9>

Ashvilll^^i Jil anaina t. ˆv-~->cr' A. sC ,CT ˆ rowsb Clymer/ˆ. J'attaFlun

JTHi.lcy

rfcviˆ

**• W. Copal. naiPtJlu* S

,UoU Ctntr.i

-UncjrUloT-Cˆ"".

/Muldon

s=5=w"i

)/ac°in\ˆ

gnu-hburg — V J oVosl.urg >

Bolivar 6'Fonc*

Y

WellsVillˆInc

"Dairt

I Whites TA ckSbonejxfc

Carrolltoi

Catatorik\£

Owcgoy

NSroolval. ot*

TuryiFoodn ~burg /V

\](l AK i rli woodf <>)*\pWersidol

‘/ VMtate US

Apahv-hii

lulf 8uil

M i JjRe A Hock. \/Rno l|J YjIectPC.lt /S /HV ■ If & hloebockgno V AttVeDurˆ

/(j KhlnooQff XtStissing

>ƒ> k: Jtto IntyTe >7 Jc

([• /o’ •’“V Wi

ImO”u4tc*C *1 E

fflffwfcr.r;“1 / Min-

ˆtn»/iughUce/psie

||1 ifnuibaˆl VG’ _ _C 1 o t

2 ■ •r.—’;

3rudfort

lUˆ ˆokˆeurtoyˆ C firebridge

iJoiois – JkoaezAjyb (A Krij.plˆbmh 01igbYˆ> ˆ/Uj – MomhacruA off.

ˆ ‘cchrdˆDfirlnKto w nVl o ’“y.Uil’y’fc lierhonksou V:

C/&vp./r7

’ “ / yffliOFiowaskaClitit,)-#/

, – yRlIeorille ,e« ‘dint/’*

J K J? Bruy«*wtrl

Lawrcnct

NEW YORK

Iruoej

/jSlbaron / o:Z.eed»« tAmenia/

>P^5SBCSUb

\Fa//s J/iHs Bneh K

7 q Monttcello ^

ontrose

SCALE

Statute Miles, 28=1 Inch.

Coud<;r«port

Road McNally's New 11 x U Map of Non Copyright by R.od McNally A Co.

Galetijn

/ J q jioniiceiic

J Cbchcct'm MapU&ood

•JWtroJsTm^j Cfn.Cekanon 'l.

Pop. 1915

1,341 Randolph . 13

525 Red Creek . F 9

923 Red Hook . J 18

417 Remsen . F 14

11,177 Rensselaer . H 19

1,580 Rhinebeck . J 18

380 Richburg . 15

1,623 Richfield Sp'gs . .G 14 567 Richmondville. . . H 16

316 Richville . B 14

346 Rif ton . J 18

256.417 Rochester . F 6

300 Rockland . B 3

5,223 Rockville Center ,.D4

23,737 Rome . F 13

804 Rosendale . J 17

1,783 Rouses Point _ A 19

459 Rushville . G 8

5,339 Rye . C 4

829 Sackett Harbor ,.D 11

3,245 Sag Harbor . C 9

8,370 Salamanca . 14

1,096 Salem . F19

669 Sandy Creek . . . . E 11 4,918 Saranac Lake . ...C 18 13,821 Saratoga Sp'gs ...F 18

4,490 Saugerties . I 18

531 Savannah . F 9

57 1 Savona . 18

795 Schaghticoke .... G 19

99,519 Schenectady. . G 18

537 Schenevus . H 15

1,124 Schoharie . H 17

1,711 Schuylerville ... .F 19

3,790 Scotia . A 19

F 1,981 Sea Cliff, Nassau . .C 5

j:'7,018 Seneca Falls . G 9

531 Sharon Springs . .G 15

1,016 Sherburne . H 13

949 Sherman . II

423 Sherman Park,

Westchester. . . .B 4

1.228 Shortsville . G8

2,641 Sidney . I 13

3,220 Silver Creek . H 2

893 Silver Springs .... H 6

582 Sinclairville . 12

1,768 Skaneateles . G 10

2,202 Sloan, Erie . G3

247 Smyrna . H 13

5,886 Solvay, OnondagaG 11 (P. O. Syracuse)

3,092 Southampton . C 8

2,106 South Glens Falls. .F 18 1,950 South Nyack,

Rockland . B 3

(P. O. Nyack)

653 Spencer . I 10

848 Spencerport . F 6

2,804 Spring Valley . C3

2,688 Springville . H 3

2,705 St. Johnsville. . . G 16

1,060 Stamford . H 15

1,041 Stillwater . F 19

2,781 Suffern . B 3

196 Sylvan Beach,

Oneida . F 13

155,624 Syracuse . G 11

758 Tannersville,

Greene . I 17

5,752 Tarrytown . C 4

1,053 Theresa . C12

Pop. 1915

2,754 Ticonderoga . D 19

1,080 Tivoli . 118

8,836 Tonawanda . F3

316 Trenton, Oneida. F 13

77,916 Troy . G 19

1,181 Trumansburg H9

2,753 Tuckahoe . C 4

559 Tully . G 11

3,910 Tupper Lake ... .C 17

339 Turin . F. 13

1,125 Unadilla . I 13

1,922 Union . Ill

762 Union Springs ...G 10

387 Union ville . B 1

642 Upper Nyack,

Rockland . B 3

(P. O. Nyack)

85,692 Utica . F 14

1,410 Valatie, Colum¬ bia . 119

795 Valley Falls,

Rensselaer .... G 1 9

407 Van Etten . I 10

532 Vernon . F13

1,051 Victor . G 7

657 Victory Mills.

Saratoga . F 1 8

550 Voorheesville. . . .H 18

726 Waddington . A 14

5,196 Walden . K 17

3,606 Walton . I 14

222 Wampsville . F 13

3,742 Wappingers Falls. A 3

3,424 Warsaw . G 5

2,505 Warwick . B 2

635 Washingtonville. . B2

3,047 Waterford . G 19

4,343 Waterloo . G 9

29,894 Watertown.; ... D 12

1,564 Waterville . G 13

15,546 Watervliet . G 18

2,760 Watkins . H 9

5,119 Waverly . J 10

1,699 Wayland . H 7

1,439 Webster . F7

1,448 Weedsport . F 10

478 Wellsburg . J 10

4,595 Wells ville . 16

1,587 West Carthage,

Jefferson Co.. . C 12

3,319 Westfield . Hi

2,330 W. Haverstraw,

Rockland . B 3

716 Westport . C 19

530 West Salamanca,

Cattaraugus .... I 3 788 West Winfield ...G14

4,666 Whitehall . E 19

22,465 White Plains . C 4

2,493 Whitesboro,

Oneida . F 13

760 Whitney Point ...I 12

1272 Williamsville . G 3

741 Wilson . F 3

665 Windsor . I 13

1,346 Wolcott . F 9

352 Woodhull . J 7

409 Wurtsboro . A 2

99,838 Yonkers . C3

1,086 Yorkville,

Oneida . F 13

571 Youngstown . F2

western part oi the State, enters the Mississippi through the Ohio River. There arc a number of tails and picturesque gorges in the Genesee River in the vicinity of the points where the stream breaks through the terraces. In the Adirondack region there are a number of beau¬ tiful lakes, the waters of which are remark¬ ably clear. Lake George (q.v.), on the south slope of the mountains, is famous for its scen¬ ery and the points of historic interest sur¬ rounding it. Lake Champlain (q.v.), on the eastern boundary, together with Lake George, belong to the Saint Lawrence River Basin. In the central part of the State are a number of lakes, long and narrow, which are called the finger Lakes. The largest are Cayuga and Seneca, about 40 miles long, and from two to four miles wide. Oneida (q.v.) Lake is nearly circular in form. Lake Chautauqua, in the western part of the State, 1,212 feet above sea- level, is the highest navigable body of water east of the Rocky Mountains. The waters of this lake enter the Mississippi although it is only nine miles from Lake Erie. The most noted water-falls and natural curiosities in the State are Niagara Falls, in Niagara River, 2,900 feet wide and 160 feet high; Portage Falls, in Gene¬ see River, consisting of two falls, of 70 feet and 110 feet, and a series of rapids 150 feet; Gene¬ see Falls, in Genesee River, at and below Rochester, consisting of three falls, of 96 feet, 25 feet and 84 feet, within a distance of two and a half miles; Trenton Falls, in West Can¬ ada Creek, Herkimer County, consisting of five cascades with a total fall of 200 feet in half a mile; Taughannock Falls, in Tompkins County, 230 feet; Chittenango Falls, in Chittenango Creek, Madison County, 136 feet; Lyon Falls, in Black River, Lewis County, flowing down an inclined plane 63 feet, at an angle of 60 de¬ grees; Kaaterskill Falls, Greene County, con¬ sisting of two falls, 175 feet and 85 feet; Baker's Falls, Washington County, consisting of a suc¬ cession of falls and rapids, having a total des¬ cent of 76 feet in 60 rods ; Cohoes

Falls, in the Mohawk, near its mouth, with a total fall in¬ cluding rapids, of 103 feet; Glens FalL, War¬ ren County, 50 feet; High Falls, in the Hudson, Warren County, 60 feet; High Falls, Ulster County, 50 feet ; the Ausable Falls, in Wilming- ton, Essex County, 100 feet; Enfield Falls, Tompkins County, consisting of a series of cas¬ cades with a total fall of 230 feet; Buttermilk Falls, Genesee County, 90 feet; and the falls in Fall Creek, Tompkins County, consisting of five falls with a total descent of over 500 feet in a mile. In East Canada Creek, about two and a half miles from its mouth, is a series of cascades and rapids having a total fall of 75 feet in 80 rods. Upon Stone Bridge Creek, Warren County, is a natural bridge 40 feet high, 80 rods broad and 247 feet long. Dover Stone Church, Dutchess County, is a ravine 25 feet wide at the bottom, one to three feet wide at the top, about 40 feet long and 40 to 50 feet high. Near Kyserike, Ulster County, is a cave which has been explored one and one-half miles from its entrance. On Black River, at Lyons Falls, are the <(Pictured Rocks® ; and in Onon¬ daga County are the ((Cratean Lakes® and ((Green Lakes.®

Geology. — Nearly all the gelogical forma¬ tions are present in New York. The Archaean L represented in the Adirondacks and the High¬

lands of the Hudson, by gneisses, granites, an¬ cient crystalline and metamorphic rocks. Pots¬ dam sandstone of a kind which denotes ex¬ istence in the Cambrian Age is on the north¬ east and west of the Archaean area of the north. The lower Cambrian rock shows in a narrow strip extending south from the head of Lake Champlain and in the vicinity of Lake George. The palaeozoic constitutes four-fifths of the State and is represented by schists, slates, metamorphosed rocks in the east and by massive and hard sandstones in the Catskills. The palaeozoic is represented by the Cambrian, Silurian and Devonian periods. The Adiron¬ dacks, Highlands and lands west were above sea-level in the Silurian period, but the area of the State west of this uplift remained sub¬ merged into the Devonian period. TheTriassic and Jurassic are represented by Newark sand¬ stones and shales, in Rockland County; and the Pleistocene, by glacial drift, and lacustrinea and estaurine clays cover a great part of the State. The Pleistocene ice-sheet covered the entire State and accounts for many of the peculiari¬ ties of the topography.

Mineralogy. — The chief minerals of New York State are salt, iron ore, sandstone, lime¬ stone, fire-clay, marble, granite, slate, gypsum, petroleum, talc, mortar colors, natural gas and cement. The salt output of Michigan exceeded that of New York until 1893, since which year New York has ranked first^as a salt-producing State. Gold in small quantities has been found in the Adirondack region, and natural gas is found near Lake Erie. Coal does not seem to ejjst in the State, although found in large quan¬ tities not far south of the boundary. The Cats- kill and Potsdam sandstone,

the Hudson River bluestone and most of the limestone are val¬ uable for building stone. The greatest deposits of hematite and magnetite are found in the Adirondack region. Rock salt is found south of Lake Ontario in the vicinity of Warsaw. The mineral springs exceed in value any other State except Wisconsin. The principal mineral and medicinal springs are the salt springs of Onon¬ daga County; Saratoga Springs; New Lebapon and Stockport, Columbia County; Massena, Saint Lawrence County; Richfield, Otsego County; Avon, Livingston County; Clifton, Ontario County; Sharon, Schoharie County; Chittenango, Madison County, and Alabama, Genesee County.

The latest available report gives as the principal mineral productions of a year : Salt, 11,095,301 barrels, valued at $3,011,932; gypsum, 516,002 short tons, valued in crude and manufactured form at $1,261,200; petroleum, 928,540 barrels, valued at $1,476,378; talc, 69,514 short tons, valued at $576,643; metalic paint, 4,925 short tons, valued at $45,050; Port¬ land cement, 5,219,460 barrels, valued at $4,- 175,528; natural gas, valued at $2,085,324; limestone, valued at $3,177,700; building brick $5,040,306; pottery, $3,064,274; other clay prod¬ ucts $2,234,804; building sand, $1,185,812; other sand and gravel, $1,065,133; iron ore, 944,403 long tons, valued at $2,970,526; sand stone, $890,411; mineral waters, $745,530.

Climate. — The climate of the State, as a whole, is continental; but that of Manhattan Island, Long Island and Staten Island is modi¬ fied by the ocean. The average maximum tem¬ perature for the State is 100°, and the minimum

is a little below zero. The Adirondack region, north of the highest point, or on the northern slope, is the coldest, having the longest and most severe winters. The mean temperature for Jan¬ uary is, in the Adirondacks, 15 J; on the coast 30°; in the western part 26°. The mean^tem- perature for July, in the Adirondacks, is 64° ; on the coast 70°, and in the western part 72°. The rainfall is copious, averaging for the eastern part of the State about 50 inches and for the western part 40 inches. The State is remark¬ ably free from malarial conditions. The Adi¬ rondack region is noted for its freedom from conditions inducing tuberculosis.

Flora.— New York State was a densely wooded region prior to and during the earl}' Colonial Period. As shown under the indus¬ trial interests of Forestry (q.v.), all the varie¬ ties of trees are found common to the

latitudes in which the territory lies. The Adirondack and Catskill mountains are still covered with spruce, white pine and hemlock, while maple, birch, beech, basswood, ash and elm are found in lesser quantities and larch and cedar in the lake and marshland of the regions. In the western part of the State the more common trees besides pine are the hardwoods — oak, chestnut, maple, beech and hickory, — while tulip, walnut, locust, sycamore, poplar and but¬ ternut are widely spread. In the hill and moun¬ tain regions, laurel, rhododendron and whortle¬ berry are found in profusion and shrubs of the lower plains are sumac, elder, hazel and sassa¬ fras. The native fruit plants include the ber¬ ries, — strawberry, blackberry, raspberry, cran¬ berry and huckleberry, — grapes, black and red cherries, red and yellow plums. The medicinal plants comprise ginseng, snake-root, wormwood, horehound, blue flag, tansy, wintergreen, peony-pleurisy or epilepsy-root, burdock, plantain and sarsaparilla. Conspicuous spring flowers are violets, buttercups, cowslips and anemones; in summer white and yellow water lilies ; and in autumn, golden rod and asters. Different species of ferns abound and over 1,500 varieties of flowering plants besides the more popular on§s here mentioned.

Fauna. — In the Adirondacks are still to be found, although in diminished numbers, the in¬ digenous animals of the wild pre-Colonial Period. The puma or panther alone has dis¬ appeared, and the lynx is seldom seen. The gray wolf and black bear occasionally appear. Deer abound in the Adirondack region and under government protection elk, moose and beaver have increased in numbers. Mink, otter, sable and red fox are trapped occasionally; porcupine, woodchucks, skunks, weasels and muskrats are common. Deer also in Long Island, raccoon, and in southern counties opos¬ sum are found, while squirrel and rabbits are prolific in all parts of the State. Nearly 400 species of fish are found in the fresh and salt waters of the State, which now are periodically replenished from the government fish stations and hatcheries. (See paragraph Fisheries). The popular song birds are the robin, chicka¬ dee, song-sparrow, warbler, thrushes, orioles, vireos, wrens, bluebird, catbird and phcebe; while occasionally the acclimated English meadow lark is heard singing above the plains of Long Island. Geese, ducks, plovers, part¬ ridge, snipe, loons, terns, rails, grebes, wood¬ cock and ruffled grouse are among wild game

birds, while pheasants in some parts of the State and quail on Long Island are liberated at certain seasons for the purpose of sport. A State game bird farm exists since 1909 near Sherburne in Chenango County. Shrikes and hawks and occasional golden eagles and bald eagles are the distinctive birds of prey.

Fisheries.— The oyster fisheries are the most productive, representing over half the total value of the fishing industries of the State. Next in value are

the bluefish, clams and men¬ haden. The most valuable fisheries are on the coast of Long Island; Suffolk County ranks first. The shad and alewives are found in the Hudson ; trout in the Adirondack lakes. The number of persons engaged in the fisheries has diminished from 1904. The State conservation commissioner, who has charge of the fishing industry, is pursuing a scientific system, looking to the preservation of the fish of the State.

Agriculture and Stock-raising. — The soil 'of two-thirds of the State is suitable for agri¬ culture, only the rocky mountain area and some sand-belts are considered so unproductive as not to be classed with agricultural lands. All the other conditions for productive farming ex¬ ist in a favorable degree. Until 1890 New York State ranked first in the value of its agri¬ cultural products ; in that year some of the Western States reached first place and the farm products of each of three of them were greater that year than those of New York. As the wheat and corn output of the West has in¬ creased, the farm products and farm improve¬ ments of New York State have decreased. The average of improved land has decreased since 1880, and the nature of the crops raised has varied. The Western wheat and corn in com¬ petition has caused the decrease of wheat and corn crops and an increase in the hay acreage. Corn for forage is increasing. The annual hay forage acreage is about half the total crop acre¬ age of the State. The acreage, production and value of important farm crops in New York State in 1916 were as follows : Corn, acreage, 540,000 acres; yield per acre, 30 bushels; pro¬ duction, 16,200,000 bushels ; total farm value, $17,820,000. Wheat, acreage, 430,000 acres ; yield per acre, 21 bushels ; production, 9,030,000 bushels; total farm value, $15,170,000. Oats, acreage, 1,206,000 acres; yield per acre, 26 bushels; production, 31,356,000 bushels; total

farm value, $19,441,000. Barley, acreage, 81,000 ; yield per acre, 23.3 bushels; production, 1,887,000 bushels; total farm value, $1,906,000. Rye, acreage, 151,000 acres; yield per acre, 18 bushels ; production, 2,718,000 bushels : total

farm value, $3,479,000. Buckwheat, acreage, 290,000 acres ; yield per acre, 12 bushels ; pro¬ duction, 3,480,000 bushels ; total farm value, $4,246,000. Potatoes, acreage, 320,000; yield

per acre, 70 bushels ; production, 22,400,000 bushels ; total farm value, $35,392,00A. Hay, acreage, 4,500,000 acres; yield per acre, 1.62 tons ; production, 7,290,000 tons ; total farm value, $86,750,000. Tobacco', acreage, 3,700 acres; yield per acre, 1,230 pounds; production, 4,551,000 pounds; total farm value, $592,000. Apples, production, 12,600,000 barrels; total

farm value, $28,350,000. Peaches, production, 1.238,000 bushels; total farm value, $1,733,200. The farm animals in 1916-17 comprised 609,000 horses with a farm value of $84,651,000; 4,000 mules, with a farm value of $620,000; 1,539,000

NEW YORK

Lower Saranac Lake, Adirondack Mountains

■

. •

‘

9|

NEW YORK

191

milch cows, with a farm value of $101,574,000; 939,000 other cattle, with a farm value of $29,- 109,000 ; 840,000 sheep, with a farm value of $/,0;)6,000 ; 759,000 swine, with a farm value of $11,157,000. The wool clips in 1916 amounted to 3,550,000 pounds, valued at $1,175,000.

High in importance of farm products is pota¬ toes. New York and Michigan are tied for first rank in the acreage devoted to potatoes, but in value of the crop New York surpasses Michigan and is in turn only surpassed by Maine. Market gardening is of considerable importance. Nearly all the farm lands of Long Island and the counties near New York City, on both sides of the Hudson, are devoted to market gardening. In 1850 the average size of farms was 112.1 acres, and in 1909, 102 acres. The farms occu¬ pied by tenants are 24 per cent of the total number. The dairy products of the State are of great importance and great value. The State ranks first in the production of milk, and second in the production of cheese. The amount pro¬ duced is sometimes greater in some of the other States, but the quality in New York is the best and always brings the highest prices. The soil, vegetable and climatic conditions and the in¬ troduction of scientific methods in dairy farm¬ ing have greatly improved the quality of the dairy products. The milk sold yearly brings on an average about $40,000,000; butter, $10,- 000,000. The dairy products bring about 31 per cent of the total income from the farms. Along the Hudson-, especially in Ulster County and in the Genesee Valley and west, there are large fruit orchards, apples predominating. In the lake region in the central part of the State grapes flourish. In production of grapes New York is

second to California. New York an¬ nually produces 253,006,361 pounds with a value of $3,961,677. Hops and tobacco are cultivated in the central part, hops especially in Frank¬ lin County. Floriculture is increasing in coun¬ ties near the city markets.

Stock holdings were as follows for the years

given :

1916

Dairy cows . 1,539, 000

Other cattle . 939 , 000

Horses . -. . 609,000

Mules and asses . 4 , 000

Sheep . 840 , 000

Swine . 759,000

1910

1,508,672

812,921

590,150

4,335

929,547

665,027

Forests and Lumbering. — The original for¬ ests of the Adirondack region were composed chiefly of white pine, hemlock and spruce; near the base of the northern slope of these moun¬ tains there were large forests of maple, birch, elm, white pine, basswood, hemlock and spruce. The hard and soft woods were also found in the southern and western parts of the State. At one time New York ranked first among the States in lumbering interests. The only forests still standing in which there is much lumbering are in the northern part of the State. Spruce and hemlock now form the principal output for lumber. The pulp wood' mills and paper mills are now using large quantities of timber, mostly spruce. The State now owns 1,814,550

acres in the Adirondack and Catskill areas, known as the Forest Preserve. This is under the control of the Conservation Commission under whose jurisdiction deputies work for the prevention of forest fires and maintain tree

nurseries from which they sell seedling trees at cost to private owners. Much of the forest land is still in the hands of private individuals and is subject to exploitation. The State has appropriated large sums to acquire some of it. New York State produced in 1914 486,195,000 feet of lumber. See Forestry.

Manufactures. — New York ranks first among the States in the value of manufactured products. The Erie Canal was a great aid in developing many of the manufacturing indus¬ tries of the State. It gave an opportunity to bring the raw material at small cost to places where there was water power, and then, still at low cost, to send the finished products to the markets. The rivers with their extensive water power have continued to hold the large share of the manufacturing even during the period when steam was the main power in many places, and now the water power is of greater im¬ portance in the development of electrical power. The enormous power of Niagara Falls is causing a remarkable increase in the output of manufactories, especially the aluminum, car¬ borundum and machinery made at the city of Niagara Falls. The great electrical plants of the State are increasing the manufacturing power; as at Schenectady, Mechanicville and other places on and near the Hudson River (q.v.) ; also at Massena (q.v.) near the Saint Lawrence River and in many other parts of the State. The agricultural and mining interests of New York State are large and important, but her great manufacturing products are not only immense in amount, but of a wide and varied diversity. According to the 1910 United States census New York has held the foremost rank in manufacturing for many years, though, since 1849, when the first authoritative census of manufactures was taken, the proportion which the State has contributed to the total value of manufactured products in the entire United States has decreased somewhat. This proportion was 23.3 per cent in 1849 and only 16.3 per cent in 1909.

In 1849 the total value of the manufactured products of New York, including, those of the neighborhood and hand industries, amounted to $237,597,249, while in 1914, exclusive of the value of the products of the neighborhood and hand industries, it reached a total of $3,814,- 661,000, or more than 16 times that in 1849. During the same period the population of the State increased 194.2 per cent. In- 1849 an average of 199,349 wage-earners, representing 6.4 per cent of the total population, were em¬ ployed in manufactures, while- in 1914 an aver¬ age of 1,057,857 wage-earners, or 9 oer cent of the total population, were so engaged. During this

period the gross value of products per capita of the total population of the State in¬ creased from $77 to nearly $400.*

In 1914 the State of New York had 48,203 manufacturing establishments, which gave em¬ ployment to an average of 1,289.098 persons during the year and paid out $873,771,000 in salaries and wages. Of the persons employed, 1,057,857 were .wage-earners. These establish¬ ments turned out products to the value of $3,814,661,000, to produce which materials cost¬ ing $2,108,607,000 were utilized. The value added by manufacture was thus $1,706,054,000, v/hich figure best represents the net wealth

created by manufacturing operations during the year.

The latest available statistics of leading man¬ ufacturing industries (census of 1910) will prove of interest. Clothing (men and women s)

— Value of output for 1909, $538,593,000; aver¬ age number of wage-earners, 189,467. The in¬ crease in the value of clothing manufactured in New York from 1904 to 1909 was $177,636,000. Textiles — Value of output, $185,780,000; aver¬ age number of wage-earners, 91,839. New York is the third State in the Union in the production of all textiles combined, of silk and silk goods, and of fur-felt hats, first in the manufacture of hosiery and knit goods and 9 carpets and rugs, other than rag, and second in that of cordage and twine and jute and linen goods. It ranks fifth in the production of woolen, worsted and felt goods and wool hats, and 11th in that of cotton goods, including cot¬ ton small wares. Millinery and ˆace goods — Value of products, $52,106,000. New York leads all other States in the Union in this in¬ dustry. Fur goods — Value of products, $41,- 301,000, constituting 73.8 per cent of the total of the United States in 1909. Printing and publishing — Value of products, $216,946,000. New York leads all the States in this industry as a whole and in each of its branches. Foundry and machine-shop products — Value of products, $154,370,000, being the second State in the Union in this industry. Lumber and timber products (including logging operations, saw mills, planing mills and establishments manu¬ facturing wooden boxes) — Value of products, $72,530,000, giving New York second rank among the States in the lumber industrv. Iron and steel works, rolling mills and blast fur¬ naces — Value of products, $66,153,000 ; average number of wage-earners employed, 12,389. The State ranks fourth in this industry. Paper and wood pulp — Value of products, $1,638,579. New York leads all other States in this in¬ dustry. Boots and shoes — Value of products,*

$48,186,000, giving the State third place among the States. Electrical machinery, etc — Value of products, $49,290,000. Tobacco manufactures — Value of products, $76,662,000, leading all States. Slaughtering and meat packing — Value of products, $127,130,000, ranking third in this industry Butter, cheese and condensed milk — Value of products, $42,458,000. New York is second in this industry, Wisconsin being first. Gas (illuminating and heating)— Value, $42,- 347,000, the State holding first rank. Furnish¬ ing goods (men's) — Value of products, $42,. 197,000. Patent medicines and compounds — New York leads J1 other States with a total output valued at $37,343,000. Chemicals — Total value, $35,346,000. Automobiles — Total value of products, $30,980,000, more than seven times the amount reported for 1904. Precious metals — Value of products, $30,825,000. Paint and varnish — Value of products, $28,559,000, the largest of any of the States. Leather New York occupies fifth place in this industrv with products valued at $27,642,000. Musical instruments — Total value of products, $33, 680,000, giving the State first place in this in¬ dustry. . .

Industrial Importance of Cities. — The fol¬ lowing table (United States census, 1910) shows the average number of wage-earners and

the value of products in many cities and towns

of the State;

CITY OR VILLAGE

New York city .

Boroughs

Manhattan. . . .

Bronx .

Brooklyn .

Queens .

Richmond .

Buffalo .

Rochester .

Yonkers .

Syracuse .

Schenectady .

Troy .

Utica .

Niagara Falls .

Albany .

Amsterdam .

Binghamton .

Auburn .

Cohoes .

‘ Jamestown .

Rome . .

Gloversville .

Oswego .

Olean .

Newburgh .

North Tonawanda .

Poughkeepsie .

Watertown .

Little Falls .

Lockport .

Elmira .

Peekskill .

Fulton .

Dunkirk .

Johnstown .

Cortland .

Port Chester .

Kingston .

Geneva .

Ogdensburg .

Glens Falls .

Middletown .

Batavia .

Hornell .

Hudson .

Mount Vernon

Plattsburg .

Corning . .

Saratoga Springs. . .

Rensselaer .

Ithaca .

New Rochelle .

Watervliet .

Ossining . . .

White Plains .

Average number of wage earners.

1909

554,002

385,358

14,434

123,883

23,891

6,436

51,412

39,108

12,711

18,148

14,931

20,030

13,153

6,089

9,861

10,284

6.823 6,497 8,209 6,789 3,633 5,741 3,817

2.259 4,344

2.824 3,299 3,291 4,211 2,138 3,647 2,055 2,799 2,756 2,589 2,356 2,122 3,281 1,526

1.259 2,774 1,733 2,007 2,183 1,302 1,207 1,049 2,074

833

763

873

735

753

356

249

Value of products.

1909

$2,029,692,576

1,388,408,005

42,680,793

417,222,770

151,680,120

29,700,888

218,803,994

112,676,215

59,333,865

49,434,615

38,164,699

37,979,986

31,199,261

28.651,913

22,825,702

22,449,057

17,114,214

15,961,022

14,830,722

14,720,240

14,423,437

14,170,682

10,412,888

10,005,443

9,928,146

9,599,776

9,150,964

8,527,416

8,460,408

8,168,450

8,067,208

7,888,183

7,867,114

6,575,664

6,573,528

6,394,624

6,243,051

5,985.738

5.153.925 4,947,976 4,876,786 4,658,240 4,400,774 3,647,630 3,506,504 3,376,415 3,137,523 3,050,410

2.336.579 2,296,089 1,919,968 1,668,724

1.668.579

1.328.925 815,789

Transportation and Commerce. — The

principal railroad systems crossing the State are the New York Central and Hudson River, the West Shore (New York, Chicago and Saint Louis), the Erie, the Lehigh Valley, the New York, Ontario and Western, the Delaware, Lackawanna and Western, the Pennsylvania and Delaware and Hudson. The great trunk lines of the country make connections with all these roads. In 1916 there were 8,534 miles of railroad in the State. The Mohawk and Hud¬ son was the first railroad in the State; it was completed and ready for operation in 1831, extended from Albany to Schenectady and was 17 miles long. About 11 years after¬ ward there was a railroad completed from Albany to Buffalo ; next came the Erie, and then the road from New York City to Albany. In 1825 the Erie Canal (q.v.) was opened, and it has been in use in the carrying trade since that time. Other canals of the State are the Oswego, the Champlain and several branches. At the general election, in November 1903, the

people voted an appropriation of $101,000,000 to enlarge the Erie Canal and this has been added to from time to time until the total is approach-ing $200,000,000. The enlarged waterways sys¬ tem of central New York is now known as the New York State Barge Canal. (See Barge Canal). The State public service commissions have general supervision of railroads, especially with reference to public safety and conven¬ ience and to any violations of the law govern¬ ing the railroads of New York. New York ranks first in the Union in foreign commerce. Its exports and imports include every variety of raw or manufactured material that enters the United States. New York City ranks as the first shinping port of the world, coming ahead of London and Liverpool. The imports for the fiscal year ending 1916 amounted to the value of $1,191,865,982 and the exports to the value of $2,332,286,213. The exports consist largely of grain, flour, cotton, tobacco, aoples and other fruits, preserved provisions, cattle and frozen meat. Most of the great railroad lines which bring merchandise from the West have their terminals on the New Jersey side of the harbor, but there are ample facilities for the transfer of goods to the docks on the eastern side by means of lighters and of barges which carry the loaded cars across. In New York Stai'e in 1915 there were 8,534 miles of railroad and 5,477 miles of electric railroad track. The canals of the State, used for commercial pur¬ poses, have a length of 638 miles, of which the Erie Canal has 340.7 miles. The commerce be¬ tween the places in New York State and other points in the Union is much greater than the foreign trade of the State. Roads (highways) built by the State or with State aid aggregated in January 1916, 6,250 miles. There were in addition 80,112 miles of rural roads in the State, 17,500 of which were surfaced. The first

State-aid Law for roads was passed in 1898, and up to 1 Jan. 1916, $96,622,498 from State and other sources have been spent on roads. In 1916 there were 317,860 automobiles in the State. For the year 1916, $17,000,000 of State funds were made available for roads. In 1915 $7,750,000 were expended by the towns and counties, etc.

Banks. — In 1782 the first bank in the State was incorporated as the Capital Bank of North America. The second bank was chartered in 1791 as the) Bank of New York. The privilege to establish a bank or the granting of a bank charter became a political favor after 1804, when the law was passed making it necessary to have the sanction of the legislature to estab¬ lish a bank or issue currency. In 1812 there were 20 banks in the State, and in 1829, 48 banks. The charters were for a specified term of years, and various means were resorted to to secure renewals. It was deemed necessary to change the laws for the establishment and gov¬ ernment of banks, and in 1829-30 a change was effected. The ˆsafety fund® method, was estab¬ lished. A board of bank commissioners was created, examinations and annual reports were established. (See Banks). The system of clearing houses, now deemed essential, began in New York City. In 1854, the first year of trial for the new system, the exchange amounted to $5,500,000,000. The total exchanges in the year 1916 were $147,180,709,461. The conditions which govern commerce and finance make the VOL 20 — 13

clearing house of New York, practically, the clearing house of the United States.

Including the national banks of this State, the combined resources of 1,583 banking in¬ stitutions under supervision was (1917) over $10,500,000,000, not considering at all the enor¬ mous resources of private banks and brokers not under supervision, especially those of inter¬ national reputation.

The statistics shown in tables on fojlowing page give valuable information regarding the growth of the banking system of the State.

Finance. — The State income is derived mainly from a tax for general expenses and for schools, 29 per cent; corporation tax, 25.5 per cent; excise tax, 17.5, and inheritance tax, 14 per cent. The first arrangement made for an income for State expenditures was the for¬ mation of a productive fund from the sale of public land. For a time the income derived from this general fund was sufficient for the support for the State government and the schools. In 1814 it was found necessary to increase the revenue, and this was done by forming another productive fund for school purposes. Later a direct tax was levied, but in 1826 this was discontinued.

A sjˆstem of public improvements was instituted in 1817, and a public debt of $7,000,000 was incurred. The Erie Canal and other public improvements in¬ creased the debt. An effort was made to meet the new obligations by a sinking fund and by canal tolls and other means. The plan of loan¬ ing State credit to private corporations, prin¬ cipally railroads, was begun in 1827. In 1842 the Erie Railroad failed with a large indebted¬ ness to the State. Other smaller creditors failed also, and this new debt, together with that of the former, amounted to $20,310,000. A tax was imposed sufficient to meet expenses, many public improvements were stopped and outside debts were funded. The constitution adopted in 1846 inserted clauses looking to a prevention of such conditions. No debt could be contracted except for war, and then popu¬ lar sanction by a referendum was necessary. A general sinking fund and a canal sinking fund were created. The constitution now in force retains the provision relative to popular sanc¬ tion by a referendum. In the year 1895 the State debt was $53,000,000. Of this amount $30,000,000 was war bounty debt. In five years the debt was reduced to $32,400,000; another decade saw it only $8,988,000; and the whole debt was canceled before 1900. In 1900 a new debt was created for improvement of the *Erie Canal. For the fiscal year 1916, the bonded debt was $211,404,660, divided as follows: Canal, $138,000,660; highway, $70,000,000; Palisades Park, $2,500,000; Saratoga Reserve, $904,000. The income at present is derived from taxes on assessable property, fees from foreign corpora¬ tions, licenses, taxes on certain public fran¬ chises, trusts and banks. For the year 1915 the expenditures were $94,902,371.71, and the reve¬ nues, $87,813,675.40.*

Insurance Statistics. — In the year 1916 there were in force life insurance policies in the State of New York to the number of 8,036,- 874, aggregating in amount $3,757,103,221. Pre¬ miums amounting to $134,321,244.60 were re¬ ceived and claims under policies amounting to $52,203,964.75 were paid. Fire insurance to the amount of $7,141,805,428, and marine and

Banks, Banking Associations and Individual Bankers.

1850

1860

1870

1880

1890

1900

*1910**

*1917**

Number .

244

306

59

68

$18,738,200

99,850,755

164

$29,539,825

254,068,296

211

$28,810,700

351,080,252

203

$34,273,000

610,142,579

212

$36,549,600

Capital .

$55,580,181

$111,834,347

$19,759,810

932,437,232

311,245,555

79,281,601

Bank-note circu-

439,303

Q H6A

lation .

27,511,787

31,759,127

37 ,553 8,058,180 61,795,773

21,146,448

177,109,131

28,308,438

238,194,498

50,637,539

519,319,671

57,618,443

Profits .

9,232,473

13,316,468

7,384,299

819,341,180

Deposits .

54,467,682

116,190,466

46,447,905

i _ rw i 5 iesO The 73 incorporated banks report capital, –

1834 and 1840, banks reporting, both safety fund and not safety fund, to the commissioners were

- *State banks only.*

Savings Banks.

1880

1890

1900

1910

1917

Number .

Resources .

Deposits .

Number of accounts open. Average account .

128

$400,944,380 00 353,629,657 00 953,707 00 $370 79

s

124

$667,865,396 40 574,669,972 59 1,477,819 00 $388 86

1 28

$1,037,869,160 34 922,081,596 26 2,036,016 00 $452 88

142

$1,676,416,322

1,526,935,581

2,886,910

$529

141

$2,172,916,413

1,991,469,146

3,452.111

$577

Private Banks. Savings and Loan Associations.

1917

1917

80

$15,505,206

10,069,544

252

$79,629,880

Resources .

Trust and Mortgage Companies.

1880

1890

1900

1910

1917

Number .

*Assets or resources . *•*

Deposits .

Surplus. . . . . .

12

*$104,707,575 41 *91,304,510 62 8,493,064 79*

32

$280,688,768 47 211,320,275 05 25,800,304 84

59

$796,483,887 12 640,837,146 35 74,506,401 87

88

$1,508,177,326

1 ,003,076,009 185,661,593

99

$3,164,170,014

2,630,085,223

183,176,027

- *Includes other liabilities.*

National Banks in New York State,

1880

1890

1900

1910

1917

Number .

Capital .

319

$85,736,060 00 16,818,677 00 340,204,504 45 693,426,072 82

295

$85,287,160 00 46,504,807 00 406,440,215 38 720,213,916 79

337

$97,322,340 00 51,355,465 00 617,656,663 39 1,322,249,445 22

449

$169,817,100

478

$175,448,000

Circulation . _ . .

Individual deposits .

Resources .

3,441,508,000

4,141,677,000

inland insurance to the amount of $5,226,33o,741 were written. In fire premiums $51,158, 90/. 53 were received and fire losses amounting to $22,988,434.87 were paid. Premiums paid for policies in casualty, credit, title and other com¬ panies amounted to $42,350,393.78 and losses paid amounted to $18,102,251.46. Assessment life and accident associations had certificates in force amounting to $69,070,038, and fraternal orders had $533,362,492. Co-operative fire as¬ sociations had in force insurance amounting to

$152,243,485.

Government. — The government of the State is administered in accordance with the pro¬ visions of the State constitution. This consti¬ tution may be amended by a majority vote of the house in two consecutive legislatures and adopted by popular vote of the people. It may be revised by a constitutional convention and the popular vote of the people. The last re¬ vision of the State constitution was made in 1894, and went into effect 1 Jan. 1895. This constitution provides for amendments and re¬ visions as stated, and that the question of a

NEW YORK

t

-

1 View looking eastward from the summit of Mount Marcy with Hay Stack Mountain in the immediate foreground Marcy is the highest mountain in the State of New York. It was called by the Iroquois Tahawus, which meant the Cloud Splitter. Around it are massed on all sides the highest summits of the Adirondacks

2 Remarkable panorama of the Mohawk valley showing the New York Central Railroad, the Barge Canal and the river. The Mohawk was the

pathway of the pioneers for a century or more before the canal was built; then came the canal and finally the railroad, both in their day great arteries of transportation

NEW YORK

The hospital buildings are to be seen in the distance.

1 State plantation near the Ray Brook Hospital on State land.

ThiS2nAeaerdtn Salamanc/ "bout ten million seedling tree plants. . This and several other New^mlf^ard" n^ar^consideredas good as there are in this or any other country. The exper, mental stage has been passed

NEW YORK

Old Pines on Ampersand Pond in the Adirondacks, near Saranac Lake. This spot was made famous as the " philosopher's camp " where Ralph Waldo Emerson, James Russell Lowell, Prof. Louis Agassiz, and other notable men, camped more than sixty years ago

NEW YORK

Mount Colden, one of the highest Adirondack summits, rising to a height of 4,713 feet in the chain of great peaks

about twelve miles south of Lake Placid

NEW YORK

195

constitutional convention and of a revision of the constitution must be submitted to the gen¬ eral vote of the people every 20 years, or more frequently if so ordered by the legislature. It provides also for a State census every 10 years. All citizens in New York State can vote, unless debarred by crimes against the law or of unsound mind. To be a citizen of New York State a man must have been a citizen 90 davs, one year a resident of the State, four months a resident of the county and 30 days a resident of the town or precinct. It is also required that voters to be entitled to vote must register, but registration for town and village elections can¬ not be made obligatory unless by express pro¬ vision of law. In the cities the holding of party primaries are regulated by law ; and the way in which votes shall be cast in all parts of the State is also regulated by law. The offi¬ cers of the government are the executive, the members of the legislature, the judiciary and their subordinates.

Executive. — The governor of New York is elected biennially, by popular vote at a general election held throughout the State the first Tuesday after the first Monday in November. He appoints a superintendent of public works, a superintendent of banks, of insurance, of State prisons, a council of farms and markets, a State architect, conservation commissioner, commissioner of highways, health commissioner and an excise commissioner. He has a veto right which may be used to prevent appropria¬ tions or other legislative measures; but the legislature may overrule the veto of the gover¬ nor by a two-thirds vote of the members of the senate and assembly. He may pardon or reprieve criminals, and he may commute a sentence. He has power to make appointments other than those mentioned subject to approval by the senate. The officials elected with the governor and for the same number of years are the lieutenant-governor, secretary of State, comptroller, treasurer, attorney-general and State engineer and surveyor. The most im¬ portant State boards or commissions are for hospitals and charities, for industry, civil serv¬ ice, public service, prisons and tax equalization.

Legislature. — The legislaiure is composed of a senate of 51 members, who hold office two years; and an assembly of 150 members, who hold office one year. The State is divided into senatorial and assembly districts. The sena¬ torial districts, being less in number, have each a much greater population than each of the assembly districts. The lieutenant-governor is president of the senate. The members of the assembly elect their own presiding officer, who is called the speaker. The populous counties are divided into two or more assembly dis¬ tricts. The members of the legislature receive a salary of $1,500 and mileage for each ses¬ sion. The legislature holds its sessions in the State Capitol at Albany.

Judiciary. — The Court of Appeals is the highest court in the State. It consists of the chief justice and six associate justices, each chosen by a popular vote and for a term of 14 years. Additional associate justices may be designated by the governor from among the Supreme Court justices to help out with in¬ creased business. There are 107 judges be¬ longing to the Supreme Court, each one of whom is chosen by popular vote for 14 years.

The State is divided into nine judicial districts. Other courts provided for by law are County Courts, City Courts, Surrogate's Courts, Jus¬ tice's Courts.

Local Government. — The incorporation of villages, chartering cities and organization of counties is within the jurisdiction of the legis¬ lature. The legislature decides the limit of taxation and assessment for incorporated vil¬ lages and cities and restricts their power of borrowing money. Any special legislation for a city or the cities of the State shall be sub¬ mitted to the cities concerned for their ap¬ proval or rejection; but the legislature

may later overrule the veto of the city. Cities are divided, according to population, into three classes. The first class includes cities having a population of 175,000 or more; the second class includes cities having a population of over 50,000 and less than 175,000; the third class in¬ cludes all other cities in the State.

Militia.— – The National Guard, a portion of the State militia, is armed, equipped and ready for service at all times. It numbered 16,323 in 1916 (officers and enlisted men). The Naval Militia is also a part of the State militia and it also is ready for service at any time. It numbered 215 officers and 5,217 enlisted men. There are four brigades of the National Guard. The headquarters are in Albany.

Political Divisions. — The State is divided into 62 counties. The county officers are judge, surrogate, sheriff, clerk, treasurer, district at¬ torney, superintendent of the poor, coroners, and in some counties auditor and register. Each county, except New York, is divided into towns. The officers of the town are supervisor, clerk, commissioner of highways, assessors, collector, constables. There are 59 cities (1910), the largest of which are: New York, pop. (1920), 5,620,048; Buffalo, 506,775 ; Rochester, 295,750; Syracuse, 171,717; Albany, 113,344; Troy, 72,013; Utica, 94,156; Schenectady, 88,723; Yonkers, 100,176. The government of the cities is vested in a mayor, board of aldermen and the subordinate officials. Some cities are governed under a special charter. The villages are usually smaller than the cities and the government is administered by a president and a board of vil¬ lage trustees. There are 43 congressional dis¬ tricts ; the State sends 43 representatives to Congress. There are State parks and reserva¬ tions in the Adirondack Mountains and Cats¬ kills and others at Niagara Falls, Saratoga Springs and elsewhere. There are eight State Reservations for Indians in various parts, of the State.

Religion . — All Christian denominations and the Jews have churches and large congrega¬ tions throughout the State. Among Christian churches the Roman Catholic predominates in number of communicants and church attend¬ ance in the large cities, and Protestants in the smaller cities and country places. The Pro¬ testant denominations, according to number of communicants and attendance, rank as follows : Methodists, Presbyterians, Baptists, Protestant Episcopalians, Lutherans and Congregational- ists.

Education. — The system of education aims to furnish free schools for all the minors of the State, and in late years a system of education for adults has been organized and put into force with success. Education is compulsory

between the ages of 7 and 16 years. The an¬ nual report of the education department (1916) gives the following statistics : Attendance.. — Common elementary schools, 1,454,514; special elementary schools, 940; common high schools, 171,263; special high schools, 4,152; academies, 53,461 ; normal schools, 8,125 ; teachers training classes and schools, 4,422 ; universities, colleges and professional schools, 56,116; private schools (estimated), 275,000; Indian schools, 842; even¬ ing schools, 173,878; evening vocational schools, 27,688; trade and vocational schools, 17,861; total, 2,248,262. The number of teachers em¬ ployed in these schools were 63j954; the net value of property, $462,698,843, and the total expenditures were $100,437,082.85. The salaries of teachers in public schools amounted to $47,- 937,545.59, the average annual salary being $967.27, and the total number employed was

49,560.

Training for teachers is given in the State normal and training schools, one State col¬ lege for teachers and a large number of trainr ing classes located in different villages and cities, according to the needs of the sections asking for the establishment of such schools. The system of granting certificates or of licens¬ ing teachers is by uniform examinations. The examination division of the State education department makes out the questions, assigns the time (for State examinations, the place), examines all the papers of the candidates and decides who shall or shall not receive certifi¬ cates. Many of the cities have special rules regarding other examinations, and also the establishment and maintenance of city training schools and classes. The local educational offi¬ cer in a city and in some of the villages is the superintendent of schools. The country sections are divided into 10,319 school districts and these are grouped in 207 supervisory districts each under a district superintendent. The State education department awards annually on the basis of an examination 750 scholarships, which entitle the recipient to $100 a year, for four years, to attend any college in the State.

Cornell University (q.v.) is the only insti¬ tution of collegiate grade in the State which awards special State scholarships by examina¬ tions. Columbia University (q.v-.), founded un¬ der the auspices of the Protestant Episcopal Church, is the oldest institution of the kind in the State. Other colleges and universities are New York University, New York City; College of the City of New York; Union College, Schenectady ; Hamilton College, Clinton ; Hobart College, Geneva; Colgate University, Hamilton; Saint Lawrence, Canton; Fordham, New York City; Saint Francis Xavier, Man¬ hattan and De la Salle colleges, New York City; Vassar, Poughkeepsie; colleges and universities in Buffalo, Syracuse, Rochester and Elmira;

Barnard is affiliated with Columbia. There are 15 theological seminaries, 12 medical schools, 5 schools of pharmacy, 3 dental schools, 9 law schools. The State requires a certain degree of education before beginning the study of a profession, in a State school, and an examina¬ tion is given at the end of the course to deter¬ mine fitness and ability for graduation. The New York State Library claims to be the first public library in the State; it was founded in 1700. See Libraries; Regents.

Charitable Institutions.— The governor and the senate appoints a State board of charities and a State hospital commission. The duties of the board of charities are to exercise, an ad¬ visory supervision over charitable institutions, State and local, and over private institutions to which public charges have been committed. The institutions thus supervised number over 500, and the number of inmates in these msti- tions is about 60,000. The office of fiscal super¬ visor of State charities was created by chapter 252, Laws of 1902. He is appointed by the gov¬ ernor subject to confirmation by the senate, and has the general supervision over the accounts and expenditures of the charitable and correc¬ tional institutions of the State, which include reformatories, industrial schools, institutions, for the mentally defective, institutions for soldiers, for the blind, orphans, crippled, deformed, and treatment of tuberculosis. State charity insti¬ tution buildings are contracted for under the supervision or by the approval of the governor, president of the State board of charities and the State comptroller. Among the present State institutions are a 'house of refuge for women at Albion, a training school for girls at Hudson, reformatory for women at Bedford Hills, soldiers and sailors' home at Bath, Craig colony for epileptics at Sonyea, home for feeble¬ minded women at Newark, home for orphan Indian children at Iroquois, industrial school, Industry, home for feeble-minded children, Syracuse, home for soldiers' widows, female dependents, orphans and army nurses at Ox¬ ford, hospital for crippled and deformed chil¬ dren at West Haverstraw, school for the blind at Batavia, hospital for cases of incipient pul¬ monary diseases at Raybrook. There are schools for the deaf and dumb, and many private in¬ stitutions which receive State aid, but are not wholly supported by the State. There are sup¬ ported annually in county almshouses during a single year about 20,000 persons with a daily average of about 7,500. In city and town alms¬ houses a daily average of about 8,500 are sup¬ ported. During the same time about 390,000 receive temporary relief. The expenditures for all the institutions supervised by the board of charities for a single year are about

$23,500,000.

The hospital commission has supervision of the State insane hospitals. They are located at Binghamton, Brooklyn, Buffalo, Gowanda, Kings Park,

Middletown, New York City, Ogdensburg, Poughkeepsie, Rochester, Utica, Willard. This commission also has control over the two hospitals for the criminal insane at Matteawan and Dannemora. There are about 37,000 patients in these institutions. There are also 20 private institutions authorized by the State board to receive insane patients. The private institutions, partially under State super¬ vision, have about 1,000 inmates. The cost for maintenance and operation of .the State insane asylums or hospitals is about $7,000,000.

Penal Institutions. — The State prisons are located at Ossining (Sing Sing), Auburn, Clin¬ ton (Dannemora). The State reformatories are at Elmira and Napanoch; one for women is at Bedford. Houses of refuge for women are at Albion and Hudson. The State penitentiaries (county institutions for short term convicts) are in the counties of Albany, Erie, Monroe,

Onondaga and Westchester. New York has numerous institutions of its own. The coun¬ ties which do not have penitentiaries ar¬ range with the penitentiary of' some other county for care and support of those sen¬ tenced to such a place of detention and punish¬ ment. The following statement shows the num¬ ber of convicts in the several State prisons 30 June in each of the last six years:

PRISON	*1912*	*1913*	*1914*	*1915*	*1916*	*1917*
Aaburn .	*1,436*	*1,445*	*1,416*	*1,546*	*1,472*	*1,244*
Clinton .	*1,282*	*1,382*	*1,430*	*1,400*	*1,443*	*1,227*
Great Meadow.	*507*	*612*	*598*	*916*	*989*	*682*
Sing Sing .	*1,421*	*1,281*	*1,511*	*1,539*	*1,582*	*1,356*

The following are the expenditures of the State prisons for the year ending

30 June 1917, for maintenance and ordinary repairs :

Auburn prison . $332,874.58

Clinton prison . 294,735.95

Great Meadow . 207,629.03

Sing Sing . 334,253.03

The abolition of the fee system in many of the counties, the more general application of the law of suspended sentence, the efforts to in¬ duce prisoners to reform, all have contributed to the decrease in the number of prison inmates. The system of instruction and training employed at Elmira is resulting in practical reforms. The parole law and the indeterminate sentence are being introduced into many other prisons. Capital punishment is still in force in the State; death by electricity, since 1880, has been sub¬ stituted for hanging. Murder in the first degree is the only crime for which capital punishment is inflicted.

Population.— Since 1820 the State has held first rank in population. The State receives the majority of the emigrants of whom great numbers domicile. The number of foreign born, resident of the State in 1910, was 2,748,011, or more than double the number in any other State. The population born in the State but of foreign parents was 3,007,248. There were the same year 6,046 Indians, 5,266 Chinese and 134,191 negroes. The urban population has increased and the rural has decreased. In the decade from 1890 to 1900, the rate of increase in population for the State was 21.2 per cent; the rate for the same year for the whole United States was 20.7 per cent. From 1900 to 1910 the rate of increase was 25.4. Pop. (1800) 589,051; (1810)

959,049; (1820); 1,372,111; (1830) 1,918,608; (1840) 2,428,921; (1850) 3,097,394; (1860)

3,880,735; (1870) 4,382,759; (1880) 5,082,871; (1890) 5,997,853; (1900) 7,268,012; (1910)

9,113,614; (1920) 10,385,227.

History. — As the credit for the discovery of America belongs to one Italian, Christopher Columbus, the protege of the far-seeing Queen Isabella of Spain, the credit for the discovery of New York is linked with the name of another Italian, Giovanni da Verrazano, the Florentine, in the service of Francis I of France. Ver- razano's ship, La Daupliine, which left Dieppe with several others in the autumn of 1523, un¬ questionably sailed by

Sandy Hook in the mid¬ dle of April 1524; proceeded as far as Raritan Bay, when by stress of weather Verrazano was forced to return to the open sea and continue his journey to the eastward. While Spain's discovery of the continent antedated the French discovery of New York by 42 years, the

French navigators anticipated the Dutch on the same lines by 85 years. The English who were the last to arrive had no part in dis¬ covering any of the land which is now known as New York, although eventually they con¬ trolled the entire territory from Florida north¬ ward.

French enterprise early determined the im¬ portance commercially and politically of the New World, although handicapped by the fierce civil wars that raged from 1560 until the acces¬ sion of Henry IV in 1594. The year made memorable by the Edict of Nantes, 1598, which secured freedom of worship for the Protestants, the Marquis de la Roche obtained a commis¬ sion to conquer Canada. His expedition was a lamentable failure. Five years later De Monts, who had been commissioned governor of Aca¬ dia, brought a number of colonists to Port Royal, subsequently called Annapolis by the English, but after two years of hardships the settlement was abandoned, the pioneers return¬ ing to France. De Monts' commission, which had been revoked, was revived by a company of French merchants who entrusted their fortunes to Samuel de Champlain, a man who by educa¬ tion, ability and perserverance was thoroughly competent to execute the responsible trust com¬ mitted to him. What William Penn was to the English court, that was Champlain to the French king, Henry of Navarre. He was a soldier and sailor of fortune; a sincere and devoted Chris¬ tian. To him must be accorded the imperish¬ able honor of being the first man who set his foot in New York, as he was the first to teach religion to the Iroquois. In 1608 he founded the city of Quebec. The 12 years' truce which acknowledged the sovereignty and inde¬ pendence of the Netherlands by Philip II after their long and sanguinary struggle for liberty marked the beginning of a historic era in the New World. Qn the evening of 29 July 1609, Champlain at the head of a band of Montagnais Indians encountered a war party of Iroquois on the west bank of Lake Champlain near Ticon- deroga in Essex County. The next morning the unfortunate Iroquois were introduced violently to gunpowder and the white man's sway and the white man's way opened on the Western Hemisphere.

On 3 September following, Hendrik Hudson sailed into New York Bay on the 80-ton ship Half Moon, with a crew of 18 men, half English and half Dutch. Hudson's son accompanied him. Hudson was an Englishman who had twice essayed to reach far Cathay by the northwest passage. The Dutch East India Company, which was the pioneer company to take advantage of discoveries of new territory and whose powers were elastic for the coloniza¬ tion of new empires and the government thereof, persuaded

Hudson by the offer of a seductive pecuniary inducement to lend his ability and fearlessness as an explorer to their enterprise. Accordingly on the fourth day of April 1609, he sailed from Amsterdam to seek for the third time the passage to India by the north. Again he was thwarted by gigantic icebergs and im¬ passable seas of frozen ice which blocked his way. He changed his course to the westward, passed Greenland and Newfoundland, and sailed south until he descried the promontory of Cape Cod. He designated the region beyond it New

Netherlands and for a long time the Dutch con¬ sidered Cape Cod as the northeast boundary line of their territorial possessions. Continuing on his way, Hudson made Chesapeake Bay, but from letters which he had received from John Smith he understood his countrymen were in possession by right of discovery. He put about and headed to the north. He discovered Dela¬ ware Bay and river which he christened the Dutch South River. He fixed the southern boundary of New Netherlands from that point. On the second of September the Highlands of Navesink appeared over the horizon to the north. For a week Hudson loitered in the vicinity of Staten Island, which he named • an object of' curiosity to the Indians as his ship was of wonder to them. September twelfth Hudson sailed into the Upper Bay and de Groote River, which was called by the natives Shate- muc or Mohicanituck, subsequently the North River, in contradistinction to the South and the East, and eventually the Hudson River in honor of the distinguished explorer who discovered it. Hudson had explored the neighborhood from Sandy Hook to Amboy, indulged in amiable converse with the aborigines and proceeded on his course in search of the northwest passage to India by the way of the Hudson River. It was only after 11 days' sail when he reached the end of navigable waters that he was com¬ pelled reluctantly to abandon the undertaking. With a deep feeling of disappointment he turned the prow of the Half Moon to the southward. The reports of his success, however, were for¬ warded to Holland and stimulated further enter¬ prises in the way of exploring and coloniza¬ tion while Hudson was detained at Dartmouth, England, whither he had put in, owing to the threatened mutiny of his crew.*

The following year the fur merchants of Holland dispatched another vessel to the River of the Mountains, which for the time was called the Mauritius after Prince Maurice, the stadt- holder. In 1611 Hendrik Christiaensen of Cleves sailed for the same destination and returned with two young Indians, the sons of a Man¬ hattan chief. In 1612 three Amsterdam mer¬ chants, Hans Hongers, Paulus Pelgrom and Lambert Van Tweenhuysen,

sent two ships, the Fortune and the Tiger, to open up trade along the Hudson River. The Tiger was accidentally burned at Manhattan Island and Adriaen Block, its commander, during the winter of 1613-14, built a new vessel, the Onrest, of 18 tons, the first to be constructed on Manhattan Island.

Two settlements had already been started in what is now the State of New York; one by Christiaensen on Castle or Patroon's Island, on the west bank of the Hudson, a mile or two south of the present Albany, called Fort Nas¬ sau ; the second on Manhattan Island, covering the space midway between the Battery and Rec¬ tor street on the west side of Broadway. Block in the meantime had sailed away to the east¬ ward in the vessel he had built, discovered the island which bears his name, drew a map of all the region and in consequence secured from the States-General a charter for the <(New Neth¬ erlands Company® under which he enjoyed the monopoly of trade in that region until 1C21 , when the charter expired. In the latter year the Dutch West India Company came into exist¬ ence, with a charter granted by the States-

General of Holland. Two years later additions were made and an act of amplification given. Under this charter, which was to endure for 24 years, the company was permitted to trade with the West Indies, Africa and (

The colony "boomed® from the beginning and the stock of the West India Company sailed upward. Under "the Freedoms and Exemp¬ tions® Act, adopted in 1628, the company gave authority to every person who should send over a colony of 50 souls above the age of 15 years, the title of "patroon® and the privilege of select¬ ing tracts of land, except on Manhattan Island, eight miles in length along the river and as far inland as he pleased. It was obligatory for the patroon to be a member of the company. He was looked upon as a feudal prince. His pos¬ sessions were exempt from taxation for 10 years. The colonists were prohibited from manufacturing woolen, linen or cotton cloth. Under authority thus conferred Kiliaen Van Rensselaer of Amsterdam, a diamond and pearl polisher, obtained, through Sebastian Jansen Krol, who had come out with Jan Huyck two years before as "a consoler of the sick,® a tract of land 20 miles in length, from Baeren Island to Smacks Island, and 24 miles on either side of the river <(stretching two days' journey into the interior,® constituting the greater part of the present counties of Albany, Rensselaer and Columbia. Michael Pauw purchased from the Indians Staten Island and the land upon which Jersey City and Bayonne are now built. With the development of the land and trade the in¬ evitable occurred. The patroons practically be¬ came rivals of the West India Company in the fur trade. As the business of the latter diminished the wealth of the former expanded. Minuit, unable to readjust the differences, was recalled. For two years the

office was vacant. It was then filled by Wouter Van Twiller, a name that has been rendered synonymous with farce, burlesque, contempt and arrogance. Van Twiller had married a niece of Van Rensselaer and war • an administrator of fair parts. He began the construction of a new fort; he built the first church edifice; a bakery; a brewery; he substituted brick for frame houses and new wind¬ mills for old. But his plans failed to mature because of his peculiar disposition. Dominie Bogardus, who had accompanied him to this country in the same ship, stigmatized him as <(a

child of the devil® and threatened to <(shake® him (

The first English flag seen in the vicinity of New York floated from the vessel commanded by Capt. Samuel Argali, the roving buccaneer, who in 1612 had captured Pocahontas and held her as a hostage for the good behavior of her father. Argali had been dispatched in 1614 on an extraordinary expedition by Sir Thomas Dale, governor of Virginia, to dispossess the unfortunate French people who had settled at Acadia. On his return from this successful buccaneering expedition, Argali paid his re¬ spects to the Dutch. He proceeded up the Hud¬ son River to Albany, forced a surrender in the name of the English king, and sailed away. New Amsterdam likewise submitted to Argali's demand, but as soon as his vessels disappeared through the Narrows, the Dutch flag replaced the English ensign as had been done at Albany. In 1633, Jacobus Eelkens, the Dutch commis¬ sary at Fort Orange, brazenly attempted to establish English trade on the Hudson, but the scheme was crushed at its inception. The New Englanders were not satisfied with their pos¬ sessions but coveted the more prosperous settle¬ ments of the Dutch to the westward. In 1638 Kieft had issued a prohibition against the Eng¬ lish trading at Fort Good Hope near the present Hartford, which had been built in 1623. Shortly afterward, owing to the insolence of the English, an order in council was issued, to strengthen the post, to maintain Dutch supremacy. We first hear of English settlers in New York in 1640 on Long Island. They had crossed the Sound from Connecticut. When the English audaciously confiscated land, near Fort Good Hope, which the Dutch had prepared for plant¬ ing and brutally chastised farmers who tried to plant, Kieft threw a detachment across the Sound in retaliation and dispersed an English settlement at Oyster Bay.

But Kieft found more trouble on his hands. The Indians of New Jersey betrayed signs of restlessness toward the governor of New Neth¬ erlands ; he was threatened by the Swedes at the south; he realized the

unfriendliness with which the Cavaliers of Virginia, Maryland and Dela¬ ware regarded his colony; he could expect no favors from the Puritans on the east. At this crisis he unwisely provoked a quarrel with the Indians by demanding tribute in maize and fur on the ground that the Dutch had supported them in defense of their enemies. From the day

Champlain introduced gunpowder to the sav¬ ages on Lake Champlain, the red man of the forest had sedulously and successfully culti¬ vated its acquaintance. So that when Kieft imprudently attempted to suppress the sale of guns and their accessories to the Indians, tur¬ bulence broke loose along the New York fron¬ tier. For three years the bloody strife continued, during which the Dutch in New Amsterdam were driven for protection under the guns of the fort and were reduced to much distress by the aggressive operations of the Manhattans, from the north, the Long Island Indians from the east and Delawares from the south and west, Roger Williams brought about an interview be¬ tween Kieft and the sachems, but the peace which followed was of brief duration, for hostil- ties were resumed more savagely than ever be¬ fore the end of the year. The Indians were bent upon a war of extermination of the whites. They felt their power, the force of their num¬ bers and were thirsting for revenge. ((When you first came to our shores you were destitute of food® exclaimed a sachem before a treaty council. (

In 1643 <(the first germ® of our Federal Con¬ stitution was planted by the formation of a league for self-government and common defense by the colonies of Massachusetts, Plymouth, New Haven and Connecticut. For the time it was a powerful organization. To it, Kieft ap¬ pealed in vain for aid, to carry on his Indian war. The confederacy was organized as much to make aggressions upon the thrifty Dutch as for defense against the Indians. Matters were going badly for Kieft until he solicited the support of Capt. John Underhill, a valiant warrior, under whose skill and energy an able-bodied force was raised, which encountered and defeated the Indians in several pitched battles. Peace was eventually assured in 1645 through the intervention of the Iroquois. Kieft failed to profit by the lesson. The act that led to his recall was the most infamous in Dutch colonial annals. Without the slightest provocation, he crossed to the west bank of the Hudson, with the soldiers from the fort, a mob from the streets and privateersmen and sailors from the harbor. Under cover of darkness he fell upon a band of peaceable and unsuspecting Indians at Pavonia and massacred men, women and children indiscriminately. Kieft left for home with a fortune. The ship was wrecked off the coast of Wales and governor and fortune went down together.

We now come , to the much misrepresented and misunderstood Petrus Stuyvesant who arrived at New Amsterdam 27 May 1647, two years after

his appointment as director- general. Stuyvesant was the son of a Friesland clergyman, who had been educated to the army and navy as well, had lost a leg in the attack on the Portuguese island of Saint Martin and wore as a substitute a wooden one, that was girdled with silver bands. He was 45 years of age, overbearing in manner, autocratic in speech, prompt and decisive in action and a devout churchman. He conscientiously attempted to carry out the instructions that directed him to guard against aggressions on the colony's boundaries, to preserve peace with the Indians

and to stimulate the growth of villages by the colonists. He found the colony much out of re¬ pair and the colonists next to demoralized. The dominating spirit that pervaded the West India Company and all that were connected with it, to the colonists themselves, was personal gain. New Amsterdam and Fort Orange, or Aurania as it was sometimes called, were flooded with an aggregation of unscrupulous merchants and traders, who robbed the Indians on one side and their customers on the other. The example was established by succeeding directors-general and the plain people emulated that example. Stuyvesant inherited the turbulence and the dis¬ satisfaction left by his predecessor and struggled with it courageously and with a hand so firm as to incite unpopularity among many of whose plans he thwarted. A year before his arrival, Kieft had served notice on New England that the English (

In the meantime internecine quarrels aroused all the choler and tyranny in his nature. With¬ out funds, the internal improvements he had in contemplation could not be carried out. He had seen how Kieft had quarreled with his (

corporated; a year later the palisades were constructed to the north of the present Wall street from the East to the North River; four years later citizenship was created and the city was surveyed, streets were regulated and named and several of them paved.

• Under Stuyvesant's administration religion was encouraged and fostered. As early as 1626, Sebastian Jansen Krol and Jan Huyck who had originally sailed to the country as <(consoiers of the sick® are found, on the Sabbath reading texts out of the Scripture and the creeds to per¬ sons who would attend. Two years later, in 1628, Michaelius, a minister of the Reformed Church, organized the first Dutch church in the New Netherlands with 50 communicants. In 1633 arrived Everardus Bogardus who sailed to this country on the same vessel with one gov¬ ernor, Van Twiller, to return

home on the same vessel with another, Kieft, only to meet his fate at sea. His quarrels with both have become his¬ torical. Along in 1640 Dominie Johannes Mega- polensis preached in the church which Kieft had built within the fort, before proceeding to his charge at Fort Orange, the present Albany. The Rev. Johannes Backerus, formerly a clergyman at Curagoa, in 1647, superseded Dom¬ inie Bogardus in the' pastoral charge of the Dutch church. New York had not escaped the wave of religious intolerance that had rolled over Europe during the preceding half century. An ordinance was adopted by the Dutch in 1640 that prohibited the exercise of all other religions except the ((Reformed as it is at present preached and practised by public Authority® in the United Netherlands. The following year, however, this bigoted mandate was temporarily revoked. Father Jogues, the first Catholic mis¬ sionary to New Netherlands, found that the colony harbored Catholics, English Puritans, Quakers, Lutherans, Anabaptists termed (

The outbreak of war between Holland and England called in play all of Stuyvesant's great ability as an executive officer. The city was put in a state of defense. He had established the city of New Amsterdam and appointed the burgomasters, the schepens and fiscal. He now attempted to adjust affairs with New England but in vain. Indian outbreaks excited the colony for several years. An uprising near New Netherlands was followed by massacres, at Pavonia, Hoboken and Staten Island. In three days 100 Dutch colonists were killed, 150 were taken prisoners and a financial loss of 200,000 guilders, $80,000, was sustained. Devastations at Esopus and the destruction of Wiltwyck were not the least disturbing problems he en¬ countered in dealing with the Indians.

meantime the villages of Jamaica and J\ew Haerlem had been created; a municipal court was established at Esopus, known as Wilt- wyck ; Arendt van Curler, long loved and trusted by the Indians as «Corlaer ," had pur¬ chased the great flats at Schenectady and the colony was spreading forth like a blossoming plant, north, west and southwest of Albany.

The aggressions of the <(malignant English" had been a source of annoyance to the Dutch lor years. Cromwell at one time threatened to seize New Netherlands. In 1657 the commis¬ sioners of the United New England Colonies conceded Oyster Bay and Huntington to the jurisdiction of New Haven and three years later Huntington and Seatauket. In 1662 Con¬ necticut laid claim to Westchester in spite of provisional treaty. Charles II had granted to the younger Winthrop Massachusetts Bay, in¬ cluding

Connecticut, and to his brother James, New Netherlands; the fact that a great part of this territory was not his to give, but belonged to the Dutch, was not included in the considera¬ tion in the least. About this time John Scott appeared on the scene. He produced orders for the stringent enforcement of the British navi¬ gation laws in the colonies, claimed that Long Island belonged to the Duke of York and pro¬ ceeded to place the English Long Island towns under one organization, of which he was elected ˆpresident." When he attempted to seduce the Dutch towns he encountered the strong arm and the stubborn will of the director-general. The contest was acrimoniously conducted, was protracted and only ended by the appearance, 29 Aug. 1664, in the bay, of the English fleet under Col. Richard Nicolls, who had been or¬ dered by his royal master, the Duke, to take possessio-n of the Dutch province, to reduce the Dutch to entire obedience, ((to put them out of capacity of doing such mischief" as they had perpetrated in other quarters. It was repugnant and mortifying to Stuyvesant's courage to sur¬ render his charge without firing a shot and, like a soldier of high spirit, he prepared to make determined resistance, in spite of the appeals of the city authorities and the clergy. <(I would much rather be carried out dead," he exclaimed. Stuyvesant appealed in vain for help and for several days cleverly delayed the inevitable. He only yielded when Nicolls entered the harbor with his ships and an overpowering force, and he regretfully signed the articles of capitulation that had been agreed to by the magistrates. On 3 September, New Amsterdam became New York in honor of the Duke, the name of the fort was changed to James, also in honor of the Duke, and three weeks later Fort Orange surrendered and was called Albany, in honor of the Duke. One of the inconsistencies conspic¬ uous in the seizure of New Netherlands by the English is that at the time peace prevailed be¬ tween England and Holland.

The province received the name of New York. Its population was estimated from 6,000 to 10,000 souls. Municipal officers continued in power, but no more elections of magistrates were to be held by the people. Stuyvesant had insisted upon the guaranty of property and civil rights and freedom of worship — the Church of England service to be held in the Dutch church at New York upon the termination of the serv¬ ice of the Reformed Church. Court proceed¬ ings were to follow English models. The

province felt the direful effects of the next 10 years of European wars. On 30 July 1673 with war under way between Holland on one side and France and England allied, a Dutch fleet under Cornelis Evertsen and Jacob Benckes suddenly appeared off Staten Island. Capt. John Manning, in the absence of Gov. Fran¬ cis Lovelace, who had succeeded the Duke of York's personal, representative, Colonel Nicolls, was not disposed to offer resistance, for his soldiers refused to fight and his own people spiked his guns. He surrendered, and the name of New York was temporarily

changed, and that of the fort to ((William Hendrick." Anthony Colve was proclaimed governor of the province. Under the treafy of 1674 New York was restored to the English. Sir Edmund Andros, an intelligent and wise officer, was ap¬ pointed governor. In 1678 he describes the province as containing 24 towns or villages with 20 churches, specifies its products and exports as provisions, tar, furs and lumber, fixes the value of estates of £150,000, and the number of men capable of bearing arms at 2,000. Under his regime the Navigation Act was enforced; friendship with the Indians was cultivated to neutralize the influence of the French; a classis of the Reformed Church was established 1679 in New York to ordain ministers, and the gov¬ ernor endeavored to individualize New York as <(the most English in sentiment of the Amer¬ ican Colonies." Owing to disputes with New Jersey, complaints were filed against Andros with the home authorities. He was recalled, and exonerated; in 1688 he returned under a viceregal government to consolidate the North¬ ern colonies. In the interim the office had been filled by Thomas Dongan, an Irish soldier, a Catholic and a discreet and conservative leader. He brought instructions to issue writs for an assembly; and the people now saw in reality the culmination of hopes began during Stuy¬ vesant's time — the possibility of popular fran¬ chise. Accordingly 17 Oct. 1683 the representa¬ tives of the people of New York met for the first time in assembly in New York City. The sessions continued until 3 November. It was ordained that assemblies should convene tri- ennially. In 1685 a charter was granted to New York and in 1686 to Albany. The hopes of the colonists for better things were dashed to the ground ; the assembly promised by the Charter of Liberties and Privileges never con¬ vened, for in February 1685, Charles II died, his brother James the Duke ascended the throne and as James the King repudiated the acts of James the Duke; the charter was vetoed, and the assembly abolished. Dongan had fallen under the royal displeasure by his failure to push forward the doctrines of the Church of Rome and was recalled.

Governor Andros was in arrest at Boston when the news arrived that James had been dethroned and the lieutenant-governor, Francis Nicholson, lacked energy and decision for the crisis. People moreover distrusted him. Wild and exciting rumors were abroad in the land. Stories were circulated that the Catholics were to join hands with the French and overturn the existing order of things. Jacob Leisler was a prosperous merchant and captain of one of the train bands. He had been born at Frankfort and had seen service in the German army. The people turned to him. But the three councillors

remained loyal to Nicholson. Leisler and his friends, fearful of the intrigues of the Catholics, proclaimed William of Orange, king. Ten mem¬ bers of the assembly were appointed by Leisler as a committee of safety, and Leisler was de¬ clared by them to be governor. He carried his authority with a high hand. He usurped the functions of the lieutenant-governor and claimed the title; he opened letters addressed to Nicholson and arrested and imprisoned those who refused to obey him. When French inva¬ sion upon the destruction of Schenectady in 1689 was imminent, he displayed great energy declared himself as the acting governor and forced recognition from Peter Schuyler, mayor of Albany, who had resisted the authority of Jacob Milborne, son-in-law of Leisler, whom he dispatched up the Hudson with an armed force to subdue the thriving city. On the strife between Leisler on the one side and Capt. Richard Ingoldesby and Col. Henry Sloughter, who had been appointed governor by William and Mary on the other ; on Leisler' s imprudent actions, it is not necessary to dwell. Eventually he was forced to submit. Pursued by vindictive enemies, he and Milborne died as martyrs. Sloughter, stupefied with rum, signed their death warrants and they were hanged near the site of the present World building in New York City 16 May 1691. Leisler was unquestionably a sincere but misguided man. Four years later Parliament reversed the attainder of Leisler and his associates. Lord Bellomont, afterward the enlightened governor of the province, declared that Leisler and his son-in-law were (

The history of the province for the follow¬ ing 84 years is conspicuous for brawls between the governor and the assembly; for efforts to disseminate the doctrines of the Episcopal Church and to weaken the influence of the French and of the Catholic Church; to develop the land and the fur trade; to increase the growth of the towns; to preserve peace with the Indians; to cultivate privateering, and to wink at piracy; to reconcile differences with neighboring colonies. Much depended upon the sincerity, honesty and integrity of the governors. In the whole line of administrators from Nicolls to Tryon, under English rule not more than three governors can be cited in whom those three traits can be found. The governor's power was absolute. He not only made the laws but interpreted and executed them and when necessary unmade them. He usurped the prerogatives of the assembly and of the courts , his council were mere automatons who danced when he pulled the string. No act of the as¬ sembly was placed on the statute book without his signature, and no decision of the court was valid until he, as chief justice, passed judgment , and in this respect he exercised powers denied to the king for his majesty, while permitted to sit on the king's bench, was prohibited from expressing judgment. Time and again the gov-ernor was threatened with removal ; now and then charges were preferred against him and once the grand jury was urged to indict him for high treason. It is a sad commentary on the record, that every colonial governor

who took office poor left office a wealthy mam There were three notable exceptions, the Irish earl, Lord Bellomont; Robert Hunter, the friend of Addison and Swift, and William

Burnet, son of the bishop of Salisbury. The province had already become the haven of the persecuted of foreign countries Between the vears 1678 and 1696 the population of New York City had nearly doubled — from 3,400 to 6 000 that of the province had increased to nearly 30,000. The infamous practice of trans¬ porting felons to America and the degrading slave trade produced the most pernicious effects upon the cause of labor, stamping it with the stigma of disgrace in the one instance and involving a contraction of wages in the other.*

Under General Hunter was tried the experi¬ ment of colonizing the Palatines. The scheme originated with English politicians who saw in it a vast profit in developing the British com¬ mercial resources, at the same time menacing French supremacy by strengthening the fron¬ tiers Settlements were established first at Livingston's Manor, and subsequently along the ˆlohawk and in the Schoharie region. I he experiment involved a loss of £100,000 to its

projectors. .

In 1732 occurred the memorable struggle between Rip Van Dam, the senior councillor, and Governor Cosby. The original cause was puerile and insignificant, and involved only a few pounds, a fraction of the salary Van Dam claimed during the 13 months he acted as gov¬ ernor; it culminated in one of the most glorious episodes in history and established the principles for the freedom of the press in this country for all time, through the courage of John Peter Zenger, editor, and the brilliant scholarship of Andrew Hamilton, his advocate in the famous trial for libel. Nine years later, the province was thrown into paroxysms of alarm over the so-called «Negro Plot. Several mysterious fires occurred in New York about the same time and the impression got abroad that negroes had kindled them with the ultimate determination of burning down the town. The only basis for the suspicion was the unsupported testimony of an ignorant immigrant woman who was bound out to the keeper of a disreputable resort. Every negro became a suspect and large re¬ wards were offered for the conviction of an incendiary. Before the frenzy ended, under the judgment of the court, 13 unfortunates were*

transported.

For years, more or less apprehension pre¬ vailed over French invasion. The French wielded greater influence over the Indians through religion and

princely presents. Settle¬ ments had been established at Oswego and at Niagara, and the governors were periodically at their wits' ends to protect them. November 1745, instigated by the French, a band of red¬ skins rushed upon Saratoga — after Fort Hoosick had surrendered — killed the brother of Peter Schuyler and a number of others5 spread destruction over the surrounding country and carried off to Canada a number of captives. The assembly of New York then followed the example set by Massachusetts and offered a bounty for Indian scalps. England had been remiss to a degree in neglecting even ordinary protection for its settlers. The home ministry permitted France to fortify and hold Crown Point, in spite of the protests from the province, whence war parties darted on their incursions of devastation, desolation and death.

Governor Clinton who succeeded Clarke as

governor in 1743 was a sailor by profession and carried into the office all the old-time mar- tinetism of the quarter deck. He attempted to overcome England's handicap with her redskin neighbors. In August and September 1746 he held a council at Albany with the Iroquois with the intention of establishing an alliance and to counteract the marplotting of the French and the Jesuits. To strengthen the bonds of friend¬ ship and as an effective object lesson, Sir Wil¬ liam Johnson, the English Indian agent for New York, appeared in the full garb of a savage, paint and all, and walked as an Indian chief at the head of the Mohawks. Owing to the illness of Governor Clinton, Cadwallader Colden ex¬ plained to them that the French had been de¬ feated at Annapolis; and that' troops from Massachusetts, Connecticut and New Hampshire had captured Louisberg. He informed them that the English king had sent troops enough to take Canada from the French and urged them to join the English in the undertaking. Ora¬ tions were thereupon delivered, belts exchanged and presents divided ; the Indians gorged and guzzled, warbled and danced and agreed to join the English procession, and the northern part of the province was overrun with war parties who scalped and spattered blood, of male and female, young and old, the strong and the helpless, with unbridled ferocity. Governor Clinton accumulated a princely fortune during his 10 years' service as governor and could well afford to quarrel with his assembly, as several of his predecessors had done, over the perma¬ nent support bill. His successor, Sir Danvers Osborne, hanged himself with his handkerchief 21 Sept. 1753, five days after his arrival in New York.

James DeLancey, lieutenant-governor, one of the best equipped men in the

province for the position, succeeded him. He had been born in Albany and was the first governor to the manner born. He presided over the congress at Albany in 1754 that contemplated union among the colonies, and opposed the plan. The Treaty of Aix-la-Chapelle was a dead letter so far as the colonies were concerned, for French aggressions were more exasperating than ever. With the outbreak of the French and Indian War, Sir William Johnson, who had married the sister of the Indian chief Joseph Brant, and who never had commanded a company of troops on the field, was placed at the head of a force of 3,400, who marched to the northward. At Lake George on 8 Sept. 1755, occurred the battle which brought a baronetcy and a fortune to Johnson, deprived the officers who really won •the victory of credit, led to the death of the celebrated Mohawk, Hendrick, and put to rout the French forces under the accomplished French general, Dieskau.

The main incidents in the French and Indian war were the capture of Fort Oswego by the French general, Montcalm, 14 Aug. 1756; the surrender and massacre at Fort William Henry at Lake George on 9 Aug. 1757 where Montcalm with 8,000 French and 2,000 Indians overcame the garrison of Colonel Monroe of 3,000 men ; the surrender of Fort Frontenac to Col. John Bradstreet, and the surrender of Fort Niagara to the English 20 July 1759.

The birth of liberty in the State of New York practically occurred in the colonial con¬

vention to consider the Stamp Act, 7 Oct. 1765. With the accession of George III, 25 Oct. 1760, a new conflict broke out between the colonists and the authorities. All commissions expired with the sovereign. It was now contemplated to permit the judges to hold office only <(during his Majesty's pleasure® instead of ((during good behavior.® Up to 31 March 1774, when the Boston Port Bill became a law, agitation throughout the provinces had become more and more pronounced and the people more and more unsettled. The battle of Golden Hill in New York City in 1770 had inflamed the public mind to the possibilities and their representatives of the Crown in their constant collisions with the Sons of Liberty oyer the destruction of their liberty pole contributed naught in diminishing the drift of popular sentiment. On 23 May 1774 New York published its declaration of rights at Fraunce's Tavern in New York City. Two months later delegates were chosen for the first Continental Congress which convened in Philadelphia 17 Sept. 1774. On 1 May 1775 the committee of 100 was appointed as the successor of the New York committee of correspondence and the committee of inspection, respectively. The constitutional government had gone out of existence. The sentiment of the English party in New York City was naturally in sympathy with England; the old Dutch settlers, with their bitter remembrances of the 100 years of English rule,

were almost unanimously in favor of revo¬ lution, but when the second Continental Con¬ gress convened in Philadelphia 10 May 1775, and the country had tasted all the .horrors of war, there were members, especially from New York, who were still hopeful that the manifold grievances might be redressed. Grave events were happening with great rapidity. Fort Ti-conderoga had been surprised and captured by Ethan Allen and Benedict Arnold 10 May ; two days later Crown Point surrendered ; within a week Arnold had captured Saint Johns, Canada, and William Tryon the last English governor, who five years before had succeeded Lord Dun- more, sought refuge on the British gunboat Asia in the harbor of New York. Throughout the war New York was the real battle ground; topographically and strategically its position was recognized as of the utmost value to English and American as well. The English plan of campaign was based upon that of the French of 1689 and of Montcalm in 1757; namely, to break the back of the province by an invasion oper¬ ating from the north and from the south along the valley of the Hudson. It was the objective that brought Burgoyne to America in the sum¬ mer of 1777, when the American forces and American people were disheartened by suc¬ cessive defeats that included the battles of Long Island and the evacuation of New York City^ ; the defeat at White Plains and surrender and massacre at Fort Washington. Three of the most important battles of the Revolution were fought on the soil of New York; that of Oriskany, 6 Aug. 1777, which practically shat¬ tered the right arm of Burgoyne, and that of Walloomsac, for many years mistakenly called Bennington, which shattered his left arm, both of which contributed immeasurably to the culminating defeat at Saratoga where the first British army in the history of England lay down its arms to an army composed of farmers.

Sir Henry Clinton had started from New York only too late to assist Burgoyne and had captured Forts Clinton and Montgomery in the Highlands of the Hudson 6 October, 11 days before the surrender. On 16 Oct. 1777, the British colonel, Vaughan, ascended the Hudson to Kingston, which was burned without the slightest provocation, leaving a stigma upon the British name for pure vandalism that has never been effaced.

With Burgoyne's surrender, New York State was relieved of large standing armies, but was called upon to encounter straggling foes that menaced the frontiers and exposed towns to the close of the war. During the campaign of 1776 the safety of the people was indubitably secured by the tireless energy and countless resources of General Schuyler, but with his retirement from the Continental army as commander of the Northern District, the

frontiers were left to shift to a large extent for themselves, and the Indians under Brant with the Tories under the bloodthirsty Butler swept over them with torch and scalping-knife, meeting with feeble resist¬ ance until Congress and General Washington selected John Sullivan to destroy their crops and burn their villages from the Chemung to Niagara.

In October 1780 the Schoharie and Mohawk valleys were ravaged by a force of 800 Indians and Tories under Sir John Johnson. With the exception of the slight skirmish at Johnson Hall where Col. Marinus Willett put the enemy to rout, New York saw no more active fighting except sporadic brushes here and there be¬ tween the militia and straggling bands of In¬ dians.

The constitutional history of New York dates from the adoption of the Declaration of Independence. The Provincial Congress which had been elected in April met in the city of New York 14 May 1776. Before the conven¬ tion adjourned the subject of independence was considered and it was resolved that it was the sense of the colony that the people desired to continue dependent upon Great Britain. As soon, however, as it was known that the Conti¬ nental Congress recommended that each colony should establish its own form of government, a decided change of sentiment occurred in New York. When the newly-elected convention as¬ sembled at White Plains 9 July 1776, the old regime had ceased to exist and the New York Congress became ((the convention of the repre¬ sentatives of the State of New York,® the Dec¬ laration of Independence was speedily ratified and a committee was selected, of which John Jay was chairman, to draft a constitution for the State of New York. The enemy seriously interfered with the plans of the convention. New York had been abandoned. The British men of war patroled the harbor within seven miles of the place where the constitution fram¬ ers were at work. Courts of law had been abolished, but the convention ordered that all magistrates and civil officers who were affected toward independence should continue to exercise their duties and that processes hereafter must issue in the name of people of the State of New York.

The draft of the constitution was submitted 12 March 1777. It was adopted 20 April and an election was ordered to be held in June. The sentiment of the constitution was decidedly

English and its tone was aristocratic. It dis¬ credited the office of governor and it distrusted the people. Its abiding faith in the judiciary stands out in a strong light. It was liberal in its religious sentiments in that it permitted ((the free exercise of religious profession and wor¬ ship without discrimination or preference of all mankind.® Slavery was still supported, although Gouverneur Morris and John Jay, who had been most

instrumental in drafting the instru¬ ment, had attempted to move for its gradual obliteration. Its two weak features were the Council of Appointment, which was supposed to be a check upon the governor, and the Coun¬ cil of Revision, which was supposed to be a check upon the legislature. The Constitutional Con¬ vention of 1801 was called to determine the jurisdiction of the governor and the Council of Appointment in the matter of patronage. The decision of the convention divided the respon¬ sibility equally between the four senators who constituted the Council of Appointment and the governor. The two obnoxious councils, Revi¬ sion and Appointment, were abolished by the constitution of 1821 which at the same time en¬ larged the area of the elective franchise by removing the property qualification. The weak¬ ness of the Articles of Confederation that had become apparent within a year of their adop¬ tion threatened to shipwreck the country un¬ less a strong form of government was organ¬ ized and substituted in its place. General Wash¬ ington and Alexander Hamilton had been agi¬ tating the necessity for a more powerful and cohesive instrument. On 17 Feb. 1787, the as¬ sembly of New York adopted joint resolutions instructing the delegates of the State in Con¬ gress to move that a convention be held for the purpose of amending the Articles of Confedera¬ tion so as <(to render them adequate to the preservation and support of the Union.®

Messrs. Robert Yates, John Lansing, Jr., and Alexander Hamilton were appointed delegates to the Federal Constitutional Convention which met in Philadelphia on the second Monday in May 1787, and which concluded its work 17 September. Messrs. Yates and Lansing with¬ drew and Hamilton was the only delegate from this State who signed the new constitution. The State convention to act upon the new constitu¬ tion convened at Poughkeepsie 17 June, and ad¬ journed 26 July. Ten of the 13 States had ratified the constitution — one more than the number necessary — with New York rebellious. George Clinton, governor of the State from 1777-95, appeared as the most resourceful op¬ ponent of the new constitution and led the anti- Federalist forces on the argument that New York was too powerful and wealthy to place herself on a par with States not her, equal in in¬ come and resources. Alexander Hamilton and Robert R. Livingston were the strongest advo¬ cates of the new constitution. In July notifica¬ tion was officially made that Virginia and New Hampshire had approved the new constitution, and the Federalists thereupon offered a resolu¬ tion (

failure of the legislature to agree in the choice of electors, lost its vote for President at the first election under the Federal Constitution.

The first political struggle in the State oc¬ curred in 1792 over the election for governor, when Governor Clinton by a fluke defeated John Jay. New York had experienced a number of disputes with her neighbors over boundary ju¬ risdiction, especially with New Jersey, Vermont, New Hampshire and Massachusetts. New York was the first of the States to cede lands belonging to her to the United States for the encouragement and development of immigration. Within a space of seven years, 5,500,000 acres of land within the State had been thrown open to settlers, bringing to the State treasury $1,030,433. Population fairly jumped and it was necessary to create a number of new coun¬ ties north and west of Albany. Internal im¬ provements, turnpikes and the development of waterways were constant subjects of discussion, and these subjects received an extraordinary stimulus in 1807 when Robert Fulton made the first trip with his steamboat on the Hudson River between New York and Albany. Three years later a commission was appointed to sur¬ vey a route for a canal to Lake Erie. On 16 April 1816, commissioners of construction were appointed, and in 1817 commissioners of the canal fund were organized. As the construc¬ tion of the canal proceeded a number of coun¬ ties were opened to the right and left, and when the canal was completed in 1825, the popu¬ lation of the State had increased to 1,500,000.

Up to the outbreak of the second war with Great Britain, political struggles in New York were marked by fierce acrimony. Never was hostility more bitterly displayed and personal vituperation carried to greater excess. Hamil¬ ton had fallen in the duel with Burr, and from that hour dueling was banished as a social evil in the State of New York. The Clinton family, the venerable George, who had been a candidate for President against Madison, through the wire pulling of his brilliant nephew, DeWitt Clinton, had been elected Vice-President and opposed the Federal administration of President Madi¬ son, whose New York representative seems to have been Gov. Daniel D. Tompkins, an adroit politician and an able man.

At the opening of the Presidential campaign of 1812, DeWitt Clinton aspired, through his Republican affiliations, for the Presidential nomination and was nominated by a number of his friends in New York City; but on 18 May, President Madison was unanimously nominated. When Congress declared war in June, the President issued a patriotic proclamation which rallied to his support the entire Republican party and forced Clinton to abandon his own party and consort with Federalists.

During the second war, Governor Tompkins stands out as strong a character as George Clinton during the War of the Revolution, and like the first war governor of the State, he was selected, in honor of the distinguished services he had rendered to his party and the State, to serve as Vice-President of the United States with James Monroe from 1817 to

1825, during ((the era of good feeling.®

Judge Tompkins presided over the Constitu¬ tional Convention of 1821. With the adoption of this constitution, the Federalist party went

out of existence for all time in New York State, and the new conservative element under the leadership of Martin Van Buren and DeWitt Clinton took charge of the party machinery.

It was during the term of DeWitt Clinton as governor that the anti-Masonic craze swept the State and largely influenced national politics by the disappearance of William Morgan from Canada, 12 Sept. 1826. On 4 July 1827, by legis¬ lative enactment, slavery was abolished. Gov. DeWitt Clinton died suddenly at Albany on 11 Feb. 1828 and his successor, Martin Van Buren, resigned in order to become Secretary of State in the Cabinet of President Jackson.

Under the administration of Enos T. Throop, who acted as governor until the regular election in 1830 when he was chosen governor, the man¬ ufacture of brick by machinery was begun in New York; the Albany Evening Journal was started by Thurlow Weed; the first omnibus was built and used in New York City; the Albany and Schenectady Railway was opened ; chloroform was first obtained at Sacket Har¬ bor; the Whig party was formed; the first horse street railway in the world was opened on Fourth avenue, New York City; and the Anti-Slavery Society of New York was organized. William L. Marcy, who succeeded Mr. Throop, resigned his seat as United States senator upon his election as governor, was a rabid partisan and rigid economist and favored moderate protection to home industry. He advocated internal improve¬ ments and after his re-election in 1834 recom¬ mended enlargement of the Erie Canal and ap¬ proved the construction of the Black River and Genesee Valley canals. The city of Albany now was recognized next to Washington as the poli¬ tical storm centre of the Union for her reputed ((Albany Regency,® which for years made and unmade candidates, controlled legislation and ruled the party and the State with arbitrary and at times high-handed methods. Mr. Van Buren was responsible for the breaking up of Presi¬ dent Jackson's Cabinet by his open recognition of Peggy O'Neil; his rejection by the United States Senate as Minister to England by the casting vote of Vice-President Calhoun would have led to a general dissolution of the Demo¬ cratic party had it not been for the resolute in¬ dividuality of President Jackson.

New York suffered with the rest of the country by the panic of 1837, which originally can be traced to the removal of the deposits from the United States Bank in 1833, and by the deluge of <(shinplasters,® as a consequence of legislative prohibition of bank bills under the denomination

of $5. The election of Presi¬ dent Van Buren was immediately followed by the financial disaster, a calamity which ar¬ rayed against the State and national administra¬ tions the entire banking and financial institutions of the entire country; that opened the way to the election of William H. Seward, the first Whig governor, in 1838, and two years later of William Henry Harrison on the ((Tippecanoe and Tyler too® platform, the first Whig Presi¬ dent of the United States. So demoralized were the finances that in 1841 the State was unable to borrow money to pay contractors upon the canals and in 1842 a law was passed suspending work and providing for the raising of money by taxation. The Erie Railway which secured a charter in 1832, which obtained from the legis-

lature in 1836 a loan of $3,000,000 and which by 1840 was completed as far as Goshen, was aban¬ doned, the company made an assignment and it was not until 1851 that the road was com¬ pleted. Public works of all character were sus¬ pended and discouragement and depression were paramount.

During the next decade through the admin¬ istrations of Governors Bouck, Silas Wright, Hamilton Fish and Washington Hunt, the anti¬ rent troubles were a very prominent disturbing factor in the State and the question of slavery throughout the country began to assume pro¬ portions that pointed inevitably to war. The Constitutional Convention of 1846 was held at the height of the demand of popular sentiment for the limitation of the power of the governor and of the legislature and for the extension of the elective franchise. The Convention abolished the Court of Chancery, limited the power of the legislature over the revenues, stripped the legis¬ lature of the power to appoint general adminis¬ trative officers of the State, and substituted general laws for the organization of business corporations instead of special legislation. In consequence a great impetus was given to the organization of banking, telegraph, insurance and railway companies to conform with the prodigiously expanding institutions of the State.

The split in the Democratic party, owing to the slavery problem, and the rapid growth of the Free Soil movement in New York, decided the election of General Taylor for President in 1848 and the election of Hamilton Fish as governor. The Whig party in turn was torn by dissensions in 1850 when Washington Hunt was elected governor over Horatio Seymour, and two years later when Seymour carried the election, it was a natural consequence of the condemnation of the people for the Compromise measures in Congress. The Whig party ceased to exist as a factor after

1852. With the ex¬ ception of the slight disturbances in the State over temperance legislation, national politics monopolized the attention of politicians until 1857. In the meantime the American party and the Republican party came into existence. The agitations in Kansas and Nebraska, with the reckless threats of the Southern leaders in Con¬ gress, opened the eyes of the most sagacious to the possibilities of war between the sections of the country. The panic of 1857 produced a temporary set-back to the rapidly growing pros¬ perity of this State. When Edwin D. Morgan was elected governor in 1858, the most active parties were the Democrats, the Americans, the Abolitionists and the Republicans. Governor Morgan was re-elected in 1860 on the same ticket with Abraham Lincoln, who had defeated New York's favorite senator, William Henry Seward, for the nomination for President at the Chicago convention.

On 12 April 1861 Fort Sumter in Charles¬ ton Harbor was attacked. On the 15th Presi¬ dent Lincoln issued a call for 75,000 volunteers to defend the life of the Union. The Union Defense Committee of New York was organ¬ ized that evening. Within 10 days 7,334 men were on their way to Washington — the first regiment to respond to the call was the 7th New York, Colonel Leffert's. April 16th the legislature created a State board to enlist and equip 30,000 men. Eighty-two companies were accepted in one week. The first volunteer regi¬

ment left the State 29 April and the last 12 July. Governor Morgan, who had been com¬ missioned major-general, was placed in com¬ mand of a separate military department of the United States constituting the State of New York. During the four years of war, New York furnished 448,850 men, or one-sixth of the total. This proportion holds good in the total losses and casualties. For organizing, uni¬ forming, equipping, substituting and transport¬ ing troops, the State expended $3,745,554.98; for bounties, $50,657,406; for relief, $500,773; or in aggregate, all things considered in the way of official outlay on the authority of the State, $57,569,082.56. The sentiment of New York State placed the responsibility for the war upon the Democratic party, although at the outbreak thousands upon thousands of Democrats who had stood shoulder to shoulder with the politi¬ cal fire-eaters of the South joined the Repub¬ lican ranks, a very large proportion obtaining commissions as officers in the army of volun¬ teers which had been hurriedly thrown together. The succession of Union disasters, however, and the declaration of the Emancipation Proclama¬ tion by President Lincoln had created a feel¬ ing of distrust, uncertainty and doubt, which led in 1862 to the overthrow of the Republican party and the election of Horatio Seymour as governor over Gen. James S. Wadsworth, an estimable gentleman and valiant soldier. The rebuke administered was not so much in the nature of a protest against the war as it was a protest against the conduct of the war. The success of the Democrats led to a

marked de¬ crease in the- number of enlistments, which forced the national government to resort to the expedient of draft. The demagogical utter¬ ances of Governor Seymour had led the reck¬ less and lawless throughout the State to believe his hostility to the conduct of the war included protection for them in the commitment of crim¬ inal acts. Unprotected by the transfer of its local militia to Pennsylvania after the battle of Gettysburg, New York City was now exposed for several days to mob law in the enforcement of the drafting, unequaled in the history of the country. Governor Seymour directlv repaired to the metropolis, began a conciliatory speech by addressing the mob as ((my friends,® but event¬ ually warned them by proclamation. The in¬ surrection was only subdued by the return of the local military organizations.

Governor Reuben E. Fenton succeeded Gov¬ ernor Seymour in 1864, having been elected on the same ticket which returned Abraham Lin¬ coln to the White House for his second term as President of the Nation. With the return of peace the country was confronted with the diffi¬ cult problem of assimilating the. hundreds of thousands of, soldiers who were now seeking employment in civil life and ordinary avoca¬ tions. One of the first propositions considered by the people during the second term of Gov¬ ernor Fenton was the agitation for the conven¬ tion to revise the constitution, which culminated in the Constitutional Convention of 1867 that assembled at Albany on 4 June. The Hon. William A. Wheeler of Malone, afterward Vice-President of the United States, was pres¬ ident of the convention which ended its labors on 28 Feb. 1868. The new constitution was adopted in the convention by a strict party vote. It introduced several original propositions. The

legislature was reorganized, restrictions were imposed upon the exercise of legislative powers ; the veto power of the governor was strengthened; a court of claims was created and the judiciary system was modified. The legislature of 1868 failed to pass an act to sub¬ mit the proposed constitution to the people ; as a result of the general election held in that year the power of the State was transferred from Republican to Democratic hands. John T. Hoffman of New York was elected governor, largely due, it was claimed at the time, by flagitious debauchery of the ballot boxes in New York City by the Tweed ring which succeeded in carrying the State for the Democratic candi¬ date for President, Horatio Seymour, by 10,000. From this year the vote of the city of New York in State politics was recognized as a powerful factor. Governor Hoffman was called wthe veto governor® because of the unprece¬ dented exercise of the veto power.

During his four years in office he vetoed 495 bills, only two of which subsequently became laws. He established the precedent of filing his reason in writing with bills he declined to sign at the end of the legislative session. The Tweed ring dur¬ ing his reign attained the height of its power. For audacity and rapacity the methods of the Tweed ring were unequaled, but it was soon brought to grief through the disclosures of the New York Times. In the meantime it had succeeded in re-electing its favorite candidate, John T. Hoffman, who at the close of his office retired to private life. As a consequence of the operations of this ring, two Supreme Court judges, George G. Barnard and Albert Cardozo, and one Superior Court judge, John H. Mc- Cunn, were ordered to be impeached. Barnard was convicted and removed from office; Car¬ dozo resigned and dodged his trial ; McCunn was removed and shortly after died of a broken heart. While the expose of the Tweed ring demoralized the Democrats, the Republicans were more or less torn by the dissensions in their own ranks on national affairs. An agita¬ tion for the revision of the Constitution had been general throughout the State for several years, had been advocated by Governor Hoff¬ man and was now recommended by Governor Dix, who in his message called attention to the misuse of sinking funds and to the abuse of the appropriations by the legislature for private charities. The State was suffering from the oppressive financial weights that had been im¬ posed by the War of the Rebellion from the reckless extravagance that had become a part of the body politic. A constitutional com¬ mission undertook to curb the expenditures and the squandering of public moneys. Samuel J. Tilden, who defeated Gen. John A. Dix for governor in 1874, and who had been actively in¬ strumental in prosecuting the Tweed ring, care¬ fully scrutinized the heavy expenditures that had been made on the canals, and advocated rigid retrenchment. The effect of the financial disasters of 1873 had fallen heavily upon the people of the State. In the winter of 1875 canal boatmen, owners and forwarders petitioned the governor for relief, urging a further reduction of tolls. On 18 March 1875, the governor sent a special message to the legislature arraigning the management of the canals. A commission was appointed to investigate the system. Twelve special reports were made to the governor, dis¬

closing a long line of abuses and calling for the prosecution and punishment of recreant public officers.

Lucius Robinson was elected governor in 1876. He followed the efforts of his predeces¬ sor to curb extravagant outlays upon chari¬ table institutions, urged economy in all public expenditures and used the veto power fearlessly. Governor Robinson was defeated in 1879. Alonzo B. Cornell, Republican, was the success¬ ful candidate. But for several years the Re¬ publican party, although successful in the Presidential election in 1880, was demoralized by the fierce struggle between the Stalwarts and

Half-breeds, consequent upon President Garfield's repudiation of Senators Conkling and Platt in the matter of making Federal appointments in the city and State of New York. The assassination of President Garfield, the accession of Vice-President Arthur, the defeat for governor in 1882 of Charles J. Fol- ger, the defeat for nomination to the Presi¬ dency of General Arthur and the election of Grover Cleveland for governor in 1882 and as President in 1884, all resulted from this bitter and unrelenting partisan warfare.

David B. Hill succeeded, as governor, Gro¬ ver Cleveland, elected President, and held office from January 1885 to January 1892. During these years the first practical step for the crea¬ tion of an Adirondack State Preserve was taken ; the Niagara Falls Reservation was cre¬ ated; use of electricity in death sentences established; and State board of arbitration created.

Governor Hill was succeeded by another Democratic governor, Roswell P. Flower. The elections of members of the legislature were closely contested. Governor Flower urged the passage of laws for an enumeration of the population and the establishment of a forest preserve. A law was passed calling for the meeting of a constitutional convention in 1894. When this met it was under the control of the Republicans and many changes were made, the most important being that which set the gov¬ ernor's term at two years and another which was aimed to prevent the legislature from pass¬ ing laws affecting individual cities. The con¬ stitution was accepted by the people at the elec¬ tion in November 1894 and is that under which the State is now operating.

Factional fights among the Democrats in the State and other issues enabled the Republicans to get control in the elections of 1894 and to retain it until 1911, electing as governors Levi P. Morton, Frank S. Black, Theodore Roose¬ velt, Benjamin B. Odell, Frank W. Higgins and Charles E. Hughes in the order named.

In the year 1898 the Spanish-American War broke out and gave New York and its citizens an opportunity to distinguish themselves in their service to their country. In this no one was more prominent than Theodore Roosevelt, who had now a reputation for tackling reforms in the civil service and in the management of the police in New York City. His popularity born of a dramatic career as colonel of the (

In the last year of Governor flowers ad¬ ministration, 1894, the Republicans had got control of the legislature apd they, began a series of investigations, particularly into mat¬ ters affecting the control of New York City by the Democrats. The first, known as the Lexow committee of the senate, showed that the police of that city had been interfering in the elec¬ tions, and the second, chosen in. 1899, and known as the Mazet committee of the assem¬ bly, showed that Tammany candidates for judgeships were systematically levied upon for campaign contributions.

The Republicans themselves, however, were not able to keep free of accusations of wrong¬ doing. In 1895 a question of appropriating $9,000,000 for Erie and other canal improve¬ ments was submitted to the people and passed, but in 1899 there was so much talk of corrup¬ tions in the canal expenditures that Governor Roosevelt appointed two Democratic lawyers to make an investigation. They made a report which showed that there had been frauds per¬ petrated, but carried out in such a way as to make prosecutions difficult.

A commission was appointed to make a sur¬ vey of the whole canal system. This recom¬ mended widening and deepening the canals so that they would accommodate 1,000- ton barges. Though vigorously supported by Governor Roosevelt, the. recommendations were not car¬ ried through the legislature. Governor Roose¬ velt also appointed a commission to revise the New York City charter, many of whose pro¬ visions had met with severe condemnation. Many changes were made and put through by the legislature under Roosevelt's successor, Benjamin B. Odell.

It was commonly stated that Governor Roosevelt because of his offense to old Republi¬ can leaders in his efforts to ((dean up® bad con¬ ditions wherever found was nominated for Vice-President of the United States in the elec¬ tions of 1900, with the idea that this office would put him in obscurity. He was elected and Mc¬ Kinley was chosen President. The assassina¬ tion of the latter in 1901 elevated him to the Presidency.

Governor Odell was very active, proposing constructive legislation and in carrying it through. Under his successor, Frank Higgins, were begun the preliminary investigations into the political activities of the great life insur¬ ance companies, which really brought the next Republican to the chair of governor.

One of the ablest of the Republican gover¬ nors in the matter of reforms was Charles E. Hughes. He came into prominence in 1905 as counsel for the Armstrong commission of the legislature, which was appointed to investigate the life insurance companies. The revelations of the use of the policyholders' money to in¬ fluence legislation created so much indignation

that Hughes became a popular candidate for governor and was chosen to the office in the elections of 1906. He determined to suppress gambling at race tracks and he carried his race¬ track bills through the legislature in spite of the bitterest kind of opposition.

He was equally determined to put through his direct primary law, which he felt would end the control of nominations for office by bosses in political conventions. He did not carry his measure and in 1910, during his last

year, he accepted an appointment as a justice in the United States Supreme Court.

The Republican party had been split by factions owing largely to the determined efforts of men like Roosevelt and Hughes to reform conditions, so that in the elections of 1910 John A. Dix, a Democrat, was elected governor. During his administration the people voted $101,000,000 to enlarge the canals in order to make them navigable by 1,000- ton barges. Thus was begun the improvement which was to cost the State of New York nearly $200,000,000 before it was finished. .

A direct primary law to which the Demo¬ crats pledged themselves in the election cam¬ paign was also put through, but did not ac- o /-mmnli qVi tfip nnrnoses for which it was in¬

tended. . , •

The Democrats did not retain their control of the State very long. In 1912 they elected William Sulzer. He began an advocacy of numerous reforms such as the child labor, minimum wage and other laws. He pushed vigorously for a perfected primary law. He soon came to serious disagreements with the party leaders and declared himself independent of them. They, through the members of the legislature, impeached him, not for anything which he had done while in office but because of his misapplication of campaign funds. On 18 Oct. 1913, he was dismissed from office and succeeded by Martin Glynn, who was the lieu¬

tenant-governor.

Under Glynn the legislature passed an im¬ proved direct primary law, abolishing State conventions. Upon his recommendation were . also passed a short ballot law and a workmen's compensation law. A measure calling for the holding of a constitutional convention in 1915 was also passed and also another providing for putting into operation the amendment for the direct election of United States senators by the people instead of by the legislatures.

The dissensions in the Democratic party had so thoroughly split its forces that the Republi¬ can candidate for governor, Charles S. Whit¬ man, was elected over Glynn in 1914 by a very large vote. The Progressive party, largely made up of Republicans, whose candidate was Fred¬ erick M. Davenport, did not draw off many votes from Whitman.

The people voted to sanction the proposed constitutional convention, and this was held in 1915. The majority of the members, were Re¬ publicans and they chose as president of the convention Elihu Root. Other prominent mem¬ bers were Seth Low, Henry L. Stimson and George W. Wickersham. The convention pro¬ posed many changes, the most important being those which would give the governor greater power in the appointment of officials formerly elective. Many other changes met with bitter opposition from small groups all over the State. The result was that in the vote taken by the people in the November 1915 election, the pro¬ posed constitution was overwhelmingly de¬ feated. The same fate happened to an amend¬ ment giving the suffrage to women, though the vote against it was smaller.

Governor Whitman, like his predecessor, Mr. Glynn, urged economy in expenditures, but there was nothing accomplished along such lines. A widowed mothers' pension bill was put through, but a measure to provide for State-

wide prohibition on referendum to the people was defeated by the legislature, even though it received the backing of the governor.

In 1916 Governor Whitman recommended the passage of financial measures increasing the power of the comptroller, and of other meas¬ ures abolishing and reorganizing certain char¬ itable institutions and prisons. He also recom¬ mended the establishment of a military train¬ ing commission to co-operate with the board of regents in giving physical and military training to young men of high-school age.

The year 1917 was that in which the United States entered the great World War. Though almost everything was overshadowed by this event, Governor Whitman had recommended for legislative action the enactment of a town¬ ship school law, by which many thousands of school districts were consolidated into less than a thousand. He favored and had put through a State constabulary bill, a military census bill, by which an enumeration of all persons under 45 years was taken, a food-control commis¬ sion to keep prices under control, a food-sup¬ ply commission to encourage food

production and a State council of farms and markets. He also advocated, and the legislature passed, a compulsory military training bill for boys be¬ tween 16 and 17 years of age.

In the November elections of 191/ tne woman's suffrage amendment to the State con¬ stitution, which had been defeated by o\er 200,000 votes in 1915, was passed by about

90,000 majority. .

In general the up-State districts were

against it, and the largest vote for it was found in New York City, particularly in districts which had the reputation of being socialistic. The espousal of the cause of womans suffrage by President Wilson and by Governor Whit¬ man had some influence, but undoubtedly the factor most contributing to the result was the manner in which women's suffrage organiza¬ tions had canvassed the State. _

Governor Whitman determined to run tor a third term and easily won the Republican nomination in the primaries over Merton Lewis. His Democratic opponent for the governorship was Alfred E. Smith who had had long legisla¬ tive experience, was at the time president ot the board of aldermen in New York City and had great personal popularity.

*Many factors had combined to bring con¬ siderable opposition to Whitmans election. There was some feeling against his having a third term and many of those who had voted for Lewis in the Republican primaries turned * their votes to Smith in the regular election. The farmers were said to have held up against him the increase of their taxes because of the township school bill, even though he had advo¬ cated its repeal and succeeded in having it repealed less than a year after its passage. I he same people were also disaffected by the waver¬ ing policy in handling' the foods and markets question. Still others were opposed . to him because of his advocacy of prohibition and others because he did not go far enough in the same matter. Certain groups were hostile because of his strong advocacy of military training. All of these groups combined served to defeat him, even though the legislature chosen was Republican in both branches.*

Governor Smith found himself at a disad-

vantage because of this Republican majority against him. He advocated the creation of a reconstruction commission to handle problems created by the Great W ar. which had closed by an armistice in November 1918, bills

providing for a referendum vote of the people on the prohibition amendment to the Federal Consti- tion, for the conservation of water power in the State, for the creation of a minimum wage commission, for maternity and compulsory health insurance, for the abolition of the State police, for the reorganization of the public serv¬ ice commissions and for the improvement of educational conditions by increasing the salaries of teachers. In 1920 the Republicans elected Nathan Miller governor in a close contest. The new governor advocated retrenchment in public expenditures, reorganization of traction com¬ panies and other public utilities.

Leading Legislation. — 1892-94. Roswell P. Flower, governor. Features of legislation were the establishment of the Adirondack Park; ordering a convention to amend and revise the constitution ; the prohibition of pool-selling in poolrooms; the excise laws were finally codified, and the question of a Greater New York was ordered to be submitted to a public vote.

1895-96. Levi P. Morton, governor. The governor's term of office now becomes two years, instead of three. The two principal features of Governor Morton's administration were the enactment of the ((Raines Law® a high-license measure aimed at reducing the number of saloons and removing them from political influence; and the passage of the "Greater New York® bill, consolidating the local governments of the city and county of New York, the counties of Kings and Richmond and part of the county of Queens, giving the new metropolis an area of 359 square miles.

1897-98. Frank S. Black, governor. The charter of ((Greater New York® received the signature of Governor Black and its provisions went into effect 1 Jan. 1898. Important canal legislation and the appointment of a commis¬ sion to investigate the expenditure of canal funds were features of this administration.

1899-1900. Theodore Roosevelt, governor. Some insurance legislation is accomplished, especially as to the maintenance of a reserve fund; the <(Mazet Inquiry® was held, regarding alleged levies for corrupting legislation ; and a committee previously appointed to report on a more equitable distribution of taxation recom¬ mended important changes in the tax laws.

1901-04. Benjamin B. Odell, Jr., governor (two terms). "Palisades Park® was created, the New York legislature acting in conjunction with that of New Jersey; Stony Point Park was purchased and dedicated; much valuable ((Greater New York® charter revision was ac¬ complished; a new terminal House Act was passed introducing a number of radical changes and drastic provisions were passed looking to the suppression of

anarchy.

1905-06. Frank W. Higgins, governor. This administration was chiefly notable for the preliminary – insurance investigation and in¬ itiatory discussion of direct primary and direct nomination legislation.

1907-10. Charles E. Hughes, governor (two terms but the last incomplete by his resignation in October 1910 to accept the office of justice of the Supreme Court of the United States.

Horace White, lieutenant-governor, filled out the rest of the term). The administration of Governor Hughes was one of the most import¬ ant of any since the war. His first act was an attempt to remove Otto Kelsey, the State superintendent of insurance, for inefficiency, which the senate refused to ratify, and Mr. Kelsey refused to resign. A bill for making the salaries of women teachers equal to that of men in the same grade was vetoed. A long continued struggle was carried on through the latter part of his administration to secure the enactment of some form of direct primaries bill, a special session of the legislature even being called in June 1910, but without direct result, the Cobb bill, a compromise, failing of passage by only one vote. A progressive in¬ heritance tax law was enacted. Other note- worthy legislative enactments, inspired for the most part by Governor Hughes, were (1) a law prohibiting gambling at race tracks, passed in 1908; (2) a law authorizing additional rail¬ road construction in New York City, passed in 1909; and (3) the creation of the public serv¬ ice commission to exercise jurisdiction over all matters connected with public transportation and public utilities. In 1910 an act was passed licensing and regulating private banking; the child-labor laws were amended by two acts so that now no minor under 16 years of age is permitted to work in any mercantile establish¬ ment, office, hotel or as a messenger for more than 54 hours a week, nine hours a day, or be¬ tween 7 at night and 8 in the morning. Among important acts of 1911 were the following: A law reapportioning the Congressional districts of the State; a direct State tax of $6,072,763; a direct primary law was passed, providing for the direct nomination of all party candi¬ dates for public office except those voted for by the voters of the entire State, and also ex¬ cepting town, ward and village officers and school directors and trustees. The candidates for State offices are nominated by State con¬ ventions, but the delegates to these conventions are nominated by a direct vote.

1911-12. John A. Dix, governor. The mpst important legislation of his first

year s admin¬ istration was the passage of a compromise elec¬ tion bill that provides for direct primaries in all but the State offices, which are still left to a convention. Other legislation of importance created commissions to investigate manufactur¬ ing conditions in cities of the first and second class, and to look into the production and dis¬ tribution and consumption of food products in the State.

Laws for highway improvement, pure food products and for rapid transit subways in New York City were passed. Labor laws were passed designed to prevent the working in fac¬ tories of children under 16 at night and for more than eight hours a day or six days in the week, of males under 18 years of age for more than six days a week or 54 hours in a week, or between the hours of midnight and four o'clock in the morning, of females under 21 before six o'clock in the morning or after nine in the evening, or more than six days in the week or 54 hours in a week.

1913. William Sulzer, governor. The legis¬ lative session was one of unusual excitement owing to the removal by impeachment of Gov¬ ernor Sulzer. Lieutenant-Governor Glynn who

succeeded him recommended to the legislature the passing of laws adopting the Massachusetts simplified ballot, the enactment of a law abol¬ ishing State conventions in party nominations and a workmen's compensation law — all of which were adopted. Several measures restrict¬ ing the hours of labor were passed and the construction of certain types of tenement-houses were enacted. Important laws about vocational and industrial education in public schools and for medical inspection were passed. Vital statistics were taken from the control of local authorities and placed under the State depart¬ ment of health. Sales of securities by brokers were restricted by the Anti-Bucket Shop Law, and a commission appointed to examine the sub¬ ject of pensions for widowed mothers. A de¬ partment of efficiency and economy in the pub¬ lic service was created. ....

1914. Martin H. Glynn, governor. Little legis¬ lation of importance was enacted at this session, the most important being a law to permit sec¬ ond and third-class cities to adopt optional forms of charters such as those providing for a city manager and a commission form of gov¬ ernment. An extra session had to be called to get the necessary appropriation bills through.

1915-18. Charles Whitman, governor. As a result of the report of a former commission established to investigate the question of pen¬ sions for widowed mothers a bill was passed providing for such pensions and a child welfare board set up in each county. A bill to set up State-wide prohibition was defeated. The in¬ fluence of the war in Europe began to make itself

*felt. A military training commission was created and was to work with the State board of regents in setting up courses in the schools in physical training and in giving instruction in military training not to exceed three hours a week. Laws were passed for the improvement of the State Guard and the Naval Militia. Rail¬ roads were prohibited from employing any one who could not read or understand English. The Great European War into which the United States entered in April 1917 affected legislation very much. Bills were passed compelling boys between the ages of 16 and 19 years of age to undergo military training, for taking a mili¬ tary census of the State, for increasing the National Guard, for registering aliens, creating a council of farms and markets, establishing a commission on food production and supply and creating a council for State defense. A bill creating town boards of education and one providing for a school board in every city of the State, and making uniform their powers and duties, were passed, though the former was later repealed in the 1918 session. A depart¬ ment of State police, consisting of four troops of 45 men each, was created. The legislation continued *o be much affected by the war and the conditions growing out of it. The dis¬ covery made by the militarv authorities that there were large numbers of people in the State who could not read English led to the proposal of an amendment to the constitution requiring that all voters after 1 Jan. 1920 must be able to read and write English. _ Bills were passed providing for military training for all boys 16 to 19 years of age; for instruction in patriotism and citizenship in all the schools of the State; requiring all persons between the ages of 18 and 50 to work 36 hours a week at*

NEW YORK

Two scenes from the construction of the new Storm King highway in the highlands of the Hudson River. The lower picture shows how the rock is blasted out in the most difiicultvengineering job ever undertaken by the State Highway Department. The upper picture gives a good idea of how the completed road will look in certain sections

NEW YORK

Two views of the Barge Canal. Upper picture shows Bushnell's Basin between Rochester and Lockport; lower

picture, the highest lift lock in the world at the city of Little Falls

NEW YORK

ˆSilS

l 'g> . ˆ V •

y 1

!

r • 4 !■

■

fir i

t m

■H

T

!

1

L;

1

■ f \ w m

i

1 Lindenwald, the home of Martin Van Buren, Kinderhook, Columbia County, after he retired from the presidency. Mr. Van Buren resided here for 21 yoars from 1841 to 1862. The house was built in 1797 and is still in a good state of preservation

2 View of the spacious hallway at Lindenwald. Observe the old-fashioned wall paper put on in Van Buren's time. The pattern is of hunting scenes. In this hallway the former president received notable men of the United States and other countries

NEW YORK

1 One of the beautiful vistas on Lake George

2 Launch race course on Lake George

NEW YORK

211

useful labor, known as the Anti-Loafing Law; prohibiting the use in public schools of any textbooks containing seditious matter or mate¬ rial showing disloyalty to the United States ; authorizing the State food commission to deal in food, and thus regulate the price, and prevent¬ ing the taking of excess profits known as profiteering. Attempts to have the legislature ratify the National Prohibition Amendment and to pass a minimum wage bill for women and minors and one for restoring the State nominating convention for certain offices failed.

1919. Alfred Smith, governor. Exactly 4,000 bills were introduced at this legislative session, but comparatively few became law. The fact that the governor was a Democrat and the legislative houses both Republican had much to do with the seeming barrenness of the legis¬ lative program. At times a few Republican senators bolted their party and enabled the gov- nor to get through some of his measures.

In his message Governor Smith had recom¬ mended certain social and industrial welfare legislation, most of which failed of passage. On the other hand, his recommendations for in¬ creases in salaries of school teachers in both rural districts and cities went through, as did also the measure for co-operating with New Jersey in the matter of constructing a vehicular tunnel under the Hudson River between New York and New Jersey, and for reorganizing the public service commission in New York City.

The legislature ratified the Federal Prohibi¬ tion Amendment, passed bills imposing an in¬ come tax, providing for the instruction of il¬ literates and non-English-speaking persons over 16 years of age, establishing State scholarships for soldiers, sailors and marines in the Great War and providing for a bridge over the Mo¬ hawk River at Schenectady known as the Great Western Gateway.

Bills providing for municipal ownership of public utilities, for leasing State hydro-electric power to private corporations and for the sale of 3 per cent beer failed of enactment.

Executives of New York as Colony and

State

FIRST DUTCH PERIOD.

Adriaen Jorisszen Tienpoint, Director1

Cornelis Jacobzen Mey, Director .

William Verhulst, Director .

Peter Minuit, Director General .

Bastiaen Jansz Krol,2 Director General Wouter Van Twiller. Director General.

William Kieft, Director General .

Petrus Stuyvesant, Director General…

4 May March April 28 March 11 May

1623

1624

1625

1626

1632

1633 1638 1647

FIRST ENGLISH PERIOD.

Richard Nicolls, Governor . 8 Sept. (N. S.) 1664

Francis Lovelace, Governor . 17 August 1668

SECOND DUTCH PERIOD.

Cornelis Evertse and a council of war. . 12 Aug. (N. S.) 1673 Anthony Colve, Governor General. ... 19 Sept. (N. S.) 1673

SECOND ENGLISH PERIOD (EARLY COLONIAL).

Edmond Andros, Governor . 10 Nov. (N. S.) 1674

Anthony Brockholls, Lieutenant-Gov¬ ernor . 16 November 1677

Sir Edmond Andros, Governor . 7 August 1678

Anthony Brockholls, Governor . 13 Jan. (N. S.) 1681

Thomas Dongan, Governor . 27 August 1683

Sir Edmond Andros,3 Governor . 11 August 1688

1 Under Dutch rule the powers of government, civil and ecclesiastical, were vested in the director of the West India Company and his council.

2 Previously director and commissary at Fort Orange.

3 Governor of New England, New York and New Jersey.

Francis Nicholson, Lieutenant-Governor 9 October

Jacob Leisler, Lieutenant-Governor. . . 3 June 1689

Henry Sloughter, Governor . . . 19 March 1691

Richard Ingoldesby, Commander-in-

Chief . 26 July 1691

Benjamin Fletcher, Governor . 30 August 1692

Earl of Bellomont, Governor . . . 2 April 1698

John Nanfan, Lieutenant-Governor .. . 16 May 1699

Earl of Bellomont, Governor4 . 24 July 1700

Provincial Council 5 . 5 March to 19 May 1701

John Nanfan, Lieutenant-Governor. . . 19 May 1701

Lord Cornbury,6 Governor . 3 May 1702

Lord Lovelace, Governor . 18 December 1708

Peter Schuyler, President of Council… 6 May 1709

Richard Ingoldesby, Lieutenant-Gov¬ ernor . 9 May 1709

Gerardus Beekman, President of Coun¬ cil . 10 April 1710

Robert Hunter, Governor . 14 June 1710

Peter Schuyler, President of Council. . . 21 July 1719

William Burnet, Governor . 17 September 1720

John Montgomerie, Governor. ..... 15 April 1728

Rip Van Dam, President of Council. . . 1 July 1731

William Cosby, Governor . . . . . 1 August 1732

George Clarke, President of Council. . . 10 March 1736

George Clarke, Lieutenant-Governor. . 30 October 1736

George Clinton,7 Governor . 22 September 1743

THIRD ENGLISH PERIOD (PRE-REVOLUTIONARY).

Sir Danvers Osborne, Governor . 10 October 1753

James De Lancey, Lieutenant-Governor. 12 October 1753

Sir Charles Hardy, Governor . 3 September 1755

James De Lancey, Lieutenant-Governor. 3 June 1757

Cadwallader Colden, President of Council 4 August 1760 Cadwallader Colden, Lieutenant-Gov¬ ernor . 8 August 1761

Robert Monckton, Governor . 26 October 1761

Cadwallader Colden, Lie'utenant- Gov¬ ernor. . . 18 November 1761

Robert Monckton, Governor . 14 June 1762

Cadwallader Colden, Lieutenant-Gov¬ ernor . 28 June 1763

Sir Henry Moore, Governor . 13 November 1765

Cadwallader Colden, Lieutenant-Gov¬ ernor . „ . 12 September 1769

Earl of Dunmore, Governor . 19 October 1770

William Tryon, Governor . 7 April 1774

Cadwallader Colden, Lieutenant-Gov¬ ernor . 9 July 1771

William Tryon, Governor . 26 June 1775

James Robertson,8 Governor . 23 March 1780

Andrew Elliott,8 Lieutenant-Governor. . 17 April 1783

GOVERNMENT BY THE PROVINCIAL CONGRESS.

Peter Van Brugh Livingston . 23 May 1775

Nathaniel Woodhull, President pro tem. 28 August 1775 Abraham Yates, Jr., President pro tem. . 2 November 1775

Nathaniel Woodhull . 6 December 1775

John Haring, President pro tem . 16 December 1775

Nathaniel Woodhull . 12 February 1776

John Haring, President pro tem . 19 June 1776

Nathaniel Woodhull . . 9 July 1776

Abraham Yates, Jr., President pro tem. . 10 August 1776

Abraham Yates, Jr . 28 August 1776

Peter R. Livingston . 26 September 1 776

Abraham Ten Broeck . 6 March 1777

William Smith, President pro tem . 9 April 1777

Pierre Van Cortlandt, Vice-President. . . 11 April 1777

Leonard Gansevoort, President pro tem. 18 April 1777

Pierre Van Cortlandt, Vice-President. . . 21 April 1777

Abraham Ten Broeck . 28 April 1777

Pierre Van Cortlandt, President Council

Safety . 14 May 1777

STATE GOVERNORS.

George Clinton .

John Jay . .

George Clinton .

Morgan Lewis .

Daniel D. Tompkins. . . John Tayler (acting) . . . De Witt Clinton .

Democratic-Republican.

1777-95

1795-1801

1801-04

1804-07

1807-17

1807-17

1817-22

4 Died 5 March 1701.

3 Before 1709 the administration of government, when the offices of governor and lieutenant- governor were vacant, was vested in the council, the right to preside being lodged in the eldest councillor.

« From 1702 to 1738 New York and New Jersey had a joint

executive .

7 John West, seventh Lord De La Warr, was appointed

governor in June 1737, and resigned the title in September 1737; but he never came to this country or qualified for the office. . .

8 A military governor during the Revolutionary War, not recognized by the State of New York.

state governors — concluded.

Joseph C. Yates .

De Witt Clinton .

Nathaniel Pitcher (act'g)

Martin Van Buren .

Enos T. Throop (acting)

Enos T. Throop .

William L. Marcy .

William H. Seward .

William C. Bouck .

Silas Wright .

John Young .

Hamilton Fish .

Washington Hunt .

Horatio Seymour .

Myron H. Clark .

John A. King .

Edwin D. Morgan .

Horatio Seymour .

Reuben E. Fenton .

John T. Hoffman .

John Adams Dix .

Samuel J. Til den .

Lucius Robinson .

Alonzo B. Cornell .

Grover Cleveland .

David Bennett Hill (act¬ ing) . . . .

David Bennett Hill ….

Roswell P. Flower .

Levi P. Morton .

Frank S. Black .

Theodore Roosevelt. . . . Benjamin B. Odell, Jr. .

Frank W. Higgins .

Charles E. Hughes .

John Alden Dix .

William Sulzer .

Martin H, Glynn (act'g) Charles S. Whitman. . .

Alfred E. Smith .

Nathan L. Miller .

Democratic-Republican.

u »

ti a

Democrat .

«

U

U

Whig .

Democrat .

it

Whig .

Democrat .

Whig .

Republican

U

Democrat . Republican Democrat . Republican Democrat .

a

Republican Democrat .

it

U

U

Republican

U

U

Democrat .

U »

a

Republican Democrat . Republican

1823-24

1825-28

1828- 29 1829

1829- 30 1831-32 1833-38 1839-42 1843-44 1845-47 1847-48 1849-50 1851-52 1853-54 1855-56 1857-58 1859-62 1863-64 1865-68 1869-72 1873-74 1875-76 1877-79 1880-82 1883-85

1885

1886-91

1892-94

1895-96

1897-98

1899-1900

1905-06

1907-10

1911-12

1913

1913-14

1915-18

1919-20

1921-

Bibliography. — History : Alexander, D. S., Political History of the State of New York0 (3 vols., New York 1906-09) ; Broadhead, J. R., (History of the State of New York) (rev. ed., 2 vols., New York 1871-74) ; Dougherty, J. H., Constitutional History of the State of New York) (2d ed., New York 1915) ; Earle, A. M., Colonial Days in Old New York5 (New York 1896) ; Griffis, W. E., < Story of New Nether- land5 (Boston 1909) ; Irving, W., (History of New York from the Beginning of the World to the End of the Dutch Dynasty by Diedrich Knickerbocker > (New York 1902) ; Janvier, T. A., (Dutch Founding of New York) (New York 1903) ; Lincoln, C. Z., Constitutional His¬ tory of New York5 (5 vols., Rochester 1906) ; Lossing, B. J.,

(New York 1913) ; Cram, G. F., ˆDescriptive Review of the Commercial, Industrial, Agricul¬ tural and Historical Development of the State of New York5 (New York 1913-14) ; Hasse, A. R., (Index of Economic Material in Docu¬ ments of the States of the United States: New York, 1789-19045 (Washington 1908) ; Tarr, R. S., (Physical Geography of New York State5 (New York 1902) ; Publications of the New York Academy of Sciences (New York 1881 et seq.) ; Publications of the State Geolog¬ ical Survey (Albany 1838 et seq.) ; (Natural History of the State of New York5 (22 vols., Syracuse 1842-79). Hugh Hastings,

Formerly New York State Historian.

Revised by James Sullivan, Director of the Division of Archives and His¬ tory of the University of the State of New York.

NEW YORK, N. Y., the chief city of the United States; its largest aggregate popula¬ tion, its richest financial centre and market, its greatest

commercial port and its most produc¬ tive manufacturing area. Moreover, New York holds the same proud position relatively in the whole world. No other city has so large a population within equivalent boundaries ; no other city controls so great monetary wealth or buys and sells so great a value of commodities ; no other city handles so large a volume of for¬ eign commerce; and no other city manufac¬ tures an equal value of commercial articles.

Topography. — The city of New York is located on New York Bay, at the mouth of the Hudson River, and extends to and along the Atlantic Ocean eastwardly from the bay. The whole of the East River and of the Harlem River and the southwesterly end of Long Island Sound are included within its boundaries. The larger part of the city lies east of the Hudson, but Staten Island, lying adjacent to the New Jersey shore, and forming the southwestern shore of the Upper Bay and the northwestern shore of the Lower Bay, is an important sec¬ tion of the city. (The East River, so-called, is not a river in the strict meaning of the word, but a strait connecting the Upper Bay with Long Island Sound. Since the cutting of the ship canal between it and Spuyten Duyvil Creek, Harlem River has become a similar tidal connection between the Hudson River and the East River. Other bodies of water lying within the city limits are Newtown Creek, Wallabout Creek, Jamaica Bay, Bronx River and Hutchin¬ son River, besides several smaller streams.

Population. — The people composing this greatest of all cities, by the State census of 1915, numbered 5,047,221. Numerous complaints of omissions on the part of the State enumerat¬ ors led to a city census by the police department ■which placed the number at 5,585,772. In 1920 the Federal census placed the number at 5,620,048. This population is made up of three principal groups, the largest being the foreign-born white ; the second in size being the native whites born of foreign parentage; the third, the native whites of native parentage. The lat¬ est authoritative figures by which these groups may be differentiated are those of the United States census of 1910. In that year the num¬ ber of foreign-born whites was 1,927,713, out of a total of 4,766,883, or 41 per cent. These foreigners represented over 60 different nations,

Southern Portion

OF

NEW YORK CITY

SCALE

U> ‘4 M y*

Rand-McNnlljr e llsH Mu|> of the Southern Portion of >‘e» York Cite

Copyright by Rand -McNally £ Co.

EXPLANATION

Steam R. R . .

Elevated R. R . –

Rapid Transit Tunnel- • ‘ ‘ ‘ ‘] \ ) | [[Trolley R. R . . . .

■queen BBonoi

QUEEN«teOSO

j 7ro^—

y|P

■SXSJl

172 RtCHCATi

‘OUT

%*ido\ V

mmm

‘fcff’Rlj

.SuBvv;

.

■

<«

...

‘

• « ;

■ . .

‘

‘ ■

>•

the largest groups being: Russians, 483,580; Italians, 340,524; Germans, 279,242; Irish, 252,- 528; Austrians, 193,203; English, 78,119; Hun¬ garians, 73,336; Swedes, 34,948; Rumanians, 32,210 ; Canadians, 26,025 ; Scots, 23,098; Nor¬ wegians, 22,251; French, 18,261; Swiss, 10,415; Turks, 9,982; Greeks, 8,004; Danes, 7,989; Finns, 7,400; and of all others — Mexicans, Welsh, Portuguese, Belgians, Spaniards, Bul¬ garians, Australians, Montenegrins, Serbians, South Americans and Central Americans — 24,969. The group of native born of foreign parentage numbered 1,820,141. The native’ whites of native parentage numbered 921,318. Negroes numbered 91,709, and Chinese, Japa¬ nese and natives of India, 6,012.

The growth of the city, at first slow, has been in a constantly increasing ratio. In 1650 the population was 1,000; at the time of the Revolution it was 22,000; it reached 100,000 in 1815, and 696,115 in 1850. The increase be¬ tween 1850 and 1890 was 300 per cent; between 1900 and 1910 there was an increase of 1,329,- 681 or 26 per cent. The official census for 1920 gives 5,620,048. Within the last two or three years the annual increase in New York’s population has been about 150,000.

Composition. — Greater New York is com¬ posed of five boroughs, each being coextensive with a county of the State. The borough of Manhattan constitutes New York County; the borough of Brooklyn, Kings County; the bor¬ ough of Queens, Queens County; the borough of The Bronx, Bronx County; the borough of Richmond, Richmond County.

The Borough of Manhattan comprises Man¬ hattan Island, on which the city of New York was originally founded, together with Black¬ well’s Island, Randall’s Island and Ward’s Island in the East River; Marble Hill, north of the Ship Canal, and Governor’s Island, Bed- loe’s Island and Ellis Island in the Upper Bay. Its aggregate area is 21.9 square miles.

The Borough of The Bronx lies on the mainland of New York State to the north and northeast of Manhattan Island, extending from the Hudson River

on the west to the East River and Long Island Sound on the east, and northward to the boundaries of Yonkers, Mount Vernon and New Rochelle in Westches¬ ter County. Included in its domain are the Brothers Islands, North and South, and Riker's Island, in the East River; and City Island, Hunters' Island and Hart's Island in Long Island Sound. Its total area is 38.87 square miles.

The Borough of Brooklyn, formerly a sepa¬ rate city, and the fourth in population in the United States at the time of its consolidation with New York, occupies the southwestern ex¬ tremity of Long Island, between the East River and the Atlantic Ocean, and includes Coney Island, which is the southernmost outpost of Long Island, and a part of the numerous islands in Jamaica Bay. It covers an area of 80.95 square miles.

The Borough of Queens, also on Long Island, extends around Brooklyn to the north, northeast and east, from Newtown Creek at the East River, along the latter to and along Long Island Sound, and by a devious line across Long Island embracing the former municipalities of Long Island City, Newtown,

College Point, Corona, Whitestone, Flushing and Jamaica, reaches the ocean at Far Rock- away, which is also included. It includes Ber- rian Island in the sound, and the remainder of the islands in Jamaica Bay not within the boundaries of Brooklyn. It is by far the largest of the boroughs, comprising 121.11 square miles.

The Borough of Richmond covers Staten Island, Shooters' Island, Prall's Island, Meadow Island, a part of Buckwheat Island, and a few low-lying marshy islets to the west and north, and Hoffman and Swinburne islands in the Lower Bay.

Intercommunication. — The East River, on account of its width the most serious barrier to intercommunication between Brooklyn and Queens on the one side and New York and The Bronx on the other, was for many years crossed only by ferries at several intervals along its shores. It is now spanned by four monumental bridges, ranking as to length of open span with the largest in the world. Three of these, connecting New York with Brooklyn, are suspension bridges ; the fourth, connecting New York with Queens Borough, is a massive cantilever structure. The traffic figures of these bridges afford the best idea of the activ¬ ity of the population which they serve. An official count made by the city on 28 Oct. 1920 showed that the daily both-ways traffic amounted to 919,166 passengers (in surface cars, elevated and subway railway cars, vehicles and afoot) ; 11,464 subway and elevated railway cars; 13,864 surface cars; and 45,579 vehicles. The Brooklyn Bridge, from Park row in Man¬ hattan to Sands

and Washington streets in Brooklyn (6,016 feet), carried 161,239 passen¬ gers, of which number 1,928 were pedestrians; 3,844 elevated railway cars ; 5,856 surface cars ; and 5,188 vehicles. Manhattan Bridge, from the Bowery at Canal street, Manhattan, to Nas¬ sau street near Bridge street, Brooklyn (6,855 feet), carried 253,264 passengers, of whom 932 were pedestrians ; 2,740 elevated and subway railway cars; 735 surface cars; and 20,785 vehicles. Williamsburg h Bridge, extending from Clinton street, Manhattan, to Havemeyer street, Brooklyn (7,308 feet), carried 404,229 passengers, of whom 981 were pedestrians ; 3,680 elevated railway cars; 5,971 surface cars; and 1,748 vehicles. Queensboro Bridge, from Second avenue at 59th and 60th streets, Man¬ hattan, to Crescent street, Long Island City, Queens (7,449 feet), carried 100,434 passengers, of whom 967 were pedestrians; 1,192 elevated railway cars; 1,302 surface cars; and 17,858 vehicles. The completion of these bridges re¬ sulted in the closing of some of the former ferry lines between the Brooklyn and Manhat¬ tan sections, 'but there are still in operation eight ferries across the East River, which, in 1916, transported 15,535,598 passengers be¬ tween Manhattan and Brooklyn ; 5,364,858 be¬ tween Manhattan and Queens; and 21,449 be¬ tween The Bronx and Queens. Two pairs of subway tunnels for electric cars connect Man¬ hattan with Brooklyn, and one pair Manhattan with Queens.

Communication between Manhattan and The Bronx is maintained by eight roadway bridges, two elevated railway bridges and two pairs of subway tunnels, all crossing the Har-

lem River and its connecting ship canal. These bridges each carry a both-ways traffic ranging from 25,000 to 40,000 persons daily, besides a vehicle traffic of from 3,000 to 12,000, and from 450 to 3,000 surface cars.

The principal transportation systems con¬ necting the various parts of the city are the subway lines, which, in part, are also elevated lines, or, more correctly, make use of elevated structures where engineering exigencies demand it. The long, narrow island of Manhattan has two subway lines, one near the east side of the island, the other near the west side. I he former is known as the Lexington Avenue line and the latter as the Seventh Avenue-Broadway line. These are both four-track lines in the lower part of the city, local trains making frequent stops using the two outer tracks, and express trains, making few stops, the inner tracks. A very large part of the service of the local trains is the gathering of passengers between the express

stations, at which points nearly the entire load of the local train will disembark and continue their journey on the express trains; with the result that the express stations in the lower part of the city suffer extreme congestion at the (

Besides the subways Manhattan has four longitudinal lines of elevated railroad in the lower part of the city — the Second Avenue and Third Avenue lines on the east side and the Sixth Avenue and Ninth Avenue lines on the west side. At 53d street the Sixth Avenue line joins the Ninth Avenue, which continues by a somewhat devious route to a terminal at 155th street and Eighth avenue. The Sec¬ ond Avenue line joins the Third Avenue line at 129th street, and thence trains continue to 183d street in The Bronx. These elevated structures carry a central third track on which express trains are run southward in the morn¬ ing and northward in the evening. With the exception of Fifth avenue, Park avenue and part of Madison avenue, practically every ave¬ nue running lengthwise of lower Manhattan has a line of surface cars. Fifth avenue is served with the double-decked motor busses of the Fifth Avenue Coach Company, running from two lower downtown terminals — Wash¬ ington square and the Pennsylvania Railroad station (32d street) — along Fifth avenue to 110th street and Riverside Drive from 72d street to 135th street, and upper Broadway to Fort George (190th street).

The movement of travel over these transit lines is so great as to amount to congestion, not

only in the <(rush hours® but at other times through the day. Several of the lines run all night and are well patronized at all hours. In 1916 (the latest complete figures available) the subway systems carried 371,505,318 pas¬ sengers; the elevated roads 312,246,796; the surface cars, 426,619,631 ; and the Fifth ave¬ nue busses, 16,223,042. The Bronx surface-car lines, most of them connecting with the Man¬ hattan lines, carried 84,535,787.

In Brooklyn and Queens the transit lines spread out fanwise to cover the more expan¬ sive territory. The Fourth Avenue subway serves South Brooklyn and reaches 57th street in Manhattan by a subway under Broadway; from there it turns eastward to Queens. The northeastern section is served by elevated and surface lines radiating from the great bridges and tunnel termini. The Brooklyn travel in 1916 amounted to 207,098,269 elevated and sub¬ way. passengers, and 336,226,568 surface-car passengers. In Queens the surface cars carried 51,326,414 passengers on lines independent of the Brooklyn lines. Other lines not accounted for in this classification carried 2,473,643 pas¬ sengers. The total number of fare-paying passengers in the Greater City, exclusive of

those traveling on the Long Island Railroad to local stations, amounted to 1,898,735,615 ; the number traveling on transfers amounted to

364,219,050.

Communication with Richmond Borough is maintained by a municipal ferry line, running from Battery Park, Manhattan, to Saint George, Staten Island. The distance is about five miles. This ferry in 1916 carried 16,941,312 passengers and 407,587 vehicles. From Saint George several lines of surface cars traverse the island.

Communication with New Jersey points on the west shore of the Hudson is accomplished by a number of ferries operated by the railroads whose terminals are on the New Jersey side of the river, and by the tunnels of the Hudson and Manhattan Railroad, popularly known as the (

New York City is connected with the coun¬ try at large by several trunk-line railroads, two of which, the New York Central and the Penn¬ sylvania systems, have stations in the heart of Manhattan. The Erie, West Shore, New York, Ontario and Western, Lackawanna, Central Railroad of New Jersey and Lehigh Valley sys-

terns have terminals on the New Jersey shore, opposite Manhattan, and connected intimately with the city by both passenger and freight fer¬ ries. Ihe New York, New Haven and Hart¬ ford trains use the Grand Central station as a passenger terminal, and this line has a con¬ nection with the Pennsylvania Railroad's yard in Queens over the New York Connecting Rail¬ road's viaduct and bridge over the East River at Hell Gate.

Principal Streets and Buildings.— The

borough of Manhattan, within which is com¬ prised the business and civic centre of the city, is laid out above 14th street in rectangular streets, but exhibits at its lower end a peculiar huddle of short streets laid out apparently with¬ out plan, and short blocks of almost every con¬ ceivable shape and size. This condition is a legacy of the days when the great city was a country town whose rambling roads were held in their purposeless confines by the title deeds of the adjacent "lots,® destined to be the most valuable in the world. Out from the southern boundary of this tangle springs straight away to the north, New York's most popular street, Broadway. It is the one thoroughfare which traverses the city from end to end — from the Battery to the extremely northerly boundary at the

Yonkers line, 16 miles distant; and it con¬ tinues into and through the latter city under the same name. A few blocks to the north of its starting point Broadway passes the westerly end of Wall street, known by name at least, the world around. As the location of the great financial interests of the nation, its influence has so ex¬ panded during the European War that it may now truthfully be styled the financial centre of the civilized world. Wall street is not much of a street in its dimensions. It is but little more than 30 feet in width, and its length is less than half a mile. Two short blocks from its Broad¬ way terminus, Broad street branches off toward the south, extending the financial area some¬ what in that direction ; while toward the north Nassau and William streets offer additional frontage for some of the thickly clustering banking institutions.

Half a .mile north of Wall street Broadway passes to the west of the City Hall in its snug little park, with Park Row and Printing House Square to the east, of some fame as the home of several of the great metropolitan newspapers. Beyond the City Hall, Broadway makes a bee¬ line for Tenth street, where its bend toward the west is marked by Grace Church and its rec¬ tory in a spacious lawn. In this leap of one and three-eighths miles has been passed another of New York's historically famous streets, the Bowery. It lies parallel with Broadway and a few blocks to the eastward. A scant quarter- mile to the west lies old "Greenwich Village,® another maze of short and crooked streets run¬ ning hither and yon, as did the highways and byways in the olden time when the village flour¬ ished as a choice residence suburb of the grow¬ ing city. Four blocks above Grace Church Broadway is halted by Union Square which lies squarely across it, but beyond the Square it forges on again in a northwest trend, and with many a slight swing to east and west, follow¬ ing the route of the old Albany Post Road. Above Fourteenth street the mathematical devo¬ tion of the city's engineers is in evidence in the

rigidly rectangular blocks of uniform width, and differing in length only as compelled by the location of the starting points of the longitudi¬ nal avenues. Broadway alone refuses to follow the path of rectitude, but goes meandering diag¬ onally across block, street and avenue for over three miles before it consents to run parallel with any of the surveyors' lines.

At Twenty-third street Broadway intersects Fifth avenue, another of New York's most famous streets. The latter has come from the Washington Arch on Washington Square, nearly a mile to the southward, and from this point runs straight to the Harlem River, at 141st street, a total distance of nearly seven miles. Broadway continues onward in its char¬ acteristic bias to Thirty-third street where it crosses Sixth avenue at an acute angle, and this is one of the busiest section of the city, the terminal of the Hudson tubes, the location of the largest department stores, and with some of New York's

most famous hotels within a stone's throw. The far-famed building of the New York Herald stands in the narrow angle between the two streets, and Broadway passes to the west of it, expanding at this point to a magnificent width worthy of its name. At 43d street Seventh avenue is crossed and from this point almost to Central Park, at 59th street, is called the "Great White Way® from the thou¬ sands upon thousands of electric lamps woven into scores of scintillating advertising signs of most ingenious construction, bordering it along this stretch. At 59th street Broadway joints its area with that of Eighth avenue to form the spacious Columbus Circle, at the south-western entrance to Central Park. From this junction Eighth avenue continues along the west side of the park under the name of Central Park, West; presenting along its western border a series of palatial apartment houses of majestic height and ornate construction. Broadway emerges from the Circle with its diagonal bent which it pursues to 78th street, where it is but two blocks from the Hudson River. From this point it bears toward the east, running between and nearly parallel to West End avenue on the west and Amsterdam avenue on the east. At 104th street Broadway resumes a devious course swinging now toward the Hudson and again away from it, with now and then a majestic stretch of noble width dividing on either side of a median line of grassy parklets. Eventually it crosses the Harlem River at Kingsbridge into The Bronx, and thence runs to and along the western edge of Van Cortlandt park, and so into Yonkers at 262d street — a total distance from its starting point at Bowling Green of nearly 16 miles, the longest continuous street in any city in the world.

The cross streets of Manhattan north from the Greenwich village zone are numbered con¬ secutively and this decorous arrangement is continued through the western section of The Bronx to the Yonkers line, in the immediate vicinity of the park, but between Broadway and the river, here a distance of somewhat more than a mile, there is a delightful area where the streets partake of the character of the in¬ definitely winding roads of a great park. Be¬ tween the Harlem and the Bronx rivers there are many little tangles of streets marking the former "cross roads® of village settlements,

the spaces between filled in with "city blocks® of parallel sides and with right-angled corners. East of the Bronx River there were only a few oldtime country roads to disturb the surveyors, and the layout of the streets is quite mathemat¬ ical in design. ■;

In Brooklyn, aside from the splendid park¬ ways mentioned in another

section, perhaps the most notable street is Flatbush avenue, which traverses the borough from the East River on the northwest to Jamaica Bay on the southeast, in a nearly direct line. As now laid out Flat- bush avenue is nearly eight miles long, and its extension across Jamaica Bay, from island to island, will add another mile, or more. It is a thoroughfare of handsome width, and in the old Flatbush section is bordered by mansions set in spacious grounds. Myrtle avenue is an¬ other of Brooklyn's longest streets, extending from Borough Hall about eight miles to the Queens boundary at Forest Park. Broadway is the principal street of the former Williams- burgh section, and is five miles in length. In the development of South Brooklyn, Fourth avenue, with its subway, has become one of the most important business thoroughfares: it is six miles in length.

In the borough of Queens one of the oldest as well as the longest streets is Jackson avenue, running from the southwest corner of the bor¬ ough at Newtown Creek northeastward six miles to Flushing Creek, and thence onward through the former town of Flushing nearly six miles further to the city boundary. Queens Boulevard is a spacious avenue, starting a mile from the East River, as an extension of 12th street, and running in a tortuous line in a gen¬ erally southeasterly direction seven miles to its junction with the old Jamaica turnpike, now Jamaica avenue. The Grand Central Parkway is referred to in the section treating of the city's parks.

The notable buildings of New York may be classified within three groups: (1) the Sky¬ scrapers,® or tall steel-frame structures ; (2)

those prominent because of architectural excel¬ lence and beauty; (3) those of historic interest. The last-named class will be discussed in the section of this article treating of the history of the city.

The development of the skyscraper type was due to the immense demand for office room in the limited area of lower Manhattan. Compe¬ tition for this area raised the value of the land per square foot to such figures that only a very tall building could return a profitable income from the investment. The same condition was the cause of the clustering of these great build¬ ings chiefly in the downtown section, where office room was most in demand. As seen from the rivers on either side of the island this group of towering structures is dominated by the pro¬ digious mass of the Equitable building, on Broadway at Pine street. It is of 37 stories, and reaches a height of 485 feet six inches above the sidewalk. Reckoning by floor space this building is the most spacious in the world. The tallest point in this particular group is reached by the tower of the Singer Building, near by, a pile of 41 stories attaining an eleva¬ tion of 612 feet. The slender proportions of this building are augmented by the bulk of the City Investing Building standing close beside it, with 34 stories and a height of over 486

feet.

The southern outpost of this architectural uplift is the noble Whitehall building facing Battery park on the south and the Hudson River on the west, its 32 stories marking a height of 424 feet. The western sentinel of the group, West Street Building, standing among others of modest ele¬ vation, reaches a height of 300 feet, 23 stories.

In the eastward edge of the group is the Bank¬ ers' Trust building of 39 stories, its striking pyramidal roof attaining the level of 539 feet above the curb. The northern escarpment is formed by the sheer white walls of the Western Union building, 28 stories, and 403 feet in height. Within the confines thus outlined, and exceeding 300 feet in height are the Adams building, 32 stories, 424 feet; the American Ex¬ press Company building, 32 stories, 415 feet; Hanover National Bank building, 22 stories, 38a feet; Liberty Tower, 32 stories, 385 feet; Amer¬ ican Bank Note Company building, 28 stories, 374 'feet ; "Sixty Wall Street,® 26 stories, 346 feet; Commercial Cable Company, 21 stories, 317 feet; "Eighty Maiden Lane,® 25 stories, 315 feet; and the Columbia Trust building, 23 sto¬ ries, 305 feet. A score of others, upward of 200 feet in height, add to the mass of this clus¬ ter of skyscrapers. For a few blocks north of this main group there is a scattering of gigan¬ tic buildings, foremost among them the Wool worth building, of 51 stories, its tower reach¬ ing 750 feet in elevation above the sidewalk. This is New York's tallest building, and, in¬ deed, is the tallest structure in the world ex¬ cepting the Eiffel Tower in Paris.. Eastward are the Saint Paul building, 26 stories, and 308 feet high; the Park Row building, 29 stories, 309 feet, and the Sun building, 23 stories, 306 feet. About 200 yards north of the latter is the immense Municipal Building, housing 36 of the city departments and bureaus. It covers the two city blocks from Tryon Row to Duane street, spanning Chambers street at Centre street with a great triple arch. It has 41 sto¬ ries and is surmounted with a tower and statue, bringing its height to 560 feet. The other area in which skyscrapers have become notably nu¬ merous is along 42d street at its junction with Broadway, and in the neighborhood of the Grand Central Station. The tallest- of these buildings is the Bush Terminal Sales building, reaching a height of 460 feet. Others of re¬ markable proportions are the Times Building, 28 stories, 410 feet; the Heidelberg building, 30 stories, 410 feet; Architects' building, 32 sto¬ ries, 390 feet; the Hotel Commodore, 28 sto¬ ries, 330 feet; the Biltmore Hotel, 26 stories, 305 feet; the World Tower, 29 stories, 335 feet; and the Lewisohn building, 22 stories, 298 feet. A number of other office buildings in the close vicinity of the Grand Central Station, ranging from 20 stories upward, are between 250 and 300 feet in height. In other parts of the city the skyscraper is only occasional: the most im¬ portant of these isolated examples being the Metropolitan Life building, 700 feet high; and for several years the tallest

building in New York. However, 12 to 20-story loft buildings are quite common, and give a characteristic impression of imposing massiveness and sub¬ stantiality.

Among the buildings which have been com¬ mended for their architectural excellence there are a goodly number in the heart of the down¬ town business district. Prominent among them

NEW YORK CITY

Copyright 1911 by F. W. Woolworth

The Woolworth Building (Cass Gilbert, Architect)

NEW YORK CITY

‘

i? n \v

*n *11 m*

n ii m

Hil’

‘ i 1 ifi

The New Municipal Building. The City Hall m the Foreground

NEW YORK CITY

The New York Custom House

NEW YORK CITY

-

mem®®®

: ■

mml 4

Ml, ;

B

jj:

.«% I

‘sit i

P 1

v ” 9

9k|$ –

Ti\i

Wfi

Pi

|3 *

,

WH „ 1

■ |kk

*■%> .-w , • „ «

1 Museum of Natural History

2 United States Treasury

NEW YORK CITY

217

are the Custom House, at the southern end of Broadway; the Produce Exchange, nearly opposite; Trinity Church, at the head of Wall street ; the United States sub-treasury, on Wall and Nassau streets; the National City Bank, occupying the majestic granite building at Wall and William streets, erected about 1840 for the Merchants’ Exchange, and covering a whole block; the chastely substantial banking house of J. P. Morgan and Company, at Wall and Broad streets; the elegant marble Stock Ex¬ change across the way on Broad street; the New York Clearing House, a handsome mar¬ ble structure on Cedar street; and the Chamber of Commerce, of granite and marble, on Liberty street. Farther north is the unique city hall, built of marble, and cherished as an especially fine and pure example of

the architecture of the early 19th century. The Hall of Records near by is also notable for its architectural merit. In this connection the peculiar elegance of the great Woolworth building should be mentioned as a most successful combination of an ecclesiastic treatment of the utilitarian de¬ sign of the multicellular office 'building. Grace Church on Broadway at 11th street and the Church of the Ascension at Fifth avenue and 10th street deserve special mention in this classification. On Madison square, East, at 25th street, is the exquisite building of the New York State Appellate Court; and two blocks north, Madison Square Garden, noted for its old Spanish facades and tower. The Knicker¬ bocker Trust Company building, on Fifth ave¬ nue at 34th street is of a noble type, and the Tiffany and Gorham buildings at 37th and 36th streets are masterpieces of adaptation of digni¬ fied models to modern business requirements. A block away toward the east is one of the choicest architectural gems of the city, the Morgan Library on 36th street. It is of white marble and of classic type. The Herald build¬ ing, modelled after a famous Italian palace, at Broadway and 35th street; the Knickerbocker Building, at Broadway and 42d street; the sculp¬ tured front of the New Amsterdam theatre; and Murray's (restaurant) — all of these are of special architectural interest. The Hotel Astor, a block above must also be included in this group.

The superb New York Public Library build¬ ing is discussed and illustrated in a separate article.

The Grand Central Station on 42d street and Park avenue is one of the city's finest achievements of the architect's skill — a rare combination of massive solidity and grace. The Biltmore Hotel, although a skyscraper, is a fine architectural production. On Fifth ave¬ nue at 43d street is the Temple Emanu-El, a notable development of the Saracenic motive. The Collegiate Church of Saint Nicholas at 48th street; the great Saint Patrick's Cathedral, 50th to 51st streets, and Saint Thomas's Church at 53d street — all on Fifth avenue — and the newly completed Saint Bartholomew's Church on Park avenue at 50th street, are each in their peculiar style superior examples of the church-builder's art. Fifth avenue in this sec¬ tion still retains some of the elegant mansions of the wealthier residents, notable among them being the Vanderbilt homes at 51st and 52d streets and at 58th street. The immense Plaza

Hotel on 59th street facing Central Park be¬ longs in the class of New York's superlative buildings. At 62d street and Central Park West is the uniquely beautiful Century Theatre. Above 59th street, on both sides of Central Park are churches, hotels, clubs, apartment houses and private residences, too numerous for individual mention. Note must be made, however, of the great cathedral-like church of Saint Paul the Apostle (Roman Catholic), on Ninth ave¬ nue, 59th and 60th streets. It is regarded

as one of the most majestic in the city.

A rapid review of the buildings of salient importance and excellence in this upper sec¬ tion of the city would include : the American Museum of Natural History, on the 77th street side of Manhattan square ; the Metropolitan Museum of Art, on the Fifth avenue side of Central Park, at 82d street ; the 8th Regiment Armory on Park avenue at 94th street ; the cathedral of Saint John the Divine, on Amster¬ dam avenue, 110th to 113th street; Columbia University Library, 116th street near Broad¬ way; the College of the City of New York, Amsterdam avenue, 138th to 140th streets ; and the Hispanic Society's building on 155th street near Broadway. Lesser buildings of distinc¬ tion throughout the city would number hun¬ dreds, but the necessary limit of this article prevents any particular reference.

Parks, Parkways and Playgrounds. — The park area in the greater city comprises 7,818.66 acres, valued at over a half a billion dollars. This area is well distributed, the larger parks, however, being in the newer sections. Man¬ hattan has 32 sizable parks covering 1,487 acres, of which some 200 acres are still unimproved. The largest single area is Central Park, 843 acres, lying between Fifth avenue on the east and Eighth avenue on the west, and extending from 59th street on the south to 110th street on the north. It represents a cost to the city of over $15,000,000. In the southwestern part is a playground and carrousel for children, and beyond is the common lawn of 16 acres. The menagerie is in the southeastern part. The Mall is a broad parade over a quarter of a mile long, bordered by double rows of great elm trees and adorned with a number of statues, busts and other sculptures. The Ter¬ race, a pile of richly carved masonry, with a spacious staircase connects the Mall with the lake, a picturesque body of water covering five acres. Beyond the lake is the Ramble, of 36 acres. Farther north is the Belvedere with its tower of stone, standing at the south end of the city reservoirs. To the left is seen the American Museum of Natural History (q.v.), located in Manhattan square, west of the park. Opposite the lower reservoir and to the east is the Obelisk, and near it, on Fifth avenue at 82d street stands the Metropolifan Museum of Art (q.v.). The upper reservoir extends across nearly the whole width of the park and is half a mile in length. North of it lies the spacious North Meadow, an unbroken sward of nearly 20 acres. The Harlem Mere, a lake of about 12 acres, fills out the northeast corner of the famous park. The other principal parks in Manhattan are Riverside Park, lying along Riverside Drive and overlooking the Hudson River, from 72d street to 129th street, 140 acres ; Morningside Park, 31.2 acres; Battery Park,

21.2 acres; Mt. Morris Park, 20.2 acres; Thomas Jefferson Park, \Sl/2 acres. Besides these are the unimproved High Bridge Park, 75.8 acres; Fort Washington Park, 40.8 acres; and Saint Nicholas Park and its extension, 27*4 acres; Riverside Drive extension, 24 acres; and an unnamed park area of 23 acres north of High Bridge. Besides the smaller parks not specifically mentioned here Manhattan has 55 playgrounds scattered about its demesne.

Brooklyn has 54 parks and playgrounds, covering a total area of 1,153 acres. Prospect Park, 526 acres, is the largest and is farfamed for its peculiar beauties of landscape and re¬ markable display of flowers, as well as for its wonderful views of New York's unequalled harbor. The larger of Brooklyn's other parks are Dyker Beach Park, on Gravesend Bay, 139.8 acres ; # Gerritsen Basin, on Jamaica Bay, 123 acres; Brooklyn Botanic Gardens, 61.39 acres; Coney Island Concourse, 59.7 acres ; Highland Park, 46.05 acres; McCarren Park (and play¬ ground), 38.4 acres; Canarsie Park, 30.5 acres; Fort Greene Park, 28.9 acres, and Sunset Park, 24.5 acres. Brooklyn has 16 parkways, the most famous being Ocean Parkway, from Pros¬ pect Park to Coney Island, Fort Hamilton Parkway, from Prospect Park to Fort Hamil¬ ton, and the Shore road, from Coney Island to Fort Hamilton.

The borough of the Bronx has the largest parks as well as the largest park acreage in the city — a total of 3,929 acres. Pelham Bay Park, in the extreme northeastern section com¬ prises 1,756 acres with eight miles of water front; Van Cortland Park, lying along the eastern side of Broadway on the northern boundary of the city, famous for its golf links, 1,132 acres; Bronx Park, on the Boston road at 180th street. 719 acres; Crotona Park, 155 acres; Claremont Park, 38 acres; Saint Mary's Park, 34 acres; and Macomb's Dam Park, 27 acres. In the southeastern section of Bronx Park an area of 264 acres is devoted to the New York Zoological Park, the largest of its kind in the world in point of space and number of specimens. There are 28 buildings and 14 groups of open air corrals, dens and aviaries. On 1 Jan. 1918, 1,130 species were represented bv 4,054 living specimens. The number of persons visiting the collections in 1917 was 1,898,424. An area of 380 acres in the north¬ ern part of Bronx Park constitutes the New York Botanical Garden, in which are extensive classified plantations, large greenhouses and a botanical museum with many thousands of specimens of vegetable growth of all preserv- able kinds. The Bronx is especially rich in parkways. The Bronx River Parkway Reser¬ vation is the largest of these, extending from the northerly line of the botanical garden along both banks of the Bronx River 15*4 miles to the Kensico reservoir. The Grand Boulevard and Concourse connects the

Central Bridge district of Manhattan with the Mosholu Parkway. Its approach is through Cedar Park, 400 feet wide, for three-fourths of a mile and thence 182 feet wide, for 4ˆ4 miles. The Mos¬ holu Parkway connects Van Cortlandt Park with Bronx Park: it is 600 feet wide and two and one-third miles long. The Bronx and Pelham Parkway connects Bronx Park and Pelham Bay Park : it is 400 feet wide and nearly four miles long. Spuyten Duyvil Parkway runs

from Van Cortlandt Park to and southward along the crest of the high ground, two and one-half miles to the heights north of Spuyten Duyvil Creek: it is 180 feet in width. Crotona Parkway is three-fourths of a mile in length, and 100 feet wide, running along the westerly boundary of Crotona Park.

Queens borough has 1,178 acres in parks. Forest Park is the largest, 536 acres, and is a fine piece of natural woodland, nearly all in the wild state. The Jacob Riis Park at Nepon- sit (on the sea) has an area of 263 acres. Of the other park enclosures, Kissena Lake Park (Flushing), 88 acres; Baiseley's Pond, 75 acres; Highland Park, 65 acres, and Astoria Park, 56 acres, are the largest. Queens has also the magnificent Grand Central Parkway traversing the entire width of the borough from Forest Park eastward, eight miles to the city line.

Richmond has but four oarks, the only large one 'being Silver Lake Park of 56 acres; most of this is unimoroved.

Monuments and Sculptures. — The most widely known of New York's monuments is the Statue of Liberty on Bedloe's Island in the Upper Bay. Thousands of pictures of this statue have been scattered broadcast all over Europe, as well as in this country. Next to that in 'point of wide familiarity is probably Grant's Tomlb, on Riverside Drive. The Obelisk in Central Park is also well known. The Washington Arch, at the Fifth Avenue en¬ trance to Washington Square, is the noblest of the city's monumental structures. The Maine Memorial Monument, at the southwestern en¬ trance of Central Park, is of modern design and imposing proportions, a highly creditable con¬ struction of granite, marble and bronze. The Worth Monument, at 26th street, in the angle between Broadway and Fifth avenue marks with a simple granite shaft the grave of Gen¬ eral Worth. The more important of the other monuments in Manhattan are the Soldiers and Sailors' Monument, and the Firemen's Memorial on Riverside Drive, at 89th street and 100th street, respectively. Among the statues should be first mentioned the equestrian statues of Washington, at Union Square; of Sherman, at the southeast entrance to Central Park; of General Siegel, and of Joan of Arc on River¬ side Drive. Scattered about the city, chiefly in the parks, are statues of Columbus, Benja¬ min Franklin, Daniel Webster, Horace

Greeley, Garibaldi, Alexander Hamilton, Farragut, Shakespeare, Lafayette, and the group of Sir Walter Soott and Robert Burns (in Central Park). Busts are much more numerous and include among others those of Audubon, Bee¬ thoven, Edwin Booth, William Cullen Bryant, Darwin, Ericsson, Washington Irving, Mazzini, Commodore Peary, Schiller and Verazzano. Prominent among the sculptures are The Pil¬ grim, The Still Hunt, The Indian Hunter and The Falconer — all in Central Park. The Bethesda Fountain on the Esplanade in Central Park, the Pulitzer Memorial Fountain, the Strauss Memorial and the Richard Morris Hunt Memorial exemplify another type of sculpture in which the city is very rich. The great bronze memorial of Commodore Vanderbilt, 150 feet long and 30 feet high, is on the wall of the Varick Street terminal.

Brooklyn has a magnificent memorial arch of the Soldiers and Sailors' at the main en-

trrU\xf to Prospect Park, a fine equestrian statue ot Washington on the plaza of the Williams- burgh Bridge, the Lincoln Memorial with a seated statue, and the Prison Ship Martyrs' Monument in Fort Greene Park. See Brook¬ lyn.

Municipal Service and Improvements. —

l he streets of New York have a total length of 3,543 miles, of which 2,226 miles are paved. The total length of the city's sewers is 1,577 miles. The department of street cleaning which takes care of the streets and the removal of rubbish, garbage and ashes, employs about 3,000 sweepers popularly known from their white duck uniforms as <(white wings,® while 1,800 drivers collect the refuse. The annual cost of this department is $3,450,000. The gar¬ bage is converted into grease and fertilizer on Barren Island in Jamaica Bay, the ashes and rubbish are used as "land filler,® 65 acres of land having thus been reclaimed at Riker's Island in Long Island Sound. The department of water supply, gas and electricity, supervises the illumination of the city by private companies and supplies water of which Greater New York consumes daily (1918) 617,000,000 gallons; over 100 gallons for each person. The city owns its waterworks including 2,984 miles of mains, ex¬ clusive of the high pressure fire mains, more than 100 miles. The water supply of Manhat¬ tan, received formerly only from the Croton watershed with an area of 360 square miles, 30 miles north of the borough, is supplemented since 1916 by the Catskill aqueduct 92 miles long, tapping the watersheds of the Esopus and Rondout creeks, in

the southern Catskills af¬ fording an additional capacity of 700,000,000 gallons a day and bringing the city's daily sup¬ ply up to 955,000,000. The Catskills water is distributed to all of the boroughs of the city. The Ashokan reservoir on Esopus creek, 12 miles from Kingston, has a water surface of 12.8 square miles and an average depth of 50 feet. When full it holds enough water to last the city 335 days at the present rate of consumption and is used for impounding the water. The Kensico reservoir is used for storing the water; the Hill View reservoir in Yonkers for equal¬ izing and distributing, while the terminal reser¬ voir at Silver Lake on Staten Island 225 feet above sea-level, is used for distributing. The entire cost of this gigantic undertaking, includ¬ ing the watershed area purchased was $138,- 154,089. The cost of the Croton water system was $192,021,000, making the entire outlay for the city's water supply up to 1918, $330,175,089. As the need arises it has been arranged to con¬ nect the watersheds of the Schoharie and the Catskill creeks with the Ashokan aqueduct, thus insuring an abundant supply for many years to come. There is no municipal lighting system. The city contracts with the commercial com¬ panies for this service. In 1918 the cost was $825,000 for gas and $2,330,000 for electricity. The city supports free public floating baths on the Hudson and East rivers, which are used annually for five to six million baths between June and September. There are also free in¬ terior permanent baths. All these conveniences help to keep the city death rate down to about 14 per 1,000. The birth rate is 21.60 per 1,000. The police department numbered in 1918, 10,- 884 men. The waterfront is protected by patrol steamers, launches and skiffs, active principally

at night. In 1918 the arrests numbered 187,913. The department in that year cost $20,146,892. The fire department in 1918 numbered 5,039 paid men, with 931 volunteer firemen in Queens and Richmond. Horse drawn apparatus has been almost entirely replaced by motor equip¬ ment. The cost of the fire department in 1918 was $9,119,285.

Industries and Manufactures. — The in¬ dustries of New York are of the widest vari¬ ety. The city's industrial supremacy is due chiefly to its immense volume of light manufac¬ turing, most of it done in small factories. The United States Census of Manufactures for the year 1914 reported 29,621 manufacturing estab¬ lishments of factory grade, covering 288 of the 317 listed industries of the entire country. Of the whole number, 12,643 employed less than six hands, and 7,834 between 6 and 20 hands. Only 25 had more than 1,000 hands ; 72 from 500 to 1,000; 191 from 250 to 500; 689 from 100 to 250; 1,360 from 50 to 100; and 3,456 from 20 to 50 hands. The entire number of persons occupied in manufacturing was 732,790, of whom 585,279 were wage-earners ; receiving annually as wages and salaries the sum of $510,710,600. Of the wage-earners 384,861 were males and 196,144 were females. Workers*

under 16 years of age numbered 3,746. The capital invested aggregated $1,626,104,312. The cost of materials used was $1,229,155,000; the value of products was $2,292,832,000. The horsepower employed was 550,962. The fuel used was 2,116,527 tons of anthracite and 2,305,- 909 tons of bituminous coal ; 212,291 tons of coke ; 3,697,136 barrels of oil and gasoline ; and 2,138,068,000 cubic feet of gas. The wholesale manufacture of clothing leads in point of value of product; over half ot the clothing worn in the country being made in New York City. The value of women's clothing produced in 1914 was $339,842,534; and of men's clothing $192,112,240. Printing and publishing held second place in value, with a total of $215,570,- 953. Slaughtering and meat packing came third, amounting to $110,706,686. Then follow, in the order of the value of the output : Bread and bakery products, $80,056,218; foundry and machine shop products, $77,898,295 ; tobacco manufactures, $75,406,362; millinery and lace goods, $70,800,274; malt liquors, 856,311,597; gas, for illuminating and heating, $42,299,984; patent medicines and druggists' preparations, $30,156,169; coffee roasting and spice grinding, $29,860,995; paints and varnishes, $29,276,898; fur goods, $29,070,984; confectionery, $28,554,- 524; copper, tin and sheet-iron products, $27,- 621,308; boots and shoes, $26t161,767; men's furnishing goods, $25,861,559; musical instru¬ ments and materials, $25,130,161; furniture and refrigerators, $22,994,450; lumber and timber products, $20,568,367; and jewelry, $20,467,868. Sugar refining, the smelting and refining of copper and the refining of petroleum were also among the industries whose production reached a value of above $20,000,000; but exact figures are withheld as tending to disclose private af¬ fairs. Other leading industries in which the value of the production reaches large figures are: silk goods, soaps, leather goods, electrical machinery, food preparations, paper and fancy boxes, chemicals, gas fixtures, hosiery and knit goods, marble and stone work, artificial flowers and feathers, and ship and boat building. Allied

to the printing trade also are the fine litho¬ graphing, engraving and map making in which New York holds first place in America.

Trade and Commerce. — Nature and man have made New York the main portal of the foreign commerce of the United States, its com¬ mercial supremacy being due in large part to its harbor facilities as well as to its geographical location. The city has a water front of 578 miles, divided among the boroughs as follows : Manhattan, 48.2 miles; Brooklyn, 201.5 miles; Queens, 196.8 miles ; Bronx, 79.8 miles ; Rich¬ mond, 57.1 miles.

The exigencies of the Euro¬ pean War so greatly increased the commerce of the port as to strain severely the accommoda¬ tions of the water front; of which only 103 miles are now occupied by docks. The wharf¬ age on Manhattan has been within recent years improved by huge piers, notably the range of Chelsea docks, 800 to 850 feet long, extending from 12th to 22d streets, and the 1,000-foot piers between 44th and 59th streets. Large sec¬ tions of the Hudson River front on the New Jersey side are owned by the great railroad cor¬ porations but some of the largest steamships find spacious berths along that shore. Across the East River on the Brooklyn shore are the docks of sugar refineries, factories, warehouses, government storage houses, the famous Brook¬ lyn navy yard, with its great dry docks, and the South Brooklyn terminal basins for canal boats; while the shores of Staten Island also are lined with docks and fringed with piers. In the calendar year 1918 the foreign commerce of the port of New York amounted to $3,- 856,312,551 — the value of the imports being $1,294,414,573, that of the exports, $2,561,897,- 978. As the imports of the whole United States were valued at $3,031,307,721, and the exports at $6,149,392,647, it is seen that New York handled nearly 43 per cent of the imports and more than 41 per cent of the exports of the nation. During the fiscal year ended 30 June 1918 the number of merchant ships entering the harbor of New York was 4,182. Of these, 3,647 were steamers aggregating 10,446,601 tons, and 535 were sailing vessels, totaling 496,488 tons. There are 99 ocean steamship lines hav¬ ing their headquarters in New York, and 38 lines of river and coastwise steamers, operat¬ ing between New York and points on the At¬ lantic and Pacific coasts, Long Island Sound and the Hudson River, and ports in Central and South America, Europe, Africa, Asia and Aus¬ tralia. The port of New York is also the freight terminal of the main line of the Cen¬ tral Railroad of New Jersey, the Pennsylvania, the New York Central, the Erie, the New York, New Haven and Hartford, the West Shore, the Delaware, Lackawanna and Western, the New York, Lake Erie and Western, the Long Island and the New York, Ontario and Western railroads. See New York, Harbor of.

Government. — The charter of New York, as revised, by the legislature in 1901, follows, in the main, the lines of the charter of the old city, with important provisions adopted from the charter of the former city of Brooklyn and from those of other American and Euro¬ pean cities. The greater part of it is the law as it has existed for half a century, and the chief changes have to do with the adoption of the borough system , and the policy of giving

control to localities over their own affairs. The executive power is vested in the mayor, the presidents of the boroughs and the heads of the departments. The mayor, who holds office for four years and is eligible for

re-election, appoints the heads of departments and commis¬ sioners, except those over which the presidents of the boroughs have jurisdiction, and except also the comptroller or head of the department of finance, who is elected by the people. He can, with few exceptions, remove any official appointed by him, and can himself be removed by the governor, after a hearing upon charges. The mayor has the power of veto over all ordi¬ nances and resolutions of the board of aider- men, but an ordinance or resolution can be passed over his veto by a vote of two-thirds of the members of that body, except that when it involves the expenditure of money, the cre¬ ation of a debt or the laying of an assessment,

a, three-fourths vote is required. The president of each borough holds office for two years. He presides over each local board in his bor¬ ough, with the right to vote on and of veto ever its actions, and is ex-officio member of the board of estimate and apportionment. He is also a member of the board of aldermen and has the same right to vote as any member elected to that body. The borough president appoints and may at pleasure remove a com¬ missioner of public works for his borough with control of all matters relating to the improve¬ ment and repair of streets and sewers. He also has control of the public buildings in his borough except schools, hospitals, peniten¬ tiaries and fire and police stations, and exer¬ cises the supervision vested in the city over the construction of buildings in his borough, except such powers as are directly vested in the tenement-house commission. The borough presidents also are removable by the governor. The board of estimate and apportionment, be¬ sides the functions implied by its name, acts as a general board of directors of the city, deter¬ mining its policy as to financial affairs, public improvements, franchises and special permits, in which matters it has practically the sole authority. The departments of administration comprise: 1, the board of estimate and appor¬ tionment; 2, finance; 3, law; 4, police; 5, fire;

6, water supply, gas and electricity; 7, street cleaning; 8, plant and structures; 9, parks; 10, docks and ferries; 11, public charities; 12, correction; 13, health, including an import¬ ant division of child hygiene ; 14, tenement house; 15, education; 16, taxes and assessments; 17, licenses.

Courts. — The city is included in two of the State judicial districts: the first district is co¬ extensive with the counties of New York and Bronx; the second district includes (among other territory) the counties of Kings, Queens and Richmond. These are thus a part of the jurisdiction of the Supreme Court of the State. In the first district there are 32 resident jus¬ tices ; in the second district there are 18. There is also a County Court for each county in the city; a city court, with 10 judges; a Court of General Sessions, with seven judges; a Court of Special Sessions, with 12 justices; a children's court, with five justices; 24 munici¬ pal courts; and 41 city

magistrates. The appel¬ late division of the State Supreme Court has its courthouse in the city; and there are head-

Copyright, Underwood & Underwood, N. Y.

NEW YORK STOCK EXCHANGE, WALL STREET

NEW YORK CITY

quarters here of two Federal district courts — the Southern of New York and the Eastern of New York; and here also is the seat of the federal Circuit Court of Appeals of the sec¬ ond district. 1 here is also a Surrogate's Court in each county included in the Greater City.

Finances and Banking. — The total assessed valuation of property within the city in 1918 was $8,591,053,726 — $8,339,638,851 real and $251,414,875 personal. This was distributed among the boroughs as follows :

Manhattan Brooklyn . . The Bronx. . Queens. Richmond.

Real.

$5 ,094,601 ,238 1,826,813,885 726,129,198 591,599,075 100,495,455

Personal.

$194,775,200

39,683,575

7,257,100

7,909,400

1,689,600

In ˆ addition to this tangible wealth the city's tax commissioner listed in 1918 taxable franchises in the several boroughs as follows : In Manhattan, $262,825,592 ; in Brooklyn, $92,- 659,654; in the Bronx, $32,097,927; in Queens, $27,479,195; in Richmond, $4,411,730 — a total of $439,474,098. The gross funded debt on 1 Jan. 1919 was $1,506,595,699. The exempt funded debt was $330,960,860 and the net sink¬ ing fund, amortization and redemption funds amounted to

$456,301,050, leaving the total con¬ stitutional funded debt, within the debt limit, $719,293,759; as against the constitutional bor¬ rowing limit (10 per cent of the assessed valu¬ ation) of $833,964,285. The receipts of the city treasury for the year 1918 were $754,897,785 and the expenditures $738,012,373.

The chief sources of income are property taxes, special assessments, franchises, water rates, docks, ferries and subways. Valuable franchises granted to private companies do not in all cases return a proportionate in¬ come to the civic treasury. There are 44 national and 48 State banks, 54 savings banks and 35 trust companies in the city, some of them having several branch establishments. The New York Clearing House Association is com¬ posed of 44 banks and 15 trust companies, as¬ sociated for the purpose of exchanging the checks and drafts they hold against each other. The clearing house is at 77 Cedar street, where it has been in operation since 1853. Banks not members of the association may clear through members. The clearing house transac¬ tions for the fiscal year ended 30 Sept. 1918 amounted to: Exchanges, $174,524,179,929 ; balances adjusted, $17,255,062,671 ; total trans¬ actions, $191,779,241,700. The average daily transactions amounted to : Exchanges, $575,- 987,390; balances, $56,947,402; total $632,934,- 791. For many years the leading savings bank was the Bowery Savings Bank, which in 1918 reports total deposits of $104,422,370 in 142,200 accounts, and a surplus of $16,771,270. But in recent years this bank has relinquished first place to the Emigrant Industrial Savings Bank, with total deposits of $168,880,510 in 185,225 accounts, and a surplus of $14,683,520. There are 11 life and 32 fire and marine insurance companies in the city, besides a number of companies engaged in casualty, credit, fidelity and surety and real estate title insurance. The best known of the city's financial institutions is the Stock Exchange, an association for the exchange of securities for currency or its rep¬ resentatives. The securities bought and sold at the New York Stock Exchange are certifi¬

cates of stocks and bonds issued under national, State or municipal authority, or by corporations doing business as common carriers, or in bank¬ ing, mining, manufacturing or other industrial pursuits. In 1918 the par value of shares sold by the exchange was nearly 14 billions, and that of bonds sold $2,093,257,500. The chief business of its members is buying and selling these stocks and bonds for outside clients, the charge being one-eighth of one per cent on the par value of every transaction. The Stock Exchange is limited to a membership of 1,200. Before 1868 seats on the New York Stock Exchange were not transferred by purchase and sale, but an initiation fee of $3,000 was required from mem¬ bers. In 1868 the transfer system was instituted and the seats began to have a market valuation. All new members are now admitted through transfer, "seats®

being worth from $65,000 to

$75,000.

Education and Intellectual Associations. —

The city has 515 elementary schools; 154 in Manhattan, 179 in Brooklyn, 56 in The Bronx, 95 in Queens and 34 in Richmond. It also has 24 high schools, 4 training schools for teachers, 2 truant schools and 4 vocational schools. The average attendance of pupils in the elementary schools in 1918 was 755,033; in the high schools, 70,366; in the vocational schools, 2,241; in the training schools, 1,029. The annual school ap¬ propriation for 1919 was $46,104,330, of which $37,589,098 was for salaries of teachers num¬ bering 22,100. Besides evening schools, free lecture courses, recreation centres, summer vacation schools and playgrounds and special classes for foreign children are maintained; also rapid progress classes for those in advance of their grade; working paper classes for those who must have extra help to be entitled to working papers ; while there are over 140 special classes for the education of mental^ defective children. Prominent among the city's higher institutions of learning are the College of the City of New York, popularly known as City College, founded in 1848 as the Free Academy, and for many years on 23d street, now housed in splendid Gothic buildings erected at a cost of about $4,000,000 on Harlem Heights between 136th and 138th streets and Amsterdam avenue. Free tuition is given by about 250 in¬ structors to an average attendance of 7,000 students at an annual cost of about $250,000. On Cathedral Heights at 116th street is Co¬ lumbia University founded by royal charter from George II in 1754 under the name of King's College. This institution is also noted for its fine modern buildings and affiliated con¬ nections. The instructors number 1,162 and the average 1918 attendance of students in all departments was 17,604, including the summer school of 5,600, and membership in the exten¬ sion courses of 4,500. On University Heights on the east bank of the Harlem River is New York University, founded in 1830, and for many years located on Washington Square and Uni¬ versity Place, where the Law school is still located. Prominent among the university buildings is the classic Hall of Fame, the gift of Helen Gould, dedicated to the perpetuation of the names of famous Americans. In 1918 the average attendance was 7,778 students, with 493 instructors. At 69th street and Park avenue is Hunter College (named after its first principal, Dr. Thomas Hunter), formerly the

Normal College, founded in 1870 as a free city institution to train girls as teachers ; the aver¬ age attendance of students in 1918 was 1,386, and the number of instructors, 120. Note¬ worthy also are Fordham University, Manhat¬ tan College, the College of Saint Francis Xavier, the Union Theological Seminary, the General Theological Seminary of the Protestant Episco¬ pal Church, and the College of Physicians and Surgeons, while a majority of the hospitals have training schools for nurses. Chief among many institutions of private endowment, is the Rockefeller Institute for Medical Research, en¬ dowed by John D. Rockefeller with $4,000,000 for the advancement of the science of medicine by laboratory investigation, experiment, clinical observation and study. Important factors also in the city's educational development are 163 public and subscription libraries, including the New York Public Library (q.v.) with its 46 branches and the museum collections of many societies. Numerous also are the art and literary associations; chief among them the Na¬ tional Arts Club with 1,450 members; the Art Students League with 1,557 members; the School Art League of New York City with 626 members and 2,790 juniors; the Salmagundi Club of 800 members ; the Fine Arts Federation of New York, an association of 15 art societies; the National Academy of Design; the Univer¬ sity Club, with 3,800 members; the National In¬ stitute of Arts and Letters; the New York His¬ torical Society; the American Geographical So¬ ciety; the Hispanic Society of America and the Authors' League of America; while there are 30 dramatic and 61 musical clubs, 180 social clubs and as many theaters. Mention also should be made of the many social settlements, some attached to churches, others of a secular nature, found in different thickly settled sec¬ tions of the city, studying and ministering to the needs of their neighborhoods in recreation, hygiene, education, industry and politics.

Churches. — New York is the see of the Roman Catholic and Russian Greek Catholic archbishops, and of a Protestant Episcopal bishop. In 1918 Greater New York had over 1,700 churches and religious societies. These were distributed as follows: Manhattan and The Bronx, 815; Brooklyn (called the (

The Disciples of Christ, Moravians, Uni- versalists, Unitarians, Friends and Christian Scientists each have a number of fine churches. There are also many independent organizations representing every form of religious belief. The finest church building is the Roman Catho¬ lic cathedral in Fifth avenue. The New Prot¬ estant Episcopal Cathedral of Saint John the Divine, located on Morningside Heights, now partially completed and opened for worship, will be when finished the costliest church edifice in America. Of the others the most notable is Trinity Church, on Broadway at the head of Wall Street, which has the longest continuous history of anv parish in the city. It was in 1697 that William and Mary granted a parcel

of land (

way,® for use ((as the parish church an.d church¬ yard of the parish of Trinity Church within our said city of New York.® The church built on this grant was first occupied in 1698. De¬ stroyed in the fire of 1776, the church was re¬ built 12 years later on the original site; but the second building was found to be unsafe in 1839, and in 1846 was replaced by the present structure. The church maintains eight chapels and aids 10 other mission churches in various parts of the city, and conducts industrial and training schools and classes and several guilds.

Charities.— All of the city's charitable in¬ stitutions except those under the board of health and the association of the Bellevue and Allied hospitals, are administered by the de¬ partment of charities superintended by a com¬ missioner. Institutional relief is given but no money nor home supplies. The city gives in addition about $4,000,000 to religious and pri¬ vately managed hospitals and asylums that re¬ ceive the city's poor. Largest among the charit¬ able institutions of the city is the Charity Or¬ ganization Society, which is supported by volun¬ tary contributions and legacies and serves as a centre of inter-communication between various churches and charitable agencies, to avoid over¬ lapping. There are 32 hospitals, refuges and asylums which receive State or municipal aid, and 170 hospitals and dispensaries supported by voluntary contributions and private endow¬ ment. Thirty-eight institutions and associations are conducted for the relief of the aged, and 140 for the relief of children. In the latter class mention should be made of the Children's Aid Society, organized in 1853, which has pro¬ vided 75,000 boys and girls with homes and places of employment, and in its industrial schools given aid and instruction to over 115,000 children; the New York Foundling Hospital, which is controlled by the Sisters of Charity, sheltered during 1918, 4,960 inmates and 582 homeless mothers ; and the Society for the Prevention of Cruelty to Children, by which an average of 9,000 complaints are yearly re¬ ceived and investigated. There are 26 organized agencies for the reformation of children, fallen women and intemperate men ; these include the Catholic Protectory, where 4,500 children are taught trades and industrial employment, and the House of Refuge where 1,300 boys and girls received upon commitment of the city courts, are given a common school education and in¬ dustrial instruction. Noteworthy among agencies for rendering special or temporary relief to the poor are the Grace Institute, en¬ dowed by William R. Grace in 1897 to furnish women and girls instruction in trades and occu¬ pations and which now has 900 pupils ; the Legal Aid Society, which gives free legal aid and assistance to those unable to procure the same; the Prison Association of New York, which aids reformed convicts after discharge ; the Provident Loan Society which loans on pledges of personal property at 1 per cent a month; the Baron de Hirsch

Fund for the bene¬ fit of Hebrew immigrants; 15 church and col¬ lege settlement houses, and the Sailors' Snug Harbor on Staten Island, where a home is pro¬ vided for 900 aged and decrepit sailors. Men¬ tion must also be made of the Society for the Prevention of Cruelty to Animals, founded in 1864 by Henry Bergh, and the parent of similar organizations in many other States and cities.

History.— The first white men known to have visited Manhattan Island, the future site of New York City, were Giovanni da Verrazano, an Italian sailing in the French service, and Diego Gomez, a Portuguese sailing in the Span¬ ish service, both of whom, while seeking a westerly way to the Indies in 1524, entered what is now the harbor of New York. Nothing, however, in the way of colonization came of their voyage. Eighty-five years later, in April 1609, Henry Hudson, an English adventurer in the service of the Dutch East India Company, sailed from Amsterdam as captain of the ship Half Moon , with a charge from his employers to seek a water route to the Indies by the north side of Nova Zembla. Ice early blocked his advance into the Arctic, and so, heading west¬ ward, a month's cruise brought him, in July, to the coast of Newfoundland. Thence he sailed southward to the James River, Virginia, and, again altering his course, still in pursuit of a new channel to India, came on 11 Sept. 1609 upon the river which bears his name. He an¬ chored for a time at its mouth and then sailed up the stream until warned by shoaling water that he was at the head of navigation, near the present site of Albany; whereupon he turned his vessel southward, and early in Oc¬ tober set out on his homeward voyage. Hud¬ son's account of the stores of fine peltries he had seen in the possession of the Indians moved his employers to prompt action, and in 1609 the former mate of the Half Moon was sent across to trade with the savages and report further upon the country. Handsome profits attended this venture, and in 1613 the Fortune and tire Tiger, commanded respectively by Hendrick Christaensen and Adrian Block, sailed for the Hudson River, being followed within a year by three other vessels from Amsterdam and Hoven. These carried back to Holland such generous cargoes of furs that their owners hastened to open regular communication with the Hudson River country and to establish posts at its head and at its mouth for the purchase and collection of skins while the vessels were on their voyages to and from Holland. The main post, called Fort Nassau, was located just be¬ low the site of Albany; but a smaller fort was built on Manhattan Island, its site being just south of the present Bowling Green. Captain Christaensen was appointed head man over both posts, and he and his half dozen comrades were, therefore, the first white settlers on Man¬ hattan Island. Though

Christaensen soon lost his life in a quarrel with the Indians, the trade he had helped to found grew and prospered, and soon the merchants who had first engaged in it joined with others in the formation of the United New Netherlands Company, to which, so far as the power lay with the States-General of Holland, was granted for three years from 1615 the monopoly of the fur trade with the newly-opened country. This monopoly was re¬ newed for a year at a time until 1621, when the Dutch West India Company came into existence, with chartered rights to the exclusive trade of all the coasts of both Americas. The new cor¬ poration was, speaking in a broad way, a com¬ mercial federation, with branches established in the several cities of Holland. Each branch, though subject to the collective authority of its fellows, was clothed with distinct rights and

privileges of its own, and was assigned a specific territory, over which it exercised the right of government and of trade. Thus, the post on Manhattan Island, with its dependent territory, was assigned to the Amsterdam branch, which at once addressed itself to the development of what had now come to be known as the prov¬ ince of New Netherlands. Accordingly, in 1623, 30 families of settlers were sent out from Amsterdam, and a part of them put ashore on Manhattan Island. More colonists arrived in 1625, men who had come as homemakers and not as transient traders ; and to confirm this promise of permanency Peter Minuit was ap¬ pointed director-general of the colony, with power to organize a provisional government. He arrived at his post in May 1626, at the head of another band of colonists, and having bought Manhattan Island from its Indian owners for a consideration of $24 he proceeded to christen the infant town New Amsterdam. Recalled from his directorship in 1632, Minuit was succeeded in turn by Wouter van Twiller, William Kieft and Peter Stuyvesant. A savage Indian war in Kieft's time well nigh extinguished the colony, but it made rapid recovery under Stuyvesant, who directed its affairs from 1647 to 1664, and by the year last named the hamlet on Man¬ hattan Island had become a town of 1,000 souls, under the government, organized in 1652, of a schout, two burgomasters and five schepens, while thriving settlements had sprung up on both sides of the Hudson and on the lands about the bay.

The Dutch, however, did not long retain possession of New Netherlands. The English claimed the entire continent as having been dis¬ covered by Cabot, and whenever the English and the Dutch were at war New Amsterdam had always to fear the threatened attack of some English squadron. The dreaded blow » finally fell in 1664, when Charles II resolved to seize New Netherlands by surprise. In pursuit of this purpose the king made to his brother James, Duke of York and Albany, a grant which included the whole of the Dutch possessions in America, and late in August 1664 a British squadron appeared before New Amsterdam and demanded

its surrender. The coming of the English found the town ill-prepared for a siege, and though Stuyvesant wished to fight, even against heavy odds, he was not allowed to have his way. Articles of capitulation were quickly agreed upon, and on 8 September the flag of the West India Company fell from Fort Amster¬ dam to be replaced by that of England, and Col. Richard Nicolls took possession of the town and province in the name of the English king and for the use of the Duke of York.

New Amsterdam was speedily renamed New York, and in June 1665 the city government was reorganized, in accordance with English customs, by replacing the schout, burgomasters and schepens with a sheriff, aldermen and mayor. Once again, from 30 July 1673 until 10 Nov. 1674, the Dutch were in possession of the town and province; but the Treaty of West¬ minster finally transferred them from the States-General to England ; and the permanent change of ownership was attended by a change of policy which made for the more rapid up¬ building of the town. One important act look¬ ing to this end bestowed on New York the sole

right to bolt and export flour. The Bolting Act remained in force from 1678 until 1694, and during that time it trebled the population of the town, and gave a prosperous permanency to its foreign commerce. According to the pro¬ visions of the act no person outside of the city could grind flour for market or pack breadstuffs in any form for sale. The result of this inter¬ dict was to throw the considerable and grow¬ ing export trade in breadstuffs, mainly with the West Indies, wholly in the hands of the millers and merchants of New York, so that during the 16 years that the act remained operative the city revenues more than doubled and the total number of buildings in the town increased from 384 to 983, two-thirds of which depended in one way or another on the trade in flour, while the port's sailing craft grew from 11 to 85 sloops and ships.

It was while the Bolting Act was still in force that, on 22 $.pril 1686, New York received the charter — knffwn as the Dongan charter, because granted through the governor of that name — which still forms the basis of its civic rights. The governor, under this instrument, appointed the mayor and sheriff, but the city was allowed a large quantityˆ of real estate, from some of which it draws a revenue to the present day, while the aldermen were elected by the freeholders of the six wards into which the town had been recently divided, and enacted by¬ laws for its government. The Dongan charter, amended by Queen Anne in 1708, was further enlarged by George II, in 1730, into the Mont¬ gomery charter, which, confirmed by

the as¬ sembly of the province in 1732, made New York virtually a free city. The mayor until the Revolution was appointed by the governor in council, until 1821 by the governor of the State and four members of the council of ap¬ pointment, and then for 13 years by the com¬ mon council of the city. Since 1834 he ha§ been chosen by the people.

The revolution by which, in April 1689, the crown of England passed from James II to his daughter and her husband, bred a popular up¬ rising in New York, and control of affairs passed for the time being from the Crown offi¬ cers to a committee of safety of 10 members, chosen by the citizens. This committee ap¬ pointed Jacob Leisler, a leading merchant, cap¬ tain of the fort, and invested him with the power of commander-in-chief until orders should arrive from the new sovereigns. This arrangement was opposed by the so-called Aris¬ tocratic party, whose leaders had been office holders under King James, but without effect, and the government of the town and province remained in the hands of Leisler until March 1691, when Col. Henry Sloughter, who had been appointed governor of the colony by Wil¬ liam and Mary, arrived in New York. Leisler declined to surrender the fort unless assured immunity for his acts as governor. This was refused by Sloughter, who had fallen under the empire of the Aristocratic party: many of Leisler's followers deserted him, and he was thrown into prison. A little later, with his son-in-law, Jacob Milborne, and others of his adherents, he was brought to trial charged with treason and murder. All were found guilty by a prejudiced and hostile court, and Leisler and Milborne suffered death on the gallows. Their execution was little less than a judicial murder.

Leisler's son afterward secured an order for the restoration of his confiscated estate, and, in 1698, an act was passed by the Parliament of England which canceled the judgments of the court in New York and sustained Leisler's course as governor. Three years afterward the bodies of Leisler and Milborne, denied funeral honors at the time of execution, were taken from their temporary resting place, near the present site of the Sun building, and. after lying in state in the city hall, were with impressive ceremony reinterred in a burial ground which stood in what is now Exchange place. No man knows their present sepulture.

The political turmoils of the period did not retard the growth of New York, and the open¬ ing of the 18th century found the town's popula¬ tion increased to 5,000 souls, — Dutch and Eng¬ lish nearly equal in numbers; a few French, Swedes and Jews, and about 800 negroes, nearly all of whom were slaves. Slave importation into New York began some time prior to 1628, and reached a climax about 1746, when a census of the town showed 2,400 slaves in a total of less than 12,000 population. Thereafter each year marked a lessening demand for slaves, though they continued to

be bought and sold during the entire colonial period. One reason for the decline of slave-holding and slave-buy¬ ing in New York was the dread of a servile in¬ surrection, dread which led uprisings among the blacks to be punished with unsparing hand. When, in 1712, a party of negroes, forming a wild plot to slay all the whites, met at night in an orchard near Maiden Lane, and killed and wounded a dozen men before being put to flight, 21 of those captured were shot, hung or burned at the stake. Reprisals even more sweeping at¬ tended the <(Great Negro Plot® of 1741, a panic compounded of fear, rage and suspicion, which has been likened to the witchcraft delusion at Salem village in 1692. This panic had its origin in a series of fires which in March 1741 alarmed the town, and fixed in the minds of many citi¬ zens the belief that they were the work of dis¬ affected slaves.

A short time before the indentured servant girl of a low tavern-keeper on the North River had been arrested, together with her master and mistress and two negroes, for complicity in a robbery. When a proclamation appeared offering a reward with a full pardon to any conspirator who would tell what he knew about a plot for burning the town, she saw in it a chance to regain her freedom, and ˆconfessed® that her master and mistress, along with sundry blacks and semi-criminal white, had matured such a plot as the first step in a projected upris¬ ing. It has ever since been doubted whether this plot was anything more than a figment of the imagination of a depraved and abandoned girl, but at the moment the creature's charges produced a reign of terror, and scores were jailed and put to death on little save her unsup¬ ported statements. Fourteen negroes were burned at the stake, 18 were hanged and 71 transported, while of the 20 whites thrown into prison four were condemned and put to death. Glutted with victims, the panic finally subsided in September 1741, leaving behind it one of the darkest pages in the history of the city. It would be unjust, however, to judge this affair by the standards of a later time. Fear and terror, fed by fraud, appear to have promoted

NEW YORK CITY

1 Cathedral of St. John the Divine

2 The Metropolitan Museum of Art

NEW YORK CITY

General U. S. Grant's Tomb, New York City, Overlooking the Hudson River

NEW YORK CITY

some awful mistakes, but those who committed 1 'em lived and acted under the hair-hung sword. 1 he panic of 1741, moreover, was followed by a wholesome revulsion of popular feeling in iavor of the negroes. They were admitted to the franchise within 10 years, and in 1758 the abolition of slavery in New York was prac¬ tically accomplished by an act which declared that from that time forth all children born of slave parents should be free.

During the first part of the 18th century ocean industries were what mainly contributed to New York's growth and wealth. Kalm, the Swedish traveler, records that 211 vessels en¬ tered and 222 vessels cleared from this port in 1730, and the town's river, coast and sea trade grew steadily until the opening of the Revolu¬ tion when about one-tenth of all the foreign commerce of the colonies were centred at New \ ork. But with the arrival of the British army of occupation, 15 Sept. 1776, a seven years' blight settled over the town. During this period it lost more than half of its population and all of its commerce, and was twice visited by destructive fires. These laid a full fourth part of the town in ashes, nor was anv attempt made to repair the devastation until after the British evacuation, 25 Nov. 1783. The war ended, however, the men of New York faced the future with stout hearts. ((The town is ruined by the war, but its future greatness is unques¬ tioned,® wrote one of them; and in this hopeful spirit was begun the work of building anew — a work pushed with such resolute purpose that within eight years from the town's evacuation its population trebled and its commerce re¬ gained and passed its former limit. During this period also it was for a year and a half the capital of the Federal government, and in the Federal Hall in Wall street, on 30 April 1789, Washington was inaugurated first President of the United States.

New York ceased to be the Federal capital in August 1790, but this did not retard its growth, and in 1807, by which time it had reached a population of 60,000, robust faith in its future prompted the appointment of a com¬ mission to plot the city south of 155th street substantially as it exists to-day. The commis¬ sioners, however, had hardly begun their task, duly completed in 1811, when New York was made to suffer from the chain of events which led to and attended the second war with Eng¬ land. The act of embargo passed by Congress, in September 1807, dealt what seemed at the moment a mortal blow to the prosperity of the town; and John Lambert, the English' traveler, writes that in April of the following year he found 500 vessels in its harbor lying up useless and rotting for want of employment, while the losses of the next six years bore more heavily upon New York than any other city. But with the conclusion of a treaty of peace in December 1814 the town's commerce revived on the in¬ stant, and the annual revenues of the port, which had fallen to but little more than $500,-000, shot up in 1815 to $14,000,000.

The end of another two years brought the practical inception of an enterprise to which the modern city is largely indebted for its com¬ mercial supremacy,— the cutting of a waterway from the Hudson River to the Great Lakes. The Erie Canal, begun on 4 July 1817, and completed on 26 Oct. 1825, made New York

the gateway to the commerce of half a con¬ tinent; and so profoundly did this union of the inland and the outland seas affect its growth that the year 1835 found it a city of 200,000 souls. A fire in December 1835, which caused a money loss of upward of $20,000,000, and the financial panic of 1837, were temporary checks to this growth, but only temporary ones. Gas was introduced into the city in 1825; the first street railway was set afoot in 1831, and in 1851, with the completion of the first trunk line to the Great Lakes, was inaugurated the rail¬ way service which has long made New York the seaboard terminus of all east and west lines. This was the Erie, begun in 1836, and extending from Piermont on the Hudson to Dunkirk on Lake Erie. Two years later the second trunk line connecting New York and the West, the New York Central and Hudson River Railroad, was established by the con¬ solidation of a number of shorter lines. Sev¬ eral railroads had been built meanwhile in New Jersey, connecting New York with Philadel¬ phia and other points. These in the process of time became one corporation, as the United Railroads of New Jersey, only to be in turn ab¬ sorbed by the Pennsylvania Railroad, which after 1854 connected Philadelphia with Pitts¬ burgh, thereby not only perfecting New York's connection with the Middle and Southern States, but also sending from the heart of com¬ merce an artery of traffic into the Middle Western States. The building of these and other lines called, however, for the investment of large sums of money, from which quick re¬ turns were expected, and this bred a spirit of speculation whose blighting influence spared no part of the nation. The banks of New York suspended payment from October until Decem¬ ber, trade and industry came to a standstill, and there were 5,000 failures, with liabilities exceed¬ ing $300,000,000. But confidence returned with the spring, and with it a resumption of rail¬ way construction, which, though temporarily re¬ tarded by the Civil War, has ever since tended in growing measure to strengthen New York's hold upon the business of the interior of the county. To-day 10 trunk lines terminate in New York, which is also the objective point of a major portion of the traffic of all the railroads running east and west.

New York's devotion to the Union during the Civil War found expression in many ways. A sixth of its able-bodied male citizens were in the field before the close of the first year of the struggle, while from the first the women of

the city busied themselves with efforts to care fo'r the soldiers in camp and hospital and for their widows and orphans. They led in the founding of the Sanitary and Christian commissions, and a single fair held in behalf of the former yielded more than $1,000,000. A kindred organization ministered to the neces¬ sities of refugees from the South, and a Sol¬ diers' Rest was established on the site of Madi¬ son Square Garden, where soldiers could find a temporary home while on their way to and from the front. But in no form did New York's de¬ votion to the Union find more sufficing expres¬ sion than in the labors of the Union League Club, which, founded in the closing days of 1862 on the basis of ˆabsolute and unqualified loyalty to the government, and unwaverin" sup¬ port of its effort for the suppression of the

rebellion,® counted among its members every loyal citizen of note in the town; $210,000,000 were subscribed by the bankers and capitalists of Manhattan to the loans made by the govern¬ ment between 1861 and 1865, and the major por¬ tion of this sum was furnished or secured by members of the Union League Club. There was but one blot on New York's story of splen¬ did loyalty. Proof of the existence of a turbu¬ lent element in the population had been fur¬ nished in 1849 when some thousands of rioters, taking into their own hands a quarrel between Edwin Forrest and the English actor, William Charles Macready, sought to drive the latter from the stage of the Astor Place Opera House, but were held in check by the police, fired into by the militia and finally dispersed; and the same lawless spirit found expression in an outbreak yet more ferocious in July 1863. Congress had passed a draft law that unwisely exempted from its operation all who should pay into the Federal treasury the sum of $300, and the discontent thus produced was systematically fomented in New York City by pot-house poli¬ ticians, who in bar-rooms and on street corners declared the draft unconstitutional, and that it bore with peculiar oppressiveness on the poor man. Many vowed resistance, and, borrowing courage from the fact that the city, to beat back Lee's invasion of Pennsylvania, had been de¬ nuded of all but 300 troops, made plans to at¬ tack the drafting officers. No trouble occurred on the first day of the draft, 11 July, but on the third, 13 July, an organized mob attacked and wrecked the office of the provost-marshal at the corner of Third avenue and 46th street. Then the rioters, inspired by animosity toward the negro race, made a raid on a colored orphan asylum in Fifth avenue, between 43d and 44th streets ; and though a handful of policemen aided the nurses in getting the children through a rear door to a place of safety, the building was burned to the ground. After this the mob attacked another enrolling

office at 1190 Broad¬ way, near 28th street, with 'the resultant firing and pillage of most of the shops in the neigh¬ borhood. A cry now went up to kill the police, and soon 5,000 rioters, so rapidly had the mob swelled in numbers, were marching down Broadway, bent upon the destruction of police headquarters in Mulberry street. Thomas C. Acton, president of the police board, informed of the rioters' purpose, detailed Sergeant Daniel Carpenter with 200 men to lie in wait for them. Carpenter marched his squad into Bleecker street and so to Broadway, at the same time sending detachments up the nearest parallel street east and west to strike the flanks of the oncoming mob. <(Hit for their heads, men,® were his orders. ((Hit quick and hard, and take no prisoners.® The fight that followed came soon to an end, and Broadway was cleared of rioters, save those that lay on the pavement with broken skulls. Routed at one point, how¬ ever, the mob soon rallied at another, and a few hours later, under cover of darkness, a desperate attempt was made to sack and burn the office of the Tribune in Park row. Here again the police did heroic service, and a charge led by Inspector George W. Dilks at the head of 110 men drove the rioters from the field with heavy loss in killed and wounded. Riotous feints meantime had been made upon the Seventh avenue and Centre street arsenals and

upon the armory at the corner of Second avenue and 21st street; the house of George Opdyke, mayor of the city, invaded and some of his furniture destroyed, and an attack made against that of Henry J. Raymond, editor of the Times, which had strongly supported the draft. It was clear at the close of Monday that the police force of the city was too small to cope with the lawless spirit. The mayor ac¬ cordingly called on the State and Federal au¬ thorities for aid, and all of the New York regiments at the front were ordered to repair to the city. While this order was in process of execution the mob continued its work of firing and looting houses and of maltreating and mur¬ dering unoffending negroes; but on the evening of Wednesday the returning regiments began to arrive in the city. With their coming, bayonets and bullets were substituted for policemen's clubs, and the rioters were attacked at every point with a resolute desire to do them harm. This wholesome policy, with a temoorary sus¬ pension of the draft, quelled the rioting, and on Friday 17 July the mayor was able to an¬ nounce the complete restoration of order. Two million dollars' worth of propertv had been destroyed and over 1,200 rioters slain.

New York during the last 50 years has wit¬ nessed the assembling of but one mob which the police could not handle without the assist¬ ance of the military. That was in July 1871, when the Orange lodges of the city undertook to parade on the anniversary of the battle of the Boyne. Announcement of their purpose evoked threats of violence from the Catholic Irish and fearing trouble, the governor of the State ordered five regiments of the National Guard to escort and protect the procession.

Policemen were also detailed to surround and guard it. The point of departure was the cor¬ ner of Eighth avenue and 29th street and at the appointed hour in the afternoon of 12 July the paraders began their line of march, — a de¬ tail of patrolmen in front, then a regiment and next the Orangemen, with a moving wall around them and two other regiments bringing up the rear. Before they had moved two blocks a volley of sticks and stones from sidewalks, house-tops and windows rained upon Orangemen, police and soldiery, many of whom were injured. Angered at this treatment, the members of one of the rear regiments, not waiting for orders, fired, some into the crowd and others at house¬ tops and windows. There was only one discharge, but 54 persons were slain. After this one deadly volley, police clubs and bayonets held some of the rioters at bay, while the greater number turned and ran as the reserve patrolmen along the line hastened to the scene. The re¬ mainder of the march passed without incident.

The political history of New York during the first half of the last century was a varied and turbulent one, but with a steady trend to¬ ward making the government democratic in all its branches. Until 1834, the mayor, as has been noted elsewhere, was chosen by tt^e State coun¬ cil of appointment or by the common council of the city, which method of selection brought to the office such men as Edward Livingston, Dewitt Clinton and Philip Hone. After 1834, however, the mayor was elected by the citizens, to whom in the meantime had been granted an unrestricted suffrage. A dozen years later the judiciary was also made elective and thence-

lorth most local officers were chosen in the same manner. During this period the Demo- cratic party was the one most often in power, 1 he Pederahsts, or their successors, the Whigs and Republicans now and then gained the upper land ; but in the long run the Democrats, under the leadership of Tammany Hall, a secret or¬ ganization whose social and benevolent aims had been early put aside for political ones, always recovered their hold on the reins. The first mayor chosen by popular suffrage was a Demo- ciat and so were most of his successors prior to the Civil War. A Republican in 1862 suc¬ ceeded to the office, but Tammany Hall soon legained control of the municipal government, and for several years political corruption ran riot in the city. Tammany Hall's master spirit at that period was William M. Tweed (q.v.), an able, but coarse and unscrupulous man, who tollowing 1863 organized the politicians of his own party and a number of the local Republican leaders of the baser sort

into a gigantic con¬ spiracy to plunder the city. The Tweed Ring, as it was called, attained its greatest power in- 1869, when it was master of every department, not only of the city, but also of the State gov- einroent. Its greatest scheme of robbery was the building of a new courthouse in City Hall Park. Work on this structure was begun under a stipulation that the cost should not exceed $250,000, but before 1871 $8,000,000 were ex¬ pended on it, more than $1,000,000 of this sum being traced to Tweed's pocket. The end came in 1871, when the Times exposed the operations of the ring. Then an aroused public sentiment compassed its defeat at the polls and this was followed by the prosecution and imprisonment of the chief offenders, Tweed himself dying in a felon's cell.

The material prosperity of the city has in¬ creased steadily in the last 50 years. A chief factor in the making of the New York of to-day was the construction of the elevated railway system, completed in 1880 through the efforts of Cyrus W. Field. This brought all parts of the island within easy distance of each other and the unbroken lines . of city blocks which quickly followed in its wake wrought a com¬ plete transformation in the region in and about Harlem, formerly an isolated suburb reached only by horse-car or steamboat, but now as near the heart of trade as 14th or 42d street was in earlier years.

The territorial expansion of New York has the while more than kept pace with its material development. By an act of the legislature passed in 1873, the corporate limits were carried across the Harlem and a part of Westchester County, amounting to 13,000 acres, erected in city wards. A dozen years later a movement was set on foot to include in one municipality Manhattan Island, Brooklyn, part of Queens County, Staten Island or Richmond County and yet another portion of Westchester County; and in 1890 a commission of 11 members, headed by Andrew H. Green, was appointed to inquire into and report upon the expediency of the project. The labor of the commission took shape in a bill passed by the legislature in 1894, which provided for the submission of the ques¬ tion to a vote of the people of the cities, towns and villages included in the proposed consolida¬

tion. The people gave their vote in November of the same year and only the residents of Mount Vernon and the town of Westchester failed to record their approval. Meanwhile, by act of the legislature, West Chester, East Chester, Pelham and Wakefield (or South Mount Vernon), were in June 1895 annexed to New York City, whereby another 20,000 acres were brought within the corporate limits and Westchester township's vote against consolida¬ tion rendered ineffective. This carried the city line to the limit in Westchester County recom¬ mended by Commissioner Green and his associ¬ ates and in January 1896 a bill was passed by the legislature

which made Kings County, a portion of Queens and all of Richmond integral parts of Greater New York. The same year a com¬ mission of nine members was appointed by the governor to frame a charter for the new mu¬ nicipality and report the same to the legislature; and its labors had issue in a bill which on 5 May 1897 received the signature of the governor. This measure, which took effect 1 Jan. 1898, divided the city into five boroughs — Manhat¬ tan, the Bronx, Brooklyn, Queens and Rich¬ mond, — embracing an area of a little less than 327 square miles, and counting a population in 1918 with an official estimate of 5,872,143. Thus, fulfilling its destiny, the village of 250 years ago has become the first city in the world. For, from the co-ordination of Greater New York in 1898 and the opening of the 20th cen¬ tury, no other centre of population has made the rapid strides in civic development, outlined in this article in the description of the vast and costly enterprises of intercommunicating river bridges, tunnels, railways, elevated and street railroads, the efficiency engineering of the harbor architects (see New York, Harbor of), the imposing new public and business buildings, the beautifying and extension of parks and parkways, and the varied municipal improvements and service which culminated 12 Oct. 1917 with the opening of the new Catskill aqueduct for the gigantic and unparalleled water-supply system of the metropolis.

Bibliography. — The most comprehensive and up-to-date reference work is by Rider, F., (New York City and Vicinity0 (New York 1916) ; consult also the publications of the New York Historical Society; Andrews, W. L., (The Journey of the Ioonophiles around New York in search of the historical and picturesque (New York 1897) ; (New York as Washington knew it* (New York 1905) ; Baker, A. G., Mu¬ nicipal Government of the City of New York) (Boston 1906) ; Coler, B. S., Municipal Gov¬ ernment } (New York 1900) ; Hemstreet, C., (The Story of Manhattan> (New York 1907) ; Huneker, J. G., Mew Cosmopolis) (New York 1915) ; Jenkins, S., (Greatest Street in the World; the Story of Broadway* (New York 1911) ; Lamb, M. J. R., (History of the City of New York: Its Origin, Rise and Progress* (new ed., 3 vols., New York 1910), Mabie, H. W.,(The Genius of the Cosmopolitan City) (New York 1919) ; Maurice, A. B., Mew York in Fic¬ tion > (New York 1901) ; Singleton, E., Mutch New York) (New York 1909) ; Van Dyke, J. C, (The New New York> (New York 1909)'; Van Rensselaer, (History of the City of New York in the Seventeenth Century> (2 vols., New*

York 1909); Wilson, R. R,

Charles Leonard-Stuart, Richard Ferris,

Editorial Staff of The Americana.

NEW YORK, College of the City of. See

College of the City of New York.

NEW YORK, Harbor of. As already stated under New York City (q.v.), the neces¬ sities of the European War so greatly increased the commerce of this, the most important har¬ bor on the Atlantic seaboard, that its accommo¬ dations and trade-handling facilities were over¬ strained. Serving as it does for the outlet of the enormous bulk of local manufactures, in¬ dustries, trade and the greater portion of the exports and imports of, and passing through, the States of New York and New Jersey, the development of the port had long been recog¬ nized as the concern of all of both States. The legislatures and governors of New York and New Jersey by the creation of the ((New York, New Jersey Port and Harbor Development Commission® in 1917 made effective a joint study of the Port of New York and its re¬ quirements. The old method of development with each of some 50 municipalities striving to solve the problems of the port in its own way or utterly disregarding the fact that it had any place or part in solving the problems of the port was failing utterly. With a converging network of trunk-line railroads, the communi¬ ties had grown by leaps and bounds, and the Port of New York had long handled sub¬ stantially half the foreign commerce of the country. But the trade of these communities, coming faster, almost, than it could be as¬ similated was accommodated in accordance with immediate needs, without any general direction. Haphazard facilities and methods had become institutions, as had makeshifts built around them to meet new contingencies. The result was patchwork. Obviously this prevented the best use being made of the natural advantages of the port. At the same time the port as a whole had long suffered the handicap of a differential freight rate in favor of other ports. Latterly, too, other ports had launched a cam¬ paign to get more of New York's business. The combination of circumstances had been effective, and New York's commerce had begun to slip away. While this slipping away was ˆlow, there were unmistakable indications that the campaign of the other ports had begun.

The New York, New Jersey Port and Har¬ bor Development Commission, created to study the needs of the port as a whole, was deeply impressed with its responsibility — that of de¬ vising a plan to meet the situation and to pro- provide liberally for- future trade. It assembled a large amount of data. The task of determin¬ ing the volume, method of handling and cost thereof of all traffic coming to, originating in or passing through the port

was the first phase of the investigation. To supervise and direct the execution of the final plan, the Commission prepared and urged upon the two legislatures early in 1918 the adoption of a supplementary and amendatory compact between the two States creating a permanent ((Port of New York District® and (

New York as a Port. — Succinctly sum¬ marized for comparative purposes it may be stated that New York is by far the greatest railroad, commercial and industrial center on the Atlantic seaboard. The population of the metropolitan district of New York is four times that of Philadelphia. The port has the finest harbor on the Atlantic Coast, with 780 miles of waterfront.

Three times as many railroad trunk lines come to New York as come to any other city on the Atlantic tidewater. More manufactur¬ ing industries are located in the New York dis¬ trict than in the combined cities of Philadelphia, Chicago, Cleveland and Saint Louis, and the value of the products of the New York indus¬ tries is nearly as great as the combined value of the products of those of the other four cities. Approximately half of all the foreign commerce of the United States passes through the Port of New York. This is one side of the picture, and it might seem that New York's position is unassailable — that as much business •as the port desires and can handle is bound to gravitate to it.

There is another side. New York suffers a severe handicap from the differential in rail¬ road freight rates, whereby shippers to or through the Port of New York pay more on shipments than to or through such cities as Philadelphia and Baltimore. A determined cam¬ paign is being made to divert traffic from New York, mainly on the grounds of alleged con¬ gestion and high terminal costs at New York. The effects of these things are already visible. The tonnage of New York's foreign commerce, mounting steadily from 1911, reached a peak in the year ended 30 June 1914 and has since fallen steadily. The 1918 figures are 26 per cent below those for 1914 and lower than those for 1911 or any succeeding year.

New York's percentage of the total foreign commerce of the United States fell from 52.67 per cent in 1916 to 44.68 per cent in 1917 and 42.36 per cent in 1918, the latter percentage being lower than in any year since 1911 inclusive. Fewer loaded freight cars came to New York in 1918 than in any of the four preceding years. Despite the abnormal railroad traffic in 1918 in the country at large figures compiled by the Commission's statisticians for four of the prin¬ cipal New Jersey trunk lines show that in the first 10 months of 1918 they received 7 per cent fewer loaded cars than in the same months of the slack year 1914 and 20 per cent fewer than in those months in the heavy year 1916.

Far more important than the past is the future. Our country is building a great mer¬ chant fleet. The opportunity of the country is here, for the nation to reach out and get its share of the world's trade. It must do so. Other ports are assuming that it will do so, and are prepar¬ ing to expand their facilities to handle the in¬ creased traffic. With five times the traffic of any other Atlantic port, New .York's prepara¬ tions must be vastly more elaborate, in the face of vastly greater complications arising from New York's very size and rapidity of growth. Evidently the time has passed when the needs of the Port of New York can be settled by the individual communities in the two States that constitute the Port — even by the great com¬ munity of New York City. The legislatures of

» k.i

NEW YORK CITY

! j

f!l«

1 8881

ilfesSSKK

ffiSlffiWi

Grand Central Station, New York

Reed & Stem, Saint Paul, Architects; Warren & Wetmore, Associates

NEW YORK CITY

"Liberty Enlightening the World," New York Harbor

NEW YORK, HARBOR OF

229

New York and New Jersey recognized this in creating this Commission.

Ihe ultimate aim of the Commission, there- rore, is to establish a general plan of Port operation and development that will serve as a guide for 50 years ; a plan flexible to meet t utu re conditions, but fixed as to general prin¬ ciples ; a plan supported by detailed estimates of costs and proof of its economic soundness, and accompanied by a tentative program which will meet the most urgent needs first.

Review of 1918 Report — Facts as to the organization of the Commission are set forth in the preliminary joint report, dated 26 Jan. 1918, and transmitted to the legislatures of New York and New Jersey 18 Feb. 1918. This re¬ port recites how the Commissions of three mem¬ bers each, appointed in 1917 by the governors of New York and New Jersey respectively, or¬ ganized a joint commission, the chairman being a member of the New York Commission and the vice-chairman a member of the New Jersey Commission — the purpose of the investigation, as set forth by the acts of the two legislatures, being to make an ˆinvestigation of the Port conditions at the Port of New York and to submit a comprehensive report recommending the proper policy that shall be pursued for the best interests of the entire Port of New York, and the legislation, State and Federal, that will be necessary to make such recommendations effective.®

The report of 1917 relates how the Joint Commission held meetings and conferences in 1917 with members of the Public Service Com¬ mission of New York, the Port and Terminal Facilities Committee of the Board of Estimate and Apportionment and the Commissioner of Docks of New York City, the New Jersey Board of Commerce and Navigation, the New York State Barge Canal Board, the presidents of the trunk-line railroads and various repre¬ sentatives of shipping, lighterage and warehouse business, together with engineering and legal experts of this and other ports.

It tells of inspections of the harbor, of studies of the West Side railroad terminal prob¬ lem in Manhattan, of the organization at the Commission's suggestion of the War Board for the Port of New York, of other co-operation with the Federal government.

A decision of the Interstate Commerce Com¬ mission in the New York Harbor case is re¬ ferred to, wherein that body states that ((his- torically, geographically and commercially New York and the industrial districts in the northern part of the State of New Jersey constitute a single community,® and commends the creation of this Joint Commission.

The report bounds that single community by Yonkers and New Rochelle on the north, Great Neck and Far Rockaway on the east, Perth Amboy and Sandy Hook on the south, Paterson, Newark and New Brunswick on the west.

Necessity for Port Plan. — Emphasis is laid in the report on the necessity for a definite port policy and plan, with such comparison be¬ tween the present methods of operation and whatever new methods may be recommended as will afford proof of the economic soundness of the plan and methods recommended.

Many studies and reports on phases of the

problem were made, and the Commission gave them careful consideration. At the same time it pointed out the great diversity of interests involved extending into two States and about 50 municipalities ; that no comprehensive plan for the entire metropolitan district has ever been made; and that none of the studies and reports referred to had been supported by evidence, statistics or exact analysis of income, cost of operation and net return on the proposed invest¬ ment in order to justify their economic sound¬ ness.

_ The Commission stated its purpose to ascer¬ tain the volume, route, classification and time of transit of all freight movements in the metro¬ politan district, together with the cost of handling this freight under normal conditions and with existing facilities. This, it stated would require detail consideration of many factors and a complete survey on the ground for an extended period of the principal lines of rail and water deliveries.

To arrive at the carrying charges of the present capital investment and of the new capital required for additional facilities, the Commis¬ sion pointed out that an approximate appraisal of the value of existing facilities would be neces¬ sary. Such a valuation, it was noted, would have to be available sooner or later if the States should determine that the harbor waterfront was to be publicly owned.

In addition to the preparation of the engi¬ neering, operating and financial plans, the re¬ port contended that there must be prepared a legal plan for combining the present distributed Federal, State and local powers of administra¬ tion and construction.

Extent of Investigation. — Finally, the re¬ port stated that it would take two years to com¬ plete the study, at an estimated cost of $400,000. Ihe specific recommendations of the Commis¬ sion were «that the study contemplated in the legislation creating the Commission and out¬ lined in this report be undertaken, and the re¬ port prepared, and to that end the two States of New. York and New Jersey appropriate $400,000 in equal payments covering a period of two years.®

The legislatures, recognizing the importance of studying and preparing a plan and policy for the Port of New York, appropriated $100,000 each to cover half of the program. Both ap¬ propriations became available 1 July 1918.

In its pursuit of the investigation the Com¬ mission found no reason to revise the estimate of 1917 as to the scope of the work, its probable cost

and its probable duration. The problem met in the detail execution of the analysis, the difficulties to be overcome, the inevitable delays, proved about as forecast.

Meanwhile the Commission worked out a definite program for the investigation, built up an engineering organization of about 70 persons, since funds therefor became available in July 1918, and accumulated a mass of important data bearing upon the present operating conditions at the Port.

Engineering Investigation.— On 30 April

1918, in the absence of Maj.-Gen. Georgt W. Goethals, chief consulting engineer of the com¬ mission, the consulting engineer was placed in charge of the engineering work. About 1 Tunc 1918, the Commission rented the 11th floor of

the building at 12-16 John street, New York, as its working engineer office. The engineering investigation resolved itself into three phases : (1) Study of existing conditions. (2) Analysis of the handling of commerce under existing conditions. (3) Planning of new methods and facilities.

Phases 1 and 2 were worked out together. Investigation of existing conditions divides the problem into four major headings — railroads, steamship, lighterage and trucking. In addition there are numerous incidental elements in the problem, some of them, such as the matter of markets and food distribution, being of the highest importance.

Organization of Work. — Originally the Commission intended to employ outside engi¬ neering organizations to conduct the investiga¬ tions, so as to obtain as nearly as possible a simultaneous picture of all the operations of the port. But it was perceived that this would lequire a large number of men and entail great difficulty in instructing them. To get the railroad picture alone, for example, would have taken about 1,000 men. Hence the consulting engineer recommended that he be authorized to organize a force to do this work himself and his recommendation was accepted.

An experienced railroad man was obtained on leave of absence for the period of the inves¬ tigation, and was put in charge of the main investigating force, with the title of railroad engineer. A force of 24 men was assembled quickly and divided into three squads of eight men each. On 23 July 1918 they began taking 24-hour or 12-hour observations of the

railroad operations at all yards and pier stations. This force, which was subsequently increased, com¬ pleted its railroad observations early in 1918. It was then divided up, the two sections start¬ ing the steamship and the trucking investiga¬ tion simultaneously. An advantage of the con¬ tinuing force was that it became increasingly familiar with the character of information needed and much time that would have been required for instructing four individual organ¬ izations was saved.

Specialists in their line meanwhile were em¬ ployed for the incidental studies. For assembl¬ ing auxiliary data, interpreting the information collected and preparing this and other reports a staff of accountants and statisticians as¬ sembled and developed the beginning of a drafting department to work out a general plan for the Port.

Four Major Investigations. — Railroads .— Twelve trunk line railroads were involved in the railroad investigation: the Central of New Jersey, the Lehigh Valley, the Erie, the Dela¬ ware, Lackawanna and Western; the Pennsyl¬ vania, the West Shore and the New York, Ontario and Western (the latter having traffic rights on the West Shore) on the New Jersey shore of the Hudson River, the Baltimore and Ohio on Staten Island, the New York Central on the west side of Manhattan; the New York New Haven and Hartford in the Bronx, the Long Island in Long Island City, and the Phila¬ delphia and Reading, which has a coal terminal at Port Reading, north of Perth Amboy.

The railroad investigation involved the an¬ alysis of the break-up and waterfront yards of each of these railroads, together with a study

of the local terminals and piers for both gen¬ eral merchandise and special uses along most of the waterfronts of the North, East and Har¬ lem Rivers; New York, Newark, Raritan and Jamaica Bays and the Long Island Sound.

Steamships. — The steamship investigation entailed the examination of steamship opera¬ tions of all sorts along a great part of these waterfronts.

Lighterage. — The lighterage investigation involved the study of the local-waterways trans¬ portation system, more highly developed in New York Harbor than anywhere else in the world, between ship, car and local consumer or producer.

Trucking. — Trucking is employed mainly as the final or initial stage of transportation, as the case may be, for the local consumer or pro¬ ducer. But it is utilized also to a considerable extent in trans-shipment of goods through the port. A visit to the district of lower Manhat¬ tan shows that here perhaps is the soundest basis for the charges of congestion made

against the Port of New York, and suggests the great importance of the trucking investigation.

Twenty-three Incidental Investigations. — One of the most important of the incidental investigations, and one deeply involved in the trucking investigation, was that of public mar¬ kets and food distribution. Fourteen hundred carloads each day, it is estimated, are required to feed New York and vicinity. The present system of distribution ties up a large section of lower Manhattan's most valuable water¬ front, besides filling the North River with car floats and the streets of lower New York with trucks.

Closely connected with this problem is one of the most acute problems of the port — that of the New York Central Railroad's freight line on the West Side of Manhattan. A third matter treated at some length is that of an exterior belt-line railroad in New Jersey.

Criticism has often been made of the mechani¬ cal equipment of New York harbor as compared with that of some of the European cities, and New York's equipment has been as often de¬ fended on the ground that European methods are not feasible here. Thorough analysis of New York's system is necessary and closely allied to this question are the special problems involved in the handling of building materials and grain. The operation of private terminals and of general merchandise warehouses also has an important bearing on the situation, as do the provisions, or lack of them, for the utili¬ zation by the port of the New York Barge Canal. The disposal of municipal wastes, in view of the fact that the waters of the metro¬ politan district are near the danger point from sewage and other pollution, must be given through consideration in the development of any plan which will tend to impede the disposal of such wastes, or bring population and in¬ dustries that will add further pollution. All these and numerous other elements of the prob¬ lem were studied by the engineers of the com¬ mission.

Erie Traffic Count. — The first railroad field investigation made was that of the Erie Rail¬ road. As the Erie is typical of the New Jer¬ sey trunk lines, a brief outline of the investi¬ gation will be of interest here.

The Erie is a double-track low-grade line between New York and Chicago, with branches to Buffalo, Dunkirk and Cleveland on Lake Erie, to the anthracite coal field of Pennsyl¬ vania and to the bituminous fields of Pennsyl- vama and Ohio. It taps the Great Lakes ore traffic at Cleveland

and runs through the heart of the steel district at Youngstown, Ohio. It has various other branches. In all it operates 2,400 miles of road.

Its terminal units at the Port of New York consist of a break-up and main classification yard at Croxton, on the New Jersey Meadows; an auxiliary classification yard at Little Ferry; waterfront yards with pier and other facilities at Jersey City, Weehawken and Undercliff; piers on the Manhattan waterfront at Duane and Houston streets, North River, and at Coenties Slip, East River; an interior freight station between West 28th and 29th streets and 11th and 12th avenues; a station in the Wall- about Market district, Brooklyn; traffic rights at the Harlem terminal of the Delaware, Lack¬ awanna and Western Railroad at 135th street and Harlem River, and traffic rights in common with other railroads at other private and public terminals in the harbor.

As a preliminary the facilities and their Junctions at each of these terminal units were examined and recorded. It was noted, for ex¬ ample, that Croxton yard has a working capacity of 4,708 cars ; that nearly all inbound freight comes to it and is classified according to local destination ; that in reverse order outbound freight is assembled here and classified accord¬ ing to destination ; that facilities exist for reclassifying less. than carload freight and consolidating it in other cars according to destination; that there are facilities for icing cars and for repairing crippled cars and track¬ age for ˆhold® cars and for interchange with the Delaware, Lackawanna and Western Rail¬ road.

The yard is a gravity yard with a classifi¬ cation ((hump» in each direction. The operation of the yard has been studied in detail — the number of tracks and the capacities of each unit, the number of classifications made and the tracks used for each, the system in effect at the transfer platform.

In like manner preliminary scrutiny showed that the Jersey City yard is in effect two yards divided by the passenger-train layout, and each yard serving certain piers and other facilities. The uses, sizes and capacities of each of these facilities were determined. Similar information regarding every one of the Erie's terminal units was obtained.

Most of the traffic counts covered 24-hour periods and the men worked in three shifts of eight men each. At Croxton yard for each shift one inspector was stationed at the west¬ erly end of the yard to count trains, engines and cars entering and leaving; a second was stationed for the same purpose at the easterly end; a third was assigned to the yardmaster's office to copy train lists; a fourth took his post at the inbound hump and a fifth at the out¬ bound hump to keep account of classifications; a sixth and seventh

were assigned respectively to the transfer platform and the icing plat¬ form. while the eighth, the squad leader, super¬ vised the entire count and gave assistance where needed

This count disclosed the total number of cars received inbound in a 24-hour period and their destination ; the number of cars received from other railroads and their destination; the num¬ ber of cars forwarded to each of the water¬ front terminals and to other railroads; the num¬ ber of outbound cars received and their origin; the number of outbound cars forwarded and their general destination; the number of cars passed over each hump; the number of cars loaded and a large number of incidental opera¬ tions.

For the north Jersey City yards one in¬ spector was stationed on the main classification engine, one at the yardmaster's office, one at the float bridges and one at each of the lighter¬ age piers. Fewer cars pass through this yard, hence more detailed data were obtained. The inbound cars, for example, divided into 20 groups according to destination. The contents of cars iced were noted here as at Croxton. The south Jersey City yard was handled in a like manner. A separate eight-hour count was made at the milk platform. The traffic study at Duane street was made on a somewhat dif¬ ferent basis from those at the railroad yards, inasmuch as trucking movements as well as car operations were taken into account. The census was an 11-hour operation requiring 24 men divided into two shifts of 12 men each.

This is one of the typical waterfront freight stations, where the cars are brought alongside the piers on car floats and unloaded and re¬ loaded as at the ordinary inland freight sta¬ tion. The system causes a piling upt of trucks waiting to load and unload and results in much loss of time to the owners. The traffic count covered not only the number of car-floats and cars received and. forwarded, but also the num¬ ber of trucks arriving and departing and much information about where they came from and where they went.

The foregoing merely outlines the method pursued in the railroad investigation and sug¬ gests the magnitude of the work and the mass of valuable information being obtained.

Terminal Costs.— Meanwhile the com¬ mission organized an auditing staff to go into the books of the carriers to determine the ton¬ nages handled and the costs. Unit costs were derived for terminal operations on four of the trunk-line railroads. They were determined for 1918 on the basis of the actual 24-hour obser¬ vations, and for 1914 on the basis of the com¬ panies' records, for the month of July 1914. It was felt that while it was

desirable to know the latest costs obtainable and the costs of op¬ erations actually observed, it was equally de¬ sirable to know the costs under the more nor¬ mal conditions prior to the World War. July 1914 was selected as the most suitable month for determining pre-war costs.

Classification of Tonnages. — A beginning was made toward a classification of all ton¬ nages coming to or going from the Port of New York in a typical pre-war year. As far as possible, the tonnages were classified in three ways — by commodities, by point of origin or destination at the port and by general locality of origin or destination at the other end of the journey. The second classification will ob¬ viously show whether the shipment is to, from or through the Port of New York. Knowledge of what comes to and goes from the port,

whence il comes and where it Roes, should help greatly in evolving the general plan.

Special Investigations. — The special inves¬ tigations were grouped under 23 heads as fol¬ lows : West Side Railroad, Manhattan; markets and food distribution; Exterior Belt Line, New Jersey; mechanical equipment of harbor; bank¬ ing and commercial operations; tariff, charges, rates; stevedoring, longshoremen, pilotage; dis¬ posal of municipal waste; handling of build¬ ing material; conditions at New York piers; Barge Canal terminals ; canals and waterways ; private terminals ; warehouses ; ferries ; hand¬ ling of fuel; handling of ice; handling of grain; express business; electric-power supply; water supply; trucking; channels and dredging.

Some of these special investigations involve much more work than others, and the studies are in various stages of completion. Three of the most important of them — those cover¬ ing the West Side Railroad, Manhattan, the system of markets and food distribution and the exterior belt line in New Jersey — are as previously stated discussed at some length else¬ where in this report. Some of the others may be briefly outlined here.

Ice. — The handling of ice is somewhat allied to the food problem. An investigator for the commission has made a canvass of all of the ice¬ houses along the Hudson River from which New York gets most of its natural ice, of the artificial ice plants which contribute to the city's supply and of the New Jersey ice sources. Data are being assembled as to the amounts of ice harvested and manufactured, the methods of distribution and the costs.

Grain. — Grain is one of the commodities handled in large quantities at the Port — a com¬ modity that requires special facilities both for local distribution and for exporting. The han¬ dling of grain has been studied at considerable length in the light of existing facilities, the facilities at competing ports and the general volume and trend of the grain movement.

Building Materials. — The delivery of build¬ ing materials — sand, gravel, stone, lime, ce¬ ment, brick, steel and lumber — in New York is hampered by a shortage of open wharves, especially on the West Side of Manhattan be¬ low 47th street and the East Side below 23d street. There has been no improvement in the methods of handling these materials in 30 years, and meanwhile the number of open piers avail¬ able has been cut down from year to year. This has resulted in longer hauls and higher costs of delivery. An examination of the water¬ front has been made to determine just what piers and bulkheads are being used now for the various materials and what others could be advantageously put to this use.

Trucking. — While trucking constitutes one of the primary subjects for investigation, cer¬ tain phases of the subject, especially the ques¬ tion of trucking delays and costs, were given early attention and listed as a special investi¬ gation, because of the movement made last year to bring about store-door delivery of freight consigned to railroad pier stations in Man¬ hattan.

The so-called Harlan plan for store-door delivery, put forth last summer by Hon. James S. Harlan, member of the interstate commerce commission, followed several other plans pro¬

posed to remedy the existing evils of a multi¬ plication of underloaded trucks on the piers and the congestion incident to the necessity of giving consignees notice of arrival of their goods. The commission's investigators looked up and recorded all of the plans and their evolu¬ tion into the Harlan plan.

Three of the investigators also devoted sev¬ eral weeks to traffic counts at certain typical points, to time studies of individual trucks and routes and to interviews with truckmen and companies using trucks. One study of special interest was the operations for six days of a two-horse truck serving a certain drygoods store. Account was taken of loads carried, time of loading and unloading, time of transit and idle time. The result showed that the truck carried on the average only 28 per cent of a load, and that it made only 36 per cent of the distance possible, so that its efficiency, deter¬ mined by the product of the two percentages, was' only 10 per cent.

The investigators also made an extensive study of the elements in the cost

of trucking operations.

Stevedoring. — Stevedoring was studied un¬ der two general heads — the equipment avail¬ able at the port and the form and execution of stevedoring contracts. Under the former head data have been recorded as to the types of ma¬ chinery utilized and their form of operatioh ; under the latter the question of stevedoring rates and costs and the difficulties of the labor problem.

Barge Canal Terminals. — New York's new Barge Canal was put into operation in 1917, and it is desirable to know whether adequate provision in the way of terminals has been made to enable the Port of New York to make full use of the possibilities of this enlarged waterway. Study has been made both of such construction as has been completed and of plans not yet executed, and later on the com¬ mission expects to be able to offer plans for additional terminals.

Canals and Waterways. — Along with the study of the possibilities of the New York Barge Canal an examination was made of other waterways, existing or contemplated, for barges and for ships, which might be a factor in the operations of the port. This examination em¬ braced several existing canals for small boats to the west and southwest of the port ; the projected intracoastal ship canal system from Boston to Florida, of which the proposed New Jersey Ship Canal, an enlarged Chesapeake and Delaware Canal and the Cape Code Canal would be the most important to New York; the New Jersey Marginal Canal (New Jersey Inland Waterway) and several projected Long Island canals.

Channels and Dredging. — An investigation was made of the navigable depths of the various harbor waters, the controlling depths of chan¬ nels, the obstructions to navigation. The dan¬ gerous reefs Jn the East River, the channel projects for Jamaica and Newark bays, the desirability of dredging the Harlem River are among the matters considered in this in¬ vestigation.

Warehouses. — There are more than 600 freight warehouses and storehouses in New York and New Jersey within the metropolitan

district, exclusive of a large number of houses \vhich handle household goods only and, there¬ fore, are of no interest in this investigation.

. Questionnaire was sent out to the owners of all of these freight houses and in addition an investigator for the commission visited most of them and

obtained supplementary informa- Practically all of the questionnaires were filled out and returned.

, Electric-Power Supply.— Electricity will un- coubtedly be more and more a factor in the operation of the port. A record has been made of every electric-power plant in the district — its location, capacity, ownership, use and other characteristics. The histories and growth of the different companies have been examined and forecasts have been made of the probable supply of and demand for power in the future.

Water Supply. — Analogous to this is the in¬ vestigation of the water supply of the port. Here again a record was made of locations, capacities, ownership, uses and other details of water-sheds, reservoirs, pumping stations, dis¬ tribution systems and other elements that go to make up a waterworks system. The water sup¬ plies of the cities in New Jersey were covered and similar data collected for the area east of the Hudson.*

Disposal of Wastes. — For a long time the navigable waters of the metropolitan district have been heavily burdened with sewage and industrial wastes. Some of this overburden, under present conditions, passes out to sea quickly, while some, in the land-locked North and East rivers, surges back and forth with the tides. Elaborate plans have been promulgated to cope with the situation, and it is obvious that waterway and waterfront changes which might affect the tidal conditions and which certainly would have important bearing on any disposal scheme of the magnitude required here must take into account this whole problem. This would be true if the port were not to com- tinue to grow. The aim of the Commission is to devise ways and means to enhance its growth and so it becomes doubly necessary to provide for the disposal of the wastes of future popu¬ lation and industries. The question of whether harbor pollution should come under the juris¬ diction of a joint port authority, if one be created, in the light of the Passaic Valley Sew¬ erage Commission case, is discussed, and irre¬ spective of how this question should be an¬ swered, it is obvious that this Commission must co-ordinate its general plan with the sewage- disposal problem. Of hardly less importance are the problems of the disposal of garbage and rubbish. Valuable waterfronts are used for dumps, and many scows are required to handle the port's refuse. The methods in use were, therefore, studied at some length.

Conditions at New York Piers. — Apart from the general steamship investigation, was the question of the uses of New York's piers. Early last November two investigators were assigned to this work, and in about five weeks they covered the railroad piers on the New York side of North River.

These men visited each of these piers and noted its size, equipment and use.

They con¬ sidered methods of operation in effect and recorded practices that interfered with efficiency.

Whether reassignment of piers according to some zoning system is feasible was one of

the objects of the survey. Soundings were, therefore, taken alongside the piers and a gen¬ eral examination was made as to whether they could be put to other uses. This survey was continued along the East River and other water- frontage of the port.

Other Investigations. — Among the other special investigations, that of banking and com¬ mercial operations disclosed the general methods of financing New York's commerce, going into such questions as credits, exchanges and dis¬ counts and comparing them as they exist in New York with those prevalent at London and other foreign ports in order to determine what burdens are placed on New York's commerce by reason of financial operations abroad — what customs exist which interfere with New York's commerce.

The private terminal investigation covered such plants as that of the Bush Terminal Com¬ pany, the New York Dock Company, the Brook¬ lyn Eastern District Terminal Company and the Jay Street Terminal Company. The fuel inves¬ tigation covered the handling of fuel both for local delivery and for the bunkering of ships. The investigation of tariffs and charges aims to determine the truth or falsity of the claim often heard of undue charges for the use of harbor facilities.

Thus are outlined some of the special in¬ vestigations made. Some of the subjects had been given little consideration in previous studies of the port.

Tunnels and Other Projects. — Vehicular Tunnel Under Hudson River. — A project much in the public eye at present is the proposed vehicular tunnel under the Hudson River. The recent marine workers' strikes have brought forcibly to public attention the possibility of a complete cutting off of vehicular traffic between New York and New Jersey, even though in both of these strikes the Lackawanna ferries remained in operation, and though other ferry service was resumed after three or four days.

The need for a vehicular connection between the two States, and the question of whether a bridge or a tunnel should be built, have been under study for a number of years by a special joint commission created for the purpose. A vehicular tunnel will assuredly aid in the co¬ ordination of the port, and any plan evolved should be able to utilize the tunnel to good advantage.

Staten Island Tunnel. — Another fact the first of the recent strikes brought out is the ease with which Staten Island can be isolated. Its only rail connection with the mainland is the Baltimore and Ohio freight line to Saint George. There are six ferries, from Manhat¬ tan, South Brooklyn, Bayonne, Elizabethport, Carteret and Perth Amboy, respectively — only the first two, it will be perceived, giving direct connection to New York. The Manhattan ferry is the main dependence of the island, and during the first day of the strike its boats did not run. The consequent inability of thou¬ sands to reach Manhattan to fulfill their busi¬ ness engagements has revived the demand of the residents of the island for a tunnel con¬ nection. There are three main possibilities for such a tunnel connection. The first is the direct tunnel under the Upper Bay to Manhattan. This is the most direct but also the most ex¬ pensive. The second is a tunnel under the

Narrows to Brooklyn, connecting- with the transit systems in that borough. This would require a much shorter tunnel. The third in¬ volves a still shorter tunnel, under the Kill van Kull to Bayonne.

Brooklyn Marginal Railway. — For years there has been agitation for a marginal railway in Brooklyn. Special legislation has been passed to permit the construction and operation of such a railway from the New York Dock Company's terminal near Brooklyn Bridge to the Bush Terminal in South Brooklyn. Various obstacles, however, notably the unwillingness of the trunk-line railroads while under private operation to co-operate in the undertaking, have blocked it. Since the United States gov¬ ernment took over the railroads the Railroad Administration, through its budget committee, has been studying the matter further. A plan has been submitted for a line from the Brook¬ lyn Navy Yard up the East River and Newtown Creek to the Bushwick terminal of the Long Island Railroad.

Co-operation with Other Agencies. —

Throughout the investigation the Commission sought to co-operate with and obtain the co-operation of other agencies. The Commis¬ sion invited and had before it at many of its meetings the presidents of the trunk-line rail¬ roads, the heads of shipping interests, the heads of terminal companies and various other in¬ terests using the harbor. After the government had taken over the operation of the railroads and other industries the Commission was in close touch with the Railroad Administration, the Port and Harbor Facilities Commission of the United States Shipping Board and the Fuel Administration. The Commission early ad¬ dressed a communication to the

Secretary of War, the Secretary of the Navy, the Director General of Railroads and the chairman of the United States Shipping Board, requesting that before any construction work was done in the port the plans be submitted to the Commission for an expression of opinion as to whether they would interfere with the carrying out of a com¬ prehensive port plan. The authorities in Wash¬ ington readily agreed to this and there was scarcely a week wheh some project was not referred to the Commission by the authorities in Washington for an expression of opinion.

As a point of contact with the Commission the regional director of railroads appointed a committee consisting of the managers of all of the trunk lines entering New York, and the fullest co-operation has been extended in the way of permission to go upon the property of the railroads in the field and in the auditor's offices.

In like manner there was hearty co-operation between the board and the commissioner of docks of New York City. The commissioner readily perceived that the missions of the dock department and the Joint Commission were quite distinct — that of the former being to study and prescribe for the immediate needs of New York City, that of the latter to fit such new construc¬ tion or changes in the mode of operation as are adopted into the ultimate plan, and offer objection only in case of seeming conflict with the ultimate requirements of the port as a whole. The commissioner, therefore, appeared before this Commission, submitted various plans and in many ways the cordial desire of mutual

service between commissioner and Commission was invaluable.

Compact Between New York and New Jersey for the Creation of a Port Authority.

— The investigation and studies made by the Commission soon convinced the Commission that, whatever physical plan might ultimately be worked out, it was essential that the two States be brought together in an agreement or compact fixing the basis and terms of co-opera¬ tion, and providing for legal machinery through which this co-operation could be made effective. The Commission, therefore, requested its coun¬ sel to make a careful and exhaustive study of all the legal phases of the problem.

Such a study was made and brings together the precedents bearing upon the problem ; dis¬ cusses at length the history of the early com¬ mercial relations between New York and New 'Jersey; the boundary dispute; the treaty of 1834; the purpose and meaning of that treaty; the Federal power over interstate commerce and navigation ; the powers of the two States, cov¬ ering the title to shore-front property both in New Jersey and New

York, the regulation of waterfront franchises, the various agencies — corporations, municipalities or other delegated powers — through which the States may act, the legal basis for interstate action and the treaty or compact-making power of the States; also the experiences in international law in dealing with such problems ; the methods for the enforcement of an interstate treaty; State limi¬ tations upon borrowing capacity thereof, and other phases of the problem. This report is re¬ garded by experts as the first compilation of authorities upon these phases of the problem of port development.

The legal problem is unique. As stated by counsel, ((at the threshold we face the fact of a dual political sovereignty. The nort lies in two States, each an independent sovereignty in its own land. The legal problem, therefore, can not so easily be stated or solved as it might be for New Orleans, Philadelphia, Boston or Bal¬ timore. Again, traffic between two States across boundary waters is interstate commerce. Neither one State nor the other can wholly regulate the port.ˆ

If it is important to overcome the physical barriers that separate the two States it is of even greater importance to overcome the legal barriers. The Commission felt that the im¬ plicit obligation of the legislation under which it was created should be reduced to the form of a compact whose terms should be explicit and definite — a compact by which the States should co-operate through a common agency in the development of port facilities. It was con¬ vinced that there were no constitutional or legal difficulties in the way of such a compact and that it should supplement the existing compact between New York and New Jersey made in

1834.

Acting under instructions of the Commis¬ sion, accordingly, counsel for the Commission prepared a tentative draft of such a supple¬ mental compact. A copy of the draft was sent to all members of the Legislatures of both States, to the mayor and other members of the board of estimate and apportionment of New York City, to other municipal officials within the metropolitan district, to civic and commer¬ cial bodies and to the press. The first public

consideration of this draft was given at a meet- mg held at the New York Chamber of Com- meiceˆ 19 December, when Governor Whitman and Governor Edge took occasion to pledge then support to the proposed

compact between tne two States. The main features of the prop¬ osition almost at once secured general popular approval. The metropolitan press was almost unanimously for it.

At the request of Governor Edge the State l>ar Association of New Jersey appointed a special committee to consider the proposed draft. > The committee approved of its legality. Committees of the various bodies endorsing the plan made careful study of the details, and valuable suggestions and criticisms were re- ceived by the Commission and its counsel. Public hearings were held at Newark and New Yoik City on 18 and 22 fan. 1919, respectively

On 29 January, a conference was held at Albany, when the draft of the compact was presented and discussed, and it was agreed that a legislative bi-State Commission should be ap¬ pointed, which should co-operate with the Com¬ mission in the revision of the compact so that it might be presented in complementary form to the Legislatures of both States.

On 15 February, through the courtesy of the New York Chamber of Commerce, the Com¬ mission met at the chamber and considered the proposed compact.

The conference adjourned to 1 March after appointing to revise and redraft the proposed compact a sub-committee consisting of the At¬ torney-Generals of both States, the majority and minority leaders of both Houses of both States, and the corporation counsels of New York and Jersey City.

The sub-committee met on 21 February and considered all the criticisms and suggestions that had been made, and instructed counsel for the Commission to revise the draft and present it for further consideration to the sub-com¬ mittee prior to the meeting of 1 March.

At the adjourned meeting of the bi-State Commission held on 1 March at the Chamber of Commerce, Governor Smith, Speaker Sweet and Senator Walters requested an adjourn¬ ment of the conference until the administrative officials of the City of New York might be given an opportunity to consider the proposed draft and express their views thereon. The con¬ ference, accordingly, adjourned subject to the call of the chair as soon as the New York legislative section of the conference was ready to report.

The matter was set down for a public hear¬ ing by the Board of Estimate and Apportion¬ ment on 26 March.

.On 4 April the Board of Estimate and Ap¬ portionment adopted a resolution in which the board expressed itself as being (

The board recommended that the Commis¬ sion be continued in existence so as to permit it,

as a result of the studies it had already made and was still making, to present such compre¬ hensive physical plan for examination and study, together with a comprehensive statement of the ways and means to carry such plan into effect. It is also stated that ((the active and earnest co-operation of New Jersey is invited by the board in any movement tending to im¬ prove and develop the Port of New York in all its parts and to the fullest extent, including matters relative to river and harbor pollution, which now constitutes a grave menace to the harbor of New York, and the abatement of the nuisance arising from the poisonous fumes generated in the factories or plants situated on the New Jersey shore opposite Riverside Drive, which nuisance is most injurious to the health and detrimental to the property of the people residing in that locality.®

Main Criticisms of Compact. — The main criticisms of the form of the compact developed by the public discussion before the Board of Estimate and Apportionment, with the argu¬ ments pro and con, are thus summarized.

Constitution of Port Authority. — It seemed to be the opinion of the members of the Board of Estimate and Apportionment that the New York section of the Port Authority should be made up of the Board of Estimate and Appor¬ tionment as a whole, or that at least two of its members should be members of the board. In support of this proposition the argument is that since the interests of New York City are so large and extensive and the consequences to the city's development so direct and immediate, the city should have virtual control of the New York section of the Port Authority. It is argued also that the principle of home rule ap¬ plies to an agency having so much to do with the future development of the States.

Against the proposition, it is held that the future development of the port will require a continuing body acquiring its knowledge by ex¬ perience and not subject at any time to being made the football of politics ; that such a con¬ tinuing authority exists at all other important ports ; that without it there will be no adequate consideration given to the great problems of the port, and that the historv of all administrations in the past shows that the members of the Board of Estimate and Apportionment are too busy with other matters to give time and attention necessary to port problems. It is pointed out, furthermore, that the port is not only a city matter but a State matter; and the State's credit may be required for its development.

The opinion of the Commission has been heretofore that the matter of

selecting member¬ ship in the Port Authority was properly a sub¬ ject for legislation and should not be embraced in the treaty. Article IV provides that the New York members are to be chosen by the State of New York and the New Jersey members by the State of New Jersey ((in the manner and for the term fixed by the Legislatures of each State?

Veto Power of the Governors. — It is pro¬ vided that each State reserves the right here¬ after to authorize the vetoing by its gov¬ ernor of any action of the Port Authority. It was argued before the Board of Estimate and Apportionment that this would give either gov¬ ernor power to hold up any improvement, no

matter how desirable, and though concurred in by the Port Authority. It is the opinion of the Commission that this section may well receive further consideration on the part of the bi-State Legislative Commission.

Harbor Pollution. — It is provided that until otherwise determined by the Legislatures the term ((rule or regulation for the improvement of the conduct of navigation and commerce within the district,® shall not include matter relating to harbor or river pollution. It seems to be the opinion of the members of the Board of Esti¬ mate and Apportionment that this reservation should not be made. In this connection atten¬ tion is called to the fact that there is pending in the United States Supreme Court a suit of the State of New York against the State of New Jersey and the Passaic Valley Sewerage Commission to restrain the construction and operation of the trunk-line sewer to be built for the purpose of conducting the discharge of sewage to a point in New York Bay. The original bill in this suit was filed 7 Oct. 1908, and by a recent order of the United States Su¬ preme Court the case was reopened for the purpose of takin.g additional testimony; and it has been stated both in New York and New Jersey that the inclusion in the proposed com¬ pact of matters of harbor pollution might em¬ barrass the United States Supreme Court in the deceision of the pending litigation. In 1903 the New York Legislature appointed a commission to investigate certain threatened pollutions of waters in New York Bay. This Commission made its first report on 31 March 1905, and its second report 30 April 1906. In its report of 31 March 1905, it emphasized in the following language the needs of the metropolitan district as a whole and the desirability of Joint State action : <(It has been suggested, therefore, that a metropolitan sewerage district should be estab¬ lished, to include all sections in both New York State and New Jersey which now or in future may sewer into the bay and its tributaries. This

district, when authorized by joint State and Federal legislation, should be under the direc¬ tion and control of a permanent interstate com¬ mission, with plenary power to control the dis¬ charge of all sewers hereafter constructed, as well as the task of evolving a comprehensive plan for ultimately rendering the present chaotic and systemless method of sewage disposal sani¬ tary and suitable for all future requirements.

((There seems to be no possibility of a com¬ prehensive treatment of this great question through the action of various and constantly changing local authorities, acting independently. Manhattan may continue, as at present, to fol¬ low no system whatever, simply emptying a new sewer into North or East River at any place where grades permit, even though a recreation pier or public bath may be already established at the same point. Brooklyn may, and probably will, carry its sewage into the sea, and thus ruin the bathing beaches within its limits, and pollute the great oyster 'beds therein, and Westchester County for 40 miles from the city may contrib¬ ute a large amount of sewage, while the State of New Jersey, with its constantly increasing population, will add to its present outflow from year to year.

"The necessity also exists for a central au¬ thority to not only direct, but also initiate, these

great public works, upon which depend the beauty and healthfulness of the approximately 450 miles of shore within the metropolitan dis¬ trict.

"Immediate action should be commenced to secure such an interstate commission, for the existing conditions must steadily approach the point where the public will demand relief.

<(In this country there is at present but one locality at all analogous to New York in this respect, viz., Boston, where a great metropolitan district empties its sewage into the harbor, but the difference in governing conditions is radical, as but one State is in control, while for New York harbor two great commonwealths would have to join forces.

<(England permitted the pollution of the Thames for centuries, but at last was compelled to purify its waters at a cost far exceeding the expense of preventing such contamination had thg demands of competent judges been complied with a hundred years ago.

(

In support of the policy urged by the Com¬ mission it obtained from Attorney-General John Cuneen an opinion upon the question ((whether in the event this commission finds it desirable to recommend for future consideration the estab¬ lishment of a metropolitan sewerage district,

covering parts of the two States of New York and New Jersey, the Legislatures of the two States have authority to establish such a district and appoint a commission having adequate powers of administration,® the Attorney-Gen¬ eral answering the question as follows : ((I am of the opinion that the States of New York and New Jersey may, if they see fit, construct a metropolitan sewerage district, covering parts of the territory of the two States, and giving jurisdiction thereover to the courts of one or the other of said two States, as to all matters pertaining to the proper sewerage of said dis¬ trict. Such concurrent acts of the States of New York and New Jersey should, however, in my judgment, be approved and ratified by an act of Congress, for the reasons hereinbefore set forth, namely, that the Federal Government has supreme control over the navigable waters of the Hudson River and New York Bay, and its approval should, therefore, be had to the joint action of the contiguous States.®

Notwithstanding the very wise suggestion on the part of the New York Bay Pollution Com¬ mission, no attempt has been made since 1906 to bring the States together upon a compact which would cover this important matter and create the central authority recommended 'by the commission of 1903.

The Port and Harbor Commission was not charged primarily with the duty of considering the .matter of harbor pollution, but it has no hesitancy in adopting and agreeing with the conclusion quoted from the report by the New York Bay Pollution Commission. If it were not for the pendency of the litigation in the United States Supreme Court, it would urge the wisdom of now adopting, after 14 years' delay, the recommendations of the New York Bay Pollution Commission.

Veto Pozver for New York City. — At various

points in the discussion before the Board of estimate and Apportionment and in the argu¬ ment made by its corporation counsel, it was urged that the action of the Port Authority in the making of rules and regulations, as well as "u , j cˆrrying forward of constructive plans, should always be subject to the consent of the iioard of Estimate and Apportionment of New York Lit}'. Such a provision, in the judgment ot the Commission, would tie the hands of the i oil Authority and preclude it from going for¬ ward with its work.

The Commission realizes that there are many phases of port development in which the assent i u auth°rities of the City of New York should be obtained,

and that this is equally true of other municipalities in other parts of the proposed district. The Commission is of the opinion that this should be worked out in the legis atioii to accompany the physical plan, and should not form a part of the treaty.

i lexibility in the Comprehensive Plan. — It was urged that the provision in the proposed compact, (

Reversion of Property to the City — It was explained to the members of the Board of Esti¬ mate and Apportionment that in the case of any improvement made by the Port Authority by contract with the city in which the consent of the city was essential, for the crossing or closing of streets, or in which a franchise grant from the city was essential, the city would doubtless require that the property when paid for should revert to it. Members of the Board of Estimate and Apportionment seemed to think that there should be a definite provision in the treaty to cover such a situation. Since, however, the project could not be consummated without the consent of the city, it seems reasonable to assume that any enlightened administration would make such a provision a condition of the grant or franchise.

The Commission is reluctant to insert in the treaty anything except those features absolutely essential. It would seem to be sound judgment that all matters requiring flexibility should be left to legislation following the treaty rather than be embodied in the treaty itself.

With the exception of certain minor changes that have been suggested, the foregoing present all of the subjects that have been made the basis of public discussion before the Board of Esti¬ mate and Apportionment. In the opinion of the Commission they present no insuperable diffi¬ culties or obstacles which cannot be overcome in any open-minded conference purposing to effectuate the compact.

Conclusion. — The problems of the port of

New York are more serious than is generally realized, even at the port itself. To the popu¬ lation of the port they are serious, because if anything less than the most efficient system ob¬ tainable is in use this fact must be reflected in prices; and because if any other port can offer a more efficient system it is likely to draw trade from New York. To all New York State and all New Jersey they are serious, because New York is the gateway to and from the interior. If there is congestion at the gateway the in¬ terior suffers. The interior trader bears his share of the extra terminal costs. He perhaps suffers a still greater loss through delays, which make his shipments undependable and put him at a disadvantage with his competitor

who escapes these delays.

To the nation itself the problems are equally serious. Foreign trade has established New lork as its focal point, and at this time, when we have a wonderful opportunity to serve the world and ourselves by expanding our foreign trade, it is of the utmost importance that New York be. ready — ready to take half of the increase in trade as she now receives substan¬ tially half of the total trade. If large prepara¬ tions are being made or planned at other ports, they must be vastly larger at New York.

The Commission, bearing all of the forego¬ ing in mind, believes that the greatest benefit to the communities of the Port of New Yo'rk, to the States of New York and New Jersey at large and to the entire country will come from a scientific development of the whole port, and is earnestly seeking to evolve a plan for such a development. Its findings to date can be sum¬ marized as follows :

A co-ordinated plan that will be a guide for 50 years can be evolved only after the picture

and analysis of present conditions has been completed.

Unquestionably the most important physical problem of the port is that of providing for a better and more economical movement of in¬ bound and outbound freight over the trunk lines now terminating on the New Jersey and Staten Island waterfront. Its solution can be found only when the details of the present con¬ ditions are known. Three problems that are in a way part of this general problem, but are urgent in themselves, are being given special study. They are the West Side railroad situa¬ tion in Manhattan; the food distribution sys¬ tem of the port, which is inseparably related to the West Side problem, and the exterior belt line in New Jersey. Another major problem which must await the complete analysis is that of providing adequate steamship terminals prop¬ erly related to the railroads.

Execution of any plan will require the direc¬ tion of a permanent authority with broad powers. The Commission has, therefore, urged the adoption of the compact discussed in the preceding section of this report. If this can¬ not be consummmatcd this year 1919 the Com¬ mission confidently hopes joint action will be taken at the next sessions of the Legislatures to create a «Port of New York District0 and a <(Port of New York Authority.0

In order that the commission mav complete its work, it recommended that the' States of New York and New Jersey each appropriate $100,000, the second and final installment of the amount determined upon a year ago as neces-

sary to cover the expenses of the investigation. By direction of Governor Edge and Hon. J. Henry Walters, the bi-State conference recon¬ vened at the call of the chairman on 5 April and the conference unanimously adopted the following resolution:

Resolved: That to the end that a compact between the two States may be submitted to the next Legislature of each State, amended in the light of suggestions made and to be made, the present conference be continued and the legislative sub-committee of each State be instructed and directed to confer with the New York, New Jersey Port and Harbor Development Commission and its counsel and present at an adjourned meeting of this conference, to be held at such time as the sub-committee is ready to report, a revision of the present revised draft of the proposed compact between the States which shall take account of all suggestions that have thus far been made or may hereafter be made; and be it further

Resolved: That it is the sense of this conference that pend¬ ing the consummation of such compact and the working out of a comprehensive plan for the development of the port, all projects for terminal facilities within the Port of New York shall be submitted to the New York, New Jersey Port and Harbor Development Commission for consideration and advice, to the end that so far as practicable all such projects shall be in harmony with such comprehensive plan when ultimately adopted; and be it further

Resolved: That the New York, New Jersey Port and Harbor Development Commission continue its work; and each State make the necessary appropriation therefor; and that the Legislatures of each State continue the present bi-State Legislative Commission.

Consult (New York, New Jersey Port and Harbor Development Commission,* Legislative Document No. 103 (Albany 1919).

NEW YORK, University of the State of.

For the history, government, administration and various departments of this important institu¬ tion, see University of the State of New York. As one of the greatest of American State institutions it exists not only for the ex¬ tension of education, for the benefit of the schools and other cultural institutions of the State, and for the private citizen, but originated primarily in the desire to promote efficiency in the principles and organization of State gov¬ ernment. Its headquarters is the New York State Education

Building located on Wash¬ ington avenue, facing the Capitol, Albany, and justly described as (

paleontological viewpoint, revealing the geog¬ raphy, history, agricultural and mineral re¬ sources, the commerce and manufactures of the State. The books of the library are housed in a series of stackrooms conveniently situated with reference to the the five reading rooms. The main stack designed to accommodate close to 1,500,000 volumes, is directly under the prin¬ cipal reading room floor. Five of the stack floors are the full size of the reading room. At the east and west sides of the two upper stack floors extend workrooms 165 feet long by 25 feet broad. Corridor stacks between the law and legislative reference rooms and between the medical and periodical rooms provide shelving for 300,000 volumes in addition to the books shelved in the alcoves of these special libraries. Special stacks on the third floor ac¬ commodate 100,000 volumes for the traveling libraries and the collection of books for the blind.

„ Famous names are connected with the history of the library. De Witt Clinton pur¬ chased its earliest collection. For over 75 years (since 1844) the Regents of the University of the State of New York have fostered and guided its development and Melvil Dewey (q.v.) made it a dynamic force throughout the world. The library from 1889 occupied portions of the third and fourth floors of the west end of the new Capitol, later spreading to the fifth and sixth floors. In 1906 the legislature made provision for a separate building for the New York State Education Department, including the State Library, but before the building was completed the fire of 29 March 1911 swept away practically its entire collection. The catastrophe was probably the greatest in modern library annals. Half a million of books, 300,000 manu¬ scripts, the -costly apparatus of administration — all forming a collection ranking with the first half dozen in the western hemisphere and among the first 20 in the world, were swept away in a few hours. The library is rebuilding its collections with remarkable rapidity and has resumed its place in the educational life of the State with undiminished efficiency.

The multiplying activities of the institution are best studied in the publications of the State Library described and listed in handbook 6, part 2, of the State Education Department. Copies are sent free to any persons interested. Besides its annual report the Library has pub¬ lished five series of bulletins. The legislation series includes, besides occasional monographs and lists, three annual bulletins which index and review the laws of the various States and digest topically the governors' messages. The his¬ tory series relates to early New York State his¬ tory, including reprints or calendars of val¬ uable manuscripts. The bibliography series comprises classified lists of books on various subjects, or relating to individuals or*

places. This series includes the annual list of best books of each year, which is sent on request to any library. The Librarv School series em¬ bodies lists, ˆoutlines, problems and monographs on subjects relating to library economy or the courses of instruction given in the New York State Library School. These bulletins appear also in the bound annual reports of the Library.

New York Libraries is a quarterly magazine devoted to library affairs and interlibrary re¬ lations in New York State. It is sent without

cost to all libraries and members of library

X1 the btate* making application. To others it is sent postpaid for 25 cents a year or 10 cents for a single copy.*

YORK, NEW JERSEY PORT

Mi«TnwRˆORxDEVELOPMENT COM- MISSION. See New York, Harbor of.

FMrˆTyORK ACADEMY OF SCI-

7 was originally incorporated in

1818 under the name ((The Lyceum of Natural History in the City of New York." The title was changed in 1876. There are four classes ot members in the Association : active, fellows coi responding and honorary. By special act of the legislature in 1902 it was empowered to collect tunds and erect a building for scientific purposes. There are sections on astronomy, physics, biology, anthropology, chemistry, min¬ eralogy, geology and psychology. Annals, mem¬ oirs and many pamphlets are published under the auspices of the Society. The academy's li- brary and headquarters are at present located in the Museum of Natural History.*

NEW YORK BARGE CANAL. See

Barge Canal, the New York State.

new YORK CENTRAL RAILROAD COMPANY, The, the incorporate name of one of the great transportation systems of the United States. Having its beginning in 1826 as the Mohawk and Hudson Railroad, with less than 20 miles of track and an equipment of but a single train, this remarkable system, popularly known as the <(Four Track Road," has resulted in the consolidation of over 100 small railroads. The early history of the ex¬ pansion of the system is detailed below. Here it is incumbent to state in

some detail the ar¬ rangements resulting in the present corporate title. On 22 Dec. 1914 the New York Central Railroad Company was incorporated under the laws of New York, Ohio, Illinois, Indiana and Pennsylvania and under the laws of Michigan on 23 Dec. 1914. The company was formed by consolidation of the New York Central and Hudson River Railroad Company; the Lake Shore and. Michigan Southern Railway Com¬ pany; Geneva, Corning and Southern Railroad Company; the Terminal Railway of Buffalo; the Dunkirk, Allegheny Valley and Pittsburgh Railroad Company; the Chicago, Indiana and Southern Railroad Company; the Detroit and Chicago Railroad Company; the Detroit, Mon¬ roe and Toledo Railroad Company; the Kala¬ mazoo and White Pigeon Railroad Company; the Northern Central Michigan Railroad Com¬ pany and the Swan Creek Railroad Company of Toledo, under agreement for consolidation, dated 29 April 1914. In 1915 the new com¬ pany merged the Jamestown, Franklin and Clearfield Railway, the Cleveland Short Line Railway, the Sturgis, Goshen and Saint Louis Railway, and the Elkhart and Western Railway.

In July 1916, the company sold its controlling interest in the New York, Chicago and Saint Louis Railroad to Cleveland capitalists for $8,500,000. All shares of the capital stock of any of the consolidating companies which at the time of consolidation were held by any of said consolidating companies were canceled under the agreement for consolidation and the remaining outstanding shares of the capital

stock were to be converted into shares of the consolidated corporation.

The directly operated mileage of the New York Central Railroad Company embraces the main line from New York to Chicago (953.47 miles), and various branches in New York, Ohio, Indiana, Illinois, Michigan, etc. (about 2,749.28 miles) ; proprietary and leased lines (about 1,527.02 miles) ; trackage rights (455.66 miles), making a total of 5,685.43 miles. More¬ over, the Boston and Albany Railroad (393.02 miles) is leased but separately operated. Other controlled lines separately operated con¬ stitute 6,588 miles; making a total in the New York Central system as of 1 Jan. 1919 (less duplications) of 12,413 miles.

This mileage is classified as follows:

Lines owned: New York to Chicago, 953 miles; branches, 2,750 miles. Proprietary and leased lines: Detroit, Toledo and Milwaukee Railroad, 47 miles; Battle Creek and Sturgis seven miles; West Shore Railroad, 479 miles; ˆ_roy and Greenbush, six miles; New York and Harlem, 136 miles ; New Jersey Tunction Rail¬ ed five miles; Boston and Albany Railroad, 393 miles; Beech Creek Railroad, 164 miles; Beech Creek Extension, 135 miles; Wallkill Val¬ ley, 32 miles ; Mahoning Coal Railroad, 71 miles ; Detroit, Hdlsdale and Southwestern Railroad, 65 miles , Lake Erie, Alliance and Wheeling Rail¬ road, 88 miles; Fort Wayne and Jackson Rail¬ road, 98 miles ; Erie and Kalamazoo Railroad, <-.2 miles; Kalamazoo, Allegany and Grand Rapids Railroad, 58 miles; Ottawa and New York Railroad, 57 miles; Saint Lawrence and Adirondack, 56 miles; trackage, 456 miles.*

The controlled separately operated lines comprise the Michigan Central system, the Cleveland, Cincinnati, Chicago and Saint Louis system, the Lake Erie and Western, the Cin¬ cinnati Northern, the Pittsburgh and Lake Erie, the Chicago, Kalamazoo and Saginaw, the To- ledo and Ohio Central, the Kanawha and Mich- igan, the Janesville and Western, the Indiana

-ˆclt and tfie Toronto, Hamilton and Buffalo railroads.

v.uiyuidic nisiory.— me growth and de¬ velopment of the New York Central extend¬ ing o\er the period from 1826 to the present is typical of American commercial progress. The genesis of the great corporation was the Mohawk and Hudson Railroad, chartered in 1826 and opened 9 Aug. 1831. It was the first railroad built in the State of New York The name was changed 19 April 1847 to the Albany and Schenectudy Railroad Company. Together tlj j other small railroads the Mohawk and Hudson was merged into a corporation, organ- ized under a special law, 2 April 1853, called the New York Central Railroad Company The Central— The 10 roads comprising the New York Central were: (1) the Albany and Schenectady;

*(2) the Schenectady and Trov chartered in 1836, and opened in 1842; (3) the Utica and Schenectady, chartered in 1833, and opened in 1836; (4) the Mohawk Valley, or¬ ganized in 1852; (5) the Syracuse and Utica chartered in 1836, and opened in 1839; (6) the Syracuse and Utica Direct, chartered in 1853 * (7) the Rochester and Syracuse, a consolida¬ tion Aof the Auburn and Rochester (1836), and the Auburn and Syracuse (1834) : (8) the Buf¬ falo and Rochester, a consolidation of the*

Tonawanda Railroad (1832) and the Attica and Buffalo (1836) ; (9) the Rochester, Lockport and Niagara Falls Railroad, organized in 1850; (10) the Buffalo and Lockport, chartered in 1852, and opened in 1854. This consolidation gave the New York Central a continuous line of railway from Albany to Buffalo. The fol¬ lowing roads were subsequently leased and merged into the consolidation : Rochester and Lake Ontario (1855) ; Buffalo and Niagara Falls (1855) ; the Lewiston (1855), and the Saratoga and Hudson River (1867).

The Hudson River. — The Hudson River Railroad Company was chartered 12 May 1846. It leased the Troy and Greenbush Railroad, which was chartered in 1843, and in October 1851 opened the new Hudson River line through its entire length from New York City to East Albany. At this stage of the development there were the two consolidated systems, the Hud¬ son River (New York to Albany), and the Central (Albany to Buffalo).

The Consolidation. — On 1 Nov. 1869, the New York Central and Hudson River Railroad Company was organized by the consolidation of the New York Central Railroad Company and the Hudson River Railroad Company. This gave a direct line from New York City to Buf¬ falo. The new company added the following extensive roads to its system: (1) the New York and Harlem, chartered in 1831, and ex¬ tending from 42d street, New York to Chat¬ ham, included a lease of the New York and Mahopac Railroad from Goldens Bridge to Lake Mahopac. (2) The Spuyten Duyvil and Port Morris Railroad, six miles long, char¬ tered in 1869. (3) The Geneva and Lyons

Railroad, from Geneva to Lyons, distance 14 miles. (4) The Syracuse Junction Railroad, a local system. (5) The Buffalo Junction Rail¬ road; between East Buffalo and North Buffalo. (6) The Troy Union Railroad, chartered as a terminal line in 1851, and originally owned by the city of Troy. (7) The two Hudson River bridges, owned by the Hudson River Bridge Company, and crossing the Hudson at Albany and East Albany. (8) The Dunkirk, Alle¬ gheny Valley and Pittsburgh Railroad leased until

2373. (9) The West Shore Railroad.

(10) The New Jersey Junction Railroad.

(11) The Beech Creek Railroad. (12) The Rome, Watertown and Ogdensburg. (13) The Mohawk and Malone Railway. (14) The Car¬ thage and Adirondack Railway. (15) The Gouverneur and Oswegatchie Railroad. (16) The New York and Putnam Railroad. (17) The Pine Creek Railway. (18) The Syracuse, Geneva and Corning Railway. (19) The Fall Brook Railway. (20) The Wallkill Valley Railroad. (21) The Boston and Albany Rail¬ road, leased to the New York Central Com¬ pany from 1 July 1900 for 99 years. (22) De¬ troit, Hillsdale and Southwestern, leased to Lake Shore and Michigan Southern in perpetu¬ ity from 1881 ; lease assumed by the New York Central. (23) Lake Shore and Michigan Southern. (24) Ottawa and New York Rail¬ way. (25) Saint Lawrence and Adirondack Railway. (26) Fulton Chain Railway. (27) Raquette Lake Railway. (28) The Cleveland, Cincinnati, Chicago and Saint Louis and sub¬ sidiary roads. (29) Lake Erie and Western. (30) Michigan Central. (31) Pittsburgh and

Lake Eric. (32) Toledo and Ohio Central. (33) Part control of Indiana Harbor Belt Rail¬ road. (34) Part control of Toronto, Hamil¬ ton and Buffalo Railway. (3.5) Part control of the Rutland Railroad Company.

Traffic Statistics. — Average mileage oper¬ ated year ending 31 Dec. 1917, 5,685.43; freight train miles, 26,619,955; passenger train miles, 27,735,074; milk train miles, 1,101,692; other passenger train miles, 3,811,968; mixed train miles, 94,748; special train miles, 18,614. The revenue freight moved in the same year totalled 110,237,661 tons, or 3,990,291 revenue tons, one mile per mile of road ; the average haul per revenue ton was 204.49 miles. Passengers carried aggregated 57,288,436, or 2,546,427,088 passengers carried one mile. On the same date the equipment in service included 1,644 freight locomotives, 717 passenger locomotives, 754 for switching service, 73 electric locomo¬ tives and 18 other engines, a total of 3,206 engines. The total number of freight cars was 137,835 ; passenger train cars, 2,973 ; company service cars, 7,964, eight tugs, dredges, scows, etc., 10 ferry boats, 21 steel tugs, seven light¬ ers, 37 hoisting barges, 174 grain boats, barges, etc., and 62 car floats.

The corporate income of the New York Central Railroad Company for the year ended 31 Dec. 1918, amounted to $69,270,920. Of this amount the sum of $55,802,630 was compensa¬ tion accrued for use of the properties by the Federal Railroad Administration. The net in¬ come. of the company was $17,917,121 and the surplus for the year carried to profit and loss was $5,321,948. In the same period the num¬ ber of stockholders

increased by 1,591, the total number at the end of the year being 28,693, of whom 28,395 were in the United States and 298 abroad. The par value held by those in the United States was $247,543,855 and by those abroad $2,053,500, the average holdings being 87 and 69 shares, respectively. In 1915 the numbers reported were 22,270 in the United States and 2,772 abroad, the general average holding being, approximately, 100 shares, while now it is 87 shares.

During the year ended 31 Dec. 1918, the net corporate income of the Cleveland, Cincinnati, Chicago and Saint Louis Railway Company was $3,120,363. Gross income of the company was $10,772,277, of which amount the sum of $9,938,597 was compensation accrued for the possession of the properties under federal con¬ trol. Surplus for the year carried to profit and loss amounted to $2,493,013.

The Michigan Central Railroad Company earned $8,955,107 during the same period. Of this amount the sum of $8,052,127 was compen¬ sation accrued for the use of the properties under federal control. The net corporate in¬ come was $547,857, and a deficit for the year carried to profit and loss amounted to $201,598. The balance to credit of profit and loss 31 Dec. 1918, was $18,448,755. The net income of the Pittsburgh, and Lake Erie Railroad Company for the year ended 31 Dec. 1918, amounted to $5,058,111. The compensation accrued for the possession of the properties by the Federal Railroad Administration amounted to $8,980,- 219. The gross income was $9,544,051, and the surplus for the year carried to profit and loss $1,459,551. The balance to the credit and loss 31 Dec. 1918, was $23,427,615.

NEW YORK COURTS — NEW YORK PUBLIC LIBRARY

NEW YORK COURTS. Sec Court.

NEW YORK HISTORICAL SOCIETY,

Ine, an association organized 20 Nov. 1804 for the collection and preservation of historical ma!teJ relating to the United States in general and the State of New York in particular. The collections of the Society are rare and valuable. In the department of antiquities is the Abbott collection of Egyptian antiques, which is con¬ sidered one of the finest in the world. The art gallery, which contains nearly 1,000 paintings and 200 portraits, includes the Bryan gallery of old masters, the Durr collection, New York Gallery of Fine Arts, the works of the Ameri¬ can Art Union and Audubon's original water- colors for his natural history. The library has a valuable collection of books, maps, manu¬ scripts and engravings. From 1857 to 1903 the collection was housed in the Society's building a.t 170

Second avenue, New York. In Novem- ber 1903 a new home for the Society at 77th street and Central Park West was dedicated and the historical treasures owned by the Soci¬ ety are now housed in the new building. Among the organizers were Anthony Bleecker, DeWitt Clinton and Peter G. Stuyvesant.

NEW YORK PUBLIC LIBRARY, was

established 23 May 1895 by a consolidation of the Astor, Lenox and Tilden libraries. Legally this was an amalgamation of three corporations known as the Tilden Trust, the Trustees of the Astor Library and the Trustees of the Lenox Library. From these institutions 22 trustees were selected from the 33 governing members of the former associations, and to these were added ex officio the mayor, comptroller and the president of the board of aldermen of the city, to serve as members of the new corpora¬ tion. The official title of the corporation is The New York Public Library, Astor, Lenox and Tilden Foundations. Vacancies occurring in the board are filled by vote of the remaining members. The agreement of consolidation pro¬ vided for the establishment and maintenance of a free public library and reading-room in the city of New York, with such branches as might be deemed advisable for the continued promo¬ tion of the objects and purposes of these several corporations. The Astor Library (266,147 vol¬ umes) was founded in 1849 by John Jacob Astor, and his endowment was increased, and land and buildings added, by the beneficence of various members of the Astor family, to a value of $941,000 at the time of the merging. The Lenox Library (86,000 volumes) was founded by James Lenox, who gave land on Fifth ave¬ nue, between 70th and 71st streets, large funds and valuable collections of Bibles, manuscripts and Americana. It received subsequently large endowments from his sister, Miss Henrietta Lenox, from Mrs. R. L. Stuart and others, the total endowment amounting to $505,000. The Tilden Trust (20,000 volumes), incorporated in 1887, was created by the will of Samuel J. Til¬ den, made in 1884, which gave his entire resid¬ uary estate to trustees to establish and maintain a free library and reading-room. A long con¬ test in the courts resulted, before the termina¬ tion of the suit, in an agreement of compromise by which the Tilden Trust became possessed of over $2,000,000.

In 1901 the New York Free Circulating Li¬ brary with 11 branches and 160,000 books was

added by consolidation, and in the same year the Saint Agnes Free Library and the Wash¬ ington Heights Free Library joined the combi¬ nation. In 1903 were added the New York Free Circulating Library for the Blind and

the Aguilar Free Library with four branches; and in 1904 the Harlem Free Library, the University Settlement Library, the Webster Free Library and the five branches of the Catholic Free Cir¬ culating Library. In 1901 Mr. Andrew Carnegie gave to the city a total of $5,200,000 for library buildings and equipments and with the portion of the gift allotted to the New York Public Library 37 branch libraries were housed as a part of its activities.

The trustees of the New York Public Li¬ brary soon after the consolidation in 1885 de¬ termined to pursue a liberal policy and to create a great library system not only for the use of scholars, but for the people. The best perma¬ nent site for the future great library was con¬ sidered to be in Bryant Park, on Fifth avenue, between 40th and 42d streets, on the site of the city reservoir, which had become obsolete and was practically unused. On 25 March 1896 the trustees made a formal address to the mayor asking aid from the city in securing the site of the reservoir, and in May 1896 the legis¬ lature passed a law authorizing the removal of the reservoir and the lease of the land to the library. On 19 May 1897, another act was passed providing for the construction by the city of a library building- on the reservoir site, and for its lease to the library, which act was amended in 1900, removing the limit of cost. On 10 November Carrere a::-d Hastings were selected as architects for the new building, and on 1 December the plans were approved by the city. After delays, owing to the failure to ap¬ propriate funds for the work, the removal of the reservoir was begun on 6 June 1899 and the new building was opened to the public on 23 May 1911. Exclusive of the books and collec¬ tions which it contains, it had been erected and furnished at an expense of about $9,000,000, on ground valued at about $8,000,000.

The new library building was not intended to be a great monumental building which would look as well from one point of view as an¬ other and which would be fundamentally an example of pure architectural form, but rather an example of dignified and elegant city street architecture. It is described by the architects as "modern Renaissance, more or less of the Louis XVI period, with such modifications as the conditions and needs of our age have sug¬ gested." The facade on Fifth avenue has poise and character and seems to issue to the people "an invitation to enter rather than a command.8 The total quantity of constructive marble in the building is about 375,000 cubic feet, quarry measure. It came mostly from the quarries of Vermont. The general plan is rectangular, 390 feet long on the Fifth avenue front, and 270 feet in depth. It is built around two inner courts and has four floors besides the cellar. The sides and front are comparatively low, the top floor being lighted by windows and 'sky¬ lights; while the centre and rear parts rise much higher and are lighted entirely by win¬ dows. The "stack" under the main reading- room is of steel, seven

decks in height, with 63.3 miles of shelving — a capacity of 2,500,000

volumes. In addition to this, the special read¬ ing-rooms have a shelf capacity of 500,000 vol¬ umes. The main reading-room floor has an area of half an acre and there are seats for 768 readers. On its open shelves are 25,000 selected volumes covering every department of human knowledge.

Of the great libraries of the world, the New York Public Library is fourth in size, possessing in 1915 a total of 2,459,996 books and pamphlets. It is notably strong in famous old manuscripts and rare editions ; illuminated and Oriental manuscripts; works on American his¬ tory and genealogy; the history of printing; books belonging in the Oriental, Hebrew and Slavonic departments, and works on the history and illustration of ancient and modern art in all its phases.

The books, manuscripts and maps owned by the library at the close of the year 1918 were valued at $3,155,354.15, and the paintings, statu¬ ary and other works of art at $266,245.

The library is conducted in two divisions; as a free reference library and a free circu¬ lating library; the latter division having 46 branches in various parts of the boroughs of Manhattan, the Bronx and Richmond. (The boroughs of Brooklyn and Queens have each its own separate library organization). The number of books in the reference department on 31 Dec. 1918 totaled 1,091,703, and the num¬ ber of pamphlets 319,263. The circulating de¬ partment had 1,187,139 volumes. During 1918 the number of volumes consulted in the refer¬ ence-rooms, called for by signed slip, was 2,063,- 265. No record is kept of the volumes taken from the open shelves in any of the reading- rooms. The number of persons entering the library building in 1918 was 2,528,657. The number of readers registering by name in the special reading-rooms was 964,587. The readers in the newspaper-room do not register.

In the library . building, besides the great reading-room there are 18 special reading-rooms, devoted to the following named departments: Americana (with 46,000 volumes) ; genealogy (30,000 volumes) ; music (22,000 volumes and pieces) ; art (25,000 volumes) ; prims (20,000 volumes) ; Jewish literature (24,000 volumes) ; Oriental literature (20,000 volumes and pam¬ phlets) ; Slavonic literature (23,000 volumes and periodicals) ; science (35,000 volumes) ; eco¬ nomics and public documents (400,000 books and pamphlets); patents; technology (65,000 volumes) ; current

periodicals (400) ; news¬ papers (60 dailies and 25 foreign) ; maps; manuscripts; library for the blind (8,000 raised letter volumes and 5,500 music scores) ; and the children's reading-room (12,000). There is also a library school giving a two years' course, with, in 1918, 48 pupils. The library has a complete printing office and bindery. The former sup¬ plied in 1918 388,613 printed catalogue cards and 8,956,897 pieces of printed stationery. The bindery bound 34,678 volumes and handled over 14,000 pieces of miscellaneous work.

In the circulating department the number of books issued from all the branches for home reading in 1918 was 9,627,505, of which total 3,955,113 were children's books. The Central Branch, located in the library building, issued 616,372 volumes in the year, an average of 1,700 books per day, and 130 for each working hour.

The aggregate attendance for the year in the reading-rooms connected with the branch libra¬ ries was 3,630,074.

The extension division of the library covers 6 sub-branches and 411 agencies in outlying dis¬ tricts, community centres, schools, business, offi¬ ces, factories, fire and police stations, hospitals, prisons, etc. This service is continually being extended, the agencies being expanded into sub¬ branches, and the latter into full-fledged branches as the library needs of the locality may develop. The yearly circulation of books controlled by this department numbers 195,330 volumes.

The library is managed by a director and staff of 1,224 assistants (in 1915). Of these, 534 were in the reference department and 679 in the circulating department. The reference library and the Central Branch of the circulat¬ ing department are maintained entirely by the income from the library's endowment funds and without financial aid by the city. The library issues annually a (Handbookˆ and publishes weekly the Staff News for information of the personnel.

NEW YORK STATE UNIVERSITY.

See University of the State of New York, The.

NEW YORK UNIVERSITY, established in 1830 in New York City. The first steps toward the founding of the university were taken in December 1829, when nine prominent citizens of New York met to discuss the proj¬ ect of establishing an institution of higher learning in the city. Through their efforts the co-operation of various literary and scientific institutions was obtained, a standing committee was organized and $100,000 subscription raised, most of which was contributed in comparatively small sums. In

1830 the university council was elected by the subscribers and the uni¬ versity incorporated in 1831. In 1832 the col¬ legiate department was opened for instruction. The ideals of the university were from the first most liberal ; the address of the standing com¬ mittee issued in 1830 stated three fundamental principles which have been consistently adhered to: (1) <(The object of the University shall be to extend the benefits of education in greater abundance and variety and at a cheaper rate than at present they are enjoyed®; (2) ((Persons of every religious denomination shall be eligible to all offices® that the university may never be under sectarian control; (3) Those attending the university shall pursue studies according to their own preference <(having an unlimited choice of the branches taught in the institution.®

The present organization of the university includes nine schools, besides the Summer School, Extramanual Division and the Woman's Law Class. These schools are the College of Arts and Pure Science (founded 1832), the School of Applied Science (1862) ; the Gradu¬ ate School (1886) ; the University Law School (1835) ; the University and Bellevue Hospital Medical College (founded as the University Medical College in 1841) ; the School of Ped¬ agogy (1890) ; the New York State Veterinary College (established at New York University 1899) ; the School of Commerce, Accounts and Finance (1900) ; the Washington Square College (1913). The university senate comprises the deans of the Union Theological Seminary, the

*General Theological Seminary and the Drew, New Brunswick, Catholic and Jewish theologi¬ cal seminaries. The work of the University College, which had always been largely elective, was in 1894 arranged for the group system; since then the arrangement of groups has been altered, but the principle has been must satis¬ factory; the groups include the classical, the classical scientific, the Semitic language and lit¬ erature, political science, philosophy, natural science, exact science and medical preparatory. The work of the School of Applied Science is • * ^ ^ same principle ; the courses*

include civil, mechanical and chemical engi¬ neering. The School of Pedagogy was the first university school to put professional in- struction in pedagogy on the same plane with the professional university instruction in law and medicine ; it was also the first school to establish degrees in course in pedagogy. The Medical College in 1898 was consolidated with the Bellevue Hospital Medical College under its present name ; in 1896 this college began requir¬ ing a four years' course for all students; this action

was in advance of State requirements, as the State law making a four years' course obli¬ gatory was not passed till the next year. No university in the Eastern States has grown rela¬ tively so fast as New York University; within 20 years (1902) the number of students has more than trebled and the value of its property more than quadrupled. The period of its greatest growth has been since 1891, when a site for a new campus was purchased on Uni¬ versity Heights, containing about 23 acres. The University College and the School of Applied ' Science were moved there in 1894, the summer school is located there and the scientific work of the graduate school is also done there ; the ether departments, with the exception of the medical and veterinary, are at Washington Square. Since that time the curriculum has been enlarged, two new schools besides the summer school have been organized and the number of students steadily increased. The university organization has also been completed and the various schools closely affiliated under the government of the university senate. This senate consists of the chancellor, the deans of the various schools, one professor from each of the schools and advisory members.

Among the buildings on University Heights the most notable is the library building. An adjoining colonnade, with museum below, is known as the Hall of Fame (q.v.). The library emphasizes the seminar rooms, of whicl there are 18, each with its stackroom adjoining; the greater number of the books are in these semi¬ nar stacks ; in 1916 there were 189,000 volumes. The total value of the university plant in 1915 was approximately $4,000,000. The students in 1916 numbered 7,977, the professors and lec¬ turers and instructors 396.

NEW ZEALAND, an autonomous state in the Pacific Ocean, 1,200 miles east of Australia, consisting of two principal islands known as North Island and South or Middle Island, besides Stewart Island south of Middle Island, and several small outlying islands. The group lies between lat. 34° 20′ to 47° 30′ S. ; long. 166° to 178° E. The length of the group, north to south, is about 1,000 miles; the maxi¬ mum breadth 180 miles; it has a coast line of

3,000 miles; and an aggregate area of 104,751 square miles. North Island comprises 44,130 square miles, Middle Island 58,120 square miles, Stewart Island 662 square miles, total 103,581' square miles, the rest being divided among Cook and other islands in the Pacific Ocean, since 1901 officially attached to the colony. New Zealand is divided into nine provincial districts, of which four— Auckland, Taranaki, Welling¬ ton and Hawke's Bay, are in North Island, and five — Nelson, Marlborough, Canterbury, Otago and Westland, in South Island. The areas and population of these provincial districts are as follows :

Area,

Population. 1916

PROVINCIAL DISTRICT

square

miles

Males

Fe¬

males

Total

Auckland .

25,364

3,732

4,241

10,807

4,225

10,875

4,881

13,858

155,298

28,775

27,194

119,572

8,506

22,415

8,088

88,085

153,468 27,150 27,073 112,542 8,102

90 ft If,

308,766

55,925

54,267

232,114

1 A AHft

T aranaki .

Hawke's Bay. . . .

Wellington .

Marlborough .

Nelson .

AT. 9C1

Westland .

7,414

93,784

Canterbury .

Iftl ft AO

Otago:

Otago Portion .

13,957

11,355

63,546

30,296

67,972

29,333

131,518

59,629

Southland Portion . . .

Totals .

551,775

547,674

1,099,449

The population of North Island in the same year was 651,072; South Island, including Stew¬ art Island and Chatham Island, 448,337. The total population was 1,162,29 3, including 49,776 Maoris and 12,797 inhabitants of Cook and other islands politically connected with New Zealand. Of the population 506,988 lived in rural districts and 592,461 in cities.

Topography.— New Zealand is one of the loneliest of civilized countries of any import¬ ance. The shortest sea voyage between its ports and those of Australia is a run of 1,200 miles. It is separated from the coast of Chile by 4,000 miles of open ocean, while north and south empty sea wastes stretch to the Antarctic and Polynesia, respectively. The archipelago itself, when the voyager at length reaches it, stands boldly up, showing, as a rule, steep shores backed up by a hilly or mountainous in¬ terior. The three main islands have a coast line of about 3,000 miles. Long curving beaches of sand or shingle, backed by cliffs or sand dunes, often extend for many leagues. But even where the hills do not thrust their sides or spurs into the surf, they are so seldom far away, and on the east coast are usually so clearly visible through the bright atmosphere, that the first impression left by New Zealand is of a chain of half-submerged highlands, broken, pre¬ cipitous and picturesque. When, as on the mid¬ east coast of the South Island, or on the west of the North Island, the shores themselves are low-lying and commonplace, the striking back¬ ground catches the eye and redeems the land¬ scape. It is, however, where the mountains meet the

ocean, or where long sea-arms wind in among the ranges, that the coastal scenery is found, the fame of which has gone abroad. In many of the sounds of the southwest a combination of grandeur and soft loveliness is seen, exceeding in sublimity the sea coast be-

tween Alaska and Vancouver and in richness and color leaving the Norwegian fiords behind. Among inlets other than these, Cloudy Bay and Blind Bay in the South Island and the Haur- aki Gulf, the Bay of Islands, Wangaroa and Hokianga are, perhaps, the more noted. Wel¬ lington, the capital, stands on a noble harbor, Port Nicholson. For commerce, the harbors of the colony are often less convenient than might have been looked for in a group so narrow' and deeply indented. The southwestern sounds aforesaid give access only to uninhahilable Alps. From Martin's Bay northward there is not a single port on the western coasts which is not hampered by a bar. Kawhia, the best of them, lies out of the way of settlement. Even on the east coast, Lyttelton, Port Chal¬ mers and Napier, the third, fourth and sixth ports of the colony, have had to be improved at great cost, and the same is the case of Bluff Harbor, the port of departure at the south end of the country, and with Westport and Grey- mouth, where most and the best coal is shipped. The truth is that many of the deep, sheltered gulfs art not just where traders would wish to have them. Fortunately, Wellington and Auckland are exceptions and these have be¬ come the two chief ports of New Zealand.

The official area of New Zealand is 104,751 square miles. This includes not only the smaller coastal islands of New Zealand proper, but outlying groups like the Chathams (q.v.) to the east, the Aucklands (q.v.) to the south and a number of Polynesian islets (the chief of which are the Cook Islands (q.v.) and Niue, which politically belong to the colony. Of the whole area, the North and South islands cover all but about 2,000 square miles. In size as in config¬ uration and climate, New Zealand may be more fairly likened to Italy and Sicily than to the British Islands. Long mountain ranges form a backbone, stretching — save for the gap made by Cook's Straits — from Puysegur Point at the extreme southwest of the South Island to the East Cape and the Bay of Plenty in the North Island. Between lat. 43° and 46° the summits rise into the region of eternal snow. Several of them reach heights of between 10,000 and 12,000 feet and Aorangi (Mount Cook), the highest peak in the islands, attains 12,349 feet. Here are glaciers, which on the western slopes descend and penetrate the evergreen pine and beech forests, while on the eastern side their size surprises geologists and mountain climbers. Some of the figures showing

their extent are these :

NAME

Area of glacier

Length of glacier

Greatest

width

Average

width

Acres

Miles ch.

Miles ch.

Miles ch.

Tasman ….

13,664

18 0

2 14

1 15

Murchison. .

5,800

10 70

1 5

0 66

Godley .

5,312

8 0

1 55

1 3

Mueller. . . .

3,200

8 0

9 61

0 50

Hooker .

2,416

7 25

0 54

0 41

Among these ranges lie seven large and many small lakes. They vary greatly in beauty, but Wakatipu, Manapouri and the western arms of Te Anau challenge comparison with the lakes of Switzerland.

North of the 43d parallel the mountains, though somewhat less in height, are no longer

a backbone merely. They extend right across the island and the seaward flank of one fine double range, the Kaikouras, towers above the eastern coast. The broken and difficult surface of the northern end of the South Island has had a marked effect on the course of settle¬ ment and politics. Southward from the Kai¬ kouras population is growing fairly dense along the eastern and southeastern coast as far as the district served by Bluff Harbor. In this stretch is found the largest flat plain — Canterbury — in the islands and many roomy valleys, flats and manageable slopes. The open, grassy char¬ acter of the land made rapid occupation easy. Two-fifths of the population of the colony are to be found between the points last named, within 40 miles of the coast. To the north, however, settlement is still thin and patchy; the southern railroads stop 80 miles short of Cook's Straits ; the southern provinces com¬ municate with Wellington by a line of steam¬ ships from Lyttelton, halfway down the South Island. As if to

separate the bulk of the North Islanders still more from the majority of the Southerners, nature has made the butt end of the North Island, for 30 miles behind Welling¬ ton, poor, wind-beaten and hilly. Only after leaving this unattractive knuckle-end do we come to fertile expanses on both sides and in a central hill-encircled plain, the Wairarapa. Ex¬ cept in the east round Napier, on Hawke's Bay, very little of this attractive country is a dead level. Rolling downs, steep hills of moderate height, narrow, rich river-valleys, mark it every¬ where. Great tracts of it are, or were, clothed with thick forest, the rest mainly with tall bracken. Generally the note within 40 miles of. the coasts is fertility. A gieen, moist, warm land more suited, as a rule, for pasture, spreads along the west coast as far north as the mouth of the river Waikato and on the east to the mouth of the Rangitaiki, on the Bay of Plenty. The centre of the island is a plateau of from 1,200 to 2,000 feet in height, lying round Lake Taupo and dominated by volcanic cones, of which several are active and others have ex¬ ploded within man's memory. Ngauruhoe (7,550) and Ruapehu (9,008) are the most restless of these. The most beautiful rises, not on the plateau, but out of the plains by the western shore. It is the solitary, symmetrical Egmont and is 8,250 feet high. A line drawn through Ruapehu northwestward to White Island, in the Bay of Plenty, passes through a tract of about 650 square miles incessantly dis¬ turbed by volcanic activity. Warm or boiling springs, geysers, pools of boiling mud, fuma- roles, solfataras, colored lakelets are numer¬ ous. Cold lakes and waterfalls add to the pic¬ turesqueness and the healing powers of the thermal waters and complete the attractions of a much-visited district.

In and near this volcanic territory the soil is mingled with pumice and is not suitable for grass, though trees and long-rooted plants may do well there. South of Lake Taupo and east of the greaf volcanoes, a patch of true desert is encountered. Bordering on the comparatively barren pumice area is found both to the east and west the fertile country already referred to. Here the usual formation is that locally called papa. This is a calcareous stratum re¬ sembling soft limestone and the fertility of even the most broken hilly surfaces of the papa

*Cape Maria Van Diemen**

irengareng»

W. 8i8Tca Craggy l.°

? E. Sister L

NEW ZEALAND

■*Kits Island*

Hummock

Kangaroo I. OJ Chappell I.

£°*4s ”

IFURNE.AUX GROUP r^\c. BARREN L ^sAc. Bar Bun

CLARKE I.

•

lttQg»roa

I MANGONUl’ ™] Reef Point r-rf Aiupara^^^fi A^N C

0tu“io\Jf flokiar‘8a {Hokianga River 3°0mapere \

nf Uland* Cape Brett

Tasmania and Fiji Islands

Albatross I.f Black Pyramid # ,

barrenoi.S

C. Grim^

Scale.

Statute Miles, 77 = 1 Inch.

f OF ISLANDS

Waroj efjVangaruru Harbour

.^WKANGAREI

lumaS _ 1

SWAN I.

SJ ey*

Burnitp^-^

. Ulverstom

-Eddystone Pt,

Kaihus

Rand McNally k Co.'s New 11 x 14 Map ■of New Zealand, Tasmania and Fiji Island. Copyright byJUnd_McN ally k Co.*

Bream Head ˆHwr and Chickens

Scottsdale

Dargavillei

Ordnance Pt.

St. Helens Pt.

Aratu]n

Launceston

ˆ BenXf'dmtind

Sandy Cape

Wiliiamsfi C\ PitiˆA

'jˆjjRODNl

sWarkwortBj

Kaipara Ilarlour

Kkknpu\4ˆV>ˆ

„ waVtemal

IlelensviJlaN

RiverheadˆJ

Aiuklam

Campbelltcr

Coromant

St. Clair

Macquarie H(

\Sfrkycinet

5> PENINSULA

ScHOUTSN I.

• *****

C. Sorell

‘VN,0W,°* \F,nlC <2-ty Drury J 0/ IANUKAU JrAam.

Mamkau Harbuui

&■ Maria I.

Pt. Hibbs

• Mayor I.

men

ˆt***ura nga Harbour Whi™ T. Cap e Runaway I

of PUn(y

TAURANGA >v iv KALB I. J

- rv.l>ˆiwa Prn a

fa; 7 \OpotTki

Glunora’so

rˆv-ˆNorfoTl

Waikato River

‘OHINIMURI A ‘ Katlikatil

[Churohlli\

\ Huntlcr|\

\RAGLAN > J .

‘iewoastlef^

b’M)J.vVu\

luburt

forestier’s PEaV.

Rocky Pt.

Elliot (

[orrinsvmt

Hu on

Whaingaroa Harbuui

TASMAN PENINSULA C. Pillar

Aotea Harbour

Ka whia Harbour

/Reporua

~&pen~3ai

> OtorohangaP’ \ K A W H l/A j T.Kuili l’ .

Scale.

Statute Ulili‘8, 70 = 1 Inch.

0 5 10 20 40 60

fTapatahl

ROTOR UAi-1 ^ Galatt

|W^AkaTAI

Terua Point

Orakeil

igˆIteratyfi

Mokau i

North Taranaki Bight J ° ° ° ˆBraoi iJ, / CLIFTON

‘ i Vi >ˆPukearuhe / – New PlymoutliˆjV “““Hjrenui y— — . — OakuraˆLˆbi,, I Inglewood ‘ ˆ f

uk»ANA K I W

0ApeEg.nonlTrRa,l§M’ \ST RATFORDV.- *u Parih»kJ| ..Oruji.”” YS%*

*0[“!”“±XHAwiA>ˆ St**

kOabl« End Foreland

HaikarTjLakt

Glsbori

[Taumaranui

7 Poverty Bay JˆfkareongaOnga

■*~-MMahia*

(VfM.UUA

J/I’ENINSULA PORJLA.VO L

*- S*tuh*k**

^^^nripap«ngBN / -HdWkc

yieAv cr.ˆ

A#- VˆMeaneeˆ ISapier

/\CUye

S A Cape Kidnapper#

sWANGANUI

MokoUy

?at‘

V.av<

Im/tw

m T}

“““‘Sky,

Wangacb^-^ muiis <

Rangitikei ItS^/ MANAWAT.L FoxiduJA

Manawatu It.

/^ITunter- ^ ZCyille T O R O U Al

Tungara Cove

» ‘^ungford ^rongahau flVainul t-‘ape Turnagaln

Cape Farewell

ShKniKin, PA^ I A T U A /

)hnJ:f -Xket5h una

A r /

^ti/ycfe ;W A/J R ^HA P a

/Mauriceville /w. ,

\IN ° R TH /Wbakatakl A^-rtia >PMasterton

■ ‘ \ioV-®rf/Carterton I / Castle Point >3

Riitp-^T^catberston’v [/ Uriti y

tmJ fj WAIRARAPA X C-

imi\fiTo.V|at Pt

SOUTH S*

\ >^Te Awaitw i ungaroa

Cape Paliiser

i Massacre or 4a Holden Bay

taka‘1 «5>

GWOOD (lasman y A J Bay Si*

Motuika^J

Kapiti I.

Karam Karamea Bight Mokihinui

Foulwlnd^^jV’

S Applebj^ St • Waketield^^Kj^j

limond

-K9rrz — rHampden\V,

ra/H)” RvturX

ifffA- Nt A H U kj-§

Charleston

»N ELS 0“N

Ahlir-*

rf Y f^ A

ekcrangu

St. Kilda^ J

Brighton/0 f> 5 “I Kararoa /

L Walls°4X’f

Greymouthfet^in

Marsdeu/ n^. A TeremakauM° ^ Stafford^ ^KumA|

Jackson

/Clarence River

lautigamanu

-d Kaik. [okanui

[R I Waian

!ulv«rden

1 River

. Ciieviot

ˆHurunui Rive • itonyhurat

v > W H ur u nul?ˆ5 PA'S* W aikari b*

*OaSP K /' * S H LIE Y*

ˆ L\ Walparal ˆ

*Otarama Gust Jf*n°*

S E L WayV-ˆ-ˆV fia,aIM W h ItevC 1 ifftfy-——-b44orndonJˆˆpli r . MethVˆn H°RestˆN//

11 r rh a

Wait aha,

Wataroa. Gillespies Beaolˆ/' Raleigh > ˆ fK, Arnott Pt-ˆy Co

tc6csKˆSpringburn«

A / Basks Peninsula Ikaroa

Aka roa Harbour

Weaterfield'

. Hinds.

Haast,

FIJI ISLANDS

*Jackson Bay * Point*

Canterbury

Statute Ulles, 81 = 1 Inch.

WmCnester

Arrow henua nashdyke rimaru >t. Andrews

Awarua

Ringgold

*Omarama'**

Islands

Milford Sound

tudholme Jo.

K uro wijˆ- w aimate c WAITAKIJˆ,ˆ 'iˆjjjAgpuntweBi

Jlenorchy ˆ iArrowtown istown Cr«

Bligh Sound Sound r

. Jvj aitaki

*t**WYaitaki Bridge*

Nrf pˆikeurl Jo.

ˆ4 > aniaru

Waikareka Jo.

[jtepopo

unpden

George

Caswell Sound ˆ Cluo-tU SounJˆ

ri.o..ii"i"'1 s""','SO'

Secretary l J\V.

*Doubtful Soun&Jte**

Doga SoutulLfyi*

fANDV.. I.JVj

Sandalwood

Nil A MI A I,

UNA I.

\TOTOA

oKok-mga

Inrie Nv

V Waynes Q

Hamiltjini

Buia Point

J ‘ V;

ijri.lSA ‘

JliveredR1® / , (Law

[aritane Imerston Jwatkouaiti

1 /TVi aikouaiti /Blueskin (&=, Otago Harbour \ Chalmers

Otmedin

‘PQ iBlandu _

GORO L

Viti Levu Bo

ˆMosshumQji

.lla’ce X

be u more itcaps A | (Wairioo _ V

Breaksta

RekolutJ

iBLANt^*

Dusky

W. Cape j

OVALAU

*,yunda”:>- • A, **

• VIJl-‘LEVU

*Dipt on *U*

troto

*r Lumsderii—^*

- – A Clioto

Hedgeb’n»e/Mataurii lEdcudale

‘BalcIutHt

proV.D^e

1 C»»v.

*fcAK^itangata yf.Mol yneux (Jb> ft ugget Point Gwakd y I *”nS Point*

ANGAU L

i^AGlenhanl,

v r

\e’ L

Campl^Bto^’

MOALA 1.

Vatu Leils

Xt/Tj

•»Port William .Paterson B ~ZA East Head -ˆOwen Head

rCaY« Point Codfirh 1.ˆ I

TOTOYA L

• Mason's Bay J

STEWART ISLAND > Moca 1-0 S 1 Long L, /Kl*

South CapeLˆ

Kadavu I,

MATUKU I.£J

Pegasus

Lougitude West from Greenwich

I

NEW ZEALAND

245

districts was attested by the fine trees and tall bracken which usually covered them. These are now giving way to the cultivated grasses of the settlers.

The deep, richly clothed gorges cut by the rivers of these districts supply the most ro¬ mantic river scenery of the islands, notably in the valleys of the Wanganui and the Mokau.

North of lat. 38 the island narrows into a long peninsula, indented again and again, and well nigh cut in twain where the Waite- mata (the harbor of Auckland) almost meets the Manukau. In this northern division the °f the east coast differs little from that of the west, for there is no central spine; save on the hills, frost is rare; north of the 38th parallel, indeed, the mangrove fringes the shores and palms, olives, oranges, guavas and the cane-break flourish!. Here is the home of the giant Kauri pine and here are the swamps and hillsides from which is dug the fossil resin, the kauri gum of commerce. The ocean is too near at hand and too cool for the northern peninsula to be oppressively hot, and, were its soil everywhere fertile, it might be more thickly settled than any other province. Unluckily its strips

and spots of rich alluvium are sur¬ rounded by _ larger tracts of stiff clay-marl, only productive after intense and skilful culti¬ vation.

In New Zealand it is the western coast which is the wetter, milder, more luxuriant clothed side. On the eastern, large tracts were found by the whites, quite treeless and clothed with coarse tussock grass. Here pastoral settlement made a beginning, spreading rapidly into the central ranges, to be checked in the South Island by the forests of the saturated west. In the North Island the climatic distinction is less marked and there the grazier flourishes in the west, after the native vegetation has been burned away.

Rivers. — Most of the very numerous rivers show the characteristics of mountain torrents, the rapidity and the cold, pure water running low in summer and disturbed by sudden turbid floods. It says much for the rainfall that very few streams run dry at any time. The volume of water in many is remarkable, notably in the chief river of the South Island, the Clutha, which, despite its strength, is but 154 miles long. In the north, the Waikato is the longest stream in the colony, and that, and four or five others (in the Auckland and Wellington prov¬ inces), are navigable by small steamers. Gen¬ erally the rivers hinder rather than help traffic, though their swiftness and number make them very valuable' in furnishing power for ma¬ chinery.

Climate. — The yearly rainfall varies from 26 inches on the littoral of Canterbury, to 170 inches among the sounds of the southwest. Throughout the settled districts the average is about 35 inches on the eastern and 60 inches on the western side. The brisk sea winds keep the sky normally clear and the amount of sun¬ shine registered is large, except in the south¬ west and immediately inland of Mount Egmont. In a country stretching through 13 degrees of latitude the climate naturally is very varied, but generally is very healthful. In the northern peninsula of North Island the conditions are semi-tropical, while in the high lands of Otago

and Southland the frosts in winter are very severe and the summer bracing and temperate. In Wellington, which may be taken as the centre of the country, the temperature scarcely ever falls more than one or two degrees below freezing point; while in Auckland, the most northerly of the large cities, the heat is tem¬ pered by sea breezes and never reaches the in¬ tensity which makes life in summer so trying in the great Australian cities. Rapid changes of temperature are caused by sudden stuffings of wind and are somewhat trying to new arrivals in the country.

Geology and Mineralogy. — To the geolo¬ gist the two large islands are a continuity, and form the remnant of a continent which once extended eastward and was probably connected with South America. A great leading

range of Palaeozoic rocks stretches through both islands, branching out in the south to enclose the exten¬ sive schistose area of central Otago. Upper Mesozoic formations have also enormous de¬ velopment; and in the North Island their out¬ crops are distinguishable through the volcanic deposits which cover a good part of the surface. In this island are also extensive areas of hydro- thermal agency, marking the expiring activity of volcanic outbursts. So late as 1886… there was a violent eruption of Mount Tarawera in the Hot Lake district, during which the cele¬ brated Pink and White Terraces of world-wide fame as natural wonders disappeared; it was previously supposed to be an extinct volcano; Mount Tongariro and Ngaruhoe, in the heart of the island, also are still active. Sedimentary rocks, chiefly of gray sandstone, are often seen, both among the ridges of the interior, and on the coast, where they frequently form precip¬ itous cliffs, but the far greater part of the rocks are crystalline. Among a great variety of fossils the most notable are those of a gigantic bird, the moa (Dinornis giganteus) , which sur¬ vived down to recent times. New Zealand is extremely rich in mineral deposits, and gold mining forms one of its staple industries. Gold was first discovered in 1853, and the total value of the output to the end of 1916 was $429,238,375. The great gold producing regions are the Thames district of Auckland, the west coast of the South Island and the interior of Otago. During the last few years the method of raising gold by dredging the beds of rivers has de¬ veloped to a remarkable extent. The extensive coal measures are also a source of wealth. Among many varieties the best is the bituminous coal of the west coast of the South Island, which is equal in quality to that found in any part of the world. The output has been steadily increasing, and for 1916 amounted to 2,257,135 tons valued at $6,455,145. Copper, chrome ore, manganese ore, sulphur and other minerals have been worked with varying success. Working miners make good wages, and there is a good deal of independent prospecting. Mining schools have been established in different parts of the colony, and the study of mineralogy is pursued with considerable zeal.

Flora, Fauna, etc. — Among vegetable pro¬ ductions the most characteristic are the ferns (130 different species), which forms almost the only vegetation over immense districts. Some of them are more than 40 feet high, and re¬ markable for the elegance of their forms. The

flax plant furnishes an article of export. A number of the forest trees furnish valuable tim¬ ber, among them the rare kauri or damar pine. Flowering plants are remarkably scarce, save in the Alps, and there are no

indigenous fruits.

In animals New Zealand is singularly defi¬ cient, only a sort of dog, now extinct like the moa, a rat and two species of bats being indigenous. Rabbits have been introduced and have multiplied so as to become a perfect pest ; pigs now run wild, as well as cats. Pheasants, partridges, quails and red and fallow deer have been successfully introduced, also the brown and rainbow trout. All the common European quadrupeds appear to be easily acclimated. Pigeons and parrots are the most common na¬ tive birds. Among others are the apteryx (a wingless bird), the huia, the tui, or parson-bird, and the owl-parrot. The chief reptiles are a few lizards. The coast waters teem with fish, and seals are still numerous in some parts.

Population. — The population is now about 1 ,162,293, or over 11 to the square mile. It is still very scanty in the western half of the South Island; in the interior of the North Is¬ land between lat. 40° and 38° ; in the great shoulder between Hawke's Bay and the Bay of Plenty; and in the far north of the Auckland Peninsula. Elsewhere it is steadily spreading

YEARS

Total

births

Illegitimate

births

Deaths

1914 .

28,338

27,850

28,509

1,302

1,152

1,146

10,148

9,965

10,596

1915 .

1916 .

- *Exclusive of expeditionary force.*

over the land up to a height of about 1,500 feet above sea-level. The advance, however, has never been rapid. The warlike native tribes, from whom land has had to be acquired by tedious purchase, have not been the only ob¬ stacle. To the difficulties of the stiff clay-marl and pumice soils must be added the denseness of the forest, the oft-recurring hill and moun¬ tain barriers and the innumerable ravines and swift torrents, making roads and bridges very costly. . Furthermore, a small archipelago placed in the southern ocean to be a lonely out- past of civilization does not attract any full stream of immigrants from Europe. So 21 years after annexation the white population had reached but 99,021. In 1881 it had attained to 489,923. In 1891 it was but 626,658. The colored population of 49,776 was stationary for many years but a slight increase has been observed recently. The Maori and Polynesians do not as a rule increase. The Chinese, who in 1881 numbered 5,000, have been reduced to 2,500 by exclusion laws — modified copies of those of the United States. The official census of March 1901 returned a population of 815,862 persons, or, excluding Maori and Polynesians, 772,719. The latter number had risen by 15 Oct. 1916 to 1,099,449, an increase of 7.3 per cent per annum from 1901. Of this population 551,775 were males and 547,674 were females. An excess of males over females is also found among the Maori, while among the Chinese less than

100 females were enumerated in 1916. The increase by excess of births over deaths is satisfactory. This is mainly due to the extraor¬ dinarily low death-rate which, contrary to pre¬ dictions, does not rise, and remains the lowest of any civilized country. In 1916 the death- rate stood at 9.64 in the thousand, as compared with a birth-rate of 25.94. The excess rate in favor of life takes a high place in the tables of international vital statistics. During the 12 years 1880-92, the birth-rate fell rapidly from 40.78 to 27.83. The fall then grew much slower, though it continued until 1899, when the rate stood at 25.12. Since then it has gradually re¬ covered. The proportion of children to each marriage is now about 3.14 as against 5.01 in 1885. The marriage-rate was 7.47 in 1916. The percentage of illegitimate births was 4.01. There can be no doubt that the decline in the birth¬ rate was almost entirely due to the deliberate limitation of families

by potential parents. It is believed that the Maori tribes mustered about 65,000 at the time of annexation. Their de¬ crease since has been mainly due to the preva¬ lence among them of tuberculosis and venereal diseases.

The movement of the white population in three recent years is given in the following table :

Marriages

Excess of births over deaths

Immi¬

grants

Emigrants

Excess of immigra¬ tion over emigration

9,280

- *18,190*

37,646

**32 , 506*

5,140

10,028

17,885

25,551

**22,476*

3,075

8,213

19,913

21,799

**21,163*

636

Between 1870 and 1885 the gain by immigra¬ tion was relatively large ; but in the seven years, 1885-91, the colony actually lost 20,000 people, mainly to Australia. There has been a gain since 1892, coming mostly from Australia, and the remainder from Great Britain. The gov¬ ernment encourages certain classes of emigrants, notably farmers, farm laborers, domestic serv¬ ants and navvies, by paying part of their pas¬ sage money. Exclusion laws have been passed to shut out criminals, prostitutes, lunatics, aged paupers and the diseased or crippled. With a view to restricting Asiatic immigration the New Zealand Parliament in 1907 passed an act which requires that any Chinese proposing to land in the dominion shall be able to read a printed passage of not less than 100 words of the Eng¬ lish language. Persons of other than European descent are classified in the immigration returns as ((race aliens® and have to pass an education test before admission. In addition to the land¬ ing tax of £100 on Chinese the government has the right to subject non-British ipcomers to a language test. Apart from those relating to Chinese and disease it cannot be said that all the restrictive regulations are stringently en¬ forced. The colony relies mainly on its distance from large centres, the cost of the voyage to it and the smallness of its quiet towns. It offers few attractions to active criminals, and is too remote for paupers.

The proportion of females to everv 100 males

NEW ZEALAND — NATIVE TYPES

Maori King and Queen — Waitaka Tribe

NEW ZEALAND

1 View of Auckland, from Ponsonby

2 Art Gallery, Public Library, and Municipal Buildings, Auckland

NEW ZEALAND

247

*<2«9'C*W WaS Per Cent 'm 1871 J*

19i6° ln ^ ^ ' 90.33 in 1901 and 99.2 per cent in

omIn i911 the total Protestants numbered 808,- «01; Roman Catholics, 140,523; Jews, 2,128; Pagans, 1,501 and 35,905 who objected to state tneir religion.

Of the white foreigners, by birth or descent, a considerable majority are of

Teutonic or Scandinavian blood. New Zealand in recent years has received increasing numbers of Irish settlers. These now equal in number those of Scottish descent. The increasing democratiza- Uon and the break up of industrial feudalism in New Zealand is in no small measure due to these settlers imbued with Republican senti¬ ments from their earliest years.

Chief Towns.— New Zealand is a decen¬ tralized country. Its main centres of popula¬ tion are the four towns of Auckland, Christ- church, Dunedin and Wellington. Of these Auckland is the largest as it is the most beau- tit ul, while Wellington, the political capital, is overhauling its rival. No other first-rate harbor is found on the North Island within 500 miles of the capital. It is the financial and banking centre of the islands and the rapid ex¬ pansion of its sea-trade suggests that it may yet challenge Auckland's leadership. Auckland taps the grazing and dairying valley of the Waikato, the quartz goldfields of the Thames, Coromandel and Waihi, and conducts a trade with the South Seas as well as with Australia. Christchurch is the market-town of the chief agricultural district, and is something of a manufacturing as well as an educational centre :

Population of Chief Cities.

Auckland . 133,172

Wellington . 95,235

Christchurch . o? 733

Dunedin.. . . . . :. 6«:7i6

Wanganui . 19 517

Invercargill . -. . ZZCW 1 7 [862

Napier . 15,131

Palmerston North . 14,006

Timarn .] 13 716

Gesborne . t . . " 12ˆ660

Nelson . 9,962

New Plymouth . . . 9 j 795

Christchurch lies inland, about five miles from its seaport, Lyttelton. The other three towns are seaports though most of the shipping trade of

Dunedin is done by Port Chalmers, seven miles from the city, and outside its ring of suburbs.

Wellington, close packed between steep hills and sea-shore, is already complaining of conges¬ tion, high rents and the lack of garden-space.

The other towns are roomy and comfortable enough, with well-planted, neatly-kept suburbs and spacious recreation grounds. There are no sky-scrapers and no slums. Wood is still the chief material in dwelling-houses, and the ratio of inhabitants to each house is 4.82.

Industries — Agriculture. — The founders of New Zealand looked forward to making it an agricultural settlement and it remains mainly devoted to grazing and mining. The de¬ liberate state encouragement of small as against very large holdings of land has not substituted tillage for grazing. The small farmer is a dairyman more often than not, or he owns a few hundred sheep and develops mixed farming. Two-thirds of the surface of New Zealand are suitable for agriculture and grazing. About 17,000,000 acres are still under forest. The total area under crop (in¬ cluding 14,734,989 acres in sown grasses and 84,649 in fallow) in 1917 was 16,841,575 acres. The total area of land under occupation in the same year was 29,404,291 acres. The area of Crown lands surveyed and open for settlement on 1 April 1917 was 967,566 acres. In South Island are a great number of the larger free¬ hold estates. The size and number of occupied

holdings according to follows : •

recent statistics are as

Number

SIZE OF

HOLDINGS

of holdings

Acres

1- 10 acres .

15,454

69 , 390

11- 50

a

12,748

358,726

51- 100

it

9,122

708,228

101- 200

12,159

1,812,196

201- 320

tt

7,972

2,054,197

321- 640

it

4,355,985

641- 1,000

tt

3,895

3,149,598

1,001- 5,000

It

5,284

10,366,504

5,001-10,000

it

517

3,593,266

10,001-20,000

it

277

3,880,927

20,001-50,000

It

165

5,126,470

50,001 and over

5,785,986

Total .

41,262,193

There are about 128,000 persons, including 30,000 females, engaged in agricultural, pastoral and dairying pursuits. The acreage and produce of the principal crops are as follows (see table below) :

It was the fall in the price of cereals fol¬ lowed by the discovery of the use of refrigera¬ tion applied to the transport of food products which turned New Zealand farmers from cereals to meat, butter and cheese. They found that cultivated grasses, — cocksfoot, timothy, clover, rye-grass — would grow admirably in the islands, carrying and fattening far more stock than the native pastures. They began the process of laying down land in cultivated

YEAR

Wheat

Oats

Barley

Acreage

Yield in

1 ,000 of bushels

Average yield per acre

Acreage

Yield in 1,000 of bushels

Average yield per acre

Acreage

Yield in

1 ,000 of bushels

Average yield per acre

1913 .

1914 . .

1915 .

1916 .

1917 .

1918 .

189.869 166,774 229,600 329,207 219,121

293.870

5,180

5,232

6,644

7,108

5,055

6,315

27.28

31.37

28.94

21.59

23.07

22.40

386,786

361,741

287,561

212,688

178,397

196,270

13,584

14,741

11,436

7,653

5 , 470 5,910

35. 12 40.75 39.77 35 . 98 30.66 30.21

37,486

32,022

18,347

30,204

29,570

1,378

1,206

597

820

738

36.75

37.65

32.53

27.15

24.96

«

grasses, with which 14,734,989 acres are now clothed. The export of frozen meat dates from 1882, when 1,707,328 pounds were sent to Lon¬ don. The rapidity of its growth may easily be shown :

Meat Export.

Year. Lbs.

1885 . 33,204,976

1890 . 100,934,756

1900 . 206,621,072

1908 . 237,473,936

1916 . 372,517,040

Butter and cheese began to be sent across the sea in 1889, and has been exported regularly since, mainly to the British Isles. The increase in the case of butter has been large and con¬ tinuous :

Export of Butter.

Year Cwts.

1900 . 163,871

1908 . 229,971

1912 . . . 378,117

1916 . 358,632

Cheese has advanced in 30 years from 26,558 hundredweight to 949,416 hundredweight in 1916.

One of the two products much of which goes to the United States is the fibre of the native flax, the New Zealand hemp of com¬ merce. The export of this has increased of late years. The value of the export in 1916 was

$3,154,080.

Minerals. — So far, the only three minerals exploited in a large way have been gold, coal and kauri gum. Good bituminous coal, also brown coal and pitch coal, is found in many districts, notably on the west coast of the South Island, in Otago and Southland, and in the valleys of the Waikato and Mokau. The bitu¬ minous coal of the west coast is equal to any in the world and is used by the British navy in the Eastern seas. In the domestic market, the local mines hold their own well and the total output increases steadily as the figures be¬ low show:

Year Tons

1885 . 511,063

1895 . 726,654

1905 . 1,585,756

1916 . 2,257,135

The total value of the gold produced since the year 1853 up to the end of

1914 was $414,769,550. The greater part of this is now extracted from quartz. In many mines the cyanide process of extraction or separation is used. About one-fifth of the gold is obtained by dredging, chiefly in the river beds of the South Island. In all about 10,500 persons are engaged in gold mining. Gold production in 1915 reached 422,825 ounces valued at $8,472,765 ; in 1916, 296,620 ounces were recovered, valued at $5,996,060.

The yield of silver amounted to 957,541 ounces in 1915 valued at $477,915, and to $787,- 053 ounces in 1916 with a value of $425,555.

The average value of the kauri-gum export is roundly $2,500 a year although a decline was noticeable in 1915 and 1916. In the latter year the value was $1,696,715. Though it is a mo¬ nopoly, tjie price fluctuates considerably. Al¬ most all of it is sent to London or the United States, where it is chiefly used in the prepara¬ tion of varnish.

Iron ore has not yet been turned to com¬ mercial account. In May 1906 a petroleum spring was tapped near New Plymouth from which oil flowed at the rate of 100 barrels a day. In 1915 194 tons of tungsten-ore, valued at $138,920, were produced ; in 1916 this was in¬ creased to 266 tons valued at $245,350.

Trade. — In proportion to population the ex¬ ternal trade is large. This is the more remark¬ able as there is virtually no transit trade. The imports are for local consumption only; ex¬ ports represent local production. Up to 1886 imports exceeded exports ; since that year the position has been reversed.

YEAR

Total imports

Total exports

1912 .

$104,872,870

111,441,510

109,280,480

108,644,170

131,696,415

$108,852,905

114,933,610

131,305,235

158,744,560

166,434,685

1913 .

1914 .

1915 .

1916 .

The total for 1916 included specie, duty-free imports and those subject to duty. The prin¬ cipal imports and exports for that year were:

IMPORTS

Article

Value

Apparel .

$14,391,615 18,883,435 4,933,830 1,931,580 4,367,340 3,589,110 947,630 1,175,695 2,292,085 5,009, 620 5,589,815 1,712,900 6,469,400

Iron, steel, machinery, etc .

Sugar .

Spirits, wine, beer .

Tobacco and cigars .

Coal .

Bags and sacks .

Fruit .

Paper, books, stationery .

Manures .

Specie .

Total, including items not specified above.

$131,696,415

EXPORTS

Article

Value

Wool .

$61,930,370 5,996,060 918,985 36,356,580 1,699,410 3,926,695 8,333,520 30,733.015 1,247,595 1,632,765 . 1,907,440 1,525,750 29,400

Gold .

Agricultural produce .

Frozen meat .

Kauri gum .

Tallow .

Hides, skins and pelts .

*Butter and cheese . **

Preserved meats . . .

Coal .

Timber .

British and foreign produce. . .

Specie .

$166,434,685

NEW ZEALAND

249

COUNTRIES

IMPORTS FROM

EXPORTS TO

1915

1916

1915

1916

Great Britain .

Australia …. .

$55 , 705 , 335 17,772,675 5,644,795 4,683,195 3,989, 080 13,001,240 38,950 661,005 17,755 1,521,610 5,608,530

$69,347,275 20,010,855 5,268,770 4,694,950 3,786, 430 19,849,625 21,435 566,760 21,650 2,814,870 5,313,795

$126,945,150

12,743,025

659,105

292,030

4,629,115

10,032,535

20

10,800

687,320

2,601,830

143,675

$134,349,940 10,957,725 582 , 480 265,575 3,459,930 12,469,935 25

1,516,440

5

550,225 2,282, 405

Fiji . .

India and Ceylon

Canada . .

United States …. .

Germany … .

France .

Belgium …. .

Japan . .

Others . .

$108,644,170

$131,696,415

$158,744,605

$166,434,685

A„Lher-tradj ‘l with Great Britain,

’^’U’ri.a la an < ˆ United States

Ihe distribution of trade with different countries covering the years 1915 and 1916 ap¬ pears in table top of page.

It will be seen that the United States almost monopolize such foreign trade as there is A Preferential Trade Act passed in 1904 imposed special duties of from 20 to 50 per cent on many foreign imports in the hope of transfer¬ ring trade to Great Britain, but the effect of tfie law, though appreciable, is not yet large.

Manufactures. — The chief manufactures are meat-freezing, butter and

cheese-making, grain milling, tanning and wool-scouring, en¬ gineering, saw-milling, clothing, boot and shoe- making printing, flax milling. The number of establishments — omitting all government work-

;uS£S~ane officiaUy ffUen as 2,459 in 1896, and 4.670 in 1916. The total approximate value of the land, buildings, machinerv and plant used in the year first named was $28,980,000. The sum rose to $109,757,880 in 1916. The returns, how¬ ever especially of the first named year, are in¬ complete. The same criticism applies to the official estimates of the number of hands em¬ ployed in factories and workshops. The official figures in by-gone years were taken on a dif¬ ferent system to the present. It is probably very nearly correct to say that 30,000 hands were employed in factories and workshops of all sizes, State and private, in 1891, against 33- 000 in 1895 ; 55,000 in 1900 and 57,823 in 1916t The total value of production in 1916, ex¬ cluding the value of the output of the govern¬ ment railway workshops and government print¬ ing offices, and! also those industries of which there were less four plants or workshops in operation, was $227,270,920. In the same year there were registered 4,670 manufactories em¬ ploying 57,823 persons, and with an invested capital aggregating $109,757,880. The princi- • pal industries, with the value of their products, are as follows :

Value of Industrial Products (from (Census of Manufactures, 1916>).

Value of

NATURE OF INDUSTRIAL ESTABLISHMENTS Output

Meat freezing and preserving . $63,067,855

Ham and bacon curing . 2,624,645

Butter and cheese factories . 37,624,520

Grain mills . 9,929,570

Biscuit factories . 2 , 228 , 735

Fruit preserving and jam-making . ’764,440

Sugar boiling and confectionery . 847,390

Breweries .

Malthouses .

Aerated water . . .

Soap and candleworks .

Rendering-plants and manure works .

Sawmills, and sash and door factories .

Grass-seed-dressing establishments

Gasworks .

Electric-light supply works. ....

*Lime and cement . * !*

Brick, tile and pottery .

Tinned ware and sheet metal works .

Iron and brass foundries, boiler works, etc

Jewelry . .

Cooperate and packing case works . .

Woodware and turnery factories . . ... .

Engineering . .

Electrical engineering . ‘

Range-making works . !

Printing and bookbinding . ‘ .

Agricultural machinery . .

*Coach building . .....**

Motor and cycle works . .

Saddlery and harness . .

Tanning, fellmongering and wool-scouring .

Ship and boat-building yards .

Sails, tents, and oilskins .

Furniture and cabinet-making.

Woolen mills .

Tailoring . .!!!!.

Dressmaking and millinery. . ....!!!!

Chemical works .

Boot and shoe factories .

Hosiery .

Clothing and waterproof factories . . . .

Rope and twine . . !

Bags and sacks (fibrous) .!....

Flax mills . .

Paper bags and boxes .

Value of output.

$3,177,440 860,715 1,284,785 1,385,265 2,119,940 9,492,630 769,630 4,022,070 1,529,375 1 , 323 , 335 1,169,520 1,501,935 624,355 490,395 965,450 1,218,260 4,417,480 128,725 418,880 8,489,155 1 ,331,280 2,439,120 947,410 1,297,535 13,776,415 654,350 489,950 2,892, 800 3,588,190 4, 144,200 2,842,360 635,050 4,007,860 314,140 4,540,585 807,235 464,505 2,353,870 234,720

Railways.— As late as 1870 there were but 46 miles of railway open for traffic. This had grown to 2,989 miles in 1917, of which all but 29 miles were owned and worked by the govern¬ ment. The number of passengers carried on the State lines in 1916—17 was 14,173,115; weight of goods carried, 6,239,173 tons; total revenue for year, $24,004,050; expenditure, $14,634,320; net revenue, $9,369,730. The total expenditure on construction of all government lines, open and unopen, to 31 March 1917, was $190,935,865. Owing to the physical divisions, broken sur¬ face and small population of the colony, the railway system is difficult to manage cheaply. Public opinion demands safety, comfort, low freight charges and good pay and short hours for employees. All these desiderata are ob¬ tained.

Posts and Telegraphs.— The receipts of the Post and Telegraph Department

for the year ended 31 March 1917 were $9,046,585, with

working expenses for the same period aggre¬ gating $6,854,050. The department had in its employ on the above date 10,194 persons. The government owns and operates the telegraph system, which has 13,896 miles of line and 50,- 320 miles of wire. In the year ended 31 March 1917, 10,875,120 messages were sent, of which 10,734,168 were private and press dispatches. The telegraph and telephone revenue for the year named above was $4,222,620. In 1916-17 the Post-offlce Department handled 242,121,361 letters, 8,133,697 post cards, 48,868,537 books, 41,807,999 newspapers, 6,085,103 parcels, issued 669,355 and paid 567,184 money orders.

Shipping. — There were registered in 1916 190 sailing vessels of 21,853 net tons and 390 steam vessels of 70,442 tons, making a grand total of 580 vessels of 92,295 net tons. Soon after the outbreak of the European War in 1914 many vessels of the New Zealand Register were transferred to the London Register in order to advantage of the War Insurance rates of the Imperial government. In 1916 574 ves¬ sels aggregating 1,448,517 tons entered New Zealand ports and 590 vessels aggregating . 1,491,593 tons cleared from the same ports.

Government Undertakings and Labor Legislation. — As landlord, railway, telegraph and telephone operator and constructor of pub¬ lic works, the state is a considerable employer of labor. But though the government does most of the business of land transfer, and con¬ ducts that of life, accident and fire insurance, is the chief trustee of intestate estates, and works coal mines, it does not systematically compete with private enterprise. It does, how¬ ever, regulate and supervise industry to an ex¬ tent unsurpassed in any other democratic and civilized country. The Department of Agricul¬ ture disseminates information, inspects flocks and herds, slaughter-houses and dairy factories ; examines, grades and brands food products and certain other exports. Its work is believed to be honestly and efficiently done. The Depart¬ ment of Labor inspects all factories, workshops and retail shops, however small, and controls servants' registry offices, even fixing the scale of fees that these last may charge. A Shop Hours Act restricts the business hours of retail shops and the working hours of merchants' clerks.

A Workmen's Compensation Act outruns in liberality the English law upon which it is based. But the most remarkable statute dealing with the

relations of employers and workpeople is the Industrial Arbitration Law, passed in 1894, amended in 1908 and again in 1914, for the pur¬ pose of superseding strikes and lockouts by the arbitration of State tribunals empowered to give decisions legally binding. Under this elaborate enactment compulsory awards may be given or agreements voluntarily entered into and registered, dealing with all industries where wage-earners are organized in unions. The act is constantly invoked and is accepted by both capital and labor, though with occasional com¬ plaints. Its practical results have been so far the disappearance of labor conflicts, the stamp¬ ing out of sweating, a general improvement of the conditions of labor, coupled with a tendency to refuse to grant a large and sudden increase of pay.

Side by side with the Labor Laws an Old Age Pensions Act, passed in 1898 and amended

in 1905, and consolidated and amended in 1913, provides for the poor of both sexes, after the age of 65, a pension not exceeding $130 a year. An applicant for a pension must be of good character, have lived 25 years in New Zealand, and have an income of less than $300 a year. The joint income of a married couple in re¬ ceipt of pensions must not exceed $500. The pension diminishes by $5 a year on each pound of private income above $170 a year possessed by an applicant. Nor does it seem to have yet diminished national thrift.

In 1917 there were 19,697 pensions, repre¬ senting an annual payment of $2,402,795, the average pension being $122. A widow's pen¬ sion is also in force. In 1917 2,024 widows were in receipt of pensions which aggregated

$196,930.

Land and Land Taxing.— One of the

avowed objects of the Democratic and Pro¬ gressive political party formed in 1877 was to restrict the growth and reduce the extent of large landed estates, and multiply small farms and holdings. This rather than Land National¬ ization was, and is, their policy. Before the year mentioned, land monopoly, allowed to grow almost unchecked, had locked up great areas of fertile land in almost unpopulated pastoral properties. As late as 1891, consider¬ ably more than half the Crown lands which had so far been alienated were shown to be held in this manner : 584 owners possessed 10,400,000 acres. The pastoral leases of the Crown were on a similar scale; for 13 leaseholders occupied 2,541,000 acres. A law advocated by Sir John McKenzie limited acquisitions of Crown land in

freehold to one square mile of agricultural land. After 1891, the same statesman caused much of the public land to be leased at a quitrent for 999 years instead of being sold, reduced the average area of the pastoral leases, and in 1894 carried a law authorizing the State to compul¬ sorily expropriate private owners at a price to be determined by arbitration. Under the terms of the law the state repurchased millions of acres. Of the properties so purchased, all but very few were bought by friendly treaty.

By a law of 1907 a lease of 66 years was sub¬ stituted for the longer lease in the case of Crown lands and for 33 years in the case of settlement lands, with privilege of renewal for successive terms. The yearly rental is fixed at 5 per cent the cost price of the land. The free¬ hold may not be purchased outright. The so- called settlement lands are rented at \x/z per cent. The transfer of lands is effected by means of local or district land boards.

The graduated land tax imposed in 1891 had for one of its objects the subdivision of the larger estates. In place of the tax hitherto levied — a property tax of one penny in the pound on the capital value, — landowners had thenceforth to pay the penny on the unimproved value only of their estates. All building, im¬ provements and livestock were exempted. Small holdings were exempted up to the value of $2,500. The tax, therefore, fell lightly on small or moderate-sized farms. On estates the unimproved value of which reached or exceeded $25,000, a special tax was levied, graduated so as to press with severity on the greater prop¬ erties. This tax mounts by eight steps from one-sixteenth of a penny on $25,000, to a maxi-

mum of threepence in the pound on land hold¬ ups valued at $1,050,000. For land tax pur¬ poses, mortgages are deducted when assessments

f;,a penny in the Pound is levied on ‘ ˆ;)Utie money lender, not the landowner, pays it. The effect of the deductions and ex¬ emptions allowed, under the land tax is to relieve nearly four-fifths of the landowners of the country from the impost altogether

In£°”“ and 0ther Taxes.— All incomes over $1,500 a year, not derived from land are

|V Vnn ˆ ta tax> 0n incomes between

$1,500 and $6,500 a year the tax is sixpence in

nnn°Undi; ahove. .fb-500 sixpence on the first

$" ' . 0 and one shilling on the excess. Com¬

panies pay one shilling in the pound on all profits. Foreign companies pay only on profits made m New Zealand. The following table foi the year 1917 shows how small a share of the total public revenue is drawn from direct taxes :

Chief Sources of Revenue

Rafws . $19,248,375

Starnes . 24,181,375

Land tax . 17,572,965

incomTta x.-.::;:: 2lfl50f3°0 Beer duty, marine, miscellaneous, etc . 4,' 289 j 010

$90,167,945

1917 there were 30,230 income taxpayers and 35,859 land taxpayers.

Public Finance. — Public finance, important in all countries, has had an especially direct in¬ fluence on the history of New Zealand, where it has molded and been affected by local cir¬ cumstances and a policy of state-socialism. From the first the government has been a bor¬ rower, and has gradually run up a debt, mainly external, and in 1917 reaching $649,180,525. It may lie convenient to divide the financial story into four periods. In the first of these, the 30 years between 1840 and 1870, borrowing was mainly the result of exceptional necessities — pressing needs for funds to buy out the New Zealand Company, to buy lands for settlement from the aboriginal tribes and to pay the cost of wars with these owners of the soil. A few public works, including one considerable rail¬ way, were begun locally and taken over by the central authority.

After 30 years the country with less than a quarter of a million whites owed $35,000,000. Then, incited by a bold and very able financier, Sir Julius Vogel, the citizens resolved to under¬ take the opening up of the islands on the lines of the development of a large unoccupied es¬ tate. Railways, telegraphs, roads and bridges were to be pushed on ; more land was to be bought from the natives; immigrants were to be imported in large batches. To this end the treasury was to borrow money in London.

Millions were borrowed and spent and, in the main, well spent. Bv 1881 the white popu¬ lation rose to 501,000. But in 1879 a financial crisis due to falling prices, bad banking and a wild land speculation had smitten the

country, and ended the second of the four periods. The resulting depression did not begin to pass away until 1895 and during the intervening years con¬ fidence in the policy of state borrowing and development weakened.

In 1895 the commercial cloud began to lift.

Prices of raw products were rallying. The set¬ tlement of the waste lands was increasing pro¬ duction. The effects of refrigeration in stimu¬ lating the export of butter, cheese and still more frozen meat was putting money into the farmers' pockets. The Progressive party de¬ termined to borrow, not only to continue public works, but to break up monopoly by land re¬ sumption and to cheapen money by lending money on mortgage to the middling and smaller farmers. In August 1895, then, a loan of $7,500,000 was raised in London. And during subsequent years borrowing has gone on at an accelerated pace. To-day we have the spectacle oi a heavily indebted government which never¬ theless easily raise's a large and growing reve¬ nue paid by a prosperous community without serious complaint or hardship. Trade and pro¬ duction advance rapidly, the wealth of the peo¬ ple has grown and a fiscal policy which might seem oppressive to the mass of consumers is lightly borne by a democracy which might lightly abolish it.

Ihe explanation is, perhaps, to be found in the beneficial character of the purposes upon which the borrowed money has for many years been spent. It has not been wasted in wars or upon the up-keep of a court or any army. The country is certainly spending freely but the aims of the outlay are defensible, being ex¬ pended on public works, purchase of native lands, farm loans, land improvements, etc.

In 1917 the principal sources of revenue, ex¬ clusive of sales and rents of land, were as fol- JTys • customs, $19,248,375; railways, $24,181,- 375; stamps, $17,572,965; land tax,' $3,565,590 ; income tax, $21,310,630; beer, marine and mis¬ cellaneous duties and fees, $4,289,010; making a total revenue of $90,167,945. In the same year the rents received from leasing pastoral runs, etc., amounted to $1,508,790. Expenditures in i2JLˆg?regated $70,293,850, comprising $20,- 073,960 for public debt charges, $7,625,530 for education, $6,842,450 for posts and telegraphs and $3,597,975 for constabulary and defense From 1870 to 31 March 1917 the total expendi- ture out of the Public Works Fund amounted to $334,842,340. The average taxation per head

$47 in excIudinff Maoris, reached

Banks and Savings Banks.— The govern¬ ment has a substantial interest in the Bank of New Zealand, the chief chartered joint-stock bank. The government holds a large sum in preference shares of the institution and

has guaranteed its debenture stock. In return the government appoints the auditor, four out of the six bank directors and a president with a veto. The . bank, which was in desperate straits when,, in 1893, the Treasury intervened to rescue it, is. now prospering, and its ordinary shares which, in 1894, could not be given away

arif unTr qu˚ted at a high Price- The two wholly New Zealand banking institutions have

a paid-up oipifid of $12,500,000, while the Bank of New Zealand has $2,649,940 of 4 per cent guaranteed stock. In December 1917 the value of notes in circulation was $32,323,470. Gold has almost disappeared from circulation A public trustee dispenses with the private trust company; land registration offices offer loans on real estate, thus competing with private banks. Savings are also attracted to the gov-

ernmental insurance plan and building and loan associations flourish.

The six banks of issue which transact the ordinary banking business are branches of Aus¬ tralian houses, except two which are New Zealand companies.

YEAR	*Deposits*	*Assets*	*Liabilities*
1857 .	*£343,316*	*8,538,935*	*15,570,610*
19,074,960	*21,821,753*	*37,757,917*	*£419,860*
£432 , 404	*1880 .*		

14,220,275

9,550,177

1900 .

17,314,535

16,964,582

1904 .

20,893,096

20,643,359

1908 .

29,098,567

23,311,903

1916 .

37,015,486

41,977,619

.

Most of the savings bank deposits are made in the public post office savings bank, which has 786 offices and held $140,078,370 to credit of its 619,972 depositors in 1916. The five private savings banks hold on deposit about $8,950,000 for 75,000 depositors.

The government money-lending on mort¬ gage to farmers and others is managed by the advance to settlers office established in 1894. The legislation has been amended at different times and is now embodied in the State Ad¬ vances Act of 1913, which authorizes the bor¬ rowing of moneys for the purpose of lending to settlers, workers and local authorities. Each year there may be borrowed for advances to settlers $7,500,000, to workers $3,750,000 and to local authorities $5,000,000. From the incep¬ tion of the scheme in 1894, 61,097 applications for loans aggregating $124,567,465 have been received. The Advances Board authorized loans of $86,794,150 to 46,954 applicants, the total actual payments to 31 March 1917 being $84,725,050, of which $44,545,980 has been repaid in respect of principal. Consult (New Zealand Official Year Book, issues of*

1914 et seq. Most of the money has been loaned on rural freehold. The rate of interest charged is 5 per cent plus 1 per cent sinking fund applied to pay off the principal. The debt is thus automati¬ cally extinguished by 73 half-yearly payments. The legal and other charges of the office are very low. Up to the present time the office has suffered no losses, and there are virtually no arrears of interest owing to it, while it has al¬ ready accumulated a reserve fund of $250,000.

Bibliography. — (The Financial Statement of the Colonial Treasurer, New Zealand (Parliament paper) ; (The New Zealand Offi¬ cial Year Book) ; (Reports of the Ministers of Lands and Agriculture1* ; (Report of the De¬ partment of Labor) ; (Reports of the Minister of Railway) ; (Reports of the Minister of Pub¬ lic Works) ; the writings of Siegfried, Reeves and Irvine and Alpers.*

Education and the Educational System. — The first generation of settlers labored persist¬ ently to set up local schools. It was not, how¬ ever, until 1877 that a national scheme of edu¬ cation available for all children alike, white and Maori, was established by the General Assem¬ bly. On the whole the measure of success gained by the friends of education has been high. New Zealanders may point to a univer¬ sity, to many secondary schools and to a really complete and efficient system of primary teaching. With the 20th century a creditable

advance has been made in manual and technical class-work. The training of teachers, too, re¬ ceives fair attention. Industrial schools for criminal, destitute and neglected children have been successful in preventing the growth of any "larrikin® class. The government maintains a school for deaf-mutes, and an institute for the blind has been founded by private generosity. The bulk of the money for education is taken from the general taxes, though substantial rents are drawn from land reserves. The state spent $7,625,530 for education in 1917. In the uni¬ versity and in secondary schools fees are charged. In the primary schools instruction is free in the six standards of the regular course; special and higher subjects are charged for. The primary system is secular, and attendance at some school is compulsory between the ages of seven and 14. The school attended may, however, be a private one, or a child may re¬ ceive tuition at home. How seldom this privi- leg'e is abused is shown by the figures dealing with illiteracy among the population.

The average attendance at the primary pub¬ lic schools in the year 1916 was 163,156, and the number on the school-rolls at the end of the year 185,884. The percentage of attendance throughout the year was the very creditable proportion of 89.1. During the same year no less than 5,132 Maori or half-caste children at¬ tended school, a high number when it is

re¬ membered that the whole colored population amounts to but 49,776. The private primary schools, of which two-thirds belong to the Roman Catholic Church, instruct 23,635 pupils. In round numbers 214,651 New Zealand chil¬ dren get elementary schooling. This means in the government schools a good deal more than the three R's. It includes history, geography, vocal music, drawing and elementary science. Boys are drilled and girls taught needlework. Military instruction is given to several thou¬ sand cadets. No religious teaching of any kind may be given within school hours, though the attachment of the great bulk of the people to Christianity is shown by the muster-roll of the Sunday schools.

There are 2,355 elementary public schools occupying 5,781 teachers.

The proportion of women teachers is much lower than in the United States. About half the colored school children go to special village schools provided for the Maori race. The others attend the ordinary public schools where they consort on equal terms with white children.

The Minister of Education is the head of a central department, entrusted with the general supervision, financing and protection of the national system and the direct management of the Maori schools, industrial schools and the schools for deaf-mutes. The ordinary public elementary schools are administered by pro¬ vincial boards of education elected by school committees of parents and guardians. Of these committees there were 1,300 in existence in 1917. The 'boards and committees appoint teachers in conjunction.

The industrial school children number 3,284. Of these about one-third live in the govern¬ ment reformatory schools ; about one-third are boarded out; about another third are handed over to the authorities of Roman Catholic schools carried on under government inspec-

Uon. A peculiarity of the New Zealand indus¬ trial school system is that the state remains in loco parentis to all its pupils until they are 21 years of age.

Secondary schools are of two divisions — OU district high schools controlled by the boards of education, with 2,115 pupils in 1917, and 37 endowed schools (sometimes clerical), managed by governors of their own, but inspected by the Department of Education. Altogether 7,052 children were in receipt of secondary education in 1917 and more than two-thirds of them re¬ ceive it free. Technical high schools had 2,105 pupils in 1916.

The University of New Zealand is an ex¬ amining, not a teaching body. It is controlled by a senate of 24 members. Four local col¬ leges affiliated to it do teaching work, but stu¬ dents may obtain degrees without keeping terms at any of these. None of the colleges are residential. In 1916 2,108 undergraduates were keeping term. The number of degrees granted since the foundation of the university in 1870 was about 4,100 at the end of 1916. Degrees are granted to women and men indif¬ ferently. Until lately, a feeling of ultra-re¬ spect for English scholarship and example has been noteworthy in the college methods, and the university confined its degrees to the five broad departments of arts, science, medicine, law and music. In 1904, however, further powers were by statute given it to confer the degrees of bachelor, master and doctor of (a) veterinary science, (b) dental surgery, (c) engineering (mechanical, electrical, civil, mining, metallurgical, naval architecture), (d) agriculture, (e) public health, (f) com¬ merce.

In response to local demands the central de¬ partment has expended funds in equipping and maintaining classes for manual and technical instruction, and even go to the length of erect¬ ing special school buildings. Sometimes the education authorities control them, sometimes they are the outcome of voluntary association. Several schools of mining (notably one at Otago University College) attra about 300 students in all. Canterbury College supports a school of engineering attended by 200 students, and a college and farm for teaching agriculture with resident students.

Bibliography. —

Government and History. — The consti¬ tution bears a general likeness to that in force in the colonies of Cape Colony, New¬ foundland and Natal. It is in the main founded on an act of the British Parliament of the year 1852, but the form then drawn up has been more than once amended by the citizens. The governor (governor-general since June 1917), is appointed by the king in council, and usually holds office for five years. He receives $25,000 a year and $10,000 additional allowances, and is vested with legislative power together with the General Assembly. He summons, prorogues and may, however, dissolve Parliament or re¬ fuse to do so. In practice, his master is the Secretary for the Colonies in the British Cabi¬ net, who may recall him. All acts of the legis¬ lature require the governor's assent, which he

may withhold pending a reference to his supe¬ riors in London. Acts relating to currency, foreign immigration, ocean-going trade and constitutional amendments are so referred. The governor-general is commander-in-chief of the forces in New Zealand.

The Parliament, the General Assembly, is bicameral, consisting of a

Legislative Council and a House of Representatives. The members of the first-named have hitherto been appointed by the governor for terms of seven years. Two of them are Maori chiefs. Formerly the Legislative Council was supposed to represent property and conservatism. Now, however, it is little more than a somewhat less energetic replica of the popular chamber, whose will it seldom thwarts. At present the Legislative Council consists of 24 members, who receive $1,000 per annum. Those appointed before 17 Sept. 1891 are life members, those later hold office for seven years only. Provision has been made for an elective legislative council, the first election to be held at the same time as the first general election of members of the House of Representatives, after 1 Jan. 1920. Twenty- four members are to be elected at the first elec¬ tion and 40 at subsequent elections. Three Maori chiefs may be appointed by the governor- general.

The House of Representatives consists of 80 members, including four Maori chiefs. All are returned by single-member constituencies for the term of three years. The elections of the white members are all held on the same day. All adults, — of both sexes — who have resided a year in the colony and one month in an electoral district may register and vote for one candidate. Any duly qualified male elector may himself become a candidate. Members are paid $1,500 a year, subject to deduction for absence without leave while the House is sit¬ ting. Their procedure is based upon that of the House of Commons, but the length of speeches is restricted by a time-limit, though there is no closure® of debates. The Maori members address the House in their own lan¬ guage, using an interpreter.

Twelve salaried ministers comprise the Ex¬ ecutive Council. They may hold office as long as they possess the confidence of the House of Representatives, and in practice all important legislation is initiated by them. Roughly speaking, . the English two-party system has been copied and for many years a Progressive and a Conservative party have disputed the ground. Party machinery, however, is neither elaborate nor all-powerful. The funds that sustain it are small and electioneering is cheap and singularly free from corruption. The se¬ crecy of the ballot is absolute. The expenses of many successful candidates do not exceed $250 apiece. By order in council of 9 Sept. 1907, and by Proclamation, the Colony of New Zealand was designated the Dominion of New Zealand on and from 26 Sept. 1907. The form of government at present obtaining was estab¬ lished by statute 15 and 16 Victoria, chapter 72, passed in 1852. The colony was divided into six provinces, later increased to 10, but after¬ wards reduced to nine. This provincial system was abolished in 1875 and governing power was transferred from the provincial officers to the governor and local boards. The proportion of voters to population is extraordinary as the fol-

following table — which deals with white electors only — shows :

Date of general election

Estimated

total

adult

persons

Number

on

rolls

Propor¬ tion of adult persons registered as

electors

Number

of

persons

who

voted

Propor¬ tion of persons on rolls who voted

1893 .

310,010

302,997

94.98

220,082

*75.25

1896 .

356,658

339,230

95.11

258,254

76. 13

1899 .

386,146

373,744

96.79

f279 , 330

*77.59

1902 .

429,385

415,789

96.83

318,859

76.69

1908 .

539,950

537,003

99.64

428,648

79.82

- *Excluding figures for three electorates in which there was no contest.*

f Including 4,974 informal votes.

At the elections of 1914 616,043 (335,697 men and 280,346 women) electors on the rolls, who returned 76 European members to the House of Representatives. At the same elec¬ tion 18,621 natives returned four Maori mem¬ bers to the same house.

Women obtained the franchise in 1893, and, as will be seen from the subjoined figures, make use of it almost as freely as men; though they are still ineligible as candidates. An experience of over a quarter of a century has shown, by general admission, that female suffrage has done no social or political harm whatever but has resulted in much general good to the whole community. On the whole, beyond listening to speeches and recording their votes, they take less open and active part in politics than was anticipated. They do comparatively little plat¬ form speaking. Certainly their vote has not changed the balance of parties. They have, however, strengthened the anti-liquor move¬ ment and have stimulated sympathetic reforms touching children and their own sex :

w. —

The Working of Women's Franchise.

Date of general election

Estimated

total

adult

females

Number

of

women

on

rolls'

Propor¬ tion of adult females registered as

electors

Number

who

voted

Propor¬ tion of females on rolls who voted

1893 .

1896 .

1899 .

1902 .

1905. .

139,471

159,656

171,373

195,783

109,461

142,305

163,215

185,944

212,876

242,930

280,346

78.48 89. 13 95.24 94.97

90,290 108,783 119,550

fl38 , 565

174,615 190,114

**85.18*

76.44

**75.70*

74.52

1908 .

1914

243,504

290,000

99. 76 97. 10

78.26

- *Excluding figures for three electorates in which there was no contest.*

t Including informal.

Local Government. — Local government is marked by a subdivision of functions resulting in a large number of directly or indirectly elected boards and councils.

In addition to the boards and committees of education, and to hospital and charitable aid boards dealing with sickness and indigence, the country contains local units, such as boroughs, town districts, counties, road districts, harbor boards, drainage districts.

The local franchise is not quite so simply and sweepingly democratic as the parliamen¬ tary. In the municipalities mere residence does

indeed confer the right to vote, but not on any question relating to loans or rates. The rev¬ enue of the local bodies comes mainly from rates, license-fees, harbor-dues and rents from land-reserves and in 1916 amounted to over $11,000,000 from rates and $27,000,000 from other sources. The larger municipalities are beginning to bestir themselves in providing lo¬ comotion, lighting, water and other improve¬ ments. Generally localities have shown them¬ selves less enterprising than the central govern¬ ment in

social and industrial experiments.

Charities and Corrections.— For relief purposes New Zealand is divided into districts, with elective boards in charge of the adminis¬ tration of public hospitals and charities. The state subsidizes charity bequests at the rate of 50 per cent ; voluntary contributions at the rate of 120 per cent, and contributions by local au¬ thorities according to a sliding scale, ranging Horn 60 to 120 per cent, according to the value of ratable property in such local district. In 1916 the total expenditure on charitable aid ag¬ gregated $623,090. In the same year 4,379 per¬ sons were accommodated in benevolent and or¬ phan asylums, of whom 2,677 were remaining at such institutions at the end of the year. The state maintained 3,284 children (1,970 boys and 1,314 girls) wholly or partly in industrial schools and other establishments. Every per¬ son, not an alien or an Asiatic, who has at¬ tained 65 years of age and has resided in New Zealand for 25 years, and is of good character, is entitled to a pension of $130 per year. A widows' pension is also paid to over 2,000 qual¬ ified under the terms of the act.

Within the state are eight Supreme Court, judges and 31 stipendiary magistrates. There are several justices of the peace and magis¬ trates' courts. On 31 Dec. 1916. the prisons contained 890 prisoners and during the year ending that day 34,196 Europeans were sum¬ marily convicted and there were 373 convictions of Europeans before the Supreme Courts.

History. — The islands were. discovered by a Dutch sea-captain, from Batavia, Abel Jansen Tasman, who chanced upon them in 1642, but did not land. Captain Cook was the next recorded comer. He visited the group in 1769 and thrice subsequently, sailing round both islands, mapping them out and describing the shores and the natives. Thereafter came French navigators, American whalers, South Sea trad¬ ers, beachcombers, runaway convicts from Aus¬ tralia, and, at last, in 1814, missionaries from New South Wales headed by Samuel Marsden. But, although Australia lay under the British flag, the English government refused or hesi¬ tated for about 60 years after Cook's voyage of discovery to annex New Zealand. Partly this was due to ignorance of its value, partly to disinclination to interfere with its warlike and intelligent natives whose numbers had been greatly overestimated .by Cook, and whose ferocity and cannibalism made them a name of fear wherever the tales of south Pacific mariners were repeated. See Maoris.

The Maori of New Zealand are a branch of the Polynesian race found in Hawaii, Samoa and other Pacific groups eastward ot Fiji. They are well-built, brown-skinned, pleasant- looking, courteous in bearing and speech. They probably reached New Zealand in the 14th cen-

tury, sailing in double-canoes. When discov¬ ered by Europeans they were divided into a number of small tribes, often at war, and as late as 1770 were neolithic men, using weapons and tools of polished stone and knowing neither pottery nor metal-working. Their artistic qualities found expression in wood-carving, weaving and dyeing. They did not even em¬ ploy bows-and-arrows, and in war fought chiefly hand-to-hand with spears and clubs. On the other hand their stockade-building was skilful and their larger huts evinced some ad¬ vance toward architecture. They were expert gardeners and, in the absence of quadrupeds, clung to the sea-coast, the river-sides, and to lakes and forests where they could find fish and birds in abundance. Their tribal system was based on modified communism. Chiefs and priests controlled them, sustained by the terrors of tabu. Their mythology, many of their legends and some of their folklore show much poetry and imaginative power. Why they never became numerous is not very clear. Probably their tribal wars, infanticide and sex¬ ual immorality helped to keep them down. Probably also their tropical origin unfitted them to cope with the cold winds and frosts of a tem¬ perate climate.

Almost coincidently with the coming of the missionaries, the Maori began to obtain mus¬ kets and gunpowder for use in inter-tribal struggles, with the result that about one-fourth of them were exterminated in 20 years. Then the fighting died down, and between 1830 and 1840 large numbers were converted to Chris¬ tianity. Unfortunately white land-grabbers be¬ gan bargaining for tracts of country, making preposterous claims. Finally two colonizing companies, French and English respectively, re¬ solved to plant settlers in the islands. The English company organized by Gibbon Wake¬ field was the first in the field, its emigrants reaching Wellington in January 1840. Their departure from England forced the hand of the British authorities who despatched a man-of- war, under Captain Hobson, to annex the coun¬ try. Hobson hoisted the Union Jack on 22 Jan. 1840, and, at Waitangi, concluded a treaty with the natives by which their lands were guaran¬ teed them and they accepted British rule. He chose Auckland as his seat of government. Meanwhile Gibbon Wakefield's company planted settlers at Wellington, Nelson, Wanganui, and New Plymouth in the region adjacent to Cook's Straits, only to find their land-purchases disal¬ lowed by the . British officials. Ruin overtook them ; disputes broke out with the natives, and in the far north at the Bay of Islands the English officials blundered into a war which proved the fine fighting qualities of the Maori. A strong governor, Sir George Grey, restored order, conciliated the Maori, bought land and enabled settlement to make headway. Gibbon Wakefield, undaunted by his first difficulties, founded the settlements of Otago (1846)

and Canterbury (1850) in the southeast where there was no native opposition. In 1853 Eng¬ land gave the colonists self-government and in 1856 the first executive responsible to the local Parliament took the reins.

For the next 20 years the working of the constitution was complicated bv the existence of local provincial councils with large powers

in each of the scattered settlements. Their jealousies and conflicts with the central author¬ ity were only brought to an end by their abolition in November 1876. They represented a peculiarity in the organism of the country which is even now noticeable. Settled from many points, the country has, even now, no one preponderating city. The jealousies and rival¬ ries of a score of districts still worry govern¬ ments and amuse travelers from other lands.

Within five years of the grant of respon¬ sible executives the colonists found themselves at war with the natives — first with one league of tribes, then with another. English troops, to the number of 10,000, were brought in; but the Maori were not always worsted : the fighting dragged on intermittently for 11 years, to be finally ended by the colonial militia and friendly natives, after the British red-coats had been withdrawn. The colonists found them¬ selves left with a war debt of more than $12,-500,000, while from 1860 to 1871 the North Island made little progress. Taught by this hard lesson, they allowed an able minister, Sir Donald McLean, to pursue a conciliatory policy. Parliamentary representation was given to the Maori, and schools to their chil¬ dren ; their land titles were scrupulously re¬ spected ; while roads were pushed through the interior and rifles kept out of it. Serious dis¬ turbances were gradually made impossible.

Meanwhile the South Island was making rapid progress. Early in the 50's enterpris¬ ing Australian sheep-owners discovered that the eastern moiety made excellent grazing coun¬ try, and it was soon parceled out into ˆruns® or ranches. Then, in 1861, alluvial gold in abundance was found at Tuapeka, in Otago, and soon afterward in Westland. Diggers rushed in by tens of thousands. Agriculture began to spread, and by 1875, — aided by the introduction of the reaper and binder and other farm machines and tools from the United States, — it showed a promise of expansion which has hardly yet been redeemed. After 1872 the North Island began to move forward, encouraged by peace and the making of rail¬ ways, roads and bridges. The burning off of the fern and clearing of the forest began to make way for sheep and cattle.

Up to 1877 public affairs were controlled by the employing, landowning and professional classes and by a few large financial institu¬ tions. The

franchise was limited. Even the smaller farmers were overshadowed if not over¬ awed. The native wars, the provincial divisions, the all-absorbing work of pioneering delayed the formation of any definite party of democ¬ racy. The expenditure of millions of bor¬ rowed money on public works also absorbed at¬ tention after 1871. In 1877, however, the in¬ evitable development came about, hastened by the appearance of a leader of eloquence and prestige in Sir George Grey, formerly governor. Supported by two lieutenants of greater prac¬ tical parliamentary talent than himself, Robert Stout and John Ballance, Grey succeeded in forcing on manhood suffrage and triennial par¬ liaments, while his party recast the public edu¬ cation system, making it national, free, secular and compulsory.

Industrial depression which overtook the colony during Grey's premiership in 1879 dis¬ credited progressive politics for a while. The

farmers, dreading a land-tax, rallied round the more conservative leadership of Sir John Hall and Sir Harry Atkinson. For the next 11 years the story of New Zealand is largely a tale of efforts to find industries more profitable than the growing of wool and wheat — efforts which had their outcome first in frozen meat factories, later on in co-operative dairies. Coal mines were opened with success and two valuable natural monopolies — hemp (phormium tenax) and kauri gum — were exploited. The Parlia¬ ment cut down public expenditure and reduced borrowing for some years. Labor, now armed with voting power, felt the pinch of depression. Wages fell, the unemployed clamored, tramps abounded. Trade unions began to organize, and socialistic writings to be studied. The small farmers and their sons cried out upon land monopoly and high rates of interest. In 1890 a labor conflict, the maritime strike, showed the trade unions,— who were badly beaten therein, — the desirabilitv of making Parliament their battle-ground and of allying themselves with Ballance and the Democrats. At the elections of December 1890 the allied forecs swept the polls, and the Liberal or Progressive party, then returned to power, continued to govern the country without a break for almost a genera¬ tion.

The subsequent years have been marked by a series of bold political and social experiments. These have been latterly so far justified that since 1895 New Zealand has regained and en¬ joyed a remarkable degree of prosperity, while to a large extent its inhabitants seem recon¬ ciled to most of the novel enactments. Bal¬ lance died in 1893, but his successor, Richard Seddon, a man of robust temper, extraordinary energy and great natural shrewdness, gained a popularity and influence which seemed quite

un¬ diminished at the time of his sudden death in June 1906.

During the Boer War in South Africa public attention was to some extent diverted from local politics, for New Zealanders hotly es¬ poused the mother country's cause and despatched 6,000 mounted riflemen, volunteers, to fight therein. But otherwise colonists have divided their attention not unequally between politics and prosperity. No leader of striking power had come forward to challenge the Pro¬ gressives, whose majority in Parliament had risen to about three to one at the moment of Seddon's death. The dominant party, however, has experienced a sensible internal change. Labor has less influence, and the farmers more, than was thought to he the case between 1890 and 1896.

Elementary military training for boys be¬ tween 12 and 18 was made compulsory in 1910. Compulsory training on stated dates is the rule for those between 18 and 21. In the Great War of 1914 — 18, New Zealand benefited by this preparation. Before the end of August 1914 a New Zealand force, in conjunction with vessels of the British and Australian navies, took pos¬ session of German Samoa. An expeditionary force of infantry, mounted infantry and artil¬ lery, with all necessary details was also dis¬ patched to take part in the war in Europe. After training in Egypt, during which a portion of the force took part in the first fight for the Suez Canal, the New Zealand troops assisted in the landing and subsequent fighting on Galli¬

poli, being eventually transferred to the western front. Until the close of 1916 the reinforce¬ ments were maintained entirely by voluntary enlistment. It was then deemed advisable to provide for compulsory military service, which was done by the Military Service Act of 1 Aug. 1916, by the terms of which men between 20 and 46 years of age were obligated to ren¬ der military service. For details of this act consult (New Zealand Year Book) (1917). Over 75,000 were called to the colors in the en¬ suing year.

The combination of small landholders and labor classes which for nearly a generation kept the Laborites in the saddle appears to be breaking up, especially since 1912. The land¬ holders are becoming conservative as they ac¬ quire greater wealth and appear inclined to throw over those who helped them win it. The labor classes are also dissatisfied, believing that their efforts to better their condition are rendered futile by the compulsory arbitration system now in force. The machinery of the latter appears to have passed to the possession of the great manufacturers, who now loudly proclaim their faith in arbitration which in days gone by they fought as only dogs at bay can fight.

Few New Zealand men have made any name for themselves outside the narrow limits of their own shores. Gibbon Wakefield, the founder of the colony, played a conspicuous part in shap¬ ing England's colonial policy between 1830 and 1856. He finally settled in New Zealand and was a member of the first House of Representa¬ tives, but owing to failing health never distin¬ guished himself in the young community. Sir George Grey (1812-98) spent nearly 40 years in New Zealand and left a lasting mark on its in¬ stitutions. A man of literary tastes, he com¬ piled a valuable collection of Maori legends. His services in South Australia and South Africa and the curious contrasts of his career in New Zealand — where he played in turn the parts of absolute ruler and leader of the people — made this eloquent, brave and refined figure the most interesting in the story of New Zea¬ land. In marked contrast to him stands out the more boisterous but strong, bold and success¬ ful personality of Richard Seddon (1844-1906), a Lancashire mechanic, who entered New Zealand politics in 1879, became Minister of Public Works in 1891, and grasped the Premiership in 1893. Seddon will be remem¬ bered in New Zealand, not only for the .notable experimental legislation passed during his long term of office and the general prosperity en¬ joyed, but as the personification of restless energy, bluff, popular geniality and a devotion to political business control and management, which undoubtedly wore him out and killed him.

Amongst other New Zealand public men the names of Atkinson, Fox, McKenzie, McLean, Ballance and Stout are the most prominent. Fox, who was more than once Premier, wrote a .good, history of the fighting with the native tribes in the years 1826-66. Alfred Domett, another Premier, was the literary friend called ˆWaring® by Robert Browning, and himself wrote a narrative poem (Ranolf and Amohia, of no mean merit. The best book in prose yet written by a New Zealander is, beyond ques¬ tion, the (01d New Zealand) of F. E. Maning,*

u and accurate study of life among

the Maori tribes before annexation.

Bibliography.— < Statistics of New Zealand> (annual) ; Hocken, T. M., 'Bibliography of the Literature relating to New Zealand5 (Welling¬ ton i1,? 08) ; (Census of New Zealand, 191 1 > (Wellington 1912) ; (Report on the Results of the Census of 19115 (Wellington 1913); (New Zealand Municipal Handbook5 (biennial) • 'New Zealand Official Year-Book5 (Welling¬ ton, annually) ; 'Reports of the several depart¬ ments5 (ib.,

annually) ; Bell, M. T„ 'The Wilds of Maoriland5 (London 1914) ; Brown J M 'Maon and Polynesian5 (ib. 1907) ; Douglas, a' P.. ('The Dominion of New Zealand5 (ib. 1909) • Elkington, E. W„ /Adrift in New Zealand5 (London 1906) ; 'Gisborne, W., 'New Zealand Rulers and Statesmen, 1844-975 (ib. 1897) ; Grey, Sir G., 'Polynesian Mythology and Maori Legends5 (1885) ; High t, J„ and Barn- ford, H. D., 'The Constitutional History and Law of New Zealand5 (1915) ; Hocken, T. M., 'Contributions to the Early History of New Zealand (Otago)5 (London 1898) ; 'Irvine, R. F., and Alpers, O. T. J., 'The Progress of New Zealand in the Century5 (London 1902) ; Lloyd, H. D., 'Newest England5 (ib. 1901) ; Loughnan, R. A., 'New Zealand5 (Wellington 1901) ; Lusk, H. H., 'Social Welfare in New Zealand5 (London 1913) ; McNab, R. (ed.), 'Historical Records of New Zealand5 (Wel¬ lington 1908) ; Moreland, A. M., 'Through South Westland5 (2d ed., London 1916) ; 'Ox¬ ford Survey of the British Empire5 (Vol. V, 'Australasian Territories5 (London 1914) ; Playne, S., 'New Zealand: Its History, Com¬ merce and Industrial Resources5 (London 1912-13) ; Pennefather, F. W., 'Handbook for New Zealand) (London) ; Reeves, William Pember, 'The Long White Cloud5 (rev. ed., ib. 1915) ; id., 'State Experiments in Australia and New Zealand5 (2 vols., London 1902) ; Rusden, G. W., 'The History of New Zealand5 (new ed., 3 vols., Melbourne 1896) ; Schole- field, G. H., 'New Zealand in Evolution, In¬ dustrial, Economic and Political5 (2d ed., London 1916) ; id., 'New Zealand5 (ib. 1917) ; Siegfried, A., 'La democratic en Nouvelle Zelande5 (Paris 1904; English trans. by E. W Burns, London 1914) ; Stout, R., and Stout, J. L., 'New Zealand5 (ib. 1911) ; Thomson, R. P., 'A National History of Australia, New Zealand, and the Adjacent Islands5 (ib. 1917) ; Tregear, E., 'The Maori Race5 (New Zealand 1904) ; White, John, 'Ancient History of the Maori5 (6 vols., London 1889) ; Whitmore, G., 'The Last Maori War in New Zealand under the Self-Reliant Policy5 (London 1902).

J. B. McDonnell, Editorial Staff of The Americana.

NEW ZEALAND FLAX. See Fibre.

NEWARK, nu'ark, Del., town in Newcas¬ tle County, on the Philadelphia, Baltimore and Washington, and the Baltimore and Ohio rail¬ roads, about 11 miles south of Wilmington. It is in a section of the State noted for its pro¬ ductiveness. The chief manufactures are paper, machinery, fibre, acids and canned goods. There is considerable trade in the manufactured articles, fruit and vegetables. It is the seat of the State College, opened in 1833. The town owns and operates the electric-light plant and the waterworks. Pop. 2,800. vol. 20 — 17

NEWARK, N. J., city, county-seat of Essex County, metropolis of the State,

in lat. 40° 41′ N., long. 74° 10′ W. ; on the Passaic River and Newark Bay, eight miles by rail from New York City and within the direct zone of the business influence and activities of the na¬ tion's metropolis. In 1920 it ranked 11th in manufacturing and 15th in population among the cities of the United States. It has an area of 23.40 square miles, of which 6.48 square miles were until recently meadow land Jying in the southern and southeastern section. The wharf frontage on the river and bay is \0]/2 miles; the width of the channel is 300 feet; depth at mean low water, 20 feet and at high water, 25 feet.

Port Newark Terminal. — In 1908 the city undertook the reclamation of its meadow land, but it was not until 1914, after the creation of the municipal department of docks and mead¬ ows, that substantial results began to appear. The area of the meadow development zone was 1,150 acres, and in a little over a year an area had been reclaimed aggregating 294 acres, of which 124 acres were reserved for new streets, freight yards, stations and dock frontage, and 170 acres were set apart for leasing for manu¬ facturing and commercial purposes. The au¬ thorized bond issues for the development, up to 1 Oct. 1915, totaled $2,250,006, and the disburse¬ ments and balances due on contracts, $2,013,608. After the United States had been forced into the World War, this section was deemed of such vital importance to the National govern¬ ment that the latter bought and leased large portions of the reclaimed area, and in 1917 established there a great submarine-boat con¬ struction plant and an extensive reservation for the needs of the quartermaster's department of the army. These and other national acquisi¬ tions early in 1918 transformed a large part of the former useless salt meadow land into a bustling suburb and gave the city an additional industrial population of over 100,000.

Manufactures. — The city has the distinction of ranking first in the Union in the value of its manufactures and the diversity of its industries, according to its per capita population. It has 252 distinct lines of industry, 50 lines turning put values from one to $30,000,000 annually. It is the largest fine jewelry manufacturing centre in the United States ; produces the largest va¬ riety of leather for shoes, carriages and up- holsterings ; is the home of the mother-of-pearl button and novelty industry; produced the first malleable iron in America; built the first loco¬ motive engine to travel up grade; made the first patent leather in the country and gave celluloid and its products to the world. In 1915 the city had 2,294 manufacturing establishments using power and employing over 10 persons, with an invested capital of $225,640,600, employing 82,439 operatives; using material valued at $130,299,000 and having an output valued at $250,654,527. The leading industries, according to the value of the finished products exceeding $5,000,000 were smelting and refining of metals, $35,- 000,000; leather, tanned, curried and finished,

$20,118,000; foundry and machine shop products, $15,403,000; malt liquors, $12,072,000; jewelry, $11,215,000; electrical machinery and apparatus, $8,920,000; paints, oils and varnishes, $7,761,000, and chemicals, $6,077,000.

Transportation and Commerce. — The fol¬ lowing trunk line railroads connect the city with all parts of the country: Pennsylvania, Lackawanna, Lehigh Valley, Erie and Reading (Central of New Jersey). Electric railways comprise the Hudson and Manhattan Tubes systems, and trolley lines extend to all important points in the State. Daily trunk line passenger trains to and from the city average 882; freight trains, 101 ; annual railway, tonnage received, 2,366,350; shipped, 1,157,876; cars of merchan¬ dise freight received and shipped annually, 335,467 ; passenger stations, 14; freight delivery yards, 23 ; daily electric railway trains to and from New York, 233; time between the two cities, 18 minutes. The large number of local trains which connect with the New York ferries and the cities on the Hudson give Newark the advantage of the ocean steamer traffic. The Passaic River entering the Newark Bay fur¬ nishes the city a most important direct water route to the ocean.

Buildings and Municipal Improvements. —

The number of public buildings in the city is 141 ; value of municipal property, $73,468,507 ; principal public buildings : United States Govern¬ ment Building, Essex County Courthouse (cost $1,750,000), City Hall ($1,500,000), Free Public Library ($350,000) and the public schools. The city is widely noted for the excellence of its water supply, having its source in the Pequan- nock River and delivered on the gravity system. The daily capacity of the watershed is 50,000,000 gallons and the average daily consumption, 46,- 500,000 gallons. There are eight storage and distributing reservoirs, with a storage capacity of 9,825,700,000 gallons. Newark has 260 miles of paved and 62 miles of unpaved streets; 309.19 miles of sewers; 5,575 gas and electric street lights; 20 city parks with gross area of about 20 acres ; 5 county parks within the city of about 642 acres; city parkways of eight and one-half acres and a seashore camp of \l/2 acres at Avon-by-the-Sea for deserving children during summer seasons. The police department, with 794 men, cost annually $1,083,200 and the fire department, with 472 men, costs annually $720,080. Recent municipal improvements also include Port Newark Terminal, previously noted.

Churches and Charitable Institutions. —

Newark has a total of 181 churches divided de¬ nominationally as follows: Presbyterian, 34; Roman Catholic, 32; Baptist, 25; Methodist Episcopal, 18; Protestant Episcopal, 17; Jewish, 11; Lutheran, 10; Reformed Dutch, 8; Congre¬ gational, 3; Science, 2; Universalist, 1; miscel¬ laneous bodies, 23. Its benevolent activities are promoted by 62 charitable organizations and in institutional work there are 12 hospitals, 5 orphan asylums and a large number of special¬ ized centres.

Social Welfare. — There are over 700 regu¬ larly organized societies engaged in all manner of social service, besides a very large number of patriotic units rendering most efficient serv¬ ice for the Newark soldiers and sailors in the World War. Strictly social clubs exceed 100 in number; building and loan associations, 256; improvement associations, 13, and savings and loan associations, 9.

Educational Interests. — Public school

property has an estimated value of over $10t-

720,000. There are 67 public schools of the different grades, with over 2,000 teachers and 73,000 pupils; cost of maintenance (1916), $3,219,288; 52 private and parish schools with an estimated enrolment of 25,000; 4 public high schools, 8 business colleges, 2 academies and 7 technical, drawing, law, industrial and normal schools. The Free Public Library cost for building, equipment, etc., $1,064,000, has over 245,000 volumes, circulates annually some

I, 125,000 volumes and is maintained at an annual gross cost of approximately $150,500. An at¬ tractive Art Museum is maintained in the Li¬ brary building and in the library proper popular exhibitions are frequently given. Other li¬ braries are the Prudential Insurance Company's Law and Medical Library and the library of the Lawyers' Club. The New Jersey Historical Society has a collection of books, manuscripts, paintings and other articles of great historical value. In 1918 the United States Shipping Board organized a school of marine engineering here, and in 1919 the principal technical school was raised to the dignity of the Co-Industrial College of Technology.

Banking and Insurance. — Under the Na¬ tional Banking Act of 1913, Newark is included in Federal Reserve District No. 2, of which New York City is the central reserve city. In 1917 there were 9 national banks, 11 trust companies, 5 savings institutions and 13 savings depart¬ ments in national banks and trust companies. National banks had combined

resources of $76,- 954,256 and deposits of $57,683,620; trust com¬ panies, resources of $50,915,242 and deposits of $39,463,402 ; savings banks, resources of $50,- 568,925 and deposits of $47,244,972. Building and loan associations had assets of $63,978,185, receipts of $36,980,243 and shareholders, 94,254. Two of the largest life insurance companies in the United States, the Prudential and the Mu¬ tual Benefit, have their home in Newark. To¬ gether they reported assets of $636,582,170, income $159,714,502, disbursements $104,252,855. There were five fire insurance companies with $3,950,000 combined capital, $23,769,71 1 assets, $12,300,924 income, $10,789,234 disbursements and $5,025,491 fire losses paid in 1916.

Vital Statistics. — In 1917 there were re¬ ported 43,769 dwellings and 18,298 factories and commercial buildings in the city. The very large type of apartment houses dotted the city thickly in all of its strictly residential sections and was even encroaching on bustling business thoroughfares. In 1918 the city faced a serious housing problem because of the great influx of workmen at Port Newark Terminal and also at many of the large industrial plants on ac¬ count of the unprecedented demands of the World War. The number of births (1916) was

II, 446; rate per 1,000, 29.7; death rate per 1,000,

16.5.

Finances. — The assessed valuation of all taxable real estate and personal property in 1916 was $420,311,342; value of all municipal property, $73,468,507 ; total bonded debt, $42,- 961,200; aggregate of sinking funds applicable to bonded debt, $11,650,082; total net debt, city and water, $31,311,118; tax rate per $1,000 of valuation, 24.50.

History. — Immediately following the Eng¬ lish conquest of the New Netherlands, in 1664, a part of the Dutch possessions in North Amer-

NEWARK, N. J,

1 Court House

2 City Hall

1 Post Office 2 Corner of Broad and Market Streets. Business District

NEWARK, N. J,

-• v

t ..wwcoK ti* \j

■mam

15®

£.% y- Jk., , -w o v

: – *- L ’ry— . I ‘

itfi

;«*» Arr% v Wi k«r% \«-%V

ilpifeiialt

»« «l »

JpSPN«S*

sjnTUt! u

3®%, * &

• iVtifti* ^

«««»gill

»

]

NEWARK

259

ica, being practically what is now the State of New Jersey, was granted to Lord John Berkeley and bir George Carteret. The settlement of northeastern New Jersey was immediately begun under a liberal form of government, a site near the mouth of the Passaic River proving attract¬ ive to certain Congregationalists, then settled m the colony of Connecticut. In May 1666, the New Englanders removed <(their families, their beloved pastor, their church records and com¬ munion service, their deacons and their house¬ hold goods® to the site of the future city of Newark. By 1685, Newark, in which the Con¬ gregationalists had settled, was a compact town of 500 inhabitants. The system of local govern¬ ment was like that of many early New England villages, being the limitation of political and religious activity,

through the agency of the town meeting to those who professed Congre¬ gationalism.

The strong element of conservatism, charac¬ teristic of the settlement of Newark, remained unchanged until long after the opening of the 19th century. Religion and education were warmly supported, and for several years the College of New Jersey, now Princeton Univer¬ sity, was located at Newark. The tidal waters of the Passaic River gave easy access to New York, the country-side supplying provisions and wood to the inhabitants of Manhattan Island. Newark was also engaged in a coastwise trade. To a degree the young community was some¬ what isolated owing to the difficulty of road¬ building over the marshes and the ridge of rocks separating Newark from Paulus Hook, now Jersey City.

In the Revolutionary struggle Newark took an active part. As early as June 1774, her in¬ habitants protested against the Port Bill, and offered to become parties to a plan of union to redress grievances. In November of the same year inhabitants of Newark, as members of the Essex County grand jury, patriotically answered the charge of the loyalist chief justice, while in January 1775, the royal newspapers were boy— cotted by many of the inhabitants of the town. In the spring of that year some of the inhab¬ itants declared that they were willing to risk their lives and fortunes for American liberty. The <(gentlemen traders of this town® were rec¬ ommended not to supply provisions to Canada and other loyal portions of North America. In March 1776, the Newark committee regulated the price of West India products, and traders were notified that defiance of regulation would cause the storekeeper to be declared an enemy to his country.

Newark was early identified with the efforts made to secure internal improvements, even be¬ fore the second war with England. Turnpikes were extended in every direction, bringing the town in close communication with the north¬ western portion of the State, from which sec¬ tion Newark has largely drawn men who have become locally prominent. During the early years of the 19th century the first bank organ¬ ized in New Jersey (1804) was established in Newark, while one of the chain of banks hav¬ ing the word <(state® in their titles (1812) was located in this city. In 1824 the city was de¬ clared by legislative enactment to be the ter¬ minal of the Morris and Essex Canal, which was soon constructed, and united the waters of New

'toik Bay with those of the upper Delaware. During the early 30's the New Jersey Railroad was built between Jersey City and New Bruns¬ wick, which with Camden and Amboy connec¬ tions placed Newark on the direct route between New York and Philadelphia. Following the construction of these lines, now a part of the Pennsylvania Railroad system, came

railroads now forming parts of the Lackawanna and the Central Railroad of New Jersey systems, and more recently the extension of the Hudson and Manhattan tube service to the city. For five months in 1916 (May 1-Oct. 1) the city was in gala attire, celebrating the 250th anniversary ol its founding. In 1917 the city adopted the commission form of government under five commissioners between whom in a like number of groups all former municipal departments were divided. In 1919 the United States Post Office Department selected a tract in the Forest Hill section of the city for a landing field for its aerial mail service. Pop. (1810) 8,008; (1830) 10,953 (1850) 38,894; (I860) 71,941; (1870) 105,050

(1880) 136,508; (1890) 181,830; (1900) 246,070,

(1910) 347,460; (1920, Federal census) 414,524. Consult City records; Atkins, (The History of Newark, N. J.>; (Records of the Town of Newark, 1666-1836) ; Dodd, H. P., (Newark of Former Days and Newark of To-day > (1907) ; Urquhart, Frank J., (A Short History of New- ark> (1910, 1916); Newark Public Library. (The NewarkeU (5 vols., 1911-16) ; Dana, John Cotton, (The Study of a City in the Schools of that City) (1911).

George J. Hagar, New Jersey Historical Society.

NEWARK, N. Y., village in Wayne County, on the Barge Canal, and on the West Shore, the New York Central and Pennsylvania railroads, about 176 miles west by north of Albany, and 30 miles east by south of Rochester. It was settled in 1820 by people from Rensselaer County in the eastern part of the State. It was incorporated as a village in 1825. It is in a fertile agricultural region, but the village has considerable manufacturing interests, including tinware works, paper box factories, a glass factory, canning and preserving factory and other establishments. Newark has a large trade in farm and dairy products, fruit and its manu¬ factured articles. Its educational institutions are the Union Free School and Academy, the public elementary schools and the free public library. There are several churches and a num¬ ber of church and literary charitable and educa¬ tional societies. The State Custodial Asylum for Feeble-Minded Women is located here. The population consists of nearly all native-born Americans, over one-half of whom are of Dutch, German and Irish descent. The water¬ works are village property. Pop. 6,964. .

*NEWARK, Ohio, city, county-seat of Lick¬ ing County, at the junction of three branches of the Licking River and on the Ohio Canal and the Baltimore and Ohio and the Penn¬ sylvania railroads, about 30 miles east by north of Columbus, and within 14 miles of the centre of the State. It was settled in 1802 by *a colony from the eastern part of the United States.*

Nearby are two large mounds which belong to the works of the ((Mound Builders.® It is in an agricultural region and in the vicinity are valuable deposits of sandstone, extensive

coal-fields and natural gas. The chief manu¬ factures are glassware, chemical instruments, carriages, hardwood, bottles, electric cars, loco¬ motives, machine shop products, rope, foundry products, flour and lumber products. There are about 160 manufacturing establishments in which there are 12,000 employees. The streets are well paved and well kept. The State en¬ campment ground and the Auditorium, a fine theatre erected as a memorial to dead soldiers of the Civil War, are of much interest. There are 28 churches, a high school, public and parish elementary schools and a public library, estab¬ lished in 1877. The five banks have a combined capital of $850,000, and the annual amount of business transacted is $3,600,000. The govern¬ ment is administered under the charters in ac¬ cordance with the Ohio State Municipal Code. The inhabitants are nearly all American born. Baltimore and Ohio Railroad Company has loco¬ motive and rolling stock repair shops in Newark with more than 2,000 employees. The Wehrle Company operates the largest stove manufactory in the world with 2,500 employees. Newark is the seat of Dennison University with 700 stu¬ dents (coeducational). On its outskirts is Buck¬ eye Lake, the largest inland pleasure resort in Ohio. This lake is nine miles long and from one to two miles in width. Pop. (1920) 26,718.

NEWARK SERIES, in geology, a term applied to that part of the Triassic system (q.v.) in eastern North America. Its limits are Nova Scotia on the north and South Carolina at the south. The typical deposits are near Newark, N. Y., whence the name is taken. The deposits in the series are conglomerates ; breccias ; thick red sandstones, which must have originated in crystalline waste, as is evident from the com¬ paratively large amount of mica and the feld- spaths; and basalt, which accompanies the sedi¬ mentary rocks and occurs in dikes and sheets, such that the violent volcanic character of their derivation is made certain. The fossils of the series are scarcely any of marine types, plants and foot-prints preponderating. The commer¬ cial value of the deposits of the Newark series is in the brown sandstone building stone of New Jersey and Connecticut, and the coal veins of North Carolina and Virginia.

NEWARK WORKS. See Mound Build¬ ers and Mounds.

NEWBERRY, nu'ber-i, John Strong,

American geologist: b. Windsor, Conn., 22 Dec. 1822; d. New Haven, 7 Dec. 1892. His early life was passed chiefly in the Western Reserve, Ohio, and he was graduated at the Western Reserve College in 1846 and at the Cleveland Medical School in 1848. From 1851 to 1855 he practised medicine in Cleveland. He was as¬ sistant surgeon and geologist to the govern¬ ment expedition that explored the country be¬ tween San Francisco and the Columbia River; also accompanied Lieutenant Ives in his ex¬ ploration of the Colorado River, and the ex¬ pedition under Captain Macomb in its explora¬ tion from the Santa Fe to the junction of the Grand and Green rivers. His reports upon the scientific results of these expeditions brought him great credit in the scientific world. At the beginning of the Civil War he became attached to the Sanitary Commission, and later secretary of its Western department. He was afterward

connected with the Smithsonian Institution, and with the. Columbian (now George Washington) University, Washington, and in 1866 was ap¬ pointed professor of geology and palaeontology at the Columbia College School of Mines, which post he retained till his death. Besides many special reports and parts of general reports, his writings include: (The Rock Oils of Ohio) (1859); (Catalogue of the Plants of Ohio) (I860) ; (Iron Resources of the United States> (1874) ; (The Structure and Relations of Dinichthys5 (1875); (Palaeozoic Fishes of

North America5 (1889) ; (Later Extinct Floras) (1898) ; etc. He was especially conversant with the palaeontology of the Carboniferous Era in America, and particularly with extinct fishes; and as a teacher he had great popularity and influence. He was among the early mem¬ bers of the National Academy of Sciences. The most interesting portions of the (Report on the Colorado River of the West, Explored in 185 7-58 5 (Washington 1861) were written by him and relate to the geology, physiography and Indians of that region. Consult the memoir by J. J. Stevenson in the American Geologist (Minneapolis, July 1893), and White, C. A., (Biographical Memoir of John Strong New¬ berry5 (Washington 1908).

NEWBERRY, Truman Handy, American naval commander and financier: b. Detroit, 5 Nov. 1864. He was graduated at Yale Univer¬ sity in 1885 and entered the railroad business. His industry soon made him a prominent figure in business and financial enterprises of his State. Newberry was one of the organizers of the Michigan State Naval Brigade, serving as landsman (1895), lieutenant and navigator (1897-98). In the Spanish-American War he participated in the attack of the Yosemite on the Spanish munitions ship, Antonio Lopez. In 1899 he was appointed colonel and aide-de- camp to the governor of Michigan; and later became Assistant Secretary of the Navy (1905- OS). On the retirement of Secretary Metcalfe, he was appointed Secretary of the Navy in the Cabinet of President Roosevelt,

serving from December 1908 to March 1909. In the European War, Mr. Newberry was given the post of ˆ lieutenant-commander of the United States Naval Reserve. In 1918 he was elected' to the United States Senate.

NEWBERRY, S. C., city, county-seat of Newberry County, on the Atlantic Coast Line and the Southern railroads, about 40 miles northwest of Columbia. It is in a region in which the cultivation of cotton is one of the chief industries. It has manufacturing estab¬ lishments for cottonseed-oil, cotton goods, pre¬ paring cotton for shipment, coffins, fertilizers and lumber products. It has considerable trade, chiefly in cotton products, fruits and vegetables. It is the seat of Newberry Lutheran College and has a handsome city hall and courthouse. The electric-lighting plan>t and waterworks are civic property. A mayor and unicameral coun¬ cil elected every two years administer city affairs under a charter of 1894. Pop. 6,000.

NEWBERRY LIBRARY, Chicago, Ill., is a free library of reference established in 1887 and maintained by a moiety of the estate of Walter Loomis Newberrv (1804-68), a pioneer merchant of Chicago. Since 1894 it has oc¬ cupied a fine structure of Spanish-Romanesque

architecture built of Connecticut granite, situ¬ ated on Walton place, between Dearborn ave¬ nue and North Clark street. The collection consists of over 375,000 books, pamphlets, manu¬ re npts, etc., representative of the principal nelds of knowledge and branches of learning which 1 all within its province; bibliography and the history of printing, religion and theology, philosophy, psychology and ethics, history, political science, geography, biography, language, literature and (in part) the fine arts.

*i e ,orˆlnal piˆns of the trustees contem¬ plated the gathering of a general collection of reference and source books on all subjects. Later, however, a co-operative arrangement was entered into with the Chicago public and other libraries under which the field of knowl¬ edge was roughly divided among them, and a policy of non-duplication of books was adopted. In each of its divisions the library possesses *reasures> making it one of the most valuable book collections in the United States. Under the head of education, notablv teachers will find an excellent working collection of authoritative works on the past history of their profession and on its present condition, tend¬ encies, methods, theory and practice. The majority of the books are, naturally, mainly intended for the use of professional scholars, but all classes of readers from the most learned investigator to the*

boy or girl seeking information for school use are welcomed.

NEWBERY, John, English publisher and bookseller: b. Waltham Saint Lawrence, Berk¬ shire, 1713; d. London, 22 Dec. 1767. Going to London he began in 1745, in Saint Paul's Churchyard, the publishing and selling of books, which he combined with the sale of patent medicines. He also published The Uni¬ versal Chronicle and Weekly Gazette, in which Johnson's

NEWBOLT, Sir Henry John, English author: b. Bilston, Staffordshire, 6 June 1862. He was educated at Clifton and Oxford and was called to the bar of Lincoln's Inn in 1887. After practising his profession till 1899 he es¬ tablished the next year the London Monthly Review, which he edited until 1904. He has published 'Taken from the Enemy (1892) ; (Mordred) (1895) ; (Admirals A1P (1897) ; 'The Island Race* (1897) ; 'Stories from Frois- sart) (1899); 'Froissart in Britain (1900); 'The Sailing of the Long-Ships) (1902) ; (Songs of the Sea* (1904) ; 'Songs of the Fleet) (1910) ; 'The Old Country* (1906) ; 'The New June) (1909) ; 'Songs of Memory and Hope) (1909) ; 'The Twymans) (1911) ; 'Poems New and Old* (1912) ; 'The Book of the Blue Sea* (1914) ; 'The Book of the Thin Red Line> (1915) ; 'History of the Oxford¬ shire and Buckinghamshire Light Infantry) (1915) ; 'Tales of the Great War* (1916) ; 'The Book of the Happy Warrior* (1917) ; (A New Study of English Poetry* (1917). Cer¬ tain of his patriotic poems, such as (Admirals*

All, > (Playing the Game,> ' Drake's Hymn)

and (The Vigil, > have established his fame.

NEWBOLT, William Charles Edmund,

English Anglican clergyman and author: b. Somerton, Somerset, 14 Aug. 1844. He was educated at Oxford, was vicar of Dymock 1870- 77, and of Malvern Link 1877-88. He was principal of the Theological College, Ely, 1887-90, and is a canon and chancellor of Saint Paul's Cathedral. Among his published works are (Counsels of Faith and Practice- (1883) ; 'The Fruit of the Spirit* (1888) ; (The Prayer Book: its Voice and Teaching* (1889) ;*

NEWBORN, a sect of Antinomians, which arose in the United States in the early part of the 18th century. Its founder was a German immigrant, named Mathias Bawmann (who died 1727). They held the doctrine of the deifica¬ tion of humanity by regeneration and that those who were regenerates were, like Christ, inca¬ pable of sin. They denied that the Bible was necessary for the illumination of Christians, and scoffed at the

sacraments. They claimed that their regeneration or newbirth was brought about by dreams, apparitions and supernatural inspiration, and was like the new name written on the white stone and known only to him that receiveth it (Rev. ii, 17). The sect sur¬ vived the death of its founder by about 20 years.

NEWBURGH, nu'berg, N. Y., city in Orange County, on the west bank of the Hud¬ son River, and on the Erie and the West Shore railroads, 58 miles north of New York. The first settlement was made by emigrants from the Rhenish Palatinate, in the winter of 1708- 09. They called the place, <(Palatine Parish by Quassaic.® The Germans were soon followed by emigrants from Great Britain, and in 1750 the English and Scotch were there in numbers sufficient to change the name to <(Parish of Newburgh® in memory of Newburgh, in Aber¬ deen County, Scotland. Before the Revolu¬ tion the farmers from the river brought their produce here to be sent to market. The lumber trade was most important; ships were built for trade with the West Indies and London; and at one time whaling was an industry of New¬ burgh. The city occupies a prominent place in the history of the Revolution. It was Wash¬ ington's headquarters from March 1782 until 18 Aug. 1783. The <(Hasbrouck House,® which Washington occupied in Newburgh, was pur¬ chased in 1849 by the State of New York, and is now used as a museum for Revolutionary and Colonial relics. It is in charge of a board of trustees who have had it restored as when Washington occupied it. While in Newburgh, Washington received the letter (see Nicola' Lewis) asking him to become king; here the army was disbanded, and from here the Newburgh Addresses (q.v.) were issued. In 1800 Newburgh was incorporated as a village, the third in the State. After its incorporation the enterprising inhabitants built turnpikes to the farming sections west of the village, and in this way secured the trade of the farmers in the vicinity. Until 1830 sailing vessels plied regularly between New York and Newburgh, but after that date steamboats were used. The*

opening of the Erie Canal diverted considerable trade from the village. The first general row¬ ing regatta on the Hudson River was held here in 1837. Others followed in 1840, 1841 and 1842. The country around has many places of historical interest. (See New York). It was granted a city charter in 1865.

The city, viewed from the Hudson River, presents a pleasing arrangement of terraced slopes, broad, clean streets, many trees and beautiful buildings. It is about 310 feet above the river, or Newburgh Bay, as the river expan¬

sion here is called. It is in an agricultural re¬ gion, the commercial centre of an extensive sec¬ tion and of a number of large industries. The chief manufactures are machine-shop products, plaster, cotton and woolen goods, felt hats, silk, leatherette, powder, paper, paper boxes, soap, ice machines, perfumes, furniture, springs, leather, carpets, flour, lumber, foundry prod¬ ucts, dairy products, overalls and cigars. It has ship yards, extensive coal, brick and lumber yards. Large quantities of coal from Pennsyl¬ vania are brought here to be loaded in coasting vessels and barges. On the northeast corner of the grounds surrounding the Headquarters® is the (cTower of Victory,® made of stone, 53 feet high, with four arcnways leading into an atrium, and stairways leading into a belvedere. It contains a bronze statue of Washington, copied by O'Donovan from Houdon's model. Other statues represent the soldiers in the War of the Revolution. A tablet bears an inscrip¬ tion telling that the monument was erected by the authority of the Congress of the United States and of the State of New York. It cost $67,000. The block of brownstone near the entrance marks the grave of Uzal Knapp, the last survivor of Washington's Life Guard; died in 1856. Newburgh has the first free public library in the State, a hospital, orphanage, county tuberculosis sanitarium and home for the friendless. Its educational institutions in¬ clude several large public and parish schools (Ro¬ man Catholic), a free academy, Saint Patrick's Academy and Mount Saint Mary's Academy. There are 25 churches, one of them for colored people. The government is administered under Plan C of the Optional Charter Law of the State, which provides for a mayor and four councilmen, elected for four years. These five select a city manager who wields the executive power. The city owns and operates the water¬ works. Pop. 30,366. Consult Ingersoll, (Handy Guide to Hudson River) ; Nutt, ('Newburgh: •Her Institutions, Industries and Leading Citi¬ zens > (1891; Ruttenber, E. M., Town of New- ,burgh) ; Powell, L. P., (Historic Towns of the Middle States) (New York 1899).

NEWBURGH ADDRESSES, in Amer¬ ican history, a term applied to two anonymous letters, appearing in 1783, after the close of the Revolution. They were written upon be¬ half of the American soldiers whose pay had been withheld. It was afterward made known that General John Armstrong was the author of the letters.

NEWBURGH SEDITION, in American history; while General Washington had his headquarters in Newburgh, on the Hudson, December 1782. great dissatisfaction manifested itself amomr his officers, and they addressed a memorial or (

manding their back pay, and security for future services. Congress refused to grant the de¬ mands, and in the following March an attempt was made to inaugurate a revolt. The matter became so serious that Washington appeared before a meeting of the malcontents and de¬ livered such a patriotic address that the spirit of insubordination immediately disappeared.

NEWBURYPORT, nu"bur-T-port, Mass., city and one of the county-seats of Essex County, on the Merrimac River, three miles from the sea, 35 miles northeast of Boston and on the Boston and Maine Railroad. It extends for about three miles along the bank of the river, but the streets lead¬ ing back from the river are short; High street, the principal residence street, lies parallel with the river, and State street, the chief business street, is perpendicular to it. In the upper part of the city the river is crossed by a chain bridge (built 1792), the first sus¬ pension bridge in America. Among the not¬ able buildings are the Putnam High School, the Anna Jacques Hospital, the Y. M. C. A. Memo¬ rial Building, the Old South Church, which contains the remains of George Whitfield, Marine Museum, Old Ladies' Home, and the public library, formerly the old Tracy mansion, where Washington and Lafayette were enter¬ tained ; the library contains about 40,000 vob umes. The house in which William Lloyd Garrison was born is also in the city. In the days of wooden sailing vessels, the chief indus¬ try of Newburyport was shipbuilding, and many of the most famous clipper ships were built there; some small vessels are still built. The harbor is good, but access to it difficult on ac¬ count of the shifting sand bar at the mouth of the river; there is a considerable trade in coal brought to the city by coasting schooners. The more important industries now include boot and shoe factories, cotton factories, hat shops, an iron foundry, comb factory and a silver fac¬ tory. The mayor, city council and board of aldermen are elected annually. The city owns and operates its waterworks, which were bought from a private company after consider¬ able litigation. Newburyport was settled about 1635, separated from the town of Newbury in 1764, and chartered as a city in 1851. The ophilus Parsons made his home here and it is also the birthplace of Francis C. Lowell. It sent a large quota of troops to the Civil War, and many of its citizens, who were sea-captains, received money from the Alabama claims. Consult Currier, J. J., (History of Newbury¬ port > (Newburyport 1906) ; Hurd, D. H., his¬ tory of Essex County, MassP (Philadelphia 1888) '; Smith, (Historyof Newburyport, Mass. (Boston 1854). Pop. 15,618.*

NEWCASTLE, Margaret, Duchess of.

See Cavendish, Margaret.

NEWCASTLE, Thomas Pelham Holies,

1st Duke of, English Prime Minister: b. Eng¬ land, 1693; a.' 17 Nov. 1768. He was the son and heir of the 1st Lord Pelham and as one of the largest land-owners in England his in¬ fluence, which he used freely in the service of the king, won favor at court and he was made Duke of Newcastle in 1715. He was appointed secretary of state in 1724 under Walpole, to whose downfall he contributed, and held his

post until he succeeded his brother as Prime Minister in 1/54. He retired in 1756 owing to his incompetent conduct of the French War but was recalled in 1757 and formed the minis¬ try so notable because of the dominating bril- of. PlJh He was forced out by Bute in l/Ow, and aiterward lived a retired life with * Uˆreˆceˆon holding for a few months in

1 6o the oflice of Lord Privy Seal. Newcastle was a small man for whom wealth and social position obtained high offices. He was igno¬ rant of the most elementary things. Such abili¬ ties as he had lay in the manipulation and pur¬ chase of "votes in Parliament, on which he spent money freely.

NEWCASTLE, William Cavendish, Duke of. See Cavendish, William, Duke of New¬ castle.

NEWCASTLE, Del., city in New Castle County, on the Delaware River, and on the Philadelphia, Baltimore and Washington, and the Philadelphia and Reading railroads, about seven miles south of Wilmington. It was set¬ tled, in 1640, by Swedes. Later it was occu¬ pied by the Dutch and then by the English. Newcastle was the place where, in 1682, Wil¬ liam Penn landed in America. In 1875 it was incorporated. It is in an agricultural region of fruit orchards and market gardens. Its good harbor, regular steamer connection with large cities, and railroad facilities make it an excellent shipping point for farm products, fruit and vegetables. Considerable fish, espe¬ cially shad, are caught in the nearby waters. Its chief manufactures are flour, brick, canned goods, woolen and cotton goods, iron products, and men's underclothing. Newcastle has a library founded in 1812, several buildings dat¬ ing back to Colonial times and two parks. Pop. 3,351.

NEWCASTLE, Ind., town, county-seat of Henry County, on the Blue River, and on the Pittsburgh, Cincinnati, Chicago and Saint Louis, the Cleveland, Cincinnati, Chicago and Saint Louis and the Lake Erie and Western rail¬ roads, about 45 miles northeast of Indianapolis. It is in a fertile agricultural and also a manu¬ facturing region. The chief manufactures are agricultural implements, flour, paper boxes, iron and steel products, automobiles, caskets, scales, bridges, lathes, bridge works, pianos, brass furniture, carriages, brick and furniture. It has natural gas, good water power and excellent transportation facilities. Nearby is the Indiana village for epileptics comprising 1,250 acres. The city owns and operates the street-lighting plant and the waterworks. Pop. (1920) 14,458.

NEWCASTLE, Pa., city and county-seat of Lawrence County, situated

about 50 miles north of Pittsburgh, at the confluence of the Shenango, the Neshannock, and the Mahoning rivers, which there form the Beaver River, and on the Pennsylvania, the Baltimore and Ohio, the Erie, the Pittsburgh and Lake Erie and the Buffalo and Pittsburgh railroads. The city cov¬ ers an area of 4,773 acres and, situated as it is in one of the richest and most charming val¬ leys in the world, and having unequaled ad¬ vantages of water power and railway facilities, it offers exceptional opportunities to the ever- increasing population.

Aside from being the commercial centre for a productive agricultural region, the city is in the heart of rich deposits of iron ore, limestone, coal and clay, and is noted for its great variety of industries. These comprise steel and roll¬ ing mills, blast furnaces, tinplate mills, car shops, wire works, paints, hosiery, rubber tires, heating apparatus works, also manufactories of machinery, boilers, castings, blast furnace jack¬ ets, pottery and table ware, and vitreous sani¬ tary ware.

Prominent among the public buildings are the United States Government Building, con¬ taining the post office, the city hall, the opera house and the Y. M. C. A. building, containing a large library, presented by Ira D. Sankey the evangelist. The Shenango Valley Hospital and the Almira Home for Aged Women are located ther.e.

The inhabitants of the city worship in over 35 church edifices representing nearly all de- nominations. I he educational advantages are of the highest standard of excellence; the pupils are accommodated and receive instruc¬ tions in a high school supplemented with sev¬ eral graded public schools, while a well sus¬ tained business college prepares young men and women for commercial life. Besides these there are also several excellent parish schools.

Newcastle stands high in the average of highways paved ; the public improvements have practically all been the outcome of the mar¬ velous growth of the city within the last two decades; during that time the electric railway system, connecting with all the surrounding cities and towns, has been built; a complete system of arc lights has been introduced, the capacity of the water system trebled, and an excellent sewerage system constructed. Cas¬ cade Park, an amusement resort, was estab¬ lished by the traction company. The Old Park Cemetery and the Graceland cemeteries are the largest of the "cities of the dead.® Newcastle was first settled in 1800 by Robert White; be¬ came a borough in 1869, and was chartered as a city in 1875. In 1914 the commission form of government was adopted. Pop. (1920) 44,938.

NEWCASTLE-UPON-TYNE, England,

a parliamentary, municipal and county bor¬ ough and episcopal city, in Northumberland County, and on the northern bank of the Tyne, nine miles from its mouth. It is about 272 miles northwest by rail from London and 124 miles southeast from Edinburgh. It occupies the sides and summits of hills that rise steeply from the river. Coal measures constitute the geological formation; and they stretch south¬ wards to Ferry Hill, northwards to Chevington.

Public Buildings.— The principal public buildings are the Moot Hall (the Northumber¬ land assizes are held here) ; the Hancock Mu¬ seum (it contains the collection of John Han¬ cock the naturalist, and many drawings of birds, etc., by Thomas Bewick, the engraver) ; the Keep of the old Castle, built in Henry IPs reign and the Black Gate, at the entrance to the Castle yard (now used as an antiquarian mu¬ seum). Of other buildings there may be men¬ tioned the Town Hall ; the Old Assembly Room; the guildhall (in which is the assize court of Newcastle), and below it, the Ex¬ change; and the Grain Warehouse, on the Quayside. There are one central public and

four branch libraries, three of the latter do¬ nated by Sir W. H. Stephenson and one by Mr. Andrew Carnegie; while the Literary Philosophical Society, the Society of Anti¬ quaries and the Church Institute have libraries attached. The Laing Art Gallery was donated by Mr. Alexander Laing in 1904. Of the the¬ atres the chief are the Tyne Theatre and the Theatre Royal.

Places of Worship. — The cathedral church of Saint Nicholas has a famous lantern tower, which was added by Robert de Rhodes about 1450, 100 years after the completion of the church. The tower has been copied elsewhere but never equaled. The clock weighs two tons and is controlled from Greenwich. The larg¬ est peal of bells weighs 5 tons 18 cwts. Saint Andrew's is said to be the oldest church in Newcastle, but Saint John's disputes the claim. Saint Mary's Cathedral (Roman Catholic) was designed by Pugin; its charming spire was added in 1872.

Schools, Educational Institutions, etc. —

Dame Allan's School, Saint Cuthbert's Gram¬ mar School (R. C.), Deaf and Dumb Institute, Northern Counties Orphanage, Church High School for Girls, Central High School, Royal Grammar School, etc. The Armstrong College was founded in 1871 by the University of Dur¬ ham (to which it is

affiliated) and the North of England Institute of Mining and Mechanical Engineers. The College of Medicine (also affiliated to the University of Durham) was built in 1887, and cost £31,000. Rutherford College, not affiliated to the University, was founded by the late Dr. Rutherford.

Municipal Enterprises. — The chief munici¬ pal undertakings are the markets, the public libraries, fire brigade, electric tramways, baths and washhouses.

Parks, Hospitals, Bridges. — Town Moor (said to have been held by the burgesses from time immemorial), 927 acres; Leazes, 86 acres; other parks and recreation grounds, 270 acres. The old Royal Infirmary is near the Central Sta¬ tion close to the Armstrong College ; a new one to commemorate Queen Victoria's Diamond Jubilee was opened in 1906. Other hospitals, etc., are the Eye Infirmary, Fleming Memorial Hospital for Children, Hospital of Diseases of Throat and Ear, for Incurables, etc. The chief bridges over the Tyne are the High Level, 1,375 feet long, with the railway track 112 feet above high water (built by Robert Stephenson, 1846- 50, at a cost of nearly £500,000) ; the Redheugh ; the hydraulic swing bridge (built by Lord Armstrong at a cost of £233,000) ; and a new railway bridge (North Eastern Railway), opened by the king in July 1906. The Byker bridge crosses the Ouseburn and serves foot and vehicular traffic ; whilst a railway viaduct, just to the north of it, carries the traffic of the North Eastern Railway.

Industries and Manufactures. — The coal mines are now all outside the city boundaries. Elswick Ordnance Works are in the west of the city, and this section is famous also for its cycles. The most notable other industries are engineering and shipbuilding. To them may be added the trade in lead, chains and anchors, the manufacture of cement, of steam winches and windlasses, of cordage and cable, paper, cranes, pumps and electric machinery. The

chemical trade, formerly active, has declined of late years. The chief exports are coals, ma¬ chinery, chemicals, manures, cement, manufac¬ tured iron, paints, tar, fire-bricks, fire-clay, etc. Quays are built all down the river side ; the docks have 19 feet at low water and accommo¬ date vessels of about 7,000 tons.

History. — The town (first called Pons TElii, then Novocastria, then Monkchester, then Newcastle-upon-Tyne) is situated near the eastern termination of the Wall of Hadrian, and Roman antiquities have been repeatedly discovered in it. In the .\nglo-Saxon period it was a monastic centre. The fortress was built by Robert, son of William the Conqueror, about 1080. It was rebuilt by William Rufus, his younger brother, who

((buylded the New¬ castle upon the Tyne, the Scots for to gayn- stande and to defended About this time the town received its present name. It received a charter from King John, but the oldest extant is said to be by Henry III in 1239, which con¬ fers the right of digging for coal in the neigh¬ borhood. The coal trade had attained some importance by 1280. Newcastle was a frequent object of attack, and was repeatedly taken in the wars between England and Scotland. It furnished 17 ships to Edward III for the siege of Calais. It was taken by the Scottish Cove¬ nanting army in 1640 and in 1644, and in 1646 Charles was delivered here by the Scottish army to the parliamentary commissioners.

Government. — The city is governed by lord, mayor, sheriff, and council. In the year 1400 a royal charter created Newcastle a county in itself, and Newcastle's first sheriff was ap¬ pointed in that year. In 1600 the great charter (confirming old privileges and adding new ones) was passed. In 1882 a royal charter created Newcastle a city. In 1906 it was made a royal borough. It is the seat of a United States consul. The city returns members to the House of Commons. Pop. 266,603.

Bibliography. — Bruce, (Reid's Handbook to Newcastleˆ (1863, rev. ed. 1903) ; Gray, (1833) ; Fordyce, (Local Records1 (1867— 76) ; Guthrie, (River Tyne1* (1880) ; Ren- del, (Newcastle on Tyne: Its Municipal Origin and Growth > (1»98) ; Richardson,*

(Handbook to Industries of Newcastle and District (1889) ; Johnson, ˆMaking of the Tyne1* (1895) ; Heslop, Northumberland Words* (1893-94) ; Corporation Manual, cur¬ rent date, etc.*

NEWCOMB, nu'kom, Harry Turner,

American lawyer and statistician : b. Owosso, Mich., 4 Jan. 1867. He was graduated from the law department of Columbian Univefsity in 1891, and entered the offices of the Chicago, Mil¬ waukee and Saint Paul Railroad in 1882. In

1895- 99 he was chief of the transportation de¬ partment of the division of statistics in the United States Department of Agriculture, and in 1899-1901 was expert chief of the division of agriculture for the United States census. In

1896- 1901 he was lecturer on statistics at Columbian University, and in 1901-02 he was editor of the Railway World. He began the practice of the law in 1902 and was almost im-

mediately employed as counsel for the Phila¬ delphia and Reading Coal and Iron Company in the arbitration before the Gray commission which settled the anthracite strike of 1902. He organized the firm of Newcomb, Churchill and h i ey in 1907 and is now the senior member of Newcomb and Frey, its successor. His practice is chiefly in corporate matters and cases involv¬ ing the law of interstate commerce and those ot taxation, in all. of which the principles of jurisprudence are in process of adjustment to meet new economic conceptions and conditions He has Written Railway Economics) (1898) • 'Ihe Postal Deficit) (1900) ;

Constitutionality of the Delegations in the In¬ terstate Commerce Law) (1910), etc.

NEWCOMB, Simon, American astrono¬ mer: b. Wallace, Nova Scotia, 12 March 1835; d. VV ashington, D. C., 1 1 July 1909. He came to the United States in 1853 and taught in Maryland; computeˆ on the Nautical Almanac at Cam¬ bridge 1857, and was graduated from the Law¬ rence Scientific School at Harvard 1858. He was appointed professor of mathematics in the United States navy in 1861 and assigned to duty at the Naval Observatory; negotiated con¬ tract for and supervised construction of the great telescope ; was secretary of the transit of Venus commission (1871-82) ; and observed transit at the Cape of Good Hope in 1882. He also directed several parties to observe eclipses beginning in 1860. From 1877-97 he was senior professor of mathematics and superintendent of the Nautical' Almanac office. He retired from active duty in the navy (1897) at the required age of 62, and thereafter devoted himself to both pure and popular science. He was pro¬ fessor in Johns Hopkins University 1884-94 and editor of the American Journal of Mathematics, retiring in 1901. He was a member of learned societies throughout the world. Since 1874 he was correspondent and since 1893 associate of the Institute of France, being the first native American to receive the latter honor since Franklin ; he was also an officer of the Legion of Honor. He received distinctions and degrees from governments and universities in most civilized countries.

He lectured at Harvard, the Lowell Insti¬ tute at Boston, etc., and delivered opening ad¬ dresses at the Flower, Yerkes and other ob¬ servatories. In connection with his work on mathematical astronomy, besides over 100 papers published in various scientific journals, he has written large works (On the Secular Variations and Mutual Relations of the Orbits of the Asteroids) (1860) ; (An Investigation of the Orbit of Neptune) (1874) ; Researches on •the Motion of the Moon) (1876); (Theory of the Inequalities in the Motion of the Moon) (1894) ; (Tables of Uranus} ; ˆMeasure of the Velocit}" of Light) (1884) ;.(Uranian and Nep¬ tune

System) ; (Astronomical Constants and

Eclipse Tables.) He founded the Astronomical Papers of the American Ephemeris and edited the first eight of this series, which contain his tables of the planets and of the stars now used by astronomers all over the world. This work contains Newcomb's famous lunar researches. Among his more popular writings are Ropular Astronomy) (1878); (School Astronomy); ˆElements of Astronomy) (1900); Algebra Geometry); Analytical Geometry; (Cal¬*

culus) ; (Essentials of Trigonometry); (The Stars) (1901); Astronomy for Everybody) (1902); A B C of Finance); A Plain Man's Talk on the Labor Question) (1886) ; (Prin¬ ciples of Political Economy) (1887) ; (His Wis¬ dom the Defender) (1900); Reminiscences of an Astronomer) (1903). He was given the rank of rear-admiral by Congress in 1906, and on his death in 1909 was given a military funeral. For an account of his place in sci¬ ence, see Benjamin, M., paper in Reading American Men of Science) (New York 1910), edited by D. S. Jordan.

NEWCOMB MEMORIAL COLLEGE FOR WOMEN, New Orleans. See Tulane University.

NEWCOMEN, nu-kom'en, Thomas, Eng¬ lish inventor of the atmospheric steam engine : b. Dartmouth, Devonshire, February 1663; d. London, August 1729. With the financial help of John Cawley he experimented on Savery's engine, patented 1698, possibly had made pre¬ vious study of the same problem at an earlier date and may have been a partner with Savery in the patent taken out in 1710. His improve¬ ment of Savery's engine consisted principally in separating boiler, pump and condenser. Steam was let into a cylinder from below and a piston above was thus forced up so that a pump rod attached to it by a balance arm was driven downward ; cold water was then intro¬ duced into the condensing cylinder, a vacuum was there formed, and the external atmos¬ pheric pressure drew the piston down into the cylinder, the pump rod being forced up by this action. Newcomen's engine is practically the modern type, which, however, has Watts' con¬ denser; it was successfully used, notably for pumping water from mines. See Steam and Steam Engines.

NEWCOMES, The, by Thackeray, pub¬ lished in 1854—55, the last of the four very great novels of the author, is more closely united to Rendennis,) to which it is a quasi-sequel, than to (Vanity Fair) or (Esmond.) As the theme of (Vanity Fair} presented a section of life in which most human endeavor ultimately turns to dust and ashes, and Rendennis) isolates with almost .epic impressiveness the phenomena of the young man, so the (Newcomes) dwells al¬ most chiefly on family relations. As in the earlier

stories Thackeray was faithful to what he saw, and the picture is a powerful one. It is a picture of family rivalry, intrigue, ambition, ill-feeling, worldliness, jealousy, weakness, credulity and many other unattractive charac¬ teristics. On the whole the various members of the family are represented in no amiable light: Barnes Newcome is especially detestable, and most of the other Newcomes are mean and selfish. The amiable weakness of the hero, Clive, deserves a better fate than his tempo¬ rary martyrdom at the tongue of Mrs. Mack the Campaigner, most abominable of mothers- in-law. The two most famous and likable characters, Colonel Newcome and his niece, Ethel Newcome, though they have faults of the head if not of the heart, relieve the general impression. They are the real hero and heroine of the book, and are. among the best-known characters in English literature; they are fairly representative of the great vividness and in¬ tensity of feeling with which the novel is writ-

ten. Like most of the author's novels, 'The Newcomes) is often highly satirical of Eng¬ lish society, Barnes Newcome, Honeyman and young society ladies being specially ridiculed. Certain passages, notably that of the death of Colonel Newcome, are among the famous pieces of writing in English literature. Consult various lives, as that by Trollope and Mrs. Ritchie's introduction in the biographical edi¬ tion of Thackeray's works.

William T. Brewster.

NEWDIGATE (nu'di-gat) PRIZE, a prize in Oxford University, annually awarded for an English poem. It was founded by Sir Roger Newdigate, Bart. (1719-1806). its value being $110. Among the winners have been several well-known men, such as Ruskin, Mat¬ thew and Sir Edwin Arnold, John Addington Symonds and W. H. Mallock.

NEWEL, in architecture, the central space or column round which the steps of a circular staircase are wound. When there is no cen¬ tral pillar the newel is said to be open. The term newel post is also used in this connection.

NEWELL, Frederick Haynes, American engineer, founder of the United States Rec¬ lamation Service and its chief engineer from 1902 to 1914: b. Bradford, Pa., 5 March 1862. He was graduated at the Massachusetts Insti¬ tute of Technology in 1885. Soon after joining the United States Geological Survey in 1888 the director, J. W. Powell, placed him in charge of water investigation, steam gauging and reservoir site surveys, a work

which finally developed into the Reclamation Service created by act of Con¬ gress, 17 June 1902. Under his direction were built the Roosevelt, Pathfinder, Elephant Butte, Arrowrock and other great dams, and the Gun¬ nison tunnel for the reclamation of about 3,000,000 acres in the West. This work was done with a fund which from 1902 to 1914 amounted to about $100,000,000. He was mem¬ ber of the commission on revision of land laws, the Inland Water-Ways Commission and of the Natural Advisory Board for fuels and struc¬ tural materials. After resigning from the Reclamation Service in 1914 he was consulting engineer to that organization until appointed head of the civil engineering department of the State University of Illinois at Urbana. He is the author of (Hydrography of the Arid Re¬ gion J (1891) ; 'Agriculture by Irrigation 5 (1894) ; 'The Public Lands of the United States (1895); 'Irrigation* (1902), and many special reports.*

NEWELL, nu'el, Peter (<(Sheaf Her- sey®), American illustrator and humorist: b. McDonough County, Ill., 5 March 1862. He was educated at Bushnell, Ill., worked for a photographer, drew crayon oortraits, studied in New York at the Art Students' League and in the early 90's became famous for his whim¬ sical illustrations to humorous books and for his own pictures with text, which appeared in various periodicals and were collected as 'Too- sys and Turvys) (1893-94), (Peter Newell's Pictures and Rhymes (1899), etc. His later work with its striking use of flat tones, possi¬ bly traceable to Japanese influence, is to be seen in the illustrations to Lewis Carroll's 'Alice in Wonderland, > ' Alice in the Looking- Glass, J 'The Hunting of the Snark,* (Mr.*

Munchausen, 'Book of Clever Beasts,) etc. His more recent publications are (The Plole Book) (1908); 'Jungle Jangle* (1909); 'The Slant Book* (1910) ; 'The Rocket Book)*

(1912).

NEWELL, Robert Henry, American humorist, whose pseudonym was "Orpheus C. Kerr,® that is "Office Seeker®: b. New York, 13 Dec. 1836; d. Brooklyn, 1 July 1901. He was educated in New York; became assistant editor of the Sunday Mercury in 1859; for it wrote his first 'Orpheus C. Kerr Papers, which were continued in three volumes (1861— 64), none possessing much deeper humor than the kind suggested by 'the title. He was a war correspondent of the New York Herald; acted as an editor of the New York World, then of the Daily Graphic , and later of the Hearth and Home, which he left in 1876. In 1878 he be¬ gan to suffer with writer's cramp and letter- blindness, from which tie never recovered. Be¬ sides his humorous sketches Newell wrote 'There Was Once a Man.* an anti-Darwinian romance (1884); 'Avery Glibun) (1867); 'The Palace*

BeautifuP (1865), and ‘ Versatilities) (1871), both volumes of verse: ‘The Cloven Foot, an adaptation of ‘Edwin Drood* (1870), and ‘The Walking Doll,* a novel of New York life (1872).*

NEWFOUNDLAND, The Atlantic Fish¬ eries Dispute. This fertile source of friction between the United States and Great Britain antedates the War of Independence. In those times the American colonists, as fellow-subjects of England, prosecuted the fisheries of the Grand Banks and Saint Lawrence Gulf on equal terms with the inhabitants of Canada and Newfoundland. During the Revolution the Americans could not exercise it, but by the Treaty of 1783 they regained this liberty. The War of 1812 abrogated it again and seizures of their vessels for attempting to prosecute the in¬ dustry brought about the Convention of 1818, which fixes the status of the question at present.

The agreement of 1818, known in diplomacy as the Convention of Ghent, is somewhat re¬ markable. The American commissioners claimed that they still possessed the privileges formerly enjoyed by them as British colonists although war had intervened and they had become an independent nation. The audacity of the claim startled the English government, who answered that it was preposterous. The Americans were bold and insistent, they had many friends, — and as every one desired peace and harmony the convention finally agreed on a compromise on the question. The British government were ignorant both of the geography and the trade of Newfoundland, and they considered the fish¬ ing rights they were giving away as practically valueless.

By this treaty the United States abandoned all claims to fishing within the territorial waters of the British North American possessions else¬ where, in return for the right to catch fish in¬ shore on the southwest coast of Newfoundland, between Ramea Isles and Cape Ray; on the west coast, between Cape Ray and Quirpon Isles; on the coast of Labrador, from Mont Joli, opposite Anticosti, eastward and north¬ ward indefinitely; and on the shores of the Magdalen Islands, with the further privilege of landing to dry and cure their catch on the un-

fn!!ml!nPOrtl0niS lhe S0lllhwest coast of New- OUrvlrinc and al°n£ Labrador.

. 1 ffeiences. as to the extent of the terri-

t?e’nl nvtHdl^1011 and the interPretation of the ;/Aty ™ad.e the. Question

one of serious menace ... J 11 8 ‘ 0 – A me r i c a n amity, owing to the vigor- fU j{an(j taken by Canada (including New-

unHl’ iq-I arains,t the American fishermen, until 1854 when by a reciprocity treaty the

Canadian fishery products were granted free entry into the United States. This accord was

Of i«i«edi b-V ConRress ln 1866, the Convention ot 1818 being reverted to. At once friction

Hnrlpedt’l and«J£ 1 ‘I7-1 n became necessary to con- i , 1 10 Washington Treaty,” which em¬ braced a series of articles dealing with the ishery problem. These provided for recip¬ rocal fishing concessions in Canadian waters, and m American waters north of lat. 36°, ut as Canada claimed that America secured the more valuable privileges an arbitration to dispose of this point was agreed upon. The hˆhery articles became operative 1 July 1873 the arbitration was held at Halifax (Nova Scotia) m 1877, and the tribunal, presided over by M. De la Fosse, Belgian Minister at Wash-

iIJmonbnAWarded Ca”ada $5,500,000, of which 81,000,000 went to Newfoundland. Congress abrogated the “fishery articles” in 1885/ and again the Convention of 1818 governed this entanglement with the result of further trouble so that in 1888 another fishery treaty, on sim¬ ilar lines to its predecessors, was arranged be- tW5eiirthe Plenipotentiaries, Secretary Bayard and Mr. Chamberlain, only to be rejected bv the United States Senate.

At this point Newfoundland and Canada parted company, so far as their attitude toward the United States was concerned. A modus vivendi for two years, to admit of the treaty being adequately considered by the Senate, had been arranged between the high contracting parties, granting American fisher-vessels, on payment of a license of $1.50 per ship-ton, the right to enter the non-treaty waters of Canada and Newfoundland to purchase bait, ice, stores, and outfits; to transship cargoes and to hire men. When the treaty was rejected Newfound¬ land saw that fisherv reciprocity between the United States and Canada was hopeless, and offered the former an accord on her own behalf. The proposal was accepted in 1891, when Sec¬ retary Blaine and Colonial Secretary (subse¬ quently Premier) Bond drafted the Bond- Blaine Convention, providing privileges for American fishermen in Newfoundland waters in return for free entry of Newfoundland fish into American markets.

When it was ready for ratification, Canada protested against it, claiming

that Newfound¬ land should not be allowed to make such a com¬ pact without including the dominion, and the British government, to avert a collision between the greater colony and the smaller, pigeon-holed this draft till Canada should have had an oppor¬ tunity to effect a similar understanding. But this she could not do, though the Conservative and Liberal cabinets both sought terms from Washington, and as neither Canada nor New¬ foundland dared abrogate the modus vivendi while hoping for a solution of the deadlock the temporary arrangement continued year after year. In 1902 Canada withdrew her protest and Sir Robert Bond revived the moribund draft

with Secretary Hay, the new one being known as the Bond-Hay Treaty, and containing im¬ provements suggested by 12 years of discussion.

In 1904 the United States Senate (

This claim of the Americans to ship New¬ foundlanders outside the three-mile limit and then return with them into port as legally part of their crew was not confirmed at Washington. The State Department discountenanced it and instructed the American fishermen that they only bring into Newfoundland waters crews shipped in American ports.

Newfoundland, early in 1906, passed a fur¬ ther act making it illegal for any of her people to leave her waters for such a purpose, or for any foreign fishing vessel to enter her waters with such men on board, while the Americans weie also required to pay light dues, observe colonial fishery regulations, . and enter and clear at the custom-houses, which obligations they had declined to subscribe to since the rupture On one of these questions, the claim of the Newfoundland government to compel all Amer¬ ican vessels to enter and clear at the Custom House is unanswerable. All nations have an inherent right to protect their revenues from smuggling. The supply of goods aboard their schooners known as "the slop chest" is solely for this purpose. Canada has always compelled them to enter and clear their vessels when visit¬ ing Dominion ports, and Newfoundland claimed the same right. The United States government did not uphold its fishermen on this point. The payment of light dues rests upon the same basis. The most contentious question was, how tar are the Americans bound to obey local fishery laws? Where these regulations are gen¬ eral and simply for the protection of the species from destruction, it would seem reasonable that they should be obeyed. One point on which

there was some friction was the right of the Americans to fish on Sunday. This irritated the Newfoundlanders more than anything else and caused the trouble years ago known as <(the Fortune Bay Outrage. }) As grave international problems were involved in the whole question, the British and American governments opened negotiations for an adjustment of it, appeal being made to The Hague Tribunal and the de¬ cision was not reached until 7 Sept. 1910, and in July 1912 a supplementary treaty was concluded giving binding effect to those parts of the award which were in the nature of recommendations only.

Taken altogether the award was a victory for the United States. Neither British imperial nor colonial authorities can compel American fishermen to report to the custom houses, nor can they impose upon these fishermen light, harbor or other dues. Hereafter American fishermen can employ Newfoundlanders on their vessels and they will also have the right to purchase supplies and enjoy other commercial privileges in Canadian ports. It was also speci¬ fied by the tribunal that future disputes regard¬ ing fisheries regulations shall be adjusted by an impartial commission selected for that purpose.

Hon. Elihu Root was the chief pleader for the United States at The Hague, while Sir William Robson appeared for Great Britain.

P. T. McGrath,

Editor (The Evening Herald, Saint Johns, N. F.

NEWFOUNDLAND. Geography. — New¬ foundland, the tenth largest island in the world, is situated on the east coast of North America, between lat. 46° 37′ and 51° 39′ N. and long. 52° 35′ and 59° 25′ W. It occupies much the same geographical position in the New World as the British Isles do in the Old. The colony lies generally in a more southern latitude than the British Isles. It is larger than Ireland, containing 42,734 square miles. It is divided from the continent on the south¬ west by Cabot Straits, about 60 miles wide, and on the northeast by the Straits of Belle Isle, 10 miles wide. It juts far out into the Atlantic and is the nearest American land to Europe, being only 1,640 miles from Ireland and 1,213 from New York. Labrador, from Hudson's Strait to Blanc Sablon, including the basin of the Hamil¬ ton, is included in the Dominion, the remainder of the Labrador Peninsula forming part of the Dominion of Canada. Area, 120,000 square miles with a coast line of about 600 miles fac¬ ing Newfoundland.

Topographical Features. — On the east coast the land is high and looks very rocky and barren; on the west coast the character of the country changes completely after Cape Ray is passed. Instead of the stern,

forbidding moun¬ tainous aspect of the east and south coast the land is level, well timbered and fertile. An American artist has declared that the scenery of Bay of Islands on the Newfoundland west coast is the most picturesque in North America. The numerous river valleys are very beautiful, especially the Humber, Codroy, etc. Much of the interior is moorland and marsh, well wooded around the numerous lakes and rivers. Most of the good land lies in these alluvial val¬ leys. The west has a finer climate and the land

generally is superior to the soil of the eastern shore. In the interior there are many isolated peaks. The chain of mountains known as the Long Range extends from Cape Ray for about 100 miles into the interior. There is another high range of mountains near the centre of the island. The highest peak is a little over 2,000 feet. The Atlantic coast line of Newfoundland and the southern shore have noble inlets, bays and harbors, admirably adapted for carrying on its great industry, the cod fishery.

Hydrography. — The peculiar feature of Newfoundland are the innumerable lakes, only two of which are large, Grand Lake and Red Indian Lake. Both are long and narrow, Grand Lake about 60 miles long and Red Indian Lake about 50; but neither is over 10 miles wide in any part. Glover Island in Grand Lake is 52 miles long. The largest river in the island is the Exploits, which is navigable for about 50 miles from the mouth of its estuary. The Humber, Gander, Codroys and Terra Nova rivers are all fine streams, but of no value for navigation except by canoes.

Soil. — In many parts of the island there is very good land, especially in the Codroy Val¬ ley, Saint George's Bay and the Humber Valley. Deer Lake, Red Indian, Exploits Arm and the River Valley also contain good soil. Fine tim¬ ber and good ground fit for cultivation surround both the Gander River and Lake. There is also good agricultural land around Avalon Peninsula. Trinity Bay, S. W. Arm, Green Bay, Notre Dame Bay, some parts of White Bay, Mortier, Placentia, Bonavista and Saint Mary's Bays. There are thousands of acres of splendid graz¬ ing ground and fine pasture lands specially suitable for sheep.

Minerals. — Newfoundland is celebrated as a producer of copper and iron, copper from the well-known Tilt Cove mine and iron from Bell Island. Iron of various kinds has been found in the north. The iron output in a recent year amounted to 656,000 tons. Argentiferous galena occurs in Placentia Bay. Asbestos is common and mica. Gold is being worked on a small scale in White Bay and petroleum of excellent quality is now being pumped at Parsons' Pond on the west coast. Slate and marble are abundant. A large deposit of talc has been opened and an aerial tramway built to it near Manuels Conception Bay. The country is al¬ most wholly unexplored and

her great mineral treasures, especially her valuable coal deposits, have not yet been tested in an efficient way with the boring machine. They are an extension of the Cape Breton coal fields and extend nearly across the island from Codroy to Green Bay. The annual mineral production is about $3,000.- 000 in value.

Climate. — The Summer climate of New¬ foundland from June until October is delight¬ ful. There is plenty of sunshine but no ex¬ tremes of heat, seldom higher than 70° in the shade. The winter climate is not so severe as in Canada. 'Zero is only occasionally touched. The spring is late and the weather variable, due to the influence of the Labrador current which brings along the ice. During the last few dec¬ ades the climate has improved and there is now no very heavy snowfall or intense frost before the end of November. The fog lies on the coast and only rarely comes in on the land.

Animal Life. — Newfoundland is the home of the woodland caribou. All the interior is one vast deer park where countless thousands of these fine animals range unmolested and un¬ seen by man. Black bears, the grey wolf, now very scarce, the lynx, foxes, beavers and otters are indigenous. The varying hare has been in¬ troduced and now swarm all over the island The Arctic hare is a native as well as the wil¬ low grouse and ptarmigan. There are plenty of snipe, ducks and geese, but no woodcock. The rivers abound with salmon and trout; there are no predaceous fishes, such as pike or pickerel.

Agriculture. — The main business of the colony is the fishery. Agriculture is only an auxiliary, and is mainly confined to the coast. The chief crops are oats, potatoes and turnips! lncrc are 231,359 acres under cultivation or in pasture. About 541,000 bushels of potatoes ■ 11,000 bushels of oats; 65,298 bushels of tur¬ nips represent an average year's product. I here are about 13,288 horses; 40 000 head of cattle; 100,000 sheep and 30T00 pigs. About $600,000 worth of agricultural product is imported into the colony every year from the United States and Canada, all of which could be raised in the island. The farming around the capital is excellent. On the west coast, where the very best land is situated is still very primitive. Before the outbreak of the war the total value of all the agricultural prod¬ uce raised on the island was about $2,000,000. This has been greatly increased by enhanced prices and more and better cultivation under the stern necessities of war.

Lumbering. — This industry has been greatly increased by capitalists from Canada and New England. The chief woods are spruce, white and yellow pine, red pine, fir, juniper, birch, witch hazel, aspen and white maple. There are now in operation several paper and pulp mills producing about 100 tons of paper and 250 tons of pulp daily, most of which is exported to Eng¬ land.

Fisheries. — The great industry of New¬ foundland is the fishery. The Grand Bank fishery has declined of late but its loss has been made good by the increase of the fishery in coastal waters and along the Labrador Coast. Under the terms of the Anglo-French Conven¬ tion of 1904 France renounced her exclusive fishing rights under the Treaty of Utrecht, but retained the right to fish in territorial waters from Saint John's Cape north to Cape Ray. In 1909 the Newfoundland fisheries disputes were submitted to The Hague and the award, given in 1910, secured the right of Great Britain to make regulations without the consent of the United States, subject to any limitations imposed by treaty. In the Grand Bank cod fishery in 3914, there were engaged 1,892 men and 105 Newfoundland sailing vessels, aggregating 7,790 net tons. The catch totaled 124,067 quintals of dry fish, valued at $775,418. The coastal- waters cod fishery for the same year engaged 15,823 small sail vessels, motor boats, etc., and 48,221 men. The catch aggregated 1,032,198 quintals of dry fish, valued at $6,193,188. On the Labrador fishery over 800 vessels and 5,500 men were engaged. The exports of codfish, in¬ cluding the Labrador fishery, aggregated 1,247,- 314 quintals. The lobster catch was 11,017 cases in 1914 and 6,022 cases in the year following.

In the year 1914 there were eight vessels en¬

gaged in whaling. The catch included 142 fin¬ backs, 13 humpbacks, one sperm and five sul- a tot.al 161 whales, valued at $85,008. The factories connected with the whal- mg industry turned out 150,146 gallons of oil, 7m i tons guano and over 80 tons of bone in The seal fishery in the same year yielded 233,719 seals, but fell to 47,004 in 1915. About 20 steam vessels and 4,000 men were formerly engaged in sealing. Sealing js now restricted by law to one month (16 March-16 April). The total value of all fisheries averages $10,000,000 annually but in 1917 reached the unprecedented value of $14,258,555. The codfishery, both in ex¬ tent of area and in production, is the largest in the world. The most remarkable feature in this great industry is its stability and uniform suc¬ cess. As certain as seed time and harvest there come every year to the shores of Newfoundland the regular supply of the bait fishes in orderly sequence, herring, caplin and squid, and the vo¬ racious cod. The seal fishery is much more variable, some years being a complete failure, other years a great success. The industry was formerly prosecuted in sailing vessels, now

it is carried on in 23 steamers. In 1918 a cold storage plant was erected for chilling fish, with a capacity of 200,000 pounds per day. During the year the chilled product of this plant was exported to England and fetched handsome prices.

The herring fishery is another large industry. The movements of the fish are sometimes very irregular and the year's catches variable, unlike the steady uniformity of the codfishery which has continued for over four centuries steadily productive. The Labrador herring, once so famous, is now a thing of the past. Owing to judicious protection, salmon are year by year increasing and every season an increasing number of anglers come to enjoy the sport, principally from the LInited States. See New¬ foundland, the French Shore Question in.

Manufactures. — Ship building is extensively carried on in the outports of the colony. There are also a very large number of saw mills, some very small and primitive, others on a large scale with all the best and most modern appliances. Nearly all the other manufactures are carried on at the capital, Saint Johns (q.v.). Paper¬ making has been inaugurated on a large scale and bids fair to have an annual output worth

$10,000,000.

Trade and Commerce. — The main import trade is done with Great Britain, United States and Canada. Imports in 1914—15 were valued at $12,693,860; in 1913-14 they were valued at $15,609,990, comprising textiles, $1,852,968; flour, $1,823,551 ; coal, $1,066,762; hardware, $901,756; salt pork, $753,309; machinery, $729,- 225 ; tea, $224,382 ; molasses, $208,949. The ex¬ ports in the same year (1914—15) were valued at $13,501,795 against $15,549,185 in 1913-14, when there were exported dried cod to the value of $8,071,899; pulp and paper, $2,168,164; iron ore, etc., $1,370,375 ; herring, $469,546; seal oil, $409,060 ; cod oil, $386,825 ; seal skins, $350,794 ; canned lobsters, $347,941. Of the total imports ($15,549,185) in 1913-14, merchandise to the value of $3,826,529 came from the United King¬ dom, $5,192,462 from British possessions (mainly Canada) and $5,796,906 from the • United States. Exports to the value of $3,256,- 446 were sent to the United Kingdom, $2,522,159

to British possessions (mainly Canada), $1,679,- 662 to the United States and $7,676,606 to other countries. Imports from the United Kingdom in

1916-17 were valued at $2,620,033, from the United States, $10,233,899, and from Canada $7,412,300. Trade with England is decreasing, whilst business with the States and Canada is on the increase.

The cause of this change is not far to seek. Whilst British capital has neglected Newfound¬ land, Canadians and Americans have been prompt to secure the advantages offered by the island's minerals and timber. They have real¬ ized that there are great possibilities in the colony. The exports of Newfoundland (1916— 17, $22,381,762) go principally to the United Kingdom, United States, Portugal, Brazil, Spain, Italy and Canada, chiefly dry codfish. Sealskins and oils go to the United States, England, and in small amounts to Canada. The iron ore goes to Canada, copper to England and iron pyrites to the United States. Trade is steadily increasing and the country is very pros¬ perous.

The Revenue of the colony is nearly all derived from the customs and is considerably in excess of the expenditure. In 1913-14 and in 1914-15, however, the expenditures exceeded the revenues. In the first-named fiscal year the revenue was $3,718,840 against $4,029,070 for ex¬ penditure and in the following $4,059,145 reve¬ nue against $4,119,975 for expenditures. Cus¬ toms receipts for 1916-17 amounted to $4,470,- 537, and the total revenue was $5,206,647 ; expenditures amounted to $4,554,890. The public debt amounted in 1915 to $32,328,415, principally incurred for railway construction and public works, and - includes the municipal debt of Saint Johns.

Means of Communication. — There are steamers running along the coast north and south. There are excellent main and branch roads. With some of the northern outports and Labrador, communication in winter is main¬ tained with difficulty by couriers. With the out¬ side world, England, the United States and Canada there are several lines of steamers. There are in operation 828 miles of government railway line with a gauge of three feet six inches, and 47 miles of private lines. The gov¬ ernment contracted for five branch lines in 1910 to Bonavista, Heart's Content, Grate's Grove, Trepassey, Fortune Bay and Bonne Bay, at $15,000 per mile for construction and 4,000 acres of land per mile constructed for opera¬ tion. These lines were opened by 1914 and have opened up fertile sections of land. There are 736 post offices, 4,524 miles of telegraph line and 926 miles of telephone wire.

Education. — This is conducted on purely de¬ nominational lines, each sect controlling its own educational money. Even the Salvation Army has its separate schools. In the capital and larger communities it works fairly well. The colleges and high schools are very efficient. In the smaller places this system of division is ruinous to good instruction. Its very worst ef¬ fect

is seen on some of the small islands where it actually destroys education. Students at col¬ leges of the Roman Catholic Church, 492; Methodist colleges, 475 ; Church of England colleges, 375. The Church of England has 395 schools of all kinds, the Roman Catholic 368 and the Methodist 364, and other denominations

52. The attendance in Roman Catholic 17,560, Church of England 16,362, Methodist 15,488 and others 2,072, making a total of 51,482. The total expenditure on education in 1914, includ¬ ing government grants, fees, etc., was $400,358.

Religion. — The principal denominations are Roman Catholics with 81,177 adherents, Church of England, 78,616; Methodists, 68,042, Salva¬ tion Army, 10,141 ; Presbyterians, 1,876 and 2,767 of other denominations.

Government. — The government is adminis¬ tered by a governor, assisted by an executive council not exceeding nine members, a legisla¬ tive council not exceeding 24 members and an elective house of assembly consisting of 36 rep¬ resentatives. Members of the legislative council receive $120 per session, members of assembly $200 or $300 per session, according as they are resident or not in Saint John's. The legislative council is nominated by the governor.

Population and Principal Towns. — In 1914 the population of Newfoundland was 247,710 (126,239 males and 121,471 females). The in¬ habitants are chiefly of Anglo-Saxon and Irish descent. Outside of the capital (32,292) there are no other large centres of population. The largest is Harbour Grace in Conception Bay, with 4,279 population ; Bonavista, 3,696; Twillin- gate, 3,348; Carbonear, 3,703. Of the total population, 67,000 are engaged in the fisheries ; 2,915 on farms; 5,376 are mechanics and 2,260 are miners. The birth rate is 30.42 and the death rate 15.66 per 1,000. In 1914 there were 11,260 immigrants and 10,825 emigrants.

History. — The early history of the Colony involves the story of the discovery of North America by John Cabot in 1497, a memorable voyage fraught with far-reaching consequences. The immediate result of the discovery was the springing up of a great transatlantic cod- fishery which first drew Britons from the narrow seas, made them a nation of sailors and laid the foundation of the British Colonial Empire. For a long time this industry was carried on secretly to avoid the exaction and tyranny of the Crown. There was not only a great fishery but a big barter trade in opera¬ tion between the English and foreign sailors. By the reign of Elizabeth this business carried on by Devonshire men had grown so extensive that Raleigh declared it was the mainstay of the Western Counties then the chief

maritime centre of England. The story of Newfound¬ land naturally divides itself into four periods. First, the early period from 1497 to 1610 when fhere was neither law, religion or govern¬ ment in the island. English and foreign fisher¬ men were ruled in a rough way by the valiant men of Devon, traders and pirates. Second, the fishing admiral period, 1610 to 1711, a time of struggle between the settlers and the ship fishermen from England. The permanent in¬ habitants were very much aided by their colonial brethren from the American Colonies. Trade began with them in 1641 and sp increased that by the time of the Revolution it amounted to $4,000,000. ‘ One of the largest items in this trade was the supply of New England rum. Thousands of Devonshire men were smuggled away every year to New England and thus helped to build up the trade fisheries of the American Colonies which became so formidable as to rival England and excited the great ad¬ miration of Edmund Burke. Third, from 1711

to 1825 when the island was under naval gov- er,K,rs and at last possessed a resident ruter and a form of settled administration. Fourth m°dfni period from 1825 up to the presem

it was JnhTh’tW t.the C?Iony was discovered a, as inhabited by a branch of the great

Algonquin family of Indians known amongst

themselves as the “Beothucks.” Their principal

dianTak WTkln lhe interior around Red fn- man Lake. They became extinct early in the*

tu!LCe„ntVrX; Misunderstandings arose between

t ˆ-the Whlte ˆen and the feud ended in

and dˆdlSaSterK-t0 ihe .aborigines. Starvation

thed ML m Combined w,lth ˆe dire hostility of ‘c-Macs who early obtained the use of firearms helped to destroy this interesting race.

<;kptrtlˆm0mlrn Re7od can only be very briefly sketched. The Colony suffered severely from

the policy of the Home Government which op- posed sett lement_ and tried

by every means to

RrL,iefi1Siland slmP)y as a fishing station for "5s" ˆhˆen A grants of]and were is¬ sued until 1813. After the country obtained a local government in 1832 and full responsible government m 1855, it went ahead fast. The most wonderful feature in its history is the marvelous recuperative power of the insular population, under the direst calamities, in-

i<309°nS lram th? French, fires and lastly in Jr . a conflagration, which consumed half the Capital, followed in 1894 by a bank crash which financially ruined nearly every one in the island, lhe real advance of Newfoundland may be dated from the advent of the railway in 1881 since built right, across the island, and giving regular communication with the United States and Canada. The movement was bitterly opposed by the fish merchants and others but every one now recognizes its beneficial results in building up new industries. The principal events in the modern history of the island w?re the settlement of the fisheries dispute with h ranee and later with the United States. Federation with Canada has been more than once a burning political issue and even yet there, are a few in favor of it.

Bibliography. — Annual Reports of Govern¬ ment Departments (Saint John's) ; 'Year-book of Newfoundland' (Saint John's ; 'Correspond¬ ence respecting the Newfoundland Fisheries' United States, No. 1 (1906; London 1906); Bellet, A., 'La grande peche de la morue a

1r\TTe7e"Neuve) (Paris 1902>; Harvey, M,, 'Newfoundland, England's Oldest Colony' (Lon¬ don 1897) ; id., 'Newfoundland in 1900' (New York 1900) ; Howley, James P., 'The Beothucks

°r J?edxJndirans> (Cambridge 1915) ; McGrath,

P. T., 'Newfoundland in 1911' (London 1911) • Prowse, D. W., 'A History of Newfoundland' (2d ed., ib. 1897) ; id., 'Newfoundland Guide¬ book' (ib., 1905; 1910); Smith, F. E,, 'The Story of Newfoundland' (ib., 1901); Thomas, W. M. S., 'Trails and Tramps in Alaska and Newfoundland' (New York 1913) ; Tilby, A W., 'British North America, 1763-1867' (Lon¬ don 1911); Willson, W. B., 'The Truth about Newfoundland' (2d ed., London 1901).

Revised by J. B. McDonnell.

. NEWFOUNDLAND, Bank of, in its

widest sense is a submarine island 600 miles long and 200 miles broad covered by water less than 50 fathoms deep, lying off the island of Newfoundland, within a degree of the eastern

coast. . They must be regarded as belonging to the primitive features of the terrestrial crust and forming part of the pedestal on which the American continent itself reposes. The con¬ fluence of the Arctic current and the Gulf stream generate here the fogs or vapors char¬ acteristic of the eastern waters of Newfound¬ land During the spring, summer and autumn months when the Gulf stream prevails in this region, the mists roll up in abundance from the surface of the suddenly chilled waters and the surrounding seas become enveloped in fogs covering a space as large as France or even as half the European continent. The reports of sea-farers for the most part, familiar only with the southeastern ports and approaches of Newfoundland, tend to confuse the island itself with its banks ; hence dense fogs are commonly legarded as a normal if not permanent feature of its climate. Doubtless during the prevalence of the south and southeast winds the vapors are rolled up from the banks by atmospheric cui rents, and at such times they are spread in thick masses over the creeks and inlets along the south coast. But as a rule they seldom penetrate iar into the interior, and, according thˆ local sayinff. ((The land eats the fog."

*1 he Hreat Bank, far more extensive than New¬ foundland itself, does not present any indented contour lines like the shores of the island. The Ureat Bank is a curvilinear triangle with rounded outlines.. If the whole submarine mass upheaved it would attach itself as a heavy peninsula to North America. A few cavities have been discovered in the sands of the bed "Whale Hole," for instance, caused perhaps by the eddies of the conflicting cur- rents in the western part of the Grand Bank, south of Cape Race, sinks to a depth of 400 feet. An equally deep chasm lies on the north- west. About 125 miles east another bank, called Bonnet Flamand, rises in an ovail mass above the chasms surrounding it, which sink to a depth of 500 fathoms. It is in the vicinity of these plateaus that the ocean bed drops into the deepest chasm yet revealed in the whole i jn*T>C- Hie seas break over the Newfound¬ land Banks although they are covered with \ ater 40 or 50 fathoms deep. "Hence their apprpach is usually revealed to mariners," writes hsee Reclus, "by the heavy chopping waters fringing their borders. But within this fringe of agitated waters the sea is generally calm, so that the Bank itself might be regarded as forming a veritable harbor of refuge but for the risk of collision with the fishing-smacks or icebergs. The large Atlantic liners, the most dreaded in case of collision, owing to their speed and enormous size, pass regularlv over the Southern 'tail' of the Bank, thereby prolonging their passage by three or four hours but avoiding . disaster. The long convoys of icebergs drifting with the polar current are a source of danger to be guarded against by the experience, skill and presence of mind of the mariners navigating these waters. The skip¬ per has to study from a distance the aspect ° fl bf surface, the glint of the crystal masses reflected from the clouds, the dense fogs and clear skies. He*

must take note in the waters of the changes of temperature, of color and of animal life, and when the sea is wrapped in impenetrable mist he must be ready for every

contingency. These convoys, drifting down from the higher latitudes, pass for the most part along the eastern section of the Bank, a few straggling blocks alone attracted to the neighborhood of the Newfoundland coast. Their route is largely determined by the action of the Gulf Stream which sets in the direction from southwest to northeast.

((The hypothesis has long been advanced that the Newfoundland Banks have been formed by the debris of all kinds deposited by the melting icebergs in the region where converge the two opposing currents from Baffin Bay and the Gulf of Mexico. Careful observations have shown that in the North Atlantic the polar drift-ice contains but a very small quantity of the rocks and stony fragments and glacial clays either brought down with the glaciers from the rocky slopes of Green¬ land, or carried away from the bed of the lower gorges. All the blocks that get stranded on the Newfoundland coast are pure as crystal and singularly free from sedimentary matter. Hence they can have contributed little or nothing to the construction of the submarine bed stretching southeastwards from the island of Newfoundland. The fisheries grounds here are among the most productive in the world. The Banks are the chief breeding-place of the cod. Herring, salmon, trout, whales and seals are also found in great numbers. These treasures are stored by three nations: United States, England and France. See Fisheries.

NEWFOUNDLAND, The French Shore Question in. The long-standing dispute be¬ tween England and France about fishing rights in Newfoundland is generally known as <(the French Shore question.® Most writers begin its history with reference to the Treaty of Utrecht, (1713) when, by agreement between the two countries, certain privileges were given to the French on the west and northeast coast of Newfoundland. It really commences, however, with the defeat of the Invincible Armada. The extinction of Spain's naval power by that great victory left the two great powers face to face, and from this date begins the long duel between France and England for the command of the sea and the control of North America. Xhe contest ended disastrously for France at the fall of Quebec and the battle of Trafalgar. Both her naval power and her great American Empire disappeared. All that now remained to her of New France were the two barren islets of Saint Pierre and Miquelon and the doubtful fishery rights in

Newfoundland. It was the sentimental and national feeling in¬ volved in this dispute that made it so difficult to settle. The French claims are based on the Treaties of Utrecht (1713), Paris and Ver¬ sailles, the main basis being the first of these agreements. It begins with declaring that the island of Newfoundland shall belong of right to Great Britain. Moreover, it shall not be law¬ ful for the subjects of France to fortify any place in Newfoundland or to erect any build¬ ings there, besides stakes made of boards and huts necessary and useful for the drying of fish, or to resort to the island beyond the time necessary for fishing and drying of fish. But it shall be allowed to the subjects of France to catch fish and to dry them on land, in that part only. The boundaries were first given between

Cape Bonavista and Point Riche on the west coast, afterward altered to the last limits be¬ tween Cape John and Cape Ray. By the Treaty of Paris (1763) Saint Pierre and Miquelon were given to France. By the Treaty of Ver¬ sailles (1783) the last boundaries were settled, and there was a secret declaration made by George III that the English were not to inter¬ rupt the French fishery by their competition. It was this last underhand clause, not made public in the Treaty, which has given rise to so much contention. The English government always claimed that it was a concurrent fishery. The French, and with right, argued that under this declaration their rights were exclusive — the French contention would have been unan¬ swerable if they had been able to occupy the whole coast line, but, as a matter of fact, their business was solely confined to about a dozen stations. They encouraged English fishermen to settle near their establishments to take care of their property during their absence. As the French business on the coast declined the native settlers increased until they numbered 17,000, compared with the 300 Frenchmen. Difficulties and disputes between the rivals were constantly arising, and but for the tact and good manage¬ ment of the naval officers of both countries would have become acute. The highest authority on English foreign politics, Sir Charles Dilke, and Admiral Revilliere of the French navy declared it was <(the most dangerous question between England and France.® Carrying on this transatlantic fishery in rivalry with oppo¬ nents who lived on the coast was utterly hope¬ less to the French. They were hampered with the burden of carrying on a business 2,000 miles from their base of supplies. Every season they had to bring out their men and gear from France, and in October to carry them all back again. No bounties could support such a hope¬ less undertaking. Up to the beginning of the last century the French carried on an immense business in Newfoundland as well as their Bank- fishery from Saint Pierre, but gradually the Shore fishery declined until of late years it has come down to a dozen old brigs and about 300 men from France. Although bounty was piled on bounty and millions of francs were spent by the home government in trying to keep the busi¬ ness alive, it went down

and down. For a time after 1890, when by a (

Tom' ClCˆ and since the agreement in

lAH, and the arbitration about values, not a solitary Frenchman has ever returned to the hrench shore.

DOG, a large, hand- • T/ °ˆS-haired, water-loving dog, originating in Newfoundland, probably from a cross be¬ tween the native Indian sledge-dog and im¬ ported Furopean dogs introduced by navigators early in the 17th century, and especially by the pointer. The breed showed extraordinarv retrieving powers and was sent to Europe in so arge numbers and at so high prices that it long ago became almost extinct in Newfoundland. It has, however, been maintained pure and has also increased in size by various breeding ken¬ nels both in Great Britain and the United otates. I he Newfoundland is massive in ap¬ pearance and may attain a height of 31 inches Jnn shoulders ; the average weight for dogs is 100 pounds and for bitches 85 pounds. The head is broad and massive with flat skull and somewhat square muzzle and the ears are small and lie close to the head. The fore legs are straight and the hind legs capable of powerful action and the tail is carried gaily but not curled over. The hair is straight and very thick and in color is black, black and white or bronze. For rescue work directed from the monastery of Saint Bernard in the Alps, the Newfoundland has superseded the famous Saint Bernard dog. For standard of points see Dog.

NEWGATE PRISON. At first marking the «New Gate® of the city of London as far jack as the beginning of the 12th century, New Gate® became Newgate prison in 1218, and throughout its career of 700 years' earned for itself a most unenviable reputation! It was rebuilt in the 15th century; the great °f 1666 partially destroyed it, and the last edifice wyas erected in 1780, but suffered greatly in the Gordon Riots of that year, when 300 prisoners, felons as well as debtors, were let loose on the public. (See Dickens' ˆBarnaby Rudge). As late as 1850 prisoners were kept in herds like cattle, with no cleaners to at¬ tend to them. Proper sanitation or even decent ventilation was unknown in Newgate even up to the date of its demolition, and no attempt at all was made to separate the sexes until the early part of the 19th century.*

Prisoners arrested by the king's warrant were the first inhabitants of Newgate. Then came Jew child-murderers and debtors. Thieves and other

criminals were in due course locked up there, where they mixed with debtors, and owing to slackness of administration it became a great school of crime. Up to 1818 prisoners cooked their own meals. New (

vol. 20 — 18

coffin at the chapel services. The building was gradually disused after 1877, and it was de¬ molished in 1904 to make room for the Middle¬ sex Sessions House. Consult Griffith's (Chron¬ icles of Newgate. (1884).*

NEWHALL, nu'hal, Charles Stedman,

American author : b. Boston, Mass., 4 Oct 1842 He was graduated at Amherst in 1869 and at Union Theological Seminary in 1872. He held the pastorate of various churches and for a time served as teacher and college professor. In 1897 he was appointed United States assist¬ ant special forest agent and a little later super¬ intendent of the United States Forest Reserves of central and northern California. He con¬ tinued in the United States Forestry Service until 1905. He has written (History of Fall RiveU (1862) ; (Ruthie's Story> (1888) ; Wines of Northeastern America (1897); Wire and*

th5 V- ?;o?ˆserves> (1902> i (J°e and the How-

*NEWHAVEN, England, town in Sussex, -*6 nul.es south of London and eight miles east of Brighton. It was the ancient port of the Ouse and is now the well-known place of em- barkation for Dieppe, between which place and Newhaven large and fast steamers ply daily in connection with the Chemin de fer de I'Ouest. The tidal harbor is enclosed by two piers and a breakwater, and Newhaven is one of the finest, roadsteads on the English coast. The area is about 30 acres. The port is protected by fortifications. The shipping was of great importance in the 18tfi century; then it de¬ clined, and of late years it revived again The harbor was first granted in 1713. Saint Michael s is a beautiful Norman church of the 12th century with a square Norman embattled tower and small semi-circular apse, curiously like that of Yainville-sur-Seine. At Bishop- stone, one mile distant, is an interesting church with a Saxon porch and dial. Newhaven has a large coasting trade of coal and provisions, and France sends here wine, spirits, silk, fruit and vegetables. Considerable ship-building is also carried on. In the Bridge Hotel, Louis Philippe a refugee from France, stayed in 1848 under the name of ((Mr. Smith.® Pop. 6,665.*

NEWLANDS, Francis Griffith, American senator and legislator: b. Natchez, Miss., 28 Aug. 1848; d. Washington, D. C., 24 Dec 1917 Ne studied at Yale, in the Columbian Law School (now George Washington University) in Washington, D. C., and was admitted to the bar in the District of Columbia in 1870. He practised law in San Francisco until 1886, when he became a trustee of the estate of his father- in-law, William Sharon, once United States senator from Nevada. In 1889 he removed to Nevada, settling in Reno. Here he became an ardent advocate of free silver coinage.

He also took a vital interest in irrigation develop¬ ment and other matters of western interest He was elected to the House of Representa¬ tives as a Democrat in 1893 and continued by re-election until 1903. when he became United States senator succeeding J. P. Jones. In 1909 and in 1914 he was re-elected. He framed the

Newlands Reclamation Act (1902) ; was mem¬ ber of the committees of ways and means, for¬ eign affairs, etc. ; was chairman on interstate commerce, prominent in rate legislation, inter¬ nal improvement measures, regulation of indus¬ trial combinations and tariff bills. Yale gave him the degree of M.A. in 1901. For years Senator Newlands' chief interest had been in America's railway transportation lines and in the development of national waterways, both for transportation and for greater fertility of land. He was regarded as the pre-eminent ex¬ pert on these matters. As author of Newlands Act, which provided a plan of land improve¬ ment in the arid West by development of water¬ ways, he gained celebrity. For a long time he pressed legislation for the expenditure of many millions of dollars for waterways and irrigation improvement. In his railroad legislative work Senator Newlands enjoyed the closest con¬ fidence of President Wilson and was regarded as the administrative spokesman on such mat¬ ters in the Senate. He was an earnest Demo¬ crat, but he regarded himself wholly as a pub¬ lic servant, and was one of the staunchest sup¬ porters of President Wilson in the Senate. On 24 Dec. 1917 he went to the Capitol to take up work in connection with an investigation by the Senate Interstate Commerce Committee, of which he was chairman, and was stricken in his office, dying shortly afterward.

NEWLANDS ACT. See Arbitration, International.

NEWMAN, Albert Henry, American Bap¬ tist clergyman and educator : b. Edgefield County, S. C., 25 Aug. 1852. He was graduated at Mercer University. Georgia, in 1871, and from the Rochester Theological Seminary in 1875. He became a college professor, and in 1881-1901 filled the chair of church history at McMaster University, Toronto, Ont., and 1901— 07 held a professorship at Baylor University, Waco, Tex. From 1907 to 1913 he was pro¬ fessor of church history and dean of the faculty of the Southwestern Baptist Theological Sem¬ inary. He was professorial lecturer in the University of Chicago, 1905-12. Since 1913 he has been professor of church history in Baylor University. He was a contributor to the third edition of the 'Hauck-Herzog Realencvklo- padie fur Protestantische Theologie und Kirche) and to 'Der Protestantismus am ende des 19

Jahrunderts, to Hastings dictionary of Christ and the Gospels* and dictionary of Re¬ ligion and Ethics,* etc. ‘ He has written ‘The Baptist Churches in the United States) (1894) ; (A Century of Baptist Achievement* (1901) ; (Manual of Church History * (1900-03). He also translated and edited Immers’ (Her¬ meneutics of the New Testament* (1877). He was department editor for church history of ‘The New Schaff-Herzog Encyclopedia of Re¬ ligious Knowledge, > etc.*

NEWMAN, Allan George, American sculptor: b. New York, 28 Aug. 1875. After receiving his education in the City College of New York and at the National Academy of Design in the same city, he devoted himself to sculpture. Among his numerous works are (Night and Day for the Harriman Bank, New York; ‘Henry Hudson Monument.* erected by Colonial Dames of America at 72d street and Riverside Drive, New York; ‘Joel Chandler*

*Harris Monument, * Atlanta, Ga. ; ‘Monument to the Women of the South,* Jacksonville, Fla.; ‘General Philip Sheridan Monument, * Scran¬ ton, Pa.; ‘General Oates, ex-Governor of Ala¬ bama,* Montgomery, Ala., and ‘General Stirling Priced Keytesville, Mo. He also made a bronze group, ‘The Triumph of Peace, * Atlanta, Ga., and ‘The Hiker, * a Spanish-American War soldier, Providence, R. I. Mr. Newman is a member of the National Sculpture Society, the Architectural League, the Union Internationale des Beaux Arts et des Lettres, and many other societies and clubs.*

NEWMAN, Francis, English colonial gov¬ ernor in America: b. England, about 1600; d. New Haven, Conn., 18 Nov. 1660. He emi¬ grated to New Hampshire in 1638, settled later in New Haven; was one of the committee which waited upon Peter’ Stuyvesant in 1653 to de¬ mand compensation for injuries received at the hands of the Dutch, and in 1654 became a com¬ missioner for the united colonies. In 1658 he became governor of the New Haven colony, which office he held until his death.

NEWMAN, Francis William, English

scholar: b. London, 27 June 1805; d. Weston- super-Mare, Somerset, 4 Oct. 1897. He was graduated at Worcester College, Oxford, in 1826; was Fellow of Balliol in 1826-30. Un¬ able to subscribe to the 39 articles he with¬ drew and went to Bagdad as a missionary; be¬ came professor of classical literature in Man¬ chester New College, York, in 1840; was pro¬ fessor of Latin at University College. London, 1846-69, and was made principal of University Hall, London, in 1848. A brother of Cardinal Newman (q.v.), the thought and faith of the two wholly diverged, the former accepting and the latter rejecting the entire historic basis of

Christianity while retaining deistic belief. Francis made important contributions to the re¬ ligious thought of his time. His 'Phases of Faith (1850), an autobiographical narrative of his religious changes, excited much contro¬ versy and was undoubtedlv his best-known writing; but 'The Soul: Its Sorrows and Aspi¬ rations* (1849), a singularly penetrating analy¬ sis of man's relations with God, shows him at his best. In 1876 he joined the British and Foreign Unitarian Association, of which he be¬ came vice-president in 1879. His further writ¬ ings show the remarkable versatility of this liberal-minded but crotchetty man, and treat of education, politics, religion and social questions. An interesting experiment was his 'Hiawatha Translated into Latin* , (1862). Consult his 'Memoir and Letters,* edited by Sieveking*

(1909).

NEWMAN, John Henry, English author, theologian, preacher and cardinal in the Roman Catholic Church : b. London, England, 21 Feb. 1801 ; d. Edgbaston Oratory, Birmingham, Eng¬ land, 11 Aug. 1890. Newman was the eldest of six children of John Newman, a London banker, from whose family Newman inherited the taste fPr music which distinguished him. The family was of Dutch origin and had come to England in the latter part of the 17th cen¬ tury. Newman's mother, Jemima Fourdrinier, was of French Huguenot origin. From her he received a religious training of Calvinistic tendency, and was early brought up with a thorough knowledge of the Bible, which it is

said he almost knew by heart. Newman, who w as a precocious boy and wrote much verse and prose, describes himself in the (Apologia as an imaginative and superstitious child. From the writers who most influenced him in his youth — particularly Law and Thomas Scott — he obtained two important beliefs that clung to hll!i life, the idea of eternal punishment*

and a belief in the necessity of dogma. When

3 -nUt r b,ecame convinced that it was the W1 xt God that he lead a single life • entered Trinity College, Oxford,

in his loth year, took his degree in 1820, and was elected a Fellow of Oriel in 1822. Here he came under several distinct influences, which ad a §Tod deal ˚f effect on his career. From Bishop Butlers (Analogy, > which he read about this time, he gleaned the principles, which ever alter characterized his work and on which he wrote much, that revealed religion

as mani- estecl in outward institutions is the symbol of the natural religion underlying — an idea that was in accord with his boyish dreams — and that "probability is the guide of life.® The strong personal influences were Dr. Hawkins, Provost of Oriel, to whose teachings Newman sa-,s u ow^d the ha'bit of caution in statement and the weighing of words, and, among other ctnnes, that of the value of tradition; Dr. Whately who for a time somewhat arrested Newmans spiritual growth and developed his reasoning power; and his intimate friends, John Keble and Hurrell Froude, spiritual enthusiasts and haters of liberalism. His studies for

Throughout this period Newman was grad¬ ually becoming alive to the conviction that he had a special mission to perform, and further stimulus was added by the French Revolution of 1830 and the struggle in England which cul¬ minated in the Reform Bill of 1832. These tendencies toward liberalism he viewed with growing distrust. Not, however, till the close of his voyage with Froude to the south of Europe in the winter and spring of 1832-33 (during which he wrote many poems, including "Lead Kindly Light) did the conviction be¬*

come urgent. Taken so very ill in Sicily on his return voyage that his servant despaired of his life, he was nevertheless convinced that he should not die; he kept saying to himself "We have work to do in England.® Hurrying thither as soon as his health permitted, he and his friends at once began the Oxford Movement (q.v.).

*The object of this movement was in general the upholding of the ideal of primitive Chris¬ tianity against the assaults of liberalism. It was pursued with great earnestness by New¬ man and his friends, Froude, Keble, Pusey, Rose and others, and the means were the (Tracts for the Times, * of which Newman was chief editor and author. He speaks of himself as occupying a modest position, but he was in reality the head of the movement. He himself held confidently to three principles which he endeavored to inculcate: the necessity of dogma in combatting liberalism; the existence of a visible church, "with sacraments and rites which are the channels of invisible grace®; and the belief that the Roman Catholic Church and the Pope were evil and anti-Christian. The first two of these .beliefs he retained till the end of his life; it was in regard to the last that his views were completely altered and upon that belief his subsequent history turned. For New¬ man the Tractarian movement had two phases: up to 1839 he wrote in the spirit of full con¬ viction and confidence;, from then till the pub¬ lication of the famous Tract 90 in 1841 there was a growing consciousness of the unsound¬ ness of the arguments that he had been using against Catholicism. The chief task in the first period was the definition of the so-called « Via Media ® in which the Tractarians endeavored to establish the true position of the church be¬ tween Romanism and Liberalism — to con¬*

struct, in Newman's words, "a possible road between a mountain and a morass, to be driven through formidable obstacles, if it is to exist, by the. boldness and skill of the engineers.® The principal book in which the doctrine is ex¬ pounded is (The Prophetical Office of the Church Viewed Relatively to Romanism and to Popular Protestantism (1837). By 1839 the soundness of his position seemed to he estab¬ lished ; but his studies had, unconsciously to himself, laid the train for the overthrow of what he had been advocating, and these doubts took shape during the next two years. The argument from Antiquity with which he had supported the Via Media turned out to be an equally good argument for the Catholic Church. He also made the discovery that in church his¬ tory there had been via medias before; the various early sects of heretics had in his' new view occupied much the same position as the Anglican Church. He was impressed by the fact that the early fathers whom he invoked in support of his effort at true compromise would inevitably, if alive, have sided with Rome, and his imagination — always a strong influence in his reasoning — was haunted by the words "Securus judicat orbis terrarum » which seemed to make nugatory all schism. The re¬ sult was that he grew far less hostile to the Catholic Church, and with Tract 90 the move¬ ment against it came to an end. The main point of that tract was that the Thirty-nine Articles of the Anglican Church had originally been framed for political rather than religious*

purposes : they were designed to allow good Catholics to become members of the Anglican Church with mere loss of their allegiance to the Pope. If that was the case, then the An¬ glican had no better doctrinal support than the Roman Church.

From that time Newman regarded himself as practically dead to Anglicanism. In the storm of indignation which the tract evoked he did not, however, immediately retreat. Pre¬ ferring to think the matter over carefully, he kept his living at Saint Mary's till 1843, and in that same year retracted the many hard things he had said about Rome. Two years later, in October, he entered the Roman Catholic Church, and early in 1846 left Oxford for good. After over a year in Rome (1846-47), he founded the Oratory of Saint Philip Neri, at Edgbaston, Birmingham, where, with the exception of four years (1854-58) spent in Dublin as rector of a new Catholic University, he remained until l is death.

Though condemned as an apostate by com¬ mon Anglican consent, and though living a very secluded life, Newman almost at once benefited by the

change. Not only did he feel the peace of security, but his literary genius is said to have ripened wonderfully. Heretofore he had written somewhat tentatively, as one groping; now he expressed himself with sure¬ ness and an unwonted command of expression. His writings during the first 18 years after his conversion, nearly all in support of Catholicism, include such various types as his discourses Addressed to Mixed Congregations (1849) ; (Lectures on Anglican Difficulties) (1850), and (Lectures on Catholicism in England) (1851) ; various of the essays collected in historical Studies*; two novels, doss and Gain* (1848) and*

In 1864 occurred the controversy with Kings¬ ley, which marks an epoch in Newman's life and in the position of the Catholics in England. Kingsley had said that the Roman clergy had little regard for truth, and had cited Newman as an advocate of cunning. Newman naturally asked for his evidence. Kingsley, in Macmil¬ lan's Magazine, where his first article had ap¬ peared, replied that he had mistaken Newman's tone, and apologized. Newman, reasonably dis¬ satisfied with Kingsley's failure to produce the specific evidence, published the whole corre¬ spondence. Kingsley thereupon replied in a vigorous pamphlet entitled ((What, then, Does Dr. Newman Mean?® in which he charged Newman with equivocation and cited all the instances he could find in Newman's life and works to prove his ppint. The merits of the controversy are as yet unsettled, though now of only historical interest; views would probably still range from extreme support of Newman to such words as those of Huxley, <(That man is the slipperiest sophist I have ever met with. Kingsley was entirely right about him.® (bet¬ ters, > II, p. 240.) The effect of the controversy was the publication by Newman of the apo¬ logia pro Vita Sua. This, which appeared serially between 21 April and 2 June, gave the key to Newman's life as an internal state*

The effect of the (Apologia was to temper in a great measure the feeling between the Catholics and the Anglicans, and it gave New¬ man the honorable position of peacemaker. From that time on he occupied a high place in England and received many dignities. In 1877 he was elected honorary fellow of Trinity College, Oxford, and two years later was cre¬ ated cardinal by Pope Leo XIII. Two works are to be especially noted, (An Essay in Aid of a Grammar of Assent* (1870), in which Newman attempted to expound systematically the logic of belief aside from exact proof, and (The Dream of Gerontius,* written shortly after the (Apologia,* in which he delineated in poetical form the yearning of a soul toward certitude and truth.*

These three books indicate where the place and power of Newman lie. His position is probably to be determined not by his intel¬ lectual contributions but by his personality which is of a high, noble and persuasive type, and

which is expressed in a style of unsur¬ passed skill and delicacy. As a contributor of ideas and new truth, he is not so important. As a theologian, his life-long beliefs and teach¬ ing — that the world is controlled by the pov^ers of darkness, that God is the only holy thing, that the Church is the only true revealer of God — in no wise differ from good Catholic opinion. The great argument on which he ultimately based all his claims, that of proba¬ bility, that we act not from certainty but from states of certitude, that personality which can induce states of certitude is a better guide than strict reason — the basis of this he got from Bishop Butler, nor did he take, into considera¬ tion the fact that his argument would allow anybody to believe anything at all, provided he could summon enough certitude lh support of it. Doubtless the mass do use just such sanc¬ tions, and Newman has certainly, both in life and in work, put the argument as well as it has ever been put, but the method is wholly opposed to scientific proof, and it is easy therein to see the reason for the view of such men as Huxley. The truth of the matter probably is that Newman, with all his training in logic, really had little regard for strict evidence; his course during the Oxford movement shows that he argued from predispositions and predi¬ lections, and his conversion was in part at least the result of evidence supplied solely by his imagination. But as a gracious and winning personality his place is of the highest, as is his power of expression. See Apologia pro Vita Sua; Dream of Gerontius ; Idea of a Univer¬ sity.

Bibliography. — The chief sources of in¬ formation are, among Newman's many works, the (Apologia, and (The Letters and Corre¬ spondence of J. H. Newman,* edited by his sister, Mrs. Anne Mozley. The best is that by Wilfred Ward (1912), and it is based on his private journals and correspondence. Lives and 'studies are those of H. T. Jennings ((Cardinal Newman, The Story of His Life*) ; R. H. Hutton ((Cardinal Newman*) ; William Barry (in (Literary Lives*). Materials for a complete study are scattered in various books as Church's (The Oxford Movement,* Mark Pattison's (Memoirs,* Abbott's (Philomythus* and (The Anglican Career of John Henry*

New man, > and a score of others (consult a long list m the Dictionary of National Biog-

(TL vr !he m,OI£ recent works- Bremond's : Mystery of Newman > ; Sarolea's Cardi¬ nal Newman and his Influence on Religious (tr 6 ra, Thought, > and Thoreau-Dangin's

English Catholic Revival,) may be recom¬ mended. The (Index) to Newman's works, by Joseph Rickaby (1914), is valuable not only

ajn Vn??x'. f°r the illustrations it affords of his intellectual and spiritual develop¬ ment. I here is an excellent short study of the conversion and the theology of Newman

by M. . Lovett (Harvard Monthly, Dec. 1892 Jan. 1893).

D , William T. Brewster,

i rofcssor of English, Columbia University.

NEWMAN, John Philip, American Metho¬ dist bishop: b. New York, 1 Sept. 1826; d. Saratoga, N. Y., 5 July 1899. He studied for the ministry and in 1849 was ordained. After nlling various charges he preached in New Or- eans m 1864-69; held three times (1869-72, 1876-/8 1 885—87) the pastorate of the Metro¬ politan Methodist Church in Washington, D. C., and was chaplain of the Senate for three ses¬ sions. He was appointed by President Grant inspector of United States consulates in Asia in 1873, in 1879 was called to the Central Church, New York, and from 1882-84 was pas¬ tor of Madison Avenue Congregational Church. In 1888 he was elected bishop. He delivered the funeral oration on General Grant. His elo¬ quence was of a highly ornate kind. He wrote (From Dan to Beersheba) (1864); (The Thrones and Palaces of Babylon and Nineveh from the Persian Gulf to the Mediterranean (1876) ; (Christianity Triumphant (1884) ;

(Evenings with the Prophets on the Lost Em¬ pires) (1887) ; (The Supremacy of the Law) (1890) ; (Conversations with Christ (1901).

NEW MARKET, Canada, town in York County, Ontario, 34 miles north of Toronto on the Holland River, the Grand Trunk Railroad and the Trent Canal extension. It is connected to Toronto by an electric railroad. Places of interest are the Park, the Fairy Lake and 'David's Temple) in the suburb of Sharon. The Friends' College is situated here. Newmarket is an enterprising manufacturing town and pro¬ duces flour, lumber, office fittings, leather, cloth¬ ing and wooden-ware. Pop. 2,996.

NEW MARKET, England, a market town in Cambridgeshire, 14 miles northeast of Cam¬ bridge on the Bury branch of the Great Eastern Railway. A part of the town is in Suffolk. Newmarket, called the "Metropolis of the Turf," has been celebrated for its horse-races from the time of James I when there was hawk¬ ing also. Charles I instituted the first cup race, and a fine palace was built on the site of the lodge of James I for the use of Charles II when he came to the races. The market-house

and the celebrated Jockey Club are the chief build¬ ings. The town is full of residences belonging to patrons of the turf and racing and training stables. The racecourse lies southwest of the town over Newmarket Heath. It has a full ex¬ tent of four miles, but is divided into various lengths to suit the different races. The course is intersected by the great earthwork called the Devil's Ditch (also Saint Edmund's Dyke). It is five miles long — the largest of the four im¬

portant dykes or entrenchments which marked, at different periods, the boundary lines between the kingdoms of East Anglia and Mercia. Eight race-meetings are held every year, the best known of which are the "Thousand Guineas" (April) and the "Cesarewitch" (Octo¬ ber). On the outskirts of the town, toward Bury, is the Fairstead, or exercising ground, where the trial gallops of young horses take place daily. Near this is the well-known War¬ ren Hill. In the neighborhood of Newmarket, Roman ruins have been found. Of its two churches, Saint Mary's, perpendicular style, is the most interesting. It is in Suffolk. Pop. about 10,482. Consult Hore, J. P., (History of Newmarket and Annals of the TurP (2 vols., London 1886).

NEWNAN, nu'nan, Ga., city, county-seat of Coweta County, on the Central of Georgia and the Atlanta and West Point railroads, about 38 miles south by west of Atlanta. It is in a productive agricultural region in which cotton and fruits are extensively cultivated. The principal industrial establishments are cot¬ ton mills, grain elevators, cottonseed-oil mills, machine shops, flour mill, tannery, fertilizer works, a large plant for manufacturing boilers, engines, presses and mill machinery, fertilizer works and an ice factory. There is a fine court¬ house and a Carnegie library. The city owns the waterworks and electric plants. Pop. 7,037.

NEWNES, nunz, Sir George, English jour¬ nalist: b. Matlock, 13 March 1851; d. Lynton Devonshire, 9 June 1910. He was educated in London and entered journalism. He was the founder of Tit-Bits, a very successful weekly, the nature of which is indicated by its title ; and he also founded the Strand Magazine and was proprietor of the Westminster Gazette. He was member of Parliament (Liberal) for the New¬ market division of Cambridgeshire, 1885-95, m as created a baronet in 1895 and returned to Parliament from Swansea 1900-10. He applied much of his wealth to public purposes.

NEWNHAM (nun'am) COLLEGE, Eng¬ land, an institution for the higher education of women at Cambridge, founded in 1871 and in¬ corporated in 1880. Ordinarily no students are admitted under 18 years of age; the course of study corresponds with that of Cambridge Uni¬ versity. There are a number of exhibitions and scholarships connected with the college, which

is conducted on the same lines as Girton (q.v.). The faculty numbers about 26 and there is an average attendance of over 200 students.

NEWPORE, Fort, a former Revolutionary fortification on Ward Creek, near Oneida Lake,

NEWPORT, nu'port, Christopher, English sea captain: b. about 1565; d. 1618. In 1592 he commanded a ship in the West Indian expedi¬ tion ; sailed to Virginia in 1606, 1607, 1609 and 1611, was wrecked on the Bermudas in the third of those voyages, but made his way to Vir¬ ginia after many adventures recounted by Jour- dain in the (Discovery of the Bermudas, > which Shakespeare may have used in writing the 'Tempest. > In 1612 he entered the employ of the East India Company, for whom he made several very successful voyages.

NEWPORT, George, English naturalist: b. Canterbury, 4 July 1803; d. London, 7 April

1854. He was educated at the London Univer¬ sity and became a surgeon, but devoted much time to entomology, in which science he made valuable discoveries. He wrote Observations on the Anatomy, Habits, and Economy of Athalia Centifolise (1838) ; (Catalogue of the Myriapoda in the British Museum } (1856), etc.*

NEWPORT, Ark., city and county-seat of Jackson County, 85 miles northeast of Little Rock, on the Chicago, Rock Island and Pacific, the Saint Louis, Iron Mountain and Southern, and on the White River railroads. It is situ¬ ated in a cotton-growing district and its indus¬ tries are connected mostly with this crop, con¬ sisting of cotton and oil mills, lumber mills, iron foundry and stave and handle works. Pop.

(1920) 3,771.

NEWPORT, England, a town of Mon¬ mouthshire, on the Usk, 134 miles by rail west of London. It is one of the great trading ports communicating with the Bristol Channel. As one of the principal outlets for the produce of extensive collieries and iron and steel works in the vicinity, it has extensive dock accommoda¬ tion covering over 126 acres, railway and ship-building plant, and a transporter bridge across the river. Its public buildings are all of modern erection and 'include town hall, market hall, county offices, public baths, museum, art gallery and technical institute. Its most an¬ cient buildings are the remains of a 12th cen¬ tury castle and the church of

Saint Woollos, a large edifice partly of Norman date. Pop.

83,691.

NEWPORT, Ky., city in Campbell County, at the confluence of the Ohio and Licking riv¬ ers and on the Louisville and Nashville and the. Chesapeake and Ohio railroads. Cincin¬ nati, on the Ohio, and Covington, on the Lick¬ ing, are opposite Newport. The city was settled in 1791, in 1795 was incorporated and in 1850 was granted a city charter. It is a popular resi¬ dential city for Cincinnati business men. It is in an agricultural region and farm products are among its most important shipments. The chief manufacturing establishments are sheet-iron works, carriage works, watch-case factory, steel plant, fly-screen works, lithographing plant and aircrome decorating works. It has large coal and brick yards and considerable river trade. Fort Thomas, a government military post, is on an elevation near the city. Some of the prominent buildings are the city hall court¬ house, post office, the banks, a Masonic temple, the churches and schools and the library. It is the seat of Mount Saint Martin's and Immacu¬ late academies and it has good public and parish schools and . a public library. The city now has commission government. It was formerly under the charter of 1894, which provided for a mayor who held office for four years and a council. The mayor appointed the police and firemen and the members of the water commis¬ sion, and, subject to the approval of the aider- men, the superintendent of public works and the city auditor. The council elected the bridge commissioners. The board of education is elected by the people and the members hold office two years. The waterworks is owned and operated by the municipality. Pop. 29,317.

NEWPORT, N. H., town, county-seat of Sullivan County, on the Sugar River and on the Boston and Maine Railroad, about 35 miles

in direct line northwest of Concord and 45 miles northwest of Manchester. Its scenery and cli¬ mate make it a favorite summer resort. It is in an agricultural and grazing region and the good water power contributes to its industrial prosperity. Its chief manufactures are woolen goods, agricultural implements, shoes, lumber and lumber products, clothing and dairy prod¬ ucts. The Richards Library and Museum, the Carrie F. Wright Memorial Hospital and a high-class modern hotel are notable buildings. It is within six miles of Lake Sunapee, one of the most beautiful lakes in the world, and within three miles of the famous Corbin's Blue Mountains Forest Park. <(Good roads® is one of the town's slogans and its streets and side¬ walks are among the best for a town of its size in the State. The city owns and operates the waterworks. Pop. 4,400. Consult Wheeler, (The History of Newport, N. H. (Concord*

1879).

\

NEWPORT, R. I., city, port of entry, county-seat of Newport County, in Rhode Island, on Narragansett Bay, and on the New York, New Haven and Hartford Railroad, about 30 miles south of Providence. It has daily steamer communications with Providence, New York, Fall River and other ports. It is a famous summer resort and in the season its facilities for transportation are much increased. Its beautiful scenery, equable climate, ease of access by land and water from New York, Bos¬ ton and other large cities, make it a favorite watering place. Its occupancy by people of great wealth, who have built summer residences costing millions of dollars, has made it fashion¬ able and exclusive. In 1639 Newport was settled by Roger Williams and later Anne Hutchinson and other refugees, who for reli¬ gious convictions had been expelled from Mas¬ sachusetts by the Puritans, came to Newport. At first Newport was independent in govern¬ ment, but in 1644 Roger Williams obtained a patent from the British Parliament under which all the colonies in what is now the State of Rhode Island were united under the name of "The Incorporation of Providence Plantations in the Narragansett Bay in New England.® The charter gave much dissatisfaction and in 1663 was changed to a charter that continued in force until 1843. (See Dorr's Rebellion). A public school was established in Newport in 1840. From the beginning the place was a trading port of importance ; its commerce was greater than that of New York in 1769-70. One of the first acts of resistance against Great Britain took place at Newport when the British sloop Liberty was destroyed here, while engaged in enforcing obnoxious smuggling laws. The British took possession of Newport 6 Dec. 1776 and held it for two years. The shipping of the place and the general trade were nearly destroyed during the Revolution. The British soldiers burned in all about 475 houses. In 1780 Rochambeau and his troops from France made Newport their headquarters. In 1784, the year after the Revolutionary War had closed, Newport was incorporated; but in 1786 it surrendered its charter and was not reincor¬ porated for 77 years.

It is claimed by some historians that New¬ port and other parts of the United States were discovered by Northmen as early as the 11th

century. The «01d Stone Mill® in Touro Park is pointed out as a relic of the days of the iNlorthmen ; hut it is now generally believed that this mill

was built in the 17th century. New-

*?oon w?>s- ?ne of the caPitals of the State until * Pishop Berkeley lived in Newport from "29 to 1/32 and here wrote his ode on Western progress and part of his (Alciphron.> William Ellery Chanmng and Commodore M. C. Perry v\ ere born in Newport. Some of the historic places are the State House built in 1742; the aty hall built in 1763; Redwood Library, 1748* Trinity Church (P. E.), 1725; the headquarters ot the British army (Sayer House), in 1780. One of the oldest newspapers in the United States still in existence is the Newport Mercury C?ja^^s^ec^ James Franklin in 1758. The oldest part of the city is around the harbor; the modern part, with its magnificent mansions, surrounded by well-kept lawns, is toward the ocean. Overlooking and guarding the harbor are Fort Greble and Fort Adam. Some of the attractions other than those mentioned are the long beaches, the bathing places, the <(Hanging Rocks, ® the 12-mile Ocean Drive, Purgatorv (a rocky fissure 50 feet in depth), the Cliff Walk and the Spouting Rock (when the water is disturbed by a storm it is forced through an opening in this rock). It has a United States torpedo station on Goat Island and a United States Naval Training Station and War Col¬ lege on Coaster Harbor, also a naval hospital (1897). The city has many parks, fountains and monuments which are works of art. It is the seat of Saint George's and Cloyne House schools and Saint Mary's Academy. A valuable collection of relics are in the Newport Historical Society building; there are several libraries, the People's, Redwood and others.*

It still has a large fish trade, but the city is now known for its society life and its indus¬ tries and commerce are of little value. Pop. 30,472. Consult Arnold, S. G., (History of the State of Rhode Island) (2 vols., New York 1860); (Rhode Island Colonial Records > ; Brooks, (The Controversy Touching the Stone MilP; Greene, (The Providence Plantation } ;

(Newport in the Revolution,) an article in the New England Magazine ; Mason, G. W., Rem¬ iniscences of Newport (Newport 1884) ; Stone, E. M.,*

1884).

NEWPORT, Vt., village, county-seat of Orleans County, on Lake Memphremagog, and on the Boston and Maine and the Canadian Pacific railroads, about 50 miles in direct line north by east of Montpelier. In the summer season it has regular steamer communication with all the villages and towns on the lake. It is a favorite summer resort on account of its climate, the scenery in the vicinity and the op¬ portunities for fishing. Its trade is "Nefly in farm products; its manufactures are lumber veneer of all kinds, large overall factory and creamery. It has fine church and school

buildings and the Goodrich Memorial Library which contains 9,000 volumes. Pop. 4,976.

NEWPORT NEWS, Va., city and port of entry in Warwick County, on the James River and Hampton Roads, and at the terminus of the Chesapeake and Ohio Railroad, situated 70 miles southeast of Richmond and 14 miles north of Norfolk. The city lies in the centre of a

rich vegetable and fruit country. It is con¬ nected with Hampton and Old Point Comfort by electric railways. In the heart of the city facing the James River is Casino Park, which has become a popular resort. With several foreign and coast lines of steamships sailing hence, and with a fine harbor and excellent shipping facilities, Newport News has very re¬ cently become an important port and the centre of large commercial interests. The foreign trade in 1916 amounted to about $79,000,000; the exports amounting to about 90 per cent of the above. The foreign commerce of the port is largely carried on by the Chesapeake and Ohio Railroad and the United States Shipping Company, making direct connection with Eng¬ land and the Continent. The city has become fourth in the United States in the shipment of grain. Here is an extensive shipbuilding plant, one of the largest in the world, giving employ¬ ment to over 10,000 workmen ; three dry-docks, 600, 700 and 900 feet long; two grain elevators with _ a capacity of' 2,850,000 bushels ; wood¬ working mills, ice factories, lumber mills, iron works, shoe factory, coal wharves, shirt fac¬ tory and brewery. Newport News is governed, under its original charter of 1896, by a mayor, elected every four years, common council, con¬ sisting of 16 members, and a board of eight aldermen. The city has an improved system of waterworks and electric light and gas plants. Newport News is a young town practically lacking in history. It was first laid out in 1882 and incorporated in 1896. Its growth has been very rapid; the population in 1890 was 4,449; in 1917 it was 23,674; in 1920 it was 35,596.

NEWRY, nu'ri, Ireland, seaport and parlia¬ mentary borough in County Down and Armagh, on the Newry River, 38 miles southwest of Bel¬ fast and 73 miles north of Dublin by the Great Northern Railway. It is also on the Newry Canal at the head of Carlingford Lough and is connected also by canal with Lough Neagh. The place dates from 1131. In 1175 an abbey was founded here by Maurice McLoughlin, king of Ireland, and in 1543 this abbey was con¬ verted into a collegiate church for secular priests. It was dissolved by Edward VI, who granted it to Sir Nicholas Bagenal, marshal of Ireland. Bagenal made it his residence and laid the foundations of the town's prosperity. The castle, erected by De Courcey, was taken by Edward Bruce in 1318. In 1689 Newry was set on fire by the Duke of Berwick retreating before Schomberg. James I and James II granted charters to the town. Newry is hand¬ somely built and the situation is

striking as it lies in a narrow valley surrounded by moun¬ tains. The western part, called Ballybot, is connected with the older town by four bridges over the canal and four over the tidal water. Newry is one of the most important ports of the province of Ulster. It admits vessels of 2,000 tons to Victoria Docks, three miles from town. Vessels drawing 15 feet can ascend the canal to the Albert Basin. In connection with several sub-ports further down the Newry River it is the outlet for a large trade, par¬ ticularly with Liverpool and Glasgow, in cattle and agricultural produce. Flax-spinning, weav¬ ing, tanning and granite polishing are the chief industries. The town possesses rope and sail- works, breweries, distilleries, tanneries and

flour-mills. Fine granite is quarrjed in the neighborhood. Pop. 12,587.

NEWS-LETTER, a popular name applied

to the printed sheets or letters issued weekly in the early part of the 17th century, the news for which was collected in the coffee-houses. Orig¬ inally they were literally letters of news written by professional newswriters and sent by them to their employers weekly. Many early printed newspapers took News-Letter as a title, as the Boston Newsletter , etc.

NEWSPAPER, a publication devoted pri¬ marily to daily sheets publishing the news as to current events. The term is also construed to cover semi-weekly and some weekly papers of the same class. Along with the news, news¬ papers customarily print comment, criticism or discussion of such events by editors and con¬ tributors. As such, the newspaper has become one of the most powerful factors in modern existence. Not only does it serve as a dis¬ tributor of every form of knowledge, but it also guides the opinion of great masses of people, and more important still, it becomes the voice of the people; so that the demands of a news¬ paper with a large clientele are listened to at¬ tentively by all public officials from the highest to the lowest.

As a rule, newspapers are conducted for the money to be obtained by their publication. In a few cases they are operated by their owners as organs of their individual expression, or in the special interest of some political move¬ ment.

The cost of making a newspaper is prodi¬ gious. There are heavy charges for cable and telegraph news; a large staff of local newsgath- erers must be maintained; special correspond¬ ents at points of great activity must be

pro¬ vided; the office forces must necessarily be of high-grade minds — not to mention the intricate and expensive machinery required to actually produce the printed sheet in the briefest pos¬ sible period. The great weakness of the news¬ paper is its dependence upon its advertising patronage for its livelihood, the price at which it is sold to readers being scarcely more than the cost of distribution. Ufider these conditions it is not likely that the newspaper will print material which would tend to injure the busi¬ ness of the advertisers which support it, so that to some degree at least the advertising may be said to control the policy of the paper.

The larger daily morning papers usually publish two editions; the first for suburban distribution, the _ second for city circulation. The larger evening dailies print several edi¬ tions, the first about noon, or even before, and three or four later editions, the last leaving the press about six o'clock. Later news of great importance or interest is handled in an "Extra.® The principal dailies issue a Sunday edition made up of six or eight classified sec¬ tions — News, Editorial, Dramatic, Sports, Household, Special Articles, etc.

Much of the general news, foreign and domestic, is gathered and transmitted to the individual papers by press associations. This service is distributed to a large number of subscribing members of the association, and the cost of gathering it is thus minimized. In addition to this association service, most of the larger papers have their own correspondents

at centres of important news and receive daily a very considerable special service by telegraph.

Making the Newspaper. — In the making of a newspaper the fundamental work is literary. The control of the character of the material prepared is vested in the editor-in-chief, who is in some cases also the principal owner. Upon him is laid the responsibility for the heads of the departments who are immediately in charge of the production of the literary material of the paper. The editorial writers are directly under the editor-in-chief and do their work in accordance with his suggestions or instructions. The managing editor is an executive. He directs the make-up of the paper, deciding what shall go in and the space it shall occupy. He calls upon the several editors for the material he may need to fill out the vacant spaces. In the actual construction of the paper, he or his assistant is on duty until the last page form is complete. In some instances the managing editor and the editor-in-chief are one. The city editor is in charge of the collecting of local news through his staff of reporters, who may number from 10 to 50. He assigns cer¬ tain reporters to particular tasks, so as to "cover® all events likely to be of public interest In the case of a morning paper the city editor is usually

succeeded by a "night editor® who remains on duty until the forms are on the press. In the larger newspaper offices there is also a news editor, who receives and edits the telegraph and cable news. There mav also be a political editor, whose province it is to write editorials in the interest of the political party with which the paper is affiliated; and a finan¬ cial editor who records and comments upon the fluctuations in market values of stocks, -bonds, etc. There must be also a sport editor, a dramatic editor and a musical editor, whose duties are sufficiently indicated by their titles, the two latter holding as well the positions of critics. The literary editor has charge of the strictly literary articles, book reviews, etc.

All the copy passes from the various edi¬ tors to the "desk® where it is read by respon¬ sible assistants to the editor-in-chief, corrected as to character of statement, form and, if need be, spelling, punctuation, etc. From the desk it goes to the composing-room and is then under the direction of the superintendent or foreman. He is essentially a mechanician, whose duty it is to construct in type the lit¬ erary material furnished him. In the city of¬ fices and in many of the larger country offices typesetting machines are in use, though a great deal of type is still set by hand. The type¬ founders report a continually increasing demand for their product despite the spread of the typesetting machines. The type as set, by what¬ ever means, is assembled into page forms by the foreman under the direction of the manag¬ ing editor. When the page is satisfactorily filled, the printing may be done directly from the type for a small issue. In the offices of the large papers the page forms are stereo¬ typed and the printing done from the plate thus made. The pages are assembled for one side of the sheet on which the paper is printed in one part of the press and for the other side in another part, the web of paper passing first one set of page forms and then the other. When printed on both sides it passes to the folding machinery which folds and cuts apart

the individual papers and counts them at the delivery shelf. They are then delivered to the cn dilation manager whose business is to sell as many of them as possible. He has his torce of delivery automobiles which hasten out on their various routes, leaving the bundles with news dealers or distributors.

The business department of the paper at¬ tends to the financial part of the combination, and with this department is associated the ad¬ vertising editor, whose copy also goes independ¬ ently to the composing-room, or to a separate ° coming back in the form of type s}11Pˆr'nˆendept and the

managing editor. v\ ith all its seeming complexity the various operations are carried on at top speed with perfect accord and with rarely a serious hitch.

Various commercial enterprises have arisen m connection with newspaper making. Some of these are known as "syndicates who buy literary material from authors and sell it to newspapers in that form ; or they may stereo¬ type it and sell the "plate-matter,* as it is called, ready for placing it on the press. Other syndicates or co-operative bureaus make up and sell newspaper sheets printed with items of general interest on one side. These are known as "patent insides* and are used very largely by country papers, which by their use have their typesetting reduced to half. The "patent insides* generally carry sufficient ad¬ vertising to cover their cost and therefore are sold at little more than the cost of the paper they are printed on.*

The total number of newspapers and per¬ iodicals published in the world at present is estimated at about 60,000, distributed as fol¬ lows: United States and Canada, 26,360, of which about 2,600 are dailies and 650 semi¬ weeklies; Germany, 8,000; Great Britain, 8,000; France, 4,300; Japan, 2,000; Italy, 1,500; Aus¬ tria-Hungary, 1,200; Asia (exclusive of Japan), 1,000; Spain, 850; Russia, 800; Australia, 1,000; Greece, 600; Switzerland, 450; Holland, 300; Belgium, 300; all others, 1,000. Of these more than half are printed in the English language. These figures were correct before the war. Since that outbreak many publications have ceased, but it may be presumed that they will generally resume upon the return of normal conditions. A detailed history of the news¬ paper in America will be found under News¬ papers, American.

Early Roman Bulletins. — The newspaper had -its origin several centuries before the Christian era. The Romans published the Acta Diurna, the Acta Publica, the Acta Senatus and other journals. The Acta Diurna was a bulletin in which accounts were given of the progress of the imperial arms. The intelligence was communicated by the generals who re¬ ceived it from the officers under their com¬ mand, and thus the contents became known throughout the army. The Acta Diurna, how¬ ever, recorded other than military matters, such as trials, punishments, deaths and sacrifices. The Acta Senatus contained accounts of the various matters brought before the Senate, the opinions of the chief speakers and the decisions of the house, published regularly by command of Julius Caesar, as part of the gov¬ ernment gazette. The Acta Publica was a still nearer approach to the true newspaper form. During the later times of the republic, and

under the empire, it was published daily at Rome by the authority of the government. It contained a register of the births and deaths in the city; an

account of the money paid into the treasury, from the provinces and everything relating to the supply of corn, and a kind of court circular, containing an account of the births, deaths, festivals and movements of the imperial family. Such details of public affairs as it was deemed expedient to publish were also included in it. The speeches in the Senate and the public assemblies were taken down by the early Roman short-hand writers called actuarii. These, assisted by clerks and notaries, drew up the Acta under the superintendence of censors, # quaestors and other magistra es. The publication consisted in posting them in some public place, that any one who pleased might read them.

First Printed Journals. — "Ti Chau, better known as The Peking Gazette, was probably the first printed newspaper, and is the oldest daily journal in the world. It was first issued about 1340 a.d. The Gazette is still in exist¬ ence, and is an official journal, forming a pamphlet of 20 to 40 pages of coarse paper, printed from wooden types on one side only, and having a colored paper cover; Toward the close of the 15th century, soon after the inven¬ tion of printing, small sheets, usually in the epistolary form, appeared in Augsburg, Vienna, Ratisbon and Nuremberg. They were called Relationen and the N ewe Z eytung , and gave ac¬ counts of the discovery of America and of other important public events, and like modern newspapers they chronicled the more interesting and startling local incidents. The Notizie Scritte, published monthly in Venice, in 1562, is said to have been the first Italian newspaper. Its price was a small coin called gazetta; hence the word gazette which came to be the popular name for the modern newspaper. The war which Venice waged in Dalmatia gave rise in 1563 to the custom in Venice of having military and commercial information read at a particu¬ lar place by those desirous to learn the news, who paid for this privilege. A file of these Venetian papers, covering a period of 60 years, is still preserved in the Magliabecchi Library at Florence.*

English Newspapers — A printed bulletin entitled Relations was published in England as early as 1462, and in 1527 there was one called New Tidings, but neither of these presented more than a single piece of intelligence. A pamphlet called The A7 ewes from S Paine made its appearance in the reign of Queen Elizabeth in order to convey to the people the tidings of the approaching armada from Spain, and the various counter-movements on the part of the British army and fleet. The first newspaper printed in English was published in Amster¬ dam, 2 Dec. 1620. It was a folio sheet printed both sides; and was issued by the Dutch book¬ seller Petrus Keerius, and 'his printer, Joris Veseler. A more pretentious journal was is¬ sued in 1622, under the title The Weekly Nezvs from Italy, Germany, etc., published by Na¬ thaniel Butter, Nicholas Bourne and Thomas Archer, and this may be regarded as the first specimen of the

regular newspaper in England. Numerous other news journals followed, hut it was not till the beginning

of the parliamentary wars that the news¬ paper first acqured political influence. One of these, published in November 1641, under the title of Diurnal Occurrences, or the Heads of Several Proceedings in both Houses of Parlia¬ ment, is noticeable as the first which furnished a report of the proceedings in Parliament. The other papers which followed this were the English Post, England's Memorable Accidents, The K ingdom's Weekly Intelligencer, The Spy, I he Parliament's Scout, The London Post, The Country Messenger, and were most of them published weekly. In Cromwell's time the prin¬ cipal journals were the Mercurius Politicus and the Public Intelligencer. The publication of newspapers without license was prohibited in the reign of Charles II, and an office was created called Licenser of the Press. Adver¬ tisements first appeared in English newspapers in 1652. The first copy of the London Gazette was issued 7 Nov. 1665 at Oxford, whither the court had retired in consequence of the plague then raging in London. It has since been uninterruptedly published twice a week as an official court circular. The first London daily paper was published in 1709 under the name of the Daily Courant. At this time ap¬ peared Defoe's journal, the Review. The first number of the Tatler was published on 23 April 1709, and of the Spectator on 1 March 171 L. Though not properly newspapers in the modern sense of the term, their early numbers con¬ tained general news in addition to their other literary matter. In 1712 a tax or stamp-duty was imposed by the government of a half-penny on papers of half a sheet or less, and a penny on papers of a single and above a half sheet. The London Daily Advertiser first appeared in 1726, and became afterward celebrated by the publication of the famous ((Letters of Junius® (q.v.). The Morning Chronicle appeared in 1769 and the Morning Post in 1772. The Times was first commenced 18 Jan. 1785, under the name of the London Daily Universal Register, which was afterward superseded by that of the Times on 1 Jan. 1788. It was ably conducted from the first by Mr. Walter, who in 1803 trans¬ ferred the management to his son. The Daily News appeared in 1846, the Daily Telegraph in 1855, and the Daily Standard in 1857. Others of later establishment are the Echo, Graphic, Mail, Pall Mall Gazette, Westminster Gazette, etc. The provincial English press began with the Norwich Postman, published in 1706, and fol¬ lowed by the Norwich Courant in 1714, and the Weekly Mercury, or Protestant's Packer (at Norwich) in 1720. The Worcester Post¬ man appeared in 1708, the Newcastle Courant in 1711, the Kentish Post in 1717 and the Leeds Mercury in 1718.

Ireland and Scotland. — The first newspaper published in Ireland was the Dublin News-Let¬ ter, in 1685, followed by the Dublin Intelli¬ gencer in 1690. The Belfast News-Letter, still flourishing, first appeared in 1737. The Lree- man's Journal commenced in 1763. In Scot¬ land, on 31 Dec. 1660, appeared at Edinburgh the first number of the Mercurius Caledonius, which had an existence of only three months. The Edinburgh Evening Courant was started in 1718. The Caledonian Mercury commenced in 1720 and existed 150 years. The Edinburgh Gazette dates from 1699. The first paper pub¬ lished in Glasgow was the Glasgow Courant, on

11 Nov. 1715, followed by the Glasgow Journal in 1729. The Edinburgh Scotsman was first issued in 1817 and the Glasgow Herald in 1782.

France. — The first French newspaper, the Gazette de France, appeared in 1631, edited by Theophraste Renaudot, a physician, who had been in the habit for some time previously of presenting to his patients a printed account of the various occurrences of the day. The Gazette had a most successful career and ex¬ isted until 24 Aug. 1848, when it was sus¬ pended. Two weeks later it was resumed un¬ der the title of Le Peuple Framgais, which title was again altered to L'Etoile de la France. The Gazette Burlesque, a newspaper in verse, was commenced in 1650, under the management of the poet Jean Loret. The Mercure Galant was started by Donneau de Vise in 1672 and under the title of the Mercure de France, to which it was changed in 1717, continued to exist until 1853. After the Revolution a host of new papers appeared. Among these were the Chronique de Paris, the Orateur du Peuple, Herbert's Pere Duchesne and Ami du Peuple. Of all the newspapers, however, commenced at this eventful period, the only ones which have survived are the Journal des Debats and the Moniteur. Under Napoleon the press was sub¬ jected to a rigid censorship, which was con¬ tinued until 1819. During the reign of Louis Philippe appeared La Presse and Le Siecle, both of which commenced in 1836. Since that date the growth of the newspaper press in Paris has been rapid. In 1903 over 1,400 news¬ papers were regularly published in Paris alone, some 60 of these being daily political organs. The most important of all is the Temps, with politics of moderate republicanism. Le Petit Journal, a cheap popular journal, has a cir¬ culation of over 1,000,000 daily.

Germany. — Egenolf Emmel, sometimes called the father of journalism, established at Frankfort in 1615 Die Frankfurter Oberpost- amtszeitung. A second journal was com¬ menced at Hildesheim in 1619 and a third at Herford in 1630. At the end of the 17th cen¬ tury there were at least 30 daily newspapers in Germany. The Hamburgischer Correspondent appeared in 1714 as a continuation of the Hol- steinische Zeitungscorrespondance, established in .1712. It was the first German newspaper which received

news of foreign affairs from correspondents resident abroad. The Allgemeine Zeitung was published in 1798, and soon rose to the highest position in German jour¬ nalism. Other important journals are the N orddeutsche Allgemeine Zeitung , the Na¬ tional Zeitung, the Neue Preussisclie Zeitung, the Volks- Zeitung, the Vossische Zeitung, the Kolnische Zeitung, etc.

Russia. The first journal in Russia ap peared in 1703, and was followed by several others during the first half of the 18th century. The press in Russia is under verv strict super¬ vision and thus naturally has but. little influence in public affairs. The Journal de Saint Peters- bourg, in trench, has a considerable circula¬ tion outside of Russia.

Holland and Belgium. — The pioneer news¬ paper of Holland was first published in 1656. The early Dutch newspapers were distinguished by the accuracy of the information furnished by them. It was not until 1830 that they began to comment on public occurrences, their crit-

icism having been previously directed to items o commercial intelligence. The principal Dutch journals are the Allgemeene Handelsblad of Amsterdam, the Haarlemsche Courant the Journal de la Haye and Staats-Courant, the two latter published at The Hague. Among Belgian papers the Independence Beige the Journal de Bruxelles and the Etoile Beige are distinguished for the ability with which thev are conducted.

Australia.— There are nearly 1,000 papers published in Australia. The daily issues are excellent imitations of the London newspapers. ˆ t ˆLˆney Gazette was established in 1803.

India. The first Indian newspaper in the English language appeared in Bengal in 1780. lhere are upward of 300 newspapers published in the various vernacular tongues. i • ˆHjkey the first newspaper appeared in 179.. in French and the first daily journal in bpain was published in 1704. The modern newspapers of Norway, Sweden, Denmark, Italy, South Africa, Switzerland, Portugal Greece, China, Japan and South and Central America, are of less importance than those of the other countries heretofore mentioned, being largely local in character.

Bibliography.— Diblee, G. B., 'The News- paper> (London 1913) ; Fowler, H. C., Jr., 'The Handbook of Journalism: All About News- Paper Work> (New York 1913) ; Rogers, J. E, 'The American Newspaper) (Chicago 1911); Scott, W. R., 'Scientific Circulation Manage¬ ment for Newspapers) (New York 1915) • 'Sells World Press) (London 1915) ;

*Shuman, L. L., 'Practical Journalism) (New York 1912) * Symons, J. D., 'The Press and Its Story) (Lon¬ don 1914).*

NEWSPAPER SYNDICATE, an associa¬ tion for the furnishing of special news fea¬ tures, generally of a literary nature, to daily and weekly newspapers. See Press Associa¬ tions.

NEWSPAPERS, American. The history of the printing of newspapers in America prop¬ erly begins on 25 Sept. 1690, for it was upon that date that Richard Pierce, of Boston, is¬ sued the first number of what was to have been a periodical publication. Strange as it may seem, however, this first American journalist was endowed with a sense of originality of which even the makers of the modern sensa¬ tional newspaper might find reason to be proud, for, in his salutatory, he stated that as there were many false rumors being circulated in the town of Boston which were constantly doing a great deal of harm, he requested his readers to furnish him with a list of those persons who were starting such stories that he might advertise them in the succeeding issues of his paper. In other words, his plan was to print a regular weekly list of all the liars in town, a scheme which would certainly have sold many copies of the sheet had not the authorities put an end to the project by promptly suppressing the newspaper. This journal was to have borne the name of "Public Occurrences, both Foreign and Domestic.))

As only one issue of this strange newspaper appeared, the historians of journalism have usually failed to mention it, but, instead, have given the credit for the publication of the first periodical to John Campbell, a Scotchman, and

the postmaster at Boston, who issued the first number of The Boston News-Letter, on 24 April 1704. It was printed on half a sheet of pot paper, 7J4 X 1 inches, with a small pica type, and its entire contents consisted of sev¬ eral extracts from The London Plying Post, in relation to the Pretender; the queen's speech to Parliament regarding that subject; a few items of local news; four short paragraphs of maJ1«e intelligence from New York, Philadelphia and New London, and a single advertisement — that of the proprietor. This was just 82 years alter the appearance of the first English news¬ paper in London and 99 years after the first newspaper in France. Germany had antedated all other countries, having made several short¬ lived attempts to establish periodical journals as early as the latter part of the 16th century.

For more than 15 years Campbell had the journalistic field entirely to himself, but, in the latter part of 1719, another paper, called The Gazette, was started in Boston and, in 1721, a third was established by James Franklin under the name of The New England Courant. In the meantime

there had appeared at Phila¬ delphia the first newspaper published outside of New England. It was called The American Weekly Mercury, and its first number was is¬ sued by Andrew Bradford, the son of William Bradford, 22 Dec. 1719. The first paper to be printed in New York was The New York Ga¬ zette, established in October 1725, but by 1740 the number of newspapers in the English col¬ onies in America had increased to 11, three of which had been established in Pennsylvania — one being printed in German — one in New York one in Virginia, one in South Carolina and the remaining five in Boston.

In the beginning the American newspaper was a very small affair, being little more than an abstract of such papers as might chance to arrive from Europe on or about the date of publication. In fact, little change was made in them until after the time of the Revolution when the political agitators found it conven¬ ient to make use of them in presenting their appeals to the people. It was largely for this purpose that the first daily newspaper, The American Daily Advertiser, was established in Philadelphia by Benjamin Franklin Bache, in 1774. During the time that the seat of gov¬ ernment was at Philadelphia, it was this paper that was used by Jefferson to oppose the Fed¬ eral section of Washington's administration as well as all measures which originated with Hamilton or his friends. In 1802 Zachariah Poulson became its proprietor and the name which he gave to it, Poulson's Advertiser, was retained until 1839, when it was consolidated with The North American.

The second daily newspaper was The New York Daily Advertiser, first issued on 1 March 1785, by Francis Childs and Company. About a year later, 20 July 1786, the first newspaper appeared west of the Alleghany Mountains. It was published at Pittsburgh, Pa., and was called The Gazette. During the early post- Revolutionary days, Alexander Hamilton's spe¬ cial organ was The United States Gazette, a paper established in New York in 1789, by John Fenno, of Boston.

The territory comprised within the New England States had no permanent daily news¬ paper until 3 March 1813, when the Boston

Daily Advertiser was started by William W. Clapp. Prior to that time two distinct attempts to establish such papers had been made. As early as 6 Oct. 1796, Alexander Martin, an Irishman, started The Polar Star, which lived about six months. It was followed, 1 Jan. 1798, by Caleb P. Wayne's Federal Gazette, which ceased publication in less than three months. Of the

hundreds of papers started in New York between 1725 and 1827, when the first number of The Journal of Commerce appeared, only two now survive, The Commercial Adver¬ tiser, now better known as The Globe and Com¬ mercial Advertiser, and The Evening Post.

The history of the penny newspaper dates from 1830, the idea having 'been suggested by the Illustrated Penny Magazine, first issued in London during that year. During the next few years, therefore, several similar attempts to in¬ troduce cheap papers were made in the United States, notably at Philadelphia and Boston. As these publications were always as small as they were cheap, however, they were but short¬ lived, and it was not until 1 Jan. 1833, when the price of The Morning Post was reduced to one cent by its publishers, Dr. Shepard, Horace Greeley and Francis V. Story, that any pretentious effort was made to print a cheap newspaper. Although this experiment was not a success its failure was due to causes other than that of the price, so, when Benjamin H. Day established the New York Sun, 3 Septem¬ ber of the same year, he also fixed its price at one cent and the day of the cheap press had come.

Development of American Journalism from 1775 to 1915.

YEAR

Daily

Weekly

Semi¬

weekly

Monthly

Semi¬

monthly

Quarterly

Total

1775

37

1800

150

1810

27

282

37

**15*

361

1828. .

861

1840

1 ,403

1850 (U S)..

254

1,902

31

100

95

19

2,526

1860 (U S)..

387

3,173

79

280

30

4,051

1870 (U S)..

574

4,295

115

622

96

49

5,871

1880 (U S)..

971

8,633

133

1,167

160

122

11,314

1880 (A). . .

909

7,811

134

929

110

68

10,100

1885 (A). . .

1,207

10,241

146

1,284

189

96

13,304

1890 (A). . .

1,662

13,562

202

1,772

260

99

17,712

1895 (A). . .

1,988

15,196

329

2,150

249

158

20,217

1900 (A). . .

2,200

15,681

515

2,328

261

256

21,235

1905 (A). . .

2,377

16,152

600

2,550

262

180

22,312

1910 (A). . .

2,470

16,269

620

2,767

264

197

22,587

1915 (A). . .

2.494

16,091

605

3,064

341

f445

23.040

*(A) Ayer's American Newspaper Annual. * Tri-weekly.*

t Includes bi-monthlies and tri-weeklies.

Following are the 10 oldest newspapers of the United States which remain in existence in

1916:

Portsmouth, N. H., New Hampshire Gazette, estab¬

lished . 1756

Newport, R. I., Mercury . 1758

Windsor, Vt., Journal . 1763

Hartford, Conn., Courant . 1764

New Haven, Conn., Journal-Courier . 1766

Philadelphia, Pa., North American . 1771

Baltimore, Md,, American . 1773

Alexandria, Va., Alexandria Gazette . 1784

Augusta, Ga., Chronicle . 1785

Hudson, N. Y., Gazette , , , . . 1785

The colonial newspapers devoted most of their small space to foreign affairs, copying from and reflecting the style of the London papers. Local matters were considered too well known to be worthy of mention. The arriving and sailing of vessels and sometimes the com¬ ings and goings of stagecoaches, with a few advertisements, mostly about slaves and ap¬ prentices, are about the only sort of local chron¬ icles that can be found in the papers prior to 1750. Sometimes letters or parts of letters from people in adjoining towns were printed, but the rule seems to have been to regard as most important the things that were farthest away.

Between 1750 and 1760 there developed a style of vituperative journalism that prevailed largely until about 1833. The idea of freedom of the press had taken strong root in the Ameri¬ can mind, and the early disposition was to use the newspapers to ventilate all sorts of animosi¬ ties, but mainly political squabbles growing out of the competitions of office seekers. The press in the early days of the Republic was mainly partisan and secured most of its support from politicians. Advertising had not yet developed, and subscribers were few. Paper and printing were expensive, so that there was little to be made by running a newspaper. In fact, most of the1 journalists of the early days seem not to have depended upon their papers for a liv¬ ing, but to have run them as side issues. Under such conditions it is not surprising that space came to be given up largely to minor political squabbles and windy communications from writers hiding under such nom-de-plumes as <(Vox Populi,® <(Veritas,® etc.

There were no systematic attempts at news¬ gathering. Editors took their choice of what interested subscribers sent in, with never a thought of reporting important gatherings or conventions. It was not until 1833 that the first real American newspaper appeared in the New York Sun and the success of its policy of publishing the news instead of devoting its columns to the editor's personal and often ec¬ centric opinions upon political matters was so immediate that it was soon followed by many rivals. Most notable of these was The Herald, first issued by James Gordon Bennett in 1835, which promptly took the lead. There had previ¬ ously (1801) been established in New York The Evening Post (which William Cullen Bryant began to edit in 1828), and The Journal of Commerce, which dates from 1827.

Bennett was a natural reporter and gathered two or three times as much news as the Sun, and really laid the foundations of the modern school of American journalism. He was the first to print financial news, to discuss theatres and plays, to write up the happenings in clubs and social life and to give the talk of the street. He was also the first to attempt a prompt re¬

port of a big fire, with a picture of the burning building in 1836. Dana and Bryant showed themselves great editors, but Bennett outclassed all his. contemporaries in business management, gathering the most news, both local and foreign, and getting it quickly on the street. He was also the first to develop a considerable line of advertising. He was the first to demand larger and faster printing presses and to issue the <(triple sheet® of 12 pages, the progenitor of the modern multiple page newspaper.

- \n The Tribune entered the New York held, with Horace Greeley as editor, and if 1 ennett taught the others how to do business, o Greeley, Dana and Bryant must be awarded the credit of establishing the strong editorial utterances which have ever since been char¬ acteristic of the American press. Abandoning the vituperation of earlier journalists, these men, all gifted scholars, taught the growing newspaper editors of America how to write and how to edit newspapers so as to command the respect of their fellow-men, even when they dis-

editorial policy or conclusions.

Ihe New York Times came in 1851, with Henry J. Raymond, an admirable reporter and able writer, worthy of his colleagues.

Other great newspapers and editors of the antebellum days were: The Springfield

(Alass.) Republican, started as a weekly in 1824 and made a daily in 1844 and attaining national celebrity through the genius of Samuel Bowles. In 1830 The Boston Transcript ap¬ peared and the Detroit Free Press in 1831. The Philadelphia Inquirer dates from 1829. The Philadelphia Public Ledger was first issued in 1836 and under the management of George W. Childs easily led the press of Pennsylvania. The Baltimore Sun, New Orleans Picayune and Milwaukee Sentinel were all born in 1837. The Brooklyn Eagle first saw the light in 1841. The Cincinnati Enquirer in 1842 and the Cleveland Plain Dealer in 1843. The career of the Boston Herald began in 1846. The Chicago Tribune and Milwaukee Wisconsin were founded in 1847 and in 1848 the Cleveland Leader appeared and was brought into prominence by Edwin Cowles. The Saint Louis Post-Dispatch, over which Murat Halstead presided, was born in 1851, the same year as the New York Times. The first great paper founded on the Pacific Coast was the San Francisco Call, dating from 1856. The New York World did not appear until 1860 and it was along in the eighties before it re¬

ceived the inspiring guidance of Joseph Pulitzer, great editor and keen business man.

Prior to 1810 the circulation of the most widely read daily newspaper did not exceed 900 copies, while there were few publications, either weeklies or semi-weeklies, that could boast of a larger circulation than that of 600 copies. There were about 25 dailies in 1810, issuing 310 times a year; 36 semi-weeklies; seven tri-weeklies and 290 weeklies, the aggregate circulation for the

YEAR

Number of daily- papers published

Total circulation per issue

1850 .

254

758,454

1,478,435

2,601,547

3,566,395

8,387,188

15,102.156

I860 .

387

1870 .

574

1880 .

971

1 890 .

1,610

1900 .

2,235

1910 .

2,470

**23,000,000*

1915 .

2,494

**29,000,000*

- *Estimated.*

•

year being estimated at considerably less than 2,000,000 copies, while the value of the paper used could not have been in excess of $45,000. Compare those figures, therefore, with these from the last available United States census,

when the total products of the newspaper and periodical industry of the country was stated to be $232,993,094, and when there were 108,672 persons employed in this business. During this year the amount received from advertising was $148,534,392, while the amount from subscrip¬ tions and sales was $84,438,703. The above table is interesting as showing the steady de¬ velopment in number and circulation of the in¬ dustry of daily paper making in America.

Newsgathering.— To attempt to tell the story of the growth of the American newspaper without relating some particulars in regard to the wonderful feats which it has from time to time performed would be to give but a super¬ ficial view of the subject. Prior to the days of the telegraph the daily press had great diffi¬ culty in obtaining its information about current events in other parts of the country. To offset this disadvantage they adopted three methods of quick communication. One was by pony ex¬ press ; another was by carrier pigeons, and, when steam had been sufficiently developed to make fast traveling by rail or steamboat pos¬ sible, special trains and boats were frequently chartered for special occasions. The New York Herald and the New York Journal of Com¬ merce were the first papers to own swift sailing yachts which were used to obtain early informa¬ tion from incoming European vessels, while A. S.

Abell, of the Baltimore Sun, established his own overland express between New Orleans and Baltimore. This consisted of 60 blooded horses, housed at conveniently located relay sta¬ tions, and the project was so successful that, during the Mexican War, he not only beat all the other newspapers in getting news, but he secured his information so far ahead of the government's own dispatches that he was able to advise the officials at Washington of import¬ ant events sometimes more than 30 hours be¬ fore the reports of the happenings had been received at the War Office. Another instance of conspicuous enterprise was shown by Henry J. Raymond. While a reporter for the New York Tribune, he was sent to Boston to report a notable speech by Daniel Webster. Returning by boat, he arranged to have the necessary com¬ position frames and cases erected in his room, that, as fast as he could write, the sheets might be put into type, so that all were ready for pub¬ lication the instant he reached the office.

In 1846, when the entire country was so greatly excited over the Oregon boundary dis¬ pute with Great Britain, several of the news¬ papers combined to send a swift pilot boat to England. There all the important news was obtained ; the boat returned as quickly as it went, and the American people were provided with the information they craved many days before it could possiblv have arrived if it had come by the ordinary channels, the slow-sailing vessels of that day.

As so much enterprise was shown by news¬ paper publishers at a time when the means of quick communication were few and costly, it was but natural that they should have hailed the steam railroad and the electric telegraph with delight. During the 10 years between 1840 and 1850, the period in which these inventions were first generally extended, the circulation of the American papers increased more than two-fold.

Samuel Toplift of Boston was the first sys¬ tematic gatherer of foreign news in the United States. For 30 years, beginning about 1820, he met the European boats in Boston harbor, and brought the news to the Exchange Coffee House, whence it was forwarded to New York by pony express. In 1848 seven of the large New York daily paper owners combined forces for gathering news outside of the New York field, and the Associated Press was thus formed. In the course of time smaller news¬ gathering associations were formed by groups of newspapers in various localities. The New York Associated Press gathered the foreign and Washington news, and exchanged its budget of news with these smaller associations, thus covering the entire field. They dominated the news field for many years, and

sometimes re¬ fused to serve newspapers, and did not serve other newspapers to their satisfaction. Compe¬ tition arose in the United Press and the West¬ ern Press Association. A few of the more wealthy owners of the Associated Press then purchased a controlling interest in the United Press, and thus stopped competition, except that of the Western Association. These two asso¬ ciations ran in opposition for a few years, and then Melville E. Stone, manager of the Western Association, convinced all parties that condi¬ tions were wrong, and that there should be no private ownership of newsgathering. There¬ upon the presenj; Associated Press was born, as a New York corporation, in 1900, with condi¬ tions that enable any newspaper to come in, and exercise a vote in the control. It had, in 1916, a membership of about 900 newspapers, and expended in the vicinity of $4,000,000 a year for news.

Owing to the high rates at first charged for telegraph and cable messages the papers of those days did not get the almost unlimited news service which they receive to-day. Even as late as 1879 the night rate from California to Boston was 10 cents a word ; between Chi¬ cago and Boston it was five cents a word, and between Washington and Boston, two cents a word. Since that time the rates have been reduced fully 75 per cent. The original cable rate was $100 for 20 words, whether served to newspapers or to the general public, while the rate to newspapers is now but 10 cents a word, either for day or night service.

The result of the high tolls was shown in the compact dispatches published by the news¬ papers of that day. For example, when the America won the international yacht race, 22 Aug. 1851, no report of the event was received by any American paper until 4 September, when the news came in the form of a dispatch from Halifax. On this day the report in the New York Sun contained about 500 words, the Tribune used but 250 words about the con¬ test and the Evening Post was content with 200 words. So, too, when Brooks assaulted Sumner, the senator from Massachusetts, in 1854, the longest report sent to any Boston paper comprised less than half a column, and this was printed quite inconspicuously at the bottom of the page. In 1860, when Lincoln was nominated for the Presidency, at Chicago, one operator was able to send out all the press matter that was offered to him, while, at recent conventions, the hundred and more operators

have had all they could do to handle the millions of words of descriptive matter filed with them by correspondents representing every newspaper of prominence in the country. When these facts are remembered, however, it does not seem so strange that the aggregate number of words of press matter that went over the West¬ ern Union wires in 1879 was but 28,000,000, whereas the total number of words contained in press specials handled by the same company in recent years has been no less than 10

times as great.

Scarcely more than 40 years ago some of the most progressive journals in this country depended solely upon boys to carry their papers to their subscribers, while larger lots, the papers intended for dealers, were trundled through the streets on wheelbarrows. To-day all the news¬ papers have their own systems of fast delivery wagons, and the most progressive publishers charter ˆspecial® trains, not only for their Sun¬ day editions, but frequently for other occasions during the year.

The growth of the Sunday newspaper dates from the Civil War, but it wTas many years after the conclusion of that struggle before the large Sunday editions began to make their ap¬ pearance. In fact, it was only in 1870 that one of the leading papers in Boston increased the size of its Sunday issue from four to eight pages, and, strangely enough, the change met with all kinds of adverse criticism. During the next few days many of the subscribers to this journal called at the office to protest that the new paper was much too large, and this same criticism has continued as the great Sunday papers have steadily increased in size.

In 1916 there were 10,929 cities and towns in the Linited States having newspapers. New York City led with 981, and New York State with 2,121 ; Illinois had 1,826, Pennsylvania 1,358, Ohio 1,128 and Texas 1,081 ; New York State had 208 dailies and 1,100 weeklies, Illi¬ nois 181 dailies and 995 weeklies, Pennsylvania 212 dailies and 840 weeklies, Ohio 172 dailies and 715 weeklies, Texas 98 dailies and 864 weeklies. No other State had as many as 1,000 newspapers. The Southern States had 4,131, the Mid-Western States 5,013, the West¬ ern 6,349, and the Pacific Slope States 2,079.

*Classification of Papers. — While the news¬ paper directories and census reports class all sorts of publications together, and they are in¬ cluded in all the totals here given, it should be understood that many of the publications re¬ ferred to are no longer generally known as newspapers, the title magazine being chosen by many monthlies and periodicals, by many week¬ lies, bi-monthlies, monthlies,' etc. The first United States newspapers were mostly weeklies, and scarcely entitled to be called newspapers, because they did not begin to systematically gather news until after 1830. When the public came to appreciate what real news was, the daily newspapers experienced a rapid growth, and in 1916 there *vere 2,494 of them, more than in any other country on the globe. Their issues of six times a week represent a much greater volume of circulation advertising and general business than the 16,000 weeklies, the majority of which are what are termed country newspapers, retail¬ ing the minor happenings of the small towns, with their social gossip, interesting mainly to*

those who have personal acquaintance in the locality.

r- reˆˆours weekly had its rise before the Civil War, the Independent being emblematic of this class. These were the first publications to obtain national circulations in the United States. 1 he first important trade paper was the Dry hoods Economist, established 1846 j a year pre¬ vious the Scientific American had made its de¬ but. Harper's Magazine appeared in 1850 and Harper's Weekly in 1856. The Iron Age, the second great trade paper, was first issued by David W lliams in 1855. The Engineering and Aiming Journal, the first of the engineering press, had its modest beginning in 1866. The success of these papers in special fields opened the eyes of publishers to the opportunities of \vhat is now known as trade journalism and class journalism, and many thousands of periodi¬ cals are now issued covering all important fields of human activity. The more important classes are indicated below :

Classified No. in

publications U. S.

Magazines, women's publications and mail order journals. 210

Religious . 1,031

Agricultural . 720

Advertising . 18

Architecture and

building . 78

Automobiles . 69

Papers for the blind. . 9

Books and writers. . . 26

Business methods …. 17

Carriages and harness 14

Clothing and furnish¬ ing . 26

Collegiate . 512

Commercial and indus¬ trial . 120

Decorating . 20

Dramatic . 21

Drugs and paints . 63

Educational . 195

Electrical . 49

Fashion . 47

Financial . 92

Fruit and produce. ... 19

Furniture and uphol¬ stery . 28

Groceries . 84

Historical . 41

Hotel and restaurant . . 43

Classified

No. in

publications

U. S.

Insurance . . .

81

Journalism . . .

19

Juvenile .

311

Legal .

105

Liquor. . . .

47

Lumber and wood-

working. . . .

35

Mechanical and en-

gineering. . .

67

Medical .

178

Military .

43

Milk .

42

Milling .

18

Mining .

22

Moving pictures .

17

Music .

48

Negro interests ….

198

Patriotic .

26

Petroleum .

23

Philanthropical .

31

Poultry .

93

Printing .

16

Prohibition .

192

Railway .

70

Real estate .

43

Scientific .

102

Shoe and leather .

22

Sociology .

47

Sports .

70

Sunday school .

164

Secret societies .

346

. The foreign language press, mostly weeklies, is formidable in both numbers and circulation.

German . 512

French . 131

Spanish . 120

Italian . 98

Swedish . 70

Danish and Norwegian 60

Polish . 61

Bohemian . '. . 57

Yiddish. . . 34

Japanese . 30

Chinese . 11

Croatian . 16

Finnish . 18

Greek . 16

Hollander . 19

Hungarian… . 19

Slovak . 21

Russian . 8

Miscellaneous . 162

Total . 1,463

The Publishers' Association. — With a realization that it was essential for the news¬ paper publishers to organize to remedy abuses in advertising, and confer on matters of mutual interest, the American Newspaper Publishers' Association was organized in 1887, and has for many years maintained a headquarters in New York City. Advertising has been systematized and collections largely insured through the co¬ operation of this organization. During recent years the annual gatherings have developed more and more into conferences as to wise busi¬ ness policies. They make five-year agreements

with the labor unions, deal as an organization with the express companies and paper manu¬ facturers and maintain a bulletin for distribut¬ ing regularly information of value to the mem¬ bers, who numbered in 1916 over 350 of the larger newspapers of the United States and Canada.

Mechanical Equipments.— The tremendous

development of newspapers would have been impossible without the construction of rapid machines for printing, stereotyping, folding, typesetting, etc. Up to about 1840 the single cylinder printing press, with a capacity of 1,000 to 1,500 sheets on one side per hour, was the only means of newspaper production. R. Hoe and Company brought out a double cylinder machine, which doubled the capacity. Still more speed being required, the type-revolver was invented and manufactured in many forms by Hoe. (See Printing Presses). Then fol¬ lowed the perfecting press, printing from a roll of paper on both sides. About 1875 An¬ drew Campbell built a web stereotype perfecting press, with rotary folder, capable of high speed, but failed to push his invention. Shortly after¬ ward the Hoes brought out their lightning per- fecter, which was brought to its modern form by Stephen D. Tucker and Luther C. Crowell about 1884, and with this machine a majority of the great newspapers of the world are equipped. The capacity of a single machine is about 24,000 papers per hour, but by duplication and quadrupling the mechanism this output can be increased almost indefinitely, some presses having been built with a capacity of 216,000 eight-page papers per hour.

In recent years Goss, Scott, the Duplex and Wood companies have come into the field of fast newspaper presses, so that there is great variety of choice for the newspaper publisher. The smaller dailies are commonly

equipped with the duplex presses, which print direct from the type, without stereotyping, at speeds of 3,000 to 10,000 papers per hour. Mechanical typesetting was first commercially successful in the United States, in the Thorne machine, but about 1885 the linotype machines of Ottmar Mergenthaler began to take the market. (See Composing Machines). Another single type machine, the monotype, enjoys a large sale. In 1914 the in¬ tertype and linograph machines appeared, based •largely on expired patents of the linotype.

In the field of stereotyping, the autoplate machineˆ of H. A. W. Wood came into use about 1890, being the only automatic stereotyp¬ ing machine, and generally employed by the great newspapers of the world. Since an in¬ creasing number of newspapers have circula¬ tions from 200,000 to 600,000 daily, requiring a press capacity that will deliver all these papers within two hours' time, and since these papers are commonly 16 to 24 pages in size, and occa¬ sionally 64 to 128 pages, it will be apparent that the pressrooms of the large daily papers have developed into vast manufacturing establish¬ ments of wonderful capacity and reliability.

Charles H. Cochrane,

Of the Staff of N ewspaperdom.

NEWSTEAD (nu'sted) ABBEY, England,

on the border of Sherwood Forest, 10 miles northwest of Nottingham, was an Augustinian Canons institution founded in 1170 by Henry II in atonement for Becket's murder." In 1540

alter the dissolution, it was given to Sir John Byron the Little, and is celebrated in connection with Lord Byron, the poet, who made the semi-ruinous edifice his home in 1808, but sold it in 1818. The abbey has since been restored, and has many carefully preserved relics of the poet. Consult Irving, (Abbotsford and NewsteadP

NEWT, nut, a small tailed batrachian of the genus Diemyctylus, Triton, or a related genus, usually classed under the Salamandrince, but sometimes considered to constitute a distinct family, under the name Pleurodelidce. Newts are sometimes also called elfs or tritons, and the name is often loosely applied to salamanders of other genera not closely related. Among technical characteristics of the newts in general are the bony carpus and tarsus, the bony ball- and-socket joints of the vertebrae, the bony post-

frontal-equamosal arch of the skull and the nar¬ row bands of palatine teeth. The tongue is generally very small. The species are more strictly aquatic than most salamanders, and the males of most species undergo remarkable sea¬ sonal changes in the development of high dorsal crests, popillae or other appendages on the arms and elsewhere, and of brilliant colors. About 20 species belonging to this group of genera are known, of which more than half are European, several Asiatic and only two North American, while none have been found elsewhere. The eastern American species (Diemyctylus virides- cens) , of which a quite distinct variety occurs in Texas and Mexico, is. abundant throughout the Eastern States, and extends into Canada. It may be distinguished by the rather narrow arched head marked with a pair of longitudinal keels, and the handsome greenish red color of the back, the pale yellow below and the row of conspicuous scarlet, black-bordered spots on each side. In the adult stage just described this animal is about three and one-half inches long and completely aquatic. A terrestrial form is somewhat smaller, lacks the dorsal crest alto¬ gether, has a rougher skin and a bright vermil¬ ion color. This is the pretty little creature com¬ mon in Eastern woods, which later returns to the water and assumes the greenish garb. Newts are chiefly nocturnal, and when abroad swim actively, not merely crawling on the bottom in the manner of most salamanders. They feed on all kinds of aquatic larvae, worms, small mol-, lusks and crustaceans, and are very voracious. During the breeding season in the spring the male develops a broad cutaneous fin, richly pro¬ vided with sense organs on the back and tail, and becomes otherwise modified. The fertilized eggs are deposited singly, each in a gelatinous capsule whose adhesive nature permits of their attachment to water-plants, some of the leaves of which are drawn about each egg. The larvae are strictly aquatic and possess three pairs of external gills, but after metamorphosing, leave the water and assume the red terrestrial phase, when they live in the woods under stones and logs, appearing at night or during rain. This stage lasts for several years, when they seek the water either in the spring or fall and soon ac¬ quire the adult color and characteristics. Whether or not they can again enter the red phase by leaving the water is not certainly determined. Like frogs, newts swallow the skin after molt¬ ing, which appears to take place most readily while the animal is immersed in water.

The Pacific newt (Diemyctylus torosus) is nearly twice as large, and is further distin¬ guished by the wide, flat keelless head, and brown, unspotted color. It is very abundant in California, and ranges from the southern part of that State to Alaska. Its habits are essen¬ tially similar to those of the Eastern species. It feeds on earthworms, snails, slugs, insects, and its own sloughed skin, eggs and young. In this species the eggs are deposited in clumps.

The numerous European species present many interesting differences in detail in habits, especially in the mode of reproduction. Some of them live habitually away from the water and migrate long distances to it in the spring, and one species is remarkable from the fact that the ribs penetrate the skin. All of the newts make very interesting and satisfactory aquarium pets.

J. Percy Moore,

N University of Pennsylvania.

NEWTON, nu'ton, Alfred, English orni¬ thologist and zoologist: b. Geneva, 11 June 1829; d. London, 7 June 1907. He was educated at Magdalene College, Cambridge, of which he was travelling Fellow 1854—63, Fellow in 1877 and till his death professor of zoology and comparative anatomy. He took a prominent part in urging bird protection by legislation ; traveled in Lap- land, Iceland, West Indies, North America, the Pacific and Spitzbergen; edited The Ibis (1865— 70) and the Zoological Record (1870-72) ; con¬ tributed the ornithological articles in the 9th edition of the Encyclopaedia Britannica) ; and greatly advanced the study of the comparative anatomy of birds. He wrote (The Zoology of Ancient Europe y (1862) ; (Ootheca Woolley- ana) (1864-1902); (1893-96).

NEWTON, Sir Charles Thomas, English

archaeologist : b. Bredwardine, Wales, 16 Sept. 1816; d. Margate, 28 Nov. 1894. He was educated at Shrewsbury School and at Christ Church College, Oxford, and was assistant in the department of antiquities in the British Museum, 1840-52. He became vice-consul at Mytilene in 1852 and acting consul at Rhodes in 1854; discovered the tomb of Mausolus at Halicarnassus and the famous bronze serpent of Delphi at Constantinople and after a year as consul at Rome in 1861 became keeper of Greek and Roman antiquities in the British Museum, being the first incumbent of this post and hold¬ ing it until December 1885. During this term he furthered archaeological excavations in Ephesus, Priene, Smyrna, Sicily, Cyprus, Cyrene and Rhodes and procured for the British Museum the Farnese collection, the two Castellani col¬ lections and those of Pourtales and Blacas. From 1880 to 1888, Newton (who was knighted in 1887) was professor of classical archaeology in University College, London; to his work there and in the British Museum is largely due the revival of English interest in classical an¬ tiquities. He wrote (Method of the Study of Ancient Ai'C (1850) ; (History of Discoveries at Halicarnassus, Cnidus and Branchidae) (1862-63) ; (Travels and Discoveries in the Levant (1865); and Essays on Art and Archaeology* (1880).*

NEWTON, Gilbert Stuart, English painter: b. Halifax, Nova Scotia, 20 Sept. 1794; d. Chel¬ sea, England, 5 Aug. 1835. His mother was sis-

ter to Gilbert Stuart, the American portrait- painter, his father an officer in the British army and he went eventually to England after visit¬ ing Italy and France (1817). After studying at the Royal Academy he exhibited regularly both in the Royal Academy and the British In¬ stitution from 1818 to 1833. He was elected ivoyal Academician in 1832. The last three years of his life he was confined in a private asylum for the insane. His pictures, which are finely colored, are mostly domestic scenes, are anecdotic in motif and he especiallv excelled in the portrayal of feminine beautv of the English type. His best works include 'The Gentle Shep- herd) ; 'The Dutch GirP (both of which were engraved); 'Porceaugnaz and the Doctors) ; 'I he English GirP; 'Olivia's RetunP ; 'The Forsaken.) Specimens of his work are in the possession of the New York Historical Society and the Metropolitan Museum, New York Sir Walter Scott, Tom Moore and Washington Irving sat for portraits to him.

NEWTON, Henry Jotham, American manufacturer and chemist, inventor of the dry- plate photographic process : b. Hartleton, Pa., 23 Feb. 1823; d. from street railroad accident, New York, 23 Dec. 1895. At 20 he was a partner in the firm of Wittlesey Brothers, piano-makers, Salem, Conn., whom he left six years later to form the New York firm Lighte and Newton; this new company greatly improved the manu¬ facture of pianos. Newton was later connected with the Bradburys in the piano trade; in 1884 he became president of the Henry Bonnard Bronze Co. His invention of a permanent col¬ lodion emulsion and of the other details of the dry-plate process in photography dates from 1875. Educated a Presbyterian, Newton joined the Methodist Church, then the Unitarian and finally allied himself with the Spiritualists. A society formed by him in 1875 for psychical research and of which he was president was, he claimed, the first Theosophical Society, from which Mme. Blavatsky and Henry S. Olcott took the ideas which they falsely proclaimed to be of Indian origin.

NEWTON, Hubert Anson, American as¬ tronomer and mathematician : b. Sherburne, N. Y., 19 March 1830; d. New Haven, Conn., 30 Aug. 1896. He was graduated at Yale in 1850 and in 1855 became professor of mathe¬ matics there. He spent one year in foreign study and for the rest of his life lived quietly in New Haven. He was far better known as an astronomer than as a mathematician because of his remarkable researches as to meteors and meteoroids, undertaken to verify Olmsted's hypothesis

that meteors were the more visible portions of a great stream of bodies with a fixed orbit about the sun and this hypothesis he proved correct by a brilliant and painstaking series of mathematical computations. In 1861 he superintended the work of the Connecticut Academy of Arts and Sciences in relation to the meteors of August and November and pre¬ pared a celestial map for the use of the investi¬ gators. He wrote on meteors for several en¬ cyclopaedias and published most of his original papers on that subject in the 'Memoirs) of the National Academy and in the American Journal of Science , of which he was long editor. The National Academy awarded him the Smith gold VOL. 20 — 19

medal for his work on meteors. Newton did much to introduce the study of the metric system into the public school curriculum; was an authority on the theory of transcendental curves and wrote various tables for life insur¬ ance companies. He was a simple, genial, mod¬ est man and deeply interested in the material advancement of Yale College.

NEWTON, Sir Isaac, English mathema¬ tician and natural philosopher : b. Woolsthorpe, Lincolnshire, 25 Dec. 1642 ; d. Kensington, 20 March 1727. He was sent at an early age to the village school and in 1654 to the free grammar school of Grantham. He was entered at Trinity College, Cambridge, in 1660. He had the good fortune to find in the celebrated Dr. Barrow, professor of Greek (1660-63) and from 1663 Lucasian professor of mathematics, an able teacher and fast friend. He appears to have found particular interest in Wallis' treatise, 'Arilhmetica InfinitorumP He was graduated in 1665. While absent from Cambridge in 1665-66, during the plague, he discovered the binomial theorem (q.v.) and the direct and inverse methods oi fluxions (q.v.) (that is, differential and integral calculus) ; computed the area of the hyperbola; and first turned his attention to the subject of gravity. The famil¬ iar story, first given by Voltaire, is that the fall of an apple led him to reflect on the nature of that remarkable principle which attracts bodies to the centre of the earth. He considered that if the moon was retained about the earth by terrestrial gravity, the planets, which move round the sun, ought similarly to be retained in their orbits by their gravity toward that body. Having determined the law of the gravity of the planets toward the sun he endeavored to apply it to the moon, that is, to determine the velocity of her motion round the earth by means of her distance, as settled by astrono¬ mers, and of the intensity of gravity, as shown by the fall of bodies at the earth's surface. To make this calculation it was necessary to know exactly the distance from the surtace to the centre of the earth but unfortunately at that time there existed no correct measure of the earth's dimensions. Newton was obliged to employ the imperfect measures then in use, and found that they gave for the force which re¬ tains the moon in her orbit a value greater by one-sixth than was allowed by observed facts. This small*

difference seemed to his cautious mind a strong proof against his bold conjecture, and, furthermore, Newton was then unable to show that a homogeneous attracting sphere be¬ haved as if all its mass were situated at its centre. He imagined that some unknown cause modified, in the case of the moon, the general law of gravity indicated by the motion of the planets. Yet he did not abandon his leading notion, but determined to wait till study and reflection should reveal to him this supposed unknown cause. In 1667 he returned to Cam¬ bridge as Fellow of Trinity. In the year 1668 Mercator published his 'LogarithmotechniaP in which he had obtained the area of the hyperbola referred to its asymptotes by ex¬ panding its ordinate into an infinite series, which was the main secret of Newton's method. Barrow showed this work to Newton, who im-

- *It now appears that the main credit for the invention of the calculus should go to Dr. Barrow, Newton's teacher.*

mediately gave him his own treatise, but did not yet publish.

In the course of 1666 his attention had been accidentally drawn to the phenomena of the refraction of light through prisms. His exper¬ iments led him to conclude that light, as it emanates from the radiating bodies, is not a simple and homogeneous substance, but that it is composed of a number of rays, endowed with unequal refrangibility and velocity and possessing different coloring properties. He made the mistake of supposing it to be impos¬ sible for a compound prism or lens to be achro¬ matic. More than two years elapsed before he returned to his researches on this subject; but in 1669, having been appointed Lucasian profes¬ sor of mathematics, and preparing to lecture on optics, he endeavored to mature his first results, and composed a complete treatise, in which the fundamental properties of light were unfolded, established and arranged by means of experi¬ ments alone, without any mixture of hypothesis — a novelty at that time almost as surprising as these properties themselves.

In 1672 Newton was chosen a Fellow of the Royal Society, to which he communicated a de¬ scription of a new arrangement for reflecting telescopes, which rendered them more con¬ venient by diminishing their length without weakening their magnifying powers, and soon after, the first part of his labors on the analysis of light, in which he advocated the material theory (that is, that light consists of small par¬ ticles shot out by a luminous object), the soci¬ ety appointed three members to study it fully and report upon it. Hooke undertook to draw up the report. Instead of

discussing the new facts as presented by the experiments of New¬ ton, he examined them merely in relation to his own hypothesis — now known as the undulatory theory, and accepted as the true one — and con¬ cluded by allowing whatever appeared reconcil¬ able with his own hypothesis, and by advising Newton not to seek any other explanation of the facts. Newton in reply adduced new ex¬ periments confirming his material (or corpus¬ cular) theory and refuted the objections to the production of whiteness by the mixture of all the rays. He addressed another paper (1675) to the Royal Society, completing the account of his results and of his views on the nature of light. This treatise, united with his first paper on the analysis of light, afterward served as the base of the great work, (Treatise on Optics > (1704) in which, however, the experimental in¬ vestigation of the phenomena is more extensive and more strictly separated from all hypothesis. It is now known that Newton was wrong, and that light results from wave-motion in a per¬ vading medium called ether. But Hooke's ex¬ planations were vague, and his theory remained untenable until the discovery, a century later, of the principle of interference (q.v.). In 1679 Newton had occasion to write to Hooke about a system of physical astronomy on which the Royal Society had asked his opinion. Hooke and Newton held conflicting opinions, and Newton, having examined by mathematical cal¬ culations a position maintained by Hooke, found that an attractive force, emanating from a centre, and acting inversely as the squares of the distances, would produce motions exactly resembling the planetary motions both in re¬

gard to the form of the orbit and the velocity of the body at each point. This was the secret of the system of the world; but it still re¬ mained to account for the discordance of the moon's motion, which had before (1665) em¬ barrassed Newton. But in 1684 he learned the results of a new measurement of the arc of a meridian. Two years were spent in following up the consequences of this discovery, and pre¬ paring his immortal work, (Philosophiae Natu- ralis Principia Mathematica) ; but it was not till 1686 that he concluded to present his work to the society, and it was printed in 1687 at the personal expense of Halley, the secretary. Newton's teachings were introduced at Cam¬ bridge in 1699 and at Oxford in 1704, but were not admitted by the French scientists for half a century.

In 1687 Newton was one of the delegates sent by the University of Cambridge to main¬ tain its rights before the High Commission Court when they were attacked by James II, and in 1689 he was elected by the university to the Convention Parliament, but never distinguished himself in that body. He had always taken great interest in chemistry, and constructed a small laboratory for prosecuting his investiga¬ tions, and seems, after the publication of the (Principia,' to have devoted almost his

whole time to them.

In 1696 he was appointed warden of the mint, a general recoinage having then been un¬ dertaken. In this office he rendered essential service, and in 1699 was made master of the mint. In 1701-02 he again sat in Parliament for his university; in 1703 he was chosen president of the Royal Society; and in 1705 was knighted by Queen Anne. In 1704 he gave to the world his (Optics,' which contains all his researches on light. Later works were his (Arithmetic.a Universalis' (1707; more complete 1712); (Methodus Differential^" (1711); and his (Analysis per Equationes Numero Terminorum Infinitas) (1711) ; (Chronology of Ancient

Kingdoms Amended' (1728); and Observa¬ tions or Daniel and the Apocalypse' (1733), an attempt to show the fulfilment of the prophe¬ cies. In 1705-12 he was involved in a contro¬ versy with Flamsteed; and in 1705-24 in one with Leibnitz as to priority in the discovery of fluxions. The splendid genius of Newton has often been testified to, among many by Ma¬ caulay, who declared that in no other person did the demonstrative and inductive faculties ever exist in such perfect co-ordination. His statue, by Roubiliac, stands in Trinity College, Cambridge. Horsley's edition of his works (1779-85), with the (Opuscula,' collected by Castillon (1744), and his (Letters,' inserted in the (Biographia Britannica,' contain nearly all his printed works. Three editions of the (Principia' were published in his own lifetime; the last reprinted at Glasgow in 1871 by Sir W. Thomson (Lord Kelvin) and Professor Blackburn. The standard (Life of Newton' is that by Sir David Brewster, who had full access givtm him to the great mass of New¬ ton's papers (1855; 2d ed., 1860). Consult also Ball, W. W. R., (Essay on Newton's Principia' (London 1893) ; De Morgan, A., (Essays on the Life and Work of Newton' (reprinted Chi¬ cago 1914). This latter work contains a bibli¬ ography.

SIR ISAAC NEWTON

.

•

.

. , ■ >

f .

NEWTON

NEWTON, John, English astronomer and mathematician: b. Oundle, Northamptonshire, England, 1622; d. Ross, Herefordshire, England' 25 Dec. 1678. He was graduated from Oxford University in 1641 and engaged in mathematical and astronomical work, remaining loyal to the king during the Protectorate. After the Restora¬ tion he was made king's chaplain in 1661 and became canon of Hereford in 1673. He wrote 1 Institutio Mathematica) (1654); Geometrical Trigonometry > (1659) ; (Introduction to the

Art of Logic) (1671); Gosmography5 (1679), etc.

NEWTON, John, English clergyman: b. London, 24 July 1725; d. there, 21 Dec. 1807. He made several voyages with his father before 1742, was impressed in 1743, deserted and was captured, and was exchanged into a slaver. A life of debauchery was followed by his conver¬ sion in 1748; in 1755 he left the sea and was surveyor of tides at Liverpool 1755—60. His religious experiences were deepened by the preaching of Wesley and Whitefield, and after a period of private study he was ordained priest in the Church of England in 1764. From 1764 to 1780 he was curate of Olney, Buckingham¬ shire, and then became incumbent of Saint Mary Woolnoth, London, where he preached until the year of his death. His evangelical in¬ fluence was very strong there, and he preached to large congregations. He is best known, however, for his connection with the poet Cowper, who settled at Olney in 1767, and who was kept occupied by the good man in an al¬ most unintermitted round of religious exercises. Newton seems to have foreseen the outcome, and endeavored to provide congenial occupation for the poet in seeking from him contributions to the (Olney Hymns) which, published in 1779, attained great popularity. Newton received his D.D. from the College of New Jersey (Princeton) in 1792. His sermons were char¬ acterized by unction and intensity, but they have no literary value. One of his hymns is the well-known Glorious Things of Thee are Spoken. 5 Among his works are (An Authentic Narrative of Some Particulars in the Life of John Newton) (1764), an evangelical classic; Glney Sermons) (1767) ; Gardiphonia) (1781) ; (Apologia5 (1789), and the beautiful and touching Getters to a Wife) (1793). His memoir edited by Cecil was published in 1808. See Cowper.

NEWTON, John, American military engi¬ neer: b. Norfolk, Va., 24 Aug. 1823; d. New York, 2 May 1895. He was graduated from West Point in 1842 and was appointed to the engineering corps. At the beginning of the Civil War he was chief engineer of the Department of Pennsylvania and in September 1861 was made brigadier-general of volunteers. He served with distinction through the war and in 1865 was pro¬ moted brigadier-general and major-general in the regular army. He was mustered out of the volunteer service in 1866 but continued in the regular army, and in 1884

was made chief of engineers. He engineered the removal of the obstructions at Hell Gate Channel in the East River, New York; was commissioner of public works in New York, and in 1886 was retired at his own request. In 1887-88 he served as com¬ missioner of public works of New York City,

and in the latter year became president of the Panama Railroad Company.

NEWTON, Richard Heber, Protestant Episcopal clergyman: b. Philadelphia, 31 Oct. 1840; d. 19 Dec. 1914. He was son of the rector of Saint Paul's, Philadelphia, studied in the Philadelphia Divinity School, was assistant to his father (1860-62) and, after a short time in a church at Sharon Springs, N. Y., succeeded his father in Philadelphia, leaving this charge in 1869 to go to All Souls' Church, New York. In 1903 he was appointed preacher to Leland Stanford, Jr., University but soon resigned this position. He was a broad-churchman, and was several times threatened with trial for heresy for the free expression of his views. He took a prominent part in the Congress of Religions held at Chicago in 1893 and was vice-president of the organization of this congress. He wrote (The Morals of Trade> (1876) ;

NEWTON, Robert Safford, American surgeon: b. Gallipolis, Ohio, 12 Dec. 1818; d. New York, 9 Oct. 1881. After receiving a preliminary education at Gallia College, Ohio, he went to the University of Kentucky, where he received the degree of M.D. in 1841. He practised in Gallipolis until 1845, when he re¬ moved to Cincinnati where he made a reputa¬ tion as physician and surgeon. From 1849 to 1851 he was professor of surgery in the Univer¬ sity of Memphis, Tennessee, and in the latter year was called to a similar chair in the Eclec¬ tic Medical Institute in Cincinnati. He re¬ signed in 1862 and in 1863 went to New York City. There he helped found the Eclectic Medi¬ cal College, in which he was professor of surgery from 1865 until his death and of which he was also president from 1875 till his death. Dr. Newton was a successful operator and the inventor of several surgical instruments. He was also engaged in the investigation of cell pathology and made a specialty of cancerous diseases. From 1851 to 1861 he edited and pub¬ lished the Eclectic Medical Journal and after he settled in New York he edited the Eclectic Medical Review until 1874, when it was merged into the Medical Eclectic. He published several books with D. B. Powell, including (An Eclectic Treatise on Diseases of Children5 (New York 1854 and 1880), and was the sole author of 'Pathology of Inflammation and Fever5 (1861; new ed., 1867) ; (A Treatise on Antiseptic Sur¬ gery5 (1876) and Gxplorations in Cell Pathol¬ ogy5 (1877).

NEWTON, Ill., city, county-seat of Jasper County, on the Embarras River and on the Illinois Central Railroad, about 100 miles in direct line

southeast of Springfield. It is in a productive agricultural region, and in the vicinity of large coal fields. The chief manu¬ factures are dairy products, flour, brick, tile, lumber products, . woolen _ goods, brooms, ice cream and candies, and it has a large cold storage plant. The city carries on an active trade in farm and dairy products, fruit, coal and its manufactures. Pop. 2,108.

NEWTON, Iowa, city, county-seat of Jasper County, on Chicago, Rock Island and

Pacific and the Minneapolis and Saint Louis railroads, about 30 miles, direct line, east by north of Des Moines the capital of the State.

It is the commercial centre of a rich agricul¬ tural section in which considerable attention is given to stock-raising. There are 28 factories, their annual volume of business amounting to $4,575,000, with a monthly pay-roll of $100000. Newton is commonly known as the ((Washing Machine Centre of the World. w Besides this and worthy of mention are the following manu¬ factured products : flour, agricultural imple¬ ments, gas engines, tractors, advertising novel¬ ties, toys, tile and brick. The city is a beautiful home city, 11 fine churches, six schools, among the finest in the State. Nearly 20 miles of paved streets. The trade is chiefly in manufactured articles, farm products and livestock. The city owns and operates the waterworks, light, power and gas plant. Pop. 6,800.

NEWTON, Kan., city, county-seat of Har¬ vey County, on the Atchison, Topeka and Santa Fe and the Missouri Pacific railroads, about 201 miles southwest of Kansas City and 115 miles southwest of Topeka. It is in the south central part of the State, in the valley of the Arkansas River, one of the most fertile sections of Kansas. It was settled in 1871 and incorpo¬ rated a city in 1880. The chief manufacturing establishments are flour mills, drill factory, separator factory, creamery, large ice plant and stock yards. It is a division point of the Santa Fe Railroad and has repair shops. The num¬ ber of railroad employees who are residents of Newton is about 750, and about 200 men are employed in the manufacturing establishments mentioned. There are 15 churches for white people and two for the colored. It is the seat of Bethel College, the only college in America under the auspices of the Mennonite Church (1904). It has a high school, good public and parish schools and a Carnegie library. The three banks have a combined capital of $175,000. The government is vested in a mayor, who holds office two years, and two commissioners also elected biennially. The majority of the people are native born; the foreign born are Germans, Irish and French. Pop. (1920) 9,781.

NEWTON, Mass., city in Middlesex County, on the Charles River, and on the Bos¬ ton and Albany Railroad, six miles west of Boston. The area is 18 square miles; the city includes 13 villages. It was settled in 1631 and was part of Cambridge until 1688, when it was incorporated as a town under the name of New Cambridge, which name it retained until 1692; the city charter was granted in 1873. Newton is a beautiful residential city; within its limits is a part of the Metropolitan Park; its own city parks cover an area of about 170 acres. _ A large cemetery, in a prominent part of the city, contains the graves of many people noted in history. Newton has some manufacturing es¬ tablishments, chief of which are silk mills, fire- alarm supply works, rubber works, paper-box and curtain factories, printing works, worsted mills and cordage factory. It has the Lasell Seminary for women (1851), the Allen School for boys (1853), Mount Ida School for young women, Boston College (Catholic), Saint John's Industrial School, the Newton Theological Seminary, opened in 1825 under the auspices of the Baptists, and a public library which con¬

tains about 94,000 volumes. The prominent public buildings are several beautiful churches, the classical and technical high schools, the elementary and parish schools. Near the site of Waban's Wigwam, where John Eliot began to preach to the Indians, 28 Oct. 1646, stands the Eliot Memorial.

The annual municipal expenditures for main¬ tenance and operation are about $1,500,000. The chief items of expense are for public schools, $400,000; for streets, parks, sewers, $300,000; interest on debt, $169,000; police de¬ partment, $105,000; fire department, $96,000; municipal lighting, $61,000; health department. $43,402; charity, $38,000. The government is administered under a revised charter of 1002, which provides for a mayor who holds office two years and a board of aldermen consisting of 21 members, three from each ward. The mayor and aldermen appoint or elect the ad¬ ministrative officials, except the school board, which is chosen at a popular election and for a term of three years. The city owns and operates the waterworks. Pop. 46,054. Con¬ sult Smith, (History of Newton. }

NEWTON, N. J., town, county-seat of Sussex County, on the Delaware, Lackawanna and Western Railroad, about 40 miles north¬ west of Newark. It is in an agricultural re¬ gion, and in the vicinity are slate quarries. The chief manufactures are roofing slate, silk, paper boxes, shoes and dairy products. # It is the seat of the Newton Collegiate Institute and it has the Dennis Library, which contains about 9,000 volumes. Newton is known as a summer resort. The town owns and operates the water¬ works. Pop. 4,700.

NEWTON-ABBOT, England, a market- town of Devonshire, 15 miles south

of Exeter by the Great Western Railway. It is beauti¬ fully placed at the head of the Teign estuary where the Lemon enters. Newton- Abbot was given to the abbot of Tor by William, Lord Brewer, founder of the monastery, in 1196, whence the town gets its name. Newton- Abbot contains some ancient monuments the oldest of whioh is a tower of the 14th century chapel of Saint Leonard. Two churches, Saint Mary's in Wolborough and All Saints in Highweek, are of Perpendicular style. Saint Mary's, however, contains a Norman font and some heraldic ornaments of the 15th century. Forde House, a valuable Tudor mansion, be¬ longing to the Earl of Devon was visited by Charles I and William of Orange, who was proclaimed king being here in 1688 and who first read his declaration to the people of England at Newton- Abbot market-cross. The town- hall and markets are also interesting. There are important Roman remains in the vicinity. The establishment of large engine works bv the Great Western Railway greatly developed local industry, and there is much shipping trade. Fine china and pipe clay are worked near the town and exported to the potteries. Lignite ail'd tin ore are mined. Large agri¬ cultural fairs are held here. Pop. 12,500.

NEWTON-IN-MAKERFIELD, England, a town in Lancashire, 15 miles east of Liverpool and 15 miles west of Manchester. The barony belonged to Edward the Confessor and was held by the Banastres from the Conquest to 1286. The township of Newton-in-Makerfield

(Newton-le-Willows) gave its name in Saxon times and in the reign of William the Con- queror to one of the hundreds of Lancashire. 1 here was a market here in 1558. A party of Highlanders were taken prisoners near the town by Cromwell in 1648 and hanged in the woods which is still called Gallow's Cross. Newton is an important railway junction and manufacturing centre. The chief industries are paper making, printing, iron foundries, glass, sugar refining, wagon making, brick making and coal mining. It has a mechanics' institute, a grammar school and a town-hall. Near the town is a fine race course. Races and horse and cattle fairs are held here every summer. A beautiful lake in the town called Newton Mere is covered with pleasure boats in the spring and summer. Newton returned two members to Parliament from 1558 to 1832, when it was disfranchised. Coal is mined in the neighborhood. Near the town is a moated Elizabethan half-timbered house and an ancient barrow. Pop. 16,699.

NEWTON THEOLOGICAL INSTITU¬ TION, theological school founded 1825 at Newton, Mass., under the auspices of the Bap¬ tist bodies of New

England. Its course covers three years and at its completion the degree of bachelor of divinity is conferred. The library contains 34,000 volumes and the institution has 10 members on the faculty and 81 students. The buildings and grounds are valued at $400,- 000; other property controlled by the institution is valued at about $1,400,000, not including an endowment fund of $800,000.

NEWTONIAN PHILOSOPHY. See

Newton, Sir Isaac.

NEWTON'S RINGS. This is the name given to those colored rings seen when between the surfaces of two plates of glass a thin film of air intervenes. This phenomenon takes its name from its discoverer, Sir Isaac Newton (1642-1 727), who describes it in his work on (Optics) (London 1704). He took two lenses, one convexo-plane, its convex side having a radius of 14 feet, the other equi-convex, with the radii of its surfaces 50 feet, and laid the first with its plane downward on the top of the second, thus producing a thin film of air between the lenses, the film being thinnest near the centre and becoming gradually thicker out¬ ward. On slowly pressing the upper lens against the under one a number of concentric colored rings, having the point of contact of the lenses for their centre, appeared and increased in size when the pressure was increased. These rings, or more properly systems of rings, are in this form of the experiment seven in number, and each of them is composed of a number (ranging from eight in the first or smallest ring to two in the outermost) of rings of different colors, the colors, though different in each of the systems of rings, preserving the same ar¬ rangement as the colors of the spectrum. Thus, in the second ring the color is violet and the outside scarlet. The colors are very dis¬ tinct in the first three systems of rings, but be¬ come gradually confused and dull toward the outside, till they almost fade away in the seventh system. The centre is deep black. The thickness of the air-film in the centre is about half a millionth of an inch and increases gradually to nearly one one hundred and

thirty thousandths of an inch, when the colors disappear. Consult Newton,

NEWTOWN, Conn., town in Fairfield County, 20 miles north of Bridgeport on the New Haven and Hartford Railroad. It owns waterworks and the Beach Memorial Library. Farming is the chief occupation. It is a rich agricultural country and there are many beauti¬ ful drives in the vicinity. A fire hose factory is situated here. Pop. 434.

NEWTOWN, N. Y., since 1898 a part of the borough of Queens in New York City; formerly a separate town in Queens County. It was settled in

1652 by people from New England and first called Middleburgh. In 1664 it became a part of Connecticut and was then called Hastings. The following year it came into possession of New York and the name was changed to Newtown. Consult Riker, Jr., (The Annals of Newtown.)

NEWTOWN, Battle of (29 Aug. 1779), won by Gen. John Sullivan (1740-95). While waiting in the summer of 1779 for the prom¬ ised return of D'Estaing from the West Indies to co-operate against Canada, Sullivan, com¬ manding 4,000 men, entered the Iroquois Country, or Country of the Six Nations (Mo¬ hawks, Oneidas, Onondagas, Cayugas, Senecas and luscaroras), to punish and prevent the devastations of the Indian tribes and their Eng¬ lish allies. In the little settlement of Newtown, now incorporated in the city of Elmira, New \ ork, a battle of considerable importance was fought on 29 August. General Sullivan de¬ feated several bands of Indians, including a force under Joseph Brant and Sir John John¬ son (son of Sir William Johnson), and drove out of the country thousands of Indian war¬ riors and destroyed their villages and crops. Next morning General Sullivan began his march toward Catherine Town, near the south¬ ern extremity of Seneca Lake. A monument to General Sullivan now marks the historic spot of the battle. (See Sullivan, John; Brant, Joseph). Consult journals of the Military Ex¬ pedition of Maj.-Gen. John Sullivan against the Six Nations of Indians in 1779, with rec¬ ords of centennial celebrations, prepared by order of the State government (Auburn. N. Y., 1887), and (Life of Gen. John Sullivan,) by Oliver W. B. Peabody, in Spark's (American Biography, > Vol. XIII, p. 135.

NEXT FRIEND, in law, an adult, other than a guardian, who represents in an action another person not legally competent to main¬ tain a suit in his own behalf. The practice originated in England in the time of Edward I. A next friend is not a party to an action but acts solely for another and is considered an officer of the court. In some States a minor may sue through a next friend to compel an accounting by his guardian in case there is some ground for belief that the latter has been guilty of a breach of trust. An action began by a next friend cannot be terminated or settled otherwise than by consent of the court.

NEY, na, Michel, Duke of Elchingen, Prince of the Moskva, French soldier: b. Sarre- Louis (Moselle), 10 Jan. 1769; d. Paris, 7 Dec. 1815. He was the son of a cooper and became a

non-commissioned officer of hussars in 1787. He soon attained great distinction for bravery as well as for military capacity, was quarreled over by Kleber and Jourdan as to who should have his services, contributed greatly to the victory of Hohenlinden and obtained the mar¬ shal's baton in 1804. He opened the campaign of 1805 against Austria by a brilliant victory at Elchingen, 14 October (whence his title Duke of Elchingen) and brought about the capitula¬ tion of Ulm. He occupied the Tyrol and marched on to Carinthia, when stoppedˆ in his career by the Peace of Presburg. In 1806 and 1807 he fought at Jena, and after the capture of Magdeburg at Eylau and Friedland, his con¬ duct at the latter earning for him the title of «le brave des braves? In 1808 he maintained his high reputation in Spain. Napoleon recalled him, but kept him at a distance till the com¬ mencement of hostilities against Russia, when he received the chief command of the 3d divi¬ sion of the imperial forces. He commanded the centre at the battle of the Moskva, or Borodino, and so distinguished himself as to earn the title of Prince of the Moskva. In the conduct of the retreat, in which he commanded the rear guard, his ability, valor and devotion were con¬ spicuously manifest, and he exerted himself to the utmost to save the wreck of the army Napoleon and Murat had deserted. In 1813 he decided the victory of Liitzen, assisted at Bautzen and Dresden, but was defeated by Bernadotte at Dennewitz. He was now obliged to retire to Torgau, but soon took the field again; chased the Swedes from Dessau and fought at Leipzig and Hanau. When the enemy entered France he disputed every step of their progress. Brienne Montmirail, Craonne and Chalons-sur-Marne are shining names in the history of his battles.

After Napoleon's abdication, Ney took the oath of allegiance to the king, was made a peer and received the cross of Saint Louis. He en¬ joyed marked distinction at court and appeared to be entirely devoted to the Bourbons, but was the object of bitter hostility on the part of the returned emigres. When Napoleon landed on his return from Elba Ney collected a large force, was appointed its commander and with many assurances of his zeal and fidelity to the king marched against the invader. But notic¬ ing the desertion of his soldiers and their in¬ clination for Napoleon, he regarded the cause of the Bourbons as lost. He joined Napoleon at Lyons on 13 March and thus opened his way to Paris. Napoleon gave him the command of his left wing, which engaged with the British at Quatre Bras. At Waterloo he led the last charge of the Old Guard and had five horses shot under him. His clothes were full of bul¬ let holes and he fought on foot till night in the midst of the slain. He kept in hiding for a time after the new restoration but was captured, the ultra-loyalists demanded his life and he was tried for treason, sentenced (5 December) to death and shot in the Luxembourg garden. <(After the execution? says Lamartine, "bitter shame seized on every soul? It was universally regretted that Ney, the brave, had

been chosen to suffer. Consult

NEYMARCK, na'mark, Alfred, French economist: b. Chalons-sur-Marne, France, 4 Jan. 1848. He was engaged in the banking business in his early years in his native city and was in Berlin in 1866-67. In 1869 he went to Paris and edited a political paper. He soon acquired fame for his knowledge of statistics and economical subjects, became president of the Statistical Society, vice-president of the Society of Political Economy and a member of many important commissions. He was a dele¬ gate to the Saint Louis World's Fair in 1904 and was made a Commander of the Legion of Honor. His books include (Les milliards de la guerre) (Paris 1875-77) ; (Colbert et son temps } (2 vols., 1877) ; 'Turgot et ses Doc- trines) (2 vols., 1885) ; 'Les valeurs mobilieres in France> (1888) ; (Un centenaire economique, 1789-1889) (1889); (Vocabulaire manuel d'eco- nomie politique) (1898); finances contempo- raines) (2 vols., 1903) ; 'L'Annee de l'entente cordiale et de l'arbitrage) (1904); 'La banque de France de 1880 a 1905) (1905) ; L'Obsession fiscale) (5 vols., 1902-07) ; and (Que doit-on faire de son argent} (1913).

NEZ PERCE (na per-sa') INDIANS. See

Chopunnish.

NGAMI, nga'me, Lake, Africa, in western Rhodesia, north of the Kalahari Desert, a por¬ tion of a great prehistoric inland sea, when first visited by Livingstone and Oswell in 1849, about 20 miles long, 10 miles broad and very shallow. Its only feeder was the Teoge or Kubango and its outlet the Botletli or Zuga. In the rainy sea¬ son the water was fresh, but in the dry season the lake became a mere brackish marsh. Since 1890 the waters have gradually disappeared, the site of the lake now being marked by an ex¬ tensive reedy marsh-land, some portions of which are utilized for growing corn. It is be¬ lieved that formerly it had an outlet to the Limpopo Basin.

NGAN-HUI, n-gan-hwe', or NG AN¬ HWEI, n-gan-hwa'e, China, an eastern inland province, intersected by the Yang-tse-kiang, sep¬ arated from the ocean eastward by the prov¬ inces of Che-kiang and Kiang-su, and bounded northwest by Ho-nan, west by Hu-peh and south by Kiang-si. The principal river is the Yang-tse-kiang, giving water communication to the interior. The province is fertile ; there are great areas under forest; coal and iron ore are the principal minerals. Area, 54,826 square miles; pop. about 17,300,000; capital, Ngan- king-fu (q.v.).

NGAN-KING-FU, n-gan' king' foo', China, a city and river-port, capital of Ngan- hui (q. v.), on the north bank of the Yang-tse- kiang, about 200

miles above Nanking; since 1897 open to foreign trade. It suffered severely during the Tai-ping Rebellion. Pop. about

40,000.

NGORNU, n-gor'noo, or ANGORNU,

Africa, a town of Bornu, British Northern Nigeria, on the southwest shore of Lake Chad, 15 miles south of Kuka, the capital. It is on the trade route communicating with the interior and the coasts, and its fairs are of great com¬ mercial importance. The town is subjected to inundations from the lake during the wet sea¬ son. Pop. 40,000.

NIAGARA, ni-ag'a-ra, Lundy s Lane, Battle of Battle of.

Battle of. See

also Chippawa,

w FALLS, Canada, a town of

Welland County, Ontario, on the west bank of the Niagara Gorge, just below the Falls, and op- Niagara balls, N. Y. It communicates with the United States by three bridges, has electric and steam railroad service and is a station on the Michigan Central and on several lines linking with the Grand Trunk. It com¬ mands the best view of the Falls from Queen Victoria Niagara Falls Park, extending above and below the Falls for two and a half miles. Enormous electric power plants, larger than on the United States side, have been constructed to utilize the water power. Cereal foods, car¬ borundum graphite, cyanide, wire and steel chains, hosiery and automobile accessories are among the industries. The town was originally named Clifton or Suspension Bridge, after its English prototype at the Severn Gorge, Bristol (q.v.). Pop. 11,850.

NIAGARA FALLS, N. Y., city in Niagara County, on the Niagara River, and on the New York Central and Hudson River, the Wabash, the Erie, the Michigan Central, the Grand Trunk, the West Shore and the Lehigh railroads, about 25 miles north by west of Buffalo. Until 1892 what is now the city con¬ stituted two separate villages, Niagara Falls, originally known as Manchester and Suspension Bridge, formerly Niagara Citv; they were con¬ solidated in that year and chartered as a city. (For the New York State Reservation and the bridges connecting the city with the town of

Niagara Falls (q.v.), Ontario, see Niagara). The manufacturing establishments have in¬ creased and are increasing since the utilization of the power of the river by the new methods. The chief manufactures are paper, flour, dressed lumber, wheat biscuit, electro-chemical products, foundry products, machinery, chemicals, metal lurgical products, aviation materials, electric batteries and wood products. It has a public library, the building for which was donated by Andrew Carnegie, a high school, business schools, public and parish schools, the De Veaux College (Protestant Episcopal) and the Niagara University (q.v.).

On account of the Falls, one of the scenic wonders of the world, the city is visited annu¬ ally by thousands of tourists. The government,, administered under the city manager form, pro¬ vides for a mayor, who holds office for four years, and a council. The administrative officers are appointed by the mayor and city manager. A recent assessed value of the real estate was about $36,785,780. Pop. 42,257.

NIAGARA. Description and Geography.

— The course of the Niagara River runs a little west of north from Lake Erie, through a flat and fertile country for about 20 miles, carrying with it the drainage of Lake Erie and the Up¬ per Great Lakes. At the end of this 20 miles the river, which has descended for the last half mile in a series of rapids and cascades, comes to an abrupt declivity, the Niagara es¬ carpment, and the water makes a sudden plunge, dividing . into two falls, the American Fall, 167 feet in height, with a comparatively straight crest of 1,060 feet, and the Canadian or Horse¬

shoe Fall, 158 feet in height, with a deep curve in the centre, a crest of about 2,500 feet and running at right angles to the river. The Canadian Fall carries much the larger volume of water, it having been estimated that only about 10 per cent of the water flows over the American Fall. The apex of the Horse¬ shoe Fall is accepted as the boundary line between the United States and Canada, thus placing the islands at or near the Falls ex¬ cept Cedar Island and the Dufferin Islands in the United States. Behind the Luna Fall, a small section of the American Fall, is the Cave of the Winds, a natural rocky chamber eroded by the water, approximately 100 by 75 feet and a favorite resort for tourists desiring to ex¬ perience the full force of the cataract.

From the Falls the river descends in a series of rapids between rocky cliffs of from 200 to 350 feet in height, for about three miles, until it reaches the Whirlpool, a ˆcircular excavation m the westerly bank of the river, the boundaries of which are rocky cliffs 300 feet high for two- thirds _ of its circumference, while the other third, its northerly bank, is made of an

accumu¬ lation of sand, gravel and clay.® The river rushes into this elbow with tremendous force in a northwesterly direction, but has to turn and leave it in a northeasterly direction. The im¬ pact of these two currents meeting forms the rotary movement of the Niagara, called the Whirlpool, which with the Whirlpool Rapids below is second only to the Fall itself in beauty and fascination. From here the river flows through the deep gorge until it reaches the Lewiston escarpment, and on through a low plain to Lake Ontario, a total fall of 326 feet from the level of Lake Erie. The width of the gorge at the top varies from 700 feet at the Whirlpool to 1,700 feet opposite the centre of the American Fall. At the water line the width decreases.. The depth of water on the crest of the American Fall measures from one and one half to four feet under usual conditions, but northerly and easterly winds have at times set the water back, until the Fall has been nearly dry. The depth of water of the Horseshoe Fall is not definitely known, although various at¬ tempts have been made to compute it.

Geology. — The life history of Niagara Falls has long been a fascinating and absorbing study for the geologists of the world. It is of supreme importance, as here, more completely than any other known place, are presented the evidences which give a measurement of the time which has elapsed since the disappearance of the northern ice sheet of the glacial period. The first geological survey of the Falls was made in 1842 by Prof. James Hall and from that time to the present day geologists have attacked the problem of the age of the Falls, with varying results, according to their stand¬ points and the theories of their respective ages. The age of the Falls has been variously esti¬ mated at from 5,000 to 50,000 years, a wide margin, which shows that the subject is still fruitful for study.

Modern students accept certain fundamental theories regarding the geological history of Niagara. It is believed that the valley of the present Niagara was determined in general out¬ line in pre-glacial times when the American con¬ tinent stood at an elevation of from 2,000 to

5,000 feet higher than at present. By study of the erosion of smaller streams in the vicinity under similar conditions, the pre-glacial Niagara Valley may be reconstructed as beginning at the northerly part of Buffalo, draining north¬ ward by way of the Whirlpool and Saint David's Channel, recognized by Hall and Lyell, early in the 19th century, while the lake basin to the south of the Buffalo watershed was at least 150 feet below the top of the limestone

Preglacial Drainage.

(Dotted lines, present drainage; black lines, preglacial

drainage.)

terrace and drained to the west. With the advent of the Ice Age, the whole drainage of the North American continent underwent a change. The ice filled the basin of the Ontario Valley, and the streams flowing into it had to find an outlet to the south. This was probably the period when the Tonawanda and Chippawa creeks overflowed their southern boundaries at Buffalo into the valley of Lake Erie, which overflow finally eroded the present inlet. With the gradual recession of the ice sheet north¬ ward, and the constant increase of water masses, the outlet of the drainage flowed at different times in different sections of the divide to the south into the Mississippi or the Mohawk val¬ leys. As the level of these glacial lakes lowered, the continent itself lowered, until finally the level of Lake Erie was about 30 feet higher than at present, and drained through the pres¬ ent valley of Niagara. As the level of Lake Ontario fell, the waters found the lowest point

in the escarpment at Lewiston, and the Niagara we know was born. ... ,

It is inaccurate to speak of the beginning ot the Falls at Lewiston, as the thin layer of lime¬ stone on the top of the escarpment, with masses of soft shale underneath, did not offer sufficient resistance for the formation of a fall, but made the work of erosion so easy that it is probable that a series of rapids were formed, as Lake Ontario became lower. This gorge eroded its way southward until it met the ancient channel of the Tonawanda and the Chippawa at the whirl¬ pool, and then began the erosion of the present gorge south of the whirlpool. Geologists dif¬ fer greatly as to the age of the gorge south of the whirlpool, one school maintaining that it is pre-glacial and another that it is entirely post¬ glacial. The middle ground between the two is that the pre-glacial stream did not cut deeply, and that the erosion of the gorge from tlle whirlpool southward is largely post-glacial. It is accepted that originally the Falls were un¬ divided, but as the work of erosion and reces¬ sion proceeded, until the fall reached the north¬ ern end of the American Fall, Goat Island and the other small islands on the American side came into existence, and the Falls divided, the larger volume of water remaining in the deepest channel, west of Goat Island, and the lesser volume forming the American Fall. The Horse¬ shoe Fall, owing to its larger volume of water and deeper channel, recedes much faster than the American. A geologic section of the Niag¬ ara region from Lake Erie to Lake Ontario exposes the following strata of the Silurian : The Medina series, sandstones and shales, dis¬ tinguished in this section by their bright

red color; the Clinton series, shales and limestone; the Niagara, shale and limestone; the Salina series, gypsum and shales in varying thickness ; the Water Line group. Of the Devonian: the Corniferous and Helderberg limestone. From north to south may be successively met all the series from the Medina group to the Niagara limestone, up the gorge along the cut of the New York Central Railroad. At Lewiston may be seen at the water's edge about 230 feet of shales and sandstones of the Medina series of red color; above this 32 feet of Clinton lime¬ stone and shale of greenish and white color, overlaid by 70 feet of gray-colored Niagara shale and 20 feet of drab-colored Niagara lime¬ stone. There has been considerable speculation on the part of geologists as to the probable future of the Falls. Observation and investiga¬ tion have shown that rapid changes are taking place in the crest and contour of the Horse¬ shoe Fall. In 1890 the crest of the Canadian Fall measured 3,010 feet. It now measures ap¬ proximately 2,500 feet. A certain portion of this change is due to erosion and recession. In 1904-05 the crest of the Fall was further nar¬ rowed by the artificial filling of the channel on the Canadian side. Consult Dow C. M., (A Bibliography and Anthology of Niagara Falls> (chapter 7>, which contains a full bibliography of the geology of Niagara, with many extracts and quotations from the leading geologists of the different periods.

History. — When we speak of the Niagara frontier we mean the region bordering the river of Niagara from its beginning at Buffalo to its termination at Fort Niagara on Lake On¬ tario. The most striking feature in connection

A View of the Falls taken from a boat

with the history of this region is its antiquity. We are not accustomed to think of the Niagara in the same breath with the Atlantic Coast, but the fact remains that Niagara was known even before ˆ Jamestown and Plymouth Rock, through all the early history of our continent this region played a large part in the affairs of nations, and to-day the Falls are known the worm over as a marvelous scenic spectacle, and the source of a tremendous power in the industrial development of the two great Eng¬ lish-speaking nations. Father Hennepin was long credited with the honor of being the first white man to see and describe the Falls, but later researches have revealed that several rrench missionaries and explorers, among them Champlain, preceded him to the Niagara region and wrote of the Falls,

although the evidence goes to prove that they did not ex¬ plore the river, and received their accounts of the Falls from the Indians. La Salle made his first expedition to the Niagara in 1669, and on his second visit in 1678 he was accompanied by bather Hennepin. Hennepin's earliest and most trustworthy account Of the Falls was pub¬ lished in his 1 Description de la Louisiane> in 1683, and his famous picture of the Falls ap¬ peared in the edition of 1697. Whatever his claims, it may be truthfully said that Hennepin was the first European to see, to describe and to depict the Falls. Through the French mis¬ sionaries and explorers friendly relations were established with the Indians of the Niagara re¬ gion. Various trading posts were built, and in 1725-26 Fort Niagara was erected at the mouth of the river and became the centre of a broad French influence. The French domination of the region lasted until 1759, when Fort Niagara and its dependencies were surrendered to the British. In 1763 occurred the massacre of a British force near Fort Schlosser by a band of Indians under Pontiac. Many of the victims were thrown or driven alive into the Devil's Hole Ravine on the banks of the Niagara. This was the last rebellion of the Indians against the British rule. A strong garrison was maintained at Fort Niagara, and the region was controlled by the British until 1796, 13 years after the dose of the Revolutionary War. In this locality were planned the Indian raids against the settlers of western New York and Pennsylvania which were a feature of Revolu¬ tionary times, and which resulted in Cherry Valley, Wyoming and other massacres. In 1812 Niagara became the scene of land conflict be¬ tween the British and the Americans. Various engagements were fought, with success first to one side and then the other, until the siege of Fort Erie by the British was ended by a bril¬ liant sortie of the Americans in September 1813. With the Treaty of Ghent 1814, began the Hundred Years' oeace on the Niagara.

The general development of the Niagara re¬ gion was slow. In 1802 the American side was opened for settlement by the Holland Land Company, but the opening of the Erie Canal in 1825 gave the whole region its first great im¬ petus toward permanent establishment and de¬ velopment. The city of Niagara Falls, formerly Manchester, while still maintaining its tourist aspect, especially in summer, is a thriving com¬ munity with unusual opportunities for manu¬ facturing and industrial development owing to the great reservoir of power at its doors. Fort

Niagara is maintained as a United States mili¬ tary post, and there are still standing on this site several structures left from the French and British periods of occupancy.

New York State Reservation at Niagara and Queen Victoria Niagara Falls Park.— In 1879 Governor Robinson in a message to the New York State legislature advocated the purchase by the State of land along the Niagara

River and Falls to be used as a State park and reservation. After public interest in the matter had been aroused, a bill passed the legislature of the State of New York in 1883 authorizing the purchase of the present reservation, a tract of 412 acres, 300 of which are under water, and placing this reservation under the control of five unsalaried commissioners to be appointed by the governor. The control of this territory is still vested in New York State, and is ad¬ ministered by an appointive commission. The province of Ontario, under the leadership of Lord Dufferin, very promptly took similar steps for the preservation of the scenery on the Canadian side, and by successive purchases and grants the Canadian government acquired a strip of land along the river from Lake Erie to Lake Ontario comprising 1,178 acres and known as Queen Victoria Niagara Falls Park.

I he Canadian Park is administered by a board of seven commissioners, who are appointed by order of council and who serve without com¬ pensation. The policy of the two governments has been to preserve for the future all the sur¬ roundings, as well as the natural beauty of the Falls, and where by the vandalism of previous generations the scenery had been marred in any way, to restore it so far as possible to its original setting. Such buildings, bridges and other structures as the New York State Com¬ mission has deemed it necessary to build have been planned with a view to the harmony of the landscape. The commission has also been zealous in protecting the cataract from any un¬ bridled use of power which would destroy its beauty. Consult Dow, C. M., (A History of the State Reservation at Niagara (Albany 1914), which contains the complete story of the establishment of the reservation, its administra¬ tion, the policy of the commission and its achievements and an account of the power situ¬ ation.*

From the city of Niagara Falls, N. Y., down through the gorge along the brink of the Niagara River past the turbulent rapids and whirlpool, forming an unrivaled scenic route, an electric trolley line runs and connects by the Queenstown bridge with the Canadian heights above the edge of the gorge. The line extends beyond the Horseshoe Falls to Chip- pawa and stop-offs allow sightseers to visit the parks and all points ot interest. The railway and other bridges spanning the gorge also afford airviews of the entire length of the gorge, of the falls and their attractive natural and other features.

Power. — The history of industrial Niagara is the story of one of the most vital economic developments of the age. The first application of Niagara power was that in the saw mill built by the French in 1725 on the New York bank of the river near the rapids. Augustus Porter built a mill on the New York bank of the upper river in 1805, and two years later Porter and Bacon erected a grist mill near the

same location. Other mills and one dynamo for arc lighting purposes were established be¬ fore 1885, when 'the State took over the prop¬ erty where these mills stood. The total capac¬ ity of the mills operated before that date bv the American Falls w'as about 100 horse power. The first diversion of water from above the cataract for power purposes was proposed in 1842 by Augustus Porter, but it was not until July 1861 that the canal for carrying the water from above the Falls to a point near the top of the gorge was completed. The Civil War checked the development of this power for a time, but in 1877 the canal and the river front¬ age at both ends of it were purchased by the Niagara Falls Hydraulic Power and Manufac¬ turing Company, and the power thus diverted was utilized. The water rights of this company are limited to the capacity of the canal. The possibilities unfolded by the generation of water power into electric energy and the trans¬ mission of this electric energy to distances un¬ thought of, comparatively few years ago, have exerted a strong influence upon the power de¬ velopment at Niagara. In 1885 Thomas Ever- shed proposed a plan which contemplated the diversion of water at a point more than a mile above the Falls. This water was to be con¬ ducted beneath the city of Niagara Falls with a system of canals and wheel-pits for the pur¬ poses of power production. The Niagara Falls Power Company was organized to carry out this plan in a revised form and electric dis¬ tribution of power was to take the place of branch canals and tunnels. The construction of this work was begun in 1890, and the first electric energy was sold to the Pittsburgh Re¬ duction Company for the manufacture of aluminum in 1895. The Niagara Falls Hy¬ draulic Power and Manufacturing Company constructed a generation equipment at the foot of the cliff in 1895, and these two are the only power companies actually in operation on the American side, although two other companies not operative claim rights under old charters granted by the State of New York. On the Canadian side four power companies following in construction the plan of the American plants are in operation. The policies of the govern¬ ments of Canada and the United States toward the utilization of the Niagara power afford an interesting contrast. The power companies on the American side divert the water under legis¬ lative grant for commercial purposes entirely free from any rental or revenue charge by the government for the use of this power. The Canadian government, on the other hand, far- seeing in its policy, has, as a condition for each permission to divert the waters of Niagara for power purposes, required an adequate yearly rental from the power companies, this rental being based on the amount of horse power gen¬ erated. Before 1913 the amount of water di¬ verted from Niagara may be summed up as follows, the figures being the number of cubic feet diverted

each second.

Niagara Falls Hydraulic Power and

Manufacturing Co . 6,500

Niagara Falls Power Co . 8,600

Canadian Niagara Power Co . 9,500

Ontario Power Co . 12,000

Electrical Development Co . 11,200

Electric Railway Co . 1,500

- 34,200

Total . 49,300

With the lapsing of the Burton Act of 1913 the amount diverted has materially increased, the Burton Act having been designed to pro¬ tect the natural scenery of the Falls by keeping within bounds the use of power on the Ameri¬ can side and by restraining the sale and trans¬ mission of power ffom the Canadian side to manufacturing establishments operating in the United States. The tremendous demand for electrical power brought into being by war in¬ dustries during 1914-18 again increased the di¬ version of water for power purposes. Niagara power is used in Syracuse 165 miles from its source for manufacturing purposes and for the operation of electric railways and also in Wind¬ sor, Ontario, 240 miles away. This achieve¬ ment of science and technical skill which has harnessed one of the great forces of nature for the use and benefit of man is indeed one of the marvels of our age.

‘ Bibliography. — Besides the works quoted in the text consult also Cumberland, F. B.,

(Century of Sail and Steam on the Niagara River) (Toronto 1913) : Gilbert, G. K., (The History of the Niagara River) (in Annual Re¬ port for 1890, Smithsonian Institution, Wash¬ ington 1891), and (Niagara Falls and their Histor}ˆ (New York 1895) ; by several authors, (The Niagara Book) (Buffalo 1893) ; Grabau, A. W., (Guide to the Geology and Palaeon¬ tology of Niagara) (New York 1901) ; Harri¬ son, J. B., (The Condition of Niagara Falls5 (New York 1882) ; Hennepin, L., (New Dis¬ covery of a Vast Country in America5 (ed. by Thwaites, G. R. ; 2 vols., Chicago 1903) ; Holley, G. W., (History of the Falls of Niagara5 (New

York 1882) ; Hulbert, A. B.,

Charles M. Dow.

NIAGARA FORT. See Fort Niagara.

NIAGARA INTERNATIONAL PARK,

on both sides of Niagara River at Niagara Falls, a reservation for public purposes estab¬ lished by the joint action of the legislature of the Stale of New York and the Parliament of the Dominion of Canada. See Niagara.

NIAGARA-ON-THE-LAKE, Canada, a town of Lincoln County, Ontario, at the mouth of Niagara River, on the west bank, 12 miles below Niagara Falls, and 36 miles by water from Toronto. It is a pleasant summer resort. It was burned down in midwinter 1813, by the Irish-American General McClure during his retreat, an unnecessarily savage action that was deplored by both sides and led to cruel re¬ prisals. Pop. 1,318.

NIAGARA SERIES, in geology, the earli¬ est strata of the Upper Silurian era, following the Oswegan Series and preceding the Onon¬ daga Series and the lower Helderberg Series. It, in turn, is subdivided into the strata of the Clinton group and those of the Niagara for¬ mation. Neither is continental in extent, but both are important, are very rich in fossils and

consist of sandstones, limestones and shales. Ihe Clinton formation, shaly sandstone in New York and Pennsylvania, and more com¬ pletely limestone further west, occurs in Ohio, Indiana, Wisconsin, Tennessee, Kentucky, Ala¬ bama, Missouri and Georgia ; and is marked by the occurrence of oolitic argillaceous hema¬ tite. The Niagara formation is a thick lime¬ stone, underlaid with shale; the wearing away of the latter undermines the limestone as at Niagara Falls. The Niagara group occurs in New Hampshire, Connecticut, Ohio, Illinois, southern Michigan, New York, Ontario, Indi¬ ana, Iowa, Missouri, Maine and the Maritime Provinces, western Tennessee, northern Ken¬ tucky, Missouri, Arkansas and (scantily) in the Rockies. The fossils of the series are mol- lusks, corals, crinoids, etc. ; apparently there are no land or fresh-water animals.

NIAGARA UNIVERSITY, Niagara County, N. Y., a Catholic educational institu¬ tion founded by the Rev. John J. Lynch of the Congregation of the Mission in 1856. The im¬ posing buildings occupy a prominent position on the American bank of the Niagara River 250 feet above water level,

between the Falls and Lake Ontario, commanding a full view of the rapids, the gorge and the country for a radius of several miles. The grounds cover an area of 300 acres. The high school, college and seminary departments with their various courses lead to the degrees of B.A., B.S., Ph.B. and M.A. The institution not only enjoys the powers and privileges of a university granted by State legislature but is numbered by the State Board of Regents among the approved colleges of high standard, and her degrees placed in the same class as those of leading educational institutions of the country. Her alumni have become prominent in Church and State, in public and professional life. The faculty numbers 22; the annual enrolment of students who come from all parts of the coun¬ try averages 400. The university library con¬ tains over 20,000 volumes. The grounds and buildings are valued at $500,000.

NIAM-NIAM, ne-anT ne-am'. See Nyam-

NYAM.

NIANTIC (Nai'antukqutia, <(the point at the river's mouth), an Algonquian tribe at one time prominent in American history. When first historically known it occupied the coast of Rhode Island from the region of Narragansett Bay to Connecticut. The Niantic spoke the same dialect as the Narragansett and the two tribes are often confounded with one another. They seem to have looked upon themselves as practically one people; and their interests were closely united, yet they always remained, in organization at least, distinct tribes. This is seen in the fact that when the Narragansett threw all their energies and resources into King Philip's War, the Niantic refused to have any part or share in it. After the destruction of the Indian power the Narragansett, as they surrendered to the government in small bodies from time to time, were sent to live with the Niantic, who had by their foresight preserved their independence, their land and their tribal organization. Curiously enough, however, they lost their tribal designation to the new¬ comers, owing to the fact that the Narrangan- sett, though utterly defeated, scattered and

broken, had so impressed the terror of their name upon the imagination of the people of the Rhode Island coast and neighboring country that the more peaceful and less historic Niantic were lost sight of in the face of a tribal com¬ bination in which the warlike Narragansett formed a prominent part. Henceforth the fused tribes were known as Narragansett, though they were, as a matter of fact, more strongly Niantic than Narrangansett. See Narragansett.

NIAS, ne-as', Dutch East Indies, an island in the Indian Ocean, off the southwest coast of Sumatra, from which it is separated by a strait 60 miles

wide. It is about 70 miles long, 20 miles average breadth, area, 2,100 square miles. The surface is mountainous, attaining a maxi¬ mum altitude of 1,970 feet. In 1857 when the Netherlands took possession of the island, the population was reckoned at 17,000. The Nias- sers are of the Malay race, but fairer than the usual type. They are industrious and frugal, expert handicraftsmen, temperate and regular in their habits, but inclined to be avaricious, vindictive and sanguinary. The chief vege¬ table products are rice, cocoanuts, bananas, to¬ bacco, sugarcane, etc., and annually about 110,000 pounds of pepper. Hogs are reared, and there is a domestic export trade with Sumatra in rice, yams, beans and poultry. Pop. about 200,000. Consult Modigliano, (Un viaggio a Nias) (Milan 1890) ; Sundermann, H., (Kleine niassische Chrestomathie) (in (Bijdragen voor de taal-landen volkenkunde van Nederlandsch Indie, } Vol. VII, 5th series, The Hague 1892) ; id., (Kurzgefasste niassische Grammatik (Mors 1892) ; id., (Deutsch-niassisches WdrterbucfP (Mors 1892).*

NIATA, or NATA, a breed of Argentine cattle, which long ago started among the Pam¬ pas Indians, and is now nearly or quite extinct. They were really deformed, the parts of the face being so out of proportion as to give the face a queer pug-like appearance. They were very interesting to the students of evolution as an example of a variant which maintained its peculiarities through a long period, breeding <(true,® and .showing no reversion to the normal type. Consult Darwin, Charles, (A Naturalist's Voyage Around the World) (new ed., New York 1908).

NIBELUNG, ne'be-loong, in Scandinavian mythology, a monarch whose subjects are called Nibelungs and territory the Nibelungen- land. There were two contemporary kings in this realm, against whom Siegfried, Prince of the Netherlands, fought. He slew the 12 giants who formed their paladins with 700 of their chiefs. Siegfried's warriors then became known as the Nibelungen, but after the assas¬ sination of Siegfried, when the treasure he had amassed passed into the hands of the Bur¬ gundians, these latter appropriated the name and were known by it in the heroic poems and tales of the Middle Ages. The word Nibe¬ lungen is from nebel (darkness), and means the children of mist or darkness.

NIBELUNGEN RING, The. A group of four operas by Richard Wagner, who also wrote the librettos, calling- the entire work a "Stage Festival Play for Three Days and One Preliminary Evening,® first produced in its en-

tirety at Bayreuth, 13, 14, 16 and 17 Aug. 1876. The names of the

separate music dramas, as Wagner preferred to have them called, are ((Die G6tterdammerung)). They are commonly spoken of collectively as a trilogy and sometimes as a tetralogy. (Rhein- gold) was first performed separately (against Wagner's wish) at Munich, on 22 Sept. 1869, and (Walkiire) on 26 June 1870, the others re¬ ceiving their first performance at the Bayreuth production. Although too lengthy to be given in less than four evenings and, in fact, more often heard piecemeal than as a single opus, the <(Ring® was conceived by Wagner as a unit and for an intelligent understanding of its artistic purpose must be studied as such. Originally, Wagner planned a drama on (*

In turning for his dramatic material to the poetic myths which were familiar household tales to the German people, Wagner was con¬ sciously trying to follow where the Greeks had led; and his great canvas, depicting the figures of the legendary gods and heroes in a dramatic sequence was quite in the Greek manner. On the primitive conceptions of the old Skalds Wagner imposed a whole modern philosophy which does not at all points rest easily on the foundation stones; but the power of his genius has reared a structure of such imoosing grandeur that the imperfections seem to shrink to small proportions. To what extent the ((Ring® dramas would stand without their musi¬ cal environment might be an interesting, but hardly a fair, inquiry, since Wagner's avowed purpose was to create an art work that should be judged, not as music or drama, but as a combination of the arts.

With the composition of the <(Ring,® Wagner developed most extensively his system of lead¬ ing motive or leading motives (guiding themes is perhaps a better equivalent), short, delinea- tive, musical phrases, woven through the music and designed as a sort of running commentary on the stage-play. While the musical eniov- ment of those works, of the closely-knit, elab¬ orate symphonic development of musical ma¬

terial that unifies them from first page to last, is in no sense dependent upon a study of the handbooks describing and tagging the themes, familiarity with the composer's intention great¬ ly increases the listener's artistic pleasure. Wag¬ ner was not only a great composer. His was a remarkable intellect; and a careful study of his leading motive system, showing the meticu¬ lous care with which text, situation and music are joined, the many alterations to which the motives are subjected to express new shades of meaning, the constant development and expan¬ sion of the themes to serve the dramatic re¬ quirements, the ramifications of this most intri¬ cate machinery of dramatic expression cannot fail to become a rare intellectual treat. One of the most telling instances of the employment of leading motive occurs in the last act of (G6tter- dammerung, where Siegfried narrates his life story, which is eloquently mirrored in the*

orchestral accompaniment. In the death-march and Brunnhilde's final apostrophe, the familiar themes are brought together in a web of con¬ trapuntal texture and color, a veritable musical apotheosis that has no equal in the whole range of music. Saint-Saens has written that ((from the elevation of the last act of (Gotterdam- merung) the whole work appears in its almost supernatural grandeur, like the chain of the Alps seen from the summit of Mont Blanc.® (Lavignac's (Music Dramas of Richard Wag¬ nerˆ translated by Esther Singleton, contain an excellent comprehensive analysis of the leading motive system in all of the Wagnerian operas).

The first of the (was not heard here until 9 Nov. 1887, when it was given at the Metropoli¬ tan Opera House in New York, and (Gotter-dammerung) and

Lewis M. Isaacs.

NIBELUNGENLIED, The, the most

famous of the mediaeval epics, was written in all probability in the decade between 1190 and 1200. It is based on earlier individual ballads, but in its present form is the work of some minstrel who gave it its courtly form. It be¬ longs to the type of the folk epic, as the author is unknown, and it is written in four-lined strophes instead of the rhyming couplets of the courtly epics. A veneer of chivalry has been flung over it, but the elemental natures of the old Teutonic heroes are continually break¬ ing through with uncontrollable force. Its great popularity is attested by the large num¬ ber of manuscripts that have come down to us. We possess in all 28 more or less complete ones, preserved in 31 fragments. Only nine of these, however, can be considered fairly complete, and only three, designated as A, B, C, are con¬ sidered of primary importance. A battle royal has been fought to prove that each one of these in turn stands nearest to the original. It is now generally considered that C, the longest, is

a later redaction, but opinions are still divided as to whether the- priority should be given to A or B, the probabilities, however, being that B is the more original, and A merely a careless copy.

The Nibelungenlied is the best portrayal of the ancient Germanic ideal of Treue (faithful¬ ness), faithfulness to death and even beyond the grave. Its theme is also ((How pleasure ends at last in pain." It tells the story of the love of the youthful knight Siegfried for the Princess Knemhild the sister of King Gunther of y\ orms. After a year's wooing, during which time

Siegfried defeats the Saxons, the couple are happily married, Siegfried also helping Gunther to win the hand of the warlike maiden Brunhild. The mutual jealousy and distrust of the rival queens finally culminates in a dramatic quai rel in front of the portal of the church in which Kriemhild is triumphant. Brunhild' in her blind fury now plans the death of Siegfried and has him foully murdered by the gloomy Hagen, as he is quenching his thirst in a wood¬ land spring. For a long time Kriemhild nurses her revenge. Finally she marries Etzel (Attila), the king of the Huns, has her brothers invited to a great festival and killed in a series of exciting combats, with which the second part of the poem is largely taken up. Nemesis, however, overtakes her in the person of old Hildebrand, the armor bearer of Dietrich of Berne. Furious that such brave heroes should fall at the hands of a woman, he cuts her in two with his sword, leaving Dietrich and Etzel to mourn over the bodies of the slain.

In a certain sense the poem is only a torso, as it relates almost nothing of Siegfried's early life, his encounter with the dragon, the curse pronounced upon the possessor of the Nibel ungen treasure, Siegfried's awakening of Brunhild from her magic slumber within the charmed wall of flames. Nor is the poem en¬ tirely homogeneous; furthermore, it contains not a few contradictions. In spite of these de¬ fects, however, it is undoubtedly the finest product of Middle High German epic poetry. It is imposing through its very simplicity, through the grandeur of the story which it in no way seeks to adorn or decorate. The account given of Siegfried's youth is related in Scandinavian sources such as the ˆddaP the (Volsunga- saga> and the

Notwithstanding the popularitv of the Nibelungenlied during the Middle Ages it was soon forgotten by the mass of the people with the decay of chivalry. The figures of the old legend, however, lived on and were embodied in a popular ballad, (das Lied vom hurnen Sey- friedp preserved for us in a print of the 16th century. It was dramatized by Hans Sachs, the shoemaker poet of Nuremberg, and related in prose form in a chapbook of the 18th century. The poem itself was rediscovered by a German physician, J. H. Obereit, who found the manu¬ script C at the castle of Hohenems in the Tyrol 29 June 1755. The scientific study of the poem began with Karl Lachmann, who in 1816 read

an epoch-making paper on it before the Univer¬ sity of Berlin. He published also a critical text of A, now in its fifth edition (Berlin 1878). K. Bartsch and later Paul Piper published edi¬ tions of B, Fr. Zarncke of C (6th ed., 1887). Useful works on the legend are Lichtenberger, N., (Le Poeme et la Legende des Nibelungen (Paris 1891) ; Holz, G., (Der Sagenkreis der Nibelungen> (Leipzig 1907) ; Kettner, E., (Berlin 1897) ; Fr. von der Leyen, Vol. XVIII, New York 1897). The best German translation is probably that of Karl Simrock published by G. Holz, 1909.*

Good English translations in verse have been made by G. W. N. Lettson, (New York 1912). Alice Hor¬ ton has retold the story in modern prose, (The Lay of the Nibelungs> (London 1898), and D. B. Shumway has made an exact prose rendering (The Nibelungenlied> (Boston 1910). Full bibliography is given by Th. Abelung, (Das Nibelungenlied und seine Literatur (Leipzig 1907) ; and by F. E. Sandbach, (The Nibelun¬ genlied and the Gudrun in America* (New York 1905).*

D. B. Shumway.

NIBLACK, Albert Parker, American naval officer: b. Vincennes, Ind., 25 July 1859. He was graduated from the United States Naval Academy in 1880; served with an expedition of survey and exploration to Alaska in 1884-87; was inspector of naval militia in 1895-96; and writer and lecturer on signaling and naval tac¬ tics at the Naval War College in 1893-96. He was then naval attache at Berlin, Vienna and Rome till the Spanish-American War; during this war he served on the blockade of Cuban ports, being engaged in the battle of Nipe Bay. In 1898 he was transferred to the Philippines, took part in the suppression of the native in¬ surrection, in the Boxer Campaign in 1900 in China, and in 1901 was appointed secretary of the naval commission in the Philippines to locate a naval station. Inspector of target prac¬ tice 1902. Sea service Pacific station 1903-07. Promoted to commander 1 July 1907, and com¬ mander ships, Naval Academy and in Central American waters three years, going in July 1910 as naval attache to Argentine, Brazifand Chile, and then to Berlin and The Hague. He commanded the third seaman regiment at the American occupation of Vera Cruz, 21 April 1914. Commanded the United States ship Michigan of the Atlantic fleet, and attended the Naval War College, 1916. He has written (The Coast Indians of Alaska and Northern British Columbia (1889).*

NICZEA, ni-se'a, or NICE, Asia Minor, an ancient city, capital of Bithynia, on the east shore of Lake Ascania, 45 miles southeast of Byzantium, its site now occupied by the village of Isnik. As Ancore or Hellicore, it is said to have been colonized by Boeotians, and de¬ stroyed by the Mysians. Antigonus rebuilt it 316 b.c., and named it Antigoneia ; but Lysi- machus, having conquered this part of Asia

changed its name to Nicaea, in honor of his wife, Nicaea, daughter of Antipater. Under the Roman Empire it retained long an exalted rank among the Eastern cities, and is renowned in ecclesiastical history for the

famous councils held here in the reign of Constantine (325 a.d.) ; and by desire of the Empress Irene 785 a.d. In the year of the first council Nicaea was overthrown by an earthquake ; ■ it was restored by Valens in 368. After the foundation of the Latin Empire in Constantinople in 1204 the Greek Emperor Theodorus Lascaris made Nicaea the capital of his empire, which it con¬ tinued to be until in 1261 the Greek emperors recovered Constantinople. It was finally taken by the Turks in 1330.

NIC2EA, or NICE, The Councils of.

(1) An ecclesiastical council held at Nicaea, in Nicomedia, in 325. Of the method of sum¬ moning the first ecumenical council Gibbon says, ((The archbishop or metropolitan was em¬ powered by the laws to summon suffragan bishops of his province, to revise their conduct, to vindicate their rights, to declare their faith, and to examine the merit of the candidates who were elected by the clergy and people to supply the vacancies of the episcopal college. The primates of Rome, Alexandria, Antioch, Car¬ thage and afterward Constantinople, who exer¬ cised a more ample jurisdiction, convened the numerous assembly of their dependent bishops. But the convocation of great and extraor¬ dinary synods was the prerogative of the emperor alone? Constantine before his conversion convened a council at Arles (314 a.d.). The object of the Council of Nice, likewise convened by him, was to settle the controversy which had risen in re¬ gard to the divinity of Christ, and to contradict and condemn the views of Arius. The bishops who attended the council are variously esti¬ mated : Gibbon gives 318; Eusebius, 250; other early authorities, 300 and 320. The Eastern bishops attended in person ; the Western Church was represented by seven delegates, the most important of whom was Hosius of Cordova, who attended and presided as the Pope's dele¬ gate. The number of ecclesiastics of all kinds present was over 2,000. The session lasted about two months. It was frequently attended by the emperor in person. According to some accounts the earlier sittings were very stormy, and Constantine had to use much address to reconcile the disputants. Finally the council de¬ clared it to be and to have ever been the teach¬ ing of the church Catholic, in conformity with the apostolic tradition in all the churches, that Jesus Christ, the Son of God, is (— of the same substance or nature — with the Father; and accordingly in the creed called of Nice (otherwise the Nicaeo-Constantinopolitan creed) are the words, predicated of the son of God consnbstantialis patri, the word consub- stantial being a rendering of the Greek word of precisely the same. meaning and of analogous formation, Homoousios. (See Council). (2) The second Nicene Council, the seventh ecu¬ menical council of the Church, was summoned by the Empress Irene and her son Constantine, and met in 787 a.d. under Tarasius. The chief question was the reconsideration of the subject of images, the use of which successive emperors had forbidden; but the traditional view of the

Church was maintained at the council, canons were published on non-resid.ence of the clergy, etc., double monasteries were forbidden and regulations adopted for the ordering of the lives of clerics and nuns.

NICANDER, ni-kan'der, Greek physician and poet of the 2d century b.c. He was born in Claros, near Colophon in Ionia; was heredi¬ tary priest of Apollo in his native city, and may have spent part of his life in Italy. He wrote various didactic poems now lost ; one of these was Virgil's model for the Georgies? and another, the (Heteroeumena) or transforma¬ tions? suggested Ovid's Metamorphoses? theriaca? on dangerous wild animals, and (Alexipharmaca? on antidotes, his two extant works, were edited by Schneider (1816 and 1792). Consult Vollgraff, (Nikander und Ovid> (1909).

NICANDER, Karl August, Swedish poet: b. Strengnas, Sweden, 20 March 1799; d. Stock¬ holm, 7 Feb. 1839. He was educated at the University of Upsala, and with a poem on Tasso took a prize at the Swedish Academy in 1826. In 1827-29 he traveled in Italy, and, re¬ turning to Sweden, lived in want all the rest of his life. He wrote poems, tales and dramas. (Lejonet i oknen) (1838), a eulogy of Na¬ poleon, is considered his best poem. His other works include (Runesvardet> (1821), a drama; (Hesperider? poems and tales (1838), and (Minnen fran Sodern? recollections of Italy (1831-39). A collection of his poems was pub¬ lished in Stockholm (4 vols., 1839-41 ; 5th ed.

1883).

NICARAGUA, ne'ka-ra'gwa, a country of Central America, bounded on the north by Honduras, on the east by the Caribbean Sea, on the south by Costa Rica and on the south¬ west and west by the Pacific Ocean. It has 200 miles of seacoast on the Pacific and about 300 miles on the Caribbean. Its area, according Jo conservative estimates, including Mosquitia, is 49,200. square miles, total population 703,540.

Political Divisions. Departments. — Blue- fields (formerly Zelaya), cap. Bluefields; Ma¬ nagua, cap. Managua; Granada, cap. Granada; Leon, cap. Leon ; Carazo, cap. Jinotepe; Rivas, cap. Rivas ; Chinandega, cap. Chinandega ; Esteli, cap. Esteli; Jinotega, cap. Jinotega; Nueva Segovia, cap. Ocotal ; Matagalpa, cap. Matagalpa ; Rio Grande, cap. Rio Grande ; Chontales, cap. Juigalpa.

Districts — Cabo Gracias, Prinzapolca, Rio Grande, Siquia. San Juan del Norte.

Physical Features.— The Sierra de los Morabios, running from the Gulf of

Fonseca to the western shore of Lake Managua, appears to be the centre of volcanic energy in Nicaragua. It has the following vents: Cosigiiina (famous on account of the terrific explosion of 2 Jan. 1835), Chonco, El Viejo (quiet' since 1684), Santa Clara, .Telica, San Jacinto, Rota, Las 1 lias (eruption in 1850), Asososco and Momo- tombo (eruptions in 1870 and 1886) ; and though only two of these may be described as active, the others are dormant, rather than extinct! l his ridge is near the Pacific Coast, and its southeasterly trend is continued by the isolated volcanoes Masaya (active), Apoyo (extinct), Mombacho, Ometepe and Madera (extinct). The two last are on an island near the western shore of Lake Nicaragua, and but a few miles

from the nearest point in Costa Rica. In other words, practically the entire Pacific Coast range is intensely volcanic; the only exception being found at Brito and the neighborhood south¬ west and south of Ometepe and Madera, where according to the views of some geologists, the internal fissure in the earth's crust that gave rise to the several volcanic vents of Central America" is "completely built up and healed. Hence the low gap in the grand American cor¬ dillera found at that place, which has a mean height of about 150 feet above sea-level the lowest gap from Alaska to Tierra del Fuego " iˆough this gap, over this ((healed fissure," the Nicaragua Canal (q.v.) was to have been cut. . lhe volcanic characteristics are not found iar inland, but are restricted almost entirely to the western border; nevertheless the principal cities are built in this narrow strip of land be¬ tween the Pacific and the lakes. Chinandega,

VfnAA- ? f˚ast lnT tile n˚rfhwest, has about 11,000 inhabitants; Leon, 63,000; Managua, capi¬ tal of the republic, 35,000; Masaya, 13,000, and Hranada, on the west shore of Lake Nicaragua, 17,000. Of these the largest and most beautiful city, Leon, contains the cathedral of Saint Peter which it is said, was built at a cost of $5,000,000 when labor was valued at 25 cents a day. From the roof of this great church can be seen in one view 13 volcanoes. In the central region the largest town is Matagalpa (15,000 to 16,000). The western strip, despite its insecurity and op¬ pressive climate, has been preferred as a place of residence by the majority of the Nicaraguans on account of its facilities for communication and transportation — among which are to be reckoned the great lakes, Nicaragua (92 miles long by 34 miles wide) and Managua (32 miles long by 16 miles wide), connected by a river which could, without difficulty, be rendered navigable. The greater part of the republic, stretching eastward from the lakes to the de¬ partment of Zelaya, is of a different geologic

formation. It is covered with a chain of moun¬ tains of moderate height, and transverse spurs which are not volcanic extrusions but Antillean folds. (See article Central America). The strip of Caribbean Coast "annexed" in 1894 by President Zelaya was formerly the Mosquito Reserve, or Mosquitia, a British protectorate; but Great Britain gradually withdrew in Nica¬ ragua's favor her claim to exercise jurisdiction there. This eastern coast is now regarded as one of the most valuable parts of the republic and the "Atlantic Slope" — the Caribbean side in general — contains placer mines, its fruit in¬ dustry is profitable, large plantations of rubber trees are being cultivated and rosewood, cedar and mahogany are taken from its forests.

Many parts of the central uplands are com¬ paratively cool and well watered, with very rich soil and nearly untouched treasures in forest and mine; but they have remained unde¬ veloped hitherto chiefly on account of the lack of good roads. The earthquake shocks of Nica¬ ragua are less severe than those of Guatemala and Salvador, and dangerous fevers prevail chiefly, though not exclusively, in the lowlands or near stagnant water. The large rivers, ris¬ ing in the central mountains and emptying into the Caribbean Sea, are the Segovia, also called Coco or Wanks, which forms the boundary with Honduras, the Grande, the Kurringwas and the

Bluefields or Mico. The San Juan flows from Lake Nicaragua to the Caribbean, and in part forms the boundary with Costa Rica on the south. The route of the Caribbean section of the canal, for which the waters of the San Juan would have been utilized, included a cut through Costa Rican territory west of Ochoa.

Fauna and Flora. — The fauna includes the puma, deer,- jaguar, monkeys, alligators, arma¬ dillos, ant-eaters, guatuso, peccaries or wild hogs and many species of reptiles, some very poisonous. There are large herds of cattle. Prominent among avifauna are macaws, parrots, buzzards, wild turkeys and humming-birds. In¬ sect life is super-abundant. Great trees extend over the eastern plain and the ground beneath them is covered with a dense network of vines and bushes. There are over 70 varieties of fruit trees, of which about 55 receive a measure of cultivation. About 50 varieties furnish various gums, resins, balsams, oils, spices, hbres, used in the industries and in medicine, and about an equal number of varieties furnish hardwood lumber. Citrus fruits abound in the western portion, and rubber also is plentiful. The forest resources have been utilized but little. Most tropical crops such as bananas, cocoanuts, plantains, oranges and pineapples, coffee, sugar, corn and beans, are grown and the area of cultivation is on the increase and would extend more rapidly but for the scarcity of labor.*

Mineral Resources.— Among Central Amer¬ ican republics, Nicaragua ranks second (Hon¬ duras being first) in respect to mineral wealth. Gold and silver are found in the departments of New Segovia, Chontales, Zelaya, Leon, Mata¬ galpa and Jinotega; copper in Leon, New Se¬ govia and Matagalpa; lead and iron in New Segovia and Matagalpa; mercury, salt, sulphate of June,, sulphur and combustible minerals in Leon; tin in New Segovia; nickel and zinc in Matagalpa. More than 500 mines are registered in the National Bureau of Statistics, and 494 of these are set down as producers of gold. An¬ timony, arsenic and other metals have been found but in unimportant quantities. In the 16th and 17th centuries great quantities of silver were produced and rich deposits of this metal are known to exist.

Industry and Commerce. — The forests contain mahogany, ebony, cedar, quebracho, light rosewood, mora, brazilwood, vanilla, sar¬ saparilla, vegetable wax, ipecacuanha, quin¬ quina, copaiba, balsam, rhubarb, etc. In many parts of the republic — near both coasts, in the valleys, on the slopes and plateaus near the lakes and rivers — soils of exceptional value for agricultural purposes are found ; and though the system of cultivation is rudimen¬ tary, extraordinary, results are sometimes achieved. Thus, it is said on good authority that sugarcane produces at least two annual crops, and sometimes three; cotton planted in October is picked the following February on all the western lands; the virgin soil of the eastern slope yields four crops of maize in a year; and indigo can be cut three times before replanting becomes necessary. Coffee thrives best at elevations between 2,000 and 3,000 feet above sea-level. In the highlands of the north¬ west coffee is extensively grown. In a recent year 11,192,908 kilos, valued at $5,004,449, were

exported. Rice produces abundantly on central and eastern slopes. The systematic cultivation of rubber has been undertaken recently. Bananas are grown in the west, principally in the departments of Leon and Managua, for home consumption ; in the east, on a large scale, for export. The annual yield of cacao is insufficient to supply the local demand; in quality, however, it is so excellent that it brings a higher price in the home market than the im¬ ported chocolates. The selling price is from 20 to 25 cents gold per pound. Tobacco and aguardiente (made from sugarcane) are gov¬ ernment monopolies. Tobacco is grown in sev¬ eral districts, the best being produced on the island of Omotepe, in Lake Nicaragua. Cot¬ ton, corn, breadfruit, black beans and sweet potatoes are produced in large quantities in the western part of th~ republic, and occasionally small quantities of

beans, corn, cheese, lard and sugar are exported to the neighboring republics. In the upland regions the vegetables of the tem¬ perate zone are produced. Cattle raising is be¬ coming an important industry in the northwest, and quantities of hides are exported. There are 1,200,000 cattle in Nicaragua. Horses and swine are reared.

Cigars are produced in large quantities. There are few manufacturing enterprises and these are engaged in turning out articles of a cheap grade for domestic consumption. Thus coarse cotton fabrics, boots and shoes, candles and soap are manufactured and also a cheap grade of furniture. Roofing tiles and pottery are also produced and the Indian population turns out hammocks, straw hats, gold and silver jewelry and carvings. For the Letter grades of manufactures the main reliance is upon the country's imports.

Exports consist principally of coffee, rubber, bananas, gold, hides, sugar, fine woods, cacao, cocoanuts, cotton dyes and dye-woods and sil¬ ver. The imports are cotton goods, iron and steel manufactures, flour, chemicals, drugs and medicines, etc. In a normal year, imports amounted to $5,770,006 and exports $7,712,047. The principal exports consisted of 11,192,908 kilos of coffee, valued at $5,004,449 ; gold to the value of $1,063,007 ; bananas, 1,393,026 bunches, value $429,802 ; hides and skins, 684,082 kilos, value $326,559; 7,734 tons of wood, value $321,- 869; rubber, 221,432 kilos, value $278,763; cacao, 65,086 kilos, value $39,828; dyewoods and dyes, 3,984,053 kilos, value $39,455 ; sugar, 497,217 kilos, value $31,805; 864,857 cocoanuts, value $18,741 ; silver, 508 kilos, value $17,137. In the same year the principal imports were : Cotton goods, $1,417,032; food products, $890,017; iron and steel manufactures, $786,901 ; liquors, beer, wines, etc., $238,881 ; hides and skins, $223,205 ; chemicals, drugs and medicines, $231,959; silk goods, $149,905 ; vegetable fibres and manufac¬ tures, $135,008; petroleum, $106,377 ; woolen goods, $95,797 ; paper and manufactures, $81,- 776. In a recent year with the total value of Nicaragua's imports as $3,159,218 and of ex¬ ports $4,567,202, her imports from the United Nicaragua's imports as $3,159,218 and of ex¬ ports to the same country $3,079,810.

Shipping, Railways, Etc. — Corinto, the principal western port, has the advantage of the Pacific Coast lines of steamships, American, Chilean, British, etc. Bluefields, on the eastern

coast, has regular communication with the United States by means of the vessels of New Orleans and Mobile steamship companies. The Pacific Railroad of Nicaragua is the only line in the republic, in connection with which steam¬ ers ply on the lakes. San Juan del Sur is an¬ other important port on the Pacific Coast, while on the east coast in addition to

Bluefields are the ports of Cape Gracias a Dios, Las Perlas, and Greytown (San Juan del Norte). There is now a continuous line connecting the port of Corinto with Chinandega, Leon, Manangua, Masaya, Granada and Diriamba, with branches to El Viejo and Momotombo; and several other branch lines are projected. The total system in operation is 171 miles long. There are 20 miles of private railway on the Atlantic Coast near the Rio Grande, and, on the west side of Lake Nicaragua, three private steam tramways aggregating three miles in length. The steam¬ ers running on the San Tuan River and on the lakes now belong to the government, as well as steamers for traffic on the Atlantic and Pacific coasts. The national railways were leased to a company for 15 years and the steamers for 25 years from 1 Jan. 1905. In 1901 an American syndicate undertook the construction of cart roads to supply communication with Matagalpa, New Segovia and other points in the interior. There are in operation about 3,637 miles of telegraph lines with 130 offices, also 805 miles of telephone lines and 29 telephone stations. The number of post offices was about 135 in 1915. The government maintains wireless tele¬ graph stations at Managua, Granada, San Car¬ los, San Juan del Norte and Castillo.

Monetary System, Weights and Measures. — The metric system of weights and measures is in use, and the present monetary system has the gold standard as its basis, the theoretical unit being the cordoba, divided into 100 centavos. The weight of the theoretical gold unit is 1.6718 grammes of gold .900 fine, or say 1.50464 grammes of fine gold, and its value in terms of United States currency is $1.00. The cir¬ culation consists of silver coin and bank notes guaranteed to be payable in gold. Until 24 March 1913 the monetary unit was the silver peso with a nominal value of $0.h35, but the actual currency was inconvertible paper, and the exchange rates ranged from 1,000 per cent to 1,700 per cent premium for sight bills on New York. After the establishment of the National Bank of Nicaragua, Inc., certain New York capitalists undertook, through the medium of that bank, the rehabilitation of Nica¬ ragua's finances, with the result that the pres¬ ent monetary system, provided for under the act of 20 March 1912, went into effect 24 March 1913. Under this system the old paper peso circulation is being retired at the rate, now invariable, of one cordoba for 12.50 pesos. To maintain the cordoba at par, there is a <(con- version fund® in the United States and Europe.

Banking and Finance.— A series of eco¬ nomic reforms designed to remedy the un¬ satisfactory economic situation of Nicaragua began with the effort to put the currency on a sound basis, as described in the foregoing para¬ graph, and with the establishment of the Na¬ tional Bank of Nicaragua, which has the exclu¬ sive privilege of issuing legal tender notes, sub¬ ject to the provisions of the monetary law and

for the account of the republic only. The Na¬ tional government owns 49 per cent of its stock, 51 per cent being the property of American bankers. It has a special issue department for the maintenance of the national currency, and its capital, $300,000, may be increased if neces¬ sary to meet the country's needs. There are two other banks — private credit institutions that do every kind of banking business except the issuing of notes. The public treasury has been and still is in difficulties, which are ascribed to the long period of inflation, the frequent recurrence of revolutions and former bad gov¬ ernments. To remedy this evil the present government of Nicaragua asked a helping hand from the United States; and through the good offices of the State Department Nicaragua was enabled to enter into such relations with two important American banking houses that, with their aid, it became possible to effect a re¬ organization of the national railway as well as the monetary reform and the establishment of the national bank. The government's income is only about $2,500,000, and almost all of its debts (aggregating $13,780,662) are described as past due or "pressing.® The interior debt was given recently as $6,670,662 and the for¬ eign debt $7,110,000. The government, having tried repeatedly but without success to obtain a foreign loan, now expects to apply the $3,000,000 to be paid under the canal treaty with the United States (see Nicaragua Canal) to the payment of those debts which are more pressing, paying off the rest with bonds. The treaty is expected to encourage the investment of American capital in Nicaragua ((by insuring a continuation of present stable and peaceful conditions.® Summarizing the country's natural resources, the government committee reported that the lands in the various sections are adapted to the cultivation of coffee, cacao, bananas, cbcoanuts, pineapples, citrus fruits, tobacco, sugar, cotton and rubber, <(the success of which has been practically demonstrated, but in a crude and limited manner® ; that large areas are well adapted to the raising of cattle, being covered throughout the year with natural grasses of remarkably high food value and watered by perennial streams ; that the country is analogous geologically to the State of Ne¬ vada, producing both gold and silver in paying quantities, although the mines are operated in the crudest manner; that an extensive area is heavily wooded with primeval forests of ma¬ hogany, cedar and other valuable hardwoods, pine and dye-woods ; and Anally that the need of additional transportation facilities is em¬ phasized by the fact that inhabitants of the one coast are under the necessity of importing articles which are actually produced in and exported from regions along the other coast, though the two littoral regions are only 200 miles apart.

Government. — The present constitution was promulgated 12 March 1912 and came into operation on 5 April 1913, with the exception of articles 168 and 170. The Congress, composed of two chambers, the Senate of 13 members and a Chamber of 40 deputies, meets annually at Managua, 15 December. Both senators and deputies are chosen by direct popular vote, and all male citizens over the age of 21 are entitled to vote, as are also "those over 18 years of

age who are married or who can read and write.® (Pan-American Union Handbook, con¬ sult Bibliography) . The Chamber of Deputies is renewed by halves and the Senate by thirds every two years. Senators are elected for six years and must be secular citizens over 40 years of age. Deputies are elected for four years and must be secular citizens over 25 years of age. Senators and Deputies are elected directly by the vote of the people, the departments of the republic being divided into electoral districts, there being one Deputy for each 15,000 inhabit¬ ants or fraction above 8,000. Each district elects one Deputy and one alternate. Each department elects one Senator and one alter¬ nate for each two Deputies to which it is en¬ titled. The executive power is vested in a President and a Vice-President, who must be native citizens over 30 years of age, and who are elected by direct popular vote for a four- year term, with the express provision that the President is ineligible to succeed himself in office. There are Ave cabinet ministers, the departments being Government, Justice, Police and Charities; Foreign Relations and Public Instruction; Treasury and Public Credit; War and Navy; Promotion (Fomento) and Public Works. A supreme court of justice holds ses¬ sions at Managua. There are also courts of appeals in Leon, Granada and BlueAelds, be¬ sides several district or local courts. The governors of the departments are appointed by the president. They also command the local military forces.

Army and Navy. — Military service is com¬ pulsory between 17 and 55 years of age, but the law in this regard is not rigidly enforced. The period of active service is one year. In the active army there are about 4,000 men; in the reserve about 36,000. The naval branch includes 10 small gunboats or revenue-cutters, of which four are on the lakes, three on the Caribbean and three on the PaciAc Coast.

Education and Religion.— ■ Earnest efforts are being made by the government to secure competent instructors and to increase the num¬ ber of school buildings. The school age, as rescribed by law, is, for each child, the period rom 5 to 14 years. The principal university, with faculties of law and medicine, is located at Leon. Other universities are situated at Granada and Managua, with faculties of law only. There are two normal schools and eight colleges at Managua, and schools of telegraphy at Managua and Granada. A national indus¬ trial, commercial and scientiAc museum has been established at Managua. Altogether there are about 40 institutions for higher education and about 350 elementary schools in the repub¬ lic supported by the government. These employ oyer 390 teachers and are attended by more than 15,000 pupils. There are a few private schools. The prevailing form of religion is Roman Catholic but freedom is

accorded to all de¬ nominations and special favors prohibited to any. The Roman Church has two archbishop¬ rics, Managua and Leon and two bishoprics, Granada and Matagalpa.

Population. — The estimated population on 31 Dec. 1914 was 703,540, as against 689,891 on 31 Dec. 1913. About 75 per cent of the inhabitants live in the western half of the country. The people of this section are prin¬ cipally of mixed Spanish and Indian extraction,

though there are a few families of pure Spanish descent and many full-blooded Indians. The population of the eastern half is composed mainly of Mosquito and Zambo Indians and negroes from Jamaica and other islands in the Caribbean, with some Americans and a small number of Nicaraguans from the west coast. The Indian population is docile and industrious, furnishing most of the country's labor. The government has made several efforts to induce immigration, but so far the result has been negligible.

History. — On 21 Jan. 1522 Gil Gonzalez Davilla with four vessels sailed westward from Panama in search of the Spice Islands. Pro¬ ceeding along the Pacific Coast, after many mishaps, he reached the home of an Indian chief whose name was Nicaragua and con¬ verted him to Christianity. On the same day 9,017 natives, if we may believe the command¬ er's assertion, accepted baptism. Nicaragua's town stood on the shore of the lake to which his name has been given. Gil Gonzales heard from the pilots he had with him that, by way of the lake and river, there was easy communi¬ cation between the "North Sea® and the "South Sea® ; and he wrote that only ((2 or 3 leagues of very level road® separated the ocean from the lake. Until 1718 the isthmus, including the province of Nicaragua, was subject to the vice¬ roy of Peru; after that to the Spanish repre¬ sentative at Bogota. New Granada (Colombia) continued to claim certain rights in the entire isthmian territory, even up to Cape Gracias a Dios. The most interesting period is that in which occurred the invasion and temporary con¬ quest of Nicaragua by William Walker, of Nashville, Tenn., with his 56 "emigrants.® Walker became virtually dictator in 1856. His aim, disclosed to one of his associates, was to found an empire embracing Central America and Mexico. (See Bibliography). In 1895 the short-lived "Greater Republic of Central Amer¬ ica® was formed by the association of Nica¬ ragua with Salvador and Honduras. It could hardly be called a genuine union.

Three years later that attempt to displace permanently the separatist tendencies was aban¬ doned; but again (in 1907) a similar object was sought, and on this occasion the consequences were twofold — not alone the comparatively unimportant attacks by means of which Zelaya hoped by force to drive the Central American states into a confederation under his own leadership, but also the truly important inter¬ position of the United States and Mexico and the peace conference held at Washington in November and December. The conference was attended by delegates from all the Central American countries, and a progressive effort then and there began to safeguard the interests of all by treaty and by conventions that seemed in the main Well and wisely planned. In 1908 Great Britain recognized Nicaragua's sover¬ eignty over the Mosquito Reservation, and in the same year Nicaragua concluded treaties of commerce with Italy and Belgium. In 1909 the measure of local discontent with President Zelaya's aggressive foreign policy and perhaps even more with the monopolies and concessions that seemed oppressive in Nicaragua itself, was filled to overflowing. Among other difficulties, there was a claim advanced by citizens of the

United States; and the presence of American cruisers in the vicinity of Nicaraguan ports soon lent a threatening aspect to a demand (17 March) for the submission of that claim to arbitration. It was so referred in May. Early in October a candidate for the office of chief executive, Gen. Juan J. Estrada, secured a following that justified revolution; the Atlantic Coast towns over-promptly surrendered to him or his forces; there were several miniature bat¬ tles, and finally he was proclaimed the "pro¬ visional President,® although Zelaya was still to be reckoned with. On 18 November reports of the shooting of Groce and Cannon (citizens of the United States) by Zelaya's order led to a declaration (22 November) that the govern¬ ment of the United States would demand rep¬ aration; and on 1 December the Estrada gov¬ ernment was recognized and Zelaya's repre¬ sentative at Washington was dismissed with the warning that the United States would hold those who had ordered the execution of Groce and Cannon personally responsible. On 16 December Zelaya at last surrendered the cares of office. During 1910 the ruinous civil war continued, arraying East against West, until the latter section yielded and its capital, Mana¬ gua, was taken at the end of August. Then General Estrada asserted authority as Provi¬ sional President, issuing on 15 September a call for a presidential election. Before that could be held Adolfo Diaz was inaugurated as Provisional President. On 7 Oct. 1911 the National Constituent Assembly elected General Mena President for a four-year term. Many concessions that Zelaya had granted were now repealed, on the ground, of course, that the lawful authority of a president had been ex¬ ceeded, to the detriment of the country's in¬ terests. Re-establishment of

diplomatic rela¬ tions with the United States was marked by the appointment of Elliott Northcott hs minister, and San Juan del Norte, or Greytown, was made a free port. But the crisis was not past.

The election of Mena by the Constituent Assembly, as mentioned above, was simply in¬ valid in view of a certain agreement, known as the Dawson conventions, to which Mena was a party and which provided that a quite differ¬ ent method should be adopted — an election by the people rather than by the Constituent As¬ sembly — to ascertain the nation's real choice of successors to the Provisional President and Vice-President. Mena, refusing to accept his fate, revolted on 29 July 1912; the Minister of the United States thereupon demanded pro¬ tection for American lives and property; Pro¬ visional President Diaz requested assistance ; in response marines under Rear-Admiral Souther¬ land were sent to Nicaragua, and the surrender of Mena with 700 men took place on 25 Sep¬ tember at Granada — at whiph city also the American Red Cross supplies of food were afterward' distributed. By successes at Masaya, Granada, Leon, Chichigalpa and Chinandega, the American forces gained mastery of the entire region along the railway from Corinto to Managua, and fighting came to an end. A prompt withdrawal of the American forces should be noted : by 1 December only a lega¬ tion guard of 400 marines remained at Mana¬ gua. The elections held on 2 November re¬ sulted in the choice of Adolfo Diaz for a

four-year term, beginning 1 Jan. 1913. Peace having been established, indispensable arrange¬ ments were made with foreign bondholders and the National Bank of Nicaragua, Inc., designed to act as fiscal agent of the republic, began its useful work at the capital in October 1912.

Bibliography.— Bransford, J. F., (Smithsonian Institution, Washington 1881); Cosby, J. T.,

(Latin American Monetary Systems and Ex¬ change Conditions (New York 1915) ;*

Marrion Wilcox.

NICARAGUA, Lake, in the republic of the same name, is situated in the southwest of Nicaragua, 106 feet above the Pacific Ocean, from which it is separated by a strip of land 12 miles wide. It is 110 miles long from north¬ west to southeast, has a mean breadth of 30 miles and a maximum of 40 miles, and ranges from 50 feet to 200 feet deep. It receives the waters of

Lake Managua to the northwest by the Tipitapa River, and discharges by the San Juan River into the Caribbean Sea. There are numerous islands in the lake, the largest being Ometepe, noted for its two active volcanoes. There is steamer traffic, the lake forming a link in a route across the Isthmus of Central America. It appears that the elevation of the lake above the sea was greater in former times. In ancient times it was joined with Lake Ma¬ nagua and discharged its waters into the Pacific in the Gulf of Fonseca. See Nicaragua Canal.

NICARAGUA CANAL. References to phases of the history of this proposed inter- oceanic waterway have been made in the article Nicaragua. Advocacy of this route as Pana¬ ma's chief rival was rife during the 19th cen¬ tury and at the beginning of the 20th. In 1838 the mayor of New York City, Aaron Clark, together' with other influential citizens, me¬ morialized Congress in the interest of a canal planned to connect the Atlantic and Pacific oceans, recommending that negotiations should be opened between New Granada (now Co¬ lombia), Central America and the great powers of Europe, for the purpose of entering into a general agreement for the promotion of the project. President Van Buren sent John L. Stephens as an agent to the Isthmus, and Mr. Stephens, recommending the Nicaragua route as the most desirable, estimated the cost of a canal in that locality at $25,000,000 but did not think the time favorable for undertaking such

a work, because of the unsettled and revolution¬ ary conditions then prevailing. In 1826 John Bailey was sent out by an English company to survey the Nicaragua route, and negotiated for a concession. Though he failed in his main purpose, he remained in Central America, and in 1837 determined what he considered the best route for a canal — extending from San Juan (now Grey town) to Lake Nicaragua, across the lake to Lajas, and thence to San Juan del Sur on the Pacific. The reasons for the general interest in the question, well stated by General Goethals in the introduction to his valuable work, The Panama Canal , etc. (see Bibliog¬ raphy), in substance are that the settlement of the northwestern boundary question, by which the United States came into possession of Oregon, and the termination of the Mexican War, by which California was added to the Union, followed by the discovery of gold in the territory recently acquired, brought promi¬ nently to the attention of the American people the matter of transportation via the Isthmus. Communication overland was so difficult and dangerous that the main current of immigra¬ tion was Cape Horn. To make the newly acquired territory more accessible, lines of steamers were inaugurated from New York to the Isthmus, and from the Isthmus to Cali¬ fornia and Oregon. But the passage across the Isthmus was attended with serious personal inconveniences and suffering, as well as ex¬ orbitant charges.

The importance of making a connection across the Isthmus aroused the government to action, and arrangements were made for treaties with both New Granada (Colombia) and Nica¬ ragua. The right of transit across the Isthmus of Panama was secured and ratifications were exchanged 10 June 1848; subsequently Nica¬ ragua conferred on the United States, or a com¬ pany of its citizens, the exclusive right to con¬ struct canals, railways, or any kind of roads, so as to open a passage and communication by land or water, or both, between the Caribbean Sea and the Pacific Ocean. In return the United States was to aid and protect Nicaragua in all defensive wars to the extent of protect¬ ing and preserving its territorial limits. The Nicaragua Treaty, however, was not approved at Washington, and the American Charge, who had exceeded his authority in negotiating it, was removed.

His successor arranged a treaty upon the subject, and a contract with the American, Atlantic and Pacific Ship Canal Company, composed of Cornelius Vanderbilt, Joseph L. White, Nathaniel Wolfe and their associates. While the treaty was not ratified, the contract was protected, the company securing for that purpose articles of incorporation from Nica¬ ragua. By the terms of the contract the com¬ pany had the exclusive right of cutting a ship canal ffom Greytown to any point on the Pacific, by way of the San Juan River, Lake Nicaragua, the Tipitapa River or any other waters within Nicaragua's jurisdiction. It also gave exclusive right for the construction of rail or carriage roads, or both. The company determined that there should be a careful survey made from ocean to ocean, and that a line of location should be determined. Colonel Orville W. Childs, of Philadelphia, was appointed chief

engineer, and took charge of the work in 1850, completing it in 1852. He reached the conclusion that a ship canal by the Nicaragua route was practicable only by following up the valley of the San Juan River to Lake Nicaragua, and from the lake either southwesterly along a line through some valley extending across the dividing ridge, or northwesterly up the Tipitapa River to Lake Managua, thence through the valley extending through the head of that lake to some suitable seaport on the Pacific. As between these two routes, an ex¬ amination led him to believe that the one lead¬ ing from the lake at the mouth of the Lajas River, up the eastern slope of the divide, and . down the valley of the Rio Grande on the west¬ ern slope to the Pacific, presented more favor¬ able conditions than any other between Lake Nicaragua and the Pacific, and was superior to any route by way of Lake Managua. His project has been the basis of all

subsequent ones. At the request of the company the Presi¬ dent of the United States submitted Colonel Child's report of the survey and location to topographical engineers of the United States, for their inspection and opinion, and they re¬ ported in March 1852 that the plan proposed was practicable, but recommended certain changes and modifications. Nothing further was done by the American, Atlantic and Pacific Ship Canal Company toward the con¬ struction of a maritime canal, and its contract was forfeited.

The Treaty of 1884. — In December 1884 a treaty was negotiated between the United States and Nicaragua for the construction of a canal by the former, to be owned by the two contracting parties. While the treaty was pend¬ ing in the Senate in 1885 it was withdrawn by the President for the reason that the perpetual alliance with Nicaragua which the treaty pro¬ posed, as well as the protection of the integrity of the territory of that state, was contrary to the policy of the United States. In 1887 Nica¬ ragua granted a concession to A. G. Menocal and others for the construction of a ship canal from Greytown to Brito, and, as the canal would affect the territory of Costa Rica also, a similar concession was secured from this republic in 1888. The Maritime Canal Company of Nica¬ ragua was organized and incorporated by the Congress in 1889, for the construction of the canal. Actual construction was begun in Oc¬ tober of 1889 and was continued for over three years, but comparatively little was accomplished. Work was suspended during 1893. Several at¬ tempts were made to secure government aid, but without avail. A bill for this purpose, after its passage by the Senate in 1895, was pending in the House of Representatives (where it sub¬ sequently failed) when an amendment was made to the Sundry Civil Bill which provided for a board of three officers, one from the army, one from the navy and one from civil life, to make a personal investigation, and to examine the <(plans, profiles, sections, prisms and specifica¬ tions® for the various parts of Menocal's plans for the Nicaragua Canal, for the purpose of ascertaining ((the feasibility, permanence, and cost of construction and completion of the canal.® The board appointed consisted of Lieut. -Col. William Ludlow, corps of engineers, army of the United States, M. T. Endicott,

civil engineer, navy of the United States and Alfred Noble, civil engineer. The board found it impracticable, within the time fixed by law and with the limited means appropriated for its work, to make a full and thorough examination of the route and obtain the necessary data for a final project, and recommended that further explorations should be undertaken and observa¬ tions made, to collect information and data, so as to determine the location and cost of the work. The board submitted, however, a tenta¬ tive estimate of the cost.

Carrying out the recommendations of the board organized under the Sundry Civil Act of 1895, Congress appropriated by the act of 4 June 1897 funds to (

The price fixed by the New Panama Canal Company was $109,141,500; but the board was of the opinion that the value of the French property referred to was only $40,000,000; and if the figure had been acceptable the report leaves no doubt that the recommendation of the board wpuld have been different. Because of lack of funds the New Panama Canal Com¬ pany could not carry the work to completion, and their only hope for any return for the

investment was from the United States. In these circumstances the company on 4 Jan. 1902 declared itself ready to transfer to the United Slates its properties and concessions on the payment of $40,000,000. This put the matter m. a new light, and the Isthmian Canal Com¬ mission was called together, changed its previ¬ ous recommendation, and on 18 Jan. 1902 re¬ ported that in view of ((conditions that now exist and all the facts and circumstances upon which its present judgment must be based, the commission is of the opinion that the most practicable and feasible route for an Isthmian canal, to be under the control and management and ownership of the United States, is that known as the Panama routed

The " Nicaragua Canal" Treaty of 1916. On 26 Feb. 1913 the Senate of the United States took into consideration a proposed new conven¬ tion or treaty with Nicaragua, negotiated with the object of granting, on the one side, and of securing, on the other side, to the United States as an exclusive privilege the perpetual right to construct a canal across Nicaragua. That con¬ vention, signed in 1914 and ratified by Nicara¬ gua but not by the Senate of the United States until 1916, made provision for the payment of $3,000,000 for the canal option and (among other things) for a naval station on the Gulf of Fonseca, at which begins the boundary with Honduras and upon which the Republic of Sal¬ vador also looks out. As a matter of fact, the control of that important gulf is snared among the three nations of the old ˆGreater Republic of Central America® mentioned above; at the northern end of the route Costa Rica's bound¬ ary must be crossed; and this division of in¬ terest and control is but a reminder of difficul¬ ties that have been encountered whenever the government of the United States in the past, before the selection of the Panama route, en¬ deavored to make satisfactory arrangements for cutting a canal by way of Lake Nicaragua. Ratification of the ((Convention between the United

States and Nicaragua® was advised by the Senate, with amendments, 18 Feb. 1916; on 19 June 1916 the convention was ratified by the President; on 24 June 1916 it was pro¬ claimed (Treaty Series, No. 624, Washington 1916). In Article I ((The Government of Nica¬ ragua grants in perpetuity to the Government of the United States, forever free from all taxation or other public charge, the exclusive proprietary rights necessary and convenient for the construction, operation and maintenance of an interoceanic canal by way of the San Juan River and the Great Lake of Nicaragua or by way of any route over Nicaraguan territory.® In Article II the government of Nicaragua ((leases for a term of 99 yeart to the govern¬ ment of the United States the islands in the Caribbean Sea known as Great Corn Island and Little Corn Island; and the government of Nicaragua further grants to the government of the United States for a like period of 99 years the right to establish, operate and maintain a naval base at such place on the territory of Nicaragua bordering upon the Gulf of Fonseca as the government of the United States may select. The government of the United States shall have the option of renewing for a further term of 99 years the above leases and grants upon the expiration of their respective terms,

it being expressly agreed that the territory hereby leased and the naval base which may be maintained under the grant aforesaid shall be subject exclusively to the laws and sovereign authority of the United States during the terms of such lease and grant and of any renewal or renewals thereof.® Article III relates to the payment above mentioned, etc. The consent of the Senate of the United States to the ratifi¬ cation of this convention was given with the proviso ((that nothing in said convention is in¬ tended to affect any existing right® of Costa Rica, Salvador and Honduras.

Bibliography.— Childs, O. W., and Fay, J. D., ˆReport of the Survey and Estimates of the Cost of Constructing the Inter-Oceanic Ship Canal in the State of Nicaragua (New York 1852) and, in same year, Supplemental Esti- mates) ; Frank, J. C, (American Interoceanic Canals, a List of References, etc.* (New York 1916); Goethals, G. W., (The Panama Canal: an Engineering Treatise* (Introduction, Vol. I, pp. 1-30, account of Nicaragua-Panama com¬ petition, New York 1916) ; Menocal, A. G., (Report of Nicaragua Surveving Party) (Washington 1886) ; Napoleon III,*

Marrion Wilcox.

NICARAGUA WOOD, called also Peach- wood, a bright-red dyewood native to Nicara¬ gua, and a species of Cczsalpinia. It resembles Brazil wood botanically and in its properties, but yields a smaller amount of coloring matter.

NICATOR. See Demetrius II.

NICCOLINI, Giovanni Battista, jo-van'ne

bat-tes'ta nek-ko-le'ne, Italian dramatist: b. San Guiliano, near Pisa, 31 Oct. 1782; d. Florence, 20 Sept. 1861. He studied at the University of Pisa; published his first poem in 1804; and be¬ came in 1807 professor of history and mythol¬ ogy in the Academy of Fine Arts in Florence. His chief writings are his patriotic tragedies and his lyric verse. Among the former are: (Nabucco) (1816) ; (Antonio FoscarinP

(1827) ; (Giovanni da Procida) (1830), and (Arnoldo da Brescia (1843), the last a bitter attack on the Guelph party and his most fa¬ mous work. Among his other verse is (Beatrice Cenci,* a free translation of Shelley ; 'Rosmund a d'Inghilterra) (1838); and (Filippo StrozzP (1847). Strongly anti-papal in tone, in popu¬ lar estimation his plays were esteemed rather above their merits, and their fervid idealism does not help their capabilities for acting. Niccolini wrote also some volumes of criticism. The best collected edition is by Gargiolli (1862 et seq.). Consult the biography and critique by Vannucci (1866).*

NICCOLITE, a native arsenide of nickel, having the chemical formula NiAs. The crys¬ tals, when found, belong to the hexagonal sys¬ tem ; but the mineral usually occurs massive. It is reddish in color, and opaque with a metal¬ lic lustre. It has a hardness of from five to five and five-tenths, and a specific gravity of from seven and three-tenths to seven and seven-tenths. Niccolite occurs in Saxony, Bohemia,

Sweden, Cornwall, Scotland, Spain, Chile and the Argentine Republic. In North America it is found at Chatham, Conn., at Franklin Fur¬ nace, N.]., at Silver Cliff, Colo., and at Tilt Cove, Newfoundland. (Also known as (tKup- fernickle,® (< false copper, M or <(devil's copperˆ).

NICCOLLS, Samuel Jack, American Pres¬ byterian clergyman: b. Greenfield Farm, West¬ moreland County, Pa., 3 Aug. 1838; d. Old Forge, Adirondacks, N. Y., 19 Aug. 1915. He was graduated from Jefferson College in 1857; studied theology at Western Theological Semi¬ nary, and was ordained to the Presbyterian ministry in 1860. He was subsequently pastor at Chambersburg, Pa., and chaplain of the 126th Pennsylvania volunteers in 1862, and in 1865 became pastor of the 2d Presbyterian Church, Saint Louis. He was moderator of the Pres¬ byterian General Assembly in 1872. In March 1915, he celebrated the 50th anniversary of

his pastorate in Saint Louis. He published 'Women's Position in the Church, > (The Eastern Question in Prophecy, > etc.

NICCOLO, Alunno, nek'kd-lo a-loon'no, Italian painter: b. Foligno about 1430; d. there in 1502. He is also called Niccolo Alunno, Niccolo di Liberatore and Niccolo da Foligno. According to tradition his first teacher was Bartolommeo di Tommaso. Later he fell under the influence of Benozzo. Niccolo is an Umbrian and the true representative of the art of Foligno. He is said to have been the teacher of Perugino, Pinturicchio and Andrea di Luigi ; and, consequently, he is one of those who prepared the way for others of greater note, one of those who formed the Umbrian School which culminated in Perugino and Raphael. Alunno's first altarpiece at Deruta, representing the Virgin attended by Saint Fran¬ cis and Saint Bernardino (deprived of its wings and predella) , is dated 1458, a (Madonna with Saints, } in the Brera Gallery, Milan, was painted in 1465; an altarpiece, v Annunciation, > dated 1466, is in Santa Maria Nuova at Peru¬ gia and is remarkable for the graceful form of Gabriel with his crisp, wavy hair bound by a crimson band, and seraphs resembling Gozzoli's work and the altarpiece of Montelpare is now in the Vatican Museum. This is dated 1466, and signed (Nicholas Fulginos. After 1471 the influence of the decorative Crivelli begins to show, as in the altarpiece in the Duomo, Gualdo, and in the (Annunciation, > Bologna Gallery. The altarpiece in Saint Niccolo, Foligno (of which the predella is in the Louvre), represent¬ ing Saint Nicholas and the Infant Christ and painted in 1498, may be considered as Alunno's masterpiece in his second eclectic style. One of his latest works is the c Madonna with Angels and Saints) (1499) in a church at La Bastia, between Assisi and Perugia. A (Perugia 1872) ; Blanc, Charles, (Lcole om- brienne' ; Crowe and Cavalcaselle, (A New

History of Painting in Italy, > edited by Edward Hutton, Vol. Ill, pp. 163-174 (London and New York 1909).

NICCOLO (nek'ko-lo) OF AREZZO,

a-ret'so, Italian sculptor and architect: b. Arezzo, 1350; d. 1417. He worked on the sculp¬ ture of the cathedral at Florence, and executed two statues for the campanile (1383). His re¬ lief of the Virgin in the fagade of the Santa Maria della Misericordia is remarkable for a freedom and elegance which point to a distinct advance in Italian sculpture.

NICCOLO DE' NICCOLI, da nek'ko-le, Italian humanist: b. Florence, 1363; d. there, 23 June 1437. He rendered literature most im¬ portant service by ransacking Europe for manu¬ scripts of the principal Greek and Latin works. At' his death he presented to the public his library, which became the basis of the Marcian library, one of the most famous of Italy. Niccolo

copied and corrected numerous manu¬ scripts with his own hand, and thus came to be regarded as the originator of textual criticism of the ancient authors.

NICE, nl'ke, a Greek goddess. See Nike.

NICE, nes, Asia Minor. See Nicˆa.

*NICE, lies', France, a city, seaport, and health resort, capital of the department of the Alpes Maritimes, beautifully situated near the base of the Maritime Alps, on the Mediter¬ ranean, and on both sides of the Paillon or Paglione, a mountain torrent of short and rapid course, 140 miles east by north of Marseilles. It is divided into the Old Town, on the left bank of the Paglione, and the New Town, on the right. Both quarters, but more especially the New Town, have of late years been much ex¬ tended. The streets of the former are mean¬ looking compared with those of the latter, in which there are wide streets and boulevards, and lofty and handsome houses. The quays that border the Paglione are lined with gay shops, and between these and the sea the stream is entirely covered over, leaving a wide space or square where is a handsome public casino, with a fine winter garden. The Croce de Marbre commemorates the reconciliation of the Emperor Charles V and Francis I by Pope Paul II. There are statues of Massena, Gari¬ baldi and Carnot. At the mouth of the stream there is a public garden, and westward along the sea-front a fine promenade, the Promenade des Anglais, bordered with hand¬ some hotels and villas. On a pier or jetty pro¬ jecting from the public garden is a fine new casino. Public buildings include a cathedral, theological and teaching seminaries, natural his¬ tory museum, observatory, several theatres, public library with 60,000 volumes, etc. Nice possesses some silk, cotton and paper mills ; many oil mills and manufactories of leather, silk, soap, liqueurs, dyes, essences, perfumery, etc. Immense quantities of flowers are grown. The harbor or port is separated from the rest of the town by the Castle Hill (320 feet), which has been laid out into beautiful grounds commanding magnificent views and crowned by the remains of an old castle. The harbor has recently been greatly improved, and is available for vessels of *5,000 tons. The exports by sea consist principally of olive-oil. Nice is much*

resorted to in winter by foreigners, particularly English. The carnival of Nice, which begins on Shrove Tuesday, lasts eight days. Owing to sudden changes of temperature (mean tem¬ perature 60° F., ranging from 27j4° to 88°), its climate is unsuitable for those laboring under pulmonary and

bronchial complaints, but patients suffering from chronic rheumatism, goiU and paralysis derive benefit. Pop. 142,940.

The ancient Ligurian town of Nicaea, founded by a colony of Phocseans from Mas- salia (Marseilles), became subject to Rome in the 2d century b.c. It was in the hands of the Saracens during the greater part of the 10th century. Then, after existing as an independ¬ ent city, it acknowledged the supremacy of the Counts of Provence and the House of Savoy (1388). In 1543 it was taken and pillaged by the Turks. Later, from 1600 onward, it was repeatedly taken by the French; and they kept possession of it from 1792 to 1814, In 1860 it was ceded to France by Sardinia (Savoy). Massena was born near the city, and Garibaldi in it. Consult Hole, (Nice and her Neighbours (1881); Loveland, (The Romance of Nice> (1912) ; Moris, (1899) ; Nash, (Guide to Nice* (1884).*

NICE, Councils of. See Nicaea, Councils

OF.

NICENE (ni'sen) CREED, a detailed doc¬ trine embodied in the liturgies of the Catholic, Oriental and Anglican churches, and generally accepted by Protestants. While not absolutely identical with the original Creed formulated at the Council of Nicsea (q.v.) in 325 a.d., against the Arian heresy, the main points of doctrine therein agreed on are embodied in it. Prior to its adoption, the several churches had their own doctrinal formulae. The final clauses after (

NICEPHORUS, ni-sef'6-rus, Greek his¬ torian: b. 758; d. 829. He is generally known as Nicephorus Constantinopolitanus, was secre¬ tary to the Empress Irene, and in 806 was elected patriarch of Constantinople. The violent Emperor Leo. V deposed him, and he retired to a cloister in 805. To this retirement we owe his invaluable (Chronologia Compendiaria) and (Breviarium Historicum.

NICEPHORUS I, Byzantine emperor of the first decade of the 9th century a.d. ; d. 26 July 811. He is often called (

NICEPHORUS II, Phocas, Byzantine em¬ peror: b. 912; d. 10 Dec. 969. He was of Cap¬ padocian descent, and, like his father, Bardas Phocas, proved himself a great general. Dur¬ ing the reigns of Constantine VII and Romanus II he fought the Arabs in Asia and southern

Italy, and in 961 recaptured the island of Crete from the Saracens. In 963 he returned to Con¬ stantinople after the death of Romanus II, was proclaimed emperor in August, and in Septem¬ ber married Romanus' widow, Theophano. As emperor Nicephorus' military career was no less

brilliant than before; he renewed the war against the Arabs, won all of Cilicia, and in 969 captured Antioch; and was equally success¬ ful against the Bulgarians and Macedonians. At home his heavy taxes to carry on these cam¬ paigns and his bold tampering with ecclesiastical funds aroused monks and people against him. He was assassinated by his wife's paramour and his own kinsman and general, John Tzimisces. Nicephorus was not only a gen¬ eral 'but a statesman and diplomat, as is evi¬ denced by his work (Legatio, edited by Pertz (1839). Consult Schlumberger, (Nicephore Phocas* (1890).*

NICEPHORUS III, Botaniates, Byzantine emperor of the 11th century. He was a general grown old in the service, when in 1078 he suc¬ cessfully plotted against Michael VII and be¬ came emperor. His reign of three years was filled with contention against his rivals at home and with Robert Guiscard abroad. He was forced to abdicate in favor of Alexis Com- nenus in April 1081, and spent the few months that remained to him in a monastery.

NICETAS ACOMINATUS, ni-se'tas a-kom-i-na'-tus, Byzantine historian : b. Chonae (hence called Choniates), in the middle of the 12th century; d. Nicaea, 1216. He was a resi¬ dent and official of Constantinople up to 1204, when the city was captured and he removed to Nicaea. His excellent history of the Byzantine Empire from 11 18 to 1206, completing Zonaras, is his most important work; it is edited by Bekker (1835).

*NICHIREN, nich'i-ren, Japanese religious reformer : b. 1222 a.d. ; d. 1282. He founded a Buddhistic sect, the Nichvien-shiu. He appears to have been a fanatic religionist of a persecut¬ ing temper, and to have quarreled bitterly with other sects. Two exiles were imposed upon him for his subversive doctrines. The central doc¬ trine of his teaching is that all life may attain to being a Buddha by repeated transmigrations. Final salvation is reached by prayer and obedi¬ ence to the law. Nichiren is reverenced, but not worshipped, by his followers, whose chief shrines are at Ikegami, near Tokyo. A transla¬ tion of the sacred book of the sect is printed in Max Muller's (Sacred Books of the East.1**

*NICHOL, nik'ol, John, Scottish lecturer and author: b. Montrose, Scotland, 8 Sept. 1833; d. London, 11 Oct. 1894. He was edu¬ cated at Glasgow University and Balliol Col¬ lege, Oxford, being graduated with honors from the latter in 1859. From 1862 to 1889 he was professor of English literature in Glasgow University, later lectured widely in England and Scotland on literary subjects, and was prominent in the university extension. He visited the United States several times, and during the Civil War warmly supported the * Northern cause. He prepared the article on (American Literature) for the Encyclopedia Britannica,* which has been*

separately pub¬ lished; and also wrote (Fragments of Criti- cism) (1860); (Hannibal* (1872), a dramatic

poem; 'Tables of European Literature and History' (1876) ; (Byron ' in the (English Men of Letters' series (1880); 'Robert Burns) (1882); (Francis Bacon' in Philosophic Classics for English Readers' (1888-89); Pant' (1889), and 'Carlyle' in the English Men of Letters' series (1892). Consult his (Memoir' by Knight (1896).

NICHOL, John Pringle, Scottish astron¬ omer: b. Brechin, Forfarshire, 13 Jan. 1804; d. near Rothesay, 19 Sept. 1859. Originally edu¬ cated for the Scottish Church, at King's Col¬ lege, Aberdeen, he turned his attention to as¬ tronomy and in 1836 was appointed professor of astronomy in Glasgow University, a post which he retained with great credit till his death. He lectured in the United States 1848- 49. Among his works may be mentioned 'The Architecture of the Heavens' (1838); Phe¬ nomena of the Solar System' (1838) ; 'The Stellar Universe' (1847) ; the Planetary Sys¬ tem' (1851), and 'The Planet Neptune' (1855). These have the merit of being written in a very attractive and interesting style, and ob¬ tained a wide oopularity. He likewise edited a (Cyclopaedia of Physical Sciences' (1857).

NICHOLAS, mk'6-las, a proselyte of An¬ tioch, one of the seven deacons (Acts vi, 5). He is sometimes charged, though on insufficient evidence, with founding the sect of Nicolatians alluded to in Rev. ii, 15.

NICHOLAS, Saint, a popular saint revived by. both Greeks and Latins on 6 December. Saint Nicholas belongs to the 4th century of the Christian Era. The accounts of his life are purely legendary. According to tradition he was a native of the city of Patara, in Lycia, Asia Minor, was devotional in early youth and entered the monastery of Sion near Myra. In the course of time he became an abbot and sub¬ sequently was elected archbishop of the metro¬ politan church of Myra. This was in the time of the Emperor Diocletian under whom Saint Nicholas was persecuted, tortured and kept in prison until the more tolerant reign of Con¬ stantine. He is said to have been present at the Council of Nicaea (325), but this is uncon¬ firmed by historians.

The history of Saint Nicholas did not end with his death and burial. His relics were pre¬ served with great honor at Myra until the end of the 11th century, when some merchants of Bari, on the Adriatic, moved by a pious

indig¬ nation, made an expedition to the coast of Lycia; and, by means of a ruse, seized his re¬ mains and carried them off to Italy. Landing at Bari they deposited these sacred relics in the church of Saint Stephen (9 May 1087). On that day it is said that 30 persons were cured of distemper through imploring the intercession of Saint Nicholas. Since that time his tomb at Bari has. been a pilgrimage place. Perhaps no saint enjoys so great a popularitv as Saint Nicholas. He is the patron saint of Russia. He is regarded as the special guardian of vir¬ gins, of children and of sailors. Scholars were also under his protection; and he even came to be regarded as the patron of robbers, from an alleged adventure with thieves, whom he com¬ pelled to restore some stolen goods to their proper owners. In consequence thieves were called in the Middle Ages ((clerks of Saint Nicholas." Tn art Saint Nicholas is represented

with various attributes. His most usual ap¬ pearance is standing in his splendid episcopal attire by the side of three children in a tub. The interpretation of this is found in the legend that Saint Nicholas miraculously restored tc life three youths, sons of rich parents, who had been murdered, cut up and hidden in a salting tub, by a wicked innkeeper of Myra, in whose house they had taken lodging for the night while on their way to Athens to continue their education. From this circumstance Saint Nicholas became the patron and guardian of children. The legend regarding his care of virgins and the connection of his name with the giving of presents in secret is told as follows : A nobleman in the town of Patara had three daughters, but was so poor that he was unable to provide them with suitable marriage por¬ tions. He was on the point of abandoning them to a sinful course of life when Saint Nicholas heard of it; and, going secretly to the nobleman's house at night, he threw a nurse of gold into an open window. This fell at the feet of the father who used it for the dowry of the eldest daughter. On the second night Saint Nicholas threw a second purse for the second daughter; and on the third night an¬ other for the third daughter. On this occasion the nobleman caught Saint Nicholas in the act and held him by his robe. Saint Nicholas made him promise that he would inform no one of his munificence. From this incident it became the custom for the older members of a house¬ hold to place presents in the shoes or stockings of their young relatives, who on discovering them in the morning were pleased to attribute them to the generosity of Saint Nicholas. From this same exhibition of munificence Saint Nicholas is often represented as bearing three golden balls which later became the sign of the pawnbrokers. Hence Saint Nicholas is sometimes considered as the patron of pawn¬ brokers.

An important function of Saint Nicholas was to guide mariners. Hence in many sea¬ port towns there are churches dedicated to Saint Nicholas in which sailors hang up votive pic¬ tures and return thanks for preservation

at sea. It is said that Saint Nicholas, when making a voyage to the Holy Land, caused a terrible tempest to abate; and at another time appeared and saved some mariners who had invoked his aid. Churches dedicated to Saint Nicholas are numerous in all countries.

. On Saint Nicholas' Day in ancient times a singular ceremony used to take place. This was the election of the Boy Bishop or Epis- copus Puerorum, who from 6 December to In¬ nocents or Childermas Day (28 December), ex¬ ercised a burlesque episcopal jurisdiction; and, with his juvenile dean and prebendaries, parodied, the various ecclesiastical functions and ceremonies. These ceremonies, ridiculous to modern minds, , were encouraged as object les¬ sons and participated in by the clergy them¬ selves. The election of the Boy Bishop pre¬ vailed throughout the English cathedrals and grammar schools ; but it was most particularly observed at Sarum (Salisbury). A full de¬ scription of the mock ceremonies is preserved in the ' Processional of Salisbury Cathedral,' where the service of the Boy Bishop is set to music and printed. Strype in his ' Ecclesi¬ astical Memorials' says that in 1556 "on the eve

of his day Saint Nicholas, that is, a boy habited like a bishop, went abroad in most parts of London, singing after the old fashion, and was received by many ignorant but well disposed people into their houses, and had as much good aif ever was wont to be had before.® VYith the establishment of Protestantism in England, the pastime of the Boy Bishop ended. In France the Boy Bishop was not abolished until 1/21, and continued in Germany until late in the 18th century.

The Feast of Saint Nicholas at Bari is one of the principal ecclesiastical festivals of south¬ ern Italy; and the grand prior of Saint Nich- olas at Bari is one of the chief ecclesiastical dignitaries of Italy.

The celebration of Saint Nicholas Day has ˆeen ?eneral in the Low Countries and Rhine provinces; but the growing concentra¬ tion of the winter fest'val on Christmas Day and the rise in importance of the Christmas tree during the last 200 years has caused the Saint Nicholas customs to be absorbed into the Christmas celebration. In Belgium and Holland Saint Nicholas Day is still the clay of joy and not Christmas. "On the eve of his festival day,® writes an authority. "Saint Nicholas makes his tour, visiting palace and cottage. Frequently in the early evening he makes

a preliminary visit in his bishop's robes, with pastoral staff and mitre, at each house, making inquiries concerning the conduct of the children, giving appropriate praise or warning, and promising on the following morning to §jve substantial reward. When he is gone, the children place receptacles for the gifts which Saint Nicholas is expected to let fall down the chimney. The receptacle varies in different places. Sometimes shoes are neatly polished for the purpose, at other times plates, or baskets, or stockings, or specially made shoes of porcelain are set on the bed, in the open chim¬ ney, before the door of a room or merely in the corner of a room. Saint Nicholas'-steed, variously conceived of as a gray horse or a white ass, is not forgotten. For him the chil¬ dren put water and hay, or carrot, or potato peeling, or a piece of bread in the shoe, or basket, or stocking. In the morning from the tipped-over chairs and general disarray in the room it is evident that Saint Nicholas has been present. Replacing the oats, or hay, or carrot are found sweets and playthings for children that have been good, obedient and studious during the year. In the case of bad children, rods are left and the fodder is untouched.® Saint Nicholas' robe — his ((tabard® — en¬ ables him to travel from place to place in¬ stantly. In Holland he is supposed to use a horse for his journey at night over the roofs of the houses. Belgium and Holland have special cakes and sweets for the Saint Nicholas season. Life-sized figures of Saint Nicholas are frequent in front of shop windows and in some places a man dressed like the saint goes about the streets on a white horse with presents. The Dutch settlers brought the Saint Nicholas cus¬ toms to New York, whence they spread to other parts of the United States and became amalga¬ mated with the Christmas customs from other countries. The American "Santa Claus® is a corruption of the Dutch San Nicolaas. "Santa Claus,® writes McKnight, "the name derived from Saint Nicholas through the familar use of

children in Teutonic countries, crossed to America. The exact route followed by him is somewhat open to question. On the way he traded his gray horse or ass for a reindeer and made changes in his appearance. In America he has made himself very much at home; and, according to the explanation most generally ac¬ cepted, from America he recrossed the Atlantic to England, whence he has journeyed to the most distant parts of the British Empire, to India and to Australia, where he is as familiarly known as in America.® The immortal noem of 'The Night Before Christmas,) by Clement C. Moore, makes him a jolly elf "Saint Nick,® who rides "in a miniature sleigh drawn by eight tiny reindeer.®

Consult Schnell, Eugen, (Revensburg 1886) ; Laroche, Jules, (Naples 1751); Cahier, C,, 'Caractenstiques des Saints> (Paris 1867) ; McKnight George Harvey,

NICHOLAS, Saint, of Myra, one of the

chief saints of the Greek Church, called the Wonder-Worker and venerated by the Roman Catholic Church: b. Parara, province of Lycia, in Asia Minor, toward the end of the 3d 'cen¬ tury; d. Myra, 6 Dec. 345 or 352. He was a bishop of Myra, imprisoned during the Diocletian persecution and set at liberty by Con¬ stantine the Great. He was present at the Council of Nicsea (325). He is venerated in the East and West as a saint and miracle worker, the patron of little children, unwedded

ina^no'7 sailors, and of Russia and Greece. In 1087 his body was stolen by Italian mer¬ chants and taken to Bari in South Italv 9 May. His festival, the anniversary day of his death, is still kept with special ceremonies in Italy, Germany, Switzerland and the Low Countries. He is the original of the Christmas present- b ringer, "Santa Claus,® this name being a cor- i uption from the Dutch, the early colonists bringing the observance of Saint Nicholas' day to America. Nicholas or old Nick being a cant name for the Devil. Saint Nicholas' clerks became a cant name for thieves. Con¬ sult Praxmarer, (Der Heilige Nikolaus und seine Verehrung (1894); and Chambers' Book of Days.* See Boy Bishop.*

NICHOLAS, the name of five popes, as follows :

NICHOLAS I, Saint: b. Rome; d. there, 867. He succeeded Benedict III in 858. He was of a resolute disposition and successfully upheld the papal authority. He excommuni¬ cated Photius, patriarch of Constantinople, who had usurped that see after the deposition of Ignatius by the Emperor Michael III. He re¬ stored the violated rights of Thietberga, the unjustly divorced wife of Lo Lothair of Lor¬ raine, brother of the Emperor Louis II, and that though they took arms against him and laid siege to Saint Peter's itself. Consult Lam- mer, (Nikolaus I und die byzantinische Staats- kirche seiner Zeit (1857); and (Lives) or studies by Greinacher (1909) ; Leroy (1898) • and Roy (1901).*

NICHOLAS II (Gerhard, ger'hart, Fr. zha-rar) : b. Burgundy; d. Florence, 19 July

1061. A canon of Liege he became bishop of Florence in 1046 and succeeded Stephen X in the papal chair in 1059. He was opposed by a rival, called Benedict X, the choice of some of the Roman nobles, but being disavowed by the Council of Satri, Benedict was obliged to forego his claim. Hildebrand wTas the counsellor of Nicholas throughout his pontificate, and through his direction a council was assembled at Rome in

1059 which restricted the papal election to the college of cardinals.

NICHOLAS III (Giovanni Gaetano degli Orsini) : d. 1280. He came of a noble Italian family and in 1277 was elected in succession to John XXI. From the emperor, Rudolph of Hapsburg, he succeeded in obtaining the cession of Romagna and the exarchate of Ravenna, and he deprived Charles d'Anjou, king of Naples, of the vicariate of Tuscany. He sent missionaries to Persia and China (1278) and attempted to originate a crusade. He was suc¬ ceeded by Martin IV.

NICHOLAS IV (Gorolamo Masci) : b. Ascoli, Italy; d. 1292. While very young he entered the order of Saint Francis and in 1274 became its general. He was made a cardinal by Nicholas III and bishop of Palestrina by Martin IV, and in 1288 was elected Pope. He was the first Franciscan pontiff. He excom¬ municated James of Aragon and his followers in Sicily and promoted the claims of Charles II of Anjou to that kingdom. He sent mission¬ aries to the Bulgarians, Tartars and Chinese. Acre, the last Christian stronghold in the East, fell into the hands of the Saracens, during his pontificate, and unsuccessful efforts to excite a new crusade are supposed to have hastened his death.

NICHOLAS V (Tommaso Parentucelli) : b. probably at Sarzana, near Pisa, 1398; d. 1455. He was the cardinal-bishop of Bologna and succeeded Eugenius IV in 1447. During his pontificate the last anti-pope, Felix V, made submission and the Council of Basle was dis¬ solved (1449). Three conspiracies were formed against him by Stefano Porcaro, who, after being twice pardoned, was executed (1453). The fall of Constantinople (1453) led to stren¬ uous effort by Nicholas to arouse the princes of Europe to succor their brethren in the East ; but the age of chivalry was past and his ap¬ peals fell on deaf ears. He was one of the most learned men of his time, collected books and manuscripts, and ordered translations to be made of the Greek classics. The Vatican library was also founded by him, and he embel¬ lished Rome with numerous fine edifices.

NICHOLAS V (Pietro Rainalducci), anti-pope, 1328-30: b. Corbara in the Abruzzi ; d. Avignon, October 1333. A married man, he separated from his wife in 1310, joined the Franciscan Order and acquired fame as a preacher. During the papal exile at Avignon, Louis of Bavaria nominated him Pope against John XXII. He was elected by an assembly of priests and laymen and was consecrated by the bishop of Venice in Saint Peter's Cathedral, 12 May 1328. In April 1329 he was excommuni¬ cated, until, submitting with a rope around his neck to John XXII, 25 Aug. 1330, he received the pardon which was refused to Louis, who temporised for a retraction. The anti-pope re¬

mained in retirement until his death.

NICHOLAS I, king of Montenegro: b. Nie- gush, the ancient home of the long-reigning family of Petrovitch-Niegush, 25 Sept. 1841 ; d. Antibes, France, 2 March 1921. He was the son of Mirko Petrovitch, a famous. Mon¬ tenegrin soldier, and brother of Danilo II. The latter was assassinated 13 Aug. 1860, leav¬ ing no male heir. , Mirko Petrovitch having resigned his claim to the throne, Prince Nicho¬ las succeeded. Owing to the influence of the wife of Danilo II, the Princess Darinka, Prince Nicholas had been educated in Paris at the Academy of Louis-le-Grand and was in Pari when his uncle was murdered. He returned to Cetinje, Montenegro, and in the same year was married to Milona, daughter of Peter Valsqtitch, president of the Council of State. In 1862 he distinguished himself in the cam¬ paign against Turkey and on one occasion narrowly escaped with his life. In 1876 he de¬ clared war against Turkey and in 1877-78 captured Nikshitch, Antivari and Dulcigno. This war, in which his military reputation was greatly increased, resulted in a considerable extension of the frontiers of Montenegro and the acquisition of a seaboard on the Adriatic. In 1896 he celebrated the bicentenary of the Petrovitch dynasty and attended the coronation of the Tsar Nicholas II. In 1898 he visited Queen Victoria at Windsor Castle. On 28 Aug. 1910 on the 50th anniversary of his reign, he changed his title from that of Prince to King, in accordance with a petition from the Na¬ tional Assembly or Skupshtina. Nicholas I, his family and his government fled from Mon¬ tenegro in December 1915, when the country was overrun by the Austro-Germans. Since that time he has lived in France and the Montenegrin government has been at Neilly- sur-Seine. On 8 Nov. 1918, Nicholas declared himself in favor of a union of Montenegro with the new state of Jugo-slavia with each component state independent as to religion, education and territorial integritv. On 29 No¬ vember he was deposed by the Skupshtina, the Montenegrin National Assembly, which de¬ clared for a union of Montenegro with Serbia under King Peter. The family of Nicholas I was included in the act of deposition.*

He had three sons and five daughters. The eldest son, Prince Danilo, married (1899) Duch¬ ess Jutta of Mecklenburg-Strelitz ; Princess Helena is married to King Victor Emmanuel III of Italy; Princess Anka to Prince Francis Joseph of Battenberg; Princess Militza to the Grand Duke Peter Nikolaievi'tch, former com¬ mander of the Russian armies, and Princess Stana to Duke George of Leuchtenberg. Of him James D. Bourchier writes: ((The descendant of a long line of warriors, gifted with a fine physique and a commanding pres¬ ence, a successful military leader and a grace¬ ful pose, King Nicholas possesses many char¬ acteristics wh;ch awoke the enthusiasm of the impressionable Servian race, while his merits as a statesman have received general recog¬ nition. >} His writings hold a high

place in modern Slavonic literature. They include his¬ torical dramas, poems and ballads. Among them are (Balkansa Tzaritza) and (Kniaz Ar- yaniti,) dramas; (Skuphene Pesme and (Nova Kola, > songs; and (Haidana, Potini Aben- serage) and (Pcsnik i Vila,* poems.*

NICHOLAS I, Pavlovitch, Tsar of Russia: b. near Saint Petersburg, 6 July (25 June) 1796; d. Saint Petersburg, 2 March 1855. He was third son of Paul I. He married in 1817 the t nncess Charlotte, daughter of Frederick Wil¬ liam III of Prussia. The Crown was relin¬ quished by his elder brother, Constantine, and on 24 Dec. 1825 he entered upon his reign and 3 Sept. 1826 was crowned at Moscow. On 26 Dec. 1825 the military conspiracy of the Deka- brists, which had been for several years in op¬ eration, broke out. Nicholas suppressed this revolt with great energy and personal courage ; but the ultimate result was to arouse a policy of strong autocracy, based largely on the army, and bent on strictly maintaining internal peace. The civil administration was placed under mili¬ tary supervision ; and the laws subsequently promulgated for the relief of serfdom were largely ineffective. Nicholas' foreign policy was aggressive. A war with Persia (1827-28) was concluded by a peace which gave Russia an important increase in territory; and a disastrous one with Turkey (1828-29) by the peace of Adrianople which secured to Russia the east¬ ern coast of the Black Sea, and brought about the establishment of the Grecian kingdom. The European revolutions of 1830 were followed by an insurrection in Poland, which was rigor¬ ously suppressed and was followed by the com¬ plete Russification of that country. The un¬ bending rule of Nicholas earned him the sob¬ riquet of the ((Iron Tzar.® Under the stern discipline which he believed the necessities of the time and the expanding empire required, Russia seemingly became well-ordered. This was largely due to the work of the dreaded Third Section — the secret police system which he inaugurated, so as to bring every subject into direct communication with the throne. As opposed to the willing service of a free and enlightened people, encouraged to express their opinions on public questions, the servile sub¬ servience of an oppressed people always tends to degeneracy, and its effects became evident when the army and navy, called upon for special efforts, revealed astounding instances of corruption, disorganization and stupidity in ad¬ ministrative circles. Having, as he thought, disciplined Russia, Nicholas believed it to be his duty to discipline the world. In 1826, on behalf of the British government, politically and commercially interested in the development of Eastern Europe, the Duke of Wellington on a diplomatic mission had sought to effect a con¬ cert of opinion. The Iron Tsar had proved superior in diplomatic finesse to the Iron

Duke and, without political safeguards, Great Britain had to submit to the encroaching Russification of Turkey by the Treaty of Adrianople. In 1849 Nicholas aided Austria in the conquest of the Hungarian revolutionists. His attitude toward Turkey brought on the Crimean War. In 1853 he demanded protectorate over Turkish sub¬ jects of Greek religion, but the Sultan refused, and was supported by England and France. The Russian army proved to be unprepared, and was defeated at the Alma and Inkerman. Nicholas died before the end of the contest (see Crimean War). During his reign con¬ formity to the Orthodox Greek Church was imposed on his subjects. He was the most prominent sovereign of his time and an honest, brave and majestic despot, but a martinet and

a reactionary who was always afraid to dele¬ gate his authority.

Consult Edwards, (1890) ;

1907, 1909).

NICHOLAS II, Tsar of Russia: b. Saint Petersburg, 18 May 1868; executed by the Revolutionists, 17 July 1918. He was the eld¬ est son of Alexander III by his wife, the Dan¬ ish princess Dagmar, known as czarina by the name Maria Feodorovna. His education under General Danilovitch was military; it was con¬ cluded by a trip through the East, in 1891, dur¬ ing which he was nearly killed by a sabre stroke from a Japanese fanatic. His father's death 1 Nov. 1894 brought him (much against his will) to the throne; he married Princess Alice of Hesse, 26 Nov. 1894; and in May 1896 was crowned with great pomp at Saint Petersburg. His policy he proclaimed would be the peaceful one of his father, and this for 20 years certainly proved true as regards his relations with the European powers. His visits to Vienna, Breslau and Paris in 1896, and the visits paid him in return in 1897 by the Em¬ peror of Austria, by William II of Germany, and by President Faure of France showed his willingness and the eagerness of Austria, Ger¬ many and France that there be a peaceful European policy. Even more striking was the Tsar's note to the powers, published by Count Muravieff 24 Aug. 1898, inviting them to a Peace Congress, looking to the disarmament of the Powers, The Hague Congress in 1899 was followed by another visit to Paris by the tsar 18-21 Sept. 1901 and by President Loubet's trip to Saint Petersburg 20-23 May 1902, and by a Franco-Russian convention iutended to offset the Anglo-Japanese entente. The war with Japan and a reactionary policy at home gave rise to a strong revolutionary movement in 1905. Repression followed with relentless hand and Nicholas presented a miserable spectacle of vacillation — too weak to assert his autocratic powers and exact obedience and without the resolution or the humanity to inaugurate a liberal policy. His superstition was shown by his consultation of fortune-tellers, spiritualists, mystics and charlatans in

his desire to secure a male heir, his first four children being all girls. His internal policy is dealt with fully in the article on Russia (q.v.). Upon his accession, Nicholas II was hailed as a liberal, if not a radical. Whether there was internal reform during his administration is uncertain ; even the rescript in favor of religious freedom seemed a doubtful reform in the eyes of some critics, who urged that although freedom was granted to all present sects the death penalty still held for any Greek churchman who left the Ortho¬ dox faith for any other. How far the emperor was personally responsible for the acts of his government is also doubtful ; he was often de¬ scribed as the mere tool of his narrow procura¬ tor-general, Pobiedonostyeff. The measures taken to Russianize Finland, and the slack treatment of those guilty of the Kishineff mas¬ sacres, seem — to say the least — unlike the tsar as he was pictured at his accession. The part taken by Nicholas to prevent the out¬ break of war in 1914 and his determination to

protect Serbia were perhaps the greatest and noblest acts of his public life. The story of his efforts in these directions is told elsewhere. (See Russia; War, European). Reverses at the front and hints of pro-German intrigues brought troubles to the Tsar and his govern¬ ment in 1915 and 1916. The closing days of the latter -year saw the resignation of Premier Stuermer brought about by the Duma. Trepoff succeeded and a more progressive administra¬ tion ensued. Rasputin, the notorious monk, whose influence at court had been as powerful as it was baneful, was murdered. Trepoff 's administration displeased the bureaucrats, how¬ ever, and in January 1917 he was succeeded by Prince Golitzin, a reactionary Conservative and probably a pro-German. Discontent soon mani¬ fested itself under his regime. Riots provoked by food scarcity broke out in Petrograd on 9 March; within two_ days the infection had spread to the munition workers who voted to strike, and a mutiny followed in the army. The Duma met on 12 March, defied the Tsar's decree of dissolution and assumed the leader¬ ship of what everyone now recognized as a rev¬ olution. Nicholas was peremptorily told to dis¬ miss his reactionary ministers and to inaugu¬ rate internal reforms if he would save his throne. The Duma leaders, under Rodzianko, also intimated that an end must be put to Ger¬ man intrigue and that the war be prosecuted with full vigor and in close co-operation with the Entente. Nicholas's weakness of resolu¬ tion delayed matters until it was too late to save the Imperial House. On 15 March 1917 Nicholas II abdicated the throne at Pskov, for himself and his son, in favor of the Grand Duke Michael. The latter declined the then doubtful honor of the succession until a Na¬ tional Assembly should have passed upon the future

form of government. The new govern¬ ment placed the Imperial family under arrest in the palace at Tsarkoe-Selo. After a few months' confinement there the former Tsar and his family were deported to Tobolsk, where about a year was spent in semi-seclusion amid the rigors of a Siberian winter. By orders of the Bolsheviki Nicholas II, now plain Nicholas Romanoff, was shot to death 17 July 1918, and a subsequent announcement was made that his wife and children had also been executed, but the exact fate of the family remains uncertain. Pope Benedict XV sent a special envoy to Russia to ascertain their fate and, if they were found alive, to bespeak decent treatment in their regard, but thus far his efforts have been futile. See Russia; War, European, and con¬ sult Elchaninov, A, (Czar Nicholas IP London 1913) ; Gardiner, A. G., (Prophets, Priests and Kings) (London 1908; new ed., 1914) ; Harden, Maximilian, (Monarchs and Men- (Philadelphia 1913). Leudet, Maurice, (Nicholas II in time) (Paris 1899) ; Oukhtomski, Prince E. E., (Voy~ age en Orient, Grece, Egypte, Inde, 1890-91, de son altesse imneriale le Cesarevitch) (2 vols., Paris 1893) ; Vasili, Paul, (Behind the Veil of the Russian CourP (London 1914); Speeches of Nicholas, 1894-1906) (in Russian, Saint Petersburg 1906).*

NICHOLAS, Str Edward, English secre¬ tary of state : b. Wiltshire, England, 4 April 1593; d. East Horsley, Surrev, England, 1 Sept. 1669. He was educated partly at Queen's Col¬

lege, Oxford, and in 1620-21, 1623-24, 1627-28 he was a member of Parliament. In 1641 he became secretary of state under Charles I, urged a composition with the Scots, arranged the Treaty of Uxbridge, after the surrender of Oxford (1646), retired to the Continent, but nominally remained in his office until the king s execution. During the exile of Charles II he was practically excluded from influence through (he hostility of Queen Henrietta and the Catho¬ lic faction; but at the restoration in 1660 he resumed his former office from which he re¬ signed in 1662.

NICHOLAS, George, American soldier and

statesman: b. Hanover, Va., about 1755; d. Kentucky, in 1799. He was the son of Robert Carter Nicholas (1715-80), a prominent Vir¬ ginia statesman. After graduation at Wil¬ liam and Mary College in 1772 he joined the 2d Virginia Regiment in 1775, of_ which he was made captain. In November 1776 he became major of the 11th Virginia Regiment, of which he was made lieutenant-colonel in the follow¬ ing year. He resigned from the service in November 1778. In 1781 he was a member of the Virginia assembly, and in 1788 he was an active member of the convention that ratified the Federal Constitution. In 1790 he removed to Kentucky and was a member of the conven¬ tion that formed the constitution of

Kentucky at Danville, Ky., 1 April 1792. He was the first attorney-general of Kentucky.

NICHOLAS, Wilson Cary, American sol¬ dier and legislator: b. Hanover, Va., about 1757 ; d. Milton, Va., 10 Oct. 1820. In 1774 he was graduated from William and Mary College, and at the beginning of the Revolutionary War joined the Continental army. He became officer in command of Washington's life guards and served in this position till 1783. He was a mem¬ ber of the Virginia State Convention which rat¬ ified the Constitution of the United States, and was one of those who favored ratification. In 1799 he became United States senator, and in 1804 resigned from the senate to become collec¬ tor of the ports of Norfolk and Portsmouth. In 1807 he was elected to Congress, serving till 1814, and in the latter year was elected governor of Virginia for two years. He was one of the most influential supporters of Thomas Jefferson.

NICHOLAS OF CLEMANGES. See

Clemanges, Mathieu Nicolas.

NICHOLAS OF CUSA. See Cusa.

NICHOLAS LAND, an Arctic archipelago

discovered in 1913 by Capt. Boris Andreevitch Vilkitsky (1870), Russian naval officer and Arc¬ tic explorer, who met with great success while commanding a squadron of ice-breakers in sur¬ veys of the ice-clad waters of. the Siberian Ocean. Nicholas II Land, named for the last tsar of Russia, extends from 30 miles north of Cape Chelyuskin to 81° N. lat., 96° E. long. The eastern coasts of the newly discovered archipelago cover about 200 miles. The most southerly of the islands is within 30 miles of Asia. The geological specimens obtained indi¬ cate that Nicholas II Land is an extension of the continent of Asia. The explorer described Nicholas II Land as consisting of high abrupt cliffs, covered with scanty vegetation, and iso¬ lated peaks apparently volcanic.

«r, N,1CHTˆLAS OF . LYRA, li'ra, called

octoi Planus et Utilis,ˆ medijevai French ni°nk and 'bildical scholar: b. Lyre, Normandy: d. Paris, 23 Oct. 1340. He entered the Fran- ciscan order in 1291, became professor of theol¬ ogy in the Sorbonne; later was provincial of his order in Bui gundy and labored for the conver¬ sion of the

Jews. His Hebraic and rabbinical leai rung was profound. His chief work is the I ostillae Perpetuae (1471-74), a running com¬ mentary on the Scriptures and the first put into print. It is liberal in its interpretations, but, on account of his linguistic knowledge, is on a much sounder basis than similar works of the pcnod. It was much used by Luther. Consult Davidson, 'Sacred Hermeneutics:* (1843).*

NICHOLAS NICKLEBY, mk'l-bi, a well known novel by Charles Dickens which ap¬ peared serially in 1838 and 1839. It contains in Dotheboys Hall a realistic description of the condition of cheap boarding schools of that period, . and the author s strictures accomplished not a little toward reform in this direction.

NICHOLAS VILLE, nik'o-las-vil, Ky., city, county seat of Jessamine County, on the Cincin¬ nati, New Orleans and Texas Pacific, the Louis¬ ville and Nashville railroads; about 10 miles south by west of Lexington and 70 miles east by south of Louisville. It was settled in 1799, and in 1835 was incorporated. It is the commercial centre of a productive agricultural region, in which tobacco is one of the chief crops, and con¬ siderable attention is given to horse-breeding. It has flour and lumber mills, tobacco storage plants, and wheel works. The Jessamine Fe¬ male Institute, opened in 1854, is located here, and there is a public library and a college for boys. Pop. 2,935.

NICHOLLS, nik'olz, Charlotte. See

Bronte, Charlotte.

NICHOLLS, Francis Tillon, American lawyer: b. Donaldsonville, Ascension Parish, La., 20 Aug. 1834; d. 5 Jan. 1912. He was graduated from West Point in 1855, and in 1856 served in the campaign against the Seminole Indians. He then resigned his commission in the army to study law and was admitted to the bar in 1858, beginning his practice in Napoleon- ville. In 1861 he entered the Confederate army as captain and was promoted lieutenant-colonel m the same year and brigadier-general in '1862. He had charge of the defenses of Lynchburg, Va., and in 1864 was superintendent of the trans-Mississippi conscript bureau. After the war he resumed his law practice in Ascension Parish, La., and later removed to New Or¬ leans (1880). In 1876 he was the Democratic candidate for governor; his party claimed the election by about 8,000 votes, but a Republican returning board declared his opponent elected. He, however, took his seat and was subsequently recognized as governor by the Federal govern¬ ment. In 1888 he was again elected governor and during his administration actively opposed the Louisiana Lottery Company, and vetoed the bill .granting it a new charter with increased privileges. From 1893 to 1904 he was chief

justice of the Louisiana State Supreme Court and thereafter until his death associate chief justice.

NICHOLLS, Rhoda Holmes, English- American painter: b. in Coventry, England (maiden name Grome). After receiving an

education in London, she became a pupil of the Bloomsbury School of Art in London and won there the queen's scholarship. She then studied in Rome under Cammerano and Vertunni. After being married to Burr H. Nicholls in Sussex in 1884 she came to the United States and eventually settled in New York City. Mrs. Nicholls has exhibited in all the artistic centres in the United States, be¬ sides Rome, Turin, Munich and London. She has taken medals in New York, Boston, At¬ lanta, Nashville and Charleston and in the West Indies and Interstate, Chicago, Buffalo and Saint Louis Expositions. She was on the staff of the Art Interchange and Art Amateur; and was co-editor of Palette and Brush. She is a member of the New York Water Color Club; the American Water Color Society; the Ameri¬ can Society of Miniature Painters; the Art Students' League; the Woman's Art Associa¬ tion of Canada, and many other clubs and societies.

NICHOLS, Edward Leamington, Amer¬ ican physicist: b. Leamington, England (of Ameiican parents), 14 Sept. 1854. After grad¬ uation at Cornell University in 1875, he studied in Leipzig, Berlin and Gottingen, taking his Ph.D. at the latter in 1879. He then was ap¬ pointed fellow in physics at the Johns Hopkins and afterward spent some time in the Edison Laboratory at Menlo Park, N. J. From 1881 to 1883 he was professor of physics and chem¬ istry in the Central University of Kentucky and in 1883 became professor of physics and astron¬ omy in the University of Kansas. In 1887 he was made professor of physics at Cornell, which he has since held. He was president of the American Association for the Advance¬ ment of Science in 1907 and of the American Physical Society in 1907-08. He is also a mem¬ ber of the National Academy of Sciences; the Kansas Academy of Science; the American In¬ stitute of Electrical Engineers ; the Illuminat¬ ing Engineering Society, and was a member of the visiting committee of the United States Bureau of Standards. Dartmouth has given him the degree of Sc.D. and the University of Pennsylvania that of LL.D. Dr. Nichols was the founder of the Physical Review, which he edited from 1893 to 1912. He has published 'The Galvanometer (1894);*

NICHOLS, Ernest Fox, American phys¬ icist: b. Leavenworth, Kan., 1 June 1869. After graduation at the Kansas Agricultural College in 1888, he studied in Cornell, Berlin and Cam¬ bridge, England. From 1892 to 1898 he was professor of physics at Colgate University and held the similar chair in Dartmouth in 1898- 1903 and Columbia University in 1903-09. In

1909 he was made president of Dartmouth and held this post until 1916, when he became pro¬ fessor of physics at Yale. In 1907-09 he was a research associate of the Carnegie Institute of Washington, engaged in the study of radia¬ tion phenomena at the Mount Wilson Solar Observatory. Some of his important work is the remodeling and improvement of the Crookes radiometer; the study and measure-

merit of long heat waves; the measurement of the heat radiation from the stars Arcturus and Vega and the planets Jupiter and Saturn; and the measurement of pressure due to radia¬ tion. The American Academy of Arts and Sciences gave him the Rumford Medal in 1905. The degree of LL.D. has been given to him by several colleges and universities : Colgate, Clark, Wesleyan, University of Vermont, University of Pittsburgh and Dennison, and that of Sc.D. by Cornell (1897) and Dartmouth (1903). Dr. Nichols is a member of various scientific socie¬ ties and in 1903 was vice-president of the American Society for the Advancement of Science. He has contributed many papers on radiation and kindred subjects to important scientific journals in this country and in Europe. He is a collaborator of the Astrophysical Jour¬ nal and associate editor of the Physical Review.

NICHOLS, George Ward, American writer: b. Mount Desert, Me., 21 June 1837; d. Cincinnati, Ohio, 15 Sept. 1885. He was art critic on the New York Evening Post under William Cullen Bryant and was aide-de-camp to General Sherman in the Civil War. He was president of the Cincinnati College of Music for several years and greatly improved its edu¬ cational and financial standing. He wrote (1877) ; lot¬ tery) (1878), etc.

NICHOLS, Henry ˆEzra, American naval officer: b. New York; d. off Paranaque, Philip¬ pine Islands, 10 June 1899. He, was graduated from the United States Naval Academy in 1865 and served in the navy with steady promotion. He .was engaged on the Coast Survey in 1876- 77 and in 1880-84, and. in 1897 took command of the Bennington, which became one of Ad¬ miral Dewey's fleet in 1898. In 1899 he was transferred to the command of the monitor Monadnock and rendered valuable assistance at the capture of Paranaque. Captain Nichols was overcome by the heat during the bombard¬ ment and died while his ship was still in action.

NICHOLS, Henry Hobart, jr, American landscape painter: b. Washington, D. C., 1 May 1869. He received his education in the public schools of Washington and Shortledge College, Pennsylvania, and studied at the Art Students League of Washington at Julien's Academy in Paris. In Paris he

also studied under Cas- tellucho. He was the founder of the Society of Washington Artists and was assistant to the director of Fine Arts of the United States Com¬ mission to the Paris Exposition in 1900. In 1912 he was elected an associate of the National Academy of Design. He is a regular contribu- utor to the Corcoran Art Gallery's exhibitions and has received several prizes there. He is a member of the Allied Artists of America; of the New York Water Color Club; of the Amer¬ ican Water Color Society, and many other clubs and societies. He now lives at Lawrence Park, Bronxville, N. Y.

NICHOLS, William Ford, American Prot¬ estant Episcopal bishop: b. Lloyd, N. Y., 9 June 1849. He was graduated from Trinity College, Hartford, Conn., in 1870 and from the Berkeley Divinity School, Middletown, Conn., in 1873. He entered the priesthood the next year and was successively rector of churches at West Hartford, Conn.; Newton, Conn.; Christ

Church, Hartford (1877— 87) ; and Saint James, Philadelphia (1887-90). He declined the bishop- coadjutorship of Ohio in 1888, but in 1890 was consecrated bishop-coadjutor of California, be¬ coming bishop of that diocese in 1893. In 1893 he founded the Christian Divinity School of the Pacific at San Mateo, Cal. He has been dele¬ gate to several conferences of his church in the United States and abroad and has written

Candidates for Holy Orders5 (1909) ; (Some World Circuit Saunterings5 (1913), etc.

NICHOLS, William Henry, American manufacturing chemist: b. Brooklyn, N. Y., 9 Jan. 1852. He was educated in the Polytechnic Institute of Brooklyn and was graduated from the New York University in 1870, since when he has been engaged as manufacturing chemist, copper-refiner and smelter. In 1890 he became president of the Nichols Copper Company and has been associated with a number of other corporations. He was president of the Granby Consolidated Mining, Smelting and Powder Company and an incorporator of the American Chemical Society. In 1904-05 he was president of the Society of Chemical Industry and in 1912 of the International Congress of Applied Chemistry. He was also made chairman of the committee on chemicals of the Council of Na¬ tional Defense in April 1917.

NICHOLSON, nik'61-son, Sir Francis,

English colonial governor: b. England, 1660; d. London, 5 March 1728. In 1684 he came to America as lieutenant in the English army and in 1688 was commissioned lieutenant-governor of the New England colonies and

represented the governor, Sir Edmund Andros (q.v.) at New York. At the time of the accession of William and Mary in England and of the Leis- ler rebellion in New York, he was obliged to abdicate his office and return to England. (See Leisler, Jacob). In 1690 he was appointed lieutenant-governor of Virginia and went to Jamestown to take charge of the affairs of the colony. During his administration, which was most successful, he gave especial attention to bettering the condition of the Established Church and to education ; he was one of the founders of William and Mary College, to which he gave £300. When Andros succeeded Lord Howard as governor of Virginia, Nicholson, disappointed that he had not received the ap¬ pointment, resigned as lieutenant-governor and was made governor of Maryland. Here he aroused opposition by changing the capital from Saint Mary's to Annapolis and also by his in¬ tolerant attitude toward the Catholics and others not connected with the Church of England. In 1698 he was appointed governor of Virginia, but failed to attain his former success in that col¬ ony. His constant menacing and tyrannical at¬ titude aroused the opposition of the Virginians and he particularly angered them by his removal of the capital from Jamestown to Williamsburg; he was recalled from Virginia in 1705. In 1709 and 1711 he was in command of abortive ex¬ peditions against New France. In 1710 he com¬ manded an expedition against Acadia and cap¬ tured Port Royal and in 1712 was made gover¬ nor of Acadia. In 1719 he received his appoint-

ment as governor of South Carolina, being the

i 12yal £°vernor that colony and filled the office < with ability and success. He was hpiˆhted in 1720 and returned to England in l/2b, when he was promoted lieutenant-general He wrote journal of an Expedition for the Reduction of Port Royal > (1711), reprinted in the Nova Scotia Historical Society's trans¬ actions) for 1879, and (An Apology or Vindica¬ tion of Sir Francis Nicholson, governor of South Carolina > (1724).

NICHOLSON, Henry Alleyne, English scientist: b. Penrith, Cumberland, 11 Sept 1844* d. Aberdeen, Scotland, 19 Jan. 1899. He was educated at Gottingen and Edinburgh, was pro¬ fessor of natural history in the University of Toronto in 1871-74, of physical science in the Durham College of Physical Science in 1874- °f natural history at Saint Andrews in 1875— 82. From 1882 to 1899 he was regius pro¬ fessor of natural history at Aberdeen. His chief work was done in the palaeontological depai tment of zoology. Among his writings are (A Manual of Palaeontology) (1872; 3d ed. with Lydekker 1889), (Introduction to the Study of Biology) (1872) ; (The Ancient Life History of the Earth5 (1877) ;

(Synopsis of Classification of the Animal Kingdom (1882), and many scientific papers.*

NICHOLSON, Henry Hudson, American engineer : b. Rushford, Wis., 25 May 1850. He was educated at Antioch College, Ohio, and in 1865 served as a private in the 49th Wiscon¬ sin Infantry. In 1874-82 he was professor of science in the State Normal School, Peru, Neb., and from 1882 to 1905 professor of chemistry and director of the chemical laboratory in the University of Nebraska. In 1884 he studied at Harvard and in 1885 at Heidelberg and Berlin. He was consulting engineer of the Hamilton Mines Company, 1898-1903; Ingold Placer Mining Company, Jack Gold Mines Company, Oregon, and manager and engineer of the Standard Consolidated Mines Company; direct¬ ing engineer of the Killen, Warner-Steward Company, Chicago; consulting engineer of the Killen-McLaughlin Mining Company, Red Cliff, Colorado, and of the Plumas Lincoln Copper Company, Doyle, Cal. He is a member and fellow of various societies and the author of several papers on his specialty.

NICHOLSON, Isaac Lea, American Prot¬ estant Episcopal bishop : b. Baltimore, Md., 18 Jan. 1844; d. Milwaukee, Wis., 9 Oct. 1906. He was graduated from Dartmouth in 1869, took priest's orders in the Episcopal Church in 1872 and held rectorships at Baltimore 1872-75; Westminster, Md., 1875-79, and Saint Mark's, Philadelphia, 1879-91. In 1891 he was conse¬ crated bishop of Milwaukee.

NICHOLSON, James, American naval officer: b. Chestertown, Md., 1737; d. New York city, 2 Sept. 1804. He went to sea when a boy, and was engaged in the capture of Havana in 1762. In 1776 he was given com¬ mand of the Defence, fitted out by the colony of Maryland, and retook some vessels which the. British had captured. In June 1776 he was assigned to the command of the Virginia of the Continental navy, and while his vessel was

blockaded in Chesapeake Bay he with his crew joined the army and took part in the battle of Trenton. Later when the Virginia attempted to put to sea she went aground and was taken by the British, though Captain Nicholson and most of his crew escaped ; an official inquiry ac¬ quitted him of all blame. In January 1777 he was made commander-in-chief of the Conti¬ nental navy, holding that position till the close of the war. In June 1780, when in command of the frigate Trumbull, he fought a severe battle with the British ship Wyatt, without de¬ cisive result, and in August 1781 was taken prisoner in the Trumbull by the British vessels Iris and General Monk, though he made a most gallant resistance and did not surrender until his ship was completely disabled. He was ex¬ changed shortly before the close of the war, and in 1801 was appointed commissioner of loans for

the State of New York.

NICHOLSON, James William Augustus,

American naval officer: b. Dedham, Mass., 10 March 1821; d. New York, 28 Oct. 1887. He entered, the navy as a midshipman in 1838, served in the Mexican War and as lieutenant under Perry on the Japan expedition. In the Civil War he commanded the steamer Isaac Smith in the operations against Port Royal (1861); in 1862 was promoted to the rank of commander . and had charge of the monitor Manhattan in the battle of Mobile Bay; and later took part in the bombardment of Fort Morgan. In 1873 he was promoted commodore, and from 1876 to 1880 was in command of the Brooklyn. Navy Yard. In 1881 he was made rear-admiral and was assigned to the Mediter¬ ranean, where he protected the United States consulate during the English bombardment of Alexandria, Egypt, and had much influence in restoring order. In 1883 he was retired from active service with the rank of rear-admiral.

NICHOLSON, John, British officer in India: b. Dublin, 11 Dec. 1821; d. near Delhi, 23 Sept. 1857. He went to India in 1839 as a subaltern in the service of the East India Com¬ pany; displayed great bravery in the defense of Ghazni in 1841 and during the treacherous attack made by the Afghans immediately after¬ ward. He served in the commissariat during the campaign in the Satlej and was present at Ferozshah, and in 1846-47 was in Kashmir. While deputy commissioner in the district of the Punjab between the Jhelam and the Indus his tact and skill and prodigious valor in re¬ ducing the savage tribesmen to law and order was something marvelous, so much so that in his last year no murder or highway robbery was ever committed or even attempted; the im¬ press of his commanding personality was such that he was worshipped by a sect of fakirs as a demigod under the name of Nikkei Seyn. He distinguished himself in the Second Sikh War (1849) at Gujrat tuid Chilianwallah. He served as administrative officer at Bannu 1851- 56. On the outbreak of the Indian mutiny he was made brigadier-general. During that try¬ ing. period he did more than any other man to maintain British authority in the Punjaub; strove to put mettle into his over-cautious chief' General Wilson, and organized a flying column which signally defeated the mutineers at Trimmu Ghaut and at the Ravi River. He led

the assault on Delhi, at which he was mortally wounded, and died nine days afterward. Of commanding stature and a born soldier and

administrator, his early death removed a tower of strength to British rule in India. Consult the (Life) by J. L. Trotter (1904), and Sir John Kaye, (Lives of Indian Officers) (1889).

NICHOLSON, Joseph Shield, English po¬ litical economist: b. Wrawby, Lincolnshire, 9 Nov. 1850. He was educated at the University of Edinburgh, at Trinity College, Cambridge, and at Heidelberg, and in 1880 became profes¬ sor of political economy at Edinburgh. Among his writings on his specialty are (Effects of Ma¬ chinery on Wages) (1878) ; (The Silver Ques¬ tion > (1886) ; Principles of Political Economy) (1893-1901); < Strikes and Social Problems) (1896); (Banker's Money) (1902); (Elements of Political Economv) (1903); (The Tariff Question) (1903);

NICHOLSON, Louisa Margaret (Louise Nikita). American singer: b. Philadelphia, Pa., 1872. She was educated abroad, where she made her debut in 1889 with marked success, and became prima donna at the Paris Opera in 1894. The roles in which she has achieved most success are (Fille du regiment ; (Tra- viata} ; (Pagliacci,) etc.*

NICHOLSON, Meredith, American author: b. Crawfordsville, Ind., 9 Dec. 1866. He entered journalism and in 1885-97 was reporter and editor on the Indianapolis News. In 1897-1901 he was treasurer of a coal-mining company in Denver and then returned to Indianapolis, where he has since devoted himself to literature. He is a member of the National Institute of Arts and Letters and has received honorary de¬ grees from Wabash and Butler colleges. He has written < Short Flights,) verse (1891) ; (The Main Chance (1903) ; (The Hoosiers) (1900) ; Pella Dameron) (1904) ; (The House of a Thousand Candles) (1905); (Poems) (1906);*

NICHOLSON, Reynold Alleyne, English Orientalist: b. 19 Aug. 1868. He was a son of H. A. Nicholson (q.v.).Pe was educated at the University of Aberdfefo and at Trinity Col¬ lege, Cambridge, contirpfiug his studies in Ger¬ many. He was examiner in classics at Aber¬ deen in 1897 and since 1901 has been professor of Persian in University College, London, and lecturer in Persian at the University of Cam¬ bridge. He has published (Selected Poems from the Divani Shamsi Tabriz) (1898) ; (Memoirs of the Saints) (Persian texT, 1905— 07) ; Piterary History of the Arabs) (with

Du Pre Thornton, 1907) ; (Introduction ana Notes to Fitzgerald's Omar Khayyam) (1909); (The Don and the Dervish) (1911) ; (The Mys¬ tics of Islam) (1914); three Arabic reading- books, etc.

NICHOLSON, Thomas, American bishop and educator: b. Woodburn, Ontario, 27 Jan. 1862. He was graduated from the Toronto Normal

School in 1883 and entered the Metho¬ dist Episcopal ministry in 1884, after having taught in various schools. After holding charges in Michigan he became professor of philosophy and biblical literature and also principal of the academy at Cornell College, Iowa. From 1903 to 1908 he was professor of philosophy in Dakota Wesleyan LIniversity, of which he was also president. In 1908 the General Conference elected him secretary of the' board of education of the churches, and he took a leading part in the educational develop¬ ment of Iowa and South Dakota. In 1916 he was elected bishop of the Methodist Episcopal church. He has lectured in many States on the English Bible. Several universities have given him the degrees of D.D., LL.D., A.B. and A.M. In 1898 he was president of the South Dakota State Teachers' Association. Bishop Nicholson is the author of (Epworth League Bible Studies) (1901-02); (Epworth League Devotional Topic Book) (1902) ; (The Neces¬ sity of the Christian College) (1904), and (Studies in Christian Experience (1907). Since 1908 he has been editor of The Christian Student (Chicago).*

NICHOLSON, William, English scientist: b. London, England, 1753; d. London, 21 May 1815. After making two voyages as a mid¬ shipman in the East India service (1769-76) he entered an attorney's office, but soon was sent to Amsterdam as agent for the sale of Wedg¬ wood pottery. In 1784 he was appointed sec¬ retary to the General Chamber of Manufac¬ turers of Great Britain and he was also con¬ nected with the Society for the Encouragement of Naval Architecture, established in 1791. He spent much time upon the construction of various machines for comb-cutting, file-making, cylinder printing, etc., and he invented an aero¬ meter. In 1800 he gave a course of public lectures in London on natural philosophy and chemistry and about this time he discovered a way to bring about the decomposition of water by the voltaic current During the later part of his life he was chiefly interested in water¬ works engineering in Portsmouth, Gosport and Southwark.

In 1797 he founded the Journal of Natural Philosophy , Chemistry and the Arts, generally known as Nicholson's Journal, the earliest jour¬ nal of its kind in Great Britain. This was continued until 1814. Nicholson attracted at¬ tention to himself by the publication of (An Introduction to Natural Philosophy) (London 1781). This was followed by a translation of Voltaire's (Elements of the Newtonian Phi¬ losophy.) Besides many contributions to the Philosophical Transactions, he published (First Principles of Chemistry) (1788) ; a (Chemical Dictionary (1795) ; edited the (British Encyclopaedia, or Dictionary of Arts and Sciences) (6 vols., London 1809), and translated Fourcroy's (Chemistry) (1787) and Chaptal's Chemistry) (1788).*

NICHOLSON, William, English painter and engraver : b. Newark-on-Trent, 1872. He began his artistic education under Her-Romer in London and completed it under Bougereau and Constant in Paris. He collaborated with James Prydein the designing of posters, the brilliant originality of which at once attracted at¬ tention and established his reputation as a great wood engraver. Among his productions some of the more notable are (An Alphabet (1898) ; (An Almanac of Twelve Sports > (1898) ; (London Types | ; Characters of Romance) (1900). His portrait woodcuts have met with wide accept¬ ance, especially his < Whistler, > 1 Kipling, >

(Bernhardt, } (Queen Victoria. > His portraits in oil include (The Landlordˆ a remarkably telling and vivid piece of work; (The Little Baron > ; (Master Francis and Christopher Bacon* ; (Nancy with the Mug) ; (Nancy with the Feather Hat, * and those of his mother and W. E. Henley. (Carlina,) an exquisite study in the nude; (The First Communion Day,* and the 1 Place du Petit Enfer) are examples of his work in other fields. His work is marked by originality, excellent draughtmanship, exquisite coloring and a genuine instinct for style. He was awarded a gold medal at the Paris exhibi¬ tion of 1900.

NICHOLSON, William Gustavus, Field- Marshal Lord, British soldier: b. Leeds, 2 March 1845; d. London, 13 Sept. 1918. He passed through Woolwich in 1863 and obtained his first commission in the Royal Engineers. From 1868 to 1871 he served in the West In¬ dies ; in the latter year he was sent to India, where he spent about 30 years, being engaged most of the time on government engineering works. After serving in the Afghan War he became secretary of t'he defense committee at Simla, and later went through the Egyptian campaign in 1882. In 1890 he was made mili¬ tary secretary to Lord Robert?, then com¬ mander-in-chief in India. Between intervals of frontier fighting Nicholson constructed fortifi¬ cations, roads and railways. When Lord Roberts took over the chief command in the South African War he called Kitchener from the Sudan and Nicholson from India to assist him. The latter returned to India at the end of 1900 with the rank of major-general. Early in 1901 he was appointed director-general of mobilization and military intelligence at the War Office, London, where he carried into effect a general reorganization in the face of powerful opposition. He served a year as chief military attache to the Japanese army in Man¬ churia 1904-05, and in the latter year was offered a Mediterranean command, which he re¬ fused. In 1908 he was promoted chief of the general staff, in which post he was succeeded by General French in 1912. He continued to be a member of the Committee of Imperial De¬ fense and during the war served as a commis¬ sioner to inquire into the conduct of the Gal¬ lipoli and Mesopotamian campaigns.

Nichol¬ son's brilliant career was remarkable in that he never commanded even a small unit in peace or war, yet he rose to field-marshal; he never graduated from the Staff College and yet 'be¬ came chief of the Imperial General Staff. Without political, family or other influence he became a peer of the realm and occupied a position of recognized authority among states¬ men and soldiers. vol. 20 — 21

NICHOLSONITE, a variety of the min¬ eral aragonite, containing from 1 to 10 per cent of zinc. Occurs at Leadville, Colo.

NICIAS, nish'i-as, Greek painter of the 4th century b.c. He was renowned for the loveli¬ ness of his woman figures in encaustic. He was a contemporary to Apelles, the painter of Alexander the Great, and Praxiteles the sculptor, whom he assisted in coloring his statues. He is said to have invented encaustic painting.

NICIAS, Athenian general in the Pelopon¬ nesian War (q.v.) : d. Sicily, 414 b.c. He in¬ herited great wealth (including over 1,000 slaves) from his father, Niceratus, and, enter¬ ing politics after Pericles' death, became leader of the aristocratic party and the enemy of all demagogues, notably Cleon. He won popular favor, however, by his piety and the lavish use of his wealth. His natural caution and timid¬ ity was a proverb among the comic poets of the day, and he seems to have been the prey of blackmailers. In 425 he led the troops that hemmed the Spartans in at Sphacteria; in the next year captured Cythera ; in 423 was in com¬ mand in Thrace; and, after Cleon's death, brought about the famous Peace of Nicias (421), which ended the first period of the Peloponnesian War. Cleon's place as a leader of the war party was to a certain degree taken by Alcibiades, who won consent to his plan for the Sicilian expedition by astutely suggesting that Nicias, the opponent of the project, the tried general and the well-known conservative, should be one of the commanders of the ex¬ pedition. The recall of Alcibiades soon after the expedition started left matters largely in Nicias' hands. After the death of his colleague Lamachus (415) this was less true, since the new general Demosthenes boldy urged open at¬ tack on Syracuse. Nicias saw that this would be fatal, and, it is said, that, influenced by superstitious fear of an eclipse of the moon, refused to act at all for a month. He was terribly defeated and weakly surrendered ; and in spite of the promises of his enemies was put to death. He had been mortally sick through¬ out this trying campaign. Consult Church,

*(Nicias and the Sicilian Expedition * (1899).*

NICK OF THE WOODS, a romance by Robert Montgomery Bird, M.D., published in 1837. It is a tale of Kentucky during the (

NICKEL, a metallic element resembling iron in its appearance and general properties, discovered by Cronstedt in 1751 in kupfernickel (see Niccolite), a mineral which resembles copper ore, but from which copper cannot be extracted and whose name appears to signify "devil's copper.® Metallic nickel occurs in the form of grains along the bed of the Fraser River, and it is also a common constituent of meteorites. The commercial supply, however, is obtained by the reduction of certain nickel- bearing minerals, of which niccolite and gar- nierite are important. The latter mineral is

especially valuable because it is free from co¬ balt, a metal with which nickel is almost al¬ ways associated, and from which it can be sep¬ arated only with much difficulty. Garnierite is a hydrated silicate of nickel and magnesium, of variable composition, which occurs in vast quantities in the vicinity of Noumea, New Caledonia; similar deposits also exist in Douglas County, Ore., and Jackson County, N. C., and also in the province of Malaga, Spain. The New Caledonia mines are worked by a French company, which ships the nickel to Europe both as matte and as ore. Nickel also occurs as a subordinate constituent of the mineral pyrrhotite (FecS?) replacing the iron up to 6 per cent. In the Sudbury district of Ontario, the largest producer of nickel in the world, the chief ore is pyrrhotite occurring as a magmatic segregation (q.v.) in a great gabbro (q.v.) (norite) sill (q.v.). Little nickel is pro¬ duced in the United States.

Physically, nickel is a hard, ductile, malleable metal, white in color, but with a yellowish tinge, and susceptible of a fine polis'h. Its specific gravity varies from 8.36 to 9.26, ac¬ cording to the physical treatment to which the metal has been subjected; its specific heat is about 0.109 and its specific electrical resistance is about one-seventh of that of mercury. It melts at a high temperature, — probably at about 2,500° F. Next to iron and cobalt, nickel is the most magnetic substance known, the magnet at¬ tracting it very strongly, though less strongly than either of the other two metals mentioned. (For full data concerning the magnetic qual¬ ities of nickel, consult Ewing, (Magnetic In¬ duction in Iron and Other MetalsO- Nickel is greatly used for electroplating, both for pro¬ tection against rusting and on account of the lustrous polish that can easily be given to arti¬ cles coated with it. It is also largely coming into favor for the manufacture of cooking utensils. When alloyed with other metals nickel is used for coinage and for other pur¬ poses past enumeration. With iron it forms alloys that are collectively known as ((nickel- steel,® certain of these being of the highest value for the manufacture of armor plate. The nickel-iron alloys are anomalous in many re¬ spects. It has been found, for

example, that although nickel and iron are two of the most highly magnetic elements known, it is possible to form alloys of these two metals alone, which are practically non-magnetic. Iron-nickel alloys are also anomalous with respect to their co¬ efficients of expansion, and one of them in par¬ ticular (known as (

comes yellow when heated, and from it the various nickel salts may be prepared. The sesquioxid, Ni203, is a black substance, and is most conveniently prepared by adding a solu¬ tion of bleaching powder to a soluble nickel salt. Nickel bromide, NiBr2, nickel chloride, NiCh and nickel sulphate, NiSCh + 7FFO, are used in medicine to a limited extent. Sul¬ phuretted hydrogen gas precipitates nickel from alkaline solutions in the form of a black sul¬ phide, having the formula NiS. (See Chemical Analysis). Finely divided nickel absorbs dry carbon monoxid at 85° F., with the formation of a singular compound called <(nickel carbon monoxid, }) having the formula Ni(CO)4 This substance is a volatile liquid which freezes at 13° F. below zero, and boils at 109° F. Its vapor explodes violently when heated to 140° F., and deposits pure nickel when mixed with an inert gas and passed through a heated tube. Advantage is taken of this strange compound for the preparation of metallic nickel for chem¬ ical purposes, when great purity is essential. See Ore Deposits.

NICKEL, Refining of. See Electro¬ chemical Industries.

NICKEL GLANCE, a name given to two nickel ores (NiAsS, NiSbS), now fallen prac¬ tically into disuse and formerly applied to Gersdorffite.

NICKEL-STEEL. Following the hint of¬ fered by iron and nickel alloys in meteorites, experiments in making nickel-iron and nickel- steel began 80 years ago when Faraday and Stodart alloyed nickel and iron (1822). Further experiments, to mention only a few names, were made by Wolf in Schweinfurt (1830), by Bessemer (1858) and by John Garugee of Con¬ necticut (1883). The first systematic and prac¬ tical tests of the value of nickel-steel were made by James Riley of Glasgow in 1888-89. The experiments of C. E. Guillaume of the Inter¬ national Bureau of Standards reported in 1899 showed that in addition to its previously known characteristics, the most notable of which were resistance to corrosion much greater than that of carbon steel and the remarkable combina¬ tion of high resistance to stresses and shocks, retaining its fibrous structure where carbon steel crumbles, with great malleability and ease of working. For forgings, however, it has been found necessary to have manganese present in the proportion of from 0.3 to 0.7 per cent. Nickel-steel, if containing more than 36 per cent of nickel, has the lowest coefficient of expan¬ sion known, remaining almost invariable in di¬ mensions under the ordinary atmospheric changes of temperature. A combination of this steel

with about one-half of one per cent each of manganese, silicon and chromium consti¬ tutes the alloy Invar (q.v.) an invaluable ma¬ terial for instruments of precision. Much more widespread, of. course, is the use of nickel-steel and nickel-chrome steel for armor plate adopted because of its unequaled hardness and toughness and because its loss of strength from punching is only 15 to 20 per cent of the original strength, whereas carbon-steel loses about 33 per cent when punched. A more important use, though apparently limited by the expense of nickel- steel, is for rails ; a test made by the Pennsyl¬ vania Railroad on the Horseshoe Curve resulted so favorably that the rails on much traveled

X f a-reuncarly a~] 1 of nickel-steel even where the stiaight away tracks are of carbon-steel hor ordinary uses only a very small percentage ot nickel is required the range being from 1.5 to 4 per cent. Nickel-steels may now be had in the market with from 1.5 to 95 per cent of nickel. It is in use for gun tubes and other

finance parts, pneumatic hammers, drills i ades of turbines gas engine valves, aero-en- gnie parts, axles, shafts and gears and all parts oi machines which have to sustain severe strains and shocks. A chrome-nickel steel carrying 0.45 per cent carbon; 0.51 per cent manganese- 1.19 per cent nickel, and 0.98 per cent chromium shows a tensile strength of 224,250 pounds per square inch. It is much used in aeroplane con¬ struction. The mechanical properties of nickel steels, however, are not wholly dependent upon their content of nickel, but they are modified to a considerable degree by the percentages of car¬ bon and manganese in the alloy. The increase of carbon in 30 per cent nickel-steel from 0.12 per cent up to 0.80 per cent exhibited an in- freas1e/1 ˚fA tensile strength from 64,000 pounds to 114,000 pounds per square inch; the elastic

iimnmat tlme bein§' increased from

41,UUU to 68,000 pounds per square inch The elongation was increased from 29.5 per cent to er cen an *he reduction of area from 63.9 per cent to 50 per cent. The addition of very small percentages of chromium to nickel-steels increases very considerably their resist¬ ance to wear.*

PlaLnite. – The nickel-steel containing 46 per cent of nickel and about 0.15 per cent of carbon has been given the name (

The alloys with larger proportions of nickel (above 36 per cent) not only have a surpris¬ ingly low coefficient of expansion, but differ from the

alloys with less nickel in respect to magnetism ; alloys with less than 25 per cent of nickel can be made non-magnetic or mag¬ netic to any desired degree; between 25 and 35 per cent the alloys are practically non-magnetizable at ordinary temperatures, but on being cooled to 32° exhibit magnetic qualities, and after being cooled to 60° below zero be¬ come highly magnetizable, a property not' lost until it has again been heated to 1080°. Con¬ sult United States Standards Bureau Circular 58, < Invar and Related Nickel-Steels) (Wash¬ ington 1916).

NICKER, in Teutonic mythology, water- fairies which dwelt in rivers and lakes as well as in the sea. Mention is made of them in the poem of ˆBeowulf. The word seems origi¬ nally to have been used as an indefinite name for any water-monsten Traces of it may be found in Old Nick, } nix, and nixy (borrowed from German Nixe).*

NICKNAMES, National and Popular.

The little name called nickname is a familiar substitute for the proper name of a person or place, given either in ridicule or affection. In the English language <(neke name® or ((eke name,® appears as early as 1440. Possibly the

name came from nick, to cut; for the nick¬ name is primarily a cutting of the full name, such as Ned for Edward, Bess for Elizabeth, Nick for Nicholas, etc. Nicknames sometimes develop into graphic individualities and create a national type or figure, which the pencils of artists and caricaturists elaborate until Uncle Sam, or John Bull, or the poilu, or the Yank, or the doughboy come to represent the char¬ acter and feeling of an entire nation or an entire class.

Uncle Sam. — First on the list comes the famous (

llson, invariably called Uncle Sam by kindred and friends, was an inspector appointed by the government to receive large supplies for the army contracted for in New York and to be delivered at Troy on the Hudson. The casks and chests were all marked with the initials of the contractor Elbert Anderson (E. A.), above and beneath those of the country United States (U. S.). A facetious workman, being asked the meaning of the latter, replied in jest he did not know unless they meant Elbert Anderson and Uncle Sam. The jest took, was repeated by other workmen and by them carried into the army. The initials on the commissary's barrels and boxes were carried throughout the country and the explanation soon gained wide renown. «Uncle Sam® became the representa¬ tive of the United States government and the national figure.

. Brother Jonathan.— Older than Uncle Sam is Brother Jonathan, the popular representative of the people of the United States. The orig¬ inal was Jonathan Trumbull (q.v.), governor of Connecticut, noted for his common sense and integrity. He was a native of Lebanon, Conn., a graduate of Harvard and a member of. the Connecticut assembly. He did every- thing in his power to secure the independence of the colonies and was implicitly trusted and consulted by Washington in emergencies. When VVashington was in need of ammunition and the onicers whom he called into consultation could offer no suggestions, Washington said ((We must refer the matter to Brother Jonathan,® alluding to Trumbull, who from that day was known as Brother Jonathan. In due time the name was applied to the whole nation. Trum¬ bull looked like the familiar symbolic cari¬ cature. He was tall, gaunt, sharp-featured and tor full dress wore a swallow-tailed homespun coat made in his own household from wool of his own sheep and colored with maple-bark procured from his own trees. His tight trousers, _ six inches above his ankles, were of striped linsey-woolsey, spun and made by his own family.

John Bull. — John Bull was used in a satire of Dr. John Arbuthnot called <(Law is a Bot¬ tomless Pit,® exemplified in the case of Lord Strutt, John Bull, Nicholas Frog and Lewis Baboon (Louis XIV), who spent all they had in a lawsuit This was a series of five pamph¬ lets advocating the conclusion of peace after the Wars of the Spanish Succession in the days of Queen Anne. The five tracts are printed in two parts as the History of John Bull in Mis¬ cellanies in Prose and Verse> (1727) with preface by Pope and Swift, intimate friends of Dr. Arbuthnot. Arbuthnot fixed the popular

conception of John Bull, although it is not certain that he originated the character. The lively satire is still amusing reading. Arbuth- not says: (

Jacques Bonhomme. — Jacques Bonhomme is a name given to the French. It originated in mediaeval times and was applied to the poor peasant, who, with extraordinary patience, first paid for the costly banners and suits of armor that were captured from the noblemen at CreQy and Poitiers and then paid their lord's ransom and after that again helped with their hard won earnings to swell his revenues. So tract¬ able and meek were they that a nobleman who had wasted all his substance used to comfort his creditors with the observation that ((Jacques Bonhomme® would pay all of his debts. But when the peasants awoke and rose in madness against their oppressors ((Jacques Bonhomme,® the good-natured peasant, went out of fashion for a time.

Jean Crapaud (((toad®) dates from the time the French kings had three toads in their coat- of-arms. Paris was called Lutetia the muddy, and the inhabitants were called Frogs. The Frenchman is often referred to as <(Johnny Crapaud.®

Nicknames of Various Nationalities. —

Blackamoor, a negro in contra-distinction to a tawny Moor; Blue Caps, or Blue Bonnets, name for Scotchmen; Blue Nose, name for Nova Scotians; Bog Trotter, name for an Irishman; Bonnet Rouge, a French Red Re¬ publican, in allusion to the red cap of Liberty; Cabbage Eater (Kapustaik), a Russian; Carlo, an Italian; Canuck, a Canadian; Chukhua, Russian name for a Finn ; Cockney, a London citizen born within the sound of Bow Bells ; Chow, a Chinaman ; Coon, a negro ; Colin Tampon, a Swiss ; Croatic, an Italian name for an Austrian ; Cousin Michael, a German ; Cuffey, a negro (also written Cuddy), meaning a beast of burden (Friday, child in Ashantee) ; Dago, from Saint Jago or San Diego, an Italian laborer; Frog-eater, a Frenchman, in allusion to his fondness for frogs; Greaser, name ap¬ plied to a Mexican by the people of the United States on account of his greasy appearance; Infidel, a Turk; Hans Worst (Jack Sausage), a German ; Ivan Ivanovitch, a Russian, the em¬ bodiment of the Russian people; Jack Pudding. an English clownish fellow; Jacques, a poor French artisan; Jean de la Suie. a Savoyard; Jean Potage, a Frenchman; Jean Baptiste, a Canadian; John Chinaman, a Chinaman; Johnny Row, an English rustic, or country bumpkin ; Macaroni, an Italian ; Moskel, a na¬ tive of Southern Russia; Mynheer Closh (or Claus), a Dutchman; Mosoo, a Frenchman; Nic Frog, a Dutchman; Paddy, for Patrick, an Irishman; Pantaleone, name in Italy for tax¬ payers; Piou-piou, French soldier, "worm

crusher® ; Pot de biere, French name for an English soldier; Pickleherring, a Dutchman, in allusion to his love for soused herring; Polack, a Pole; Redskanks, a Scotch High¬ lander; Red Heads, or Red Turbans, Moham¬ medans; Robert Macaire, a Frenchman; Roi- neck (Wry neck), a Britisher (Dutch South Africa); Sambo, a negro; Sammy, a Scotch¬ man ; Sawney, from Sandy, a Scotchman ; Sur- ley Boy (from Sorley buie, yellow hair), an Irishman; Taffy, a corruption of David, a Welshman ; Unspeakable Turk ; Unbleached American, negro; Dixie, a popular term for the Southern States, was probably derived from the geographical line drawn by Mason and Dixon which formerly separated the Northern from the Southern States. "Dixie land,® made popular by a negro ministrel song, passed into current use as the name of the happy, abundant South. Yankee; the best au¬ thorities agree that the word is derived from the imperfect effort made by the Northern Indians to pronounce the word English. <(Yengees® was the nearest they could get to English. The contemporary Southerners were

called by the Indians “Long knives,® on account of their swords. ((Yankeedom® is the nick¬ name for New England. <(Yankee Doodle® was the name given to a song, <(The Yankee’s Re¬ turn from Camp,® describing the raw recruits of 1775.

American Civil War Nicknames. — The

Southerners were Secesh, or more good-natur¬ edly, Johnny Reb (rebels). Johnny was prob¬ ably taken from Johnny cakes. The Northern¬ ers were Yanks, or Boys in Blue, or Blue- bellies. The North had also Doughfaces, Northern abettors of slavery, deriving their names from the kneadable character of dough. John Randolph of Roanoke branded the 18 Northern congressmen who helped to displace Mason and Dixon’s Line as “doughfaces.® Copperheads was applied to the Northern fac¬ tion in secret sympathy with the Southern “rebels.® These retorted upon the Union men by calling them Niggerheads. Butternuts was applied to sympathizers of the rebels, so- called from the uniforms worn in the early part of the war by the Confederate soldiers, which, being homespun, were dyed with the juice of the butternut. Radical Republicans were nick¬ named Rads. Officials who were not expected to expose themselves to’ the enemy were called Bombproofs ; a Bummer was a man of erratic behavior, and originally the bummer was called a Buffalo, a name peculiar at first to North Carolina and then spreading throughout the South. The Jayhawkers combined murder with marauding, and were famous during the bloody strife carried on in Kansas before the Civil Mar in “Bleeding Kansas.® The Mossy- back was a man of the South who hid in swamps to escape conscription. The Musical Box of the Confederates, also Jeff Davis’ Box, was the humorous name given to the ill- built, creaking army wagons. The Wooden Horse, which at one time was thought in the North to be an infernal machine to be sent into Boston or New York harbor, was a secret so¬ ciety organized for political purposes. Mili¬ tary imprisonment of suspected sympathizers with the South was known as the Bastille, consented to by the Hickory Unionists of the

NICKNAMES

border States. Ku-Klux-Klan, a secret as¬ sociation of Southerners formed shortly after Lie Civil War to preserve order during a period when lawlessness was rife in the South. The name was an alliterative corruption of the Greek word meaning circle and Klan was added. 'I he Ku-Klux-Klan, : ® says the Memphis Ap¬ peal (1871), was a secret political organization which, by their ghostly apparel in which they traversed the country, was intended to appeal to negro superstition and prevent devastations at night. But radicalism raised such a howl and thieves assuming the Ku-Klux garb, the organ¬ ization was finally abandoned.® This organiza¬ tion was also called the White League. See also Ku-Klux-Klan.

World War Nicknames.— When the Amer¬ ican soldiers found themselves in France and taking part in the great struggle, they dis¬ carded the numerical names of their divisions and substituted nicknames that applied descrip¬ tively to each particular group of fighters. General Pershing's history of American troops in France, from the time they arrived in 1917 up to the time the armistice was signed, showed that there were 40 divisions of "Doughboys® across the Atlantic. Nearly all of these gave themselves nicknames : the 26th Division, com¬ posed of National Guardsmen from the New England States, was known as the "New Eng¬ land Division®; the 27th Division was the "New York Division® ; the 28th Division was the "Pennsylvania Division®; the 29th Division, composed of men from New Jersey, Delaware, Maryland, Virginia and the District of Colum¬ bia, was the "Blue and Gray Division, > remi¬ niscent of the Civil War; the 31st Division, composed of men from Georgia, Alabama and Florida, was the "Dixie Division® ; the 33d Divisiop was the "Illinois Division® ; the 37th Division, from Ohio, was called the "Buckeye Division®; the 77th, from Camp Upton, near New York, the "Metropolitan Division®; the 84th, from Illinois, Kentucky and Indiana, the "Lincoln Division,® and the 36th, the "Pan¬ ther Division® from the fighting panther on their insignia and the Latin motto meaning "We'll do it in spite of hell.® The men came from Texas and Oklahoma. The 85th, from Camp Custer, of Wisconsin, Michigan, Ken¬ tucky, Indiana and Illinois, was called the "Custer Division.® The 78th Division, com¬ posed of men from New York, New Jersey and Pennsylvania, was called the "Lightning Di¬ vision.® The 80th, made up of men from the mountains of Virginia, was called the "Blue Ridge Division.® The 41st, its members com¬ ing from Oregon, Washington, Idaho, Mon¬ tana, Wyoming and North Dakota, was known as the "Sunset Division.® The 42d had gained an . enviable reputation as the "Rainbow Di¬ vision® long before it sailed for the battlefields of France. This famous division was com¬ posed of the National Guard of New York, Louisiana, Pennsylvania, Wisconsin, Ohio'

Georgia, Alabama, Iowa, Illinois, Indiana, Min¬ nesota, Maryland, South Carolina, Colorado, Missouri, Virginia, North Carolina, Texas, New Jersey, Tennessee, Oklahoma, Michigan, Dis- tric of Columbia, California, Nebraska and Ore¬ gon. The 91st Division, which, together with the 37th, was sent to help the French army in Belgium, composed of men from Oregon, Wash¬

ington, Colorado, Nevada, Utah, Idaho, Mon¬ tana and Wyoming, was the "Wild West Di¬ vision.® The 80th Division was known as "Lee's Division,® named for Gen. Robert E. Lee, and composed of men of the Southern States.

Among the many nicknames of the war one of the most popular is that of Doughboy. Doughboy was primarily a dough-cake baked for sailors; then it was applied to a brass but¬ ton of similar shape worn by the infantry, and lastly to a foot soldier. The name occurs in Ringrove, (Bucaniers of America) (1685) ;

Damfier's (Voyages (1697), and in several of Mrs. Custer's books. The latter says in Rent¬ ing on the Plains) : "Early in the Civil War the term was applied to the large globular brass buttons of the infantry uniform, from which it passed by natural transition to the infantry¬ men alone® ; and also, "She was so accus¬ tomed to fast riding with our cavalry she does not know how to treat a doughboy.® A dough¬ boy is also a small round doughnut served to sailors on shipboard.*

*State and City Nicknames. — The American love for nicknames also is shown by the familiar titles given to States and cities. Arkansas is the Bear State,® a name given when bears abounded. California is the "Grizzly Bear State.® Connecticut is the "Blue Law State,® from the unenviable fame acquired by the first regulations of the government of the New Haven colony known as the Blue Laws * the "Freestone State,® from the quarries of free¬ stone; and the "Nutmeg State® from the al¬ leged manufacture of wooden nutmegs. Dela¬ ware is the "Blue Hen State,® from the noto¬ riety that one of her sons, Captain Caldwell, acquired m the Revolutionary War for his love of cock-fighting, and also his well-drilled men known in the army as the "game cocks.® His idea that a blue hen produced the best cocks gave rise to the appellation. Florida is the "Gulf State.® Georgia is the "Cracker Mate, from the Crackers, — the most ignorant and lowest of its inhabitants. Illinois is the "Prairie State® and also the "Sucker State,® from the numerous holes in the prairies made by the crawfish, into which the thirsty native traveler inserted a reed to draw forth refresh¬ ing water. Indiana is the "Hoosier State,® said to have been derived from the call "Who's here ?® Iowa is named the "Hawkeye State,® fiom a great Indian chief, the terror of the early settlers; Kansas is the "Garden State,® also*

called the "Squatter State,® from the early settlers. Kentucky is the "Corn-Cracker State ® and also "Bear State.® Louisiana is the "Peli¬ can State,® from the bird that frequents the marshes, and "Creole,® from its original French and Spanish colonists. Massachusetts, known first as the Colony of Massachusetts Bay, is the "Bay State.® Maine is the "Pine Tree State.® Maryland is the "Old Line State,® from the Old Line regiments which she con¬ tributed to the Continental army in the War of the Revolution. Michigan is the "Wolverine State,® from the little wolves abounding there; also the "Lake State.® Minnesota is the "New England of the West.® Mississippi is the "Mudcat State,® from the numbers of cat-fish Missouri is the "Bullion State,® in allusion to Col. Thomas H. Benton who, being an advocate of gold and silver currency in Congress, was called "Old Bullion.® New Hampshire is the

((Granite State,® from its granite rocks. New York is the "Empire State,® as surpassing all other States in wealth and population ; also the <(Excelsior State,® from the motto on its coat- of arms. North Carolina is the "Turpentine State.® Ohio is the "Buckeye State,® from the chestnut which grows there, whose fruit has a spot like a deer's eye. Pennsylvania is the "Keystone State,® the central State when the Union was formed. Rhode Island is "Little Rhody,® because of its size. South Carolina is the "Palmetto State.® Texas is the "Lone Star State,® because of the one star in her original coat-of-arms. Vermont is the "Green Mountain State.® Virginia is called the "Old Dominion,® a name earned in times of peril by her loyalty to Charles II. Wisconsin is called the "Badger State,® on account of its many badgers.

Baltimore, Md., is called "Monumental City,® having had monuments in her squares before other towns in the United States and boasting of the large and handsome Washing¬ ton Monument. Boston has several nicknames. One is the "Athens of America,® which caused the witty John Randolph of Roanoke to re¬ mark, "Boston may be the Athens of America, but it has never been mv good fortune to meet with any of the Athenians.® Oliver Wendell Holmes dubbed Boston "The Hub of the Uni¬ verse,® and Boston has also been called the "City of Notions® because of the mental anti- tude of its citizens, and the "Tri-mountain City,® because it is built on three hills. This, the oldest appellation, survives in Tremont Street and Tremont Hotel. Brooklyn is the "City of Churches® ; Buffalo is the "Queen City of the Lakes® ; Chicago is the "Garden City® ; Cincinnati is the "Queen City® ; Cleve¬ land the "Forest City® ; Detroit the "City of the Straits® ; Duluth the "Zenith City of the Unsalted Seas® ; Galena the

“Crescent City of the Northwest®; Hannibal the “Bluff City®; Hartford the “Charter Oak City,® from the large oak tree, no longer in existence, in the cavity of which the charter of the colony of Connecticut was concealed by the legislature when James II, in 1686, sent Sir Edmund Andros across the seas to take possession of the charters granted to the colonies; Indianap¬ olis is the “Railroad City® ; Keokuk the “Gate City,® on account of its situation at the foot of the Lower Rapids of the Mississippi River which opens here to navigation; Louisville, Ky., is called “Falls City,® because it is at the head of the Louisville Falls of the Ohio River; Lowell, Mass., the “Spindle City.® on account of its cotton factories; Montpelier, Vt,, the “Green Mountain City®: Nashville, Tenn., the “City of Rocks®; New Haven, the “Elm City®; New Orleans, the “Crescent Citv,® because the Mississippi makes a bend here; New York, the “Empire City,® also “Gotham,® derisively ap¬ plied by Washington Irving in his (Salma-gundP ; Philadelphia, the “City of Brotherly Love® and the “Quaker City®; Portland, Me., the “Forest City® ; Pittsburgh, the “Iron City® ; Rochester, the “Flower City® and “Flour City,® in allusion to its nursery trade and flour-mills ; Savannah, the “Garden City®; Springfield. Ill., “Flower City® ; Saint Louis, the “Mound City,® from being built on the burial places of In¬

dians; San Francisco, the “Golden City,® also “’Frisco®; Washington, D. C., the “City of Magnificent Distances® and the “Federal City.®

NICOBAR (nik-6-bar’) ISLANDS, a

group of 19 islands in the Bay of Bengal, 12 inhabited (total area 635 square miles), with the Andamans (q.v.), 75 miles to the north and forming together a province of British India. The Nicobars consist of two groups — a south¬ ern group, composed of the islands Great and Little Nicobar and several smaller islets, and a northern group, separated from the southern by Sombrero Channel, about 36 miles broad. The largest island is Great Nicobar, 30 miles long by 12 miles broad, and the next Kamorta, which is the largest of the northern group. . The highest mountain, Thuillier (2,105 feet) is on Great Nicobar. They yield cocoanuts, plantains, teak, sassafras, lemons, limes, oranges and pine¬ apples. The thick forests and heavy dews render the climate unhealthful for foreigners. The rainfall varies from 165 inches in moist to 93 in dry years. The cocoanut palm yields the chief food of the natives and is almost the only tree cared for by them, about 15,000,000 being exported annually. Water is obtained by dig¬ ging. The people belong to two races, an in¬ land tribe, little civilized, who show Mongolian affinities and are regarded as indigenous, and the coast people who are of mixed Malay blood, but idle and lazy. They collect and export trepang and edible birds’ nests. The archi¬ pelago known from the time of Ptolemy was the scene of Jesuit

missionary activity from at least early in the 17th century and of Moravian after 1768, was occupied by Denmark, 1756— 1856. In 1869 it was annexed by Great Britain, to put a stop to the piracy of the people. A penal colony which existed at Nancowry on the island Kamorta, was withdrawn in 1888. Pop.

8,818.

NICOBAR PIGEON. See Pigeon.

NICODEMUS, nik-6-de'mus, ruler of the Jews, that is. a member of the Sanhedrin, who belonged to the sect of the Pharisees, and is only mentioned in the Fourth Gospel. He came to see Jesus secretlv by night (John iii) and eventually after the Resurrection is tra¬ ditionally said to have become one of his dis¬ ciples. He protested against the injustice with which Jesus was treated by the council (John vii, 50) and after the crucifixion joined with Joseph of Arimathea in giving fitting sepulture to this body (John xix, 39). Some commen¬ tators have fancifully identified Nicodemus with the rich young man (Mark x, 17-24), but there is no solid ground for the conjecture.

NICOL, mk'ol, Erskine, Scottish artist: b. Leith, 3 July 1825; d. 8 March 1904 He was educated in art at the Trustees' Academy, Edin¬ burgh, under. Sir William Allan, He resided some time in Dublin, where he painted por¬ traits and subjects of humorous genre. In 1850 he settled in Edinburgh and in 1862 in London ; but for 25 years a portion of the year was spent in Ireland, where he gathered ma¬ terial for and painted his numerous clever pic¬ tures of Irish peasant life, among which may be mentioned (Donnvbrook Fair) (1859) ; ˆPaddy's Mark) (Corcoran Gallerv. Washing¬ ton) ; (Paving the Rent) (Vanderbilt Collec¬ tion, New York) ; (The Day After the Fair)

(Scottish National Gallery) ; ˆBeggar My Neighbour (Glasgow Corporation Gallery). He was elected a member of the Royal Scottish Academy in 1859.*

NICOL PRISM, a piece of apparatus in¬ vented in 1828, by William Nicol. for the pro¬ duction of a beam of plane-polarized light. Its

A

operation is based upon the fact that when a 'beam of ordinary light enters

a crystal of Ice¬ land spar (crystallized calcite) from certain di¬ rections, it is decomposed into two beams, each of which is plane-polarized. One of these beams is called the ((ordinary ray® and the other the ˆextraordinary ray® ; and as the min¬ eral exerts a different refractive power upon the two, they are divergent within the crystal. Nicol conceived the idea of introducing a sur¬ face of discontinuity within the crystal, dis¬ posed at such an obliquity that one of these rays would be totally reflected, while the other would be transmitted, and allowed to emerge from the crystal in a direction parallel to that in _ which the incident beam entered it. His prism is made by cutting a rhomb of Iceland spar as indicated by the plane ABCD, in Fig. 1, which passes through the obtuse angles of the crystal. The surfaces being then polished, the parts are cemented together again with Canada balsam, as shown in Fig. 2. The ends are

ground so as to make an angle of about 68 de¬ grees with the length of the rhomb, and a ray of ordinary light, upon entering the crystal as indicated at AB, in Fig. 2, is separated into two rays. Both are refracted, but the ((ordinary ray,® BD, is refracted more than the ˆex¬ traordinary® one, BC; and BD strikes the plane of section of the crystal at such an obliquity that it is totally reflected to E, while BC, strik¬ ing it at a less obliquity, passes through and emerges from the crystal at F. The sides of the rhomb are usually blackened, so that the ordinary ray is absorbed at E, and destroyed. The Nicol prism is exceedingly valuable, as it gives a beam of light that is completely polar¬ ized and entirely without color, when the in¬ cident light is white.

NICOLA, mk'o-la, Lewis, American sol¬ dier: b. Dublin, Ireland, 1717; d. Alexandria, Va., 9 Aug. 1807. He entered the English army in 1740, rose to the rank of major, but resigned and emigrated to America, where he settled in Philadelphia. During the American Revolution his military experience was of great assistance to the colonies and in 1783 he became brigadier-

general. It was he who wrote to Washington yvhat is known as the (Nicola Letter, > in which it is suggested that the latter should be made king. He wrote (A Treatise of Military Exer- cise> (1776).

NICOLAI, ne'ko-U, Christoph Friedrich,

German publisher and author: b. Berlin, 18 March 1733; d. there, 8 Jan. 1811. From his father he inherited in 1752 the business of the Nicolai Publishing Company, which he made one of the foremost in Berlin. In his youth he was a friend of Lessing and of Moses Mendelssohn, with whom he founded the Bibliothek der schonen Wissenschaften (1757), a critical re¬ view, and another literary journal, the Briefe die neaeste Litteratur

betreffend (1761). But little by little he broke with the leaders of Ger¬ man thought and began to attack in a narrow and futile spirit both the critical school and the romantic movement, the significance of which he was quite incapable of appreciating. Goethe and Schiller replied in (Xenien) to his parodies of cWerther) (1775), etc. Nicolai wrote a novel with a rationalistic purpose, (Sebaldus Nothanker) (1773), and merits praise for his excellent description of a Trip through Germany and Switzerland) (1789), and for the historical value of his (Anecdotes of Fred¬ erick IP (1788-92). Consult the autobiography, edited by Lowe (1806), and the (Life by Gockingk (1820).*

NICOLAI, Otto, German composer: b. Konigsberg, Prussia, 9 June 1810; d. Berlin, 11 May 1849. He received his musical education from B. Klein of Berlin and his first work pro¬ duced in public was a (Te Deum) performed at the Singakademie in 1833. In 1833 the Cheva¬ lier Bunsen obtained for him the post of or¬ ganist at the chapel of the Prussian embassy in Rome, where he made careful study of Italian church-music. He was conductor of a theatre at Vienna 1837-39 and kapellmeister of the Court opera 1841-47 and subsequently of the Berlin opera. He founded the philharmonic concerts at Vienna for the purpose of securing worthy renderings of the Beethoven symphonies. His best-known work is his die lustigen Wei- ber von Windsor (libretto by S. Mosenthal), first presented at Berlin 9 March 1849, which won and maintained great success by its humor¬ ous characterization, invention and technical skill. Consult Mendel, dife) (1866), which contains a list of all Nicolai's works, printed and in manuscript, and Kruse's (Otto Nicolai and his Life as an ArtisP (Berlin 1912).*

NICOLAIEF, ne-ko-li'ef. See Nikolaieff.

NICOLAITANS, mk-o-la'i-tanz, a sect mentioned in Rev. ii, 6, 15, as given over to idolatrous practices and impurity of life. They thus contravened the decree of the Council of Jerusalem, Acts xv, 20-29, and were accordingly accounted heretics. But the reference in the Revelation may be purely allegorical, in keep¬ ing with the symbolical allusiveness of the book. There is no ground for supposing that such a sect was founded by Nicolas, the proselyte of Antioch, who was one of the seven deacons. This name was .given to a Gnostic sect of the 3d century, and it has been applied variously in an abusive and party spirit in later times. Consuh Encyclopedia of Religion and Ethics.)

NICOLARDOT, Louis, loo-e ne-ko-lar-do. French author: b. Dijon, France, 28 Nov. 1822; d. Paris, France, 21 Nov. 1888. His literary work is favorably known and among his more notable publications are ‘ Journal of Louis XVI5 (1873) ; (The Impeccable Theophile Gautier 5 (1883) ; (La Fontaine and the Human Comedy5 (1885), etc.

NICOLAS, nik‘6-las, Sir Nicholas Har¬ ris, English antiquarian : b. Dartmouth, 10 March 1799; d. near Boulogne, 3 Aug. 1848.. He was of French Protestant descent; served eight years in the navy (1808-16) ; studied law, and became the leading genealogist of his day. Hood, for instance, says that Miss Ivilmansegg’s ancestry ((Were enough, in truth, to puzzle Old Nick, not to mention Sir Harris Nicolas.® Among his many works are ‘Notitia His- torica) (1824); (History of Agincourt5 (1827); Proceedings and Ordinances of the Privy Council of England, 1386 — 1 542 ˆ (1834—37) ;

despatches and Letters of Lord Nelson) (1844-46), and ‘History of Royal Navy5 (down to Henry V, 1847). He was created K.C.M.G. in 1832.

NICOLAUS (nIk-6-la’us) OF DAMAS¬ CUS, Greek historian. He lived in the time of Herod the Great and was intimate with that monarch and with Augustus. He tutored the children of Antony and Cleopatra. Of his writings, a (Universal History) in 144 books, and his biography of Augustus, fragments of great value, remain. Consult Muller, ‘Frag- menta Historicum Grsecorum5 (Vol. Ill, pp.

343-464).

NICOLA Y, nek’oUa, John George, Amer¬ ican author: b. Essingen, Bavaria, 26 Feb. 1832; d. Washington, D. C., 26 Sept. 1901. He came with his family to the United States in 1838 and settled in Illinois, where he was educated in the public schools. He entered the office of the Free Press in Pittsfield, Ill., when 16 and later became its proprietor and publisher, soon making himself a political power in the State. In 1856 he entered the office of the secretary of state at Springfield, Ill., where he became a devoted adherent of Lincoln. When the latter was elected to the Presidency Nicolay was ap¬ pointed his private secretary and as the duties of the office increased John Hay (q.v.) was selected as assistant secretary. Together they formed the plan of writing a biography of Presi¬ dent Lincoln and gained his approval of their project. In 1865 Nicolay was appointed by the President to be United States consul at Paris, where he remained until 1869 and in 1872-87 he was marshal of the Supreme Court. In 1874 he began in collaboration with John Hay Abra¬ ham Lincoln, a History,5 the authoritative biography, published serially (1886-90) and in book form and supplemented by Lincoln’s Com¬ plete

Works,) in 12 volumes (1894). He also wrote 'The Outbreak of the Civil War) (1881). His daughter, Helen Nicolay,. who has in¬ herited her father's absorption in the life and achievement of the great President, is the au¬ thor of (Personal Traits of Abraham Lincoln)

(1912).

NICOLE, Francois Leon Etienne, fran- swa la-on a-te-en ne-kol, Haitian poet : b. near Grande Riviere, 1731 ; d. Cape Franqais, 1773.

Educated in a Jesuit college, he went to Pans in 1750, where Voltaire introduced him to the Encyclopedists and Louis XV granted him a pension in recognition of his talents. In 1769 he returned to Haiti, where he was in the gov¬ ernor's employ. He published 'The Romance of the Slave) (1766); ironical Flowers) (1770), and 'New Poems) (1772).

NICOLE, Pierre, French moralist: b. Chartres, 19 Oct. 1625- d. Paris, 16 Nov. 1695. Graduated from the University of Paris in 1644, he took minor orders; he was a member of the Port Royal community, held a professorship in it, wrote' many of its schoolbooks, was one of its controversialists with the Jesuits and shared in its vicissitudes, being forced to retire to Belgium, but returning in 1683. The Abbe Goujet, who wrote his

NICOLE, in Moliere's (Bourgeois Gentil- homme,5 a servant of the Monsieur Jordain, who understands and exposes her master's follies in an amusing way.

NICOLET, nee-coe-lay, Canada, a town in Nicolet County, Quebec, at the mouth of the Nicolet River on Lake Saint Peter, 82 miles northeast of Montreal, on the Intercolonial and the Quebec, Montreal and Southern railways. It is the seat of Nicolet County and an enter¬ prising manufacturing town. Sash and door factories, brick yards, tanneries and foundries are situated here and also factories for aerated waters, machine-shop products and optical ap¬ pliances. Nicolet has a Roman Catholic cathe¬ dral, college, seminary and two monasteries. It also possesses a commercial academy, county buildings and a hospital. Pop. 2,593.

NICOLINI, ne-ko-le'ne, Ernesto, French

singer, whose real name was Ernest Nicolas : b. Saint-Malo, 1834; d. Pau, January 1898. His splendid tenor was trained at the Conservatoire. He made his debut in Paris in 1857, soon after¬ ward devoted himself to Italian opera and Ital¬ ianized his name, returned to Paris and then toured Europe. His last years were spent off the stage, because of ill-health. He married Adelina Patti in 1886 with whom he toured.

NICOLL, nik'ol, Sir William Robertson,

Scottish clergyman and editor : b. Lumsden, Aberdeenshire, 10 Oct. 1851. He graduated at the University of Aberdeen in 1870 and was Free Church minister of Dufftown (1874-77) and Kelso (1877-85). He became editor of several periodicals, including the British W eekly, the English Bookman, the Expositor and (1900) the British Monthly. Among his publications are Palls to Christ5 (1881) ; ' John Bunyan5

(1884); 'Ten-Minute Sermons5 (1895); 'The Key of the Grave5 ; Sunday Afternoon Verses5 (1897) ; 'Letters on Life5 (1901) ; 'The Church's One Foundation5 (1901) ; 'Life of Maclaren5 (1908) ; 'The Round of the Clock5; 'Emily Bronte5 ; 'The Expositor's Dictionary of Texts5; and 'Sunday Evening5 (1910). He edited the 'Expositor's Greek Testament5

(1897 1900) is an authority on the Brontes and was responsible for a complete edition of Char- °V;f. Brontes works; is library adviser to the publishing house of Hodder and Stoughton and the most distinguished of Non-Conformist jour¬ nalists. He was knighted in 1909.

NICOLLET, ne-ko-la, Jean Nicolas,

iench explorer and geologist : b. Cluses, Savoy, ?UU yt j1786» d Washington, D. C., 11 Sept. 848. He came to the United States in 1832 to make a scientific investigation of the South- ern and Western States, and was later engaged by the United States government to make an exploration of the far West. He published i lemoire sur le mesure dun arc de parallele moyen entre le Pole et 1'EquatoU (1826); Lours a 1 usage de la marine) (1830); (Cours de mathematiques/ ; and a (Report on the Hy-*

*?!S§i'?phl?s*1 Basin of the Upper Mississippi) (1841), with a map (1843), etc.*

NICOLLS, nikolz, Mathias, English colo¬ nial jurist: b. Plymouth, England, about 1630; d. Long Island, N. Y., 22 Dec. 1687. He was appointed secretary of the commission and cap¬ tain under Col. Richard Nicolls, who was sent to capture New Netherlands in 1664. He be¬ came the first secretary of the province and a member of the governor's council. He was the chief compiler of the first code of English laws in New York, known as the (

NICOLLS, Richard, English colonial gov¬ ernor : b. Ampthill, Bedfordshire,

England 1624; d. at sea, 28 May 1672. During the Civil War in England he joined the king's army, was placed in command of a troop of horse, and when the Royalists were defeated fled to* Holland, where he entered the service of the Duke of York, serving with him in the Con¬ tinental Wars. On the accession of Charles II he was appointed gentleman of the bed-chamber to the Duke of York. In 1664 the king made him the chief of a commission appointed to set¬ tle the affairs of the New England colonies and to take New Netherlands from the Dutch, the claim to which was based on priority of dis¬ covery and was equivalent to a declaration of war. He sailed from England in June of the same year, and after stopping at Boston for a short time reached New Amsterdam on the 25th of August. The Dutch surrendered to him without resistance; he took formal possession of the city on 8 September, the Dutch officials shortly after taking the oath of allegiance to the English king. Nicolls changed the name of the province and the city of New Amsterdam to New York; and also gave Albany its pres¬ ent name. In 1665 he proclaimed the ((Duke's Laws" which had been prepared under his direction; this was the first code of laws in New York, and combined features of the English law with the Roman-Dutch law for¬ merly prevailing in the province. In the same year he gave an English form of city govern¬ ment to New York City. His administration was efficient, and especially moderate and con¬

siderate toward the Dutch, and he was respected and trusted by English and Dutch alike. In 1666 he successfully settled some difficulties with the French and Indians; in 1667 resigned but did not leave the colony till the arrival of his successor, Lovelace. He returned to Eng¬ land in 1668, and taking part in the war between England and Holland, was killed in the naval battle against De Ruyter in 1672.

NICOMACHUS, ni-kom'a-kus, surnamed Gerasenus, Neo-Pythagorean philosopher: b. Gerasa, Palestine, about 1st century a.d. He was one of the earliest writers on mathematics and music, and his name became a synonym for mathematical accuracy. ((You number like Nicomachus of Gerasa" being a Philopatris proverb. He wrote a life of Pythagoras and several musical and mathematical works which became lost. Enough, however, remained of his work to greatly influence learning in the 15th and 16th centuries.

NICOMEDIA, mk-6-me'di-a, Asia Minor, an ancient city of Bithynia, its site occupied by the modern Izmid or Izmikmid (pop. 30,000), at the northeast corner of the Gulf of Izmid — the ancient Astacenus,— an arm of the Pro¬ pontis or Sea of Marmora. It was named after its founder, Nicomedes I (278-250 b.c.), and was a residence of the Bithynian kings, a city of gi eat splendor, and in later times a favorite place of resort with the emperors Diocletian and Constantine the Great. Arrian the his¬ torian was

a native, and Hannibal committed suicide here. Numerous interesting remains of the city are preserved.

NICOPOLIS (((City of Victory"), ancient iipirus, Greece, in the extreme southern part opposite the promontory of Actium. It was founded in the year 31 b.c. by the Emperor Augustus (Octavian) to commemorate the great naval victory won by him at Actium over Antony and Cleopatra. He named it the City of Victory and made a great city of it. He gathered a large population from the neighbor¬ ing towns and instituted games — the great Actian games in honor of Apollo Actius — v Inch drew crowds every fourth year. On the spot where Octavian's tent stood he erected a temple to Neptune adorned with the prows of the captured galleys. The city was peopled by colonists from the vicinity, and it soon became the head (Strabo III, xiii, 3- VII, vi i, 6 and X, ii, 2). Pliny the Elder called it a «free city" (Book I, p. 274). Saint Paul mvited Titus to join him there (Titus iii, 12), from which we may gather the fact ' that (hristians were among the population. Origen was there for a time (Eusebius, Hist. Eccl. vi. 16). At the beginning of the 5th century, it was laid waste by the Goths and was restored by Justinian. In the 6th century it was still the capital of Epirus. About 732 it was incor¬ porated into the patriarchate of Constanti¬ nople. In the Middle Ages, the site was built upon and the town of Prevesa arose. Three miles north of the present town are found the ruins of Nicopolis in a place called Old Prevesa on a small bay of the Gulf of Arta, v here a narrow isthmus separates the gulf from the Ionian Sea. These ruins consist of the acropolis, two theatres (one with 27 rows of

scats) and an aqueduct which conveyed water from a source 27 miles from the town. Con¬ sult Dion Caso Li; Procopius, Bel-Goth, iv, 22; Wordsworth, ; Merivale, (Rome,) iii, 327; Lewin, (Life and Epistles of St. PauP (4th ed.) iii, 353.

NICOPOLIS, a city in Cappadocia, or Armenia Minor, founded by Pompey on the spot where he defeated Mithradates. It was beautifully situated in a well watered plain, the valley of the Lycus, 100 miles northwest of Satala and 98 miles northeast of Sebastia. It was originally called Tephrice and was colo¬ nized by veterans of the army and the neighbor¬ ing peasantry. As all the Roman highways of this part of the country radiated from this point, Nicopolis soon became a populous city (Strabo XII, iii). Nicopolis was annexed to the Roman Empire in the time of Nero (a.d. 64-). and became the metropolis of Lesser Armenia. It had an altar of the Augusti, and temples to Victory and to Zeus Nicephorus. Chris¬ tianity was

introduced into Nicopolis at an early date and under Licinius (about 319) 45 of the citizens were martyred. About 472 a church was erected here to the Virgin. In 499 Nicopolis was destroyed by an earthquake. Justinian rebuilt the walls and erected a monas¬ tery to the memory of the 45 martyrs (Pro¬ copius,

NICOPOLIS, Egypt, city, founded by Oc- tavian (24 b.c.) to commemorate his final victory over Antony and the surrender of Alexandria. The Roman emperor was at this moment highly incensed with the Alexandrians, and,, by the foundation of a Roman town in their im¬ mediate neighborhood, sought to inflict a per¬ manent blow on their political and commeicinl supremacy. Nicopolis was built a little west of the Delta on the banks of the canal that connected Canopus with the capital about three miles from its eastern gate. Augustus Caesar planned to make Nicopolis a city of the first rank. He built an amphitheatre, established games and intended to erect several fine tem¬ ples, but the natural advantages of Alexandria were greater and Nicopolis was never more than a suburb of its rival. Within a century after its foundation the name of Nicopolis dis¬ appears from history. Pliny mentions (vi, 23) a town called Juliopolis, situated on the same canal and about the same distance fiom Alexandria. In all probability the city was the successor of Nicopolis.

NICOPOLIS, a city in Thrace (Nikup) at the foot of Mount Halmus and at the junc¬ tion of the Iatrus with the Danube, not far from the mouth of the Nessus. It is said to have been founded by Trajan to commemorate his victory over the Dacians. Upon ancient coins it is called Ulpia. The scholiast upon Ptolemy says it was subsequently named Christopolis. Socrates and Hierocles both called it Nicopolis.

Consult Ptolemy (iii, p. 11). See Nikopol, Bulgaria.

NICOSIA, neko-ze'a, Cyprus, capital and largest city of Cyprus, situated in the north- central part of the island. Its earliest name was Ledra, but Leucon (or Leucos), son of Pomfrey Soter (b.c. 280) restored it and called it Leucotheon, or Levcosia. Constantine fortified it with walls that lasted until the time of the Venetians. Richard Coeur de Lion gave the city in 1193 to Guy de Lusignan, the first of the Lusignan kings (reigned 1192-94). The 300 years during which Cypress was ruled by the house of Lusignan were the most bril¬ liant in the varied history of Cyprus ; and under these kings and queens Cyprus became of an importance out of proportion to its small area and 'population. Its wealth and luxury in the 14th century evoked the amazement of all West¬ ern visitors. The castle was rebuilt in 1211 and a new one was constructed in 1382. The walls, four miles in circuit, were finished by Peter II in 1372 and destroyed by the Venetians, with 80 churches and the famous monastery of Saint Dominic in

1564. In rebuilding the walls the circular form was retained, but the circuit was reduced to three miles. The river Pedias, which had flowed through the city, was turned into a new channel outside it. Nicosia is situated on a barren plain framed by distant hills. In the middle of the town stands the cathedral of Saint Sophia, adopted as a mosque by the Turks in 1570. It was begun early in the 13th century but was injured by an earthquake in 1267. The magnificent west porch dates from the 14th century. Two minarets now replace the western towers and the building is white¬ washed in accordance with Moslem require¬ ments. Among the other interesting buildings are the palace of the Latin archbishops of Ni¬ cosia; the Armenian church; the Haidor Pasha Mosque, formerly Saint Katharine's Church, a purely Gothic building; the diminutive Arablar Mosque of Byzantine origin; the Turkish Bath, formerly the church of Saint George of the Latins ; the mosque of the Standard Bearer (Turkish) ; and the library containing a small but valuable collection of Turkish, Persian and Arabic manuscripts. The old Qonaq, or Palace of Nicosia, disappeared in 1904 for »the new palace, containing the courthouse and govern¬ ment offices.

<(The older houses,® writes a recent traveler, <(are nearly all built of mud-colored, sun-dried bricks but' here and there may be seen the re¬ mains of stone-built houses, with beautiful arched gateways surrounded by coats-of-arms, relics of the Lusignan and Venetian periods. The bazaars afford a considerable variety of scene, they are either under arches, or are covered overhead with trellised vines, or stretched awning of canvas, while each street is appropriated to its own particular trade. The articles offered for sale are vegetables and fruits, rugs, pack-saddles, cottons and silks of native manufacture, hammered copper pots, silver-ware, etc. Every Friday a fair is held, which is largely attended by the inhabitants of the neighboring villages.® The town also manufactures leather goods and woolen articles. Pop. (1911) 16,052. Consult Lukach and Jar- dine, 'Handbook of Cyprus) (London 1913).

NICOSIA, Sicily, a city in the province of Uatania, 4ˆ miles west of Catania and 21 miles north of Leonforte. Nicosia is situated on a rocky eminence, 2,840 feet above the level of the sea and also on the Salso River. The town, which presents a thoroughly mediaeval appearance, is more behind the age than any other in Sicily. The inhabitants speak a Lom¬ bard dialect. Nicosia's origin is unknown; but it was destroyed by the Saracens and repeopled by the Normans. Among the interesting build¬ ings are a fine Norman cathedral and the church of Sainte Maria Maggiore containing Teredos by Antonio Gagini. There are many quaint and

picturesque houses. In the vicinity are rich mines of rock salt; beds of alum and sulphur and sulphur springs. The industries of the town are corn, wine, cattle and oil. Ni¬ cosia has been the episcopal see of Sicily since 1816. From Nicosia the old road, rocky and picturesque, passes Rocca di Sarno, where the brave Norman Serlo perished through treachery, and leads to Leonforte. Pop. (1911) 16,441.

NICOT, Jean, zhoii ne-ko, Sieur de Ville- main, French diplomat: b. Nimes, 1530; d. Paris, 5 May 1606. He studied in Paris, was a courtier of Henry II and acted as envoy of Francis II to Lisbon (1560), whence, having procured seeds from a Dutchman who brought them from Florida, he introduced tobacco into France. To this circumstance the scientific name for tobacco, Nicotiana, is due. Nicot wrote a French dictionary, (Tresor de la langue frangaise) (1606).

NICOTIANA, ni-ko-shi-a'na, a genus of plants of the potato family (Solanacece) , rep¬ resented by the two species of tobacco (N. tabacum and N. rustica). These plants abound in all their parts with poisonous elements, the special and characteristic one in this case being the alkaloid nicotin, to which tobacco owes its peculiar narcotic properties. See Tobacco.

NICOTIN, or NICOTINE, named from Jean Nicot (q.v.) who introduced the tobacco plant into France, the characteristic alkaloid element of the tobacco plant, in all parts of which it appears in combination with malic and citric acids. When pure and freshly prepared, it is a colorless, intensely poisonous liquid, which evolves a very irritating odor of tobacco, but on exposure to the air it rapidly oxidizes and becomes brown in color. It is moderately soluble in water, and dissolves readily in alco¬ hol and ether. The quantity of nicotine con¬ tained in the 'smoke of burning tobacco leaf varies from about 2 to 8 per cent, the larger percentage being in the coarser kinds. Taken internally, nicotine is one of the most potent of poisons; one-sixty-fifth of a grain taken by the mouth causes symptoms of poisoning to be shown, and a single drop will kill a rabbit or cat in a few seconds. See Tobacco.

NICOYA, ne-ko'ya, a gulf on the west coast of Costa Rica, extending inland north by west about 60 miles and from 20 to 30 miles in width. Along the shore are high mountains and many picturesque inlets. Cape Blanco is at the entrance. Punta Arenas, on the east shore, is the port of entry.

NICTHEROY, ne-ta-ro'e, Brazil, a town of Rio de Janeiro, prior to 1894 the capital of

the state, on Praia Grande Bay in the Bay of Rio de Janeiro, opposite the city of that name. It is noted for its elegant suburban residences. Pop. estimated at 40,000.

NICTITATION, nikhi-ta'shon, involun¬ tary winking of the eye, from the Latin word nictarc, to beckon. It is a slight spasm of the orbicularis muscle of the eye and is often induced by nervousness, hysteria, neurasthenia, etc. "The eyelids sometimes nictitate with an involuntary quiver0 is a medical definition of nictitation; and a chronic spasm of the eyelids is spoken of as a "nictitating spasm.® Some animals, such as elephants, opposums, seals and the cat tribe, and all birds and fishes, have what is called a third eyelid, or nictitating mem¬ brane.

NIDIFICATION is nest-building: that is, the process and practice of arranging or con¬ structing a place for the deposit and protection of eggs and of the young hatched therefrom as long as required by the circumstances of each case. The membranous or glutinous packets in which the eggs of many of the higher worms, mollusks, of some insects, and even of most amphibians (frogs and salamanders, for ex¬ ample) are enclosed, coincident with their void- ance by the female, may not be included, be¬ cause they are not prepared by the mother, but are as natural products as the eggs themselves. Insects and spiders put their eggs in places of safety, or wThere the young, when they come, will be close to their proper food. When not buried in some way they may be protected by some sort of covering, but this is about all until we come to the highest group — the ants, wasps and bees. The larvae of insects, however, con¬ struct for themselves many and sometimes very remarkable abiding-places, which are certainly "nests® in the broader sense of the term, since they are the shelters within which juvenile growth and transformations, often much pro¬ longed, are carried on; but it is not proper to include mere pupa-cases, such as the cocoons of moths. Thus the white, silken webs that disfigure and injure our fruit-trees are spun by a colony of caterpillars, and form their nest, to which they return nightly after feeding; finally, however, each caterpillar wraps a cocoon about him and sinks into the pupal inertia for the winter, and this wrapping is in no sense a nest. Some insects, however, do make definite homes for eggs and expected young. The most striking examples are found among the wasps and bees, both social and solitary, and the ants, tlm last-named forming regular nurseries in their colony-habitations, and caring for their larvae as do the most intelligent mammals for their young. Sufficient details to illustrate these and other cases of insect nidification may be found in the articles Ant: Bee; Insect; Moth; Wasp, etc. The clearest illustration, probably, is afforded by the common brown wasps (Po- listes) that make individual paper nests, shaped like inverted wine-glasses, hung by a short stem ; they are very often attached to the ceil¬ ings of sheds, barn-lofts and the porches of rural

houses. These begin with a single cell made in early warm weather by a female wasp that has survived the winter. In this cell she lays a fertile egg, and then proceeds diligently to add other cells around this until finally half a dozen circles have been fashioned. Mean-

while the eggs in the central, first-made cells, have hatched and the grubs grow and must be fed. As they increase, the cells are lengthened, and constant nourishment is given by the busy mother, until finally the earliest grubs escape as mature wasps and begin to help in the care of the rapidly increasing family. Ihis is a real nest.

The examples of nidification among fishes are related in considerable detail in the article Fishes, Nest-making by.

Among the salamanders, newts, toads, frogs and other amphibia, the eggs are usually in¬ closed in some sort of gelatinous envelope and laid in the water, in most cases without any particular care, and in others are attached to stones or plants, and probably guarded by the parent. Some newts and frogs coil about or carry the eggs; or, as in the case of the well-known Surinam toad, the eggs are voided from the protruding and turned-up oviduct of the female in such a way that the male, perched on her back, squeezes them into the spongy sur¬ face of her back, where they mature in little pockets. Some Eastern frogs and many of the South American tree-frogs have similar devices, but only one makes what might be called a nest. This is the ferreiro or "smith® (Hyla faber) of Brazil, which digs up mud in its ponds, and builds around a chosen space .a strong wall reaching to, or a little above, the surface of the water. This is done at night by the female, who pats the wall into a firm rampart ; and here she lays her eggs, the tadpoles thus hatching and growing in security until able to escape and take care of themselves.

The reptiles in many cases (among snakes and lizards) bring forth their young alive, and when they care for them do so without any pre¬ vious preparation. The pythons (q.v.) coil around their eggs and thus protect and incu¬ bate them. Many snakes worm their way into loose soil or rotting dung-heaps, and leave their eggs to chance. The chameleons and many other lizards scrape a hole in the mold and cover up the eggs left there. That is also the method of the turtles, but they are more, care¬ ful, for while some simply dig a cavity in the sand of the sea-beach or river-bank, deposit their eggs and cover them up, others take great pains to pack the earth down hard. The well- known green turtle searches long and carefully

before she satisfies herself that the spot is suit¬ able, and then digs with her flippers a hole three feet deep, in which she deposits about 200 eggs. The hole is then filled up, and the top leveled off until little or no trace of the operation is visible. That is the practice of the Old World crocodiles, also the gharial, or gangetic crocodile which varies it by burying its eggs deeply in two layers, with a thick layer of sand between them. Our American alligators, however, make much more elaborate preparations for their young as is described under Alligator.

Birds, of course, furnish the most typical examples of nest-building and of all the other phenomena of nidification, often on a scale that compels wonder at the ingenuity and beauty dis¬ played. See Birds, Nests of.

Nidification, among mammals, involves a wider use of the term than with birds, at least, and may be defined as any living-place con¬ structed by the animal and formed more or less

like a bird's nest. A striking instance is afforded by the habits of the big anthropoid apes — the gorilla, orang-utan and the chimpan¬ zee. All of these, in a very similar manner, construct platforms of broken branches in trees, upon which to sleep, where the females bung forth and nourish their young. Sir James Brooke, in his (Ten Years in Sarawak, > says that in the case of the orang-utan, the nest is always built low down, often within 25 feet of the ground, and is three or four feet in diameter and quite flat on top. The Australian bandicoots form compact nests of grass in a shallow hole in the ground, and our American opossums in a hollow log, or broken tree-trunk. The cony (Hyrax) of South Africa, and our cony (Ochotona), make warm winter-nests within the interstices of loose rocks, and some African lemurs bed-chambers of sticks and leaves in the tree-tops. The chief mammalian nest-builders, however, are found among the arboreal squirrels and the rats and mice of vari¬ ous parts of the world. The European dor¬ mouse is an excellent example. The British squirrel forms a nest, "constructed,® says Bell ((British Quadrupedal 1839), "in a very intri¬ cate and beautiful manner, of moss, leaves and fibres curiously interlaced ; and it is usually placed either in a hole in a tree, or in a fork between two branches, often where it can with difficulty be distinguished from, the tree itself.® Our American rodents have similar habits. The flying squirrels of this country form thick warm beds of feathers, hair or other soft materials in abandoned woodpecker-holes and other cran¬ nies. Our common gray and fox squirrels, which spend the winter in well-bedded chambers in tree-holes, construct in summer large nests of leaves and leafy twigs, massed together in tree-tops, into which they bore their way, then, by crowding and biting, hollow out the interior into a snug living-room. Our field-mice make warm nests of grass, etc., in hollows of the soil for winter residence; and one of them, the jumping-mouse, weaves a ball of such materials, placed in

a bush, into which it creeps for hiber¬ nation. Still more remarkable are the similar but larger houses of the wood-rats (Neotoma) , Thus Cram ((American Animals,) 1902) says of the Alleghany wood-rat that it inhabits rocky ledges among loose piles of broken rocks, "Here he gathers together a mass of sticks, shreds of bark, leaves and other debris to form a nest, building them sometimes into a more regular dome-shaped structure.®

Ernest Ingersoll.

NIEBELUNGEN LIED. See Nibelun-

gen Lied.

NIEBUHR, ne'boor, Barthold Georg,

German historian and classical scholar, the founder of modern historical method: b. Copen¬ hagen, 27 Aug. 1776; d. Bonn, 2 Jan. 1831. He was son of Karsten Niebuhr (q.v.) ; was edu¬ cated by his father in his early youth; studied at Kiel (1794-96), at London and at Edinburgh (1798-99) ; and in 1800 entered the service of the Danish government. He became director of the government's bank in 1804, and showed in this post and in the Prussian service, which he entered in 1806, much business ability, due, so he affirmed, to his life in England and Scotland. A quarrel with Hardenberg made Niebuhr's re¬ tirement necessary in 1810, soon after he had

Ho WgEge5 lU financinS a Prussian loan in Holland and he taught Roman history at Ber-

was lerr! three iˆlrs uwit> such success that he

n? d t?r-publlsh the hrst two volumes of his*

Roman History> (1811-12). But in 1813 he re-entered the Prussian government employ, and

hinnaˆTnef Part, m ™usinS national oppo¬ sition to Napoleon; but his temper was over-

Steinˆ Tan(lsfe uS00n broke with his superior, Stein. In 1816 he was sent as Minister to the

atican brought about the understanding be-

hidlˆn ruisi.a and the Pope signalized by the bull

ripe J=Stt°PPOrtUDty of testing his critical theo- ries as to early Roman history by topographical

and other detail. In 1823 1m retired from the diplomatic service and settled in Bonn, where he lectured on ancient and modern history. i • lebuhr s great and epoch-making work was nis destructive criticism of the early Roman leg¬ endary period and his reconstruction of this

fˆenPln0,d ˆ"the mass of myth and legend, which beclouded it, or, to put it more broadly and more truly, it was his application of this higher critical method to history. His (Roman History (1811-32, English version, Hare and Thirwall, 1851), carrying the story of Rome down to the Punic Wars, was completed in an English form by Leonhard Schmitz in (Lectures on the History of Rome from the First Punic War to the Death of Constantine> (1844). ihese two parts form a great collection of facts and material, and a wonderful exemplification of method, but the more popular and brilliant style of Niebuhr's pupil, Theodor Mommsen (q.v.), has made Nie¬ buhr s work to a certain degree antiquated. He collaborated with Platner and Bunsen in their Description of the City of Rome' ; founded with Bockh and Brandis the Rheinisches Mu¬ seum, a classical review; edited the (Corpus Scriptorum Historian Byzantinae) ; and wrote many minor philological and historical studies, besides editing new fragments of Gaius, Cicero and Merobaudes. His (Stories of the Greek Heroes } # ((Griechische Heroengeschichte, 1842), originally written for his son, Marcus, is a famous juvenile. Niebuhr was possessed of original genius, had an intuitive grasp of his¬ tory that made him detect the false evidence and was so adept at learning languages that he had mastered 20 in early manhood. He was also a man of broad scholarship and catholic taste, as may be seen by his personal reminis¬ cences and correspondence in Hensler's (1838-39). Con-*

- – - i.ˆ1 V 1UJU-J7) . VˆUIl-

suit also the biographies by Classen (1876) and Eyssenhardt (1886) ; and Winkworth, (Life and Letters (1852).*

NIEBUHR, Karsten, German traveler, father of B. G. Niebuhr (q.v.) : b. Lfiding- worth, Hanover, 17 March 1733; d. Meldorf, Prussia, 26 April 1815. In 1760 he entered the Danish service as lieutenant of engineers, and in 1761 joined the expedition sent by Frederick V of Denmark to explore Arabia, Egypt and Syria. All his companions in this expedition died within a year after their departure, but in spite of these distressing discouragements, he pursued his work single-handed, and in 1766 returned

to Copenhagen. The works in which he gave the world the result of his expedition are classics and remarkable for their accuracy.

They in

NIECKS, neks, Frederick, Anglo-German composer and critic : b. Dfisseldorf, Germany, 3 beb. 1845. He was educated at Leipzig Univer¬ sity and was a violinist and music teacher in his native city till 1868 when he settled in Scot¬ land, where he was for some years engaged in teaching music, and since 1875 he has written much for musical journals. From 1891 to 1914 he was Reid professor of music at the Univer¬ sity of Edinburgh. He has published (A Con- cise Dictionary of Musical Terms) (1884) • Chopin as a Man and Musician (1888); and*

. mo\ amme Music in the Last Four Centuries >

(19U8) .

NIEDERMEYER, ne'der-ml-er, Louis, Bwiss composer: b. Nyon, 27 April 1802; d.

I ans, 14 March 1861. He studied under Mos- chdes in Vienna, and in Italy with Fioravanti and Zingarelli and settled in Paris. He met W1 great success in operatic music, such

a/S,oˆane ,St,Uart> (1844> and

NIEDERWALD, ne'der-valt, Germany, the western termination of the Taunus range in the Prussian district of Wiesbaden, abutting on the Rhine opposite Bingen. On a command- near. Rs summit was erected, 28 Sept. lo83, the national memorial commemorative of the sucessful War of 1870 — 71. An entended pedestal, ornamented with allegorical figures is surmounted by a bronze figure of Germania, 34J4 feet m height. The whole was designed by Schilling, a Dresden sculptor. Toothed- raimays carry visitors up to the monument trom the villages of Rfidesheim and Assmanns- hausen at the foot, both noted for their wine.

NIEHAUS, ne'hous, Charles Henry,

A™encan sculptor : b. Cincinnati, Ohio, 24 Jan.

1 j , Hˆa? ,educated at the Public schools and the McMicken School of Art; and on the savings of his boyish years proceeded to Munich Bavaria where he won high distinction. After his. residence in Germany he returned to the United States, proceeding again to Europe and setting up a studio in Rome from 1881 to 1885 His fame as a sculptor was meantime growing He is

equally expressive with the chisel as with the modeling tool. No sculptor has been more associated with memorials of a public character than he. Among monuments may be cited the Hahnemann and Paul Jones monuments at V\ ashington, D. C. ; the equestrian monuments to Drake at Titusville, Pa., and to General r or re st, at Memphis, Tenn. ; the apotheosis of baint Louis at Saint Louis, Mo.; the Astor historical doors to Trinitv Church, New York- and the pediment to the State Hofise at Ken- tucky Among busts may be mentioned those of Disraeli Dr. Collyer, Robert Blum, Joseph Jefferson, Rabbi Gottheil, Hon. Charles Hack-

ley and Governor Hoadley. His ideal works include the Csestus in the Metropolitan Museum, New York, the (Greek Athelete using a StrygiD His statues include those of Garfield at Cincin¬ nati and the Capitol, Washington; Governor Allen of Ohio, Ingalls and Morton in the ro¬ tunda of the Capitol, Washington; Moses and Gibbon in the Congressional Library; Farragut and McKinley at Muskegon; and a statue of McKinley and lunette for his tomb at Canton, Ohio. Fie has executed three statues of Presi¬ dent Lincoln, the first a seated figure of heroic size in bronze, the property of the Historical Society of Buffalo, N. Y. ; the second, al¬ most a replica of the first, is at Muskegon. His third statue, exhibited in 1916 which is in Cres- tele marble, is regarded as a most successful presentation and reveals almost perfectly the deeply brooding expression habitual to the coun¬ tenance of the martyred President. Mr. Nie- haus was awarded gold medals at Buffalo in 1901 ; at Charleston in 1902 ; and Saint Louis in 1904. He was elected a member of the Na¬ tional Academy in 1906. Consult Armstrong, Charles Niehaus) (New York 1902).

NIEL, ne-el, Adolphe, French marshal: b. Murat, Haute-Garonne, 4 Oct. 1802; d. 14 Aug. 1869. He was educated at the Ecole Polytech¬ nique, Paris, and the Military School, Metz, and in 1835 became captain of engineers. He took part in the expedition against Constantine in Algeria 1836—37 ; commanded the engineers at the siege of Rome in 1849 during the revolu¬ tionary movement under Garibaldi ; took part in the bombardment of Bomersund in the Baltic in 1854, and as chief of engineers planned the operations against Sebastopol in 1855. He fig¬ ured prominently at Magenta and Solferino in the Italian campaign of 1859, was made a mar¬ shal of France by Napoleon III in return for his service and in 1867 became Minister of War. The Marshal Niel rose derives its name from him.

NIELLO WORK, in art , a method of ornamentation described among other

old writers by Pliny, and much practised in the Middle Ages, and to which may be traced the origin of engraving. The lines of a design are cut in a piece of gold or silver; it is then cov¬ ered with a black composition consisting of copper, silver, lead and sulphur, and a little borax is sprinkled over it by subjecting it to heat over a fire ; the composition becomes liquid and runs into the lines of the design; the whole is then allowed to cool, when the surface of the metal is scraped and burnished, leaving the drawing in black upon the metal. Plaques so ornamented -were principally employed in the making of church plate and reliquaries and for costly personal ornament. The art is still prac¬ tised by goldsmiths as a mode of ornamenting ware, especially in Russia and India, but its principal use is for door-plates, plates for shop fronts, etc., in which the brass or zinc plates are engraved and the depressions filled with wax. The term is also applied to impressions in a viscid water-ink on paper from metal-plate engravings taken by the early fathers of copper¬ plate printing for testing the state of their work. See Engraving. Consult Wilson, H., Silver- work and Jewellry) (London 1912).

NIEMANN, ne'man, Albert, German oper¬ atic tenor: b. Erxleben, near Magdeburg, 15 Jan.

1831. At first a worker in a machine factory, he became an actor in 1849; was trained in sing¬ ing by Schneider, hofkapellmeister at Dessau, and by Nusch, a baritone; appeared at Berlin, Stuttgart and Konigsberg; and after further study under Duprez at Paris, played in the first production of Tannhauser in that city (1861), was made (

NIEMCEWICZ, nyem-tsa'vich, Julian Ur- sin, Polish statesman and author : d. Skoki, Lithuania, 1757 ; d. Paris, 21 April 1841. After graduating from a military school, he entered the army in 1777 and became major in 1788. In that year he was sent as a deputy to the Polish Diet where he defended the rights of the middle and peasant classes. He was a publisher, of the People's Paper and framed the Constitu¬ tion of the Third of May® (1791), which made monarchy hereditary in Poland. He acted as adviser and adjutant to Kosciusko and was taken prisoner with him at the fatal battle of Maciejowice (1794) and shared his captivity in Petrograd. On his release he traveled in the United States, where he married Mrs. Living¬ ston Kean of New York. When he heard of Napoleon's entrance into Poland in 1807 he re¬ turned to his native land. After the Congress of Vienna he was made Secretary of State and President of the Constitutional Committee in Poland; and when Poland came under Russian control he was retained in office. The events of 1830 drove him again into exile and he went to Paris, where he died. Niemcewicz wrote in many styles. His (Historical Songs of the Poles) (Warsaw 1816), a series of ballads de¬ scribing the chief heroes of Poland's golden age of Sigismund I and the

reigns of Stephen Ba- thori and Sobieski, are greatly beloved by the Poles and did much to arouse their national consciousness. His comedy, (The Return of the Deputy1 (1790) was popular also and his novel, (John of Tenczyn1 (1825), much in the style of Walter Scott gives a fine picture of old Polish days. He also wrote a (History of the Reign of Sigismund IIP (3 vols., 1819) ; and a Collection of Memoirs on Ancient Poland1 (6 vols., 1822-23). A collection of his works was published in 12 volumes (Leipzig 1838- 40), but it is not complete. Consult Czartorey- ski, (Life of Niemcewicz (in Polish, Paris I860) ; Pamientniki, Memoirs1 (1876, 1877, 1912) and Niemcewicz, Lithuanian Letters1

(1812).

NIEMEN, ne'men or nyem'en, a river of Prussia, wifh 70 miles, the lower part of its course of 500 miles, lying within the province of East Prussia, where it is called the Meml. It rises a few miles south of the city of Minsk. It is navigable to Grodno ; below Tilsit it di¬ vides into two branches, which reach the Kur- isches Haff each bv four mouths and is almost cut off from the sea by narrow spits of sand.

NIEMEYER, ne'mi-er, Felix von, German physician, grandson of the poet and theologian Felix August Hermann Niemeyer : b. Madge-

Imi-g, Dec. 1820; d. Tubingen, 14 March 1871. He was educated at Halle; practised in Madge- burg 1844—55 ; was professor of pathology and therapeutics at Greifswald, and from 1860 at 1 ubingen ; was military surgeon during the r ranco-Prussion War; was ennobled for his .sei\ices to the king of W urtemberg; and wrote a lextTl?f Special Pathology and Thera¬ peutics, (1858), often republished and distinctly valuable.

NIEPCE, Joseph Nicephore, zho-zef ne- sa-tor ne-eps, French inventor: b. Chalon-sur- Saone, 7 March 1765; d. Gras, near Chalon, July 1853. He served in the French Revolution¬ ary army, was administrator of the district of Aice 1705-1801, then devoted himself to chemi¬ cal and mechanical studies at Chalon, and from loll to lithography. His researches in photog- raphv began in 1813, and by 1824 he was suc¬ cessful in obtaining permanent impressions of the images of the camera obscura. In 1826 he joined Daguerre in a further prosecution of the investigations. An article of their agree¬ ment seems to make it clear that the real credit tor the discovery of photography belongs to A lepce, and that Daguerre was merely an im¬ portant and in its development. Consult Fouque, (.La vente

sur l'invention de la photographic > (1867); and the (Life> by Davanne (1885). bee also Daguerre; Photography.

NIETZSCHE, net'she, Friedrich Wilhelm,

German philosopher: b. Rocken, 15 Oct 1844- d. Weimar, 25 Aug. 1900. He studied philology at Bonn and Leipzig, and held the professor¬ ship of classical philology at Bale from 1869 to 1879. The next 10 years were spent at differ¬ ent health resorts. In 1889 he became insane and died at Weimar in 1900. His most im¬ portant writings are (1878) •

(Also sprach Zarathustra) (1883-92); (Jenseits von Gut und Bose) (1886);

(1895) .

Nietzsche's theories may conveniently be divided into three periods; the first, which may be called the aesthetic period, extending until 1878; the second, the intellectual or positivistic period, until about 1883, and the third, or ethical, until 1889. The relation between these periods has been much discussed, and many critics have denied . the existence of any unifying principle. It must be remembered that his writ¬ ings are the brilliant but nevertheless incoherent revolt of a doomed mind against its malady. On the other hand, the whole of Nietzsche's philosophy often seems an attempt to answer the question as to the nature of the chief good, and the chief radical differences in the three periods may be explained as due to changes in his standard of valuation.

(1) During this period Nietzsche accepted Schopenhauer's general standpoint, especially his emphasis upon the priority of will to intel¬ lect, and his pessimism, but regarded the latter as resulting in increased artistic activity rather than in question. The ultimate values are those of the artist, and the two great forces in art are typified by the Greek gods Apollo and Dionysus. The former is the dream, which, conscious of its own illusion, mirrors appear¬

ances. The latter is the intoxication that marks the breaking forth of the underlying reality. The hope of modern art lies in the union of the two in the Wagnerian opera, an estimate of Wagner later to be contradicted.

(2) With the beginning of the intellectual period, a logical rather than an aesthetic value is made supreme.

(3) The third period is by far the most im¬ portant, since it contains the most characteristic and original of Nietzsche's views; and here the ultimate value is one of conduct rather than of thought or feeling. The basal reality

is the will for power, a metaphysical principle which is extended from human activity to the universe, but which as such receives only vague treatment. The ethics is both negative and positive, in that it consists, first, of a criticism of existing moral distinctions, and, second, of the exposition and defense of a new moral ideal. Historically there are two moralities, each with its own set of opposites. Good and evil, the first pair, are valuations of the ruling classes, for whom everything that expresses or furthers the will of the individual is good. All that he does or likes, his passions, his ideals, all that forms a part of himself is good; while whatever is dif¬ ferent is evil. The other pair of valuations, good and bad, belongs, on the contrary, to the slaves, and here whatever characterizes the ruler and so is inconvenient or painful to the subject is stigmatized as bad, while good is applied to all those qualities and actions that make life easier. It is essentially the morality of suppressed resentment; and whereas the seal of aristocratic approval is set upon the positive traits of the healthy animal, such as courage, self-assertion and desire for unrestrained free¬ dom, to the slave good means meekness, sym¬ pathy and obedience. The present European standards are those of the slaves, and Nietzsche even affirms that they have became such largely through a deliberate plot of the Jews, at the be¬ ginning of the Christian era, to revenge them¬ selves upon their Aryan conquerors by foisting upon thern an ignoble standard of worth.

The aristocratic moral ideal that Nietzsche would substitute for this one takes self-asser¬ tion as its most essential characteristic. At the bottom of everything is the will for power; and all that makes for fullness of life is to be cherished, even though it overrides all our ideas of morality and of religion. The so-called vir¬ tues of pity, humility and the like are merely symptoms of weakness and degeneracy. Strength and pride, ruthlessness toward one¬ self and toward others, courage and love of battle, all mark the true man, who has put be¬ hind him prejudice and tradition. For such com¬ plete affirmation of life opposition is a necessity, and a good war sanctifies every cause. The im¬ pulses should be given full play, not weakened by despicable self-denial. Altruism is an offense against delicacy, and pain alone can bring about the proud isolation that is above all pettiness. Such a view of the chief good is by no means to be called hedonistic. There is doubtless a fierce joy in battle and in all sorts of conflict; but the end proposed and reached is not hap¬ piness. Power and power alone is the good.

The two doctrines most often associated with Nietzsche's name, though they are not essential to his ethics, are those of the Superman and the

Eternal Recurrence. The first is the end and justification of human struggle, and in tne earlier books is represented as a mystical product of the individual will, while latei it is described as a higher species with the relation¬ ship to man that man has to the ape. ine Eternal Recurrence is the theory, by no means new that present events but form a part of an infinite cycle and thus will be endlessly repeated in every detail. The final test of Nietzsches aristocrat is his willingness to accept such repe- tition even of the hardest conditions lhe whole attitude toward life evidently makes the pessimism of the first period no longer possible, and the new standpoint is characterized by its author as tragic optimism, namely, the view that finds life worth while not in spite of but be¬ cause of its pain. Nietzsche s theories have been much discussed and have exercised an unexpected influence, especially among men interested primarily in art or in social reform; and many consider them the logical outcome and application of Darwinism, but there is nothing in Darwinism itself, apart from all preconceived philosophical interpretations, which compels a Nietzschean ethics. .

Bibliography.— Bakewell, IX, 4 April 1899 , Pg- 314- 331) • Brandes, (Friedrich Nietzsche> (1888; tr. New' York 1914); Chatterton-Hill, J., (The Philosophy of Nietzscheˆ (New York 1913) , Dolson, (The Philosophy of Nietzsche' (New York 1901) ; (Cornell Studies in Philosophy (No. 3) ; Drews, (Nietzsche's Philosophic" (1904); uncompleted biography by E. Foster- Nietzsche (Vol. I, Leipzig 1895) ;

Grace Neal Dolson,

Professor of Philosophy , Wells College, Author of « The Philosophy of Nietzsche ."

NIEUPORT, ne'oo-por, Belgium, town in the province of West Flanders, on the Yser River, 10 miles southwest # of Ostend. It was a strongly fortified town in. the Middle Ages. A castle was erected here in the 9th century by the Flemish counts for protection against the Normans. Of this castle only the donjon tower remains. In 1160 the name was changed from Santhoven to Neoportus. The siege of Nieuport by the French in 1488—89 is the chief episode of its heroic period. Here, too, Maur¬ ice of Nassau defeated in 1600 the Spaniards under the Archduke Albert in the famous battle of the Dunes. The old buildings are hiehly interesting: the Cloth Market dates from 1480; there is an old Gothic church (restored in 1903) ; and a town-hall containing a small collection of naintings.

The lighthouse dates from 1289. Two miles from the town is the modern seasiae resort, Nieuport Bains, which although dating

from only 1869 is very popular for visitors on account of the fine bathing. The pier ex¬ tends 1,500 yards into the sea at the entrance of the Yser which has been canalized. I he industries of Nieuport are shipbuilding, rope and net-making and fishing. Pop. (1904) 3,780.

During the European War Nieuport was the scene of almost continuous fighting. the famous Nieuport-Dixmude line offered the greatest resistance to the German drives tor Calais. Trench warfare was almost incessant at Nieuport during the first year of the war.

NIEUWENHUIS, Ferdinand Domela, Dutch Socialist; b. Amsterdam, 1846. He was educated at the Lutheran Seminary in Amster¬ dam and was pastor of churches m Harlingen, Beverwijk and The Hague. In 1879 he became leader of the Social Democrats, which he had founded, and in 1887 he was elected to the States-General. Growing more extreme in his views he formed, with Cornelissen, a free Socialist faction. He took a prominent part in the Socialist congresses of Brussels (1891) and Zurich (1893), opposing Liebknecht and compulsory military service. In 1897 he started a new journal, De veye Socialist. Nieuwenhuis is the author of (Schetsen en tafreelen uit de Fransche revolutie van 1789' (1889) ; (Die ge- schiedenis van het socialisme' (3 vols., 1901— 02) ; (Hoc ons land geregeerd wordt op pa- pieren in de werkelijk held' (The Hague |891 ; 4th ed.) ; (De welenschap en het Karakter' (The Hague 1892) and many other books and pamphlets on political subjects. He has also written on religion and published a book on the Bible, (De Bijbel' (Amsterdam 1893).

NIEVO, Ippolito, Italian poet: b. Padua, 1832 d. by shipwreck near Tirreno, 4 March 1861.' He was educated in Padua, Verona and Mantua; joined the army; took part in the revolution under Garibaldi and became a col¬ onel. His works, which show the development of the Italian national consciousness from 1775 to 1850, are ranked high in Italy. They com¬ prise historical novels, stories, dramas and poems. Nievo has much wit and a picturesque manner of expression. He passed from roman¬ ticism to realism. He is regarded as the founder of the realistic school in Italy His works include (Angelo di bonta' (1856) ,*

(Conte pecoraio' (1857) ; three collections of tales; (Confessioni d'un ottuagenario' (186/), posthumously published ; and the unfinished (I1 pescatore di anime.' His portrait appears in (Nuova Enciclopedia Italiana' (Boccardo, Vol. XV, p. 429, Turin 1883). Consult Mantovim, D, (I1 poeta soldato, Ippolito Nievo' (Milan 1900) ; Molmenti, P. G., Hppolito Nievo, cenm critico-biografici' (Venice 1869) ; and Croce,

NIEVRE, ne-avr, France, a central depart¬ ment, bounded bv Yonne, Chef, Allier, Saone- et-Loire and Cote-d'Or; area, 2,658 square miles; capital,

Nevers. The soil is generally rocky and sandy, cut up by ramifications, almost always wooded, of the mountains of Morvan, forming the watershed between the Rhone and the Seine. There are several plateaux more or less fertile, a number of hills covered with vines and valleys productive in pastures; but the principal wealth consists in forests and minerals. The Nievre, whence the name of the department, is an inconsiderable affluent of the

01Te {F?™ right. The three chief rivers

e Allier, Lorie and Yonne — are navigable, and the Y°nne, which belongs to the system ot the Seine, is connected with the Loire by ai Ca™ xaT9ross .tlie watershed, and there is

uS° tbe Ntvernais Canal. Oats and wheat are the chief cereals. More than a third of the whole surface is covered with forests, the tim¬ ber from which, forming one of the principal sources of wealth, is conveyed by water in great quantities to Paris, etc. Its wines are import¬ ant- Minerals include iron and coal, and the chiei manufacturing products are woolen cloths,

lirTn, glass, porcelain, cutlery, etc. Pop. 299,-

0 1

NIFLHEIM, nif'hlm, in Scandinavian my¬ thology, the region of endless cold and ever¬ lasting night, ruled over by Hela. It is sepa- rated from Muspelsheim, the kingdom of light and heat, by a huge chasm' (Ginnungagap, yawning gap). Here flows the spring Hver- gelmir, watched by the dragon Nidhugger ; this sprmg sends out 12 ice-rivers, from the drops of which, thawed by sparks from Muspels¬ heim, sprang the chaotic giant, Ymir, and the cow, Audhumbla.

Agostine, Italian philosopher: b Giapoli, Calabria, Sicily, about 1473 ; d. Sissa, 18 June 1538. Three cities claim to be his birthplace: Giapoli, near Calabria, Sicily; Tro- pea, near Abruzzi ; and Sessa, near Tierra di Lavoro. The latter Nifo recognized as his natal town. He lived in Sezga, studied philos¬ ophy m Padua and lectured in Padua, Naples, Rome and Pisa, attracting the attention of Leo X, who had him defend the Catholic doctrine of immortality against the attack of Pom- ponazio and the Alexandrists. In this famous controversy Jhe opposed Pomponazio's theory that the rational soul is inseparably bound up with the material part of the individual and insisted that the individual soul is indestruc¬ tible (being a part of absolute

intellect) and on the death of the body is merged into eternal unity. As a reward for his splendid argument he was made Count Palatine with the right to call himself by the name of Medici. In 1495 he published an edition of the works of Averroes with a commentary presenting the views of the orthodox Catholics. His commen¬ taries on Aristotle were widely read and fre¬ quently reprinted. The most famous edition appeared in 14 volumes, including the 'Opus- cula) (Paris 1654). His own philosophical works are (De immortalitate animP (Venice 1524); (De intellectu et daamonibus) ; (De in- finitate primi motoris quaesto' and 'Opuscula moralia et politicaP

NIGEL, nigel, English satirist of the close of the 12th century, sometimes called Wireker.

A monk at Christ Church priory, Canterbury, he wrote various verse, the most important of his poems being the (Speculum Stultorum, > in which, as in the prose work (Contra Curiales et Officiates ClericosP he boldly attacked the vices ob his fellow-ecclesiastics. The Specu¬ lum StultorunP or 'Mirror of Fools, > with its story of the ass, Burnellus, who wished his tail was longer, for centuries enjoyed great popularity. Consult Wright, 'Anglo-Saxon Satirical Poets) (1874).

NIGELLA, a genus of plants of natural order Rununculacece, having five colored spread-

VOL. 20—22

ing sepals; 5 or 10 small twc-lipped petals, with tubular claw; the carpels more or less connected together, many-seeded ; leaves divided into threadlike segments, flowers solitary at the top of stem or branches. They are annuals, natives chiefly of the countries near the Medi¬ terranean and warmer temperate parts of Asia. Some, occasionally seen in gardens in Britain, are vulgarly known by the names Devil-in-a- bush and D evil-in- a-mist. The seeds are aro¬ matic and somewhat peppery. Those of N. sativa, species common in cornfields in south¬ ern Europe, are supposed to be the black cum¬ min of the ancients, perhaps the cummin of the Bible. The seeds of a specie of Nigella are much used by the Afghans for flavoring curries.

NIGER, ni'jer, or JOLIBA, jol'i -ba, a river of West Africa, the third in size of the African continent, known by various native names throughout its course, being the Joli'ba in its upper reach, the Mayo Balleo and Isa Eghirren in the central reach and the Kwarsa or Quorra in its lowest reach. The upper and central reaches are politically controlled by France and the lower reach, through Northern and South¬ ern Nigeria, by Great Britian.

The Niger rises on the eastern slope of Mount Yenkina on the boundaries of Sierra Leone and Liberia, about 175 miles from the west coast, its headwaters being contiguous to those of the Senegal which flow in an opposite course. It flows northeast as far as Timbuktu, 300 miles above which it is joined by the Bani, a large tributary, and splits up into numerous diverging channels and Jakes. .,Aˆter Passing Timbuktu it flows east for 200 miles, then turns southeast through a rocky country past Say. At about 11° 40′ N., just above Ilo, it enters British North Nigeria, at Giri being joined 'by the Sokoto River from the east. At Boussa navigation is impeded by dan¬ gerous rapids. Finally, after a long southwest¬ ern curve to Bida, it bends more to the south and is joined by a tributary of first-class size, the Benue, or Mother of Waters, a rival in vo ume which has come from a source 860 miles to the east. The united stream now passes through a series of bold picturesque hills by a narrow gorge, }) and eventually breaks up into one of the most remarkable mangrove- covered deltas of the world. This delta, malari- unhealthful, covers an area of about 14,000 square miles, completely intersected by iTan-NT es of the river, the principal of which, the Nun, runs through the middle of the delta I he westernmost branch, the Benin, has a bar which presents a great difficulty to navigation! Other mouths or branches are the Bonny, New Calabar, Brass and Forcados (which has now taken the place of the Nun as the principal navigable mouth), distributing the Niger's waters into the bights of Benin and Biafra in the Gulf of Guinea. In its course the Niger passes through much fertile valley lands, and there are valuable lignite deposits east and west of the river, while numerous towns and villages stand on its banks, and a considerable canoe commerce is prosecuted. Slaves were formerly nearly the only article of export from the Niger, but palm oil is now the principal staple, the delta outlets being known as oil rivers. The whole course of the river is about 2,500 miles, and the area of its basin is esti¬ mated at 584,000 square miles. By means of the Niger-Benue system direct access is had at

the height of the season with Nafoda, 200 miles from Lake Tchad, and 900 miles form the sea. Mungo Park was the first European traveler to explore any part of this river (1796— 97) and was drowned in the Boussa rapids. The honors of modern exploration are divided between French, British and German travelers. Consult Bindloss, (In the Niger Country) (London 1898) ; Hourst, (Exploration of the Niger } (Eng. trans., ib. 1898) ; Leonard, A. G., (The Lower Niger and its Tributaries (ib. 1906) ; Mockler-Ferryman, (Up the Niger) (ib. 1892).*

NIGER, Military Territory of the, a sub¬ division of French West Africa, situated in the Upper Senegal-Niger colony (formed in 1904 from the Senegambia and Niger territories). The territory lies north of the British Pro¬ tectorate of Nigeria and directly west of Upper Senegal-Niger.

At the same time that the colony of Upper Senegal-Niger was formed the military territories, which now form an integral part of it, were broken up. The second military terri¬ tory (which included nearly all the country within the Bend) was handed over to the civil administration. The first (Timbuktu) has been incorporated in Upper Senegal-Niger, and is administered by a colonel under the authority of the lieutenant-governor. The third (Zinder- Chad) territory has been constituted an autono¬ mous unit. The capital is Bakmako (pop. 1918, 8,734). The most important cities are Kayes (pop. 5,820), and Timbuktu (4,270). At Bamako is a professional school and a school for the sons of chiefs. At Timbuktu there is a Mussulman Superior School with 67 pupils and one official. The natives cultivate peanuts, millet, maize, rice and cotton. Rubber and Kariti are other products. Cattle abound. Native industries include pottery, brick making, jewelry, weaving and leather-work. The chief imports are cotton, foodstuffs and metal-work. The chief exports are peanuts, cattle, rubber, skins and wool. There is a complete system of telegraph from Kayes to Naimey and from Zinder to Lake Tchad. The Senegal-Niger Railway runs from Kayes to Koulikoro, a dis¬ tance of 349 miles. Small steamboats run from Koulikoro to Timbuktu, so that it is now pos¬ sible to perform the entire journey from Europe to Timbuktu by rail and boat. A wireless telegraph connects Timbuktu with the Eiffel Tower in Paris. See Upper Senegal-Niger; Timbuktu; French West Africa.

NIGERIA, nl-je'ri-a, or NIGER (nl'jer) TERRITORIES, West Africa, an extensive British colonial possession on the lower Niger, organized since 1900, within the boundaries ar¬ ranged by the Anglo-German Agreements of 1885, 1886 and 1893, and the Anglo-French Agreements of 1889, 1890 and 1898. It com¬ prises the Lagos Protectorate and Southern and Northern Nigeria, being bounded on the east by German Kamerun, and on the west and north by Dahomey and the French military terri¬ tories.

Nigeria includes the whole course of the Niger from a short distance above Ilo to its mouth, and also the left bank for a few miles higher up. The northern boundary runs irreg¬ ularly eastward to a point on Lake Tchad. Nigeria also includes the whole course of the

Benue from a point above Yola to its confluence with the Niger at Lokoja. The coast-line ex¬ tends from the Rio del Rey on the east, to near the mouth of the Benin River on the west, and thus includes all the mouths of the Niger. The total area is about 336,000 square miles ; the mixed negrito

population may amount to 17,- 000,000, chief of which are the Fulah or Fulani of the Hausa states. Mohammedanism is widely diffused. For administrative purposes the territory is divided into Northern and Southern Nigeria, the boundary line being drawn due east from Owo, on the Lagos fron¬ tier. The country is mainly a level or rolling plateau, but in the central districts there are mountain ranges and isolated peaks, many of them forest-clad, of considerable elevation. The Niger and the Benue are the chief rivers, the latter being especially valuable for navigation. The Gulbin-Sokoto is a perennial left-bank ter¬ ritory of the Niger, and the Waube, flowing into Lake Tchad, is also of some importance. The climate is tropical, with a dry (October- May) and a wet season. During the latter the rains are often extremely heavy and accom¬ panied by severe thunder-storms. The mean annual temperature is about 80° F., but at some periods of the year the temperature in the shade may exceed 100°. The delta lands are unhealth¬ ful, and the same may be said of much, of the interior, but the climate of the elevated dis¬ tricts is generally quite suited to Europeans. Geologically, the region is formed mainly of granite and various metamorphic rocks, but sedimentary formations, chiefly sandstones and almost entirely belonging to the older periods, are also found. Silver, tin, antimony, lead, iron and other minerals occur. Among the vege¬ table and agricultural products, most of which are exported, are cotton, indigo, palm-oil, palm kernels, ground-nuts, india-rubber, ebony, cam¬ wood, gums and coffee. Ivory and hides are also important exports, and among the native industries leather-working deserves mention. There are great tin deposits covering 9,000 square miles. There is direct railway com¬ munication between Lagos and Kano (712 miles), and other lines. The chief towns of Southern Nigeria are Asaba, Onicha, Akassa, Idda, Wari, Burutu, Brass, New Calabar, Bonny Opobo and Old Calabar, all ports with custom¬ houses; Ado and Benin. The chief towns of Northern Nigeria, which consists mainly of the former Sokoto empire and the larger part of Bornu, are Lokoja, at the confluence of the Niger and Benue, Kano, Sokoto, Gando, Ilorin, Yakoba, Kuka, Yola, Ilo and Katsena.

The greater part of Nigeria was adminis¬ tered by the. Royal Niger Company till 1 Jan. 1900, when it was bought out bv the British government and the two protectorates of North¬ ern and Southern Nigeria formed. This com¬ pany was formed in 1882 as the National African Company, and four years later it re¬ ceived its royal charter. Most of what is now Southern Nigeria was not under the rule of the company, but formed from 1884 till 1893 the Oil Rivers Protectorate, and from 1893 till 1899 the Niger Coast Protectorate. The king¬ dom of Benin was incorporated in the Niger Coast Protectorate in 1897.

In 1906 the colony and protectorate of Lagos was incorporated with Southern Nigeria; and in 1914 Northern and Southern Nigeria were

amalgamated under a governor-general Lagos lLde/r,rent SCat ,°£ government; but it is !n-

heart nf th 0ve the capitaI to K:,,!uiia1 in the neart ot the country.

CoHStdt, in addition of the travels of Barth C appeˆon R Lander, Richardson and Rohlfs,' Bmdloss In the Niger Country> (1899) • Fal-

Ohn't I0" f*,or?™ack, throt'f?h Nigeria > T-U)' /innzfrˆ' Tle Lower Niger and Its nbes (1906) ; Lucas, historical Geography

A/r Colonies : West Africa* (1913V

Nˆ?eria:,tt,s Problems and Its People*

\tV n-'> nJm £he, Makin8 of Northern Nigeria (1911); Raphael, 'Through Unknown Nigeria* (1914); Schultze, 'The Sultanate of Born ii (Eng. trans., 1914), and a recent work hy a former lieutenant-governor of Northern Nigena, Temple, C. L., (Native Races and their Rulers) (Cape Town 1918).

NIGGER CHUB, or NIGGER DICK, a

aark-green chub (q.v.) of the Mississippi Val¬ ley, distinguished by the three-lobed condition of the under jaw. See Cutups.

NIGGER TOES. See Brazil Nut.

NIGGERFISH, a name given to the sea- bass of the genus B odianus, common in the w atcrs of Bermuda and hlonda. The Spanish name for it is guativere. Consult Harris, Wil¬ liam C., and Bean, "larleton H., 'The Basses* Fresh-water and Marine* (illustrated by Louis Rhead, New York 1905).

NIGHT. (1) See Day. (2) In Greek mythology, Night (Nyx) was personified as a powerful goddess, who by means of sleep ex¬ ercised power over men and gods. She was the daughter of Chaos, wife of Erebus, and mother of Hfther and Hemera (Day), of the Fates, Sleep, Death, Dreams, Hunger, Fear, Nemesis and Strife. By day she dwelt in Tartarus en- eloped in thick clouds.

NIGHT-APE. See Douroucouli.

NIGHT-BLINDNESS, a defect of vision.

See Vision, Defects of.

NIGHT BLOOMING CEREUS, the name

given to the superb variety of night-flowering cactus, the cereus grandiflorus, with its vanilla- scented flowers. See Cereus and Cactus.

NIGHT-HAWK, or BULL-BAT, an

American nightjar or goat sucker (Chordeiles virgmianus) . It arrives in the Northern States about the middle of May and is crepuscular and nocturnal in habits, pursuing insects on the wing with great activity and often at a great height in the air, frequently over towns and cities. It retires in the daylight hours to the woods or an orchard and sleeps sitting length¬ wise on some large horizontal limb, or on a log, where its grayish mottled plumage, blend¬ ing with the color of the old bark, makes it unnoticeable. When flying it often utters a harsh scream, and also, when dropping sud¬ denly through the air, as it often does, it produces a strange booming sound. The night- hawk attains a length of 9 or 10 inches. It is blackish-brown on the upper parts, barred and mottled with grayish and huffy; a large wing- spot, bar across the tail, and V-shaped blotch on the throat, are white in both sexes and is the easiest mark of recognition. The tail is forked and is a little shorter than the wings when in repose.. The gape is large and the rictal bristles are inconspicuous.

I he eggs, two in number, oblong shape, and dirty bluish-white sprinkled with dark olive- brown, are produced about the middle of May, and are deposited on the bare ground in a dry situation, no nest being constructed. In Texas, Mexico and the Antilles there exists an allied species (C . acutipennis) .

NIGHT-HERON. See Herons.

NIGHT SCHOOLS. See Evening Schools.

w NIGHT THOUGHTS, or THE COM- LAINT. The first book of the 'Night lhoughts appeared in 1741, when Young had just completed his 60th year; the ninth and last book was published four years later. The pro¬ fessed puipose of the whole poem is to recom- mend the faith in another life as a compensation for the sorrows, disappointments and hollowness of this one. Young is careful to tell us in the preface to the first night that ((the occasion of the poem was real, not fictitious® ; and doubt- ess the reflections in the first two books were largely suggested by personal bereavement. His wife died early in 1741; two other friends, a daughter of*

his wife by a former marriage and her husband, to both of whom Young was warmly attached, had died, one in 1735 and the other m 1740.

“Insatiate archer, would not one suffice! ”

cries the poet in a burst of genuine grief.~But gnef that is really poignant is not usually quite so lhetoncal , one does not need to read far even in the early parts of the poem to suspect that the Poet was not wounded so much in his affections as in his ambitions. Did we know nothing of \ °ung s career, we might safely conjecture that •this is the complaint of a man who, at the summit of his years, turns away from life dis- appointed, with the pious resolve to disown and discredit the things he had most desired. Af¬ ter the close of the third Night this tone of melancholy reflection changes to one of declam¬ atory argument. Young had the typical 18th century confidence in “reason® and used the last six Nights of the poem mostly in the attempt to “reclaim® a certain Lorenzo, who is sup¬ posed to be a representative of the prevalent deism of Young’s time. But Lorenzo is a man of straw; and. Young’s familiar arguments, whatever their instrinsic value, are lost in such a wilderness of wordy metaphor that the reader of to-day is inclined to sympathize with Lorenzo and emerges at the end of 10,000 lines dazed and wearied rather than convinced.

In fact, Young’s poem exhibits about all the dangers that best the extravagant rhetorician. His imagination is at times genuinely lofty; >et he is always mistaking bigness for great¬ ness. With a flux of metaphor, apostrophe and hyperbole at command, he is always forgetting that the most sublime and the most pathetic truths admit only the simplest statement. If he occasionally writes a line of epigrammatic brevity and force, like

“ Procrastination is the thief of time ” or

“An undevout astronomer is mad ”,

he is sure to submerge his fine line in a rub- Dish of feeble metaphor. Worst of all, such a continuous roll of tumid declamation, in excla¬ mations. and superlatives, forces us to doubt the poet s sincerity. Lacking in spontaneous feel-

ing, he deems it his- duty to force his emotions by violent rhetorical stimulants. As he says,

“On such a theme as this, ‘tis impious to be calm

But emotion thus excited is likely to leave the reader’s sceptical calm quite undisturbed.

Yet it must be remembered that in his own day Young enjoyed a reputation hardly inferior to that of Pope. The ‘Night Thoughts> was deemed the greatest moral poem of the century, admired equally for its art and its religion. For some 40 years probably no other poem in England was more widely read. The fame of it quickly spread to Germany, where no fewer than three different translations were made in the decade from 1750 to 1760. In France also it was hardly less admired.

Explanation of this popularity is found partly in some unquestioned merits of Young’s work — in the sustained amplitude of its blank verse, thought by many superior to Milton’s; in the exhaustless, if unregulated, store of its imagery; in occasional passages of subtle thought or lofty emotion. But the most important cause of this contemporary estimate of Young’s poem is in its appeal to a temper of unrest and dis¬ satisfaction then almost universal in Europe, a temper which took different forms in different countries, but everywhere was inclined to wel¬ come a literature of morbid, sentimental melan¬ choly. It is noticeable that the one prose work more widely read in England than any other for some 30 years, Hervey’s ‘ Meditations among the Tombs, > was an exact contemporary o f (The Night Thoughts,5 and was filled with the same tumid rhetoric. Blair’s Grave5 (1743), a poem of some thousand lines of blank verse, is another example of what has been called the Graveyard School of literature. The temper which enjoyed such literature was one of the many forms of reaction against con¬ vention in religion and society as well as in art, which issued later in romanticism in literature, and in revolution in society. With the growth of a more healthy and vigorous tone of feeling, the interest in this morbid, sentimental work largely passed away; it is safe to say that (The Night Thoughts 5 has found few readers in the last hundred years. Consult Courthope’s ‘His¬ tory of English Poetry) (Vol. V) ; Eliot, George, (Essays) — “Worldiness and Other Worldliness® ; Kind, J. L., ‘Edward Young in Germany5 (Columbia University Press).

Caleb T. Winchester.

NIGHTINGALE, Florence, English phi¬ lanthropist : b. Florence, 12 May 1820 ; d. Lon¬ don, 13 Aug. 1910. She early became inter¬ ested in hospital work, was trained as a nurse and studied the methods of hospital adminis¬ tration through Europe. In 1853 she estab¬ lished a hospital for invalid gentlewomen in London. The early stages of the Crimean War (1854-55) disclosed a terrible state of affairs in regard to the treatment of

the wounded. The hospital arrangements were inadequate and unorganized; the usual satellites of warfare — fever, cholera and dysentery — were doing their deadly work among the wounded and healthy alike. Public indignation was aroused, and the government called on Miss Nightin¬ gale. It was a remarkable coincidence that, while the Minister for War, Sydney Herbert, was writing asking her to undertake the oner¬ ous task of organizing the hospitals, the lady

was also writing to him. offering her services, her experience and, if necessary, her life itself.

In a week she raised a band of trained nurses and proceeded with them to the Turkish mili¬ tary hospital at Scutari on the Bosphorus, arriving on 4 Nov. 1854. She took com¬ mand of the hospital, introduced system and order where indescribable chaos had reigned, and laid the foundations of modern scientific nursing. She made three trips across the Black Sea to the Crimea and reorganized the base hospitals and dressing stations. Here she was attacked with fever; a special yacht carried her back to Scutari. On her recovery she resumed her post and continued her devoted labors till the end of the war. In recognition of her serv¬ ices a fund of £50,000 ($250,000) was raised for her. She refused to accept the money for herself but devoted it to found the Nightingale Llome at Saint Thomas' Hospital. She re¬ ceived the thanks of Parliament and was fre¬ quently consulted by royal commissions in re¬ gard to field and camp hospitals. Her advice was sought by the American government dur¬ ing the Civil War and by the French in the Franco-Prussian War of 1870-71. Numerous honors were conferred on her; she received the rare distinction of the Order of Merit in 1907 and the freedom of the city of London in 1908. Among her writings are 'Notes on Hospitals5 (1859); 'Notes on Nursing5 (1860); 'Lying- In Institutions5 (1871) and 'Life or Death in India5 (1874). She is commemorated in the new statuary group of the Crimean War Monument in London and the Nightingale statue in Waterloo Place. _ Longfellow's 'Santa Filomena5 was written in her honor, since when she became known as "The Lady with a Lamp.55 Consult the authoritative 'Life5 by E. T. Cook (London 1913) and biographies by Matheson, A. (1913) ; Richards (1909) and Miss Tooley (1905) ; Kinglake's 'Invasion of the Crimea.5

NIGHTINGALE, a celebrated song-bird of the family Sylviidce or Warblers. The nightingale (Daulias luscinia or Luscinia me- garhyncha) is attractive for no lustre or bril¬ liancy of plumage, the upper parts of the body being rusty-brown tinged with olive, and the under parts pale ash, blending into white at the throat and Ibelly. It average length is about six inches. In habits the nightingale is active and lively; it frequents trees of small size and bushes, and subsists chiefly upon an insectivorous dietary. It is a migratory bird, and occurs throughout Europe, but in Great Britain is

limited to certain districts, so that it is never or rarely heard in Wales nor in the most western districts of England, nor in Ire¬ land or Scotland. The song continues from 15 April until the middle of June, when the young are hatched. The male bird sings during the day, and at night also and perhaps more fre¬ quently, while the female is incubating; and the flood of song poured forth in the stillness of the evening forms one of the chief sources from which the reputation of the nightingale has been derived. The nest is of rough con¬ struction. It is generally formed of leaves and grasses, and is situated mostly in damp places or in the neighborhood of water. The eggs number from four to five, and are of an olive-green color. These birds live in confine-*

bl[d-cat9hcrs- if possible, take the males before the arrival of the females. Birds trapped after the pairing season are said to lan- gmsh and die. Another species, formerly re¬ garded as identical with the above, is D. Phi¬ lomela which has a more easterly distribution, extending far into western Asia. This is the bird most often referred to in literature as the 1 ei sian bulbul; and it takes a prominent place in classic mythology as does a third species Lusctma hafizi in Persia and Turkestan. -Nightingales endure captivity well and are kept as cage-birds in all parts of the world. See Cage-birds and the authorities there mentioned- consult also Burroughs, < Winter Sunshine> (Boston 18/6; autograph ed., ib. 1904); New-

i?nl:NAlfTrred; (Dictionary of Birds> (London 1896); Kirkman (ed.), 'The British Bird Book (London 1911), and the writings of British ornithologists.*

NIGHTJAR, a bird of the family Capri- mulgidce (q.v.). This name was first given to a single species, that common in the British Islands, on account of the jarring note it utters after dark; but most of the members of this nocturnal family produce similar sounds, and the term seems preferable in many respects to the erroneous designation .''goatsuckers55 tradi¬ tionally applied to them in southern Europe and which should long ago have been aban¬ doned. American representatives are the night-hawks, whippoorwills and chuck-wilPs-widow elsewhere described. The British nightjar is much like the American whippoorwill in ap¬ pearance, and is known by many provincial names, such as dor-hawk, churr-owl, fern-owl, etc. Consult Montagu, 'Dictionary of British Birds) ; Newton, Alfred, 'Dictionary of Birds) (London 1896) ; White, 'Natural History of Selborne.5

NIGHTMARE, a sensation of oppression or of suffocation which sometimes occurs dur¬ ing sleep. The sufferer experiences a short period of intense anxiety, fear, horror, etc.; feels what seems an enormous weight on his breast ; is pursued by a phantom, monster or wild beast, which he cannot escape; is on the brink of a precipice from which he cannot re¬ move, or is, perhaps, rolling down it without being able to make any exertion for his safety; and his bodily members refuse to do their office, until he suddenly awakens himself by starting up, or by a loud cry; he is then in great terror, and the body may be covered with sweat. Nightmare is generally due to repletion and in¬ digestion, and is often superinduced by lying on the back, especially when the head is low.

A person subject to nightmare should carefully observe moderation in eating and drinking, should avoid heavy meals shortly before retir¬ ing and likewise overrich food. Alcoholic excess may lead to nervous disorders character¬ ized by conditions, physical and psvchical, which increase liability to nightmare and simi¬ lar forms of disturbance. See Delirium ; In¬ cubus; Mara.

NIGHTMARE ABBEY, a novel by

Thomas Love Peacock, the hero of which is a caricature of Shelley. It was published in 1818.

NIGHT'S LODGING, A. (Na dnve). Gorki wrote his drama 'Nadnye) ('At the Bot¬ tom }) in 1902. It was translated into German

as 'Ein Nachtasylx5 ('A Night's Lodging5), and is known by this title in English. It gained its reputation because Max Reinhardt intro¬ duced it at the Little Theatre in Berlin, after it had been acclaimed as a masterpiece in Mos¬ cow on 31 Dec. 1902. There is no action and the plot is insignificant. A poor, maltreated woman dies in the purlieus. Vaska, the thief, i ejects the landlady and keeps company with her kindlier sister. During a brawl the land¬ lord is killed, and the widow denounces her past lover to the police. The redeeming char¬ acter is a pilgrim whose quaint philosophy seems to keep aflame the spark of humanity in the creatures of the purlieus. When he leaves, all return to their sordid lives, and one of them' a former actor, hangs himself. The charac¬ ters are described with gross fidelity to nature, and it is only the artistry of the Moscow Art theatre and of Reinhardt's troupe that made the production possible. In the hands of less gifted players the drama is intolerable.

Leo Wiener.

NIGHTSHADE, any of several plants of the order Solanacece, sometimes

called night¬ shade family, especially distinguished for toxic properties, and constituting the typical genus S olanunt. The common or black nightshade (6. nigrum), an annual or biennial, with erect angular stem, ovate, sinuate-dentate leaves, di ooping lateral umbels of white flowers and globose black berries, grows as a weed in waste place in most parts of the world. It is only slightly narcotic. The leaves in a fresh state ai e said to be injurious to animals which eat them, but seem to lose almost all narcotic prop¬ el ty by boiling, and are used as spinach, partic¬ ularly in warm climates. The berries, though generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity without danger. They contain, however, the alkaloid solanine found also in the shoots of the potato. Several comparatively innocuous species, such as the horsenettle or apple of Sodom (S. carolinense) with orange-yellow berries, are natives of the dry western portions of the United States and Canada, and one, the bittersweet, blue bindweed, felon wort poison- flower or woody nightshade (S. dulcamara), is naturalized all over the eastern half of the country. (See Dulcamara). The deadly nightshade (see Belladonna) is a member of an allied genus, whose toxic principle is atropin (q.v.).

NIGIDIUS FIGULIS, Publius, Roman scholar : b. about 98 b.c. ; d. 44 b.c. He took part in political affairs during the closing days o! the republic; became praetor in 59 b.c.; and having sided with Pompey in the Civil War was compelled by Caesar to live in exile In philosophy he was a Pythagorean; and for the scope of his learning he was ranked by Aldus Gelhus next to Varro (q.v.). His fame as an astrologer was great, and in the 'Chronicle5 of Eusebius he is styled "Pythagoricus et magus 55 Gelhus complains of the obscurity and subtlety of Figulus' writings, but the examples he ad¬ duces in proof are not thought by critics to sup¬ port the assertion. The fragments extant have been edited by Swoboda (1889). Consult also Roll rig, 'De Nigidio Figulo5 (1887).

NIGRITE. A variety of asphalt mined at Soldier Summit, Utah. Brittle, imperfectly

fusible, imperfectly soluble and probably useful for same purposes as grahamite.

NIGRITIA, m-grish'i-a. See Sudan.

NIHILIANIST, in theology, one who taught " Christus , secundum quod est homo, nihil est» that is, the human nature of Christ had no existence, so far

as it could be called his. In other words Christ did not become anything different from what he was before, by assuming human nature, because no change can be wrought in the unchangeable God, and a man is not to be called a cloak because he puts one on. This was the view of Abelard, and John of Damascus, and was held to be tenable, at least, by Peter Lombard (see Lom¬ bard, Peter). It was condemned in the Lat- eran Council of 1179.

NIHILISM, from the Latin nihil (a trifle, nothing), the state or condition of nihility, being nothing. A general term used to define a Russian socialistic movement, and a name also applied in metaphysics to the doctrine that refuses a substantial reality to the existences of which man is conscious. In Russia the word Nihilist was first applied by Ivan Turgenev to the hero of his novel (Fathers and Sons, who was intended to be the personification of a movement in Russia for the emancipation of women, the independence of children and the spread of natural religion.*

Doctrine of Nihilism. — Followers of Ni¬ hilism were those who disbelieved that improve¬ ment in the social condition of man is possible by orderly progress and evolution ; particularly members of any association that was devoted to the work of destroying the established form of the Russian government without any hope or definite theory of substituting another gov¬ ernment in its place. In general, the Nihilists stood for communism, free-love and the aboli¬ tion of religion and centralized government. Nihilism appears to have permeated _ every stratum of Russian society, and its recruits and followers are gathered from every social grade, alike from the nobility, the army and the peas¬ ants. The Bolsheviks of. the revolution of No¬ vember 1917 are essentially the heirs of the Nihilists.

Early History. — As early as 1818 a party of freedom, so-called, was organized in Russia, and on 14 Dec. 1825 occurred the rising of the Decembrists among the officers and soldiers of the army. These revolutionists aimed at the emancipation of the serfs and the introduction of constitutional government. The revolt was quelled, and six of the leaders were executed and 125 others imprisoned or exiled. About 1850 liberal ideas received an impetus from the study of socialistic writers of other countries. On ’23 April 1849, some 40 persons were ar¬ rested who belonged to an association formed by Petrashevsky, an official of the Foreign Office. These were sentenced, to death, but the sentences were commuted to imprisonment and banishment. In 1857 Alexander Hertzen founded a journal, the Kolokol, which had a re¬ markable influence upon the Russian youth. In the same year there arose in Russia a move¬ ment, under the leadership of Chernishevski, which criticised existing society. In the uni¬ versities and among the educated everywhere this movement spread like wildfire. In 1864 he

published a novel entitled (What is to, be Done?) which proved a revolutionary firebrand among the peasantry. This appeared while he was in jail, and with the consent of the author¬ ities. Like most of the books of the Nihilists of the time, its propaganda were marked as fic¬ tion. Another writer, Shapoff, urged the in¬ troduction of self-government and local auton¬ omy. Numerous organizations sprang up in the universities, and in 1862 the various secret associations united under the name of (Land and Freedom. In 1866 a certain Karakozov tried to assassinate the Tsar. In 1868 Bakunin commenced the publication of a newspaper in Geneva. In this journal he advocated the total abolition of the state and the substitution of small communes.*

Tfie Socialistic Propaganda.— In the early

part of 1870 a number of young men and young women of the upper classes voluntarily went to work in the fields and the factories so as per¬ sonally to carry on Socialistic propaganda and distribute Socialistic literature. Their organs were the Forward of London and the Work¬ ingman of Geneva. This work continued about six years, during which time there were 23 po¬ litical trials of 417 persons, half of whom were condemned to exile in Siberia or to hard labor in the mines. During this period there existed a more moderate party, but it failed to satisfy the demands of the young men of the universi¬ ties. In 1875 the Narodniki "nationalists® be¬ came a prominent organization. The govern¬ ment became active, and during 1876 and 1877 the prisons were filled wfith propagandists.

The Party of Removal. — In 1877 former adherents of the Nihilistic movement organized a new and stronger secret party, which aimed at the removal by force of crowned heads, and a warfare against the government. On 24 Jan. 1878, a young woman of 28, named Vera Zas- sulitch, shot at General Trepoff, who had caused a prisoner to be whipped for refusing to take off his hat to him. She was tried be¬ fore a jury, and, strangely enough, was ac¬ quitted. The government was enraged and had the verdict annulled. On 4 Aug. 1878 General Mesentzoff was killed, and 22 Feb. 1879, the governor of Kharkov, Prince Kropotkin, was assassinated. On 2 April 1879, an attempt to assassinate the emperor, Alexander II, was made by Soloviev. He was captured and hanged. Alexander II (q.v.) was assassinated 13 March 1881. These crimes were claimed by a secret revolutionary committee which really had very little authority over the direct perpe¬ trators.

The Will of the People. — Some time later at a secret meeting of this committee held at Lipezk, the acquisition of political freedom was declared to be the first necessity. It was hoped to gain this by the formation of a

legis¬ lative body, elected by the people, with guaran¬ tees for electoral independence, and liberty to agitate for reforms. This was demanded from Alexander III (q.v.) shortly after the assassi¬ nation of his predecessor as the price of cessa¬ tion from violence. This new party, the “Narodnaia Volia® or “Will of the People,® sought to overthrow despotism by execution of the communistic instincts of the peasants. It set forth the following demands: (1) A repre¬ sentative assembly having supreme control in

state matters; (2) provincial self-government with elective officers; (3) village communism; \4’. ireed˚m of conscience, press, speech, asso- ciauon and political agitation; (5) suffrage; Ceu a national militia instead of a standing .army; (7) nationalization of land; (8) meas¬ ures to socialize factories. This movement

?ooc e<ˆ a fadure and the party collapsed in

1885.

.Latter-Day Conditions. — The condition of Nihilism in Russia before revolutions of 1917 has been likened to a sleeping volcano. There had been no successful outbreak and few as¬ sassinations although the secret party existed in larger numbers than ever before. The discov¬ ers the police showed that Nihilism was widely spreading in Russia, not only among the working classes but among the aristocracy, and even in the army, especially in Saint Peters¬ burg, and in many of the principal cities and towns. Secret affiliations were known to exist between the Russian Nihilists and the French and Italian anarchists. Relieved of the op¬ pression from above by the successful outcome of the revolution of May 1917, Nihilism has given rise to the Bolsheviki, the dominant party at present (January 1918). See Anarchism; Maxamillists ; Socialism.

Bibliography. — Kennan, ‘Siberia and the Exile System > (New York 1891) ; Kornilov, Modern Russian History* (tr. New York 1917) ; Krapotkin, ‘Memoirs of a Revolution- ist> (Boston 1899) ; Milyoukov, ‘Russia and Its Crisis> (Chicago 1906) ; Tikhomiroff, ‘Russia, Political and SociaP (London 1887) ; and ‘Russia under the Tsars* (London 1885).

NIHONGI, ne’hon-ge, a Japanese historical work embracing records of ancient Japan. It was first issued in 712 as the Kojiki, and was edited and fashioned on the model of Chinese histories, reissued in 720.

NIIGATA, ne-e-ga'ta, Japan, a seaport city, capital of the. province of Echigo, on the west coast of the island of Hondo, nearly opposite the island of Sado, on the west bank of the Shinanogawa. Its streets are intersected by canals and there are 200 bridges. It was one of the treaty ports opened in 1859, but owing to unsuitable harbor, now deepened by dredging, its foreign trade has been nominal ; its coasting and internal trade, however, is important and increasing, the province, being rich in petroleum and minerals, and agriculture being well de¬ veloped. Pop. 66,622.

NIJMEGEN, nl'ma-hen. See Nimwegen.

NIJNE-TAGILSK, nezh'ne-ta-gilsk', East Russia, the chief town of the Ural Mountains mining region in the government of Perm, on the Tagil, 135 miles east of Perm. Its chief in¬ dustrial establishments are the iron works founded by Demidoff; iron, gold, copper and platinum are mined in the surrounding district. Pop. 45,179.

*NIJNI-NO VGOROD, nezh'm-nov'go-rod, or NIZHNI-NOVGOROD ("Lower Novgo¬ rod**), Russia, a government bounded north by the governments of Kostroma and Viatka, east by Kasan and Simbirsk, south by Penza and Tamboff and west by Vladimir; area, 19,789 square miles. The capital is Nijni-Novgorod (q.v.). The surface forms an extensive plain, occasionally broken and diversified by low un¬*

dulating hills. These hills are almost invariably composed of limestone, which is largely devel¬ oped over the whole government. The only metal found is iron; gypsum prevails in every quarter. The entire government belongs to the basin of the Volga, which, entering it on the northwest, and traversing it in one vast curve to the east, drains a considerable portion of it directly, all the other drainage being brought to it by the Oka and it tributaries on the west, the Sura and its tributaries on the east and the Senets and Vetluga on the north. The soil is of remarkable fertility, rendering this government the granary of Russia. The principal crops, in addition to the ordinary cereals, are hemp and flax. Much attention also is paid to the pro¬ duction of fruit. The extent of forest is equal to that of arable land, and there are tracts of excellent timber. Both manufactures and trade have made great progress. Several govern¬ ments possesses much larger establishments, but in none is the spirit of activity and enterprise more universal. The principal manufactures are coarse cloth, canvas, cordage, glass, soap and leather; domestic industries are important and growing. .The trade includes corn, flour, hemp and flax, iron and ironmongery, etc. The central position of this government, and its large navigable rivers, are highly favorable to its trade. Pop. 2,081,200.

NIJNI-NOVGOROD, NIZHNI-NOV¬ GOROD, or simply NIJNIY, Russia,

the capital of a government of the same name, at the confluence of the Oka and Volga, 273 (by rail) miles, east of Moscow. It is of world¬ wide celebrity in connection with its great com¬ mercial fair which has been held here annually since 1816, lasts from 15 July to 10 September and is attended by an average of 400,000 dealers and visitors, . from all countries between Eng¬ land and China. There is an upper city con¬ taining the Kremlin,, a lower city and a suburb. . The Kremlin, finely situated on the loftiest point of the high town, is surrounded by a lofty wall flanked With towers, round or square, and contains the principal edifices, particularly two cathedrals, with precious^ relics, one a picture 900 years old, the governor's palace, and an episcopal semi¬ nary. With the exception of these, the elegant church of the Holy Women, and a few other public edifices, the whole town is built of wood and possesses little interest. It is, however, becoming noted for its educational institutions^ including schools, libraries and museums. For the convenience of those frequenting the fairs there is an enormous market hall, electric light¬ ing and an electric street railroad, and 60 blocks of buildings for booths, containing more than 2,500 apartments separated by fireproof walls. The value of goods sold at one of these fairs often exceeds $90,000,000. At these fairs all. foreign goods are supplied in smaller quan¬ tities, those of . Russian production showing an increase. Nijni-Novgorod, founded in 1221, was devastated on several occasions by the Tar¬ tars ; its. prosperity dates from 1816 when the great fair was removed to Nijni-Novgorod from Makarieff, after a great fire. Pop. 112,300.

NIKA (ne'ka) RIOT. The insurrection in Constantinople in 532 against Justinian, caused by the contention between the Blue and Green factions. See Justinian I.

NIKE, mice, in Greek mythology, the god¬ dess of victory : called by the Romans Victoria. Her festival was on 1 November. In art she is generally represented as a winged female figure. Her attributes are a palm branch, a garland and sometimes a herald's staff.

NIKE APTEROS, or ATHENE NIKE,

a small but beautiful Doric temple standing on a bastion flanking the entrance to the Athenian Acropolis. It was torn down by the Turks in the 17th century.

NIKISCH, ne'kish, Arthur, Hungarian or¬ chestral conductor: b.

Szentmiklos, Hungary, 12 Oct. 1855. He studied violin, composition and piano under Hellmesberger, Dessoff and Schen- ner, respectively, in the Vienna Conservatory , was first violin in the Vienna Royal Opera or¬ chestra for a year ; and then in 1877 became musical director of the City theatre of Leipzig. He directed the Boston Symphony Orchestra 1889-93, the Royal Hungarian Opera in Buda¬ pest 1893-99, and the Philharmonic concerts m Leipzig from that date up to the present In Leipzig he conducts the famous Gewandhaus concerts. He toured the United States in 1912 with the London Symphony Orchestra. Nikisch wrote (Die ChristnachtB and other music. Consult the study by Pfohl (1900).

NIKITA, ne-ke'ta, Louise. See Nichol¬ son, Louisa Margaret.

NIKITIN, nye-ke tyen, Ivan Savitch, Rus¬ sian poet: b. Voronezh, 3 Oct. 1824; d. there, 28 Oct. 1861. He was educated in the seminary of his native town and on the failure, of his family fortunes managed a roadside inn in 1843. He also kept a book store toward the end of his life. Nikitin began to write about 1850. His patriotic poem 'Russia, published in 1853, attracted attention and was followed by a volume of poems (1856),. issued under the patronage of Count Dmitri Tolstoy. In I808 he won much fame by the publication of a poem, 'Kulak > (The . Money-Lender), which portrays peasant life in graphic style. ' Ihe Volga Boatman* ; (The Ploughman* and (A Winter Night in a Village* became very popular. Nikitin also wrote two novels. Some of his poems have been translated into English. His biographer, De Poule, issued a complete collection of his works (Moscow 1886). Con¬ sult biography by Sawizkij (Petrograd 1893) ; and Newmarch, Rosa, (Poetry and Progress in Russia* (New York 1907).*

NIKKO (Sun's Brightness). Properly speaking Nikko is the name of a mountainous district lying about 100 miles to the north of Tokio ; but it is generally applied to. the prin¬ cipal villages, Hachi-ishi and Irimachi, 91 miles from Tokio by the Northern Railway and the sacred grounds between them. Lying 2,000 feet above the sea, Nikko is a delightful, summer resort. The mountain range in which it is picturesquely located is called Nikko-Zan (Mountains of the Sun's Brightness). From time immemorial Nikko, with its mountains, cascades and monumental forest trees, has al¬ ways been revered by the Japanese. A Japa¬ nese proverb says : "Do not use the word mag¬ nificent till you have seen Nikko.® A Shinto temple existed at Nikko in remote times; but it was removed and in 767 a Buddhist temple was founded by Shodo Sho-nin, the subject

of many strange legends. In the 17th century was added the mausoleum of the illustrious Iyeyasu, founder of the Tokugawa dynasty, who was buried there with amazing pomp in 1617, and the tomb of his scarcely less famous grandson, Iyemitsu, who was slain in 1650 while visiting his grandfather's

tomb. On issuing from the village one of the first objects to attract attention is the Mihashi, or Sacred Red Bridge, spanning the Daiya-gawa, a stream about 40 feet wide. This bridge, erected in 1638, was closed to all persons but the Shogun save twice a year when pilgrims were allowed to walk across. Having been washed away in 1902 this bridge was restored in 1907. Forty yards lower down is the bridge for ordinary visitors. Ascending, a paved slope, through a grove of cryptomerias, the visitor 1 caches the enclosure commonly spoken of as Mang'wanji, within which stands the S&fnbutsudo, or Hall of the Three Buddhas, so called from the gi¬ gantic gilt images of the thousand-handed Kwannon. Near this is the famous pillar called Sorinto, erected in 1643 for the purpose of averting evil influences. This is a cylindiical copper column, 42 feet high, very black, and adorned at the top with a series of lotus flowers from the petals of which hang small bells. Broad steps between two rows of cryp¬ tomerias lead to the granite torii, presented by the Daimyo of Chikuzen in 1618, on the left of which is a five-storied pagoda of graceful form and painted in harmonious colors. This build¬ ing (104 feet) was given in 1649. Around its base the signs of the zodiac are carved. Among the other buildings clustering around the shrine of Iyeyasu are the Ni-o-mon, or Gate of the Two Kings, with its carvings of lions, unicorns, elephants, tigers and peonies ; the vermilion-colored wall that encloses store¬ houses and various buildings connected with the religious rites ; a bell-tower with the fam¬ ous (

on the hill beyond. Tall cryptomerias over¬ shadow this, a small bronze pagoda, with a stone table in front bearing an immense bronze stork with brass candlestick in its mouth, an incense burner and a vase with lotus flowers. I he whole is enclosed by a high stone wall. Lacquered buildings, Buddhist images, pagodas and torn are abundant in the vicinity. Flights of stone steps and carved gates lead likewise to the mausoleum of Iyemitsu, the oratory and chapels of whom are not less magnificent than those of Iyeyasu. The tomb itself is on the summit of a hill called Hotoke-iwa, and not far away is buried Iyeyasu's horse, which carried Iyeyasu in the decisive battle of Seki-ga-hara in 1600. . The trees on this hill are of marvel¬ ous variety and beauty, particularly in the autumn. Numerous shrines, temples, sacred buildings and images fill the great enclosure.

Thirteen of the ((Abbots® of Nikko (who were always princes of the imperial blood) are buried in the grounds. The magnificent resi¬ dence of the abbots was burned in 1871 by a nre that destroyed a large number of the tem¬ ples. What the visitor sees is, therefore, but a fragment . of

Nikko's former splendor. Enough remains to. astonish and bewilder the eyes and mind. .Since the beginning of the present . century judicious repairs have been proceeding. A great festival is held here an¬ nually on 1 and 2 June. The sacred palan¬ quins containing the divine symbols are then borne in procession, when ancient costumes, masks and armor are donned by the villagers, old and young taking part in the display. An¬ other, but less elaborate, -ceremonial takes place annually on 17. September. Many foreign resi¬ dents of Tokio have villas in Nikko, or at Chuzenji, seven miles beyond. The one draw¬ back to the climate is the frequent rain. Within a radius of 15 miles there are no less than 25 or 30 lovely cascades. . The mountain climbs of Nyoho-Zan and Nantai-Zan attract many tour¬ ists. Nikko is not only noted for its superb wood-carving and painting and the most per¬ fect assemblage of shrines in all Japan, but for the glorious tints of its. foliage at the beginning of November. Hence it has been described as f(a double glory — a glory of nature and a glory of art.® Nikko is a mart for skins of the badger, deer, marten, wild-boar, etc., and for various pretty articles made of a black fossil wood (jindai-boku) , brought from Sendai in the north. (See Iyeyasu and Tokugawa). Con¬ sult Tyndale, Walter, (Japan and the Japanesê (London 1910) ; Clarke, Joseph I. C., (Japan, at First Hand) (New York 1918).

NIKOLAI NIKOLAIEVITCH, nye'ko- la'ye-vitch, (Grand Duke Nicholas), Russian general : b. Saint Petersburg, 6 Nov. 1856. He is the second cousin of the Emperor Nicholas II. He was graduated from the Nikolaiev Military Academy and made lieutenant of cavalry in 1871. During the Russo-Turkish War he be¬ came junior officer of a Hussar regiment and was decorated for conspicuous bravery; receiv¬ ing the Cross of Saint George and the Golden Sword for his daring to cross the Balkans and the Danube. He also received the Prussian order (Pour le Merited He took part in the capture of Sofia and Adrianople. In 1893 he was made lieutenant-general; in 1895 inspector of cavalry and colonel of Hussars of His

Majesty's guard; in 1905 he was made major- general of the Guards and president of the council of defense; and in the next year be¬ came commander of the military district of Petrograd. In 1907 he married the Princess Anastasia (b. Cettinge, 1867), daughter of the king of Montenegro and sister of the queen of Italy. His great military reputation and his knowledge of European strategy caused him to be appointed commander-in-chief of the Rus¬ sian army at the outbreak of the European War in 1914. In September 1915 he was re¬ moved from the command in European Russia and. sent to the Caucasus to take command against the Turks in that region, being super¬ seded in the command of the European Russian army by the Tsar. Nicholas was largely in¬ strumental for the issuance of the manifesto promising the Poles national autonomy. He is a

profound student of all military matters and was one of the first in Russia to appreciate the value, of aviation. Nicholas is a good writer and is fond of delving into Russian history. He is also a noted sportsman and has in his palace at Petrograd a unique collection of stuffed bears, which he himself killed in various parts of the world. Consult (Le Grand Duke Nicolas) (in Le Correspondant, Paris 1915).

NIKOLAIEFF, ne-ko-li'ef, or NICO- LAIEV, Russia, a seaport, and the chief naval station on the Black Sea, at the confluence of the Ingul and Bug, 36 miles northwest and in the government of Kherson. It occupies a large space, is fortified and well built, with wide streets and a finely planted boulevard. It is administered by a governor, who is also com¬ mander-in-chief of the Black Sea fleet. It was founded in 1791, has important dock yards, depots and machine shops, and a floating dock anchored in the Bug; also tobacco factories and a large trade in grain. Pop. 106,300 (about 17 per cent being Jews).

. NIKON, ne'kon, Russian patriarch and primate: b. 1605; d. 17 Aug. 1681. He was ap¬ pointed (1646) by the Tsar Alexis Mikhailovitch to be. archimandrite of the Novospasky monas¬ tery in Moscow, became metropolitan of Nov¬ gorod in 1648 and in 1652 patriarch of Russia. In 1666 he was deposed and banished to a monastery. He died while on his way, by im¬ perial permission, to. the monastery of the Resurrection of Christ, which Nikon himself had built, and where he had gone into tem¬ porary retirement in 1658. He introduced re¬ forms into the service of the Church, upheld monasticism, lived a life of exemplary devotion and aimed at the educational and social ad¬ vancement of the people. His revision of the debased liturgies of the Church in order to bring them into conformity with their originals gave rise, to the sect of the Raskolnics (q.v.) or (01d Believers,® and culminated in his own dis¬ grace; but his reforms were adopted. Consult Palmer, W., (The Patriarch and the Tsar>

(1871-76).

NIKOPOL, Bulgaria, chief town in the sub-prefecture. in the district of Plevna on the Danube, 24 miles northeast of Plevna, on the railway from Sofia to Bucharest. As a military post it has been important for centuries and is commanded by a citadel and fortifications which run down to the river. A mined castle domi¬ nates the scene and gives a touch of pic-

turesqueness to the country. Here, too, the Danube is joined by the Osem.

Until the creation of a new port at Somovit, Nikopol was the outlet for the trade of Plevna, Lovtcha and other inland towns. It now has additional trade on account of the railway. The chief ex¬ ports are cereals and the chief industries tan¬ ning and fishing. The town is also called Nicopolis ad Istrum, being confused with the town of Nicopolis founded by Trajan to com¬ memorate his victory over the Dacians, several miles below at a spot still called Nikup, at the confluence of the Iatrus or Qantra with the Danube. Nikopoli occupies the site of the an¬ cient Asamus. It has seen many battles. Sigis- mund of Hungary captured the fortress in 1392 and 1395, and he, in turn, was defeated by the Turks under Bajazet I in 1396. The town was besieged by Ladislaus I of Hungary in 1444; the Turks were defeated by Bathori in 1595 and by Michael of Wallachia in 1598; the town was captured by Pasvan-oglu in 1797; the Russians under Kamensky took it in 1810; the Turkish fleet was destroyed here and the Turk¬ ish camp taken by Govarov in 1829, and the town was captured and burned by the Russians under .Ivriidener in 1877. Good wine is pro¬ duced in the country and there is considerable trade between Nikopol and Wallachia, as well as to other parts of Bulgaria. Nikopol is in¬ habited chiefly by Bulgarians and Turks. Pop.

(1910), 5,379.

NIKOPOL, Russia, town in the govern¬ ment of Ekaterinoslav, on the right bank of the Dnieper, 70 miles southwest of Ekaterinoslav. It is situated on an elongated peninsula between two arms of the Dnieper ; and as the banks are low and marshy here it is a place where the Dnieper can be conveniently crossed. Hence, for centuries, Nikopol (formerly called Nikitin Rog), has been an important place. At the present time it is on the highway from Ekaterinoslav to Kherson, the point where the ˆsalt-highway® of the Chumaks, or Little Rus¬ sian salt-carriers, crosses the Dnieper and leads thence to the Crimea. As -Nikopol is also a strategic point, many battles have been fought for its possession, _ testified by numbers of graves in the vicinity, and in one of these mounds was found the famous Scythian vase representing the capture of wild horses, to¬ gether with other antiquities. A little beyond the town is situated the old fortified camp of the Zaporogian Cossacks described in Gogol's novel (Taras Bulba (1834). Nikopolis is one of the chief centres for the export of corn, hemp, linseed-oil and wool. Agriculture and shipbuilding are also industries. The chief in¬ habitants are Jews, Mennonites and Little Rus¬ sians. Pop. (1900), 21,282.*

NILE, a river of northeast Africa, cele¬ brated from remote antiquity as the Egyptian Hope or Aur-Aa — Great River, the Hebrew Sihor, and the Greek iNefiloc the longest river of the African continent, and the second in length of the rivers of the world, the Missouri- Mississippi being the longest. Its length is esti¬ mated at 4,000 miles, and the area of its basin at 1,082,000

square miles, extending through 35 degrees of latitude, or 2,450 miles in a direct line.

The White Nile or Bahr-el-Abiad flows from Victoria Nyanza, and is joined at Khartum by the Blue Nile or Bahr-el-Azrek which has

its source in the Abyssinian Mountains. The principal feeder of the Victoria Nyanza and the head stream of the Nile proper is the Ivagera, formed by three tributaries, the chief of which is the Nyavarongo, which rises in about 2° 30′ S. at an altitude of about 7,000 feet; the Kagera flows through a delta into Victoria Nyanza just north of 1°. Other influents are the Katonga from the west, the Nzota from the northeast, the Moroao and Ruvano from the east. The great river which flows out of Vic¬ toria Nyanza in the north at about lat. 0° 30′ N., and long. 33° 40′ E., before its identitv with the Nile was known, was called the Kari or Somerset River. At its outflow from the lake it forms the unimportant Ripon Falls, then flows northwest, and about lat. 1° 40′ N. ex¬ pands into Lake Ibrahim Pasha, discovered in 1874. On again contracting to the dimensions of a river it flows first west, then northeast to lat. 2° 15′ N., where it forms the Falls of Karuma. It then turns west, and after form¬ ing the Murchison Falls, enters, at the town of Magungo, the Albert Nyanza, at an elevation of about 2,550 feet. Magungo lies on the east side of the lake, close to its northeastern ex¬ tremity, and exactly at this latter point, about lat. 2° 35′ N. and long. 31° 22′ E., the river again leaves the lake, flowing in a northerly direction. Above Gondokoro, a town lying about lat. 5° N., the river forms a series of cataracts, and till 1876 the part of the river lying between these cataracts and the Albert Nyanza was never fully explored. In that year, under the direction of Colonel Gordon, a steamer was carried in pieces round the cata¬ racts to Dufile, and on 7 March Romolo Gessi started thence to sail up the river, and on the 18th of the same month reached the Albert Nyanza. The whole of this part of the river J64 miles long, is navigable, deep and broad] in many places with a breadth of upward of 700 yards.

Not far below Gondokoro, which is nearly due north of the outlet of the Albert Nyanza, the Nile begins to flow more to the" west

u tI .reac^es lat- 9° N., where it receives the Bahr-el-Ghazal, the most important of the tributaries that flow into it from the left bank On receiving this affluent it turns due east for about 100 miles, and then after receiving the Sobat from the southeast, a very important nver draining the country between Abyssinia andJre ^/lctona Nyanza, flows almost due north to Khartum. Here it is joined from the east bv the. Blue Nile or Bahr-el-Azrek, the source of which was discovered by Bruce in 1770 in the Abyssinian highlands, in lat. 11° N. • lont? 36 30 . It flows first north into Lake' Dem-bea or Tsana, then emerges from it in an east¬ erly direction, describes a

great arc to the south extending below lat. 10° N., then turns to the west, after some distance receives its southern tributary, the Dedhesa, and lastlv takes a northerly course. After receiving from the east the rivers Dender and Rahad, it joins the White Nile at Khartum. The united Nile then flows first to the northeast till at lat. 17° 30′ N. it receives its last tributary, the Atbara, from the Abyssinian frontier From its junction with the Atbara the Nile flows north, having on the west or left bank the desert of Bahiuda; on the east Mekheyr, which is commonly called Berber. Lower down it

NILE

1 Rapids of the first cataract

2 Nile boats near Cairo

foims several islands, one of which bears the name of Kandake (Candace), and also one or more cataracts ; it then bends west by south, and passes by Jebel Barkal, where stand the remains of a temple, repaired by Tirhaka (700 b.c.), but probably 1,000 years older. Resuming its northerly course, it enters the plains of Dongola, and forms several islands of great extent. Quitting these plains by a cataract, the river flows through the districts of Mahas, Sukkot, Wadi, Kenuz and Batn-el-Hajar (or the Glen of Rocks), at the head of which is the second or great cataract, and entering Egypt at Philse — the Pi-lakh or limit of the Egyp¬ tians — it descends the lowest cataract to Syene or Assouan, which is in lat. 24° 5′ N. From Philie, lat. 24° 3′ N., the Nile flows through Egypt in a single stream as far as Batn-el-Bakara, the ancient Cercasorum, at the head of the Delta, in lat. 30° 15’, where it divides into two branches, leading down respectively to Rashid (Rosetta) and Dimyat (Damietta), and entering the sea in about lat. 31° 35′ N. These two mouths correspond, as is supposed, to the Phatnitic and Bolbitinic mouths of the ancients, which, however, in ancient times were not so important as the Pelusian mouth on the east and the Canopic on the west, between which, proceeding from east to west, thefe yrere other five mouths, rtatmetlTTespecti vely the Tanitic, Mendesian, Phatnitic or Bucolic, Sebennitic and Bolbitinic.

The Nile received divine honors from the Egyptians, and at a later period also from the Greeks and Romans. By the Egyptians he was represented as a hermaphrodite, with a beard and woman’s breasts, and a skin of a blue color. The Upper Nile was distinguished from the lower by a peculiar floral symbol. The Nile had a temple dedicated to himself at Nilopolis, and his

principal festival is mentioned under the name of Niloa. In Greek and Roman art he is depicted in the attitude of a river god re¬ clining, around whom sport 16 children, an alle¬ gorical representation of the height in cubits of the inundations of the river.

As rain scarcely ever falls in the valley of the Nile from the 18th nearly to the 30th par¬ allel, and very scantily even lower down, the river owes its supplies wholly to the copious rains of the countries wherein it rises. In Egypt it begins to increase in June, attains its greatest height in three months, and then sub¬ sides as gradually as it rose. The ordinary rise at Cairo is about 25 feet. During the flood a great portion of the Delta and of the valley of EgypT higher:up isinundaied. In Sennaar also, and Dongola, extensive tracts are watered im¬ mediately by the river; but in general the banks of the Nile above Egypt are irrigated by means of the water-wheel. In early times the case was different, as is shown by the composition of the soil formed of alluvial deposits in places no longer reached by the stream, even in its highest state of flood. The changes of level which have taken place in relation to the river are demonstrated by the hieroglyphic inscrip¬ tions at Semneh, a day's journey beyond the second cataract, which attest that 4,000 years ago the average height of the Nile at its utmost flood was 23 feet higher than at the present day, while inversely the yearly inundations of the river in Egypt are continually raising the level of the whole surrounding valley. There are two

principal seasons of cultivation — winter from October to April and summer from April to August for land and basin irrigation, and ex¬ tending to October in the perennially irrigated areas. As the perennially irrigated land re¬ ceives less alluvial silt than the basin areas, artificially manuring is resorted to, and such crops as sugar cane and cotton in the basin are also chemically manured. Only in the delta of the river and below the first cataract at As¬ souan is there any great density of population along the banks. With irrigation, the vast areas of soil in the Soudan should make that province one of the most important cotton-producing areas of the world.

The Nile reservoir, for which the great dams at Assouan and Assiout have been constructed, enables wide tracts of land to bear two crops a year instead of one, brings waste districts into tillage, and greatly increases the area of sugar cultivation. See article and illustration under Assouan, Vol. II; also Egypt; Irriga¬ tion. Consult in addition to the travels of Bruce, Speke, Baker, Burton and Grant, Brown, R., (The Story of Africa) (London 1893-94) ; Chelu, (Le Nil, le Soudan, l'Egypte> (Paris 1891) ; Ebers, (Egypt: Descriptive, His¬ torical and Picturesque > (Eng. trans., London 1898) ; Hartmann, (Die MillandeD (ib. 1884) ; Hayes, (Sources of the Blue Nile) (ib. 1905) ; Johnston, H. H., (The Nile Quest (ib. 1903)*

; "Lyons, H. G., (Physiography of the River Nile and its Basin) (Cairo 1906) ; Schweinfurth, (The Heart of Africa) (Eng. trans., London 1895) ; Todd, J. A., (The Banks of the Nile) (New York 1913) ; Wood, (Egypt under the British) (London 1896).

NILE GROUP, a marble statue of the Alexandrine period now in the Vatican. It shows a half-reclining figure of a vigorous man representing the river Nile; he leans with his left arm on a sphinx; climbing over him are naked chubby children, intended, it is supposed, to typify the height to which the flooded river rises, namely, 16 cubits. The execution of the group is fine, and the whole treatment is pecu¬ liarly Alexandrine. The group was found at Rome near the church of Minerva, in the vicin¬ ity of a temple of Isis ; but it was subsequently removed to the Vatican by the order of Pope Leo X.

NILES, Hezekiah, American publisher : b. East Bradford, Chester, Pa., 10 Oct. 1777 ; d. Wilmington, Del., 2 April 1839. From 1800-05 he was engaged in the publishing business in Wilmington, Del., then moved to Baltimore, Md., where with George Bourne he edited and published the Evening Post. In 1811 he founded Niles' Register , a weekly journal, which in- 1837 he moved to Washington and published under the name of Niles' National Register. While in Washington he obtained a position in the Pension Office, and gave up the editorship of the Register, which was moved back to Baltimore in 1838 and continued by his son and others till 1849. He published (Quill Driving, 5 a series of humorous essays; and Principles and Acts of the Revolution (1822). The Niles' Register was devoted chiefly to the dis¬ cussion of politics, and is regarded as one of the most valuable sources for the study of the American history of the period ; the volumes for

1812-27 have been reprinted. Niles, Ohio, and Niles, Mich., were named for Hezekiah Niles.

NILES, nilz, John Milton, American jour¬ nalist and politician: b. Windsor, Conn., 20 Aug. 1787; d. Hartford, Conn., 31 May 1856. At 20 he began the study of law privately, and in 1817 settled in Hartford, Conn., where with the co¬ operation of others he established the Hartford Times, of which he was principal editor tor several years, and to which he contributed for 30 years ; through this paper he warmly sup¬ ported Andrew Jackson and the Democratic party. Appointed postmaster of Hartford in 1829 he resigned on receiving the executive ap¬ pointment to

the United States Senate, a post which he retained till 1839. In 1839 and 1840 he was Democratic candidate for governor of Connecticut, and in the latter year was post¬ master-general under President Van Buren. He was again elected to the Senate in 1842, and on the expiration of his term in 1849 retired from public life. He published The Independent Whig (1816); (Gazetteer of Connecticut and Rhode Island5 (1819); (Life of Commodore Oliver H. Perry > (1820) ; < History of South America and Mexico, and a view of Texas) (1839); (The Civil Officer5 (1840), etc.

NILES, Nathaniel, American statesman: b. South Kingston, R. I., 3 April 1741 ; d. West Fairlee, Vt., 31 Oct. 1828. _ He was graduated from Princeton College in 1766 and subse¬ quently studied medicine, law and theology, and he preached in various Congregational churches in New England. He settled in Vermont after the American Revolution and there conducted religious services in his own house for nearly 40 years. He served in the Vermont legislature and was its speaker in 1784, was a judge of the State Supreme Court and was a member of Congress in 1791-95. As "censor55 he assisted in the revision of the State constitution and he was six times Presidential elector. He wrote the popular war song (The American Hero) after the battle of Bunker Hill, and published (Four Discourses on Secret Prayer) (1773) ;

NILES, Nathaniel, American lawyer: b. South Kingston, R. I., 15 Sept. 1835; d. 29 June 1917. Educated at Phillips Andover, he was admitted to the bar in 1857. He served for several terms in the New Jersey legislature of which he was speaker in 1872 and where he introduced important measures, notably those establishing 1,200 free school libraries and a free school fund of $3,000,000 derived from all riparian rights in the State. In 1879 he be¬ came government director of the Union Pacific Railroad and in 1884-89 was president of the Tradesmen's National Bank of New York.

NILES, Mich., city in Berrien County; on Saint Joseph River, and on the Michigan Cen¬ tral and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, about 110 miles southwest of Lansing and 90 miles east of Chicago, Ill. Niles is in the region traversed by the earlier explorers who followed the rivers which were inlets and outlets of the Great Lakes. The French missionaries founded here a mission in 1697. On the site of the city, or nearby, was Fort Saint Joseph, the ruins of which are still in existence. In 1782 Spain claimed the land for miles around Niles on account of the capture,

in 1781, of this fort by a force of Spanish soldiers. In 1828 a colony of eastern home- seekers located at Niles ; in 1838 the village was incorporated, and was chartered as a city in 1859. Niles is the commercial centre of a pro¬ ductive agricultural region, and its good water power has

made it a manufacturing city, 4 he chief manufactures are flour, lumber, paper, lithographs, furniture, steel tanks, dairy products, poster printing, leather belting, canvas belting, metal store fronts, kitchen cabinets, exhaust fans and blowers, wire cloth, copper lightning rods, cables, automobile and railroad jacks, mole traps, doll beds, wire shovels and forks, coloring matter for packing plants, ma¬ chine shop and foundry works. Thcie is con¬ siderable trade in farm products, fruit and the manufactured articles. 4 he government is vested in a mayor, who holds office one year, and a council. The city owns and operates the electric-light plant and the waterworks. Pop. (1920) 7,311.

NILES, Ohio, city in Trumbull County, on the Mahoning River and on the Baltimore and Ohio, the Erie and the Pennsylvania railroads, about 50 miles southeast of Cleveland. It is a manufacturing centre; the chief manufactures are galvanized iron, foundry and blast furnace products, automatic presses, oil tanks, electric and steam cars, chinaware, incandescent bulbs, metal lath, iron roofing, motor trucks, sheet steel, ice and milk cans and tin. The govern¬ ment is administered under a charter of 1895 and provides for a mayor, who holds office two years, and a council. The electric-light plant and waterworks are owned by the city. Pop.

(1920) 13,080.

NILGAI, a large bluish-gray antelope (Boselaphus tragocamelus) of the plains and less forested parts of India, where it forms one of the principal game animals of the country. The short conical horns and general appearance of the head and body are somewhat ox-like ; but the legs are long and slender, and a large tuft of hair depends from the chest. Nilgai both graze and browse, feed during the day, and are able to thrive with very little water. Where they are not much hunted they become so tame as to be troublesome to visitors; but when much dis¬ turbed grow shy and wary. Their chase is therefore often interesting, but the small horns make so poor a trophy that they are not often shot. The best sport is obtained by running them down on horseback and killing them by spearing. Consult works on East Indian zoology and sport, especially Kinloch, (Large Game Shooting5 (1895), and Baker, (Wild Beast5 (1890); Blanford, W. T., (Fauna of British India: Mammals5 (London 1889); Lydekker, R., (The Game Animals of India5 (ib. 1907).

NILGIRI, nil-ge're, or NEILGHERRY, HILLS ((Elue Mountains5), India, a southern plateau-like range of Madras, giving its name to a district, and owing to its great elevation and delightfully cool climate, much resorted to by invalided Europeans resident in India, the principal health-station being Ootacamund. The hills rise abruptly from the plains 40 miles from the west coast, to an average height of 6,000 feet, the highest peak shooting up to

8,760 feet. The mass is isolated, with the exception that a precipitous granite ridge leaves its western face

and connects with the Western Ghats. The

™eJT1StS °f grassy uPlands with large groves of forest trees; but the lower slopes are

SW' Coffee, «« and cinchona are cultivated 1 he Nilgiris are inhabited by five istinct tubes of whom the Todas are the most interesting. They speak a Dravidian dialect

*olWt,V1CtlveuPS yandry' The men are tal1 and athletic with Roman noses, black bushy beards

f S(,Ley

- ,e ahe Todas, > by Rivers (1900). Their sole occupation is tending cattle. The Nilgiris distnct has an area of 958 square miles Pop about 115,000. p<

mp ˆIEOMETER> in hydraulics, an instru¬ ment for measuring the rise of the Nile during-

ps, ,pfnodlcal floods. On the island of Er-

nn°o„ ' ˆnt , of, Piro' 5s a graduated pillar, upon which the height of the water is read off.

with P+i! ar .standsTin a weH which communicates with the river. In the time of Pliny, a height

ot 12 cubits meant famine, 13 scarcity 15

andu pIMlty: At Present the canals are cut and distribution commences when the

nver reaches 18 cubits; 19 cubits is tolerable, 20 adequate, 21 excellent, 22 abundant, and 24 ruinous. In ancient times taxation varied ac-

cordmg to the height of the inundations. See Nile, The.

onPI!!iLSSON' nil's on, Christine, Swedish operatic soprano: b. Hassaby,

near Wexio,

? W(Ltn' 2° Aug. 1843. She was the only daughter of a poor farmer, at nine began to smg at village concerts, and educated for the operatic stage by Berwald at Stockholm, and Masse and Wartel at Paris. In 1864 she made her first appearance as Violetta in and Margaret

anPrrf10ˆ s : EIYira in In 1872 she married

M. Auguste Rouzaud, a Parisian merchant, who

pdm 1882; and in 1886 she married Count A

de Miranda, who died in 1902. Since 1888 she

has lived in retirement. Her voice was a

soprano of moderate power, but very brilliant and even.

NIMBLE FLY, an insect that takes its name from its rapid movements. It belongs to the family Dexndae. Its legs are extremely

■ugL-JnrltS far y stages this fly is parasitic and inhabits beetles and snails. About 50 species belong to North America. Consult Kellog? Vernon L., (American Insects> (New York . 1908, pp. 301-357). K k

NIMBUS, (1) in painting, the halo or coHecHon of rays with which artists surround the heads of sacred persons, in Christian art, of Christ, and the angels and saints. The use of this ornament is both ancient and widespread being probably of astrological origin, and it is exemplified in the Indian, Egyptian, Etruscan, ,rccjk ai)d Roman religions. The ancient poets speak of their deities as being crowned with such a nimbus in their occasional appearances on cdi th, and in paintings this nimbus was

represented in the same way as in the paintings ?pR°m,an Cathohc artists. The nimbus as rep¬ resented in Christian art (beginning in the 5th century) is usually circular in form, but some- tunes it is triangular; sometimes in the form

n Iht r7S' oae Proceeding from the summit

*° trG °t le,r tW° fr°m the sideS**

SO that the three form three arms of a cross, he triangular nimbus symbolizes God the

-and tbe ,Tnnityi it is sometimes en¬ closed in a circle, which symbolizes

eternity.

I he nimbus with three rays is also a symbol of the Trinity. The Virgin is symbolized by a A ng C Aing' and sometinies by a crown or dia-

JvArh Anothfr ,form of the nimbus is that in . b one of the common circular shape sup¬ ports a cross. In later times the nimbus was represented in a lighter or more aerial form, and melting as it were into the picture. (2) In meteorology the word is applied to a rain cloud •

fnnrHlmeSt ˆ aSSed as if forming a primary or fundamental variety of cloud; it is really a mixture of the stratus, the cumulus and ˆhe

edges' h haS a Unif°rm gray tint and Ringed

NIMEGUEN, nim'a-gen. See Nimwegen.

IMES, nem, or NISMES, France a south- eastern c.ty, capital of the department of Card 62 miles northwest of Marseilles, noted for its ancient buildings and monuments of Roman origin, which are second only to those of Rome. Jt is situated in a delightful plain near the outspurs of the Cevennes and handsome boule¬ vards occupy the site of the former ramparts, ihe city proper is small and irregularly laid

bm ItTiP narrT ltreetS and in'built houses ; ut its three, suburbs, one of which, called the

Cours-Neuf, is larger than the city itself, present

a finer aspect, having wide, straight avenues

fine public walks and handsome buildings!

fThJf tihev' edlfice.s of the Christian era are the cathedral, begun in the 11th century but con¬ structed chiefly in the 16th and 17th and occupy-mg the site of a temple of Apollo; the church of Saint Paul; the new palace of justice- the

?S?nrali hosP\taI I the Hotel Dieu, rebuilt in 1830; the public library (112,000 volumes)'; the

bufltrabvhVSeK°f detentl?n> whRh is the citadel Fori py Vauban over the remains of the old

fnTtlR°Gan erCCted 111 1629 by the Calvinists; and the fine monumental fountain by Pradier

erected in 1851, on the esplanade. The public

fbnfde?' 1Si Stld to be seen tbe fountain

that furnished the Roman baths with water

and the beautiful promenade known as the

ours Feucheres, are also attractive features.

nfTp1St \e SGat °f- a Roman Catholic bishop of a Protestant consistory, and has tribunals of primary jurisdiction and commerce, a depart¬ mental academy, several learned institutions a lyceum or college, a normal school, a theological seminary, schools of drawing, chemistry and physics, geometry and mechanics as applied to hLar s> and a museum of natural history.

Ihe monuments of the Roman period are the mson Carree, so called from its rectangular form, a beautiful Corinthian temple nearly in the centre of the city. It stands on a stylobate

82V f^ ap,proached bV 1 J stePs; the platform is 82/2 feet long and 40^ feet wide, and the build¬ ing and platform together are 58/ feet hieh It*

lZlT°AndCA b/ 30 C(1',umns' 10 °f which' are detached and form the portico. It suffered

greatly during the Middle Ages, but since 1789 it has been restored and surrounded by an iron railing. In 1823 it was converted into a mu¬ seum of paintings and antiquites. The amphi¬ theatre, or Les Arenes, is the most perfect of its kind extant. Its height outside is from 68 to 104 feet, and its external circumference 1,17414 feet. It has from 32 to 35 ranges of seats, and was capable of accommodating from 17,000 to 23,000 spectators. It was used as a fort¬ ress by the Visigoths and the Saracens, when attacked by the Franks; during the following centuries it was also occupied as a strong¬ hold. No fewer than 2,000 persons had estab¬ lished their abode within the walls of this build¬ ing, when in 1809 it was cleared by order of the prefect ; and it has since been protected against encroachments. The Tour Magne (turns magna) is the remnant of a tower which flanked the ancient walls. The boulevards now occupy the site of the ramparts, but portions of them are still extant in the Porte d' Auguste and Porte de France, two Roman gates, the former of which is ornamented with

sculptures. To these monuments must be added a ruined nympheeum, a fane dedicated to the nymphs, which com¬ municated with a neighboring bath for women, the remains of which have been mistaken for those of a temple of Diana. The magnificent aqueduct, known as the Pont du Gard, is in the vicinity of Nimes.

In point of industry and commerce Nimes holds a distinguished rank; it is the great south¬ ern mart for raw and manufactured silk. Its manufactures are principally silk shawls and hosiery; mixed silk, cotton, and woolen stuffs; blonde lace and tulles, galloons, ribbons, carpets and leather products. There are several, large dyeing and printing establishments, vinegar factories and distilleries. Its trade is .mostly in wine, brandies, vinegar, essences and oil. There are limestone quarries nearby.

Nimes is supposed to have been built by a Greek colony, and was afterward for about 500 years in the possession of the Romans. In the 16th century it became a stronghold of Calvin¬ ism, and suffered much during the civil wars. The treaty known as the Pacification of Nimes, concluded here in 1629, granted freedom of worship to the Huguenots, but deprived them of their fortified towns. In .1815 it was the scene of religious violence during the reaction that succeeded the fall of Napoleon. Guizot and Daudet were natives of this town. Pop. 80,437.

NIMRAVUS, a genus of large Tertiary fossil cats, typical of the family Nimravidce, or Macharodontidce, which includes the various sabre-toothed tigers (q.v.).

NIMROD, according to the Mosaic scrip¬ tures, the founder of the Babylonian monarchy, son of Cush (Gen. x, 8). He flourished about 2450 b.c.. He is styled a mighty hunter <(bef ore the Lord,® a somewhat vague expression, but evidently referring to battle and conquest as well as to the chase. All that is definitely known about Nimrod is that he was a Cushite, that he established a kingdom in Shinar, the classic Babylonia, the chief towns being Babel, Erech, Accad, and Calneh, that he extended his kingdom northward along the Tigris over Assy¬ ria, where he founded a second group of capi¬ tals, Nineveh, Rehoboth, Calah and Resen. In the Chaldaean epic of the deluge Nimrod has

by some scholars been identified with Gilga- mesh, the heroic figure whose story is dated about 2200 b.c. and who is represented as fight¬ ing with a wild beast; and by others with Mero- dach, the Assyrian god.

NIMRUD, mm'rood, Mesopotamia, the name given to a mound which is supposed to be the site of an ancient Assyrian city on the east bank of the Tigris River at the confluence of the Tigris and the Zab Ala, and 18 miles

below Mosul. It is supposed to be the city Calah (q.v.) mentioned in Genesis x, 11, a suburb of Nineveh. Excavations have shown the city to have been five miles in circumference and surrounded by walls flanked with towers. Perhaps the most important of the archaeo¬ logical treasure discovered here is the black obelisk of Shalmaneser II, now in the British Museum, and on which his military exploits are recorded. See Nineveh.

NIMWEGEN, nim'wa-gen, or NIME- GUEN, ninFa-gen (ancient Noviomagus; Dutch, Nijmegen) , Netherlands, city in the province of Gelderland ; on the Waal, about 12 miles south of Arnheim. Built in the form of an amphi¬ theatre, on a series of hills, it overlooks a beautiful valley. It is in a productive agricul¬ tural region in which grain and grapes are prominent productions and much attention is given to stock-raising. The 13th century church of Saint Stephen, the ruins of the palace of the Carlovingian kings, and the museum of Roman antiquities, are the principal places of interest in the city. The chief manufactures are leather, tin, cutlery and silverware, wine, eau de cologne, flour, and cigars. It has an extensive trade in wine, grain and cattle.

Nimwegen possesses many ruins showing its Roman origin. It was originally a Roman camp by means of which control was exercised over the Teutons living northeast of the Rhine. It was one of the Hanse towns. From 1585 for nearly 100 years it was in the theatre of much of the contentions, and also of the peace-mak¬ ings among the Spaniards, Swedes, French, Dutch and Austrians. The ((Peace of Nim- wegen® in 1678-79 was the ending of the con¬ test between the French and the Dutch, the great event in the life of Louis XIV. It marked the time when France became the chief of the Great Powers. Pop. (1910) 56,035, predomi¬ natingly Catholic.

NINDE, William Xavier, American Metho¬ dist bishop: b. Cortland, N. Y., 21 June 1832; d. Detroit, Mich., 3 Jan. 1901. He was graduated from Wesleyan University, Middletown, Conn., in 1855, and was ordained in 1856. He was in charge of various churches in New York and Ohio, and in 1870 was called to the Central Church, Detroit. He accepted the chair of practical theology at Garrett Biblical Institute, Evanston, Ill., in 1873 ; in 1879-84 he was presi¬ dent of the institute and in 1884 he was elected bishop. He was the president of the Epworth League, 1896-1900. Consult biography by Mary L. Ninde, his daughter (1902).

NINDEMANN, Wilhelm Friedrich Carl,

German- American Arctic explorer : b. Gingst, Germany, 22 April 1850. He removed to the United States in 1867 and in 1872 accompanied the Polaris expedition. When the Polaris was caught in the ice he with 18 of the crew drifted on an ice-floe for seven months. They were

rescued by the Tigress in 1873. He joined the

was" crushed6?111ˆ1 18i79' and when the vessel aid in 1881 K r He 1CeJleT was despatched for 5 "Irrl b/ CnP aTn De Long- He assisted ˆ whnJf S' Ue L,˚ng and his companions,

lose bodies were discovered the next year.

i Spanish- American War. He

polfahrten > figg) "" Matrosen Nord-

NINE-BARK, an American shrub (Opu- lasta opuhfohus), of the rose family, common throughout the eastern part of the United states It has an ungainly form, glabrous wigs, bright green, three-lobed, crenate-lentate leaves and small white or purplish flowers in terminal corymbs. Its bloom, remarks Mrs

ˆfKberTy- ,1S not vre7 Pretty, but it redeems itself by the beauty of the ripening pods. «Thev hanging in quantities at the ends of its long' curvmg hi anches, produce something the same eflect as the fruit of a species of opulus or cranberry-tree. ... The common name which would naturally recall one of the hydrangeas, is in reference to a trick of the bark in peeling not nine but many times into dilapidated-looking strips.® The hydrangea (q.v.) referred to is H radiata, a showy wild shrub, which is given this name by the moun¬ taineers of the Southern States on account of the ragged peeling of its bark. Both shrubs nourish in rocky and swampy places, and both are susceptible of cultivation. Consult Louns- (19(?l') S ˚Uthern Wildflowers and Trees.*

NINE-PINS, a game with nine pins or bot¬ tle-shaped pieces of wood set on end, at which a large wooden ball is rolled for throwing them down. See Bowling.

NINE WORTHIES, romantic heroes, grouped together in Arthurian legend, especially 111 u bnomphes des neuf preux, > where the author describes a vision in which he saw three Jews (Joshua, David, Judas Maccabaeus), three pagans (Hector, Alexander the Great, Julius Caesar) and three Christians (Arthur, Charle¬ magne, Godfrey of Bouillon). These worthies wuth occasionally a tenth, Bertrand du Guesclin,' and with Guy of Warwick sometimes substi- tutcci for Godfrey of Bouillon, may be traced back to. old Welsh legends; Brunet says the three triads are of Spanish

*origin ; and Dunlop showed that the list appeared in an old Low German poem on Alexander. Shakespeare makes them the butt of some fooling in (Love's Labour's Lost.**

NINEKILLER. See Butcher-bird.

NINETEENTH CENTURY. Some na¬ tion in Europe has been at war on the average every second year since 1450, that is, during modern times, but the 19th century had more than its share of these wars. They were, too, ever so much more costly in life than older wars, industrial development having favored the evolution of destructive agents. Napoleon hlled the first 15 years. Made first consul (1798), President of the Italian republic (1802), emperor by overwhelming popular vote (1804) he proposed to Tsar Alexander at Tilsit (1807)' in the raft conferences on the Niemen River to divide the world between them into eastern and western empires. It seems almost impossible to imagine the 19th century reverting to the dual Byzantine-Roman imperial scheme of things,

yet this was calmly proposed by the man who nad made himself, in Freeman's expressive phrase the tyrant of Europe.® Gibbon, scarce 10 years before, had declared it impos¬ sible tor a military leader ever again to dictate the destiny of nations as had Alexander the Great, or Caesar, yet had he but lived a few years he would have seen this almost an ac- comphshed tact. Napoleon admitted, when £"er seemed favoraWe to the scheme, that there was but one bar — England — but he ielt that if the two emperors were loyal allies, eveE t'lls obstacle could be made to disappear.'

1 he events which led up to this were the battle of Austerlitz (1805), after which Napo- leon became protector of the Federation of the dlf, victory at Jena over the Prussians (i oUo) followed by the appointment of Louis Mpole˚n as king of Holland and the victories of Eylau and Friedland (1807) over the Rus- smns After this came the conquest of Spain 2nd Napoleons attempt to make Joseph, his brother, its king, while Murat, one of his mar¬ shals was made king of Naples. He received a setback in Spain, but won the battle of Wa- gram (1809) over the Austrians. The following year, divorcing the childless Josephine, h? man ied Mane Louise, the daughter of the emperor of Austria, in the hope to found a dynasty, and the next year his son was crowned

nQfm˚fmRome— At the height o£ ˆ Power L 181 1) his empire reached from beyond Rome

through France, Holland and Belgium and all the western German states up to Mecklenburg and the Baltic Sea; he was besides king of Italy, to which the Illyrian provinces were sub¬ ject protector of the Federation of the

Rhine and mediator of Switzerland. Only in Spain w lere, with the help of the English, a success- ful stand was made against Napoleon's gen- erals, did his prestige fail. His star had set with this, however, and though in 1812 he won the battles of Smolensko and Borodino, Mos¬ cow, after its capture, was burned by the Rus¬ sians and Napoleon's grand army was de- stroyed by the Russian snow and the troops which hung on his rear and flanks. With a new army of fresh levies, most of them were mere boys, Napoleon won the battles of Lutz, Baut¬ zen and Dresden but lost the battle of the nations at Leipzig. The German spirit, at last Hroused, drove him to the Rhine with the loss of his whole army. He abdicated and was sent to the island of Elba but with the title of

fe.™per°r (i8Jo1); JTust a ˆear a£ter his abdica¬ tion, March 1815, Napoleon returned to France.

he restored Bourbons had been tactless be¬ yond even their wont and Napoleon was wel¬ comed by France. Marshal Ney, sent to arrest him, threw himself into the arms of his old

. ˆ d in a few days Napoleon was

again firmly seated on the throne. The allies moved against him, but Napoleon, hoping to crush their forces in detail, marched into b landers where he defeated the Prussians, but yas held by the English for the long day (18 June 1815) at Waterloo, until Bliicher with afresh force of Prussians decided the battle. Ihe Hundred Days, as they were called were over. Napoleon surrendered to the Eng¬ lish as the most magnanimous of his enemies,

(1820 38 SCnt t0 ˆaint H

England was the supreme, constant factor against Napoleon. He realized this and was ready to make any sacrifice for <(six hours' control of that wet ditch® — the Channel. He sold Louisiana to the United States to secure funds for an English invasion (1803) but Nelson's almost complete destruction of the combined French and Spanish fleets off Cape Trafalgar (1805) blocked this. Napoleon's one consolation was that he hoped by round¬ ing out the territory of the United States <(to raise up a rival to England that would sooner or later humble her pride.® Meantime Robert Fulton had gone to him with his steamboat, but Napoleon failed to recognize the oppor¬ tunity it w'ould have given him. The one stain on English prestige was the bombardment of Copenhagen and the seizure of

the Danish fleet in 1807. Fearful lest the Danes should join Napoleon and shut them out from the Baltic Sea and the rich markets of central Europe, an English fleet in position before Copenhagen, without warning, demanded that the Danes surrender all their ships and naval stores. They were to be held as a deposit and given back at the end of the war. The Danes refused to violate their neutrality thus and did not yield until some 2,000 houses had been destroyed, when their fleet was carried off by the English. The incident aroused the bitterest feelings against Britain and un¬ doubtedly pushed the United States into the War of 1812. Madame de Stael,T replying to Jefferson's explanation as to the United States practically helping Napoleon against England, that ((America has nothing to do with the continent of Europe,® pertinently asked, ((Can you be indifferent to the cause of free nations- — you the most republican of all?® Jefferson re¬ plied that (

Napoleon will be remembered better for what he did for law and social order than as a victorious commander. He strove to be a beneficent autocrat. Professor Sloane terms him ((one of the greatest social reformers of history.® He healed the wounds inflicted upon France by the Revolution. He invited the Royalist exiles to return. Realizing that a France without religion was a contradiction in terms, he entered into a concordat with the Pope, recognizing him as the head of the Church with full authority. Under his rule prosperity came back to France. Bridges, roads, canals and ports were restored and Napoleon directed the construction of great highways and military roads, triumphs of en¬ gineering, across the Alps. . Public buildings were restored, sadly needing it since the Revo¬ lution, and manv magnificent monuments erected, so that Paris and other French cities became the most beautiful in Europe. He re¬ formed the laws of France and the Code Napo¬ leon set his name beside that of Tustinian as one of the great lawmakers of historv. What the French Convention began was perfected by Napoleon and his code secured the benefits of

the Revolution for the French people. It swept away the old, unequal, oppressive customs and regulations and decrees and laws that were an inheritance from the feudal ages. It recog¬ nized the equality of noble and peasant in the eves of the law; it affected deeply the laws of other countries, and for it Napoleon's name will be honored much more than for his mili¬ tary glory as long as this stage of our civiliza¬ tion lasts.

The Napoleonic wars were followed by the formation of the Holy Alliance, under the in¬ spiration of Tsar Alexander of Russia, its principal members being Russia, Austria and Prussia. Its purpose was announced as the maintenance of peace and order in Europe, the principles of Christianity to be the maxims of governments. All the rulers promised to use their authority <(to promote the welfare and secure the happiness of their

subjects.® Un¬ doubtedly the intentions were the best, and yet the Holy Alliance proved before long to be only a league for the maintenance of absolute government and the protection of the various states from the neutralizing tendencies which had been sown throughout Europe by the French Revolution. Metternich was the moving spirit in it. Entirely reactionary, he could not think that the people should have any share in the government. He was for the old order and his influence was greater than any other down to the middle of the century.

In spite of the Holy Alliance a series of minor wars occurred during the first half of the century, Russia and the sultan (1828), a quadruple alliance of England, France, Spain and Portugal against Don Miguel and Don Carlos (1834), France and Mexico (1838), Eng¬ land and China' — to compel the renewal . of the opium trade (1840), France with Algiers (1848). There was a much more interesting series of revolutions for popular liberty, most of which failed. The Greek Revolution was followed by the massacre of Scio (1822), Bel¬ gium secured its independence from Holland (1830), and the Poles began a struggle for their liberty the same year, but failed and thou¬ sands of families were sent to Siberia. The Polish Revolution was renewed (1848), but only to fasten the fetters tighter on the suffering people. In 1848 there were revolutions in France and Sardinia, in Bavaria, Prussia, Schleswig-Holstein, in Hungary, whence Kos¬ suth escaped to the United States, and in vari¬ ous places throughout Italy, including Rome, where a republic was proclaimed 9 Feb. 1849, only to fall very shortly.

The spirit of liberty manifest in the French Revolution failed egregiously, but was destined to spread all during the 19th century. Between 1810 and 1826 all the South American colonies of Spain and Mexico (1836), after an imoerial incident under Iturbide (1820)-, became inde¬ pendent republics. After a revolution Brazil became a constitutional empire of great liberal¬ ity, independent of Portugal. The revolt of the Greeks against the Turks was unsuccessful, but it attracted the attention of Europe to an impossible situation that could not be permitted to endure, and Byron's romantic death for the cause of Greece at Missilonghi deeply stirred the spirit of liberty everywhere. The Bourbons continued their tactless rule in France and Charles X was forced to flee in 1830, to be

succeeded by Louis Philippe, no longer as king of France, but king of the French. Unfor- tunately, when his turn came to go (1848) while the French planned to have a republic an.d .th£ temporary presidency of Lamartine

raised high hopes, Louis Napoleon became the hrst actual President and the coup d'etat gave urn control of France, making his election as emperor (1852) only a matter of form. A c>cle had been completed and France was once more destined to imperial domination.

*The most important series of political events in the century was the rise of Prussia to the rank of a great power in Europe and of the German Empire under Prussian influence. Early in the century Prussia was prostrate at i i Napoleon, bitterly humiliated. 1 his led. to reaction and a strenuous military organization of the country, so that eventually Prussian troops were an important factor in the great battle of the nations at Leipzig and a Prussian army under Bliicher came to the A*1? English at a critical moment at*

V\ aterloo, bringing about Napoleon's ultimate defeat, lhe king of Prussia had promised his people a constitution, but violated his promise, so Prussia appears in European history until the middle of the century only because of in¬ ternal disturbances. The Revolution of 1848 sent many promising young Prussians into ex¬ ile because of their patriotic efforts to secure a constitutional monarchy. Troublous times con¬ tinued for 10 years, which kept Prussia from any advance in power, but when Wilhelm I became king (1861) he declared that Prussia ought not- to be content with what she had, but should strengthen her army and extend her frontiers. As regent while his predecessor, Friedrich Wilhelm IV, was ill he had insisted that the Prussian army ought to be (

intervention of Napoleon III brought a truce. Prussia, now the leading state in Germany, ab¬ sorbing some of the German principalities which had allied themselves with Austria, proceeded to strengthen her army. France was the next opponent. The opportunity came over the Spanish succession. Queen Isabella was driven out in 1868 and the Spaniards offered the throne to Leopold of Hohenzollern, the head of the Catholic house of that name, related to the i eigning house of Prussia. France was strongly opposed to the candidacy. The friction between the countries seemed past, however, when Bismarck, after consulting with Moltke,' the head of the Prussian army, as to pre- paredness, deliberately falsified a telegram making it so irritating to the French as to pre¬ cipitate the war. Bismarck, in furnishing ma¬ terial for his memoirs, cynically boasted of this afterward, as of other utterly dishonorable diplomatic transactions. Anything was justified so long as it was done for his country.

The Franco-Prussian War was declared 19 July 1870. The French Minister of War boasted that the army was so perfectly equipped that it would not

*require even a gaiter button *or a year. It had been looked up to as the model military organization of the world, studied ‘by all the other nations, but now proved rotten to the core. The Prussian army, on the other hand, was as Moltke had declared ready to the minute. . Scarcely two weeks had passed before the series of Prussian victories began France had counted on the jealousy of the other German states to keep them neutral at least, or perhaps ready to join against Prussia. All sided with Prussia except Austria, which re¬ mained neutral. .On 3 August the French lost the battle of Worth, and by 6 August when a rumor was current in Paris that the Prussians were defeated, French armies nearly everywhere were in disastrous retreat.*

On 18 August Marshal Bazaine lost the bat¬ tle of Gravelotte and shortly afterward was isolated at Metz. MacMahon with the emperor was caught at Sedan between two Prussian armies and on 1 September compelled to sur¬ render. This led to the fall of the empire. Paris was soon invested. Gambetta, escaping in a balloon, organized the French Republic. The last hope of the French expired when on 27 October Metz, with 180,000 soldiers, was sur- l endered by Bazaine. He was tried for treason subsequently and condemned, but the verdict of history is that he was an overestimated man, outgeneraled by Moltke and hampered by confusion in the French military system. On 10 December the German Empire was voted by the Reichstag at Berlin and on 18 De- cember, on the proposal of the king of Bavaria the representatives of the German states meet¬ ing in the palace of Versailles chose King Wil¬ helm of Prussia as German Emperor, with the right of succession in his family. At the end of the war Bismarck insisted on the cession of Alsace and Lorraine, with their immense min¬ eral wealth, to Germany and an indemnity of five milliards of francs (about $1,000,000,000). This seemed such a huge sum, coming on the heels, of the great losses inflicted by the war that it was felt that it would cripple France forever. The sum was paid in five years, while France enjoyed unexampled prosperity. United Germany became the most powerful state in

Europe, After he had made the Triple Alli¬ ance with Italy and Austria, which somehow was brought to sink its long traditions of enmity so as to secure German support against the growing power of Russia, Bismarck was looked upon as the greatest statesman of Europe. He was quite literally a mere states¬ man. Everything had been done for Prussia without any thought of the rights of the people, still less of the rights of other peoples or other countries. The policy of <(blood and iron,® of which he was so proud, was the watchword of Prussianism, continuing its influence even after Bismarck's dismissal by the young emperor, Wilhelm II, in 1889. It worked itself out to its legitimate conclusion and was recognized for the supreme injustice it represented, only with the great War of 1914-18.

The contrast with Bismarck in the 19th cen¬ tury is his great English contemporary, Glad¬ stone. He was the leader in more social re¬ forms, correcting age-long abuses, than any statesman of history. The memorable session of the English Parliament during his first Premiership (1868-74) accomplished an almost incredible amount of legislation for popular benefit. The British Parliament, elected in 1865, dissolved in 1868, on the

question of the dis¬ establishment and disendowment of the Irish Church. To the surprise of the Conservatives, who had appealed to the country, the Liberals were returned with an overwhelming majority. The Irish Church bill was at once brought for¬ ward, passed by the Commons and when it would probably have been rejected by the House of Lords, the queen wrote to the arch¬ bishop of Canterbury, reminding him that the bill had been carried by a very large majority in a House of Commons elected on this issue, so the Lords yielded to the will of the people and the bill was passed. This was the prelude to far-reaching social reforms. In 1870 Glad¬ stone secured the passage of a land act for Ireland and the beginning of justice for the Irish tenant farmers. This bill recognized that the Irish farmer had an estate in his holding and gave the sanction of law to the Ulster cus¬ tom of tenant right. This session of 1870 was famous for its legislative achievements. Mr. Herbert Paul says that an example of activity so various and so successful can scarcely be found since the days of the Great Parliament (1640). (

remove another injustice in Ireland. The Eng¬ lish people could not advance so fast as this and Gladstone was replaced as Premier by Disraeli. In contrast with the work of his great political opponent, Gladstone's achieve¬ ments stand out in ever-increasing prominence as time goes on. Disraeli was a great politician ; Gladstone a statesman in the best sense of the word, who realized that the statesman's highest privilege and duty was to provide opportunities whereby the people might secure all possible pursuit of happiness. Following this policy, Gladstone could even change opinions publicly expressed and adhered to for a long time. Toward the end of his life he became a con¬ vert to Home Rule for Ireland, in the hope to remove a stigma that had blotted the fair name of .England for centuries, and though his pur¬ pose was not attained, what he accomplished brought the Irish question into such prominence that it could never again be at rest until prop¬ erly settled.

For a generation after Napoleon's time, however, Europe, spent with wars, avoided them except for these unimportant conflicts. Imme¬ diately after the middle of the century, however, a series of costly wars was initiated. In 1851 when the World's Fair in London was held, the first of the modern universal expositions of which there were to be so many others before the end of the century, the keynote of the in¬ ternational addresses delivered was world peace which seemed to be surely impending. Nations were to make commerce with each other and not wrar, and exchange art and industrial treas¬ ures and not bullets. Littre, the great Positivist philosopher, looked up to as one of the great thinkers of the time, was particularly emphatic in his prophecy of peace. Such hopes were destined to bitter and ' immediate disappoint¬ ment. The next 20 years saw a series of great wars. In 1853 Russia went to war with Turkey; England, France and

Sardinia allying them¬ selves with the Turks. In 1857-58 the Indian Mutiny imperiled British interests in Asia. In 1859 Sardinia and Austria went to war, with the French as the allies of the Sardinians. Napoleon III won the battle of Solferino and confirmed the impression that the French were the greatest military nation in Europe, for which it was destined to pay so dearly 10 years later. In 1861 the Civil War broke out in America, each side thinking it would be over in three months, but it lasted four bitter years and cost some 600,000 lives and set back Amer¬ ican development for a decade. In 1864 Den¬ mark dared to go to war with Prussia and Austria and was, of course, badly defeated, having to give up Mecklinburg and Schwerin to her opponents. In 1866 Prussia and Austria went to war over these Danish provinces and Austria was beaten to her knees' in six weeks. In 1870 came the Franco-German War, and in 1877 the war between Russia and Turkey, Russia's victories being neutralized by the In¬ ternational Congress of Berlin which was in¬ tent on maintaining the balance of power.

The war in the Crimea had one very prac¬ tical result which greatly benefited the next generation. The army medical department of the English troops broke down completely under the task of caring for the wounded in the bitter climate of the Crimea. Literally thousands of

wounded English soldiers lay absolutely un¬ touched for many days in the midst of their excretions, almost unfed. The wounded on the deck ot a vessel carrying them to the base hos¬ pital at Scutari were so crowded that the offi¬ cers could not go below for their instruments ?r\ navigation and had to proceed at hazard, ine ietid odor from the wounds was so of¬ fensive that some of the officers could not eat. Miss Nightingale, who had some experience m nursing, was asked to organize the nursing care of the soldiers and proceeded to the C nmea to solve the awful problems which had developed. She succeeded, and on her return the organization of nursing generally was taken up and the trained nurse of the present time was the result. Nursing had sunk to the lowest possible ebb, and the women attendants in the hospitals were looked upon as little better than menial servants, many of them actually re¬ cruited from the workhouse or the prisons; all that could be expected of them -was to keep reasonably sober.

Foi two centuries hospitals had been running down and reached the lowest depths about the middle of the 19th century. The coming of the trained nurse, an educated woman with definite authority, soon brought reform in hospital or¬ ganization and construction and Lister's dis¬ coveries lifted up

surgery, so sadly degenerated for several centuries, until with hospital im¬ provement there came reform also in medical education, with the reintroduction of bedside teaching. As a result of these movements, a great new epoch in hospital work developed which will be looked back upon by future generations as one of the most important land¬ marks in the history of the century.

The Civil War in the United States was one of the pivotal events of the century and seemed for a time to many a demonstration that a democracy could not endure. It was the culmination of a century of differences of opinion. After the Revolution, the great pre- ponderance of the population was at the South. Virginia, one of the most populous of the States, had more than double New York's number of inhabitants. North Carolina ex¬ ceeded New York in population by the total census of New York City and Long Island. Maryland was as large as New York and Tennessee followed very closely. The North grew rapidly, the South slowly. In 1810 New York was second in population and it surpassed Virginia by one-third in 1820. Of the first five Presidents, four were from Virginia. Early in the century New England and the Middle States, except Delaware, prohibited slavery and the importation of slaves to the United States was forbidden. The spread of population to the West, especially after the discovery of gold in California, raised the question whether slavery should be permitted west of the Mis¬ sissippi. Legislative compromises were made, but with the election of Lincoln on a «free soil® platform, South Carolina withdrew from the Union, followed by Alabama, Florida, Georgia, Louisiana, Mississippi and Texas, and a Southern Confederacy was formed. Lincoln was inaugurated 4 March 1861 and the Con¬ federates began the war by firing on Fort Sumter, in Charleston Harbor, 12 April 1861. Both sides were sure that the war would be

over in a few months, as President Lincoln's call for 75,000 volunteers for 90 days and President Jefferson Davis' declarations demon¬ strates, ˆ ˆ IaSted f˚Ur ˆrs, COSting SOme 000,000 lives and two billions of money, the most important war of history up to this time. The South, fighting on an interior line, was not only able to maintain the struggle, but to bring the North near to defeat. During the year from July 1862 to July 1863, the North won no victories. Then came the turning point M Gettysburg 3 July and Vicksburg 4 July 1863. Grant's forceful thrusts gradually wore down the Southern armies, Sherman's march to the sea deprived them of reserves of men and means, but it was not until 9 April 1865 that Grant and Lee met at Appomattox to arrange the surrender of the Army of Virginia and bring the war to an end. Peace was sadly marred by the assassination of President Lincoln at Ford's Theatre on Good Friday night 14 April 1865. A generation later, when the Spamsh-American War came, there was scarcely a trace of the old bitterness left.

*Except for some Indian troubles due to ii3.gT3.nt abuses of the Indians by Indian agents and the whites who lived near them, the United ˆa*es was at peace for a generation after the Civil War, until the war with Spain. This was brought on by Spanish misrule in Cuba, but WraSi?recˆdated the unfortunate blowing up of the Maine, a United States man-of-war in the harbor of Havana 15 Feb. 1898. Congress was rushed into war by popular sentiment.*

1 he events of the war were the capture of Manila by Dewey (1 May) and the battle of Santiago (3 July) in which the Spanish fleet was destroyed. By the treaty of peace Cuba became a free country under the protection of the United States and Porto Rico and the I hihppines came under United States dominion.

The dream of centuries was realized in the second half of the century in a united Italy under X ictor Emmanuel II. The kings of Sar¬ dinia ruled over Savoy and Piedmont on the Continent and were ambitious to increase their territory and, above all, push the Austrians out

Italy. King Charles Albert was dis¬ astrously defeated at Novara (1849) and resigned his crown in favor of his son, Victor Emmanuel, who, under the influence of Cavour, sent 15,000 Sardinians, as they were called to help France and England against Russia in 'the Crimean War. The understanding was that France would in return help Italy against Aus¬ tria. Cavour promised Savoy and Nice to Njipoleon to round out his French territory, and m 18ˆ9 the war between Austria, Italv and brance broke out. After the battle of Solferino, Napoleon made peace with the Austrian em¬ peror at Villa Franca, disappointing Cavour's plans but largely increasing Victor Emmanuel's kingdom, the capital of which now became Florence instead of Turin as before. The most significant result of the battle of Solferino came from the presence there by chance of M. Durant of Geneva, who saw all the suffering of the wounded soldiers under the broiling sun. It gave him the idea of organizing an international non-combatant association for the relief of suf¬ fering on the battlefield. Out of this came the Red Cross organization which has meant so much not only for war but also for the emer-

gencies of peace ever since. Napoleon refused to permit the Pope to be disturbed in the pos¬ session of Rome and maintained a French army there. With the fall of Napoleon, however, during the Franco-German War in 1870, Sar¬ dinian troops under Garibaldi entered Rome and this

became the capital of a united Italy, which has been growing in sojidarity ever since.

Two extremely important features of the his¬ tory of the century are the rise into prominence of the great British colonies, Canada, Australia, New Zealand and South Africa. All of them have made wonderful strides, comparable to those made in the United States. At the end of our American Revolution, Canada had about 70,000, while the United States had some 3,000,- 000 inhabitants. By the end of the 19th century, Canada had multiplied over 100 times in popula¬ tion, the United States less than 35 times. Can¬ ada as a colony suffered from colonial abuses and in 1837 there were two revolutions, one in Upper, the other in Lower Canada. They brought reforms. After the famine in Ireland, a great many Irish emigrants came to Canada, and with the increase of population the need of federation was felt. It was brought about 1 July 1867. The opening up of the Northwest Provinces and the discovery that the hnest kind of wheat could be grown there attracted im¬ mense numbers of people and the thorough democracy of the government brought many new citizens. Canada seemed to be drifting toward absolute independence of the mother country until Canadian volunteers served in the Boer War, a forecast of the sacrifices to be made a little later in the Great War.

Australia, discovered by Captain Cook in 1770, was proposed as a colony for American Royalists after the Revolution, but the plan fell through. It became a convict station, but in spite of this grew rapidly in population until at the mid-century there were some 350,000 free inhabitants, about 200,000 in New South Wales, and 75,000 each in Victoria and South. Australia. In 1851 came the discovery of gold by a gold miner from California. The- male population rushed to the gold fields, leaving only women and children in the cities. Immigrants came in swarms, and in 10 years Victoria grew from 70,000 to 600,000 inhabitants. Fortunately, gold was discovered in other parts of Australia, and this diverted population to them. For 50 years the annual gold outnut was some $50,000,000. Six independent colonies came into existence, but the rise of Japan, Germany's entrance into the south Pacific, European spheres of influence in South Africa and tariff troubles forced them into union. Their Constitution is an imitation of that of the United States and the site of the Federal capitol, centrally located in a city (Canberra) to be built for it, repeats the history of Washington. The Confederation of Aus¬ tralia made the great southern continent ready to play an important role in the 20th century. The Boer War showed its loyalty to the mother country and the Great War consecrated it in blood.

The last year of the century saw a severe 1-low to English prestige in the Boer War. The Dutch South African settlers, known as Boers, trekked from

the British dominions at the Cape of Good Hope into the Transvaal, or cross-river country. They were living in peace when the discovery of gold led to a great influx of Uit-

landers (foreigners). The Boers refused to share the franchise except under rigid condi¬ tions, and Dr. Jameson (1895) led a raid to secure reform. President Kruger, instead of court-martialing the captured raiders, gave them up to the British, who treated them with leni¬ ency. Chamberlain, the English minister, seemed intent on forcing the Boers into war, thinking this the easiest way to end friction. Sir William Butler's warning of the danger of such a mistake was unheeded. A period of severe political tension ensued, and Britain found herself in a war which proved costly in life and treasure. The Zulu War and its disasters had not proved a lesson. A tactless English agent pushed Cetewayo, king of the Zulus, into a war (1878-79) easily avoided but extremely costly in men and in prestige. The Zulus, brave to desperation, inflicted severe losses. The young French Prince Imperial lost his life in one of their incursions. The Boers proved quite as brave and even more successful in fighting. The dogged courage of English troops, pushed to frontal attack, only sacrificed them to the bullets of an enemy, all sharpshooters, ready to take advantage of every mode of concealment and using smokeless powder, so that the Eng¬ lish saw their comrades fall scarcely able to dis¬ cover what to shoot at in return. The public feeling of the world ran strong against Britain. (

The greatest chapter in the century's history is that of the discoveries in science. Father Piazzi's discovery on the very first morning of the century, of Ceres, the first asteroid recog¬ nized, was a portent of the century's scientific advance. Treviranus' use of the word ((biology® for the first time the same year marks an epoch. Lamarck suggested not only a theory of evolu¬ tion but its factors. Biology became dominant. Schleiden and Schwann demonstrated the ex¬ istence of cells in all living things, plants and animals, showing a bond between them. The cell doctrine became the foundation of physiology and pathology. Virchow's work in cellular pathology furnished the basis for a scientific study of the internal causes of disease, while Pasteur demonstrated the existence of microbes as the extraneous etiology of infec¬ tious diseases. Pasteur's work made possible the development of sanitary science and an im¬ mense reduction in the death rate of cities. His discoveries furnished Lister with the prin¬ ciples of antiseptic surgery, with all that they meant for the saving of life and suffering. Be¬ fore Lister, only a few emergency operations to save life were done, while now many serious operations could be performed for the relief of suffering and the prevention of complications.

The second half of the century was in scientific circles largely taken up with the dis-

S n, iAen of evolution. Independ¬ ently Charles Darwin and Alfred Wallace hit

upon the theory of natural selection as afford¬ ing an explanation for the evolution of living

n Qcm Dt?ru1iS bo.ok 'Origin of Species' r ° j ' wklck Darwin himself would have pre- terred to call by its secondary title, (The Pres¬ entation of Favored Races in the Struggle for 1-ite, for it discusses not origins but preser¬ vations, at once became the storm centre of dis¬ cussion for scientists and theologians. There was a tendency to exaggerate what was called Darwinism, so that the second decade after the publication of Darwin's book came subse¬ quently to be known as the < (silly seventies." Huxley in (The Coming of Age of The Origin ot Species) (1880) reminded the world that so long as species were infertile with each other the missing link would continue to be a mystery. Abbot Mendel's discovery of a series of laws of heredity led biology from theory to observa¬ tion once more, but preoccupied with evolution theories the significance of his work was not recognized until the end of a generation. Weis- mann's demonstration that acquired characters are not inherited left the subject of evolution in the air at the end of the century.

The purely physical sciences entered an era of great development. In 1846 a new planet, Neptune, was discovered by Leverrier at Paris and Charles Adams at Cambridge, through mathematics alone from the study of the varia¬ tions of Uranus, which had been discovered by Herschel (1781). This was a great triumph for applied mathematics and with the development of astronomical spectroscopy which demon¬ strated that the universe was composed of materials with which we were familiar on earth gave a new confidence to students of science. The doctrine of the conservation of energy was demonstrated by Joule, Mayer and Helmholtz. Electricity was developed marvelously by Davy, Faraday, Clerk Maxwell and Lord Kelvin, who left imperishable monuments of successful re¬ search. Sir William Crookes' studies of radiant matter stimulated research in radiation and led to the discovery of the X-rays (Roentgen 1895) and of radium and the radio-active substances. Madame Curie's discovery proved valuable for physics as well as for medicine and surgery. The study of radiation opened up a new and wonderful chapter in chemistry and led to de¬ velopments in chemical physics which revolu¬ tionized ideas as to the constitution of matter. .Chemistry made the waste material of factories the source of valuable by-products. Coal tar yielded up the dyes and drugs

which had been stored in prehistoric plants, the original dis¬ coveries in this field being made by the English and exploited by the Germans. Illuminating •gas banished darkness and was succeeded by electricity which effected a revolution by which night was almost turned into day. Night life developed in the great cities and made great social changes. Men worked by day and could play far into the night, but the increase in insanity and suicide became alarming.

The 19th was above all the century of in¬ ventions. These concerned chiefly the trans¬ portation of the human body and human thought. The locomotive, the steamboat, elec¬ tric motor appliances, the electric telegraph, the telephone and finally wireless telegraphy with the evolution of printing were all phases of

this movement. The development of bridges, tunnels, canals, were complements and the ele¬ vator and electric light supplemented the work. Photography was a phase of printing. After the solution of the transportation problem the most important inventions were destructive agencies. The rifling of fire arms, the ma¬ chine gun, smokeless powder and high ex¬ plosives seemed to promise to make war im¬ possible and Alfred Nobel, the inventor of dyna¬ mite, under that impression established his peace prize. The steel bridge naturally sug¬ gested the steel building frame, the under water tunnel the use of caissons for deep founda¬ tions for high buildings. Applications of steam and electricity made labor-saving ma¬ chinery possible, though John Stuart Mill de¬ clared that instead of saving human labor machinery added to the drudgery of mankind. The discoveries of science were all made avail¬ able for the convenience and comfort of man- kmd. The great mass of men were not in a position however to enjoy them.

In literature the classical and didactic 18th century gradually gave way before the romantic early 19th, though not without a struggle Percy's (Reliques> aroused Sir Walter Scott first to romantic poetry and then to be the founder of a great movement in fiction, which "ad for moving spirits men like Manzoni, Dickens, Thackeray, George Eliot and Victor Hugo. America contributed two of the great¬ est fiction writers, Hawthorne and Poe. A really great period of fiction ran out in trivial realism. Dramatic literature followed the same course and though there was great theatrical deyelopment little that is expected to live was written in the field of drama. In poetry Words¬ worth, Keats, Shelley, Byron, Coleridge, Long¬ fellow, Whitman and Tennyson achieved reputa¬ tions, some of which have endured though many of the literary lights of the period have already been extinguished by time.

The art of the 19th century began under classic influences in France

encouraged by Napoleon, but the romantic movement in litera¬ ture affected art also and the latter half was dominated by the Barbizon school, whose work lST.irieC0-gnized as enduring value. Frangois Millet is one of the great painters of all time, though he nearly starved while doing his work! He has left a magnificent monument in his pictures of present life which are at the same time human documents of great significance. Some of his colleagues did work of onlv less import. Etching, with Haden, Whistler and Zorn, had a fine revival in the latter part of the century; the decorative arts came into their own once more and the arts and crafts derived a new stimulus from the more careful study of Renaissance and mediaeval models.

The outstanding religious event of the cen¬ tury was the Oxford movement which Newman dated from a sermon of Pusey 's in 1833. The younger generation at Oxford, hoping to bring the Church of England back to primitive Christianity, published a series of hence the term Tractarian Move¬ ment which drew wide attention. They con¬ tinued from 1833 to 1841. It was felt." how¬ ever, by the great majority of Anglican church¬ men that the movement was out of symoathy with the Anglican Church and in 1845 the

chief figure among the leaders, John Henry Newman, became a convert to Catholicism. He took part in the foundation of a Catholic University at Dublin in the early fifties and later was made a cardinal.

The outlook for humanity at the end of the century was not promising. There were so many abuses in the social order that it seemed almost certain that severe internal troubles in many countries in the form of an uprising of labor against capital must occur before there could be any assurance of the end of discon¬ tent. A great part of the laboring population was not receiving a living wage, that is, such wages as would enable them to live decently and support their families properly. Prosperity in the sense of the accumulation of national wealth in many countries was very great, but there was an extremely unequal distribution of the wealth, so that a few families rolled in luxury and the great majority of the people, some of them having to work very long hours in extremely unsuitable conditions, were so poorly paid that they had to live in circum¬ stances unworthy of civilization. Investigations conducted by Booth in London in the early nineties, showed that about 1,000,000 of people, nearly one in three of the population, were unable to obtain the necessaries for healthy living. In many districts more than half the population were in distress or on the

verge of it. London was said to be exceptional be¬ cause of its overcrowding and the hard times were blamed for unfortunate conditions, but when Rountree made a careful survey of York in 1899 he found the people of that provincial town in nearly as bad a condition as that re¬ ported for the capital, though that year trade was unusually prosperous. More than one in four of the population was found to be living in poverty though the fixed standard of family wages below which the poverty line was drawn was only 21 shillings and 8 pence per week, just about $5.25. Conditions were worse on the Con¬ tinent. The United States Daily Consular Re¬ ports at the close of the century declared that of 2,000,000 of people in Berlin, 1,125,000 had an income, but nearly one-half of the incomes were exempt from taxation because they were below $214 per year. Of the 600,000 taxed incomes, nearly 550,000 were less than $700 a year, that is about $2 a day. Conditions were better in America and yet many of our work¬ ing people were compelled to live huddled to¬ gether in slums under intolerable conditions, while a few enjoyed luxuries.

Spahr in (An Essay on the Present Dis¬ tribution of Wealth in the United States, 5 es¬ timated (1896) that 125,000 families of the wealthy class in the United States held $33,- 000,000,000 of the total wealth of the nation, while 5,500,000 families of the poorer class had altogether but $800,000,000. Of every 100 fami¬ lies one possessed more than the remaining 99 put together. The industrial era culminated in the creation of monopolies and trusts in which men, sometimes by good luck, but oftener by illegal or unjust means, amassed vast fortunes, which when distributed by will served, as a rule, to do much more harm than good. Social unrest and threatening social revolution were impending at the beginning of the 20th century. The spirit of the French Revolution had made

itself felt all during the century. Its main purpose, to quote Hilaire Belloc, was to gain back for the lower classes, so-called, the rights which they had enjoyed in the Middle Ages. The proletarians that is, in the original sense of the word, the child raisers of the race, struggled all during the century to secure the essential rights of humanity, the rights, to use Carlyle's expression, to have what is not denied to the animals, proper nutrition and shelter for themselves and their offspring. At the end of the century better things seemed impending.

There remained, however, a number of po¬ litical problems unsolved which boded ill for the time to come. In spite of more than 100 yea/s of supposed denationalizing, the Poles were still intent on freedom with no prospect cT an end to serious trouble in North Central Europe until Polish national feelings were satisfied. The age-long feud between the Irish and the English was active as ever, the source of serious friction between the two peoples. The Tsar broke the promise of his dynasty that the language and certain

national rights of the Finns should be respected. In Bohemia the Czechs were in ever-increasing turmoil with the Germans and Austria was a seething cauldron of national disquiet with nearly a dozen nationalities claiming rights which the ruling caste was not willing to grant them. Finally there was Italia irredente, portions of Italy still held by Austria, and Alsace-Lor¬ raine which had been taken by the Germans, but had not become Germanized during the generation. All these problems were clamor¬ ing for solution and could not be eliminated as political trouble factors until solved with right and justice. James J. Walsh,

Author of cThe Thirteenth, the Greatest of Centuries R etc.

PRINCIPAL EVENTS OF THE NINETEENTH

CENTURY.

1801. Piazzi discovers the planetoid Ceres, 1 January. Napoleonic wars continue. Battle of Alexandria, Egypt, 21 March. Battle of Copenhagen. British destroy the Danish fleet, 2 April. Peace treaty between France and Great Britain, 1 October. War between the United States and Tripoli.

1802. Napoleon re-establishes Christianity in France, 2 March. Treaty of Amiens signed, 27 March. Dr. Olbers discovers planet Pallas, 28 March. For the discovery of vaccination, British Parliament awards Dr. Jenner $50,000. Treviranus enunciates the principles of bio¬ logical development. Napoleon named consul for life, July. Prince of Orange abdicates, August.

1803. War renewed between England and France, 16 May. War in India. Scindia defeated, 10 August. The Great Mogul of Delhi deposed, September. Haiti, French negro colony, achieves independence, 19 November. France sells Louisiana to the United States.

1804. Napoleon proclaimed emperor, 20 March. Duke d'Enghien shot, 21 March. Code of Napoleon first promulgated. Francis II abandons title of emperor of Germany, and assumes that of emperor of Austria. Lewis and Clark expedition.

1805. War declared between England and Spain. Napoleon crowned king of Italy, 26 May. Biitish defeat French and Spanish fleets, 22 July. Napoleon restores Gre¬ gorian calendar in France. Battle of Trafalgar and death of Nelson, 21 October. Battle of Austerlitz, 20 December. Peace between Tripoli and United States.

1806. Cape of Good Hope occupied by the British, 8 Janu¬ ary. Burr's conspiracy. Confederation of the Rhine; Saxon Bavaria and Wurtemburg become kingdoms.

1807. Peace of Tilsit. British again bombard Copenhagen, 7 September. French occupy Portugal; the royal family emigrates to Brazil, 29 November. Fulton's first steam¬ boat starts the great development of marine travel of the century. Slave trade abolished.

1808. Napoleon proclaims blockade of Great Britain. French occupy Rome. Murat made king of the Two Sicilies. Joseph Bonapart-e king of Spain. Spain declares war

*ˆNovember C6′ * ˆay‘ Finland surrenders to Russia,*

1809 Battle of Wagram. Battle of Corunna. British de-

iomS D°l^encˆ ir Basque roads.*

810. Rebellion m Mexico. Napoleon divorces Josephine and marries Maria Louisa of Austria. Peace between France and Austria. France annexes Holland. Berna- dotte becomes Crown Prince of Sweden.

1811. Indian war in West. Mamelukes massacred at Cairo. British take Java.

1812. Napoleon's disastrous invasion of Russia. War be¬ tween United States and England. Spanish Peninsular campaign.

1813. United States troops invade Canada. Perry's victory on Lake Erie. Russia, Prussia and Bavaria confederate against France. Spain abolishes the Inquisition. Revolution in China. British victories in Spain. Napqleon defeated at Leipzig.

1814. British troops burn capital at Washington. British ah- j "®hington invade France and capture Bordeaux. Allied sovereigns enter Paris. Napoleon abdicates and is exiled to Elba. General treaty of peace. England acquires Cape of Good Hope, Malta, Mauritius, Tobago and Saint Lucia. Norway annexed to Sweden. Peace

i signed between England and America.

1815. Battle of New Orleans and British defeat. Napoleon escapes from Elba. The 100 days campaign ends with the battle of Waterloo. Napoleon exiled to Saint Helena. Holy Alliance established. Americans suppress Algerian piracy. Brazil made an empire. Lamarck propounds the theory of

evolution.

1816. British fleet destroys Algiers.

if! o' ?°ˆvar becomes dictator of Venezuela.

1818. Chile achieves independence.

1819. Colombia proclaims a republic. Purchase of Florida, bteam navigation begins between Europe and America.

1820. the Missouri Compromise. Rebellion in Spain. Heath of George. Ill of England. Austrians suppress Utahan Carbonari. Meeting at Troppau of sovereigns of Russia, Austria and Prussia. First king of Haiti commits suicide.

1821. Mexico, Colombia, Venezuela and Ecuador proclaim republics. Greek war of liberation. Napoleon dies at Saint Helena.

1822. Brazil separates from Portugal. Greece strikes for freedom. Constitutionalists triumph in Spain, but are condemned by the Congress of Verona. Liberia founded by American Colonization Society.

1823. The Monroe Doctrine formulated. French army invades Spain and suppress the Constitutionalists.

1824. Argentina gains independence. Peru is made free by Bolivar. War between England and Burma. English acquire Singapore.

1825. Erie Canal completed. Gas used for lighting New York streets. Drummond invents the limelight. Bolivia becomes a republic. Steam railroad development begins with the opening of the Stockton and Darlington line in England 27 September

1826. War between Russia and Persia. Great Britain and United States arbitrate on damagesfor the War of 1812.

1827. Treaty of London creates the kingdom of Greece. Turkish- Egyptian fleet destroyed at Navarino by the allied fleets.

1828. Greece gains, independence. Uruguay becomes a republic. Russia effects peace with Persia, and declares war against Turkey.

1829. Peace treaty between Russia and Turkey. Spain attempts to recover Mexico. Venezuela separates from Colombia.

1830. Revolt in Paris. Separation of Holland and Belgium. France

conquers Algiers. Revolution in Poland.

1831. Polish rising defeated. Brazilian revolution. Reform bill introduced into British Parliament. The Abolition movement acquires importance in the United States.

1832. Black Hawk War. Nullification in South Carolina. Reform bill passed in England. Abd-el-Kader leads Arabs against French occupation of Algiers.

1833. Migrations of the Boers begin. Abolition of slavery in the British colonies. American Anti-slavery Society founded. Carlist insurrection in Spain. Civil war in Portugal. Royal fleet defeated by insurgent fleet. Treaty of peace and alliance between Turkey and Russia.

1834. Quadruple alliance of England, France, Spain and Portugal. Education in England receives its first par¬ liamentary grant.

1835. The second Seminole War. Texans revolt against Mexican rule. Conference of Toplitz between the emperors of Russia and Austria and the king of Prussia. Halley's comet reappears.

1836. The Alamo massacre. Texas gains independence and proclaims Houston President. Revolts in Spain and Portugal.

1837. Chicago incorporated as a city. Financial crisis in the United States. Rebellion in Canada. Queen Victoria ascends the British throne.

1838. Peru proclaims independence. International Copyright Act passed. Great Western steamship makes her first

transatlantic voyage. Daguerre introduces photog¬ raphy.

1839. Gold found in Australia. Central American confed¬ eracy dissolves. Egyptian forces defeat Turkish army and acquire its fleet. Russia wars successfully in Cau¬ casia; disastrously against Khiva. Anglo-Indian force invades Afghanistan. Anti-Corn Law and Chartist agitations in England.

1840. Penny postage inaugurated in Great Britain. Marriage of Queen Victoria to Prince Albert of Saxe-Coburg. Revolt in Syria. Occupation of Acre and Beirut by British and Austrian expedition. Peace established by the Treaty of London. Opium war between England and China.

1841. Union of Upper and Lower Canada. Successful revolt of the Afghans against British rule.

1842. British disasters in Afghanistan. Khyber Pass mas¬ sacre. Dorr Rebellion in Rhode Island. ‘ Seminole War ends. Maine boundary settled “by Ashburton Treaty. British punitive expedition reoccupies Afghanistan and retires. Treaty of Nanking opens Chinese ports to British commerce. Boer Republic in Natal occupied by the British.

1843. Irish Home Rule and Repeal agitation under O’Connell. •cj”ee Church formed in Scotland. Scinde captured by the British. Thames tunnel opened. Botta discovers site of Nineveh.

1844. Electric telegraphy is practically developed. French subdue Algiers and Morocco. United States and France make treaties with China. Santo Domingo establishes a republic.

1845. Texas admitted to the Union. Mexico declares war with the United States. British war with the Sikhs in India.

1846 Defeat of Mexico. Occupation of California and New Mexico. Repeal of the English Corn laws. New Zea¬ land acquires constitutional charter. Great Irish famine, and large emigration to the United States. Leverrier and Adams by applied mathematics discover the planet Neptune.

1847. War between Mexico and the United States. Mexican capital captured. Jesuits expelled from Switzerland. Salt Lake City founded by the Mormons.

1848. Gold discovered in California. Revolution in France; republic proclaimed; Louis Napoleon becomes President. Risings in Italy, Germany, Austria, Hungary, Denmark, Poland and Ireland. War between Italy and Austria. Second Sikh War in India. British occupy the Orange River State. Boers migrate and establish Transvaal Republic.

1849. Gold miners rush to California. Prussia defeats Danish attack on Schleswig-Holstein. Austrians sup¬ press Hungarian revolt. Also the Italian revolt. French army restores the papal temporal power in Rome. British conquer Sikhs and annex Punjab. Livingstone discovers Lake Ngami.

1850. Russia starts its career of conquest in Asia. German Confederation becomes effective. Clayton-Bulwer Treaty between the United States and Great Britain provides for transisthmian canal. Taiping Rebellion in China. McClure discovers Northwest Passage.

1851. Coup d etat in France; Louis Napoleon elected presi¬ dent of the Republic for 10 years. The Great Exhibi¬ tion in London.

1852. Empire restored in France. Napoleon III proclaimed emperor. British

war with Burma and annex Pegu. Buenos Aires secedes from Argentina. Opening of Japan.

1853. Russo-Turkish War. Revolution in Mexico. The Taipmgs take several Chinese cities.

1854. The Crimean War. Commercial treaty between the United States and Canada. Commodore Perry effects a treaty between Japan and the United States. The Orange River Republic is established.

1855. Walker s filibustering expedition to Nicaragua. Fall

Sebastopol to the allies. Capitulation of Kars to the Russian forces. Bessemer steel process patented. Transisthmian . Panama Railway opened. Zambesi Victoria Falls discovered by Livingstone.

1856. Settlement conflicts in Kansas. Crimean War ends Britain annexes Oudh. British wars with Persia and China.

1857. The Indian Mutiny. France and England invade China. Business panic in the United States.

1858. Great Britain suppresses the mutiny and annexes India. China defeated, makes treaties with England, Trance and other powers, and cedes Amur to Russia. First Atlantic submarine cable laid. Evolutionary theory of Darwin and Wallace announced.

1859. The John Brown raid at Harpers Ferry. Franco- Italian War with Austria. Austrians defeated at Ma¬ genta and Solferino. Treaty of Zurich ends war and Italy acquires Lombardy. Livingstone extends explora¬ tion in Africa.

1860. Oil wells discovered in Pennsylvania. Abraham Lincoln elected President of the United States South Carolina secedes. Anglo-French War with China and

occupation of Peking. Garibaldi’s campaigns in Italy. French occupy Syria after massacres of Christians. Spain wars with Morocco and acquires Tetnan.

1861. Civil War in United States commences. Victor Emmanuel becomes king of Italy. Russian serfs freed. Austrian Empire receives a new

constitution. France, England and Spain send fleets to Mexico to enforce claims.

1862. British government demands release of Mason and Slidell, Confederate commissioners, taken from the British steamer Trent. Numerous battles fought between Northern and Southern forces. First battle of ironclads in Hampton Roads. France declares war against Mexico. France acquires Cochin-China. In expedition against Rome, Garibaldi is defeated, wounded and captured.

1863. Civil War in United States continues. Emancipation of slaves proclaimed. Poles unsuccessful revolt against Russia. France conquers Mexico, proclaims an empire with Maximilian of Austria as emperor.

1864. Civil War in the United States continues. Austro- Prussian War with Denmark ended by the Treaty of Vienna. Russia conquers Circassia. Spanish-Peruvian War. The Taiping Rebellion in China suppressed.

1865. Civil War ends in United States. Lincoln assassi¬ nated. Crank and pedal bicycle invented. Mendel's theory of heredity established. Fenian Rebellion in Ireland. War between Paraguay and Argentina. Alliance between Argentina, Brazil and Uruguay.

1866. Fenians from United States invade Canada. Prusso- Italian forces defeat Austria; treaties of Prague and Vienna effect peace. Venetia united to Italy. German Confederation dissolved. North German Confederation formed. Spain attacks Chile and Peru and bombards Valparaiso and Callao. Second and successful Atlantic cable laid.

1867. Purchase of Alaska by United States. Maximilian shot in Mexico. Abyssinian War with England. Suez Canal opened to navigation.

1868. Revolution in Spain, Royalists defeated. Insurrection in Cuba. Shogunate of Japan overthrown. Defeat of Paraguay.

1867. The Pacific Railway completed. General Grant be¬ comes President of the United States.

1870. Franco-Prussian War; German Empire formed. Napoleon III deposed; France becomes a republic. Italy annexes Papal States. Mont Cenis tunnel com¬ pleted.

1871. William I proclaimed emperor of Germany at Ver¬ sailles. The war of the Commune in Paris. Emanci¬ pation of slaves in Brazil. Disastrous fire in Chicago. Dry plate photography introduced.

1872. Geneva Convention settles Alabama claims in favor of the United States. Germany expels the Jesuits. British Parliament passes the Ballot Act. Revolution in Spain.

1873. Spain forms a republic when King Amadeus abdicates. Egypt receives autonomy. Ruma occupies Khiva. British expedition subdues Ashantis.

1874. Coup d'etat in Spain and Alfonso XII proclaimed king. Great Britain annexes Fiji Islands.

1875. Great Britain acquires control of the Suez Canal. Carlist revolt in Spain suppressed. Egyptian-Abys- sinian War.

1876. Centennial Exposition at Philadelphia. Sioux War. Custer massacre. Bell's telephone introduced. Ruma annexes Khokand. Turkish atrocities in Bulgaria. Queen Victoria proclaimed empress of India. Abyssinians defeat Egyptians. Kaffirs defeat Transvaal Boers.

1877. Diaz becomes President of Mexico. Japanese Sam¬ urai revolt suppressed. Russo-Turkish War. British annex Transvaal Republic. Stanley descends Kongo River and crosses Africa. Edison invents phonograph.

1878. Russians occupy Adrianople. British fleet steams through the Dardanell s to stem Russian advance, and British forces occupy Cyprus. European situation ad¬ justed by Treaty of Berlin. Russian embassy received, British embassy rejected by Afghans, British troops enter Afghanistan and place Yakub Khan on the throne. Half-t ~ne process revolutionizes engraving m th'ds.

1879. British Ambassador and suite massacred at Kabul. British expedition avenges deaths and restores prestige. Specie payment resumed in United States. Chile wars against Bolivia and Peru. Zulu War in South Africa.

1880. Partition of Africa begins. France annexes Tahiti. Spain abolishes slavery in Cuba. Chinese coolie immi¬ gration restricted in the United States. Transvaal revolt against British suzerainty.

1881. French begin digging Panama Canal. Assassination of President Garfield. British defeated by Boers who win independence. French protectorate over Tunis. Revolt in Egypt under Arabi Pasha. Assassination of Alexander II of Russia.

1882. Murder of Lord Cavendish and secretary in Phoenix Park, Dublin. Europeans murdered in Egypt. Bom¬ bardment of Alexandria followed by British control of Egypt. French Tonquin expedition. Anti-polygamy bill

enacted in United States. Pasteur isolates hydro¬ phobia bacillus. Koch isolates tuberculosis bacillus.

1883. Civil service bill passes Congress. Brooklyn bridge opened. French protectorate established in Anam. French aggression in Madagascar. The Mahdi anni¬ hilates Egyptian army led by Hicks Pasha.

1884. Russia annexes Merv. War between France and China. Convention between Great Britain and the Transvaal Republic.

1885. The Mahdi captures Khartum and General Gordon is killed as British troops near city. Revolt in Canada; Riel, the leader, captured and hanged. Russo-Afghan- Indian difficulties settled by British concessions. War between England and Burma. War between Serbia and Bulgaria. Kongo Free State established.

1886. Earthquake at Charleston. Anarchist riots at Chicago and Milwaukee. Great Britain annexes Upper Burma. Greece threatens Turkey. Great powers blockade Greek ports. Talking machine perfected.

1887. Centenary of United States Constitution celebrated. Queen Victoria's jubilee celebration. Neutrality of Suez Canal confirmed. Great Britain annexes East Zululand. Stanley's second expedition through Africa.

1888. William II becomes emperor of Germany. Bou- langist agitation in France. Chinese Exclusion Act in United States. Canadian Fisheries Treaty signed in

' Washington. Retaliatory measures against Canada advocated by President Cleveland creates stir. Abys¬ sinians defeat Italians. Imperial British East Africa Company is chartered. Hertzian waves developed.

1889. Flood devastates Johnstown, Pa., with loss of over 2,250 lives. Japan inaugurates a new constitution. Brazil revolts, proclaim a republic and exiles Don Pedro. British South Africa Company is chartered. Automobile improved and becomes of practical use.

1890. Heligoland transferred by Britain to Germany in return for African concessions. McKinley tariff bill becomes law. Linotype printing improved and adopted.

1891. Revolution in Chile. Australasian federal convention at Sydney. Triple alliance renewed for six years.

1892. Bering Sea Treaty ratified. Saint John's, Newfound¬ land devastated by fire. French forces occupy Dahomey, Panama scandals in France.

1893. Chicago's Columbian Exposition, World Fair and Parliament of Religions. French ultimatum to Siam. South African War opens Matabeleland. Rio Janeiro bombarded by Brazilian rebels. Business depression in United States. Edison invents kinetoscope.

1894. Chino-Japanese War. British establish protectorate in Uganda. Dreyfus falsely convicted of treason against France. President Carnot of France assassinated. Great railway strike in Chicago.

1895. Treaty of Shimonoseki ends Chino-Japanese War. French campaign in Madagascar. Abyssinians defeat Italians. Cuba revolts against Spain. Jameson's abortive raid in the Transvaal. President Cleveland's Venezuelan message. Roentgen X-rays discovered.

1896. British forces occupy Ashanti. Anglo-French Siamese complications settled. General Weyler's suppression measures in Cuba increases revolt. Italy's disastrous defeat at Assua ends war with Abyssinia. France annexes Madagascar. Anglo-American agreement over Venezuelan difficulty. Wireless telegraphy practically developed by Marconi.

1897. Diamond jubilee of Queen Victoria. United States rejects Olney-Pauncefote Treaty. Gold rush to Yukon commences. Famine and pestilence in India. Greek action in Crete precipitates intervention, war with Turkey and defeat. Canada introduces differential tariff bill.

1898. United States battleship Maine blown up in Havana harbor. Spanish-American War. Annexation of Hawaii. Occupation of the Philippines, Cuba and Porto Rico. Treaty of Paris ends Spanish-American difficulties. The " Dreyfus affair " agitates France. Khalifa defeated at Omduram and Sudan reoccupied. Fashoda affair complicates Great Britain and France. Peace confer¬ ence at The Hague. China leases Port Arthur and Dalny to Russia. Chile and Argentina agree to per¬ petual peace and arbitration. The Curies discover radium.

1899. The Philippines revolt against United States rule. Hostilities in Samoa. Boers invade Natal and the South African War begins.

1900. The Hay-Pauncefote Treaty facilitates construction of the transisthmian canals. Great Britain annexes the Transvaal uftd Orange River republics. Boxer Rebellion in China; siege and relief of the foreign legations. Russia occupies Manchuria. Australia becomes a common¬ wealth.

NINETY-SIX, Fort, a former Revolution¬ ary fort in Ab'beville County, S. C., near the Saluda River. It was so-called on account of being 96 miles from the frontier fort of Prince George. During the Revolutionary War it

was held by Lieutenant-Colonel Cruger and 500 men for King George. General Green laid siege to

it and attacked it on 25 May 1781, and had seized the outlying works, when sometime after it was reported that Lord Rawdon with 2,000 men had arrived at Charleston and was march¬ ing to its relief. Green accordingly pressed home his attack, but was unsuccessful, and the reinforcements arrived on 21 June; but Rawdon was ultimately, through Green's fabian tactics and danger to his communications, forced to abandon the fort.

NINETY-THREE ((Quatre-Vingt- Treizeˆ, a novel by Victor Hugo, published in 1874. It bears the sub-title (Premier Recit. La Guerre Civile, } and was intended to form the first part of a trilogy. The edition of 1882 contains several remarkable designs signed by the author. The story deals with the French Revolution and the civil war in La Vendee.

NINEVEH, mne-ve, the ancient capital of the Assyrian Empire. The site of the city, which was destroyed about 606 b.c. by the Baby¬ lonian Nabopolassar and the Mede Cyaxares, has been identified with the modern Kouyunjik. It stands on the left bank of the Tigris, op¬ posite to the town of Mosul. The first historic notice of Nineveh is in Genesis x; it is de¬ scribed as (

It was known to travelers that vast mounds covered the banks of the Tigris opposite Mosul and extended to a considerable distance inland. They were long considered to cover the ancient site of the Assyrian capital, but it was not until 1841 that M. Botta, the French consul at Mosul, began excavations with the result that he ob¬ tained a few fragments of brick and alabaster. He renewed his efforts at Ivhorsabad, 12 miles to the northeast, in 1843 and discovered an Assyrian edifice which had remained buried in the sand for thousands of years. The work was continued by Layard, who explored the lofty mounds . of Nimrud, situated 18 miles south-southeast of Mosul at the point where the tributary Zab joins the Tigris. This was the beginning of a series of the most remarkable discoveries. He immediately came upon numer¬ ous slabs covered with cuneiform inscriptions of unique importance. A chamber in the an¬ cient ruins was lined with these, and they were found to be in excellent preservation. He un¬ earthed, moreover, gigantic figures of various kinds — winged bulls and lions with human heads and winged sphinxes, which stood as guardians at the gates of stately palaces. It was evident that the old city had been destroyed by fire, for the

stone images in many cases were calcined and crumbled into dust on ex¬ posure to the air. The fire had not, however, desolated what the explorer designated the northwest palace. Here he discovered in excel¬ lent preservation 28 rooms, decorated with bas- reliefs, carvings and moldings which told the

tale of the art and civilization which had flour¬ ished at Nineveh in its palmy days. Returning to Kouyunjik, Layard met with even more im¬ portant results from his excavations. When he pierced the mounds at this point he was enabled to explore nine vast rooms, one of them 130 feet long, and all replete with interesting and valuable sculptures, inscriptions and carvings. In 1849, after returning to England and arous¬ ing the interest of the learned world in his magnificent discoveries, he renewed his work at Kouyunjik and found an almost inexhausti¬ ble treasury of antiquities in the sand mounds of the plain. He was now acting as agent for the British Museum, whose Assyrian collection he enriched with some of its most precious examples of art and inscriptions. Loftus and Hormuzd Rassam continued the work in 1853 and 1878-82, and the excavations at Nimrud were renewed by George Smith in 1873. Wallis Budge in 1888 and L. King in 1902 have con¬ tinued the work of excavation.

There can be no doubt that some of these monuments represent the remains of ancient Nineveh and scholars have arrived at the con¬ clusion that the city of Ninus occupied the site of Kouyunjik and Nebbi Yunus on the left bank of the Tigris at the confluence of the Zab. Asur, an even earlier capital of Assyria, was undoubtedly built on the site of the modern Ivalah Sherghat. The palaces of Sennacherib and Assurbanipal have been unearthed from the mounds of Kouyunjik, and a second palace of Sennacherib and Esarhaddon from the mounds of Nebbi Yunus. It is concluded from these discoveries by some archaeologists that Nineveh proper was one of a cluster of cities and royal residences that stood on the banks of the Tigris. Nineveh proper was built in the shape of an irregular trapezium. The palace of Sargon at the northern angle had a fagade 400 yards in width. The chief sculptures and inscriptions which are now stored in the British Museum belong to palaces and temples in the northwest of the city. The principal oalace was built in the 9th century b.c. by Assurnasirpal. Near by he built a great tower, rising with narrowing stages. His son Shalmaneser II built the central palace of the group. The statue of Nebo in the British Museum was brought from what has been called the south¬ east palace, but was really a temple.

Nineveh was not the earliest capital of Assyria and only came into importance in the time of Sennacherib, who is recorded on the inscribed bricks to have built its walls. From his time it was the chief seat of empire, and may have given its name to the whole group of cities between the Tigris

and the Zab. Hence Jonah describes this Nineveh as a city of three days' journey, and • Diodorus declares its cir¬ cuit was 480 stadia.

Consult the works of Layard, Botta, Ras¬ sam, Flandin, Oppert and George Smith ; also Hilprecht, (Exploration in Bible Lands in the 19th Century) ; Hogg, (Recent Archaeology) (Philadelphia 1903) ; Kaulen, (Assyrien und Babylonien) (Freiburg 1899) ; Perrot and Chipiez, (Art in Chaldea and Assyria) (London 1884) ; Rawlinson and Pinches, (The Cunei¬ form Tablets in the Kouyuniik Collection of the British Museum (ib. 1889-99), and the (Guide to the Assyrian Antiquities of the Brit¬ ish Museum. **

NINEVEH, Va., Cavalry Engagement at.

After the battle of Cedar Creek (q.v.) in Vir¬ ginia, General Sheridan on 9 Nov. 1864 with¬ drew his army to Kernstown, and General Early followed him as far as Middletown. Sheridan ordered Torbet, commanding his cavalry, to move on Early at noon of the 12th, Merritt's and Custer's divisions to the right, on the Back and Middle roads, against Rosser, and Powell's division to the left, on the Front Royal road, against Lomax. Powell moved down the road as directed, and thence across toward Middle- town, and at Nineveh met McCausland's cav¬ alry brigade, which charged him; but he made a counter-charge and routed it, capturing two guns, three wagons, two battle-flags, and 161 prisoners, and pursuing eight or nine miles up the Luray Valley. Six regiments were en¬ gaged on either side. The Union loss was two killed and 15 wounded; the Confederates lost 20 killed and 35 wounded. Meanwhile the col¬ umn on the right drove Rosser across Cedar Creek, and under cover of the night Early again retreated up the valley to New Market. Con¬ sult (Official Records, } Vol. XLIII ; Pond, (The Shenandoah Valley in 1864. }

NINGPO, nmg'po', China, a city and treaty- port in the province of Che-Kiang, in a fertile plain on the left bank of the Takia or Ningpo River, 13 miles from its mouth, and about 100 miles south ot Shanghai. It was opened to foreign trade by the Treaty of Nankin in 1842. It is surrounded by walls five miles in circuit, 25 feet high and 15 feet wide at top, and, be¬ sides, has extensive suburbs outside. Though highly extolled by the Chinese as one of the most beautiful cities of the Celestial Empire, it consists of narrow filthy streets and one-sto¬ ried houses, sometimes of stone, but mostly of brick. Its most remarkable edifice is a brick tower, formed of seven stories, and above 160 feet high, but now a mere ruin, and it contains numerous temples, colleges, etc., chief among them the temple of

the Queen of Heaven founded in the 12th century,. but the present building, elaborately and richly ornamented, dates from 1680. Shops and immense store¬ houses occupy the quarters near the river, while eating-houses and tea shops abound near the gates and in the suburbs. The manufactures consist chiefly of silk and cotton goods, carpets, furniture, salt, etc. The fisheries are important. The principal exports are tea, silk and raw cot¬ ton ; and the principal imports, besides manu¬ factured goods, sugar and opium. The great buik of the trade is carried on with the other treaty ports. Ningpo was the site of a Portu¬ guese settlement in 1522, has been an important missionary centre, and was taken by the British without resistance in 1841. Pop. estimated at

450,000.

NINIAN, nm-i-an, Saint, the apostle of the southern Piets. He labored in evangelizing northern England and southern Scotland at the end of the 4th and the beginning of the 5th centuries. He was a Briton by birth, but had been thoroughly educated in language and phi- losophy at Rome. The field of his activity ex¬ tended as far north as the Grampian Hills, and his see church, dedicated to Saint Martin of Tours, was Candida Casa, now Whithorn, the modern Wigtonshire, the southwestern county

of Scotland. His death is placed by hagiolo- gists in 432 and his festival is 16 September. After his death the Piets relapsed into pagan¬ ism; but after the revival of Christianity under David I the shrine of the saint at Whithorn became a famous place of pilgrimage. Consult the biography by Ailred of Rievaulx, printed in Forbes' (Historians of Scotland) (1875).

NINIGRET, an American Indian sachem of the Niantics, one of the Algonquin tribes. In 1637 he assisted the colonists in the Pequot war; and in 1647 began a war against the Mo- hegan, which was concluded by a peace at Bos¬ ton. In 1667 he sold much of his land on Long Island to the colonists. He refused to allow Christianity to be preached to his people, say¬ ing <(Go make the English good first. » He diet} in 1677.

NINO, Pedro Alonso, pa'drd a-lon'sone'no, Spanish navigator : b. Moguer, Spain, about 1455; d. about 1505. He piloted one of Colum¬ bus' ships in the expedition of 1492, and accom¬ panied him on his third voyage in 1498 to Trinidad and the coast of Paria, and returned to Spain filled with the project of making an expedition to the new country in search of treasure. He was granted the royal permission, one-fifth of the spoils to be the share of the Crown. The voy¬ age was a successful one; he peaceably obtained from the Indians a great store of treasure, but was accused of withholding the share belonging to the king and died before the suit was ended.

NINON DE L'ENCLOS, ne-non de lon- klo, or LENCLOS. See Lenclos, Anne.

NINTH CENTURY. The crowning of Charlemagne in Rome by the Pope (800), and his magnificent constructive administration and ability as a lawgiver for the Empire of the West promised greatly for the 9th century, but the promise was not to be fulfilled. He made the mistake of dividing the empire between his three sons, but they quarreled over it and only one of them, Louis I, called the Pious, or le Debonnaire, the Easygoing, lived to survive him. It needed a genius like the founder to maintain the empire that he had created, and genius is not hereditary. Louis after an inglo¬ rious and turbulent reign, divided the empire among his three sons. It was not long before internal and external peace were at an end. Louis' sons turned their arms first against their father and then against one another. Finally the famous Treaty of Verdun was made (843) by which France, Germany and Italy became separate and independent states. This repre¬ sents the beginning of France and Germany as we know them at the present time.

Other troubles were brewing even during Charlemagne's lifetime. The Norsemen came down on the Channel coast in 808 and returned at intervals tp ever-increasing numbers, until in 841 they plundered Rouen and advanced toward Paris. They secured a foothold on the main¬ land, which, for the sake of peace, was recog¬ nized, and the Normans became an important factor in the politics of both France and Eng¬ land. They represent the disturbing element of the time. During this century, their hardy brethren secured a foothold in Sicily and southern Italy and set up a kingdom of their own in Russia under Ruric, who is looked back

to as the founder of the Russian dominions. Everywhere they went, the Northmen, instead of maintaining their own nationality, fused with but became the dominant element of the people vvhom they invaded. After a time they were the most French of the French, the most Eng¬ lish of the English, and those who went to Ireland are often said to have become more Irish than the Irish themselves.

The frontiers of all the more civilized states suffered severely from the incursions of these barbarians and the 9th century represents an¬ other such a migration of nations as constituted such an important element in the history of Europe in the 5th century, when German tribes were pouring down upon the Western Empire and brought about its fall. The rulers were not such as to be able to maintain themselves in the face of these attacks.

The very titles given the kings and emperors ot the time indi¬ cate how low they had fallen in popular esti¬ mation. Louis I, le Debonnaire or the Easy¬ going, had among his successors men who re¬ ceived such titles as Charles I, the Bald ; Louis, surnamed the German, somewhat at least in de¬ rision ; Louis II, the Stammerer; Charles the Fat, and Charles III, the Simple, at the end of the century. The Eastern Empire was scarcely better off, for there was Michael II, called Bal- bus or the Stammerer, and Michael III the Drunkard, though at the end of the century came Leo VI, called the Philosopher, if that may be considered a title of respect for a king at a time when what is needed is not reflection but resolution and action. In the East the Caliphate declined, relieving the pressure some¬ what on the Eastern Empire, but the northern nations now began their incursions and there was war with the Lombards, the Bulgarians, the Saracens and, a little later, the Russians.

The Norsemen were making all the coasts of the North Sea and for some distance inland unsafe and after a time wandered into the Mediterranean Sea to carry on the same devas¬ tation. The Saracens were, however, making life utterly miserable for the Mediterranean coast cities. All the islands, Malta, Sicily, Corsica, Sardinia, were attacked over and over again by them, and the Italian penin¬ sula was often invaded. They captured Brin¬ disi, Bari and Tarentum, burned Ostia and Civita Vecchia, invaded even some of the sub¬ urbs of Rome, destroyed the rich Abbey of Monte Cassino and threatened Naples, Salermo and Amalfi, so that some of these cities had to treat with them to- be spared. They landed in southern France toward the end of the century, pillaged Arles and Marseilles (889) and founded a military colony in Provence from which to make incursions to various parts of the country. Between the Northmen and the other Teutonic barbarians from the North and the Saracens from the South, it is easy to understand what little peace or chance for the cultivation of the arts of life there was.

With weak rulers everywhere and invading barbarians, north and south, east and west, spe¬ cial provision had to be made for some sort of protection for the people. Charles Martel in the 8th century had organized a body of cav¬ alry, rapidly moving troops, which could be sent from one part of the country to another to re¬ pel such invasions. They were available,

besides, to quell internal dissensions and came to be an important part of the government resources for peace. This was the origin of chivalry (cheval, horse) , and it is easy to under¬ stand what a great development such a means of protection would take during the disturbed times after Charlemagne's death. These men on horseback came to be the resource of the weak from invading foreigners and rascally fellow countrymen. When

justice failed, the knights errant often redressed grievances, and above all, protected the weak against the strong, and the innocent from imposition. Such an institution was open to the most serious abuses. Many a knight errant became an arrant knave, though most of them took their duties quite seriously and tried to right the wrongs they knew. A high sanction was given to knighthood by the institution of a solemn initia¬ tion after a novitiate as a squire. The knights assumed their duties and station very much as the members of a religious order. After a day of fasting and a night of prayer, the knight was solemnly invested with the insignia of his order under the patronage of some chosen lady. The high reverence for womanhood which it incul¬ cated did much to lift knighthood to the highest plane. On the whole, our word chivalrous still enshrines a great historical truth with regard to this institution.

In the midst of the disturbances, due to bar¬ barous incursions while kings and emperors were too weak to protect their subjects or to repel invaders, another institution, feudalism, arose, that was to have a deeper influence on history even than chivalry. The word feudum or feodum occurs first toward the end of the 9th century, but the institution had been gradu¬ ally coming into existence for several genera¬ tions. It means property held in consideration of service, the word probably being derived from the same root as the German vieh, cattle, with a secondary sense, property. Men were willing to hold their property on condition of service because this secured them protection from the owner in time of invasion or distraint. Like chivalry, this was subject to many abuses and degenerated in certain places to what was little better than slavery. Maine ((Early Law and CustonF) said, however, <(The feudal ten¬ ure which was certainly at first the tenure of servants, who but for the dignity of their mas¬ ter might have been called slaves, became in the Middle Ages the tenure of noblemen.® Under this system everything belonged to the king or the lord, and all others held from him or from those who were holders from him, with specified obligations in return. The weaker man, in cer¬ tain phases of feudalism, placed himself under the personal protection of a superior without altering his title or divesting himself of his estate. He became a vassal and did homage. The placing of his hands between those of his lord was the typical act by which their co-rela¬ tion was established. The oath of fealty was taken at the same time. Feudalism was an in¬ stitution needed for mutual protection in the disturbed times, which degenerated into a seri¬ ous imposition and an infringement of rights in more peaceful times, and then had to be abol¬ ished. It still survives as a basis of the law relating to land both in England and Scotland.

The particular bright spot in the history of

the century is the life of King Alfred of Eng¬ land (849-901), who so well deserves the name of Great, the only English monarch ever given the epithet. The Danes had gained a foothold in England in the second quarter of the century, shortly after the seven kingdoms of the Saxon Heptarchy were united by the King of Wessex under the name Anglia (England), some 10 years after he had defeated the Britons deci¬ sively (813). The securing of rich booty was so easy in Britain that the Danes returned some 10 years later and under the weak Ethelwulf rav¬ aged the country unmolested and burned the city of London (838). Ethelwulf made a pil¬ grimage to Rome, and some years after his return defeated the Danes on the Isle of Thanet. He was succeeded by his sons, Ethel- bald and Ethelbert, who reigned jointly, and under whose reign the Church gained a great deal of influence. Under Ethelred, the Danes, no longer satisfied with incursions into the country, Settled down in Northumberland and proceeded to add to their territory until de¬ feated by Alfred, who ascended the throne (871). Alfred was only half-heartedly sup¬ ported by his subjects, however, who had grown tired of the never-ending conflict, and only his indomitable character, rendered still braver by adversity, saved England from the northern invaders. Alfred was, however, much more than a warrior. He was a great constructive administrator and lawgiver, deeply interested in education both for himself and his subjects, a writer of no small capacity, one of those geniuses who are raised up to lift a period and a people from obscurity. Nothing so well illus¬ trates how utterly independent of its environ¬ ment the human spirit is in its capacity to do things than the careers of such men. Alfred's life has of course been a favorite subject of study to Englishmen ever since but it amply deserves all the attention that has been given to it.

Around Alfred's name have gathered a num¬ ber of legends but with a core of historical truth which shows him at all times in life a really great man. Though the subject of in¬ ternal disease, Alfred was most active in work. By measured candles he divided his day into three parts of eight hours — one for sleep, one for work, and one for recreation of the body and diversion of mind. His evenings were given to study or dictation or intellectual inter¬ course with friends. He was no mere bookman but an active administrator. He repaired the fortifications destroved by the Danes, cleared the land of robbers and increased the fleet, lay¬ ing the foundation of England's naval great¬ ness. Justice was his hobby and he severely punished unjust judges. He compiled a code of laws from preceding customs, modestly refusing to add much of his own. His chief interest in the midst of all this activity was letters and he felt that the royal example would do more than anything else for the encouragement of litera¬ ture, so he made translations of the Latin authors into English, and he was the

founder of our literature. He translated Pope Gregory's work on Pastoral Care and sent a copy to every diocese as a sort of standard of the Eng¬ lish of the time. He made translations of Orosius and Bede. His favorite work was Boethius' (Consolations of Philosophy,* the free*

translation of which by him gives the best insight into Alfred's own character and his out¬ look on life. It is just over a thousand years since the death of this (< darling of the English," of whom historians agree that he was (

Alfred found it impossible to drive the Danes from England, so after establishing his own kingdom, he recognized their settlement of the northeastern part of England in the treaty of Widdemer (872). Here the}'- continued to re¬ ceive accessions from their home country, and this part of England came to be known as the Danelaw or Danelaugh, and as it occupied prac¬ tically all of the east coast of England and stretched well beyond the middle of the country, only a comparatively small territory was left for Alfred, and yet it is his rule over this that has given him immortal fame. His intellectual and spiritual influence and not the number of people that he ruled revealed his greatness. The Danes continued to grow in number and power all during the next century, until finally the Danish king, Canute, came to rule over all England as well as the Norse countries, and was really the head of an empire.

The 9th century saw the extirpation of the Piets or early inhabitants of Scotland, by Ken¬ neth, king of the Scots, bringing another peo¬ ple with a destiny into history. The greatest Pictish monarch of history, by name MacFer- gus, after a contest with a series of rivals, gained the supremacy which he held in the sec¬ ond half of the 8th century. It is not known just how, at the middle of the 9th century, Kenneth MacAlpin, called by all Scottish rec¬ ords a Scot, succeeded in reversing this conquest of the Piets and putting a Scottish man on the throne of Scone, but this was the beginning of modern Scotland.

There are traditions of the foundation of Oxford and Cambridge as universities at the end of the 9th or the beginning of the 10th century, but they are not substantiated. Schools were founded at both of these places, perhaps in Alfred's time, and they continued to be cen¬ tres of the intellectual life for England, but neither of them deserves the name of university even in the. loosest sense that can be given to that term, until the 13th century. Alfred's in¬ terest in literature and the intellectual develop¬ ment of his people did much for education, but the seeds thus planted needed long cultivation before flowering into higher institutions of learning. Some would trace the tradition of a foundation at Oxford back to Brutus in Roman times, but the rejection of such legends as of those of Alfred's

foundership of Oxford should not prevent students from recognizing how

much the great king actually accomplished, even though it were not all that the myths which have gathered around his name would assert.

A great scholar of the century, whose work has been revived to have far reaching influence in our time was John Scotus Erigena or Eriu- gena (Erin born). Wales and Scotland both claimed to be his birthplace, but it is now gen¬ erally admitted that he was born in Ireland. His knowledge is interesting as an index of the scholarship of the time. His work shows that he knew Latin well and also Greek, in which he even wrote some poetry, that he knew some Hebrew at least, though it is doubtful that he had any knowledge of other Oriental languages sometimes attributed to him. His principal work is the (De Divisione Naturae, in which in dialogue form, he treats the principal prob¬ lems of philosophy and theology. ((He declares that the creation of the world is in reality a theophania or revelation of the essence of God in the things created. Creation is a process of the unfolding of the divine nature. His system is a combination of neo-Platonic mysticism, emanationism and pantheism which Erigena strove in vain to reconcile with Aristotelean empiricism, Christian creationism and theism.® (Turner, (History of Philosophy*). His pan¬ theism was condemned at the Council of Paris in the 13th century after having been the sub¬ ject of a number of ecclesiastical censures be¬ fore. His works lived on, however, to influence the German mystics in the following centuries, and his ideas have a fascination for certain minds. A thousand years after his death, at the end of the 19th century, one of the most popular systems of philosophy among German university men of a certain type, that of Transcendental idealism, recurs to Erigena's mode of thought and forms of expression, and the confirmed ad¬ herents of this school recognize in Erigena a kindred spirit and speak of him in the highest terms. A thousand years is often supposed to be a sufficiently long interval for the progress of human thought to a position far advanced beyond previous modes of thinking, yet here is one of these phases of recurrence of interest which is so often to be met with.*

In connection with Erigena we hear of Gottschalk, a German monk, whom Erigena answered, but in doing so fell into errors him¬ self, and Rabanus (Hrabanus) Maurus, who after some years with Alcuin at Tours, became a teacher at Fulda and then headmaster of the school there. He made Fulda the best-known school in Europe. He wrote a pedagogical work, (De Universo, a sort of encyclopedia in 22 books. His works show how broad*

were the interests of his time. He became Abbot of Fulda and proved a magnificent practical administrator, adding to the buildings and equipment. He took a determined stand in supporting Louis the Pious against his re¬ bellious sons, and afterward supported Lothair the eldest, in the hope of having a single strong government. After the defeat of Lothair he resigned his abbacy, but later was reconciled with Louis the German and then was made archbishop of Mainz, doing much in that posi¬ tion to make that city the enduring seat of ecclesiastical authority it was for so many cen¬ turies. Rabanus is a typical example of a great scholar who was a fine force for good of many kinds in his time.

The first mention of the episcopal school at Paris later to become the brilliant university was 882. Rulers and the Church did all in their power to maintain the schools founded by Charlemagne and to extend them, but the constant necessity of being ready to fight the barbarians, north and south, and the destruc¬ tion of schools and of religious houses by them utterly precluded any idea of educational prog¬ ress and very soon brought decline. The sur¬ prise is that anything was accomplished under the disturbing conditions. Libraries were founded, however, and that of Saint Requier (831) is known to have contained a number of volumes of the Latin classics, at least one of which, (Trogus Pompeius, is lost to us.*

The Venetians come prominently into his¬ tory in this century. The people of the neigh¬ borhood of Aquilea who in the 5th century took refuge from the Huns under Attila in the lagoons of the northern Adriatic came very naturally to be a seafaring people, and as the medium of exchange between the East and Italy, achieved prosperity. How great this was in the 9th century, and how high the standard of aesthetic taste had come to be among this merchant people, is very well illustrated by the fact that the great cathedral of Saint Mark's was built in the second half of this century. Its style was that of Roman architecture, modi¬ fied by contact with the East and known com¬ monly as Byzantine. Without such, a monu¬ ment it would be almost impossible to believe that in the midst of these bitter, troubled times, when Venetian trade by sea must have been seriously disturbed by Saracenic and Norse pirates, there were men thinking in terms of fine art for a people whose own tastes were so well developed that they were thoroughly ca¬ pable of appreciating such work and helping liberally in the construction of it.

While Charlemagne at the beginning of the century was doing so much for education and the beginning of culture in the West, his great Eastern contemporary, Haroun A1 Raschid, was encouraging intellectual development in the Cal¬ iphate in such a way that he has been deservedly famous for it ever since. His successor, A1 Mamun, the seventh Abasside Caliph of Bagdad (813-933), the youngest son of Haroun, fol¬ lowed his

father's example so well that he bears the title of <(the father of letters and the Augustus of Bagdad,® while his reign is spoken of as the Augustan Age of Mohammedanism. As governor of Khorassan before the death of his father he founded the college there and attracted a number of distinguished teachers. After he had unseated his elder brother and quelled some insurrections and especially a re¬ ligious war that at one time threatened to un¬ crown him, he made his capital, Bagdad, a centre of intellectual activity. He was himself an ardent student of mathematics and astron¬ omy and the first Arabic translation of Euclid is dedicated to him. He founded observatories at Bagdad and near Damascus, caused a degree of the meridian to be measured on the plane of Shimar and had astronomical tables con¬ structed, which are said to be wonderfully ac¬ curate. He was an author of no little merit, some of whose books are well known to Mo¬ hammedan scholars. With him ended the pe¬ riod of Arabian encouragement of letters so far as the Caliphs were concerned. There

seems no doubt now that the influence ex¬ erted by himself and his father in letters and education have been exasperated by the very surprise of finding anything of this kind under the Caliphs. From this time forth Eastern Mohammedanism represents a dreary lack of interest in things intellectual, except for a pe¬ riod in Persia in the 11th century, when native genius triumphed over an unfavorable environ¬ ment and wrote a series, of works that have lived. Moorish culture in Spain came as a later growth.

James J. Walsh,

Author of (The Thirteenth, the Greatest of Centuries ,y etc.

PRINCIPAL EVENTS OF THE NINTH CENTURY

800. Charlemagne crowned Emperor of Western Europe. The golden period of the Arabian or Saracenic Empire under Haroun-al-Raschid, Caliph of Bagdad. The Arab University and library of Cordova, famed for science throughout Europe. The Turks or Tartars of the Altai Mountains advance westward.

808. Normans invade northern France.

813. Al-Mamun, youngest son of Haroun-al-Raschid, suc¬

ceeds as Caliph of Bagdad.

814. Death of Charlemagne.

827. Egbert overlord in England unites the seven Anglo- Saxon kingdoms.

832. Normans and Danes infest England.

833. Death of Al-Mamun, Caliph of Bagdad.

838. Danes invade England and burn London.

840. Employed as mercenaries by the Arabs, a bodyguard of Turks dispose of the throne and limit the Caliph to Bagdad.

843. Division of Charlemagne's Empire. Treaty of Verdun. The independent beginnings of the kingdoms of France, Germany and northern Italy.

845. Northmen threaten Paris.

849. Alfred the Great of England born.

850. Venice rises in power; the cathedral of St. Mark's built. 862. Rurik becomes first king of Russia.

868. Achmet the Turk seizes Egypt and Syria.

870. Northmen discover Iceland and later settle there.

871. Alfred becomes king of Wessex, England.

878. Alfred of England defeats the Danish invasion; forms a navy; enacts wise laws; cultivates learning and science, and founds schools at Oxford and Cambridge.

882. The episcopal school at Paris spreads education.

886. Northmen besiege Paris.

889. Saracens attack and sack Arles and Marseilles.

897. Basilius I, Macedonian legislator and economist, defeats Arabs and Bulgarians.

899. Louis IV last emperor of Charlemagne's line.

NINUS, ni'nus, eponymous king of Nin¬ eveh and founder of that city. His name is nowhere mentioned, apparently, in Assyrian monuments, and the story that he extended the Assyrian Empire to India and to Egypt is his¬

torically false. But he figures largely in Greek myth and ((history,® where Nineveh is said to have been founded by him and named for him; he married Semiramis, wife of Onnes, but his wife murdered him, and ruled as regent for her son Ninyas, who is as mythical a personage as his father. For Semiramis alone in these stories does history show any actual existence.

NIOBE, ni'o-be, in Greek mythology , the daughter of Tantalus, was the wife of Am- phion, who, in common with Zethus, governed Thebes, which they had built. According to the common accounts she had seven sons and seven daughters, and, proud of her blooming off¬ spring, so far forgot herself as to exalt her¬ self above Latona, the mother of only two children — Apollo and Artemis; and in punish¬ ment for her presumption she had to witness the destruction of her children by the arrows of the twin deities. Anguish and despair petri¬ fied the wretched mother, after long wander¬ ings, into a stone. Amphion and Zethus also fell, pierced by the arrows of Apollo, when, full

of wrath, they penetrated into the sanctuary of the god. This is the most common account of the fate of Niobe, in the circumstantial de¬ tails of which poets frequently differ, who have taken this story for a subject as often as artists. The origin of the fable seems to he in the ancient figure of speech by which it was said of young people who died suddenly that they had been struck with the arrows of Apollo or Artemis ; and in almost all languages, petrifaction is the natural image of the highest degree of torpid despair.

NIOBE OF NATIONS, The, a name ap¬ plied to Rome, the <(lone mother of dead em¬ pires.®

NIOBIUM, in chemistry, a metallic element discovered in 1801 by Hatchett and called by him columbium, but more fully investigated by Rose, who gave it its present name. Niobium is present in tantalite, euxenite, pyrochlore and in other minerals. The metal may be prepared from the fluoride of niobium by heating it in a covered crucible with sodium and dissolving out the soluble salts with water. It is insoluble in nitric acid, soluble with difficulty in hydro¬ chloric acid, but dissolves in hot hydrofluoric acid. It forms two oxides of a chlorus char¬ acter, uniting with basylous oxides to form salts.

NIOBRARA, ni-6-bra'ra, a river which has its rise in Laramie County, Wyo., and which flows east into Nebraska, crosses the northern part of the State, making regular, long north and south curves, and flows into the Missouri River at Niobrara in Knox County. It is about 450 miles long, flows rapidly in the upper part of its course, but moves slowly through the almost level prairie country of the northern part of Nebraska.

NIOBRARA STAGE, in geology, a sub¬ division of the upper Cretaceous division, form¬ ing with the Benton stage the Colorado Epoch. It has a thickness of from 400 to 1,000 feet and includes chalk, calcareous marls, shales, sand¬ stones and limestones, which in most of the area are in two formations — Timpas limestone below and Apishapa shale above. These for¬ mations are especially conspicuous in Kansas, eastern Colorado, South Dakota, Wyoming and northern New Mexico. Large numbers of fos¬ sil bones and shells occur in the group, notably huge reptiles and fish and birds with teeth. Elasmosaurus, a reptile from the Niobrara chalk beds in Kansas, was over 40 feet long, half of its length being a slender neck. The Tylo- saurus, a great marine lizard, is also found.

NIORT, nyor, France, the capital of the department of Deux-Sevres, 42 miles east of La Rochelle, 40 miles southwest of Poitiers and 254 miles southwest of Paris by rail. Niort lies on the left bank of the Sevre Niortoise, partly in the valley and partly on the surround¬ ing hills. Until the 7th century the Niort plain formed part of the Gulf of Poitou and the mouth of the Sevre was at the foot of the hills where the town subsequently developed around the castle erected in 1155 by Henry Plantagenet. It was captured by Louis VIII in 1224. By the Peace of Bretigny (1360) it was ceded to the English ; but the inhabitants revolted against the English and the Black Prince took the town by assault and massacred many of the

inhabitants. In 1373 the French, under Du Leschn, regained possession of their city. Niort became a centre of Protestantism and Gas- pard de Coligny, haying made himself mas- te! of the town, resisted the Catholic forces after the battle of Jarnac (1569) but surren¬ dered after the battle of Moncontour (1569). Henri IV took Niort and the town suffered se¬ verely by the Revocation of the Edict of Nantes (1685). The town consequently is full of his¬ torical associations, not the least of which is that it was the birthplace of Madame de Main- tenon. Of the ancient castle there remains only the donjon — two large square towers joined by a central building flanked by turrets — said to have been built by Henry II or Richard Cceur de Lion. From the turrets a superb view is obtained of the valley of the Sevre and the beautiful public garden (which ranks as one of the finest in France). The church of Notre Dame, dating from the 15th and 16th centuries, is a splendid example of late Gothic and Renais¬ sance architecture. Its spire rises to a height of 246 feet and is beautifully adorned with stat¬ ues of the evangelists. Saint Andre, noted for a fine window in the apse, and Saint Hilaire, noted for its fine frescoes, were built in the 19th cen¬ tury. 1l he town hall, named Alienor Palace, after

Eleanor of Guienne, is Renaissance in style. It houses a fine collection of antiquities. In the vicinity of Niort are the ruins of the feudal fortress of Coudray-Salbart. Niort

is the seat of a prefect and a court of assizes. It has a board of trade-arbitration, lycees for girls and boys, a chamber of commerce and a school for drawing. It also has a branch of the Bank of France. The public garden and the nurseries are celebrated. The town has a large trade in gloves, dressed chamois, oil, brushes and leather. Pop. 23,775.

NIOX, ny-oks', Gustave Leon, French

soldier: b. Provins, Seine-et-Marne, in 1840.

He was the son of an army officer, was edu¬ cated at the Prytanee Militaire de la Fleche and served in the Mexican campaign of 1862-65. In 1870-71 he was in high command during the siege of Paris. After this period he taught in the Ecole Superieure de Guerre and became commandant of the Invalides and director of the army museum. His (Simple secit de la guerre de 1870-7P (1897) was crowned by the Academy. He also published (Recit historique de l'expedition du Mexique) (1874) and edited Collection d'ouvrages de geographic militaire) (6 vols., 1876) and (Atlas de geographic gener¬ al (1887).

NIPA, an East Indian palm (Nipa fruti- cans) of the order Palma and the only species of its genus and frequent at the mouths of riv¬ ers from the Philippines to Ceylon and Austra¬ lia. It is a low-growing tree with creeping, smooth stems and large clusters of fruit. Its abundant sap is used for sugar and wine mak¬ ing and its feathery leaves for thatching or roofing. These leaves are often 20 feet long and form the principal material for house¬ building in the farms and villages of the Philip¬ pines and East Indies generally. It abounds in the salt marshes and, like the mangrove (q.v.) with which it is commonly associated, it is an important land-builder.

NIPAL, ne-pal'. See Nepal.

NIPHER, Francis Eugene, physicist: b. Port Byron, N. Y., 10 Dec. 1847. He was grad¬ uated from the Iowa State University in 1870 and became instructor there. In 1874 he went to Washington University as professor of phys¬ ics. In 1877 he organized the Missouri Weather Service which he conducted at private expense for 10 years. During the summer months from 1878 to 1882 he made a magnetic survey of Mis¬ souri. _ The results of an active life of study, experiment and achievement in various scien¬ tific lines are embodied in his works: (Theory of Magnetic Measurements) (1886) ;

Electric¬ ity and Magnetism, } a mathematical treatise (1895); ˆIntroduction to Graphical Algebra) (1898); Experimental Studies in Electricity and Magnetism > (1914). He has contributed many scientific papers to the Transactions of the Academy of Science of Saint Louis, of which he is a member. He is a fellow of the A. A. A. S., member of the American Physical Society, the Physical Society of France and of the Royal Society of Arts, London.

NIPHON, nif-on\ See Nippon, or Nihon.

NIPIGON, a lake in Canada. See Nepigon.

NIPIS.SING, nip'I-sing, or LAKE NEP- ISSING, in Ontario, Canada, lies at an altitude of 644 feet above sea-level, northeast of Georgian Bay, Lake Huron, with which it communicates by French River. It is irregular in coast-line, is 48 miles long, has a maximum breadth of about 30 miles and an area of 330 square miles. Its chief feeder is Sturgeon River, draining from the north a group of smaller lakes. The lake contains numerous islands, one of which is an Indian reservation. The Canadian Pacific, Grand Trunk, Canadian Northern and Timis- kaming and Northern Ontario railways touch its shores. Steamers ply on the lake and the region has become a favorite sporting and hunt¬ ing ground. The watershed separating it from the Mattawa River and the Ottawa Valley marks the summit level of the proposed Geor¬ gian Bay Canal. The route from Montreal via the Ottawa River and Nipissing to Georgian Bay was that taken by the old voyageurs.

NIPISSING INDIANS, an American tribe of the Algonquin family residing, when discov¬ ered by the French in 1613, on the shores of Lake Nipissing, in northern Ontario, Canada. In the 17th century they were one of the most important tribes of British America and were regarded by the Jesuit missionaries as the typi¬ cal Algonquins. After their dispersion by the Iroquois they fled to Nipigon and some settled at Three Rivers. They were semi-nomadic and comparatively unwarlike, and staunch friends of the French. Their chiefs were elective. The Indians on the reserve at Lake Nipissing are classed as Chippy was.

NIPMUC INDIANS, or ((fresh water people,® an American tribe residing chiefly in colonial days in central Massachusetts. The ma¬ jority of the Nipmucs did not at first join with Philip in his war against the colonists, but were active against the English during the struggle in Connecticut in 1675. In January 1676 the remnant of Philip's tribe, with the Narragan- setts, the Quaboag and River Indians, effected a junction with the Nipmucs. On the over¬ throw of Philip some of the Nipmucs fled to

Canada and others dispersed westward on the Hudson River.

NIPPER, Susan, in Dickens' (Dombey and Son, > a young maid, nurse to Florence Dombey. She marries Toots. The sharpness of tongue whereby she justifies her name is offset by fidelity to her charge.

NIPPERDEY, mp'per-di, Karl Ludwig,

German philologist ; b. Scliermin, Germany, 13 Sept. 1821 ; d. Jena, Germany, 2 Jan, 1875. He was educated at the universities of Berlin and Leipzig and in 1852 accepted a professorship at Jena. He made translations of Caesar, Nepos, Tacitus, etc., with critical notes, which have been widely used. See Scholl's biography (1875), and his collection of his works, (C. Nipperdeii Opuscula) (1877).

NIPPON, or NIHON, the Japansese pro¬ nunciation of the name Jih-pen, which is the Chinese pronunciation of the characters mean¬ ing ˆsun-origin,® that is to say <(the place the sun comes from.® This name was given to Jih-pen (or Japan) by the Chinese on account of the position of the islands to the east of China. Marco Polo's Zipangu and the poetic Cipango are from the same Chinese compound with the addition of the word go (or kico), which means country. The name Nihon (Japan) seems to have been first officially used by the Japanese government in a.d. 670. Before that time the usual designation of the country was Yamato, properly the name of one of the central provinces. Another designation is O-mi-kuni, <(the Great August Country.® Yamato and O-mi-kuni are the names the Japanese prefer in poetry and belles-lettres. Japan has other ancient names, some of which are curiously long, for example : Toyo-ashi-wara-no-chi-aki- no-naga-i-ho-aki-no-mizu-ho-no-kuni, which means ((the Luxuriant-Reed-Plains-the Land- of Fresh-Rice-Ears-of-a-Thousand-Autumns- of-Long-Five-Hundred- Autumns.® Consult Asiatic Transactions (< Ko j iki 5) , Vol. X, Sup¬ plement.

NIPPUR, nip-poor', Mesopotamia,. an an¬ cient city of Babylonia, between the Tigris and Euphrates, 120 miles southeast of Bagdad, its site now marked by the numerous mounds and excavated ruins at Nuffar. It was built on both sides of the Shatt-el-Nil Canal, one of the early sources of the Euphrates. Nippur was a great and flourishing city 4000 b.c., and the tablets of its great library discovered since 1888 antedate Abraham's departure from Ur of the Chaldees for the Promised Land. Nippur is identified with the Calneh of Genesis x, 10, and was the most northerly

and easterly of the four con¬ spicuous centres of Babylonian civilization and religion, literature and science. It was the seat of the worship of En-Lil, the father of the gods and Lord of the Storm, the cause of all the weather troubles of mankind and the original conception of a god of anger and a religion of fear. Marduk, the supreme god of Babylon, superseded him about 2300 b.c., and there were 24 subordinate deities.

Nippur was overthrown and its buildings ruined by the Elamite hordes under Kudur- Nankhundi, 2285 b.c., who destroyed nearly every city of Babylonia. Favored by the per¬ mission and protection of the sultan and his administration, the University of Pennsylvania

has since 1888 excavated and laid bare many of its important ruins. The western half repre¬ sents the remains of the city proper, the eastern half the great temple sites. The work was supervised first by Dr. John Punnett Peters and latterly by Dr. J. H. Haynes and Prof. H. V. Hilprecht. Considerable attention was paid to the excavation of the great temple of En-Lil, the foundation of which was laid between 6000 and 7000 years before Christ. Nine strata can be distinguished in the temple courts, dating from 3800 to 350 b.c. An ancient government palace of immense proportions, where the kings lived, belonging to the fifth millennium before Christ, and one of the ancient gates and walls of the city, were uncovered. A government palace erected about 3000 b.c. was completely and systematically excavated, besides numerous other buildings of less importance. Most valu¬ able inscriptions in stone belonging to the earliest rulers of Babylonia, by the help of which the early history of mankind in the valley between the Tigris and Euphrates, will be recon¬ structed, were discovered. Antiquities in coins, jewelry in gold, silver and bronze in great quantities ; vases in enameled and plain pottery of all periods; seals and seal cylinders, such as the Babylonians used in connection with their business transactions; images of gods, play¬ things in terra-cotta, bas-reliefs, weights, uten¬ sils in bronze, iron and silver, etc., were also found. These were a few of the important relics recovered, without mentioning the numer¬ ous facts ascertained and the many questions solved through study in the trenches, which have important bearing upon the religious ideas and customs of the daily life of the Babylo¬ nians. But chief of the important discoveries made during 1889-1900 were those in connection with the famous library of the sanctuary, which was found beneath 25 feet of accumulated debris, representing several millenniums of his¬ tory. In the uppermost stratum of this mound the excavators found coffins which had been buried in the early centuries of our Christian era. A great many antiquities were also gathered which belonged to the Jews who continued to live at Nippur after the return of Ezra and Nehemiah. Prominent among them were terra¬ cotta bowls containing incantations and charms inscribed in Hebrew and Mandaean. At a depth of 25 feet were found a series of

rooms, a num¬ ber of which contained ledges or shelves built out from the wall, for the purpose of laying out the tablets in rows. The library seems to have been divided into two parts. There was a busi¬ ness section for keeping accounts, and the educa¬ tional quarters, with a vast library of a literary character.

Nearly 20,000 tablets were recovered, illus¬ trating practically every branch of literature known to the Babylonians. Among the inscrip¬ tions are hundreds of historical texts, dictiona¬ ries or lists of Sumerian words with Semitic equivalents ; lists of birds, animals, plants and stones ; lists of words for chairs, stools and other articles of furniture; hymns, astronomical and mythological inscriptions, tablets which refer to the service and functionaries of the temole — how many garments the god En-Lil wore, how many temples and shrines there were at Nippur besides those dedicated to En-Lil, and what the revenues of the temples were; tablets containing

grammatical sentences written by students, arithmetical calculations, etc.

In appreciation of Professor Hilprecht's val¬ uable services, the sultan presented him with, among other important antiquities, the largest part of the find of the library, which is now de¬ posited in the University of Pennsylvania.

Only a small portion of the mounds at Nip¬ pur has thus far been completely excavated. Considerable work yet remains to be done on the temple. Only one side of the ancient gov¬ ernment palace has been cleared, and about one-twentieth part of the library, but arrange¬ ments have been effected for a continuance of the work of excavation until completed. (See Assyria; Babylonia). Consult Fisher, C. S., (Excavations at Nippur> (New York 1905-06); Geere, (By Nile and Euphrates) (ib. 1904) ; Hilprecht, (01d Babylonian Inscriptions, Chiefly from Nippur' (ib. 1893-96), and (Explorations in Bible Lands During the Nineteenth Century' (ib. 1903) ; Peters, (Nippur, or Explorations and Adventures on the Euphrates' (ib. 1897) ; Zehnpfund,

NIRGUA, ner'gwa, Venezuela, city in the state of Yaracuy, 110 miles southwest of Cara¬ cas. Nirgua was founded in 1554 and in 1565 rich

gold mines were discovered in the neigh¬ borhood. Copper, coal and other minerals exist here and sulphur is also abundant. Hence the region is peculiarly rich. The neighboring coun¬ try also produces coffee, cacao, sugar, tobacco and cotton as well as livestock. Pop. about

10,000.

NIRUKTA, nT-rook'ta. See Veda.

NIRVANA, mr-va'na, a term which orig¬ inally denotes the blowing out or extinction of a flame, and is used in the metaphorical lan¬ guage of Buddhistic philosophy to mean that condition which succeeds to the long process of metempsychosis to which imperfect souls are subjected before they reach the end of Karma, the active life of earthly effort and struggle after perfection. Nirvana, according to Rhys Davids, was originally intended by Buddha to indicate extinction of existence, annihilation, as an escape from the perturbations of passion and the miseries of life. The utterly negative char¬ acter of this conception seems later on to have undergone a change. Buddha has said, ((It is enough to know that Nirvana is an advance be¬ yond life; it is a condition of fearless security and happiness." But there is no definite impli¬ cation that this happiness is conscious, or that a sense of personal identity accompanies it. An¬ nihilation may be quite consistent with <(Free- dom from the pang of earthly existence," and even prove <(a region or condition of peace." This peace in Nirvana results from the fact that no transmigration into baser forms of wretched ghost, beast or demon is possible for the en¬ franchised spirit. The ˆextinction" in this case will only mean the extinction of the baser ele¬ ments in the individual. The great and pure elements are developed in inverse ration ; there follows a calm and sinless state of mind, such as even Lucretius sometimes caught sight of when he speaks of ((vita dis digna" as the ob¬ ject of the philosopher. <(The life worthy of Gods" — holiness, purity, freedom, wisdom — this is nirvana in the true Buddhist sense;

though when and where it is to be realized is left one of the misty problems of oriental mysti¬ cism. Consult Dahlmann, (Nirvana' (Berlin 1897) ; Rhys Davids, (Origin and Growth of Religion as Illustrated by Indian Buddhism' (London 1881), and (Buddhism' (ib. 1896); Max Muller, (The Meaning of Buddhism' (ib. 1857) ; Oldenberg, (Buddha, sein Leben, seine Lehre, und seine Gemeinde' (Eng. trans., 1882) ; Poussin, (Boudhisme' (1909). See Buddha; Brahman; Hinduism; Jains.

NISAMI, ni-sa-me. See Nizami.

NISAN, nl'san, in the Jewish calendar, the first month of the sacred year and seventh of the civil year, answering nearly to our March. See Calendar.

NISARD, Jean Marie Napoleon Desire,

zhon ma-re na-po-la-on da-ze-ra ne-zar, French author: b. Chatillon-sur-Seine, 20 March 1806; d. San Remo, Italy, 27 March 1888. He became professor of eloquence at the College de France, Paris, in 1843; in 1852 inspector-general of education; in 1857 director of the Lcole Normale Superieure, and in 1867 a senator. In 1850 he was elected to the Academy. He be¬ longed to the doctrinaire school of criticism, which he tried to exalt into an exact science. His reputation as a historian of literature was established by his (Les poetes latins de la decadence' (1834). Others of his works are: An excellent (Histoire de la litterature fran- Qaise' (1844-61) ; (Melanges d'histoire et de litterature' (1859) ; the distinguished study, (Les quatre grands historiens latins' (1875), and

NISBET, niz'bet, Hume, Scottish artist and novelist: b. Stirling, Scotland, 8 Aug. 1849. Leaving Scotland at 16, he spent six years in Australian travel and on his return was for eight years prior to 1885 art master in Watt College, Edinburgh. He has since twice re¬ visited Australia and has published 46 romances, including (Bail Up'; several volumes of verse, and various works on art, such as (Where Art Begins,' and also of travel, such as

NISBET, John, Scottish forester: b. Edin¬ burgh, 2 Oct. 1853; d. 1 Dec. 1914. He was educated at Edinburgh University and also studied m Munich. Entering the Indian forest service in 1875, he became conservator of for¬ ests, . Burma, in 1895, retiring in 1900 and re¬ ceiving the Kaiser-i-Hind gold medal for his services. _ In 1912 he was appointed adviser to the Scottish Board of Agriculture. He has pub¬ lished (British Forest Trees' (1893); (Studies in Forestry' (1894);

NISBET, Robert Buchan, Scottish painter: b. Edinburgh, 1 July 1857. He was educated at the Edinburgh Institution and chose as his profession that of landscape painter in water colors. His success was attested by the awards made to him at three international exhibitions — Dresden (diploma) 1892; Antwerp (medal) 1894 ˆVienna (medal) 1898. He was elected an associate of the Royal Scottish Academy in 1893 and a full member in 1902. Among his

most notable works are (Evening Stillness } (purchased by the Chantrey Bequest) 1890; ˆThundery Weather) ; (Harrowing) ; (Waiting for the Tide) (1898) ; (Between Showers >

(1898) ; (November Evening (1899) ; (A Fish¬ ing Village* (1900). Many of his works are in public collections.*

*NISH, nesh, or NISSA, nes'sa, Serbia, a fortified city on the Nishava, a tributary of the Morava, 130 miles southeast of Belgrade. It has Turkish and Serbian sections, but holds a position of strategic importance on the Vienna- Constantinople and Salonika Railroad routes. It was the seat of the National Assembly until 1901, and is the see of a Greek bishop. It has hot springs and baths, celebrated since the Roman era, when Nish is mentioned as Naissus by Ptolemy. Constantine the Great was born at Nish. Situated at the junction of many of the main highways of the Balkan Peninsula, it has had a turbulent history, in 1456 being captured by the Turks ; in 1878 it was taken by the Ser¬ bians under king Milan. The unsuccessful at¬ tack in 1809 is still perpetuated by the ((Tyele- Koula** (Tower of Skulls), erected by the Turks half a mile east of Nish, and consisting of the heads of Serbians killed during the battle. Pop. 24,949, including 2,000 Moslems. It be¬ came the temporary location of the Serbian government after the outbreak of the Great War in July 1914, and on 6 Nov. 1915, during the successful campaign of the Central Powers against Serbia, fell to their forces after three days of heavy fightingˆ*

NISHAN EL-AAMAN, m-shan' el a-man' (Ar. Nishan al-aman, order of the best), Tuni¬ sian order of honor founded by Mohammed-es- Sadok in 1859. It commemorates the adoption of the constitution and has but one degree.

NISHAN EL-IFTIKHAR, el-if-ti-kar', a Tunisian order of merit.

NISHAN EL-IFTIKHAR, Turkish order founded by Sultan Selim III and revived in 1827. It is conferred upon foreigners who have rendered services to the Turkish state. There are no classes of honor, but the value of the medal differs with the degree of the re¬ cipient.

NISHAN I-IMTIAS, em-te-as', Turkish order of merit founded in 1879 by Sultan Abdul Hamid. It is conferred upon Turkish officials who have displayed at least three of the attri¬ butes: patriotism, fidelity, bravery and zeal, these names being engraved on the medal.

NISHAN I-SHEFKIAT, e-shef-kat' (Ar.- Pers. Nishan-i-shifqat, order of clemency), Turkish order of three degrees established by Sultan Abdul Hamid in 1878. The medal is con¬ ferred upon women who have rendered

aid to their country in times of war or peril.

NISHAPUR, msh-a-poor', Persia, the capi¬ tal of a province of Khorasan, situated in the northeast of the country in a fertile plain at an altitude of 3,900 feet, 50 miles west of Meshed. Anciently it was of great commercial and polit¬ ical importance. An active domestic trade is still carried on, and the city has long been cele¬ brated for the quality of the turquoises found in the district. Omar Khayyam was born here in 1123, and his unpretentious tomb is shown in a mosque among the ruins of the old town. Pop. about 15,000.

NLSHGAR. See Nass Indians.

NISI PRIUS, (1) in law , authority for the judges to proceed on their circuits and try causes by jury. (2) Formerly, a writ ordering the sheriff to have the jurors in a civil case at Westminster on a day named unless the judge should previously go to the proper county in which to try the cause. (3) A general term for the trial of civil causes before a jury. It is applied to-day in England to actions before the King's Bench Division of the High Court of justice in London, and also popularly in the country districts to designate proceedings in certain civil courts in the circuits under the Judicature Acts. The term is used in the United States also, mostly to designate civil courts whose judges travel in circuits and which try cases with the aid of a jury.

NISIBIS, ms'i-bis, Asia Minor, anciently an important town, the capital of Mygdonia, Mesopotomia, now the town of Nisibin, in the district of Diarbekir. The cuneiform inscrip¬ tions found here refer to it as Nasibina. It held a commanding situation on the road be¬ tween the Tigris and the Mediterranean, and was frequently taken and retaken in the wars between the Romans and the Parthians and afterward between the Romans and Persians, until it was given up to the latter by the Em¬ peror Jovian in 363. The Persians were de¬ feated here by Belisarius in 451 and by Marcian in 573. Pop. 4,000.

NISQUALLI (mz'kwa-le) INDIANS, an

American tribe of the Salishan family formerly residing on Puget Sound, Washington. They joined the Puyallup and other tribes in signing the Medicine Creek Treaty of 1854. In 1858, the Nisquallis took part in the general Indian war in the Northwest. There are to-day rather over 100 survivors.

NISROCH, ms'rok, in Assyrian mythology, a god, in whose temple, and in the very act of idolatry, Sennacherib was slain by his own sons (2 Kings

xix, 37). The name signifies <(the great eagle® ; and the earlier Assyrian sculp¬ tures exhumed at Nineveh have many repre¬ sentations of an idol in human form, with the head of an eagle. Among the ancient Arabs, also, the eagle occurs as an idol. Historians long accepted Joseph Halevy's conjecture that the word is a corruption of Nusku; while it has also been held to be identical writh Marduk of the latter Babylonian pantheon, and by others again as a corruption of Asur.

NISSA, nes'sa, Servia. See Nish.

NISSEN, Heinrich, hin'rih ms'sen, German archaeologist : b. Hadersleben, Germany, 3 April 1839; d. March 1912. He was educated in Kiel and Berlin, and in 1869-76 was professor of ancient history in Marburg and subsequently held professorships in Gottingen, Strasburg and Bonn. He wrote

NISUS, ni'sus, Greek mythological king of Megara. His life depended upon a lock of gold or purple hair and of this his daughter Scylla deprived him when Minos, of whom she was enamored, laid siege to Megara. This act of

treachery enabled Minos to take the city, but shocked by the conduct of Scylla, he had her tied to the stern of his ship and by some ac¬ counts she was drowned in the Saronic Gulf. Another legend makes her swim after Minos' ship and she is then pounced upon by her father in the form of a sea-eagle, whereupon she changes into the sea-bird Ciris, and is ever after pursued by him. Consult Frazer, (The Golden Bough> (1900).

NITHARD, ne-tar', Frankish historian: b. about 795 a.d. ; near Angouleme, 15 May 843. He was a grandson of Charlemage. He was in the service of Louis the Pious, and later of Charles the Bald, whose cause he espoused during the dissensions between the sons of Louis. He fought in the battle of Fontenay, and was killed in a battle against the Northmen. At the command of Charles the Bald, he wrote a history of the times (De dissensionibus filiorum Ludovici pii ad annum usque 843, J which, though naturally partisan, is a valuable source for the study of early mediaeval history. It is contained in the (Monumenta Germaniae His- toriaeP published by Pertz (1870) ; and was also published by Holder (1882), and in German by Jasmund (1889).

NITHSDALE, mths'dal, William Max¬ well, 5th Earl of, Scottish Jacobite: b. Scot¬ land, 1676; d. Rome, Italy, 20 March 1744. He joined the Jacobites in 1715 and served under Forster and Derwentwater at Preston

where he was captured. He was imprisoned in the Tower and sentenced to death, but assisted by his wife he made his escape in woman's clothing the night preceding the day set for his execution, and after remaining in hiding for two days, escaped to France, disguised as a footman in the livery of the Venetian ambassador. He was the ((Willie® of (Kenmure's up and awa' ; and the story of his escape written by his countess will be found in transactions of the Societies of Antiquaries of Scotland (Vol. I).

NITOCRIS, nl-to'kris, Egyptian queen, the last of the Sixth Dynasty. She succeeded her brother Menthuophis, whose assassination she avenged by drowning all who had any com¬ plicity in it. She was buried in the third in size of the greater pyramids, which she had enlarged. She was supposed by the Greek historians to be Rhodopis, ((rosy-cheeked,® a Greek courtesan, with whom the king fell in love from the sight of her lost slipper — the original of the Cin¬ derella legend.

NITON, a chemical element generated by the element radium. It was discovered in 1900 by Dorn and called radium emanation.. Gray and Ramsay gave it the name niton, from the Latin nitere to shine, in 1911. The molecular weight was determined by Perkins in 1908; by Debierne in 1910; and by Gray and Ramsay in 1911. All agreed that this weight is 222.4. Sir William Ramsay proved in 1912 that the cura¬ tive value of the famous spring at Bath, Eng¬ land, is due to the niton contained in its waters. Niton liquifiesˆ at low temperatures and may, therefore, be isolated from its mixtures with helium. Pure liquid niton boils at 62? C. and 79.6° F.

ffThe proof that each atom of radium yields an atom of the gas helium,® writes Dr. Leonard Keene Hirschberg of the Johns Hop¬

kins University, «was settled for all time by Sir William Crookes and Professor Rutherford. They covered a screen with crystals of sulphate of zinc. As the miniature explosions take place during the escape of helium from radium, the helium is shot out with much force. As the atoms strike the screen, flashes of light appear. Those, of course, are the alpha rays, so called. After these particles of helium have broken away, the atom of radium is really radium no longer, but a gas which is now known as the new element niton. The rate of change of radium into niton progresses in a slow, geomet¬ rical disintegration. After a period of 1,760 years, one ounce of radium will have changed into half an ounce of niton and helium while one-half an ounce of unchanged radium will re¬ main. Allowing another 1,760 years to elapse and one-half of the half ounce or a quarter of an ounce of radium will be changed to niton and helium. The next 1,760 years would make an eighth of an ounce change and an eighth of an ounce remain unchanged. Thus this curious half period of decay wjll go on

indefinitely. Niton, like helium and argon, is practically in¬ ert. It forms no chemical salts or other com¬ pound, and its existence is temporary, lasting a little less than four days. To be exact, after 3.86 days it in turn disappears and changes into something new.

(

((Liquid niton also causes a faint violet in¬ candescence. In the dark it is most beautiful. The liquid itself, however, in a lighted room, appears quite clear. Ramsay and his assistant, Whytlaw. Gray, found that the atomic weight of niton is equal to that of an atom of radium minus an atom of helium. Since radium is 228 and helium 4, niton has the atomic weight of 224. Like radium, niton decays in that curious geometrical ratio, called (half-period of de¬ cay.) ‘ Thus, niton changes one-half in four days, in eight days a quarter of it is left, in twelve days an eighth, sixteen days, a sixteenth, twenty days a thirty-second, twenty-four days a sixty-fourth, so that practically at the end of one month it has all changed.® Consult Ramsay, Sir William ; Radium ; Radio Activity.

NITRATE OF SILVER, a compound of sdver and nitric acid, having the formula AgNO.-?. It may be prepared by” dissolving pure silver in warm nitric acid that has been diluted with two or three times its own weight of water. The solution is evaporated to dryness and the residue gently heated until all the nitric acid has been expelled, after which it is dis¬ solved in water and crystallized ; the silver ni¬ trate being then obtained in the form of color¬ less rhombic tabular crystals. The commercial product is usually the result of the separating of silver from gold bullion, and in this case it often contains copper. This is removed by boiling with freshly precipitated silver oxide which throws down the copper in the form of

oxide. Nitrate of silver is readily soluble in water and in a somewhat less degree in alcohol. It melts at 424° F., and when cast into sticks it constitutes lunar caustic, being used in this form as a cauterizing agent. Its cauterizing ef¬ fect depends upon the fact that it forms, with the albumen of the flesh, an insoluble albumi¬ nate of silver. It is sometimes combined with two parts of potassium nitrate to form what is known as (for marking linen, and as a basis for dyes to color the hair black. It was much used in photography in the days of the old (

Medical Uses. — Nitrate of silver is officinal in two forms, the heavy crystalline salt, readily soluble in its own weight of water, and the lunar

caustic above mentioned. Applied to the skin, it produces a brownish-black stain due to the formation of chloride of silver, through com¬ bination with the sodium chloride of the per¬ spiration. The crystals only are used internally either in pills or solutions. Nitrate of silver as ordinarily applied to an inflamed mucous mem¬ brane is more of an astringent than of an irri¬ tant. Applied locally as a caustic, its action is superficial, coagulating the albumen and so form¬ ing a protective coating. Internally it is used (combined with an anodyne) in gastric ulcer, gastritis, intestinal ulcerations and dysentery. Salt and soap checks its action. Externally in stick form, it has been used to prevent the pit¬ ting of smallpox. In solution it is employed to quiet the pain and relieve swelling in cases of felon, orchitis and epididymitis ; in inflamma¬ tion of the mouth, pharynx and larynx ; in whooping cough, pruritus ani, bedsores, boils, granular lids, conjunctivitis, etc. Nitrate of silver should not be used internally for too long a time, as it is not readily eliminated from the body. Argyria or chronic poisoning is lia¬ ble to result from such use of the remedy. See Silver-Poisoning.

NITRATE OF SODA, SODIUM NI¬ TRATE, or CHILE SALTPETER, a com¬ pound of sodium and nitric acid, having the formula NaN03. It may be prepared by neu¬ tralizing nitric acid with sodium hydrate or so¬ dium carbonate and evaporating the solution; but it occurs native and in large quantities, in the northern part of Chile and in the neighbor¬ ing parts of Peru and Bolivia. Deposits of it are also known in Humboldt County, Nev., and in San Bernardino County, Cal. The Chilean deposits occur at a height of 3,300 feet above the sea, but they are undoubtedly of marine origin, since they contain the remains of re¬ cent shells. Nitrate of soda, as it occurs in nature, may be purified by repeated crystalliza¬ tion from its aqueous solution. It crystallizes

in rhombohedral forms and is isomorphous with calcite; but in nature it is usually found massive, or in beds, or as an incrustation. The crude substance is valuable as a fertilizer (see Manures and Manuring), and it is also used extensively as a source of nitric acid and of nitre (qq.v.), and for the production of the cheaper grades of gunpowder.

NITRATES, salts of nitric acid. See Nitrate of Silver; Nitrate of Soda; Nitre; Nitric Acid.

NITRE, nl'ter, NITER, NITRATE OF POTASH, POTASSIUM NITRATE, or SALTPETER, a compound of nitric acid and potassium, having the formula KN03. It oc¬ curs native in many places as an incrustation upon the soil, notably in Spain, Egypt, Persia and India. It is formed, either naturally or artificially, by the action of a nitrifying bacillus on decaying nitrogenous matter in contaat with potassium compounds (see' Nitrification). It also

occurs in considerable quantities in the caverns of Kentucky and Tennessee, and else¬ where along the Mississippi Valley. It is ob¬ tained on a commercial scale from these vari¬ ous sources, but it is also prepared in vast amounts from native nitrate of soda (q.v.). When hot concentrated solutions of nitrate of soda and potassium chloride are mixed, nitrate of potash and chloride of sodium (common salt) are formed, the latter separating out in the form of crystals when the solution cools, W'hile the nitrate of potash remains in solution. Nitre has mild antiseptic properties and it is also used in dyeing, in metallurgy, in medicine (as a diuretic and diaphoretic), and in the preparation of fluxes. It is used in the arts most commonly, however, in the manufacture of gunpowder (q.v.). For <(sweet spirits of nitre® see Nitrous Ether.

NITRIC ACID (Latin, ((from nitre®), in chemistry, a compound of nitrogen, .oxygen and hydrogen, having the formula HNOs, and pos¬ sessing strongly acid properties. It appears to have been discovered in the 9th century, by Geber, the ((father of chemistry,® who describes a method of preparing it by distilling a mixture of nitre, alum and copperas (sulphate of iron). The modern method of preparing it by the action of free sulphuric acid upon nitre was apparently first described by Glauber, about the middle of the 17th century. Lavoisier proved that the acid contains oxygen, and Cavendish, in 1785, succeeded in preparing nitre by passing electric sparks through a mixture of oxygen and nitrogen, in the presence of a solution of caustic potash. Free nitric acid occurs in rain-water in exceedingly small amounts, and its salts are formed, in the soil, by the bacterial oxidation of nitrogenous organic matter. (See Nitrifica¬ tion). Commercially, nitric acid is manufac¬ tured by distilling sodium nitrate (((Chile saltpetre®) with strong sulphuric acid. The sul¬ phuric acid (H2SO4) unites with the sodium nitrate. (NaNOs) to form nitric acid (HNOs) and acid sulphate of sodium (HNaSOO. as in¬ dicated by the equation: NaN03 + H2SO4 = HN03+HNaS04. When the temperature is sufficiently raised, the acid sulphate of sodium combines with another molecule of the sodium nitrate to form normal sodium sulphate (Na3SO.i), another molecule of nitric acid being*

liberated at the same time, as indicated by the equation :

HNaSCh + NaN03 = Na2SO + HN03.*

The temperature is not always carried to the point where this last reaction occurs, however, because although the yield is larger, the product is more

largely contaminated with objectionable impurities, and the residual <(cylinder cake,® or (

The method of manufacture described above is the usual one, but other methods are also used, and the Valentiner process, in which the distillation is conducted in a vacuum, is strongly favored by many modern manufacturers. (Con¬ sult Rogers, industrial Chemistry). Nitric acid and its compounds are also made by the oxidation of the nitrogen of the air (see Nitro¬ gen), either by the direct action of the electric arc, or by catalytic combination at high tem¬ perature and pressure. The cost of manufac¬ ture by the electric arc method has been practically prohibitive in the past, except in Norway, Sweden and Switzerland, where the needful electric current can be generated very cheaply, by water power. The catalytic method is growing in favor, and during the war im¬ mense plants were constructed in the United States, at Muscle Shoals and elsewhere, to pro¬ vide, by this and other synthetic methods, the nitric acid that was needed in the manufacture of explosives. Germany could not have con¬ ducted the war except for the fact that she was able to manufacture synthetic nitric acid in large quantities by the Haber process and modifications thereof.*

Nitric acid, perfectly free from water, has not yet been prepared, although snecimens have been obtained containing from 99.5 to 99.8 per cent of HNOs. When free from all impurities except water, nitric acid is a colorless liquid, which gradually decomposes in a strong light, with evolution of oxygen, water and nitrogen peroxide (N204) becoming yellow from the pres¬ ence of the peroxide. The most highly concen¬

trated acid freezes at about 50° F. below zero, and boils at about 187° F., although it begins, below the boiling temperature, to decompose into nitrogen peroxide, water and free oxygen. Concentrated nitric acid may have a specific gravity as high as 1.552. Nitric acid was for¬ merly known as ((spirit of nitre,® and (when diluted) also as ((aqua fortis® (that is, ((strong water®). It is an active oxidizing agent, espe¬ cially when warmed, owing to the facility with which it parts with oxygen. When mixed with hydrochloric acid, it is known as (

Nitric acid is used in large quantities in chemical industries of all kinds. It is of the greatest importance in the manufacture of the coal-tar colors, and of many of the modern high-power explosives. (See for example, Nitroglycerin and Guncotton). In using strong nitric acid, either alone or mixed with sulphuric acid, great quantities of nitrous fumes are often liberated, and it is extremely import¬ ant to protect the workmen from them. When nitrous fumes are inhaled (even though largely diluted with air) they cause strangulation and loss of consciousness — often followed,

after seeming recovery, by fatal edema of the lung tissues, or at a later time by pneumonia. It is, therefore, customary to use the nitric acid, so far as possible, in closed tanks, and to transfer it 'from tank to tank through pipe lines, by means of gravity or air-pressure.

With the metallic bases, nitric acid forms a series of exceedingly important salts known as ˆnitrates.® Practically all of the nitrates are crystalline and readily soluble, and they are characterized by marked decrepitation when heated upon charcoal before the blowpipe. Several of the nitrates are used in dyeing, not¬ ably . those of aluminum, iron and lead. Aluminum nitrate, A1 (N03)3, may be prepared by. dissolving aluminum hydrate in dilute nitric acid, and crystallizing by evaporation. It crystallizes in rhombic prisms which contain nine molecules of water, are readily soluble, and melt at 99° F. Ferrous nitrate, Fe(N03)2 + 6H2O, is prepared by dissolving ferrous sul¬ phide in dilute nitric acid, and slowly evapo¬ rating the solution at as low a temperature as possible. Ferric nitrate, Fe(N03)3 + 9H20, crystallizes, in rhombic prisms, and may be pre¬ pared by dissolving metallic iron in nitric acid, adding more aci.d, and finally cooling the solu¬ tion. It is readily soluble in water, but nearly insoluble in cold dilute nitric acid. Normal lead nitrate, Pb(N03)2, may be obtained in the form, of octahedral crystals, by evaporating a solution of lead carbonate in dilute nitric acid. The nitrates of barium and strontium are used to a large extent in pyrotechny, on account of the beautiful colors that they yield. They may be prepared by adding, to the corresponding carbonates, not quite enough dilute nitric acid to decompose the whole of the salt, and subse-

quently filtering and crystallizing. See also Nitrate of Silver; Nitrate of Soda; Nitre.

A. D. Risteen.

NITRIDES, in chemistry, compounds con¬ sisting of nitrogen and one other element. They are usually prepared by the action of ammonia upon metallic oxides or chlorides, but in some cases they may be prepared by the direct com¬ bination of free nitrogen with the other con¬ stituent. Hydrogen nitride or triazoic acid has the formula N3H. It forms salts with the met¬ als. Its sodium salt is formed by treating the compound NaNH2 with nitrogen chloride, NCR Triazoic acid and its salts are highly ex¬ plosive. Nitride of boron (ˆaethogen®), for ex¬ ample, has the formula BN and is formed when boron is heated in nitrogen gas. Magnesium nitride, a crystalline substance having the for¬ mula Mg3N2, is also formed when

metallic magnesium is heated to redness in an atmos¬ phere of nitrogen in the presence of calcium- carbide. Ramsay, Raleigh, Travers and others took advantage of this latter fact for effecting the absorption of the nitrogen of the air, in their researches upon argon, helium and the other rare gaseous elements of the atmosphere. (See Argon). The nitrides of the metals are mostly decomposed by heat and sometimes with explosive violence. Magnesium nitride, how¬ ever, is quite stable.

NITRIFICATION, the process by which nitrates are formed, either in the soil or else¬ where, by the putrefactive or fermentive decay of nitrogenous organic matter, or by the oxi¬ dation of nitrogen itself. It has long been known that nitrates are formed in the soil and in India, as well as in Spain and certain other parts of Europe, nitrate of potassium (<(nitre®) is still manufactured to some extent by mixing porous soil with manure and other organic ref¬ use, adding wood ashes (as a source of potas¬ sium) and allowing the mass to stand in heaps for two years or so. Under suitable conditions of temperature and moisture, the yield may be as much as 10 pounds of crude nitre per ton of earth. Analogous changes go on, from year to year, in all fertile soil, and it was formerly believed that the natural conversion of nitrog¬ enous matter into nitrates is due to the fact that the soil, by a sort of capillary action, con¬ denses air within its pores ; oxidation being thereby promoted because the air held by the soil, being denser than normal atmospheric air, contains more oxygen per unit of volume. In 1862, however, Pasteur suggested that nitrifi¬ cation is effected through the agency of bac¬ teria, or other forms of miscroscopic life; and in 1877 Schlosing and Muntz established this view upon a firm foundation, by means of many ingenious experiments. It has also been further and most convincingly established by Waring- ton, Mutiro, Winogradsky, P. F. Frankland, G. C. Frankland and others. It has been shown, for example, that nitrification is arrested by powerful antiseptics and that it proceeds most actively at about 100° F., and less rapidly both at higher and at lower temperatures. Further¬ more, if soil or sewage be raised in tempera¬ ture to 212° F., so as to destroy all life that may be present, nitrification at once stops, and it will not proceed again when the temperature is restored to 100° F., even in the presence of

abundance of air that has been passed through germ-proof filters. If the sterilized mass be "sown with the nitrifying agents, however, by the addition of a small quantity of unsterilized soil or sewage, nitrification is at once resumed, and thereafter proceeds normally. Certain con¬ ditions are essential to active nitrification, in addition to a suitable temperature, the free access of oxygen, and the actual presence of a sufficient number of the live and active organ¬ isms. It is essential, for example, that the soil or other medium in which the nitrification oc¬ curs shall be slightly alkaline, and thi-s implies the presence of a base such as potash or car¬ bonate of*

lime, in sufficient quantity to fix the nitric acid as it is formed ; for if no such base is present, the medium soon becomes acid, so that the organisms cease their activities. It is usually held that some quantity of organic car¬ bon must also be present, in order to furnish food for the nitrifying organisms ; but it ap¬ pears that this is not essential in all cases, be¬ cause certain forms of life have been found to be capable of nitrifying inorganic solutions, obtaining their carbon from carbon dioxide gas. In the presence of a considerable amount of organic carbon, especially when the conditions are otherwise unfavorable to nitrification, an inverse process, known as ((denitrification,® is likely to result, such nitrates as happen to be present being thereby reduced to compounds that are less highly oxidized. Denitrification also appears. to be due to the activities of special micro-organisms and whether the nitrates of a soil increase or decrease depends upon which of the two antagonistic kinds of organism is most highly favored by the conditions. Moisture is essential in both cases ; but its absolute amount is of the greatest importance. Nitrification may be proceeding rapidly in a soil that is moderately moist and well aerated, and yet the same soil, when thoroughly waterlogged, may be a vigor¬ ously denitrifying medium. Nitrification pro¬ ceeds best in the dark and strong light checks it in a marked manner, or even stops it alto¬ gether. In nature, nitrification is most active within a few inches of the surface of the ground, and it takes place only with exceeding slowness at a depth of two or three feet. Some micro-organisms transform nitrogenous com¬ pounds into compounds of ammonia, some transform ammoniacal salts into nitrites and some . transform nitrites into nitrates. In na¬ ture it is probable that all these processes go on simultaneously. It was long believed that the free nitrogen of the air does not take part in the nitrification processes of the soil. It is now pretty generally admitted, however, that certain micro-organisms actually possess the power of absorbing free nitrogen and fixing it in the form of a chemical compound. We do not yet know how general this power may be, but it appears to be exhibited, beyond dispute, by some of the miscroscopic forms of life that live, perhaps parasitically, upon the roots of the pea and certain similar plants. Consult Conn, Agricultural Bacteriologv) (Philadel¬ phia 1909) ; Kellerman, in United States Bur earn of Plant Industry, Circular No. 113 (Washing¬ ton 1913) ; Lipman, (Bacteria in Relation to Country Life) (New York 1908) ; Lohnis, (Handbuch der landwirthschaftlichen Bacteri- ologie> (Berlin 1910).

NITRILE, in chemistry, a compound which may be regarded as derived from ammonia, NH3, by replacing the three hydrogen atoms by a single rivalent organic radical. (Compare Amide). They have the general formula

XCN, where X represents methyl (CH6), ethyl (C2H5), or some similar monovalent alcoholic radical, and they may therefore be regarded as alkyl cyanides. They may be prepared by dis¬ tilling potassium-alkyl sulphates with potassium cyanide, the general reaction being XKSCh + KCN = K2SO4 + XCN. A similar reaction takes place between alkyl palides and potas¬ sium cyanide. Acetonitrile, for example, which has the formula CH3.CN, may be prepared by distilling dry potassium-methyl sulphate, CH3. KSO4, with dry potassium cyanide, KCN. Acetonitrile is also known as methyl cyanide, and is a colorless, inflammable liquid with an ethereal odor, mixing readily with water and with alcohol, having a specific gravity of 0.80, and boiling at about 178° F. The nitriles can be hydrolized to form acid amides, the ammo¬ nium salts of organic acids, and finally the acids themselves. This, together with the fact that it is possible to replace a palogen atom in an organic compound by a cyanogen (CN) radi¬ cal, furnishes a fertile method of synthesizing long chains of carbon atoms.

NITRITE OF AMYL. See Amyl Nitrite.

NITRITES, salts of nitrous acid (q.v.).

NITRO-BENZENE, or NITRO-BEN- ZOL, a liquid chemical substance having the formula CcH5 (NO), which is formed by the action of fuming nitric acid upon benzene. See Aniline and Benzene.*

NITRO-CELLULOSE, a compound of nitric acid with cellulose, in which the hydroxyl of the cellulose is more or less completely re¬ placed by molecules of N03. An exchange of N03 for OH always occurs when cellulose is treated with nitric acid, but the extent of the nitration depends upon the circumstances of the treatment. The nitro-celluloses are more prop¬ erly described as ((cellulose nitrates,® and sev¬ eral of them are known. Those found in col¬ lodion pyroxylene and guncotton are the most important. The molecular formula of cellulose is not precisely known, but on the hypothesis that it is C12H20O10, we may consider collodion pyroxylene as a mixture of the tetra-nitrate and trinitrate and guncotton as the hexanitrate, its •chemical formula being C12H14O4. (N03)6. See Celluloid; Collodion; Explosives; Guncotton.

NITRO-COMPOUNDS, in chemistry, com¬ pounds in which one or more atoms of hydro¬ gen are replaced by an equal number of nitroxyl (NO2) radicals, the nitroxyl radicals being directly connected with carbon by means of their nitrogen atoms. Many of the nitro-compounds are of great importance in the chemistry of coal-tar derivatives. Nitro-benzene, GH5.NO2, for example, which is obtained by the action of nitric and sulphuric acids upon benzene, is the source from which commercial aniline is manu¬ factured. (See Aniline and Benzene). Con¬ sult, also, Benedikt,

*(Chemistry of the Coal- Tar Colors.**

NITRO-DYESTUFFS. See Coal-tar

Colors.

NITRO-HYDROCHLORIC ACID, NI- TRO-MURIATIC ACID, or AQUA REGIA,

a mixture of nitric and hydrochloric acids, for¬ merly known as (

NITROGEN. See Liquefied and Com¬ pressed Gases.

NITROGEN FIXATION. See Electro¬ chemical Industries.

NITROGENOUS FERTILIZERS. See

Fertilizers.

NITROGLYCERIN, or GLONOIN, a

powerful explosive discovered by Ascanio Sobrero in 1846, and first produced commer¬ cially by Emmanuel and Alfred B. Noble, at Helenborg, Sweden, in 1862. The process of manufacture was much improved by George W. Mowbray of North Adams, Mass., and Walter N. Hill of the United States Torpedo Station, at Newport, R. I., these improvements yielding a product of greater purity, and also overcom¬ ing many of the dangers attending the manu¬ facture, transportation and use of the substance. Nitroglycerin is manufactured by treating gly¬ cerin with a mixture of concentrated nitric and sulphuric acids, but the proportions of the material used and the methods of operation are different in different countries. In the United States the acids are usually mixed in the. pro¬ portion of two parts by weight of nitric to three parts by weight of sulphuric, so as to con¬ tain 61.9 per cent of real H2SO4, 34.5 per cent of HNO3, and not more than 0.7 per cent of N203. These <(mixed acids® are shipped from the acid works in iron drums holding 1,500 pounds each, this weight being a convenient charge for one run in the nitroglycerin con¬ verter. The <(converter® or ((nitrator® is a closed cylindrical vessel of lead, standing within a wooden one. The mixed acids are introduced by a pipe at the top of the converter, and the glycerin is forced into the vessels at the bottom, by means of compressed air. The fumes pro¬ duced by the reaction are carried off through a ((fume pipe,® which is provided with a window to view the gases. The reaction between the glycerin and the acids causes the evolution of considerable quantities of heat; and to prevent the temperature of the converter from rising to the danger point, cold water is continually passed through the space between the lead cyl¬ inder and the

wooden one, and also through a cooling coil of lead pipe, which is placed within the lead cylinder. Compressed air is also in¬ jected directly into the mixture to aid in the cooling, and extra air pipes are provided, for use in case the rise of temperature cannot be controlled by the means that are normally suffi¬ cient. The temperature of the mixture is con¬ tinuously observed, by means of sensitive, spe¬ cially constructed thermometers, which enter the converter through the top. In operating the process, the mixed acids are run into the con¬ verter first, the cooling water is next turned on, and, lastly, the glycerin is slowly introduced at the bottom. When the materials are pure, and no particle of water is allowed to enter the mixture and the temperature is not permitted to rise above 86° F., this part of the operation may be regarded as reasonably safe. In recent years this is ensured by the use of ice machines to cool the water and the mixture.

When the conversion is completed, the charge of the converter is run off into a ((sep- arator,' which is a cylindrical leaden vessel pro¬ vided with windows, with a vent pipe for the escape of vapors, and with an injector pipe, through which compressed air may be intro¬ duced for cooling purposes, in case any tendency toward rise of temperature is observed. When the charge is allowed to stand, the nitroglycerin rises to the top of the separator, and the spent acids, by reason of their greater density, sink to the bottom. The separation being nearly complete, the nitroglycerin is drawn off through an upper spigot, and the spent acids are drawn off at the bottom and passed to a second sep¬ arator, for the removal of the last traces of nitroglycerin that they contain. A vessel called the nitrator-separator is now in use in which conversion and separation are both carried on. The nitroglycerin is now repeatedly washed with water, then with a solution of soda ash, and again with water, until the last traces of acid are removed from it. The spent acids are sent to the ˆregaining® works, where the sulphuric acid (which is not destroyed in the process) is recov¬ ered for further use. The small quantity of ni¬ tric acid that remains unused is also recovered in a dilute form, and used for other purposes. Theoretically, 100 parts by weight of glycerin should yield 246 parts of nitroglycerin ; but the yield in the United States is only from 200 to 220 parts.*

Nitroglycerin is also known as (

When chemically pure, glyceryl trinitrate is a colorless, odorless, transparent, oily liquid, but commercial nitroglycerin varies in color be¬

tween a hock-wine and a dirty yellow. It has a specific gravity of 1.599 when liquid, and 1.735 when frozen. Kast and Hibbert find it, when pure, to exist in two crystalline forms. Hence it is tantomeric. The stable form freezes at 56° F. if exposed for a long time to this tem¬ perature, forming long, whitish crystals, and the labile form at 34.04° F. It boils at 293° F. It is slightly volatile at ordinary temperatures and according to Hess it volatilizes completely upon continuous exposure to a temperature of 158° F., and Guttmann has found that dynamite (see below) loses 10 per cent of its nitrogly¬ cerin by an exposure of several days to a tem¬ perature of 104° F. Nitroglycerin is almost in¬ soluble in water, but dissolves readily in wood alcohol, grain alcohol, ether, benzene and many other organic liquids. It undergoes dangerous decomposition with explosion upon contact with sulphuric acid (except under the condition of manufacture described above), and it is also de¬

composed by alkalis and by alkaline sulphides. The safest way to destroy it is by treating it with a solution of ammonium sulphide, or, where the quantity is large, with spent lime from the purifiers of gas works. Nitroglycerin has a sweetish, burning taste, and is poisonous, producing extremely violent headaches when taken by the mouth, absorbed through the skin or inhaled as vapor ; though some persons, by constant association with it, become immune to its physiological effects. The antidotes are cold compresses, fresh air, black coffee and mor¬ phine. It is used in medicine as a heart stimu¬ lant, in the treatment of angina pectoris, in the revival of the drowned and as an antidote in cases of poisoning by carbon monoxide and water gas.

Nitroglycerin begins to decompose at 122° F. and" at 158° it will react to the Abel test in 15 to 20 minutes. A.t 293° F. it may be distilled and at 424.4° F. it explodes. Pure nitroglycerin is not very sensitive to friction or moderate percussion, except when pinched between metal¬ lic surfaces, or struck a glancing blow. If placed upon an anvil and struck with a ham¬ mer, only the particle struck, as a rule, explodes, the remainder being scattered ; but this is an un¬ safe experiment to try with a quantity of the explosive, because in some cases the whole mass will be exploded. Frozen nitroglycerin is in general less sensitive to shock than the liquid, but explosions have occurred which were be¬ lieved to be due to the breaking of a crystal of the solid substance. When a small quantity of nitroglycerin is freely exposed to a flame, it burns brilliantly and without explosion ; but when the experiment is tried with a larger quantity, explosion is likely to follow. A drop of nitroglycerin, when placed upon an iron plate and slowly heated, may volatilize com¬ pletely without exploding; and if the drop is placed on an iron plate that is previously heated to incandescence, it will assume the spheroidal condition and volatilize without explosion ; but if the plate be heated to a temperature just be¬ low incandescence the drop

explodes violently upon contact with it. Nitroglycerin was at first exploded, in blasting, by means of a gun¬ powder fuse, and this method is still used to a limited extent with dynamite ; but it is chiefly fired by means of a powerful detonator, by which its greatest explosive efficiency is real¬ ized.

Commercial nitroglycerin is not pure. It may contain among other impurities mono- and dinitro-glycerins and tetra-nitropoly glycerin.

Nitroglycerin is principally used in the manufacture of dynamite, explosive gelatine, gelatine dynamites and smokeless p.owders such as ballistite and cordite. The liquid substance is used in torpedoes for oil wells, to remove the paraffin which clogs them or to shake the oil¬ bearing sandstone so as to secure a better flow of oil. Owing to the difficulty and danger of transporting and handling liquid nitroglycerin, attempts were early made to absorb the liquid by means of some substance which would not interfere with its explosive action, but which would form with it a solid body, or a powder, which could be handled more conveniently and safely. Many such absorbents have been tried, charcoal being the first; but Nobel found that a kind of infusorial earth, consisting chiefly of

the silicious remains of diatoms and known as ((kieselguhr,® is much superior to charcoal, and this substance is now largely used as an ab¬ sorbent, in the manufacture of common Myna- mite.ˆ Sawdust, especially in combination with certain chemical substances, is used as an ab¬ sorbent to a considerable extent. <(Dualin,® for example, is a mixture of 50 parts of nitrogly¬ cerin, 30 of sawdust and 20 of saltpetre, and ((Atlas powder® and ((Hercules powder® consist of nitroglycerin, carbonate of magnesia, wood fibre and sodium nitrate. <(Blasting gelatine,® invented by Alfred Nobel, consists of nitro¬ glycerin gelatinized by the addition of nitrated cotton fibre; its manufacture being based upon the fact that a mixture of mononitro-cellulose and dinitro-cellulose, when free from unnitrated cotton and from trinitro-cellulose (ˆun-cot¬ ton®), dissolves in warm nitroglycerin with the formation of a gelatinous substance. <(Gelatine dynamite® consists of a mixture of thin blasting gelatine with wood meal and saltpetre.

Because of the low freezing point of nitro¬ glycerin the dynamites made from it are prone to freeze at natural temperatures. Frozen dy¬ namite is difficult to handle and explodes with detonators and thawing it is a dangerous opera¬ tion. To avoid this low freezing, dynamites known as L. F. dynamites have been invented, in which nitrobenzenes, nitrotoluenes,

nitro- naphthalenes and substances of an analogous nature have been incorporated and now are quite widely used.

Bibliography. — Eissler, Manuel, (Handbook of Modern Explosives> (London 1890) ; id., (The Modern High Explosives) (New York 1893) ; Guttman, Oscar N., Manufacture of Explosives) (ib. 1909) ; Sandford, P. G., (Nitro Explosives (2d ed., ib. 1906) ; Marshall, Arthur, (Explosives> (Philadelphia 1917) ; Snelling and Storm, ˆBehavior of Nitroglycerin when Heated> (United States Bureau of Mines, 1912).*

Charles E. Munroe.

NITROSO-DYESTUFFS, or QUI- NONE-OXIMES. See Coal-tar Colors.

NITROUS ACID, an acid which has the formula HN02, but which is too unstable, in the free state, to admit of isolation. A blue, aque¬ ous solution of it may be prepared by dissolving nitrogen trioxide in ice-cold water (see Nitro¬ gen) ; but when this solution is warmed the nitrous acid decomposes into nitric acid, nitric oxide and water, as indicated by the equation 3HN02=HN0a+2N0+H20. The salts of nitrous acid (which are known as Mitrites®) are more stable, and certain of them occur in the soil as a result of the oxidation of organic matter. (See Nitrification). The nitrates of the metals are mostly soluble in water and in alcohol, their solutions being decomposed by boiling, or by the addition of dilute sulphuric acid. Potassium and sodium nitrites may be prepared by melting the corresponding nitrates with metallic iron, and crystallizing from solu¬ tion in water. Silver nitrite, AgN02, may be prepared by heating starch with nitric acid, pass¬ ing the resulting gas into a solution of caustic potash, neutralizing this with acetic acid, and finally adding a solution of silver nitrate. It crystallizes in small white crystals, is one of the most insoluble nitrites, and may be used in the preparation of tnanv of the others. Am¬ monium nitrite, NH4.N02, for example, may be

obtained by adding a solution of silver nitrite to one of ammonium chloride (sal ammoniac). Nitrite of ammonium is used as a source of nitrogen, since it is decomposed by the action of heat into water and free nitrogen. Many of the organic derivatives of nitrous acid are also of importance. (See, for example, Amyl Nitrite and Nitrous Ether).

NITROUS ETHER, or ETHYL NI¬ TRITE, the nitrite of the organic radical ®ethyl.® It has the chemical formula C2H5N02, and is usually prepared by acting upon ethyl alcohol with nitric acid. It is a yellowish liquid having a specific gravity of about 0.90, and boil¬ ing at 64° F. It mixes readily with alcohol, but only to a slight extent with water. It decom¬ poses when kept in contact with water, evolving nitric oxide (NO). When mixed with

about 20 times its own volume of alcohol (rectified spirit), it is known as <(spirit of nitrous ether,® or (

NITROUS OXIDE, or NITROGEN MONOXIDE, a gaseous substance having the chemical formula N20, and obtained by heating ammonium nitrate, NH4.N03, as indicated by the equation

NH4.N03 = N20 + 2H20.

Care must be exercised in its manufacture, as ammonium nitrate, when heated, is liable to ex¬ plosive decomposition. Nitrous oxide is a color¬ less gas, with a slightly sweet taste. It sup¬ ports combustion nearly as well as oxygen, and when subjected to a pressure of 30 atmospheres at 32° F., it condenses into a colorless, mobile liquid. _ When inhaled, it is apt to produce ex¬ hilaration, for which reason it is commonly called "laughing gas.® Sir Humphry Davy, in experimenting with nitrous oxide about the year 1801, discovered that it produces insensi¬ bility when inhaled for a sufficient time, and in recent 3'ears it has been used as an anaesthetic for dental work and other minor surgical opera¬ tions. _ Davy himself suggested this use in the following words : <(As nitrous oxide, in its ex¬ tensive operation, seems capable of destroying physical pain, it may probably be used with ad¬ vantage in surgical operations in which no great effusion of blood takes place.® It does not ap¬ pear that the gas was so used, however, until 1844. On 10 December of that year Dr. Gardi¬ ner Q. Colton gave a lecture on ((Laughing Gas,® in Union Hall, Hartford, Conn., admin¬ istering the gas to several of his auditors, for the purpose of illustrating its peculiar proper¬ ties. Horace Wells, a Hartford dentist, was present at the lecture, and was impressed by the practical possibilities . that appeared evident to him. On the following day Wells obtained a supply of the gas from Colton, inhaled it him¬ self until he became unconscious, and while he was in this condition Doctor Riggs extracted one of his teeth. When consciousness returned, a few minutes later, he exclaimed, "I didn't feel it! The greatest discovery of the age!® About the same time Dr. William T. G. Morton and Dr. Chas. T. Jackson, of the Massachusetts Gen¬ eral Hospital, at Boston, introduced ether as an anaesthetic, and a patent for its use was is¬ sued to them in November 1846. There has been much bitter controversy concerning the priority of Wells and of Morton and Jackson,

as regards the introduction of anaesthetic meth¬ ods in surgery; but so far as nitrous oxide is concerned, the evidence appears to favor Wells. Morton

and Jackson experimented chiefly with ether, a substance which Wells appears to have used in his practice only upon one occasion. Nitrous oxide acts by causing partial asphyxia¬ tion and by a direct action on the nervous sys¬ tem. It raises the blood-pressure, and so should not be used where fatty heart or a diseased condition of the blood-vessels exists. Nitrous oxide is notable in that it leaves no bad after effects, and that it is not so unpleasant to take as most other anaesthetics. It is sometimes used as a primary anaesthetic for major operations, being followed by ether or chloroform. See Liquefied and Compressed Gases.

*NITTIS, nit'tes, Giuseppe de, Italian painter, etcher and engraver : b. Barletta, near Naples, in 1846; d. Paris, 22 Aug. 1884. After studying at the Naples Academy he went to Paris and placed himself under Gerome and Meissonier. Soon he became influenced by Manet and turned from landscapes and genre to the painting of scenes of out-of-door Parisian life and other subjects of the Impressionist School. From 1879 he cultivated the art of pastel painting. His London pictures took the same rank as his Parisian studies. Nittis was distinguished for his observation, fine taste, skill in drawing, transparency of color, atmos¬ pheric effects and beautiful women. His etch¬ ings, engravings and water colors are highly valued. He received the third class medal at the Paris Solon in 1876, the first class in 1878, and was given the Legion of Honor in 1878. His best works include (Road from Naples to Brindisi5 ; descending Vesuvius) ; (Place de la Concorde, Paris) ; (Place des Pyramides, Paris5 ; Luxembourg Museum5 ; doulevard Haussmann, Paris5 ; (In the Bois de Boulogne, Paris5 ; (Place du Carrousel, Paris5 ; (At the Races5; * Westminster, London5; (Cannon Street, London,5 and (The Victoria Embank¬ ment, London.5 Consult Renan, A., (Joseph de Nittis5 in Gazette des beaux-arte (Paris 1884) ; Burty, Ph., (J. de Nittis5 in L'Art (Paris 1880) ; Lostalot, Alfred de, (Les pastels de M. de Nittis au cercle de l'Union artistique5 in Gazette des beaux arts (Paris 1881) ; (Une eauforte inedite de J. de Nittis5 in Gazette des beaux arts (Paris 1913) ; and Pica, Vittorio, (Guiseppe de Nittis e la scuola napoletana di pittura5 in Emporium (Bergamo 1914).*

NITZSCH, nitsh, Karl Immanuel, German theologian: b. Borna, Germany, 21 Sept. 1787; d. Berlin, Germany, 21 Aug. 1868. He was a son of Karl Ludwig Nitzsch and was educated in Wittenberg, becoming professor of a theo¬ logical seminary in Berlin in 1817 and in 1822-47 he was < professor at Bonn. He then returned to Berlin where he was professor and rector, university preacher and a member of the high consistory. He was one of the foremost advo¬ cates of the Evangelical Union, and was of moderate views and ethical rather than dog¬ matical in his teaching. He published (System der Christichen Lehre5 (1829; Eng. trans. 1849) ; (Praktische Theologie5 (3 vols. 1847— 67), etc.

NIU-CHUANG, nu-chwang', NEW- CHWANG, or YING-TSE, China, a city of Manchuria, on the left bank of the Liao-ho

River, formerly at its mouth, but owing to silt¬ ing up, now about 14 miles from its mouth. It is practically an inland city, but was chosen as one of the ports to be opened to foreign com¬ merce by the treaty of Tien-tsin (1858). Pop. varies from 70,000 to 100,000. The foreign set¬ tlements and the trade, however, are at Ying- tse, near the river's mouth, which is known to Europeans as Niu-chuang. The port is con¬ nected by railway with Tien-tsin, and also with the great Siberian Railway. Though closed by ice in the winter months, it carries on an im¬ portant trade. Ying-tse imports cotton, woolen and silk goods, sugar, paper, metals, opium, tobacco, etc. Large quaptities of salt are manu¬ factured in the vicinity and there are also coal mines. The port was captured by the Japanese in March 1895, and was part of the territory ceded to Japan which the latter power after¬ ward relinquished. It was occupied by the Japs during the Russo-Japanese War in 1904, and, while nominally Chinese, is in reality under Japanese control. See Manchuria. Pop. 54,380.

NIUE, ne-oo'a, NIUE-FEKAI, or SAV¬ AGE ISLAND, in the South Pacific Ocean, politically dependent to New Zealand since 1901, is of ancient coral formation, 14 miles long, 10 miles wide, with a maximum altitude of 200 feet, and an area of about 100 square miles. The soil is very productive, yielding cocoanuts, tara, yams and bananas. Copra fungus and straw hats are exported. Pop. 3,943, Malayo- Polynesians, all Christians, due to the labors of the London Missionary Society.

NIVELLE, ne-vel', Robert Georges, French

general: b. Tulle, department Correze, 1856. His father was an army officer and his mother was an Englishwoman, a Miss Pennington. He was educated at Saint Cyr and the Lcole Poly¬ technique in Paris. He appears to have adopted all three branches of the service, being equally an expert in artillery, cavalry and infantry. His first active service years were spent in China and the French possessions in Northern Africa. Before the absorption of Korea by Japan Nivelle was sent on a special mission to Seoul. At the outbreak of the European War Nivelle was a colonel. He distinguished himself dur¬ ing the Charleroi retreat and again at the battle of the Marne. He was made general of brigade in October 1914 and a few weeks later was placed in command of the 61st Infantry divi¬ sion. The German Crown Prince's onslaughts at Verdun gave General Nivelle his great oppor¬ tunity. As General Petain's right-hand man he contributed more than anyone else, with his consummate skill in handling artillery, to the successful defense of the right bank of the Meuse. When General Petain left Verdun to command the central group of armies his mantle naturally fell

upon General Nivelle, whose bril¬ liant continuation of the defense of Verdun is already an epic of the great war. It was on 23 June 1916, during the second battle of Verdun, that General Nivelle issued the order which gave rise to the famous expression, ((Ils ne passeront pas55 (They shall not pass!). Equally remarkable with the defense was the subsequent recapture by Nivelle's army, inside of a few days, of nearly all the ground that the Germans had taken in six months at the cost of half-a- million men. In December 1916 General Nivelle succeeded General (Marshal) Toffre in the com-

mand on the French front with the title of Commander-in-Chief of the Armies of the North and the East.® He held that post till May 1917, when he was placed in command of

§rouP °f armies and General Petain became Commander-in-Chief. See War, European: verdun Campaign.

NIVELLES (Nyvel in Flemish), Belgium, town in the province of Brabant, on the Thines River, 19 miles south of Brussels. A convent founded here in the 7th century by Ita, wife of Pepin of Landen, is supposed to have been the foundation of the town. On its site stands the Romanesque church of Saint Gertrude, named for Ita's daughter, dating from the 11th century. It has two choirs and on the high altar stands the beautiful 13th century reliquary of Saint Gertrude (died 659), to whom the church is dedicated. The treasury possesses an ancient crystal goblet said to have belonged to the saint. The tower was restored in 1859 after a fire. On the top stands a man of iron who strikes the hours with a hammer, representing Jean de Nivelles, a celebrated baron of the 15th century, whose title eventually became merged into that of the Count of Horn. At Nivelles the Frenchˆ under Marceau defeated the Aus¬ trians in 1794. Nivelles was, prior to the War 1914-18, a busy little town with manufactures of parchment, paper, cotton, lace, carpets, fur¬ niture, agricultural implements, art goods, and a considerable trade in grain and livestock. The town also has a railway repair shop. Por¬ tions of the town were destroyed by the Ger¬ mans. Pop. 12,624.

NIVEN, William, American mineralogist: b. Bellskill, Lanarkshire, Scotland, 6 Oct. 1850. After a common-school education in Scotland, he came to the United States in 1879, and pur¬ sued mineralogical investigations. He discov¬ ered four new minerals, — yttrialite, thorogum-mite and nivenite in Llano County, Texas, in 1889, and aguilarite at

Guanajuato, Mexico, in 1891. In 1891 he also found the remains of a prehistoric people, covering several hundred square miles in the state of Guerrero, Mexico, also discovered a buried prehistoric city beneath the Valley of Mexico comprising over 2,000. square miles in September 1911. He was assist¬ ant commissioner of Arizona to the New Or¬ leans Exposition. He is a member of the Amer¬ ican Museum of Natural History and of the New York Academy of Sciences.

NIVENITE, a variety of the mineral uran- inite, high in uranium and carrying 10 per cent or more of ytterium earths and 6.7 to 7.6 per cent of thoria. Occurs sparingly with other rare minerals at Baringer Hill, Texas.

NIVERNAIS, ne-ver-na, France, an an¬ cient central province corresponding nearly to the present department of Nievre, held by the Counts (afterward Dukes) of Nevers.

NIX, or NIXIE, in German folk-lore, the name of water spirits (male and female), haunt¬ ing rivers, brooks, ponds and lakes, and occa¬ sionally passing into the form of a horse or fish. See also Nicker.

NIXON, John, American military officer: b. Framingham, Mass., 4 March 1725; d. Mid- dleburv, Vt., 24 March 1815. In the expedition against Cape Breton in 1745 he fought under

Sir William Pepperell and was at the capture of Louisburg. He joined the colonial forces at the outbreak of the American Revolution and fought at the battle of Lexington, and at Bunker Hill he commanded a regiment. He was made brigadier-general in 1777 and was given com¬ mand of Governor's Island in New York harbor. He served under General Gates in the battle of Stillwater, and retired in 1780.

NIXON, John, American soldier: b. Phila¬ delphia, Pa., 1733; d. there, 31 Dec. 1808. He was early prominent in opposing the taxation demands of England, and in 1774 became a member of the first committee of correspond¬ ence in Pennsylvania; and was also a member of the committee of safety. In 1775 he became lieutenant-colonel of a battalion which he led at the battle of Princeton in 1777. In 1776 he commanded at Fort Island, and later in the same year was placed in command of the guard of the city of Philadelphia; he was the first to publicly proclaim the Declaration of Independ¬ ence in the city on 8 July. He served in the army till 1780, and was a member of the navy board and director of the provision supply. He was one of the organizers of the Bank of North America, and its president from 1792 to 1808.

NIXON, Lewis, American shipbuilder: b. Leesburg, Va., 7 April 1861. He

was gradu¬ ated from the United States Naval Academy in 1882, and was then sent to the Royal Naval College at Greenwich, England, to take a spe¬ cial course in naval architecture from which he was graduated in 1885. In 1884 he had been appointed to the construction corps of the navy, and on his return from abroad was ordered to duty in connection with the building of the cruisers Chicago and Boston ; he was later superintending constructor for the navy at the Cramp shipyard, and assistant constructor at the Brooklyn Navy Yard. In 1890 he designed the battleships of the Indiana class, and when the contract for these vessels was awarded to the Cramp shipyard, he resigned from the navy to become superintending constructor there. He retained this position until 1895, when he leased the Crescent shipyard at Elizabeth, N. J., where he built 100 vessels within six years, including the sub-marine torpedo boat Holland. In 1902 he became president of the United States Ship¬ building Company, which includes the Crescent shipyard, the Eastern Shipbuilding Company, and others ; and he is also connected with other manufacturing interests. In politics he has been allied with the Democratic party ; was appointed a commissioner of the East River Bridge in 1898; and in November 1901 succeeded Rich¬ ard Croker as leader of Tammany Hall, resign¬ ing the position in May of the next year ; he has also been chairman of the finance committee of the Democratic Congressional Campaign Com¬ mittee. He was made commissioner of public works for Richmond Borough, New York City, in 1914. In 1919 he became State Commissioner of Public Works and later Commissioner of Public Utilities of New York City. He is the author of (The Canal Tolls and American Shipping) (1914).

NIXON, Oliver Woodson, American jour¬ nalist: b. Guilford County, N. C., 25 Oct. 1825; d. 1905. He was graduated from Farmers' Col¬ lege, Ohio, in 1848, and from Jefferson Medical College, Philadelphia, in 1854. During the Civil

War he was medical director of the Army of Missouri and in 1870 established the Cincinnati Evening Chronicle. With his brother, W. P. Nixon (q.v.), he merged it with the Cincinnati Times, and in 1878 they purchased the Inter- Ocean of Chicago, of which he was for many years literary editor. He published (How Mar¬ cus Whitman Saved Oregon for the Union)

(1895).

NIXON, William Penn, American jour¬ nalist : b. Fountain City, Wayne

County, Ind., 19 March 1833. He was graduated from Far¬ mers' College, Ohio, in 1854 and from the law school of the University of Pennsylvania in 1859. He practised his profession in Cincinnati till 1860 and sat in the Ohio legislature 1865-68. He was business manager of the Cincinnati Chronicle, 1868-72, after which he was associ¬ ated with the Chicago Inter-Ocean, which he purchased with his brother O. W. Nixon (q.v.) as publisher, manager and editor. In 1897 he was appointed collector of the port of Chicago. He was president of the Associated Press for several years, was a delegate at large to the Republican National Convention of 1896.

NIZA, net'sa, Marcos de (also called Fray Marcos), Italian missionary in America: b. Nice at the beginning of the 16th century; d. between 1550 and 1570. He gets his name, de Niza, from the city of Nice, where he lived and entered the Franciscan Order. His governor- general Antonio de Mendoza, on the request of Marcos' bishop and friend Bartolome de las Casas, sent him abou.t 1531 to New Galicia in order to reassure the Indians there that the pur¬ pose of the Spaniards was simply to convert the natives, not to enslave or conquer them. Fray Marcos lived successively in Peru, Guate¬ mala and Mexico, and in 1539 undertook to explore the Northwest and to discover the truth of the story told by Cabeza de Vaca of the seven cities of Cibola and their golden wealth. Niza probably made his way into Arizona, and is fre¬ quently called the <(discoverer of Arizona." Upon his return he published a book locating the <(seven cities,® for which he must have mis¬ taken the Zuni pueblos. But the hopes to which he roused Mendoza were shattered by the ex¬ pedition led by Coronado in 1540, which found no gold in Cibola. Previously Niza had become provincial of his order and was a member of Coronado's expedition to New Mexico and Arizona in 1540. Niza's (Descubrimiento de las siete ciudades) was edited by Ramusio, but is most accessible in a French version (1838).

NIZAMI, m-za-me' (full name Abu Mo¬ hammed Ben Yusuf Sheik Nizam-ed-din), Persian poet: b. Western Persia, 1141; d. Gan- jah, 1203. Besides a (Divan,' or collection of lyrics, he wrote five larger poems, upon which his poetic fame rests, and which in Persia are regarded as masterpieces. These poems are (1) (Makhzan-al-asrar' (Storehouse of Myster- ies)), a didactic poem, in which theoretical doc¬ trines as to ethics alternate with historical de¬ tails, anecdotes and fables; (2) (Khusrau and Shirin,' a romantic epic, which has for its sub¬ ject the love of the Persian king Khusrau for Shirin; (3) (Laila and Majnun,' which de¬ scribes the love of Majnun, a son of the Ara¬ bian desert, for the beautiful Laila; (4)

seven novels in a kind of poetical heptameron. The most famous of these tales is the fourth, called Turandocht, which, after being subjected to various changes, furnishes the materials of Gozzi's and Schiller's well-

known dramas; (5) Hskandar Namah' ((Alexander Book'), a tra¬ ditional and embellished history of Alexander the Great, taken from the Greek poem on that subject by the pseudo Callisthenes. These five have been assembled in a collection known as (Panj Ganj' (

(1883).

NIZAM'S (ni-zamz') DOMINIONS. See

Hyderabad.

NIZHAN, nye'zhan, or NYˆEZHIN, nye'- zhen, Russia, city in the government of Cher- nigof ; on a branch of the Desna which flows into the Dnieper. It is in a fertile agricultural region in which tobacco is one of the principal products. It has a large trade in grain and tobacco. Pop. 33,000.

NIZHNI-NOVGOROD, nezh' ni-nov'go- rod. See Nijni Novgorod.

NIZHNI-TAGELSK, ta-gilsk, Russia, also known as Tagil, town in the government of Perm, 88 miles northwest of Ekaterinburg and 130 miles east of Perm, to which cities it is con¬ nected by railroad. The town, beautifully situ¬ ated in a valley on the eastern slope of the Ural Mountains at the junction of the Tagil, Tura and Salada rivers, is in a region rich in deposits of gold, copper, iron and platinum. It was founded in 1725 by Nikita Demidor, who estab¬ lished an iron foundry here. The town con¬ tains many iron and steel mills, and although its chief industry is mining, there is an enter¬ prising trade in various articles of native manu¬ facture, particularly wooden boxes and trays which are sent to the fairs of Irbit and Nizhni Novgorod. The inhabitants are nearly all Great Russians. Pop. 45,000.

NIZHNI TCHIRSK, South Russia, a town in the province of the Don Cossacks, on the right bank of the Don, 210 miles northeast of Novocherkask. The chief productions are wool, grain and cattle. Vineyards are plentiful in the neighboring country. An important annual fair lasts 10 days. Pop. 16,300.

NJORD, nyerd, in mythology, god of the wind and waves. See Scandinavian Myth¬ ology.

NO AMMON, or NO, the Hebrew designa¬ tion for Thebes, the Disopolis Magnus of the Greeks. It i§ mentioned in Nah. iii, 8 (//rpoc 'Apfi&v) and in Ezek. xxx, 14-16; Jer. xlvi, 25 (didcnroXig). The shorter form, No, seems to have prevailed generally among the Hebrews, and the Assyrian records call the city Ni, while in Egypt after the 21st dynasty it is written Nt, doubtless pronounced ne-t. Nahum's reference to it as <(part of

Ammon" makes its identity with Thebes positive. See Thebes.

NO-BODY CRAB, or SEA-SPIDER.

See Pantopoda.

NO MAN'S LAND — NOAH

381

. NO MAN S LAND, a name applied to out¬ lying districts in various countries; at one time to what is now mainly Griqualand East; also to a territory of 80,000 square miles in South Australia ; to a small island near Martha's Vine¬ yard, Mass. ; to a strip of land bordering on Pennsylvania, Delaware and Maryland, still in dispute between those States because of the displacement of the early boundary stones. Most commonly, however, the name is applied to Oklahoma in the following connection : In 1845 Texas, on being admitted into the Union, ceded to the United States that strip of her land which lay north of lat. 36° 30′ N. This piece, 167 miles by 35, was without government until 1890, when it became a part of Oklahoma. At one time there was a great rush of prospectors and settlers to this section. The term ((No Man's Land® was also employed during the Great War to designate the ground lying be¬ tween the front line trenches of the opposing armies.

NO NAME, a novel by Wilkie Collins (q.v.) published in 1862.

NOACHIAN (no-a'ki-an) PRECEPTS, seven canons or laws which, according to the Talmud, were given by Jehovah to the sons of Noah, and embodied the duties of Gentiles living under Jewish rule. These Precepts are analogous to what among the Romans was classed as Natural Law or Jus Gentium, a code revealed by the consensus of conduct among the Mediterranean nations. The seven Noach- ian Precepts enjoin: 1. Submission to civil au¬ thorities, kings, judges, etc. 2. Avoidance of idolatry and sacrilege. 3. Reverence to the name of God, as in taking an oath. 4. Proper re¬ straint and direction of the human sexual instinct. 5. Reverence for life, even of animals, by refusing to consume the blood of beasts as food. 6. Respect for the rights of property. 7. Refusal to eat the member of a living animal. The expanding and refining genius of the Rab¬ bins added others, and by the 3d century a.d., there were 30, the principal additional four be¬ ing : 1. The blood of a living animal is not to be drawn for the purpose of drinking it. 2. Ani¬ mals are not to be mutilated. 3. Magic and sorcery are unlawful. 4. The crossing of ani¬ mals and grafting of trees are also unlawful. No stranger was allowed to dwell in Hebrew territory unless he conformed to the Noachian Precepts and became a "proselyte of the gate®; in contradistinction to the strangers who con¬ formed by being circumcised, and were styled ((proselytes of righteousness.®

The Gentile who faithfully obeyed the Pre¬ cepts <(belonged to the pious among the na¬ tions and had a portion in the world to come.®

NOAH, no'a, according to the Hebrew Scriptures, the son of Lamech, and 10th in de¬ scent from Adam. He was the first ancestor of the new race of men who should people the earth after the flood, in which points he is the counterpart of the Chaldaic Xithuthros, the Hindu Prithu, and the Greek Deucalion, sever¬ ally. We read nothing of him from his birth till he is 500 years old, when we are told that he begat three sons, Shem. Ham and Japheth. Having been warned by God of the coming flood, he built an ark or great vessel by the direction of Jehovah, into which he entered with

his family and a number of animals of every kind. After the waters had subsided the ark rested on Mount Ararat, where Noah offered a burnt-offering to God, and was assured that the earth should never again be destroyed by a flood. This is the first passage in the Bible where altar or burnt-sacrifice is mentioned. As a sign of this covenant with Noah, God set the rainbow in the clouds. Noah died at the age of 950 years, 350 years after the flood. Recent scholarship is inclined to believe that in the narrative (Gen. v-ix) material from two dif¬ ferent sources has been joined

together: Up to ix, 17 Noah appears as the hero of the flood ; and from verses 20-27 as the discoverer of the art of making wine, and the first to fall a victim to intoxication. Taken as a whole the narrative marks several important points in the history of civilization. In agriculture, the recognition of such seasons as seed time and harvest; and the discovery of the vine, which is made such a salient point in Greek mythology; the institu¬ tion of sacrificial worship ; the institution of civil government. The Noachian Precepts (q.v.) are founded on Genesis ix, 1-17.

NOAH, Mordecai Manuel, American poli¬ tician and journalist: b. Philadelphia, 19 July 1785; d. New York, 22 May 1851. In early life a clerk in the government service and after¬ ward a sessional reporter in the Pennsylvania legislature, he was in 1813 appointed United States consul at Tunis, with a special mission to Algiers. He succeeded in ransoming the American prisoners whom the Algerians held in slavery, but was recalled on the pretext that his religion was incompatible with his consular posi¬ tion at Tunis. He was abundantly vindicated later. In those days the United States paid a yearly tribute of $200,000 to Tunis for the privilege of navigating the Mediterranean. Noah denounced such payment, insisting that the money would be better spent in building war ships. Settling in New York City in 1819 he published a volume of his (Travels in Eng¬ land, France, Spain and the Barbary States, > and founded the National Advocate. In 1822 he was elected high sheriff of the city and county of New York. After the discontinuance of the National Advocate, lie began the New York Enquirer which was merged with the Courier and became the Cornier and En¬ quirer, in partnership with James Watson Webb, but political differences soon dissolved their connection. Appointed by President Jack- son surveyor of the port of New York, he es¬ tablished in 1834 the Evening Star and became judge of the Court of Sessions. In 1842 he started a daily, The Union, which became a weekly and under the title, Noah's Sunday Times and Messenger, was edited by him until his death. A project in which he engaged in 1820 was to re-establish the Jewish nation and form a place of refuge for Jewish emigrants on Grand Island, in the Niagara River, near Buf¬ falo. In 1825 with impressive ceremonies, he laid the cornerstone of the proposed city at White Haven, but the new (

Morais, (Eminent Israelites of the 19th Cen- tury) (1886), and his own (Gleanings from a Gathered Harvest (1845).

NOAH, Samuel, American soldier: b. Lon¬ don, England, 19 July 1779; d. Mount Pulaski, Logan County, Ill., 10 March 1871. Of Jewish descent and

a cousin of M. M. Noah (q.v.), at 20 he emigrated to America, and was appointed 5 May 1805 cadet in the First regiment of ar¬ tillery. He was graduated 9 Dec. 1807, was promoted ensign in Second regiment and after desultory service in the Gulf States resigned (13 March 1811) his commission of first lieu¬ tenant in the army. He joined Magee's Mexi¬ can forces which were besieged at Fort Bahia (14 Nov. 1812) by the Spanish royalists. On Magee's death, Noah in command of the rear¬ guard routed the enemy and captured San Antonio. War having been declared by the United States against England, Noah left Texas to re-enter the United States army, but on President Madison's refusal to recommission him, volunteered as a private soldier to defend Brooklyn and served to the end of the war. At the time of his death he was the oldest graduate from West Point. Consult Cullom, (Biographical Sketches of Deceased Graduates of the United States Military Academy. >

NOAH, Book of, a legendary pseudepi- graphical book purporting to throw fuller light on the antediluvian and postdiluvian years of Old Testament history. The book has. been lost but its contents have been largely incor¬ porated in the Ethiopic book of Enoch and in the book of Jubilees. Its date and authorship are uncertain ; a recent commentator places the former as between b.c. 50 and a.d. 80.

NOAILLES, no-I, French family originat¬ ing in Limousin, dating from the 11th century. Its more important members are as follows : Antoine de Noailles, b. 1504; d. Bordeaux, 11 March 1562. He w'as admiral of France, Ambassador to England 1553-56, the king's agent in the Truce of Vaucelles and governor of Bordeaux. His great-grandson, Anne Jules de Noailles, b. Paris 1650; d. Versailles 1708; was a servile courtier of the French king, who made him marshal of France in 1693. His son, Adrien Maurice, Due de Noailles, b. Paris, 29 Sept. 1678; d. there, 24 June 1766, like his father was marshal of France (1734). Before this he had made his reputation by his financial policy and his opposition to Law. He fought in the war of the Polish Succession, became commander-in-chief of the army in Italy in 1735 and in the war of Austrian Succession was crushingly defeated at Dettingen. His memoirs were edited by Millot (1777) and his correspondence by Rousset (1865). His son, Louis, b. Versailles, 21 April 1713; d. Paris, 22 Aug. 1793; fought in Flanders and Germany; became marshal of France in 1775. Louis Marie, Vicomte de Noailles, b. Paris, 1756; d. Havana 1804; married a sister of Lafayette's wife and with Lafayette urged French interven¬ tion, and fought in America in behalf of the American colonies, in which he took refuge during the darkest days of the Revolution. He returned to France soon afterward, but re¬ signed from the army in 1792, again came to America and fought bravely in the French army in San Domingo, being killed in the brilliant

capture of an English war vessel off Havana. Paul, a great-grandson of Louis, b. Paris, 4 Jan. 1802; d. there, 12 May 1885; upheld the Bourbons and wrote (Histoire de Mme. de Maintenon) (1848-58) and (Histoire de la Maison de St. CyU (1865), and was a member of the Academy. His great-grandson, in turn, Emanuel Henri, Marquis de Noailles, b. 15 Sept. 1830; d. 16 Feb. 1909; was French Minister to Washington 1872, to the Papal Curia 1873, to Rome 1876-82, to Constantinople 1882-96, and 1896-1902 to Berlin; and wrote on Polish history. His elder brother, Jules Charles V icturnien, Due de Noailles (1826-95), was a well-known economist, one of the editors of the Revue des Deux Mondes and author of many economic and historical studies. The Comtesse Nathieu de Noailles (b. 1876), who is 'of Roumanian descent, was married in 1897 to the grandson of the last-mentioned Duke, and is a novelist and poet of the ultra-emotional school. Her novels include (La nouvelle es- perance> (1903) ; (Le visage emerveille) (1904) ; (La domination (1905) ; and her poetical works, (Le cceur in nombrable) (1901, crowned by the French Academy) ; (Les eblouissements) (1907) ; (Les vivants et les morts) (1913).

NOATAK (noVtak') RIVER, Alaska, a large river flowing into Kotzebue Sound, with a drainage basin of 8,000 square miles. In 1885- 86 it was explored and navigated for 100 miles by McLenegan and Story. As it lies within the Arctic Circle its extensive mineral deposits — coal, copper, silver and gold — are difficult to develop. Fifty miles north of Kotzebue is Noatak, a mission for the Eskimo. Consult (United States Geological Survey Bulletin No.*

536.

NOBBE, no'be, Friedrich, German plant physiologist: b. Bremen, Germany, 20 June 1830. He was educated at Jena and Berlin, and in 1861 was called to a professorship at the Industrial School in Chemnitz. In 1868 he joined the faculty at the Academy of Forestry and Agriculture at Tharandt, where he founded an experiment station for plant physiology, and he originated, in 1869, scientific seed testing. He has published (Wider den Handel mit Waldgrassamen fur die Wiesenkultur (1876) ; (Antrage des Ausschusses fur Samenpriifun- gen) (1900) ; (Bericht des Auschusses fur Samenprufungen (1903-04), etc.*

NOBEL, no'bel, Alfred Bernard: b. Stock¬ holm, Sweden, 21 Oct. 1833; d. San Remo, Italy, 10 Dec. 1896. He was the third son of Emmanuel, and in 1842 his father moved with his family to Saint Petersburg, Russia. In 1850 he sent Alfred to the United States to study under the famous engineer, John Ericsson. On reaching his 21st year the son returned to Saint Petersburg trained as an engineer and more¬ over able to speak fluently

Swedish, Russian, English, German and French. Later he took up the study of chemistry and showed a marked preference for that science in its technical appli¬ cations. Emmanuel Nobel went to Russia under contract to prepare mines and torpedoes for the Russian government, and erected on the Neva works for their manufacture which eventually were extended to include the manufacture of firearms and agricultural implements.

After Alfred returned from America he was constantly engaged with his father in pursuing some invention. Among other substances nitro- glvcenn especially occupied their attention, and finally in 1862 they had erected a works at Hel- enborg, Sweden, where nitroglycerin was manu¬ factured on a commercial scale for the first time in its history. . In 1864 the works were destroyed by an ejcplosion which killed the chemist and Alfreds younger brother Oscar, and the calam¬ ity so affected Emmanuel Nobel as to bring on a paralytic stroke which left him permanently crippled. Alfred Nobel, however, immediately erected new works on a barge anchored in Lake Malaren and in 1865 enlisted capital to erect works on a large scale at Winterviken, Sweden, and Kriimmel, Germany. So many accidents occurred with nitroglycerin, and especially the destruction of a vessel transporting it at Aspin- wall on the Isthmus of Panama attracted such attention, that its transportation was interdicted by many governments. In the latter part of 1866 Nobel discovered dynamite, which replaced it and which was at once manufactured in his Swedish and German factories and in 1868 at a factory which he started near San Francisco, Cal. In 1871 he erected at Ardeer, Scotland, the works which soon became the largest dyna¬ mite works in the world. In fact dynamite proved to be of such utility that works sprang up in all civilized countries. In 1875 Nobel in¬ vented explosive gelatine and the gelatine dynamites. In 1888 he invented ballistite. Alfred Nobel was interested in many other arts than that of explosives, having taken out in Eng¬ land alone 129 patents. With his brothers Lud¬ wig and Robert he formed in 1878 the famous firm of Nobel Brothers that operated the petroleum wells at Baku, Russia, and became the most active competitor of the Stand¬ ard Oil Company. He also purchased the large ordnance works at Bofors, Sweden, that he might the more readily carry out his inventions in ordnance and his investigations in metal¬ lurgy. At his death he left an estate worth over nine millions of dollars, and in his will, after leaving small legacies to his already wealthy relatives, directed that the residue should constitute a fund the interest from which should be divided into five equal amounts and awarded as prizes to the person who shall have made, (1) the most important discovery or invention in the domain of physics ; (2) in chemistry; (3) in physiology or

medicine; (4) who shall have produced in the field of liter¬ ature the most distinguished work of an ideal¬ istic tendency; and (5) who shall have most or best promoted the fraternity of nations, the abolishment or diminution of standing armies and the formation and increase of peace con¬ gresses. See Nobel Prizes.

Charles E. Munroe.

NOBEL PRIZES, The. A series of five annual prizes provided for by the will of Alfred Bernard Nobel (q.v.), intended for the reward of individuals who work for the benefit of humankind in the domains of (1) physics, (2) chemistry (3) medicine, (4) literature and (5) peace. Prizes (1) and (2) are awarded by the Royal Academy of Science in Stockholm; (3) by the Caroline Medical-Chirurgical Institute in Stockholm; (4) by the Swedish Academy in

Stockholm, and (5) by the Norwegian Stor¬ thing (Parliament). The statutes approved .by King Oscar of Sweden require among other conditions <(that every candidate for a prize ... be proposed as such in writing by some duly qualified person. A direct application for a prize will not be taken into consideration.® (< Every written work, to qualify for a prize, shall have appeared in print.® ((No work shall have a prize awarded to it unless it has been proved by the test of experience or by the examination of experts to possess the pre¬ eminent excellence that is manifestly signified by the terms of the will.® The announcements of the awards are made on 10 December when the prize is given together with a diploma and .gold medal. It is expected that within six months thereafter the prize-winner will lecture upon the subject for which the prize is awarded at Stockholm, or, in the case of the Peace prize, at Christiania.

The will was contested by heirs but a com¬ promise was effected on condition that a por¬ tion of the property be devoted to the found¬ ing of institutions for research, known as Nobel Institutes, which has been done. The income from the residue of the estate permits, however, of five prizes, each approximating closely to $50,000 in value, reduced after 1915 by the amount of the Swedish defense tax, being awarded annually.

From their inception in 1901 to 1920 the awards have been as follows :

Physics.— W. C. Rontgen, German; H. A. Lorentz and P. Zeeman, Hollanders; H. A Becquerel, P. Curie and Marie S. Curie, all French; Lord Rayleigh, English; Philipp Leonard, German; J. J. Thomson, English; Albert A. Michelson, American; Gabriel Lipp- man, French; William Marconi, Italian, and Ferdinand Braun, German; Johannes Diederik van der Waals, Hollander ; Wilhelm Wien, Ger¬ man ; Gustaf Dalen, Swiss ; H.

Kamerlingh Omnes, German; M. von Laue, German; Wil-. liam Henry Bragg and W. L. Bragg, English; Charles G. Barkla, English; M. Planck and Professor Stark, Germans; C. G. Breteuil, French.

Chemistry.— , J. H. von Hoff, Hollander; E. Fischer, German; S. A. Arrhenius, Swede; Sir William Ramsay, English; Adolph von Boeyer, German ; Henri Moissan, French ; Edouard Buchner, German ; Sir William Crookes, English ; Ernest Rutherford, English ; Wilhelm Ostwald, German; Otto Wallach, Ger¬ man; Marie S. Curie, French; Professor Griggnard and Professor Sabatier, French; Professor Werner, Swiss; William Richards, American; Richard Willstatter, F. Haber, Ger¬ mans, and. Professor Asihan, Finnish.

Medicine. — • E. A. von Behring German; R. Ross, English; N. R. Finsen, Dane; Pavloff, Russian ; Robert Koch, German ; Ramon y Cajal, Spanish; Professor Golgi, French; Dr. Laveran, French; Paul Ehrlich, German, and Elie Metchnikoff, Russian; Theodor Kocher, Swiss; Albrecht Kossel, German; Allivar Gull-i strand, Swedish ; Alexis Carrel, French ; Charles Richet, French; R. Barany, Austrian; Jules Bordet, Belgian, and A. Krogh, Danish.

Literature.— R. F. A. Sully-Prudhotnme. French; Th. Mommsen, German; Bjornsterne Bjornson, Norwegian; Frederic Mistral,

French, and Jose Echegaray, Spanish; Henryk Sienkiewicz, Polish; Professor Carducci, ItaL ian; Rudyard Kipling, English; Rudolf Eucken, German; Selma Lagerlof, Swedish; Paul Heyse, German; Maurice Maeterlinck, ˆ Belgian ; Gerhard Hauptmann, German ; Rabindranath Tagore, Bengalese; Romain Rolland, French; V. Heidenstans, Swedish; K. Gjellerup, Dane; H. Pontoppidan, Dane; C. Spitteler, Swiss; K. Hamsun, Norwegian.

Peace. — 'Henri Dunant, Swiss, and Fr. Passy, French; E. Ducommun and A. Gobat, both Swiss; W. R. Cremer, English; the Insti¬ tution of International Law (first award to an institution); Baroness von Suttner, Austrian; Theodore Roosevelt, American; E. T. Moneta, Italian, and Louis Renault, French; K. P. Arnoldson, Swede, and' M. F. Bajer, Dane; Baron d'Estournelles de Constant, French, and M. Beernaert, Belgian ; International Perma¬ nent Peace Bureau, Berne; T. M. C. Asser, Hollander, and Alfred Fried, Austrian; Elihu Root, American; Henri la Fontaine, Belgian; International Red Cross of Geneva; Woodrow Wilson,

American.

In 1918 Theodore Roosevelt, with the con¬ sent of ' Congress, distributed his prize among war charities. Consult Mosenthal, (0The In¬ ventor of Dynamite® in the Nineteenth Century (1898) ; (Les Prix Nobel } published annually at Stockholm.

NOBERT'S TEST-PLATES, finely-ruled glass plates so named from F. Nobert, a Ger¬ man optician, used for testing the power of microscopes. The rulings are executed on the under surface of a piece of exceedingly thin glass by means of a diamond point. Some of these ruled plates have the almost incredible number of 225,187 spaces to the inch. As means of testing the power of the microscope they are superior to any other object.

NOBILITY, in European countries, a cer¬ tain rank or class of society which possesses hereditary honors and privileges above the rest of the citizens. Such a class is found in the infancy of almost every European nation. Its origin may be attributed to military supremacy, to the honors paid to superior ability, or to the guardians or royal rulers of the nation. Among the Romans the patricians originally formed the nobility; but a new order of nobility arose out of the plebeians, consisting of those who had held curule magistracies and their de¬ scendants, and enjoying the right of having images of their distinguished ancestors. Among the ancient German tribes only obscure traces of hereditary nobility are found. The dignities of the counts of the Franks, the aider- men and great thanes of England, as also of the jarls (in England eorlas) of Denmark, were accessible to every one distinguished by merit and favored by fortune. In Venice a civic no¬ bility grew up consisting of a series of families who gradually acquired all political power and kept "it to themselves and _ their descendants. In England hereditary nobility, the nobility be¬ longing to the titles of duke, marquis, earl, vis¬ count and baron, is now entirely personal, though formerly, as a result of the Norman conquest, it was connected with the holding of lands.

In Spain and Italy still the same rank de¬ pends in greater measure upon property; and in France and Germany the de and von of titles point to the same fact. The higher grade of nobility in Spain are called Grandees, the lesser Titulados. In France and Germany nobility is common to all the members of the noble family, the nobles long formed a class of petty sover¬ eigns within their own domains, and they could not engage in trade without losing their rank. The French Revolution first deprived the nobles of that country of their privileges and exclusive rights, as that of jurisdiction, etc.; and the de¬ cree of 19 June 1790 abolished hereditary rank entirely. Under Napoleon I arose a new hered¬ itary nobility, with the titles of princes, dukes, counts, barons and chevaliers, which descended to the

eldest son. After the restoration of the Bourbons (1814) the ancient nobility reclaimed their former rights and privileges. Nobility was again abolished in 1848, but was restored by Napoleon III. Ah marquises and viscounts hold pre-Revolution titles. In Germany there are three distinct grades of nobility: (1) The members of reigning houses, and de¬ scendants of families who belonged at the time of the old empire to the sovereign no¬ bility of the state, and were reichsiunmittelbar, or directly connected with the empire, or hold¬ ing their domains directly under the emperor, but whose houses have subsequently been medi¬ atized, or deprived of sovereign power in ac¬ cord with special treaties between the state and the princes. There are at present 50 princely and 51 graftliche (countly) mediatized fami¬ lies, who in accordance with the act of the diet of 1806, have equality of rank with the reigning houses and enjoy many of -the special privileges which were accorded to the high nobles of the empire. (2) Counts and barons not belonging to the reigning or mediatized houses; and (3) the knights and patrimonial proprietors of Germany. In Norway the Par¬ liament abolished nobility by the three succes¬ sive decrees of 1815, 1818 and 1821.

In Great Britain titles of nobility can only be conferred by the sovereign, and that by pat¬ ent, in virtue of which they become hereditary. Life peerages also are occasionally conferred on judges of the supreme appellate court. The nobility, as the term is commonly used, consists of those holding the titles already mentioned (or all above the rank of baronet) and their more immediate connections ; but if the term were to be used as generally in Europe the gentry would also be included, or all families entitled to bear coat armor. Those of the no¬ bility who are peers of England or of the United Kingdom, hold hereditarily a seat in the House of Lords, while the Scottish peers elect 16 of their number to represent their order, and the Irish peers elect 28 representa¬ tives for thg same purpose. A few peerages are held by Canadians ; creations of recent years have evoked a storm of protest in the Dominion. There is no nobility in the United States, the Federal Constitution declaring that <(No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of Congress, accept of any present, emolument, office or title of any kind whatever, from any king, prince or foreign state.® Con-

gress sparingly gives its consent for a person in the service of the government to accept a decoration or other mark of honor from an¬ other government.

Consult for Great Britain: Burke,

NOBLE, Alfred, American civil engineer: b. Livonia, Mich., 7 Aug. 1844; d. 19 April 1914. From 1862 to 1865 he served with the Union forces in the Army of the Potomac ; after the war entered the University of Michigan, where he was graduated in 1870. In 1870-82 he super¬ intended alterations and improvements in the Saint Mary's Falls Canal and the Saint Mary's River between lakes Huron and Superior. After 1882 he gave his time to bridge and tunnel engineering. He was engineer of the Wash¬ ington Bridge, New York, the Mississippi bridges at Alton and Cairo, Ill., and was as¬ sistant chief engineer of the Missouri River bridges at Leavenworth and West Alton. He was a member of the Nicaragua Canal Board in 1895, of the United States Board of Engineers on deep waterways in 1897-1900 and of the Isthmian Canal Commission in 1899-1903. As member of the International Board of Con¬ sulting Engineers on the Panama Canal, Noble was one of the minority of five out of 13 engi¬ neers who advocated a lock system instead of a sea-level canal. From 1902 to 1909 he was chief engineer of the Pennsylvania Railroad tunnels under the East River, and of the termi¬ nal construction of the same road in New York City. He served also in an advisory capacity in the construction of the New York Subways and the Galveston sea-wall. He was awarded the John Fritz medal in 1910 and the Cresson medal of the Franklin Institute in 1912. He was a member of the American Society of Civil Engineers and of many similar societies, and served terms as president of most of these. He wrote papers which appeared in the Pro¬ ceedings of these societies.*

NOBLE, Sir Andrew, English physicist: b. Scotland, 13 Sept. 1832; d. 1913. He was educated at Edinburgh Academy and the Wool¬ wich Military Academy and was an authority on army ordnance and explosives. He was assistant inspector of artillery in 1859, and after 1860 was a member of the firm of Sir W. G. Armstrong, Whitworth and Company. In 1862 he invented the chronoscope, by which it was possible to measure the velocity of a projectile by various powders. This invention hastened the adoption of rifles. Later he became chair¬ man of the company. In 1900 he served as VOL. 20 — 25

member of a Royal Committee to investigate the properties of smokeless powder. He re¬ ceived many honors from domestic and foreign scientific societies and honorary degrees from Oxford and Cambridge. He was made Knight Companion of the Bath in 1893 and was created a baronet in 1902. He published (Artillery and Explosives (1906) and many papers, lectures, etc. He became high sheriff of Northumberland in 1896.*

NOBLE, Annette Lucile, American au¬ thor : b. Albion, N. Y., 12 July 1844. She was graduated at Phipps Union Seminary in 1863, and devoted

herself to literature and traveled over most of the civilized world writing stories and travel sketches for American periodicals. She wrote 30 books for boys and girls, some of which have been translated into Dutch, German and other languages. Her most popular works are (Uncle Jack's Executors (1880); (After the Failure* (1887) ; (The Crazy Angel**

(1901).

NOBLE, Eugene Allen, American educa¬ tor : b. Brooklyn, N. Y., 5 March 1865, was graduated from the Wesleyan University, (Con¬ necticut) in 1891 and studied theology also at Garrett Biblical Institute in Illinois. He was ordained to the Methodist Episcopal ministry and became pastor of Methodist Episcopal churches in Bridgeport, Conn. (1891—95) and Brooklyn (1895-97). From 1897 to 1902 he was superintendent of the Seney Hospital, Brooklyn, and from 1902 to 1908 head master of the Cen¬ tenary Collegiate Institute at Hackettstown, N. J. In 1908 he became president of Goucher College, Baltimore, serving until 1911 when he became president of Dickinson College (Pennsylvania), which post he held until 1914. He subsequently resided in Schenectady, N. Y., and is a contributor to magazines on educational and literary topics. He has received the degree of LL.D. from Hamilton College and the University of Pittsburgh; S.T.D. from Wes¬ leyan University; L.H.D. from Dickinson College; and D.D. from Saint John's College, Maryland.

NOBLE, Frederick Alphonso, American Congregational clergyman : b. Baldwin, Maine, 17 March 1832; d. 31 Dec. 1917. He was grad¬ uated from Yale in 1858, and from the theo¬ logical seminaries of Andover (1858-60) and Lane (1861). He was minister of Union Park Church, Chicago, 1879-1901, when he resigned and was president of the American Missionary Association 1898-1900. He has been promi¬ nently connected with the leading missionary conferences of his church, and has written (Divine Life in Man (1896) ; (Typical New Testament Conversions* (1901) ; (The Pil¬ grims* (1903), etc.*

NOBLE, John Willock, American lawyer: b. Lancaster, Ohio, 26 Oct. 1831 ; d. 1912. He was graduated from Yale University in 1851 and engaged in law practice. He was city at¬ torney of Keokuk, Iowa, at the outbreak of the Civil War, when he enlisted and served through the war, rising to the rank of brevet brigadier- general. After Lie war he settled in Saint Louis ; in 1867-70 he was United States attorney for Missouri at Saint Louis, and in 1889-93 Sec¬ retary of the Interior in President Harrison's Cabinet. He resumed his law practice in Saint

Louis His term as Secretary was rendered difficult by the questions attendant on organiz- ing the Territory of Oklahoma and opening Indian lands to settlement by the whites.

NOBLE, in numismatics, an ancient Eng¬ lish coin> six shillings and eightpence, or "Jst. ,struck in the reign of Edward III, U44. Half-nobles and quarter-nobles were also in circulation at the same period.

NOBLESVILLE, no'b'lz-vil, Ind., city, county-seat of Hamilton County, on the White Kiver, and on the Lake Erie and Western and Chicago and Southeastern railways, 24 miles north by east of Indianapolis, and interurban roads to all parts of Indiana. It is in a fine agricultural region and in a natural gas belt It was settled in 1824, and in 1839 was incor¬ porated. Hamilton County is the greatest horse-raising county in Indiana. Its manufac¬ turing industries comprise carriage, furniture and box factories, planing mills, flouring mill, foundry, straw board, enameling, carbon, serum, and dairy products, and a canning factory. It has grain elevators, water, electric and gas plants, splendid schools, churches, library, up-to-date public buildings, paved streets, coni Crete walks, modern homes with beautiful lawns and shade trees. Living conditions and other advantages are most favorable for all kinds of manufacturing. It has a large trade in its manufactured articles and farm products at home and abroad. It maintains a very progress¬ ive Chamber of Commerce. The charter of 1890 provides for a mayor, who holds office four years, and a council. Pop. (1920) 4,758.

NOBUNAGA, no-boo-na'ga, Japanese gen¬ eral and statesman: b. Owari, 1533; d. Kioto, 1582. He was son of a soldier and small land¬ holder, and to the little property left him in *49 by his father rapidly added more, so that in 1559 he had control of the entire province of Owari. Thence, with the assistance of his lieu¬ tenant, Hideyoshi, he made bold forays into neighboring provinces. In 1567 he made an alliance with Yoshiaki, younger brother of the lately assassinated shogun, and^ having put him upon the throne in 1568, was appointed vice¬ shogun, in which office he put down all opposi¬ tion, crushed the political power of Buddhism, and ensouraged the Jesuit missions, no doubt merely to counteract the influence of the Budd- nists. Yoshiaki, attempting an alliance against Nobunaga, was deposed in 1573, and Nobunaga took the powers but not the titles of the shogunate, thus forwarding the work of politi¬ cal reform. In 1582 one of his lieutenants, angered, according to legend, 'by a practical joke of Nobunaga, turned against him, hemmed him in in a temple in Kioto, and set fire to the building. Nobunaga committed hari-kari. Con¬ sult Dening, (Life of Hideyoshi } (1890);

Brinkley, < Japan > (1901).

NOCERA INFERIORE, no-cha'ra en'fa- re-o ra (formerly NOCERA DE' PAGANI),

Italy, town in the province of Salerno, 23 miles southeast of Naples by. rail. It is situated at the foot of Monte Albino, 135 feet above the sea-level. A branch railway of the line from Naples to Avellino connects Nocera with Codola (three miles). The town was the an¬ cient Nuceria Alfaterna, destroyed by Hannibal in 216 b.c. and rebuilt by Augustus. The old

cathedral proves that Nocera became a see at an early date. In the 12th century Nocera took the part of Innocent II against Roger of Sicily and paid heavily for its choice. A colony of Saracens was brought here by Frederick II, and from their presence the town is suoposed to have received the name <(of the pagans, a name also given to the town of Pagani about a mile away. In 1385 Pope Urban VI was be¬ sieged in the castle of Charles of Durazzo. Here he had imprisoned the cardinals who favored the anti-pope Clement VII. In this old castle, now in ruins, Helena, widow of Man¬ fred died after the battle of Benevento (1266). Two miles toward the village of Nocera Superiore is the circular church of Santa Mana. Maggiore dating from the 4th century with its curious dome covered with a false roof.. This is supported by 40 ancient columns and its walls are covered with frescoes of the 14th century. Nocera was the birthplace of Francesco Solimena, the painter, and of Hugo de Pagani, founder of the Templars. Nocera is the episcopal see of Campania. It has several large factories for linen and woolen goods Pop. (1911) 23,368.

AivitfKUSlANzE, The. It was

in October 1817, that the brilliant young Scotch- men, John W ilson and John Gibson Lockhart, took the new Blackwood's Magazine out of the hands of two incompetents who for six months had been feebly trying to bring it to birth, and de. it at °.nce the most brilliant and daring of English periodicals. Five years later, in 1822, there appeared in its pages the first number of that famous • series of papers in dialogue, the Noctes AmbrosianaeP It is not certainly known with whom the plan of the Noctes originated. For the first year or more, both Wilson and Lockhart seem to have contributed to them, perhaps with some assistance from that swash-buckling Irishman, William Maginn who figures as O'Doherty in the early numbers, u U1, 1 , Lockhart resigned his position on the Blackwood to take charge of the new Quarterly Review in London, and after that time most of the papers were certainly written by Wilson himself. He abandoned the attempt to nnpei sonate many different characters, and reduced the number of speakers to three: Christopher North the Ettrick Shepherd (James Hogg),

and a Mr. Tickler, said to represent an uncle of Wilson. But the three persons only represent different sides of Wil¬ son s genius or different moods of his temper Christopher North is Wilson as critic or philosopher, though not given to very staid re- flection in either capacity; the Shepherd repre¬ sents Wilsons exuberant humor and extrava- gant sentiment Wilson letting himself go Uck er, the most prosaic person of the three is Wilson the man of affairs. The Noctes are the record of those jovial nights when these thiee foregathered in ftthe blue room^ or at well-laden table of the Edinburgh inn of Mr. Ambrose.*

No form of composition could have been better suited to give full expression to Wilson's genius. For Wilson was never a careful or consecutive thinker; his prejudices and his emotions were always getting the better of his argument. His statements were seldom precise his opinions seldom temperate. But from the

jovial speakers at the table of Mr. Ambrose we do not expect methodical discussion in judicial P^^ase- It is talk we hear there; the talk of red-blooded men of full minds and healthy di¬ gestions, eager, witty, exhaustless and never dull. It ranges freely over all subjects, literary, social, political: in one evening you shall get a broad and vivid picture of the life of that day as a high-spirited Tory gentleman sees it. Of course the reader of our time must find much of this rapid after-dinner talk concerned with matters merely local and temporary, with men and measures now forgotten; he will sometimes also be a little impatient at the amount of in¬ terest in meats and drinks and the effects thereof. Yet in these papers from month to month there is a great volume of literary criticism, often prejudiced, usually brief and unsystematic, but often wise and never merely idle ; there is also a great body of political and social criticism, often narrowly Tory in char- after, but always positive and vigorous. And the talk is constantly running away from these more serious themes, to some of the homely joys of active life. You shall find an account of a dog-fight or a swimming match standing cheek by jowl with a slashing criticism of the cockney poets or an estimate of the Kantian philosophy. For North was alwavs an out-of- door man who loved horses and dogs ; perhaps he is at his very best in some of those rhap¬ sodies of the Shepherd which are at once the most faithful and the most imaginative descrip¬ tions of Scottish scenery ever written.

But whoever the speaker and whatever the theme, the voice is always that of John Wilson — big, arrogant, sentimental, soft-hearted giant, who

*daffed the years aside and declared that the one thing he proposed never to learn was how to grow old. The voice is doubtless rather loud and the temper over-excited. There was little subtlety in Wilson's mental processes, lit¬ tle fineness or delicacy in his sympathies. But, perhaps for this reason, no man could ever put himself more completely into his writing. To be in his company is, at all events, to get a new sense of many of the healthy joys of living. Even if it is claimed that the Noctes do not teach or inspire, they have at least lasting power to exhilarate; and that, in such a dull-colored world as this sometimes seems to be, is, no small service. Consult Oliphant, Mrs., 'William Blackwood and His Sons) (Vol. I, ch. 6) ; Saintsbury, (Essays in English Litera¬ ture > (1780-1860, ch. 9) ; Winchester, C. T., 'A Group of English Essayists.**

Caleb T. Winchester, Professor in Wesleyan University.

NOCTILUCA, a luminous flagellate pro¬ tozoan (Noctiluca miliaris), extremely abundant throughout all seas, and one of the chief causes of the "phosphorescence® of the waves. It is a spherical animal — large for an infusorian (.02 inch in diameter) — and moves by means of a long stout lash or flagellum, beside which there is a second, very much smaller, lying in the "mouth® region. Its substance is remarkably spongy, and tke phosphorescence is said by All- man to have its seat just underneath the tough rind which is its most peculiar characteristic. The young are derived from segmentation of the protoplasm of the body, which forms small oval bodies with a whip-like lash, quite unlike the adult, but in general resembling other flagel¬

late protozoa. It represents, with a similar form (Leptodiscus) , the order Cystodagellata. See Flagellata.

NOCTUIDiE. See Moths.

NOCTURNE, (1) in art, a painting exhib¬ iting some of the characteristic effects of night light. Whistler has produced various nocturnes which have given rise to considerable contro¬ versy. (2) In music, the term denotes a com¬ position in which the emotions, particularly those of love and dreamy, melting tenderness, are developed. The nocturne was invented by John Field, and has become a favorite style of composition with modern pianoforte composers. Chopin is the most famous of nocturne com¬ posers. See Chopin.

NOD, LAND OF, The, the "land east of Eden,® to which Cain fled after he had killed his brother Abel (Genesis iv, 16). Some au¬ thorities consider the word as coming from the Hebrew nud, to flee, and think the Land of Nod means simply the land of flight, or exile, or "the land of wandering.®

Other authorities go so far as to identify Nod with some country in India, or take it to mean the land of nomadic tribes in Asia, perhaps extending even to China. Sayce (Expository Times 1911) thinks it was the "land of Yalu,® east of Babylonia. Others again suppose that Cain represents the Kenites, a tribe inhabiting the Negeb, and that the Land of Nod may have been a district there. Cain, or Kayin, might easily have represented the nomads of Central Asia. "That the figure of Cain represents some phase of nomadic life may be regarded as certain,® writes a com¬ mentator. The name Cain has a collective sense; and every descriptive touch in the clos¬ ing verses is characteristic of desert life. His expulsion expresses the fundamental fact that his descendants are doomed to wander in the uncultivated regions beyond the pale of civiliza¬ tion. We are, therefore, led to think of Cain as the impersonation of an inferior race of nomads, maintaining a miserable existence by the chase and practising a peculiarly ferocious form of blood-feud. The view thus suggested of the fate of Cain finds a partial illustration in a group of low-caste tribes called Solubba, or Sleyb. These people live partly by hunting, partly, by coarse smithwork and other gipsy labor in the Arab encampments. They are for¬ bidden by their patriarch to be cattle-kepers, and have no property but a few asses ; they are excluded from fellowship and intermarriage with the regular Bedouin, though on friendly terms with them: and they are the only tribes that are free of the Arabian deserts to travel where they will, ranging . practically over the whole peninsula from Syria to Yemen. To go to the Land of Nod is an old English form meaning to go to bed.

NODAL LINES AND POINTS. See

Node; Harmonics.

NODDY, a sooty brown tern (Anons stoli- dus) , widely diffused through the northern and southern hemispheres, and well known to sailors for its fearlessness, regarded as stupidity, al¬ lowing itself even to be taken by the hand; but this is true only of birds rarely or never dis¬ turbed by men. The noddy is a rare visitant to northern shores, but is very abundant in warmer climates, as in the West Indies and South Seas,

where its eggs are gathered from certain lonely islets in immense quantities and used as food.

NODE, (1) in astronomy, the two points in which the orbit of a planet

intersects the plane of the ecliptic ; the one through which the planet passes from the south to the north side of the ecliptic being called the ascending node, and the other the descending node. As all the bodies of the solar system, whether planets or • comets, move in orbits variously inclined to the ecliptic, the orbit of each possesses two nodes, and a straight line drawn joining these two points is called the line of nodes of each body. It is scarcely necessary to add that as the earth moves in the plane of the ecliptic she has

N O D I A K , a Papuan animal. See Echidna.

NODIER, Charles, sharl no-de-a, French author: b. Besangon, France, 29 April 1780; d. Paris, 27 Jan. 1844. At an early age he pro¬ ceeded to Strassburg, where he studied under Eulogius Schneider, and, returning to his native district, gave much of his attention to natural history. In 1798 he became assistant librarian at Besangon. Soon drawn into connection with Royalist clubs, he wrote with great acrimony against Bonaparte. These philippics subjected him to prosecutions, and even to imprisonment. For several years he lived concealed in the Jura, and then fled to Switzerland, where he sup¬ ported himself as a corrector of the press until, after many adventures, he returned to France. In 1814 he went to Paris, where Louis XVIII rewarded him with a title of nobility and the cross of the Legion of Honor. In 1824 he was appointed librarian to the arsenal, and while in that post he actively assisted the growth of Romanticism, and in 1833 was admitted a mem¬ ber of the Academy. As a critic he is known by a series of excellent editions of the French classics with notes. As a grammarian and lexi¬ cographer he published dictionnaire universel de la langua frangaise) and dlements de linguistiqueP Among his many other works, many of them fictions of the romantic school, are (Stella ou les proscrits) (1802); (1822) ; the first direct imitation in France of Scott's romances; (La Fee aux miettes) (1832) ;

degende de Soeur Beatrix (1838). Consult Menessier-Nodier, (Charles Nodier* (1867).*

NODULAR DISEASE. See Sheep.

a

NOE, Amedee de, a-ma-da de no-a. See Cham.

NOEGGERATH, neg'e-rat, Emil Jacob,

German gynecologist : b. Bonn in 1827 ; d. Wiesbaden in 1895. He was educated in Bonn, receiving his medical degree in 1855, and came to the United States in 1856. Settling in New York, he became professor of

*obstetrics and gynecology at the Bellevue Hospital Medical College. In 1885 he went back to Germany and settled in Wiesbaden. He originated a new method in ovariotomy and was one of the first to emphasize the importance of latent gonorrhea in women. With Dr. Jacobi he founded in New York the American Journal of Obstetrics, of which he was coeditor from 1868 to 1871. With Abraham Jacobi he also wrote Contributions to Midwifery * (1859). He was sole author of (Beitrage zur Struktur und Entwicklung des Carcinoms) (1892).*

NOEL, no'el, Baptist Wriothesley, Eng¬ lish clergyman: b. Leightmont, Scotland, 10 July 1799; d. Stanmore, Middlesex, 20 Jan. 1873. A brother of the 1st earl of Gainsborough, he was graduated from Cambridge University in 1821, entered the Anglican priesthood and became in 1827 incumbent of Saint John's, Bedford Row, London, where he achieved distinction as an evangelical preacher and helped (1846) to found the Evangelical Alliance. In 1848 he quitted the Establishment for the Baptist fold, was minister of John Street Chapel, London, 1849-68, was twice president of the Baptist Union, and was prominent in philanthropic labors in the metrop¬ olis. He supported strenuously the cause of the North in the American Civil War. He pub¬ lished (Essay on Christian Baptism (1849) ; (The Union of Church and State) (1848) ; (Freedom and Slavery in the United States of America* (1863) ; (Hymns About Jesus> (1869), etc.*

NOEL, Nicholas, French physician: b. Rheims, 27 March 1746; d. Rheims, 11 May 1832. He was the son of a poor laborer and was apprenticed to a blacksmith, but his love for science attracted the cure of the parish, who obtained a fellowship for him in the Paris University. He left his studies there to give his assistance to the United States in the struggle for independence. Arriving in 1776 he offered his services to Congress and was appointed surgeon to a regiment in Gen. Nathaniel Green's division. He was also surgeon on the frigate Boston ; organized the military hospitals in Philadelphia; and was present at the surrender of Yorktown in 1781. Returning to France in 1784, he became house surgeon of the hospital in Rheims. In 1792 he was again in the army. In 1793 he was appointed inspector of military hospitals in Belgium, but he resigned in 1795. He then settled in Rheims, where he founded an academy of medicine and a botanic garden. His writings include (Journal

NOEL, Roden Berkeley Wriothesley,

English poet: b. England, 27 Aug. 1834; d. Mainz, Germany, 26 May

1894. He was a son of the Earl of Gainsborough. He was educated at Cambridge, and though never a popular poet his work appeals to highly educated readers and is much of it rich in melody, though too voluminous to keep entirely to his best standard. His published volumes include 'Behind the Veil and Other Poems) (1863) ; 'A Little Child's Monument5 (1881) ; 'A Modern Faust and Other Poems5 (1888), etc.

NOEL, Thomas, English poet: b. Kirkby- Mallory, England, 11 May 1799; d. Brighton, 16 May 1861. He was graduated from Merton College, Oxford, in 1824, and was the author of 'The Cottage Muse5 (1833) ; 'Rhymes and Roundelayes5 (1841), which includes the famous poem 'The Pauper's Drive,5 often credited to Hood; 'Beatrice and Other Poems5 (1868). He also wrote the words of the well-known song 'Rocked in the Cradle of the Deep.5

NOEMI, a romance by Sabine Baring- Gould, published in 1895. It is a tale of Aqui¬ taine, during the English occupation, in the early 15th century.

NOETIANS, no-e'shi-anz. See Sabellius.

NOETIC CONSCIOUSNESS. See

Metaphysics.

NOGALES, Ariz., town and county-seat of Santa Cruz County on Mexican border and on the Southern Pacific Railroad, 68 miles south of Tucson. A street is the dividing line from the Mexican town of the same name. The ruin of the Tumacacori Mission near Nogales, built by Father Kino in 1687, is an interesting histori¬ cal feature. The town is an inland gateway to the west coast of Mexico and is a centre of mining and cattle industries. Mining machinery is manufactured. The headquarters of the United States customs district for the State are located here. The waterworks and sewage plant are municipal property. Pop. (1920)

5,199.

NOGALES, no-ga'les, (1) Mexico, town in the state of Sonora, on the Santa Cruz River, on the boundary between Mexico and Arizona, and on the Sonora Railroad. A United States consul is stationed here. Pop. 3,640. (2) The

Mexican town is separated only by a thorough¬ fare from an American town of the same name, and greater population, the capital of Santa Cruz 'County, Arizona.

NOGARET, no-ga'ra\ Guillaume de,

French statesman : b. Toulouse in 1260 ; d. Paris, April 1313. His father was a citizen of Tou¬ louse, said to have been condemned as a heretic during the Crusade of the Albigenses. The name came from a small ancestral property at Nogaret, near Saint Felix de Caramon. Guil¬ laume de Nogaret studied law and was pro¬ fessor of jurisprudence in the University of Montpelier. In 1293 he entered the service of the French king, Philip IV, and spent the rest of his life in extending the power of that monarch. In 1295 he became a member of the royal council. His name is mainly conspicuous because connected with the quarrel of Philip IV with Pope Boniface VIII. In 1300 he was sent with an embassy to Pope Boniface VIII of

which he left a very highly colored and pic¬ turesque account; and in 1303 when Philip IV was about to yield to the power of Boniface, who was extending his authority over the sovereigns of Europe, Nogaret came forward with a bold plan that he should go to Italy, seize Boniface and bring him to a church coun¬ cil in France convened to depose him for heresy, simony and other crimes. The king consented to the plan, and on 7 March a solemn royal as¬ sembly was held in the Louvre, where Guillaume de Nogaret read a long series of accusations against Boniface and demanded the calling of a council to try him. Soon afterward Nogaret went to Italy, and by the aid of a Florentine spy he gathered in the Apennines a band of enemies of the Gaetani (Boniface's family). Among these was Sciarra Calanna, who accom¬ panied Nogaret to Anagni, the birthplace of Boniface, who was there. On 7 Sept. 1303, Nogaret and Colonna at the head of a com¬ pany of 1,600 men surprised the little town and took Boniface prisoner. Within two days, however, the people rose and compelled the invaders to flee. The aged Pope was freed, but he died a month later (11 October). His suc¬ cessor, Benedict XI, was too timid to excommu¬ nicate the offenders. Early in 1204 Nogaret went to Languedoc to report to Philip IV, who re¬ warded him with gifts of money and land, in¬ cluding the town of Marsillargues on the right bank of the Vidourle (in the eastern part of the Department of Herault), with its castle. Nogaret was sent back with an embassy to Benedict XI to demand absolution for all con¬ cerned in the plot against Boniface. Benedict refused to receive Nogaret and excepted him from the general absolution he granted on 13 May 1304. On 7 June the Pope issued against Nˆogaret and those associated with him in the attack of Anagni the Flagitiosum scelus. When Benedict died, 7 July 1304, French influence had a Frenchman, Bertrand de Got, elected as Benedict's successor, under the name of Clement V. In 1312 Clement V acceded to Philip's plan to destroy and despoil the Templars. The whole proceeding bears traces of the un¬ scrupulous Nogaret, who was successful in getting the renegade members of this order together to give evidence against their fellows. In 1307 Nogaret became

keeper of the seal, and in consequence, was the king's chief Minister. He was employed in the trial of Guiscard, bishop of Troyes, charged with various crimes including witchcraft, which had begun in 1308 and lasted until 1313. This legal procedure may have been a gentle hint to Clement V. for the latter granted absolution to Guillaume de Nogaret on 2 April 1313. As a penance Nogaret was to go on the next crusade and also to visit certain pilgrimage places in France and Spain. He never did so. He remained keeper of the seals until his death and was busy with the king's affairs concerning Flanders a month be¬ fore his death. Consult Dupuy, 'Histoire du differend d'entre le pape Boniface VIII et Philippe le Bel, roy de France5 (Paris 1655) ; Renan in 'Histoire litteraire de la France, XXVII5 ; Holzmann, 'Wilhelm von Nogaret5 (Freibure 1898) ; Finkc, Heinrich, 'Aus den Tagen Bonifaz VIII5 (Munster 1902) ; Moli- nier, Auguste, 'Les Sources de l'histoire de France TIT 5 (Paris 1903), and Thomas, Louis,

(La vie privee de Guillaume de Nogaret, An¬ nates du Midi (Toulouse 1904).*

NOGARET, Stanislas Henri Lucien de,

French colonist in America: b. Marseilles, 1682; d. Paris, 1759. He studied law; ran away from college ; served in the army in Canada until 1716, and then was sent to Louisiana, where he became Bienville's lieutenant in the bloody wars with the Natchez Indians described by Nogart in his (Precis des etablissements fondes dans la vallee du Mississippi par le Chevalier Le Moyne de Bienville) (1738). From 1735 until his death Nogaret resided in France and acted as director of the Louisiana Company.

NOGENT-SUR-MARNE, France, a town in the Department of Seine, six miles east of Paris by rail. It is built on a hill on the right bank of the Marne. The Eastern Railway crosses the Marne here over a viaduct 875 yards long. Nogent stands on the line of the Paris fortifications on the outskirts of the Bois de Vincennes. Its beautiful situation gained for the town the name of Beaute and Charles V built a castle here which Charles VII pre¬ sented to Agnes Sorel who was called in con¬ sequence ((Dame de Beaute.® This chateau was demolished in the 18th century. An island in the Marne south of the town is called lie de Beaute. An old Gothic church with a Roman¬ esque tower is Nogent's chief building. In front of it stands a monument to the painter, Wat¬ teau, who died here in 1721. Nogent has exten¬ sive stone quarries and manufactures pottery and

chemicals. Pop. (1911) 14,051.

NOGI, no'ge, Kiten Marosuke, Japanese soldier: b. Chosu, near Tokio in 1849; d. Tokio, 13 Sept. 1912. He came from one of the fami¬ lies of the Samurai, the old nobility of Japan, and was brought up with ideals of rigid etiquette and Spartan heroism. Trained for a soldier's career, he became a major in 1871 and was made a captain in 1877, participating in the civil war of that year in Japan. During the Chino- Japanese war he commanded a brigade and fought in the battles of Kinehow and Port Arthur, placing his troops with such skill at the latter place that the city quickly fell into the hands of the Japanese. He was immediately promoted to be lieutenant-general with com¬ mand of the second division and rewarded with a peerage. In 1896 he was made governor- general of Formosa, but his rule proved too strict and he returned to Japan as commander of the 11th Division. This post he resigned in 1900 and retired to quiet life, devoting him¬ self to farming and ihe study of warbooks, war maps and methods, preparing for the struggle that he predicted would come with Russia. When the Russo- Tapanese war broke out in 1904, Nogi was promoted to general, and ordered to attack Port Arthur. He landed his corps on the Liaotung Peninsula on 1 June 1904 and commanded the first and 11th Divi¬ sions. Gradually he detached himself from Oku's army corps and fell into a position to march to Port Arthur. The city of Dalny fell (26 May). On 6 June Nogi took command of the Third Army, protected in the rear from the army of Oku. The Japanese had now to drive the Russians from the passes and roads and to prepare a base of supplies. Much heavy fighting occurred, but Noai marched against

the Russian outposts on 26 June and drove the enemy from strong positions. He was, how¬ ever, attacked furiously by Stoessel, the Russian commander, whom he ultimately overcame. By the end of July Nogi was in the immediate neighborhood of Port Arthur; and, although he had lost about 8,000 men, he attacked the Russians on 20 July with an equal force. His supplies were inadequate and he had not been correctly informed as to the strength of the fortress. The siege continued for six months, marked by terrific fighting and terrific losses on both sides. The Japanese lost in three weeks 16,000 men. In September the fighting concen¬ trated at 203 Meter Hill, which the Japanese took on 5 December. Nogi's two sons were among those killed in the attempt to capture this point. The Japanese lost some 10,000 men and the Russians about 3,000 at Port Arthur which General Stoessel surrendered to Nogi on 2 January 1905. In the course of the fighting here hand grenades made their appearance. Nogi now led this army toward Mukden where General Kuropatkin had made a stand. In February Nogi swung around the Russian left wing and from 9 March to 16 March a desper¬ ate battle raged around the capital of Man¬ churia. The battle of Mukden was up to that date the greatest battle that the world

had seen. At Mukden 700,000 troops were fighting on a line which was at one time 80 miles long. Nogi had the honor of bringing about Kuropatkin's retreat and surrender. He was created baron in 1895 and raised to count in 1906. At the command of the emperor he became honorary president of a school for young peeresses.

The unusual circumstances of his death at¬ tracted worldwide interest and comment. Japan's most famous general, with his wife, committed suicide on the occasion of the fu¬ neral of the emperor, Mutsuhito. This was done <(in accordance with Samurai tradition, in order to inspire his countrymen with reverence for the past and to save them from the cor¬ rupting tendencies of modern life.® As the gun gave the signal for the funeral procession to start, the Count and Countess Nogi, care¬ fully attired for the ceremony, stabbed them¬ selves with swords according to the etiquette of hara-kiri, the honorable Japanese suicide. The dramatic event impressed the whole world and provoked much comment. ((The fact was,® writes a commentator, ((that General Nogi was a great Samurai bred in the practice of ancient Japanese knighthood and nobly illustrating its virtues. He had served his country with unsel¬ fish devotion. From his youth he had borne hardships and great sorrows with the stoicism of his ancestors; the winner of some of the greatest and most fiercely fought battles of modern times, he had ascribed all his victories to the influence of the spirit of his Imperial master ; and when that master died, in accord¬ ance with the ancient habit of the Samurai, he committed suicide in order that the emperor might not go alone on his journey. General Nogi's death brought out very strikingly the sincerity of his loyalty to the old ideas of Bushido — the Samurai code of honor, courage, loyalty, courtesy. It also presents in a very dramatic way the contrast between non-Chris¬ tian and Christian ideals.®

The Japanese view of the suicide is seen in Count Okuma's words concerning the event : <(There was a threefold motive : first, the deed was marked by loyalism of the very highest kind ; second, the act was a warning to the modern tendencies toward corruption, or fall¬ ing away from the old ideals of life among the upper classes of our people ; third, it was a re¬ buke to those in high places in the army and in official life who are becoming more and more absorbed in money-making, in politics and in the furthering of their aspirations at Court.®

Count Nogi was famous for his character as a man as well as for his soldierly qualities. He was also a famous poet, highly skilled in the technique of the art. ((Poet, dreamer, seer,® wrote Richard Barry,, ((he kept himself detached — a body apart who retained all his faculties for

supreme concentration on the vital military problems when they were presented. In executive skill, in organizing talent, he seemed to be deficient. In the military genius that comprises tactics and strategy and the in¬ spiration of effective leadership he was su¬ preme. He died — calm, masterful, serene — with the poise of an informed spirit, to whom this life is but a lesser step in the greater jour¬ ney.® See Russo-Japanese War; Mukden; Port Arthur, etc. Consult Washburn, Stanley, (Nogi: a man against the background of a Great War5 (New York 1913) ; Barry, Rich¬ ard, (Nogi — Seer, Statesman and Soldier) in Harper's Weekly (28 Sept. 1912) ; Farant, Leon, (Le generate Nogi poete and also Val- joie, Jean de, (La mentalite japonaise a propos du hara-kiri 5 in Societe Franco-Japanaise de Paris (Paris 1912) ; Barry, Richard, (Port Ar¬ thur : a Monster Heroism5 (New York 1905), portrait of General Baron Nogi studying the defenses of Port Arthur in his garden in the Willow Tree Village, Manchuria, p. 62; also portrait of Nogi Harper's Weekly (21 Sept.

1912).

NOGUCHI, nd'goo-che, Hideyo, Japanese physician: b. Inawashiro, Yama, Fukushima, japan, 24 Nov. 1876. He was educated in pub¬ lic schools and under private tutors in French, English, German and Chinese literature, and was graduated in medicine at the Tokio Medi¬ cal College in 1897. He was assistant in the General Hospital in Tokio in 1897-98; assistant in the Government Institute for Infectious Dis¬ eases in 1898-1900; quarantine officer in the Yokohama Harbor Station in 1899; and physi¬ cian in charge of the Central Hospital at New- chwang, China, in 1899-1900. He was also lec¬ turer on pathological anatomy, Tokio Dental College in 1898-99. In 1901 he came to the United States and studied at the University of Pennsylvania, where he became assistant in pathology in 1901-03. In 1903-04 he was in Copenhagen, connected with the Staten Serums Institute. Returning to the United States, he worked in the Carnegie Institute in Washing¬ ton in 1903-04. In 1904 he joined the staff of the Rockefeller Institute for Medical Research, New York, of which he became a member in 1914. His contributions to medical science are the following: special attention to serpent venoms ; a method for obtaining a pure vaccine for smallpox; pure cultivation of syphilitic or¬ ganisms; microscopy of infantile paralysis; the presence of treponema pallidum in the

brain of general paresis and in the spinal cord of locomotor ataxia; and introduction of a skin test for syphilis. He is the author of the so- called Noguchi luetin reaction. He is a Fellow of the New York Academy of Sciences; and a member of the Association of American Patholo¬ gists and Bacteriologists; Association of Ameri¬ can Physicians; and many others. He was knighted by King Alfonso of Spain in 1913, by King Christian of Denmark in 1913 and by the king of Sweden in 1914. The Emperor of

Japan gave him the Order of Merit in 1915. He has published (Snake Venoms) (New York 1909) ; (Serum Diagnosis of Syphilis and Lue¬ tin Reaction) (1910; 3d ed. 1912). Consult Paget, S., (Noguchi's Researches in Infective Diseases, Science (N. S., Nov. 21, 1913) ; Por¬ trait in World's Work (January 1914).

NOGUCHI, Yone, Japanese poet: b. Tsu¬ shima in 1875. He was educated at the Otani School, Nagoya, under the support of the main Buddhist temple of the Otani sect, at the Na¬ goya High School and at the Tokio University. In 1893 he came to the United States, arriving in San Francisco, where he suffered extreme poverty. He made some friends among Amer¬ ican writers and stayed for a time with Joaquin Miller. In 1897 he published (Seen and Un¬ seen: or Monologues of a Homeless Snail,5 and in the next year (The Voice of the Valley, 5 a little book inspired by a stay in the Yosemite. In 1902 he went to England and lived with Yoshio Markino, a Japanese artist, in poor lodgings in the Brixton Road, London, pro¬ ducing here a little book (From the Eastern Sea,5 the cover of which was designed by Yoshio Markino. During his stay in England he lectured at Oxford on Japanese poetry. In 1903 he went to New York and returned to Japan. He crossed to China and traveled for about a year and in 1906 he published in Tokio (The Summer Cloud.) He writes fre¬ quently under the nom de plume of <(Miss Morning Glory.®*

Besides the books mentioned Yone Noguchi has published (The American Diary of a Japa¬ nese GirP (1902, 1913); (The Pilgrimage5 (1909-12) ; (Lafcadio Hearn in Japan5 (1911) ; (Through the Torii5 (1914) ; (The Spirit of Japanese Poetry5 (1914) ; (The Spirit of Japanese Art5 (1914). Consult (The Story of Yone Noguchi told by himself,5 illustrated by Yoshio Markino (London 1914) ; and Ran- some, Arthur, Portraits and Speculations5 p. 189 (London 1913).

NOILS (also Noyls), the short and broken fibres and knots of wool that are combed out of the long staple. Noils are after¬ ward carded and spun into coarse woolen yarn. They are also used for felting. Noils are, therefore, the short refuse wool which re¬ mains entangled among the teeth. There are many grades of noils. The word seems to come from the Latin nodus, a knot, and through the Old French noill, nuiel or newel, a button or stone of a fruit, and the modern French noyau, a kernel.

NOIRE, nwa-ra, Ludwig, German phi¬ losophical writer: b. Alzey, Hesse, Germany, 26 March 1829; d. Mayence, Germany, 26 March 1889. He was educated in Giessen and taught for many years in the gymnasium at

Mayence, giving himself meantime to philosoph¬ ical study. He wrote (Die Welt als Entwickel- ung des Geistes) (1874) ; (Einleitung und Be- griindung einer monistischen Erkenntnissthe- orie> (1877); 0885).

NOISELESS POWDER. See Explo¬ sives.

NOISSEVILLE, nwas-vel, France, a vil¬ lage five miles east of Metz, celebrated as the scene of Bazaine's attempt to break through the line of German besiegers, 31 Aug.- 1 Sept. 1870. With 120,000 men and 600 'guns, he at¬ tacked Manteuffel with 41,000 men and 138 guns, drove him back and took the villages of Montoy, Servigny and Courcy, but German re¬ inforcements arriving on the second day, Bazaine was compelled to fall back upon Metz.

NOLA, no'la, Italy, city and episcopal see in the province of Caserta, 16 miles east by north of Naples. It is said to have been founded by the Etrurians before Rome was built, and 313 b.c. it became a part of the Roman territory. It successfully resisted an attack ol Hannibal in the Second Punic War. Nola claims to have made, in the 5th century, the first bells used in Christian churches and the festival of Saint Paulinus, their inventor, is faithfully observed. Giordano Bruno (q.v.) was born in Nola and Augustus died here in 14 a. d. Nola is celebrated for its antiquities, which include a portion of a church of the 4th century. Pop. 14,900.

NOLDEKE, nel'de-ke, Theodor, German orientalist : b. Harburg, Germany, 2 March •1836. He was educated at the gymnasium of Lingen, Hanover, and at the University of Got¬ tingen. In 1859 he won the prize offered by the French Academie des Inscriptions with his history of the Koran, which he wrote in French and translated into German in the following year. He was privat-docent at Gottingen in 1861-64, and then was appointed assistant pro¬ fessor there. In 1868-72 he occupied the chair of theology at Kiel and was then called to the professorship of Oriental languages at Strass- burg from which he retired in 1906. A scholar of wide attainments, he has made a specialty of the Semitic languages and of Oriental philology and history, in which departments he is a lead¬ ing authority. He is a voluminous writer, nearly 600 titles being set against his name. Much of his work is intended for specialists only, yet much of his writing is intended for the general public. He has published (Das Leben Muhammedls) (1863) ; (Die alttesta- mentliche Litteratur> (1868) > (Grammatik der Neusyrischen Sprache) (1868); (Untersuchun- gen zur Kritik des Alten Testaments) (1869); (Mandaische Grammatik) (1874) ; (Aufsatze zur persischen Geschichte> (1887); (Oriental- ische Skizzen) (1892), translated into English in that year and revised by him; (Beitrage zur

semitischen SprachwissenschafP (1904) ; (Bur- zoes Einleitung zu dem Buche Kallla wa Dimna) (1912) ; ˆUntersuchungen zur Achikar- Roman) (1913).

NOLHAC, ndl-ak, Pierre de, French his¬ torian and critic: b. Ambert, 15 Dec. 1859. He studied at the French school in Rome, worked for a year in the Bibliotheque Nationale, in 1886 became professor of history and classical philology in the ficole des Hautes Etudes, and in 1892 was appointed conservator of the Ver¬

sailles Museum. Among his literary and his¬ torical studies are (Lettres de Joachim du Bel- lay) (1884) ; (La Bibliotheque de Fulvio OrsinP (1887) ; (Erasme en Italie> (1888) ; (Marie Antoinette) (1890) ; (Petrarque et humanisme) (1892) ; (Histoire du chateau de Versailles > (1899-1900) ; (Louis XV et Marie Leczinska) (1900); (La creation de Versailles (1901); (Louis XV and Mme. de Pompadour) (1902) ; (Les jardins de Versailles) (1905) ; (Nattier, peintre de la Cour) (1905) ; (Poemes de France et d'ltalie* (1905); (Versailles et Trianon)*

(1909); (Le Trianon de Marie Antoinette) (1914), and works on Fragonard, Francis Boucher, Mme. Le Brun and Hubert Robert.

NOLI ME TANGERE («Touch me not»), the words spoken by the risen Christ to Mary Magdalen (John xxviii, 7). The subject was a favorite in Italian art. It frequently appears in cycles representing the life of Christ as in Giotto's frescoes in the Arena Chap 1, Padua, and in Duccio's frescoes in Siena. Fra An¬ gelico, Martin Schongauer (15th centurv) and Lorenzo di Credi (Uffizi) also painted this sub¬ ject beautifully. The most famous of all paint¬ ings on this theme is the one by Titian, repre¬ senting Christ and the Magdalen in the fore¬ ground of a beautiful landscape, the Magdalen on her knees raising her hand to touch Christ, who draws back his robe uttering the words <(Touch me not.® It was painted about 1518, and bought by Rogers, the poet, who bequeathed it to the National Gallery, London, in 1855. The canvas measures about four feet by three. A smaller picture by Titian, a fragment only of the original, representing the figure of Christ in a white tunic and blue mantle is in the Madrid Museum. It was taken to Spain by Mary of Burgundy in 1556. The Escorial has a copy. The Madrid Museum has a (Noli me Tangere by Correggio, representing Christ and Mary Magdalen. It was owned by Philip IV, and was originally in the Escorial. This is about four by three feet. Albertinelli's (Noli me Tangere) is in the Louvre. This is a small work: Christ is leaving the sepulchre and Mary Magdalen is kneeling before him. It was painted between 1490 and 1500 and shows the influence of Fra Bartolommeo. This picture belonged to Louis XIV. Consult Jameson, Mrs., (History of Our Lord in Art* (Vol. II, pp. 278-285, London 1865).*

NOLL, nol, a name by which Oliver Crom¬ well (q.v.) was popularly known.

NOLLE PROSEQUI (no prosecution). A technical term in English law, signifying that the proceedings against the defendant shall be discontinued. This originated in England in the reign of Charles II. In the United States the nolle prosequi is confined almost exclusively to criminal cases. The codes regarding the methods of procedure differ slightly in the dif¬ ferent states . In some states the prosecuting officer may enter a nolle prosequi at his dis¬ cretion; in others the permission of the court must be obtained. The term is sometimes shortened to nol. pros. See Nonsuit; Pleading ; Practice.

NOLLEKENS, nol'e-kenz, Joseph, Eng¬ lish sculptor: b. London, 11 Aug. 1737; d. there, 23 April 1823. He was the son of a painter of Antwerp who had settled in England, and after studying sculpture at Rome became very sue-

cessful in the execution of portrait busts, and was elected to the Royal Academy in 1772. He modeled busts of George III, Pitt, Canning and Castlereagh. His finest ideal statue is (Venus with the Sandal.) He was exceedingly penurious in his habits and left a fortune of $1,000,000. Consult (Nollekens and his Times,) by J. T. Smith (Gosse's edition, 1895).

NOMA. See Cancrum Oris.

NOMADS, a general name given roaming or wandering people or tribes without fixed habitations, and generally pastoral. Nomadic tribes are seldom found to quit their wander¬ ing life until they are compelled to do so by being surrounded by tribes in settled habita¬ tions, or unless they can make themselves mas¬ ters of the settlements of a civilized nation. But this change commonly takes place 'by de¬ grees. Some of the greatest revolutions in his¬ tory have been effected by these wandering tribes. North Africa, the interior of South Africa, and the northern and middle parts of Asia, are still inhabited by nomadic tribes. Different tribes, however, possess different de¬ grees of civilization. Some are little better than bands of robbers.

NOMARCHY, or NOME. (1) The largest political division of Greece, which is divided again into demarchies. There are 30 nomarchies in Greece. The nomarchy cor¬ responds to the French prefecture. The nomarch, or governor of a nomarchy, is ap¬ pointed by the king on the nomination of the Minister of the Interior; but the demarchs, who assist them in the work

of administration, are popularly elected. Prior to 1899, the eparchy formed the divisional unit below the nomarchy, but at. that date it was abolished. (2) The name given by the Greeks to the provinces into which Egypt was divided, from the earliest historical period to the end of the Roman rule.

NOMBRE DE DIOS, nom'bra da de'os, Mexico, city in the state of Durango, about 150 miles from the Gulf of California, and 30 miles southeast of Durango, the nearest railroad sta¬ tion. It was the earliest Spanish settlement in Mexico, and is situated in a region noted for its extensive deposit of silver ore. Pop. 11,000.

NOME, nom, Alaska, city in the north¬ western part; on the north shore of Norton Sound (q.v.) at the mouth of Snake River, 14 miles west of Cape Nome. It is the commercial centre of an extensive gold mining district, in¬ cluding a large part if not all of Seward Penin¬ sula district which contributes to the wealth of Nome. The placer gold fields, so dependent upon water for their development, are not con¬ tinuous ; rich deposits may have long interven¬ ing stretches where as yet no gold has been found. Nome came into existence as a mining camp in 1898-99 when gold was discovered in the creeks and streams of the vicinity, and the value of the beach deposits was recognized. Angelo Heilprin, president of the Philadelphia Geographical Society, is authority for the state¬ ment that out of the Nome sands "in barely more than two months® has been taken over $1,000,000 by the crude method of "rocking.® Nome is the shipping point for Council City, second in size to Nome. The tin found in the

vicinity of Cape Prince of Wales, and at Cape York, 90 miles northwest of Nome, is of indus¬ trial interest to Nome. Short narrow gauge railroads connect several of the mining camps with the city. The gold output for 1913 was about $2,500,000. The harbor is closed by ice the greater part of the year, so that the city is active only from June to October. The city government is well organized, with all the de¬ partments essential for proper maintenance and operation. The streets are lighted by electric¬ ity; it has a good water system, free mail de¬ livery, and many of the modern conveniences found in cities in older settlements of the United States. There are steamer connections with Seattle and the Yukon. Pop. about 5,000. See Alaska.

NOME, (1) in music (especially in ancient Greek) any melody which was made up from or depended on natural or inviolable rules. (2) A province or other political division of a coun¬ try, especially ancient Egypt and modem Greece. See Monarchy.

NOME, Cap. See Cape Nome.

NOMINALISM, a name of one of two rival schools of mediaeval philosophy. The dis¬ cussion arose respecting the nature of our gen¬ eral or abstract ideas, or of "universals.® It was contended by some that abstractions — as a circle in the abstract, beauty, right — had a real existence apart from round things, beauti¬ ful objects, right actions. This was called real¬ ism and was the view which had been main¬ tained by Plato. Those who held the opposite view were called Nominalists, because they maintained that there is nothing general but names; the name "circle® is applied to every¬ thing that is round, and is a general name: but no independent fact or property exists corre¬ sponding to the name. Specifically the con¬ troversy was as to the existence of "universals® or of genera and species, and arose out of a passage in the Latin translation of Porphyry's UsagogeP Roscellinus, canon of Compiegne, in the latter part of the 11th century, was the first advocate of nominalism, and maintained, in opposition to the advocates of realism, that gen¬ eral ideas have no separate entity. He was charged with holding heretical opinions con¬ cerning thei Trinity, for which he was cited be¬ fore the Council of Soissons and condemned 1092 a.d. His first great opponent was Anselm, archbishop of Canterbury, and later Abelard, who had been a pupil of Roscellinus, modified his master's views into what is known as con¬ ceptualism.

NOMINATION. See Caucus.

NOMINATIONS, Political. See Conven¬ tions, Political.

NOMOCANON, in the Greek Church, a systematic collection of ecclesiastical laws, in¬ cluding certain secular enactments, especially imperial decrees, which have an ecclesiastical bearing. The most important is the Nomo- canon of Photius (883) which was republished at Rome 1842 in the (Spicilegium Romanum, and the*

(1335).

NON-ACTIVITY. See Neutrality.

NON-COMBATANTS, a term used in

warfare for officers .and privates charged with

administrative duties and who do not fight un¬ less in self-defense; also for residents of a belligerent state who take no part in war.

NON-COMMISSIONED OFFICERS, in

the army are officers intermediate in rank be¬ tween the commissioned officers and privates or marines. They hold rank, not by commission from the executive authority, but by appoint¬ ment of a superior officer. They are selected from the rank and file, and are generally the most meritorious of these. They vary in rank and comprise sergeants-major, sergeants, drum-majors, corporals. Their duties are various, but in general it may be stated that they over¬ look the men when off parade and while in barracks. They can only be reduced to the ranks by the colonel-commandant or by court-martial. A grade of officers above non-commis¬ sioned officers are the warrant officers. See United States — Army.

NON COMPOS MENTIS, non kom'pos men'tis (((not of sound mind®), an expression used of a person who is not of sound under¬ standing. See Insanity.

NON-EUCLIDEAN GEOMETRY. See

Geometry, Non-Euclidean.

NON-FEASANCE (not doing), a legal term signifying the omission of some act which one is under a legal obligation to perform. The rule of law is that no action lies for non¬ feasance, i.e., for failure or refusal to perform the obligation, but that an action does lie for mal-feasance (or mis-feasance) , i.e., for negli¬ gently or improperly performing the obligation. Poison in (English Law> writes: ((Misconduct of officers of justice, being what the law terms malfeasance, that is, wrong doing, or culpable non-feasance.® Some writers are of the opinion that non-feasance never amounts to a tort; but this is erroneous. For example, if the owner of a factory fails to comply with a law requiring him to equip his factory with fire-escapes, in case of fire he is liable in damages to the per¬ sons injured. His omission in non-feasance and his non-feasance is a tort. The word comes from the Latin non and facere, to make, through the French faisant of the verb fciire. Consult Jag- gard, E. A., (Handbook of the Law of Torts) (Saint Paul 1895).

NON-INTRUSIONISTS, those members of the Scotch Established Church who contend for the principle that no minister should be in¬ truded on a parish contrary to the will of the congregation. The name originated in a resolu¬ tion, bearing this import, proposed by Dr. Chal¬ mers and seconded by Lord Moncreiff in the General Assembly in 1833. It was to meet these views that the General Assembly, in 1834, passed the Veto Act, which brought the Church into conflict with the law courts and the disruption from which the Free Church of Scotland came into being in

1843.

NON-PARTISAN PRIMARY. See Pri¬ mary, Direct; Elections.

NON POSSUMUS, ((We cannot,® an ex¬ pression used by Pope Clement VII in reply to Henry VIII's demand for the dissolution of his marriage with Catharine of Aragon ; used in general expression for the refusal of the Roman Catholic, Church to yield to the demands of the temporal power.

NON-RESISTANCE, Doctrine of, is that it is unlawful, on religious grounds, to resist the commands of a ruler or magistrate. This view is held by the Friends and is to be found in the works of Tolstoy. The New Testament writers urge the necessity of obedience to those in au¬ thority, although, as usually understood, this teaching refers only to lawful commands. It has, however, been maintained that obedience is to be rendered to all the commands of a ruler without exception.

NONANE, or ENNEANE, the ninth

member of the series of the saturated fatty hydrocarbons or paraffins. It has the chemical formula C9H20 and is theoretically capable of existing in no less than 35 different isomeric forms, a number of which have been actually identified. Two of these, having a common specific gravity of about 0.742, and boiling at 266° F. and 277° F., respectively, are known to exist in ordinary petroleum.

NONCONFORMIST, the name applied in the early part of the 17th century to those persons who, while adhering to the doctrine of the Church of England, refused to conform to its discipline and practice, chiefly in the matter of certain ceremonies, for example : the wearing of the surplice, kneeling at the reception of the Sacrament, signing of the cross after christen¬ ing and the use of the ring in marriage. After the passage of the Fourth Act of Uniformity in 1662 and the ejection from their livings of those clergymen who refused to conform to that act, the term Nonconformists was applied to all those who bv their opposition ceased to be members of the Established Church and who gradually formed themselves into sects. The history of this break in English Protestantism dates from the reign of Mary Tudor; but it does not become of real importance until the days of Elizabeth, when repugnance excited by the horrors of Mary's reign, hatred of Spain and the example of the reforms taking place in other centres of Europe strengthened the forces hostile to the Established Church. With the accession of Elizabeth, the Calvinist sec¬ tion, soon nicknamed ((Puritans,® returned from their voluntary exile. <(In Geneva and Heidel¬ berg,® writes an authority, ((they had learned to love the bare services and the elaborate preachments of the prevailing

fashion.® Europe, or a large part of it, owned in Calvin an in¬ tellectual and spiritual master and his authority was more absolute than that of most of the Popes. Swayed by these notions such men came back hoping for a ((root-and-branch® rev¬ olution and anxious to reform the Church on the Calvinistic Presbyterian model. Thus, when it appeared that the new order would not only continue episcopacy, but would en¬ join set prayers, sacerdotal vestments and out¬ ward sacramental signs there was a great out¬ cry. The first few years of Elizabeth's reign were filled with the (Vestiarian Controversy.) Elizabeth, however, who had very little personal religion, preferred an episcopal to a presby- terian system and retained ritual and such prelates as Matthew Parker (1504-75), to strike a balance between conservatism and innova¬ tion; to maintain the Prayer Book in spite of the Genevan party, and to adjust delicately, and yet firmly, the difficult questions of the day. Those who held Puritan views Elizabeth

cordially detested, as her forcible expressions plainly show ; but, on the other hand, she was willing to conciliate them for the sake of their political support. Elizabeth's Act of Uniform¬ ly (the third), passed in 1559, ordered the use of the Second Prayer Book from 24 June 1559. Wishing to please the Puritans, Archbishop Parker, on an understanding with Queen Eliza¬ beth, published certain "advertisements® ad¬ dressed to the clergy, requiring them, at least, to conform to the wearing of a surplice, kneel¬ ing at communion, using the font for baptism, etc. ; but the effect was small, for the Puritans became bolder and bolder until they demanded the substitution of an entirely Presbyterian regime, demanded by Thomas Cartwright in his First and Second Admonitions (1572) and followed by his (Book of Discipline) (1580). In 1588 the (Mar-Prelate Tracts appeared and were hawked about the London streets. The violence of their attacks upon the oueen and the bishops caused Elizabeth to take drastic measures. Perry and Udel, authors of the tracts, were tried and executed and Cartwright was imprisoned. The Marprelate Tracts, how¬ ever, opened a rift in the Puritan party itself. They were the climax in the first Puritan as¬ sault upon the Established Church in favor of the (Book of Discipline,* but the act passed in 1593 inflicting punishment to be followed by ex¬ ile of a second offense on all who refused to attend the Established Church, or who held separate meetings, caused a division in the Puri¬ tan party. Some, retaining their beliefs out¬ wardly, pretended to conform, while the ex¬ tremists, for a time called Brownists (after their leader), fled to Holland; and a quarter of a century later sailed from Leyden and then from Plymouth in the Mayflower, 6 Dec. 1620, and settled in New England. With the death of Queen Elizabeth the hopes of the Non¬*

conformists revived. Their system of doc¬ trine and government was 'dominant in Scot¬ land and they hoped for much from the Scot¬ tish James. They met him on his way to Lon¬ don and presented their (Millenary Petition, which requested that the ritual to which they objected should be abolished in the State Church. James promised them a conference, which met the next year (1604) at Hampton Court Palace. The king proved wholly on the side of the Established Church and the Non¬ conformists were disappointed. The same year Archbishop Bancroft, with the king's sanction, enforced the canons of 1604 restoring the rites in such parishes where the Puritans had suc¬ ceeded in suppressing them. This controversy culminated in the long fight of Archbishop Laud (1573-1645) in his desire to rescue the Church of England from Calvinistic influence and who died a martyr. On the day that he was beheaded by the Nonconformists party the Book of Common Prayer was disestablished and the Directory was substituted for it by the Lords and Commons. "Thus,® wrote a member of the Lower House, "the Archbishop and the Prayer Book died together.® The su¬ premacy was now transformed from the Crown to Parliament ; the Solemn League and Cove¬ nant was accepted for the whole nation; and the Westminster Assembly of Divines met in Westminster Abbey as a permanent committee to reform the Church (1643). On the restora¬ tion of the king (Charles II) the Convocation*

of 1662 revised the Prayer Book and forced its use. Those who refused to conform — and there were nearly 2,000 clergymen who did so — organized themselves outside of the Estab¬ lished Church and called themselves by the name of Nonconformists. Many repressive acts were passed against them, including the Five Mile Act, making liable to imprisonment any Nonconformist minister who came within five miles of the town from which he had been ejected. The next epoch in the history is the Toleration Act of 1689 regarded in its day as a charter of religious liberty. Many legal rights were allowed to the Nonconformists. With their conditions ameliorated, the Nonconform ists were lapsing into quietude when the great Methodist, or Wesleyan, movement fired the dissenting sects to new activity. Under John (1703-91) and Charles Wesley (1707-88) and George Whitefield (1714-70) Methodism be¬ came a power in England at large and crossed the Atlantic to the United States.*

In the 19th century the word Nonconform¬ ist was applied in England generally to all Protestant dissenters, i.e., to those who dissent from the Church of England. The great ob¬ ject of these sects, often referred to as a "Nonconformist party,® has been to disestab¬ lish the Church of England. Thev form a body of no_ small political power. Though not succeeding in their aims, 'they have had several privileges accorded to them. Since 1836 dis¬ senters have been allowed to be married by their own ministers and according to their own rites ; the registration of births, marriages and

deaths has been transferred from the Church to the State; a charter was given to the free University of London ; the great universities of England have admitted Nonconformist stu¬ dents since 1871 and since 1880 the Burials Act allows the Nonconformist ministers access to the churchyards for funerals.

A sentence in a letter to the London Times, 28 Nov. 1890,- reads : "The minimum demand of the great Nonconformist party is the abdication of Mr. Parnell. Nothing less will satisfy the Nonconformist conscience now.® The phrase "Nonconformist conscience® appears as early as 1672, when Mervel wrote : "I suppose the Nonconformists value themselves though upon their Conscience and not their numbers.® Statistics of 1918 with regard to the Noncon¬ formists of Great Britain are as follows: Pres¬ byterians: (Church of Scotland), 1,887 minis¬ ters; 721,158 communicants; 1,693 churches; income £491,982; (United Free Church of Scotland, consisting of the Free Church and United Presbyterian), 1,596 ministers; 518,747 communicants; 1,516 congregations; income £1,001,752. Free Church of Scotland, 88 minis¬ ters; 178 congregations. United Original Secession Church, popularly known as "Auld Lichts® (seceders of 1733), 22 ministers; 3,247 communicants; £5,545 income. Presbyterian Church of England, 370 ministers ; 355 congre¬ gations and 8 preaching stations. Presbyterian Church of Wales, 1,346 ministers; 184,694 com¬ municants; 1,452 churches. Presbyterian Church in Ireland, 640 ministers; 103,760 communicants; 562 churches; £308,517 income. Methodists in Great Britain, 8,504 churches; 2,603 ministers; 494,993 communicants; 19,211 lay preachers. United Methodists, 2,727 churches; 649 minis¬ ters; 157,057 members. Primitive Methodists,

4,841 churches; 1,157 ministers; 205,217 mem¬ bers. Wesleyan Reform, 197 churches; 22 ministers; 8,317 communicants. Independent Methodists, 145 churches ; 404 ministers ; 8,770 communicants. Congregationalists (original Separatist, or Independents) British Isles, 4,989 churches ; 3,062 ministers ; 489,618 communi¬ cants. Baptists (possibly originally derived from the Lollards), British Isles, 3,158 churches; 2,070 ministers ; 408,029 communicants. The total amounting to more than 30,326 churches and 3,139,602 church members. In addition to these sects, there are the Salvation Army, the Brotherhood Movement, Christian Endeavor LInion, Moravian Church, Churches of Christ, The Countess of Huntingdon's Connexion, Dis¬ ciples of Christ, Free Church of England, So¬ ciety of Friends and the British and Foreign Unitarian Association. (See Lollards; Wy- cliff; Reformation; Huguenots; Presby¬ terianism ; Brownists ;

Congregationalism ; Baptists; Methodist Churches; Friends; Calvin; Laud; Wesley; Whitefield; Fox). Consult Neal, (History of Puritans or Pro¬ testant Nonconformists, 1517— 1688> (2d ed.,

London 1822) ; Price, (History of Protestant Nonconformity in England from the Reforma¬ tion under Henry VHP (2 vols., London 1836) ; Bogue and Bennett, (History of Dissenters, 1688-1808) (4 vols., London 1808) ; Bennett, (History of Dissenters, 1808-38) (London 1839) ; Wilson, 'History and Antiquities of the Dissenting Churches) (4 vols., London 1808) ; Abbey and Overton, (The English Church in the Eighteenth Century) (London 1878) ; Hetherington, 'History of the Westminster As¬ sembly of Divines > (Edinburgh 1878) ; Clark, H. W., (History of English Nonconformity) (2 vols., London 191 1—131 ; Selbie, W. B., 'Non¬ conformity (London 1913) ; 'The Literature of Dissent , in Cambridge History of English Literature, Vol. X (London and New York

1913).

NONES, nonz, (1) in the Roman calendar the fifth day of the months January, February, April, June, August, September-, November and December, and the seventh day of March, May, July and October. The nones were so called as falling on the ninth day before the ides, both days included. See Calendar. (2) The office of the Church recited at the ninth hour of the day (about 3 pm.), but in practice ear¬ lier, from the common meaning of noon.

NONIUS, no'm-us, Marcellus, Latin gram¬ marian: b. probably Thubursicum in Numidia at the opening of the 4th century a.d. His 'De Compendiosa Doctrinal originally consist¬ ing of 20 books, is greatly esteemed on account of its many quotations from earlier writers whose works are lost. The 16th book is no longer extant. Consult editions by Quicherat (1871) and L. Muller (1888) ; also Nettleship, 'Essays in Latin Literature) (1885) ; and W. M. Lindsay (1903).

NONJURORS, in British history, those who refused to take the oath of allegiance to the government and Crown of England at the Revolution of 1688, when James II abandoned the throne. The noniurors maintained the doctrine of passive obedience and non-resist¬ ance, and regarded the accession of William and Mary as a usurpation. They numbered

among them upward of 400 clergy and eight bishops of the Church of England and one archbishop, many of them men of learning and of blameless reputation, of whom the saintly Bishop Ken was one. They were of High pro¬ clivities, asserted the liberties of the Church in spiritual things and maintained an episcopal succession of their own. Although their sym¬

pathies and prayers were with the exiled house of Stuart, they were seldom actively disloyal to the de facto sovereigns. When in 1689 the Church Establishment in Scotland ceased to be episcopal, 300 nonjuring clergymen were deprived of their livings, to which Pres¬ byterians were appointed ; but they and their successors were more actively disloyal than their English brethren, participated largely in the Jacobite risings in 1715 and 1745 and were in consequence vindictively proscribed. On the death of the young Pretender in 1788, the Scot¬ tish Episcopal bishops made submission to the reigning house of Hanover. The last nonjur¬ ing English bishop died in 1805. Consult Lath- bury, T., 'History of the Nonjurors> (London 1845) ; Ollard and Crosse, 'Dictionary of Eng¬ lish Church History} (ib. 1912) ; Overton, J. H., 'The Nonjurors) (ib. 1902).

NONNUS, non'us, Greek poet of the 5th century of our era. He wrote the 'DionysiacaP an epic poem in 48 books relating the journeys and expeditions of Dionysius in lively and poetic style, full of taste and learning. He was a Christian and produced a poetic paraphrase of Saint John's Gospel. Consult Ludwich, 'Beitrage zur Kritik des Nonnos> (1873).

NONPAREIL, (1) a small and beautiful finch (Cyanospiza ciris) of the South Atlantic and Gulf States; sometimes called the painted bunting. It is nearly related to the indigo-bird (q.v.), and is frequently kept as a cage-bird, especially by the French people of southern Louisiana, who call it le pape (the pope). It is about the size of a canary, and, in the male, ultramarine blue over the whole head and neck, excepting a narrow stripe from the chin to the breast, which, with the under parts generally and the rump, is vermilion red; there are touches of green about the shoulders. The fe¬ male is clear dark green above and yellowish on the lower surfaces. Its song is a series of melodious warblings, and its nest is placed in bushes and low trees, and contains pearly white eggs marked with purplish and reddish brown. (2) In typography, 6-point type, or 12 lines to the inch : in America the size of type between minion and agate, and in England between emerald and ruby.

NONSENSE, Fort, in American history, the name of a former fort near Morristown, N. J., projected by Washington to keep his dis¬ couraged and famished army from revolting during the winter of 1779-80. The Washington Association 'of New Jersey erected a memorial stone on the site of the earthworks in 1888.

NONSUIT, in law. See Nolle Prosequi.

NONYL, or ENNYL, in chemistry, a group of organic radicals whose common em¬ pirical formula is C9H19, and whose hydrides are the nonanes (q.v.). The nonyls are analo¬ gous to ethyl and nethyl in their

chemical be¬ havior, and. like these, cannot exist in the free state. The derivatives of the nonyls have

been very little studied as yet, because they are of no commercial importance, and their 'rela¬ tions are exceedingly complicated, owing to the large number of possible isomeric forms that each of them can have. Several of their alco¬ hols, amines and chlorides have been prepared, however.

NONYLENE, or ENNYLENE, the ninth member of the olefine series of fatty hydrocar¬ bons. It has the chemical formula CgHis, and is capable of existing in many isomeric modifi¬ cations. All of these modifications that are known are liquid. The specific gravity lies be¬ tween 0.7 and 0.9, and the boiling-point between 230° F. and about 300° F.

NOOTKA (noot'ka) INDIANS, a name given to several North American Indian tribes of the Wakashan family, residing chiefly on Vancouver Island, but extending from Cape Cook on the north to beyond Port San Juan and including the Wakah of Cape Flattery, Washington.

NOOTKA SOUND, Canada, an indenta¬ tion on the west coast of Vancouver's Island. See Vancouver Island.

NORBERT, Saint. See Premonstraten-

SIANS.

NORCHIA, nor'che-a, The Biga of, in

archaeology, a name given to the remains of a biga, or two-horse chariot, discovered in 1901 in the course of some excavations undertaken by a country builder at Norchia, a small town almost 30 miles north of Rome, in what was once a populous part of Etruria. With it were found a number of bronze vessels and some pieces of pottery, of a character familiar among Etruscan remains. These remains were pur¬ chased by the Metropolitan Museum of Art in New York, and placed on exhibition.

NORD, nor, France, a northeastern frontier department bordering on Belgium and the North Sea; area, 2,229 square miles. Capital, Lille. The coast, marked by a long chain of sandy hil¬ locks, furnishes the two harbors of Dunkirk and Grayelines. The interior is a monotonous but fertile alluvial flat, intersected by sluggish streams and canals. A great part is in

the basin of the Sambre. The department, while essen¬ tially agricultural, upward of four-fifths of the area being under cultivation, is also first of the departments in industry, there being great tex¬ tile industries, important iron and steel works, porcelain and glass manufactures and produc¬ tive coal-mines. Part of it was in German occupation during the Great. War. Next to the Seine, it is the most populous of French depart¬ ments. Pop. 1,961,780.

NORDAU, nor'dow, Max Simon, German physician and author: b. Budapest, Hungary, 29 July 1849. He studied at the University of Budapest, receiving his degree in 1872; he then traveled for six years, visiting the principal countries of Europe, and in 1878 began the practice of medicine in Budapest. In 1880 he went to Paris, and after two years of study re¬ sumed the practice of his profession there. He began his literary career at Budapest before entering the university as contributor and dra¬ matic critic for Der Zwischenact ; he subse¬ quently was an editorial writer and correspond¬ ent for several other newspapers. His news¬

paper writings were collected and furnished the material for his earlier books, including (Pariser Studien und Bilder) (1878) ; (Seifenblasen) (1879); Worn Kreml zur Alhambra) (1880); (Paris unter der dritten Republic (1881), which are mostly criticisms of political and social conditions. In 1883 he published (Die konventionelle Lugen der Kulturmenschheit (English translation, Conventional Lies of * Society*), in which he shows what he believes to be the essential falsity of some of the social, ethical and religious standards of modern civil¬ ization; and in 1892 published (Entartung,* translated into English under the title (De¬ generation P This is his best-known work and provoked much criticism ; in it he maintains that the civilization of the present, the new inven¬ tions and the growth of great cities have re¬ sulted in the degeneration of man, especially of the higher classes ; that this degeneration is seen particularly in the lowered, and often depraved, standard of literature, art and music; and that the authors and artists of the day whose work is in accordance with these standards are them¬ selves mental and moral degenerates. He is a disciple of Lombroso. His other works in¬ clude (Paradoxeˆ (1885; in English, Para¬ doxes*); (Die Krankheit des Jahrhunderts) (1887; in English, (The Malady of the Cen- tury)) (Seelen Analysed (1892); (Die Droh- nenschlacht* (1897); the novel,*

NORDENBERG, nor'den-barj, Bengt, Swedish artist: b. Kompikalla, Sweden, 22 April 1822; d. Dusseldorf, 14 Dec. 1902. In his early years he was a house-painter. In 1843 he went to Stockholm and studied in the Academy while still following his trade. In 1851 he went to Dusseldorf and studied under Theodor Hilder- brandt. In 1857-58 he studied in Paris under Couture, after which he visited Italy. He finally settled in Dusseldorf.

Nordenberg was much influenced by Tidemand. His subjects were drawn chiefly from Swedish peasant life. They include (Communion in a Village Church (National Gallery, Christiania) ; (The Organist* (Leipzig Museum); (Levying the Tithe in Skane* and (Wedding Procession in Varend* (both in the Stockholm Museum) ; (A Golden Wedding* and (A Forest Fire.* Nordenberg was given a medal at Lvons in 1866, at Stock¬ holm in 1845, 1847 and 1848 and London in 1879. He had honorable mention at the Paris Salon of 1864 and at the Vienna Exhibition in 1873.*

NORDENFELT, nor'den-felt, Torsten Vilhelm, Swedish inventor: b. 1842. After a thorough technical training, from 1862 to 1866

he was engaged in promoting the sale of Swed¬ ish iron in London; and early in the eighties established in Sweden, England and France factories for the production of ammunition, machine guns, torpedoes and submarine torpedo boats. Soon afterward with Hiram S. Maxim (q.v.) he formed the Maxim-Nordenfelt Com¬ pany. Oscar TI of Sweden named him royal chamberlain in 1885. Nordenfelt's best-known invention is a machine gun, intended as a de¬ fense against torpedo boats, made with from 2 to 12 barrels, from any one of which the supply of ammunition can be shut off with¬ out interfering with the other barrels. See Machine Gun.

NORDENSKIOLD, nor'den-sheld, Adolf Erik, Baron, Swedish Arctic explorer: b. Hel¬ singfors, 18 Nov. 1832; d. Dalbyo, Sweden, 12 Aug. 1901. He was educated in Finland at the University of Helsingfors by his father, Nils Gustav Nordenskiold (1792-1865), a mineral¬ ogist, with whom he explored parts of the Urals. He was graduated in 1857, and in 1858 became superintendent of the mineralogical de¬ partment of the Swedish Royal Museum in Stockholm, having been forced to leave Fin¬ land by the Russian authorities, who took um¬ brage at his political views. In all subsequent Arctic expeditions sent out by the Swedish government he took part, accompanying Tor- rell to Spitzbergen in 1858 and 1861, and being leader himself in 1864 and in 1868, when he at¬ tained 81° 42′ the farthest north at that time reached on board ship. Oscar Dickson, a wealthy gentleman of Gothenburg, who had contributed to previous exploration funds, made it possible for Nordenskiold to explore Greenland in 1870, a preliminary expedition, which, however, made important discoveries of algae and meteorites and penetrated the island farther than had ever been done before. In 1872, after serving two years in the Swedish lower house of Parliament, where he allied him¬ self with the Liberal party, Nordenskiold set out on the fifth Swedish expedition, which win¬

tered in Mossel Bay, whence with a few com¬ rades he pushed north in the spring of 1873 on sledges. In 1875 and 1876 he led the expeditions sent out by Dickson across the Kara Sea and up the Yenesei River. These were mere prepara¬ tions for his great exploit in 1878-80 when he accomplished the Northeast Passage, the dream of explorers for over three centuries. He left Karlskrona 22 June 1878; wintered in the ice near Bering Strait, and reached Yokohama 2 Sept. 1879, and returned to Europe by the Suez Canal. He was created a baron in 1880. In 1883 he again explored Greenland from the west coast, beating his previous record of the farthest inland. The remaining years of his life were spent in the study of early cartography, his publications in this field being (Periplus, an Essay on the Early History of Charts and Sail¬ ing Directions (1897) ; an edition of Marco Polo, in French with facsimile (1882) ; (Bidrag til Nordens aldsta historia) (1892), in honor of the American Columbian celebration, and accom¬ panied by the earliest maps of North America. Most of his important explorations were also described by his pen. Consult Leslie, (Arctic Voyages of Nordenskjold) (1880) ; and the (Life) in Swedish, by Andersson (1901).*

NORDENSKIOLD, Gustav, Swedish ex¬ plorer, son of A. E. Nordenskiold (q.v.) : b. Stockholm, 1868; d. Morsill, 6 June 1895. He explored Spitzbergen in 1890 and the Colorado canons in 1891, and described the latter in a work translated by Morgan under the title (The Cliff Dwellers of the Mesa Verde) (1893).

NORDENSKIOLD, Nils Erland Herbert,

Baron, Swedish ethnologist: b. Stockholm, 19 July 1877. He is the son of A. E. Nordenskiold (q.v.) ; after an education at Upsala, in 1906-08 he became connected with the Museum of Nat¬ ural History, Stockholm. In 1913 he was made director of the ethnographic division of the Goteborg Museum. Between those years he traveled and made collections for the museums in Stockholm. He visited Patagonia in 1899; Argentina and Bolivia in 1901—02 ; Peru and Bolivia in 1904-05; Bolivia in 1908-09; and in the interior of South America in 1913. In 1912 he received the Loubat prize and the Wahl- berg gold medal. In addition to numerous arti- cleso in scientific periodicals, he has published (Fran hogfjall och urskogar (1902) ; Hndian- lif i el gran chaco* (1910) ; Hndianer och hoita) (1911); and (Svdamerikas indianer**

(1912).

NORDENSKIOLD, Nils Otto, Swedish explorer and geologist, nephew of A. E. Nor¬ denskiold (q.v.) : b. Smaland, 6 Dec. 1869. He was educated at Upsala, where he was gradu¬ ated with a doctor's degree in 1894. In

*1895-97 he accompanied the scientific expedition to Patagonia under Ohlin; in 1898 traveled through the Klondike *and Alaska; in 1900 was a member of the Danish expedition under Amdrup to the eastern coast of Greenland; and in October 1901 left Gottenburg on the Ant¬ arctic to explore the south polar regions. His ship was sunk in Erebus and Terror Gulf in the early part of 1902, and he and his men en¬ camped on Paulet Island, whence they were rescued by the Uruguay, a gunboat sent out by the government of Argentina. In 1909 he ex¬ plored the southwest of Greenland. He was appointed professor of geography at Gotten¬ burg in 1905. He is the author of (Antarc- tica) (1901-04), and (Geology and Physical Geography of East Greenland * (1909).*

NORDERNEY, nor'der-ni, Germany, one of the East Friesian Islands, three miles from the coast of Germany and belonging to the province of Hanover. It is about eight miles long and a little over one mile wide, and is ac¬ cessible from the mainland at low tide. It is treeless, covered with dunes which are from 50 to 75 feet in height. At the southwest extremity is a village which is protected from the sea by a wall, and the lighthouse in the centre of the island may he seen many miles. The island is the most important of the group on account of being a favorite sea-bathing place. Pop. about

4.300.

NORDHAUSEN, nord'how-zen, Germany, city in the province of Saxony, on the Zorge, 40 miles north-northwest, of Erfurt. It is at the base of the Hartz Mountains and the west end of the fertile ((Goldene Aue,® that is, <(golden plain.® It has 70 large distilleries of corn brandy (((Nordhauser schnaps®), breweries, tan¬ neries, chemical works and tobacco factories and a great export trade in ham and other hog

products A quaint town-hall, a Gothic cathe¬ dral and the church of Saint Blasius, which has two paintings bv Lucas Cranach, are all of interest It became a free imperial city in 1253. Pop. 32,564.

NORDHEIMER, nord'him-er, Isaac,

i J?nriCJai\?rientalist : b- Memelsdorf, Germany, 1809; d. New York, 30 Nov. 1842. He was graduated from Munich in 1834; in 1835 he came to New York and was instructor in sacred literature in Union Seminary (1838-42), and professor of Hebrew at the New York Univer¬ sity (1836-42). His (Hebrew Grammar, > an elaborate work in tw.o volumes,

appeared in its second edition in 1842. His other works include (A Grammatical Analysis of Scripture or a Chrestomathy) (1838);

NORDHOFF, nord'hof, Charles, American journalist and author: b. Erwitte, Westphalia, Prussia, 31 Aug. 1830; d. San Francisco, Cal., 15 July 1901. He came to the United States with his parents in 1835, and in 1843 was ap¬ prenticed to a printer in Cincinnati. In 1844 he joined the Linked States navy and served three years, in which time he made a voyage round the world. He continued to go to sea in mer¬ chant, whaling and fishing vessels until 1853, and from that time to 1871 (with the exception of four years spent in editorial work in a New York publishing house) was engaged in news¬ paper work. From 1871 to 1873 he traveled in California and Hawaii, and in 1874 became Washington correspondent for the New York Herald, retiring from journalism in 1890. He has described his experiences as a sailor in his (Man-of-War Life) (1855); (The Merchant VesseP (1855) ; (Whaling and Fishing) (1856; new ed., 1903), and (Nine Years a Sailor (1857). His sociological and political writings include Recession is RebellioiP (1860); (The Freedmen of the South Carolina Sea Islands) (1863) ; (Politics for Young Americans) (1875), which was adopted as a school textbook, and (The Communistic Societies of the United States* (1874); this last is a description and history of different communistic colonies, and is a valuable contribution to descriptive sociology. His other works include Stories of the Island World) (1857); California for Health, Pleasure and Residence (1872); (Northern California, Oregon and the Sandwich Islands) (1874) ; (God and the Future Life) (1881), and Pen¬ insular California) (1888).*

NORDICA, nor'di-ka, Lillian, American opera singer: b. (Lillian Norton) Farming- ton, Me., 1859; d. Batavia, Java, 10 May 1914. She studied in the Boston Conservatory and under O'Neill made her first appearance in 1876 as a concert artist; in 1878 went to Europe with Gilmore's Band, studied at 'Milan under Sangio- vanni and made her operatic debut at Brescia in (Traviata. Her success was great; she was immediately engaged for the Imperial opera at Saint Petersburg, and after two years there appeared in Paris in 1882. In the same year she retired from the stage to marry Frederick A. Gower, whom she sued for divorce in 1885, but who disappeared at about the time of the suit, probably having been killed in a balloon*

accident. She first appeared in London in 1887, and in New York in 1895. In 1894 she played Elsa in (Lohengrin > at the Wagner Theatre in Baireuth, and in 1896 married the Hungarian tenor Doeme, who took the title role in Par¬ sifal' at Baireuth in 1894. She obtained a divorce from him in 1904 and in 1909 was mar¬ ried to an American banker, George W. Young. Her repertoire was large and she was especially successful in

Wagnerian opera and in (Les Huguenots) and

NORDLINGEN, nerd'lmg-en, Germany, town in the northwestern part of Bavaria, on the Eger River, 75 miles northwest of Munich. Its history dates back to the year 900, and some of the buildings still remaining bear evidence of an even earlier date. It became an Imperial city in 1215. Two of the decisive battles of the Thirty Years' War were fought in Nordlingen; one 16 Sept. 1634, where Ferdinand, the king of the Romans, was successful and South Ger¬ many was freed from foreign rule, and the other 13 Aug. 1645 between the Imperial forces and the French, — the French were victorious. Nordlingen has considerable manufacturing in¬ terests in linen and woolen goods, carpets, leather, agricultural implements, furniture and toys, and there are large nurseries. It has schools of note and a large library. Pop. 8,705.

*NORDRAAK, nor'drak, Rikard, Norwe¬ gian composer : b. Christiania, 12 June 1842; d. Berlin, 20 March 1866. He was a piano pupil of Kiel and Kullak in Berlin. At a very early period in his life he turned his attention to the study of Norwegian folksongs and composed music to the national hymn, <(Ja, vi elsker dette landet,** written by his cousin, Bjornstjerne Bjornson (1832-1910). In 1864 he met Grieg and inspired him with the idea of devoting his genius to Norwegian melody and the cultivation of a specifically national art. Lie wrote inci¬ dental music to Bjornson's dramas of (Mary Stuart* and (Sigurd Slembe,* piano pieces and songs.*

NORDSTRAND, nord'strant, Germany, an island belonging to the North Friesian group, in the North Sea; area, about 21 square miles. Prior to 1634 the area was about 210 square miles, but that year a flood swept over the island, destroying the greater part of the land and drowning over 6,000 people. Many people on the islands of the vicinity were drowned. Pop. about 3,000.

NORE, nor, a river in Ireland which has its rise in the mountains in the northeastern part of Tipperary, flows northeast into Queen's County, then southeast through Kilkenny, and after a course of about 70 miles, joins the Barrow River about two miles above New' Ross. Kil¬ kenny is the largest city on its banks.

NORFOLK, nor'fok, Charles Howard,

11th Duke of, English politician: b. 5 March 1746; d. London, 1815. Breaking with the tradi¬ tions of his family, notably his father, a Roman Catholic and author of pamphlets on penal laws

against the Catholics, the son became a Protes¬ tant and a Whig; opposed the war with Amer¬ ica; sat in Parliament 1780-84; became a lord of the treasury in the Portland Cabinet in 1783, and was dismissed in 1798 from the lord-lieu¬ tenancy of the West Riding for toasting the ((sovereign English people® in terms displeasing to the Crown. He was noted for his convivial habits and his dislike of soap and water. At his death the title passed to Bernard Edward Howard, the first Roman Catholic peer to sit in the House after the Act of Emancipation in

1829.

NORFOLK, Henry Fitzalan-Howard, 15th Duke of, English politician: b. Carlton Terrace, 27 Dec. 1847; d. London, 11 Feb. 1917. He suc¬ ceeded to the title in 1860 upon the death of his father, whom he resembled in his zeal for the Roman Catholic Church. He was president of the Catholic Union of Great Britain; acted as special envoy to the Pope in 1887 ; with the Unionists he opposed Gladstone's Home Rule program, and from 1895 to 1900 was Postmas¬ ter-General. He served in the South African War.

NORFOLK, Henry Granville Fitzalan- Howard, 14th Duke of, English politician : b. 7 Nov. 1815; d. Arundel Castle, Sussex, 25 Nov. 1860. He studied at Trinity College, Cam¬ bridge, became a zealous Whig and was always an ardent Catholic. He was a member of the House of Commons from 1837 to 1852; then breaking with his party on the Ecclesiastical Titles Bill of 1850 spent several years in Paris, where he was known as a friend of Monta- lembert, and in 1856, upon his father's death, entered the House of Lords, where he vigor¬ ously opposed Palmerston. He wrote various pamphlets on the Catholic question and the (Lives of Philip Howard, Earl of Arundel, and Anne Dacres, His Wife1* (1857).

NORFOLK, Henry Howard, 6th Duke of, English nobleman, friend of Evelyn, the diarist: b. 12 July 1628; d. Arundel, Sussex, 11 Jan. 1684. He was a younger son of the 3d Earl of Arundel, lived abroad untiLthe Restoration, and in 1667 presented the Arundel Library to the Royal Society and the famous Arundel marbles to Oxford University. He was envoy to Morocco in 1669, and succeeded his brother as duke in 1670. Consult Evelyn, (Diary. *

NORFOLK, Henry Howard, .7th Duke of, English politician, son of the 6th duke : b. 11 Jan. 1655; d. London, 2 April 1701. He studied at Magdalen College, Oxford; became lord-lieutenant of Norfolk, Berkshire and Sur¬ rey, and was so strong a Protestant that in spite of his personal attachment to James II he signed the petition for the Convocation Parlia¬ ment in

1688, brought over the eastern counties to William of Orange and was made privy councillor in 1689.

NORFOLK, John Howard, 1st Duke of (2d creation), English admiral, supporter of the house of York: b. about 1430; d. Bosworth, Leicestershire, 22 Aug. 1485. He was a great- grandson of Sir William Howard, founder of the family and chief justice of common pleas under Edward I and Edward II. He served in France, was elected to the Commons in 1455 by the interest of John Mowbray, last Duke of Norfolk of that name, thus becoming allied to

the house of York. He was knighted upon the accession of Edward IV, fought again in France and against the Lancastrians and in spite of this was made a baron by Henry VI. He became a lieutenant of Richard III, who made him Duke of Norfolk, earl marshal and admiral of Eng¬ land in 1483, and fighting for Richard at Bos¬ worth he was killed. The title of Duke of Nor¬ folk revived for him had been held by the Mow- brays, from whom he was descended on the distaff side.

NORFOLK, Thomas Howard, 2d Duke of, English soldier and statesman, son of John Howard, 1st Duke of Norfolk (q.v.) : b. 1443; d. Framlingham, Suffolk, 21 May 1524. He was created Earl of Surrey in 1483, the title by which he is best known. Like his father he fought for Edward IV at Barnet (1471) and for Richard III at Bosworth (1485), and was attainted and imprisoned for over three years. He arranged the marriage between Margaret, daughter of Henry VII, and James IV of Scotland (1501). One of the best generals of his day, he put down the Yorkshire rising of 1489, defeated the Scotch at Flodden (1513), being created Duke of Norfolk after that battle, and on the ((Evil May Day® of 1517 re¬ pressed with terrible severity a riot in London. The entire subservience to the Crown which marked his later years was shown by his con¬ curring in the condemnation of Buckingham for treason, after acting as lord high steward of the court which tried his friend.

NORFOLK, Thomas Howard, 3d Duke

of, English statesman, son of 2d Duke (q.v.) : b. 1473; d. Kenninghall, Norfolk, 25 Aug. 1554. He married Anne, daughter of Edward IV; served in the navy and in 1513 under his father at Flodden. He opposed the policy of Wolsey and angered the king against him; was less successful in his opposition to Thomas Cromwell, and shared the spoil of the monas¬ teries; and in 1546 with his son Henry, Earl of Surrey, was accused of high treason. He won the battle of Solway Moss in 1542. He was condemned and saved from death only by the demise of Henry VIII. He remained in the Tower during Edward Vi's reign; but was re¬ stored to favor under Mary;

and in his 81st year showed equal bravery and rashness in leading the forces against Wyatt (1544). His grandson, Thomas Howard, 4th Duke of Nor¬ folk, son of the Earl of Surrey: b. 1536; d. Tower Hill, 2 June 1572; became duke in 1554; gave largely to the foundation of Magdalene College, Cambridge, was sent to Scotland in 1568 to inquire into affairs there; attempted to marry Mary, Queen of Scots; and as head of the English nobility played a prominent part in the Ridolfi plot in her behalf. He was tried for treason and executed.

NORFOLK, Thomas Mowbray, 1st Duke

of (of the first cre'ation), English statesman: b. about 1366; d. Venice, 1399. He was sum¬ moned to Parliament in 1383 as Earl of Not¬ tingham ; served in Scotland in the following year; joined in the prosecution of the favorites of Richard II by the Merciless Parliament; but was soon reconciled to the king and assisted him greatly in his tyrannical policy toward the nobles. Norfolk arrested Gloucester, Arundel and Warwick, and when bidden to produce

Gloucester for trial he said that the prisoner was dead, and very possibly he was responsible for Gloucester's death. He was made Duke of Norfolk in the same year, 1397 ; but in 1398 was accused of treason and banished from England.

NORFOLK, England, a county bounded north and east by the North Sea, south and southeast by Suffolk and west by Cambridge¬ shire and Lincolnshire. Norfolk is the fourth largest county in England. Its area is 2,053 square miles. The eastern and central portions consist of an undulating plain with pretty river valleys and low chalk downs in the north. The principal rivers of the east¬ ern section are the Yare and its tributaries Wensum, Bure and Wavency. Most of this part of Norfolk is well wooded and fertile and there is little heath land. The west¬ ern part of Norfolk includes part of the fen country. Here the rivers are the Great Ouse and its tributaries, the Little Ouse, or Brandon which flows across the western bound¬ ary line of Suffolk, the Wissey and the Nor. The district known as Bedford Level extends from Welney and Hilgay Fens near the junc¬ tion of the Great and Little Ouse northward to the Wash. In the middle eastern section lie the famous Norfolk Broads, shallow meres and marshes of an average depth of eight feet, luxuriant with reeds and water plants inter¬ sected by the lower courses of several rivers, particularly the Bure and its tributaries. The Broads abound in pike, bream and other fish and a vast

number of water fowl, such as heron, bittern, snipe, teal, mallard and king¬ fisher. Generally speaking the coast line is flat and low with few river mouths. Several villages existing in 1066 have been engulfed by the ever-encroaching sea. From the mouth of the Yare — Yarmouth to Happisburgh — the shore is bor¬ dered by sand dunes, then come cliffs from 50 to 200 feet in height and then a low sandy coast extending to Saint Edmund's Point. West of Lynn much land has been reclaimed from the sea in modern times and south of this a Roman embankment runs into Lincolnshire. Submarine forests exist off the coast, particu¬ larly in Brancaster Bay and in the vicinity of Cromer and Happisburgh. Fossils of large mammals are occasionally found here by fisher¬ men. The climate is cold owing to the exposed position of the coast to east and northeast winds. Fogs are common in the nearby dis¬ tricts and a characteristic mist called the "cynd" frequently covers the eastern parts.

Norfolk is mainly in the diocese of Norwich with small portions in those of Ely and Lincoln. The county is divided into six Parliamentary divisions. It returned members to Parliament as early as 1290. The city of Norwich now returns two members; the boroughs of King's Lynn, Norwich and Great Yarmouth each re¬ turn one member in addition to the six divi¬ sions. The total number of civil parishes is 700. The municipal boroughs are King's Lynn, Norwich, Thetford and Yarmouth. The urban districts are Cromer, Diss, Downham Market, East Dereham, Hunstanton, North Walsham, Sheringham, S waff ham, Walsoken and Wells- next-the-Sea. Among the other towns are Holt, Fakenham and Wymondham. Assizes are held at Norwich. The Great Eastern Railway pro¬ ven.. 20 — 26

vides the principal railroad communication to Norwich and Yarmouth; Ely to Lynn; Lynn to Swaffham. There are many branch lines, in¬ cluding the Midland and Great Northern from Lynn to Kromer, Norwich, North Walsham and Yarmouth. Boats run down the eastern rivers to the port Yarmouth. The Great and Little Ouse are also navigable and are con¬ nected to Lynn by canals. The chief industries of Norfolk go back to historic times. Sheep raising flourished, horses were bred, bees were kept, salt was made, fisheries were important and there were about 600 water mills when the Domesday book was prepared (1086). Flemish immigrants introduced the worsted trade in the 13th century and the name came from the fact that this product first was manufactured at the town of Worstead. The leather business flourished in Norman times. Linen was made in Aylsham in the 14th century. Agriculture is still one of the features of Norfolk. About four-fifths of the total area is under cultiva¬ tion. Wheat and barley are grown and oats for which Norfolk is famous. A fair amount of small fruit is cultivated. Pasture land is fine and much attention is given to the raising of sheep and cattle. The old Norfolk "polled stock" is a distinct breed. Fisheries are im¬ portant, particularly those of Yarmouth.

The Yarmouth "bloater," nicknamed the "Yarmouth pheasant," makes the tour of the world in tins or as "bloater paste." Silk is manufactured at Yarmouth, Wymondham and North Walsham. Worsted is one of the chief places in England for the manufacture of cloth; Norwich manu¬ factures silk and wool, boots and shoes, weaves shawls and has extensive mustard and starch works. Flour mills and works for making agricultural implements are numerous through¬ out the county. Pop. 321,733. Consult cVic- toria History of the County of Norfolk) (London and New York 1901-06) ; Emerson, P. H., (Pictures of East Anglican Life (Lon¬ don 1888) ; Davies, G. C., (Norfolk Broads and Rivers* (Edinburgh 1884) ; Dutt, W. A., (Norfolk and Suffolk Coast) (New York*

1910).

NORFOLK, Neb., city in Madison County on the Elkhorn River, 75 miles southwest of Sioux City on the Chicago and Northwestern and the Union Pacific railroads. It is a busy commercial centre and is situated in a rich agri¬ cultural district. Norfolk has a Federal court¬ house, a public library, a State Hospital for the Insane, a United States weather bureau station, a fine park and municipal waterworks. Farming and cattle-raising are important in¬ dustries. Large flour and cereal mills, cream¬ eries, bottling-works, packing-houses, concrete block, threshing-machine and washing-machine . factories, a planing-mill and shops of the Northwestern system are other activities of the city. Pop. (1920) 8,634

NORFOLK, Va., city, port of entry, and United States naval station in Norfolk County, the second largest city of Virginia, on the Elizabeth River, which is an arm of the Chesa¬ peake Bay, the Albemarle and Chesapeake Canal and Dismal Swamp Canal. It is 116 miles by water and 70 miles in a direct line southeast of Richmond, on the Atlantic Coast Line Railroad, the Seaboard Air Line, the Chesapeake and Ohio, the Norfolk and West-

ern, the Norfolk and Southern, the Southern and the New York, Philadelphia and Norfolk railroads. The city covers an area of about seven and one-half square miles and is laid out on rather level ground. The climate is genial, being tempered by the Gulf Stream, which runs nearer the shore off Capes Henry and Hatteras than at any other point along the Atlantic Coast. Among the prominent buildings are Saint Paul's Church, built in 1737, public library, Carnegie library, city hall, custom house, Saint Vincent's Hospital, Protestant hospital, post office, Norfolk Mission College, upward of 30 churches, an academy for young ladies, an

institution for colored students, and there is a beautiful public park covering 95 acres. Under the revised and amended charter of 1908, Nor¬ folk is governed by a mayor, elected every four years, and a board of control of three members. A common council and board of aldermen of 40 members have charge of the legislative func¬ tions. The cost of maintenance for the city de¬ partments amounts to $1,200,000 annually; the principal items being interest on debt, $210,000; fire department, $130,000; schools, $275,000; street, sewer and drain department, $95,000; and police department, $160,000. The municipal waterworks were built in 1872 and cost $1,- 236,000. There are 70 miles of street mains in the system. The city's annual income is in excess of $3,000,000.

Norfolk is eight miles distant from Hamp¬ ton Roads and 17 miles from the Atlantic Ocean. Norfolk and Portsmouth, on the oppo¬ site side of the Elizabeth River, constitute the largest naval station in the United States. The Norfolk navy yard is located at Portsmouth. The coaling station here handles over 3,000,000 tons annually. The harbor is commodious, ac¬ cessible for the largest warships and has a main channel 30 feet deep. The defenses include Fortress Monroe. A United States customs district embraces both Norfolk and Portsmouth. The foreign trade in a recent year was repre¬ sented by exports, $17,541,324; imports, $1,295,- 347. Norfolk is the terminus of many steam¬ ship lines, transatlantic and coastwise, and has a large boat traffic with the interior by canal. It is already an important commercial centre and is growing rapidly in this direction. The commerce of the port includes lumber, coal, grain, cotton, peanuts, oysters, fruit and vege¬ tables. It is the leading peanut market of the world; is the fourth cotton port of the United States, with a business of 600,000 bales annually; an oyster trade of $2,500,000 and a trucking business of $6,000,000. Norfolk has several national and State banks, a chamber of commerce, board of trade, cotton exchange,

, real estate exchange. The Union stock yard here has an annual business of over $2,500,000. The manufacturing industries represent capital to the amount of over $11,000,000, with a pro¬ duction valued at about $14,000,000. The in¬ dustries include cotton knitting-mills, cotton compress-mills, fertilizer factories, shipyards, tobacco and cigar factories, iron foundries, ma¬ chine shops, steel works, carriage and wagon shops, creoscting works, housing factories, steel shutter and blind factory, lumber mills, silk mills, barrel, box and crate factories, brick¬ yards, breweries, bottling works, grain ele¬ vators, electric supply works and numerous

minor concerns. There are gas and electric light plants here, an electric traction system and daily and weekly newspapers. The town of Norfolk was first settled in 1680. It was bombarded and nearly destroyed by the British under Lord Dunmore, 1 Jan. 1776. In 1736 the town was

incorporated as a borough and was chartered as a city in 1845. The city suffered severely in 1855 from an epidemic of yellow fever. During the Civil War, in April 1861, General Taliaferro entered the city with a large body of Virginia troops. In May 1862, the Federal army took possession of the city and during the interval from April 1861 to May 1862 the city was the chief Confederate naval station. A new charter was granted in 1906, and was amended two years later. In 1906, Berkeley, a suburb, was annexed. Pop. 115,777. Consult Burton, H. W., (History of Nor¬ folk (Philadelphia 1877) ; Forrest, W. S.,*

(Historical and Descriptive Sketches of Nor¬ folk and Vicinity) (Philadelphia 1853) ; Lamb, (Our Twdn Cities of the 19th Century) (Nor¬ folk 1888).

NORFOLK ISLAND, in the Pacific Ocean, 400 miles northwest of North Cape, New Zea¬ land, nearly midway between that colony and New Caledonia, and about 800 miles east of Australia, is six miles long and has an area of 10 square miles, rising in Mount Pitt to a height of over 1,000 feet. The climate is healthful and the soil fertile and well watered; lemons, grapes, figs and pineapples flourish; distinctive features of its flora are the Norfolk Island pine, growing to a height of 200 feet, and the Norfolk Island cabbage, a dwarf pine. Norfolk Island was discovered by Cook in 1774. Be¬ tween 1788 and 1805, and again between 1826 and 1855, it was a penal settlement for convicts sent from New South Wales. In 1856 many of the inhabitants of Pitcairn Island (q.v.) were transferred hither by the British government. The people are indolent and owing to inter- mariiage, a decaying race; they fish, farm and supply provisions to passing vessels. Formerly under New South Wales, the island was in 1914 placed under the government of the Australian commonwealth. It is a station of the British All-Red cable. Pop. 985.

NORFOLK ISLAND PINE. See Arau-

CARCIA.

NORFOLK SPANIEL. See Spaniel.

NORFOLK AND WESTERN RAIL¬ WAY COMPANY, a company incorporated 24 Sept. 1896 under the laws of Virginia, as successor to the Norfolk and Western Railroad. Additional lines were acquired from time to time, including the Cincinnati, Portsmouth and Virginia Railroad, and a half-interest in the Winston-Salem Southbound Railroad (the other half being owned by the Atlantic Coast Line Railroad). The company also controls the Pocahontas Coal and Coke Company. The Pennsylvania Railroad Company and its sub¬ sidiary companies own $11,320,000

preferred and $41,975,900 common stock of the Norfolk and Western, or about 38 per cent of the total capi¬ tal stock.

*On 31 Dec. 1917 the directly operated lines of the company consisted of 2,086.45 miles, in¬ cluding 1,542.98 miles of main lines owned, 529.49 miles of branches owned, and 13.98 miles**

of traffic rights. The main line runs from Nor¬ folk, through the West Virginia soft-coal fields to Cincinnati, Ohio, and Columbus, Ohio, with lines to Richmond, Va., Hagerstown, Md., Winston-Salem, N. C, Durham, N. C., and Bristol, Penn. Most of its mileage, however, lies in the State of Virginia and West Virginia. For the year ended 31 Dec. 1917 its total operating revenues amounted to $65,910,242; total operating expenses, $41,161,503; total operating income $19,651,816; total other income, $3,530,239; gross income, $23,182,055; net income, $18,946,137 ; surplus for year, $8,393,840 ; leaving the percentage earned on common stock outstanding at end of year at 14.96 per cent. On 31 Dec. 1917 the equipment included 431 passenger cars, 41,908 freight cars of all kinds, 10 barges, 241 side dump cars, 41 derrick tool cars, and 1,180 maintenance, wreck¬ ing cars, etc. On 27 Dec. 1917 the complete operation of this railroad property was taken over by the United States government and the road in 1918-19 was operated by the Director-General of Railroads.

NORIA, a hydraulic machine used in Spain, Syria, Egypt and other countries for raising water. It consists of a water-wheel with re¬ volving buckets or earthen pitchers, but its modes of construction and operation are various. As used in Egypt it is known as the sakieh. These machines are generally worked by animal power, though in some countries they are driven by the current of a stream.

NORIAC, n6-re-ak, Jules, pseudonym of Claude Antoine Jules Cairon : b. Limoges, France, 1827; d. Paris, France, 1 Oct. 1882. His novels won a high reputation and among the most widely known are (The Coun¬ tess of Bruges) (1878) ; (The Chevalier de Cerny) (1879), etc.*

NORM, a standard of reference in accord¬ ance with which an entity or state of affairs is approved or disapproved. Our standards of right and wrong, truth and falsity, beauty and ugliness, pleasure and pain, are all norms, and the sciences which concern themselves with ap¬ plying these standards — namely, ethics, logic, aesthetics and what may be called

hedonics — are classed as normative sciences. Not every criterion is a norm; an act of approval or dis¬ approval must depend on the application of the criterion. Thus, when one is weighing in an experiment the electrolytic deposit on a piece of metal, he is not applying a norm, but when he weighs a purchase to determine whether it is less in weight than it should be, he is applying a norm, as in this latter case the discovery of a deficiency in weight is the object of disapproval. This approval or disapproval seems on intro¬ spection to be the same in nature throughout all the different norms with which it is associated, and to be insusceptible to any obvious analysis. The distinction between the several normative sciences, or sciences which are concerned in evaluation according to norms, resides not in any distinction between the sorts of approval in¬ volved in each, but to the object of that approval and to the scope of the consciousness in which it is approved. A normative judgment is ethical when the range of consciousness has been en¬ larged to the greatest possible extent, and an attempt has been made to consider every relevant antecedent, concomitant and conse¬

quent circumstance. It is aesthetic when the range of consciousness is restricted to what lies within the object of evaluation, but embraces every possible detail within the limits of this restriction. It is logical when the content of the mind consists entirely of propositions which, by disregard of their peculiar matter, have been reduced to mere schemata. It is hedonic when the existing state of consciousness is taken as it is found, with no attempt to broaden or deepen its scope. See ˆEsthetics ; Ethics ; Logic.

NORMA. Italian opera in two acts, by Bellini, first performance at La Scala, Milan, by Pasta, Grisi and Donzelli, 26 Dec.' 1831. London first heard the work at King's Theatre, 20 June 1833; Paris at the Italians, 8 Dec. 1835; and New York, at Niblo's, 30 Sept. 1843, Corsini and Perozzi singing Norma and Pol- lione. The New York Academy of Music, Irv¬ ing Place, was opened with Norma, sung by Grisi and Mario, 2 Oct. 1854. Romani's li¬ bretto of Norma was taken from Soumet's tragedy of the same name, produced at the Theatre Frangais, 6 April 1831, about a year before Norma was heard at La Scala. The suc¬ cessful opera killed the play. The scene is laid among the Druids in Gaul during the occupa¬ tion by the Roman legions. The first and most celebrated representative of the Druid priestess was Pasta. Norma became one of Grisi's most famous parts. It was also splendidly sung by Malibran, Titiens and Lilli Lehmann. Rubini and Mario were famous in the part of Pollione. The prayer ((Casta Diva,® sung by the Druid priestess, after she cuts the sacred mistletoe, is one of Bellini's most popular melodies and ex¬ hibits his marvelous skill with ornate embel¬ lishment. His air has lately been revived and sung in concerts by Alma Gluck. Consult (Omaggio a Bellini nel primo centenario della sua nascita) (Catania 1901) ; Lloyd, William A., (Vincenzo BellinP

(London 1916) ; Upton, (Standard Operas } (Chicago 1890).

NORMAL, nor'mal, Ill., city in McLean County, at the junction of the Chicago and Alton and the Illinois Central railroads, about 60 miles northeast of Springfield. It was set¬ tled about 1840. It is in a productive agricul¬ tural region in which considerable attention is given to the cultivation of fruit and nursery stock and to the raising of Norman and French draft horses. It has canning factories, novelty works and a large trade in farm products, nur¬ sery stock and horses. It is the seat of the Illinois State Normal University and the Illinois Soldiers' Orphans' Home. Pop. (1920) 5,143.

NORMAL COLLEGE (now HUNTER COLLEGE) OF THE CITY OF NEW YORK, founded in 1869, for the training of teachers. The first attempt in New York City to provide public means for teachers to procure professional training was in 1856, when a daily normal school was established, which remained in existence only three years. This was fol¬ lowed by the Saturday Normal School, which proved a source of inspiration to the teachers, and made them strong advocates for more thorough professional work. In 1869 the Nor¬ mal and High School for young women was established by the board of education ; in 1870 the name was changed to Normal College. Graduates of grammar grades were then ad¬ mitted and the course was for three years. The

first president was Thomas Hunter. The en¬ trance requirements and the course of study have been raised, and now the institution has a four-year course of academic work, based on a four -year course in the city high schools. The degree of A.B. is conferred. It has in addition a model kindergarten and a model elementary school, a model high school, an ex¬ cellent library and well-equipped laboratories. A large number of the teachers in New York City are graduates of this college. The teaching staff at present numbers 130 and the students 1,450; the high school department has 70 teachers and 1,100 pupils, the model elementary school 22 teachers and 750 pupils, and the kindergarten five teachers and 100 pupils. In 1914 the name was changed to Hunter College in honor of the first president, Thomas Hunter. None but residents of New York City are eligi¬ ble for admission. The board of trustees con¬ sists of the president of the college and the members of the New York board of education.

NORMAL SCHOOLS. See Teachers,

Professional Training of.

NORMAN, nor'man, Sir Henry, English traveler and author: b. Leicester, England, 19 Sept. 1858. He was graduated from Har¬ vard in 1881 and later studied at Leipzig. In 1882 he began . a public agitation for the preservation of Niagara Falls, which resulted in the purchase of land on both sides of the falls by the State of New York and the Domin¬ ion of Canada for use as a public park. He was for several years on the editorial staff of the Pall Mall Gazette and later of the London Daily Chronicle , and retired from journalism in 1910. He traveled widely in the United States and Canada and also in Japan, Russia, Siberia, central Asia, Korea, China, Siam, the Malay Peninsula Egvpt and the Balkans. In 1902 he founded the (World's Work, an illus¬ trated monthly which he also for some time edited. From 1900 to 1910 he represented (in the Liberal interest) South Wolverhampton in the House of Commons and after the latter date Blackburn. He was chairman of the War Office Committee on Wireless Telegraphy in 1912; and after the outbreak of the Great War was a member of the Inventions Panel of the Ministry of Munitions. He was knighted in 1906 and created a baronet in 1915. He has written (An Account of the Harvard Greek Play) (1881); (The Preservation of Niagara Falls1* (1882) ; (The Real Japan* (1892) ; (The Peoples and Politics of the Far East* (1895) ; (The Near East* (1899) ; < All the Russias* (1902), and < Delhi* (1902).*

NORMAN, Okla., city, county-seat of Cleveland County, on the Atchison, Topeka and Santa Fe Railroad, about 48 miles south of Guthrie and 20 miles south of Oklahoma. It is an agricultural region in which the cultiva¬ tion of wheat and cotton and cattle-raising are the chief occupations. The principal manu¬ factures are flour, cottonseed oil and ice. It has considerable trade in wheat, flour, cotton, cottonseed oil and livestock. It is the seat of the University of Oklahoma (q.v.) and of the State Insane Asylum. There are several churches, public schools and banks. The gov¬ ernment is vested in a mayor and a board of aldermen of eight members. The city owns its water-supply system. Pop. (1920) 5,004.

NORMAN ARCHITECTURE, a variety of the Romanesque style originated by the Nor¬ mans and introduced into England by William the Conqueror. Within the generation of their conquest of the district known to-day as Nor¬ mandy they began to erect churches and cathe¬ drals in memory of their victories. Their con¬ quests supplied them with the means for making these large edifices. Not content with the small churches then common in France, they desired monuments worthy of their great con¬ quests. While retaining the general style of the French churches the Normans erected much larger buildings. They borrowed also to a lim¬ ited extent from the early Gothic. Size and massiveness characterize the early period when the

Latin plan (derived from the Basilica) of a central portion with aisles at the sides, and with a semi-circular apse at the east end is fol¬ lowed. The tower was a favorite and in Nor¬ man hands became highly developed. Ornamenta¬ tion consisted of the billet, chevron, zigzag, etc., but remained of a simple design. Semi-circular arches crowned doors and windows. At first single pillars supported the nave arches, but ih later examples shafted piers are found. The main central part of the structures at first were without vaults because of the great width, and wooden roofs were substituted, with vaults on the side aisles only. The masonry of the early period is rude, with large joints, and the stones generally unhewn. The style prevailed from about the beginning of the 10th century until the death of William the Conqueror, near the close of the 11th century. Normandy has many fine extant examples, among which perhaps the best known are the churches of Caen erected in the time of the Conqueror. This style of architecture was brought into England by the Normans at the Conquest in 1066. They there extended the scale of the buildings, as they had done in Normandy, preserving, however, many local peculiarities of the Saxon style, which they found in the countrv. An example of pure Norman is the White Tower chapel of the Tower of London. There are, however, many buildings, both in England and in Scot¬ land, which date from before the end of the 12th century, when the pointed style began to be used. Durham, Lindisfarne, Canterbury, Dunfermline are partially Norman, besides many other churches and castles. The Anglo- Norman is heavier than the French-Norman, the cylindrical nave piers of the above-named buildings being much more massive than those of French works. To relieve this heaviness, the chevron, spiral and other groovings were cut in the piers. The moldings and forms of doors, windows, etc., are the same as those of Normandy. There is one remarkable difference in the plans of the early Norman churches in the two countries: in France, the apse at the east end is always semi-circular; in England, this form was gradually given up; and toward the last the square east end was universally adopted. Consult Browne, E. A., (Norman Architecture (New York 1907) ; Dehio and Bezold,*

Architecture normande (2 vols., Paris 1884—*

NORMAN CONQUEST, in English his¬ tory, the successful attempt made by William

of Normandy in 1066 to secure the English crown from his rival Harold, son of Earl Godwin. It was no real conquest of the land and people by an alien race, but rather re¬ sembled in its chief characteristics the accession

of William of Orange to the throne in 1688. Any immediate evil effects were more than counterbalanced by the advantages which it conferred on England, such as the grafting on Anglo-Saxon institutions of the better organi¬ zation and greater mastery of law of the Nor¬ mans ; the bringing of England more into touch with European politics and the consequent be¬ ginning of her ever-widening foreign relations ; the repression of internecine strife and the greater security of life and property; the great impetus given to architecture and to many of the industrial arts, and finally its great in¬ fluence on the development of the old English language into modern English. See Great Britain — The Conquests.

NORMAN FRENCH, the language spoken by the Normans at the time of the Conquest. Its development in England was largelv, if not altogether, independent of foreign influences, and latterly varied from every form of French, and even from the dialect of Normandy, with which it had at the outset coincided. It ceased to be a spoken language after 1400. It was the legal language of England till the reign of Edward III, and certain law phrases and legal words have been incorporated into English. It exercised a considerable influence on the Anglo- Saxon, and is still spoken among the native population of the Channel Islands (q.v.), the remnant of the Norman possessions belonging to Great Britain. See Normandy.

NORMAN LAW. See Law; Normandy.

NORMANBY, nor'man-bi, Constantine Henry Phipps, 1st Marquis of, English states¬ man : b. England, 15 May 1797 ; d. South Kens¬ ington, England, 28 July 1863. He was edu¬ cated at Trinity College, Cambridge, and in 1818 entered Parliament, sitting for Scarbor¬ ough in the liberal interest. In 1832 he was appointed captain-general and governer of Jamaica and in 1835 was made lord-lieutenant of Ireland, where he was extremely popular. He was Secretary for War and the Colonies in 1839 and later was transferred to the Home Secretaryship which he occupied until 1841. He was Ambassador to France 1846-52 and to Florence 1854-58. He wrote (The English in Italy) (1825) ; (A Year of Revolution (1857) ; Vindication of the Duke of Modena) (1861), and several novels, one of which was (The Contrast (1832).

NORMAND, nor'mand, Henrietta Rae,

English painter: b. London, 30 Dec. 1859, daughter of T. B. Rae; married Ernest Nor- mand, painter, 1884. She was educated in London art schools and was awarded a medal at the Paris and Chicago Universal Exposi¬ tions. Since 1880, when she first exhibited at the Royal Academy, she has been represented there every season. Some of her most import¬ ant pictures are

Marquess of Dufferin and Sir Alfred J. New¬ ton.

NORMAND, nor'man, Jacques Etienne,

French communist: b. Abbeville, France, 1809; d. San Antonio, Tex., 1867. He was a Saint Simonist, and during the Revolution of 1848 in France petitioned the legislature for permission to establish a communistic colony; he was ban¬ ished from France when Louis Napoleon be¬ came President and came to the United States. Buying considerable land near San Antonio, Tex., he established a communistic colony called Reunion, which prospered for a time, but which was finally suppressed by the Texas legislature. While trying to establish another colony he was arrested and imprisoned. He wrote (Principes de socialisme) (1846) ; (Theorie de la Commune Naturelle) (1855) ; (Theorie de la Republique Communiste Univer- selle> (1860).

NORMANDY, nor'man-di, France, an an¬ cient province bordering on the English Chan¬ nel, now divided into the departments of Seine- Inferieure, Eure, Orne, Calvados and La Manche. It is a fertile region, with well-cultivated fields and fruitful orchards and the people are intelligent and industrious, ranking among the best and most energetic of French provincials. Under the Romans this portion of the country formed part of Gallia Lugdunensis Secunda; after 'the Frankish invasion it was a constituent part of the kingdom of Neustria, and was given by Charles the Bald to the Duke of Paris. From the middle of the 9th century its coasts were harried by the vikings or Northmen (see Normans), who early in the 10th century estab¬ lished themselves in such force along the Seine that Charles, king of the Western Kingdom, was glad to arrange a treatv with their leader, Rolf (Rollo, Rou), at Clair-sur-Epte in 912, practically ceding the region, which henceforth was known as Normandy. Its capital was Rouen, and it comprised Upper Normandy, with the towns of Dieppe, Evreux, Harfleur, Havre, Honfleur, Lisieux, Rouen and Yvetot, and Lower Normandy with Caen the chief town, Alencon, Avranches, Bayeux, Cher¬ bourg, Constances, Falaise, Granville and Saint Lo. Rollo's most distinguished successor was William II, Duke of Normandy, who invaded England in 1066, and as William I established a Norman dynasty, thereby uniting Normandy with the latter country. Philip Augustus con¬ quered Normandy in 1204, the French holding it till 1417, when it was recovered by the Eng¬ lish, who held it till 1450, when it was finally wrested from them by Charles VII. The Chan¬ nel Islands (q.v.) are a remnant of the Nor¬ man possessions still belonging to the descend¬ ants of the Norman kings of England, .where down to the present day the law administered in the royal courts is virtually the Grand Coutamier de Normandie, or the old customary law of Normandy. One feature survives in the Cry of Haro. This ancient customary law of Normandy seems to have been collected in

writing on three separate occasions. The earliest collection was apparently written down by private persons in 1200 and about 1220 and had no official character; the third collection (1585) is a revised edition of the second, the Grand Coutamier, completed early in the 14th century. Consult Freeman, (Norman Conquest'

(1877); Haskins, (Normandy and William the Conqueror) (1909); Palgrave, (History of Nor¬ mandy } (1878); Powicke, (The Loss of Nor¬ mandy, 1 189-1204 > (1913) ; Prentout, (Essai sur les origines de la fondation du duche de Nor- mandie) (1911); Spence, (Dreamland in History> (1890).

NORMANS, or NORTHMEN, a general name given the people of ancient Scandinavia or Norway, Sweden and Denmark. This name was given to them in the Netherlands, in Ger¬ many and France: in Great Britain they were called Danes. They were fierce and warlike tribes, who made piratical expeditions to all parts of the European seas, plundering by land and by sea, and often overrunning large tracts of country, in which they practised every enor¬ mity. "They had scarcely any inducements,® says Mackintosh, the English historian. "to spare countries which they visited only to plunder, and where they did not hope to dwell ; they were less than others liable to retaliation, and they had neither kindred nor family nor home. They were, perhaps, the only barbarians who applied the highest title of magistracy to denote the leaders of piratical squadrons, whom they termed vikingr or sea-kings. Not con¬ tented with their native and habitual ferocity, some of them sought to surpass their com¬ panions by working themselves into horrible and temporary insanity® Vikingr does not, however, mean sea-kings, 'but is derived from vik, a bay or creek. The poverty of their coun¬ try compelled them to adopt this means of sub¬ sistence, and their religion inspired them with a love for daring enterprises, since it taught them that warriors fallen in battle were ad¬ mitted to Valhalla, the northern paradise.

In 795 some Norwegians established them¬ selves in the Faroe Isles and in Orkney; toward the middle of the 9th century they founded the governments of Novgorod and of Kiev, in Russia; and after the discovery of Iceland certain oowerful Norwegian families, taking refuge from the persecutions of Harold, king of Denmark, settled in that island. The Northmen began their piratical excursions in the first part of the 9th century, and', soon cov¬ ered the sea with their boats, and ravaged the coasts of England, Germany, Friesland, Flan¬ ders and France. Under the

feeble reigns of Charles the Bald and Charles the Fat they ascended the rivers to the very heart of France and plundered Paris itself. It became neces¬ sary to purchase their retreat with gold. Their incursions into France were afterward renewed and Charles the Simple was obliged (912) to cede to them a part of Neustria, which was afterward called, from them, Normandy (q.v.), and to give his daughter in marriage to Rollo, their chief. Rollo embraced the Christian re¬ ligion, was baptized under the name of Robert and became the first Duke of Normandy and a vassal of the king of France. His followers received the religion of their leader and aban¬ doned their roving and piratical habits ; though they still retained, as also did their descendants for a long time, marks of their Scandinavian origin and that warlike ardor which had ren¬ dered them so terrible to those against whom they directed their attacks. Great Britain was, for about two centuries, desolated by the Danes! as the Northmen were there called. Egbert, in the beginning of the 9th century, had no sooner

made some approaches toward a regular gov¬ ernment and the establishment of tranquillity, than the "Scandinavian heathens,® as the Saxons termed them, made their appearance. Alfred (871—901) finally delivered the country from the invaders, after they had subdued the whole land except the "isle of the nobles,® into which the king had retreated with a few nobles. But the relief was only temporary : they re¬ turned, under his successors, in greater force, obtained possession of the northern and eastern part of the country, and in the beginning of the 11th century three Scandinavian princes (Canute, Harold and Hardicanute) ruled over all England for the space of about 25 years. The Saxon line was then restored; but in 1066 William, Duke of Normandy, obtained the Eng¬ lish throne. This conquest, as it is commonly called, had a most important influence on the Saxon manners, language and constitution, which had hitherto escaped with little change, and is, therefore, one of the most important epochs in the English history. In the year 1000, according to the Saga narratives, Leif, son of Eric the Red, leaving Greenland, which had been discovered and settled by his father, a Norwegian, proceeded southward in a ship, ac¬ companied by 35 men, and discovered the Amer¬ ican coast, to which he gave the name of Vin- land. In 1007 a rich Greenlander, with a fol¬ lowing of 60, emigrated to Vinland, and there planted a colony, which seems to have thriven, but after a time we hear nothing more about it. The Normans also established a new kingdom in Naples in 1016. The foreign expeditions of the Northmen gradually diminished their num¬ bers and strength at home, and rendered them less formidable.

Consult Depping, (Histoire des expeditions manhmesdes Normands> (1826); Du Chaillu, (The Viking Age> (1890); Fischer, (Eng tr 1903) ; Freeman, history of the Norman Con¬ quest of England } (1877) ; Hov- gaard,

(1891) .

NORN.S, nornz, in Scandinavian mythology, the three Fates, representing the past, the pres¬ ent and the future, whose decrees were ir¬ revocable. They were represented as three young women, named respectively Urd, Ver- dandi and Skuld. They sit by the well of Urd under the world-tree Ygdrasil in Asgard, and there determine the fate of both gods and men Besides these three there are many inferior norns, both good and bad, answering to the genu of classical mythology; to such are at¬ tributable the unequal destinies of men in the world. . Women who possessed the power of prediction or magic also bore this name.

NORQUAY, John, Canadian statesman : b near Fort Gerry, Manitoba, 8 May 1841; d Winnipeg 5 July 1889. He was of mixed bcotch ana Indian parentage and was educated at baint John's Academy, Red River Settle¬ ment. During the negotiations after the Red Iuver Rebellion he secured the confidence of 'both the authorities and the half-breeds in 1869, and on the formation of the government was

107ˆ1 C ˆ t t0 ,ˆrst Manitoba Parliament in

v . hnr lo/l he was appointed Minister of 1 ublic Works and Agriculture, to which he was

again appointed in 1876, having in the mean¬ time resigned and joined the Davis administra¬ tion (1875). In 1878 he formed a ministry and became Premier and Colonial Treasurer. From 1874 until his death he sat in the legislature. He was Premier of Manitoba from 1878 to 1887, when he resigned. Norquay promoted legislation on municipalities, drainage and county courts; upheld the rights of his native province and initiated the struggle for enlarged boundaries; finally granted in 1912. On sev¬ eral occasions he represented the province to the federal government at Ottawa. He also contended successfully against the monopoly in railway construction conferred upon the Cana¬ dian Pacific. Consult Begg, Alexander, his¬ tory of the Northwest5 (Toronto 1894). His portrait appears in Canadian Magazine (July

1903).

NORRIDGEWOCK INDIANS, an Amer¬ ican tribe of the Algonquin family and the leaders in the Abnaki confederacy. They for¬ merly lived along the Kennebec River in Maine and were frequently called Kennebec Indians.

They were patrons of the French missionaries, who first ministered to them in 1688, and were regarded as dangerous enemies of the English colonists. The latter sent an expedition against the Norridgewocks in 1724, when the Indians were defeated, the resident priest, Father Rasle, killed, and the tribe dispersed, some going to the Penobscot and Passamaquoddy and others to Saint Francis, in Canada. Those who re¬ turned to their old home were dispersed for a second time in 1754 and made their way to Canada.

NORRIS, nor'Is, Edwin, English linguist: b. Taunton, Somerset, England, 24 Oct. 1795 ; d. Brompton, England, 10 Dec. 1872. His early youth was spent in tutoring, and in 1818-37 he was a clerk with the East India Company. In 1837 ihe became assistant secretary of the Royal Asiatic Society and in 1859 its secretary. His time was principally devoted to the study of the Semitic languages and the Celtic dialect and he was an authority on cuneiform writing. His greatest work is his (Assyrian Dictionary)

(1868-72).

NORRIS, Frank, American novelist and journalist: b. Chicago, 5 March 1870; d. San Francisco, 25 Oct. 1902. He studied at the University of California and at Harvard, after three years as an art student in Paris; was correspondent of the San Francisco Chronicle in South Africa in 1895-96; edited the San Francisco Wave 1896-97 ; wrote articles from Cuba for McClure's in 1898, and was the. author of several virile realistic novels (Mc- Teague) (1899), in illustration of slum life in San Francisco; (Moran of the Lady Letty,5 a romantic story (1900); (The Octopus, > a story of wheat raising and the transportation trusts (1901), and The Pit,5 dealing with wheat ex¬ change and gambling. The two last named stories are epical and Zolaesque in manner, and were to have been concluded by (The Wolf,5 a story of European famine.*

NORRIS, George Washington, American lawyer and financier: b. San Francisco, Cal., 5 July 1864. He was educated at the University of Pennsylvania, was engaged in the practice of law in Philadelphia from 1886 to 1894 and from 1894 to 1911 was a member of the banking firm

of Edward B. Smith and Company. From 1911 to 1915 he was director of the deoartment of wharves, docks and ferries of Philadelphia; in 1916 served as vice-chairman of the Federal Re¬ serve Bank of Philadelphia. On 6 Aug. 1916 President Wilson appointed Mr. Norris mem¬ ber of the Federal Farm Loan Board, of which he is active executive officer. Mr. Norris is trustee of the Philadelphia Bureau of Munici¬ pal Research and of many social societies.

*NORRIS, George William, American statesman: b. Sandusky County, Ohio, 11 July 1861. He was born on a farm and spent his early years farming in the summer and attend¬ ing schools in the winter, receiving most of his early education at Baldwin University, Ohio. He wase graduated at the Indiana Normal Col¬ lege in 1881. He studied law and was ad¬ mitted to the bar of Ohio in 1883. but removed to Nebraska in 1885. Here he was elected as a Republican and re-elected prosecuting attorney of Furnas County for three terms from 1895 to 1903, and from 1895 to 1902 he was judge of the 14th Nebraska district. He w*as elected to the 58th United States Congress in 1903 and served continuously until 1913, when he became United States senator (Republican) from Ne¬ braska. He was a member of important com¬ mittees and in March 1910 was not only one of the 35 congressmen who struggled to over¬ throw Speaker Cannon, but a leader in the fight. ' He introduced a resolution providing for the election of a committee by the House and for the elimination from it of the speaker; but when the resolution was adopted by means of a coalition with the Democrats, Norris refused to vote for the deposition of Cannon. In 1912 he declined to join the Progressives.*

NORRIS, Kathleen, American author: b. San Francisco, 16 July 1880. Her maiden name wa9 Thompson and she was educated by her parents and by private teachers and took a special course at the University of California. In 1909 she was married to Charles Gilman Norris, also a writer. She began to write short stories which appeared in the Atlantic, Mc¬ Clure's, Everybody's, the Ladies' Home Journal, etc., and developed into a novelist. Her books are

NORRIS, Mary Harriott, American novel¬ ist: b. Boonton, N. J., 16 March 1848; d. 14 Sept. 1919. She was graduated from Vassar College in 1870, was principal of a private school in New York 1890-96, and dean of the woman's department of Northwestern University, Evanston, Ill., 1898-99. Among her published books are (A Damsel of the 18th Century) (1889) ; The Gray House of the Quarries) (1898) ; The Grapes of Wrath) (1901) ; The Story of Christina) (1907) ; The Veil5 (1908) ; The Golden Age of Vassar) (1915).

NORRIS, Tobias Crawford, Canadian statesman: b. Brampton, Ontario, in 1861. In his youth he moved to Manitoba and became a farmer and an auctioneer of livestock. Enter¬ ing municipal politics, he soon advanced and was elected as a Liberal for Lansdowne in the Manitoba legislature, where he served for seven

years. He was returned in 1907 and in 1909 elected leader of the Liberal opposition. In May 1915 he became Premier of Manitoba.

NORRIS, William Edward, English novel¬ ist: b. London, England, 18 Nov. 1847. He was the son of a former chief justice of Ceylon, was educated at Eton and admitted to the bar in 1874 but never practised. His first novel, 'Heaps of Money, > appeared in 1877, and was successful. It was succeeded by (Mademoiselle de Mersac> (1879); (Matrimony> (1881); (1899);

(1910); (The Rt. Hon. Gentleman> (1913); .Barbara and Company > (1914), all of which nave enjoyed popularity. He has shown not a little skill in character drawing and his dialogue is entertaining and natural.

NORRISTOWN, Pa., borough, county-seat oi Montgomery County, on the Schuylkill River, the Schuylkill Canal and on the Philadelphia and Reading and the Pennsylvania and Stony Creek railroads, about 15 miles northwest of Philadelphia. It was settled about 1688 by a colony from Wales, laid out in 1785, and incor¬ porated as a borough in 1812. It was named in honor of Isaac Norris, who owned a large tract of land in what is now Montgomery County. It is in an agricultural and mining section of the State and has extensive manufacturing in¬ terests. The _ chief manufactures are knitting machines, hosiery, men's underwear, glass, iron wire, screws, tacks, boilers, bolts, silos, rugs,' paper _ boxes, machine-shop products, agricul¬ tural implements, iron and wood furniture. It has considerable trade in manufactured articles and farm products. Granite, limestone and marble are mined nearby. Some of the prom^ ment buildings are county courthouse, city buildings, Masonic Temple and the county prison. It has a State Hospital for the Insane, Charity Hospital, Saint Joseph's Protectory (Roman Catholic) for girls, Friend's Home and the Agnes Stinson Home for Aged Ladies. The educational institutions are a high school, public and parish schools, the Montgomery His¬ torical Society and the McCann Library. The tomb of Winfield Scott Hancock (q.v.) is here in Montgomery Cemetery, also a memorial shaft to John F. Hartranft. Valley Forge (q.v.) is only six miles west by north and many other places of historic and scenic interest are in the vicinity. The government is vested in a bur¬ gess, who holds office three years, and a council. The electric-lighting plant is owned by the municipality. Pop. 32,319. Consult Hevsham Theodore, 'Norristown, 1812— 1912> (Norris¬ town 1913).

NORRKOPING, nor'He-ping, Sweden, sea¬ port, on the southeast coast, on the Bravik River, about 80 miles southwest of Stockholm. It was founded in 1384, but it has several times been destroyed by fire. The Motala, a rapid river, flows through the city and furnishes ex¬ tensive water power which is used for manufac¬

turing. It is an important commercial city and has docks, shipbuilding yards, an extensive trade in its manufactures of cotton and woolen goods, carpets, sugar, paper, beer, etc., and in the imports which are reshipped at Norrkoping for the interior. Pop. 45,416.

NORRLAND, nor'land, Sweden, the largest of the three historical divisions of Sweden, in the northern part; area, 80,785 square miles. It has a cold climate, well-wooded in the south, scanty vegetation in the north. The towns and villages are chiefly in the southern part; but few settlements are in the northern part. Pop. 963,397. See Sweden.

NORSE, the language of Scandinavia, es¬ pecially in its earliest forms. Old Norse is rep¬ resented by the classical Icelandic and still with wonderful purity by modern Iceland. See Ice¬ landic Language ; Icelandic Literature ; Dan¬ ish Language; Danish Literature; Nor¬ wegian Language; Norwegian Literature; Swedish Language; Swedish Literature.

NORSE MYTHOLOGY. See Scandi¬ navian Mythology.

NORSEMAN, or NORTHMEN. See

Normans.

*NORTH, Christopher, the pseudonym, of one of the authors of the 'Noctes Ambrosianae. * See Wilson, John.*

NORTH, Sir Dudley, English financier and economist, 3d son of the 4th Lord North: b. Westminster, 16 May 1641 ; d. Covent Garden, 31 Dec. 1691. He early entered the employ of a merchant; became a leading merchant in and treasurer of the Turkey Company; resided for many years in Constantinople and returned to England in 1680; was one of the sheriffs of London in 1682 and a commissioner of customs in 1683, and retired from public life shortly after the accession of William and Mary. He was a man of great ability, one of the first Eng¬ lishmen to urge the doctrine of free-trade and the author of an important pamphlet on the 'Currency.

NOKin, unisna, American physician: b. Goshen, Conn., 8 Jan. 1771; d. New London, Conn., 29 Dec. 1843. His father and grand¬ father were physicians and he early determined to follow their profession. Studying medicine in Harvard under Lemuel Hopkins and in Phil¬ adelphia under Benjamin Rush, he practised in Goshen until 1812, when he removed to New London. Here he practised until his death. Dr North kept abreast of the times and was always foremost in adopting new ideas. He was among the first to practise vaccination in the United States and sent a newly vaccinated patient to Dr. Edward Miller in New York for the pur¬ pose of supplying vaccine from the pustule. Dr. North paid special attention to the

diseases of the eye and established the first eye infirmary in the United States at New London in 1817 VYfien the new and obscure disease called spot¬ ted fevfT appeared in New England and raged rom 1806 to 1810 Dr. North coped successfully with it. His 'Treatise on a Malignant Epidemic commonly called Spotted Fever (New York 181 1J, received general approbation. His other*

mw, arG' ',he Science °f Life (1829), and Uncle Tobvs Pilgrim's Progress*

in Phrenology) (New London 1836). Consult Bolton, H. Carrington, (Life and Writings of Elisha North) (printed privately 1887).

NORTH, Francis, 1st Baron Guilford, English lord chancellor, brother of Dudley and Roger North (qq.v.) : b. Kirtling, Cambridge¬ shire, October 1637; d. Wroxton, Oxfordshire,

5 Sept. 1685. He was educated at Cambridge and studied law at the Middle Temple. His rise was rapid : in 1671 he was knighted ; in 1673 he was returned to Parliament and became Attorney-General, and from 1675 to 1682 was chief justice of the Court of Common Pleas. In 1682 he became lord keeper and presided at the trial of the Popish plot conspirators and stained his reputation by his partisanship in the trial and execution of Stephen College, the Protestant joiner. He was created Baron Guilford in 1683 and died soon after as¬ sisting at the coronation of James II. His uncompromising royalism made him the object of contemporary attack and present misunder-. standing, notably in Lord Campbell's (Lives of the Lord Chancellors. It is to an early attack of this nature, namely, that in Kennett's Com¬ plete History) that we owe Roger North's Apology* for his brother, which grew into the (Lives of the Norths.* The conflict of testi¬ mony makes his personal character problemati¬ cal, but it is certain that he was a learned law¬ yer and a patron of literature, the art and the sciences.*

NORTH, Frank Mason, American Metho¬ dist Episcopal clergyman : b. New York City, 3 Dec. 1850. He was graduated from the Wes¬ leyan University in 1872 and ordained a Metho¬ dist clergyman ; became pastor of a church in Florida, N. Y., in 1873-74. He then had the following charges: Amenia, 1874— 76; Cold Spring on the Hudson, 1876-78; New York City, 1879-81; White Plains, N. Y.. 1882-84; Calvary Church, New York, 1884-87, and Mid¬ dletown, Conn., 1887-92. He was corresponding secretary of the New York City Church Ex¬ tension and

Missionary Society from 1892 to 1912. In 1912 the General Conference elected him one of the three corresponding secretaries of the board of foreign missions, which he still holds. He was also corresponding secre¬ tary of the Methodist National City Evangeliza¬ tion Union (1896-1912) and chairman of the executive committee of the Federal Council of Churches in America. In 1914 he traveled in the Orient to visit the missions. From 1892 to 1912 he was editor of the Christian City. Wes¬ leyan gave him the degree of A.M. in 1875 and D.D. in 1894.

NORTH, Frederick, Lord, 2nd Earl of Guilford (better known as Lord North), Eng¬ lish statesman, George Ill's Prime Minister dur¬ ing the American Revolution : b. London, 13 April 1732; d. there, 5 Aug. 1792. His father was Francis, 1st Earl of Guilford. He was educated at Eton and Oxford ; studied and traveled abroad for three years ; and in April 1754 was elected to the House of Commons for one of his father's pocket-boroughs. From June 1759 to July 1766 he was a junior lord of the treasury; and in 1767 became Chancellor of the Exchequer and leader of the House of Commons upon the death of Townshend, whose measures taxing the American colonies Lord North carried through, and in this particular as in general

*showed himself the f(king's friend** and entirely indifferent to the wishes of the people; indeed he prided himself that he had never voted for popular measures. Early in 1770 he became Prime Minister, but was none the less merely the king's tool; in March 1774 he succeeded in passing the celebrated Boston Port Bill and Massachusetts Bill ; and though he seems to have seen soon after the king's policy was a mistaken one and could result only in the loss of the colonies, and although he urged in 1775 that the colonies, if they taxed themselves, should not be taxed by Parliament, he still sup¬ ported the king's obstinate policy and remained in office, while his government grew steadily weaker because of the defection of men whose scruples, identical with his, carried force with them. On 20 March 1782 he resigned, just in time to forestall a motion for the dismissal of the cabinet. In February of the next year, by a dexterous coalition with his old enemy, Fox, he secured the dismissal of Shelburne, was a member of the coalition cabinet in 1783 and thereafter acted with the opposition against Pitt. The last five years of his life Lord North was blind, but still took some interest in poli¬ tics, and spoke occasionally in the House of Lords, of which he became a member in 1790 upon his father's death. Personally he was clumsy, awkward, very short-sighted, with an unintelligent puffy face, expressionless eyes and heavy lips, closely resembling George III. As Prime Minister he was the king's agent and completely subservient to the obstinate king; in¬ deed, he refused to be called Prime Minister, denying the place of any such office in the British Constitution. After his coalition with Fox he broke with the Crown, however, and refused George Ill's urgent offers to*

make him Premier in 1783. He was neither a great states¬ man nor a great orator, but had a gift of humor, wit and pleasant temper. Consult Donne, Cor¬ respondence of George III with Lord North) (1867); Lecky, (History of England (1882- 87) ; Lewis, Administration of Great Britain)*

(1864) ; Lucas, Reginald, Cord North (1913).*

NORTH, Maranne, English flower painter and botanist: b. Hastings, England, 1830; d. Gloucestershire, England, 1890. She inherited her passionate love of flowers from her father, Frederick North, member of Parliament from Hastings, who retired from public life in 1865. He then traveled with this daughter, who had studied flower-painting under Valentine Barthol¬ omew, visiting nearly every quarter of the globe and exploring the forests of Java, Borneo, India, ' Chile, North America and Australia, as well as those of Europe, in a search for new specimens. A fever contracted in Borneo was the ultimate cause of her death. Her water-colors, displaying much beauty, as well as scientific accuracy, were exhibited in London in 1879, and she presented her entire collection to the Botanical Gardens at Kew, adding the gift of a gallery in 1382, in which she arranged them herself with great taste. Students of botany owe much to her travels and skilful brush. Five botanical species have been named in her honor. Her autobiography, Recollec¬ tions of a Happy Life, was edited by her sister, Mrs. Tohn Addington Symonds (2 vols., Lon¬ don 1893), who also published extracts from her diary, (Further Recollections of a Happy Life>*

(London 1893). Consult Hemsley, W. B., (The Gallery of Marianne North's Paintings of Plants and their Homes, } Royal Garden's View, descriptive catalogue (London 1883).

NORTH, Roger, English colonist in Amer¬ ica: b. about 1585; d. 1652. He was the son of Sir John North, and a grandson of Roger, 2d Baron North, and in 1617 accompanied Sir Walter Raleigh to Guiana, did good service against the Spaniards on the Orinoco and re¬ mained faithful to his commander to the last. In 1619 he applied for a patent to trade along the Amazon, and, when this was denied him be¬ cause of Gondomar's influence with the king, he sailed from Plymouth without leave in May 1620, and was imprisoned upon his return. In 1627 he received letters patent to found Guiana, but spent the last years of his life in England. North planted the English power in South America, and was one of the most notable colonial projectors of his day.

NORTH, Roger, English lawyer and his¬ torian, brother of Dudley North and Francis North (qq.v.) : b. Tostock, Suffolk, 3 Sept. 1653; d. Rougham, Norfolk, 1 March 1734. He studied at Jesus College, Cambridge; became a barrister at the Middle Temple; rose rapidly in the practice of law, becoming Attorney-Gen¬ eral to the queen in 1686. He entered Parlia¬ ment in 1685, and voted against the court party on the question of the dispensing power. As he was a staunch nonjuror, he left political life upon the accession of William and Mary; and spent the rest of his life in retirement. He was a famous book-collector, but is best known for his Aives of the Norths, > an invaluable picture of the life of the period, as is his Auto¬ biography. y Both these books are included in Bohn's Library (1890). His strong Tory senti¬ ments are to be seen in the North also wrote (Memoires of Musick) (ed. by Rimbault in

1846).

NORTH, Simon Newton Dexter, Amer¬ ican statistician: b. Clinton, N. Y., 29 Nov. 1849. He was graduated at Hamilton College in 1869 and became editor of the Utica Morning Herald, which post he held until 1886. In that year he went to Albany as editor and part pro¬ prietor of the Express. He was appointed chief statistician for manufacturers of the twelfth census, and in 1903-09 director of the United States Census, in both of which positions he showed exceptional ability. In 1906 he held the chairmanship of the American Tariff Commis¬ sion to Germany, and in 1910 he was elected president of the American Statistical Associa¬ tion. For 15 years (1888-1903) he was secre¬ tary of the National Association of Wool Manu¬ facturers and editor of its Quarterly Bulletin. The degree of LL.D. was conferred upon him by Bowdoin in 1902 and the University of Illinois in 1904. His writings include (Historv and Present Condition of the Newspaper and Periodical Press in the United States) (1884) ; (A Century of American Wool Manufacture, 1790-1 890 > (1895); (01d Greek— An Old-Time Professor in an Old-Fashioned College, a memoir of his father, Dr. Edward North (1905); (Simeon North — First Official Pistol Maker of the United States) (Concord 1913),*

and many pamphlets and articles on economical, educational and industrial subjects.

NORTH, Sir Thomas, English translator of Plutarch, son of the 1st Baron North: b. about 1535 ; d. about 1601. He studied at Peter- house, Cambridge; entered Lincoln's Inn 1557; and was knighted about 1591. He has been called <(the first great master of English prose.® In 1579 he published his version of Plutarch's 'Lives, actually a version from the French of Amyot. It was dedicated to Queen Elizabeth, was very popular in her day and was the imme¬ diate source of most of Shakespeare's classical*

plays, notably Antony and Cleopatra, (Corio- lanus,* 'Julius Caesar) and 'Pericles,* some of which have entire speeches taken scarcely with a change from North. North also translated Guevara's (Libro aureo,* a Spanish adaptation of the 'Meditations of Marcus Aurelius) ; and a collection of Oriental fables from the Italian of Doni. Consult Skeat, 'Shakespeare's .Plutarch> (1875) ; and Leo, 'Four Chapters of North's Plutarch* (1878). The complete ver¬ sion is to be found in the 'Temple Classics, * and in a splendid reprint in the 'Tudor Trans- lations) (1895).*

NORTH, William, American soldier: b. Fort Frederick, Pemaquid, Me., 1755; d. New York, 3 Jan. 1836. He entered the Revolution¬ ary army in 1775 and served under Arnold in the Quebec expedition. In 1779 he was aide-de- camp to Baron Steuben, whom he greatly as¬ sisted and who at his death bequeathed to North a large part of his property. He was present at the surrender of Cornwallis and re¬ mained in the army after the war, rising to the rank of brigadier-general in 1798. He sat in the New York State assembly, of which he was twice speaker, and from 1789-99 was a United States senator. He was mustered out of serv¬ ice in 1800. He wrote a biography of Baron Steuben.

NORTH ADAMS, Mass., city in Berkshire County, on the Hoosac River and on the Boston and Maine and the Boston and Albany rail- ioads, about 50 miles northwest of Springfield. It was settled in 1765 and was part of Adams until 1878 when it was incorporated as a town and in 1895 was chartered as a city. It includes the villages of Brayton, Greylock, Beaver and Blackington. It is situated in a beautiful sec¬ tion, amid the Berkshire Hills, at the base of Greylock, the highest peak in the State. In the western part of the city is the site of old Fort Massachusetts, captured in 1746 by French and Indians under command of Vaudreuil. In the eastern part of the city is the starting point of the Mohawk Indian trail, a macadamized road of great scenic beauty following the old trail of the Mohawk Indians used in their journeys between the Hudson River and the Connecticut River; built by the State of' Massachusetts at a cost of $350,000. Hudson Brook and its nat¬ ural bridge are points of interest, and near is the famous Hoosac Tunnel, electrified by the New York, New Haven and Hartford Railroad in 1912. The chief industrial establishments are machine shops, cotton and woolen mills, boot and shoe factories, print-goods factories, cream¬ eries and cigar factories. The trade is chiefly in manufactures, farm and dairy products. It has a city hospital, good municipal buildings and a number of fine church edifices. The edu

A HERD OF WINNIPEG BUFFALO

cational institutions are a State Normal School, high schools, public and parish schools and the North Adams Library. The charter of 1895 provides for a mayor, who holds office one year, and a council. The school committee, assessors and library trustees are elected by popular vote. The city owns and operates the waterworks. Pop. 22,282. Consult Spear, (History of North Adams* ; (Berkshire Hills* ; Rowe and Fair- field, (North Adams and Vicinity, Illustrated) (North Adams 1898).

NORTH AMERICA. See America.

NORTH AMERICAN BUFFALO (Bison Americanus), the only species of the ox indig¬ enous to America, though the Bovidce include the American antelope, Rocky Mountain sheep and goat, and the musk-sheep, or musk-ox. The bison is called buffalo by the Americans and Canadians, although it is very different from the buffaloes of the Old World. A generation ago it was found in vast numbers in the great prairies between the Mississippi and the Rocky Mountains; it occurs as far north an the vicin¬ ity of Great Marten Lake, latitude 63° or 64°, extensive level and marshy tracts there affording it suitable food. The American buffalo is very similar to that of Europe. ' It is generally smaller in size, and is said to attain at times a weight of 2,000 pounds. Its limbs and tail are short and the tail has fewer vertebrae than that of Europe. The horns are shorter and more blunt. The foreparts are still more shaggy, and retain more of that quality in summer. See Buffalo; Bison.

NORTH AMERICAN INDIANS. See

Indians, American.

NORTH AMERICAN PHALANX, the

most important colony founded by the Fourier- ists in the United States. It was organized in 1843 and located in Monmouth County, N. J., about 40 miles south of New York. The organ¬ ization was on the joint-stock principle and all the members were engaged in the co-operative labor of the colony; they were paid a certain amount for labor, for talent (or administration) and for capital invested ; the rule was to pay the highest prices for the hardest and most dis¬ agreeable labor. The labor was at first mostly agricultural, products being sold outside the colony ; but later mills were built and a consid¬ erable amount of manufacturing done. A com¬ mon-school education was provided. The life was simple and pleasant, there was a library and reading-room, but the colony lacked many of the elements of culture that distinguished the life of Brook Farm (q.v.). The

*management was good and for many years the colony pros¬ pered; in 1853 dissensions resulted in a seces¬ sion of some of the members and the founding of a new phalanx; in 1854 the mills were burned down, a serious loss that badly crippled the colony; and in 1856 the organization was formally dissolved. Consult Noyes, (History of American Socialisms.**

NORTH ANDOVER, Mass., town in Essex County, on the Boston and Maine Rail¬ road and on the Essex River, about 30 miles north of Boston. It was a part of Andover until 1855 when it was incorporated as a town. It is a manufacturing place, but a large portion is reserved for residential purposes and it is noted for its beauty and healthfulness.. The chief manufactures are woolen goods, mill ma¬

chinery and wood products. The government is administered by town meeting. The water¬ works are owned and operated by the town. Pop. (1920) 6,366.

NORTH ANNA, Operations on the.

After the loss of 18,000 men in assaulting Gen¬ eral Lee's lines at Spottsylvania Court House, General Grant concluded to turn Lee's position by a movement that would bring him nearer to Richmond and possibly interpose his army be¬ tween Lee and that place. The movement was begun on the night of 20 May 1864 by Han¬ cock's Second corps, which, preceded by Tor- ■bert's cavalry, marched for the Mattapony and North Anna rivers. Torbert attacked and drove Kemper's brigade from an entrenched position at Milford Station and across the Mattapony, Hancock following and entrenching beyond the river on the 21st. Other corps followed Han¬ cock and Grant's advance reached the North Anna in the forenoon of the 23d at Island and Jericho, fords and Chesterfield bridge the lat¬ ter a mile above where the Richmond and Fred¬ ericksburg Railroad crosses the river. But Lee was in his front. He had detected the move¬ ment and put his army in motion for Hanover Court House, and on the morning of the 23d was south of the North Anna, in position cov¬ ering the roads and railroads leading to Rich¬ mond. Here he was joined by General Breck¬ inridge from the Shenandoah Valley, and by Pickett's division from near Richmond. Ewell's corps was on the right, Anderson's in the cen¬ tre and A. P. Hill's on the left. Breckinridge and Pickett were in reserve. General Warren, with the Union Fifth corps, crossed the river at Jericho Ford, constructed a pontoon bridge and at 4.30 p.m. of the 23d his entire corps was in line of battle about half a mile from the river and on the edge of a wood next to it, the front being covered by the wood. Cutler's di¬ vision was on the right, Griffin's in the centre and Crawford's on the left, its flank resting on the North Anna. About 6 p.m. Wilcox's di¬ vision of A. P. Hill's corps fell upon Cutler's division and part of Griffin's, driving

back Cut¬ ler in some disorder, following him and uncov¬ ering Griffin's right ; but Griffin drew back his right, Bartlett's brigade hastened to his support and Wilcox was driven back with a severe loss in killed and wounded, and nearly 1,000 pris¬ oners. Warren lost about 350 men. About the same time Hancock had prepared to force a passage at Chesterfield bridge. A part of Ker¬ shaw's division held a bridgehead north of the stream ; that was charged and carried about 6 p.m. by the brigades of Colonels Pierce and Egan, with the loss of 150 men, the Confeder¬ ates retreating across the river. The crossing of the river by Warren and Wilcox's unsuccess¬ ful effort against him forced General Lee to change and shorten his line during the night of the 23d, until it was nearly in the form of a right-angled triangle, with the right angle op¬ posite Ox Ford and extending down the river three-fourths of a mile, then southeast to near Hanover Junction. The left, under A. P. Hill, ran from Ox Ford southwest across the Vir¬ ginia Central Railroad to Little River. On the morning of the 24th Hancock crossed the river unopposed and began to entrench within 700 yards of Lee's line, where about 6 P.M. Smyth's brigade was attacked and became sharply en¬ gaged. Barlow's division was got ready to

attack, but Lee's entrenchments were found so strong that the attack was abandoned. At the same time Wright's Sixth corps crossed the river at Jericho Ford and joined Warren. Burn¬ side's Ninth corps arrived at Ox Ford but could not cross in the front of the blunt angle of Lee's line holding the south side, upon which Potter's division was sent to the left and, cross¬ ing lower down, formed on Hancock's right, while Crittenden's division moved up stream to near Quarle's Mill and crossing joined Craw¬ ford's division of Warren's corps. Crittenden, supported by Crawford, moved forward to connect with and open the way for Wilcox's division to cross, but was attacked by Mahone's division and was driven back with severe loss. Everywhere Lee was found well entrenched. Grant found himself in a false position; his two wings on one side of a stream, difficult at times to cross and liable to sudden rise by heavy rains, while his centre was on the other side, with Lee's centre like a blunt wedge, stand¬ ing ready to receive him and interposing be¬ tween his wings, neither of which could sup¬ port the other. The trains were ordered to re¬ cross the river on the 25th and on the night of the 26th Grant recrossed and, marching to the left 32 miles, crossed the Pamunkey at and near Hanover Town by the afternoon of the 28th, and was in connection with his new base at White House. Consult (Official Records> (Vol. XXXVI) ; Humphreys, (The Virginia Campaign of 1864-65) ; Walker, (History of the Second Army Corps ; Grant, (*

*Personal Mem¬ oirs * (Vol. II) ; Pennypacker, (Life of Gen¬ eral Meade> ; The Century Company's (Battles and Leaders of the Civil War* (Vol. IV).*

E. A. Carman.

NORTH ATTLEBORO, at'l-bur-o, Mass , town in Bristol County, on the New York, New Haven and Hartford Railroad, about 30 miles southwest of Boston. It includes the villages of Oldtown, Adamsdale, Falls Village and Rob- insonville. It was settled in 1637 and incorpo¬ rated in 1887. The chief industries of the town are connected with the manufacturing and sale of jewelry. It has establishments for the manu¬ facture of boxes, buttons, braid, cotton yarn, rope, silverware, machinery and supplies for the jewelry business. Some of the prominent buildings are the G. A. R. Memorial Hall, Elks Home, the Holmes Memorial building, the high school and the Richards Memorial Library (public). The government is administered by town meetings. The town owns and operates the electric-light plant and the waterworks. Pop. 9,562.

NORTH BALTIMORE, Ohio, town in Wood County, 36 miles south of Toledo, on the Baltimore and Ohio and the Cincinnati, Ham¬ ilton and Dayton railroads. The town was set¬ tled in 1842 and incorporated in 1873. It is situated in an oil-field and has a supply of natural gas. Manufactures of oil-well ma¬ chinery, bricks, stone-ballast and cigars en¬ gage the inhabitants and there are also flour¬ mills and grain elevators. Pop. 2,503.

NORTH BATTLEFORD, Canada, town in the district of Battleford, Saskatchewan, 230 miles northwest of Regina, on the Canadian Northern Railway. It is situated at the union of the Saskatchewan and Battle rivers. The town has a government building, a collegiate institute, electric light and power-

systems, waterworks and market. The in¬ dustries include machine and engine works, sash and door factories, stone works, cement blocks and sills. Pop. 5,868.

NORTH BAY, Canada, capital of Nipissing district in the province of Ontario, on the north shore of Lake Nipissing, and on the Grand Trunk, Canadian Pacific, Canadian Northern and Temiskaming and Northern Ontario railroads. There are normal and high schools, lumbering and mining industries in the vicinity, planing and saw mills, machine and car repair shops and box factories. North Bay is the headquarters of the French River tourist traffic. Pop. 7,737.

NORTH BRADDOCK, Pa., borough in Allegheny County, on the

Pennsylvania Rail- > road, about six miles east of Pittsburgh and two miles east of Homestead. It was a part of Braddock until 1897 when it was incorporated as a separate township. It has extensive steel rail interests, but a portion of the borough is a res.idential reserve. The government is vested in a burgess, who holds office three years, and a council. Pop. 14,928.

NORTH BROOKFIELD, Mass., town in Worcester County, 15 miles west of Worcester, on the Quaboag River and a branch of the Boston and Albany Railroad. It owns a public library and municipal waterworks. The in¬ dustries include boots, shoes, rubber-goods, overalls and woolen and cotton fabrics. Pop. about 3,075.

NORTH CAPE, a promontory of Magero Island, off the northern coast of Norway, in lat. 71° 11″ N. It rises 968 feet above the sea and is regarded as the northernmost point of Europe, although a point nearby, the Knio-skjoerodde, is really a few minutes further north.

NORTH CAROLINA, kar-6-li'na, one of the original 13 colonies, midway between Maine and Florida; bounded by Virginia on the north, by Tennessee on the west, by South Carolina and Georgia on the south and south¬ west and the Atlantic Ocean on the east. It extends from lat. 33° 51J4′ to 36° 34′ N., and long. 75° 27′ to 84° 20′ W. from Greenwich, taking the greatest width each way. Tennessee originally was part of North Carolina, but in 1790 was ceded by it to the United States.

*Area. — North Carolina ranks the 19th State in size in the Union, and is the largest on the Atlantic Coast save Georgia and Florida. It contains 52,286 square miles (including the area 3,620 square miles of its sounds and rivers) and is slightly larger than England. Its surface is very nearly a one thousandth part of the land area of the globe. Its greatest length from east to west from <(Cherokee to Currituck® is more than 500 miles and its greatest width north and south is 188 miles. **

Topography. — The State is divided by na¬ ture into three divisions — eastern, which is generally level, with many swamps and sandy, farther back with two great sounds near the ocean, the Albemarle and Pamlico ; the central or hilly regions ; and the western, which is mountainous. The coast line of more than 300 miles runs at first east of south, thence south¬ west. Along the whole ocean coast stretches a chain of narrow, barren sand banks, broken oc¬ casionally by inlets which are constantly chang¬ ing, occasionally filling up entirely in the course

NORTH CAROLINA.

Estimated population, 2,466,025

COUNTIES

Pop.

28,712 Alamance . B 7

21,592 Alexander . C 3

17,745 Alleghany . B 3

25,465 Anson . E 5

19,074 Ashe . B 2

. Avery1 . B 2

(Pop. incl. in Mit¬ chell. Wautauga & Caldwell Cos.)

30.877 Beaufort . C 12

23,039 Bertie . B 11

18,006 Bladen . E 8

14,432 Brunswick . F 9

49,798 Buncombe . G 5

21,408 Burke . . . . . C 2

26.240 Cabarrus . D4

20,579 Caldwell . C 2

5,640 Camden . B 13

13,776 Carteret . E 12

14,858 Caswell . B 7

27,918 Catawba . C 3

22,635 Chatham . C 7

14,136 Cherokee . H 2

11,303 Chowan . , – B 12

3,909 Clay . H 2

29,494 Cleveland . D 2

28,020 Columbus . F 8

25,594 Craven . D 11

35,284 Cumberland . Df?

7,693 Currituck . B 13

4,841 Dare . C 14

29,404 Davidson . C 5

13,394 Davie . C4

25,442 Duplin . E 10

35,276 Durham . B8

32,010 Edgecombe . CIO

47,311 Forsyth . B 5

24,692 Franklin . B 9

37,063 Gaston . . D 3

10,455 Gates . B 12

4,749 Graham . H2

25,102 Granville . B 8

13,083 Greene . D 10

60,497 Guilford . B 6

37,646 Halifax . B10

22,174 Harnett . D 8

21,020 Haywood . G 4

16,262 Henderson . H 5

15,436 Hertford . B 12

. Hoke . E 7

(Pop. inch in Cum¬

berland & Robeson Cos.)

Pop.

8,840 Hyde . C 13

34,315 Iredell . C 4

12,998 Jackson . H4

41,401 Johnston . C 9

8,721 Jones . Ell

11,376 Lee . D 7

22,769 Lenoir . D 10

17.132 Lincoln . D 3

13,538 McDowell . G 6

12,191 Macon . H 3

20.132 Madison . F5

17,797 Martin . C 11

67,031 Mecklenburg . D4

17,245 Ml, ;hell . F 6

14,967 Montgomery . D6

17,010 Moor.j . D 7

33,727 Nash . CIO

32,037 New Hanover . . .F 10 22,323 Northampton.. . .B 11

14,125 Onslow . E 11

15,064 Orange . B 7

9,966 Pamlico . D 12

16.693 Pasquotank . B 13

15,471 Pender . E 10

11,054 Perquimans . B 13

17,356 Person . B 7

36,340 Pitt . C 11

7,640 Polk . H 6

29,491 Randolph . C6

19,673 Richmond . E 6

51,945 Robeson . E 7

36,442 Rockingham . B6

37,521 Rowan . C4

28,385 Rutherford . D 1

29,982 Sampson . E9

15,363 Scotland . E 7

19,909 Stanly . D 5

20,151 Stokes . B 5

29,705 Surry . B 4

10,403 Swain . G 3

7,191 Transylvania . H4

5,219 Tyrrell . C 13

33,277 Union . E 4

19,425 Vance . B 9

63.229 Wake . C 8

20,266 Warren . B 9

11,062 Washington . C 12

13,556 Watauga . ,B2

5,698 Wayne . D10

30,282 Wilkes . B3

28,269 Wilson . CIO

15,428 Yadkin . B 4

12,072 Yancey . G 5

Incorporated Cities, Towns. Villages, Etc.

169 Abbotsburg . F 8

794 Aberdeen . D 7

283 Advance . C 4

924 Ahoskie . B 12

2,116 Albemarle . D 5

118 Alexander, Bun¬ combe . G 5

98 Almond . H 3

936 Andrews . H 3

221 Angler . D8

486 Ansomville . D5

681 Apex . C 8

145 Archdale . C 6

151 Arden . G 5

1,865 Ashboro . C6

20,832 Asheville . G5

115 Atkinson . E 9

524 Atlantic . E 13

543 Aulander . B 11

440 Aurora . D12

77 Autry ville . D 9

990 Ayden . D 11

195 Baileys . C 9

416 Bakers ville . F6

283 Bath . D 12

211 Battleboro . B 10

370 Bayboro . D 12

56 Beargrass. Martin. C 11

2,483 Beaufort . E 12

2,863 Belhaven . C 12

1,176 Belmont . D 3

800 Benson . D 9

1 ,529 Bessemer City .... D 3

469 Bethel . Cll

162 Biglick . D 5

173 Biltmore, Bun¬ combe . G 5

697 Biscoe . D 6

219 Blackcreek . C 10

311 Black Mountain. .. G 5

276 Bladenboro . E8

261 Blowing Rock . . . .B 2

796 Boardman . F8

85 Bonsai . C 8

179 Boone . . . B 2

282 Boonville . B 4

209 Bostic . D 2

919 Brevard . H 2

50 Bridgersville,

Wilson . C 10

348 Bridgeton . Dll

149 Broadway . D7

725 Brookford,

Catawba . C 3

612 Bryson City . G 3

66 Buies . E 7

249 Buies Creek,

Harnett . D 8

956 Burgaw. . . E 10

4,808 Burlington . B 7

422 Burnsville . F6

259 Cameron . D 7

160 Candor . D 6

1,393 Canton . G4

1,892 Caroleen . D 2

863 Carthage . D7

383 Gary . C 8

219 Castalia . B 10

222 Catawba . C 3

323 Cerrogordo . F 8

1,242 Chadbourn . F8

1,149 Chapel Hill ..... .C 7

39,823 Charlotte . D 4

76 Cherry . C 13

1,153 Cherry ville . D 3

852 China Grove . C 4

127 Chocowinity . C 11

297 Claremont . C3

147 Clarendon . F8

276 Clarkton . F8

1,441 Clayton . C 9

426 Cleveland . C4

1,101 Clinton . E 9

344 Clyde . G 4

169 Coates. — . D 8

189 Colerain . B 12

80 Collettsville . C 2

848 Columbia . C 13

122 Columbus . H6

9,219 Concord . D 4

158 Conetoe . C 10

421 Conover . C3

246 Contentnea.

Greene . D 10

833 Cornelius . D4

74 Council . E 9

308 Cove City . D 11

324 Creedmoor . B8

329 Creswell . C 13

289 Cronly . F 9

175 Crouse . D 3

300 Cumberland . E 8

1,065 Dallas . D 3

1,056 Davidson . D 4

320 Denton . C 5

282 Denver . C 3

277 Dlllsboro . H 4

360 Dobson . B 4

737 Dover . Dll

164 Dudley . D 9

1,823 Dunn . D 8

25,061 Durham . C8

522 East Bend . B 4

383 East Kings Mountain,

Gaston . D 3

577 East Laurlnburg,

Scotland . E 6

Pop.

881 East Lumberton,

Robeson . E 7

1.729 East Spencer,

Rowan . C 4

2,789 Edenton . C 12

171 Edward . D 12

9,710 Elizabeth City ...B 13 117 Elizabethtown .... E 8

886 Elkin . B 4

377 Elk Park . F 6

293 Ellenboro . D 2

590 Elm City . CIO

200 Elon College . B 7

1,167 Enfield . B 10

81 Enoch ville . C4

162 Eureka . D10

146 Everetts . C 11

248 Evergreen,

Columbus . F 8

441 Fairblufl . F 8

730 Fairmont . F7

519 Faison . D 9

352 Faith . C 5

132 Falkland . C 10

816 Farmville . CIO

7,045 Fayetteville . E 8

1,592 Forest City . D 2

137 Forestville . C 9

189 Fountain . CIO

329 Four Oaks . D 9

379 Franklin . H3

809 Franklinton . B 8

951 Fremont . D 10

127 Fuquay Springs ,,D8

284 Garner . C8

169 Garysburg . B 10

5,759 Gastonia . D3

203 Gatesville . B 12

154 Germanton . B 5

1,162 Gibsonville . B 7

308 Glen Alpine ..... C 2

119 Glenwood . G 6

102 Godwin . D 8

304 Gold Hill . D 5

126 Gold Point,

Martin . C 11

6,107 Goldsboro . D10

240 Goldston . C 7

2,504 Graham . C6

381 Granite Falls . C 3

363 Granite Quarry… C 4

19,577 Greensboro . B 6

4,101 Greenville . Cll

291 Grifton .. . . Dll

330 Grimesland . Dll

209 Grover . D 3

314 Halifax . B 10

452 Hamilton . C 11

2,173 Hamlet . . . . E 6

205 Hampton, Ruther¬ ford . H 6

230 Hardin Mills,

Gaston . D 3

140 Harrellsville . B 12

162 Haywood,

Chatham . C 7

428 Hazlewood . G4

4,503 Henderson . B 9

2,818 Hendersonville ...H5

1,856 Henrietta . D 2

1,841 Hertford . B 12

3,716 Hickory . C 3

487 Highlands . H4

12,896 High Point . C 6

140 Hildebran . C 2

857 Hillsboro . B 7

165 Hobgood . B 11

175 Hoffman . E 6

261 Holly Springs . C 8

204 Hookerton . D 10

964 Hope Mills . E 8

443 Hot Springs . G 4

411 Hudson . C 3

591 Huntersville . D4

398 Icemorlee, Union . . E 4 154 Indian Trail . . ..1)4 124 Ingold, Sampspn…E 9 107 Iron Station .'.... D 3

527 Jackson . B 11

505 Jacksonville . Ell

398 Jamesville . C 12

60 Jason, Greene. . .D 10

184 Jefferson . B 3

799 Jonesboro . D 7

621 Jonesville . B 4

111 Jupiter,

Buncombe . G 5

316 Kelford . B 11

270 Kenansville . E 9

726 Kenly . . C 9

1,128 Kerners ville . B 5

170 Keyser . D 6

2,218 Kings Mountain . D 3

6,995 Kinston . D 11

242 Kittrell . B 9

1 ,007 LaGrange ..... D 10

203 Lasker . B 11

297 Lattimore,

Cleveland . D 2

2,322 Laurinburg . E 7

1,127 Leaksville . B 6

153 Leicester . G 5

3,364 Lenoir . C 2

279 Lewarae, Rich¬ mond . D 6

262 Lewiston …….. B 11

4,163 Lexington . C 5

474 Liberty . C 6

386 Lilesville . D 6

380 Lillington . D 8

2.413 Lincolnton . D 3

Pop.

1,152 Littleton . B 10

243 Long View,

Catawba . C 3

1,775 Louisburg . B9

876 Lowell, Gaston . . . D 3

266 Lucama . C9

165 Lumber Bridge ...E7

2,230 Lumberton . E 8

983 McAdenville . D 4

186 McFarlan . E 5

189 Macon . B 9

1,033 Madison . B 6

653 Magnolia . E 10

664 Maiden . C3

220 Manly . D 7

408 Manteo . C 14

52 Mapleton . B 12

1 07 Margaretsville . . . B 11

1,519 Marion . C 2

225 Marlboro. Pitt . . .C.l 1

802 Marshall . G 5

301 Mars Hill . G 5

499 Marshville . E 5

396 Matthews . D 4

141 Maupin, Pitt ...C 11

1,321 Maxton . E 7

874 Mayodan . B 5

345 Maysville . E 11

693 Mebane . B 7

88 Merry Oaks . C 7

74 Micro . C 9

117 Middleburg . B 9

467 Middlesex . C9

419 Milton . B 7

86 Mineral Springs. . . E 4 194 Mint Hill

Mecklenburg . . .D 4

1,063 Mocksville . C 4

100 Moncure . C7

4,082 Monroe . E 4

254 Montezuma,

Mitchell . F 6

198 Mooresboro . D2

3,400 Mooresville . . C4

2,039 Morehead City. . .E 12

2,712 Morganton . C 2

151 Morrisville . C 8

261 Mortimer, Cald¬ well . C 2

498 Morven . E 5

347 Mountain Island,

Gaston . D 3

3,844 Mt. Airy . B 4

723 Mt. Gilead . D 6

526 Mt. Holly . D 4

1,071 Mt. Olive . D 9

753 Mt. Pleasant . D 5

809 Murfreesboro . . . .B 11

977 Murphy . H 2

750 Nashville . C 9

160 Nebo . G 6

10,433 Newbern . Dll

95 New Hill . C 8

312 New London . D 5

321 Newport . E 12

2,316 Newton . C 3

73 Newton Grove. ,,.D9 1,902 North Wilkesboro B 3

928 Norwood . D 5

251 Oak City . C 11

57 Oakley . G 11

778 Old Fort . G 6

94 Ore Hill . c 7

645 Oriental . D 12

3,018 Oxford . B 8

154 Pactolus . B 11

94 Palmyra . B 11

324 Pantego . C 12

67 Parkersburg . E 9

219 Parkton . E 8

272 Parmele . Cll

86 Patterson . B 2

232 Peachland . E 5

628 Pee Dee . E 6

258 Pembroke . E7

62 Pendleton . B 11

210 Pikeville . D 10

652 Pilot Mountain ...B 5

92 Pine Bluff . D 6

394 Pine Level . D 9

211 Pinetops . c 10

412 Pinetown . c 12

688 Pineville . D 4

58 Pink Hill . D 10

502 Pittsboro . C7

2.165 Plymouth . C 12

287 Polkton . E 5

227 Polloks ville . E 11

75 Powellsville . B 12

354 Princeton . . . D 9

627 Princeville . F 4

580 Raeford . D 7

20,127 Raleigh . C 9

1,022 Ramseur . C 6

1,950 Randleman . C6

1,089 Red Springs . E 7

4,828 Reids ville . B 6

179 Rennert . E 8

370 Rhodhiss, Caldwell C 2

210 Richfield . D 5

445 Richlands . E 11

367 Rich Square . B 11

147 Ringwood . B 10

1,670 Roanoke Rapids .B 10 122 Robbinsville . . . . .H 3

422 Roberdell . E 6

616 Robersonville . . . .C 11

2,155 Rockingham . E 6

249 Rockwell . 0 5

12,067 Rocky Mount. . . .C 10

80°

78°

10

Abingd

SMYTH

Betty Baker'

_ , ˆHlllsville©

Grayson*

■'.Fries

\ 'M

ˆVC A R R 0 L L \ f PATRICK (

' I* _ _ yi o. * \

> K iblet Slnnr-f'

Eaoi3!*^™ooc’oR«“n

•» Galax) {T,

[Virginia Beach

35°

E

34 c

WESTERN PORTION OF .

NORTH CAROLINA

On Same Scale

ryvllle

V IE R

mi

Elkmont.

MONROE

UlO K

v-V. VN/

*teo»kJ Cre.b,V-

H

33°

© vil|.,-/7sOu Nec^hiu»re|

*-^critalMil^oEtx)aE„ialle1 . XT

oTelUco o o \ JACK

Wests Mill

\ouuo» ucc^’.v ^fg’ i ‘Etowap I? l — —^UaDao / ^

apu V^0a , 3iSn Ulan t y reXr I lend e nso u v i I le p q i Greeitrivc:

transyiMia

ssfoyos? rr.uHiud' ;chejTj«e,d2»ew»« i – r~

E m A M oHi2 < 3onvUle—/ » RoBtoan^Jalvcrt 0 B^^a'NVtfo *' ^T\ -,t k

^ ^ M A C O N ucrono\° Bessie La ,,ed_r T'«£N.TN

^H.,,i„r,"kr – *- KpStan

S„c\a y 8hJvc^ • * 1

goenx__ftT-

iENVILLE

jfHatteras &atteraa Inlet

if ,

0SM1TH I8LAND

NORTH CAROLINA

SCALE

Statute Miles, 32 = 1 Inch.

B

36

c

E

G

Rand McNally's New 11 x 14 Map of North Carolina. Copyright by Rand McNally & Co.

H

33

82

81°

80°

78°

10

12

13

76°

14

289°

Pop.

•tuv muuui iwuio,

Nash . C 10

170 Rolesville, Wake ..0 8

819 Roper . C 12

183 Roseboro . E9

364 Rose Hill . E 10

145 Rosman . H 5

787 Rowland . F 7

1,425 Roxboro . B 8

491 Roxobel . B 11

437 Royall Cotton Mills,

Wake . C 8

229 Rutherford College O 2

1,062 Rutherfordton . ...D 1

7,153 Salisbury . C4

235 Saluda . H 6

2,282 Sanford . D 7

136 Saratoga . G 10

1,726 Scotland Neck ...B 11

280 Seaboard . B 11

1,331 Selma . D 9

139 Shallotte . . .• . G9

121 Sharpsburg . C 10

3,127 Shelby . . D 3

315 Shelmerdine, Pitt C 11

308 Shore . B 4

895 Siler City . C7

1,347 Smithfield . D9

450 Snowhill . D 10

238 South Biltmore,

Buncombe . G 5

202 South Wadesboro,

Anson . E 5

542 Southern Pines . . . D 7

1,484 Southport . G9

1 99 Sparta . B 3

1,915 Spencer . C 5

1,246 Springhope . C 9

419 St. Paul . E 8

321 Stanley . D 3

204 Stantonsburg ... .C 10

239 Star . D 6

4,599 Statesville . C 3

79 Stokes, Pitt . C 11

1 59 Stokesdale . B 6

404 Stoneville . B 6

161 Stonewall . D 12

82 Stout . . E 4

305 Stovall . B 8

185 Swanquarter ... .D 13

390 Swansboro . E 11

698 Sylva . H 4

418 Tabor . F 8

4,129 Tarboro . CIO

662 Taylorsville . C3

154 Teacheys . E 10

3,877 Thomasville . C 5

269 Tillery . B 10

Pop.

331 Trenton . Dll

332 Trinity,

Randolph . C 6

1,055 Troy . D 6

700 Tryon . H 6

43 Tunis . B 12

139 Union . B 11

155 Union Mill . D 2

392 Vanceboro . D 11

296 Vandemere . D 12

273 Vass . D 7

420 Vaughan . B 10

185 Waco . D 3

2,376 Wadesboro . .... .E 5

287 Wakefield . C 9

1,443 Wake Forest . C 9

444 Wallace . E 10

215 Walnut . G 5

480 Walnut Cove . B 5

127 Walstonburg . C 10

807 Warrenton . B 9

723 Warsaw . E 9

6,211 Washington . C 12

602 Waxhaw . E 4

2,008 Waynesville . G 5

442 Weaverville . G 5

1,999 Weldon . B 10

846 West Hickory,

Catawba . C 3

(P.O. Hickory)

231 West Lumberton,

Robeson . E 7

755 Whitakers . B 10

179 Whitehall . F 9

1,368 White ville . F8

216 Whittier . G 3

45 Wilbank. Wilson. C 10

799 Wilkesboro . B 3

53 Williams. Yadkin . B 4

1,574 Williamston . C 11

29,892 Wilmington . F 10

6,717 Wilson . CIO

684 Windsor . B 12

289 Winfall . B 13

31,155 Winston-Salem ...B 5

484 Winterville . D 11

624 Winton . B 12

312 Woodland . B 11

187 Woodleaf . C4

393 Worthville . C 6

54 Wrights ville Beach,

New Hanover. . F 10 130 Yadkin College. .. .C 5

432 Yadkin ville . B 4

338 Yancey ville . B 7

431 Youngsville,

Franklin . B 9

483 Zebulon . C 9

of years and nevv ones being opened by storms. The eastern division extends inland from the ocean about 150 miles. The dividing line be¬ tween it and the central division trends south- westwardly and was once the shore line of the ocean, all east of it having been in prehistoric ages the bed of the sea. This line is clearly marked by the falls of the rivers. This eastern division contains the two great sounds already named into which the Chowan, the Roanoke, the Tar, the Neuse and other rivers pour their waters. Farther south, the Cape Fear and its tributaries empty directly into the Atlantic. The central division, beginning at an elevation above sea-level of about 200 feet, extends an average width of 200 miles westwardly, rising gradually to an average elevation of 1,200 feet or more at the foot of the Blue Ridge. The western part of this, central region is called the ((Piedmont section.® The western division contains 6,000 square miles and has an average elevation of 2,500 feet. The highest peaks east of the Rocky Mountains are to be found here. The highest of them, Mount Mitchell, is 6,688 feet. There are no less than 24 peaks which are higher than Mount Washington in New Hampshire. The principal mountain ranges are the Blue Ridge and Great Smoky Range, but there are also the Black Mountains and the – Balsam. The general trend is from northeast to southwest.

Rivers. — The rivers of North Carolina are numerous, but they are navigable only to the falls, the old shore line of the ocean in the east, hence the grand total of near 3,500 miles (of which scarcely more than 400 miles is nav¬ igable) indicates a vast water power which marks out the future of this State as one of the greatest manufacturing States in the Union. Indeed it may be well doubted if there is an¬ other which equals it in water power. At the (

Sounds and Lakes. — Besides the two great sounds, Albemarle and

Pamlico, there are smaller ones, Currituck, Croatan, Roanoke, Core and Bogue. There are many lakes, the largest being Alligator, Phelps, Mattamuskeet, Pungo and Waccamaw. The largest (Matta¬ muskeet) has an area of 100 square miles, and Lake Phelps is about half as large.

Capes and Bays. — From the shore-line jut out Cape Hatteras and Cape Lookout, between which is Raleigh Bay. Lower is Cape Fear, between which and Cape Lookout lies Onslow Bav. South of Cape Fear is Long Bay. The ocean front of North Carolina is considered the most dangerous on the Atlantic seaboard.

Islands. — ■ Roanoke Island between Albe¬ marle and Pamlico sounds is the largest in the State and has an area of about 25 square miles. This island was the scene of the first English settlement on this continent, in July 1585. Here also was born the first child of the English race on this continent, Virginia Dare, 18 Aug. 1587. This colony made under the auspices of Sir Walter Raleigh (in whose honor the canital of the State is named) was soon abandoned. Cedar Island is nearly as larˆe. Smith's Island at the mouth of the Cape Fear has nearly 15 square miles.

Climate and Rainfall. — The mean tempera¬ ture is 59 degrees or about the average tem¬

perature of the northern hemisphere. The State is on the same isothermal line as middle California, southern France and northern Italy. The rainfall is 60 inches for the eastern belt, 45 inches for the central and 58 inches for the western.

Geology. — The eastern division is covered with a stratum 50 to 300 feet thick of Tertiary sands and clays. It shows numerous marl de¬ posits and phosphate 'beds. Through the cen¬ tral part of the State is a three-foot seam of triassic, not carboniferous, coal which is esti¬ mated to cover 70 square miles. The western part of the State shows azoic formations only.

Soil. — The soil of the eastern division is generally sandy. Along the rivers are extensive bottom lands of clayey loam, which are very fertile, while the swamp lands have a deep peaty black soil, and when drained are exceed¬ ingly fertile. In the central and western divi¬ sions the soil is clay, and gravelly or sandy loam.

Agricultural Products. — North Carolina is

the only State that fills every blank in the cen¬ sus of farm products, yielding all the crops grown in both the northern and southern sec¬ tions of the Union. Its greatest crops, however, are corn, cotton and tobacco. Cotton is grown in the eastern division and in the southern half of the

central division. The yield in 1912 was 1,106,000 bales, eight times the quantity pro¬ duced by this State in 1861, being the largest percentage of increase shown by any State since the Civil War, save Texas. In tobacco produc¬ tion North Carolina is second onlv to Ken¬ tucky and the area has been steadily increasing. Nine-tenths of the tobacco known in the markets of the world as ((Virginia Brights® is grown in North Carolina. Durham is the lar¬ gest shipper of manufactured tobacco in the country. Corn is grown in every county. Rice is produced in large quantities in the eastern division and in the production of sweet potatoes the State stands first. In the last few years there has sprung up a great trucking industry, which extends from Currituck to Brunswick. Grape culture has largely increased of late years and no small quantity of wine has been produced and shipped.

Timber. — The extent and value of the for¬ ests are especially noteworthy ranging from the palmetto, magnolia and live oak around Wilmington to the fir, hemlock and white pine in the mountains of the west. The vast quanti¬ ties of pine and cypress, and of hardwoods, especially oak, hickory, ash, walnut and gum, have not only attracted saw mills, but have created large furniture factories at High Point and at other places. High Point has the largest output of furniture in the Union except Grand Rapids, Mich. Of the various species < ˆf trees found in the States east of the Rocky Moun¬ tains all the eight varieties of pine, the seven varieties of magnolia, the five varieties of maple and both varieties of walnut are found in North Carolina, while it produces 19 out of the 20 varieties of oak, four out of the five varieties of spruce, three each out of the five varieties of elm and birch respectively and six of the eiˆht varieties of hickory. Immense quantifies of turpentine, resin, tar and pitch are also produced from the vast tracts of pine forces.

Fauna. — Deer, red and gray foxes, rac-

coons, squirrels, opossums and rabbits are nu¬ merous, while wolves, bear, wildcats, beavers and others are still to be found. Swan, geese, brant and wild duck swarm in the sounds, bays and rivers of the east in the cold months, while in all parts of the State quail, woodcock, snipe, doves and wild pigeons, larks and many other birds are numerous. The attraction to sports¬ men has been so great that a close season for game has been enacted by the 'legislature, and an Audubon Society has been authorized by the legislature for the protection of birds.

Fisheries. — • More than 20,000 men are em¬ ployed in the fisheries on the sounds and at the mouths of the rivers. More than $2,500,000 capital is invested. The shad and herring fish¬ eries are especially valuable. Some of the seines are from a mile to three miles long and are operated by steam power. There are 26 counties interested in this industry, the princi¬ pal ones being Currituck. Pasquotank, Chowan, Bertie, Beaufort, Dare, Pamlico, Craven, Car¬ teret, Onslow, New Hanover and Brunswick. Herring are mostly cured in salt and shipped in barrels, but the shad, striped bass, chub, perch and other fish are shipped' on ice, the large fisheries having each its own ice factory. The State in 1876 organized its fish commis¬ sion, establishing fish hatcheries which largely increased the catch of fish. Of recent years the United States government has taken over this work and has a shad and herring hatchery at Edenton and a similar establishment for rock bass and salmon at Weldon, at the falls of Roanoke River. The young fish thus hatched are set free in all the principal rivers and waters of the State and in other States, some being shipped even to the rivers of the Pacific coast. The oyster and shellfish industry in the eastern waters are also of great value. The State has an oyster and shellfish commission which owns a steamboat and has many agents to encourage and protect this industry. The oysters are of fine quality, those of New River being especially prized. Diamond-back terra¬ pins and turtles are found all along the coast and are shipped North and inland, as are also large quantities of clams.

Navigation. — Vessels drawing 24 feet can ascend the Cape Fear River 30 miles to Wil¬ mington, while the river is navigable 120 miles further to Fayetteville, to which point the Fed¬ eral government is deepening the channel to eight feet. The Roanoke is navigable 130 miles to Weldon, the Tar and the Neuse about 100 miles each and the Chowan for 75 miles. Two canals connect the Albemarle and Pamlico sounds with Chesapeake Bay, and Congress has passed a bill to establish an inland waterway along the whole front of the State by deepen¬ ing the sounds which lie behind the sand banks that fringe the seaboard. Much of the work has been done.

Manufactures. — The water power of the State owing to the great non-navigable extant of its rivers and streams is very great, in fact more than twice enough to manufacture the entire cotton crop of the South. Already the State has more cotton factories than any other in the South and is a large manufacturer of tobacco. Other factories of all kinds have greatly increased in number. There are over 60,000 persons employed in tobacco manufactur¬ ing and over 70,000 in the cotton factories.

Child labor under 14 years of age is forbidden by law in factories of all kinds. The chief manufactories of tobacco are to be found at Durham, Winston, Reidsville and Henderson. There are also cotton factories at those

points and at Charlotte, Raleigh, Concord, Salisbury, Fayetteville and at other towns as well as at many points on the streams remote from towns, especially in Alamance, Mecklenburg and Gas¬ ton counties, which counties have the largest number of cotton factories of any in the State.

Minerals. — The State has areas of coal, copper, gold, mica, iron, corundum, kaolin and marl. The last is to be found only in the east¬ ern part of the State, the others in the centre and west. Silver, lead, zinc, zircon, graphite and manganese are also found. The deposits of iron are widely distributed over the State, the most abundant kind being the magnetic. The Cranberry iron mine' in Mitchell County yields an ore unsurpassed in the world. There are two bituminous coal fields — one in Chat¬ ham and Moore counties and the other in Stokes and Rockingham. Both are in close proximity to extensive deposits of iron. Gold is found in 29 counties, mostly in the centre and west of the State, and more than 40 mines are being worked. Up to the discovery of gold in California, North Carolina was the largest gold producing State in the Union ; the total yield up to date has been about $30,000,000. Tin 'has been found in Cleveland County. At one time three-fourths of all the mica in the world was mined in this State and largely in Mitchell County. It is of a superior quality and plates three and four feet across are not unusual. Beautiful marble underlies large sections of Cherokee and Clay counties in the extreme west. Granite, sandstone and porphyry are to be met with in large quantities, and superior stone for grist mills is quarried in Moore County. Near Wilmington are valuable phosphate beds. The State produces more corundum than any other locality in the world and of the best quality. The valuable gems, diamonds, emeralds, rubies, garnets, amethysts, opals, agates and hiddenites are found. A fine exhibition of minerals, gems, marbles and stones of all kinds is to be seen in the Museum of the State Agricultural De¬ partment at Raleigh. At Dunn's Mountain near Salisbury is an exhaustless supply of granite almost as white as marble, and at Mount Airy is an equally large quarry of light gray granite. Near Raleigh is the granite quarry from which the material for the State Capitol was taken. Indeed granite quarries of good quality are to be found in most of the counties and sand¬ stone quarries are numerous. Mineral springs are numerous, the most noted being the Panacea Springs in Halifax County and the Seven Springs in Wayne in the east, while in the centre and west are the Hot Springs in Madi¬ son, ˆ the Sulphur Springs in Jackson, the Glen Alpine and Connelly Springs in Burke, the Vade Mecum Springs in Surry, the Lithia Springs in Lincoln, Cleveland Springs in the county of that name, Jackson Springs in Moore, and there are many others. Among natural ob¬ jects of interest are Mount Mitchell, the high¬ est peak on this continent east of the Rocky Mountains; Linville and Cullasaja Falls; Hickory Nut Gap and the adjacent Chimney Rock; Table Rock and Paint Rock.

Railroads. — There are now over 5,000 miles

of railroad in operation and several 'hundred miles more under contract or in contemplation. There are street railways in all the larger towns and a few miles of rural trolley lines with many more proposed. The four principal railway sys¬ tems are the Southern, the Seaboard Air Line, Norfolk Southern and the Atlantic Coast Line. The railroads are valued for taxation at $125,- 000,000, but this is very much less than half their true value, as they were returned in the census of 1890 as worth at that time $151,-

000,000.

Government The present constitution, adopted in 1868, amended by a convention in 1875 and by several amendments submitted by legislatures since and ratified by the people, provides for an executive department consist¬ ing of a governor (not re-eligible) , a lieutenant- governor, secretary of state, treasurer, auditor, superintendent of public instruction and attor¬ ney-general, all elected by the people for four years. There is also a commissioner of agricul¬ ture, a commissioner of labor and a commis¬ sioner of insurance elected by the people and a corporation commission of three members elected by the people for a term of six years. The legislative department consists of 50 sen¬ ators and 120 members of the house of repre¬ sentatives elected by the people every two years. The judicial department consists of a Supreme Court composed of a chief justice and four associates chosen by the people for eight years and 20 Superior Court judges, who are chosen for the like period by the people and who ride in rotation 10 Superior Court districts, the State being divided into two divisions.

Education. — North Carolina was the sec¬ ond State to establish a State university, which it did in 1789 at Chapel Hill. It has now also the State Agricultural and Mechanical Col¬ lege at Raleigh, a Training School for Teach¬ ers (women) at Greenville and a State College for Women at Greensboro. These four con¬ stitute a complete system of higher education 'by the State. There is also a State Agricul¬ tural College for the colored at Greensboro. There are also many sectarian colleges, of which the Baptists have one at Wake Forest, the Presbyterians at Davidson, the Methodists at Durham and there are others. There are also several colleges for women, and three col¬ leges for the colored people. As early as 1825, the State provided a public school fund and in 1840 established a public school

system. This now provides instruction in primary and in¬ termediate grades, free of charge, to all chil¬ dren between the ages of 6 and 20. There are over 900,000 pupils in the public schools. There is an annual appropriation for normal institutes for the instruction of both white and colored teachers. The public school system supported by State appropriations is supplemented by graded schools for free education maintained in all the larger towns by local appropriations. The public funds for education are divided be¬ tween the whites and blacks per capita. Be¬ sides the State Library of 80,000 volumes, and the Law Library of the Supreme Court of 40,000 volumes, both at Raleigh, several towns have public libraries and the university and all the colleges maintain libraries. The State has also established libraries for the public schools

in the rural districts. .

Penal and Charitable Institutions.— The

State has established a penitentiary at Raleigh, three insane asylums — one at Goldsboro for the colored people, the other two for the whites at Raleigh and Morganton. There is an Insti¬ tution for Deaf-Mutes for the whites at Mor¬ ganton and one for the colored deaf, dumb and blind at Raleigh and an Institution for the Blind for the whites also at Raleigh.

Counties. — There are 100 counties, of which Robeson is the largest and New Hanover the smallest. Wake has the largest population and Graham the smallest. There are railroads in all the counties except seven.

Cities.— The principal towns are Wilming¬ ton, the chief seaport, 30 miles above the mouth of the Cape Fear, up to which vessels can come drawing 24 feet; Raleigh, the State capital, named in honor of Sir Walter Raleigh; Char¬ lotte, Greensboro, Salisbury, Statesville and Winston in the central part of the State; Ashe¬ ville, Waynesville and Morganton in the west, and Fayetteville, Goldsboro, Washington, Eliza¬ beth City, New Bern and Beaufort in the east, the last four being, like Wilmington, seaport towns.

Colonies. — There is a growing stream of immigration from the North, which in some in¬ stances has taken the form of colonies, the most successful and prosperous of which is at South¬ ern Pines in Moore County. This State has the smallest per cent of foreign population in the Union, and indeed irrespective of percentage the smallest foreign population of any State.

Population. — By the census of 1910 North Carolina had a population of 2,206,28 7 ; of which 1,500,513 were whites; 697,843 were negroes and 2,015 Indians. There were 1,098,471 males and 1,107,816 females. There

were something more than two whites to every negro. The bulk of the negro population is in the eastern division and the southern half of the central division. There are very few negroes in the mountain country. The population (1920), according to the returns of the Census Bureau, is 2,559,123, of which about 70 per cent is white and 30 per cent colored.

History. — The coast of North America was first seen by John Cabot in 1497, and 87 years later the first attempt by the English to estab¬ lish a colony on this continent was made by Sir Walter Raleigh, whose exploring expedition of two ships arrived at Wokoken Inlet on the coast of North Carolina 4 July 1584. This expedi¬ tion landed at Roanoke Island and carried back two savages, Wanchese and Manteo. The next year Raleigh sent out a fleet of seven ships under Sir Richard Grenville which settled 108 colonists on the island under Gov. Ralph Lane. Falling into straits for want of food these colonists were taken home in June 1586 by Sir Francis Drake, who was returning with his fleet from a raid upon the Spaniards in the West Indies. Soon after they left, Sir John Grenville arrived with relief, but not finding the colony left 15 men and returned home. In 1587 a new colony consisting of 89 men, 17 women and 2 children came out under Gov. John White. His daughter, the wife of Ananias Dare, on 18 Aug. 1587 gave birth at Roanoke Island to Virginia, the first child of English parentage born on this continent. Governor White soon returned to England, but the Span¬ ish Armada of 1588 prevented aid being sent to

the colony till 1590, at which time the colony had disappeared and the fate of the ((Lost colony of Roanoke® is one of the unsolved problems of history. The next settlement by the English was made at Jamestown, Va., in 1607. In 1629 a grant of Carolina was made to Sir Robert Heath and an abortive attempt at settlement was made in 1639. Gradually scat¬ tering settlers came into the Albemarle and Pamlico region from Virginia, and in 1660 a New England colony bought land from the Indians and settled near the mouth of the Cape Fear. They soon left, but were succeeded in 1663 by a colony from Barbados under Sir John Yeamans, who repurchased the land from the Indians. This settlement was abandoned in 1690. On 24 March 1663 Charles II granted to the Duke of Albemarle (the restorer of the monarchy) and seven others, as Lords Proprie¬ tors, all the country between the Atlantic and Pacific oceans and between latitudes 36° and 31°, and William Drummond was appointed governor. In 1665 a second charter to the same Lords Proprietors was granted, extending the limits to lat. 36° 30′ on the north. The first legislature was held in 1665. In 1669 the ˆFundamental Constitutions of Carolina® drawn up by the famous John

Locke were adopted by the Lords Proprietors and were sent out to the colony. They proved too elaborate and cum¬ bersome for the handful of pioneers, residing mostly in the northeast of the province, on Albe¬ marle Sound, and after a nominal existence were repealed in 1693. Twenty proprietary gov¬ ernors followed in rapid succession. For the most part, save Drummond and Archdale, they were very unfit, and often unworthy men. The sturdy colony deposed six of them and sent them back. One (Sothel) they put into prison and forced him to take an oath of abdication. In 1677 under Governor Culpeper there was open rebellion on account of undue taxation on tobacco and interference with trade regulations. Again in 1708 under Thomas Carey there was a rebellion on account of the taxation of Quak¬ ers and Dissenters for the support of the Estab¬ lished Church. For more than two years there was no government of any kind in force, the farmers attending to their crops and ((doing and saying what they list.® In 1691 was adopted a system of having one governor for Carolina with a lieutenant-governor each for Albemarle and Charleston, the two principal settlements. In 1708 Bath was incorporated as the first town. In 1710 Governor Hyde, a cousin of Queen Anne, came out as the first governor of North Carolina. On 20 Sept. 1711 the Tuscarora Indians, by preconcert, fell upon and massacred the settlers on the Roanoke, Neuse and Pamlico. The war lasted two years, but with the aid of troops from South Carolina the power of the Indians was broken with the capture of their fort at Nahucke in the spring of 1713. In 1718, Edward Teach, commonly known as <(Blackbeard,® the leader of the pirates who had troubled the colony, was killed in a sea fight off Bath, which put an end to piratical depredations. In 1728 the long boundary dispute with Vir¬ ginia was settled, the line being surveyed to the foot of the mountains. In the same year seven of the Lords Proprietors sold out their interest to the Crown for $87,500. Earl Granville retained his one-eighth which was set off to him as a

strip of land, 70 miles wide, next to the Vir¬ ginia boundary, though he surrendered all right to share in the government. At this time there were three counties, Albemarle, Bath and Clar¬ endon, divided into eight precincts. In 1729 the above counties were abolished, the precincts be¬ coming counties, and the colony was definitively divided into North Carolina and South Caro¬ lina. The population of North Carolina was then about 40,000. The royal government thus established continued until the Revolution. There were five royal governors, George Bur- rington, 1729-34; Gabriel Johnston, 1734-52; Arthur Dobbs, 1754-65; William Tryon, 1765— 71 ; Josiah Martin, 1771-75. During this period immigration came in rapidly, mostly from Vir¬ ginia and Pennsylvania, so that at the outbreak of the Revolution the population had risen to 300,000 and there were settlements to the moun¬ tains and beyond. There were

Scotch settle¬ ments made after Culloden on the Cape Fear. Germans and Moravians came in by way of Pennsylvania, from which also and from Charleston came many Scotch-Irish. In 1740 the province sent a battalion to join the Eng¬ lish expedition against Carthagena in South America. In 1749 the first printing-press was set up. The first book was printed in 1752 and a crude postal service was established in 1755. In 1758 the colony sent a regiment under Col. James Innes to Winchester, Va., to take part in the war against the French and Indians, and soon after sent other troops under Hugh Wad¬ dell against the Cherokees in the west of the province. The colony openly resisted the Stamp Act and on 16 Nov. 1765 forced the stamp mas¬ ter, William Houston, to resign his office and to swear not to receive the stamps. In February 1766 under the leadership of Hugh Waddell and John Ashe the inhabitants of Wilmington, with¬ out using any disguise, boarded the Viper, sloop of war, and demanded and obtained the release of certain merchant vessels which had been seized on account of failure to observe the Stamp Act. A few days later 700 armed militia surrounded the house of Governor Tryon and took therefrom in his presence the comp¬ troller of the province and enforced him to do what Houston had done. In 1765 an agitation began against the exaction of exorbitant official fees and poll-tax which culminated in open war, known as the Regulators War, in which the insurgents were crushed by Governor Tryon at the battle of the Alamance 16 May 1771. This was really the first bloodshed in the Revo¬ lution. In August 1774 a Provincial Congress was held in New Bern in defiance of Governor Martin's prohibition, which elected delegates to .the Continental Congress. In Edenton 51 women held the famous <(Tea Party,® subscrib¬ ing to a paper to boycott the use of East India tea and to abide by the action of the Provincial Congress. Patriotic meetings were held in many counties. Soon after the receipt of the news of Lexington and Concord, the people of Charlotte assembled, 20 May 1775, and declared the country independent of Great Britain and by special messenger sent a copy of their pro¬ ceedings. to the Continental Congress. This was the first declaration of the kind in Amer¬ ica. In honor of this event, (<20 May 1775® is borne on the State seal and flag. Governor Mar¬ tin fled from New Bern 14 June 1775 and took

refuge on a British man of war. On 12 April 1776 the new State instructed its representatives in the Continental Congress to vote for independ¬ ence, being the first State to do this. A free constitution was adopted in that year. The first victory for the patriot cause was that gained by the North Carolina militia at Moore's Creek 27 Feb. 1776. The State furnished 10 regiments of ((Continental® regulars and many thousands of militia for

shorter (

One of the first acts of the State as a mem¬ ber of the Union was the cession of Tennessee, which was accepted by the United States 2 April 1790. The permanent capital was located at Raleigh by statute in 1791. There soon set in a tide of emigration to Tennessee, then to other Southern and Western States, so that North Carolina which in 1790 ranked third m popula¬ tion was only eleventh in 1840. This tide showed no slackening until after 1850. In the War of 1812 the State furnished nine regiments, two of which went to Norfolk, and one to Jack- son's aid in the Creek War. Capt Johnston Blakelv of Wilmington commanded the United States sloon Wasp and destroyed many English ships. Among its many privateersmen who Dreyed on the enemy's commerce Capt Otway Burns was the most famous. In the Mexican War the State sent a regiment and two com-

P North Carolina was the next to the last State to enter the Federal Union in 1789 and she was the next to the last to leave it in 1861. I he State voted against Secession in February of that year, but when President Lincoln called for troops to coerce the seceding States and Virginia had seceded, North Carolina on 20

May 1861 followed her example. The die was cast she did her full duty to the cause she had espoused. With a voting population (white) of 112.000 ill 1861 she sent over 127,000 men to the rrmfpderate armies. Some 5,000 or more (whites and blacks) joined the Union forces. The first man killed on the Southern side in battle was a soldier from this State Henry L. Wvatt at Bethel, Va., 10 Tune 18ol, and his¬ torians claim that the dead left nearest the ene¬ mies' lines at the pivotal battles of Gettysburg and Chickamauga were North C arolina s sons,

and they fired the last volley at Appomattox. The captures of Fort Hatteras, bort fisher, of Plymouth, the battle of Bentonville 19-21 March 1865, and the surrender of Joseph E Johnston 26 April 1865 were the most notable events of the war which took place on her soil. Wilming¬ ton was famous as a port for blockade running and was the last to be closed. Her war gov¬ ernor was Zebulon B. Vance, afterwardˆ for many terms United States senator. I he State lost 42,000 killed and wounded, or about one- third of the troops she furnished to the Confed¬ eracy. In 1868 began the era of Reconstruction, when the blacks were first allowed to vote and the <(carpet bag® rule began. The Ku-klux Klan (q.v.) was organized as a protest against this in 1869, and the State was in a turmoil until the whites regained full control of the govern¬ ment. In 1870 Governor Holden was impeached and removed from office. The State has grown rapidly in

population and development since the War. ~ In 1894 and 1896 the Populist and Re¬ publican parties combined and carried the State. In 1898 the State again became Democratic and the general assembly submitted a constitu¬ tional amendment disfranchising the uneducated negroes, which was ratified by the people in 1900. Prohibition was adopted on a referendum vote in 1908. The history of the State may be divided into three periods, i. e., the Proprietary Government (1663-1729), during which time the governors were appointed by Lords Pro¬ prietors and were as follows :

Governors of North Carolina.

Proprietary period (1663-1729)

William Drummond .

Samuel Stephens . JJ67-1669

John Jenkins, President of Council . J673 6/6

Thomas Eastchurch . . ISfciSJ

Thomas Miller, President of Council . 1677 1678

John Harvey, President of Council . , • • • •

John Jenkins .

Seth Sothe (or Southwell) . J683 1689

Phillip Ludwell . . . ISl ifiol

Alexander Lillington, Deputy Governor . 1691-1694

Thomas Harvey, Deputy Governor. . 1694- 699

Henderson Walker, President of Council .

Robert Daniel, Deputy Governor . 1704 1/ 3

Thomas Carey, Deputy Governor . J !

William Glover, President of Council . 1/U6 l/u/

Thomas Carey) Contestants (Carey's Rebellion) 1707-1710 William Glover ' i7in_i7i7

Edward Hvde, Deputy Governor. . . . . ‘ ‘ 1 7

Thomas Pollock, President of Council . i7i2_i7??

Thomas Pollock, President of Council . ,777-1771

William Reid, President of Council . i79l_i7?s

Edward Mosely, President of Council . 77L1770

Sir Richard Everard . 1/25 1

The Second or Royal Period extended from 1729-1776. The following were the governors

appointed by the Crown:

„ 1731-1734

Nathaniel Rice, President of Council . . 1734-1752

Gabriel Johnston. . ... • ■ • v. . i7S7— 1753

Nathaniel Rice, President of Council. . 1753-1754

Matthew Rowan, President of Council . 1754-1765

Arthur Dobbs . ; ; ; ; ; ; ; ; 1 765-1771

James Hasell, President of Council . 1771-1775

Josiah Martin .

In 1776 began the government under the republic. The governors thereunder were

elected by the legislature annually until 1837, and were as follows :

Richard Caswell . 177 s— 1 7 7Q

Abner Nash . 1779-1781

Thomas Burke . . 1781-1782

Alexander Martin . 1782-1784

Richard Caswell 1784-1787

Samuel Johnston . 1787—1789

Alexander Martin, Federalist . 1789-1792

Richard Dobbs Spaight, Sr., Republican. . . . ! E 1792-1795

Samuel Ashe, Republican . 1795-1798

William Richardson Davie, Republican . . 1 798-1 799

Benjamin Williams, Republican . 1799-1802

James Turner, Republican . . 1802-1805

Nathaniel Alexander, Republican . 1805-1807

Benjamin Williams, Republican . . . 1807-1808

David Stone, Republican . . . 1808-1810

Benjamin Smith, Republican. . . 1810-1811

William Hawkins, Republican . 1811-1814

William Miller, Republican . 1814-1817

John Branch, Republican . 1817-1820

Jesse Franklin, Republican . 1820-1821

Gabriel Holmes, Republican . 1821-1824

Hutchings G. Burton, Republican . 1824-1827

James Iredell, Republican . ‘ . . 1827-1828

John Owen, Democrat . E 1828-1830

Montford Stokes, Democrat . 1830-1832

David Lowry Swain, Democrat . 1832-1835

Richard Dobbs Spaight, Jr., Democrat . EE 1835-1837

Iii consequence of the Convention of 1835 the governors were made elective, for a term of two years, by the people. During the period since, the following filled the office:

Edward B. Dudley, Whig . 1837—1841

John M. Morehead, Whig . 1841—1845

William A. Graham, Whig . . E . 1845-1849

Charles Manly. Whig . 1849-1851

David S. Reid, Democrat . 1851-1854

Warren Winslow (ex-officio), Whig. . . . E C C C 1854

Thomas Bragg, Democrat . 185 5-1859

John W. Ellis, Democrat . 1859-1861

Henry T. Clark, Democrat . 1861-1862

Zebulon B. Vance, Democrat . 1862-1865

W illiam W . Holden, Republican (appointed by

President Johnson) . 1865

Jonathan Worth, Conservative . 1865-1867

In 1867 Maj. Gen. Daniel E. Sickles was ap¬ pointed Military Governor of District No. 2 consisting of North Carolina and South Caro¬ lina, and was succeeded in that position by Maj. Gen. E. R. S. Canby in 1867, who held under the Constitution of 1868. William W. Holden was elected governor. He was removed by impeachment in August 1870. The follow¬ ing have been the governors since that date :

Todd R. Caldwell, Republican . 1870-1874

Curtis H. Brogden, Republican . 1874-1877

Zebulon B. Vance, Democrat . 1877-1879

Thomas J. Jarvis, Democrat . 1879-1885

Alfred M. Scales, Democrat . 1885-1889

Daniel G. Fowle, Democrat . 1889-1891

Thomas M. Holt, Democrat . 1891-1893

Elias Carr, Democrat . 1893-1897

Daniel L. Russell, Republican . 1897-1901

Charles B. Aycock, Democrat . 1901-1905

Robert B. Glenn, Democrat . 1905-1909

William W. Kitchin, Democrat . 1909-1913

Locke Craig, Democrat . 1913-1917

T. Walter Bickett, Democrat. . . 1917-1921

Cameron Morrison, Democrat. . . 1921-

The Court System, adopted in 1776, pro¬ vided for a Superior Court system of three judges. These were increased in number to four, and in 1800 an Appellate Court was es¬ tablished consisting of the Superior Court judges in conference. This title was changed to Supreme Court in 1805, but there were no separate judges until the Supreme Court was created by legislative enactment in November 1818, to take effect 1 Jan. 1819. This court con¬ sisted of three judges up to 1868, when the court was created by the constitution and con¬ sisted of five judges until 1 Jan. 1879, when the number was reduced to three. It was again

increased to five judges, to take effect 1 Jan. 1889. The chief justices have been as follows:

John Louis Taylor . 1819-1829

Leonard Henderson . 1829-1833

Thomas Ruffin . . 1833-1852

Frederick Nash . E ! ! ! ! 1852-1858

Richmond M. Pearson . 1858-1878

William N. H. Smith . 1878-1889

August S. Merrimon . 1889-1892

James E. Shepherd . 1892-1894

William T. Faircloth. . . 1895-1901

David M. Furches . 1901-1902

Walter Clark . R E 1903-

Under the constitution of December 1776 the general assembly was elected annually. The members of the house of commons were chosen by manhood suffrage and the senate by freeholders owning 50 acres of land or more. 1 he qualification of electors for the State senate was changed in 1856 to manhood suf¬ frage. Free colored men were qualified as voters until disfranchised by the convention of 1835. I he constitution of 1868 removed all dis¬ qualification of electors because of race, but in 1899 an amendment was adopted which dis¬ qualified negroes who were illiterates.*

By the constitution of 1868 elections for the general assembly were made biennial, the office of lieutenant-governor to preside over the senate was created, and the term of State executive officers was made four years. The terms of the judges is eight years.

Bibliography. — The histories of the State are: # Hugh Williamson (2 vols., up to 1771) ; Martin (2 vols., up to 1776) ; F. L. Hawks (2 vols., for the period 1663-1729) ; John H Wheeler (1 vol., 1663-1850); John W. Moore (2 vols., to 1876) ; S. A. Ashe (Vol. I, to 1783, Vol. II to date, in preparation). Among the histories of certain periods are G. W. Graham, (The Mecklenburg Declaration) ; Foote's Revo¬ lutionary Sketches) ; Mrs. C. P. Spencer's (Last 90 Days of the War> ; Clark, Walter, 'History of North Carolina Regiments> (5 vols., 1861-65) ; Battle, Kemp P., 'History of the University of North Carolina) (2 vols., 1798-1912) ; and Schenck, David, (North Caro- (1780-1781). The State has published 'The Colonial Records of North Carolina, 1629- 1776) (10 vols., edited by W. L. Saunders), and (The State Records of North Carolina,

1 776— 1 790> (16 vols., edited by Walter Clark), with four volumes of Index to the above by Stephen B. Weeks.

' . Walter Clark,

Chief Justice Supreme Court, North Carolina.

NORTH CAROLINA, University of.

The University of North Carolina is situated among the hills of Orange Countv in the town of Chapel Hill, 500 feet above the sea. The charter of the university was granted' in 1789. The cornerstone of its first building, the Old East, was laid on 12 Oct. 1793, now' known as University Day. Its

endowment by the State was in the form of old claims on sheriffs and other public officers and escheats, including un¬ claimed land warrants, to be located in West Tennessee, granted to soldiers of the Conti¬ nental Line. Only a small sum was realized from these sources for many years. The money which enabled the doors to be opened in Janu¬ ary 1795, was realized from donations in small amounts by friends of education and a loan of $10,000 by the State, afterward converted into a gift.

The management was at first entrusted to Rev. David Ker, D.D., afterward Federal judge of Mississippi Territory, as presiding professor. The post fell successively to Profs. Charles W. Harris, Joseph Caldwell and James S. Gillaspie, but in 1804 the trustees elected Caldwell, a grad¬ uate of Princeton, to the office of president. Dr. Caldwell in 1812 resigned the presidency, in order to devote himself to his department of mathematics. His successor. Rev. Robert Hett Chapman, born in New York, held the presi¬ dency four years, when Dr. Caldwell was re¬ elected. In 1835 the residue of the Tennessee lands was sold and an endowment of about $200,000 realized. The new president, ex-Gover- nor David Lowrie Swain, was widely and favor¬ ably known. The number of students increased and when, in the decade beginning with 1850, the South became prosperous, the number of students reached as high as 461 in 1858-59.

The alacrity with which the students rushed into the Civil War may be gathered from the fact that out of the 243 freshmen in the three years ending in 1861 only 16 became graduates. Two hundred and seventy alumni are known to have lost their lives in the struggle. Although numbers diminished, the energy of President Swain kept the doors open until the end of the war, and until the trustees, elected under the Reconstruction Acts in 1868, dismissed all the faculty and suspended the exercises for six months.

The endowment of the university was lost during the Civil War. The new president, Solomon Pool, after a year's trial, was forced to close the doors. By a constitutional amendment the general assembly elected a new board of trustees in 1874. These were hindered by legal difficulties, thrown in the way, from taking charge until the next year. The doors were then reopened, alumni and friends repairing the buildings and the general assembly granting a small annuity, coming from the land scrip fund, Rev. Charles Phillips, D.D., being chairman of the faculty. Soon an annuity of $20,000 from the State was secured, and that, with in¬ come from endowments and tuition money, en¬ abled the trustees to increase the faculty largely and add to the library and apparatus.

In 1877 the university was the first institu¬ tion in the South to inaugurate a summer nor¬ mal school. It was continued with much suc¬ cess, and has been one of the chief agents in arousing the spirit of education in the State.

Since 1875 the old curriculum of Latin, Greek and mathematics, with a small amount of scientific and other studies, has been abandoned. An equal attention is paid to the sciences, well- equipped laboratories supplied and courses mapped out leading to the degree of A.B. The departments of the university have been in¬ creased until they now embrace a collegiate de¬ partment leading to the degree of A.B., a grad¬ uate department giving the degrees A.M. and Ph.D., a law department having a two-years' course leading to B.L., a medical department giving two years at Chapel Hill and two years at Raleigh with the degree of M.D., a pharmacy department with a two-years' course leading to Ph.G., and an engineering department.

Women are admitted to certain courses. In 1917 the institution had about 1,100 students and 90 members in the faculty. The campus covers about 50 acres and with the buildings is valued

at $1,250,000. The income is about $200,000 annually and the library contains 75,000 vol¬ umes.

NORTH CAROLINA COLLEGE OF AGRICULTURE AND MECHANIC ARTS,

a technical industrial institution founded in 1889 at West Raleigh. It was the result of a move¬ ment that had been agitated for some years by a small but earnest and determined set of men who became convinced that the industrial growth of the State was being retarded by the lack of technically trained men to assist and guide this development. The college opened its doors to students in October 1889, and, like all new enterprises, at first encountered some hosti¬ lity, a great deal of indifference and incredulity being exhibited as to its power to do the work that was wanted. When the college opened it had only one building, very little equipment and only five professors present for duty. Since then, nine other large and comfortable buildings have been added, and the shops, the drawing-rooms, the chemical, the physical, the horticultural, the electrical laboratories, the barn, the dairy and all the class rooms have been equipped with the best modern apparatus to do thorough and prac¬ tical work. The specific object of the college is to give young men, besides a general education, a technical training that will make them self- sustaining in life and intelligent directors of agricultural and mechanical enterprises. A reg¬ ular college course, minus the classical languages but plus scientific studies in particular lines, is offered at tuition fees so low as to attract young men from all parts of the State. Four years' courses are offered in agriculture, civil, mechan¬

ical, electrical and chemical engineering, textile work, cotton manufacturing, and dyeing; the degrees conferred for the completion of these courses are bachelor of agriculture and bache¬ lor of engineering; there are also graduate courses, two years' courses in agriculture, me¬ chanic arts and cotton manufacturing and twelve weeks' courses in agriculture, carpentry, machine shop work, engine and boiler tending and machine drawing and designing. The ex¬ periment station is also connected with the college and receives an annual Federal appro¬ priation. The college controls the national land grant of 1862, and also receives State and Federal appropriations ; in 1916 the income amounted to over $100,000. The library con¬ tains 10,000 volumes ; the students numbered 708 and the faculty 63. The buildings and grounds are valued at $975,000.

NORTH CHICAGO, Ill., city in Lake County, on Lake Michigan, 35 miles from Chi¬ cago and three miles south of Waukegan, on the Chicago and Northwestern and the Elgin, Joliet and Eastern railroads. A United States naval training station is situated here. The town manufactures gas-machines, wire-fencing and gates, springs, brass and iron-castings, en¬ velopes, cards, portable elevators and milk- machinery. It also owns machine-shops and zinc works. Pop. 3,306.

NORTH DAKOTA, da-ko-'ta, is one of the North Central States of the American Union. It is bounded on the north by the Canadian provinces of Saskatchewan and Man¬ itoba; on the south by South Dakota; on the east by Minnesota, and on the west by Montana.

Its area is 70,837 square miles, of which 654 miles is water. It extends 360 miles east and west and 210 miles north and south. Its capi¬ tal is Bismarck.

Topography. — Extending in a curve from the northwest border to the centre of the State is the escarpment of the Coteau du Missouri. That portion of North Dakota which is to be found northeast of this corteau lies in the so- called Prairie Plain region of the American continent. Southwest of this escarpment the State lies in the Great Plain region. The prairie plain is level or gently rolling and is divided into two great tablelands. The eastern and lower of these is the famous Red River Valley which begins in Minnesota and extends through the State of North Dakota as far north as Lake Winnipeg in the province of Manitoba. This valley is remarkably level throughout its entire length, being 965 feet above the sea at Wahpeton, at

its southeastern extremity, 836 feet at Fargo, some 60 miles north of that point and 798 feet at Pembina, or at the extreme northeast boundary of the State. West of the northern portion of the Red River Valley and 30 miles west of the river are the so called Pembina Mountains, a range of low hills which forms a part of its escarpment and serve to partially divide it from the second of the prairie plains. In Walsh County and some 40 miles from the northern boundary of the State, this second plain is some 500 feet higher than the Red River Valley, from thence it gradually ascends to the so called Coteau de Prairies in Sargent County at the southern boundary of the State, where it attains an elevation of about 2,000 feet. The surface of this area is level or gently rolling, but is not as a whole nearly as level as that of the first plain or Red River Valley. It has but one range of hills, the so called Turtle Mountains, whose area is some 800 square miles, and a small portion of which is in Manitoba. The highest points of this range, however, are only 2,400 feet above the level of the sea. This region is of great beauty and is dotted with numerous lakes. West of this second prairie plain or plateau is another ridge or escarpment of some 400 feet in height and 20 to 50 miles in width, the northern portion of which forms the watershed between the Hudson Bay and the Gulf of Mexico. West of this ridge is the third plateau which comprises that portion of the State which is in the Great Plains as opposed to the Prarie Plains region. It comprises al¬ most a half of the State and rises gradually toward /the west until it reaches an altitude of some 3,300 feet in Bowman County. Thence it extends westward through Montana until it merges in the foot hills of the Rocky Moun¬ tains. In the southwest portion of this area are the so called Bad Lands. Here the burning coal beds have baked the clay of the buttes into striking colors and the erosion of the cen¬ turies has given to them fantastic forms of rare beauty. This region, and in fact almost all of the country west of the Missouri River, lies beyond the limit of the glacial ice beds which spread over the rest of the State, and which not merely planed down the hills but filled the crevices and valleys with glacial drift. It is for this reason that the effects of the erosion of the waters is here more marked and that the western portion of the State, though nearly all

arable, is more rolling and uneven than is that of the east. There are no mountains in the State, merely hills and buttes.

The general topography of North Dakota can be best understood by a classification of its rivers and their valleys and watersheds. These are :

(1) The Red River of the North, which forms its eastern boundary and flows into Lake Winnipeg through a valley of rich bottom land 50 to 60 miles wide. The elevation of this valley is about 965 feet in the extreme south¬ west but gradually descends toward the north. The chief affluents of the Red River are the Sheyenne in the south, the Goose in the centre and

the Pembina in the north. The Red River is also joined at Grand Forks by the Red Lake River, but this latter river does not otherwise flow within the State.

(2) The Dakota or James River (French, (

(3) The Mouse or Souris River in the north and west of the centre of the State. This river flows south by east down from Canada and sweeping around in a great loop runs north into Canada again and joins the Assiniboine.

(4) The Missouri, which has a navigable course of about 300 miles in the State. Its coteau or plateau which is a stony upland, sepa¬ rates its bed from that of the Dakota or James, and is dotted with small alkaline lakes.

(5) The Little Missouri, which runs north and south in the extreme western triangle of the State and then turns east for another 100 miles to join the Missouri.

(6) The Cannon Ball, the Heart, and the Knife, which flow into the Missouri from the west and which are also to be found in the southwestern triangle. This triangle is a coun¬ try of broad valleys and scattered buttes.

Geology. — A Cretaceous deposit overlies the greater portion of the State and often to a great depth. This fact makes a study of the older formations exceedingly difficult. Deposits of the Laramie transition period are found in the western part of the State, while in the Bad Lands (q.v.) tertiary formations are frequently found. The Red River Valley is doubtless un¬ derlain by rocks of the Archean Age, the forma¬ tion being characterized by granite, gneiss and schists. This floor is, however, probably over¬ laid by Cambrian Sandstone over a considerable part of its area, and in places by a thin layer of Silurian Limestone. The Cretaceous forma¬ tions which are represented are the Fox Hills, Pierre, Niobrara, Benton and Dakota. The Da¬ kota is mainly a sand deposit which has become more or less hardened, and underlies the upper Cretaceous and Drift throughout the greater part of the State, being comparatively thin in the eastern part, but increasing in thickness to¬ ward the central and western parts. The hard¬ ened Dakota or Dakota sandstone contains a large proportion of quartz and mica. The Ben-

NORTH DAKOTA.

Estimated population, 791,437

COUNTIES

Pop. 1915

Pop. 1915

4,728

Adams .

. G 4

10,809 McKenzie . . . .

. D 2

18,706

Barnes .

.F 14

15,879 McLean .

. D 7

12,705

Benson .

DU

6,790 Mercer .

. E 6

3.250

Billings .

. . F 2

26.719 Morton .

.... G 7

1 7,33/

Bottineau .

. . B 8

11,135 Mountrail . . .

. C 4

5,041

Bowman .

. .G 2

10,331 Nelson .

, . . .D 13

9,097

Burke .

. .B 4

4,058 Oliver .

F, 7

14 ,57

Burleigh .

. .F 8

14,341 Pembina ....

. ...B14

40,436

Cass .

.F 15

9,703 Pierce .

. C 9

15,811

Cavalier .

.B 13

15,070 Ramsey .

. . . .C 12

10,094

Dickey .

.G 13

11,045 Ransom .

. . . .G 14

8,894

Divide .

. .B 2

8.098 Renville ....

. B 6

8,156

Dunn .

. .E 4

21,265 Richland _

. . . .G 16

5,684

Eddy .

. D 12

9,694 Rolette .

...B10

10,323

Emmons .

. ,G 9

9,634 Sargent .

6,054

Foster .

.E 12

8,249 Sheridan. . . .

. E 9

6.038

Golden Valley . .

. .E 1

2,135 Sioux .

.... B 7

28.658

Grand Forks . . . .

.C 15

4,999 Slope .

. G 2

Grant .

. G 6

14,247 Stark ... .

F 4

(Pop. incl. in

M or-

7,016 Steele .

. . . .E 14

ton Co.)

24,091 Stutsman . . .

. . . .F 12

6,567

Griggs .

.E 13

9,147 Towner .

...Bll

7,711

Hettinger .

. .G 4

12,838 Traill .

. . . .E 15

6,948

Kidder .

. F 10

20,373 Walsh .

. . . .C 14

11,453

La Moure .

. G 13

28,068 Ward .

. C 6

7,037

Logan .

.G 11

13,204 Wells .

. D 10

16,950

McHenry .

. .C 8

18,143 Williams _

. C 2

8.020

McIntosh .

.G 11

Pop. 1915 Pop. 1915

194

Rock Lake . . .

..Bll

105 Tagus .

408

Rolette .

. .B 10

105 Thorne .

. B 10

587

Rolla .

,.B10

203 Tioga .

630

Rugby .

250 Tolley .

...B6

141

Ruso .

. . . D 8

209 Tolna .

. .D 13

161

Russell .

. . . B 8

452 Tower City . . . ,

. . .F 14

224

Rutland .

. . H 14

691 Towner .

. . . C 8

338

Ryder .

. . . D 6

422 Underwood . . .

... E 8

390

Sanborn .

. .F 13

296 Upham .

. . . C. 8

346

Sarles .

. . B 12

4,606 Valley City. . .

. . .F 14

327

Sawyer .

...C7

837 Velva .

. . . D 8

214

Scranton .

. . . G 3

235 Verona .

. .G 13

304

Sharon .

. . D 14

2,467 Wahpeton . . . .

. .G 17

358

Sheldon .

. . F 1 5

592 Walhalla .

. . B 13

328

Sherwood .

. . . B 7

657 Washburn . . . .

. . . E 8

86

Sims .

...F7

592 Westhope .

...B7

267

Souris .

...B8

264 White Earth . .

. . . ,C 4

424

St. John .

..B10

3,124 Williston .

. . . .C 3

513

St. Thomas . . .

. . B 1 5

623 Willow City . . .

. . .B 9

518

Stanley .

...C5

437 Wilton .

. . . .E 8

246

Starkweather . .

. ,C 12

571 Wimbledon . . .

. .E 13

500

.Steele .

. F 10

432 Wishek .

...G10

273

Strasburg .

. . G 9

439 Wyndmere . . . .

. ,G 15

276

Sykeston .

. . E 11

193 Zeeland .

. . H 10

Incorporated Cities, Towns, Villages, Etc.

299 Abercrombie ... .G 16

338 Adams . C 14

320 Ambrose . B 2

669 Anamoose . D 9

654 Aneta . . D 14

342 Antler . B 7

271 Ardoch . C 15

682 Ashley . Gil

399 Balfour . D 9

120 Bartlett . C 13

202 Barton . CIO

328 Bathgate . B 15

1 003 Beach . F 2

137 Berlin . G12

454 Berthold . C6

275 Binford . E 12

444 Bisbee . Bll

5,443 Bismarck . F8

1,331 Bottineau . B 8

651 Bowbells . B 5

302 Bowdon . E 10

481 Bowman . G

203 Brinsmade . C 11

186 Brocket . C 13

241 Buffalo . F 14

332 Cando . C 11

115 Canton, Pem¬ bina . B 14

257 Carpio . C 7

1 217 Carrington . E 12

1,553 Casselton . F 15

225 Cathay . Ell

•652 Cavalier . B 14

175 Cayuga . G 15

457 Churchs Ferry . . .C 1 1

418 Cogswell . G 14

225 Columbus . B 4

184 Conway . C 14

1 019 Cooperstown ... .E 13

539 Courtenay . E 12

279 Crary . C 12

206 Crosby . B 3

76 Crystal . B 14

226 Davenport . F 16

265 Dazey . E 13

150 Deering . C 8

‘,,157 Devils Lake . C 12

187 Dickey . G 13

3 678 Dickinson . F 4

1320 Dogden . D8

297 Donnybrook . C 6

171 Douglas . D 7

348 Drake . D 9

587 Drayton . B 15

478 Dunseith . Bfi

84 Eckman . B 7

749 Edgeley . G 12

300 Edinburg . C 14

344 Edmore . C 13

266 Egeland . B 6

1,389 Ellendale . G 12

540 Enderlin . F 14

353 Esmond . C 10

140 Fairdale . C 13

387 Fairmount . H 17

17,389 Fargo . F 16

713 Fessenden . D 10

f.516 Finley . D14

301 Flaxton . B4

221 Forbes . H 12

233 Forest River . Cl 5

J52 Forman . G 14

206 Fullerton . G 13

119 Gardena . B8

406 Garrison . D7

268 Glenburn . C7

921 Glen Ullin . F 6

410 Goodrich . E 9

2,229 Grafton . C15

: 5,837 Grand Forks .... D 16

**455 Granville . C8*

191 Great Bend . G 16

j.183 Hague . G 10

F»213 Hamilton . BJ15

1,503 Hankinson . H 16

340 Hannahford . . . .E 13

1,443 Harvey . D 10

666 Hatton . D15

387 Havana . H 14

597 Hebron . F 6

766 Hettinger . H 4

1,237 Hillsboro . E 16

175 Hoople . C 14

909 Hope . E 14

365 Hunter . E15

353 Inkster . . C12

4,358 Jamestown . F 41

99 Jud . G 12

1,437 Kenmare . B 5

456 Kensal . E 12

108 Hermit . B 3

330 Knox . C 10

181 Kramer . B8

645 Kulm . G12

1.023 Lakota . D 13

929 Lamoure . G 13

1,214 Langdon . B 12

341 Lankin . C 14

456 Lansford . C 7

1,224 Larimore . D 14

682 Leeds . C 11

182 Lehr . Gil

1,019 Lidgerwood . H 15

644 Linton . G9

1,758 Lisbon . G 14

484 Litchville . F 13

109 Ludden . H 13

517 McClusky . D 8

398 McHenry . D 12

310 McVille . D 13

374 Maddock . D10

3.873 Mandan . F8

207 Mapleton . F 16

790 Marmarth . G2

285 Max . D 7

240 Maxbass . B 7

1,070 Mayvllle . E 15

343 Medina . F 11

78 Merricourt . G 12

449 Michigan . C 14

641 Milnor . G 15

410 Milton . B 13

510 Minnewaukan. ..Oil

6,188 Minot . C 7

701 Minto . C 15

493 Mohall . B 6

238 Monango . G 12

98 Mylo . B 10

528 Neche . B 14

120 Nekoma . B 12

102 Newburg . B 8

621 New Salem . F 7

157 Niagara . B 7

218 Nome . F 14

153 Noonan . B 3

432 North Minot,

Ward . C 6

769 Northwood . D 14

1,499 Oakes . G 13

332 Omemee . B 9

253 Osnabrock . B 13

182 Overly . B 9

479 Page . E 15

177 Palermo . C 5

1,008 Park River . C 14

717 Pembina . B 15

221 Perth . B 11

353 Petersburg . C 14

312 Pisek . C 14

224 Plaza . C 6

{491 Portal . B 4

561 Portland . E 15

536 Ray . C 3

198 Reeder . G 4

412 Reynolds . I) 15

647 Richardton . F5

M

**

♦

102 °

10

1 1

c

D

E

99°

13 98- 14

NORTH DAKOTA

SCALE

Statute Miles, 3t = 1 Inch.

0 5 10 20 _ 30 40 _ 50

Rand McNally's New 11 x 14 Map of North Dakota. Copyright by Rand McNally & Co.

"'tg"nC1'osbyl-_

> JTansemo

>UpIand

I D I V,| D(\i

I c Stady V oPluuLf o

vAppam h Zahl /

Gladys0 4r. 'T# C'K

- Angie

BonetrailJ/%. AMarmou , _

/WW>VL>L | Ray

A. pj

\ J I

CAN,

Carnduff ~ \ prys

North

- j ■ x j°rtni

6fc| Fnrtnn.'Vii* "r^i f J ^S'iTrtal 'r NCrtli/utc

;il-L ^>°^oc.ig.ncroJb?^3S

ipping ”\»| X • 3

Hofflu„!,\4′ |If M 0 U 1 T R Af I L

pAc

Delorai ˆcm. . ˆ*

PAC. ,/ »@?vf

Goodlands

e«« Glen boro \Hartney Jc. Relmont

o’c

Carman

-‘Somerset

ikopa

-XaS o Amanda

»3rv 1 k w l

pI” /o Joe ‘

yw..

Elsworth

Quinion’ˆor r>n w

-Fayette Renville o

X ‘ • T -T.

..JA-.Jfort f.

ˆ BERTH OLD f

*groveˆ*s£ˆ5*

Y INDIA I

RES.

Rau! > c

°* GrWland ° S*”*er

toissevain

i Lake Lou — •rv

/ \Rocfc Lafc*\£

Killarney

Holmfeld/5^. (C*N.

Spring Lake *\ < ^Pan Liyce. 7lon \ 1

./ ^ M, f l ‘N^’^Vc ! Ca^d4

bigj^ — – KABTHFRN ninftsav‘11

> . -p •

1

W , AUr“odTB/ A,D G^rs?

_ W r-\ O VtXV. <\u «€

Hcsnault ^ Logamk x>.

Pitts *

c? /Nee Eafo

^Cfenicrville

0Amundsville ^

v Ktv.7\z,;r”

©Oakdale .

“T^\\^”> VvBailey\ n\,et ^Defiance

CtXjfi *P rin® 1

v°t D U N m X

A ^ n _ .til a ’

lundsville AT **,/ ‘A®* I Z_

Bmegldn 1 j/ V^ strawlSy U * ‘ A

(•§ /’ Umg L. fl Byerso I 0 *

W EmureliS, V C^xVson kCrookcd k J Skogr

| skoemo

Ejbowtjods J Oroa |c UncohtO ^

Coll i»*, I SHERIDAN ,

■Zv&r- — P °- ~ZTj) \Harbor \P. (tCeV vUe ’ k

U«c :/ Expansion

*CVL Tl ‘ o/i’Miuin haven \J..0r(ipy» — & -~-o — ■ >.

.t W yf JSsOT^j:

r + SAjr^3C;’;“1’ K”’”“‘eo Collins

, A«JXfT®Iai,,iing ° ;owdish _ _

Fairfield* S^owj _ ^ Br°Yh°° „C”1 Nisb^t o JF^ort Clar^BeneRr

^ \0KStantonM0®nd^f/‘4tottvftT’ -a

..£*!&• A#’>,irlru—-^t»k i 1»«

DospouN^ —i.u4 T>.i,..„o **t»r**

/ S , t

-Pelican0

(piP’c

NORTHERN

0|

,... – . ,,, ksf’

Scroco o ^‘loY

O LO-vV E R i… , _ .

^Center , P.J,J Ov-‘

S,ood8\“ ^NBohan Xang^lahl

iKbsin- Hsooov.X’^TConter | |4 V

Creek XSv>

Vo

1 ~^SCohefl’ld^

s

Taft0 oShyllsmade

| Bangel,N-x/jyji(|way

[stjUart Bicrman

5-v-/> Giese Ami..

^ G c’

_ x \n p v c •

° Mound Purcell0 tfunTfi °iL ^ …

Tpio.‘A”“1 Rege^« lA8, nMinrt-ai o!|HiJ]gs ‘:’y^=r>A,

S – Chenow!th_ «4iWV’

0v ^ >^r | ^ v.s >

vaNs ^7^1 *

• ®l > . . ^

K I D

llifford

Pillsbury 4/ -AV^lde: afti

tabula

xj»r_. > » t v,Barne

Heart Irp'DcVaul-

cO' • IH° Gay ton ' ^

annon Ball Jc.,

,

Delahunt .

Ijo"1

46°

H

'Bo w

^a.,^u f

Paoli

:Uea^w I Janesbunt CtjM'v' . Srheller

SA&Zw" – A u

,s^x,:~fiV'-l< >Hartford fTeni,,k

caooo"11 | E M M[o I^-S

>tyjCcn9on

W ° M

rkl U4t,n Arnor _g> (Langbcr

-^o Concord

;H A R D | N G

wHiinnKT', >1 y.. — — — -v – _„t>- \r leuL » • vj • jp • ■ 'v' ' v ' r I _ V" u/?. _ i/i , vLllltOll*

£v.x\o I d: •— ? ^ cL 0 -✓Atc.v.enson // j — fv^ — Q i

, -rso’r^’^h ^_ “iS^M.ibertE [Jlu“‘b”rt ® Seh*n’r W

^T81 I Wolf Butte l cl,r,^I7T~ T”l’r,t,r Rock o ^/.^LVV Bl.bbins .v’Vr^YI J X^ree/c

— — ‘l ° Spring butte r^v f Selma ° * “a/T\ ifj VVlchadwick ^~V // \ Mastel\%

A O NAyM S ■\|co„.r„rg Par0diaeo Wij>r^ ‘Hv Nfc“^a s.r.,hu^

Bucyrua \ ftowere — W aV ^Kort

■ Ap^x4t«^_| – ° 1 i.aT^A’?0 •

y ~«r- T — Sr,.T7.l

f? v u\€“under Hf v^v^PAUL

1 1 p E s

-JET

S

B»eiic

Tuttle .oWV N

H)

CXaA/H^bTeT

tArthur j ?. \ Argusviljle

Vance

I Vft \Peters

! ®L \ O G A N

>r\ Beaver c°«J{ing

To\ca»

Pascal Hellwig

. Lowell

M’C J3 H E R S 0

Frederick

| j) R o jVy N jpurchA,. Britton

B

48″

D

/^’ T ,

A R S H A L L

/04°

, 103°

6 ,02°

Y /o»“

>oo° 10

11

89»12

13

14

98°

16

10

97°

2690

17

NORTH DAKOTA

ton and Niobrara formations are well developed in the central and northern part of the State, hut seldom appear along the eastern border. They are principally composed of blue clays and shales, and immediately overlie the Dakota sandstone. The Pierre group is found through¬ out the centre of North Dakota and its debris forms much of the soil and subsoil and of the glacial deposits which are scattered over the eastern half. The Pembina Mountains, so called, are merely an eroded edge of this forma¬ tion, and it is also everywhere found in the Turtle Mountain region. The Fox Hills group is to be found almost entirely under the Lara¬ mie and later deposits in the western part of the State, and, in portions of the Turtle Mountains and near Dickinson in Stark County, develops into an excellent building stone. The Laramie and its overlying Tertiary extend over a large portion of North Dakota west of the Missouri River. It consists principally of clays and shales, some of which are of great value for brick and pottery uses. In the same formation also are. found immense beds of lignite coal. In addition to these deposits is the so-called Drift which is mainly to be found east of the Missouri River. This drift is composed of sand and clay mingled with gravel and boulders, and is merely the rock refuse which was carried along by and created by the glaciers of the past and which was deposited as the ice melted. It, however, has formed a soil which is of great depth and of great fertility.

Minerals. — About 32,000 square miles of the western portion of North Dakota are underlaid with lignite or half-made coal. The total pro¬ duction of this coal is hard to estimate as it is so abundant that the farmers often dig their own supplies from the hillsides. It is safe to say, however, that the annual output is at least 600,000 tons, and the government geologists esti¬ mate that the total deposits of the State are equal in heat units to the present total con¬ sumption of the United States for 99 years.

Lignite is a free burner and an excellent gas coal, and the cheap fuel to be derived therefrom is destined to be of great value not merely for household and heating purposes but in the de¬ velopment of manufacturing centres, which are certain to arise. Together with the coal, indeed, and in the same areas, are to be found valuable and inexhaustible deposits of various kinds of clay which are of the highest grade and capable of almost any brick and pottery use. There have also been found scattered throughout the Bad Lands, large quantities of paint rocks, of various colors, which only need the addition of oil or water for use. Antimony is also found in varying quantities. Natural gas is also found in more or less extended areas throughout the State.

There is in North Dakota comparatively little building stone that may be

quarried, but large boulders are scattered everywhere through¬ out the western area. There is also limestone of excellent quality, as well as large quantities of cement material and glass sand.

Flora and Fauna. — The forested area of North Dakota is very small, and is mainly to be found in the Pembina, Turtle Mountains and the Devils Lake regions, where grow oak and ash, poplar and birch, willow and boxelder, plum and bullcherry and other deciduous trees.

Along the Missouri are large cottonwoods and along the Red River some elm. The character¬ istic wild animals are timber and prairie wolves, panthers and wild cats, gophers, prairie dogs and deer. Trappers also find otter, mink, beaver, raccoon and badger. Sportsmen shoot much grouse, prairie chicken, wild geese and wild ducks.

Climate and Rainfall. — The mean annual temperature for the State is 39° F. At Bis¬ marck, in the south centre, it is 4° in January and 67° in July, with extremes of — 44° and 106°. At Williston, in the extreme northwest, the ex¬ tremes are — 49° and 107°. The dryness of the atmosphere makes these great extremes not only bearable but healthful. The average annual precipitation for the whole State is about 17 inches, and decreases from 20 inches in the Red River Valley to 14 inches in the extreme west. As only 2 per cent of this, however, falls in the winter months, not only are the needs of agriculture fairly subserved hut the suffering incident to humid cold is not present, and the winters, though cold, are healthful and stimulating.

Soils and Agriculture. — Few States in the Union have a larger percentage of tillable land than has North Dakota, and though the char¬ acter of the soil, the climatic conditions and the rainfall vary to a greater or lesser extent over its vast expanse, there are but small areas which are not marvelously fertile. Even the so-called Bad Lands from an economic standpoint are bad only in that they are broken and difficult to travel, and the richness of their valleys and the abundance of the coal, clay, argillaceous limestone and glass sand deposits there to be found more than counterbalance any drawbacks which may come from difficulties of road build¬ ing. The soil is no doubt the richest in the Red River Valley, which is a wonderful bottom land where a black rich top soil of decayed vegetation overlies alluvium and glacial drift to a great depth and down to a clay subsoil which is itself rich farming ground. The mar¬ velous fertility of this region, its ease of culti¬ vation and its freedom from rocks and stones, for many years prevented a proper appreciation of the western area of the State, but there the mineral resĉrces and climatic conditions are more to be desired and the agricultural possi¬ bilities, though at first less apparent, are almost as great. The soil in the western portion of North Dakota, indeed, though thinner than in the Red River Valley, is almost everywhere

rich in the elements of plant growth, and, though more sandy, is on that account more friable and quicker. The climate, too, in the trans-Missouri region is perceptibly warmer than in the north¬ eastern portions of the State, and this fact is of great importance, especially to the maturity of corn which is now an established crop.

Perhaps, indeed, in no other State is the Creator's marvelous policy of compensation bet¬ ter illustrated than in North Dakota. The sea¬ sons for instance are comparatively short, but the days are proportionately long, and the hours of sunshine in the growing months of April, May, June, July and August are unusuallv high. During these months the total number of hours of possible sunshine at Springfield, Ill., is 2,174, while the number at Bismarck, North Dakota, is 2,269, and this fact is augmented by

the rapidity with which the atmosphere clears after rainstorms. So, too, though the weather is severe in the winter, the frost often goes from six to eight feet beneath the surface of the ground, thus preserving the moisture which, during the growing months, gradually thaws and rises to the surface and feeds the crops during periods when the rainfall might otherwise be inadequate. Not only is this so, but the cold and extreme depth of frost over the great snow¬ less plains (for on account of the rarity of the atmosphere North Dakota is comparatively free from snow), destroy countless millions of the larvae and eggs of the predatory worms and in¬ sects. Though the average rainfall decreases toward the western portions of the State, the data of many years has shown that all but 2 per cent of this rainfall falls during the growing season, and if properly conserved is adequate to the needs of diversified farming.

Crops. — The greatest crop of North Da¬ kota is wheat, of which she raised in 1915 no less than 155,845,963 bushels, and for which her farmers received the sum of $135,585,988. This sum, however, represents but a little over one- half of what was received for other agricultural products, the total being $226,218,053, and being made up as follows: Wheat, 155,845,963 bushels, value $135,585,988; oats, 102,856,040 bushels, value $27,711,131; barley, 57,331,328 bushels, value $25,225,784; rye, 3,675,165 bushels, value $2,903,380; flax, 5,233,0 71 bushels, value $9,314,- 866; speltz, 2.744,160 bushels, value $1,042,781; potatoes 7,775,910 bushels, value $3,188,123; corn, 11,120,872 bushels, value $7,450,984; tame hay, 527,002 tons, value $4,216,016; wild hay, 1,670,000 tons, value $9,519,000.

In addition to this were cattle, hogs and sheep fattened and killed for home use of a value of $3,609,956, and 600,000 hogs, 339,000 dairy cattle and 515,000 steers and other cattle, which were sold in the eastern market and were of the value of $9,058,180, also dairy and cream¬ ery products of the value of $5,000,000. In all a sum $243,886,189, or a total agricultural produc¬ tion of $381 for every man, woman and child within the State. In this estimate no allowance has been made for the wool clip, which in 1909 was 2,457,000 pounds, nor for the garden prod¬ ucts, poultry, eggs and small fruits, the amount and value of which is rapidly increasing every year, but concerning which no accurate data can be obtained.

Manufactures. — The enormous coal depos¬ its and their close proximity to the fine pottery clays, which are to be found in inexhaustible quantities in the western part of the State, are destined in the near future to make a manufac¬ turing centre of that region. At the present time, however, agriculture and cattle raising are the paramount industries and, with the ex¬ ception of flour, creamery products, fire and pressed bricks, harnesses and candies, the fac¬ tories of the State may be generally termed neighborhood manufactures. Of flour mills there are upwards of 60, with a daily capacity of 10,000 barrels. In 1914, the creameries con¬ sumed 13,462,000 pounds of cream, and in addi¬ tion to this 10,000,000 pounds of butter were made in families. There are numerous brick plants and potteries, the largest of which are at Hebron and Dickinson, and whose pressed brick is marketed as far west as the Pacific

Coast. In 1914, the capital invested in manu¬ factures was $14,484,000, and the value of the products was $21,147,000.

Banks and Banking. — All private banks are compelled by law to take out charters as State banks. In 1915, there were 650 State banks and 151 National banks, carrying total deposits of about $116,062,0 27. In addition to these institu¬ tions there were numerous building and loan associations, trust companies and other similar institutions.

Transportation. — The Missouri River is navigable throughout its length but needs a clever pilot. The Red River is navigable from Fargo to Winnipeg, but boats run only from Grand Forks. The total railroad mileage is 6,281 miles. There are three principal railroad systems and several small local lines. The prin¬ cipal systems are the Great Northern, the Northern Pacific and the Minneapolis, Saint Paul and Sault Sainte Marie. The two former cross the entire State from east to west, the first mostly north of the parallel of 48°, and the latter a little south of the parallel of 47°. The Minneapolis, Saint Paul and Sault Sainte Marie cuts the State diagonally through its centre and connects with the Canadian Pacific at the north¬ ern

boundary. The Chicago and Saint Paul and the Chicago and Northwestern railroads also enter the State with short branches in the south. All of these roads have numerous branch lines.

Education. — The public schools have a land endowment valued at $64,000,000. One-eigh¬ teenth of the lands of the State were reserved for their use in the outset by the constitution, making 2,531,200 acres. In addition to this some 500,000 acres were reserved for the support of the technical schools and schools of higher edu¬ cation and for the support of the charitable institutions. There were also set aside 50,000 acres for the use of the State capital. None of these lands may be sold for less than $10 an acre, and the State is obliged to make good any shortages.

In 1915 $7,000,000 were expended for the support of the public schools. Of these there were 6,800 employing 8,000 teachers, and pos¬ sessing sites and buildings of a value of $14,- 736,247. There are in addition to these schools the following institutions for higher and special education : an agricultural college at Fargo, State University at Grand Forks, with a School of Mines in connection, State Normal Schools at Valley City, Mayville and Minot, a Normal and Industrial School at Ellendale, a School of Forestry at Bottineau and a Scientific School at Wahpeton. There are also numerous agri¬ cultural experiment stations scattered through and supported by the State, and a large experi¬ ment and tree distributing station at Mandan, which is supported entirely by the Federal gov¬ ernment.

There . is a college at Fargo] which was founded in 1387 by the Congregationalists, but which is now nonsectarian, a Methodist college at Grand Forks, which is affiliated with the State University, a Presbyterian college at Jamestown and a number of academies and parochial schools. The State also maintains a legislative reference bureau and an educa¬ tional reference department. During 1915, the latter department ministered to the needs of

NORTH DAKOTA

State Capitol at Bismarck

NORTH DAKOTA

o <. P- w P

3.33

o »

W «•

3 2

crp M

3’h- o 0> c

2.3

3 GT?

s.|

►— *r

3 5-

►<

o

733

o a «•”

3

o ^ ® O

el

W

c

a

tw HH 0) HD

ST 2.

^ CL

0>

o

•n C/i

o«

§3

«S

NORTH DAKOTA

423

some 275 towns and answered the correspond¬ ence of 12,000 people. There are also 283 traveling libraries and 1,047 library stations. Three hundred and forty-four newspapers are published within the State.

Religion. — The Catholic population of the State is estimated to he nearly 93,000. The Methodist is about 11,000, the Baptist about 4,040, the Protestant Episcopal about 1,983, the Presbyterian 7,159, the Congregational 7,383, and the Lutheran about 59,923. There are probably 4,000 Tews in the State and about 150 synagogue families.

Charitable and Penal Institutons. — There is a soldiers' home at Lisbon, an asylum for the blind at Grafton, a school for the deaf at Devils Lake, a hospital for the insane at Jamestown, a sanitarium for tuberculosis at Dunseith, a reform school at Mandan, and a penitentiary at Bismarck.

Finances. — The assessed valuation of the State for 1915 was $385,386,000. The real value of the State, however, is probably in the neighborhood of $2,000,000,000, the assessments being based on a very low percentage. Hie taxation for State purposes is limited to four mills. This, however, is exclusive of interest on he bonded debt. This debt may not exceed $200,000. Local indebtedness may not exceed 5 per cent of the assessed valuation of the local property, although incorporated cities may, by special vote, increase this limit. In 1915-16 the principal expenditures were as follows : Executive department, $577,663.51 ;

legislative department, $112,000; judicial depart¬ ment, $194,025; education, $866,079.20 ; military, $8,000; agriculture, $245,815.20; chanties, $531,262.84; correction, $280,863.01; public health, $52,440; labor, $19,000.

Population and Civil Divisions.— – In 1880 the population of North Dakota, which then constituted the northern half of the territory of Dakota, was 36,305, excluding Indians. It is 646,872, excluding Indians, and the school census of 1916 was 186,494. Of this number a little over 72 per

cent are either foreign bom or of foreign descent. About 25 different na¬ tionalities are represented. There are prob-f ably 100,000 Norwegians, 60,000 German Rus¬ sians, and there are also large settlements of Canadians, Icelanders, Swedes, Danes, Aus¬ trians, Irish, English, Hungarians, Scotch, Hebrews, French, Welsh, Bohemians, Dutch, Bulgarians, Greeks, Turks, Finns, Esthoman

and Italians. . . .

There are no large cities in the State, and there is only one with a population which reaches 20,000— Fargo (21,961). There are however, a number of thriving small ones, of which Grand Forks is the largest, having a pop¬ ulation of 14,010. The next largest is Minot, with a population of 10,476. Then follows Bis¬ marck with a population of about 7,000 and Dickinson, Jamestown and Valley City, and Devils Lake, all of which have over 5,000 people. Then a number of towns having a population of less than 5,000, but more than 1,000, and a still larger number of small villages. The Indians number about 9,000, and are found on four reservations, Standing Rock, bort Berthold, Devils Lake and Turtle Mountain. There is a military post at Fort Lincoln near Bismarck, and another at Devils Lake. I he State has

52 counties, which with their county seats are as follows:

Adams .

Barnes .

Benson .

Billings .

Bottineau . . . Bowman ….

Burke .

Burleigh .

Cass .

Cavalier .

Dickey .

Divide .

Dunn . .

Eddy .

Emmons .

Foster .

Golden Valley Grand Forks.

Griggs .

Hettinger. . . .

Kidder .

LaMoure ….

Logan .

Mercer .

Morton .

Mountrail . . .

County seat

County

County seat

Hettinger

McHenry . . .

. Towner

Valley City

McIntosh. . .

. Ashley

Minnewaukan

McKenzie . .

. Schafer

Medora

McLean. . . .

. Washburn

Bottineau

Nelson .

. Lakota

Bowman

Oliver .

. Center

Bowbells

Pembina. . . .

. Cavalier

Bismarck

Pierce .

. Rugby

Fargo

Ramsey . . . .

. Devils Lake

Langdon

Ransom . . . .

. Lisbon

Ellendale

Renville. . . .

. Mohall

Crosby

Richland . . .

. Wahpeton

Manning

Rolette .

. Rolla

New Rockford

Sargent .

. Forman

Linton

Sioux .

. Fort Y ates

Carrington

Slope .

. Amidon

Beach

Stark .

. Dickinson

Grand Forks

Sheridan . . . .

. McClusky

Cooperstown

Steele .

. Sherbrooke

Mott

Stutsman . . .

. Jamestown

Steele

Traill .

. Hillsboro

LaMoure

Walsh .

. Grafton

Napoleon

Towner .

, . Cando

Stanton

Ward .

. . Minot

Mandan

Wells .

. . Fessenden

Stanley

Williams. . .

. . Williston

State Govenment. — The governor is elected for two years. The State officers are elected in November of the even numbered years. The legislature is composed of a senate, whose members are chosen for four years, and a house of representatives, whose members are chosen for two. It meets biennially and its sessions are limited to sixty days. The Judicial Department consists of a Supreme Court, of five members holding office for

six years, twelve district judges, holding office for four years, the county judges and justices of the peace. Some of the county judges are given general jurisdiction to a limited amount. Under the new apportionment three repre¬ sentatives are sent to Congress. The con¬ stitution makes it a misdemeanor for anyone to interfere with another's obtaining, or en¬ joying after having obtained, employment from anyone. It also provides for the prohibition of the liquor traffic. Residence in the State for one year is required before an application for a divorce will be entertained and the grounds therefor merely include adultery, cruelty, desertion, habitual drunkenness, in¬ curable insanity and conviction of a felony. The Initiative and Referendum are both in use and on both constitutional and statutory provisions. A system of primary election for all public officers also prevails. Women vote in school elections and for non-constitutional officers.

Governors of North Dakota.

John Miller . Republican .

Andrew II. Burke . • . . • • • ■

E C. D. Shortridge. . . . Democrat-Independent.

Roger Allin . Republican .

Frank A. Briggs . u .*

Joseph M. Devine . u .

Frederic B. Fancher. ... .

Frank White . .

E. Y. Sarles . .

John Burke . Democrat .

L. B. Hanna . Republican. ... .

Lynn J. Frazier . (Non-Parti¬ san League) .

- *Died in office.*

1889-1891

1891-1893

1893-1895

1895-1897

1897- 1898

1898- 1899

1899- 1901 1901-1905 1905-1907 1907-1913 1913-1917

1917-

History.— The old Territory of Dakota took its name from the Dakotas (allies), an¬ other name for the Sioux Confederation. Lewis and Clark wintered at Mandan and were at the mouth of the Yellowstone in 1804. In

1810 Lord Selkirk built a fort at Pembina, sup¬ posing the territory to be a part of his pur¬ chase from the Hudson's Bay Company. The first steamer ascended, the Missouri in 1830. Fremont in his explorations penetrated to Devils Lake in 1839. In 1832 George Catlin was here and painted some of his famous In¬ dian portraits. The first purchases of land from the Sioux were made in 1851. In 1857 the first settlement in the Dakotas was made at Sioux Falls in South Dakota.

That part of North Dakota which lies south of the Pembina River was originally a part of the Louisiana Purchase. That part which lies north was conveyed in 1809 by the Hudson's Bay Company to Lord Selkirk and was brought into the United States by the location of the boundary at the 49th parallel in 1811. In De¬ cember 1912 that portion of the original pur¬ chase which lay north of the 33d parallel and which extended to the international boundary was formed into the Territory of Missouri. In 1834 the Territory of Michigan was created and in it was included all of the country east of the Missouri River and north of the States of Missouri and Illinois. North Dakota and South Dakota were contained therein. In 1837 Michigan was admitted as a State and the re¬ maining territory was termed Wisconsin. In 1838 North and South Dakota were taken from the Territory of Wisconsin and added to the Territory of Iowa, which also included Minne¬ sota. In 1849 the eastern part of the Dakotas was merged into the newly created Territory of Minnesota, while in 1854 that part which lay west of the river was included in the Territory of Nebraska. In 1858 Minnesota was admitted into the Union and for a time that portion of the Dakotas which lay east of the Missouri River was unprovided for. This continued until 2 March 1861 when the Territory of Da¬ kota was created and which included not only the Dakotas but Montana, Wyoming

and a part of Idaho. From this area Montana was sep¬ arated in 1873 and on 3 Nov. 1889 the present States of North and South Dakota were given their present boundaries and admitted into the Union.

With the exception of the years 1892 and 1912 North Dakota has always elected a Repub¬ lican national ticket. It has, however, always been extremely progressive in its policies and was the first State in the Union to hold a prefer¬ ential primary for the presidency of the United States. This was in 1912. It adopted a primary system in 1905 and the 1916 elections show a complete victory for an agrarian movement which advocates State-owned packing houses, flour mills, terminal grain elevators, State grain inspection and compulsory State hail insurance, a largely extended rural credit system, a State owned bank and the exemption of farm im¬ provements and farm personal property from taxation. The woman's suffrage movement was very pronounced in the State.

Andrew A. Bruce,

Chief Justice of Supreme Court of North Dakota.

NORTH DAKOTA, State University of.

The State University and School of Mines of North Dakota is located at Grand Forks. It was established by an act of the Territorial legislature approved 27 Feb. 1883. The fol¬

lowing colleges or departments have thus far been organized : The College of Law, granting the degree of LL.B. ; The College of Liberal Arts, granting the degrees of B.A. and M.A. ; The College of Mechanical and Electrical En¬ gineering, granting the degrees of M.E. and E.E. The College of Mining Engineering, granting the degree of E.M. ; The Normal Col¬ lege; the School of Commerce; the School of Mines and the School of Pharmacy. The plant of the University consists of eight sub¬ stantial buildings heated by steam and lighted by electricity. The University has received as a grant from the Federal government 126,080 acres of land which, under the terms of the grant and of the State constitution, may not be sold for less than $10 an acre. It is prob¬ able that this grant will eventually yield a fund of not less than $2,000,000. The University is maintained by an annual fixed appropriation of two-fifths of a mill on the dollar of the assessed valuation of the State for purposes of taxation. The total income of the University for the current year is approximately $225,000. The University owns, exclusive of its lands, property valued at $1,575,000. Its library num¬ bers 30,000 volumes. A public health laboratory, a weather bureau station and a station of the Geological Survey are maintained here. A mining substation is located at Hebron and a biological station at Devils Lake.

NORTH DAKOTA AGRICULTURAL COLLEGE, opened in 1891, at Fargo. The regular four years courses include agriculture, general science and mechanical engineering ; the shorter courses are agriculture and steam engi¬ neering, two years, and a (

NORTH DOWNS. See Downs.

NORTH FORELAND, for'land. See Forelands, North and South.

NORTH GERMAN CONFEDERA¬ TION, the union of German States in 1866 under the leadership of Prussia. See Ger¬ many.

NORTH ISLAND. See New Zealand.

NORTH KINGSTOWN, R. I, town in Washington County, 23 miles south of Provi¬ dence, on the New England Navigation Com¬ pany Line. It is famous for its buildings such as the Old Narragansett Church built in 1707 and Smith's blockhouse built in 1638. There is also an Indian graveyard. Other buildings include a public library, town hall and high school. Pop. 4,048.

NORTH PLAINFIELD, N. J., borough in Somerset County, 24 miles west of Jersey City and 28 miles west of New York City, on the Central Railroad of New Jersey. Here are situated Mount Saint Mary's College and Herbert's Hall for Exceptional Children. In the neighboring county are stoneiquarries, large orchards, stock-farms and dairies. The town's industries are chiefly fruit canneries, bottling works, a woodworking factory and a factory for telescopes. Tourists visit Washington Rock, Elsinore Castle and Wetumpka Falls. Pop. 6,916.

NORTH PLATTE, Neb., town, county- seat of Lincoln County, at the confluence of the North and South Platte rivers. and a divi¬ sion point of the Union Pacific Railroad, about 225 miles direct west of Lincoln, capital of the State, on the Lincoln Highway. It is in a pro¬ ductive agricultural region where irrigation has been introduced. Considerable attention is given to stock-raising and the county fair held at North Platte each year is one of the best in the State. Cattle, sugar beets and alfalfa are exported. The Union Pacific Railroad has machine shops here and the roundhouse is the second largest on the system. The payroll averages $60,000 a month. It has grain ele¬ vators, cold storage plant, stock, brick, lumber and coal yards.

The school facilities are among the best in the State ; in addition to the high school is a junior high school The United States Land Office is located in the Federal building; also the United States Weather Bureau headquarters and State ex¬ perimental station. There is a well-equipped Carnegie Library and an active chamber, of commerce. The waterworks are municipal property. Pop. 10,466.

NORTH POLE. See Arctic Region; Polar Research.

NORTH PROVIDENCE, R. I., town and county-seat of Providence County, five miles northwest of Providence, of which it is a suburb. It is situated on the New York, New Haven and Hartford Railroad. The town owns a public library. The chief factories make woolen goods. Pop. (1920) 7,697.

NORTH RIVER, the name given to the lower course of the Hudson River. This name was applied in the early days when the Dela¬ ware was called the South River. See Hud¬ son River.

NORTH SEA, or GERMAN OCEAN, a

northeastern extension of the Atlantic Ocean lying between Great Britain and the continent of Europe; lat. 51° to 61° N. ; long. 2° 30 W. to 7° 30′ E. • Great Britain with the Orkney and Shetland islands being on the west ; Denmark and part of Norway on the east; Strait of Dover, part of France, Belgium, Holland and Germany on the south ; and the Arctic Ocean on the north. Extreme length, from the Strait of Dover to Unst, the most northern of the Shetland Isles, about 700 miles ; greatest breadth, between Haddingtonshire, Scotland, and Denmark, about 420 miles; area, over 190,- 000 square miles. The shores of all the countries that surround the North Sea are deeply indented with bays, fiords, inlets and large estuaries; hut its most remarkable arm is the Skager Rack.

between Denmark and Norway, which com¬ municates through the Kattegat with the Baltic Sea. The North Sea is deepest on the Norwe¬ gian side, where the soundings give 190 fath¬ oms ; but the mean depth of the whole basin may be stated at no more than 31 fathoms. The bed of this sea is traversed by several enormous banks, one of which trends from the Firth of Forth, Scotland, in a northeasterly direction, to a distance of 110 miles; others run from Den¬ mark and Jutland upward of 105 miles to the northwest ; while the greatest of all, the Dogger Bank, occupies the centre of the sea, from lat. 54° 10′ to 57° 24′ N. and long. 1 ° to 6° 7′ E. The great oceanic tidal wave which originates in the Atlantic, after having swept the west coasts of Great Britain and Ireland, enters the northern extremity of the North Sea, giving high water nearly simultaneously to the oppo¬ site shores of Scotland and Norway. Pursuing its course along the

coasts of the former and of England, it rules the tides as far south as the Thames, making the tour of Great Britain in 18 hours. On entering the North Sea, on the north of Scotland, the tidal wave does not exceed 12 feet; but gradually – increases to 14, 16, 18 and in the Humber to 20 feet ; a differ¬ ence of height depending on the figure, of the shore, the form of the bottom and the direction of incidence of the wave. Three other currents enter the North Sea — the Polar, the Baltic and the Mediterranean currents. The fisheries are the most productive of the world and are spe¬ cially valuable on the Dogger Bank, on all the shores that bound it, and in the direction of the Orkney and Shetland Isles. Among import¬ ant rivers draining into it are the Thames, Hum- her and Forth, the Elbe, Weser, Ems, Rhine, Meuse and Scheldt. The Kaiser Wilhelm Canal affords an entrance into the Baltic with¬ out going round Jutland. The North Sea has been" from the earliest times one of the most important highways of the world. Consult Mackinder, (Britain and the British Seas)

(1902).

NORTH SMITHFIELD, R. I., town in Providence County, six miles from Woonsocket,, on the New York, New Haven and Hartford Railroad. The chief industry is bleaching. Pop.

2,699.

NORTH STAR, in astronomy, the north polar star, of the constellation Ursa Minor, also called Polaris. See Ursa Major.

NORTH STAR, ORDER OF. See Or¬

ders and Decorations of Honor.

NORTH SYDNEY, Canada, town and port of entry, Cape Breton Island and County, province of Nova Scotia, on the northern side of Sydney Harbor, five miles north-northwest of Sydney, and on the Intercolonial Railroad. Coal is mined in large quantities and there are large shipping interests besides some smaller manufactures. It is the general shipping point for farm products and general merchandise going into Newfoundland. Steamers also con¬ nect with Saint Lawrence River ports and Char¬ lottetown, a ferry with Sydney, and the Sydney mines with electric railroad. Besides the pub¬ lic schools, Saint Joseph's Academy (Catholic) is located there. The town was first settled in 1792 by Loyalists. Pop. 5,418.

NORTH TARRYTOWN, N. Y., village in Westchester County, 26 miles north of New York on the east bank of the Hudson River and on the New York Central and Hudson River Railroad. It joins Tarrytown and is near Sleepy Hollow, made famous by Washington Irving's Negend of Sleepy Hollow. The Old Dutch Church, erected in 1699, still holds its congregation. In the Sleepy Hollow Cemetery are the graves of Washington Irving, Paul Leicester Ford, Carl Schurz and many repre¬ sentatives of old Knickerbocker families. North Tarrytown manufactures silk and automobiles. Pop. (1920) 5,927.*

NORTH TONAWANDA, ton-a-won'da, N. Y., city in Niagara County, at the conflu¬ ence of Niagara River and Tonawanda Creek, on the Erie Canal and on the New York Cen¬ tral, the Erie and the Lehigh Valley railroads, opposite Tonawanda, and five miles above Buf¬ falo. Several other railroads, using leased tracks, and electric lines connect the city with Buffalo, Niagara Falls and other places. North Tonawanda is in an agricultural region, but the city is noted for its manufacturing and commer¬ cial interests. It has large lumber yards, and the chief manufactures are steam pumps, merry- go-rounds, pig iron, bolts, nuts, structural steel, concrete blocks, gasoline motors, automatic organs, steam radiators, pumps, motor boats, toy railroads, steam piping and a variety of lumber products. The industries represent an invested capital of $10,000,000, and an annual product worth $12,000,000. The public library has about 6,000 volumes. The charter of 1897 provides that the government shall be vested in a mayor, who holds office two years, and a council con¬ sisting of two members from each ward, and three at large. The city owns and operates the waterworks. Pop. (1920) 15,482.

NORTH VANCOUVER, Canada, city in British Columbia, on the north shore of Bur- rard Inlet and opposite the city of Vancouver, to which it is connected 'by ferry, bridge and railroad. A fine boulevard, 150 feet wide, sur¬ rounds the city. The magnificent scenery and the fine drives attract manv tourists. Nearby are Grouse Mountain (4,350 feet), the Crown (5,600 feet) and the Lions f6,500 feet). The industrial establishments include shipbuilding, doors, ashes, awnings, furniture and cigar fac¬ tories and numerous lumber mills. Pop. 8,200.

NORTH VERNON, Ind., city and county- seat of Jennings County, 65 miles southeast of Indianapolis and 21 miles southeast of Colum¬ bus, on the Baltimore and Ohio Southwestern, the Pittsburgh, Cincinnati, Chicago and Saint Louis and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. It is situated in a fine agricultural district. North Vernon pos¬ sesses an electric-light plant and waterworks, flour mills, lumber mills and factories pro¬ ducing glass-chimneys, lawn swings, snokes and wood brackets. Pop (1920) 3,084.

NORTH YAKIMA, Wash, city and county-seat of Yakima County, 157 miles south¬ east of Seattle, on the Northern Pacific, the Yakima Valley Traction and the Oregon-Wash- ington Railroad and Navigation systems. It is situated on the Yakima River in a rich agri¬ cultural and fruit-growing region. The indus¬ tries are chiefly livestock, dairy-farms, fruit

canneries, flour, saw and lumber mills and cold- storage houses. The town has a Carnegie Li¬ brary, a fine hospital, Federal and high-school buildings. The commission form of govern¬ ment has been adopted. Pop 18,539.

NORTHAMPTON, north-ampton, Eng¬ land, a parliamentary and county borough, capi¬ tal of the county of the same name, 66 miles northwest of London by rail, on the left bank of the Nen, and on the London and North¬ western and Midland railroads. The _ prin¬ cipal buildings are the town hall, the shire or county hall, the county and borough jails, corn exchange, barracks, infirmary, theatre, etc. There are a free library, museum, schools of science and art, grammar school, founded in 1552; mechanics' institute, an . athenaeum and other literary and artistic societies.. The benev¬ olent institutions include the infirmary, a lunatic asylum, the Royal Victoria Dispensary, Saint John's and Thomas-a-Becket hospitals, etc. The principal churches are All Saints', founded in 1160, destroyed in the great fire of 1675 and) rebuilt by Wren in 1680; Saint Peter's, restored in 1850; Saint Giles', Saint Sepulchre's, dating from the 12th century, and one of the four round churches in England, and the Roman Catholic Cathedral. The staple manufacture is boots and shoes for home and export trade, which employs thousands of hands. The curing of leather is also carried on on a large scale. The races held on a race course north of the town attract great numbers of visitors. Besides two weekly markets there are 11 annual fairs. Northampton, known in Saxon times, was in possession of the Danes from 921 and appears in Domesday Book as Northane- ton. It was the meeting place of several par¬ liaments; and here the treaty of Northampton was signed in 1328, guaranteeing, the independ¬ ence of Scotland. In the vicinitv Henry VI was defeated in battle by the Yorkists and taken prisoner (10 July 1460). The city was held for the parliament during the Great Civil War. There are interesting Romano-British remains. Consult Adkins, Northampton in English History) (London 1898) ; Campion, Northampton with its Surroundings (North¬ ampton 1907) ; and the Victoria County His¬ tory. Pop. 90,064.*

NORTHAMPTON, Mass., city, county- seat of Hampshire County, on the Connecticut River and on the New York, New Haven and Hartford and the Boston and Maine railroads, 18 miles north of Springfield, 109 miles west of Boston and about 140 miles from New York City. The largest part of the city is known as the (

works, hosiery mills, sewing-machine and' fur¬ niture factories, machine shops, pulp mills, emery wheel works and foundries. There are about 3,000 employees in the manufactories. The trade is principally in the manufactured articles and farm products. It has. a number of fine buildings and prominent institutions, among which are the Dickinson Hospital, the State Asylum for the Insane (700 patients), and the opera house. The last . mentioned, a gift from a native of the city, is owned and managed by the municipality. There are a number of fine church buildings, dhe educa¬ tional institutions are Smith College (q.v.) ; the Burnham Classical School for Girls; the Clarke Institute for Deaf-Mutes, endowed by John Clarke ; public and parish schools; three public libraries, gifts of natives of North¬ ampton, and the "Home Culture Club,-0 founded by George W. Cable (q.v.), and assisted by a gift of $50,000 from Andrew Carnegie. The educational advantages of this club have been of great benefit to a large number of men and women; unique features are the instructions in household arts and amusements. The three national banks have a combined capital of $650,000, and the three savings banks have a total deposit of $4,975,000. The Cl Smith Char¬ ities® has peculiar features that. make it a most remarkable and beneficent institution. It was founded by the will of a public benefactor, who desired to aid a special class of worthy persons. On certain conditions young men and women and widows receive annual gifts of money, young women receive gifts when they marry and young men, who learn a trade, receive a certain sum of money when they at¬ tain the age of 21. The charter of 1883 pro¬ vides for a board of aldermen and a council of 21 members elected annually by the people The board of education and the trustees of the Forbes Library are chosen by popular vote. The city owns and operates the waterworks and also its own Municipal Theatre. It is a most healthful community and has aˆ live and energetic board of trade. Pop. 21,951. Con¬ sult Trumbull, (History of Northamptonˆ

NORTHBRIDGE, Mass., town in Wor¬ cester County, on the Mumford and the Black- stone rivers and on the New York, New Haven and Hartford Railroad, about 10 miles south¬ east of Worcester. It was settled in 1662 and remained a part of Mendon until 1772 when it was1 incorporated1 as a separate town. It has a public library and a hospital. Its chief manu¬ facturing establishments are large cotton and woolen mills, machine shops, cotton-mill ma¬ chine works, furniture and cigar factories, em¬ bossed paper, silk mills, etc. The government is administered by annual town meetings. 1 he Whitin Machine Works own and operate tie town's waterworks. Pop. (1920) 10,174.

NORTHBROOK, Earl of. See Baring,

Thomas George.

NORTHBROOK, 1st Baron. See Bar¬ ing, Sir Francis Thornhill.

NORTHCLIFFE, 1st Baron (Alfred Charles William Harmsworth) English journalist and newspaper proprietor: b. Chapel- izod, county Dublin, Ireland, 15 July < >■ He established in 1888 a highly successful weekly, Answers, which he still nominally con¬ tinues to edit; in 1894 he acquired the London

Evening News,' and in 1896 he founded the Daily Mail, the first half-penny morning news¬ paper to achieve a distinctive success in Lng- land and in which American methods were freely borrowed. Journals of the same kind were established by him in other populous cen¬ tres. In 1908 he secured control of the London Times, his most ambitious venture, and from that time he exercised, by means of his power¬ ful syndicate of newspapers, a strong influence on the public life of the country. After the outbreak of the European War he showed him¬ self a keen critic of the British War Office and its methods. In especial, the attacks on Loid Kitchener that were made by his journals in May 1915 aroused widespread resentment which had an immediately adverse effect on his cir¬ culations, and he was accused of endeavoring to assume a dictatorship. But it is not to be denied that his criticisms were fruitful of re¬ sults — in the formation of a Coalition Ministry and the creation of a Ministry of Munitions; in the general enforcement of compulsory service in England and Scotland; and in an improved British aviation service ; and that the strictures passed at the inception of the Allied campaign in Gallipoli were borne out by events. Lord Northcliffe's interests are wide and varied; he equipped' the Arctic Expedition of 1894 un¬ der F. G. Jackson; he is an authority on motor¬ ing and has done much to advance the science of aviation in the United Kingdom. He- has visited the United States on several occasions; in 1900 he was given charge for one day of a New York daily and produced it as a quarto, the form he considers newspapers should adopt. He was created a baronet in 1904 and was raised to the peerage as Baron Northchffe m 1905. In 1918 he came to the United States on a special mission connected with the Euro¬ pean War.

NORTHCOTE, north'kdte, James, English artist: b. Plymouth, England, 22 Oct. 1746; d. London, 13 Tuly 1831. He early showed a taste for drawing and was encouraged to go to London, where he arrived (1771) with a letter of introduction to Sir Joshua Reynolds, under whom he worked for five years. He visited Italy in 1777, where he spent his time in copying the old masters, especially Titian. He returned to London in 1780, and six

years later ex¬ hibited his first historical work, (The Young Princes Murdered in the Tower. > He was

elected an academician in 1787. Between 17<_J and 1831 he exhibited no less than 229 historical paintings, taking subjects from English history or Shakespeare; these are chiefly remarkable for highly effective composition. The faces are Greek, the costumes absurd, the chiaroscuro fantastic and exaggerated, and the coloring in¬ harmonious. His greatest skill is shown as an animal painter. His portraits are uneven, but those of men are better than those of women, while some of his children's and angels faces are beautiful. This will be seen from his 'Por¬ trait of Sir Simon Taylor > ; (A Dog and a Hawkˆ; 'Prince Arthur and Hubert ; hour Infant Angels in the Clouds. } He painted al¬ together some 2,000 works. He was the author of a somewhat commonplace memoir of Sir [oshua Reynolds (1813) and a Life of Titian (1830). Consult Gwynn, Stephen, (Memorials of an 18th Century Painter > (1898).

NORTHCOTE, Sir Stafford Henry, 1st

*Earl of Iddesleigh, English statesman: b. Lon¬ don, 27 Oct. 1818; d. there, *12 Jan. 1887. He was educated at Eton and at Balliol College, Oxford, became private secretary to Gladstone in 1843; was called to the bar in 1847, and in 1851 succeeded his grandfather in the baronetcy. He sat in Parliament in 1855 for Dudley, in 1858 was elected member for Stamford, and in 1866 for North Devon, which he represented till 1885. In 1862 he published (Twenty Years of Financial Policy. } In 1866 he became president of the Board of Trade; and 1867-78 was secre¬ tary for India. He was chairman of the Hud¬ son's Bay Company 1869-74, and during the crit¬ ical period of the company's transfer of Prince Rupert Land to the Canadian government visited Canada in its interests. In 1871 he was a member of the high joint commission which arranged the Treaty of Washington; and in 1874-80 was chancellor of the exchequer in the Cabinet of Disraeli. After the Liberals returned to power in 1880 he became Conservative leader in the Commons and as such assisted in effect¬ ing the compromise on the Franchise Bill of 1874. In 1885 he was practically superseded to make way for Lord Randolph Churchill, and in the short Salisbury administration of that year was appointed to the nominal office of first lord of the treasury and raised to the peerage. In the second Salisbury government (1886), he held the office of foreign secretary. Consult his published (Letters and Essays) (1887) ; Lang, 'Life, Letters and Diaries of Stafford Northcote) (1890).*

NORTHEAST, Pa., borough in Erie County, 14 miles northeast of Erie on the New York Central, Lake Shore and Michigan South¬ ern and New York, Chicago and Saint Louis railroads. A Roman Catholic College (Saint Mary's) is situated here. The town has munic¬ ipal waterworks. Fruit growing is the chief industry; but there are manufactures of grape- juice, canned goods, wines, wooden novelties, baskets, crates, flour, lumber, foundry products and copper. Pop. (1920) 3,481.

NORTHEAST BOUNDARY. See

Boundaries of the United States.

NORTHEAST BOUNDARY DISPUTE,

the disagreement between the United States and Great Britain from 1783 to 1842 respecting the northeast frontier. The Treaty of 1783 defined the northeast boundary of the United States, toward Canada, as extending from the source of the Saint Croix due north to the highlands or watershed between the Atlantic and Saint Law¬ rence systems, thence along those highlands to the northwesternmost head of the Connecticut River. Disputes arising over this definition, an arbitration treaty was signed in 1827, and in 1831 the King of the Netherlands, as arbitrator, made an award to which the American Senate withheld assent. Fresh negotiations were un¬ dertaken; friction took place in the disputed territory culminating in the (

It was reckoned, however, that in value the area awarded to the United States was equal to four- fifths of the whole. Consult Mr. James White's contribution in (Canada and Its Provinces (Vol. VIII, pp. 779-826; Toronto 1914). See Boundaries of the United States.*

NORTHEAST CAPE. See Chelyuskin, Cape.

NORTHEAST PASSAGE. See Arctic

Regions ; Polar Research.

NORTHEN, ndr'ten, Adolph, German painter: b. Munden, Prussia, 6 Nov. 1828; d. Diisseldorf, 28 May 1876. He was a pupil in the Diisseldorf Academy from 1847 to 1851, when he devoted himself to the delineation of soldier life and battle scenes. In 1852 he began a series of pictures illustrating the wars of Napoleon I. These included (The Battle of Waterloo) (1855) ; and (The Retreat of the Grand Army. To these he added scenes from the war with Denmark, and from the German- Austrian war 1866. His series portraying the last Franco-Prussian war includes (The Storm¬ ing of Weinberg) ; {The Transport of French Prisoners * ; and (The Charge of the 16th Uhlan on a Square.**

NORTHER. See Cold Wave.

NORTHERN BAPTISTS, the name given to describe the members of the Baptist denomi¬ nation who live in the northern part of the United States to distinguish them from the Southern Baptists dwelling in the Southern States. The Northern Baptist Convention, a semi-official body, organized in 1907, administers their various activities, such as missions, etc.

NORTHERN BEAR, in international poli¬ tics, a name often applied to Russia.

NORTHERN BOUNDARY. See Bound¬ aries of the United States.

NORTHERN DRIFT, in geology, an ob¬ solete name for the boulder-clay of the Pleisto¬ cene Period. The deposits were popularly sup¬ posed to have been brought by the polar cur¬ rents from the far North.

NORTHERN GIANT, a name applied

formerly in Europe to Russia, alluding to its size, growth and population.

NORTHERN LIGHTS. See Aurora Borealis.

NORTHERN MYTHOLOGY. See My¬

thology.

NORTHERN SECURITIES CASE, an

important case decided by the United States Supreme Court in 1903. The Northern Securi¬ ties Company was a corporation organized to take over the stock and the control of the Northern Pacific and the Great Northern rail¬ way companies. The question brought before the Supreme Court under the Sherman Anti¬ trust Law of 1890 was whether the transaction constituted a ˆcontract combination — or con¬ spiracy in restraint of interstate or foreign trade or commerce.® (Northern Securities Company v. United States, 193 U. S. 197). The combination was declared to be illegal. The constitutionality of the Act was then ques¬ tioned; but the court decided that Congress had the power to enact it; and the Northern Securities Company was enjoined from exer¬ cising any rights of ownership or control in or

over the stock of the two subsidiary companies. Consult Canfield, (The

Northern Securities De¬ cision and the Sherman Anti-Trust AcD (in Columbia Law Review, Vol. IV, New York 1904) ; Meyer, B. H., (History of the Northern Securities Case- (Madison 1906) ; and Coudert,*

F. R., (Certainty and Justice > (New York 1913).

NORTHERN TERRITORY. See Aus¬ tralia.

NORTHFIELD, Mass., in Franklin County, one of the oldest towns in the Connecticut Val¬ ley. Its early history is connected with the French and Indian wars, and it is the most northern town in Massachusetts, located on both sides of the Connecticut River, midway between Greenfield, Mass., and Brattleboro, Vt., and on the Central Vermont Railroad. The town is in an agricultural region and contains some of the very best land in the Connecticut Valley. Its broad macadamized main street over two miles in length, with its four rows of beautiful large elm trees, set out in 1815 by Thomas Power, are the admiration of all visitors. It is famous as a centre of religious training. It is the birth¬ place of Dwight Lyman Moody and was his home and the scene of much of his work. The annual conferences of Christian workers and of students are held here during the summer. The Young Ladies Seminary, founded by D. L. Moody in 1879, is located here and the Mount Hermon School for boys, # founded in 1881, in the adjacent town of Gill is connected with the Northfield educational work. The government is administered by town meetings. Its popula¬ tion 1,781, not including the seminary students.

NORTHFIELD, Minn., city in Rice County, on the Cannon River, and on the Chi¬ cago Great Western and the Chicago, Minneapo¬ lis and Saint Paul and Rock Island railroads; also on the Dan Patch Electric Line. It was settled in 1856 and in 1875 was chartered as a city It is situated in an exceedingly fertile agricultural section in which dairying is the principal industry. It is the largest Holstein- Friesian cattle community in the country. It is the seat of Carleton College opened in 1866 by the Congregational Church but non-sectarian in teaching, an institution of 50 teachers, over 500 students and $1,200,000 endowment It is the home of Saint Olaf College founded in 1875 under the auspices of the United Lutheran Church, cind now hs.s over 600 students. Other educational institutions are the Scoville library, the Carnegie library, the Goodsell observatory and one of the best high schools in the State. It has the Odd Fellows Home, a community building, nine fine churches, electric power, gas, municipal waterworks and public baths. North- field was settled in 1856 and is governed under a city charter of 1875 which provides for a mayor, elected biennially, and a unicameral council. Pop. (excluding students) 4,023.

NORTHFIELD, Vt., town, including a village of the same name, in Washington County, on the Dog River, and on the Central Vermont Railroad, about nine miles south by west of Montpelier. It is in a valley surrounded by low hills and mountains. Bald and I aine mountains are near. It contains the Carnegie and Brown libraries, a monument to Governor Paine and a soldiers' monument. In the vicinity

are black slate and granite quarries. The chief industries are connected with the quarrying of granite and slate, and with farm and daily products. It has flour and lumber mills and hosiery and woolen factories. It is the seat of the Norwich University, established in 1819 and opened in 1834. The village owns and operates the electric-light plant. Pop. 1,916.

NORTHFIELD CONFERENCES AND SUMMER SCHOOLS, a series of meetings for Christian workers established at East North- field, Mass., in 1882, by the evangelist, Dwight L. Moody (1837-99), a native of that town. The first meeting was a student conference in 1886. This conference has assembled once a year ever since that date. The object is to in¬ terest students from various colleges in activi¬ ties of religious endeavor, particularly missions. The General Conference of Christian Workers has met here annually ever since 1888. Other annual gatherings include the Sunday ˆSchool Workers Conference, the Young Women s Con¬ ference, the Home Mission School and the For¬ eign Missionary School. Associated with the work is the Mount Hermon School which gives courses in Bible study during the summer.

NORTHINGTON, nor'fhing-ton, Robert Henley, 1st Earl of, English statesman: b. about 1708; d. Grange, England, 14 Jan. 1772 He was educated at Oxford; in 1733 was called to the bar and in 1747-57 sat in Parliament for Bath. In 1756 he was appointed Attorney-Gen¬ eral and in the next year became Lord Keeper of the Great Seal (the last to hold that office) and took his seat as speaker of the House of Lords, over which he presided for three years. In 1761 he was made Lord Chancellor and owing to ill-health resigned in 1767. First attached to the Leicester House party, he became one of the "King's friends.®

NORTHMEN. See Normans.

NORTHROP, nor'thrup, Birdsey Grant, American educator and clergyman : b. Kent, Conn., 18 July 1817; d. Clinton, Conn., 28 April 1898. He was graduated at Yale in 1841 ; and from its divinity school in 1845; and was sub¬ sequently a pastor of a Congregational church at Saxonsville, Mass., for 10 years. He was agent of the Massachusetts State Board of Education and secretary of the Board of Edu¬ cation of Connecticut 1857-67 and in the latter office was partly instrumental in the introduc¬ tion of free and

compulsory education. He introduced the observance of Arbor Day in schools and was considered as the "father of Village Improvement Societies.® In 1872 he was invited by the Japanese government to es¬ tablish a system of public education in Japan. Although he declined the honor, he rendered such valuable service to that country that he was received as the guest of the Japanese na¬ tion.

NORTHROP, Cyrus, American educator: b. Ridgefield, Conn., 30 Sept. 1834. He was graduated at Yale in 1857, from its law school in 1859 and was admitted to the bar m 1860. He was clerk of the Connecticut house of rep¬ resentatives in 1862 and of its senate in 1863. He became editor of the New Haven Palladium in 1863 and in 1863-84 was professor of rhetoric and English literature at Yale. From 1869-81 he was collector of the port of New Haven;

president University of Minnesota 1884-1911, and since president emeritus. '

NORTHROP, Harry Pinckney, American Roman Catholic bishop: b. Charleston, S. C., 5 May 1842; d'. 7 June 1916. He was gradu¬ ated at Mount Saint Mary's College, Emmits- burg, Md., in 1860, studied four years in the theological seminary there and at the American College in Rome, and was ordained to the priesthood in 1865. He held' several pastorates in his native city and elsewhere, and was con¬ secrated in 1882 as vicar apostolic of North Carolina. In 1883 he was transferred by papal brief to the see of Charleston.

NORTHUMBERLAND, nor-thum'ber- land, John Dudley, Duke of, English states¬ man : b. England, 1502; d. London, 22 Aug. 1553. During the war with France 1544-45 he com¬ manded the English squadron, accompanied Hertford in his invasion of Scotland and later was one of the executors of the will of Henry VIII. In 1547 he took a decisive part in the battle of Pinkie and suppressed Ket's rebellion in 1549. He schemed against Somerset, the Protector, and in 1550 was the dominant influ¬ ence in the council and the chief instrument in his condemnation and execution. The next year he was created Duke of Northumberland, lord high steward and earl marshal. Then am¬ bition overleaped itself. Plis fourth son, Lord Guilford Dudley, married Lady Jane Grey in May 1553 and the duke persuaded Edward VI to name her as his successor, thus setting aside the Princesses Mary and Elizabeth. Through Northumberland's influence she was placed on the throne 10 July, but the scheme miscarried and he was

executed for high treason. He was the ablest general of his time, adopted the Reformation that he might pillage the religious houses and recanted on the scaffold.

NORTHUMBERLAND, Robert de Mow¬ bray, Earl of, English warrior: d. about 1125. He was a son of Roger de Montbrai, a follower of William the Conqueror, and was made Earl of Northumberland some time not far from 1080. He was constantly engaged in feudal quarrels in the course of which he burned Bath and ravaged Wiltshire ; and when Malcom, king of Scots, invaded England for a second time in 1093 he was met and slain by Mowbray at Alnwick. He raised an insurrection in 1095 and endeavored to wrest from the Conqueror's sons the crown and give it to their cousin, Count Stephen of Aumale. At first successful, he was finally forced to retreat to his great castle of Bamborough, where, after a stout re¬ sistance, he was finally taken, and though re¬ ports conflict, it is reasonably certain that the remaining 30 or more years of his life were spent in prison. He founded the priory at Tyne¬ mouth.

NORTHUMBERLAND, Earls of. See

Percy.

NORTHUMBERLAND, 7th Duke of, Henry George Percy: b. 1846; d. 14 May 1918.

He was educated at Oxford University, served in the army (volunteers) and sat in the House of Commons for 17 years before he succeeded to the dukedom in 1899. Of great wealth and numerous titles, he filled a number of public offices — as a magistrate, a Fellow of the Royal Society and president of the Royal Institution;

a trustee of the British Museum and treasurer of Queen Victoria's household. As lord high steward he carried Saint Edward's crown at the coronation of King George in 1911. His sons won high distinctions in the army during the Egyptian, South African and European wars.

NORTHUMBERLAND, England, a mari¬ time county bordering on Scotland and on the North Sea; fifth in size of English counties; area, 2,018 square miles. The county-seat is Newcastle-upon-Tyne, and other large towns are Wallsend and Tynemouth. The surface is diversified with hill, moorland and valley, gradually rising from the coast to the Cheviot range, and its principal river is the Tyne. Beans, wheat and barley are the principal crops ; shorthorns and Cheviot sheep are largely raised. Coal and iron mining and their supplemental indhstries place Northumberland high among the most productive counties of England. It is celebrated for its

archaeological remains, Ha¬ drian's Wall crossing the county in the direction of Solway. Consult histories by Bates (1895) ; Hodgson (1820-40: a recognized authority); and that published in 10 volumes by Reid of Newcastle (1893—1914) ; Gibson, (Renowned Castles, Churches and Antiquities (1848-54) ; and Bruce, (The Roman WalP (1874).*

NORTHUMBERLAND, Pa., town in Northumberland County, 54 miles north of Harrisburg, on the Susquehanna River and on the Pennsylvania, the Philadelphia and Reading and the Delaware, Lackawanna and Western railroads. The town is beautifully situated in picturesque mountain scenery and is a popular summer resort. _ Two large bridges span the river at this point. In the vicinity are mineral springs and large deposits of iron ore and lime¬ stone. The town manufactures nails, hats and caps, coffins and silk, and has flour mills, plan¬ ing mills, iron works, forge works and exten¬ sive freight yards with machine shops and other buildings constructed by the Pennsylvania Rail¬ road Company. Pop. 3,517.

NORTHUMBRIA, England, an ancient Anglo-Saxon kingdom, one of the Heptarchy, which extended from the Humber to the Forth and included Lancaster and Cumberland, and was bounded on the west by the kingdoms of Strathclyde and Cumbria. The kingdom was founded by Ida, an Anglican chief, who invaded the country in 547. On the death of Ida in 560 part of it was incorporated in the kingdom of Deira, which occupied also what is now Yorkshire. Bernicia and Deira were united un¬ der Ethel f rith in 593. It was Christianized under Edwin (617-33) and his successor, Saint Oswald (d. 642). In 792 it was ravaged by the Danes. While it became subordinate to Wessex in 827, under King Egbert, it was not until after the Norman Conquest that the king¬ dom really became an integral part of England.

NORTHWEST BOUNDARY. See

Boundaries of the United States.

NORTHWEST BOUNDARY DIS¬ PUTE, the disagreement between the United States and Great Britain from 1814 to 1846, respecting the northwest frontier. The terri¬ tory bounded north by lat. 54° 40', east

by the Rocky Mountains, south by lat. 42°, and west by the Pacific Ocean, had been claimed.

at various times and to various extents by Russia, Spain, Great Britain and

the United States. The Russian claim, which rested mainly upon occupation by fur traders, was settled by a treaty 11 Jan. 1825. Under this treaty the United States were to make no settlements north of lat. 54° 40', and Russia none south of that latitude. Great Britain and Russia agreed upon the same terms. The Spanish claims were confined south of lat. 42° by the treaty which ceded Florida in 1819. Great Britain had little or no claim by discovery. The United States claim rested upon the voyage of Gray up the Columbia River in 1792 and the explorations of Lewis and Clark through the Rocky Mountains and through the Oregon country in 1805-06, under the ordprs of Jef¬ ferson. By the treaty of 20 Oct. 1818 the whole territory west of the Rocky Mountains was to be opened to both countries for 10 years and, in 1827, the joint occupation for an indefinite period was agreed upon. Later this produced dissatisfaction and, after considerable negotia¬ tion, Great Britain was induced in 1846 to accept lat. 49° as the boundary from the Rocky Mountains to the channel between Van¬ couver Island and the mainland. See Bound¬ aries of the United States; Alaskan Bound¬ ary Commission.

NORTHWEST COMPANY, The. An

organization, chiefly of Scottish-Canadian trad¬ ers, formed in 1783 as a rival in the fur trade of the Hudson's Bay Company, which since 1670 had enjoyed by oharter a monopoly of trade in Prince Rupert's Land. This company absorbed one of its rivals, the X-Y Company, in 1795'; performed a great work in the ex¬ ploration of the Pacific slope; decided in 1805 to extend its posts to the mouth of the Colum¬ bia, and built several forts south of lat. 49° but was forestalled at the mouth of the Colum¬ bia by the founding of Astoria in 1811 by the Pacific Fur Company, established by John Jacob Astor, which company it absorbed in 1813. It strongly opposed the Selkirk settlement on the Red River — an opposition which culminated in the Seven Oaks affray in 1816; and in 1821 it was incorporated by the Hudson's Bay Com¬ pany.

NORTHWEST FRONTIER PROV¬ INCE, India. A political and administrative province of British India, constituted in 1901, out of part of the province of the Punjab. It is bounded on the north by the Hindu Kush, on the south 'by Baluchistan, on the east by Kashmir and the Punjab and on the west by Afghanistan. It has an area of 38,665 square miles; but only 13,193 square miles are British territory, the remainder being inhabited by tribes under the political control of the agent to the governor-general of India. These moun¬ tain regions came under the suzerainty of the British government during the latest Afghan War; and it was the attempt, on the part of the conservative administration of Great Brit¬ ain, to separate these tribes from the quasi¬ authority of the Amir of Kabul, and to bring them under the power of Great Britain, which led to the

Afghan War of 1878.

Pathans from the greater part of the popu¬ lation and are the dominant class. About 92 per cent of the people are Mohammedans of the Sunni sect; 65 per cent are engaged in agriculture and 14 per cent in industry.

The capital of the province is the ancient city of Peshawar (q.v.), the residence of the chief commissioner. There are deputy com¬ missioners at Peshawar, Abbotabad, Kohat and Dera Ismail Khan. Outside the native city of Peshawar there is a large military cantonment and there are outlying stations of English and native troops. There is railway communication from India to Peshawar, crossing the river Indus at Attok, and running to the entrance of the Khyber Pass. There is also a railroad to Kohat, and to Dera Ismail Khan.

The Peshawar Valley is watered by the Ka¬ bul River, which empties itself into the Indus at Attok; and the Derajat Valley is drained by the Kuram and the Gambila rivers. On the left bank of the Kabul River is the district of Yusuf zai, inhabited by an Afghan people speaking the Afghan language. Nearly all the invading armies of northern India have passed through the Peshawar Valley. In this valley there are interesting and important Buddhist remains. The most notable of these are at Takh-i-Bhai, a short distance from Murdan, and the Gurkhatri in the centre of the city of Peshawar. The valley is said to have been fre¬ quently visited by Gautama, the founder of Buddhism. It is notoriously unhealthful and is designated by the British soldier ((the valley of death." The temperature ranges from a mini¬ mum of 17° in February to a maximum of 137° in July. The rainfall varies from 17 to 25 inches. There are two rainy seasons, the mon¬ soon and winter ; two harvest seasons, spring and autumn, wheat being the chief product of the spring and millet of the autumn harvest. The principal agricultural products of the prov¬ ince are wheat, millet, jawar, cotton, rice and indigo. The Peshawar Valley is especially cele¬ brated for its rice. The poppy plant is exten¬ sively grown in the Darajat. The cultivation of the land mainly depends upon artificial irriga¬ tion. Rock salt is the principal mineral prod¬ uct. Pop. of British territory 2,196,933.

NORTHWEST PASSAGE. See Arctic

Regions; Polar Research.

NORTHWEST PROVINCES, India, un¬ til 1901 the designation of a political division now the United Provinces of Agra and Oudh (q.v.).

NORTHWEST TERRITORIES, Can¬ ada, the general name first given to the great areas of British North America lying north¬ west of the watershed of the Saint Lawrence River. The boundaries have been gradually circumscribed by the creation of the provinces of Manitoba, Saskatchewan and Alberta and the Yukon territory and by successive exten¬ sions of the provincial boundaries. The most recent boundary extension act, that of 1912, en¬ larged the provinces of Manitoba, Ontario and Quebec by areas formerly included in the terri¬ tories. Manitoba received an accession of 178,100 square miles, Ontario 146,000 square miles, and by the addition of Ungava and that part of Labrador which is included in the Do¬ minion of Canada, Quebec acquired 354,961 square miles of additional territory. The Northwest Territories now comprise the old provisional districts of Mackenzie, Franklin and Keewatin, lying north of the provinces of Al¬ berta, Saskatchewan and Manitoba, extending to the Arctic Ocean and including the islands

therein as far north as land has been discov¬ ered. The area is estimated at 1,242,224 square miles, of which 34,298 square miles are water ; and the population of this vast area, which is decreasing, is about 10,500, of which 5,100 are Indians, 2,600 Eskimos and the remainder chiefly half-breeds. The territories form mainly an undulating plain or tableland, and all the shores overlook tidal waters. The principal lakes are the Great Bear and Great Slave lakes, respectively, 11,800 and 11,700 square miles in area. The Mackenzie River has a total length of 2,525 miles, and with its tributa¬ ries drains an area of 682,000 square miles ; the second river, the Dubawnt, is 875 miles in length. The climate varies greatly according to location from temperate to arctic. In the western part the vegetation is similar to that of the Prairie provinces; but north and north¬ east the vegetation becomes stunted, and about half the total area of the territories is com¬ posed of great treeless plains known as the Barren Lands. In the Mackenzie Valley gar¬ den vegetables are successfully raised, and the soil is well adapted for oats and barley. Ani¬ mal life varies as it passes from the Canadian through the Hudsonian to the Arctic Zone, and includes moose, beavers, bears, caribou, white wolf and seals. Fish, which are very abun¬ dant, form the staple food of the inhabitants, and include whitefish, the most valuable fish food of the north. Gold was first attempted to be worked by Sir Martin Frobisher in 1576, and it is known that veins exist; copper is abundant, and coal occurs in large quantity in the southwestern part of the territories. The seat of government is Ottawa, and it is under the jurisdiction of the commissioner of the Royal Northwest Mounted Police.

Consult Tyrrell, J. B., (The Northwest Territories) (in (Canada and Its Provinces, Vol. XXII, 1914).*

NORTHWEST TERRITORY, United States, the name given by the Continental Con¬ gress of America, in 1787, to a region east of the Mississippi, north of the Ohio, south and west of the Great Lakes and west of Pennsyl¬ vania. The greater part of this territory be¬ longed to France prior to 1763, when, by treaty, Great Britain became possessor of all the do¬ main east of the Mississippi, in North America, which had been claimed by France. The terri¬ tory west of the Alleghany Mountains and north of the Ohio River was, in 1774, annexed to the province of Quebec. By the treaty of peace with Great Britain, at the close of the Revolu¬ tionary War, in 1783, this region was ceded to the United States. Its area was about 265,878 square miles and it bordered on all the great interior waterways of North America which had been explored; the Saint Lawrence River, because a part of the Great Lakes, not excluded. The exact status of this territory was a subject of dispute for several years, on account of the conflicting claims of ownership of New York, Virginia, Connecticut and Massachusetts. The States mentioned cited in support of their claims various early grants from the Crown and conquests of Indian tribes. The original Colonial charter usually gave definite north, east and south boundaries but that of the west was often the sea, the South Sea, the ocean, etc., which was interpreted as Pacific Ocean. Ihe other States of the Union refused to recog¬

nize the claims based on charters and acts as cited, but held that the lands in question should belong to the whole Union and should be ad¬ ministered for the common good. Congress in session, in 1780, gave a pledge to the Union that if the States claiming this western territory should cede it to the Confederation it should be used for the good of all the States, and should, in due time and.under proper conditions, be admitted as States of the Union, with equal rights and privileges with the original States. New York was the first to cede her claims, in 1781; three years later Virginia ceded her claims, except a section north of the Ohio River (now the southern part of the State of Ohio) called for some time the ((Virginia Mili¬ tary District.® In 1785 Massachusetts gave up her claims, and in 1786 Connecticut ceded all except a strip extending from the Pennsylvania boundary westward 120 miles, comprising about 6,000 square miles and called the ((Western Re¬ serve® (q.v.). Connecticut retained jurisdiction over this territory until 1800. A tract of 500,000 acres, in the western part of the ((Western Re¬ serve,® was donated by Connecticut as ((Fire Lands® to be divided as directed among such of its citizens as had been damaged by incursions of the British troops during the Revolutionary War. On 13 July 1787 the ((Northwest Terri¬ tory® was established by the Continental Con¬ gress. The ordinance was prepared by the chairman of

the committee, Nathan Dane of Massachusetts. This ordinance provided for the enactment of certain rules deemed neces¬ sary for the public good, the chief provisions of which were (1) that not less than three nor more than five States should be formed out of the <(Northwest Territory® ; (2) that slavery should be prohibited forever within its borders; (3) that religious freedom should be wholly and entirely established and maintained ; (4) that schools and means of education should be forever encouraged; (5) that the writ of habeas corpus and trial by jury should be guaranteed to all its inhabitants. A form of government was provided for and the territory was divided. It was further provided that when any one of the divisions had a population of 60,000 it might be admitted into the Union as a State. Certain conditions of admission were exacted in accordance with the Ordinance of 1787. The Continental Congress which estab¬ lished the ((Northwest Territory® and so wisely provided for its admission into the Union had its last roll-call 10 Oct. 1788.

The new Congress confirmed the ordinance relating to this Territory. At first the govern¬ ment was administered by means of a governor, secretary and three judges appointed by Con¬ gress, who governed the whole as one district. The governor and judges sitting together had power to make and execute , such laws as they deemed needful for the district, -subject to the approval of .Congress, until such time as the Territory would have a legislature of its own. Provision was made for a legislature when there were in the Territory 5,000 free male in¬ habitants of full age to be voters. This legis¬ lature was to consist of a legislative council of five members, chosen by Congress, and a house of representatives chosen by male inhabitants who were freeholders. The first governor of the Northwest Territory, Arthur St. Clair, was

appointed October 1787. He arrived at Mari¬ etta, the capital, July 1788. His first official act was the founding of Washington County. He appointed magistrates, established courts, ar¬ ranged for defense against the Indians and in every way sought to promote the advancement of the country. The first legislature of the Ter¬ ritory met 24 Sept. 1799. The house of repre¬ sentatives had 22 members, representatives of the nine counties of the whole Territory. In May 1800, upon petition, Congress divided the Northwest Territory into two territorial gov¬ ernments, the boundary between which was a line extending from the mouth of the Kentucky River north to Canada. The portion east of this line was called ((Territory Northwest of the River Ohio,® and its capital was Chillicothe. The portion west of this line was called ((Indi- ana Territory,® and the capital was

Vincennes. William Henry Harrison was first governor of the ((Indiana Territory.® Virginia completed her articles of cession 1 March 1784. On that same day Jefferson, as chairman of a com¬ mittee, proposed a plan which was adopted by Congress 23 April 1784. The territory was to be divided into States, each State two de¬ grees wide and the lines to be intersected by two meridians, one passing through the falls of the Ohio and the other through the mouth of Kanawha River. The States were to be named Chersonesus, Assenisipia, Sylvania, Pelisipia, Illinoia, Polyptoamis, Washington, Mesopo¬ tamia and Michigania. Slavery or involuntary servitude were to be allowed only as a punish¬ ment for crime. The plan never went into effect and was superseded by the Ordinance of 1787, whereby the Northwest Territory was established as mentioned. In 1785, the year Massachusetts yielded her claims, Congress pro¬ vided for a survey of the lands in dispute. Ohio, the first State formed out of the North¬ west Territory, was admitted in 1803 and was the 17th State of the Union. Michigan Terri¬ tory was created January 1805 and William Hull was first governor. It was admitted as a State in 1837. Illinois Territory was organ¬ ized in 1809; Kaskaskia was the capital. It was admitted as a State on 3 Dec. 1818. Indiana was admitted as a State in 1816. A part of Michigan Territory was in 1836 organized as the Territory of Wisconsin. It became a State in 1837. A part of the Territory of Wisconsin is now the eastern part of Minnesota.

Consult Hinsdale, B. A., (The Old North¬ west (2d ed., New York 1889) ; McCarthy, D. G., territorial Governors of the Old North¬ west (Iowa City 1910) ; Merriam, J. M., on the legislative History of the Northwest Ordi-nance} (in (Proceedings > of American Anti¬ quarian Society, April 1888) ; Moore, C., the Northwest under Three Flags (New York*

1900).

NORTHWESTERN COLLEGE, a co¬ educational institution in Naperville, Ill., founded by the Evangelical Association in 1861. Its faculty comprises 27 professors and instruc¬ tors and there are nearly 500 students. The library contained about 11,000 volumes; the grounds and buildings are valued at $235,000; the amount of productive funds $238,700; the income, about $43,500. The number of gradu¬ ates is more than 600.

NORTHWESTERN UNIVERSITY, Ill.,

chartered under the auspices of the Methodist Episcopal Church, in 1851, and first opened in 1855. The first department organized was the collegiate department ; the present organization includes (1) the College of Liberal

Arts; (2) the Medical School; (3) the Law School; (4) the School of Pharmacy ; (5) the Dental School ; and (6) the School of Music; the college and the School of Music are at Evanston, Ill., and the professional schools in the city of Chicago. The university also maintains three secondary schools, namely, the academy at Evanston, Grand Prairie Seminary at Onarga, Ill., and Elgin Academy at Elgin, Ill. The Garrett Biblical Institute, a theological school under separate management, is located on the college campus, and is in close co-operation with the university; the Norwegian-Danish Theological School and the Swedish Theological Seminary are affiliated with the institute. The work of the College of Liberal Arts is mainly elective, the courses be¬ ing arranged for major work in one department and minor work in another; the degrees of A.B. and B.S. are conferred; the corresponding mas¬ ter's degrees and the degree of doctor of phi¬ losophy are conferred for graduate work. The government is by a board of 36 trustees elected by the board, to which are added eight chosen by Church conferences. Women are admitted, and dormitories on the campus are provided for their use. The campus contains about 75 acres of ground, on the shores of Lake Michigan ; the buildings include the old college, the first building erected, University Hall, the Fayer-weather Hall of Science, the gymnasium, the observatory and the library. The professional schools occupy their own buildings in Chicago, the law school, school of pharmacy, and dental school being in Northwestern University Build¬ ing at the corner of Lake and Dearborn streets, and the medical school having two buildings on Dearborn street, between 24th and 25th streets. There is a large athletic field, and the athletic affairs of the university are under the management of a committee of 15, 5 from the faculty, 5 from the alumni and 5 from the students. The Students' Debating Society is affiliated with the Central Debating League, in¬ cluding the students' societies, of the universities of Michigan, Chicago and Minnesota ; and with the Northern Oratorical League, including soci¬ eties from the universities of Michigan, Wis¬ consin, Iowa, Chicago, Minnesota and Oberlin College. The college library contains over 50,000 volumes, besides 35,000 pamphlets, and the professional schools have also special libra¬ ries. In 1917 the productive funds amounted to $5,200,000, and the annual income was close to $900,000 ; number of students in attendance, 5,200; number of professors and instructors, about 500.

NORTHWICH, England, town in Chester, at the confluence of the Weaver and Dane, 16 miles northeast of Chester and 172 miles north¬ west of London, on the London and North¬ western Railway. It is noted for its salt mines and brine springs which have been worked from prehistoric times. Northwich is still the centre of the principal production of salt in Great Britain. Both rock salt and white salt obtained by evaporation from brine are exported. The white salt produced here is sent chiefly to

Amcnca. The annual product amounts to about 1,500,000 tons. The Marston Mine, 300 feet deep, is very picturesque with its vault sup¬ ported by enormous salt pillars. Owing to the pumping of brine for the manufacture of salt and alkali, the town has caved in at many places. Some of the houses have sunk or stand at fantastic angles. In 1892 a portion of High street which had sunk had to be raised six feet. Boats are built here to convey salt to Liverpool down the river Weaver which is connected by a hydraulic lift a mile from the town with the Trent and Mersey Canal at a higher level. The chemical works at Northwich are among the largest in the world. Other industries include manufactures of bricks, iron, brass, leather, fur, tanneries and. iron foundries. The prin¬ cipal buildings are the church of Saint Helen, Witton, with a finely curved roof of the 17th century and a market-house. A museum and a library were presented to the town bv Sir John Brunner in 1887. In the same year Robert Verdin gave Verdin Park to Northwich. Pop. 18,1 cl.

NORTON, nor'ton, Andrews, American Unitarian theologian : b. Hingham, Mass., 31 Dec. 1786; d. Newport, R. I., 18 Sept. 1852. He was graduated at Harvard in 1804, and after studying theology was a tutor in Bowdoin Col¬ lege in 1809. He returned to Harvard in 1811 as mathematical tutor there ; and became in 1813 librarian of the university and lecturer on Bibli¬ cal criticism and interpretation. In 1819-30 he was Dexter professor of sacred literature. He was among the most eminent exponents of Uni-tariamsm, equally strong in his protests against Calvinism and the naturalistic theology repre¬ sented by Theodore Parker. He published treasons for not Believing the Doctrines of £PnitTanans) 0833; new ed., with memoir by W. Newell, 1856; 11th ed., 1876); 'The Gen¬ uineness of the Gospels) (1837-44) • 'The Latest Form of Infidelity > (1839). In 1833 with Charles Folsom he inaugurated the Select J ournal of Foreign Periodical Literature (4 vols., 1833-34). For his verse consult Griswold Poets and Poetry of America) (Philadelphia

1842) .

NORTON, Caroline Elizabeth Sarah Sheridan, English poet and novelist: b. Lon¬ don ,1808; d. there, 15 March 1877. A grand¬ daughter of Richard Brinsley Sheridan and a sister of Lady Dufferin, she showed her talent at 13 with Her differences with her husband were not then ended, for he claimed not only the custody of her children but the income from her writings. She wrote 'English Laws for Women in the Nineteenth Century, > a pamphlet which con¬ tributed to the change of English laws as to the

status of women. Two weeks before her death Mrs. Norton was married to Sir William Stirling-Maxwell. A supposed episode in which she, Melbourne and Barnes of the Times

figured was made the basis of Meredith's 'Diana of the Crossways5; but the novelist in his latest editions warns his readers that the story <(is to be read as fiction.55 Her principal works are (The Sorrows of Rosalie5 (1829) a Byromc poem;

NORTON, Charles Eliot, American

scholar: b. Cambridge, Mass., 16 Nov. 1827; d. there, 21 Oct. 1908. He was a son of Andrews Norton (q.v.) and after he was graduated from Harvard in 1840 was in the employ of a Bos¬ ton establishment jn the India trade. Except a voyage to India in 1849 and various trips to Euiope his life was passed in the house where he was born. During the Civil War period he edited the papers of the Loyal Publication So- C1.ety and W5th h5S friend, J. R. Lowell, edited the North American Revieiv 1864-68. From 1875 to 1898 he was professor of the history of art at Harvard, becoming professor emeritus in the year last named. As a Harvard professor he exercised a salutary influence over succes- si\e generations of collegians before whom he has placed the highest ideas. The young men were helped by him to quicker perception of what culture really is as well as to discrimina¬ tive discernment between true and false culture ke|Ween# thoughtful, intelligent citizenship, and the noisy, puppyish assertion that so often passes itself off as patriotism. Few Americans have been sterner critics than he of whatever in American life falls below an ideal standard, and as a consequence few men, not professedly politicians, have been the target for so much adverse, comment as was Professor Norton, stigmatized often as unpatriotic he rose to a much higher level of patriotism than his critics. He enjoyed the friendship of many of the fore¬ most personages of his time and was the literary executor of such men as Lowell, Carlyle Emerson, Curtis and Ruskin. He was the fore¬ most of American Dante scholars and was the founder of the American Dante Society, as well °l ii Arch*°l°gical Institute of America, ot which he was the president for many years. His published books include 'Considerations on Some Recent Social Theories5 (1853) • 'The New Life of Dante5 (1859, a partial translation with essays, followed by a complete transla*

ˆteS °-£ ,Travel and Stlldy in Italy5 • ˆHr?forical Study of Church Building m the Middle Ages 5 (188°);

nomf10a F?QnTy °f Gray as a Naturalist5 0903) ; 'Longfellow5 (1907); 'A History of Ancient Art,5 lectures of Norton's edited by Brown and Mhggm (1891). He also edited I he Early Letters of Thomas Carlyle5

(1886) • Letters of James Russell Lowell5 (1894) • Letters of Ruskin to C. E. Norton5 (1904) Consult Emerson and Harris, 'C. E. Norton5 (Boston 1912) and Norton, Sara, and De Wolfe Howe M. A. 'Letters of Charles Eliot Norton ˆ913) Blographlcal Comment5 (2 vols., Boston

NORTON, Frank Henry, American jour¬ nalist: b. Hingham, Mass., 20 March 1836. He was connected with the Astor Library in New York (1855-65) as assistant librarian and assist¬ ant superintendent, and entering journalism in 1872 was editor and owner of the New York Era 1879-81, and from 1883 to 1891 on the staff of the New York Herald. Besides such dra¬ matic burlesques, etc., as (Alhambra, } (Cupid and Psyche, > he has written Wife of Alexander H. Stephens } (1883) ; (The Malachite Cross > (1894) ; (Historical Register of the Centennial ExpositioiP (1876), and historical Register of the Paris Exposition (1878) ; (Daniel Boone* (1883). He was one of the founders and for several years served as president of the Ameri¬ can Numismatic and Archaeological Society, etc.*

NORTON, John, American colonial clergy¬ man : b. Shortford, Hertfordshire, England, 6 May 1606; d. Boston, Mass., 5 April 1663. He was educated at Cambridge University, entered the ministry and in 1635 left England and came to Boston. He was pastor at Ipswich in 1636- 52; then he succeeded John Cotton as col¬ league of John Wilson in the pastorate of the First Church of Boston. In this charge his in¬ fluence steadily increased and his opinions came to be sought by officials of both church and state. He was still in this position when the colonies decided to send their petition to Charles II in 1662, and was selected to accompany General Bradstreet; though the petition was nominally granted and Norton had without doubt per¬ formed his delicate task with fidelity, the colonies were dissatisfied with the results and henceforward his popularity waned. This change in public feeling was without doubt the cause of his death in the following year. He wrote (Responsio ad Totam Questionum Syl- logen) ; (The Orthodox Evangelist (1654); (The Heart of New England Rent by the Blas¬ phemies of the Present Generation (1660), etc.*

NORTON, Lillian. See Nordica, Lillian.

NORTON, Richard, American archaeologist and educator : b. Dresden, Germany, 9 Feb. 1872. He is the son of Charles Eliot Norton and was graduated from Harvard in 1892, after which he studied in Germany and at the Ameri¬ can School of Classical Studies in Athens, Greece. From

1899 to 1907 he was director of the American School of Classical Studies in Rome. In 1903 he visited central Asia in pur¬ suit of archaeological study, and in 1910-11 he was director of the excavations made at Cyrene under the auspices of the Archaeological Insti¬ tute of America and the Boston Museum of Fine Arts. In 1914 he organized and became commander of the American Volunteer Ambu¬ lance Corps and served with the French army. He is the author of (Bernini and Other Studies in the History of Art) (New York 1914).

NORTON, Sidney Augustus, American chemist: b. Bloomfield, Ohio, 11 Jan. 1835; d. 30 Aug. 1918. He was graduated from Union College, Schenectady, N. Y., in 1856 and from Miami Medical College in Cincinnati 1867, in which latter institution he was professor of chemistry 1867-72. In 1873 he became professor of chemistry and from 1899 was professor emeritus at the Ohio State University. He published 'Elements of Natural Philosophy)

*(1870) ; (Essays and Notes) (1874) ; (Elements of Physics * (1875) ; (Elements of Inorganic Chemistry) (1878) ; 'Organic Chemistry* (1884), etc.*

NORTON, Thomas, English dramatist and lawyer: b. Bedfordshire, England, 1532; d. England, 1584. He became private secretary to Somerset, was afterward counsel for the Sta¬ tioners' Company and the Merchant Tailors' Company. Pie was elected to Parliament in 1558 where his eloquence soon gave him a com¬ manding position in debate. He was a persecu¬ tor of the Catholics. His views on the epis¬ copacy brought him into trouble and he was imprisoned in the Tower for treason. He col¬ laborated with Sackville in writing 'The Trage- die of Gorboduc) (1560-61) which was the first English blank-verse tragedy.

NORTON, Thomas Herbert, American chemist and consular officer: b. Rushford, N. Y., 30 June 1851. He was graduated from Hamil¬ ton College, Clinton, N. Y., in 1873 and after¬ ward studied at Heidelberg. From 1878 to 1883 he was manager of important chemical works in Paris, France, and was professor of chemis¬ try in the University of Cincinnati 1883-1900. In May 1900 he was appointed to establish the United States consulate at Kharput, Turkey, was made consul at Smyrna in 1905 and at Chemnitz, Saxony, in the following year, re¬ maining until 1914. He compiled for the De¬ partment of Commerce important reports on the chemical industries of Europe. Since 1915 he has been detailed as special agent to investigate the chemical industries, especially dyestuffs, for the Department of Commerce. He has pub¬ lished (Dyestuffs for American Textile and Other Industries) (1915) ; 'Dyestuff Situation in the United States) (1915) ; (Potash from Kelp (1915).*

NORTON, Mass., town in Bristol County, 30 miles south of Boston and eight miles north¬ west of Taunton, on the New York, New Haven and Hartford Railroad. The Wheaton Female Seminary is situated here, and a public library is maintained. The town manufactures paper and wooden boxes and jewelry and has bleaching-works and a wool-combing plant. Pop. 2,544.

NORTON SOUND, an arm of Bering Sea indenting the west shore of Alaska. It is about 200 miles long and 175 miles wide from Cape Nome to Cape Dyer. The Yukon is the largest river flowing into the sound; a number of short streams enter from the north. The coast is irreg¬ ular; the largest indentations are Golofnin and Norton bays and Golofnin Sound. A number of islands are along the coast; the largest are in the eastern part of the sound. Nome (q.v.) is the most important city on the coast. Captain Cook discovered Norton Sound in 1778.

NORUMBEGA, nd-rum-be'ga, a name given by the early explorers to various parts of the eastern coast of North America, also to a river and to a mythical Indian city. In 1539 the name was applied to the whole coast from Cape Breton to Florida, but this seems to have been on the authority of an anonymous narra¬ tive called 'Dieppe Captain. The map of Verrazano's voyage, published in 1529, locates Aranbega on the coast of New England; Mer¬ cator's map, published in 1541, locates Anorum-*

bega near the Hudson River; Gastaldi's map, 1556, locates Norumbega near Cape Breton. Other accounts mention Norumbega as a large river, brackish near the mouth ; and still others picture it as a city with high towers and sub¬ stantial houses. The rivers mentioned are sup¬ posed to have been Penobscot, Connecticut or Hudson. Champlain, in 1605, applied the name to Maine, and also to the Penobscot River. Humphrey Gilbert (q.v.) in 1583 began an ex¬ ploration of the beautiful country of Norum¬ bega, and so convinced was he of its existence that he took with him a poet to sing its praises. A map of 1582 makes Penobscot River a strait connecting the Saint Lawrence with the ocean at the mouth of the Penobscot. The country between was called Norombega. The origin of the word has been attributed to many languages ; as an Indian word meaning ((still waters®; a Spanish word meaning ˆfields55; a Norse word, Norvegr, meaning Norway, etc. In 1889 Professor Horsford caused the erection of a memorial tower at the confluence of the Charles River and Stony Brook, near Watertown, Mass., in memory of Norumbega, a Norse city which once existed here. Considerable research has been given to the matter, and some

historians claim to have reasonable proof of the origin and location of what by many is considered a mythi¬ cal city or a name applied by different ex¬ plorers to different rivers and locations on the coast between Cape Breton and Florida. Con¬ sult Fiske, John, (Dutch and Quaker Colonies in America) (Boston 1899) ; Horsford, E. B., de¬ fenses of Norumbega5 (ib. 1891) ; and dis¬ covery of Ancient City of Norumbega5 ; Beau- vois, da Norambegue5 (Brussels 1880) ; Win- sor, Justin, (Narrative and Critical History of America5. (Boston 1884) ; De Roo, P., distory of America before Columbus5 (2 vols., New York 1900).

NORVAL, nor'val, Young, son of Lady Randolph and her first husband, Sir Malcolm Douglas, in Homes' tragedy, douglas5 (1757). He is reared in obscurity and his identity is re¬ vealed to Lady Randolph only after he has saved the life of his stepfather. Glenalvon, the latter's heir, jealous of Norval, incites Lord Randolph's jealousy against him and a duel ensues in which Glenalvon is killed and Norval dies immediately after, whereupon Lady Ran¬ dolph flings herself from a precipice. The part was much favored by both Kemble and Mac- ready.

NORWALK, Conn., city, Fairfield County, on Long Island Sound, and on the New York, New Haven and Hartford Railroad, about 40 miles northeast of New York; area, 25 square miles. Norwalk was consolidated by a major¬ ity, vote of the people in 1913, under one city, which includes South Norwalk, East Norwalk, West Norwalk, Rowayton, Broad River, Silver- mine and Winnipauk. It has nine banks, four national banks, two trust companies, each with a savings department, and three savings banks ; the annual weekly payroll to industrial workers alone is $105,000 (1915). The chief industrial establishments are hat factories, corset, paper, shoe, silk, shirt, underwear, automobile, rubber factories, ladies' waists, air compressors, build¬ ers' hardware, etc. Oyster culture is exten¬ sively carried on, the Norwalk oyster being famous the world over. It is a fine residential

city, excellent schools. Norwalk was settled in 1649 and received a town charter in 1651. During the Revolutionary War, on 11 Nov. 1779, it was burned by British and Hessians. Pop. 27,743. Consult Selleck, C. M., (Norwalk5 (Norwalk 1896).

NORWALK, Ohio, city, county-seat of, Huron County, on the Wheeling and Lake Erie (main line, and also Huron branch), New York Central Railway and Cleveland and South Western Electric railroads and the Lake Shore Electric, about 56 miles west by south of Cleve¬ land and 14 miles south of Lake Erie. Huron County is one of the 10 counties which com¬ posed the ((Western Reserve55 or the (

7,858.

NORWAY (Norwegian Norge; Swedish Norridge or Norrike, signifying North King¬ dom), the western kingdom of the Scandinavian Peninsula in the north of Europe. Norway is bounded on the northeast by Russian Lapland, east by Sweden, and on all other sides by the sea, the Arctic Ocean being on the north, the Atlantic and the North Sea on the northwest and west and the Skager-Rack on the south. From the Naze on the south, to a point adjoin¬ ing the North Cape, the length southwest to northeast is about 1,080 miles; greatest breadth, measured nearly in the parallel of 60°, about i-75 miles, area, 124,130 square miles. For ad¬ ministrative purposes Norway is divided into

1

70'

2

3

65'

4

5

60'

6

7

55

8

.r0t3Q TRWANDSHOIOE/ 3

NORWAY and

SWEDEN

*ˆFn-f-ngnev, S**V7j/a ruldtˆL M 0*

| / -a" ,-f 'C HRISTIRNIft

aM !/

.tsonto

Skˆ|‘TanT;en cˆs)]

ˆ rs /\v, b V»Y LianYVkvNrv

A’Sˆdvlki

Slcep.endej

■UtT»nj

“StWa siV/ˆvaV*

Statute Uliles, 97 = 1 Jncli.

:o too i

ˆSTORSTENS

❖ JU

^^“Lier ,

,a ill/,, – .

T/

JN. TtVAL Ojjˆo]

BipnasoJˆOˆ RiNtfvlSSoˆ jr. Kaorviko ifi

iHa*gged’aL

• IN. ken

Laiifjordy

vananpeaˆ

Rand, MoNally & Co.’s New 11 X 14 Map of Sweden and Norway. Copyright by Rand McNally & Co.

A’ord rente n_

WiMMi1 1

^^Oskarshorgl f A l W Drobak . J. A as A

jilioptad

‘Sevieni

ˆKloven;

Sbrreist

rPX- enVikAn) .$ > (!

Balsfjordˆf-ˆ ” ˆ0 A Maalylven

rˆ’|jOr0vrebygdˆn~ ‘Sal Apen J_ Vf A

y* \s*leeil A ft (a.

Anderisfi

A N DO f > verbergj

XOFOTEN t-MS*.

Okenesˆ

I*anoo > ˆ‘j

BLANDS nS

., IIadbelo’cS OsTVAAtlOf’CIk VcSTy»Ao5ifˆS%W

y Av,estby; HvitstenJˆi

illarstadˆ’ > addTjprd A £

.((HblljlSl

j.Hestad <

B.ierko

Aaalel

Lango

f-Iolihcsframi:

:“Ihykjv .‘V£-A\

kEBNEKAISSE’Hd*

gpSgteLl

: ^=-c f”<

ekˆkkq^^. i

ilonftbut*’

», Mo*KE.Va

Moskexq

VˆEROˆ

Rost

Uios/anavare

Karj? Johans VNfki’rkegA (§ M %Skoppunu

Hortei

.Vittam

Jvmopnunj

A as g aa i d s t r an d:>

lˆrstndy i/ˆfifesuClTilELMA

SaltJajcn SfT»”;.G,l”lilft..oVQulokJock leiereif ˆ

4i -v St – ˆ=-

*’!{”

‘Vac-mˆn A’v ‘ˆCvV

rffe .1 ˆTftrna il ‘yi f Jffu r Jon

\la\in.b«rg0t

Basto

ˆ ■'f N

Larkollen

’f/?rl|%5

ifaade

li’fcinneH

, Bod!

cal ten fiord Sandbornt Gildeskaai/’A,

\Tarendo

la in ne s’:

Ikasbyˆ

Niujmriiel* a«*a-ˆoS’

K\ 1 v

J 6c\k mock _sˆ –

SvantteU,

‘Tbrislieij

lColla’li

A-JTi-”””

Stokkej V‘i# I laslafi’/f’ SptQdJ 1

st j. ra

■odrikstrtd’

*’ A SO- jj Qˆ-” C

- Hestm a .xbo f) aXyS$ c$ >

T»jbxbsop,iidS.AM--- –

Hanko

Fulchuk

l. a „

vtoUs) VNˆ:

L ,A keder\ TorJ AederNˆ. Torneft AL I

Tomo

Ahtah opgiˆˆAefsek tMTTCˆˆ,.! . ’

SfˆS

.jArjeph’o ˆ

LˆV N b,

•a > VS tdtafven

Torgauten L. H.

‘Sandefjordr

r,:Hedruriv /

ASMˆLO1”

Elfsby

Store Fierder

,i]rum ~AJ_

Sfii .})

■ XelfjordeD)

“Brono,

Soraele’

.Malutraskˆyˆ /

Scale oe miles.

ˆBrrirmforj

ˆByske

:e\leftea

-i'if ^^H/nFattmojnackˆ

Fredriksvgern

R'^Bindale

F=SF6ldereid erei'd £0 *

CHRISTIANIA FJORD AND VICINITY

iBtutrnel

Hato;

Fosnes 5

Afrt Ign maj-Lt*;,'

lurtrisk

7/Namsog'

£2s feiˆfflNSsSˆU,

latangorV

'ofanger

sNyentr:

sOrmsjd_ 'h\ Doroieaˆl A|ele.

NBygdea jRatan .Safvar j

'N-]p AX0E6O

Fredrikˆ.

'RoRson

Umea

Ilbrjitfors

RlingV

^^^■-^”Levanb

TroEten >j\

Trehorningpjo^

Hittei

‘ULENnk,

V.unaeb

v^Grumlsunda,

^OrnBkbldBvik

>s» R^pele1 Lanpsele *

VlBrunflo

X 5:15. – g”T. .

fZ” fWSi

‘aSjfer •

VfT ‘ }.

1 .J[-| vj \ : #)s^2s

^Z-T^r ^-b^Tpnsetg’/^.V.’ ‘^>l

^fv^T^^alfe-5^E] vedalen\fr|

\hW ‘^V

RagunJi

fordingra

MH^fitel^eilesjby OUfors£ Brack e^

Tiicsr^^j’

’ Hemso Hernosand

(Sabra;

dnd*l «

‘

%ˆHafvttr m,Y tier’sˆ ‘ˆHogdnl

Run d» vail

,i._Jˆ*Galtstrbm o Gnarp feˆeTK*j°

Dˆllcn

jdTudiksvaTl YiAl Hornrlasld

Stode

”l,inseii\ˆ iTAOJAH’.ij/S 43,857 ft. “,

l nillKfeVllal

Ram8j‘o

‘ kf trJˆx-WˆT? ˆ —ˆN- SY ill (CJfeˆHERJEHOGNEN

v-fjc, >• H a» t.VMkaissr it«w

SpW 4 1 -A P U ‘1 -S. .%:-N jp

A %

& /iJv-‘Y % \ X ■

>\Xds. Aviifewcˆvstaisjfesjla < 'KJW‘>««V.<

- tht*

h’A ‘4i-r- W* 1°

fi ‘’^’^Oˆaevnakl?

\ Sipdak’l ‘/A,

A’iA Y* i /V.CBcnealcerl/ –

ˆ lj ‘ ‘ vˆ> ? rSk edun-i n? #

ˆr1

. . ■’ˆjDiVf-eu

-pbakˆ

ˆtammei

neborg-ˆ

Jerfsb tjForBa’5

■0ˆ30

Kilafors

[amra-

ˆEnanger

Boderliamn.

ˆLjusne

‘??.b&en\

AS’onrsundet

ˆHiUe

Nˆlofle

ˆn-pi fkarl.eby

Riittvik

Linghed

sfPGi

5 Field L U *100.6$ e Fjord ?

ˆYAppelb’

lorgˆker’

TNapˆˆ Husbyˆ S-ˆ, neforˆ /BatorA .

ad ° . i'-'Jtedemora'b

\ .. Ludvnca^-A^ ti7l> \an^ffHotk^, /

.'WTirVi

II b Mi:.'

Gy'sWe,

i^regrund # Sijgshamr^ N T^o riBBelbamn^pLL

*bltbatnrj^*

addo

<$ \ ^ J^orrtelge

Riifibokp^AAA]

jSigtuna ^^.FuruBund

h\Ja ArVaxli'olm

Hango

el j ord^j.^^ wf

V^ortepbZ

GUlberga; fi Silierud!

^yVOrebro

F ^yPeperforB' Luxa^r-

Otteruackei A8kerRttnd/

5TO o uw

^^oCCKatrinelmira V

^jv iVi g ,

[allee'taH. — 4r0xelos.und

WminrH^Rgl =^~ A ^_°^rkdsund

4 So’der£oping

linkopIngV®.

fy”^TaJdeinarsvik.

yChristinebarm Se’ffle A

, a ‘» r,K

•ww

Jypˆ Grebbeetndv in aL QuilJc |

Y fflenerJL.

fIppeVuˆ,‘iviade8.i

Vlfcllerudˆ -.ˆiS

Ha m in a i

Fernau

OESEL

jv Ui.-m

G0T8KA

Sando

AyidaOerg

LyeckiJV r. .MorlundˆJˆ Orust I. tjo, TJORN ‘L .Cfl:

Stens-

,.torp

Alin]

forass,

Kappelshai

Capojskagen

fThe SkawDfJ HjorrIn^^^> ^

F^erikshav^#

Tlngetado

y\?astervik

dcarsrum

? Skngen

*°TH E N BdRgr-'SStUa// Sr^*

I Kun^bao®3/rfCMX.

1 ^—jOrmevallan /kHolt

Vi'Spfcytyoii

■ Varber5iKoi?^n\y*

**?*■ AKlifnaredYV'*

'Y. Falkenberg^ lJjy/To'i

*, 'V- Getin^*

^ HaliustrtdjeA V

s-'V^ ^

JR k.'S. C&Pkfi&T'

/XL 10 Glim.

'Gofhetn

gothlaSb

'g, (jetergarn

Windau.

j V^onaL

SaTpr

fhulto [Fopeˆ lPopt 7 ˆ pˆ BhedNHogsbyj rdf4 >\8iffj06rri)nb r

mfjviPpaA'

Vaggeryd

> Klin

'Flgeholm "ˆ'hl A'dre

, /OBoda j,«

O.Urshamn

ˆMop/teras /K)ja

dcoyf ˆ/Blorgbolui Sundre

i8 I Hogstuw®

rTJ /oLASD (To Kalmar) .

■sun da

Batata

.oslagBkulla,

\V allenti

iemvigjAg

Kalmar*

'Miirbylanga , Sodra Mockelby ,/Ottenby

,i....iTJ

Rotcbroaˆ p^\

/of»ta_ Diunolm;

VVd pansAvJ

N vSolnaVy

'orsas

Silkeborg Jim “SkandcrlTy’rgi ‘ Horsens*

Rfngkjbbi®

Skjff™t3?C

Y axnol

A t) E Lsu iVa’A, Vs ˆ V-‘ I ‘rout V 1 inWl /)brt/ XI f y\ ˆ

I 4JN’A

KkrotnkT:

An.? V

r0.Dalby

ISvodala

? I Xalluncn YIC’

j\ borg V- ‘ ‘Rosk i 1 d oj*

Odenser-ˆsiapeUeˆˆˆ

b k/kn- K\ri;A ‘.

ˆ //Unqelavˆc A

!Uptafsb<

Vejleˆ

/redsrida

•folding

SimriBhamn

*JElfsjo SaltRiobj NV Erstavik*2 f tSnTrre.*

Sandhammai

?/ naele(.Rbnne

BORNHOLM

(To Denmark)

iamdb

Environs of STOCKHOLM

Statute Miles ,

insborgA

S^‘vfltt OEK I.

jobing ‘Falster I.

Kilometres

Longitude Eaat from Greenwich.

SWEDEN, PROVINCES (LANS)

1 Stockholm 13 Gothenburg & Bohus

2 L’psala

14 Elfsborg

.’} Sb’dermanland

15 Skaraborg

4 (jatergiitland

1(3 Verm land

5 Jonkoping

17 Orebro

6 Kronoberg

18 Veetmanland

7 Kalmar

19 Kopparberg

8 Gothland (Iel.)

20 Gefleborg

9 Blekingc

21 Vesternorriand

10 Chriptianstad

22 Jemtland

11 Malmohua

23 Vesterbotten

12 Halland

24 Norrbotten

NORWAY, PROVINCES (AMTS)

1 Sinaalenene

10 Stavanger

2 Aker eh us

11 S. Bergenhus

3 Hedemurken

12 N. Bergenhus

4 Christian

13 Romudal

5 Buakcrud

14 S. Trondhjem

6 Jarleberg & Laurvik

15 N. Trondhjem

7 Brat8berg

16 Nordland j

8 Nedenes

17 Tromso

9 Lister k Mandal

18 Finmark

.

■

six pr°vinces corresponding with the stifts, or subdivided into 20 bailiwicks pi • • ‘ The stif are Christiania, Hamar, Chnstiansand, Bergen, Trondhjem and Trom- so. Christiania is the capital.

Topography. — The coast consists for the most part of bold precipitous cliffs, and is re- markable. for the vast number of islands by which it is lined, and the bays or fjords which narrow, deep and winding, cut into it in all directions, providing an almost uninterrupted series of excellent natural harbors of refuge Many of these fjords are deeper than the sea outside which averages 200 fathoms; Sogne bjord, tor instance, is 2,820 feet deeper; Hard-

?”geX S°rd 930 ieet » and Vest and Nord fjoids 840 ieet. Some of these fjords pene¬ trate great distances inland and send off numer¬ ous branching arms. The Sogne Fjord cuts its way to the foot of the Jotun Fjeld, 106 miles tiom the ocean, and Ffardanger Fjord en¬ circling the Folgefond is 68 miles long; the Justedal lies between the Nord and Sogne tjords. These three are the most characteris- tic of the fjords and offer some of the most sublime and accessible scenery in Norway.*

,he surface generally is mountainous, partic- ulai ly in the west and north, the mountain masses, however, assuming the form of great plateaus or tablelands called fjelds, fields or fells, as the Ffardanger Fjeld, Dovre Fjeld, etc. the main range, the Kjolen or Kell Mountains from 3,000 to 6,000 feet high, runs parallel to the coast from the plateau of Finmark in the north to 63° in the south and then divides, as the backbone of the peninsula forming the boundary with Sweden. The highest summits belong to the Sogne Fjeld, a congeries of elevated masses, glaciers and snow fields in the centre of the south division of the kingdom, where rise Galdhoppingen 8,400 feet, the Glitre- tind 8,384 feet and Skagastolstind 7,879 feet. The line of perpetual snow ranges from 5,000 feet in the south to 3,000 feet in the north. In general the valleys are short and abrupt; and the streams, dashing down impetuously through rocky gorges, form numerous cascades. The leveler portions of plateau regions consist of dreary moors, covered in winter with snow and in summer with coarse grass and heather, stud- ded with numerous tarns and forest belts of c

Hydrography. — The short distance from the western slope to the western coast gives rise to a great number of minor streams, which pro¬ ceed dn ectly to the shore or the fjords. On the eastern slope the streams do not properlv assume the character of rivers till they have run a considerable part of their course in Sweden. The few important rivers of Norway have a southerly direction in accordance with the gen¬ eral slope aleady referred to, and discharge themselves into the Skager-Rack; of these the longest are the Glommen 350 miles, Drammen 163 miles, with its tributary the

Hallingdal 113 miles, Nummedal Laagen 143 miles, and Ot- teren 140 miles. Some of these streams in their lower courses expand into long narrow lakes of considerable size: Lake Mjosen is 60 miles long, and its bottom is 1,080 feet below

the level of the sea; others are Randsfjord (43 miles long), Tynfjord (19 miles), and Fsemund (3b miles long and 2,300 feet above sea-level).

he most important rivers in the north are the lana, which forms part of the boundary be¬ tween Russia and Norway, and falls into the Arctic Ocean; and the Namsen, which falls into the Atlantic.

Geology and Mineral Resources.— The

prevailing rocks of Norway are gneiss and mica-slate, of which all the loftier mountains are composed. Granite is of comparatively rare occurrence. On some of the plateaus blocks of conglomerate occupy a large part of the surface. Porphyry, argillaceous schist and limestone oc¬ cur, but in very limited quantities, and rocks of volcanic formation are rare. Almost all parts of the country bear traces of the grinding' ac- tion to which the structural rocks were sub¬ jected during the Glacial period. The minerals are numerous and abundant; the most important are iron, copper, silver and cobalt; others are nickel, feldspar and marble. For a century rWato about 1870 the copper and iron mines of Roros and the silver mines of Kongsberg yielded considerable outputs ; but have since de¬ clined.ˆ The principal mine is at Vigsnses on Karmo at the entrance to Bukken Fjord, which yields $300,000 worth of pyrites in the year. The total mineral output of Norway, iron pyrites, silver, copper, apatite, nickel', was valued at $10,736,180 in 1915, showing an in¬ crease over preceding years. The silver mined was valued at $270,000; copper at $2,039,440; iron pyrites at $4,672,200. Over 8,700 work people are employed in this occupation.

*. Climate. — Known as «The Land of the Mid- night Sun,** one-third of Norway lies within the frozen zone and the ereater part between the same degrees of latitude as Greenland. It would in all probability be still covered with a similar ice-cap to Greenland, as it was in the end of the Tertiary period, were its shores, west and north, not washed by the Gulf Stream. It is mainly owing to. this warm oceanic artery that Norway is habitable; its influence, to¬ gether with the direction of the parallel moun¬ tain rampart, the distribution of the atmospheric pressure and the presence of deep-sea banks off the coast, determines the predominant climatological features of the country. The isotherms do not run from west to east, but parallel to the coast. The harbors on the west are never blocked with ice ; while in places more inland, though much farther south, as at Chrisˆ tiama, this regularly happens. Hammerfest, for instance, on the north coast, in lat. 70° 40′ N*

has a winter mean of 22-6° F., 3° higher than Christiama, which has virtually an inland site, in lat. 59° 55′ N. In winter the west coast dis¬ tricts are the warmest, and the cold increases in intensity according to the distance inland; whereas in summer the reverse is the case' though altitude is then a more potent influenc¬ ing factor than in winter. The places that have the lowest winter mean (11.8°) are all inland, as Elverum and Roros (Roraas), near the Swedish frontier, Kautokeino (in southern Finmark), and Nyborg (at the head of Varan- ger Fjord) ; at all these places the mercurv has been known to freeze (— 40° F.). The places which have the highest summer temperature are Christiania, the southwest extremity of the country, the heads of the western fjords and

the interior of Finmark. The prevalent south¬ west winds bring considerable rainfall, 40 to 70 inches in the year, to the west coast of southern Norway. In the interior only 12 to 16 inches fall during the year.

Flora and Fauna. — In general the mountain slopes up to a certain height are clothed with magnificent pine forests, and at lower elevations the oak and the beech are by no means uncom¬ mon. In the loftier altitudes, below the snow line, willows, lichens and numerous wild ber¬ ries — cranberries, raspberries, bilberries and cloudberries — are found in summer. Among wild animals are the bear, wolf, lynx, fox, wild reindeer and lemming; buzzards, kestrels and owls prey on the smaller animals and birds; snipe, loom and teal abound in the lakes; lap¬ wings and plovers breed in the tarns; in win¬ ter the ptarmigan is plentiful, and the eagle, sparrowhawk, woodcock, raven and crow are common throughout the kingdom.

Forestry. — The forests cover about 26,300 square miles, of which 73 per cent are pine trees ; 4,000 square miles are under state control. The area of late years has greatly diminished, but trees are being systematically planted in several parts, especially in the southern and eastern parts of the country. The trees are cut down principally in winter and floated down the streams in early spring to the saw mills at their mouths. The saw mills, wood pulp and cellulose factories, give employment to about 12,000 peo¬ ple. The export of manufactured lumber in 1915 amounted to over $14,328,990, and of wood pulp over $16,457,064.

Fisheries. — The fisheries are of great value, and contribute mainly to the support of the in¬ habitants along the seaboard, from the Naze to the entrance of the White Sea. The fisher¬ ies are divided into three chief divisions — Lofoden, Romsdal and Finmark. They include cod, herring,

mackerel, salmon, shark, walrus, seal and lobster fisheries, the cod and herring fisheries being by far the most important. Over 100,000 persons are employed in the fisheries, and the annual total value of the products of the fisheries in 1916 exceeded $46 800,000, more than two-thirds of which was cod. The rivers and lakes abound with salmon and salmon- trout, and make Norway one of the best angling countries in the world.

Land Tenure, Agriculture, etc.— The farms are generally the property of those who culti¬ vate them, small proprietors being common in Norway. They often include a large stretch of mountain-pasture, perhaps 40 or 50 miles from the homestead, to which the cattle are sent for several months in summer. Among the crops cultivated for food the principal is barley, which ripens at 70° of latitude; rye is success¬ fully cultivated up to 69° ; oats to 68° ; but wheat not beyond 64°, and that only in the most favorable seasons. Another most val¬ uable crop is potatoes, grown with success even in Finmark. Some hemp and flax are also pro¬ duced, and in the southern part of the country some tobacco is grown. Fruit, too, particularly the apple, pear and cherry, is raised generally in all the lower localities of the south and the centre. The grain raised falls far short of the consumption. One of the most extensive and profitable branches of rural economy is the rearing of cattle, for which many parts of the country are well adapted. The breeds, however,

are inferior, but the milk of the cows is good and enters largely into the food of the inhabitants; and butter is produced in such quantities that there is a considerable export trade of that commodity. Sheep are less numerous than goats, and yield a coarse though abundant and warm wool ; swine are not viewed with much favor. The 'horses are vigorous and sure-footed, but of diminutive size; the ponies are among the best of their kind, and are often exported. Another domestic animal of great value is the reindeer, which forms the principal stock of the northern provinces.

Commerce. — The export trade is chiefly con¬ fined to raw produce. The principal items are timber, with wood-pulp and cellulose; fish, smoked and dry, with ice, fish-oil, etc. ; also copper ore, iron pyrites, lucifer matches, paper, etc. The chief imports are grain, bacon and other provisions, coals, textiles, wool, cotton, hemp, salt, sugar, . coffee, tobacco, wine, brandy, etc. This trade is chiefly concentrated in the towns of Bergen, Christiania and Trondhjem, though Drammen, Stavanger, Christiansand and Arendal likewise have a considerable share in the commerce of the country. During the lat¬ ter half of the 19th century the foreign com¬ merce of Norway more than quadrupled; in 1916 the exports amounted to over $256,966,580 and the imports to over $351,952,874.

Manufactures. — These have increased since the protective system adopted

by the non-re¬ newal of the customs treaty with Sweden in 1897. The purely industrial establishments are grouped mainly around Christiania. They num¬ ber 6,958 and employ 152,725 work people. Be¬ sides those already mentioned, the more import¬ ant are textile manufactures, machine shops, chemical factories, iron and metal works, brick¬ works, flour mills, tobacco factories, breweries and in a minor degree tanneries, distilleries and factories for matches, glass, oil (fish and vegetable) and paper.

Shipping and Navigation. — Norway's mer¬ cantile navy amounted in 1918 to 3,424 vessels (of which 2,761 were steamships), with an ag¬ gregate tonnage of 1,508,758. The Norwegians are among the busiest sea-carriers of the world. Shipbuilding and supplemental industries are carried on chiefly at Christiania in about 150 establishments employing over 3,000 men. The Norwegian ports were entered in 1916 by 9,430 vessels of 4,700,000 tons and cleared by 9,387 vessels of 4,734,208 tons.

Railways, Communications, etc. — In 1918 there were 2,007 miles of railroad, of which 1.- 719 miles were controlled by the state and the rest operated by private companies ; there were also 14,688 miles of telegraph and telephone lines, most of which also belong to the state, with 66,253 miles of wire. The national and communal roads had an aggregate length of over 15,000 miles; the principal means of com¬ munication, however, are steamboats.

Weights, Measures and Money.— The met¬ ric system (q.v.) of weights and measures was introduced in 1879 and became obligatory 1 July 1882. The unit of value is the krone, equal to 100 ore, comparative value 27 cents; the 20 kroner gold piece weighing 8.96 grams con¬ tains 8.0645 grams of fine gold, and the silver krone weighing 7.5 grams contains 6 grams of fine silver.

NORWAY

North Cape

Veblungsnaes and Romsdals Horn

NORWAY

NORWAY

Banking. — There are two state banks, the Bank of Norway — (

Government, etc. — Norway is a constitu¬ tional and hereditary monarchy, the royal suc¬ cession being in the direct male line in the order of primogeniture. If there is no male heir to the tihrone, the king may propose a suc¬ cessor to the Storthing (or Legislative Assem¬ bly), the assembly reserving the right to nom¬ inate another if it does not approve the king's choice. On 7 June 1905, Norway declared its union with Sweden dissolved, and an agreement to this effect was signed 26 Oct. 1905. Prince Charles of Denmark was elected king 18 Novem¬ ber, and accepted the crown as King Haakon VII 20 Nov. 1905. His wife, whom he married 22 July 1896, was Princess Maud, the third daughter of the late Edward VII of England. Their son, Prince Olav, Crown Prince, was born 2 July 1903.

The Constitution, or Grundlov, bearing originally date of 17 May 1814, and many times amended, vests the legislative power in the Storthing which represented the sovereign power of the people. The king has the veto power, which may be twice exercised on a measure; but if the same bill passes three Storthing which have been assembled by sepa¬ rate and subsequent elections, it becomes law without the royal approval. The king com¬ mands the army and navy, and makes all ap¬ pointments, but, except in a few cases, is not allowed to nominate any but Norwegians, to public offices under the Crown. He exercises his authority through a Council of State, com¬ posed of one Minister of State and at least seven Councillors, who may be present in the Storthing and take part in public . discussions without voting. Local government is exercised by a chief executive functionary called the Amtmaend in each of the 20 districts into which the country is divided.

The ordinary revenues of the Crown, as shown by the budget for the year ending 30 Tune 1918, were $64,844,000; extraordinary revenues, $49,881,520; total revenue, $114,725,- 520. The prospective expenditure, as listed in the budget of that time, including state railways, army, navy, post, telegraph, etc., church, arts and education, interest and redemption of pub¬ lic debts, etc., ordinary expenditures, $64,844,-

000; extraordinary expenditures, largely de¬ fense and scarcity measures, $69,881,520. For 1918-19 the budget provided for ordinary ex¬ penditure, $83,850,000; extraordinary, $15,537,-

374.

The most important fortresses of Norway are Oscarsborg and the new fortresses by Ag- denes, Bergen, Tonsberg and Cristiansand. The army of Norway is a national militia, somewhat resembling that of Switzerland. The navy consists of 4 war ships, 12 gunboats, 5 destroyers, 41 torpedo boats, some submarines and mine layers.

Ethnology. — The Norwegians are almost entirely of Scandinavian origin. They are about the middle height, light-haired and blue¬ eyed, sober and thrifty, honest and industrious, and where not devoted to a rural life have a strong passion for the sea, and make excellent sailors. The Finns or Lapons dwelling in Nordland, and more specially in Finmark, bear little resemblance to the Norwegians oroper. The Qvaens, though dwelling in the same locali¬ ties with the Finns, are very easily distinguished from them both by physical features and habits.

Population. — In 1910 the population was 2,391,782; males, 1,555,673; females, 1,236,109. Illegitimacy is somewhat high, averaging 8.5 per cent of the births. The Laps numbered 18,590, and Finns 7,172. The population is more rural than urban, only about one-sixth living in the towns. Emigration has decreased com¬ pared to former years, the number in 1916 be¬ ing 5,212, of whom 4,865 came to the United States. From 1900 to 1910 the population of Norway increased 'by 151,750.

Education. — Primary education is compul¬ sory, and is conducted on a national system, according to which gratuitous elementary in¬ struction is placed within the reach of all. The schools, designated by the name of almue skoler, or people's schools, are stationed in all towns and parishes. In the country the instruction is only elementary; in the schools themselves an important distinction is made, some being what is called fast skoler, or stationary schools, and others omgangs skoler, or ambulatory schools. The latter, as their name implies, shift about at certain periods of the year, from place to place in the more thinly-peopled districts ; and thus have the effect of bringing education to those who, but for this arrangement, would be doomed to live without it. Towns possess, in addi¬ tion to these people's schools, what are called middle schools, middle and royal schools, burgher schools, Latin or learned schools, in all of which superior instruction is given; there are also four cathedral schools, one each in the towns of Christiania, Bergen, Trondhjem and Christiansand. At the head of all the educational establishments is the Royal Fred¬ erick University of Christiania, with five facul¬ ties, 63 professors and an average annual at¬ tendance of 1,550 students.

Religion. — The great body of the people are Protestants of the Lutheran confession. Though no express law prohibited other re¬ ligious bodies from meeting for public worship, the popular feeling was for long so decidedly opposed to it that a law, permitting them so to meet, and form regular congregations under their own pastors, was passed for the first time in 1845. Recently there were 62,553 dissenters, including 10,986 Methodists, 7,659 Baptists,

2,046 Roman Catholics. The country is divided into six bishoprics (stifts), corresponding in name and extent with the administrative prov¬ inces, and into 902 parishes. With exception of the cathedral of Trondhjem, founded 1180 or 1183 A.D., and a few other churches which are stone edifices, the churches in Norway are gen¬ erally built of wood. Many of them are very ancient structures, dating as far back as the 11th and. 12th centuries.

Judiciary.— Norway is divided into 107 dis¬ tricts for the administration of civil justice. Of these districts each with an inferior court, 26 are urban, and the rest rural courts, each with one chief, and two other judges, and a Hoiesteret, or Supreme Court for the whole kingdom, consisting of a president and a mini¬ mum of six other judges.. In each town and district there is a Forligelseskommission, or court of mediation, consisting of two men chosen by the electors, before which civil cases are generally first brought.

History. — In the earliest times Norway was divided among petty kings or chiefs (jarls), and its people were notorious for their piratical habits (see Normans). Harold Fair Hair, who ruled from 863 to 933, succeeded in bring¬ ing the whole country under his sway, and was succeeded by his son Erick. He was ultimately driven from the throne, which was seized in 938 by his brother, Hako I, who had embraced Christianity in England. Magnus the Good, the son of Saint Olaf and Alfhild, an English lady of noble birth, was called to the throne in 1036; and having in 1042 succeeded also to the throne of Denmark, united both under one monarchy. (See Denmark). After his death the crowns of Norway and Denmark again passed to different individuals. In 1319 the crown of Norway and Sweden became for a short time united in the person of Magnus V. Erick of Pomerania succeeded, by separate titles, to Nor¬ way, Sweden and Denmark; and in 1397 was crowned king of the three kingdoms. Sweden then for a time became a separate kingdom; but the union between Denmark and Norway was drawn closer and closer, and very much to the disadvantage of the latter. The subse¬ quent history of Norway becomes for a long period a part of that of Denmark. After the defeat of Napoleon by the allies in 1813 it was arranged by the Treaty of Vienna in 1814 that Denmark must cede Norway to Sweden, and the result was the union of the two countries under the Swedish Crown. The union has been accompanied with a certain amount of friction, partly owing to the entirely democratic char¬ acter of the Constitution of Norway, in which country titles of nobility were abolished early in the 19th century. The right claimed by the king to veto absolutely bills passed by elected representatives met with an overwhelming pro¬ test by the people, the struggle lasting till 1884. In 1905 a grave constitutional struggle arose between the two countries, from the demand

for greater independence for Norway in her foreign policy. The situation developed an acute crisis over the refusal of King Oscar to rant separate consular service to Norway. On June the Storthing passed a resolution for dissolving the union of the two countries, and after a period of strained relations and warlike preparations a treaty was drawn up at Karlstad, the Swedish Riksdag officially adopting it on

16 October, thus recognizing Norway's inde¬ pendence. On 20 Nov. 1905 Prince Charles of Denmark accepted the throne, taking the title of Haakon VII. In 1907 a treaty guaranteeing the integrity of Norwegian territory was signed by Great Britain, France, Russia and Germany, which was approved by Norway in 1908. In 1907 woman suffrage was adopted. During the European War 1914 — 18, strong feeling arose in Norway against Germany's ruthless submarine warfare entailing severe losses of Norwegian shipping and lives. On 29 Nov. 1917 a. con¬ ference of the Scandinavian powers at Chris¬ tiania was interpreted as the result of Nor¬ way's efforts to co-operate with Denmark and Sweden in the event of a declaration of war against Germany. See War, European; Neu¬ trals and the World War.

Bibliography.— Consult Beckett, (Norway and its Measures5 (1914) ; (The Fiords and Folk of Norway5 (1915) ; Bennett, (Handbook of Norway5 (1896) ; Boyeseh, (Norwav5 (In (Story of the Nations,5 1900) ; Bradshaw, 'Nor- way, its Fjords, Fjelds and Fosses5 (1896) ; Chapman, (Wild Norway5 (1897); Du Chaillu, (The Land of the Midnight Sun5 (1881), and (The Land of the Long Night5 (1900) ; Gjerset,

(History of the Norwegian People5 (1915) ; Keary, 'Norway and the Norwegians5 (1892) ; Nielson, 'Handbook of Norway5 (1899) ; Sedg¬ wick, 'The Story of Norway5 (1885) ; Willson, 'Church and State in Norway5 (1912).

Charles Leonard Stuart, Editorial Staff of The Americana.

NORWAY, Me., town in Oxford County, 49 miles north of Portland and 17 miles north¬ west of Auburn, on the Grand Trunk Rail¬ road. It was settled in 1786. Being in an agricultural and lumbering region, dairy-farm¬ ing, livestock and fruit-growing and lumber products form the chief interests. There are also manufactures of shoes and hosiery. Pop

(1920) 2,208.

NORWAY, Mich., city in Dickinson County, on the Menominee River, 50 miles northwest of Menominee, and on the Chicago Northwestern and the Wisconsin and Michigan railroads. The city is a centre for iron-mining. The chief mines, with their valuable ore deposits, are the Argon and the Vulcan

*Iron Mountain, nine miles distant. The manufactories include re¬ pair shops and pulp mills. The falls in the river are utilized for power. The city has waterworks and an electric-light plant. * Pop.*

(1920) 4,533.

NORWEGIAN LANGUAGE. The origi¬ nal Old Norse tongue which seems to have been spoken quite uniformly all over the North underwent, during the Viking Age (700-1100 a.d.), a process of gradual differentiation re¬ sulting in three distinct dialects: Old Norwe¬ gian, Old Swedish and Old Danish, to which after the settlement of Iceland has to be added Old Icelandic as a fourth. Old Norwegian and Old Icelandic stand very close to each other and are called West Norse in distinction from the other two East Norse dialects. West Norse shows tendencies toward assimilation -of consonants (kk, pp, tt, where East Norse has nk, mp, nt), furthermore Umlaut where it does not appear in East Norse, the Medio-Passive ending -sk as compared with -s. As to the differences between Icelandic and Norwegian

the reader of Old Norse texts will notice that Old Norwegian prefers -i, -u in endings where Icelandic has -e, -o (though in later texts re¬ placed by -i, u). Initial h before 1, n, r, is lost in Old Norwegian but retained in Icelandic (ringr vs. hringr((ring®) . The eastern dialects of Old Norwegian showed quite early Swedish characteristics, whereas the southwest was col¬ ored by Danish. These influences become more pronounced after Norway lost her independ¬ ence, and from 1500 on Norwegian ceased to exist as a literary language, but survived in the country districts and in popular traditions. Our knowledge of the oldest type of Norwegian is based to some extent on loanwords which were taken over by the Lapps and Finns and are even to our day preserved in their original forms. Thus Finnish kuningas shows the primitive Norse form of Old Norwegian konungr (king). Next in importance are Runic in¬ scriptions on stones, walls, coins and ornaments. The oldest Norwegian inscriptions are those of Einang and Steinstad (5th century). The old¬ est manuscripts date from the end of the 12th century and contain law codes, homilies, leg¬ ends, etc. After the definite union with Den¬ mark the official and literary language of Nor¬ way became Danish and remained so until the beginning of the 19th century. The older dia¬ lects were, however, spoken everywhere in the country districts and tended to modify the lan¬ guage of the educated classes, the so-called Dano Norwegian, in more than one respect. The pronunciation differed considerably from Copenhagen Danish, especially

with regard to consonants and musical accent, and the vocabu¬ lary took over many words and phrases from the dialects, a process which continued through¬ out the 19th century and is part of the whole movement toward nationalization of Norway. Dano Norwegian in this form is the language of the great classics of modern Norwegian lit¬ erature, like Ibsen, Bjornson and Ivielland. Others, like Lie, draw more from Nordland dialects.

Landsmaal Movement. — The natural de¬ velopment of Dano Norwegian seemed far too slow and inadequate to the more rabid patriots and nationalists. They had been investigating the peasant dialects especially of the Western districts and wondered whether it might not be possible to construct with the help of this lin¬ guistic material a distinctly Norwegian vernac¬ ular, entirely indigenous to the soil and rela¬ tively free from Danish elements. This unique idea soon found followers and resulted in a lin¬ guistic synthesis, as it were, which is now known as <(Landsmaal® in distinction from the Dano Norwegian type of <(Riksmaal.® The movement was first staited by the philologist, Ivar Aasen, about 1850 and supported by the journalist Vinje and the poet C. Janson. It entered upon a new phase about 1870, when several scholars like Fjortoft and Hoyem de¬ manded that Landsmaal should be based on Eastern and Northern dialects as well as on Western and that it should not be archaic, but modern and practical in its whole character. This modified ((Landsmaal® was adopted by Arne Garborg and a few other writers, . and has since then, in spite of violent opposition, gained steadily ground in private life and pub¬ lic institutions. Its chief opponents are the ad¬ herents of Dano Norwegian who under the

leadership of Knud Knudsen insist that the language of a country ought to be the product of natural growth and not of enforced legis¬ lation. Whether <(Landsmaal or New Norse® will ultimately become the national language of the whole of Norway seems as yet very doubt¬ ful. Out of 600 or more newspapers and pe¬ riodicals only some 20 employed ((Landsmaal)> in 1917 and of a population of two million and a half hardly 300,000 live in districts where it has been introduced into public schools. Par¬ liamentary proceedings are published both in ((Landsmaal® and ((Riksmaal,® but the Cham¬ bers of Commerce declared in 1911 that they considered ((Landsmaal® worthless for practical business purposes.

Accent. — Wordstress shows the same gen¬ eral characteristics as in other Germanic lan¬ guages, but the musical accent or inflection fol¬ lows peculiar laws and has no analogy except in Swedish. The sentence inflection or (

- *Bibliography. — History of Language : Falk and Torp, (Dansk-Norskens lyd-historie) (Christiania 1898) ; ib., (Dansk-Norskens*

Syn- tax> (Christiania 1899) ; Noreen, cGeschichte der nordischen Spracheffi (Strassburg 1913) : Grammars: Hofgaard, (Norsk grammatik)

(Christiania) ; Lindgren, (Dansk och norsk grammatik) (Stockholm) ; Olson, J., Norwe¬ gian Grammar and Reader } (Chicago 1898) ; Groth, P., (Danish and Dano Norwegian Grammar) (Boston and Christiania 1914) : Dictionaries : Brynildsen, J., (Dictionary of

the English and Dano Norwegian Languages) (2 vols., Copenhagen 1907) ; Larsen, A. B., dictionary of the Dano Norwegian and Eng¬ lish Languages) (ib. 1897) ; Falk and Torp, (Etymologisk Ordbok over det Norske og Danske Sprog) (2 vols. [also in German], Christiania 1906) : For accent: Storm, J., (Om Tonefaldet i de skandinaviske Sprog) (Christiania 1874) ; a good account in Poes- tion's (Lehrbuch der norweg. Sprache) (Vienna 1901 : Landsmaal : The most recent and best treatment in the Journal of English and Ger¬ man Philology, Vol. XIII (January 1914), and in Scandinavian Studies and Notes) (Vol. IV, February 1917). A grammar of Garborg's dandsmaaP in the same periodical, Vol. III. A handy dictionary by Skard, M., dandsmaals Ord-lista) (Christiania 1903).

Ewald A. Boucke,

Professor of German , University of Michigan.

NORWEGIAN LITERATURE. The

literary life of Norway during the Middle Ages is closely bound up with that of Iceland, since many skalds or poets who were born in Iceland, including Sighvatr Thordarson, Hall-

fredr Ottarson and others, spent part of their lives at Norwegian courts. If we eliminate from the entire mass of Old Norse literature everything that is of Icelandic origin, few writers remain who deserve a place in the an¬ nals of Norwegian literature. It must be ad¬ mitted, however, that large portions of the famous collection of heroic ballads and lays which goes under the name of the Older Edda, probably originated in Norway, as the tale of 'Smith Volund,' parts of the 'Havamal' and some of the 'Sigurd Songs. ' The first histori¬ cal name is that of Bragi (about 800) who in the (Ragnarsdrapa) describes the mythical characters engraved on the shield which was given to him by King Ragnar of Denmark. Bragi was the first of the official skalds who held the position of a poet laureate at the courts of

the Norwegian kings. Other court poets were Thornbjorn Hornklofi and Thjo- dolf of Hvin, both unusually gifted, but un¬ fortunately their best works (Glymdrapa) and 'Haustlong' have only come to us in frag¬ ments. One of the most famous skalds was Eyvindr Finnsson whose splendid 'Hakonarmal' was included by Herder in his collection of world poetry, 'Stimmen der Volker.' After the death of King Harald Sigurdarson (1066), who was himself gifted as a poet, the art of the skalds degenerated more and more into empty formalism. The rich prose saga literature of the North is almost entirely of Icelandic origin. There seems to have been, however, consider¬ able activity in Norway during the first half of the 13th century in the field of translations and adaptations of chivalrous epics and romances. This kind of imitative literature flourished par¬ ticularly under King Sverre and King Hakon the Old (d. 1263). Such adaptations are the (Thidreksor Vilkinasaga' (very valuable as a source for the Theodoric-and Nibelungen leg¬ end), furthermore the 'Karlamagnussaga,' the romances of (Flores ok Blantdflur,' of Tris¬ tram ok Isond,' the legend of (Barlaam ok JosofaP and many other treatments of mate¬ rial imported from the South. Of special im¬ portance for our knowledge of customs and manners of mediaeval Norway is the '^Specu¬ lum regale' or 'King's mirror ' in which a father gives his son instructions in matters of conduct and good taste, — a curious forerunner of the Cortigiano and Lord Chesterfield's letters. The extensive ballad literature which flourished especially in Denmark and Sweden during the 14th and 15th centuries found less response in Norway and least of all in Iceland, whereas a later type of folksong built on the stanza of . four short lines, the so-called stev, re¬ mained popular in Norway into our days, col¬ lected by S. Bugge, 'Gamle norske folkeviser) (Christiania 1858).

The constant dissensions and feuds of pre¬ tenders and other disasters like the ravages of the Black Death may account for the decline of national ambition and racial vitality in the later Middle Ages. In 1397 the three Scandi¬ navian realms were bound together by the Pinion of Calmar, and while Sweden very soon regained her independence, Norway was gradu¬ ally reduced to the status of a Danish province. Language and literature became Danish and whatever there was left of literary ambition gravitated m the direction of . Copenhagen. Many prominent writers who figure now in the

annals of Danish literature were born in Nor¬ way, above all Ludvig Holberg, the great dramatist and philosopher. Among those who remained loyal to the Norwegian soil was Peder Dass (d. 1708), the most popular figure of his age, author of various descriptive poems like the famous 'Nordlands Trompet' and the 'Norske Dalevise,' anticipating the style of Thomson and Brockes. The influence of Pope and Thomson is still more noticeable in the works of Chr. Tullin (d. 1763), author of didactic poems

and praised by Lessing on ac¬ count of his wedding poem, 'Maidagen.' He is usually classed as a Danish poet. E. Storm (d. 1794) was the first to strike a national note in his ballads and fables which were written in a Norwegian peasant dialect. The most import¬ ant event in the direction of a national rebirth was the founding of the Norwegian Society in Copenhagen in 1772 for the purpose of en¬ couraging and stimulating national Norwegian literature and life. Johan Wessel, although now classed as a Danish writer, was one of the leaders of this movement. Other prominent members were the brothers Claus and Peder Frimann, very popular on account of their poetic descriptions of the life of the sailor, 'den syngende somand.' J. N. Brun (d. 1816) was the author of the classic tragedy 'Zarine,' re¬ membered now chiefly because it gave rise to Wessel's famous parody, 'Love without stock¬ ings.) Brun wrote many patriotic and religious songs, and as a preacher stimulated greatly the awakening of national consciousness. Claus Fasting was active as critic and epigrammatist J. Zetlitz cultivated the Anacreontic style and Enevold Falsen held the stage for quite a while with his comedy 'Dragedukken' (1797).

Modern Norway, both as a political and in¬ tellectual power, dates from the year 1814, the year of the separation from Denmark. All the latent energy and vitality which had been stored up for centuries seemed to awaken suddenly and to demand an outlet. The building up of a genuine Norwegian type of civilization was the aim and ideal of the progressive minds of the country. First among them stands Henrik Wergeland (1800-45), a strange mixture of enthusiasm and awkwardness, of idealism and lack of good sense. His most ambitious work, 'Creation, Man and Messiah,' is on the whole less attractive than some of his short poems like 'The English Pilot,' 'The Jew' and 'Jan van Huysum's Blomsterstykke.' Wergeland's radical nationalism caused a literary feud some¬ what similar to that of the Phosphorists and pothicists in Sweden, but it was even more intense. Wergeland's chief adversary was Toh Welhaven (1807-73), a poet of broad culture and aesthetic refinement, who believed rather in a gradual evolution of national ideals and who wished to maintain closer relations with Den¬ mark and the larger European currents of thought. In q series of sonnets, 'Norges Daemring' (1834), he attacked the narrow pro¬ vincialism and unbridled pathos of the Werge¬ land party most vigorously. Welhaven's influ¬ ence upon the whole intellectual development of his country reached far into the century, whereas Wergeland was hailed by the political radicals and young enthusiasts as their inspiring genius. _ The antagonism between these two parties is reflected to some extent, in the rela¬ tion between the cosmopolitan, intellectual Ibsen

a»d, the tˆore impulsive nationalistic Bjornson. V elhaven s aesthetic culture shaped the poetic style ot Andreas Munch (1811—94), whose sub¬ jects are, however, rather in the romantic vein, as his charming epic, 'Kongedatterns Brude- fart.) Two scholars whose activity corresponds m many respects to that of the brothers Grimm in Germany were P. Asbjornsen and Jorgen Moe, editors of a valuable collection of fairy tales, (Norske Folkeeventyr> (1842). Few literatures can boast of such an inexhaustible supply of mythological characters, elemental spiny, and grotesque inventions in which a vivid imagination and a keen sense of humor are delightfully mingled. Another literary genre which has been very productive in Norwegian literature is that of the peasant tale and de¬ scriptions of country life. The following writers have contributed to this field: Nicolai Oestgaard, translator of some of Auerbach's village tales, but in his own sketches far more realistic; Bernhard Herre, (Recollections of a hunter' ; Harold Meltzer, (Little pictures from the life of the people' ; Magdalena Thoresen, 'Pictures from the Westcoast; the Land of the Midnight's Sun' ; Jacob B. Bull, 'Pictures of Norwegian Life' ; Kristian Elster, one of the most gifted writers in this field, dealt also with social problems in his novel, 'Dangerous Peo¬ ple.-' As a pathfinder in the whole question of woman's social position should not be over¬ looked Camilla Collett (1813-95), whose novels, 'The Bailiff's Daughters' and (From the Camp of the Dumb,' stimulated Ibsen's treatment of this subject.

We have reached the most brilliant epoch in the literary life of modern Norway, whose four leading writers, Ibsen, Bjornson, Lie and Kiel- land, will receive special treatment at the proper places. All four are realists, but they differ considerably in their specific aims and methods. Kielland, chiefly known through his novels 'Skipper Worse,' (Abraham LovdahP and his 'Tales from Two Countries, > takes a critical or sceptical attitude toward human society; Lie appears in his best works, (The Pilot and his Wife,) (The Visionary, ' (Barque Future,' as a big-hearted sympathetic observer of human nature and as a poet of great imaginative power; Bjornson developed from a naive realist and storyteller into a champion of social eman¬ cipation, and, with his wide range of interest, may be regarded as the very epitome of the whole cultural development of modern Nor¬ way; Ibsen, finally, is recognized to-day as the greatest dramatist since Shakespeare, as a con¬ structive interpreter of the relation between society and the individual and as a guide in determining our moral rights and respon¬ sibilities.

Contemporary Norwegian literature seems to incline rather toward the realistic and natural¬ istic interpretation of life and shows on the whole quite a sombre complexion. One of the most powerful writers is Knut Hamsun (b. 1860), who, owing to many discouraging ex¬ periences, views life without and within as a bitter struggle, from the first pangs of 'Hun¬

ger' to the resignation of 'Muted Springs.) The chief works of his earlier period, (Hun¬ ger^ 'Mysteries,' (Pan and Victoria, ' reflect ihe tumultuous career of an intellectual vaga¬ bond who like his hero, Nilson Nagel, without apparent purpose or aim, speculates on the

deeper relations between life and nature, free¬ dom and fate, and who mercilessly tears the mask from everything that does not stand the test of truth and reality. Among his plays (Munken Vendt' stands out on account of its fine spiritual enthusiasm and its masterly form. His later novels are superior in plot and finish, but lack the primitive strength and spontaneity of his first books. Hamsun was thoroughly familiar with American conditions and intro¬ duces in many of his stories American settings. His book, 'Intellectual Life in Modern Amer¬ ica,' contains some severe criticism. Arne Garborg (b. 1851) is another truth seeker, but less concrete and brilliant than Hamsun, more absorbed in religious and social problems. He is determined to free his people from the hard¬ ness and gloom of Pietism without sacrificing the real substance of Christianity. His book,

' Peace, > takes up the Brand problem but from a more human and practical point of view. 'The Lost Father,' one of his most searching confessions, offers in place of the lost Father¬ hood of the old God the new gospel of the Brotherhood of Man. 'Wearied Souls' con¬ tains in form of introspective analysis reflec¬ tions on the utter hopelessness of our whole existence and is one of the most harrowing accounts of this kind of mental bankruptcy. 'Bondestudenter' (Peasant students) tells the story of a certain type of student who after periods of doubt and struggle settles down to a life of material comfort. 'Mannfolk' gives a realistic picture of the Bohemian life of Christiania. Garborg is one of the few writers who employ "Landsmaal." Amalie Skram (d. 1905) is the third of the great naturalists. Her novel, 'Afkom' (Offspring), deals with the depressing subject of transmitted curse in the modern form of inherited weakness. 'Foraadt' (Betrayed) is a story of marriage and separa¬ tion, keen and forceful, but painfully disillu¬ sioning. The leading character, a strangely unresponsive and even frigid woman, occurs repeatedly in Amalie Skram's stories. 'Two friends' is a sea tale and presents in the chief character a more human variation of the Peer Gynt type. Amalie Skram was first married to a sea captain with whom she made many voy¬ ages, and later to the Danish author Erik Skram. In some respects Gabriel Finne (d. 1899) is perhaps the most consistent naturalist, author of the novel 'To Darner' (Two Ladies), in which the duel of the sexes is treated some¬ what in the physiological manner of Strind¬ berg. In his best play,

Among contemporary novelists also occur the names of Jens Tveldt, author of 'Ven- heppa' and 'Brite Per,' a Westlander, who has faith in the vitality and regenerative power of his race; Theodor Madsden, a naturalist, who in

'God's Finger' describes an unhappy mar-

riage, in another novel, (Under the Tree of Knowledge, a modern Faust type and search¬ ing intellectualist ; Thomas Krag, psychologist and connoisseur of women, ˆobberslangen,* **Ada Wilde,** (Gunvor Kjeld* ; Hans Jaeger, who attained notoriety through several con¬ fiscated books, especially his sketches from the Bohemian life of Christiania; Hans Kinck, equally at home in West Norway and Italy, au¬ thor of numerous impressionistic tales and sketches; Johan Bojer, another naturalist, best known through his novel, (The Power of Faith, > a story of truth and illusion; Mons Lie, son of Jonas Lie, who in his novels, (Adam Ravn) and (Man overboard,* broods over life's unseen forces and ultimate values; Bernt Lie, nephew of Jonas, seems to have fallen heir to his uncle's warm-hearted, sunny disposition, (Sister Judith.) Finally, two women writers: Alvide Prydz, interested in problematic characters, (Dream,* (The Promised Land,* and Anna Munch, who brings the message of harmony and happiness in her novels, (Ruler of the World) and ˆoyfulness.* Only a few lyric poets of more than average ability are to be noted. Garborg's*

*Among the writers who employ ((Lands- maal** should, in addition to Arne Garborg, be mentioned Vetle Vislie, (Solvending,* a prose poem of guilt and redemption ; Ivar Mor- tensen, (Varg i Veum,* a play in the declama¬ tory sagastyle; Rasmus Loland, author of stories and sketches with rather depressing themes.*

Bibliography. — The best Norwegian work is by Jaeger, H., Hllustreret Norsk litteratur- historie) (2 vols., Christiania 1896 et seq.). A shorter treatment by Bing, J., (Norsk litteratur- historie (Copenhagen 1904). For contempo¬ rary literature Naerup, C., Hllustreret norsk litteraturhistorie, 1890-1904* (Christiania 1905) ;*

Christensen, Hj., (Vort litteraere liv. > (Chris¬ tiania 1902). For general reference: Halvorsen, (Norsk Forfatter lexikon, 1814 — 1880) (6 vols., Christiania 1885 et seq.). The only English treatment is Horn's Scandinavian Literature) (trans. by R. Anderson, Chicago 1884; en¬ tirely inadequate for the modern period). An interesting though rather incoherent essay on modern Norwegian literature by Bjornson in the Forum, Vol. 43 (1910) ; Gosse, (Northern Studies) (London 1883) gives a brief introduc¬ tion into Norwegian poetry since 1814. Many valuable monographs on Norwegian writers have been contributed by Georg Brandes and are found in his collected works. Important for the whole field are the Publications of

the Society for the Advancement of Scandinavian Study® (Urbana, Ill.). Popular articles occa¬ sionally in the American Scandinavian Review, published by the American-Scandinavian Foun¬ dation, New York.

Ewald A. Boucke,

Professor of German, University of Michigan.

NORWEGIAN MUSIC. Norwegian mu¬ sic is sometimes classified with Scandinavian music but this is wrong. Norwegian music is in a class by itself. Norwegians are extremely tenacious of their national life. Foreign music and literature never had the same influence in Norway as they had in Sweden and Denmark. The opera and musical comedy never took root in Norway. The people have always clung to their simple melodies and folksongs. The con¬ sciousness of national life awoke in 1772 wfien the Norwegian Society,ˆ a band of patriotic Norwegians living in Copenhagen, Denmark, combined to found a university in Christiania (which was accomplished in 1811), and to re¬ cover their native independence (1814). Poets, historians, collectors of folktales and folksongs did valuable work in preserving the national inheritances that had been handed down from generation to generation by tradition. Until the end of the 18th century, therefore, the only mu¬ sicians in Norway were simple unsophisticated peasants, who, like the wandering minstrels of the Middle Ages, traveled from place to place to play in such houses, or before such people, who would receive, or listen to, them. The songs they sang were of the simplest kind and the instruments they played upon to accompany the songs and dances they gave were of the most primitive pattern.

Instruments. — First should be mentioned the old Norwegian violin with four strings tuned in three peculiar ways A, D, A, E; A, E, A, E; or A, E, A, C, sharp C. This peculiar tuning for the purpose of accommodating the instrument to the tone form of three old modes — the Phrygian, the Hvpodorian and the Hypo- lydian — the influence of which is very per¬ ceptible in early Norwegian music. There is also a little violin called the Kardangerfele, probably named after Hardanger Fjord, where it is generally played. This little violin is usually ornamented with naintings, or carvings. Sometimes it has both. The scroll is often carved in the shape of a human head, or in the form of a unicorn or a griffin. Beneath the four catgut strings lie metallic springs, .or wires (svmpathetic strings), that vibrate when the other strings are set in motion. The bow re¬ sembles that of an ordinary double-bass bow;

but it is of course much smaller. The Krog- harp is an antique and uncouth instrument with a sound-board and metal strings. It is capable of producing great emotional effects and is peculiarly fitted to express the weird, melancholy Norwegian melodies. It is still a favorite with the peasantry. The Langleike is an old-fash- loned dulcimer and is played with a plectrum made of wood, or fish bone. The Nyckelharpe is a kind of keyed dulcimer or violin, resem¬ bling the hurdy gurdy or organistrum that was played by the wandering ministrels of all countries in the Middle Ages. The Kantele is a kind of lyre; the Lur is a wooden trumpet; and the Norwegian pipe is a simple tube with holes, made from the bark of the mountain oak.

Primitive Songs and Dances. — The melo¬ dies played upon these primitive instruments were songs, hymn-tunes and dances of the simplest nature, but very individual with regard to their rhythms and peculiar intervals. Among the. songs are simple ditties descriptive of various avocations, or appropriate to the dif¬ ferent seasons. Thus there are shepherd songs, reaping songs, angling songs, mowing songs, winter songs, descriptive of the beauties of the snow and ice and spring songs which ((told of the melting frosts, the opening buds and the de¬ licious perfume which bathes Norwegian hills when the sun and the leafage of the trees are hastening on to summer.® Of the dances so characteristic of Norway the most important are the Spring dans (springing dance) ; the Ganger (walking dance) and the Hailing. The Hailing is the most characteristic dance of Norway. Its name comes from the town of Hallingdal between Christiania and Bergen. It is well described in Frederika Bremer's novel ˆStrife and Peace) as follows: <(Perhaps there is no dance which expresses more than the Hailing the temper of the People who origi¬ nated it. It begins with little hops, accompanied by movements of the arms. It is bear-like, clumsy, indolent, and half dreaming. But it wakes and becomes in earnest. The dancers suddenly begin to dance throwing off their indolence and clumsiness and exhibit strength and dexterity. The same person who a moment ago seemed fettered to the earth now throws himself with springs of agility into the air as though he had wings. Then after many evolu¬ tions which make the unaccustomed spectator positively dizzy, the dancer assumes his in¬ dolent clumsy character and ends the dance as he began it? Bjornsterne Bjornson also gave a fine description of the Hailing in his novel (Arne. > The Hailing is generally danced by single dancers, or by two or three dancing in competition. The music is generally written in 2-4 time and in a major key and is usually played on the Hardangerfele.

Composers.— About the end of the 18th century F. C. Groth and Andreas Flintenberg began, with very little musical culture, it is true, but with praiseworthy industry, to com¬ pose cantatas. At the same time organists in towns and in the country also began to pre¬ serve the traditional tunes that had been handed down orally. One of these, L. Matthias, gath¬ ered

540 old Norwegian songs and dances which would otherwise have perished. L. M. Linde- mann was another who collected the national melodies of his country. Thrane, who lived in

the beginning of the 19th century and who was educated in Paris, began to compose in a vein that might be termed national. He broke the ice, as it were, for Halfdan Kjerulf (1815—68) , who strove to express, in addition to the charms of his country and its scenery, the national aspirations toward liberty that were throbbing throughout Norway. Kjerulf associated him¬ self with Bjornsterne Bjornson who wrote the words for many of Kjerulf 's melodies, which enjoyed enormous popularity. Kjerulf 's songs have been compared to those of the German, Robert Franz. His accompaniments are well written and are often treated polyphonically. His two books of songs (Sanger och Visor) are much admired. One song, (My Heart and Lute} is very popular. Next to Kjerulf comes Rikard Nordraak (1842-66), who did much for the cause of national music, not the least of which was his influence upon Grieg. Nordraak composed the Norwegian national anthem. He was a cousin of Bjornsterne Bjornson.

To this period belongs Ole Bull (1810-80), the most famous violinist and the foremost Norwegian musician of his time. His reputa¬ tion as a violin virtuoso remains undiminished, but it is not generally remembered that he founded the National Theatre at Bergen and persuaded Ibsen to become its director and in¬ fused his personal enthusiasm into the work of Grieg and other Norwegian composers. The Norwegians divide their music into four periods: (1) the Folksong; (2) the Old Ro¬ mantic from Thrane to Kjerulf; (3) the Ro¬ mantic; and (4) the New Romantic, reaching to the present time.

The great trio of modern Norwegian com¬ posers — Grieg, Svendsen and Sinding — strike their roots in all four periods, as they are pre¬ eminently the exponents of the Norwegian soul.

Edward Hagerup Grieg (1843-1907) re¬ turned from Leipzig to figure as a great revo¬ lutionist in the music of his country. He be¬ came intimate with Rikard Nordraak and until that composer's death in 1866 the two worked together to foster a veritable Norwegian school of music. In 1864—65 Nordraak founded the Euterpe Society in Copenhagen, the object of which was to bring forward the works of young Northern composers. In 1867 Grieg founded a musical society in Christiania which he conducted until 1874, when he was succeeded by John Svendsen. But even more as composer Grieg gave impetus to Norwegian music. His compositions breathe the poetry of his native country and express the spirit of the land and of its people. He himself wrote : ((The funda¬ mental trait of Norwegian folk-song is a deep melancholy which may suddenly change to a

wild, unrestrained gaiety, mysterious gloom and indomitable wildness — these are the contrasts of Norwegian music.® Of all Grieg's works his incidental music to Ibsen's (Peer Gynt, often played in concert halls as a suite, has perhaps made him known to the world as a fas¬ cinating and original composer. In his songs, piano pieces and orchestral music Grieg is a true representative of his country and of his race. Next to the ((Chopin of the North® as Grieg is called comes Johan Svendsen (1840- 1911), son of a military bandmaster, and who after an education in Leipzig and Paris re¬ turned to Christiania and wielded great in-*

fluence in the musical life there as conductor and composer. His (Norwegian Rhapsodies } for the orchestra and

Among the more recent Norwegian com¬ posers should be mentioned Johan Haarklou (b. 1847) ; Catherinus Elling (b. 1858) ; Ger¬ hard Schjelderup (b. 1859), inspired by native scenery as in his (Midsummer Night on the Fjord ; and (A Sunday Morning) ; Sigurd Lie (1871-1904), famous for his 'Easter Suited Ole Olson (b. 1850), who has produced an oratorio, (Nidaros) (1897), and operas, includ¬ ing cLeyla) (1908); and Johan Halcorsen (b. 1864), who has written suites, violin pieces, music for several dramas and the (Coronation Cantata } for King Haakon. Consult Finck, Henry T., (Grieg and His Music) (New York and London 1909) ; Bull, Sara C, 'Ole BulP (Boston 1883).

NORWICH, nor'widh, Conn., city, county- seat of New London County, at the junction of the Shetucket and Yantic rivers where they form the Thames, at the head of navigation on the Thames, and on the New York, New Haven and Hartford and the Vermont Central rail¬ roads, about 14 miles from Long Island Sound, and 40 miles southeast of Hartford. It was settled in 1659 by a company of English from Saybrook, and the place was named after Nor¬ wich, England. It was incorporated as a town¬ ship in 1685, and chartered as a city in 1784, and rechartered in 1871. Its surface is irregular and it is surrounded by picturesque valleys and hills. The land around is productive but its exceptional water-power advantages have con¬ tributed to the extensive development of manu¬ facturing industries. The chief manufactures are firearms, leather, silk fabrics, cotton and woolen goods, machinery, stoves, iron and iron products, and furniture, leather and belting, and woodworking machinery. It has a large trade in its own manufactures, lumber, farm products, coal and clothing and food supplies for the interior of western Connecticut. It is the in¬ dustrial and commercial centre of a large por¬ tion of New London and

Windham counties. The educational institutions are public and parish schools, the Free Academy, built and en¬ dowed by public-spirited citizens, the Art Mu¬ seum connected with the Academy, and the Otis Free Library, which has about 30,000 volumes. The prominent buildings are the Slater Me¬ morial Hall, the Stale Armory, State Insane Hospital, the William Backus Hospital, the Y. M. C. A. building, the courthouse and Saint

Patrick's Roman Catholic Church. There are several good church buildings and a large number of handsome residences. The Indian burying ground which contains the grave of Uncas, the place where Miantonomoh fell, the ruins of colonial homes, the places where once lived the Huntingtons, and others prominent in Revolutionary times, are all of historic interest.

The revised charter of 1877 provides for a mayor, who holds office two years, and a council of 12 members, six of whom are elected each year. The city owns and operates the waterworks, gas and electric plants. Pop. 29,032. Consult Caulkins, F. W,, < History of Norwich (Hartford 1866) and Gilman, W. C., 'Celebration of the 250th Anniversary of Settle¬ ment of the Town of Norwich) (Norwich*

1912).

NORWICH, nor'ij, England, episcopal city, county and parliamentary borough, capital of Norfolk County, on the river Wensum, 108 miles northeast by north of London (114 by rail) and 19 miles west of Yarmouth. The city proper extends more than a mile and a half in length from north to south on both sides of the Wensum, and a mile and a quarter in its greatest breadth. The geological formation con¬ sists of chalk, upper drift and crag; beds of sand and gravel.

Industries. — The great Colman factory — mustard, flour and starch — represents the most important industry in Norwich, the prem¬ ises on the river front extending three-quarters of a mile. Boot and shoemaking, brewing and the making of agricultural implements are prominent manufactures, and Norwich has one of the largest organ manufactories in Great Britain. The cattle market is one of the largest in England.

Public Buildings, etc.— The great Norman Castle was probably built by William Fitz Os- bern, one of the Conqueror's captains, as a place oi arms and Jo overawe the subject Saxons. The keep, which remains, is nearly square, 92 by 96 feet, and 76 feet high ; it is only exceeded in England by the Norman keep at Colchester. Long used as a prison it is now a museum and art gallery, in which are valuable ornithological specimens.

The cathedral is a grand Anglo-Norman pile, 407 feet long, and 72 feet

broad, the spire reach¬ ing 315 feet from the ground (the second highest in England). It contains several ancient chapels, a beautiful choir, and the cloisters are the most spacious in England except Gloucester. The Erpingham Gate and Saint Ethelbert's Gate, which give entrance to the upper close, are of considerable interest. In 1272 a great part of the church and the adjoining monastery were burned by the citizens and many of the ecclesi¬ astics killed. The Bishop's Palace, north of the cathedral, built by various prelates, is an ex¬ tensive edifice. Saint Andrew's KM1, anciently the nave of the church of the Dominicans (Blackfriars), is a noble perpendicular struc¬ ture, saved from spoliation by Henry VIII through the public-spirited action of Augustine Steward, thrice mayor of Norwich. It is now one of the handsomest civic halls in England; the walls are decorated with a number of valu¬ able portraits, especially Beechey's 'Nelson, with others by Gainsborough, Lawrence, Opie, etc. The Guild Hall, succeeding the Tolhousei*

where the kings tolls were paid, was built in 141 j ihis ancient city abounds in quaint relics oi the past, and is notable for its antiquities and curios. One of the show-places is Hercules and Samson House (Cubitt's), a large and very ancient mansion facing the cathedral, the portico supported by ponderous figures of Her¬ cules and Samson. It has great historical asso¬ ciations; its paneled rooms are filled with a choice collection of antique furniture, old china, and curios of every kind. The Strangers' Hall, an ancient building, is a local museum con¬ taining many interesting exhibits.

The uninteresting Shire Hall contains sev¬ eral portraits. There are barracks, a corn ex¬ change and agricultural hall. The Norfolk and Norwich Hospital (1771) has been greatly ex¬ tended of late years. The Jenny Lind Chil¬ dren's Hospital was founded by the great song¬ stress in 1853 ; and the new infirmary was opened in 1900. There are two good libraries: Norfolk and Norwich Subscription and the Free Library.

Churches. — Apart from the cathedral, Nor¬ wich, with its suburbs, has 40 Anglican churches. That of Saint Peter's Mancroft contains the tomb of Sir. Thomas Browne, author of the ˆeligio Medici. > The chief churches of the Independ¬ ents, Baptists and Presbyterians, are large and well attended. Before the Black Death in 1349 Norwich city had twice as many churches as to-day, and came to be called (

Educational Facilities. — Norwich grammar school occupies a charnel-house (Bishop Salmon 1325) transferred there and to adjacent build¬ ings

at the Reformation. There are also the commercial school, divided from the grammar school, and a large technical institute.

History. — The earliest mention of Norwich in any record tells of conflict between Saxon and Dane, and is the statement in the (Saxon Chronicle } that in 1002 °Swegen came with his fleet to Northwic and wasted a burned the burh.® With the Norman Conquest came the building of the castle, and in 1101 the dedica¬ tion of the cathedral by Losinga, first bishop of the diocese. The most stirring events in Norwich arose from the Laborer's Revolt in 1381, and Kett's Rebellion in 1549, both of which were rigorously suppressed. The Black Death, 1348-49, swept away a third of the inhabitants of Norwich, and the plague of 1665-66 resulted in about 3,000 deaths. This British Norwich is almost certainly the parent city of Norwich, Conn., for Miss Mary Perkins in her history of the latter (1895) says: ((The Mohegan Indian fort may have suggested castle-crowned Nor¬ wich to the brothers Huntington, who are sup¬ posed to have emigrated from Norwich, England.® The first charter was granted in 1194. The city returns two members to the House of Commons. Pop. 121,478.

Bibliography. — Early History: Blomefield, (Norwich) (1745) ; (Records of the City of Norwich } (Vol. I, 1906), published by author¬ ity of the corporation; Hudson, (How the City of Norwich Grew into Shape) (1896); Modern History: Rye's

(Norfolk Annals) (a chronological record, 2

vols., 1901) ; Bayne's (History of Norwich (1898); Quennell's 'History of the CathedraP (1900) ; and Hawkins, C. B., (Norwich: a Social Study) (1910).*

James Hooper,

Author of (Gnide to Norwich f etc.

NORWICH, N. Y., city, county-seat of Chenango County, on the Chenango River, and on the Delaware, Lackawanna and Western and the New York, Ontario and Western rail¬ roads, about 52 miles in direct line south by west of Utica and 42 miles north by east of Binghamton. It is the industrial and commer¬ cial centre of a productive agricultural region. The chief industrial establishments are factories manufacturing hammers of all kinds, drugs, patent medicines, cosmetics, perfumery, knit un¬ derwear, interior woodwork, silos, wire baskets, condensed milk and gloves. There are also railroad shops, machine shops, foundries, creameries and stone quarries in Norwich. Norwich has a free public library, city hospital, county buildings, Old Ladies' Home, Y. M. C. A., seven up-to-date school buildings, eight

churches and two national banks. Pop. 8,342.

NORWICH UNIVERSITY, situated at Northfield, Vt. It was first chartered (1819) under the name of American Literary, Scien¬ tific and Military College and was situated at Northfield, Vt., was moved to Middletown, Conn., in 1824 and in 1829 it was moved to Nor¬ wich; and the name changed to Norwich Uni¬ versity in 1834. Fire destroyed its buildings in 1866 and the institution was removed to North- field. _ The usual collegiate courses are offered; and in addition courses in civil and chemical engineering and military science; military drill is also a part of the curriculum. The chief work of the university has always been in science and engineering, and in 1898 it was made the official State military school, and receives a State appropriation. The degree of bachelor of arts and bachelor of science are conferred. Admiral Dewey was a student of Norwich. In 1917 the annual income amounted to $65,000; the students numbered 191 and the faculty 18.

NORWICH CRESTED CANARY. See

Canary.

NORWOOD, Mass., town in Norfolk County, on the New York, New Haven and Hartford Railroad, about 12 miles southwest of Boston. It has a large printing establishment, a railroad repair shop, foundry, tanneries, leather, glue and ink factories, machine-shops and furniture factories and national and co¬ operative banks. The educational institutions are the Morrill Memorial Library which con¬ tains about 8,000 volumes and the public schools, high and elementary. The town owns and operates the waterworks and lighting system and has the benefits of the Norwood Civic In¬ stitution, a property valued at more than $70,- 000, which is held in trust for the inhabitants. Formerly administered by annual town meeting, Norwood in 1915 was the first town in Massa¬ chusetts to adopt the commission-manager form of government. Pop. (1920) 12,627.

NORWOOD, Ohio, city in Hamilton County, on the Pennsylvania, the Baltimore and Ohio Southwestern, the Cincinnati. Lebanon and Northern and the Norfolk and Western rail¬ roads, northeast of and adjoining Cincinnati.

It was settled in 1804, incorporated as a village in 1898 and chartered as a city in 1903. It is a beautiful residential hill-suburb of Cincinnati, and also a manufacturing city of considerable importance. The chief industrial

establish¬ ments are playing-card factory, the elastic book¬ case works, electric manufacturing works, wash¬ ing-machine factories, foundry, piano factory, millwork works, tool factory, iron works, safes and vault works, enamel sign works, lithography works. Several of the manufacturing compa¬ nies have buildings of considerable architectural merit. Other notable buildings are the town- hall, Enterprise Block, Knights of Pythias Hall, Carnegie library, the bank building and the eight churches. The educational institutions are five public schools (fine buildings), one parish school, and there are branch libraries of the Cincinnati public library. The government is vested in a mayor, a council of eight mem¬ bers and a board of public service consisting of three members, all elected by the people, The city owns the electric-lighting, sewage and water supply plants. The population is mostly native-born Americans; some are of German descent. Pop. (1920) 24,966.

NOSE, that part of the face of man and the higher animals which is included in the mechanism of respiration, containing avenues for the passage of air to the lungs, and which also contains and accommodates the organs of smell ; in a broader and looser sense, the muz¬ zle. The nose in most animals is the most prom¬ inent feature of the face — least so in monkeys and lemurs, not much prolonged in the cats, but an important part of the prolonged muzzles of other carnivora, and of the long-headed herbiv¬ orous animals generally. In several kinds of animals, otherwise widely diverse in structure and relationship, the fleshy part of the nose has been extended, through similarity of required service, into a more or less prolonged proboscis, as in the pigs, some shrews, certain seals, and most prominently the elephants. In these cases the nose performs other services than its usual functions and becomes a tool for rooting, an organ of prehension, etc.

In structure, the nose consists of a series of bones of the face (see Skull), together with certain cartilages, forming a tube or tubes holding the paired olfactory surfaces and nerves. The cavities of the nose are the two anterior nares, which open externally by the nostrils (in some of the lower animals, as the cetaceans, joined into a single one, the ˆblow-hole®) ; and the posterior nares, which are within the bones of the face and open interiorly into the mouth at the top of the windpipe. These cavities are separated by a more or less continuous carti¬ laginous partition called the septum, which is perforated by apertures for the transmission of bloodvessels and nerves. Occasionally the two nasal fossae or cavities communicate with each other.

The muscles which are concerned in the movements of the nasal cartilages include the triangularis (or compressor) nasi, which arises by its apex from the superior maxillary bone, and is inserted into a fibrous aponeurosis spread¬ ing over the front ridge of the nose. The fibres of the muscle of one

side may unite with those of the opposite and companion muscle. The depressor alae nasi of each side also arises from

the superior maxillary bone, and is inserted into the septum and posterior part of the alae of the nose. The former of these two muscles appears to increase the breadth of the nose, and thus may open, dilate or expand the nostrils ; the action of the latter muscle is that of a true compressor of the nostrils, each of the depres¬ sors drawing its ala or side of the nostril down¬ ward. The levator labii superioris alaeque nasi lies on the side of the nose, between the inner side of the orbit and the upper lip. When in action this muscle dilates the nose, raises the upper lip and alae of the nose; its use being well seen in the expression of a derisive smile and in the wrinkling of the skin at the angles of the nose and mouth.

The skin of the nose is of delicate and smooth character. The papillae or minute eleva¬ tions of the true skin in the neighborhood of the mose are described as being of smaller size than ordinary, while the supper skin or cuticle is of more than usually thin nature. The hairs of the skin are also of finer nature than in the other regions of the body; and the sebaceous or skin glands are very numerous, and possess short ducts, while their secretion is generally present in very abundant quantity.

There are three meati or compartments of the nose, which are formed in the outer wall or side of each of the nasal cavities by the tur¬ binated bones. These compartments are of un¬ equal size, and they communicate by apertures, with certain spaces known as air-cells or sinuses, existing in the frontal, sphenoid, superior maxil¬ lary and ethmoid bones. The upper or superior meatus is the smallest compartment, and occu¬ pies the posterior part of the nasal wall. It communicates with air-cells known as the pos¬ terior ethmoidal and sphenoidal sinuses. The middle meatus is a little larger. It communi¬ cates anteriorly through a passage of infun¬ dibulum with the anterior ethmoidal and frontal sinuses. The inferior meatus is the largest cavity, and occupies the greater part of the outer nasal wall. Into the front portion of the inferior meatus the nasal duct opens; this canal conveying the tears or lacrymal secretion from the eye to the nose. (See Eye). Posteriorly to the extremity of the inferior meatus the aper¬ ture of the Eustachian tube, leading from the ear, may be seen.

The mucous membrane lining the nostrils and nasal cavities is also known as the pituitary membrane. It extends throughout the nasal sinuses, into the pharynx, into the nasal ducts and orbits and through the Eustachian tubes into the tympana and mastoid cells of the ear. (See Mucous Membrane). In the upper part of the nose, corresponding to the upper and middle turbinated bones and the ethmoidal por¬ tion of the septum — and termed the olfactory region, from the distribution at this part of the olfactory

nerves — the mucous membrane has a covering of epithelial cells of the columnar variety, but non-ciliated. And beneath this layer, and also between the columnar epithelial cells, nucleated or olfactory cells are found. These latter cells form the terminal points as it were of the delicate ultimate filaments of the olfactory nerves, or the nerves of smell (see Nose and Throat) ; and in this way the odorif¬ erous particles drawn into the nostrils, and brought in contact with these cells, stimulate

through them the olfactory nerves, and produce the^ sense or impression of smell.

The study of the comparative anatomy of the nasal organs shows us that man possesses a sense of smell greatly inferior in very many instances to that possessed by the lower animals. The distribution of the olfactory nerves in man is of a very limited nature when compared with what obtains in such animals as the dog, sheep, etc. And among these lower forms great dif¬ ferences are apparent in the kinds or qualities of odors most readily perceived or appreciated. The carnivorous mammals will in this way be most susceptible to the odors of other animals, and the herbivorous forms to those of plants.

NOSE AND THROAT, Disease of. The

nasal cavities, the naso-pharynx, the pharynx and the larynx together form a continuous path¬ way, and so joined are known in medical litera¬ ture as the upper respiratory tract, the same be¬ ing a continuous passage which extends from the external orifice of the nose to the lungs. There are various subdivisions of these anatomi¬ cal structures, the chief ones being in the nasal cavities and known as the accessory sinuses to be hereinafter described.

Rhinitis. — In earlier days, this affection both in its acute and chronic form was termed catarrh, and was so named by Galen who be¬ lieved that the dropping down was the result of a secretion from the brain passing through the orifices of the ethmoidal bone into the nose, this process tending to relieve the brain of superfluous substances. Later on, this theory was successfully combated. Through later years, students of pathology have 'been able to give a more intelligent classification of the various intra-nasal inflammations in the gen¬ eral term rhinitis.

The two important subdivisions are (1) acute rhinitis and (2) chronic rhinitis. In a general way it should- be understood that the entire upper

respiratory tract is continually the seat of air-borne bacteria. This is true even of the more vicious types known as the strepto¬ cocci, pneumococci, staphylococci, and often diphtheria and influenza bacilli. Futhermore, the naso-pharynx may harbor these micro¬ organisms without producing the specific dis¬ eases which they represent, but in case the in¬ dividual's resistance becomes lowered from any cause, the constitutional symptoms of these various diseases may suddenly appear.

Acute Rhinitis. — This is an acute inflam¬ matory involvement of the nasal mucous mem¬ branes which usually extends to the mucous membrane of the upper respiratory tract. The majority of cases of this affection constitutes what is known by the laity as (

VOL. 20 — 29

a vitiated atmosphere where overcrowding, filth and defective diet prevail. These attacks are usually ushered in 'by sneezing, a sensation of nasal stuffiness and tickling or irritation in the throat. This is followed by chilliness, moderate rise of temperature and sufficient intra-nasal swelling to cause obstruction to breathing. A profuse watery discharge, which later becomes muco-purulent, is a characteristic symptom of this affection, and the sense of smell becomes temporarily impaired. In a small proportion of cases, the affection extends to the accessory sinuses and produces what is known as acute sinusitis. It is not the purpose of this article to prescribe treatment, but a few words upon the subject of prevention seems pertinent and here the author quotes from his textbook on (Diseases of the Ear, Nose and Throat. }

<(Frequent attacks of simple acute rhinitis, especially in adults, demand the inauguration of stringent preventive measures. The following remarks relating to the general care of the body are appropriate in their relation to taking cold. An ordinary draught of air in a room never should induce an attack of acute rhinitis in a person who habitually practises proper hygienic health measures, and one who fears such exposure confesses to a lack of resistance which is incompatible with good health. The efforts of all individuals, and especially those who abide in changeable climates, should be to fortify the resisting power of the body; in other words, to develop resistance rather than to at¬ tempt prevention by means of coddling habits, either during childhood or adult life. For this purpose, a morning application of cold water to the body, either in the form of a sponge, spray or plunge, is highly recommended. Most healthy individuals react readily and promptly from a sudden plunge into cold water, and in a considerable proportion the reaction takes place without rubbing with a towel. Neverthe¬ less, much benefit arises from friction, induced by rubbing the entire body with a coarse bath towel immediately after the bath.

(

(

(

those with outdoor occupations. In this con¬ nection, it may be stated that excessive cloth¬ ing may do as much harm as insufficient. \ henever the occupation requires indoor life, the undergarments should be of light weight, to be supplemented by heavy outer garments when going out of doors. It is not wise to wear heavyweight woolen undergarments in occupa¬ tions unattended by undue exposure ; the light wool will usually suffice. Of late, the linen- mesh underwear has obtained considerable popularity, upon the theory that bodily moisture rapidly passes through this fabric.

11 Protection of the feet from dampness and cold is of great importance. Whenever the streets or sidewalks are wet or slushy, rubbers should be worn to protect the feet from damp¬ ness. _ Exposure to draughts does not induce colds in the same proportion as does the neglect to protect the feet from cold and dampness.

(< The prolonged inhalation of vitiated air should also be avoided. All occupied rooms and particularly sleeping apartments should be sufficiently ventilated to insure the proper amount of oxygen. The air of a sleeping apartment should be fresh, and on account of warm bed covering, the temperature may safely be lowered to 50 degrees or even lower. In ex¬ treme weather the temperature of the sleeping apartment can be controlled by allowing suf¬ ficient heat to enter the room.

(

ˆGeneral and Local Treatment.— It is ex¬ tremely difficult to induce persons suffering with acute rhinitis to submit to the form of treatment which mitigates its severity, lessens its duration and almost surely guarantees im¬ munity from troublesome and even severe or serious complications. As a rule, the patients know that the disease is self-limited, that in a large proportion of cases serious complications do not occur, and they unwittingly run risks by attending to their usual duties, and only those who are prone to prolonged complications are willing to submit to the necessary restrictions and medication. Elderly persons should in¬ variably remain indoors during the active stages of acute rhinitis.®

Chronic Rhinitis. — Chronic rhinitis may be

described as (1) a chronic inflammatory process involving the nose and possibly the accessory sinuses as a result of a succession of acute attacks. It also occurs, secondarily from systemic diseases such as syphilis, Bright's disease, gout, rheumatism, malaria, etc.

2. Membranous inflammation, of which there are three varieties: (a) croupous or pseudomem¬

branous, an exudate without material organiza¬ tion and not due to specific bacteria, and which may be produced by escharotics or infectious fevers; (b) fibrinoplastic inflammation, which is characterized by the formation on the sur¬ face of the membrane of clastic material that seems to organize in layers, but is non-bacterial in origin; (c) diphtheritic inflammation, a more deep-seated exudate due to a specific germ, the Klebs-Loffler bacillus, or Bacillus diphtheria.

Unlike the foregoing this false membrane when removed leaves a bleeding surface, show¬ ing that ulceration exists, which extends at least through the basement membrane.

3. Hemorrhagic inflammation, a violent in¬ flammation of the mucous surface, character¬ ized by interstitial hemorrhage.

4. Gangrenous inflammation, a type of in¬ flammation which sometimes follows the acute infectious diseases in children. It may be due to 'burns, scalds, etc.

Specific Inflammations (Chronic Infectious Inflammations; Specific Granulatoma). —

These include actinomycosis, glanders, leprosy, syphilis, tuberculosis (qq.v.), and rhinoscleroma, which is characterized by excessive thickening and swelling of the skin and mucous membrane of the nose, and is supposed to be due to Bacil¬ lus rhino scleromatis.

Nasal Bacteria. — Owing to the peculiar con¬ struction and functions of the nasal cavities, together with the moist condition of the mem¬ brane, bacteria to a great or less extent ac¬ cumulate. The secretions of the nose and naso¬ pharynx are supposed bv most bacteriologists to possess considerable germicidal influence, as may be instanced by the fact that they are found in much larger numbers in the anterior nares than in the rhinopharynx. It may also be noted that even the more virulent types, es¬ pecially the Staphylococcus pyogenes, Micrococ¬ cus pneumonia (Frankel), Bacillus tuberculosis, Friedlander's pneumococcus, Klebs-Loffler bacil¬ lus

(diphtheritic), and the streptococcus may be found and still not result in the development of the specific diseases of which thev are sup¬ posed to be the causative factors.

It is difficult to disassociate this condition from that of chronic purulent nasal sinusitis. Indeed, in almost every case of chronic rhinitis, a purulent discharge from some of the acces¬ sory sinuses is present. In a limited propor¬ tion of cases, atrophy of the nasal mucosa is a prominent symptom and often the turbinated bones become more or less absorbed, while in the majority of cases hyperplasia or infiltration of the nasal mucosa is the prominent symptom, invariably resulting in more or less nasal ob¬ struction. Defects in nasal conformation such as septal spurs and deflections which interfere with nasal drainage and respiration are common etiological factors. When long continued, it re¬ sults secondarily in marked changes in the mucous membrane of the post-nasal and phar¬ yngeal spaces. Accumulation of secretions in¬ duces sneezing, hawking and clearing of the throat.*

Atrophic Rhinitis.— This affection may be described as a chronic inflammatory process in¬ volving the intra-nasal tissues whereby more or less absorption of the turbinal bones and destruction of the glandular structures of the muscosa is present. In the majority of cases the condition is a simple chronic catarrhal process

but the more serious ones are hereinafter de¬ scribed under the heading of Ozena. The sim¬ ple form may not be attended by distinctive symptoms even though the secretions are al¬ tered. While the actual cause is not fully known, it is generally considered to result from frequent and long continued attacks of acute inflammation of the nasal mucosa. Most ob¬ servers incline to the opinion that all cases of atrophy have been preceded by long continued hypertrophy of the same tissues. A marked symptom is alteration in the character of the secretion which is prone to accumulate and end in crust formations. Dryness of the pharynx and larynx is a later symptom, probablv re¬ sulting from the loss of normal moisture im¬ parted to the air in its course through the nasal cavities. Any local treatment should be ante¬ dated) by careful physical examination and the discovery, if possible, of any constitutional disease or hereditary tendency like syphilis or tuberculosis. Frequent cleansing of the nasal mucosa with bland alkaline solution is helpful.

Ozena. — The term means fetid accumula¬ tion in the nose. This marks

the most trouble¬ some of all nasal affections especiallv from the standpoint of the patient wl\ose intra-nasal spaces are continuously packed with highly offensive crusts and masses of secretion. Atrophy of the intra-nasal tissues is invariably present. A recent discovery has shown that almost without exception the antrum of High- more is the seat of the disease and that by ap¬ propriate operation upon this cavity the disease may be eliminated. In any event, a long con¬ tinued local treatment preferably by a rhinol- ogist is imperative.

Nasal hydrorrhoea is an obstructive nasal condition accompanied by an excessive flow of watery fluid from the nose, probably of reflex origin.

Nasal Syphilis . — A disease also called speci¬ fic catarrh, specific rhinitis and syphilitic rhin¬ itis. It is an intra-nasal manifestation of syph¬ ilis, usually of the tertiary variety, accompanied with more or less necrosis of both soft tissues and bone. Occasionally the nasal mucous mem¬ brane may become the seat of the initial lesion. The intra-nasal lesions of the tertiary stage are severe and extensive and may involve the car¬ tilaginous septum or the bony framework of the nose, resulting often in serious and extensive deformity. Wherever there are masses of ne¬ crosed bone the odor is exceedingly offensive, and frequently large pieces of broken down bone may be removed en masse.

Lupus (q.v.) is a skin-disease of which there are two distinct forms.

Furunculosis (phlegmonous rhinitis) is the formation of abscess in any part of the nasal cavities.

Ulcers. — Small ulcers may form in various portions of the nasal cavity, but are usually found upon the septum, and result from for¬ eign bodies, picking of the nose, and from a general systemic disturbance like diabetes. Malignant growths occur in the nose and do not differ essentially from those found else¬ where in the body. Infected ulcers, when oc¬ curring in nasal cavities, are due to some spe¬ cific form of disease like syphilis, glanders, diphtheria, scarle fever, smallpox, typhoid fever, or typhus iever, the type depending upon the nature of the accompanying disease.

Neurosis. — Neurosis of olfaction (smell) is a perversion of olfaction, a perception of imaginary odors frequently amounting to hallu¬ cination. Hyperosmia, overacuteness of olfac¬ tion, is supposed to be due to impairment of nerve-force. See Anosmia.

Sneezing is a forcible and audible spasmodic expulsion of air through the nose and mouth caused by inhalation of irritating substances or by irritation of the vasomotor centres. See Hay Fever.

Non-Inflammatory Diseases. — Of these, one of the most common is nosebleed (q.v.). Several varieties of foreign bodies are occa¬ sionally found in the anterior nasal space. Rhinoliths are developments of hard substances in the nasal mucosa formed from the deposit of mineral salts. Various animate foreign bodies may be found in the nose, such as in¬ sects, maggots and intestinal worms. Of other foreign bodies, those placed in the nos¬ trils by malingerers and children form the greater part, and consist chiefly of buttons, beans, peas, seeds, rags, etc.

Neoplasm of the Upper Respiratory Tract. — Non-malignant neoplasm (papilloma) is a benign wart-like growth made up of hypertro¬ phied papillae, appearing rarely in nasal cavi¬ ties, but occasionally seen in the pharynx and larynx. Adenoma is a benign tumor made up of connective tissue enclosing large spaces filled with blood. Enchondroma in the nasal passages is a cartilaginous growth, sometimes called chondroma, and is an offshoot from the cartilaginous septum. Exostosis is a bony growth projecting outward from the surface of the intra-nasal bony framework. Myxoma (nasal polypus) is the lowest grade of adult connective-tissue tumor. It is a soft translu¬ cent growth made up of connective tissue and capillary vessels enclosed in a jelly-like matrix. They are usually pedunculated, multiple and sometimes of large size, grayish in color, trans¬ lucent, and have a smooth surface. They give rise to symptoms of intra-nasal pressure and obstruction, asthma, laryngeal cough, impair¬ ment of smell, and excessive watery discharge. As a rule the growth is associated with diseases of the accessory sinuses.

Malignant Tumors. — Carcinoma and Sar¬ coma may originate in any part of the upper respiratory tract. It rapidly assumes grave proportions, and is amenable to operative inter¬ ference only during incipiency. Sarcoma, which is a highly malignant tumor, has its origin in the deep connective tissue and gradu¬ ally spreads to the mucous surface. It is nodu¬ lated and fungoid in appearance and tends to ulcerate in the later stages. See Tumor.

Diseases and Deformities of the Anterior Nasal Cavities. — Owing to the prominence of the nose and its peculiar anatomical conforma¬ tion, the septum becomes peculiarly liable to injuries and malformations, the most common of which is deviation or deflection. A deviated or deflected septum (usually limited to the car¬ tilaginous portion) is a permanent change from the perpendicular to varying deformities. The deformities assume various shapes, with an oc¬ casional offshoot of a cartilaginous mass here¬ tofore described as enchondroma. These often result in severe intra-nasal obstruction and re¬ quire radical operative interference for relief. A modern operation for septal deformities has

proved most effective. Synechia is a cartilagi¬ nous or fibrinous band extending from the sep¬ tum to the nasal wall. A synechia may some¬ times form between the turbinals. Septal ul¬ cerations are usually due to picking the nose, the desire for which may be induced by irri¬ tants, foreign bodies and the inhaling of poi¬ sonous gases. They may also be syphilitic in origin. Septal perforations are openings through the cartilaginous septum. They are of varying sizes, and are due to extension of ul¬ ceration. Abscess of the septum is a collec¬ tion of pus in the septal tissues, due to injuries or general systemic diseases. Depression of the nasal cartilage is a nasal deformity follow¬ ing extensive loss of septal tissue or of nasal bones, usually due to syphilis or injury.

Diseases of the Nasal Accessory Sinuses. — The nasal accessory sinuses are a series of cavities and cells all lined with mucous mem¬ brane and having communication with the nasal cavities. They are the frontal sinuses, the anterior and posterior ethmoidal cells, the sphenoidal sinuses and the maxillary antra.

Maxillary Sinuses. — The maxillary sinus or antrum of Highmore is situated in the body of the superior-maxillary bone. It is separated from the nasal cavities by the outer nasal wall with the exception of a small opening whereby it communicates with the nasal cavities. It is lined with an extremely delicate mucous mem¬ brane and frequently becomes the seat of in¬ fection by way of the nasal cavities. In fact, all of the nasal accessory sinuses are liable to become the seat of acute purulent inflamma¬ tory processes, especially the infection accom¬ panying attacks of grip. Exanthemata also may be mentioned as causative factors. Occasionally, the maxillary sinus becomes infected through the roots, of carious teeth. The attacks are accompanied by a sensation of fullness, severe localized pain and purulent discharge. Barring the clinical symptoms, diagnosis is facilitated by translumination, which is effected by first plac¬ ing the patient in a totally dark room and then introducing into the mouth a bright electric light. A comparison of the illumination with the opposite side often furnishes important diagnostic information. A more thorough method is by means of a radiograph. A good radiograph of the nasal accessory sinuses is most valuable in aiding the rhinologist to locate diseased areas. Acute cases usually recover by local treatment, but chronic cases may re¬ quire operative measures. The antrum also may become the seat of both benign and malig¬ nant growths.

Diseases of the Ethmoidal Cells. — These groups of cells, located in the

ethmoid bone and communicating with the nasal cavities, are subject to both acute and chronic inflammatory and purulent diseases, the most common being the acute catarrhal inflammation occurring with general purulent rhinitis. The purulent form may occur on one or both sides, and may be associated with a suppurative condition of other accessory sinuses. When far advanced, it re¬ sults in an enlargement of the middle turbi¬ nated bones, the walls of which become cystic, forming, with the broken-down tissues of the ethmoid, large cysts filled with pus or polypoid degeneration.

The sphenoidal sinuses are less frequently the seat of disease, although they may be the

seat of the same diseases heretofore described as occurring in the other sinuses.

The anatomical relation of the fro.ntal sin¬ uses to the nasal cavities renders them liable to the development of both acute and chronic in¬ flammatory conditions, purulent infections and tumors.

'Catarrhal inflammation, both acute and chronic, with its attendant supra-orbital pain and sense of weight and fulness in the fore¬ head, is occasionally present in connection with the same condition in the nasal cavities. Acute suppurative inflammation (empyema) is an acute suppuration brought about by the intro¬ duction of infection from the nose through the infundibulum. When long continued, the puru¬ lent process takes on the form of chronic purulent inflammation, in which there may be more or less necrosis of the bony walls and the development of polypoid degeneration. The severest forms are usually quite curable by means of operation.

Nasopharynx.— The nasopharynx is that section of the upper respiratory tract between the posterior border of the vomer and the level of the soft palate. The nasopharynx may be the seat of the following diseases: (1) acute naso¬ pharyngitis (acute post-nasal catarrh, acute rhinopharyngitis) ; (2) chronic nasopharyn¬

gitis; (3) atropic pharyngitis (see Atrophic Rhinitis above) ; (4) hyperplastic nasopharyn¬ gitis; (5) specific inflammations (see Pharynx below, also Pharynx, a separate article) ; (6) adenoid vegetations (see Tonsils below).

Acute nasopharyngitis is an acute inflamma¬ tion of the mucous membrane lining the naso¬ pharynx, usually accompanied by similar inflam¬ mations in the nose, pharynx and larynx. Chronic nasopharyngitis

is a chronic catarrhal inflammation resulting usually from repeated acute attacks and with the same causal relations. It is characterized by the presence of tenacious mucus, with more or less continuous efforts on the part of the victim to «hawk» and clear the throat. In the later stages the secretion shows a tendency to become thick, forming scabs and inspissated masses. This affection may result from the inflammation of irritating gases. Hyperplastic nasopharyngitis is a chronic inflammation resulting in the development of connective tissue in the mucous membrane.

Adenoids. — The lymphatic glands which bear the name of adenoids are a series of lymph-glands which are superficiallv located in the mucosa of the vault and posterior wall of the naso-pharynx. These lymph-glands are normal under healthful conditions and require treatment only when they become the seat of hyper-plastic enlargement. It is an affection essentially of child life and it is more com¬ monly observed between the ages of 3 and 12 years. Heredity seems to be an important etio¬ logical factor. Bad hygiene, vitiated air and irritating gases are supposed to be among the predisposing causes. The presence of this con¬ dition is indicated by interference with nasal respiration, resulting in mouth-breathing, espe¬ cially at night, snoring, . restlessness, ((dead® voice, and often with considerable arrest in the progress of physical development. With these symptoms are frequently found narrowing of the nasal orifices, attacks of middle-ear suppu¬ ration and narrowing of the chest-walls. En-

largement of these glands is considered to be extremely detrimental to child-life, and com¬ plete removal by operation offers the only means of cure and should always be done.

Pharynx. — The pharynx is that portion of the upper respiratory tract bounded above by the soft palate and below by the upper borders of the larynx and oesophagus. The uvula, when normal, should be about three-eighths of an inch long. It is occasionally bifid, and when it is greatly relaxed or enlarged the condition is described as elongation of the uvula. The uvula may be subject to inflammations, ulcer¬ ation, tuberculosis, syphilis and oedema. The same may be said of the soft palate, which is also subject to adhesions, in which there is an attachment or adhesion between the soft palate and the posterior wall of the pharynx. Adhe¬ sions of this character are due to the ravages of syphilis.

Tonsils. — The tonsils are a series of glands known as (1) the pharyngeal or Luschka's ton¬ sil, also called adenoid vegetation; (2) the fau¬ cial

tonsils, located on either side of the phar¬ ynx between the faucial pillars; (3) the lingual tonsils, a series of glands at the base of the tongue. Taken as a whole, they nave been known as Waldeyer's ring. A visible hyper¬ trophy or enlargement of any one of the series is usually accompanied by similar enlargement of the others. They form a part of the nor¬ mal anatomical structures of the locality and, when diseased, call for operative interference.

The faucial tonsils are located between the anterior and posterior faucial pillars and nor¬ mally are not visible to the eye. The lymphatic structure, however, is liable to pathological changes resulting in enlargement or hypertro¬ phy. The enlargement may be slight, but the tonsils may become so much enlarged that they meet in the median line of the pharynx. The enlargement becomes much aggravated during the attacks of the various acute inflammations which may occur in this region. The faucial tonsils are subject to acute inflammation occur¬ ring with general pharyngitis.

Tonsilar and peritonsilar abscess (quinsy, phlegmonous tonsilitis) is a suppurative in¬ flammation of the tonsil, accompanied by severe pain, fever and swelling in the tonsilar or peri- tonsilar region, resulting in formation of abscess.

Follicular tonsilitis (lacunar and cryptic tonsilitis) is an acute inflammation of the ton¬ sil attended with small fibrinous exudates in the crypts. It is accompanied by constant pain, chills, high temperature and is supposed to be due to exposure to cold, climatic changes and lowered vitality.

The causes of hypertrophied tonsils are chronic inflammation, inherited diathesis, gouty or rheumatic conditions, climatic influences and the infectious diseases of childhood. The con¬ dition is accompanied by interference with respiration, more or less difficulty in swallow¬ ing, involvement of the Eustachian tube, anae¬ mia, languor and retarded physical develop¬ ment, all these symptoms being aggravated by the recumbent position.

More recent investigation of diseased ton¬ sils in adult life have shown that even when these organs are not particularly enlarged, they may be the seat of chronic infective processes, particularly chronic peritonsilar abscess.

Caseous tonsilitis is a condition resulting from acute or chronic inflammation of the ton¬ sils, in which the crypts show a tendency to fill up with various secretions. These masses show a tendency to ferment and form small foul¬ smelling caseous masses, which eventually squeeze out of the crypts. It has been found that muscular rheumatism and even attacks of pericarditis and appendicitis may originate from the tonsil. Modern

removal of this organ is known as tonsilectomy, an operation which is usually performed under general anaesthesia. This operation means the complete removal of the organ with its sac thus opening up any blind abscesses which may lie underneath. Various methods are employed in the performance of this operation.

Mycosis of the tonsil and pharynx is an affection characterized by the development of small yellowish-white, clearly defined masses forming around the tonsilar crypts and fre¬ quently extending over the surface of the pharynx and the glands at the base of the tongue. It is supposed to be caused by Lepto- thrix buccalis.

Fish-bones, pins and other foreign bodies occasionally find lodgment in the tonsil-crypts.

Lingual tonsil is made up of a mass of adenoid tissue located between the circumval- late papillae at the base of the tongue and the attachment of the epiglottis.

Disease of the Pharynx (acute inflamma¬ tory diseases of the pharynx, acute catarrhal pharyngitis), an inflammatory process, catarrhal in character, results from exposure to cold, and is usually attended with a like condition in the nose and larynx. It may also be due to gastric disorders and lowered vitality. There are many contributing causes, among which may be men¬ tioned the exanthemata, bad ventilation, bad hygiene, insufficient clothing, overindulgence in alcohol and tobacco, and the inhaling of nox¬ ious gases. The disease is indicated by a cer¬ tain dry painful condition of the pharyngeal walls, congested vessels, swelling and some¬ times cedema. Later on the dryness gives way to a more or less profuse secretion gradually becoming more tenacious and mucopurulent.

Infective pharyngitis (hospital sore throat, phlegmonous pharyngitis) is an inflammatory condition, attended with more or less exudate, occurring in individuals who are exposed for a prolonged period to septic influences. It is fre¬ quently found in the throats of physicians and nurses who care for diphtheria and scarlet- fever patients.

Croupous or simple membranous pharyngitis is an inflammation of the pharynx or tonsils at¬ tended with the development of a false mem¬ brane without the presence of any specific germ. Clinically the disease resembles diphtheria, but is in no sense to be considered as the same. (See Diphtheria). A positive diagnosis can be established only by bacteriological examina¬ tion.

Ludwig's Angina. — This is a suppurative cellulitis occurring in the tissues

of the neck, due to secondary infection from within the throat. Diphtheria, scarlet fever and grip may be mentioned as exciting causes.

Chronic Inflammatory Diseases. — Simple chronic pharyngitis (clergyman's sore throat) is an inflammation of the pharynx resulting either from frequent acute inflammations or

f rom overuse of the voice. Public speakers and singers are peculiarly liable to its development. It may also result from lesions of the liver, kidneys, lungs and heart, or from the use of stimulants. The marked symptoms are hyper¬ emia or congestion, with dryness, hoarseness and a feeling of throat-tire.

Follicular pharyngitis (granular pharyngi¬ tis) may be defined as an inflammation in which the granular structures of the pharynx become chiefly involved. It is accompanied by noarse- ness, irritation and cough, together with the appearance on the posterior wall of small granular enlargements. The disease is sup¬ posed to result either from voice-strain or im¬ proper vocalization.

Atrophic pharyngitis (dry pharyngitis, pharyngitis sicca, atrophic pharyngitis) may be defined as a chronic inflammation resulting in pathological alterations in the structure of the mucous membrane of the pharynx and impair¬ ment of the muciparous glands. The disease is attended therefore by perverted secretion, with a burning, itching sensation in the throat, and extreme dryness. It is usually accompanied by atrophy of all the membranes of the upper respiratory tract.

Rheumatic pharyngitis (gouty sore throat, rheumatic sore throat) is an affection that may be acute or chronic, and is due to the presence of some irritant in the blood. The uric-acid diathesis may be considered an exciting cause, and the disease responds to antirheumatic or antigout treatment.

Tuberculosis of the pharynx is a rare in¬ volvement, always secondary to pulmonary tuberculosis. Its presence is indicated by the formation of small tubercles upon the soft palate or pillars of the fauces. A positive diagnosis may be made by microscopical ex¬ amination of the secretions.

Syphilis . — All three forms of syphilitic lesions may appear in the pharynx. The pri¬ mary lesions are occasionally found upon the tonsils or other surfaces of the pharynx in the form of chancre. The mucus-patch is usually present at some period during the history of every case. The tertiary

lesion or gumma may also develop in any of the pharyngeal struc¬ tures. often resulting in extensive ulceration and adhesion.

Glanders. — An infectious disease due to the Bacillus malles, and communicated to man from animals, usually horses.

Retorpharyngeal Abscess. — A suppurative inflammation in the posterior wall of the pharynx resulting in the development of ab¬ scess, which may burrow upward or down¬ ward, causing serious danger to life. The pri¬ mary infection is usually due to inherited tuber¬ culosis or syphilis.

Foreign Bodies in the Pharynx. — – The ex¬ posed location of the pharynx, with its irregular surfaces, renders it peculiarly liable to the lodg¬ ment of foreign bodies. Among those rather frequently observed are fish-bones, pieces of other bone, shells, coins, pins, needles, sharp objects of various kinds, false teeth, etc.

The Larynx. — That section of the upper respiratory tract which occupies the space be¬ tween the root of the tongue and the upper end of the trachea is called the larynx (q. v.). It is subject to a variety of diseases, among which

are malformations and deformities. Con¬ genital deformities in the larynx are rare. Congenital stenosis is a narrowing of the calibre of the larynx due to the formation of webs or bands stretching across the interior. Acquired stenosis is due to cicatricial contrac¬ tion, traumatism, or syphilis. Tubercular ulceration may also be mentioned as a cause of stenosis of the larynx.

Acute catarrhal laryngitis (spurious croup) is an acute inflammatory process involving the mucous membrane of the larynx and attended with hoarseness, dryness and slight dyspnoea. The disease is caused by cold, exposure, gastro¬ intestinal disturbances, nasal obstruction, bad ventilation, inhalation of irritating gases and overuse of the. voice. There is usually slight fever, cjugh and in the later stages consider¬ able expectoration.

Acute laryngitis in children (spasmodic croup, false croup) does not differ in etiology and pathology from ordinary acute laryngitis. The symptoms, however, are much more marked. The small calibre of the larynx in childhood, together with the greater elasticity of the tissues, renders the condition more serious. The engorgement is more rapid, and the symp¬ toms of suffocation rapidly develop. The pe¬ culiar stridulous breathing, with frantic respira¬ tory efforts and a hoarse barking cough, gives the disease an appearance of unusual severity. The disease usually continues

for three days, and is relieved by steam-inhalations, emetics, and laxatives.

For spasm of the glottis see Laryngismus Stridulus.

Acute epiglottiditis, inflammation of the epiglottis, is rarely entirely local except when due to swallowing an irritating substance. It is usually associated with inflammation of con¬ tiguous membranes. The chief symptom is a burning, smarting sensation, with a tendency to oedema.

CEdema of the larynx is an acute inflam¬ mation of the larynx accompanied by serious in¬ filtration of the tissues, and resulting in marked interference with respiration.

Rheumatic laryngitis (laryngeal rheumatism, gouty sore throat) is an acute laryngitis di¬ rectly traceable to a rheumatic or gouty dia¬ thesis.

Membranous laryngitis (true croup, mem¬ branous croup, diphtheritic croup, fibrinous croup, croupous laryngitis, laryngeal diph¬ theria) is an inflammation of the mucous mem¬ brane lining the larynx, manifesting the appear¬ ance of true diphtheria, but usually without the presence of Klebs-Loffler bacilli. Various forms of pathogenic bacteria are usually present. It may occur at any season of the year, and clinically it approaches so nearly to diphtheria that a positive diagnosis is most difficult. Many observers believe the condition to be exceedingly rare, and that true diphtheria is nearly alwdys present wherever true mem¬ brane is found in the larynx.

Laryngeal diphtheria, without the presence of membrane in the pharynx or nose, some¬ times occurs, the symptoms being quite similar to membranous laryngitis. The characteristic odor, however, is usually present, and the Klebs-Lbffler bacilli mav be found.

Hemorrhagic laryngitis may occur as a re-

suit of acute laryngitis, or from syphilis, tuber¬ culous or malignant disease, or from rupture of a blood-vessel.

Simple chronic laryngitis (chronic catarrh of the larynx) is an inflammation involving both the superficial and deeper layers of the mucous membrane, with more or less of tissue- changes. The disease is supposed to result from repeated acute attacks. A subacute va¬ riety may be mentioned, but it cannot be clearly defined beyond stating that it is the commence¬ ment of the _ chronic form. Among other causes are the

inhalation of irritating gases or dust, nasal obstruction and improper use of the voice. The marked symptoms of this condition are hoarseness, a tickling sensation, with a tend¬ ency to clear the voice, slight cough, with con¬ siderable secretion and occasional loss of voice.

Dry laryngitis (laryngitis sicca, atrophic laryngitis, laryngeal ozaena) is always associated with a similar condition in the nose and naso¬ pharynx, the S3rmptoms of which have all been described.

Anaemia of the larynx, when marked, is usually a local manifestation of general anaemia.

Singers' nodules (chorditis tuberosa, tra¬ choma of the vocal chords) are new-growth for¬ mations appearing on the margin of the vocal chords and usually at the junction of the middle and anterior thirds. They are small oval masses, sometimes developing upon both chords, While resulting from inflammation, the exciting cause is no doubt the improper use of the vocal apparatus. There is marked interference with phonation and sometimes complete loss of voice. Treatment consists either of rest or the adop¬ tion of a system of vocal exercises which bring other series of muscles into activity. Local astringent applications have been employed.

Syphilis of the Larynx. — Both secondary and tertiary lessions of syphilis may appear in the larynx, mucous patches, however, being somewhat rare. The tertiary stage is of com¬ parative frequency, and is manifested by the development of gummata, with destructive ulceration and subsequent cicatrization.

Tuberculosis of the Larynx. — This dis¬ ease, also called consumption of the larynx, consumption of the throat, laryngeal phthisis and tubercular laryngitis, is a specific inflam¬ mation of the larynx, the direct result of the tubercle bacillus. Tuberculosis of the larynx is rarely, if ever, a primary affection, and usu¬ ally occurs as a manifestation of general tuber¬ culosis. It begins with the development of minute miliary tubercles in the larynx, which eventually result in large swellings of the arytenoid cartilages. These subsequently break down, forming large ulcerations. Great suffer¬ ing results, with dysphonia, dysphagia, continu¬ ous irritation of the larynx, progressive hoarse¬ ness and irritating cough with excessive ex¬ pectoration. In the late stages hemorrhage may occur. This form of tuberculosis is rapidly fatal, with but little hope of the patient's re¬ covery.

Foreign Bodies in the Larynx. — Acci¬ dental entrance of foreign bodies into the larynx occasionally occurs. Foreign bodies usually enter during the process of swallowing, speaking or breathing. The resulting danger depends much upon the character and size of the foreign body and also upon its

location.

Liquid food and even small portions of solid food are usually dislodged with little difficulty unless the entire calibre of the larynx is shut off. Foreign bodies may usually be seen by the ordinary methods resorted to for examining the interior of the larynx. They are removed by extraction by way of the mouth and larynx or by external operation. Unfortunatelv the masses are sometimes drawn beyond the larynx into the bronchial tubes with fatal results, un¬ less they are removed by bronchascopy.

Neuroses of the Larynx. — Of the various laryngeal symptoms sometimes resulting from impaired nerve-supply or from brain-lesions is spasmodic cough. This occurs more frequently in persons of neurotic type, although it may be of reflex origin. Anaesthesia, paraesthesia and hyperaesthesia of the larynx may be mentioned under this type of affections.

Hysterical aphonia is usuallv described as a sudden and complete loss of voice, occurring in unmarried females. The immediate existing cause is usually shock, fright, anger or some other sudden emotion. The condition may re¬ main for some time and recovery may be sud¬ den and unexpected and without treatment.

Laryngeal Vertigo. — This is a neurosis in which the dominant symptoms are a sudden strangling cough with vertigo and momentary loss of consciousness. It is a rare affection, and is usually associated with acute or chronic inflammation of the larynx, strongly influenced by fatigue or nervous excitement. The disease quickly responds to treatment.

Paralysis of the Vocal Chords. — Temporary interference with the nerve-supply of the vari¬ ous muscles controlling the larynx, especially from local causes, is not infrequent. The paralysis following diphtheria and accidental poisoning is typical. A more severe form re¬ sults from pressure from aneurism, cancer, phthisis and syphilis. But lesions of the brain are by far the most destructive in results. Paralysis in this location may be either motor or sensory. Bilateral paralysis of the superior laryngeal nerve is both motor and sensory in character. The gravity of these conditions de¬ pends upon the cause. Bilateral abductor paralysis, on account of the approximations of the vocal chords without the muscular power to separate them for proper inhalation, is dan¬ gerous to life, inasmuch as a fatal attack of dyspnoea may occur at any time.

Bronchascopy. — This is an operation de¬ vised to remov'e foreign bodies from the bronchial tube and larynx. Metal tubes of various sizes are employed for this purpose. These are of various sizes and are illumin¬ ated by specially devised electric lamps.

Intubation of the Larynx. — This process was devised and perfected by the American physician, Joseph O'Dwyer. It consists in placing a hollow tube within the larynx for the purpose of relieving dyspnoea. Intralaryngeal tumors sometimes tend to occlude the lumen of the larynx and intubation is resorted to for the relief of the attendant dyspnoea. Intubation also serves as a method of relief in cases of laryngeal stricture. The operation is never at¬ tempted unless the patient's life is threatened by occlusion of the larynx or sudden spasm. The most common disease giving rise to the necessity for intubation is diphtheritic laryn¬ gitis.

Suspension Laryngoscopy. — Suspension laryngoscopy is a procedure by means of which the curved road from the teeth to the vocal chords can be converted into a straight one so that through the wide open mouth a direct view of the larynx can be obtained, so that the operator is left with both hands free for manipulation and operative work. This pro¬ cedure is carried out by means of an elaborate mechanical outfit and is not applicable to ordi¬ nary office work.

Tracheotomy. — An operation whereby an external opening is made into the trachea be¬ low the larynx, through which a tube known as the tracheotomy-tube is inserted. It is per¬ formed for the relief of any obstruction to breathing. The site selected for entrance into the trachea may be high or low according to the nature and location of the obstruction.

Operations on the Larynx. — Thyrotomy consists of splitting the thyroid cartilage in the median line for the purpose of opening the larynx and removing growths or foreign bodies. Laryngectomy is an operation for the complete removal of the larynx and is performed only in case of malignant growth. In cases where only part of the larynx is removed it is called partial laryngectomy. An artificial larynx is an instrument which in certain cases may be in¬ troduced after a laryngectomy and which serves to fulfil some of the functions of the larynx.

Consult Phillips, 'Diseases of the Ear, Nose and Throat) ; Wright and Smith, 'Diseases of the Nose and Throat.)

Wendell C. Phillips,

Surgeon to the Manhattan Eye, Ear and Throat Hospital.

NOSEBLEED, hemorrhage from the nose: epistaxis. This is the most frequent form of bleeding from a mucous membrane. It may be caused by

direct injury, as by a blow upon the nose, a scratch within the nostril, etc., or may result from ulceration or other morbid growth in the nasal cavity. It is also of frequent occur¬ rence in gunners, caused by the severe concus¬ sion of heavy firing. It is most common in children and young adults. When an active hemorrhage, it may be preceded by a feeling of tension and heat in the nostrils, pain in the forehead, giddiness, buzzing in the ears, flush¬ ing of the face. These symptoms are seldom all present in the same case, and in many in¬ stances the flow of blood is not preceded by any apparent disorder. Nosebleed may also be of a passive character, as when due to a mor¬ bid state of the blood, for example, in typhoid fever, scarlet fever, purpura, scurvy, etc., or to obstruction of the circulation by disease of the heart and liver. In persons advanced in life it must be more cautiously interfered with than in the young. If the person so affected is plethoric, the hemorrhage is evidently of an active character, and is a natural relief. Usually it will stop by the clotting of the blood in the nostrils or upon pressure of the wing of the nostril against the nasal septum. It may, however, go to an extreme extent and require other means for checking. There are many methods of affecting this, but the application of cold water, snow, ice, etc., to the forehead, spine or other parts of the body is the most general. Raising both arms suddenly above the head has been said to stop the flow quickly; or

a small quantity of solution of alum, as stiong as it can be made, may be thrown up wilh a syringe or a piece of linen soaked in the solu¬ tion may be stuffed up the nostrils. From 10 to 15 drops of dilute sulphuric acid may be given in water at intervals, according to the nature and persistence of the attack. The ap¬ plication of cotton or a sponge, tannin, alum, etc., may be necessary under direction of a physician, who, in desperate cases, is needed for discovering the bleeding-point, and by whom plugging of the nostrils may be resorted to. Recently anti-pyrin has been used with very great success. It is dissolved in water, about 10 grains to the ounce. Another efficacious remedy is the extract of suprarenal glands used in strong solution. With both these remedies cold water is used to free the bleeding cavity of clots; when this has been effected about half an ounce of one of these solutions is in¬ sufflated and retained in the nose as long as possible. Consult 'Reference Handbook of the Medical Sciences) (Vol. IV, pp. 68-70, New York 1914).

NOSKOWSKI, nos-kof'ske, Sigismund,

Polish composer: b. Warsaw, 1846; d. Wies¬ baden, Germany, 1909. After studying at the Warsaw Musical Institute in 1864-67 he went to Berlin to study under Kiel and Oscar Raif. In 1876 he became conductor of the Bodau So¬ ciety in Constance. In 1881 he returned to Warsaw as director of the Musical Society. He became professor in the Warsaw

Conservatory in 1888, second kapellmeister of the Warsaw Philharmonic in 1904, and of the Warsaw opera in 1906. His opera, 'Livia, was brought out in Lemburg in 1898. He also wrote symphonies, ballet-music, an overture, string-quartets and piano music. Noskowski also invented a musi¬ cal notation for the blind.*

NOSOLOGY, in medicine, that science which treats of the systematic arrangement or classification and nomenclature of diseases. Many systems of nosology have been in use at different times, some of which have been founded on the nature of the ascertained cause of disease ; others on the pathological conditions which attend diseases ; and still others on the differences between structural and functional diseases and so on. In fact different systems will always be required for different uses. Recent progress in bacteriology has necessitated modifications in nosological methods, and future advancements will do the same, while the meth- • ods of modern medicine lead to such classifi¬ cations as best suit the requirements of scientific knowledge applied in ordinary practice. See Disease — Classification of Diseases.

NOSSAIRIANS, nos-sa'ri-anz (Arabic for Nazaraeans), a subdivision of the Shiites, or fol¬ lowers of Ali, who hold that God has incor¬ porated himself with some of their prophets, particularly with Ali, and Mohammed ben- Hamsiah, his sqil The Nossairians are charged with borrowing this doctrine from the Chris¬ tians who teach the incarnation of God in Christ, hence they nickname them Nazaraeans. Consult Broughton, 'History of Religions. > See Mohammedanism.

NOISSI-BE, nos-se-ba', a volcanic island off the northwest coast of Madagascar, about 14 miles long and eight miles wide; area 130

NOSTALGIA (Greek, ˆhomesickness®), a feeling of depression and anxiety due to ab¬ sence from home or country. The victim of this disease is possessed with the desire to return, and often filled with apprehension and despair when the desire is without early pros¬ pect of being gratified. The condition is apt to be attended by loss of sleep, loss of appetite, often by emaciation and various forms of phys¬ ical malady, while the psychic disturbance sometimes leads to melancholia ending in mania and death. Nostalgia is especially liable to occur in cases of unwilling absence from home, as those of conscripts, etc. Even soldiers volun¬ tarily serving far

from home are often great sufferers from this disease, insomuch that army medical officers have come to recognize it in its extreme severity as a disability warranting fur¬ lough, or even discharge, in order to save the patient's life. This aspect of nostalgia was impressively illustrated in the United States army both in the Philippines and in Europe.

NOSTRADAMUS, nos-tra-da'mus (true name Michel de Notredame), French physi¬ cian and astrologer : b. Saint Remv, Provenge, 14 Dec. 1503; d. Salon, 2 July 1566. He was of Jewish descent, studied first at Avignon, and then at the medical school of Montpellier, and after taking his degree acted for some time as a professor, but afterward settled as a medical practitioner at Agen. Finally, after traveling in Italy, he established himself at Salon, near Aix, about 1544, where he wrote his famous

'1842).

NOSTRILS. See Nose and Throat; Nose¬ bleed.

NOSTRUM, a derogatory term for quack remedies and medicines and for certain pat¬ ented remedies which have proved worthless or injurious.

NOTA, no-ta, Alberto, Italian dramatic poet: b. Turin, 15 Nov. 1775; d. there, 18 April 1847. He was carefully educated, and after studying law practised for a long time as an advocate and held important appointments under government until the political circumstances of Italy obliged him to retire from public life. The comic element is weak in him, the plot usually very simple and the events taken from ordinary life. On the other hand he excels particularly in his delineations of character and most irregular natures are presented with ex¬ traordinary skill. Of his numerous dramas (La

Fiera> (1826), a graphic and amusing descrip¬ tion of manners, is perhaps the best. Among others may be named (I1 Filosofo celibe) (1811) ; (.La novella sposa) (1826) ; HI Tor¬ quato Tasso' (1826). Twelve editions of his works appeared between 1816 and 1843, the last Italian edition, (Comedie di Alberto Nota' (8 vols.), appearing in 1842-43.

NOTA.BLES, Assembly of, in French his¬ tory, signifies the deputies of the states who were appointed and convoked by the king. It had no legislative or executive powers, and did not, like the states-general (q.v.) set up consti¬ tutional claims. In the early history of France mention is several times made of the notables, but the first assembly of any importance was in 1554. From 1626 no such assembly was again called, till in 1786 the minister and comptroller- general, Calonne, conceived the idea of sum¬ moning the notables for the purpose of effecting several arrangements

which he considered necessary, and there were accordingly assem¬ bled 7 princes of the blood, 9 dukes and peers, 8 field-marshals, 22 noblemen, 8 counsellors of state, 4 masters of requests, 11 archbishops, 37 chief justices, 12 deputies, the civil lieutenant and 25 magistrates of the different cities of the kingdom, making in all 144 persons. This as¬ sembly forms an epoch in the modern history of France. A second meeting of the notables was called in November 1788 to consult on the man¬ ner of assembling the states-general and was dismissed on 12 December.

NOTARY, or NOTARY PUBLIC (Latin notarius, from nota, mark), originally denoted, with the Romans, those slaves or freedmen who acted as stenographers (making use of certain abbreviations, signs, notes), particularly in the meetings of the senate. In later times the notarii were the secretaries of public authorities. From the Romans the name passed over to the nations of Western Europe, and in modern times a notary is a witness, appointed as such by government, whose testimony is in some cases useful to give credibility to instruments; in other cases is required by law to give them full validity, as, for instance, in protests of bills of exchange, etc. In France the impor¬ tance of the notary was, and still is, greater than anywhere else. He is not only a public witness for every one who wishes his testimony, but he is also the great witness of government. He makes all contracts, mortgages and other deeds and conveyances where the property in question amounts to more than 150 francs.

In Great Britain and the United States a notary public is a person who publicly attests deeds or writings to make them authentic in another country, but he principally acts in busi¬ ness relating to commerce, makes protests of bills of exchange which are not accepted or not paid; attests the statements of masters of ships in regard to the damage which their vessels have suffered, etc. In England they are ap¬ pointed by the Archbishop of Canterbury, in Scotland by the Court of Session. In the majority of the States of the Union they are appointed by the governor; in others by the governor with the advice of the council and in the District of Columbia by the President, and they derive their particular powers from statute provisions. In Rhode Island they are elected annually by the general assembly, . In New

York the statute which defines their powers in respect to foreign and inland bills, drafts and notes, confers upon them the further authority <(to exercise such other powers and duties as by the law of nations and according to commercial usage, or by the law of any other State, gov¬

ernment or country, may be performed by pub¬ lic notaries.® In New Hampshire, in addition to the usual powers of the office, notaries may take depositions, and acknowledgments of deeds be¬ fore them have the same validity as those made before justices of the peace. Similar provisions are found in the statutes of Connecticut and Rhode Island. In New York State women are occasionally appointed notaries by the Governor. They cannot act in cases in which they are interested.

NOTATION, Arithmetical, any mode of designating number by marks or figures. See Numerals; Arithmetic, History of; Deci¬ mal Fraction.

NOTCH, The. See Crawford Notch.

NOTE, (1) in law and business. (See Promissory Note). (2) In music a character which, by its place on the staff, represents a sound, and by its form determines the relative time or continuance of such sound. See Music.

NOTHING TO WEAR, title of a poem, by William Allen Butler (1825-1902), a well- known New York lawyer, satirizing the frivol¬ ity and extravagance of the American women. This verse, which begins ((Miss Flora McFlimsy of Madison Square,® published anonymously in Harper's Weekly in 1857, had a wide circula¬ tion and was translated into French and Ger¬ man.

NOTHOSAURUS, a genus of small sau- ropterygian reptiles, allied to the plesiosaurs and the type of a family (N othosaurides) which in¬ cludes several genera confined to the Triassic period, and prevalent as fossils in the Old World, especially in the German Muschelkalk formation. Their necks were long and termi¬ nated in an elongated skull with crocodile-like jaws armed with strong teeth; the limbs were comparatively long and slender. Their height exceeded nine feet six inches. Consult Zittell-Eastman, (Text-book of Palaeontology) (Vol. II, 1902).

NOTICE, (1) information, warning, or intelligence given in any manner, as by personal service; also, the instrument itself by which notice is given. Originally notice meant knowl¬ edge, surviving in the legal phrase judicial no¬ tice, signifying the acceptance by courts of the verity of well-known events or facts without the necessity of proof. There are two kinds of notice — actual and constructive. Actual notice is reliable information directly communicated either orally or in writing to the person to be charged. Constructive notice is such knowl¬ edge as the law presumes to exist, even if never communicated to the person to be charged. Thus in the case of property deeds which have been recorded in compliance with statute, such records are held to be constructive notice to all mortgagors, purchasers, etc.

A notice of dishonor of a negotiable instru¬ ment fixes the liability of an indorser thereof, and must be given usually not later than the day following, unless, after due diligence, the

indorser cannot be found. It may be oral or in writing, and must give a description of the dis¬ honored investment.

Notice must be given, in certain cases, by a landlord to terminate a tenancy, as one from year to year or at will. Usually this is fixed by statute.

If a person acquires land with notice of a prior equitable right, he cannot defeat that right by acquiring the legal title. On the other hand, if he acquires such land without notice of facts sufficient to put him on inquiry he will be protected.

If a creditor assigns a debt, the assignee must give the debtor notice, and if he does not do so, the debtor will be protected if he pays the assignor and not the assignee.

Notice is often required by statute in certain cases, as notice by a plaintiff to a defendant of an action to be brought, notice by advertise¬ ment instead of personal service, notice given by one person to another in a proceeding to pro¬ duce written instruments in his possession or subject to his order, etc.

Notice is important in pleading, as where notice is necessary to fix a liability, it must be pleaded in the declaration or complaint of the plaintiff as having been given.

In cases of insurance on ships, a notice of abandonment is frequently necessary to enable the assured plaintiff to proceed as for a total loss when something remains to be saved, in relation to which, upon notice, the insurers might themselves take their own measures. Bouvier's Law Diet. (1914 ed.) s.v.

As a general rule, notice to the agent in the same transaction is notice to the principal, but there are exceptions to this. For example, if an agent is acting adversely to his principal, his knowledge is not held to be the knowledge of his principal, and likewise a principal cannot be held responsible for the knowledge of his agent when it is not the duty of the agent to com¬ municate such knowledge to his principal.

NOTKER, not'ker, two Swiss monks, of the monastery of Saint Gall. Saint Notaer Balbulus (the Stammerer) : b. Thurgau, about 840; d. Saint Gall, 6 April 912; is best known for his adoption of the simple Roman or

Gregorian chants, and for his words for many sequences, the most famous being (Media vita in morte sumusB He was canonized 1513. Notker Labeo (Thick Lipped; sometimes called ˆTeutonicus,® the German); b. about 950; d. 1022; founded a great school of translators, who, working under his name, translated into German Boethius, the Psalter, etc., and thus left important documents for the study of Old High German in the 10th and the 11th centuries. The version of Labeo and his school are edited by Piper (1883-84). Consult Kelle, (Die Sankt Gallen deutschen Schriften und Notker Labeo)

(1888).

NOTO, Sicily, a city and episcopal see. three miles, from the Mediterranean, and 27 miles by rail southwest of Syracuse. Its chief buildings are a fine cathedral and town hall. It. has manufactures of olive oil, vegetable fibre, wine and macaroni, and quarries of limestone. Noto dates from 1703, when it replaced the ancient Netum, overthrown in 1693 by an earth¬ quake. Pop. of commune, 31.625.

NOTOCHORD, or CHORDA DOR¬ SALIS, a rod of gelatinous tissue forming me main skeletal axis in the young of all Chordata (q.v.) and in some persisting as the only support of the body throughout life. It arises in development from the mid-dorsal line of the entoderm (see Embryology), becomes cut off from this parent layer and comes to lie as a continuous unsegmented structure between the digestive tract and the central nervous sys¬ temˆ Around it is formed an envelope, the notochordal sheath, and in the vertebrates the bodies or centra of the vertebrae arise. In the lower vertebrates parts of the notochord persist throughout life (for example, filling the cavi¬ ties in the ends of the vertebrae in fishes), but in the higher forms the notochord is almost en¬ tirely replaced by bone and the inter vertebral ligaments, the sole remnants of this structure in man being the so-called nucleus pulposus of these ligaments. See Amphioxus : Ascidian.

NOTOGZEA, no'to-je'a (ˆsouth-earth®) , a name derived from two Greek words notos, south, and gala, earth. Notogaea was used to describe the great faunal region that embraces the whole Southern Hemisphere with the ex¬ ception of Africa. It originated with Huxley in 1868 who thought that Australasia and South America, two remote continents peculiarly re¬ lated by the fact that marsupials (kangaroos, etc.) are found in both and not elsewhere, could be described as one zoographical region. The word notogaea, therefore, connects these two continents and makes them one for

purposes of study and classification of fauna. It is believed that in ancient times there was no ocean be¬ tween these two continents and that the land was continuous. Notogaea is sometimes used as the equivalent of the Neotropical region — Cen¬ tral America and the Antilles ; but is not in general use.

NOTONECTIDZE. See Fresh-water In¬ sects.

*NOTORNIS, a genus of gigantic rail-like birds of the South Island of New Zealand with¬ out the power of flight. The genus was first known by fossil remains named Notornis man- telli. Subsequently living examples were found, the last of which is preserved at Dunedin ; but it is supposed that none now exist. Norfolk Is¬ land formerly had another species, pure white, but it was exterminated by early white visitors to the island; the skin of one is preserved in Vienna. Consult Newton, dictionary of Birds**

(1896).

NOTOTHERIUM, a genus of fossil mar¬ supials found in Upper Pliocene deposits in South Australia, allied to Diprotodon (q.v.) but smaller.

NOTRE DAME, Cathedral of. See Paris.

NOTRE DAME, no'tr dam, University of,

a Roman Catholic institution in charge of the Fathers of the Holy Cross, at Notre Dame, Ind. It was founded in 1842 and chartered two years later. It has 13 full collegiate courses besides courses in art and music. The courses lead to the degrees of A.B., B.S., Ph.B. and B.L. The equipments for all laboratory and applied science work are exceptionally good; the science build¬ ing and furnishings are valued at $500,000. The departments of natural science received great assistance in their foundation work from the

personal attention of the scientist, Very Rev. J. A. Zahm (q.v.). The frescoes and a number of the oil paintings are by Gregori, and are of remarkable beauty and power. To encourage good works along spiritual and intellectual lines, the university presents each year a medal called the <(Laetare Medal® to some Roman Catholic lay¬ man or woman who has done some special good work for the benefit of humanity. Two regular publications are issued from the university, but one, Ave Maria, is not a distinctively univer¬ sity periodical. Affiliated with the university are several schools for the brothers, novices and young priests of the Congregation of the Holy Cross, and on the grounds is the Provincial House of the Order for the United States. The university has also several preparatory schools in different parts of the United States. There are connected with the university an average of 80 professors and instructors;

900 students. The library contains 65,000 volumes, and 10,000 other volumes in departmental libraries. The scientific apparatus, machinery and 20 buildings with their furniture are valued at $2,800,000; and the grounds at $400,000.

NOTRE-DAME DE PARIS, by Victor Hugo (1831), is the most important historical novel of. French 19th century romanticism. Written in hot haste in the course of a few weeks, it is almost bewildering in its wealth of vocabulary and flow of language. Yet the plot, placed in the 15th century, is slender and un¬ real. It tells the story of a gypsy girl, Esme¬ ralda, in love with a worthless young captain, Phoebus de Chateaupers, and herself loved by the priest, Claude Frollo, and the hideous hunchback bell-ringer of Notre-Dame, Quasi¬ modo. Esmeralda is falsely charged with the murder of Phoebus, Quasimodo kills his pro¬ tector, Claude Frollo, and fights the mob, not knowing that it has. come for his rescue. The novel is full of Victor Hugo's characteristic qualities and defects. It thrills by its melo¬ dramatic episodes and climaxes, but it bores at times, by its long descriptions and tedious di¬ gressions. The. characters are often marionettes or the mouthpiece for the author's views. It abounds in the antitheses dear to Hugo, whether between the elements of a human being's character, as the hideousness of Quasi¬ modo and the ardor of his affection and grati¬ tude, or between great human influences, such as are expressed in the often quoted (Ceci tuera celafl the printed book which destroys the spirit of medievalism and its architecture. It is, indeed, as an emotional reconstruction of the Middle Ages that the book has its chief merit. Victor Hugo has taken the old Paris Cathedral Church of Notre-Dame as the em¬ bodiment of the spirit of the oast. Not only does it seem itself, in the course of the work, to become instinct with life, but it has grouped about it the congested existence of the old 15th century town — its crowded confusion, its mystery-plays, court trials, executions, the King of France himself and the beggars and murderers of the Cour des Miracles. (Notre-Dame de Paris) is a sort of melo¬ dramatic prose epic of tremendous power and of many blemishes.

Charles H. C. Wright.

NOTT, Charles Cooper, judge; b. New York, 16 Sept. 1827; d. 6 March 1916. He was

graduated at Union College, of which his grandfather, the Rev. Eliphalet Nott, was president. He practised law in New York City until the Civil War began, when he was com¬ missioned captain in the Fifth Iowa cavalry. In the second year of the war lie became colonel of 176th New York Volunteers. He was captured while wounded at Brashear, La., and spent 13 months in a military prison in Texas. President Lincoln, of whom he was a close friend, appointed him a member of the United States Court of Claims and later President Cleveland appointed him chief justice of that court. He resigned in 1905.

NOTT, Eliphalet, American clergyman and educator: b. Ashford, Conn., 25 June' 1773; d. Schenectady, N. Y., 29 Jan. 1866. He was left an orphan at an early age, and was brought up by his brother Samuel in Franklin, where he taught to obtain means to enter college. He was graduated from Brown University in 1795 and entered the Presbyterian ministry the same year. After holding pastorates in Cherry Val¬ iev and Albany, N. Y., he became president of LInion College in 1804, where he remained till his death. This institution was then in its infancy with small funds and neither suitable buildings nor apparatus. He at once set about its rehabilitation and secured funds through a lottery permitted by act of the State legislature. He bequeathed to the university property worth $500,000. He invented the first stove for burn¬ ing anthracite coal and secured1 various patents on heating apparatus, through which means he amassed a large fortune. He published 'Coun¬ sels to Young Men5 (1810); 'Lectures on Temperance) (1847). His funeral sermon on the death of Alexander Hamilton was widely famous. Consult 'Memoirs) by Cornelius Van Santvoord, revised by Taylor Lewis (1876).

NOTT, Josiah Clark, American ethnologist and physician: b. Columbia, S. C., 24 March 1804; d. Mobile, Ala., 31 March 1873. In 1824 he was graduated at the South Carolina Col¬ lege and from the medical school of the Uni¬ versity of Pennsylvania in 1827. After further study abroad he established himself in Mobile, and in 1858 founded a medical school there, which became a branch of the State University. During the Civil War he was for a time on the staff of Confederate General Bragg. With G. R. Gliddon (q.v.) he wrote 'Types of Man¬ kind^ (1850) and 'Indigenous Races of the Earth) (1857), the purpose of which was to op¬ pose the theory of the unity of mankind. He was sole, author of 'The Connection Between the Biblical and Physical History of Man5 (1849); 'The Physical History of the Jewish Race5 (1850); 'Types of Mankind5 (1854).

NOTTEBOHM, ndt'te-bdm, Gustav, Ger¬ man composer: b. Liidenscheid. Westphalia, Prussia, 12 Nov. 1817; d. Gratz, Germany, 1 Nov. 1882. He served in the German army at Berlin in 1838-39, but continued his musical studies, and there formed a friendship with Schumann and Mendelssohn,

through the in¬ fluence of the latter obtaining his discharge from the army and becoming a composer of note. Among his works are 'Fin Skizzenbuch von Beethoven5 (1865) ; 'Studies on Beethoven5 (1873); 'Mozartiana5 (1880); 'Catalogue of the Published Works of Franz Schubert5

NOTTINGHAM, not'ing-am, Heneage Finch, 1st Earl of, English statesman: b. Kent, England, 23 Dec. 1621 ; d. London, 18 Dec. 1682. He was educated at Oxford, studied law and was admitted to the bar of the Inner Temple in 1645. At the Restoration his reputation as a lawyer raised him to the post of Solicitor-Gen¬ eral ; in 1661 he was elected member of Parlia¬ ment for the University of Oxford and was made a baronet, in 1670 became Attorney-Gen¬ eral, and in 1673 lord-keeper. He was made Lord Chancellor in December 1674, in wfiich office he showed remarkable ability and discre¬ tion. In the same year he was made Baron Finch, and in 1681 became Earl of Nottingham. His powers as an orator were highly rated; and Dryden has given to posterity his portrait in 'Absalom and Achitophel,5 under the char¬ acter of Amri. From his time dates the unques¬ tioned supremacy of the Commons over money bills;' and he has been called the "father of equity.55 He was imbued with a persecuting spirit toward the Non-Conformists.

NOTTINGHAM, England, a city and civic county, capital of Nottinghamshire, on the Leen, near its junction with the Trent, 124 miles northwest of London by rail. It occupies a picturesque site overlooking the Vale of Trent. The castle, which crowns the summit of a rock, rising 133 feet above the level of the Leen, was originally built by William the Con¬ queror as a means of overawing the outlaws frequenting the recesses of Sherwood Forest. Dismantled during the Protectorate, it subse¬ quently became the property of the Duke of Newcastle, who in 1674 erected a large mansion on part of the site. This, after being partly burned in riots connected with the reform movement in 1831, now contains the Midland Counties Art. Museum, free library, etc. The church of Saint Mary is a cruciform structure in the Perpendicular style. The Roman Cath¬ olic: Cathedral of Saint Barnabas was de¬ signed by Pugin. The principal educational and literary institutions are the University College and Technical School, High School for Boys, the Blue-Coat School, the School of Art, the Albert Hall and the Mechanics' Institute. An arbore¬ tum covering 18 acres is a feature of the town. The staple manufactures are cycles, hosiery and lace, the latter being a specialty. There are also manufactures of cotton, woolen and silk goods and of articles in malleable and cast iron. Nottingham was a place of import¬ ance in Anglo-Saxon times and was twice or thrice taken by the Danes. Charles I raised his standard here in 1642, and next year the town and castle were taken by the Parliamentarians. At Nottingham, Richard Arkwright first erected his spinning jenny. Serious riots, occasioned by the introduction of machinery,

took place in 1811-12 and 1816-17. Nottingham is the seat of a United States consul. Pop. 259,904.

NOTTOWAY (notWa) INDIANS, an

American tribe, of the Algonquin family, for¬ merly residing along the Nottoway River, in Virginia. They were very similar to the Tus- caroras of North Carolina.. In 1785 about 400 survivors of the tribe occupied a reservation of 27,000 acres. As late as 1827 they kept up a tribal organization in Southampton County.

NOTUS, the south wind or (more exactly) southwest wind.

NOUE

NOUN

461

NOUL Frangois de la, fran-swa de la noo French Huguenot captain: b. near Nantes, 1W1 ; d. Montcontour, 4 Aug. 1591. He was a membei ot an old Breton family, fought in Piedmont under Brissac, became a Protestant in 15ˆ7, and was one of Coligny's bravest lieu¬ tenants. In 1570, at the siege of Fontenay-le- Lomte, he was wounded in the left arm, and after its amputation wore an iron mechanism to hold the bridle, thus winning the nickname of <(Bras de Fer,® or «Iron Arm.® He fought in Flanders with great success from 1578 to" 1580, when he was captured by the Spanish. His five years of captivity were occupied with the com¬ position of his 26 (Discours politiques et mili- taires> (1587). He fought under Henry of Navarre at Senlis, Arques, Ivry and Lamballe, and was mortally wounded1 in the last fight. Consult the biography by Hauser (1892).

NOUGUES, nooga', Jean, French com¬ poser : b. Bordeaux, 1876. He early gave evi¬ dence of unusual talent by writing a good opera before he was 16. His father then sent him to Pans to study. His opera (Thamyris) (1904) was successful and was followed by (La Mort de Tintagiles> (1905); and in 1914 'L'eclaircieP He has also composed bal¬ lets' and pantomimes.

NOUMEA, noo-ma'a, Pacific Ocean, city and capital of the French colony of New Cale¬ donia, an island in the Pacific Ocean. 700 miles east of Queensland, Australia. Noumea is situ¬ ated on the southwestern coast; and, having an excellent harbor, is the chief port. Boats ply between Noumea and Sydney, Australia, and a railway runs to Bourail (90 miles). The ship¬ ping is quite large. Noumea possesses a tech¬ nical school and a branch of the Banque de l'lndo Chine. Pop. 8,961.

NOUMENON, noo'me-non (((a thing known"), a philosophical term put into currency bv Immanuel Kant (1724-1804). the German philosopher. According to Kant's philosophy the noiimenon is exactly the opposite of phe¬ nomena. Henry Sturt writes : ((The term is a relic of an early period of Kant's mental de¬ velopment. In his fully mature or critical posi¬ tion he held that the noumenal world was in¬ accessible to the speculative reason, and yet that we are not altogether excluded from it, since the practical reason, i.e., our capacity for acting as moral agents, assures us of the existence of a noumenal world, wherein freedom, God and immortality have a real place. The relation to noiimena to phenomena in the Kantian system is a most difficult one; and in view of the fact that the acutest intellects of Europe have been engaged vainly for more than a century in reconciling the various passages on the subject, the safest conclusion is that they are irreconcil¬ able. The course adopted by Kant's immediate successors in German idealism was to reject the whole conception of noiimena, for the reason that what is essentially unknowable has no ex¬ istence for our intelligence. Kant, however, protested against this development when it was propounded by Fichte, and held that he had pre¬ cluded it by his ˆrefutation of idealism.® He

stood unshakably to the belief in an absolutely real world behind phenomena. Kant saw, what so many of his successors failed to see, that the world as we know it is an expression of power ; and he could not imagine whence the power could come if not from a world beyond phe¬ nomenon.® See Kant.

NOUN, a word or name denoting a per¬ son, place or thing. It is one of the eight "parts of speech.® The word comes from the Sansksrit namen (name) and has passed with few changes into every language; for instance in Zend it is namen; Persian, nam; Afghan, nmn; Armenian, anum; Greek, onomar atos; Latin, nomen; Anglo-Saxon, nama; Scandi¬ navian, namm; etc.

In the childhood of the world, when people began to talk, they first tried to find sounds and words that would describe, or stand for, the persons, places and objects around them. As races advanced they tried to find names for emotions and abstract ideas. Proper names were derived from common names; in other words, a noun became a proper noun when a common name was applied to a particular person, or place, or thing. It is to the Greeks that we owe our (

Some of the older grammarians included the adjective under the noun, distinguishing their types of word as noun-substantive and noun-adjective.

Nouns have person, gender, number and case. There are three persons; first, second and third: (1) person speaking; (2) person spoken to; (3)

person spoken of. Gender is the distinction of sex. There are four genders : masculine, feminine, common and neuter. Masculine and feminine are self-explanatory. The common is used for such words as may be either male of female — parent, child, bird, cat, etc. The neuter gender denotes the name of objects which are neither male or female (book, chair, pencil, house). A notable ex¬ ception is ship, which is of the feminine gender.

Number shows how many persons, places or things are intended. Nouns have two numbers: Singular and plural. English nouns have three cases: (1) the nominative, the doer or agent (subject of the verb) ; (2) the possessive, de¬ noting possession or ownership; (3) the objec¬ tive, the object of the action, or relation. The plural of English nouns is usually formed by adding s or es to the singular. There are, how-

ever, several exceptions to the rule, such as foot, plural feet; tooth, teeth; mouse, mice; goose, geese ; cow, kine ; man, men ; woman, women ; child, children; ox, oxen. Some words, sheep, deer, etc., have the same spelling for both singular and plural. In Old English the plurals of a certain number of substantives (nouns) were formed by mutation of the root vowels as fot, fet, or boc, bac. In modern English this system of inflexion has been pre¬ served in some cases as foot, feet, and altered in other cases as book, books. Forms in er and en used earlier as plurals for nouns in English have almost entirely disappeared from the language. In Middle English, as in Modern English, oxen is the plural of ox, but eyen the plural for eye has disappeared.

Also in Middle English the suffix er existed in many words which had been originally of the neuter gender: the plural of child was childer, of calf calver, etc. The old plural of brother was brether.

Formation is always going on. One of the • ways by "which nouns grow is by the addi¬ tion of a suffix. One of the commonest Eng¬ lish suffixes used to make a diminutive is let, seen in the comparatively recent words like brooklet, streamlet, playlet. But the word is in reality a development of the older et (the French ette in helmet, banneret cygnet, etc.) Several of these forms, such as islet, circlet, eaglet, etc., were formed out of nouns which ended in 1. A comparatively new suffix is nist — tobacconist, etc. This is an extension of the old suffix (Greek, through Latin into French) ist, as in jurist, dentist, etc., seemingly due to words where the n belongs to the root part,

• — pianist, machinist, etc.

Consult, Ellis, A. J., (Early English Pro¬ nunciation 5 vols. (London 1869-89) ; Helfen- stein, J., (A Comparative Grammar of the Teutonic Languages* (London 1870) ; Maetzner,

(An English Grammar*, translated by C. J. Grece, 3 vols. (London 1874) ; Muller, F. Max, (Lectures on the Science of Language)

2 vols. 8th ed. (London 1875) ; Peile, J., introduction to Greek and Latan Etymology*, 2d ed (London 1872); Peile, J., (Primer of Philology-* (London 1877) ; Salverte, (History of the Names of Men, Nations and Places >, translated by Mordacque (London 1862), Sayce, A. H., introduction to the Study of Language*, 2 vols. (London 1880) ; Skeat, W. W., (Principles of English Etymology* (Oxford 1877) ; French, R. C., (English Past and Present1* 9th ed. (1875) ; and Whitney, W. D., (Language and the Study of Language*

2d ed. (London 1868).

NOURMAHAL, noor-ma-hal', <(Light of the Harem, ** the heroine of Thomas Moore's poem, The Light of the Harem, in

NOURSE, Edward Everett, American theologian : b. Bayfield, Wis., 24 Dec. 1863. He was educated at Lake Forest Academy and Uni¬ versity (1883-86), at Macalester College, Saint Paul (1886-87), and was graduated at Lake rorest University in 1888, and at Hartford theological Seminary in 1891. In 1894-95 he studied in the University of Jena. In 1895 he

returned to the United States to become pastor of the Second Congregational Church in Berlin, Conn., having been licensed to preach by the Chicago Presbytery in 1890, and ordained in the Presbyterian ministry in 1903. He remained in Berlin until 1898, when he became instructor in the Hartford Theological Seminary, holding this position until 1890, when he was made associate professor. In 1905 he became professor of biblical theology in the same institution, which he still (1919) holds. He is also lecturer on biblical theology in Mount Holyoke College. He is one of the editors of the Standard Dic¬ tionary of the Bible* ; a contributor to The Americana and other encyclopedias; and the author of (Brief Commentary on the Epistles of Saint Paul* (1911), reprinted under the title Selected Epistles of Paul* (1915).

' NOUVELLE FRANCE, noo-vel frans, or NEW FRANCE, the original name given to Canada (q.v.) by the early French settlers.

NOVA AQUIL.ZE, the name given to a new star which made its appearance 8 June 1918 in the constellation of the Eagle, in the southern stream of the Milky Way, almost on the Celestial Equator. It was first observed by Mr. W. F. Denning of Bristol, England, at 10 p.m. Greenwich mean time. Astronomers declared it to be the most brilliant temporary star that has shown in the firmament since the celebrated one of 1604, and that it was probably the product of a collision between two other stars thousands of years ago. Its brilliancy waned after a few weeks.

NOVA C.7ESAREA, the Latin name for New Jersey.

NOVA CONSTELLATIO COINAGE,

two silver coins proposed by Robert Morris in 1/83 for national coinage, but not accepted by the Continental Congress. They were called the Mark and the Quint. See Numismatics.

NOVA SCOTIA, no-'va sko'shi-a, one of the three mai itime provinces of the Dominion of Canada, comprises a long, narrow peninsula, on the eastern coast of North America, lying northeast and southwest, and the island of Cape Breton, separated from the peninsula on the northeast by the gut of Canso, 16 miles long and from mile to 2 miles wide, and Cheda-bucto Bay. Ihe dangerous Sable Island, sur¬ rounded by a sand bank on which many ships have been wrecked, is a dependency of Nova Scotia, from which it is distant about 90 miles in, ˆt. 43° 59′ N. at its eastern end, long. 59°

45 W. The whole province, including Cape Breton, lies between lat. 43° 25′ and 47° N and W 59" 40′ and 66° 10′ W. The greatest length of the peninsula is about 280 miles and its greatest width from 50 to 100 miles It is bounded north by the Straits of Northumber¬ land and the Gulf of Saint Lawrence, south and southeast by the Atlantic Ocean, and north¬ west by the Bay of Fundy. The island of Cape Breton, whose extreme length is 100 miles, ex¬ treme width 85 miles, is almost equally divided by an inland sea, the Bras D'Or Lake. The pemnsula has an area of 17,453 square miles, and Cape Breton 3,975 square miles, total, 21 – 428 square miles. Sable Island is 25 miles long and 114 wide, and consists of sand hills thrown up by the sea, on which grasses grow which

Xongitude West from Greeowich.

►nIhou>ie

CIIA LEURS BA

M

WKF.PiRian it at- 4

*■

Harbor

Thirds

Settlement

‘■ Fourth \Lake

‘PISIOP l Tfo/X^A

u r y vf’st-s^vci #c

Adams

Ttti-a-Gtmoht

SE /, ^Coffin I.

,/ry’*J ,ri’Grand Entry JUGUALF.S’ //Alright Island ,

> ISLANDS.- ‘XT-.-/

(cifc

“** Harbor n I 1 1

SSfflfflmfr

qdaleii Jslatid) 1

Limerick

Glonces&r Jc.

i. >

Black Brook

,QUI8ia1 it MTN/

Victor L.

Upsalquitc)

;d”Pin©

[ge River,

Etang du North, Amh erst /I) I /South’ ‘ Cape •*,

0j$7Rivern. V4 W fojˆLong Lake\?\ t/ˆj

Upper Neguac(2fcguac of Burnt Churcho 5- &/Q Church \t.V VˆtfX JMfrJ

Nictau,

‘St. Francis

CORKS MTN.

StVPaoi.?

-/IsLANf

IRTaGE

Floafc Lto*?

‘nsˆ-vˆx// ‘li II

St-La.urre-.iCt j ,

BALD' MTV.

MICUI BA

\Lalif

_JHran

Fallsioi

lOrtonviUef] stone 9 I ' LI meal tone'

tb "Point,

, // ;Nail Pond) Skinners Pond A

QUAC DeBloiV/

I j/ffotilmfi /

*/ c, / ' – -Af'1 **

«/

> easant;Bayr / ^ JNcJb P

/ -o /

I Eastern Harbor (/>-

jir /AmM Jm

i An

/ BRETON IS I. AN*

/o o p-^jyorthSh^re

> Big Intervale Brooks

fT. ■«».« | Bird I. fi ^V?

iiah\\(| / /

tie Tignish \ lldure /Capes ildare1) j | 1) f

/ Nelson Passmore ^Barnaliy IWcr,

LDerbr Jc.i Hillertonp/

TTov. n s

>uth Jtltj 31/oTv

Venous'

°«&(sfpfd.

tSreylRapidsC 7 LBˆgersvflle

> 1 1 oir rd (XcadiS

Ashland.

nhsIrKeu Aldouand ,

it Blacky ill<

Dunph\

'YfW.JSr.

■ t . ˆNicholas Hi ve r.. ,

l T .

1 l0 St. T\erre<$}\ r He |fill CrfkSjfy&Csft

Marpˆˆ

- Mills"*' r.CtfvO-'1.

fctJWif- ,/

2=-ˆNortkaoij

ˆ—Rlchmˆodj

S8ii l/wliiin'.; ' ,i

Vy ✓."GlasBvilleS

V/ . ir – ,..i.

ˆDoaktour

CarroUa J-*

- 10 rendenll, Cc itre\;ilie(d C orner «

- ChaHest iom tiehlj o > BumjnerH > Lyujlsay

T*feJ

Aroostook

Itratr

X/ Coldstreagf .N a

GT0^

McGi'

Seboeisjj,

Lake

, ^rore*t'Hil

lg\l*^8'vSU

\Vill|amsburg

fo7.i8i"k

r^Mim

Victon

""""i r* o,

tnntnlor

' Bouilii

JDGHTON'I:

»ct own p

"te if?'-* s•••

5>6o-»(ot!a.ri.

\r.Js Bear Cl Co r

‘

^..q) ^»c Kcsvricl

5cat*r^-I.

P-McKSp ft Ul-Poii;!’

\Kirklan\d < Monument I Settlement)

V. iLFostervlJ

VAlborV,

1 1 1 i – » J

jJOa’^-^Capc-

,J^

barvuse

iirpuBe

S Q abarousePoint^,- or Cape Portland-^

4 r^Sou\thampii’a^ppisg^^ks’ 7~y8cott\c.

Camterbury^ Pfmce Wmiam1

Grand S/5gar\3njajHarfaeic

09\pP,V ©Coles tslon.b

HswEpiSS

rrvgFb*>aahd«moak SUilti

“p^Codys

Vi* ? V.\nntaalef af«o>

vScotch ojr«>4a. rW\Co*V\SctfJ<.m7Dt /

tom fries

N Mi l. (8»ckV-J

ˆS;

,.,j° Monif T. /jUaT]/vdl*ˆ 1 – v – , l< *

°\A, <5a I

I'JWSJjLW JHilbborojX, Viagaooer/

' AˆPenobsfinis/i fHopovell lapels "Tlurnwcsi'cii OoperroH HUl/y

,1 nY K.vcraide/ˆˆfA

ii'J S ty'ut/aL -J o llur/eilsA , ˆ v o /-f.oiQt livri. Alnja – –

' v ' . ...

'AndiqueX UJRG Ef<\

tfms W'-oifij

I irblo MnuntAin/ ' CAKE zJLocLih

i River Dooys*!

■ A Oroinoctoˆˆfˆ N'

[sQ — if oFrenrh Lfike .

jipree Tree Creek oMy LHbc/-ni>0 Shan

,ˆsSf,csrJ SSkim .

'Blaster ''''''''i Jfam&md-

GudrUu$%r(r,'V' dJarendoiiKˆrC J/jCn . »ˆEmrle Bocˆl

Inn cedilla0

i d erson ˆˆT'QenTn ark itlemebt aFoW|,e ■ (»V«fwdrlJlBalnjordl0ˆ»A j Jlew 'Annano' °\£a tomnh

bollcighU.E.rltorvnˆs

juri/tflJ**!

j,v- Mattawamke*

9> St/ Andrews.0 ‘

K o r V>‘so ˆ

4’ak°,(SsQlmQDLai’&rl (r| ‘ i>rxCr Lake C’W’” ;!’* itc*o\eif

laaaVH.ubot i

r,o Qharlu C’cy

Baskehegaib.

r’!. it

¥c-0 r d Uairloeh ffTti I o 0

\rlariv //Glefeg

■ •AˆTSwA‘1V \

ft 0Eh8tmlh Jfeivtonˆ jM

-

ˆ.Dean ˆ,w„

. 0 U l’pe rˆSTThsri vk[0

” >£Hute\i’iton i‘«

ii be. Caribou -J, . r ˆOoWMincsT

i Two < b’Jilaniec

»/€>. vk’ V. miV\

iecupooˆ NoˆSrlmttli s3» lupl II enoiffarˆXˆP

xr. _ ….I 7vS>fSt’ˆ

Moores Mhh’ Scotch Ridg® Q fl

Llad‘°’*’

‘ ”‘lr Ti O ,

SlormonK VJ VO* V=\

Abamgamooto

|d Choverio Ij ‘8ummorville;

Q 7 ‘‘‘t.iffAr!’ Alban),

‘ y CV/ > 04’p^^‘k^S7nknjlolli ^

//id‘1- rQ- 6t*£’’£r’ ofyjrvvv** Clements O,,

y.l&A K Brook. V. Spring

“AJwVM River >

^oliWi%VVorH0pfii’li,v ‘Vl I. 3f«r*i

5^‘tNim oh’:S^O’” /,^0a’ 1 ‘« m V/ Brookfl

i,w j\SaiHnicrvilleA5ta./b.* y^rLtKiE

Ju’£oi,LaYYiiY’l i *1

Cugmagum Rivf^

SL w Kendo rook

^^~v.irt^rC_LJg J

/V MfSiJ)

/T’Ciiiacke

Caufilianfflajcr^

4’ Milford treat Works.

r’r

(te.^ewge

yANGOR

Penobscot Jc .

‘rand Manan*^ ..Grand M,\ j pl’iSLANDN ^^osb’IslaWd) ,

Mucliias

%/W°)

ICaatalh

if//* r

j Pan hi

JjaAre.l

Buoksport

Hubbardˆ,

■ -“.

2. _ i Cross Island

J .’ ‘r = V”C = i’lMtSTAKE lSL

ter,?r v.V

> A|M / /— 'an« Hi and

Rirersdslˆl North fieldˆn ˆorth

ok U old >

‘liclsoa O Q Conqn <

> 0M. l/ˆ0’°-

lonburg ‘V

Island

‘ ir.nl

Zakt lc lefieldo.

lubliJOolˆcrˆLa Have 1)

— °J& oˆKingBburg /f//AT- – - –

ˆrVˆtfausoNs1 1. –

Have Iron Bound I. _,.ˆLa > li.N’d8LANp,1 I I I I f – -‘•

.

Nlˆ SikM Bridgeˆ ’a/ E.7ˆ£Rvad CoreJ

[/,/liort Mo dutlj

A\v

Qˆ$S = #Hc

‘O-O Salmon River\0’y Beaver River Corner,,.

MARITIME

PROVINCES

SCALES

Milton’

s ABLE Island

l*ort Maitland-

/V. , -•• mi I Kail

1 lints Point

VliddlejOhio’ ˆ

N) (o Hoad i (Xj« * Jordan Ri

Short Beach} h / Wellingto

Matoun.

[f M atou t’A sV an d yoiiiiijj

Statute Miles, 37 = 1 Inch,

?5 _ 50

‘Demin c Nutts Bay

Rand.McNally ’s “New 11 x 14 Map of “Marl time J*royinc®| -Copyright. by Band McNally & Co,

NOVA SCOTIA

maintain many wild horses- known as Sable Is¬ land ponies.

Topography.— The surface of Nova Scotia pi opei is undulating, and the scenery varied but not grand. Three ranges of highlands, with a general direction of from southwest to north¬ east, their general features clearly showing them to belong to the Appalachian Range, diversify the. surface. These, roughly, are the range ex¬ tending along the Atlantic coast from Cape Sable to Cape Canso, which are chiefly of Lower Cambrian formation, except for a belt of intrusive granite that stretches from Cape Sable to Chebucto Head, near Halifax ; the Cobequid Mountains, which rise to a height of about 1,050 feet and extend from the Bay of Fundy on the north or isthmian side of the province, through the counties of Colchester and Cumber¬ land to the vicinity of Pictou ; and a detached, narrow ridge of trap, known as the North Mountain, about 700 feet high, which extends along the Bay of Fundy, from Digby County to the steep headland of Blomidon, in Kings County, near the entrance of Cobequid Bay. The rock formation of Cape Breton is similar to that of Nova Scotia proper, but is more irregularly distributed. The chief features of the surface of Nova Scotia were left marked as at present by the great earth storm of the later Devonian period. The fertile valleys between the three ranges of hills are respectively of Upper Silurian, Devonian and Carboniferous origin. The northwest side of the peninsula is deeply indented by large arms of the sea, sep¬ arated by steep promontories. The Atlantic side is penetrated everywhere by inlets of greater or less size, the most important of which are Chedabucto Bay, Halifax Harbor and Chester Basin. The north shore, on the Gulf of Saint Lawrence, is comparatively smooth and uni¬ form in its coast line, and this is true also of the eastern coast of Cape Breton, while the other sides of this island are very irregular. The peninsula has about 400 lakes, of which Rossignol in Queen's County is the largest. The Bras D'Or Lake in Cape Breton covers an area of 500 square miles, or about one-sixth of the entire area of the island. The climate of Nova Scotia, tempered as it is by the Gulf Stream, which flows very near its southwesterly end, is comparatively mir'd, and especially in the sheltered Cornwallis and Annapolis valleys is favorable to comfort and health. The aver¬ age temperature is 65° F. in summer, 25° F. in winter. The average rainfall for 27 years (1874-1900) was 38.1, average snowfall for the same period 75.4, total precipitation 45.6. On account of its freedom from extreme heat Nova Scotia has become a popular summer resort for United States people, especially of the East¬ ern and Middle States. The province contains many rivers, but few of them are over 50 miles in length. In the valleys the soil is of great richness, and Nova Scotia is noted for its vast tracts of inexhaustibly fertile diked marsh land, in earlier or later times by patient industry reclaimed from the sea. This marsh land lines the head

waters of the Bay of Fundy and spreads far inland up the valleys of its river tributaries. In general, alluvial deposits are formed in river basins by materials washed down from higher levels bv fresh-water floods; here the whole deposit is of tidal origin, the re¬

sult of a landward rather than a seaward trans¬ portation. Every incoming tide is freighted with a finely comminuted sediment, the produce of the wearing action of the currents upon the sides and bottom of the bay. The elements of this sediment are trap and new red sandstone, the latter being the greater element. Its detri¬ tus consists of a large percentage of silica, a little clay, the iron which mainly determines the reddish color of the deposit, and the calcareous matter which served as cement in the parent rock. The great fertility of this alluvium may be seen in the fact that the Annapolis, Corn¬ wallis, Grand Pre and Cumberland marshes have been producing annually for over two centuries from two to four tons per acre of the finest hay. After the hay has been removed the dikes are converted into autumn pastures for cattle, who fatten more rapidly on their luxuriant after-growth than on any other kind of food. The reclaiming of these dikes from the daily tides, which if permitted to rush in will destroy the grass for a year, was begun by the Acadian French and energetically pur¬ sued by their successors, the New England people who came in 1760-61. The flora of Nova Scotia is much the same as in other sec¬ tions of Canada south of the Saint Lawrence. The woods are maple, elm, walnut, oak, tama¬ rack, spruce, pine and other woods, hard and soft.

Agriculture.— The most important indus¬ tries of the province are agriculture and fruit growing, fishing, mining and lumbering. Of late, however, a good deal of activity has .been shown in manufacturing of various kinds. Nova Scotia has an area above tide level of 13,483,671 acres, of which 5,260,455 acres are occupied, and 1,257,449 acres are improved. Of this im¬ proved land, 40,474 acres are covered by or¬ chards and nurseries, apple orchards of great extent occupying a great part of the fertile <(Annapolis Valley, » which includes the counties of Annapolis, King's and Hants. Pears, plums, cherries and peaches and small fruits, especially strawberries, are also raised in considerable quantities. In 1910, 540,589 acres of the prov¬ ince was hay land, 30,827 was planted with potatoes, 96,309 with oats and 12,909 with wheat. In 1900 the value of field crops was estimated at $8,584,956; in 1910 the value was $11,005,033. Of field crops in 1910, hay and clover were valued at $6,532,815; potatoes at $1,739,376; oats at $1,466,492. In the last 30 years the apple industry has steadily increased, cold stor¬ age making possible large shipments of this fruit to the British markets. In 1890, the total yield of apples was 1,051,592 bushels; of plums 9,246 bushels ; of peaches 534 bushels. In 1900 the yield was, apples 2,065,104 bushels; plums, 28,931 bushels; peaches, 3.231 bushels; pears, 14,881 bushels;

cherries, 16,669 bushels. In 1910 the yield was, apples, 1,666,9 77 bushels; peaches, 1,043 bushels; pears, 23,506 bushels; plums, 16,- 984 bushels ; cherries, 10,004 bushels. The total value of fruits and vegetables in 1900 was $1,407,369; the value in 1910 was $3,026,445; the increase in value of these products in 10 years thus being $1,619,076, or 115.04 per cent.

Fisheries. — The fisheries of Nova Scotia have always been active, salmon, cod, shad, mackerel, lobsters and other fish abounding in the waters about the coasts, some of these being

plentiful in the rivers. The value of the total catch in 1900 was $2,112,022, an increase of $399,288, or nearly 23 per cent over the value in 1899. The number of men employed in fishing vessels and boats in 1900 was 25,212, of persons employed in lobster-canning factories, 6,447. The value of all fisheries for the fiscal year ending June 1903 was $8,000,000, and the num¬ ber of men employed was 29,529. In 1910 the total value of all fisheries was $10,119,243, the number of persons employed in this industry being 26,568. Fishing receives fjom the Dominion government a subsidy outside of bounties of about $400,000 a year. In many parts of the province game is plentiful, bears, foxes, deer and smaller animals being found in considerable numbers. The value of furs taken in 1910 was $22,748. The total value of forest products in 1910 was $3,409,528.

Minerals. — Nova Scotia is remarkably rich in minerals, its coal fields being apparently al¬ most inexhaustible, and gold, lead, copper, manganese, gypsum and barytes being found in abundance. For the year ending 30 Sept. 1901 the sales of coal aggregated $3,119,335, the province of Quebec being the largest consumer. The province has 11 coal mines, five of which are in the peninsula and six in Cape Breton Island. In 1902-93 these mines employed 8,062 persons. There are more than 20 districts where gold is mined, the most important mine being at Sherbrooke in Halifax County. Be¬ tween 1900 and 1901 the number of tons of ore crushed was 1,358,864, and the value of the gold extracted about $14,274,054. The value of the gypsum yield in the same year was $119,278. The mine royalties in 1902-03 reached the large figure of $487,948.90. The value of mineral products in 1910 was $17,059,122. In this year, 5,889,193 tons of coal were marketed, at a value of $13,812,887.

Manufactures. — In 1902-03 the value of manufactured products exported

from Halifax reached the sum of $766,164. Among the chief manufactures are agricultural implements, bis¬ cuits and breads, coke, drugs and chemicals, extract of hemlock bark, fertilizers, furniture, iron and steel, leather and wood pulp. The can¬ ning of fruits, milk and meat is receiving much attention. In Cape Breton and the western part of the peninsula considerable leases of Crown lands have lately been made for the develop¬ ment of the wood pulp industry. In various places, owing to the abundance of hemlock bark, tanning is actively carried on, and some atten¬ tion has long been given to sugar refining and rope and twine making. In 1910 there were 1,480 manufacturing establishments, employing 28,795 persons, the capital invested aggregating $79,596,341. The value of manufactured prod¬ ucts in this year was $52,706,184.

Transportation. — In 1901 the province had in operation 943 miles of railway; since then this has been increased to 1,360. Telegraph and telephone lines run everywhere and the province has two cable stations, one at Canso and one at Sydney, with wireless stations at Cape Sable, Picton, North Svdncy and Sable Island. At the close of 1901 Nova Scotia had in registra¬ tion 1,980 vessels with a tonnage of 214,560. In that year she had registered 133 vessels with a tonnage of 14,660. The total number of ships arriving from foreign ports during the fiscal

year ending 30 June 1901 was 3,103; tonnage 419,031. This registration included the ships arriving at 85 ports. Of these Halifax headed the list, with 1,185 vessels and 899,079 tons, Sydney coming next with 361 vessels and 541,- 455 tons. Halifax is the third port in Canada, Victoria, British Columbia, being first and Montreal second. In 1913 Halifax entered and cleared ships to the extent of 3,182,- 923 tons; Sydney, 1,115,873 tons; Bridge- water, 66,687 tons ; Barrington, 10,592 tons. In 1914 Nova Scotia owned, in 21 ports, 2,098 sailing ships and 416 steamships, with a total tonnage of 135,052. The vessels built in the province, 1911-14, inclusive, numbered 385, with a tonnage of 19,395. In 1912 Nova Scotia had telephones in use over the distance of 32,373 miles.

Banks. — The banks in operation are Bank of' British North America; Canadian Bank of Commerce ; Bank of Montreal ; Merchants' Bank; Bank of Nova Scotia; Royal Bank of Canada. The amount of exchanges of the clearing house of chartered banks at Halifax, 1909-13, according to Bradstreet, was $105,- 347,636. In 1900 the amount was $77,000,000.

Finances. — The revenues of the province come chiefly from a Dominion subsidy of about $433,000 annually; from mine royalties, which exceeds this sum; from the lease of Crown lands, which in 1901-02 amounted to $74,735, and from succession duties and other miscel¬ laneous sources. The total revenue from all these sources in 1902-03 was $1,140,216. In

the year ending 30 Sept. 1913 the subsidy from the Dominion government was $636,667; the reve¬ nue from mines was $852,954. The total reve¬ nue was $1,920,565; the total expenditure, $1,- 949,784. The expenditures were less than the revenue by about $53,000. At the close of the fiscal year ending 30 Sept. 1902 the debt of the province was $3,766,300. Nova Scotia supports a school for the deaf and dumb and one for the blind, an insane and a general hospital and 24 poorhouses. Criminals are sent to the provin¬ cial penitentiary at Dorchester, New Bruns¬ wick. The public charities in 1902-03 cost the province $40,573. In 1912 there were 73 persons sentenced to the penitentiary and two were put to death.

Population. — The population of Nova Scotia is greater than that of any of the prov¬ inces of Canada except Ontario, Quebec and Saskatchewan. The population of Ontario in 1910 was 2,523,274; of Quebec, 2,002,712; of Saskatchewan, 492.432. Nova Scotia in the last census year had 492,338. In 1900 she had 459,- 574. The adjoining province of New Brunswick had 351,889. In origin, 177,701 are reckoned as English, 145,535 as Scotch, 54,244 as Irish, 51,- 746 as French, 38,844 as German, 6,541 as negro. 4,179 as Holland Dutch, 1,915 as native In¬ dian, 1,360 as Jewish, 1,089 as Austro-Hun¬ garian. The province has two cities, Halifax, the capital, with a population in 1910 of 46,- 619 and Sydney (in Cape Breton) with a population of 17,723. It has some 28 or 30 incorporated towns, of which the largest are: Glace Bay (in Cape Breton) with a popula¬ tion m 1910 of 16,562; Amherst, with 8,973; Sydney Mines (Cane Breton), with 7,470 ; New Glasgow, with 6.383; Yarmouth, with 6,600; Truro, with 6,107. In 1900 Halifax had a

population of 17,723; Sydney, the seat of the steel industry, of 9,908. In 1890, before the steel industry started, the latter had but 2,427.

Education. — Nova Scotia has an intelligent free school system, and there is no appropria¬ tion and no demand for appropriation for sep¬ arate sectarian schools. In each of the 18 counties there is a county academy, the highest department of the public schools, the curricu¬ lum of which contemplates the fitting of pupils for college. At Truro there is a Provincial Normal College, in which about a thousand teachers are trained every year. In 1914 the whole number of public schools in the province was 2,724, with a total enrolment of pupils of 106,351. In the high school grades alone there were 8,903. The central control of public edu¬ cation is vested in a council of public instruc¬ tion, which is identical in constitution

with the executive council of the province, and is ad¬ ministered directly by a superintendent of edu¬ cation. Between the ages of seven and 12, at¬ tendance at school is compulsory. The schools are supported by local taxation and by subsidy, about two-fifths of the necessary cost being met by government grant and municipal aid. The total expenditure for public education in 1914 was $1,556,618. Of chartered colleges with de¬ gree conferring powers, Nova Scotia ought to have but one, but she has six. Besides, there is the Wesleyan College at Sackville, New Bruns¬ wick, just over the boundary between the two provinces, which gets a great many of its stu¬ dents from Nova Scotia. One of these col¬ leges, Dalhousie, at Halifax, is undenomina¬ tional ; the others are all under the domination of sects. King's , at Windsor , is Anglican ; Acadia, at Wolfville, is Baptist; Saint Francis Xavier, at Antigonish, is Roman Catholic. The latter sect has also a college known as Saint Anne's, at College Point, in Digby County, and one called Saint Mary's at Halifax. The Prot¬ estant colleges are co-educational, the Roman Catholic not. The great wrong of this multi¬ plicity of colleges in a small province is seen in the fact that the whole six, and Mount Alli¬ son besides, cannot muster over 1,500 students. The smallest (and oldest) of the Protestant col¬ leges is King's, which in 1914 reported 97 students in all departments, only 46 of these being students of arts. The persistence of all these institutions, to the disregard of advanced learning, is one of the evil results of sectarian religionism. Besides these colleges is a tech¬ nical college at Halifax, which in 1914 regis¬ tered 33 pupils, and a College of Agriculture at Truro in connection with the government agri¬ cultural farm.

Government. — Since confederation the province has been represented at Ottawa by 10 senators and 20 members of the lower house. It has its own local legislature, meeting at Hali¬ fax, and a lieutenant-governor appointed by the governor-general and his council. The local legislature consists of a council of 21 members and a legislative assembly of 38. The executive consists of three ministers with salaries and six without portfolios. The house of assembly is elected by the counties, the municipal units of government being counties and towns. In each of the 18 counties the people elect a county council, which in turn appoints the other county officers. It is necessary to secure the sanction

of the people in order to borrow money, and the lieutenant-governor has a right to veto upon the money-borrowing powers as well as the by¬ laws passed by the council.

Religion. — All religious denominations are on an equal footing in Nova Scotia and none from superiority of numbers or social standing has any

pre-eminent rights. The largest sect in point of numbers is the Roman Catholic, with 144,991 adherents. Then come the Presby¬ terians with 109,560; the Baptists with 83,854; the Anglicans with 75,315 ; the Methodists with 57,606 ; the Lutherans with 7,359 ; the Congre- gationalists with 2,690. The strength of the Baptist denomination is due to the fact that late in the 18th century the larger number of the New England Congregationalists in the province became members of this sect, thus re¬ ducing Congregationalism within narrow limits. Since 1900 the Baptists and Free Baptists have united and the two sects are now one. The recent movement throughout Canada to amalga¬ mate the Presbyterians, Methodists and Con¬ gregationalists has many warm advocates and many opponents, especially among the Presby¬ terians, in Nova Scotia. Few Nova Scotians in their native province are without some church attachment.

Distinguished Citizens. — Nova Scotia has reared a large number of able and eminent men. Such are Hon. Sir Adams George Archibald, K.C.M.G. ; Hon. Sir Edward Mortimer Archi¬ bald, K.C.M.G. ; Hon. Sir Edward Mortimer Archibald, Kt. ; Gen. John Charles Beckwith,

C. B.; Rear-Admiral Sir Edward Belcher, R.N., K.C.B. ; Hon. Sir Frederick William Borden, K.C.M.G.; Rt. Hon. Sir Robert Laird Borden, K.C.M.G. (the present Premier of Canada) ; Hon. Sir John George Bourinot, K.C.M.G.; Hon. Sir James Cochran, Kt. ; Lieut. Gen. Wil¬ liam George Cochran, C.B. ; Hon. Sir Samuel Cunard, Bart; Hon. Sir John William Dawson, K.C.M.G.; Baron Haliburton (Sir Arthur Lawrence Haliburton) ; Hon. Sir Brenton Halli¬ burton, Kt. ; Hon. Sir John Eardley Wilmot Inglis ; Hon. Sir William Johnstone Ritchie, Kt. ; Hon. Sir John Sparrow David Thompson, K.C.M.G.; Hon. Sir Charles James Townshend, Kt. ; Rt. Hon. Sir Charles Tupper, Bart. ; Hon. Sir Charles Hibbert Tupper, K.C.M.G.; Rear Admiral Sir Provo William Parry Wallis, G.C.B. ; Hon. Sir Robert Linton Weatherbee, Kt. ; Vice-Admiral Sir George Augustus West- phal, K.C.B. ; Maj.-Gen. Sir William Fenwick Williams, R.A., G.C.B. ; Hon. Sir William Rob¬ ert Wolsey Winniett, R.N., K.C.B.; Hon. Sir William Young, Kt. ; Hon. Joseph Howe; Hon. Judge James William Johnstone, etc. Among the writers of note the province has produced are Thomas B. Akins, D.C.L. ; David Allison, LL.D. ; Hon. Sir John G. Bourinot; John B. Calkin, LL.D.; Hon. Sir John William Dawson, LL.D. ; Arthur Wentworth Hamilton Eaton,

D. C.L. ; Rev. George M. Grant, D.D. ; Hon. Judge Thomas Chandler Haliburton; Rev. George William Hill, D.C.L.; Hon. Joseph Howe; Mrs. Mary Jane Katzmann Lawson; Rev. Arthur J. Lockhart; Hon. Judge J. W. Longley, D.C.L. ; Beamish Murdoch, Esq. ; J. Macdonald Oxley; Benjamin Rand, Ph.D. ; Rev. Silas T. Rand, D.D. ; Theodore Harding Rand, D.C.L. ;

Rev. Edward Manning Saun¬ ders, D.D. ; Hon. Judge A. W. Savary, D.C.L. ;

Miss Marshall Saunders; Rev. T. Watson Smith, D.D.

History. — The Nova Scotian peninsula was the most important part of the ancient Acadia, and its little town Annapolis Royal, in French times called Port Royal, while the province re¬ mained in the hands of France, was the chief Acadian seat of authority and centre of in¬ fluence. The name Acadia or Acadie is first found in the petition of De Monts to the French king for leave to colonize this portion of the New World. The province of New Brunswick was included in Acadia, but not the island of Cape Breton. Nova Scotia's authentic history begins with the landing at Port Royal in the spring of 1604 of Sieur de Monts, a gentleman of the bedchamber of Henry IV of France, who had previously accompanied Chauvin and P ontgrave to the Saint Lawrence. There is a French tradition that a little settlement was made in Cape Breton as early as 1541, but Port Royal was the first settlement ever attempted on any part of the peninsula. De Monts held a commission as lieutenant-general of Acadia with full powers to cultivate and hold the land, to discover mines and to convert the Indians. In his first expedition another nobleman, Baron Poutrincourt, accompanied him. Owing to the failure of the French trading company in 1607 the colony they founded at Port Royal was suspended for nearly three years. In 1610, however, Poutrincourt again came to Port Royal and from that time the town has had a continuous history. When Poutrincourt came the second time he took possession of the houses his people had built in 1604, and it may, therefore, be said that Port Royal is the oldest town in all North America, except Saint Augustine in Florida, which was founded by Spaniards in 1565. Jamestown, Va., was founded by the English in 1607, and Quebec by Champlain in 1608. Shortly after 1610 other explorers came to Port Royal, in their wake coming first Jesuit, then Recollet priests, who soon converted all the native Micmacs (an Al¬ gonquin tribe) to the Roman Catholic faith. In 1613 Argal (afterward deputy governor of Virginia) destroyed the fort at Port Royal. In 1621 Acadia was granted to Sir William Alexander, who named it Nova Scotia and helped James I establish the order of Baronets of Nova Scotia. In 1628 Sir David Kirk cap¬ tured Port Royal for England, but in 1632 the province was restored to France. In 1654 Acadia was surrendered to English troops sent out by Cromwell, but in 1667, by the Treaty of Breda, was restored to France. In 1710 Col. Francis Nicholson finally conquered Port Royal for England, and in 1713 the Treaty of Utrecht confirmed Nicholson's conquest. In

1749 Col. Edward Cornwallis brought out an English colony and founded the town of Halifax, im¬ mediately afterward establishing a civil govern¬ ment there in place of the military government at Annapolis. In 1755 because of their per¬ sistent refusal to take the oath of allegiance the Acadian French were removed, and in 1760- 61 their lands were occupied by some 10,000 New England people who thus started many of the best-known present families of the province. In 1758 a constitution, with an elective assem¬ bly, was granted1 Nova Scotia, in 1763 Cape Breton and Prince Edward Island were an¬ nexed to Nova Scotia, but in 1770 Prince Ed¬

ward Island was separated. In 1773 began the large Scottish emigration which has given cer¬ tain counties of Nova Scotia the chief part of their population. In 1776 and 1783 from 30,000 to 35,000 Loyalists, chiefly from New England and New York, poured into the province, the New York Loyalists founding the town of Shelburne and creating in Nova Scotia the first colonial see of the English Church. In 1754 New Brunswick and Cape Breton were both separated from Nova Scotia, but in 1820 the latter was reannexed. In 1848 responsible gov¬ ernment was introduced and in 1867 Nova Scotia became a province of the Dominion of Canada. In its history as an English province Nova Scotia has had to the present 35 gov¬ ernors (since Confederation they have been, of course, lieutenant-governors), many of them more or less famous military men. Before the appointment of Lord Dorchester as governor- general of Quebec, Nova Scotia and New Brunswick in 1786, she had also 11 lieutenant- governors, of whom Gen. Edmund Fanning, a Loyalist, was the last.

Bibliography.— Akins, Selections from the Public Documents of Nova Scotia) (1869); Bourinot, (Builders of Nova Scotia (1899) ; Brown, 'History of the Island of Cape Breton' (1869) ; Calkin, School Histories and Geog¬ raphies of Nova Scotia, of various dates; Campbell, (History of Nova Scotia* (1873); Dawson, (Acadian Geology > (1868); Haliburton, (Historical and] Statistical Account of Nova Scotia* (1829); Murdoch, (History of Nova Scotia* (1867); Parkman, 'Montcalm and Wolfe) (1875) ; papers in the Nova Scotia Historical Society's (1894). and vari¬ ous _ county histories. Arthur Wentworth Hamilton Eaton, author of (The Church of England in Nova Scotia) ; 'The History of King's County, Nova Scotia, Heart of the Aca¬ dian Land* ; (The Famous Mather Byles* ; (Acadian Ballads,) etc.*

Arthur W. H. Eaton,

Author of ' The History of Kings County, Nova Scotia, Heart of the Acadian Land' ; (The Church of England in Nova Scotia * etc.*

NOVA ZEMBLA, nova zem'bla (Russian, Novaia Zemla), two islands in the Arctic Ocean, belonging to Russia, and forming a de¬ pendency of the government of Archangel •

£nn°° 30, to 77° N'; lon£- 52° to 69° E- Area', 350,000 square miles. They are separated by

the narrow Matotchkin Shar Strait, and from the Isle of Vaigatz on the south and from the mainland on the east by the Sea of Kara. Their greatest length, northeast to southwest, is about 700 miles ; breadth, about 80 miles. The greater part of the interior, which is mountainous, with extensive snowfields, is unexplored. The gen¬ eral slope of both islands appears to be toward Matotchkin Strait, on which the mouths of at least 15 small streams have been counted. Lakes also are numerous. The whole territory is wild and desolate. The coasts swarm with seals, various kinds of fish and vast flights of water- fowl. The interior, which is partlv covered with stunted shrubs, short grass and moss, is frequented by reindeer, white bear, ermines and Arctic foxes. Minerals discovered include

coal, gold and copper. In 1596 Nova Zembla was reached by Barentz, who wintered there. It was circumnavigated by Johannesen in 1869 and 1870, and the Kara Sea found compara¬ tively free of ice. It was again circumnavigated by Captain Carlsen in 1871, and partially ex¬ plored by Lieutenants Weyprecht and Payer in the same year, and again in 1872-74. Other ex¬ plorations have been made since, and two or three settlements of Samoyedes have been established. Pop. about 100.

NOVACULITE, an extremely fine-grained quartz rock of sedimentary origin. It is used for fine whetstone, oilstone and hones and was formerly made into implements by the Indians. Large deposits in Arkansas and Oklahoma are the source of ˆArkansas® stones and ((Wichita5) stone, the former mostly snow white and highly prized for whetstone.

NOVALIS, no-va'lis. See Hardenberg, Friedrich von ; Heinrich von Oftendingen.

NOVARA, Italy, (1) a town in Piedmont, capital of the province of Novara, situated be¬ tween the Agogna and Terdoppia, 51 miles northeast of Turin. It has an ancient and mag¬ nificent cathedral with a lofty tower, an episco¬ pal palace, two colleges, museum, a ruinous old castle and a remarkably fine market-house. The manufactures include silk, cotton, linen, biscuits and organ building. The rice and grain markets are the most

important in Piedmont. Pop. about 58,858. Novara is famous for the battle fought there on 23 March 1849′ between the Sardinians and Austrians, in which the former were completely defeated, and Charles Albert, in consequence, abdicated in favor of his son, Victor Emanuel. (2) The province consists generally of a large and fertile plain, watered by the Po and several of its tributaries, and well adapted for the growth of rice. Area, 2,548 square miles. Pop. 768,658.

NOVATI, no-va'te, Francesco, Italian his¬ torian and author: b. Cremona, 1859. From 1883 to 1889 he was a professor in Milan, Palermo and Genoa, returning to Milan in 1892. With Arturo Gral and Rodolfo Renier he founded the Giornale Storico della letteratnra italiana in 1883. His specialties are the Middle Ages and Renaissance in Italy. Among his works are (Studi critici e letterarP (1889) ; (L'influsso del pensiero latino sopra la civilta italiana del medio evo (1897) ; (Altraverso il medio evo5 (1905) ; (A ricolta5 (1907) ; (Freschi e.minii del dugento5 (1908) ; (Storia letteraria d'ltalia: le origini5 (1900-09).

NOVATIANISM, noˆva'shi-an-izm, the doctrine of Novatianus, a priest of the Church at Rome in the 3d century and who is said to have died a martyr's death between 254 and 260 a.d. Novatian had been a Stoic philosopher and carried out the stern, harsh views of that sect in his ministry as a Christian teacher. The schism called after him originated as follows: After the Decian persecution a controversy arose about the manner of dealing with those who apostatized or worshipped idols, before the threat of torture or death (lapsi). Nova¬ tian at first inclined to advocate their absolu¬ tion after due penance, but when Cornelius, the Roman bishop, followed this course, Novatian opposed his authority, and was chosen and or¬ dained bishop by three country bishops in op¬

position to Cornelius, and thus became the first anti-Pope. He was condemned in councils at Rome and Carthage. The party who shared his views were called Novatians. They held that, in the case of idolatry through fear of persecution, the Church could not absolve the penitent and this doctrine they extended, at a later period, to all grievous sins. They claimed for themselves a character of especial puritv, assumed the name Puritans (Cathari) and in¬ sisted on the rebaptism of converts to their views. Their rigorous doctrines made headway from Spain to the confines of Asia Minor, and they were strongly represented in North Africa, where they continued to be taught up to the 6th century. See Cyprian.

NOVATION, a legal term derived from the Roman law, which recognized three kinds of novatio: (1) the substitution of a new debtor; (2) the substitution of a new creditor, and (3) a new contract. Novation as defined to-day signifies the substitution of a new obliga¬ tion for an old one, the

latter being thereby ex¬ tinguished. The term is of civil-law origin and is rarely used in common law. Novation is a contract consisting of two stipulations : one, to extinguish an existing obligation ; the other to substitute a new one in its place. In the civil law there are three kinds of novation: (1) where the debtor and creditor remain the same, but a new debt takes the place of the old one; (2) where the debt remains the same, but a new debtor is substituted; (3) where the debt and debtor remain, but a new creditor is sub¬ stituted. To constitute a novation there must be (1) a valid pre-existing obligation; (2) con¬ sent of capable parties; (3) express intention to innovate. (See Contract). Consult Civ. Code, Cal., § 1530; Civ. Code,

Dak., § 863; Hard v. Burton, 62 Vt. 314, 20 Atl. 269; McCartney v. Kipp, 171 Pa. 644, 33 Atl. 233; McDonnell v. Alabama Gold L. Ins. Co.. 85 Ala. 401, 5 South. 120; Shafer's Appeal, 99 Pa. 246.

NOVEL, The. The word novel (derived from the Latin adjective novella, feminine of novellus, Italian and Spanish novella , French nouvelle) signifies literally, when applied to fiction, a new tale, new story or new anecdote : that is, one never told before, or at least one never heard before by the listener. Since the early period of the Renaissance the word, in its slightly variant forms, has been employed in most of the literatures of western Europe, ex¬ cept English, to denote a short fictitious narra¬ tive dealing mainly with the incidents anl in¬ trigues of ordinary life, and written usually, though not invariably, in prose. This was also the English usage in the 16th century when col¬ lections of Italian novelle were first translated into English, either directly or through the French. But during the next century the short tale of the Italian type underwent in English large expansion; and ihe word novel, naturallv enough, was still retained as the name of the longer narrative, which by the time of Richard¬ son had assumed, to a degree, the structure of the drama and the amplitude of the epic. Clarissa Harlowe, eight volumes in the whole, was called a novel. For a certain class of fic¬ tions we have also had since the time of Chaucer and before him the term romance, which (derived from the Latin adjective ro-

manicus, through the adverb romanice, (

These distinctions, historical in origin, it will be well to bear in mind. But for the broad treatment of the theme now in hand, the novel must be made to include many fictions in prose and some in verse that do not fall strictly within the meaning of the term. Novels may be divided into two classes.

There is, said Stevenson, the novel of incident and the novel of character. In the novel of character, the interest is directed to the portrayal of men and women ; and the tale, the story or the yarn is a subordinate consideration. This type of fiction has no date earlier than (Don Quixote) ; it was made a fashion by Richardson and Fielding. In the novel of incident, the interest is directed to what happens; characters, if there be any at all, come only by the way; the tale, the story or the yarn is the main thing. As folktales, this type of fiction belongs to ail races and peoples in a primitive state of civiliza¬ tion. As. a cultivated literary form, it com¬ monly follows the break-up of the primitive epic. After

1897).

The Orient. — For centuries before the in¬ vention of printing, the professional story-teller was everywhere a most important figure — in the East as well as in the West — and he still retains much of his ancient prestige among all peoples where the habit of reading has not be¬ come generally diffused. If he appears first in Egypt, it is simply because the records of Egyp¬ tian civilization are the most ancient of all. Just as at later times in the West, tales cen¬ tred around Charlemagne or Richard the Lionhearted, so it was in Egypt. Among the debris of a most ancient cycle are three short stories known as the (Tales of the Magicians. > On a day in the third millennium before Christ, Cheops, the builder of the great pyramid, suf¬

fering from ennui, called his three sons into his presence that they might entertain him with the wonders wrought by famous magicians. One tells of a crocodile which a magician made of wax and threw it into the river, where it seized and carried away the lover of the magician's faithless wife, as he went out for an evening bath. This story is, so far as con¬ tent goes, very dike a mediaeval fabliau or novella. Another relates that when King Sneferu was one day out on the lake of his palace with the maidens of his court, one of them lost a jewel from her hair, which was recovered by a magician who parted the waves and laid bare the bed of the lake. It is an exceedingly pretty tale. The last son tells of a magician who neatly restored the heads of animals after first cutting them off. Through¬ out these stories, the most ancient of the world, appears frequently ((the chief reciter,® who was a sort of master of the revels. In the story¬ telling of succeeding dynasties, magic gave way more and more to adventure, and the descrip¬ tion of manners, especially among the peasantry. (The Shipwrecked Sailor (12th dynasty) is the Egyptian (Robinson CrusoeP (The Doomed Prince) (18th dynasty) is a tale of ro¬ mantic love. The prince, as in many a since popular romance, obtains the princess for his wife by climbing up to the window of her palace supposed to be inaccessible. And (Anpu and Bata* (19th dynasty), the first part of which*

runs on the motif of Joseph and Poti- phar's wife, has a beautiful pastoral setting. What one misses in Egyptian, as in all other ancient fiction, is the portrayal of character, ex¬ cept on the simplest lines.

In India the beast-fable, the fairy tale, the adventure and the love-intrigue have been cur¬ rent from the earliest times. Stories of these several types were, in the old time, usually fitted into the frame work of a single narrative after a very elaborate plan. Bearing most closely upon the fiction of the West is the (Panchatantra, a book of fables in which the ways and conduct of men — their friendship, disputes, craft, jealousies and virtues and vices in general — are frankly transferred to the lower animals, the bull, the lion, the crow, the owl, etc. These stories, always didactic in aim, abound in humor, irony and satire. Trans¬ lated from the Sanskrit into the literary lan¬ guage of Persia in the 6th century of our era, the book passed thence into Arabic about 750 a.d., under the name of the (Fables of BidpaP ; and finally through the Latin into the modern literatures of western Europe. More remote from our subject are the (Vetala — panchavim- cati,> a group of 25 fairy tales, well known in English under the title of (Vikram and the Vampire) ; and the ˆatha-sarit-sagara,* or (Ocean of Rivers of StoriesP an immense col¬ lection of verse-tales of various kinds, com¬ posed by Somadeva, a Kashmirian* poet of the 11th century. Jnteresting also as approaching somewhat to the modern picaresque story of low life is the (Dasa-kumara-carita* (composed by Dandin in the 6th century), which tells of the adventures of 10 princes. Finally, out of Arabia came to the West (The Book of the Thousand Nights and a Night, * a work in its' kind as great as either of the Homeric epics. This treasure-house of stories consists of beast fables, longer and richer in incident than those*

of India, beautiful tales of magic and fairy land and histories and historical anecdotes which localize the scene. Over all is the glamour of the moonlit night and the beautiful princess who relates them. Some of these stories had doubtless been recited for centuries by the pro¬ fessional raconteur, called in Arabic the rawi. (Sinbad the Sailor, > for example, may be older than the (Odyssey. > But the collection as a whole (which is based upon a Persian original of the 10t'h century) did not assume definite shape until the 13th century of the Christian era; and the famous (Ali Baba7 and 'Aladdin7 exist in no manuscript earlier than the 16th century. Translated first into French and then into English and every language of the west, the (Arabian Nights, 7 after scores of imita¬ tions, passed into romantic fiction and became a part of it. Scott's 'Talisman7 would 'have been quite

different but for this precious in¬ heritance from the east.

The Greeks likewise added to the treasure- house of fiction. Their myths, epics, histories and biographies contained, from Homer to the end, elements clearly novelistic or romantic. The 'Odyssey,7 for example, is a skipper's tale, one of many, made beautiful by weaving into it stories, long afloat, of Circe, Calypso, Poly¬ phemus, the lotus-eaters, and the fairy realm of the Phaeacians. Though we call it a hero-epic, it is really much like a mediaeval romance of adventure. Plato was an admirable story-teller, as well as philosopher. Like Defoe he knew how to give an air of reality to fiction by an accumulation of details, not neglecting to tell by the way how he came by his story. The (Re¬ public is perhaps too philosophical in aim for more than mention here. But it is the starting point of the scores of Utopias of western Europe from Sir Thomas More to Mr. H. G. Wells. Xenophon all but discovered the his¬ torical novel. In his 'Cyropaedia,7 he took for his hero the elder Cyrus as representative of a king who by self-control and vigorous self¬ training became ruler of the world. Running through the romance is a pretty oriental tale, which tells of the beautiful captive Panthea, tempted by Araspes, but faithful to her hus¬ band Abradates. The 'Cyropaedia,7 which was translated into French and English in the 16th century, became a model for historical fiction before Scott and gave great impetus to the creation of perfect gentlemen like Sir Charles Grandison. So much and much more may be safd for the fiction of ancient Greece. Be¬ sides Plato's and Xenophon's, there were many other political, philosophical and historical tales. All along ran the novelistic treatment of heroic legend; moral allegories were at one time the fashion, and with the exploits of Alexander in India came many geographical wonders and several freely invented biographies of the hero himself, which eventually resulted in the Alexander novel or legend, well-known from its later development by the French poets of the 13th century.

The Greek novel as a cultivated genre wholly distinct from other literary forms belongs, how¬ ever, to a period subsequent to Alexander ; to Greece in its decadence after the glory of her letters had departed, when the centre of culture was no longer Athens but Alexandria and the cities of Asia-Minor. Then the erotic tale of

adventure took the place of the verse-epic. Of this type the oldest extant specimen is the so-called (Nimrod Fragment7 (1st century, A.D.), which has as subject the love of Nim¬ rod, the legendary founder of Nineveh, for a maiden who may be identified perhaps with Semiramis. The motive for the hero's bravery is not unlike that in the mediaeval romance of chivalry. Antonius Diogenes, the Jules Verne of the Greeks, wrote of (The Marvelous Things Beyond Thule7 (2d century), descriptive of a voyage to the North Pole, a descent into Hades, and travels in the sun and moon. To the same

century belongs the (Babylonica7 of Jamblichus, a Syrian, so-called because its scene is in and near Babylon. The 'Ephesiaca7 of Xenophon of Ephesus (3d century) is built in part on the motif of (Romeo and Juliet.7 'Apollonius of Tyre7 (3d century), known in English since the Anglo-Saxon period, furnished the plot of Shakespeare's 'Pericles.7 (Clitophon and Leucippe7 by Achilles Tatius of Alexandria (5th century) abounds in marvels, gorgeous descrip¬ tions, and metamorphoses. Best of all in this kind is the (Ethiopica, or Theagenes and Chariclea7 by a Syrian who called himself Heliodorus (5th century). The boy and girl lovers, after separation, adventures and mirac¬ ulous escapes, are finally united and live happily ever after. The involved and com¬ plicated structure of this tale was taken over into western fiction by Sir Philip Sidney and the French romancers. One beautiful Greek prose-pastoral of the same period has survived : the sweet and sensuous 'Daphnis and Chlce,7 the far distant shadow of (Paul and Vir¬ ginia.7

The impossible adventure of the Greek tales, especially of the class represented by (The Mar¬ velous Things beyond Thule,7 did not escape the wit and banter of Lucian, the orator and rhetorician. In his 'True History7 he sailed with his mariners beyond the pillars of Her¬ cules, on to the moon and morning star, and to the Elysian fields, where he met with the Plomeric heroes. (

Mediaeval Romance. — The Romans had nothing of their own much like a novel, ex¬ cept perhaps the 'Satiricon7 of Petronius Arbiter, descriptive of dissolute life in the time of Nero. Their tales and fables were little more than an adaptation of the Greek. But their language, both written and spoken — in Italy, Spain and Gaul — became the chief medium through which ancient fiction passed to the new nations of the West. The tradition, literary as well as oral, was never quite lost in the darkest period of the Middle Ages. An¬ other source of transmission was the Crusades, when met the East and the West. Many a

mediaeval tale, clearly Greek or oriental in origin, was brought home by the Crusader and told to one and another until some one put it down in writing. The flourishing period of mediaeval romance is included in the years be¬ tween 1150 and 1400. It was then that the poets developed, from Latin sources, the sagas of Alexander, Troy and the elaborate romance of Troilus and Cressida. The new nations pos¬ sessed, too, their own myths, traditions and legends. Charlemagne and his peers became the heroes of a romantic cycle; and the French poets, working over Celtic*

matter, produced the great stories of Arthur, Lancelot, Guinevere and the Round Table. Most like the modern novel were the French romans d'aventure, which are only loosely connected with traditions and may cut themselves wholly free. There are extant scores of these verse-romances, both in French and' in English, like (Guy of Warwick slightly Saxon in setting, (Havelok the Dane, 5 (King Horn,5 and (Gawˆin and the Green Knight/ which is one of the best. Certain of them, Greek or eastern in motif or outline, turn upon disguises and beautiful recognition-scenes at the close, just as in Shakespeare's (Twelfth Night) or (As You Like It/ Such for example, are the (Life of Ipomydon5 and (Amis and Amile/ The flower in this kind is (Aucassin et Nico- lette5 (part prose and part verse), the story of two lovers of Provence, who, as in Greek romance, are separated to be brought together in happiness at the end. By the side of this charming story may be placed also the less known (Chastelaine de Vergi/ which announces the intense tragic passion of Romeo and Juliet/ More realistic in aim were the fabliaux, short poems usually, which dealt with a trick or humorous incident in ordinary life for the purpose of exciting laughter. The main in¬ cidents of these tales, mixed with beast-fables, were in many cases transmitted from the East. A point of diffusion' was the (Disciplina Clericalis/ a collection of 26 stories in Latin prose, made by Petrus Alphonsus, a Spanish Jew of the 12th century. Its great successor was the (Gesta Romanorum5 (13th century). Tales of intrigue drawn from these and other sources, when lightly treated in verse, were called fabliaux; if neatly turned into Italian prose, they were called novelle. At the end of the Middle Ages stands Chaucer, who, gather¬ ing up all the current types of fiction, breathed into them the spirit of a delightful personality. On the way to Canterbury, the knight begins the story-telling with a gorgeous romance of chivalry, the squire stops midway in a tale of eastern marvels, the prioress relates the legend of a saint, and the pardoner is ready with an oriental apologue. The Reeve's tale is an ex¬ panded faliau and the priest's story of Chanticleer and Dan Russell the fox is a fabliau and beast-fable in one. Near Chaucer stands Boccaccio, who in the merry Decameron retold in prose the older fabliaux, giving thereby vogue to the novella. The various types of mediaeval fiction are described by Gaston Paris, in (La Litterature Franqaise au Moyen Age5 (2d ed., Paris 1890). Symonds' Renais¬ sance in Italy5 contains an account of the Italian novelle (Vol. V, London 1881).

Caxton to Richardson.— As in the Orient, the mediaeval story ©f western Europe, whether

in verse or in prose, was for the most part something to be related by a professional reciter or others in the gathering of friends, in public squares, or in the stately assemblies of lords and ladies. In the longer tales, verse was the more common inasmuch as rhyme was an aid to the memory. There were, however, persons who preferred to read by themselves the cur¬

rent fictions. For this public, various verse- romances about Arthur, Lancelot, and the Holy Grail were remodeled and expanded, as early as the 13th century, into an immense prose- narrative. The habit of reading, already begun, was greatly extended by the invention of print¬ ing, with the result that the old verse-romances were everywhere turned into prose, and the short prose-tales were expanded into narratives that might assume the magnitude of an epic or a saga. Conspicuous instances of this trans¬ formation are Malory's (Morte Darthur/ a compendium of Arthurian romance, and the French (La Fleur des Batailles/ a Charlemagne romance in which Ogier the Dane is the hero. These are but two out of hundreds of examples of what was taking place wherever the print¬ ing press was set up. To Caxton and the noble printers that followed him we are in¬ debted for the creation of a prose style suit¬ able to the novel.

The most striking innovations were made at first in the Spanish Peninsula. Out of a Portuguese verse-romance of adventure there grew up in the 1 5th century, by accretions from many sources, the famous prose (Amadis of Gaul/ to which final form was given by a Spanish writer named Montalvo. In its outer structure Amadis differs from similar mediaeval tales of knightly adventure in that the narrative drifts on, as in Greek romance, to the marriage of the hero and the heroine. It was the first and the best of the modern romances of chivalry, which soon became so numerous as to fill the library of Don Quixote. In a like man¬ ner mediaeval verse-pastorals were turned into prose, though they usually still retained some mixture of yerse. Among the first of them was the Italian (Arcadia5 (1504) by Jacopo Sannazaro. The type was further developed in the Spanish Peninsula by George of Monte- mayor, whose (Diana Enamorada5 set the fashion for France and England. It was in Spain, too, that some one first had the happy thought of placing behind the scenes of con¬ temporary life a gay scamp to let him relate what he saw there. These so-called picaresque novels, or romances of roguery, began with the anonymous (Lazarillo de Tormes5 (1554) and were popular for a full century. Always realistic in aim and straightforward in move¬ ment, the romances of roguery were import¬ ant forerunners of the modern novel. Akin to them and of still greater significance, was Ron Quixote/ a vast prose-epic,' written in burlesque of the romances of chivalry, but carrying along with its banter humorous de¬ scriptions of contemporary manners. Don Quixote and his Squire Sancho Panza were by far the most elaborate characters that fiction had yet produced. And no work comparable with that of Cervantes was to appear again in Spain or elswhere for more than a century.

In France and Italy the novelistic literature chiefly cultivated at this time, aside from redac-

tions of the older romances and tales, was the conic or novella. Collections of these short stories were sent forth from nearly every city of Italy, and the (Heptameron) of Margaret of Navarre became a close rival to Boccaccio's (Decameron.* The great humorist was Rabelais, who made the farcical adventures of Gargantua and Pantagruel the occasion for social satire, weaving into his story as he went along many a coarse jest in the vein of the old fabliaux. He was followed by a group of imitators who tried to outdo him in ribaldry and buffoonery, but none of them possessed his immense learning and keen intelligence.

In Elizabethan England, men and women turned to fiction for amusement as well as to the drama. Beginning with Painter's (Palace of Pleasure) (1566), the Italian novelle came into English in shoals; the best of the Greek romances were translated from the French; and the Spanish romances of chivalry, pastorals and rogue-stories were known in part. And whatever England took was worked over into fictions in harmony with her own society. For its wide scope Sidney's

After the passing of the Elizabethans and of Cervantes (1616) the main stream of European fiction shifted for a century to France. The English 'Arcadia* and the Spanish

of the line came Madame de la Fayette, whose 'Princesse de Cleves* has long been regarded as one of the classics in French fiction. Along with their pastorals and histories, the French continued to cultivate the stories of bourgeois life in line with the older conte and fabliau. Such were Sorel's 'Francion,* Scarron's (Ro¬ man Comique,* and Furetiere's (Roman Bour¬ geois,ˆ in which the aim was, to some extent, the ridicule of contemporary manners in low life. Burlesque in the style of Cervantes or Lucian made its appearance in Sorel's (Berger Extravagant,* a hit at the 'Astree,* and in Boileau's 'Heros de Roman,* descriptive of the descent of Scuderi's heroes into Hades to be flogged and cast into Lethe.

Through translation, the ponderous French romances became almost as popular in England and Germany as in the land of their birth. In both countries coteries of fashionable men and women vvere formed for reading and studying them as if they were all classics. Occasionally there was an imitation, like Roger Boyle's 'Parthenissa* or John Crowne's (Pandion and Amphigenia.* Outside of their influence was Grimmelshausen's 'Simplicissimus * the first of the German realistic novels, which described the adventures of a vagabond during the awful desolation of the Thirty Years' War. In this novel the picaresque element is quite apparent as well as in the (English Rogue ... a Complete History of the Most Eminent

Cheats of Both Sexes, composed jointly by one Rich¬ ard Head and Francis Kirkman, a London book¬ seller. Mrs. Aphra Behn, the dramatist, set the fashion in England for scandalous tales of high life. Among her successors were Mrs. Mary Manley and Mrs. Eliza Haywood. Quite apart from these immoralities was Mrs. Behn's 'Oroonoko,* which gives a realistic account of a royal slave barbarously put to death at Suri¬ nam, where the author had lived for some years.*

Interesting as much of this 1 7th century fic¬ tion may be, it is, with the exception of the (Princesse de Cleves and now and then an¬ other story, affected in style and involved in structure. A better and plainer narrative came with Bunyan's (Pilgrim's Progress,* the news¬ papers, the biographers and the essayists. Steele and Addison described clearly scenes in London and the provinces; they deftly sketched and contrasted men and women as they knew them, with agreeable banter of prevailing ab¬ surdities in dress and conduct. In doing this they were really nearer to the modern novel than the romancers and the storytellers. And so was Defoe. He and Swift wrote the lan¬ guage that men speak in ordinary discourse, making fiction seem like truth. (Robinson Crusoe* is indeed our prose Hliad.* Except for minor details, we have no better narrative in English, and the hero is a typical Englishman of the class to which he belongs, behaving as an Englishman should behave if cast upon a desert island. In France the Spanish picaresque novel was at this time cleverly employed by Le Sage in his* (Gil Bias* for social satire, and Mari¬ vaux, in a novel called (Marianne,* began the delicate analysis of emotion. Not to be for¬ gotten, too, is (Manon Lescaut,* by the Abbe Prevost, a charming tale on the "divine right of passion.®*

Richardson to Scott. — For centuries, stories, tales and romances of all sorts had been set adrift; contemporary manners had at times been depicted under the guise of history and the pastoral life, and from the standpoint of rogues and adventurers. But no one, not even Cervan¬ tes, had ever been able to keep before him for long the ideal of the novel as we now under¬ stand it : to wit, the direct and faithful por¬ trayal of character amid the scenes of real life. Strange to say, too, no one had ever seen that for this end much might be learned from the drama, that a narrative might be made closely and logically dramatic. These discoveries were left for Samuel Richardson, a London printer of no rank and little schooling. The interest in his first novel, to which he gave the name of Pamela5 (1740), centres about the distress of a beautiful waiting-maid of humble birth. Her mistress dies and then the son and heir tries to win her to a dishonorable alliance.

After a protracted struggle of will against will, the young man repents of his evil-doing and mar¬ ries the young woman whom he would have be¬ trayed. It is a simple story that may be told as here in two or three sentences. But for his treatment of the theme Richardson required two volumes, to say nothing of a continuation. Dur¬ ing and after each struggle there were sensa¬ tions to record; many characters had to be introduced as participants in the action; and the whole narrative was made to move from incident to incident with the logic of the drama, up to a climax and on to a catastrophe. When he had done with (Pamela, 5 Richardson had created, perhaps without being aware of it, a novel from which characters emerge as clear and definite as from the drama, and in much greater detail. Richardson attained to his full stature in (Clarissa Harlowe,5 wherein a tragic theme is unfolded with great skill. His career closed with

The formula of the novel once discovered, it was easy for a man practised in letters to im¬ prove upon the humble printer. Henry Fielding, essayist and playwright, wrote (Joseph An- drews) to show Richardson what a novel ought to be, and afterward went on with (Tom Jones) and (Amelia.5 Fielding was a great humorist in direct descent from Lucian and Cervantes. The novel, as he understood it, was an immense comic-epic running on in the well- polished grooves of the drama, but suspended at intervals that the author might converse with the reader about his art, his fame and the conduct of his characters. Knowing England better than any other man of letters in his day Fielding conveyed the wealth of that knowledge into characters like Parson Adams, Squire Western and Tom Jones, who always stand out full and complete. While the great master was at work on (Tom Jones, 5 Tobias Smollett took the field with (Roderick Random,5 our first novel of the sea, which was followed by Pere¬ grine Pickle) ; (Count Fathom5 ; (Sir Launcelot Greaves5; and (Humphry Clinker.5 If Field¬ ing was a comic writer who delighted in expos¬ ing to ridicule vanities and affectations, Smol¬ lett was a satirist who lashed hypocrisy and the darker vices with the glee of a madman. He

had in him also the spirit of fun, which welled up splendidly in (Humphry Clinker,5 ((the most laughable story,55 said Thackeray, (

*Owing to changed social conditions, the novel broke up into new types after the death of Sterne. Among large numbers of people in England and France, interest in the comedy and tragedy that grow out of love and intrigue gave way, in the years before the French Revo¬ lution, to the larger social and political rela¬ tions and to theories of education and govern¬ ment. The novel at once became the popular medium of current speculation, incorporating into itself the tract, the pamphlet and the treatise. The novel of distinct purpose which began with Rousseau's (Emile,5 w*as continued by many English writers including Thomas*

Holcroft and William Godwin, the author of (Caleb Williams.5 In other hands the novel absorbed romance. The so-called Gothic ro¬ mances all sprang from (The Castle of Otran¬ to,5 a nightmarish tale by Horace Walpole. Among Walpole's successors were Clara Reeve; Mrs. Ann Radcliffe, author of the (Mysteries of Udolpho5 ; <(Monk55 Lewis; and Charles Brock- den Brown, the American. In Germany there was a similar tendency to romance and super¬ stition as illustrated by the work of Tieck and Hoffmann.

Meanwhile, a group of novelists, mostly women, held more nearly to older traditions.

(Evelina5 and Pecelia5 by Frances Burney (afterward Madame d'Arblay) brought the public back to London — to assemblies, Rane- lagh, the opera, and Drury Lane, where thronged the world of fashion with nothing to do. With Miss Burney began the novel of manners in the most restrictive meaning of the phrase. Hitherto characters had been differentiated by

what they said and did. Miss Burney laid equal stress upon how they spoke and how they behaved, upon tone, look and gesture. From her art it is an easy transition to the character- types of Maria Edgeworth. One may pass by, good as they are, Miss Edgeworth's tales of fashionable life and various fictions in which she sought to reform English society from top to bottom, for her stories of Irish life such as (Castle RackrenD and the (Absentee, > wherein first appeared the Irishman as he really is, be¬ having himself in those ways that seem so ab¬ surd to an Englishman, and engaging in no long conversation without one or more of those delightful blunders in speech known as Irish bulls. From Miss Edgeworth's sketches, as she called them, flowed all these Irish tales which for the next 50 years flooded England. Miss Burney and Miss Edgeworth shared one defect, for neither of them knew how to manage a story. Their many natural and vivacious scenes are more or less detached and never firmly held together. But the art of Fielding, long since lost, was now to be regained and refined by Jane Austen, a woman of gentle breeding and charming style. Her first novel to be printed was (Sense and Sensibility p then followed (Pride and Prejudice, } (Mansfield Park, (Emma,) (Northanger Abbey) and Persua¬ sion,) of which the best is the novel one hap¬ pens to be reading. The scenes of them all were laid in South England, where Jane Austen passed her life. Without employing the con¬ ventional devices of the novelist, she was able to awaken interest by the manner in which she developed her story, the nice discrimination be¬ tween men and women much alike to the*

ordi¬ nary observer, and the wit and irony that ac¬ companied the entire performance. Jane Austen was in a sense the last of her line, completing the work of Miss Burney and Miss Edgeworth ; she also set the clock to the delicate impression¬ ism of the 19th century.

Sir Walter Scott. — Scott, equally with Richardson, marks an epoch in the course of European fiction. From the earliest times, as in Egypt and Greece, history had been an adorn¬ ment to the tale or story. Shakespeare and many others had written historical dramas. The French romances of the 17th century, many of them, were historical allegories. The Gothic writers laid their scenes in mediaeval or early modern times. With several romancers just before Scott, history was a still more definite aim, especially with Jane Porter, author of the Scottish Chiefs.) But none of Scott's prede¬ cessors had the historian's perspective. None of them did much more than project the pres¬ ent into the past. Scott's aim was to restore as carefully as he could the manners and cus¬ toms of our forefathers, to tell us how they behaved under the stress of civil and political commotions. The historical novel, as Scott organized it, was, then, the novel of manners pushed back, at first one or two generations, and eventually to the Middle Ages. He began in

was clearly the founder of the historical ro¬ mance. His numerous imitators in England included Horace Smith, G. P. R. James, W. H. Ainsworth, and in part, Dickens and Thackeray. Under Scott's direct inspiration, Cooper launched his great romances of the forest cele¬ brating the career of Leather-Stocking; and as a challenge to the seamanship of Scott's

Varied Types of the 19th Century. — By

1832, the year of Scott's death, romance had run its immediate course in England, though there were many survivals. The passage of the Re¬ form Bill and other legislation led to a break¬ up of society; the older bourgeoisie fared badly, losing their homes and drifting to debtors' prisons and workhouses ; and a new middle class rose to wealth and power. The manners, virtues and vices of the new order became at once the main theme of the novelists. Bulwer-Lytton, who could write at will a his¬ tory, a sentimental romance, a criminal novel, a ghost story, or a Utopia, well illustrates the transition from romance to the novel of corn- temporary manners. Dickens was the chronicler of those who had suffered most by political and social changes. Beginning with (Pickwick J (1836-37), a long series of comic sketches un¬ excelled in their kind, he definitely struck the humanitarian note in (01iver Twist (1837), which dealt, in humor and pathos, with the workhouse and the new poor-law. He there¬ after passed in review private schools, public education, prison discipline, the*

red-tape of Downing street, delays in the Court of Chan¬ cery, graft (we should now call it) in business and the professions, and all sorts of hypocrisy and meanness that oppressed the people. De¬ spite the sordidness of their matter, all of Dickens's novels were ennobled by the author's lofty idealism, and made delightful by a sense of humor that never deserted him. Those that were wrought out of the author's most intimate experience — (David Copperfield, for example — were no doubt the best ; but Dickens could interest when he took, as in (Hard Times,) a subject about which he knew little or nothing. His Christmas stories were national events. Of immense creative power, Dickens added to fic¬ tion hundreds of humorous types, among which are Mr. Pickwick, Sam Weller, Micawber and Dick Swiveller. He was, however, surpassed in fertility by his early French contemporary, Honore de Balzac, who in the vast (Comedie Humaine* endeavored to portray every phase of French life, traversing its hell, purgatory and paradise. But what fell without the ken of Diokens was taken up by other novelists. Charles*

Kingsley, now better known for 'Hypatia) and .Westward Ho\ canvassed the questions at issue between labor and capital, in ' Yeast } and Alton Locke, } drawing by the way vivid pic¬ tures of sweatshops and the distress of agri¬ cultural laborers. Mrs. Elizabeth Gaskell, in Mary Barton > and (North and South, > de- s9T!ˆec ˆ.le frightful condition of women and children in the great manufacturing towns of Noith England. And Benjamin Disraeli created a sensation by his trilogy, 'Coningsby,) Sybil and 'Tancred,) dealing in turn with the state of parties,® ((the state of the people,® and "the state of the Church of England.® Disraeli s first novels, impressive for their scope, were all marked by keen intelligence, wit and mockery. The relation of Dickens, Kingsley, Gaskell and Disraeli to their times is ex¬ haustively treated by Cazamian, (Le Roman So¬ cial en Angleterre) (Paris 1904L*

In the meantime Thackeray was depicting, with matchless humor and irony, the ways of the well-to-do middle class to which he him¬ self belonged. (Barry Lyndon, > the (Book of Snobs, various burlesques of contemporary novelists, and a multitude of sketches were suc¬ ceeded by (Vanity Fair, a novel without a HeroP No English novel since 'Tom Jones) had contained so much of real life. It was a humorous transcript of what was going on among the rich bankers and merchants in Bloomsbury, with some invasions into the dis¬ reputable aristocracy of Belgravia. In (Pendenms) Thackeray described much of his own career; and in the 'Newcomes,) he re¬ turned, though taking the edge from his irony, to the

theme of his first novel. Finally, he car¬ ried his realistic methods into history, writing 'Henry Esmond) and the (Virginians, > of which the former is rightly regarded as the best his¬ torical novel in English.

Esmond' is, however, hard pressed for first place by the < Cloister and the Hearth, > by Charles Reade, who also wrote several admir¬ able novels under the humanitarian impulse, such as (It is Never Too Late to Mend.) To the same period belong Charlotte Bronte's (Jane ~VrK), (Shirley) and 'Villette,) and her sister Emily s ' \ inhering Heights, } all of which are Byron ic in the vehemence of passion. In the Umted States, Poe and Hawthorne had molded the short-story to a beautiful form, and the lat- ter s 'Scarlet Letter) at once took rank among the great fictions. To Anthony Trollope de¬ scended Thackeray's humor, without, however, t e master s irony and genius. For 20 years Irollope was the delight of a large audience. He was the easy and amusing chronicler of every-day English life, rising to his highest powers in the tales of cathedral life, which be¬ gan with (The Warden > and (Barchester Tow¬ ers) and closed with the 'Last Chronicle of BarsetP This series of delightful novels, no doubt, suggested to Mrs. Margaret Oliphant the Chronicles of Carhngford,) dealing with the ways of Dissenters. (Salem Chapel) and (Miss Majoribanks,) among the best of them, give Mrsˆ Oliphant a permanent place in the course of English fiction.

With Marianne Evans, known in letters as George Eliot,® there entered into the English novel a now and profound personality. Hith¬ erto moralists and philosophers had tried fiction

with no great success. But George Eliot, be¬ sides her large acquirements from books, pos¬ sessed wit, humor and a fund of fresh obser¬ vation. Beginning with (Scenes of Clerical Life,) 'based upon incidents and traditions brought over from her life as a Warwickshire girl, she published in 1858 (Adam Bede,) her first long novel. It was quite different from any other novel that had ever been produced. True, it ran on the lines of the conventional story of a young woman's betrayal ; but beneath the outer sequence of incident was a relentless study of motive, clearly and logically developed from beginning to end. It was the first purely psychological novel ever written. Still more im¬ pressive work followed in (The Mill on the Ploss,' 'RomolaC and ' MiddlemarchP At the same time George Meredith was finding his way to the psychological novel. His < Ordeal of Richard FevereP appeared in the same year as (Adam Bede,) but his subtle osychological man¬ ner came later, in the (Egotist) and (Diana of the Crossways.) Narrower in his outlook than George Eliot, he took fewer characters for his studies, carrying the analysis of motive t© a re¬ finement that sometimes rendered him unintel¬ ligible. And Henry James has since refined upon Meredith. The stories whereby James first won attention were international episodes delightfully objective in method, like

‘Daisy Miller,) depicting by contrast American and European types and manners. But by 1890, he began very complex studies of unconventional phases of English life, and adopted for his pur¬ pose an involved and indirect style, with the result that most readers are now uncertain just what happens in a novel like the (Golden Bowl,) foi the incidents must be largely inferred from the characters.

It is impossible to relate here in detail what has been done for fiction on the Continent since the death of Balzac. In France, Flaubert and JJaudet were the great literary artists of their time, ˆola, who established the vogue of ((the naturahstic novel,® described the ugliest aspects ot life with a boldness never before attempted in fiction. His influence is obvious in very many English novels, but most of all in George Moores ‘Esther Waters,) by far the best novel

*Jqoo’T °fLthe Zola tyPe. Paul Bourget, since 1*92, has been the exponent of psychology narB—avla S representative has been first of w ,PJ°rnsen-Sienkiewicz, author of (Quo Vadis) and an impressive trilogy dealing with the struggles between the Poles and the Cos¬ sacks, may stand for Poland. Among Ger¬ many’s numerous novelists are Paul Heyse, au- thor of ‘Kinder der Welt> ; Spielhagen, who presented his ideal of a novel in a collection of essays on the (Theory and Technique of the Novel ; and Sudermann, the dramatist, whose pathetic Frau Sorge) soon found its way to English readers. • y*

Of modern Russian fiction the founder was Gogol, whose < Dead Souls) (1842) is a master¬ piece of realism and grim humor. Again Russia produced a novelist of the first rank in lurgenev,. whose art — say in ‘Fathers and Sons is quite beyond praise; its influence has been long potent in the West. Tolstoi be¬ ginning with ‘Anna Karenina,) treated current social problems in novels of absorbing interest. His novels read, not like fiction, but as if they

were genuine documents on contemporary life. To the same period belongs Dostoevski, who, especially in (The Brothers Karamazov, > car¬ ried minute psychological analysis into the realm of pathology. Of less importance is Gorki, in whose (Twenty-six . Men and a GirP is well displayed his talent in the portrayal of hideous scenes among the lowest strata of the under¬ world. Chekhov, who died in 1904, was then assuming a position in Russian fiction second only to Turgenev. Still, he never developed the perfect art of his predecessor, nor had he the wide

sweep of Tolstoi. Representative of his subtle work is the collection of tales called (The Black Monk and Other Stories) (1903). Artsybashev came to the front in 1907 with (Sailing a powerful novel exalting the natural instincts of man against all moral restraint. At the present moment the leader in Russian fiction is Andreev, author of (The Red Laugh, > (The Seven who were Hanged, } (Judas Iscariot, } (A Dilemma, y and many other terrible stories. Regarded as a whole, contemporary Russian fiction excels that of all other nations in un¬ compromising realism.

With the 20th century came, too, a revival of the <(biographical novel, }) which aims to de¬ pict the entire career of the leading character or some important phase of his life. This type of novel is an interesting reversion through Dickens and Thackeray to the manner of Field¬ ing and Smollett. Its extreme representative is (Jean-Christophe, > by the French novelist, Ro- main Rolland, running to 10 volumes and pre¬ senting in its wide sweep a remarkable view of European life and thought just before the out¬ break of the Great War. In English fiction, the new fashion was established by the success of William De Morgan with (Joseph Vance > (1906) in the style of a loose autobiography, and deservedly maintained by his (Alice-for- Shortp (Somehow Good,> and (It Never Can Happen Again.- > Slightly antedating De Mor¬ gan was Samuel Butler's brilliant study in the diabolism of human nature, called (The Way of All Flesh.) To the same group belong Arnold Bennett, who won his public with (The Old Wives' Tale) and has since written prodigi¬ ously; and John Galworthy, whose best novel thus far is (The Man of Property. Of larger calibre is H. G. Wells, the socialist and re¬ former, who would make over society in accord¬ ance with the facts of biology. Representative of his work are (Ann Veronica,* (Marriage,* (The Wife of Sir Isaac Harman,* and (The Research Magnificent.* Somewhat apart from this group, but within it in her reflection of current views on social conventions is May Sin¬ clair, the author of (The Divine Fire,* (The Helpmate,) (The Judgment of Eve,* and (The Three Sisters,* all of which are iconoclastic in tone. And during all these years the wonderful portrayer of men and women has been Joseph Conrad, whose readers have been comparatively few.*

The Great War gave the novelist a new subject and is profoundly altering his art. The novelist now strives by all means in his power to make his fiction appear as fact. He relates the experiences of an officer or a pri¬ vate at the front, working stories and anecdotes into a sequence; he writes of a man or a woman caught in Germany at the outbreak of

*the war; or seeks to tell the world how the war affected him or his friends far behind the battle line. He needs little or no plot. His art is essentially a return to the art of Defoe, whose sole aim was a good tale dressed in the garb of truth. So we have Mrs. Ward with (Missing, * and (Towards the*

GoaP ; Locke, W. J., with (The Red Planet ; and an unknown writer with (Christine,* purporting to be genu¬ ine letters out of Germany from a daughter to her mother. Thus far have appeared two very notable novels in this style. They are Well's (Mr. Britling Sees It Through* and Henri Barbusse's (Le Feu* — the story of a squad under fire.*

Howells, who has often interpreted Tolstoi in brief essays, has held firmly to a realistic treatment of current types and manners, elimi¬ nating so far as possible the conventional plot which the novel early took over from the drama. His (Rise of Silas LaphanP is by far the best American novel of the present generation. Hardy is the English novelist of most thought and substance since George Eliot. He struck the note of his stern realism in (A Pair of Blue Eyes> and (Far From the Madding Crowd, and rose to the height of his genius in (Tess of the D'Urbervilles.* Mrs. Humphry Ward gained her public with (Robert Elsmere,* and after writing several other problem novels, shifted her theme in (Lady Rose's Daughter> and the (Marriage of William Ashe,* to beauti¬ ful women in risky situations. A tendency toward the abnormal in recent fiction, slightly visible in Mrs. Ward, is best represented by Mrs. Harrison's (Sir Richard Calmady.* The intensity of Hardy's tragedy, though less well- rendered, descended to Phillpotts, author of the (Secret Woman * and other Wessex novels. His (Three Brothers* is almost worthy of his great master.*

Toward the close of the 19th century, the English .novel passed through a brief cycle of romance, history and adventure. No decade and perhaps no year since Scott and Dumas had been without an historical novel or a story of adventure. In recent years Blackmore's (Lorna Doone) had been received with delight by a wide public; and Shorthouse's (John Inglesant, a spiritual romance of singular beauty, had met with almost equal favor. But the novelist who revived history and adventure as a fashion was Stevenson. He became for his time a lesser Scott, though, in technical detail, he surpassed his countryman. Beginning with (Treasure Is¬ land, } a story of pure adventure, he passed on through the ethical parable of (Dr. Jekyll and Mr. Hyde* to (Kidnapped,* (David Balfour,* and the (Master of Ballantrae,* which were tales of adventure in an historical background after the style of Dumas. These and other tales and short stories, admirable in form and style, and revealing a charming personality, won the hearts of the critics as well as of the larger public. As in the case of Scott, Stevenson was accompanied and followed by scores of his¬ torians, among whom were Conan Doyle, S. R. Crockett, Stanley Weyman, Anthony Hope Hawkins, Weir Mitchell, Mary Johnston, Ger¬ trude . Atherton and Winston Churchill. Most of this work, though there are exceptions, is mechanical in execution and is destined to pass quickly into oblivion. But Maurice Hewlett es-*

pccially has made an interesting psychological study of Mary Queen of Scots under the title of the 'Queen's Quair) ; and in the (Forest Lovers,' (Little Novels of Italy,) and (New Canterbury Tales,) he has revived in his own beautiful way the spirit of the Renaissance and the Middle Age.

No less interesting than the recrudescence of romance was the exploitation of remote districts and countries for fresh material, until the earth has now become well-nigh exhausted. First of all comes to mind Kipling, who revealed India in tales of wonderful vigor and insight, like those in collections named (Soldiers Three,)

(Phantom Rickshaw and Other Tales,) 'Many Inventions,) and in

The 20th century opened with a remarkable vogue of the short-story, so well adapted to the newspaper and magazine. Short narratives in prose have been cultivated from the earliest times. Egypt and India had them long before the dawn of modern civilization. As novelle they were brought to high finish by Boccaccio, and ever since his time they have been frequent in all the literatures of the West. But a new type, depending less upon narrative interest than upon conveying a definite impression or an emotional state, came in with Poe and Haw¬ thorne. Short stories of this kind, containing few characters and shorn of unnecessary inci¬ dent, were exquisitely wrought by Daudet and Maupassant. Less clean-cut but admirable in their several styles are the short stories of James, Stevenson, Kipling, Hewlett, Aldrich, Davis, Stockton, O. Henry, Edith Wharton and many another writer. Recently supreme excel¬ lence has been attained by several Russian novelists — Chekhov, Kuprin, Sologub and Andreev.

Bibliography ■— Egypt and the East.— The

best Egyptian stories were translated into Eng¬ lish by Petrie, 'Egyptian Tales) (2 vols. Lon¬ don 1895) ; and into French by Maspero, 'Les Contes populaires de l'Egypte ancienne' (Paris 1889). Consult also Warner, (The World's Best Literature) (New York 1897) for speci¬ mens. A concise account of the tales of India is given, with a full bibliography, by Macdonell, 'A History of Sanskrit Literature) (New York 1900) ; and a more extended account by Schroe- der, Hndiens Literatur und Cultur' (Leipzig 1887). For specimens, consult Jacob. (Hindoo Tales' (London 1873) ; Burton, 'Vikram and the Vampire ' (new ed. London 1898) ; and 'World's Best Literature.' The most faithful

translations of the Arabian Nights are by Bur¬ ton (10 vols., London

1885-86, and six supple¬ mental vols. 1887— 88) ; by Payne (8 vols., Lon¬ don 1882-84), and by Lane, edited by Jacobs (6 vols. London I898). Burton's translation was abridged by Lady Burton (6 vols. Lon¬ don 1887-88).

Greece. — The standard book on the Greek novel is Rohde, (Der Griechische Roman' (new ed., Leipzig 1900), of which a summary was made by Schwartz, (Fiinf Vortrage fiber den Griechischen Roman' (Berlin 1896). Con¬ sult also Salverte, (Le Roman dans la Grece ancienne'; Dunlop, (History of Prose Fiction) (rev. ed. London and New York 1888) ; Warren 'A History of the Novel previous to the 17th Century' (New York 1895). For translations, see the new revisions of Greek and Roman classics in the Loeb Library, the (Greek Ro¬ mances ' and the (Golden Ass' of Apuleius in Bohn's Library, and the 'Works of Lucian' translated by Fowler (Oxford 1905).

*England. — Cross, development of the English Novel,' a summary of English fiction from mediaeval romance to Kipling (new ed. New York 1905) ; which should be supplemented for contemporary writers by Phelps, (Essays on Modern Novelists' (New York^l910), and (The Advance of the English Novel' (New York 1916). Dunlop, (History of Prose Fic¬ tion,' to Scott (rev. ed., London 1888) ; Raleigh The English Novel,' to Scott (New York 1894) ; Jusserand, the (English Novel in the Time of Shakespeare' (London 1890) ; Lanier, "The English Novel and the Principle of its Development,' from Richardson to Eliot (rev. ed., New York 1897) ; Stoddard, (The Evolu.tion of the English Novel,' presenting a theory of development (New York 1900) ; and Matthews, Aspects of Fiction,' of the present day (New York 1896). Besides these general works cover¬ ing the periods indicated, essays on special aspects of the novel are numerous in the works of Leslie Stephen, Saintsbury, James, Stevenson, Howells and Brander Matthews. The field is well covered by Perry in 'A Study of Prose r iction ' (Boston 1902). Among works of ref¬ erence may be cited Baker, (A Descriptive Gmde to the Best Fiction' (London 1903) * Nield, (A Guide to the Best Historical Novels and Tales' (3d ed., New York 1903), and Dix- son, 'Subject Index to Universal Prose Fiction' (New York 1897).*

Spain. — bor the Spanish novel as a whole, consult Ticknor, 'History of Spanish Litera¬ ture' (4th ed., Boston 1871), and for a brief summary Clarke, Spanish Literature' (London 1893) The picaresque novels are described by Chandler, 'Romances of Roguery' (New York 1899) ; and by De Haan in 'An Outline of the History of the Novella Picaresca in Spain' (The Hague and New York 1903). Consult also Dunlop and Warren as cited above.

France.— Paris, 'La Litterature Frangaise au Moyen Age,' for mediaeval

types (2d ed Pans 1890) ; for 17th century, Korting, 'Ge- schichte des Franzosischen Romans in XVII Jahrhundert' (Leipzig 1885ˆ87), and Breton Le Roman au dixseptieme Siecle' (Paris 1890) ; for the 18th century, Waldberg. 'Der Empfindsame Roman in Frankreich' (Strass- 1906) ; and for the last century. Gilbert, Le Roman en France pendant le XiX Siecle'

(rev. ed., Paris 1896); Wells, (New York 1898) ; and Brune- tiere, (Le Roman Naturaliste) (New ed., Paris 1892). In various essays Brunetiere has cov¬ ered nearly the whole field from the beginning of the 18th century.

Germany.— Mielke, (Der Deutsche Roman des XIX Jahrhunderts5 (Braunschweig 1890) ; Rehorn, (Der Deutsche Roman5 (Koln und Leipzig 1890) ; and Spielhagen, (Beitrage zur Theorie und Technik des Romans5 (Leipzig

1883).

Russia. — The great body of Russian fiction, along with biographies of the authors, is be¬ coming more and more known through numer¬ ous translations. Consult W. L. Phelps, (Essays on Russian Novelists5 (New York 1911) for an excellent guide. See also the articles on indi¬ vidual novelists in this encyclopedia.

The Short Story. — Specimens of tales and short stories from the Egyptian survivals to the present day are given by Jessup and Canby, with an introductory essay on the genre, in cThe Book of the Short Story5 (New York 1903). The best collection of British and Amer¬ ican short stories is Sherman's (A Book of Short Stories5 (New York 1914), which con¬ tains a very fine essay by the editor. The art of the short-story has been admirably treated also by Matthews in ((Philosophy of the Short- Story,55 in (Pen and Ink5 (New York 1888) and by Perry in (A Study of Prose Fiction5 (Boston 1902). Among other interesting books consult Barrett, (Short Story Writing5 (New York 1900) ; Esenwein, (Writing the Short Story5 (New York 1909) ; Gra'bo, (The Art of the Short Story5 (New York 1914) ; Hamilton, (The Materials and Methods of Fiction5 (New York 1908) ; and Pitkin, (The Art and the Business of Story Writing5 (New York 1912). Phelps, W. L., (The Advance of the English Novel5 (1906).

Further information on the novel may be gained by consulting the articles in this en¬ cyclopedia on the various literatures and on the leading writers mentioned in this essay.

Wilbur L. Cross,

Professor of English, Yale University.

NOVEL CONSTITUTIONS, or NOV¬ ELS, in law, were the supplementary constitu¬ tions of some Roman emperors, and especially those of Justinian, so called because they ap¬ peared after the authentic publications of law made by such emperors. The Novel Constitu¬ tions (also called Novels), together with the Institute, Digest and Code, constitute the whole body of law which passes under the name of Justinian. Although no official compilation of the Novelise was made they were preserved in several private collections, the most important of which, the (Liber Authenticorum5 was in¬ corporated, in the 12th century, in the (Corpus Juris Civilis 5 with the other Justinian codes. Consult Sohm, R., (The Institutes5 (Oxford 1901, trans. by J. C. Ledlie).

NOVELETTE, (1) in music, a term de¬ noting certain compositions in free form, char¬ acterized by a great number of short themes introduced without regular succession. Schu¬ mann (q.v.) was the inventor of this composi¬ tion. (2) An abbreviated novel, or short work of fiction. A short story usually contains from

1,000 to 20,000 words; a novelette from 20,000 to 40,000 and a novel from 40,000 words unward.

NOVELLINO, no-vel-le'no, 11, or CEN¬ TO NOVELLE ANTICHE, a 13th century collection of Italian stories of a very multifari¬ ous character taken from every possible source, biblical, classical, chivalrous and historical. The style is simple and natural and often distin¬ guished by a charming naivete. The tales were gathered from various sources. Early Latin collections, oral traditions, folk-tales, books of chivalry, the French fabliaux all contributed to them. Consult Gualteruzzi, (Novellino5 (Bo¬ logna 1525) ; Colombo, Michele, (Novellino5 (Milan 1825) ; other editions by Carbone (Flor¬ ence 1868) ; and by Donin (Turin 1890) ; Biagi, (Le Novelle Antiche5 (Florence 1880).

NOVELLO, VINCENT, English com¬ poser: b. London, England, 6 Sept. 1781; d. Nice, France, 9 Aug. 1861. He was one of the founders of the Philharmonic Society of London and of Novello, Ewer and Company, London music publishers. His contributions to cathedral music are numerous and valuable, and in editing the unpublished compositions of

great musicians he accomplished an important work.

NOVEMBER (from novem, nine), the eleventh month of our year and the ninth month of the Roman year when it consisted of 10 months. It has 30 days, and in Great Britain is generally regarded as perhaps the gloomiest period of the year. The first day of the month is All Saints Day. (See Calendar). In the United States Thanksgiving Day comes in November.

NOVGOROD, or VELIKI-NOVGO- ROD, ve-le'ke nov'go-rot (((Great Novgorod55), Russia, (1) a town, capital of the government of Novgorod, on the Volkhoff, near the point where it issues from Lake Ilmen, 103 miles southeast of Petrograd. It is divided by the river into two parts, which communicate by a stone bridge. The portion of the town on the right bank contains in its centre the Kremlin or citadel. Within it is the cathedral of. Saint Sophia, built after the model of Saint Sophia at Constantinople ; and numerous churches and several monasteries. The town- hall, post office and commercial building stand on the left bank of the river. The manufac¬ tures are of little importance and consist of sail cloth, leather, tobacco, candles, vinegar, etc. The trade in corn, flax and hemp, carried on chiefly with the capital, is considerable. Nov¬ gorod was in early times the capital of an independent state. So great was its power and wealth that it excited the jealousy of the Mus¬ covite princes, and in 1478 the Tsar Ivan III nearly destroyed the city, deprived it of its lib¬ erties and banished its most influential citizens. On the opening of Archangel to English trad¬ ers, but more especially after the founding of Saint Petersburg, the town rapidlv declined. Pop. 27,130. (2) The government of Novgorod

has an area of 47,236 square miles. Pop. 2,200,000, chiefly engaged in agriculture and stock-raising. Consult Kluchevsky, V. O., (History of Russia5 (3 vols., London 1911-13).

NOVGOROD-SYEVERSK, sya'versk, Russia, city on the Desna River, 148 miles northeast of Tchernigov, in the government

of Tchernigov. It is one of the oldest towns in Russia. In the 11th century it was the capital of an independent principality. Sub¬ sequently it was annexed to Lithuania. Nov- gorod-Syeversk possesses an Orthodox Cathe¬ dral, dating from 1671; an ancient monastery; and a college, dating from 1808. Novgorod- Syeversk is a brisk trade centre. It manufac¬ tures soap, bricks and has tanneries and to¬ bacco and sugar plantations Pop. 12,727.

NOVI LIGURE, no-'ve le'goo-ra, Italy, town in the province of Alessandria,

33 miles northwest of Genoa and 13 miles southeast of Alessandria. The town has several churches, a museum, public library, a lyceum and tech¬ nical schools. The chief industry is the cul¬ ture and manufacture of silk. Woolen goods are also made here. Novi was the scene of a battle (15 Aug. 1799), when the French were defeated by the Austrians and Russians and General Joubert was killed. Pop. 20,000.

NOVIBAZAR, no ve-ba-zar, or NOVI- PAZAR (Yenibazar), Jugo-slavia, the capital of the district of Novibazar, Kossovo, on the Rashka, 130 miles southeast of Bosna-Serai. There are no public buildings worthy of notice except the ruined citadel. It is the chief point of communication between Bosnia and Serbia; several of the chief roads of the country cross each other here. By the terms of the Treaty of Berlin of July 1878, the liva or district of Novi-bazar was maintained under a dual Aus- tro-Turkish control. Th§ town was given to Serbia by the treaties of London 30 May 1913. Pop. about 14,000.

NOVICE. See Neophyte.

NOVIKH, no'vek, Gregor ("Rasputin®), Russian lay mon.t: b. Tobolsk, Siberia, 1873; d. Petrograd, 29 Dec. 1917. He came of a peasant family with some hereditary gift of mesmerism. Known in youth as a dissolute character, Re was given the sobriquet of Ras¬ putin (q.v.). At 30 he became religious and although never in religious orders, his fame as an ascetic grew, and the dignitaries of the Church favorably regarded him as one who might prove a popular "miracle worker.® Though he never changed his immoral life, his reputation extended first in Moscow and from 1900 in Petrograd, among the highest circles of society. He started a new cult, in which dancing and debauchery were interspersed with mystical seances. He was introduced at the Imperial Court, where he exerted a powerful influence for years. In 1915 he published some details of his amours in the Novoye Vremya and was shortly after banished to his native Tobolsk. He was allowed to return in 1914; in July he was stabbed in the street by a peas¬ ant woman who wished to avenge one of his victims. The secret of his popularity at court, where he held the office of "Lighter of the Sacred Lamps,® was stated to be due to an al¬ leged miracle he had performed in restoring the young ex-tsarevitch, Alexis, to health. M. Gutchkoff (q.v.) denounced Rasputin in the Duma in 1912 as "a mysterious tragi-comic figure, an apparition of the Dark Ages.® Both the ex-tsar and his consort were frequently exhorted to expel the sinister monk from the court. All efforts to remove him failed and criticism of his actions were forbidden by the censorship. The scandal grew to such dimen¬

sions that the nobility — including grand-dukes and princes of the royal blood desired to re¬ move what they called a "plague spot® from the

national life. He grew frightened and shut himself up in his house, surrounded by a pri¬ vate bodyguard and secret police. On the night of 29 Dec. 1917 Prince Yussupoff, a young graduate of Oxford and married to a connec¬ tion of the Imperial family, invited Rasputin by telephone to his palace to a supper party. Rasputin, taken off his guard, entered the wait¬ ing automobile of his host and was driven to the Yussupoff palace on the Moika Canal. Here he was shot by the young prince in the presence of a grand-duke, a former Minister of State and several members of the Duma. The body was dropped into the Neva through a hole in the ice. It was recovered three days later, taken to Tsarskoe-Selo and buried in a silver casket.

NOVIKOFF, nov'ikof, Nikolai Ivanovitch,

Russian author : b. near Moscow, Russia, 27 April 1744; d. there, 30 July 1818. He entered the Imperial service, but soon turned his atten¬ tion to literature and became editor of the Mos¬ cow Gazette (1779-89). He established in Mos¬ cow a Typographical Society, whose purpose wasi to further inexpensive reprints of valuable books, and he also founded there the first cir¬ culating library in Russia, and in many various ways endeavored to promote the cause of edu¬ cation. In the Drone (1769-70) and the Painter (1772-73) he fought for the liberation of the Russian slaves and ridiculed the passion then shown by the upper class for everything French. Both periodicals were stopped by or¬ der of the court. He was imprisoned (1792) for writing (A History of the Jesuits, > and his property was confiscated, and his hospitals, schools, libraries and bookstores closed. His other works include (The Painter) ; (Russian Biographies, etc. Consult Gretch, (Essai sur l'Histoire de la Litterature Russe,* also Lugi- noff, (Novikoff and the Moscow Martinists**

(1897).

NOVIKOFF, Olga Kireeff ("O. IC.»), Russian political writer: b. Moscow, 1840. Her parents belonged to the nobility, and at 19 she was married to General Novikoff. She re¬ moved to England and there found friends among the most eminent statesmen of the day. Her political writings, signed "O. K.,® aimed to further an Anglo-Russian alliance and con¬ tinued the work of her brother who was killed in the Turkish War. She has published (Is Russia Wrong? (1877) ; (Friends or Foes* (1878); (Skobelev and the Slavonic Cause* (1884) Consult Stead, W. T., (The M. P. for Russia: Reminiscences and Correspondence of Madame Olga Novikoff* (New York 1909).*

NOVO CHERKASK, no'vo cher-kas'ka, or TCHERKASH, Russia, city, capital of the province of_ the Don Cossacks, near the Don River, about 40

miles from its entrance into an arm of the Sea of Azof. Anthracite coal mines and rich farm lands are in the vicinity. Two large fairs are held here each year, which bring considerable trade to the city. It has a number of manufacturing establishments, sev¬ eral excellent schools and a large library. Brewing was the chief industry of the city up to 1914. Pop. 68,200.

NOVOGEORGIEVSK, no' vo-ge-6r'ge- yeisk, boland, fortress on the Bug and Vis¬ tula rivers, nine miles northwest of Warsaw. Ihis spot was fortified by Charles XII of Sweden and the fortifications were extended py Napoleon. It was captured by the Russians in 1813. and occupied by the Poles in 1830 dur- nig their insurrection. One of its names is the "Polish Quadrilateral." The Poles also call the fortress Modlin, because it stands on the site of an ancient town of that name. The fortress is built on the banks of the Bug and the Vis¬ tula. The Germans captured Novogeorgievsk early in the World War.

, NOVOROSSISK, no'vo-ros-sesk', Russia, city on the Black Sea, in the government of Tchernomorsk, Caucasus, 60 miles south of Ekaterinodar by rail. A fortress was erected here by the Turks in 1722 and in 1838 Novo- rossisk was built. The English and French bombarded it in 1855. Novorossisk, situated on a large bay, is the chief outlet for the North Caucasus district. A large mole protects the harbor. North of the bay, in Novi Gorod, are the Russian Standard Petroleum Works and a large grain elevator. Grain and naphtha con¬ stitute the chief industries. There are also iron foundries and cement works. Novorossisk ex¬ ports barley, wheat, linseed, wool, kerosene, oil cake and cement Pop. 61,200.

NOVUM ORGANUM (literally, new meth¬ od or instrument), a famous work by Francis Bacon, published in 1620. It forms the second part of Bacon's philosophical work entitled Hnstauratio Magna, > (The Great Restoration of Sciences. The first part, therefore, is an attempt at an interpretation of nature from direct ob¬ servation.

NOVY, novi, Frederick George, chemist and bacteriologist: b. Chicago, Ill., 9 Dec. 1864. He was graduated from the University of Michigan in 1886 and studied in Berlin. In 1891 he became assistant professor at the Uni¬ versity of Michigan and was several times promoted until in 1902 he was made professor of bacteriology. He was at Pasteur Institute in Paris in 1897 for the prosecution of his studies and in 1901 he formed one of the United States commission to investigate the plague in San Francisco. He is

a member of many scientific societies, domestic and foreign, and is the author of (Cocaine and Its Deriva- tives) (1887); laboratory Work in Physio¬ logical Chemistry (1898) ; laboratory Work in Bacteriology* (1899) and several books in col¬ laboration. He has also published results of many researches in physiological chemistry, bac¬ teriology and proto-zoology.*

NOWANAGAR, no-wa-na-gar', or NA- WANUGGUR, na-wa-nu-gur', India, the sea¬

port capital of a native Gujarat state of the same name in the Kathiawar peninsula, at the mouth of the Nagna, on the Gulf of Cutch, 54 miles east of Rajkot, with which it is connected by a branch railway line. It is noted for its textile manufactures, pearl fisheries and carries on an active export and import trade and has extensive coastwise and inland trade. The town is encircled by a very strong ancient wall over four miles long. Pop. 44,887.

NOWATA, no'-wa'ta, Okla., city and county-seat of Nowata County, on the Saint Louis, Iron Mountain and Southeastern and on the Missouri Pacific railroads, 23 miles south of Coffeyville, Kan., and 32 miles north¬ west of Wagoner. Nowata is situated in a region rich in natural gas and oil-wells. Apart from this source of income the industries are farming and stock-raising. The city owns its waterworks. Pop. (1920) 4,471,

NOWELL, no'el, Increase, Anglo-Ameri¬ can colonist: b. in England, 1590; d. Boston, 1 Nov. 1655. One of the original patentees of the Massachusetts Bay Company, in 1630 he came to New England with John Winthrop. About 1632 he was dismissed from Boston be¬ cause of his urging the separation of Church and State; and became one of the founders of Charlestown and ruling elder in the church. He was outlawed by the English authorities for failure to appear before them. Nowell was secretary of the colony (1644-49), treasurer of Harvard College and chaplain to the force sent against the Narragansett Indians. He died in poverty, but a large land grant in New Hamp¬ shire was voted by the colony to his widow and his son, Samuel (1634—88), who had distin¬ guished himself in the swamp fight with the Narragansetts.

NOX. See Nyx

NOYADES, nwa-yad, in French history, the name given to the execution of political offenders by drowning them, practised during the Revolution, especially during the Reign of Terror, by Carrier at Nantes. The method adopted was crowding the victims into a boat, withdrawing a plug in the bottom and casting them adrift. See Carrier, Jean Baptiste.

NOYAU, or CREME DE NOYAU, nwo- yo, a French liqueur prepared from white brandy, bitter almonds, sugar-candy, grated nut¬ meg and mace and sometimes flavored with the kernels of apricots, peaches, the peel of oranges, etc.

NOYES, noiz, Alfred, English poet: b. Staffordshire, England, 16 Sept. 1880. He was educated at Exeter College, Oxford, where he gave evidence of his fine taste for literature. In 1913 he came to the United States to deliver a course of lectures at the Lowell Institute, Boston, choosing for his subject "The Sea in English Poetry." Yale gave him the degree of LL.D. in that year. In 1915 he became profes¬ sor of English literature at Princeton Uni¬ versity. He has contributed verse to the lead¬ ing magazines of England and the United States. His books are published in London and New York. They include

men) (1907) ; (The Enchanted Island and Other Poems) (1909) ; (Collected Poems)

(2 vols., 1910) ; five volumes in America with additional poems (1911) ; (Robin Hood) (1912); (Tales of the Mermaid Tavern) (1912) ; (The Winepress, a Tale of War5 (1914);

NOYES, Arthur Amos, American chemist: b. Newburyport, Mass., 13 Sept. 1866. He re¬ ceived the degrees of S.B. in 1886 and of S.M. in 1887 at the Massachusetts Institute of Tech¬ nology and of Ph.D. at Leipzig University in 1890. At the Massachusetts Institute of Tech¬ nology he was instructor in analytical chem¬ istry from 1890-94; assistant professor of or¬ ganic chemistry from 1894-97; associate pro¬ fessor from 1897-99; professor of theoretical chemistry from 1899; and director of the re¬ search laboratory of physical chemistry from 1903. He was acting president of that institute from 1907-09. He has received honorary de¬ grees of LL.D. from Maine University, 1908; LL.D. from Clark University, 1909; Sc.D. from Harvard University in 1909; Sc.D. from Yale University in 1912; and LL.D. from Pittsburgh University in 1915. He was president of the American Chemical Society in 1904. He is au¬ thor of (A Detailed Course of Qualitative Chemical Analysis of Inorganic Substances) (1895) ; (Class Reactions and Identification of Organic Substances5 (1899) ; (General Prin¬ ciples of Physical Science5 (1902) ; (The Elec¬ trical Conductivity of Aqueous Solutions5 (1907); (General Principles of Chemistry5 (1916) ;also of numerous papers on researches in physical, analytical and organic chemistry and on educational topics.

NOYES, Frank Brett, American journal¬ ist: b. Washington, D. C., 7 July 1863. He is the son of Crosby Stuart Noyes (1825-1908), a well-known American journalist and was edu¬ cated in the public schools of his native city and the preparatory department of Columbian College (now George Washington University). From 1881 to 1901 he was manager of the Washington Star and in 1902-1909 was editor of the Chicago Record-Herald. Since 1910 Mr. Noyes has been president of the Evening Star Newspaper Company in Washington. In 1894 he was made a director of the Associated Press, of which he became president in 1900.

*NOYES, Henry Drury, American eye-spe¬ cialist: b. New York City, 1832; d. 1900. He was graduated at New York University in 1851 and at the College of Physicians and Sur¬ geons in 1855. From 1868 to 1900 he was profes¬ sor of otology and ophthalmology in Bellevue Hospital Medical College. He was one of the founders of the American Ophthalmological Society in 1864 and was its president from 1878 to 1884. His published works include (A Treat¬ ise on Diseases of the Eye*5 (1881) ; (A Text Book on Diseases of the Eye5 (1890; 2d ed.,*

1894).

NOYES, John Humphrey, American au¬ thor and founder of the Oneida Community (q.v.) : b. Brattleboro, Vt., 6 Sept. 1811; d. Ni¬ agara Falls, Canada, 13 April 1886. His father was a representative in Congress 1815-17 and his mother an aunt of President R. B. Hayes (q.v). He studied at Dartmouth, took theological courses at Andover and Yale, was licensed to preach as a Congregational minister in 1833. He soon lost this license, having professed a second conversion, a belief in the dual sexual nature of God and the doctrine that the Chris¬ tian is bound by no rule of duty or conduct. With these tenets and an attempted return to the communism of the primitive Church, he gathered round him a Perfectionist Community at Putney, Vt., whose practice of complex mar¬ riage forced them to migrate to Oneida, N. Y. But there, too, they outraged public sentiment, sq that they gave up their peculiar tenets in 1880 and Noyes and some of his adherents moved to Canada. He wrote (The Berean,5 which may be called the (Bible of the Oneida Community5 (1847; (Communism5 (1848); (The Second Coming of Christ,5 that is in 70

a. d. (1859) ; (Salvation from Sin5 (1869) ; and (History of American Socialism5 (1870). See Oneida Community.

NOYES, Walter Chadwick, American lawyer: b. Lyme, Conn., 8 Aug. 1865. He was educated at Cornell University and was ad¬ mitted to the bar in 1886. From 1895 to 1907 he was judge of the Court of Common Pleas of New London, Conn., and from 1907 to 1913 was United States

circuit judge of the second circuit. In 1913 he removed to New York to practise in that city and in 1915 he was ap¬ pointed receiver of the Chicago, Rock Island and Pacific Railroad. He became general counsel for the Delaware and Hudson Com¬ pany and engaged in general practice in New York. In 1909 and 1910 he was United States delegate to the International Conference on Maritime Law in Brussels. He is author of the (Law of Inter-Corporate Relations5 (1902) and the (American Railroad Rates5 (1905).

NOYES, Wiliam Albert, chemist: b. near Independence, Iowa, 6 Nov. 1857. He was graduated at Iowa (now Grinnell) College in 1879, from Johns Hopkins University (Ph.D.) in 1882. Received the degree of LL.D. from Clark University in 1909. He was professor of chemistry in the University of Tennessee, 1883-86, in the Rose Polytechnic at Terre Haute, 1886-1903 and chief chemist of the Bu¬ reau of Standards, 1903-07. Since 1907 he has been professor of chemistry and director of the chemical laboratory of the University of Illi¬ nois at Urbana, Illinois. He is a member of the National Academy of Sciences and has been editor of the Journal of the American Chemical Society since 1902. He organized and edited Chemical Abstracts, ,1907-09 and is the author of (Elements of Qualitative Anal¬ ysis5 (1887; 6th ed., 1911) ; (Organic Chemistry for the Laboratory5 (1897) ; < Organic Chem¬ istry5 (1903) ; (Kurzes Lehrbuch der organ-ischen Chemie5 (1907); and (Text-book of Chemistry5 (1913) ; also of many scientific papers.

NOYES, William Curtis, American lawyer:

b. Schodack, N. Y., 19 Aug. 1805; d. New York, 25 Dec. 1864. He was admitted to the bar in

1827, was appointed district-attorney of Oneida County, and later established a law practice in New York, 1838. He was one of the strongest advocates at the New York bar, and earned a reputation for highest integrity. At the time of his death was engaged in codifying the laws of the State, a work begun in 1857. In 1861 he was a member of the Peace Convention, held in Washington previous to the outbreak of the Civil War, where he strove to maintain the Union. He willed his extensive law library to Hamilton College, Clinton, N. Y.

NOYON, nwa'yon', France, city in the Department of the Oise, 67 miles

north of Paris on the railway to Brussels. Noyon suffered greatly during the European War. It is a town full of historic interest, built on the slopes and at the foot of a hill and on a small stream the Verse, which flows into the Oise about a mile distant from Noyon. Noyon was a military post in Caesar's time. Three famous councils were held here — in 814, in 1233 and in 1344. Noyon was the birthplace of John Calvin in 1509. Noyon was until the devastations of the War of 1914-18 full of antiquarian and archi¬ tectural interest. Among these were remains of an old Roman wall and a beautiful statue of Apollon Gaulois, or Belenus, discovered in 1856 in the wood near the Mont de Choisy. The cathedral of Notre-Dame, which was begun after the original church was burned in 1131, was a fine example of the transition from Romanesque to Gothic. Until the European War the principal industries were sugar-refining, oil refining, beer, chemicals, tanneries, iron- foundries, manure works, lace, linen and tulle, leather and cloth. Pop. 7,300. Consult A-Le- franc, (Histoire de Noyon jusqu'a la fin du XIII Siecle> (Paris 1887).

NU , noo, or NUU, or NUN, was the Egyptian deity who represented the primeval waters out of which sprang the sun-god Ra, <(while as yet there was no heaven and neither serpent nor reptile was formed® Nu <(gave birth to himself and made his name to come into being® reads the old Egyptian text. Out of the bosom of Nu sprang all the primeval gods of Egypt; and these gods are the names of his limbs — Later Ra, Temu and Nu became identi¬ fied as one supernatural being; and Ra takes to himself the attributes of all the other gods who sprang from Nu. Thus in Chapter XLII of the Book of the Dead Ra says of himself: <(My hair is the hair of Nu ; My face is the face of Disk; My eyes are the eyes of Hathor; My ears are the ears of Apuat,® etc., throughout a long list which includes every member of the human body. In the Egyptian as in the Chris¬ tian religion, God the Son assumes all the attri¬ butes and functions of God the Father. It was in the presence of Ra, the father god, that Nu created the other gods out of his own being. Consult Breasted, J. H., development of Re¬ ligion and Thought in Ancient Egypt5 (New York 1912) ; Budge, E. A. W., (Egyptian Ideas of the Future Life5 (London 1908) ; (The Gods of the Egyptians) (1904) ; Wiedmann, A., (Religion of the Ancient Egyptians (Vol. I, London 1904).*

NUBA, noo'ba, an ethnological name given to the negro tribes of Kordofan, in Eastern Sudan, whence they spread into Dafur and Wadai. They are divided into two distinct vol. 20 — 31

groups, the Nubas proper, in central and south¬ ern Kordofan; and the Nilotic Nubas. The Nubas are true negroes. Consult Muller, F., (Algemeine . Ethnographic 5 (Vienna 1879) ; Stanford, (Africa5 (1895).

NUBAR PASHA, noo'bar pash'a, Egyptian statesman: b. Smyrna, January 1825; d. Paris, 14 Jan. 1899. An Armenian Christian, he was educated in Switzerland and France; in 1842 he became secretary to Boghos Bey, Egyptian Min¬ ister of Commerce and Foreign Affairs. He later rose to be bey, arid was sent on important diplomatic missions. Under Said Pasha he was in charge of the transport service through Egypt to India, and built the railway across the desert from Cairo to Suez. After the accession of Ismail Pasha, who at first strongly relied upon him, he was Egypt's first Minister of Public Works, and from 1866 Minister of Foreign Affairs. He successfully concluded at Constan¬ tinople and Paris the negotiations toward the construction of the Suez Canal, obtained for Ismail the title of khedive, and strove to intro¬ duce European culture and methods of admin¬ istration. At that time in Egypt the consulates of 17 various powers administered as many different codes of law, and to these courts alone the subjects of the said powers were amenable. Nubar prevailed upon the powers to allow the organization of international courts with a uni¬ form code, perhaps his greatest achievement. He was dismissed in 1874, but on demand of the powers was at the head of the ministry in 1878-79, directing the financial reforms. In 1884-88 and 1894-95 he was again Premier. He was very adaptable, not to say pliant, and read¬ ily became the administrator of a British policy of which he did not approve.

NUBIA, nu'bi-a, Africa, a comparatively modern name for a large region, formerly a portion of Ethiopia, and extending on both sides of the Nile from Egypt to Abyssinia; touching the Red Sea on the east and the desert on the west. Nubia proper, or Lower Nubia, extends from Assuan on the Egyptian frontier to Don- gola; beyond that is Upper Nubia. But of late the name of Egyptian Sudan, properly appli¬ cable to a section of Upper Nubia, has come to be used for Nubia in its widest sense, together with the once Egyptian territory actually in the Sudan, and the equatorial provinces. The great Nubian Desert lies east of the Nile, opposite the great west bend of the river. See Egypt; Sudan.

•

NUBLE, noo'bla, Chile, an inland province, bounded on the north by Linares, on the east by Argentina, on the south and west by Concep¬ cion; area. 3,407 square miles. It is an agricul¬ tural region in which the chief product is wheat, and considerable attention is given to raising cattle. Pop. 210,000. Capital, Chilian.

NUCLEIN, nu'kle-in, from the Latin nu¬ cleus , a kernel, is the principal constituent of cell-nuclei, or the complex chemical substance termed also chromatin by virtue of which a cell grows, develops and reproduces. It is most abundant in white blood corpuscles. Nucleinic acid is an organic acid

rich in phosphorus. From blood serum a nuclein or nucleinic acid, may be separated. Consult Allbutt's (System of Medicine5 (1896). See Cell; Cytology.

NUCLEUS. See Cytology.

4 – . .

NUDDEA, nud e-a. See Nadia.

NUDIBRANCHIATA, nu'di-bran'ki-a'ta,

one of the two primary divisions (orders or sub-orders) of the opistho-branchiate gastro¬ pods (q.v.). The name is in allusion to the absence of the primary gills or ctenidia, which in mollusks occur typically within the mantle cavity, and the functional substitution for them of external processes or cerata which perforate the mantle when the latter is present. The cerata differ greatly in form and arrangement and their peculiarities characterize the different families. They may be retractile or not ; armed with stinging cells or without them; simple, pronged or arborescently branched, in the latter case usually penetrated by portions of the com¬ plexly ramifying liver. In their arrangement they may form dorsal or lateral rows, or a circle about the anus. Frequently they are most beautifully colored, and in many cases closely resemble the object on which the animal lives. The young are provided with a nautiloid shell, which is lost early in life, leaving the adult devoid of this protection. A mantle may or may not persist, and the integuments are fre¬ quently filled with calcareous spicules. On the head are found a pa-ir of minute sessile eyes, and a pair of often retractile tentacles, which are olfactory in function and are known as rhinophores ; in addition to which there may be a second pair of tractile tentacles. The mouth is provided with a radula and sometimes with jaws. Because of the usually elongated form of the body and their strictly marine habit, the nudibranchesare known popularly as ˆsea-slugs.® With the exception of a few free-swimming, pelagic and parasitic forms, the vast majority of the species belong to the littoral zone, where they creep upon algae, hydroids, polyzoans and similar organisms, which afford them conceal¬ ment and a place to attach the gelatinous cap¬ sules in which the eggs are deposited, besides furnishing the animal or vegetable food on which the particular species subsists. Most, if not all, of them are hermaphrodites. Upward of 1,000 species have been described and arranged hi 17 families. On the Atlantic Coast of the United States 21

genera and 33 species occur in the region north of Cape Hatteras.

NUECES, nwa'ses, a river in Texas which rises in a ridge of low mountains in Edwards County and flows south into Dimmit County, then east, northeast and southeast into Corpus Christi Bay. It formerly marked the boundary of the province of Texas in Mexico. It is about 400 miles long and navigable only a short dis¬ tance from the Gulf. It drains an area of about 19,000 square miles and there are many irrigation plants along it, especially in its water¬ shed in Edwards County.

NUELSEN, nul'zen, John Louis, Ameri¬ can Methodist Episcopal bishop: b. Zurich, Switzerland, 19 Jan. 1867. He received his education in Germany and came to the United States in 1886. He was ordained a Methodist Episcopal minister in 1889 and was given a church in Sedalia, Mo. In 1890 he graduated at the Drew Theological Seminary (Madison,

N. J.) and in 1892 took the degree of M.A. in the Central Wesleyan College. In 1890-92 he was professor of ancient languages in Saint Paul's College, Minnesota, and in 1892-93 he

studied in the universities of Berlin and Halle, hrom 1894 to 1899 he was professor of exegeti- cal theology in the Central Wesleyan Seminary, Warrenton, Mo., and in 1899—1908 he was pro¬ fessor in the Nast Theological Seminary, Berea, Ohio, where he edited the Deutsch-Amerika- nische Zeitschrift fiir Theologie und Kir che. In _ 1908 he became bishop of the Methodist Episcopal Church. In 1912 he was placed in charge of all Methodist Episcopal work in Con¬ tinental Europe with Zurich as his headquar¬ ters. He has written for encyclopaedias on theology and is associate editor of the Inter¬ national Standard Bible Encyclopaedia (Wash¬ ington, D. C.). His books include (Die Bedeutung des Evangeliums Johannes) (1903) ; (Das Leben Jesu in Wortlaut der vier Evan- gelien) (1904); (John Wesley, ausgewahte Predigten) (1905); (Luther the Leader> (*906) ; (Kurtzgefasste Geschichte Metho-

dismus> (1907) ; (Recent Phases of German Theology) (1908); (Methodismus und Welt- mission> (1913), and Reformation and Metho- dismus (Zurich 1917). The University of Denver gave him the degree of D.D. in 1903 and the Nebraska Wesleyan Universitv that of LL.D. in 1910.

NUEVA CACERES, nwa'va ka'tha-res, Philippines, formerly Naga, a pueblo and capital of the province of Ambos Camarines, situated at ? ouˆern part of the province on the Naga River at the head of navigation for large vessels, 10 miles inland from San Miguel Bay. It is a port of entry, an important road centre, and has an excellent trade. It is well built, contains a government house, a cathedral episcopal palace, a seminary, hospital,

paro¬ chial school and a normal school for girls. It was at one time the seat of the episcopal see ot the Philippines. Pop. about 20,000.

NUEVA ECIJA, a/the-hah, Philippines, a province of central Luzon, having a coast line of 23 miles on the Pacific, and bounded on the north by Pangasinan and Nueva Vizcaya, and on the south by Infanta and Bulacan. The sur¬ face is mostly low, but is broken in the north¬ east and south by foothills of the Cordilleras. The Grande dc La Pa.rnpa.nga, River crosses the province from north to south, the Canaren trib¬ utary of the Agno follows the northwestern boundary, the Pampanga Chico, the south¬ western; many smaller rivers are tributary to these. The soil is very rich, the larger rivers frequently overflowing and fertilizing the fields with their deposits. Rice is raised in the south¬ ern and central portions; other important products are corn, tobacco, sugar and papay. The chief industry is agriculture; there are some manufactures for home consumption only sugar is manufactured and refined on the plan¬ tations. Cattle are raised in the central part of the province. A road parallels the entire course of the Grande de la Pampanga River.*

I here are numerous other roads, and a large boat traffic along the Pampanga and its tribu¬ taries. Civil government was established in Nueva Ecija in June 1901, and at the end of that > year the governor reported that the province was c

/

NUEVA ESPARTA, as-par'ta, Venezuela, a state composed of islands off the northwest coast of the republic. Margarita is the largest island of the group. Nueva Esparta was a part of the state of Guzman Blanco until 1901, when it became a separate state.

NUEVA SAN SALVADOR, san sal-va- dor', or SANTA TECLA, Salvador, Central America, city in a mountainous region a little northwest of the centre of Salvador and about eight miles from the capital. The chief occupa¬ tion is mining. Pop. about 17,000. See Sal¬ vador.

NUEVA VIZCAYA, veth-ka'ya, Philip¬ pines, a province of the island of Luzon, situ¬ ated south of the centre of Northern Luzon, bounded on the east by the province of Isabela and on the west by Pangasinan and Benguet ; area, 1,075 square miles. The surface of the province is uneven, being broken by the foot¬ hills of the Sierra Madre, the Cordillera Cen¬ tral and the Caraballo range. The Magat tributary of the Grande de Cagavan River crosses the province from northwest to south¬ east and there are numerous smaller rivers and streams. The only crop raised to any ex¬ tent is rice ; sugar, chocolate and tobacco are also raised, but not in sufficient quantities to supply the inhabitants of the province. Sev¬ eral kinds of building stones, granite, sand¬ stone, etc., are found in the mountains, but quarried only to a small extent ; there are also valuable forests containing resin and gum trees, but these products are not gathered on account of the difficulty of transportation. A few simple fabrics are woven for domestic" use. The main highway of Luzon from Manila to Aparri passes through this province, but there is but little traffic on account of the difficulty of reaching the interior. Civil government was established for the province in January 1902; and a special form of municipal government, organized for a few of the larger towns, which is being extended to other towns as they are prepared for it. Pop. 67,000, mostly non-Chris¬ tian tribes.

NUEVITAS, nwa-ve'tas, Cuba, seaport in the province of Camagiiey, in the northeast part of the province, on the coast and on the railroad which extends 39 miles to Puerto Principe. It has an excellent harbor and a large trade with other seaports of Cuba, the West Indies and the United States. Pop. about

7,000.

NUEVO LAREDO, nwa'vo la-ra'dd1, Mex¬ ico, town in the state of Tamaulipas, on the Rio Grande and on the Mexican National Rail¬ road. It is opposite Laredo, Texas, and about 160 miles north by west of Monterey. Nuevo Laredo figured prominently in the revolution which began in Mexico toward the close of 1910 and it was partially burned by the Federals in 1914. It has a customs house and is the seat of a United States consulate. Pop.

9,000.

NUGENT, John F., American legislator: b. LeGrand, Ore., 28 June 1868. He was educated in the public schools of Silver City, Idaho, was admitted to the bar and began the practice of his profession at Silver City in 1898. He served four terms as prosecuting at¬ torney of Owyhee County, Idaho, and two

terms as chairman of the Democratic Central Committee of the same county. He also served two terms as chairman of the Democratic State Central Committee and was appointed United States senator by Governor Moses Alexander, on 22 Jan. 1918, to fill the vacancy caused by the death of James H. Brady.

NUISANCE, in law , a term used to denote whatever is a serious disturbance, annoyance or discomfort to one's neighbors, or in a general sense to the public at large, in the exercise of their rights of property. Sometimes the same act may be legally considered both a nuisance and an injury for which damages may be ob¬ tained. Nuisances are of two kinds, public or common, and private.

Public nuisances are offenses against the public at large such as annoyances in the high¬ ways, bridges and public rivers, by rendering the same difficult or dangerous to pass, either by actual obstructions or by want of repair; in¬ jurious and offensive trades and manufactures, which, when hurtful to individuals, are action¬ able, and when detrimental to public health or convenience, punishable by public prosecution, and subject to fine according to the nature of the offense ; keeping hogs in a city ; disorderly houses, unlicensed plays, gaming houses and brothels ; lotteries ; making and selling fire¬ works in unlicensed places. The storing of petroleum, ammunition, gasoline and explosive material in general is also strictly regulated. From the very nature of it a public nuisance is a criminal offense, and consequently punish¬ able as such by the State. Therefore, as a general rule and principle, the individual must institute proceedings against a public nuisance, not in his own name, but in that of the State, unless he can show that some particular injury has been done or is being done to himself above that suffered by the public in general. The injury must be direct, substantial and con¬ sequential.

A private nuisance may be defined as an injury or annoyance to the person or property of an individual. Such an act is not generally a criminal offense. If a person builds a house so near to that of his neighbor that the roof of the new building overhangs that of the other, and throws the water on it, this is a private nuisance, for which an action will lie. But de¬ priving one of a mere matter of pleasure, as of a fine prospect, this, as it abridges nothing really necessary or convenient, is not an injury for which there is legal remedy. To keep hogs near one's house, to carry on any offensive trade, as a tanner, tallow-melter, soap-boiler, or the like, are all nuisances for which an individual has remedy by action, but it is necessary to show that such nuisances are of a character to render serious discomfort to ordinary persons or to sensibly damage property. So also is it a nui¬ sance if life be made uncomfortable by the ap¬ prehension of danger, or by employing a steam engine, which produces a continual noise and vibration

in the apartments of a neighbor. Be¬ sides the remedy by action, injured parties may, in a clear case, take the law into their own hands, and remove or abate the nuisance, but it is never advisable to take this course. But in some cases a nuisance may be legalized by statute. In England the power of the Parlia¬ ment in this respect is unlimited; but that of the United States Congress is restricted by the

Constitution. In all municipal codes there are elaborate provisions with reference to sewers and diains, the disposal of sewage, scavenging and cleansing, water supply, cellar dwellings and lodging houses, the prevention, abatement, etc., oi nuisances, offensive trades, unsound meat, infectious diseases and hospitals, mor¬ tuaries, highways and streets, lighting of streets, public pleasure grounds, markets and slaughter houses, police regulations, prosecution of offenses, alteration of areas, etc. The over¬ crowding of houses may be stopped. Pro¬ visions are also made to prevent the spread of diseases in times of epidemics, and common lodging houses from being kept unclean. The inspector of nuisances or the medical officer of health has, at all times, power to inspect any animal, carcass, meat, poultry, game, fish, fruit, vegetables, corn, bread or flour, and if found unfit for food, or diseased or unsound, they may be carried away and destroyed, and the owner or dealer fined. The local authority may order house proprietors to provide proper water closets, to cleanse gutters and cesspools, and to remove any pool, ditch, drain, urinal or privy injurious to health.

1 lie victim of a private nuisance has three 1 emedies open to him : A suit for damages, an injunction and an abatement. If he proves his case he is entitled to nominal damages, in any case; but if, in addition, he prove that he has sustained real material damages or injury, he may secure such damages ; and if the defendant has been proven to have acted with malice, he is liable to punitive damages also. An injunc¬ tion is not always available ; and in some States it is often difficult to secure, especially when it can be shown that an injunction would work hardship upon the defendant, other individuals or the public in general. In this case the in¬ jured party has still open to him an action for damages. This is the general mode of pro¬ cedure employed by individuals against incor¬ porated concerns and powerful companies on account of the difficulty of securing an injunc¬ tion against them. Consult Garrett, E. W., (Law of Nuisances) (London 1897) ; Joyce!

J. A. and H. C., (Treatise on the Law Govern¬ ing Nuisances > (Saint

Louis 1906); Pollock, Sir Frederick, (London 1908) ; Wood, H. G., (Law of Nui sances) (San Francisco 1893).

NUIT DE MAI (May Night). The <(Nuit cle MaP remains one 'of the most cele¬ brated and characteristic of de Musset's lyrics. His theory of poetry, in so far as so spon¬ taneous a singer may be said to have held to any theory, was far different from Words¬ worth s, for instance. Poetry is not the result of reflection on experience ((emotion recollected in tranquility.® It is experience itself. Its ex¬ cellence depends upon the intensity of the emo¬ tion which has thrilled the poet 'and the sin¬ cerity with which he has reproduced it. For this reason de Musset's poetry is not poetry of description or reflection, and his favorite theme was love, since it was the source of life's deepest joys and sorrows. His own emotional life reached its climax when, hardly more than a lad, at 23, he fell passionately in love with Ceorge band and set out with her on the great flight to Venice. What had begun as a divine adventure, after a brief hevdav. ended in heart¬ break and a long bitterness. This, the cardinal

cxpei ience of his life, he recorded after his return to Paris in the (May Night, > a dialogue between the poet and the muse, his confidant. In it he parallels in almost identical terms the sentiment expressed in Shelley's (Skylark — "Our sweetest songs are those that tell of sad¬ dest thought.®*

The high sense of spring's return, of the keen¬ ness oi youth and genius foiled, the bitterness of lost love, the now ineffectual consolation of poetry, there expressed with wonderfully sym¬ phonic, rhythmic power, make of (Nuit de Map the most intense and direct of the romantic love lyrics of France To have written it one must have been 23, have loved George Sand and have been Alfred de Musset, whose heart strings, like Israfel's, ((were a lute.®

Christian Gauss.

NUKHA, noo'kha, Russia, town in Trans¬ caucasia, about 120 miles east by south of Tiflis and 150 miles northwest of Baku. It is near oil fields and is the industrial and commercial centre of a silk-producing region. The inhab¬ itants are mostly Armenians and Russians Pop. about 41,804.

t i NIIKIMLORA, noo-koo-a-loHa, Friendly Islands, the capital of 1 onga, the largest island of the group. See Friendly Islands.

NULATO, noo-la to, Alaska, native village on the north bank of the Yukon River, above the mouth of the Koyukuk. Nulato has long been the trading station for the natives of this region A government school and the Roman Catholic mission of Saint Peter Claver are situ¬ ated here. There is also a

telegraph station. Pop. about 300, chiefly natives.

NULL, niil, Eward van der, Austrian

9 Jan> 1812 : d there- 3 April 1868. He was professor of architecture

and ornamentation in the Vienna Academy and a prominent practising architect. Most of his designs were executed with August von Sic- cardsburg These include the Larisch palace and the Opera, at Vienna, 1861-69. Null's style was largely Renaissance, inclining to late Renaissance and rococo, and he exercised a decided influence on the architectural develop¬ ment of Vienna.

NULLA BONA (no goods), the name of the return made bv the sheriff to a writ of exe¬ cution when he has not found any goods of the defendant within his jurisdiction on which he could levy. The sheriff must, however, use all reasonable means to find the goods of the debtor If the sheriff should give a false re¬ port, he is liable for the value of the goods he should have seized. See Attachment Execution.*

NULLIFICATION, in American history the formal suspension by a State within its ter- ntonal jurisdiction of a law of the United Mates. A political doctrine first suggested in the Kentucky -Resolutions of 1798. Its funda¬ mental principle was accepted by the Hartford Convention of 1814, but it was not until 1832 that the theory was fully developed by the master mind of Calhoun, and acted on by South

fro!iln?Tln ltSi ˆamous Nullification Ordinance of 24 November of that year. The Federal Constitution recognized both the Union and the Mates as bearers of power, but did not clcarlv apportion it between them, nor clearly deter-

mine, in cases of disputed claims, which was the final arbiter.. The nation possessed only dele¬ gated authority, while to the States remained the residuary powers. Calhoun, in elaborating this doctrine, claimed that historically the States came into being first and were the creators of the Union, the grantors of power to their agent, the Federal government. It followed, there¬ fore, as a natural consequence, that the final judge of the amount of power granted could not lie with the created — the agent — but must remain with the States as the creator. Also at this point the question arose in regard to the remedy should the agent of the States exceed the authority delegated, and pass laws that were contrary to the reserved rights

of the partners in the Union. The fundamental basis then of nullification as Calhoun developed it was State Sovereignty (q.v.) ; and, in cases where the Nation was encroaching on the re¬ served rights of the States, he found in nulli¬ fication a peaceable remedy. Secession and revolution were thus to be made unnecessary. The Union was as perfect after as before nul¬ lification. All rights and duties of the States and the Union remained unchanged except in regard to the one nullified and therefore void law. Should any of the co-States desire to test the matter a constitutional convention might be called, and the question be settled by process of amending the Constitution ; but till overruled in this way the law was void in the nullifying State.

The cause of nullification is bound up in a compound of the protective tariff and sec¬ tional slavery. The former offered the imme¬ diate occasion for its promulgation, while the conditions that made protection popular in one section, and hated in the other, were found in the latter. As late as 1816 the South was not radically opposed to a protective tariff. But under the slave system manufactures and com¬ merce did not develop. The South therefore could not profit by the protective system, and gradually developed a strong opposition to its continuance. By 1828, under the teaching of President Thomas Cooper, of the University of South Carolina, public opinion in that State had come to hold that the producer and not the consumer paid the tariff duty. It was also noted that about three-fourths in value of all exports from the United States consisted of the products of the South, cotton, rice, tobacco, etc. Therefore, in harmony with Cooper's teaching, the South paid approximately three- fourths of the government revenues derived from imported goods. Hence the demand for lower duties grew apace. But instead of lower rates the tariffs of 1824 and 1828 raised them. The tariff of 1828 — ((the tariff of abomina¬ tions® — aroused Calhoun to seek a remedy. In that year he set forth his nullification theory tentatively, but did not press for action under it By 1832 the National debt having been ex¬ tinguished, the South at once began to demand a lower tariff, insisting that the extinction of the public debt removed all excuse for the longer continuance of high duties — of protec¬ tion. Instead, however, of revising the tariff in 1832 in such a way as to reduce it to a reve¬ nue standard, the duties in the new law were placed on a protective basis, and that principle affirmed to be adopted as a permanent one. In South Carolina, for some years, a struggle be¬

tween the nullifiers and the anti-nullifiers to control the legislature had been in progress. The tariff act of 1832 for the first time gave the necessary two- thirds majority to the nulli¬ fiers, and on 24 Oct. 1832 the Senate by a vote of 30 to 13, and the House by 99 to 25 resolved to call a convention to meet 19 November. On 24 November the convention voted 136 to 26 to declare the tariff acts of 1828 and 1832 null and void, because beyond the

powers delegated to the United States. The convention also au¬ thorized the legislature to pass all laws neces¬ sary to enforce the ordinance of nullification. Laws were accordingly passed to prevent the collection of the tariff within the State, to give to the governor the power to call out the State militia, and to give the State courts full control of all cases involved under the tariff laws. '

President Jackson in his annual message of December 1832 barely noticed this nullification action, but in his celebrated Proclamation of 10 Dec. 1832 he discussed the subject in all its aspects. He denied the possibility of nullifica¬ tion being a peaceable remedy. He asserted the National as opposed to the States Rights interpretation of the Constitution, and con¬ cluded with an earnest plea for the Union. He appealed to the people of South Carolina not to be misled, not to be deceived into thinking that their action could end short of war and treason. He pictured their fate and the fate of the Union should they persist in their policy. In the meantime Congress had taken the matter into consideration. The great Webster-Hayne debate of 1830 had awakened the people to a realization of the issue. Now in February 1833 Calhoun and Webster were pitted against each other in the Senate of the United States, in the greatest constitutional discussion con¬ cerning the nature of the Union and the powers of the States that had ever occurred in the American Congress. Webster supported Jack- son in his national views, while Calhoun reaf¬ firmed the constitutionality of nullification, as a peaceable remedy, against the usurpation of power by Congress. Webster presented the Supreme Court as the final arbiter in disputed cases. Calhoun claimed that this would be making the agent the judge of his own powers — an impossible principle. The request of the President that he be granted increased powers was now met by the introduction of the so- called Force bill 21 January. The bill, how¬ ever, made no progress until the introduction of Clay's Compromise Tariff bill 12 February. The two measures then moved forward with equal step. The one gave the President power to collect the revenues in South Carolina, using the whole power of the government for the purpose, if necessary; the other provided for a gradual reduction of the tariff duties, until by 1842 no duty should exceed 20 per cent, a rev¬ enue basis. The two measures reached the President at practically the same time: — he signed them both 2 March 1833, and on 16 March South Carolina repealed her ordinance of secession. Both parties could thus claim a victory; the administration and its friends, as well as Clay, in that the protective tariff still existed ; the nullifiers in the fact that provision was made to reduce the tariff to a revenue basis, thus in fact yielding to South Carolina, at the very moment of adopting the Force bill.

Nullification as a consitutional and peaceful

remedy against oppression was never again as¬ serted, but the basis of the theory — the doc¬ trine that the States were sovereign — was not abandoned. In fact it was advocated even more strenuously than before. Instead of nul¬ lification in the Union, as a remedy, the doc¬ trine of secession — a separation from the Union — gradually became the accepted prin¬ ciple of the States Rights school of statesmen. The advocates of the latter view held that to nullify a law and remain a member of the Na¬ tion was absurd; but affirmed that in case of a breach in the compact to withdraw from the Union was a constitutional right that flowed naturally from the character of the Union. Consult Houston, CA Critical Study of Nullifi¬ cation) (New York 1896); Von Holst, Constitu¬ tional History of the United States> (Vol. I) ; Powell, Nullification and Secession in the United States* ; Niles, (Register* (Vol. 43) ; Richardson, (Messages; Debates in Congress* (1832-33); Calhoun, (Works* ; Webster, (Works* (Vol. Ill) ; Houston, (A Critical Study of Nullification in South Carolina.*

H. W. Caldwell,

Professor of American History, University of

Nebraska.

NULLIPORE, a name given to certain more or less massive sea-weeds of the family Rhodophycece, common on rocky shores in warm climates, and especially about coral islands, where they serve to protect the corals somewhat against the beating of the waves. From secreting lime on their surface, and hence resembling coral, they were formerly supposed to be a kind of zoophytes. Some small species occur on the northern Atlantic coasts.

NULLITY OF MARRIAGE. The entire

invalidity of a supposed, pretended or attempted marriage, by reason of the relationship or in¬ capacity of the parties or other diriment im¬ pediments (absolute bars to marriage). An action seeking a decree declaring such an as¬ sumed marriage to be null and void is called a suit of ((nullity of marriage.** Nullity of marriage differs from an action for divorce, because the latter supposes the existence of a valid and lawful marriage. See Marriage.

NUMA POMPILIUS, nu’ma pom-pil’i-us,

2d king of Rome, belongs to the legendary pe¬ riod of Roman annals. According to ancient accounts he was from Cures, in the land of the Sabines, and was distinguished for wisdom and piety. He was elected king after the year's in¬ terregnum following the death of Romulus. His lengthy and quiet reign (39 years) he de¬ voted to the adequate establishment of religion; and to him the Romans ascribed their whole system of worship and ceremonial law. He also founded the temple of Janus, which dur¬ ing his rule remained closed. The sacred books of Numa, containing the prescribed manner of observance for the rites and ceremonies of reli¬ gion, were said to have been entombed, and to have been discovered in 181 b.c. This story is now regarded as a forgery. Consult Carter, (The Religion of Numa* (New York 1906) ; Lewis, G. C., (Credibility of Early Roman History* (1855) ; Plutarch, (Numa.*

NUMANTIA, nu-man'shi-a, Spain, an an¬ cient town, situated on the Douro, near the

place now called Soria in Old Castile. It is famous for its resistance to the Roman power. While the neighboring places yielded to the Romans, the Numantians were firm in refusing submission. Large forces under the praetor Pompeius Aldus (137 b.c.) and the consul Hos- tilius Mancinus were repulsed. Scipio Afri- canus, the younger, with an army of 60,000 was sent to subdue them. He surrounded the town and famine compelled them to yield after a siege of 14 months. The conqueror destroyed the town, 133 b.c.

NUMBERING MACHINE, in printing, a machine for impressing consecutive numbers on account or record books, coupons, railway cer¬ tificates, bank-notes, railway tickets, etc. The invention is that of Blaise Pascal (1650), and consists of discs or wheels decimally numbered on their peripheries, the whole mounted on one axfe upon which they turn freely, acting upon each other in serial order. The first wheel of the series containing the units is moved one figure between each impact, and when the units are exhausted the tens come into action, and act in coincidence with the units, which con¬ tinue their action.

NUMBERS, Book of. The book of Num¬ bers is the fourth of the so-called (

Contents. — The early chapters of Numbers are closely connected with the books of Exodus and Leviticus; the closing chapters with Deuteronomy. The book may be divided into three parts: (1) Events before Mount Sinai (i, 1-x, 10) ; covers a period of 19 days, begin¬ ning one month after the setting up of ' the tabernacle (compare i, 1 with Exod. xl, 17). (2) > Wanderings from Mount Sinai to the Plains of Moab (x, 11-xxii, 1) from the 20th day

of the second month of the second year to the 40th year. (3) Happenings in the Plains of Moab (xxii, 2-xxxvi, 13) ; covers the clos¬ ing months of the desert wanderings.

The contents may be summarized as fol¬ lows: The book furnishes an account of the wanderings of Israel from the encampment be¬ fore Mount Sinai to the settlement east of the Jordan. The arrival of Israel at Mount Sinai is recorded in Exod. xix, 1; the departure from there in Numbers x, llff; the events recorded in i, 1-x, 10 took place during the stay at Mount Sinai. 1 hus the book opens with an account of the census taken of the people who came out of Egypt, which is followed 'by a long legal sec¬ tion. Then comes the record of the wanderings during the period extending from the second to the 40th year: the survey of Canaan, the re¬ fusal to enter the land, the march back to the

wilderness and various rebellions. The more important events of the first 10 months of the 40th year are narrated in detail : the march around Edom, the death of Aaron, the con¬ quest of the land of the Amorites and of Bashan, the episode of Balaam, the sin of Baal- peor, the second census, the slaughter of the Midianites and the settlement east of the Jor¬ dan. Interspersed with the historical narratives are legal sections.

Composition. — Like the preceding books of the Pentateuch, Numbers in its present form is a compilation of material taken chiefly from three originally separate sources, commonly designated by the letters J, E and P. (For proofs of this assertion and for the significance of these symbols see article Pentateuch). The P sections are easily separated from the J and E sections, but it is rather difficult to separate the J material from the E material. The first section (i, 1-x, 10) is taken entirely from P; in the second section (x, 11-xxii, 1) the JE material predominates, whole chapters being derived from the combined JE (for in¬ stance, chapters xi, xii, xvii, xviii, xix) ; the closing section (xxii, 2-xxxvi. 13) is made up largely of extracts from P (for instance, the whole of chapters xxvi-xxxi and xxxiii- xxxvi) ; chapters xxii-xxiv (except xxii, 1) are from JE; in the rest of the section material from the several sources is closely woven to¬ gether. Of the whole book only about one- fourth comes from JE. The characteristics of the several sources are discussed in the article Pentateuch. For an analysis of the book ac¬ cording to the several sources consult any modern commentary on Numbers or any Old Testament Introduction. The contents of each source in an English translation are arranged consecutively in C. F. Kent, (The Student's Old Testament, > and E. S. Brightman, (The Sources of the

Hexateuch) ; compare also Carpenter and Battersley, (The HexateucfP and W. E. Addis, (The Documents of the HexateuchP

The Legal and the Narrative Sections. —

The laws contained in Numbers belong to P; no laws taken from JE are found outside of Exodus. These laws, though dealing with a variety of subjects, are chiefly ceremonial in nature. They are arranged in four groups; in Division I, chapters v-ix ; in Division II, chap¬ ters xviii, xix; in Division III, chapters xxviii- xxx and xxxiii-xxxvi. Though late in their present form, there is every reason for be¬ lieving that the legal sections contain some very ancient elements.. The narrative sections are of unequal historical value. Naturally, the JE sections, written in the 9th and 8th centuries from an objective prophetic point of view, are of considerable importance; though even they were written primarily not to record history but to reveal the hand of God in the early history of Israel. The P sections, written later, with a pronounced priestly bias, are less reliable as historical sources for the period of the Exodus; on the other hand, they throw much light on conditions at the time the narratives assumed their present form.

Poetic Fragments. — The book of Numbers

has preserved several poetic fragments: (1) The Priestly Benediction (vi, 24-26), embodied in P, but pre-exilic in origin. It may have been a part of the Temple ritual in Jerusalem

prior to the exile, but its date cannot be de¬ termined. (2) The Song of the Ark (x, 35, 36), must have originated at a time when the ark was still moved from place to place, that is, before the erection of the Solomonic temple. The first two lines seem to have been ad¬ dressed to the ark as it was carried into battle, the rest on its return to the sanctuary. (3) A Song concerning the boundary line between Moab and Israel (xxi, 14, 15). Only a frag¬ ment of this has been preserved, whose mean¬ ing in doubtful and origin uncertain. (4) The so-called Song of the Well (xxi, 17, 18), an ancient folk-song, the origin and occasion of which are uncertain. (5) Song concerning Heshbon, the city of Sihon (xxi, 27-30). This fragment presents numerous difficulties; the text is corrupt, as a result the meaning is ob¬ scure and the date uncertain. (6) The Oracles of Balaam (chapters xxiii, xxiv). Chapter xxii and some verses in. 23 and 24, written in prose, furnish the historical setting for the utterances of Balaam, which are poetic in form. There are seven poems, four longer ones centring around Israel, and three shorter ones containing threats against other nations: (a) Israel's exaltation (xxiii, 7-10) ; (b)

Israel's conquering power (xxiii, 18-24) ; (c) Israel's prosperity and

strength (xxiv, 3-9) ;

(d) Israel's conquering king (xxiv, 15-19) ;

(e) destruction of Amalek/ (xxiv, 20); (f) devastation of the Kenite territory (xxiv, 21, 22; (g) an oracle of uncertain meaning (xxiv, 23, 24). It has been suggested, with some de¬ gree of probability, that xxiv, 1-19 is not the continuation of chapter xxiii but a duplicate ac¬ count of the same incidents. If so, poems c and d may be simply different recensions of a and b, the former representing the tradition current in the south, the latter that current in the north. As to the date of the poems there exists . much uncertainty. For the poems centering around Israel, Gray considers a date prior to Saul out of the question and a date earlier than David improbable; they may well have originated during the period of the early monarchy. Of the shorter poems the first, against Amalek, may reflect conditions in the age of David (compare 1 Sam. xxx) ; but the other two are usually assigned to a later date; that against the Kenites seems to presuppose the rise of Assyria, and the last oracle the dawn of Greek power.

Bibliography. — In addition to the discus¬ sions named in the body of the article, atten¬ tion may be called to the following books in English: Bacon, B. W., (The Triple Tradition of the Exodus (Hartford 1894) ; Chapman, A. T., Hntroduction to the Pentateuch) (Cam¬ bridge 1911); Cornill, C. H., (International Critical Commentary series, New York 1903) ; Kennedy, A. R. S., (Leviticus and Numbers" ((New Cen¬ tury Bible,* Edinburgh 1911); McFadyen, J. E., Untroduction* (New York 1905) ; McNeile. A. H.,*

Hastings, dictionary of the Bible, > and Encyclopedia Biblical

Frederick Carl Eiselen, Professor of Old Testament Interpretation,

Garrett Biblical Institute.

NUMBERS, Theory of, in its elementary part, is that branch of mathematics which deals with the properties of integers. The scope of the whole subject can be best indicated after an explanation of the idea of a modular system of numbers, which is fundamental in it. An. ade¬ quate treatment of certain problems relating to integers requires that the system of integers (including zero) under consideration be enlarged by the introduction of certain other numbers, and that the system, so enlarged, shall retain the fundamental properties of the original sys¬ tem. The latter

is such that it contains the dif¬ ference (and hence the sum) of any two of its numbers, and this property is selected as funda¬ mental. A system of numbers which has this property is' called a modular system; it always contains (1) the number zero, (2) the negative of each of its numbers, (3) an infinite (see Assemblages, General Theory of) number of numbers. In general it is possible to select a certain set of numbers of the system, called the basis of the system, as say, nn, m2, . .., mn, called the elements of the basis, and to express every member of the system in the form a'iWi + x2m 2 + . . . + xnmn, where the +s are integers. The theory of numbers is the study of certain modular systems.

Divisibility of Integers.

The set of integers, which is a very simple modular system having one element, unity, in its basis, has the additional property that it con¬ tains the product of every two of its numbers; and two large classes of relations of integers are called additive and multiplative since they depend mainly upon ideas of addition and multi¬ plication respectively. The introductory part of the subject deals mainly with the latter rela¬ tions. For the sake of brevity there will be assumed from Arithmetic and Algebra (see Algebra) the commutative and associative laws for addition, the commutative, associative and distributive laws for multiplication, the mean¬ ings of divisor, or factor, common divisor, great¬ est common divisor (G. C. D.), multiple, com¬ mon multiple, least common multiple (L. C. M.),ja, function, and the processes for finding the G. C. D. and L. C. M. of two integers.

Factorization of Numbers.— An important and at times an exceedingly difficult problem is that of finding all divisors of a number. Cer¬ tain numbers have no divisors except themselves and unity. These are called prime. (Two numbers which have no common divisor except unity are called relatively prime). All divisors of. a number may easily be found if all of its prime divisors are determined, but no satisfac¬ tory method has been devised for such deter¬ mination. Nevertheless certain principles are clearly understood.

Consider now one modular system consisting of all positive and negative multiples of an in¬ teger a, and another consisting of all such mul¬ tiples of another integer b. It may be shown that (1) the set of numbers consisting of all of the numbers of these tzvo systems and also of the sums of all pairs of them is a modular

system consisting of the positive and nega¬ tive multiples of d, the G. C. D. of a and b. For if any two integers of the first system be ax i, ax 2, and if any two of the second system be by i and by2, then any two of the third

system can be represented by axi + by i and ax2 + by2. The difference of these, a(xi — x2) + b(yi — y2) , is in the third system, since it is the sum ofia(.ri — x2) and b(y i — y2) , which are in the. first and second systems, respectively. The third system is, then, a modular system, and consists of all multiples of its smallest number, n, say. Since a and b are in the third system, n must be a common divisor of a and b. But every number of the system, being of the form ax + by, is divisible by d. Hence n = d.

_J^S an example, let a = 6, b = 8, whence d 2. The three systems are respectively ..., — 24, — 18, —12, —6, 0, 6, 12, 18, 24, ...

• < • > 32, 24, — 16, — 8, 0, 8, 16, 24, 32, . . .

8/ – f ~ 4 -2, 0, 2, 4, 6, 8. . . .

C oiollary (2). If tzvo integers a, b, have

their G. C. D. equal to d, there exist integers x, y, such that ax + by= = d. (This is true even if d=l).

1. a = 6, b = 8, d — 2; 6.3 +

2. a 5, b 6, d — 1; 5.5 +

Example 8(— 2) =2.

Example 6(— 4) = 1.

The following result is used repeatedly in later arguments :

Theorem (3). If of three numbers a, b, c, two of them, a and b, are relatively prime, then every common divisor of ac and b is a common divisor of b and c. For let ac and b have a common divisor d. Since a and b are relatively prime there exist numbers x and y, such that ax + fry — 1. Then acx + bcy = c. But d is a divisor of acx and bey, and hence of c. It is therefore a common divisor of b and c.

Corollary (4) . If a and b, and also b and c, are relatively prime, so are ac and b.

A theorem of fundamental importance in re¬ lation to the factorization of numbers may now be proved.

Theorem (5). A positive integer can, in one and only one way, be represented as a product of prune factors.

1 j.P^ss^^e> let an integer n be expressed by two different products of

prime factors, pip2… pk and <71ˆ2 – qh where in each case the order

of the factors is such that a smaller factor never follows a larger. Then p^p2 _ pk =

m*V ‘ If any factor, as p2, were not pres¬ ent in the second product it could not be a divi¬ sor of that product, nor of n (see 4). A con¬ tinuation of this argument yields a reductio ad absurdum.

. F(?r !arge numbers the problem of factoriza¬ tion is very difficult, but for small ones it is comparatively easy. For since the smallest prime factor of a number n, not itself a prime,

cannot exceed V n, itjs necessary to test only prime factory up to Vn.

Distribution of Primes.— The proof that the number of primes is infinite was given by Euclid, and. is singularly brief. The assumption that there is a largest prime, p, is shown to be incorrect by the consideration of the number 1 + 1 P± which, not being divisible by any num¬ ber less than (/ > + l), must either be divisible by a prune greater than or be a prime itself.

The law of distribution of primes has been

carefully studied, but the investigations cannot be presented here, the law being a very obscure one. Two special results are of some interest. It has been shown that between any number and its double, 2n, there is at least one prime, and also that any number, m, of consec¬ utive numbers can be found, no one of which will be prime.

Number and Sum of Divisors of a Number.

—If the number 55125 be expressed by means of its prime factors the result is 32 53 72. Now every divisor of this number must be a product of powers of 3, 5 and 7. In fact, all of these divisors are terms in the expansion of the product 0 + 3 + 32) (1 + 5 + 52 + 53) (1 + 7 + 72). This expansion contains (2+1) (3+1) (2 + 1) =36 terms. Hence the number of di¬ visors of 55125 is 36. Again, the product men¬ tioned is equal to the sum of these 36 divisors.

Also (l+3 + 32) = – (see Algebra, Geo-

3 — 1

metrical Progression) . Hence the sum of all

33 — 1 54 — 1 7;3 — 1 .

divisors of 55125 is – . – . – . In

3—1 5 — 1 7 — 1

general, if n=p\P-\ .... pkak the p's being

primes, (6) the number of divisors of n is (fli+1) (d2 + 1) . . . . (a/c + 1), and (7) their

sum is

si 4- 1 f 1

pj — 1 pi — 1 Pk — 1

p\ — 1 pi — 1 py. — 1

Number of Numbers less than a Given Number and Relatively Prime to It. — The

number 10 1 25 = 3453. The numbers less than 10125 and relatively prime to it are those which are not divisible by 3 or by 5. From the first 10125 numbers all multiples of 3, and all mul¬ tiples of 5, should be omitted. There are 4 X 10125 multiples of 3, and 4 X 10125 multi¬ ples of 5, but some of these, the J/i5 X 10125 multiples of 15, are multiples of both 3 and 5. Hence the number of numbers relatively prime to and less than 10125 is (10125 — 4X10125 — 4X10125+1/i5><10125)= 10125 (1 — 4) (1 — 4), since the multiples of 15 should not be removed

twice. In general, if n p? • • it may*

be shown that (8) the corresponding num¬ ber, which is always denoted by 0(w), is

nil –) (l –). . . .(1 –) . For example

X p' X p' V Pk 0 (7)=6, (10)=4, 1>(p) = (p — l). This im¬ portant function 0(w) has the notable proper¬ ties. (1) If n and Wi are relatively prime 0 (nih)=

Theory of Congruences.

Consider the modular system consisting of all positive and negative multiples of a positive integer m. Then any integer either is in this system or differs from a number of it by a number r, less than m. Hence every integer is expressible in the form mq + r. Integers may then be divided into m classes, all those in any class having the same remainder when divided b\ m. Then the difference between two numbers of the same class is divisible by m, and these two

numbers are said to be congruent with respect to the modulus in. If in and n2 are in the same class, this relation is written Wi=w2(mod. m), a notation which is due to Gauss. The state¬ ment is called a congruence. Thus the modulus being 3, the numbers 7 and 16 belong to the same class, since each gives the remainder 1 when divided by 3. Then 7 = 16(mod. 3), or in other words, the difference between 7 and 16 is a multiple of 3.

The following are fundamental properties of congruences, the modulus, when omitted, be¬ ing m :

(9) If a= =_b, and a =£, then h = c.

If a — b,_j and c — d, then a + c = b + d, and ac — bd.

If a b, then ca = cb.

If ca= cb, and if d is the G. C. D. of c and

fK

m, then a EE 6 (mod. —).

a

Between the methods used and the results obtained in the theory of congruences and the methods and results in the apparently unrelated field of the theory of equations (see Equations, General Theory of), there is a parallel so striking that one acquainted with the latter can promptly select, and even solve, a great many of the most important problems relating to the former. Thus congruences may state relations between known quantities only, or between known and unknown quantities, in the latter case suggesting the problem of finding possible values of the unknown quantities. Congruences of the latter sort may be classified either ac¬ cording to the number of the unknown quan¬ tities or according to the degrees of the ex¬ pressions with respect to these unknown quanti¬ ties. Thus if f(x, y, 2,....)

is an algebraic expression containing several unknown numbers

x, y, 2, . as well as known numbers, the

standard problem is: To determine integral values for x, y,2, ... such that the congruence f(x,y,2, ...)i=0(mod. m), shall be true. A set of values of the sort required constitutes a solution of the congruence. If there is only one unknown number in the congruence, any value of that number for which the congruence is true is called a root of the congruence. Two roots which are congruent are regarded as the same root.

Consider now congruences which contain only one unknown number x, and in particular, congruences of the form f(x) = a0xn + cnxni . . . . + an =■ 0 (mod. m) where a0 , fli,. . . ,an are integers, an being relatively prime to m. Then by methods parallel to those of the theory of equa¬ tions it may be proved that when the modulus is prime (1) the congruence has not more than n different roots; (2) if r is any integer, the remainder free from x obtained when f(x) is divided by (x — r) is congruent to f® (mod. m) ; (3) if r is a root of the given congruence, the remainder obtained by dividing f(x) by (x — r) is congruent to zero (mod. m).

Linear Congruences. — The general congru¬ ence of the first degree in x, namely, aox + ch EE 0(mod. m) , a o being relatively prime to m, has just one root. For of the m numbers ao, 2a0, 3ao,

. . . . (m — l)aro, man, no two differ by a multiple of m (see 9). Hence just one of them be¬ longs to each of the m classes of numbers. If ka0 and — a-i belong to the same class, then

\kdo — (— fli) j- or kao + ai is a multiple of m.

Hence Ook + ax EE 0(mod. m) ; and k is a root of the congruence.

Corollary: The congruence a0x= l(mod. m) (°o relatively prime to in) has just one root, cio, say.

in this case the numbers a0, ao are called associate numbers.

If in the congruence ao.r + ch= 0(mod. in), ao and in have as G. C. D. the number d, the con¬ gruence has no roots unless ch is divisible by d, in which case it has d of them. For suppose that cio = a‘0.d, a^ — aC.d, m — m’.d. Then if

dox + ax is divisible by m, ~X~J~ °l or a\x + o',

*is divisible by in' , and conversely. But the con- gi uence a ox *F a , =0 (mod. m) is of the sort considered just above, and the numbers which satisfy it are all congruent (mod. in'). It has then only one root, say k (mod. in'). All num¬ bers which satisfy the latter congruence are roots of the former, but they are not all con¬ gruent (mod. in). On the contrary, with re¬ spect to the modulus in, there are d distinct sets, and the original congruence has d roots k, k + m, k+2m', ..., k + in' (d — 1).*

The last result furnishes an interesting ex¬ ample of the failure of the parallel between the theory of congruences and the theory of equa¬ tions. Of these there are not a few. They generally occur when the modulus is not prime. Another interesting example is the possibility of solving several simultaneous congruences in one unknown quantity, the moduli of the con¬ gruences being different.

Theorems of-Fermat and Wilson.— Before discussing the various classes of congruences of higher orders it is convenient to exhibit two of the most interesting results of the whole subject. They are the theorems of Fermat and Wilson.

Fermat's Theorem. If p is any prime num¬ ber, and a any number less than p and greater than zero, then aP-'=\ (mod. p).

Consider the set of numbers a, 2a, 3a, .

(p l)(i. No two of them are congruent (mod. p). Hence they are congruent to differ¬ ent ones of the numbers 1, 2, 3, ... (/> — 1)(

though not necessarily in this order. The prod¬ uct of the first set is congruent to the product of the second set, whence av- 1 | p — 1 = \p — t

(mod. p). Then aP-i EE 1 (mod. p) since | p — 1 is relatively prime to p (see 9).

The statement of Wilson's theorem is: If p is any prime number, \p — 1 — — 1 (mod. p).

Both of these theorems have been so gen¬ eralized as to apply to the case in which the modulus is not prime.

Fermat's theorem furnishes another instance of the failure of the parallel between the theory of numbers and the theory of equations. For from it we see that the congruence xp=x(mod. p) is satisfied by every number of the system of integers.

Congruences of Higher Orders.— The gen¬ eral quadratic congruence may be written a^+dxX+di — 0 (mod. m) . Its' solution may be reduced to the solutions of a linear congru- ence_and of a binomial congruence of the form x 2 = a(mod.m). In connection with this con¬ gruence the important questions are: (1) What

relation must exist between a and m in order that the congruence may be solvable? and (2) What are the roots of a congruence of this sort which is known to be solvable? According as the congruence is or is not solvable, a is said to be a quadratic residue or a quadratic non¬ residue of in.

In regard to the first question it may be noted that if (x 2 — a) is divisible by m, it is divisible by every prime factor, p, of in. Hence if the congruence is solvable a must be a quadratic residue of every prime factor of in. It may also be proved that the product of two num¬ bers is a quadratic residue if each number is a residue, or if each is a non-residue, but that the product is a non-residue if only one is a residue. Hence it is possible to determine whether a is a residue of m if one finds whether each prime factor of a is a residue of each priripe factor of m. This procedure raises three distinct questions, for a may have as factors, — 1, 2 or odd primes. It is easy to show that, p ' being a prime factor of in, (1) —1 is a quad¬ ratic residue of all primes of the form 4n+l (e.g., 13, 17, 29), but a non-residue of all primes of the form (An+3) (e.g., 23) ; and (2) 2 is a residue of all primes of the form (8w+l) or (8n— 1) (e.g., 17, 23), but a non-residue of all primes of the form (8«+3) or (8n — 3) (e.g., 11, 29).

To determine whether a given odd prime, p, is a quadratic residue of another odd prime q, use is made of the famous Reciprocity-Theorem, first proved by Gauss. This theorem states that if, of two odd primes p and q, one is of the form (4w+l) then each is a quadratic residue of the other, or each is a non-residue of the other; while if both primes are of the form (4 n +3), one is a residue or non-residue of the other according as the other is d non-residue or residue of the one. This theorem is the most celebrated one in the theory of numbers ; it has been proved in a great variety of wavs. Gauss himself having contributed seven distinct proofs. The application of this result and of the two preceding ones is greatly facilitated by the use of what is known as Legendre's Symbol.

Legendre's Symbol.— It is found that ac¬ cording as a number a is or is not a quadratic residue of p, a certain function of a and p is congruent to +1 or — l(mod. p). Legendre

introduced the symbol ^ , defining it to be

+ V or — 1, according as a is or is not a quad¬ ratic residue of p. The

three results stated may be written symbolically:

ni fc2.)-wm a

P ’

/ P\ /q \ p — i <7 — i

(3) (7)’ v=f-1)~~

The use of the third result may be illustrated • 1. 3 3

by taking £=13, q= 3. Then . (—ˆj = + 1.

But two congruent numbers are both residues or both non-residues. Hence, since 13 = 1 (mod.

3) ’) • Moreover 1 is a quadratic resi-

3 3 ‘

NUMERALS

491

idue of every number. Hence ˆ ˆ = -f 1:

and so ˆ = + 1 • Accordingly 3 is a quadratic residue of 13.

The difficulties of solving a binomial quad¬ ratic congruence which is known to be solvable are relatively slight, and the question will not be considered here.

The theory of congruence of degrees higher than the second is far from complete. Consid¬ erable attention has been given to binomial congruences of the form a0xn + an= 0 (mod. m). Gauss found that he could not properly state the reciprocity-theorem for the case n= 4, with¬ out making a study of the modular system of

numbers of the form a~hb V — 1, a and b being integers. His results have been generalized and much more general modular systems have been studied. An account of these cannot be given here.

Other Branches of the Subject. — The

theory of congruences belongs to the multipli¬ cative part of the subject. Another notable branch is the theory of forms, which is essen¬ tially

additive. In it the standard problem is (

Historical Sketch. — Historically, the de¬ velopment of the Theory of Numbers falls into two well-defined periods, whose point of divi¬ sion is the year 1801. Until late in the first period the subject was not recognized as con¬ stituting a distinct branch of mathematics. The publication in 1801 of Gauss' famous (Dis- quisitiones Arithmetic^ firmly established the subject as such a branch, and since that event its development has been rapid and unin¬ terrupted.

Probably the earliest investigators in this subject were Pythagoras (580 ? — 500 ? b.c.) and his followers, who were familiar with the ideas of odd and even numbers factors and multiples and primes. By the time of Euclid (about 300

b.c.) the subject included the idea of perfect numbers, that is, those which are equal to the sum of their divisors less than themselves, and of common divisors, the process for finding G. C. D., the proof that the number of primes is infinite. Diophantos (246 ?— 300 ? a.d.) studied methods of finding rational solutions of inde¬ terminate equations. His work inspired some of the best of the later writers of the first period, among them Bachet de Meziriac (1581-1638 a.d.) and Fermat (1601-55 a.d.), who edited his works. Fermat contributed several very notable results, though without proof. Among them are the theorem already mentioned in the pre¬ ceding text and the theorem that no integral solutions exist for the equation xn + yn — zn, if n is an integer > 2. Euler (1707-1863 a.d.) proved this last theorem for n = 3 and 4, gen¬ eralized the former theorem, studied the func- ion + > (n), stated the reciprocity-theorem -and initiated the study of quadratic forms. The work of Lagrange (1736-1813 a.d.) and Le¬ gendre (1752-1833 a.d.) on quadratic forms closes the first period.

In the work which opened the second period Gauss (1777-1855) systematized the subject in much the same way as that in which Euclid brought order into the subject of geometry. He treated thoroughly the elementary theory of congruences, residues (quadratic and higher), quadratic forms and founded the modern theory of modular systems by the study of the system

of numbers a + b V — 1, a and b being integers. Of the many workers since Gauss' time it will suffice to mention Dirichlet, who simplified some of Gauss' methods, and made important contri¬ butions by the use of infinite series ; Kummer, Dedekind and Kronecker, who considered gen¬ eral modular systems ; and Eisenstein, Smith, Hermite, Sylvester and Minkowski, who con¬ tributed largely to the theory of forms.

Bibliography. — Bachmann, (Niedere Zahlen- theorie) and (Die Analytische Zahlentheorie-* ; Carmichael, R. D., (Theory of Number) (New York 1914) ; Dirichlet, (Zahlentheorie) ; Gauss, (Disquisitiones Arithmetic^ ; Kronecker, L.,

1911).

George H. Ling,

Dean of the Faculty of Arts and Sciences, University of Saskatchewan.

NUMERALS (from Latin numeralis, from numcrus, number). In mathematics the word is commonly used to designate characters which represent numbers, as in speaking of the Ro¬ man numerals. In very ancient times there were approximately as many systems of numer¬ als as there were languages, and particularly with the higher numerals there were often quite radical modifications from century to century. The numerals most generally used by the mathematicians of classical times were the Greek ; of mediaeval times, the Roman ; of modern times, the Hindu or Arabic. Of these, the first two were but little used in actual computation, the abacus (q.v.) answering for this purpose.

The primitive Greeks, like other early peo-

pies, had little use for large numbers, and so they used separate marks like scores (A. S. sceran, to cut, whence shears, and to shore up a building by a piece of cut timber) or tallies (Fr. tailler, to cut, whence tailor) on a stick. Even as late as 351 b.c., an inscription at 'Tralles, in Caria, has | | | | | | | for seven. This plan seems to have been followed by a primitive alphabetic system, the letters being taken in their natural order: A for 1, B for 2, T for 3, A for 4, and so on until the alphabet was ex¬ hausted. For monumental purposes, however, the initial letters of important number words came early into use. These letters were I (either as a primitive single stroke or from

la, for n (Jlhre, five), A (Af/ca, ten),

H (H EKarov, the H being the old breathing, replaced by ' in inarov, hundred), X (Xtluoi, thousand), and M (M vpioi, ten thousand), to¬ gether with various ligatures of these letters. These numerals were, in mediaeval times, called Herodian, from Herodianus, a grammarian who flourished in the 2d century a.d., who described them. The final form, which generally replaced the Herodian numerals in the 4th century b.c., was alphabetic. It

consisted of the accented letters of the alphabet, with three obsolete ones added to bring the number to 27. Of these, the first nine represented the units 1-9, the second nine the tens 10-90, and the third nine the hundreds 100-900. The thousands were represented by the same letters differently ac¬ cented, although M, Mi>, or was generally

used for 10,000, ˆ or /3M for 20,000, and so on.

The Roman numerals are believed to have been partly derived, through the Etruscans, from certain Greek letters not adopted in the Italian alphabets. In particular, 0, after pass¬ ing through various modifications, became C> the final form being, of course, influenced by the word centum. The letter 4* was adopted for 1,000, and half of it for 500, so that until quite recently CO has been printed for M, and O for D. If the symbol be rapidly written it may be made to resemble oo , a form not uncom- mon m the Middle Ages, or the cursive M, and this final form, as in the case of Q, was de¬ termined by a numeral word, mille. The primi¬ tive form of the Greek chi, quite different from the later X, was adopted arbitrarily for 50, and it is easy to trace, in monumental inscriptions, its transition to the L. As to the use of X for 10 and its half, V or A for 5, there is no gen¬ erally accepted origin, although there have been many ingenious conjectures. In writing large numbers there was great diversity of method, owing to the fact that they were little used in operations, the words being written in full to indicate results. The use of a bar over a numeral to indicate its multiplication by 1,000 was occasionally seen, as in Pliny, but it was not common for the reason that the bar was frequently used to distinguish a numeral from a word. A method which found considerable favor was that of using CD for 1,000 CCTT') fo-r, CCCDDD for 100,000, and so om with D, DJ, ODD, for 500, 5,000 and 50,000. In the later Middle Ages, forms like vjq, ixM, MM, iiiM, and Mccccciiij, for 600. 9.000, 1,000- 000; 3,000 and 1,509 were common. The idea

that a character could never be used more than three times in succession is a creation of recent textbook makers, as the use of I II I instead of IV on clock-faces shows. The number 1900 was formerly written MDCCCC, although MCM has become common in the present century.

The Arabic or Hindu numerals 1, 2, 3, now in common use are cursive forms from the primitive symbols — , =, = The numerals 4, 5, 6, 7, 8, 9 seem to have been Bactrian letters arbitrarily adopted in northwestern India as number signs, just as the Etruscans adopted the Greek 0, 4> and X. The system first appears in an inscription of the 3d century b.c., in a cave at Nana Ghat, in the Bombay presidency. The name zero is from Arabic sifr which is a translation of the Sanskrit sunya, void, through the late Greek rˆuppa. It appears in Fibonacci (q.v.) as zephyra, whence

zephiro, zefro, zero, and the French chiffre, whence the early Dutch ciffer and our cipher. The symbol, without which the most essential feature, the place value, of our system is wanting, may have been used in the 6th century a.d., although the earliest known document containing it is an In¬ dian grant of 738. The date of the introduc¬ tion of the system into Christian Europe is in dispute. The numerals were known to Gerbert (Pope Sylvester II, q.v.) about 1000 a.d., and they may have been known to Boethius (q.v.) 500 years earlier. The Moors in Spain knew them under the name gobar (dust), in allusion to their representation upon the dustboard. (See Abacus). The first Christian writer fully to appreciate them was Fibonacci (q.v.), who made them known in Italy in 1202 a.d. It was not, however, until after the invention of print¬ ing (c. 1450) that their great value could be made widely known. Their extensive use may be said to have 'begun in Italy in the latter part of the 15th century. The first printed arith¬ metic naturally appeared in the centre of the world's commerce of that period, northern Italy (Treviso 1478), and it used these numerals ex¬ clusively. In Germany, however, the Hindu characters had not entirely replaced the Roman when the first arithmetics were printed, and hence one of the most popular writers of the first quarter of the 16th century, Kobel, makes extensive use of the latter. Indeed, so familiar had these characters become to the common people of Germany in the 15th century that they were often called German ("Teutsche") numerals, and this name was common as late as 1550. The commercial interests of France not demanding many arithmetics early in the 16th century, the Roman numerals never ap¬ peared prominently in their printed books. In England, the Roman numerals played but a small part in the practical textbooks, although for college and_ church accounts they were used until the 17th century. See Arithmetic History of.*

1 he lollowing are some of the> forms which the Hindu-Arabic numerals have taken in their evolution from the Bactrian alphabet:

Numerals 12345 67890

Bactrian Alphabet V r P 7 ?

*N£n& Ghdt -=.3 y rPT *>?*

Later Hindu -= = y t 1 £ A

10th O. Boethius MS. _rrTi/9hJbv86 ® Bernelinus, 11th C. I a S fr 9 la A 8 ~o*

*Gobar Numerals i C } ^ * s I**

Arab MS., c. 970 A. D. 1- ? $ sS 0 r v 1 9 o

BibLography. — Bayley, in the journal of the Royal Asiatic Society > (Vol. XV (N. S.), p. 22) ; Bombelli, (L’antica numerazione iialica) (Roma 1876) ; Biihler, Undische Palseographie> (in the (Grundriss der Indo-Arischen Philologie und Altertumskunde) (Vol. I, Heft. 11, Strass- burg 1896, p. 73) ; Cantor, M., (Geschichte der Mathematik> (Vol. I, Leipzig 1880) ; Fazzari, (Dell’ origine delle parole zero e cifra) (in lAteneo,) anno. I, No. 11, reprinted, Napoli 1903); Friedlein’s edition, of Boetius (Leipzig 1867) ; Martin, (Les signes numeraux et l’arithmetique chez les peuples de l’antiquite et du moyen-age) (in the (Annali di Matematica pura ed applicataˆ Vol. V, Roma 1864) ; Treutlein, (Geschichte unserer Zahlzeichen’ (Karlsruhe 1875) ; Woepcke, F., (Memoire sur la propagation des chiffres indiens) (Paris

1863).

David Eugene Smith,

Professor of Mathematics, Teachers’ College, Columbia University, New York.

NUMERATION, the reading off of num¬ bers that are expressed in figures. As shown in Notation (q.v.), the first figure on the right hand expresses units; the next, tens; the third, hundreds, and following the same nomenclature with the next three figures, we have the fourth expressing the units of thousands; the fifth, tens of thousands; the sixth, hundreds of thou¬ sands. The seventh figure, in like manner, ex¬ presses units of millions; the eighth, tens of millions, and the ninth, hundreds of millions. When this method is consistently followed out, as is the case with American, French and other Continental arithmeticians, the fourth period, or group of three figures, is denominated billions, the first figure of it (the 10th from the extreme right) being units of billions, the next, tens of billions, etc. Read in this way, the figures 27, 684, 563,904-, 209 express twenty-seven trillions, six hundred and eighty-four billions, five hun¬ dred and sixty-three millions, nine hundred and four thousands, two hundred and nine units. If every number had an independent name an ordinary lifetime would not be sufficient in which to learn them up to even 1,000,000. In Great Britain there is a variation in the mode as given above, the only effect of which is to render it more complicated: thus, after units of millions come tens and hundreds of millions, but then instead of

billions we have, according to the current usage, thousands of millions; after this, tens of thousands of mil¬ lions and hundreds of thousands of millions, and then billions, which occupy the 13th figure from the. right, and are reckoned in the same way as millions, so that the next unit or trillions does not come in till the 19th figure. The above number, according to the British mode, would be read twenty-seven billions, six hundred and eighty-four thousand-five hundred and sixty- three millions, nine hundred and four thou¬ sands, two hundred and nine units. The first method is perfectly symmetrical, keeping throughout to divisions of three figures, the second only keeps to this division up to hun¬ dreds of millions, when it changes it for a division into parcels of six figures, which are named from units up to hundreds of thousands of units. The latter mode is, however, grad¬ ually falling into disuse. See Notation, Arith¬ metical; Numbers, Theory of.

NUMERICAL APERTURE, a term used in optics; the method by which the illuminating and resolving power of high-power microscopic objectives is calculated. Since it became cus¬ tomary to interpose water, oil or other fluid between the object and the lens, it is found that a water immersion lens of 9 7l/2°, and an oil im¬ mersion of 82°, give equal results to a dry or air lens of 180°. This obviously depends on the diameter of the back lens of the objective and on the refractive index of the medium between lens and object. It is expressed by the formula n sin u, where n is the refractive index of the medium — air or fluid — and u the semi-angle of aperture. It is thus found that an oil-lens of 180° has a numerical aperture of 1.52 against 1.00 for 180° in air. This only represents the comparative diameters of the effective pencils, and the relative illumination is, of course, ob¬ tained by squaring the numerical apertures to get the comparative areas of the pencils. We thus find that an oil-lens of 180° gives 2.310 the illumination of a dry object of 180°.

NUMERICAL NOTATION. Musical no¬ tation has been the subject of many experi¬ ments from time immemorial, and our present system is the result of long-continued develop¬ ment. At one time letters were used to repre¬ sent tones; then came the peculiar signs known as neumce; and these in turn were developed into the notes of to-day. But theorists have not been satisfied with the present system, and have tried to. improve upon it in various ways. One innovation is that of designating the tones by means of numerals instead of notes. Although the ancient Persians already had a method of this kind, and Souhaitty in the 17th century adopted a similar plan, it is Rousseau with whom the device in question is more especially associated. In 1742 he read a paper before the French Academy of Sciences entitled (Projet concernant de nouveaux signes pour la mu-sique,5 in which he developed his ideas on the subject. Notes, as mentioned, were to be re¬ placed by numbers, and the various octaves and

accidentals were to be indicated by special signs. The plan did not meet with much favor, but similar schemes were from time to time brought forward again, largely by compatriots of the famous French thinker. Only one of these, embodied in the well-known Galin-Paris- Cheve system, has gained wider prominence. But the numerals in this system are only used in preparation, not replacement, of the ordinary notation, and there are other features on which the comparative popularity of the system in part depends.

It is doubtful whether any plan which en¬ deavors to supersede the present method by means of numbers will ever be able to gain a secure foothold. In the first place, our system appears actually to be as good a one as it is possible to construct. The defect of the numer¬ ical method is that it does not appeal sufficiently to the faculty of perception. It involves the understanding rather than the eye. Its applica¬ tion would seem to be limited to extremely simple passages, while the extension to more involved harmonic and polyphonic sections would entail complexities as great as or even greater than those which it seeks to avoid. The staves . of our present usage are a happy sym¬ bolization of musical strings, and the notes are

equally appropriate as representations of the hammers or fingers by which these strings are set into operation. To substitute numbers, therefore, would be a step backward rather than forward.

Again, the present system has been estab¬ lished so long that it is almost out of the ques¬ tion to think of replacing it with another. The attempt to do so would resemble the endeavor to establish a new system of weights and meas¬ ures, or alter the spelling of entire languages. Even these latter changes, desirable though they may be, have been found impossible to effect in some countries. There is little hope, therefore, for a reform which does not promise advan¬ tages of a character so decided as to compen¬ sate for all the inconveniences incident to a change.

Albert Gehring,

Author of (The Appreciation of Music,' etc.

} NUMIDIA, nu-mld'i-a, Africa, the ancient Roman name for the region now correspond¬ ing roughly with modern Algeria. It was di¬ vided among various tribes, but after the Second Punic War it was united under Masinissa, and several of its rulers became noted in Roman history, more especially Jugurtha. In 46 B.c. it became a Roman province. Under the

Ro¬ man emperors Numidia attained a high degree of prosperity, and Christianity was in a flourishing condition here. It was afterward conquered by the Vandals, later by the Arabs and in modern times by the French.

NUMISMATIC AND ARCHAEOLOG¬ ICAL SOCIETY, The American. See Amer¬ ican Numismatic and Archeological So¬ ciety.

NUMISMATICS (Greek, v6fua/ia\~ Latin, numisma, ‘ a coin) in the science which treats of coins, their origin and technique, their history, mythology and art. A coin (Low Latin, cuneus = a die, and then, coin) is a piece of metal of a determined shape and weight, bear¬ ing a mark, device or type stamped upon it by government authority, which constitutes an official guarantee of the fineness and weight of the metal. The coin serves as an official and guaranteed medium of exchange, and is thereby distinguished from the medal which is a com¬ memorative piece resembling the coin externally but having no exchange function ; and also from tokens, counters, etc., which are only semi¬ official in origin and do not possess the perma¬ nent legal character of the coin.

It is clear from the foregoing that objects of a monetiform character, such as medals, tokens, counters, medalets, metallic tickets and the like, while included in the study of numis¬ matics according to its widest acceptance, are only brought within the scope of the science by a considerable extension of the term. Their study, while interesting and important and sometimes indispensable, does not form the chief subject of investigation. Neither does our modern paper currency, nor do the earlier forms of money before the invention of coined money, such as shell-money, ring-money, etc., nor the ancient and modern substitutes for metal coinage in various materials such as wood, leather and shell come within the strict definition of the subject. All such objects, metallic or not, monetiform or otherwise, are studied as subordinate branches of the science

whose main point of interest is the coin. Just outside and yet partly within the definition fall the official and private commemorative insignia called decorations or orders, which, including as they do medals issued in war and peace to be worn as decorations, can scarcely Be denied a place in the family group. These, then, are the widest limits of the science. The field covers the coinages of all countries from the earliest times to the present day, and it will only be possible here to indicate the general outlines of the two chief branches, coins and medals.

Coins. — The question of the origins of coin¬ age is to-day well established. Coins were in¬ dependently invented in western Asia, more precisely on the coast of Asia Minor, and this invention is the starting point

of the Greek and Roman series. Again, coins appear to have been invented independently in China and also in India, in the latter case at a considerably later date. The subject is most naturally di¬ vided into four groups, Oriental, Greek and Roman, mediaeval and modern coinages. Under Oriental are classed all coins emanating from the Far and Near East with inscriptions in Chinese, Arabic, Persian and Indian, i.e., all Eastern languages except (1) coins of Semitic peoples in close proximity to ancient Greece, namely, the Jews and Phoenicians, (2) the coins of the ancient Persians and the Bactrian rulers of India which are usually, because of their close relationship, grouped with the Greek coins. Oriental coins may also be described as Asiatic and they extend over the whole period em¬ braced by our other three divisions, Greek and Roman, Mediaeval and Modern. Greek and Roman coinage comprises those coins bearing Greek, Latin and allied inscriptions (with the inclusions above noted), which were struck by the peoples of the lands surrounding the Medi¬ terranean basin and in the far-way colonies of those ancient civilizations. The period of issue is from the invention of coined money about 700 b.c. to the fall of the Roman Empire, 476 a.d. Greek coins proper fall within the chrono¬ logical limits, 700 b.c. to 268 a.d. (death of Gallienus, Roman emperor). Roman coins be¬ gin as late as the middle of the 4th century, or 338 b.c., and extend to 476 a.d.

. Mediaeval coinage includes all European coinages from the dissolution of the Roman Empire down to about the 16th centurv. The line of. demarcation between mediaeval and mod¬ ern coins is to be found in the technical execu¬ tion of the piece. The ˆmilled® coin, that is, one struck by a <(mill and screw" press in place of the hand-wielded hammer, marks the begin¬ ning of modern machine methods of striking. The process of striking coins by means of a screw press instead of by hand began in Eng¬ land about 1651 (and still earlier in France) but was not generally adopted until 1662. The greater and ever-increasing regularity and me¬ chanical exactness achieved bv machinery led finally to the complete mathematical symmetry of the modern coin.

Greek and Roman Coins. — The most an- ciem civilizations preceding that of the Hellenes or Greeks, had not made the important discov¬ ery of coining money. Among the peoples of Assyria and of Egypt, among the Phoenicians pre-Hellenic populations, known as Minoan (Cretan) or Mycenean, coins were un-

Plate I

NUMISMATICS

Plate H

NUMISMATICS

:

Plate m

NUMISMATICS

495

mown, although a form of money consisting of metal in lumps, rings and bars was employed m exchange. The credit of adjusting a lump ot metal to a fixed weight and stamping- it with a mark must be given to the Greeks of Asia Minor living along the coasts of Ionia. Ancient tradition seems to assign the invention to the

i i aiuS Minor, and the truth is prob¬

ably that the Lydians and the Ionian traders or bankers issued the first coins of the Western World. There are no fixed types on these earliest coins, and this fact and other considera¬ tions lead to the view that the issues were neither civic nor regal, but somewhat private in their nature. _ These pieces are bean-shaped lumps of a mixed metal called electrum found in Ionia as a natural alloy consisting of gold and silver in a variable composition. The ob¬ verse or face of the coin is the side which at first bears the device or type. An example of a very primitive coin without any type is shown in plate I, 1. The obverse is merely roughened while the reverse has three irregular punch marks or incuses. Animal types are very com¬ mon devices on the earliest coins, e.g., the stag (plate I, 2), the lion (plate I, 3) and, lion and bull confronting (plate I, 4). The coin with a stag (unique, British Museum Collection) is re¬ markable for the Greek inscription reading: ((I am the badge of Phanes,® and was perhaps struck at Ephesus. At about the same time as the earliest Ionian coins, i.e., about 650 b.c., arose the silver coinages of /Egina, Corinth, Chalcis and Eretria (in Eubcea) in Greece proper. The coins of Athens, about 594 b.c., are among the earliest that show double types, i.e., a device on both obverse and reverse. The early Corinthian piece, called a stater or stand¬ ard coin (plate 1, 6) and the primitive cur¬ rencies of Athens (plate 1, 7) and yEgina (plate I, 8) formed together with the electrum staters of Asia Minor the chief currency of the period 700-480 b.c., the epoch of archaic art.

To Croesus of Lydia, 561-546 b.c., belongs the credit of introducing a coinage of pure gold and silver, 10 of the silver pieces passing for one of the gold. These gold Creseids or staters of Croesus (plate I, 4) are the

earliest gold coins known, if we except the occasional pieces of the archaic electrum stater class in which the gold contents are much higher than the average (plate I, 3). The Creseids are at any rate the earliest pure gold coins. These were followed by the pure gold darics (plate I, 5) of the Persian conquerors of Lydia, named after Darius the Elder (521-486 b.c.), who issued a gold and silver coinage which be¬ came, like that of Croesus, a state coinage of great proportions. Thus early was a standard gold coin invented which is the prototype of our modern standard gold . coin, the English pound and French 20-franc piece, etc. The darics, like the electrum staters of Cyzicus in Asia Minor, and the silver tetradrachms of Athens, yEgina, etc., formed a sort of interna¬ tional coinage which passed readily in all the markets of the ancient world. Plate I, 9, shows a tetradrachm of Syracuse of the period about 500 b.c. still archaic in style. An intervening style called 'the transitional arose after the end of the Persian wars, 480 b.c., lasting for about 60 years and led uo to the great blossoming of Greek art in the 4th century. Among the finest creations of Greek numismatic art are the

large coins known as Syracusan medallions, the decadrachms struck in Sicily about 413 b.c. They were victory coins issued after the defeat of the Athenians by the Syracusans. These masterpieces of die-engraving are the work of artists who signed their names on the medal¬ lions. Plate .1, 10, is a decadrachm of Cimon signed kim (Kimon) on the bandeau of the nymph's head on the obverse. Plate I, 11, is the work of Euaenetus signed eyainet (Euainetos) beneath the head of the obverse. In plate I, 12, we have an example of the coin¬ age of Alexander the Great which had a very wide circulation in Asia Minor following upon his conquest of the Persian Empire in 331 b.c. After Alexander's death in 323 b.c. these tetradrachms continued to be issued for 100 years or more. The conquests of Alexander extended even to the Indus (327 b.c.) and his successors founded an empire in Bactria, thus carrying the Greek types far to the East. The portraits on the Bactrian issues (plate I, 13 — Antimachus) are very realistic and purely Greek in style.

The earliest coins of the Roman series are those issued for the Roman population1 in Italy and consist of large cast bronze issues of a most unwieldy size. The more primitive cur¬ rency consists of irregular bronze lumps or ingots called aes rude. The next currency, aes grave, is regular in its shape which is circular and the coins weigh about a pound (Fig. A).

Fig. A.

These coins were issued about 335 b.c., and there were various subdivisions of the stand¬ ard piece or As which is here represented bear¬ ing the head of Janus. Under the head horizon¬ tally is the mark of value,

1, or unit. The aes grave currency was issued in six denominations, viz., the as, the semis (half), triens (third), quadrans (fourth), sextans (sixth) and nncia, ounce or twelfth. At first these were of the liberal (pound) weight, but the system suffered a succession of reductions in weight from 335- 89 b.c., at which final date the As had a mini¬ mum weight of one ounce or one-tenth of the old Oscan pound of 273 grams. The silver denarius or piece of 10 asses, with its half (nuinarius) and quarter (sestertius) was first

struck in 268 a.d., and this with the bronze currency just described above forms the chief coinage of the Republican period. The Re¬ publican silver coins used to be known as Con¬ sular or ˆfamily® coins from the presence on them of the names (at first abbreviated) of officials who used the Roman gentile name. These officials were monetary magistrates, not consuls, although the consuls may have orig¬ inally been in charge of the issue of coinage. The Republican silver and bronze coinage has been arranged chronologically in the catalogue of the British Museum, but the sales catalogues continue to follow the old family, or gentile, alphabetical system. Under the Roman em¬ perors the currency was composed of the gold aureus (plate I, 15 — Augustus, 29 b.c 14 a.d.), the silver denarius , and the new coinage con¬ sisting of the large brass coin called the sestertius (of four asses) (plate I, 14 — Nero, 54-68 a.d.) , the middle brass, dupondius (two asses) and the copper pieces, the as, semis and quadrans. The obverses bear portraits of the emperors and the imperial family. The art is often excellent in the first two centuries after which it suffered a decline. The head of Faustina the Younger (plate I, 16), the wife of Marcus Aurelius, is a good example not of the finest, but still of excellent work. The appear¬ ance of the portraits of women of the imperial family is not to be understood as signifying that such coins were struck by the sovereign right of the empress or daughter of the em¬ peror, for it was merely in the nature of a compliment that the portraits of the imperial family appeared on the coins.*

The coins of Phoenicia, Parthia and Judaea are commonly classed with Greek coins. They are described at this particular point because we are now passing from the coinage of the Western world to that of Asia. The coins of Phoenicia, partly Hellenic and partly Oriental in character, show many interesting types of Phoe¬ nician deities. The Phoenician galley and the dolphin bear witness to the maritime character of the country. The two great mints of Sidon and Tyre issued abundant coinages. Plate II, 11, a coin of Tyre, 450-400 b.c., shows the dol¬ phin above the waves and

reverse, owl accom¬ panied by the Egyptian royal emblems, the crook and flail. The independent coins of the Jews were probably first struck during the reign of Simon Maccabaeus under the right of coin¬ age granted by Antiochus VII of Syria in 139 — 1 38 b.c. The well-known shekel (plate II, 4) bears the sacred cup with the inscription ((shekel of Israel® and ((year 2® ; the reverse has for type a branch with three buds and inscription ˆJerusalem the Holy.® The coins of Parthia begin in the 3d century b.c. and continue to about 220 a.d. These people gained their independ¬ ence (248 b.c.) from the Seleucid kings who as successors of Alexander the Great had ruled Persia. The silver drachms and tetradrachms bear portraits of Oriental looking rulers in a Greek style. (Plate II, 1, Mithradates I, 174 — 136 b.c.) . The reverse type, a Parthian archer in Oriental dress, is a fit emblem of this war¬ like race. The ancient Persian coinage, as we have seen above (plate I, 5), has a distinctively Western character and it was therefore de¬ scribed in connection with the Greek series. The Parthian coins are of Greek weight and

fabric (i.e., external appearance), and their types reveal a Greek origin. But the coins of the Sassanians, a Persian race which overthrew the Parthians (226 a.d.), are of true Oriental character. The coins are thin and flat in relief, being thus sharply differentiated from Greek coins. The types are: obverse, portrait of king in high Oriental head-dress; reverse, the Per¬ sian fire altar flanked by two attendants. The inscriptions are in Pehlevi. On the coin figured on plate II,, 2 (Sapor II, 309-380 a.d.) the bust of the deity is placed above the altar where flames are usually seen. This coinage con¬ tinued down to 651 a.d. when the Arabs con¬ quered Persia.

Oriental Coins. — The Arabic coinage be¬ gins shortly after the establishment of the Arab dynasty, 661 a.d. The earliest coins are imitations in gold and copper modeled upon the coins of the Byzantine emperors of Constanti¬ nople. The Byzantine coinage (plate II, 14— 17) is an outgrowth of the Roman imperial series, but as it was such a prolific currency and extended through the mediaeval period, it is best treated later in connection with the mediaeval coinage on which it exerted a lasting influence. Plate II, 13, shows an Oriental issue which preserves the old Byzantine types and has even an inscription in Greek, THBEPIAAO= Tiberias (mint-place in Palestine) followed by same mint-name in Arabic. It was struck prob¬ ably before the orthodox Arab coinage, which began in 695 a.d. The original Byzantine proto¬ type of the obverse is seen on the gold solidus (plate II, 12) of Heraclius I and his two sons. In Persia the Arabs copied coins of Sassanian types, bust of king and Persian fire altar (cf. plate II, 2) debased in style. Plate II, 3, shows an Arabic imitation of a Sassanian coin of Chosroes, 591-628 a.d., issued by the Arab gov¬ ernor in Persia, Abdullah ben Hazim, in 688 a.d. at the mint of Merv in Turkestan. Out¬ side of the circle enclosing the obverse type is an Arabic

inscription reading (The Arab conquerors of Persia struck coins of the Sassanian types just noted throughout the mediaeval period in Persia. About 1520 the coinage of the Shahs of Persia begins, and its thick flap (of metal piece on which the coin is struck) and flowing style of writing mark it off distinctively from the earlier Mohammedan coinages. Plate II, 7, is a coin of Shah Hussein (1694-1722 a.d.)

The earliest native coinage of India begins about 350 b.c. and consists of square, punch- marked silver and copper. Plate II, 8, shows a purana with the swastika, an ancient symbol, the sun and various punch-marks probably stamped

by bankers or traders as in the case of the eaihest Ionian coins. A local coin struck at Taxila, single die, reverse plain (plate II, 9), bears the Buddhist symbols, the Chaitya and sacred Bodhi tree enclosed in a railing. The Kushan copper coin (plate II, 10) shows Kadphises II, king of Kabul and Northern India, 85-120 a.d., standing near an altar, Greek inscription and on the reverse, the god Siva and bull. The Kushan tribes conquered the Greek kingdom founded in the Kabul Val¬ ley by the Bactrian rulers. Thus Greek and Oriental characteristics combine.

The most ancient group of Oriental coins is that of the Chinese people who evolved a type of coinage entirely unlike the coinages of the Western world, and dating probably from just as early a date as the earliest coins of the Greeks, i.e., about 700 b.c. The coinage is of cast bronze and the shapes, which are those of various implements, knives, spades, etc., sug¬ gest the age of barter when different objects of every-day use passed as media of exchange. The familiar round coins with a square hole in the centre known as ((cash® were issued at a very early period and this form of coin is still in use. A knife coin of Ming City issued dur¬ ing the civil wars in the 3d century b.c. is shown in plate III, 1. The mark on the blade indi¬ cates the mint place. The cash here shown (Plate III, 2) is a piece of almost pure brass of the ruler Chien Lung, 1733-96. It bears the name of the reign and the words tung pao, ((current money,® and on the reverse the name of the mint in Manchu.

The coinage of Japan is comparatively mod¬ ern and began about the 5th century a d. It consists of copper coins similar to the Chinese. Silver was not uncommon. The long ingots of base silver with various stamps impressed on them were issued in the 17th and 18th centuries. Small oblong silver pieces, rather ornamental in style, called ichi-bu and ni-bu,

((one bu and two bu,® were struck in the 19th century. Gold pieces were issued in the form of flat plates of oblong shape, rounded at the ends, called o-ban and ko-ban, ((large plate® and (III, 3) is a ko-ban and is about 150 years old. Both China and Japan have adopted a modern currency, although the old currency is still in use to-day.

Mediaeval Coinage. — The Byzantine coinage forms a sort of appendage to the Roman series and is so closely connected that there is scarcely any perceptible difference between late Roman and Byzantine issues. An example of an issue of the declining empire is the gold solidus (plate II, 15) of Constantius II, 337-361 a.d., which has a Byzantine appearance but is classed with the latest issues of the Roman Empire in the East. Byzantine coinage proper begins in 491 a.d. The large bronze coin of Justinian, (plate II, 14) 527-565 a.d., shows the emperor holding the globe surmounted by a cross, a Christian emblem. The reverse is occupied by a large M, the Greek numeral for 40, indicating 40 nummi, the denomination, and below CON for Constantinople, and at the sides ANNO XIII, 13th year of the reign, hence 539-540 a.d. This coin is therefore a dated piece and this is the characteristic ancient method of dating, which is by regnal or official years. Above the M is the Christian cross again. The two solidi VOL. 20 — 32

following (plate II, 16, 17) of Constans II (641-668 a.d.) , and of Constantine VII with his son, Romanus II (945-959), show the emperors holding the cross ; also, the globe with cross and the cross on a pedestal, all typical devices. The reverse of the former bears the figure of Christ with nimbus. These then are some of the characteristic Byzantine types : bust of emperor facing holding the globe ; two em¬ perors side by side facing; three figures stand¬ ing (see plate II, 12) ; bust of Christ facing.

The influence of Byzantine coin types may be traced in Italy and Sicily, in Russia, in France and Germany and as far north as Denmark. The source of many mediaeval types is there¬ fore to be sought in Byzantine models. The European coinage from the fall of the Roman Empire to the rise of the empire of Charle¬ magne consists of barbarous, largely imitative issues struck by the Visigoths, Ostrogoths, Vandals, Lombards, Merovingians, etc. The year 800 may be taken as the beginning of the true mediaeval coinage for the silver denarius of Charlemagne was a definite departure from the gold coinages of the age of the barbarians who based their issues upon the old Byzantine prototypes. The year 1252, when the gold florin was first struck in Venice, may be said to fix the point of de¬ parture from the old transitional mediaeval styles to the more varied and original issues of the later mediaeval period. The denier (denar¬ ius), the grot (groat, groschen) and gold fiorino (florin) were the types of coins from which arose a vast multitude of denominations and issues struck by a great number of authorities — kings, dukes, bishops, popes, abbots, and so on. With the

Renaissance, the coinages assume a more independent character and the European coinages are full of the fresh inspiration of a great artistic epoch. The introduction of por¬ traits led to one of the finest developments possible . in the field of coins and medals. The period of the classical Renaissance which opens with the middle of the 15th century ranks with the best Greek period (end of the 5th century and the 4th century b.c.) for the distinguished excellence in numis¬ matic and medallic productions. In Italy artists of world renown such as Vittore Pisano, known as Pisanello, Matteo da Pasti, Sperandio, Benvenuto Cellini, and others produced large cast bronze medals modeled with unerring artis¬ tic simplicity and grace. After the 16th century the art of the coin and medal began to degen¬ erate. A formal classicism set in which held medallic art in fetters until the revival of artistic work on the medal in modern France led to whatever is good in our modern achievements. We cannot follow the details of the develop¬ ment of either coins or medals in the various countries of Europe during the period succeed¬ ing the Renaissance and the modern epoch. But we must briefly describe certain phases of the coinage of our own country.

United States Coinage. — The earliest coins struck in the American colonies are the New England shillings, six-penees and three-pences issued in Massachusetts, about 1652. The shil¬ ling (plate III, 4) bore the initials n.e. (New England) and the Roman numerals XII to indi¬ cate the denomination. There is no type prop¬ erly speaking, just the stamps on a thin flat

piece of silver. In 1616-24 the English of the Bermudas, known then as Sommers Islands, struck copper shillings, six-pences, three-pences and two-pences bearing a hog on one side with Roman numerals to indicate the value, and on the other side a ship. These pieces, called ((hog money," constitute the earliest form of money used in the colonies, though not a native coinage. The English government refused to allow the colonies the rights of coinage and on the other hand failed to provide coins for their use. Hence, the New England shillings were struck without authority from the home government. The coins are necessarily of the most primitive design. Six-pences and three-pences were also coined. In 1652 this type was given up and the more interesting series of shillings and fractions appeared. These bore the inscription in mas- athusets on the obverse which bears as type a tree, commonly the pine, but sometimes the oak and willow, while the reverse bore the inscrip¬ tion new England, a. N. dom in a circle in the centre of which was 1652, under which XII (plate III, 5). These coins continued to be struck until 1686, but the date of the piece was never

altered.

For about 100 years the coinage of the colonies consisted of local and foreign token coinage, that is to say, pieces of merely nominal value, the only authorized pieces provided by the English government being the Rosa Ameri¬ cana copper coins issued in 1722. In 1787 the State of Massachusetts struck copper cents (plate III, 6) bearing on the obverse an Indian standing and holding bow and arrow with in¬ scription commonwealth and a star in the field to indicate the colony, while the reverse bore an eagle with open wings in heraldic pose hold¬ ing an olive branch and arrows and the inscrip¬ tion Massachusetts and date 1787. On the eagle's breast is cent (or half cent). In 1788 New Jersey struck copper cents bearing the following types, head of a horse above a plough¬ share and nova czesarea, while the reverse bears a shield and the inscription e pluribus unum (plate III, 7). The State of Connecticut likewise issued similar copper cents. The first national piece was the so-called Fugio cent bearing a sun-dial above which the sun and in¬ scription mind your business and date 1787, while the reverse consists of a link border com¬ posed of 13 circles, and a central circle en¬ closing the inscription we are one; on the band around the central circle is inscribed united states.

These were the simple and homely begin¬ nings in the early development of the Union. There were pattern pieces of various kinds, cents with the head of Washington, the Conti¬ nental dollar, a trial piece, and so on. In 1793 the first regular coinage of the United States began with an interesting issue of large copper cents bearing a quite agreeable and not in¬ artistic head of Liberty (plate III, 8) accom¬ panied by the inscription liberty and date and varying reverses with inscriptions united states of America and one cent. There were also corresponding half-cent pieces. The later developments are so familiar that we need not go into the details here. There was an early gold coinage beginning in 1795, eagles and half-eagles, showing an attractive Liberty head wearing a cap and on the reverse an eagle.

With the revival of the art of the medal in modern times, the coinage of modern peoples has undergone a decided improvement. The twenty-dollar or double-eagle gold coin designed by Augustus St. Gaudens is at once original and modern and of high artistic merit. The ex¬ ample here shown (plate III, 9) is the first type issued, and of high relief, an effect ob¬ tained by a slightly concave "field" or space about the type. The relief, unfortunately for art, was judged too high for practical uses, and the later issues are of lower relief.

Finally, there remains to be mentioned the very interesting private gold coinage struck in California, Utah, Colorado and Carolina during and after the great discoveries of gold in 1849. There are many varieties of this

unique coinage of which two are here shown : The octagonal piece (plate III, 10), a fifty-dollar gold coin of Augustus Humbert, United States Assayer, struck in 1851 and an oblong bar issued by Moffat and Company (plate III, 11).

Consult Head, B. V., (Historia NumorunP ; Hill, G. F., (Handbook of Greek and Roman Coins) ; Macdonald, G., (Coin Types, their Origin and Development ; Rawlings, G. B., (Coins and How to Know Them; Hazlitt, W. C., (Coinage of the European Continent ; Engel et Serrure, (Traite de numismatique du Moyen Age) ; id., (Traite de numismatique moderne et contemporaine* ; the catalogues of the cqin collections of the museums of Europe, especially the British Museum Catalogues (con¬ sult (Numismatics > in the card catalogue of any public library) ; also the following numismatic periodicals: Numismatic Chronicle; Revue Numismatique; Zeitsclirift fur Numismatik ; Numismatische Zeitsclirift ; Rivista Italiana di Numismatica; Journal International de Numis¬ matique ; Revue Beige de Numismatique ; Ameri¬ can Journal of Numismatics.*

Agnes Baldwin Brett.

NUMITOR, nu'mi-tor. See Romulus.

NUMMULITE, a genus of F oraminifera, mainly extinct, which forms vitreo-calcareous, many-chambered shells having much the form of a doubly convex lens, which when flattened by pressure, as in fossil examples, led to their being likened to little coins (nummnli). They varied in size from that of a pinhead to that of a silver dollar. The group originated in the Car¬ boniferous, increased and flourished at its maxi¬ mum during the early part of the Tertiary period, when these foraminifers swarmed in the seas in incredible abundance. Their shells con¬ stitute the bulk of the Eocene Nummulitic Sandstone of the Old World, where it is one of the most important, if not the principal for¬ mation of the Tertiary series of rocks, in point of extent. Attaining a thickness of many thou¬ sands of feet, it ranges from the Alps and Atlas to the Carpathian Mountains ; appears in Egypt, Asia Minor, Persia, and can be traced through India and China into Japan. The pyramids of Egypt are built in greater part of this nummu¬ litic limestone. Orhitoides is found in the Eocene deposits of our Southern States. See Foraminifera. Consult Geikie, (Text-book of Geology (1882), and the writings of Lyell, Prestwich and other geologists.*

NUN. See Monasticism ; Sisterhoods.

NUN OF KENMARE. See Cusack, Mary

Frances.

NUMISMATICS

1 New Jersey Cent

2 Vermont Cents

3 Vermont Tokens

AMERICAN COLONIAL COINS

4 The Granby Token

5 The Fugio Cent

6 Continental Coinage

7 Carolina Tokens

8 The Nova Constellatio

9 Rosa Americana — Two Pence 10 Sommer Island Brass Coin

NUN OF KENT — NUNEZ

499

NUN OF KENT. See Barton, Elizabeth.

NUNATAK, a rock hill projecting through glacial ice in the form of an island. Particularly common near the edge of the Greenland ice sheet. See Glacier.

NUNC DIMITTIS, nunk di-mit'is, the first two words of the Latin version of the Song of Simeon (Luke ii, 29, 33), <(Lord now lettest thou thy servant depart in peace,® etc. It was anciently used in the Vespers or Compline serv¬ ices of the Eastern and Western Churches, and is found in the Book of Common Prayer as part of the evening service.

NUNCIO, nun'shi-o, a papal commissioner who permanently represents the Pope abroad, and corresponds to the secular ambassador at a foreign court. A papal commissioner who is sent on a temporary mission is styled a legate and, if a cardinal, is styled a legate a latere, that is, sent immediately from the side of the Pontiff. Previously to the Council of Trent the papal nuncios acted as judges in the first in¬ stances of matters which lay within ecclesiastical jurisdiction; since that time they have been formed into a kind of court of appeal from the decisions of the respective hishops.

NUNCOMAR. See Hastings, Warren.

NUNEATON, nun-e'ton, England, a town of Warwickshire, on the Anker, 17 miles north¬ east of the town of Warwick. It has two churches, a free grammar and several other schools. Cotton and woolen manufacturing is carried on to some extent. Pop. 27,700.

NUNES, noo'nyesh, Pedro, or PETRUS

NONIUS, Portuguese geographer and mathe¬ matician : b. Alcacerdo Sal, 1492; d. Coimbra, 1577. He was professor of mathematics at the University of Coimbra. Among his works are a translation of parts of Ptolemy (1537) ; (De Crepusculis. Liber} (1542), in which is described the measuring instrument known as the nonius, which consists of a protractor graduated in 90ths, 89ths, . . . 46ths of a quadrant; and (De Arte atque Ratione NavigandP (1546). A complete edition of his works was published at Basel in 1592. It is to Nonius that we owe our knowledge of the mathematical instruments of the early Portuguese navigators.

NUNEZ, Cabeza de Vaca, noo'nyas ka-ba'- tha da va'ka, Alvar, Spanish explorer in Amer¬ ica : b. Estremadura, about 1490; d. Seville, 1557. In 1527 he sailed from Spain in the ill- fated expedition of Panfilo de Narvaez in the capacity of royal treasurer and high sheriff of the expedition, which met with much ill-luck. Nunez showed great resourcefulness in his at¬ tempts to get the party back to the coast of the Gulf. The boats were finally wrecked and the survivors were washed ashore on the islands off Matadorda Bay (1528). While most of the Spaniards were retained as slaves, Nunez finally secured his liberty. He was successful in trade, exchanging the shells and wampum of the coast for hides and other inland commodi¬ ties. During his eight years' captivity he also gained considerable reputation as a sorcerer and the reverence in which he was consequently held was undoubtedly an aid to his safety. He escaped; fell in with three other survivors of Narvaez' undertaking and together they as¬ cended the Rio Grande; crossed Chihuahua and

Sonora to the Gulf of California and finally (May 1536) reached Culiacan. They were sent on to the City of Mexico, which they reached in July of the same year. Thirteen months later Nunez reached Spain. The pilgrimage of 2,000 miles involved every sort of vicissitude. One result of the journey was to reveal to Spanish knowledge a great territory north of Mexico and to lead to the strange quest for the seven cities of Cibola. A joint account of their travels, given by the travelers at Santo Do¬ mingo, was printed in Oviedo's (Historia Gen¬ eral y Natural de Indias. Nunez was sent as administrator or Adelantado of Rio de La Plata in 1540, and was the earliest explorer of Paraguay. In 1544 he was arrested on the*

charge of Irala, a follower; sent to Spain; con¬ demned to exile in Africa, a sentence which was apparently never executed. In eight years he was officially pardoned. He published an account of his adventures in 1542. This ap¬ peared in an English version in (Purchas his Pilgrimes) (1625) ; as well as in a translation by Smith (1857-71). Consult Bancroft, H. H., (History of the North Mexican States and Texas J (San Francisco 1884) ; Lowery, W.,

(Spanish Settlements within the Present Limits of the United States (New York 1901); Oviedo, G. Fernandez de, (Historia General y Natural de las Indias* (Madrid 1853).*

NUNEZ, Pedro de Villavicencio, Spanish painter: b. Seville, 1635; d. there, 1700. He was of noble birth and early became a pupil of Mu¬ rillo (q.v.) and one of the best Spanish painters of the Seville school. At Malta, where he re¬ sided as one of the Knights of the Order of Saint John of Jerusalem, he studied under Mat- teo Preti (q.v.), called ((Calabrese.);> Returning to Seville he lived on the closest terms of inti¬ macy with Murillo who expired in his arms. After the death of his great teacher he went to Madrid and there produced the picture, beg¬ gar Boys Playing Dice, which is altogether in the best style of Murillo. This work he pre¬ sented to Charles II, king, of Spain. (Scenes from the Life of the Virgin-* he executed for the Carmelite convent at Seville, while his fine likeness, of Archbishop Spinola at Seville gives a good idea of his power and style as a portrait painter. He was an excellent portrait painter and his historical and genre compositions are, after those of Murillo, among the best of the Seville school.*

NUNEZ, Rafael, Colombian statesman : b. Cartagena, 28 Sept. 1825; d. there, 18 Sept. 1894. He entered Congress in 1851, became Secretary of the Treasury in 1855 and consul at Havre in 1862, and, later on, at Liverpool. He became governor of the state of Bolivar in .1876 and President of Colombia in 1879, 1883 and 1891. Several revolts took place during his oc¬ cupancy of the Presidency, owing to the loosely organized form of the federation. • So in 1886 Nunez carried through a reform of the Con¬ stitution by which the government was made a centralized republic and the presidential term of office extended to six years. This made Nunez virtually a dictator for the rest of his life. He was also, previous to this, a journalist, editing the Porvenir in Colombia and FA Conti¬ nental in New York; and he published several volumes of prose and verse, the most important

being (La reform politica en Colombia) (Bo¬ gota 1885).

NUNEZ DE ARCE, Don Gaspar, Span¬ ish dramatist and lyric poet : b. Valladolid, 6 Aug. 1834; d. 1903. He studied at the Univer¬ sity of Toledo, became a deputy in 1865, a mem¬ ber of the Academy in 1876 and Minister for Colonial Affairs in 1882. Subsequently he be¬ came a senator and president of the Society of Spanish Writers. He was special war corre¬ spondent for La Iberia during the African campaign (1859-60), and his letters back from the front attracted nation-wide attention. His lyric verse won for him the title of the ((Ten- nyson of Spain.® Among his works are Bri¬ tos del Combate) (1875), poems of the revolu¬ tion; (La Selva Obscura) (15th ed.) ; (La Vision de Fray Martin) (1880, 1886, on Martin Luther), translated into German by Fastenrath ((Luther im Spiegel Spanischer Poesie,5 2d ed., 1881) ; (Ultima Lamentacion de Lord Byron 5 (1879); (E1 Vertigo5 (1879); (La Pesca> (1884) ; and (Maruja5 (1885). Among his dramas are (Deudas cle la honra5 ; (Quien debe pagar5 ; (Justicia providenciaP ; and (Haz de lena.5 In the edition (Obras dramaticas es- cogidas5 (Madrid 1884) are included most of his dramas.

NUNEZ DE BALBOA. See Balboa.

NUNIVAK, noo'ni-vak, Alaska, an island off the west coast, in the Bering Sea; separated from the mainland by the Etolin Strait, about 48 miles wide. It is about 55 miles long and 40 miles wide; area, about 1,200 square miles. It is fertile and well wooded on the west and south ; the inhabitants are Eskimos. They have considerable trade in ivory, skins and fish.

NUN'S PRIEST'S TALE, The, one of

the stories in Chaucer's Canterbury Tales.5 Its origin is a fable by Marie de France which was subsequently amplified in the (Roman du Renart.5 It relates the escape of Chanticleer from the jaws of the fox by inducing the latter to open his mouth for speech. Dryden mod¬ ernizes the story in (The Cock and the Fox.5 In yEsop's Fables a similar narrative occurs.

NUPHAR, a genus of yellow water-lilies, order Nymphceacece. See Water-lily.

NUR-ED-DIN EL-BETRUJI, noor-ed- den' el-be-troo'je, Arabian astronomer: b. Mo¬ rocco, 12th century. He was known also by the name of Alpetragius and was an authority upon astronomy in his day. He disproved Ptolemy's theory of the epicycle. See (Alpetragii Arabis Planetarum Theoricis Physicis Rationibus Pro¬ bata5 (Venice 1531). Consult Suter, (Die Matematiker und Astronomen der Araber5 (Leipzig 1900).

NUR-AND-SPELL, an old English game, peculiar to the rural districts, played with a ball, which is ((risen55 from a trap and hit with a bat made for the purpose. The ball, called the <(nur,55 is made of wood, a little bigger than a walnut. The bat, called a <(tripstick,55 as it is also used to spring the trap or ((spell,55 consists of a piece of hard wood, six by four inches, and one inch thick (the pommel), attached to a supple handle from three to four feet long, which the player grasps with both hands, giv¬ ing the full swing of his body with the stroke. The game consists of the cumulative distance of a given number of strokes, the player who

has the greatest number of yards being the winner.

NURAGHE, noo-ra'ga, the name given to prehistoric monuments in Sardinia belonging to the Bronze Age. The origin of the word is un¬ known. It is very likely that it is derived from the Phoenician nur, meaning fire. The nuraghi are distributed all over the island, but are more frequent toward the centre and in the Nurra. In the district of Gennargentu some of them are 3,600 feet above sea-level. Notwithstanding the use of many of them as quarries by neigh¬ boring villagers, they still number between 3,000 and 4,000, suggesting a large but scattered population in pre-historic times. Sometimes they occupy inaccessible mountain tops or im¬ portant sites on ridges, sometimes they are found in (lie approaches to tablelands, in narrow gorges and at the fords of rivers. Many are on the seashore and in fertile plains. Gen¬ erally the nuraghe was near a spring or well. Each nuraghe was within sight of neighboring nuraghe , evidently for the purpose of signaling, and each was surrounded by a little plot of ground sufficient for the support of a family. Everything points to the supposition that they were fortified habitations and not tombs or temples.

The nuraghe in its simplest form is a conical tower about 30 feet in diameter at the base and decreasing in diameter as it ascends. When complete it is 60 feet high. It is built of rough blocks of stone (about two feet high), unhewn sometimes and sometimes roughly dressed on one side with bronze instruments. On the in¬ side the gaps are often filled with clay. The roof is sometimes of wood, sometimes of earth and vaulted. The entrance almost invariably faces south, about five or six feet high. The architrave is flat, and there is a space over it to admit light and to relieve the pressure on it from above. Within the doorway there is usually a niche on the right and a stone stair¬ case ascending in the thickness of the wall to the left. At the end of the corridor is a round central room unlighted except for the door. Small rooms or stone cupboards in the thick¬ ness of the wall occupy the sides of this chamber. The staircase leads to a platform on top of the nuraghe, or to a second chamber concentric with the first lighted by a window above the main doorway of entrance. Some of these simple nuraghe have additions, bastions or chambers ; and in some cases

there is a very complicated system of fortification — a wall of circumvallation with towers at the corners, pro¬ tecting a small group of buildings, such as the Nuraghe Losa, near Abbesanta, and the Nuraghe Saurecci, near Guspini. Others, like the Nuraghe Lugheres near Paulilatino and the Nuraghe de S' Oreu near Domusnovas, are pro¬ tected at the entrance by a regular system of courtyards — something after the fashion of a baronial castle of the Middle Ages. Stores and arms were probably kept in the recesses in the gloomy central chamber, where sometimes stone seats project from the walls and where there are traces, too, of a domestic altar. The upper floors seem to have been the residence of the chief's family. Here are hearths and a smoke-hole in the roof. The earliest type of nuraghe apparently coincides with the later Neolithic Age. The date of this nuraghi civili-

zation is now placed from toward the end of the second millennium, extending to about the 7th century b.c. Votive ships are found in some of the forts, and there are remains of marine animals used for food, shell necklaces, amber (evidently brought by sea) and blocks of copper with 2Egean stamps. Many of the earlier bronze and stone figures have close analogies in Cretan finds. Whether we can regard these primitive Sards as themselves a maritime peo¬ ple or merely as possessing trade relations with the prehistoric Greek world is still uncertain. The fate of the nuraghi civilization is unknown. Whether from external attack or internal decay, it. was already declining when Phoenician set¬ tlements began.

Close to or in sight of the nuraghe to which they belong are the prehistoric tombs. These are of two classes : the (

Consult Bouchier, Edmund S., (Sardinia in Ancient Times) (Oxford 1917) ; Forester, Thomas, (Rambles in the Islands of Corsica and Sardinia- (London 1858) ; Fergusson, James, (History of Rude Stone Monuments } (London 1872) ; Bresciani, A., (Dei costumi dell' isola di Sardegna* (Naples 1850) ; Peet, T. E., (Stone and Bronze Ages in Italy-* (Ox¬ ford 1909) ; Pinza, G., (Monumenti primitive della Sardegna* (Milan 1901) ; Perrot, G., and Chipiez, C., 'History of Art in Sardinia, Judaea, Syria and Asia Minor) (2 vols., trans., Gonino 1890) ; Mackenzie, Duncan, in Papers of British School of Rome, Vols. V and VI; Pet- tazzoni, (La religione primitiva in Sardegna) (in Rendic. dell Ac cad. dei Lincei, 1910) ; Tar- amelli, Antonio, (I1 tempio nuragico ed i monu- menti primitivi di S. Vittoria di Serri* (in Reale acad. dei monumenti antichi, Vol. XXIII, p. 313-440, Milan 1915) ; Taramelli, Antonio, H altipiano della Giara di*

Gesturi in Sardegna ed i suoi monumenti preistorici in R. acad. di Lincei monumenti antichi, Vol. XVIII, pp. 5-120 (Milan 1907), also articles by Taramelli in Bullcttino di pcDleontologia Italiana.*

NUREDDIN-MAHMUD, noo-red-den' ma-mood', Malek al-Adel, sultan of Syria and Egypt, styled (

NUREMBERG, nu'rem-herg, or NURN- BERG, Germany, a city of Bavaria, in Middle

Franconia, the second in the kingdom, and once the greatest and most wealthy of all the free imperial cities of Germany. It is on the Peg- nitz, 93 miles northwest of Munich. It is par¬ tially surrounded by an ancient wall flanked with towers and pierced with 10 gates, the whole enclosed by a dry ditch 100 feet wide and 50 feet deep; parts of these fortifications have been removed to make way for great extensions and improvements. The Pegnitz, traversing the town from east to west, divides it into two nearly equal parts, the north, or Sebalderseite, and the south, or Lorenzerseit, connected by numerous bridges. Notwithstanding modern improvements Nuremberg remains the quaintest and most interesting of German cities, owing to its many picturesque mediaeval features. The Burg or royal palace, built (1024-1158) by Con¬ rad II and Frederick Barbarossa, commands a glorious view of the surrounding country, and is rich in paintings and wood-carvings. Among conspicuous public edifices are the town- house, an Italian three-story building, with a fine front, and a great hall, the walls of which are decorated with paintings in oil, many of them by Diirer ; the Germanic National Museum, founded in 1852 in a suppressed Carthusian monastery, a Gothic building of the 14th cen¬ tury, with extensive cloisters, since much ex¬ tended by the addition of the adjoining rebuilt Augustinian monastery, among the first in Ger¬ many, and exceedingly rich in works illustra¬ tive of the arts and industries of the Middle Ages. The most remarkable edifice is Saint Sebald's Church, which gives its name to the north division of the town. It is a Gothic struc¬ ture of great elegance externally and internally (its older parts dating from the 10th century), containing the shrine of Saint Sebald, a tomb in bronze by Peter Vischer, who, with his five sons, labored upon it for 13 years, and adorned it with nearly 100 figures, among which those of the apostles are conspicuous for size and beauty. Other buildings deserving of notice are the church of Saint Lorenz, containing a re¬ markable monument by Adam Kraft, exqui¬ sitely sculptured in white stone, 64 feet in height. There are several public fountains, the chief being the Schone Brunnen, in the form of a graceful Gothic cross 63 feet high, adorned with figures. There are statues of Diirer, Hans Sachs, Melanchthon and others. There is also a monument of the war with France, erected in 1876. The town library contains over 110,000 volumes, and educational institutions are nu¬ merous. Communication

between the various parts of the town and with the suburbs is facilitated by electric tramways. Before the passage to the East Indies round the Cape of Good Hope was discovered Nuremberg was the great mart of the produce of the East, coming from Italy and. going to the north. The manu¬ factures are still considerable, and again rapidly rising in importance. Among the most important at the present day are toys, lead- pencils, colors, chemicals, . clocks and watches, brass and steel wares, playing cards, tobacco and cigars, railway-carriages, machinery, electrical apparatus, musical and scientific instruments, beer, etc. The toys made here and in the neighborhood go to all parts of the world. Printing, lithographic work, type-founding and book-binding are also extensively carried on. There are schools for the training of mechanics ;

and there is a large industrial museum. The town is celebrated, in connection with its in¬ dustry, for the invention of watches, wheel- locks (used in discharging olej muskets), gauge- plates for drawing brass- wire, clarinets and air- guns.

Nuremberg, though an ancient city, does not carry its origin so far back as Roman times, n ilad acfluired considerable importance by the 10th or 11th centuries, and was frequently visited by the emperors of Germany. It was greatly enlarged by Conrad III, and received several embellishments and important privileges from Frederick Barbarossa. In 1219 it was raised to the rank of a free city of the empire. It early took part in the Reformation. Subsequently it suffered during the great European wars, and being repeatedly laid under contribution by both parties became so exhausted that the sources of its prosperity were almost dried up, and the population rapidly decreased by extensive emi- gration. Haying finally incurred a load of debt, which made it an acquisition of little value to any state, it was formally taken possession of in 1806 by Bavaria, which undertook the settlement of its debts, and, by judicious arrangements, has considerably increased its trade. Many dis¬ tinguished individuals have been born here, among them the poet Hans Sachs, the painter Albert Differ (whose house may still be seen), and the sculptors Peter Vischer and Adam Ivraft. Pop. about 400,000.

Bibliography.— Bell, N. R. E, 'Nurem¬ berg (New York 1905) ; Headlam, Cecil, (The Story of Nuremburg) (in 'Mediaeval Town series, London 1899) ; Mummenhof, Ernst Ursprung und Alteff (Nuremberg

1908) ; Ree, P. J., 'Nuremberg and its Art to the End of the Eighteenth

Century > (New York 1905); Reicke, Emil, 'Geschichte 'der Reichsstadt Nurnberg> (Nuremberg 1896) ; Rosel, Ludwig, 'Alt-Niirnberg) (Nuremberg 1895) ; Schroltes, Georg, -Geschichte der Stadt

1909) erg bis zum GegenwarC (Nuremberg

. NURHAG, ancient round towers on the lslaind of Sardinia. ˆ They are about 50 feet high and about 90 feet in diameter, measured at the base and outside of the platform on which the largest of them are founefed. The materials are limestone, tranchitic porphyry, granite or vol- canic. rocks, obtained from the neighboring quarries. Each block forms a cube about three feet each way, and its surface is an irregular line, such as the blows of the hammer in shap¬ ing it may be supposed. to have made; the walls aic without cement, within as well as without.

A wall of 10 feet, built like the main structure is surrounded by a parapet three feet high. The roof of each apartment is arched; the en¬ trance terminates in a flat architrave, and is sometimes so high that a man can enter without stooping, and sometimes so small that he can only creep into it on his stomach, though it gets wider as he proceeds. Hence the low chambers are mere cells formed in the thickness of the wall, while the high chambers are supported by pillars. In the cells broken human bones mixed with earth, like that of ordinary graves, have been found. It is many centuries since' these remarkable monuments attracted attention. The origin and aim of these structures is still, how¬ ever, not free from doubt, though they are gen-

' rally i cgai ded as tombs, constructed so as to be available, in emergencies, for purposes of defense.

NURSE, Trained, is one who has followed a couise of training in a school for nurses usually connected with large city hospitals, for two years or more, and who has received a diploma after a severe examination and has been graduated. It was not until the early part of the 12th century that a so-called school for nurses was organized, by the Abbess Hilde- garde, among her friends and associates for service in the hospitals. From this small begin- mnff grew the system of a special training for nursing, which, however, remained in its in¬ fancy until the middle of the 19th century. In 1840 there was an organization of nurses in London which cared for the sick poor, but it remained for Florence Nightingale to give the impetus to a movement toward securing a more efficient training for nurses. This movement Miss Nightingale started in 1853. In 1870 Miss Louise Lee Schuyler, who was the founder of the New York State Charities Aid Association organized the Bellevue Training School for bemale Nurses in New York City, and in 1872 the first class of trained nurses in the United

States was graduated from Bellevue Hospital. Now nearly, every large hospital in the country has its training school.

The term of study, in most of the schools, is two years. In some of the small towns the course may be for six months or 18 months, and in some schools three and even four years is required. Application is made to the super¬ intendent of the training school, and after a physical examination the applicant is received on a two-months' probation term. During this period the applicants receive board and lodging but serve without pay, and education, strength! powers of observation and endurance are tested.' If, after this probation, they prove acceptable to the superintendent, they are required to sign an agreement for the balance of the term whereby they bind themselves to obey the regu¬ lations of the hospital and remain in the school until the term is ended. This agreement can be terminated for cause by either party. Pupils reside in the "home® connected with" the hos¬ pital, wear a uniform, while on duty, and re¬ ceive board, lodging, laundry work and a small compensation. Lectures are given by the mem¬ bers of the staff of house physicians, the visiting physicians and surgeons and head nurses. The lectures by the physicians cover anatomy, physiology, materia medica and all departments or tuedicine. . The head nurses teach bandaging and the dressing of wounds. Obstetrics and" the care of the insane are also taught. Massae-e is taught in a degree ; but if a nurse wishes to take the full course, it requires a six-month term in a regular massage school. A diet- kitchen, where proper food for the sick is pre-pareff, is generally under the charge of one of the head nurses. The first three months are occupied by the pupils in a general observation of the work of the hospital ward's head nurse and the assistant nurse. The care of the beds o» the patients is one of the first duties learned, f aking the pulse, temperature and respiration ol a Patient and making a record of it on a chart provided are the next steps. In the sur¬ gical wards the dressing of slight wounds is a

part of the duties, and probably the pupil must assist in the care of the operating-room and making ready the dressing to be used after operations have been performed. The pupil is then examined and, if the examination is satis¬ factory, advancement to assistant nurse follows. After three months more comes another ex¬ amination, and at the end of a year still an¬ other. The pupil then is a full-fledged nurse and is placed in charge of a ward, and full re¬ sponsibility for the condition of the patients is placed upon her. She must receive the new patients sent from the receiving ward, note their condition and, if she thinks it warranted, send for the house

physician at once. Otherwise the patients wait until the regular call. She must go with the house physician when he makes his visits to the bedside of each patient, carefully note his diagnosis of each case, make a memo¬ randum of the medicines prescribed and see that the medicine is properly administered. She must note the least sign of change in the pa¬ tient's condition, and, if for the worse, call the physician at once, or in extreme emergency be ready to know what to do and do it at once. She must be extremely self-reliant and be ready to know how to act on the instant, as the life of the patient very often depends on quick action. After graduation she goes into private practice and must be prepared any hour, day or night, to respond to a call. The salary received varies, according to the severity of the case.

In December 1887, D. O. Mills of New York, after a visit to the city hospitals, decided that the number of infirm and sick men who were in the hospitals made it a necessity to educate male nurses, and he organized the Mills Train¬ ing School for Male Nurses of Bellevue Hos¬ pital, put up a building on the Bellevue grounds and gave it to the city of New York to be used as a ˆHome® for the male training school. The first class of male nurses was graduated from Bellevue in 1890. The male training school idea was taken up by the physician in charge of the City Hospital, on Blackwell's Island, and the first class graduated from there in 1890, shortly after the Bellevue class. The training is the same as in the female schools, the only differ¬ ence being that greater attention is bestowed upon diseases of men. When the male nurse begins private practice his salary ranges from $5 a day of 12 hours to $10; and, in contagious or infectious diseases, to even more.

State registration of trained nurses is now a law in New York, Virginia, North Carolina, New Jersey, Maryland, Indiana, California, Colorado, Connecticut, New Hampshire, Dis¬ trict of Columbia, Iowa, West Virginia, Minne¬ sota, Illinois, Georgia, Wyoming, Washington, Texas, Oklahoma, Nebraska, Delaware, Pennsyl¬ vania, Missouri, Michigan, Massachusetts. The legislatures of these States passed bills between 1903 and 1910 requiring trained nurses to register their names and addresses with the county clerk of their respective counties. In the State of New York registered nurses are entitled to use the abbreviation ((R.N.® after their names, and it is made a misdemeanor pun¬ ishable by fine for any person not a trained nurse to use the abbrevation. Nothing, how¬ ever, contained in the acts is considered as con¬ ferring any authority to practise medicine or to undertake the treatment and cure of diseases.

Examinations are held under a commission of five members of the New York State Nurses' Association, appointed by the Regents of the University of the State of New York. They grant certificates which may be revoked for

sufficient cause, after written 'notice to the holder, and no person is allowed to practise as a registered nurse after such certificate has been revoked. The law in the other States is virtually the same as in New York. The best- known training schools are those connected with the Bellevue, Presbyterian, Mount Sinai and City Hospital in New York City; the Massa¬ chusetts General Hospital in Boston ; Phila¬ delphia and Pennsylvania hospitals in Phila¬ delphia; Johns Hopkins Hospital in Baltimore and the Illinois Training School for Nurses, Chicago. The first class of young negro women ever graduated as trained nurses was sent from the Lincoln Hospital and Home, New York City, in December 1903. For provisions of the State laws consult Body, L. C., (State Regis¬ tration for Nurses> (Philadelphia 1911). Con¬ sult also Goodnow, Minnie, (Outlines of Nurs¬ ing History) (Philadelphia 1916).

NURSE-FROG, any of various frogs and tree-frogs which have or make special arrange¬ ments for the care of the eggs or young, or of both. The most widely known example is prob¬ ably the European obstetrical frog, the male of which takes charge of the eggs as soon as laid by the female, and carries them with him until they hatch. Many other species, especially among those living in the American tropics, take precautions as to their offspring. Thus one, the Brazilian ferreiro (Hyla faber), makes beneath the water in the ponds where it goes to spawn small walled-in basins of mud, within which the spawn is deposited and the tadpoles are reared in safety from many enemies that would attack them were they running at large. Several kinds of frogs have their few eggs placed upon the back of the female, in pits or pouches in the skin, and keep them there until they hatch ; and in one well-known genus (Phyllobates) the tadpoles cling to the mother's back and are carried about and cared for until able to transform and care for them¬ selves. Consult Gadnow, (Amphibia and Rep¬ tiles } (1902). See Frog.

NURSE-SHARK, a name given by Amer¬ ican fishermen to several different kinds of shark, as the Sleeper (Somniosus microcepha- lus), and especially a voracious tropical shark (Gingly mo stoma cirratum) abundant about the coral reefs of the West Indies and the coast of Mexico, where it is called gata. The Port Jack- son shark (Cestracion) is sometimes called nurse-shark.

NURSERY, properly speaking, any place in which plants are grown for transplanting. As used in America, however, florists' establish¬ ments have been excluded because they were developed later than the fruit nurseries and be¬ cause their equipment is strikingly different. Since the development of nurseries in which ornamental plants such as herbaceous peren¬ nials are grown, the term has been gradually returning to its original meaning, for many nurseries now grow for sale all classes of plant materials — trees,

shrubs, perennial herbs, (

As now constituted, the nursery business in

North America is a development of the past century and a quarter, for though there were some nurseries prior to 1800, they were few, small and local in their influence. With the development of fruit growing, especially in New York State, about the time of the opening of the Erie Canal in 1825, the nursery industry began to grow both in extent and influence. Until about 1860 the development of the busi¬ ness was mainly westward from New England to New Jersey and to Michigan and Illinois. After the Civil War the industry began to spread southward and southwestward until now practically every State has its nurseries.

On the Pacific Coast, especially in Cali¬ fornia, the mission fathers had their small nur¬ series, but not until agriculture began to rank in importance with mining were commercial nurseries established in these States. To-day some of the largest and most important ones are located in California, but New York still leads in this industry, its centre during the past 75 years continuing to be at Rochester.

Indexes of the relative importance of the in¬ dustry are afforded by the 13th United States Census Report, which shows about 2,500 nurs¬ eries, representing an aggregate value of $20,- 600,000 and an area of 80,600 acres. During the decade since the previous census the value of the product had more than doubled, being over $21,000,000 in 1909. Of this amount New York contributed more than $2,700,000, California $2,100,000 and Texas $1,200,000. Extensive nursery interests are also centred in Maryland, Florida, Michigan, Missouri, Georgia, Alabama, Tennessee, Ohio, Arkansas and Kansas.

In America nursery methods differ widely from those of Europe. They have mainly to do with extensive rather than intensive practices, the growing of large numbers of specimens for commercial ventures, instead of speciallv trained specimens for amateur plantings. This state¬ ment applies particularly to fruit trees, which in America are planted far apart, whereas in Europe they are more popularly grown upon walls and trellises or as cordons and espaliers in greatly restricted quarters. American nurs¬ erymen are interested in growing straight stemmed fruit trees in uniform rows, each specimen being as nearly as possible a replica of every other of its kind.

While berry bushes such as currant and gooseberry are grown from cuttings, and others (raspberries, blackberries, etc.) are reproduced by means of "tips® and "suckers, » the tree fruits are propagated by grafting or budding. (See Graftage). Any of these method, depending upon the species or the variety, may be used for reproducting ornamental trees and shrubs. Forestry subjects are generally grown from seeds. They often demand great care and skill in the handling of the seeds and of the seedlings. Formerly piece root grafting was the most pop¬ ular method of propagating apples and pears in the Eastern States. In some sections it is still in vogue, but as in the case of the stone fruits, such as peaches and cherries, budding is steadily leplacing it. In the Middle West small pieces of loot are advocated not so much because they permit the growing of several trees from the one stock, but because the "piece® merely serves to nurse the scion until this develops

roots of its own and thus the trees attain greater hardiness than might otherwise be the case. Experiments tried in various States seem to indicate that otherwise there is little advan¬ tage gained by budding over grafting, or long pieces over short ones except in convenience and speed of handling. In some cases nurseries practise "double working® to avoid the damage to weak trees, for instance, Tompkins King and Grimes Golden apple from diseases such as col¬ lar rot, these varieties being worked upon re¬ sistant stems such as Ben Davis or Northern Spy.

To supply the general nurseries with stocks upon which to graft or bud the various named varieties of fruit and ornamental trees, special¬ ists have arisen during the past 20 years, so that to-day the nurseryman who grows his own grafting or budding stocks from seeds other than peaches is the rare exception.

Prior to the Great War practically all the pear, cherry, quince and many other stocks were imported from France. But the war al¬ most destroyed that industry, so American nurs¬ eries and the fruit industry have both seri¬ ously suffered in consequence. The Prairie States furnish the great bulk of the apple stocks, the work being in the hands of men who sow the seeds in rows, cultivate the seedlings like carrots or beans, dig the plants after the leaves have fallen in autumn and sell them to those nurserymen who use them for grafting during the winter or budding the following summer. With the peach the case is different; each nurs¬ eryman sows each spring seeds for what trees he needs and during the summer buds them. An interesting fact in this connection character¬ ized the last year of the Great War and the suc¬ ceeding season; namely, that whereas American nurserymen were often unable to supply desired varieties of apples, pears, cherries and other fruit trees, due mainly to shortage of stocks, they usually had complete lists of varieties and adequate supplies of

peach trees simply because they grew the seedlings themselves.

Because many diseases and insects cause serious damage to nursery stock, special State and national legislation has been passed to con¬ trol the dissemination of stock and provide for quarantine of imported plants, both interstate and international. Under provisions of various acts inspectors are placed at ports of entry to scrutinize imports of nursery stock, pass "safe® shipments and condemn and destroy such as are infested with disease and insects. Had such inspection been established early enough, many of the pests imported from foreign coun¬ tries, especially Europe, might have been kept out and losses amounting to millions of dollars thus pi evented. See Insects of Importance to Man ; also Plants, Diseases of.

While insects and diseases make production of mirsery stock difficult the most important restricting factor is the necessity to use land that has not grown trees oftener than once in five years. The trouble is apparently not chemical but physical, the main reason being that the land is under crop for several years and is handled when it should be left un¬ touched. The humus becomes depleted, even exhausted, so several years of rest in clover or grass are necessary to put the soil in good condition again.

NURSERY FOR CHILDREN, HYGIENE OF THE

505

In America special nursery tools have been developed to economize time and effort and thus make the industry more profitable. Among these are various knives for grafting and bud¬ ding, hoes for planting, spades with rein¬ forced metal handles for digging, plows and subsoilers for preparing the land and apparatus for spraying two or more rows at a time. But most important of all are the tree diggers operated by 8 to 16 horses, by traction en¬ gines or by stationary engines which use steel wire cables wound on drums to draw them from end to end of the rows.

In the north eastern United States and ad¬ jacent Canada nursery stock of fruit trees, grape vines and bushes, also of many orna¬ mentals, is dug in the autumn and stored in frostproof buildings, the best of which some¬ what resemble cold storage houses. The main advantages of such storage are that damage by mice and rabbits and winter injury by fiost are prevented and the nurseryman is per¬ mitted to pack and ship stock earlier in the spring than would be the case were the stock left out of doors during the winter. Unless the temperature is kept at 28° to 34° Fahrenheit there is considerable risk of damage either by freezing if below this range or by mildew if above; also there is risk of drying out of roots and tops so that when the stock reaches the purchaser it may be lacking seri¬ ously in

vitality. Thus the practice of winter storage favors the nurseryman more than the planter. Hence the advantage to the latter of ordering dormant stock for fall delivery, whether he plants in the autumn or merely ((heels in® or buries the stock until spring.

Nursery interests in the United States and Canada are represented by several sectional organizations and the whole area by the American Association of Nurserymen which meets annually in various parts of the country and publishes an annual report. The National Nurseryman is a monthly magazine devoted to the industry and published at Rochester, N. Y. American books which deal with the propaga¬ tion phases of the business are Fuller, Prop¬ agation of Plants) (New York 1887) ; Bailey, (The Nursery Book (New York, 11th ed., 1907), and Kains, Plant Propagation, Green¬ house and Nursery Practise) (New York 1916).*

M. G. Kains, Horticultural Consultant.

NURSERY FOR CHILDREN, Hygiene

of the. There is no part of the home requiring more particular and intelligent care with respect to the conditions of health than that which is assigned to the children of a household. The children's apartment should be a large, sunny, dry and well-ventilated room. Absence of sun¬ light is as bad for children as plants — both grow pale and sickly in consequence of it. Ex¬ cess of sunlight can be averted by blinds, awn¬ ings or dark-colored (preferably green) win¬ dow-shades. The room should be above the first floor, in a well-built house, on dry ground, and should have good plumbing. The furniture of a nursery should be comfortable, but simple and easily cleaned. The floor is best covered with a carpet or rug which can be readily removed for cleansing or when a contagious illness prevails. The walls should be either painted (preferably a light gray), varnished or

covered with a varnished paper which can be washed. Dirt must be kept out of the nursery. There should be no heavy furniture. All cup¬ boards and closets should be kept clean and well aired. There should be no <(tuck-away® places. Dusting, as ordinarily carried out — that is, the transferring of dust from one place to another — should be unknown. Dust should be removed by hand, with a slightly moistened piece of cheese-cloth, and with the cloth fastened in a metal grasp fitted to the end of a pole made for that purpose. The floor should be swept after moistened tea leaves or sawdust have been sprinkled over it, or better yet, with a vacuum cleaner. The corners of the room should be rounded so that no dust can lodge in them.

Ventilation and Warming. — While a nurs¬ ery should be always comfortably warm, it should be well aired or ventilated and fresh air must

come from out of doors. Few houses are equipped with such a good system of heating and ventilation that the opening of a window to admit air is not necessary. But cold air should not blow upon the child. In fact, in cold weather children should not be allowed to stay near a window, even if closed, as it is the cold air that comes through crevices that <(cuts like a knife.® As the current of cool air is greatest along the floor of a room, in cold weather chil¬ dren should not sit upon the floor. The room may be frequently ventilated by opening a win¬ dow for a short time at the top, the children meanwhile being more warmly clad. Or the air may be admitted through an elbow tube or through the space between the upper and lower sash, the lower sash being raised several inches and having under it, along its entire length, a board (window-board). A stout piece of cloth, decorated if desired, may be fastened across the lower part of the window, with the window raised nearly to the upper edge of the cloth, the air comes tempered through the cloth and also between the upper and lower sash. The upper sash may be lowered a few inches and a frame covered with one or more layers of cloth fitted in between the sash and the window- frame. As lamp and gas light readily pollute the air of a room, electric light is preferable.

The temperature of a nursery should be from 65° to 70° F. Open fire-places or hot- water pipes are frequently better for heating purposes than close stoves or furnaces, which unduly dry the air. If close stoves are used they should have no dampers, because of the danger of coal-gas permeating the air of the room. All heating and lighting apparatus should be well protected, so that children can¬ not burn themselves or set fire to anything.

Nuisances and Sources of Contamination. — There should be no imperfect plumbing in the nursery — in fact all plumbing would better be in an adjacent room. Soiled napkins and other offensive articles should be promptly re¬ moved from the nursery, also remnants of food. Toys should, as far as possible, be unpainted and clean. Disinfectants are rarely needed, ex¬ cept in cases of sickness, if sunlight, good air and cleanliness are secured.

Toilet. — While a warm bath, with the oc¬ casional use of a pure soap and thorough dry¬ ing, is necessary, the child should become ac¬ customed to cool water. This can usually be

accomplished by gentle sponging with cool water after the use of warm water. A child does not always need a daily bath. Soft towels or cloths are

best for drying purposes. Toilet-powders need not be used except where the skin remains moistened. Much of the soreness upon the buttocks and in the groins can be prevented by the use of dry, soft napkins, washed in soft water and with a soap containing little alkali. The scalp and teeth should be kept clean, and only soft brushes employed. A comb should rarely be used.

Dress. — This should be sufficiently warm, and as small in amount as is consistent with comfort. The underclothing is of the most importance and should be of woolen or linen mesh-work of varying degrees of thickness, depending on the seasons of the year. The fabric of children's clothing should be soft. Tight construction by bands is injurious. When a child begins to use its limbs freely the clothing should be shortened. Shoes should be soft, and for young children without heels, and should not cramp the toes.

Food. — The child's food should be well cooked and clean; the milk should be pure; if there is any doubt as to its purity it should be sterilized. Long-tubed nursing-bottles should not be used. All receptacles of food should be kept clean. Boiling and straining the drinking- water is frequently advisable. It should be cooled by placing it in corked booties in the refrigerator. (See Children, Diseases of). Consult Dennett, R. H., (The Healthy Baby> (New York 1912).

NURSERY LORE, songs and folklore of children. Nursery lore naturally divides it¬ self into two distinct classes, the songs, rhymes and stories told from generation to generation in substantially the same form by older people, and the peculiar child lore handed on from one generation of children to another by the children themselves. The former include the vast body of nursery stories found re¬ corded in books for the use of children, and die tales of mothers and nurses told to children. To the second division belong the songs, games and occasional stories which children habitually make use of in their play. Many of these are of great antiquity. The strongest faculty in the child is that of imitation. He lives over again in his games the occupations that inter¬ est his elders; and long after the latter has substituted newer interests and occupations for the older, the child continues to hand dowm to succeeding generations of children echoes of the past in the shape of imitations of these earlier activities of the human race. In the course of time these become conventionalized into an unchanging, meaningless form in which all memory of their origin is lost. These are repeated in the playroom, on the playground and wherever children meet together. The verse form of the songs and jingles helps to preserve them unchanged from year to year, and they, in their turn, aid in preserving the formulas of games which they accompany. These games, with their accompanying songs and formulas, were at one time the property of older

people as well as of children, and some of them were dropped by the latter almost within the memory of persons still living. Out of the May dances and other ceremonial ob¬

servances of a like nature, dating back to the days of a widely extended nature worship, sprang many later sports and celebrations, after the Christianized peoples had forgotton their former beliefs but had not yet altogether abandoned the more striking of the ceremonies connected therewith. These form a most curious and interesting survival of the manners and customs of tribes and peoples. In them are mingled and, as it were, jumbled together history, love games, flower oracles, rhymed formulas, striking alliterations and assonances, pleasing jingles, cadences and songs with re¬ frains or choruses. The memory of the dead past that inspired them is gone; but the charm of music and of simple refrain has survived in a luxuriant growth of what appears pure sense¬ less sound, beautified by the freshness, simplicity and earnestness of child nature.

'Games. — When books and other reading material were not so plentiful as now, when means of communication were poor, and when people found few sources of public entertain¬ ment outside their own homes and those of their relatives and friends, then formal square dances, charades and games of many kinds were very popular and formed a part of every entertainment where young, middle-aged and even older people were met together for social ends. These games, some at least of which had a mythological origin probably of remote antiquity, were originally played to the ac¬ companying of rhymed formulas, singing, and later to the sound of musical instruments in the case of the country dances. These rural en¬ tertainments included guessing games, dances, counting games, sports of such a nature that the youth of both sexes might take part in them, choruses (carols), riddles, games of hide and seek and pure nonsense contests. These were all imitated by the children in their play. The same thing may be seen to-day in Russia, Hungary, parts of Germany and Austria where the peasantry has preserved its more rural and primitive aspects. Among the American In¬ dians, but a generation ago, the children im¬ itated, in their games, the sports and cere¬ monies of their elders. In parts of Latin America, notably Mexico, the nine days preced¬ ing Christmas are given over to entertainment in which a memory of the "novenas is the leading feature. (See Posadas). The children imitate these semi-sports, semi-religious formu¬ las at school, in the streets and at home, per¬ forming them exactly as their elders do; and often they continue them for several days after the ((novenas» are past, probably because the constant movement and the music please them. In all of these there is in evidence the process through which the ancient folk cere¬ monies passed in becoming nursery lore.*

Nursery lore, like everything human, has been subject to many changes stretching over long periods .of time. Rhymes, choruses and tales have been detached from one connection and attached to another; and folklore has grown up about certain mythological per¬ sonages and historical characters, giving us very distinct and abiding notions of them. Every child and older person, for that matter, knows, that King Arthur was a goodlv king, old King Cole was a merry old soul, Queen Guinevere was skilled in the baking of cakes,

Queen Anne once ruled the land (England), Georgey Porgey, the German Prince who leigned in England, was fond of pudding and pie, and that the merry Charley (the Stuart) loved good ale and wine. Many of us, too, remember that other luckless Charles of our childhood days, who went about, in our imagination, upon a black horse, and the James who had a daughter which he gave to the Oranger, only to be driven out of his kingdom by the two of them. All these more modern characters have been dressed up in ancient rhymes just as were Arthur and the chivalrous characters of his age. In the games and rhymes of children we still hear a curious echo of this burning past of English history, when the events chanted therein went to every true man s heart. The scurrilous songs sung by the Stuart adherents about the house of Guelph during the reign of the first four Georges is reflected in the rhyme showing that the Georgey Porgey already referred to ((Kissed the girls and made them cry®. Many a young girl cried and many a household mourned on account of the profligate character of members of the families of these early Ger¬ man sovereigns of England. Yet it is curious to have the echo of this non-moral age come down to us in the mouths of innocent children and to have it hobnobbing with ((Poor Old Robinson Crusoe,® the athletic cow who jumped over the moon, or the dish that purloined the spoon.

Gradle Songs are to be found in the lore of nearly all races ; and they are undoubtedly of great antiquity. The North American Indian possesses some of the most beautiful of these lullabies. The structure of the latter gives an indication of how they were originally composed. If the child cried and remained awake past his natural bedtime, the assumption of primitive people was that he was being troubled by some spirit. Incantations and choruses were at once resorted to in order to free the infant from his unwelcome visitor. The more powerful the charm the more likely was the child to soon fall asleep. Practically all the Indian races had songs of this character, living examples of which are still to be found in current use among the Pueblo Indians and the native races of Mexico, Central

America, Colombia and Venezuela. As the charm idea grew more and more obscured with the im¬ position of Christianity upon paganism, the lullabies assumed a more human and per¬ sonal tone. Side by side with these human¬ ized lullabies existed tales of changelings and bewitched children which continued to form a part of nursery lore in most countries until comparatively recent years. When children became ill, it was believed they were being troubled by some evil spirit, and songs, charms and incantations were resorted to to scare them away from the child or to induce them to leave it. In the course of time these, too, became lullabies in a modified form.

Riddles. — These are as old as the literature and ritual of races. We find them constantly appearing in biblical and other literatures in connections that show they played an important part in the life of the people from the highest to the lowest. The gods, the oracles, the prophets, the priests and the rulers frequently spoke in riddles and myths, and adventurers

and heroes are represented as propounding riddles to those high in authority. Oracular language was used in connection with almost every phase of life in its relation to religious ceremonies. It is but natural, therefore, that many of these should have survived among other superstitions of the past. Thev are found curiously intermingled with surviving child lore, often in a form that still reveals their ancient connections.

Charms entered into almost every phase of belief, every relationship of life, and, in the greater part of the world, belief in them has not yet altogether disappeared. They were used to cure every form of disease, to induce love, to drive out evil spirits, to scare away witches and wizards, to make butter come, to render fields, cattle and women fruitful. In the olden days they were of fearful import, and only priests and those empowered to handle them might lawfully use them. Those found using them without this authorization might be drowned, buried or otherwise put to death as a menace to the people. The old charms of making butter, milking a cow to an incantation and the driving away of witches are survivals, among others, of charms whose efficacy was once universally believed in. As already indi¬ cated, to this class belonged the lullabies or cradle songs which were, at one time, quite nu¬ merous. Many ancient prayers took the form of charms, as, for instance, in the nursery rhyme ((Mathew, Mark, Luke and lohn guard the bed that I lie on,® or ((Mathew, Mark, Luke and John saddle the horse, and I'll, get on!® (((I'll be gone®), and other variants: «Hickup, hickup, go away, come again another day!® The first invocation was to the saints, though it was_ probably of an earlier origin, while the latter invocation was to the thing itself which was creating the trouble. ((Rock-a-bye baby, thy cradle is green,® ((Hush-a-bye baby, on

the tree top!® and (

Accumulative Stories are tales that keep adding to the original incident as the story pro¬ ceeds, as ((01d Mother Hubbard,® ((The "house that Jack built.® Sometimes each incident is repeated and. a new one added until the end is reached; while in other tales these repetitions are avoided. These tales take many forms ; some are short and some are quite long. Of the longer ones there are generally severed ver¬ sions with variations. Though thev may be of considerable antiquity most of these stories seem to be tales of pure invention. This, in itself, would explain the many variants of such tales.

Proverbs and Refrains. — A large class of nursery rhymes in a sense may be called riddles. Of this class are <(Humpty Dumpty,® <(The ship¬ sailing on the sea,® ((Little Nancy Red-head and white toes, the longer she stands the shorter she grows® (a candle), ((01d mother Twitchell

who has but one eye,® and "Higgledy, Piggle- dy, here we lie, plucked and picked and put in a pie.® Closely allied to these are many tales that seem to be largely nonsense with a goodlv mixture of humor. There is the hen who crossed the road to get to the other side, and (

Some nursery rhymes are essentially dra¬ matic in form. To these belong the good Doc¬ tor Faustus who whipped his scholars out of Scotland into France and out of France into Spain and into Scotland whipped them hack again ; (

Bibliography. — Bolton, H. C., Counting- out Rhymes of Children) (Boston 1897) ; Dent, (Mother Goose Book of Rhymes and Songs) (New York 1910) ; Forbes, E. E., (Favorites of a Nursery of 70 Years Ago) (Boston 1917) ; Gomme, A. B., traditional Games of England, Scotland and Ireland) (London 1894) ; Had- don, A. C., (The Study of Man) (New York 1898) ; Halliwell-Phillips, J. O., the Nursery

Rhymes of England) (London 1842) ; Halsey, R. V., (Forgotten Books of the American Nursery) (Boston 1911); Lang, A., the Nursery Rhyme Book) (London and New York 1897) ; Newell, W. W., Carnes and Songs of American Children } (New York 1903) ; Orr, M. S., (Mother Goose Pictured> (Philadelphia 1915) ; Perkins and Woodroffe, (Mother Goose Rhymes and Tunes) (pictured, New York 1914) ; Saintsbury, G., (National Rhymes of the Nursery) (London) ; Whitmore, W. H., the Original Mother Goose's Melody) (Boston

1892).

John Hubert Cornyn, Birmingham Southern College.

NUS, Eugene, e-zhen nits, French drama¬

tist: b. Chalons-sur-Saone, France, 1816; d. 1894. He was an ardent Socialist, and his first success as a dramatist was with his (Jacques]e Corsaire) (1844). Among his works are (L'En- seignement mutueP (with Desnover, 1846) ; (Le Vicaire de Wakefield) (1849); (La tour de Londres11 (with Brot and Lemaitre, 1855), all dramas; and (Les dogmes nouveaux) (1861); (La republique naturaliste5 (1862); (Lettre a Emile Zola) (1879) ; Choses de l'autre Monde) (1880); (Ala recherche des destinees) (1891); (Vivisection du Catholi-

cisme) (1894), etc.

NUSHAGAK (noo'sha-gak) BAY, Alaska,

practically an extension of Bristol Bay. It is noted for its salmon fisheries. The annual catch varies from nearly 3,000,000 to 6,100ˆ000. Since 1907 the government has protected the tributary streams, Nushagalc and Wood, the spawning-grounds of the salmon. The native settlements of Chogiung, Nushagak and Ka- nakanak are situated on the shores of Nusha¬ gak Bay and all are provided with government schools.

NUSKU, noos'koo, in Assyrian mythology, a solar deity who afterward became a fire god. He was regarded as a messenger of the gods.

NUSLE, noos'lye, Austria, town in the Crownland of Bohemia, the southeastern sub¬ urb of Prague. A castle and park are the chief features. Candles, soap and cocoa-fibre mats are produced here. Pop., including the village of Pankratz, 53,000.

NUSSBAUM, noos'bowm, Johann Nepo- muk, German surgeon : b. Munich, Bavaria, 2 Sept. 1829; d. there, 31 Oct. 1890. He studied in Munich, Wurzburg, Berlin and Paris, and in 1860 became professor at the LTniversity of Munich. He published (Die Pathologie und Therapie der Ankylosen) (1862) ; (Die Verletz- ungen des Unterleibs) (1880); (Ueber Chloro- formwirkung) (1885), etc.

NUT, noot, in Egyptian mythology, the goddess of the sky, wife of Keb, the god of earth.

NUT, a piece of metal tapped and adapted to be screwed on the end of a butt. It is used for many purposes, but especially on the end of a screw-bolt,

in order to keep it firmly in its place.

NUT BROWN MAID, The, an old Eng¬ lish ballad, the earliest extant form of which is found in Arnolde's eliques series 2, book i, 6.

NUT-GALL, a hard, nut-like gall (q.v.), especially those from the Asiatic oaks, used in ink-making and for other purposes. The Chi¬ nese and Japanese nut-galls of commerce, how¬ ever, are from species of Rhus, and are large and very irregular in form. They contain from 30 to 60 per cent of tannin, and are the source of gallic acid (QH23COOH) which ap¬ pears in white silky needles, soluble in alcohol, less so in ether and sparingly soluble in cold water; it is precipitated blue-black by ferric salts, the color disappearing on boiling, and is not affected by gelatine, except in the presence of gum. Consult Maisch, (Materia Medica> (2d ed,, 1885).

NUT-GRASS, or CHUFA, a sedge of the genus Cyperus, especially C. esculentus, of the Eastern and Southern States, whose root-stocks bear small tubers, like nuts, which are edible to man, and of good flavor when roasted, and which are highly nutritious to hogs who eagerly search for them. Consequently these sedges are planted in some parts of the country as a food-crop for swine. An oil may be expressed from these tubers, or Aground-almonds,® which is an excellent substitute for olive-oil for table use.

NUT-LOCK, a means for fastening a bolt- nut in place preventing its becoming loose by the jarring or tremulous motion of the ma¬ chinery. Such are used upon fish-plates of rail¬ ways, upon harvesters, etc.

NUT-WEEVIL, a snout-beetle of the ge¬ nus Balaninus, which deposits an egg in the kernel of a nut, when it is young, where the egg hatches and the grub feeds until the kernel is destroyed, when it bores its way out through the shell. Several species infest the various commercial nuts.

NUTATION, a slight change in the direc¬ tion of the earth's axis produced by the same cause as the precession of the equinoxes, namely, the attraction of the sun and moon upon the equatorial protuberances of the earth. If the orbits of the earth and moon were cir¬ cular and in the same plane, the motion of precession, which consists in a slight revolution of the direction of the earth's axis in a period of about 266 years, would be regular and uni¬ form. But, owing to the inclination of the orbits, and the revolution of the moon's node, the real direction of the axis of the earth re¬ volves in a small circle around its mean di¬ rection in a period the

same as that of the moon's node, namely — 18.6 years. Bradley discovered and explained nutation not long after his discovery of the aberration of the fixed stars.

NUTATION IN PLANTS. The word comes from the Latin nutatiu, a nodding, and in pathology is defined as <(a constant _ nodding or oscillation of the head by which it moves involuntarily in one or more directions.® The word has a more extended meaning in plant life for it defines the various movements exe¬ cuted by organs — such as stems, leaves, roots and tendrils by which the organ is inclined suc¬ cessively in various directions. Nutation is due to the unequal rate of growth on different sides of the organ. Nutation is, therefore, one of the problems of growth as well as of move¬ ment, Sachs, in 1873, restricted the term nuta¬ tion to the movements of the apex produced by

growth. Frank had previously (1868) applied it to growth movements which result from ex¬ ternal influences. Baranetzky (1883) associ¬ ated circumnutation with the influence of grav¬ ity and Darwin (1880) asserted that ((circum- nutation is universal in all growing organs.® Nutation is one of the problems of the move¬ ments of plants (phytodynamics) upon which botanists and physiologists are engaged, for phytodynamics is one of the most important foundations of vegetable physiology. Consult Sachs' (History of Botany, > trans. by Garnsey and Balfour (Oxford 1890), pp. 535-563; Green, J. R., (A History of Botany, > continuation of Sachs (Oxford 1909), pp. 445M-57).

NUTCRACKER, the English name of a species of crow (Nucifraga caryocatactes) found ranging over a wide area in the pine forests of northern and sub-Alpine Europe and Asia. It is dull brown, thickly speckled with white spots and is about the size of a jay. The nutcracker is gregarious, wandering in bands of 50 or 100 in the autumn, but scattering to re¬ mote regions and becoming silent during the breeding season. Its chief food is nuts and seeds of conifers. It is said to hold nuts and cones with its foot and to extract the kernels by repeated blows of the bill.

A closely related American bird is Clark's crow (Picicorvus columbianus) , discovered by the Lewis and Clark expedition in 1804—06. It is about one foot long, of a generally gray color, the wings and tail black with large white areas. It inhabits the coniferous belt of the Rocky Mountain slopes and congregates in great flocks, which rove in search of food. The well-concealed nest is built in the tops of pine trees in the highest mountain ranges. Con¬ sult Coues, (Birds of the ■ Northwest (1874).*

NUTHATCHES, small passerine birds forming the family Sittidce, related to the tit¬ mice, from which, and from the creepers, they are readily

distinguished by the long, straight, slender bill. The typical genus (Sitta), with about 15 species, is confined to North America, Europe and Asia, but some related genera are found in the southern hemisphere. In the United States we have four species and several sub-species. The common resident eastern species (S . carolinensis) is nearly six inches long and has the under parts white, but is blue on top, and has a green-back crown. The red-bellied nuthatch (S', canadensis) is an inch shorter, with the under parts rusty brown and the glossy black cap cut by a pure white stripe on each side. This is a migrant species, which breeds in the Northern States and Canada and on mountain tops, but in winter extends its range to the Gulf Coast. Two still smaller species, the brown-headed nuthatch (S . pusilla) and the pigmy nuthatch (S . pygmcea), are re¬ spectively southern and far western. Both have the crown brown, not black, as in the other two species, and N. pygmcea, which is only four inches long, may be distinguished by the black and white markings on the middle tail-feathers, which are plain in S. pusilla. The habits of all are similar. They spend their time in traveling restlessly up and down the trunks and limbs of trees in the most nimble manner, hanging in any attitude supported 'by their strong, large feet alone and without the assistance of the tail. Consequently they display greater freedom of movement than either the woodpeckers or the

creepers. Their food consists chiefly of insects and their eggs. In the autumn and winter they have the habit of wedging acorns and nuts firmly in crevices, and hacking them with the bill till they break open; this is done partly for the kernels and partly for the grubs which they frequently contain. From this habit the com¬ mon name is derived. Their only note is a hoarse call. They nest in holes in trees, often in crevices beneath bark, and lay four to eight speckled eggs.

NUTLEY, N. J., town in Essex County, five miles north of Newark and eight miles south of Paterson. The town was settled in 1680 and has several picturesque old colonial Dutch stone houses. Nutley was included in the Newark Patent of 1713 and when the town¬ ships were formed it became part of Bloom¬ field in 1812, part of Belleville in 1874, was formed into the Franklin township in 1882 and finally in 1902ˆ it was incorporated as the town of Nutley. Nutley is practically a residential suburb of New York and contains many hand- someˆ houses. It possesses a Carnegie library, the Nutley School and an attractive high-school building. The chief industries are paper and woolen mills. In 1912 the commission form of government was adopted. Pop. (1920) 9,421.

NUTMEG, the hard kernel of the fruit of various species of Myristica, especially M. frag- rans or moschata, of the order Myristicacece. The common nutmeg tree grows about 25 feet high, bears oblong, entire leaves, axillary ra¬ cemes of small flowers, followed by golden yel¬ low pear-shaped fruits which split in halves, ex¬ posing the kernel surrounded by a false aril which forms the mace (q.v.) of commerce. The fleshy halves of the fruit are used as pre¬ serves in countries where the trees are culti¬ vated. Various species are cultivated in the tropics, particularly the East Indies, West In¬ dies and Brazil. They are among the most im¬ portant spices as which they are chiefly used. A fatty oil called oil of mace is expressed from the seed, and a nearly colorless essential oil is obtained by distillation. The tree thrives in the West Indies up to elevations of 2,000 feet, but is less productive there than at lower alti¬ tudes. It does best in a well-drained, rich loam, in warm, protected valleys.

NUTMEG-BIRD, a name among bird- dealers for an East Indian mynas (Munia un- aulata), also known as cowry-bird; it is brown, with white streaks above and spots below, a yellow rump and a white middle to the under parts. An Eastern fruit pigeon (genus Myristi- civora) is also so called, because it feeds upon the nutmeg fruit.

NUTMEG MELON. See Melons.

NUTMEG STATE, a popular name for the State of Connecticut, derived from the al¬ leged ingenuity of Yankee inventors who were facetiously charged with manufacturing wooden nutmegs to be sold as genuine.

NUTRIA. See Coypu.

NUTRITION OF FARM ANIMALS, The. The common domestic animals are fed for a variety of purposes. With cattle, sheep and pigs it is the object to induce gains in weight, that is, to fatten them, or in the case of milch cows, to produce gains in the form of body secretion — milk, rather than fat on the

body. In a similar way, sheep are fed for the production of wool ; goats for milk or their fleece, and poultry for the market and the pro¬ duction of eggs. Cattle are sometimes, and horses are almost universally, fed as beasts of burden. Animals with young require food for their development and after birth the young ani¬ mal needs it for growth and the development of the body as well as for maintenance.

A great deal of information regarding food requirements has accumulated from the experi¬ ence of countless generations and for many years the problem has been studied experiment¬ ally at agricultural colleges, experiment stations and similar institutions, in this and other coun¬ tries. It is fair to say, at the present time, that the feeding of farm animals rests upon quite well-defined general principles, derived from the studies of the chemist and the animal physi¬ ologist, concerning the composition and func¬ tions of food and the way it is utilized after it is eaten. Such studies show that the materials composing the body are constantly breaking down and being consumed and that to keep the animal in a healthy and vigorous condition re¬ quires a constant supply of new material ; if this is lacking or is insufficient, hunger and finally death result. To supply the needed ma¬ terials for growth, maintenance and repair is one of the chief functions of food, but in addi¬ tion to this it maintains body temperature and also furnishes the force or energy which en¬ ables the animal to do work, including that per¬ taining to the necessary functions of the body, such as keeping up the beating of the heart, the respiratory movements and so on. Since it furnishes heat and energy, the food may be said to serve as fuel. If, in addition to main¬ taining the system, growth is made, as in case of a young animal, or milk is secreted, more food is _ needed than for maintenance. If the supply is in excess of all demands, some is stored as a reserve material, principally in the form of fat. To supply food in the right pro¬ portions to meet the various requirements without waste, constitutes scientific feeding. By carefully studying the composition of feed- ing-'S tuffs, the proportion in which they are di¬ gested find the requirements of different ani¬ mals when at rest, at work, producing wool, giving milk, etc., the principles of feeding have been deduced. In. applying these in practice, the cost and special adaptations of different feeding-stuff s must also be taken into account.

The animal body and the different feeding- stuffs which nourish it are all made up of a comparatively few chemical compounds, namely water, ash or mineral matter, and the so-called nutrients, protein, fats and carbohydrates, the carbohydrates being subdivided into "two groups namely, ˆnitrogen free extract, » that is, sugars' starches, etc., and «crude fibre.» Of these pro¬ tein is the only nutrient which supplies nitro¬ gen the characteristic element of body tissue in the right form, and is, therefore, the only one which can truly serve for building and re¬ pairing the flesh and other nitrogen containing portions of the animal body. Mineral sub¬ stances are also essential for tissue building as well as other purposes. Fats and carbohydrates serve as fuel and yield energy in the forms of neat and muscular power. Protein may also serve as a source of energy and thus has a two¬ fold function.

Water.— – Water, though not a nutrient, is essential, being needed to dilute the blood and for other physiological purposes. All animals also require oxygen of the air for maintaining the life processes. Water constitutes from 40 to 60 per cent and ash from 2 to 5 per cent of the body; fat varies greatly with the condition of the animal, but seldom falls below 6 or rises above 30 per cent. The dry matter of the flesh, skin, bones, muscles, internal organs, brain and nerves, in short, all the working ma¬ chinery of the body, is composed quite largely of protein.

Accessory Substances.— Recent investiga¬ tions have indicated that in addition to the fore¬ going ingredients there are present in feeding- stuffs minute quantities of other substances, va¬ riously known as (

ally plentiful in the leafy portions of plants, and rations containing such materials as pas¬ turage clover hay, alfalfa hay, corn fodder or corn silage are comparatively unlikely to prove deficient in this respect. See Nutrition of Man for more extended discussion of nutrients.

Character of Food. — The feeding-stuffs of most importance for farm animals are of vege¬ table origin and include cereal grains, such as oats and corn, either ground or unground, and the milling by-products, such as middlings and bran ; leguminous seeds, as beans, peas and cow- peas ; oil cakes and other commercial by-prod¬ ucts, as linseed-oil cake, cotton-seed meal, glu¬ ten feed and so on; fodder crops, fresh and cured ; and the different roots, tubers and green vegetables. In quite recent times, cane mo¬ lasses, beet molasses and other beet-sugar by¬ products have also assumed more or less import¬ ance in this connection. As regards feeding- stuffs of

animal origin, milk is the natural food of the young of all mammals. After weaning, skim-milk is a common food, especially for pigs. Dried blood, meat meal and similar feeds of animal origin are also sometimes fed. The composition of a number of the more important feeding-stuffs may be seen by reference to the subjoined table, which shows the average com¬ position as determined by analysis and also the digestible nutrients furnished by each 100 pounds of the feeding-stuffs.

It will be seen that the cereal grains resem-

Table I. — Average Composition of a Number of Feeding-Stuffs.

KIND OF FEED

Percentage composition

Digestible materials in

100 pounds

Energy

in

100 lbs. digestible nutrients

Water

Protein

Fat

Nitrogen

free

extract

Crude

fibre

Ash

Protein

Fat

Carbo¬

hydrates

Per cent

Per cent

Per cent

Per cent

Per cent

Per cent

Lbs.

Lbs.

Lbs.

Calories

Corn fodder .

79.3

1.8

0.5

12.2

5.0

1.2

1.10

0.37

12.08

26,080

Kafir corn fodder .

73.9

2.3

0.7

15.1

6.9

2.0

0.87

0.43

13.80

29 , 100

Oat fodder .

62.2

3.4

1.4

19.3

11.2

2.5

2.44

0.97

17.99

42,090

Meadow fescue .

69.9

2.4

0.8

14.3

10.8

1.8

1.49

0.42

16.78

34,760

Timothy .

61.6

3. 1

1.2

20.2

11.8

2.1

2.01

0.64

21.22

45,910

Kentucky blue grass. . .

65.1

4. 1

1.3

17.6

9.1

2.8

2.66

0.69

17.78

40,930

Red clover . .

70.8

4.4

1.1

13.5

8.1

2.1

3.07

0.69

14.82

36,190

Alfalfa .

71.8

4.8

1.0

12.3

7.4

2.7

3.89

0.41

11.20

29 , 800

Cowpea, forage .

83.6

2.4

0.4

7.1

4.8

1.7

1.68

0.25

8.08

19,210

Corn silage .

74.4

2.2

1.1

15.0

5.8

1.5

1.21

0.88

14.56

33,050

Corn fodder, field cured.

42.2

4.5

1.6

34. 7

14.3

2.7

2.34

1.15

32.34

69,360

Oat hay .

16.0

7.4

2.7

40.6

27.2

6. 1

4.07

1.67

33.35

76,650

Timothy hay .

13.2

5.9

2.5

45.0

29.0

4.4

2.89

1.43

43.72

92,730

Hay from mixed grasses.

15.3

7.4

2.5

42.1

27.2

5.5

4.22

1.33

43.26

93,930

Red clover hay .

15.3

12.3

3.3

38. 1

24.8

6.2

7.36

1.81

38. 15

92,320

Alfalfa hay .

8.4

14.3

2.2

42.7

25.0

7.4

10.58

1.38

37.33

94,940

Cowpea hay .

10. 7

16.6

2.9

42.2

20. 1

7.5

10.79

1.51

38.40

97,870

Mangel wurzels .

91.2

1.4

0.2

5.4

0.8

1.0

1.03

0 11

5.65

12,890

T urnips .

90.6

1.3

0.2

5.9

1.2

0.8

0.81

0.11

6.46

13,990

Corn, underground ….

10.9

10.5

5.4

69.6

2.1

1.5

7.14

4.97

66.12

157,220

Oats .

11.0

11.8

5.0

59.7

9.5

3.0

9.25

4. 18

48.34

124,760

Wheat .

10.5

11.9

2.1

71.9

1.8

1.8

10.23

1.68

69.21

154,850

Cowpeas .

14.8

20.8

1.4

55.7

4.1

3.2

18.30

1.10

54.20

139,490

Corn meal .

15.0

9.2

3.8

68.9

1.9

1.4

6.26

3.50

65 . 26

147,800

Gluten meal .

8.6

30.0

8.8

49.2

2.6

0.8

21.56

11.87

43.02

170,210

Gluten feed .

7.8

23.4

8.3

53.2

6.2

1.1

19.95

5.35

54.22

160,530

Brewers' grains, dried . .

8.0

24. 1

6.7

44.8

13.0

3.4

19.04

6.03

31.79

119,990

Wheat bran .

11.9

15.4

4.0

53 9

9.0

5.8

12.01

2.87

41.23

111,140

Wheat middlings .

12.1

15.6

4.0

60.4

4.6

3.3

12.79

3.40

53. 15

137,000

Cotton-seed meal .

8.2

42.3

13.1

23.6

5.6

7.2

37.01

12.58

16.52

152,650

Cotton-seed hulls .

11.1

4.2

2.2

33.4

46.3

2.8

1.05

1.89

32.21

.69,840

Linseed meal, new proc-

ess .

9.9

35.9

3.0

36.8

8.8

5.6

30.59

2.90

38.72

141,160

Sugar-beet pulp, fresh . .

89.9

1.0

0.2

6.3

2.2

0.4

0.63

7.12

14,420

Sugar-beet pulp, dry. .

6.4

10.8

1.3

58.4

19.8

3.3

6.80

65.49

134,460

25 7

a 7 3

658.2

8.8

7.30

58.20

259 180

UCGl PUgdi 1IIUICIDOV3. . . .

25 1

a2 . 4

669.3

3.2

3.20

69.30

298 300

Whole milk

87.2

3.6

3.7

4.9

0.7

3.48

3.70

4.77

30,870

Skim milk .

90.6

3.2

0.3

5.2

0.7

2.94

0.29

5.24

16,439

a Largely non-albuminoirl nitrogenous materials. b Very largely sugars.

ble one another quite closely in composition, being characterized by a fairly low water con¬ tent and a considerable amount of protein and nitrogen-free extraot. Some crude fibre derived largely from the outer or bran layer of the grain is also present. Bran, shorts, middlings and other by-products and cereal grains vary in composition, but all have a low water content while the crude fibre content is rather high, and the nutritive ingredients are principally pro¬ tein and carbohydrates. The large proportion of crude fibre is due to the fact that these prod¬ ucts represent the outer layers of the grain, which are more hard and firm in structure than the interior portion which consists quite largely of starch. Beans, peas and leguminous seeds resemble the cereal grains in having a low water content, though in general they furnish a higher percentage of protein. Such foods are known to be useful and valuable, but with the possible exception of cowpeas, they are not very com¬ monly fed in the United States, although much used in Europe.

Concentrated Feeds. — The various cakes, gluten meals and similar

feeding-stuffs are, generally speaking, commercial by-products. Thus, cotton-seed cake is the material left after the oil has been expressed from the cotton seed. In the same way linseed cake is the residue ob¬ tained from flaxseed in the manufacture of linseed oil. When these are ground they be¬ come cotton-seed meal and linseed meal. In the manufacture of beer the malted grain re¬ maining is known as brewers' grains, and is best fed after drying. When starch is manu¬ factured from corn, the nitrogenous portion of the grain is rejected and constitutes gluten feed and gluten meal. There are a number of mixed feeds on the market which are made up of shrunken grains, branny material and other resi¬ dues obtained in the manufacture of cereal breakfast foods, etc. These vary in feeding value, some of them comparing favorably with more common cereal feeds. Grain, ground and unground, commercial by-products, leguminous seeds, oil cakes and similar products are very frequently called concentrated feeds, the name being suggested by the fact that their feeding value, especially the protein content, is high in comparison with the bulk. So far as the gen¬ eral experience and the result of American and foreign experiments go, most of the common feeding-stuffs in the group are wholesome and valuable.

Forage Crops. — The various forage crops — grass, clover, Kafir corn, corn, etc., all have a high water content when fresh, that is, they are more or less succulent and juicy. They contain, however, considerable nutritive mate¬ rial, chiefly protein and carbohydrates, and are valuable feeding-stuffs. The leguminous forage crops — alfalfa, clover, cowpeas, soy beans, vetch, etc.— are richer in protein than the grasses. When forage crops are dried and cured the resulting hay is richer in proportion to its bulk than the green material ; in other words, it has been concentrated by the evapora¬ tion of the greater part of the water present. However, this is not the only change which has taken place. When hay is properly cured, it undergoes a peculiar sort of fermentation or oxidation materially affecting its composition.

improving the hay by diminishing the quantity of crude fibre and by increasing the relative amount of other nutrients, especially nitrogen- free extract. Hay which has undergone proper curing has a better flavor and agrees better with animals and is apparently more digestible than hay which has dried quickly in the sun without fermentation.

The feeding value of different forage crops, fresh and cured, depends in considerable degree upon the stage of growth, the nutritive value of the crop, generally speaking, increasing until the growth is complete and diminishing some¬ what as the plants mature or become overripe. Straw, the fully ripened stalk of cereal grains, contains some nutritive material, but is less nutritious than the same portion of the plant cut before ripening.

In the perfectly ripe con¬ dition the nutritive material, elaborated in dif¬ ferent portions of the ordinary forage plants, has been largely conveyed to the seed and used for its development or stored as reserve mate¬ rial. Young animals get needed mineral mat¬ ter from milk. Later forage crops, fresh and cured, are important sources of mineral matter, indispensable for growth, development and health.

Silage . — 1 Green forage crops are frequently preserved by ensiling. In this process the ma¬ terial undergoes a peculiar oxidation which cor¬ respondingly changes it in composition and food value. Some of the carbohydrates are changed into alcohol, acetic and other acids, and crude fibre is undoubtedly softened somewhat, and possibly the silage is thus rendered more di¬ gestible. Bodies having peculiar flavor and odor are also formed. By far the most im¬ portant crop ensiled is corn, but various sor¬ ghums are also satisfactorily used. Green cereals are less satisfactory, but some of the legumes may be employed, as well as such materials as beet pulp, beet tops, refuse from pea canneries, etc.

Roughage. — The green crops, hay, straw and other cured crops and silage, are frequently called <(coarse fodder® or <(roughage.® This term is due to the fact that they contain a com¬ paratively small amount of nutritive material and a high proportion of crude fibre as com¬ pared with their total bulk. Although pound for pound inferior to concentrated feeds in composition, they are an essential part of the ration of farm animals, capable of producing a large part of the total food material, as well as serving to give the required bulk to the food and being useful in other ways, among them their richness in the (

The outcome of many experiments made with farm animals is in accord with the observa¬ tion of careful feeders : namely, that the various common coarse fodders may be fed very largely as circumstances demand. Although timothy hay is still regarded, in some regions, and corn fodder in others, as the best coarse feed, yet ex¬ perience has shown that both these feeds, corn silage, and also hays from the cereal grains and from clover and alfalfa, are all of great value.

Fiesh herbage was, of course, the original food oi domestic animals, and in .early times natural pastui age was almost entirely depended upon to support them during a considerable part of the year The importance of pasturage is still conceded, but the fart is also recognized that it, owing to drought or other cause, the supply is insufficient, other food will be needed.

When green food is cut and fed fresh to farm animals, more or less confined, the practice is called ‘^soiling,® and is becoming quite prevalent, espe¬ cially in older countries where land is expensive. Partial soiling is much more common, being re¬ lied upon to carry animals through the period when pastures are short. Under the soiling system, a larger number of animals can be kept upon a given acreage, and by allowing open air exercise in a large yard or pasture, the practice has been demonstrated as entirely feas¬ ible for dairying animals. On an average, car¬ rots, Swedish turnips or rutabagas and other roots and tubers, green vegetables and fruits contain a high percentage of water and small amounts of the different classes of nutrients. 1 he percentage of crude fibre is smaller than in the green forage crops ; but since the proportion of nutritive material is small in comparison with the total bulk, they are ordinarily referred to as coarse fodder. The establishment of beet- sugar factories in this country has led to the production of immense quantities of sugar-beet pulp as a waste material, sometimes called ((dif- fusion residue,® or «beet chips,® which consist of the residue of the beet after the extraction of the sugar under pressure in the diffusion bat¬ teries. This is used as feed. Sugar-beet mo¬ lasses is another product of the beet-sugar manufacture which accumulates in large quan¬ tities, and both this and cane molasses are com¬ ing to be regarded as an important feed. It owes its value largely to the sugar in it.

Preparing Feed.— It is often claimed that cooking feed increases its palatability and di¬ gestibility. The general opinion drawn from experiments with farm animals is that this be¬ lief is not warranted and that the cost of cook¬ ing is not made up for by the increased value of the ration. Soaking feed, especially hard grain, renders it more easily masticated, and possibly increases its digestibility, but the gen¬ eral conclusion is that the importance of soak¬ ing feed for most farm animals is overesti¬ mated. Opinions differ as regards the advan¬ tages of grinding grain, but from the results obtained in a large number of tests with farm animals it does not appear that the superiority of ground over unground grain is sufficient to pay for the cost of grinding, provided the ani¬ mals have good teeth and sufficient time to chew their food thoroughly. Chaffed or chopped coarse fodder occupies less space for storage than uncut hay or straw and can be readily handled. Shredding corn fodder is a useful practice, and more of the stalks and harder por¬ tions will be eaten than when fed whole, but for most farm animals in general the practice of cutting or chopping coarse fodder is much less followed in the United States than in Europe. Precaution should always be taken to avoid feeding-stuffs which are harmful in themselves or which become harmful. Dirt, small stones, etc., should be removed from grain by proper screening and all feeding-stuffs should be clean. Moldy feeds and those which are more or less vol. 20 — 33

decomposed are unwholesome and may prove a cause of various diseases. Plants which are infested with ergot are also harmful. There are a number of plants which are poisonous to stock, such as rattlebox (Crotalaria sagittalis), loco weeds (Astragalus sps.), larkspur (Del¬ phinium sps.) , death camas (Zygadenus venen- osus), water hemlock (Cicuta sp.), etc., and care should be taken to prevent animals from securing them. An explanation of the poison¬ ing of stock by young sorghum and other green plants ordinarily wholesome is offered by the discovery of a peculiar glucosid, which with the aid of a special ferment, also present in the plants, liberates prussic acid. This is doubtless always present in at least minute traces, but apparently becomes dangerous when the plant is arrested in dry weather at certain stages of i ts growth. Sunlight such as prevails in the arid and semi-arid regions of the United States sometimes causes the development of the poison in excess.

Digestibility of Feeds.— The real value of any feeding-stuff is determined not alone by its composition, but also by its digestibility; that is, by the amount of material which it gives up to the body in its passage through the di¬ gestive tract. It is evident that if two feeding- stuffs have practically the same composition, but one gives up more material to the body than the other — that is, is more thoroughly digested — it must actually be more valuable than the other material. The bulk of the substance of almost all feeding-stuffs is insoluble when eaten or not in the right condition for body use. Material in solution can pass through the walls of the stomach and intestines into the circulation and be utilized by the body; there¬ fore, digestibility consists chiefly in rendering insoluble materials soluble. This is effected by the aid of digestive ferments and also to a less extent by bacteria. The usual method of ascertaining the digestibility of a given ma¬ terial is to feed it for a longer or shorter time, the amount and composition being determined. From the total nutrients consumed, the amounts excreted undigested in the faeces are deducted, showing the amount of each retained in the body. It is the usual custom to express the amounts digested in percentages, the results thus obtained being termed coefficients of digestibil¬ ity. As regards the results of digestion experi¬ ments with farm animals as a whole, it may be said that the percentage of protein digested is fairly high, being greater in grains and seeds than in hay or grasses. Generally speaking, the value obtained for the digestibility of fat is rather low, but there are reasons connected with the. analytical methods commonly followed which render, the results obtained with fat not altogether satisfactory. Nitrogen-free extract is quite thoroughly digested by farm animals, but crude fibre is much less thoroughly assimilated. Farm animals differ considerably as regards the thoroughness with which they digest their foods. It seems fair to say that, in general, ruminants digest a larger percentage of fats and carbohydrates, including crude fibre, than

horses, the difference being most marked in. the case of the crude fibre. Pigs ordinarily digest their food quite thoroughly. These results are in accord with what might be expected from differences in the digestive organs of the different classes or animals.

Food Requirements. — Attempts have been made to ascertain the food requirements of various kinds of farm animals under different circumstances, and large numbers of feeding ex¬ periments have been made under varying con¬ ditions with this end in view. From the results various feeding standards have been deducted which attempt to show the amounts of digestible protein, fat and carbohydrates supposed to be best adapted to different animals when kept for different purposes.

The feeding standards prepared by Wolff, a German investigator in animal nutrition, as well as their energy requirements, were for¬ merly he most widely used of any. Wolff's standards have been modified by Lehmann, as the result of additional experiments and prac¬ tical experience, and also in the attemnt to adapt them more closely to the practical needs of the animal. A number of these standards are as follows:

statement of the amounts of the 'different nutri¬ ents required by. animals, as indicated by the results of experiments and observation, and are intended to apply to the average conditions. No single standard can be laid down for all condi¬ tions, nor need a standard be adhered to arbi¬ trarily. Good judgment and intelligent observa¬ tion on the part of the feeder are also necessary.

The value of any ration which may be deter¬ mined upon may be calculated with the aid of the feeding standard and the figures in Table I. Suppose four pounds of oats constitute one of the ingredients of a ration. According to the table, it is evident that if 100 pounds of oats furnish 9.25 pounds of digestible protein, one pound will furnish .0925, and four pounds will furnish .37000. In the same way, if 100 pounds of oats supply 124,760 calories of energy, one pound will furnish 1247.60 calories and fo'ur pounds will furnish 4990.40. . The sums of the protein supplied by all the feeds show the

Table II. — Wolff-Lehmann Feeding Standards.

(Amounts of nutrients required per day per 1,000 pounds live weight)

Total

Digestible nutrients

ANIMAL

dry

matter

Protein

hydrates

Carbo¬

hydrates

Fat

Fuel value

Pounds

Pounds

Pounds

Pounds

Calories

Oxen at medium work .

25

2.0

11.5

0.5

27 , 200

Oxen at heavy work .

Fattening cattle:

28

2.8

13.0

0.8

32,760

First period .

30

2.5

15.0

0.5

34,650

Second period .

30

3.0

14.5

0.7

35 . 500

Third period .

Milch cows:

26

\

2.7

15.0

0.7

35 , 900

Giving 1 1 pounds milk per day .

25

1.6

10.0

0.3

22,850

Giving 16.5 pounds milk per day .

27

2.0

11.0

0.4

25 , 850

Giving 27.5 pounds milk per day .

Fattening sheep:

32

3.3

13.0

0.8

33 , 700

First period .

30

3.0

15.0

0.5

35 , 600

Second period .

Horses:

28

3.5

14.5

0.6

36,000

Light work . . .

20

1.5

9.5

0.4

22,150

Medium work . .

24

2.0

11.0

0.6

26 , 700

Heavy work .

Fattening swine:

26

2.5

13.3

0.8

32,750

First period .

36

4.5

25.0

0.7

57,800

Second period .

32

4.0

24.0

0.5

54,200

Third period .

25

2.7

18.0

0.4

40 i 200

Recent investigations of the experiment stations of this and other countries have shown that in some respects these standards, which are still much used, are inaccurate, and extensive modifications, calling especially for less protein, have been proposed by Henry and Morrison. Other standards, based on determinations of net energy values, have been proposed by Armsby for several kinds of livestock, and by Bull and Emmett for fattening

lambs. In Den¬ mark and other Scandinavian countries what is known as the (

It should be borne in mind that the feeding standards are simply a concise and approximate

total amount in the ration, and so on, with all the other nutrients, and with the energy. In making such calculations, it is a common prac¬ tice to consider only the protein and energy value since these factors show features of the food best understood and the calculation is somewhat simplified without materially lessen¬ ing the value of the results. Too little is known as yet to warrant similar calculation for mineral substances and vitamins. It is believed that well-chosen rations as regards protein and energy will supply these needs also. It is not necessary that a ration should furnish each day the exact amount called for by a standard, but rather that it should approximate it through long periods, a slight deficiency at one time being made up by a corresponding excess at another.

In calculating rations it is essential that weights be used rather than measures. It is often inconvenient to weigh the grains, but the weight may be calculated with sufficient ac-

curacy by the figures given beiow, which show the weight of a quart of a number of common feeding-stuffs.

Some of these materials, especially by-prod¬ ucts like wheat bran, vary considerably in weight, and the given figures cannot be re¬ garded as strictly accurate. Weighing is, of course, always the safer way where it is desired to feed quite definite amounts. In selecting feeding-stuffs for his stock, the farmer will naturally be governed by the conditions of the market. The cost of feeding-stuffs is controlled by other factors than the actual amounts of food materials which they contain ; indeed, there often appears to be very little connection be¬ tween the two. Bearing in mind that the pro¬ tein is the most expensive ingredient, and the one especially sought in concentrated feeds, the farmer can make his selection with the aid of such data as are given in Table I. Of course, the special adaptability of some materials to different kinds of animals and different pur¬ poses will also be taken into account.

Weight of Feeding-Stuffs per Quart.

lbs. oz.

Com, cracked . 1 12

Com meal . 1 8

Corn-and-cob-meal . 1 6

Oats, whole . . . 1 ....

Oats, ground 12

Wheat, whole . i 14

Wheat bran 10

Wheat bran, coarse 8

Wheat middlings . 1 2

Wheat middlings, coarse 13

Gluten meal . 1 1 1

Gluten feed . 1 3

Linseed meal . 1 2

Cotton-seed meal . 1 8

Alfalfa meal 10

Sugar beet pulp, dry 10

Cocoanut cake . 1 5

Another important consideration where fer¬ tilizers or manures have to be relied upon is the manurial value of a feeding-stuff. If the manure is carefully preserved a large proportion of the fertilizing constituents of the feed is re¬ covered in the manure and goes to enrich the land. See Fertilizers.

With respect to some feeds — the coarser grain products, for instance — which could be eaten either by man or by farm animals, it should be borne in mind that their fertilizer value would commonly be lost in the former case and saved in the latter, since house sewage is seldom and farm manure generally used for fertilizer.

Feeding-Stuff Inspection. — About three- fourths of the States have passed

laws requir¬ ing that the composition of certain classes of feeding-stuffs be guaranteed by the manu¬ facturer, and providing an inspection of these goods to see that the guaranty is complied with. In most cases the laws require that each package be labeled to show the protein and fat content, and often the maximum content of fibre. These laws in general apply only to the so-called concentrated feeding-stuffs, especially the by-products and mixed feeds, and not the cereal grains sold as such. The inspection is usually in charge of the Agricultural Experi¬ ment Station or the State Department of Agriculture and is managed very similarly to the fertilizer inspection. The need for this inspection arises from the quite wide variation

in the composition of many of the Dy-products, the confusion of names, as in the case of the by-products from starch manufacture, the large number of mixed feeds which are pul upon the market under proprietary names, and the occasional tendency to mix with the material substances of inferior value. The feeding-stuff inspection protects the farmer from fraud in the same way as the fertilizer inspection, and gives him the benefit of a guaranteed com¬ position in buying. The result of this in¬ spection, which has been in operation a number of years, has been quite marked in driving inferior grades of goods, like adulterated cotton-seed meal, out of the market, and tend¬ ing to bring about greater uniformity in com¬ position in the case of standard by-products.

The Federal Food and Drugs Act of 1906 specifically includes in its scope the food of animals. It thus constitutes an additional safeguard against the adulteration or sophisti¬ cation of feeding-stuffs entering into interstate commerce.

Charles Ford Langworthy, Department of Agriculture , Washington, D. C.

NUTRITION OF MAN. The term nu¬ trition includes the sum of the processes by which an animal or plant absorbs and utilizes food substance. Te be properly nourished, man must be supplied at suitable intervals with the foods which will best serve to build the body, maintain it in health and permit of the per¬ formance of the necessary amount of work. Food may, therefore, be defined as the nu¬ tritive material taken into the body for the purpose of growth and repair and for the maintenance of the vital processes. The body may be likened to an intricate engine which has to be built, kept in repair, supplied with fuel and operated. Food serves all these func¬ tions in the working machine, and in the intelli¬ gent selection of human food no function must be neglected.

Composition of Food. — A study of foods shows that they are made up of a few chemical constituents, namely, protein, fat, carbohydrate and ash, together with more or less water and in some cases with minute amounts of

the newly-recognized vitamins. The first three of these constituents are organic compounds of carbon, hydrogen and oxygen, the proteins having in addition nitrogen, sulphur and oc¬ casionally other elements, such as phosphorus and iron. As regards the group protein the molecule is very complex and may vary within wide limits while still possessing certain com- • mon characteristics. It may be likened to a chain, longer or shorter, made of links which differ in number, kind or arrangement. There are 18 different kinds of links (amino acids) in most of the food proteins, but there are certain proteins which lack one, two or three kinds of links and are thus incomplete unless combined with others furnishing the lacking links. For convenience we may roughly divide the common proteins into two groups according to their make-up of amino acids. First, the complete proteins containing all essential amino acids, such as milk, eggs and meat, and certain vege¬ tables, such as soy beans and peanuts; second, incomplete proteins including most of the vegetable proteins.

The group fat includes the fat of meat, such

as suet and lard, the fat of milk (butter), and true vegetable fats and oils like olive, corn and cotton-seed oil. Associated with these are the fat-like substances or lipoids, such as the phospholipins and phosphatids of egg yolk and of active animal and vegetable tissues. As the fats and fat-like substances differ from the other constituents of food in being soluble in ether, the term (

The group carbohydrate includes the sugars, starches, pentosans, celluloses, crude fibre, and other bodies of a similar chemical structure, all of which can more or less readily be broken down into the simple sugars. The group is usually divided according to the analytical methods followed in estimating it into nitrogen free extract® and (

The group mineral matter includes the in¬ organic elements present in the form of salts or in combination with organic material in the juices and tissues of the different foods, the principal elements found being sodium, calcium, magnesium, iron, chlorine, fluorine, phosphorus and sulphur. The term <(ash constituents® is often and very appropriately used for this group, since the mineral matter represents the incombustible portion which remains when any given food is burned. The ash constituents are present to some extent in all foods, with the exception of a few such as refined sugar, purified oils and pure starches. The proportion is much greater in milk, vegetables and fruits than in other foodstuffs.

The group of vitamins, or accessory factors, is composed, according to present knowledge, of two as yet unidentified substances, one soluble in fat and commonly known as fat-soluble A and the other soluble in water and known as water-soluble B. The water-soluble substance is present in nearly all common foods. It is not found, however, at least appreciably, in polished rice, commercial starch, pure sugar or- in fat of either animal or vegetable origin. The fat-soluble substance is less widely distributed. It is found in the fats of milk, eggs and organs and in the green leaves of plants but is not found in seeds — save in or related to the germ — or in oils, such as olive oil and those from oil-bearing seeds, such as cotton seed. The occurrence of a third vitamin is claimed and the name water soluble suggested.

Water is present in practicallv all foods, predominating in fresh fruits and succulent vegetables.

Food as it is bought or even as served on the table contains more or less material which is not or cannot be eaten, such as the bones of meat and fish, the sheJls of eggs and the skins

and seeds of vegetables and fruits. In dis¬ cussing the chemical composition of foods, such portions are usually spoken of as refuse, but they form an important item when the actual cost of the nutrients of food is con¬ sidered.

Composition of the Body. — The human body is composed of the same general con¬ stituents as are the foods. Proteins are the most important constituents of body tissues, including the muscles and internal organs. Analyses of body tissues show that they are made up of the same links or amino acids as are the food proteins, but generally in a dif¬ ferent form of linkage, so that it is necessary that the chains which are supplied by the food should be more or less completely unlinked and recombined in new form. The fat in the human body is found in adipose tissue, around certain organs, and joined with protein in complex combinations of still unknown composition in cellular protoplasm. Carbohydrates are present as glycogen in the liver and muscles and cir¬ culating as sugar through the blood. Mineral matter is found in the skeletal structure and active protoplasm and in the body fluids. The vitamins are present in the secretions of the mammary glands and the fat-soluble form in the fat of the active organs. Water is present in the body tissues and fluids.

Digestion and Absorption of Foods. — The similarity in composition of foods and of the human body shows that one important function of food is to furnish the necessary materials for the building and repair of the body. The food materials are made ready for this purpose by the process of

digestion which consists in separating the useful portion of food from that useless to the body; breaking down complex substances into simpler forms, in dissolving and emulsifying and so making food capable of diffusion through the lining of the digestive tract This is accomplished with the aid of digestive ferments or enzyms which are contained in the saliva, in the gas¬ tric juice of the stomach, and in the pan¬ creatic juice of the intestines. 'The saliva has the power of changing starches into sugar. The gastric juice acts upon proteins and to a slight extent upon fats, and the pancreatic juice upon the proteins, fats and carbohy¬ drates. The chemical change involved is in all cases hydrolysis, that is, the addition of the ele¬ ments of water in such a way that simpler products are formed. Digestion is aided by the fine division of the food in chewing and by muscular contractions — the so-called peristaltic action of the stomach and intestine — which helps to mix the digestive juices and their enzyms with the food. The digested food passes through the walls of the alimentary canal into the blood. The heart pumps the blood containing the nutrients Qf the digested food and the oxygen which it gets in the lungs all ovfer the body, and thus the organs and tissues are supplied with the materials which they need for their particular functions.

The protein materials have been broken down during digestion into the separate lit\ks or (amino acids), or simple combination of links of which they were composed, and the tissues now select the necessary links and rearrargr them into new chains. The growth*

of protein tissues, muscles, liver, kidney, blood, etc., is obviously dependent upon the supply of the proper amount of the required ˆ links, otherwise the needed protein chains cannot be formed. The processes of daily life cause the breaking down of a cer¬ tain amount of the living tissue of the protein-lich type, and if the body is to be maintained this must be replaced or repaired from the protein which the food supplies. This renewal and repair process in the body tissue may be likened to replacing worn or broken links. The proper selection of food proteins thus involves the use of complete proteins or such a combination of incomplete proteins that the deficiencies of one are supplied by others.

The hydrolysis products of the fats are, upon absorption, recombined into neutral fat and pass from the blood into the tissues where a part, is transformed into tissue lipoid or enters into combination with proteins to form some of the chemically complex substances of cellular protoplasm, cell membrane, or the cen¬ tral nervous system. The greater part of the fat

is either used as fuel or stored for later use.

The simple sugars, which are the digestion products of carbohydrate, pass from the portal vein into the liver where they are temporarily stored as glycogen. This is given up gradually to the blood in the form of the simple sugar glucose, the content of which in the blood re¬ mains small and nearly constant. The glucose, which is thus carried to the muscles and other tissues by the blood, is partly converted into fat but to a large extent used as fuel.

The mineral matter is used as bone constitu¬ ents, giving rigidity and relative permanence to the skeletal tissues, as essential elements of the organic compounds which are the chief solid constituents of the soft tissues, and as soluble salts held in solution in the fluids of the body, furnishing the material for maintaining the elasticity and irritability of muscle and nerve, the acidity or alkalinity of digestive tissues and of secretions and the neutrality or slight alkalinity of the internal fluids.

The water present in the food is not a nutrient in the sense that it serves for building tissue or yielding energy, but it is essential, serving for carrying the food in the digestive processes, for diluting the blood and for many other physiological purposes.

The changes which the vitamins undergo and their exact function are not clearly under¬ stood, as their chemical nature is as yet un¬ known. A deficiency of fat-soluble A causes the failure of young animals to grow under otherwise suitable conditions, and its prolonged absence from the diet may lead to a peculiar eye disease, xerophthalmia. A deficiency of water-soluble B is the cause of the disease beri-beri, marked by a degeneration of the nervous tissues. A deficiency of a third vita¬ min, it is claimed leads to scurvy.

Fuel Value of Food. — The activities on which the life of the body depends involve a continuous expenditure of energy, and this energy is obtained by the oxidation of carbo¬ hydrate, fat and the non-nitrogenous fraction of protein, as in the form of digestion prod¬ ucts they circulate in the blood, meeting the oxygen taken in through the lungs. They repre¬

sent the fuel of the human engine, and their •calorific, or heat-producing, power, may be measured as accurately as that of coal or any other fuel by the use of an instrument known as the bomb calorimeter which measures the heat produced in the burning of a given amount of material by means of the rise in temperature of a known volume of water surrounding the bomb in which the combustion takes place. The result is expressed in calories, the amount of heat necessary to raise one kilogram of water one

degree Centigrade. One gram of carbohydrate or protein has been found to pro¬ duce four calories of heat, while the same amount of fat furnishes nine. If then the per¬ centage of each of these constituents in a given food is known, its fuel value can be easily cal¬ culated. The average composition of a num¬ ber of common foods and the energy which one pound will furnish when burned in the body are shown in Table I.

In the selection of a fuel there are other things to be considered than the ultimate heat which can be produced. The carbohydrates, particularly the sugars, may be likened to a quick-burning fuel, while the fats act as a more concentrated fuel, burning more slowly. Only the non-nitrogenous portion of protein is available for fuel, and this, together with the fact that a certain amount of protein is in¬ dispensable as building material, makes the use of it as a fuel expensive and extravagant. In the body all three are used in varying amounts, a shortage of one kind being made up within limits at least at the expense of others, and if there is a general shortage the body has to call upon its own tissues for fuel. Carbohydrate is burned in largest quantities, but for the sustained effort a certain amount of fat has been found necessary.

Digestibilty of Foods.— The digestion of food, the exercise of the functions of the vari¬ ous organs and the oxidation processes result in the formation of various excretory products. The parts of the food which escape digestion are periodically .given off by the intestines. Such solid excreta or feces include not only the particles of undigested food but also the so-called metabolic products, that is, residues of the digestive juices, bits of the lining of the alimentary canal, etc. Other excretory prod¬ ucts are the urine, respired air and perspiration. One of the most important considerations in fixing upon the value of any given food is its digestibility; in other words, the proportion of its nutritive ingredients which the body can retain and utilize. As frequently employed, the term digestibility has several other signifi¬ cations. Thus to many it conveys the idea that a particular food ˆagrees® with the user; in other words, that it does not cause distress when eaten. The term is also quite commonly understood to mean the ease or rapidity of digestion, and one food is called more digestible than another because it is digested more readily or in less time. However, the term digestibility, as most commonly used in scientific treatises, refers to the thoroughness of digestion. This can be calculated for the three organic constituents and ash by the analysis of the food consumed and of the resulting feces. The relation between the constituents of the food consumed and the corresponding con-

Table I. — Average Composition of Some Common American Food Products.

FOOD MATERIALS (AS PURCHASED)

Refuse

Beef, fresh:

ANIMAL FOOD

Per cent

Flank .

Porterhouse steak

Sirloin steak .

Rib rolls .

Corned beef .

Veal: Breast .

Leg cutlets .

Mutton: Leg, hind. .

Loin chops .

Lamb, leg (hind) .

Pork, fresh:

10.2

12.7

12.8

8.4

20.3

3.4

18.4 16.0

17.4

Ham .

Loin chops Tenderloin

10. 7 19.3

Pork, salted, cured and pickled:

Ham, smoked .

Salt pork .

Bacon, smoked .

Poultry:

Chicken, broilers .

Fowls .

Turkey .

Fish:

13.6

7.7

41.6 25.9

22.7

Cod, dressed. . . . Mackerel, whole Shad, whole Shellfish:

29.9 44.7 50. 1

Oysters, “ solid ” .

Lobsters .

Hen’s eggs .

Dairy products :

Butter .

Whole milk .

Skim milk .

Buttermilk .

Cream .

Cheese, full cream. . .• .

VEGETABLE FOOD

Flour, meal, etc.:

Entire wheat flour .

Graham flour .

61.7

11.2

Wheat flour, patent roller process:

High grade and medium .

Low-grade .

Wheat breakfast food .

Com meal . .

Oat breakfast food .

Rice .

Tapioca . .

Bread, pastry, etc.:

White bread .

Whole- wheat bread .

Crackers .

Molasses .

Honey .

Sugar, granulated .

Vegetables:

Beans, dried .

Beans, lima, shelled, green .

Cabbage .

Com, green (sweet), edible portion

Lettuce .

Onions . .

Peas, green, shelled .

Potatoes .

Sweet potatoes .

Tomatoes .

Turnips. . .

Fruits, berries, etc., fresh:

Apples .

Bananas .

Grapes .

Oranges . .

Pears .

Raspberries .

Strawberries .

Fruits, dried:

15.0

15.0

10.0

20.0

20.0

30.0

25.0

35.0

25.0

27.0

10.0

5.0

Dates .

Figs. .

Raisins .

Nuts: Almonds.

Chestnuts, fresh .

Cocoanuts .

Hickory nuts . . .

Pecans .

Peanuts .

Walnuts, English

Chocolate .

Cocoa . .

10.0

10.0

45.0

16.0

48.8

62.2

53.2

24.5

58.1

Water

Protein

Fat

Carbo¬

hydrates

Ash

Per cent

Per cent

Per cent

Per cent

Per cent

54.0

17.0

19.0

0. 7

52.4

19. 1

17.9

0.8

54.0

16.5

16. 1

0.9

63.9

19.3

16.7

0.9

49.2

14.3

23.8

4.6

52.7

15.6

11.0

0.8

68.3

20. 1

7.5

1.0

51.2

15.1

14.7

0.8

42.0

13.5

28.3

0.7

52.9

15.9

13.6

0.9

48.0

13.5

25.9

0.8

40.8

13.2

26.0

0.8

66.5

18.9

13.0

1.0

34 > 8

14.2

33.4

4.2

7.9

1.9

86.2

3.9

17.4

9.1

62.2

4. 1

43.7

12.8

1.4

0. 7

47.1

13.7

12.3

0.7

42.4

16.1

18.4

0.8

58.5

11.1

0.2

0.8

40.4

10.2

4.2

0.7

35.2

9.4

4.8

0.7

88.3

6.0

1.3

3.3.

1.1

30.7

5.9

0.7

0.2

0.8

65.5

13.1

9.3

0.9

14.5

0.7

81.8

3.0

87.0

3.3

4.0

5.0

0.7

90.5

3.4

0.3

5.1

0.7

91.0

3.0

0.5

4.8

0.7

74.0

2.5

18.5

4.5

0.5

34.2

25.9

33.7

2.4

3:8

11.4

13.8

1.9

71.9

1.0

11.3

13.3

2.2

71.4

1.8

12.0

11.4

1.0

75.1

0.5

12.0

14.0

1.9

71.2

0.9

9.6

12.1

1.8

75.2

1.3

12.5

9.2

1.9

75.4

1.0

7.7

16.7

7.3

66.2

2. 1

12.3

8.0

0.3

79.0

0.4

11.4

0.4

0.1

88.0

0. 1

35.3

9.2

1.3

53.1

1.1

38.4

9.7

0.9

49. 7

1.3

5.9

9.8

9.1

73.1

2.1

25.1

2.4

69.3

3.2

18.2

0.4

81.2

100.0

0.2

12.6

22.5

1.8

59.6

3.5

68.5

7.1

0.7

22.0

1.7

77.7

1.4

0.2

4.8

0.9

75.4

3.1

1.1

19.7

0.7

80.5

1.0

0.2

2.5

0.8

78.9

1.4

0.3

8.9

0.5

74.6

7.0

0.5

16.9

1.0

62.6

1.8

0.1

14.7

0.8

55.2

1.4

0.6

21.9

0.9

94.3

0.9

0.4

3.9

0.5

62.7

0.9

0.1

5.7

0.6

63.3

0.3

0.3

10.8

0.3

48.9

0.8

0.4

14.3

0.6

58.0

1.0

1.2

14.4

0.4

63.4

0.6

0.1

8.5

0.4

76.0

0.5

0.4

12.7

0.4

85.8

1.0

12.6

0.6

85. 0

0.9

0.6

7.0

0.6

13.8

1.9

2.5

70.6

1.2

18.8

4.3

0.3′

74.2

2.4

13.1

2.3

3.0

68.5

3.1

2.7

11.5

30.2

9.5

1.1

37.8

5.2

4.5

35.4

1.1

7.2

2.9

25.9

14.3

0.9

1.4

5.8

25.5

4.3

0.8

1.4

5.2

33.3

6.2

0.7

6.9

19.5

29. 1

18.5

1.5

1.0

6.9

26.6

6.8

0. 6

5.9

12.9

48. 7

30 . 3

2.2

4.6

21.6

28.9

3 7.7

7.2

Fuel

value

per

pound

Calories

1 ,085 1 ,075 955 1 ,030 1,230 730 670 875 1,400 845

1,300

1,300

875

1,620 3 , 555 2,705

290

750

1,045

210

355

365

220

140

595

3,350

3,350

165

160

880

1,890

1,635

1,625

1,610

1,625

1,655

1,615

1,800

1,590

1,610

1,185

1,115

1,875

1,300

1,480

1,815

1,565

555

120

460

70

200

455

305

445

105

120

215

290

330

170

255

245

170

1.420 1,435 1,405 1,615 920 1,370 1,125 1,565 1 .875 1 . 335 2,770 2,255

stituents of the feces is known as the coefficient of digestibility. From a

large number of ex¬ periments, it has been calculated that on an average the different groups into which foods may for convenience be divided have the fol¬ lowing coefficients of digestibility :

comparatively thick walls on which the digestive juices have little effect. The heat of cooking, especially with the aid of water, ruptures these cell walls and also makes the starch more soluble. In the case of breads, cakes, pastry and other foods prepared from flour, the aim

Table II. — Coefficients of Digestibility of Nutrients and Their Fuel Value Per

Pound in Different Groups of Food Materials.

Food Material

Protein

- *Fat*

Carbohydrates

Digesti¬

bility

Fuel value per pound

Digesti¬

bility

Fuel value per pound

Digesti¬

bility

Fuel value per pound

Per cent

Calories

Per cent

Calories

Per cent

Calories

Fish and meats .

97

1,940

95

4,040

98

1,730

Eggs .

97

1,980

95

4,090

98

1,730

Dairy products .

97

1,940

95

3,990

98

1,730

Animal food (of mixed diet) .

97

1,940

95

4,050

98

1,730

Cereals .

85

1,750

90

3,800

98

1,860

Dried legumes .

78

1,570

90

3,800

97

1,840

Sugars .

98

1,750

Starches .

98

1,860

Vegetables .

83

1,410

90

3,800

95

1,800

Fruits .

85

1,520

90

3,800

90

1,630

Vegetable foods (of mixed diet) .

84

1,840

90

3,800

97

1,820

Total food (of mixed diet) .

92

•1,820

95

4,050

97

1,820

As a general rule, it may be said that car¬ bohydrate is more completely digested than proteins or fats, and that the protein of animal foods, as supplied by meat, milk, fish and eggs, is more digestible than that supplied by vegetable foods. It will be seen, however, that the coefficients differ less for the different types of food than might be expected from popular impressions of digestibility and indigestibility. The coefficients of digestibility are also less influenced by the conditions under which the food is eaten and vary less with individuals than is generally supposed.

Preparation of Food. — The preparation of food has much to do with its nutritive value. Thus, many articles which are unfit for nourish¬ ment when raw are nutritious and palatable when cooked. It is also a matter of common experience that well-cooked food is appetizing and wholesome, while the same material, if badly cooked, is unpalatable. Cooking is of importance for at least three reasons. It changes the mechanical condition so that the food material may be acted upon more freely by the digestive juices; it makes it more appetizing by improving the appearance or flavor or both ; and it kills by heat disease germs and parasites if such be present. Food which is attractive to the taste quickens the flow of saliva and other digestive juices and thus aids digestion. The cooking of meats develops the pleasing taste and odor of extractives and that due to the browned fat and tissues, and by softening and loosening the protein of the con¬ nective tissues makes the meat more tender. Extreme heat, however, tends to coagulate and harden the albuminoids of the lean portions and also to weaken the flavor of the extractives. Heating often changes the structure of food materials very materially so that they may be more easily chewed and more easilv and thoroughly digested. In many vegetables the valuable carbohydrates, chiefly microscopic starch grains, are contained in tiny cells with

is to make a palatable, light and porous food more easily broken up in the alimentary canal than the raw materials. Sometimes this is ac¬ complished simply with the aid of water and heat. In cooking, the heat changes part of the water in the dough into steam, which in trying to escape forces the

particles of dough apart. The protein (gluten) of the flour stiffens about the tiny bubbles thus formed in the dough, and the mass remains porous even after the steam has escaped. More often yeast or baking- powder is used to (

Quite generally foods lose weight in cook¬ ing. The principal loss is water, but if food, such as vegetables or meat, is boiled in water considerable nutritive matter, principally soluble salts and water-soluble vitamin is lost unless the water in which the food is cooked be utilized. Cooking in alkaline medium destroys water-soluble vitamins. The process of desic¬ cation which is now so extensively employed in the preservation of fruits and vegetables renders the watery foods much more con¬ centrated.

Food Requirements and Dietary Stand¬ ards. — The information gained from a study of the composition and nutritive value of foods may be turned to practical account by using it in planning diets for different individuals or classes of individuals. There are four import¬ ant methods of studying the food requirements under different conditions and obtaining the so- called dietary standards : (1) By observing the

amount of oxygen consumed and carbon dioxide evolved (respiration experiments), (2) by de-

termining the balance of intake and output (carbon and nitrogen metabolism experiments),

(3) by direct measurement of heat given off by the body (calorimeter experiments) and

(4) by observing the amount of food consumed (dietary studies). The most direct and con¬ vincing way of ascertaining the energy meta¬ bolism is the third of these methods, known as the method of direct calorimetry. This con¬ sists in measuring the total energy expendi¬ ture of the body as heat, or as heat and mechan— ical work, by confining the subject in a chamber permitting of actual measurement of the heat produced. The results obtained by all methods

From results of many investigations by the methods described above, a number of so- called dietary standards have been suggested which are designed to show the amount of nutrients and energy' which are required by persons of different occupations and habits of life. These standards represent reasonable amounts rather than maximum or minimum

quantities and are to be thought as guides for home and institution management, rather than exact expressions of food requirement. The European dietary standards proposed by Voit and the American standards proposed by At¬ water follow :

Table III. — Dietary Standards.

Individual and Occupation

Actually eaten

Digestible

Fuel

value

Protein

N

Fat

Carbo¬

hydrates

Protein

Fat

Carbo¬

hydrates

Man at hard work (Voit) .

Gms.

Gms.

Gms.

Gms.

Gms.

Gms.

Calories

145

100

450

133

95

437

3,270

Man at moderate work (Voit) .

118

56

500

109

53

485

2.965

Man with very hard muscular work (Atwater) .

175

(*)

(*)

161

(*)

(*)

5 500

Man with hard muscular work (Atwater) .

Man with moderately active muscular work

150

(*)

(*)

138

(*)

(*)

4,150

(Atwater) .

Man with light to moderate muscular work

125

(*)

(*)

115

(*)

(*)

3,400

(Atwater) .

Man at “ sedentary ” or woman with moder-

112

(*)

(*)

103

(*)

(*)

3,050

ately active work (Atwater) .

Woman at light to moderate muscular work Or

100

(*)

(*)

92

(*)

(*)

2,700

man without exercise (Atwater) .

90

(*)

(*)

83

(*)

(*)

2,450

(*) Fat and carbohydrate in sufficient amounts to furnish, together with the protein, the indicated amount of energy

are strikingly consistent, and by means of them it has been possible to tabulate hourly factors from which the day's energy- metabolism and, therefore, the day's food requirement in terms of energy' may be computed.

By means of the first and third methods, not only can the energy be

calculated, but the proportion of fat and carbohydrate oxidized can be determined. The so-called balance or metabolism experiments are used to determine as nearly as possible the protein requirement and have also been applied to the determination of the calcium, phosphorus and iron require¬ ments on the assumption that yvith an adequate supply of these essentials a balance will be maintained between the intake and output. The plan followed in the fourth method, or dietary studies, is as folloyvs: Exact account is taken of all the food materials (1) on hand at the beginning of the study. (2) purchased during its progress and (3) remaining at the end. The difference between the third and the sum of the first and second figures is taken as representing the amounts used. The amounts of nutriments and energy furnished by the total quantity of each food material are cal¬ culated through the aid of figures obtained from analysis of samples of the different foods or from tables of average composition. From the total food eaten by all the persons during the entire period, the amount eaten per man per day can be calculated, using the so-called man value coefficients for the y-arious members of the family. The folloyving coefficients yvere adopted by the Interallied Food Commission in 1918: From 0 to 5 years, 0.5 man value; trom 6 to 10 years, 07; 11 vears and over, males 1, females 0.83.

\ ith the recognition of differences in the quality of proteins and of the importance of the unidentified fat-soluble and yvater-soluble vitamins, for yvhich yve have as yet no direct quantitative measurements, a fifth method of studying the food requirements has come into extensive use, namely, biological studies of maintenance and growth under different dietary conditions. These are of necessity7 conducted on laboratory animals, and the interpretation of results in the light of human nutrition is more or less theoretical. They serve to indicate, hoyv- ever, that too much yveight must not be at¬ tached to any attempt to state the requisites of an adequate diet in terms of exact quantities of certain nutrients. At best such standards should serve only as an indication and not as a rule.

Selection of Food. — W e may summarize the material requisites of an adequate diet under the folloyving heads: It must (1) pro¬ vide sufficient amounts of digestible organic nutrients to yield.' the necessary number of calories or energy-; (2) furnish oroteins in ample amount and of suitable sorts; (3) supply adequate amounts and proper proportions of ash constituents ; (4) furnish sufficient vitamins, and (5) it must include a sufficient amount of material of such physical character as to ensure the proper handling of the food mass in the digestive tract.

As a simple means of ensuring these req¬ uisites, the diet should be so arranged that it contains in reasonable amounts representatives of each of the following groups into yvhich foods may for convenience be divided: (1) Green and succulent vegetables; (2) milk, eggs, meats and other typically

protein foods; (3)

NUTS

521

cereal grains and their products; (4) sugars, including those naturally occurring in sweet fruits, fresh and dried; and (5) fats, includ¬ ing milk fats and organ fats. The first group supplies mineral building material in a propor¬ tion large in comparison with its energy value. The secpnd group supplies in its protein, in a proportion large as compared to its energy value, nitrogen in the right form for body¬ building material. The fourth group supplies little except body fuel in a quickly available form. The fifth group is like the fourth, an energy-yielding group, but is set apart because the amount of -energy supplied per unit weight of fat is so much greater than that supplied b\r a unit weight in any other group. The third or middle group shares the properties of the groups which precede and those which follow, being valuable sources of mineral and nitrogenous body-building materials and also important sources of energy. If representatives of each group be used, the diet will not lack in vitamins, for the fat-soluble A is found in the leafy vegetables of group 1, in milk, eggs especially in meat of group 2 and in butter and organ fat of group 5, and water-soluble B in representatives of at least the first three groups.

These groups should also be kept in mind in the economic use of food. A considerable choice of selection on the basis of cost can be made among foods of each group. If the group system or some equivalent is not ad¬ hered to there is danger in the economic selec¬ tion of food of limiting too much the choice of foods to those of high calorific value, such as the cereal products. There is economic justification for the purchase of certain foods, particularly vegetables and fruits, which would appear expensive if considered simplv as sources of energy. When economy demands the dimin¬ ished use of meat, other protein foods should replace it in proper proportion. The greatest factor of safety in the human diet is the regu¬ lar use of milk because of the high quality of its proteins, its mineral content and its rich¬ ness in fat-soluble A.

In order that one may partake of a truly varied diet in which the various groups are rationally represented, proper dietary habits are very important as are also wise food selection and good cookery. Good food habits should be taught in youth. If they have not been ac¬ quired then, a special effort should be made to acquire them in later life.

Charles Ford Langworthy, Department of Agriculture, Washington, D. C.

NUTS, hard-shelled fruits, indehiscent, with a hard, dry pericarp, growing on certain trees and bushes in most temperate and tropical regions. The shell, which is often enclosed by woody or leathery husks, does not open of it¬ self when the nut is ripe. Common examples are hazel and hickory nuts. Peanuts and other ground nuts properly belong to another class of fruits. The more important nuts may be di¬ vided into two classes: (1) those used for food, and (2) those used for oil, dyeing and other purposes, medicinal, ornamental and com¬ mercial.

The principal kinds of edible nuts are sweet and bitter almonds (Amygdalus communis), native to Asia Minor, northern Africa, south¬ ern Europe, and successfully cultivated in Cali¬

fornia; Brazil-nuts, or nigger-toes, the seeds of a majestic tree (Bertholletia excelsa), whose habitat is Venezuela and northern Brazil; bread-nuts growing on a tree (Brosimum alicas- trum) of Jamaica; several varieties of chest¬ nuts, the American (Castanea americana) in the Eastern and Southern States, the Spanish (Cas¬ tanea sativa) in southern Europe, northern Af¬ rica, and western Asia, also species found in Australia and Tahiti ; cocoanuts, the fruits of the cocoanut palm (Cocos nucifera) in the East Indies, West Indies, Florida, South America, and Oceania ; cola, or kola nuts, the seeds of a tree (Cola acuminata) native to West Africa and cultivated in tropical America; hazelnuts,, filberts, or cobnuts (Corylus avellana) in Eng¬ land, Spain, Sicily, and other parts of Europe, also the American hazel (C. americana) and the California hazel; hickory nuts (Carya alba and other species) in the United States (from Maine to Texas) and Mexico; pecans (Carya olivceformis) , in Indian Territory, Texas, Louis¬ iana, and other southern States ; pistachios or green almonds (Pistacia vera), found in south¬ ern Europe, southwestern Asia, and northern Africa; souari or suwarrow nuts (Caryocar nuciferum) , also called the butternut of Dem- erara, native to Brazil and Guiana ; walnuts (Jug Ians regia), commonly named English or Persian walnuts and Madeira-nuts, in Asia, Europe, Chile and California, also the black walnut (/. nigra) and the white walnut (J. cinerea) or butternut of the United States.

Certain edible nuts are used as sources of oil. The principal kinds are the almond (sweet and bitter), the ben nut of the East Indies, the candle nut of the South Sea Islands, the cashew- nut of the West Indies, the cocoanut of the East Indies, the dika nut of West Africa, the palm nut of West Africa, the pine nuts of Europe and Asia, the physic nut (Curcas purgans) of tropical America, the English walnut and the American butternut.

Of nuts having medicinal qualities are the seeds of Strychnos nux-vomica, of southern Asia and the East Indies, from which the poisonous drug nux-

vomica is obtained, and the betel nuts, fruit of the areca palm (Areca catechu), in the East Indies and the Philippines, used as a ver¬ mifuge, also said to have stimulant and tonic properties. Some kinds of nuts are turned to account for various practical and ornamental purposes. The boomah nut (Pycnocoma ma- crophylla) , of Africa, is used for tanning; soap- nuts (Sapindus safonaria) , of the West Indies, in washing. The horse chestnut (PEsculus hip- pocastanum) , of Europe, contains starch. The cumara nut (Dipterix odorata), of Brazil, is valuable for its perfume. The sassafras nut (Nectandra puchury), of Brazil, is used in flavoring chocolate. Ravensara nuts, also called the Madagascar clove nutmeg, are useful for seasoning. Many species of nuts are prized as ornaments. Betel nuts are utilized as coat but¬ tons; bladder nuts (Staphylea pinnata), of Cen¬ tral Europe, are worn as beads in necklaces ; also the bonduc nut (Guilanderia bonduc), of India, and the grugru nut (Acrocomia schlero- carpa), of South America, are used as breads. The corozo nut or vegetable ivory, of Brazil and Colombia, is made into toys, and the co- quilla nut (Attalea funifera), of Brazil, is valu¬ able for decorative turnery.

The demand for nuts as an article of com¬ merce is constantly growing. The consumption of home-grown nuts cannot be accurately esti¬ mated. The yearly exports of domestic nuts amount to $398,312, of which pecans (the most important of native nuts) form a considerable item. Imports during the fiscal year 1914 amounted to nearly $19,782,924, the bulk being of three kinds: almonds ($4,678,000), walnuts ($4,492,000), and cocoanuts ($3,292,000). The most popular varieties of almonds are from Tarragona and Ivica, Spain, and from Formi- getta, France. Shelled almonds, which are largely used by confectioners, for the most part .come from Spain, Sicily and Italy. The wal¬ nuts from Grenoble, France, are said to be the best, and those from Naples have a fine flavor. Importations of cocoanuts are chiefly from South America and the West Indies. Of other nuts, filberts or hazels come principally from Italy, Sicily and Spain, chestnuts from France and Italy, and Brazils from South America.

Recent experiments tend to show that the food value of nuts is much greater than was formerly supposed. Many savages and wild animals depend largely upon nuts for suste¬ nance through long periods of the year. Ac¬ cording to a missionary of the Kongo, the natives subsisted almost entirely upon cola nuts during a famine lasting months. Among civil¬ ized people nuts have been looked upon as accompaniments to a feast, promoting cheerful¬ ness and pleasant talk. They serve this purpose and more, for as sources of protein and fat they furnish considerable nutritive

material and en¬ ergy. Where other provisions are deficient in protein or albuminoids and fat, almonds and walnuts supply this lack. The chestnut may be used as a substitute for the cereals, because of its high proportion of starch, sugar and dex¬ trin. In some parts of Asia nut oil is used considerably in cooking.

Almonds, Brazil-nuts filberts, hickory nuts, pecans, walnuts, chestnuts and other nuts con¬ tain in concentrated form a great deal of nour¬ ishment. When bought at ordinary prices, they should not be considered luxuries but fairly eco¬ nomical articles of diet. Investigations carried on at the Agricultural Experiment Station of the University of California in 1901-02 empha¬ size the fact that nuts are to be regarded as true foods rather than food accessories.

Samples are selected from various analyses of nuts. The edible portion of almonds con¬ tains: water, 4.8 per cent; protein, 21 ; fat, 54.9; carbohydrates, 7 ; ash, 3.9 ; fuel value per pound, 3,030 calories. Almonds are generally eaten as dessert, as is the Brazil-nut, whose edible por¬ tion contains: water 5.3; protein, 17; fats, 66.8; carbohydrates, 7; ash, 3.9; fuel value per pound, 3,329. The chestnut (Spanish, dry) contains: water, 5.9; protein, 10.7; fat, 7.0; carbohydrates, 74.2 ; ash, 2.2. The chestnut is widely grown in France, where large quantities are used as food by both poor and well-to-do classes. Dried chestnuts are ground to flour and baked in cakes. In Italy the chestnut is eaten fresh, boiled and roasted, also in the form of porridge. Chestnut cake is a common delicacy among the peasants of the Apennines. In Korea the chest¬ nut practically serves as a substitute for the potato, being cooked in several ways. In some countries chestnuts are used for fattening hogs

and other animals. The edible portion of the filbert contains: water, 3.7; protein, 15.6; fat, 65.3; carbohydrates, 13; ash, 2.4; fuel value per pound, 3,432. The filbert is eaten chiefly as a dessert in England and America. In some coun¬ tries of Europe it is often roasted, and it is sometimes ground to a flour and m'ide into bread. It is grown in enormous quantities about Trebizond. The fruit of the shag-bark hickory is a great favorite with Americans. The edible portion of the hickory nut contains : water, 3.7; protein, 15.4; fat, 67.4; carbohy¬ drates, 11.4; ash, 2.1; fuel value, 3,495. The pecan (Hicoria pecan) is the 'most popular of American nuts. The edible portion of the pecan contains: water, 3; protein, 11; fat, 71.2; carbo¬ hydrates, 13.3; ash, 1.5; fuel value per pound, 3,633. The English walnut ranks next to al- iponds in popularity. In Korea it is a regular article of diet. The edible portion of the wal¬ nut (Italian, / regia) contains water, 2.5; pro¬ tein, 27.6; fat, 56.3; carbohydrates, 11.7; ash, 1.9; fuel value per pound, 3,100. As there is practically no refuse in the composition of nuts, other food substances having bulk should be eaten with them.

Vegetarians point to the lithe, active squirrel and recommend the eating of nuts for reducing the abdomen and increas¬ ing agility. The fact that Americans do not ap¬ preciate the food value of nuts as much as Europeans and Asiatics do is attributed to the abundance of fruits and cereals in this country. The increasing demand, however, is encourag¬ ing nut culture in California and other States. The quantity and value of nut products in the United States as reported by the 13th census was as follows :

Almond . .

Pecan .

Persian English walnut Miscellaneous nuts. . . . Value of all nuts .

6,793,539 lbs. 9,890,769 Ids. 22,026,524 lbs. 23,617,178 lbs.

$4,447,674

consult Broadbent, A., Vol. VI (1900); United States De¬ partment of Agriculture, Division of Po¬ mology (1896); Fuller, (The Nut Cul- turisC (1896) ; Hume, (The Pecan and its Culture) (Glen Saint Mary, Fla., 1910) ; Lake, cThe Persian Walnut Industry of the United States) (Bulletin No. 254 of the United States Bureau of Plant Industry) ; Parry,

NUTT, nut, Alfred Trubner, English folk¬ lore and Celtic scholar: b. London, 22 Nov. 1856; d. 1910. His education was obtained at University College School and the College de Vitry Franqois. After _ serving from 1874 a three-years' apprenticeship in the book publish¬ ing business on the Continent, in Leipzig, Ber- a.nd Paris, he succeeded to that of his father, David Nutt, in London, in 1877. He joined the Folk Lore Society soon after and was elected its president in 1897. He founded the English Uoethe Society in 1886 and was one of the founders of the Irish Texts Societies in 1898.

He has written (The Legend of the Holy Grail with Especial Reference to the Hypothesis of its Celtic Origin) (1888) ; (The Voyage of Bran (1895-97) ; (Celtic and Mediaeval Ro- mances) (1899). He founded the (Folk-Lore Journal, * the title of which was afterward shortened to (Folk-Lore'* ; and contributed ex¬ tensively to it and other magazines.*

NUTTALL, nut'al, George Henry Falk- ner, American biologist: b. San

Francisco, Cal., 5 July 1862. He is the son of Dr. Robert Ken¬ nedy Nuttall and the brother of Zelia Nuttall, the Mexican archaeologist. He was graduated in medicine at the University of California in 1884 and took a Ph.D. at Gottingen in 1890. In- 1890-91 he was assistant and associate at Johns Hopkins University, Baltimore; in 1894-99 he was a member of the staff of the Hygienic In¬ stitute, Berlin, and university lecturer in bac¬ teriology and preventive medicine; and in 1900- 06 he was lecturer in bacteriology and reader in hygiene in the University of Cambridge, Eng¬ land, where since 1906 he has been Quick pro¬ fessor of biology. He has been examiner for diplomas in public health and tropical medicine and hygiene at Cambridge, at the University of Liverpool and for the Royal Army Medical Corps ; director of the Quick Laboratory, Uni¬ versity of Cambridge, a member of Advisory Committee for Plague Investigations in India and of the Imperial Bureau of Entomology (Colonial Office, London). In 1892 Dr. Nuttall found the Bacillus aerogenes. In 1905 he dem¬ onstrated that bacteria in the alimentary canal are unnecessary for a perfect digestion in healthy animal life. In 1899 he showed the im¬ portant part played by insects, the spider family and centipede family as transmitters of bac¬ terial and parasitic diseases. Dr. Nuttall is an authority on tropical diseases and tropical medi¬ cines and is a member of various medical so¬ cieties that specialize on these subjects. He is an officer and member of numerous medical and scientific societies. He was founder and editor of the Journal of Hygiene (1901) and of Parasitology (1908). He has published over 150 articles on American, British, German and other journals since 1886, dealing with research work in bacteriology, entomology, protozool¬ ogy, hygiene and physiology and also (Hygienic Measures in Relation to Infectious Diseases) (1903) ; (Blood Immunity and Blood Relation¬ ship (1904) ; (The Bacteriology of Diphtheria, with Graham Smith and others (1908) ; ˆTicks,* with C. Wafburton and others (1908) ; (The Drug Treatment of Canine Piroplasmosis) (1910) ; (Russian Ixodoides* (1912) ; and (The Training and Status of Public Health Officers in the United Kingdom* (1913).*

NUTTALL, nut'al, Thomas, English- American naturalist : b. Long Preston, Settle, Yorkshire, England, 5 Jan. 1786; d. Nutgrove, near Saint Helens, Lancashire, England, 10 Sept. 1859. He learned printing, came to the United States in 1807; traveled widely; made numerous discoveries in botany; ascended the Missouri River in 1811, the Arkansas in 1819, and in 1825-34 was professor of natural history and curator of the botanic gardens at Harvard. In 1834 he joined an exploring party headed by Captain Wyeth to the Oregon and Upner Cali¬ fornia. From there he went to the Sandwich Islands, returning home by way of Cape Horn.

From 1842 he resided in England. Among his publications were (The Genera of North Amer¬ ican Plants) (1818) ; (A Journal of Travels into

the Arkansas .Territory) (1821); (Introduction to Systematic and Physiological Botany (1827) ; (A manual of the Ornithology of the United States and Canada* (1834); (Narrative of the Pacific Expedition* (1839) ; and (The North American Sylva : Trees not Described by.F. A. Michaux* (1842-49).*

NUTTALL, Zelia, American archaeologist : b. in San Francisco, Cal., in 1864; d. in Mexico in 1915. She was the daughter of Dr. Robert Kennedy Nuttall and the sister of Dr. George Henry Falkner Nuttall the biologist. She was educated in Paris, Germany, Italy and at Bed¬ ford College, London. She made a special study of languages and turned her attention to the antiquities of Mexico. Her researches in Mex¬ ican archaeology, ancient picture-writing and history made her famous and she took her place among the leading authorities on these questions. She first attracted attention by a contribution to the American Journal of Archce- ology (1886) on (The Terra Cotta Heads of Teotihuacan. The following year she became assistant of the Peabody Museum and in 1908 was made honorary professor of the National Museum in Mexico. When the discoveries of mysterious old ruins in Mexico made that coun¬ try a second Greece for archaeologists Mrs. Whitelaw Reid and Mrs. Crocker of San Fran¬ cisco gave the University of California funds to pursue archaeological researches there. Zelia Nuttall was appointed field director of the Reid- Crocker mission. She then established herself in Coyoacan, one of the historic suburbs of Mexico City, in an ancient palace built by Alva¬ rado, one of Cortez's aides. In her explorations of the Pyramids of the Sun and Moon near Teotihuacan, 27 miles from Mexico City plans for a local museum were made. She was a member of the scientific mission sent to Russia in 1894 by the University of Pennsyl¬ vania; a member of the jury of awards in all of the great American expositions beginning with the Columbian, and was the recipient of many medals from foreign countries. She was a member of American and foreign scientific societies. She prepared a facsimile edition of an ancient Mexican Codex (original owned by Lord Zouche at Harynworth, England) which is published as the (Codex Nuttall* (1902), and published, in addition to numerous papers; (The Fundamental Principles of Old and New World Civilization* (1901) ; (Book of the Life of An¬ cient Mexicans* (1903); (Penitential Rite of the Ancient Mexicans* (1904) ; (New Light on Drake: Documents Relating to his voyage of Circumnavigation 1577-1580* (1914). Consult sketch (with portrait) by Danenbaum, R.,*

(Archaeologist of Mexico in World To-day (Chicago, April 1908).*

NUTTING, Charles Cleveland, American zoologist: b. Jacobsonville, Ill., 25 May 1858. He was graduated from Blackburn University, Illinois, in 1880 and received the degree of M.A. in 1882. In that year he engaged in

zoological explorations for the Smithsonian Institution, visiting Central America in 1882-84, and Florida in 1885. In 1886 he became curator and pro¬ fessor of zoology in the Museum of Natural History of the University of Iowa which he

held till 1890 and then became head of the de¬ partment of zoology in the State University of Iowa. He was engaged in important scientific researches onward. He went to the Saskatche¬ wan River in 1891, to the West Indies in 1893, Plymouth, England, and Naples in 1895, Cali¬ fornia in 1895 and 1909 and to the Barbadoes in 1917. He was a member of the civilian scientific staff of the United States ship Al¬ batross during the Hawaiian cruise of 1902. Mr. Nutting is a member of various scientific societies and has been president of the Ameri¬ can Society of Zoologists, central branch, since 1907. He collaborated in the reports of the Siboga Expedition (1909-11). His most im¬ portant publications are 'Narrative of Bahama Expedition from University of Iowa) (1893) ; 'American HydroidsP which appeared in the reports of the United States Commission of Fisheries and elsewhere (1900-04) ; report on 'Gorgoniacea of the Siboga Expedition (1910). He is also the author of numerous articles pub¬ lished in scientific magazines in the United States and England.*

NUTTING, Mary Olivia, American writer: b. Randolph Centre, Vt., 1 July 1831 ; d. 1910. She was graduated from Mount Holyoke Sem¬ inary (now College) in 1851, taught there 1853- 70, was librarian of the institution 1870-1901, and from the last-named date to her death librarian emeritus. She wrote under the name of Mary Barrett until 1894. She has published 'Steps in the Upward Way) (1867) ; (Our Summer at Hillside Farm> (1867) ; 'The Story of William the Silent (1869); 'The Days of Prince Maurice) (1894), etc.*

NUX VOMICA, the popular name for the seeds of a tree (Strychnos nux-vomica) of the natural order Loganiacece. The tree is a native of Ceylon, Coromandel and other parts of southern Asia. It is of medium size, bears ob¬ long, entire smooth leaves, and flowers in ter¬ minal corymbs, followed by one-celled berries as large as oranges. They have brittle shells, white gelatinous pulp, and flat, disc-like hairy gray seeds which are tough, odorless and very bitter. The pulp is a favorite food of many birds. The seeds have long been used in pharmacy and medicine, and are of great value, being the source of the alkaloids strychnin and brucin. Under the name false Angostura bark the bark of this tree has been used to adulterate the true Angostura bark, from which it differs in its properties.

NYACK, ni'ak, N. Y., village in Rockland County, on the Hudson River, where the ex¬ pansion is called Tappan Bay, and on a branch of the Erie Railroad. It is connected by ferry with Tarrytown on the opposite side of the Hudson, and it is about 26 miles from the Grand Central Station in New York. It was settled in 1700, incorporated as a village in 1873, gave up its charter in 1876, and was again incorpo¬ rated in 1883. It is a beautiful residential village, but has some manufacturing. The chief indus¬ trial establishments are boot and shoe factories, wagon, carriage and sleigh factory, yacht, boat¬ building, and cloth finishing works. For many years it has been an educational centre; it is the seat of the Nyack Military Academy, the Hud¬ son River Military Academy and the Rockland Military Academy. It has public and parish

schools, a public library and several good church buildings, notably Saint Ann's (Roman Catholic), the interior of which is beautifully decorated. The village owns and operates the waterworks. Pop. 4,444.

NYAM-NYAM, nyam-nyam', NIAM- NIAM, AZANDE, or ZANDEH, an African people of Negro-Hamite race, composed of numerous petty tribes dwelling in the basins of the Shari and Welle rivers. They number upward of 2,000,000. The men devote them¬ selves to hunting and war; the women culti¬ vate the fields and eleusine, manioc, sweet po¬ tato, gourds, yam, banana, etc. These with •game are the chief food, though a portion of the people are notorious cannibals. They have no cattle. Considerable manual and artistic skill is shown in the forging of iron, making of pottery and baskets, and the carving of wood. They are passionately fond of music, and play a kind of mandolin. Polygamy prevails. Their weapons are spears, knives, a species of iron boomerang and shields. The petty tribes of which they are composed are partially inde¬ pendent and partly dependent to the Belgian Congo. Consult Schweinfurth, Georg, 'The Heart of Africa) (New York 1874) ; Stanford, 'Africa (London 1895).*

NYAN, ni-an', a large wild sheep (Ovis hodgsoni) of the Tibetan Mountains, with great spiral horns on the head of the ram, and yield¬ ing excellent mutton. It is called argali by British sportsmen, and is one of the prizes of the chase in the Himalayan region.

NYANGWE, nyang'we, Africa, a trading station in the Kongo Free State, on the Kongo River; lat. 4° 15' S. ; long. 26° 20′ E. In 1871 it was visited by Livingston, and in 1876 Stanley made the place his headquarters while exploring the Upper Kongo. It is connected by road with Albertville on Lake Tanganyika. By caravan route, rivers and steam cars from Leopoldville connections exist with the Atlantic.

NYANZA, nyan'za, a Bantu word meaning "great water." It is used as the

English word "lake" in connection with the names of three large bodies of water in Central Africa : as, Albert Nayanza, Victoria Nayanza and Albert Edward Nyanza.

NYASA, nyas'sa or nyas'sa (from the Bantu word nyanza, that is, "great water"), a lake in southeastern Africa, nearly 400 miles from the Indian Ocean, and west of German East Africa, discovered by Livingston in 1858. It extends north and south about 350 miles, and east and west from 20 to 50 miles; area, about 14,300 square miles. It is about 700 feet deep at its southern point, but to north, or its source, it is quite shallow. Toward the south the bed sinks below the level of the Indian Ocean, and at its head the surface is over 1,000 feet above the ocean level. The 'outlet is Shire River, which flows south into the Zambesi. With the exception of Murchison Falls and Rapids, 70 miles long, in the Shire River, there exists unbroken water communication between the head of Nyasa and the Indian Ocean. The African Lake Company have launched steamers on the lake, investigated the coast, and made a road from the north end of the lake up the heights to the plateau between Nyasa and Tan¬ ganyika (q.v). Another road has been made

around the rapids in the Shire River. On the west and east coasts are mountains, those on the east are from 4,000 to 11,000 feet in height. In some places low sandy land extends between the water and the mountain, and in other parts, as at the north, the mountains come down to the water. A number of rivers flow into the lake from the west; they have broken through the mountain barrier.

NYASALAND PROTECTORATE, Af¬ rica, a portion of British Central Africa, lying around the shores of Lake Nyasa, and extend¬ ing to the banks of the Zambezi, known from its constitution 14 May 1891 until the change to the present name in 1907, as the British Cen¬ tral Africa Protectorate. It includes all British Nyasaland, as well as the Shire High¬ lands, and the greater part of the basin of the river Shire. The expenses of administering the Protectorate are partly met out of revenue locally raised, and further by an annual grant from the Imperial government. The adminis¬ tration is in the hands of a governor, assisted by an executive and legislative council. The area of the Protectorate is about 40,000 square miles; the European inhabitants number about 800, the Asiatics, 400, the native inhabitants about 1,060,000.

The principal occupation of the European settlers is planting; and many

thriving planta¬ tions of coffee, sugar, cinchona and tobacco have been established. Ivory, tea, ground nuts and rubber are also raised. The principal im¬ ports are soft goods, provisions and hardware. The chief towns, Blantyre, Zomba, Fort John¬ ston (the principal port on Lake Nyasa, and naval depot), Karonga (north end of Lake Nyasa), the starting, point for Tanganyika and Kotakota (west coast of Lake Nyasa). The Protectorate is divided into 12 districts, man¬ aged by a number of collectors and assistant collectors, judicial officers, etc. There is at least one judicial officer, and in some cases two or three, in each district. Almost the entire trade of British Central Africa is with the United Kingdom. Steamers ply on Lake Nyasa and on the Zambesi and Shire rivers. A rail¬ way, 113 miles in length, now connects Port Herald with Blantyre, and is projected to Lake Nyasa. The Protectorate is connected by telegraph overland with the Cape; and, with the Portuguese rivers, to Chinde its port of outlet at the mouth of the Zambesi, and with Quili- mane.

*Consult Duff, H. L., (Nyasaland under the Foreign Office * (London 1906) ; Johnston, Sir H. H., 'British Central Africa) (London 1897) ; Rankin, D. J., 'The Zambezi Basin and Nyasa- land) (London 1893).*

NYAYA, nya'ya. See Hinduism. NYCTIPITHECUS. See Douroucouli.

*NYDIA, a character in Bulwer's (Last Days of Pompeii. * She is a blind flower girl, of good birth, rescued from slavery by the hero.*

NYE, ni, Edgar Wilson, American humor¬ ist : b. Shirley, Me., 25 Aug. 1850; d. near Asheville, N. C. 22 Feb. 1896. He removed when a young man to Wyoming Territory; studied law, and was admitted to the bar in 1876. He served as postmaster and was elected to the legislature. Subsequentlv he made his home in New York (1886), having already be¬ come widely known as a humorous lecturer and

writer under the pseudonym of (

NYEZHIN, nye'zhen. See Nizhan.

NYIREGYHAZA, nye-red-y-ha'zo, Austria- Hungary, town in the district of Szabolcs, on the Nyir River, and at the junction of two railroads, about 170 miles by rail northeast of Budapest. It is in a productive agricultural region in which wheat, grapes and a variety of fruits grow 'luxuriantly. It is in the vicinity of the Tokay wine region. There are a num¬ ber of manufacturing industries, among which are the manufacturing of matches, soda and saltpeter. Pop. about 40,000.

NYKOPING, nii'He-ping, Sweden, sea¬ port, on a bay of the Baltic Sea, about 60 miles southwest of Stockholm. In the 13th century this was one of

the most important places in Sweden. The castle, now a ruin, ranked in strength with those of Stockholm and Calmar. In 1719 the town was captured and nearly destroyed by the Russians. It has regular steamer communications with Stockholm and other ports, and is of considerable manufactur¬ ing and commercial importance, its business in spun goods and grain being very active. Pop. about 11,000.

NYLGHAU. See Nilgai.

NYM CRINKLE. See Wheeler, Andrew Carpenter.

NYMPH. See Pupa.

NYMPHZEACEZE, an order of aquatic plants the water-lilies. They are generally large, floating on the surface of the water, and having a stem which forms a subterraneous creeping shoot. The flowers are very large, solitary, with cylindrical peduncles as long as the petioles of the leaves ; the perianth is colored, petaloid, composed of a great number of petals, arranged in several rows, and often inserted, as well as the stamens, in the lower part of the sides of the ovary; the outermost of these petals seem to constitute a calyx, while those within form a kind of corolla. The stamens are very numerous ; the anthers are turned toward the centre of the flower. The ovary is simple, covered almost throughout by the perianth-segments and by the stamens ; it is globular, with several cells, each containing a great number of ovules; the stigma is radiated, peltate, sessile. The fruit is globular, resem¬ bling externally a poppy capsule, indehiscent, fleshy within, divided into a great number of cells containing seeds immersed in a fleshy pulp. This order furnishes one of the best examples of the gradual passage of petals into stamens and of sepals into petals; the transition is so insensible that many intermediate bodies are neither precisely petals nor precisely stamens, but part of both. The principal genera of the order are Euryah, Victoria, Nxmhhcca- and

Nuphar. See Lotus; Victoria Regia; Water- lily.

NYMPHS, in Greek mythology, youthful goddesses of inferior rank to the other divini¬ ties who dwelt in Olympus. Begotten by Oceanus, or by Zeus and others, they preserve and nourish the woods, rivers, springs and mountains. They are, therefore, distinguished according to their offices, as Oceanides, nymphs of the ocean, regarded as daughters of Oceanus; Nereides, or nymphs of the Mediterranean, who were regarded as daughters of Nereus; Leimon- iades, or nymphs of the meadows; Dryades

or Hamadryades, or nymphs of trees, whose lives were regarded as beginning and ending with those of the trees with which they were asso¬ ciated ; Melides, or nymphs of fruit-trees; Oreades or Orestiades, or nymphs of mountains and grottoes : these, dressed lightly, as hunt¬ resses, were the companions of Artemis (Diana), who was herself originally an Arca¬ dian nymph; there were also Naiades, who pre¬ sided over fountains, Potamides over rivers, and Limniades over lakes. The nymphs hold a middle station between gods and mortals, and, without being immortal, yet live longer than is permitted to man. At their death the sub¬ stance which they have supplied with nourishing moisture perishes also. This first notion of nourishment, which is supposed in the very idea of a nymph, seems to have given origin to the second representation of them as nurses of young children entrusted to their care.

NYORO, or BA NYORO, Bantu tribe liv¬ ing on the shores of Lake Albert Edward, in Africa. As a race they are well built, tall and good-looking. They live in cone-shaped, thatched huts and make dugout canoes, bur and rafts. They lived principally on sweet potatoes, fish and game, and are good weavers, potters and workers in iron. They are said to number about 125,000.

NYREN, nii-ran', Magnus, Swedish astrono¬ mer: b. Wermland, Sweden, 21 Feb. 1837. He was educated at Upsala and became an instruc¬ tor in the Pulkova Observatory in 1868. His astronomical researches have been of great value and he was made vice-director of the Observatory at Pulkova in 1890, a position which he retained until 1908. In 1888 he was ap¬ pointed Councilor of State; and in 1899 he was awarded the Valz prize by the Academie des Sciences, Paris. He has published determina¬ tion du coefficient constant de la precession au moyen d'etoiles de faible eclat J ; (Bestimmung der Nutation der Erdachse> (1873); Varia¬ tions de la latitude de Poulkova' (1893) ; 'L'Aberration des etoiles fixes' (1883), etc.

NYS, nus, Desire, Belgian philosopher: b. Saint Leger, Belgium, 21 Nov. 1859. He was educated at Tournai and at the universities of Louvain and Leipzig. In 1883 he was ordained a priest of the Catholic Church and from 1893

to 1906, served as director of the Seminaire Leon XIII at Louvain. He was made its presi¬ dent in 1906 and in the same year was ap¬ pointed to the chairs of cosmology, psychology and chemistry in the University of Louvain. He is knight of the Order of Leopold II and member of the Philosophic Society of Louvain. He has published (Le probleme cosmologique' (1888) ; (La notion detemps d'apres S. Thomas d'Aquin' (1898) ; (La notion d'pace au point de vue metaphysique et psychologique' (1900) ; (La cosmologie' (1900 ; 2d ed., 1906); (Les theo¬ ries sur la

nature de l'espace depuis Descartes' (1907). He is a contributor to (The Catholic Encyclopedia' and to La Revue Neo-Scholas- tique.

NYS, Ernest, Belgian lawyer: b. in Con- trai, Belgium, 27 March 1851. He was edu¬ cated at the universities of Ghent, Heidelberg, Leipzig and Berlin and practised law in Ant¬ werp and in Brussels, in both of which cities he held judicial posts. He became professor of international law in the University of Brus¬ sels and was made a member of the permanent court of arbitration at The Hague. He was also one of the editors of the Revue de Droit International. He is professor of international law at the Brussels University. The degree of honorary doctor of laws was given to him by the universities of Oxford, Edinburgh and Glasgow. His books include (La guerre mari¬ time' (1881) ; (Le droit de la guerre et les pre- curseurs de Grotius' (1882) ; (Les origines du droit international' (1894); (Recherches sur l'histoire de l'economie politique' (1898); (Le Droit international,' 3 vols. (1904-6, new ed., 1912); (Idees modernes; (Droit international et franc-magonnerie' (1908) ; (Les Etats-Unis et le Droit de gens' (1909) ; (Le Droit romain, le droit des gens et le College, des docteurs en droit civil' (1912).

NYSSA, ms-tag'mus, a genus of trees. See Tupelo.

NYSTAD, nii'stat, Finland, town in the Lan of Abo-Bjorneberg, on the Gulf of Both¬ nia, 40 miles southeast of Abo. At Nystad was concluded in 1721 the treaty between Swe¬ den and Russia, by which the territory con¬ quered by Peter I along the Gulf of Finland and the Baltic was conceded to Russia. Pop.

4,500.

NYSTAGMUS, involuntary motion of the eyeballs. The movement is usually lateral, but is sometimes rotatory, and in rare cases vertical. It may be induced by inflammation and other disorders of the eyes, and in miners is not in¬ frequently caused by long-continued work underground in obscure light. Very little in the way of cure is possible.

NYX, niks, in Greek mythology, the goddess of night or darkness. She was the daughter of Chaos. Her brother was Erebus.

Othe fifteenth letter and the fourth vowel of the English alphabet. It is derived, through the Latin and West¬ ern Greek alphabets, from the Phoe¬ nician letter ayin, of the same shape, corre¬ sponding to the Hebrew £ and pronounced as a heavy glottal catch. It is called the labial vowel because of the part the lips have in its pronunciation : for analogous reasons the third vowel i (ee) is called the palatal and a (ah) the guttural vowel. In the

Greek alphabet, as we now have it, there are two characters to represent this vowel, namely, great o (omega, u) and little o (omicron, O, o), but these characters were not differentiated in early times. The vowel sounds in our language which are represented by o are numerous, namely, (1) The sound it has in oh, lo, cone: this is the regular, long sound of o, and it is common to English with most other languages. Curiously, English seems to lack the short vowel sound corresponding to this long o: what is usually called the short o, the vowel sound in on, odd, log, is not the o of lone shortened, but rather the sound of a in all shortened. But though orthoepists hold that the true short open vowel sound of o is unknown in English, na¬ tives of New England almost invariably in many words shorten the open o (as in go) without changing its quality ; in their pronuncia¬ tion of bone, home, coat, toad, etc., the vowel is the true o shortened. This short o is not rec¬ ognized by Alexander J. Ellis as an English vowel sound. The editors of Webster's Dic¬ tionary (edition of 1879) remark of this local pronunciation that ((its rise and growth are in¬ teresting facts, and its final prevalence is a thing he (the theoretic phonologist) would rather desire than deprecate.® The long o sound is variously represented in English ; by o (lo), by ow (low), by an (hautboy), by can (beau), by eo (yeoman), by ew (sew), by oa (roam), by oe (hoe), by oo (door), by ough (dough), by on (shoulder), and by owe. (2) The vowel sound commonly called short o, as in odd, cob, is really, as we have seen, the short¬ ened vowel sound represented by a in all, fall. (3) The obscure short vowel sound heard in dene, son, ton; this sound is usually represented by u, as in dun, sun, tun. (4) The sound of u in rune, for example, move, prove. (5) The same sound shortened, as in wolf, woman; the vowel sounds four and five are the sounds of the fifth vowel in a standard alphabet (6) The sound usually rendered by broad a in all, call: examples, order, former, north.

O', in Irish proper names, a patronymic prefix corresponding to the Mac of the High¬ lands of Scotland; thus O'Connell means <(the son of Connell.® It is supposed to be a cor¬

ruption of the Irish ua (Gaelic, ogha), mean¬ ing a grandson.

OAHU, o-a'ho or o-wa'hoo, the north¬ ernmost large island of the Hawaiian group; length 38 miles, average width about 20 miles. It has an irregular coast line, several small harbors, one excellent harbor on the west coast, upon which Honolulu (q.v.), the capital of Hawaii, is situated. Two mountain ranges cross the island, and between is a large dry plain which is productive when irrigated. Mount Kaala, 3,890 feet, is the highest point on the island.

OAK APPLE, any large gall (q.v.) on an oak ; specifically, in England, a

spongy ex¬ crescence on the twigs of Quercus pedunculata.

OAK CROWN, ORDER OF THE. See

Orders and Decorations.

OAK GROVE, BATTLE OF. After the battle of Fair Oaks or Seven Pines (q.v.) 31 May-1 June 1862, General McClellan remained inactive astride the Chickahominy, his advance but five miles from Richmond. In the last week of June Fitz-John Porter's corps of two divi¬ sions, with McCall's division, temporarily at¬ tached, was on the left bank of the Chicka¬ hominy and held the right of the line. Next on the left, across the stream, was Franklin's corps of two divisions and on Franklin's left, in the order named, Sumner's and Heintzelman's corps, of two divisions each. Keyes' corps, of two divisions, was in reserve. The effective strength of the army was 92,500 and McClellan was daily calling for more. Lee, including Jack¬ son's command, which was near, stood between him and Richmond with 80,000 men. The bridges being repaired and the ground firm, McClellan, 25 June, determined to advance the left of his picket-line preparatory to a general forward movement. Immediately in front of the most advanced redoubt on the Williamsburg road was a large open field, beyond which was a swampy belt of timber of some 500 to 700 yards, which had been disputed ground for many days. Further in advance was an open field, crossed by the Williamsburg road and the railroad and commanded by a Confederate re¬ doubt and rifle-pits. It was McClellan's inten¬ tion to push his lines through these woods in order to ascertain the nature of the ground and to place Heintzelman and Sumner in posi¬ tion to support an attack to be made by Franklin on the 26th, on the rear of Old Tavern and which, if successful, would force Lee from the heights overlooking Mechanicsville and clear the way for a general advance on Richmond. The movement began about 9 a.m. by the advance of Hooker's division of Heintzelman's corps on both sides of the Williamsburg road, where a

mile separated the Union and Confederate works. Hooker was supported by Kearny's division on the left, and on the right by Richard¬ son's division of Sumner's corps. The Con¬ federate pickets were driven in, and Hooker struck Wright's and Armistead's brigades of Huger' s division, which, with a part of Ransom's brigade, made a stubborn resistance and at 11 a.m., after Hooker on the right had advanced some 800 yards and Kearny nearly a mile, the entire Union line was ordered to fall back; Kearny,

however, held on to the ground won. At 1 p.m. McClellan came upon the field and ordered a renewal of the advance. Hooker was reinforced by a brigade of Couch's division and advanced; Kearny joined in on his left. Ma- hone's brigade and the rest of Ransom's rein¬ forced the Confederates and a severe fight en¬ sued, lasting until dark. McClellan says he ac¬ complished his object. The Confederates claim that McClellan was repulsed and gained no material advantage and that at night they occu¬ pied their old positions. This battle also known as that of Kings school-house, French's Fields and the Orchards, was the beginning of the Seven Days' Battles (q.v.). The Union loss was 67 killed, 504 wounded and 55 missing. The Confederate reports show a total loss of 441. Consult (Official Records> (Vol. XI) ; Webb, (The Peninsula) ; Allan, (History of the Army of Northern Virginia) ; The Century Company's (Battles and Leaders of the Civil War} (Vol.

II).

OAK PARK, Ill., village in Cook County, nine miles west of Chicago (of which it is a residential suburb) on the Chicago and North¬ western Railroad. Formerly a part of the town of Cicero, it was incorporated as a separate vil¬ lage in 1902. Oak Park owns its waterworks and contains, in addition to handsome resi¬ dences, several fine buildings. These include the Scoville Institute, the hospital of the Sisters of Misericordia, a public library and several schools. An annual horseshow is held here. It is also a thriving manufacturing centre with at least 47 establishments whose products are estimated at $1,555,000 annually. Pop. (1920)

39,830.

OAKELEY, Sir Herbert Stanley, English

composer: b. Ealing, 22 July 1830; d. November 1903. He was educated at Rugby and at Christ Church, Oxford, studied music in England and at the Leipzig Conservatory under Moscheles and Plaidy and later devoted himself to the organ, working with Breidenstein in Bonn and with Schneider in Dresden. In 1858-68 he was musical critic to the Guardian, in 1865-91 pro¬ fessor of music at Edinburgh and for many years composer to the Queen in Scotland, where he furthered orchestral and organ music and established Students' Choral Associations in the universities. His compositions are princi¬ pally religious, including anthems, cantatas, hymn tunes, chants and service-music; but he also wrote some pieces for the pianoforte. He was knighted by Queen Victoria in 1876. Con¬ sult Oakeley, E. M., (The Life of Sir Herbert Stanley Oakeley* (London 1904).*

OAKEN CROWN, ORDER OF THE.

See Orders, Royal.

OAKES, oks, Urian, American colonial scholar and clergyman, 4th president of Har¬

*vard College: b. England, 1631; d. Cambridge, Mass., 25 July 1681. He was brought to Amer¬ ica in 1634, showed himself an able mathema¬ tician and astronomer when a mere boy, was graduated at Harvard in 1649, studied theology, preached for several years in England and in . 1671 became pastor of the church in Cambridge and fellow of Harvard College. He became acting president of Harvard in 1675 and was inaugurated in 1680 as president. He wrote much Latin verse and a famous (Elegy upon the Death of Thomas Shephard,) selections from which may be found in Tyler, (History of American Literature. *

OAKLAND, ok'land, Cal., city, county-seat of Alameda County, on the eastward side of San Francisco Bay, opposite San Francisco, the Pacific Coast terminus of Southern Pacific, Western Pacific and Santa Fe railroads; port for trans-Pacific and coastwise steamship lines and for California River boats, connected with the State capital, Sacramento and with cities and towns up and down coast and in interior by a number of electric railways ; chief cities and villages of county reached by interurban trolley lines. The city has 15 miles of water¬ front, of which seven miles comprises a land¬ locked harbor along the southern boundary, known as the ((estuaryT This is navigable throughout for ocean-going vessels of the deep¬ est draft. To the westward, the city has eight miles of waterfront along the bay shores already developed and in process of development. Here more than 400 acres has been reclaimed from the bay by dredging and moles and this land is much sought after for sites of factories desiring contiguous deep water. Jutting out from this western waterfront are three moles for railroad traffic to ferryboats. These moles have been further reinforced by rubble stone jetties con¬ structed by the Federal government. The army engineers have recommended the construction of an immense dike all along the western bayshore just outside of the pierhead line to divert the flow of the Sacramento River and provide a safe harbor of constant depth for deep sea shipping. Topographically, Oakland is set in an immense amphitheater, bounded on the north and east by the foothills of the Coast range, which rise almost to the height of mountains. These hills maintain an equable climate, shut¬ ting off the fogs and cold trade winds from the ocean and the heat from the interior valleys. The hills slope down to the bay in a series of benches, on which have been constructed streets and contour boulevards. These benches have been utilized for homesites, thus providing one of the most beautiful cities in the United States. The hills

also provide an almost perfect natural drainage. That portion of the city next to the bay, about one-half its area, is practically level. The mean temperature for 1914 was 57.5°. In the same year the thermometer went as low as 35° in December and as high as 86° in March and September. Winter is the rainy season but it is not a disagreeable rain. Sometimes a light frost falls. In 1915 the number of clear days was 143, of fair days 118 and of cloudy days*

Though the county-seat of a great agricul¬ tural county, Oakland has forged rapidly to the front in the last few years as a manufacturing centre. This is largely due to its numerous in-

OAKLAND, CALIF

Oakland as seen from Lake Merritt

City Hall Square

OAKLAND, CALIF

OAKLEY

OAKS

o&J

dus trial siies, easily accessible to both water and rail lines, the contiguity of a cheap, un¬ limited fuel source in the crude petroleum pipe¬ lines at Richmond, 10 miles to the north and to the open climate which permits of industrial operations every day in the year. Oakland's principal industries are, fruit and vegetable can¬ ning, cotton spinning, shipbuilding, iron work-ing, gas engine manufacturing and lumbering. A recent government census of Oakland manufac¬ turing showed, capital invested, $36,411,000; wages, $5,966,000 ; value of products, $28,522,000. The increases from 1909 were, capital, 90.5 per cent; wages, 12.2 per cent; value of products, 27.7 per cent. It is believed that since 1914 the manufactures have increased by a conservative estimate about 60 per cent.

There are 15 banks, with an aggregate capi¬ tal on 1 Jan. 1915, of $4,676,290, surplus, $2,393,- 088 and deposits, $55,340,000. Clearings in 1915 totaled $181,471,320.

Some of the prominent buildings are, the City- Hall, completed in 1914 at a cost of $2,- 000,000 ; the Municipal Auditorium, completed in 1915 at a cost of $1,000,000; the Hotel Oakland, $1,125,000; the Claremont Hotel, $1,000,000; the Athenian Club, $200,000; the First Methodist Church,

*$150,000; Saint Paul's Episcopal Cathe¬ dral, $100,000; the Y.M.C.A. building, $400,000. Oakland has 50 public schools, five high, of which one is polytechnic, 41 grammar and four evening. The city was the pioneer in outdoor schools and its recently constructed school build¬ ings are so arranged as to be made into practically open-air classrooms. Saint Mary's College (Roman Catholic) for young men and Mills College for young women are accorded the highest rank among educational institutions of the Pacific Coast. There are also business col¬ leges, music conservatories, engineering schools, etc. As a part of the public high school system is maintained Chabot Observatory, equipped with one of the largest telescopes on the Pacific Coast. There are 28 parks and nine play¬ grounds, totaling 500 acres. The park system centres around Lake Merritt, the largest salt¬ water lake inside a municipality in the world. Oakland has numerous scenic drives and boule¬ vards, chief of which are the Skyline boulevard, along the crests of the hills back of the city ; the Foothill boulevard, along the bases of the same hills ; the Diamond Canyon road, leading to the <(Hights,** the home of the late poet, Joaquin Miller; the Tunnel road, running through the hills to the interior valleys. The Pacific Coast terminus of the Lincoln highway is at Oakland.*

The $50,000 Carnegie library, erected on a $20,000 site, contains more than 125,000 volumes. The municipal reference library in the city hall is open to the public for obtaining information on technical subjects.

Oakland was settled in 1820 by Don Luis Maria Peralta and other Spaniards. It was incorporated in 1852 and chartered as a city in 1854. The commission form of government was adopted on 1 July 1911, providing for a mayor, who is president of the city council and com¬ missioner of public affairs and commissioners of public health and safety, public works, streets and revenue and finance. Pop. (1920) 216,361.

OAKLEY, Violet, American mural painter: b. New York City in 1874. She studied at the

Art Students League in New York and also under Cecilia Beaux; at the Pennsylvania Acad¬ emy of Fine Arts under Howard Pyle, the illustrator; and in Paris under Aman-Jean, Collin and Lazar. She first devoted her talent to illustration, but soon turned to mural paint¬ ing and the designing of stained-glass windows. Her first important commission was for 13 panels depicting the (Founding of the State of Spiritual Liberty, for the governor's reception room of the State Capitol at Harrisburg, Penn., and nine panels, (Creation and Preservation of the Union* for the senate chamber. Among her most important achievements are a series called*

(Building of the House of Wisdom, in the house of Charlton Yarnall in Philadelphia; a window, (Divine Comedy of Dante Alighieri,* in the house of Robert Collier, New York City; a panel called (The Constitutional Convention,* in the Court House, Cleveland, Ohio; and deco¬ rations in the church of All Souls and the church of All Angels, both in New York City. Miss Oakley has received gold medals from the Saint Louis Exposition (1904), the Pennsyl¬ vania Academy of Fine Arts (1905) and the Architectural League of New York (1916). A medal of honor was given to her at the Panama Exposition (1915) and also at the San Fran¬ cisco Exposition (1915). She resides in Phila¬ delphia and is a member of the Society of Mural Painters, the Society of Illustrators, the New York Water Color Club, the Philadelphia Water Color Club and a Fellow of the Penn¬ sylvania Academy of Fine Arts. Consult Arm¬ strong, R., 'Work as Illustrator,* Critic (June 1900) ; Morris, H. S., 'Work of Violet Oakley,* Book Buyer (May 1902) ; Morris, H. S., (Violet Oakley's Mural Decoration,* Century Magazine (June 1905) ; Morris, H. S., 'New Motive in Decoration,* Century (1911) ; Coleman, C., (Mural Decoration in the Pennsylvania Capi¬ tol,* Architectural Record (December 1897) ; Sturgis, R., (Pictures in Harrisburg State House,* Scribner's (May 1907) ; (Divine Com¬ edy: Studies in Red Chalk,* Century (Decem¬ ber 1912) ; and Portrait in World's Work (April 1912).*

OAKMONT, Pa., borough in Allegheny County, 10 miles northeast of Pittsburgh, on the Pennsylvania Railroad. It is situated on the Allegheny River. A Carnegie library and a high school are the chief buildings. The in¬ dustries are glass, iron and powder-works, tools , of many kinds, pipes and fittings, hot-water boilers and structural steel. Pop. (1920) 4,512.

*OAKS, a genus (Quercus) of trees and shrubs of the family Fagacece. The species, of which there are about 400, are characterized by alternate, simple, deciduous or evergreen leaves, inconspicuous monoecious flowers, the staminate usually in slender pendulous catkins, the pistillate usually nearly sessile and gener¬ ally solitary or in groups of two or three and developing into ((acorns** which are more or less globular or oblong nuts set in the hardened, scaly involucres (cups) which sometimes nearly surround them. Nearly all the species are natives of the northern hemisphere, especially the temperate and colder portions. Some spe¬ cies are natives of the warmer parts of the temperate zone, but few are actually tropical. Most of the oaks are noted for strength, dura¬ bility, longevity and striking individuality of*

appearance; and on account of these qualities they have been used as symbols by many races and enter into literature and tradition. Some of the species reach maturity only when 50 to 100 years old, and others even exceed this maximum before reaching a size suitable for lumbermen's purposes. Specimens are known which have reached nearly 1,000 years, and others of half that age are common.

Oaks are generally propagated by seeds planted as soon as mature in the autumn ; choice varieties are grafted or budded; and evergreen species are often increased by means of cuttings or layers. In general they thrive best upon well-drained, fairly moist, loamy soils, especially such as are well supplied with lime. They are, however, found in all kinds of habitats, includ¬ ing almost pure sand, clay, rocky mountain sides and the mucky soils of undrained swamps. With few exceptions the valuable species are easily grown and readily transplanted while young.

Among the oaks are some of the most valu¬ able trees of the temperate zone. Their acorns furnish a valuable food for swine, and in some instances are used for human food; their bark is one of the most important barks used in tanning; and their timber, which is noted for its solidity, strength, resistance to moisture and durability, is one of the most important woods of the world. It is used largely in shipbuilding, but less now than before the introduction of iron and steel vessels ; in railroad and mill con¬ struction, bridge building, etc.; and, because of its handsome graining and its ability to receive polish, it is extensively employed in interior finish of houses, in furniture, etc. . The galls which grow upon certain species and the bark are widely used as a source of tannin for ink manufacture. Some of the more rapidly grow¬ ing species are planted largely in Europe in copses, the stems being cut every few years for fuel and for the bark. Few trees are more highly prized by horticulturists and landscape gardeners ; but usually the specimens must be in place before the gardener lays out the ground, because with most species little effect can be expected under 10 years. For. this reason other trees of quicker growth are planted with oaks and are removed when the oaks need the space.

About 50 species and half as many hybrids and varieties are natives of the United States, some extending from Nova Scotia to Minnesota and southward to the Gulf States, others being, limited to very restricted localities. In general these species belong to two groups, the black oaks and the white oaks. Those of the first group have leaves with pointed tips and acorns that require two years to reach maturity; those of the second have leaves with round lobes and acorns which reach maturity the first year. The most important species is probably the white oak (Quercus alba), which has the full range mentioned above. It attains a height of 100 feet, has broadly-spreading branches which form an open rounded head, and

the light gray bark which gives it its name. It is one of the hand¬ somest of its genus, and being of rather quick growth for an oak, and remarkable for its state¬ liness, it is often planted in parks. Its timber being compact and remarkably handsome, is one of the most prized for furniture. The mossy-cup or bur oak (O. macrocar pa) re¬

sembles the white oak in size, appearance and distribution, but its timber, being of coarser grain, is less valued. The chestnut-oak (Q . prinus) is a smaller tree, with a broad irregular head and dark brown bark deeply furrowed and with leaves like those of the chestnut. It ranges from Maine to southern Michigan and Pennsylvania. It is especially valued for its bark, which is exceptionally rich in tannin. The live oak (Q . virginiana) is a broadly spreading tree, seldom more than 60 feet tall. It is noted throughout its range, which extends from Vir¬ ginia southward, for its glossy, dark green leaves and its dense shade, for which it is widely planted in the South for ornament. It is usually draped with Spanish or Florida moss, which also adds to its striking appearance. The red oak (Q . rubra) which has a range similar to the white oak, is a rapidly-growing, hand¬ some tree, sometimes reaching 150 feet and forming a broad round head. Its timber is very heavy, durable and hard, but is coarse-grained. It is less used for the finer work than the white oak. A close relative, the scarlet oak (Q. coc- cinea), is smaller than the preceding, but is similar in range, uses, etc. Both kinds are remarkable for their autumn colors. The water-oak (Q. aquatica or nigra), popularly known as the black or dyer's oak, is common from Delaware southward to the Gulf States. It attains a height of 80 feet, and being of rapid growth it is frequently planted as a street tree in the South. In the North it is not hardy.

The European or British oak (Q. robur) is a native of western Asia and northern Africa as well as of Europe. About 50 horti¬ cultural varieties of this species are in cultiva¬ tion for ornament, some being introduced into America for this purpose. This is the oak of legendary lore, under whose branches the ancient Druids held their religious ceremonies. It is also the oak used by the navies of Europe for more than a thousand years. The cork-oak (Q ■ pseudo-suber) is a native of the Mediter¬ ranean region and is noted for its bark which furnishes the cork of commerce. The gall-oak (Q: lusitanica) is a shrub, native to western Asia, and is chiefly useful for its nut-galls (q.v.), which occur upon the leaves as the re¬ sult of insect attack. The Valonia oak (Q. c cgilops), common in the same region, is noted for the astringency of its acorns, which are largely used in tanning. The holm, holly or evergreen oak (Q. ilex) is a native of southern Europe and bears acorns used for food.

A very large number of insects live upon the oak, its timber and its decaying wood. One estimate for the United States places this at 1,000; the

number actually recorded being be¬ tween 500 and 600. In Germany, according to Kaltenbach, there are 537. These belong to all orders and include borers, leaf-chewers, sap- suckers and fruit-eaters. Among the most noted are the oak-tree pruner (Elaphidion villosum), a beetle which lays its eggs in the twigs, in the pith of which the larvae feed until nearly mature, when they chew out a ring of wood nearly to the bark, retire to the semi- severed twig, plug up the burrow and pupate. The wind snaps the twigs, hence the name. Many gall-forming insects, plant-lice, leaf- miners, scale-insects and leaf rollers feed upon the leaves, which are also often attacked to a

damaging extent by the larvae of numerous lepidopterous insects. Some of the curculios are frequent pests upon the acorns, which are ren¬ dered useless for stock food, because their contents have been eaten by the larvae. Per¬ haps the most serious pests, however, are the borers, of which there are a large number. These may retard the development of the trees or may so injure the wood by their burrows as to make it unfit for purposes where strength and appearance are necessary. Consult Pack¬ ard, (Fifth Report, United States Entomologi¬ cal Commission (Washington 1890).

OAKUM, in shipbuilding , threads of hempen ropes picked to pieces, to be used when mixed with pitch for calking the seams of wooden vessels. Until recently old men, women and children were employed to pick oakum, but this is now chiefly done by machinery. The rope or junk is old rigging and cables bought up for this purpose. It is first cut by a power¬ ful knife into short lengths, and these are thoroughly steamed to dissolve out the tar. The strands being then pulled apart, they are spread in the sun to dry. After this they are torn in pieces and cleaned of dust in carding ma¬ chines, a succession of which are used, until the oakum is obtained in clean light fibres. Since the passing of the wooden ship oakum is very little in demand.

OAKVILLE, Canada, town in . Halton County, Ontario, 21 miles southwest of To¬ ronto, on Lake Ontario and on the Grand Trunk Railroad. Appleby School for Boys is situated here. An electric railway con¬ nects Oakville with Hamilton. The town owns its waterworks and electric-lighting plant. The industries are planing-mills, boat-building, tan¬ ning, aluminum ware, evaporators, baskets and leather. Oakville is a favorite summer resort. Pop. (1914) 2,972; in summer 3,500.

OANNES, o-an'nez, in Babylonian mythol¬ ogy, a god of the sea, described as having the head and body of a fish, to which were added a human head and feet In the daytime he lived with men to instruct them in the arts and sci¬ ences, but at night retired to the ocean.

OAR FISH, or BAND-FISH, one of the

ribbon-fishes (Regalecus banksi), a peculiar deep-sea fish, 12 to 20 feet or more in length, with a narrow and extremely compressed body of a silvery color. The dorsal fin extends the whole length of the back and the anterior part is like a mane. The ventral fins are thoracic and are much reduced in width. The fish is found in all oceans and is probably responsible for most reports of sea-serpents. It. is only rarely met with and usually in a dying con¬ dition, as its proper home is in the depths of

the sea.

•

OAS, o-as', Philippines, a town in the prov¬ ince of Albay, Luzon, situated in the Inaya River, 15 miles northwest of Albay, the provin¬ cial capital. It is on the main road between Ligao and Polangui, has a considerable river trade and is the centre of one of the finest hemp-growing districts of the province. Pop.

17,200.

OASIS, a fertile place in a desert, usually found where lack of vegetation is caused by lack of moisture. Some of the mountains in the Sahara are of sufficient height to cause

condensation of moisture and rainfall; and as much of the soil has all the ingredients neces¬ sary for productiveness, an oasis is formed. Springs sending out enough water to moisten the soil aid in the formation of fertile spots; and artificial means are now used; the artesian wells are assisting in making productive places in the Sahara. See Sahara.

OASTLER, ost'ler, Richard, English re¬ former: b. Leeds, England, 20 Dec. 1789; d. Harrogate, England, 22 Aug. 1861. In 1820 he succeeded his father as steward of the Fixby estates at Huddersfield, Yorkshire. In 1830 his attention was called to the evils of child labor in the factories and he started a cam¬ paign against the conditions by a vigorous letter to the Leeds Mercury, entitled Yorkshire Slavery.) After many years of agitation the Ten Hours Bill and other acts ameliorating factory conditions were passed. Oastler's ener¬ getic work gave him the title of (The Factory King. } Owing to his opposition to the new poor law he was dismissed from Fixby

and in 1840 being unable to repay his employer a loan of £2,000 the latter had him imprisoned for debt in the Fleet. Here he remained nearly four years, meantime publishing the Fleet Papers, a weekly journal discussing the fac¬ tory and poor law questions. The working¬ men of England and Oastler's personal friends raised the money to pay his debt and he was released in 1844. He was triumphantly re¬ ceived on his return to Huddersfield. In 1869 a statue to his memory was erected at Brad¬ ford. In 1851-55 he edited a weekly news¬ paper called the Home.

OAT GRASS. See Grasses of the.United States.

OATES, ots, Titus, notorious English per¬ jurer, the fabricator of the story of the Popish Plot: b. Oakham, 1649; d. London, 12 July 1705. The son of a clergyman of the Church of Eng¬ land who had become an Anabaptist preacher and in 1654 was expelled from a chaplaincy in the Parliamentary army, he was turned out of successive schools and took no degree at Cam¬ bridge, but was ordained and became vicar of Babbing in 1673. Soon after he was vicar to his father, with whom he circulated such out¬ rageous stories against a schoolmaster of the parish that they were expelled from the living. After various ups and downs, about 1676 he conceived the idea of informing against the Roman Catholics ; he became a Roman Catholic in 1677, studied at Valladolid and Saint Omer, but was expelled from both, and 1678 gave in¬ formation as to a Popery Plot against Charles II, intended to seat upon the throne James, Duke of York, and turn the country over to the Jesuits. He received a large governmental pension and his story was implicitly believed, resulting in the judicial murder of 35 innocent persons. But in two years the excitement somewhat subsided; and upon the accession of James II, Oates' pension was withdrawn and he was put on trial for perjury, was found guilty, fined, condemned to stand in a pillory, and be imprisoned for life after a terrible flog¬ ging, which he survived as by a miracle. His sentence was reversed after the accession of William and Mary; he was set free and re¬ ceived an annual pension of £300. In 1693 he

married a rich widow and a few years later joined the Baptist congregation and preached among them, but was soon expelled. Consult North, Roger, (1883) ; and the English histories of Hallam, Lingard and Macaulay.

OATH, Military, a solemn or formal ap¬ peal to God (or to any deity), in witness of the binding character of the promise, made by each recruit at the time of his enlistment. Among ancient nations and races the oath also

imprecated divine vengeance if the swearer should be guilty of a falsehood or violate his promise. When the law took his most solemn oath he laid his hand on the book of the law and swore by the God of Israel. The ancient Scandinavians and Teutons swore by their gods and laid their hands on some special object of veneration — a bloody ring held by the priest, or touched their swords or beards as they took the oath.

The Roman term for the military oath of allegiance was originally the preliminary en¬ gagement entered upon with the general by newly-enlisted troops (Cicero Off. 1, 11, 36; Livy, XXII, 38, 2). The oath was taken first by the legates and tribunes. Officers then adminis¬ tered it to the soldiers in the following manner

— one soldier in each legion recited the formula of the oath, and the rest wer'e called off by name; and coming forward one by one swore to the same oath idem in me, i.e., (

Military knighthood in the days of chivalry

— that originated between the time of Charle¬ magne and the Crusades — was subject to much form and ceremony. Manly arms were never received without a regular investiture, which became a general practice in the 11th century. Many of the orders of knighthood had their own special oaths.

The military oath of the present day con¬ sists of an enlistment contract, which is signed by the recruit. In the United States army the enlistment contract signed by the recruit is as

follows: ((I, N, born in – in the State of

- , aged – years and – months, and

by occupation a – , do hereby acknowledge

to have voluntarily enlisted this – day of

- – 19 — , as a soldier in the Army of the

United States of America, for the period of

- years in active service and in the Army of

Reserve for the periods and under the condi¬ tions prescribed by law, unless sooner dis¬ charged by proper authority; and do also agree to accept from the United States such bounty, pay, rations, and clothing as are or may be established by law. And I do solemnly swear (or affirm) that I will

bear true faith and allegiance to the United States of America; that I will serve them honestly and faithfully against all their enemies whomsoever; and that I will obey the orders of the President of the United States and the orders of the officers appointed over me, according to the rules and articles of War.® A somewhat similar formula is subscribed by the recruits of foreign armies. An oath is also administered to officers at the time of their being commissioned and also in some cases where the performance of special duty is assigned them. It is not so picturesque as the verbal oath, but it is no less binding. See Knighthood; Law, Military; Army; Navy; United States.

OATHS AND AFFIRMATIONS (Ju¬ dicial). A judicial oath is a solemn declaration made in some form warranted by law, before a court of justice or some officer authorized to administer it, by which the person taking it promises to tell the truth, the whole truth and nothing but the truth, in relation to his knowl¬ edge as to the matter then under consideration, and appeals to God to witness his sincerity. It is distinguished from an extra-judicial oath in the fact that the latter is not made under any warranted form of law, and has no binding force, except in the conscience of the one tak¬ ing the oath. An affirmation is made in place of an oath by a person conscientiously opposed to an oath, and it is a declaration which is equivalent in law to an oath. Oaths are of ex¬ tremely ancient origin, and are not peculiar to Christianity, having been used by many nations of the world. Affirmations in place of oaths were the result of a statute first enacted in England for the benefit of those to whom the invocation of the Deity was objectionable. Generally under the present laws, only those persons included within the statutes permitting an affirmation to be made in place of an oath have such right. Authority to administer oaths is an incident to judicial officers. All persons having sufficient intelligence to appreciate the nature of an oath and believing in the exist¬ ence of a Supreme Being, who demands a moral obligation to speak the truth when under oath, are competent to take an oath.

In nearly all of the United States, through statutory enactment, it is provided that every person believing in a religion, not the Christian religion, may be sworn according to such cere¬ monies as his. religion may have; a substantial compliance with the provisions of the statute as to the form of an oath is usually sufficient, the test generally being as to whether or not the person taking the oath would be liable for punishment for perjury in the event that such oath had been violated. Any person lawfully required to depose the truth, and making a wil¬ ful false oath on any material point, whether he believes it or not, is subject to be held for perjury, and punishment therefor in accordance

with the statutes under which he may be in¬ dicted. See also Evidence; Law, Criminal; Witness.

r OATS, various grasses of the genus Avena. The best known species is often subdivided into Tartarian oats (A. orientalis) and common oats (A. sativa). In the former variety the pani¬ cles are one-sided and somewhat contracted; in the latter they are loose and spreading. The origin of common oats is in doubt, but many writers suppose that they are derived without hybridizing from a Tartarian species now un¬ known to botanists. The numerous varieties of this species vary greatly in color, size of grain, height, etc., and more or less in composi¬ tion. Other species are cultivated to a small extent but are mostly considered weeds. The best known of these are probably animated oats (A. sierilis) whose seeds move with varying amounts of moisture; wild oats (A. fatua) val¬ ued in some places, for example, California, for pasturage, but generally regarded as a noxious weed; bristle-pointed oats (A. strigosa) used sometimes like the preceding but also consid¬ ered a weed; and short oats (A. brevis) cul¬ tivated at high altitudes for its seed which ma¬ tures where other cereals fail.

Oats succeed well upon a great variety of soils if these are well supplied with moisture. They will not do well in wet soil nor in hot countries, though in warm regions they succeed if the soil is moist enough. They thrive best in temperate climates, in many of which they rank as one of the most important cereal crops. The land is plowed and harrowed usually in spring and the seed either sown broadcast or drilled in at the rate of about three bushels to the acre. In the western United States the seed is commonly sown broadcast upon corn- land which has been prepared only with the harrow. In the eastern States the ground is usually plowed previous to sowing. Since the plants are very hardy the seed may be sown as soon as the ground can be worked in spring, a practice which insures an early development of the plants under favorable conditions. In about three months the harvest usually occurs in northern countries ; in southern regions a somewhat longer time is necessary because of the shorter days and usually drier conditions. Though the average yield per acre in the United States was, during the last decade of the 19th century, 26.14 bushels, yields of more than 50 bushels are common under good man¬ agement, especially in Europe. The world pro¬ duction is about 4,600,000,000 bushels per an¬ num. The 1914 production of the United States was 1,141,060,000 bushels; the production of Europe is about 2,700,000,000 bushels. Russia, Germany and France, in order named, are the largest European producers.

Oats are rather exempt from the attacks of specific insect enemies; and the means of com¬ bating the general cereal enemies are the same as for

wheat, barley and other grass and grain insects. They are subject to the attacks of sev¬ eral so-called plant diseases, of which the best known are rust and smut. Since these are less troublesome upon early maturing varieties, these are chosen in regions which seem to be infested. They also have another advantage in that they are less likely to lodge than taller a-tud later growing varieties.

The oat has long been considered one of the most valuable of cereal grains. Treated as a grass it makes an excellent forage, fodder or hay; and as a grain it is one of the standard feeds for domestic animals, particularly the horse, and is widely used as human food, espe¬ cially for making porridge. In the manufac¬ ture of what are called (

11.8; water, 11.0; crude fibre, 9.5; fat, 5.0; ash, 3.0. Since analyses have failed to reveal the presence of a supposedly stimulating principle called <(avenin,® chemists and other investi¬ gators have concluded that such a principle does not exist.

Consult Morrow and Hunt, (Soils and Crops of the Farm) (1892) ; Hunt, (The Cereals in America) (New York 1904), and Farmers' Bul¬ letins Nos. 424 and 426 of the United States Department of Agriculture and books upon general farming.

OAXACA, wa-ha'ka, Mexico, state, border¬ ing on the Pacific Ocean, and bounded on the north, east and west by the states of Puebla, Vera Cruz, Chiapas and Guerrero. Area about 28,778 square miles. The principal mountain ranges are the Sierra Madre, which crosses the whole state, and Sierra del Sur, near the coast. See Mexico — the States of.

OAXACA, or OAXACA DE JUAREZ,

da hoo-a'rez, Mexico, capital of the state of the same name. The situation, in the midst of a fertile valley, the rivers Atoyac and Jalatlaco flowing through it out into the Oaxaca valley, is most attractive. It is 288 miles southeast of Mexico City, by railway, and is 5,067 feet above sea-level. It enjoys an unlimited supply of pure water, by means of two aqueducts, one of which was built in 1755 and the other in 1880. Transportation facilities are supplied by the Mexican Southern and Oaxaca and Ejutla railways. There is a local bank, — the Bank of Oaxaca, — which, together with branches of the National Bank and the United States Banking Company, and an agency of the Bank of Lon¬ don and Mexico, supply the financial needs of the community. Within the last. few years the city has assumed much prominence as a base of supplies and headquarters for the many and rapidly developing mines of the State. The streets are laid out somewhat like those of Washington, are lighted by electricity and are well paved and

clean. The general style of architecture is Spanish, and the most notable edifices of interest are the Government Palace, the Palace of Justice, the Municipal Palace, Federal Building, Museum and Institute of Sci¬ ence and Art, the Normal School, State Hos¬ pital, Charity Hospital and the Municipal Ne¬ cropolis. The educational institutions include a number of primary schools, the State Insti¬ tute of Science and Art, in which are taught jurisprudence, medicine, obstetrics, pharmacy, telegraphy and business methods; the Normal School for Men and the Normal School for Women, in which both primary and advanced instruction is given. Two museums — the Oaxaqueno and the Fernando Sologuren — are

devoted to the investigation and study of archaeology and the natural sciences. The cathedral of the city, founded in 1553 and re¬ built in 1730, is an imposing edifice of gray stone. There are many public gardens or parks — among them the Zocolo, Guadalupe, San Francisco, Netzahualcoyoto and the Con¬ stitution. The city is believed to have been an important place long before its discovery by the followers of Cortez, by whom it was occupied in 1521. It was constituted a city by royal charter in 1532 and given its present name, Oaxaca de Juarez, in 1872. Here were born and reared several of the greatest men of Mexico; among them being Porfirio Diaz; Ignacio Mariscal, Mateos Romero, many years Minister of Mexico to the United States; and in a poor little hamlet not far distant, Benito Juarez. Pop. about 42,000.

OAXACA, Ruins of. Architectural re¬ mains found on the mountain tops around the city of Oaxaca in southern Mexico, which was founded by the Zapotecs in 1486 under the name of Huaxyacac and occupied by the Spaniards in 1522 who named it Antequera. Oaxaca is noted for two of the most noted ruin-groups in Mexico. The principal ruins are those of Mitea, the burial city of the priests and kings of the ancient Zapotecs, which show quite a distinct character, although presenting certain analogies to the Mexican. One of the chief structures is a step-pyramid rising in three steps to a height of 130 feet. Another is a pyramid of brick. Besides these there are courts surrounded by palaces which were necropolises, dwellings of the priests, chief priest and of the king. The latter's dwelling has an audience hall. The wall paintings of the palaces are remarkable. The deities are those of the Mexican pantheon.

Mitla, once a marvelous city, is now built over by a modern Indian village and, with the exception of half a dozen of its greatest temples, is practically destroyed. Mitla is 29 miles by stage to the southeast of Oaxaca on the

Tehuantepec highway.

The other ruin group is situated upon Monte Alban (6,245 feet), a few miles west of Oaxaca. Monte Alban is a mountain ridge about a thou¬ sand feet high, one mile long and a quarter of a mile wide, which has been remodeled by the hand of man into terraces, plateaus and pyra¬ mids. As it stands to-day it is in its outlines an artificial mountain and an astonishing monu¬ ment to the energy and culture of the ancient races.

The ruins of Monte Alban were explored by Garcia in 1855, by the German traveler Mitller in 1857 and by Charnay in 1858-59. W. H. Holmes, who made a careful study of Monte Alban in 1896, came to the conclusion that it was originally a hill-top city occupied by people who made use of the valley and mountain slopes for their crops and gardens.

(

of the work dawns upon the mind. As the explorer climbs the slopes and picks his way from summit to summit, he is fairly dazed by the vast array of pyramids and terraces, which not only crown the heights but overspread the steep slopes, destroying traces of natural contour and making the mountains actual works of art ® The greatest of the works covers an area of about 3,400 feet by 1,200 feet and consists of a vast series of level courts inclosed by terraces and flanked bv pyramids. The corners of the quadrangles are ornamented by pyramids and in the centre rises a mound. Some of these pyramids are 400 feet square and rise to a height of 40 feet to the summit, which is 300 feet square. The builders not having large stone used a mixture of adobe and small stones, faced with rough blocks, sometimes with dressed masonry, and covered with cement on the outside. Cement floors are observed in the ruins and much interesting sculpture. "The chain of pyramids,® says Mr. Holmes, "extend¬ ing from north to south along the middle of the great square, constitutes one of the most interesting features of these remains. How striking must have been the effect when these pyramids were all crowned with imposing temples, when the great level plateau about them, 6,000 by 1,000 feet in extent, was brilliant with barbaric displays, and the enclosing ranges of terraces and pyramids were occupied with gathered throngs. Civilization has rarely con¬ ceived anything in the way of amphithe- atric display more extensive and imposing than this.

The museum of Oaxaca has a large col¬ lection of objects taken from Monte Alban. The. American Museum of Natural History has carried on explorations in this region and owns a valuable collection of antiquities from the valley and Oaxaca, Mitla and Monte Alban illustrative of Zapotecan culture. On Monte Alban have been found pottery similar to the

ware now sold in the Oaxaca market; amulets of jadeite and other hard stone and a few gold and silver objects. It is supposed that the Monte Alban ruins are older than those of Mitla and that Mitla flourished in the 6th century a.d. Consult Charnay, (Les Anciennes Villes du Nouveau Monde) (Paris 1885) ; and (Cites et ruins americaines) (Paris 1863) ; Seler, E., (Wandmalereien von Mitla (Berlin 1895).; (Fiihrer von Mitla> (Berlin 1906) ; Bandelier, A. F., (Report of an Archaeo¬ logical Tour in Mexico in 1881 > (Boston 1884) ; Holmes,. W. H., (Archaeological Studies among the Ancient Cities of Mexico* (Chicago 1897) ; Saville, M. H., Exploration of Zapotecan Tombs in Southern Mexico) (Washington*

1899).

OB, ob, or OBI, o'be, Siberia, a great western river with its head-streams, the Biya and the Katun rising in the Altai Mountains within the frontiers of the Chinese dominions. The river flows northwest and north for 2,500 miles through level country to the Arctic Ocean, which it enters by three mouths at the great Gulf of Ob. an inlet of the Kara Sea, between Nova Zembla and the mainland. It extends between lat. 64° 30′ and 72° N., and long. 68° and 77° E., and is ice-bound from October to Tune. The chief tributaries of the Ob are the Irtish, Tcharysh, Tom and Tchulym, all navi-

gable. On the banks of the Ob are the towns of Barnaul, Tomsk and Tarym. At present only a few steamers ply on the great water-system of the Ob, of which over 9,000 miles are navigable.

OBADIAH (Hebrew, (

OBADIAH, Book of. Several verses of this book stand in some close relation with a portion of Jeremiah. The following verses of Obadiah are largely identical with the cor¬ responding verses in the 49th chapter of Jere¬ miah, but with some variations : Obadiah v, 1—4, 5, 6, 8 = Jeremiah xlix, 14-16, 9, 10a, 7. The possibilities are that Obadiah has quoted from Jeremiah, that the quotation is in the reverse order, or that both have quoted from an older oracle. A careful comparison makes it exceed¬ ingly probable that Jeremiah has quoted from Obadiah, principally because the arrangement is more natural in Obadiah and the material much more condensed. Hence, so far as Obadiah is concerned, the relation to Jeremiah may be dismissed. If chapter 49 belonged to the actual oracles of Jeremiah that might help to fix the date of Obadiah. But it is generally agreed that the oracles concerning the nations in Jeremiah xlv-li

are considerably later than Jeremiah. Hence the date of Obadiah is to be fixed quite irrespective of Jeremiah.

It is evident, however, that Obadiah quotes an older oracle, introduced by the statement in verse 1, <(we have heard tidings from Yahweh.® This older oracle consists of verses 1-4. This was a prediction of destruction to Edom, given by an unknown prophet. It was delivered, doubtless, before the destruction of Jerusalem in 586, for there are no allusions to the activity of Edom in connection with that event.

There seems no reason to doubt that sub¬ stantially the remainder of the book is by Obadiah, although some have questioned this. The prophet in verses 5-9 indicates that the

older oracle is now being fulfilled. He goes on later to predict further destruction for this nation, in connection with the general judgment upon the nations in the day of Yahweh, verses 15-16. The outcome will be that Israel will come to possess the land of Edom, verses 19-21.

The date of Obadiah is evidently after the destruction of Jerusalem in 586, for that is the event described in verse 11. It was also, evi¬ dently, when disaster had begun to come upon Edom. This was doubtless the series of disasters at the hands of the Nabateans. In 312 b.c. the Nabateans had occupied the Edomite capital, Petra, and driven the Edomites north¬ ward, this being the culmination of a movement begun quite a long time before. It is probable, therefore, that the date of Obadiah was in the 5th century b.c.

Bibliography. — Bewer, J. A., cObadiah) ((International Critical Commentary, New York 1911) ; Perowne, T. T.,*

George Ricker Berry,

Professor of Old Testament Interpretation and Semitic Languages, Colgate University.

OBALDIA, Jose Domingo de, President of Panama : b. David, province of Chiriqui, 1845 ; d. 1 March 1910. He was the son of the President of Colombia, was educated at the In¬ stitute de Christo in Bogota and completed his education in the United States at French's School, New Haven, and in New York. Re¬ turning to Panama, he became interested in agriculture and stock-raising and accumulated a fortune. In 1900 he was elected to the Colombian Congress and in 1903 was made senator and also in that year was made governor of the province of Panama, then under the rule of Colombia. He joined in the revolution of 1903 which achieved the inde¬ pendence of Panama and was made second vice-president of the new Republic. In 1904 he was appointed minister to the United States, where as

a member of the governing board of the Pan-American Union he labored for the cause of Pan-Americanism. Returning to Panama he was elected first vice-president of Panama and1 served as acting president during the absence of President Amador in Europe. Two years later (1908) he was made President, the candidate of the Liberal party. He died during his term of office. He endeavored to give the country a good administration. Obaldia was a man of wealth, owned ranches in Panama and large interests in Costa Rica and other Spanish- American countries.

OBAN, Scotland, seaport, fashionable water¬ ing place and municipal and police borough of Argyllshire, 20 miles northwest of Inveraray and 113 miles northwest of Glasgow by the Caledonian Railway and by the Crinan Canal. It is situated on the Bay of Oban, an arm of the Firth of Lome, whence it takes its name Obe-an, Ettle bay.® The island of Kerrera (four miles long and two miles wide' screens it from the Atlantic gales and makes it almost a land-locked harbor. Moreover, as it nestles at the foot of mountains of Mull, which rise picturesquely north and east of the town, an exceptionally mild climate for the latitude is*

enjoyed here. Oban is, therefore, a favorite resort for tourists in the west highlands. From the constant influx of visitors arriving by rail, yacht and steamer the place is called the "Charing Cross of the Highlands.® When Dr. Johnson visited this place during his tour through the Hebrides Oban was a tiny village. To-day it is a bustling little seaside town con¬ taining hotels, banks, shops, churches, piers and public park. At the north end of Oban Bay, on a high bluff looking over the sea, stands the ruin of Dunolly Castle. It dates from the 12th cen¬ tury and was the stronghold of the MacDou- galls, Lords of Lorn. It still belongs to the family whose modern house occupies a sheltered nook below it. The chief exports are sheep products and whisky. Pop. 5,600.

OBANDO, d-ban'do, Jose Maria, Colom¬ bian general: b. in Garcia, 1797;; d. 27 June 1861. At: the age of two years he was abducted and carried to Popayan where he was adopted by a gentleman named Obando. His origin is unknown. At first he served in the Spanish army as a guerilla and obtained the rank of lieutenant-colonel. In 1822 he joined the Revolutionists and rendered great service under Bolivar in the province of Pasto. In 1828 he opposed Bolivar and headed a Liberal revolt against the dictatorship of Urdaneta and de¬ feated the dictator at Palmira (1831). He then formed a constitutional government for the Republic of New Granada, was secretary of war and marine, and in 1832 went to Ecuador

to negotiate a treaty of peace. In 1838-41 he led a rebellion against Marquez but was de¬ feated and exiled. When his party was re¬ stored to power in 1849, he became a member of the congress and secretary of the chamber of deputies. In 1850 he was made governor of Cartagena^and in 1852 President of the repub¬ lic. In 1854 he was overthrown and exiled. In 1860 he was recalled and commissioned to sup¬ press a revolution in Cauca and in defense of the federation against the Revolutionists or Centralists, died on the battlefield of Cruz Verde.

OBEAH. See Fetish ; Obi.

OBEDIENCE, from the Latin obedire, to obey, is submission to the rule of another; the action of doing what one is bidden to do; the compliance with or the performance of a com¬ mand. Obedience is also abstaining from what is prohibited in compliance with a command or prohibition. "Obedientia est legis essentia® (obedience is the essence of the law) says Coke. Obedience (ecclesiastical) in canon law. means the duty by which the various gradations in ecclesiastical organization are held subject, in all things consistent with the law of God or of the Church, to the several superiors placed immediately above them, respectively in the hierarchical scale. Thus priests and' in¬ ferior clergy owe canonical obedience to the bishop; and bishops, by, the present law of the Roman Catholic Church, take an oath of obedi¬ ence to the Pope.

In ecclesiastical history the word obedience has a special signification and is applied to the several parties in the Church who during the ui (at v estern schism adhered to the rival popes.

I he "Roman obedience® in those days desig¬ nated all those who adhered to the Pope chosen at Rome and the "Avignon obedience® meant

the supporters of the Avignon Pope. Histo¬ rians speak of the "obedience of Gregory XII,® the "obedience of Benedict XIII® and so on. Applied to a monastic institution the word obedience signifies the voluntary submission which all members of religious orders vow to their superiors and to the rules and constitu¬ tions of the order.

The word obedience is also used to designate a place or office with the estate and profits be¬ longing to it, in a monastery subordinate to the abbot and corresponding to a dignity in a cathedral or collegiate church. The "obedien- tiares® were usually the sub-prior, precentor, cellarer, sacristan, chamberlain, kitchener, ln- firmarer, keeper of annals, hostler, almoner, pitanciar, lumberer and master of the lady chapel. The obediences varied according to the size of the monastery. Sometimes the gardener, fruiterer or keeper of the orchard was included.

The word obedience is also given to the writ¬ ten precept or formal instrument by which a superior of a religious order communicates in¬ structions to a subject, for example an instruc¬ tion to undertake a certain mission, to relin¬ quish an appointment.

The word obedience is also the name given to those rooms containing the materials for the different kinds of works which the nuns executed. There were a great many of these obediences at Port Royal, for example ˆobe¬ diences for the linen, the robery, the mattresses, the bedding, the furniture, the drugs, the apothecary's shop.® An archaic definition of obedience is a salutation, bow or curtsy — obeisance. People "made obedience® to the throne; they "made obedience® on entering a room ; and they "made obedience® on meeting each other.

OBELISK (Greek bfie/.tmiog,) obeliskos ; diminutive of obelos, "a pointed instrument,® "a

spit®; Egyptian teken, possibly related

to the Hebrew pn tokan, "to make even,® "level®; Arabic, Misallat , "a darning needle®; hence Cleopatra s needle. The Obelisk repre¬ sents the Sun. The ancient Egyptians were sun-worshippers: thev_ regarded the great lumi¬ nary as the creator of the universe, the maker of all the gods above and below, and even as the author of himself. The sun as Ra, the great god of the Egyptians, was represented upon the monuments by the solar disc. In time several other names and attributes were applied to him. The rising sun was called Har-em-khu, "Horus on the horizon.® During his daily course he was Ra, "the life-, giver,® representing day, light etc. 1 he setting sun, the symbol of night, dark¬ ness and death, was worshipped as Tum or remu.' When the number of deities in the pantheon multiplied, Rci appeared ˆhc monuments and in the papyri under different forms and names, and is represented alike by animate and inanimate objects. The ˆY9 ost striking and characteristic monuments which represented him on earth were the obe¬ li and pyramid. The obelisk, symbolical of Jignt and life, represented his daily course; the pyramid, symbolical of darkness and death the setting sun.*

i\a was praised as "the Double Obelisk® am

.SPhinx> > deitY (Budge,

sphinx is the symbol of his early rising, and is called Har-em-khu, and according to the 'Book of Dead) (q.v.) is the symbol of resur¬ rection. The

obelisk is the technical figure of one ray or pencil of light emanating from the sun.

The material chosen for the obelisk was gen¬ erally red granite, or syenite — a few, however, being of hard sandstone. The former was pro¬ cured from the granite quarries at Syene (the modern Assouan). Red granite, some Egypt¬ ologists think, was chosen for two reasons : First, as being the most durable material, fitly representing the eternal sun. Secondly, on ac¬ count of its red hue, suggesting the color of the solar disc at his rising and setting.

There were many obelisks throughout Egypt, but An, the city of the Sun (Heb., On; Greek, Heliopolis, the Beth-shemesh of the Bible), was the centre of sun worship and undoubtedly con¬ tained several obelisks, but one only now re¬ mains. It was erected, according to Petrie, by Usertesen I, a Pharaoh of the 12th dynasty (between 2758-2714 b.c.).

Of the numerous obelisks erected by Userte¬ sen I, Thothmes III, Rameses II, only 48 are still in existence ; 10 of which, including the one at Assouan, are prostrate, and 38 are found distributed in the following places : 9 in Egypt, 2 in Constantinople, 12 in Rome, 6 in Naples and other parts of Italy, 2 in France, 4 in England, 2 in Germany and 1 in United States. These monuments have always excited the cupidity and envy of Egypt's conquerors. Even as early as Augustus Caesar the work of removing the beautiful monoliths as trophies had begun. According to Rollin (Oeuvres Completes de Rollin par M. Latronne. Nou- velle ed., Vol. I, p. 14) that emperor removed two of those obelisks and made an unsuccessful attempt to remove a third.

The largest of the Egyptian obelisks _ was removed to Rome and now adorns the piazza of Saint John Lateran. It was brought from Thebes to Alexandria (about 330 a.d.) by Con¬ stantine the Great; thence to Rome by Con- stantius, who placed it in the Circus Maximus. Its present height is 108 feet and 7 inches. According to Cooper its weight is 455 tons. «On the fall of Rome the obelisk was thrown down and broken into three pieces, and it was suffered to remain unnoticed and indeed for¬ gotten, save by a few antiquaries, amidst the ruins of the ancient circus till Pope Sixtus V caused it to be excavated, restored and re¬ erected in the present state (1588 a.d.) Cooper, (Egyptian Obelisks, * p. 35.*

The obelisk in Central Park, New York, and the one on the Thames Embankment, London, are commonly known as ((Cleopatra's needles. They were removed from Alexandria. The lat¬ ter lay prostrate, half buried in sand, and was removed in 1877 to England. Our obelisk was brought over to this country at the expense of the late Mr. W. H.*

Vanderbilt in 1880. Both originally adorned the temple of Ra at Heli¬ opolis and were erected by Thothmes III (1503- 1449 b.c.) . The hieroglyphic inscription on our obelisk bears the legends of two Pharaohs, Thothmes III and Rameses II. The central column on each side speaks of the achievements and triumphs of Thothmes III over the heredi¬ tary enemies of Egypt, the Khetta (the Hit" tites). The two lateral columns were engraved

about 300 years later by order of Rameses II. The legend treats of the same subject. He also fought the Khetta.

Commander Gorringe ((Egyptian Obelisks, p. 115) gives a comparative table of the meas¬ urements and weight of these interesting mono¬ liths. According to him the exact measure¬ ment of the obelisk in Central Park is 69 feet 6 inches in height, 7 feet 9 inches thick at the base and 448,000 pounds in weight. The Lon¬ don obelisk is 68 feet 5 inches in height, 7 feet 8 inches thick at the base and its weight is 418,000 pounds. The hieroglyphic inscriptions upon the south and west sides of our obelisk are deteriorated. But those on the east and north sides are in good condition. The inscrip¬ tion upon the pyramidions are almost obliterated.*

Bibliography. — Cooper, (Egyptian Obe- lisks) (London 1877) ; Yates, (Remarks on the Obelisks (1845); King, (Cleopatra's Needle: A History of the London Obelisk) (London 1884) ; Marucchi, (Gli Obelischi egiziari di Roma) (1898) ; Gorringe, (Egyptian Obelisks) (1883) ; Fontana, (Della trasportatione dell' Obelischo Vaticano* (1500) ; Ferry, (L'Obe- lisque de Louxor) (1868) ; L'Hote, (Notice historique sur les Obilisques* (Paris 1836).*

OBER, o'ber, Frederick Albion, American author: b. Beverly, Mass., 13 Feb. 1849; d. 1913. He was educated in the public schools and made a study of ornithology, traveling extensively in the pursuit of his studies in the West Indies (1876-80), Mexico, Spain, South America and northern Africa. He discovered 22 new species of birds. He has written (Camps in the Car- ribees) (1880) ; (The Silver City) (1882) ; (Travels in Mexico) (1883); (Montezuma's Gold Mines> (1885); # (1892); (Josephine, Empress of the French (1895); (Under the Cuban Flag* (1896) ; (History of the West Indies) (1900) ; (The Cacique's Treas¬ ure Cave* (1901); (The Last of the Arra- waks* (1901) ; (Tommy Foster's Adventures* (1902) ; (Hernando Cortes, Conqueror of Mex¬ ico* (1905) ; (Two Boys with Columbus* (1905); (Pizarro and the Conquest of Peru* (1906) ; (Heroes of American History* (12 vols., 1907) ; (A Friend of King Philip* (1907); (A Guide to the West Indies and Bermudas* (1908).*

OBERAMMERGAU, o'ber-am"mer-gow, Bavaria. See Ammergau; Passion

Play.

OBERHAUSEN, o'ber-how-zen, Germany, a town of Rhenish Prussia, in the Rhine val¬ ley, a few miles northeast of Duisburg, an im¬ portant railway centre and seat of industry, having blast-furnaces, rolling-mills, forges, rail¬ way shops, extensive chemical works, porcelain, tinware, soap, wire-rope, glass factories and productive coal mines, etc. Pop. over 100,000.

OBERHOFFER, o'ber-hof'er, Emil, Ger¬ man- American musician : b. near Munich in 1867. He received his early musical education from his father, a capable organist, and played the organ and violin extremely well at the age of 10. He studied the piano and musical composition under Carl Kistler in Munich and in Paris under Isidore Philip. He settled in the United States and became conductor of the Apollo Club at Saint Paul. In 1901 he directed the Philharmonic Club in Minneapolis and through his efforts the Minneapolis Symphony

Orchestra was organized and endowed. Of this Mr. Oberhoffer has been the conductor since its creation in 1903 and has raised it to a high standard of excellence that ranks it with the leading symphony orchestras of the United States. He also holds the chair of music in the University of Minnesota.

OBERHOLTZER, o'ber-hol-ser, Ellis Pax- son, American historian ; son of Mrs. S. L. Oberholtzer (q.v.) : b. Philadelphia, 1868. He was educated at the University of Pennsylvania (Ph.D. 1893), and at Berlin, Heidelberg and Paris; was on the editorial staff of the Phila¬ delphia Evening Telegraph (1889-96) ; edi¬ tor of The Manufacturer (1896-1900), literary and . dramatic editor of the Philadelphia Public Ledger (1902-08). He has published (The Referendum in America) (1893, 3d ed., 1908) ; (Die Beziehung zwischen dem Staat und der Zeitungspresse> (1895); (1904); (The Literary History of Philadelphia> (1907);

OBERHOLTZER, Sara Louisa (Vickers),

poet, author and philanthropist: b. Uwchlan, Chester County, Pa., 20 May 1841. She was educated at Friends Boarding School, Millers- ville Normal, and by private tutors. From 1890 Mrs. Oberholtzer devoted much of her time to the introduction of the school savings banks system into the public schools of the United States and Canada. Mtrs. Oberholtzer was one of the speakers at the first meeting of the Na¬ tional Council of Women in

Washington, D. C., 1890; at the World's Congress of Women in Chicago in 1893; at the Geneva (Switzerland) meeting in 1903, etc. Her bulletin on < School Savings Banks, > written for the United States Bureau of Education, and printed by the gov¬ ernment in 1914, has been widely distributed. Files of her Thrift Tidings, the quarterly she issued regularly for the public since 1907, will be found in most of our State and public libra¬ ries. Mrs. Oberholtzer is the acknowledged leader of the school savings banks movement now established in public schools in nearly every State in the Union and some schools in Canada. Her published books are (Violet LeeP (Come for ArbutusP

OBERLANDER, o-ber-lan'der, Adolf, Ger¬ man caricaturist and artist: b. Regensburg, 1 Oct. 1845. In 1861 he entered the Munich Art Academy and later became a pupil of Pilotys, making brilliant progress under his instruction. Ffe found that historical painting did not suit his particular talent, which he early revealed in a humorous cartoon published in 'Fliegende Blatter (1863). He subsequently abandoned painting and devoted his entire time to humor¬ ous and satirical designs, which showed such striking virtuosity that he became the leading artist on the staff of 'Fliegende Blatter. * He is strong as a caricaturist and exquisitely deli¬*

cate as a draughtsman, and his use of satire and ridicule is good-natured and avoids the coarseness and brutality sometimes too appar¬ ent in the pages of the comic papers. The majority of his cartoons have been collected and published in the 'Oberlander Album (Munich 1879-1901). Oberlander's subjects are taken from mythology, fairy lore, fables, animal life and the customs and habits of the German middle class. He is also a painter of some note ; and pictures of his are in the gal¬ leries of Munich, Berlin, Dresden and other cities of Germany and in private collections.*

*OBERLIN, Jean Frederic, o-ber-lan, Al¬ satian clergyman and philanthropist: b. Strass- burg, 31 Aug. 1740; d. Ban-de-la-Roche, 1 June 1826. He was educated at Strassburg and in 1767 became pastor at Ban-de-la-Roche. There he spent the rest of his long life in labor for the material and spiritual improvement of his degraded parishioners. He practised medicine among them, founded a loan and savings bank, introduced cotton manufacture, helped the peo¬ ple build better roads, and brought in modern agricultural methods. His orphan asylums were the beginning of the many "Oberlin- vereine** for the protection of children. Be¬ side all this he ■yvas a man of rare spirituality, being frequently styled "a saint of the Protes¬ tant church,** and an excellent pastor, who preached each month three sermons in French and one in German. Oberlin College (q.v.), Ohio, was named in his honor. Consult the biographies by Butler (English, 1882) ; Lutte- roth (French, 1826; a German version, 1890) ; and Hackenschmidt (German, 1902) ; and the life and works of Oberlin as*

edited by Hilpert and Stoeber (German, 1843).

OBERLIN, Ohio, village in Lorain County; on southern division of New York Central main railway system, east and west; Lorain and Ashland and the Lorain and West Vir¬ ginia north and south; also the Cleveland, Co¬ lumbus and Southwestern interurban electric railway, 33 miles west by south of Cleveland, on the State highway. It was settled in 1833 as a college town, and Oberlin College was founded the same year, and has grown to be one of the largest colleges in the United States. Oberlin was incorporated as a village in 1846 and has always been noted for its beautiful shady streets and fine homes, it has never had any saloons, it is an ideal residence town. It is in a fertile agricultural region and its indus¬ tries are chiefly connected with farm products. Besides the college and its fine system of pub¬ lic schools, there is a business college and a kindergarten training school. Pop. 4,365, with¬ out the students numbering 2,000.

OBERLIN COLLEGE, at Oberlin, Ohio; coeducational, founded in 1833 under the name of the Oberlin Collegiate Institute. In 1850 the name was changed to Oberlin College, although from the beginning the work offered was of college grade. The preparatory was the first department opened, but within two years the collegiate department and the theological school were organized and in operation. It was the first college in the United States to adopt co¬ education, and in 1835 admitted students "with- out respect to color.» Oberlin College was a noted centre from which emanated strong anti¬ slavery sentiments, and in the vicinity was the

Underground Railroad" (q.v.), so much used 1 ni- -Very by the Abolitionists (q.v.). In addition to the regular courses in the College of Arts and Sciences, there is a department of music and a graduate school of theology (un¬ denominational). .Courses are also given in physical education for both men and women. There is a summer school (offering work of college grade only). There is an average of 190 teachers and officers connected with the college, and a total student enrolment of 1,700. The attendance in the College of Arts and Sciences is limited to 1,000. The college has 5,280 living alumni. The library contains 185,985 bound volumes and 153,193 unbound volumes and pamphlets. The buildings and equipment of the college are valued at $2,266,650. The pro¬ ductive endowment amounts to $2,929,170.91, not including the Hall bequest, which will ulti¬ mately come into the possession of the college for endowment purposes, conservatively esti¬ mated at $3,000,000. For

1917-18 the total income of the institution was $642,799.89.

OBERLIN THEOLOGY. This term is applied to a system of doctrine inculcated at Oberlin College by the teaching of the Rev. Charles Grandison Finney (1792-1875), who became professor of theology at Oberlin Col¬ lege in 1835 and president in 1851-66. Finney was an impressive teacher and preacher, who broke away from Calvinism and modified its tenets. Finney carried on revival services in New York, Philadelphia and Boston during the years 1828-57, and in London in 1849-50, and traveled through England and Scotland in 1858, expounding his theories and holding re¬ vivals.

The general type of doctrine is the "New School Calvinism," of which the characteristic thought is that all responsible character per¬ tains to the will in its voluntary attitude and action, and that each moral agent determines for himself, in the exercise of his own freedom, whatever is morally praiseworthy or blame¬ worthy in his character and life; that sin is a voluntary failure to meet obligation, and that nothing else is sin ; and that righteousness, or holiness, is a voluntary conforming to obliga¬ tion such as is always in the power of every moral agent. Neither sin nor holiness can be transmitted, inherited or imputed, in the sense of being reckoned to the account of one in whose will it has not originated. As punishment can be inflicted only as an expression of blame¬ worthiness, no one can be liable to punishment for Adam's sin, because no one can be blame¬ worthy for any sin but his own. It is just as impossible that one should be forgiven any sin but his own. The ethical philosophy of Finney and his associates makes the well-being, or blessedness of the sentient universe the Sum- mum bonum, or ultimate good; and the volun¬ tary regard for this good, which is called be¬ nevolence, _ the grand element of all virtue. It is a peculiarity of the Oberlin Theology to re¬ gard virtue (or righteousness) and sin as in their own nature antagonistic to one another, each being contradictory of the other, and necessarily exclusive of it. Virtue being benevolence, and sin the refusal to be benevo¬ lent, they cannot coexist in the same will.

The Oberlin doctrine of sanctification first promulgated at Oberlin by Mr. Finney and

others was based upon the prevalent idea that some sin still remains in the character and ac¬ tion of the converted man, coexisting with his obedience. The problem of sanctification is to eliminate this remnant of sin and make the obedience entire and permanent. On this view there would be two classes of Christians : the simple converted rendering a partial consecra¬ tion and obedience ; and the entirely sanctified whose consecration and obedience are entire. The theoretical and practical views of the Oberlin theology may be gathered from the fol¬ lowing: The Oberlin Evangelist (24

vols.,

Oberlin 1839-62) ; The Oberlin Quarterly Re¬ view (4 vols., Oberlin 1845-49) ; Finney, Charles G., Systematic Theology } (2 vols., Oberlin, 1845-46) ; Fairchild, (Moral Philoso- phy> (New York 1869) ; Foster, F. H., (Genetic History of New England Theology) (Chicago 1907). The modern theological ideas of Oberlin College are set forth in King's Reconstruction in Theology } (1901) ; (Theology and the Social Consciousness } (1902); (The Seeming Un¬

reality of Spiritual Life) (1908), and cTheLaws of Friendship: Human and Divine) (1909).

OBERON. Of all the works of the once fashionable, facile and wildly piquant senior member of the poetical galaxy which made the court of Karl August of Saxe-Weimar the literary centre of Germany, his romatic epic (Oberon) (1780), is the only one universally read to-day in Germany. However, it is diffi¬ cult for our age to appreciate Goethe's en¬ thusiastic reception of the poem with the prophecy that "as long as poetry remains poetry, gold gold and crystal crystal,

It transplanted the manner and form of Ariosto's (Orlando furioso, though the stanzas are not so regularly built as the Italian. Based on Count de Tressan's (1778) narration of the chanson de geste of "Huon de Bordeaux® (12th century) and influenced by Shakespeare's and Pope's version of Chaucer's (The Marchantes Tale,* it mingles the fairy lore of Brittany and of (The Arabian Nights* to celebrate exploits of the king of the fairies, Oberon (Old French Alberon, derived from the German Alberich — (Elf-prince*). For the slaying of Karl the Great's despicable son, Chariot, Huon duke of Guienne, is con¬ demned to go to Babylon (or Bagdad) and de¬ mand four molars and a tuft of the beard of the kalif after kissing the latter's daughter and slaying her intended. This feat is accomplished through the friendship of Oberon and the magic power of his horn, a blast of which causes all wicked persons to dance, and of a certain ring, which had been abstracted from its owner, Titania, and to which all the spirit world was subject.- Commanded to go to the Pope at Rome before consummating marriage with the kalif's daughter, Huon yields to temp¬ tation and the couple are thrown on a desert isle by Oberon, who had deserted his Titania with the vow never to return to her unless a human couple should be found who were abso¬ lutely faithful, since she had championed the faithless girl wife of an aged dotard. About the invented quarrel of Oberon and his queen, Titania, is centred the whole conception of Wieland's poem. Thrown by the instrumental-*

ity of Titania into captivity in Tunis, Huon and Rezia withstand the first test of temptation and, reunited, return to Paris and reconcile Karl. C. M. von Weber based his opera (Oberon } on Wieland's poem. Consult Kohler, Reinhold, (Oberon) (Leipzig 1868) ; Wieland, C. M., (Gesammelte Werke> (Franz Muncker, Vol. I, Stuttgart and Berlin) ; id., (Prussian Academy of Sciences, Erich Schmidt and others, 1909; English trans., William Sotheby, London 1805).

Carl E. Eggert.

OBERON, OR THE ELF-KING'S OATH, romantic English opera in three acts by Cad Maria von Weber, libretto by James R. Blanche, first represented at Covent Garden, London, 12 April 1826. The libretto is founded on Villeneuve's romance, (Huon of Bordeaux) and Sotheby's translation of Wieland's poem (Oberon. > It was Weber's last work. The keynote of the whole is the picture of the mysteries of elf-land and the life of the spirits of air, earth and water, and through the hazy atmosphere of elves and spirits are discerned the outlines of two contrasting themes — West¬ ern chivalry and Oriental life.

Reiza's aria, (Ocean thou Mighty Monster, } in the second act is frequently sung on the con- cel t stage b}^ dramatic sopranos. The charming overture beginning with a horn solo also has frequent independent performance. Mendels¬ sohn, Gade, Schumann and Wagner have all drawn inspiration from this sublime and dreamy work.

The original autograph score is in the Royal Library, Petrograd, having been presented by Max von Weber to Alexander II in 1855.

The opera was translated into German by Theodor Hell and given in Leipzig in Decem¬ ber 1826; in Vienna, 20 March 1827, and in Ber¬ lin, 2 July 1828. It was given in Paris in German without success in 1830 and in French with success in 1857. Oberon was first sung in New York, 9 Oct. 1829. It was given in Italian at Her Majesty's, London, 3 July 1860, with recitatives by Sir Julius Benedict, and this version was given in Philadelphia, 9 March 1870. (OberoiP was revived in London, 7 Dec. 1878 and in New York at the Metropolitan Opera House, 28 Dec. 1918, in a new revision by Arthur Bodansky, who conducted the work. Consult Upton, Standard Operas (Chicago 1897), and Musical America (New York) 4 Jan. 1919.

OBESITY, a bodily state characterized by excessive collections of fatty

tissues beneath the skin and within the tissues and organs of the body. In states of health the skin is provided with a layer of fat, which ordinarily increases and decreases as the state of health, amount of lood or amount of exercise varies. Obesity becomes a disease when the increase of fatty tissue interferes with the functions of the body in its various parts. The condition may be in¬ herited or acquired. The producing cause of most but by no means of all cases of obesity is the ingestion of more food than is required by the body. This is particularly true of the foods that are readily converted into fatty tis¬ sue — the carbohydrates (starches and sugars), fat and alcohol. In those who lead sedentary lives or are naturally indolent these substances, unless sparingly indulged in, cause the fatty

accumulations. There is also an interrelation between the sexual life and obesity, as seen at the time of puberty and at the menopause in many women, and by the deposition of fat in animals after castration. In ordinary cases of obesity the fat accumulates jn the form of tiny droplets in the tissue-elements; in fatty degen¬ eration the tissue elements are changed into fat. Fatty degeneration is found in the organs of those not afflicted with obesity, but in the late stages of the disease under consideration this very serious morbid change may come about.

The mechanisms by which fat is formed in the human body are by no means clearly under¬ stood. Physiological chemistry teaches that the synthesis of fat begins with glucose which on oxidation forms pyruvic acid. A hormone ac¬ tion, or enzyme, converts this into an acetalde¬ hyde and carbon dioxide. Condensation then forms ketone acids which by the processes of condensation and polymerization builds up fatty acids. This is all under the control of the vegetative nervous system.

The underlying causes of these disturbances in metabolism are not always clear ; while the excess of food consumed to the amount used in physical and mental labor is frequently ac¬ countable for the trouble, there are in many in¬ stances undiscovered factors. It is possible that deficiencies in the internal secretions from the thyroid and other glands may be in some way connected with the trouble. In myxoedema (q.v.) there is a disorderly deposit of fat through the body, and this disease is apnarently due to atrophy of the thyroid gland. A number of glandular interactivities are related to different types of obesity. There is a marked/ hypo- pituitary type of obesity following pressure on the infundibulum with marked fatty develop¬ ments particularly seen in young children or young adults. These are frequently seen after mild grades of hydrocephalus, which causing pressure on the pituitary, causes a partial atrophy of this gland and obesity becomes pro¬ nounced. . It may persist unless another gland¬ ular activity compensates for it. The gonadal

i.e., genital — obesity of the eunuch and eunuchoid states have been mentioned. In later life pancreatic obesity is a frequent type. Hypothyroid states lead to the mvxcedematous types. Hypoovarian types are also frequent.

Various plans of dietary treatment, most of which are unscientific, have received their orig¬ inators' names. Among the first was that prac¬ tised by William Banting (q.v.) on himself at the. advice of Harvey. According to ((Bant- ingism the patient partakes of only 20 ounces of dry food in 24 hours and over half of this aUowance is meat, while the fluid is reduced to 35 ounces. This plan, while it removes the food most likely to form fat, gives to the individual ˆmount nitrogenous matter difficult of digestion and assimilation, and deprives the body of heat-producing substances. Further¬ more, the normal fat-supply of the brain is seriously reduced. A small proportion both of fat and carbohydrate must be combined with nitrogenous matter in order to ensure normal metabolism.

The Ebstein treatment recognizes the fact that fat is more easily disposed of in the body than starches and sugars, and that meat sub-

stances may be converted into fatty tissue when in excess. He, therefore, allows some fat, a moderate amount of meat, and almost entirely eliminates carbohydrates from the dietary. He also greatly restricts water and forbids alcohol. An ordinary diet-list made up according to this system is as follows : Breakfast, tea without sugar and dry buttered toast ; dinner, meat soup or roasted fat meat with fat gravy, one or two fresh vegetables in moderation, salads and dried fruits ; supper, an egg, moderate allowance of ham or fat meat and an ounce of thin well- buttered toast or dry bread.

The Oertel plan is much like the Ebstein, but the fats are not so freely given, and the carbo¬ hydrates not so sparingly. Great reliance is placed on graduated exercise to strengthen the heart's action, and thus the condition of the patient is improved and the fat oxidated. Patients under this system are made to climb carefully graded mountain paths for specified distances, which increase as the heart becomes stronger. Patients showing respiratory embar¬ rassment are allowed only about 25 grams of fat, 90 grams of carbohydrate and 150 grams of proteid ; those showing no respiratory em¬ barrassment are allowed less proteid and more fat and carbohydrate.

The table prepared by Yeo contrasts these dietaries with the normal average :

Albuminates

Fats

Carbo¬

hydrates

Normal average . . . .

grams

grams

grams

. 130

84

404

Banting .

. 170

10

80

Ebstein .

. 100

85

50

Oertel .

25-40

70-110

Schweinger's system is practically the same as Oertel's, differing in withholding all fluid un¬ til two hours after meals, allowing very little then. Germain See allowed a diet of proteid and fat, and required his patients to take large amounts of fluid. This plan seems to be well suited to individuals

afflicted with gout and rheumatism. Others rely on rest and passive exercise, in the form of Swedish movements, etc., with a skimmed-milk dietary gradually re¬ placing the ordinary food until the skimmed milk becomes the only article allowed. The patient is confined to a single room and for 10 days is allowed to walk but little. Careful watch must be kept that the patient's strength be not overtaxed. Many <(eat and grow thin® diets have had their day; they chiefly are valu¬ able in that they permit stomach satisfaction without offering too much food convertible into sugar. A properly selected opotherapy in the hands of a competent neurologist offers the best general treatment for excessive obesity.

OBERSTEIN, Germany, town of the prin¬ cipality of Birkenfeld, in the state of Olden¬ burg, 32 miles southwest of Kreuznach on the railroad to Miinster-am-Stein, and on the Nahe River, a tributary of the Rhine at Bin¬ gen. With the adjacent township of Idar on the Idar Bach, it has been famous since the 16th century for the cutting and setting of agtes and other precious stones, formerly found in abundance in the amygaaloidal melaphyre of the district in the Galgenberg or Steinkaulen- berg overlooking Idar, and which is reputed to have furnished many of the Cinque Cento and Roman gems. By the middle of the 18th cen¬ tury the local deposits were almost exhausted,

but the important industry has been continued and increased by the importation of agates and other ornamental stones from all parts of the world, chiefly from Uruguay. Steam and elec¬ tricity have largely supplanted the 'abundant water-power, operating the jewel-mills lining the Nahe River for over 30 miles from above Kreuznach to below Idar. Pop. 10,000.

OBI, o'be, a river in Siberia. See Ob.

OBI, o'bi, OBE, or OBEAH, a species of witchcraft practised among the native African and the West Indian negroes. The law of Ja¬ maica, enacted in 1760, which prohibited under severe penalties the practice of obi, enumerates among the materials used for fetishes or spells, bloody feathers, parrots' beaks, dogs' teeth, alli¬ gators' teeth, broken bottles, grave dirt, rum and egg shells. Balls of earth or clay mixed with hair,, rags or feathers and bound with twine, or in some cases blended with the upper section of the skulls of cats or stuck round with^ cats' teeth and claws, or with human or dogs' teeth and with glass beads were also used. In 1762 the influence of the obi men produced a formidable insurrection among the slaves in Ja¬ maica and several of these sorcerers were hanged by the authorities. See Fetish ; Witch¬ craft.

OBIDOS, Narrows of, Brazil, a contraction of the Amazon River, near the

town of Obidos, 400 miles from the sea, where the river is com¬ pressed into a single course a mile wide and over 200 feet deep, through which the water rushes at the rate of four to five miles an hour. In the rainy season the flood-level near Obidos rises 35 feet above normal low river.

OBIT, o/bit or ob'it (Lat. obitus, decease), the service in the Church at the solemn inter¬ ment of the dead ; in the Roman Catholic Church, an annual religious service, founded for celebrating the memory of a deceased per¬ son and for the expense of which an endow¬ ment was left in many European countries. It is also called an annual or a year's memory. The institution of obits is said to be an ancient one in the Church. It is attributed to the prac¬ tice in the primitive church of commemorating the martyrs, on the anniversary of their deaths. During the period of prosperity following the persecutions similar commemorations were ex¬ tended to benefactors of the Church and to private individuals by friends and relatives. A like institution, called the .commendation qf benefactors, is observed in the English univer¬ sities.

OBITER DICTUM, in law, an opinion by a judge on a legal point not in issue or forming no part of the grounds of the decision. Obiter dicta, while having no commanding authority, are nevertheless of some weight, particularly when uttered by eminent judges. Distinguish¬ ing between the law of a case and the dicta is sometimes very difficult, even for the jurist, but it is important, as the dicta have not the binding authority of law. The United States Supreme Court has held (16 How. 287) that to make an opinion a decision ((there must have been an application of the judicial mind to the precise question necessary to be determined to fix the rights of the parties, . . . and, there-

fore, this court has never held itself bound by any part of an opinion which was not needful to the ascertainment of the question between the parties." Where appeals are frequent, it is usual for judges to fortify their decision by statements of merely collateral principles and hence obiter dicta have become common. Speak¬ ing generally, it may be said that dicta of emi-ment judges have approximately as much legal weight as would be attached to the utterances of eminent legal writers.

OBJECT, Philosophical. See Metaphys¬ ics.

OBJECT-GLASS, or OBJECTIVE. See

Lens ; Microscope ; Telescope.

OBJECT TEACHING, a model instruction

in which the teacher makes use of objects, pictures, charts and other aids to concrete presentation of the ideas to be taught. The claim of the advocates of purely objective teach¬ ing for young pupils is that the development of the child naturally proceeds from concrete to concrete and that the recognition of this fact is essential for successful teaching of the young. Objective teaching is the means toward an end. Young children live a life of concrete things. They have all the concrete world about them to learn and nature has so fitted them that they readily learn everything that they can handle, feel, touch, taste or experiment with in any way with the senses. Childhood is the age of experiment and concrete investigation. Ob¬ jective teaching takes advantage of this fact and it proceeds to teach children through the senses. They are made acquainted with more or less abstract ideas by sensual knowledge of objects. Forms, sizes, shapes, colors, numbers, qualities and attributes the child learns by actu¬ ally coming into contact with them and making them a part of the daily experiences of his young life, in a way that seems no different to him from his general and natural manner of acquiring knowledge.

Object teaching is extended to the teaching of sciences, languages, mathematics and other subjects. In fact there is not a branch of education in which the principles of objective teaching have not made the presentation of the subject matter more concrete; hence, more com¬ prehensible. The aim of object teaching is to train the senses, to increase the interest, to im¬ prove the power of judgment and to aid the ex¬ pression of ideas through the development of languages. That these objects may be attained all matter must first be presented to the percep¬ tion of the child in a concrete form and with such associations as at once to interest and thus cause a reaction in his mind. In other words, he is taught to think in his childish yet natural way. The teacher's business, therefore, in proper object teaching, is so to direct the activ¬ ity of the child, through the use of natural ob¬ jects about him, that he may learn not only to know them but also to compare them with other things and to reason about them.

Object teaching is as old as the teaching of the race. All primitive peoples have had some system of teaching generally suited to their social and racial advancement. Thus teaching and schools preceded the actual knowledge of letters. At the time of the discovery of Amer¬ ica all the cultured races of the New World had extensive systems of indigenous education,

which for all, except the priestly Ciass and the interpreters of the hieroglyphic manuscripts, was taught in a purely objective manner. In other words, the pupils learned to do by doing and their doing was done in order to learn. Here, therefore, in America, there existed ob¬ ject teaching in that

early period of education when the means of recording the ideas of man were so imperfect that they had still to remain in the hands of professional interpreters and, hence, entered very little into the life of the nation as a whole. Under these conditions, objective teaching was the only possible method. In the lives of all the peoples of Europe and the other countries of the Old World there existed also a period in which writing, if used at all, was in such an undeveloped state that it was in the hands of professional interpreters, who were generally of the priestly class because the rituals of religion, of charms and medicines, which were a part of religion, were those which the tribe or nation valued most and so made most efforts to preserve. It was only after so¬ ciety became more complex and printed books came into use that object teaching was super¬ seded by printed information, which often con¬ veyed information in a manner far from the spirit of the old oral and objective method of imparting knowledge through experimental con¬ tact.

Long after the direct method of teaching had practically disappeared from the schools of Europe, it retained its hold where it had begun, that is in the teaching and imparting of knowl¬ edge of trades and, to a certain extent, of pro¬ fessions ; pupils even being apprenticed to doc¬ tors, lawyers, druggists and other professional men to learn professions experimentally and practically. Even in Greek and Roman times efforts were made to make teaching more prac¬ tical and many of the teachers taught almost altogether objectively. It was in the Middle Ages, when teaching fell almost altogether into the hands of the Church and practically only the priests and the members of the learned pro¬ fessions were educated, that object teaching was replaced by book teaching. Very early in this period there were gropings toward more concrete teaching. Among the first of the advo¬ cates of more objective presentation of knowl¬ edge was Comenius (1592-1670), who definitely formulated the principles of object teaching and organized and applied them to the work of the schoolroom. He proclaimed his gospel in words that sound very familiar to day; <(Since the beginning of knowledge must be with the senses the beginning of teaching should be made by dealing with actual things. The object must be a real useful thing capable of making an im¬ pression on the senses." He wrote and pub¬ lished textbooks illustrated with pictures to be used in objective teaching; and he advocated the use of pictures of things to make concrete the words relating to them. Comenius had many imitaiDrs in his day and his idea of pic¬ ture charts is still followed, especially in the teaching of modern languages, in several European countries. The natural successor of Comenius was Rousseau (1712-78) . He made a great step in advance when he insisted in taking into consideration the experience of the child in his relation to the facts of life around him. He proclaimed his gospel: "Never substitute the sign for the thing itself save when it is impos*

sible to show the thing; for the sign absorbs the attention of the child and causes him to iorget the thing represented.® Pestalozzi (1746- lo26) got his first ideas of object teaching from the writings of Rousseau. He attempted to put objective teaching on a scientific basis. Starting with the idea of wsense impression,® he pro¬ claimed that it was the <(only true foundation of human instruction, being the only true founda¬ tion of human knowledge. All the rest results from this sense impression and the process of abstraction made through it.®

In Germany the teachings of Pestalozzi took root; and his pupils carried his pedagogical ideas to their logical conclusion. They studied the child and his surroundings and proceeded to teach him in conformity with these surround¬ ings and his own natural tendencies, and they evolved a practical working system and built up about it a complex structure of the theory of object teaching which is being added to daily in all parts of the civilized world. So thoroughly was this work done that early in the latter half of the 19th century object teaching had been introduced into most of the primary schools of Germany. As early as 1854 the importance of object teaching had been recognized by the kingdom of Prussia; and in 1872 the German government, through the Minister of Education, placed itself on record as favoring object teach¬ ing in the schools of Germany.

After the Franco-Prussian War object teach¬ ing began to come into its own in France, and it was gradually but rapidly introduced into all the primary schools of the republic. Many ex¬ pounders and defenders of the system sprang up and France came rapidly to the fore as the prophet of object teaching and the use of the natural method in the imparting of foreign languages.

As early as 1809 Joseph Neef established various Pestalozzian schools in the United States ; in Philadelphia, 1809 ; Village Green, Pa., 1813; Louisville, 1816; New Harmony, Ind., 1825 ; Bar Harbor, Mass., 1839; Westfield, Mass., 1844. Westfield introduced object teaching and claimed that all branches of study could be taught objectively. In 1860 Edward A. Sheldon (q.v.) became acquainted with a collection of pictures, models and appliances made use of by the English Home and Colonial School Society. These he found in the National Museum (of Education) in Toronto. Canada. On his return to Oswego, N. Y., he introduced object teach¬ ing into the public schools. In 1863 Sheldon read a paper on object teaching before the National Teachers' Association held in Chicago, which so interested that body that a committee was appointed to inquire into the subject and to report to the association. Two years later the committee reported favorably; advocating the establishment of object teaching in the

elemen¬ tary schools of the United States. Prof. H. H. Straight gave to the movement system and or¬ ganization and applied object teaching to science, and W. T. Harris followed along the same lines and introduced object teaching into the schools of Saint Louis. His influence carried the move¬ ment to most of the schools of the United States. Out of these and other efforts for the establishment of object teaching in primary schools grew the wider embracing (

United States, but in Canada, the Latin-Amer- ican countries and Europe. (See Kinder¬ garten; Nature Study Pedagogy; Pesta¬ lozzi; Sheldon, E. A.). Consult Barnard, 'Pestalozzi and his Educational System > ; Ob¬ ject Teaching } ; Calkins, (Primary Object Les¬ sonsˆ ; 'Manual of Object Teaching > ; Ricks, (Object Lessons > ; Salmon, D., (Longman's Ob¬ ject Lessons) ; Sheldon, E. A., < Manual of Elementary Instruction.)

J. H. Cornyn,

Editorial Staff of The Americana. OBLATES. See Orders, Religious.

OBLIGATION, the binding power of a contract, promise, law or the like ; also, a written instrument creating an obligation, as a deed or bond. This term dates back to Roman law (obligatio) . In English law it is restricted in meaning to the duty of the party who is bound to perform, whereas in Roman law it signified also the right of the party who could enforce performance. A party who is bound to per¬ form an obligation is to-day known as an obligor or debtor, while the party who can en¬ force performance is known as an obligee or creditor. The Roman law, like the English law, to-day, held that obligations may arise ex con¬ tractu (from contract) or ex delicto (from tort). The Romans further divided obliga¬ tions into those quasi ex contractu and those quasi ex delicto. These classifications are re¬ tained by many codes in Europe to-day. An example of an obligation quasi ex contractu is one which arises in case of an unauthorized agency or when one party is enriched unjustly at the expense of another. An example of an obligation quasi ex delicto is one which arises when a party is held to be liable for a tort which he did not commit or authorize.

Obligations are extinguished by performance, by the creditor accepting something in lieu of performance, by confusion (which arises when the debtor becomes heir to the creditor, or the reverse), by novation, by set-off, by release, by limitation, by death of one of the parties (usually only in obligations exdelicto), by bank¬ ruptcy, etc.

OBLOMOF, by Ivan Alexksandrovitch Gdncharof, is regarded as one of the master¬ pieces of Russian literature. The character of its hero so completely stands for a type common in the old days of^ serfdom, that it has given rise to a term, oblomovshchina or oblomovism, signifying something more than mere indolence, though indolence is its root. It is outlined in the very first glimpse that we get of Oblomof as he lingers in bed while all the rest of the world is busy with pleasures or affairs : <(He was a pleasant-looking man of two or three and 20, of medium stature, with dark gray eyes; but his face lacked any definite idea or concentration of purpose. A thought would wander like a free bird over his features, flut¬ ter in his eyes, light on his parted lips, hide it¬ self in the furrows of his brow; then entirely vanish away, and over his whole countenance would spread the shadeless light of unconcern. This, indifference extended even to the attitudes of his body,, even to the fold of his dressing- gown. Occasionally his eyes would darken with a shade of weariness or disgust, but neither weariness nor disgust could for an instant dis¬ pel from his face the indolence which was the

dominant and habitual expression not only of his body but also of his very soul. Oblomof was good, honorable, tender and generous. Hence he had many friends and they tried to cure him of the terrible disease that pos¬ sessed him. They tried to get him to ride or to walk or to go with them into the society which he ought to adorn ; but energy was lacking even to dress. Scholtz, his boyhood friend, made him promise to join him in a trip abroad. Oblomof went so far as to procure his pass¬ port, order an expensive coat and buy a cap. But days passed and he kept postponing it. For a little there was some improvement : he met Scholtz's pretty friend Olga and her aunt. It would have been an admirable match. Olga loved him and did her best to stir him into energetic action ; but he let her go and when Stoltz returned from Europe he found their engagement broken and married Olga him¬ self. He took hold of Oblomof's neglected estate Oblomovka and brought it back to a paying basis; but Oblomof let himself fall into the clutches of a designing widow, his land¬ lady, and married her. Then he had apoplectic strokes and died, still loved and regretted. Scholtz and Olga took his little son and brought him up with their own children. Oblomof is, therefore, the story of a pathetic broken career depicted relentlessly, with wonderful skill. A charming and quite original feature of it is the use of Oblomof's dreams to relate the story of his early life and abortive education. These day dreams are a sort of psychoanalysis ex¬ plaining how he came to be the man he was and also what sort of a man he was. Serfdom, which removed from the landed aristocracy the necessity of even such a simple task as putting on its own boots, was responsible for many cases of oblomovisrm a term, by the way, ap¬ plied by Oblomof to himself, recognizing it as a hopeless disease. The first draught of the story appeared under the title (Son Oblomova > ((Ob¬ lomof's DreamO in 1848-49 in the Illustrated Album. In its complete form, in four parts, it has enjoyed popularity ever since. Extended passages from it translated by N. H. Dole first appeared in English in (The Library of the World's Best Literature> in 1897; in 1915 it was published complete in the version of C. J. Hogarth.

Nathan Haskell Dole.

OBOE, o'b5-e, an Italian musical wind in¬ strument resembling a clarionet in shape, and sounded through a double reed. It consists of three joints besides the mouthpiece, and like many other wind instruments produces a series of overtones.

OBOLUS, a Greek coin of silver or copper, the sixth part of a drachm, about 21 cents in value.

OBONGO, 5-bong'g5, or ABONGO, a

tribe of pigmies who live in different parts of French Kongo in West Africa. See Pigmies.

OBRADOVICH, o-bra'do-vich, Dositey, Serbian author: b. Csakovar, Hungary, in 1739; d. Belgrade, 7 April 1811. At the age of 15 he entered the monastery of Hoppovo in south Hungary, but he soon found the life of a monk distasteful and abandoned it for a life of travel with a view to acquiring a knowledge of classical and modern languages and literatures. He studied philosophy and natural theology in

the universities of Leipzig and Halle and brought out his first book in Leipzig in 1783. After visiting France and England he returned to Leipzig and then spent several years in Vienna and Trieste. As an ardent Serbian patriot he proclaimed the principle that books ought to be written for the people in the lan¬ guage that they understand and speak. He therefore wrote his first book, which was called (The Life and Adventures of Demeter-Obrado- vich — a monk named Dosetey) (Leipzig 1783), partly autobiographic and partly fantastic, in the Serbian language. It immediately made a great impression and was continued in a work called (Home Letters } (1785). This was fol¬ lowed by a translation into Serbian of (Afsop's Fables) (Leipzig 1789), which was even more warmly welcomed. These books created a read¬ ing public and mark the beginning of the mod¬ ern period of Serbian literature. Obradovich, or Dositey, as he is popularly called, was so highly appreciated as patriot and author that in 1807 Karageorge invited him to Serbia to be a senator and minister of public education, in which capacity he established in Belgrade the first Serbian college (Velika Shkola), which ultimately became the University of Belgrade. Obradovich also wrote (Wise CounseP (1784) and a work on morals (1793), both having Serbian titles. His complete works were pub¬ lished by Vozarovich (10 vols., Belgrade 1833— 45). Consult Servic, (Dositheus Obradovic) (Neusatz 1889), and Leger, (Serbes, Croates et Bulgares) (Paris 1913).

OBREGON, o'bra-gon', Alvaro, Mexican general : b. in the district of Alamos, Sonora, in 1880. He came of a wealthy family, owning large tracts of land in Sonora, and after re¬ ceiving a good education devoted himself to scientific farming and stock-raising on his in¬ herited estates. He also invented several pieces of agricultural machinery. Yet, although a man of wealth, he early became an advocate of reform laws that would give the common people of Mexico a share in the land ; showed much sympathy for the peons and Indians and became interested in the problem of their edu¬ cation. His career as a military leader began in 1912 when he recruited a force of 400 In¬ dians, with which, as lieutenant-colonel, he en¬ tered into

the service of Madero to put down the revolt of Pascual Orozco (1881-1915). His early history has been well told in a small sketch by Allene Tupper Wilkes in Harper's Weekly (1914) as follows: <(When in the early months of Madero's term of office Pascal Orosco and his Reds became a terror in- the state of Chihuahua, Obregon collected a band of 400 Maya Indians and volunteered to help drive the Reds from the country. Obregon and his Indians were put under the command of Huerta, who had been sent by Madero to quell the Orosco rebellion. In the battle of Ojito Obregon's command gained for themselves the title of Mnvincibles.ˆ His fame spread to Sonora and so many of his fellow-citizens came to join him in Sonora that he rode home again at the head of a revolutionary army of 4,000 men.

<(He was made colonel in the Sonora State Militia and held this rank when Felix Diaz started the military uprising in Mexico City, which resulted in the death of Madero. Obre-

gon again gathered his band of Indians, be¬ tween 400 and 500 of them, and offered his services to Governor Pascaras of Sonora. He was ordered to Nogales, where he routed the garrison that, under the command of Colonel Costerlisky and Colonel Rangel, had gone over to Huerta. Soon after this he fought a suc¬ cessful battle at Cananea. Governor Carranza of Coahuila had by this time been declared first chief of the Constitutional army, and he now raised Obregon to general of division with the Army of the West, a rank equal to that held by Villa, who commanded the Central army. Then followed Obregon's unpronounce¬ able victories, an unbroken record until he laid siege to Mazatlan.® His successful attack of Sinaloa and Culiacan and the capture of Guada¬ lajara, 9 July, opened the way for his advance on Mexico City; and he led the Constitutional army into Mexico City on 15 Aug. 1914. He attacked and defeated Zapata in his stronghold in Puebla, driving him into the state of Morelos. The battle of Puebla (January 1915) was the death-knell of Zapata's hopes. He re¬ occupied Mexico City in January 1915, but evacuated it on 10 March. In April he under¬ took a campaign against Villa for the control of central Mexico and shattered Villa's hopes completely at the battle of Celaya (15-19 x\pril 1915). He defeated Villa in the battle of Leon (31 May-4 Tune 1915), where he was severely wounded. He lost an arm in battle. In 1920 he was elected President of Mexico.

OBRENOVITCH, o-bren'o-vich, Serbian princely family, rivals of the Karageorgevitches, who hold the throne since the assassination of

Alexander I (q.v.). See Serbia.

O'BRIEN, o-bri'en, Cornelius, Canadian Roman Catholic archbishop: b. New Glasgow, Prince Edward Island, 4 May 1843. He was educated at Saint Dunstan's College, Charlotte¬ town, Prince Edward Island, and at the Propa¬ ganda College in Rome, and was for some time professor in Saint Dunstan's College and rector of Saint Dunstan's Cathedral. In 1882 he was consecrated archbishop cf Halifax. Among his published works are (After Weary Years, } a novel;

O'BRIEN, Fitz-James, Irish-American short-story writer, journalist and poet: b. Lim¬ erick, Ireland, 1828; d. Cumberland, Md., 6 April 1862. After study at Dublin University he went to London, where he soon got rid of a fortune, became a journalist and in 1852 came to the United States. He wrote for Broug¬ ham's Lantern and became also one of the valued contributors to Harper's Monthly and Weekly. His imaginative short stories, (The Diamond Lens} and (The Wondersmithp first printed in the Atlantic, were of a series notable for originality and effective ingenuity. He was also one of the most popular dramatists of his day. His (A Gentleman from Ireland) kept the boards for a generation. In 1861 he en¬ tered the 7th New York regiment and was sent to the defenses of Washington. Later he was appointed to the staff of Gen. F. W. Lander, won praise from McClellan, and on 26 Feb. 1862 received in a skirmish the wound from which he died. He was a true, if a minor, poet, and wrote some very striking prose fic¬ tion. William Winter, poet and critic, collected his most worthy work (1881). Consult Winter, VOL. 20 — 35

William, (Brown Heath and Blue Bells) (New York 1895), and also the introduction to Win¬ ter's collection, O'Brien's poems and stories mentioned above.

O'BRIEN, Jeremiah, American patriot : b. Scarborough, Me., 1744; d. Machias, Me., 5 Oct. 1818. He was in the lumber business at Machias at the outbreak of the Revolution. Shortly after Lexington, the British cruiser Margaretta appeared in Machias harbor, seek¬ ing lumber for the defenses at Boston. Sixty volunteers soon set out in a lumber-sloop, un¬ der the leadership of O'Brien, to capture the British vessel. In the following hand-to-hand encounter, the first sea-fight of the war, they were completely victorious. The sloop took on board the Margaretta' s armament, and, renamed the Machias Liberty, coasted about, with O'Brien as captain, for 18 months, and took several prizes. O'Brien was later in command of the privateer Hannibal, was captured and was for some months imprisoned in the Mill Prison, England, but made his escape. On his return to the United States he was appointed collector of the port of Machias.

O'BRIEN, Lucius Richard, Canadian painter : b. Shanty Bay, Ontario, 15 Aug. 1832. d. 1899. He began life as an architect and civil engineer and spent much time sketching in the open air as an amateur. In 1872 he joined the Ontario Society of Artists: in 1880 was appointed president of the Royal Canadian Academy of Art, and in 1895 president of the newly-formed Provincial Guild of Sculpture. He is pre-eminently a portrayer of Canadian scenery and the two pictures of Quebec which he painted by order of Queen Victoria, his views of the Rocky Mountains and Selkirk Range and his (Sunrise on the Saguenay) (Art Gallery, Ottawa) are the most character¬ istic of his works.

O'BRIEN, Richard Barry, Irish historical writer and biographer: b. Kilrush, County Clare, 1847; d. London, 17 March 1918. He was educated at the Catholic University, Dub¬ lin, and in his student days advocated an Irish republic. He went to London in 1869 to com¬ plete his legal studies, and while there he gathered experience which, according to his own confession, softened his sentiments toward England, though he remained an uncompro¬ mising Nationalist throughout his life. As personal friend and adviser to Parnell and John Redmond he for many years exerted con¬ siderable influence in Irish politics. He pos¬ sessed a profound knowledge of Irish history and parliamentary procedure, combined with sound judgment and literary ability. At the outbreak of the European War he strongly sup¬ ported John Redmond's declaration in Parlia¬ ment that it was the duty of Ireland to take her stand with England in defense of liberty. Three of his sons immediately volunteered and entered the army. At the time of his death O'Brien was a director of the National Bank. Among his numerous writings the best known are the biographies of Parnell (1898), Lord Russell of Killowen, Lord Chief Justice of England (1901), and John Bright (1910).

O'BRIEN, William, Irish journalist: b. 2 Oct. 1852. He was for several years a con¬ tributor to various journals, and in 1875 he joined the staff of the Freeman's Journal, and

in 1880 founded United Ireland. He was prose¬ cuted nine different times for political offenses and spent over two years in prison. He en¬ tered Parliament as a Nationalist in 1883, re¬ tired in 1895 and was re-elected in 1900 and 1909. In 1898 he started a new agrarian move¬ ment, called the United Irish League, with the Irish People as its orvan. Among his works are (When We Were Boys' (1890) ; (Irish ldeas) (1894); (A Queen of Men (1897) ;*

(Recollections5 (1906), and (An Olive Branch'

(1910).

O'BRIEN, William Smith, Irish politician: b. Dromeland, County Clare, Ireland, 17 Oct. 1803; d. Bangor, North Wales, 17 June 1864. He was educated at Harrow and Cambridge, in 1826 entered the House of Commons as mem¬ ber for Ennis and in 1835 was returned for Limerick and retained his seat for 13 years. He was for some time an ardent suoporter of O Connell ; but on O'Brien becoming the head of the Young Ireland party the friendship was broken. He was active in the insurrection of 1848 and was arrested, tried for high treason and sentenced to imprisonment for life at Tas¬ mania. He was pardoned in 1856. He was the author of (The Principles of Government (1855). Consult Sullivan, A. M., (New Ire¬ land' (London 1877) ; Duffy, (Young Ireland' (2d ed,, 1883).

OBSCENITY, in law, that which offends modesty, delicacy or chastity. It is a misde¬ meanor by English law to give an obscene ex¬ hibition or to publish obscene matter, as is also the use of obscene language in public places. By the Federal law of the United States it is an offense to send obscene matter through the mails, and it is also a statutory offense in Eng¬ land. It is held usually that a publication is ob¬ scene if it is likely to corrupt those whose minds are open to immoral influences and into whose hands a publication of this sort may fall. It is no defense that it was done to accom¬ plish a good purpose or that it is an accurate report of a judicial proceeding. There has been much criticism of the law in this direction in recent years, to the effect that many works of medical or sociological importance have been kept from the market owing to the legal con¬ tention that they violate the laws of obscenity.

OBSERVANTINES. See Franciscans.

OBSERVATORY. An observatory may be defined as a station or institution for the ob¬ servation of phenomena of nature. The prin¬ cipal kinds, of observatories are astronomical, meteorological, magnetic and seismoloedcal ; dealing respectively with observations of celes¬ tial objects, of the weather, of the earth's mag¬ netism and of earthquakes. In some cases all of these kinds of observations are made at the same astronomical observatory. The term astrophysical observatory is applied to an insti¬ tution which specializes in spectroscopic work, solar physics or other applications of physics to astronomy. Astronomical observatories are of very ancient origin, and they have developed in complexity as new instruments and improved methods of research have gradually been dis¬ covered.

Location and Equipment. — The proper

location of an astronomical observatory is of great importance, as is now better recognized

than formerly. The site should have a wide horizon and be free from the disturbances as¬ sociated with life in large communities, such as shocks and vibrations due to traffic of rail¬ ways and electric lines, dust and smoke. The modern illumination of cities produces a glare of light at night, even at distances of several miles, which greatly hinders visual observations and practically forbids celestial photography. Accordingly the tendency has been in recent years to remove existing observatories to sta¬ tions farther from large cities, while new in¬ stitutions are located with much more care than formerly. Observatories chiefly for re¬ search, if not attached to a university, are placed in favored mild and dry climates where clear skies are the rule, and where there is only a small diurnal range of temperature. An alti¬ tude of a few thousand feet is desirable, to ayoid the dust-laden and denser lower strata of the atmosphere and to secure good trans¬ parency. The heating of the slopes of a moun¬ tain in such a region by the sun may injure the steadiness of the air for observation of the sun, and produce what is called poor <(seeing" during the daytime, while at night the seeing may be very steadv. Some lofty stations, like Pike's Peak, Colo. (14,000 feet above the sea), seem to be continually subject to conflicting currents of the upper air, producing unsteady images, fatal to good astronomical work.

In view of the heavy piers which must be installed for supporting the instrument and which constitute a large item of expense of con¬ struction, the site should be suitable in respect to drainage and rock formation. It is unde¬ sirable to set piers on ledges, as they may out¬ crop elsewhere and convey vibrations from a long distance. Probably a deep gravel fur¬ nishes as good a foundation as any.

Where possible a large observatory is placed with its main axis east and west, as the rooms for meridian instruments must have their open¬ ings of roof north and south; but these in¬ struments may be placed in wings, or, better, in small detached buildings, which are planned so that they will quickly assume the temperature of the outer air. If there are large domes, they are placed at the ends of the building, to avoid mutual obstruction ; but they, too, are often detached structures. Aside from domes and observing rooms, a modern observatory generally includes the following rooms : Offices for the staff of observers and computers and for administration: a library; rooms for lec¬ tures, for the reception of visitors, for measur¬ ing machines; laboratories (for instance, phys¬ ical, spectroscopic, photographic, photometric) ; dark rooms for developing and

copying photo¬ graphs, storerooms for preserving them; clock rooms ; cabinets for small apparatus ; a machine shop and a carpenter shop.

Observatories for instruction of college stu¬ dents may be very simple, with a dome for the largest telescope, and one or two wings for meridian instruments. A flat roof or balcony from which celestial objects mav be pointed out to students is a convenience. To avoid the great expense of large turning domes, horizon¬ tal telescopes have come into use somewhat in recent years. They are often set up for tem¬ porary stations, as for observing solar eclipses. Here an instrument called a coelostat or siderostat carries one or more large flat mir-

OBSERVATORIES

1 Main Building, United States Naval Observatory 2 Nine-inch Meridian Circle, United States Naval Observatory

3 Twenty-six-mch Great Equatorial, United States Naval Observatory

OBSERVATORIES

1 Yerkes Observatory, Williams Bay, Wis,

2 Twenty-four inch Bruce telescope, Harvard College Observatory

OBSERVATORY

547

'J ; ' by a driving mechanism continually .nrows the light into a long horizontal tube, which may be of wood, or even paper, contain- mg either a lens at the near end or a concave mirror at the far end for forming the image of the celestial object. The image may he brought into a laboratory or dark room for observation or photography, if desired. This construction has serious limitations, however, and one of its defects is the difficulty of avoiding unequal tem¬ peratures in the cross-section of the beam within the tube, which seriously impair the definition. The largest instrument of this sort thus far constructed is the Snow telescope of the Yerkes Observatory, afterward transferred to the Solar Observatory. The flat mirror of the coelostat had a diameter of 30 inches and the second flat mirror of 24 inches, the concave mirror at the far end having a diameter of 24 inches and a focal length of 60 feet.

An improvement over this construction is the vertical telescope. The same two flat mir¬ rors are required, but the beam is reflected down vertically instead of horizontally. This avoids the difficulty in the cross-section of the

tube, as a progressive change of temperature and densit}ˆ of the air along the direction of the beam should not injure the definition. If an objective is used, it is placed just below the level of the coelostat; if a concave mirror forms the image, it would be placed far below, at a distance something more than its focal length, e.g., in a well, with the apparatus of the eye-end housed at the surface of the ground, or a little below it. Horizontal and vertical tele¬ scopes commonly are of relatively extreme focal length. At the Mount Wilson Observatory two of these vertical instruments, called tower telescopes, have been erected for solar work, one of 75 feet, the other of 150 feet focal length. . The small dome covering the coelostat and objective is supported on a skeleton steel tower, the members protected by steel sheaths from vibration due to wind, and the powerful spectroscopes into which the light is brought are set down in pits beneath the surface of the ground. A vertical reflector, of the well type, has. not yet been constructed. These designs obviously depart widely from the conventional type of observatory.

For detailed description of the Snow horizontal telescope, consult Astrophysical Jour¬ nal, 21, 157-167, 1905; for tower telescopes, ibid., 25, 68-74, 1907; 27, 204-212, 1908; articles by G. E. Hale.

The type of telescope known as the Conde, invented by M. Eoewy of the Paris Observatory in 1871, and put into operation 12 years later, is now used at a few European observatories. It has manifest advantages. The observer can remain in a warm room in a comfortable posi¬ tion before the fixed eye-piece, and looking down the direction of the polar axis. Flat mirrors throw the image from the object-glass up the oblique tube to the eye-piece. A special construction is required for the building; the dome is unnecessary, but the large movable cylinder for protecting the instrument cannot be much less expensive than a dome of corre¬ sponding size.

The Field of Research and Study. — An

astronomical observatory is provided with in¬ struments for the precise study of celestial phenomena. This study may cover a wide

field of research, including some or all of the following: (a) The measurement of the accu¬ rate positions of sun, moon, planets, comets, stars, nebulae. From the combination of suc¬ cessive positions, the motion in the sky of these objects may be deduced. The knowledge of such positions is necessary for the navigator, the geographer, the surveyor and is the basis tor practical astronomy, (b) The determina¬ tion of the exact time by observing the passage of stars across the meridian. Modern life re¬ quires the constant knowledge of the time. It is obtained from observations of the stars, and then widely distributed to railway stations, jewelers and

public places by telegraph and by wireless, (c) Conversely to (a) and (b) the exact position of the station itself is deter¬ mined by observation of the stars with special instruments. This yields fundamental data for geography and geodesy, (d) The measurement of the brightness, or intensity of the radiation, of all celestial objects, which is found to be changeable in a great number of cases. For instance, the intensity of the sun's radiation lately has been found to vary, which is of the greatest practical importance for the inhabit¬ ants of the earth, (e) The visual and photo¬ graphic study of the surface markings, rota¬ tions and changes of the sun, moon and planets.

(f) The photography of the heavens as a whole for investigating the structure of the universe; and of comets and nebulas in particular, for re¬ cording the appearance and changes, which are very marked for comets, but not for nebulae.

(g) The investigation of the physical and chem¬ ical constitution of celestial bodies, for giving a basis for a philosophy of the universe and for studying its evolution. Such observations are the special field of astrophysics, and an institu¬ tion devoted chiefly to such work is called an astrophysical observatory. The instruments of an observatory differ according to the ourposes named above for which they are to be used.

For precise fundamental positions of celes¬ tial objects, (a) the meridian circle is the chief instrument. This is a telescope of from 6 to 10. feet long, turning on a horizonal axis pointing exactly east and west, and very rigidly supported by heavy piers. The motion of the instrument itself is, therefore, solely in the meridian, from the north point, through the zenith to the south point of the horizon. At¬ tached to the sides of the instrument are large graduated circles representing the highest skill of the instrument-maker. The divisions are generally made on an inlaid strip of silver, usually .12 to each degree, or 4,320 for the whole, circle. They are read by from two to six microscopes rigidly connected to the large piers supporting the axis. When the star passes across the field of the telescope the ob¬ server sets a movable spider thread so that the star shall run exactly along the thread ; then he notes the exact instant when the star passes each of a set of vertical spider-threads, pressing a key which makes a record of each within a few hundredths of a second on a chronograph connected, with a very accurate clock keeping sidereal time. Then the microscopes are very carefully read and the star's position is obtained for. that passage or transit: the circle giving the position in the north and south direction, and the record of the time giving that in the east

and west direction. Similar observations of standard stars, and of fixed points like the nadir (by sighting the instrument at a sur¬ face of mercury under the floor and making the horizontal thread and its image coincide) yield the accurate position of the star, after numerous instrumental corrections have been determined and applied. The star's distance in degrees, minutes and seconds north or south of the celestial equator is its declination; its distance in hours, minutes and seconds east of the vernal equinoctial point of the sky is its right ascension.

It is thus apparent that clocks of the best possible construction are essential in an ob¬ servatory. They are generally kept in special vaults protected from all jar of traffic and from changes of temperature or moisture, and sometimes from changes of atmospheric pres¬ sure by being in a chamber exhausted of air. Chronometers, being portable, are also used in observatories for some observations, and gen¬ erally at astronomical stations in the field.

For the determination of the time, (b) above, a smaller and less complicated instru¬ ment, known as the transit, is employed. No finely graduated circle is necessary and the tele¬ scope is seldom over 30 inches long, with a lens of two or three inches aperture. For eliminat¬ ing instrumental constants, the observer raises the axis out of its V-shaped supports, and re¬ verses its direction, changing the east and west sides, after half of his list of stars has been observed. The essential feature of having the telescope exactly in the plane of the meridian, and of observing and electrically recording the instant at which a time star passes each of the set of vertical spider threads, is the same as in case of the meridian circle.

For finding the accurate positions of faint objects instruments set in the meridian have too many limitations, and telescopes are used which may be pointed to any part of the sky. These are now almost universally mounted equatoi ially, which means that one axis points toward the celestial pole, thus allowing a free east and west motion, while the other axis is perpendicular to the first, allowing a free mo¬ tion north and south. A driving mechanism is provided which turns the polar axis toward the west one complete turn in a sidereal day. This makes the telescope follow any star quite closely as it moves across the sky from rising to setting; otherwise the stars would quickly drift out from the field of view. Very large telescopes can be mounted in this way. The positions observed with such an instrument are relative : that is, the distance and direction of the unknown object from a known star in the same field of view is measured by a system of fixed and mobile spider threads operated by a very accurate screw with graduated head. This attachment is called a filar micrometer. If no known star is in the field of view, but one is seen to the east or west nearbv, the

telescope may be clamped and the two objects be allowed to drift in succession through the field, the dis¬ tance in declination between them being meas¬ ured by the threads, and in right ascension by the interval of time, elapsing between the pas¬ sage of the two objects across the system of north-and-south threads.

Equatorial telescopes are of two principal

kinds: refractors, in which the image is formed by an object-glass; and reflectors, in which a concave mirror, generally of glass, silvered, col¬ lects the light and brings it to a focus. See Telescope.

The arrangement of the dome is different for the two types of instrument. The observer does his work at the lower end of the refractor, and for large instruments it is a great con¬ venience to have a rising floor or platform so that he can be always at a convenient height for reaching the eye-end. As the observer must be at the upper end of the tube of a re¬ flector, it is necessary with the largest instru¬ ments to hang an observing cage on the inner surface of the dome, opposite the shutter, and to move this about by electric motors to suit the necessary altitude of a given object. Large equatorial telescopes require domes which may be turned on circular tracks toward any direc¬ tion; cylinders may be used, but in America hemispherical domes are employed almost without exception. A shutter several feet wide covers the opening, extending from the base to the top of the dome.

From the observation of the altitudes (c) at transit of stars whose declinations are ex¬ actly known, the latitude of the observatory may be precisely determined, with employment of the meridian circle as above, or of a smaller, portable transit instrument provided with ex¬ tremely sensitive levels and called the zenith telescope. The practical use of this instrument was developed by Capt. Andrew Talcott of the United States engineers shortly before 1850. It is used for the survey of all boundaries which run along a parallel of latitude and for the exact location of all stations used in the trian- gulation of a national survey. The same room or detached building can be used for the zenith telescope as for the transit instrument for time.

It may seem unnecessary to determine the latitude of a fixed observatory but once, when it is definitely located. It was by the repetition and increase in precision of such measurements however that the discovery was made in 1885- 88 that the latitude of a place is not constant but variable. This is proved to be due to the tact that the earth's axis varies within the eaith, so that at the pole it would trace an irregular curve in a period of about 428 days, having, in years showing the greatest range, a maximum diameter of

about 60 feet. This af¬ fects the latitude of every station on earth. Another instrument used in a few observatories for this purpose is the transit set in the prime \ ertical or plane passing through the zenith and east and west points of the horizon. For this instrument the opening of the roof must lie east and west, but otherwise the installation is the same as for the transit.

i ;• A , . C11L Ui Lne ongntness (d) of celestial objects, or celestial photometry, has been great.y developed in recent years. Useful observations of the brightness of variable stars can be made by the eye, without instruments, oi with a field glass or small telescope. Numer¬ ous varieties of photometers are used, some depending upon polarizing the light by nicol prisms and equalizing the images of the vari¬ able and comparison star. At Harvard College Observatory, E. C. Pickering devised the ((me-

lidian photometer® of this type, in which the north star was kept in the field for comparison with each star measured. This instrument was arranged so that the observer could remain in a small room without a dome and observe the stars as they crossed the meridian. The newest photometers are intended to be independent of the eye, depending on the principle (a) that the electric resistance of selenium changes when light falls upon it, or (b) that a so-called photo¬ electric current is developed when light falls upon specially prepared surfaces of sodium, potassium, etc., inside of evacuated glass cells. These photometers are commonly attached to refracting telescopes with apertures of 10 inches or more.

Both refracting and reflecting telescopes are now employed successfully in photographic photometry, with ordinary and with special plates sensitized to match the human eye.

The measurement of the intensity of the radiations received from the nearest star, our sun, is a special problem of astrophysics closely related to meteorology. The instruments em¬ ployed are the actinometers and the bolometers, the latter invented by S. P. Langley and suc¬ cessfully used by him at the Astrophysical Observatory of the Smithsonian Institution at Washington, and further developed by his successor, C. G. Abbot. A horizontal tele¬ scope was used considerably. Special apparatus was also designed and set up on Mount Wilson, Cal., for the problem of measuring the funda¬ mental <(solar constant,® or amount of heat- energy received per square metre per second at the earth from the sun. Observations by Ab¬ bot at widely separated stations have estab¬ lished the fact that the radiation received from the sun varies by as much as 7 per cent.

With an exceedingly sensitive radiometer it was possible for E. F. Nichols to detect and roughly measure the heat-radiation from two of the brightest stars in 1900 at Yerkes Obser¬ vatory. Further advances were made when W. W. Coblentz of the Bureau of Standards at Washington revived the use of the thermopile and greatly increased its sensitiveness. He was able to measure the radiation of 110 stars during a few weeks of work with the reflector at the Lick Observatory in the summer of 1914.

The investigation (e) visually and photo¬ graphically, of the surface markings, etc., of celestial objects is an important part of the work of practical astronomy. The refractor has more generally been employed, but large reflectors can serve very usefully. Direct photographs of the sun's surface and spots (for which a refractor of small aperture, photo¬ graphically corrected, then called a photohelio¬ graph, is used) are made daily at several ob¬ servatories. It is possible that at some time in the future the relation between the sun's activity and the weather will be sufficiently understood to be of the greatest importance to agriculture. The spectroheliograph is a par¬ ticularly valuable instrument for photograph¬ ing in desired monochromatic rays not only the surface markings (spots, faculae, flocculi), but also the enormous gaseous eruptions, called prominences, around the edge of the sun. The calcium radiation at the H or K line is chiefly used. The instrument, which is fundamentally a spectroscope, was devised almost simultane¬

ously by G. E. Hale at the Kenwood and Yerkes observatories and by H. Deslandres at the Meudon Observatory near Paris. Work with the spectroheliograph generally forms an im¬ portant item in the program of an astrophysi¬ cal observatory.

That portion of the surface of the moon (60 per cent) which is visible from the earth has been minutely studied, both visually and on photographs. No changes of importance have been established. The question of the origin of the moon is of interest to geology as well as to mathematical astronomy (celestial mechanics). To not a few observers there has been a particular fascination in the study of the changing surface-markings of the planets, particularly of Mars, Jupiter and Saturn. It was primarily for the investigation of Mars that the late Percival Lowell established his excellent private observatory at Flagstaff, Arizona. Photography has been successfully applied to several of the planets, but others, like Venus, are still shrouded in mystery as to their surface markings. Four new satellites of Jupiter and one of Saturn have recently been discovered photographically, besides hundreds of asteroids. If a planet exterior to Neptune should be found at some future time it will probably be picked up on a photograph.

The ever-increasing application of photog¬ raphy (f) to astronomical

investigation has resulted in great progress and has to a large extent changed the character of observing. If a cluster containing perhaps thousands of stars in one field is to be measured and tri¬ angulated, the present procedure is to secure as good photographs as possible on nights when the atmospheric conditions are the best. One such photograph, secured with an exposure of perhaps two hours, may require months for its. measurement and discussion. This work is done microscopically under measuring machines of the utmost precision in a convenient, well- lighted office rather than under the difficult conditions of visual observations in strained positions of the observer and with perhaps severely cold temperatures in the dome. It is found that nearly all kinds of relative meas¬ urements of celestial objects can be thus per¬ formed more accurately and more easily on good negatives than at the eyepiece of a tele¬ scope of even larger size than that with which the photograph was taken.

For finding the relative distances of the stars from their annual parallaxes, the photo¬ graphic procedure with large refractors has been very successful in recent years and an important campaign in this work has been in progress, particularly in American observa¬ tories. When refractors corrected optically for visual observations are used photographi¬ cally, a yellow filter is placed before the plate, which must be sensitive to yellow light.

The great international undertaking for the production of a photographic map of the en¬ tire heavens, known as the Carte Celeste or the Astrographic Chart, to include all stars as faint as the fourteenth magnitude, together with a catalogue of the measured positions of the stars as faint as the eleventh magnitude, was begun under the auspices of the Paris Observatory about 1887. It is only partially completed after about 30 years of labor. Practically all of the

necessary photographs have been secured. A nearly uniform type of photographic refractor with aperture of 33 centimeters (13 inches) and focal length of 343 centimeters (U% feet) was employed by the 19 co-operating observatories. The greatest part of the labor is required for the precise measurement of the positions of the stars involved, several millions in number, and the subsequent computations, all of which must ultimately be published with the fewest possible errprs in the process of typesetting.

The whole sky has also been photographed with smaller instruments and on

a correspond¬ ingly smaller scale. The Harvard Map of the Sky, taken with a lens of but one inch aperture and of only 13 inches focal length, is com¬ prised in a set of 55 glass plates 8 by 10 inches in size. It records a vast amount of informa¬ tion.

Photography with a large reflecting tele¬ scope was used for important studies of nebulae by Keeler at the Lick Observatory and by Wolf at Heidelberg, showing vast numbers of spiral nebulae. Special provision has to be made in a modern observatory for the safe and dry stor¬ age of the great number of plates which ac¬ cumulate.

The investigation (g) of the physical and chemical constitution of celestial objects has increasingly occupied attention at observatories in recent years and has affected the design and equipment of such institutions. Spectroscopes, generally for photography and called spectro¬ graphs, have been improved in design and effi¬ ciency. The spectra of over 300,000 stars have now been classified at the Harvard Observatory, on plates taken with one or more prisms put over the object-glasses of photographic re¬ fractors.

The type of spectrograph having a slit and apparatus for producing a spectrum of compari¬ son from iron or other metal has been used for determining, the velocity of celestial objects m the line of sight, and this has constituted a chief part in the program of some observa¬ tories with their principal refractors and re¬ flectors since 1900. Such instruments have been applied successfully in measuring the rotation of Saturn's rings, of the planets themselves, and very recently to the rotation of the nebulse.

A new variety of very close double stars was revealed by the alternate double and single appearance of the lines in spectra of stars otherwise inseparable in the most powerful tele¬ scopes, and by the alternating approach and recession of stars revolving around close and invisible companions. The investigation of such interesting systems has occupied much of the time. of the telescopes at several observatories. The interferometer, an instrument of the physi¬ cal laboratory capable of measuring the most minute quantities, has been applied with great success to the measurement of wave-lengths in the solar spectrum. Adapted for photog¬ raphy, it. has demonstrated that the gases of the interior of the Orion nebula are in a state of commotion, with relative velocities of sev¬ eral miles per second. For studies of cos¬ mogony the knowledge of physical and chemi¬ cal properties of the celestial objects is recog¬ nized. as of fundamental importance.

Historical Notes. — The first suggestions of observatories are probably to be found in the

towers of the temples of the priests of the Babylonians, who required astronomical data to fix the dates of religious ceremonies. This may have been as early as between 4000 and 3000 b.c. The Babylonians or Chaldaens as they were often called made use of the gnomon, which was a vertical shaft or pillar erected on a level surface and served for determining the sun s position from the length of the shadow cast, lhe obelisks of the Egyptians were thus employed as astronomical instruments and per¬ haps were erected mainly for that purpose. The Greeks learned the use of this instrument from the Chaldaens and from the Egyptian priests. In the 6th century b.c., Anaximander, a dis¬ ciple of the first Greek astronomical philosopher Thales, erected a gnomon at Lacedemon. We may infer that Pythagoras used astronomical instruments.

' The School of Alexandria, which flourished from b.c. 331 for more than seven centuries, contributed greatly to the development of mathematics and astronomy. Aristarchus of Samos was a careful observer in the 3d cen¬ tury b.c., and taught that the earth moved around the sun and believed that the planets also did so. We do not know what instru¬ ments he used. His follower, Eratosthenes (276-194 b.c.) , designed an armillary sphere for the school at Alexandria with which observa¬ tions were then made and important data de¬ termined. Hipparchus, who lived during the 2d century b.c., was an accurate observer and is justly regarded as a 'founder of the science of astronomical observation. His greatest dis¬ covery was that of the precession of the equinoxes. Ptolemy, living in the 2d century a.d., was the last great astronomer of the School of Alexandria.

With the rise of culture arrtong the Arabs, especially under Haroun al Raschid, great in¬ terest in astronomy was developed, and by his son, Al Mamun, an observatory was built near the flourishing city of Bagdad. The Arabian prince, Albategnius (in the 9th century a.d.), was an industrious observer in Mesopotamia and in Damascus, where an observatory had been established earlier. The learning of the Arabs spread to Persia, where, observatories were erected at Maraga and also at Samarcand.

Ulugh Beg, grandson of the Tartar Prince I amerlane, i e-established an observatory at Bamarcand about 1420 and made important ob¬ servations. At about the same time, Regio¬ montanus, a German astronomer, was provided with an observatory, well equipped, by a mer¬ chant pnnce at Nuremberg. The most elaborate observatory of the period before the invention ot the telescope was that built for the Danish astronomer Tycho Brahe (1546-1601) on the island Hveen. It was called Uraniborg and with his excellent equipment Tycho made for many years highly accurate observations which ed to the discovery by Kepler of the important laws which fully established the Copernican system.

the invention of the telescope was put into practical use in astronomy in the first decade of the 1 7th century, primarily by Galileo at Padua and Florence. Great precision in pointing at celestial objects was thus obtained and new instruments of observation were then developed National Observatories.— The national

observatories were founded particularly to aid navigation in solving the problem of finding the longitude at sea. The Royal Observatory at Greenwich was erected in 1675 by King Charles, for John Flamsteed, the first Astronomer Royal. It has maintained a lead¬ ing place among observatories, particularly dur¬ ing the long directorate of Sir G. A. Airy (1835-81). The field of work of the obser¬ vatory and the equipment have been much en¬ larged during the administration of Sir William Christie (1881-1910) and of the present As¬ tronomer Royal, Sir Frank Dyson (1910—) . In addition to departments for the time, for merid¬ ian observations, for the alt-azimuth, for helio¬ graphic work, for astrographic work and for double star work, the observatory has also a department of magnetic and meteorological ob¬ servations. While fully maintaining the stand¬ ard of its earlier work, the observatory is now highly efficient in all of these fields.

The Paris Observatory was erected during the years 1667-71. It has specialized in the determination of the position of celestial ob¬ jects, with meridian instruments and equatorials. It contributed greatly to the introduction of photographic methods in astronomy, the brothers Henry having made photographic re¬ fractors and applied them successfully. A fine series of photographs of the moon has been taken with a large coude and accurately meas¬ ured. Pioneer work was done in the distribu¬ tion of the time by wireless telegraphy from the Eiffel tower. For the first 120 years of its existence the observatory was directed by four of the Cassini family, son, grandson and great- grandson of the first. Among the later di¬ rectors may be named Arago, Leverrier, Mouchez and Loewy.

The observatory at the Cape of Good Hope was established under the English Admiralty in 1820. Fundamental observations of posi¬ tion were its first care. Later, and particularly under Sir David Gill, the observatory was greatly enlarged and work with the heliometer, with photographic telescopes and with the spectroscope was added to its scope and im¬ provements were made in all of the instru¬ mental equipment.

The Russian observatory at Poulkova was founded in 1839 and

fundamental observations of great accuracy, in addition to extensive ob¬ servations of double stars, were conducted un¬ der W. Struve. Important work in stellar spectroscopy has been done there.

In 1844 the Naval Observatory at Wash¬ ington was established by Lieutenant Gilliss, with F. M. Maury as its first director. Funda¬ mental observations with various instruments and micrometric measurements with the equa¬ torial have constituted the principal programs of work, in addition to the time service, which is distributed throughout the United States by telegraph. It has a department of nautical in¬ struments, one for chronometers and for com¬ passes and the important department of the Nautical Almanac.

The National Observatory of Argentina was completed at Cordoba in 1873 under the di¬ rection of B. A. Gould. Great catalogues were issued giving the places and brightness of the southern stars.

The first institution to be known as an astro-

physical observatory was that established at Potsdam (1874— 78) by the Prussian govern¬ ment. H. C. Vogel was the first director. Very important work has been done here in solar and stellar spectroscopy and stellar photometry and photography and in other applications of physics to astronomy.

An astrophysical observatory was estab¬ lished at Meudon, near Paris, in 1876. Import¬ ant work was accomplished in photographing the sun and its spectrum by the first director, J. Janssen, and by H. Deslandres with spectro- heliographs of different types.

In 1918 the Canadian government erected at Victoria, B. C., a great silver-on-glass reflector of 72 inches aperture, equipped with a power¬ ful spectrograph, which is now being success¬ fully operated.

University Observatories in Europe. —

Some of the best-known university observa¬ tories are the following, to which are added the names of the observers who contributed most to their fame:

1751. Gottingen: Tobias Mayer, Gauss.

1765. Vienna: Von Littrow.

1771. Radcliffe Observatory, Oxford.

1776. Observatory of the Roman College: Secchi (1852-78) here observed the spectra of the sun and stars.

1811. Konigsberg: Bessel here developed the art of astrono¬ mical observation to the highest point thus far attained. 1818. Munich: Lamont.

1835. Berlin: Encke.

1845. Bonn: Argelander established this observatory and made his Durchmusterung of the northern stars, giving approximate positions of over 300,000. This has served as the foundation for much future work.

1897-98. Heidelberg (Konigstuhl) : Max Wolf has conducted here some of the most important photographic observa¬ tions of the heavens made in Europe and discovered large numbers of asteroids. He has also made important spectroscopic observations, in addition to many other varieties of work.

Among private observatories should be named that of William Herschel (1786-1827) at Slough near Windsor, whose observations were with his reflecting telescopes and, includ¬ ing the discovery of Uranus, made a new epoch in astronomy; this work was continued and extended by Sir John Herschel. The Earl of Rosse constructed at Parsonstown, Ireland, a great reflector in 1844, with which observa¬ tions of the nebulae and of other objects were made by himself and his son. Sir William Hug¬ gins (1824—1910) in his private observatory at Upper Tulse Hill, London, made many im¬ portant observations of the spectra of the stars and nebulae with the aid of photography.

Among contemporary American observa¬ tories, the following may be named as the most important ones: Harvard College, 1840, famous for work of the Bonds and from 1876-1919 of Edward C. Pickering, director, and his as¬ sociates. The most extensive work in photo¬ graphing the heavens by a single institution and of photographing the stellar spectra have been carried out under his administration, to¬ gether with a vast amount of photometric work. To extend the work done at Cambridge to the southern hemisphere, a branch station was es¬ tablished at Arequipa, Peru, and equipped with powerful instruments.

At the University of Michigan, Ann Arbor, 1853, important research and instruction yield¬ ing valuable results, have been carried on con¬ tinuously.

At the Dudley Observatory, at Albany, 1856, fundamental observations for position

and extensive cataloguing of the stars have been carried out by Lewis Boss and his son, Benja- man Boss. The work there of Ormsby Mc- Knight Mitchel (q.v.) also was notable.

Allegheny Observatory, University of Pitts¬ burgh, 1859. Important work on the heat of ihe sun and moon was done under S. P. Lang¬ ley. A new observatory was built in 1900 with large instruments, used now for photographic astrometry and spectrography.

Dearborn Observatory, founded in Chicago in 1864 and transferred to Evanston, North¬ western University, in 1887. The excellent 18- inch refractor was used for observations of double stars and planets for many years by G. W. Hough and since by Philip Fox.

Lick Observatory, University of California, Mount Hamilton, was opened in 1888, with the 36-inch refractor by Clark as its principal in¬ strument. Extensive campaigns of observation of double stars and micrometric observations of other objects have been made with this in¬ strument. The observatory has taken a lead¬ ing place in the determination of the motions of stars in the line of sight by the spectro- graphic method. For this purpose also a branch station has been established in Chile. Important observations of the nebulae have been made with the three-foot Crossley reflector. Re¬ fined fundamental observations have been made with the meridian circle. Extensive observa¬ tions s°lar eclipses have been carried out in different parts of the world. The directors have been E. S. Holden, 1888-98; Tames E Keeler, 1898-1900; W. W. Campbell, 1900—.

Astrophysical Obseryatory of the Smith¬ sonian Institution, W ashington, 1889. This was founded by S. P. Langley for the study of the solar radiation with the bolometer and other appliances developed by Langley and C. G. Abbot, his successor as director.

Chamberlin Observatory, University of Den¬ ver, 1890. The large refractor has been used for micrometric observations under the direc¬ tion of H. A. Howe.

University of Virginia, McCormick Obser¬ vatory, 1882. The 26-inch refractor has been used for micrometric and photometric observa- tions and latterly for determining- stellar paral¬ lax by photography.

Lowell Observatory, Flagstaff, Ariz. This private observatory was established by Per- cival Lowell in 1894, particularly for the obser¬ vation

of the planet Mars. It has an excellent 24-inch refractor and a 40-inch reflector. Very important spectrographic observations have been made at this elevated station by V. M. Slipher, present director, on the velocity in the line of sight of the nebulas and their rotation and the motion in the line of sight of some of the star clusters.

„ Umversity of Chicago, Yerkes Observatory, Williams Bay, Wis., was opened in 1897 un¬ der the directorship of George E. Hale, who developed here the use of the spectroheliograph which he had begun earlier in Chicago. The great 40-inch equatorial refractor has been used by Burnham for double stars and by Barnard tor extensive micrometric work. A large amount of time has also been given for spectro¬ graphic observations in determining the radial velocities of the stars. The method of using

a visually corrected refractor photographically was developed for this instrument by Ritchey, who employed a yellow filter and plates sensi¬ tive to rays of that color. For a dozen years this instrument has thus been applied success¬ fully to the photographic determination of stellar parallaxes. The photographic study of the Milky Way has been carried on by Barnard with the Bruce photographic telescope and much photometric work, visual and photographic, has been done by J. A. Parkhurst, and by Edwin B. Frost since 1905.

Flower Observatory, University of Pennsyl¬ vania, Philadelphia, 1896. The principal work has been the study of variation of latitude and the observation of double stars under the di¬ rection of E. Doolittle.

Carnegie Institution of Washington, Mount Wilson Solar Observatory, Pasadena, Cal, 1904. Tins institution was inaugurated in 1904 by George E. Hale, present director. Its equip¬ ment comprises a large horizontal telescope with coelostat, known as the Snow telescope twro tower telescopes 60 and 150 feet high a five-foot reflecting telescope provided with pow¬ erful spectrographs, also used for direct photog¬ raphy. A still larger reflector of 100 inches aperture is just being brought into use in 1919. A large laboratory is maintained at Pasadena amount of work has been accom¬ plished in many directions of astrophysics. A method has been developed by W. S. Adams for determining the distances of the stars from certain characteristics of their spectra. Im- portant photographic and photometric re¬ searches on the study of stellar clusters are in progress.

Excellent equipment for instruction and re¬ search are also usefully employed at many other institutions as Princeton University, Carleton College (I\ orthfield, Minn.), Swarthmore Col- Pennsylvania, the State universities of California, Wisconsin, Illinois, Ohio, Minnesota, Mas sou n ; also at colleges for women, Vassar, v\ ellesley, Smith, Mount Holj'oke.

n- , , ir . H.DWIN B. Frost,

Ulrrut0r °f Yerkes Observatory, University of

O flC CLQ O .

• • Tr \ d. vnreous glass ot volcanic

origin, usually black or blackish green but sometimes brown, red, gray, or banded ' with combinations of these colors, varying from opaque to translucent. It is chemically a rather complex silicate, most commonly of aluminum. Next to. its vitreous appearance the most strik¬ ing physical characteristic is its conchoidal frac¬ ture, which was utilized by primitive races for the making of knives and weapon-heads, orna- ments and mirrors, notably by the Mexicans, who called the material itstli and quarried it in their mountains. The principal American va¬ riety is the chatoyante or cat's-eye, which con- Sns..a n!d(?y golden or silvery white gleam.

he hparobsidians, or those resembling liparites are best typitied by the famous Obsidian Cliff in Yellowstone National Park. Other acid obsid- ians are found in California, Mexico, Hungary, t e Lipari Islands and New Zealand. More

fonnrtS

vitreous type (with about 53 per cent of silica) occurs in volcanic districts, notably various parts of Mexico, Kilauea and Reunion.

™St??TETRICAL FROG, or MIDWIFE 1 OAD, a small European frog (Alytes obstret- ncans) of the Discoglossidco , which has the general appearance of a smooth toad. The upper parts bear many warts and are variegated in color, reddish spots becoming conspicuous in the males at the breeding season, and the under parts are dull white. It is found in Spain, Portugal, southern France and Switzerland, on high mountains as well as in the lowlands, and in towns, gardens and parks as well as in the remotest wilds, wherever a little water is available for a home. The species is thus very numerous, yet is rarely seen, for it is nocturnal, hiding quietly by day in some dark nook or in a little hole dug in the ground by itself. At night, during all the warmer months, the males call to one another incessantly in a tinkling note which is not loud enough to be an¬ noying. This frog gets its names from its peculiar manner of caring for its eggs. When the female

feels the time approach for the dis¬ charge of her eggs, the male mounts upon her back and waits, assisting her efforts, for the ex¬ trusion of the ova, which at last happens sud¬ denly. This takes place on land, not in the water. The eggs are comparatively large, and from SO to 100 in number, connected by a gela¬ tinous cord into two strings ; and they are caught and retained, as in a di§h, by the thighs of the female, which are extended straight be¬ hind her, close together. The male immediately fertilizes the eggs, and then proceeds to wind them about the upper part of his own legs, by thrusting his feet back and forth through the mass until they are fastened upon his thighs to his satisfaction. The female is then released, and the male carries his burden to his hole, where he remains, going abroad at night in search of food and to moisten the eggs in the dew, or occasionally in a puddle or pond. After about three weeks, the embryos are nearly ma¬ ture, and the father takes them to the nearest water and remains within it until soon the tadpoles emerge. They are in a more advanced stage than in most frogs, but do not complete their metamorphosis until the following spring. Consult Fischer-Swigart, (Zoologischer Gar- ten) (Berlin 1885) ; Gadow, (Amphibia and Reptiles5 (1901).

OBSTETRICS, that department of medi¬ cal practice which deals with the care and treat¬ ment of women during and after pregnancy and childbirth and with the care of the child when born. It is one of the most important branches of medicine. The study of all the parts of the female body concerned in the proc¬ ess of procreation, the healthy and sick func¬ tions during pregnancy and childbirth, besides the care of the mother and child during the early weeks following birth, all fall within its province. Although the function of child-bear¬ ing is strictly physiological, it is a process of great complexity and shows many variable features, so that in ancient as well as in modern times it has always caused an immense amount of sickness and suffering. Happily the art of obstetrics is being established on a rational and scientific basis, and the mortality, suffering and after-invalidism due to child-bearing are being reduced to a minimum. As would be natural with such a universal fact as reproduction, many and curious myths and customs have had

their day, to give way to equally fantastic ideas. Among ancient peoples obstetrics had its special workers, and among savages at the present time a crude obstetric art is practised. Among the Chinese in prehistoric times (3000 b.c.) mid¬ wives were the chief attendants on pregnant women. The length of pregnancy is given in the oldest existing works on medicine as 270 days. Women then were compelled to stay in bed at least three days and for 14 days were not allowed to see visitors. In ancient Assyria and Babylonia midwives were many, and to these women helpers was entrusted the care of the pregnant woman. This custom has continued to the present

time, but with the gradual in¬ crease in education the better qualified physi¬ cian is called upon with increasing benefit both to the mother and child. Physicians have also, however, been employed in this work since the earliest times. The modern era of obstetrics covers scarcely more than 30 years. The prac¬ tical annihilation of puerperal sepsis by methods of cleanliness has revolutionized the whole sub¬ ject of obstetrics, as the knowledge of bacterial infections has done with every branch of medi¬ cine. As the foetus is practically under the con¬ trol of the obstetrician at the present time, and as the danger of blood-poisoning can be elim¬ inated, obstetrics, in the hands of the properly qualified, has risen to the level of an exact science. Women still die of childbed fever, but lack of proper care is the cause. Cleanliness is salvation. Dirty hands or finger-nails on the part of the nurse, midwife or doctor may be fatal, and every mother should know it. In dif¬ ferent lands and races the earliest age of child-bearing varies from about 10 to 18. In European races the average is about 14 to 15. Women of warmer climates mature younger than those of the temperate zones. The gen¬ eral period of cessation of child-bearing is about the 45th year. Eight years is about the earliest authentic recorded age of pregnancy, and women of 60 or 70 have been known to have children. One case of pregnancy, with birth of child, is said to have occurred in a woman of 103 years, but the authenticity of this is doubt¬ ful. ˆ Following impregnation, which occurs physiologically only as a result of coitus, the ovum, which in the great majority of cases has previously come from the ovary, descends the Fallopian tube and becomes fastened to the wall of the uterus. Here a rich supply of blood-vessels grows up and around it to nourish the developing foetus. This set of blood-vessels subsequently becomes the placenta, or after¬ birth, and constitutes the chief medium of blood-supply between mother and child. Fol¬ lowing impregnation a characteristic series of symptoms occur in the pregnant woman. Men¬ struation ceases, as a rule, the breasts begin to give peculiar sensations, the woman urinates more frequently and her nipples have darker lines about them. These are the early signs. Later — from six weeks to a few months — she notes morning discomfort, with perhaps nausea and vomiting; constipation begins to annoy her; the abdomen begins to swell ; the breasts be¬ come tender; and the bladder grows trouble¬ some. Still later the nausea may disappear; the swelling uterus makes itself more and more prominent; the breasts become fuller, firmer and have a waxy exudation. At the end of

about nine months — 270 to 280 days — labor begins. This is usually preceded for about two weeks by a distinct drop of the child in the pel¬ vis, whereby the waist-line sinks very percep¬ tibly. Labor is ushered in by some premonitory cramp-like growls, with inability to hold the urine and by the escapement of a certain amount of fluid in which the child has floated for the final three or four months or more. Irregular pains, which slowly increase in severity, cramp-like in character and intermit¬ ting, continue for from 4 to 24 hours or more. These constitute the first stage of labor and are premonitory and useful in dilating the opening of the uterus (q.v.), the cervix. The pains become more severe and frequent and longer in duration, and the second stage of labor, during which the child is to be squeezed out of the uterus, begins. This is a very dis¬ tressing time and, were it not for the intermis¬ sions in the pain, would be unendurable. The pains become faster and harder, the bag of water usually bursts, and with further cramps the child progresses, head-first, through the vagina into the world. Here meeting with a cold reception when compared to the warmth of the body from which he came, he reflexly cries out and with cleansed mouth, takes his fill of air.

Following the birth of the child there is a quiescent period for a few moments to half an hour, then with further pain the uterus squeezes out the afterbirth, and the third stage of labor is completed. The cord connecting the child and the placenta is cut between two knots and the infant becomes an entity. The length of time of the second stage varies widely. In first children, and in older women, with the first baby particularly, it is apt to be longer. From two to six hours may be said to be the average. Following the birth the mother should lie in bed and the child be put to her breast at regular two-hour intervals. Although the milk will not come for a few days, the child begins a regular habit and the^ breast receives its physiological stimulus. It is wise for the young mother to remain in bed at least 10 days, as this favors the return of the uterus to its normal condition.

OBSTFELDER, Sigbjorn, Norwegian novelist: b. 1866; d. 1900. In 1897, with (The Red Drops1 and (The Cross1 this young author came into prominence as opening a new field in Norwegian literature. The promise of a bril¬ liant future was closed by his death in a hos¬ pital in Copenhagen in August 1900. He left in manuscript a notable book (A Priest's Diary,1 posthumously published (1901).

OBSTRUCTION, a term applied to the policy which intentionally impedes progress in a legislative body for party or factional purposes. In the United States House of Representatives during the 80's of the 19th century, the policy of obstruction became such a serious abuse, that drastic remedies had to be applied to check the evil. By motions to adjourn to a certain day and to take a recess the time of the House of Representatives was wasted

and the power of the majority to control legislation was seri¬ ously threatened. Both motions were subject to two amendments upon each of which as well as upon the original motion the yeas and nays could be demanded by one-fifth of the members present. These motions could be repeated with¬ out limit and the time of the house wasted in

useless roll-calls. In the 50th Congress on one occasion the house remained in continuous ses¬ sion for eight days and nights during which time there were over 800 roll-calls on motions to adjourn and to take a recess. Speaker Reed in 1890 announced that he would henceforth refuse to entertain such motions and the prac¬ tice he established was embodied in the rules of succeeding Congresses. Rule XVI, section 10, as revised in 1911, stipulates that ((no dila¬ tory motion shall be entertained by the speaker.11 See Closure; Filibustering in Legislation.

OBVERSION, from the Latin obvertere, to turn toward or against, used in logic as a form ˆ of immediate inference in which, by changing the quality from one proposition an¬ other is inferred, having a contradictory predi¬ cate. The import of the judgment remains un¬ changed. The original proposition is called the o'bvertend, and that from which it is inferred is called the obverse. The logical term obver- sion is also called permutation.

OC, Land of, the name given to the country in which Provencal is spoken in the south of France. The term is specifically applied to it by the members of the Felibrige Society. See Provencal Language; Provencal Literature; Felibrige.

OCALA, o-ka'la, Fla., city, county-seat of Marion County,' on the Ocala Northern, the Ocala and Southwestern and the Seaboard Air lines, about 160 miles in direct line southeast of Tallahassee, and 70 miles south¬ west of Saint Augustine. The noted Silver Spring is about five miles east of Ocala. It is in a region in which are raised large quan¬ tities of cotton, oranges and vegetables. Other products which are sent to Northernmarkets are lemons and sweet potatoes. It has considerable trade in phosphate found in the vicinity. The sewerage system is most unique, it being formed by a subterranean river, which was accidentally discovered while drilling for a well. Neither the source nor the mouth of the river has been discovered. The city owns and operates the electric-light plant. Pop. 5,002.

OCALA PLATFORM, in American poli¬ tics, a series of resolutions passed at the national congress of the Farmers' Alliance, held at Ocala, Fla., 8 Dec. 1890. It demanded the abolition of national banks; the establish¬ ment of sub-treasuries which should lend money directly to the people at low rates of in¬ terest, free coinage of silver, low tariff, the prohibition of alien ownership of land and a graduated income tax.

O CALLAGHAN, d-kaTa-han, Edmund Bailey, Irish-American historian: b. Mallow County Cork, Ireland, 27 May 1797; d. New York, 27 May 1880. He was educated in Ire¬ land and in France. He removed to Canada in 1823, where in 1827 he became a medical practi¬ tioner, and #was editor of the Vindicator, the organ of the Society of the Friends of Ireland (1834). Lie was elected to the assembly of Quebec in 1836, but after the insurrection (1837-38) he removed to the United States to escape the consequences of the part he took in the insurrection. He spent many years in the office of the secretary of state at Albany em¬ ployed in editing the records of the State. He wrote (History of the New Netherlands1

(1846) ; (Documentary History of the State of -\ew \ork) (4 vols., 1849-51) ; (Documents Re¬ lating to the History of New York) (11 vols., 1855-61) ; (A Calendar of the Land Papers) (1864) ; (Voyages of the Slavers Saint John and Arms 5 (1867).

OCANA, o-ka'na, Colombia, town in the department of Santander, on the Taira River, 230 miles north of Bogota. It was founded in 1572, and is the commercial centre for the coal, anise, hides, lead, coffee and other products of the district. From Ocaha extensive trade is carried on with parts of Venezuela and down the Magdalena River. Pop. 17,200.

OCARINA, ok-a re'na, a musical instru¬ ment extensively used in Calabria by the peasants, and said to be of Tyrolese or Aus¬ trian origin. Prior to the discovery of America an instrument similar in form and make was in use among the Aztecs and other more cultured races of Mexico; and it is still found there in the mountainous districts. The Chinese hsuan, in use 3000 b.c., is the earliest known prototype of the ocarina. It consists of a gourd shaped clay bulb, pierced with a number of small holes and a mouthpiece. Its tone was sweet, but the range was exceedingly limited — less than an octave — but in the course of sub¬ sequent development its compass and power were greater augmented.

O'CAROLAN, Turlogh, Irish musician-

poet. See Carolan.

OCCAM, ok'am, or OCKHAM, William

of, mediaeval controversialist, of the Franciscan order, known as ((Venerabilis Inceptor55 and (XXII condemned the decision of the chapter, and Occam defended it against him, for which he was by order of the Pope

imprisoned at Avignon. He escaped, however (1328), and a vessel sent by Louis the Bavarian conveyed him to Italy. The Pope excommuni¬ cated the fugitive and vainly tried to get him sent back to Avignon, but Occam from that time resided at the court of Louis and engaged in polemical warfare with papal authority. He charged John XXII with teaching heresies, and when Louis in 1348 declared the imperial acces¬ sion independent of papal confirmation Occam supported him. On the death of Michael da Cesena in 1342 he became general of his order, though not recognized by the Pope. In logic and philosophy Occam occupies a distinguished place. His principal work is (Summa Totius Logices.5 Consult Lindsey, T. M., (Occam and his Connection with the Reformation5 (London 1872) ; Little, A. G., (Gray Friars of Oxford5 (Oxford 1892) ; Riezler, (Die literarischen Widersacher der Papste zur Zeit Ludwig des Baierns5 (1874) ; and Poole's article in the dic¬ tionary of National Biography,5 Vol. XLI.

OCCANEECHI INDIANS, an American tribe of the Siouan family residing in southern Virginia in the 17th century. When they first appear in American history in 1670 their

chief town was upon an island at the junction of the Staunton and Dan rivers near Clarks¬ ville. Their tongue became the general trade language of a very considerable extent of country. They aided the \vhite settlers against the invasion of northern Indians in 1676. In these wars they suffered so severely that they were not able to hold their own against their enemies, so in 1701 they removed to North Carolina, near the present town of Hillsboro, and disappeared by uniting with other tribes. Consult Mooney, James, (Siouan Tribes of the East5 (Washington 1894).

OCCASIONAL CAUSES. See Descartes, Rene ; Metaphysics.

OCCLEVE, ok'klev, or HOCCLEVE, Thomas, English poet of the 15th century: b. about 1370; d. about 1450, both dates being based merely on the internal evidence of his poems. ˆ For 24 years he was a clerk in the Privy Seal office, London. He evidently knew Chaucer, and the famous portrait of Chaucer on the margin of the Harleian manuscript of the (De Regimine Principum5 is believed to have been drawn by Occleve himself. This work (Concerning the Duties of Kings) was, for the most part, a digest of the Latin treatise bearing the same title by PEgidius Colonna. It is in the prologue to it that Occleve gives the few details of his life that are known. Besides this poem, which was edited by Wright in 1860, Occleve wrote the autobiographic sketch (La Male Regie de T. Occleve,5 and various shorter poems, the most notable being the (Mother of God,5 an orison to the Virgin, long attributed to Chaucer. Occleve's poems are edited by Furnivall (1892-

97).

OCCLUSION, in chemistry, a name given by Graham to the property of metals to absorb, or hold in solution, gases. This property is most remarkably displayed by platinum and palladium in their affinity for hydrogen, of which platinum will absorb 114 times its own volume and pal¬ ladium between 700 and 800 times its own vol¬ ume. The entire class of oxides illustrates again this special kind of absorption. The term is also used of mere surface condensation, as of ammonia or oxygen in charcoal.

OCCOM, ok'om, Samson, Indian preacher: b. Mohegan, New London County, Conn., about 1723; d. New Stockbridge, N. Y., 14 July 1792. He entered the Indian school of Rev. Eleazar Wheelock at Lebanon, where he remained four years. In 1748 he kept a school in New London, but shortly after removed to Montauk, Long Island, where he taught and, as a licensed Con¬ gregational minister, preached to the Indians. In 1759 he was ordained to the Presbyterian ministry, with which he remained connected. In 1766 he went to England with Rev. Nathaniel Whitaker as an agent for Moor's Indian charity school. Being the first Indian preacher who had visted that country, he was successful in attract¬ ing large audiences and obtaining donations ex¬ ceeding £10,000. After his return to America, Occom preached at various places, passing his latter years within the bounds of the Albany presbytery. He wrote an account of the Mon¬ tauk Indians, printed in the (Massachusetts) Historical Society collections (1st series, Vol. X), and published a sermon on the execution of an Indian at New Haven in 1772.

OCCULTATION. The occullations of stars and planets by the moon, as in its east¬ ward motion during the month it passes in front of star or planet and blots them for a while from view, have, in a measure, their counterpart in occultations of stars by planets or by comets, and also in the occultations of satellites by their primaries.

Occultations of the Moon.— The general theory of occultations is analogous to that of solar eclipses. (See Eclipse, Bibliography) . For stellar occultations, however, considerable simplification occurs because the apparent radius of the occulted body is indefinitely small and there are but two instants to be computed, namely, the immersion or disappearance of the star and its emersion or reappearance from behind the moon's disc. The elements for the prediction of the occultations of stars are given in all the national ephemerides, chiefly accord¬ ing to Bessel's method. In the

‘American Ephemeris) these elements are given for stars down to 7.5 magnitude. Observations of the occultations of stars are chiefly valuable as furnishing indispensable data for determining the distance, size and motions of the moon. (See Moon). The accuracy of a lunar position thus determined is many times that of the or¬ dinary meridian observations of the moon’s limb. The occasion of a total lunar eclipse offers special facilities for determining with great accuracy the occultations of a number of small stars. The best lunar method of deter¬ mining the longitude of a place is that of observ¬ ing the occultations of stars, and it has only been superseded by the telegraphic method of the comparison of signals.

The immersion and emersion of stars in oc¬ cultations by the moon are accompanied by phenomena of a varied character, which have been the subject of much discussion. Some astronomers have been willing to dispose of all these phenomena by vaguely describing them as due to physiological causes, without at¬ tempting any scientific expalantion and without satisfying the experience of the more acute and sensitive observers. The various phenomena noted may be scheduled as follows: (1) In¬ stantaneous disappearance or reappearance of the star. (2) Apparent projection of the star upon the moon’s limb. (3) Sudden change of magnitude. (4) A slow disappearance or re¬ appearance, sometimes described as “gliding.® The instantaneous immersion or emersion of the dark limb is naturally to be expected, and is readily accounted for by the assumption that the moon has no appreciable atmosphere, and that the apparent angular diameter of the stars is insensibly small. This instantaneous disap¬ pearance is very usual under conditions of good seeing, although under such conditions also, when the star apparently approaches closely to the moon’s serrations along the dark north or south limb, it has been seen to disappear behind a mountain and reappear in the next valley, and so on. Such instances have been particularly noted by the elder Bond and by Davidson. These disappearances and reappearances are to be dis¬ tinguished sharply from those not associated with the finest definition. Sensible displacement of stars with respect to the moon at occultation, or a “clinging® upon the lunar limb, has fre¬ quently been observed, and although attributed

by Innes to improper focusing, or focusing on the red star so as to throw the moon’s image out with respect to it, it is probably, as David¬ son suggests, due to the formation of a facti¬ tious or spurious limb® of the moon by irregu¬ lar refraction, upon which the star is projected through the unconsciously selective action of the eye on the star image. It is chiefly large, bright and mostly red stars, like Aldebaran and Antares, that have been projected from the whitish, spurious border of the moon. ((With a large, colored star,® says Davidson, ((all the phases of this phenomenon are unmistakable; with a large white star they may be somewhat in doubt;

with a small white star, they will probably not be noted, especially in small tele¬ scopes with low power.® With this phenome¬ non the true immersion is still instantaneous. Sudden decrease in the magnitude of the dis¬ appearing star, as if in two distinct stages, has again and again been noted by expert observers. In certain instances this distinct phenomenon has been proved to be due, and in all cases is probably due, to the occultation of a double star. It seems likely that a very close observa¬ tion of these light changes at occultation will more and more be deemed a valuable means of detecting very close double stars lying in the moon's path. The. "gliding® or gradual occulta¬ tion of stars is, with some show of probability, attributed by Innes to occultation of double stars too close to make a separate physiological im¬ press. He thinks that close doubles of a period too long for spectroscopic discovery and yet too close for visual detection may thus reveal themselves by the magnification due to the appreciable interval taken by the moon in traversing an arc too small for direct measure¬ ment. In both of the cases of "disappearance in two distinct stages® and of "gliding® the position angle of the double star with respect to the moon's path, as well as the angular sep¬ aration of the components, enters as a factor of the delicate phenomena.

That the disturbance and reappearance of a star in nearly all cases appears to be absolutely instantaneous is not surprising when we con¬ sider the great distances which separate all of the stars from the solar system. A very simple computation shows that were even the nearest star to have a diameter of 1,000,000 miles, its apparent angular diameter as seen from the earth would be but 0.0076 inches, and the time occupied by the advancing edge of the moon in passing across this apparent disc would be less than two-hundredths of a second. If we sup¬ pose that a star of the same size is 10 times as far away, the time would be but one-tenth as great as this. It cannot be doubted that the time required for the complete extinction of a stai s light, in the great majority of cases, does not exceed one-thousandth of a second. This is far too small an interval to be directly ob¬ served, and no photographic device for record¬ ing the necessarily gradual extinction of the light nas yet been successfully invented. If however, such an apparatus shall be secured, it will enable us to directly measure the apparent angular diameter of the stars — quantities far too small for us to observe by any methods at present known to us.

Occultations of Ptanets. — T he phenomena attendant upon occultations of planets by the

moon differ somewhat from those of stars. The beautiful and startling appearance which Venus and the new moon present to the unaided eye at the time of this planet's occultation, and the early association of the new moon with religious festivals, has led to the crystalization of this phenomenon as a symbol on the Turkish flag and is also thrice emblazoned on the Egyptian. The phenomenon of an occultation of Jupiter, photographed and visually observed at Are- quipa in 1892, led W. H. Pickering to an interesting discussion of the apparent effect of a slight lunar atmosphere. Of an occultation of Saturn, 3 Sept. 1900, G. G. Tupman says that it "disappeared at dark limb, which was not visible except on the planet and ring. The last little patch of light, longer than broad, parallel to the moon's limb, seemed to linger strangely. The distance of centres was dimin¬ ishing 0.28 inch per second, and the moon seemed to travel very rapidly across the planet and ring.® It seems undesirable to speculate on this phenomenon further than to class it with similar phenomena of displacement of stars at the occulting limb, of the moon.

Occultations by Planets. — The observation of the occultations of stars by planets may be utilized in determining the position and diame¬ ter of the planets and in securing some knowl¬ edge of the effect of their atmospheres on the phenomena. The prediction of these occulta¬ tions by planets was for some time annually made by Berberich of the (Astronomisches JahrbucliP The phenomena of immersion and emersion have, in the cases of Mars as observed by South, of Venus by Curruli, been practically instantaneous. Only a slight hesitancy in reap¬ pearance was noted in the latter case. An occultation of a 6.5 magnitude star by Jupiter, as recently observed by H. Struve, gave the times of the immersion and the emersion un¬ certain from 7 to 10 seconds and showed these times to be phenomena of a gradual character.

Occultations of Satellites. — The occulta¬ tions of Jupiter's satellites by the planet are a part of the general theory of the configuration of the Jovian System as seen from the earth, and are regularly predicted in the American Ephemeris and Nautical Almanac and other Ephemerides. The projection of the satellites within the apparent limb of Jupiter at occulta¬ tion has been seen by many observers and is satisfactorily explained by the effects of atmos¬ pheric disturbances on the planetary edge just as in the case of the star's projection on the disturbed and spurious limb of the moon.

Occultations by Comets. — The passage of comets over stars, as visually and photograph¬ ically observed, has disclosed some facts of in¬ terest in this class of occultations. Until quite recently all observers agreed that the nebulous envelopes of comets do not absorb the light of stars, and long ago Olbers had shown that there was no evidence of refraction by comets. One eminent observer after another has recorded the occultation of a star or

cluster of stars by a comet without sensible diminution of the light of the stars, and this phenomenon has also been markedly attested by the photography of comets. A few observers have noted the dim¬ inution or even the complete extinction of stellar light in their occultations by comets. Max Wolf has, moreover, recently demon¬

strated by photography that the envelope of Comet 1903c exercised a selective absorption on a 6.5 magnitude star and that the same comet failed to absorb the light of a less brilliant star of a different type. The projection of the stars upon the envelopes and tails of comets thus not only affords means for accurate measure¬ ment of the position and form of these objects, but promises to supply occasional hints of the cometary absorption of stellar light.

Bibliography.— Bessel's method of treating predictions ot occultations is given in (As- tronomische Nachrichten> (No. 145). A num¬ ber of graphical, or partly graphical, methods, useful to observers in predicting occultations, have been published in recent years. Among these may be mentioned the suggestions of G. W. Hough in Popular Astronomy for 1897; Major Grant's diagram given in (Hints to d ravellers ; M. J. Bijourdan, XXIII), and the graphical method of Rigge, No. 3786, Astronomische N achrichten. In the same journal (No. 2388) Seeliger has dis¬ cussed the conditions of frequency of occulta¬ tion of stars by planets.*

Revised by Eric Doolittle.

OCCULTISM (from the Latin occultare, to hide), deals with the doctrines, principles or practice of occult science, such as magic, the¬ osophy, mysticism, etc. Occultism deals with forces of nature, not generally known, and is chiefly kept up in the Eastern countries, par¬ ticularly in India. Dr. Joseph Grasset, in his UTOccultisme hier et aujourd'huP (Paris 1907), writes: "Occultism is not a survey of all things hidden from science; it is a survey of facts not yet belonging to science (posi¬ tive science, after August Comte's manner), but which may belong to it. Occult facts are outside of science, or in the vestibule of sci¬ ence, endeavoring to conquer the right to be in¬ cluded in the text of the book of science, or to cross the threshold of the palace. There is no logical situation which hinders these facts from ceasing one day to be occult and becoming sci¬ entific. Charles Richet calls them metaphysical. As they are really psychical, I should rather term them juxta- or pre-scientific. To the word metaphysical Boirac prefers the term paraphysical, in which the prefix para indi¬ cates precisely that exceptional and paradoxical phenomena are in question — phenomena quite outside the known principles of thought and life. One might describe paraphysical pheno¬ mena as all phenomena manifesting themselves among living beings, . or through their actions ; and as being not

entirely explained by nature's principles and powers as already known.

"The attractions of a scientific mystery have not been the appanage of any one epoch ; but one divides into three periods the stopping- places of the prescientific wonders of the mod¬ ern age:, the period of Mesmer; the period of Spiritualism ; and the present day.®

Mesmerism, or animal magnetism, intro¬ duced by Mesmer (1734-1815), was derived, in fact, from the works of Paracelsus of the 16th century ; Spiritualism originated in the United States in 1847 ; and the end of the 19th century witnessed a new spirit which Paulhan spoke of in (Ee Nouveau Mysticisme) (1891) as "a mysticism that, far from repelling the scien-

tific system willingly seeks it.® From this time onward occultism has assumed the aspect of a serious study. Among those, to quote from Charles Richet, who (

An impetus was given to the scientific study of occultism in 1893, when De Grasset presided at the Montpellier Faculty of Medicine during the presentation of a thesis about occult phe¬ nomena. Albert Coste in (Les phenomenes psychiques occultes) (2d ed., 1895), made an official report of the actual condition of the subject. At the same time, Dariex, wishing to establish in France a similar work to that of the Society for Psychical Research, already pro¬ moted in London, issued the Annales des Sci¬ ences Psychiques, which contains much docu¬ mentation of all these questions. These investi¬ gators <(limit occultism,® in the words of Dr. Grasset, <(lo the investigation of phenomena that, first, does not belong to science; second, that may without logical hindrance belong to it later on. In a word occultism is the pre-scien- tifical Wonders.® (See Magic; Mysticism; Theosophy; Spiritualism). Consult Bertrand, G., (L'occultisme ancien et moderne5 (Paris 1899) ; Besant, Annie, (Ancient Wisdom5 (Lon¬ don 1910) ; id., (The Changing World5 (London 1910) ; id.,

(Transcendental Magic5 (trans. by A. E. Waite, London 1896) ; Cooke, C., Curiosities of Occult Literature5 (London 1863) ; Davies, Thomas W., (Magic: Black and White5 (Chi¬ cago 1910) ; Decrespe, M., (Principes de phy¬ sique occulte5 (Paris 1894) ; Denis, J. F., < Tab¬ leau historique analytique et critique des sci¬ ences occultes5 (Paris 1842) ; Debay, A.,

1896) ; id., Pa magie et l'hypnose5 (Paris

1897) ; id., P'occultisme et le spiritualisme5 (Paris 1902) ; id., (Qu'est ce que l'occultisme5 (Paris 1905) ; Fabart, F., (Histoire philoso- phique et politique de l'occulte, magie et preface de Camille Flammarion5 (Paris 1885) ; Figuier, G. L., Pes mysteres de la science5 (Paris 1887) ; Flagg, W. J., (Yoga5 (New York 1898) ; Flammarion, Camille, (Mysterious Psychic Forces5 (Boston 1907) ; id., (Uranie5 (trans. by M. J. Serrano, New York 1896) ; Gal- lais, A., Pes mysteres de la magie5 (Paris 1909) ; Garland, Hamlin, (The Shadow World5 (Boston 1908) ; Hartmann, Franz.

tes des sciences occultes5 (Paris 1862) ; Leh¬ mann, A., (Aberglaube und Zauberei5 (Stutt¬ gart 1908) ; Lodge, Sir Oliver, Pife and Mat¬ ter5 (London 1905) ; id., (Man and the Uni¬ verse5 (ib. 1908) ; id., (The Immortality of the Soul5 (ib. 1911) ; id., (Raymond 5 (ib. 1916) ; Owen, Robert D., (Footfalls on the Boundary of Another World5 (Philadelphia 1889) ; Park, Roswell, (The Evil Eye5 (Boston 1912) ; Rog¬ ers, L. W., Pints to Young Students of Oc¬ cultism5 (Albany 1900) ; Salverte, A. J. E. B. de, Pes Sciences occultes5 (Paris 1843; trans. by Thomson, 2 vols., New York 1847) ; Sedir, Paul, Pes incantations de logos humain5 (Paris 1897) ; id., Pes forces mystiques5 (ib. 1916) ; Sinnett, A. P., CXCVI (Paris 1906); Lodge, Sir Oliver, (The Attitude of Science to the Unusual,5 a reply to Professor Newcomb, in Nineteenth Century (London 1909) ; New¬ comb, Simon, < Modern Occultism5 in Nine¬ teenth Century (ib. 1909) ; Peladan, J., (Intro- troduction aux sciences occultes5 in Grande revue (Paris 1902) ; and also the Occult Re¬ view from 1915 to date.

Esther Singleton.

OCCUPANCY. See Possession.

OCCUPATION, Diseases of. See Dis¬ eases, Occupational.

OCEAN, The, or SEA, comprises the con¬ tinuous body of water which covers the greater part of the earth's surface, the area being two and one-half times that of the dry land. The latter is for its greater part aggregated on the northern hemisphere, the southern is pre¬ eminently oceanic. The ocean is divided into five great divisions which have partly natural, partly imaginary boundaries.

The Pacific, the largest one, is bounded on the east by America and the meridian of Cape Horn on the west by Asia, the Great Sunda Islands, Australia and the meridian of Tas¬ mania, on the north it terminates in Bering Stiait and on the south at the Antarctic circle.

The Atlantic Ocean, the next in size, is bounded on the east by the coasts of Europe Africa and the meridian of Cane Agulhas, on the west by America

and the meridian of Cape Horn and on the north and south by the Arctic and Antarctic circles respectively.

The Indian Ocean is bounded on the east bv the Great Sunda Islands, the west and south coast of Australia and the meridian of Tas¬ mania, on the west by the coast of Africa and the meridian of Cape Agulhas, on the north bv Asia and on, the south by the Antarctic circle.

The Arctic and Antarctic Oceans comprise the waters between the Arctic circle and the North Pole, the Antarctic circle and the South Pole, respectively. The actual boundaries of the oceans do not always agree with these theoretical ones; thus the northern coasts of America, Europe and Asia are the actual bound¬ aries of the Arctic Ocean; Hudson Bav and the White Sea are included, although they reach

*Aln°- * ie le.mPerate zone. Furthermore, tne Aictic circle is not the actual boundary be¬ tween the Arctic Ocean and the Atlantic, but a line drawn from Greenland to Norway by way of Iceland, the Faroe and Shetland islands, riom a morphological point of view there is no such thing as an Antarctic Ocean ; there are no land surfaces or submerged ridges that sep¬ arate it from the adjoining oceans. The area should properly be divided among the adjoin¬ ing great oceans — the Atlantic, Pacific and Indian; when we speak popularly of Antarctic Sea and Antarctic expeditions we refer to the entire region that lies south of the extreme southern points of the land masses, Cape Horn, Cape Agulhas and Tasmania, in lat. 56° S., 34° 51′ S. and 43° 40′ S., respectively.*

Area. — The areas of the three great oceans are given at 67.7 million square miles for the Pacific, 34.7 for the Atlantic and 18.6 for the Indian. Ihe two Polar seas are much smaller, but no exact figures can be given for the reason that there are about 3.1 million square miles in the North Polar regions and 8.3 in the South Polar regions still unexplored. As to dimen¬ sions the Pacific is the widest, with 9,400 nautical miles between Panama and the Philip¬ pines ; the Atlantic is much narrower, about 3,700 nautical miles between Cape Agulhas and the La Plata, or 4,500 miles between Cape Bo- jador on the African Coast and the Rio Grande, if we include the Gulf of Mexico. The Indian Ocean has its greatest width between the south¬ ern capes of Africa and Australia, over 6,000 nautical miles. The distribution of islands plays a prominent part in the physiognomy of the oceans. We have to distinguish between oceanic and continental islands. The open Atlantic is rather poor in oceanic islands,

more so is the eastern part of the Pacific, and especially poor is the northern part of the latter ocean and the eastern part of the Indian Ocean. The south Pacific is unsurpassed for its wealth of oceanic islands; ((small sizew is a characteristic feature of these islands, in fact the hundreds and thou¬ sands of Polynesian islands have a total area less than that of Celebes. Each ocean has its share of continental islands, which includes not only those near continents, but also such as have a continental structure, of which New Zealand is a t)ˆpe. The Pacific has its East Indian Archipelago, New Guinea, etc.; the At¬ lantic, the British Islands, the Antilles; the In¬ dian Ocean, Madagascar and Ceylon; the Arctic, Greenland, Nova Zembla, etc. Accord¬ ing to size Greenland with 0.81 million square miles heads the list of large continental islands, with the New Guinea, Borneo, Madagascar, Sumatra, Nipon, Celebes, Java and Cuba fol¬ lowing in the order of size. There is yet an¬ other element which imparts diversity of char¬ acter, not only to different oceans, but to dif¬ ferent parts of the same ocean — the develop¬ ment of the coast line. An ample development, the presence of deep incisions, is considered a great factor in the promotion of culture. Europe with the Mediterranean, Baltic, North Sea and English Channel : the eastern coast of North America with the Gulf of Saint Law¬ rence, the Gulf of Mexico and the Caribbean Sea, are especially favored in this respect, while the absence of deep incisions is noticeable in the contour lines of the southern continents, notably Africa and South America. A very

peculiar feature in this respect is the border seas which line the eastern coast of Asia; these are in succession, commencing at Bering Strait, the Bering Sea, Okhotsk Sea, Japan Sea, East Sea and South China Sea. A very rich de¬ velopment, though on a smaller scale, is im¬ parted by glacial action to coast lines in north¬ ern regions; we notice this especially on the coasts of Norway, Iceland, Greenland and the northeast and. northwest coasts of America.

Depth. — The mean elevation of the land sur¬ face is estimated at about 383 fathoms, and the mean depth of the sea at between 1,900 and 2,000 fathoms, hence the latter is about five times as great as the former; but, in spite of this disparity, the culminating heights of the land (the Gaurisankar with 29,000 feet) ap¬ proach very nearly the greatest defths of the sea (the Guamˆ trench with 5,269 fathoms or 31,614 feet). _ The mean depth of the three great oceans is about the same, the Pacific is slightly deeper and the Indian rather shoaler than the Atlantic Ocean.

The bed of the Atlantic has a peculiar form : instead of one deep basin separating the Old and New Worlds, as it was thought to be 50 years ago, there are two separate troughs, one on the American and the other on the Euro¬ pean side, separated bv a rise which commences at Iceland and passes through the middle of the ocean, taking in on its course the Azores,

Saint Paul and Ascension islands, and has been traced as far as lat. 40° S. This rise was for¬ merly designated the Dolphin Rise, but in mod¬ ern nomenclature it is Atlantic Rise. The troughs, which are divided by gentle swells into several basins, terminate on the south in two cross ridges, the Rio Grande and Whale ridges, and on the north in a ridge stretching from Greenland to Iceland and thence to the Shet¬ land Islands. It is called the Icelandic Ridge and has a depth of Jess than 328 fathoms. The depth_ of the basins exceeds 3,000 fathoms (3,825 southeast of the Bermudas). The great¬ est depth, however, 4,662 fathoms, is not found in these basins, but in a trench off Porto Rico which terminates in the Old Bahama Channel. It has been noticed that the arms of the north Atlantic in the higher latitudes, like the Baltic, North Sea and English Channel on the Euro¬ pean side, and Hudson Bay and the Gulf of Saint Lawrence on the American side, are shal¬ low, while those in lower latitudes have com¬ paratively great depths, the Mediterranean 2,406 fathoms, the Bay of Biscay 2,625 fathoms, the Gulf of Mexico 2,119 fathoms and the Carib¬ bean Sea 3,428 fathoms.

In the Pacific we find the northern part de¬ cidedly deeper than the southern. In about lat. 20° N. are the Hawaiian Islands rising from a plateau of over 1,000 fathoms depth and to the northward and southward of it are basins with over 3,000 fathoms depth which extend in an east and west direction over the greater part of the width of the ocean. The southeastern Pacific or, more definitely speaking, that part to the eastward of the Marquesas and other coral islands, appears to have been more charily located by the explorers and surveyors than any other part of the great oceans. We have no exact knowledge of the disposition of its basins and ridges, but mav form some concep¬ tion of the depths from the observation that, barring the immediate vicinity of the coasfi

there are no soundings recorded of less depth than 1,450 fathoms, or more than 2,711 fathoms. Farther west we notice the groups of innu¬ merable coral islands which have 'become his¬ toric from the investigations of Forster, Dar¬ win, Dana and A. Agassiz. They rise rather precipitously from depths of between 1,000 and 3,000 fathoms. Only passages of very mod¬ erate depth lead from the deep parts of the western Pacific into the Indian Ocean through the archipelago of islands which separates Asia from Australia, but within this archipelago there are several basins which show rather re¬ markable depths — the China Sea with 2,715 fathoms, the Sulu Sea with 2,550 fathoms, the Celebes Sea with 2,795 fathoms, the Banda Sea with 4,000 fathoms and the Coral Sea with 2,518 fathoms. The

uniformity of these depths appears to indicate that these successive basins were at some remote period parts of a con¬ tinuous sea and that their separation is due to volcanic eruptions. The discovery within the last 30 years of several areas of local depres¬ sion in different parts of the Pacific whose depth is far in excess of those of the large basins, also leads to the supposition that they are the result of violent volcanic action. They are found in close proximity to the coast of the mainland or close to chains of islands in the shape of longitudinal depressions, designated as trenches. The deepest one of these trenches is the Guam with 5,269 fathoms (the deepest sounding ever recorded), the Kermadec-Tonga with 5,155 fathoms, the Japan with 4,656 fathoms, the Aleutian with 4,037 and the Ata¬ cama, off the coast of Peru and Chile, with 4,175 fathoms depth.

Of the three great oceans the Indian ap¬ pears to be the least complicated in form, having only one great basin of 3,532 fathoms depth ; this is found in its eastern part, in the bight formed by the west coast of Australia and the Great Sunda Islands.

The Arctic Ocean may properly be divided into two parts, separated by Greenland, which descends into the temperate zone to lat. 60°. The eastern part lies north of Europe and Asia and the western part north of America. This ocean was formerly credited with very mod¬ erate depths, less than 700 fathoms, this mainly for the reason that the regions earliest known, those just north of the continents, were very shoal, but late Arctic expeditions have shown the existence of a deep trough, 2,650 fathoms between Greenland and Spitzbergen, which is taken as a continuation of that of the Atlantic beyond the Icelandic ridge, and also depths of over 2,000 fathoms far to the eastward and northward of Spitzbergen, indicating the ex¬ istence of another large basin. In the western part we find at Davis Strait, in about the lati¬ tude of the Arctic circle, a barrier of 360 fathoms depth which separates the trough of the western Atlantic from Baffin Bay. Except Baffin Bay, which has depths of over 1,000 fathoms, the entire region to the westward as far as Bering Strait seems to be shallow; in Bering Strait the greatest depth is only 28 fathoms.

Since the time of the Antarctic expedition of Wilkes and James Ross (1839-43) the opin¬ ion has prevailed that the Antarctic Ocean was one of inferior depth and that a gradual shoal¬ ing would have to be expected from the south:

ern parts of the great oceans toward the Ant¬ arctic continent. This opinion was based upon the nature of the soundings which Ross took near the newly-discovered land and which indi¬ cated a rapid shoaling, but has been dispelled by the results of the recent Antarctic expedi¬ tions which show depths of over 3,000 fathoms to the southward of Africa in about lat.

60° S., 2,975 fathoms between Madagascar and Ker¬ guelen Island, and between the latter and the Antarctic Continent 2,540 fathoms. We are rather interested in the depths existing between the southern capes of the continents and the nearest land to the southward in order to ascer¬ tain if any submarine connections exist, such as we have traced between North America and Asia on one side and Europe on the other. Between the Cape of Good Hope and Bouvet Island 2,962 fathoms have been found, between Cape Horn and the New Shetland Islands 2,106 fathoms; there are no soundings between Aus¬ tralia and the Antarctic Continent, but rather less than 2,000 fathoms are expected.

Composition and Density of Sea Water. — The briny taste and higher specific gravity of sea water than fresh water is due to the pres¬ ence of salts, held in solution, and although the absolute quantities of these salts are very variable, the relative proportions are alwavs very nearly the same. In 1,000 parts of sea water are found on an average 26.9 parts of chloride of sodium (common salt), 3.2. parts of chloride of magnesium, 2.2 parts of sulphate of magnesium, 1.3 parts of sulphate of lime and 0.7 residue.

The salinity is increased by evaporation on the surface, and although this is supposed to be always active, it is greatly promoted by high temperature and strong dry winds. The salin¬ ity is diminished by the addition of fresh water either from rivers, rain or melting ice. The highest salinity is found in the regions of the trade winds with the following results : 37.9 in the north Atlantic, 37.6 in the south Atlantic, 36.4 in the Indian Ocean, 35.9 in the north and 36.9 in the south Pacific, each in 1,000 parts of water. Between these regions of high salinity in approximately lat. 20° to 30° both north and south, there is found in the neighborhood of the equator a zone of low salinity, 35.5 to 35.0 in the Atlantic and 34.5 to 34.0 in the Pacific, and this is attributed to heavy rains and weak, humid winds. In the higher latitudes a rapid decrease of salinity is noticed with increase of latitude, except in' re¬ gions that are reached by the Gulf Stream drift; thus a density of 35 is found beyond lat. 76° N. between Spitzbergen and Nor¬ way, while in the southern oceans this density is not met with far beyond lat. 40° S., and not so far in the north Pacific. The 'Gulf Stream, which is fed by the highly saline waters which both the north and south trade winds convey to the eastern shores of North America, has a density at least as high as the north Atlantic in the trade-wind regions, while sev¬ eral arms of the sea in the Bahamas have a density greater still.

The greatest densities, exceeding those of the open ocean, are found in land-locked basins in warm and dry climates; thus we find 41 in the Red Sea, 38 in the Persian Gulf, 37 in the Mediterranean. Copious additions of river water reduce the salinity, and for this reason

we find low densities along the eastern and Gulf coasts of the United States, and when such waters empty into basins with narrow entrances we observe even lower degrees of salinity, thus 15 to 18 in the Black Sea and from 5 to 8 in the Baltic. Salinity is also reduced by melting ice, as we notice especially in the north Atlantic, where two mighty cur¬ rents, the East Greenland and the Labrador, carry vast quantities of ice in the shape of bergs and floes from the Arctic regions toward the south. Concerning the vertical distribution of salinity, it has been noticed that it decreases to the depth of 200 to 300 fathoms in those re¬ gions where a decided evaporation takes place, like the trade-wind regions, and increases to the same depths where a dilution occurs ; that be¬ yond these depths it decreases slowly to the depth of 1,400 to 1,830 fathoms, thence in¬ creases again until bottom is reached. In the inland seas, however, the density generally in¬ creases as the depth to the bottom.

Temperatures. — The rule holds good gen¬ erally that the mean annual temperature of the surface waters is somewhat higher than that of the air, and that it fluctuates much less. The warmest water is found at the equator, and here the Indian Ocean and the western Pacific exceed in heat the Atlantic and eastern Pacific. From these equatorial regions there is a grad¬ ual decrease in temperatures north and south, but the temperatures of northern regions are generally higher than those of the southern in corresponding latitudes for the reason that the warm water which is carried by the southern trades across the equator is replaced by cold water from tTie Antarctic regions, which is as¬ sumed to be the coldest on earth. Furthermore, in the higher northern latitudes the eastern parts of the oceans are warmer than the west¬ ern, the drift being northeast, and again, the northeast Atlantic is much warmer than the northeast Pacific for the reason that the Gulf Stream is a much more powerful stream than the Kuroshiwo. The warm waters which we meet at the equator reach to the depth of only about 50 fathoms, the cold waters which we meet beyond that depth are assumed to come from the Antarctic regions. In the regions of the trade winds the surface water, made heavy by evaporation, descends, and hence we find here in depths of from 50 to 250 fathoms the water from 4° to 6° warmer than in the equa¬ torial regions. But this water moves not only downward, but drifts to greater distances from the equator. The last traces of these tropical waters we find in the bottom layers of the Arctic and Antarctic oceans ; this water has parted with nearly all the heat with which it started on its journey, by supplying cold currents and by melting ice, but still retains enough salt to betray its origin.

From the bottom regions of the Arctic Ocean there is a slow movement of the water toward the equator and although that from the north polar regions starts with much lower temperatures, between — 2° to — 3° C., it rap¬ idly gains heat and shows temperatures of from + 1° to + 2° C. in middle northern lati¬ tudes, while under the equator and in southern latitudes the bottom temperatures do not vary greatly from 0° C. This distribution leads to the assumption that the cold waters which in the equatorial regions rise toward the surface

are of Antarctic origin. Theoretically no ice should be formed on the surface of the sea water until the whole body of water has been reduced to less than — 2U>° C., but in the Arctic regions freezing generally takes place before this temperature is reached, on account of the slowness of vertical circulation, and warm layers are often found under the surface ice. For seven or eight months of the year the entire Arctic Ocean, with the execution of the southern parts of the Greenland Sea and Baffin Bay, is covered with ice. In the Atlan¬ tic, Iceland, the British Islands and the coast of Norway; in the Pacific the Pribilof Islands and Aleutian Islands are free of ice all the year round. Thawing in the Arctic regions commences about the end of May. The Arctic summer is rather short ; new ice begins to form in September. The discovery of a <(northwest passage® from the Atlantic to the Pacific fur¬ nishes the motive for the greater number of expeditions commencing with those of Cook (1778) and Vancouver (1792-94) on the Pacific side of America, and those of Parrv (1819-24) and Ross (1831-33) on the Atlantic side; these undertakings were finally abandoned only after human endurance had been put to its severest tests and many lives sacrificed in the vain en¬ deavor. Nordenskjold in 1878-79 successfully accomplished the northeast passage by way of the Siberian coast ; but the experience of sub¬ sequent expeditions teaches that the chances for finding an open passage all the way through are rather uncertain. In the Atlantic two great currents convey the melted ice with its freight of bergs and floes from the Arctic regions, the East Greenland and Labrador cur¬ rents. The first one, after following th : east coast of Greenland to Cape Farewell, turns north along the eastern side of Davis Strait, crosses over to the western side before reach¬ ing Baffin Bay and joins the Labrador cur¬ rent. The latter flows along the Labrador coast, sends a branch through the Strait of Belle Isle ; but the principal part passes along the Newfoundland coast and banks and, if not dissipated by the warm waters of the Gulf Stream, dips under it. Here on the southern edge of the Banks of Newfoundland we wit¬ ness the most rapid change of temperature found in any part of the ocean, in May 10°, from 5° to 15°, within two degrees of latitude, or from the temperature off the coast of Ice¬ land to that off the coast of Spain. There are no Arctic currents on this

grand scale in the Pacific ; the ice generally disappears a short distance south of the Pribilof Islands. In the Southern hemisphere we have a vast region of floe ice the limit of which is lat. 57° S. off Cape Horn and 38° S. off Cape of Good Hope. The vertical distribution of temperature in en¬ closed basins is essentially different from that in the open ocean by decreasing from the sur¬ face downward to the depth of the channel which opens into the ocean and remaining con¬ stant thence to the bottom. Thus in the Cele¬ bes Sea a uniform temperature of 3.8° is found between 860 fathoms and the bottom (2,795 fathoms), while in the adjoining Sulu Sea, with about the same depth, the temperature is 10.3° below 400 fathoms. In the Gulf of Mexico and the Caribbean Sea a uniform tem¬ perature of 4.2° is found below 900 fathoms, and in the Mediterranean, with a depth of less

than 200 fathoms in the Strait of Gibraltar, the temperature from about 270 fathoms to the bot¬ tom is 13°.

The Bottom of the Sea is different in many

respects from the surface of the land. The mantle of sea water protects it from subaerial disintegration and erosion which gives such a varied shape to the landscape and although sea water may decompose the bottom of the ocean, there are no currents strong enough to transport the residue to distant regions. While the land surface is constantly reduced by denu¬ dation, the bottom of the sea receives constant accessions. 1 he materials which contribute to this process are either of continental or pelagic origin. The first are either such as the cease¬ less actions of the waves remove fr®m exposed parts of the coast or material brought down to the coast by the rivers. The currents carry these materials out to sea and, while the heavier ones, such as gravel and coarse sand, remain near the shore, the lighter ones, as fine sand, silt and mud, are transported to considerable distances before they sink to the bottom. In this way the coast is lined with a fringe of continental deposits which may be quite narrow, but often attains a width of 100 miles or more. This fringe is designated as continental shelf; when broad it has a moderate slope and is generally assumed to terminate with the 100- fathom curve. It is succeeded by a well-defined steeper slope called the continental slope. Con¬ tinental or terrigenous deposits are often found at considerable distances from the coast, dis¬ connected from the shore deposits; in such cases they are formed by conflicting currents losing their velocity and depositing the sand and silt which they carry. These deposits, called sand banks, often constitute dangers to navigation. In the higher latitudes melting ice¬ bergs

and floes produce banks; in this way the large Newfoundland Banks, 270 miles wide, are supposed to have been formed.

The finest terrigenous material, designated as mud, is carried to sea far beyond the 100- fathom limit and in the shape of blue, red, green, volcanic and coral mud covers about one-seventh ipart of the ocean's bottom to depths of over 1,000 fathoms. These "muds" also cover the bottom of the large continental basins with the exception of the Gulf of Mex¬ ico and Caribbean Sea, and prevail in. the Arc¬ tic Seas. The continental slope generally des¬ cends very gently from the "shelf" to the trough of the sea, but there are instances of quite steep descent ; such are met with off the west coast of Europe, Africa, Mexico and South America, also near volcanic and coral islands. But the bottom of the deep troughs and basins nearly everywhere presents the pro¬ file of the dead level of a vast plain. Although animal life presents its contribution to the continental deposits in the shape of broken shells of mollusca, etc., they occupy only an accessory position, and it is in the deeper parts of the ocean that they constitute the principal component. Globigerina ooze, composed mainly of the microscopic shells of a genus Foraminif- era, covers over one-third of the ocean's bot¬ tom; it prevails in the medium depths and especially where there are warm currents, like the Gulf Stream. The largest area is found in the Atlantic Ocean ; it predominates in the northwestern part of the Indian, but is re¬

stricted to the Polynesian Plateau in the Pacific Ocean. A variation of this ooze, which con¬ tains large proportions of mollusca shells, prin¬ cipally those of Pteropods, is called Pteropod ooze and is found on the central ridges of the Atlantic, in depths not exceeding 1,400 fathoms, and also in the Gulf of Mexico and Caribbean Sea. The red clay occupies the greater depths of the ocean and a larger area than any other deposit, more than one-fourth of the earth's surface. It is a genuine clay and assumed to be the result of the decomposition of pumice and other volcanic materials. The absence of shells in this deposit is not thought to be proof of the absence of animal life; apparently the shells have been dissolved by the free carbonic acid of the sea water and absorbed by the latter before reaching bottom. In some of the deepest parts of the Indian and in the eastern Pacific, silicious rad'iolarian remains are found in such quantities in the red clay that this kind of deposit has been designated radiolarian ooze.. See Ocean Currents; Ooze.

Bibliographer. — Challenger Reports (Lon¬ don 1897) ; De Lesse, A., (Lithologie du Fond des Mers) ; Murray, J., and Hjort, J., (London 1912) ; 'Murray, J., and Renard, A. F., (Deep Sea Deposits) (London 1891) ; Thoulet, J., (Oceanography (Paris 1890).

Adolphus Lindenkohl, Late of the United States Coast and Geodetic

Survey.

OCEAN CABLES. See Cables, Sub¬ marine.

OCEAN CURRENTS. The surface of the ocean is very rarely in a state of perfect rest. We make a distinction between vertical and perceptible horizontal motion ; the latter we call currents. Near the coast, in channels and estuaries, the currents are referred to a variety of causes, among which the tides are the most important, but in the open sea the winds are recognized as the primary cause of all the great currents. A regular and continuous wind blowing over the surface of the ocean will induce motion in its surface, but the velocity communicated to the water is always far less than that of the air producing it. In conse¬ quence of the viscosity of the water the motion of the surface will be transmitted in part to greater or less depth but greatly diminishing rapidly below the surface. The rate of this motion in a body of water and the depth to which it penetrates are altogether a question of time, and it has been demonstrated that if the winds act continuously upon an unconfined ocean the entire body of water from surface to bottom will have motion imparted to it. burthermore, the momentum acquired by the water in motion will carry it on in its course for a considerable time with slowly diminishing velocities, should the wind cease .to blow.

The trade winds are those which in the At¬ lantic and Ldcific oceans blow with great regu¬ larity all the year round on both sides of the equator in the Northern hemisphere from the northeast and in the southern from the south¬ east. In the Atlantic the southeast trades are the prevailing winds between the Cape of Good Hope and Rio de Janeiro to the equator, the northeast trades between lat. 12° N. and about lat. 30° N. The two regions are separated

by a region of light changeable winds and calms called the equatorial calms or doldrums. The trade winds induce currents on the ocean's sur¬ face called the North and South Equatorial Currents respectively. The limits approximate those of the corresponding trade winds ; the northern lies between lat. 10° and 28° N. and has a mean velocity of 14 miles per day, the southern between lat. 15° S. and the equator and has a mean velocity of 16 miles per day. The South Equatorial Current from about long. 20° W. passes north of the ecpiator ; this may be due partly to the southeastern

*trades which extend into the Northern hemisphere and partly to the configuration of the South American coast which compels the current to take a north¬ westerly course. It finally enters the Caribbean Sea through the different passages among the Lesser Antilles ; a small portion, however, separates from the main body and moves south, following the South American coast. Between the two Equatorial Currents we find the Guinea Current which belongs to a secondary class, called compensating currents, which always run in an opposite direction to the primary, and are explained by a natural tendency of the water to restore equilibrium disturbed by the primary current. The Guinea Current commences about 35*4° W., attains a velocity of 15 miles, and on reaching the coast of Africa, near Cape Palmas, passes into the Gulf of Guinea. One part of the waters which the North Equatorial Current conveys to the American shores enters the Caribbean Sea and joins those of the South Equatorial ; the other part moves along the Bahamas toward the northwest. The waters which the Equatorial Currents carry into the Caribbean Sea are assumed to acquire their motion partly from the impulse of the trades, partly in consequence of the prevailing easterly winds and to pile up against the western shores. Very little doubt is entertained at present that the current through the Strait of Yucatan into the Gulf of Mexico, which is one of the strongest on record (from 60 to 120 miles per day), is solely due to the difference of level between the Caribbean Sea and the Gulf. But these waters do not tarry in the Gulf of Mexico, its level being in turn higher than that of the Atlantic; they are, consequently, forced toward the Strait of Florida where they find an outlet, enter the Atlantic as the celebrated Gulf Stream, a name first used by Franklin. In the narrowest part of the channel, off Cape Florida, it ap¬ proaches the coast to within 15 miles, occupies the entire width (40 miles) and depth (482 fathoms) of the channel and attains velocities of 69 to 100 miles per day at the surface. By calculation it has been shown that a current of the velocity of the Gulf Stream requires a dif¬ ference of elevation of at least 0.7 feet of the Gulf over the Atlantic, which difference agrees very nearly with that found by direct leveling across the Florida Peninsula. After leaving the Straits, the Gulf Stream moves to the northward over a rocky bottom with a depth of 460 to 270 fathoms, and distant from the coast about 100 nautical miles. In lat. 34° it enters ihe deep water of the ocean; when off Cape Hatteras, it again approaches the coast, being distant only 35 miles and in depths of over 1,500 fathoms. Its temperature there is 31° C. in summer and 26° C. in winter, having lost only 3° since leaving the Straits of Florida.*

It is readily recognized by its high temperature and dark blue color, its western edge being especially well defined. It is not a deep current; at the depth of 250 fathoms its temperature is 10° C., under its western edge it is 7.2°, while under its eastern edge a temperature of 15.6° is found. This

*appears to indicate that it moves over a wedge of cold water which comes from the north and west and descends toward the east into the depths of the ocean. The width of the Stream off Hatteras is about the same as in the Straits of Florida, 40 miles, and its velocity is between 50 and 73 miles per day. After leaving Cape Hatteras it gradually changes its northeast direction into due west with constantly diminishing velocity and tempera¬ ture until it reaches the southern edge of the Banks of Newfoundland which it does in sum¬ mer in lat. 42*4° N. and in winter in 41ˆ4° N., with temperatures of 22° C. and 10° C. respec¬ tively and velocity of 24 to 30 miles per day. It is here no longer considered as an ocean current but a drift, and is called the Gulf Stream drift. The deflection of the Gulf Stream toward the east is attributed partly to the rota¬ tion of the earth and partly to the direction of the prevailing winds. While the central part of the Gulf Stream drift makes its way toward the western shores of Europe and moderates their climate, one part enters Davis Strait and produces an open channel to the southern part of Baffin Bay during winter; another one passes into Denmark Strait between Iceland and Greenland, but it soon sinks into the depths of the sea. A more persistent branch passes be¬ tween Iceland and the British Islands and the coast of Norway, and has been traced to the eastward as far as the west coasts of Spitzber- gen and Nova Zembla during the summer season. The southern part of the Gulf Stream drift, more properly called Atlantic drift, leaves the main body south of the Azores and, as the North African Current, follows the coast of Africa to Cape Blanco where it joins the North Equatorial Current. The vast oval¬ shaped area enclosed by the North Equatorial Current, the Gulf Stream and the Gulf Stream drift is one of calms and weak drifts, and is called the Sargasso Sea from the sea-weed which accumulates about its borders.*

Turning to the currents that descend from the polar region into the temperate zone, we find in the removal of vast bodies of water from the western part of the ocean to the eastern of the Gulf Stream the cause of other currents, compensating currents, whose function it is to move waters in the opposite direction, from the northeast to the southwest, for the purpose of restoring equilibrium, as in the Labrador current. The prevailing northwest¬ erly winds in Baffin Bay assist such a move¬ ment along the coast of Labrador and New¬ foundland to the southward, and this direction is maintained until Cape Race has been passed where it is changed to southwest on account of the rotation of the earth. This current is active during the season of melting ice. Field ice generally appears on the Banks as early as February and disappears about the end of May. Icebergs are most abundant in May and are found in diminishing numbers until the end of August. The majority of bergs come from the west coast of Greenland (some few come from Frobisher Sound and Hudson Strait), and move

at the rate of about 10 miles per day. Similar conditions to those existing in Baffin Bay pro¬ duce a southerly current along the east coast of Greenland, called the Greenland Current, which rounds Cape Farewell and turns to the north¬ ward toward the depression which the Labrador Current has created in Baffin Bay. After skirt¬ ing the ice barrier which usually exists in Davis Strait in the spring, it merges into the Labrador Current. The temperature of these currents is very low, but their density is comparatively high for the season that they are shallow and rest on warm and heavy waters and have been con¬ stantly gaining salt during their progress. Being comparatively heavy the Labrador Current sinks under the Gulf Stream. The cold waters which extend along the western edge of the Gulf Stream as far as Cape Florida have sometimes been considered a continuation of the Labrador Current, but it appears that the movement of these waters toward the southwest is extremely slow and disguised by the more powerful mo¬ tion produced by the winds and tides. Further¬ more, the movement of this littoral band is retarded by warm currents making their way into the Gulf of Saint Lawrence and Gulf of Maine. _ In conformity with the laws of oceanic circulation as now understood, the waters of the Labrador Current as well as the cold waters of the coast regions pass beneath the edge of the Gulf Stream (which is very thin) and con¬ tinue to sink and move along the slope of the continental plateau as they drift slowly south¬ ward until they reach the bottom of the ocean with a temperature of 2.2°. The existence of a cold wall along the western edge of the Gulf Stream and cold bands within its limits, which were discovered by the early Gulf Stream ex¬ plorations and which have since been denied and reaffirmed, can hardly be considered as per¬ manent features ; similar bands are often noticed in thin superficial currents and are the conse¬ quence of underlying cold water being forced to the surface either by lateral pressure or by the sinking of the warm water by reason of evaporation or loss of heat.

That part of the South Equatorial Current which turns to the southward off Cape San Roque, called the Brazilian Current, is quite weak, having a velocity less than 20 miles per day; off the Falkland Islands it is joined by the Cape Horn Current which comes from the southern Pacific and crosses the south Atlantic. When off Cape of Good Hope this (

The currents of the Pacific are similar to those of the Atlantic. The North Equatorial has its origin near the Revillagigedo Islands off the coast of Mexico, in long. 110°, flows between lats. 10° N. and 20° N. in a westerly direc¬ tion across the entire width of the ocean to the Philippines, about

7,500 miles, with a velocity of 12 to 18 miles per day. The South Equatorial extends from lat. 15° S. to the equator and has its greatest velocity near its northern edge. It has a mean velocity of 24 miles per day, but this is often more than doubled in the eastern part. In the neighbor¬ hood of the Fiji Islands it divides, one part, the northern, known as the Rossel Current, passing

through the various passages among the Poly¬ nesian Islands toward Torres Strait and the north coast of New Guinea; the southern branch called the Australian Current, trends toward the east coast of Australia with a velocity of 24 miles, but gradually loses strength and is deflected toward the southeast. The Equatorial Counter-Current, setting toward the east, commences at Mindanao in the Philippines and extends to the Bay of Panama and is especially strong during the period from June to October. The Japan Current, or Kuroshiwo, is a continuation of the North Equatorial and is the Gulf Stream of the Pacific. Starting from the east coast of Luzon, it passes the east coast of Formosa ; changing its course to the northeast, it makes for the southwestern point of Japan. Off this point the current divides; the major portion passes through Van Diemen Strait and the passages between the Linschoten Islands, and runs parallel to the south shores of the Japanese Islands, attaining its greatest velocity of 48 to 72 miles per day. It leaves the coast of Japan after having reached Cape Maboye, to the eastward of Yokohama, and turns to the northeast, like the Gulf Stream off Cape Hatteras, without, however, reaching beyond the latitude of 40° N. One branch of the Kuroshiwo parts from the main stream before Van Diemen Strait has been reached, enters the Japan Sea through the Korea Chan¬ nel and follows the west coast of Japan to La Perouse Strait, through which it passes into the Okhotsk Sea and flowing along the west shores of the Kurile Islands it can be traced to the west shore of Kamchatka Penin¬ sula. The strength of the Kuroshiwo is greatly influenced by the winds of the western Pacific; during the summer months, between the middle of May and the beginning of October, the south¬ west monsoon blows on the coast of China to lat. 20° N., and is followed during the winter by the northeast monsoon which retards the stream, hence it has its greatest strength in August and its least in March when it is hardly recognized as a warm stream. It is an open question whether a branch of the Kuroshiwo enters the Bering Sea. The currents here are so feeble and so much influenced by the winds and tides that their record does not convey any definite information ; but from the fact that the southwestern, or deeper, part of this sea is always free of ice while the northeastern, or shoaler, part during the winter months is cov¬ ered with an impenetrable mass of ice we may safely conclude that warm water from the Pacific enters the sea, if not as an active cur¬ rent, at least as a powerful drift. In confirma¬ tion of this supposition we find in the deeper parts of the sea

during August a mean surface temperature of 7.4°, at the depth of 100 fathoms a minimum of 2.9°, at 200 fathoms a maximum of 3.4 , and at 1,000 fathoms 1.9>°, with salinity increasing regularly from surface to bottom 1 he breaking up of the ice for some distance northward of Bering Strait indicates that a portion of the current passes through the strait.

In long. 150° W. the Kuroshiwo can no longer be considered a warm current; it thence gradually assumed a more southerly direction and passes Ihe coast of California as a cold current, the Gab forma Current, and finally merges into the INorth Equatorial in about long. 130° W. The east Australian Current, corresponding to the

Brazilian of the Atlantic, is regarded as a warm current ; it has a width of 40 miles, with its inner edge about 20 miles off shore, and shows velocities of from 12 to 72 miles. South of Tasmania and New Zealand we find1 the same vvesterly winds and easterly drift that we no¬ ticed in the south Atlantic. On reaching the South American coast a branch of this drift turns to the northward past the coast of Chile and Peru and joins the South Equatorial south¬ ward of the Galapagos Islands. This current has a velocity of only 15 miles and is gener¬ ally supposed to produce the comparatively low temperatures prevailing along the west coast of South America, but these are more cor¬ rectly attributable to the cold water which rises from the bottom to the surface near the coast. There are no Arctic currents in the Pacific on the grand scale of the Labrador, no icebergs and the ice in Bering Sea is not very compact. In fact the trips over the ice by the natives of both Asia and America in the depth of winter to visit their kinsfolk on Diomed Island, in the middle of Bering Strait, are considered hazardous ventures. The ice in winter extends from Bristol Bay to some miles to the north¬ ward of Saint. Paul Island, thence northwest to Cape Navarin; in the summer months, Au¬ gust, September and early October, the Arctic pack ice extends from Icy Cape on the coast of Alaska to Herald Island. Floating ice is found as far south as 35 miles to the southward of the Pribilof Islands and to about 60° lat., off the coast of Kamchatka. Along this coast there is a cold current in spring and early summer; this is reinforced by cold water which by strong tidal currents may reach the eastern shores of the Kurile Islands through Amphitrite and other straits from Okhotsk Sea. This cold current, the Kurile Current, carries quantities of Arctic ice and is noted for its low emperatures from surface to bottom. It follows the east 'coast of Japan as far as Van Diemeni Strait, is interposed between the shore and the Kuro- shiwo and is known as Oya Siwo (green water).

The Indian Ocean shows different conditions from those of the other two great oceans for the reason that its northern limit is within the torrid zone. During the summer months the southeast trade winds pass the equator and are changed into southwest winds or southwest monsoon. During the rest of the year from October to April, the northeast monsoon, which corresponds to. the northeast trade winds of the other oceans, blows over the northern part of the ocean. During this period the currents north of the equator have a northwesterly direction, attaining especially great velocities off Ceylon (80 miles) and the east coast of Africa. During the southwest monsoon the water north of the equator moves in the oppo¬ site direction, from west to east toward Su¬ matra, and again attains its greatest velocity off Ceylon. In the Southern hemisphere between the latitudes of 7° and 20° S. the Equatorial Current flows to the west during the whole year with velocities of between 12 and 36 miles, sometimes as much as 60 miles. Off the east coast of Madagascar the current divides into a northern and southern branch. A part of the northern branch turns to the northwest, reach¬ ing the Bay of Zanzibar during the southwest monsoon and turning into the Equatorial Coun¬

ter-Current during northeast monsoon. The other part rounds the northern Cape of Mada¬ gascar with velocities of 18 to 48 miles and enters the Mozambique Channel as the Mozam¬ bique Current. During the northeast monsoon the Equatorial Counter-Current is found be¬ tween the equator and lat. 7° S. with velocities of from 12 to 18 miles. Its function is to restore the equilibrium by carrying back part of the waters removed by the Equatorial Cur¬ rents from the eastern part of the ocean. During the southwest monsoon the eastern flow extends over the whole ocean north of lat. 5° S., with velocities of more than 48 miles at the equator. The Agulhas Current is a con¬ tinuation of the Mozambique Current; it has a velocity of 46 to 51 miles and off Cape of Good Hope meets the cold water from the vicinity of Cape Horn. The collision of the two currents produces streaks of alternate warm and cold water, differing 8° or more in temperature, a feature which has attracted the attention of many navigators.

The most noticeable feature of the currents in the Arctic Ocean is the almost universal eastward and southeastward set north of the American continent and the generally west¬ ward set north of Siberia, although at a con¬ siderable distance from the mainland. Both currents seem to originate north of Bering Strait and the fact that they set out from this locality in nearly opposite directions has sug¬ gested the existence of a large island or con¬ tinent between the Pole and Bering Strait.

In the Antarctic regions, or rather those to the southward of Tasmania, Cape Horn and the Cape of Good Hope, the drift is generally from west to east, in conformity with the pre¬ vailing westerly winds.

In conclusion it may be of interest to notice one or two currents which in a strict sense may not be considered ocean currents but which may explain the function of difference of density in the production of currents. In the Mediterranean we have noticed a higher density in consequence of evaporation than is possessed by the adjoining ocean. In consequence of this difference there is a surface inflow of ocean water with a velocity of 48 to 72 miles and an undercurrent of the denser water into the ocean. On the other hand the density of the Baltic is less than that of the adjoining North Sea, hence we have a surface current from the Baltic into- the North Sea and an undercurrent in the opposite direction.

Bibliography. — Boguslawski und O. Krum- mel, (Handbuch der Ozeanographie) (Stutt¬ gart 1884—87) ; Supan, A., (Grundzuge der physischen Erdkunde) (1903); Report on the Scientific Results of the Voyage of H. M. S. Challenger (1882-95) ; Buchan, (Report on the Oceanic Circulation (Appx. to Challenger Re¬ port 1895) ; Murray and Renard, (Deep Sea Deposits) (1891); Petermann, (Geogr. Mit- teilungen : Die Gewasser der Bank von Neu- fundland) (1897); United States Coast and Geodetic Survey Reports: (The Gulf Stream > (1890) Lindenkohl, A., specific Gravity of the Waters of the Gulf of Mexico and the Gulf Stream) (1895) ; (Salinity and Temperature of the Pacific Ocean (1898) ; Rodman, United States Hydrographic Office: (Ice and Tee Move¬ ments in the North Atlantic Ocean J (1890); Page, (Ice and Ice Movements in Bering Sea)

(1900) ; Simpson, (Ice and Ice Movements in Bering Sea and the Arctic Basin > (1890) ; Agassiz, (Three Cruises of the Steamer Blake, > Vol. I (1888) ; (Wissenschaftliche Ergebnisse der deutschen Tief see-expedition > (1902) ; (Norwegian North Polar Expedition, J Vol. Ill (1893-96); Kriimmel, O., (Handbuch der Ozeanographie) (Stuttgart 1897-11); Lamson, F. S., (Oceanography (Washington 1913).*

Adolphus Lindenkohl, Late of the United States Coast and Geodetic

Survey.

OCEAN DISASTERS. See Disasters of the World, Notable.

OCEAN GROVE, N. J., town in Mon¬ mouth County, on the Atlantic Ocean and on the Central of New Jersey and the Pennsyl¬ vania railroads, 54 miles south of New York. It is a famous summer resort on account of its fine beach and the ease of access from New York, Philadelphia and other

cities. It adjoins Asbury Park (q.v.) ; Wesley Lake is on the boundary. The Ocean Grove Camp Meeting Association of the Methodist Episcopal Church controls the town and regulates its laws. The sale of intoxicants and tobacco and theatrical performances are prohibited. The Sunday laws are strict and rigidly enforced. The prominent buildings are the Auditorium, which seats 10,000 persons, cost $75,000 and was dedicated 9 Aug. 1894; the public school building and the post office. Religious meetings are held in the Audi¬ torium. The school building, called the Nep¬ tune Township High School, cost $72,000. The Association owns and operates the electric-light plant and the waterworks. The Association was organized in 1869; but the first permanent building, a wooden frame covered with green boughs, was not erected until 1875. In 1874 a stand for the speakers had been erected and the audiences sat on temporary seats made by plac- ing planks on trestles. There are several large hotels and boarding-houses and many summer cottages. In the summer months the popula¬ tion varies from 20,000 to 30,000. The winter population is about 3,000.

OCEANA, o-she-a'na, or ENGLAND AND HER COLONIES, a work of travel by James Anthony Froude, published in 1886. This is the record of a journey made by the author via Cape Town to Australia and New Zealand and home by way of Samoa, the Sandwich Is¬ lands, San Francisco, Salt Lake, Chicago and New York, in 1884—85.

OCEANIC DEPOSITS. See Ocean; Ooze; section on Oceans in article on Geology; and section on Sedimentary Rocks in article on Rocks.

OCEANIC LIFE. See Benthos; Deep Sea Life; Deep Sea Exploration; Fishes, Geographical Distribution of; Globiger«ina ; Ooze; Plankton; Seaweeds; Zoogeography,' etc.

OCEANICA, o-she-an'i-ka, OCEANA, or OCEANIA, the name given to the land divi¬ sion of the world which is composed of islands in the Pacific Ocean. The limits of Oceanica are not well defined; some geographers include in this division all the oceanic islands in the Pacific, others include the East Indian Archi¬ pelago. A subdivision of Oceanica adopted by many is into Western Oceanica or Malaysia,

corresponding with what is better known by the name of the Malay Indian or East Indian Archipelago, Micronesia or Northern Oceanica, Polynesia or Eastern Oceanica, and Melanesia or Southern Oceanica. The islands and peoples of Oceanica will be found described under their respective titles.

OCEANID.S, in Greek mythology, a class of nymphs, daughters of Oceanus and Tethys. They were 3,000 in number and were said to have an equal number of brothers. See Mythology.

OCEANOGRAPHY. Oceanography is the science which treats of the physics and bi¬ ology of the ocean, including the extent and conformation of the basins, the deposits which cover the bed, the depth, physical and chemical properties, motions and circulation of its waters, and the nature and distribution of marine or¬ ganisms.

As a result of the marine hydrographic coast surveys of the various maritime countries, undertaken in the interests of navigation, the coast-line of the world is now among its best- known geographical features, and hence, since geodesists have determined the size of the ter¬ restrial spheroid, the area of the oceanic sur¬ face of the globe is known with closeness to 140,000,000 square statute miles, which is an expanse exceeding the total area of the lands of the globe by 83,000,000 square statute miles. In other words, 71 per cent of the surface of the globe is covered by the waters of the ocean. Although the depth of the ocean has been meas¬ ured in many thousand places throughout the world since the middle of the 19th century when deep-sea soundings first began to be suc¬ cessfully made, yet there are oceanic areas as large as the United States where no soundings have been made, and many others where the present soundings are but widely spaced. The contours of the oceanic basins cannot, therefore, be completely drawn at present and the volume of the ocean may only be stated by estimation to be 324,000,000 cubic statute miles, or 14 times the bulk of all the lands in the world above sea-level. The accepted measurements of the areas within the different zones of depth are given in the following table:

DEPTH IN FATHOMS

Between 0 and 1000. . . .

“ 1000“ 2000….

“ 2000 “ 3000 ….

“ 3000 “ 4000 _

“ 4000“ 5000….

Exceeding 5000. . . .

The mean depth of the ocean is 2,080 fathoms and the greatest depth, which is found east of the island of Mindanao, is 5,348 fathoms.

In their general extent and position, it is likely that ocean basins have been permanent since the waters were gathered ‘together. The study of deep-sea observations does not sup¬ port the view that, by alternate rising and sink¬

ing of the earth's crust, oceans and continents have successively occupied the same areas.

Traces of all known chemical elements have been found in the waters of the ocean and if there are any that are unknown traces of them will be found there. Although the total amount of salts contained in sea water varies in differ¬ ent parts of the ocean, the existing proportions

area in square statute miles

22,000,000

27,000,000

81,000,000

9,800,000

of total ocean floor

16 19 58 7

195,000) r ..

5 , 000 1 ˆess tˆian

A 700°

110 °

120 °

D

130°

140 °

750 “

G

700

H

770 °

180 0

K

750°

750°

M

140*

N

730

30

A. S

I A.

^^/SHIKOKU

1 Kyushu >

Longitude East from Greenwich.

Longitude West from

Greenwich.

30

HINA

Midway Is. •:%> (u. s.)

• ; Bonin Is.

- (J*«0

t Laysan I..

20

Canton

(/Taiwan

| _ / (Formosa) _ _ _ _

Volcano 1 (J*r*)

Gardner T.

ˆ.French Frigate Atoll

•ˆMarcus I._

70

A

‘ ‘H A N O I

(FRENC

I A M

HG1CW

Gulf oP Siam

-m AINAN

V Bat an la/

Ct»0o

Channelˆ

Parece Vela or Douglas I.*

Peru Is.’*

Farallon do r Urracas I.

Pajaros l.

Laoagˆ «fparri

Babuyan Is.

1

CHIN

Saigon

• c f Vig5m -A LUZON

.\v • **S. Fernandof** jjjfjk,.

. . >. UngayeiW? ! ˆPHILIPPINE

A lUat \V

\v" M a n i ISLANDS

-k Mindoro

■ * – trW'FS8.

II'a-NaY V 11 J &

0'< Calamian j . . Group

S„br:

A ˆ

Nuyˆ

S'RENUT rˆjVi POIi A I.

a

J* •■■n.

.-/rio

I.'.-'19, P'fntianiil MNGEN 1. '

jucxa •Day

OfiUDg p

Wa*

6

70c

20

1 BOiD»Pj 1 Macassar/

- Agrigan I.,#

» Pagan I.

Marianne Islands (iJadrokes)

(Ger.) \

Tinian I..' Saipan I.

- Rota I.

Agana *

F Guam (U. a)

TROPIC OF

Wakl I. '

CANCER.

Bird.

(B. «.)

Taongi Is. ...

Marshall

„ , , ... |Ger->

Brown Is.** s

Niihaa

_*> C HAWAIIAN ISLANDS

_ H°L.o9\,|.y ■'rs. I CLN.I

£ ^.QJ^Hawaii.

11 tidM- ' r 1 MINDANAO

. Zamboanga ^ ^ £)JMatt~

• **P ^n'JJLiizoa ^

-

SEA – f c7 >

Vap Jft.

(Gci.).

Pelbw Is., (Ger.)

4 < 5 > 1IakaIs"

C A R O L I N

.HogoeoIs. P

• •

E -jl S LliA N D S (GER.r

Mediuro

*• Is.

Mulgrave

. Butaritari I.

4 > /*

Aj.HI AN

Ban'. g£*PC = * *o in la. Tf

/

SundaSt'

'Java He»'

VA'n A-?' V-^A . %

\^st£

- /Hv j j’“‘h

^ -opl V fi” . Kittutsoiu i h ; aum • -0 n

A i

1 4; *• . J c V ^

iAi/jIm

K7v A ^

O’

Ap £

> ang Cook

Gilbert Islands

i ?:’ (7 •

Wo*se\ *’

TtVl

18. Hendrik I.

RCKsh”^’ A RC I

NU /j ‘-riNlSSA

•p/ »C, o. Geoi afAoC.OrfDrd Et»MERANlA V\V>‘

HGer.) .)V5

tlf Jt

Nauru I. – (Ger.) panapft i_ •

or Ocean I, (Br.)

Christmas I.1 (Br.;

‘~^>‘i,,.ryARAFURA

TIMOR (PORT.) – — – -

A XT VV&’V’ SXVuˆ ˆKu;.ang MelVILI.L L

s y ‘ ■ TAt»ioRB*TTsn?

” ~ SEA Pt. DarwiA/ˆxl

SEA Pt. Darw C. Londonderry . _C..

Buccaneer Archipelago:-; C. L’evequtˆi

SEA Torres J? Strait ˆ „

*• _ r\C. YorkoˆCˆ

-ˆ•jAVebbel Is. Y 1

ncrˆon’c- Arnl °.m N S ˆ

V’V

.’‘y’BlSMiARC’if’&.ˆARCHIPELAGfa (Ger.)

‘tk..i,wA-. .

,,o ► i

Solomon Is.

. O; ˆvChoiseul I.

, xioˆ J>o ~Xˆ 49AtREL l-

New’ˆBrˆ

a?. ■’=»> Georgia Ib- ‘vJw SANTA CRUZ Is.

Guadalcanar I –

Howland I. iBaker I.*.

/

F

Washington I.

- (Br.)

• Fanning I.

(Br.)

ˆChristmas I. (Br.)

(Br.) •

Taputeonan ! > ■ > ’ v Dˆon or Nnkunau »Feru I.

Ellice Is.

(Br.)

S. Christoval l.4ˆ ˆSanta Cruz I.

Louisiade

N D I A N

Broome k

Wyndhfi

•ri,y — • : ...

w

Port Roperˆ

Gulf if

. Melville

A NORTHERNBikMˆKS

rLag range

N W . Cape a

Carnarvon’

r > Saˆ Lake

’ort Hedland

.ebourriT) GREAT SANDY

STERN

DESERT

ACtU S T

»

t

Steep Point <ˆGIads£one7NaanlnA GREAT

/Cuˆ.

GcraldtonNl

Dongarap-

VICTORIA DESERT

jˆ.U-ˆfTxR ALIA

'.ntaˆna lˆc00ktown)C,. Flattery

Archipelago

(Br.)

CORAL

SEA

.Rennell 1. L

- Vaniko

Torres Is..*

v. Banks

Espiritu Santo I/L. jAuroU I.

ˆ a R Pentecost I. Mallicolo I.ˆ>o Amljrym I.

EQUATOR

Phoenix Is. . (Br.) % .

*Tokelau Is. * .(Br)*

Uea I.

Samoa Savaii I~ LG“

(Fr.) oavau ‘•’Q d- . Hoorn Is>» Upolu IF’C

*Fiji Is. *. jBoscawenl.*

*N EW iSMdwich IYaS*WA LKVU KePPel >•*

S; Hebrides iˆ. vm leVu:?

Caftioovea’l

T! V auua-Mbalevu .

I ˆVavaoIs.

Cl

(Vinton >

enden>r ‘ ‘.f-

lonci

Territory I

sandy [ˆ _ jQoU EENi&ˆAlˆ:

R ˆ -tJ?

-D.

Vliickay-‘ ,

Tanna 1.’

*ˆEhomango 1. ˆ;Sl*kemba; ” Tonga*

lock ham pton

ˆ — .Ood no (latta

SOU TN

Lake Eyr

, T if. Vi ,£$r eraid \ . . .*

FJfF A ‘^B^nd^b|j&L|or. Sandy I.

— v’V’ / MaryByrouglijn

N™ %i. %UveaI. Loyali

—

(rR.) Numea

-Pines

TROPIC OF

. _.f A? Va ‘ /

f/ Charleville/_

n J\J

Z±

B?uri

JiBrisbane

Sc. Byron

0

Kandavu 1. lty Is.

Is. Hapai Is.

Jarvis 1.

Malden T

, Starbuck I. Manahiki Is.

(Br.)

Tongarewa 1. <»,

•H

umphrey I.

Manua 1. Tutuila I.

‘ (U. 8.)

/

C

Marqu

Hiau I. *•

esas Islands

(Fr.)

Nukahiva l.©| – Uahaga I.

, Hiva-oa I.

Ho

Fatuh

.• Cook Is.

Aitataki If (.B»0Mitiero !.

Society Is.

.’(Fr.) Ralatea I.

Tah

‘ N ainuka l”: Friendly

’ongatabu I.1** Eua L

Islands (Br.)

CAPRICORN

» Norfolk

• (ft!.)

c

- Kermadec Is.

Atiu I.' Rarotonga I. *

.ravaLs5^ /;'Ral;oi"

Makemo I. « 1- Hari.LT;

Fakarava I. .hine I.

i. ,J 4*>

i*:

Tatakoto I.

Vana-Vana Tematangi I. r Tubuai Is.

, . Rurutu I.

Manaia I. v –

_ _ _ Tubuail.^; jF_r.J _

■" Rewaiwai I.

A

Tureia I.

Jifururoa ' Maria I.

I. Gambler I.

- – - – at- –

Crescent I.

N

Rapa I. • , (Fr.)

10°

0“

10°

20

30

0

C E A

AT \ V Kalgoorlieˆ, SANDY P««TH DESERT E«cla.

Frem an tlej/

Busselton-

*C. Leeuwin**

Albany

40 °

*C-‘ Aria**

Great Australian Bight

Tt. Lincoln »

(Pirt I

‘Mjusta

Bpurkˆ

,ˆN I Cobar

U T HˆW

c,la i d gjtvmmji

ellington >. ■ & •

Bendigo

(Br.)

«indi

Xeweastle

. Lord Howe L CBr.)

SYDNEY

»urn .. Nowra

...JAN0ERRA

,ur5tae.-T£RR-'T09'

How.

C. Maria Van Diemen' jWhangan

North Cape Mongonui

jViftl®

i!ape I

Port Albert

P ^ Wilson |Promontory

- *Baxsh Strait (XFiindere I.*

King iJ 0»°7er:5c

Net

NEW

Auckland

*Hamilton^*

Plyinoutli^i

o„_

f plenty J NORTH /East Cape

ISLAND

& pier

C. Grime

*Launceston^*

C. Sore) In

s. Fi Cape

c»Capi Bnrren I.

C. Portland 8t. Marja

TA|S MANIA

lobart

C. FarewelLp- | Nelsoh

Z E A L A ND"0r'

Hokitiki

qxton

asterton

ELLINGTON

•don

Christchurch

' SOUTH

King-

C. Providence^.

Stewart I. -In veruarg i ll

ISLAND

^Dunedin

Kaltangata

Auckland I&.$-

(Bb.)

Antipodes Is.

(B»-)

Campbell I. (Br.)

P Chatham Is. (Br.)

Bounty Is. (Br.)

Antipodes of Greenwich Island

OCEANIA

.Rand McNally St Co.'a New 11 'r'14'Maj) ot-Ooeanla.', Copyright by Rand _ McNally Co.

700

B

110

C

120

130°

E

140

150

G

160 0

H

770°

40 ‘

730 °

770°

K

160°

150°

M

140°

N

130 °

0

OCEANOGRAPHY

5C7

set forth in the following table, according to Dittmar s analysis, are practically the same in all parts and at all depths of the open ocean:

Parts per thousand

Sodium chloride . 27 213

Magnesium chloride 3 807

Magnesium sulphate . . [[’ i . 658

Calcium sulphate . . ‘ ‘ ’ 260

Potassium sulphate . 0.863

Calcium carbonate . 0.123

Magnesium bromide . 0.076

1 he dissolved substances are present mainly as ions. Of the elements in solution, sodium and chlorine seem to be the only ones that are not withdrawn by organisms and organic processes, and they may therefore

have been uniformly on the increase since the beginning of geolog¬ ical time. This conclusion has been made use of in the calculations which have assigned 100,000,000 years as the age of the ocean.

The average value of the salinity of the sur¬ face waters of the ocean is 35 parts in a thou¬ sand parts of water. The factors affecting its variation are evaporation, dilution and the ac¬ tion of winds. In the Red Sea, where the rate of evaporation is high and the rainfall small, the salinity rises to 39, while, under the oppo¬ site conditions of the China Sea, it falls to 34. In the borders of the frigid zones, as well as in the doldrums of the tropics, the salinity is reduced and in the trade-wind regions increased. In general, there is a small decrease of salinity with increasing depth in the open ocean down to about 1,000 fathoms and below that a tend¬ ency to increase is observable.

The gases of the atmosphere are everywhere contained in sea water, but the proportions in which they are present are different in the at¬ mosphere and the ocean, because of the varying capacity of water to dissolve them. Dry air contains about 21 per cent of oxygen, but air extracted from sea water contains about 34 per cent. The gas content of sea water is chiefly made up of nitrogen and oxygen, to¬ gether with small quantities of free carbonic acid and traces of argon and neon.

While the nitrogen suffers little or no dimi¬ nution, the oxygen is continually being used up by the processes of marine organisms, so that, if it were not being constantly dissolved at the surface and distributed by the general circulation, the proportion of oxygen in the depths would be reduced below the amount necessary to support the animal life v/hich now' abounds there. The rate of solubility varies with the temperature in such a manner that more gas is absorbed at low than at high tem¬ perature. Since the rate of solubility is greater at low than at high temperatures, the polar waters are found to contain as high as 24 parts of oxygen and nitrogen per thousand parts of water while tropical waters contain as low as 12 parts.

It is in respect of temperature that the ocean exhibits many of its most significant characteristics. Over 80 per cent of its bulk remains at a temperature below 40° F. More than 90 per cent of the sea-floor is thus cov¬ ered, including all these vast regions, in depths greater than 2,000 fathoms, where the tempera¬ ture is uniformly found to be within the range of a few degrees above the freezing point of fresh water. Salt water freezes at a lowrer

temperature than fresh water; sea-water with a salinity of 35 per thousand freezes at 28° F. and it is not uncommon to find temperatures but little above this in the waters of the polar seas. About 16 per cent of the entire

ocean surface has a temperature below 40° F. In the surface waters of lower latitudes there is a progressive rise in temperature, reaching the average of 80° at the equator; but the position of the isothermal lines is much modified by prevailing winds, by the situation of land- masses and by distribution of areas of ba¬ rometric maxima and minima. The warmer surface waters occupy only a comparatively small depth even in the tropics. The following table gives the mean temperatures for the whole ocean, as calculated from all observa¬ tions in all latitudes at the specified depths :

Mean

Mean Fahrenheit

DEPTH IN

Fahrenheit

DEPTH IN

tempera-

FATHOMS

temperature

FATHOMS

ture

100 .

. 60.7°

900 .

. 36.8

200 .

. 50.1

1,000 .

. 36.5

300 .

. 44.7

1,100 .

. 36.1

400 .

. 41.8

1,200 .

. 35.8

500 .

. 40. 1

1,300 .

. 35.6

600 .

. 39.0

1,400 .

. 35.4

700 .

. 38.1

1,500 .

. 35.3

800 .

. 37.3

2,200 .

. 35.2

While the mean daily variation of tempera¬ ture in the surface waters of the open ocean is probably less than 1° F., the range from season to season may amount to 50° F. in those regions, like the oceanic areas around Japan, New¬ foundland and the Cape of Good Hope, where the surface is

occupied successively by waters of polar and of equatorial origin; but, on the other hand, there are very extensive regions both in the tropical and polar waters where the range does not exceed a few degrees during the course of the year. With descent into the depths, the seasonal changes in temperature tend rapidly to diminish.

The variation of the density of sea-water according to. salinity and temperature is a prime factor in oceanic circulation. The mean density at successive depths is given in the following table:

DEPTH IN FATHOMS

Density

DEPTH IN

FATHOMS

Density

Surface .

1.0252

400 .

. .. 1.0273

100 .

1.0261

800 .

. .. 1.0276

200 .

1 . 0268

1,500 .

1 0279

300 .

1.0271

2,000 .

. .. 1.0280

The observed

increases of density

with in-

creasing depth is chiefly attributable, down to 1,000 fathoms, to decrease of temperature but below that depth the continued rise in density

Pressure per square inch

DEPTH

33 feet .

Atmospheres

. 1

Pounds

15

Tons

66

a

. 2

30

....

99

u

. 3

45

....

100 fathoms .

. 18

270

500

u

. 90

1,350

1 ,000

a

. 180

2,700

i .2

2,000

«

. 360

5,400

2.4

3,000

u

. 540

8,100

3.6

4,000

u

. 720

10,800

4.8

5,000

u

. 900

13,500

6.0

5,348

u

. 960

14,400

is due to a small increase of salinity which pre¬ vails in the greater depths of the ocean aug¬ mented by the compression to which the deep waters are subject under the weight of the

superincumbent mass since water is com¬ pressible by about one-twenty-thousandth of its bulk under the pressure of one atmosphere. Leaving out of account the pressure of the at¬ mosphere upon the surface, for the pressure at successive depths in the ocean see the last table on preceding page.

The blue color of the ocean is owing to the selective absorption of light by sea-water, in which the blue rays are 10 times less absorbed than the red rays. There is light entering into the lesser depths of the ocean, but it is differ¬ ent from the familiar light of day on account of its deficiency in the rays from the red end of the solar spectrum. Recent observations conducted with photographic plates showed that, on a sunny day in the Sargasso Sea, there was sufficient light at a depth of 550 fathoms to affect a sensitive film after an exposure of 80

ing currents rise from the depths. These mas¬ sive movements are in striking contrast with the rate of motion of the surface currents im¬ pelled, for the main part, in a clockwise cir¬ cuit in each of the oceans of the northern hemi¬ sphere and in an anticlockwise circuit in each of the oceans of the Southern hemisphere, in general accord with the circuit of the prevail¬ ing winds, which, in their direct and indirect effects, taken in conjunction with the configu¬ ration of the continents, constitute the prime agency in originating and maintaining the cir¬ culation of the ocean.

The deposits which cover the bed of the ocean have been classified by Murray, according to their origin, into two grand divisions : terrig¬ enous and pelagic. In the accompanying table these deposits are described and further sub¬ divided into classes :

Littoral deposits between high and low-water marks.

Marine Deposits

Boulders, shingle, gravels, sands, muds, etc., derived from adjacent land.

Shallow-water deposits, between low-water mark and 100 fathoms.

Sands, gravels, muds, marls, derived from adjacent land, shores, and shal¬ low waters.

Deep-sea deposits beyond 100 fathoms.

Blue mud Red mud Green mud Volcanic mud Coral mud

Globigerina ooze Pteropod ooze Diatom ooze Radiolarian ooze Red clay

Terrigenous deposits formed in deep and shallow water close to land masses, from materials carried down from the land surfaces or torn away from the coast to¬ gether with the remains of organisms which live on the bottom in shallow waters.

Pelagic deposits formed in deep water far removed from land, largely from the re¬ mains of calcareous and siliceous organ¬ isms which have lived in the surface waters and have fallen to the bottom after death.

minutes. Another plate was exposed for two hours at a depth of 900 fathoms without show¬ ing any effect. By employing filters for rays of different color, it was shown that, at a depth of 275 fathoms, many blue rays were present but scarcely any red ones, while at a depth of 55 fathoms all the component rays of sunlight were present, although there were fewer of the red than the others. The extent of the vegetable kingdom in the ocean is con¬ fined to this region of light-penetration or photic zone which must vary in its depth according to the zenith distance of the luminary and the na¬ ture of the materials held in suspension and solution in the water. The mantle of living matter which clothes the globe wherever water, air and earth commingle, while extending only a short depth into the crust of the earth and a short height into the atmosphere, extends throughout the whole depth of the ocean ; but below the photic zone all of the numerous forms of living things which abound belong to the animal kingdom.

It has been pointed out that there exist in the ocean systematically varying distributions of salinity and of temperature, giving rise to a systematic distribution of the density or heavi¬ ness of the waters. This is one of the basic factors in oceanic circulation, causing a system¬ atic descent from the surface of the heavier waters which characterize the polar borders of the temperate zones and a slow movement thence of the deeper waters, entirely distinct from the oscillations of the mass of the ocean set up by seiches and tides, both toward the equator and totvard the poles, where ascend-

As yet knowledge is scanty in relation to the rate of deposition and the depth of marine deposits, since, in the operation of deep-sea sounding, the

bottom soil has not usually been penetrated more than a few inches. It is very doubtful whether any analogues to the terres¬ trial rocks are to be found in connection with the pelagic deposits, from which there is a significant absence of quartz.

George W. Littlehales, Hydrographic Office , Washington , D. C.

OCEANUS, o-se'a-nus, in Greek mythol¬ ogy, the oldest of the Titans, and a personifica¬ tion of the sea. He was called the son of Gsea (the earth) and of Uranus (heaven). Oceanus and Tethys were the parents of rivers and of the race of goddesses called Oceanids (q.v.). According to another account he was the father of all gods and men. The physical idea at¬ tached by the Greeks to the term Oceanus was that the earth was a flat circle surrounded by a river (Oceanus), out of which the sun and stars were supposed to rise and set, and on whose banks were the abodes of the dead. The term ocean was thus applied especially to the Atlantic, o.'sea beyond the Pillars of Hercules, in contradistinction to the Mediterranean or in¬ ternal sea.

OCELLUS, a structure found in various groups of invertebrate animals, consisting of a spot of pigment enclosed in a capsule or cavity, generally supplied with nerve-filaments, and to which the function of sight is attributed. See Eye

OCELLUS LUCANUS, o-sel us lu-ka'nus, a Pythagorean philosopher : b. Lucania, Italy, 5th century b.c. His works are (On Law ; 'On Kingly Rule and Piety* and 'On the Nature of the Whole, > the last of which is the only one of his treatises now extant, excepting some fragments found in Stobseus, written in Doric. 'On the Nature of the Whole) is in Ionic, which fact leads some critics to doubt its authenticity. It is divided into four chapters, in which the author maintains that the whole, that is, Nature, the Universe, has no beginning nor end, and that men have always existed. He treats of the divisions of the universe, the heavens, the earth, the human race and the nature of time. Consult Mullach, 'Fragmenta Philosophorum Graecorum > (1860) ; Taylor,*

'Ocellus Lucanus, translated into English*

(1831).

OCELOT, o'se-lot, a tropical American wild-cat (Felis pardalis), averaging about two and one-half or three feet in length exclusive of the tail, and

about 18 or 20 inches tall. Its body color is a variable and handsome fawn or grayish-brown, marked with lines of blackish ring-spots. The muzzle is somewhat long. The ocelot ranges northward as far as Louisiana, and is found in forests, where it preys largely upon birds. It is commonly seen in menageries, and in Mexico is often found in a semi-domesti¬ cated condition about farmhouses. It can climb trees with ease.

OCHAKOF, 6-cha'kof, or OTCHAKOFF,

Russia, a town in the government of Cherson, on the Black Sea, at the mouth of the Dnieper, formerly an important Turkish fortress, with a citadel, the walls of which were 25 feet high. In 1737 it was stormed by the Russians, who lost 18,000 men in the attack. The Turks at¬ tempted to recover it with a force of 70,000 men, but were repulsed with the loss of 20,000. In 1738 it was given up by the Russians, who had previously destroyed the works. The Turks fortified it anew in 1743, and held it until 1788, when, after a siege of six months, it was stormed by Suvaroff, who razed it to the ground. By the peace of 1792 it was ceded to Russia. It has modern fortifications, and some coasting trade. Pop. 16,250.

OCHELHAUSER-YUNKERS EN¬ GINE. See Internal Combustion Engine.

OCHIL HILLS, Scotland, a mountain range on the borders of Perth, Clackmannan, Kinross and Fifeshire; average breadth, about 12 miles; highest summit, Bencleuch, in the southwest, about 2,300 feet above sea-level. The Ochils are of basalt and greenstone, and contain copper and iron ores.

O CHI NO, o-ke'no, Bernardino, Italian theologian and reformer : b. Siena, 1487 ; d. Schlakau, Moravia, 1564. He entered the Order of Observantine Friars, the sternest of the Franciscan orders, and in 1534 he had himself transferred to the still more strict Order of Capuchins, of which he was elected vicar-gen¬ eral in 1538 and in 1541. He evidenced leanings toward the Reformation as early as 1539, being convinced that salvation was not to be attained by ecclesiastical meditations, fasting and prayer. His sermons plainly indicated the change in his beliefs, but no movement was made against him until 1542, when the Inquisition was set up in

Rome, and Ochino was cited to appear. Realiz¬ ing that either death or imprisonment was in store for him he decided upon flight and made his way to Geneva, where he joined Calvin. Here, within two years, he published six vol¬ umes of sermons explaining the change in his views upon religion. He was minister in charge of the Italian Protestant congrega¬ tion at Augsberg in 1545—47, but was com¬ pelled to flee before the occupation of the city by the imperialist forces, and made his escape to

England. There he be¬ came a prebendary of Canterbury, and received a pension from Edward VI. During this time he wrote 'A Tragedy or Dialogue of the Un¬ just usurped Primacy of the Bishop of Rome> (1549), a work of remarkable power, written originally in Latin, but translated into English by John Ponet, bishop of Winchester. The Latin version is lost, but the translation shows so striking a resemblance to Milton's 'Paradise Lost that it is considered by many to be the in¬ spiration of that work. The accession of Queen Mary in 1553 deprived him of his haven in Eng¬ land and he went to Zurich, where he became pastor of an Italian Protestant congregation. Here he was accused of favoring polygamy and doctrines derogatory to the Trinity, and neither his denial nor the record of his life served to secure him from banishment. He then went to Poland, but an edict against foreign heretics in 1564 forced him again to find a refuge. He settled in Moravia, and died soon afterward. He was bitterly criticized by the Protestants at the time of his death, but it has since been demonstrated that many of his doctrines were misrepresented and many forgeries foisted upon him. He expounded his faith in free will as against predestination in his 'Labyrinth J (c. 1562). His 'Thirty Dialogues> (1563) were misunderstood and deepened the troubles of his last years. Consult Benrath, B. O., 'B. Ochino von Siena) (1875; 2d ed., 1892; Eng. trans. by H. Zimmern, 1876).*

OCHLOCKNEE, ok-16k'ne', or OCK- LOCKNEE, or OCKLOCKONEE, a river of southeastern United States, about 150 miles in length, rising in Worth County, Ga., passing into Florida, between Leon and Gadsden counties, and flowing into the Gulf of Mexico through Apalachee Bay. It is too shallow for navigation, but is useful for rafting timber from the neighboring pine forests. Its banks also furnish a clay used in brick-making.

OCHRE, o'ker, or OCHER (Greek, "yel¬ low, "yellowish green,® "pale®), friable clay with an admixture of iron oxides, giving it a color varying from yellow to red, as the iron per¬ oxide is hydrate (yellow) or anhydrate (red). The reddish color may be deepened artificially by burning. Rarely manganese takes the place of iron in the composition of ochre, or occurs in addition to iron, the brownish variety thus formed being called "Sienna® (from its famous source in Italy) or "umber® (Latin, umbra, "shade®). Ochre is used largely in the produc¬ tion of paints. The coloring of these two shades again is deepened by their being burnt. Umber and sienna are largely found, outside of Italy, in New York, Pennsylvania, Missouri and Tennessee; and the leading States in the produc¬ tion of ochre are Pennsylvania, Georgia, Cali¬ fornia and Vermont. But the United States

produces less ochre and iron oxide pigments than France or Germany. Until recently the home product was inferior to the foreign, being only 50 per cent pure, a fault now remedied by specially designed crucible furnaces, which en¬ sure the purity of the increased output. The best yellow ochre is that coming from Oxford, England. See Limonite; Hematite.

OCHRO, same as Okra (q.v.).

r .OCHS, oks, Adolph S., American pub¬ lishers b. Cincinnati, Ohio, 12 March 1858. His early hte was that of a country lad, and he ob¬ tained a common school education at Knoxville, I enn., where for a year he served as carrier and newsboy. In 1871 he was grocer's clerk at Fro vide nee, R. I., attending a night school meanwhile. He then returned to Knoxville, where he was a druggist's apprentice for a year. Eater he learned the printing trade, and in 1876 he became assistant to the foreman in the com-P°sinf r?°m ?f the Knoxville Tribune. In c77 he joined the staff of the 'Chattanooga To l^atCh and. became its editor-in-chief. In i«/8 he acquired a half interest in the Chat¬ tanooga Tunes, which he developed into a lead-lng newspaper of that State. Incidentally, he established The Tradesman, which is familiar t° Southern business men, in which periodical he still owns a large interest. He also estab¬ lished the Southern Associated Press and be¬ came its president. In 1896 Mr. Ochs became publisher and controlling owner in the New York Tim In 1901 he purchased the Phila¬ delphia Times, which was managed by his brother, George Washington Ochs. The next year he paid more than $2,500,000 for the Phila¬ delphia Public Ledger, and the two papers were consolidated. Just, considerate, resourceful, en¬ lightened of view, undaunted by difficulties and unspoiled by success, preferring always the straight and open way to the path of indirection, as mindful of public responsibility as private duty, loyal to principle even at the cost of pres¬ ent advantage, one of the best and highest examples of the commercial publisher, Mr. Ochs is a recognized force of international import¬ ance.

OCHS, George Washington, American journalist, brother of Adolph S. Ochs (q v) • b. Cincinnati, 27 Oct. 1861. He was graduated at the University of Tennessee in 1879. He was mayor of Chattanooga, Tenn., in 1894-95

a?d m at896"?7- He Published the Paris edition of the New York 'Times at the Paris Exposition in, ^00 in 1901—02 he was general manager • Philadelphia Times. He was editor of the Philadelphia Ledger in 1902-15, since when if yl? edited the Current History Magazine and the New York Times' Mid-Week Pictorial. He is a Chevalier of the French Legion of Honor.*

OCHSNER, oks'ner, Albert John, Amer¬ ican surgeon: b. Baraboo, Wis., 3

April 1858 He was graduated from the University of Wis- consin in ip, took his M.D. at the Rush Aledical College, Chicago, in 1886, and later studied medicine at Vienna and Berlin. He has been engaged in practice at Chicago since 1889 and has served as chief surgeon of Augustana ana Saint Marys hospitals since 1896. lie has been professor of clinical surgery at the College of Physicians and Surgeons, Chicago »ince 1900, and in 1908 was appointed first lieu¬

tenant in the United States Army Medical Re¬ serve Corps, becoming major in 1916. Author of (Hand lio ok on Appendicitis > (2d ed., 1906) ; ˆClinical Surgery for the Instruction of Prac¬ titioners and Students 5 (2d ed., 1905) ; Or¬ ganization, Management and Construction of Hospitals' (1907);

~ .OCHTERLONY, ok-ter-lo'ni, Sir David,

British general and administrator: b. Boston, Mass.' 12 Feb. 1758; d. Meerut, near Delhi, 15 July 1825. He went to India as a cadet in the army of the East India Company in 1777, was appointed resident at Delhi in 1803, was promoted major-general in 1804 and in that year successfully defended Delhi against cY . He prevented the advance of the

Sikhs m 1808 He conquered Nepal in the War of 1814—15, received a baronetcy for his ser\ ice and in 1816 concluded the final peace treaties of the British with Nepal. He brought the Pindari War of 1817-18 to a successful termination with little bloodshed, and in 1818 was appointed British resident in Rajputana and afterward became British resident of Cen¬ tral India, performing excellent service in pad- lying and building up the country. In 1825 he supported Balwant Singh, the infant Rajah of Bharatpur, against the insurrection headed bv his cousin, Durjan Sal, but his action was dis¬ approved by the governor-general, Lord Am¬ herst, and he was ordered to withdraw his sup¬ port. Ochterlony promptly resigned and died soon afterward. His successor, Metcalfe, sup- ported his po icy and forced Lord Amherst to yield, although the delayed action necessitated

rvi-,fen?P °yrnCnit of1129'001° men for the work

Ochterlony had well in hand without outside assistance.

OCHTMAN, okt'man, Leonard, artist: b Zonnemaire, Zeeland, Holland, 21 Oct. 1854. He settled in Albany with his family in 1866 and became a draughtsman in an engraving

° ' lla<ˆ a studl° at Albany for two years

and subsequently took a winter course at the Art Students League, New

York. As a land-

*tbrn,mfaT?te[*!? k self-taught, but traveled through England, France and Holland for the*

sbow°nSei0f St£dy‘ — ls P°wer and skill are shown in such paintings as (Nffiht on the

Mianus Riyer> ; (Autumn Moonlight ;

hght Night in Spring); < A Morning Sym-

fcC J‘vld “lor, depth of imagination and breadth of treatment characterize his paintings whoSe truthfulness reveals a genuine love of

official of tb161]1 a|?thor- He.ls. a member and official of the leading art societies and has been

the recipient of numerous silver and gold

medals and other awards and honors.

OCIMUM, a genus of plants. See Basil.

OCKERSON, ok’er-son, John Augustus,

MTrchClS48C1V Frenglneer: \Skane’ Sweden, 4 1R51 .ni848′ He/ame1 ˆ the United States in 1851 and was graduated from the University of Tlhnms in 1873 He served in the Union army in the Civil War; m 1871-79 assisted in the

United Stated Lake-’ and in 1876 was

United States assistant engineer at Eads Tunc-

tion. He was engaged in the survey of the

Mississippi River in 1879-87. He was Employed

as a mining engineer in 188&-98, and since 1898

has been a member of the Mississippi River Commission. He was consulting engineer of the chief department of Liberal Arts at the Saint Louis

Exposition in 1904, and a member of the International Jury of Awards at the Paris Ex¬ position in 1900. He was a delegate to the In¬ ternational Congress of Navigation in 1900, 1905, 1908 and 1912, and to the Congress of the Merchant Marine at Paris. He has been dec¬ orated by the governments of France, Italy, Sweden, Germany, Belgium and China and is a contributor to scientific journals on topographi¬ cal and engineering subjects.

OCMULGEE, ok-mul'ge, a river in Geor¬ gia which rises north of the central part of the State, flows south, southwest and east, unit¬ ing with the Oconee to form the Altamaha. It passes through an agricultural region; its length is about 260 miles. The upper course has many rapids and small cascades, and the lower course is through a more flat country, covered with pine forests. It is navigable for small steamers for about half its distance from the mouth to Macon.

OCONEE, o-ko'ne, a river in Georgia which rises in Hall County, flows southeast and unites with the Ocmulgee to form the Alta¬ maha. It is navigable for about 100 miles from its mouth.

O'CONNELL, o-kon'el, Daniel, Irish pa¬ triot: b. Cahir, County Kerry, Ireland, 6 Aug. 1775; d. Genoa, Italy, 15 May 1847. He studied in France at the colleges of Saint Omer and Douay, and in 1793, on his return home, began the study of law. In 1798 he was admitted to the bar, and soon began to distinguish himself both by legal skill and oratory. After a speech made at Dublin in the beginning of 1800, at a meeting held to petition against the union, he was regarded as one of the most promising and energetic of the younger Catholic leaders. The question of Catholic emancipation being seri¬ ously agitated, he was active in every attempt to remove the national grievances, and he was a tireless member of the various Catholic so¬ cieties and unions formed for the purpose of procuring the repeal of the laws placing civil disabilities on Catholics; in 1824 he founded the ((Catholic Association^ which carried on active agitation in spite of government measures against it and succeeded in creating a general sentiment in favor of Catholic emancipation. The chief grievance was that Catholics could not sit in Parliament without taking an oath contrary to conscience. In 1828 O'Connell took a decisive step by becoming candidate for Par¬ liament in the county of Clare. He was elected but could not take his seat because he refused to take the preliminary oath. His election, how¬ ever, was a fact that could not be ignored, and as the feeling in favor of emancipation continu¬ ally increased, the ministry with the Duke of Wellington at its head decided they must con¬ cede it. In 1829 therefore the Catholic Emancipa¬ tion Bill was passed, and under its provisions O'Connell took his seat, and became the leader of the Irish party in the House of Commons where he continued to represent Clare until his death.

While carrying on this agitation, he was for many years the annual recipient of a large sum contributed by his Catholic countrymen who idolized him as their liberator. Tn 1842

he began the agitation for the repeal of the union between Great Britain and Ireland, and the disestablishment of the Anglican church, holding monster meetings at which he was the chief speaker. In 1843, arrested on a charge of conspiracy and sedition, he was convicted and sentenced to fine and imprisonment; but the House of Lords reversed the judgment on 4 Sept. 1844. He then resumed his seat in Parlia¬ ment, but his influence was lessening as a new Irish party had risen — called Young Ireland — which advocated more radical measures, and did not favor O'Connell's <(moral forced policy. In 1846 he supported the Whig ministry which still further alienated him from the younger party. His health was failing, and in 1847 he went to Italy, intending to visit Rome, but he died at Genoa.

Bibliography. — Cusack, (The Liberator, his Life and Times > (1872) ; Dunlop, Robert, (Life of Daniel O'ConnelP (New York 1900) ; Fitz¬ patrick, W. J., Correspondence of Daniel O'ConnelP (London 1888) ; Lecky, W. E. H., (Leaders of Public Opinion in Ireland (New York 1903) ; MacDonough, Michael, (Life of Daniel O'ConnelP (Saint Louis 1905); McCar¬ thy, Justin, ˆHistory of Our Own Times) ; O'Connell (his son), (Life and Times of Daniel O'ConnelP (1846) ; Phillips, Wendell, (Daniel O'Connell. >*

O'CONNELL, William Henry, American cardinal: b. Lowell, Mass., 8 Dec. 1859. He was graduated from Boston College A.B. 1881, and studied theology at the North American College, Rome, Italy, 1881-84. He was or¬ dained priest at Rome, 8 June 1884 and was appointed rector of the North American Col¬ lege, 21 Nov. 1895. He was named a domestic prelate in 1897, and on 22 April 1901 was ap¬ pointed bishop of Portland, Me. Pie was consecrated at Saint John Lateran, Rome, 19 May 1901, and returning to the United States he at once entered upon the duties of his dio¬ cese, having been installed in the cathedral at Portland, Me. He was honored with the title of assistant at the Pontifical Throne in Janu¬ ary 1905, and was a. special papal envoy to the Emperor of Japan in 1905, at which time he was presented with the Grand Cordon of the Sacred Treasure by the Mikado of Japan. He was elevated to the archbishopric and named co¬ adjutor to Bishop Williams of Boston, Mass., on 8 Feb. 1906, his title being archbishop of Constance, and on the death of Bishop Wil¬ liams he succeeded to the see of Boston, 30 Aug. 1907. He was created cardinal by Pope Pius X, 30 Nov. 1911. By this time he was already looked upon as one of the most influ¬ ential Catholics in the United States. Plis pub¬ lished works consist of sermons and addresses.

O'CONNOR, d-kbn'or, Andrew, American sculptor: b. Worcester, Mass., 7 June 1874. He was from childhood the pupil of his father, to whom he owes the greater share of his educa¬ tion as an artist. He works in both marble and bronze and is noted for his statues and bas- reliefs. He received the second medal at the Paris Salon in 1906, the highest award ever given a foreign sculptor at that institution. Among his works may be mentioned the central porch at Saint Bartholomew's Church, New York; 11 marble statues at the Essex County courthouse, Newark, N. T. ; a bas-relief in the

library of J. P. Morgan, New York; the Gen¬ eral Liscom monument, Arlington; the General Thomas monument, Tarrytown; a bronze statue of Gen. Lew Wallace at the Capitol, Washing¬ ton, and a marble statue of him at Crawfords- ville, Ind. ; the monument to Gen. John A. John¬ son, Saint Paul; the original model of the statue of Commodore Barry at the Luxembourg Museum; and the original design of the bronze doors at Saint Bartholomew's, and a marble portrait of Edward Tuck, also in the Luxem¬ bourg Museum ; a statue of Lincoln at Spring- field, Ill., etc. In April 1919 Mr. O'Connor was chosen associate of the National Academy of Design.

O'CONNOR, Arthur, Irish political leader: b. Mitchelstown, County Cork, Ireland, 1763; d. near Nemours, France, 25 April 1852. He was admitted to the bar in 1788, was elected to the Irish Parliament and as a member of the United Irishmen served as one of their directory of five, in consequence of which he was tried for high treason, but finally discharged. He then became editor of The Press, the society organ. He went to France and on his return to Ireland was again arrested, and kept in prison until 1803 when he made his escape and entered the service of Napoleon, who made him a lieu¬ tenant-general in 1804 and later general of divi¬ sion. He married the daughter of Condorcet and became a French subject in 1818. He pub¬ lished (Letters to Earl Camden (1798) ; (The Actual State of Great Britain) (1804); (A Speech on the Catholic Question * (1795) ;*

(Monopoly? the Cause of All EviP (1848).

O'CONNOR, John, Canadian jurist: b. Boston, Mass., January 1824; d. Coburg, Ontario, 3 Nov. 1887. He removed with his parents to Canada in 1828 where he was educated, and in 1854 admitted to the bar. He sat for Essex in the Canadian Parliament 1867-72, and in the last-named year was president of the council in Sir John Macdonald's administration. Later he was Minister of Inland Revenue and Post¬ master-General, and became queen's counsel in 1873. In 1878 he was reappointed president, of the

council and in 1880 became a second time Postmaster-General, was Secretary of State for a time, and in 1881 reassumed the office of Post¬ master-General. He was a commissioner for revising the statutes of Canada and Ontario, and in 1884 was appointed judge of the High Court of Justice of Ontario.

O'CONNOR, John Joseph, American Roman Catholic bishop: b. Newark, N. J., 11 June 1855. He was educated at Seton Hall College, in the American College at Rome, at Louvain and in 1877 he was ordained to the priesthood. Professor of philosophy and the¬ ology, Seton Hall College and Seminary, 1878— 95; pastor Saint Joseph's Church, Newark, 1895-1901; consecrated bishop of Newark, N. J., 25 July 1901.

O'CONNOR, Roderic, or Rory, king of Ireland, son of Turlough O'Connor, king of Connaught: b. 1116; d. Abbey of Cong, County Mayo, 1198. He succeeded to the throne of Connaught on the death of his father in 1156, made war against the O'Brians, O'Lochlinns and others and in 1166 was inaugurated king of all Ireland at Dublin. When Henry II

visited Ireland in 1171 after the Norman inva¬ sion Roderic did not make submission to him ; but in 1175 a treaty was concluded by which Roderic was to continue to rule Connaught, and was to be head of the kings and chiefs of Ire¬ land under the sovereignty of Henry II, whom Roderic acknowledged as his liege lord. His son Chonchobhar, allied with the English, in¬ vaded Connaught in 1186 and drove Roderic into Munster. Later he was permitted to re¬ turn but was deprived of his throne. He was again king for a short time after the death of his son in 1189, but was deposed by Cathal O'Connor. He retired to a monastery, where he died. Consult Orpen, G. H., (Ireland Under the Normans) (2 vols., 1911).

O'CONNOR, Thomas Power, Irish jour¬ nalist and politician : b. Athlone, 5 Oct. 1848. Educated at Queens College, Galway, he entered journalism in Dublin, went to London in 1870 and' was for a time in the London office of the New York Herald. He entered Parliament for Galway in 1880, and represented the Scotland division of Liverpool in 1885. He founded and edited The Star, 1888-90, The Sun and the Weekly Sun, and later became editor of M. A. P. (Mainly About People). He early became one of the most active members of the Parnell party. In 1881 he made a tour of the United States and lectured on the Irish cause to large audiences. In 1906 and again in 1917 he visited the United States on other lecture tours. In 1883 he had become president of the Irish National League of Great Britain. His works include a biography of Beaconsfield (1883) ; Gladstone's House of Commons) (1885) ; (The Parnell Movement (1886) ; Gladstone, Parnell and the Great Irish Strug- gle) (1886); (Sketches in the House) (1893); (1902) ; (The Story of the Great French Fraud)

(1902); (Sir Henry Campbell-Bannerman) (1904); Gome Old Love Stories) ; and very many magazine and newspaper articles.

OCONOMOWOC, o-kon'o-mo-wok, Wis., city in Waukesha County, on the Chicago, Mil¬ waukee and Saint Paul Railroad, about 33 miles west by north of Milwaukee. It is in the midst of a region of beautiful lakes, the largest of which are La Belle and Fowler, and it is noted for the good fishing in the vicinity. Fertile farm lands are in this part of the State, and the industries of the city are connected chiefly with farm and dairy products. The city owns and operates the electric-light plant and the water¬ works. Pop. 3,301.

*O'CONOR, 6-kon'or, Charles, American lawyer and politician: b. New York, 22 Jan. 1804; d. Nantucket, Mass., 9 Feb. 1884. He studied law, was admitted to the bar at 20 and soon became one of the leading lawyers of the country; the Forrest divorce suit, the Slave Jack case (1835), the Lispenard will case (1843) nnd the Jumel case (1871) were Tthe most im¬ portant litigations he took part in before the great Tweed suits in which he acted for the prosecution with William M. Evarts and W. H. Peckham. O'Conor wrote Peculation Trium¬ phant, * a record of the Tweed ring. A Southern sympathizer during the war, he went bail for Jefferson Davis together with Horace Greeley. In 1872 he was nominated for the Presidency*

by the wing of the Democracy opposed to the nomination of Horace Greeley; he refused the

T1Q'7Alr^^n')l1 P°^ed nearly 30,000 votes. In 1876 O Conor acted as counsel for Samuel J. iilden before the Electoral Commission.

O'CONOR, John Francis Xavier, educa¬ tor: b. New York City, 1 Aug. 1852. A.B. Saint rrancis Xavier College, New York; English studies in London ; philosophy in Louvain (three years) ; theology in W oodstock (four years) ; Oriental studies at Johns Hopkins, and Lyons of Harvard. Became member of Society of Jesus in 1872; ordained priest 1885. Professor of philosophy and rhetoric at College of Saint Francis Xavier; at Georgetown University; Fordham University; Saint Joseph's College, Philadelphia; president and founder of Brook¬ lyn College; founder of Brooklyn Alumni So¬ dality ;_ Saint Joseph's Alumni Sodality of Phil¬ adelphia; Alumni Association of Saint Ignatius School. Preacher; lecturer on Christian art; on Greek art; on the Wagner operas. Lecturer on

cuneiform inscriptions before any schools on it were established in United States. Author of (Babylonian Inscriptions'; and translator of first Babylonian inscriptions published in Eng¬ lish in America. Member of Oriental Congress of Vienna. Author of Oriental articles in (Hebra- icaP Author of (Reading and the Mind' (7th ed., 1907) ; (Christian ArU (1885) ; (Cuneiform Inscription of Nebuchadnezzar' (1885); (Three Holy Lives (1887) ; (Pearls of a Year (1887) ; (Life of Saint Aloysius) (1892) ; (Practice of Humility) (1890) ; (Sacred Scenes and Mys- teries) (1898); (Facts about Bookworms) (1898) ; (Rhetoric and Oratory' (1898) ; Edu¬ cation in the Schools of New York) (1901) ; 'Dante, a Drama' ; cPrayer, that wins'; short stories, music, poems, plays, articles; (A Study of Francis Thompson's Hound of Heaven' (7th ed., 1914); (Everysoul, Mystical Opera' (5th ed., 1915) ; (Sunshine Through the Clouds' (1916); (Selected Verse' (1916); (The Cru¬ sade of Children' (1916) ; (A Spiritual Retreat' (1916). Member of 19th International Con¬ gress of Americanists in Washington 1915, and official delegate of Georgetown University, pre¬ senting valuable ethnological and historical paper on Early Indians in the United States and their missions; composer of aDear Lord" and (*

OCONOSTOTA (Aganasata, ((ground- hog"), a Cherokee Indian chief: b. about 1708; d. 1810. He was one of a delegation of 32 chiefs who waited on Governor Littleton of South Carolina with the object of finding a peaceful solution to the troubles that threatened to bring on a long and bloody war between the Indians and the English. In 1760 Littleton ordered all these delegates thrown into prison. After a while, when the governor thought he had impressed the Indian chiefs with the power of the English government, Oconostota and two other young chiefs were set at liberty and sent home to inform the Cherokees that nothing but unconditional submission on their part would be considered by him as the representative of the British government. As soon as he got back home Oconostota took command of the Cherokees, organized a large war party and laid siege to the post. He paid back the English

governor's bad faith in coin, by inviting the commander to a peace conference and shooting him. In return the English shot the chiefs still in their power (February 1760). In June of the same year Colonel Montgomery invaded the land of the Cherokees. At first he met with considerable success ; but he was finally defeated by the Indians at Nikwasi (near Franklin, N. C.) with heavy loss. Less than two months later Oconostota captured Fort Loudon. The following year Colonel Grant, with a force of 2,600 men, laid waste the Cherokee country and destroyed their villages and crops. The Indians, though undefeated, suffered so much from hunger and other privations that they finally concluded a treaty of peace with the British. From that time on Oconostota was the faith¬ ful ally or

the British. In 1768 he signed a treaty of peace with the Iroquois who had been his lifelong enemies. He took no active part in the Revolutionary War, being infirm and a semi-invalid. He resigned his chiefship in 1782 in favor of his son. See Cherokees.

OCONTO, o-kon'to, Wis., city, county-seat of Oconto County, at the mouth of the Oconto River, on Green Bay, and on the Chicago, Mil¬ waukee and Saint Paul and the Chicago and Northwestern railroads, about 30 miles north by east of the city of Green Bay. It was settled in 1850 and in 1882 was incorporated. It is in an agricultural and lumber region and has con¬ siderable trade in farm and dairy products, fish and lumber. Its chief industrial establishments are flour and lumber mills, canneries, cream¬ eries, a brewery and a wagon factory. It has a good public library, a high school, court¬ house and a number of fine residences. Poo

(1920) 4,920.

OCOTE, o-ko'ta, a very resinous pine tree of parts of Mexico and Central America. It makes excellent lumber for flooring and all kinds of carpenter uses, but it is difficult to work on account of its hardness and the quan¬ tity of gum which it contains. The trees, which grow to a fair size, are highly aromatic. On account of the great amount of resinous matter contained in the ocote it was used extensively at the time of the discovery of America for torches by the natives of Mexico ; and it is still put to the same use in the more remote moun¬ tainous districts of the country. Much of it is turned into charcoal, which is sold throughout the towns and villages of the greater part of the republic, where very often it furnishes the only fuel used. The lamp-black obtained from the ocote, which is called humo de ocote (smoke of ocote) is used for the basis of an excellent black paint and, mixed with water color prepa¬ rations, is employed extensively for painting and decorating houses and buildings of all sorts.

OCOTEA, a genus of tropical trees of the mountain-laurel family (Lauracece , q.v.); the wood of which is strongly and usually disagree¬ ably scented. Prominent species are the stink- wood (O. bullata) of the Cape of Good Hope; til-wood (O. fattens) of Madagascar, and the cinnamon-yielding O. cuplularis of Mauritius. Some of these trees yield valuable timber. See Stinkwood.

OCRACOKE (o'kra-kok) INLET, on the

coast of North Carolina, between the islands of Portsmouth and Ocracoke, and forming a

passage from the Atlantic into Pamlico Sound. Just at the western end of the inlet is a light¬ house, and on each side are dangerous shoals. Cape Hatteras is about 20 miles northwest.

OCTAGON, in geometry, a polygon of eight angles or sides. A regular octagon is an octagon all of whose sides and angles are re¬ spectively equal to each other. See Geometry.

OCTAHEDRITE, dioxide of titanium in the crystal form, so called because of its tetra¬ gonal crystallization; sometimes styled Anatase. Its chemical composition (T1O2) is that of the amorphous rutile and Brookite. Octahedrite is yellow, brown, gray, blue or black; has a quasi- metallic lustre; is unaffected by acids and infu¬ sible with blowpipe; becomes incandescent if gradually heated; has a density of 3.83 to 3.93; and a hardness of 5.5. It occurs in the granite fissures of Switzerland, of Dauphine at Bourg d'Oisans (whence the French name Oisanite), of the Brazilian diamond fields, and in the United States in Burke County, N. C., and Smithfield, R. I.

OCTAHEDRON, in geometry, a solid con¬ tained by eight faces. The regular octahedron has as faces equilateral triangles. It has 12 edges and six corners, and is reciprocal to the cube, which has eight triedral angles as vertices, 12 edges and six faces. See Geometry.

OCTANS, the ˆOctant,® in astronomy, the constellation surrounding and including the South Pole of the heavens, and one of the 14 added to the heavens by Lacaille in connection with his work at the Cape of Good Hope.

OCTAVE, the eighth day after a festival, and the intervening days, all of which partake of the nature of the festival. In the Roman Catholic Church octaves are privileged and non- privileged, with many degrees and subdivisions of the former. The octaves of Easter and Pentecost are specially privileged. In the octave of Epiphany only the feast of patron saint, title or dedication of a church may be kept, and that not on the eighth or octave day, on which the services of the festival are to be repeated. In the Church of England the only festivals men¬ tioned as having octaves are Christmas Day, Easter Day, Ascension and Whitsunday. Dr. Sparrow, in the (Rationaleˆ says that our whole life being spent in the revolution of seven days, the eighth or octave signifies eternity. On the other hand Du Cange declares that the eighth day denotes a finished solemnity, inasmuch as our Lord's resurrection took place on the eighth day, counting the period of his Passion as be¬ ginning on one Sunday, when he entered Jeru¬ salem in triumph, and ending on the next, when he

rose in triumph from the grave.

OCTAVE IN MUSIC, the interval be¬ tween any musical note and its most perfect concord of which it is half the pitch. See Har¬ mony.

OCTAVIA, Roman matron, wife of Mark Antony, the triumvir, and sister of Octavian, or Augustus: d. 11 b.c. She was married (be¬ fore 54 b.c.) to Gaius Claudius Marcellus, who became consul in 50 b.c. Julius Gesar, her great uncle, wished to divorce her from Mar¬ cellus so that Pompey might marry her and thus be as closely bound to him as he had been during the life of Julia, his first wife and

Caesar's daughter; but Pompey and Marcellus both objected. After Marcellus' death in 41, however, she was married to Mark Antony, thus cementing the bond between him and her brother Octavian, the future Augustus. An¬ tony's passion for Cleopatra and his complete enslavement to her, in spite of the remarkable beauty and matchless virtue of Octavia, had much to do with precipitating the war be¬ tween Antony and Octavian. She was actually divorced by Antony in 32 b.c., but cared ten¬ derly for her children after his death. Her son by Marcellus was Marcus Marcellus, adopted by Augustus as his heir. He died prematurely in 23 b.c. bitterly bewailed by his mother and pathetically sung by Virgil in the sixth 2Eneid. Her daughters by Antonius be¬ came, respectively, the grandmother of Nero, and the mother of Caligula. The porticus Oc- tavise, 'built in her honor by Augustus, enclosed the temples of Jupiter Stator and Juno. Con¬ sult Abbott, F. F., (Society and Politics in Ancient Rome) (New York 1909).

OCTAVIA, Roman empress, wife of the Roman emperor Nero (q.v.) : b. 42 a.d. ; d Pan- dataria, 62 a.d. A daughter of the emperor Claudius and of Messalina (thus a grand¬ daughter of Octavia, the wife of Antony), she married in 53 her cousin, Nero, then only 16. He was soon unfaithful to her, first leaving her for Acte, a freedwoman, and then for Poppaea Sabina, whom he married in 62, only 16 days after his divorce from Octavia. But Octavia's popularity was so great that Nero was forced to recall her to Rome, where she was so en¬ thusiastically received as to rouse the jealousy of Poppaea. She was exiled to Pandataria on a false charge of infidelity and was there killed by Nero's emissaries. A tragedy, telling her story and bearing her name, was long attributed to Seneca ; its author may have been Curiatius Maternus, but it is still printed among Seneca's plays. Consult Butler, H. E., (Post-Augustan Poetry (Oxford 1909) ; Chickering, E. C., (An Introduction to Octavia Praetexta* (New York 1910) ; Teuffel, W. S., (Geschichte der ro- mischen Litteratur* (Vol. II, Leipzig 1910).*

OCTAVIANUS, or OCTAVIAN. See

Augustus.

*OCTOBRISTS, or OCTOBERISTS («the Party of the 17th of October**), a Russian con¬ servative political party formed by the mode¬ rates after the Tsar's manifesto of 17 Oct. 1905, in which he guaranteed to Russia a liberal constitution. They supported the program of Count Witte, advocating an extension of suffrage and a reorganization of the Duma. The Duma already formed was to become a lower house, the Imperial Council to constitute one-half the members of the upper house, while the remaining members were to be elected. They were in the minority in the second Duma ; but in the third, through changes in the repre¬ sentation from the more distant provinces and by placing a_ property restriction on suffrage in other districts, the Octobrists became the Cen¬ tre of the house. By this time, however, the party as originally conceived had practically disappeared, the remaining members supporting monarchial ideals, so that on the whole they were regarded as reactionaries. They main¬ tained support of the government at the out¬ break of the European War in 1914.*

DECAPODS AND OCTOPODS

•

L

OCTOIC ACID, or CAPRYLIC ACID

rnR°naniC rC u ^viAlg the chemical formula

form °nf °l C]Hl5C° °H, and occurring, in the

and akn f g yc m common butter and, also, in much larger quantities, in cocoanut

°CJ,' l bu obt,aIned l" the form of white C ystals, which melt at 63° F. Octoic acid is almost insoluble in cold water, but dissolves in boiling water. Various isomers and com¬ pounds of the acid are known, but none are of any commercial importance.

OCTOPODA, the eight-armed cephalopods. bee Cephalopoda ; Octopus.

r x genus of the Abranchiate

Cephalopoda (q.y.), or cuttlefishes, forming the >pe of the family

*Octopodidce , the members of which group are familiarly known as "poulpes.ˆ inese forms possess eight arms of equal length united to each other by a web varying in extent in different forms. The arms possess two rows of sessile wholly fleshy suckers. The prom¬ inent head is joined to the body by a distinct neck, and the body itself is short, generally more or less rounded in shape and unprovided With, side or lateral fins. The shell is internal and is represented by two short "styles,® which if ˆddcd *n fˆe ˆmantle.® In the octopods the third right arm of the male animals becomes developed to form a "hectocotylus® or sexual organ (see Argonaut) ; and in some this modi- fied. arm is detached from the body and de¬ posited within the mantle cavity of the female for the. purpose of fertilizing the eggs, a fresh arm being developed as occasion requires.*

*The poulpes attained a popular notoriety from the tales which were formerly circulated of gigantic members of this group which had n° • ex,i.stence *n reality. Some forms spread their limbs 12 or 14 feet, like great spiders, and -might, under favorable circumstances, hold under water a person whom they had seized until he had drowned, at the same time biting him with their horny parrot-like jaws; no doubt such accidents have occasionally happened to pearl-divers and the like. . Ordinarily, however, the octopus does not attain one-half these di¬ mensions and many species have bodies no larger than an ordinary pear. These animals live in rocky places along shore and about reefs, protecting their soft bodies bv sitting in holes and crevices with arms reaching out to seize their victims, which are fishes and any animal they are able to overpower. They are themselves preyed upon by large fishes, turtles, etc. Many species are eaten in various parts of the world and the common one (Octopus vulgaris), of the Mediterranean and neighboring Atlantic coasts, has been speared and taken to market from a time immemorial, and is still a regular object of pursuit, espe¬ cially in Italy. A deep-water species (Eledone moschata) is trapped for market in from 10 to 20 fathoms of water by lowering earthen jars and leaving them a few hours. Th!e creatures creep into these jars, as a fine hiding- place, and allow themselves to be drawn to the surface. The flesh is eaten boiled, fried and in salads and is preserved by pickling. Sepia (q.v.) is the substance in the "ink-bag® : and "cuttlebone® the supporting calcareous plate be¬ neath the skin of certain species. Of the Amer¬ ican species O. bairdii and others of the eastern coast dwell in deep water or about the tropical*

coial reefs. On the Pacific Coast several species are taken near shore and were always utilized by the Indians. Since the settlement of Cali¬ fornia their flesh is regularly supplied to the ban brancisco market, where it is bought by Italians and Chinese. Some specimens brought m there are among the largest known, measur¬ ing 14 feet across the outstretched arms. Con- JVjt 'bo°ks of conchology, especially Cooke, Mollusca>

(1895) ; and 'Standard Natural His¬ tory J (Vol. I, 1884). See Argonaut; Cepha¬ lopoda; Cuttlefish.

. OCTOPUS, The, a novel by Frank Nor¬ ris, published in 1901. It was the intention of ffs author to write a trilogy of novels which should symbolize. American life as a whole, with Jlsu. 1 °P es> aspirations, possibilities and problems 1 his book, which is the first of the three, has for its central motive Wheat, the great source of American power and prosperity, and also the liteial staff of life. (The Pit, > the second of the proposed trilogy, appeared in 1902, not far from the time of the author's death.

OCTOSTYLE, a term in architecture ap¬ plied to .a temple or portico having eight columns in front. The most perfect example was. the Parthenon at Athens, a building of the Doric order. Few remains of Greek buildings of this style exist, the common practice having been to construct temples of the hexastyle or six-column order. Another notablq example of the octostyle is the portico of the Pantheon at Rome.

OCTROI, ok-trwa, an old French term particularly applied to the commercial privileges granted to a person or to a company. In a ike sense the term is applied to the constitution of a state granted by a prince in contradis¬ tinction to those which are derived from a compact between the ruler and the representa¬ tives of the people. The. tax was levied on articles of food brought into a city or town. A great deal of the money for the expenses of the local town government in France is ob¬ tained from the Octroi, nine-tenths of which are. applied to local uses and one-tenth to the national treasury. Under the name "Alcabala® a similar tax was collected in Spain and the bpamsh colonies. This tax was in force in Mexico until a few years before the revolution of 1910.

OCUBA-WAX, a vegetable wax obtained irom. the fruit of a nutmeg (Myristica ocuba) growing abundantly in the marshy grounds on the. shores of the Amazon and its tributaries.

It is. easily bleached, and is used extensivelv in Brazil for the manufacture of candles.

O'CURRY, o-kur'i, Eugene, Irish scholar:

ib/oTT3' County Clare, 1796; d. Dublin, July 1862. He was son of a rather gifted farmer.

Though lame he worked on the farm until 1834. He was for three years employed on the Ordnance Survey; and after several years spent in copying Gaelic manuscripts and writing translations for the Royal Irish Academy Trinity College (Dublin), the British Museum and other learned institutions,

he was called, in 1855, by John Henry Newman to the chair of Irish history and archaeology in the Catholic University of Ireland, then just founded. There he displayed a wonderful knowledge of all the sources of Irish history,

literature and civilization from the earliest times. His lectures, published in 1860, as (Manuscript Materials of Irish History, are accounted the best single work on mediaeval Irish literature. A second series of his lec¬ tures, (The Manners and Customs of the An¬ cient Irish People, * made up of his later lectures, appeared in 1873. O'Curry prepared the catalogue of the Irish manuscripts in the British Museum, and with John O'Donovan (q.v.) worked on the compilation of the an¬ cient laws and institutions of Ireland. Consult Hyde, Douglas, ˆLiterary Historv of Ireland) (London 1906) ; Webb, Compendium of Irish Biography) (Dublin 1878).*

ODD FELLOWS, The Independent Or¬ der of, a secret, fraternal benefit society. The general administration of its laws is designated by the generic term Odd Fellowship. The origin of the society and the source of its pe¬ culiar name cannot now be historically traced. Until near the close of the 19th century it had been asserted for years that Defoe — the Eng¬ lish novelist — mentioned <(Odd Fellow® as early as 1745 a.d.,, but modern research has relegated this, as well as many other alleged in¬ cidents of the order's early days, to the realm of tradition. It is known, however, that a so¬ ciety grew up in England during the 18th cen¬ tury, almost rivaling in numbers and influence the Masonic Fraternity, and that this Antient and Most Noble Order of Bucks began to de¬ cline about the year 1773 and passed out of ex¬ istence. A reasonable supposition attains among antiquaries that these lodges furnished the nucleus of the Odd Fellows, into one lodge of which George IV of England, while Prince of Wales, was quite unceremoniously admitted one night and became a member thereof at a date subsequent to 1780. This is the first authentic reference to the society of Odd Fellows by name. The earliest ritual extant is dated in 1797 and was used by the Patriotic Order. It appears from English contemporary history that an Improved Order existed prior to this, and the title, Most Noble Grand, for the presiding officer of the (

Rise of the American Order. — The first lodge established on this continent was Shaks- pere, No. 1, New York city, 26 Dec. 1806. The five Odd Fellows composing this lodge were of the Loyal Independent Order and the moving spirits were Solomon Chambers and his son John C., English mechanics from the south of London. The early members were zealous

workers and other lodges were soon organized.

In 1809 the roll of membership, in the six New York City lodges, comprised 36 prominent citi¬ zens and business men, as well as many others of less influence. In 1819 George Pope Morris was admitted and at once became a leader in the councils of the Order in the Empire State. Attempts had then been made to plant Odd Fellowship in other parts of North America. In 1815 there were two lodges in Halifax, Nova Scotia. In Boston, during 1818, James B. Barnes — • who had emigrated to the United States from England the previous year, and four others instituted Massachusetts Lodge, No. 1, and held regular meetings, the method being, like New York, ancient usage and self-institu¬ tion. The records extant, however, date only from 20 March 1820. Washington Lodge, No. 1, of Baltimore, was organized 26 April 1819 under the leadership of Thomas Wildey, now recognized as the founder of American Odd Fellowship. Wildey came to the United States from England in 1818. He had been affiliated with one of the branches abroad since 1804 — had <(passed the chairs,® and was known as a leading Odd Fellow. The (

AMERICAN OCTOPODS

A

1 Alloposus mollis, male. Side view, showing

the sac containing the hectocotylized arm, cut open so as to expose the partly developed arm

2 Hectocotylized arm, enlarged

3 Same animal, ventral view

4 The common Octopus (O. bairdi) of the North Atlantic coast (male)

4a Terminal part of sexual arm 4b Section of the lingual ribbon, showing flinty teeth

i ˆ Clty was more satisfac-

tory to the Odd Fellows of Philadelphia than

hat of Baltimore; and it is also stated the lodges m Boston, New York and Baltimore \eie not aware of one another's existence be- .˚re j 1S- event The

Order made history rap¬ idly during the succeeding six months. Each i y ˆaS dominated by a master mind : Wildey, in Maryland; Morris, in New York; Barnes, in Massachusetts; Pearce, in Pennsyl¬ vania. The question of supremacy, however, was soon settled. Massachusetts readily sur¬ rendered its claims to priority and accepted a charter from the Grand Lodge of Maryland and the United States on 9 June 1823; and the Grand Lodge of that commonwealth was duly opened 11 June 1823, all the lodges participat¬ ing. The Order in that State accepted a like charter dated 4 June 1823 and the Grand Lodge was duly instituted 24 June 1823. It having be¬ come known that Wildey had endeavored to unite the Odd Fellows of Massachusetts and New York, overtures were also made to Penn¬ sylvania and these were immediately accepted. The charter is dated 13 June 1823 and the Grand Lodge of the Keystone State was organized 27 June 1823. The consolidated Order became at once homogeneous and prosperous. As a pre¬ lude to these momentous events, coincident with the actual foundation of the American Order, the managers in Maryland had organized, under the Duke of York Lodge charter, the Grand Lodge of Maryland and of the United States, 22 Feb. 1821, which relegated Washington and others, in Maryland, to the condition of sub¬ ordinate lodges. Following the centralization of the government of the four pioneer com¬ monwealths, the "Grand Lodge of the United States® was evolved, on 15 Jan. 1825, by the rep¬ resentatives of the Grand Lodges of Massachu¬ setts, New York, Pennsylvania and Maryland, the last-named taking her place with the State Grand bodies, subordinate to the sovereign head. This theory of a government composed of one head, the source and repository of all true Odd Fellowship, with subordinate State bodies and lodges subordinate, in contradistinction to the English system of a governing movable commit¬ tee, was due to the genius of John Pawson Entwistle, who had joined the Order in 1820, becoming the brains of the young organization; Entwistle, the first Deputy Grand Master, was afterward Grand Secretary, but his career as a "builder® was cut short by his early decease. The last link in the chain of regularity was forged 15 May 1826, when the American body was chartered by the Manchester Unity. Sig¬ nificant of this, the early charters were issued to the Order of Independent Odd Fellows and the branches originating in the United States were organized irrespective of the consent of the English body even prior to 1842ˆ13, the date of official separation.

Government and Degrees.— Between 1826 and 1885 the government of the Order had been evolutionary in its nature. The inheritance from England in ritualistic matters was the merest outline of a possible utility. The de¬ grees were crude in structure and unsuited to the genius of a modern fraternal society, being copies from orders of other origin — notably f rom Masonry. When the foundations of gov¬ ernment had

become settled, attention began to vol. 20 — 37

be paid to degrees of higher significance than the lodge system. Entwistle gave the first im¬ pulse to this part of the fabric of Odd Fellow¬ ship. After his death the work was continued by a long line of distinguished Odd Fellows, including such American citizens as James L. Ridgely, Grand Secretary from 1838 to 1881 ; James B. Nicholson, Isaac McKendree Veitch, Schuyler Colfax, who may be said to have been the "builders® of the Order; Rev. Edwin H Chapin, D.D., Rev. James D. McCabe, D.D., 1 a b P Shaffner, who, together with Entwistle and Ridgely, were largely the authors of the present American ritual. Two English degrees and one American, finally, made up the encamp¬ ment series. As early as 182 1—25 these were conferred in connection with the lodge depart- ment. The final separation of the encampments into a distinct branch, higher than the lodge and governed by Grand Encampments, did not occur until 1841. In 1851-52 the Rebekah degree was adopted, its author being Schuyer Colfax. This is a branch to which both sexes are admitted, but was made with a view to admitting women to the Order. The sequence of degrees was com¬ peted in 1885 by the adoption of the Patriarchs Militant and organization of the uniform or display branch. The Grand bodies followed the sequences of the degrees. In 1879 the name of the supreme body was changed to the Sover- eign Grand Lodge, a title more in consonance with its inherent powers, especially in its juris¬ diction without the United States of America. The Sovereign Grand Lodge is made up of Grand Representatives from the Grand Lodges and Grand Encampments of the United States and Canada. Grand Lodges possess jurisdic¬ tion over State and Provincial Rdbekah Assem¬ blies and Rebekah lodges, as well as in the government of subordinate lodges. The Patri¬ archs Militant, with the local unit, called Can¬ ton, is organized like the United States Army, with Department Councils, all under the im¬ mediate government of the Sovereign Grand Lodge. In Australasia, Denmark, Germany, ffie Netherlands, Sweden and Switzerland, Quasi-Independent Grand Lodges govern the Order. These hold an allegiance to the Sover- eign Grand Lodge, use the American ritual mod¬ ified, and a common bond exists in connection therewith; but they do not enjoy a representa¬ tion in the sovereign head. They, however, gov¬ ern the Order in the countries named and con¬ form to the laws and usages of the civil govern¬ ments thereof. The development of this dual system was the labor of many years and varied experiments. The dates of the introduction of American Odd Fellowship without the United States were these: Canada, 1843; Australasia, 1868; Denmark, 1878; Germany, 1870; the Neth¬ erlands, 1877; Sweden, 1884; Switzerland, 1871. As early as 1846 lodges were instituted in the Hawaiian Islands ; in Cuba, in 1883 ; in Mexico, in 1882; and the Order has followed the flag into the Orient, having been established, in¬ cluding South America, in 22*

nationalities, provinces and territories, in 18 of which Grand Lodges have been chartered. In 1914, how¬ ever, of the entire lodge membership of 1,672,658, only 63,562 were enrolled outside of North America. In that year there were 1,508,791 Odd Fellows in the United States; Pennsylvania led with 157,751, followed by New

York with 126,294; Illinois with 105,062; Ohio, 87,788; Indiana, 84,044; Missouri, 63,657 ; Michi¬ gan, 62,200; Massachusetts, 60,436; etc., etc. Canada and Maritime Provinces had 100,305 lodge members and Australia 45,300.

Other Organizations of Odd Fellows. — The largest body is the Manchester Unity, num¬ bering 950,000 members. It has lodges through¬ out Great Britain and its colonies — a few in the United States — and is, in effect, a chartered benefit society. Annual reports are made to the government, under the laws regulating Friendly societies and actuaries determine the solvency or insolvency of the Order and license lodges accordingly. In ritual matters, likewise, it has nothing in common with American Odd Fel¬ lowship. The Grand United Order ranks next in relative importance. This body is the parent of the colored lodges in the United States and elsewhere and is of English origin. Other Friendly societies exist in Great Britain and are of more or less importance as health in¬ surance associations.

Beneficent Features. — The American Or¬ der has not incorporated into its polity any fea¬ tures of health or life insurance; indeed, it has, on the contrary refused to recognize voluntary associations of Odd Fellows, the object of which was to enlarge the benefit systems of regular relief. Nevertheless, the Order has always in¬ sisted upon ((stated weekly and funeral bene¬ fits,® distinct from voluntary charity — these payments to members who are ill, or in afflic¬ tion, being of ((right,® not a donation. This characteristic is a distinguishing trait of the American Odd Fellow. On the great seal is emblazoned: <(We command you to visit the sick, relieve the distressed, bury the dead and educate the orphan.® Correlatively the atten¬ tion of the Order was early attracted to the founding of institutions of learning, several of which have survived. The dual motive of fra¬ ternity and stated relief led to the establishment of homes for the aged, the indigent, the widow and the orphan. Pennsylvania had six of these homes, New York has four, Illinois two, Cali¬ fornia two and several other States possess two, with more in prospect. Every Grand Lodge in the United States and Canada has one or more of these homes or has taken measures to found such an institution. This beneficence has been fostered in foreign

jurisdictions as well ; and the Order in Denmark has purchased the palace of the Crown Prince for this pur¬ pose, going into the (

The Reunion of 1865. — During the Civil War of 1861-65 the roll of the Southern juris¬ dictions was regularly called during the annual sessions of the Sovereign Grand Lodge. At the close of hostilities the officers and mem¬ bers in the South were welcomed to the chairs and seats which had been held for them during the four years of strife and separation. The roll-call at Baltimore, 18 Sept. 1865, by the ven¬ erable Grand Secretary Ridgely, was notable even in fraternal circles. Every survivor an¬ swered to his name and appointments had been made to fill vacancies so that the representation was complete. Attempts had been made throughout the States composing the Southern

Confederacy, with varying success, to keep up the organizations of the Order; but, at this re¬ union, measures were unanimously adopted whereby fraternal hands and hearts assisted in rebuilding the waste places. This was the first fraternization of the Blue and the Gray. The procession in the streets of Baltimore the next day, occupying more than one hour in passing any given point, attracted national attention. The marshals were Joseph Kidder of New Hampshire and John Q. A. Herring of Mary¬ land.

Bibliography. — (Ars Quatuor CoronatorumP London; publications of Early English Text Society; (History of Signboards, > London; Ridgely and Spry, histories of Odd Fellowship; (Official History of Odd Fellowship, the Three- Link Fraternity) (Boston) ; Rituals of 1797, 1816, 1845 and 1880; Proceedings, G. L. U. S. and S. G. L. (Vols. I to XX) ; Ford, Symbol¬ ism of Odd Fellowship) (Providence 1904) ; Fuller, G. H., (Directory of Subordinate

Lodges of the I. O. O. F. on the Continent of North America) (Boston 1913) ; Stevens, A. C. (ed.), (Cyclopsedia of Fraternities) (2d ed., New York 1907) ; Annual Proceedings of the Sovereign Grand Lodge, I. O. O. F. (Balti¬ more).

ODE, a lyric poem supposed to express the feelings of the poet in the pressure of high excitement, and taking an irregular form from the emotional fervency which seeks spontaneous rhythm for its varied utterance. The Greeks called every lyrical poem adapted to singing — and hence opposed to the elegiac poem — an ode (ode, that is, song). The Dorians are said to have been the inventors of the choral ode to be sung by a group of persons ; the Spartan, Aleman, is credited with having first divided the chorus into two parts, the strophe (turn), and antistrophe (counterturn). These two names had their origin in the fact that as the one group of the performers answered the other they turned to the right and

then to the left. Later on from Sicily came a third addi¬ tion, the epode, wrhich was sung by the united chorus at the end of the movements to the right and left. The principal ancient writers who employed this form of verse were Pindar, Ana¬ creon, Sappho, Alcaeus, among the Greeks, and Catullus and Horace among the Romans. As employed by English writers the ode takes either the Pindaric form of strophe, anti¬ strophe, and epode irregularly arranged and contrasted ; or, as in its later development, the form of a regular series of regular stanzas. The former style is found in Dryden's (Ode for Saint Cecilia's DayP while the latter is seen in Shelley's (Ode to a Skylark. > The masters of English poesy who have carried the ode to its highest achievements are Milton, Marvell, Dry- den, Collins, Gray, Coleridge, Wordsworth, Keats and' Shelly. Consult Gosse, E. W., Eng¬ lish Odes) (New York 1881) ; Scollard, Clinton, (Odes and Elegies (New York 1905) ; Sharp, William, (Great Odes, English and American * (London l890).*

ODE TO DUTY. Wordsworth's (Ode to Duty, written in 1805 and published in 1807, is a noble appeal to the principle of morality for guidance and support. It represents in a measure a recantation of Wordsworth's earlier faith in the spontaneous and unguided impulses*

of the heart, written at a time when he was corning to feel more and more the need of an invariable standard. While continuing to rec¬ ognize the worth and beauty of the creed of joy and love, he feels that there must be also the mandate of the stern power which preserves the stars in their courses and lays the law of sacrifice and self-restraint upon the soul of man. Stern as is the voice of duty, it is yet also divinely beautiful,

" Nor know we anything so fair As is the smile upon thy face."

The mood and temper of the (Ode is charac¬ teristic of much of Wordsworth's later work. According to Wordsworth's own statement the Ode to Duty* was modeled on Gray's (Hymn to Adversity,* which in turn was imitated from Horace's (Ode to Fortune.* The stanza is identical with, that used by Gray, and there are resemblances in idea and phraseology. Consult notes in Dowden's (Poems of Wordsworth* (Athenaeum Press Series).*

James H. Hanford.

ODE TO GOD, The (Russian title (Bog). In the 18th century the Deists of various European nations reveled in singing praises to God. We have such odes by Voltaire, Klop- stock, Haller, Brockes, Young; in Russia the fashion was set by Lomonosov's*

Leo Wiener.

ODE ON A GRECIAN URN. John

Keats's (Ode on a Grecian Urn was first pub¬ lished in the memorable volume of 1820 which contains the greater part of its author's most characteristic work. Inspired by the loveliness of an exquisite form of Hellenic art Keats ad¬ dresses his Urn as the very incarnation of beauty. ' Three pictures, characteristic of the representations actually found on the Greek vases, are described; the first a lively pursuit of maidens <(in Tempe or the dales of A ready® ; the second a pastoral scene of love-making and music; the third a solemn sacrificial procession. To Keats the very incompleteness of the (*

vase becomes the type of that beauty which transcends all its sensuous embodiments :

" Th°u' siIent form, dost tease us out of thought As doth eternity."

Its message is the self-sufficiency of beauty and the identity of the ideas of beauty and of truth. In form the poem is a regular or stanzaic ode, firmly knit in structure. Highly imaginative in expression and exquisite in rhythm, it has al¬ ways been regarded as one of the most consum¬ mate of English lyrics. Consult the introduc¬ tory essay in Selincourt's (Poems of John Keats ; Brooke, (Studies in Poetry* ; Bridges, (Keats, A Critical Essay* ; Masson, (Words- worth, Shelley, Keats and Other Essays* ; Arnold, (Essay on Keats* ; selected bibliography in Page's (British Poets of the Nineteenth Cen¬ tury.*

James H. Hanford.

ODE: INTIMATIONS OF IMMOR¬ TALITY FROM RECOLLECTIONS OF EARLY CHILDHOOD. The (Ode on Im¬ mortality, as it is generally called, by William Wordsworth, is by many considered the great- e|t lyric in the English language. It consists ot 203 lines of irregular verse in 11 stanzas of unequal length, was composed between the years 1803 and 1806, while the poet was living at Town End, Grasmere, and was published in 1807. In effect it is a poem on the eternity and the destiny of the human spirit and the inter¬ relation of man and nature. In its mysticism — its*

belief in intuitive knowledge, in the power of humanizing experiences to interpret nature and in the power of nature to sustain and con¬ sole the spirit of man — it is a complement to Wordsworth's (Tintern Abbey. The two poems should be read together as the supreme statement of the Wordsworthian doctrine and philosophy of life.*

Ostensibly the ode asserts the poet's belief in immortality as evidenced by his own tran¬ scendental experiences. As a child he seemed to retain vague recollections of a former state of being, and something of the radiance of this heavenly life still invested the outer world of sense. These are the ((recollections of early childhood® which are to him <(intimations of immortality.® Even as a man he had his mo¬ ments of transcendent vision when he saw into the life of things. He often spoke of such experiences to his friends and often in his shorter lyrics he alludes to them. On such eso¬ teric and highly personal grounds he bases his belief in immortality. This is not a philosophy, nor did Wordsworth assert that it was such, yet it is quite sufficient to give body and con¬ sistency to the ode, which should be read not as an argument nor as a philosophy, but as the lyrical expression of a mystic's convictions, in¬ tuitions and dreams, transcending philosophies and facts. Though it is customary to speak of the (

(Wonder } ; but it is probable that the com¬ munity of ideas between these poems and the ode is entirely accidental.

The structure of the ode, while coherent and carefully wrought, is not obvious unless the reader perceives it to be based upon the poet's train of thought and emotion. He stands in the midst of a May morning, but can no longer feel the joy of nature that he felt as a child — (III and IV). The answer is that our birth is but a forgetting of our former exist¬ ence; the child, fresh from heaven, invests all natural objects with the light that never was on sea or land ; as he grows older the light fades (V and VI). As a child he is the <(best philosopher® : before life lays upon him the weight of custom, he reads the riddles of the universe (VIII). Yet the grown man does not entirely and forever lose the light and the memory; he has his moments of transcendent revelation when his spirit plays upon the shores of the universal ocean (IX) ; and, as a com¬ pensation for the loss of the early glory, has come a deeper insight into the meaning of nature, 'brought about by common human ex¬ periences (X and XI).

No such bare, cold and formal outline can afford any conception of the majesty and splendor of the great ode and the irresistible sweep of its

power. Though based upon an intellectual concept, it is not argumentative or didactic, or even philosophic in the ordinary sense. Its thought is vitalized by its profound emotion, and both thought and emotion are enveloped with a glory of diction perhaps unequalled by any other English lyric. Though a few lines in the seventh stanza lapse into something approaching banality — Words¬ worth's besetting danger — the style in the main is sustained at the very highest pitch of lyric excellence ; and the poem abounds in lines unsurpassable for wealth of suggestive power, imaginative vision and sheer rhythmical beauty. Emerson called this ode the ((high-water mark which the intellect has reached in this age.® Critics from Coleridge to the present have con¬ sidered it hot only Wordsworth's supreme achievement, placing him among the Immortals, but, in its union of thought, emotion and music, probably the greatest of English lyric poems.

Marion Tucker.

ODE TO A NIGHTINGALE. John Keats's ˆde to a Nightingale, published in the volume of 1820, is one of the richest and most impassioned of English lyrics. The essential theme of the poem is the intoxicating, almost stupefying, beauty of the bird's song, heard in darkness, and the experience it brings with it of momentary release from the weight of mor¬ tal care. Like the skylark in Shelley's poem the nightingale becomes a symbol of deathless hap¬ piness, and of ((the life of sensation rather than of thought® for which Keats yearned. The poet loses himself in ravishment and longs to die in the ecstasy of beauty, but the exalted mood quickly gives way to deep depression and the melancholy thought of self, as the song withdraws*

" Past the near meadow?, over the still stream."

In no poem is Keats's marvelous power of rich poetic utterance more strongly felt. The lines are steeped in sensuous imagery, but the poet is carried by the intensity of his imagination far beyond mere sensation into the heart of wonder and romance.

" The voice I hear this passing night was heard In ancient times by emperor and clown:

Perhaps the self-same song that found a path

Through the sad heart of Ruth, when, sick for home, She stood in tears amid the alien corn;

The same that oft-times hath Charm'd magic casements, opening on the foam Of perilous seas, in faery lands forlorn."

*The poem is a regular ode in eight stanzas. It falls short of the (Ode on a Grecian Urn) in spirituality and perhaps in perfection of lyric form, but it is no less a favorite with lovers of essential poetry. Consult bibliography under article (Ode on a Grecian Urn.**

James H. Hanford.

ODE TO THE WEST WIND. Shelley's

(0de to the West Wind, though not so popu¬ lar as his (Skylark,* is perhaps the technical masterpiece among his shorter poems. The poet himself says, ((Thi.s poem was conceived and chiefly written in a wood that skirts the Arno near Florence, and on a day when that tempes¬ tuous wind, whose temperature is at once mild and animating, was collecting the vapors that pour down the autumnal rains. They began, as I foresaw, at sunset, with a violent tempest of hail and rain, attended by that magnificent thunder and lightning peculiar to the cisalpine regions.® The poem was published with Pro¬ metheus Unbound) in 1820.*

Above any other modern poet Shelley pos¬ sesses that mythopoetic faculty of the Greeks which makes the forces of nature personal and alive. His West Wind is a tempestuous and elemental spirit, in which at the end he loses himself. The Ode consists of 70 lines of Italian terza-rima, a difficult metre, here used with astonishing skill. The metrical scheme differs from the Italian in that each of the five parts, or stanzas, of the Ode is metrically complete in itself and is rounded out with a couplet. The structure, planned and executed with a care unsurpassed in any other English lyric, embodies a definite pattern or design. The first, second and third stanzas, respectively, invoke the wind in its play with the dead leaves, the clouds and the waves. In these occur the aerial singing, the color, and the sweep that mark Shelley's characteristic treatment of natural phenomena. The fourth and fifth stanzas make the personal appeal, as the poet prays to be one with the wind ; and the whole closes with an irresistible poignancy unmatched even in the poems of Shelley. The diction represents the poet at his best; the Ode abounds in exquisite phrasing, and every line is wrought with the delicacy of the highest poetic art.

In the skilfulness of its structure, in its splendor of imagery and felicity of phrase, in the intensity as well as the universal significance of the poe+ ^'s aspiration, in its power to inspire the reader with the poet's own emotion and to sweep him along in a rushing tide of melody in which the music of nature and the human heart are identified and blended, the (Ode to the West Wind) takes its place among the few perfect masterpieces of all modern lyric poetry.

Marion Tucker.

ODELL

ODENSE

581

ODELL, o-del', Benjamin Barker, Jr.,

American political leader: b. Newburgh, N. Y., 14 Jan. 1854. He was educated at Bethany College, W. Va., and at Columbia, leaving the latter after three years to enter the ice business with his father in Newburgh. He proved suc¬ cessful in business, acquired an interest in his fathers establishment, and became president of the Consolidated Gas, Electric Light, Heat and Power Company of Newburgh and treasurer of the Central Hudson Steamboat Company. He early took an interest in politics and soon became a prominent local leader of the Re¬ publican party. In 1880 he was a candidate for State senator, but was defeated. In 1894 he was elected to Congress; re-elected in 1896, and declined the nomination in 1898. During his last term in Congress he was chairman of the committee on accounts and a member of the committee on the District of Columbia. Before his first election to Congress he had been chosen chairman of the executive com¬ mittee of the Republican State Committee, and in 1898 was made chairman of the State com¬ mittee. The election of Roosevelt as governor was, in large measure, due to the energy and skill with which he conducted the campaign. In 1900 he was elected governor of the State of New York. Under his leadership, laws were passed which increased indirect taxes and re¬ duced the direct tax to .13 of a mill, and at the same time appropriations for roads and schools were increased. The administration of State insane asylums was also simplified by abolishing the board of managers and centraliz¬ ing control under the commission on lunacy. In 1902 he was re-elected. In the first year of his second administration a referendum vote of the people authorized the enlargement of the Erie Canal which Odell had consistently urged. He opposed special legislation and vetoed a large number of special and personal bills ; favored home rule for cities, and gave valuable aid to tenement house reform. In 1903 Colum¬ bia University conferred upon him the honorary degree of LL.D. in recognition of his public services. In 1905 he was defeated by Timothy L. Woodruff for the office of the State chairmanship, a position he had held previous to his election as governor for the first time.

ODELL, Jonathan, American clergyman and Tory satirist: b. Newark, 26 Sept. 1737; d. Fredericton, New Brunswick, 25 Nov. 1818. A grandson of Jonathan Dickinson (q.v.), he was educated at what is now Princeton

University, studied medicine and was surgeon in the British army. After several years spent in England, where he was ordained a deacon of the Church of England, he became a priest in 1767 and was made rector of Saint Ann's, Burlington, N. J. He assured the colonial authorities that he would keep his loyalist sentiments to himself in the exciting times before the Revolution, but on 4 June 1776 he wrote his famous birthday ode for the king, which may have suggested, in part, the phraseology of 'Hail, Columbia, > as it begins 'O'er Britannia's happy landP The New Jersey Convention, holding him an enemy to the American cause, exacted from him a parole to keep on the east side of the Delaware and within eight miles of Burlington. He was driven from home by the patriot forces and took refuge in the home of Margaret Morris,

who hid him in a secret chamber. He escaped to New York, where he took a prominent part with the Loyalists, notably by his acrid and satiric attacks on Congress and its individual members, as in (The Word of Congress) (1779), 'The Congratulation, > 'The Feu de Joie' and 'The American Times) (1780). Upon the evacuation of New York he lived in England for a time and then removed to New Brunswick, where he, his son and his grandson after him held high office and took much interest in politics. He had a decided literary gift and was the most effective satirist on the Tory side. Consult the chapter on Odell in Tyler, 'Literary History of the American Revolution > and the collection of Odells poems with those of Joseph Stans- bury made by Winthrop Sargent in 1860.

ODENBURG, e'den-boorg (Hungarian So- pro), Hungary, a free city and the capital of a county of the same name, near the south¬ west shore of the Neusiedler See, 36 miles southeast of Vienna. It dates from the Roman Scarabantia and has several interesting ecclesi¬ astical and other edifices. It is one of the finest cities of its size in Hungary. Among its ex¬ cellent public buildings are several monasteries and churches, the Palace of Justice, the Gym¬ nasium, the Realschule, the normal school, the Protestant Lyceum and other educational es¬ tablishments. Its industries comprise woolen, linen and cotton cloth, sugar refining, cutlery, glass, agricultural implements, soap, starch, rubber goods, fire engines, bricks, vehicles of various kinds and earthenware; and it has a trade in these, and in corn, cattle, wool, wine and generally in agricultural products. Oden- burg is one of the strongest Catholic centres in Hungary. Pop. mostly German, about 35,000.

ODENHEIMER, o'den-hi-mer, William Henry, American Protestant Episcopal bishop: b. Philadelphia, 11 Aug. 1817; d. Burlington, N. J., 14 Aug. 1879. He was graduated from the University of Pennsylvania in 1835 and after taking orders in the Episcopal Church in 1841 was rector of Saint Peter's Church, Phila¬ delphia, till 1859. In the year last named he

was consecrated third bishop of New Jersey. On the division of the diocese in 1874 he chose the diocese of Northern New Jersey (now Newark). He was prominent as a hymnologist, and among his published works are (Origin and Compilation of the Prayer Book) ; (The Devout Churchmans Companion) ; 'Private Prayer BookP

ODENKIRCHEN, o-den-kerk'en, Prus¬ sia, city in the Rhine province, on the river Niers, 21 miles by rail southwest of Diisseldorf and at a junction of railway lines to Munich, Gladbach and Stolberg. It has Roman Catholic and Evangelical churches, a Jewish synagogue, a teacher's seminary and an agricultural school. There are textile, leather and dyeing industries. Pop. 20,060.

*ODENSE, o'den-sa, the third largest and one of the most important cities of Denmark. The capital of Odense Amt and the largest town on the island of Fiinen, it is a busy sea¬ port at the mouth of the Odense River near the fiord of the same name. It is one of the best built cities in Denmark. The streets are well paved and m*iny of the houses are large*

and handsome ; and quite a number of them are modern. It is the foremost advocate of modern progress in the kingdom and was the first city in Denmark to have water distributed to public buildings and commercial and private houses. Among the notable public edifices of Odense are the cathedral of Saint Canute, built in the 13th century and the best example of Gothic architecture in the country, the church of Our Lady (12th century), Odense Castle (built by Frederick IV), a large and imposing City Hall, a very modern post office, the Agricultural College, the Technical School, a Seminary and the Archaeological Museum. The harbor, which consists of two basins formed by the elongated basins of the Odense Ship Canal where it opens into the fiord is one of the most important shipping centres in the king¬ dom. This, added to the fact that Odense is the chief railway centre of the island of Fiinen, gives it a very prominent place in the economy and trade of the nation. Among its chief com¬ mercial establishments are machine shops, breweries, textile mills, tobacco factories, distil¬ leries, chemical works, glass factories and sugar refineries. From Odense are exported extensively, bacon, hides, butter and cheese. Pop. about 45,000.

ODENWALD, o'den-valt, Germany, a for¬ est and chain of mountains and a mountainous region between the Neckar and the Main, in the territories of Hesse-Darmstadt, Baden and Bavaria. The Neckar divides the Odenwald

from the Black Forest. The Odenwald is about 50 miles in length, contains 1,740 square miles and in Katzenbuckel attains a maximum alti¬ tude of 2,057 feet. Several other peaks reach in the neighborhood of 2,000 feet. It presents charming scenery and in literature is associated with much interesting tradition.

ODEON, o'da -on, among the Greeks and Romans, the name applied to a public building devoted to poetical and musical contests. The first odeon was built at Athens by Pericles and was afterward used for popular meetings and the holding of courts. At a later period two others were erected in Athens, beside those in other Greek cities. The first odeon at Rome was built in the time of the emperors. The odeons resembled the theatres, except that they were inferior in extent and were covered with a roof. The name is occasionally given in the United States to a music hall or theatre. Odeon is also the name of a theatre in Paris opposite the gardens of the Luxembourg Palace. It is devoted principally to the classical drama and is next in importance to the Theatre Franˆais. The Odeon was originally built in 1728. It has been destroyed by fire several times and during its existence has gone under various names.

ODER, o'der, a river of Central Europe, which rises in Moravia, in the southern branch of the Sudetic Mountains, flows through Silesia, becomes navigable for small boats at Ratibor, passes by Breslau, where it is navigable for barges of 40 to 50 tons, enters Brandenburg and Pomerania and empties into the Baltic. Its whole course is above 562 miles. It receives numerous navigable streams, communicates with the Elbe by several canals and is of great com¬ mercial importance. The principal towns on its banks are Breslau, Frankfort and Stettin. Be¬

fore reaching the sea it forms the large mari¬ time lake called the Stettin Half and divides into three branches — the Peene, Swine and Divenow. The Oder is generally shallow and though only in its upper courses does it flow through a hilly country, yet the current is gen¬ erally swift and varies much in volume. Vast sums of money have been spent to confine it to its course with only partial success. Con¬ sult Bramer, (Die Oder und ihr GebieC (Ber¬ lin 1899) ; Tietze, W., (Die OderschiffahrP (Breslau 1906).

ODERBERG, Germany, town situated on the Alte Oder in the Prussian province of Brandenburg and about two miles from Bralitz and 47 miles from Frankfort-on-Oder. Oder- berg has a splendid Gothic church, dedicated to Saint Nicholas. Another object of great in¬ terest to visitors is the Barenkasten, an ancient castle now in a ruined state. Oderberg has ex¬ tensive lumber interests and has a large trade with Russia in this commodity. Pop. 4,000.

ODES. Linder the heading “Canti,® or odes, are grouped 41 poems of Giacomo Leopardi of which five are fragments, and three in very brief form. The keynote is love of country. The best known of them is the first,

Americo Ulysses N. Camera.

ODESCALCHI-ERBA, o-des’kal-ki’-er-ba, the name of an ancient Roman house of princely lineage. The family takes its name from Enrico Erba, who was Imperial vicar of Milan in 1165. In 1709 Lucrezia Odescalchi, a sister of the Roman Pontiff, Innocent IX, was mar¬ ried to Alessandro Erba. She traced her descent from Giorgio Odescalchi, who lived at Como in the closing years of the 13th century. In 1714 Alessandro received the title of prince of the Holy Roman Empire and in the same year he was made His Serene Highness the Duke of Syrmium in Hungary. The family is to-day one of the most powerful in Italy. Its head is now styled Fiirst Odescalchi, Duke of Syrmium in Hungary, prince of Bassano, and

a dozen lesser titles. Until the war he was also an hereditary magnate of Hungary. He is also a grandee of Spain and the holder of numerous foreign titles, orders and decorations. The Roman seat of the family is the Palazzo Odescalchi. Another seat is the beautiful castle of Bracciano. Several estates in Italy and Hungary also belong to this ancient house. Consult the (Almanach de Gotha) and Reumont, A. von, (Geschichte der Stadt Rom) (Berlin

1868).

ODES OF HORACE. Horace’s Odes are in four books. Books I— 1 1 1 were published to¬ gether in the year 23 b.c., when the poet was 41 years of age. Book IV appeared several years later, probably in 13 b.c. The four books em¬ brace 103 poems. Horace’s tastes had made him an earnest student of Greek litera¬ ture, particularly of Greek poetry, and we thus find Greek models exercising the most potent influence over the form and content of his verse. So far as form is concerned, the Odes are founded mainly on the measures em¬ ployed by the Lesbian poets Alcaeus and Sappho (about 600 b.c.). In their contents and motives also, as well as in many bits of phrase and epithet, Horace is profoundly indebted to the same writers.

The Odes are brief lyric poems and cover a wide range of themes. Thus we have (1) Patriotic Odes. Horace’s earnest patriotism and keen solicitude for the weal of the state, com¬ bined with his personal devotion to Augustus

and his firm faith in Augustus's wisdom as a ruler, led him to devote his gifts to stimulating the national sense and quickening the national conscience. Some of the loftiest and most suc¬ cessful of his poems are the outcome of this purpose. Foremost in this class are the six odes at the beginning of Book III, in which the poet emphasizes the cardinal virtues that had made Rome great and to which he urges the rising generation to cling, if they would ensure the perpetuation of that greatness for the future. The horrors of civil war are touched upon in the fine ode to <(the ship of state" (I, 14). In I, 37, a lofty note is sounded in the exultant ode of triumph at the defeat and death of Antony and Cleopatra. (2) Odes in Praise of Augus¬ tus. Book IV abounds in odes of this class, though they are not lacking in the earlier books. Among the most successful are the odes ad¬ dressed to Augustus as the one hope of the state at the time when he was said to contemplate laying down his power. In IV, 5 ; IV, 15 and others Horace recounts the blessings of Augus¬ tus's sway, in which fertility, peace, honor, uprightness, chastity reign everywhere. (3) Poems on Life and Conduct. These form a large and characteristic class. Favorite motives are the uncertainty of life, the wisdom of a rational enjoyment of its pleasures, the cultiva¬ tion of a spirit of tranquillity and contentment, the observance of <(the golden mean," along with protests against the growing taste for lux¬ urious living. The finest of all these is III, 29, on the superiority of the righteous man to the bufFetings of fortune. (4) Love Poems. Love had been one of the most conspicuous themes in the 2Eolic lyric poetry of Sappho and Alcaeus, on which the Odes are chiefly modeled. But Horace's passion lacks every token of sincerity.

His love poems represent no genuine experience or sentiment. Yet III, 9, is a successful little three-act drama in which estrangement passes to a happy reconciliation. (5) Praises of Wine. This favorite theme of the 2Eolic poets is only sparingly treated by Horace. In III, 21, we have an enumeration of the beneficent effects of wine. But in I, 18, we are cautioned that Bacchus's gift is not to be profaned, but should be enjoyed in moderation. (6) The other poems are miscellaneous in character. Some are affectionate tributes to friends; others are in honor of places, or elaborate some mythological theme. The concluding ode of Book III is a proud prophecy of the poet's immortal fame, <(I shall not altogether die."

The

Charles E. Bennett,

Late Professor of Latin, Cornell University.

ODESSA, o-des'a, the most important town and seaport of southern Russia, in the govern¬ ment of Kherson, on the Black Sea, between the mouths of

the Dniester and Dnieper, about 950 miles south of Petrograd. It is the fourth city of the country and is the intellectual and commercial capital of New Russia (Novo¬ rossiya). It is built principally of stone and is thoroughly modern in appearance. Among the promenades and squares of the city are the Nikolai boulevard, beside the harbor, with a bronze statue of the Due de Richelieu ; the Cathedral square, with the monument of Prince Voronzoff; the Catharine square, with a monu¬ ment of the Empress Catharine II ; the Alex¬ ander Park, with a pillar in honor of the Emperor Alexander II. Among the Greek churches are the Cathedral or Sobornaja church, built in 1794-1848. The other buildings and institutions of the city comprise the town- hall, Voronzoff palace, archiepiscopal palace, public library, chief passenger railway station, university, town theatre, post office, custom¬ house, institution for noble ladies and bar¬ racks. The university, founded in 1864, as a development of the Richelieu gymnasium, has a large library, containing nearly 200,000 vol¬ umes, museums and an observatory, It. has

r A

**>o . c*

faculties of medicine, law, philosophy, history and philology, mathematics and physics. There are numerous other educational institutions of different kinds and grades, including several technical schools. There are also hospitals, an orphanage, a foundling institution and a bac¬ teriological institute. Tramways and omnibuses facilitate internal communication ; the town is well supplied with water from the Dniester and is electrically lighted. The harbor, which is protected on the southeast by a long mole with a lighthouse at the end, and by a breakwater, consists of several sections separated by shorter moles, and has a floating dock. The harbor, like the city itself, is quite modern and is deep enough to accommodate deep-draft vessels. The business of the port was, in 1912, over 1,450,000 tons from over 700 steamers. The port is usually icebound for a few days in winter, but an ice-breaker is now in use to keep it open. Strong batteries protect the har¬ bor basins from seaward attacks. Odessa is the chief grain exporting seaport of Russia. Other articles of export are sugar, timber, flour, oil-seeds and oil-cake, beans, peas and fish. The principal imports are coal, tea, fruits, agri¬ cultural implements and machinery, iron and steel and raw cotton. The chief industrial es¬ tablishments are the sugar refineries, flour-mills, oil-mills, engineering works, tanneries and to¬ bacco factories, soap works, jute works, brew¬ eries. The city had, in 1912, nearly 500 large industrial establishments, employing over 22,000 skilled workmen and many unskilled laborers. Of the Russian ports only Reval

and Petrograd receive more imports than Odessa. The im¬ ports of Odessa, for the most part, go to Petro¬ grad, Kharkov and Batum. Odessa, named after Odessus, an ancient Greek settlement on this site, dates practically from the Turkish castle of Khadji-Bey, built in the 15th century and captured by the Russians in 1789. Odessa was bombarded during the Crimean War. Odessa is a very cosmopolitan city and is grow¬ ing rapidly. In 1901 nearly one-third of the in¬ habitants of the city were Jews; and in its popu¬ lation of over 620,000 in 1911 were many Greeks, Italians and Albanians. Odessa was the scene of very serious anti-Semitic riots in 1905-06, in which many Jews and other foreigners lost their lives. At the same time the mutinous Black Sea fleet terrorized the city. The port was closed during the Balkan War (1912-13) and bombarded by the Turkish fleet at the be¬ ginning of the European War in 1914. See War, European.

ODEUM, a name sometimes used in the United States for a specific kind of theatre, generally known as <(Odeon.® See Odeon.

ODGERS, William Blake, English writer on law: b. Plymouth, Devonshire, 15 May 1849. He was educated at the University of London and Cambridge University, and became a bar¬ rister of the Inner Temple in 1873. He was recorder of Winchester 1897-1900, and of Ply¬ mouth 1900-12, after which he was recorder of Bristol. He became Director of Legal Studies at the Inns of Court (1905) : and Professor of Law at Gresham College (1907). He has pub¬ lished (King Arthur and the Arthurian Ro- mances) (1872); and such well-known legal works as (Odgers on Libel and Slander > (1881); (Odgers on Pleading, Practice and Pro¬

cedure) (1891); (An Outline of the Law of LibeP (1897); (Odgers on Local Government (1899) ; (Powell on Evidence) (1910) ; (Odgers on the Common Law of England) (1911), and (Bullen and Leake's Precedents of Pleadings)

(1915).

ODIN, Teutonic god, called Wodan by the Saxons and Wuotan by the High German. He held a high place among the ((ases® or secondary gods of the Scandinavian mythology at first, and later came to be held the centre of the system, the ruler of the world, the patron and source of all sciences, inventor of runic writ¬ ing, of poetry, and of magic (hence identified with Mercury Hermes by the Roman writers on Germanic customs and religions), and, Minerva- like, a protector and companion of all brave heroes. Probably in origin he was a storm- god; his name seems to mean ((the mad. or raging one® and as such he is portrayed as riding the eight-footed horse Sleipner. As a wind-god his functions were various: he pre¬

sided over the harvest and over the sailing of ships, and was god of battles and of the dead. In battle he was accompanied by the Valkvries, who brought to Odin's banqueting hall. ValhaWa, the slain heroes. Sometimes, Apollo-like, he is the sun-god, the sun is his eye, the heaven his canopy, and the mountain of Hlidskjalk his throne, at the sides of which are his raven mes¬ sengers, Huginn (((Thought® or ˆReflection®) and Muninn (ˆMemory®) , who bring him news of all that happens in the world; and the two wolves, Gere and Freke. He had a wonderful eight-footed steed named Sleipner, a magic spear called Gungner and a talismanic ring Draupner. In drinking at the fountain of Mimir he lost an eye but became the wisest and greatest of the gods. Odin's wives were three : lord (the inhabited earth), Frigg (the cultivated earth), and Ring (the winter-locked earth). Snorre Sturleson and Saxo Grammaticus make Odin a chief, who in alliance with Mithridates fought the Romans unsuccessfully. To the Ro¬ man identification of Odin with Mercury is due the use of his name for the fourth day of the week (French ((Mercredi,® German <(Dienstag,® English ((Wednesday,® that is, Odin's or Wodan's day). Consult Anderson, R. B., (Norse Mythology) (Chicago 1875). See Hisir; Scandinavian Mythology.

ODO, or EUDES, ed, of Bayeux, Norman bishop, English earl and viceroy, half-brother of William I, of England: b. about 1036; d. Palermo, Italy, Feb. 1097. He became bishop of Bayeux in 1049, and participated in the Norman Conquest in 1066, gathering the ships for the expedition and taking part in the action at Senlac. He was made Earl of Kent in 1067, was a royal minister and, in the absence of William I, was frequently called upon to serve as viceroy. In 1083 he was accused of planning a military expedition to Italy for the purpose of making himself pope and was summarily dis¬ graced and cast into prison, where he remained until just before the death of William I. He led a rebellion against William Rufus for the purpose of gaining the throne for his nephew, Duke. Robert, but was unsuccessful. He was permitted to leave the country and joined Robert in Normandy where he enjoyed con¬ siderable influence. He died while on' the way to Palestine in the First Crusade. He rebuilt

the Cathedral of Bayeux, and it is supposed tliat he ordered the Bayeux tapestry. Consult rreeman E. A., (History of the Norman Con-

?uefj » Round, J. H., (Feudal Eng¬

land5 (1895).

ODO, or EUDES, ed, of Paris, king of France: b. about 857; d. 1 Jan. 898. His father was Robert the Strong, the first of the Capet line. As Count of Paris, Odo successfully de¬ fended Paris from the Norse in 886. Two years later he was made king of the West Franks in succession to Charles the Fat, who had been deposed. Charles the Simple made several unsuccessful attempts to regain the throne, but Odo held on and at his death recommended Charles as his successor. Con¬ sult Favre, Edouard, (Vol. II, ib. 1903).

ODOACER, o-do-a'ser, or ODOVACER,

king of Italy: b. about 435; d. 5 March 493. The son of Edecon or Edicon who may be identical with one of Attila's lieutenants, and a Scyrian or Rugian of noble birth, he became a leader of a band of Rugians, Herulians, Scyrians and Turrilingians. He entered the Roman army about 470, and in 476 was a mem¬ ber of the Imperial bodyguard. When Orestes deposed Nepos and made his own son, Romulus Augustulus I, emperor, Odoacer headed the ris¬ ing of the dissatisfied German soldiers, killed Orestes, forced Romulus to retire, received the title of Patricius from the Eastern emperor Zeno, but no recognition as king of Italy; yet in spite of this he played the part of king ably for a time. This was formerly looked upon as the date of the fall of the Western Empire. He took up his official residence at Ravenna which he made his capital. He conquered Dalmatia in 482 and defeated the Rugians in 487 and 488, but in 489 Theodoric, king of the Ostrogoths (q.v.), was sent against him by Zeno, who had become alarmed at the conquest made by Odoacer. He hoped by this move to get rid of not only Odoacer but of the Goths who had been threatening Constantinople for some time. Odoacer, defeated at the battle of Isontius (Isonzo) in 489, retired; but making a second stand at Verona, was again defeated. Hastening to Rome he found the city in insurrection ; so he went to Ravenna, where he reassembled his army, marched against the Goths in 490, de¬ feated and pursued them to Pavia. But later he was defeated for the third time on the banks of the Adda. He retreated to Ravenna where he was besieged by Theodoric for three years and forced to surrender, Theodoric promising him a share in the rule of Italy. The defeated king was assassinated at a banquet a week after his surrender. Consult Gibbon, Edward, de¬ cline and Fall of the Roman Empire5 (Vol. IV, London 1912) ; Hodgkin, T., (Italy and her In¬ vaders5 (Vol. Ill, 1885).

ODOMETER, a small clock-like mechan¬ ism employed for registering the number of revolutions of a carriage, automobile, bicycle, or other wheel, to which it is attached. The workings of the odometer are very simple : Two wheels of the same diameter, and turning freely on the same axis, are placed face to face ; the edge of one is cut into 100 teeth, and that of the other into 99 teeth, and an endless screw works into the notches in each

wheel.

When the screw has turned 100 times around, the wheel having 99 teeth will have gained one notch on the other, which gain is shown by an index attached to one wheel, which passes over a graduated arc on the other. Every 100 turns are thus registered on the second wheel, and all turns less than 100 are shown by a sepa¬ rate index. Now, instead of the screw turning on its axis, it is found more convenient to have the screw fast, and to allow the weight of the machine to be suspended freely, so that as the carriage wheel turns, the effect is the same as turning the screw on its axis. Other forms of the odometer are now in use on bicycles, and motor vehicles of all kinds. It is also called ˆcyclometer55 and ((speedometer,55 and is made to indicate the distance traversed and the rate of travel.

ODONATA, an order of insects compris¬ ing the dragon flies. See Dragon Fly.

O'DONNELL, Frank Hugh, member of the Irish parliamentary party: b. 1848; d. Nov. 1916. In 1888 he brought a libel action against the London Times claiming £50,000 ($250,000) damages in respect of certain statements in the famous ((Parnellism and Crime55 articles pub¬ lished in that paper. Though he lost the ac¬ tion, it was mainly as a result of the case that the Parnell Commission was set up two months later.

O'DONNELL, o-don'el, Leopold, Duke of Tetuan, Spanish marshal : b. Santa Cruz, Teneriffe, Spain, 12 Jan. 1809; d. Bayonne, France, 5 Nov. 1867. He entered the Spanish army and supported Maria Christina, the queen-mother, in her struggles against the Car- lists, and by intrigue he secured the appoint¬ ment of governor-general of Cuba in 1843, where he made use of his office to enrich him¬ self. On his return to Cuba in 1848 he car¬ ried on his political intrigues against the minis¬ ters successively in power; and in 1854 he fi¬ nally headed a military insurrection ; but he was soon defeated and driven into Andalusia. There he made a deal with Espartero; declared himself a liberal ; and became War Minister under Espartero in 1856 and 1858 was Prime Minister. In 1859 he led a succ ssful expedi- dition agamst the Moors, and as a result, was made Duke of Tetuan. He was recalled in 1863 and again in 1865-66, but never held the confidence of the country. Consult Alfaro- Manuel Ibo, cLa Corona de laurel5 (Madrid

1860).

O'DONOGHUE, o-don'6-hu, David J., British biographer and editor : b. London, Eng¬ land, 22 July 1866. He was educated in Ro¬ man Catholic schools and entered journalism in which field he has written principally on

Irish art, music and literatui . for leading Dublin newspapers. He founded the Irish Literary Society in London and is vice-presi¬ dent of the National Literary Society in Dub¬ lin. In 1909 he became librarian of University College, Dublin. He has published Ureland in London5 (with F. A. Fahy, 1887) ; (The Poets of Ireland5 (1891-93) ; (Traits and Stories of the Irish Peasantry5 (4 vols., 1896-97) ; (Irish Humourists5 (1892); (Minor Irish Poets5 (1893) ; (Humor of Ireland5 (1894) ; Untro- duction to Reliques of Barney Maglone5 (1894); Irish Poetry of the 19th Century5

(1894);

O'DONOJU, Juan, hoo-an o-don-6-hoo', Spanish soldier: b. Spain, about 1755; d. Mex¬ ico, 8 Oct. 1821. He entered the Spanish army where he attained the rank of lieutenant-gen¬ eral and in 1821 appointed captain-general and acting viceroy of New Spain. Upon his arrival at Vera Cruz he found the country in the hands of the revolutionists and his au¬ thority only nominal. He accordingly resolved to treat with the insurgents and on 23 Aug. 1821 he signed with Iturbide at Cordoba a treaty which recognized Mexico as an inde¬ pendent state over which a Bourbon prince was to reign. The country remained in the hands of the revolutionists and O'Donoju died before the nullification of his treaty by the Spanish Cortes.

O'DONOVAN, o-don'o-van, John, Irish scholar: b. Attateemore, County Kilkenny, Ire¬ land, 9 July 1809; d. Dublin, 9 Dec. 1861. He was educated in Dublin, entered the Irish Rec¬ ord office in 1826 and was appointed in 1829 to the historical department of the Irish survey. He was connected with the Irish Archaelogical Society from its foundation in 1840. In 1847 he was called to the Irish bar, and from 1852 was in the employment of the commission for the publication of the ancient laws of Ireland. He wrote very extensively on Irish history and antiquities and he was the editor of the publi¬ cations of the Irish Archselogical Society, and later became professor of the Irish language in Queen's College, Belfast. Of the many edi¬ tions of Irish works issued by him, the great¬ est is that of (The Annals of the Four Mas¬ ters' (1848-51). He also wrote an authori¬ tative ˆGrammar of the Irish Language' (1845). Consult Carrigan, (History and An¬ tiquities of the Diocese of Ossory' (Dublin 1905) ; Gilbert, < Memoirs' (London 1862) ; Hyde, D., (Literary History of Ireland' (Lon¬ don 1906).

O'DONOVAN, William Rudolf, American sculptor and painter: b. Preston County, Va., 28 March 1844; d. 20 April 1920. He served in the

Confederate army during the Civil War and at its close opened a studio in New York. His work, though his art is self-taught, soon gained a reputation and in 1878 he became an associate of the National Academy. He exe¬ cuted the statue of Paulding at Tarrytown, the statues of Washington for Caracas, Venezuela, Newburgh, N. Y., and for the Trenton battle monument. The equestrian statues of Lincoln and Grant for the Soldiers and Sailors' arch in Prospect Park, Brooklyn, are his work, also the memorial tablet to Bayard Taylor at Cor-' nell University, a statue of Archbishop Hughes at Fordham University and many other public memorials. It is, however, in portraiture that he has gained more distinction. Of his many portraits may be noted that of William Page, N.A. for the National Academy of Design;

of Winslow Homer, N.A. ; Thomas Eakins, N.A. ; Swain Lyford, N.A. ; Arthur Quartley, N.A. ; General Joe Wheeler for the National Gallery at Washington, Walt Whitman and E. A. Steadman. Since the beginning of this century Mr. O'Donovan devoted most of his time in painting directly from nature in tempera — the oldest of mediums used by the Egyptians, the Greeks and early Italians. During that time, however, he made busts of Gen James Grant Wilson, of the distinguished art expert, A. W. Drake, and of Dr. Talcott Williams, sometime head of the school of journalism at Colunbia University.

ODONTOGLOSSUM, an extensive genus of orchids of the tribe Vandeae and the sub¬ tribe Oncidicse, natives of Central America, much prized by cultivators for their magnificent flowers, which are remarkable both for their size and the beauty of their colors. A consid¬ erable number of species have been introduced into Europe, and grow well in a moderate tem¬ perature. O. crispum or O. Alexandra is a superb flower, and was named after Queen Alexandra when Princess of Wales. There are over 100 species of this tribe, native of the Andes, from Bolivia to Mexico. They are all extremely handsome and so are much prized by collectors. They produce a pseudo-bulb, and spare, stiff, fleshy leaves and the plants are all epiphytes. Flowers in ample panicle and white, yellow or reddish. See Orchid.

ODQNTOLCiE, a subdivision of the primi- itive subclass toothed birds, N eornithes, which has been variously limited. It is now held to comprise those (Hesperornis , Enaliornis and Baptornis) that have their teeth set in a groove in the mandibles ; while the other genera, as Icthyornis, form the subdivision Odontotormoe.

ODONTORNITHES. A name proposed by the late Professor Marsh in 1885 for the extinct birds with teeth, aves dentata. Because of the possession of teeth he considered them a subclass equivalent in rank to that of all other

known birds combined dividing them into three chief groups or orders, the Saururae, Odontolcae and Odontotormae. The first of these groups is known only from tw'o very complete speci- ments of Archaopteryx from the Upper Jurassic deposits of Solenhofen preserved in the British and Berlin museums. Archaopteryx was a bird about the size of a common crow unique among birds in the possession of a long, vertebrated tail, each joint of which bore a pair of long quill feathers, impressions of which were per¬ fectly preserved in the rocks. The wings of all other flying birds have the bones of the fore¬ arm, wrist and the united three middle fingers adapted for the support of the long quill feath¬ ers. The fingers of Archaopteryx, however, were free and movable, each, like the fingers of reptiles, ending in a sharp claw. The sternum or breastbone was absent or very small, and the vertebrae were more like those of reptiles than those of other birds, with the exception of the OdoiTtotormae.

The Odontolcae, like the Odontotormae, are known almost exclusively from the Cretaceous chalk rocks of western Kansas. They were swimming birds, standing about three feet high w,th only vestiges of wings, but with powerful! webbed swimming feet. Their bones, unlike those of most other birds, are solid, and their

vertebrae are of the ordinary bird kind. The sternu®, like that of the ostriches, has no keel on its under side. Impressions of their feath- is pieserved in the rocks prove that they too vveie like those of the ostrich, or Apteryx, that is plumulaceous. They swam, not like a duck or goose upon the surface, but in the water coming to the surface to breathe. The teeth ot the upper jaws are confined to the back part, and were inserted in a common deep groove,' not in separate sockets. Hesperornis is the best known genus.

The Odontotormae, on the other hand, were small birds about the size of a dove, or better of a tern which they resembled in habits. The wings were large and strong, in structure quite like the wings of modern birds, and the large sternum had a deep keel for the attachment of the muscles of flight. The teeth were inserted in separate sockets. The vertebrae, however, unlike those of all other known birds except Archceopteryx, are concave at each end like those ot a. fish, whereas the ordinary bird vertebra has its articulation at the ends saddle-shaped, that is convex in one direction, concave in the other. About a half dozen kinds of Odonto¬ tormae are known from Kansas, the most famous of which is the one first discovered by Marsh in 1872 which he called I chthyornis, be¬ cause of its fish-like

vertebrae. Other forms from the Cretaceous of New Jersey and Eng¬ land may belong with them, but their teeth and vertebrae if so, are unknown. The teeth of all Odontornithes are conical and slightly recurved like those of a snake or lizard though less slender, but unlike them they were not co-ossi- fied with the jaws.

The classification of the Odontornithes pro¬ posed by Marsh has not been generally approved by ornithologists. The Saururae, because of the more pi imitive structure of the tail and wings, are given a subclass rank by themselves while the Odontolcae and Odontotormae are considered to be two of the four chief groups of the other subclass,. the Ornithurae, of which the Ratitae and Carinatae, or as they are more properly known, the Dromaeognathae and Euornithes, are the two others, the last including more than 10,000 known species, the three others, recent and extinct, less than 100.

Samuel W. Williston,

Walker Museum, The University of Chicago.

ODONTOTORMAE. See Odontolcˆe.

O'DOWD, Bernard Patrick, Australian

poet: b. Beaufort, Victoria, 11 April 1866. He was graduated from Melbourne University in arts and law and entered journalism in the interest of the labor party. Since 1887 he has been assistant librarian of the library of the Supreme Court of Melbourne. Among his pub¬ lished works are (Dawnward) (1903) ; (A Southern Garland5 (1904);

O'DWYER, Joseph, American physician : b. Summit County, Ohio, 1841 ; d. New York, 7 Jan. 1898. He was educated at McGill Uni¬ versity, Montreal, and at the New York Col¬ lege of Physicians and Surgeons, taking his M.D. in 1866. He became resident physician at the City Hospital of New York on Blackwell's Island in 1866 and later established himself in

practice in New York. He was appointed to the tˆle ˆew York Foundling Hospital in 1872 and labored there for nearly 35 years, be- coming a foremost specialist in the diseases of children He perfected a system of intubation of the larynx, laboring 12 years to bring the idea to a stage of practical utility, and con- terring a great service in the treatment of diphtheria and stenotic diseases of the larynx. He.was among the first to adopt the use of the anti-toxm serum in diphtheria and threw him- S i w"? ie-h,eartedly into the struggle with the early, difficulties encountered in its use He contributed extensively to medical periodicals and was author of < Analysis of Fifty-six cases Treated by. Intubation of the Larynx5 (1888) ;

Intubation in Chronic Stenosis of the Larynx5 (1888).

A O, O-UIS

i ODYSSEY, The. There is still no more plausible conjecture than the opinion that Homer composed the (Odyssey> in his old age. In the phrase of a late Greek epigram it is the setting sun but still the sun.55 (Consult LM-' !H,omer a"d the Iliad,' London • ,'tt ' the analyses of Andrew Lang "L^is Homer and the Epic,5 London 1893, p. Zzort j . It is unnecessary, then, to repeat what \vas said m the articles Homer and Iliad on the unity of the two Homeric epics and their i elation to one another. The literature of the higher Homeric criticism has been convicted of so many blunders and so much false reasoning that the burden of presumption now weighs heavily. against the promulgator of any negative, separating or disintegrating hypothesis. An

?Trin.jnh Sc^°^ar (Blass) said that even the Iliad5 is as well composed as Plato's (Repub-

r u Ai JEimber of the greatest literary critics ° J9th century concur in the opinion that the Odyssey5 is either the best or one of the best plots in existence and that it is certainly the world s most readable long poem. An ab- breviator of the familiar story, then, need not delay to reply to every foolish cavil that has been suggested by over-ingenious scholarship. It is enough to tell the tale in such a way as to bring out some of the excellencies of the plot and suggest some of the imaginative and poetic qualities that have held the attention of so many generations of readers.*

*Another order of*4nquiry, though hardly less conjectural than the divagations of the higher criticism, has more justification and more in¬ terest. What materials, what traditional motives of mythology, folklore and folktale and early maritime adventure in the Mediter¬ ranean did Homer use and incorporate in the finished structure? Was Odysseus in some re¬ mote and mythological sense a solar divinity and have we a survival of this conception in the 350 cattle of the sun devoured by his men? What analogies may comparative literature or comparative folklore discover between the re¬ turn of Odysseus or the journey of Telemachus and other legends of the ((Return of the Hus¬ band or the Hero,55 and «The Quest of the Son for the Father.55 (Lang, p. 227). In what proportion do the adventures of Odysseus in western seas combine poetic invention, folklore, the sailor's gossip in the ports of Asia Minor and Western Greece, authentic traditions of early Greek commercial enterprise or the <(sail-*

ing directions of Phoenician mariners® ? Can we localize on the map Scylla and Charybdis and that HCgean isle of Circe, and the Lotus Eaters and the land of the Phaeacians? Is the big round eye of the Cyclops a symbol of the craters of the extinct volcanoes of the Solfatara region? Is Southern Provence as a reader of Anatole France suggests the true Phaeacia, or is it Scheria or Ischia or Trepani in Sicily the home of Nausicaa, ((authoress of the Odyssey?® Is Calypso's isle at the heel of Italy or at the foot of Monkey Mountain out¬ side the straits of Gibraltar? Is Ithaca itself the little island that has traditionally borne the name or is it as Dorpfeld and an immense literature of his controversial adherents main¬ tain Leukas? (Consult the exhaustive chapter on c(Homeric Cosmography and Geography,® in (Seymour's Life in the Homeric Age,5 New York 1907). What proportion of conscious allegory blends with the romance and the wonder and the folktales of the (Odyssey5? (Consult Stawell, p. 149). Those who like to let the winged fancies loose in the haze of con¬ jectural conceivabilities will enjoy the mon¬ strous literature that has gathered about these questions. (Consult for example Harrison, J. E., (Myths of the Odyssey5 ; and Thompson, J. A. K., (Studies in the Odyssey,5 Oxford 1914). It would be idle to discuss them in the space of this article.

In the sober history of Greek literature the (Odyssey5 like the (Iliad5 is merely the supreme example of a recognized type. The (Iliad15 was the best epic on an episode of the Trojan War, the (Odyssey5 the best story of the re¬ turn of the heroes from Troy, their adventures by land and sea and the state of affairs they found at home after their long absence. The bards of the (Odyssev5 are represented as sing¬ ing lays of both types. In the (Odyssey5 the central theme and the subordinate motives of folktale and mythology not only combine into an artistic plot, but yield larger dramatic and spiritual unities. It is not necessary to pro¬ nounce which of the three or four chief moral suggestions absolutely dominates the whole. The (Odyssey 5 has been plausibly described as the poem of homesickness. The 58th line of the first book and the 28th line of the ninth book with Ovid's imitation almost anticipate ((Home, Sweet Home.® And a famous sentence of Cicero repeated by Bacon celebrates the loyalty of Odysseus who preferred his old woman to immortality.® Other critics have described the (Odyssey5 as the poem of wisdom correspond¬ ing to the (Iliad,5 the poem of bravery. For Horace its main lesson is the character of the sagacious, faithful, much-enduring Odysseus, equal to every emergency and patient of every stroke of fortune. Horace had not read Pro¬ fessor Wilamowitz' pronouncement that to speak of the character of Odysseus at all is sheer nonsense. (On Odysseus consult Jebb, (Classical Greek Poetry,5 New York 1893, pp. 48-53). In the present time readers who go as far as line 351 in book 24 where

“ Justice through the world’s first mouth of song Proclaims the gods still live for these have paid.”

will take it, as the Greeks did, as the poem of righteous judgment long deferred but at last fulfilled. The plot, though better composed, resembles that of the (Iliad 5 in that it plunges in medias res and postpones the dramatic climax

by digressions and artful delay. (Consult Sta¬ well, pp. 1 19-121 ff.). What distinguishes the (Odyssey 5 is the skilful interweaving through¬ out the first 12 books of the adventures of Odysseus and the situation in his Ithacan home with the voyage of his now grown-up son, Tele¬ machus, in quest of his father. The poem opens with a council of the gods : Athene, the pro¬ tectress of Odysseus, complains to Zeus that the hero because of the anger of Poseidon whose son the Cyclops, Polyphemus, he has blinded is still after 10 years of wandering from Troy de¬ tained by the nymph Calypso in a far off isle, while the suitors in Ithaca woo his wife and devour his substance. Zeus gives Athena a free hand. She descends to Ithaca disguised as Mentes and presents herself as a guest to Telemachus who sits glowering at the riotous suitors in his father’s halls. She counsels him to call an assembly of the people and formally forbid his home to the suitors, and himself to gos on a voyage to enquire about his father. Other episodes in this book portray the entire situation, introduce us to the leaders of the suitors, to the bard Phemius who sings episodes from the tale of Troy to them, to the tearful but slightly coquettish Penelope who presents herself in the men’s hall and is rebuked by her son who now feels himself a man, to the old nurse Eurycleia. Odysseus, though absent, is throughout present to imagination as the centre of interest and the destined hero of the poem. (Stawell, p. 132). The story of Telemachus continues through the next three books. He summons an assembly, denounces the suitors, procures a ship with the aid of Athena dis¬ guised as Mentor, provisions it with the assist¬ ance of Eurycleia and withouk’the knowledge of his mother. Accompanied by Mentor he visits old Nestor at Pylos, and learns much of the Trojan War and the return of the heroes. He then visits the splendid palace of Menelaus at Lacedaemon, hears of Menelaus’ adventures in Egypt, sees the fatal beauty of Helen of Troy face to face and is recognized by her womanly instinct. When they weep at old memories their tears are stayed by the mingling in the wine of a portion of

“ that Nepenthe which the wife of Thone

In Egypt gave to Jove-born Helena.”

Then, as he is preparing to depart laden with gifts, the scene suddenly changes to the palace of Odysseus, where we learn of the distress of

Penelope at her son's absence and the beauti¬ ful dream which Athene sends to console her, of the angry suspicions of the suitors and the ship which they station in ambush to intercept Telemachus on his return — thus preparing us to acquiesce in the awful retribution that over¬ takes them in the end. In this interesting sus¬ pense we are left until the resumption of the story of Telemachus in the fifteenth book. The fifth book takes up the story of Odysseus, with a repeated council of the gods. Athene again complains of his hard fate and Hermes is dis¬ patched to Calypso's isle to bid the nymph re¬ lease him. .She yields unwillingly, assists him to build a raft, which is minutely described and on which he embarks only to be wrecked by the wrath of Poseidon. Rescued by the wimple of the sea-goddess Leucothea he is finally cast ashore at a river's mouth on the coast of the Phaeacians where he sleeps naked under a bed of leaves as a spark of fire is hidden in the

ashes. ((The sea had soaked his heart out® (Chapman).

In the sixth book next morning by a dramatic coincidence the princess Nausicaa, daughter of Alcinoos, king of the Phaeacians at the instiga¬ tion of Athene drives with her mule car and attendant maidens to do her laundering at the river s mouth. The girls play ball and their cries when the ball falls into the river awaken Odysseus whose aspect terrifies all but the de- J1?U1u Signified princess. She bids them

clothe him and invites him to accompany her to the hospitality of her father's palace or rather as she naively explains her mother's, since queen Arete really rules the house. But to forfend gossip she bids him linger behind and enter after her. The city of the Phaeacians, Odysseus approach to the palace, and the gar¬ dens of Alcinoos are minutely described. When Alcinoos rebukes his daughter for her inhospitality in bidding the, stranger lag be¬ hind, Odysseus ((lies like a gentleman® and avers that it was by his suggestion.

" If there be trouble to herward and a lie of the blackest can clear,

Lie while thy lips can move and a man is alive to hear." — (Kipling).

The eighth book in a series of vivid scenes describes the entertainment of Oysseus by the Phaeacians with song and dance and sports. The day closes with a banquet, and Odysseus about to enter the banquet hall meets Nausicaa and 'bids her goodbye in a scene of exquisite delicacy and reserve lightly touched with the faint sweet, unreal attraction of the maiden toward

the interesting middleaged stranger. At the ban¬ quet the bard's songs of the Trojan War move Odysseus to tears. The king tactfully stops the singing and asks the stranger's name and story. Perhaps he had lost a friend or a brother at Troy. Thus we are introduced to the motive of a story within the story adopted by Virgil in .Eneas's narrative to "Dido and copied in all later classical epics. In artful dramatic climax the long withheld name is at last pronounced. (

Amid all these marvels stands out the jour¬ ney to the Cimmerians' land where at the en¬ trance to the pit of hell Odysseus consults the ghost of the seer Teiresias and sees the shades of those who have ftgone west.® For compara¬ tive literature it is the motive of .Eneas' descent to the shades and of so many earlier mvths and later epics. For comparative religion it is an

inextricable jumble of "survivals® and anticipa¬ tions. For the lover of poetry it contains the ineffable pathos and tenderness of Odysseus' meeting with his mother's spirit and a hint of the mediaeval motive, the ballad of dead ladies :

They that in days long past were fair-tressed maids of Achaia." (2, 119; consult Lang, p. 312).

We share the breathless interest of the audience

Hushed by the spell of his words as they sit in

the shadowy dim hall " (Consult Stawell, p. 163).

and repeat with King Alcinoos (11, 276ff.,) "These nights are everlasting and I could listen to thy tale even to the coming of the dawn.®

The next morning dawns with the bustie of preparation for Odysseus' return. The magic ships of the Phaeacians bear him in oblivion of all he had suffered in

" Rest undisquieted, likest to death, unawakening sweet sleep."

to his island home where the swifter, closelier- knit dramatic action of the last 12 books begins. Athene in the guise of a shepherd appears to him, reassures him in his first confused doubts, transforms him into the likeness of a beggar and directs him to the hut of his faithful swine¬ herd Eumaeus while she speeds to Sparta to hasten the homecoming of Telemachus. The fourteenth book describes with touches of humorous realism the conversation of Odysseus and the swineherd. The fifteenth brings Tele¬ machus safely home, evading the ambush of the suitors. The sixteenth

opens with Tele¬ machus' visit to the swineherd's hut and the dramatic "recognition® of son and father who plot vengeance on the suitors. The latter baf¬ fled in their designs form new schemes. The seventeenth and eighteenth books recount Tele¬ machus' return to the palace, Odysseus later ar¬ rival there in the disguise of a beggar, the pathetic recognition of him by his old dog Argos who dies on seeing his master after 20 years, and various scenes which bring out the insolence of the suitors and justify the appalling vengeance of Odysseus. The nineteenth book contains the first direct conversation between Odysseus and Penelope and his recognition by the old nurse Eurycleia who in washing his feet perceives the scar of a wound he had re¬ ceived when hunting in his youth. In the twentieth book Odysseus tosses throughout a sleepless night and broods on his wrath and gladly hears at early dawn the omen of an old woman's curse on the suitors for whom she must grind corn. During the banquet of this day the suitors warned of their impending doom by a seer "stare with great eyes and laugh with alien lips,® in Tennyson's imitation of the Homeric phrase.

The crisis is brought about by Penelope's challenge to the suitors to shoot with the bow of Odysseus which she brings forth. All fail and the supposed beggar is allowed to try despite the angry protests of the suitors. Meanwhile by a prearranged plot Eurycleia, Eumaeus and the faithful goatherd Philoetius who had been taken into their counsels shut up the women and close the doors of the great hall. Odysseus draws the bow and sends the arrow home through the apertures in the axe-heads to the consternation of the suitors, while a thunder clap from Zeus gives augury of his success in the greater contest that impends. Then at the opening of the twenty-second book comes what

the ancients felt as the supreme climax of the poem.

" Stripped from the rags of the beggar he stood forth, lordly Odysseus,

" Sprang to the great stone threshold upholding the bow and the quiver,

" Showered the shafts at his feet and spake to the wondering suitors:

" Lo one test is accomplished, too hard ye deemed for fulfilment;

" Now at a strange new target I'll aim my arrows co know if

" Mine be the fortune to hit it and glory by grace of Apollo."

Then begins a murder grim and great to which only the accumulation of outrage from the be¬ ginning of the poem can reconcile the reader. Homer feels this and represents Odysseus as checking Eurycleia's exultant cries and chiding her with the words

" Piety suffereth not that we make vain boast over slain men;

" Fate slew these and the judgment of God, and their deeds that were evil."

Like the Hliadp the tOdyssey) continues after what the modern reader feels to be the culmination. But we could ill spare the twenty- third book in which the hard-hearted Penelope as her reproachful son calls her at last recog¬ nizes Odysseus, and which contains one of the sweetest, truest most intimate portrayals in all literature of that friendship of happy marriage of which Homer elsewhere says (

Paul Shorey.

CECOLAMPADIUS, ek"o-lam-pa'di-us (((Light-of-the-House®), Grsecized name of Johannes Hiissgen, German religious reformer: b. Weinsberg, Wiirtemberg, 1482 ; d. Basel, 24 Nov. 1531. He began by studying law in Bo¬ logna, and after a further course in philosophy, history and the classical tongues in Heidelberg, Tubingen and Stuttgart, he returned to Weins¬ berg. He was appointed preacher at Basel in 1515 and assisted Erasmus in producing his edi¬ tion of the New Testament. After two years' residence at Augsburg (1518-20) he entered the monastery of Saint Bridget at Altenmiinster, near Augsburg. Coming upon Luther's writ¬ ings he left the monastery and, joining the reform movement, eventually went to Basel (1522), where he was appointed professor of theology and occasional preacher in Saint Mar¬ tin's Church. He vigorously pushed forward the Reformation by his disputations, addresses and writings; especially by his controversial activity at Baden in 1526 and at Bern in 1528; he did the same service at Basel, where as rector of the cathedral he occupied the leading ecclesiastical position. He was in 1531 called to Ulm and worked there with Bucer and Blarer in the cause of ecclesiastical reforma¬ tion. He entered upon a stubborn controversy with Luther on the subject of the Lord's Sup¬ per and espoused the view of Zwingli in his (De Genuina Verborum Domini, Hoc est Cor¬ pus Meum, Interpretatione. In 1529 he held a public disputation with Luther on the same subject at Marburg. He was one of the kindest-*

hearted and most liberal-minded of the re¬ formers. Weak in health from his early days, he overtasked his strength, and by his prema¬ ture death was in some degree a martyr to his own zealous activity. He was buried in the cloister of the cathedral at Basel. Consult Herzog, J. J., (Leben von

Johannes Hiissgen (1843) ; Hagenbach, K. R., (Leben von Johan¬ nes Hiissgen, mit ausgewahlten Schriften* (1859); Walker, Williston, (The Reformation) (New York 1900) ; (Cambridge Modern His- tory) (Vol. 2, New York 1904).*

(ECUMENICAL, ek-u-men'i-kal (Greek, oikoumenikos, of, or pertaining to, the whole inhabited or civilized world, generally the Medi¬ terranean Basin, universal). This epithet is generally applied to the general councils of the Church, or councils to which all the bishops throughout the world were invited. According to the theologians of the English Church there have been only six oecumenical councils, namely, that of Nicaea, 325 a.d. ; Constantinople, 381 a.d. ; Ephesus, 431 a.d.; Chalcedon, 451 a.d.; Second of Constantinople, 553 a.d. ; and Third of Constantinople, 680 a.d. In the Roman Cath¬ olic Church it is applied to those councils whose members are convoked from the whole world under the presidency of the Pope or his legates, and whose decrees, confirmed by the Pope, bind all Christians. In the case of the first oecumen¬ ical council, that of Nicaea or Nice, the Emperor Constantine summoned the bishops and Hosius presided as Pope Sylvester's legate. Toward the end of the 6th century the patriarchs of Constantinople assumed the title <(CEcumenical® in the same sense as the epithet Catholic in the Western Church but the Roman See always refused to sanction it. See Council; Nicˆa, Council of.

(EDEMA. See Dropsy ; Pathology.

OEDENBURG, e'den-boorg, a royal free city and capital of the district of the same name in Hungary. See Odenburg.

CEDIPUS, ed'i-pus, the principal character in three tragedies of the Greek dramatist Sooˆo- cles. He was the son of Laius, king of Thebes, and his wife, Jocasta. As Laius had been warned before the child's birth that he was to die by the hands of his son, he ordered the in¬ fant to be exposed on Mount Cithaeron, his feet having first been attached together by a trans¬ fixing pin. The effect of this cruelty was that he was afterward known as <(the man with swollen feet® (CEdipus). The herdsman to whom the task of exposing the child was com¬ mitted compassionately gave him to the shep¬ herd of Polybus, king of Corinth, who was childless, and CEdipus became that monarch's adopted son. The young man, who considered himself a prince of the Corinthian royal house, was once taunted with his origin by a drunken companion ; his suspicions were roused and he fled from Corinth. The oracle at Delphi in answer to his inquiries as to hrs birth would only tell him that he was fated to slay his father and marry his mother. Leaving the oracle he pursued his journey and met Laius and his servants. The king of Thebes in his chariot tried to force CEdipus from the road and was slain by the young man, who slew all

the attendants also, as he supposed. In course of time he reached Thebes, where

CEDIPUS COLONEUS — CEDIPUS REX

Creon, brother of Laius, had succeeded to the throne and was offering the hand of the wid¬ owed Jocasta as well as the kingdom to the man who should release the city from the sphinx, a monster which devoured every one tading to find an answer to her as yet in¬ soluble riddle. CEdipus answered the riddle and slew the sphinx. He had many years of pros¬ perity as king of Thebes and husband of Jocasta, but eventually a pestilence visited the land which, according to the Delphic oracle, could only be checked by expelling from the country the assassin of Laius. When at last it was brought home to CEdipus that he was the man he put out his eyes and Jocasta hanged herself. Then CEdipus went forth a wanderer led by the hand of his daughter Antigone, the Cor¬ delia of the Greek stage, until he reached Athens, entered the grove of the Eumenides and there was called without death or pain into the other world. The legend of CEdipus is, however, much older than the drama of Sopho¬ cles. It seems to have been one of the primi¬ tive folktales ; and it eventually, in the hands of the storytellers, became one of the earlier epics of the Greek people. It is briefly but clearly indicated in the Odyssey. It seems, as a folktale, to have varied very much according to the district and the storyteller. Consult Jebb, Sir R. C., (CEdipus Tyrannus, (CEdipus Coloneus) and (Antigone y (Introductions, Cam¬ bridge 1891-1900) ; Seneca, (CEdipus) and ˆhoenissseC*

CEDIPUS COLONEUS, ko-lo-ne'us, ((CEdipus at Colonus," Greek tragedy by Sopho¬ cles, first presented at Athens after his death by his grandson, Sophocles, in the archonship of Nicon, 402 b.c. (See CEdipus). The play, replete with pathos and beauty, is staged in the Eumenidian grove, to which the faithful Antig¬ one has led her father, the blind CEdipus, and where he dies. Legend says that Sophocles by reading aloud the finest passages in it proved his sanity when brought before judges by his children who were eager to administer his property.

CEDIPUS COMPLEX, a concept used in psychoanalytic procedures meaning that every individual has deeply buried within his un¬ conscious certain tendencies which were once conscious in the human race but have by cul¬ tural repression become unconscious and un¬ thinkable. It derives its name from the Greek theme of the story of CEdipus, written by many dramatists in the Grecian period, chiefly Euripides and Sophocles, and, expressed very tersely, portrays the tragedy and catastrophe which result from incest with the mother — or father. Traces of this old racial taboo and the efforts made by the individual in control¬ ling it are made the

special concern of the psychoanalytic technic, since the hypothesis as¬ sumed is, that the individual's unconscious mo¬ tives are best appraised, as to their social ethical values, in terms of the individual's greater or lesser conquest of this old racial struggle. The Christian terminology, ((unless ye leave father and mother, ye shall not enter the kingdom of heaven," is a non-psychological rendering of -the same problem. The CEdipus Complex has to do only with unconscious thinking. To state it, as some silly critics of psychoanalysis have

done, as the <(son's love for the mother" as a conscious process is nonsense. The hypothesis is one of the broadest generalizations of the psychoanalytic technic and its discovery by Freud, in its various disguised and complicated distortions, one of the great psychological gen¬ eralizations of modern science. Consult Jelliffe, 'Technic of Psychoanalysis J ; Jones, 'Papers on Psychoanalysis > ; Lay, (Man's Unconscious Conflict. y See Psychoanalysis.

CEDIPUS REX is the masterpiece of Greek drama. Sophoclean art is here at its highest. In subtlety of structure the play remains to this day unequalled. Among all the choral composi¬ tions of Sophocles the odes are distinguished for their variety. To sentiments most diverse the poet gives admirable lyric expression. The 'CEdipus Rex) is a magnificent psychological study of a great character suddenly meeting with an overwhelming reverse of fortune. From the first utterance of CEdipus to the very end of the play the action moves straight on to the goal. The past deed of CEdipus reveals to us the cause of his horror without putting him beyond the pale of our sympathy. The fact that the play received only the second prize furnishes food for thought. What must some of the thousand lost J)lays have been? No other, drama shows mastery to an equal degree in the development of plot. Modern plays can more easily separate plot and character, since new scenes can be introduced and minor parts multiplied. Some of Voltaire's plays are models of ingenious construction; but they are unin¬ teresting, whereas in the (CEdipus Rex) the highest constructive skill is closely associated with a wonderful delineation of a few char¬ acters. The style is rich and flexible, the power of language marvelous. The whole fabric of the drama rests on an improbability, but, as Aristotle says, this falls outside the action of the play.

The scene is before the palace at Thebes. CEdipus comes forth and asks the suppliants the meaning of their frequent cries of dole. The priest replies: ((a curse is on our land — Thebes is harried by a pestilence." But the king already knows their ailment. His soul groans for state, for self, for all. He has sent Creon, his wife's brother, to Delphi to learn how he may deliver

the state. The messenger arrives and reports that the oracle commands him to drive out the man that slew the former king, Laius. CEdipus promises to search out the criminal. Fifteen Theban elders enter and sing an ode of supplication. CEdipus asks their assistance that he may obtain some clue to track the guilty man: no one is to speak to the murderer, share house, sacrifice or prayer with him. Even if he should prove to be a member of his own household, may the same curse rest on CEdipus himself, if he does not thrust the murderer forth. He avers that he will prosecute the case as for his own father. The chorus protest their innocence, but suggest that CEdipus would not go amiss if he sent for Teiresias. But Creon had already advised this course, and he wonders why the blind seer tarries. At this moment the soothsayer ap¬ pears. The king entreats him to name the mur¬ derer, but Teiresias, loth to speak, turns to go: "I will not proclaim my secret grief — that I say not thine." < ('Sdeath ! you know and will

not tell?" "Your questioning will be vain." "Arch villain ! why you would turn a very stone to rage." "What is to come will come e'en if I refuse to unseal my lips." "Were you not blind, I'd say that you did the deed." " You are the man that defiles this land ac¬ cursed." "Insolence surpassing insolence ! How do you expect to escape?" "The truth is my strength. You slew the man whose slayer you seek." "Measureless liar! Not with impunity will you repeat that infamous charge." "You have been living with your dearest kin most foully and knew it not." "Presumptuous priest ! Do you think you will say on and on and not smart for this?" CEdipus now inveighs against wealth and sovereignty for the envy that goes with them; his old friend Creon is seeking to overthrow him and grip the general sway by the merit of vile gold, hiring a scheming charlatan, blind in his art, but open-eyed for gain. The seer replies : "In all the world there is none that will be more miserably crushed than you." "Vengeance! Death! Confusion! Damnation seize you ! Out of my sight ! Avaunt ! Back whence you came and rid me of your pres¬ ence!" The chorus waver. No prophet can be trusted if he prove false; but CEdipus was shown to be wise when the Sphinx came against him of old. Highly indignant, Creon enters as the king comes forth. After a warm altercation Creon declares that he never had a thought of aspiring to the throne. Jocasta comes out and urges her husband and brother to check their hideous rashness. Turning to CEdipus she bids him allay his fire of passion with the sap of reason : once an oracle came to her from Delphi declaring that the child born to her and Laius was destined to slay his father, but when only three days old the babe was exposed — so the oracle was not fulfilled, for the king was slain by robbers at three crossways. Mention of this spot startles CEdipus. "Who brought the

re¬ port?" "A slave, the sole survivor. When he saw you crowned King he begged me to send him to the pastures far from town." The queen sends for the herdsman. CEdipus con¬ fides to her the story of his past life: "My father was Polybus of Corinth. One day a fellow drunk with wine declared I was not my father's son. I questioned my parents and they were angry at the man and answered me eva¬ sively. But the reproach haunted me, and I went to Delphi to ask Apollo, but he dismissed me with words of woe and terror that it was my fate to mate with my mother and slay my sire. I turned, avoiding Corinth, and went where you say the king was slain. There I met a herald and a man in a carriage. They tried to force me from the road. Furious, I struck the driver; but the old man fetched me a blow with his goad. Then I slew all." Jo¬ casta reassures CEdipus : the herdsman cannot retract his story; besides, Apollo predicted the death of Laius at her child's hands.

The chorus sing an ode on the sanctity of the eternal laws that wane not away. A mes¬ senger enters. He brings good news : Polybus is dead, and the people desire to crown CEdipus king of Corinth. But CEdipus refuses : while his mother, Merope, still lives, he cannot hope for peace. The Corinthian then informs the king that Polybus and Merope were not his par¬ ents, for he had received the babe CEdipus from

a herdsman, in the winding glens of Cithseron, his ankles transfixed with spikes — hence his name "Swellfoot" (CEdipus). The king gives peremptory orders for the herdsman to be brought. Jocasta rushes into the house, and CEdipus is obliged to resort to rigorous meas¬ ures before the old man consents to tell the truth : the queen had given him, CEdipus, as a babe, to expose on a mountainside, because she was afraid of the prophecy that he would kill his father. "O light, never will I look on thee again. Born accursed, living sinfully with those I should not, and murderer of my sire !" With these words CEdipus rushes into the palace. Jocasta has already realized that she can live no longer. She alone had discerned the whole truth and recognized that the awful denoue¬ ment was coming. For dramatic skill and power hardly any other drama contains any thing so fine as her exit. After the choral song a messenger comes out : Oh, what deeds, w'hat grief! Jocasta's dead. She rushed to her bridal bed, clutching her hair and calling on Laius. Then in burst CEdipus. To and fro he rushed begging for a sword and calling on his wife who was no wife. With a dreadful cry he sprang to the door, forced the bolts and rushed into the room. There he beheld his wife hanging in a noose of twisted cords. With a cry of woe he loosed the knot. Then from her vesture he tore the brooches and drove them full into his eye-balls, shouting: "No more shall ye behold the wrongs I suffered and all I wrought." Many times he smote and at each blow a dark shower of blood drenched his beard. "Look ! The gates are opening." As the musicians play an overture, CEdipus comes forth : "Oh,

how my soul is pierced by the stings of the sorrows I never can forget ! O take me away, the damned, disgraced, accursed. O Cithaeron, why didst thou shelter me? O ye three roads and secluded glen that drank my blood shed by these hands from my father's veins! O nuptials, ye brought me into life and produced fruit from the same soil — fathers, brothers, sons, brides, mothers, incestuous acts and all the foulest sins that men can name!" Creon enters and tells the wretched king that he has not come to cast reproaches. CEdipus entreats him to bury Jocasta with due rite: "but my two hapless, helpless girls — do thou care for them. If I could but touch them — O ye gods, do I hear them weeping? Are my darlings here? Come to these brother arms. I can but weep for you. To what gatherings will you go and not come home in tears? Wickedness and crime of every sort are here — your father slew his father, wed his mother and got children of her from whom he sprang. O Creon, do not suffer your poor little nieces to wander about as helpless waifs. They are so young and tender, so delicate." Creon finally prevails upon the unhappy man to go within. As the chorus march off they bid all behold how the mighty have fallen and the play ends with the Greek truism : "Count no man happy until he has reached the goal of life."

CEdipus is the ideal hero of all tragedy. He accords with Aristotle's conception of such a character — one not without human weakness, yet by no means a thoroughly bad man. The play also meets Aristotle's requirement that the reversal of situation should accompany the

recognition of identity of persons. In no other drama is the tragic irony so manifest. CEdipus iimself opens the investigation which is to bring about his own destruction. The first disclosure 'y ,m. e in his wife's reassurance, and the last mk in the chain of evidence is his examination oi the chief witness, the herdsman. Apollo's oiacle came to fulfilment. Human wisdom was proved to be foolishness with God.

King CEdipus is of all Sophocles' tragedies the one in which the unexpected plays the most prominent part. As soon as the investigation begins, the revelations come in throngs. What produces the great dramatic beauty of the play is the effect made on the chief character bv these successive accusing revelations. No other dramatist has succeeded in an equal degree with Sophocles in portraying a great soul, over¬ whelmed with grief and suffering, bitterly meditating on its destiny and manifesting in the midst of tears firmness of judgment, con¬ sciousness of rectitude and majesty in the most terrible moral distress.

Joseph E. Harry,

Lecturer on the Greek Drama at the Sarbonne ;

Author of ‘ T he Greek Tragic Poets p etc.

CEDIPUS TYRANNUS, ti-ran’us, “CEdi- pus the King,» the greatest drama by Sophocles (q.v.), played first at Athens about 415 b.c. (See CEdipus.) It is considered the most rep¬ resentative of the Greek tragedies; and as such had very considerable influence upon subsequent Greek literature and upon European literature during the long classical period. The same theme was treated in Latin by Seneca, in Eng¬ lish by Dryden and in French by Corneille, Voltaire, Chenier and Lacroix. The scene of the story is laid in Thebes which is being scourged by a fearful pestilence, which can be driven forth only by the punishment of the murderer of Laius upon whom a curse has been invoked ‘by CEdipus. The plot gradually leads CEdipus to a realization of the fact that he himself, though he did not know it, is the mur¬ derer of his father. In horror at the revelation CEdipus blinds himself and begs Creon to send him into banishment.

OEHLENSCHLAGER, e’len-shla-ger, or OEHLENSLAGER, Adam Gottiob, Danish poet and dramatist: b. Vesterbro, near Copen¬ hagen, 14 Nov. 1779; d. Copenhagen, 20 Jan. 1850. He was son of the organist of the Danish royal palace at Fredericksburg; began to write poetry at nine ; attracted the attention of Storm, who assisted in the boy’s education; made un¬ successful ventures in commercial life and as a comic actor; and under the patronage of the Oersted brothers (qq.v.) again devoted himself to study and to literature. Strongly imbued with the spirit of the Old Norse sagas and with modern German romanticism, his first published poems, (Digte) (1803); ‘Tors Reise til Jotun- hejm) ; ‘Vaulundurs Saga) and (Aladdin, eller den forunderlige Lampe,) gained him a national reputation at 26 and won from the government a pension for foreign travel. In Halle, where he lived with Steffens, he wrote the great his¬ torical tragedy, ‘Hakon JarP ; and upon his return to Denmark was elected professor of aesthetics in the University of Copenhagen (1810). His best work was done by 1830, the later volumes being far below the average. Oehlenschlager is the great national poet of

Denmark, a leader of the romantic movement, who did much for renewed interest in early Teutonic and Norse literature and legend and who was spiritually akin with the English romanticists of the first half of the 19th century. It is perhaps as a dramatist that he is of most importance in Danish literature, though his dramas show more strongly epic and lyrical

qualities than dramatic. This however is a general characteristic of the Romantic move¬ ment of this period. They are important on account of their really national spirit and the fact that most of them have for their themes the popular sagas and folktales of the Norse countries to which Oehlenschlager's work gave a new life and a peculiar interest which has continued to grow since his day. Oehlen¬ schlager's (Aladdin) is accessible to the Eng¬ lish reader in the excellent version by Sir Theodore Martin (1863). His other important works include (Correggio, J a tragedy written in German (1809)— it is to be noted that Oehlenschlager himself translated all his works into German — a Norse romantic cycle (Helge) (1814); another Oriental theme, 'Ali og GulhyndiJ ; the tragedy 'StarkoddeU (1812); the poetic cycle 'Frederiksberg) (1817) ; the tremendous epic (Nordens Guder) (1819) to which (Hakon,> 'BalduO and (Tors Reise) paved the way; 'Erik og Abel,) a tragedy (1820) ; and (Dina) (1842), almost the only one of his late works with a gleam of the old fire. See Axel and Valborg ; Hakon Jarl.

Bibliography.— Arentzen, K. A. E., 'Bag- gesen og OP (8 vols., Copenhagen 1870-78) and his (Biography of Oehlenschlager) (Copen¬ hagen 1879) ; Andersen, Wilhelm, 'Oehlen¬ schlager, et Livs Poesi) (3 vols., Copenhagen 1899-1900) ; Brandes, George, 'Gesamelte Schrif- tenj (Vol. II, Munich 1902) ; Nielsen, Rasmus, Biography of Oehlenschlager) (Copenhagen 1879); Oehlenschlager, A. G., 'Meine Lebens- ennnerungen) (4 vols., Leipzig 1850) ; Sergei, Albert, 'Adam Oehlenschlager in seinen per- sonlichen Beziehungen zu Goethe, Tieck und Hebbel, nebst einer Oehlenschlager-bibliogra- phie) (Rostock 1907). Several of these have been translated into English.

OEHLER, e'ler, Gustav Friedrich, German theologian : b. Ebingen, Wiirtemberg, 10 June 1812 ; d. Tubingen, 19 Feb. 1872. He studied at Berlin and Tubingen and subsequently taught at Basel and Tubingen. In 1840 he became pro¬ fessor in the theological seminary in Schon- thal, was appointed professor of theology at Breslau in 1845 and in 1852 he became head of the theological seminary at Tubingen. He op¬ posed the union of the Lutheran and Reformed churches, and he held aloof from the old Lutheran party, while subscribing to confes¬ sional Lutheranism. He was one of the most prominent Old Testament scholars on the con¬ servative side. Among his works are 'Intro¬ duction to Old Testament Theology) (1845) ; 'Outlines of Old Testament Knowledge) (1854) ; 'Relation Between Old Testament Prophecy and Heathen Soothsaying) (1861)- 'Old Testament Theology) (1873— 74), English translation (1874-75), and 'Manual of Sym¬ bolism) (1876). Consult Knapp, 'Ein Lebens- bild von Oehler) (1876).

OEHME, e'me, Ernst Erwin, German painter: b. Dresden, 18 Sept. 1831; d.

son and pupil of Ernst Friedrich Oehme, the landscape painter. He attended the Dresden Academy of Art, and for a short time worked under Ludwig Richter; after which he made an artistic tour through Germany, Switzerland, England and France. He painted, in oils and water-colors, landscapes, architectural views, genre and portraits. The Court Theatre at Dresden was decorated by him ; a series of tapestries was also painted by him in water- color, in imitation of Gobelin tapestry. His (Stone Quarry in Saxony* (1860) is in the Dresden Gallery; and he executed for Queen Carola of Saxony a collection of views of Compiegne. The most important of his remain¬ ing pictures include (Funeral in Spreewald) ; (Bear Hunt) (in water-colors) ; (The Valley of Montafont.*

CEIL-DE-BCEUF, e'y'-de-bel (ox's eye), a small round or oval window. Such a window in the palace of Versailles gave the name Salle de I'Oeil de Bceuf to the king's ante-chamber. Since the Renaissance the window has been used frequently with decorative intent as in friezes along the upper parts of buildings, and it is largely with such significance that the term is used in English.

OELAND, e'land, Sweden. See Oland.

OELWEIN, ol'win, Iowa, city in Fayette County, Iowa, on the Rock Island and Pacific and on four lines of the Chicago Great Western railroads, about 65 miles in direct line west by north of Dubuque. It was settled in 1873 by August Oelwein ; was incorporated January 1888, and chartered as a city March 1897. It is in an agricultural region but it has considerable manufacturing interests. The Chicago Great Western Railroad has repair shops there. The government is vested in a mayor and a council of eight members, who are elected biennially. The city owns and operates its waterworks. Pop. (1920) 7,455.

(ENANTHOL, e-nan'thol, in chemistry, a product of the dry distillation of castor-oil preferably in a vacuum. The immediate product of the distillation is mixed by shaking with a solution of carbonate of potash and then heated, when cenanthol (CeHisCHO) separates as an oily colorless fluid with a strong aromatic odor, slight solubility in water, a boiling point of 155° C., and at 17° C. a density of 0.827. By oxida¬ tion of cenanthol, or by direct oxidation of castor-oil, oenanthylic acid (CeHis.COOH) is prepared; this is a fatty volatile acid, the esters of which were formerly

supposed to give wine its odor, although it is now known that this odor is due to a mixture of esters of capric and caprylic acids.

(ENANTHYLIC ACID, one of the volatile fatty acids. See CEnanthol.

CENEUS, e'nus, in Greek mythology, the king of Pleuron and Calydon in .TEtolia. He was the husband of Althaea, and by order of Diana his country was ravaged by the Caly- donian boar. He was dethroned and imprisoned by the sons of his brother Agrius, but was res¬ cued by his grandson, Diomedes, who restored the kingdom to his son-in-law Andraemon, CEneus being then too old to rule. He was afterward killed by the sons of Agrius. The city of CEnoe was built over his burial place. Legend says he received the grape vine from

Bacchus; hence the juice of the grape was called "oinos,® the Greek form of his name. Consequently he is the reputed introducer of vine culture into his own land, from whence it spread first over all Greece and then over the civilized world.

CENONE, e-no'ne, a nymph, daughter of the river-god Cebren, or Kebren, and wife of Paris. She was gifted with powers of prophecy and warned Paris not to undertake the journey which resulted in the rape of Helen. Upon his refusal to heed her cautions she told him that she alone could heal him if he were wounded. Angered by the faithlessness of Paris, however, she refused to minister to him when he returned after the fall of Troy, al¬ though some accounts state that her father would not permit her to heal him. Paris re¬ turned to Troy, where he died. CEnone, re¬ penting, or escaping from her father's authority, hastened after him with medicines, but arrived a'fter his death. Frenzied with grief she is supposed to have cast herself upon his funeral pyre; while other accounts represent her as flinging herself from a tower, or as hanging herself. The story is told in Ovid's (v) and in Tennyson's

CENOPIDES, e-nop'i-dez, Greek astron¬ omer: b. Chios, 5th century b.c. He is reputed to have studied under the Egyptian priests, and is said to have known of the obliquity of the ecliptic. 2Elian credits him with inventing the cycle of 59 years in order to make the lunar year accord with the solar year.

OENOTHERA, a genus of plants of the family Onagracce, popularly known as the even¬ ing primrose (q.v.).

OERSTED, er'sted, Anders Sandoe, Danish

statesman, brother of Hans Christian Oersted: b. Rudkjobing, 21 Dec. 1778; d. Copenhagen,

1 May 1860. He studied philosophy and law at Copenhagen and was admitted to the bar in 1799. He became a famous jurist, was ap¬ pointed Attorney-General in 1825 and drew up the Constitution granted in 1831. He was cabi¬ net minister, 1842-48 and from October 1853 to December 1854 was Prime Minister, his speedy resignation being forced by his unpopular con¬ servatism, a distinct departure from his earlier politics. He was impeached with his entire cabinet, but all were acquitted. CErsted wrote on Hegelian philosophy, on Danish and Nor¬ wegian law (1822-23), on Scandinavian politics (1857) and has left an interesting autobiography (1856). y y

. OERSTED, Hans Christian, Danish physic¬ ist: b. Rudkjobing, 14 Aug. 1777; d. Copen¬ hagen, 9 March 1851. His father was an apothecary and the boy assisted him, studied at Copenhagen, where he became assistant in the medical faculty in 1800, traveled in Europe 1801- 04 and again 1812-13 and in 1806 was appointed professor of physics at Copenhagen. In 1829 he became director of the new' Polytechnic of the same ˆity and in 1850 a privy councillor. His greatest work written in Berlin was the result of experiments on the magnetic needle with the electric current, which established the intimate interrelation of electricity, galvanism and magnetism and which were described in his(Experimenta circa Effectum Conflictus Elec- trici in Acum Magneticam (1820). In 1819*

he discovered experimentally that a magnetic needle was deflected by a current in a wire passed over it or below it. This is the earliest lecoided experiment in electric magnetism; and is oi great importance because it opened the way to many brilliant experiments and finally led >o the subjugation of electricity to indus¬ trial and other uses. As a reward for this and other experiments and discoveries in electricity Oersted was awarded the Copley medal by the Royal Society of England and the highest mathematical honors of the Institute of Paris. Oersted also wrote a valuable (Manual of Me¬ chanical Physics) (1844) and various studies in chemistry, physics, metaphysics, aesthetics and popular science, all pervaded with his predomi¬ nating thought of the unity of sciences and their position as the servants of religion. His style is clear, picturesque and attractive and his works have been popular in the original and in Ger¬ man versions. Oersted endeavored to make scientific subjects popular, and with this end in view he wrote very many periodical articles and numerous books and his university lectures were thrown into popular form. Consult Alex¬ ander, C. A., (Memoir of Oersted) (a transla¬ tion of Beaumont's life of Oersted, published in the Annual Report of the Smithsonian In¬

stitute 1868 and in book form 1869) ; Hauch and Forchhammer, 'Biography of Oersted5

(1853). ,

OERTEL, er'tel, Johannes Adams, Ger¬ man- American Episcopal clergyman and artist : b. Furth, Bayaria, 3 Nov. 1823; d. 1909. After studying art: in Germany he practised engraving until 1848, in which year he set up as a painter in New York. He painted 'Rock of Ages,5 which became vastly popular and was repro¬ duced in millions of photographs and chromo¬ lithographs. He took holy orders in 1867, has had more than one pastoral charge and was appointed professor of Christian art in the University of the South. He painted a series of four large pictures entitled 'The Plan of Redemption5 which he presented to the uni¬ versity. He is also a successful wood carver, confining himself to ecclesiastical and religious subjects in both departments of his activity.

OERTEL, Max Joseph, German laryn¬ gologist: b. Dillingen, 20 March 1835; d. 19 July 1897. He was educated at Munich, was docent in laryngology there in 1867-76 and thereafter was professor of that subject. He discovered the diphtheria bacillus in 1868, de¬ vised a famous system for the correction of respiratory troubles and invented the laryngos- troboscope. Author of (Respiratorische Thera- pie5 and (Therapie der Kreislaufstorungen5 in (Handbuch der allgemeinen Therapie5 (1883); 'Ueber Terrainkurorte zur Behand- lung von Kranken mit Kreislaufstorungen5 (1886) ; (Pathogenese der epidemischen Dip- therie5 (1887), etc.

OESEL, e'zel, a Russian island. See Osel.

OESER, e'zer, Adam Friedrich, German painter, etcher and sculptor: b. Pressburg, Sax¬ ony, 17 Fob. 1717; d. Leipzig, 18 March 1799. He was trained as a sculptor under Raphael Donner and as a painter, in the Vienna Acad¬ emy, 1730-39. He afterward was a pupil of Mengs and Dietrich at Dresden where he de¬ signed the decorations of the court theatre and

mural paintings in Castle Hubertsburg (1749). In 1759 he went to Leipzig where, in 1764, he was appointed director of the newly-founded art school. Besides his professional activity as a teacher he did a great deal of decorative work and won a reputation as a painter of ceilings. Among other things he executed a picture for the church of Saint Nicholas and a number of minor decorative panels and drawings. As a sculptor he shows to advantage in the statue of hrederick Augustus the Just in Leipzig and of the Danish Queen Matilda in Celle (Aisne-et- Nord). His versatility is proved by his mas¬ terly etchings, 45 in number, some after the manner of

Rembrandt, some in a highly original style of his own. He was a strong opponent of mannerisms in art and he shared in Winckel- mann's efforts after a reform in art through a study of the antique; but his own canvases give little evidence of Greek influence. By his pas¬ sion for allegorical compositions he is some¬ times betrayed into the extravagances of the rococo school. He was one of the great art teachers of his day and among his pupils was Goethe, with whom he kept in touch after the latter had become the leading spirit at Weimar. Among his numerous paintings, which are mainly of religious and mythological subjects and portraits, are (The Artist's Children5 (1766, in the Dresden Gallery) ; (Marriage at Cana5 (1777) ; (The Painter's Studio5 (Weimar Museum) and several in the Leipzig Museum. Consult Durr, (Biography of Oeser5 (Leipzig

CESOPHAGOTOMY, e-sof-a-got'a-mi, a surgical operation for the relief of stricture of the oesophagus and the removal of foreign bodies lodged in it, when dilation and other measures are of no avail. There are two forms of the operation, external and internal. Ex¬ ternal cesophagotomy consists in cutting into the oesophagus in front between the thyroid carti¬ lage and the sternum, and extracting the foreign body with forceps, or dividing the stricture with a knife. Internal cesophagotomy is usually re¬ sorted to for the relief of stricture, especially when of cicatricial origin. The stricture is di¬ vided by a cutting instrument (the cesophago- tome) _ passed through the mouth. After the operation bougies are used to prevent recon¬ traction. When the cesophagotome cannot be used,, or inanition is imminent, gastrotomy or opening the stomach so that food can be given is resorted to.

OESOPHAGUS. See Digestion.

ˆr-,??STERLEY> Karl, son of Karl

Wilhelm Oesterley (q.v.), German painter: b. Gottingen, 23 Jan. 1839. After studying in the Hanover Polytechnic under his father, he went to Dusseldorf (1857), and began under Deger his essays as a religious painter. On a visit in Liibeck (where he copied Hans Memling's 'Passion of Christ,5 1865) he was attracted to landscape and architectural pieces and was so successful in this domain, that he thenceforth devoted himself to landscape. Since 1870 he has generally derived his motif from Norwe¬ gian scenery. His pictures are distinguished for their dazzling color, transparent atmos¬ phere, distinctness in light and texture and grandeur of conception. Among them are (Midnight near Lofoden5 ; 'Mountain Gorge in

OFFENBACH

Norway; 'Romsdalsfiord* ; (Scene on the Coast of Northern Norway) (1879, in the Mu¬ seum at Breslau) ; (Raft Sound* (1879, Breslau Museum) ; (Fishing on the Norwegian Coast, * (View on Salten Fiord* (1882, Hamburg Gal¬ lery) ; (Lodenwand on North Fiord) (1885, National Gallery, Berlin) ; (Romsdal Fiord* (1891, Leipzig Museum).*

OESTERLEY, e'ster-li, Karl Wilhelm,

German painter: b. Gottingen, 20 June 1805; d. Hanover, 28 March 1891. He was a pupil of Matthaeus in Dresden, studied in Rome 1824-29, in 1831 was appointed professor of the history of art in the university of his native town and in collaboration with Ottfried Muller published 'Monuments of Art. Meanwhile he was ex¬ tending his artistic studies in Diisseldorf, Munich and Paris. On the completion of his picture, (Christ and Ahasuerus* (1844), he was appointed court painter of Hanover. The chief of his remaining works are 'Jephtha's Daughter* (1836) ; (Christ Blessing Little Chil¬ dren } (1841) ; 'The Ascension* (in the chapel royal at Hanover), completed 1838; 'Scene from Burger's "Lenore.** * He produced also altar-pieces and portraits and designed stained- glass windows.*

OETINGER, e'ting-er, Friedrich Chris¬ toph, German theologian: b. Goppingen, Wiir- temberg, Germany, 1702; d. Murrhardt, Ger¬ many, 10 Feb. 1782. He was educated at the University of Tubingen and became reader of theology at the University of Halle. In 1738 he took charge of the parish of Hirschau and gained the leadership of the Pietists in that sec¬ tion. His translation of several of the works of Swedenborg brought upon him ecclesiastical censure, but he was protected by the Duke of Wiirtemberg and latter was appointed super¬ intendent of the churches in the district of Weinsberg. He subsequently held the same position in Herrenberg and afterward became prelate in Murrhardt. He wrote many theo¬ logical treatises which have been edited by Ehmann, over 70 in all (1858-63). Among these is (Earthly and Heavenly Philosophy, which on account of its religious views raised a storm in Germany. Consult monographs by Auberlin (1847), Ehmann (1859) and Wachter*

(1885).

O'FARRELL, Michael Joseph, American Roman Catholic bishop: b. Limerick, Ireland, 2 Dec. 1832; d. Trenton, N. J., 2 April 1894. He was educated at the Seminary of Saint Sul- pice, Paris, and ordained to the priesthood in 1855. He went to Montreal where he was pas¬ tor of Saint Patrick's and Saint Bridget's churches and in 1869 accepted a call to New

York as assistant in Saint Peter's Church. In 1881 he became the first bishop of the then newly-formed diocese of Trenton, N. J.

OFFA, a king of Mercians in Anglo- Saxon England : d. 796. He succeeded to the throne after Ethelbald, on defeating the usurper Beornraed, 757 a.d. Kent and the East Saxons were brought under his rule, and the power of Wessex was crushed by a defeat in 779. He likewise defeated the Welsh, wrested from them part of their border lands and to retain them within their own limits erected here the rampart known as Offa's Dyke (q.v.). With the consent of Pope Adrian I he raised the see

of Lichfield to the position of an archbishopric; and he had diplomatic intercourse with Charle¬ magne. Ethelbert, king of East Anglia, was murdered by his instigation and Offa then seized his kingdom. He founded the abbey of Saint Albans, and a grant by him to the see of Rome is supposed to have been the ori¬ gin of Peter's Pence (q.v.). He promoted trade between England and the Continent. Consult Hodgkin, Thomas, (Political History of England) (Vol. I London 1906) ; Oman, C. W. C., (England before the Norman Con¬ quest (New York 1910).

OFFA'S DYKE, an ancient earthwork ex¬ tending along the whole border between Eng¬ land and Wales, said to have been built by King Offa of Mercia in the 8th century, as a bound¬ ary between his dominions and those of the Welsh. It extends from the vicinity of New¬ market, in Flintshire, and traverses the coun¬ ties of Flint, Denbigh, Salop, Radnor, Here¬ ford and Monmouth to Beachey, at the mouth of the Wye. Another dyke of a similar kind called Watts' Dyke runs at distances of from one-fourth mile to three miles apart from Offa's Dyke, in the same direction, through the counties of Flint and Denbigh. These dykes are supposed to mark the neutral ground on which the Welsh and Britons were at liberty to meet for transacting business.

OFFENBACH, Jacques, zhak of-en-bak, French Hebrew composer: b. Cologne, 21 June 1819; d. Paris, 5 Oct. 1880., He entered the Paris Conservatoire in 1833, became proficient on the violoncello and for some time played this instrument in the orchestra of the Opera Comique. Later he was conductor of the or¬ chestra at the Theatre Frangais, and in 1855 opened the Bouffes Parisiens, where he enjoyed immense popularity. There were presented many of his most popular works, (Orphee aux Enfers) (1858) ; 'Genevieve de Brabant (1860) ; (La Belle Helene* (1865) ; 'La Barbe Bleue* (1866) ; 'La Grande Duchesse> (1867) ; 'La Princesse de Trebizonde) (1870); 'Madame Favart* (1878). From 1866 he- de¬ voted himself entirely to composition. His last opera and the one that he considered his best was (Les Contes d'Hoffman> (1881), success¬ fully produced at the Opera Comique after his death. Offenbach was a clever*

musician ; his music is natural and has a verve and swing which made it immensely popular. This, com¬ bined with the excellent librettos of all the Offenbach operas and operettas, easily makes their author the master spirit in his own field. He was the originator of the opera-bouffe, and was imitated by many who never attained his melody or comic force. Consult Bekker, Paul, 'Jacques Offenbach) (Berlin 1909) ; Martinet, 'Offenbach, sa Vie, et son CEuvre) (1892).

OFFENBACH, of'fen-bah, Germany, town in the state of Hesse, five miles southeast of Frankfort, on the left bank of the Main. It is well ajid regularly built, and has an old castle, formerly the residence of the princes of Isenburg, the modern palace of the prince of Isenburg-Birstein, a townhouse, several churches, a synagogue and theatre. Offenbach is the most active manufacturing town in the state. Its industries include fancy leather goods, such as pocket-books, portfolios and traveling bags;

and there are manufactures of aniline, celluloid, per turnery, stearin, vaseline, lacquer and other chemical products, sewing and other machines, and machine tools ; paper of various kinds,

rS?tSuai sˆoes' type-founding and printing. Offenbach was founded in the 10th century and in 1685 the Isenburg-Birstein family took up its official residence there. Pop. about 80,000.

• OFFENBURG, of en-burk, Germany, city in the state of Baden, on the river Kinzig, z/ miles by rail southwest of Baden and 12 miles southeast of Strassburg. It is men¬ tioned as early as 1100 and became a town in 1223 and a part of Baden in 1802. There are remains of old fortifications and many fine works of sculpture. There are manufactures of textiles, agricultural machinery, leather goods, dyes and cement and the town has some importance as a trade centre. Pop. 16,848.

OFFERINGS AND SACRIFICES, gifts offered to the Deity. Sacrifice differs from almsgiving as a religious service, or from con¬ tributions made merely for the purpose of sup¬ porting a system of external religion, in being offerings made directly from the worshipper to the Supreme Being. They may, however, under proper authority, be applied to charitable or religious uses; to the maintenance of the priesthood, or to the celebration of solemn feasts.

The origin of sacrifice is a point much dis¬ puted ; the two opposed views being that of a primaeval appointment by the Deity, and that of a

spontaneous origination in the instinctive de¬ sire of man to draw near to God. The univer¬ sality of sacrifice has been urged in favor of the hypothesis of a primitive institution by Divine command, but the more legitimate infer¬ ence from this circumstance appears to be in favor of the opposite view. Of the symbolic character of sacrifice there are various kinds or degrees, all having in common the acknowl¬ edgment of dependence on the one hand and of protective power on the other. These may be represented under three heads — (1) propitia¬ tory, or designed to conciliate generally the favor of the Deity; (2) eucharistic, or symbol¬ ical of gratitude for favors received; (3) ex¬ piatory, or offered in atonement for particular offenses. To a different class may be assigned deprecatory sacrifices designed to avert the arbitrary wrath or appease the wicked dispo¬ sition of deities.

The origin of the Jewish sacrifices is traced to the earliest times. We are told in the book of Genesis (ch. iv), that <(in process of time® Cain and Abel brought each an offering to the Lord, and the different characters and results of these offerings are recorded. After the flood Noah offered a sacrifice <(of every clean beast and of every clean fowl,® an apparent in¬ timation that the distinction between clean and unclean animals had already been made, and consequently of a prior Divine appointment of sacrifice. Abraham, Isaac and Jacob offered sacrifices in which appeared a circumstance peculiar to the Jewish economy, that of a cove¬ nant between the offerer and the Divine being, of which the sacrifice was accepted as a sign. When Moses demanded the manumission of the Israelites from their bondage in Egypt, the plea which he presented to Pharoah was that they might go three days' journey into the wil¬

derness to sacrifice to the Lord. It was when the 'deliverance had actually taken place, and during their sojourn in the wilderness, that the Jewish ceremonial law with its elaborate ritual of sacrifice was given (accepting the ordinary traditional view regarding the so-called Mosaic legislation). The details of this ritual, with its surrounding observances, are amply set forth in the book of Leviticus. The burning upon the altar of animals is among the commonest of the forms of sacrificial rites both among the Jews and Gentiles. The Jewish sacrifices consisted mainly of burnt-offerings (of clean animals) daily, with double offerings on Sabbaths, and special offerings at festivals, unlimited in ex¬ tent, and which, being partaken of by the peo¬ ple, were called peace-offerings. Such sacri¬ fices, called hecatombs, were also common among the Greeks and Romans. Meat-offer¬ ings (of flour, oil and wine) accompanied the burnt-offerings. Sin-offerings (various) at special feasts and at each new moon were gen¬ eral expiatory offerings, besides which trespass- offerings were made privately on certain speci¬ fied occasions, as well as in expiation of par¬ ticular offenses. The most remarkable sin- offering was that of the two goats on

the great day of atonement. Incense was offered every morning and evening. Offerings were made separately, first for the priests and afterward for the whole people. What is most notewor¬ thy about the Jewish sacrifices was their re¬ striction to one particular place, the tabernacle, and later the temple (but consult Ex. xx 24). Offerings on high-places were forbidden, and are always noticed with reprobation as the indi¬ cation of a rebellious spirit. The view of Mai- monides among the Jews, and of Warburton and others among Christian divines, was that sacrifices were not so much divinely appointed, as divinely permitted under restraints among the Jews, (

The sacrifices of the Gentile nations were the result of natural impulses developed by tra¬ dition, or cultivated by priestly care into a sys¬ tem. The powers of nature, or the most promi¬ nent objects, celestial or terrestrial, in which those powers resided, were commonly their ex¬ citing causes ; while the terror of natural con¬ vulsions, and still more the disorders and mis¬ eries of human life, conjured up malevolent beings, whose wrath was only to be deprecated by blood, and sometimes by the blood of those dearest to the offerer. Not animals alone, but slaves and captives, were sacrificed freely. Among many of the Eastern nations surround¬ ing the Jews human sacrifices were common

particularly among the Phoenicians. Some traces of this custom may be found in' leg¬ endary times even among the Greeks and Ro¬ mans. Numerous legends hang upon the cir¬ cumstance that the wrath of some divinity is only to be appeased by the sacrifice of a human victim to be recognized in some special way, or sometimes of a continued series of such vic¬ tims. In one other respect only do the heathen sacrifices, including those of the Greeks and Romans, demand special notice, as differing materially from those of the Jews in the fre¬ quent inclusion among them as a sacrifice ac¬ ceptable to the Deity of the chastity of women. This is always denounced in the strongest terms by the Hebrew prophets. The sacrifices of the Greeks and Romans, like those of the Jews, were either bloody or bloodless, the former usually accompanied by libations of wine and by incense. They were frequently used as a means of consulting the gods, procuring omens, etc., and for political purposes.

Of the universality of sacrifice the annals of almost every people bear record. The ances¬ tors of nearly all the existing races in Europe practised human sacrifices, and similar usages widely prevailed in Africa and. America, as well as in Asia. Few religions, whether ancient or modern,

have omitted sacrifices from among their rites. The Buddhists offer only first- fruits and flowers ; the Mohammedans give alms, but offer no direct sacrifices. The Roman Catholic, Greek and Anglican churches make the service of the Eucharist a service of sacri¬ fice each in a somewhat different sense or de¬ gree. The introduction of Christianity had the effect of indirectly putting an end to Jewish sacrifices, and of directly abolishing heathen sacrifices in the Roman Empire. These latter were prohibited by the Emperor Theodosius in 381. It was this final destruction of the temple by the Romans that abolished the Jewish sacri¬ ficial system which had been limited to its precincts.

OFFERTORY, in the Roman Catholic Church, is that portion of the service of the Mass in which the priest offers to God upon the altar the bread and wine which are to be con¬ secrated. In the music of the mass the term offertory is used to designate the antiphon or music appropriated to that part of the service above designated. In the Anglican Book of Common Prayer the term offertory is applied to that portion of the service during which the alms are collected among the people, whether during the service of the Holy Communion or not, while certain prescribed sentences from Scripture are being said or sung. The alms are then offered by the officiating clergyman, be¬ ing laid on the altar usually with an ascriptive address to God. When the Lord's Supper is celebrated the unconsecrated 'bread and wine are offered at the same time. In general the term offertory has the modern sense, in Protes¬ tant churches, of the collection of money made at a religious service ; and it is also used to designate the music rendered at the same time.

OFFICE, Divine (Lat. Officium divinum) in the Roman Catholic Church, a general desig¬ nation since the 9th century for the services of the canonical hours (q.v.). These services or offices are prescribed to be said each day by bishops, priests, deacons and subdeacons in the

Roman Catholic Church. See Breviary : Liturgy ; Missal.

OFFICE, Qualifications for. See Elec¬ toral Qualifications; Terms of and Qualifi¬ cations for Office.

OFFICE LABOR-SAVERS. Man goes from barbarism to civilization by learning to do things better, quicker, easier or cheaper. Some labor-savers combine two or more of these improvements. America leads the world in prosperity because it led in adopting stand¬ ard sizes for machine parts and in other labor- saving methods and devices. Obviously by as much as services of high salaried desk workers are more valuable than those of mechanics, by so much are literary labor- savers worth more than highly prized ma¬ chines of manufacture and commerce. Yet it was not till the Library Bureau was founded in Boston as part of the national library move¬ ment started in 1876 that this was practically recognized. Since then there has been marvel¬ ous development, till now a device for saving time, labor or money in office, library or study is valued as highly as one for factory, shop or farm.

Hundreds of ingenious, practical labor- savers for technical uses will be urged by their promoters. Electric tabulating, computing, bookkeeping, addressing and other machines illustrate immense savings possible by devices, as important to desk workers as sewing- machines to seamstresses or modern tools to mechanics. If we admit that time and labor should be saved for brain work as for hand work, then the minutest saving is worth at¬ tention. Many factories make their entire profit by using an improved method or ma¬ chine, or by utilizing waste in some by-product. In large offices, a method by which 4 motions do what formerly took 5 saves a large yearly aggregate in salaries.

Writing and Printing.— Writing is easily greatest of human inventions. All nations in traditions attribute to it divine origin. Some 5000 years ago Egyptian priests evolved pic¬ tures of things into ideograms or pictures of abstract qualities and ideas, then pictures for sounds of words or syllables (where some Eastern languages still stop) ; and finally pic¬ tures for sounds of final elements or single letters. These were written on stone, horn, clay, metal, wood, wax, bamboo, birch-bark, skins and papyrus, till we reached that won¬ derful product, paper. The first writing im¬ plement, of flint, was followed by stylus, fine brush of hair, split reed, quill, steel and

gold dip pens, now in turn superseded by fountain pens and typers. After writing, the ancients invented abbreviation systems as labor-savers. Then came for cursive writing faster small or lower case forms of letters. Taking less space and being both written and read quicker, they will in time displace capitals entirely and avoid the foolish waste of having to learn two alphabets.

Avoid capitals. They take more time and space, are less legible. All recognized experts advise against them, and the best printers are cutting them out more and more. In signs, labels, bulletins, etc., lower case can be read easier and farther; for the small forms with their ascenders and descenders have been

proved by the marvelous instruments in psy¬ chologic laboratories to be much more legible. I he uneducated tend to sprinkle their writ- lng full of capitals. The next step was greater abbreviation and greater simplifying of forms by stenography, revolutionized and systemized by Isaac Pitman. (See Shorthand). The greatest invention after writing was printing, followed by telegraph, cable, telephone and wireless, which show what the human mind has already done and suggest future possibili¬ ties.

Model Office or Study.— A southeast cor¬ ner room is best ; north light is most uniform ; west least desirable. Hygiene forbids carpets in public rooms. Use hardwood floors, or cor- ticine, which is cheap, durable, easily washed, deadens noise and is warm. Atmospheric steam is best for heat. It is regulated as easily as hot water, heats or cools much quicker and is free from danger of freezing. For ventila¬ tion, have both inlet and outlet flues, with open fire if practicable. If not, insure circulation through flues by gas jets, steam pipes or motor fans. Desks should have window at left so the hand will not shadow the writing. Left- hand writers would reverse this rule. Roll¬ tops darken the desk, tempt to disorder and are forbidden in some offices. The roll, if used, is better over pigeonholes, which are best in front of the chair if one has many papers, as this allows most boxes to be reached quickest. Open pigeonholes allow quickest work, but catch more dust than drawers and take more space than vertical files, which hold on edge papers, pamphlets and clippings, and are cleanest, cheapest and best for most stor¬ age. Space not needed for pigeonholes in front and all under the desk is best used for vertical files or drawers. Telephone and desk lights (with metal shade to protect eyes), on arms, swing aside when not in use, and save desk space. Standard size pigeonholes, drawers, trays and shelves fill all blank wall space at left and behind, within reach from the swivel-

and-spring desk chair.

Chairs with curved spring back give a grate¬ ful support to tired backs. Upholstered chairs are heating and sometimes dangerous.

A model desk is 78 cm high, not 75 as usual. Short men can use higher chairs but tall men cannot cut off their legs. The higher desk is better for eyes. Many stoop over desks because they are too low for natural eye focus.

Drawers run to floor without baseboard and clear through to back have side runs with no cross pieces and at no extra cost, give easier action and maximum storage. All draw¬ ers are at least 9 cm deep inside to hold stand¬ ard card trays. A desk 78 cm high with no cross bars gives 1 drawer for V size, 4 for P and 1 for Q (see p. 601).

The middle opening for the feet is at least 60 cm wide with a centre drawer over it hold¬ ing 50 by 60 cm sheets for large charts and tables. Above drawers each side are slides as long as width of top allows. On small desks may be added to either end extension leaves supported by folding brackets. Tops are 60 to 100 cm wide; 150 cm (60 in.) is the longest top whose ends can be easily reached from the chair.

Office bells are buzzers, not single stroke,

to allow simpler codes of time-saving signals. Buzzers allow short and long signals like tele¬ graph dot and dash. Barometer or fountain sponge cup and mucilage stands save labor. Use only inkstands like Perfect or Capitol that prevent evaporation and so require no refilling till ink is all used. Self-inking rubber stamps for any words or dates often written save much time and give more distinct entries. If sev¬ eral are used keep in racks plainly labeled, or it takes as long to find the right one as to write the words. A metal straight edge ex¬ actly P size is much quicker than shears and ruler in fitting clippings and parts of sheets for trays.

Blanks. — Have printed blanks for every¬ thing much used, with alternatives both printed so that instead of filling in words, a single stroke crosses out those not wanted. Printing is cheap, clerical labor costly. A letter sheet with months at the head of 12 columns, ruled with 31 num¬ bered lines, gives a square for each day in the year and is invaluable for statistics or records. Each sheet is thus a diary for 2 years. As they cost perhaps lc, they may be used al¬ most as freely as blank paper. For longer, or 2 or more column, entries use 6, 3, 2 or 1 month to the page, thus giving needed room for tables. Where summaries and charts are needed for shorter periods than a month use decimal blanks, i.e., decades instead of

weeks. Leave a blank line for footing after each 10 days. This total is also day aver¬ age by moving decimal point. In 31 day months it gives 3 decades and 1 single day, so every sheet shows, without figuring, totals and averages for each 10 days and also for the month. If working by week much duplicate figuring is necessary because except in February month and week have no common divisor.

Writing. — Vertical writing disjoined is more like print and some can write it as fast as sloping, hand, which is so much less legible that libraries prohibit it on catalog cards.

Ink should dry naturally, blotting blurs sharp lines of writing and takes away some color.

Envelopes. — • Odd size envelopes are a nuis¬ ance and go less safely in mails than standard sizes, as they project and are torn or crumpled by post office when tied in bundles. For notes and post cards use No. 5; for Q or 4P sheet (15 x 25 cm) No. 6ˆ4 ; for letter-sheet No. 8ˆ4 ; if enclosing these, use No. 9. Never use for manuscript a sheet wider than 20 cm. Science proves this line much too long for easiest reading. The best width of paper is about 15 cm.

Typers. — As typing is more legible, easier, faster and cheaper, thus combining all 4 labor- saving elements, it is foolish and costly to allow clerks to write by hand. Many high salaried men have learned that ease and speed make it wise to type such writing as they do with their own hands. If one writes at all, by as much as his time is more valuable than a $10 clerk, is the typer worth more for his personal use. Visible typers have driven out the blind and remove a serious objection, as "each letter is in sight as written. By touch system in growing use, operators never look at keys but strike right ones by touch, like a skilled pianist. See Typewriter.

Fountain Pens. — Dip pens are as absurd for a constant tool as a muzzle-loading rifle for a modern soldier. Thousands have tried fountain pens and discarded them as failures, when they would have found them invaluable by observing these rules: (1) Select from a full line a pen exactly suiting your hand. More than 100 varieties of each first-class pen are regularly made. (2) Keep gold pen bright by cleaning it often on a wet sponge. (3) Use free-flowing standard ink, preferably filtered. Never mix inks or fill from a bottle open to air and dust. If clogged by poor or mixed inks or dirt, soak barrel and feeder thoroughly in water or wash out with alcohol. If you

wish different colors for checking, black, red and blue are best. (See Colors below). (4) To avoid top-heavy effect for sensitive hands, do not put cap on top of holder when writing. (5) Buy a make of pen of established repu¬ tation. $1 watches occasionally keep good time but no one expects it. $1 pens will usually disappoint. Large holders are easier to sensitive hands. Prove this by holding a knitting needle or very small pencil. In¬ stead of the common clip, it is much quicker and as safe to sew the deep watch pocket into 3 or 4 narrow pockets. If you carry pens not clearly distinguished at a touch by size, buy different shaped caps or have lines cut on the cap so touch tells you instantly which pen it is without looking at it. Use your fountain pen constantly. If kept for traveling or use away from the desk, it will not work as well. To use a dip pen for any purpose is as silly as to refuse to use a telephone or other modern labor saver.

Duplication. — Copying by hand was costly and untrustworthy. The copypress banished it and in turn this was largely superseded by rubber roller copiers, worked as easily as a clothes wringer and giving, without copying ink, 5 or more good copies if needed. This has given way to the carbon sheet, usable with pencil or stiff, smooth-pointed pen, but best with typer which makes with one writing 10 good copies on thin paper, or on cobweb paper 15 to 20. The best duplicator is the stencil typed on wax paper or a substitute and printed on a simple press giving 1,000 copies, if needed, as permanent as other printing. A tiny motor attached to any electric light furnishes power. As wax is costly, many use pans of composition on which anilin ink from pen or typer ribbon offsets. These use only common paper, are cheapest and quickest for temporary use if more copies are wanted than can be carboned, but anilin ink soon fades. A practical duplicator is a great labor-saver to desk workers, most of whom often greatly need extra copies that time and cost forbid printing.

Card System. — This is easily chief of liter¬ ary and business labor-savers. With the mod¬ ern library movement dating from 1876, its growth has been phenomenal and the saving effected is more than money can measure. In¬ stead of bound books, separate cards or sheets are used, on edge with frequently projecting guides, which enable one to find any item almost instantly in its exact alphabetic or classi- fied place.*

Matter may be added or removed at any point without recopying or disarrangement, so

that material is always up to date. The plan is invaluable for every growing record, and has been adopted successfully for thousands of uses. Its usefulness is diminished or destroyed unless cards are cut to more exact hight than common machines allow. A minute variation results in ˆbridging,® that is, a low card be¬ tween two higher ones is missed by the

finger in turning. The best patterns of trays, sup¬ porting blocks, and locking rods are necessary to give greatest speed in reference. Most patent devices for these purposes are useless. Library experience has shown what gives best results.

Sizes. — The international standard P or pos¬ tal size card is 7.5 cm. high, 12.5 wide. The U. S. government prints its postcard, size K. and all its catalog cards on this size, and the Na¬ tional and International Library and Biblio¬ graphic societies use this standard, which has in _43 years established itself beyond possi¬ bility of change. It is enough smaller than 3×5 inches, for which the inexpert often mis¬ take it, to make inch cards worthless in a standard index. They must be recopied or

cut down to standard size at large expense, or serious trouble results. However glibly recom¬ mended by salesmen who know little beyond their desire to sell, never use 3 x 5 inch cards which grew out of ignorance of international standards, for it is impossible to mix these 2 sizes.

This P size is very often found better to use in place of larger sheets for short bills, receipts, bank checks, etc., as they can be handled much quicker. The saving of space occupied seems trifling, but grows serious. Originally cards were over 3 times as large and were kept in a single row of covered boxes. Gain in number of cards stored on a given floor space was 3-fold when 3 rows of drawers replaced these boxes and 15-fold for standard cases 15 rows high; 2-fold more when cards were made half thickness, 2-fold more with trays twice as long. Thus 180 times as many cards are stored on given floor space. Single column trays with sides cut down to give more light and with label-holders in the pull are better than the heavier 2-column drawers. In a standard unit case of 2 to 3 pigeonholes wide, 15 high, each hole 9 x 29 cm and 50 cm deep, just holds 2 standard trays. Between rows 6 and 7 are slides on which to rest drawers from pigeonholes too high or low to allow convenient reading. Short desk trays 25 cm long with sides and partitions, if any, only 5 cm high, give better light and easier han¬ dling than if full hight of cards. All desk drawers should be full 9 cm deep to hold these trays. All cards have an 8 mm hole near the lower edge, in the middle. For private use locking rods needed in public indexes may be omitted, but the hole is often needed to tie cards together or for special uses. Rods are to prevent removal and loss, so a notch in place of a hble is bad, as cards can be bent a little and readily removed without tearing.

A pocket binder with eyelets opposite the card holes and a tie cord and bar is handy to carry cards. The best card stock, weighing 200 grams to a square meter, is as good as the older 300 or 400 gram stock which took twice the space. Heavier cards are needed

cnly for guides. These with projecting tabs double usefulness. Cards as well as guides can Wlth these tabs, affording immense pos¬ sibilities of double, triple and quadruple classing by tab, card color, ink color, and number or heading. For lighter cards 133 gram or 28 lb demy stock, % the weight of the light standard, is best. With it 300 times as many cards can be put in a floor space as with old outfits. 100 gram stock, 5 lb commercial note-paper, is used where space saving and cheapness are more important than ease of handling.

The largest standard card index is L size, for cards 25 cm high by 20 cm wide. The drawers are 21.5 wide and 28 cm high inside, and outside are 27.5 x 30 cm by 60 cm long. They have rods and blocks with sides cut away like P size, but drawers are on extension slides so they can be opened full length. The unit is 4 drawers high from the floor, the highest that can be readily consulted standing. The best low unit is two L drawers high with a P drawer and an extension slide and table top above, making a case 78 cm high, 32 cm wide and 50 cm long. This stands at the end of a desk as an extension, or better at right angles, so all cards may be read without rising from the chair. Heavy manila guides 27 cm high have tabs 4. cm wide projecting 1 cm higher. Another projection from middle of bottom runs in a groove in drawer bottom and has a stout eyelet thru which locking rod runs, a neces¬ sity for so large guides. For these large sheets 2 folios not used in P size are needed. A manila envelop 20.5 x 25.5 cm, open at the top and right side, holds together stiffly enough to hold thin papers on edge. The long folder is of manila 20 cm wide, 51 cm long, folded with front 27 cm, back 24 cm high. In the top, smaller subdivisions than indicated in project¬ ing tabs of guides are written and closer class¬ ing of papers is maintained. Manila, white, blue, buff and other colors are used for these folios when more than one classing is wanted in the same series, e.g., personal papers mingled with office or firm papers on the same subject. Thus papers belonging to several different parties can be closely clast together by sub¬ jects without confusing ownership which is instantly recognized by folio color. This L size index fits most magazines, pamphlets, let¬ ters and typed documents and is the best work¬ ing unit for all papers too large for P trays. It is better than filing on long edge because papers may be read in the drawer with letter¬ heads, titles of articles, etc., at the top in the best light, exactly like library catalogs. The more widely used commercial vertical files, 12 in. wide, 10 in. high are slower in use be¬ cause papers are kept on sides instead of ends and folios must be lifted out and opened before consultation. So many use objectionably large sheets with a line too long for easy reading that the larger file will be used

commercially till we learn the advantages of never using a sheet larger than 20 x 25 cm. For all other uses L size drawers and files are better. When letters or papers on larger size come in, they are quickly folded once or margins cut down with photo cutter and dropt into regular place.

For one seeking maximum efficiency for great quantities of notes, pamphlets, clippings and papers of the most convenient working

size, to use commercial letter files, 12 x 10 inches, is like using a card catalog tray big enough to hold business envelops on end. It wastes space, works badly because of loose fitting and chiefly has lines running perpen¬ dicularly instead of horizontally as they must be read.

Intermediate sizes are seldom needed. B or billet (10 x 15 cm), N or note (12.5 x 20 cm) are largely used, but a single size, D or double P (15 cm high by 12.5 cm wide), is best and has the great advantage that a single fold makes it exactly fit standard P trays now universally used. Large sheets for card index stock 50 x 60 cm save waste so aliquot parts of this are best. 99 times out of 100 P, D, Q or L size will be best. Odd sizes cost more and waste badly when indexes are combined or re¬ arranged. If other sizes must be had for special use, choose from this full series:

Symbol

Name

Size in cm.

V

Visiting card

5 x 7.5

H

Half P

6.25 x 7.5

I

Index

5 x 12.5

P

Postal

7.5 x 12.5

B

Billet

10 x 15

D

Double P

12.5 x 15

N

Note

12.5 x 20

0 or 4P

15 x 25

L

Letter

15 x 20

2L

Double letter

25 x 40

4L

40 x 50

S

Standard

50 x 60

Recent experiments confirm the theory that the most pleasing proportion in a sheet or

pamphlet is in the ratio of 1 to a/2; i.e., 1 to 1.414 or nearly 5 to 7. This has the advantage of always keeping the same ratio with suc¬ cessive bisection, so paper can be cut to any size in the series without waste. This would change the standard large sheet from 50×60 to 50 x 70.7 cm and standard letter size to 17.7 x25 cm, a better length of line, while hight still fits standard library shelves. The P card is so firmly established thruout the world that it could not be changed.

Arrangement in any card system is either A to Z, like a dictionary, or 1, 2, 3, or clast, both numeric and clast plans having alphabetic indexes on P cards. The numeric system is best for correspondents writing many letters or for special contracts or other business dis¬ tinct but not obviously clast under any subject or name. Use short numbers 1 to 9 or 99 for heaviest correspondence. Assign and index the rest as subjects arise, the folios being kept in 1, 2, 3 order. They can be filed or found much quicker than by any other than arabic notation, which is the simplest known to the human mind. The numeric file scatters by accidental order matter on allied subjects which ought to stand side by side. Every system needs an alphabetic supplement for miscellane¬ ous correspondents who write few letters, since it is self-indexed and its few papers are put away and found again quicker than if clast or numbered and indext.

Classification.— A great file of papers is like a library in miniature. Experience the world over has proved that while alphabetic and numeric systems are invaluable for many pur¬ poses, usefulness demands close classing as material grows. The best plan is to combine simplicity of numeric and utility of clast as in the (Decimal Classification and Relativ

Index) used by most libraries. The simplest possible printed index of 35,000 heads tells in¬ stantly by what number to mark or to find any paper. Bees are marked 638. This means class 6, Useful Arts, division 3, Agriculture, section 8, Bees. Every paper about bees is marked 638 and goes in the drawer in numeric order where it can instantly be found by the printed index. 43 years' use in 30 countries has proved this numeric system, with its relativ index, a marvelous labor-saver. Classing is a necessity if all material on any given subject is to be readily found. The labor of making one's own classification is usually prohibitive if well done. By adopting the scheme in gen¬ eral use by libraries this labor is saved and

subject numbers are in harmony with thousands of other catalogs and indexes in which each number has the same meaning; for as pointed out at a recent international congress, these numbers are an international language of per¬ fectly definite meaning among all civilized na¬ tions, and also cheapest and quickest in appli¬ cation. Copies of this great labor saver can be found in any library.

Dead Matter. — Individuals like libraries may often wisely separate <(dead}) from ˆlive® material. Correspondence and topics no longer often consulted are transferred to duplicate drawers of cheaper construction for storage. Working drawers and trays near the desk will thus be filled with matter oftenest used, while that removed is not tied in bundles or packt in boxes, but is kept best and cheapest in P and L drawers, in a single series, so that matter re¬ moved at different times is all found in its ex¬ act clast, numeric or alphabetic order regardless of date of removal. The index entry shows by an underscore, topic removed to storage, so no time is lost in double reference.

This system has grown marvelously as people learned its economy of time and space. For¬ merly papers were folded, endorsed and tied in bundles. Flat filing in cabinets, minutely self-indext without labeling, drove out that costly system. Vertical filing, like a library catalog, has now driven out most flat filing cabinets.

Loose Leaf System. — This started in Am¬ herst College library in 1872 as a shelf list and is only a variation of the card index of which the essential is unlimited intercalation. Instead of standing on edge in drawers, loose leaves are put in a binder which holds them like a book, opening flat but allowing leaves to be added or removed at any point almost instantly. For certain desk uses this is preferable to trays, but most records go best in regular trays. Fear of losing detached pieces proves practically groundless and saving over books is very large. 9/10 of matter usually kept flat in drawers is better kept on edge in vertical files, handier and cheaper except for papers in constant use in open pigeonholes, cards in P trays and books and pamphlets on shelvs.

Shelvs. — The best library shelf is 75 cm long, 20 cm deep and 25.5 cm high, thus taking all books up to octavo, 25 cm. Book cases are 7 or 8 shelvs high with 15 or 20 cm ledge, if vvisht, above the 3 lower shelvs. The best pamphlet case is a plain wood box covered with marble paper, open only on the back. This is handier and more durable than costly patent boxes. Read shelvs, pigeonholes and

blanks all from top to bottom and from left to right like columns of a newspaper, never jump¬ ing the upright.

Colors. — These may have mnemonic values in binding, paper or ink. Languages, not sub¬ jects, should guide in bindings if books are ar¬ ranged, as almost universally, by subjects, for variety of color on each shelf is important in finding and replacing books quickly. The library language scheme used for 40 years is :

1. American, light brown 6. Spanish, olive

2. English, dark brown 7. Latin, light green

3. German, black . 8. Greek, dark green

39. Minor Teutonic, dark blue 91. Minor Aryan, light blue

4. French, red 92. Semitic, yellow

5. Italian, maroon 93-99. Hamitic, etc., light drab

Colors beginning with the same letter as the subject are easier remembered, but should not be chosen if a distinctly better color is available. Libraries use blue for bibliography, canary for criticism, green (life color) for biography.

Day Colors.

Sunday

sage green

Thursday

turquoise

Monday

melon

or manila

Tuesday

terra-cotta

Friday

fawn

Wednesday

white

Saturday

straw

Month

Colors.

January

white

July

blue

February

fawn

August

apple green

March

melon

September

straw

April

azure

October

orange

May

manila

November

nile green

June

jonquil

December

dove or drab

Paper Colors for 26 Letters.

Omit most of those often confused or too dark to be written on. Avoid second colors named as they may confuse with others first in the list elsewhere. Letters with no available color are assigned the best unused, so to give colors for all 26 letters if needed.

A azure, apple green, amber B blue, buff, brown

C canary, cherry, carmin, cream, caf6-au-lait D dove, drab E ecru F fawn

G green, gold, gray, granit H heliotrope, hazel I ivory, indigo J jacqueminot, jonquil K com

L lilac, lavender, lemon M melon, mauve, marigold, manila N nile green O orange, old gold, olive P pink, primrose, pearl sray, purple 0 Quaker drab R red, rose, robin egg S sage, straw, salmon, sky blue, steel T terra-cotta, turquoise, tea, tan U ultramarine, buff

V violet, mauve W white

X granit

Y yellow

Z zenith (pale greenish blue), manila

The favorite distinct colors to write on are white, buff, blue, canary, green, cream, manila. Melon or salmon soils worst from handling. As cards must be of uniform size 'to fit trays and drawers, distinction of various circulars and blanks often made by shape is best made by color tho it may also be made by project¬ ing tags, clipped corners or color of ink.

Ink Colors. — The best colors in order are : Black, red, blue, green; and less permanent, violet or lilac. Colors are used chiefly for fig¬ ures or other short entries or for checking lists. 2, 3 or 4 pens or pencils can be carried be¬ tween the fingers so that a check mark may be

made instantly in either of 4 colors. Red is used for receipts, returns, income, renewals; blue tor the reverse, payments, outgo, issues; green for gain; lilac for loss. Special mean¬ ings are assigned to check marks for each case and are always written as a key at the begin¬ ning of the list for future reference. Inks or pencils of different colors assigned to different people working over the same lists show who made each mark. Where classification may change, color is better in ink than in paper as recopying can be saved by underscoring the first words in the new color.

Exact Reference. — In indexes and other exact work indicate by superior figures the particular ninth of page or column in which the passage referred to begins; 5 : 343 means vol. 5, p. 34, beginning in third ninth of the page (about l/3 the way down). Of superior figures odd numbers 1, 5 and 9 denote top, middle and bottom of pages ; 3 and 7, points half way be¬ tween top and middle or middle and bottom, while even numbers are mere modifiers of these positions, 2 denoting a point a little below the top, 8 a point a little above the bottom ; 4 and 6, points just above and below middle. If there are several columns on a page, use 2 superior figures, the first denoting column and the second position in column, e.g., 7 :891S-28 means vol. 7, p. 89, beginning in the third ninth of column 1 and ending near the bottom (in the eighth ninth) of column 2.

L. B. Dates. — In condensed matter use the library date system (1) Day of week, (2) day of month, (3) month, (4) year:

Ap

Months

Days

J1

O

Su

Th

My

Ag

N

M

F

Je

S

D

Tu

W

St

For Wed. 9 Sept. 1885, write W9S85.

Numbers for months are dangerous. As usage is about equally divided, no one can tell whether 6-7 means July 6 or June 7. The L. B. dates above are exact, average fewer marks and are used for compactness and accuracy.

Colon Forenames. — Where space is impor¬ tant, indicate most common full names by initials followed by a colon or double period, thus C:H:Smith is Charles Henry Smith, while C. H. Smith may have any names beginning with C or H. With no extra space or cost full names are accurately given by this library list:

A: Augustus.

A. .

Anna.

B: Benjamin.

B. .

Beatrice.

C: Charles.

C. .

Charlotte.

D: David.

D. .

Delia.

E: Edward.

E. .

Elizabeth.

F: Frederick.

F. .

Fanny.

G: George.

G. .

Grace.

H : Henry.

H. .

Helen.

I: Isaac.

I. .

Isabella.

J: John.

J..

Jane.

K: Karl.

K. .

Kate.

L: Lewis.

L. .

Louisa.

M : Mark.

M. .

Mary.

N: Nicholas.

N. .

Nancy.

O: Otto.

O. .

Olivia.

P: Peter.

P. .

Pauline.

R : Richard.

R. .

Rebecca.

S: Samuel

S. .

Sarah.

T: Thomas.

T. .

Theresa.

U: Ulrich.

U. .

Ursula.

V: Victor.

V. .

Victoria.

W: William.

W. .

Wilhelmina.

Z .

Zenobia.

Numbers.— Use only arabic numerals and letters and avoid the clumsy and easily misread

Roman numerals; write v. 88, not Vol. LXXXVIII. Never spell out numbers even at beginning of sentences. 88 is quicker written, quicker read, takes less space and is vastly better than "Eighty eight® with 11 letters to do badly what is done perfectly by only 2 figures.

Newspaper Clippings. — These are almost useless unless closely clast. Plain manila sheets x 25 cm are better than patent scrapbooks. Clast like other papers with subject number on left upper corner and keep laced in binders or much better in L drawers like thin pamphlets, thus bringing clippings, circulars, letters and notes on each topic all together in one folio.

Metric System.— John Quincy Adams re¬ ported to Congress that metric weights and measures generally used would be a greater labor-saver to the human race than steam. Since then nearly all civilized nations have adopted them, and America and England are both near¬ ing such adoption. The international decimal system, agreeing perfectly with our arithmetic, stands near the head as a labor-saver. Com¬ putation showed that a single railroad could save $50,000 a year in clerical labor by its use. A committee of 20 normal school experts report that it would save a year in the school life of each child if we had only metric system (q.v.) instead of compound numbers.

Language. — The most practical, cheapest and oftenest needed labor-saver is to use the fewest words and marks that will convey mean¬ ing readily and accurately. See Simplified

Spelling; Shorthand. ,, ~

Melvil Dewey,

President National Efficiency Society; formerly Director New York State Libraries.

OFFICIAL GROUP BALLOT. See

Ballot.

OFFICINAL PLANTS (Lat. officinalis, of the shop, from Lat. oMcina, shop), plants which are used in medicine, and therefore sold in the druggists' and apothecaries' shops. The term Officinal® was formerly — though erroneously — used as a synonym of "official,® meaning preparations recognized by the officials in charge of the compilation of pharmacopoeias. Many drugs and plants which are not official are sold in the shops, and are therefore officinal. (See Plants and related subjects). Consult (United States Dispensatory > (19th ed., Philadelphia 1907).

OG, according to the Hebrew Scriptures, the king of Bashan, defeated by the children of Israel at: Edrei (Num. xxi, 33). He is said by rabbinical writers to have been one of the giants who lived before the flood, and escaped the deluge by climbing to the roof of Noah's ark. Noah, according to tradition, fed the giants that they might be to men of after times a proof of the power of God, who had created and destroyed such monsters. In the war of Off against the Israelites he took up a mountain four miles in circumference to throw down upon Israel, when it was honeycombed by ants sent by Jehovah, fell and overwhelmed him. His teeth grew so quickly that they entered the mountain and held him fast, so that Moses could kill him. To give an idea of his gigantic size, the rabbins say that Moses, who according to their account was six ells high, and had a battle-ax of the same length, was obliged to make a leap of six ells in order to strike his ankle-bone. He bled to death of the wound.

OGAM, og'am, or OGHAM, an ancient alphabet or system of lettering, formerly in use among the Celtic peoples of Ireland, Scotland and Wales, chiefly found in inscriotions on stone, but also, though more rarely, in

books.

Ogam Inscription, From a Stone Found Near Ennis.

The ogams were supposed by the Irish to be the invention of the god Ogam. Ogams con¬ sist chiefly of straight lines, mostly vertical and oblique, horizontal lines and curves being sparingly used. They derive their significance partly from their position on a continuous hori¬ zontal stem-line along which they are written, some of the characters being drawn resting on the horizontal line as a base, others depending from it and others intersecting it. This hori¬ zontal line, however, really represents a perpen¬ dicular line, namely, that formed by the angle of the upright stone on which ogams were originally cut. The total number of letters represented in the alphabet is 21. According to some scholars a single vertical stroke resting on the line represents h ; two contiguous strokes d; three t ; four c\ five qu. A single horizontal stroke depending from the line stands for b; two for /; three for w or /; four for s : five for n. The letters m, g, ng, 2 are represented bv one to five oblique strokes right to left cross¬ ing the line ; the vowels a, 0, u, e, 1, by one to five vertical strokes crossing the line. A cross on the line stands for p or e.

Diphthongs are represented by curves or compound letters.

The age of this alphabet has been the sub¬ ject of considerable discussion. The best au¬ thorities seem now to be agreed that it cannot be traced beyond the introduction of Chris¬ tianity.

Recent investigation tends to link the ogams with similar characters found in the Orient, and of relatively late date. The object of its con¬ struction seems not to be explained, but the most ancient ogams are all inscribed on stone. Ogams are found chiefly in Ireland, but some have been found also in Scotland, Wales, the Shetland Islands, and even in. England, the total number known only amounting to aibout 300. The Celtic names which constitute the greater part of the inscriptions are frequently Latinized. There are numerous papers and dis¬ cussions regarding them in the publications of archaeological societies.

Consult Abercromby, (The Ogham Alpha¬ betˆ in the Academy (London 1880) ; (d'Arbois de Jubainville, L'alphabet irlandais primitif et le dieu Ogmios, in Academie des inscriptions et des belles-lettre (Paris 1881) ; Brash, R. R., (The Ogam Inscribed Monuments of the Gaed- hil in the British Islands) (London 1879) ; Loth, (Le sort et l'ecriture chez les anciens CeltesP in the Journal des savants (Paris 1911); History, Grammar and Import of the Irish Epigraphy) (London 1897-1907) ; Mac Neill, (Oghmoracht,> in the Gaelic Journal (Dublin 1908-09) ; id., (Notes on*

the Distribution, History, Grammar and Import of the Irish

Ogham Inscriptions, > in the Proceedings of the Royal Irish Academy (Dublin 1909) ; Nichol¬ son, W. B., (Keltic Researches) (London 1904) ; Rhys, Sir John, (Lectures on Welsh Philology) (2d ed., ib. 1879) ; id., (The Inscriptions and Language of the Northern Piets, > in Proceed¬ ings of the Society of Antiquarians of Scotland (Edinburgh 1892) ; id., (Celtic Britain) (3d ed., London 1904).

OGDEN, Aaron, American soldier: b. Eliza¬ bethtown, N. J., 3 Dec. 1756; d. Jersey City, 19 April 1839. He was graduated at Princeton College in 1773 and in 1777 he joined the army and served with distinction during the whole Revolutionary War, at one time under Lafay¬ ette, and obtaining the personal commendation of Washington. At the close of the war he was discharged with the rank of major. He afterward practised law, and was a Presidential elector in 1800. He was one of the commis¬ sioners for adjusting the disputed boundary be¬ tween the States of New York and New Ter- sey; from 1801 to 1803 was United States senator, and in 1812 governor of New Jersey. He was president of the Society of the Cincin¬ nati during the last decade of his career. Con¬ sult Dayton, A. O., (Addresses before the Whig and Cliosophic Societies of the College of New Jersey > (Princeton 1839) ; Collections of the New Jersey Historical Society) (Vol. VII, Newark 1872).

OGDEN, Francis Barber, American in¬ ventor: b. Boonton, N. J., 3 March 1783; d. Bristol, England, 4 July 1857. He was aide-de- camp to General Jackson in the battle of New Orleans; is said to have been the first to apply the principles of the expansive power of steam and the use of right angular cranks in marine engines. In 1813 he obtained a patent for con¬ densing engines of low pressure and with two cylinders, in which the above principles were utilized. In 1817 the first engine ever built on these lines was constructed by him in Leeds, England. The first screw propeller success¬ fully introduced into practical use was launched by John Ericsson on the Thames, May 1837, and was called the Francis B. Ogden. The building of the first screw propeller for Ameri¬ can waters, the iron vessel Robert F. Stockton, was superintended by Mr. Ogden in Liverpool, where he was United States consul (1829ˆ-0). From 1840-1857 he was consul at Bristol.

OGDEN, Frederick Nash, American mili¬ tary officer: b. Baton Rouge, La., 25 Jan. 1837; d. New Orleans, La., 25 May 1886. After en¬ gaging in mercantile life from boyhood he en¬ tered the Confederate army at the outbreak of the Civil War, and subsequently became major of heavy artillery and lieutenant-colonel of cav¬ alry. At the close of the war he resumed com¬ mercial life, and in 1868 founded the Crescent City

Democatic Club, a powerful political or¬ ganization. He was made major-general of State militia; and was president of the Red Cross Association of Louisiana during tho yel¬ low fever qpidemic of 1878.

OGDEN, Herbert Gouverneur, American cartographer: b. New York, 4 April 1846; d. 1907. He was educated in private schools; in 1863 was appointed an aid in the United States Coast and Geodetic Survey and an as¬ sistant in 1869. He served with the army on the defenses of Washington in 1864, accom-

panied the Nicaragua expedition in 1865, and the earliest naval exploring expedition to the sthnnis of Darien in 1870 as topographer, and had charge of the party sent to locate the in- ternational boundary between British Columbia and Alaska, in 1893. He was a recognized ex¬ pert in topography and cartography.

OGDEN, Peter Skene, British-American fur-trader: b. Quebec, 1794; d. Oregon City, Ore., 27 Sept. 1854. His people had resided in New Jersey until the Revolution, when they removed to Canada, his father becoming a judge in the Admiralty Court at Quebec. He entered the service of the Hudson Bay Com¬ pany in 1821 after several years' connection with the Northwest Company. His travels for the company extended through many practically un¬ explored portions of northwestern United States and southwestern Canada, particularly along the great rivers. He named Mount Shasta, and his explorations extended east into Nevada and Utah. The present Humbolt River, Nevada, was originally named for him, and in Utah there are Ogden City, Ogden Canyon, Ogden Hole, Ogden River and Ogden Valley. From 1845 until his death his head¬ quarters were at Fort Vancouver, and after the retirement of Dr. John McLoughlin (q.v.) he became the ranking chief factor of the Colum¬ bia. He was said to be the best-known white

man west of the Rocky Mountains among the Indians. He was a man of high courage and resourcefulness and was warmly regarded by both his men and the Indians. His rescue of the women and children captured by the In¬ dians after the massacre at Whitman Mission in 1847, was among his last achievements, and the Indians themselves declared that they would not have surrendered the captives to another. He remained a British subject until his death. Author of (Traits of American Indian Life) (London 1853), a rare and quaint little volume dedicated to Lady Simpson, wife of Sir George Simpson of the Hudson Bay Company. Con¬ sult Elliott, T. C., (Peter Skene Ogden, Fur Traderˆ (1910) ; Laut, A. C., (Conquest of the Great North-West (1911).*

OGDEN, Robert Curtis, American mer¬ chant and philanthropist: b. Philadelphia, Pa., 20 June 1836; d. 1913. From 1885 he was a re¬ tail merchant, a member of the John Wana- maker firm. He is best known by his work in behalf of the cause of education in the South. He was president of the board of trustees of Hampton Institute, a trustee of Tuskegee In¬ stitute and president of the Southern Educa¬ tional Board and the Conference for Education in the South. His efforts were directed chiefly toward providing education for both negroes and illiterate whites through Southern agencies and in friendly co-operation between North¬ erners and Southerners. In 1903 Tulane Uni¬ versity gave him the degree of LL.D. in recog¬ nition of his services, and Union College and Yale University accorded him like recognition. He published (Samuel Chapman Armstrong, the Founder's Day address at Hampton Insti¬ tute (1894) ; (Pew Rents and the New Testa¬ ment (1892V; Sunday School Teaching)*

(1894).

OGDEN, Rollo, American clergyman and newspaper editor: b. Sand Lake, N. Y., 19 Jan. 1856. He was educated at Williams College,

Andover Theological Seminary and the Union rheological Seminary and was ordained in the Presbyterian ministry in 1881. He was asso¬ ciate pastor at First Church, Cleveland, Ohio, in 1880-81 ; was a missionary in the City of Mexico in 1881-83 and in 1883-87 he was

?oo^ of Case Avenue Church, Cleveland. In 1887 he engaged in literary work in New York. He joined the staff of the New York Evening Eost in 1891, and since 1 Feb. 1903 he has been editor of that publication.

?GDt?N' Ruth' the pen name of Fannie Ogden Ide, an American writer of juvenile stories. See Ide, Fannie Ogden.

OGDEN, William Butler, American rail¬ road president : b. Walton, N. Y, 15 June 1805; d. New York, 3 Aug. 1877. He entered upon a business career at an early age, was a mem¬ ber of the New York State legislature in 1834, and in 1835 he removed to Chicago where he established a real estate business. Upon Chi¬ cago's incorporation as a city in 1837 he became its best mayor, and he was closely identified with the early development of the city. He was an active promoter of the Chicago and Galena Railroad, of which he became president in 1847.

W3jS fieep^y interested in canal improvements and advocated the construction of a ship canal across the Michigan Peninsula. He became president of the Chicago, Saint Paul and Fond du Lac Railroad in 1855,

and was instrumental in merging it in 1864 with the Chicago and Galena and other smaller railroads into the Chicago and Northwestern Railroad, of which also he was president. He was the first presi¬ dent of the Union Pacific Railroad and a be- tfVer expansion of railroad service to

the Pacific. He was largely interested in the lumber trade and connected with many hospi¬ tals, educational and charitable institutions as an officer and benefactor.

OGDEN, Utah, city, county-seat of Weber County, at the junction of the Ogden and Weber rivers, and on the Southern Pacific, Union Pacific, Rio Grande Western, Oregon Short Line and Salt Lake and Ogden railroads, about 35 miles north of Salt Lake City and 10 miles from Salt Lake. It was founded in 1848, and in 1850, under the direction of Brig- Tarr}oy°Vnff (9-v-)» .it was laid out as a city. In 1851 it received its charter. Ogden is in a fertile agricultural region, and in the vicinity of valuable mines. The opening of the Ogden Canon is at the city limits, and its grand and picturesque scenery brings many tourists to the place. The water power of the falls is used for the electrical works which supply power, Jiffht an.d heat for Ogden and Salt Lake City! The chief industrial establishments are can¬ neries, pickle factories, beet-sugar factory, woolen mills, cement mills, can factories, cereal establishments, broom factory and brick and tile yards. It has an extensive trade in manu¬ factures and farm products, and is the dis¬ tributing centre of quite a region with which it is connected by railroads. The educa¬ tional institutions are the State Industrial School, State Institutions for the Deaf, Dumb and Blind, the Weber State Academy (Mor¬ mon), the Sacred Heart Academy (Roman Catholic) and public and parish schools. The government which is vested in a mayor, who

holds office two years, and a council is of the commission form, which replaced that of 1898. The mayor appoints, subject to approval by the council, the administrative officials except the treasurer, clerk, auditor, police justice and attorney, who are elected by the people. Pop.

(1920) 32,804.

OGDENSBURG, N. Y., city, port of entry, in Saint Lawrence County, at the confluence of the Saint Lawrence and Oswegatchie rivers, and on the New York Central and Hudson River and the Rutland railroads, about 170 miles, in direct line, northwest of Albany, the State capital. It is connected by ferry with Prescott, Ontario. It is at the foot of the deep-water navi¬

gation of the Great Lakes, has unusual facilities for transportation, has direct connection by rail with New York City and Boston, and steamer connection with all the lake and river ports. Shipping and wholesale dealing in lumber, grain and coal are its most prominent in¬ dustries. Several fleets of vessels are owned here. Other important industries are the manufacturing of silk, flour, gloves,' dress skirts, leather and brass goods, lumber and lum¬ ber products. The importations at the port of entry amount to about $22,000,000; exporta¬ tions, about $7,000,000. The prominent public buildings are the custom-house, a fine town- hall, an opera-house, two handsome club¬ houses, a state armory and seven large churches, including the Roman Catholic cathe¬ dral. Among the charitable institutions the most prominent is the Saint Lawrence State Hos¬ pital for the Insane, established and equipped at a cost of several millions, and supervised and superintended by specialists. Other insti¬ tutions are the City Hospital, United Helpers' Home, Saint John de Deo's Hospital (quaran¬ tine hospital), an orphanage and a home for the aged. The educational institutions are Saint Mary's Academy (free), public school free academy, public and parish schools and a public library. The library is built on a site of great beauty on the river front and surrounded by several acres of green lawn and trees. The building cost $50,000 and was paid for by the citizens of the city. By an act of the legisla¬ ture in 1901 the corporate limits of the city were extended. Pop. (1920) 14,609.

OGE, Jacques Vincent, zhak van-son o-zha, Haitian revolutionist: b. Dondon, Haiti, about 1755; d. Haiti 1791. He was a mulatto, but was born free and as a young man served in a Ger¬ man army there. In 1789 he represented Haiti in the Constitutional Assembly and when he returned to Haiti he took up the cause of the slaves. Unsuccessful in his petitions to the assembly, he formed a company in the United States in 1790 and led a revolt in 17T. He was victorious in several battles, but was ultimately defeated; the plea that his life should not be forfeited if he surrendered was disregarded and he was tried and sentenced to death and executed.

OGEE, o-je', in architecture, a molding con¬ sisting of two members, one concave and the other convex. An ogee arch is a pointed arch, the sides of which are each formed with a double curve. It is generally introduced over doors, niches, tombs and windows, its inflected curves weakening it too much to permit of its application for the support of a great weight.

OGEECHEE, o-ge'che, a river in Georgia, has its headwaters in Greene County, flows southeast into Ossabaw Sound, a course of about 200 miles. Savannah is 17 miles north of the mouth of the river. Where the waters enter the sound a number of islands have been formed, largest of which is Ossabaw. The river is navigable for small steamers for some distance from the ocean.

OGGIONE, od-jone, or OGGIONO, Marco da, Italian painter : b. Oggiono, Lom¬ bardy, about 1470; d. between 1530 and 1540. He studied religious painting under Leonardo da Vinci as early as 1490 and was the oldest of that master's scholars. One of the finest of his pictures is (The Three Archangels) in the Brera at Milan. He is, however, best known for his copies of generally attributed to Leonardo, is undoubtedly the work of Oggione whose creations are not unfrequently credited to his greater teacher. A (Salvator Mundi, in the Detroit Museum, is said to be the work of Oggione.*

OGILBY, o'g'l-bi, John, British writer: b. in or near Edinburgh, November 1600; d. London, 4 Sept. 1676. His father was of a good family but lost his fortune and became a prisoner in the King's Bench ; but young Ogilby hoarded small savings, adventured in the Vir¬ ginia lottery and won sufficient money to free his father and start himself in life. He was tutor to the children of the Earl of Stafford, lord deputy of Ireland, and afterward he owned a prosperous lfttle theatre in Saint Werburgh street, Dublin. The misfortunes of the Civil War ruined him and he made his way to Cambridge, where he gained the interest of scholars there and taught Latin. He trans¬ lated Virgil and received a considerable sum for it, and later realized a further sum by a translation of ˆEsop. He then learned Greek and made translations of the (Iliad) and (Odyssey > of Homer, in which he is supposed to have been assisted by Shirley. After the Restoration he gained the favor of Charles II, established another theatre in Dublin and later removed to London where he set up a publish¬ ing business. His plant was destroyed in the great fire of 1666, but he was enabled to rebuild his establishment and was known for the fine work produced. Many of the books were in folio form with engravings by Hollar and others of note. He produced sumptuous edi¬ tions of his own translations from the classics, and later issued many profusely illustrated vol¬ umes on geography and typography. His trans¬ lations and his verse were ridiculed by Dryden and Pope, but Pope is credited with borrowing from the despised translations of Virgil.

OGILVIE, 6 gl-vT, Clinton, American painter: br New York, 28 Dec. 1838; d. 1900 After studying under James McDougal Hart (q.v.), he started oij his student-travels in Europe and spent much time in the art gal¬ leries and studios of Paris (1866-67, 1872-73). In 1864 he was elected an associate of the Rational Academy. He has been successful as a landscape painter and has generally gone to

Switzerland or France for his subjects. His best-known pictures includes (The Valley of Schwytz, Switzerland } ; (Lake Como near Bel- lagio ; Among the Adirondacks> ; ; and

OGILVIE, William Henry, Australian poet and journalist: b. Holefield, Scotland, 21 Aug. 1869. He went to Australia at the age of ZO, where he was soon in the bush, breaking horses and driving, at which he spent 11 years, also sampling sheep and experiencing station life in all its phases. He finally became over¬ seer of the station. While there he wrote verses for the Sidney Bulletin. In 1905-07 he was professor of agricultural journalism in Iowa State College in the United States. Among his published works are (Fair Girls /?™19ray,Horses> 0891.) ; ˆHearts of Gold (1901); (My Life in the Open* (1908); (Whaup o' the Rede* (1909); (1913);*

(1914).

OGILVIE-GORDON, Mrs. Maria M., Scottish geologist : b. Aberdeen, 19th century. She was educated at Ladies' College, Edinburgh, University College, London, London Univer¬ sity and at the University of Munich. She was the first woman to be awarded a Ph.D. at the University of Munich. She has specialized in observations of the volcanic and dynamic phe¬ nomena of the dolomites, South Tyrol, and disproved ***the applicability of Darwin's coral- reef theory to the dolomite reefs in this area. She has also made investigations of the micro¬ scopical structure of the skeletons of both fossil and recent corals. Author of (1893);***

(Coral in the Dolomites) (1894); (Microscopic and Systematic Studv of the Madreporian Types of Corals* (1895-96); (1898-99);

OGLESBY, o'g'lz-bi, Richard James,

American soldier and lawyer: b. Oldham County, Ky., 25 July 1824; d. Elkhart, Ill., 24 April 1899. He removed with an uncle to Deca¬ tur, Ill., in 1836, studied law there while engaged in the carpenter's trade and gained admission to the bar in 1845. He served in the Mexican War with the rank of lieutenant and later entered the Louisville Law School, where he was grad¬ uated in 1848. In 1851 he resumed his law prac¬ tice in Decatur, Ill., and in 1860 was elected to the State senate from which he resigned to enter the Union army. At Forts DoneLson and Henry he performed distinguished service and in 1862 was promoted brigadier and later major- general of volunteers. He was at the battles of Pittsburgh Landing and Corinth and was com¬ pelled to resign in 1864 because of his wounds. In 1865-69 he was governor of Illinois and in 1872 was re-elected but declined the office to become United States senator in

1873-79. He was again governor in 1885-89.

OGLETHORPE, o'gl-thorpe, James Ed¬ ward, English soldier and colonist : b. London, 21 Dec. 1696; d. Cranham Hall, Essex, 1 July

1785. In 1714 he joined the army of Prince Eugene as aide-de-camp, whom he served with distinction in the campaign against the Turks, 1716-17, especially at the siege and capture of Belgrade (q.v.). In 1722 he was sent to Parlia¬ ment as member for Haslemer. Becoming ac¬ quainted with the abuses of the debtor's prison in London, he made them known to Parliament and was appointed chairman of a committee for their investigation. His work in behalf of in¬ solvent debtors, thus begun, was continued in his project for their colonization in North America, in connection with which he also aimed at an asylum for oppressed Protestants of the European continent. With others in 1732, he obtained a charter for a tract of land between the Altamaha and Savannah rivers and in January 1732 Oglethorpe with a party of 120 colonists arrived at Charleston. Soon after¬ ward he founded Savannah (q.v.) and for 10 years he served as governor of the colony of Georgia, named in honor of George II. By his defense of the colony and neighboring territory of the South against encroachments of the Spaniards and Indians from Florida and his efforts to secure the trade of the Cherokees, he rendered services to England quite beyond the ordinary work of colonial administration and laid for Georgia the foundation of a stable commonwealth. Besides the defenses which he gathered in the colony, in 1738 he brought a regiment of volunteers from England, and in the war of Jenkins' Ear (see Colonial Wars in America), he vigorously laid siege to Saint Augustine, with 2,000 men, but the inadequacy of his force prevented him from capturing the place. He achieved an important success in holding Amelia Island against the Spanish at¬ tack, and another by his victory at Frederica, in 1742. In 1743 Oglethorpe returned to Eng¬ land, and two years later was made major- general. He had brought himself into financial straits by advancing money for defensive needs in Georgia. In 1745 he served against the Stuart invaders, and pursued the Jacobite fugi¬ tives. He was court-martialed for failing to overtake them, but honorably acquitted. Ogle¬ thorpe and his fellow-trustees of Georgia sur¬ rendered their charter in 1752, and the colony became a royal province. In 1765 he was raised to the rank of general in command of all the king s forces. His interest in American affairs never abated, and he was one of the first to wait upon Mr. Adams, after his arrival in Eng¬ land as Ambassador, to whom he expressed his esteem and regard for America, and his satisfac¬ tion at the termination of the difficulties be¬ tween Great Britain and her colonies. Consult Bruce,

*Henry, (Life of General Oglethorpe * (New York 1890) ; Cooper, H. C., (James Og¬ lethorpe, the Founder of Georgia* (New York 1904) ; (Journal of the Earl of Egmont**

(Atlanta 1908) ; Sparks, (American Biography, 2d series, Vol. II, for a memoir of Oglethorpe by W. B. O. Peabody; Wright, (Memoirs of James Oglethorpe) (1867) ; and Lecky, Eng¬ land in the 18th Century) (Vol. I, 1879).*

OGLETHORPE UNIVERSITY, Atlanta, Ga., a coeducational institution established under the auspices of the Southern Presbyterian Church, with a Presbvterian directorate. It is a successor of the former Oglethrope University which was established in 1835 and had a sue-

cessful existence until the disturbances of the Civil War interrupted its operation and re¬ sulted in its closing in 1872.

OGMORE AND GARW, 6g'm5r and gar'oo, Wales, town in Glamorganshire, near Bridgend. There are the Norman ruins of Ogmore Castle, and those of the fortified priory of Ewenny, dating from 1146. The town is situated in an important coal-mining district. Pop. 26,741.

O'GORMAN, James Aloysius, American jurist and politician: b. New York, 5 Mav 1860. He was educated at the College of the City of New York and at New York University, and was admitted to the bar in 1882. He was justice of the District Court of New York in 1893—1900, and of the Supreme Court of New York in 1900-11. He served in the United States Senate in 1911-17, and in 1912 was a member of the executive committee of the Democratic National Committee. He resumed his law prac¬ tice in New York in 1917.

O'GORMAN, Thomas, American Roman Catholic prelate: b. Boston, Mass., 1 May 1843. His early education was obtained in Chicago and Saint Paul, and from his 10th to his 22d year he studied in France. From 1867-78 he was pastor at Rochester, Minn., from 1878-82 a member of the Paulist community, New York City, and from 1882-85 pastor at Faribault, Minn. Chosen first president of Saint Thomas' College, Merriam Park, Saint Paul, he was for four years its professor of dogmatic theology, and in 1890 was called to the chair of Modern Church History in the Catholic University,

Washington, D. C. On 19 April 1896 he was consecrated bishop of Sioux Falls by Cardinal Satolli in Washington. Bishop O'Gorman is an authority on mooted historical questions and the author of a (Historv of the Roman Catholic Church in the United States/ When, in 1902, President Roosevelt sent a commission to Rome to treat with Vatican on Philippine matters, Bishop O'Gorman was chosen one of the mem¬ bers.

OGOWAI, o-go-wa', or OGOVE, 6-go-va', the principal river of the French Kongo, equa¬ torial West Africa. It has a densely forested and wide delta on the western coast near Cape Lopez. Its sources are in the Cristal Range, about 130 miles west of Stanley Pool, and it reaches the Atlantic after a northwesterly, cir¬ cuitous course of about 700 miles, 200 miles of which from the mouth are navigable by small steamers. It has several tributaries, the chief of which are the Ivindo and the Lolo. The river was discovered by Du Chaillu in 1857 and explored by him (1857-59). It flows through a densely populated country; and along its banks are a number of European posts and trading stations.

O'GRADY, Standish, Irish author: b. Castletown Berehaven, County Cork, 18 Sept. 1846. He was educated at Trinity College, Dub¬ lin, was called to the bar and later abandoned law for literature. He has devoted himself chiefly to the romances and history of Ireland, and is generally credited with the initiation of the movement known as the Celtic Renaissance. He is editor of Pacata Hibernia, and author of (History of Ireland, Heroic Period) ; (History of Ireland, Critical and Philosophical Period) ;

(The Flight of the Eagle) ; (The Bog of Stars ; (Finn and His Companions) ; (Lost on Du- Corrig) ; (The Coming of Cuculain/ etc.*

O'GROWNEY, Eugene, Irish Gaelic scholar: b. Ballyfallon, County Meath, 25 Aug. 1863; d. Los Angeles, Cal., 19 Oct. 1899. He was educated at the Diocesan Seminary at Navan, and at Maynooth College, and was or¬ dained in the Roman Catholic Church, 24 June 1889. He was appointed curate at Ballynacargy, County Westmeath, immediately after his or¬ dination and remained there until 1891, when he became editor of the Gaelic Journal and was appointed professor of Irish at Maynooth Col¬ lege. He had from his student days taken a keen interest in the Irish language and spent many of his holidays in the Isles of Aran and in the sections of Connemara and Cork where the language remains pure. Under the strain of his many duties at the college, together with the editing of the Gaelic Journal and attending to its wide correspondence, Father

O'Growney's health began to fail. He nevertheless suc¬ ceeded in preparing a summary of Irish gram¬ mar, two parts of a series of Irish readers, and one part of a manual on Irish composition. He is credited with being one of the leaders of the Irish language awakening; was actively con¬ nected with the establishment of the Gaelic League in 1893, and that year inaugurated the (Easy Lesson in Irish/ which appeared in Free¬ mans' Journal and in the Gaelic Journal ; and afterwards were published in book form as (Simple Lessons in Irish/ forming, an import¬ ant contribution to the Irish language movement. In 1894 he was granted leave of absence and went to Arizona for his health. He failed steadily, however, and died at Los Angeles in 1899. Four years later his body was taken to Ireland for interment. Consult O'Farrelly, Agnes, (Leabhar an Athar Eoghan, the O'Grow- ney Memorial Volume (Dublin 1904).*

OGSTON, og'ston, Sir Alexander, British surgeon : b. Edinburgh, 1844. He was educated at Aberdeen University, was assistant profes¬ sor in forensic medicine there in 1866-73, lec¬ turer in surgery in 1874-82, professor of sur¬ gery in 1882-1910, and since then professor emeritus. He is famous for operations correct¬ ing knock-knee and flat foot and for frontal sinus disease. He was with the British army in the Sudan in 1885, and again in the South Af¬ rican War in 1899-1900, receiving rank as hon¬ orary colonel in the Royal Army Medical Corps. He was honorary surgeon in Scotland for Queen Victoria and King Edward VII, and is surgeon in ordinary for King George V in Scotland. He was knighted in 1912 and in 1914-15 he was president of the British Medi¬ cal Association. In the European War he served in Serbia in 1915 and in Italy in 1916—17. Author of Contributions to Medical Sci- ence) (1869); (Surgical Papers> (1871);

(1899).

O'HARA, o-har'a, John Bernard, Aus¬ tralian poet: b. Bendigo, Victoria, 29 Oct 1864. He was graduated from Melbourne University in 1885 and four years later he became princi¬ pal of Melbourne College, a position he has re¬ tained ever since. He is the author of (Songs of the South) (1891-95) ; (Lyrics of Nature>

/lonˆ; (19°2); 'Odes and Lyrics' (1906). J

O'HARA, Theodore, American soldier and poet: b. Danville, Ky., 11 Feb. 1820; d. near Guerryton Barbour County, Ala., 6 June 1867. be studied law and was admitted to the bar; but quitted it to become an officer in the United States navy. He was connected with the Lopez and Walker movements, and served as captain and major in the Mexican War. In the Civil \ ar he was a colonel in the Confederate serv¬ ice. His famous poem, (The Bivouac of the Dead,' was written in commemoration of the Kentuckians killed in the battle of Buena Vista during the War with Mexico. Consult Rauck,

G. W., (0'Hara and his Elegies' (Baltimore

1875).

O HIGGINS, 6 hig'mz (Sp. o-e'gens), Am- brosio. South American administrator : b. County Meath, Ireland, about 1730; d. Lima, Peru, 18 March 1801. His real name was Am¬ brose Higgins. His uncle, who was a Spanish priest, had charge of his education and sent him to South America. He went to Buenos Ayres first and then to Chile, where he was a trader and peddler for several years. He entered the Spanish army, distinguished himself in the Araucanian wars, where he had command of the frontier against the Indians, with the title of intendant. He rapidly rose in rank until in 1788 he was made captain-general of Chile. His rule there proving very successful, he was given the title of Marquis of Orsino and appointed viceroy of Peru in 1796, where he also proved an excellent ruler and retained this latter office until his death. His son Bernardo O'Higgins (q.v.) also played an important role in Chilean history.

O'HIGGINS, Bernardo, Chilean soldier and dictator: b. Chilian, Chile, 20 Aug. 1776; d. Lima, 24 Oct. 1842. A natural son of Ambrosio O'Higgins (q.v.), he was educated in England, where he became a republican under the in¬ fluence of Miranda and others. He returned to Chile in 1802, and in 1810 joined the Chilean revolutionists. In 1813, when Carrera was de¬ posed from the supreme command of the army, O'Higgins was appointed to succeed him. He met with constant opposition from Carrera and his faction and civil war was imminent, when a Spanish army from Peru entered the country and the two factions combined to withstand the Spanish attack. The Chileans tinder the command of O'Higgins met the Spaniards at Rancagua, 2 Oct. 1814 and were defeated on account of Carrera's failure to bring the rein¬ forcements expected. The leaders fled across the Andes, but O'Higgins, in 1817, joined the invasion under San Martin as one of the chief lieutenants. The charge under his leadership decided the Chilean victory at

Chaeabuco, 12 Feb. 1817. He was then made dictator of Chile, after San Martin had declined the office. Under his rule the independence of Chile was formally declared and the Spaniards driven out. His administration was efficient but his republican sentiments and his attempts to estab¬ lish a representative constitutional government aroused the opposition of the aristocratic party, which, aided by the adherents of Carrera, re¬ belled and finally deposed him in 1823; he then went to Lima, Peru, where he spent the rest of his life. Consult Chisholm, A. S., (The Inde vol. 20 — 30

pendence of Chile' (Boston 1911); Vicuna- Mackenna, (Vida de Don Bernardo O'Hig¬ gins' (Santiago 1882).

O'HIGGINS, Chile, an inland province hounded north and west by Santiago, by Argen¬ tina on the east and by Colchagua on the south. Area, 2,342 square miles. Capital, Rancagua (q.v.). The surface in the west is level and is devoted to agriculture and pasturage; in the east the country is on the slope of the Andes and in this mountainous region gold and other metals are mined. The principal rivers are the Maipo and the Raipel. Pop. about 100,000.

. OHIO (Iroquois, Ohionliiio, ((beautiful river." Popular name, Buckeye State), a State in the north central part of the United States; bounded on the north by Michigan and Lake Erie, on the east by Pennsylvania and West Virginia, on the south by West Virginia and Kentucky, on the west by Indiana. ˆThe boundary lines dividing Michigan and Indiana irom Ohio, and Pennsylvania from Ohio to the Ohio River, are straight lines, the southern and southeastern boundaries are formed by the Ohio River. The State is between lat. 38° 27′ and 41° 57′ N. and long. 80° 34′ and 84° 49′ W. The maximum length, north and south, is 210 miles and east and west 215 miles. The area is. 41,060 square miles, of which 300 square miles are water surface. In size it ranks 32d among the States and was the fourth State ad¬ mitted into the Union.

Topography.- That portion of the State bordered by the Ohio River and Lake Erie has an irregular boundary. The course of the Ohio along the border is 436 miles ; the lake shore is 230 miles, giving the State a navigable water front of 666 miles. The largest inlets from Lake Erie are Sandusky and Maumee bays. In the portion of the lake between those bays are a number of islands, several of which belong to Ohio. The general surface of the State is a rolling plain, from 300 to 500 feet above Lake Erie, or from 900 to 1,200 feet above the sea. Some portions have an altitude of 1,500 feet; in Logan County, the western part of the State, is the highest point, 1,540 feet altitude,

and the lowest is the shore of the Ohio near Cincinnati. The divide between the rivers of Lake Erie and those of the Ohio River is a low ridge which crosses the State from the middle of the west¬ ern border, in Mercer and Darke counties, to near the northeastern boundary, in Trumbull County. The river channels are cut deep in many parts of the State and many of the banks are massive rugged rocks and huge boulders. The best harbors on the lake shore are Ash¬ tabula, Cleveland. Sandusky and Toledo.

Hydrography. — There are two drainage basins in the State ; the one sloping north toward Lake Erie, and the other south toward the Ohio. The rivers flow through valleys, some of which were at one time flood plains, but many of the streams have cut channels from 100 to 200 feet in depth and flow through low valleys. The Ohio River is in some places from 500 to 600 feet below fhe hills on either side and a considerable distance below the tops of the banks. The streams which flow south are the longest and deepest. The largest are the Muskingum, Mahoning, Hocking, Scioto, Little Miami and Great Miami. The longest wholly within the State is the Muskingum,

This river has been made navigable by slack- water and other improvements for about 100 miles from its mouth. The chief rivers in the northern basin are the Maumee, Portage, San¬ dusky, Huron, Vermilion, Black, Rocky, Cuya¬ hoga and Chagrin. Many of the rivers of the State furnish considerable water power and are a great aid in the development of manufactur¬ ing industries. There are no large lakes in the State, but in many parts there are groups of small lakes noted for their beauty. In Summit County there are several small lakes. The buried river channels which are found in many places in Ohio are of interest to the geologist. These channels have been filled in by sand, gravel, etc., and now the waters of rivers that once followed deeply excavated channels are flowing over beds far above their former bot¬ toms.

Geology. — There are no great breaks of the strata, nor any great variations in the geologi¬ cal structure of the whole State; the underly¬ ing sedimentary rocks show only a slight in¬ clination from the horizontal. There is a broad fold whose axis extends from the northeastern part of Indiana southeast to near Cincinnati, then crosses into Kentucky, extending to about the central part. This is called the Cincinnati Arch or anticlinal. From this arch the strata dip

westward to the coal fields of Illinois and south and southeast under the Alleghany coal fields. The elevation of this arch must have occurred at the close of the Lower Silurian pe¬ riod and prior to the beginning of the Upper Silurian period. The geological formations which are exposed are the Lower and Upper Silurian, the Devonian, the Carboniferous and the drift. In the Lower Silurian near Cincin¬ nati may be found the oldest rocks, called the Cincinnati Group. In but few localities is there found such a variety and richness of the fossil remains as in the beds of limestone and clay or marl in this vicinity. On the crown of the Cin¬ cinnati Arch, near the northern part, the for¬ mations of the Upper Silurian area may be seen. Near Sandusky is the Salina group, the forma¬ tion containing salt as at Syracuse, N. Y. Here also are beds of gypsum. In the western part and on the islands of Lake Erie is the water lime which is found in the Helderberg region of New York State. It flanks the Cincinnati Arch on each side. The corniferous limestone, the chief element of the Devonian in the State, forms two outcropping belts on opposite sides of the Cincinnati Arch, one crossing the north¬ west corner of the State and the other extend¬ ing from Sandusky to Columbus. Corniferous limestone forms the surface rock of Kelley's Island. This same rock is quarried at Kelley's Island, Sandusky, Columbus and other places in the State. The capitol at Columbus is built of this stone. In the corniferous rocks at San¬ dusky and Delaware are found the remains of fossil fish. The black shale, similar to that found in the Genesee Valley in New York State, is in the northwest corner of the State, and also a belt from 10 to 20 miles wide, ex¬ tends from the mouth of the Huron River to the Ohio. It is a black bituminous shale con¬ taining from 10 to 20 per cent of carbonaceous matter. It is the source of a large part of the oil and gas of Ohio. In this shale are found the remains of large fossil fishes. Bordering on the lake shore from the Pennsylvania line is

a mass of shale, the upper member of the De¬ vonian, and the continuation of the formations found in the Portage and the Chemung Valley of western New York. The eastern part of the State is underlaid by the Carboniferous forma¬ tion, an extension of the great Alleghany coal fields. The coal measures are composed of strata of shale, sandstone, coal, limestone and fire clay with iron ores are found in the eastern and southeastern part. These coal measures have an area of 10,000 square miles in Ohio. There are no formations later than the Car¬ boniferous until the period of the Glacial drift. All the State except the southeastern portion was covered with ice. The drift deposit in many places is several hundred feet deep. The Great Lakes once overflowed much of the State, as

may be traced by the existing raised beaches.

Minerals and Mining. — The value of the output of the mines, quarries and wells, in

1914, as reported by the United States Geolog¬ ical Survey, was $101,661,384, the most import¬ ant being bituminous coal, $21,250,642; natural gas, $14,667,790, and petroleum, $13,372,729. The State ranked fourth in 1914 in total value of mineral products, first in output of clay products, fifth in quantity and fourth in value of coal, fourth in quantity and third in value of natural gas and seventh in output of petro¬ leum. It has been estimated that at the present rate of consumption the State has bituminous coal enough to last 1,000 years. Fire clay of a superior quality forms the interbedding strata of the coal measures. Building stone and the carbonate variety of iron ore are also found here. The salt and gypsum deposits near San¬ dusky have already been mentioned. Petroleum was discovered in 1884 in the Trenton lime¬ stone formation of the Lower Silurian period, and both the Upper and Lower Silurian forma¬ tions had reservoirs of gas. The coal output of this State was, in 1880, 5,364,817 (long) tons; in 1890, 16,953,705; in 1910, 30,544,346, and in

1915, 22,627,046 (short) tons. The number of

employees engaged in the coal industry of the State is approximately ♦ (1915) 41,430. The

petroleum industry since 1885 has been most important. Production in 1890 was 16,124,656 barrels (42 gallons) ; in 1900, 22,362,730, and in 1914, 8,536,352. There are two distinct petro¬ leum districts : one, the Lima district, in the northwest, is the more important; the other, called the Eastern district, is in the southeast. Lubricating oil is obtained in what is called the Mecca-Belden district. There are two gas fields in the State ; that in the Eastern district was the first developed in the 70's. The gas was used wastefully and in a few years the sup¬ ply was almost exhausted. In 1880 the natural gas of the Eastern district used for light and fuel was valued at $5,000,000 ; in 1885 the value of the product from the same district was $100,000. About 1885 the gas fields near Find¬ lay, in the northwest, began to attract attention. Until 1889 the output of the northwest in¬ creased annually, then it began to decrease gradually until 1898, since when the annual out¬ put has increased. The natural gas industry of Ohio is a source of great advantage to its peo¬ ple. The latest data (August 1916) show that Ohio ranks first in*

the number of consumers of natural gas, 34 per cent of the total amount of natural gas consumers and 36 per cent of the domestic gas consumers in the United States

OHIO.

Estimated population, 5,273,814

COUNTIES

Adams . . G 6

Allen . c 4

Ashland . c 8

Ashtabula . All

Athens . f 8

Auglaize . C 4

Belmont . DIO

Brown . G 5

Butler . F 3

Carroll . . . . . CIO

Champaign . D 5

Pop.

24.755 56.580 22,975 59,547 47,798 31,246 76,856 24,832 70,271 15,761 26,351 66,435 29,551 23,680 76.619 30,121 34,036

637,425 Cuyahoga . B

42,933 ~

24,498 27,182 38,327 39,201

21.744

221,567 Franklin . E

23,914

25.745 14,670 29,733 42,716

460,732 Hamilton . F

37,860 30,407 19,076 25,119 28,711 23,650 17,909 34,206 30,791 65,423 30.181 22,927 39,488

Pop.

55,590 Licking . D 7

30,084 Logan . D 5

76,037 Lorain . B 8

192,728 Lucas . A 5

19,902 Madison . E 6

116,151 Mahoning . B 11

33,971

23,598

25,594

27,536

45,047

Marion . C 6

Medina . B 9

Meigs . F 8

Mercer . C 3

Miami . D 4

Pop.

3,618

265

142 234 290

1,059

3,493

723

143 353

1,931

209

1,542

270

821

541

Carthage . G 1 2

Casstown . D 4

Castine, Darke . . . D 3

Catawba . E 5

Cecil . : . . . . B 3

Cedarville . E 5

Celina . . C 3

Centerburg . D 7

Centerville . E 4

Centerville . E 4

Chagrin Falls . . . . B 10 Chambersburg,

Gallia . G 8

Chardon . A 10

Chatfield,

Crawford . C 7

Chauncey, Athens. F 8 Chesapeake, Lawrence

Erie

Geauga

Greene

. .E 5

24,244 Monroe .

. .E 10

G 8

163,763 Montgomery .

...E4

410 Chester Hill .

.F 9

. .F 5

16,097 Morgan .

. . .E 9

229 Chesterville .

.D 7

.C 11

16,815 Morrow .

. . .C 7

1,930 Cheviot .

G 12

. . D 9

57,488 Muskingum . . .

,..E9

2,950 Chicago Junction,

. .C 7

18,601 Noble .

,.E 10

Huron .

. B 7

. . B 9

22,360 Ottawa .

. . . A 6

309 Chickasaw .

.D 3

. D 3

22,730 Paulding .

. . .B 3

15,470 Chillicothe .

. F 6

. .B 3

35,396 Perry .

...E8

410,476 Cincinnati .

.F 3

. D 6

26,158 Pickaway .

,,.E6

6,744 Circleville .

. E 7

. . B 7

15.723 Pike .

...F6

784 Clarington .

E 11

. .E 7

30,307 Portage .

..B10

558 Clarksburg .

.F 6

. .E 6

23.834 Preble .

. . . E 3

425 Clarksville; .

.F 5

,.E6

29.972 Putnam .

...B4

674,073 Cleveland .

.B 9

. .A 4

47,667 Richland .

...C7

2,955 Cleveland Heights,

. .G 8

40,069 Ross .

...F6

Cuyahoga .

. B 9

.B 10

35,171 Sandusky .

. . B 6

1,423 Cleves .

F 3

. .E 5

48,463 Scioto .

. . . G 7

239 Clifton .

.E 5

. D 9

42,421 Seneca .

. . . B 6

305 Clinton .

.C 9

. .F 3

24,663 Shelby .

. . . D 4

222 Cloverdale, Putnam

. .C 5

122,987 Stark .

B 4

. .C 5

108,253 Summit .

. . . B 9

2,815 Clyde .

.B 7

D 10

52.766 Trumbull .

. .B 11

1,759 Coal Grove .

G 7

. B 4

57,035 Tuscarawas . . .

. . .D 9

1,111 Coalton .

.F 7

. .F 5

21,871 Union .

. . . D 6

869 Coldwater .

C 3

. . F 8

29,119 Van Wert .

...C3

379 College Corner . . .

. E 3

. .C 9

13,096 Vinton .

,..F7

1,979 College Hill .

.F 3

. . B 7

24,497 Warren .

...F4

1,582 Columbiana .

C 11

Jackson . F 7

Jefferson . D 11

Knox . D 8

Lake . A10

Lawrence . G 8

568

Aberdeen .

...G5

2,465

Ada .

. . . .C 5

176

Adamsville. . . .

. . .D 9

1,543

Addyston .

407

Adelphi .

. . . F 7

570

Adena .

. . D 11

85,625

Akron .

. . . B 9

546

Albany .

. . . F 8

414

Alexandria . . . .

. .. D 7

730

Alger .

. . C 5

18.960

Alliance .

. . .C 10

402

Alvordton .

... A 4

484

Amanda .

...F7

417

Amelia .

...F4

267

Amesville .

...F8

2,106

Amherst .

. B 8

1,041

Amsterdam . . .

..Dll

902

Andover .

..All

460

Anna. . .

. . . D 4

656

Ansonia .

. . . D 3

169

Antioch .....

. . E 10

1,187

Antwerp .

. . . B 3

400

Applecreek . . . .

...C9

380

Arcadia .

. . ,B 5

1,361

Arcanum .

. . D 3

1,082

Archbold .

. . B 4

798

Arlington .

. . C 5

468

Arlington Heights G 13

6,795

Ashland .

...C8

706

Ashley .

. . D 6

21,498

Ashtabula .

..All

972

Ashville .

. . . E 7

226

Athalia .

. . .G 8

5,463

Athens . ‘. . .

. . . F 8

3 719

Attica .

...B7

■I f 883

Bainbridge . . .

...F6

93240

Bairdstown, Wood B 5

M77

Baltic .

. D 9

31551

Baltimore .

...E7

13,210

Barberton .

. . . B 9

4,233

Barnesville. . . .

..D10

506

504

Barnhill,

Tuscarawas . Basil .

. . .D 9 ...E7

1,034

Batavia .

...F4

282

Batesville .

. .E 10

450

Bay, Wood . . . .

. . B 5

671

Beach City . . . .

. .C 10

564

Beallsville .

. . E 10

286

Beaver .

...F7

455

Beaverdam . . . .

1,783

Bedford .

. . . B 9

14,348

Bellaire .

.Dll

283

Bellbrook .

. . . E 5

889

Belle Center. . .

. . . D 5

9,237

Belief ontaine . .

. . D 5

689

Belle Valley. . .

. . . E 9

5,209

Bellevue .

. . . B 7

1,056

Bellville .

...C7

572

Belmont .

..D10

298

Belmore .

. . B 5

510

Beloit .

..C 11

1,249

Belpre .

. . F 9

352

Benton Ridge .

. . .B 5

45,422

38,058

25,198

46,330

20,760

2,609

1,011

554

1,201

486

720

682

169

1,813

602

185

610

754

1,953

567

579

Pop.

305

14,858

137

376

234

868

1,285

336

1,193

10,770

734

2,659

614

507

1,021

624

733

10.882

294

7,214

5.560

537

1,001

2,496

817

1,580

1,778

320

140

1,864

345

3,736

558

1,741

269

2,527

560

181

955

574

489

1,394

410

166

308

Washington . . . .

.F 10

214,878 Columbus .

.E 6

4,228

Wayne .

. .C 9

1,802 Columbus Grove .

.B 4

833

Williams .

..A3

234 Commercial Point

.E 7

6,237

Wood .

. . B 5

164 Congress .

.C 9

876

Wyandot .

. .C 6

9,064 Conneaut .

A 11

837

1,074 Continental .

.B 4

643

illages, Etc.

741 Convoy .

.C 3

366

370 Coolville .

.F 9

676

Berea .

. . B 9

1,564 Corning .

.E 8

Bergholz .

.D 11

612 Cortland .

B 11

1,019

Berlin Heights. .

. .B 7

146 Corwin, Warren . .

.F 4

276

Bethel .

. F 5

11,570 Coshocton .

.D 9

40,496

Bettsville .

. .B 6

1,848 Covington .

.D 4

596

Beverly .

. .E 9

3,807 Crestline .

.C 7

361

Bexley, Franklin

. . E 6

970 Creston .

.C 9

662

Blakeslee .

. A 3

526 Cridersville .

• C 4

331

Blanchester . . . .

. .F 4

3,028 Crooksville, Perry

E 8

317

Bloomdale .

. . B 5

295 Crown City .

. G 8

239

Bloomfield, Jefferson

609 Cumberland .

.E 9

286

D 11

345 Custar .

1,368

Bloomingburg . .

. .E 6

4,020 Cuyahoga Falls . .

.B 9

364

Bloomville .

. . B 6

699 Cygnet .

. B 5

474

Bluffton .

. .C 5

599 Dalton .

.C 9

410

Bolivar .

. .C 9

373 Danville .

. D 8

Botkins .

233 Darby vilie .

.E 6

2,823

Fernbank . G 11

Findlay . B 5

Fitchville . B 7

Fletcher . D 4

Florida . B 4

Flushing . D10

Forest . C 5

Fort Jennings . C 4

Fort Recovery .... D 3

Fostoria . B 6

Frankfort . F 6

Franklin . F 4

Frazeysburg . D 8

Fredericksburg .... C 9 Fredericktown .... D 8

Freeport . D 10

Freeport . D 10

Fremont . . . B 6

Gahanna . D 7

Gallon . C 7

Gallipolis . . . G 8

Gambier . D 8

Garrettsville . B 10

Geneva . All

Genoa . B 6

Georgetown . G 5

Germantown . E 4

Gettysburg . D 4

Geyer, Auglaize . . . C 4

Gibsonburg . B 6

Gilboa . B 5

Girard . B 11

Glandorf . B 4

Glendale . F 13

Glenmont . C 8

Glouster . F 8

Gnadenhutten . . . D 9

Gordon . E 3

Grafton . B 8

Grand Rapids .... B 5 Grandview Heights,

Franklin . E 6

Granville . D 8

Gratis . E 3

Graysville . . . E 1 0

Green Camp . C 6

Greenfield . F 5

Greenspring . B 6

Greenville . D 3

Greenwich . B 7

Grove City . E 6

Groveport .... E 7 Grover. Jefferson .Dll Grover Hill,

Paulding . B 3

Hamden, Vinton . . F 7

Hamersville . F 5

Hamilton . F 3

Hamler . B 4

Hanford. Franklin . E 6 Hanging Rock .... G 7

Hanover . D 8

Hanoverton . C 11

Harpster . C 6

Harrisburg . E 6

Harrison . F 11

Harrisville . D 11

Harrod . C 4

Hartford,

Trumbull . B 11

Hartwell . F 12

142

Bourne vilie .

. .F 6

127,224 Dayton .

. . E 4

359 Harveysburg . . .

. .F 4

514

Bowerston .

D 10

223 Deavertown ....

. . E 8

391 Haskins .

. .B 5

297

Bowersville .

,E5

187 Deersville .

.D 10

233 Haviland .

. .C 3

5,222

Bowling Green . . .

.B 5

7,327 Defiance .

. . B 4

338 Hayesville .

. ,C8

1,844

Bradford .

. D 4

1,082 Degraff .

. .D 5

677 Hebron .

,.E7

890

Bradner .

. B 6

9,790 Delaware .

. ,D 7

305 Helena .

. .B 6

690

Bratenahl,

872 Delhi .

.G 12

452 Hemlock .

. .E 8

Cuyahoga .

B 9

373 Dellroy .

. D 10

2,395 Hicksville .

. ,B 3

925

Bremen .

.E 8

5,038 Delphos .

. .C 3

417 Higginsport . . . .

. .G 5

3,974

Bridgeport .

D 11

1,689 Delta .

. .A 4

272 Highland .

. F 5

742

Brilliant .

D 11

4,008 Dennison .

DIO

370 Hilliard .

. .E 6

341

Brink Haven . . . .

. D 8

1,515 Deshler .

. . B 4

4,296 Hillsboro .

. .F 5

400

Brooklyn Heights

:.B 9

235 Dexter City ....

. .E 9

422 Hiram .

. B 10

383

Brookside,

1,519 Dillonvale .

D 11

1,095 Holgate .

. . B 4

Belmont .

D 10

202 Donnelsville ....

,.E5

287 Hollansburg. . . .

. D 3

1,187

Brookville .

.E 4

877 Doylestown .

. ,C 9

786 Holloway, Belmont

195

Broughton .

. B 3

1,549 Dresden .

. . D 9

D 10

3,641

Bryan .

B 3

239 Dublin .

. D 6

320 Holmesville .

. .C 9

1,180

Buchtel .

.F 8

1,109 Dunkirk .

. ,C 5

391 Hopedale .

. D 11

269

Buckeye City. . . .

.D 8

334 Dupont .

. .B 4

404 Hoytsville .

. .B 5

304

Buckland .

. .C 4

13,214 East Cleveland .

.B 10

1 699 Hubbard .

.B 11

9,103

Bucyrus .

. .C 6

22,586 East Liverpool. .

.C 11

1,021 Hudson .

. B 10

351

Burbank .

. ,C 8

3,537 East Palestine ..

.C 11

328 Huntsville .

. .D 5

236

Burkettsville. . . .

.D 3

479 East View, Jefferson

1,756 Huron .

. .B 7

650

Burton .

B 10

D 11

221 Idlewood, Cuyahoga

730

Butler .

. -C 7

4,972 East Youngtown,

B 9

96

Butlerville,

Mahoning . . . .

B 11

13,949 Ironton .

. .G 7

Warren .

.F 4

3,187 Eaton .

,.E3

100 Ithaca, Darke . .

. .D 3

3,156

Byesville .

E 10

1,072 Edgerton .

,.B3

5,468 Jackson .

1,971

Cadiz .

D 1 1

387 Edison .

. .C 7

55 Jacksonboro,

87

Calais .

E 10

678 Edon .

..A3

Butler .

. .F 3

1,430

Caldwell .

E 10

321 Eldorado .

. .E 3

685 Jackson Center .

. .D 4

562

Caledonia .

. .C 6

129 Elgin, Van Wert.

. .C 3

1.285 Jacksonville . . . .

13,483

Cambridge .

. D 9

447 Elida .

. ,C 4

1,133 Jamestown .

. .E 5

899

Camden .

. E 3

937 Elmore .

. B 6

1,461 Jefferson .

.A 11

6,621

Canal Dover .

D 10

3,423 Elmwood Place. .

.G 12

716 Jeffersonville .

. .E 6

978

Canal Fulton . . .

,C 10

18,618 Elyria .

. . B 8

259 Jenera .

. .C 5

740

Canal Winchester. E 7

509 Empire .

.C 11

314 Jerome vilie ... .

. . C 8

685

Canfield .

B 11

249 Enon .

. . E 5

458 Jerry City. Wood..B 5

451

Cannelville,

1,953 Euclid .

.A 10

242 Jerusalem .

• E 10

Muskingum . . .

. E 9

292 Fairfield .

,.E5

917 Jewett .

.D 10

60,852

Canton .

C 10

2,263 Fairport .

.A 10

805 Johnstown .

,.D7

1,349

Cardington .

.D 6

346 Fairview .

D 10

811 Junction City .. .

. .E 8

2 225

Carey .

.C 6

437 Farmersville . . . .

. ,E 3

770 Kalida .

. .C 4

116

Carlisle .

915 Fayette .

. .A 4

1,017 Kelleys Island . .

. .B 7

284

Carroll .

.E 7

370 Fayetteville ....

. .F 5

1,561 Kenmore Summit . B 9

1,730

Carrollton .

C 10

578 Felicity .

. .G 4

A

B

41

c

D

40

E

F

33”

G

Bankers

CoDDOttUt JO.

jj.ii.nc

Youngs dle> <*

r Sturgis

White Pigeon

Tryonrllle

Llnoevillo

TrTTuti

*r»j*ttocj*

li-ordtoo

T“ ! Tii’n*

)Concora o LCUtk ofaUH*

vCbardon

‘Meadville

Buchanan

°Cooo0J Tf/rn

“r l . , ° Bridarfwal*

*Columbia j/nkie M on tpel ier/^^*

WstXL I A

sY Pulaski ‘Mribwii Bryan /

-Oak Shad C»ra,*

Lagrange

Titusville 1

*Angola**

10 Holland

K SOLE vs I. [lleys Island.

hour ValUy \ well Lin

'Ottokee

Eckltj

Steubenville,

6.Eadi,llG = E A U GlA W

> ' °ilM HIIU B"l~ h

> Chagriog 'ibddlflleld \0 IL< "

*•nL F«lil JT ^ „ Bun-lysbuEgN***

*v(jA>3 , °SlMe1o P«\km*a*

>tg^olo°Au>.u?a W.Pai&agff

Blukeel

'£trVke£^7>o/J

o/Now Paris ^(Milford Jo.

, Onato»ut° L,,,. >d?J Gt»n«>,urglVlilO(O IN JHoomllcId^ I *

illfl ^"Urnerl/ Bu

T Cot Hand i ,

onKa <|v^OlM>gY'lll•,

iJ \M/B lT(L L •X \Xx, PkTyrrel AA/ Warren\ [^jfNDrooklWd V

Stoneboro

olSnn/ j Rapid AfV y\u*

vj^ol c t lure/ W«too J*

1 > R V I \f/ P°‘t«*0 , J \ V Rudolf’ Wwthop*’^,/ Custar I*1? L/ Farnham /

, , A Juait Ridgoo r (Okolom

/A N\C E /

‘Moats Vlvweiur

‘Ciooro

IndaN^.

- “ ll l > OOd*OC9C

*olu wnhia Brec)tavUle >

N fStroogsiill* A’of,

Brua»wi

uv (Hinckley O

l // R.chprld.

i&V** i ‘

ahoron

Tremont

/*•

Mercer

Warsaw

Laotto

^Pymatuning d/Sharpsvllle ‘SNharon _ .

8blppen6vill

6 Mnlintft/ Stno’ll*/’

Mnr»o,

lichfi.ld)

,»-’’’’|pot,tiK’0’Vj]joE;*

Antwi

Toxburg

‘.Pollock

unction t j Charluei

/Watson L.cTi /cj

E„t-C »AfF3

-j/jlepublicL,J vnSwandpr^-7^-L ‘

**^1 _ 3om,1’le / CbiJa?o Jc?S Carrotbeta*x(New Haven*

Columbia

Paulding’

,P A U L

n01ena N. Fairfield f .i° Fltuh-o) ville V

Ohool

South Whitley

»lorl’,m.r{V“bu,tll/

Ll/l M, A HlO_NJ-N-G_l

TBotlm Cooler T New Middlotowo J’elerthTUg0

“Branch toi

U illiards

(Chippewa LakeR .

I I N A'il

W «’» I”!!!*

“X

LyˆPArcad

/ W,4tO fodepeodeoc

7ndlav

HSibcr S

Castle

North Manchester

Sˆ’-tfˆNova/ –

–

[ˆ7 Albio

AshJandVˆˆ- .ovˆThb. rg/ Row! s

‘aSHLAv

. v .lorotnottillaˆ

%/3la..,™

£t,“T3|Mni.

/LANNiPt1 MoZenao

f LucasˆAj-PerryS- Cw»i J

[Lexington cille— — —

. Unoi.ogi •

°NA»filU fcEoodon U® r. Lookh.lt >4. ,,*

*[5KT *)B,‘’»neAA H*

.ningtown

Oteˆow

-Bolivar.

Redback

‘Moravia

Newport

WWainpum.

‘Scott .oS

r °ƒL l,u,“SUD/e»oro rk*

i’V ?«r>bˆA Ncoqi yiie.X i”“’»«o»nL fS |

/I «lam

I N – /17

■ — ˆ — f’ b. Patlteraon/

*ma“fV *”• lo/ Jhf-lH A R Dirt 7N ■ ‘*

ayoMtloId’ˆ ˆ /

g’” M V.».4I.Vˆ*

8mith»illy>xf ˆ/Lswi OrrviUˆrˆˆ“f ‘ i\ ton1-

]V\V OOltfcl EAGrof*

f GrooololWn ‘Clinton »\ I o «*

V DixonJ1

Y «.|,

t. Cavett

’ U i /oli ear wordˆnTi ro ■ IjSulphur 8pn. ‘S.

’Rcjlhavr °|j

gl“P. Cederi*

j’ Volley V

Q Heediburg Ssj Plain0

*Huntington**

Kittanningl

*RyKr#‘*T° 1*

*>3LouiSvliUa’ vno«n«;*otfh*

gˆom.bu\u . i

*lh*lbjr Jo-*

.Shelby

Lerneri

v,

/W«iet lord’sˆ [.•‘E.Pnlestine [Lisbon _

Harmony

Butler

[omewood

Landeckj

, Canncltc

Lce»ille Crow*

*i c »>‘ *

*I ˆ Uarpster |Mare*jilles V*

- , _il»er.-reek / l

*° Mi o Ronodhead ViJ 1.. LarueVˆ – ol_*

v4» – “‘YoWerloa /L. \Mt ˆffTYrecnˆCˆ

oNcVlUmpehire ryjf Victloryˆ-ˆl ‘i. . <

- | s‘o

>3ˆ ><» .1 / “Bjh.IL /

oTHunts/ Rusbelyfrauia /

“■iv r111”/ M.Siiwd ; ft?® >/ »>. [•jXp\G/ A N.V.-C” <$^ci.ib*

. / ^ — \/«,,\ofontalUP Broadway/

— forTVs. • UX.N/I O N

DegrafT E.u‘,’,ld _ MUil.burs O %» O.tr.n

W.Llb.riyV OS »AD»«_

rysville N.

Rosewood I

o Kings Cr

Venqdoci

*/j/f * l*

Callery

Crestline

GalionJ

Wabash

BlufTton

WlllshirJ’

Allentown

iouaiugtQO V Mill port

Clarkson.

, Lohanool

‘JT~-^<

slotlfeia/) — “I

— •■7 \dit» V

ee t VlfhrsshbtgJC/ r °Nv\infieUy /r^ rnlhaLCr.ViPa^al/^®

[o J DsrBfljfcVˆ

/ J°yo®\Wrˆv

< > RagcrevUKsNynˆ

■tusc/arJxw

me WainAvrlglU /JX >oe CreekE .

_ L.(ph*d*n/V£*w

3 Po// h 0 ‘ &

W «h , no

Heave’AlL.‘Roe’bcBter

KisklmlnetaB

S- Jo.

inoervilh»ˆ7

lutTl/HuAie

IRockfordVˆ o Mercler CbattanooA,a J TamaX’-

MERC

H~\Celinn)

5ˆ. j /, • ooteiuo

•W/bena r o J /St. James l_

,./ Whettt«w“f!*

/ Aodr«w«0 nnr|

/o Mt.GIlTOdli i*1/1 /Lcvennffo

SfRIROW’dB.,.,

Ciho4io(

pHolmwtTille 0 Benton Berlin J

Xiverpi

heater

risburg

Marion

/%andj Creek

Iraddock

ˆfMillorsburg

/Charm0 8httnw,ˆ KillbuOk Sugarcri

*a/ Weleoin**

Baddow \ Pass I

*jSl.Mory**

lErastus /7\rt — 1 JColdwater/ \» ju

_E ickasaw

| ‘Tort Rejoovory I St. Henry J W«»»

Burlˆettaville o Oagooil • Roesburg

/rnantown “rtoi),,,

mocracyo r. ...

, Danville

iFredorioktown /

nr on It o •“Of

Wheeling Jo.

BiriningbatD,

Hartford City

*Jackson\ • Lei Center ˆ >Anna ’I |_*

y fnWAttIUd

I Ash leytjr" laduor/ 0

A / I 0 Kilbonrnel

Fa war

/iXl)elawar«

AW"' v>4j I \Uiia,ona/ '

A HLewla yCen.

} < qv/. H/arlym

*'Me H>«fpot**

leene

Csnnl

Lewisville

Fairmouot

.Peerless

Redkey

ightmlie I V- Newcastlejo ˆ

New Guilford . – .

'buig 0 / Roecoeˆ

0 Bladensburg Cosboctoib I 0 W.fcarl ele / pun oFnllaburg la; O'

*Li*m.*

Perry ton o

Irwin

| illiawNˆ

.Welliiurg

k^cwcomerttownf V Enfield ^(a(|iN |e\ tte CAdwallader0 | ^>Moor – CM«*»U» j*

ilPostboy" ^rT^p^t Ml. fid t\ 1 _ . .Londonderry© %^T I fT*

*oAo((im jFluAins^l/' J/E R N S E V Hendjyshurg St.Cla*rsvill^*

*Y|JnerOld Fttirviewr 0 7 **

' V WnehingU

Alexandria

*\ \ Ur*tar^T*

Aft.

/ale

'arrentc

rl DBaoon/ 'Plainfield

<7; Condit 'Sunbury

loo, P0,ner WTci I P 0 Appleton ,

I Jobnatown \gt

\ Newway o I

L\l C K l\ N

V Alexandria \ II Granvillle

Russia

Muncie

*S*r N I /V<^en'0rX*

_ 1 ?«ILKi^a5*

III . iiurg/o' / 0Ro8edale y

Xii . oTraderaville ^

I 0 Catawba Re«nca OOJ.

4— /-Moorfield i~rS. ˆ

Lic 1 AD IS O n

’/Springfield \oL.i»,«t.

°a. V lenn.

8.Ch.n.st»5W7jr Lin, ch.p.i

Webster,

Washington

h Martin* VSˆ.Ferry,

hvleKker8 ! DˆA GYeenviile

I Baker o lealtiueo /

Mariˆuanc

:u ‘tltsioG

oAdsmavill® I

Acdersoi

ˆCjyvvT/Covinlglton oTvJtV W, Mil A\\M„I
MJElea8aDxkCa8et0WD foChr.*:

l£fc,bSlv H,11/kf;-oy f-T’ – ■

w *, t . , • — p 1 – . \ I 1 -i\

/NewNJ p0

few in ban r ! C,eni0D®< ˆ TjJ«r Central CUyˆ

Gahanna Pataakalq

Wheeling

Bellnoot Beihesdn > =

Nnihport

‘BUM Sago,

’i’ Norwich

BroNwnsvUlc

cllaire

HolUan8butˆ

New Madioon” 9uJor

r-yV jiaaaaSliiFSZy Hut

J > 43&WoTo o-ltatorrnie s“o„0

■ Sarahs- \ftitoMbuig G

*- \ ville - < * – Brister ..*

nAq\b/L E nssˆve’* “■ ‘CVfc.lA»ˆlBehL – 5*

l Fulda gufiˆo GrifTlt

™“ \s. Olive 1 M O

*4\ Dexter CltJ(A > J„|||D H«rAieO[*iUe’ “[An*

j |\ J Klim Tr*

*|»ck.burk\ *-,« • °Ma*tertoi*

MoundsvUle

A hatan or prlhatan Pi.

\P. 0.

Cruclbtnˆ Van)

Newcastle

(Captina

Alton

Uniontovm

oPhii\iTniburg

TBTHerspofl. “©Pickmogtoo 1 ortˆsjburstonl BasilSvCˆ Baltimore

|r >.

\Carroll

Union up Brookvlille

New Salem ˆ Pleusupt ville \ Somersotj

Cutnbcrlanpˆp lˆ* Uiramallutg *ˆ3 Blu® Rocl _ __

— _ Bello V«Iloy\

a Woodgrov”ˆ 0 f Remeratille !*£?’

V’sHIoConnelsvill©

A * NoolyeiiU®

i0\RoG A Ns),

Stockport W // “

‘oSLIHog yvˆitio‘4 Loj

I W A S ,,H I

n s cj“’” /L°*rzw —

°4—>- / . CˆyA*ff(f onstltutlon A

ˆ *M/

ParKrsburg

JT/Grovej

Canal ‘t) Winchester

TxfhSpii

Wayneshurg

Fairchance

jˆ/Oahorn •

Fairfield

ˆ | Uo®Jr

ayton A

bOipy

HKilburg- /Orlˆ nT Darby ville

Trotwooa

National dilicary Home

Riuhrllle 1

j Denver- town

F A I R

Luncastej

-/R/Y' Hoppsto 'TcorrJ.lll dnG /V ,11 JBtll iliatnisbu\r| o f IC«nt«r*illol I V*

iavo7Fartnersv3le\1. den tf °G4tisX

in» / GermaBlownC

1 5 lo °W. |ik ton

\ Somerville tys

l/ATrontooTyfV

U t\le/M,

\ McOonigl® Y

Aahvillej A YCfflarbill

«jcw Martloavllle Irooklyn Jo,

P I C K\A

ˆnooostburg'.*

JtusbviTTi

Amanda lA^ Sugar GroveX

enBvi le, .Corning

Cottage Grove1 Cullege Corn

Stout®, i

'Bloomingpurg

Franklin

Warner

v Matemorna.

Ornodriew 3

iWilliam;

l" fa I /

port "TTVoflarllon £'c^*Cr(T'«ii*

r\ 8outbYPerrjo

slrowbu,l 1 ll- '1,-on ville' H.ydfctiv\iiret..t4

.1)11 AdePIJ H O C K J N \Gv-t

/ Lnei'*." c-oHajoes p, \N.l»oi*

HllIirUl.0 Jfeo "f w- „thJ ci.J

J S s-Bioo^'J^Askarw—

("Taosono 'p.gin Mills8'''"'7' mSC iRiton («;,d,lb.rgC"0,V

0.11— p.-iu. v°i n T/oeors:

0 iKllensvllle A. o 5

|4\ \X Ox . 0 Vp \Mc4rthur nond^paleNxJ^^ 8h?ldon //NxEa^'p /•

*liebv r) \ 4 *0 ^NJisw// JXn /*

King wood

\ Stanley villt j OM

G T O N Marietta

v. J0r > 8’”“‘a’:

*1DlOD\Cu7k*buj’g Austin 7/ “V, \ Frankfort ˆ*

iFoirmont

Middlobourne

Folsom,

Sbelbyvlllc

rookvllle

1 turreoui

/Turtle) \ Fori Creek \ oAocirnt

Rowlesburˆj

7 St. Marys

‘Green9burg

dal— 1

M tirnhfitljd.

*VL/ Morrow A/,- *rG’i*

vifldsot o.

ˆ TN °’®/. e.0o«h9n 1ˆˆ“—— Q./V-AVJ9 W o o Edenloo

,\»9XbbU0 < Newtons- vN«|

Pleasant Runo o Dunlap

*GV1»V” Fro8\t Coolvllle**

Croat vueK Springdale o 6] Glendale i

Preston Sekitan ˆHarrison P/L

Pleasanton

Shade °

I Brecon J _

/ Sixteen

Jsbaronvi/le oMile Stand /Evendal/e ^ S^Z

Winslow / -c ‘ -V5? S^“

Ilockingport

Transito

Lawrenceburg

j

blen R\ ojm v Ip

*Coaitony^:^^ Crots Ro/fa^^ Jncksqqy^ n -Jj/Cove *

,rJAC K1S O

Iff iDjovllle Cbtll<.ri

Woodl.AaJ

Wyoming d 1

Lock/lai Hartwell / J

**cd8vlll0*

Lawrencobi

Bottom

Mt. Healthy 0

/ l-ark k-b” -}./ //

r Reading / [C (*

‘rlington /Roaamoy/ae Xj !«”>o”’%n,„ton 7 =

[f-o /feenocdr/toiteim

-ood/ ...Milford;

Bcrnesburg

\ Groesbeok 0

LˆTa,torsCreekoMountjilry

0r»yˆ Elmwood Place, fo Monfort IvorydaRˆ Wlnton Placˆ

QL Cun\m5nsvil/l

A C/of . ®7(

Versailles

, Pomeroy x;

Miners ville ˆSyracuse obsOEN-o Raomo

Auroi

Rutlandˆ\ˆˆ I. Middle port'll Kygor o

Elizabeth

LudlO'/Y)/> 1 Lato/nia/tt'S,

jbbius

New RichrnonnˆS

]ˆoPl. Plensuu? i

• Sardiniaˆ

brown

le-° Wincheiter imerJ I 0(

\ Georgetown

*BwmUvM** J 0E<*

iffnvill® Decatur . A

MaeastU

-MtuneVX Cheshireˆ 1 e\ Bid well «/*

Thunhnu Addison/,

Bore j*

*\Wbilc Water Park *») \o > „ jc.*

**?tV \ »*

'/fiiabetb

>lt. Jo> CV Rarden\ Young «?. lank. oa, ill [,

DtwayV L

Nairn0 VMaf»haT.°'ar Fk. o V " 8« Jfcarllle P.Ov Lu. asulle o w abacs MitU ' Da vis YMiniord*— /*

ITS-Oˆ/?.

IV heeler >WebfterZM

ldlewild.

iMoSrOWˆ

LNevilla

erevter' 6uiiii,ouxjp/?;,"

0-5,, A G A L\ I A Js

m Patriot V r> V\CC

tn Switch | 0 o –

*/C.drnul0 **

fo J j Lincoln /Jl/o

Watorloo . v_ _ Eureka M

' o Merquville

Saunders viUeJ ˆ Crowˆ City

A W R E N C E/ˆTV

I ronton 0Rock- wrlieT

i Af;p JL.

Nj.ˆ0 .xv ˆ cGetaway/M

*Prˆrvillc Vrf**

Glenmort

ˆellsbui'?,

B rookvllle

oLevanna

Newtown

Ttlplcj-

OHIO

*/C: \o**

}W Mt.*

Washington,

*V*N o Mt.' %*

ˆc St. Joseph*

Falmouth'

HUamstown

AberdeeX

"Maysvillc

MAP OF ˆ

HAMILTON CO OHIO

8CALE OF MILES

SCALE

*Statnte Miles, *28 = I Inch.*

[lUverton] \ Hang

£ yMcalUornia

Vancebui

omo o°’

Garrison

’■ Coal Grors Ashland*

Rond McNally’s New 11 x 14 Map of Ohio. Copyright by Rand MoNally k Co.

Winfield ˆ

Carter

Longitude West from Greenwich

l

2 850 3

4 84” 5

6

83” 7

8 82° 9

IO « 11*

12 80°

13

43RI

Pop.

598 Kennedy Heights,

Hamilton . F 3

4,488 Kent . B 10

7.185 Kenton . C 5

149 Kettlerville,

Shelby . D 4

400 Killbuck . C 9

277 Kimbolton . DIO

813 Kingston . F6

136 Kirby . C 6

297 Kirkersville . E 7

123 Kossuth . C 4

418 Lafayette, Allen . . . C 4

467 Lagrange . . B 8

528 Lakeview . D 5

22,615 Lakewood,

Cuyahoga . B 9

15,670 Lancaster . E 7

772 Larue . C 6

339 Latty . B 3

302 Laura . D 4

457 Laurelville . F7

2,698 Lebanon . F 4

828 Leesburg . F5

194 Leesville . D 10

115 Leesville Cross

Roads . C 7

2,665 Leetonla . C 11

1,773 Leipsic . B 4

192 Leroy. Medina. ...B9

672 Lewisburg . E3

291 Lewisville . E 10

654 Lexington . C8

647 Liberty Center. ...B4

35,384 Lima . C 4

136 Limaville, Stark..C 10 991 Linden Heights,

Franklin . E 6

501 Lindsey . B 6

512 Linndale, Cuyahoga

B 9

3,084 Lisbon . C 11

331 Lithopolis . E7

136 Little Sandusky. . .C 6 307 Lockbourne, Franklin

E G

166 Lockington . D4

3,439 Lockland . F3

1 015 Lodi . B 8

4,850 Logan . F 8

3,530 London . E 6

36,964 Lorain . B 8

489 Loramie . D 4

609 Lore City . D 10

1,804 Loudonville . C 8

1,678 Louisville . C 10

1,421 Loveland... . F4

569 Lowell . F 9

1.592 Lowellville . B 11

187 Lower Salem,

Washington .. .F 10

272 Lucas . . .C 8

923 Lynchburg . F 5

408 Lyons . A 4

1,107 McArthur ..... F 8

547 McClure . B 5

1,088 McComb . B 5

1,831 McConnelsville .... E 9

491 McGuffey . C5

454 Macksburg . . E 9

863 Madison . A 10

5.193 Madisonville . G 13

155 Magnetic Springs .D 6

556 Magnolia . C 10

245 Maineville . F4

345 Malinta . . . ’ . B 4

971 Malta . E 9

753 Malvern . C 10

1,966 Manchester . G6

22,734 Mansfield . C 8

721 Mantua . Bio

88 Marble Cliff, Franklin

E 6

•1,172 Marblehead . B 7

283 Marengo . D 7

14,785 Marietta . F 10

22,430 Marion . C 6

225 Marseilles . C 6

294 Marshallville . C9

252 Martinsburg . D8

9,996 Martins Ferry . . .D 11

334 Martinsville . F 5

3,576 Marysville . D 6

737 Mason . F 4

15,310 Massillon . C9

2,307 Maumee . A 5

1,446 Mechanicsburg ...D5

2,734 Medina . B 9

317 Melrose . B 4

621 Mendon . C 4

732 Mentor . A 10

475 Metamora . A 5

4,271 Miamisburg . E4

640 Middlefield . B 10

607 Middlepoint . C 3

3.194 Middleport . F8

15,625 Middletown . F3

327 Midland . F 5

483 Midway. Madison. E 6

153 Mifflin . C 8

696 Milan . B 7

1,321 Milford . F4

685 Milford Center. ,.,D6

276 Millbury . A 6

187 Milledgeville . E 6

218 Miller City . B 4

2,020 Millersburg . C 9

350 Milton Center,

[Wood . B 5

|92 Mlltonsburg. . E 10

Hop.

1,032 Mineral City . C 10

981 Mineral Ridge . . .B 11

1,396 Minerva . C 10

4,049 Mingo Junction ..Dll

1,583 Minster . D 4

438 Mogadore . C 10

255 Monroe . F 4

1,152 Monroeville . B 7

228 Montezuma . D 3

2,759 Montpelier . A 4

334 Morral, Marion. ,.C6

280 Morristown . D 10

832 Morrow . F 4

327 Moscow . F4

497 Mt. Airy,

Hamilton . F 3

451 Mt. Blanchard . . . .C 5

290 Mt. Cory . C 5

208 Mt. Eaton . C 9

1,673 Mt. Gilead . C 7

1,799 Mt. Healthy . F 12

539 Mt. Orab . F 5

701 Mt. Pleasant . . . . D 11

1,071 Mt. Sterling . E 6

10,628 Mt. Vernon . D 8

740 Mt. Victory . C 5

984 Mt. Washington. . G 13

326 Mowrystown . F 5

1,386 Murray . F 8

134 Mutual . D 5

4,007 Napoleon . B 4

268 Nashville . C8

1,357 Navarre . C 10

133 Nellie, Coshocton D 9

6,082 Nelsonville . F8

889 Nevada . C 6

200 Neville . G 4

215 New Albany . D 7

185 New Alexandria,

Jefferson . D 11

29,635 Newark . E8

376 New Athens . D 10

865 New Berlin . . . C 10

304 New Bloomington

Marion . C 6

(P.O.Agosta)

1,858 New Boston, Scioto

G 7

1,586 New Bremen . D 4

5,813 Newburg . B9

940 Newburg Heights,

Cuyahoga . B 9

1,058 ‘New Carlisle . E 5

2,943 New Comerstown D 10

683 New Concord . D 9

804 New Holland . E 6

487 New Knoxville ...D4 202 New Lebanon,

Montgomery . . . E 4

227 New Lebanon,

Miami . D 4

(P.O. Potsdam)

2.559 New Lexington ...E8

1,557 New London . B 8

628 New Madison . E3

711 New Matamoras.E 10

870 New Paris . E3

9,912 New Philadel¬ phia . D 10

1,733 New Richmond ... G 4

268 New Riegel . C 6

149 New Salem, Fair-

field . E 7

2 242 New Straits ville . . . E 8 757 Newton Falls . . . . B 11

142 Newtonsville . F 4

546 Newtown, Hamilton

F 3

793 New Vienna . F 5

889 New Washington. .C 7 509 New Waterford . .C 11 258 NewWeston, Darke F 3

298 Ney . B 13

8,921 Niles . B 11

2,503 North Baltimore ..B 5

560 North Bend . G 11

793 North Lewisburg. .D 5 1,030 North Olmsted,

Cuyahoga . B 9

62 North Randall,

Cuyahoga . B 9

155 North Robinson. . .C 7

7,858 Norwalk . B 7

186 Norwich . E 6

22,286 Norwood . G 13

2,387 Nottingham . B 9

1.559 Oak Harbor . A 6

1,418 Oak Hill . G 7

1,639 Oakley . G 13

358 Oakwood . B 4

496 Oakwood . B 4

4,365 Oberlin . B 8

91 Octa. Fayette . . . . E 6

860 Ohio City . C 3

394 Olmsted Falls . . . .B 9

185 Orangeville . B ll

3,101 Orrville . C9

866 Osborn . E 5

214 Osgood . D 3

448 Osnaburg . C 10

431 Ostrander . D6

2,182 Ottawa . B 4

477 Ottoville . C 3

234 Otway . G 6

289 Owensville . F 4

2,017 Oxford . E 3

5,501 Painesville . A 10

216 Palestine . D 3

562 Pandora . C 4

800 Pataskala . E 7

Hop.

191 Patterson . C 5

2,081 Paulding . B3

1,207 Payne . B 3

921 Peebles . G 6

1,006 Pemberville . B 6

536 Peninsula . B 10

1,913 Perrysburg . B 5

541 Perrysville . C8

343 Phillipsburg . E4

310 Pickerington . E7

668 Piketon . G6

660 Pioneer . A3

14,152 Piqua . D 4

240 Pitsburg . D 4

1,407 Plain City . E 6

215 Plainfield . D 9

788 Pleasant City. . . .E 10

571 Pleasant Hill . D 4

1,769 Pleasant Ridge . .G 13

608 Pleasantville . E 8

1,314 Plymouth . C7

367 Poland . C 11

250 Polk . C 8

4,023 Pomeroy . F9

450 Portage. ..... .B 5

3 007 Port Clinton A 6 233 Port Jefferson .... D 4

28,741 Portsmouth . G 6

421 Port Washington D10

298 Port William . E 5

415 Powhatan Point .E 11

577 Proctorville . G 8

945 Prospect . D 6

259 Put in Bay . A 7

746 Quaker City . D 10

594 Quincy . D 4

540 Racine . G 9

350 Rarden . G 6

5,310 Ravenna . B10

470 Rawson . C 5

3 985 Reading . F 13

623 Rendville . E 8

475 Republic . B 7

431 Reynoldsburg . . . .E 7

372 Richmond . D 11

203 Richmond, Lake .A 10

(P.O. Painesville)

1,729 Richwood . D 6

427 Ridgeway . C 5

1,840 Ripley . G 5

599 Risingsun . B 5

186 Rochester, Lorain. B 8

455 Rock Creek . A 11

1,186 Rockford . C3

3,179 Rockport . B 9

349 Rockyridge . A 6

1,174 Rocky River . B 9

258 Rogers, Colum¬ biana . Cll

243 Rome, Ashtabula All

595 Roscoe . D 9

2,113 Roseville . E 8

261 Rossburg . D 3

514 Roswell, Tuscarawas

D 9

560 Rushsylvania . D 5

246 Rushville . E 8

438 Russellville . G5

1,514 Sabina . F 5

9,799 Salem . Cll

265 Sales ville . . .D 10

2.403 Salineville . Cll

20,193 Sandusky . B 7

281 Sarahsville . E 9

534 Sardinia . G 5

262 Savannah . C 8

877 Saylor Park . G 11

9 58 Scio . D 10

472 Scott . C 3

2,104 Sebring . C 11

893 Seneca ville . E 10

340 Seven Mile . F 7

602 Seville . C 9

334 Shanesville . C 9

2,280 Shawnee . E 8

4,903 Shelby . C7

721 Sherrodsville . . . . D 10

566 Sherwood . B 3

555 Shiloh . C 7

1,016 Shreve . C 9

6,607 Sidney . D4

459 Silverton . L 13

187 Sinking Spring. . . . F 5

589 Smithfield . Dll

447 Smithville . C 9

1,286 Somerset . E8

349 Somerville . E 3

212 South Bloomfield .E 6 1,181 South Charleston .E 5 626 South Lebanon,

Warren . F 4

1,273 South Newburg,

Geaug'h. . B 10

316 South Point . G 8

211 South Salem . F 6

420 South Solon . E 5

499 South Webster . . . G 7

853 South Zanesville,

Muskingum .... E 9

191 Sparta . D7

1,748 Spencerville . C4

355 Springboro . F4

51,550 Springfield . E 5

127 Springhills,

Champaign . D 5

443 Spring Valley . E 5

5,002 St. Bernard . G 13

1,393 St. Clairsville. . . .D 11 560 St. Henry . D 3

244 St. Louisville . . . . D 8

5,732 St. Marys . C 4

1,261 St. Paris . D 4

174 Stafford . E 10

27,445 Steubenville . Dll

438 Stockport . F 9

144 Stone Creek . D9

835 Strasburg . C 10

3,370 Struthers . B 11

1,026 Stryker . B 4

389 Sugar Creek . D 9

368 Sugar Grove . E 7

489 Summerfield . E 10

485 Sunbury . D 7

1,058 Swanton . A 5

977 Sycamore . C 6

1,002 Sylvania . A 5

302 Tarlton . F 7

495 Taylorsville,

Muskingum .... E 9 448 Terrace Park . . . .G 13

411 Thornville . E 8

12,867 Tiffin . B 6

2,038 Tippecanoe City . .E 4

321 Tiro . C 7

191,554 Toledo . A 6

314 Tontogany . B 5

4,271 Toronto . Dll

564 Trenton . F2

711 Trimble, Athens. . .F 8

348 Trotwood . E 4

6,122 Troy . D 4

471 Tuscarawas . D 10

4,751 Uhrichsville . D 10

1,595 Union City, Darke D 3 210 Uniontown

Muskingum .... E 9 (P.O.Fultonham)

239 Unionville Center. D 6

245 Uniopolis . C 4

3,779 Upper Sandusky . .C 6

7,739 Urbana . D 5

1,729 Utica . D 8

303 Vanburen . B 5

221 Vandalia, Mont¬ gomery . . ! . E 4

400 Vanlue . C 6

7,157 Van Wert . C 3

247 Venedocia . C 4

1,369 Vermilion . B 8

1,580 Versailles . D 3

368 Vienna . B 11

324 Vinton . G8

3,073 Wadsworth . B9

319 Waldo . D 6

5 349 Wapakoneta . C4

13,059 Warren . B 11

512 Warsaw . D 8

366 Washington . D 10

7,277 Washington Court

House . F 5

957 Washingtonville ..Cll

834 Waterville . B 5

2,650 Wauseon . A 4

1,803 Waverly . F6

760 Waynesburg . CIO

542 Waynesfield . C4

705 Waynesville . F 4

2,131 Wellington . B 8

6,875 Wellston . F 7

7.769 Wellsville . Cll

1,030 West Alexandria. .E 4

386 West Cairo . C4

1,285 West Carrollton. .. E 4

230 West Elkton . E 3

154 Western Star,

Summit . B 9

1,903 Westerville . E 7

446 West Farmington B 10 1,043 West Jefferson .... E 6

840 West Lafayette. .. D 9

253 West Leipsic . B 4

1,288 West Liberty . D 5

44 5 West Manchester . .E 3

913 West Mansfield. ... D 5

1 9 1 West Millgrove,

Wood . B 5

1,207 West Milton . E 4

913 Weston . B 5

147 West Rushville,

Fairfield . E 7

642 West Salem . C8

1,080 West Union . G6

980 West Unity . A 4

485 Wharton . C 5

506 White House . A 5

203 Wilkesville . F8

948 Williamsburg . F 5

536 Williamsport . F 6

2,072 Willoughby . A 10

653 Willshire . C 3

4,491 'Wilmington . F 5

258 Wilmot . C 9

927 Winchester . G5

261 Windham . B 11

2,502 Woodsfield . Ell

310 Woodstock . D5

807 Wood ville . B 6

6,136 Wooster . C 9

547 Worthington . D 7

277 Wren . C3

1,893 Wyoming . F 13

8,712 Xenia . E 4

1,360 Yellow Springs . . .E 5 182 Yorkshire, Darke D 3

108,385Youngstown . B 11

476 Zaleski . F 8

250 Zanesfield . D5

30.863 Zanesville . E 9

182 Zoar. Tuscarawas .D 9

OHIO

are within its borders. There are 1,361,778 acres of gas land under lease, or 13 per cent of the total acreage under lease in the United States; its producing gas wells number 5,673. }}]$. anm!al industrial gas consumption (in 1000 cubic feet®) is 66,515,215; the domestic gas consumption is 71,873,699, making the total gas consumption 138,388,914. Of this Ohio produces (in «1000 cubic feet®) 68,270,174; the balance is an imported production.

Ohio ranks first among the States of the Union in the quantity and value of clay prod¬ ucts. Their value in 1890 was $10,860,934; in 1904, $25,686,870; in 1914, $38, 667,374; the total value from 1909 to 1914 increased 26.6 per cent. The values of the different clay products in 1914 were as follows: Brick of all kinds, $10,-337,292; sewer pipe, $4,691,719; fireproofing, $2,200,544; tile (including drain and stove lining) $3,971,836; potterv, $14,212,651; all other clay products, $3,25 3,332. The value of the limestone production for 1914 was $3,363,149, produced by 144 operators with 3,746 workers. The gypsum production increased from 213,325 tons in 1910 to 251,283 in 1915, and the value of cement produced in 1914ˆ was $2,111,154. The mining of iron ore has ceased to be an import¬ ant industry in Ohio. During 1914 the value of the salt production was $2,197,204.

Climate. — The climate while temperate is variable, and great extremes occur; but neither excessive heat nor cold is of long duration. The maximum temperature is 107.9° and the minimum 34° below zero. The northern part of the State has a longer and colder winter than the southern part ; but the winters are not severe in any part of the State. In the north¬ ern part, near the lake, sudden changes of temperature occur, especially during the sum¬ mer ˆseason. The mean temperature for July is 73°, for January 26°. The rainfall is evenly distributed and of an amount generally con¬ ducive to the growth of farm products. The annual rainfall averages 39.35 inches. The climate is healthful ; the winds which are at times a disturbing element as regards tempera¬ ture, serve to keep the climate of the State as a whole remarkably healthful.

Soil. — The soil of nearly two-thirds of the State is the deposit of the drift or quarternary, and nearly all of such soil is fertile. In the southeastern part the soil is composed of the decomposed sub-rock structure. In the north¬ east the clay soils are found in many counties and in the west there is a large percentage of limestone; along the rivers are alluvial soils.

Forests and Forest Products. — The west¬ ern part of the State was once covered with forests, the hardwood variety of timber, used in building, was abundant. The ash, elm, beech and varieties of cedar, pine, chestnut, maple, oak and in some parts walnut were found. In the western part the prairie zone begins. The total extent of forests is about 9,300 square miles, which is 23 per cent of the total area. The wood products of Ohio were noted for their good quality, when the raw material was obtained from the forests of the State. There are over 2,000 lumber and timber manufac¬ tories, and the value of the product for a single year is over $20,500,000. The value of the lum¬ ber and planing mill products, including sash, doors and blinds, in a recent year was $10,- 676,293 ; the value of the furniture products is

over $9,500,000, and of paper and wood pulp, over $6,500,000. The flora and fauna of Ohio belong to the temperate zone, but all large wild animals have disappeared before the advance of civilization.

Agriculture.— The agricultural statistics of Ohio, prepared by State authority, show that in 1916, 9,650,059 acres of land were under culti¬ vation, 5,028,492 were in permanent pasture, 1,615,672 in timber, 274,388 in orchard and 868,453 acres lying waste. These figures show the total number of acres of agricultural land owned to be 17,882,821. Of this amount ap¬ proximately 55 per cent is cultivated, 29 per cent is in permanent pasture, 10 per cent in timber, 2 per cent in orchard and 4 per cent lies waste. The large number of manufacturing towns and cities making a ready market for farm and dairy products has greatly influenced the agricultural development of the State, and has been one of the chief causes of the in¬ crease of improved land acreage from decade to decade since 1850. Fertilizers are in gen¬ eral use, the consumption in 1916 being 331 – 733,455 pounds, at a cost of $3,472,432. The agricultural products are varied. Some seem to grow well in all parts of the State. The clay soil of the northeast is well adapted to wheat, but it is raised in other sections. The leading crops are corn, wheat and hay. According to the United States Department of Agricul¬ ture the corn production (1917) was 162,273,000 bushels; wheat, 38,786,000 bushels; hay, 4,050,- 000 tons ; oats, 78,733,000 bushels. The tobacco production _was 91ˆ775,000 pounds; potatoes (Irish), 16,560,000 bushels, and sweet potatoes, 109,000 bushels. Reports to the Department of Agriculture of Ohio for 1917 show the com¬ bined production and acreage of rye and barley to be 3,755,132 bushels and 151,819 acres. The potato product is large and of an excellent quality. The State is noted for its extensive orchards. The

annual apple crop fluctuates. The crop of 1915 according to State statistics was 11,719,263 bushels, while that of 1917 was 2,808,619 bushels. In 1916 the following fruit crops were produced : Peaches, 755,968 bushels ; pears, 106,592 bushels; cherries, 54,455 bushels; plums, 10,098 bushels, and other small fruits, 303,351 bushels. Large vineyards are in the region near Lake Erie, the acreage being 15,747, from which were gathered 12.963,069 pounds of grapes from which was pressed 87,730 gallons of wine.

Stock-raising.— Statistics furnished by the Department of Agriculture of Ohio for the year 1917 show the number of livestock to be as follows: Horses, 941,319; cattle, 1,882,426; swine, 2,160,074; sheep, 1,547,398. For the last decade there has been a steady increase in the number of horses, cattle and swine and a de¬ crease in the number of sheep, the effect of the latter being shown by the wool production of the State. In 1907 the clip of wool was over 13,000,000 pounds, while in 1916 it was but 8,947,621 pounds. In 1916 there was pro¬ duced in home dairies 27,966,116 pounds of but¬ ter and in factories and creameries 4,170,668 pounds. The cheese production was 748,923 pounds in the homes and 2,478,036 pounds in factories and creameries. There has been a steady decrease in recent years in these prod¬ ucts. The production of eggs in 1916 amounted to 72,158,205 dozen.

Manufactures. — According to the latest re¬ ports available (Census of Manufactures, 1914 — Department of Commerce) the value of Ohio's manufactured products was $1,782,- 808,279, the average number of wage-earners employed in its manufacturing industries was 510,435, and the value added 'by manufacture, which is the best measure of the importance of manufacturing industries, amounted to $762,- 026,264. In 1914 Ohio ranked fourth among the States in all three items, and fifth in 1909. The value of manufactured products in Ohio in 1914 represented 7.4 per cent of the total for the United States. The corresponding pro¬ portions for 1909 and 1904 were 7 per cent and 6.5 per cent respectively.

A summarization of the industries of Ohio shows a wide range of character and high valu¬ ations in capital and production. In the manu¬ facture of rubber goods, Akron being the lead¬ ing point of the industry, which includes rubber tires, clothing, mats, type, springs, tubing, brushes, bands, etc., Ohio held first rank both in

1914 and 1909, the value of products for the industry in the State representing 49 per cent of the total value of products for the industry for the United States in 1914 and 42 per cent in 1909. In the manufacture of automobiles, including bodies, parts and accessories, Ohio ranked second among the States in 1914 as in 1909. There was an increase of 6,622 or 54.6 per cent in the average number of wage-earners employed from 1909 to 1914, while the value of products increased $46,871,831, or 120.7 per cent, and value added by manufacture $10,- 063,332, or 49.5 per cent during the same period. In electrical machinery, apparatus and supplies, Ohio ranked! 10th in 1914, having advanced from 20th place in 1909. In the manufac¬ ture of tin plate and terneplate Ohio ranked third, reporting 15.8 per cent of the total products of the United States in 1914. In the value of paper and wood pulp produced, Ohio ranked sixth, holding the same relative position as in 1904 and 1909, the value of the products being in 1914 $23,284,192. In the pro¬ duction of butter, cheese and condensed milk the State ranked eighth. In 1914 it ranked first in the production of beer, soda and mineral- water bottles; second in table ware, jellies, tumblers and goblets, lamps and liquor flasks ; and third in window glass, blown tumblers, stem ware and bar goods; and produced more than one-third of the glass table ware, and more than one-fourth of the lamps, gas goods, and beer, soda and mineral-water bottles manu¬ factured in the United States. The total value of these products in 1914 was $19,191,342. In the production of iron, steel and tin plate and terneplate there is such co-operation, connec¬ tion and duplication that it is almost impossible to furnish separate figures as to those indus¬ tries. Considered as a combined industry the blast furnaces, steel works and rolling mills, and tin and terne dipping plate plants gave em¬ ployment to 53,136 wage-earners, representing a capital investment of $330,896,624, and show in added value by manufacture, the sum of $78,961,099. In these combined first two branches the State ranked second. Ohio ranked third among the States in the value of its out¬ put of agricultural implements in each of the last three censuses. In 1914 it ranked second in the manufacture of carriages and wagons; eighth

in the manufacture of leather; fifth in the pro¬ duction of chemicals and tenth in the value and output of petroleum.

The manufacturing importance of the State is due to its ample natural resources as detailed under Minerals and Mining , and Forests, and their accessibility by waterways and rail, which led to an early introduction of domestic manu¬ factures along with the chartering of a trading and banking company in 1803. Cleveland

and Cincinnati are the chief industrial centres. Cin¬ cinnati long held the lead, but has apparently attained its maximum, while Cleveland is still increasing. From 1800 to 1850 Cincinnati was the centre of an extensive hog raising region, and during that period was the most important meat-packing city in the United States ; the manufacture of tobacco is also a leading in¬ dustry of Cincinnati. The manufacture of foundry and machine shop products, including engines, boilers and machinery of many varie¬ ties, is carried on extensively in all the leading cities of the State, but chiefly at Cleveland and Cincinnati. Youngstown, in the Mahoning Val¬ ley, is the leading city in the State in the iron and steel industry. Mining machinery is made at Columbus and Akron, machine tools at Hamilton. Pottery is produced at Cincinnati, Akron, Zanesville, Roseville and East Liverpool, the last town manufacturing over 49 per cent of the white granite ware and semi-vitreous porce¬ lain of the United States. Toledo is one of the granaries of the country with important flour¬ ing and grist mills, and Springfield and Canton lead in the manufacture of agricultural imple¬ ments.

Commerce and Transportation. — The for¬ eign commerce of the State carried on through Cleveland, Cincinnati, Toledo and Sandusky, the four ports of entry of the United States cus¬ toms districts of the region, is practically un¬ important,. compared with the enormous do¬ mestic commerce over the waterways and the railways of the State. The Ohio River, form¬ ing the southern boundary of the State for 436 miles, and its tributary, the Muskingum River, navigable for several miles above Zanesville, have formed for over a century one of the great highways of internal commerce, affording cheap communication with western Pennsyl¬ vania and the entire Mississippi valley; not¬ withstanding the advent and competition of rail¬ roads, their waters still bear the larger freight of coal, lumber and the heavier articles of transportation. Two canals originally connected Lake Erie with the Ohio River, one from Cleve¬ land to Portsmouth, and the other from Toledo to Cincinnati ; but at the present time there is no connection with the lake and river by either, owing to abandonment and decay. Lake Erie and the Erie Canal afford water communication with the Atlantic seaboard; and the northwest States are reached via the western Great Lakes and the Sault Sainte Marie Canal.

The construction of railroads dates from 1832 and the incorporation of the Mad River and Lake Erie Railroad, now absorbed in the Big Four system. The railway mileage of the State in 1900, including main line, second line, branches and side tracks, was over 14,000 miles. The great lines traversing the State are the Baltimore and

Ohio, the Lake Shore and Michi¬ gan Southern, the Pennsylvania, the Erie, the

Cleveland Cincinnati, Chicago and .Saint Louis, and the New York, Chicago and Saint Louis. Lhe consolidation of the railroads is proceed- in§ gradually, and nearly all the local lines together with the Lake Shore and Michigan Southern and the Baltimore and Ohio are now controlled by larger corporations. The State is provided also with a network of interurban electiic railroads connecting almost every popu¬ lous centre, and ranking first among the United States in the extent of its mileage.

Banks — The first bank of the State was a private institution, which was virtually a private company to which the privilege of doing a bank¬ ing business had been granted. Five banks were established before 1813, all by special act of the legislature. The first government bank in the State was established in Cincinnati in 1817. 1 his ˆinnovation,® as it was called, met with great opposition, and various methods were sug¬ gested whereby the United States bank might be suppressed or induced to leave the State. From 1817 to 1836 there were 25 banks estab¬ lished. In 1836 an effort was made to establish a second United States bank, but the legislature passed a special act preventing its establishment. A number of private and unauthorized banks were established between 1840 and 1850. The failure of several of those banks caused losses to many people, and led to the passage of pro¬ hibitory laws regarding the establishment of unauthorized banks by the legislature of 1845. The law proved ineffective, and a free banking law was passed in 1851. So much had public opinion shanged, that in 1863 nearly all the State banks became national banks. In the panic years of 1873, 1884 and 1893 there were many bank failures in the State, nearly all of which were confined to private and State banks. In 1900 the high prices of United States bonds and other reasons caused a reaction in favor of State banks. From 16 Nov. 1900 to 15 Nov. 1902 inclusive, there were established in the State 42 banks, savings and loan associations. During the same period there were established 20 building and loan associations. In 1915 there were in the State 553 State banks (which in¬ cludes all banking institutions other than pri¬ vate and national banks) ; 188 private banks and 378 national banks, making in all 1,119 au¬ thorized banking institutions. In 1914 there were 656 building and loan associations with assets of

$240,930,784, 197,560 depositors and 413,907 stockholders. Since 1908 all the banking institutions of the State, except national banks, have been under the supervision of a State su¬ perintendent. of banks, with an adequate force of examiners and other expert assistants. The powers vested in the banking department are very extensive and detailed and, so far as ex¬ aminations are concerned, are regarded as even more effective than those which govern the national institutions. The authority of the de¬ partment extends not only to all State incor¬ porated banks and savings banks, but to trust and safe deposit companies, not including, how¬ ever, building and loan associations, which are under the superintendence of another State de¬ partment. Annual reports, published by the superintendent of banks, show the condition in detail of every concern within the scope of the department.

Finances.— Prior to 1825, Ohio had no debt. The first State debt was contracted that year,

for the construction of canals (see History). Later the debt was augmented for other canals, subscriptions toward railroads and roads, and in 1833 the State debt was $16,880,000, in 6 and 7 per cent bonds. The incomes from canals and a special tax were devoted to the public debt. The State credit remained unimpaired, so that when necessary it was able to borrow further sums. The years 1838-40 brought finan¬ cial ruin to many enterprises throughout the Union, and made the borrowing of large sums a matter of difficulty. To have discontinued the public works would have caused great loss, so in 1843 the State issued 7 per cent bonds. The canals absorbed the school fund, the sinking fund and the proceeds from sale of public lands, and by 1856 the debt had been reduced nearly $3,000,000. A further debt of $2,423,349 was incurred in 1856, after which the whole was gradually decreased.

In 1880 the State debt was $6,476,805. In 1903 the remaining portion of the funded debt, $200,000, matured and was paid, together with $6,000 of interest money. A special university fund was created in 1892. The income of the State is derived from a general tax; about 60 per cent comes from the general property tax, and nearly 18 per cent from the excise tax. The expenses were in 1910, $12,074,835.44, and revenues, $1 1,567,122.77, making an excess of expenditures of $507,712.67. The assessed value of the real property of the State is $1,656,- 944,631, and of the personal property, $827,- 370,943 ; total, $2,484,315,574. The assessed valu¬ ation is 60 per cent of the actual value ; and the tax rate $1.35 per $1,000. The State as such has no bonded indebtedness.

There are general revenue, sinking, school and university funds.

Education. — The Territory of Ohio received its first grant of land for public education in 1785; the Continental Congress reserved for school purposes the 16th section in every town¬ ship. Later grants were made by Virginia, the Western Reserve and certain Government Military reservations. No common school sys¬ tem was established until 1825 ; the law was passed the same day as the law providing for the construction of canals (see Finances). In 1827 provision was made for selling school lands. Further legislation was enacted from time to time, that of 1873 provided for the classification of school districts, and making obligatory the use of the English language in teaching all branches to be taught in the schools. The German language had been used in many schools. Prior to the establishment of the com¬ mon school system, there had been founded a number of schools, some private and others by churches or communities. The Ohio University (q.v.) at Athens was founded in 1804 and the Miami University (q.v.) in Oxford in 1809. The legislature of 1901-02 passed a bill, which became a law 12 March 1902, establishing normal schools, for the training of teachers. This law provides for two schools in connec¬ tion with the Ohio University at Athens and the Miami University at Oxford. These schools are known as State normal schools, they are to be supported by an income from the ((Ohio and Miami University ' Fund,® created with the bill. The income is derived from a direct tax. The legislature at the same session passed bills which classify the different grades of schools and provide for examinations for entrance to

high schools. The Child Labor Law and the Compulsory Education Laws were rewritten and made to harmonize. Children between the ages of 8 and 14 are compelled to attend school the full time and children between the ages of 14 and 16, not engaged in some regular em¬ ployment, are also required to attend ; and if the child over 14 and under 16 cannot read and write the English language he must attend the full time. Heavy penalties are provided for the violation of the compulsory edhcation laws. The centralizing of township schools began in Ohio some years ago, when the matter was optional. The first legislation on the subject, in Ohio, was enacted in 1892. The teachers' institutes, teachers' pensions, the school curric¬ ulum, all receive wise and almost constant attention. The principal cities have city train¬ ing classes for persons who intend to become teachers. In

1902 there were in the State 2,437 school districts, 66 of which were city districts, and 1,335 were township districts, of which latter there were 11,078 subdivisions. The number of children of school age was 1,245,393. The total number of children in public schools, colleges, universities and public institutions was 844,728; the number in Roman Catholic parish schools, academies, colleges and institutions was 74,605, leaving 326,060 children who were in pri¬ vate schools in the State, in schools outside the State, or if between the ages of 16 and 21 they might be in the workshop. The Lutherans have parish schools in nearly all the large cities. In 1909 there were in the State 812 public high schools, 38 private secondary schools, 14 theo¬ logical schools, 35 colleges and universities, and 47 professional schools including law, medicine, dentistry and pharmacy. (The colleges and uni¬ versities appear under their corporate names). In 1916 the Catholic educational institutions in the cities of Cincinnati, Cleveland, Columbus and Toledo were as follows: Parish schools, 380, pupils, 107,629; academies and high schools, 38, pupils, 5,242; colleges, 14, pupils, 2,699; orphan asylums, 11, inmates, 2,215; houses of correction, 5, inmates, 830.

Religion. — « The Roman Catholics have, ac¬ cording to the (Catholic Directory 1921, } 889,- 423 members. The Methodists claim one-Jourth of all the church members of the State. The other Protestant denominations rank as follows: Presbyterians Lutheran, Baptist, Disciples of Christ, Congregationalrsts and Protestant Epis¬ copalians. The Protestants have large and well organized Sunday schools connected with all their churches. The Roman Catholics have Sunday schools also, but where the parish school has been established, the attendance at the Sunday school is usually limited to those not receiving religious instruction during the week.

Charitable and Penal Institutions.— The

State board of charities consists of seven mem¬ bers ; six of whom are appointed by the gov¬ ernor; the governor of the State is ex-officio a member and is president of the board. A secretary is appointed by the board. The board has the supervision of all State and municipal institutions, including infirmaries, jails and orphanages, or all institutions for fur¬ nishing relief or for correction. The State law further, provides that this board shall examine, for criticism or approval, all plans for charitable

or penal institutional buildings, or changes in buildings. There are 17 State institutions, as follows : State hospitals at Athens, Cleveland, Columbus, Dayton, Longview, Toledo ; the Ohio Hospital for

Epileptics, Institution for Deaf and Dumb ; State School for the Blind ; Industrial Home for Girls ; Industrial School for Boys ; homes at Xenia and Sandusky; a State peniten¬ tiary and a State reformatory. The municipal institutions are workhouses at Canton, Cincin¬ nati, Cleveland, Columbus, Dayton, Toledo, Xenia and Zanesville, and a House of Refuge at Cincinnati. The county institutions are in¬ firmaries, homes and jails. Outdoor relief is given by infirmary doctors, township clerks and under the direct supervision of the Soldiers' Relief Commission. Changes have been made in the care of epileptics, who are housed in a hospital at Gallipolis. The Juvenile Court, at Cleveland, has shown there are great opportuni¬ ties for the prevention of the crimes often com¬ mitted by the young and how they may be re¬ claimed. The annual State Conference has been productive of much good. Each county has a board of county visitors.

The annual expenses of the State institu¬ tions are considerably over $2,600,000; for the municipal institutions, $150,000; for the county institutions, $2,127,000, making for the whole a total considerably over $5,000,000. A National Soldiers' Home is located at Dayton. It has accommodations for 6,000 persons. The Roman Catholic charitable institutions of the State are 14 orphan asylums, having nearly 2,000 inmates; three industrial schools, 450 inmates; 19 hos¬ pitals, over 12,000 patients each year; four homes for the aged, about 500 inmates each year; three homes for the friendless, about 200 inmates each year.

Government. — The State constitution now in force was adopted in 1851 and is the second one under which Ohio has been governed. (See History). Provisions for a constitutional con¬ vention are arranged for in two ways. (

State Capitol at Columbus

Soldiers' and Sailors' Monument, Cleveland

Legislature. The senate and the house of representatives constitute the legislature. The number of members is based upon the popula¬

tion and is determined by the legislature. Most ot the counties have only one member in the lower house, but some of the smaller counties are united with other counties for representa¬ tion. For senatorial representation many of the counties are united; but some of the large counties are separate senatorial districts. A county may be made a separate senatorial dis¬ trict if it has the population required for a full senatorial ratio and if a full senatorial ratio is left in the county or district from which it asks separation. The regular sessions of the legislature are biennial, beginning on the first Monday of January each even-numbered year, d he members are chosen by popular vote, for two years, the day of election being the first -Tuesday after the first Mlonday in November. The salaries of members are fixed by law. Bills may originate in either house; each bill can contain but one subject. The lower house im¬ peaches and the senate tries all impeachment cases; the concurrence of two-thirds of the members of the senate is requisite for a convic¬ tion.

Executive.— The governor and his associate officers — lieutenant-governor, secretary of State, State treasurer and attorney-general are elected for two years, at the general State elec¬ tion. The auditor is elected for four years ; the board of public works and the school com¬ missioner for three years. The governor ap¬ points the superintendent of insurance, com¬ missioner of railroads and telegraphs, State and law librarians, gas commissioner and supervisor of public printing. He has the power to call extra sessions of the legislature and the usual veto and pardoning powers. In the absence of the governor, for any cause, the lieutenant- governor, president of the senate or speaker of the house are in the line of succession.

Judicial. — The judicial power is vested in the Supreme Court, Circuit Courts, Courts of Common Pleas, Courts of Probate and justices of the peace. Other courts inferior to the Su¬ preme Court may be established by the general assembly. The general assembly may establish courts of conciliation and limit their duties and powers, but the judgment of such courts is not final except the parties interested agree to abide by such decision. The judges and justices are chosen by popular vote. The judges of the Supreme Court are chosen for a term not less than five years, the judges of the Common Pleas for five years, the justices of the peace for three years.

Local Government.— The legislature pro¬ vides by law for the organization and powers of cities and incorporated villages and for the election of county and township officials. The terms of office of county officers do not exceed three years.

Laws. — The legal rate of interest is 6 per cent, but 8 per cent may be obtained by con- tract.. Pure-food laws have been passed and are rigidly enforced. Divorces may be obtained for several causes — wilful absence for three years, extreme cruelty, habitual drunkenness, imprisonment in the penitentiary, adultery, di¬ vorce procured by either party in another State,

are the chief causes. Restrictions as to time of residence in the State are enforced.

Militia. The number of men of militia age is about 1,076,928. The militia in 1915 con¬ sisted of 509 commissioned officers, 5,717 en- hsted men, making a total organized militia of 6,226.. During the Civil War, Ohio furnished one-eighth of the Federal troops.

*Political Divisions.— There are 88 counties in the State. The Federal census of 1910 gave the population of the nine largest cities as 'fol¬ lows : Cleveland, 560,663; Cincinnati, 364,463; ToEdo, 168,497; Columbus, 181,548; Dayton, 116,577; Youngstown, 79,066; Akron, 69,067- Springfield, 46,921; Canton, 50,217. Columbus is the capital of the State. The population of the above cities according to an estimate of the united States Census Department was on 1st July 1915, as follows: Cleveland, 657,311; Cin- S™1** 406-706; Toledo, 187,840; Columbus, 209,722; Dayton, 125,509; Youngstown, 104,489; Akron, 82,958; Springfield, 50,804; Canton,*

*History. — Numerous evidences of prehis¬ toric Ohioan inhabitants are found in the mounds existing in different parts of the State, rhe study of any one of these mounds, especi¬ ally type of fort *n Adams County,*

shows the degree of advancement of the people now called the Moundbuilders (q.v.). The fii s t appearance of Ohio in history is when Robert Cavalier de LaSalle left his home at LaChine, near Montreal, Canada, in 1669, on a journey of adventure, before his return he dis¬ covered the Ohio River and ascended on its waters near where Louisville now stands. When LaSalle later vested in France the title of the Mississippi Valley by discovery in 1682, the area of what is now known as Ohio be¬ came a French possession and remained such until the Treaty of Paris in 1763 when it be¬ came territory of Great Britain.

• XKe ˆrst English-speaking settlement made in Ohio was established at the mouth of Lara¬ mie's Creek, on the Great Miami River in what is now Shelby County. This settlement was made in 1749 and was

called Pickawillany.

n- Junefi 175?' the French, with their Indian allies, the Chippewas and Ottawas, massacred these white settlers and wiped out the first English settlement in what is now Ohio. In 1748 some English and Virginian gentlemen organized what was known as the ((Ohio Land Company, M for the purpose of settling the newly-discovered Ohio Valley. Their settle¬ ments aroused the intense antagonism and jealousy of the French and the result was an attempt on the part of the French to stop these intrusions into her territory and England to persist in continuing them. In 1753 The Ohio Company complained to Governor Dinwiddie of the interference by the French authorities and the governor sent George Washington, a young man of 23, to endeavor to terminate the fric¬ tion by peaceable negotiations. He was un¬ successful, however, and the conflict continued until finally peace came from the Treaty of Paris, signed 18 Feb. 1763, by the terms of which the vast territory of which Ohio was a part became the possession of Great Britain. After 10 years of peace the murder of nine kinsmen of the Iroquois chief Logan by a borderer named Greathouse, caused an upris-

ing of the Indians and in 1774 a campaign against them was inaugurated by Governor Dunmore of Virginia, which is known in his¬ tory as Lord Dunmore's war. It was in this campaign, in the heart of the Indian country along the Scioto River, that the celebrated speech of Logan, the Mingo chief, was de¬ livered.

When the war for independence came on, the Continental Congress, regarding the Northwest T erritory as a good heritage to preserve for American supremacy, fortified various points in what is now known as Ohio, the earliest of which was Fort Laurens, the first military stockade erected by American authority in Ohio. This fort was abandoned in 1779. In 1780 and the five years following, Ohio was the theatre of active warfare against the Indians and under the leadership of Col. John Beauman, of Ken¬ tucky, the Indians were attacked on the Little Miami River in what is now Greene County, and by Col. George Rogers Clark at other points contiguous. In this period occurred various scenes indicative of the terrible con¬ dition of feeling existing between the Indians and whites. There were massacres on both sides characterized by brutality and savagery. The year 1782 opened with a number of atrocious deeds of violence by

the Indians. Innocent women and children were murdered in the most horrible manner. The whites were exasperated, and in February of this year Colo¬ nel Williamson led an expedition against the Indians. They marched into the Tuscarawas country in eastern central Ohio and massacred in cold blood and with brutal vengeance the Moravian Indians, a peaceable and Christian tribe that had never raised their hands against the whites nor participated in any of the troubles between the Americans and English. Later in May of the same year Col. Wm. Craw¬ ford marched 500 men through the Ohio coun¬ try from where Steubenville now stands to the Wyandot country on the Sandusky River, near where Upper Sandusky is now located. His attack resulted in defeat with a loss of over 100 of his men and the capture of Colonel Craw¬ ford himself. Colonel Crawford was burned at the stake by the Delaware Indians in re¬ taliation for the murder of some of their tribe by Colonel Williamson's men. i TheSi5 Indian campaigns and wars, up to 1782, while they were the outgrowth of adven¬ ture upon the part of the Pennsylvanians and Virginians, were sanctioned by the Continental Congress and by the various colonial govern¬ ments.

.When peace came through the Treaty of Pans, which was signed 3 Sept. 1783, all the territory east of the Mississippi River was re¬ linquished to the United States by Great Britain. A part of the acquisition was what was known as the Northwest Territory (q.v.), which added 240,000 square miles to the United States. In October 1787, the Federal government sent 700 troops to the frontier to protect this territory and Jo emphasize to the Indians that the white man's government had commenced. On 5 Octo¬ ber Congress elected officers for the new gov¬ ernment. Arthur Saint Clair was named as governor and with him were designated James M. Varnum, Samuel Holden Parsons and John Ai mstrong as judges and Winthrop Sargent as

secretary of the territory. Mr. Armstrong de¬ clined to serve as judge and John Cleve Symmes was named to fill the vacancy. On 9 July 1788, Governor Saint Clair and his associate officers arrived at Fort Harmer where they remained until the 15th when they entered Marietta as the representatives of the National government.

The first settlement in the Northwest Terri¬ tory was effected under the control and direc¬ tion of Gen. Rufus Putnam, who had formed (

Governor Saint Clair, as before stated, in¬ augurated the reign of law and on 2 September the first court ever held on Ohio territory was opened with formal ceremonies at Marietta. The second

settlement in Ohio was made at Columbia, about five miles above Cincinnati. Major Benj. Stites of Pennsylvania purchased 10,000 acres from Judge Symmes near the mouth of the Little Miami. On 18 Nov. 1788, 26 hardy Pennsylvanians located at this point' erected a block house, laid off a little town and called it Columbia. While the major was laying off the town of Columbia, Mathias Denman, with Robert Patterson and Israel Ludlow laid off a town on the high north bank of the Ohio River and opposite the mouth of the Licking River. About 28 Dec. 1788, Denman and his companions, 15 in number, landed at this site and founded the city of Cincinnati (q.v.).

In February 1789, North Bend, near the Indiana line, was settled by Judge Symmes and his associates. For the protection of the three settlements at Cincinnati, Columbia and North Bend, Fort Washington was constructed at Cin¬ cinnati, which was then the principal centre of the Miami country. On 2 Jan. 1790, Governor Saint Clair arrived at Fort Washington and is¬ sued his proclamation establishing Hamilton County. The county-seat was fixed at Cincin¬ nati. This was the beginning of the great State of Ohio. It absorbed the population of North Bend and Columbia and in 1795 its population were soldiers.

The next settlement in point of time was at Galhpolis. October 1790, 400 French emigrants settled at this place and in memory of their native land called it Galhpolis. They were in¬ duced to make settlement here by the pic¬ turesque and highly colored representations made to the French people by Joel Barlow who went to France in 1 788 to represent the Scioto Company (q.v.), for the purpose of putting its an llP°n the market. The settlers were un¬ qualified and unfitted for the hardship of pio- neer life, and this fact, in addition to the one that the title to the lands was defective, broke up the settlement. Many of them drifted fur¬ ther west to Detroit and Kaskaskia and some remained and purchased their land from the Ohio Company. Congress, in 1795, sympatheti¬ cally granted 24,000 acres of land to these de¬ frauded emigrants. This land is in the eastern part of Scioto County on the Ohio River and

la? kno.wlL ˆy reason of its history, as the <(French Grant."

At Manchester, on the Ohio River, in 1791,

Co1 Nathatlie1 Massie made the first settlement m the Virginia Military District. This com-

Mf. •theAe7\t07 between the Scioto and Little liami which had been reserved in the deed of

soldiers ˆ Vlrgmia for bounty land for her

m An l796 p?1,01161 Massie, assisted by Duncan McArthur, laid out and founded the town of cnillicothe. The opening to emigration of the tar-tamed land of the Shawnees attracted many settlers from Virginia and Chillicothe in a short tune became an important and populous town.

1 he settlements referred to thus far were in the southern and central portions of the State and it was not until 1796 that emigration com¬ menced to develop in the northern part. Gen Moses Cleaveland, as agent for the Connecticut Land Company, with 52 Connecticut settlers, on 4 .July 1796, landed at the mouth of Con- neaut Creek, in Ashtabula County, for the pur¬ pose of settling the Western Reserve. In ad¬ dition to being settlers, many of them were surveyors. On 26 July 1796, Cleaveland and his associates proceeded to the mouth of the Cuy- ahoga River and laid out the chief settlement of the Western Reserve. It was named Cleve- in honor of the leader of the expedition.

1 he pioneers of the Western Reserve that settled at these points suffered many privations and the country did not grow as rapidly as those further south and in 1798 there were but 130 persons in the whole Reserve.

.,0hjo now. 90mmenced to grow with con- siderable rapidity and settlements sprung up and developed in every quarter. In 1799 there were in existence and enjoying peace and pros¬ perity the towns of Marietta, Columbia, Cincin¬ nati, North Bend, Gallipolis, Manchester, Ham- llton Dayton, Franklin, Chillicothe, Cleveland, r ranklmton, Steubenville, Williamsburg and Zanesville. Their prosperity and safety was accomplished through much tribulation and danger, for during the period of their develop¬ ment the territory had passed through its second war with the Indians, to which a retrospect is necessary.

Notwithstanding that on 9 Jan. 1789, at Fort Llarmer, Governor Saint Clair made a treaty with the Six Nations and the representatives of the Wyandots; Delawares, Chippewas, Otta- was,

Pottawatomies and Sacs, he failed to se¬ cure the good-will of the Indians. Marauding parties and forays on the part of the savages continued, to be projected against the whites, evidently instigated by the English. Accord¬ ingly, in September 1790, Saint Clair, with a little army, gathered from Pennsylvania, Vir¬ ginia and Kentucky, amounting to about 1,400, of which 300 were regulars, marched against the Indians. He was overwhelmingly defeated. Owing to a failure to control the militia and lack of general discipline, the battle resulted in a rout. After the defeat of Saint Clair, Gen. Anthony Wayne, one of the most daring officers of the Revolution, was placed in charge of a campaign against the Indians and spent the spring and summer of 1793 at Fort Washing¬ ton in Cincinnati, drilling and recruiting his men. In October 1793 he left Fort Washington with an army of 3,000 well-equipped soldiers and proceeded to six miles beyond Fort Jeffer¬ son, where he erected Fort Greenville, near where Greenville, Darke County, is now situ¬

*ated. He spent the entire season here and in the spring of 1794, after making many efforts to enter into a treaty of peace, he attacked them on 20 August, defeating them with great slaugh- *er- bLne of the Wyandot chiefs were killed alia the Indian question was solved forever in Ohio. This engagement was known as the cattle of Fallen Timbers, on account of the breastworks of fallen trees behind which the Indians were massed. The result of this cam¬ paign was a treaty of peace which was known as the Treaty of Greenville, which was signed by the chiefs of the 12 hostile tribes at Fort Greenville, 3 Aug. 1795. By the terms of this treaty the Indians released extensive territory between the Lakes and the Ohio River and the United States gave them $20,000 in merchan¬ dise and $9,000 annually, to be divided among the several tribes. This was the last Indian warfare in Ohio.*

With peace the population of the territory bˆan to increase. In 1790 there were about o,UU0 white inhabitants in Ohio ; five years later there were 15,000 white persons in the North¬ west Territory and by 1798 there were 5,000 free male persons of full age within its bound¬ aries and under the Ordinance of 1787 this entitled the people to a territorial legislature. Accordingly on 29 Oct. 1798, Governor Saint Clair issued his proclamation fixing the day for electing territorial representatives on the third Monday of December following. Thus the Territory of the Northwest passed into its sec- ond or legislative grade of government.

During the years preceding this change, bar¬ ring the Indian troubles, the settlers were pro¬ gressing satisfactorily. Religion and

literature were planted in Ohio. The first church in the territory was erected in 1790 at Columbia and

˚n un?V' 17?ˆ' the ,first newspaper was printed by William Maxwell of Cincinnati, under the

name of The Sentinel of the Northzvest Ter¬ ritory.

. in.e nrst territorial legislature met at Cin¬ cinnati, 4 Feb. 1799. Edward Tiffin of Ross County was elected speaker of the first general assembly of the Northwest Territory, and HTJFT Vanderburgh president of the council. W ffiiam Henry Harrison, afterward President ot the United States, was elected the first dele¬ gate to Congress from the territory. A bitter conflict between the governor and the legislature commenced at this time. Saint Clair was a federalist and he was opposed by the followers of Mr. Jefferson in the territory: At this time the vast Territory of the Northwest was divided into two districts — the dividing line ran from the mouth of the Kentucky River to Fort Re¬ covery, and northwest to the boundary line be¬ tween Canada and the United States. ' West of this line was erected the Territory of Indiana, of which Mr. Harrison was appointed governor, and east of the line was the Territory of the -[Northwest, of which Chillicothe was designated the seat of government. On 19 Dec. 1799 Gov¬ ernor Saint Clair, exercising the power vested in him by the Ordinance of 1787, dissolved the ter¬ ritorial legislature and fixed the first Monday in November 1800, as the date of its next session.

The second session of the territorial legisla¬ ture met at Chillicothe on 3 November, and after being in session five weeks adjourned on 9 December. William Henry Harrison having

resigned his position in Congress, William Mc¬ Millan of Cincinnati was elected to fill the vacancy and Paul Fearing of Marietta to serve the succeeding term. At this time Ohio had a population of 42,000. Transportation and trade were increasing on all hands. On the Ohio River there were packets running regularly for mail and traffic between Cincinnati and Pitts¬ burgh, making the round trip in about four weeks. The first vessel of any size or import¬ ance was the brig Saint Clair, built at Marietta, of 110 tons burden. It was loaded with pro¬ visions, sailing down the Ohio, Mississippi and across the Gulf

of Mexico, and finally landed safely in Philadelphia. Transportation by land was by the heavy and cumbrous trading wagons drawn by four and six horses. Cincinnati was a great distributing point for the southern and central part of the territory.

The iron used in the territory came from Pittsburgh and Baltimore, and when from the latter cost $200 a ton for transportation to the interior of Ohio. The southern and central parts got their supply of salt from the ((Ohio Salt Works,® located in what is Jackson County of to-day. It sold at the works for two and three dollars a barrel, and after the journey homeward of 100 miles the purchaser sold it to his neighbors for seven dollars a barrel. These were some of the general conditions of the people in what is now Ohio in 1800. There were no vehicles except for burden in the terri¬ tory. Marietta was the stronghold of Federal¬ ism and Chillicothe was the seat of Republican¬ ism, and there were bitter conflicts between the followers of Alexander Hamilton and Thomas Jefferson. Cincinnati was divided almost equally in politics.

The third territorial legislature commenced on 24 Nov. 1801. At this session Cincinnati and Chillicothe were incorporated and the seat of government changed from the latter town to the former.

On 3 April 1802, Congress passed an act enabling the people of Ohio to form a constitu¬ tion and State government. This was the result of a persistent controversy between, the fol¬ lowers of Jefferson and the Federalists. In pursuance to that law of Congress the constitu¬ tional convention met at Chillicothe 1 Nov. 1802 and adopted a constitution for the State. It was never submitted to the people. The intense feeling against Saint Clair on account of his vetoes eliminated the veto power from the gov¬ ernor. The convention fixed the capital at Chillicothe until 1808, and named the boundaries of the State. On 19 Feb. 1803, Congress of the United States extended the jurisdiction of the Federal courts over Ohio.

On the second Tuesday of January 1803, the election for governor was held. Edward Tiffin, the candidate of the anti-Federalists, was elected. On Tuesday, 1 March 1803, the first legislature met at the State capitol at Chilli¬ cothe. Nathaniel Massie was elected speaker of the senate and Michael Baldwin speaker of the house. Officers provided under the constitu¬ tion were appointed as follows : Secretary, William Greighton, Jr.; auditor of State, Thomas Gibson; treasurer of State, William McFarland; judges of the Supreme Court, Return J. Meigs, Jr., Samuel Huntington and William Spriggs. At this session Thomas

Worthington and John Smith were elected United States senators from Ohio.

In 1805 Aaron Burr (q.v.), the ex-Vice- President, visited the west and spent consider¬ able time in Ohio, accumulating boats, provisions and accoutrements for the carrying out of his treasonable designs, which were frustrated through the activity of Governor Tiffin. For this act Tiffin received the thanks of the Presi¬ dent of the United States. On the ground of being suspected as an accomplice of Burr, John Smith, one of the senators from Ohio to the United States Senate, was charged with treason, and after a complete investigation by the Senate a motion was made to expel him, 9 April 1808. but failed for want of the requisite two-thirds vote. He resigned, however, at the request of the general assembly of Ohio, and Return J. Meigs, Jr., was elected in his stead.

The first seven years of Ohio's estate was a period of marvelous advancement. The popula¬ tion in 1810 was 230,760, an increase of more than 400 per cent over that of 1800. The im¬ migration was healthy and valuable. New counties were erected and out of the wilderness came wealth, so that in 1810 the taxable prop¬ erty of Ohio was valued at $25,000,000. The natural resources of the State became known and developed. The first blast-furnace was operated in Mahoning County; coal was first mined in 1810 in Summit County.

Education advanced materially (see para¬ graph on Education). By 1810 there were 14 newspapers in Ohio, representing the two contending parties of the day. The popula¬ tions of the towns throughout Ohio continued to increase. Cincinnati ranked first in import¬ ance and in size. Its population had increased to 2,540. On the whole, Ohio was occupying a positive and prominent position in the Union.

The first steamboat to navigate the Ohio River was launched at Pittsburgh and called the New Orleans. It descended to Louisville and continued to make trips between that place and Cincinnati. With this event began a new era in the business development of the Ohio, and the value of the Ohio River as a channel of transportation became more apparent than ever to the people of the new State. In 1810 as a result of political feeling in the legislature, the seat of government was transferred from Chillicothe to Zanesville.

On 14 Feb. 1812, the legislature changed the seat of government from Zanesville to Chilli¬ cothe, but at the same time provided for

the permanent establishment of the capital at Columbus.

In the second war with England, which was finally declared by the United States 18 June 1812, Ohio played an important and patriotic part. She furnished regiments to General Hull at Detroit, and resented his cowardly surrender. Under Gen. William Henry Harrison the sol¬ diers of Ohio were chief in his movements in the northwest in the war against England. Governor Meigs in the meantime calling out, as necessity required, the quota of men assessed upon Ohio. At Fort Meigs, at Fort Stephenson and at other points throughout the State there were conflicts with the British, and at Lake Erie, through Oliver H. Perry, a young sea- captain from Rhode Island, the English suprem¬ acy upon the northern lakes and upon the

OHIO

619

bne °,f rthe northwestern Boundary was de-

theTfl forever The battle of Lake Erie was the last engagement of the War of 1812 that oc¬ curred within the territorial limits of Ohio To*

*$300000enSr °f lhlS ™*r.0hio contributed over J S Governor Meigs, on account of his*

mas e, LSerVT- 5 ˆthe country, was made post- mastei -general in President Madison's Cabinet.

• r\ general assembly met for the first time

Semh?i3 5,US °n 2 DeC 1816' and {t has as"

sembled there ever since. In this year the Mate Library was founded by Governor Worth¬ ington and from a few volumes gathered by

*than 'lOQOOcf volumesˆ * C°lleCti°n °f m0re*

Tthe je?on, d0, United States bank, when re- chartered in 1816, opened branches in Ohio at Cincinnati and Chillicothe. This was the occa- sion for a long and severe contest between the officials of the State of Ohio and the United Mates government over the right of the former to tax branches of the United States bank.

lLnlgSomoaSSTlbIˆpasSecJ a law taxi"g each fiank $50,000 and

authorized the State govern¬ ment to collect it by force. After a long litiga- tion it was ended in 1824 by the Supreme Court of the United States declaring the Ohio law axing Danks unconstitutional. The controversy was carried on largely by the advocates of the Mate banks on one hand and the opponents on the other.

In 1825 the State of Ohio commenced the construction of her canal system. The work was f2vri?\a!1y commenced 4 July 1825. Gov¬ ernor DeWitt Clinton of New York and Gover- noi Jeremiah Morrow of Ohio initiated the tabor ot breaking the ground. After 10 years all that energy, men and money could do was directed to the canals. The Federal government aided and encouraged the construction by the donation of 1,100,351 acres of land. This land was sold and the proceeds, about $2,200,000, were used for the construction of the canals. At the same time of the inauguration of the canal system the public school system was de¬ veloped. By the association of the friends of interna! improvement and popular education both of the great movements were accom¬ plished.

Lafayette visited Ohio in 1825 and was made the formal guest of the State for days, amid the thundering of cannon and the acclamation of a grateful people.

Commencing in 1831 Mormonism flourished several years in Ohio. Joseph Smith with his followers settled in Kirtland, Lake County, in 1832. They built a building here in 1835 which was dedicated on 27 March 1837, in a ceremony witnessed by thousands of people. The Mormon Church grew in numbers, wealth and power for five years in this State; but finally, under the condemnation of public opinion and the enforce¬ ment of the law, crumbled away until its leaders and people, in 1838, fled from the State to be¬ yond the Missouri River.

What is known in Ohio history as the ((Toledo War,® culminated in 1835. It was a dispute between Ohio and Michigan over the boundary line between these two States. There was involved in this controversy a strip of land the whole length of the northern Ohio boundary, five miles in width at the west end and over eight miles at the east end. It was rich agri¬ cultural land, but its chief charm was the harbor

where Toledo now stands. Both sides, through then governor and legislative bodies, asserted t leir lespective jurisdictions over the mooted terntoiy. So strong was the determination of each State to secure possession of the strip °t territory which each claimed that the militia oi both States were called out for a time and conflict was

imminent. On 31 March Governor Lucas with his staff and 600 of the militia of O no appeared at the debated boundary line. M the meantime Governor Mason, with 1 000 men, arrived at Toledo, and there encamped fully determined to assert the jurisdiction of viichigan. In the meantime, however, two peace commissioners from the President of the United States arrived on the scene. The dispute was finally terminated on 29 Aug. 1835, by the re¬ moval of Governor Mason from his position as governor of the Territory of Michigan. Con¬ gress, at its next session in June 1836, decided ni favor of Ohio. As compensation for the loss of this fertile strip of land Michigan was given the large and fertile peninsula between Lakes Hui on, Michigan and Superior. Ohio thus set- t ed her northern boundary and Michigan was

given one of the richest beds of mineral ore in the world.

On 4 July 1839, the cornerstone of the present State house was laid in the presence of mar?7 cozens. The occasion was made one of public display and demonstration. Ex-Governor Jeremmh Morrow delivered the address and laid the cornerstone.

The census of 1840 found Ohio the third State in point of population, having 1,519,467 inhabitants; being an increase of 63 per cent over the population of 1830. At this time nearly one-third of the population was employed in manufacture and trade. Cities, while increasing Ln were stiH small in size. Cincinnati

had 46,338 inhabitants; while Cleveland was a town of 6,000, and Columbus the same. In this decade the railroad system of Ohio was com¬ menced.

Iu common with the rest of the country, Ohio was much agitated by the nomination and election to the presidency of Gen. William Henry Harrison in 1840. This was the first impression in a political way that Ohio made upon the country. Up to this time the State had but little influence at Washington. But the nomination of her citizen, General Harrison, at once made Ohio the battlefield of the contest. Great meetings, never equaled up to this time were frequent in the State. General Harrison's march through Ohio was one triumphal pro¬ cession of oratory, display and song. At Day- ton a political meeting, addressed by General Harrison, numbered 80,000. At Chiflicothe he spoke to 50,000 people. Political meetings at this time lasted for several days, just according to the number of orators. The ((Log Cabin campaign resulted not only in the election of Gen William Henry Harrison to be President of the United States, but also*

Hon. Thos. Cor¬ win was elected governor of Ohio.

In 1846 Ohio was again called to play an important part in the military affairs of the Union. War with Mexico was declared 13 May 1846, and Ohio sent out four regiments of vol¬ unteers and three independent companies. The total number of men furnished was 5,536; more than any other northern State.

In August 1846 the introduction of raw coal

as furnace fuel in lieu of charcoal, for iron- smelling, was an industrial event the effect -of which on the wealth and growth of the State cannot be justly estimated. It gave a fresh impetus to iron manufacturing and allayed the painful doubt about its reliability raised by the diminution of the timber supply for the char¬ coal blast furnaces.

In February 1850, an act calling a second constitutional convention was passed. Nearly 50 years had passed since the forming of the first constitution and in the stupendous develop¬ ment of the State it was generally admitted that the instrument needed change and revision. After a session of 135 days the convention ad¬ journed, and on the third Tuesday of June 1851, the constitution was submitted to the peo¬ ple and it was adopted by a pronounced ma¬ jority.

The last vestige of what is known as the <(black laws,® that is laws that discriminated against the negro in Ohio by preventing him being a witness in court if a white man was party to the case, and by preventing his settle¬ ment in Ohio without giving bond and by im¬ posing other restrictions, both unjust and un¬ justifiable, were repealed in 1849. Anti-slavery sentiment was strong in Ohio and the legisla¬ ture of this period was known as the "anti- slavery legislature.® Out of the public discus¬ sion of those days grew the Republican party, which held its first State convention in the State of Ohio in Columbus, 13 July 1855. In the election which followed Salmon P. Chase was elected governor, and on 14 Jan. 1856 com¬ menced his gubernatorial term. Governor Chase's administration was signalized by the reorganization of the militia of the State. Dur¬ ing this period the State was noted for its "Underground Railroad® (q.v.).

With the approach of the Civil War and in that crisis Ohio met every

patriotic demand made upon her. When President Lincoln issued a proclamation, 15 April 1861, calling for 75,000 of the militia of the several States of the United States, the response was immediate from Ohio. Within 24 hours after the Presi¬ dent's call 20 companies had proffered their services. Within 36 hours they were on their way to Columbus, where they were organized, 18 April, into the First and Second regiments of Ohio volunteers. The next day they started for Washington city. All this preparation was actively sustained by the legislature. -On the day after the call to arms the senate passed a million-dollar appropriation bill for war pur¬ poses exclusively. Within three days it passed the house unanimously. The late President Garfield was at that time a member of the Ohio senate and took advanced ground in sus¬ taining the Federal government. In the sum¬ mer of 1863 the State of Ohio was subjected to the attacks of Gen. John Morgan, a daring Confederate raider, who entered the southern part of the State near Cincinnati and passed through southern Ohio; but after inflicting considerable damage, was eventually captured at Salineville, Ohio, 26 July 1863. Morgan's raid cost the people of Ohio $897,000.

Ohio more than responded to the call of President Lincoln for troops, so that up to 1 Dec. 1864 she had furnished 346,326 to the service of the United States. Of these 11,237 were killed or mortally wounded and 13,354

died of disease. According to the adjutant- general's report for 1866 the people of Ohio paid for local bounties during the war $54,000,-000, and the military expenses amounted to over $11,000,000, making the total expenditures chargeable to the Civil War over $65, 000,006.

For the third time, 14 May 1873, a constitu¬ tional convention assembled to prepare and present to the citizens of Ohio a new organic instrument of law; but they were satisfied with the constitution of 1851 and they rejected, on 18 Aug. 1874, the proposed constitution by a majority against it of 147,284.

The history of Ohio in these later days has been one of unbroken progress and prosperity. No stirring events have entered into her rec¬ ords save the marvelous developments of her people.

Ohio's part in the war with Spain was characterized by patriotism and promptitude. The President issued two calls for troops, 23 April and 25 May 1898. "So expeditious was the work of getting Ohio's quota ready for serv¬ ice,® says Governor Bushnell in his annual

message for 1900, "that a comparatively short time elapsed in camp life at the rendezvous. The entire mustering was completed in eight days. Ohio was the first State in the Union to put a volunteer regiment in the field.® Under the first call Ohio furnished 428 officers and 8,052 enlisted men ; under the second call, 73 officers and 6,801 enlisted men, making a total of 15,354.

In 1903 Ohio celebrated its centennial as a State of the Union at Chillicothe. The occasion was marked by appropriate ceremonies, formal addresses and literary papers on . the various phases of Ohio's history and development.

The fourth constitutional convention as¬ sembled at Columbus 9 Jan. 1912. After a long session it offered to the people 41 amend¬ ments and a special proposition on licensing intoxicating liquors; of these all but eight were adopted, as well as the license proposition. Among the more radical amendments were proposals on the intiative, referendum and re¬ call, which were adopted.

In March 1913 Ohio was visited by general and disastrous floods, the severest occurring in the Miami and Scioto valleys. Jn the Miami country, 400 people lost their lives and the property damage approximated $150,000,000. In the Scioto Valley the loss of life reached 145 persons, and the property loss and damage was over $25,000,000.

Of the Presidents of the United States eight were either born in Ohio or were residents of the State, viz. : William Henry Harrison, Ulys¬ ses S. Grant, _ Rutherford B. Hayes, James A. Garfield, Benjamin Harrison, William McKin¬ ley, William H. Taft and Warren G. Harding.

In the growth of population of Ohio she maintained her position as third State in the Union for 50 years, from 1840 to 1890, when she became the fourth in rank, having been outgrown 4>y Illinois; but, notwithstanding,. the percentage of increase for as old a State has been marvelous. From 1820 to 1850 the de¬ velopment of population was over 700 per cent, and it was more than doubled from 1850 to 1900. The population during the last four decades was (1890) 3,672,316; (1900) 4,157,545; (1910) 4,767,121 ; (1920) 5,759,394. In June 1920

S°Vniames M .Cox and W- G- Harding were tne Uhioan nominees for the Presidency.*

Governors of the

NAME

Arthur St. Clair .

§ Charles Willing Byrd .

Northwest Territory.

Term of service

15 July 1788 — 14 Dec. 1802 14 Dec 1802 — 3 Mar. 1803

Governors of Ohio.

NAME Tirm of service

Edward Tiffin . 3 Mar. 1803— 1 Jan. 1807

- *Thomas Kirker . 1 Jan. 1807—12 Dec. 1808*

Samuel Huntington . 12 Dec. 1808— 8 Dec 1810

Return J?nat,han Meigs . 8 Dec. 1810—24 Mar. 1814

**Othmel Looker . 24 Mar. 1814— 8 Dec. 1814*

Thomas Worthington . 8 Dec. 1814— 14 Dec. 1818

**A,,an ™llen Brown . 14 Dec. 1818— 4 Jan. 1822*

- *Allen Trimble . 4 Jan. 18.2— 28 Dec. 1822*

Jeremiah Morrow . 28 Dec. 1822—19 Dec. 1826

£llen Tn?bAle V . 19 Dec- 1826—18 Dec. 1830*

Duncan McArthur . 18 Dec. 1830— 7 Dec. 1832

Robert Lucas . 7 Dec. 1832— 13 Dec. 1836

fe?ieph cvnce . 13 Dec- 1836 — 13 Dec. 1838

Wilson Shannon . 13 Dec. 1838—16 Dec. 1840

Thomas Corwin . 16 Dec. 1840— 14 Dec. 1842

Wilson Shannon . 14 Dec. 1842—15 April 1844

ˆThomas Bartley . 15 April 1844— 3 Dec. 1844

Mordecai Bartley . 3 Dec. 1844—12 Dec. 1846

William Bebb . 12 Dec. 1846—22 Jan. 1849

Seabury Ford . 22 Jan. 1849—12 Dec. 1850

n u . 12 Dec- 1850—13 July 1853

- *William Medill . 13 July 1853— 14 Jan. 1856*

Salmon P. Chase . 14 Jan. 1856— 9 Jan. 1860

William Denmson . 9 Jan. 1860— 13 Jan. 1862

David Tod.. . 13 Jan. 1862— 11 Jan. 1864

John Brough . 11 Jan. 1864—29 Aug. 1865

tCharles Anderson . 29 Aug. 1865— 8 Jan. 1866

iac°b 5- 9°x- . . 8 Jan. 1866—13 Jan. 1868

Rutherford B. Hayes . 13 Jan. 1868— 8 Jan. 1872

Edward F. Noyes . 8 Jan. 1872—12 Jan. 1874

Allen . 12 Jan. 1874—10 Jan. 1876

Rutherford B. Hayes . 10 Jan. 1876— 2 Mar. 1877

**Thomas L. Young . 2 Mar. 1877—14 Jan. 1878*

Richard M. Bishop . 14 Jan. 1878— 12 Jan. 1880

Charles Foster . 12 Jan. 1880—14 Jan. 1884

George Hoadly . 14 Jan. 1884—11 Jan. 1886

Joseph B.Foraker . 11 Jan. 1886— 13 Jan. 1890

James E Campbell . 13 Jan. 1890—11 Jan. 1892

William McKinley . 11 Jan. 1892—13 Jan. 1896

Asa S. Bushnell . 13 Jan. 1896— 8 Jan. 1900

George K. Nash . 8 Jan. 1900—11 Jan. 1904

t yronT. Herrick . 1 1 Jan. 1904— 8 Jan. 1906

John M. Pattison . 8 Jan. 1906— 18 June 1906

t Andrew L. Harris . 18 June 1906—11 Jan. 1909

Judson Harmon . 11 Jan. 1909— 13 Jan. 1913

James M. Cox . 13 Jan. 1913—11 Jan. 1915

Frank B. Willis . 11 Jan. 1915— 8 Jan. 1917

James M. Cox . 8 Jan. 1917 — 1920

Harry L. Davis . Jan. 1921— Jan. 1923

*§*t Became governor on removal (§), resignation (*), or death (f) of predecessor.*

Bibliography.— Black, (Story of Ohio) ; Clark, (Picturesque Ohio ; Clarke, (Antiquites of Ohio) and (Founders of Ohio* ; Claypole, (Lake Age in Ohio*; De Nadaillac, Prehis¬ toric Americans-* ; Force, Parly Notices of Indians of Ohio* ; Hinsdale, (The Old North¬ west ; Howe, Historical Collections of Ohio* ; Howells, (Recollections of Life in Ohio*; Mc¬ Cabe, (Historic Towns of Ohio) ; Maclean, ; Moorehead, Primitive Man in Ohio* ; Reid, (Ohio in the Wat ; Randall and Ryan, (History of Ohio*; Short, (Ohio: a Sketch of Industrial Progress* ; Siebert, Gov¬ ernment of Ohio* ; Thompson, Pibliography of Ohio* ; Ryan, (Civil War Literature of Ohio*; Venable, Pootprints of Pioneers in Ohio* and Peginnings of Literary Culture in Ohio,*

Daniel J. Ryan,

*Author of CA History of Ohio); (The Civil War Literature of Ohio * ; etc .*

OHIO, Army of the, in American military history, a division of the Federal army in the Civil War; organized in 1861-62 by General Buell ; afterward under the command of Gen¬ eral Rosecrans and incorporated with the Army of the Cumberland. A second department

of the Ohio was formed and was also in 1865 in¬ corporated in the Army of the Cumberland.

OHIO COMPANY, The, in American his¬ tory, a western colonial enterprise known as Ohio Company the first and Ohio Company the second. (1) In 1749 George II granted to a party of wealthy Virginians a tract of land containing 500,000 acres, lying mostly to the west of the mountains and south of the Ohio River. Thomas Lee was the projector of this company, but it was later conducted by Law¬ rence Washington. The conditions of the grant were that 100 families should be established there and a garrison maintained. It was short¬ lived. (2) On 3 March 1786 at the suggestion and in the house of Rufus Putnam (q.v.) of Rutland, Mass., Putnam, Cutler, Brooks, Sar¬ gent and Cushing organized an association of 1,000 shares, each of $1,000 in Continental cer¬ tificates, or $125 in gold. A year was allowed for subscription. Land was to be purchased from Congress, in tracts lying between the Ohio and Lake Erie. On 9 May 1787 Parsons, agent for the company, appeared before Congress and was well received. Congress granted certain lots- free of charge and an enormous tract was bought at about eight or nine cents per acre in specie. Colonization was immediately begun, and slavery was prohibited. The company had much influence in shaping the ordinance for the government of the Northwest Territory. See Ordinance of 1787.

OHIO FALLS CANAL. See Canals. OHIO NORTHERN UNIVERSITY,

Ada, Ohio, a coeducational institution chartered in 1904, but existing under different names from 1871. It was originally the Northwestern Ohio Normal School, but was consolidated with the Northwestern Normal School in 1875. It came under the control of the Methodist Episcopal Church in 1898, and was reorganized, taking its present name in 1904. In 1918 its president was Dr. A. E. Smith. It had 522 students with the United States army and 1,354 attending, the staff numbering 47 members. There are 5,155 living graduates.

OHIO RIVER, one of the largest tribu¬ taries of the Mississippi. It is formed by the junction of the Allegheny (q.v.) and Mononga- hela (q.v.) rivers, at Pittsburgh, in the western part of Pennsylvania. The Allegheny River brings to the Ohio the waters of Chautauqua Lake, and the drainage waters from the south¬ western part of the State of New York. The headwaters of the Allegheny in New York are only a few miles from Lake Erie. It is nav¬ igable 120 miles from the Ohio. The head¬ waters of the Monongahela have their rise in the

Alleghany Mountains in West Virginia, near the source of the Potomac River. It is navigable for about 60 mi'les from the Ohio. The Allegheny and Monongahela are large rivers at Pittsburgh, where they blend their waters to make the new stream. Here the Ohio is 1,021 feet above sea-level, and at its confluence with the Mississippi it is 322 feet above the sea. At first the Ohio flows north by

west, the valley broadening out to a flood plain. At Beaver the river turns and flows south by west, then almost south, forming the boundary between Ohio and West Virginia. Changing its course west, northwest, southwest, it forms the boundary between Ohio and Kentucky, then the boundary between Kentucky on the south and Indiana and Illinois on the north. Along its course are a number of large curves, but it has no falls or rapids that obstruct navigation except at Louisville (q.v.), where a coral reef exists ; but the rapids formed have been over¬ come by lateral canals. The descent here is about 22 feet in two miles. The river is now navigable for its whole remaining course, a dis¬ tance of about 975 miles; but a direct line from Pittsburgh to the mouth of the river is about 614 miles. The area of the Ohio Basin is about 214,000 square miles. The average rate of flow is a little over three miles an hour. The chief tributaries are the Muskingum, Scioto and Miami in Ohio and the Wabash, which is the largest affluent from the north. The largest tributaries from the south are the Tennessee and the Cumberland. Other large streams are the Kanawha, Licking and Kentucky. The largest tributaries of the Ohio have their head¬ waters in the mountains, and thus they become the depositories of vast quantities of the melted snows and heavy rains of spring which cause floods in the Ohio Valley. Often great damage to property and even 'loss of life is caused by these floods. The difference between the high and low-water mark some seasons exceeds 60 feet, and in 1887 it was over 70 feet. In the Ohio Valley flood (March-April 1913) damage was done to 206 towns and over 400 persons lost their lives and $180,000,000 property loss was sustained. There are times in the dry season when the water is so low at Pittsburgh and in places below, even as far as Cincinnati, that navigation is hindered or retarded. The Ohio and its tributaries have 2,300 miles of navigable waters. The coal from Pennsylvania, West Virginia and Ohio, the building stone and the grain and other farm products, the iron, steel, clay and lumber products, make a large amount of freight which is carried over the Ohio and its tributaries. The average annual amount of freight is over 15,000,000 tons. There are a number of large cities

on the banks of the Ohio, some of which are Cincin¬ nati, Louisville and Evansville.

The Ohio River has been prominent in the history of the United States. From the first it was recognized as one of the important water¬ ways of the country. The short portages from Lake Erie to the navigable tributaries of the Ohio and the continuous waterway to the Gulf of Mexico make the river an important route for the explorer, missionary and settler. (See United States — History: Northwest Terri¬ tory; Ohio). Consult Bliss, (Dr. Saugrain's Relation of his Voyage Down the Ohio River, > (in (American Antiquarian Society Proceed¬ ingsˆ Worcester 1897) ; Hulbert, A. B., (The Ohio River> (New York 1906) ; King, (History of Ohio) ; Thwaites, R. G., (On the Storied Ohio> (Chicago 1903).

OHIO STATE ARCHAEOLOGICAL AND HISTORICAL SOCIETY was first

organized at Mansfield, Ohio, in 1875 as the Archaeological Society of Ohio. Subsequently

it was reorganized at Columbus and incorpo¬ rated March 1885 as the Ohio State Archaeolog¬ ical and Historical Society. Its first president was Hon. Allen G. Thurman. The head¬ quarters are at Columbus. It has a library and very extensive archaeological museum in Page Hall, Ohio State University. It is managed by a board of trustees, part of whom are appointed by the governor and part elected by the mem¬ bers of the society at their annual election. The society is supported with appropriations by the general assembly of the State. It publishes an annual volume of biographical, historical and archaeological matter pertaining to Ohio. It conducts archaeological researches each summer amid the sites and remains of the prehistoric mound builders. Its members, divided into four classes, honorary, life, corresponding and ordinary.

OHIO STATE UNIVERSITY, The,

opened at Columbus in 1873. In 1866 an act passed the Ohio legislature providing for the establishment of the Ohio Agricultural and Mechanical College, in accordance with the pro¬ visions of the Federal land grant of 1862. But nothing further was done until 1870, when a second law was passed iby which the college was established at Columbus. It was reorganized in 1878 and the name changed to the Ohio State University. The present organization includes a graduate school and 11 colleges: (1) the Graduate School

administers all the graduate work offered in the university, leading to the following degrees in course : M.A., M Sc

Ph.D., C.E., M.E., E.E., E.M., Cer.E., Chem.E., and M.Arch. ; (2) the college of agriculture offers four-year curricula in agriculture, horti¬ culture, forestry, landscape architecture, applied entomology and home economics, leading to the degree B.Sc.; (3) the college of arts, philoso¬ phy and science offers courses in languages, sciences and humanities, leading to the degrees B.A. and B.Sc. ; (4) the college of commerce and journalism, offering two-year curricula, based upon two years of college training in ac¬ counting, banking and finance, charity organiza¬ tion, insurance, journalism, manufactures, marketing— dipmestic and foreign, public serv¬ ice, social service and transportation, leading to the degree B.Sc.; (5) the college of dentistry, a four-year curriculum leading to the degree D.D.S.; (6) the college of education, offering four-year curricula in general education, art, home economics, manual training and agricul¬ tural education, leading to the degree B.Sc. in Edu. ; (7) the college of engineering, offering four-year curricula in architectural, ceramic, chemical, civil, electrical, general, mechanical and mine engineering and architecture, leading to a bachelor degree ; (8) the college of homoeo¬ pathic medicine, offering a four-year curriculum based upon two years of college training and leading to the degree M.D. ; (9) the college of law, offering a three-year curriculum, based upon two years of college training and leading to the degrees J.D and LL.B. ; (10) the col¬ lege of medicine, offering a four-year curricu¬ lum based upon two years of college training and leading to the degree M.D. ; (11) the col¬ lege of pharmacy, offering a four-year cur¬ riculum, leading to the degree B.Sc. in Phar¬ macy; (12) the college of veterinary medicine, offering a four-year curriculum, leading to the

degree D.V.M. There are also shorter courses ottered in agriculture, horticulture, dairying, poultry husbandry, clayworking, industrial arts and mining. The instruction in agriculture, en¬ gineering and science has always been a prom¬ inent feature of the university's work; and its alioratories are especially well equipped. A lake laboratory for biological study is maintained at Sandusky. Military drill is a part of the curriculum for men. Women are admitted to all the departments. The governing body is a board of trustees, appointed by the governor with the approval of the State senate for seven years. The campus and farm contain 585 acres, of which 475 are set apart for the work in agriculture and horticulture. The

income is derived from the land grant of 1862, from the annual Federal appropriation and from a per¬ manent annual grant from the State, estab¬ lished in 1891 and doubled in 1896. In 1916 the total income was $1,698,813.55; the students numbered 5,822 and the faculty 470.

OHIO UNIVERSITY, Athens, Ohio, the pioneer higher institution of learning in the (<01d Northwest.® Ohio University is the oldest higher institution of learning in that part of the United States known as the <(01d North¬ west.ˆ Before Ohio was admitted to State¬ hood the Territorial legislature, in session at Chillicothe, made provision <(that there shall be a university instituted and established in the town of Athens.® This action bears date of 9 Jan. 1802. The institution to be ˆinstituted and established® was named the ((American West¬ ern University.® Two years after the passage of the act — Ohio having in the meantime been admitted into the Union — the State legislature re-enacted the provisions of the Territorial Act, with but few changes, by another act dated 18 Feb. 1804. This latter act, which gave the name (

The first graduates, Thomas Ewing and John Hunter, received their diplomas in 1815. The whole number of degree graduates, of baccalaureate rank, in the history of the uni¬ versity is men, 905; women, 314; total, 1,219. The total number of different students enrolled increased from 405 in 1901 to 4,962 in 1916.

A more intelligent statement of an approxi¬ mate enrolment of different students is as

follows :

College of Liberal Arts . 620

State Normal College . 1,941

Summer School (total 2,290) counting only those

not enrolled elsewhere . 1,542

Extension Classes (total 1,185) counting only those

not enrolled elsewhere . ; . 859

Total . 4,962

The university buildings are 15 in number, not including the

president's home, the heating plant, the greenhouse and 10 buildings used as dormitory quarters for women students. Con¬ servative valuation of the property of the uni¬ versity is as follows: grounds, $541,562; build¬ ings, $976,000; equipments, $211,100; total, $1,728,662. The financial support of the univer¬ sity is derived from three sources, namely, the mill-tax, special appropriations and local re¬ ceipts from incidental fees, rents and interest

on permanent funds forming a part of the irre¬ ducible debt of the State of Ohio. Receipts from all these sources in 1916 amounted to $319,718.02. Salary payments for the fiscal year ended 30 June 1916 amounted to $166,663, of which amount the sum of $136,211.34 was for teaching service exclusively. Expenditures for the year made a total of $300,533.86.

One degree is given in the college of liberal arts — A.B. The degree of B.S. in Education is given those who complete the four-year courses in the State Normal College. To re¬ ceive either of these degrees the student must have a credit of not less than 120 semester hours based upon at least 15 units of secondary work. Each semester covers a period of 19 weeks and each recitation period represents 55 minutes of actual class-room work. The field of instruction, covered is shown by the follow¬ ing classification of colleges and departments * college of liberal arts; the State normal col¬ lege.; the college of music; the department of public speaking; the school of commerce; the department of physics and electrical engineer¬ ing; the department of mathematics and civil engineering, and the departments of drawing and painting.

In the State Normal College the following courses are offered: 1, course for teachers of rural schools; 2, a two-year course in elemen¬ tary education ; 3, a four-year course in sec¬ ondary education : 4, a four-year course in supervision for principals and superintendents; 5, a one-year course for college graduates; 6, a two-year course in the kindergarten school; 7, a two-year course in school agriculture; 8, a two-year course in manual training- 9, a two- year course in. household arts ; 10, a two-year course in public-school music; 11, a three-year course in public-school drawing; 12, a two-year course in physical education. All courses named lead to a diploma; courses 3, 4 and 5 to a diploma with the degree of bachelor of science in education. The library contains over 46000 volumes. The faculty numbers 88.

OHIO WESLEYAN UNIVERSITY,

Delaware, Ohio, was founded under the pat¬ ronage of the Methodist Episcopal Church in 1841, when the original property was acquired and an academy opened. The charter was granted in 1842. In 1844 the College of Lib¬ eral Arts began its work. In 1877 the Ohio Wesleyan Female College, an independent in¬ stitution, established in Delaware in 1853, was incorporated in the university, its students were admitted to university classes and its graduates to ad eundem degrees. Since this time the university has been coeducational. In 1896, the Cleveland College of Physicians and Surgeons, originally established in 1863, be¬ came an integral part of the institution and its subsequent graduates were admitted to the de¬ gree of doctor of medicine in the university. This school was combined with the medical de¬ partment of Western Reserve University in June 1910.

The . university has maintained, since its foundation, college preparatory classes, now organized as the academy; and maintains, in the conservatory, a school of music and a school of fine arts, both established in 1877.

A school of oratory, established in 1894, is now organized as a department of the college. The

school of business, established in 1895 and for several years organized as a part of the acad¬ emy, was discontinued in June 1912. The grad¬ uates of each of these schools, upon the com¬ pletion of a prescribed course of study, are granted certificates under the seal of the uni¬ versity, but are not thereby admitted to aca¬ demic degrees. The total value of grounds, buildings and endowments is $2,400,000 and the annual income from endowments and fees, $160, 000. The library contains 69,876 volumes. The total number of students enrolled for a re¬ cent academic year was 1,256, of whom 1,066 were in the college. The college faculty num¬ bered 60 and the faculties of the other schools, 16. The aim of the college is to maintain a genuine curriculum of liberal arts that its graduates may be prepared, under high ideals of scholarship and conduct, for successful pro¬ fessional or technical study elsewhere, or for the discharge of all their obligations as citi¬ zens. It confers the degrees of bachelor of arts and bachelor of science. The total number of graduates, including the class of 1916, who have received

baccalaureate degrees is 4,864.

OHM, 6m, Georg Simon, German physi¬ cist: b. Erlangen, 16 March 1787; d. Munich, 7 July 1854. He was educated at the Univer¬ sity of Erlangen. In 1817 he became a teacher at the gymnasium in Cologne, and in 1826 at Berlin. From 1833 to 1849 he was director of the polytechnic school at Nuremberg, and in 1849 went to Munich as professor of physics at the university. His researches were chiefly concerned with galvanic currents and he formu¬ lated the law which is known as Ohm's law ; that the current is directly proportional to the electromotive force and inversely proportional to the resistance. This law was first stated in his (Bestimmung des Gesetzes, nach welchem die Metalle die Kontaktelektrizitat leiten) 0826), and was further developed and proved in his (Die galvanische Kette mathematisch bearbeiteU (1827) ; in English (The Galvanic Circuit Mathematically Investigated) (1891). He also wrote (Beitrage zur Molekularphysik) (1849), and (Grandziige der Physik) (1854). His collected writings were published by Lom- mel in 1892. His name was given to the prac¬ tical unit of electrical resistance in 1881. Con¬ sult Mann, (Georg Simon Ohm) (Leipzig 1892) ; Von Lommel, Eugen, Scientific Work of Georg Simon Ohm) (Washington 1893, trans. by W. Hallock).

OHM, the practical unit of electrical resist¬ ance, adopted in 1881 by the International Con¬ gress of Electricians at Paris, the centimeter- gram-second unit formerly in use having proved too minute for convenient reckoning. The ohm, named after the German physicist Ohm (q.v.), equals 1,000,000,000 (109) C. G. S. electro-magnetic units of resistance; a mi-

chrom is a resistance of one millionth -jq of

the ohm; and the megohm is a measure 1,000,000 (10b) times the ohm. The ohm may be independently defined as the electrical re¬ sistance to an unvarying current offered by a uniform column of mercury at 0° C., 106.3 cen¬ timeters in length and one square millimeter in cross-section.

OHMANN-DUMESNIL, Amant Henry,

American dermatologist: b. Dubuque, Iowa, 30 Sept. 1857. He was graduated from the Mis¬

souri State University in 1877 and from the Saint Louis Medical College, Washington Uni¬ versity, in 1880, and has since made

dermatol¬ ogy his specialty. He was professor of derma¬ tology in the College for Medical Practitioners 1881 ; in the College of Physicians and Sur¬ geons 1882; and in Marion Sims College of Medicine, 1895-97. He was also editor of the Weekly Medical Review; editor of the Saint Louis Medical and Surgical Journal and Atlas of Dermatology, and later editor and proprie¬ tor of the Saint Louis Medical and Surgical Journal and has published (Hand Book of Der- matologv) (1898); history of Syphilis' (3 vols., 1899).

OHM'S LAW, a fundamental principle in the mathematical theory of electricity, discov¬ ered in the early part of the 19th century by Dr. Georg Simon Ohm, a professor of physics at Cologne. It was first published in 1826. The law may be stated in the following manner: In any closed electrical circuit of resistance R, the current C, produced by an electromotive force E acting around the circuit, is given by the for¬ mula C— =E/R; C being measured in amperes, E in volts and R in ohms. Some authorities regard this simple equation as a sort of truism, pointing out that the ampere is, by definition, the current generated by one volt in a circuit whose resistance is one ohm. Ohm's law is much more than a truism, however, because it states not only that one volt generates a cur¬ rent of one ampere in a circuit whose resist¬ ance is one ohm, but also that P volts, acting in a circuit whose resistance is Q ohms, gener¬ ate a current of P/Q amperes. Ohm's law was first given for the case in which a con¬ stant electromotive force acts in a simple linear circuit, but it may readily be generalized so as to apply to branched circuits and to circuits in which the electromotive force is variable. See Electricity; Resistance, Electrical: Units of Measurement.

OHNET, Georges, French novelist: b. Paris, 1848; d. there, May 1918. He at first became a lawyer, but soon turned to journalism and edited, in the early 70's, Le Pays and the Constitutionnel. But it was in the melo¬ dramatic novel that his literary skill was best displayed. He wrote an enormous quantity of articles, novels and plays, and was writing on the war until a few days before his death. His masterpiece was the novel (Le Maitre de Forges) (1882), known to English readers as (The Ironmaster? A dramatized version met with great success. He was a strong admirer of George Sand and modeled his work on her later style, after the force of the Romantic movement had spent itself. Some of Ohnet's novels brought him more profit and notoriety than critical approbation. They form a series bearing the generic title of c Battles of Life?

OIL. There exists in nature a great number of substances that are more or less fluid at or¬ dinary temperatures, that are insoluble in

water, that take fire on application of flame, and, while not very closely related, are grouped together under the name "Oils? Some are ready formed, as petroleum ; others are easily ob¬ tained by subjecting the crushed seeds of plants to pressure or by extracting the meal with volatile solvents, as linseed and rapeseed oil ; or by the aid of heat and pressure as lard

oil, and others by distillation as oil of pepper¬ mint. Some are sparingly soluble in alcohol, others) reely so ; but all except castor oil are soluble in ether, petroleums of various grades, chlorofoim and carbon-disulphide and in each other. Because of certain similarities in char¬ acteristics they are classified under the three headings of essential oils, fixed oils and petroleums.

Petroleum. — As is indicated by its name, petroleum is obtained from the rocky structure of the earth. (See Petroleum). An older classification included the petroleums with the essential oils, because of the readiness with which they are distilled.

Fixed or Fatty Oils. — These are a section of the bodies described under the general head- ing of "'Oils, Fats and Waxes® and are derived from both animal and vegetable sources. They cannot be distilled, as the petroleums, ordi¬ narily, are without decomposition ; they leave permanent, translucent grease spots on" paper ; they are, therefore, called «Fixed Oils.® They vary in specific gravity from .875 to .960. Fixed oils are fluid at ordinary temperatures, differing in this respect from the fats which are more or less solid. Both oils and fats are mixtures composed chiefly of olein, stearin and palmitin, but those in which olein predominates are known as oils. Olein is that portion of fixed oils that is fluid at ordinary temperature, while the crystalline portion consists of stearin and palmitin. They differ chemically, but for prac¬ tical purposes this distinction is sufficiently broad. Considered chemically, the fatty oils and solid fats are neutral glycerides of fatty acids, whereas waxes are esters formed by the union of fatty acids with alcohols not belong¬ ing to the glycerol series. When treated with an alkaline solution the fixed oils are saponified with the formation of glycerol. There have been many classifications of the fixed oils based on various characteristics, but the most conven¬ ient one for practical purposes appears to Lew- kowitsch to be that of arranging them according to the magnitude of the iodine value. This principle leads

to a natural subdivision into liquid fats (oils) and solid fats (fats), the former being differentiated from the latter by their considerably higher iodine values. This value indicates the percentage of iodine chloride absorbed by a fat or wax, expressed in terms of iodine. The iodine value is obtained by treat¬ ing the oils in a prescribed manner with iodine chloride, the percentage absorbed being a meas¬ ure of the proportion of the unsaturated bodies present. The knowledge of this value is of great service in the selection of proper fixed oils for definite purposes. Those consisting largely of unsaturated bodies, as, for example, linseed and poppy seed, are useful in painting. Naturally thin, they can carry large proportions of pigment giving great covering power. On exposure to air the unsaturated portions be¬ come saturated, or ((dry® as commonly stated, to a hard surface. For the same reason, lin¬ seed oil can not be used for lubrication. On the other hand, olive oil, which has a low iodine number because it contains less un¬ saturated bodies, can be used for lubrication, but is entirely unsuited for painting purposes. There is a close relationship between the iodine value and the capacity to absorb oxygen so that

arranging the vegetable oils according to the magnitude of this value gives a classification as to drying power.

Cholesterol has long been recognized as one of the crystalline constituents, chemically an alcohol, of fats and fatty oils, of animal origin. Other similar bodies have been isolated and these are all now classified as zoosterols. Vegetable fats and fatty oils are characterized by the presence of corresponding alcohols to which the name phytosterols has been given. Recent researches have served to show the chemical difference between the two series and their derivatives and naturally lead to a second guiding principle in the subdivision of the glycerides. Arranging the fatty or fixed oils and solid fats according to these two principles, we obtain the following subdivisions :

Liquid Fats and Fatty Oils:

A. Vegetable oils

1 . Drying oils

2. Semi-drying oils

3. Non-drying oils

B. Animal oils

1. Marine animal oils

a. Fish oils

b. Liver oils

c. Blubber oils

2. Terrestrial animal oils Solid Fats:

A. Vegetable fats

B. Animal fats ,

1. Body fats

a. Drying fats

b. Semi-drying fats

c. Non-drying fats

2. Milk fats.

Liquid Fats and Fatty Oils.

A. Vegetable Oils. 1. Drying Oils.— The drying oils include linseed, Chinese tung oil, poppy seed oil and several of the less familiar ones which are characterized, when exposed to air, by changing to first, a tacky and eventually a smooth varnish-like surface. Be¬ cause of this fact linseed oil has long been an important article of consumption as a vehicle both for carrying lead and fine paints for prac¬ tical house painting and when mixed with pig¬ ments, for decorative work. Its source is the seeds of the flax plant. Chinese tung oil, also known as Chinese wood oil, Japanese wood oil and as simply wood oil, was first mentioned in about 1735 as an adulterant of Chinese lacquer. It is obtained from the seeds of Aleurites cor- data, a tree indigenous to China. The fruit forms a nut, in which three to five seeds hav¬ ing a hard shell and an oleaginous kernel are enclosed; hence in China the oil is frequently termed (

2. Semi-Drying Oils. — The semi-drying oils are frequently divided into first, the cot¬ tonseed oil group, which includes, beside the one giving the name, maize (corn) oil, sesame, soja bean and several other lesser-known oils;

and second, the rape oil group which also in¬ cludes the oil derived from the seeds of ravison, black, white and Indian mustard. The oils of this group, in the past, have been used in large quantities for the lubrication of machinery and for illuminating purposes, but are now almost entirely replaced by pure mineral and com¬ pounds of mineral and fixed oils, respectively. The highly refined rapeseed oil expressed from seeds grown on their own farms, is prepared by the peoples of European nations for do¬ mestic purposes and also for burning in sanctu¬ ary lamps.

3. Non-Drying Oils. — The non-drying oils are best known through olive, arachis and castor oil. The olive oil obtained from the flesh of barely ripe olives is of better quality than that from fully matured or over-ripe fruit. Fine grades are made from hand-picked fruits from which the kernels have been removed. Ex¬ ceptionally fine qualities are prepared by peeling hand-picked fruit and pressing lightly after carefully removing the kernels. The pressed pulp is worked over in various ways for the pro¬ duction of the lower grades of edible oils and those for lubrication and soap-making Castor oil is obtained from the seeds of Ricinis com¬ munis. The most important sources are East India, Java, the Mediterranean coun¬ tries, Mexico and the United States. The medicinal oil is produced by expression in the cold. The oil from the presses is received in well-tinned vessels where it is allowed to set¬ tle, following which it is refined by heating in tinned pans over water kept at its boiling point to coagulate the albumen. When this is accom¬ plished it is cooled and strained through canton flannel into cans in which it is brought to market as ((cold drawn® oil. The oil cake is afterward heated and pressed for lower grade oils used for mechanical purposes. Castor dif¬ fers from all other fixed oils in its solubility in alcohol and in its being nearly insoluble in the petroleums. Arachis, peanut oil, is ob¬ tained by expression from the ordinary pea¬ nut, Arachis hypogeia. Under the newer processes it is being converted into a salad oil, water-white in color and entirely free from the odor of peanuts.

B. Animal Oils. — The two divisions of the animal oils represent practically also the dry¬ ing and non-drying classes. As with the vege¬ table oils there also exist those derived from the animal kingdom that are intermediate in position between the drying and non-drying oils, as indicated bv their iodine number. These, however, are the little-known oils and of small commercial value.

1. Marine Animal Oils. — a. Fish Oils. — The fish oils are obtained from pressing the entire fish — and include the menhaden, herring, sardine, sprat and portions of the salmon that are not usable for food. The catch of the men¬ haden, for example, which is largely the source of the fish oils expressed in the eastern United States, is in enormous quantities, especially off the coast of New Jersey from about May until November. Some seasons as much as 400,000 tons have been caught and pressed. The United States Fish Commission reported in 1912 a production of 6,651,203 gallons of menhaden oil which, together with the scrap used for fertilizer, amounted in value to $3,690,155. This

oil is graded under different qualities, the best being that obtained from fresh fish. The oils are clarified by filtering through fullers' earth and then are allowed to rest for some time in tanks, cooled either naturally or artificially, to separate the stearin and impurities from the olein. The more fluid part of the oil is re¬ moved by decantation and the stearin, which settles out, is afterward pressed for the re¬ moval of a larger percentage of the oil. Both the oil and stearin have a large use in the manufacture of leather.

b. Liver Oils. — These are obtained, as indi¬ cated by the name, from the livers of the larger fish, the best known being the cod, haddock, skate and dogfish. They contain notable amounts of cholesterol and other unsaponifiable substances. Genuine cod liver oil is obtained from the liver of the Gadus morrhua. At cer¬ tain times every year enormous shoals of cod frequent the coast of the Northern seas, chiefly the coasts of Norway, Scotland, the East coast of the United States and Canada, the coast of Newfoundland and also the West coast of the United States and the coasts of Japan and Siberia. For many years the best medicinal cod was obtained from Lofotes, Norway, at which point the cod appears in February, the fishing season lasting from that month until April. Later in the year they appear at Fin- marken, but here they are in an immature con¬ dition and hence do not yield as much oil or of as good quality as that obtained from the fish caught off the Lofotes coast. Another difficulty is that the cod frequenting the Fin- marken coast are accompanied by other fish, whose livers naturally become mixed with those of the cod and do not add to its value. The main purpose of catching the cod is its value as food and it seems probable that the use¬ fulness of the oil was an accidental discovery. The former practice on shipboard was to place the livers freshly taken from the fish in bar¬ rels, where they were allowed to decompose. This ruptured the oil-containing cells and the accumulated oil in the barrels was tapped off and purified for medicinal purposes. Because

of contamination, as well as the method of pro¬ duction, its odor and taste were objectionable. In the best equipped establishments at present, the method followed is to place the fresh livers in tin-lined vessels provided with open steam coils, almost immediately after they have been taken from the fish, washed and sorted — all livers showing stains being discarded. Low pressure steam is then blown into the livers and the oil exudes almost immediately. This method is also being followed in Newfound¬ land, so that the product now being made there is not considered inferior to the Norwegian medicinal oil. The crude medicinal cod liver oil is filtered to free it from liver tissue and bleached by treatment with fullers' earth or by exposure in closed glass vessels by the ac¬ tion of the sunlight. Medicinal oil so prepared deposits stearin at a low temperature and such oil is term eh "Congealing Oil.® This is ren¬ dered ((non-congealing» by cooling it down to a temperature below Zero0 C and pressing or decanting the stearin free oil. The livers un¬ ified for the preparation of medicinal oil, either from disease or decomposition due to keeping them too long, are steamed and pressed

tor a grade of commercial oil used in finishing leathers. That cod liver oil has a therapeutic value seems to have been definitely proven, Dut on just what constituent this depends in¬ vestigators do not agree.

,, C;t,B1iUbber Oils.ˆAmong the blubber oils, tne third group of the marine animal oils, are several oi varying composition, which are thus described by Lewkowitch : «Seal oil, whale oil, turtle oil and dugong oil consist almost wholly oi glycerides; dolphin oil, porpoise oil and brown fish oil contain notable amounts of sper¬ maceti forming as it were intermediate mem¬ bers between true fatty oils and liquid waxes.

• • w (

occupy an exceptional position on account of their containing considerable proportions of glycerides and volatile acids. In this respect turtle and dugong oils form intermediate links between these oils on the one hand and seal and whale oils on the other.® The ˆtrying® out of the blubber oils is now mostly done on shore. The blubber is stripped clean from flesh, cut into strips which are thrown into chopping machines and the shredded mass immediately

delivered into melting pans and boiled with steam. The first oil off is of the best quality. If desirable to prepare an oil free from stearin, that work is accomplished in the same way as described under cod liver oil.

Sperm is omitted from this classification because while fluid, it is chemically a wax and not an oil. It is unique in many respects. Nearly all the other fixed oils have a specific gravity heavier than .915, while sperm oil has a specific gravity of .880. Its flash test is practically as high as any of the fixed oils, .but its. viscosity is much lower than any other fixed oil. Notwithstanding these characteristics, sperm oil in the past has been used for lubrica¬ tion for nearly all kinds of machinery, ranging from ring spindles to steam cylinders. There are two recognized varieties — the sperm ob¬ tained from the head cavities and from the blubber of the sperm whale, or cachalot (Phy – seter, macro cephalus) and Arctic sperm oil ob¬ tained chiefly from the bottle-nose whale (Hyperoodon Rostratus). The oils from the two portions of the body differ considerably in appearance and if rendered on shipboard are kept separate, but when received at the re¬ fineries, they are generally mixed in their natu¬ ral proportions of one-third head oil and two- thirds body oil. This mixture is chilled and pressed for the separation of the spermaceti which remains in the press cloths, the oil, freed from wax passing through. The head or brain oil is clear and limpid when first re¬ moved, but after a short time thickens and hardens through the chilling of the spermaceti. The body oil is a light straw color. Sperm whales yield varying amounts from five to 145 barrels of the crude material.

2. Terrestrial Animal Oils. — The liquid fats from terrestrial animals are practically all non-drying. A few of scientific interest, not obtained in commercial quantities, judged by their iodine value alone might be classed with the semi-drying oils. Many of the oils in this section come on the market only after they have been pressed for removal of a portion of the stearin and palmitin with which they are mixed

in the tissues. Lard oil, for example, is ob¬ tained from the fats from the visceral cavity ol the hog, the best grade being rendered within 24 hours after removal. It is allowed to granu¬ late at a temperature of approximately 55° F., alter which it is pressed. The oil obtained is largely used for illuminating purposes, though a portion is required for the <(enfleurage ® proc¬ ess in obtaining essential oils (see Perfumes and Perfumery), while the combined stearin and palmitin are mixed with the softer grades of lard to stiffen it for summer trade. The grades rendered from the less desirable fats of the hog in

the past have found a ready market for use in cutting threads on metals, but in automatic machine work they are now being superseded by the specially prepared mineral oils.

Other familiar oils from terrestrial animals are neatsfoot and tallow oil. Genuine neats- foot oil is obtained from the feet of cattle. The hoofs are washed and scraped to remove hair and impurities, are sawed or split to better expose the . fatty matter and kept simmering with water in steam-jacketed pans for eight to 10 hours. . The oil rises to the surface from which it is frequently skimmed and is trans¬ ferred to heated tanks in which it is allowed to settle to separate it from water and other suspended matter. On chilling the stearin set¬ tles to the bottom of the container; the clear oil is decanted and if the process has been well- carried out, may have a cold test of 20° F. Neatsfoot oil should be pale yellow in color, have a bland taste and a characteristic odor! The demand for this oil in the leather industries has brought out inferior grades, adulterations and substitutes. Some of the latter, however, are quite as valuable in finishing leather as genuine neatsfoot. The products obtained from the rough fats taken from cattle come to the market both as oils and fats and because of their importance in both conditions, will be taken as the types for the connecting links be¬ tween the oils and the fats. The methods of separating the fats are of sufficient in¬ terest to warrant describing them in detail. In the large slaughter houses the fat is im¬ mediately removed from around the kidneys and bowels of the slain animal ; is carefully freed from all inferior fatty matter and taken at once to the oleomargarine factory where it is sorted, washed thoroughly with warm water and placed in cool rooms to dry and harden. It is ((rendered® by heating in tin-lined jacketed kettles to a temperature of 109° F., the lique¬ fied portion rising to the top of the kettle from which it is decanted. The liquid is cooled in shallow tin-lined trays at such a temperature that the stearin will crystallize or (

The fat taken from all other portions of the carcass are usually rendered together. The simple process calls for a steam jacketed lead-lined kettle supplied with open steam coils, hav¬ ing a close fitting cover to which a pipe is

•

attached for conveying the odorous vapors to a stack and facilities

for charging and discharg¬ ing. The rough fat is cut up, put into the tank, hot water run in, steam turned on. and continued until all the fat obtainable by heat alone has risen to the surface. The melted fat is removed, a small percentage of dilute sul¬ phuric acid added and steam again turned on. The acid breaks down the animal tissues and releases oil from the cells which heat alone could not. In smaller places these two grades are mixed in melted condition, purified by set¬ tling over hot water, run into molds allowed to cool and solidify and sold as cake tallow. The sweetness and purity of the product de¬ pends quite as much on the stock used as on the care taken in rendering and purifying. In the larger institutions the rendered fat is al¬ lowed to cool at granulating temperature, after which it is placed in canvas bags and submitted to pressure. The oil pressed through the can¬ vas is mostly olein and is the tallow oil of commerce. The portion remaining inside the bags has a higher melting point than the tal¬ low because consisting chiefly of stearin and palmitin, and is marketed as tallow stearin.

Essential Oils. — The greater proportion of the essential oils are found in nature ready formed. The characteristic odors of plants are due in most cases to the presence of one or more of these bodies. Not all now being pro¬ duced, however, are of vegetable origin, large quantities being made synthetically in labora¬ tories to the identical chemical structure of the natural oil. The essential oils differ from the fixed or fatty oils in that they are volatile, leaving at most only a trace of residue, hence they do not pro¬ duce a permanent grease spot on paper. They are usually of very complex com¬ position, and different specimens from the same botanical source often exhibit considerable variations in the proportions of their constitu¬ ents. The following by Mr. Ernest J. Parry, taken from the last edition of Allen's Analy¬ sis,) gives important information as to their composition : ((The only satisfactory classifi¬

cation of Essential oils is according to their botanical origin. The alternative method, adopted by many French chemists, is to classify them according to their chemical relationships. But this at once raises a serious difficulty. Many oils owe their chief characteristics to at least two different substances. For example, citronella oil contains a large amount of both geraniol and of citronella. If we adopt a chem¬ ical classification, are we to place this oil with otto of roses, which contains a very large amount of geraniol, or with a lemon-grass oil, which consists chiefly of the aldehyde citral. Both German and French chemists prefer a botanical classification, and this will be found to have considerable advantages over a chemi¬ cal one. The greater part of the Essential oils will be found to owe their

principal characteris¬ tics to one or more of the following groups of compounds: (1) Terpenes, hydrocarbons of

the formula CioHie: in many of these cases 90 per cent of terpenes are present, but they are seldom the most useful portion of the oil, which frequently depends entirely for its value on the remaining constituents, e.g., lemon oil, orange oil; (2) Sesquiterpenes, hydrocarbons

of the formula CjsEEi : cedar-wood oil and patchouli oil are type of this class; (3) Open chain alcohols and their corresponding alde¬ hydes : such are the so-called Indian grass oils (citronella, lemon-grass and Indian geranium oils; (4) Aromatic alcohols of the camphor series and their corresponding ketones, such as peppermint, thuja and pennyroyal oils; (5) Aromatic alcohols of the benzene series and their corresponding aldehydes and ketones, such as bitter-almond oil, caraway oil and cinna¬ mon oil ; (6) Sesquiterpene alcohols, such as sandalwood oil. (7) Phenols and their deriva¬ tives, such as clove and aniseed oils. (8) Esters of any of the above-mentioned alcohols, such as lavender and bergamot oil, wintergreen oil. (9) Sulphur compounds, such as garlic oil. There are a few oils which do not come under any of these heads, but they are not very numerous.®

The essential oils of plants are usually liquid at ordinary temperatures, but many of them deposit solid bodies called stearoptenes by cooling, e.g., camphor and the paraffin hydro¬ carbons of rose oil.

Manufacture of Essential Oils. — They are

obtained by the following methods: (A) By pressure, as the oils of lemon, laurel and ber¬ gamot. (B) By distillation with water, or by passing a current of steam through the matter to be extracted. It has been found that the steam distillation of some essential oils is not the best method of manufacture, because cer¬ tain bodies may be changed chemically by this operation and impart an odor not present in the plant itself. (C) By fermentation and dis¬ tillation, as the essential oils of mustard and bitter almonds. After all the fixed oil has been extracted from the mustard seed meal, water is added. In its presence, a fermentation is started which results in the formation of essen¬ tial oil which is then recovered by distillation with water. (D) By solution in a fixed oil devoid of odor, such as olive oil or lard — the (

twn) , and that has long been a valuable product t,jm the Philippines, a full description of it in an article by Mr. Alois von Isakovics in Rog- eis and Aubert's (Industrial Chemistry) will be quoted :

,(

Florus R. Baxter,

Chief Chemist of the Vacuum Oil Company.

OIL-BEETLE. See Blister-beetle.

OIL-BIRD or GUACHARO. See Gua-

CHARO.

OIL CAKE. See Flaxseed.

OIL CITY, Pa., city in Venango County, at the junction of Oil Creek and the Allegheny River, and on the Pennsylvania, the Lake Shore and Michigan Southern and the Erie railways, about 130 miles north by east of Pittsburgh. It was settled about 1825, but was only a small place, with but few local manu¬ factories, until the oil wells of the vicinity were developed in 1860. It was incorporated as a borough in 1863 and chartered as a city in 1874. A terrible catastrophe occurred on 5 June 1892, when burning oil came down Oil Creek from Titusville, a distance of 18 miles, and swept over the city. More than 100 persons were killed and property to the amount of about $1,000,000 was destroyed. The city is in the midst of the celebrated oil fields of Penn¬ sylvania and many of its industries are con¬ nected with the marketing of petroleum. Some of the prominent buildings are the Oil Ex¬ change, the Standard Oil Company office build¬ ings, the city hospital, church and school build¬ ings and several building blocks. The educa¬ tional institutions are the public and parish schools and jhe Carnegie Free Library. The government is vested in a mayor, who holds office for four years, and a council of four members, elected every two years. The school board, assessors, treasurer and comptroller are elected by the people. The city owns and oper¬ ates the waterworks. Pop. (1920) 21,274.

OIL CLOTH. See Floor-cloth.

OIL ENGINE. See Internal Combus¬ tion Engine.

OIL-FISH, the colloquial name of several fishes of the blenny family (Comephorus haika- lensis) notable for yielding oil, as the men¬

haden (q.v.) of the eastern United States. Specifically, the Russian golomynka (q.v.). The specific oil-fish which has supplied the term now current in the United States for several oil-yielding fish, is found only in Lake Baikal (q.v.). It is without scalest is about a foot long and is very soft and full of oil.

OIL FUEL. See Oil; Petroleum.

OIL GAS. See Oil.

OIL OF MUSTARD, a volatile, pungent, colorless and irritating oil formed in mustard by fermentation when it is wet. It is chemi¬ cally known as allyl isothiocyanate C3H5NCS. The seeds of the black mustard contain a bland fixed oil from which volatile oil is produced by the action of a soluble ferment upon the potassium salt of myronic acid in the presence of water. Oil of mustard blisters the skin. Pure oil boils at 151° C. The term ((mustard oils® is commonly applied to organic isothiocyanates in general.

OIL PAINTING, a method of painting in which the pigments used are ground in lin¬ seed oil, made from the seed of the flax plant, or in poppy oil ; in many respects the most valuable of the various processes at the com¬ mand of the artist who works in color. Ap¬ parently unknown to the ancients, and but little used by the earlier painters of the Renaissance in Italy, it has gradually come into wider use in succeeding schools of art, and at the present day has very largely superseded the older methods of tempera, encaustic and fresco, even for monumental mural paintings. In the important art of scene painting the use of dis¬ temper still prevails, for various reasons of practical convenience. The technical disad¬ vantages under which the artist painter labors are probably reduced to a minimum by the use of oil colors, but they are by no means entirely removed. The oil itself is a yellow vehicle, and has a tendency to cause the colors both to yellow and darken with age; the pigments — even with all the science of modern chem¬ istry applied to their fabrication — are fre¬ quently unreliable, being affected by time, by exposure to the atmosphere, smoke, gas, etc., by being mixed with each other, or even by contact with the steel of the palette knife, and, many of them, having a tendency to become useless by drying in their tubes. Paint¬ ings executed in this medium, liable to deteriora¬ tion

through all these causes, are also frequently injured by unskilful or careless technical meth¬ ods cracking when the glazing or over-paint¬ ing has been applied before the first painting was thoroughly dry, or because of the use of a medium, a varnish or a dryer, which does not dry nearly simultaneously with the pigments. Many of the paintings of the modern French school, executed in the highest period of the contemporary art, and by the recognized mas¬ ters of the school, have cracked within twenty- five years of their execution. The use of bitu¬ men — a great temptation to many painters be¬ cause of its luminous, warm, dark tones — very frequently causes the painting to crack, as notably in the works of Munkacsy (q.v.). To prevent the yellowing of the oil vehicle it is usually thinned with turpentine, or is replaced in the painter's palette cups by a mixture of Sic- catif de Harlem and turpentine, or turpentine alone, or refined kerosene, or even by some of

the retouching varnishes. The use of an ab¬ sorbent ground to paint upon also lessens this danger (while diminishing very considerably the lustre and beauty of the colors) ; Puvis de Chavannes (q.v.) used the common oil colors on a canvas prepared with plaster. Want of sunlight also causes oil paintings to yellow, and they can be partially restored by exposure to that light. Zinc white is much the safest white to use with oil. Oil painting cannot be used directly on a plaster wall because of the com¬ bination of the caustic lime with the oil, thereby forming a soap which destroys the durable quali¬ ties of the pigments and causes them to redden or yellow. The modern mural painters adopt the safer method of painting their pictures on canvas, which is then fastened to the wall with white lead. This method has the advantage of dispensing very largely with the disagreeable necessity of working on scaffoldings, frequently at a great height from the ground, as the old painters did. In general, heavy impasto, or the application of much color by many repaintings and scumbling or glazing of thin color over an¬ other underneath, are more apt to lead to deterioration of the painting than the use of nearly pure colors applied sparingly and with but little thinning medium. The slow but grad¬ ual destruction of many of the world's master¬ pieces in this manner is a heavy loss ; the paint¬ ings in the great Louvre galleries in Paris, left uncleaned, darken very perceptibly in the course of 20 years.

The invention of oil painting was ascribed in Vasari's time to the Flemish painter Jan van Eyck (q.v.) (died 1440), but something, at least, of the art had been known much earlier. In a technical work, the (Book of Art5 by Cen- nino Cennini, one of the later followers of Giotto (1276-1336), the mixing of pigments with boiled linseed oil is mentioned, though not with reference to artistic works. The brothers Van Eyck (Hubert and Jan) seem to be entitled to the honor of having first availed themselves of the great advantages pos¬ sessed by the oil pigments with their slow dry¬ ing qualities, which permitted the mingling of the colors on their palattes and their canvases. They are said to have mastered the properties of color from Pliny's (Historia Naturalis.5 In the old tempera painting, the colors were laid on and dried, practically, one at a time. In the first half of the 15th century the painters of northern Italy heard of the new method of the Van Eycks, and experimented with it; An- tonello da Messina (q.v.), a Sicilian painter (1430-79), saw in the possession of Al- phonso, king of Naples, a painting by Jan van Eyck, and was so much impressed by it that he journeyed to Bruges to study the new art, and brought it back to his compatriots in 1465. It was practised in Tuscany earlier than in Venice, and with different methods in Florence and Venice, but its adoption was gradual. It is related that Sebastiano del Piombo lost the friendship of Michelangelo (q.v.) by endeavor¬ ing to induce him to adopt this method for his (Last Judgment in the Sistine Chapel; and the almost complete destruction of Leonardo da Vinci's (q.v.) (Last Supper) (1498) is attrib¬ uted to the use of oil on the plaster wall, while the fresco (buon fresco) of the (Cruci¬ fixion } by Donato Montorfano, painted in 1495,

is still in good condition, though exposed to the same unfavorable conditions. Some of the Italian painters, including Perugino (q.v.), Pollaiuolo (q.v.), and Andrea Verrocchio (q.v.) employed a mixed method, partly oil and partly a species of tempera, in their easel pic¬ tures. A few of the moderns, as Gustave Mo¬ reau (q.v.), have combined this method with water-color, or other processes. It is remark¬ able that the very earliest oil paintings, those by the Van Eycks and their Flemish contemporaries, are among the most perfectly preserved of any that have come down to us. Several attempts to discover a satisfactory substitute for oil have been made in modern times, as, the water-glass (stereochromy) invented by the German chemist Von Fuchs, and practised by Kaulbach and his school and by the English painter Maclise, used for mural paintings; the mixture of copal, wax, resin and oil by Lord Leighton and some of his compatriots in mural work, and, the latest, the <(solid oil

colors® of Jean Franqois Rafaelli, the Parisian painter, for easel pictures. For the preference displayed by modern artists for this medium there are several reasons — general con¬ venience and ease of handling, and certain prop¬ erties in the oil medium which seem to enable the painter better to represent — or, at least, sug¬ gest — the material aspects of Nature and of both animate and inanimate objects, real or imaginary. The materials and processes of tempera, fresco (q.v.), water-color (q.v.), and pastel (q.v.), all possess various disadvan¬ tages, both material and artistic, for general use. See Mural Painting; Painting, Technique of.

Bibliography. — Bersch, Manufacture of Pigments) (1900) ; Blanc, (Grammaire des arts du dessin) ; Cennini, (Treatise on Paint- ing) (Eng. tr., 1899) ; Church, (Chemistry of Paint and Painting5 (1901) ; Couture, Meth- ode et Entretiens d'Atelier) ; Dalbon, (Les orig- ines de la peinture a l'huile> (1904) ; Dufres- noy et de Marsy, (L'Ecole d'Uranie ou l'Art de la peinture5 (1753) ; Eastlake, Materials for the History of Oil Painting) (1847) ; Hurst, G. H., (Painters' Colors, Oils and Varnishes5 (1901); Merimee, (De la peinture a l'huile5 (1830) ; Mierzinski, (Handbuch der Farben- Fabrikation5 (1898) ; Paillot de Montabert, 'Traite complet de la peinture5; Pliny, (His- toria Naturalis5 (Vol. XXXV) ; Riffault and others, (Fabricant de couleurs5 (1884) ; Schultze-Naumburg, (Die Technik der Ma- lerei5 ; Vibert, Peinture a l'huile.5

William Walton,

Author of (Chefs d' Oeuvre ; Exposition Uni- verselle 1889. 5

OIL-PALM. See Palm-oil.

OIL RIVERS, rivers of the Niger Delta, chief among which are Benin, Brass, New Cala¬ bar, Bonny, Opobo, Kwo-Ibo and Old Calabar, in the Niger Coast Protectorate, formerly known as the Oil Rivers Protectorate. The rivers are named from the oil palm district through which they flow and are navigable to steamers of light draught.

OIL SHALE. In various parts of the

world there are shales containing organic mat¬ ter in greater or less proportion and which on heating in suitable retorts yield crude petro¬ leum. Such shales have been utilized to some

extent in tins way and the original kerosene or

coal oil was obtained many years ago by dis¬ tilling coaly shales. Vast deposits of oil shales occur in the United States, notably in a wide ai ea in northeastern Utah and northwestern Coloiado, which some time will be used as a source of gasoline, kerosene and other petro¬ leum derivatives. Much of the shale will yield a barrel of distillate or crude oil to a ton of shale. The highly carbonaceous shale Tor- bamte of Scotland and certain shales in New South Wales yield twice this amount. Accord¬ ing to Baskerville there were 55 shale oil com¬ panies in the United States in 1860 and al¬ though the output was small there was great promise of increase when the discovery of petroleum paralyzed the industry.

For many years shales have been worked extensively for oil in the West and Midlothian districts in Scotland. In 1915 six companies were engaged in the industry. The beds are mostly from one to eight feet thick, and while the material varies considerably in composition the shales yield from 20 to 40 gallons of oil and 30 to 60 pounds of ammonia sulphate to the ton. The shale is quarried or mined like coal, crushed and distilled in huge retorts, when it gives off crude oil, ammonia and fuel gas. The crude oil can be worked up into many products. V ery little oil is contained in the shale, most of the organic material being bitu- minized vegetable matter which the heat con¬ verts into oil and the other products. Ordinary oil shale consists of about 60 per cent of ash or 10 times, as much as ordinary coal. Its specific gravity averages 1.6 or much higher than coal, and the richer shales are lighter than the lean material. Ordinarily the shale yielding the most oil yields less ammonia, but the ratio of products, depends somewhat upon conditions of distillation. Good shale is distinguished from common more or less carbonaceous shale by its brown streak, toughness and not crumb¬ ling on exposure to the weather. It consists of thin layers, but the layers are not readily separable and it is somewhat flexible as well as tough. When cut with a sharp knife the edges of the layers curl up as they are severed.

The amount of shale mined annually in Scotland averages nearly 3.000,000 tons, which produce about 65,000,000 gallons of crude oil, or more than 20 gallons to the ton. This oil yields about 3,000,000 gallons of naphtha, 18,- 000,000 gallons of burning oils, 40,000 gallons of lubricating oils, 25,000 tons of paraffin and 50,000 tons of ammonia salts. The cost of mining and distillation is stated to average about $1.85 a ton, or nine cents a gallon, for the crude oil. The gas given off is sufficient to furnish the heat for the distilling process. It has been estimated, that a plant with capacity of

700 to 800 tons daily would cost about $500,000 in Scotland.

The oil distilled from shale at Broxburn

yielded the following

products

on

redistillation :

Naphtha .

. sp. gr.

. 740

1.36

per cent

Kerosene .

«

810

31.60

a

a

u

840

4.86

(i

Lubricating oil .

u

.865

10.30

u

a

u

885

10.08

a

Paraffin .

10.52

u

68.72

Loss in refining . 31.28

Large deposits of oil shales occur in New Brunswick. Working tests of these shales made in Scotland showed yields of from 37 to 45 barrels of oil and 58 to 100 pounds of am¬ monium sulphate to the ton. Oil shale from Castillon, Spain, is reported to yield \Zx/2 gal¬ lons of crude oil to the ton, and shales from Asia Minor 30 to 40 gallons. Extensive de¬ posits are reported in Brazil, New Zealand and South Africa.

In the Uinta Basin in northeastern Utah and northwestern Colorado there are extensive de¬ posits of oil shale in the Green River forma¬ tion of early Tertiary age. The shale is in several beds, some of them four to 10 feet thick, and so extensively exposed that vast amounts are easily mined. The richer shale is black or brownish. It has been estimated (bv Winches¬ ter) that in the Utah part of the basin there is enough shale to produce 42,800,000,000 barrels of crude oil and 500,000,000 tons of ammonium sulphate. In Colorado there is sufficient shale in beds three feet or more thick and richer than the Scottish shale which will yield about 20- 000,000,000 barrels of crude oifiand 300,000,000 tons of ammonium sulphate. These deposits have the great advantage of being at or near the surface so that they can be worked very cheaply. Many field tests made by distilling the Utah and Colorado shales gave yields that varied

greatly, but more than half the samples yielded from 25 to 30 gallons of crude oil and more than five pounds of ammonium sulphate. The specific gravity varied from .859 to .933 with an average of .897. Fractionation of the distillate gave gasoline (to 150° C) seven to 12 per cent; kerosene (150-300° C.), 28.5 to 49 per cent; paraffin, 1.63 to 9.21 per cent, and asphalt, 0.47 to 4.10 per cent, with some sulphur and nitrogen.

A large area. of the Uinta oil shale district has been set aside as an oil reserve for the Navy Department.

More than a dozen large companies have been organized to win oil from these shales and are now making experiments to determine the most efficient and economical way of doing so. Aerial tramways are being built to bring the shale from mines to be opened high on the sides, of the mountains down to retorts or dis¬ tillation plants to be built in the valleys near water and near lines of transportation. '

Chemists are finding that a great many use¬ ful things can be made from the oil shales — such as dyes, explosives, paints, fertilizers and substitutes for rubber, as well as gasoline, kero¬ sene, paraffin and flotation oil — but the indus¬ try is not yet far enough advanced to enable anyone to tell which of these products or how many, of them can be manufactured at a profit. The industry must eventually succeed, but its success may depend largely on the profits de¬ rived from the sale of the by-products.

Oil shales appear to owe their peculiar prop¬ erties to partly bituminized vegetable debris originally deposited with the fine silt of the shale. Most of the oil is developed by the de¬ structive distillation, although a small amount of petroleum exists in the rock and may be ex¬ tracted by ether, carbon bisulphide and other solvents. Thin sections made by the late C. A. Davis revealed an admixture of a number of more or less decomposed plant fragments, algae, fungi, spores, pollen and bacteria in a

jelly-like mass intermixed with very fine par¬ ticles of silt.

Bibliography. — Woodruff, E. G., and Day, D. T., 'Oil Shale of Northwestern Colorado and Northeastern Utah (United States Geological Survey Bulletin 581, 1914) ; Win¬ chester, D. E., (Oil Shale in Northwestern Colo¬ rado and Adjacent Areas) (United*

States Geo¬ logical Survey Bulletin 641-F, 1916) ; (Oil

Shale of the Uinta Basin, Northeastern Utah (United States Geological Survey Bulletin 691-B, 1918) ; Baskerville, C., 'Economic Possi¬ bilities of American Oil Shales y (Engineering and Mining Journal, Vol. LXXXVIII, pn. 149— 154, 195-199, 1909) ; Cadell, H. M.. 'Scottish Shale Industry) (Petroleum World, Vol. X, p. 230); 'The Story of the Forth: Oil Shales of the Lothians) (Scottish Geological Survey Memoirs, 1912) ; Steuart, D. R., 'Chemistry of Oil Shale) (Scottish Geological Survey Me¬ moirs, 1912) ; Cunningham-Craig, E. K., 'Origin of Oil Shale) (Proceedings Royal So¬ ciety, Edinburgh, Vol. XXXVI, pp. 44-86, 1916); Ells, R. W., 'Report on Bituminous or Oil Shales of New Brunswick and Nova Scotia, also on Oil Shale Industry of Scot- land) (Canada Department of Mines, Publica¬ tion 55 and 1107).*

N. H. Darton,

Geologist, United States Geological Survey.

OIL SHARK, SOUP-FIN SHARK, a

shark (Galeorhinus zyopterus) of the southern Pacific Coast, allied to the topes, grayish, and often six feet in length. Its liver yields a large quantity of valuable oil, and its fins are highly prized by the Chinese as a material for soup; hence its popular name. From the fins, when dried, a fine white gelatin is obtained. The oil shark is generally caught during July and August when it enters quiet bays, river mouths and protected places along shore to deposit its young.

OIL-STONE, a slab of fine-grained abra¬ sive stone, used for imparting a keen edge to tools. It is so called because oil is used for lubricating its rubbing surface. The most ex¬ tensively used oil-stones in the United States come from Arkansas and Indiana. Formerly there were large importations of oil-stones from Germany. The Kansas stones, which are of white siliceous rock of a very fine texture, are known as Washita or Arkansas stones, while the Indiana stones, which are also very fine grained, are marked under the names of Hindostan or Orange stones. Oil-stones are also made artificially, and of these one of the best is made from powdered corborundum.

OIL WELLS. See Petroleum.

OILED ROADBEDS. See Oil; Petro¬ leum.

OISE, waz, (1) a river of France, which rises near Selogne on the frontier, in the forest of Thierache, among the Ardennes, Hainaut, Belgium, flows southwest across the depart¬ ments of Aisne-et-Oise, and joins the Seine about six miles below Pontoise in the depart¬ ment of Seine-et-Oise. (2) A northern depart¬ ment of France named after the river. The greater part of the surface, which is generally more or less level, is in normal times exten¬ sively cultivated. The department of the Oise

lies on both sides of the river of the same name, north of the departments of Seine-et-Oise and Seine-et-Marne. Before the devastations of the European War it produced extensively cereals, beets, sugar, potatoes, fine grapes and other fruits and cattle. It is also a well-de¬ veloped industrial region, manufacturing iron, paper, chemicals, pottery and textiles. Area, 2,272 square miles; pop. about 423,000. Capital, Beauvais.

oj£da, o-ha'da, Alonzo de, Spanish cava¬ lier and explorer: b. Cuenca, about 1468; d. Santo Domingo, 1515. He sailed with Colum¬ bus on his second voyage in 1493 and there¬ after identified himself intimately with the ex¬ ploration and occupation of the New World. In 1495 he performed a feat of great boldness in the capture of the cacique Caonabo. In 1499, with Juan de la Cosa, former pilot of Colum¬ bus, and accompanied also by Amerigo Ves¬ pucci, he explored the northern coast of South America from a point probably on the north of the present Brazil westward to the Gulf of Venezuela. On a charge of trespassing, during a second voyage in 1502, upon territory belong¬ ing to Portugal, he was arraigned, after his return, and punished by censure and fine. Af¬ ter being imprisoned for debt in Spain, he sailed for the third time for South America in 1505 and explored to the Gulf of Darien. In November 1509, with over 300 men, he made an abortive attempt to capture Nueva Andalusia, between the Gulf of Darien and the Gulf of Venezuela, of which territory he had been ap¬ pointed governor. Ojeda next established a colony at San Sebastian, but ran short of pro¬ visions and, sailing for Hispaniola in quest of reinforcements and supplies, was shipwrecked on the coast of Cuba, and died in poverty and wretchedness at Santo Domingo.

OJEDA, Emilio de, Spanish diplomat. After holding several minor diplomatic posts he became first secretary of the Spanish em¬ bassy at London in 1880, was charge d'affaires in Bolivia and in 1883 Minister Resident in Montevideo, in 1884 at Lima and at Athens in 1888. In 1890 he was made Minister Plenipo¬ tentiary to Peru, to Morocco in 1894 and sec¬ retary of the Spanish commission to

arrange a treaty of peace with the United States in i898. He succeeded the Duke de Arcos as Minister to the United States in June 1902.

OJETTI, o-yat'te, Ugo, Italian author: b. 1871. He attained a considerable reputation as an art critic and lecturer, was an extensive contributor to Corriere della Sera, Milan, and in 1915 became editor-in-chief of the committee in charge of publishing a series of works bear¬ ing on Italy's part in the war, 'Problemi italianiP Author of 'Senza Dis) (1894) ; '11 Vecchio) (1898); 'L'America vittoriosa, travels (1899); 'L'oeilletP comedy (1908); 'I capricci del conte Ottavio) (2 vols., 1908A39) ;*

' Ritratti d'artisti italiani > (1911); 'L'Amore

e suo figlio,5 novel (1913);

O JIBWAY, the largest and most import¬ ant of the Algonquin tribes. See Chippewa.

OJIER, o've-a, The Dane, Frankish Duke of Autchar, romantic hero of Charlemagne's court and legendary hero of the Danes. Ac-

tord;iig to the old chronicles he safeguarded the journey of Gerberga, widow of- Charle¬ magne s brother Caroloman, and her children t0 court of the king of Lombardy in 771 oi //w and after various military exploits en¬ tered the cloister of Saint Faro at Meaux, where

r ,SieCri- °ther versions place him as the son ot Geoffrey, King of Denmark, and make him hostage for his father at the court of Charle¬ magne, where he gained high favor with the emperor through his military prowess. His son being slain by Charlemagne's son, Chariot, Ojierˆ killed the queen's nephew and the em¬ peror's life was saved from his fury only through the prompt action of the knights, who, however, permitted him to escape to his Nor¬ mandy stronghold, Castelfort. Here he with¬ stood a seven years' siege but was eventually captured and imprisoned at Rheims. He ob¬ tained his release through the necessity for securing a champion to meet the giant Saracen chief, Brehus, whose forces were overrunning France. He defeated the giant, married an English princess and, again in high favor with Charlemagne, was rewarded with the fiefs of Brabant and Hainaut. A later version adds a touch of magic in which he is under

the protection of the fairies. Morgan la Fay, Ids principal fairy guardian, rescues him at various critical times, and he is supposed to have dwelt 200 years in her castle of Avalon. There are Italian and German versions of the . hero's exploits, and in Danish legend he be¬ came Holger Danske a great champion of the Danes and who is supposed to sleep in a moun¬ tain ready to waken and come to the defense of Denmark in time of need. Consult Barrois, J. B., (La Chevalerie Ojier de Danemarche) (2 vols., 1842) ; Pio, L., (Sagnet om Holger Dan§ke) (1870).

OJINAGA, o'he-na'ga, or VILLA DE OJINAGA (formerly PRESIDIO DEL NORTE), Mexico, town in Chihuahua, at the confluence of the Rio Grande and the Rio Conchas, nearly opposite but slightly below Presidio, Texas. It has an important export and import trade with the United States. It was the scene of military activities in 19121 and in 1914 in the Mexican revolution.

O.K., a term signifying all right, correct, the origin of which is generally ascribed to Andrew Jackson, seventh President of the United States. The story originated with Seba Smith (Major Downing), the humorist, that Jackson used O. K. to endorse official papers as correct, or as Smith put it, <(Orl Korrect,ˆ and the term became a by-word in the Presi¬ dential campaign of 1832, being used by Jack- son's opponents as an illustration of his illiter¬ acy. According to Parton Jackson endorsed legal documents with 0. R. (order recorded) ; and this may have occasioned the jest about ((0. K.)} The term has also been ascribed to an Indian chief, ((01d Keokuk, w who was ac¬ customed to sign documents with the initials O. K. It is now commonly used to signify worth, merit or excellence. The term O. K. has also been ascribed to Josh Billings, John Jacob Astor and several other characters; but it is probable that it is older than any of these and that it had its orimn in Aux Caves from which the best tobacco and rum were imported in Colonial days. The port was frequently

written O. K., the literal pronunciation or sound of the name itself.

OKA, o'ka (((gold fish)}), Canada, a Catho- lic mission settlement of Iroquois and Algon¬ quin Indians, on the Lake of Two Mountains, near Montreal. It was settled by some 900 Iroquois Catholic converts from Sault au Recol¬ let, in 1720, who were shortly afterward joined by Algonquins from the Isle aux Tourtes. The Mohawk and Algonquin languages are spoken by the respective bodies, who inhabit different sections of the village. A branch settlement exists at YVatha (Gilson), Ontario, since 1881. The total number at Gilson

and Oka is about

600.

OKA, 6-ka', two rivers of European and Asiatic Russia. (1) Oka, in Europe, rises in the government of Orel, flows north till near the town of Kaluga, then east past that town, east-northeast across Riazan and the east of Vladimir, and after a course of about 600 miles, navigable from Orel, joins the Volga at Nizhni- Novgorod after a course of nearly about 1,000 miles of country, for the most part fertile and populous. The Oka is navigable for ordinary river steamers for 850 miles and for smaller boats for 900 miles. Consequently there is much traffic on it. (2) Oka, Asiatic Russia, rises in the mountains between China and the government of Irkutsk, flows north-northeast for 400 miles, and joins the Angara at Bratsk.

OKAPI, the native African name of a large animal (Ocapia johnstoni) of the giraffe family which inhabits the forests of the upper Kongo Valley. It had been vaguely known previously, blit the first specimen and description given to science were obtained by Sir Harry Johnston in 1899, in the Semliki forest, near the Uganda border. The animal has many of the features of a giraffe, such as drooping hindquarters, a short tufted tail and a skull of similar shape, with vestiges of three horn pedicels or cores, but, of course, no external horns. The neck is short, thick and maneless. The head is long and narrow, the ears large, the eyes- far from ears, and the lips prolonged and mobile, suited to grasping the leaves of trees, upon which they are said by the negroes to feed. The size is that of a medium antelope, about four and a half feet tall at the withers. The colors are remarkable. The head, neck and body gener¬ ally, as described by Johnston, range in color from warm purplish red to sepia and jet-black; but the cheeks are ye/llowish-white ; the legs are cream-white on their lower part and above broken into rings or stripes of alternate black and white extending on the hams up to the root of the tail. A single stuffed and mounted skiia is deposited in the British Museum.

These animals seem uncommon, and dwell in almost inaccessible forests, where they are said to go about alone or in pairs. It is probable that they may be the lingering survivors of a species now nearly extinct which formerly ranged far more widely, especially to the north¬ ward, since Egyptologists at once recognized this animal as the prototype of the figure of the ancient Egyptian deity Set, whose curious head has heretofore eluded identification. For the discovery of the okapi, consult transactions and*

with the figure of Set, consult (Scientific Amer¬ ican Supplement ' (28 March 1903), and the writings of Wiedemann; Johnston, Sir H. H., 'Okapi' (Smithsonian Institute Report, 1901, published Washington, 1902).

OKAYAMA, o-ka-ya'mii, Japan, a town and capital of a prefecture of the same name in the province of Bizen, on the island of Hondo, near the shore of the Inland Sea sepa¬ rating it from Shikoku, 89 miles to the west of Kobe.

OKEECHOBEE, o-ke-cho'be ("Big Wa- ter"), a lake in Florida, in the southern part of the State. It is about 40 miles long and 28 miles wide; depth from a few inches to 13 feet. It is on the northern border of the Everglades (q.v.), and it seems to be changing slowly, as no doubt the Everglades have changed. Vegetation is increasing within the lake and the marshy shores are encroaching upon the lake boundaries. Caloosahatchee River, by means of canals, has been made an outlet, but considerable of the water spreads over the Everglades. The canals mentioned have reduced the area of the lake and drained portions of the Everglades so as to make them suitable for raising certain crops. Okeechobee is the largest lake in the Southern States.

O'KEEFFE, o-kef', John, Irish actor and dramatist: b. Dublin, 24 June 1747; d. South¬ hampton, England, 4 Feb. 1833. He was an actor in Henry Mossop's stock company for 12 years, but his sight began to fail when he was 23 and he turned to the writing of come¬ dies, comic opera and farces. His farce 'Tony Lumpkin in Town' (1773) was pro¬ duced in Dublin, and it later enjoyed a con¬ siderable success at the Haymarket Theatre in London (1778). Despite failing vision he be¬ came a prolific writer of plays and verse, most of which was dictated to a secretary; but the approaching blindness, which overtook him in 1797, had no dampening effect upon the gaiety and humor of his work. Many of the songs irom his 'Operas remained popular for years and some, like (I am a Friar of Orders Gray) and 'Amo Amas I Love a Lassie,' are still sung. He wrote some 68 plays, of which about 50 were produced and many were highly suc¬ cessful. Hazlitt terming him "The English Moliere." He was in straightened circumstances for a time after becoming

totally blind, but a benefit at Covent Garden, under the patronage of the Prince of Wales, netted him a consider¬ able sum in 1800, and he was granted an an¬ nuity of 20 guineas from Covent Garden Theatre. In 1820 he was granted a pension from the privy purse amounting to 100 guineas annually. . Ofii his many plays, 'Wild Oats' (1791) and 'The Castle of Andalusia' (1782) alone have survived to be given modern stage presentation. Among the most successful be¬ sides these were 'The Agreeable Surprise' (1781); 'Peeking Tom of Coventry' (1784); 'The Highland Reel' (1778) ; 'Tony Lump¬ kin s Rambles' (1792) ; 'The Eleventh of June' (1798). An edition of his plays was pro¬ duced (4 vols., 1798) but did not include many of his greatest successes as the copyrights had previously been sold. He was also author of 'Recollections' (1826), later edited by Stod¬ dard, R, H., in 'Personal Reminiscences by

O'Keefe, Kelly and Taylor' (New York 1875) ; and twcr volumes of verse, 'Oatlands, or the Transfer of the Laurel' (1795) ; 'A Father's Legacy to His Daughter' (1834).

OKEFINOKE (6-ke-fi-no'ke) SWAMP ("trembling earth") in the southeastern part of Georgia, occupies nearly all of Charlton County, and parts of Ware and Clinch Counties, extending into Baker County, Florida. The area is about 660 square miles. In the eastern part is a lake containing several small floating islands, the marshy shores of which show the same formation as Okeechobee (q.v.) Lake in Florida. In some parts of the swamp, which is from 40 to 70 miles from the coast, are large trees and a dense low vegetation. In places where the sandy soil rises above the sur¬ face of the swamp water there are pine forests, in some places open, in others very dense. In the thicker forests are black gum, cypress and ojher swamp trees. These are interspersed with open grassy spaces locally known as "prairi.es"

. and little lakes. Alligators and moccasins in¬ habit this swamp in large numbers.

OKEGHEM, o'ke-gem, or OKEHEM, OKENGHAM, OCKEGHEM, OCKEN- HEIM, Joannes, Flemish composer: b. prob¬ ably at Termonde, East Flanders, early in the 15th century; d. Tours, probably 1513. He was a singer at the Antwerp Cathedral and is sup¬ posed to have received his education there. He entered the service of the King of France in 1452 and became head of the chapel of Charles VII. He remained in the service of the royal house through the reigns of Louis XI and Charles V III but retired to Tours on the acces¬ sion of Louis XII in 1498. He was regarded as the head of the

second and greatest Nether¬ landish school of music, was credited with the invention of canonic and contrapuntal art, and with that of counterpoint and canon. Among his pupils were Josquin Despres, De la Rue and others through whom his art was carried into the foremost musical circles of the world. Most of his compositions are thought to have been destroyed during military invasions but enough remain to evidence the great progress made during the 40 years of his leadership. There remain six masses, an Ave, six motets, a number of songs and other compositions.

O'KELLY, Charles, Irish historian: b. Screen Castle, Galway, 1621 ; d. 1695. He was educated at the Irish College in Saint Omer, France, and upon the outbreak of the Civil War in England in 1642, took his stand with the king, but in consequence of the outcome of the war in Cromwell's favor was forced to leave the country and, with about 2,000 compatriots and followers, continued to render service to the royal house under Charles II in France and Spain, subsequently serving as colonel of cav¬ alry. Upon returning to England after the Restoration, O'Kelly attended the Dublin Par¬ liament of James II in 1689 as a representative of Roscommon. In 1691 he was entrusted with the defense of the island of Bofin against the Oiange troops, but was compelled to capitulate and after the Treaty of Limerick retired to pri¬ vate life. He is perhaps better known as the author of the history of the Revolution, 'Ma- cariae' (1692), of which three editions have ap¬ pealed; (1) that of the Camden Society in

1.42; (2) the annotated edition of 1850, pre-

Tardr&ri ,the. Insh Archaeological Society by

in isSCa f-?uanf anˆ/3) that which appeared in 1894 as (The Jacobite War in Ireland. >

O KELLY, James, American Methodist Episcopal minister: b. Ireland, about 1757; d. in Worth Carolina, 1826. Emigrating to the United States in 1778 he became a Methodist preacher traveling from place to place. When the Meth¬ odist Episcopal Church in the United States was organized (1784) he was one of the elders ordained, and later he held the position of pre¬ siding elder in the district of South Virginia. He was soon afterward found in opposition to his

denomination regarding the life-tenure and powers of the bishops, and the General Confer¬ ence of 1792 was followed by his withdrawal, which led to the first secession from that eccle¬ siastical body, several churches and ministers jomingi with O'Kelly to form the Republican Methodist Church. His determined fight against the Episcopacy, though it failed to dislodge the innovation of the bishopric, gave the practical ends for which he contended to the lower ranks of the Methodist ministry. By 1795 the defec¬ tions from the Methodist Episcopal Church caused by O'Kelly's agitation reached almost 6,500. His Republican Methodist Church changed its name to <(Christian Church® (q.v.). Consult Buckley, (History of Methodism the United States) (New York 1898).

in

OKEN, 6 'ken, or OKENFUSS, Lorenz,

German naturalist: b. Bohlsbach, Wurtemberg, 1 Aug. 1779; d. Zurich, 11 .Aug. 1851. He studied natural history and medicine at the University of Wurzburg. In 1802 he published (Grundriss der Natur-PhilosophieC in which he reduced to a system the materials Fichte and Schelling had previously undertaken to ar¬ range; in this he maintained that animal classes are simply a representation of the organs of sense and divided the animal kingdom accord¬ ingly into five classes. In (Die Zeugung) (1805) he advanced the doctrine that all or¬ ganic beings originate from and consist of vesicles or cells. He was professor of medi¬ cine at Jena in 1807 and of natural science in 1812; but he was forced to resign because of his attitude toward the government, 1819. In 1828 he became professor of scienee in the University of Munich and in 1833 he went to the University of Zurich where he remained until his death. His inaugural discourse at the University of Jena (Ueber die Bedeutung der ScadelknocheiC or (On the Signification of the Bones of the Skull, > which was published later, became popular. In 1808 he announced the propositions that organism is a combination of the activities of the universe, within a single individual body and that world and organism are one in kind ; that light is only a polar ten¬ sion of the ether evoked by a central body in antagonism with the planets and heat only the motion of this ether. His (Lehrbuch der Na- tur-Philosophie) appeared in 1809-11. In 1816 he began the publication of his periodical, the Isis, devoted principally to natural science. In 1821 he originated the annual general meet¬ ings of German naturalists in different cities, the first of which was held at Leipzig in 1822. The British and American associations for the advancement of science have been since then instituted more or less after the German

model.

His other published works include (Lehrbuch der Naturgeschichte > (1813-27), and (Alge- meine Naturgeschichte) (1833-42).

OKINAGAN, o'ke-na'gan, North Amer¬ ican Indian tribe of the Salishan family, for¬ merly occupying the territory to the west of Okanogan River, Wash., from Old Fort Okano¬ gan to the Canadian border and in British Columbia, the country around Okanagan Lake. Subsequently they drove the Athapascan tribe from the Similkameen Valley and occupied "fat territory. There are reservations in which 527 of them lived at Colville, Wash., in 1906, and 824 lived at the Kamloops-Okanagan agency, British Columbia in that year.

OKLAHOMA (Choctaw Indian, land of the red men), one of the southwest central states of the United States. It was admitted to the Union in 1907 by joining Indian Terri- t°iy and Oklahoma Territory. It was the 46th State admitted to the Union. It contains an an of 70,057 square miles and lies between 33 andQ35′ and 37° N. and long. 94° and 29′ and 103° W. It is bounded on the north by Kansas and Colorado, on the east by Missouri and Arkansas and on the west by Texas and New Mexico and on the south by Texas. The Red River forming the whole of its southern boundary.*

Physiography. — Oklahoma lies entirely in the Mississippi River Basin. Its drainage finds its way through the Arkansas and Red rivers and their tributaries. While the surface of the State as a whole is a plain, this plain is broken in different sections by hilly lands and small mountains. The Ozark Mountains are in the northeastern part of the State and the Ouachita in the southeastern part and the Arbuckle and the Wichita mountains in the southern por¬ tion In the southern part of the State some of the mountain peaks rise 1,500 feet above their base. The surface of Oklahoma slopes from the northwest to the southeast. The alti¬ tude ranges from about 4,500 feet in the ex¬ treme northwest corner near the Colorado border to a little less than 400 in the south¬ eastern corner where the Oklahoma-Arkansas line meets the Red River.

Climate. — The climate of Oklahoma is tem¬ perate. The extreme seasonal changes range from a little Qbelow zero in the winter to a little over 100° in the summer. The tempera¬ ture decreases 1° for about 65 feet of eleva¬ tion, so the northern and western parts of the State are cooler than the southern and eastern parts. The average temperature for 10 years for January was 37.87°, while the average temperature for August for the same period was 81.55°.

Population. — According to the Federal cen¬ sus of 1920 the population of Oklahoma is 2,028,283. Of these about 75,000 are Indians and about 140,000 negroes. About 15 per cent of the population is foreign born, the greater number of the foreign population came from Germany. About 40 per cent of the native pop¬ ulation was born in the State. Every State in the Union is numerously represented, but Texas, Missouri, Kansas and Arkansas predominate! In 1910 there were only eight cities with popu¬ lations of over 8,000. This number has been greatly increased by the discovery and de¬ velopment of new oil fields. Oklahoma City

has a population of 91,259, Tulsa, 72,075, Mus¬ kogee, 30,277, Ardmore, 14,181, McAlister, 12,095, Shawnee, 15,348, Guthrie, 11,757, Enid, 16,576, Bartlesville, 14,417 and Okmulgee, 17,430.

Mineral Resources. — Oklahoma is one of the richest States in the Union in mineral re¬ sources. The mineral resources of the State include oil, gas, coal, lead and zinc ore, asphalt, shale, clay, glass sand, sand and gravel, sand¬ stone, limestone, marble, granite, gabbro, Port¬ land cement rock, gypsum, salt, iron ore, man¬ ganese ore, tripoli, volcanic ash, copper ore and mineral waters. Of the above-mentioned resources the following are being developed and marketed in their original form or as manu¬ factured products : oil, gas, coal, lead and zinc ores, pyrite, manganese ore, asphalt, gypsum, granite, sand and gravel, limestone as build¬ ing stone, crushed rock and lime, sandstone, Portland cement, clay products, tripoli and mineral waters.

Oil and Gas. — Oil and gas is by far the most important industry being developed in Oklahoma at the present time. During the past few years Oklahoma has ranked first in both production and value of petroleum among the producing States of the Union. There are at present over 100 oil and gas fields in Oklahoma. The total production of petroleum in Oklahoma

the eastern and northeastern parts of the State and includes about 12,000 square miles. The first coal mined in Oklahoma on a commercial scale was in old Indian Territory in 1872. In 1890 Oklahoma produced 869,230 short tons and in 1907 had increased to 3,642,658 tons and re¬ mained near these figures until 1917, when 4,000,000 tons were produced. Coal is mined in the following

counties : Coal, Haskell, Lati¬ mer, Leflore, Okmulgee, Pittsburg, Rogers, Wagoner and Tulsa.

Lead and Zinc. — The value of Oklahoma's production of lead and zinc in 1917 is esti¬ mated at $14,000,000. In 1908 only 1,730 tons of lead ore and 6,475 tons of zinc ore concen¬ trates were milled and which had a total value of $231,772. The total output from 1908 to and including the year 1914 was 160,856 tons of lead and zinc concentrates valued at $4,798,288. During 1915 there was considerable drilling, prospecting and development but the 'production and value of the' output were ap¬ proximately the same as in 1914. In 1916, however, the value of the output increased 120 per cent over 1915. Over 1,406,900 tons in 1915. The production in 1917 is estimated at over 2,000,000 tons, an increase of about 50 per cent over 1916. The value in 1917 is estimated at $14,000,000 as compared to $9,378,142 in 1916.

Table Showing Production and Value of Petroleum, Zinc and Lead and Coal, 1915-18.

1915

1916

1917

1918

PRODUCTS

Amount

Value

Amount

Value

Amount

Value

Amount

Value

Petroleum .

Lead and zinc. . . Coal .

123,000.000

891,800

2,990,450

Dollars

70,500,000

4,236,632

5,980,900

106,000,000

1,406,900

3,700,000

Dollars

139,000,000

9,353,000

8,000,000

98,622,843

2,000,000

4,000,000

Dollars

158,288,686

14,000,000

9,815,700

85,000,000 2,500, 000 4,674,167 33,377,645,561

32,780,536,000

Dollars

153,000,000 20 , 000 , 000 19,030,000 7,500,000

Gas used .

Gas conserved for future use. . . .

from 1891 to and including 1917 is estimated at 870,000,000 barrels, ranking first among the petroleum-producing States. In 1915, 97,915,243 barrels, valued at $56,706,133 were produced. Oklahoma ranks second among the States in the marketed production of natural gas. The marketed production in 1917 is estimated at 130,000,000,000 cubic feet as compared to 123,- 5 17, 358; 000 cubic feet in 1916, valued at $13,- 000,000 and $11,980,000, respectively.

Coal. — The coal field of Oklahoma lies in

f

Agriculture.— The land area of Oklahoma is 44,420,960 acres. Of this 21,621,952 acres are under improved farm control, 7,699,588 acres in pasture and waste and 468,361 in native meadow. There are 194,784 farms of which 95,784 are owned by the occupant and 99,000 rented by tenants. The assessed valuation of farms in 1917 was $1,052,125,874.

The following table will give the acreage, production and value of the leading crops for

1918.

Acreage, Production and Value of the Leading Crops for 1918.

CROP

Corn .

Wheat .

Oats .

Cotton .

Kafir and Milo

Alfalfa .

Sorghum .

Hay .

Broom corn . . .

Potatoes .

Sweet potatoes Peanuts .

Acreage

Yield

Value

Value per acre

3,756,000

27,865,000 bu.

$47,318,000

$12 60

2,813,000

32,628,000 bu.

65,245,000

23 20

1,034,000

29,143,000 bu.

22,149,000

21 40

3,075,000

473,000 tons

66,250,000

21 50

1,322,000

J4.533.000 bu.

23,525,000

17 60

270,000

528,000 tons

15,091 ,000

55 90

283,000

510,000 tons

8,170,000

25 30

170,000

104 , 000 tons

2,297,000

13 50

236,000

30 , 000 tons

9,600, 000

40 70

37,000

1,495,000 bu.

3,543,000

95 80

15,000

794,000 bu.

1,794,000

119 60

19,000

399 , 000 bu.

598,000

31 50

Average value per acre for the State

$20.36

OKLAHOMA.

Estimated population, 2,377,629

Pop

10,535 Adair . . 18.138 Alfalfa. . .

13.808 Atoka _

13,631 Beaver. . 19,699 Beckham. 17,960 Blaine 29,854 Bryan 35,685 Caddo . . . 23,501 Canadian . 25,358 Carter.... 16,778 Cherokee . 21,862 Choctaw.. 4,553 Cimarron 18.843 Cleveland

15.817 Coal .

41,489 Comanche . Cotton . . .

(Pop incl. che Co.)

17,404 Craig .

26,223 Creek .

23,231 Custer .....

11,469 Delaware . . 14,132 Dewey

15,375 Ellis .

33,050 Garfield . . . . 26.545 Garvin . . . .

30.309 Grady .

13,760 Grant .

16,449 Greer .

11,328 Harmon . . . 8,189 Harper 18,875 Haskell 24,040 Hughes
23,737 Jackson . . . 17,430 Jefferson . .

16,734 Johnston ..

26,999 Kay .

18,825 Kingfisher.. 27,526 Kiowa .

COUNTIES

. D 16

. A 5

. H 12

. J 5

. FI

. D 5

. J 12

. F 5

. E 6

. 19

. D 15

. I 14

. J 1

. F 9

. H 12

. 15

. 15

in Coman-

. A 15

. Dll

. D 3

. B 16

. D 3

. Cl

. B 7

. G 9

. G 7

. A 7

. G 2

. G 1

. A 1

. F 15

. F 12

. H 2

. 17

. I 10

. A 9

. D 7

. G 3

Pop.

11,321 Latimer .

29,127 Le Flore .

34,779 Lincoln .

31,740 Logan .

10,236 Love . .

15,659 McClain .

20,681 McCurtain... 20,961 McIntosh....

15.248 Major .

11,619 Marshall .

13,596 Mayes .

2,744 Murray .

52,743 Muskogee....

14,945 Noble .

14,223 Nowata .

19.995 Okfuskee.... 85,232 Oklahoma... 21,115 Okmulgee...,

20,101 Osage .

15,713 Ottawa .

17,332 Pawnee .

23.735 Payne . .

47.650 Pittsburg .

24,331 Pontotoc .

43,595 Pottawatomie 10,118 Pushmataha . 12,861 Roger Mills ..

17.736 Rogers .

19,964 Semirole. 25,005 Sequoyah 22,252 Stephens .

14.249 Texas .

18.650 Tillman .

34.995 Tulsa .

22,086 Wagoner .

1 7 ,484 Washington . .

25,034 Washita .

17,567 Woods .

16,592 Woodward...

.G 15 . G 16

• D 10 . .D 8 . .J 9 . . F 8

. .1 16

.E 14 . .C 5

.1 10

C 15

H 9 E 14 . . B 9 A 14 E 11 . . E 8 . E 13 B 11 A 16

• C 10 . .C 9 G 13 G 10

.F 10 H 14 D 1 B 14 F 10 E 16 H 7 . .J 3

. .1 4

C 13 D 14 A 13 . E 3 ■ A 4 . B 2

Incorporated Cities,

4,349 Ada . G 11

376 Adair . B 14

493 Addington . . I 7

1 ,279 Afton . B 16

366 Agra . D 10

786 Alderson . G 13

303 Aline . B 5

645 Allen . G 11

4,821 Altus . H3

3,688 Alva . A 4

3,439 Anadarko . F 5

1,273 Antlers . 113

950 Apache . G 6

713 Arapaho . E 4

10,462 Ardmore . 19

511 Arnett . Cl

381 Asher . F10

1,968 Atoka . H 12

170 Avard . B 4

6,181 Bartlesville . A 13

326 Beaver . J 5

855 Beggs . D 12

513 Bennington . 113

378 Berwyn . 19

307 Bigheart . B 12

524 Billings . B8

280 Binger . F5

384 Bixby . D 13

335 Blackburn . C 11

3,266 Blackwell . A 9

508 Blair . G 3

629 Blanchard . F7

508 Bluejaciet . A 15

535 Bokchito . I 12

483 Bokoshe F16

1,334 Boley . Ell

828 Boswell . J 13

679 Boynton . E 14

259 Braggs . E 15

339 Braman . A 9

428 Bridgeport.'. . E 5

1,667 Bristow . Dll

696 Britton . E 8

1,576 Broken Arrow. . . .C 13

282 Buffalo . A 2

135 Burlington . A 5

487 Byars . G 9

286 Byron . : . A 6

317 Cache . H 5

1,143 Caddo . I 12

570 Calvin . G 12

206 Cameron . F 6

181 Canadian . F 14

295 Caney . 12

703 Canton . C 5

883 Carmen . B 5

835 Carnegie . F5

260 Carney . D 10

265 Carter . F 2

289 Cashion . D 8

294 Castle . Ell

404 Catoosa . C 13

770 Cement . G 6

387 Centralia . A 14

2,024 Chandler . D 10

882 Chant, Haskell. . .F 15

471 Chattanooga . H5

1,683 Checotah . E 14

1,350 Chelsea . B 14

2,016 Cherokee . A 6

468 Cheyenne . E 2

Towns, Villages, Etc.

15,447 Chickasha . F7

242 Choctaw . E 9

483 Choteau . c 14

2,866 Ciaremore . C 14

388 Clarksville . D 14

425 Cleo . B 5

1,310 Cleveland . C 11

2,781 Clinton . E4

3,255 Coalgate _ _ _ H 12

1,324 Collinsville . B 13

1.301 Comanche . H 7

100 Cooperton . 04

307 Copan . A 13

1,950 Cordell . F4

489 Cornish . I 8

183 Covington . C 8

1,187 Coweta . D 14

378 Cowlington . . . . . F 16

413 Coyle . D 9

903 Crescent . D 8

220 Cross, Kay . A 9

529 Crowder . F 14

1,072 Cushing . D10

854 Custer . E4

146 Dacoma . B 5

394 Davenport . D 10

361 Davidson . I 3

1,416 Davis . H 9

166 Deer Creek . \ .A 8

662 Delaware . A 13

1,344 Dewey . A 13

240 Dill . F 3

278 Dougherty . H9

132 Douglas . C 7

2,477 r uncan . H7

5,330 Durant . 112

579 Dustin . F13

388 Earlsboro . F 10

2,090 Edmond . E8

926 Eldorado . H 2

178 Elgin . G 6

3,165 Elk City . E 2

266 Elmore . H 8

7,872 El Reno . E 6

20,307 Enid . B 7

915 Erick . FI

1,307 Eufaula . F 13

819 Fairfax, . B 11

569 Fairland . A 16

2,020 Fairview . ;C5

248 Fallis . D 9

1 341 Fargo . B 1

215 Faxon . H 5

374 Fletcher . G 5

415 Foraker . All

382 Fort Cobb . F 5

1,344 Fort Gibson . D 15

697 Fort Towson . I 15

525 Foss E3

931 Francis . Gil

3,027 Frederick . H 4

924 Gage . Cl

351 Gans . E 16

382 Garber . B 8

957 Garvin . j 15

1,452 Geary . E5

186 Geronimo . H 5

373 Glencoe. . C 10

320 Goltry . B 6

316 Gore . E 15

740 Gotebo . F4

Pop.

830 Grandfteld . .14

1,229 Granite . G2

416 Grant . J 14

888 Grove . B 16

305 Guertie . G 12

12.035 Guthrie . D8

1,342 Guymon . J 3

2,024 Haileyville . G 14

147 Hallett . C 1 1

101 Hardy. Kay . A 9

356 Harrah . E 9

2,963 Hartshorne . G 14

857 Haskell . D 13

727 Hastings . 16

270 Headrick . H3

780 Heavener . G 17

760 Helena . B 6

1,665 Hennessey . C7

1,671 Henryetta . E 12

350 Hickory . H 10

686 Hinton . E 6

275 Hitchcock . D6

3,845 Hobart . G3

307 Hoffman . E 13

2,296 Holdenville . F 12

964 Hollis . G 1

760 Hominy . B 11

525 Hooker . J 3

538 Howe . . . .• . G 17

4.582 Hugo . 114

341 Hunter . B7

562 Hydro . E 5

1,493 Idabel . J 16

188 Indiahoma . H4

481 Indianola . F 13

253 Ingersoll . A 5

405 Inola . c 14

281 Jefferson . A 7

290 Jenks . c 13

361 Jennings . C 11

365 Jet . . A 6

163 Jones . E 9

595 Kaw . A 10

336 Kemp . j u

273 Keystone... . C 12

1,197 Kiefer . D 12

216 Kildare . A 10

2,538 Kingfisher . D7

439 Kingston . j 10

1,021 Kiowa . G 13

761 Konawa . G 10

2,884 Krebs . G 13

253 Kremlin . B 7

275 Lahoma . B 6

127 Lambert . A 5

635 Lamont . A 8

339 Langston . D 9

7,788 Lawton . H6

1,880 Lehigh . H 12

412 Lenapah . A 14

197 Leon . j 8

768 Lexington . F9

1,156 Lindsay . G 8

222 Lone Grove . I 9

677 Lone Wolf . F 3

296 Longdale . 0 5

217 Lookeba . E 5

220 Lovell . C8

*310 Luther . *.'e 9*

18,504 McAlester . G 13

166 McComb . ! . F 9

526 McCurtain . F 16

638 McLoud . E 9

1,564 Madill . 110

271 Manchester . A 6

3,667 Mangum . G2

412 Manitou . H 3

515 Mannsvilie . I 10

224 Maramec . CIO

342 Marble City . E 16

1,546 Marietta . j 9

1,965 Marlow . H 7

480 Marshall . C8

503 Maud . F 10

476 Maysville . G8

1,110 Medford . a 8

349 Meeker . E 10

69 Meno . B 6

199 Meridian . D 9

2,907 Miami . A 16

438 Milburn . in

626 Mill Creek . H 10

706 Minco . F 7

225 Moore . F 8

493 Mooreland . B 3

327 Morrison . c 9

701 Mounds . D 13

449 Mountain Park .... G 3 855 Mountain View. .. .F 4

671 Muldrow . E 17

441 Mulhall . c 8

44.218 Muskogee . E 14

264 Mutual . c 3

277 Nardin . a 8

348 Nashville . b 7

119 Navlna . d 8

1,992 Newkirk . A 10

403 Noble . F 8

3,724 Norman . F8

128 North Enid . B 7

3,672 Nowata . A 13

366 Oakland . Iio

199 Oakwood . D”4

550 Ochelata . B 13

402 Okarche . D7

920 Okeene . c 6

1,389 Okemah . E 12

92.943 Oklahoma City. .. ,E 8

4,176 Okmulgee . E 12

324 Oktaka . E 14

Pop.

850 Olustee . H 2

255 Oologah . B 13

340 Orlando . C 8

249 Orr . I 8

373 Owasso . C 13

419 Paden . E 11

310 Panama . F16

239 Paoli . G 9

2,689 Pauls Valley . H 8

2,776 Pawhuska . B 11

2,161 Pawnee . B 10

263 Peggs . C 15

135 Peoria . A 16

603 Perkins . D10

3,133 Perry . C8

680 Phillips . H 12

255 Piedmont . E 7

2,521 Ponca . B 9

1,113 Pondcreek . B7

637 Porter . . D 14

548 Porum . E 15

1,830 Poteau . F 17

1,025 Prague . .Ell

1,798 Pryor . C 15

2,740 Purcell . G8

355 Quinlan . B3

597 Ralston . B 11

725 Ramona . B13

574 Randlett . 15

556 Ravia . I 10

350 Red Fork . C 12

398 Red Oak . G 15

378 Redrock . B 9

207 Renfrow . A 7

411 Rentiesville . E 14

271 Ringwood . B 6

368 Ripley . D10

378 Rocky . F 3

1,044 Roff . H 10

228 Roland . E 17

298. Roosevelt . G 3

823 Rush Springs . G 7

1,207 Ryan . J 7

2,470 Sallisaw.. . E 16

12,929 Sapulpa . C 12

241 Sasakwa . Gil

1,881 Sayre . FI

73 Scullin . H 10

352 Seiling . C 4

416 Seminole . F 11

857 Sentinel . F3

159 Seward . D8

1,231 Shattuck . C 1

18,138 Shawnee . E 10

152 Silo . Ill

289 Skedee . B 10

606 Skiatook . B 12

1,122 Snyder . G 4

233 Soper . 113

196 South Coffey ville . A 14

421 Sparks . E 10

1,173 Spiro . F 17

276 Sterling . . . G 6

575 Sterret . . J 11

116 Stidham . E 13

1,583 Stigler . F 15

3,444 Stillwater . C9

1,039 Stilwell . D 16

494 Stonewall. _ ..-Hll

685 Stratford . G 9

1,220 Stroud . Dll

321 Sugden . I 7

3,684 Sulphur . H 10

352 Taft . D 14

2,891 Tahlequah. . D 16

340 Talala . B 13

491 Talihina . G16

468 Taloga . C 3

498 Tamaha . E 15

1,626 Tecumseh . F 10

852 Temple . 16

573 Terral . J 7

372 Texhoma . J 3

361 Texola . FI

1,371 Thomas . D 4

441 Tipton . H 3

1,408 Tishomingo . I 11

1,776 Tonkawa . A 8

176 Tryon . D10

30.575 Tulsa . . .C 13

387 Tupelo . Hll

794 Tuttle . F 7

656 Valliant . J 15

312 Vera . 3 13

524 Verden . F 6

794 Vian . E 16

4,082 Vinita . B 15

4,018 Wagoner . D 14

213 Wain wright . E 14

405 Wakita . . . A 7

1,377 Walter . H 6

677 Wanette . G 9

286 Wann . . A13

948 Wapanucka . Hll

1,723 Watonga . D 6

533 Waukomis . C7

2,928 Waurika . 16

332 Wayne . G 8

1,160 Waynoka . B 4

2,118 Weatherford . E 5

380 Webbers Falls ...E 15

684 Welch . A 15

1,229 Weleetka . F 12

590 Wellston . E 9

802 Westville . C 17

1,190 Wetumka . F 12

1,022 Wewoka . F 11

2,277 Wilburtou . G 14

411 Wildcat, McIntoshE14 498 Wister . G 16

'S-kXutauˆua

COMANCHE

M.ONIGOJ

CHEROI

rS«»utb Havrn

IBaxter

‘aldwefl

ftW lllstcii ‘^\I)|by>rthJ

Vernon-TCli/lori

/uth Coffey v) lb

SALINE RES.

Parana

Yell on1

Juapaw

Abbie°

° Irene

ink ford “TVvGrainola

VS’ Indicator or) o (§S

Faulkner]

Flagg,

cTegarden Whitehorse A.

\ Noel.

K (unison –

Renfrr

Eaton

Lookout

’o raker

1 Hollow

Doby Springs v

yo . _ Charleston

Buffaloˆ— °*

H A R PeE'd?i

iiavcrco Stockholm® uffalo

\V0Cupid /-RibbyS

*Fern° *

o Cedar Dotson

Blnhkland

VMPeikeon

O Hudson wiraer o

' Ea

Oentrmlla

Keitbo

.Saratoga

Rosa ton

Washunga

crokej

/Peˆy Delawar

'Bartlesville

[— |vGlenoak

. T Nowatt

W-L Oglesby

I Watovaj OohelnHu • T

[serva;

hl/ara/i (EJlendale

Lament xrS' "j Tonkawalm;

'SALINE'^' I

. _ _ . RES > > < ^ jJ

x U. L°KaowIton > oH j'.c»°Eniloa 0 1*

SJ1. fc»-J ,c\"e Milan

rrf^A0 ..•»

OXX — o— _Goltry

£«Alin. Car./'7/"

a- R _ Alvaretta '■ *

' p) Cleo Springs b,

*ZfT RingwoodJI^L_ Bernard! i'c7r^'*l p \ V\ Walyball J \ \ M) o/ ROonoordj*

A 0 ^RuBKy^h •a j Isajbella /0 Pllymoulth

[Burbank

'Kelso/cJpo

Aubu rn o

Okesa

f Bodock V Iponco City j jwhiteaglel

Afton

,°KhjgtleyNj ltUWl > l 3()Wnnoorc – |° Ocateo"

ONALD

Pineville

« Moran oKasb

svhuska

muu Estella Whjte-Oak/1

PoniScreek.

*K- yX/i/**

J fc< O Zena

V-0 ,Jay,, Wet

9 Prairie

pL- Sycamoreˆ

r DELAWARE

*| Eucba -X/X— *

Nelagoney

Remington'

Perdue

! lilladale

'Waynoka

yF.alrfax N

fer«FhOT"> 4 k

■Dig Heart

Edgewood

Big

Cabin

I van hoe

Bressie Ford ol

*■ \ P. 0. **

**1 Kremlin*

I'lleinan

Chelsea

|Talala.

Chaney

Highland

Eel ford j Aˆ/ftaletonC

Filson

Mash am

A Skedcc]

•Catesby PI

(Quinlan.

Solon

Bu§hyb/ead 'c

*Foyll/4**

/Sequoyah

ICarrier'OT • lla Jonnu'A K o Bio n ton'

° Galena

lologahl

s iJl'M

FEvnrtia.

Hominy

Sadie o

O Alexandra

[8klatook

nolllnsvljle.

‘Dawes ■

„ ‘Greenbrier];

iAshley/7 Tip //c*

1 lyUA YJ(E/J

vPryor J (sa).- Q

YjI,_5P’i! Wellf

T /V • ‘) fa J Rose. I

Ojteau / Uˆr /xocu6t GroJe Oi

I 2 Tereeitao’ ~CV

ˆ“prinpMˆo

VV?A R Do s

Driscoll 8 |o Pearl

toa!°

Richmond

McNeaJo, —

-V>f Polo h /otoe

Du>“V’ ATSmvlUyˆˆ

ngtoiK/’ AU ayward // Birnineˆ

I (iansel^TRicbbnrg

„°k Bull,‘!>p>uSr/r>erry °_

*bhftncr n **

\ ˆ An trim /abdˆn.

A PotterQ \ L‘ S

Doris

Sharon i

o Keenan i

o

Cooley Hallren

jreinore

jWTiawah

ligriX

f \%Cht

,8perry|

- *l*

*c**

Turlej

0&MMoh

/'Drummond I ° Wildwood

nbo \ Q ,

(Bryan \Greenovti / flaramec> RaUettV; r. Vo- /JenningfeAˆ

Shat tuck

o Lynn sAuicb >

'hester.

Glencoe

Sinoetj

Bison

ˆGoodwin Craft

*Terlton**

oSeiling

Orlando

*Fondao yvLonUdal Cantonment' Eott**

Cbˆv,

. rshall

Parkmano

Ingalls

f Sheridan f Hennessey

Stlllivati

'Watts1

\ Arnett

Mazie

IP/ 10 keen e

.Al8uma

'Flsbei Eei Fox'

- *-*

Mulhall -Standard t

Chancec

Stone0} H

Af. Evans

Reason o tS

Archer

| o Qneta

• Blab op –

Paradise

|F«rguson

Sapulpa

[Drumri

pitts^y-

rK.S

(ejyegrojy / f %

*“A(J *

’alireiiuah ^VRoron]

‘CTi A D a(| > P&kblll Iwauhillou)OjkO»”

p°Ett»|Stllwellfe ‘ — J

*I Blanck/^ **

**wt /r JNe*

I q-1.

Lawrle i Crescent

Litltlerobe fff ANTELOPE/HILLS

Cushing

Ioland

‘Russell

^’/-{5ickfo\rd i Hitch cook. aeleSRomnn\ JO 0)

.1 ^TJtoseV /Winnviewl

Oakley o t)?kwood Putnam U Ru/t Sti noton j

“NobBco^jT

Raymond o > Webb M

Grand

I Shamrock.

0,reta xf

N-Redbird

aO. Kiefer l

&■ Cherokee Mete Seminar]

WandcT

Lonebelio

Mallonl VAvery °! o Baker |

| Wright W l Partridge J

^^=4/ .Uoglt«D

‘ J MeridianjtS^^- Seward ‘j\;

Evansrilleo „ o Waterloo Garden

•Omegaˆ In gfijsllPT I Huntidlle . ‘ U QXˆ

f Leedey

Rhea o Aledo

Mounds i

Angora

Bnri/>u!i

/Parkland0 ‘Carney Kendrick ,

I N CO U

ˆ°IJa

Chandlerl

Brietoai

i ° Durham °Crawford

cRuth

Tabor

Watoii

*. Hector PaBkeUm Cl The riv,. * \V7*

Natural Ridge ˆ*

OlGee

ko.Khet Boypton.

Brantley

Navina

•Antelope

'ort Gibson

STONY ' HILLS It dora ,

Osceola > Moore wood O fFimple

Iden Mancac

Rome

ˆ\Leota ˆ1

Q TˆhomasV

Indopendeuceˆˆ

Stroud]

'CT'allls

•AWar-H

'Quails I <3 lQ Cook tone iGreenleaf

Croweon

lilamburg

ROGER MILLS

] ˆDudley

Greenfield’

ADthun c

u s

— S’- Butler- S.J °Veak, dwardsVillt l

T o QStaflord

CarpeoterSyˆV Rath bone o

Preston ‘

‘Okarch.e

0 Ednaiyk, Tuskegec /j dnd. B.Si-hool) <

/lcholsow’ [mm It III yKeefelon

Rc 3 moot a ° Strop >) CitV/

ˆ/kaudley/gjy,

iaiXOˆˆˆy (

b j>a rk i’V C-ˆˆT

m m L- \ . ,*

a Payson N. / , Pragut

keryr pRUidU

(Wei Is ton

ix Agency

J udson o

‘Piedmontˆ

^^°Custer S. •y' o Claude v

Arapahoe

feEnion

\rcodia /Lot

Hartoell/?0®^

d" _ .sfZ-

'^Morris ^ /-

r Counoilbilly^^^jS^y ^K'y.

< Rent ieavHleL clara^

. / n#0'311 Cbeootah/- ~

>er Mldl.th Rosevi lo oHilton

Rankin

Cr eeK. c M i c« «■ beV Welty°

Lockhart /.

°0 K/L

Britton \W 1 Owondta'f®

KLAllIpP

■ Bluffs

Enehoe-

Okfuskee f

^Richland Frisco o

Lamed 6 | Carpenter 8ta.(

Calumet-

Harrington

OKFUSKEE, I ,«jki

r*T\ ‘^Av‘rv eft* Henryetta

BrJ*;ntX ,

VBrldge- port / Hinton Ad-

Kidder /< *

Q Dempsey 0 Grimes

o Pilot Berlin®

Lewiston

CboC’* Harrahˆjˆ>— MTifN,- McLjud ˆ 1 W ˆttNe*liaˆjvV

• o Mateer

Hagar° j BvllenTont ˆ

Heasto i

•° I Libbie

[Canute

powers ‘

Ca

V Union WheatlatJfF H Mustang rr—Tˆ

-icrce n

Stidham’

iP.Famec

v?.

kukralls i V Cl.

Atll.o ˆ’,‘prioe0| Bs?5?’,1r Sylvian ! v _ / j

b’lH’‘S’FoCheJ.,l.;J*ˆ“

EMINOLE

Wetuu

SlvSmlnQle | ,.iva

i “xLvv”* > <

‘ ikejˆf — l”-

l Marvel o

Onapa

O8prout

rndine0

mton

Scheidel

CProntise0 o ˆ x) Mayfield

STn’Na j

■«’* -.A V

Lookeba ‘cc

Quincy

Shelly

Shell, ˆ Seger0 0ˆ>

-i I (T ˆ Ac“1“A CordefiX S““yo

o V- o J Cloudchicf (jCowden ‘Boise

1 , yV/Brdckrn Hoyto% XBowtJt. Q UhU

Wirtb Enterprise Ho, Heron ; u”Uih*r

Su8sellvllle3 – -\8viir/,

Quint^^*— jSa < y'ista ikUois

o^*//iuc

^-V^reat her6t oul J ofTreton _

XCaseo Stella. IFrankIln °0 I Waco

‘ X Ltad”1 ‘

/ M.td°ckl[pink / o Liltle\ I Morvin .

*pt*1*

o McCom \ Etowah iTribboy/

P’Vh,.[image]

ntaeM^ 0 Al.rhld

))i – Tr^usdaie’d’

J|UxinS<»n [e

pufr – O — iRa?”|4-<

Boat va’-‘V

Moore

Sickles

Uro(» HcfncrW A’ S

|j Moonmn° /Diil

Vivlan0’ ’

o Eufaula

Mellette®

7t. Ctn9df&/y

Peastei

linger

.Tuttle N

Raiford.

[Harold

ATbert\ c Lac

A DVi'D 0

i Jenson,

Sturm i

Vernon ,

• ua°

Amber

Iracemont'

ˆBarton,

■Mekuaukey \ -Thrace #»'

f\ X/ Lamar]*

Ywier vY\e/o(i*

*o'4**

v Donovan/

,Agua

Ralnf

'lndianniaV

Crowder]

Bettina o

M/idilleberg

Mountaˆ View

mtlnel/ Rocky

Emma

/Cameron LO

. <

‘ HUlol CO ° I UJ ˆGilmore’ |

*1 3 Cˆ/Bhady points _T Calhoun aV ..Witteville^*

*w*iS*,Boteai*

Kennadyo _

ris . Cavanali ,a,ve\Jolui ‘

Gotebo

Blancha /rral,ier | Naples I kLuciie „ i

■ *Goldberg*

Ream 6

< TXCW

Dibble

Washing0’

‘Komaltr

Ellavilioj

Willow

lamegie

Neola

Anadaimjor’cTP- ‘ Chi

(alton

•kasln

Spaulding

Brinki

pAvoca

olmrt

Randlett,

f8k cred Heart

nuntley.u

Monr

Alden

[oCurty Purcell!

Malvern ® .

*/$• Lavcrty Cement/^ 'keeche'"/;^*

HILLS

CyriV^C

cr Violet Vista °|

Z Granite

Arch ibaU

Toklo

Sedan

: Arpelar c

iCabaniss

)Vamoo8a < "1

iSSasakwa:

i/onekah ^ / Alex°

1 Agawam

Madge

Po«-n A.

Jo-ril «.

Fjurcheˆ~X [oison Cravens

Onasoo

l fCy o/ 0 Sum merfield

?

J . n%,i !‘i

Cooperton j X Wildman I N. ° Clove]

Aˆ/Krebs: I /Frinkˆ

Stuart’

tlaniru:

RooseveU’

Francis . steedman

BmdleytˆAˆj— [Rush Springs Erlnlsprlngs

- – > Echos,, o.

Civet/ SlrtlPˆVHˆllcc’’’’*

v/Boudin(.t AlMMUipi/Xrt Vl.iarr DWiˆ

ˆ x,iT‘6“’,d

Oteaua’ Meers_0-‘o»ˆHˆ]

*J0’ *’ jyj/i*

V FT. SILL M. R.

Fletoheri

)I>amon Bengal;

WINDING “• ST»m MT.

JJlJS /

° ‘Sand,

T I ° o ° o >VMc[Knight Icaoross .

harmc

• |S> Dry den o.

H«llfeaˆeiiyov

Lades8ao ler cBlake ‘-i® Russell

l Black.

WiJ

l/jyb’oinii

Housto’i

lomptoo

P’Brewef

Blanoo/

Vila Conwnj] ^^Ahloso

iTOC Lu,a

P\S\oSvewall — j

[OAshlind.

V _ Wh|tˆbead*®ˆ5^^

jˆPai i lih-ayˆv

Antioch’’ Gulf JcN sjtono Klondlkeo

G A oR, V

o Elmore Vp”*1 Foster Citjo Bind, ,

K”” s?w. I oRobberson*

‘ F.oio°

% Asterllng]

Means0

I’- ‘vX

1— 1 1 A del la olkl » R

C O AlL?“1^*

hitesboroo

. f lovry A^Rittsbm

ydold6/^p|NE MT (

**0\T I — ‘*

£>/ /Limeetone Gap

~ Muse «

I k’AMichi MTS-i

Ootavia Ci

‘Albion

yoeum “ ‘0 } °

>^U8kahonw Hay ton ‘Stanley Nashoba

Fitzhugh.

Marlow Bray

[Sta. Woodftll

Odetta>

Martin ,1 A—

_Dol’berg . ’Iona |o I Hickory ‘(..‘Palmed

Frisco _ o

Franks

[utfred]

Ileadrt

A Centraboma [

ˆBALO MT. j JAC K ‘p’oRK

• ‘ . AaJ MT8ˆ

i Nellie

■y [Lawton ,

v % l/l \ Letitia-.

>C O MSA NIC H E’

(Hoiliday/Tlnney 1 (Phelps eg iFaxonOˆ GeronimoJ \

I Jpri ction

T J – C

Chattanooga c, hpeatone

Aaron [Y

Oluste^^

WillowTala

Wesley’

Ludlo’

Creta

‘Flora

Johns

Burro;

Redden

Smitbviller

Clarita)

I &\

ARBUCKLE j\Dav

***•

, Arthur(

lesquitej

Nelms

\ilha„ihra'|l/ Penlotle |

'Ll °'\Connetrllle\ Brora l/c ShMilhCreelr o')

• \ Ghibkasnw EocM AcndomyO !terW Reagan Springlirook?^.- froyV ®T Belton.®

Tatums Homerl

Strlngtown J<£

Jumbo

*OiW*J*

"Griffin

Carmel o

Stoner o Velma 0 Harrisburg © Alma

\ Parks ~n

Comanchel ^

•r-. (Loco Dixl

Poolevllle

llToderick

I „ AEubanks

I ^Wadena

I o Fiole,

I jfceUond I Darwin . (p A' « «**

W at son

/> Drake

b\ Arhuckle

G 1 °N»i

Tesca

Doughert;

Corum

gWalter

p\ ) o -OVG regg

*- -e-x TlTOVN Devot “““o TaJhirV H**

Bethel

O Emerson Adelaide

PINE MT.

Glenn Springer

OKLAHOMA

iGrahanr

*/ Hollister^v/pN^*

/) LovelandV A

Sanford QuanahN.

l CS

■^WILLIAMS MT.» >®Hochatown I

.linluui

Farris

(Davidson.

iblioityirigc

ler Emot® VI

a fl o w ay

/«ntj\BeaUe,

ˆ■/Caddo Mato,0 •» /s asseta Eant,0 C

vˆPRingolc /I

Allkcˆii

ˆ•vm 9 a

> ■ˆSoBismark;*.-.

A.ntlers\ Ethei i ˆ

SCALE

Statute Miles, 27 ■ = ! Inch.

Gr&ndfield’

Corlnne pSobol

SZZ&* – y

lc\t a? w /st.

DunvAod ,L /Tc-Xv McMillanˆ oTyleTT

PSHI Weaˆrˆ S

\ Ran oEpviHe I -ebanoDo

lernoi

ˆTo*

Kcnefie

Nel8ono Hamden’

nd LinnoV- > ˆfMdˆTlV MadillCuinbvrVFort Washittf L
L,u‘lSRoblˆrsroost .oWi.kˆAvleswA’rtb Silo

o, wˆˆOIfad [BtbnSpliff VK ler’eˆV

■ y y S ol

v.i

Lukfata® Bolyˆ0 Wpeelock .Academy _ˆ_o B°ktuklo J

Bugden

Orr Oswalt o MarBilcn1'

Haniiltono Nye> ˆForgan Moc

Dague

Orinne

[illerton'

JJiSA Hidalgo

Beatrice Lorena ° ,

>o citnmaron

Garrett

E",on° Wlliewbar 0 I I,obJ0 oHurle, Golf 1

C I M AaR R 0,-NM;,

tC yifi Oscar'

n Ervin iGrant Frog' \ Shoals

ackaon

Roberta

Courtney oWu bottom V, NSˆˆˆˆˆBurneyviUej ZlVeV . » 1ˆ=

eh° o

Goodwater . is I

S.Haworth

® – - I

Bokboma/>s, J rd America's ˆ rrla Arkindoj

L K'J o j*

'Mc/b Janis |

Terra!

oEula

Fell.

Idabeiq

-Shawneetowi

Nabisco

ˆMarietta'

i llomar ffl \ V

Qberlin

.Allison Utica vV v r ˚k ftnur

i\A in v» 1 CTr~~- L 'X-L-'i ubaX

Mineral

Rtuen.

'M. Hardesty JJZ? , — — – – ,

OU Aˆ>XX/' D /d Elmwood-1. Grand VolleyoJ ˚Ecter Balko /C Fulton o I Gray© Lakemp , ® Range] Wellborn o >

Kullituklo

l Turney0 , o Redjvolntj

Thackeryillc;

_arnaby

Ringgold

, ®Clearlake

*„ 'Tiffin cMl ^^oSnep,^^*

Lockwood _ o 1

Warner Jcˆ>/ t OF T-JU \ 'fy DeniaonyPˆ?;

grays/Mon

*C Sherman W *

James

’Remv

‘q/HioodweU

Paris

x 14 Oklahoma.

Galneivill;

Rand McNally1

Copyright by Rand McNally A Oo»

**

Pop.

389 Woodvllie . . . 2,696 Woodward ..

255 Wyandotte. . 2 002 Wynne Wood

685 Yale .

231 Yeager .

j.018 Yukon .

• .J 10 . . .B 2 A 16 . H 9 . .C 11 . .F 12 . . E 7

OKLAHOMA

637

Livestock. The following table will give the number and value of the livestock of the otate for 1917 and 1918 as compiled from the report of the State commissioner of agricul¬ ture.

law to provide a fund to pay depositors in case of bank failure. Since statehood not a dollar has been lost by depositors in State banks. The State banks guarantee law is con¬ sidered a success. It makes it necessary to

Number and Value of the Livestock of the State for 1917 and 1918.

1917

1918

Number

Value

Number

Value

*Horses . **

702,908

269,125

512,847

1,234,264

81,026

940,837

$59,747,000 27,451,000 29,745,000 46,902,000 405 , 000 9,480,000

730,993

284,082

551,098

1,441,399

148.805

946.805

$65,789,000

31,249,000

35,820,000

61,980,000

1,637,000

14,202,000

Mules .

Milch cows .

Other cattle .

Sheep and Goats .

Swine .

Total .

3,741,007

$173,730,000

4,103,182

$210,677,000

Dairy Progress in Oklahoma.— ((The dairy industry became more firmly established in Oklahoma in 1918 than perhaps ever before. The farmers in general purchased more milk cows, and correspondence from farmers and breeders showed an increased interest in better cows, in the building of silos, and in growing more feed on their own farms, as well as better methods of feeding cattle. The high prices which farmers received for butter fat in that war year was a great stimulus to more dairy¬ ing even though prices of feed which had to be purchased were high. Several new breeders of purebred dairy cattle were added to the previous list of breeders and these new breeders mani¬ fested great interest in dairying. The south¬ eastern section of Oklahoma has perhaps the best natural facilities for more dairying. A number of new co-operative and local cream¬ eries were established during 1918 and are being successfully operated. One of these creameries operated a cheese factory and demonstrated that cheese can be successfully manufactured Under factory conditions at least during the cooler portion of the year.®

Honey Bees.— There are approximately 10,656 colonies of bees, valued at about $160,000. N They make a surplus of about 265 tons

of honey per year, which is worth about $600 per ton. This makes an annual yield of approximately $159,000 worth of honey from $160,000 worth of bees.

Banks. — The great impetus given to indus¬ trial development by the opening up of oil and

National

State

Number .

346

$17,657,000

6,190,000

35,216,000

150,206,000

191,251,000

581

$11,057,550

3,447,668

5,276,981

83,038,862

106,460,977

Capital .

Surplus .

Cash, etc .

Loans .

Deposits .

mineral fields of Oklahoma has stimulated the banking industry.

State banks are required by

**Report of the professor of dairying, Oklahoma, A. & M. College.*

have very stringent State banking laws. The condition of the various banks in December 1918 is shown herewith.

Transportation.— The railroad mileage in 1918, not including sidings and spurs, was 6,449 miles. The principal systems are as follows : Saint Louis and San Francisco, 1,498 miles; Chicago, Rock Island and Pacific, 1,326 miles; Atcheson, Topeka and Santa Fe, 1,080 miles; Missouri, Kansas and Texas, 703 miles; Mis¬ souri, Oklahoma and Gulf, 315 miles; Midland Valley, 245 miles; Missouri Pacific, 161 miles; Fort Smith and Western, 196 miles; Kansas City, Mexico and Northern, 186 miles; Wichita Falls and Northwestern, 328 miles; Kansas City Southern, 142 miles. There are about 14 other short lines _ in and about the oil fields. There are 2,334 miles of oil pipe lines valued at

$43,270,696.

Industrial Commission.— The constitution of Oklahoma has a strict provision on em¬ ployers' liability to employees. This provision has been vitalized by appropriate legislation, which provides for an industrial commission to settle questions arising. The report of this commission shows that for the year ending 1 Sept. 1918 there were 19,918 accidents in 33 industrial plants and the compensation paid to the injured for the year amounted to $663,-

764.12.

Military. — Oklahoma had a well organized militia at the beginning of the Great War of 1914-18. It comprised about 1,500 enlisted men and 75 officers. It included a regiment of in¬ fantry, two troops of cavalry, a company of en¬ gineers with a signal corps and sanitary field hospital detachment. The Oklahoma National Guard'was called to the Mexican border in 1916 at the time of the Mexican raids across the border. Oklahoma furnished 85,000 men for the War with Germany, many of them for over-sea service. The State was a centre of military activity during the War. Camp Doni¬ phan with a training capacity of about 35,000 men was located at Fort Sill. Fort Sill was the location for the school of fire for artillery officers. There was also an aviation camp at Fort Sill.

Manufactures.— In 1914 the value of the products of manufacturing industries of Okla-

homa amounted to $102,005,693 and the total average number of wage-earners employed was 17,443. The State ranked 34th in value ot products in 1914 against a rank of 40th in 1909, while in average number of wage-earners it ranked 39th in both 1914 and 1909. In 1914 there were 2,518 establishments employing a maximum of 22,700 persons with a capital of $65,477,654. The three most important indus¬ tries in Oklahoma are flour and grist mills, cottonseed products and petroleum refining. The value of the flour mill industry output in 1914 was $16,000,000, in 1909 it was $19,144,475, a decrease of 12.8 per cent for the five-year period. Oklahoma ranked 10th in 1914 in pro¬ duction of cottonseed oil products showing 255,075 tons crushed producing 8,292,903 gallons of oil, 118,903 tons of cake and 72,778 tons of hulls with 20,753,751 pounds of linters. In 1914 Oklahoma ranked eighth in the produc¬ tion of petroleum refining. This industry has had a marvelous increase since 1914. In 1914 the total value of the refined output was $13,- 014,146 against only $1,055,011 for 1909. The total production of refined oils in 1914 was 8,610,533 barrels.

Table Showing Manufacturing Industries

for 1914.

Industry	Number	Wage earners	Value of product
All industries .	2,518	17,443	$102,005,693
Flour mill products .			

253

700

$16,688,690

Petroleum, refining .

23

516

13,014,372

Smelting and refining, zinc .

6

1,641

9,938,743

Oil cottonseed and cake. . .

60

851

7,589,813

Lumber andtimber products

284

2,651

4,113,522

Printing and publishing. . . Foundry and machine

624

1,619

4,034,851

products .

Bread and other bakery

122

886

3,173,342

products .

Cars and general shop con¬ struction and repairs by

342

697

2,773,811

steam-railroad companies

13

1,718

2,270,374

Glass .

12

1,270

2,005,736

Ice, manufactured .

97

528

1,604,146

Butter .

14

46

808,978

Coffee .

6

60

756,677

Confectionery .

51

99

636,753

Explosives .

6

73

538,015

Brick .

23

402

495 , 903

Copper, tin and sheetiron. .

72

141

474,484

Mineral and soda water. . .

108

122

472,235

Clothing, men's .

6

207

417,442

Saddlery and harness .

30

54

367,701

Marble and stone work. . .

55

142

339,575

Wall plaster .

6

151

313,216

Candy .

37

57

294,504

Mattresses and springbeds.

11

75

268,378

Brooms and broomcorn . . .

36

97

227,224

Food preparations .

11

41

219,522

All other industries .

210

2,599

28,178,686

Education. — The public school system of Oklahoma is well organized and maintains a high standard of proficiency. All teachers in the public schools must have a high school or normal training and those in high schools must have a college education. The constitution in providing for a public school system expressly declared that separate schools must be provided for white and colored children. This separation of races also applies to institutions of higher learning whether supported by the State or not. 1 here are 626,548 children of school age

in Oklahoma with an enrolment of 549,866. There are 14,305 teachers employed in the pub¬ lic schools. There are 627 schools in Okla¬ homa doing high school work, with an enrol¬ ment of 22,927 and 1,500 teachers. There are 50 high schools in Oklahoma which belong to the North Central Association of Colleges and Secondary Schools.

The University of Oklahoma (q.v.) located at Norman was established by an act of the first Territorial legislature in 1890 and its doors were opened to students in September

1892.

The Agricultural and Mechanical College, lo¬ cated at Stillwater, has a fine plant, with an 80- acre campus and 1,000-acre farm, about 100 instructors and an enrolment of 2,300 students. There are five secondary agricultural colleges in Oklahoma.*

Other State educational institutions are six State Normal schools, located at Edmond, Alva, xTahlequah, Durant, Ada and Weatherford.

The State supports a State College for Wo¬ men at Chickasha, which is growing in strength and equipment, having had appropriated for its support by the 1919 legislature over $400,000 for the next biennium.

There is a State school for the colored people at Langston which combines in its organization normal, agricultural and college training. The school of mines is at Wilburton and in Feb¬ ruary 1919 another school of mines was estab¬ lished at Miami in the zinc region. There are State preparatory schools at Claremore and at Tonkawa.

Charities and Correction. — The charitable

institutions supported by the State consist of an orphan home at Pryor, a school for the blind at Fort Gibson, a school for the feeble¬ minded at Enid, a school for the deaf at Sul¬ phur, a reform school for boys at Pauls Valley and an institution for the deaf, blind and or¬ phans for the colored race. Oklahoma supports about 21 educational institutions, not including the charitable institutions. There are denomi¬ national colleges as follows : Kingfisher College (Congregational) at Kingfisher, Phillips Uni¬ versity (Christian) at Enid, Kendell College (Presbyterian) at Tulsa, the Methodist Univer¬ sity at Guthrie, the Baptist College at Shawnee and the Catholic University at Shawnee. The peni/tentiary of the State is located at McAlister and a branch prison at Granite. There are three insane asylums, located at Vanita, Nor¬ man and Fort Supply.

Public Lands.— Sections 16 and 36 were set aside for the benefit of public schools. Section 13 in each township of Oklahoma Territory except the original five counties was reserved for institutions of higher learn¬ ing and the proceeds of it divided between Oklahoma University, Agricultural and Me¬ chanical College and the normal schools. Like¬ wise section 33 in Oklahoma Territory was reserved

for public buildings, the proceeds of which go to the construction of buildings of educational institutions, asylums, penitentiaries and the State capitol. The enabling aot also reserved from homestead entry and donated to the educational institutions over 1,000,000 acres of land. This latter with section 13 constitutes a land endowment for the educational institu¬ tions from which a great part of the revenue

OKLAHOMA

State Capitol at Oklahoma City

OKLAHOMA

Fields of Kafircorn, Western Oklahoma

OKLAHOMA

639

necessary to run the schools is derived. The greatei part of the lands have been sold and the proceeds invested by lending to farmers on farm lands at 5 per cent. The lands which are not sold are leased and the proceeds used for the purposes specified in the grant.

Government.— The constitution of Okla¬ homa was formulated in 1906 by a convention and adopted in 1907 by popular vote. The gen- eral framework of the State government is like that provided for in other States, consisting of a single executive, bicameral legislature and a system of courts consisting of a Supreme Court, District Courts and County Courts. The consti¬ tution provided for the election of all State officers who were to be nominated by a primary election in each party. The constitution pro¬ vided for the exercise of the initiative and referendum but not for the recall. The consti- tution also provided that cities of over 2,000 population could form their own charters and under this provision many of the larger cities have adopted the commission or managerial form of government.

Suffrage. — The constitution provided for manhood suffrage which was afterward limited by statute by an educational test and the Grand¬ father clluse. The Grandfather clause was declared unconstitutional by the United States Supreme Court in 1915, the educational test remaining but applied to all alike. At a recent election the constitution has been amended allowing women to vote in all elections.

History. — The first European to visit Okla¬ homa was Coronado

who marched across it in 1541 while searching for the Land of Quivira. During the latter part of the 17th and the first part of the 18th centuries French trappers and traders from the lower Mississippi visited much of the eastern portion of the present State of Oklahoma and gave names to many streams and mountains in that region. All of Okla¬ homa except the "Panhandle® was a part of the Louisiana Purchase. From 1817 to 1840 was the period during which the great Southern tribes of Indians, the Cherokees, Choctaws, Chickasaws, Creeks and Seminoles, were re¬ moved here from Georgia, Alabama, Florida and Mississippi and in which Oklahoma was divided among them and set apart as an Indian Territory. These Indians held slaves and when the Civil War broke out all of these tribes joined the Southern Confederacy. When the war closed they were compelled by the treaties of 1866 to cede to the United States much of their western lands, uuon which they had estab¬ lished no settlements, as a home for friendly Indians of other tribes. The Creeks ceded the western half of their lands for which the United States paid them 30 cents- an acre. The Semi¬ noles were compelled to cede all of their lands at a price of 15 cents an acre and to accept as a new home a much smaller tract carved out of the lands ceded by the Creeks. The Chicka¬ saws and Choctaws also gave up the western part of their country which had been previ¬ ously leased to the United States and was known as the "Leased District.® For this they received $300,000. The Cherokees did not abso¬ lutely surrender any of their lands but agreed to allow the United States to locate friendly Indians upon that part of their western lands known as the "Outlet® ; the title to remain with

the Cherokees until such Indians had been so located. Tribes of Western Indians were ac¬ cordingly removed to this region and given reservations. Among them were the Cheyenne and Arapaho, Kiowa and Comanche, Sac and Fox, Pawnee, Iowa, Kickapoo, Shawnee, Pota- watomi, Wichita, Ponca Sioux, Otoe and Mis¬ souri and some others. A large tract near the centre of the present State remained unoccu¬ pied. White people were forbidden to settle there but colonization schemes were developed by Capt. David L. Payne and others. President Hayes issued proclamations in 1879 and 1880 forbidding settlement but it was found neces¬ sary to use troops to remove the "boomers,® as the would-be settlers were called. One of the chief difficulties in the way of the "boomers® were the "cattle-kings,® who under leases from Indian tribes or in some cases without any authority whatever were grazing large herds within the limits of Oklahoma. In 1885 Con¬ gress authorized the President to negotiate with the Creeks and the Seminoles for the pur¬ pose of opening these

vacant lands to settle¬ ment. This was accomplished in 1889. On 23 March of that year President Harrison un¬ der the authority of an Act of Congress ap¬ proved 2 March issued a proclamation declar¬ ing these unoccupied lands would be open to settlement under the homestead laws of the United States at noon 22 April. Troops along the border kept the home-seekers in order until that time when the great crowd that had gath¬ ered dashed across the line in a mad race for the best lands and town lots. The entire region was settled almost within a day. Towns were laid out, farms opened up and the population increased at an extraordinary rate. There was no government until May 1890 when an Or¬ ganic Act was passed by Congress (2 March 1890) creating the Territory of Oklahoma. By this act the "Panhandle® which had been a veritable "No Man's Land® was made a part of Oklahoma and provisions were made for other additions as fast as the various Indian reservations were opened to settlement. The Organic Act provided for a governor, a secre¬ tary and a Supreme Court appointed by the Pvesident and for a bicameral legislature elected by the people. The first governor was George W. Steele and the first legislature met at Guthrie on 27 August. Other Indian lands were opened to settlement in 1891, 1892, 1893, 1901 and 1906 while Greer County, a tract claimed by Texas, was awarded to the United States by the Supreme Court in 1895 and im¬ mediately attached to Oklahoma. The agitation for statehood began in 1891. There was much discussion as to whether Oklahoma and Indian Territory should be joined to make one State or admitted separately as two States. A bill admitting Oklahoma passed the House of the 57th Congress but failed in the Senate. Indian Territory made but little effort to secure sep¬ arate statehood until 1905. In July of that year delegates from the Five Nations met at Muskogee in what is known as the Sequoyah Convention. This body formed a State con¬ stitution for the state of "Sequoyah® but Con¬ gress refused to recognize its work so the con¬ vention came to nothing except that the leaders in this movement were later prominent in the convention that made the Oklahoma constitu-

tion. After much debate the Joint Statehood Bill, or Enabling Act, was at last passed by Congress and approved 16 June 1906. It pro¬ vided that Oklahoma and Indian Territory should be admitted as one State, provided such union were approved by both Territories. The union being approved the 112 delegates pro¬ vided for by the Enabling Act met at Guthrie 20 Nov. 1906 and proceeded to draft a

*State constitution. Some of the radical features of this instrument caused the convention several times to come into conflict with President Roosevelt. Ninety-nine of the delegates were Democrats and bitter clashes came over the attempts to introduce a "Jim Crow® clause. William H. Taft in a speech delivered at Okla¬ homa City 24 Aug. 1907 criticized the con¬ stitution very severely and strongly advised its rejection. It was adopted, however, at a spe¬ cial election held 17 Sept. 1907 by a vote of 180,333 to 73,059 for rejection. Prohibition which was submitted as a separate provision s was accepted by a vote of 130,361 to 112,258.' At the same election State and county officers were chosen. The Republicans had nominated the Territorial governor, Frank Frantz, as their candidate for State governor. The Democrats had nominated Charles N. Haskell. Haskell was elected and of the five Representatives in Congress four Democrats and one Republican were elected. Saturday, 16 Nov. 1907, President *»«L Roosevelt proclaimed Oklahoma the 46th State of the Union. On that day Governor Haskell and the other State and county officials as¬ sumed office. The legislature was Democratic and Robert L. Owen and Thomas P. Gore were chosen as United States senators. In the Presidential election of 1908 Bryan received 122,406 votes, Taft 116,558 and Debs 21,729. Gore was re-elected to the Senate in 1909. At the primary election of 1910 the so-called "grandfather clause® amendment to the con¬ stitution was adopted. This was declared un¬ constitutional by the Supreme Court of the State and later by the United States Supreme Court in 1915. The Enabling Act had made Guthrie the capital until 1913 but at an election held in 1910 it was voted to remove it to Okla¬ homa City. This gave rise to litigation in the courts and the Supreme Court of the United States decided that the part of the Enabling Act fixing the location of the capitol at Guthrie was unconstitutional. In November 1910 the Democrats elected their candidate, Lee Cruce, who received 120,218 votes as compared with 99,527 for the Republican candidate, Joseph W. McNeal. The Republicans, however, elected an additional representative in Congress, giv¬ ing them two, while the Democrats had three. The census of 1910 gave Oklahoma 1,657,155 in population. This entitled the State to eight representatives in Congress so three more, all Democrats, 'were elected at large in 1912. In the Presidential election of 1912 Wilson re¬ ceived 119,156 votes, Taft 90,786 and Debs 42,262. Owen was returned to the Senate, as a Democratic legislature was elected. In November 1914 the Democrats elected Robert L. Williams as governor by a vote of 100,597 as compared with 95,904 for the Republican candidate, John Fields. Gore was again elected to the Senate. In 1916 Wilson*

received 148,115 votes and Hughes 98,299. In 1918 the Demo¬

crats nominated and elected as governor J. B. A. Robertson, who received 104,132 votes. The Republican candidate, H. V. McKeever, received 82,865. Owen was again returned to the Sen¬ ate. Oklahoma has eight Representatives in Congress. The governors of Oklahoma have been as follows :

TERRITORIAL.

George W. Steele .

... Republican . . . .

. . . 1890-91

Robert Martin (acting) . .

. . . 1891-92

Abraham J. Seay .

. . . Republican. . . .

. . . 1892-93

William C. Renfrow .

. . . 1893-97

Cassius M. Barnes .

. . . 1897-1901

William M. Jenkins .

U

. . . 1901

Thompson B. Ferguson. .

ii

. . . 1901-06

Frank Frantz .

U

STATE.

. . . 1906-07

Charles N. Haskell .

. . . 1907-11

Lee Cruce .

a

. .. 1911-15

Robert L. Williams .

u

. . . 1915-19

J. B. A. Robertson .

a

. . 1919-

Bibliography. — (The Oklahoma Red Book) (Oklahoma City 1912 et seq.) ; reports of the various administrative authorities of Okla¬ homa; 'Statistics and Information Concerning the Indian Territory, Oklahoma and the Cher¬ okee Strip, etcP (Saint Louis 1893) ; Abbott, L. J., 'History and Civics of Oklahoma) (Bos¬ ton, 1910) ;Cantonwina, Alexander, 'Star Forty- six, Oklahoma } (Oklahoma City 1911) ; Evans and Bunn, 'Oklahoma Civics and History) (2d ed., ib. 1913) ; Gould, C. N., 'Geography of Ok¬ lahomaˆ (ib. 1909) ; Hill, L. B., 'History of the State of Oklahoma) (2 vols., Chicago 1908) ; Roberts, C. H., 'Essential Facts of Oklahoma History and Civics) (Boston 1914).

J. S. Buchanan,

Dean of the College of Arts and Sciences, Uni¬ versity of Oklahoma.

OKLAHOMA, University of. A State coeducational institution for higher education, established at Norman, Okla., by the First Ter-' ritorial legislature in 1890. It was opened to students in September

1892. It is supported by biennial appropriations of the State legislature and also from an income on public lands that were set aside when the various Indian reser¬ vations were opened to settlement. Section 13 in each township in the greater part of old Oklahoma Territory was set aside for insti¬ tutions of higher learning and the proceeds from leasing the lands or sale is divided be¬ tween the university, the Agricultural and Me¬ chanical College and the normal schools. The Statehood Bill gave to the university about 250,000 acres of additional land in 1906. This with one-third of section 13 makes a large land endowment which is supplemented by direct appropriations. The legislature of 1919 appro¬ priated $1,800,000 for the next two years.

The university comprises the following col¬ leges and schools: Graduate School, College of Arts and Sciences, with schools of educa¬ tion, journalism, public and private business, social service, home economics, fine arts, law, medicine, pharmacy, engineering.

There Js a campus of 120 acres with seven large fire-proof buildings valued at over $1,000,- 000. There is a faculty of 120 instructors and an enrolment of 3,000 students. Tuition is free to residents of Oklahoma. Stratton D. Brooks, formerly superintendent of schools of Boston, Mass., has been president since 1912. The library contains 24,000 volumes.

OKLAHOMA CITY, OKLAHOMA

Reservoir Dam for Water Works

i Robinson Street looking north from Grand Avenue 2 Downtown scene looking north from Grand Avenue

OKLAHOMA CITY, OKLAHOMA

ADMINISTRATION HALL, UNIVERSITY OF OKLAHOMA, NORMAN, OKLA.

♦

‘ *

AGRICULTURAL AND MECHANICAL COLLEGE; a coeducational

Mate and Federal institution founded at Still¬ water, Okla., in 1891. It offers courses in agri¬ culture, mechanic arts, military science, domestic science and teaching, with correspond- ln& mstructi°n in mathematics, physics, English, philosophy, history and other subjects and awards the degrees B.S. and M.S. There is a secondary school to which pupils from the eighth grade are admitted and which prepares for the college course. The college owns a 1,000-acre farm, has an 80-acre campus, substan¬ tial brick buildings and adequate equipment. Its income is derived from State and Federal funds and from its allotment of public lands. Tuition is free. In 1918 the president was James W. Cantwell, A.M. ; the number of in¬ structors was 125 and students, 1,814. The li¬ brary had 26,503 volumes. The value of the buildings and equipment is about $900,000 and the annual income is about $260,000.

OKLAHOMA CITY, the capital of the State of Oklahoma. It is also the county-seat of Oklahoma County and is situated on the north branch of the Canadian River and on the Atchinson, Topeka and Santa Fe, the Chicago, Rock Island and Pacific, the Saint Louis and San Francisco, the Missouri, Kansas and Texas, and the Fort Smith and Western railroads. It is the commercial and industrial centre of a productive agricultural and stock-raising region. It has a large number of wholesale houses. The chief manufacturing establishments are cotton mills, flour mills, box and cracker factories, patent medicine factories, iron works, soap fac¬ tories, wood work shops, packing-houses, oil refineries and cottonseed-oil mills. It has an extensive trade as it is the distributing centre for a large region ; and the grain, cotton and livestock of the surrounding country is mostly shipped from Oklahoma City to Eastern and Southern markets. The city is the seat of the Oklahoma City College, and Saint Mary's Academy. It has public and parish schools and a Carnegie free public library. There are a number of church buildings, the State Uni¬ versity and Saint Anthony's hospitals. The city has a number of banks, with a large com¬ bined capital. Oklahoma City was settled 22 April 1889 by 3,000 men who came on railroad trains and horseback from the Territory line, after noon of said date, when by proclamation the country was declared open to settlement. It was incorporated July 1890 and chartered as a city April 1891. The government is vested in a mayor and four commissioners elected for a four year term. The city owns and operates the waterworks. The population is nearly all Amer¬ ican-born white people, about 2 per cent are negroes and 3 per cent Indians. Pop. (1920)

91,259.

*OKLAWHA (((crooked water**), a river in central Florida which rises in the central part of the State, flows almost due north for about 80 miles, turns abruptly and flows east into the Saint John about 20 miles south of Palatka. It is about 200 miles long. It is narrow and crooked but is navigable for launches and steamers for nearly its whole length.*

OKMULGEE, ok-mul'ge, Okla., town and county-seat of Okmulgee County, 44 miles

southwest of Muskogee, on a fork of the Ca¬ nadian River and on the Saint Louis and San Francisco Railroad. Its courthouse is a stone building formerly the capitol of the Creek In¬ dian government. There arc good schools, a hospital and the commission form of municipal government. There are roller-mills, cotton and cottonseed-oil industries and glass manufac¬ tures. The surrounding district is rich in coal, oil and gas. Pop. (1920) 17,430.

OKOLONA, 6'ko-lo'na, Miss., town and county-seat of Chickasaw County, 68 miles south of Corinth, on the Mobile and Ohio Rail¬ road. It is the seat of the Okolona High School and college and owns a modern lighting plant and waterworks. The district raises cotton, corn and stock and there is a considerable lum¬ ber industry. Pop. (1920) 3,852.

OKOTSK, 6-kotsk', Sea of, an extensive inlet of the north Pacific Ocean, indenting the eastern coast of Russian Siberia. It is bounded on the north by Siberia, is separated from the ocean on the east by the Kamchatka Peninsula and is partially enclosed by the Kuril and Urup islands on the east and southeast and by the island of Saghalin on the southwest. It is connected with the Sea of Japan by the La Perouse Strait between Saghalin and Yezo islands and also by the long passage between Saghalin and the mainland which broadens out into the Gulf of Tartary. The sea is about 1,000 miles in length and 600 miles wide, is nearly rectangular in shape and its northern' shore nearly follows the 60th parallel N. The coasts are steep, good harbors are few and these are generally icebound from November to April. The onen sea is often fogbound and sub¬ ject to heavy storms and consequently is little frequented.

OKRA, a plant (Hibiscus esculentus) of the mallow family, native of Africa, commonly grown for its long pods. These are used as a vegetable, especially, because of their mucilagi¬ nous texture, to give

body to soups, stews and catsups. The plant is a tall, rough annual with flowers similar to those of the cotton plant. It is extensively grown in the southern United States and to a less extent northward.

OKU, o'ku, Yasukata, Count, Japanese soldier: b. province of Chikuzen, Fukuoka Prefecture, 3 Nov. 1846. He entered the army in 1871 and was a major in the Imperial forces during the Satsuma Rebellion in 1877. He at¬ tained rank as lieutenant-general in 1894 and in the war with China commanded the Fifth Army Division. For services at the battle of Newchwang he was created baron. He re¬ ceived the rank of full general in 1903 and in the Russo-Japanese War, 1904-05, he com¬ manded the Second Army. He rendered dis¬ tinguished service at Nanshan, Telissu, Kai- ping and Newchwang, Ta-shih-chao, Liao- yang, Shaho and Mukden. He was awarded the First Class Order of the Golden Kite and the Grand Cordon of the Rising Sun; was ap¬ pointed chief of the general staff and member of the Supreme Military Council, succeeding General Viscount Kodama in 1906; and in 1907 he was created count.

OKUBO, o'ku-bo, Toshimitsu, Japanese reformer and statesman: b. in the province of Satsuma 1830; d. Tokio, 14 May 1878. He

displayed Trom childhood evidences of great ability. He was special adviser of the Prince o! Satsuma, who was the great exponent of the restoration of the Mikado to supreme power. His political sagacity was amazing. From the first he penetrated the designs of Russia in the har East and for this reason, after his return from Europe in 1872, he opposed the war with Korea, knowing that temporary success, before Japan was modernized, would simply be playing into Russia's hands. It was Okubo's manifesto in 1 868 that brought the Mikado from palace seclusion behind the screen of mystery into public life, and removed the capital to Tokio. From 1870 until his death he was the most powerful minister in the Imperial cabinet, and the personification of energy and progress. As special envoy to China in 1874 he settled the Formosa episode. The suppression of the Sat¬ suma Rebellion in 1877 settled Okubo's policy as the permanent one for Japan. He was as¬ sassinated 14 May 1878 by six of his own clans¬ men but received posthumous honors from the emperor. Consult his life by Maurice Courant (Paris 1904).

OKUMA, ok'oo-ma, Shigenobu, Japanese statesman : b. at Saga, in the province of Hizen, 1837. Early in life he became an advocate of advanced reforms, the abolition of the feudal system, the restoration of the emperor to power and a new system of education; and his persis¬ tent knd courageous advocacy of these reforms was influential in bringing about the revolution of 1867-68. After the reorganization of the Japanese government he was appointed to a position in the Foreign Office, and in 1872 was made Minister of Finance, in which position he brought the national finances into order and established a national currency. In 1881 he withdrew from office and organized the Pro¬ gressive party, which urged that a constitutional government be immediately organized, and that the ministry be subordinated to the Parliament, of which he was the recognized leader during his political career. After the Japanese parlia¬ ment was established, he became Minister of Foreign Affairs, but -his liberal attitude toward the revision of the treaties with foreign coun¬ tries aroused so much popular opposition that he retired from office. In 1896 he was for a short time in the cabinet, and in 1898 organized a cabinet of which he was Premier; but he re¬ signed within a few months and retired from public life. After his withdrawal from office in 1881, he founded the Semmon-Galko, a school for the study of law, literature and political economy. In 1907 he resigned leader¬ ship of the Progressive party. He advocates iiigher education of women.

OLAF, 6 laf, Saint, king and patron saint of Norway: b. 995; d. Sticklestad, Norway, 1030. He was a great-grandson of Harald Haarfager, a son of Harald, chief of the dis¬ trict of Granland. He early made himself iamous by his military expeditions to England, successfully assisting King Ethelred against the incursions of the Danes. After the death of Eric and the expulsion of his son, Olaf caused himself to be proclaimed king. He began his reign by introducing a special court of law called the Hirdskra, and restored the ancient boundaries of Norway and Sweden, but above

all he was a zealous supporter of Christianity and may indeed be called the real converter of Norway. The severity which he employed for this purpose afterward exposed him to a for¬ midable retaliation at the hands of his own subjects. Having engaged in war with Canute the Great, king of England, he allied himself with King James of Sweden, but was so com¬ pletely defeated in battle that he fled to Sweden and Russia. In 1028 he was induced by a dream to return to Norway, where he found the people so alienated from him that he could only bring 3,000 men into the field to oppose the forces of the mighty Canute. The armies met at Sticklestad near Drontheim, in*

1030, and Olaf lost both the battle and his life. His body was buried in the cathedral of Drontheim, and he has since 1164 been honored as the patron saint of Norway. His feast day is 29 July. Many legends respecting him are current throughout the North, and his name has been given to an order of knighthood founded by King Oscar I in 1841 as a reward for services to king and country, art and science. Consult Longfellow's

poem, (1863).

• • _

OLAND, e'liind, an island in the Baltic Sea, owned Iby Sweden and lying off the southeastern extremity of that country, separated from the mainland by Kalmar Sound, a strip of water from five to 15 miles broad. The island is 85 miles in length and 10 miles in 'breadth at its widest point. The area is 519 square miles, •j re 1S a n < ˆe limestone along the west side and much of the island is sandy and barren. There are, however, some well-wooded hillsides and the narrow coast land is productive. There are several small streams and a lake, Horusjo, about three miles long. Barley and sandstone are the principal exports, and fishing and navi- gauon constitute the chief occupations of the inhabitants. The principal town and capitol is Eorgholm, a watering resort on the west side ot the island, and here are ruins of a castle dating the 13th century, later remodeled into a palace, and now one of the most famous ruins in Sweden. In Scandinavian history Oland ap¬ pears frequently as a battleground between Denmark and her northern neighbors. It was at one time self-administered but in 1824 was united with the Lan of Kalmar.

Johnson County, Kan., on the Atchison, Topeka and Santa Fe, the Saint Louis and San Fran¬ cisco, the Missouri, and the Kansas City, Clin¬ ton and Springfield railways, about 22 miles southwest of Kansas. It is in an agricultural and stock-raising region. The chief manufac¬ tures are flour, furniture, shoes, brick and agri- cultural miplements. The State institution for the deaf and dumb and a Carnegie library are located here. The city owns and operates the waterworks. Pop. (1920) 3,268.

5l'bˆrs > Heinich Wilhelm Mat¬ thaus, German astronomer: b. Arbergen, near Bremen 11 Oct. 1758; d. Bremen, 2 March 1840 -He studied 'medicine at Gottingen in 1777-80 and at the same time pursued Kaestner's course in mathematics. He engaged in the practice of medicine at Bremen in 1781, practising continu¬ ously until 1823, and devoting the nights to his astronomical

investigations. In 1779 he devised a method for determining the orbit of a comet

which is still in use by astronomers and known as (<01bers's Method. w It was described by Baron von Lach (Ueber die leichteste und be- quemste methode die Bahn eines Cometen zu Berechneffi (Weimar 1797). He was especially interested in comets and in the minor planets. He rediscovered Uranus, supposed to be a comet, in 1781 ; confirmed the identification of Ceres in 1802; discovered Pallas later in that year and Vesta in 1807. He discovered many comets, most of them, however, being first de¬ tected at Paris; but that of 1815 bears his name as the original discoverer. His hypothesis of the origin of comets was later disproved ; but his observations, notes and calculations remain of high value. Besides the publications by Baron von Zach, his papers were published in the (Jahrbuch of Bode) (1782-1829); and of Encke (1832). His collection of books relating to comets is in the Pulkowa Library. Consult Schilling, C., (Wilhelm Albers, sein Leben und seine Werke) (3 vols., 1894-1900).

OLCOTT, ol'kot, Eben Erskine, American mining engineer: b. New York, 11 March 1854. He was educated at the College of the City of New York and at Columbia University. He engaged in practice as a mining and metallurgi¬ cal engineer in the Western States, Mexico and South America and later became president of the Hudson River Day Line and the Mary Powell Steamboat Company. He is interested in railway transportation in the Catskills, is a director in several New York banks and in 1901-02 he was president of the American In- titute of Mining Engineers. He inaugurated the movement for the Hudson-Fulton celebration in New York in 1909 in honor of the Hudson ter-centenary and the Fulton centennial.

OLCOTT, Henry Steel, American theoso- phist: b. Orange, N. J., 2 Aug. 1832; d. Adyar, India, 17 Feb. 1907. He was educated in the University of the City of New York and in 1858-60 was agricultural editor of the New York Tribune. In 1863-66 he was special com¬ missioner in the United States War and Navy departments and was admitted to the bar in 1866. He was one of the founders in 1875 of the New York Theosophical Society, and was its president. He edited the Theosophist (1879— 1907) and in recognition of his services to Hindu philosophy received the unique honor of the sacred thread of

the Brahman caste. In 1878 he was appointed by President Hayes to report on the trade of the United States and India. He and Mrs. Annie Besant (q.v.) founded the Central Hindu College at Benares, and with her he lectured throughout India and Ceylon. In his later years he lived at Adyar, in the province of Madras, India. He published (Sorgho and Umphee5 (1857) ; (People from the Other World> (1875) ;

OLD AGE, Diseases of. The human body reaches its complete development about the 30th year. About this time the lungs attain their maximum respiratory capacity, the heart reaches its maximal normal growth and the brain is heaviest. Growth in stature ceases be¬ tween the 20th and 25th year but this is due to the downward pressure upon the spinal

column when the body is in the erect position, the unequal thicknesses of the discs between the vertebrae forcing the spinal column into curves. In every other direction skeletal growth con¬ tinues until about the 30th year and about this time the individual requires the largest hat, shoes and gloves and he has the largest chest measurement. At this time the body is in its most perfect physical condition. .

Causes of Old Age.— Aging begins soon after the period of development has been com¬ pleted. Diminution in respiratory capacity has been demonstrated between the 35th and 40th year, the average weight of the brain is less at 40 than it is at 30 and the normal blood pres¬ sure begins to rise about the 40th year. This rise in blood pressure indicates that the arteries are beginning to lose their elasticity and the heart must send the blood through the arteries with greater force to maintain the circulation. The greater demands made upon the heart are met by an increase in the thickness of the walls whereby the propulsive force of the heart is increased. The organs and their functions continue however to maintain their harmoni¬ ous relations with allied organs and func¬ tions, and a state of stable metabolism, in which the waste of tissue is counter¬ balanced by the repair, continues to exist for about 30 years. This is the period of maturity. Toward the end of this period ob¬ jective and subjective manifestations of aging appear but not until the end does functional im- – pairment become marked. Fast living and the neglect of the physiological needs of the body, as excessive work and insufficient sleep, im¬ proper food, unhygienic surroundings, etc., wall hasten the period of maturity and shorten it, and the person will look old, feel old and his tissues will present the senile changes in the fifth or sixth decade of life.

The popular conception of old age is based upon the years of life and the objective mani¬ festations, the appearance. There is, however, not one of the many objective manifestations of old age that is distinctively senile. Gray hair and baldness, wrinkles, tanned, dry skin, thin, shrunken features, falling out of the teeth, dull expression, general body waste, mental decay, and other objective features of old age may appear in earlier life, either as the result of disease or due to physiological causes or un¬ known causes.

The individual conception of old age is based upon the subjective manifestations, the feel¬ ings ; but so repugnant is the idea of aging to most persons that when the manifestations ap¬ pear they will be ascribed to any other possible cause than aging. Shortness of breath due to diminished respiratory capacity will be called asthma ; the aches and pains in the joints due to hardening of the ligaments and cartilages and senile changes in the joints themselves will be ascribed to rheumatism ; malaria will be held responsible for the more rapid fatigue and the tendency to fall asleep during the day. Im¬ paired vision, diminished virility, forgetfulness, vertigo, even prostatic troubles which are purely senile, will be ascribed to accidental disease and not to advancing age.

The scientific conception of old age is based entirely upon the condition of the organs and tissues. As there is no regularity in time, ex-

tent or order in which the organs and tissues undergo the senile changes a person may be physically aged before he is old in years while another of advanced age may show few of the senile changes. Precocious senility, too early aging, is becoming more prevalent, especially in busy commercial centres where excessive activity, mental strain, unnatural sensory im¬ pressions as loud noises, artificial light, peculiar flavors employed in cooking, the exceedingly rapid and fine vibrations of the present day motor vehicles, cause rapid degeneration of the organs and tissues that have been excessively employed. Insufficient sleep and incomplete elimination of waste contribute to the rapid degeneiation by preventing complete repair. This explains the frequency of cardiac, renal and cerebral diseases in the sixth decade of life, these diseases causing the most deaths dur¬ ing this period.

Senile Changes. — The earliest demonstra¬ ble senile change occurs in the respiratory capacity of the lungs. Hypertrophy of the heart may appear earlier but this is pathological and is almost always due to violent athletics during the period of development. The dimin¬ ished respiratory capacity is caused primarily by the_ deposit of dust in the air vesicles and lung tissue. Fine dust in the inspired air is deposited in the lungs from birth but the in¬ crease in the size of the air vesicles during the period of. growth overcomes the diminution of the aerating surface that is being covered by dust. The deposit of dust continuing after the limit of growth has been reached, the aerating surface is continually being encroached upon and the amount of inspired and expired air constantly diminishes. At the age of 30 the average amount of carbonic dioxide is about

l, 340 cubic inches an hour. This is reduced to about 1,000 cubic inches at the age of 60 and it

m. ay faH to 700 cubic inches or less at the age of 85. The dust not alone covers the interior of the air cells, but fine particles work through the walls of the cells and remain embedded in the lung tissue, producing Pneumokoniosis. As a result of this deposit the lungs which are pink in infancy become dark and marbled or mottled, the color depending upon the amount and character of the dust deposit. In compara¬ tively dust-free localities the lungs of aged per¬ sons are dark gray; in agricultural districts they are dark greenish or bluish ; in smoky or sooty sections they are gray-black or brown-black. Iwo other factors aid in diminishing the respi¬ ratory capacity of the lungs. Owing to the senile changes in bone and cartilage the chest walls become rigid and prevent the complete expansion of the lungs; and owing to impaired nutrition due to impaired blood and defective circulation when the blood vessels degenerate, the walls of the air cells waste producing Senile Emphysema. Violent respiratory efforts as in coughing will have the same result, the walls breaking instead of wasting away slowly. The air cells coalesce and where there were many small cdls, each containing aerating walls, there will be a few large cells with the aerating par¬ titions removed. Senile emphysema causes no distress during quiet breathing but slight exer¬ tion will cause dyspnoea and an effort to take deep breath will bring on a spasmodic cough. Violent exertion as in running will cause rapid

and extensive emphysema which will seriously interfere with the respiration.

Ihe immediate result of diminished respira¬ tory capacity is impaired

oxygenation of the blood. Less air being inhaled less oxygen is available for interchange with the carbonic dioxide which is to be eliminated. The blood retaining part of the impurities which should have been removed in the lungs, its carrying capacity of nutrition to the tissues and of waste from the tissues is impaired. This is one of the ultimate causes for the senile degeneration of the tissues. Incomplete aeration is at first partly overcome by more rapid respiration, the respiratory rate at the age of 30 being 16 per minute, rising to 18 per minute at the age of 50, and it may rise to 20 per minute later. This rapid respiration causes fatigue and waste of the muscles of respiration and the respiratory rate is automatically lowered and the periods of rest between inspiration and expiration are lengthened. This prevents too rapid muscle waste but the impairment of the blood proceeds more rapidly. Several other factors contribute to the impairment of the blood. A number of causes combine to weaken the propulsive power of the intestines and retard the passage and expulsion of the fecal mass and thus constipa¬ tion is produced. The fecal mass remaining too long in the intestines, it decomposes and the decomposition products are absorbed and carried in the blood. (See Autointoxication). Leucomaines, tissue waste products, are like¬ wise retained and owing to degeneration of the kidneys part of the urea which should be eliminated by the kidneys is retained in the Wood. The entire quantity of blood in the body is diminished, and there is usually a larger pro¬ portion of calcium salts than in earlier life. In consequence of these changes in the blood it becomes denser and more viscid and it passes t uough the capillaries and other fine tubes with greater difficulty. The tissues receiving an in¬ sufficient and perverted blood supply are im¬ properly nourished and they degenerate.

We have traced here one of the many fact¬ ors responsible for the production of the senile changes. This factor becomes operative with the first breath that the new-born child takes and it continues with increasing force through¬ out life. The production of pneumokoniosis has been advanced as the basic cause of aging but the extent of the pneumokoniosis bears no relation to the extent of the senile changes and persons have been found who exhibited marked senile changes at a comparatively early age in a fairly dust-free atmosphere. Several auto¬ intoxication theories have been advanced the one advanced by Metchnikoff being the ' best known. There is the same objection to these that there is to all theories confining the basic cause to a single factor. They all fail when put to the test of universal application. The only theories of aging that have not been abso¬ lutely disproven are those that place the basic cause of aging in some characteristic of the

cell. Better appliances than those at present at our command, especially more powerful microscopes and a better understanding of t e chemical and perhaps physical processes that are engaged in the production and main¬ tenance of life, will probably reveal the intrinsic factor in the cell that causes it and the tissue

which it forms to undergo the changes that we call aging.

In tracing the causes of aging with a view t(?f rnin)mizmg them, more importance has been a ri u ed to the condition of the blood vessels than to the condition of the blood itself. (See ˆ r1eriosclerosis). The arteries degenerate early, the usual form of degeneration being a hardening of the vessel. In many cases the earliest change is Atheroma, a fatty degenera¬ tion in which the vessel is softer than normal but the elasticity of the vessel is diminished as in arteriosclerosis and the heart must exert increased propulsive force to send the blood through the body. There is consequently both in hardening and in softening of the vessels increased blood pressure. (The terms Arterio¬ sclerosis and Atheroma are often used inter¬ changeably although they refer to different con¬ ditions of the vessels).

Senile degeneration of the vessels is due to three causes, acting either independently or together. The impurities in the blood cause localized irritation and inflammation of the lin¬ ing membrane of the vessel, producing an in¬ flammatory degeneration. Owing to the insuffi¬ cient and perverted blood supply the waste of muscular fibres in the arterial walls is not completely repaired but is replaced by a growth of fibrous tissue which requires a smaller blood supply. This nutritional degeneration is the ordinary form of senile degeneration of the tissues. A mechanical degeneration results from the continual contraction and expansion of the muscular fibres (nearly 100,000 times a day), these fibres when insufficiently nour¬ ished losing their tone and elasticity. The three factors are active in varying degrees in every senile case.

Fibrosis, the increase in fibrous tissue, re¬ placing the waste in other tissue, is a distinc¬ tively senile phenomenon. The new growth does not always fill the space of the waste tissue and the manner of its growth sometimes produces most pernicious results. In the spleen the fibrous tissue forms bands which compress the spleen substance

causing it to waste and in crossing blood vessels the bands may compress a vessel, occluding it and depriving of nutri¬ tion the part which it is to supply. In the blad¬ der the fibrous tissue forms bands across the interior of the walls and the weakened walls bulge out between the bands and form pockets. Urine collects in these pockets and may remain for days, decomposing and producing cystitis. In the solid organs like the kidneys, liver, lungs, brain and glandular organs, the fibrous tissue growth compresses the organ and inter¬ feres with its functions. The only notable ex¬ ception to this is the prostate gland which is frequently enlarged in old age. The heart is usually enlarged but this is not a senile change and the fibrosis does not diminish its size to an appreciable degree. The true senile degen¬ eration called Brozvn Atrophy, in which the heart is smaller; denser and shows extensive fibrosis, is very rare.

Fibrosis occurs early in degeneration of the arteries. Late in life calcium deposits occur and in very rare cases there is complete calcification of the vessel and the so-called pipe-stem artery is produced. In the inflammatory degeneration the lining membrane becomes thickened and in small vessels this thickening may completely ob¬

literate the lumen of the vessel. Where this happens the part beyond the occlusion is de¬ prived of nutrition and unless a fresh blood supply is rapidly obtained through collateral circulation senile gangrene follows. There are few diseases due directly to the degenerated arteries, the pernicious effects of arteriosclerosis being mostly the secondary effects produced in organs and tissues that receive an insuffi¬ cient blood supply. Directly due to arterio¬ sclerosis are Angina Pectoris or neuralgia of the heart which is ascribed to degeneration of the coronary artery; abdominal crises, neuralgic attacks in the abdomen ascribed to arterio¬ sclerosis of the abdominal aorta; Charcot's claudication, a painful cramp of the legs with sudden lameness, ascribed to arteriosclerosis of the femoral artery. Cerebral apoplexy due to cerebral hemorrhage follows rupture of a cerebral vessel which has degenerated. In the case of aneurism which is due to degeneration of the vessel, the degeneration is almost always a sequel of syphilis and is not due to the senile changes. Arteriosclerosis may be due to other causing than aging and it will produce the same conditions as the senile degeneration.

The loss of elasticity of the vessel is partly overcome by the increased force with which the heart propels the blood but the force is partly dissipated and lost in the more distant parts of the body, especially in the fine vessels supplying the organs. The heart responds to the

diminished propulsive force of the vessels by increasing its own and this is accomplished by a gradual thickening of its muscular walls. There is in earlier life a wide margin of safety between the ordinary activity of the heart and the limit of its functional capacity. After the heart has reached the limit of its overgrowth further excessive demands upon it reduce the margin of safety until the limit of its functional capacity is reached. The progressive degenera¬ tion of the vessels necessitates ever-increasing work of the heart and finally, when the limit of its functional capacity is reached, it can no longer respond. The heart may then become paralyzed and sudden death ensues. More of¬ ten the heart muscle loses its tone, it expands and cannot contract completely, the walls be¬ come thinner and the cavities enlarge. Cardiac dilatation is an extremely grave condition in old age. Even slight exertion will suffice to cause spasm or paralysis of the organ or after a few moments of excessive activity it be¬ comes so weak that it cannot propel the blood to the brain. The brain being deprived of nutrition it and the cranial nerves become in¬ active and paralysis of the vital centres results. This is probably the most frequent mode of death in old age.

The pernicious effects of tissue starvation caused by impaired circulation and depraved blood are found in every organ and tissue. The organic matter of the bone wastes and the bones become brittle and fracture easily. The head of the femur gradually becomes de¬ pressed until it forms a right angle with the shaft and owing to the brittleness of the bone even a slight jar will suffice to produce a frac¬ ture at the neck between the head and the shaft. On account of the loss of organic mat¬ ter fractures do not heal readily in the aged. In the chest the intervertebral discs become hard and in extreme old age they may ossify,

The same thing' happens to the cartilages by which the ribs are attached to the spinal col¬ umn and to the sternum, the sternum and the ribs become hard and lose their resilience and the whole bony chest wall becomes a rigid box which interferes with the expansion of the lungs. Late in life bone substance itself wastes. A notable example of this is seen in the lower maxilla after the alveolar process, in which the teeth are implanted, has wasted. The waste of the lower jaw gives to the senile face its weak and weazened appearance.

The aches and pains in the joints from which the aged frequently suffer and which are generally called rheumatism, and often treated as such, are due to arthrosclerosis or hardening of the joint. The ligaments and cartilages harden, the synovial sacs, the water pads between the ends of the joints, become dry and the articular cartilages covering the ends of the bones waste through attrition. Rheumatoid Arthritis or Arthritis deformans in which the joint becomes immobile and the part, generally the hand, becomes deformed, occurs almost exclusively in middle aged and elderly persons. This condition, for which many causes have 'been assigned, is probably only an extreme senile change in which the ligaments contract as well as harden. In rare instances the ossification of many or nearly all the joints will occur, as happened in the case of the celebrated ossified man exhibited a few years ago.

Muscle wastes and the waste is either not replaced at all or it is replaced by fibrous tissue or fat. The fat either accumulates between the muscle fibres producing fatty infiltration or it invades the muscle cells producing fatty degeneration. The fatty change in muscle is pathological and occurs when the blood supply is insufficient for fibrous tissue growth. Fatty degeneration is, however, the normal senile change in brain and marrow. A fat deposit upon the abdomen is usually looked upon as an early sign of aging. This may appear early through inactivity and it may be absent in persons who are active, especially if they do much stooping. Late in life the fat dis¬ appears.*

In old age the diaphragm becomes flaccid and the folds of peritoneum which hold the abdominal organs in place become loose, per¬ mitting a ptosis or sinking of the organs in the abdominal cavity. Owing to the waste and atony of the muscular fibres of the stomach this organ becomes dilated and its contractility is lessened and owing to the waste of the se¬ creting glands digestion is slower and food re¬ mains longer in the stomach. For these rea¬ sons the generally accepted ((little and often® rule for feeding the aged is irrational. The intestines in old age become dilated, the walls are weakened and the whole mass of bowels sinks. The transverse colon sinks at the centre but it is fixed at the hepatic flexure on the right and the splenic flexure at the left and these two bends often form kinks which in¬ terfere with the free passage of feces. This is a contributing cause for constipation, the most frequent ailment among the aged. In many cases the rectum becomes dilated until it forms an immense nouch in which feces accumulate for days.

Aside from a diminution in the amount of

bile secreted there is apparently little change in the functions of the liver. The bile remains longer in the gall bladder than in earlier life and it becomes thicker, often forming choles- trin ga>ll stones. Such gall stones are frequently found after death though they gave no evi¬ dence of their existence during life. They are, however, softer and not as jagged as the patho¬ logical stones which give the severe symptoms in gall stone colic. The changes in the kidneys differ from all other senile changes inasmuch as the fibrosis begins at birth and is progressive until impaired nutrition occurs. Thereafter the fibrosis which until then was confined to the space between the apices of the pyramids invades the deeper tissues. In its gross ap¬ pearance the senile kidney resembles the kidney in interstitial nephritis (Bright's disease), but the lining membrane of the tubules and loops show no change and the functional impairment is slight. Less urea and other normal sub¬ stances are eliminated but there is little or no albumin in the urine and no casts are found. Many pathologists do not differentiate between the senile kidney and the kidney of nephritis and report all kidneys showing the gross changes as nephritis. The failure to differen¬ tiate between the two accounts for the number of nephritis cases found at autopsy that gave no symptoms of the disease during life.

Were it possible to examine the kidney dur¬ ing life it would be possible to determine the extent of the senile changes from the extent of the fibrosis. At present we have no stand¬ ard or basis upon which we can estimate the extent of the senile changes. The blood pres¬ sure which is generally employed to determine the extent of the arteriosclerosis is uncertain as there are many other causes for high blood pressure beside arteriosclerosis and a low blood pressure can exist in the presence of arterio¬ sclerosis. A more reliable estimate of the ex¬ tent of the senile change can be formed from the condition of the sternum. The ensiform appendix , the lowest part of the sternum, is cartilaginous in early life and it begins to ossify from above downward during maturity. Nor¬ mally the ossification does not reach the tip until very late in life. In early and rapid a£Png this appendix ossifies early and rapidly and it may he completely ossified before the 60th year. Ordinarily the ossification extends down about two-thirds of its length at the age of 60 and below this it has the soft resilient feel of cartilage.

Mental Change. — The mental changes in advanced life proceed independently of the phys¬ ical changes although the degeneration of the blood vessels and the impairment of the blood affect the nutrition of the brain and its func¬ tions. Brain power may show evidences of impairment before there is any evidence of physical change and on

the other hand certain faculties continue to improve in their capacity for two decades or more after the brain be¬ gins to lose weight. The faculty of memory, however, begins to lose in power before the brain has reached its complete development.

Forgetfulness of names and dates is usually the first symptoms of senile imoairment and this may attract the person's attention during the fifth decade of life. Long before this is noticed the individual unconsciously avoids tasks which demand excessive employment of

this faculty. The diminishing power to receive Su°re iTPressi?ns and ideas does not make sharp impression upon the mind as does the diminishing power to recall. He may have been able to learn a new language in a few months in youth and now he finds that he cannot retain a few new words notwithstanding frequent repetition, and unless compelled by necessity he loses interest in the new language and makes no further effort to learn it. For¬ merly he may have been able to recall at will a tune heard weeks before; now a new tune will make a momentary pleasant impression but unless a conscious effort is made to retain ifi ˆ is soon forgotton. In old age a conscious effort must be made to retain impressions which formerly impressed themselves automat¬ ically and a conscious effort must be made to recall them. The difficulty in retaining new impressions is due partly to degeneration of the sensory end organs. The lens of the eye flattens and hardens in old age producing presbyopia, the far-sightedness of the aged. Objects close by become blurred and the eye does not adapt itself rapidly to see objects at varying distances. The visual impressions are therefore indistinct and they are not re¬ ceived as clear images which the memory will retain. The drum of the ear either hardens forming otosclerosis or it wastes and becomes perforated. In either case the sound waves produce an abnormal impression upon the ter¬ minals of the auditory nerve and presbyacusia, partial or complete deafness, results. In the nose the Schneiderian membrane wastes and the sense of smell is impaired and may be entirely destroyed. The taste bulbs degenerate and the sense of taste is impaired and the aged person wants sharp, spicy, sour, salty or sweet food. The sense of touch and feeling is likewise impaired in old age and persons are less sensi¬ tive in touch and in the appreciation of sur¬ face pain. They are more apprehensive but surface sensation is actually diminished. The seeming fortitude of aged persons to endure pain is explained by diminished local sensa¬

tion and weakened mental power to appreciate it. For this reason diseases like pneumonia, peritonitis, pleurisy, gastritis, in which pain is an early symptoms, are often neglected until the disease is far advanced and is recognized by other symptoms.

As the mind becomes progressively dulled to impressions obtained through the sensory organs the impressions of mild sensations be¬ come evanescent and only powerful impres¬ sions, or those to which the mind is specially directed, are retained.

Difficulty in absorbing and retaining new ideas is often an early sign of mental aging. A person finds that where formerly a single reading of a book left a clear mental picture he must now read a paragraph several times and make a conscious effort to understand its import. For the same reason he cannot follow a play which has a complicated plot. The aged person falls asleep at the play, sermon or lecture because the ideas projected come faster than he can assimilate them and the ef¬ fort to follow them causes brain fag and men¬ tal exhausation. Brain fag sets in more rap¬ idly with advancing age and in manv cases the quantity of work done, rather than the quality, is the indication of the extent of the

mental impairment. Writers who could work for hours without intermission must now take frequent rests. If they continue after brain fag sets in, mental confusion follows and this ends in complete mental exhaustion and the mind be¬ comes a blank. The power of imagination be¬ comes weakened, new ideas do not arise as readily and the writer is often unable to find the appropriate word or phrase to express his ideas. It is sometimes possible to detect in the work of an aged writer at what points brain fag set in by the deterioration of the character of his work.

Judgment and reason may remain unim¬ paired but the mind works more slowly and be¬ comes sooner exhausted. Judgment is, how¬ ever, readily affected by the emotions and the aged lose control over their emotions. Intense joy or sorrow lasts but a moment and is soon forgotten yet they will weep where there is but little occasion for grief and they will laugh over trivialities. Fear and hatred will often arise without adequate cause and will persist long after the cause is forgotten. Love is never intense and where i't appears as a new emotion in an old man toward a young woman the sexual and egotistic elements predominate over the spiritual element. In most cases where remarkable mental ability has been re¬ tained in old age close observation revealed a deterioration of all the faculties except the one upon which all the mental power of the indi¬ vidual had been

concentrated. The mental ability in this one direction became so promi¬ nent that the deficiencies in other directions were overlooked.

The mental attitude of the aged person who has nothing to occupy his mind but his body and his fate is a dull, hopeless resignation to the inevitable. Retrospection brings regrets, the contemplation of the future arouses a haunt¬ ing dread and the mind is concerned only to preserve the body in the best possible condition to prolong life. If the mind is occupied with serious work which necessitates the whole at¬ tention of the individual he is cheerful, hopeful and ambitious. The neglect to furnish aged in¬ mates of institutions with occupations which will keep the mind from self and death is re¬ sponsible for the generally depressed air of these inmates and the frequency of senile de¬ mentia in institutions. In senile dementia there is a gradual dulling of the intellect in¬ volving every faculty, the will and emotions. There are no marked delusions but a gradual weakening of the perception and conception of things and ideas until there is a complete men¬ tal blank.

The aged adhere to old habits and ways and find it difficult to adapt themselves to modern ideas. They resent the efforts of friends and relatives who try to induce them to adont modern ideas and their resentment may develop into hatred so intense and persistent as to be¬ come a mania. This unreasonable hatred of those toward whom there should exist the natural affection arising from close relationship may be unsuspected during the life of the aged individual and may not be known until it is found that the person who had incurred this hatred had been left out of a will. The term oikiomania has been applied to this mental condition.

Changes in Type. — The process of aging

produces a remarkable phenomenon in the ap¬ proximation of the sexes toward a neuter type. I he male pelvis in old age approaches the female type and the female chest resembles the male chest. There is frequently a growth of hair on the face of the female while the hair on the face of the male becomes scanty. The atrophy of the lower maxilla gives to both a weak and weazened appearance. Her voice be¬ comes lower in pitch, his becomes higher. The female acquires some male characteristics and the male becomes effeminate, but the

general trend is toward a neuter type. This interest- ing phenomenon, called virilescence in the female, has received little attention.

Care of the Aged. — The general care of the aged in the home and in institutions has re¬ ceived but little scientific study. In recent years the diseases of the aged have received some attention and are studied as a special branch of medicine to which the term Geriatrics has been given. Even the slight research work that has been done in this direction has already brought to light some unsuspected causes for early and rapid degenerations but the great problem of old age, the basic cause or causes, is still unsolved.

Duration of Life. — Various formulae have been devised for estimating the normal dura¬ tion of life. Nascher's estimate of 90 years is based upon the normal length of each of the three periods, development, maturity and de¬ cline. If these periods are not hastened or shortened each lasts about 30 years and each is broken about the middle by a violent change called a climacteric. A senile climacteric oc¬ curs about the 75th year during which there is a readjustment of functions, and this is fol¬ lowed by senility, the final stage of life. Cases of extreme longevity are very rare. They are really freaks of nature corresponding to giants in growth.

Bibliography.— Of the voluminous litera¬ ture dealing with old age, beginning with Cicero s (De Senectute) (b.c. 45), a few works have literary interest but only those of recent years have scientific value. The works of the Middle Ages were either philosophical treatises, or works dealing with the prolongation of life based upon the assumption of the existence of the alchemist's panacea. The best known of this period is Roger Bacon's (1290?). translated and published under the title by Robert Brown (London 1683). Of the earlier works of modern times, C. W. Hufe- land's (Makrobiotik) (Jena 1796), is best known. This work passed through many edi¬ tions, was translated into several languages and is still occasionally quoted. The more recent works of this nature are E. Metchnikoff's (London and New York 1903), and Prolongation of Life> (ib 1910) • A. Lorand's <01d Age Deferred> (Philadelphia 1910); H. Weber's (Means for the Prolonga¬ tion of Life) (4th ed., London 1914). Jean h mot's /Philosophic de la Longevity (Paris 1900) is an optimistic philosophical study (English translation, New York 1909) M I P. Flourons' (Paris 1854) is a scientific study based upon statistical research and is frequently quoted. C. S. Minot's 1 roblems of Age Growth and Death) (London

and New York 1908), and C. M. Child's (Senescence and

Rejuvenescence) (Chicago 1915), are profound biological studies. The first scientific medical work dealing with old age is Sir John Floyer's (Medicina Gerocomica> (London 1724). All modern medical works on the subject are based upon E. Canstatt's (Krankheiten des hoherem Alters und ihre Heilung) (Erlangen 1839). The most recent works are J. Schwalbe's (Lehrbuch der Greisenkrankheiten) (Stuttgart 1909) ; Boy Tessier's

1919).

I. L. Nascher, M.D.,

Author (Geriatrics: Diseases of Old Age and

*their Treatment .**

OLD-AGE INSURANCE AND PEN¬ SIONS. — The problems of old-age destitution and legislative efforts to meet it are significant of the modern industrial era in which a very large proportion of the productive population are dependent for their living upon a weekly wage or monthly salary. In an agricultural com¬ munity the aged remain part of large family units and develop no economic problems of their own. Modern industrial development through the competitive striving for efficiency has shortened the productive period of human existence at the same time when improvements in medicine, hygiene and sanitation have ex¬ tended the span of human existence. As a re¬ sult every industrial community sooner or later finds itself confronted with the industrial problem of superannuation and the social problem of old-age dependency, and efforts to provide for these conditions in some scientific way claim the attention of modern government to a rapidly increasing degree. In every coun¬ try where the problem was carefully_investi- gated, or systematic provision was ffiade, a"very large proportion of the aged persons was found to be without any income or earnings In Great Britain, e.g., out of 1,250,000 persons over 70 years of age in 1908, 414,000 were in poorhouses and other institutions, and 667,000 were found to have practically no sources of income. In France over half a million of per¬ sons over 70 years of age, in 1907. were found to possess an income of less than $6 a month though the percentage were less striking in Australian colonies, there too, notwithstanding the generally better economic conditions, a very large proportion of the aged were found in need of support.

Through the same channels which were built to meet the problem of sickness (see Health Insurance), . . workingmen's organizations,

friendly societies, mutual aid societies, etc., made efforts to relieve the conditions of their aged members. But this proved' to be a very difficult undertaking and many societies came to grief through inability to meet the obligations assumed, so that in many countries it became necessary to pass laws prohibiting the payment of old-age pensions to friendly societies On the other hand, large establishments, finding that superannuated employees interfered with the efficiency of the plants, were forced to make

provision for the retirement of their employees, at certain ages. Finally the States sooner or later were obliged to face the problem of some systematic provision for their aged citizens. The discussion of plans for systematic treat¬ ment of the problem of old age antedate in many States .all other forms of social insurance.

The advantages of the insurance method suggested themselves because the "hazard® of old age dependency could strike only a com¬ parative minority of those who survived at 65 or 70, and besides the possibilities of the law of compound interest working themselves out throughout a long period of years offered very alluring prospects. As early as _ the fifties, State institutions for voluntary insurance of old-age annuities were organized in France and Belgium and in 1864 even in Great Britain. Developments within the field of old-age insur¬ ance were really more typical and characteris¬ tic of the theoretical evolution of social insur¬ ance than in any other branch. The organiza¬ tion t>f State insurance funds for furnishing voluntary insurance at cost, the granting of more or less substantial State subsidies to stim¬ ulate such gratuitous old-age pensions, fol¬ lowed each other in fairly rapid succession. Organically tied up with old age was the prob¬ lem of chronic invalidity,' which may be con¬ sidered, both economically and physiologically, as equivalent to premature old age.

Including the systems of gratuitous State pensions, the following classification of legal¬ ized methods of old-age provision mav be made.

I. Voluntary State insurance without subsi¬ dies. Great Britain, 1864; Canada, 1908.

II. Voluntary State insurance with subsi¬ dies; France, 1850;

Belgium, 1851; Italy, 1898; Spain, 1908; Serbia, 1910.

III. Compulsory old-age insurance. Ger¬ many, 1889; Austria (salaried employees only) 1906; France, 1910; Luxemburg, 1911; Ru¬ mania, 1912; Sweden, 1912; Netherlands, 1913. Also a large number of special industries in other countries; as e.g., Austria (mining, 1884) ; France (mining, 1894; seamen, 1898; railroads, 1909) ; Italy (railroads, 1885) ; Russia (rail¬ roads, 1888), etc.

IV. Old-age pensions. Denmark, 1891 ; New Zealand, 1898; New South Wales, 1900; Victoria, 1901; France, 1907; Australia (acr covering entire commonwealth) 1908; Great Britain, 1908.

From the point of view of efficiency the first method proved a dire failure; the simple pro¬ vision for safe and cheap old-age annuities failed to attract any considerable proportion of the wageworkers. Even the fairly liberal sub¬ sidies, given in several Latin countries, though somewhat more successful, were very far from becoming universal, in fact attracted the lower middle class and the better paid mechanic rather than the great mass of unskilled labor. After some 10—1 5 years of experience in Italy only a few hundred thousand workmen in¬ sured and the average amount of insurance was very small indeed.

The German system of compulsory insur¬ ance for old age and invalidity was very much more successful numerically, even though its benefits are rather small. For over 20 years it remained practically the only national compul¬ sory old-age insurance system, but within the last five years before the war a very rapid ex¬ tension of the same principle in several coun¬ tries took place. In these new acts, the estab¬ lished methods of the German system were rather closely followed.

These consist in the compulsory insurance of all wageworkers in industry, transportation, commerce, agriculture and domestic service, and salaried persons receiving less than 2,000 marks per annum. The dues are collected in small weekly payments and for this purpose the insured are divided into five income classes with a definite weekly contribution for each. The employers and employees contribute equal shares of weekly premium, which is collected from the employer by means of special stamps, which are pasted in the books of the insured. The final old-age pension begins at the age of 70 and depends upon the wage class of the in¬ sured. To every pension a subsidy of 50 marks is added out of the State treasury.

Though the system is known as old-age in¬ surance. the orovisions for invalidity are really

Wage

Class

Annual wage in marks

Annual wage in dollars

Weekly contribution

Old-age pension at age of 70

Old law

New law

Insurance pension

State

subsidy

Total

Pf

Cents

Pf

Cents

Marks

Dollars

Marks

Dollars

Dollars

1 .

350

83 . 80 & under

14

3.3

16

3.8

60

14.28

50

11.90

26. 18

2 .

350 to 550

83.80-130.90

20

4.8

24

5.7

90

21.42

50

11.90

33.32

3 .

550 to 850

130.90-202.30

24

5.7

32

7.6

120

28.56

50

11.90

40.46

4 .

850 to 1,150

202.30-273. 70

30

7.1

40

9.5

150

35.70

50

11.90

47.60

5 .

1,150 & over

273. 70 & over

36

8.6

48

11.4

180

42.84

50

11.90

54,64

Wage Class

Invalidity pension

Basic pension

State subsidy

Total

Supplementary amount for each paid-up week of insurance

Marks

Dollars

Marks

Dollars

Marks

Dollars

Pf

Cents

1 .

60

14.28

50

11.90

110

26. 18

3

0.7

2 .

70

16.66

50

1 1.90

120

28.58

6

1.4

3 .

80

19.04

50

11.90

130

30.94

8

1.9

4 .

90

21.42

50

11.90

140

33.32

10

2.4

5 .

100

23.80

50

11.90

150

35.70

12

2.9

I

650

OLD AGE INSURANCE AND PENSIONS

more important, as over 75 per cent of the pensioners receive their pensions before reach¬ ing the age of 70. This is clue to the liberal interpretation of the term ˆinvalidity® under the German act, which is not limited to total loss of earning capacity but covers reduction of the normal earning capacity to one-third. The basic invalidity pension is smaller than the old-age pension but the actual amount depends upon the number of paid-up weekly contribu¬ tions. In the preceding table the main facts in regard to the old-age pensions and contributions are presented. The contributions are given under the old law as well as under the revision of 1911, the latter, however, being larger be¬ cause some widows' and orphans' benefits have been grafted upon the old age and invalidity system.

In addition there are very complex regula¬ tions concerning return of payments in case of remarriage, in case of death and so forth. The later old-age insurance acts on the whole follow the German type of legislation, although there are numerous variations of detail.

Objection has often been raised to this sys¬ tem because of its apparent complexity, and the much simpler method of gratuitous provisions has been advanced as an alternative. This method was first applied on a national scale in Denmark (1891), spread to a few Austra¬ lasian colonies, and in 1907-08 by national legis¬ lation to France, Great Britain and Australia.

The financial arrangements of these pen¬ sions laws are very simple. They establish a system of periodic (weekly or monthly) pay¬ ments to all persons over a certain age (60 in Denmark; 65 in New Zealand and Australia; 70 in Great Britain and France) provided the need is established on the basis of maximum limits both of property and income; there are additional requirements as to citizenship, resi¬ dence and evidence of worth or good moral character, in general. The French and Aus¬ tralian system also include pensions for perma¬ nent invalidity. The actual amount of pension varies according to the circumstances of the individual case, but in most acts there is a defi¬ nite scale based upon income from other sources. The Danish pensions vary from 50 kroner ($16.30) to 200 kroner ($53.60) per annum, the French from 5 to 20 francs per month ($0.96 to $3.86), in Great Britain from one to seven and one-half shillings per week ($0.24 to $1.83) and in Australia up to $2.50 per week.

In addition to the greater simplicity it is argued that this method of straight pensions puts the cost where it belongs, upon the national treasury, and can be collected by a proper tax system. It is also

pointed out that the intro¬ duction of an old-age pension system imme¬ diately meets the existing problem of old-age destitution, while the system of old-age in¬ surance to be effective and reasonably cheap needs a long series of years to work itself out, to allow for the effect of mortality and com¬ pound interest.

As against this pension method, it is argued that it remains essentially a method of public outdoor relief, that it has a demoralizing effect directly discouraging thrift (since the pensions are only given on evidence of need) and moreover that it establishes a low dead level of pensions. Pensions gratuitously given

to everybody must necessarily be low, while the method of compulsory insurance permits of a more satisfactory provision based upon the customary wages of the insured. The problem of comparative advantages of these two meth¬ ods constituted one of the most discussed prob¬ lems before the international congresses on social insurance.

The inability of solving the immediate prob¬ lem of old-age destitution through the compul¬ sory , insurance system is generally recognized by the inclusion in most old-age insurance acts of complicated so-called transitory provisions, which offer a very much larger State subsidy to the pensions of persons who have reached a cer¬ tain age at the time the Insurance Law goes into effect. It is evident that for those who are at the time near the pension age, the straight pension element so much predominates over the insurance element, that it might be said that a compulsory old-age insurance scheme has to be ushered in by an old-age pension scheme. Another obvious limitation upon the compulsory old-age insurance method is that it is adaptable only to wageworkers or employees while a certain proportion of old-age destitution arises out of other social classes. There is no logical objection to both systems existing side by side, as is proven by the pas¬ sage of a compulsory old-age insurance law in France in 1910, three years after the pension law was established.

In nearly all civilized countries there is in operation a system of straight pensions to government employees, whose number is in¬ creasing in proportion to the rapid develop¬ ment of governmental activities and the indus¬ trial activities of the modern state. Many pen¬ sion systems exist not only for the military establishments but also for the civil employees and finally for the industrial employees of governments. The following countries possess pension systems: Denmark since 1891, New Zea¬ land since 1898, Belgium since 1900, France since 1907, Australia since 1908 and Great Britain

since 1908. The straight old-age pension plan has become popular in the United States primarily because of our familiarity with the British plan, while for a generation Germany was the only example of a national compulsory old-age system. France has combined both the compulsory and straight plans. In a sense also the British system may be considered as em¬ bracing both plans since a system of compulsory invalidity insurance has been introduced in con¬ nection with sickness insurance.

Denmark.— Denmark established the first system of straight old-age pensions by the Act of 9 April 1891. Little attention was attracted to the system for many years until the British plan brought all systems before the public. The Danish plan was intended to be a system of 'outdoor relief to free the recipient of this form of relief from the various disqualifica¬ tions, both legal and moral, which poor-relief carries. By this legislation it was admitted that an honest workman, disabled in his declining years, was entitled to support without being classed as a pauper, without losing his rights as a citizen and without losing caste, of which the poor-relief always deprived him. The age of 60 was fixed as the pension age. About 78,000 persons are now in receipt of pensions which aggregate nearly 10,000,000 kroner annu-

ally. Fixed amounts are not stipulated in the law and it has been left to the local distributors to settle, based on their personal knowledge, how much should be given in each case to the parties in question, without too much injustice occurring. The average amount in 1918 was

$33.

France. — The law of 14 July 1905 made it obligatory in France for the state to provide assistance, from 1 Jan. 1907, for aged persons, the infirm and incurable. The scheme is non¬ contributory and is confined to the necessitous poor. Those admitted to the scheme must be Frenchmen who are without sufficient means and who are incapable of providing by their labor for the necessaries of their own existence. They must also satisfy one of the following two conditions: they must be either (a) over 70 years of age, or (b) younger but suffering from an infirmity or a malady which is con¬ sidered incurable. If they satisfy these condi¬ tions, they become entitled to a pension of not less than 60 francs ($12) a year and not more,

except under exceptional circumstances, than 240 francs ($48) a year. The assistance may be granted either in money or in the form of suit¬ able accommodation and treatment in a hospital or similar institution.

Germany. — The German system is of spe¬ cial interest both because of -its avowed inten¬ tion to stimulate and endow thrift and also of the fact that the contributions imposed are com¬ pulsory. The first law on this subject was passed in 1889 and applied compulsorily to all persons over 16 years of age, working for wages or salaries up to $500 a year, except government and other public officials who were otherwise provided for. In order to draw an old-age pension, the claimant must have attained the age of 70 and must have been insured for a period of 1,410 weeks, termed the "time of waiting.® The insured persons are divided into four wage classes and the contributions as well as the pensions differed according to these classes. The employers are responsible for the whole contributory part, but could subtract the con¬ tribution of the employees at next pay-day. The premiums were levied in the form of stamps which were issued for the several wage classes. Receipt cards were obligatory and had places for 52 or more stamps and had to be exchanged for new ones when filled up. Some modifications were introduced in the Act of 1899, by which the burden of the payment of premiums was equalized. Later a fifth wage class was added and a central pension office established.

New Zealand. — The act providing old-age pensions was passed in 1898. It provided for the payment out of the Consolidated Fund of a pension of $90 per annum, or $1.72 per week, without contribution by the beneficiaries. An amending act of 1 Sept. 1905 increased the full pension to $130 per annum, or $2.50 per week. The act applies to all residents of the colony who fulfil the necessary conditions. The quali¬ fications of an applicant are briefly as follows: He must have reached the age of 65 ; he must have resided continuously in the colony for 25 years ; he must not during the past 12 years have been imprisoned for four months ; he must not at any time have deserted his wife and children ; he must have lived a sober and reputable life for at least five years previous;

his income must not reach $300, etc. Payment is made by 12 monthly instalments through the post office.

Australia. — The old-age pension system came into force in New South Wales and Vic¬ toria in 1901, and closely followed the New Zealand system, and in Queensland in 1908. These plans were

superseded by the Common¬ wealth Act of 1 July 1909, by which the pen¬ sion age is 60 years for women and 65 for men. A residence of 20 years is required. Pension commissioners fix the pension rate for each special case. It must not exceed $130; nor must the recipient's total income from all sources exceed $260. Good character and citi¬ zenship are other necessary conditions.

Austria. — In 1906 Austria established com¬ pulsory old-age and invalidity insurance after the model of Germany. Only salaried em¬ ployees are benefited by the act. There are six salary classes.

Belgium. — Minor schemes of insurance had received government aid long before a comprehensive system was enacted into law on 10 May 1900. The two main objects of this law are as follows: (1) Assisted Insurance. — To encourage the working classes to save and to assist them by state contributions, by con¬ stituting a fund which will secure to them at the age of 65 an annuity not exceeding 360 francs, or about 18 cents per day. (2) Non¬ contributory Pensions. — To grant workmen or women, or ex-workingmen or women, special grants of 65 francs per annum when they are in want.

United States. — The old-age pension method is familiar to the American people through the system of war pensions, which are paid to a large number of war veterans at a cost of over $150,000,000 a year. The British Old- Age Pension Act of 1908 has also stimulated the demand for old-age pensions rather than in¬ surance. While no legislative action, except by some States and municipalities for their own employees, has yet been accomplished, the sub¬ ject has called within recent years for consider¬ able discussion. Several States have had in¬ vestigating commissions and the reports of two Massachusetts commissions are perhaps best known. While both of these have been adverse to any immediate legislative program, the sub¬ ject continues to receive considerable attention. A recent report of the Wisconsin Industrial commission suggests both methods as possible alternatives. Bills for old-age pensions have been introduced in the United States Congress, in Massachusetts and other States.

Bibliography. — See under Social Insur¬ ance. Also consult Hoare, H. J., (01d Age Pensions) (London 1915) ; Squier, L. W., 'Old Age Dependency in the United States (New York 1912) ; 'Massachusetts, Commission on old age pensions, annuities and insurance) (1910) ; 'Massachusetts Report of the Com¬ mission on Pensions* (1913) ; Wisconsin Indus¬ trial Commission, 'Report on Old Age Relief*

(1915).

OLD BAILEY, London, England, an an¬ cient historic criminal court, prior to 1903 adjoining Newgate Prison, between Holborn Viaduct and Ludgate Hill, where now stands the Central Criminal Court. A prison was attached to it. In the Old Bailey the surviving

judges of Charles I were tried after the Resto¬ ration, in 1660, and it witnessed also the trials of the patriot, Lord William Russell, in 1683, Jack Sheppard in 1724, Jonathan Wild in 1725, the poet Savage in 1727, Dr. Dodd in 1777, Bellingham, the assassin of the statesman Per¬ ceval, in 1812 and the Cato Street conspirators in 1820. In the days when the criminal law of England was much more severe and far-reaching than it is to-day, Old Bailey Court became known not only in England but all over the English-speaking world for its severity and the number of convictions made and death sen¬ tences imposed. In the trial of Charles Dar- nay for treason, in the (Tale of Two Cities) Dickens has graphically described Old Bailey. It is now officially designated as the "Central Criminal Court,® but non-official England still knows it as "Old Bailey.®

OLD BAY STATE, a name given to Mas¬ sachusetts, whose shores are washed by Cape C od Bay. Prior to the adoption of the United States Constitution, Massachusetts was known as "the Colony of Massachusetts Bay.®

OLD CASTILE. See New Castile.

OLD CATHOLICS, religious denomina¬ tions formed by certain seceding Roman Catho¬ lics in 1870, whose basis of belief and practice was declared to be the revival of the traditions of the Apostolic Church and the recognition, as authoritative, of the first seven oecumenical councils of the Church and none others.

The Cause of the Revolt. — An oecumenical council, commonly known as the Vatican, was convened at Rome and assembled 8 Dec. 1869, which included 49 cardinals, 9 patriarchs of the Eastern Church, 4 primates, 121 archbishops, 479 bishops and 52 abbots and other monastic dignitaries. On 15 Jan. 1870 the number present had increased to 744, and by March to 764. When the object of the council, the definition of papal infallibility, was made known, a pro¬ test was made, outside the council, by Dr. Dollinger, the most illustrious scholar of Roman Catholic Germany, supported by the

French Minister Darn and the Austrian Von Buesh and a small party of bishops. Nevertheless the dogma was at length promulgated and received the assent of the Roman Catholic hierarchy throughout the world. Its terms were as follows •

"We teach and define . . . that the Ro¬ man pontiff, when he speaks ex cathedra, that is, when in discharge of his office of Pastor and Doctor of all Christians he defines, in virtue of his supreme apostolic authority, a doctrine of faith or morals to be held by the Universal Church, is endowed with the divine assistance promised to him in Blessed Peter, with that infallibility with which our divine Redeemer willed that the Church should be furnished in defining doctrine of faith or mor¬ als, and therefore that such definitions of the Roman pontiff are irreformable of themselves and not in virtue of the consent of the Church.® This dogma was promulgated 18 July 1870.

The universities of Germany alone opposed the new Vatican decree. Dr. Von Schulte, pro¬ fessor at Prague, was first to utter a written protest. At Nuremberg a vote of dissent was passed by a meeting of Roman Catholic pro¬ fessors and scholars in August 1870. "Father

Hyacinthe® (M. Charles Loyson) issued his (Appel aux Eveques Catholiques/ denying that the decree was binding on the Church. The learned Dr. Dollinger set forth in a letter his reason for dissent as "a Christian, a theologian, an historical student, and a citizen.® His ex-communication was immediately proclaimed from all the pulpits of Munich. He was, how¬ ever, supported by the professors of the Uni¬ versity, and an address to the king, written in the same spirit of protest, received 12,000 Roman Catholic signatures. Finally an assem¬ bly of the dissentients was held at Munich the following September and w.as attended by 500 delegates from all quarters of Europe. The lectures of Reinkens delivered in 1871 made the issues plain to the world, and his arguments were echoed and enforced in the inaugural address delivered by Dr. Dollinger as rector of the University of Munich.

N Constitution of the Old Catholic Church. — The movement gradually gained such momem turn that organized action was forced upon its supporters. On 4 June 1873 Dr. Reinkens was consecrated their bishop at Rotterdam by the Jansenist Bishop Heydekamp of Deventer and, as the cause was spreading rapidly in Switzer¬ land, a congress was held there and was at¬ tended by both English and American theo¬ logians (12—14 September). The election of Bishop Reinkens was recognized by the German government, and in the following }rear a synod and conference were held at Bonn.' The

results of these discussions were embodied in canons by which the clergy were allowed to marry, com¬ pulsory fasting and confessions were abolished, the vernacular was ordered to be used in pub¬ lic worship, and it was made permissible in the churches to administer the communion in both kinds to Anglicans. In Switzerland the Old Catholics, or as they there preferred to style themselves, Christian Catholics, chose Profes- soi Herzog tor their bishop and he was duly consecrated by Bishop Reinkens 18 Sept. 1876.

1 he University of Bern elected an Old Catholic faculty and in 1890 there were 55 congregations under Bishop Herzog, with some 50,000 lay members and 72 ministering clergymen. In Austria the Old Catholics organized themselves m ISSo and in 1900 were reported to number 16,000 souls. In France a Gallican Old Catholic mo\ ement was set on foot by Pere Hyacinthe under the jurisdiction of the Arminian arch¬ bishop of Utrecht. The Old Catholics in Italy were led by Count Campello, those in Spain by C abrera and in 1890 and 1892 there was an international Congress of Old Catholics at Lucerne, another at Rotterdam in 1894 and a third at Vienna in 1897. On the death of Bishop Reinkens in 1896, Vicar-General Theodor Weber was elected to take his place and consecrated in Bonn with a jurisdiction extending over the German Empire. In this large diocese the Old Catholics number 61 priests (four of them re-rn™an folding Pr°fessorates), and from 45,000 to 50,000 lay members ; and were building many churches, parsonages and seminaries. At Bonn and Essen they have founded hospitals and poorhouses. Among the periodicals devoted to the interests of the Old Catholics' move¬ ment are Internationale Teologische Zeitsthrift (Bern); Der Katholik (Bern); Altkato- n sc lies V olksblatt (Bonn) ; Deutscher Merkur

(Bonn) ; Amt Itches Altkatolisches Kirchenhlatt (Bonn); Le Catliolique National (Bern) – Lc Latholique Frangais (Paris) ; La Luz (Madrid); 7, lJ° tamo Savonarola (Piacenza); II Labaro

j d emol' Oud Katholiek (Rotterdam) ■ and Kevue Internationale de Theologie Con- ˆdt Beyschlag

1 883) .

OLD CHURCH SLAVONIC LAN¬ GUAGE AND LITERATURE, in Slavic philology, the name of the parent tongue of Slavonic group languages and literature. In the 9th century the Slavic biblical and liturgi¬ cal books were translated by the (

which were not Slavic. This happened to Rumanian in the south, and to Lithuanian in the north.

The sway of Church Slavic as the mediaeval literary speech of all the Orthodox Slavs lasted many centuries. In Russia it obtained until the time of Peter the Great, and among the Serbs and Bulgars until the end of the 18th century. Peter the Great put the first obstacle m the way of the monopoly of Church Slavic as the Russian literary speech. He ordained a new form, a kind of modernized letter adopted under Dutch influence, and called this the citi¬ zens alphabet. The hitherto superfluously orna¬ mented letters and characters of the abbreviated words and expressions were kept in reserve for church use. Thus the Old Slavic was limited only to liturgical purposes. Even theol¬ ogy as doctrine and church oratory and admin¬ istration were henceforth carried on in the new Russian language, which was used in the church service only on special occasions.

Among the Orthodox Southern Slavs, par¬ ticularly the Serbians, a mixture of Church Slavic in Russian form with a popular render- ing was in vogue to the end of the 18th century, v uk Stefanovic was the first reformer to shake oft the remnants of this artificial dialect. The pure speech of the Serbian people came into its own as the common organ of officialdom and literature. . The. influence of Vuk Stefanovic in Bulgaria arrived somewhat later and more tardily. So even till to-day all Orthodox Slavs have one. and the same church language, which is essentially, restricted to church uses. The limits to which it is employed are much nar¬ rower than those allowed to the Latin in the Cathohc Church. As to the ancient literature in Old Church Slavonic, it was mostly written by clergy-men of all ranks, and very often by the monarchs themselves, who either chose to, or were forced to, renounce the throne and to join monastic life. They generally wrote their 'books and documents in the cloisters : at Hilen- dar (Mount Athos), at Studenica, Decani, Rilo, Pecerskiy and many another monastery in the Balkan Peninsula and southern 'Russia. The writers imitated Greek literature, which was very- handy to them and extremely rich in content. Propeily speaking the Old Slavic literature represents Byzantine literature en miniature. It embraces almost the same branches of literary production : theology, history, rhetoric, mysticism, asceticism, polemics, exegesis and other religious topics existing in almost any country at that time. There have been collected up to now 5,000 manuscripts, which represent the production of the old period of Slavic literature, but it cannot be affirmed that there are so many finished works. Besides compila¬ tions and translations there are original writ¬ ings and documents mostly on the lives of the Slav and Jugoslav saints. The disciple of

Cyril and Methodius, Clement (styled in the titles of his works, ((the Slavonic apostle55) wrote many sermons and panegyrics of saints. To him mid his pupil Gorazd, is assigned (Vita SS. Cyrifli et Methodii,5 a valuable biography of the Slavic missionaries. Of the year 1073 is the (Iz!bornik5 or Miscellany5 of Prince Sviatoslav, written for that prince by John the diak or deacon. This is a kind of a Russo- Slavonic encyclopedia, drawn mostly from

Greek sources. Its style is praised as clear and simple. The reputed author of the earliest Russian Chronicle, Nestor (1056-1114), a monk of the Pecerskiy cloister of Kiev, wrote his books in Herodotean manner, and gave im¬ portant ethnological data of Slavonic races. Similar works are found in Serbo-Slavonic re¬ cension under the name (The Ancient Serbian Biographies. The best writers of the time were Archbishop Sava or Saint Sava (1164—1236), his brother, King Stefan Prvovencani (i.e., the "first crowned8), and the monks Domentian, Theodosius and Gregorius Tsam- blak. The highest literary creation of the period is undoubtedly (The Lives of the Serbian Kings and Archbishops, } by Archbishop Danilo (d. 1338). With the Serbian "Enlightener8 (Pros – vctitelj) Sava and the Russian historian, Nestor, began the long series of Slavic an¬ nalists, whose works remind us of the (Anglo-Saxon Chronicle,) with dry details and quaint stories. The chronicles and biographies in the Old Slavic literature are almost without literary value, but as historical material they are useful. In the field of legislation there are some codes of laws in early Slavonic literature which rep¬ resent many features of interest. Such are the (Russkaya Pravda> of Yaroslav (11th century) and the (Zakonik Stefana Dusana) (14th cen¬ tury). Both of these codes show that the Slavs were at that time auite on a level in civilization with the rest of Europe. From the 15th to the end of the 18th century, the cultural life of the Southern Slavs and their literature was almost entirely centred at Ragusa (Dubrovnik), the only portion of the Jugoslav country which was free from the Ottoman yoke. But because this literature was no longer written in the Old Church Slavonic, it remains beyond the scope of this article.

Bibliography.— Bilbasov, (Kyrill i Metodiy> (Petrograd 1868) ; Bogisic,

1900) ; id., (Historija knjizevnosti naroda hrvat- skoga i srpskoga>

(Zagreb 1867) ; ICacanovskiy, (Serbskia zitia i letopisi (Slavyanskiy Sbornik, Vol. Ill, Petrograd 1876) ; Karskiy,

1901) ; Lavrov, (Obzor zvulkovih i formalnih osobenosti bolgarskago yazika) (Moskva 1887) ; Leger,

- *Lexicon Palaeoslovenicum-Graeco-LatinurrP (Kiev 1862-65) ; Miletic, (0 clanu u bugarskom jezikip (Zagreb 1889) ; Niederle, (Lidstvo v dobe predhistoricke) (Prague 1893) ; Nova- kovic, (Istorija srpske knjizevnostP (Belgrade 1871) ; id., (Prvi osnovi slovenske kniizevnosti medju balkanskim Slovenima) (Belgrade 1893); Oblak, (Das alteste datirte slovenische Sprach- denkmaP (Arcliiv f. Slavische Philologie, Vol. XIV, p. 192, 1892) ; Pypin-Spasovic'h, (Istoriya Slavyanskih Literatur> (Petrograd 1879) ; Stojanovic, (Katalog rukopisa i starih stam-*

panih knjiga) (Belgrade 1901) ; Schleicher, (Die Formenlehre der Kirchenslavischen Sprache) (Bonn 1852) ; Sobolevskiy, (Drevniy tˆerknovno-slav. yazik> (Moskva 1891) ; Safarik, Pamatky dFevniho pisemnictvi Jihos- lovanU> (Prague 1851); id., (Slovanske Staro- zitnostP (Prague 1862-63) ; Vondrak, (Altkir- chenslavische Grammatik) (Berlin 1900).

Milivoy S. Stanoyevich.

OLD COLONY, a name applied to the southeast part of Massachusetts, the section occupied by the Plymouth Colony, and later given to the State.

OLD CREOLE DAYS, a collection of short stories published in 1879 by George W. Cable, then a young man living in New Orleans. The setting of the stories is that of the pictur¬ esque old French and Spanish city in the early years of the 19th century just as it was merg¬ ing into the American city of later years. Against the background of the Rue Royale with its balconies, cafes and gardens, or the historic mansions on the bayous and the Mississippi, charming types of Creole men and women, with now and then picturesque backwoodsmen or more practical Americans, are portrayed in these stories, that may challenge comparison with the best short stories of modern literature. Mr. Cable is as supreme a master of style as he is of delicate characterization and romantic incidents. One cannot praise too highly the atmosphere of charm and distinction that he has thrown about one of the outstanding human situations in American history. While the author now and then reveals a tendency, so

marked in his later writings, to suggest his own interpretation of social problems engen¬ dered by certain caste feelings, these stories have the freshness and the charm of a master artist. While it is difficult to speak too highly of the (Cafe des Exiles, (Tite Poulette,* or (Madame Delicieuse,* there is something more elemental in (Posson Jone) and (Jean-Ah Poquelin.* The last-named story, in its revela¬ tion of the hero's resistance to the American invasion and of a brotherly love that knows no limit in its self-sacrifice, is one of the moving tragic stories of modern times.*

Edwin Mims.

OLD CURIOSITY SHOP, a novel by

Charles Dickens, written in 1840—41, as a serial for Master Humphrey's Clock, a weekly period¬ ical based on the model of Addison's Spectator, to publish short stories, essays and miscellane¬ ous papers. In the fourth number, acceding to the public request for another ((long story,8 Dickens commenced the (01d Curiosity Shop! It is a novel of a difficult trend with an involved plot. The character of Little Nell stands out as that of a precocious child of inherited tend¬ encies in a somewhat overdrawn exhibition of pious seriousness and long submissive suffering, which plays upon the sympathy and emotions of sentimental readers. Jeffrey and Landor, however, co'mpared the delineation of this char¬ acter to that of Cordelia. The story is re¬ lieved by the lively wit of Dick Swiveler, the Marchioness, Quilp and the description of the wandering Bohemians which maintain the best characteristics of the humor Dickens had origi¬ nated in the (Pickwick Papers> ; (Nicholas NicklebyP etc.*

OLD DOMINION, a name given to Vir¬ ginia. In the original charters pertaining to the «tf f Vlngima, it was frequently called the colony and dominion of Virginia » Mas¬ sachusetts was given the name «01d Colonv® and Virginia (<01d Dominion.®

OLD-FIELD LARK, a local name in the southern States for the meadow-lark (q.v.).

OLD FOLKS AT HOME, a famous southern plantation song, words and music written in 1850 by Stephen Collins Foster

(q.v.). The song realized some $15,000 for the author.

OLD FORGE, Pa., borough in Lacka¬ wanna County, on the Lackawanna River, and on the Lehigh V alley, and the Delaware, Lack¬ awanna and Western railways, about five miles southwest of Scranton. It was settled in 1830 and remained a part of the Old Forge town¬ ship until 1899, when it was incorporated as a borough. It is in the anthracite coal region and a large number of the men and boys of the borough are engaged in coal-mining. The chief industries beside the mining and shipping of coal are glass-blowing, manufacturing silk goods, and making chemicals and fertilizers. It has a fine high school building and good grade schools. The government is adminis¬ tered by a burgess, who holds office three years, a borough council and subordinate officials. Pop. (1920) 12,237.

OLD GLORY, a popular name for the flag of the United States. It was first applied in 1831 by William Driver, a sailing captain of Salem, Mass., who died at Nashville, Tenn., in 1886. Previous to the outbreak of hostilities between the North and South «01d Glory® was flung to the breeze every day from the window of Captain Driver's Nashville house; but when the conflict began the old flag had to be secreted It was kept out of sight till General Nelson's wing of the Union army appeared in Nashville 27 Feb. 1862, when Captain Driver presented it to the general to be hoisted on the Capitol. It was run up, and Captain Driver himself did the hoisting. Its name and history soon be¬ came familiar to all the soldiers in General Nelson's command.

OLD GRIMES, the hero of a popular humorous American ballad and song, by Albert Gorton Greene (q.v.). The title is an adapta¬ tion from one of the metrical tales by George Crabbe, but the personage described in the bal¬ lad is an exaggerated study of an eccentric New Englander who flourished in the earlier half of the 19th century.

OLD GUARD, The, a popular name ap¬ plied to a body of French troops in the army of Napoleon I. The Guard consisted of five regiments; was distinguished for bravery, and at the battle of Waterloo made the final charge of the French army. Previously it had suffered severely in the Russian campaign. The Guard was created by Napoleon in 1804, out of picked men from every part of the service and from members of the Consular Guard. The Old Guard was peculiar in that it had its own general staff and received orders from its own commander-in-chief alone.

OLD HICKORY, an affectionate nick¬ name given to Andrew Jackson (q.v.) by his militia troops, on account of his toughness and

endurance of hardship. It seems to have been first conferred on occasion of his march back from Natchez in February 1813, when, after having sent him there to foil an expected Brit¬ ish attempt on New Orleans, Secretary Arm¬ strong ordered him to disband his men. Jack- son in great wrath marched them home in a body undergoing great discomforts on the way.*

OLD HUNDRED, a popular religious hymn tune adopted from a 15th century mel¬ ody. The tune is found in the Flemish Psalter (1540) and in the Dutch Psalter (1561). In England it was originally sung to the 100th Psalrrn The melody was adapted to Beza's CXXXIV Psalm, included in the Geneva Psalter (1554), and was arranged by the musi¬ cal editor of the book, Louis Bourgevis. Hence the tune has been frequently credited to him. It was included in the Psalms with music by Marot. and Beza (Lyons 1563) ; and two years later, in Claude Goudimels' collection of tunes published in Paris. It is thus evident that it was both well known and popular by the mid¬ dle of the 16th century. In England it was originally known as the <(hundredth tune® ; and from this designation came the name (<01d Hundred.® Consult Fitzgerald, (Stories of Famous Songs } (1897).

OLD IRONSIDES, a name applied to the United States frigate Constitution (q.v.).

OLD KENTUCKY HOME, a famous plantation song, written and set to music by Stephen Collins Foster in 1850.

OLD LINE STATE, a popular name for the State of Maryland, which in the early colo¬ nial days was the dividing line between the Crown land grants of William Penn and Lord Baltimore.

OLD MAN; OLD WOMAN, ornamental and culinary herbs. See Artemisia.

OLD MAN OF THE MOUNTAIN, a

name given to a huge rock on Profile Mountain, m the Franconia Range, N. H. When viewed from certain positions it bears a marked re¬ semblance to a man's face. The name is some¬ times given to Profile Mountain.

OLD MAN OF THE MOUNTAIN, the

mediaeval name of the ruler of the Assassins. See Mohammedanism.

OLD MAN OF THE SEA, (1) frequently in Greek poetry, an epithet applied to Nereus. (2) In the

OLD MORTALITY, a novel by Sir Walter Scott published in 1816. It deals with the struggle between the Covenanters and the forces of the Crown under Claverhouse (see Graham, John, Viscount Dundee), about 1670. The title is the nickname given to Robert Paterson (q.v.), who bestowed years of care upon the gravestones of Covenanters.

OLD NICK, popular sobriquet of the Devil, derived from Saint Nicholas (Ger. Nicolaus, diminutive Nickel, often used of the Devil) and more remotely from Nekker (or Nikker), a Teutonic water-sprite whose appearance to sailors foreboded death and drowning. Chris¬ tianity, when it got the upper hand in the Germanic countries, still retained a liking for this old Teutonic culture god; but the priest¬ hood did its best to discredit him. Hence he survives to-day with two exactly opposite char¬ acteristics. As Saint Nicholas and Santa Claus he is the beneficent culture god and lover of children as he was beloved and! respected by the Pagan people. As Old Nick he lives up to the reputation the Christian priests gave him when they degraded him from his 'high estate. •He was the carrier of souls to the future world, and as such boded disaster. In this re¬ spect he is closely related to the Irish Ban She; and from this side of his character his Old Nick attributes were deduced. Old Harry, Old One, Old Scratch are other names similarly used.

OLD NORTH STATE, The, a name some¬ times given to North Carolina (q.v.).

OLD OAKEN BUCKET, The, a poem by Samuel Woodworth (q.v.), an American poet, written in 1817 and first published as (The Bucket. J The air to which it is set is an adapta¬ tion of Frederick Smith's music of Moore's song (Araby's Daughter. }

OLD ORCHARD, Me., town in York County, on the Atlantic Ocean, and on the Bos¬ ton and Maine Railroad, about 10 miles south¬ west of Portland. It is a famous summer re¬ sort, on account of its smooth ocean beach 12 miles long, where surf bathing is safe, and there are good opportunities for fishing. Deep- sea fishing is a

favorite sport, but those who prefer still-water fishing go to Biddeford Pond nearby. In 1903 conventions were held here tinder the auspices of the Christian Workers' League, the _ Christian Alliance, and the Woman's Christian Temperance Union, and a Musical Festival, a White Cross Convention, and a Methodist Convention. The population is several thousand in the summer months, but the regular residents number about 1,700.

OLD POINT COMFORT, Va., a famous watering place in Elizabeth City County; on the point of a small peninsula where Chesapeake Bay and Hampton Roads enter the Atlantic Ocean. It is near Fort Monroe and about five miles north of Norfolk. The climate is equable, the opportunities for bathing, fishing and boat¬ ing are excellent; the garrison at the Fort, and the cities of Norfolk and Portsmouth nearby all add to the attractions. The place has two ex¬ cellent hotels which are frequented summer and winter. Commercially the town is active in the shipment of fish, oysters and vegetables.

OLD RED SANDSTONE, in geology, a name loosely used by Hugh Miller (q.v.) in his (The Old Red Sandstone and footprints of the Creator,) for the formation below the Car¬ boniferous (q.v.), and above the Silurian (q.v.) New Red Sandstone (q.v.) was by contrast used of similar red strata of Permian Age. Miller's books did much to draw the attention of scientists to this group of Paleozoic rocks, and the term became popular. In scientific usage it was soon ousted by (Devonian * (q.v.),*

which as suggesting Devonshire the typical English locality is less misleading than Old Red Sandstone, inasmuch as these rocks consist of other sandstones than red, for examnle, white, yellow and green, and of many beds of clay and .limestone. These beds are believed to be largely of estuarine and terrestrial origin, containing both marine and land fossils. The Devonshire rocks, on the other hand, are not sandstone but chalk; the identity or similarity of geological genesis between the rocks of Devon and Miller's Scotch sandstones was proved by the similarity of fossil remains. In America the main groups falling under the head of the Devonian or Old Red Sandstone System are those styled by the New York Geological Survey, the Catskill, Chemung, Portage, Hamilton, Marcellus, Upper Helderberg, Schoharie and Oriskany groups (qq.v.).

OLD SQUAW, or OLD WIFE, the long¬ tailed duck (Clangula hiemalis), a sea-duck present in the nesting season in all boreal re¬ gions, and visiting the United States in winter. It is blackish and

whitish ; head, neck and lower parts mostly white in winter; a patch of gray on -the head ; breast brownish black ; bill black and orange; tail very long — a means of in¬ stant recognition of the drake. The tail of the female is short, and her plumage is mostly grayish brown. Gunners sometimes call the drake ((old injun® and the female alone <(old squaw® ; also ˆsouth-southerly,® etc. Most of the names are taken from its noisy habits, for it is almost continually calling, but its cries are musical. They are favorite with gunners more from the skill required in shooting them, on account of their swift flight and wary ways, than for excellence of flesh ; they rarely present themselves for a shot except when they come into the bays and river mouths for food at sun¬ rise, flying in long lines. They also are met with on the Great Lakes.

OLD TESTAMENT, Canon of the. See

Bible, Vol. Ill, p. 613.

OLD TESTAMENT, Jewish Translations of the. See Bible, Vol. Ill, p. 652.

OLD TESTAMENT INTERPRETA¬ TION, History of. See Bible, Vol. Ill, p. 638.

OLD TESTAMENT STATISTICS. See

Bible, Vol. Ill, p. 673.

OLD TESTAMENT TEXT CRITI¬ CISM. See Bible, Vol. Ill, pp. 629-633 ; 669-

671.

OLD -WOMAN -WHO – NEVER – DIES,

according to a Mandan myth, is a supernatural character who lives in the moon. She is the mother of six children, three sons and three daughters, the Sun, the Night, the Morning Star, the Evening Star, and two other stars, one of which circles round the polar star. Old-Woman-who-never-dies sends the geese and wild fowl in the spring, and she makes the corn grow. Dances are given in her honor in the spring and in the autumn at Which she is en¬ treated among other things to send the buffalo. The great stag, the white-tailed stag and the blackbirds help the Old-Woman-who-never-dies to guard the corn fields and the mice and the moles aid the good work. She lives in the south and when the birds go south in the fall they go to her and she

feeds them out of her magic kettle which never becomes empty.

. OLDBERG, old'berg, Arne, American mu- S1C1j-nˆb' Yol!nSStown, Ohio, 12 June 1874. He studied at Vienna and Munich under Lesche- tizky and Rhineberger, and since 1899 he has been professor of music at Northwestern Uni¬ versity. He was president of the Chicago Manuscript Society in 1901-03. His composi¬ tions in chamber music include several quar¬ tets, a trio and three quintets, and among his orchestral compositions are two symphonies, two overtures, a theme and variations, an orchestral rhapsody and an organ concert. He has also composed numerous pianoforte pieces.

OLDCASTLE, old'kas-1, Sir John, Lord Cobham, English nobleman: b. Herefordshire in the 14th century: d. London, 25 Dec. 1417. He obtained his peerage by marrying the grand¬ daughter of Lord Cobham. A zealous adherent of Wickliffe, he collected and transcribed his works and distributed them among the people. In the reign of Henry IV, at the head of an English army in France, he obliged the Duke of Orleans to raise the siege of Paris. Under Henry V he was accused of heresy, and not being able to satisfy his accusers he was con¬ demned as a heretic, and committed to the Tower, but escaped. It was then reported to the king that 20,000 Lollards were to assemble at Saint Giles' for his destruction, with Lord Cobham at their head. This accusation seems to have been credited by Henry, and there cer¬ tainly was an abortive attempt at a Lollard ris¬ ing, with which Oldcastle was probably con¬ nected. He avoided capture for a time, but at last was taken, and as a convicted heretic and traitor was (

OLDENBURG, ol'den-berk, Henry (Ger.

ol'-den-boorg) , German writer and courtier: b. Bremen, Germany, about 1615 ; d. Greenwich, England, September 1677. He was graduated from the Gymnasium Illustre, Bremen, in 1639; sent as consul for Bremen to London and served in that capacity during the (

OLDENBURG, Germany, (1) a town, capital of the state of the same name, 24 miles northwest of Bremen, on the Hunte, which here receives the Haaren and forms a VOL. 20 — 42

harbor. It has fine promenades on the site of the old fortifications, two grand-ducal palaces or residences, one of them containing a fine

library, a handsome grand-ducal picture gal¬ lery, a modern town-house, a public library, museum of Germanic and other antiqui¬ ties, fine theatre, railway station, gynasium and commercial school. Among its foremost in¬ dustries are manufactures of tobacco, glass, leather, soap, earthenware, corks, linoleum, yarn, knit goods, brick and musical instruments. Pop. over 30,000. (2) The grand-duchy of

Oldenburg, comprising the duchy of Olden¬ burg and the principalities of Birkenfeld and Liibeck, has an aggregate area of 2,479 square miles. It borders on the North Sea and is surrounded east, south and west by Hanover. In the Diet or Reichstag of the German Em¬ pire the duchy is represented by three deputies and in the Bundesrath or Federal Council by one member. The ducal house of Oldenburg dates from the commencement of the 12th cen¬ tury, and among its branches are the kingly houses of Denmark and Greece. Pop. about

400,000.

OLDFIELD, old'feld, Anne, English ac¬ tress: b. London, England, 1683; d. there, 23 Oct. 1730. Her dramatic powers attracted the attention of Farquhar, the dramatist, and through his influence she made her appearance at Drury Lane. She soon overcame adverse criticism and rapidly rose to be the leading actress of her day. Her preference was for roles in plays of the "genteel comedy" order, but when finally persuaded to take tragic parts she is said to have startled even her fellow actors by her power. Though received in the highest social circles her private life furnished ground for censure, as she openly lived with Arthur Mainwaring, and after his death with General Charles Churchill. She was buried in Westminster Abbey with high honors. Her most famous roles were Lady Betty Modish in 'The Careless Husband) ; Jane Shore; Cleo¬ patra; Sophonisba. Consult Baker, (English Actors from Shakespeare to Macready) (New York 1879) ; Doran, (Annals of the Stage (Bath 1888) ; Geneste, Tome Account of the English Stage* (Bath 1882).*

OLDHAM, old'am, John, American colo¬ nist: b. England, 1600; a. Block Island, R. I., 1636. He came to Plymouth from England in 1623, but because of designs against the Ply¬ mouth government entertained by him with John Lyford, a Church of England clergyman, he was banished from the colony. He subse¬ quently made his peace with the colonists and was of service to them on several occasions. Removing to the Massachusetts Bay Colony he settled in Watertown, which he represented in the first General Court. His murder by Indians on Block Island in 1636 was the chief

incident leading to the Pequot War (q.v.).

OLDHAM, William Fitzjames, American Methodist Episcopal bishop : b. Bengalore, India, 15 Dec. 1854. He was educated at the Madras Christian College, at Allegheny Col¬ lege, Meadville, Pa., and at the University of Boston. He entered the Methodist Episcopal Ministry in 1883, and in 1884 founded the Malaysian Mission of the Methodist Episcopal Church at Singapore, Straits Settlements -jmd

in the East Indies. In 1885 he founded the Anglo-(hinese School at Singapore, which in l()hS had 1,000 students. In 1895 he founded a chair of missions and comparative religions at the Ohio Wesleyan University and was its occupant in 1895-1900. He was assistant sec¬ retary of the Missionary Society of the Metho¬ dist Episcopal Church in 1900—04; was mis¬ sionary bishop for southern Asia in 1904-12; and in 1912 was appointed corresponding secre¬ tary of the Board of Foreign Missions. He was Graves lecturer at Syracuse University in 1912 and 20 May 1916 he was elected a bishop.

OLDHAM, England, town in Lancashire, six miles northeast of Manchester. From an in¬ significant village in the 18th century, Oldham during the 19th century became one of the chief seats of the cotton industry, and an important coal-mining centre. In the town and the im¬ mediate neighborhood there are over 300 cotton mills, which employ about 40,000 mill hands. Its numerous other industries include wool¬ weaving, hat-making, iron-founding and the manufacture of engines, gas-meters, sewing machines and cotton weaving and spinning ma¬ chinery. Although irregularly built on hilly ground and of no great architectural preten¬ sions, Oldham is distinguished for its munici¬ pal enterprise and the administrative owner¬ ship of its various public utilities, as gas, water, electric-lighting plant, street railroads, baths, wash-houses, hospitals, cemeteries, markets and museums. Pop. about 150,000.

OLDHAMIA, a genus of carboniferous brachiopods, known as fossils in the rocks of India and China. The name has also been applied in Great Britain to some remains of indeterminate character, probably of sea weeds. It also applied to a fossil alga found in the Cambrian rocks of Ireland.

OLDMIXON, old'mik-son, John, English political writer: b. Axbridge,

Somerset, 1673; d. 1742. In his {Essay on Criticism in Prose) (1728), he attacked Pope, who returned the compliment by abusing Oldmixon in the (Dun- ciadP He published also

*OLDTOWN, Me., city in Penobscot County, on the Penobscot River, and on the Bangor, Aroostook and the Main Central railroads, about 11 miles northeast of Bangor. It was settled in 1820 and was a part of Orono until 1840, when it was incorporated as a town; and was chartered as a city in 1891. It is in a lumber region, and the chief manufactures are wood products, machinery, patent medicines, chemicals and foundry products, pulp, boots and shoes, woolen goods and large quantities of lumber in different forms. It has a free public library in different forms. It has a free and a fine city hall. The revised charter pro¬ vides for a mayor and council elected annually. Pop. 6,630. Consult Howard, (History of Penobscot County.**

OLDYS, ol'dis, William, English antiquary: b. probably London, 14 July 1696; d. College of Arms, 15 April 1761. He was a natural son of Sir William Oldys, Chancellor of Lincoln.

He suffered financially through the South Sea Bubble in 1 720, and in 1724-30 lie was the guest of the Earl of Malton. He assisted Dr. Knowler in editing the (Earl of Strafford's Letters and Despatches (2 vols., 1739). On his return to London in 1730 he found that his library and manuscripts had been sold, among them an annotated copy of Gerard Langbaine's ' Dramatick Poets,* which later formed the foundation for Cibber's Lives of the Poets* (1753). Despite this loss he had succeeded in 1731 in collecting a valuable library which he sold to the Earl of Oxford, and in 1738-41 he was literary secretary to the earl. Upon his patron's death Oldys was forced to subsist upon irregular employment from the booksellers, re¬ lieved in 1742-46 by his work with Dr. Johnson in preparing a catalogue of the library of the Earl of Oxford and the (Harleian Miscellany* (8 vols., 1744—46). In 1747-60 he contributed much valuable material to the (Biographia 'Bntannica,* but owing to financial difficulties he. spent the years 1751-53 in Fleet Street Prison. Through the efforts of friends his debts were then paid and he was appointed Norroy king-of-arms. He lived at the College of Arms the remainder of his life. His works include (The British Librarian* (1737-38) ; HJfe of Raleigh,* prefixed to Sir Walter Raleigh's (History of the World* (1736; sep¬ arate ed., 1740) ; (Life of Charles Cotton*

(1760).

OLE BULL. See Bull, Ole Bornemann.

OLEAN, o-le-an', N. Y., city in Cattarau¬ gus County, on the Allegheny River at the mouth of Olean Creek and on the Pennsylvania, the Erie, the Pittsburg, Shawmut and Northern railroads; about 68 miles in direct line south by east of Buffalo. It was settled in 1804 by Major Hoopo and David Heuston, was incor¬ porated as a township in 1808, as a village in 1854 and was chartered as a city in 1893. It is in a fertile agricultural region and near the Pennsylvania oil fields and is a distributing point lor large quantities of petroleum which is brought by pipe lines from the oil fields south of the city and considerable of it is sent by the same means to other cities. The chief manufacturing establishments are lumber mills, tanneries oil-refineries, glass factories, ma¬ chine, lailioad and copper shops, wagon and carriage factories, brewery, brick yards, flour mills and furniture factories, ihe educational institutions include public schools, one parish school, commercial colleges and the Foreman Libiaiy. The two banks have a combined capi-

£ nnn nm25,(¥2 and the total assets are over

tp4,UU(J,ULHJ. Ihe government is vested in a

mayor, elected for two years, and 12 aldermen,

six ot whom are elected each year. Pop. (1920)

jUO.

OLEANDER, a genus of shrubs (Neriuni) of the order Apocynacece. The two or three species have narrow, leathery, evergreen leaves and terminal cymes of flowers, usuallv pink, followed by pods containing twisted seeds. The common oleander (N. oleander) is a native of subtropical and tropical Asia and of the Medi¬ terranean region, whence it has been introduced into other warm countries as an ornamental shrub and hedge plant and into greenhouses for growing m tubs. In the Bermudas it is so abundant that the landscape is perceptibly tinted

by its bloom at some seasons. Otherwise the shrub seems to have few uses though charcoal from its sott light wood is used in Algeria for

making gunpowder. The plants are easily grown from cuttings placed in water or in \vet sand, fhey thrive best in rather moist sod, but will also do well upon high land if they obtain a good root-hold. The sweet-scented oleander (N. odorum), a native of Japan, India and Persia, is less sturdy than the common species and is less cultivated.

OLEASTER, or SILVERBERRY, a

shrub (hlceagnus august if olia) of the order blaagnacece (q.v.), an ornamental plant intro¬ duced from western Asia and southern Europe into temperate climates as an ornamental plant. It grows about 20 feet tall, is often spiny, has narrow light green leaves about two inches long, small, fragrant bell-shaped flowers, fol¬ lowed by yellow, oval silvery-scaly fruits. It seems to prefer well drained limy soils and sunny situations. It is very popular in cold climates, especially in the Dakotas and Minne¬ sota, where it has proved hardy.

OLEFIANT GAS. See Ethylene.

OLEIC ACID, CisHaiCh, the most import¬ ant member of the "oleic® series of unsaturated organic acids occurs as the glyceride triolein, C3H5 (C18H33O2) 3, in most liquid and solid fats as olive, almond and codliver oils, lard, tallow, etc., olive oil being about 72 per cent pure olein. To obtain the free acid the fat is saponified with alkali, the soap so formed dissolved in water and the fat acids liberated by the addition of dilute hydrochloric or sulphuric acids. This impure oleic acid is heated for a time with pow¬ dered lead oxide (litharge). The lead salts so obtained are extracted with ether which dis¬ solves only the lead oleate. On acidifying the ethereal solution with dilute hydrochloric acid the lead is precipitated as lead chloride, leaving the pure oleic acid in solution from which it can be obtained by evaporation of the ether. The decomposition of triolein into oleic acid and glycerine may be accomplished by other means such as heating with superheated steam or with water and sulphuric acid. Oleic acid is a thin colorless oil at ordinary temperatures but solidifies when cooled to 4° C. (39° F.). Crystallizes from alcohol in silky needles melt¬ ing atQ14° C. (57° F.). Specific gravity at 19° C. (66° F.) is 0.897. It decomposes when heated to boiling at ordinary atmospheric pressure, but may be distilled unchanged under diminished pressure or with superheated steam. Insoluble in water, very soluble in acohol, ether and most other organic solvents. It is a mono-basic acid forming many well defined salts, many of which are of use in the arts or in medicine. Sodium oleate is the chief constituent of castile soap; potassium oleate is found in soft soap ;

lead oleate is the "lead plaster® of the pharmacist. When well cooled oleic acid is treated with nitrogen, trioxide it is changed to a solid isome- ride, elaidic acid, which is used to some extent in making candles.

OLEINE. True oleine is the gyceride of oleic acid. Composition, CsHsˆCisfLsChK It occurs in most vegetable and animal fats, nota¬ bly in olive oil, lard and tallow. A colorless, odorless, nearly tasteless oil, insoluble in water, only slightly so in alcohol, soluble in ether. Alkalies saponify it to the alkali salt of oleic

acid (soaps) and glycerine. Nitrogen trioxide c . JJiges it to its solid isomeride elaidine. It is difficult to obtain it perfectly free from the glycerides of other acids occurring with it. The teim "oleine® is applied to various commercial products, such as the liquid fats used by the soap-maker and the liquid fatty acids utilized by the candle manufacturer.

OLENEK, o-lye-nyok', a river of northern biberia, which rises between Mounts Boldisno and Dsholokon and after a tortuous northeast¬ ern course of about 1,000 miles enters the Arctic Ocean 100 miles to the west of the Lena delta. It is six miles wide and 20 feet deep at its mouth, on the left bank of which is the village of Ust Olenskoe.

OLEOGRAPH, o'le-6-graf, an imitation of oil painting produced by means of a process similar to that of chromo-lithography. The use of embossing to imitate the rough texture of the painting is sometimes employed and the pi int when finished is mounted on canvas, sized and varnished to heighten the effect. The artis¬ tic value suffers through the attempt at imita¬ tion, frank reproduction coming under a dif¬ ferent category.

OLEOMARGARINE, a mixture of fats used cis a, substitute for butter. Oleomargarine was invented by a Frenchman, Mege-Mouries in 1870. His idea was to produce a substance very like butter in physical properties and chemical composition that would be more wholesome than and as cheap as poor butter. He used the best of beef-suet as a basis; 1,000 parts of well washed and finely chopped fat were digested at 45° C. (113° F.) with 300 parts of water, one part of carbonate of potash and two-stomachs of sheep or pigs. After two hours the membranes had dissolved under the influence of the pepsin of the stomachs and the melted fat had rise11 to the surface. It was drawn off, salted and allowed to cool whereupon most of the stearin and palmatin crystallized out. This semi-solid mixture was

subjected to hydrau¬ lic pressure and the fluid oleo 50—60 per cent pressed out. The oleo was churned with 10 per cent of its weight of milk together with a little butter color and the product worked up like regular butter. Many changes have been made in the. manufacture of oleomargarine since its invention by Meges-Mouries. The process given below as described by Armsby (Science , Vol. VII, pp. 471-472) is essentially die same as that described by Armour and Swift and is a fair representative of that followed in this country. From the beef-tallow is prepared the oleomar¬ garine oil of Mege. The caul fat of freshly killed beeves is, after thorough washing first in tepid water and then in iced water, allowed to stand in a cold room until' thoroughly cold.

It is then rendered at a temperature between 130 and 175 F. The resulting oil is allowed to cool slowly until a considerable portion of the stearin and palmatin has crystallized out and the pasty mass is then subjected to hydrau¬ lic pressure. The still fluid (about two-thirds of the whole) flows out into a tank of cold water, where it solidifies into a granular mass which is known to the trade as "oleo® oil or simply "oleoA The name "oil® is somewhat misleading as the product is a granular solid of a slightly yellow color. Fresh leaf lard treated in substantially the same way as the

beef tallow yields the <(neutral lard® or ((neu- tral® of the trade, also a granular solid of a white color.

The objects of this treatment are twofold, first, to produce fats as free as possible from taste or odor ; second, to remove some of the difficultly fusible stearin and palmatin, in order that the finished product may melt readily in the mouth. Haying thus secured the fats in the proper condition, the manufacturer proceeds to mix ((oleo® and <(neutral,® the proportions vary¬ ing according to the destination of the product ; a warm climate calling for more ((oleo,® a cold one for more ˆneutral,® and to flavor the mix¬ ture with butter. This flavoring is conducted in large steam-jacketed vessels provided with re¬ volving paddles, by which their contents can be thoroughly agitated. Here the ((oleo® and ((neu- traL are melted and thoroughly agitated with a certain proportion of milk, or sometimes of cream and a proper amount of butter-color. Forty-eight gallons of milk to 2,000 pounds of product are stated to be a common proportion. After sufficient agitation, the melted mass is run

into cold water and as it cools is broken up by paddles so as to granulate the mass. After thorough washing it is salted and worked ex¬ actly like butter. The product is known as oleomargarine. Although it contains hardly more than a trace of butter, the latter flavors the whole mass so strongly that when well salted, as it usually is, it might readily pass with an inexpert or careless consumer for rather flavorless butter. Oleomargarine is the cheap¬ est product made. By adding to the material in the agitator or ((churn® more or less pure butter what is known as butterine is produced, two grades of which are commonly sold, namely, ((creamery butterine® containing more and (tdairy butterine® containing less butter. Certain other substances such as cottonseed-oil, sesame oil sugar, glycerine and glucose are used to some extent by a few, usually unimportant makers. On the question of the wholesome¬ ness of artifical butter there is a wide difference of opinion, but most authorities say that a butter substitute carefully made from the fresh clean fat of healthy beeves or swine is wholesome.

The physical properties of oleomargarine are so similar to those of butter that it is very dif¬ ficult to distinguish between them by any super¬ ficial test. For a good test that can be applied in the household, consult Farmers' Bulletin No. 131, United States Department of Agriculture (to be obtained for the asking from the Secretary of Agriculture). The analytical chemist is able to detect oleomargarine by making use of the fact that it contains a large percentage of fatty acids not soluble in water and a lower per¬ centage of those volatile with water vapor than butter does. There has been both Federal and State legislation regarding this substance. The Federal law of 1886 imposed a special tax on the manufacture ($600 per annum), the wholesaler ($480) and the retailer ($48). In addition the manufacturer must sell it in stamped packages, the stamps making an extra tax of two cents a pound. The act of 1902 abolished this tax of two cents but established new rates, namely, 10 cents a pound on artificially colored oleomar¬ garine, while oleomargarine free from any color that would cause it to look like butter was rated at one-fourth of a cent a pound. The special

taxes on the maker, etc., were not changed. Most States have an extra tax of their own. They vary widely and change frequently. Some merely add a few cents a pound while others fix so high a rate or such conditions of manufac¬ ture or sale as to be practically prohibitory.

The production of oleomargarine in this country in 1888 was

34,325,5 27 pounds, which in¬ creased to 126,316,427 pounds in 1902. Only about 3 to 4 per cent of it was exported. Oleo- oil however, was exported in large quantity (161,651,413 pounds in 1901), more than half going to the Netherlands. In 1909 oleomarga¬ rine to the value of $14,000,000 was manufac¬ tured in the United States; while the exports in 1914 amounted to 2,533,000 pounds valued at $263,453; and oleo oil 97,017,000 pounds valued at $10,157,000, most of the former going to the West Indies and of the latter to Denmark, Ger¬ many, Norway, Sweden, Belgium and Great Britain and colonies. Consult, Bannt, W. T.,

. (A Practical Treatise on Animal and Vegetable Fats and Oils) (Philadelphia 1896) ; Wiest, E., (The Butter Industry in the United States) (New York 1916) ; New York Commercial Manufacturing Company, 'Oleomargarine But¬ ter } (New York 1880) ; United States Depart¬ ment of Agriculture Wear Book) (Washington 1895-96) ; United States Census (Bulletin No. 138) (Washington 1902) ; United States Office of Internal Revenue 'Revised Regulations Con¬ cerning 01eomargarine) (Washington 1907).

OLEOMETER, o-le-om'e-ter, a species of apparatus adapted for determining the relative densities and proportions of oils contained in seeds, nuts and other materials. The construc¬ tion of the apparatus permits of a small quan¬ tity of volatile solvent being used to extract the oil, being distilled back upon the material under treatment and filtered through it suc¬ cessively several times.

OLERON, o-la-ron, France, an island in the Bay of Biscay, its nearest point two miles from the coast of the department of Charente- Inferieure, opposite Rochefort. It is 19 miles long by about five broad, and is very fertile. On it are the port of Le Chateau and the towns of Saint Pierre d'Oleron and Saint Georges d'Oleron. In history, the island is noted for the Jugements ou Roles d'Oleron — Judgments or Laws of Oleron, a code of maritime law compiled by command of Eleanor of Guienne before she married Henry II of England, and modeled on the (Book of the Consulate of the Sea) (a maritime code regulating commerce in the Levant). It was drawn up from the de¬ cisions of the maritime court of Oleron, in the duchy of Guienne, and was intended for the use of mariners in the Atlantic waters. It was introduced into England in the end of .the 12th century and into' Flanders in the 13th. The usages and1 decisions upon which it was based were those observed in the wine and oil trade between Guienne and the ports of England, Normandy and Flanders. The code formed the basis of modern maritime law. It was pub¬ lished for the first time in the ˆCollections des Lois Maritimes>

of M. Pardessus. An English translation was published as ‘ Rutter of the SeaP See Commercial Law.

OLEVIANUS, o-la-ve-a’noos, Kasper, Ger¬ man religious reformer: b. Treves, 10 Aug. 1536; d. there, 15 March 1587. He studied law

in Paris, Orleans and Bourses, where he be¬ came acquainted with the teachings of Calvin. Further theological learning was acquired by him in Geneva and he began to teach the Ref¬ ormation doctrine in Treves in 1559, and to promote the spread of the new movement under the inspiration of Calvin. This roused the hostility of the archbishop, and the reformer was compelled to retire to Heidelberg, where he was appointed member of the church consist¬ ory, and court preacher. He now in collabora¬ tion with Ursinus produced the Heidelberg Cateshism. His Lutheran sympathies led Louis VI to depose him from his ecclesiastical pre¬ ferments in 1576; and he went to Berleburg and thence in. 1584 to Herborn, where he advocated the doctrines of the Reformation in the terri¬ tories of Count von Wittgenstein and Nassau. His special contribution to the progress of the Reformation was of a practical and administra¬ tive character, and from him the Reformed churches received that Presbyterian type of organization and policy which has become per¬ manent in Europe and1 America, where his method of government by synods has become universal. Consult Harbaugh, (Fathers of the German Reformed Church) ; Hagenbach, (Vater und Begriinder der Reformierten Kirche\ (1857) ; Cuno, F. M,, (Blatter d.er Erinnerung an Dr. Caspar 01evianus) (Barmen 1887).

OLFACTORY NERVE, or OLFAC¬ TORY SENSE. See Nose and Throat.

OLGA, Saint, a popular saint of the Rus¬ sian Church. She was a peasant girl taken to wife by the Grand-duke Igor of Kiev, who met her ‘by chance when on a hunting party in Pskoff. She possessed remarkable talents and an exalted character. After her husband had lost his life when returning from an unsuccess¬ ful expedition to Constantinople (945), she managed the government for his son, Sviatoslav, a minor, until he came of age in 955. Then going to Constantinople, she was baptized by the Patriarch Theophilactes and took the name of Helena. On her return to Russia she labored earnestly and successfully for the propagation of the Christian faith.

After her death in 969 she was canonized by the Greek Church under her original name and her festi¬ val is kept on the 11th day of July (O. S.). Consult Castremont, D'Elissalde, (Histoire de Tlndroduction du Christianismo sur le conti¬ nent russe, et la vie de Sainte 01ga} (Paris

1879).

OLIBAN (Olibanum), a gum-resin which flows from incisions in certain species of Boswellia, a genus of trees of the family Burseracece, noted for the production of aro¬ matic gums, growing on bare rocks in the mountains of southern Asia and northeastern Africa. Olibanum is the lebonah of the He¬ brews, libanos or libanotos of the Greeks, thus of the Romans, of all which terms the ordinary English translation is ˆfrankincense" (q.v.). It is produced mainly by B. serrata, a large tree growing on dry and rocky ridges from Abys¬ sinia and southern Arabia to northern India; but the best oliban comes principally from Somaliland and from Arabia.. Aden is the chief point of collection, exporting from 1,500,- 000 to 2,000,000 pounds annually, much of which goes to India and China. 1 he gum oc¬ curs in commerce in semi-transparent yellowish

tears and masses; has a bitter nauseous taste; is hard, brittle and capable of being pulverized; and diffuses a strong aromatic odor when burned. It was formerly used in medicine, but' now is. chiefly employed as incense in Roman Catholic churches and Indian and Chinese tem¬ ples. It contains 56 per cent of resin soluble in alcohol, 30 per cent of gum soluble in water, and from 4 to 8 per cent of an aromatic oil. Another species of Boswellia supplies in India an inferior gum of similar properties, both used as incense and as a substitute for pitch.

OLID, Cristobal de, kres-to'bal da o-led', Spanish soldier: b. about 1490; d. Naco, Hon¬ duras, 1524. He was brought up in the retinue of Diego Velazquez, governor of Cuba, who in 1518 sent him with a small force to find Gri- jalba, of whom nothing had been heard since his setting out for Yucatan. In Yucatan he met, Cortes and was induced by him to desert Velazquez and join the other in his adventurous schemes. In 1524 was captured and beheaded by one of Velazquez's kinsmen.

OLIER, o'lya', Jean Jacques, French priest: b. Paris, 20 Sept. 1608; d. there. 2 April 1657. He was educated at the Jesuit College of Lyons, the College of. Harcourt and at the Sor- bonne. He was ordained priest in 1633 and in company with other priests traveled

through Suvergne and Velay as a missionary. His reputation reached Louis XIII and through the advice of Richelieu Olier was appointed co¬ adjutor of the bishop of Chalons-sur-Marne, an honor he declined in order to carry out his project of founding a seminary for priestly education.. In 1642 he established a seminary at Vaugirard, near Paris, and gradually gathered other priests to aid the work. Later in the year he was appointed to the charge of Saint Sulpice, Paris, a parish notorious for its evil practices. Olier accepted the charge with¬ out abandoning the seminary and succeeded in making Saint Sulpice a model parish. He made a determined stand aeainst duelling and brought to his support a number of the most valiant among the nobles, who took a vow not only to refrain from giving or accepting challenges but to. refuse to act as seconds. The Seminary of Saint Sulpice was chartered in 1645, and in 1655 the cornerstone of the church of Saint Sulpice was. laid. Other seminaries under Olier's direction were founded at Clermont, Le Puy, Viviers, Bourg, Saint . Andeol, and Montreal, Canada. Consult (Vie de M. Olier, Fondateur du Seminaire de Saint Sulpice > (1853); Jervis, (History of the Church of France) (Vol. 1).

OLIGARCHY, a form of government in which the supreme power is vested in a small class of persons. See Government.

OLIGOCENE, in geology, a name intro¬ duced by Beyrich (1855) for beds in North Germany, especially at Mainz, including por¬ tions of formations of the upper Eocene and the lower Miocene, and so forming a fourth subdivision of the Tertiary (q.v.), namely into Eocene, Oligocene, Miocene and Pliocene. The rocks of the Oligocene are freshwater, brackish, or marine in origin and display a quasi-tropical flora; they occur in the Paris Basin, in Switzer¬ land, where they are called Molasse, and rather rarely in North America, where the more im¬ portant beds identified with the Oligocene occur

in the Northwest Territory, North Dakota, along the White River, and from Florida to Texas, the last being styled the Vicksburg beds by Conrad and the Orbitoidic beds by Heilprin, who first called attention .to the frequent oc¬ currence in it of a fossil foraminifer, Orbitoides mantelh.

OLIGOCHiETA, ol-i-go-ke'ta, a suborder of ˆ cratopod annelids (see Chˆetopoda) of which the earthworm (q.v:) is the most familiar

example. The species are almost solely inhabit¬ ants of the earth or of fresh water, have the segments of the body similar, and differ from the marine chsetopods (Polychceta , q.v.) in their greater simplicity of structure. They lack all appendages — cirri, palpi, tentacles, as well as parapodia, the bristles arising directly from the body-wall, either distributed regularly or ar¬ ranged in four bunches on each segment Usually eyes are lacking and there is no metamorphosis in .development. These animals are hermaphroditic, and usuallv some of the segments are markedly glandular, forming a girdle (clitellum) which secretes the cocoon in which the eggs are laid. The group is divided ln^°7iT- e aclua^c or parasitic species (Limicola or Microdrile) and the terrestrial forms (Ter – ncola or Macrodrile') . The aquatic species are mostly minute.

OLIGOCLASE (Greek, slight fracture), one of the feldspar unisilicates, with the pos¬ sible formula (CaNa^) A2I4S19O26. It crystallizes m the triclinic form, but with angles very near to those of the monoclinics feldspar orthoclase (q.v.) ; has a single clean fracture; is not af¬ fected by acids; varies in color from white to greenish ; has a specific weight of 2.62-2.65 and a hardness of 6; occurs in granite and other early, rocks in Switzerland, Germany, Sweden and in the United States in New Hampshire Connecticut, North Carolina and elsewhere. A reddish variety with fine iron oxide crystals is used as a gem and is called sun stone.

OLIN, Stephen, American Methodist cler¬ gyman: b. Leicester, Addison County, Vt. 7 March 1797; d. Middletown, Conn., 16 Aug. 1851. He was graduated at Middlebury College, Vt. ; was appointed principal of the Tabernacle Academy, South Carolina and subsequently entered the ministry of the Methodist Episcopal Church. In 1826 he was appointed professor in the Uni¬ versity of Georgia. In 1833 he was transferred to the Virginia Conference, and elected presi¬ dent of Randolph Macon College. Later he spent some time in foreign travel, and in 1842 became president of Wesleyan University, Mid¬ dletown, Conn. He was an impressive nreacher, and a prominent advocate of the evangelical al¬ liance. He wrote (Travels in Egypt, Arabia Petraea, and the Holy Land> (1843) • (Greece and the. Golden Horn> (1854);

OLINDA, d-len'da, Brazil, a seaport town of Pernambuco, five miles north of the city of Pernambuco, which replaced it as the capital and commercial centre of the state, after the Dutch burned Olinda in the 17th century. Olinda was founded in 1535. For a long time it was the most important city of northern

Brazil. In addition to being the capital of the province of Pernambuco it was also the ad¬ ministrative headquarters of the Dutch Colony . established there in the 17th century. Long after it ceased to be the provincial capital it remained the favorite residence of old and wealthy families. Pop. 12,000.

OLIPHANT, ol'T-fant, Laurence, English

traveler and author: b. Cape Town, South Africa, 1829; d. Twickenham, near London, 23 Dec. 1888. He was the son of a chief justice of Ceylon, and after a boyhood spent in England went to Ceylon in 1841 and was subsequently private secretary to his father. Although later called to the bar he spent much of his time in travel, visiting the Crimea in 1852, and Canada and the United States (1853-54) as private secretary to Lord Elgin, and in 1855 he served under Omar Pasha in the Crimean War. The next year he joined Walker, -the filibuster, at New Orleans, and was attached to Lord Elgin's China mission 1857-59. The year 1860 saw' him with Garibaldi in Italy and the year after he was secretary of legation at Yeddo, Japan, where he was wounded by assassins. He after¬ ward traveled in Egypt, Poland and Palestine. He sat in Parliament for the Stirling Burghs 1865-67, but having by this time come under the influence of the mystic, Thomas Lake Harris (q.v), he resigned his seat and entered the brotherhood which Harris had founded at Broc-ton, Chautauqua County, N. Y. At Brocton under the orders, of Harris, he was forced to do the hardest kind of farm labor, and there his mother joined him, but was not permitted to hold any confidential intercourse with him. Both mother and son gave up their private means to the community. In 1870 Oliphant re¬ turned to Europe and was Times correspondent during the Franco-Prussian War. In 1872 he married and the next year, with his wife and mother returned to Brocton. All three of the Uliphants were now the obedient slaves of Harris, and while his wife and mother were employed in menial duties Oliphant was called upon to engage in commercial enterprises for the good of the community. Husband and wife were presently separated by the command of the inexoiable Harris, the wife being removed to a branch of the community in California. At last m 1882, they emancipated themselves from the Harris influence, and after more wandenng Oliphant finally settled at Haifa in the Bay of Acre,, and busied himself with schemes for assisting the lews to return to l alestine. Although he had broken with Harris icStl retam.ed visionary beliefs not easy to define. In spite of his singular mysticism he was a shrewd man of business, a polished man ot the world, and a writer of rare talents Among his many books are (A Journey to KhatamandiP (1852) ; (1853);

to T?hinˆ a.nd JaPan> (1857-59); (The /ieQn7o? ˆcollections of Irene. McGillicuddW (1878); (Piccadilly,> a novel (1865); (188fl); (Sympneumata) (18861; ˆMas-

in a Life of Adven aire (1887) ; Haifa, or Life in Modern Pales-hne> (1887); (1888); ˆScientific RehgmiP (1888). Consult (Memoir of Lau¬ rence Oliphant and Alice, his Wife,> bv Mrs Margaret Oliphant (1891).

OLIPHANT, Margaret Wilson, novelist and biographer : b. Wallyford, near Mussel¬ burgh, Scotland, 4 April 1828; d. Wimbledon, Surrey, England, 25 June 1897. She was a cousin of Laurence Oliphant (q.v.). She re¬ moved with her parents to Liverpool in child¬ hood and in 1852 was married to her cousin, Francis Wilson Oliphant, an artist in stained glass, who died in 1859, leaving her with three children and no means to support them except her pen. She began literary work early, pub¬ lishing (Passages in the Life of Mrs. Margaret Maitland 5 in 1849, and this was quickly fol¬ lowed by several other tales of Scottish life. After the death of her husband her family was supported entirely from the earnings of her pen, and during her long literary career she published 120 books and quite as many contri¬ butions to Blackwood's Magazine in the shape of reviews, etc. Few women of her time have surpassed her in the amount of work accom¬ plished and the even excellence of what she wrote. Of her many novels among the best are those comprising (The Chronicles of Carlingford) (1863-76) — of which (Salem Chapel5 (1863) and (Miss Majoribanks) (1866) are the most important, — (Within the Precincts5 (1879) ; Ularry Joscelyn5 (1881) ; (The Ladies Lindores) (1883) ; (The Sor- ceress) ; and (The Cuckoo in the Nest) (1892). She was not a great novelist, for she lacked constructive power, and her plots are not al¬ ways effective ; but her careful and sympathetic analysis of character, her humor, pathos, inven¬ tion and naturalness entitle her to a high place among novelists of the second rank. Of sev¬ eral tales of the supernatural by her (A Little Pilgrim in the Unseen) (1882), is the best known, but is surpassed in power by (A Be¬ leaguered City) (1880) ; and (01d Lady Mary5 (1884). In addition to her work in fiction she produced a large number of biographies and works of literary history, such as the (Life of Edward Irving) (1862), a remarkable piece of sympathetic biography; (The Makers of Flor-ence) (1874) ; (The Literary History of Eng¬ land 1790—1825 }

(1882) ; (Life of Laurence Oli¬ phant J (1883) ; (The Victorian Age of English Literature,) with her son F. R. Oliphant (1892) ; (Historical Characters of the Reign of Queen Anne5 (1894) ; (Annals of a Publish¬ ing House5 (1897) ; etc. In spite of much sor¬ row in her life her outlook upon existence was cheerful and tolerant, and her influence upon English fiction was wholesome in every respect. For a half century her admirable fictions were the delight of a wide circle of cultivated read¬ ers in this country and her own, and her (Chronicles of Carlingford,5 at least, have in them something of the same quality which ren¬ ders Trollope's Dorsetshire tales so enduring. Consult (Autobiography and Letters of Mrs. Oliphant5 edited by H. Coghill (1899). Consult Coghill, Mrs. H., (The Autobiography and Letters of Mrs. M. O. W Oliphant5 (New York

1899).

OLIVAREZ, Gaspar de Guzman, Count of, gas'par da gooth-man o-le-va'reth, Spanish statesman: b. Rome, 6 Jan. 1587; d. Toro, Spain, 22 July 1645. He was educated at the Univer¬ sity of Salamanca, was a gentleman of the bed¬ chamber to the Prince of Asturias, and gained the favor of his royal master to such an extent that soon after the latter succeeded to the

throne as Philip IV, Olivarez was appointed Prime Minister. For 22 years (1621 — 43) his power was almost unlimited. He was Duke of San Lucan Barrameda, and was known as the <(Count-Duke.5) His sole object soon became the extortion of money from the people to sup¬ ply the expenses of the war with Holland, France and other powers. His severity occa¬ sioned revolts in Catalonia and Andalusia, and the Portuguese threw off the Spanish yoke, and acknowledged the Duke of Braganza king in 1640. The foreign wars were so fatal to Spain, whose armies were defeated by the French, and whose fleets were destroyed by the Dutch, that the king was compelled by universal public dis¬ content to dismiss Olivarez in 1643. Consult Canovas del Castillo, Antonio, (Estudios del Reinador de Felipe IV5' (Madrid 1889) ; Sil- vela, F., (Cartas de Sor Maria de Agreda y del rey Felipe IV5 (Madrid 1885).

OLIVE, Princess of Cumberland, title assumed in 1821 by Mrs. Olivia Serres: b. War¬ wick, 3 April 1772; d. 21 Nov. 1834. Her maiden name was Wilmot ; she married John Thomas Serres in 1791 and was separated from him in 1803. She wrote poetry and fiction and several pamphlets (1813-17) urging the claim of her uncle, James Wilmot, to be the author of (Junius Letters.5 In 1821 she was arrested for debt, and moved a stay as being daughter of the Duke of

Cumberland. She asserted that £15,000 had been left her by George III, who recognized her as Cumberland's daughter, but she died without being able to see the king's will. Her claims were continued by her daugh¬ ter Lavinia (1797-1871), who married Thomas Ryves, a portrait painter, was divorced from him in 1841, and in 1866 procured a verdict that her mother was not the daughter of the Duke of Cumberland. This cause celebre was built upon most outrageous forgeries, but both Mrs. Serres and Mrs. Ryves succeeded in interest¬ ing Sir Gerald Noel and others in their pre¬ tensions.

OLIVE THORNE, American writer on ornithology. See Miller, Harriet Mann.

OLIVE, one of the leading fruits of the world. It is borne by a small tree (Olea euro – pcea) of the order Oleacece, and is the most im¬ portant member of its genus, which includes between 30 and 40 species. This tree is a native of western Asia and probably of the Mediterra¬ nean region, and attains a height of about 25 feet, bears small lanceolate evergreen leaves and axillary racemes of fragrant yellowish- white flowers followed by oblong or ovoid fruits (drupes). From remote antiquity it has been cultivated as a food-plant, especially for the oil pressed from its fruits. Throughout the coast of the Mediterranean the olive has been grown upon a commercial basis for many cen¬ turies, individual trees being known to be more than 1,000 years old. It was introduced during the 18th century into California, which is now the leading olive-producing district o£ the United States, but part of Arizona and New Mexico are adapted to olives and are gradually coming into notice. The assumption is made that seed was introduced in 1769 from Mexico and planted at the San Diego Mission, whence cut¬ tings were taken to other missions throughout California; and this olive, the only one known in the State until about 1880, was called the

(Mission® variety. Since 1880 numerous vari¬ eties have been introduced from olive-growing countries of Europe.

Hie olive succeeds best in warm, dry cli¬ mates. It will withstand some frost, but at blossoming time this is believed to impair if not to destroy the crop ; and the same result is otten attributed to high wind and very dry air at that time. A rich, well-drained soil is pre¬ ferred, but the tree will succeed and produce excellent crops upon a very great variety of soils; it is usually a mistake, however, to plant it upon rocky hillsides, as too numerous fail¬ ures in California prove. While not exacting as to food, the trees must have an adequate fertilizer. To return to the soil of the pomace after the oil has been, expressed, together with slight dressings of commercial fertilizers and judicious cultivation, will keep the trees in lusty bearing condition. The trees are usually set about 30 feet apart either in hexagons or in squares, the former plan being preferred in California because it is more economical of land, and permits of plowing in three directions instead of only two. The land is kept cleanly cultivated throughout the season.

The olive is propagated by layers, suckers, sprouts, cuttings, tips of twigs, grafts, buds and seeds. The last three, being tedious and slow are rarely employed. The favorite method is by means of tips. These are obtained from small dormant branches, partly defoliated rooted in moist sand and then transplated in nursery rows. The trees should begin to bear when about eight years old and reach full pro¬ ductivity when about 30.

Olive Oil.— The principal uses of the olive are tor oil production, for pickling, either green °? nPe' ai^ for drying. For the production of oil, the ripe fruits are carefully gathered by o^frd, bruised as little as possible and preferably crushed at once, otherwise they are partially dried in very thin layers through which air must circulate freely to avoid molding and fer¬ menting, unsound fruit being prone to decay and impair the flavor and odor of the oil. An old practice was to crush the fruit by means of heavy mill-stones in pits, but the oil thus extracted from the kernels has been found to injure both the flavor and the keeping quality of the oil obtained from the pulp. Modern crushers, therefore, do not break the stones. The crushed pulp is then pressed in linen sheets the pressure being applied very gradually A second pressing is made after the pulp has been mixed with cold water. Other pressings are sometimes given, each one resulting in a grade of oil inferior to the preceding. The two first grades are sometimes mixed. Since the sepai ation of the oil from the juice by

gravity is hazardous on account of liability to ferment the impurities are washed out quickly by special apparatus in which a current of cool water comes in contact with a small quantity of the juice, mixes with it, separates the larger parti¬ cles of pulp and allows the oil to rise through a tall column of water which further washes the oil-globules as they rise. After being al¬ lowed to stand for a time in a cool room this oil is racked off and sold as ((new oil,® or may .e allowed to stand for further clarifica¬

tion. Since the American market demands a clear oil, however, much of the domestic oil is filtered, a process which, especially if often re¬

peated, impairs the flavor and makes the oil seem greasy. Throughout the process, scrupu¬ lous cleanliness is essential, because olive oil is prone to absorb any taint either in the uten¬ sils or in the air. The oil is pale yellow, ino¬ dorous, and has a specific gravity of .918 at a temperature of 15° C. It is largely used in cookery and pharmacy, for lubricating and il¬ luminating purposes, and for making Castile and other kinds of soap, for which purpose the lower grades are most employed. In the United States it is often adulterated with cot¬ tonseed-oil. Gallipoli oil, which is used in dyeing, is made from the fermented fruit.

Olive oil also has important medical uses. In doses of from one to two ounces for adults, and one teaspoonful for infants, it acts as a laxative. It is also used in intussusception of the bowels; as an antidote in cases of acrid poisoning; as a local neutral protective from the atmosphere; in place of suet, lard, etc., as -an inunction to increase the fat of the body, or to reduce the heat of the skin, and by workmen in lead factories as a laxative, and to prevent the absorption of lead. Combined with cam¬ phor, morphine, etc., it is applied to wounds, burns and bruises, and forms the basis of many liniments It is used to allay the pain of insect bites, and (warmed) in the ear, to destroy in¬ sects. It is also employed as an application to swollen breasts, as a lubricant of surgical in¬ struments, sounds, pessaries, etc., and as an in¬ jection in cases of constipation; but for this last purpose it is inferior to castor oil. In large doses, it is believed by some physicians to hasten the discharge of gall-stones, sometimes apparently softening them.

Pickled Olives.— For pickling the fruits are gathered by hand before they are likely to be¬ come soft during the process, a degree of ma¬ turity notˆ readily described except by saying that the time is just before the fruits would

C u-11?6 ˆr?m green to the mature fruit tint which varies with the variety from yellow to almost black. They are first placed either in pure water, which must be changed each day or in a weak solution of lye. This is to re¬ move the bitterness and acridity and to soften the skin. After the latter process, which may occupy from one to three months, the lye is removed by soaking in pure water.' Then the o ives are subjected to a series of immersions 111 Sa u solutions of gradually increasing strength, the maximum being dense enough to oat an egg. They will now keep for years if properly stored. Pickled green olives are much less a food than a table delicacy or relish* but pickled ripe olives, which are prepared by much the same _ process and are gaining in javor, are considered primarily as a food However, there is little difference in their food value. Dried olives are popular in some Med¬ iterranean countries, but are little known in the American market.

The average composition of pickled green o ives is : water, 58; fat, 27.6; carbohydrates, 4.3; protein, ash etc., 7.8; that of pickled ripe olives: water 65.1; fat, 25.5; carbohydrates, 3.8; protein, ash, etc., 5.6.

Besides the species mentioned above, sev-

flfj °tJ)e/r related species afe valued more or less. Olea chrysophylla, a tropical African species, has been introduced into southern Cali-torma, where it is planted -for ornament, the

under surfaces of the leaves being bright golden ,c OW Olea, or Osmanthus, fragrans, is the ragrant olive of China and Japan, where its flowers are used for perfuming tea. It is also cultivated in greenhouses for its inconspicuous but exceedingly fragrant flowers.

In ancient Greece the olive was sacred to rallas Athene and was a symbol of chastity and peace. Like the laurel it was used for making wreaths for crowning the victors in ath- • 11C sPorˆs- Olive wood is very hard and beau¬ tifully grained, and is valuable for cabinet work.

„™0Iive,S vary in size from 100 to more than 400 to the pound. The exports of the United

c ?,bout 6,000,000 gallons of oil and

L000,000 gallons of green olives. The United States production of olive oil in 1912 amounted to 350,000 gallons.

Consult Bailey, (Cyclopedia of American Horticulture^ (1900-02); Goldmann, F., (Freiburg 1897); Hayne, c California Experiment Station Bulletin No. 129' (1900) ; Neville-Rolfe, E., (Report on

the Cultivation of the Olive in Italy) (London 1897) ; Pierce, N. B., (01ive Culture in the United States } (United States Department of Agriculture, Yearbook 1896).

OLIVE-BACKED THRUSH, an Ameri¬ can thrush. See Thrush.

OLIVE-SHELL, the polished and often beautifully colored shell, of nearly the size and shape of an olive, of a marine gastropod mollusk (family Olividce) , allied to the volutes and cones, many species of which inhabit the warm seas, creeping about the bottom in search of animal food at considerable depths. The front of the foot is developed into a strong sort of fender, and fleshy flaps (mesopodium) are re¬ flected laterally over the shell. An allied genus of smaller size is Olivella, one species of which has been used in the South Pacific islands as a kind of shell-money. Consult Cooke, (Mollusca) (1895).

OLIVEIRA MARTINS, o'le-va/ra mar¬ tens, Joaquim Pedro de, Portuguese author : b. Lisbon, 1845; d. 24 Aug. 1894. He entered commercial life at 14 but continued his studies and in 1870 he became manager of the mine of Saint Eufemia near Cordova. It was during this period that he wrote (0. SocialismoC In 1874 he returned to Portugal as administrator of the railway from Oporto to Povoa. He had meantime seriously devoted himself to the study of economics, geography and history, and his (A Circulagao fiduciaria) (1871), received the gold medal of the Royal Academy of Sci¬ ences at Lisbon as well as gaining for him membership in that institution. He was elected president of the Society of Commercial Geog¬ raphy of Oporto in 1880, and in 1884 became a director of the Industrial and Commercial Museum there. He entered Parliament in 1886, and in 1888 he removed to Lisbon where he became editor of the Reporter. He be¬ came adxuinistrator of the Tobacco Regie in 1889. He was his government's representa¬ tive at international conferences at Madrid and Berlin in 1890; and for his address at the fourth centenary of Columbus at Madrid in 1891 he was awarded membership in the Span¬ ish Royal Academy of History. He was ap¬ pointed Minister of Finance in 1892 and sub¬

sequently was vice-president of Junta do Credito Publico.

Together with his many activities in busi¬ ness and public life he attained a position of leadership in the literature of Portugal during the last half of his life. He was a man of high moral character and perceptions, an ardent patriot and gifted with keen psychological sense as well as a broad and sympathetic grasp of so- cio logical conditions. He possessed as well vivid imaginative powers, an easy grace of ex¬ pression and a knowledge of history which gave him an important share in the literary revival his country experienced in the latter part of the 19th century. Author of (Biblio¬ theca das sciencias socises' (1881-93); Historia de Portugal *; (Historia da republica Romana) ; (Portugal*

contemporaneo ; etc. Consult Barreto, M. (Ohviera Martins* (1887); D'Ayalla, F. D.' Os Ideaes de Oliviera Martins) (1897)- De Quental, A., <01iviera Martins) (1894).*

OLIVENITE, natural hydrated arsenate of copper, occurring in most copper ores. It varies in color from brown to green, and in form from crystal, usually oblique tetrahedral prisms, the common form in the English cop¬ per mines, to amorphous, being then styled ((wood copper® or <(wood arsenate® because of its fibrous nature. Both forms occur in the Utah copper mines.

. OLIVER, Andrew, American colonial offi¬ cial: b. Boston, 28 March 1706; d. there, 3 March 1774. ˆ He was graduated at Harvard College in 1724, was elected to the general court and became secretary of the province. He was a brother of Peter Oliver, chief justice of Massachusetts. When the Stamp Act was passed by the English Parliament he made himself obnoxious by accepting the office of distributor of stamps, and on 14 Aug. 1765 was hanged in effigy from the ((liberty tree.® In the evening of the same day the mob cut down the effigy and burned it in front of Oliver's house. Oliver was so much alarmed that the next day he publicly resigned his office. In 1771 he was appointed lieutenant-governor, succeeding his brother-iq-law, Hutchinson, and pursued the same public course, promoting, as far as possible, the olans of the British min¬ istry. This was proved by his letters obtained by Franklin in England and sent back to America in 1772. When, therefore, the general court petitioned the king for the removal of Hutchinson, Oliver's name was also included. The petition was refused, but Hutchinson was let out of office very shortly after the death of Oliver.

OLIVER, Frank, Canadian journalist and statesman : b. Peel County, Ontario, 1853. He went to Manitoba in 1873 and to Edmonton in 1876,

and in 1880 he established the Edmonton Bulletin. He served in the northwest council in 1883-88 and in the legislative assembly which succeeded the council in 1888-96. In 1896 he was elected to the Canadian House of Com¬ mons for Alberta, and in 1905-11 was Minister of the Interior under Sir Wilfrid Laurier. He afterward represented Edmonton in the house.

OLIVER, George Tener, American lawyer: b. Ireland, 26 Jan. 1848; d. 22 Jan. 1919. He was of American parentage and was educated at

Bethany College, West Virginia. He was ad¬ mitted to the bar in 1871 and in 1871-81 was engaged in practice at Pittsburgh. He later entered the iron and steel industry, and after 1900 he was publisher of the Pittsburgh Gazette and the Pittsburgh Chronicle Telegraph. He was elected to the United States Senate in 1909, serving out the unexpired term of Senator P. C. Knox, and in 1911 he was re-elected.

OLIVER, Henry Kemble, American mu¬ sician: b. Beverly, Mass., 24 Nov. 1800; d. Boston, Mass., 10 Aug. 1885. He was a boy soprano in the choir of Park Street Church, Bos¬ ton, and was graduated at Dartmouth College in 1818. He was mayor of Lawrence, Mass., in 1859, and in 1861-65 he was treasurer of the State of Massachusetts. He was afterward mayor of Salem, and in 1880 removed to Bos¬ ton, where he lived thenceforth. He was organist and musical director of churches in Lawrence and Salem; and founded a Glee Club and a Mozart Association in Salem. He wrote (The National Lyre with others (1848) ; Col¬ lection of Church Music) (1860) ; (Original Hymn Tunes* (1875); (Federal Street* (1832; sung at Boston Peace Jubilee, 1872) ; the hymns,*

OLIVER, James, plow manufacturer and inventor of the chilled plow : b. Scotland, 28 Aug. 1823 ; d. South Bend, Ind., 2 March 1908. He came to America in 1835 with his parents, who, after residing for a year in Seneca County, N. Y., settled in Mishawaka, Ind., in 1836. He learned the trade of a molder, and in 1855 began the manufacture of plows at South Bend., Ind., founding the establishment of which he becanre president. After years of exhaustive study and expensive experiments he invented the first successful chilled plow, which made his name famous throughout the world. See Plow.

OLIVER, James Edward, American mathe¬ matician : b. Portland, Me., 27 July 1829; d. Ithaca, 27 March 1895. He was educated at Harvard,

*became an assistant on the American Nautical Almanac and later was appointed as¬ sistant professor of mathematics at Cornell University, succeeding to the chair after two years. He was a member of the American Academy of Arts and Sciences, the American Philosophical Society and the National Acad¬ emy of Sciences; author of (A Treatise on Trigonometry * (1886).*

OLIVER, Peter, American jurist: b. Bos¬ ton, 26 March 1713; d. Birmingham, England, 13 Oct. 1791. He was a brother of Andrew Oliver (q.v.), and was graduated at Harvard College in 1730; held several offices in Ply¬ mouth County, Mass., and in 1756 was ap¬ pointed a justice of the Superior Court, al¬ though he had never become a lawyer. In 1771 he was made chief justice. Oliver was a Loyalist, and when, in 1774, the legislature ordered the judges to refuse a fixed salary from the king, he alone declined to comply and was impeached in consequence. He wrote in favor of the British rule in a Loyalist publication called the (Censor, and went to England in 1776, when the British troops evacuated Boston. There he passed the remainder of his life. He possessed*

considerable literary skill and was a collector of antiquarian materials.

OLIVER TWIST, begun while Dickens was still at work on (Pickwick Papers) and published in 1837-38, was one of the earliest and is still among the best known and widely read of the author's novels. Almost more than any other of his stories, except (Pickwick, it is modeled upon that loose agglomeration of adventures known as the picaresque novel, most familiar to English readers in such stories as Smollett's (Roderick Random* and Pere¬ grine Pickle,* and of which the best known examples are (Gil Blas) and (Don Quixote.* It is, however, much more beneficent and mov¬ ing than most of its prototypes and is full of sympathy and pathos. Oliver Twist, a waif, after being half-starved and ill treated in an orphan asylum, runs away to London, where he falls in with and is exploited by the under¬ world of the Jew, Fagin; Charlie Bates, the Artful Dodger; Bill Sikes and other disrepu¬ table people, but is finally rescued through the providential advent of the kindly disposed peo¬ ple of whose colorless amiability the Cheeryble brothers in (Nicholas Nickleby) are the best known. Oliver finally appears to be a scion of respectable stock and the villains of various descriptions are condignly discomfited by a considerable variety of arrests, terrors, mur¬ ders and mortal accidents. The story is one of the most rapidly moving and affecting of Dickens' earlier works in its sympathy with op¬ pressed childhood, and the figures of the under¬ world are usually thought to be among the most interesting in Dickens' great gallery of such characters. Those of Bill Sikes and Nancy are particularly realistic, and though Fagin, Bumble and some of the others are somewhat grotesque, they have become house¬ hold words. The higher classes are, as usual in*

Dickens' novels, less convincingly drawn and far less real.

William T. Brewster.

OLIVERS, Thomas, British Methodist preacher: b. Tregynon, Wales, 1725; d. London, March 1799. He received little education and earned a scanty livelihood as a cobbler. Upon hearing Whitefield preach at Bristol he was converted, became a preacher of the Methodist Society at Bradford, Wiltshire, and later came under the supervision of Wesley. He spent the years 1753-75 as a traveling preacher, and in 1775-79 he was supervisor of the Methodist press, a position for which he had not the necessary education and from which he was removed. He afterward lived in retirement in London, and was buried in Wesley's tomb. He wrote numerous tracts, but his hymns were more important and his (The God of Abraham praise) is still included in the best collections.

OLIVES, Mount of, or MOUNT OL¬ IVET, the historic hill on the east side of Jerusalem, separated from the city by the valley of Jehoshaphat and the brook Kedron, and rising to a, height of over 2,700 feet. It is celebrated as the scene of many Biblical inci¬ dents, especially in the ministry of Jesus Christ. It has four eminences extending from north to south, known respectively as Galilee or Viri Galilsei, Mount of Ascension, Prophets and Mount of Offense. The northernmost of these derives the name by which it is known among

hp Vhl t-11 fl °m iheLfact that {t is suppQsed to c the hill on which two angels addressed the

GS» Eˆur the Ascension, as «Ye men of ualilee. I he next in order, proceeding south- vvard, gets its name of Mount of Ascension i°m the supposition, originated by the Em¬ press Helena, that this was the scene of our Lords ascension, a supposition at variance with the narrative of Luke (xxiv 50 51)

where it is said that Christ ((led them out as ar as to Bethany." This was the most im- portant of all the eminences. At its foot lay the Garden of Gethsemane. The next emi¬ nence southward is rather a portion of the pre- vious one than a separate height, and is re¬ markable for containing a celebrated catacomb known as the «Tombs of the Prophets" (per¬ haps in allusion to the words of Christ in Matt. xxii1 29) The southernmost eminence is called the Mount of Offense, because it is sup- posed to be the (< Mount of Corruption" on whnch Solomon erected the high places for

strange gods (1 Kings xi, 7; 2 Kings, xxiii, JO). On the hill is the small village of El 1 °ur on the north of which is the Chapel of the Ascension belonging to the Mohammedans ut used on festival occasions bv Christians On the east are several Russian buildings, in¬ cluding a handsome church, a hospice for pil¬ grims and a tower from which a magnificent view is obtained, especially of the Dead Sea, Jordan Valley and surrounding country. South of the village are the Paternoster Church, or Church of the Lord's Prayer, belonging to the fvoman Catholics, and also a Carmelite convent. Modern olive trees represent the historical trees from which the mount derived its name, and which were cut down during the siege of Jerusalem 70 a.d. From the village of El Tour a road to the southeast leads to Bethany, pass¬ ing Bethphage.

The Mount of Olives seems to have been a sacred place back in the semi-heathen days when it appears to have been devoted to the worship of the moon. The mount was known in later days as the Mountain of Light and on it a beacon was lighted to announce the com¬ ing. of the new moon. This practice was kept up in even later days of the Jewish sovereignty. Consult Baedekez, Palestine and Syria) (Lon¬ don 1906) ; Hofman, (Galiileae auf dene Old- berg> (Leipzig 1896) ; Leary, L. G,, (The Real Palestine of Today (New York 1911).*

OLIVET, Mich., founded in 1844 and in¬ corporated in 1866, is mainly important as the seat of Olivet College, a coeducational and non¬ sectarian institution, founded in 1844 by John J. Shipherd, as Olivet Institute and chartered as a college in 1859. It is closely allied with and under the management of the Congrega- tionalists. Besides the regular preparatory and collegiate courses, the curriculum offers courses in pedagogy, the sciences, biology and music. The college confers the degree of A.B. The main buildings are Parsons Hall, Shipherd Hall, Mather Hall, a building for the labora¬ tories and the biological museum and Burrage Hall, the home of the library, which in 1905 contained 30,000 volumes. There is also a small gymnasium and the campus contains 15 acres. The Olivet Congregational Church is the church chapel and is the joint property of the college and church. The property of the col¬ lege in buildings and endowments was valued

in 1910 at $350,000; the faculty numbered 26; students, 260, and graduates, 732.

OLIVETANS. See Orders, Religious, of the World.

OLIVINE, natural silicate of iron and magnesium (Mg2Fe2SiCh) , also called peredot and chrysolite, occurring in lava and as a prin- apal constituent of basaltic rocks. It is rhombic and holohedric, of hardness 6

y2-7 and of spe¬ cific gravity 3.3—4. It is possibly an original magnesian component of rocks now altered to serpentine. Olivine is transparent, olive green or brown, with a colorless streak and conchoi- dal fracture.

iv O'LLA PODRIDA, ol'y'a po-dre'da (Sp., nterally, rotten or putrid pot), a popular Span¬ ish dish consisting of various kinds of meat stewed with vegetables. The term has also been applied to any incongruous mixture, particularly literary collections, to which the word hodge¬ podge might similarly be employed.

OLLENDORF'S SYSTEM, an educational term applied to a 19th century method of learn- invented by H. G. Ollendorf (1803-65), and designed for those who teach themselves. The grammars are intended to give t e students a mastery of the conversational few15 °f angUage' Srammatical rules being

OLLION, Henri, French educator: b. Bois- C "ˆu1' ˆran.ce' 1 April 1878. He was educated at the Jesutt colleges of Lyons and Avignon and the universities of Tubingen, Leipzig, Lyons and Paris. He was successively master of conferences and after 1909 professor of philosophy at the Catholic University of Lyons arm professor of philosophy at the Institute for T ' e,Mer Education of Young Girls, Lyons.

1914 he was commissioned captain of the 213th Infantry regiment and was awarded the Croix de Guerre. He published (Philosophie de la grammaire> (1900) ; (1908); (La philosophic gene- rale de John Locke (1909); (Lettres inedites • , °Jvke ,a Thoynard, Limborch et E. Clarke > with M. de Boer (1912). M. Ollion is a con¬ tributor to the (Catholic Encyclooedia,* the Revue de Philosophie, the Revue des Facultes Lathohques de Lille, etc.*

OLLIVANT, ol'i-vant, Alfred, English novelist: b. 1874. He was educated at Rugby and at the Royal Military Academy at Woof- wich, and was commissioned in the Royal Artil- ieiy in 1893, resigning in 1895. He subsequently devoted hims^f to literature, his first book Owd Bob (1898), published in America as Bob, Son of Battle,* achieving a remarkable success. His later works have sustained his reputation as a writer of high merit. Author of 0903) ; ,*

OLLIVIER, o-le-ve-a, Olivie fimile

French statesman: b. Marseilles. 3 July 1825- d. 20 Aug. 1913. He studied law and began the practice of his profession at Paris in 1848 Having taken part in the Revolution of 1 848, he was appointed commissary-general at Mar¬ seilles under the republic, afterward becoming

prefect at Bouches-du-Rhone and then of Haute-Marne. In 1857 he entered the legisla¬ tive assembly, where he became one of the lead¬ ers of the Liberal opposition and was one of ((The Fivew who were distinguished for eloquent and often successful opposition to the policy of Napoleon III. Gradually, however, he severed himself from his former political associates, and the severance was final when in January 1870 he accepted Napoleon's invitation to form a ministry. It was this ministry which declared war with Germany in July 1870, and was over¬ thrown writh disgrace in August 1870. After¬ ward Ollivier was several times a candidate for election to the Chamber of Deputies, but with¬ out success. He was elected a member of the French Academy; and hi j home became the re¬ sort' of literary and musical Paris, for his wife was the daughter of Franz Liszt. Beyond that he took no part in politics, but devoted himself to writing works on legal and other subjects. These include (Lamartine) (1874) ; (Principes et Conduite) (1875) ; (L'Eglise et l'Etat au Concile du Vatican) (1879) ; (Thiers a l'Acade- mie et dans l'Histoire) (1879) ; (Le Concordat, est-il respecte) (1883) ; (Nouveau Manuel de Droit Ecclesiastique Frangais) (1885); (Michel- Ange) (1892) ; (L'Empire Liberal* (6 vols., 1894-1908), a defense of his career; Solutions Politiques et Sociales* (1894), and (Marie-Madeleine, Recits de Jeunesse) (1896). In 1870 he was elected a member of the French Academy.

OLMEDILLA, ol-ma-del'ya, Ramon Fran¬ cisco de la Cruz Cano, Spanish dramatist and poet: b. Madrid, 28 March 1731; d. Madrid, 4 Nov. 1795. He ranks high among the original dramatists of Spain, and he is undoubtedly the best of them in his century. He began by modeling his plays upon strictly classical lines for which he professed an ardent admiration, and remodeled or translated plays from French and Italian. During this period of translation and imitation he acquired an intimate knowl¬ edge of the theatre and developed his dramatic talent, which he tried out in almost every kind of dramatic work, legitimate drama, tragedy, comedy, serio-comedy, tragic-comedy, comic opera, farce and sainete. This wide field of action gradually drew him more and more from the rigid lines of strict classical drama, and he soon began to find his own particular and peculiar dramatic sphere in the sainete and the zarzuda, two mediums which permitted him to depict scenes from Spanish life of the middle classes. The former is a short, one-act play, with little or no regularly constructed plot, the aim of which is to give a picture from real life. Olmedilla made the sainete witty and familiar, and achieving this he succeeded in making it so popular that it has continued in public favor to the present day with no sign of declining popu¬ larity. The sainete is still to be found on the weekly bill of fare of most theatres in Spain where the moving picture has not driven out the acted drama. The value of

Olmedilla's work in this line lies in the fact that he created a species of drama peculiarly national and thus helped to free the Spanish stage from the rigid bonds of classical tradition, and to bring it back to naturalness by thus depicting scenes from real life in a truly realistic manner that at¬ tracted the sympathy of the general public. His

influence upon Spanish drama was deep and far-reaching. He turned it from regal to demo¬ cratic subjects and he cut the bonds that had long bound it to certain forms and prescribed fields.

Next to Lope de Vega he is the most prolific genius in Spanish drama; and he has reached out and covered a wider and more varied field than the only dramatist who can claim to dis¬ pute dramatic honors with Shakespeare. In his 30 years of active life he produced over 500 plays, many of which are still unpublished. These touch almost every phase of the life of the Spanish people. Olmedilla also gave form and popularity to the zarzuela, or musical com¬ edy, which has become one of the distinctive features of the Spanish stage. Previous to his time the zarzuela had been based on foreign models and had served for the amusement of the wealthy. But Olmedilla faced about and found his characters for it in the life around him just as he had done for the sainete. All this could have but one result, the renaissance of Spanish drama and its development along new and more national lines. He gave to the Spanish drama an easiness, grace and natural¬ ness of dialogue which it had not previously possessed; for he avoided affectation and ex¬ aggeration both in form of speech and versifi¬ cation. He was a master scene maker; but one weakness was his frequent inability to link up his scenes into a properly jointed and related story. This was probably partially due to his constant attention to the sainete and the zar¬ zuela, both of which were developed by him along the same irregular lines and subject to the same weaknesses. But what he lacks in this respect he makes up in his brilliant pictures and conversation of the mass of the common people of Madrid. He passes in review street venders, dwellers in back streets, all the com¬ mon and uncommon characters of the Spanish capital with their propensity for talking, their immense fund of good humor and their natural wit ; and he makes his audience laugh with them. Yet he never prostitutes the stage which he left purer and infinitely more human than he found it, and hence galvanized into that life which brought with it the renaissance of the Spanish stage. He naturally has had many imi¬ tators who have helped, consciously or uncon¬ sciously, to change the whole course of Spanish drama, by fixing the attention of the dramatist on every class of society from the highest to the lowest and forcing him to find even^where the real heart of society and to fit it into the frame of human interest. A list of Olmedilla's works would read more like a catalogue than a part of a literary biography; only a few, there¬ fore, of the best-known dramatic productions are given below: Sainetes, (La Petray la Juana ; (La*

moja mojada* ; (Las castaneras picadas* ; (Manolo) ; (E1 casero burlado) ;

OLMEDO

OLMSTED

669

ì °-EE!P' J?se Joaquin, ho-sa' ho-a-ken ot-matho Ecuadorian poet: b. Guayaquil, Eucador, 20 May 1781; d. there, 19 Feb. 1847 tie was educated in Quito and Lima, taught law tor a time in the University of Lima and then practised in his native city. He engaged actively in public affairs, was vice-president of rxuaaor and governor of the department of Guaymas, and in 1845 led a successful revolu¬ tion against General Flores, but though he di¬ rected the provisional government he was de¬ feated for the presidency. But his fame as a poet will outlast his political record, and few poets _ have been more widely read in South America than he. One of his best poems is (La Victoriade Junin,> a song to Bolivar (1826). His (Collected Works* (Valparaiso, 1848* Paris 1853, and Mexico 1862) have been widely circulated. See La Victoria de Junin Con¬ sult Gutierrez, J. M., (America Poetica* (Val¬ paraiso 1846) ; (Poesias ineditas de Olmedo) (1861); Herrera, Pablo, (Apuntes biograficos de D. J. J. Olrnedo* (1887).

r>T ˆ TEA D (om'sted or um'sted)

CLAIM, The, in American history, a celebrated case in admiralty law. Originally it was a case of capture on the high seas, and involved ques¬ tions of prerogative regarding which the de¬ cisions of the Federal commissioners were set at naught by a State Court of Admiralty. One Olmstead and others, of Connecticut, being pressed into British service aboard the sloop Active in 1777, took possession of the sloop, and were in turn captured by Houston, com¬ manding the Pennsylvania armed brig Conven¬ tion. The Pennsylvania State Court of Ad¬ miralty awarded a large share of prize money to the State and to the officers and crew of the Convention and the owners, officers and crew of a privateer which assisted in the capture. Olmstead and others appealed to the Federal commissioners of appeals and received a favor¬ able verdict. This the Pennsylvania State Court set aside and deposited the moneys with David Rittenhouse, State treasurer. His executrixes were sued in 1802 before the newly organized United States Supreme Court and judgment was executed in favor of Olmstead and others, in 1809, against violent opposition from Penn¬ sylvania.

OLMSTED, om'sted or um'sted, Charles Sanford, American Protestant Episcopal bishop: b. Olmstedville, N. Y., 8 Feb. 1853 ; d. Old Say- brook, Conn., 21 Oct. 1918. He was educated at Saint Stephen's College,

Annandale, N. Y., and the General Theological Seminary, New York, and was ordained priest in 1877. He was subsequently rector of Saint Asaph's Church, Bala, Pa., and in May 1902 was consecrated bishop of Colorado. He published (December Musings, verse (1898); (The Discipline of Perfection (1902).*

OLMSTED, Charles Tyler, American Protestant Episcopal bishop: b. Cohoes, N. Y., 28 April 1842. He was graduated from Trinity College, Hartford, Conn., in 1865, and after studying for the ministry at Saint Stephen's College, Annandale, N. Y., took orders; was assistant in Trinitv Parish, New York, 1868-84; rector of Grace Church, Utica, N. Y., 1884-99, and vicar of Saint Agnes Chapel, New York, 1899-1902. In October of the year last named he was consecrated bishop-coadjutor of the

diocese of central New York and in 1904 be¬ came bishop.

OLMSTED, Denison, American physicist and astronomer: b. East Hartford, Conn., 18 June 1791 ; d. New Haven, Conn., 13 May 1869. He was graduated at Yale in 1813 and later began the study of theology there, but in 1817 became professor of chemistry, mineralogy and geology at the University of North Carolina. He made a geological survey of North Caro¬ lina, the first State survey in the United States, publishing reports of the work in 1824-25. He was appointed professor of mathematics and natural philosophy at Yale in 1825, but from 1836, at his request, occupied only the chair of natural philosophy, which he held until his death. He, and his associate, Elias Loomis, were the first Americans to observe Halley's comet in 1835. He was notable for his theory of hailstones and his observations of the aurora borealis. He was a contributor to scien¬ tific reviews and author of textbooks, of which more than 200,000 copies were sold. Among them are Untroduction to Natural Philosophy (2 vols., 1831) ; Compendium of Astronomy* (1841) ; (Rudiments of Natural Philosophy and Astronomy* (1844), etc.*

OLMSTED, Frederick Law, American landscape architect : b. Hartford, Conn., 26 April 1822 ; d. Waverly, Mass., 28 Aug. 1903. He had some early instruction (1837-40) in civil engineering, went to sea, after a year be¬ fore the mast studied agricultural science and engineering at Yale, and later was for seven years a farmer and horticulturist upon his own land. In 1850 he made a tour, largely on foot, of Great Britain and parts of the Continent, for the study of methods of agriculture and land¬ scape gardening. In 1852-53, 1853-54 and 1856 he traveled in the South and Southwest, investi¬ gating the effects of slavery upon the economic and social condition of slave States. The re¬ sults of his observations appeared in three suc¬ cessive volumes, (A Journey in the Seaboard Slave States (1856); (A Journey in Texas) (1857) ; and (A Journey in the Back*

Country> (1861). In 1861 a compiled work, based upon the three preceding, appeared in London as

lation, visited the field and prepared reports. I K aided in the formation of the Union League (hih and was prominent in the organization of io/i ,ollˆefn Famine Relief Association. In nod he resigned from the commission and be¬ came first commissioner of the Yosemite Na¬ tional Park and the Mariposa Grove. He was in partnership with Vaux and Withers at New York in the practice of landscape architecture m 1865-72, was for a time president and treas¬ urer of the New. York Park Commission, and later for about six years was landscape archi¬ tect to the commission. In 1878 he removed to Boston and there continued his professional practice. This was very large, and in the pur¬ suit of it he visited every State in the Union and eight times crossed the Continent. In 1895 he retired. A list of the public and semi-public grounds formed wholly or largely after his plans would be very extensive. It has been es¬ timated that among the expressions of his art are more than 80 public parks, including promi¬ nently, besides Central Park, the Mount Morris, Riverside and Morningside parks of New York; the Prospect and Washington parks of Brook¬ lyn ; the Washington and Jackson parks of Chi¬ cago; the Back Bay Fens of Boston, one of the most interesting domains of the kind in Amer¬ ica ; also in Boston, Leverett, Jamaica, Frank¬ lin and Marine parks; Belle Isle Park of De¬ troit; the Cherokee, Shawnee and Iroquois parks of Louisville; Delaware, South and Cazenovia parks of Buffalo; Lake, West Side and River parks of Milwaukee; and Washing¬ ton Square in Baltimore. He laid out the grounds for the Worlds Columbian Exposition at Chicago in 1893, whose landscape features were so remarkable a success. He designed the general scheme for the preservation of the nat- tural scenery at Niagara Falls. He planned the grounds of the capitol at Washington, besides the marble terrace and the grand staircase and other structures exterior to the building. Among his further works are designs for the grounds of numerous suburban land divisions, railway stations, schools, colleges and private estates.

It is somewhat difficult to express in concise form Olmsted's distinctive service to the land¬ scape gardening of America. But it may per¬ haps be defined as having been the originating of the use of natural landscape resources, exist¬ ing under urban or partially urban conditions toward the making of pleasure-grounds. He studied the genius of American scenery, and in the adaptation of his methods thereto made a real if unconspicuous contribution to the art of the . United States. In his public parks he avoided

the formal and the monumental as he had seen it in Italy and France and combined s\stem with wild nature in an unconventional i esult which is distinctive. It has been said that one of the secrets of his success was that he never endeavored to make unsuitable condi¬ tions conform to preconceived ideas, but made logical use of such conditions as they were. At the time of his death it was asserted with par¬ donable exaggeration, if exaggeration it were, that he had done more than any other of his generation to develop the aesthetic possibilities of the country. He was a founder of the Metro¬ politan Ahiseum of Art, of the American Mu¬ seum of Natural History and of the New York Mate Chanties Aid Association, of which for many years he was vice-president. In addition

to the books above cited he wrote (Walks and Talks of an American Farmer in England) (1852), frequently reprinted, and papers and re¬ ports on special problems of his profession. For an account of Olmsted's work on the sanitary commission, consult Stille's (1866), also Century Magazine, October 1893.

*OLMSTED, Frederick Law, landscape architect: b. Staten Island, N. Y., 24 July 1870 * he was graduated at Harvard 1894. He studied landscape architecture under his father and be¬ gan practice as landscape architect in 1895. Landscape architect for Metropolitan Park Commission of Boston since 1898; Baltimore Park Commission since 1902; Roland Park Company, Baltimore, since 1898; Sage Founda- tion Homes Company, Forest Hills, Long Island, N. Y., since 1908; and for various other land companies and for many private proper- ˆrS'uˆe?1ˆer Commission on Improvement of Washington, 1902; instructor in landscape architecture, 1901-03; professor, 1903-15; lec¬ turer, 1915—-, Harvard University. Member of National Commission of Fine Arts since 1910 * member of the Board of Supervising Archi¬ ll mo* Croup Plan, Cleveland, Ohio, since*

1912; chairman Planning Board of Town of Brookline since 1914; chairman of the execu¬ tive committee, National Conference on City Planning, since 1910. He has acted in a consult¬ ing capacity for and designed portions of the parks or other public improvements of many towns and cities and numerous institutions, land subdivisions and private properties. He is au¬ thor of numerous reports and articles on parks municipal improvements, city planning and landscape architecture, and of the following

?laVe?orts: Mulder, Colo.; Baltimore, Md. (both alone and jointly with A. W. Brun- ner and 1 J. M Carrere) ; Detroit, Mich.; Hol¬ yoke, Mass. ; New Haven, Conn, (jointly with Cass Gilbert) ; Pawtucket., R. I. ; Pittsburgh, Pa.; Rochester, N. Y. (jointly with A. W. Brunner) ; Utica, N. Y. ; Woonsocket, R I • York, Pa.

OLMSTED, John Charles, landscape archi- fT mT Switzerland, 14 Sept. 1852; d. 2t7-cb' !92 ' ,.H? ,waj graduated Ph.B. at Yale 1875 and studied landscape architecture under Frederick Law Olmsted. With partners designed parks in Essex County, N. J., Cambridge, Mass New Orleans La., Fall River Mass. Bart.ford: £0ns?" Cb'rago (South parks)

B.XiUr \ T NtrP°^t' ?• l- Watertown Buffalo, Rochester, N. Y„ Seattle, Spokane,

Wash, and other cities; formed partnership

ISOS- Tede?CH Law Olmsted, Jr. (q.v.) in 1898, also designed many private places and grounds of Chicago Exposition, 1893, etc.

PBMUTZ, 61 rniits, Czecho-Slovakia, the sec¬ ond city of Moravia, 38 miles northeast of

MWnissS ¥?rch: which almost encircles it. Since 1886 the defensive works have given place to promenades and pleasure-grounds. It has a fine Gothic cathedral erected in 1306; one or two other nteresting churches; a remarkably fine townhouse the ancient residence of the archbishops and several good modern educa¬ tional buildings Its industries and trade are unimportant Olmutz is the see of an arch- nshop, and the seat of several courts and pub-

bnt°tMce?' Tt f°[mrliy P°ssessed a university, but this is now abolished except the theological

FREDERICK LAW OLMSTED

I

671

OLNEY — OLUSTEE, BATTLE OF

faculty, connected with which is an extensive ,)raIs' ^ hnutz was taken by (he Swedes, un- der Torstensen m 1642, in the Thirty Years' War. Frederick the Great besieged it for seven weeks in 1758 without success. The Con¬ ference of Olmiitz was here February 1850 between Russia and Austria respecting the atlairs of Germany and especially in reference to the revolts in Hesse and Schleswig-Holstein against their rulers, the Elector of Hesse and the king of Denmark. By the mediation of Kussia, Schleswig-Holstein was given to Den¬ mark, and the Elector of Hesse was reinstated J he city possesses excellent schools, including two higher gymnasia, a realschule, a govern¬ ment commercial school and three training schools

for teachers. It has several breweries and among, its industries are the manufacture of tin, wire, hardware, chemicals, leather chocolate, sugar and flour. It also has a con¬ siderable commerce in agricultural products and machinery.

OLNEY, ol'ni, Jesse, American geographer and educator: b. Union, Conn., 12 Oct. 1798; d Stratford, Conn., 31 July 1872. In 1828 he pub¬ lished which was a standard work for 30 years, and effected a revo¬ lution in the methods of teaching geography. He taught school in New York State and Hart¬ ford, Conn., sat in the Connecticut legislature for 10 terms and in 1867 became State comp¬ troller. He published (The National Preceptor (1831); a series of textbooks (1831-52), in¬ cluding a series of (Readers, > a (Common School Arithmetic, > a (History of the United States,) and a volume of poems, (Psalms of Life.**

OLNEY, Richard, American lawyer and statesman; bˆ Oxford, Mass., 15 Sept. 1835; d. 9 April 1917. He was graduated from Brown University in 1856 and from the Harvard Law School in 1858. In 1859 he was admitted to the bar and practised law in Boston, being par¬ ticularly successful as the chief counsel for the Boston and Maine and other railroads. In 1874 he was elected on the Democratic ticket to the Massachusetts legislature, but was not especially active in politics. In 1893 he was appointed Attorney-General by President Cleveland, and was instrumental in breaking the railroad strike of 1894, by obtaining an injunction against the strikers from the United States Circuit Court of Illinois, enjoining them from interfering with interstate commerce and the United States mails. This injunction was enforced by the use of national troops, and was sustained by a de¬ cision of the Supreme Court, it being the first case of <(government by injunction® (q.v.) in case of a strike. In 1895 he became Secretary of State, in which position he had charge of negotiations with England in regard to the boundary dispute with Venezuela; and wrote a remarkable official note, sustaining the right of the United States to interfere and giving a wide inteipretation to 'the Monroe Doctrine (q.v.). In 1896 he withdrew from the Demo¬ cratic party on account of the free silver plank in the platform, but in 1900 he supported Mr. Bryan, publicly declaring his reason for so doing to be because he could not support the Republican policy in regard to the tariff, trusts and imperialism. In 1903 he was prominently

mentioned as Democratic Presidential candidate m 1904. In 1906 he was leader of the policy¬ holders' fight against the New York and Mutual life insurance companies. In 1913 he declined appointment by President Wilson as Ambas¬ sador to Great Britain.

OLNEY, III, city, county-seat of Rich¬ mond County, on the Illinois

Central, the Balti¬ more, Ohio and Southwestern and the Cinci- natti, Hamilton and Dayton railroads, about ll.~» miles east of Saint Louis. It was settled >n 1843. It is an agricultural region and the chief manufactures are flour, brick, tile and dairy products. It has a large trade in its manufactures, and in hay, seeds and fruits. It "as a sanatorium and a free public library. The government is vested in a mayor, who holds office two years, and a council Pon

(1920) 4,491. '

OLONETZ, d-lo-nets, Russia, a northern government bounded north and east by Arch- an.gel, southeast by Vologda, south by Novgo¬ rod, southwest by Saint Petersburg and Lake Ladoga, and west by Finland; area, about 50,000 square miles. The administrative head¬ quarters is Petrozavodsk. The surface of this government is generally flat; although in the northwest some hills occur, while part of the south is traversed by the ridge which forms the water-shed between the basins of the Baltic and the Volga. The most marked natural feature is the large number of lakes, streams and morasses. The number of lakes — one of them, Onega, nearly 5,000 square miles in super¬ ficial extent — has been calculated at 1,500. The climate is rigorous. The winter is long, the summer heat, though of short duration, great. Timber constitutes an important part of the wealth of the government ; porphyry and marble are extensively quarried between lakes Ladoga and Onega; iron-ores and copper are worked; and hemp and flax thrive in many of the swampy districts. Th° chief means of support of the inhabitants art forestry, hunting and fishing. The principal manufacture is that of leather. Pop. about 460,000.

OLUSTEE, o-lus'te, or OCEAN POND, Battle of, the most sanguinary battle of the Civil War in point of numbers. On 5 Feb. 1864 General Gillmore, commanding Department of the South, ordered General Seymour to embark about 6,000 men in transports at Hilton Head and sail for Jacksonville, Fla. The transports were accompanied by five gunboats under com¬ mand of Admiral Dahlgren. The objects of the expedition were to procure an outlet for cotton, and lumber; to cut off one of the enemy's sources of commissary supplies, beef cattle; to obtain recruits for colored regiments; and to inaugurate measures for the speedy restoration of Florida to her allegiance to the Union. To assist in the latter John Hay, Presi¬ dent Lincoln's private secretary, was given a military commission and accompanied the expe¬ dition. Seymour arrived at Jacksonville on the 7th, dispersed a small guard and occupied the place. On the afternoon of the 8th Col. Guy V. Henry, with cavalry and mounted infantry, moved out some eight miles, and late in the evening surprised about 350 cavalry, under Lieutenant-Colonel McCormick, at Camp Fine- gan. Henry charged them, capturing four guns,

with caissons. He reached Baldwin, 20 miles from Jacksonville, on the 9th, where he cap¬ tured another gun and a considerable quantity of cotton. Baldwin was at the junction of two railroads from Jacksonville and Fernandina. On the 10th Henry advanced to Little Saint Mary's and encountered Major Harrison, with two companies of cavalry, and drove him with slight loss on either side, and then marched to within three miles of Lake City, where on the 11th he had a skirmish with the Confederates, and under Seymour's order fell back to Barber's at the South Fork of the Saint Mary's where Seymour concentrated his entire command, and where he had received orders from Gillmore not to risk a repulse in advancing on Lake City, but to hold Sanderson's, unless there were reasons for falling back. Seymour was de¬ layed for want of transportation, but on the morning of 20 February left his camp at Bar¬ ber's with the intention of advancing on Lake City and, if successful, of destroying the railroad communication between east and west Florida at the Suwanee River. He had the mounted brigade of Colonel Henry, the three infan¬ try brigades of Cols. J. R. Hawley, W. B. Bar¬ ton and James Montgomery, and three batteries of artillery, in all about 5,500 men and 16 guns. When Seymour landed at Jacksonville, Gen. Joseph Finegan, the Confederate commander in east Florida, had an insignificant force to oppose him, but by the 13th had collected, at Lake City, about 4,600 infantry, 600 cavalry and three batteries of 12 guns. Col. C. Smith commanded the cavalry, and Gen. A. H. Colquitt and Col. G. P. Harrison the two infantry brigades. Thirteen miles east of Lake City Finegan threw up defensive works, a short distance east of Olustee station, crossing the railroad, the left near Ocean Pond, the right near a bay or jungle. Smith's cavalry, supported by two regi¬ ments of infantry, was sent to the front to skirmish with Seymour's advance and draw it on to the entrenched line. Colonel Henry, with his mounted force, the 7th Connecticut Infantry and Elder's battery, led Seymour's advance, and after a march of 15 miles, about 3 p.m. came upon Smith's pickets. Two companies of the 7th Connecticut, of Hawley's brigade, were de¬ ployed as skirmishers, and drove them back upon their supports, which opened fire, Elder's battery was pushed forward and opened fire, the rest of the 7th Connecticut was deployed and developed the Confederate position, and Henry's cavalry was disposed on the flanks. The ground was favorable for the movement of troops. It was level and, although covered with pine timber, was free . from underbrush. Colquitt, with three regiments of his brigade, had been sent forward to support Smith and take command at the front, and had quickly formed line with his infantry, sending the cavalry to the left. This was the line that the 7th Connecticut developed, upon which Seymour massed his artillery in the centre, and sent the 7th New

Hampshire to turn the Confederate left, but the regiment got confused in its move¬ ment and, coming under a heavy and deadly fire, broke in disorder and was with difficulty rallied to take part in the action at a later hour. The 8th United States Colored Infantry became hotly engaged on the left, its commanding officer was mortally wounded, and more than half its men had fallen, when the remainder

retreated in disorder. Colquitt's men advanced and delivered a very close and telling fire upon the artillery, shooting down men and horses, but were checked by the unremitting fire of the guns and by Barton's and Montgomery's bri¬ gades, now brought up, and under whose fire the left of the Confederate line began to fall back. Meanwhile Finegan had sent everything to reinforce Colquitt, and on both sides the entire forces, except the cavalry, were des¬ perately engaged, the struggle continuing until dusk, when Seymour withdrew, abandoning his dead and many wounded, and five guns, whose horses had been shot. He was pursued about two miles that day, and withdrew in good or¬ der to Sanderson's and thence to the Saint Mary's and Jacksonville. The Union loss was 203 killed, 1,152 wounded and 506 missing. The Confederate loss was 93 killed, 847 wounded and 6 missing. Consult (Official Records > (Vol. XXXV) ; The Century Com¬ pany's (Battles and Leaders of the Civil War (Vol. IV).*

E. A. Carman.

OLYMPIA, o-lim'pi-a, a sanctuary of the Greek gods and a valley or plain lying in the middle of ancient Elis, in the western part of the Peloponnesus (Morea). It was also the scene of the Olympic games. Here were col¬ lected thousands of statues of the gods and of victors in the games, treasure-houses full of votive offerings, temples, altars, tombs and in a word the most precious treasures of Grecian art. The elder Pliny states that in his time the statues were as many as 3,000 in number. Here also were preserved important public and pri¬ vate documents, treatises and inscriptions of all kinds. The Altis (an old Elean form of alsos, *a grove), in which were situated the Olympieum or great temple of Zeus, containing the colossal statue of the god by Phidias ; the Herseum or temple of Hera, the Metroon or temple of the mother of the gods, the treasuries of the different states which had sent votive offerings to the Olympian Zeus, the Prytaneum, in which the Olympic victors dined after the contests were finished, the Bouleuterion, in which all the regulations regarding the games were made, and other buildings and sacred ob¬ jects, formed a quadrangle surrounded with walls, and having a length of about 1,800 feet and a breadth of 1,500. There also was the Exedra, a splendid building containing the reser¬ voir of an aqueduct, erected by the Athenian orator and statesman, Herodes Atticus, and fur¬ nished by him with statues of the families of the emperors Antoninus Pius and Marcus Aurelius, and by the*

Eleans, out of gratitude to the builder, with statues of the family of Atticus himself. On the north it was bordered by rocky but gently swelling hills, the most southern of which was called Mount Cronius, or the Hill of Kronos. On the south it ex¬ tended almost to the river Alphieus, and on the west it stretched to the Cladeus', a tributary of the former.' Outside the walls, but in the im¬ mediate neighborhood of the Altis, were the hippodrome, or race-course for chariots and for single horses; the stadium or foot-race course; a theatre and a gymnasium. After being buried for ages under the soil washed down from the higher grounds, and conveyed by the inunda¬ tions of the two streams between which it lies,

the plain of Olympia was again brought to view by a series of excavations begun in 1875 by the German government at the instigation °| Curtius, and continued till the spring

oi 1881. Nearly all the buildings above men¬ tioned were rediscovered, but unfortunately all in a much injured condition. Thousands of fragments of sculpture, bronzes, coins, terra¬ cottas, as well as numerous coins and inscrip¬ tions, were also among the discoveries. The originals all remained in the possession of Greece, but Germany bargained for the right to take the first casts from them, and a museum of Olympian casts and duplicates was formed at Berlin.

The excavations of Curtius cover practically all of Olympia, which was in no sense a town or even a village. It was simply one vast shrine covered with sacred edifices and buildings con¬ nected with them and the Olympic games. They show that the central part of the great en¬ closure was occupied by the great altar of Zeus, upon which were offered up the burnt sacrifices. This is a great block of undressed, unmounted stone, which stood in the open with¬ out covering or protection of any kind. When it was unearthed several layers of ashes of its victims were still lying upon it. It stood to the northeast of the great temple of Zeus, the ground plan of which was still complete when excavated, and around it were lying most of the columns just as they had lain when they were first overthrown by an earthquake before they were finally buried by debris carried into the valley by floods years after the erection of the building was begun by its architect, Libon of Elis, in the 6th century b.c. The excavations show that the description of it left by Pausanias is correct. It has a single row of 13 Doric columns at each side and six at each end. Many interesting and historically valuable remains of this temple have been recovered, some of them practically unimpaired ; and this wealth of material from Greece's greatest

temple shows why it was that it took until the middle of the 5th century b.c. to complete its construction. Among the material recovered from the ruins of the temple are statues that have become a part of the history of Greece and many in¬ scriptions of great historic interest. Among the excavations is also the temple of Hera, about 100 metres north of that of Zeus, which it resembled in form, though it was only about two-thirds as large. It had 16 columns at each side, which were partly of wood and partly of stone, showing that they had all been originally of wood and that some of them had been re¬ placed from time to time by stone columns. This is interesting as showing the history of the Doric columns, which were originally imita¬ tions of the forest trees under which the Greek altars were placed in primitive t:mes. The temple of Hera was, therefore, evidently older than that of Zeus. In the ruins of the temple of Hera the famous statue of Hermes by Praxiteles was found and placed in the Museum of Olymp'a. One of the interesting parts of the excavations is the long line of 12 treasury buildings, which stretched eastward from close to the temple of Hera, and were erected, each b> one of the Greek states in the form of small temples. In them were stored the equipment for the games and the offerings.. of the states. The ground plans and some remains pf practi-

cally all the historical buildings of Olympia have been unearthed. Among these are two gymnasiums, the Metroon, or temple of the Mother of the Gods, and the Bouleuterion, or senate-house, an oblong hall of the 6th century, paralleled by a similar hall built at a later date, both of which are connected by a square build¬ ing. To these must be added the Stadium, the Hippodrome and the Leonidseum.

OLYMPIA, Wash., city, capital of the State of Washington, county-seat of Thurston County, on Budds Inlet at the mouth of Des¬ chutes River and on the Northeastern Pacific and Union Pacific systems. The inlet is at the head of Puget's Sound and the city has steamer communication with Tacoma, Seattle, Victoria and other places on the Sound and on the Paci¬ fic Coast. It was settled in 1846 and chartered as a city in 1859, the year Washington was ad¬ mitted as a State. It is the commercial centre of a region in which there are extensive lumber and agricultural interests, also fishing and to some extent mining. Large quantities of oys¬ ters are shipped from Olympia. Deschutes River has here several falls, three quite large, which in all have a descent of about 85 feet. The water power contributes toward making Olympia a manufacturing city. The chief man¬ ufacturing establishments are lumber mills, sal¬ mon canneries, fruit and vegetable canneries, a brewery, iron works, machine shops, cooperages and cold storage plants. It has an extensive trade in lumber and lumber products and in farm products, fruits, its own manufactures and oysters. The principal

buildings are the State Capitol, built at a cost of $400,000, the county courthouse, some of the bank buildings, public library, Federal building and business blocks. It has Saint Peter's Hospital (Roman Catholic), Saint Amable Academy, public and parish schools and the State Library, which contains nearly 30,000 volumes. Pop. (1920)

8,537.

OLYMPIAD, in ancient Greece, the com¬ putation of time based on the period of four years between each celebration of the Olympic games (q.v.). The historian Timgeus is said to have been the first to adopt this mode of reckoning time, and later Greek historians al¬ most all followed his example. In reckoning by this era the year in which Coroebus gained the victory in the foot-race, corresponding to 776 b.c. of the Christian era, was taken as the first year of the first Olympiad. This mode of reckoning ceased when the games were abol¬ ished in 394 a.d., the second year of the 293d Olympiad. The interval between two Olym¬ piads was four of our years, or a Greek pentae- teris of 48 moons and two intercalary months. To reduce from the Olympic to the Christian era, multiply the next number below the given Olympiad by four and add the number of the year in the given Olympiad, if the sum is 776 or less, subtract it from 777, and the remainder is the year b.c. ; if it is greater than 776. sub¬ tract' that number from it and the remainder is the year a.d.

OLYMPIAS, first wife of Philip II of Macedon and mother of Alexander the Great : d. 316 b.c. She was married to Philip in 359 but was put away by him so that he might marry Cleopatra, a niece of King Attains, in 337. Olympias may have been cognizant of the

plot against Philip's life which resulted in his death in 336. She played a considerable part in politics during Alexander's rule. About 319 she regained a part in the government and was largely instrumental in the death of Cleo¬ patra and her infant son in 323. In 317 she joined forces with the new regent, Polysper- chon. They together invaded Macedonia and defeated Arrhidaeus, the successor of Alexan¬ der and put him and his wife Eurydice to death. Established in power, she continued to wreak her vengeance on all those who had been op¬ posed to her, and ordered the execution of sev¬ eral Macedonian nobles including Nicanor the brother of Cassander (q.v.). Cassander there¬ upon at the head of an expedition from the Peloponnesus compelled her to seek refuge in Pydna during the winter. The siege ended with her surrender of the city and her immediate execution

in the spring of 316 b.c.

OLYMPIC GAMES, in ancient Greece, a general name given one of the four great na¬ tional festivals. The games were usually cele¬ brated on the plain of Olympia and were sacred to the Olympian Zeus, who had a temple and statue there. The festival was a quadrennial one; the period elapsing between two celebra¬ tions was called an Olympiad. Their origin reaches back into a remote antiquity, prior to the commencement of the historical era in Greece and by the Greeks themselves was at¬ tributed in various traditions to a divine source. The season of the year at which the games ■were held was about midsummer. In later times, when the contests were numerous, they lasted five days and the fourth day of the festival was the day on which the first full moon after mid¬ summer fell and, therefore, according to the Greek mode of dividing the year, the 14th day of the month. The games thus lasted from the 11th to the 15th, inclusive. The number of the judges varied at different times, but ultimately was fixed at eight. Their decision was not final, but might be revised by the senate. Under the judges was a set of police called Alytse, who kept order during the celebration of the games. None but Greeks of pure descent were allowed at any time to take part in the games, until the conquest of Greece by the Romans, when they also were admitted to the contests. If, however, a man could boast of pure Hellenic blood, it did not matter to what city he belonged or whether he was rich or poor, he had in any case an equal right to be recognized as a competitor, provided he complied with the regulations of the judges. Barbarians were permitted to be spectators of the games. Women were en¬ tirely excluded and were not even allowed to cross the Alpheus while the games were going on. For the first 13 Olympiads there was only one contest, a foot-race. In course of time the number of conicsts increased to 24, including shorter and longer foot-races, wrestling, boxing, chariot- racing, horse-racing, foot-racing in heavy armor, chariot- racing with mules and games for boys corresponding to most of those in which men engaged. The prize awarded to the victor was merely a garland of wild olive, but the honor of gaining such a prize was so highly esteemed that a victor in the Olympic games was regarded as bringing glory not only to him- °eif but to his family and even the city or state

to which he belonged. The victor received his crown standing on a table made of ivory and gold. His own name and that of his father and his native state were proclaimed by a herald to the assembled multitudes. The cele¬ bration was concluded by religious ceremonies and processions and by banquets in honor of the victors. On returning to his native city the V1Cj °l was honored with a triumphal procession and heard his praises celebrated in lyric verse, which was sometimes the production of the greatest poets of the time. In addition to this, special privileges were usually conferred on them for life. A place of honor tvas aliowed them in all public

assemblies, statues were erected to them and so forth. At Athens they were maintained for the rest of their life at the public cost.

The ancient Olympic games died out during the 4th century a.d. and were not revived until 1896, when the first of a new series, the < (Mod- efn Olympic Games, » were played in Athens m a stadium especially built for the purpose. Great interest has been manifested in this re¬ vival and contestants from all the principal countries enter the lists at each Olympiad or four-year period. Many features of the ancient procedure are kept intact, as far as possible, but with modern modifications and additions.

The best records in the principal events previous to 1911, were as follows:

-'.UVliCl XV Ull

_ Walker (So. Africa), 10 4-Ss., London, '1908.

200 toerMrˆRu?THaˆ (America), 21 3-5s., Saint Louis, 19C4; iewksbury (America), 22 l-5s., Paris, 1900: Kerr (Canada), 22 2-5s., London, 1908.

400-Mcter Run — Hillman (America), 49 1-Ss., Saint Louis, onn n1?04: Long (America), 49 2-5s., Paris, 1900.

800-Meter Run— Lightbody (America), lm. 56s., Saint 1908S' 904' Sheppard (America), lm 52 l-5s., London.

1500-Meter Pun — Sheppard (America), 4m. 3 2-5s., Lon- t ■ lˆhtbnriy„ (America), 4m. 5 2-5s., Saint

no 1T?04: Bennett (England), 4m. 6s., Paris, 1900.

11 1908r Hurdles — Smithson (America), 15s., London,

200- Meter Hurdles — Hillman (America), 25 3-5s., Saint -L/Ouis, 1904.

400'ˆontfrnHurdle/SA~ˆil,ˆan (America), 53s., Saint Louis, 1904; Bacon (America), 55s., London, 1908.

Running High Jump — Porter (America), 6 ft. 3 in 1900 °n' 19081 Baxter (America), 6 ft. 2 4-5 in., Paris!

Running Long Jump — Irons (America), 24 ft. 6 1-2 in London, 1908.

Running Triple Jump — Aheame (England), 48 ft. 11 1-4 in London, 1908.

Standing Broad Jump — Ewry (America), 11 ft. 4 7-8 in

S?mtJ-°u1Sf 1904> a”d 10 ft’ 11 U4 in- London, 1906. ’ Standing High Jump — Ewry (America), 5 ft. 5 in., Paris,

P°le London~19()18bert ˆ C°°k (America)l 12 ft. 2 in.,

Sh0toˆtATf?°f , (America), 48 ft. 7 in., Saint Louis, 1904,

A46Jh7-U2ˆ’. London- 1908; Sheldon (America) 46 ft. 3 1-8 in., Paris, 1900. ‘

Discus -— Sheridan (America), 136 ft. 1-3 in., Athens, 1906, and ˆ4 2 in., London, 1908.

Throwing 16-lb. Hammer — Flanagan (America), 170 ft.

4 1-4 in., London, 1908.

Marathon Race — Sherring (Canada), 2h. 51m. 23 3-5s.f

l: ˆnyeS (A™nca) 2h. 55m. 18s.. London. S‘ (C7ee“). 2h. 55m. 20s., Paris, 1896.

Pentathlon — Mellander (Sweden). 24 points. Athens. 1906.

The 1911 meet was held in July 1912, at Stockholm, Sweden, and was most successful. Ihe scores of the American athletes (85 points) were far in the lead and nearly as great as those of all other nations combined.

The European War, 1914—18, interfered with the arrangements for the 1916 meet which was to have been held in Berlin. The 1920 meet was held in Belgium. The tables give the results

Results of Olympic Track and Field Contest, 1912

TRACK EVENTS

EVENT

First

Second

Time

100 metres ….

200 metres .

400 metres .

800 metres .

Paddock, United States .

Woodring, United States .

Rudd, South Africa . . .

Hill, England

Kirksey, United States.

Paddock, United States. .

Butler, England .

0:10 4-5 0:22

0:49 3-5 1:53 2-5 4:01 4-5 14:55

31:45 2-5 2.32:35 4-5 0:14 4-5 0:54 **

10:02 2-5 13:14 1-5 48:06 1-5 0:42 1-5 3:22 1-5 8:51 1-5*

1,500 metres .

5,000 metres .

Hill, England .

Guillemot, France .

liYi United otcttes. . ,

Baker, England ….

Mirmi, Finland .

lllc LicS . . .

Mirmi, Finland .

Guillemot, France . .

110-metre hurdles. . . 400-metre hurdles . .

3,000 metre steeplechase . 3,000-metre walk. . 10,000-metre walk. 400-metre relay . .

ivolhemamen, Finland .

Thomson, Canada. . . .

F. Loomis, United States.

Hodge, England . . .

Frigerio, Italy .

Lossman, Esthonia. .

Barron, United States. . . .

Norton, United States.

Flynn, United States .

Parker, Australia

Frigerio, Italy .

United States. . . .

Pearman, United States.

France

1, 600-metre relay.

England .

3,000-metre team race. . . .

Cross-country, team .

Cross-country, individual.

United States. . . .

England ….

Finland .

England ….

Mirmi, Finland .

Bockman, Sweden .

Decathlon . .

Lethonen, Finland, 14 points. .

Loveland, Norway, 6,804.35 . .

Bradley, United States, 25 points _

Hamilton, United States, 6,770.86.

FIELD EVENTS

Event

First

Second

Running high jump .

Running broad jump .

Hop, skip and jump. . . . Pole vault ….

Javelin throw .

Discus throw . .

Hammer throw .

Shotput. . . .

56-lb. weight .

Tug-of-war .

Landon, United States, 6 ft. 4 1-5 in.

Peterson, Sweden, 23 ft. 6 in.

Timlos, Finland, 47 ft. 7 in

Foss, United States, 13 ft. 5 3-16 in. .*

*Myrra, Finland, 215 ft. 9\ in.**

Niklander, Finland, 146 ft. 7 7-16 in

Ryan, United States, 173 ft. 5 11-16 in

Porolla, Finland, 48 ft. 9 in .

McDonald, United States, 36 ft. 11 in .*

England ….

Muller, United States.

Johnson, United States.

Jansson, Sweden.

Peterson, Denmark.

Peltonen, Finland.

Taipale, Finland.

Lind, Sweden.

Niklander, Finland.

Ryan, United States.

Holland.

- *World Record.*

OLYMPUS, a mountain situated in Thes¬ saly, at the eastern extremity of the range called the Cambunian Mountains. It is now generally called by the Greeks Elymbos or Olymbos. The Turks call it Semavat-Evi, the abode of the celestials. It rises to the height of 9,794 feet, being the highest mountain in Greece. The earliest Greeks looked upon it as the highest of all mountains and as the central point of the earth's surface. The gods of Homer dwelt on its summit. In after times the gods were said to reside in the exterior sphere of the heavens, above the firmament and this seat of the blessed received the name of Olympus. Hence the gods themselves were

called Olympian gods and, as such, formed a body of which Zeus was the head. The 12 great gods composed the council in Olympus and the others the general assem¬ bly. They did not dwell together, but separate in several mansions built upon the different heights of the many-peaked Olympus. At the highest summit stood the palace of Zeus, where all assemblies and feasts were held. From thence he could look down upon the earth, fill the heavens with clouds and hurl his thunder¬ bolts. The name Olympus was give to several mountains or chains of mountains, one in northern Mysia, two in the Island of Cyprus and others in Lycia, Lydia, Cilicia, Lesbos, Elis and Laconia.

OLYNTHUS, o-lin'thus, now AIS MA¬ MAS, Saloniki, an ancient town of Chalcidice,

Macedonia, at the head of the Toronaic Gulf, the modern Gulf of Cassandra. It was early inhabited by Greeks, was taken by the Persias under Artabazus, one of the gen¬ erals of Xerxes, was subject to Athens and re¬ gained its independence when the Spartan gen¬ eral Brasidas extinguished the Athenian power in Chalcidice. From its excellent maritime po¬ sition, it grew in wealth and importance, until, becoming too powerful, the Spartans captured it in 379 b.c. In 352 the Olynthians formed an alliance with the Athenians, which provoked the hostility of Philip of Macedon and in 347 the city was betrayed to him, the citizens were enslaved and every building was demolished.

OLYPHANT, ol'i-fant, Robert Morrison, merchant and railroad president: b. New York, 9 Sept. 1824; d. 3 May 1918. He was the young¬ est son of a prominent New York merchant engaged in the trade with China and interested in Presbyterian mission effort there. He was educated at Troy, N. Y., Middletown, Conn., and in New York City. At 15 he entered Columbia University and graduating in 1842, from 1900 was the oldest living alumnus. After graduation he entered the employment of Tal¬ bot, Olyphant and Company, his father's firm, and visited China in 1844, returning a year later. In 1858 Mr. Olyphant reorganized the old firm of Olyphant and Company of China and again visited the Orient, where he re¬ mained for four years. He was the active

head of the firm until his retirement from mer¬ cantile business in 1873. In May of that year he was elected a member of the board of man¬ agers of the Delaware and Hudson Company and its allied interests: the Cooperstown and Charlotte Valley Railroad, the Champlain 1

ransportation Company, the Chateauguay and Lake Placid Railway Company, the Chateauguay Iron and Ore Company and the Lake George Steamboat Company. He afterward served as assistant president, vice-president, and for 20 years as president. In his advanced years he held the position of honorary chairman of the executive committee. Besides the numerous philanthropies of city, State and his church, missionary endeavor in China, notably the Canton Christian College as a Fellow of the National Academy of De¬ sign, he was also actively interested in art.

OLYPHANT, ol'i-fant, Pa., borough in Lackawanna County, on the Lackawanna River and on the New York, Ontario and Western and the Delaware and Hudson and the Wilkes- Barre and Eastern railways, about six miles above Scranton. Tt was settled in 1857 and incorporated in 1877. It is in the anthracite legion and its chief industries are connected with mining and shipping coal. It manufactures blasting powder and has machine-shops and iron w˚rks; It chief trade is in coal. The govern¬ ment is vested in a burgess, who holds office three years, and a council. The borough owns and operates the electric-light plant. Pop.

10,236.

OM, orn, a Sanskrit word, to which the Hindu religion attaches peculiar sanctity and mystic, significance. It is pronounced at the beginning and end of every lesson in the Veda and is also the introductory word of the Puranas. In the Vedas it is said to compre¬ hend all the gods. According to the (Upanis- hadsP the word ((omft sums up in itself all truth and much of the latter work is taken up with explaining its mystical meaning. If ((om® is not repeated at the beginning and end of every Vedic recitation they will prove of no avail or at any rate lose much of their virtue. <(Om» symbolizes the union of the three great Hindu divinities, Vishnu, Siva and Brahma. See Om Mani Padme Hum.

OM MANI PADME HUM, om ma'ne pad'me hoom, a sacred formula in the Buddhist religion, known as the ((formula of six sylla¬ bles,® used especially in Lamaism. Among the Tibetans and the Mongols it is repeated on all occasions, important and unimportant, and is found written on all sorts of objects on which inscriptions can be made. It is the first thing which a child learns to repeat. When written in the form of a monogram its sacred char¬ acter is exalted. The formula is explained to mean either, «Oh, the jewel in the lotus: Amen®; or "Salvation in the jewel-lotus: Amen.® A Western definition makes it signify: <(Oh, the jewel in the lily of purity: Amen.® Avalokites vara or Padmapani, the lotus¬ handed, the Buddha of eternal light and heav¬ enly ruler of the Western Paradise; the re¬ puted author of the formula is said to have been born from a lotus or water-lily (q.v) Consult Schlayintiveit, Emil, < Buddhism in

Thibet> (London 1863) ; Waddell, L. A.,

OMAGUAS, o-ma'wa, a people of south¬ eastern Colombia. Their territory is now greatly restricted and the people themselves are much reduced in numbers; but the Omagua language, which belongs to the Tupi-guarani family, is still spoken even outside the limits of the original tribal boundaries. In pre- Colombian times the Omaguas were spread over parts of Colombia, Peru and Brazil. They were accustomed to flatten the heads of their chil¬ dren in early infancy and hence the designation "Omaguas,® which means flat-headed people, a name given to them by other more cultured races with whom they came into contact and who transmitted it to the Spanish conquerors.

1 he name Cambena has also the same meaning. At the time of the conquest of Peru and later, reports were current in Peru itself and among the Spanish conquerors generally, of the great wealth and high civilization and the vast ex¬ tent of territory of the Omaguas, whose chief dominion and capital seem to have been on the east side of the Cordilleras. Common report said that their s was the land of El Dorado (of the golden or gilded man), a place of fabulous wealth in gold and precious stones. Thus the capital of the Omaguas was undoubtedly con¬ founded with that of the famous Chiboha civili¬ zation of the upland plateau of Colombia, lhree successive expeditions were sent into the Omagua country to effect its conquest in 1536 1541 and 1560, but the powerful defenders of the land defeated them and drove them back with great loss. From this latter date the Omaguas seem to have been allowed to con¬ tinue their national life without other organ¬ ized attempts to conquer them. This would seem to be, in itself, evidence in plenty that they possessed neither great wealth nor pop¬ ulous cities which would certainly have at¬ tracted the cupidity of the Spanish adventurers, i here is plenty of evidence, however, that they were much more civilized than the Brazilian and other races who surrounded them ; that they dressed in woolen garments, and that they possessed a well-organized form of government which held dominion over a very extensive tract of country. The Omaguas seem to have gradually, retreated before the march of Euro¬ pean civilization and conquest to the upper Amazon Country, where they continued to oc¬ cupy numerous small villages along the Ama¬ zon Rwr and in the interior. There the Catholic missionaries found them in 1645 and continued to maintain Jesuit missions among them until the Jesuits were finally expelled from the country in 1776. The excesses of t e slave trade, attacks by Portuguese and later

u?aCrl0ns anCˆ .aˆuses °f rubber gatherers drove the Omaguas into the deep forest where their descendants live to-day. In this retreat they left behind them about half a hundred once prosperous towns and villages. - Many of them are to-day rubber gatherers.

t .P^AHA, 5 ma-ha, a tribe of American Indians of the .Dhegiha group of the Siouan family residing in eastern Nebraska. The name is derived from an Indian word meaning “those who go up the stream or against the current.®

I hey number about 1,400. This tribe, which

is very closely related to the Kausa and Osage, has wandered considerably during the past 400 wa[S’ , • ey orl§lnahy lived on the Ohio and

S ^°.ut 1500 or earlier, but moved P the Mississippi to the country round the mouth of the Missouri. Then in company with the Ponca, they crossed the Missouri and re¬ sided for a while in Iowa, where they are said to have ranged as far as the famous Pipe- stone Quarry (Pipestone, Minn.). Meeting the hostile Dakota, they were forced to retreat and the Ponca went on to the Black Hills (about 1650), while the Omaha settled on Bow Creek, Nebraska. In 1761 a part at least of the Omaha were living on the east side of the Missouri River above Big Sioux River and beyond the Iowa and they seem to have been on friendly terms with the Dakota and to have occupied, with them, territory on the Minnesota River. In 1802 the tribe was very greatly re¬ duced by smallpox and this induced them to move down the Missouri to the neighborhood of Sioux City, S. D., where they were found by Lewis and Clark in 1804. At this period and later on they were at war with the Sioux By the treaty of 16 March 1854, the Omaha ceded to the United States all their lands west of the Missouri and south of a line running west from where the Iowa River leaves the bluffs. The territory north of this constituted a reservation. Part of the latter was sold to the United States in 1865 as a reservation for the Winnebago. In 1882 a law was passed granting the Omaha • land in severalty. The dwellings of the Omaha were generally made of earth and were similar to those of the Mandan. But they also made use of bark

lodges, and when they were on hunting expedi¬ tions they carried along with them skin tepis which could be quickly set up on the open plains where other shelter could frequently not be had in the buffalo country. Despite their nomadic habits the Omaha cultivated corn, beans, squashes and probably other vegetables and made provision for winter store. Consult Fletcher, A. C., fStudy of Omaha Music) (Cambridge 1893) ; (Wash¬ ington 1911).

OMAHA, Neb., the largest city in the State and county-seat of Douglas

County, is situated cn a sightly eminence on the west bank of the Missouri River, 600 miles from its confluence with the Mississippi. Although a superficial survey of the city had been made in June 1853 no attempts were made toward a permanent survey. The Indian title had not been extin¬ guished and the Indians were very tenacious of their rights and viewed with suspicion all the movements of the white men.

History. — It was not until March 1854 that a treaty was concluded with the Otoes, Mis¬ souri and Omaha Indians, ratified 21 June and promulgated 24 June, whereby the title of the Indians was surrendered and left the land to be taken up and enjoyed by the white men. In the spring of 1854 some settlers arrived and the first building was erected. The first general election in the Territory was held 20 Dec. 1854, and on 16 Jan. 1855 the first legislative assem¬ bly was convened at Omaha, and on 24 January commenced a contest (which lasted for 12 years), when the member from Cass County gave notice that, at an early day, he would in¬

troduce a bill to locate the capital of Nebraska, the struggle was long and bitter, often at the expense of needed legislation, producing much ill-feeling and was more troublesome to man¬ age than any question the legislature had been called upon to decide. After a long debate upon the proposition of the member from Cass, the question was decided in favor of Omaha by a vote of 14 to 11 in the lower house, only to be renewed at every subsequent meeting of the legislature, until Nebraska became a State, when the capital was removed to Lincoln. On 2 Feb. 1857, by an act of the legislature, Omaha became an incorporated city, it having been up to this time a county organization, and an elec¬ tion was held on the first Monday in March in that year, when a mayor, nine aldermen and other city officers were elected. The council held its first session 6 March. Under the direc¬ tion of the council the mayor proved up the claim of the city east of the 6th principal merid¬ ian and the same was surveyed and laid out into city lots, streets and alleys.

The discovery of gold in Colorado in 1858 made Omaha the best point for outfitting for the mines. The streets were filled with emi¬ grants on the way to the gold fields and daily trains left to cross the plains in search of gold. At the breaking out of the Civil War Omaha was made military headquarters, which greatly increased its business and importance. From the day that President Lincoln decided that the initial point of the Pacific Railroad should be ((at a point on the western boundary of Iowa, opposite section 10, township 15, north of range 13, east of the 6th principal meridian in the State of Nebraska,® the success of Omaha was assured, and from a city of 320 blocks it has grown to one of 37.9 square miles.

Government.— Omaha was the first of the larger cities to adopt the

commission form of government. The city is governed by seven commissioners elected at large, the mayor being chosen from among the seven by the commis¬ sioners themselves. The mayor has charge of municipal affairs. In addition there is a build¬ ing commissioner, a fire and police commis¬ sioner, commissioner of streets, commissioner of finance, commissioner of public parks and playgrounds and commissioner of public im¬ provements. Each commissioner receives a sal¬ ary of $4,500 annually. By a special act of the legislature, Omaha, South Omaha and Dundee were permitted to consolidate by popular vote. Greater Omaha now combines these two thriv¬ ing suburbs. Within a short time, Florence and Benson will also become a part of Omaha upon their own initiative.

Public Parks. — The chief suburban attrac¬ tions of the city are its parks, 23 in number, which are connected by a boulevard system of 35 miles. Hanscom Park, the oldest, contains 60 acres. Riverview, in the bluffs overlooking the Missouri, contains 70 acres. Bemis Park contains 10 acres; Elmwood contains 215 acres; Miller Park, 80 acres, and Fontenelle Park, 110 acres. Prospect Hill Cemetery is located in the northwest part of the city on high and eligible ground. Forest Lawn is situated seven miles northwest of business centre of city; others are Mount Hope Cemetery, Jewish Cemetery, Bohemian, Ever-Green, Springwell, Holy Sepul¬ chre, Saint Mary's and Cassidy's Roman Cath¬ olic cemeteries.

Buildings. — Among the more pretentious buildings are the Douglas County courthouse, a beautiful building occupying a full block in the heart of the city and recently completed at a cost of $1,500,000, the Omaha High School building, completed recently at a cost of $1,250,- 000, the largest high school building west of Chicago. Other pretentious buildings are the Omaha Bee building, the City National Bank building, Woodmen of the World building, Union Pacific headquarters, First National Bank building, Fontenelle Hotel, World Herald building, city hall, the home of all city officers, erected at a cost of $550,000, and the United States custom-house, post office and courthouse, erected at an expense of $1,800,000. This build¬ ing, of the Roman style of architecture, is lo¬ cated in the heart of the city, with an entrance on four streets. The first floor is devoted ex¬ clusively to the post office, second to the cus¬ toms, internal revenue and railway mail service, third to the United States District and Circuit Courts, fourth to the grand and petit juries, weather bureau and civil service departments.

Churches. — Omaha has 170 churches of all denominations. It is the seat

of bishoprics of the Roman Catholic and the Protestant Epis¬ copal churches. There are in the city 21 Roman Catholic, 21 Methodist, 20 Presbyterian, 20 Lutheran, 10 Episcopal, 14 Baptist, 6 Congre¬ gational, 4 Christian, 6 Jewish, 2 United Breth¬ ren, 4 Evangelical, 2 Christian Science churches with many other denominations represented by a single church.

Charities and Hospitals.— These institu¬ tions include the Creche, Child Saving Institute, Emanuel Orphan Home, 13 hospitals and the Nebraska Institute for the Deaf. Omaha is very well equipped with hospitals, having ac¬ commodations for over 1,300 patients at one time. Saint Joseph's, an endowed Catholic in¬ stitution, is among the largest hospitals west of the Mississippi.

Finances. — Omaha although 34th city in population is 18th city in the United States in volume of business. It has 10 national banks, capital $6,950,000, deposits $91,074,567; 9 state banks, capital $935,000, deposits $10,684,697 ; a Federal Farm Loan Bank; a Federal Reserve Branch Bank and 9 building and loan associa¬ tions with resources $49,758,972. The city's bank clearings reach annually $3,000,000,000. The assessed valuation of real estate is $320,- 000,000. The tax levy amounts to .099 mills.

Libraries. — The libraries are those of the New York Life Insurance Company, Law li¬ brary (2,500 volumes) ; Omaha public library (98,000 volumes) ; the library of Young Men's Christian Association ; two Catholic libraries at Creighton College, one for the use of the fac¬ ulty (8,000 volumes, being composed in part of rare and old books and manuscripts of the 15th, 16th and 17th centuries) ; the other for the use of the students (12,000 volumes). The Masons, Odd Fellows, Swedish, Danish and Bohemian societies all have valuable libraries. In October 1888 G. W. Lininger erected an art gallery in the Italian Renaissance style, at a cost of $15,000, in which to house his judicious collection of paintings and other works of art. The present collection is valued at over $300,000 and consists of old oil paintings, mod¬ ern oil paintings, water colors, statues and

busts, vases and plaques, porcelains, curios and articles of vertu, and the whole is open to view and inspection of the public two days in the week.

Public Schools. — The schools of the city are under the control of a bo-ard of education of 12, elected at large. Women paying taxes and those who have children of school age may vote for members of the board. The superin¬ tendent is elected by the board.

There are 53 school buildings in the city, 49 graded, two high school buildings and two spe¬ cial buildings. The value of school property is

$4,000,000.

Industries. — There are many and diversi¬ fied industries in Omaha with meat packing, ore smelting and oil refining in the lead.

The American Smelting and Refining Com¬ pany commenced business in October 1870 with a capital of $60,000. In 1882 the Grant Smelt- ‘ ing Company was consolidated with the Omaha company. A reorganization was completed with a capital of $2,500,000. They handle silver, lead, copper ores, from the Western States, Mexico and British possessions. The business of a sin¬ gle fiscal year of this plant was as follows: 331,792,488 tons lead, $15,760,143; 121,301,418 ounces silver, $10,650,710; 389,685 ounces gold, $8,046,788 ; 21,324,785 pounds copper, $3,731,837 ; 7,794,928 pounds blue vitriol, $516,745. Omaha is in the centre of the great wheat and corn producing portions of Iowa, Nebraska, Kansas and Missouri, and the largest cattle and hog productions of the country are marketed here. For a single year elevators handled 68,000,000 bushels of corn, oats and wheat.

Railroads. — The geographical position makes Omaha a natural railroad centre. Ten great trunk systems, with 22 lines connecting to every part of the United States, enter the city, thus bringing it into communication with all parts of the Unfon. No Western city has greater railroad facilities. Within the past few years two railway stations have been erected, the Union depot at a cost of $400,000, and the Burlington costing $500,000. The Missouri River is spanned at Omaha by two railroad bridges and one motor and wagon bridge. The following are the lines out of Omaha for the East: Chicago, Burlington and Quincy; Chi¬ cago, Milwaukee and Saint Paul; Chicago and Northwestern; Chicago, Rock Island and Paci¬ fic; Illinois Central; Chicago and Great West¬ ern. To the North and Northwest: Chicago and Northwestern; Illinois Central; Saint Paul, Milwaukee and Omaha. West and Southwest; Union Pacific; Chicago, Rock Island and Pa¬ cific; Kansas City, Saint Louis and Council Bluffs. South and West: Missouri Pacific Wabash; Kansas City, Saint Louis and Council Bluffs.*

Trade and Commerce.— Over 900 firms, covering every line of mercantile industry known in the United States, are engaged in wholesale and jobbing. The business extends east to the Mississippi River, north to Manitoba, south and southwest to Texas and Mexico, west to the Pacific. Omaha is a port of immediate transportation of foreign goods, which has per¬ mitted the merchants to receive merchandise and pay duties at home without the

delay on the seaboard. The value of the jobbing busi¬ ness in 1890 was $47,000,000, and in 1920, $458,-

OMAHA, NEB

Douglas County Court House

OMAHA, NEB,

-.f 1

Douglas Street, west from 17th Street

O'MAHONY — O'MALLEY

679

?2j'1(!5- value of productions of factories,

ison?tr&nSv?n$F h°uses and smelters was (in 1890) $68,000,000; 1920, $453,413,605. At South Omaha are located the famous packing houses ana stockyards, where more than $30,000,000 have been invested. The daily capacity of kill-

!nnnn PrePanng fo r market is 15,000 hogs, 5,000 cattle and 4,000 sheep. The livestock re- ceipts at the stockyards are: 1890 — hogs, 1,702,- j-3, cattle, 615,337; sheep, 153,873; horses, 5,- 007; total, 2,477,002; 1920 — hogs, 2,708 482- catt e 1,602,799; sheep, 2,890,748; horses, 18,751; total, 7,220,/SO.

Trade Territory. — Omaha serves the most productive agricultural producing territory in the United States. Its trade territory, limited oniy by its transportation facilities, consists of the State of Nebraska, the west half of Iowa the northwestern part of Missouri, Montana,' Wyoming, part of Colorado, and Kansas. Some Omaha institutions include Utah, Washington and California in their trade. Omaha is the second primary livestock market and packing centre of the world, the fourth primary grain market, the greatest butter-producing city in the world, has the largest smelter of fine ores and lead, is the fourth distributing point for agri¬ cultural implements and has the largest mac¬ aroni factory in the United States.

7 aaa aaa Ci Activities, — Omaha receives over /,UUU,(JOU head of livestock on its livestock mar¬ ket annually; more than 68,000,000 bushels of

nnnnAftW^eat' °ats and rye >' manufactures 30,- 000,000 pounds of

creamery butter ; distributes $18,000,000 of agricultural implements, $60,- 000,000 of groceries, $46,000,000 of smelter products, $28,000,000 of oils, $4,000,000 of poultry and eggs, $19,000,000 of coal and coke, $27,000,000 dry-goods and notions, $9,000,000 hardware, $87,000,000 automobiles and ac¬ cessories, annually.

Newspapers.— The first paper published in Omaha was The Omaha Arrow, its initial num¬ ber being dated 28 July 1854. There are pub¬ lished at present the Morning and Evening W orld-H erald ; the Morning and Evening Bee ; the Omaha Daily News; the Omaha Daily Hotel Reporter; Omaha Excelsior; Mercury; West¬ ern Laborer; Bohemian Voice; Commercial Exhibit; Omaha Tribune; Pokrok Zapadu; Svenska Posten; Swedish Journal Tribune; Young Men's Journal; Den Danske Pioneer'; W estliche Presse; Examiner ; Central Farmer; Enterprise ; Fraternal Union Advocate; Ne¬ braska Farmer; Protector; Quill; Royal Wood¬ man and Workers Gazette.

Population.— (1920) 191,601.

O'MAHONY, o-ma'o-ni, John Francis,

Irish politician : b. Kilbeheny, County Cork, Ireland, 1816; d. New York, 7 Feb. 1877. He was educated at Trinity College, Dublin. Fired with zeal for Ireland's cause he entered the ranks of the Young Irelanders in 1845 and took part in the insurrection of Smith O'Brien in 1848, after which he was compelled to seek refuge in France. In 1854 he came to the United States. He was active in founding the organization of the Fenian Brotherhood, acted as its president for several years, and though personally taking no part in any of the insur¬ rectionary movements in Canada or Ireland his advice was never withheld. He devoted his later years to literature, but endured great pov¬

erty. At his death his body was taken to Ire¬ land, where he was buried with honors in Glas- nevin Cemetery, near Dublin. He published (History of Ireland by Geoffrey Keating> (1857), which he translated from the Gaelic and annotated copiously. Consult Webb Al¬ fred, < Irish Biography> (Dublin 1888).

OMALIUS D'HALLOY, 6'ma'le-us dal- wa, Jean Baptiste Julien, Baron d', Belgian geologist and administrator: b. Liege, 16 Feb. 1783, d. Brussels, 15 Jan. 1875. After he had finished his classical education in Belgium, he went to Paris, where he studied with Fourcroy, Lacepede and Cuvier. On returning to Bel¬ gium he observed the geologic strata of north¬ ern Fiance, and was thus led to undertake a geological map of the empire. This he did, having been exempted from military duty by the government for

that purpose. Though much of the task was completed in 1813, the map was n'T-i Pubdshed till 1822. At the same time- a Halloy held many governmental positions. He was mayor of Skeuvre (1807), of Braibant (1811), sous-mtendent of the arrondisement of Dimant (1814), general secretary of the prov- lrrCexT (1815), governor of the province

° Namur counsellor of state, senator

(1848). In 1816 he became a member of the Academy of Brussels, of which he was presi¬ dent from 1850 on. From 1842 on he was a cor¬ responding member of the Paris Academy of Sciences. Besides a vast amount of material in scientific periodicals he published 'Descrip¬ tion Geologique des Pays-Bas> (Namur 1828) • 'Elements de geologie> (Namur 1831); 'Intro¬ duction a la geologie) (Namur 1833) ; 'Geolo- gie de Belgique) (Brussels 1842) ; Des races humaines> (Paris 1845) ; 'Code administrate > (Namur 1827) ; 'Notions de Statistique) (Namur 1840). 4

U M ALLEY, o-mal'i, Frank Ward, Amer¬ en journalist: b. Pittston, Pa., 30 Nov. 1875. He studied architecture, drawing and painting, taking special courses at the University of Notre Dame, Indiana, and at the Pennsylvania Academy of Fine Arts. He was engaged as an illustrator in New York in 1902-06, also pro¬ ducing light verse, and since 1906 he has been on the New York Sun where his humorous and special articles have become widely popu¬ lar. He collaborated with E. W. Townsend in writing thf ,PlayS (1909) and 'A Certain Party (1910).*

\t t? 'GALLEY, Grace (called also Graine Ni Maille, Grany O'Mayle, Grainne O'Mail- ley, Grany Ne Male, Grayn Ny Vayle Graine Mhaol, etc.), Irish chieftainess : b.' West Galway, about 1530; d. possiblv on Clare Island, about 1600. She came of the O'Malley clan, famous sea-rovers, and was a daughter of Dubhara O'Malley, chieftain of Umhaill Uach- trach Ui Mhaille. . She was married twice and had children by both marriages, her first hus¬ band being Domhnall-an-chogaidh O'Flaherty and her second Richard MacOileverius Burke She was famous as a leader in the Elizabethan wars, and in command of a considerable fleet made many forays against British shipping and coast settlements. In 1576 she and her recond husband made an alliance with Sir Henry Sid¬ ney at Galway, but in 1577 she was captured by the forces of the Earl of Desmond while on ono of her forays and was held captive for a

time. She then continued her warring expedi¬ tions; was suspected of

*plotting against the government with the Earl of Thomond. the Burkes, Lord Birmingham and others, and she threatened the life of Theobald Dillon when he came into the country. However, she is afterward recorded as peaceably paying taxes with her husband. In 1586, after the death of her husband, she moved to obtain letters of conduct from Sir Richard Bingham, but was seized and sentenced to be hanged for a plundering expedition against Aran Island. She was released through the efforts of Richard Burke, <(The Devil's Hook,** said to be her son- in-law. She enjoyed his protection until his rebellion, when she took refuge in Ulster, being unable to return home because of the loss of her ships. She was afterward pardoned by Queen Elizabeth, but is reported to have con¬ tinued her former course. She petitioned the restoration of one-third of her husband's lands in 1595, but apparently spent her last years in poverty. Innumerable legends grew about her career, few of which can be substantiated. Con¬ sult (Calendar of State Papers, Ireland* (1574- 75, 1 588—92, 1592-96) ; O'Flaherty's 'Choro- graphical Description of the West, or H-Iar Connaught* (ed. by Hardiman, Dublin 1846).*

O'MALLEY, Thaddeus, Irish Roman Catholic clergyman : b. Garryowen, near Limer¬ ick, 1796; d. Dublin, 2 Jan. 1877. He was ordained in 1819 and came to America, but through his independent ecclesiastical action was suspended in 1827 and returned to Dublin, where he became assistant at the cathedral un¬ der Archbishop Daniel Murray and worked in-defatigably for the passage of poor-laws for Ireland. He was appointed by the government rector of the Catholic University at Malta, but because of the reforms introduced by him among the students he was dismissed. In 1845 he founded the Social Economist and later the Federalist, both of which he used in the interest of Ireland and to unite the Old Ireland and Young Ireland parties. He was often under ecclesiastical censure for the freedom with which he attacked the discipline of the Church ; was an earnest advocate of the home-rule movement, and published

OMAN, o'man, Charles William Chad¬ wick, English historian: b. Mozufferpore, Ben¬ gal, India, 12 Jan. 1860. He was educated at Winchester and Oxford, was a Fellow of All Souls' College, Oxford, from 1883: deputv pro¬ fessor of modern history at Oxford 1900 and full professor in 1905. He is the author of (A History of Greece (1888); < Warwick, the*

King Maker (1891) ; (A Short History of the Byzantine Empire* (1892);*

OMAN, o-man, Arabia, a sultanate at the southeastern extremity of the peninsula, gen¬

erally comprised in the maritime district ex¬ tending along the Persian

Gulf, the Gulf of Oman and the Arabian Sea, from El Hasa to Merbat, near the Hadramut frontier. Area, 82,000 square miles. Although mainly a mari¬ time kingdom, Oman proper is the richest part of the Arabian Peninsula, both in agricultural products and in mineral treasures. The work¬ ing of gold and silver filigree, with which daggers, belts, cups and pipes are often adorned in Oman, supports great numbers in the larger towns. The inhabitants are tolerant, but super¬ stitious and immoral. The form of government is a monarchy, limited by a powerful aristoc¬ racy with hereditary privileges, and the pre¬ scription of popular rights. The ruler is called the imam or sultan, and the capital of the state is Muscat (q.v.), a name also given to the sul¬ tanate. The present dynasty secured possession of the throne in 1741, and for some time „ Socotra, Zanzibar and parts of the east coast of Africa were attached to Oman. A British Resi¬ dent is stationed at Muscat, the sultanate being virtually a British protectorate. Popu¬ lation, consisting of numerous tribes, is esti¬ mated at 500,000.

OMAR I, o'mar, 2d caliph after Moham¬ med; d. Medina, 3 Nov. 644. See Caliph.

OMAR II, 8th caliph of the Omaides. See Caliph.

OMAR, o'mar, Mosque of, or KUBBET

*ES LAKHRA (((The Dome of the Rock**), a structure in Jerusalem believed to have been' erected by Omar, the second of the Moham¬ medan caliphs. The mosque is built over the rock which the Jews regarded as the place where Isaac was to have been sacrificed; and, in the belief of the Mohammedans, the scene of Mahomet s ascent to heaven. The mosque is octagonal, 66 feet to a side, and the dome is 97 feet high and 65 feet in diameter. There are four pordhes and numerous pointed windows inlaid with rare Persian tiles and now filled with beautiful 16th century stained glass. The walls are covered with fine Byzantine mosaics. The°riJg'i1nal Byzantine temple has been much modified by the Mohammedans. The Arabians believe the mosque to have been built by Abd al Malih in the 7th century.*

*OMAR KHAYYAM, khi-yanT, Persian poet and scholar: b. Naishapur, province of Khorassan, latter part 11th century; d. (accord¬ ing to tradition) 1123 (517 a.h.). His name is given as Ghias uddln Abul Fath Omar ibn Ibrahim al-Khayyam. The epithet Khayyam signifying «tent-maker,** is indicative of his calling previous to the time when he was able to devote himself to science and literature. Nizam ul Mulk, the great vizier of Al Arslan and Malik Shah, offered him preferment at court, but he requested instead the means of living in retirement and occupying himself*

with learning. He accordingly received a pension and. pursued researches, especially in mathe¬ matics and astronomy. Subsequently he wac made, astronomer royal at Merv, and in that capacity prepared certain astronomical tables. He was aho active in the revision (dating from 15 March 1074) of the ancient Persian calendar a work comparable to the revision of the Man calendar, by Gregory XIII to which it was similar in principle, and superior to which it has been ranked by some authorities. Among

his mathematical writings are a work on al- gebra and a . study of (The Difficulties of huclid s Definitions, both still preserved. His work on algebra was the most notable contri¬ bution of his country and age to the study of mathematics. He was the first to make an at¬ tempt to scientifically classify equations of the first degree and to consider cubes from the standpoint of the general equation. But though he did much he left much to be done by future mathematicians; for all his ‘ work was more specific than general. In his religious views he was unorthodox, and1 therefore viewed with suspicion by many of his contemporaries. He is best known to the West in later times as a poet somewhat in the manner of Lucretius, but more in that of Ecclesiastes. This philoso¬ phy he set forth in ‘Rubaiyat* (quatrains), of which, according to convention, the first, sec¬ ond and last lines rimed (the rime being in many cases even quintuple), while the third line was for the most part blank, but rarely followed the rime of the other lines. Each Rubai was distinct, and in extant manuscripts is placed in an alphabetical arrangement de¬ pendent upon the letter concluding the rime. About 500 quatrains are assigned to Omar; many are probably not his. Perhaps his heret¬ ical views had something to do with the fact that a comparatively small number of manu¬ scripts exists, and none can be made an au¬ thority. The manuscripts also vary more or less in the number of quatrains which they in¬ clude. Edward Fitzgerald made of a selected portion of the quatrains an ingenious mosaic which presents something of unitv, but prob¬ ably gives too consistent a structure to the pes¬ simistic side of Omar. The Persian seems to have been of changeful mood, sometimes humble before Allah, again reproachful or de¬ fiant; hopeful and fatalistic; rebellious and acquiescent. He often ridiculed the orthodox, and perhaps he liked to confuse and perplex them. ((For this,® says Fitzgerald, (*

Consult Bjerregaard, ‘Sufi Interpretations of the Quatrains of Omar Khayyam and Fitz- Gerald) (New York 1902) ; Batson, H. M., a new edition of Fitz-Gerald’s translation with commentary; Browne, E. G., (A

Literary His¬ tory of Persia) (New York 1906) : Dole, N. H., 'Rubayat of Omar Khayyam (Boston 1896) ; Jackson, A. V. W., 'From Constantinople to the Home of Omar Khayyam * (New York 1911) ; Payne, (The Quatrains of Omar Khay¬*

yam > (with biographical and critical introduc¬ tion, London 1898) ; Thompson, E. F., (The Quatrains of Omar Khayyam Translated (Worcester, Mass., 1906) ; Shirazi, 'Life of Omar al-Khayyami* (Chicago 1905).*

OMBAY, om-bi', or ALLOR, Malay Archi¬ pelago, one of the Sunda Islands, about 20 miles northwest of Timor, from which the Om- bay Pass, in the line of one of the best routes from Europe to China, separates it. It is about 900 square miles in extent, 65 miles long and 15 broad, and presents a bold coast and lofty in¬ terior. The mountains are covered to their summits with lofty trees. It is inhabited by semi-savage tribes, and carries on some trade with Timor in birds' nests and provisions, ex¬ changed for iron-work, Chinese wares and linen. Allor on the northwest and Bailoko on the southeast are the chief settlements and ports. It belongs to the Netherlands, and is included in the residency of Timor.

OMBOS, om'bos (mod. KOM UMBOO, or KOM OMBO, ((the hill of Umboo®), an¬ cient Egyptian town on the east bank of the Nile, about 500 miles above Cairo. The town has long been in ruins and is uninhabited, but the remains of the magnificent temples built in the time of the Ptolomies were cleared of sand and rubbish in 1893. The town itself is still buried in sand. Ombos was an unimportant town, notwithstanding its strategic position on a hill commanding both the Nile and the road from Nubia to the Nile Valley, until the Ptolemaic era. It then became capital of the separate nome of Ombites and it was at this time that the temples were built. The great temple was enclosed within a wall of crude bricks, remains of which still stand, except on the side toward the Nile. The temple is double and was devoted to the worship of Jebek and of Har-oer or Aroeris. There are also remains of a smaller Ptolemaic temple nearer the river and partially washed away. Consult Mariette, A. E., (Monuments of Upper Egypt (London 1877) ; Demorgan, J., (Kom Ombo* (Vienna*

1894).

OMBRE, om'ber, a game of cards originat¬ ing in Spain. It is usually played by three per¬ son, with 40 cards (the eights, nines and tens having been removed), and each player receives nine cards, three by three. The game is often mentioned in English 18th century literature.

OMBU (om'boo) TREE, also known as BELLASOMBRE-TREE, UMBRA-

TREE and POKE-TREE, a South American shade- tree (Phytolacca dioica) , widely cultivated as a shade tree in Spain, Malta and other coun¬ tries on the Mediterranean Sea and in India. The tree attains a height of 25 to 35 feet, is ex¬ traordinarily wide at the base of the bole, sometimes reaching a diameter of 12 to 15 feet, and has a wide-spreading top with ex¬ tremely dense foliage. The leaves are large, and the whitish flowers are borne on spikes, the fruit being, similar in appearance and in medic¬ inal qualities to that of the plant or shrub variety of pokeweed.

OMDURMAN, om-door'man, Sudan, a na¬ tive town on the White Nile, opposite Khartum. It was built as the capital of the Mahdi's suc¬ cessor when Khartum was destroyed in 1885, and extends for several miles along the river

bank. Under the Khalifa Abdallah it had a population of 500,000 inhabitants, living mostly in one-storied mud huts, lining streets laid out on an orderly system, and guarded by a walled enclosure flanked with towers, accommodating 10,000 warriors. When the Khalifa was de¬ feated, 2 Sept. 1898, by the Anglo-Egyptian troops under Lord Kitchener, Omdurman was hastily deserted, but with returning trade and prosperity has an estimated population of 60,- 000. _ Omdurman is the great mart of the gum- arabic, ivory and ostrich-feather trade of north¬ eastern Africa, and representatives of over 30 tribes congregate in its markets.

O'MEARA, 5-ma'ra, Barry Edward, Eng¬ lish physician: b. Ireland, 1786; d. London, 3 June 1836. He was household physician to the Emperor Napoleon I at Saint Helena and pub¬ lished 'Napoleon in Exile) (1822). Originally a surgeon in the British navy, he was serving on the Bellerophon in that capacity, 7 Aug. 1815, when Napoleon went on board. Napoleon not¬ ing O Meara s skill and knowledge of Italian desired the surgeon to accompany him to Saint Helena. Having obtained Admiral Keith's per¬ mission, O'Meara remained with the ex-em¬ peror till July 1818. He was then recalled and deprived of his rank for having accused Sir Hudson Lowe before the Admiralty of cruel and arbitrary conduct. He published a very inter¬ esting work, < Napoleon in Exile5 (1822).

O MEARA, Stephen, American journalist b. Charlottetown, Prince Edward Island, 26 June 1854; d. 14 Dec. 1918. He settled in Charlestown, Mass., with his parents when 10 years of age and in 1872 was graduated from the Charlestown High School. In 1872-74 he was a reporter on the Boston Globe, and in 1874 he joined the staff of the Boston Journal, of which he

ultimately became editor-in-chief and publisher. He sold the Journal in 1902 and retired, but later became police commissioner of Boston.

OMEGA, o-me'ga or o-meg'a, the last let¬ ter of the Greek alphabet; hence, figuratively speaking, the end or last of anything. See Alpha.

OMEN, a sign believed to prognosticate a future event, between which and the event foretold there appears no relation of cause and effect, but which is usually received as an inti¬ mation from a superior power. Omens have been common among most nations, and are often remembered and mentioned after they have ceased to be credited. Though generally classed among superstitions, they may some¬ times be founded on some hidden relation in things, some natural law of sequence the ground of which is unknown. They have been chiefly in vogue in the ruder ages and com¬ munities, though under the name of auguries they retained their influence during the whole period of pagan antiquity. Eminent warriors and other popular leaders in moments of ex¬ treme doubt and peril have given notable ex¬ amples of faith in them. Sneezing was deemed ominous in the time of Homer, and Eustathius states that it was lucky or unlucky according as it was directed to the right or the left. Aris¬ totle discusses the problem why sneezing from noon to midnight is good, and from midnight to noon bad. At noon it was propitious. Among the ancient Persians sneezing was es¬

teemed fortunate, a sign of contest between the fiery soul and the earthly body, and of the victory of the former. When the emperor of Monomotapa sneezes, says Codignas, it is pro¬ claimed throughout the whole land as a signal for general joy. That this belief in the danger of sneezing was pretty general is seen in the fact that in Germany and the Ger¬ manic languages and in the Latin tongues generally it is a custom to use some exclamation when one sneezes. The Span¬ iard says, ((Jesus,® that is, <(may Jesus protect you !® and the German says,

At the present day, in many parts of England and the United States, a superstitious belief in omens exists. It is regarded as unlucky to see first one magpie and then more ; but two denote marriage or merriment; three, a successful journey; four, an unexpected piece of good news , five, that you will shortly be in a great company. To kill a magpie is to incur some terrible misfortune. When a person goes out on any important business, it is lucky to throw

an old shoe after him. To present a knife, scissors, razor or other sharp or cutting instru- ment to one s friend is unlucky, as they are apt to divide love and friendship. The falling of salt toward persons at table, the spilling of wine on their clothes, are evil omens. Break¬ ing a looking glass betokens the death of the best friend of the person to whom it belonged. The burning of the cheeks or tingling of the ears, that others were talking of us ; if of the left cheek or ear, ill ; the right, well. A sow crossing the road before a person going on a journey is believed to indicate a disappointment if not a bodily accident to such person; but if the sow is attended by her litter of pigs, it denotes a successful journey.

From the belief in omens there came to be derived elaborate systems of palmistry and astrology which were simply certain specific omens classified and connected with specific rules, regulations and' manner of procedure in divination. Naturally omens came to play a large part in the religions of most of the races of the world. On the other hand, many of the omens had their origin in religious cere¬ monies, customs and beliefs. Consult Denne- field, Ludwig, (Babylonisch — assyrische Geb- urts — Omina) (Leipzig 1904); Thurston, E., (Omens and Superstitions of Southern India (London 1912) ; Toy, C. H., introduction to the History of Religions) (Boston 1913).*

OMER PASHA, o'mer pash'a, Turkish general : b. in the Austrian village of Plasky, 24 Nov. 1806; d. Constantinople, 18 April 1871. His real name was Michael Lattas, and his parents were Christians. Educated for the Aus¬ trian army, for some unrecorded reason he fled, in 1828, to Bosnia, and, embracing Moham¬ medanism, obtained the post of writing-master to Abd-ul-Medjid, the heir-apparent to the Ot¬ toman throne. In 1842 he was appointed mili¬ tary governor of the Lebanon; in 1843 he sup¬ pressed an insurrection at Albania, and in the following years others in Bosnia and' Kur¬ distan. He defeated the Russians in 1853 at Oltenitza, again at Silistria in 1854, and entered Bucharest. On 17 Feb. 1855 he repulsed, with great loss, 40,000 Russians who attacked him at Eupatoria. In October of that year he was sent to relieve Kars, but arrived too late. In 1857 he became governor of Bagdad, but he was dismissed from office in 1859 on a charge of maladministration in office. In September 1861 he was charged with the pacification of Bosnia and Herzegovina, which were again in insur¬ rection. This being accomplished, he attacked the Montenegrins, captured Cetinje and over¬ ran the country in 1862. He was made field- marshal in 1864, was sent to suppress the rebel¬ lion in Crete in 1867 and was Minister of War from 1869 until his death.

OMMANNEY, om-man'e, Sir Erasmus, British admiral: b. London, England, 1814; d. Portsmouth, England, 21 Dec. 1904. He entered the navy at the age of 12, and three years later was present at the landing of

the British army at Lisbon. He was at the battle of Navarino, in 1827, on board the Albion, throughout the action, acting as aide-de-camp to the captain, and was the last survivor of that battle, which resulted in the destruction of the Turkish fleet. In 1835 he was promoted to the rank of lieu¬ tenant, immediately volunteering to serve with

Capt. James Ross in an expedition to relieve whaling vessels beset in the ice in Baffin's Bay, and was commended for his services. Attain¬ ing the rank of captain in 1846, he was placed second in command of the Arctic, expedition to search for Sir John Franklin (q.v.), and was first to discover traces of the missing ships. He was knighted for these services. In the Crimean War he commanded the British ex¬ pedition sent to the White Sea to damage Rus¬ sian ports. Afterward he served on the coast of Central America, his last active command being as senior officer in charge of the naval establishment at Gibraltar. He was generally known as the <(Father of the British Navy.®

OMMIADS, om-mi'adz, OMMAYYADS, or UMMAYYAS, a dynasty of Arabian ca¬ liphs or "successors® of Mohammed, founded by Moawiya I, general of the Caliphs Umar and Usman (Omar and Osman). After the death of Osman, the grandson of Ummaya, in 644, Moawiya seized his kingdom and became the first caliph of the dynasty. He captured the island of Rhodes, destroyed the Colossus, one of the Seven Wonders of the ancient world, and carried devastation to the walls of Constanti¬ nople, which he besieged unsuccessfully for seven years. Moawiya had been an early fol¬ lower of Mohammed, who made him his secre¬ tary, while Omar made him governor of Syria, which he held as a possession for nearly 40 years. He died a.d. 680 and was buried at Damascus, the capital of Moslem government. With him began the great schism in Islam, which is still divided into the two sects of the Shiites and Sunnites (Shiah and Sunni), the former recognizing the only hereditary lineage from Mohammed through his daughter Fatima and her husband, Ali, and the latter accepting the line of the first caliph, Abu Bekr, father-in-law of the Prophet. The Ommiad dynasty produced 13 caliphs after Moawiya, viz., Yezid I, Moawiya II, Marwan I, Abdul Malik, Walid I, Suleiman, Omar, son of Abdul Aziz, Yezid II, Hasham, Walid, Yezid III, Ibrahim and Marwan II, the last of the Om¬ miads, defeated and crushed by the Abbasides in 750. The Cordova caliphate, founded by the Ommiads in Spain, lasted 281 years longer, till 1031, but was not recognized as the true cali¬ phate, and did not, in fact, assume such title till 170 years after the fall of the Ommiads. Marwan II was the last of the line, the bravest and . best of the Ommiads; he was slain and mutilated 5 Aug. 750. See Caliphate; Hasan and Husain. Consult Muir, W.,

OMNIBUS, a Latin word signifying "for all,® and now applied in several

languages to the well-known vehicle used for the conveyance of passengers at a cheap rate. The famous mathematician, Blaise Pascal, is said to have introduced the vehicle in Paris. Pascal was more or less interested in the affairs of practi¬ cal life. He was the inventor of the push-cart that now perambulates our streets. In 1661 he had large wagons built for regular traffic in the heart of Paris. He allied himself in this under¬ taking with several influential friends, among whom was the Duke de Roannes. In 1662 Louis XIV granted letters patent to Pascal, in which it was said that these carriages were intended

for the comfort of poor people who had to go to courts of justice, or who were sick and so poor that they could not afford to pay the two pistoles exacted by the chairmen and the drivers of coaches. At first the use of the vehicle was not generally permitted. A royal decree forbade its use by soldiers, pages, lackeys and other liveried servants, as well as artisans and porters. Pascal, in spite of the fact that he only lived to be 39, is said to have made no inconsiderable sum out of his invention. After the vehicle had been in use for some 16 years, it was aban¬ doned for various reasons. It was not until 1812 that it was again introduced, this time in Bordeaux, which city was followed in 1821 by Nantes and in 1827 by Paris. A Mr. Shillibur started the first omnibus in London in 1829, and they were introduced into New York in 1830 and Amsterdam in 1839.

OMNIBUS BILL. See Compromise of

1850.

OMOO: A NARRATIVE OF ADVEN¬ TURES IN THE SOUTH SEAS, Herman Melville's sequel to his (Typee> (q.v.), ap¬ peared in 1847, and went through five editions the same year. In it he recounts the incidents of his voyage from Nukahiva, on board the barque Julia, to the Society Islands, where he took part in a mutiny and was left with several companions on the island of Tahiti for still further cheerful vicissitudes. Unlike) is packed with activity and comedy. One cannot be sure how far the narrative is a trustworthy account of Melville's own experience, but there is the look of reality about his racy sailors, his consuls and beachcombers, and his irrespon¬ sible natives, hovering between cannibalism and a barely-guessed-at Christianity. The treat¬ ment of the missionaries led to much contro¬ versy with, others of that profession, and Mel¬ ville was, indeed, often caustic and contemptu¬ ous toward them. What should be borne in mind, however, is that the story is dramatic; that

the teller has just emerged from a world of Edenic simplicity; and that his recollection of that little world lends a touch of sharpness to his judgments of the figures he finds on the borders of civilization. Undoubtedly, he was something of a partisan of paradise; and yet the book takes its quality, its keen edge, not so much from his prejudice as from his comic force and the happiness with which he hit off the manners and personages of a heterogeneous community.

Carl Van Doren.

OMOPHAGIC RITES, or OMOPHA¬ GIA (Greek, omophagia, eating raw flesh), re¬ ligious rites in which uncooked flesh was eaten. In such religious ceremonies cannibalism some¬ times formed a part, as in the Orphic rites, in which the passion of Zagreus (q.v.), the infer¬ nal Dionysus, was commemorated by the sacri¬ fice of a man, who was dismembered and eaten. These rites were celebrated at Chios and Tene- dos, and from them Dionysus obtained the title of eater of raw fish. Dionysus rites were introduced into Italy about the end of the 3d century b.c. and in 189 b.c. the Senate, informed of their nature by a freeman who had been marked out as a victim, issued the decree <(Con- cerning the Bacchanalian Rites,® which banished

the Orphic mysteries from Italy. A ram or an ox was afterward substituted for a human vic¬ tim in the Dionysian celebrations. See Dionysus; Bacchus; Orpheus.

O'MORE, o-mor, Roger, or Rory, Irish

revolutionist: flourished 1620-52. He came of the O'More family, descended from the ancient chiefs of Leix, and which after the establish¬ ment of Queens County is said to have raised 19 rebellions. Rory O'More was largely re¬ sponsible for the Ulster uprising in 1641, in which, with Sir Phelim O'Neill and others, he planned the capture of Dublin Castle, and although that enterprise failed he achieved a victory at Juliantown, County Meath. After the failure of the Ulster uprising a price was put on his head, and he is thought to have gone to Flanders. He was later connected with the fortunes of Owen Roe O'Neill; served Antrim in his Scottish expedition in 1644; was in arms against the Kilkenny confederation in 1648; and after fighting in Connaught in the uprising of 1650 he was compelled to flee and died in ob¬ scurity.

O'MORE, Rory, or RURY OGE, Irish

revolutionist, second son and namesake of a captain of Leix: d. 1578. He was continually engaged in rebellion, but in 1565, or 1566, he received a

pardon. In 1572, however, he is re¬ corded as in arms against the queen, and in 1574 he was taken prisoner after aiding in Kildare's plots. He soon obtained his freedom, and in 1575 submitted to the authorities, obtaining a second pardon in 1576. In 1577, in the expectation of help from Spain and under the encouragement of John Burke, he again renewed hostilities, burned Naas and Carlow, but was later cap¬ tured and killed by the Fitzpatricks, who set his head on Dublin Castle.

*OMRI, om'ri, in the Bible, a king of Israel after the separation of Israel and Judah; his reign is variously placed as 926-915 b.c.; 903- 872 b.c. ; 900— 875 b.c. ; 890— 879 b.c. He com¬ manded the armies of Elah (1 Kings xvi, 16) and was engaged in the siege of Gibbethon, which was in the possession of the Philistines, when the death of Elah occurred. Omri was proclaimed king by the army and went at once to Tizrah, where he made war against Zimri, the occupant of the throne, and gained posses¬ sion of the kingdom. His title to the throne was then contested by Tibui, who had been elected by the people who desired a non-mili¬ tary king, and a civil war lasting four years resulted in Omri's complete victory. He then removed his capital to the mountain of Shrom- ron, where he established Samaria, a place of great beauty in a fertile country and possessed of high strategic value. He made unsuccessful war against Assyria, and endeavored to strengthen his position through the marriage of his son to a Phoenician princess. Through this alliance Baal-worship was introduced, causing the downfall of the dynasty after some 50 years He conquered the Moabites, and appears to have established *a considerable degree of power, since his house furnished four kings to Israel' an unusual record at that time. He is men¬ tioned on the Moatile Stone of Mesha, and in the cuneiform inscription the house of Israel is called Bit-Humri, «the house of Omri.® He is further mentioned in 1 Kings xvi, 25; 2 Chron. xxii, 2; Cant, vi, 4; 1 Kings xx, 34;*

aijd vi, 16. Consult Rawlinson,

Historical Evidences J ; Hastings, dictionary of the Bible ; Wellhausen, (History of Israel.)

OMSK, Asiatic Russia, the former capital ot western Siberia, now capital of the general- governorship of the Steppes and of the province 0 Akmolinsk, on the Irtish at the confluence ithe,0m. and on the Trans-Siberian Railway, ZbU miles southeast of Tobolsk, and 1,624 miles from Moscow by rail. It has modern fortifica¬ tions in the form of the regular polygon, flanked with

five bastions, and is the most important military station on the line of the Irtish. It has gymnasia, a seminary for teachers, a technical school and the West Siberian section of the Russian Geographical Society. It is an important industrial and commercial centre and is the chief distributing point for western Si¬ beria; and the construction of the Trans- Siberian Railway has added greatly to its com¬ mercial importance. Pop. over 130,000.

ON CONCILIATION WITH AMER¬ ICA. The speech of Edmund Burke, (

ing up an indictment against a whole people.® Consult Cook's edition of the (Speech on Con¬ ciliation (New York 1896), and Grierson, H. J. C. (in the (Cambridge History of English Literature/ Vol. XI).

Lane Cooper.

ON LIBERTY. John Stuart Mill's essay (On Liberty/ among the most carefully writ¬ ten of his works, was published in 1859 when he was 53 years of age. It was planned in 1854 and revised with great care with the co-opera¬ tion and helpful criticism of his wife. ' It is justly one of the most famous of all his writ¬ ings; it is closely reasoned and contains his most characteristic political doctrines. In po¬ litical theory, Mill was a modified individualist, believing that every man should be allowed all liberty compatible with the liberty of his fel¬ lows. In the introduction to the treatise (On Liberty he mentions the danger to which his attention has been called by the course of world events. He shows how the conflict be¬ tween liberty and authority led to the demand that rulers should become responsible to their subjects. Then in his own generation a new evil appeared — the tyranny of the majority might supplant the tyranny of the rulers; for, when the masses have become conscious of their power, they will probably be as tyrannical in legislation as in public opinion. In this re¬ spect he differs from Bentham and James Mill, who assumed that all ends would be secured by making the sovereign the servant of the people. He vigorously pleads the case for complete freedom of thought and discussion and even goes so far as to urge the doubtful point, that contradiction, even when the truth is contradicted, is desirable in itself. He is inclined to regard authority as something logi¬ cally opposed to reason and to accept the doc¬ trine of the ((right of private judgment,® al¬ though in all the fields of his activity he was more concerned to find truth than to maintain a creed. Mill believed, furthermore, that the law should not interfere with purely personal conduct. He held that «the individual is not accountable to society for his actions in so far as these concern the interests of no person but himself.® In other words, his central prin¬ ciple defended liberty of tastes and pursuits and freedom to unite for any purpose not in¬ volving harm to others. In fact there should be no legislative interference unless it*

helped the individuals restrained. Throughout the en¬ tire work Mill clings to some extent to the notion that state interference, as such, is an infringement of liberty with an implied prej¬ udice against any interference at all.

. Mill thought there was a lack of the true spirit of liberty in the society of his genera¬ tion and that some legislation might help and some legislation might hinder its growth ; he plainly stated that it was not the laws, but the spirit of the people who execute them that preserves or destroys liberty. He does not complain against the state and its organiza¬ tion, but against the stupid and intolerant spirit of its citizens. His ideal demands a state whose members are really proud of their individuality. He believed that utility was the ultimate standard of all value which, in the largest sense, must be <(grounded on the per¬ manent interests of man as a progressive

being.® He held that there were <(certain social utilities which are vastly more important and, therefore, more absolute and imperative than any others are as a class,® and the greatest of these, in Mill's opinion, was liberty, which he truly considered the foundation of all human happi¬ ness, although it could not be secured and maintained merely through legislation.

To summarize, three distinct propositions regarding the relation of the state to liberty seem to be implied in Mill's treatise, besides the valid principle that compulsion cannot be em¬ ployed to effect what in its essence is a spirit¬ ual end: (1) That an increase in the power of the state is prejudicial to liberty. This presupposes that state action and liberty are directly opposed to each other. He seems to overlook the fact that there might be an alterna¬ tive between state interference and no inter¬ ference at all. (2) That a distinction can be drawn between the part of human life "in which it is chiefly the individual that is inter- ested;; and the part (

The keynote of Mill's method is found in the individualism which he inherited from the 18th century — a doctrine of laissez-faire, which meant that the sole end of government is to protect each individual in the possession of the product of his labor. Considered in the light of the 20th century Mill's fault was lack of faith in the ability of society to improve itself by political machinery. The liberty he praises is a very positive ideal ; in fact, he imagined himself to be doing much more than urging the inestimable value of the spirit of liberty. He professed to discover a principle which should enable future generations to as¬ certain which type of legislation impairs that spirit — in other words, a just conception of the

relation of society to liberty.

Mill's work 'On Liberty> has much more than mere historical importance. It is an elo¬ quent and reasoned appeal on behalf of a prin¬ ciple whose recognition Mill thought to be the most valuable thing in society, and it has, as such, a permanent value and interest. While the trend of modern thought has been so far away from individualistic standards that Mill's renown has been somewhat obscured, his influence on his generation would be diffi¬ cult to overestimate. Next to Herbert Spencer's 'Social Statics> and (Man Versus The Stated Mill's essay 'On Liberty > is probably the finest expression of that political individualism which pervaded and dominated mid-Victorian England. Consult Mill, John Stuart, 'On Liberty) (1859, People's ed.) ; id., 'Autobiography (1873; new ed., 1908) ; Stephen, Leslie, 'The Utilitarians) (Vol. III. is devoted chiefly to Mill's work, especially pp. 60, 244-281); Ritchie, D. G., 'Principles of State Interference) (1891); Graham, W., (English Political Philosophy*

from Hobbes to Maine) (1899); Douglas, Charles, (John Stuart Mill, A Study of his Philosophy 0895); Whittaker, Thomas,*

(Comte and MilP (1909); Buckle, H. T.,

'Essays (pp. 39-161) ; Davidson, W. L., 'Po¬ litical Thought in England: the Utilitarians> (Chap. 8-10).*

Harry J. Carman.

ON NE BADINE PAS AVEC L'AMOUR

('One must not trifle with love, 1834) is im¬ portant in the writings of Alfred de Musset, both because it is the most poignant of his dramas and because it is first to mark a change in the whole character of his literary produc¬ tion He had met George Sand in August 1833, had gone with her to Italy in October, had returned alone in April 1834. One insignifi¬ cant poem was the sole fruit of that interval. This play and 'Lorenzaccio,* both written in the later half of 1834, show no longer the fresh¬ ness of youth and fancied sorrows but the bit¬ ter reality of actual suffering, a tormenting self¬ questioning, sometimes a desperate pessimism. Though the title is proverbial, 'One must not play with love,* is not technically what French dramaturgy calls a Proverbe, like Mus¬ set's 'II faut qu' une porte soit ouverte ou fermee* or 'Une caprice.* These were society scenes, eminently actable. 'One must not trifle with love,* was the last of Musset's plays to be acted (1861) and is indeed quite unsuited to the stage. A chorus, in old- fashioned French, fills interludes with com¬ ments on the action, somewhat after the fashion of the Greeks. A baron, a tutor, a cure*

and a governess furnish with their complacent self- importance a sedately comic relief to the tragedy of young Perdican's play with the love of his cousin Camille and her foster-sister Rosette. Flitting from one to another with care-free, vagrant fancy, at last he discovers, too late, the inestimable jewel of which he has made a sport; Camille, truly loving and (beloved, finds Rosette dead at Perdican's re¬ nunciation of her devotion and leaves him as the curtain falls, hopeless, in the consciousness of his unatonable guilt, herself not guiltless, yet with a broken heart.

Benjamin W. Wells.

ON THE SUBLIME (II epl ' X fovg), «the most striking single piece of literary criticism produced by any Greek writer posterior to Aristotle,® and a work whose popularity is at¬ tested by the fact that it has been translated into at least 12 languages, including Dutch, Swedish, Polish and Russian, is a treatise ad¬ dressed to one Terentianus by a certain Dionysius or Longinus or anonymous writer (according to different manuscripts) and for a long time was commonly ascribed to Cassius Longinus, the Greek rhetorician of the 3d cen¬ tury. But the equivocal testimony of the manu¬ scripts, the absence of direct references in an¬ cient authors, the names included in the treatise or absent from it, the writer's affinities in style, in thought and in general standpoint — such considerations when taken singly cause hesitation and when taken together raise the most serious doubts as to the truth of the traditional' view. In the light of recent re¬ search it has come to be recognized that the external evidence in favor of attribution to the historical Longinus is of a highly dubious char¬ acter, and that the internal evidence seems to point to the 1st century rather than the 3d as the period within which the treatise was prob-

ably written. Gaps exist in the manuscripts t0ˆhout one-third of the work and

solution1 If !te S°Uu,Ce of hope for the future

solution of the problem by the discovery of a

more complete manuscript. The object of the

*a n ohl 1S *2 .lndlcatˆ broadly the essentials of a nobk and impressive style. He defines sub¬ limity as a certain distinction and excellence in expression and remarks that innate elevation ot tone can be regulated by acquired art After a brief account of defects of style opposed to sublinuty,*

such as tumidity, puerility, misplaced passion and frigidity, the following five sources of he sublime are enumerated : (1) grandeur of thought, founded on nobility of character; U) vehement and inspired passion; (3) figures of speech, such as adjuration, rhetorical ques¬ tions, asyndeton and hyperbaton; (4) noble phrasing or diction, into which enter such ele¬ ments as choice of proper and striking words metaphors, similes and hyperboles; (5) eleva¬ tion in arrangement of words. By way of con- c usion, the author in a notable passage endeav¬ ors to trace the causes of the dearth of great literature in his own day and decides that it is traceable to decay of liberty or spread of wealth and luxury. The treatise may be considered as a , lsTllsltlon n°t only on the formation of style, but on literary criticism in general. It is a veritable storehouse of quotations, from at least 50 Greek writers, illustrating the excel- lencies and defects of matter and form. Such familiar topics of modern criticism as correct¬ ness, standard of taste and comparative method are not neglected by the author. There is a good English translation (with the Greek text

Viˆ9arˆ? Rhys Roberts (Cambridge

f«yy;. I he introduction and the appendices of his work give a good survey of the problems involved and of the bibliography to that date.

Herbert F. Wright.

ON THE SUBLIME AND BEAUTI¬ FUL. Edmund Burke's (A Philosophical En¬ quiry into the Origin of Our Ideas of the Sub¬ lime and the Beautiful5 appeared in 1756. In later editions it was much enlarged and pro¬ vided with an introductory discourse on (Taste. 5 Though but remotely connected with the major interests of his career, this work of his early manhood exhibits the characteristic marks of his comprehensive and penetratingly reflective mind, and it .occupies an interesting place in the history of aesthetics. Previous critics, Burke complains — he might have men¬ tioned Addison — make existing works of art the measures of new artistic creations; and this practice leads to an unfruitful imitation of models and to traditional judgments. He is inspired by an acceptance of the philosophy of Locke to discover by direct investigation of human nature the physical causes of the vari¬ ous qualities of emotion experienced in the presence of works of imagination. He finds that ideas capable of powerfully impressing the mind are related either to self-preservation or to society. Those which are related to self- preservation turn mainly on pain or danger, as ideas of terror, obscurity, power, privation, vastness, infinity, difficulty, etc. ; and these con¬ tribute to the effect of sublimity. Those ideas which are related to society turn mainly on gratification and pleasure, and excite affection an," tenderness, and the objects which thus

affect us we call beautiful. Burke distinguishes a pure aesthetic emotion for beauty in general from the passion excited by the beauty of woman, in which lust mingles ; but his analysis of beauty is distinctly from a masculine point ot view. ((We submit, 55 he says, «to what we admire, but we love what submits to us.55 Having examined and dismissed the more or less current notions that beauty is determined by proportion, by utility or by virtue, he finds the properties of a beautiful object in relative smallness, smoothness, gradual variation, deli- cacy and clear mild color. Taking issue with Shaftesbury who in the (q.v.). His relation to Lessing is discussed by W. G. How¬ ard in (Publications) .of the Modern Language Association (Vol. XXII, 1907).

Stuart P. Sherman-.

ONA, 6 na, or AONIH, o'ni, a group of South American Indian tribes living in the dis¬ trict surrounding the Strait of Magellan and in Tierra del. Fuego. They constitute one of the three distinct Fuegian races, each of which appears to be of different stock and to possess an individual language. They are a low type of savage although physically well developed. Their family ties are of very slight order, they have no chiefs, build only the flimsiest of huts and despite a rigorous climate go almost naked. They live chiefly by hunting and fishing; and are skilful in the construction and Use of bark canoes and in basketry. Consult Martial, L. F., Mission scientifique du Cap-Horn5 (1888).

ONA, Pedro de, pa'dro da o'na, Chilean poet: b. Confines, Chile, about 1571; d. in battle about 1620. He was educated at Lima (then Los Reyes del Peru), and there wrote his great epic poem, (Arauco Domado5 ((Chile Conquered,5 1596; re-edited 1849), which is reckoned , a Spanish classic, being included in the Spanish Academy's (Catalpgo de Autori- dades de la Lengua,5 as well as various sonnets and the descriptive poem, (Temblor de Lima el Ano de 16075 ((The Lima Earthquake of 1607, 5 1609). So popular was his work in his day that it had many imitators, some 40 of whom, were well-known poets. His work had more influence upon the Spanish literature than had that of any other Spanish colonial writer with the probably one exception of the Mexican poetess, Sor Juana Ines de la Cruz.

ONAGER. See Ordnance.

ONAGRACE2E. See Evening Primrose.

OfrATE, Juan de, hoo-an' da d-na'ta, Span¬ ish explorer: b. Guadalajara, Mexico, about 1555 ; d. about 1615. He was a man of position and influence in the colony, a son of the founder of Guadalajara, and he married a granddaugh¬ ter of Cortes. In 1595 permission was granted him by the viceroy, Velasco, to colonize the dis¬ trict north of the Rio Grande, but Monterey, Velasco's successor, withheld full powers as governor until 1598, when Onate set out on his expedition from Zacatecas with 400 soldiers, 130 of whom had families, and many wagons and cattle. He crossed the Rio Grande, founded San Juan, the first capital of New Mexico, and, notwithstanding conflicts with the Indians, the colony flourished. In 1599 and 1604 Onate explored Arizona, probably part of Kansas, and though records show that he was not governor of the colony after 1608, there is nothing by which to accurately deter¬ mine the date of his death. Gaspar de Villa- gra, a captain who accompanied Onate, has left a long epic poem in which Onate is made the hero of the narration; and from this the chief events of Onate's life have been gathered, in so far as they are known.

ONAWA, on'a-wa, Iowa, town, county-seat of Monona County, within five miles of the Missouri River, on the Illinois Central and Chi¬ cago and Northwestern railways, 37 miles south¬ east of Sioux City. It is the centre of an excellent agricultural and stock-raising region and has a considerable local trade. It has pub¬ lic schools and a public library (founded in 1867). Pop. 2,256.

ONAWAY, on'a-wa, Mich., village in Presque Isle County, 130 miles north of Sag¬ inaw, on the Detroit and Mackinaw Railroad. It is situated in a region devoted to fruit and stock-raising and has a lumber trade and manu¬ factories. Pop. 2,789.

ONCORHYNCHUS, the genus of the andromous Americana and Asiatic Salmonidce which includes the salmon of the north Pacific. It is so called from the hooked jaws of the spent males. It is also the King salmon. These salmon are of great importance on account of their large size and excellent qualities. See Salmon.

ONE HUNDRED COMMITTEE, the

name given an organized body of New York citizens, who during the occupation of Manhat¬ tan bv Lord Howe were intent upon maintain¬ ing their independence. Governor Tryon, the British commander, was so intimidated by the committee he feared for his personal safety and took refuge on board a British sloop-of- war. . The committee pave courage to the Sons of Liberty who removed the cannon from the royal battery at the foot of Broadway to a place of safety for the use of the people.

ONEGA, 6-nye'ga, (1) a lake in Russia, near the centre of the government of Olonetz, after Ladoga the largest lake in Europe, cover¬ ing, an area of about 3,700 square miles. It is of irregular shape, has generally rocky shores, and numerous creeks, bays and islands, rand is well supplied with fish. Numerous shoals and sand-banks interrupt its navigation. It is fed chiefly by the Migra, Shuia or Shuisk, Vodla and Vytegra, and discharges itself into Lake Ladoga by the Svir. A canal between the Vyte¬

gra and the Kayla, an affluent of Lake Bielo, gives it an opening into the basin of the Volga. (2) A river to the east of Lake Onega, which, issuing from Lake Lacha, government of Olonetz, flows first northeast, then northwest, and after a course of about 270 miles, so much broken by falls and rapids that it cannot be considered as navigable, enters the White Sea at the southeast extremity of the Gulf of Onega.

ONEIDA, o-ni'da, N. Y., city in Madison County, on the New York Central and Hudson River, the West Shore and the New York, Ontario and Western railroads, about 110 miles in direct line west by north of Albany, the State capital. The place was settled in 1839, at the opening of the Utica and Syracuse Railroad, now the New York Central and Hudson River Railroad, and was incorporated as a village 20 June 1848. It was granted a city charter 28 March 1901. It is the commercial centre of a fertile agricultural region and has consider¬ able manufacturing interests. The chief manu¬ facturing establishments are chair factories, push cart works, casket and carriage factories, knitting mills, steel pulley works, cigar fac¬ tories, canneries, iron works, milking ma¬ chines and milk bottle caps. There are about 1,800 employees in the manufactories. It has a large trade in its own manufactures and in farm and dairy products and fruit. It has a city hospital, a private hospital, an old ladies' home, an excellent high school, many fine churches, athletic field of 11 acres, also playground of two acres.

*Oneida Lake (q.v.), five miles north by west, is a popular outing place. The Oneida Com¬ munity (q.v.) is located two miles to the south, and Oneida Castle, the site of the ancient head¬ quarters of the Oneida Indians, adjoins Oneida. The three banks have a combined capital of $235,000, and the annual amount of the busi¬ ness is about $30,000,000. The government is vested in a mayor and six aldermen. The city owns and operates the waterworks. Pop. 10,541. Consult Durant, '.History of Oneida County.**

ONEIDA, a lake in New York, on the boundaries of Oneida, Oswego, Madison and Onondaga counties, about 18 miles south of the eastern part of Lake Ontario. It is 25 miles long and about 5j/2 miles wide. Several small streams flow into the lake and the head-waters of those from Oneida

County are near the source of the Mohawk River, and the outlet of which is Oneida River whose waters enter Lake Ontario through Oswego River. Sylvan Beach, on the east bank, is a favorite resort and a number of small villages are along the shore, the lake has a few islands.

ONEIDA COMMUNITY, a settlement of Commumsts (see Communism) at Oneida Madison County, N. Y., sometimes called Per- fectiomsts The community was founded in i847 by John Humphrey Noyes (q.v.). He had originally formed a small settlement of his fel¬ low-men at Putney, Vt., in 1838. During the first 10 years the settlement at Oneida made slow progress, but eventually became very suc¬ cessful, as a result of numerous industries and manufactures. The community followed a com¬ plex marriage system, there being no ceremony nor permanent ties between couples, and the community assumed all responsibility in the sup-

*port aiid cducahoii of children. According to the Oneida doctrine on marriage, love does not consist with selfish claims ((and no more per- mits exclusive appropriation of persons than of things. Marriage, therefore, was ˆcomplex® and not simple.® Men and women in the com¬ munity were free to cohabit at pleasure; but the propagation of children was theoretically under the control of the society and con¬ ducted professedly on scientific principles. Out- si~e opposition, principally from the Protestant churches, arose, and the marriage system was abolished in 1879. The community reorganized and constituted itself a joint-stock company in 1881, and the co-operative plan was followed in financial and domestic matters, but the com¬ munity of property and the distinctively social life were given up. A common dining-room, laundry, library and assembly hall are features still retained of the old community life. Each member has now a separate individual interest represented by shares of stock in place of the former undivided interest in the common prop¬ erty. A guarantee of support was given to all elderly and infirm persons in lieu of stock and also for the support and education of the chil¬ dren of the community, in 1882, until they should be 16 years of age. Co-operative privi¬ leges were limited to the members of the Oneida Company and their children and could be extended to others only with the unanimous consent of the subscribers to the original agree¬ ment. In 1882 the community had property valued at $600,000. Since the reorganization branch manufactures have been established at Niagara Falls, Sherrill and Kenwood, N. Y., and in 1903 the total valuation of community property was said to exceed $2,000,000. There were then upward of 300 persons in the com¬ munity which has since grown very consider- * ably. Consult*

Hinds, (American Communi- ties> (1902).

ONEIDA INDIANS (Oneyotka-ona, ((peo- ple of the stone® or from the Iroquois <(tiionen- iote® — (

O'NEILL, o-nel', Owen Roe (((Red Owen®), Irish warrior: d. 6 Nov. 1649. He was the nephew of Hugh O'Neill, Lord of Tyrone, and was educated at Louvain and in France; and subsequently distinguished himself as the commander of the Irish troops in the service of Spain. The wholesale confiscation in the north vol. 20 — 44

of Ireland known as the (

O'NEILL, Sir Phelim, Irish rebel: b. about 1603; d. Dublin, 10 March 1653. He was a kinsman of the Earl of Tyrone and was active in the rebellion of 1641. He was a member of the Irish Parliament at Dungan¬ non in 1641 and joined forces with the Earl of Antrim to support the cause of Charles I in Ireland. He was leader of the band which captured Charlemont Castle and he later be¬ came commander-in-chief of the forces of the north. Failing to gain support from the Scot¬ tish settlers in the north he ravaged a goodly portion of Ulster on a pretended necessity for reducing their opposition to the king's forces. He was unsuccessful in his siege of Drogheda Castle in 1642 and losing the confidence of his followers he was succeeded by his kinsman, Owen Roe O'Neill. His fortunes never rallied after this although he had expected to be re¬ stored to his old command, particularly after his kinsman's death in 1649. He took part in the battle of Scarriffhollis and played a notable part in the defense of Charlemont Castle against the forces of Parliament but was compelled to capitulate in 1650. He remained in hiding for a time but was captured, tried for treason and executed.

O'NEILL, Sir Turlough Luineach, Earl of Tyrone, Irish dhi-eftam : b. County Ulster, about 1530; d. September 1595. He was a cousin of Shane O'Neill, and after vain en¬ deavors to supplant him in the clan succeeded him on his death in 1567. He then pledged loyalty to Queen Elizabeth but without any apparent intention of supporting the govern¬ ment or abandoning the practices of his predeces¬ sor in his leagues with the Scots and defiance of authority. An expedition was "sent against him in 1574, under the command of the Earl of Essex, but met no success and ended in the extension of O'Neill's land grants and other privileges, including the maintenance of 300 Scottish mercenaries. He further gained royal approbation in 1578 in his creation as Baron of Clogher and Earl of Clanconnell for life. Sub¬ sequently, however, he again entered into con¬ spiracy against the government, meantime rav¬ aging the lands of neighboring clans. The gov¬ ernment then took up the claims of his cousin Hugh for the chieftainship of the clan Tyrone and after many changes in fortune he was forced to yield in 1593. Two years later he at¬ tempted to regain control of the clan but was repulsed, his castle of Strabane was razed by his cousin and Turlough took refuge in some nearby ruins, where he died.

ONEIROTECHNICS, also called DREAM ANALYSIS, an ancient and at various times reputable or disreputable pastime which has in modern times been entirely revised and recast and constitutes in modern psychological thought

an earnest and intense field for scientific investi¬ gation. The dream is thus considered a definite product of the body's activity. Behind its ap¬ parent meaninglessness it has much serious meaning. Although frequently expressed in unintelligible phrases, it is only nonunderstand- able to those who are without comprehension ; as a foreign language, Chinese or Choctaw for example, have meaning for those who under¬ stand. As Lanier puts it:

Then sight and sound: Then space and time, then language, mete and bound, and all familiar forms, that firmly keep man's reason in the road. Change faces, peep betwixt the legs, and mock the daily round."

Behind this mocking, however, the unconscious peeps through, and in that modern psycho¬ therapeutic method, psychoanalysis, the dream is used as a royal road into the unconscious.', By means of the careful analysis of the dream the unconscious motives of the dreamer are made known to him to better his mental adaptations to realty. Consult Jelliffe, tech¬ nic of Psychoanalysis.*

ONEONTA, o-ne-on'ta, N. Y., third class city in Otsego County, on the Susquehanna River, and on the Delaware and Hudson Rail¬ road, is the terminus of the Ulster and Dela¬ ware Railroad, which connects with the West Shore at Kingston, and of the. Southern New York Railways Company, formerly the Otsego and Herkimer Railroad, which connects with the New York Central lines at Herkimer and Utica. The town of Oneonta was settled prior to the Revolution, but the first settlement within what is now the city limits was made in 1790 by Frederick Brown. It was incorporated as a village in 1848. It is in an agricultural re¬ gion which is a most productive dairy country, more milk being produced within a 25-mile . radius of Oneonta than in any other sec¬ tion of New York State. The chief manufac¬ turing establishments are the Delaware and Hudson shops, which have approximately 1,000 employees (aside from 750 trainmen who live here); cigar factories, 75 employees; knitting mill, 100 employees; flour and feed mills, 100; shirt factory, 100; silk mill, 100; only American plant making Sanatogen, 20; overall factory, 125; novelty works, 14; miscellaneous, including two wholesale grocery houses, 60. It is the seat of the Oneonta State Normal and Training School which had enrolled in 1915 nearly 1,100 non-resident students. It has the Aurelia Fox Memorial Hospital, a State armory, a public library, a new government building and post office, a new municipal building, country club with a nine-hole golf course, three city club houses, a chamber of commerce having 250 members and a paid secretary, and 12 churches. The government is vested in a mayor and coun¬ cil with subordinate boards

employing paid of¬ ficials. Pop. 10,500.

ONIAS, a Jewish high priest, the son of Simon. About 188 b.c. he fled to Egypt, where he built the temple of Leontopolis, or rather he remodeled an old pagan temple given to him by the Egyptians. This Leontopolis was lo¬ cated near Heliopolis, 180 stadia from Mem¬ phis, and must not be confounded with the Leontopolis of the Delta. There is more or less obscurity regarding Onias, and from various accounts there appears to have been three of this name. Josephus declares that the builder

*of the Leontopolis was a son of Onias who fled to Egypt in the time of Antiochus V, about 164 b.c. Another account says that Onias III was murdered by Andronicus in a sanctuary near Antioch. In Isaiah (xix, 18-25) refer¬ ence is made to five cities in Egypt, occupied by the Hebrews, one of them called Leontopolis (the city of the Lion) ; and also to an altar and sacred tower at the border of Egypt where the Egyptians are expected to offer sacrifices to Yahweh. Consult Duncan, J. G., (Exploration of Egypt and the Old Testament (New York 1909) ; Herzfeld, L., (Geschichte des Volkes Israel * (Vol. II, Leipzig 1863) ; Naville, E., in (Egyptian Exploration Fund Memoir* (London 1888); Petrie, (Hyksos and Israelite Cities* (London 1906).*

ONION, a river in Vermont. See Winoos¬ ki.

ONIONS, un'yunz, Oliver, English novel¬ ist : b. about 1876. His earlier work was that "of a designer and commercial artist and he subsequently wrote for Le Quartier Latin in Paris and contributed war drawings to London periodicals. Turning his attention to fiction he achieved a considerable success. He wrote (Little Devil Doubt) (1909) ; (In Accordance with the Evidence (1912); (The Debit Ac¬ count* (1913) (The Story of Louie* (1913); (Gray Youth) (1914) ; fMushroom Town> (1915) ;*

ONIONS AND ONION CULTURE, va¬ rious species of Allium, a genus of the lily family; specifically, A. cepa, a bulbous-rooted biennial herb with hollow radical leaves and a leafless, hollow, usually swelling stem, which bears an umbel of small six-segmented bell¬ shaped white or pinkish flowers, replaced in some cases by bulblets. It has been so long in cultivation that its original form is not defi- mtly known. Probably it is a native of west¬ ern Asia and adjacent parts of Africa, since it is mentioned in old(Egyptian writings, the Pentateuch, etc. It has spread to all contries occupied by civilized man, by whom its bulbs (and to some extent its leaves) are used as a vegetable and for flavoring various culinary preparations. The annual onion crop of the United States amounts to more than 6,000 000 bushels.

Being very hardy, the onion may be planted as soon as. the ground can be worked in early spring, or it may be cultivated during the win¬ ter where the temperature does not fall to the ireezing point. In the Southern States it is generally cultivated as a winter crop. The essentials of its cultivation are a well-drained light, friable soil, rich in all plant food and humus and, above all else, free from weeds. Onions, especially while little, cannot compete with weeds. Reclaimed marshes, such as are used for celery, are highly valued also as onion fields. Every effort having been made to make the soil as loose as possible, the seed is sown in drills about 12 inches apart; machines being used for the purpose. Since the plants are somewhat slow in making their appearance and are very inconspicuous, planters often mix a few radish or turnip seeds with the onion seed the young radishes being quick to appear, con¬ spicuous, easy to remove and serving to indi¬ cate the positions of the rows until the onion plants can be seen. Throughout the growing

season the onions are kept free from weeds, ninnecl to distances about three inches apart, and the soil between the rows is kept loose and open by frequent cultivation. When the necks o ± most of the bulbs have turned yellow in the autumn the bulbs are pulled, four or nve rows being combined in one windrow, and the scullions,® or thick-necked, immature bulbs, discarded. After drying in the field for a few days the bulbs are gathered in crates, which are piled under cover for further drying before sorting and shipping them to market. Dryness, coolness (just above freezing) and soundness are essentials in storing onions during the winter.

Onion cultivation has several modifications of importance. Improved methods of culture consist in starting the plants in hotbeds or cold- frames and transplanting them to the field when four or six inches tall, and thereafter cultivating them as above described. The ad¬ vantages claimed for this method are that the plantlets are under complete control while small — the precarious time; that they are read¬ ily transplanted under ordinary conditions ; that the cost of transplanting is not greatly in excess of that of weeding in the other method; and that not only is there a more even stand in the field, but that the bulbs are larger and of more uniform grade. Another frequent practice is the sowing of seed in the autumn where t'he plants are to remain; and a still more com¬ mon one is the planting of <(sets ,® — little onions which have been specially grown for this pur¬ pose, the seed being sown very thickly the year previous. These sets are especially valued for the production of <0bunch onions,® which ap¬ pear in the markets during the early spring and summer months.

Some varieties of the onion are remarkable for their method of propagation. The potato or multiplier onion has two or more ((cores® or ((hearts,® each of which will send up leaves when the bulb is planted. If separated from its fellow hearts, each core will produce a new compound bulb and sometimes send up a flower- stalk. This variety is, therefore, a perennial which resembles garlic in its method of prop¬ agation and is intermediate in flavor between garlic and the common onion. Another botani¬ cal variety is the <(top® or ((tree® onion, which develops bulblets instead of flowers, or both, at the top of the flower-stems.

Of the varieties of the common onion grown in America, the red ones are usually of strong¬ est flavor, the yellow ones next and the white ones mildest. But still milder and better fla¬ vored are the foreign varieties known as Ber¬ muda, Spanish, etc., which are less hardy than the common kinds and are little grown in the North. They are largely cultivated in the South and in California, whence the markets derive their chief supply.

The Welsh onion or <(cibol® (Allium fistulo- sum) is a native of Siberia. It resembles the leek 'n the absence of a distinct bulb, but dif¬ fers from the leek in its hollow, onion-like leaves, which are cut like those of the shallot and used for flavoring. It is of dwarfer growth than the common onion and has more clustered leaves. It may be propagated by division of the bulbs or by seeds. In the United States it has not become very popular.

Onions are occasionally seriously attacked

by parasitic plants, which may devastate whole fields and which are not of easy control by any devised method. Bordeaux mixture has been recommended, but rotation, the crop being planted upon smut-free land, is perhaps most satisfactory.

Among the insects which prove destructive to the onion are several species of cut-worms, especially Agrotis messoria. All of these may be held in check by poisoned baits, such as sweetened bran or clover, or by trapping in early spring when the insects revive after pass¬ ing the winter in the larval stage. The onion thrips (Thrips tritici), a tiny sucking insect, sometimes devastates whole fields bv appearing in great numbers, puncturing the leaves, which turn yellow wherever pierced. It is especially troublesome in Bermuda. Kerosene emulsion has been most frequently recommended as a remedy. The most serious pest, however, is perhaps the onion maggot, the larva of a fly (Phorbia i ceparum) which lays its eggs close to the young onions in early spring. The larvae burrow into the young bulb, causing the plant to wilt and decay, a result which follows even slight injury. In late spring the maggots pu¬ pate and in about two weeks appear as adults, which lay eggs for a second brood. This brood winters partly as adults and

partly as pupae. The best remedy is probably ground tobacco- stems liberally applied to the young plants in early spring. This acts as a repellent, an in¬ secticide and as a fertilizer, and may be applied without fear of its injuring the plants. Another good plan is to pull and burn the plants of the early sowing when found to be wilting, which will lessen the number of flies able to lay eggs for the second brood. Nitrate of soda and kainit are recommended to be sown broadcast after the removal of the wilted plants; these are thought to act as insecticides and fertilizers. Consult Bailey, (Cyclopedia of American Horti- culture) (1900-02) and the special literature therein mentioned under the article Onion.

ONKELOS (Aramaic for the Greek name Akylas or the Latin Aquila), author of the Targum or Chaldee paraphrase of the Penta¬ teuch which bears his name. According to the Babylonian Talmud he lived in the time of Gamaliel, hut not earlier than the 2d and not later than the 3d century. He was a dis¬ ciple of Gamaliel and at his funeral is said to have revived an ancient custom by burning costly material to the value of 70 minse. His Chaldee is purer than that used in Palestine, and he may have been a Babylonian. His version is good, and continued until the beginning of the 16th century to be chanted in the synagogues alternately with the Hebrew. It has often been printed with or without the Hebrew text. It is supposed to have received its definite form in Babylonia in the 3d century a.d. The Samaritan Targum of the same date is evidently based upon the same authority. Another Targum on the law, known as the pseudo Jonathan, edited in Palestine in the 7th century a.d., while based on the same interpretation, is fuller and closer. See Targum.

ONNES, on'nes, Heike Kamerlingh, Dutch

physicist : b. Groningen, 21 Sept. 1853. He was educated at the University of Groningen, and after acting as assistant at the Delft Polytech-

nic he was called to Leyden where he became professor of physics and director of the physical laboratory. He is noted for his researches in low temperatures, his study of helium and his discovery of the possibility of perpetual electric current through metals at certain temperatures. He was awarded the Nobel prize in physics in 1913, and is a member of the Royal Institute of Great Britain. He is author of numerous works on physics, among them (Over het Aereiken van temperaturen belangrijk beneden het kook- punt van helium > (1910); Experiments at the Cryogenic Laboratory at Leyden) (Vienna 1910; Eng. ed., 1911), etc.

ONODI, o'nd-de, Adolf, Hungarian physi¬ cian : b. Budapest 1857. He was graduated at the University of Budapest in 1881, and in 1886 became lecturer in anatomy there. He later specialized in laryngology, became lecturer in that branch in 1894 and' since 1896 has been professor. Author of (Die nasenhohle und ihre Nebenhohlen (1893; Eng. trans., 1895); (Die Anatomie und die Physiologie der Kehlkopf- nerveiP (1902) ; (Die Nebenhohlen der nase beim kinde) (1912), etc.*

ONOFRITE. An ore of mercury consist¬ ing of the suilphose lenide, Hg(S,Se), contain¬ ing about 81 per cent of the metal. An ore formerly mined at Lucky Boy mine, six miles southwest of Maryvale, Utah.

ONOMACRITOS, on-6-mak'n-tus, Greek soothsayer and poet, who lived in the time of the Pisistratidse, 6th century b.c. At Athens he was the head of an Orphic sect and expounded the mysticism, poetry and theology of Musaeus, while his pupils arranged the Homeric poems in connected series in accordance with the sug¬ gestion of Pisistratus. Having been detected making an interpolation in one of these oracles, he was banished from Athens by Hipparchus about 516 b.c. He withdrew to Persia, where the Pisistratids employed him to encourage Xerxes to invade Greece by repeating to the king such oracles as seemed to promise success. Consult Ritschl, F. W., 'Onamakritos von Athen in his 'Opuscula* (1866).*

ONOMASTICON, a Greek term properly meaning a list of names or words, denotes par¬ ticularly a dictionary or encyclopedia of proper names. More specifically, the work of Pollux, executed in the 2d century b.c., in the Greek tongue.

ONOMICHI, ono-me'che, Japan, seaport in the prefecture of Hiroshima, on the main island of Japan, 190 miles southwest of Kioto on the Inland Sea. There are numerous temples and the streets are narrow and picturesque. The town has a thriving trade and an increas¬ ing population. Pop. 30,367.

ONONDAGA, on-on-da'ga, a lake in New York, near Syracuse. The outlet is Seneca River. Onondaga Castle, the headquarters of the Onondaga Indians (q.v.), was near this lake.

ONONDAGA (<(on the top of the moun- tain})) INDIANS, an American tribe of the Iroquois confederacy residing in central New York, on the shores of Onondaga Lake and on the mountain of the same name, in the terri¬

tory now occupied by Onondaga County. Their territory also extended northward to Lake On¬ tario and southward indefinitely, some say, as far

as the Susquehanna. Among the Iroquois they were called the ((Name Bearers® ; but their chief village was Onondaga. Previous to 1681 it was situated on a hill, which now forms part of the town of Pompey. It was afterward removed several times but was always placed on high ground where it could be the more easily defended. Hence the name "Onondaga® given to these people by their enemies, and later by Europeans. Their present Indian reserve is in the region of their later tribal home. About one-half of the original Onondaga people followed Brant to Canada and settled on the Grand River in the province of Ontario where they still reside and are divided into nine clans. In the federal councils of the Six Nations, the Onondagas acted as a sort of presiding judge to settle questions upon which the other tribes scould not agree. In 1682 the Onondagas, then considered the chief of the Iroquois tribes, made a treaty of peace in Albany, in behalf of the Mohawk, the Oneida and the Cayuga, with rep¬ resentatives of the colony of Maryland and of the Piscataway Indians. In the negotiations that took place, for a number of years, with a view to promoting peace between the tribes of the north and those of the south of the Saint Lawrence and the Great Lakes, the Onondagas took a prominent part. At first they were op¬ posed to the confederacy which was finally made up of the ((six nations.® The Onondagas early showed a liking for the Christian colonies formed by the Catholic missionaries on the Saint Lawrence (among the Iroquois) and grad¬ ually members of the tribe went over to them singly or in small bodies until, by the middle of the 18th century, about half the Onondagas had emigrated to Canada ; but this did not pre¬ vent them from keeping on friendly terms with neighboring tribes, until the Revolution broke out in 1775 when they and the Iroquois joined issue with the British. This is why at the close of the Revolutionary War the Onondagas re¬ moved, for the most part, to their present reser¬ vation on the Grand River, Canada. The rest of the Onondagas are ad on several reserva¬ tions in New York State. The Onondagas at one time numbered probably over 3,000; but in 1851 Morgan, who knew them well, estimated their population at 500 in the United States and 400 in Canada. In 1906 the Onondagas in New York State numbered 553 and those in Canada about the same figure. Consult Bruce D H., < Onondagas' Centennial > (Boston 1896) Clark, J. V., (Onondaga > (Syracuse 1849) Hale, Horatio. (The Iroquois Book of Rites (ed. 1883); Hodge, f Handbook of American Indian Tribes of North America* (Washington 1910); Jarvis, S. F,, 'Religion of the Indian iribes of North America* (New York 1820)- Le Mercier F J < -First Settlement at Onon¬ daga (1654—58) ; Millet, Pierre, (De la mission de Saint J.ean Baptiste* (Quebec 1858) ; O'Cal¬ laghan, E. B., (De Frontenac's Expedition against the Onondagoes* (1696).*

ONOSANDER, more correctly Onesand- er, a writer on military tactics who lived at Rome in the middle of the 1st century after Christ, and

composed in Greek, under the title

of Stiategetikos, an excellent work on the art of war.

ONOSPIN, in chemistry , CcoHesO®. Pro¬ duced, together with formic acid, by boiling ononm with baryta water. On passing carbonic acid gas into the solution, and digesting the pre¬ cipitate in boiling water, onospin deposits on cooling as a white, interlaced crystalline mass, insoluble in ether, but soluble in alcohol and the alkalis. It is colored crimson-red by sulphuric acid and binoxide of manganese and melts at 162°.

ONOTO, o-no-to, a tribe of South Ameri¬ can Indians. They inhabited the eastern shore of Lake Maracaibo, lived chiefly by fishing, and built their houses on platforms over the water, supported by piles driven into the lake bottom. Ojeda found them living thus in 1499, and from the analogy fancifully named the country Ven¬ ezuela (namely Little Venice). Similar dwell- ings are found in this region though the tribe as an entity, chiefly through slavery, long ago became extinct. Onoto is also the vulgar name in Venezuela of a plant of the Bixac.eas family known as Bixa Orellana. It is also the name of a municipality in the district of Cajigal, Venezuela, which contains over 5,000 inhabit¬ ants.

ONSLOW, George, French composer: b. in Clermont-Ferrand, France, 27 July 1784; d. there, 3 Oct. 1853. He was a grandson of the 1st Lord Onslow, and was sent to London to finish his education. After studying there with Cramer, Dussek and Hiillmandel, he completed his musical education under Reicha in Paris. He was elected to succeed Cherubini in the French Academy in 1824. He attempted to write for the theatre but his operas were only a moderate success. He composed many beautiful quartets, sonatas, symphonies and other instrumental pieces that are still popular. His operas include 'L'Acalde de la Vega (1824); (Le Colporteur* (1827) ; and (Le Due de Guise* (1831).*

ONTARIO, Cal., city in San Bernardino County, on the Southern Pacific, Santa Fe, Salt Lake and Pacific Electric Line, 40 miles east of Los Angeles. Citrus fruits, grapes, peaches and apricots are grown extensively in the lo¬ cality and the city has a large trade in these products. The dairy business and alfalfa grow¬ ing are extensive interests in the immediate vi¬ cinity. There are also three canneries, nurs¬ eries, packing-houses, and a large electrical sup¬ ply manufactory. The city has a public library and a

splendid high school plant. The Chaffey Agricultural College is an institution in the city recently established and is of great importance to the city and this portion of the State. The Chaffey Library belonging to these two educa¬ tional institutions has an endowment of $80,- 000, which gives it a high educational value. The water supply system is the property of the municipality as well as the Ontario Power Com¬ pany. The three local banks have a combined resource amounting to $2,000,000. The actual valuation of real property is $7,613,550, with a tax rate of $1.86 per $100. Pop. 7,280.

ONTARIO, Canada, formerly called Upper Canada, the first in population and wealth and the second in area of the province of the Dominion. It is bounded on the north by Hud¬

son Bay and on the south by the Great Inter¬ national Boundary lakes, on the east by the province of Quebec and west rand northwest by Manitoba. It is 1,000 miles in extent from north to south and about the same distance from east to west. Its area, 407,262 square miles, of which 41,382 are water, is three and a half times that of the British Isles. For admin¬ istrative purposes the province is divided into 38 counties, subdivided into townships and electoral districts. The capital is Toronto (q.v.) and Ontario also contains the Dominion capital, Ottawa (q.v.), situated in the eastern part of the province. Other important cities are Hamilton, London, Fort William, Windsor, Kingston, Brantford, Peterborough, Guelph and Saint Catharine's (qq.v.).

Topography and Physical Features.— The surface generally is an undulating plateau land with no considerable elevations. The Laurentian Hills, with a maximum altitude of 2,120 feet, extend westward from the Thou¬ sand Islands near Kingston to north of Lake Simcoe and constitute the watershed separating the rivers flowing into the Great Lakes from those entering Hudson's Bay and the Ottawa and Saint Lawrence rivers. The rocks under- lying the superficial deposits may be broadly classed as follows: (1) Paleozoic rocks, em¬ bracing 30 per cent of the area of the province, including limestones, shales and sandstones; and (2) pre-Cambrian rocks, including granites, volcanic rocks, quartzites and other sediments. The chief rivers are those already mentioned, with the Attewapiscat, Severn, Moose and Al¬ bany, entering James Bay, and in the Saint Lawrence Basin the Moira, Trent, Grand, French, Thames and the Niagara, the cele¬ brated falls and gorge of the latter belonging partly to the province and partly to the United States. Besides portions of the Great Lakes, thousands of smaller lakes including Nipissing, Nipigon, Abitibi, Saint Joseph, Scugog, Sim¬ coe and Muskoka belong to the province.

Natural Resources.— A great part of the province is covered with timber,

chiefly pine, spruce, tamarack, oak and hickory, with water facilities making lumbering one of the principal industries. It is reckoned that there are 100,- 000,000 square miles of forest areas, exclusive of the district of Patricia; and there are 21,934 square miles of forest preserves. A great pulp and paper industry has been established, the principal works having been established at Iroquois Falls. The value of the forest prod¬ ucts is $40,000,000 annually. Fur-bearing ani¬ mals, the mink, otter, skunk, beaver, are ob¬ tained in considerable numbers in northern Ontario, which is also a popular hunting-ground for moose, caribou and other large game. Fish¬ eries are important, the catch consisting of trout, whitefish, herring, pickerel, etc., in 1916 being valued at $3,341,182. The province is exceedingly rich in minerals, which include the entire list of metallics and non-metallics, ex¬ cept coal. The principal metals are nickel, cop¬ per, silver, gold and iron, in addition to lead, zinc, cobalt and platinum. The non-metallics include petroleum, natural gas, salt, gypsum, lime, clays, stone and marble, arsenic, corun¬ dum, feldspar, mica, graphite, talc, pyrite, etc. In 1883 nickel was discovered at Sudbury, the deposit since proving to be the richest in the

world, the district holding with New Caledonia a world's monopoly of the metal, and Sudbury leading with 75 per cent of the whole. The province is rich In petroleum, the wells in the southwest, especially in Lambton County yield¬ ing immense and apparently inexhaustible sup¬ plies, over 30,000,000 gallons annually, while the same may be said of the salt wells on the shores of Lake Huron. Natural gas fields in the east near Niagara and in the west, near Detroit, sup¬ plying Buffalo and Detroit, respectively, have been exploited to the value of about $300,000 an¬ nually. Ontario's mining production in 1917 con¬ stituted a record, totalling $71,060,942, of which metallic production was $56,845,788 and non- metallic $14,218,269. The values included gold, $8,698,831 ; silver, $16,193,293 ; copper in matte, $7,842,890 ; nickel in matte, $20,943,500 ; pig iron, $1,016,699; cement, $2,934,271; iron pyrites, $1,066,575; natural gas, $3,182,154; salt, $1,095,- 866. Nearly one-half of the mining wealth of Canada is produced in Ontario.

Climate. — The climate is inclined to the ex¬ tremes of heat and cold during summer and winter respectively, but owing to the dryness of the atmosphere it is always healthful and bracing. Extreme cold is felt only in the north¬ ern part, the vicinity of the Great Lakes in the south greatly modifying the extremes of temperature. The average temperature for January in the south is 21°, minimum 10° be¬ low zero; the average for

July is 68°, maxi¬ mum 90°, but rare, the ordinary maximum be¬ ing 80°.

Agriculture. — Farming is an important oc¬ cupation, especially in the south, where soils of black loam with clay and sandy varieties are of excellent quality and highly productive. The richest, most thickly settled and most highly cultivated portion of the province is the peninsula between the Ottawa River and Lakes Ontario, Erie and Huron. Until within a few years northern Ontario or (

of potatoes. The total value of field crops was $190,646,000. Stock-raising, dairy farming and bee culture are among comparatively recent industries of the province which have been at¬ tended with encouraging results, largely due to the easy accessibility of markets by rail, supplemented by the lake, river and canal navi¬ gation. Ontario has 4,666,753 livestock; horses, 887,246; milch cows, 1 ,082,1 19 ; other cattle, 865,847 ; sheep, 595,477 ; swine, 1,236,964. Aver¬ age value of occupied farm land (1916) was $52.59 per acre. The southwestern peninsula of the province, lying between Lake Erie and Georgian Bay, rivals the Annapolis Valley in Nova Scotia in the production of apples, while peaches, pears, plums and the finest vari¬ eties of grapes grow to perfection in the south¬ ern counties. Peaches and grapes arc most extensively grown in the district between Ni¬ agara and Hamilton. The problems affecting agricultural life in Ontario as elsewhere are not few. The loneliness of farm life, the scarcity of labor, the decreasing population of rural districts owing to the lure of the West are ob¬ vious problems, although they do not seem to impoverish the individual farmer or prevent increased production and rising profits. In the 10 years (1901-10) the rural population fell from 1,246,969 to 1,194,785 and the urban in¬ creased from 935,798 to 1,328,489. In New Ontario the problems were forest fires, inev¬ itable transportation needs, the pioneer diffi¬ culties of clearing the land, etc. But these are trivial considerations in the general growth of the province and they are met by the encourage¬ ment of immigration and the sympathetic treat¬ ment by the government of questions as they developed.

Manufactures and Commerce. — The man¬ ufactures are numerous, chiefly owing to the favorable position which the province occupies with regard to water power, although steam power has been introduced to a large extent, coal being obtained without difficulty by means of the lakes from Pennsylvania and in smaller quantities from Nova Scotia. Chief among the supplies of water power are the falls on the Ottawa River and rapids of the Saint Lawrence, while the works on the Ontario side of the Niagara Falls by the Ontario Hydro-Electric Power Commission and others will give the province the most extensive water power works in the world. Up to date 100 municipali¬ ties derive electrical power from the water

systems of the Commission, their high and low tension lines extending in the province for 1,400 miles. The principal manufactures are lumber and its by-products, agricultural im¬ plements, iron and woodware, wagons and car¬ riages, railway rolling-stock (including loco¬ motives), cottons and woolens, leather, furni¬ ture, flax, ordinary iron and hardware, paper, soap, etc. The value of the export in 1916 of manufactured goods, agricultifral products, animals and- their products, timber, minerals, etc., was $482,000,000 and of imports $499,606,- 959. The fisheries were valued at $3,341,182.

Railways, Canals and Shipping. — Ontario has a perfect network of railways, nearly 12,- 000 miles, which has proved of great advantage in the development of the manufacturing and agricultural industries. In summer it is sup¬ plemented by the means of transport provided

VTarton-

Longitude \ est frormGreenwich,

y\ hitedfij

“Won J?

tqYh Lakey s/ljioVittioji

°y

m

ONTARIO

imont

ˆfy Bonfleld

J”L. Xosbonsir

| A’l’inAiojui L- (

Lake Pin ago

cAo

VyA Rutter

EAird I.

Wright

A M BOROS I.

Clappert

Wpos0 (anifou L.

iCai'e. Robert .

Powaesaˆ

*Ban*tt0>*

AVctaWnˆ It. Traverse

Trout

ir.rr-.-1

Green I.

Fort Coulong®

tmong'

arbour

Ttfovrat

C»'l> Stafford Aliceˆˆj

Stewart Bay,.

S O ,

Pearce Leg!

*South River S"udridge*t*

°Inner Duck I. JMipm.e Duck I.

ihiite Trout L

it. Opeongo

ManitOwifhing

Grka7 Dvoii i.

innecherc/

Snakevˆ .0 Rivei\

Burks /J ˆFalla

pˆCˆK earney'

ft' , 't£8ts£2£2hm&

isfeA 4»atS?«L f

,Tr.N..|-V*>/ /

c/waiipˆ fo/flfe.

o RircvjlD' lfS3a\ nDuPSftn RoberUo. Alexandriaˆ

ToAthol ,

feer Lukfc 5 = ˆ v = 2 < ALiulo L*W ® Spenco'

yr.:; ·'); ˆL°nely

'it zwIlDA m Island

yˆLpˆugldcn& I (

. — K-illaloeˆˆC; llopefield ,0Ov r r |— o

,,,[* Uc„y 03" r '■

Lake riontarfoˆˆˆ—jTx i o- attacking ham,', Dacroˆ sComber mere V-

yˆPalmer Rapida gt.Pfttt^'

ira

'o\CUrohu*- P I ' ICieek\C«r

»Tj PeOdletonj

ˆ °7]

AotiiniTyy

AfC*ustitts.ffUe/ j.

\ C \ty R

jnleVsAahtogX

Renfrew

‘Bark I^Tj/ -no

McKo,izU\W^k 0 La£+^~ MisA’

Sl. Veter

DouUer , .Hybla\

Birds (Creek

George Island Q

RUSSlM

Q L. Louisa

‘Weieome L\

ilG!ott

\ Mnnotiok^t

r-p’o ND..p,

Cove Island’

ptVhile L\dj >akenham\ feeder Hill0V => Sneddei

I ..ri.i-rs

^Cal.oi, [lead

Cape [II urd,^^® Tobermory /Mjjj(il) i))})

'\ v / 7L- \PVcr8 BaiM

\ Sadler Comer*) H L

r Kahweambclewagamoi

.Griffith | \ p*

%ˆHaliburton L.

icBb ˆennawaypri.

ˆuAroˆj

f/BW

y / Tory rtf. r /JDyeart ° t?/

XOattraxtA® °»‘oQCar] < A M Apl. i,n Coferj ‘-v

Lavant 6ta > d ˆcf»on‘« Lanfark

I _ Corn* rl Q Q/L –

Mat&watchani

Denbigh- \

fcM-ne ° yˆ-‘

rvy ennacnar o \ il Great \ I .\ >

N. Gower

iCh

“KˆˆUITord

,,‘Xv Koiwtaii

“-CKgrockearig

ilkenburg

Bancroft’

;oroer-ˆ

tesseiner

hi obla — purtlir

1 Or n-.r-lijidge

.Cape Crokcr) ?apc'j Crater (J

lleleua

'^AnJocAg'dflissifj

larding y Or'

^B/ftbnrst ty Eliott . Kulcau L. rj

VGrawenhurat'

-.jWilworthy

Non

Tolcd , j^rNNoAoj f'r/»nk»lll >» Roik0\j*'bl e

/ T.\ivn'' Sprs- \^AigO'

'x r.t Xl BeiUnxyVpr

' oAb*tX tOtthen-. Nrr o \ ' , – . .^v, — •^Dublin \

fir N- n v c. c-

Lynd burst Charleston V^WA&rton CaintoumyoSfcy

GJert.

V1 x Fler\tonQ ■% \

4c?®'r'. \« > *£/S\

nri\ ,sv^B ladngtoD /*

|oC,iyiieatLikr . °C,7trtn

0 Apt teg \ f/a(^p Bugle Lake r^1V

ARBORQuqnl^l

^ pawfCam ^ijns j

I npgtioi

Norwood

kNOtiQS

‘Ogdensburg

L — , j OatjBill I \ J/tsst8«fr v/ paxicv J oCob/oc°iVk; La A

iiy&ry*’ /iP?.d\e8 PE \Figeˆi rk Held Al’elTa \/gyp port nee Bowd XjialUJi

iˆVAi ,c t of R LˆiB?,raj

i7 > sl£Jlll!nsivf v\eT/Fenelo’M’/? ukllL/W o f y liˆyTunfilopy-‘

xgionQ 0ˆ\7oˆIˆe’ tctiaM i •- 1 1 v

‘un-PUˆ1 T.Ikm ‘ Reterhorouff

IBoirfi /v. iPtTT iM va”’

7 Sturgeon / Bay [Birch ˆSfturin ■\Elmrala l Phelpstoo >

Heawc»thl|

3ark/Headh

Vrockvilleˆ rood Springs

JL Jt ‘

■fhankT^^tr) ˆ ool/orj JneUf > n O/tVCn Sound

.llenford ˆRockford 0«

r»r« .Jf “V”1

f-jrcrˆcy ˆChatswcrth

ˆyˆawkeifoneA’;/

yodfrej’

letVr»‘k J

yao

■ C’VT) MarlbauCˆi .1 ‘■’ T homatbv.r

- Vf. U untiDgdoDOiWt oi /Madoc Jo. Kir, yy

[Dobbtolon

'illteroft | ^CliaaleyJ uPaisIoy_

m y indi

A -Bi ler ry^ /4r*^ArUtanf

w sZ3srWL**t

■/ Eraser p7V>/.«-^ oDartfoWpQ

Rosen.nib oiyaFkwor

t^-mRTHUj/IBERLAND Milt LrooJt^Harwooq o 1 Jc

-Cartner / Caatleton S„,itlinJr,.n(

jV Odd V Brcdlns Bright

"Vi \ /Bnltimore —

Omhamo o tV.Uow. / Cr<«tpf

JnvcrhuroTt

!// Ttd

> Crawford.

^xPomoni1

•^TpTTurh:—. x [

ypziL. :

istadti o <

i/;arrfci| O Feoi'il Lyton Kriolotdn

■'yN-Flesherton

„ |\ VJtov'

oldj, J7on

iorbetton | vIMelancthon l ^ 1N>,

OUT'FERIN't':^

(el burnt , o j-i-,..—

5^-^Cla' Iandc7p^>- Vincent ',

iThorntoo'i I Oilfordl -ookutowoj

Bradford J

Kincardiney

f ^ – – rnnkfortiy.

6 Zephyr TpJ It. Albert / J»J libridg^J JPerl ^'"G/Manchej| '<% Myrtl

Cp ^fi>biladelphia

iVolkertoLt *»*rc '!• r\ ' r rmoaa t'rmT'l ^i'ndeejda \j/.

Grind Stoue City

(purge,* Ambcrlc

- " * •"furl \ Llo>iltnwhv>4

iv* k'"bjH

m y rd

IlietunofirlV N ft Hill fu

I Sblinu0 o linn. pl<

Pu.KjaLiVD –

% ' a /

Point rraverso /

Kinycbmd}tc • Whltecbui'ClT^

d ' iiir Helene 'W.

■Port Albert 0 0 Winghan

If (III j ,: p.TOO-nnon ^JfrdVcy

■^•^3-Blyfhy o Vo? r ^Pr'r'P^v HcnfrJ^>

_/ O/* duJmlosboTbnjrh «% , ^-^Constanco"^ ^*/

Clinton lS^9 oWintbrop^* 3 w KovSeoforth / aceffeld * Fy^Bor/bolmo j

U/l Ilf (bryadaiel mppcnA^ Dublin A}) / J [1 1 (1 1 1 1 1 1' f Zurich \ / JMitchelP

/pjinsons Jdil!s> Hens alii Ll)^eU Sebr/n?r/i^ ^n' A ^ 'Daahwjod o X /-JoW-'r-' f

c^Milfore

^SyCherr

■'Sackcts (^HarbotJ

Watertown

Ulrand ValfeT"

^ \ r fT I ^

IBiueval^^O^ *° { ■'TirthurT^

'oAlla/Y,^^

irkbam1

V, — /

X;6intPetrc:

^crgdS Otprtafl^fjrfeb > 2ieerfon Georgetn^i' Lockwoodprg^^Kir]

dOWvIllo'

Lag fie !,

Mllvertot

Trunbot

i^\^*lle8loy7

|rto Exeter] Cr edition. A I

L,/9e“‘ejy

\ \Vol)ds(ooi>. ItIioCp.IqIo

! MerrittaiA

I Tborold Tenwick’ J

Moose Factˆ

Snrnidˆy,. s

l*nrlamia T I ,

’ /V

> > — ‘ — Jf/Uandatn‘0 J

V O 0.ˆ/ •»//? TwttU’lb Li.*./

-$/f00r.l>etrolaat St-CIairM i Moor «KWa A*)

bUss’’

LGlanworth J ?/****/(>} ˆ ‘

uppemllo—ˆ/j

/ropferviHo~

e X Dresdenˆ

Ennett fkent ica» Eˆˆ rEAJy

,tbwooAˆr

tP doakui

ˆ Y Wiglo ˆi-

hautef

Statute Miles, 35= I Inch

I r jjc t j nK;

NORTHERN ONTARIO

iUajvllle,

Chautaii/qi

C H A

IN*w Usdoao

Scales.

Statute Mile*, 105 —1 Inch.

. 10 20 30 40 50 «0 ?Q 8g

.kilometres, 169 = 1 Inch,

0 20 <0 60 80 100 120

Copyright by Rand McNally Jt Co.

w.1

ị c1'

0. ,

per'iot

T

by the lakes and by a magnificent system of canals. The principal canals are the Sault Sainte Marie Canal and the Welland Canal now under reconstruction, the latter 27 miles long, east of and parallel to the Niagara River, connecting Lakes Erie and Ontario.

Government. — The provincial government is administered by a lieutenant-governor ap¬ pointed by the governor-general-in-council for five years, assisted by a responsible ministry. There is only one chamber, the legislative as¬ sembly, elected by ballot for four years, with 111 members, by the apportionment of 1914. By the redistribution of 1914 the province has 24 Senators and 82 Representatives in the Do¬ minion Parliament. The government's policy is to encourage the development of provincial resources, and this may be said to be also the opposition party's policy. The revenue of On¬ tario is made up of subsidies and contributions from the Dominion treasury and from parol land and lumber sales, licenses, stamps,

etc. The government receipts total nearly $14,000,- 000. The municipal system is one of the most perfect in the world and affords a pattern fol¬ lowed in many other countries. Liquor pro¬ hibition is enforced.

Population. — :The total population in 1911 was 2,523,294, as compared with 2,182,947 in 1901, showing an increase of 15.58 per cent. The majority of the population is of English descent, Scotch, however, predominating in Bruce, Grey and Glengary counties; Irish, Ger¬ man and other nationalities are found around Toronto. There are about 26,000 Indians.

Education. — The school system of Ontario is admirable and is under the control of a minister of education, who is always a member of the provincial cabinet. The schools are supported by a tax on property, with state grants, and are free to all. They include kinder¬ gartens, public schools and high schools or collegiate institutions. Roman Catholics may, and do, establish separate schools and are then exempted from supporting the public schools and receive a separate grant from the govern¬ ment. There are schools for Indian children, normal schools, normal colleges, country model schools, art schools and 395 free libraries under the care of the board of education and there are a number of traveling libraries. Ontario has 6,660 elementary and secondary schools, employing 120,801 teachers and having an en¬ rolment of 508,522 pupils. There are in addi¬ tion 161 high, schools and 132 continuation schools. Ontario has 539 Roman Catholic and 5 Protestant separate public schools. For pub¬ lic and separate schools the province now spends over $13,000,000 annually. At the head of the educational systems stands Toronto University (q.v.) at Kingston and Victoria, Trinity, etc., affiliated with Toronto University.

Religion. — There is no state religion. The Methodist, Presbyterian, Church of England, Roman Catholic and Baptist are the strongest numerically of the religious denominations.

History. — Ontario as part of Quebec was hunted over by the French after its exploration by Champlain in 1615 and was visited by Jesuit missionaries to the Indians. The French oc¬ cupation was not a source of much settlement but was marked by wars with the Iroquois Indians or Five Nations, in which the Huron

allies of the French were almost totally anni¬ hilated. In 1763, with Quebec and the Atlantic provinces, Ontario, passed into the hands of Great Britain, which organized the province of Ontario in 1774 and in 1791 divided it into Upper and Lower Canada. At the close of the American Revolution in 1783 Ontario received a notable immigration of United Empire Loyal¬ ists from the United States who were the actual founders of

the province. Upper and Lower Canada were reunited in 1841 and again sepa¬ rated when the Dominion of Canada was or¬ ganized in 1867, the western province becoming the province of Ontario. Besides these, the chief incidents of its history were several battles and invasions of the War of 1812, notably those of the Thames, Lundy's Lane and Queens- ton Heights ; the evolution of full responsible government and British institutions; the un¬ successful uprising of 1837 directed against certain local causes of complaint and rule and not against Great Britain; the Fenian Raids of 1866 from the United States ; the great pros¬ perity of the Crimean War and reciprocity pe¬ riod of 1854-66 ; the industrial and agricultural growth of 1880-1918.

D. S. Douglas,

Editorial Staff of The Americana, Toronto.

ONTARIO, Lake, North America, the smallest and easternmost of the five Great Lakes in the Saint Lawrence Basin, forming a portion of the boundary between and partly be¬ longing to the United States and partly to the Dominion of Canada. It is of elongated, oval shape, 193 miles long, with a maximum central breadth of 60 miles, a circumference of about 480 miles, an area of 7,260 square miles and a drainage area of 28,840 square miles. Its sur¬ face level is 326 feet below that of Lake Erie (see article Niagara Frontier) and 246 feet above the tide level of the Saint Lawrence. Its depth is said to average 490 feet ; the greatest depth is 738 feet and it is navigable throughout its whole extent for vessels of the largest size. It receives the waters of Lake Erie through the Niagara River (q.v.) with its phenomenal falls and gorge on the southwest and discharges at its northeast extremity through the Lake of a Thousand Isles, by the Saint Lawrence (q.v.). It also receives numerous rivers, including the Trent and Humber on its north and the Black, Genesee and Oswego from its southern shores. Lake Ontario has many good harbors ; and as it never freezes, except at the sides, where the water is shallow, its navigation is not so much interrupted like that of Lake Erie. It is, how¬ ever, subject to violent storms and heavy swells. It communicates by the Genesee River and Oswego Canal with the Erie Canal, and, con¬ sequently, with the Hudson River and New York City; the Niagara River and the Welland Canal, in the southwest, unite it with Lake Erie and the Rideau Canal connects it with the Ot¬ tawa at Ottawa city. Toronto, Kingston, Port Hope, Cobourg and Hamilton are the principal towns on the British side ; and Oswego, Gen¬ esee, Sackett Harbor and Charlotte on the American bank. It was discovered by Etienne Brule in 1611 and was first explored by Cham¬ plain in 1615.

ONTARIO AGRICULTURAL COL¬ LEGE, The. This institution, located at

Guelph, Canada, was founded in the year 1874

with a staff of six officers and it was opened in the same year with an attendance of 28 students. For four years the school struggled on, first under one. principal and then under another, until in 1879 Dr. James Mills was appointed to the presidency and a period of ever-increasing popularity and usefulness for thˆ institution set in. From that time the college has grown steadily in equipment, attendance and popularity and it now embraces a plant worth nearly $2,- 000,000, with well-equipped departments of ani¬ mal and field husbandry, veterinary science, horticulture, dairying, domestic science and nature study, a full set of large and substantial farm buildings, a farm of 550 acres, residences for both male and female students and first- class laboratories for chemistry, physics, biology and bacteriology, provided with apparatus for student instruction and for scientific research work and an efficient staff of 75 instructors and officers. The institution provides courses in all departments of agriculture, in nature study and domestic science. The enrollment which has been adversely affected by the Great War was 1,184 in 1914-15.

ONTOGENY, in biology, the individual de¬ velopment of an organized being, as distin¬ guished from phylogeny or race evolution. These terms were first introduced as divisions of "biogenesis,® but are now in common use in biology. The most interesting phase of on¬ togeny is the sort of parallel between the de¬ velopment of an individual, especially in the embryonic stages and the steps of development taken by the race to which it belongs.

ONTOLOGICAL ARGUMENT, the ar¬ gument, due to Saint Anselm, to the effect that God exists, because the idea of God is that of an absolutely perfect being, which must there¬ fore have the crowning perfection of existence. Modified forms of the ontological argument were used by Descartes and by Leibnitz. One form of the argument which is used by Des¬ cartes reads as follows : the result must have more reality than the cause and so our idea of the most perfect being can only result from this being itself, as the only thing in the universe that is more real. See Metaphysics ; Ontol¬ ogy.

ONTOLOGY (Greek ovto being ; and hoyog account, science), the science of being, that is, metaphysics. Aristotle did not employ the word, but called this branch of science the "First Philosophy,® defining it as the science of being, of that which exists, as far as it may be said to exist ('e-mcTr/gr}

tov dvrog), that is in fact, the science of the essence of things ; of things, not with regard to their accidents, quali¬ ties, physical or mathematical, but merely as being ; the world being including not only what¬ ever actually is, but whatever can be. The word ontology was first introduced into philos¬ ophy by Christian Freiherr von Wolff. He divided metaphysics into four parts; ontol¬ ogy, psychology, rational cosmology and theol¬ ogy. Kant denied that one can have any knowledge of existences, but only of appear¬ ances or phenomena. He believed that there was a rational science of principles and causes of the principles of being and knowing, and his system of metaphysics was merely an expo¬ sition of this rational ontology, Rational ontol¬

ogy may be treated in two different ways ac¬ cording as we postulate one existence or many. If there is one existence, all phenomena are but modifications of this. This reduces metaphysics to the science of the one substance or existence, the Absolute. If many existences or causes be postulated, several co-ordinate branches of in¬ quiry are opened up. See Metaphysics ; Phil¬ osophy; Teleology.

ONYX (Greek, ((finger-nail,® "veined gem®), a hard variety of agate, and hence a sub-variety of chalcedonic quartz, with layers, usually curvilirear, of white, alternating with red (sardonyx), gray (chalcedonvx), black (oni- colo), or green or brown. Mexican onyx is actually calcite or aragonite (q.v.) and is Softer than the real onyx. The true ancient onyx was much prized as a gem and particularly in making cameos. Most modern onyx, so-called, is „ artificially colored; Algerian onyx, for in¬ stance, being only a variety of calcite. Apart from its use in jewelry, onyx has long been used in architecture, for table-tops, columns, and, in part or entire, stair-cases, being often used with white marble. Many onyx pillars quarried in Roman times are now used in Arab mosques ; and in more distinctly Occidental buildings it is sometimes used, as in the stair¬ way of the Opera at Paris.

ONYX MARBLE, a banded variety of marble of translucent, whitish and sometimes iridescent appearance, resembling onyx. It is a variety of carbonate of lime, its coloring being due to deposits of iron or manganese. The Romans called it alabastrites and it is fre¬ quently termed <(Oriental alabaster,® although it is a carbonate instead of a sulphate of kme. It is of both travertine and stalagmitic forma¬ tion, the former being finer and handsomer. The Egyptian quarries were lost for many cen¬ turies but were rediscovered about 1850 and furnish a fine quality of the stone. The chief source of supply is Algeria, where the output is of great beauty and the deposits of large ex¬ tent. A considerable supply comes from Mex¬ ico and is known as Mexican onyx or Tecalli marble. There are other deposits reported in southwestern United States but these have not as yet been

developed. The stone is largley used for making vases, table tops, clocks and similar articles, while in ancient times it was highly prized for making receptacles for precious oint¬ ments.

OOLACHAN, oo'la-kan, EULACHON or OULACHON. See Candle-fish.

OOLITE 6'6-let (Greek, "egg-stone,® so called from its resemblance in size and shape to the roe of a fish), in geology, any minute con¬ cretionary grain or spherule, usually formed about a bit of sand or the body of a minute for- aminifer. These concretions are often calca¬ reous, and make up thick beds of limestone. Si- licious oolites, or oolitic cherts, are also abund¬ ant, and much of the iron ore of the Clinton Epoch of the Silurian is oolitic. This oolitic iron ore is known in Wisconsin, New York and the Birmingham district of Alabama. Oolites, both calcareous and ferruginous, are known to form on the bottoms of modern lakes, at vari¬ ous localities. They are said to be in process of formation on the Florida banks. What may be called the Oolitic Period was marked by

frequent pi ecipitations of muddy sediment (cal¬ careous or ferruginous) which killed and en¬ closed many minute organisms. This period is the later part of the Jurassic; and in England oolitic limestones are so frequent and so typical r "?e.UPper Jurassic that the Jurassic is often divided by English geologists into the Liassic broup. and _ the Oolitic Group, and the latter

*j]ylc*e(* *£t0 tlie Lower or Bath Oolite, the Middle or Oxford Oolite, and the Upper or Portland Oolite.*

OOLOGY, o-ord-ji, the collecting of birds' eggs has always possessed a peculiar fasci¬ nation for some men, and in the attempt to claim ior their pursuit a legitimate place m scientific work they have coined for it the term Oology. A famous naturalist once said that when the oologist prepared his specimens he blew all the science out through the hole in the shell, and there is much truth in the statement. The benefit that orni¬ thology gains from the study of a cabinet full of empty egg-shells is so slight that it is not worth the sacrifice of bird-life that the collect¬ ing entails. While the relationship between cer¬ tain groups of birds is indicated in the character of their eggs, as, for instance, between the shore-birds and the gulls and terns, neverthe¬ less the variability, in size, shape and color is so great, within many groups, that it is impossible to form any systematic arrangement from a study of eggs alone, and it is only now and then in

connection with other characters that they prove of assistance in defining a natural arrange¬ ment of birds. The significance of their shape, colors, etc., is discussed under Egg.

In collecting eggs for scientific purposes the greatest care should be exercised in positively identifying the bird to which they belong, with¬ out which dala they are absolutely worthless. The nest, which is quite as important as the eggs, should also be preserved with great care, keeping it in situ, if possible, and all details of its location, the date of the collecting, etc., should be recorded. The method of preparing egg-shells for the cabinet is explained in many books, and many instruments have been devised for the purpose. Suffice it to say that a round hole should be drilled with an egg-drill on one side of the egg, the size depending upon the de¬ gree of advance in incubation, and the contents should be removed by the use of a fine-pointed blow-pipe. Jets of water may be used effectively to aid in emptying the shell, and should be used in washing it out, while various chemical solv¬ ents may be of assistance in dissolving well- formed embryos. Every egg-shell should bear a number corresponding to its record. Direc¬ tions for the collection, preservation and care of birds' eggs are published by the Smithsonian Institution.

Probably the finest illustrated work on the oology of any region is Bendire, (Life Histories of the Birds of North America) (1892; un¬ finished). Other works are Badeker, (Die Eier der Europaischen Vogel5 (1863) ; Des Murs, (Traite general d'Oologie Ornithologique5 (I860); Davie, (Nests and Eggs of North American Birds) (5th ed., Columbus 1898) ; Gentry, G., (Nests and Eggs of the Birds of the United States5 (Philadelphia 1885) ; Hewit-son, (Eggs of British Birds5 (1856) ; Lefevre, (Atlas des CEufs des Oiseaux d'Europe5 (1845);

Newton, dictionary of Birds5 (New York

1893-96).

OOM.S, omz, Karel, Belgian painter: b. Desschel, province of Antwerp, 27 Jan. 1845; d. 20 March 1900. He was educated at the Ant¬ werp Academy and under Nicaise de Keyser, later traveling in England, Germany and Italy. He chose historical subjects in the main. Among his works are (Philip II Paying Last Honors to Don Juan of Austria5 (Antwerp Museum) ;

OORIAL, oo'ri-el, URIAL, or SHA, a

large wild sheep (ovis vignei) inhabiting the high Himalayas and Tibetan plateaus and east¬ ward to Persia, the chase of which calls for the greatest

endurance, skill and resolution on the part of the hunters. The rams have immense, rounded, coiling horns; and while both sexes vary much in color, they agree in the habit of wandering widely. Consult Blanford, W. T.,

(Fauna of British India5 (London 1889).

OOTACAMUND, ut'a-ka-mund', or UTA- KAMAND, British India, hilltown resort and headquarters of the Nilgiris district in Madras, and summer headquarters of the Madras gov¬ ernment, 55 miles northeast of Calicut, reached by a rack railway from the Mettapolliem sta¬ tion on the Madras Railway. The town is sit¬ uated on a plateau 7,230 feet above sea-level and is surrounded by hills. The principal sana¬ torium of Southern India is located here and there are government botanical gardens and a government cinchona plant. The mean annual temperature is 58° and the rainfall 49 inches. The place is notable for its beautiful private gardens and its fine drives. There are exten¬ sive plantations of coffee, tea, cinchona and eu¬ calyptus, two dairy farms, and manufactories of beer and soda water. There are excellent churches, the Lawrence Asylum, for the chil¬ dren of European soldiers, the Breeks Memorial and Basel Mission high schools, a public library and fine athletic grounds. Pop. 18,829.

OOZE, fine sticky mud, almostˆ entirely of organic origin, covering great parts of the sea¬ floor, and constituting one oi the most impor¬ tant of the ocean deposits. The various oozes are made up mostly of the remains of various foraminifers, and hence furnish a valu¬ able means for the study of deep-sea micro¬ organisms, even apart from their role in the building up of ocean beds. According as one variety or another of organic remains predomi¬ nates or occurs characteristically, the oozes are usually classified as Globigerina ooze, Pteropod ooze, Diatom ooze and Radiolarian ooze. But it must be borne in mind that no one ooze consists entirely of any one sort of the fora¬ minifers mentioned. The division mentioned is, moreover, logically a secondary division, since we may speak of the calcareous oozes (including the Globigerina and the Pteropod) and the silicious (including the Radiolarian. and Diatom oozes), a more suggestive classification, though still one that is based only on predomi¬ nant characteristics, since the Globigerina ooze, for example, is never free from silicious organ¬ isms. . Murray says that the silicious element even here varies from <(traces55 to 20 per cent. But the Globigerina ooze usually averages 40

per cent of carbonate of lime, sometimes reach¬ ing 95 per cent, and its most characteristic com¬ ponent is the foraminifer Globigerina, besides

which it contains other pelagic Foraminifera, as Pulvinulina, Orbulina, etc. The predominant color is pale gray, with occasional red and brown tints due to the peroxides of iron or manganese. The Globigerina ooze occurs near the equator both in the Atlantic and Pacific and in the western and southern Pacific ; a spe¬ cial variety of it marked by the presence of comparatively fewer rhizopods and more ptero- pods and heteropods, though these latter shells never predominate, is found in tropic depths of less than 2,000 fathoms, near the Fiji Islands and elsewhere in the western Pacific, and is called pteropod ooze. Radiolaria occur both in the Globigerina ooze and in the Diatom ooze,

. but where they predominate the ooze is named from them; a great strip of this silicious mud spreads between 15° N. and 10° S. to 140° E. and 150° W. in the Pacific. The color is reddish and brownish because of the presence of man¬ ganese and iron; the composition otherwise is mainly silicious, though as much as 20 per cent of carbonate of lime may occur. The other silicious variety is marked by the presence and predominance of Diatoms, with occasionally 25 per cent of Globigerina shells and other cal¬ careous matter. Its color is that of pale straw and, when dried, dirty white. These various classes merge into each other on the ocean bot¬ tom, and there is no hard and fast line between them. Their deposit has been slow and con¬ tinuous and apparently not such as to affect con¬ tinental areas, or even, markedly sea depths. Consult Murray, (Challenger Reports — Deep Sea Deposits) (1891). See Globigerina.

OPACITE, in mineralogy, black opaque grains or scales, usually of minute size, found most commonlv with magnetite. They are in¬ capable of microscopic identification and seem to vary in composition, some being graphitic, and others metallic oxides or silicates.

OPAH, KING-FISH, or SUN-FISH, a

large and beautiful sea-fish (Lampris luna) , a native of the Eastern seas, but found in the Atlantic and Arctic oceans, and, rarely, on the North American coasts. It is about four and one-half to six feet long and weighs 140 to 500 pounds. Its colors are verv rich, the upper part of the back and sides being green, reflect¬ ing both purple and gold, and passing into vel- lowish-green below, the fins bright vermilion. The body is oval and laterally compressed, and the scales are small. It has a single dorsal fin and a forked tail. It is believed to feed on cuttlefish and similar animals. The flesh is highly esteemed.

OPAL, hydrated amorphous silica, used as a gem-stone even in ancient times, when it was supposed to have magical virtues, as of mak¬ ing its possessor invisible if he carried it wrapped in a bay leaf, or of making him

gen¬ erally beloved so long as he trusts in its vir¬ tues. From the point of view of the mineral¬ ogist the opal is remarkable as never occurring in crystal form and as differing from quartz only in having 3 to 13 per cent of water in i4.s composition. Its fracture is conchoidal, and occasionally very perfect; its lustre vitreous, pearly or sometimes resinous ; its color vari¬ able, white, red, yellow, green, gray and blue

occurring; its density 1.9 to 2.3 and its hard¬ ness 5.5, that is, less than quartz ; it is per¬ fectly soluble in hot caustic potash, another dissimilarity between it and quartz; and it is infusible by the blow-pipe. The principal varieties of the opal are : the precious opal, with splendid coloration due to fine fissures, vary¬ ing from translucent to transparent, and oc¬ curring, especially, near Czarwenitza, Hungary, and in Australia, in conglomerate, basalt or porphyry. Its color varies with climate and temperature and sometimes disappears perma¬ nently, the opal then being called Mead.® The stone is not cut, being too brittle, but is set en cabochon. The variety usually called Mexi¬ can is actually a sub-variety of the precious opal, occurs in Guatemala, the Faroe Islands and in southern Australia, and should not be confused with the fire opal, which is the com¬ monest opal of Mexican provenance, occurring there at Zunapan, and in Washington County, Ga., as well as in the Faroe Islands. It is a hyacinth red. The girasol is a Mexican and Central American variety with bluish tinge and red reflections. The common opal is widely distributed, has a great range of colors like the more valuable varieties and differs from them in having neither reflections nor color-play ; it is found at Leisnig, Saxony, at Kosemitz, Si¬ lesia, at Dubnik, Hungary, in the Faroe Is¬ lands, in Iceland, and in America at Cornwall, Pa., Idaho Springs, Colo., and Calaveras, Cal. Semi-opal is more opaque than common opal, with which it often occurs, as well as in com¬ pany with chalcedony; it sometimes is con¬ sidered to include wood-opal, which resembles petrified wood in its origin, but has the pecu¬ liar marking of the opal. A forest of opal ized wood was discovered in Montana in 7903. Inferior varieties are hydrophone, which is transparent only in water; mother-of-pearl opal, used, especially when found with chalcedony, for cameos ; glass-opal or hyalite, made up of glassy concretions; and melinite, a gray, tuber¬ ous or reniform mass.

OPATA (o'pa-ta) INDIANS, a tribt of American Indians living in the centre and east of the Mexican state of Sonora. They have long been Christianized, are a quiet and indus¬ trious people, and are devoted to agriculture. They are domiciled in villages. This mode of life has given them a fairer complexion than that of the Indians who dwell entirely in the open air. They are the only Indians who have successfully contended with the savage Apaches. On many occasions they have aided the Mexi¬ can government in fighting other tribes. Shortly after the Spanish conquest of the domains of the Montezumas, the Opatas were found well clothed and

living in prosperous villages. Their headquarters were along the banks of the Sonora and Oposura rivers and especially in the vicinity of Arispe and Naca- sara mining regions. In early days they oc¬ cupied the whole western slope of the sierra from the headquarters of the Sonora River to Muri, near the Yaqui towns. They built of wood, adobe and loose stones, in the colder regions, and of reeds and palm leaves in the lower, better, larger and more comfortable houses than most of the neighboring tribes. They carried on an extensive trade in placer gold, pearls, turquoises, coral, emeralds and

othei valuable stones and they were good agri¬ culturists. After the coming of the ‘ Spaniards ie\ became herdsmen and possessed large flocks of cattle, goats, sheep and horses. They aie excellent workers, make good soldiers, and take readily to the ways of civilization.

iPPD,Y9??’ 6P dik- Emerson, American

vtUVa HMb,boor,,d’ ?Thio’ 7 Jan- 1830 ; d. New York, 25 April 1884. He enlisted in the Federal

aimy in July 1861 and was commissioned first lieutenant in the 41st Ohio regiment. He participated in the battle of Shiloh, and in 1863 was commissioned colonel. He lost more than a third of his regiment, the 125th Ohio, at Chickamauga, and later saw service at Mis¬ sionary Ridge, Rocky-face Ridge and Resaca. He was in command of a brigade from August 1864, and in 1865 became brigadier-general of volunteers. He rendered important service at the battle of Franklin and at Nashville. He commanded a brigade in Texas at the time of his resignation in 1866, when he was brevetted major-general of volunteers, the commission dating from the battle of Franklin. He was subsequently engaged in business in New York.

OPECHANCANO, o-pech -an-ka’no, an American Indian chief of the Powhatan con¬ federacy of Virginia: b. about 1545; d. 1644. He was a brother of the famous Indian leader Powhatan, father of Pocahontas. He it was who captured Captain John Smith and turned him over to Powhatan. After the latter’s death he became the Head of the Powhatan con¬ federacy in 1618, though his elder brother Opitchapan was then nominal head chief. Under cover of being friepdly to the English he united all the tidewater tribes in Virginia, and 22 March 1622 an attack was made on the colo¬ nists (at Jamestown). Over 400 men, women and children were massacred.

After a long term of intermittent peace, Opechancano again attacked the English in 1644 and 300 persons were put to death. The chief was afterward captured and was shot at Jamestown by a sentry appointed to guard him.

OPELIKA, op-e-li'ka, Ala., city, county- seat of Lee County, on the Central of Georgia and Western of Alabama railways, a'bout 60 miles in direct line west by north of Mont¬ gomery. It was settled in 1839 or 1840. It is in an agricultural region in which cotton is one of the chief products. The principal manufac¬ tures are cotton products, brick, fertilizers, flour and lumber. It has considerable trade in its manufactures and the farm products of the surrounding region. Pop. about 5,000.

OPELOUSAS, op-e -loo'sas, La., town, county-seat of Saint Landry County, on the Bayou Teche, and on the New Orleans, Texas and Mexico, Morgan's Louisiana and Texas and Texas and Pacific railroads, 55 miles west of Baton Rouge. It is the trade centre of a cotton, rice and livestock raising district, and contains a cotton compress and a cottonseed- oil mill. It has a high school and the Academy of the Immaculate Conception (Roman Catho¬ lic). Pop. (1920) 4,437.

OPEN-BILL, an African bird (Anastomus lamelligerus) of the stork family, so named from the odd formation of the beak, which at the anterior end exhibits a gap between the

mandibles. Another species (A. oscitans) in¬ habits the East Indies. The beak is yellow, and the general plumage black with dashes or suggestions of green and purple throughout. The open-bills are also called shell-storks or shell-ibises on account of their ordinary food, which consists of mollusks.

OPEN DOOR, The, a term of diplomatic significance applied to the unrestricted main¬ tenance of international commercial relations. It came into general use in the 19th century in regard to conditions in Eastern Asia and in¬ dicates an arrangement binding by general con¬ sent rather than by treaty, whereby all nations are allowed to trade in C hina and its dependen¬ cies upon equal terms. The European Powers controljing spheres of influence in the Chinese Republic tacitly admit foreign traders into their spheres on the same conditions as traders of their own country. This agreement, so, far as the United States and other Powers are con¬ cerned, places China, commercially, in the same relation to the rest of the world that she had before the spheres of influence were recognized. Her tariff rates are to be uniform to all nations with which she enjoys trade treaties. The Powers, on their side, agree to respect existing treaties, a condition of considerable importance to the expansion of commerce in that of the United States in particular. See articles on Treaty Ports; Free Trade; Trade;

Tariff.

OPEQUON, 6-pek'an, Battle of the (also called the Battle of Winchester), where General Sheridan, 19 Sept. 1864 defeated the Confeder¬ ates under General Early. On the night of 18 Sept. 1864 General Early had Ram seur's divi¬ sion and Nelson's artillery in position about one and one-half miles east of Winchester, Va., across the Berryville road, along an elevated plateau between Abraham's Creek on the south and Red Bud Run on the north. Rodes' and Wharton s divisions, with Braxton's and King's batteries were at Stephenson's Depot and Gor¬ don s division at Bunker Hill, under orders to join Rodes and Wharton by sunrise next morn¬ ing. Cavalry picketed the Opequpn and the roads northward and westward on the left and on the right along the Millwood and Front Royal roads to the Shenandoah. Early had about 15,000 men. General Sheridan, with about 38,000 cavalry and infantry, was at Berry¬ ville, east of the Opequon. He had ordered a movement south of Winchester to Newtown, but when he heard that parts of Early's army were at Bunker Hill and Stephenson's Depot ordered a direct attack on Winchester. Wil¬ son's cavalry division, followed by the Sixth and Nineteenth corps, was to move on the Berryville road, while Torbert, with Merritt's cavalry division, moved to Stephenson's Depot, to join Averell's cavalry division, which v/as to move up from Darksville. Crook's Eighth corps was to be in reserve at the crossing of the Opequon. Early on the morning of 19 September Wilson was on the road, crossed the Opequon and cleared the way for the infan¬ try. The Sixth corps came up and, under a heavy artillery fire, formed a line in front of Ramseur, its batteries replying to those of the Confederates. Wilson formed on the left of the Sixth corps. It was nearly noon before Grover's division of the Nineteenth corps was

formed on the right of the Sixth, with Dwight's division in reserve. Meanwhile Early had con¬ centrated his army. When Wilson drove in his cavalry pickets on the Opequon at daylight and the Union movement developed itself, he or¬ dered Gordon and Rodes from Stephenson's Depot and both arrived before the Union lines were formed and took position on Ramseur's left, under cover of a piece of woods, Gordon being on the left of Rodes, who had three bri¬ gades. At near noon the Union line moved forward; Nelson's artillery on the Confederate right and Braxton's on the left opened a de¬ structive fire ; Early ordered Rodes and Gordon to advance from the woods and attack the Union right ; and the two lines met in a deadly struggle. Ramseur and Rodes were driven steadily back by the Sixth corps and Grover's division of the Nineteenth struck Gordon's left,

held by Evans' brigade and drove it back in disorder through the woods from behind which it had advanced. Grover followed to the very rear of the woods and to within musket-range of Braxton's artillery, which was without sup¬ port; but Braxton's guns stood to their ground and opened with canister, which checked Grover's advance. At this moment Battle's brigade of Rodes' division came up, moved for¬ ward through the woods and striking a weak point in the Union line, where the right of the Sixth corps joined the left of the Nineteenth and joined by the rallied brigades of Rodes' and Gordon's divisions, drove back Ricketts' division of the Sixth corps and Grover's of the Nineteenth and caused the remainder of the de¬ ployed line of the Sixth corps to fall back to the ravine from which it had advanced. But while the Confederates were pursuing Grover, Russell's division of the Sixth corps, which was in second line, charged forward to fill the gap made by the withdrawal of Ricketts and struck the Confederates in flank, driving them back with heavy loss. The Union line was re-estab¬ lished and there was a comparative lull in the engagement, which had been very bloody. Gen¬ eral Rodes, one of Early's best division com¬ manders, and General Russell, one of Sheridan's best, had been killed. Crook's Eighth corps, which had been intended to be used on the left to seize the Valley pike south of Winchester, was now brought to the right and its two divi¬ sions, forming on the right of the Nineteenth corps, charged and broke Gordon's division. Meanwhile Wilson's cavalry on the left had driven Lomax's cavalry back toward the Valley pike. On the right Merritt's cavalry division, after severe skirmishing, had crossed the Ope¬ quon at three fords near the railroad crossing, but was quickly held in check b}ˆ Wharton's division of infantry and King's battery, which had advanced from Stephenson's Depot to meet it. A severe contest ensued, lasting some hours, both sides gaining and losing ground ; but Averell, moving up the pike from Darksville to Stephenson's, driving two cavalry brigades be¬ fore him, came into the rear of Wharton, while he was engaging Merritt, causing him to aban¬ don his position and fall back at 2 p.m. to Win¬ chester, where two of his brigades were put in reserve, in rear of Rodes' division, one remain¬ ing to support the cavalry north of the town. Merritt now advanced and joined Averell and both moved down on Early's left, driving back

the Confederate cavalry, until Merritt joined the right of Crook's troops. Averell and Merritt swung around to the rear of Early's left, driv¬ ing his cavalry through the infantry lines and compelling him to send two of Wharton's bri¬ gades to check them. Crook, who had driven Gordon, now advanced on Wharton's flank and was himself struck by a flank fire. Early was now obliged to yield ground. The Sixth and Nineteenth corps were steadily driving Ram¬ seur's and Rodes' divisions back to Winchester. Averell's and Merritt's cavalry divisions were charging around his left

flank, forcing back his cavalry in some confusion and attacking his infantry. Many prisoners were taken from both. Finally, after an unsuccessful effort to hold an intrenched position covering the town, his road to Newtown being threatened, the whole line gave way and retreated, near sun¬ down, some of it in confusion and disorder, some of it in an orderly manner, followed by Sheridan's cavalry to Kernstown, where Ram¬ seur, who was rear-guard, checked pursuit at dark. Early halted at Newtown at midnight and next morning continued his retreat through Strasburg to Fisher's Hill, Sheridan following to Cedar Creek. The Union loss at the battle of the Opequon was 697 killed, 3,983 wounded and 338 missing, an aggregate of 5,018. The Confederates lost 276 killed, 1,827 wounded and 1,818 missing, an aggregate of 3,921. They lost also five guns and nine colors. Consult (Ofiicial Records (Vol. XLIII) ; Pond, (The Shenandoah Valley in 1864* ; Sheridan, Per¬ sonal Memoirs) (Vol. II) ; Early, (A Memoir of the Last Year of the War for Independence) ; The Century Company's (Battles and Leaders of the Civil War> (Vol. IV).*

E. A. Carman.

OPERA. A drama set to music and sung with orchestral accompaniment. For all prac¬ tical purposes, the history of opera begins at the close of the 16th century, with the activi¬ ties of a small group of dilettanti, men of letters and musicians, who met at Florence under the influence of the Renaissance movement and at¬ tempted to revive the lost art of musical decla¬ mation as practised by the Greeks. Up to this time musical art had concerned itself almost exclusively with ecclesiastical music and under the wing of the Church it had led a cloistered existence, aloof from the daily life of the peo¬ ple. The brilliant and artistocratic coterie who met at the palace of Count Bardi were not in¬ terested in the democratization of the art of music, but they were nevertheless largely influ¬ ential in bringing it about. Their eyes were turned to the past, not to the future. Their attempt to restore what was forever .gone was foredoomed ; but the failure was not an inglori¬ ous one, since it gave the impetus to a great forward movement, the development of the entire range of secular music, of which the opera formed a part. Turning 'their back on existing musical theories and devices, these Florentines experimented with a declamation which was designed to follow the vocal in¬ flections of speech under emotional stress. The result was monotonous and halting and interesting only to the historian; but it con¬ tained the germs of modern dramatic music and revealed, for the first time, the possibilities of instrumental music distinct from and inde-

pendent of vocal music, to which it had here¬ tofore always been the handmaid.

It would be erroneous to assume, as it fre¬ quently is, that opera sprang fully grown from the heads of this Florentine group. Recent re¬ search has shown that the true beginnings are found in the (

The work which is generally accorded the distinction of being the first opera in (Euridic. y produced at Florence in the year 1600, of which the poem was written by Ottavio Rinuccini and the music by Giacopo Peri, both members of the group referred to ; and before the close of the same year another setting of the same poem by another of the group, Giulio Caccini, also saw the light. It is a striking coincidence that the year 1600 witnessed the birth of oratorio as well. See Oratorio.

It was only a short time before the attention of the trained professional musicians was at¬ tracted to the (

continuing recitative, thus foreshadowing the aria form. Passing over an intermediate period, marked by brilliant names, the next significant stage was reached toward the end of the 17th century, the period of Alessandro Scarlatti (1659-1725). By this time the opera which had at first employed music simply as an added emphasis to dramatic emotional expression, had become primarily a musical form with dramatic accompaniment. The librettist was the servant of the composer. Even so great a poet as Metastasio (1698-1782), the most famous and successful of librettists, whose dramatic poems were set to music by every well-known dra¬ matic composer of his own and the succeeding generation, was bound by musical, rather than dramatic conventions. And in that never- ceasing struggle for supremacy between the arts which has marked the course of operatic history the composer was, in his turn, becoming more and more the servant of the singer. In Scarlatti's day the art of tune-making was fully realized and for a long time the history of opera became the history of the aria and of the famous singers such as Caffarelli, Faustina, Cuzzoni, Farinelli, etc. Scarlatti combined learning with imagination and applied a big talent to the development of opera, which, at his hands, came to have a truly modern stamp. He used with discrimination three distinct forms of dramatic expression, the simple and primi¬ tive form of ((dry recitative® (recitativo secco), the accompanied recitative (recitativo stro- mento) and the aria. He also developed into definite design the instrumental prelude or overture.

The first great name in French opera is that of Giovanni Battista Lulli (1633-87), a Floren¬ tine by birth, who was brought to France as a mere boy and soon forced his way to the very front, founding and dominating a

school, the influence of which is still felt. In Germany, the leader among the early opera writers was Reinhard Reiser (1674-1739), who, though but a name to-day, forged an important link in the development of German dramatic music.

The reaction of opera on church music was by this time complete and the horizon of the composer in every field of music had become greatly extended by the almost universal inter¬ est in the lyric drama. Bach (1685-1750) is the one notable exception of a great composer not tempted to try his hand at opera, his sturdy, serenely balanced mind, keeping its attention entirely to the development of absolute and ecclesiastical music. There is no space for even brief mention of the long list of operatic com¬ posers of the 18th century, but the names of Handel (1685-1759) in Germany and England and Rameau (1683-1764) in France cannot be omitted. Handel's operas were genuine addi¬ tions to the literature of stage music. Follow¬ ing Italian models, his genius contrived to give them an international quality.

Gluck's (1714— 1787) career as an operatic ppwer was coincident roughly with the third quarter of the 18th century. He bent his great talents to the task of bringing opera back to the straight path of artistic verity, from which it had strayed, and to restoring the balance

between the drama and the music. His great¬ est success was made in France, where his appearance caused a sensation unique in oper¬ atic annals. His principal operas,

From Gluck to Mozart (1756-91) is not a long step chronologically, but artistically it is a transition from one period into an entirely different period, an age of symphonic develop¬ ment with its marked reaction on dramatic music. Gluck was an iconoclast and a reformer by instinct. Mozart, writing apparently without preconceived theories and along conventional lines, transfigured everything with his golden touch. His treatment of the ensembles which had become an important feature of the opera, highly organized and developed and of the orchestra as a flexible and responsive instru¬ ment for dramatic expression was far in ad¬ vance of anything that had gone before. His three greatest operas, (Don Giovanni, (Figaro) and (Magic Flute* are still in the current reper¬ tories in the leading opera houses of the world. Each is a masterpiece and they had a profound influence on all the musical stage works that have followed. Beethoven's (1770-1827) soli¬ tary opera,*

The 19th century saw the greatest extension of operatic activities. Weber (1786-1826), Wagner (1813-83) and Verdi (1813-1901) are the three highest mountain peaks in a long and imposing range. With Weber at the beginning of the century was developed the romantic opera, without which Wagner would not have been possible. (Der Freischutz, (Euryanthe) and (Oberon are the earliest and the greatest works of this genre which has had a prolific progeny. Weber still employed the stereotyped form of operatic arias, but the horizon of dramatic expression had widened visibly. Orchestral effects designed purely to heighten the stage pictures are innumerable in his works. Weber discovered the unlimited possibilities of flexible musical speech which Wagner utilized so thoroughly. Wagner's announced intention was to create a new art form through the com¬ bination and organic union of music, poetry and the related arts of the theatre and in applying this theory to his own works he not only com¬ posed the music, but wrote the librettos and even designed the stage decorations. This fusion of the arts and the greatly enlarged mechanism of the operatic structure are Wag¬ ner's chief contributions to the opera as an art form. Verdi was no pathfinder, but he is the richest contributor to the 19th century liter¬ ature of Italian opera, the history of which is in fact best summed up in his stage works from (Oberto) to*

In the introduction into Western European opera houses at the close of the 19th century of Russian works, notably those of Mous- sorgsky and Rimskv-Korsakov, with their racial

elemental qualities and barbaric stage pictures, new elements of progress and change are being realized. They, as well as Debussy's (Pelleas et Melisande (1902), Strauss' 'Salome* (1905) and Stravinsky's pantomime ballets 'Petro- uchka* and 'L'Oiseau de Feu) — a by-way of opera — show that the lyric stage drama has not yet reached its furthest development.*

Bibliography. — Apthorp, W. F., 'The Opera Past and Present) (New York 1901) ; Bie, Oskar, (Die Oper) (Berlin 1913) ; Elson, Louis, (A Critical History of Opera) (Boston 1901) ; Finck, Henry T., (Wagner and his Works (New York 1896) ; 'Grove's Dictionary of Music and Musicians) (5 vols., London 1908- 10) ; 'Oxford History of Music) (6 vols., Oxford 1901-05); (Vol. I of (The Art of Music,* New York 1917) ; Strea- field, R. A., (The Opera) (London 1897) ; Upton, George P., (Standard Operas * (Chicago*

1891).

Lewis M. Isaacs, Musical Critic and Composer.

OPERA, NATIONAL DEVELOP¬ MENTS, THEIR INFLUENCE AND

TREND. From the year 1600 to about the middle of the 18th century, with the advent of Gluck, opera bears prominently the ineradicable mark of the land of its nativity — Italy. From Italy the new art early found its way to France, Germany and England, convoyed by Italian producers, sung by Italian artists, the music set to Italian libretti. So conditioned, it was but natural that it should flourish for a time on every foreign soil, almost untouched by local influences, and that native works should be produced in close imitation of Italian models. The years 1600 to 1750 are of great significance in music, a period of experimentation, of tre¬ mendous activity; but so far as the opera is concerned, it was only the seed-time of prep¬ aration for the harvest to come. By a natural process of evolution, the transplanted variety of opera gradually acquired individuality, but time was required to develop and perfect it. In fact, another hundred years passed before it reached the point where the new species could be said to be true to form, though not of the Italian type.

While national schools of opera are rela¬ tively a recent development in the history of the art, it is interesting to note the early indi¬ cations of differentiation seen first in the adap¬ tation to local producing conditions, and, in the use of local social conventions. With the popularization of opera went the natural reck¬ oning with the taste and comprehension of the masses ; and the first indications of local vari¬ ants naturally occurred in the drama, rather than in the music, which retained its foreign character even when local stage traditions and costumes and the conventions of acting and scenery began to be employed.

When the Italian Lulli came to France and by force of Jiis personality and genius domi¬ nated the field of opera, so that he is generally looked upon as the true founder of French opera, the ballet was in high favor in court cir¬ cles and he saw at once the value of making artistic capital out of it. The emphasis which he laid upon the ballet in all of his lyric stage works gave them a certain stamp which has come to be associated with French grand opera

down to the present day and has deeply influ¬ enced its trend.

Similarly, in England, the nationalistic im¬ pulses seemed destined to have their say in the development of the masque-opera, of which Purcell was the originator. The introduction of incidental music in the stage play was familiar to the audiences of Shakespeare's day and so was its use in connection with the masque. This incidental music could scarcely be

classed as dramatic; but it pointed the way to the development of a true English variation from the Italian type, which Purcell's genius was quick to realize. The circumstances of Purcell's early death, the absence of important successors, the Puritan opposition to all Eng¬ lish stage works and Handel's advent in Eng¬ land soon after Purcell's death combined to stunt the growth of the masque-opera, which became entirely submerged in the foreign ele¬ ments then introduced.

While these nationalistic traits were showing themselves in other lands, in Italy a local vari¬ ant, opera buffa, began to develop, representing in fact a natural reaction against the remote¬ ness from the life of the people of classical opera, or opera seria as it was called. Opera buffa began in the interludes which were pre¬ sented between the acts of the opera seria. This lighter form of opera found a quick re¬ sponse from the public and developed a vigor¬ ous growth of its own. Characteristic .of it was the use of folk song and melody akin to it, and, as might be expected, since the folk song is the most convincing expression of na¬ tionalism in music, opera buffa began to show nationalistic influences more plainly than the more serious lyric stage works. Many of the composers worked in both fields, but some of them stand out from the rest as excelling in the lighter and 'freer form of work. Pergo- lesi, for example, is much better known for his (La Serva Padrona) (first produced in 1733) than for any of his grand operas; and this opera buffa, which still receives an occasional revival, is more typically Italian and more modern in spirit than the more serious works of the composer or his contemporaries.

The production of (La Serva Padrona) in Paris in 1752 started a veritable conflagration, the famous Guerre des Buffons, in the course of which Rousseau wrote his letter to prove that French music did not exist. As though to answer him, a number of native composers be¬ gan to enter the field of light opera and created the French opera comique, which substituted pictures of everyday life for the artificial clas¬ sical scenes of the Lullian opera and dialogue for the stilted recitative and, above all, utilized music of the chanson type, thus giving an added touch of racial vigor and spontaneity to the genre. The opposition of opera comique to grand opera had a healthy reaction on each; and when Gluck was called to France to defend the stronghold of the conventional classical type against the onslaughts of the new radicals, he brought with him an ideal of dramatic truth and directness which breathed new life into the old stage puppets of the classical grand opera. The reactionary advocates of the conventional Italian opera seria were soon put to rout and from Gluck's day of triumph dates modern liv¬ ing opera.

The development of the lighter form of opera on the continent of Europe found its analogue in England in the ballad opera, of which Gay's (

Beggar's Opera was the proto¬ type, a work of little intrinsic merit, enlivened by popular street tunes and yet historically sig¬ nificant, as the forerunner of the modern high- class Gilbert and Sullivan operas.*

In Germany, Mozart was more strongly in¬ fluenced by the opera buffa of Italy and the opera comique of France than by the more for¬ mal classical type, and his operas, though for the most part Italian in design, were strongly German in spirit and feeling and the direct progenitors of Weber's and Wagner's works. By Mozart's time, German instrumental music had found its own particular mode of expres¬ sion and a nationˆ flavor had become plainly recognizable.

Weber's works, although of a higher musi¬ cal type, were still the true embodiment of Ger¬ man folk song. Tunes that sprang from the soil of Italy and were 'nurtured under its sunny skies gave natural impulse to the exaltation of vocal melody in Rossini's works and the fami¬ liar genre represented by his school. Culminat¬ ing in the works of Verdi, who regenerated it by bringing it into line with the dramatic aspi¬ rations of modern music, Italian opera has, in the operas of Puccini and others of the present day school, shown that it is susceptible of all the freedom of dramatic expression that the works of Germany and France display. Yet, thanks to the persistence of native folk ele¬ ments, it retains its individual national char¬ acter.

The 19th century development of opera comique in France culminated in Gounod's

In Russia the first operas known to the Western world were those of Glinka, whose (A Life for the Tsar (first produced in 1836) may be said to be the foundation stone of Russian opera. Even to the present day, only a few Russian operas have come to have a general hearing. Moussorgsky's (Boris Godounov,* Borodine's (Prince Igor) and Rimsky-Korsa- kov's (Coq d'Or) are striking examples of an independent development based upon the robust folk melody and folk tale of*

Russia; while Stravinsky's essays in the field of pantomime ballet seem to be the most important and significant contribu¬ tion to present day dramatic music. Spanish opera has never been a very virile plant, though the end of the 19th century witnessed a little flowering in the works of Albeniz and Grana¬ dos. Spanish dance rhythms predominate in them, giving them a characteristic flavor. The only Bohemian composer whose

stage works are known outside the borders of his own land is Smetana, whose (Bartered Bride) is intensely nationalistic and a brilliant example of folk inspiration. In the Scandinavian and other European countries, as well as in America, there has been practically no operatic development of international importance. The opportunities, at least in America, have been few. However, with the modern impetus in the direction of na¬ tional artistic development, it is fair to assume that in the course of time American soil will be productive of a true native growth which shall take a prominent place in the field of opera. Among the earliest attempts at real American opera were those of William H. Fry, whose ˆeonorap produced in 1845, was his most successful work, and George F. Bris¬ tow, who wrote an opera on the <(Rip Van Winkle® story. Of recent works may be men¬ tioned Walter Damrosch's (The Scarlet Letter, produced in 1894, and (Cyrano) in 1913; Arthur Nevin's (Poia,> produced in Berlin under Muck in 1910; the prize operas*

*Bibliography. — Apthorp, W. F., 'The Opera Past and Present * (New York 1901) ; Elson, A., (A Critical History of Opera) (Bos¬ ton 1901) ; Krehbiel, H. E., (A Book of Operas: Their Histories, their Plots and their Music* (New York 1911), and "Chapters of Opera) (3d ed., New York 1911) ; Lee, E. M., 'The Story of Opera* (New York 1910) ; McSpad-den, J. W., (Opera Synopses: A Guide to the Plots and Characters of the Standard Operas* (London 1913) ; Sonneck, O. G. T., (Early Opera in America) (Washington 1915) ; Streatfield, R. A., 'The Opera) (3d ed., Phila¬ delphia 1907) ; Upton, G. P., Standard Operas: Their Plots and their Music* (Chicago 1918).*

Lewis M. Isaacs, Musical Critic and Composer.

OPERA-GLASS (Fr. lorgnette), a double telescope, used for looking at objects that re¬ quire to be clearly seen rather than greatly magnified, such as adjoining scenery and build¬ ings, the performers at a theatre or opera, etc. The opera-glass is short and light, and can be easily managed with one hand. Its small mag¬ nifying power (from two to three at the most), and the large amount of light admitted by the ample object-glass, enable it to present a bright and pleasant picture, so that the eye is not strained to make out details, as in telescopes of

greater power, which generally show a highly magnified but faint picture. It allows the use of both eyes, which gives to the spectator the double advantage, not possessed by single tele¬ scopes, of not requiring to keep one eye shut (a somewhat unnatural way of looking), and ot seeing things stand out stereoscopically as in ordinary vision.

The opera-glass is the same in principle as the telescope invented by Galileo. It consists of two lenses, an object-lens and an eye-lens. The object-lens is convex, and the eye-lens concave. They are placed nearly at the distance of the difference of their focal lengths from one an¬ other (see Telescope). The opera-glass need not be set to a precise point, as is necessary with ordinary terrestrial telescopes, for the lengthening or shortening of the instrument does not produce so decided an effect on the divergence of the light. The change of diver¬ gence caused by screwing the opera-glass out or in is so slight as not much to overstep the power of adjustment of the eye, so that an object does not lose all its distinctness at any point within the range of the instrument. There is, however, a particular length at which an object at a certain distance is most easily looked at. The two telescopes of the opera-glass are identical in construction, and are placed parallel to each other. The blending of the two images is easily effected by the eyes, as in ordinary vision. The cheapest opera-glasses consists of single lenses ; those of the better class have compound achromatic lenses. A very ordinary construction for a medium price is to have an achromatic object-glass, consisting of two lenses, and a single eye-lens. In the finest class of opera-glasses, which are called field-glasses, both eye-lenses and object-lenses are achro¬ matic. Plossl's celebrated field-glasses (Ger. Feldstecher) have 12 lenses,- each object-lens and eye-lens being composed of three separate lenses. See Lens; Telescope.

OPERATIONS, Surgical: Measures other than medical for the relief of conditions result¬ ing from disease or accident, and generally involving the use of cutting instruments or of apparatus. Surgical operations include those mentioned below.

Reduction of Fractures. — This process consists in so manipulating the fragments of bone as to bring them into proper position and free them from the intervening tissue, and then, by immovable apparatus, retaining them in posi¬ tion till union takes place from the growth of new bone or of ligament. Flat or round splints of wood, of sole-leather, of prepared felt or of pasteboard are used, or bandages impregnated with silicate of soda (water-glass), or with plaster of Paris.

Reduction of Dislocations. — The displaced

bone is manipulated by the surgeon in such a way as to force it to re-enter its socket through the tear made in its capsular ligament in its exit. Leverage is used, with hand or foot or opposing muscles as a fulcrum, and retaining apparatus is applied to secure rest till swelling and other inflammatory symptoms cease.

Amputations and Disarticulations. — Am¬ putations consist in the removal with the knife of some part of the body, as an arm, a breast, etc. In the amputation of a limb, the soft parts, after being cut through, are retracted so as to

allow the bone to be sawed off as far back in the flesh as possible. This procedure provides, after tying all bleeding arteries and cleansing the surfaces, for covering in the bone deeply with muscle and skin flaps. Before beginning the amputation of a limb, a tight rubber band is applied about it, so as to prevent hemorrhage when the arteries are severed. After these are tied, the band is removed. Disarticulation is an amputation through a joint. Skin and flesh flaps are provided, and the bone's end is well covered. In all amputations of limbs the cut¬ ting is so done that the scars resulting shall not be located so as to prevent the adjustment of an artificial limb. Many ingenious amputations of special parts of the body have been devised, as of the foot. In one of these, parts of two bones are removed, and the remnants are brought into apposition so that they unite. This is termed osteoplasty.

Ligation of Arteries. — This is an important and very frequent procedure in surgical opera¬ tions. An artery may be tied in continuity in cases of hemorrhage or aneurism, etc. In such cases the artery is exposed and a blunt-end needle, with an eye near its tip, is loaded with the chosen ligature and hooked under the ves¬ sel. The ligature is caught by the surgeon with a forceps and pulled through while the needle is withdrawn. The ends of the ligature are then tied above the artery. An artery may be tied when bleeding in the stump of an amputa¬ tion. Catgut, silk, kangaroo tendon and silk¬ worm gut are the chief varieties of ligature used. An artery is sometimes held with pins thrust through the adjacent flesh, so as to com¬ press the vessel (acupressure), or it may be closed by being twisted at its extremity (tor¬ sion).

Excision and Resection. — Excision is the removal of a portion of the body by cutting it from the surrounding tissues. If a portion of bone or a joint be removed, the operation is termed a resection. Excision may be desirable in the case of a tubercular joint or a necrotic bone, or in hip-joint disease, for

example.

Plastic Operations Upon the Face. — In these, skin from forehead or cheeks is taken to repair, for example, a nose or a lip which has been lost or excised because of disease. In some cases a finger, or the skin of the arm, may be used for this repair, the hand being fastened to the head for a few days before the trans¬ planted part is entirely severed from its original site.

Tracheotomy. — This is the operation of opening into the trachea or windpipe through the neck, in order to insert a tube through which the patient may breathe during closure of the throat from diphtheria, or swallowing a foreign body, or other cause. A modification of this is laryngotomy, in which the opening is made through the larynx, below the vocal cords.

Paracentesis. — Puncture into the pericar¬ dial or pleural cavity to draw off fluid thence.

Operations on the Kidney. — These include that of cutting the kidney open to remove a stone, or a new growth, or to drain off fluid (nephrotomy) ; suturing it to the abdominal wall to prevent floating; incising and stripping off the capsule in case of Bright's disease (nephropexy) ; and removal of a kidney (ne¬ phrectomy).

vot. 20 — 45

Appendectomy. — This is removal of the vermiform appendix, a procedure necessary in many cases while the acute inflammatory proc¬ ess of appendicitis is in progress. In some cases where perforation has not occurred, an (

Operations on the Nerves. — These may be necessary to suture divided nerves together, to resect parts of nerves or to remove ganglia in severe neuralgic affections.

Trephining. — This is opening the skull by means of the trephine, an instrument which re¬ moves a button of bone. Resort is had to it in order to explore the brain with needles or canulae in search of abscess, haematoma or cyst; to elevate depressed portions of a frac¬ tured skull, and to pick out fragments of bone; to expose a sinus because of thrombosis or sup¬ puration ; or for intracranial hemorrhage. The operation is also performed for the purpose of exposing various arteries and nerves. The ((mastoid operation,® which is frequently under¬ taken for middle-ear suppuration, is substan¬ tially as follows : An incision is made through the soft parts down to the bone back of the auricle of the affected side, from

*the tip of the mastoid process to a point opposite the upper limit of the auricle. Bleeding vessels are se¬ cured, and the periosteum is separated from the bone as far forward as the meatus. A bony projection which is thus uncovered is cut away with a chisel or gouge, and some of the cortical layer of the bone over the antrum is removed. The mastoid cells are easily reached, softened bone is scraped away and exudate is removed from the tympanum. In some cases two of the small bones of the ear, the incus and malleus, must be removed. (See Ear). Proper drain¬ age is arranged through the wound and the meatus and sutures are put in. Consult Park, (Surgery by American Authors > (1901) ; Kocher, (Text-book of Operative Surgery**

(1903).

OPERCULUM, o-per'ku-lum, in conchol- ogy, the horny or limy plate developed upon the ((foot® of many gasteropods, serving to close the aperture of the shell when the animal has withdrawn into its abode. The operculum is a cuticular development on the dorsal side of the foot, behind the shell. It is present in nearly all land, fresh-water and marine Proso-branchiata, is absent in all Opisthobranchiata in the adult state, except Action, and in all Pulmonata except Amphibola, and has been lost in several familiar families, as the cones, mitres and cowries. As a rule the operculum exactly fits the aperture, and hence it varies in outline in different groups; but in some cases where the aperture is very large it closes it only in part. Other abnormalities exist ; and

in general the operculum is a variable character of little if any value in classification. The theory formerly held that this excrescence was homologous with a second valve, or with the byssus of bivalves, is not now considered justi¬ fied by facts. Use has been found for certain round, thick and concentric opercula to repre¬ sent the eyes in rude human figures made by South Sea islanders ; and as eyestones, — small lenticular and smooth ones, as of small turban-shells, which may be slipped easily around the ball of the eye beneath the eyelid, and bring out intruding and painful objects caught there.

OPERTI, o-par' te, Albert (Jasper Ludwig Roccabigliera), Italian artist: b. Turin, Italy, 17 March 1852. He entered the British navy as midshipman, but resigned in 1868. He then elected the career of a painter; was illustrator, caricaturist and scenic artist in New York, and accompanied Lieut. R. E. Peary on two Arctic expeditions, during which he acted as New

York Herald special correspondent (1896-97). From the studies made during his northern voyages he executed his well known (Rescue of the Greely Party and (Farthest North) (for the Army and Navy Departments, Wash¬ ington) ; (The Schwatka Search) ; (Finding De Long in the Lena Delta * ; and (Dr. Kane.* He was selected as artist by the United States government to the World's Columbian Expo¬ sition.*

OPHELIA, o-fe'li-a, in Shakespeare's play of (Hamlet, the daughter of Polonius. Ham¬ let, with whom she is in love, having unin¬ tentionally killed her father in his madness, turns away from Ophelia, whose reason is now overthrown ; and in the various phases of her derangement the drama presents its tenderest scenes of pathos. While gathering flowers, Ophelia is drowned.*

OPHICLEIDE, of'i-klid, a brass wind-in¬ strument of music invented about 1790 to super¬ sede the serpent. It generally consists of a wide conical tube bent double with a bell-mouth and has 11 keys and a cup-shaped mouth-piece. Its compass ranges a little over three octaves (or 38 semitones), namely from the B flat one semitone below the lowest note of the violon¬ cello to C in the treble stave, and it is capable of very accurate intonation. It is used in orchestras, and is capable of very pleasing effects as a solo instrument, but is all but superseded by the saxhorn.

OPHIDIA, o-fid'ya, an order of reptiles containing the serpents, — saurians in which the right and left halves of the lower jaw are con¬ nected by an elastic band. (See Lizards). The appendages and shoulder-girdles are typically absent, although in certain families – rudiments of the posterior appendages and pelvis still per¬ sist. The quadrate is not fixed, and, acting as the suspensor of the lower jaw, gives a sur¬ prising capacity for swallowing. The number of vertebrae is great. The skin is covered with horny scutes, which are periodically shed with the cuticle. The eyes are without lids. The sense of smell is acute. The left lung is smaller than the right and may be quite rudimentary. A few snakes are viviparous. The Ophidia seem to have arisen from lizard-like ancestors

in Tertiary times. They are now nearly cos¬ mopolitan, only the coldest countries and cer¬ tain large islands (New Zealand, Ireland) being devoid of them. See Serpents.

OPHIOGLOSSALES, the grape fern. See Ferns and Fern Allies.

OPHIR, o'fer, a place mentioned in the Old Testament scriptures from which the ships of Solomon brought large quantities of gold, san¬ dal-wood and ivory wherewith to adorn the king's house, then building at Jerusalem. There are different opinions about its exact situation. Some scholars place

*it in northern Asia, others in India, and even America has been mentioned as comprising Ophir. Later it has been located in the East Coast of Africa. Baer identifies Ophir with Malacca. Lassen's view is that Ophir is the Semitic name for the ((Abhira,** a pastoral people in northern India, and that the land of Ophir is the territory they inhabit. Biblical tradition placed Ophir in southern Arabia, hence Glaser places Ophir on the east coast of Arabia. This Ophir has no con¬ nection with the same word occurring in Genesis x, 29.*

OPHITE, of-it, in mineralogy , formerly a synonym for serpentine (q.v.) ; now a basic rock of greenish color and eruptive origin, with an exterior resemblance to serpentine, occurring especially in the Pyrenees. Its texture is inter¬ mediate between granite and porphyry, and its structure is characterized by the incomplete crystallization of its parts, some being com¬ pletely crystallized and others entirely amor¬ phous, a phenomenon called ophitic structure.

OPHITES, of-Its (Gr. ophis, a serpent), a Gnostic sect of the 2d century who worshipped a living serpent. They considered that the ser¬ pent in Eden by misleading Eve was the liber¬ ator of man from the power of Jehovah, whom they regarded with abhorrence. It is more than probable that we have not a proper conception of the aims and beliefs of the Ophites, since their history, which has come down to us, has been written either by their enemies or by those who did not in any way sympathize with them or attempt to understand them. They seem to have been protestors against the superstitions of their age. They looked upon all the deities which assumed a position of superior nower tending to monotheism as but an exaggeration of the superstitions before which the people had fallen down. They have been accused of worshipping a serpent, but this seems to have been simply symbolical, since they paid special deference to the deceiver of Eve in the Garden of Eden as the symbol of liberty from priestly deception. See Serpent-worshippers.

OPHIUCHUS, of-i-u'kus, in astronomy, a large constellation, representing a man holding a serpent; called Serpentarius, the Serpent- bearer. It has about 80 stars visible to the naked eye, none of which are very bright. It has some- fine globular clusters and a num¬ ber of double stars.

OPHIUROIDEA, a class of the phylum

Echinodermata (q.v.), embracing the slender¬ armed sand-stars. It is divisible into three orders: (1) Streptophiurce, in which the cen¬ tral skeletal supports of the arms are but loosely articulated, so that coiling is possible in both a

vertical and a horizontal plane; (2) Zygoph- hirce, where the articulations prevent coiling in a vertical plane; (3) Cladophiura, in which the arms, which are generally much branched, have saddle-shaped articulations. For the detailed anatomy of the Ophiuroidea, see Brittle Stars. See also Basket-Fish.

OPHTHALMIA, inflammation of the eye; a general term used by the older writers, but at the present day either not employed by oculists or applied by them only to conjunctivitis (in¬ flammation of the conjunctiva) or to conjunc¬ tivitis and inflammation of the eyelids. There are various grades and types of conjunctivitis, all of which have to a greater or less extent the following symptoms in common: photophobia — aversion to or intolerance of light; an in¬ creased and usually altered secretion ; and in¬ jection of the blood-vessels, accompanied some¬ times with a slight velvety opacity, or special products, a false membrane, granulations, etc. In all forms of conjunctivitis there is need of cleanliness, antiseptic washes, poultices, protec¬ tion from excess of light and injuries, dust, etc. In most forms the case should be under the care of a physician.

Simple Conjunctivitis.— This is catarrhal conjunctivitis, characterized by congestion, a feeling as of the presence of a foreign body, lessened transparency of the conjunctiva of the lids, and a discharge, at first watery, then acrid, excoriating the cheeks, may become mucous or mucopurulent, gluing the eyelids together. Usually the vision is clear, but it may be hazy if the secretion is more than watery. Micro¬ organisms, neglect of treatment, filth and the scrofulous diathesis may convert a simple con¬ junctivitis into a purulent and more or less com¬ municable or infectious disease. Usually the prognosis is good, recovery occurring in a few days.

Varieties of Simple Conjunctivitis. — Asso¬ ciated conjunctivitis occurs sometimes with eczema, facial erysipelas, bronchitis and other disorders; exanthematous conjunctivitis (oph¬ thalmia morbillous, ophthalmia scarlatinous, etc.) may accompany or follow exanthematous diseases such as measles or scarlet fever; mechanical conjunctivitis is caused by wind, tobacco-smoke, dust or injuries; toxic conjunc¬ tivitis by exposure to the influence of certain chemicals, aniline dyes, chrysophanic acid, etc., or by the prolonged use of atropine, eserine, cocaine, etc.; and symptomatic conjunctivitis from the strain of the eyes in defective vision. For treatment, remove the cause if possible and alleviate associated conditions. Wash the eye frequently with cold or hot water, as agree¬ able, but do not rub it. As a wash or spray, 10 grains of boric acid to an ounce of water will be of

service. When the discharge is mu¬ copurulent, stronger applications are necessary.

Acute Contagious Conjunctivitis. — Known also as acute mucopurulent conjunctivitis, epi¬ demic conjunctival catarrh and pink-eye, this was formerly classified as a severe form of simple conjunctivitis. It is distinctively con¬ tagious, attacks persons of all ages, is believed to be due to specific bacilli, resembles at first simple conjunctivitis, then the discharge is mucopus or purulent, the conjunctiva is much swollen, and even chemotic, and the lids may

be cedematous and glued together. Prognosis is good, but relapses are common, recovery taking place usually in about two weeks. Treat¬ ment is similar to that of simple conjunctivitis. The affection being contagious, all sources of such contagion as is due to towels, sponges, etc., must be discarded.

Purulent Conjunctivitis. — This acute blen¬ norrhea of the conjunctiva is of two forms, that of the new-born (ophthalmia neonatorum), and the gonorrheal conjunctivitis of adults. Conjunctivitis neonatorum, characterized by severe pain, great swelling of the eyelids, serious infiltration of the conjunctiva, and a copious discharge of contagious pus, is caused by the introduction into the eye of infecting material (sometimes gonorrheal), usually from some portion of the genito-urinary tract of the mother, at the time of or shortly after the child's birth, or from soiled towels, etc. The chief risks are cohesion of the eyelid and eye¬ ball, opacity, ulceration of the cornea, and sometimes perforation. Prognosis is grave, but treatment is generally successful if a competent physician has charge while the cornea is still clear. Cold compresses at first, then hot fomen¬ tations, constant gentle removal of the dis¬ charge, at first a mild eyewash, as before indi¬ cated, later the introduction of a solution of nitrate of silver (Crede's plan) or other sub¬ stances, absolute cleanliness, and the destruction of lint, cotton or any infected substance, com¬ prise the measures of relief.

Gonorrheal Conjunctivitis. — This affection (purulent ophthalmia, acute blennorrhea in adults) is usually caused by contagion from an acute gonorrhea or a gleet, or from a similarly affected eye, through fingers, linen, towels, etc., though it may arise from a vaginal leucorrhea, diphtheria and other causes. The symptoms are similar to those which appear in the puru¬ lent conjunctivitis of the new-born but more severe, and the treatment should be entirely in the hands of the physician. The vitality of the cornea is in constant danger: ulceration and matting together of the iris and cornea, inflam¬ mation of the choroid, iris, etc., and even de¬ struction of the eye may occur. The disease may become chronic and

one of the forms of chronic conjunctivitis.

Croupous or Pseudomembranous Conjunc¬ tivitis. — Of this, which is plastic membranous conjunctivitis, there are two forms, one quite mild, usually attended by a soft, painless swell¬ ing of the lids, a membranous exudation upon the conjunctiva, and generally a scanty seropur- ulent discharge occurring before the seventh year. The cause is not known. The second form is rapid in development, is attended with much swelling and discharge and may quickly destroy the cornea. Frequent removal of the discharge with a solution of common salt, cold compresses and the use of nitrate of silver, etc., are the measures employed for relief. The af¬ fection occurs with measles, scarlet fever, influ¬ enza and non-febrile disorders.

Diphtheritic Conjunctivitis.— This form usually occurs in young children, either mildly with pseudomembranous formation, or in a deep-seated character, necrotic, with a very painful board-like exudative swelling of the lids and a scanty seropurulent or bloody discharge. Sloughing of the cornea may occur. Prognosis

is grave. Cleanliness, antiseptic washes and building up the tone of the body are necessary.

Phlyctenular Conjunctivitis. — Also called phlyctenular ophthalmia, scrofulous ophthalmia, eczema of the conjunctiva, characterized by one or more grayish, sometimes purulent elevations, generally on the eyeball portion of the conjunc¬ tiva. It occurs in strumous and badly nourished children, and tends to a disease of the cornea (phlyctenular keratitis) and to its opacity. At¬ tention to hygienic measures, good food, etc., tonics, mild eye-washes, followed by the appli¬ cation of an ointment of the yellow oxide of mercury, are requisites of treatment.

Spring Conjunctivitis. — Considered by some writers as a distinct disease, by others as a form of chronic conjunctivitis. This occurs mainly among children in the spring and sum¬ mer, and is always bilateral. There is stinging pain, considerable mucous secretion and the for¬ mation of gray semi-transparent nodules, which swell and overlap the edge of the cornea. Prog¬ nosis favorable except for relapses. Treatment requires protection of the eyes with dark glasses, weak astringent and antiseptic lotions, and per¬ haps destruction of the granulations and hyper¬ trophic masses.

Follicular Conjunctivitis. — Follicular oph¬ thalmia, characterized by small pinkish promi¬ nences mainly in the conjunctiva of the lids, usually

in rows. It is the result of bad hygienic surroundings, as in crowded tenements and pauper schools, where it may be epidemic. It is allied to granular lids. The prognosis is good, but the disease is troublesome, and often lasts for months. The treatment consists in general hygienic measures, and certain stimulating and antiseptic applications.

Granular Conjunctivitis. — Granular oph¬ thalmia, Egyptian ophthalmia, military ophthal¬ mia, known as trachoma, and, popularly, as granular lids. It occurs in acute and chronic forms, is infectious and sometimes widespread, and although affecting mainly persons of poor health and in bad hygienic surroundings, it may attack those in good health. The symptoms of the acute form are : swollen lids ; reddened con¬ junctiva; hypertrophied papillae, between which are non-vascular, roundish granulations ; scald¬ ing tears ; intense photophobia ; pain in the brow and temple ; and mucopurulent or puru¬ lent discharge. In the chronic form, there is less pain, redness and other results of inflam¬ mation; the conjunctiva is roughened; the granulations degenerate and soften. In both forms there is danger of cloudiness and ulcera¬ tion of the cornea, and of scars with conse¬ quent deformities of the lid and its border. The sufferers should shut out the light and keep the eyes most of the time partly closed. The treatment in earlier stages calls for sooth¬ ing remedies; in chronic or severe cases, caus¬ tics and astringents, operative procedures and general medication.

So prevalent is trachoma in cities, especially in the crowded tenement districts, that the health authorities now treat affected children at the schools and in their homes, thereby greatly limiting the spread of the disease and checking defects in vision. The work done on these lines in the city of New York since 1902 has been particularly noteworthy. Trachoma, mainly brought here by Russian Jews and other

immigrants from unclean environments, and which rapidly spreads by contagion, was making inroads among the more exposed children of the public schools, and threatening not only the health of New York, but, more remotely, that of the country at large. The board of health took vigorous measures for its suppression. Every child in the public schools was subjected to medical examination by experts appointed by the board, and in cases of slight affection par¬ ents were notified and instructed in the neces¬ sary precautions of cleanliness, etc. ; in more advanced cases the children were taken out of school, isolated at home and there treated; and in extreme cases still more rigorous methods were adopted. At the same time all teachers in the public schools were required to observe and report upon the slightest appearance of the dis¬ ease, in order that affected children might be promptly excluded. Within two years the most remarkable results were attained ; trachoma was almost eradicated from the city, and it has been

demonstrated that the disease, under vigilant administration of public health officials, can be brought and kept under control.

Subacute Conjunctivitis. — Somtimes chronic, this appears in association with a diplo- bacillus, is insidious, runs a course of six weeks to six months, is characterized by redness of the edges of the eyelid, congestion and hypersecre¬ tion of the conjunctiva. Treatment is the same as in simple conjunctivitis, with the addition of zinc-sulphate solution.

Pavinaud's Conjunctivitis. — This form, usually unilateral, is rare. It was first described by Pavinaud and believed to be due to infection of animal origin. The symptoms are swelling of the lids, mucopurulent discharge, large poly¬ poid granulations, with ulceration between them, and lymphatic involvement. It usually lasts from one to several months. Treatment in¬ cludes antiseptic washes — nitrate of silver or sulphate of copper — and surgical removal of granulations.

Chronic Conjunctivitis. — Chronic ophthal¬ mia : it may be either an independent affection or the result of an acute blenorrhea. As an in¬ dependent disorder, it occurs mainly in elderly people. The symptoms are hyperaemia, soreness and thickening of the edge of the tarsal con¬ junctiva, swelling of the caruncle and slight mucopurulent discharge. Treatment: antiseptic lotions, astringents, attention to the tear-ducts and refractive errors and cleanliness. Lacri¬ mal conjunctivitis is a form of the above, de¬ pending upon obstruction of the lacrimal pas¬ sages.

Egyptian and Military Conjunctivitis. —

These are terms loosely used for all forms of conjunctivitis occurring in barracks and crowded assemblies, more or less epidemic and chronic, and attended by a mucopurulent or purulent discharge.

OPHTHALMOMETER, an optical instru¬ ment devised, by Helmholtz (q.v.), to measure with accuracy the dimensions of reflected images, and to determine the axis and degree of corneal astigmatism. It consists of a small telescope enclosing a combination of convex lenses with a refracting, prism, attached to a graduated arc. The arc is crossed by an arm bearing two wires; one fixed, the other movable; one quadrilateral in shape, the other cut into

five steps. Fixed upon the patient's face in a frame, the oculist looking through the telescope focuses upon the patient's cornea the images of the

mires, brings them into alignment, and by measurement of the original positions of the mires on the arm, ascertains the amount of stigmatism present.

OPHTHALMOSCOPE, of-thal'md-skop, an instrument for examining the interior of the living eye, invented in 1851 by Prof. Helm¬ holtz, who showed that by illuminating and ex¬ amining an eye in the same direction, its deeper parts become visible. The form now generally in use consists of a section, usually oblong, of a concave spherical mirror of about 10 inches focus with a small hole in the centre ; and cer¬ tain lenses to use with it. These lenses are mounted around the outer zone of a disc which is so pivoted that it may be revolved so as to bring the lenses successively in front of the observation aperture of the mirror. Examina¬ tion is facilitated by dilating the puoil of the observed eye with atropine or homatropine ; and for a complete examination this is indispen¬ sable. The person whose eye is to be examined is seated in a dark room, with a bright light on a level with his eye by the side of his head. The observer sits opposite him, and placing the mirror close to his own eye, and about 18 inches from the eye to be examined, reflects the light upon the latter, while he looks at it through the hole. The pupil in a healthy eye appears bright red or orange; opacities in the lens or vitreous humor appear black. The de¬ tails of the retina, choroid, etc. (or fundus), can be seen in two different ways. In the indi¬ rect method the observer, seated as above de¬ scribed, holds the two and one-half-inch con¬ vex lens about three inches from the eye under examination, between it and his own, when a clear image of part of the fundus, inverted and magnified about four diameters, appears in the red light of the pupil. In the direct method, the observing eye must be placed as close to the observed as the intervention of the mirror will allow, when an image of a smaller part of the fundus is seen but erect and magnified about 14 diameters and a correspondingly small field of view. The fundus appears orange or red, varying in different individuals. The blood¬ vessels of the retina are seen as darker red lines coursing over it. The entrance of the optic nerve, commonly called the disc, from which these vessels diverge, appears as a round disc of a much paler color. A variation of this instrument has an attachment resembling a microscope by which the image entering the lens at the observation aperture is magnified up to 40 diameters. This attachment may be for use with a binocular form of the observing mieroscope ; or, again, it may be so fitted with reflecting prisms that two observers may make the examination simultaneously. The latter form is of peculiar value in consultations, and also in coaching students in ophthalmology (q.v.).

OPIE, o'pf, Amelia Alderson, English nov¬ elist: b. Norwich, England, 12 Nov. 1769; d. 2 Dec. 1853. She was married to John Opie, the portrait painter, in 1798. In 1801 she pub¬ lished (Father and Daughter, > a

novel which at once attracted attention. After the death of her husband in 1807 she returned to her father's

home, in Norwich, where she occupied a high position in society and subsequently joined the Society of Friends. She published (Adeline Mowbray) (1804) ; (The Warrior's Return and Other Poems) (1808); (Madeline) (1822); (Lays for the Dead) (1833), etc. Consult the (Life} by C. L. Brightwell.

OPIE, Eugene Lindsay, American pathol¬ ogist: b. Staunton, Va., 5 July 1873. He was graduated at Johns Hopkins University in 1893 and took his M.D. there in 1897. He was con¬ nected with the staff at Johns Hopkins Hospi¬ tal in 1897-98, and with the faculty of the uni¬ versity in 1898-1904, serving also as pathologist to Bay View Asylum in 1898-1904. He was a member of the Rockefeller Institute for Medi¬ cal Research in 1904-10; and visiting pathol¬ ogist to the Presbyterian Hospital, New York, in 1907-10. In 1910 he was appointed to the chair of pathology at Washington University, Saint Louis, and in 1912-15 he was dean of the medical faculty there. He was commissioned captain in the Medical Reserve Corps in 1917 and served with unit one (Washington Univer¬ sity) in France. He published investigations of malarial parasites (1898) ; of the anatomy and pathology of the pancreas, and the relation of pancreas to diabetes (1899-1902) : of inflam¬ mation, tuberculosis and diseases of the liver (1902-13); effects of diet (1914-15). He was co-editor of the Journal of Experimental Medi¬ cine in 1904—10. Author of (Diseases of the Pancreas) (1902).

OPIE, John, English painter : b. Saint Agnes, Truro, Cornwall, May 1761; d. 9 April 1807. When about 19 he was taken to London by Dr. Wolcott (((Peter Pindar®), who be¬ friended him in various ways. Through the influence of his patron he acquired great fame as a portrait painter, became known as the (etc. His Slaughter of Rizzio} was ex¬ hibited in 1787, and secured his election to the rank of associate to the Royal Academy In 1788 he was appointed a Royal Academician. In 1805 he was elected professor of painting in the Royal Academy, but only delivered four lectures 'before his death, and these with a memoir by his wife were published in 1809. He is also the author of the biography of Sir Joshua Reynolds in Wolcott's edition of Pilk- ington's dictionary of Painters) and of (An inquiry into the Requisite Cultivation of the Arts in England, which among other influences led to the formation of the National gallery. His work is characterized by great originality, though it frequently lacks harmonious coloring and refined elegance. His second wife was Amelia Alderson Opie (q.v.).*

OPISTHOGLYPHA, 6'pis-th6g'll-fa, a group of colubrine serpents having

compara¬ tively weak powers of poisoning their prey, and so securing immobility by paralysis. In these snakes one or a few of the posterior maxillary teeth have a groove on the front side,

down which poison may flow from glands in the lips. The supply is rarely enough to affect a man or large animal much although some of the species are of rather large size. The group in¬ cludes the long tree-snakes of the Eastern and American tropics, several familiar terrestrial snakes of the Mediteranean region, and some East Indian genera. An interesting fact is that the group connects the non-poisonous Colu- bridae with the highly venomous vipers, whose poison apparatus seems to have been evolved from an opisthoglyphous type.

OPITZ, o'pits, Martin, German poet and critic, the <(Father of modern German poetry® : b. Bunzlau, Silesia, 23 Dec. 1597 ; d. 1639. Educated at Heidelberg, he became the centre of a circle of young poets. He fled to Holland in 1620 to escape the plague but returned to Silesia in 1622 and taught for a time. In 1625 he was ennobled and crowned with laurel for his poetic fame by the emperor. From 1628 to 1632 he was secretary of Dohna, the persecutor of Silesia, and then became the client of Ulrich of Holstein, as ardent a Protestant as Dohna was a Catholic. But the story of his life, with its changing of sides and its petty flatteries is less important than his literary work. When scarcely 21 he wrote (Aristarchus, seu de Con- temptu Linguae Teutonics,) urging the infusion of classical imitation into German poetry; and in 1624 this German Boileau published (Das Buch von der deutschen Poetereip which in¬ sisted on accent in place of mere numbered syllables and in many other respects made pos¬ sible the revival of German poetry in the 17th century. Three years later he wrote the verses of said to be the oldest German opera, to the music of Heinrich Schiitz. His poetical work was correct, unoriginal, and various, including manifold versions and imita¬ tions. The antiquarian epic

OPIUM, the dried milky juice of the unripe capsules of a poppy (Papaver somnifermn) , which for this product has been cultivated through many centuries. Every species of poppy is capable of yielding it to a greater or less ex¬ tent. Opium is procured by making incisions in the poppy-head or capsule, taking care not to penetrate its cavity; the juice then exudes in drops, and after being allowed to remain for a day upon the edges of the incisions, it is scraped off — a brownish, jelly-like material. As the soft opium accumulates it is molded into round¬ ish lumps or irregular flattened cakes, of va¬ rious sizes, and put aside to dry. When of proper

consistency it is generally wrapped in leaves and sent to market. When fresh the lumps and cakes are plastic, becoming harder on the exterior, are of a chestnut or darker brown, and have a disagreeable, even sickening odor, and a bitter nauseous taste. Sometimes opium of commerce is mixed with pebbles, shot, ashes, clay, sand, and with resinous, saccharine and mucilaginous substances, and has an excess of moisture. Adulteration in the LInited States

has been reduced to a minimum under the oper¬ ation of the Food and Drugs Act of 30 June 1906. Opium is a complex substance. «It ordi¬ narily contains an odorous principle, glucose, gum pectin, a compound resembling caoutchouc, wax, fat, resin, coloring matter and plant-tis¬ sue,® also the neutral principles mecomn and meconoiosin, and meconic acid and thebolactic acid, similar to lactic acid. The most important of the derivatives obtained from opium are its alkaloids, 19 in number. In all probability the poppy was originally brought from Asia Minor. It is now grown extensively there, and in Egypt, India, Persia, China and Japan, less extensively in several parts of Europe, especially France and Germany, and in the United States. As an ornamental flower it is cultivated in nearly all temperate countries.

The principal varieties of the opium of com¬ merce include Turkey opium, used principally in' Europe and America; Persian, of variable quality, seldom used in this country; East In¬ dian, rather a poor variety, used at hgme and exported to China and other Asiatic countries; Chinese, consumed in the East, largely for smoking.

Alkaloids of Opium. — Those at present rec¬ ognized are morphine, which crystallizes in white needles, and which was discovered in 1816 by Sertiirner; narcotine (shining prisms^ or long needles, tasteless, odorless), discovered in 1803 by Derosme, although its basic nature was first shown by Robiquet in 1817 ; codeine (nearly colorless octahedra), discovered in 1832 by Robiquet and described by Grimaux in 1881 ; prepared from morphine by heating it with methyl iodide and soda, it is methylmorphine ; narceine or narceia (long quadrangular prisms or white silky needles, odorless), discovered in 1832 by Pelletier; pseudomorphine (fine crystal¬ line powder, derived from morphine), also called phormine and oxydimorphine, discovered in 1835 by Pelletier and Thibournevy ; thd)aine or para-morphine (silve scales or prisms with styptic taste), discovered in 1835 by Thibour¬ nevy; paparenine (colorless needles or prisms), discovered by Merck in 1848; rhoeadine (white tasteless prisms), discovered in 1865 by O. Hesse; cryptopine (minute prisms), discovered in 1867 by T. and H. Smith; oxynarcotine (iso¬ lated from the mother liquor of narceine), dis¬ covered in 1876 by Wright and Beckett; gnos- copine (woolly needles, obtained from nar¬ ceine), discovered in 1878 by T. and

H. Smith. In 1870-78 O. Hesse announced the discovery of lanthopine (finely crystallized), meconidine (amorphous, not stable), laudanine (large crys¬ tals), codamine (crystalline), deuteropine, lau- danosine (crystallizable) , and protopine (crys- tallizable). The discovery of hydro-catarnine (crystallizable) was announced in 1869 by Mathieson and Wright. Apomorphine or apo- morphia, derived from morphine or codeia, al¬ though a depressant, is a prompt and valuable emetic.

Of the alkaloids of opium, morphine, co¬ deine, narceine and thebaine are of most im¬ portance. Morphine in its action on the body very nearly represents that of the crude drug. Morphine occurs in different kinds and grades of opium in amounts varying from a fraction of 1 per cent up to nearly 25 per cent. The United States Pharmacopoeia prescribes a mini-

mum of 9 per cent morphine for opium. The average dose of opium for an adult is one grain; of morphine, one-eighth to one-fourth grain, Codeine acts like morphine, but is weaker, and is less likely to be followed by headache, constipation and other unpleasant symptoms. It is used principally to allay pain and coughs. ((Codeine, paparenine, cryptopine and narceine have a certain soporific action, but the remainder of the alkaloids are almost devoid of it.}) Thebaine is antagonistic to morphine; is a powerful and poisonous irritant of .the spinal centres, producing convulsions. Thera¬ peutical uses for it have not been developed.

Officinal Preparations of Opium.— The principal preparations (including the alkaloids) are the acetate, hydrochlorate and sulphateˆ of morphia, sulphate of codeia, powdered opium, pills of opium (opium and soap), Dover's pow¬ der (opium, ipecac and sugar of milk), troches of licorice and opium, tincture of opium (lauda¬ num), deodorized tincture (McMunn's elixir), camphorated tincture (paregoric), tincture of ipecac and opium (liquor Dover's powder), vinegar and wine of opium and opium liniment. The use by the physician of one or other of these preparations is to a certain extent a mat¬ ter of personal habit. The alkaloids are gener¬ ally considered to act more promptly than opfum itself and its solid and liquid preparations, and to he less constipating. Solutions of opium are more prompt in action than solid preparations and salts of morphine than morphine itself.

Properties and Use of Opium. — Opium is a stimulant narcotic; in small doses, stimulant; in larger, a sedative; and in still larger, a nar¬ cotic poison. It is readily absorbed from the stomach, less quickly from the

rectum and vagina and very little from the skin, if it is not abraded. When injected under the skin (subcutaneous, hypodermic or hypodermatic use), its action, as a rule, is rapid. Opium is used by many nations for its exhilarating and anodyne influences, being either eaten, smoked or used as a substitute for alcoholic drinks. Medically, it is used to relieve pain, to produce sleep in certain low conditions, to allay nervous irritation, as in coughs, to check excessive secre¬ tion, as in diarrhoea, dysentery and diabetes and to support the system when sufficient food can¬ not be retained. The action of opium is not always uniform. With some individuals, due to age, race temperament, condition of health, personal idiosyncrasies, etc., opium produces effects different from the ordinary results, such as delirium, cramps, vomiting, severe headache and itching of the skin. Young children, old people and persons of a nervous temperament are particularly susceptible to the influence of opi'um; small doses sometimes producing in these coma and even death. On the other hand, severe pain, flooding, etc., sometimes requires three to four times the ordinary dose. Many of the soothing syrups and carminatives con¬ tain opium. It is believed by many physicians that morphine should never be given to a child under 10, nor a hypodermic injection to a child under 15. In frogs small doses of opium pro¬ duce tetanus; in mice, convulsions; they stupefy dogs and rabbits; while it requires large doses to poison ducks, chickens and pigeons. In small doses, opium usually excites or stimulates, in¬ creasing the fulness, force and frequency of the

pulse, the temperature of the skin, the power of the muscles, arousing mental action and afford¬ ing bodily and mental calm. In a variable time, usually within an hour after the opiate has been taken, there is a disposition to sleep or repose. On arousing from sleep there is fre¬ quently headache, with nausea, tremors, etc., until the body recovers its energy. Most of the secretions are diminished by opium, the peris¬ taltic action of the bowels lessened, pain and muscular contractions or spasms allayed and nervous irritation relieved, but always with the risk of repetitions of the dose and the forma¬ tion of the opium habit.

Opium-Poisoning. — This is quite frequent, due to the overuse of the drug to relieve pain or produce sleep, or as an indulgence, it being unfortunately too easy to procure opiates. Poisoning is principally from the salts of mor¬ phine, either used alone or in patented com¬ pounds. The primary or stimulant effects may be loquacity, restlessness and hallucinations, al¬ though the period of exaltation may be short, if present at all, the symptoms of the second or intermediate period rapidly appearing. These are similar to those of congestion of the brain, weariness, dullness, drowsiness, a sense of weight in the extremeties; the face is pale, suffused or cyanotic; the pupils are slightly contracted, the breath is slow and may be deep and stertorous; the skin may be dry and warm or cool and wet ;

the pulse is generally normal ; the patient is unconscious, but may be roused by shaking, by the infliction of pain or by loud talking, and when aroused, his breathing be¬ comes more rapid. In the third period, that of narcosis or coma, the patient cannot be aroused ; the face is pale and cyanotic (bluish, especially the lips) ; the pupils are insensible to light, usually contracted to the size of a pinhead, sometimes dilated toward the end of life; the pulse is rapid and feeble; breathing is slow and shallow, with increasing intervals and some times is stertorous; the skin is bathed at first in warm perspiration, then becomes cold and clammy. Convulsions are rare. Recovery may even now take place, or death occurs from failure of respiration and arrest of the heart's action. A post-mortem examination may reveal nothing abnormal ; or the brain may be con¬ gested, the vessels of the cerebrospinal axis gorged with dark blood, the lungs, heart, liver and spleen distended with dark fluid blood, and serum may fill the ventricles and be beneath the arachnoid.

Treatment of Opium-Poisoning. — Produce

emesis, with copious drafts of warm water, with a tablespoonful of salt or a teaspoonful of mustard well stirred in; by tickling the throat with a feather; or by use of a stomach- pump. Wash the stomach continually since excretion of the poison may be expected from the circulation thither. For the washing use a one-tenth per cent solution of potassium perman¬ ganate, which may perform a most valuable service in oxidizing the poison. Applv cold affusions to the head and spine, and flagella¬ tion to the palms, soles and calves, and with a damp towel to the back; keep the patient walking briskly, though he begs for rest: give strong coffee and aromatic spirits of ammonia; frequently use the Faradaic current upon the limbs, and resort to artificial respiration if

necessary. The bladder should be kept emoty. Atropine aids respiration, but must be used with the greatest caution.

The Opium-Habit. — Indispensable as opium is in certain affections, in the hands of the thoughtless and weak it is too often a curse. It is the most seductive of all the narcotics. (

Victims of the opium-habit frequently be¬ come so demoralized as to need care in an asylum. They lie, steal, lose self-respect and ambition, are forgetful, may be subject to de¬ lusion, fear and superstition, and are careless as to clothing and necessary habits, while still thinking highly of

themselves. The great nerve- centres tolerate stimulation to a certain point. W'hen the limit is reached, the time varying in different persons, the action of the various or¬ gans and tracts is disordered. The victim of opium suffers from imperfect digestion, faulty appetite and assimilation and consequent mal¬ nutrition. The red blood corpuscles diminish, he is pale, has nausea, muscles are flabby and endurance weakens. The kidneys become af¬ fected, the skin is congested, and when the dis¬ ease is advanced, purpura appears. There is often a malaria-like fever. The functions of the testicles in the man and of the ovaries in the woman are suspended. Primarily there is functional derangement of the brain, then per¬ manent deterioration. He becomes a slave to his depraved appetite. When the time draws near for his allotted dose he is nervous, yawns, may have neuralgia, is weak, breaks out into a perspiration and is miserable. He takes his dose and is himself again; but after a time the dose has to be increased, and if relief from his cravings is not obtained he sinks lower and lower and dies a wretched death. Two methods of cure are employed; one is the gradual reduc¬ tion of opiates, the other is their sudden with¬ drawal — in either case giving in their stead bitter tonics, stimulant carminatives, such as ginger and certain stimulants and medicines. The law holds opium habitues, as it does drunk¬ ards, responsible for crimes which they commit. It is estimated that the vicious use of opium is about 50 times as great as its medicinal use,

in connection with which it is well to remem¬ ber that probably more than half of that usually classed as medicinal is in reality vicious. Con¬ sult (United States Dispensary and Reference Handbook of the Medical Sciences) ; Potter, (Handbook of Materia Medica, Pharmacy and Therapeutics) (1901); 'Reference Handbook of the Medical Sciences) (Vol. VI, New York

1916).

OPIUM, Wild, an American wild lettuce (Lactuca canadensis) , noted for its tallness, reaching a height in some plants of 10 feet.

OPIUM TRAFFIC, The. Opium as an article of commerce begins to be mentioned in history in the 9th century when it was brought into China by traveling Arabs. In the 12th century opium was being brought from India to China in the native junks. At that period its use was purely medicinal. In the second half of the 18th century the importations into China began to assume large proportions through the activities of the Portuguese traders. The first edict against it had been issued by the Chinese Government in 1729, but no attempt was made to enforce it. In 1757 the East India Company acquired a monopoly of the opium trade of India, where, since 1793, the drug has been a government monopoly, the cultivators, in Behar,

Benares and Malwˆa being paid at a fixed rate for their crops for exportation to China. The trade was contraband, the Chinese government having in 1796 prohibited the im¬ portation of opium. Through the connivance of the Chinese local officials, the importation about trebled in the 20 years between 1816 and 1836. In 1729 the imports had totaled 29,866 pounds. By 1775 they had risen to 149,000 pounds. In 1790 they were 754,700 pounds; and in 1830, 2,520,300 pounds. In March 1839 the Chinese authorities forbade all foreigners to quit Canton and ordered them to deliver up the opium in their possession and seized that on board of British ships in the harbor, 20,291 chests in all, amounting to 3,030,125 pounds, valued at $10,000,000. This the Chinese officials destroyed. War with Great Britain resulted, which ended in the defeat of the Chinese, who were obliged to cede Hongkong as well as pay a large indemnity for the opium. The treaty of Nanking under which the war was settled was signed in 1842. It provided that five ports of China should be freely open to foreign trade. The Chinese Government still held to the pro¬ hibition of the importation of opium but no further attempt was made to enforce it. By 1850 the annual importations of opium from India and other British territories had risen to 7,056,700 pounds. In 1858, under great pres¬ sure, internal as well as external, China placed opium on the list of lawful imports. Opium smoking had then become prevalent all over China. In 1880 the imports amounted to 12,- 911,800 pounds and the Chinese themselves were raising large quantities of it, the profits being much larger, than for wheat and other farm crops. In 1900 the Chinese raised 45,000,000 pounds of opium and consumed it all but 660,- 000 pounds which was exported. In addition to this prodigious quantity they consumed also 7,230,000 pounds imported from India. By 1906 China had 15,000,000 opium smokers and it was estimated that nearly or quite half of her 400,000,000 population used the drug in some

form. The annual income ot the Chinese government in customs and licenses in the opium traffic amounted to $30,000,000. In that year, however, the Empress Dowager issued a decree ordering the opium habit to be extirpated in China within the space of the next 10 years. Appeals made to the British government to co¬ operate by checking the export traffic from India received the backing of the British pub¬ lic and of some of the officials and it was agreed that if China actually carried out her program of wiping out one-tenth of her inter¬ nal opium traffic annually for the next three years, the British government would undertake to shut off the India exports in the same pro¬ portion. The closing of opium dens began at once and was carried on relentlessly. The poppy farms were decimated by*

law and many of the farmers ceased voluntarily to raise the drug plant, so that by 1909 fully one-half of the former poppy-growing acreage was in other crops and 2,000,000 opium dens had been closed. By 1912 five of the 18 provinces of China had been entirely closed to the opium trade and in 1913 five more were freed. In 1914 the freed provinces numbered 15. The remainder of the country would have been quickly cleared up but for the treaty of 1911 with the British government under which the Shanghai opium combine was operating. Through this treaty the three provinces, Kwangtung, Kiangsu and Kiangsi were held open to the traffic until March 1917, when the last ounce of smoking opium was (legally) imported into China. The combine made a strong fight to continue the trade, offering the Chinese government $16, 000,000 for an extension of time to 1 Jan. 1918. But though China was in serious finan¬ cial straits at the time, the offer was refused. The last opium farm in China had been closed down in November 1916 and on 30 June 1917 absolute prohibition of opium smoking in China went into effect.

While the opium plague was thus being stamped out in China, it was spreading in India. In the fiscal year 1901-02 the consumption of opium in India was 847,332 pounds. Ten years later it was 1,028,892 pounds. In some sec¬ tions of India the annual consumption of the drug amounted to 18.7 pounds per 1,000 of the population. In Calcutta about one-tenth of the people were opium eaters and in the Assam section the proportion of opium smokers and eaters was at least 20 per cent and was esti¬ mated by some officials as 25 per cent.

Recent reports of travelers in the Dutch East Indies, particularly in Java, have voiced severe criticism of the government of the Netherlands for promoting the spread of opium consumption in those islands. The Netherlands government controls the opium trade in those islands as a monopoly and maintains retail shops where so small a quantity as five cents worth can be freely purchased. It is charged that the opium traffic brought into the treasury of the Dutch government in 1902 the sum of $5,500,- 000 and that in 1914, while China was rigor¬ ously cutting out the traffic on her soil, the Dutch collected $8,400,000 from the Dutch East Indies opium trade. To this the government replied that though the revenue had indeed in¬ creased, the traffic had been cut down by 55 per cent between 1890 and 1911; and at any

rate the consumption of opium was not by Dutch subjects but was confined to the 300,- 000 Chinese immigrants residing in the islands.

The Japanese government has always stead¬ fastly opposed opium and the law forbids its importation, possession or use except as a medicine. With the occupation of Formosa in 1895, the Japanese government found nearly

7 per cent of the 3,000,000 inhabitants to be opium smokers. The government took over the opium traffic as a monopoly and licensed the opium users, at the same time preventing the spread of the habit and administering a cure to the younger habitues. In 1900 there were 169,000 opium users on the register. In 1903 the number was 143,500. During the years fol¬ lowing a large number of additions were made, due to the immigration of Chinese devotees. The number is steadily diminishing, however, and the traffic will eventually wear itself out.

With the occupation of the Philippines the United States succeeded to an extensive opium traffic. A government measure proposed for its regulation was suppressed in consequence of a vigorous outcry raised in the States against the legalization of the traffic in the drug and against any form of governmental participation in the profits realized from its sale. Under the law of Spain in force in the Philippine Islands for years before the American occupancy, the Fili¬ pinos were forbidden to smoke or use opium and all dealers in opium were forbidden to sell the drug to the Filipinos or to permit it to be used on their premises by Filipinos. The Span¬ ish system provided for the sale of the privilege of selling opium to Chinamen in each province to an opium farmer or contractor. It provided that opium should only be used or smoked in certain places, which were under the surveil¬ lance of the police and if a Filipino was found in such resorts he was arrested and the owner of the resort was subjected to punishment. This was the system at the time of the Ameri¬ can occupation, but it was found that there were at least 10,000 Filipino addicts to opium in some form, although few smokers. The Span¬ ish regulations were not continued by the American authorities, and for nearly five years the only checks upon the sale and use of the drug was a duty imposed in the custom-house and a provision in the municipal code requiring municipal councils to pass ordinances punishing the keepers of dives in their respective towns. In 1903 a commission was sent to visit the opium-consuming countries near the Philippines .and to report on a plan to control the traffic. The commission commended the Japanese method in Formosa but it was not put into effect. In 1907 the Philippine commission passed an opium law prohibiting the use of the drug except under the direction of a registered physician and made the mere possession of the drug a crime punishable with fine and im¬ prisonment. In 1903 the imports of opium were 254,547 pounds, in 1909 they were 93,053 pounds- The weight of the opium imported in 1915 is not given but its value is stated at $4,600 — about 1,500 pounds.*

In the United States there are said to be about 200,000 persons who are habitual users of drugs and a few more than half use opium. Since the passage of the Harrison Law in 1915, the annual opium importations have fallen from

491,600 pounds in that year to 165,000 pounds in 1916 and to 86,812 pounds in the fiscal year ended 30 June 1917. A great deal of opium smuggling is carried on across the Mexican border and some across the Canada line and it is probable that an occasional batch gets in along the Pacific Coast. It is impossible to estimate as to these illegal importations.

OPODELDOC, op-o'del'dok, a medicinal plaster, said to have been invented by Minder- erus and used for external injuries. The name is now applied to a liniment which is much used as an anodyne application in sprains, bruises and rheumatic pains. It is prepared by dissolv¬ ing three ounces of common soap in a pint of alcohol by the heat of a sand bath, then adding an ounce of camphor and a fluid dram each of oil of rosemary and oil of origanum. It con¬ cretes into a soft, translucent, yellowish white mass, of the consistency of soft ointment; but it becomes liquid when rubbed upon the skin.

OPON, 6′ pon, Philippines, a pueblo of the province of Cebu, situated on the northwestern shore of Mactan Island, three miles across the channel from the town of Cebu. In 1521 Ma¬ gellan was killed here in conflict with the natives. Pop. over 20,000.

OPOPANAX, o-pop'a-nax, a gum resin with a peculiar acrid odor, the produce of an umbelliferous plant, Opopanax chirorium. This plant is a native of southern Europe and Asia Minor and the granular gum is brought to market from the Levant. The physicians of ancient times highly esteemed it for its puri¬ fying and aperient virtues and it still continues a famous medicine in the East, where it is looked upon as a cure for almost all diseases. The perfume known as opopanax is not derived from this gum-resin. There is a commercial opopanax, a kind of perfumed myrrh, obtained from a Balsamodendron, largely, imported into Germany, where an essential oil is distilled from it.

OPORTO, 5-por'to (Port. (

foundries and sugar-refineries are also in opera¬ tion. The chief exports, in addition to wines, are olives, olive and other oils, raisins, onions, oranges, lemons and other fruits, salt, cork, cattle and building materials. In ancient times the site of Oporto was occupied by the harbor town Portus Cale afterward Porto Cale, from which the name of the kingdom, Portugal, is derived. Oporto was the capital of Portugal till 1174, when the seat of government was transferred to Lisbon. It was taken and sacked by the

French in 1805, who retained possession of it till 1809, when the British crossed the Douro and compelled them to re¬ tire. Oporto having sided with Dom Pedro, it was besieged in 1831-32, for over a year, by the troops of Dom Miguel, when much of it was destroyed, and its trade was, for the time, annihilated. Pop. about 200,000.

„ OPOSSUM, the name, adopted from the Indian name of the northern species, for the family of American marsupial mammals Didel- phyidce, more particularly for the typical genus Didelphys, and specifically for D. virginiana of the United States. The place of this family in the order is among the higher polyprotodonts associated with the dasyures and bandicoots (Perameles) . Their greatest peculiarity lies in the fact that, with a single exception, this group contains all the marsupials existing out¬ side of Australasia. The family itself is not represented there, for various marsupials care¬ lessly called ˆctpossums® in Australia are not members of this family, which is confined to America, and mainly to its tropical parts, where doubtless it is a survivor from the Mesozoic Age when marsupials were generally distributed over the whole world. The opossums are arboreal omnivorous animals, ranging in size from that of a cat to that of a mouse. They have 50 teeth, having 10 incisors in the upper jaw and eight in the lower, one canine tooth on each side in each jaw, three compressed pre¬ molars and four sharply-tuberculated molars on each side. The head is long, muzzle pointed, ears large and naked. The fur is long, loose and grizzled. The tail is long, prehensile, and in part scaly. The feet are plantigrade, with five toes on each foot, their claws long and sharp; but the inner toe of the right foot converted into a thumb, destitute of a claw, and opposable to the other digits. The nouch, so characteristic of marsupials, is absent in the familiar northern species, and most others, the nipples opening be¬ tween folds of skin which represent a marsu- pium. To these the minute young are at¬ tached by the mother as soon as born, which is after only about 26 days of embryonic life, and when still in a very undeveloped condition ; and there they cling five or six weeks until able to run about. The young are numerous and re¬ main with the mother until well grown, clinging to her fur and being carried about as she scram¬ bles among the branches, with their tails tightly wound abon} hers, or about her limbs or neck. Their prehensile rope-like tails are of vast serv¬ ice to these animals, enabling them to use all four feet in food-gathering while suspended by this useful fifth member.*

In habits the opossums generally are noc¬ turnal. The food consists chiefly of insects, small mammals, and birds; most species are fond of fruits; and the Brazilian crab-eating

opossum (D. cancrivora) obtains its name from its partiality for the flesh of crabs, which the northern species will also eat, as well as frogs, when other food is scarce. They are pre-emi¬ nently arboreal animals, and make their homes in hollows of trees, bedded with leaves and soft grass ; here the days are spent in drowsy hiding, and the young are brought forth in early sum¬ mer. Owls frequently share these hollows with the opossums. On the ground the movements ot the opossums are slow and awkward. They get credit for being exceedingly cunning ani¬ mals, and are famous for their skill, and patient- endurance of indignities and even torture, in counterfeiting death when threatened with harm. "Playing 'possum* has passed into a proverbial expression to indicate any deceitful procedure. Some observers declare that this supposed counterfeit of death is solely the paralyzing effect of fear, but this simple ex¬ planation is not generally regarded as wholly adequate to account for the phenomenon.

The number of species in this family is un¬ determined, but more than 20 have been named, mainly small animals of South America. The most remarkable form, perhaps, is the tiny red¬ dish "mouse-opossum* (D . murina) of Mexico and southward, which is no larger than a field- mouse. Other species are shrew-like. Of a different genus is the curious yapok (Cheiro – nectes variegatus) , found from Guatemala to Paraguay, which has the hind-feet webbed. It swims and dives with great ease, gathering from the w7ater its food, consisting of fishes and crus¬ taceans. It inhabits holes in the banks of rivers, and is strongly marked with brown bands on a gray ground. Several of the tropical species are more strongly colored than the northern opossum, which is simply whitish gray.

The flesh of all the larger species is eaten, and that of the Virginia opossum is regarded as one of the woodland delicacies of the South¬ ern States. Hunting the opossum with dogs at night is a favorite sport in the South, especially in autumn, when the body has a thick layer of fat all over. The animal takes refuge in a tree, and is either shaken down or shot as it hangs by the tail. The flesh is usually baked and eaten with roasted sweet potatoes.

Consult writers upon American mammals, as Audubon and Bachman, Goodman, Allen, Mer- riam, C. C. Abbott, D. L. Sharp, etc. For the family generally consult Beddard, (Mam- malia) (1902) ; Goeldi, (Proceedings) of the Zoological Society of London, 1894, p. 457 ; or any treatise on mammals.

OPOSSUM-MOUSE, one of the diminu¬ tive, active, very mouse-like flying phalangers (q.v.) of the genus Acrobates.

*OPOSSUM-RAT, a book-name, translated from the local name ((raton runcho ,** in Ecua¬ dor, of a rare little marsupial inhabiting the northern Andean region, which is of special interest because it represents in America an entirely different branch (the diprotodont) of marsupials from the marsupials, and is the sole survivor of a family (Epanorthidce) formerly prevalent in Patagonia. It looks like an opos¬ sum of the size of a rat, lives in high brush¬ wood, feeds mainly on birds and their eggs, and specimens are obtained rarely and with difficulty. It was first described in the (Pro-ceedings) of the Zoological Society of London*

for 1860, by R. F. Tomes, in working out a col¬ lection of small mammals obtained by Louis Fraser in Ecuador, who published the first notice of Ccenolestes, which he described under the name Hyracodon fuliginosus. Oldfield Thomas rediscovered Tomes' genus in a specimen ob¬ tained near Bogota. This specimen Thomas found it necessary to consider as representing a new species. The name Hyracodon having been found to be preoccupied, Thomas suggested Ccenolestes, calling his specimen obscurus and Tomes' fuliginosus. Consult Thomas, Proceed¬ ings Zoological Society of London for 1895, p.

870.

OPOSSUM-SHRIMP, mysis stenolepis, a small, shrimp-like marine crustacean of the order Schizopoda, so called because of the egg¬ carrying pouches between the thoracic legs of the female. See Crustacea.

OPPELN, op'peln', Prussia, river port and capital of a district in the province of Silesia, on the Oder, 51 miles southeast of Breslau, on the railway to Kattowitz and at a junction con¬ necting it with Beuthen, Neisse and Tarnowitz. It has a church of Saint Adalbert, founded in the 10th century, and the 15th century palace of its dukes is situated on an island in the Oder. Ihe town was in a prosperous condition as early as the 11th century, and was incorporated in 1228. In 1163-1552 it was the capital of the duchy of Oppeln. On the extinction of its line of dukes it became Austrian territory but was ceded to Prussia in 1742. There is a nor¬ mal seminary and a Roman Catholic gymnasium. Manufactures include beer, cement, cigars, lime, lumber, machinery and soap; and there is an extensive trade in cattle, grain and the rich mineral products of the district. Pop.

(1910) 33,907.

OPPENHEIM, op'en-him, E. Phillips,

English novelist: b. 1866. He was educated at Leicester, England, has

become very popular there and in the United States. Among his published works are (Enoch Strone) ; (A Man and his Kingdom- ; (A Millionaire of Yester¬ day* ; (The Survivor* ; (The World's Great Snare) ; (The Master Mummer* ; (Anna the Adventuress* ; (Mysterious Mr. Sabin* ; (The Traitor* ; (A Prince of Sinners* ; (Mr. Win- grave* ; (A Maker of History* ; (The Secret* ;*

*(Conspirators * ; (The Missioner* ; Qeanne of the Marshes* ; (The Illustrious Prince* ; (The Missing Delora* ; (The Falling Star* ; (Havoc* ; (Double Four* ; (Peter Ruff.* Later works in¬ clude (The Lighted Way* (1912) ; (The Mis¬ chief Maker* (1913) ; (The Way of these Women* (1914); (The Amazing Partnership' (1914) ; (The Game of Liberty* (1915) ; (A Peoples' Man* (1916) ; (Mr. Grex of Monte Carlo* ; (The Double Traitor* ; (The Hillman* (1917) ; (The Wicked Marquis* (1919) ; (The Curious Quest* (1919).*

OPPENHEIM, James, American fiction writer: b. Saint Paul, Minn., 24 May 1882. He was a special student at Columbia University in 1901-03, and at the same time was assistant head worker at the Hudson Guild Settlement. He is well-known as a contributor of verse, short stories and articles to the leading Ameri¬ can magazines. He (edited, in 1916-17, the Seven Arts Magazine. Author of (Doctor Rast (1909) ; (Wild Oats,* novel (1910) ; (Pay Envelopes,* short stories (1911); (The*

Nine-Tenths,5 novel (1911); (Idle Wives5

(1914); (The Beloved) (1915); (War and Laughter, poems (1916) ; The Book of Selffc5 poems (1917); (The Solitary5 (1919), etc.

OPPENHEIM, Lassa Francis Lawrence,

Anglo-German international lawyer : b. Win- dekken, Prussia, 30 March fi858. He was edu¬ cated at the universities of Gottingen, Heidel¬ berg, Berlin and Leipzig. He was later lecturer and professor at the University of Freiburg, and in 1891 became professor at Basle. In 1895 he became lecturer at the University of Lon¬ don, and in 1908 he was appointed Whewell professor of international law at Cambridge University. He was naturalized a British sub¬ ject in 1900. Author of (Die Rechtsbtugungs-verbrechen5 (1886) ; (Die Objekte des Ver- brechens5 (1894) ; (Das Gewissen5 (1898) ; (The Science of International Law5 (1908) ; (The Future of International Law) (1911) ; (The Panama Canal Conflict5 (1913) ; (The Collected Papers of John Westlake on Public International

Law) (1914), etc.

OPPENHEIM, Nathan, American physi¬ cian ; b. Albany, N. Y., 17 Oct. 1865 ; d. 5 April 1916. A graduate of Harvard (1888), and of the College of Physicians and Surgeons (1891), he made a specialty of the diseases of children. He published in that field (The Development of the ChilcP (1899) ; (The Medical Diseases of Childhood5 (1900) ; (The Care of the Child in Health5 (1901) ; (Mental Growth and Condi¬ tions of Children5 (1902).

OPPER, Frederick Burr, American illus¬ trator: b. Madison, Ohio, 2 Jan. 1857. He left school at 14, worked in a newspaper office and then in a store in New York, soon succeeding in getting his humorous sketches published. He was employed upon the Frank Leslie publica¬ tions three years, and was associated with Puck 1880-99. In the last named year he joined the staff of the New York American. He has pub¬ lished several of his series of humorous draw¬ ings in book form, and has illustrated humor¬ ous books by Bill Nye, Eugene Field, Mark Twain and others, an edition of 'Mother Goose,5 'vEsop's Fables,5 etc.

OPPERT, op'pert (Fr. o-par), Jules, French Orientalist: b. Hamburg, Germany, 9 July 1825; d. Paris, France, 21 Aug. 1905. He was educated for the law at Heidelberg, studied Oriental languages at Bonn and Berlin and philosophy at Kiel. His first literary work, 'Das Laut-system des Altpersischen,5 was pub¬ lished in 1847, and in 1848 he accepted a pro¬ fessorship of German at the Lyceum of Laval and two years later he went to Rheims in the same capacity. He was a member of the expedition sent by the French government to Mesopotamia in 1851; and on his return he laid before the institute his system of deciphering Assyrian in¬ scriptions. In 1857 he was appointed professor of Sanskrit at the schools of the National Li¬ brary; in 1869 teacher of assyriology in the College de France, and in 1874 he became full professor of the same subject in the latter insti¬ tution, receiving election to the Academic des Inscriptions in 1881. He published (Les In¬ scriptions des Achemenides5 (1852) ; (Grande Inscription du Palais de Khorsbad5 (1863) ; 'Le Peuple et la Langue des Medes5 (1879) ; (Etudes sumeriennes5 (1881) ; (Le Calendrier perse5 (1899).

OPPIAN, op'i-an, Greek poet: b. (at Kory- lus or Anazarbus in Cilicia) in the 2d century a.d. He wrote a didactic poem of five books on Fishing (Halieutica5 in lively but often tumid diction, and with correct and polished versification. A good edition of the 'Halieu- tica,5 the (Cynegetica5 (and a paraphrase) is by Lehrs (1846). Another poem on Hunt¬ ing (Cynegetica5 has been falsely attributed to him; but the diction is rough and the verse halting, and the work is no doubt the produc¬ tion of a writer of the time of Caracalla, 3d century a.d., to whom it was

dedicated. Inter¬ nal evidence would seem to show that it was written about 212 a.d. by another Oppian who came from Apamea in Syria. Consult Miller, (Oppians des Jiingern Gedicht von der Jagd5 (1885). Consult Draper and Jones, (The Halieutica5 (Oxford 1722) ; Mawer,'The Cyne- getica5 (London 1786) ; Bourguin, E. J., (Ha- heutica5 (1877).

OPPIUS, op-pi-uz, Caius, Latin author and friend of Julius Caesar. He, with L. Cornelius Balbus, had charge of affairs in Rome during the absence of Caesar. Suetonius (Caesar 56), asserts that Oppius was believed by many to have written the histories credited to Caesar chronicling the events of the Spanish, African and Alexandrine wars. The contention is now considered unwarranted as Oppius was in Rome during these campa'gns and the writer evidently participated in them. He wrote a life of Cae¬ sar, and of Cassius and the elder Scipio,. but these are lost. Consult Schanz, M., 'Geschichte der romischen Literatur5 ; Teuffel-Schwabe, 'History of Roman Literature5 ; Nipperly, 'De Supplements Commentarium Caesaris.5

OPPOSITION, in logic, opposition of judgments is the relation between any two which have the same matter, but a different form, the same subject and predicates, but a different quantity or quality. There are four kinds of opposition, namely, contradictory, con¬ trary, subaltern and subcontrary. The follow¬ ing diagram illustrates what is known as the square of opposition.

Contr ar »es

The assertion of a proposition is equivalent to the denial of its contradictory. Contraries can both be false but cannot both be true. Sub¬ contraries can both be true, but cannot both be false. A proposition implies the truth of its subaltern. The validity of the square of oppo¬ sition depends on the preliminary assumption that some A, the subject of discourse, exists. For example, you cannot conclude that because

no mermaids live in the sea, some mermaids do not live in the sea. See Logic; Logic, Sym¬ bolic.

In politics , the iparty who, under a constitu¬ tional government, are opposed to the existing administration, and who would probably come into power on its displacement. A fair and temperate opposition is a wholesome check upon the party in power, ˆ as it is for its interest to demonstrate the injustice, impracticability or insufficiency of the laws or proceedings of the government; but, on the other hand, the des¬ patch of public business may

be seriously de¬ layed by the conduct of a factious or obstruc¬ tive opposition.

In astronomy, the situation of two heavenly bodies when they are diametrically opposed to each other, or when their longitudes differ by 180°. Thus there is always an opposition of sun and moon at every full moon ; also the moon, or a planet, is said to be in opposition to the sun when it passes the meridian at mid¬ night. . Signified by the symbol «; as « if © the opposition of Jupiter to the sun.

OPS, Roman female divinity of plenty and fertility. She was supposed to make her abode on the earth as. the protectress of agriculture, and was worshipped usually in the temple of Saturn, whose wife she was believed to be. Newly born children were especially recom¬ mended to her care, and her festivals were called Opalia (19 December) and Opiconsivia (25 August).

She shared the Saturnalia festival with Saturn. At the Opiconsivia celebration, which seems to have been of a priestly character only the vestals and one of the pontifices were per¬ mitted to be present. As the mother of Jupiter, Ops was honored with Jupiter himself on the capitol. Not far from the temple she had also art altar in common with Ceres.

OPSONIN, a term applied by Sir Almworth Wright to the substance which is believed to exercise an opsonic or seasoning action in blood serum, rendering bacteria susceptible to phago¬ cytosis. Based upon the researches of Metch- nikoff, who founded upon the phagocytosis process a theory of immunity to disease, the study of opsonin by Wright, Douglas and others led to the formulation of the opsonic index which furnishes a record of the condition of tubercular patients subjected to vaccine treatment. See Phagocytosis.

OPTIC, Oliver. See Adams, William Taylor.

OPTIC AXIS. See Light.

OPTIC NERVE. See Eye.

OPTICAL GLASS. See Glass, Varie¬ ties OF.

OPTICAL ILLUSION. See Illusion.

OPTICAL IMAGES. See Light.

OPTICAL LANTERN, the highest devel¬ opment and refinement of the magic lantern (q.v.). Like its progenitor, it consists essen¬ tially of a source

of light of a brilliancy ade¬ quate to its designed use, a condensing system of lenses to rather and concentrate the light rays upon the object to be illuminated, and a projection system of lenses to magnify and de¬ fine the enlarged image upon a screen or blank

wall. In the gathering of these essentials into one convenient instrument a general pattern prevails,, but there are minor differences in the designs of the various manufacturers which do not, however, affect the working results in any considerable way.

Although its most common use is for the ex¬ hibition of transparent photographic pictures by transmitted light, in churches, halls arid lodge rooms, the optical lantern is very largely em¬ ployed in educational work for lectures in class-rooms. In the State of New York there is maintained as a part of the educational sys¬ tem a department of visual instruction pos¬ sessing a collection of 300,000 educational lan¬ tern slides which are loaned free of charge to schools making proper application for them. Many individual schools throughout , the State own an optical lantern, and make frequent use of the slides offered by the State department. A more scientific use of the optical lantern is in the study of the enlarged images of microscopical subjects and other scientific photographs. With suitable attachments it is possible to use the lantern to great advantage in the study of polarized light and in spectrum analysis.

The sources of light available for use in the optical lantern are practically two — the oxy- hydrogen or calcium light, and the electric arc light. The calcium light (q.v.) will give ade¬ quate illumination for screen pictures up to 15 or 16 feet square, and under favorable condi¬ tions even to 18 feet square. From 18 up to 25 feet square no light is sufficient but the electric arc. In the latter case the direct current is almost a necessity. The alternating current can be used, but it is so noisy as to be offen¬ sive. The handling of the current and connec¬ tions requires an operator conversant with elec¬ trical equipment, as many precautions must be taken. The strength of current best suited to use in the lantern is 50 volts, and the usual voltages of 110 volts and 220 volts should be reduced to 50 by a suitable rheostat. The bril¬ liancy of the arc light as used in lanterns ranges up to 3,000 candle-power. In the case of the calcium light, the necessary oxygen and hydro¬ gen gases are found on the market in most cities in cylinders in condensed form, under pressure of 225 pounds per square inch. The apparatus for burning these gases in the lantern is known as a jet. In the preferred form the gases are conducted separately to the two tubes of the jet, and pass through these tubes into a mixing chamber which is packed with wire gauze or finely perforated metal plates. From the mixing chamber projects a spout which delivers a Jet of the mixed gases slantingly up¬ ward against a cylinder of lime about one- fourth of an inch

distant.

The hydrogen gas is first turned on at the cylinder valve, and lighted at the jet. The oxy¬ gen gas is then admitted slowly into the jet, and the combustion of the hydrogen in the oxygen produces the intense heat necessary to render the lime cylinder incandescent. The impinging of the current of gas upon the lime wears it away gradually, and necessitates the revolving of a new face to the flame. The necessary paraphernalia for this movement forms a part of the jet. Another form of jet, known as the "blow-through® iet brings the hydrogen gas to the mouth of the spout in a ring-shaped

aperture, forming a conical flame, and the oxygen is delivered into the centre of this cone. With the blow-through jet a soft lime is re¬ quired; with the mixed-gas jet the lime should be hard. The usual size of the lime cylinders is one inch in diameter. A somewhat larger picture may be forced when necessary by using a larger lime — up to one and one-half inches in diameter, but at the expense of equal sharp¬ ness in the picture, and a larger consumption of gas. While the electric light gives a more brilliant picture, the quality of the oxy-hydro- gen light is more agreeable, being "warmer® and of a mellow character, where the electric light is "cold® and harsh. The brilliancy of the oxy-hydrogen light as used in the lantern is

convex lens with a plano-concave lens cemented on the rearward surface, the plane side toward the light. At the rear end of the mounting are two lenses set a very small distance apart — a double-convex lens toward the rear, and a thin concavo-convex lens in front of it, with its convex face toward the front. These lenses are graded according to the photographic plate with which they are commonly used in making portraits — as quarter-plate and half-plate lenses. The quarter-plate lens is used generally on lanterns, as it gives a 10-foot picture at 20 feet distance from the screen; and a 20-foot picture at 40 feet. These proportions are adaptable to the large majority of public halls, and to the average church and class-room. The

W

B

MM

MMifttiff

mUL

z

Fig.

about 600 candle-power, and thence up to 800 candle-power under the most favorable con¬ ditions.

The light produced is gathered and concen¬ trated by the condensers, a system of two or three lenses set from four to six inches from the source of light. This distance can be ad¬ justed in the lantern by sliding the light mechanism forward or backward, as may be indicated by the circle of light thrown upon the screen. Where the condensing system is of two lenses, they are plano-convex lenses of four to four and one-half inches in diameter, their convex sides toward one another, and about three-fourths of an inch apart. Sometimes these lenses are set far enough apart to allow a glass cell filled with water to be inserted between them, to cut out heat rays which might damage the objects being shown — as in the case of living animalculae. Where a third lens is added to the condensing system it is a concavo- convex lens, placed at the end of the con¬ denser mount nearest the light, and with the concave side turned thereto. It is somewhat smaller as to diameter than the other two. There is much dispute among lanternists as to whether the third lens adds any advantage. It is useful in certain conditions, but it is an optical fact that every new lens added to an optical instrument reduces the amount of light passing through, unless it is joined to the others by cementation.

The projecting lenses are of the type known to photographers as portrait lenses. The com¬ bination is made up of four lenses in one tube or mounting. In the forward end is a double-

l.

"third-plate® size, intermediate between the other two, is useful in the larger cities, where it is desirable to put the instrument in a gal¬ lery. Having a longer focus, it gives a smaller image on the screen as compared with the dis¬ tance; an 8-foot picture at 20 feet; a 16-foot picture at 40 feet; a 24-foot picture at 60 feet. The standard for quality in projection lenses is the Darlot portrait lens, made in France. But the American lenses of the same tvoe are at least fully as good.

Having provided these essentials, instrument makers vary the housing and the framework with which they are mounted for convenient use. The accompanying sketch in Figure 1 shows the customary arrangement for exhibi¬ tion purposes. L is the lamp house showing the position of the

carbons of the electric light, the horizontal carbon being placed accurately in the optical axis of the instrument. C is the three-lens condensing system, with a water cell, W, in place. S is the slot for the slide carrier. B is the light-tight bellows which allows the projection lens to be run back nearer to the light, for focussing. P is the projection sys¬ tem of lenses.

In Figure 2 is given a sectional diagram (in elevat:en) of the lantern used to project images of opaque objects. L, L, indicate the positions of the carbons in the two lamp houses ; C, C, the two condensing systems for throwing parallel rays upon whatever object is placed upon the field (F). The projecting lens system (P) is of much larger aperture in pro¬ portion than with the ordinary optical lantern, as the image is made up of light rays reflected

from a surface more or less absorbent of light, instead of being the direct rays of the arc pass¬ ing through a transparent medium. The rays forming the image pass upward through the projecting system and strike upon the tilting mirror M, being thence reflected to the screen. Both lanterns may be used for an intense illumination, or -one may be used to give high

effects known as interference colors, shadows known as interference figures and the like. By these means it is possible to study very small mineral grains in a rock, and identify the minerals, when it would not be possible to recognize them in any other way. This study is known as Optical Mineralogy and it forms the basis of all microscopic study of rocks,

relief, or the intensity of either lantern may be varied.

Attachments of several kinds are provided for educational work, including a moving pic¬ ture apparatus, microscope, etc. See Lantern Slides ; Magic1 Lantern ; Moving Pictures. Consult Fraprie, F. R., (How To Make Lantern Slides5 (Boston 1918) ; Gage, S. H. and H. P., (Optic Projection5 (New York 1914) ; Nie- wenglowski, G. H., (Traite Pratique des Pro¬ jections Lumineuses5 (Paris 1910) ; Norton, C. G., (The Lantern and How to Use it5 (London

1901).

OPTICAL MINERALOGY, the study of minerals by means of their optical properties, in other words by means of their effect on light. The minerals or rocks are ground into sec¬ tions .03mm in thickness, in which condition most minerals are transparent. Each different mineral has its own peculiar

effect on polarized light, especially as seen under the microscope. In some cases the minerals absorb rays of cer¬ tain color more readily than others, or absorb certain rays more when the light passes through in one direction than in another. Some minerals have the power of breaking light up into an ordinary and an extraordinary ray, one of which travels faster than the other. This property, known as double refraction, possessed by certain minerals, produces a host of phenomena under the microscope, such as color

Petrography. See Petrography; Mineralogy; Polarized Light; Microscope.

OPTICAL PHENOMENA OF THE ATMOSPHERE. See Light.

OPTICS. See Light.

OPTIMISM (Lat. optinvus, best), the opin¬ ion that this world, physically, socially and morally, is the best that could possibly exist. It is opposed to pessimism (Lat. pessimus, worst), the opinion that this is the worst pos¬ sible world. The optimist looks upon existence as a great and unmixed good. Some advocates of optimism have maintained that while the Author of all things was not compelled to pro¬ duce the best and happiest order to things, he has in fact actually done so, because the pres¬ ence of evil teaches mankind to discern and choose the good, by striving through suffering and self-exertion to attain the blessedness which is within the reach of all alike. Other optimists reason a priori that. it is impossible that God could produce anything that was not the best; that in spite of evil and suffering, it harmonizes with the idea of His nerfect goodness to infer that the motive for the creation of man is stronger than that for non-creation, in that life affords means of enjoyment which are unques¬ tionable and give the opportunity and capabil¬ ity of attaining perfection. The discussion as to the preponderance of good or evil in the world and their admixture was maintained by

the fathers of the Church and by the schoolmen. In modern philosophy optimistic tendencies have been exhibited by Descartes, Malebranche and Spinoza, but the full development of the theory was left to Lei'bnitz (q.v.), who in his

OPUNTIA. See Prickly Pear.

OQUASSA, or QUASKY, Trout. See

Trout.

ORACH, or ORACHE, a weed.. See

Goose-foot.

ORACLES, responses believed to be given by a deity to a worshipper or inquirer. There were in ancient Egypt oracular shrines or oracles, as there were in many other countries ; but by far the most celebrated were those of Greece. The oracle at Dodona, in Epirus, the oldest in Greece, appears to have originally be¬ longed to the Pelasgians. Everything points to a native origin, but at a later period Egyptian influence produced important changes, notably the substitution of priestesses for the earlier male interpreters known as Selli. At this oracle Zeus himself was supposed to speak to men through the rustling of the leaves of a lofty oak (pointing back to primitive nature worship). Other forms of divination were in¬ troduced from time to time, such as the strik¬ ing of metal basins. From Plato we learn that in his day the priestesses, following the example of those at Delphi, made their pronouncements in a state of religious frenzy. Dorimachus, an ZEtolian general, razed the temple of Zeus here to the ground in 219 b.c., and the oracle appears never to have recovered from the blow. Not so old, but far more important, was the oracle of Apollo at Delphi, in Phocis, where the oracular declarations were made during a period of frenzy by the Pythian priestess seated on a tripod over a chasm from which a peculiar exhalation was supposed to issue. This was the chief national oracle of the whole Hellenic race, and its influence on Greek history must have been considerable. It was sometimes con¬ sulted also by foreigners. It attained the zenith 5of its power in the 6th century b.c., and from the time of Alexander the Great its influence was of little account. Other noteworthy ora¬ cles of Apollo were those at Abae in Phocis, at Thebes in Bceotia, at Hysiae in Boeotia, at Claros in Miletus, at Gryneia in the ZEolian territory of Asia Minor, at Argos and at Delos. Ora¬ cles of other gods, such as Dionysus, Hermes and Pan, are mentioned, and there were also oracles of heroes such as Asclepius, Heracles, Trophonius (a famous one at Lebadea in Boeotia), Tiresias, Amphiarus, Mopsus and Colchos. The spirits of the dead were sup¬ posed to utter oracular sayings in certain places, especially near Lake Aornos among the Thres- protians and at Tsenarus in the south of La¬

conia. In Italy the only oracles in the strict sense of the term were the temples of Fortune at Prseneste and Antium. The oracles were consulted at the outset of every great under¬ taking, such as the founding of a city or colony, the declaring of war or the conclusion of peace ; but their responses were generally expressed in more or less ambiguous language. In an age when the principles governing the laws of nature were unknown and when

superstition held its grip on the educated almost as firmly as on the illiterate, scarcely anything, however important or unimportant, was undertaken without consulting the oracles. The kings of Egypt, Assyria, Babylonia, Rome and Greece sought the advice of the oracles before under¬ taking any move of importance and biblical history shows the Jews, though disclaiming these heathen practices, placing faith in dreams and revelations which had their origin in the sdme source. Consult Bouche-Leclercq, (His- toire de la Divination dans L'Antiquite (1879- 82) ; Myers, W. F. H.,*

ORAL HYGIENE. See Health Educa¬ tion.

ORAN, 6-ran' (Fr. d-ron), Algeria, (1) a town, capital of the department of the same name and on a bay of the same designation in the Mediterranean, 209 miles by rail southwest of Algiers. It rises in the form of an amphi¬ theatre, on the side of Mount Murdjadjo, has quite the appearance of a French town and is mostly modern. It is strongly fortified by works of recent construction. Among the build¬ ings may be mentioned the cathedral, the grand mosque, the citadel or castle, the Kasbah or old citadel and the large military hospital. There are two harbors, an old or inner, 10 acres in area, and a new or outer of 60 acres area. The principal articles of export are esparto grass, cereals, wine, olives, tobacco, hides, skins, cigarettes and cattle. Pop. about 180,000, of whom three-fourths are Europeans. The town was built by the Moors. It was captured by the Spaniards in 1509, by the Turks in 1708 and again by the Spaniards in 1732. It was de¬ stroyed by an earthquake in 1791 and shortly after abandoned by the Spaniards. In 1831 it came into the possession of the French and has been developed by them into a large and pros¬ perous town. (2) The department, forming a long belt along the Mediterranean, bounded on the east by the province of Algiers, south by the Sahara and west by Morocco, has an area of 25,650 square miles and a population of 1,231,000. Among the communes are Sidi bel- Abbes, 31,000; Mostuganem, 24,000; Muscara, 25,000; and Tlemcen, 40,000.

ORANGE, or'enj, Prince of. See William the Silent, Prince of Orange; William III, King of England; Maurice of Nassau.

ORANGE, Cal., city in Orange County, 30 miles southeast of Los Angeles, near the Santa Sua River, and on the Southern Pacific and the Atchison, Topeka and Santa Fe railroads. The city is situated in a productive fruit region and

has canneries, packing plants and other estab¬ lishments connected with the fruit industry. Poultry raising is also being developed exten¬ sively. Pop. (1920) 4,884.

ORANGE, Conn., town in New Haven County, near Long Island Sound, and on the Housatonic River, six miles southwest of New Haven, on the New York, New Haven and Plartford Railroad. The town is the centre of a productive agricultural region and manufac¬ tures automobiles. Pop. 13,094.

ORANGE, Mass., town, Franklin County, on Miller's River and on the Fitchburg Rail¬ road, 37 miles north-northeast of Springfield. The town includes the villages of Orange, North Orange and Tully. The town was incorporated in 1810. The surface is very uneven, the vil¬ lage of Orange being built on a hill that rises abruptly from the river. Orange is one of the most enterprising manufacturing towns of the county. The manufactures include sewing ma¬ chines, motor-carriages, water-wheels and other machinery, furniture, boxes, shoes and clothing. It has three handsome parks and a public li¬ brary. Pop. (1920) 5,393.

ORANGE, N. J., city in Essex County, on the Delaware, Lackawanna and Western and the Erie railroads, about four miles west by north of Newark. It has electric railroad con¬ nections with Newark, Jersey City, East Orange, South Orange, Bloomfield, Montclair and other cities and towns in the vicinity. Orange was settled about 1666 by a colony from Connecticut. At first it was a part of Newark and was called ((Newark Mountain.® The residents of <(New- ark Mountain,® in 1718, established a separate church, and the organization was known as ((The Mountain Society.® This same church was known in 1781 ˆis the <(Second Church of Newark,® and now (1904) as the ((First Presby¬ terian Church of Orange.® In 1790 a further separation took place, and the place was called Orange Dale. In 1806 Orange became a sep¬ arate town, incorporated under the name of Orange. Other divisions were made and South, West and East Orange were established in the years 1861, 1862 and 1863, respectively.

Orange is on an elevation, the lower slope of Watchung Mountain, a ridge extending northeast and southwest, rising in some places 650 feet above tidewater. The town itself is from 150 to 200 feet above sea-level. Adjoining the city or in the near vicinity are Hemlock Falls, in South Orange; Llewellyn Park, which contains 750 acres, and many fine residences, West Orange; Eagle Rock, an eastern crest of the mountain, is now within the limits of the Essex County Park System. The city and vi¬ cinity have miles and miles of good roads, many shade trees and long lines of well-kept hedges. Orange and all the ((Oranges® are residential sections

for New York business men, many of whom have their homes there, while others remain only during the summer months. The city has considerable manufacturing in¬ terests, among which are hat factories, for which Orange is noted, printing plants, lawn mower establishments, breweries and chemical laboratories and the Edison laboratory near Llewellyn Park. The number of employees in the manufactories is about 5,000. The city has an extensive trade in hats and considerable trade in other manufactures and fruit. Some VOL. 20 — 46

of the prominent buildings are the Metropolitan building, Music Hall, Masonic Temple, Decker building, the <(First Presbyterian Church,® al¬ ready mentioned, the original still standing, but several times remodeled, and the church, school and library buildings. It has a House of the Good Shepherd, an orphanage and the Orange Memorial Hospital. The educational institutions are public and parish schools, the Stickler Memorial library, a city library, the Orange Training School for Nurses, and at South Orange, Seton Hall College, a Roman Catholic institution for boys and men. The Locke Col¬ lege for Boys and other private schools are in the ((Oranges.® There are 20 churches, repre¬ senting a number of denominations. The city has a number of organizations whose objects are educational and charitable, as the Men¬ delssohn Union, a Bureau of Associated Chari¬ ties, a New England Society and several literary societies. It has also a number of athletic and social clubs. The government, administered under a revised charter of 1879, is vested in a mayor and council, who appoint or elect the administrative officials, except the board of edu¬ cation, which is chosen by popular vote. The city owns and operates the waterworks. Pop. (1920) 33,239. Consult Wickes, (History of the Oranges from 1666 to 1806) (1892) ; Whit- temore, (The Founders and Builders of the Oranges) (1896).

ORANGE, Tex., city, county-seat of Orange County, on the Sabine River, at the head of navigation, and on the Orange and North¬ western and the Southern Pacific railroads, 85 miles northeast of. Galveston and 20 miles east of Beaumont. It is the shipping centre for the surrounding region, exporting rice, cotton, sugar and livestock. It has . several large lumber mills, shingle and saw mills, and also oil, paper, cotton gins and a rice mill. The public schools include a high school for the colored race. The city owns and operates the waterworks. Pop.

(1920) 9,212.

ORANGE, Fort, a former fort built in 1623, on the site of the present city of Albany, N. Y. It was erected by the Dutch as a defense work against the Indians.

ORANGE CITY, Iowa, town, county-seat of Sioux County, on the Chicago and North¬ western Railroad, 40 miles north-northeast of Sioux City. It is in an agricultural and stock- raising district. Its most notable public build¬ ing is the county courthouse. It is the seat of the Northwestern Classical Academy (coeduca¬ tional), founded in 1882 under the auspices of the Reformed Church. Pop. ,(1920) 1,632.

ORANGE FREE STATE, Province of the, South Africa, early known as Orange River Colony and from 1854 as Orange Free State, in 1900 was annexed by Great Britain after joining in the Boer invasion. On 20 Sept. 1909 it was made part of the Union of South Africa (q.v.). It is bounded on the north by the Transvaal, east by Natal, southeast, south and southwest by Basutoland and Cape Colony, and west and northwest by Griqualand West and South Bechuanaland. Area, over 50,000 square miles, divided into 19 districts. Capital, Bloemfontein (q.v.) connected by rail with Cape Town and Port Elizabeth, and also with the

Transvaal and Natal. The country generally consists of vast undulating plains, lying 3,000 to 4,000 feet above sea-level affording good pas¬ ture lands, and interspersed in many places with rocky hills called kopjes. The country is cold in winter, and in summer is liable to violent thunderstorms and long droughts ; the climate, however, is generally healthful. The rivers that intersect the country are all small, and the boundary rivers, the Vaal and Orange, are un¬ available for traffic. Agriculture and pasturing are the chief occupations, and wool, hides and ostrich feathers the principal exports. Graz¬ ing is still the chief industry of the state, but agriculture is becoming yearly of more import¬ ance. Among the agricultural products which are growing in output from year to year are wheat, oats, corn, potatoes and tobacco. Of these corn is by far the most important crop, amounting, in normal times, to over 7,000,000 bushels. Some 35,000,000 pounds of wool are produced yearly. Diamonds and other precious stones have been found in paying quantities, rich coal mines exist, and the state is said to abound in other mineral wealth. Gold was dis¬ covered in 1887. The diamond mines are at Koffyponteln, Jagersfontein and in the neigh¬ borhood of Kroonstad. The value of the dia¬ monds mined in the state is over $7,000,000 a year.

The state has about 1,200 miles of railway which traverse the middle of the country, southwest and northeast from border near Colesberg to the Transvaal border at Vereeni- gig. Branch lines connect the trunk line with the Natal system, Frankfort and other points.

As a member of the Union of South Africa, the Orange Free State has an elective pro¬ visional council of 25 members with power to legislate on all local matters not affecting the Union as a whole, the executive committee of four members selected by the provisional council and an administrator appointed by the governor-general. The state is represented in the House of Assembly of the Union by 17 members. The government aided schools num¬ ber somewhat less than 1,000; at all of which fees are charged.

Prior to 1836 this region was inhabited by Bushmen, Bechuanas and Zulus. The colony was founded in 1835-36 by Dutch settlers from Cape Colony. It was annexed by Great Britain in 1848 in order to put a stop to the Boer out¬ rages on natives ; but in 1854 it was recognized as an independent state. The language of the country is a Dutch dialect, and the Dutch Re¬ formed Church is the dominant religion. Under its independent regime the executive was en¬ trusted to a president elected for a period of five years by universal suffrage ; while the volksraad or parliament, elected for four years, exercised legislative functions. The history of the Orange Free State till 1899 was one of steady, peaceful progress, interrupted by hardly any stirring event, except some fighting with the Basutos down till 1869, and a more serious quarrel with the British government in 1871 concerning the Kimberley region. The latter dispute was settled by arbitration, under which the British government agreed to pay £90,000 to the Free State as compensation for its loss. In 1889 the state was admitted into the Customs Union of South Africa, and in that year also

the railway from the Orange through Bloem¬ fontein to the Vaal was completed. The great¬ est president of the state was Johannes Hen- drikus Brand, afterward knighted as Sir John Henry Brand, who held office from 1863 till 1888. His successor was Francis William Reitz, who was latterly state secretary of the Trans¬ vaal republic. The last president of the state was M. T. Steyn, elected in 1896 and re-elected in 1901. In 1897 an alliance with the Trans¬ vaal for mutual defense was confirmed. When the war between Great Britain and the Trans¬ vaal broke out in October 1899 the Free State Raad decided to stand by its alliance treaty, and joined the Transvaal in the invasion of British territory. After the state had been invaded from the west and Bloemfontein oc¬ cupied, it was annexed to the British Empire under the name of Orange River Colony, by proclamation of date 28 May 1900.

In 1907 self-government was granted and this was maintained until 31 May 1910, when the colony was consolidated in the Union of South Africa as the province of the Orange Free State. Pop. about 200,000 whites, 360,000 colored, most of the latter being Bantus ; total 560,000. See South African War.

Bibliography. — Brown, A. S., (Guide to South Africa) (London 1909) ; Bryce, (Impres¬ sions of South Africa-' (London 1847) ; Cres- wicke, (South Africa and the Transvaal War5 (Edinburgh 1900) ; De Wet, (Der Kampf zwis- chen Bur und Brite) (Leipzig 1902) ; Johnson, (London 1882) ; Theal, (South Africa5 (London 1899) ; Wright, (Thirty Years in South Africa5 (London 1900).

ORANGE INDUSTRY, The. In inter¬ national commerce the orange is the most im¬ portant fruit marketed in the fresh state. It is grown in warm parts of all the continents and enters important market channels from two — Europe and North America, while in the popular mind the apple is doubtless placed first it occupies a secondary place because in only North America and Australia is it planted on a large commercial scale and its fruit goes mainly to temperate climate markets whereas the orange commands a market range from the equator to the limits of civilization. The grape, fresh, dried as raisins, manufactured as wine, juice and jelly, has always been and is still greater in the value of its contribution to com¬ merce and in the distance it safely traverses, but the grape rules not as a fruit, but through its manufactured products, while the orange carries its natural beauty, fragrance and flavor unchanged around the world. The date is also an important rival as a world food, but its use, though worldwide, is more important in countries where it is indigenous. From the earliest times the orange has not only been ac¬ cepted in northern climes as an expressive ex¬ ponent of tropical and subtropical salubrity, but by its own distinctive characteristics as a fruit it has won recognition as befitting the highest uses of mankind. By its nature, too, the orange ministers to its own commercial popularity. It endures long shipment; it ripens slowly and through a season of several months which con-

stitute the winter in northern latitudes when local fruits are scant or absent and the refresh¬ ment in the citric juices most welcome. The production of such a commercial commodity has from the earliest times constituted an im¬ portant industry.

Though the orange thrives in the tropics it will withstand a few degrees — seven is the lowest record in Florida — below freezing point; but where frost is likely to occur the risk is considered too great for commercial ventures.

The fruit grown in semi-tropical countries, especially those which have a more or less dis¬ tinctly marked two-season climate, differs in character

from the strictly tropical orange. It is firmer, heavier, more sprightly in flavor and has much better keeping and carrying quali¬ ties. _ The tropical orange has but small com¬ mercial importance; the semi-tropical orange rules in the markets of the world. That the semi-tropical orange should have this distinc¬ tive character is most fortunate, for it ministers directly to the will for industry which is supe¬ rior in semi-tropical countries.

Thus its ability to withstand slight frosts of short duration has enabled it to supply a market range of 70° of north latitude and more than 50° of south. Though the tropi¬ cal orange might reach most distant markets in small quantities, it could never attain the com¬ mercial supremacy which the fruit now enjoys.

The sweet orange, which is the species from which commercial varieties have been developed, is a native of eastern Asia whence it was car¬ ried to India, to Asia Minor and to Mediter¬ ranean countries especially in southern Europe. It possibly reached Portugal from India through the early Portuguese navigators. Thus the dis¬ tribution of the fruit was westward. The his¬ tory of modern commercial orange growing consists of a series of progressive movements always trending westward and gaining in vol¬ ume — the newer centres of production out¬ stripping the older and ultimately largely dis¬ placing their product in the greatest markets of the upper divisions of the Temperate zone. When the Moors introduced orange growing into Algeria and Spain they displaced the traf¬ fic from Asia Minor and gave the Mediter¬ ranean region for several hundred years undis¬ puted possession of the markets of the north of Europe and possession also of the American de¬ mand when that arose. When the Spaniards and Portuguese carried the orange to the West Indies and to Florida they laid the foundation for an industry which American enterprise de¬ veloped in Florida until that district not only contended with the Mediterranean region for American markets, but was planning to invade northern Europe by direct shiploads, but the demonstration came that the climate of northern Florida and of the Gulf Coast westward was too treacherous for commercial ventures in orange¬ growing — at least with the popular varieties and proved methods of propagation.

When the Florida supply failed through the severe freezing of 1894-95, California came for¬ ward and is now not only supplying four-fifths of the oranges consumed in the United States, but is selling the highest priced oranges in the London market against a world of competitors. This competition with the product of California

is working hardship in the Mediterranean re¬ gion because that region can more than supply Europe and needs American markets as an out¬ let. Italy has exported $6,000,000 worth of oranges and lemons in a year, but since

the first of this century prices have declined and the interest is depressed. Every effort is being made to secure relief from local taxation and from duties imposed by north European coun¬ tries. The Spanish product of oranges and lemons, which ranks next to the Italian, has to meet heavy tariffs in all countries except the United Kingdom and the belief at Valencia as far back as 1902 was ((U. S. Commercial Rela¬ tions,) Vol. 2, 1902, page 686) that the limit of British markets' consumption of Valencia oranges at paying rates has been reached; in fact, the British markets collapsed under the heavy shipments of 1901. When it is stated that the value of oranges imported into the United Kingdom in 1900 was $10,603,950 and such a free buyer has more than enough, it can be realized how important it is to the Mediter¬ ranean producers that the populous countries of central Europe should hold less strictly to agrarian interests which aim to hamper the entrance of food supplies even if they cannot themselves produce them. Manifestly the American product can enter such markets only with a fancy product which will win an extra price, except as a little difference in the ripen¬ ing season may afford an opportunity.

The commercial position of the orange in the United States is also such as to awaken apprehension. The present strength of the situation lies in the protective tariff and the bete noir of growers is the possibility of mak¬ ing gaps in it by reciprocity treaties. The prod¬ uct of the West Indies is a direct menace to the Florida product, which meets it in point of market season and the Mexican product, which is undergoing expansion at the hands of Ameri¬ can capitalists, is constantly feared by the Cali¬ fornia growers because the Mexican railway will give it quick entrance to the great central States and consequent advantage in distribution to the East and the Northwest. The orange from the West Indies and South Florida is dif¬ ferent from the California orange in main ripening season and in character of the fruit, but the differences do not give full relief. With the late ripening varieties, the California grower extends his shipments into the autumn and thus laps upon the early fruit from Florida and Jamaica, while the parts of California which bring earliest maturity to the fruit are shipping before the southern fruit is cleared away. In fact, California of itself can keep the markets supplied with oranges fresh from the trees and in prime condition the year around.

As to the difference in oranges grown under humid and arid conditions, the moisture being supplied by rainfall in one case and by irrigation in the other, the arid-region orange shows su¬ perior density, thinness and texture of rind, higher sugar and acid percentages and a more sprightly or vinous flavor. The popular con¬ ception of the superior sweetness of the orange grown in humid countries is due both to a greater amount of sugar in the juice and to a less amount of acid; for determinations of sugar and acid in

fully ripe naval oranges grown in southern California and in Florida

show the former to contain approximately 10 per cent of sugar and \Vi per cent of acid, whereas the latter contains about 2 per cent less sugar and scarcely 1 per cent of acid.

The quality of an orange is largely inherent in the variety, but all varieties are similarly changed by growth under humid or arid condi¬ tions of climate and soil and this modification becomes a factor of much industrial importance. This fact is strikingly illustrated in California by the standing of the navel orange which has been grown for a century or more as the chief orange in Bahia, Brazil, whence it was imported. In Brazil it demonstrated no shipping qualities and according to Burke ((U. S. Special Consu¬ lar Reports, } Vol. I, p. 411) would need to be picked before maturity if to be shipped, while, as grown in California and Arizona, it is picked at full maturity and is successfully shipped all over the United States and to Europe.

Orange growing in Florida has recovered from the serious reverses prior to 1900. The product of 1894 was about 6,000,000 boxes. Then came the disastrous freezing in December of 1894 and February 1895, with a tempera¬ ture of 14° F. at Jacksonville. In the latter year only 75,000 boxes were shipped. In 1903 the product was about 900,000 boxes. Confi¬ dence is being restored by the safety of the trees in the southern half of the State and by the promising results of trial of hardier varieties in the older citrus district in the northern part.

In Louisiana the freezing of 1895 nearly an¬ nihilated the citrus fruit interest. Not until about 1910 was there evident a disposition to resume production on a commercial scale. In the Gulf parts of southwestern Texas and in the south¬ western corner of Arizona the navel orange is being grown on a small business scale for ship¬ ping to distant markets. Conditions favor early ripening and an advantage is secured by sale in advance of the main California product. From California the shipments of oranges be¬ yond State lines in 1913-14 were over 48,500 carloads. This is the largest crop in the his¬ tory of the State, though the season of 1910-11 approached it with nearly 46,400 carloads. Only in two other years has the crop exceeded 40,000 carloads.

Planting during the last two decades has been very active. It is estimated that in 1915 the California citrus industry, including grape fruit, lemons,

etc., represented a capital of $200,- 000,000, a labor employment of 40,000 people and an area of 200,000 acres. The orange is by far the most important of the fruits represented by these figures. The orange industry of the United States is now largely supplying the home demand for the fruit. Imports of oranges reached their highest value in 1883 at $3,010,662 and have since then declined. The value in 1910 was $82,546, of which one-half came from the British West Indies; a quarter from Italy and an eighth from Mexico.

The orange industry of the United States is unique in the high social and financial standing of those who have engaged in it and in the striking features of its development. Both in Florida and in California large scale produc¬ tion was first undertaken by northern men who had gained wealth and had lost health in pur¬ suit of it. They brought capital and commer¬ cial ability to the ventures which they exploited. The professional classes of the North also par¬

ticipated largely in the work, bringing scholar¬ ship, insight and experience in organization. There were a few also who possessed horticul¬ tural experience, but the other classes largely predominated. The result has been the develop¬ ment of an industry characteristically Ameri¬ can in spirit and new in methods. It has bor¬ rowed very little from the practices of Old World orange growers. Free from tradition and prejudice, it proceeded rapidly upon the re¬ sults of original investigation and experiment, establishing a system of culture and of com¬ mercial handling of the product which are with¬ out precedent in the older orange regions of the world. For the care of the orange orchard, see Orange and Orange Culture.

ORANGE-MELON, a sort of muskmelon.

See Melons.

ORANGE OIL, an essential oil obtained Jrom the rinds of oranges and used in manu¬ facturing perfumes and liquors. The oil is extracted either by distillation or by expression, generally under warm water. The oil, being lighter than the water, rises to the surface, from which it is skimmed off. Another method of extraction is to press the peel of the fruit against a flat sponge which absorbs the oil as it exudes from the broken cells. Orange oil con¬ sists of over 90 per cent limonene or terpene with small amounts of citrol, citronellol and other component parts. It is usually of a pale yellow color, of specific gravity between 0.846 and 0.853. The greater part of the orange oil of commerce comes from Italy, Sicily or South¬ ern France — orange-flower water is produced by steam distillation and has a specific gravity of 0.87 to 0.88; while orange-leaf varies from 0.885 to 0.900.

various species of the genus Citrus (family Rutacece), and their fruits. The most impor¬ tant species is the sweet orange (C. Sinensis) which is the parent of most of the commercial varieties. It is a small, branching long-lived tree or shrub, with oval or elliptical, evergreen, apparently simple but really compound leaves and very fragrant white flowers. The fruits are globular or elliptical, and vary considerably in size. Botanically considered they are berries divided into 8 or 10 cells (locules) filled with a juicy and more or less acid pulp. The tough, yellow rind is valued, especially in some vari¬ eties, for its oil, which is extracted for use in flavoring and in perfumery. The flowers also are employed in decoration and worn as a significant ornament, especially by the bride, at her wedding. But it is as a dessert fruit, and for the manufacture of preserves, marmalade, etc., that the orange is of chief importance. For these purposes the tree has been taken from its presumably native home in southeast¬ ern Asia to all tropical and sub-tropical climates in the civilized world, and is cultivated exten¬ sively in many places not only to supply the local demands, but for the shipment of its fruits to climates beyond its range of cultiva¬ tion. See Orange Industry.

In the United States the two important com¬ mercial regions of orange growing are Florida and southern California. In the former the region of successful cultivation has been re¬ stricted by experience of killing frosts to the southern counties, although previous to 1894 the

orange-growing region extended over most of the peninsular parts of the State. In many places the trees were growing wild when the State was settled, and it is surmised that these trees were the progeny of specimens introduced by the Spaniards in the early days. A third region is the delta of the Mississippi River. Parts of southwestern Texas and southwestern Arizona have been found suitable to commercial orange culture.

The species mentioned above has developed several well-marked botanical varieties, each of which has. more or less horticultural forms. The most important botanical variety is sinen¬ sis, which is the immediate parent of the com¬ mon sweet orange, and the Portugal or Malta orange. In the United States about 80 of the numerous varieties are cultivated, though those of commercial importance are scarcely more than a score.

They a.re characterized by usually round fruits, which are generally sweet or slightly acid, and have a sweet aromatic skin highly valued in cookery for flavoring. Their juice makes a superior wine. To this group belong the famous Bahia or navel varieties, which are extensively cultivated in California, and usually are seedless. The initial trees, originally na¬ tive to Brazil, were introduced in 1870 by William Saunders of the United States Depart¬ ment of Agriculture at Washington, and dis¬ tributed throughout the orange-growing sec¬ tions of the country. It is, therefore, often called the Washington navel. Its peculiar for¬ mation is due to the development of a second¬ ary axis with more or less cells in the centre of the fruit. The cause of this freakish devel¬ opment is unknown.

The bitter, sour or Seville orange (variety aurantium) is so named from its pulp. Though it is thoroughly naturalized in Florida from early Spanish importations, few of its horticultural varieties are cultivated in the United States, except as a stock upon which to bud varieties of sweet orange, lemon and po¬ melo, — a use for which they seem especially well fitted. In Spain, especially in the neigh¬ borhood of Seville, this species is extensively cultivated for shipment to Great Britain, where its chief use is in the making of marmalade. The flowers, immature fruits and young. twigs of this variety are extensively employed in the manufacture of an ethereal oil, and the skin of the ripe fruit in making Bigaradia oil. In Southern France the flowers are widely used for making perfumery. The Bergamot orange (variety bergamia) is a small tree or shrub rarely seen in the United States, but cultivated in Europe for more than 200 years. The rind of the fruit furnishes Bergamot Oil, which is largely used in the manufacture of eau de co¬ logne and other perfumes. The mandarin, or tangerine orange (variety deliciosa) is a very small tree or shrub with dense foliage and small fruits most noted for the looseness of the skin which is barely attached to the pulp. Be¬ cause of easy removal of the pulp it has re¬ ceived its commonest name — kid-glove orange. Its varieties are gaining in popularity in the United States. The Otaheite orange (variety taitensis) is not, as its common name implies, a native of Tahiti but is probably either a vari¬ ety of the common sweet orange or a hybrid between two other species of citrus, possibly

the lemon and the orange. It is a very popular pot-plant in greenhouses, on account of its diminutive size, free blooming and fruiting qualities. The fruits have a mawkish flavor. The king orange (variety nobilis) is a native of China whence it was introduced to Califor¬ nia in 1880. Its large very juice vinous fla¬ vored fruits are gradually becoming popular in spite of their rough skins. The Satsuma or onshiu orange (variety unshiu) , a Japanese group of varieties, was introduced into Florida in 1876 but until recently has been rather quies¬ cent. But since it is one of the hardiest of all edible oranges it is steadily becoming popular commercially in the Gulf

States, especially when grafted upon stocks of the trifoliate orange. The Calamondin orange (variety mitis) a native of the Philippine Islands and popularly grown in Hawaii under the name of China orange, has been introduced into the Gulf States where it has proved very hardy but useful only as a home fruit. The three-leaved or trifoliate orange (Poncirus trifoliata) is a small thorny Japanese tree, whose chief use is as a hedge-plant. It is hardy as far north as New York, and is popular southward. Its small yellow downy juiceless, bitter, sour fruits are sometimes used in preserves. The plant is also valued as a stock upon which to bud vari¬ ous citrus fruits, especially the kumquat (kin- kin, or kin-kits, F ortunella margarita) and the Satsuma orange, a variety of mandarin orange. When used as grafting stock it is said to make the more tender varieties somewhat hardier and to reduce the size of the larger growing sorts By hybridizing it with various species of citrus several promising hardy varieties have been produced, but so far have not been cultivated commercially. The Osage orange (Maclura pornifera) is a member of the family Mora- cecea. It is therefore not properly an orange at all. See Osage Orange.

The orange was formerly propagated almost wholly by means of seeds, but since the sweet orange varieties so produced seemed to be seri¬ ously affected with root-disease Ufoot-roU) and were variable both in habit of growth and value of fruit, propagation by means of buds has very largely replaced the more primitive methods. The stocks preferred in Florida and the Gulf States are the Seville and trifoliate orange and the so-called ((rough lemon,)? ap¬ parently a natural hybrid, which resembles the lemon in foliage and flower, but whose fruit looks like the sour orange, being large, round and distinctly acid. These stocks are grown from seed, and when the seedlings are of suit¬ able size they are budded with the desired variety. After growing in the nursery for a year, after being budded, the trees may be set in the orchard. The distances usually chosen vary between 25 and 30 feet, but varieties upon trifoliate stock may be set closer together.

When transplanted the tops are rather severely cut back so as to balance the loss of root in digging; and to check evaporation the ground is frequently covered with a mulch of straw, pine needles or other loose material. Clean cultivation is also given from the time the orchard is set, at least during the growing and dry season, followed by the sowing of some cover-crop, which will enrich the sod. THs crop may be cut for hay, but its equivalent in such cases should be returned to the land in

the form of fertilizer and humus. Fertilizers should be applied liberally because the orange is a gross feeder.

There are several conditions essential to suc¬ cess in orange growing: soil, naturally rich or generously fertilized ; temperature, suitable not alone to the life of the tree, but to the sound¬ ness and quality of the fruit; moisture, con¬ stantly available in adequate quantity, but not in excess ; cultivation, to promote root growth by aeration and distribution of moisture; pruning to promote adequate wood growth and leaf action ; protection from destructive insects and fungi. The soils which best befit the tree are deep loams with a good amount of clay, although the tree is not fastidious about soil- texture if plant food and moisture are ample. In Florida the orange soils are predominantly light at the surface and are largely sustained by regular fertilization, but a firm subsoil, for moisture retention within reach of the deeper roots and yet with drainage to obviate standing water renders light soil acceptable. A leachy subsoil, as for instance a deep sand stratum, is undesirable. In California the soils chiefly used for the oranges are clay loams of considerable depth without change in character and which are, therefore, of more enduring richness, but even the best and deepest soils in California are now showing the need of fertilizers to meet the heavy draft of the fruiting trees.

The orange tree is in danger whenever the temperature reaches the freezing point. The degree attained must, however, always be con¬ sidered in connection with the length of time it prevails: for instance, four degrees of frost for an hour may do less harm than two degrees for two hours. As the temperature falls lower the duration becomes less important. Five degrees of frost for a very brief interval mav injure the ripening fruit and the tenderer leaf growth; 10° will ruin the fruit and consider¬ ably injure the tree. A temperature of 20° F., or a little less, may kill younger trees to the ground and older trees to the stump, while 14° F. in Florida in 1895 killed to the ground trees some of which were more than half a century old. The root, however, escapes de¬ struction and will send up new shoots provided the injured top is soon removed.

Where the temperature does not fall below 25 degrees injury has been successfully averted by burning numerous small fires among the trees. In California systematic use of electric- alarm bells connected with thermometers to arouse the sleeping workmen and the lighting of small pots of crude petroleum have saved the fruit from injury by six degrees of frost. Such protection has been demonstrated to be profit¬ able in places where such frosts are to be ex¬ pected. The occurrence of frost is local in California and is not conditioned upon latitude. Oranges are successfully grown in suitable loca¬ tions between lat. 32° and 40° N. — nearly 500 miles of distance, and the extreme low tempera¬ ture is practically the

same at about the same elevation throughout this distance. It is also true that owing to the intervention of high ranges of mountains giving protection from cold currents of air from the north and north¬ west, the season is earlier at the north than at the south, and the oranges from northern and central California are marketed in advance of the main crop from southern California — the

fruit being marketed previous to the time of the lowest temperatures (December and Janu- ary).

Oranges are grown with moisture from rain¬ fall in Florida, while in Arizona and Cali¬ fornia irrigation is essential. Even in parts of California where deciduous trees fruit satisfac¬ torily without it, the orange must be irrigated. The amount of water depends upon the age of the trees, the depth and retentiveness of the soil, the local rainfall, etc. The average amount is an annual total of 15 inches depth of water over the whole surface of the land occupied by the trees, and the application is made in frac¬ tions at intervals of about three weeks during the dry season. Upon the lighter soils the land is laid off for each irrigation by low levees or dykes into squares enclosing one or several trees, according to the slope of the ground, and these squares are filled from an adjacent ditch. In the heavier soils where the water can be dis¬ tributed well by lateral seepage, the water is turned into several parallel furrows plowed be¬ tween the rows of trees and is allowed to run in small streams for 24 hours or more.

Cultivation follows irrigation as soon as the ground has dried sufficiently to work well, for the purpose of preventing the surface from baking and preventing also the loss of moisture by evaporation. Thus the surface soil of a California orange orchard is kept constantly clean and mellow. No growth of weeds or other plants is permitted except when crops of legumes for plowing under green, to promote friability and to increase the humus-content of the soil, are undertaken. This cultivation of the surface promotes deeper rooting of the tree and aeration of the lower soil layers and the general thrift of the tree. California ex¬ perience amply proves that irrigation and fertil¬ ization, unaccompanied by thorough and ade¬ quately deep cultivation, do not secure the best results.

The orange tree requires only light pruning after its proper shape is attained, but pruning to maintain the shape and to prevent the foliage from becoming too densely matted is essential. Pruning for shape has been more definitely pursued in California than elsewhere. The trees are grown with very short trunks ; in fact, the lowest branches almost touch the ground. Cultivation is extended a certain distance be¬ neath the tree by having a lateral extension to the cultivator. The men and teams never pass under the trees. The trees are encouraged to enclose themselves with a solid wall of

foliage and all the work upon the tree and gathering of fruit is done with stepladders in the spaces between the trees. It would be well-nigh im¬ possible to climb into the branches of such an orange tree, nor is it ever expected to do so. The trees are generally bluntly-conical or pyra¬ midal in form, though some prefer a more roundish outline. The trees of the varieties most largely grown are low and of a semi¬ dwarf stature,; only a few seedling trees of 30 feet or more in height are now to be seen.

Orange trees continue to bear, with reason¬ able care and under favorable conditions, for many years, reaching profitable age in some cases when less than six years old. The trees bear more or less continuously, flowers and fruits in all stages of development being found upon the same tree throughout the year. The

great mass of fruit, however, becomes ripe at one time. When ready for harvest the indi-

V1 n i /ruits are cut °ff with scissors, not pulled from the trees. They are then allowed to stand for a few days to dry and soften some¬ what before being graded and boxed for ship- Incilh Each fruit is wrapped in tissue paper before being packed. The standard orange- box contains two cubic feet and usually holds about 200 oranges. Large specimens occasion¬ ally reduce the number below 100, and small ones increase it to more than 250. When prop¬ erly managed both before packing and during shipment the fruits should keep for several months.

Among the difficulties in orange growing are several so-called diseases which also attack other cultivated members of the genus Citrus. Perhaps the most widely distributed and troublesome is the ((foot-rot,): > which seems to be worst upon sweet oranges and lemons. It is feared in Australia, Europe, California and Florida, in the last-named region having caused annual losses of $100,000 or more. Though its origin has not been satisfactorily explained, it is readily recognized by the abundant exuda¬ tions of gum near the ground, the yellow leaves reduced in size and number, the dry, peeling bark and the dead twigs. Ultimately the trees become girdled and die. Good drainage, re¬ sistant stocks, the avoidance of over-cultivation and stimulation with nitrogenous manures have been found the most satisfactory preventives. The removal of soil from the base of the trunk has been recommended as a remedy.

Blight is another little understood affection. Only bearing trees seem to be

troubled by it. The leaves wilt even in moist weather; water- sprouts are produced in profusion on the trunk and main branches, but live only one or two seasons ; the trees blossom abundantly the sea¬ son after the wilting, but fruit fails to set and very little reaches maturity. The result is al¬ ways fatal, even when only a small branch is originally affected. Scab, attributed to a species of fungus (Cladosporiimi) , appears as ex¬ crescences upon the fruit and foliage. It is con¬ sidered most troublesome upon lemons, and four or five applications of ammoniacal solution of copper carbonate is recommended as a rem¬ edy. (See Fungicides).

Die-back is among the most troublesome pests of Florida orange orchards. It seems to be due to imperfect drainage and improper cul¬ tivation, which are succeeded by imperfect nutrition. Hence, improved drainage, cessation of cultivation, withholding nitrogenous manures and reducing the present content of such foods in the soil by cropping the orchards with nitro¬ gen-consuming crops such as grass, have all been urged as remedies. Mulching is also rec¬ ommended. The characteristics of this trouble are the dying back of the tips of the twigs, reduction in the ˆseU of fruit, premature ripen¬ ing, splitting and shedding of the fruit. These characteristics may be seen in trees of all ages and varieties. The sooty mold (Meliola camel-lice') , which also appears upon many other kinds of trees, is not a disease, but because of its presence in abundance may prevent adequate aeration of the leaves. It is a mold that 'lives upon the honey-dew (q.v.) which is exuded by various species of insects (see Aphid), which may be held in check by various insecticides,

notably resin washes and hydrocyanic acid gas. It often covers the fruit with a felty mass which precludes sale.

Melanose, stem-end rot and wither tip or anthracnose are fungous diseases generallv kept in check by good orchard sanitation, re¬ moval of diseased fruit, pruning and destruc¬ tion of injured wood, and by spraying with Bordeaux mixture. Citrus canker, a bacterial disease, is caused by Pseudomonas citri. In Florida it has been very threatening, but by burning the affected trees where they stand it is being held in check.

Among the numerous insects that feed upon the orange are several caterpillars, the most prominent of which are oerhaps the orange dog, the caterpillar of a butterfly (Papilio cres- phontes), the saddleback caterpillar (Empretia stimulea) and the bag-worm (Oiketicus ab- botii). The cotton-stainer or red-bug (Dysderi – cus suturellus) and the leaf-footed bug (Lepto – glossus phyllopus) puncture the fruit. The Morellos orange-worm, the maggot of a fruit- fly (Trypeta ludens) , does great damage in Mexican orchards, and its possible introduction is dreaded by American orchardists, because the maggots destroy the fruit by tunneling- in it. Several species of

leaf-rollers and sucking bugs are troublesome, as are also various species of aphis, notably the orange aphis (Siphonophera citrifolia). In Florida and somewhat in Louisiana the white fly (Aleyrodes citri) is sometimes so abundant upon the foliage as to impair aeration of the leaves. It is not only a serious pest because of its sap-sucking habits, but because of its exudations of sugary matter upon which the smut fungus mentioned above lives. The rust-mite of the orange, also called the silvery mite of the lemon, because of the appearance of its work upon the two trees, sometimes injures the fruit; and the six- spotted mite (Tetranychus sexmaculatus) , a close relative of the red spider of greenhouse notoriety, feeds upon the under sides of the leaves. The mites mav be controlled 'by flow¬ ers of sulphur, which for the former should be added to kerosene emulsion.

The most dreaded group of insects, however, is that of the scale insects, of which there are a very large number that attack both foliage and trunks. With few exceptions the remedies found most satisfactory for these insects are hydrocyanic acid gas. Consult Farmers' Bulle¬ tin 923) of the United States Department of Agriculture.

The most notable exception is the white or fluted scale {I eery a purchasi), an introduction from Australia. Having become exceedingly troublesome in California, its natural enemy, a ladybird beetle, was introduced with the result that it is now rarely seen in the State. Other well-known scale-insects in California orange groves are the red scale (Aspidiotus citricola), the black scale (Lecanium olece) ; in Louisiana groves, the chaff scale (Parlatoria pergandei) is most important, but the purple scale (My til – apis citricola) is also somewhat troublesome, as is also the orange chionaspis (Chionaspis citri) ; in Florida groves, the chaff and the pur¬ ple scale are well-known pests, as also are the long scale (Mytilapis gloveri) and the Florida red scale (Aspidiotus ficus). Many of the in¬ sects. mentioned occur in Mexico, the West Indies, etc. ; some of them in Europe, Australia

and other parts of the world; but the insect fauna of foreign countries is rich in species that do not appear in the American list.

Consult Risso and Poiteau, (Histoire natu- relle des Oranges) (Paris 1822) ; Bonavia, (The Cultivated Oranges and Lemons of India and Ceylon (London 1890) : Garey, (Orange Cul¬ ture in California) (San Francisco 1882) ; Moore, (Treatise of Orange Culture in Florida, Louisiana and California) (1883) ; Harcourt, (Florida Fruits) (Louisville, Ky., 1886) ;*

*Wick- son, California Fruits) (San Francisco 1891) ; Manville. Practical Orange Culture * (Jack¬ sonville 1883); Spalding, (The Orange: Its Culture in California) (Riverside, Cal., 1885) ; B. Alino, (E1 Naranjo) (Valencia 1900) ; vari¬ ous bulletins of the California State Experiment Station, Berkeley, Cal., and publications of the California State Board of Horticulture, espe¬ cially the one of 1902. Hume, Citrus Fruits and Their Culture) (New York 1904) ; Coit, Citrus Fruits) (New York 1916) ; also many bulletins, small books, pamphlets or reports by Davis, Fish, Prange, Canada, Fowler, Garcelon, Lelong and Gallesio.*

M. G. Kains.

ORANGE RIVER, South Africa, the most important southern river of the continent, rising in the Kathlamba or Drakensberg range, within 100 miles of the Indian Ocean, and traversing the country eastward to the Atlantic Ocean, with a slight northerly inclination. The native name of the river is Gariep, which, in the Hottentot language, means ((great water.® It received its present name in 1777 in honor of the House of Orange. It describes numerous wide curves in its course of 1,300 miles, and separates Cape Colony on the south from the Orange River Colony, Griqualand West, Bech- aunaland and German Southwest Africa on the north. Area of basin, 325,000 square miles. Its principal tributaries are the Caledon and the Vaal, both joining it from the right. Its volume varies greatly between the dry season, when it is not navigable, and the rainy season, when it overflows its banks in the upper parts of its course. Its mouth is obstructed by a bar, but above the bar it is navigable for small vessels.

ORANGE-ROOT, the common name of the hydrastis. See Golden Seal.

ORANGE-TIP, one of the several butter¬ flies of the family Pier idee (q. v.), which are usually white and marked with black and with a conspicuous orange spot at the end of the front wings. The lower surface of the hind wings are mottled with a greenish network.

ORANGEBURG, or'enj-berg, S. C., city, county-seat of Orangeburg County, on the Edisto River and on the Atlantic Coast Line and the Southern railroads, 81 miles north by west of Charleston and 50 miles south by east of Columbus. It was settled in 1735 by Swiss and Germans, was incorporated in 1755 and chartered as a city in 1870. It is in an agricultural and lumbering region. The chief manufacturing establishments are cotton mills, lumber and planing mills, a sash and blind fac¬ tory, flour and grist mills, ice factory, brick works, wagon and carriage factory and printing works. There are two colleges for colored pupils, one a State industrial institution and

the other under the auspices of the Methodist Episcopal Church. There are graded schools for both white and colored and seven churches. The four banks have a combined capital of $210,000, and the annual amount of business is about $1,500,000. The city, which has adopted the commission form of government, owns and operates the electric-light plant and the water¬ works. Pop (1920) 7,290.

ORANGEMEN, the unfortunate party designation which for more than a century has contributed to keep alive religious and political divisions of the worst character in the British Empire, especially in Ireland. The Orange or¬ ganization had its origin in the animosity which had subsisted between Protestants and Roman Catholics in Ireland since the Reformation, but which reached their full development after the Revolution of 1688, and the wholesale confisca¬ tion of Roman Catholic property by which that event was followed. From that time the Ro¬ man Catholics of Ireland may be said legally to have lost social, political and religious status in their own country. Some attempts in the latter part of the 18th century to ameliorate their condition excited, especially in the north, the alarm of the Protestant party, who regarded the traditional ((Protestant ascendency® as en¬ dangered. Acts of violence became frequent, and, as commonly happens, combinations for aggressive and defensive purposes were formed by both parties. The members of the Protestant associations appear at first to have been known by the name of (III, who, in Ireland, has been popularly identi¬ fied with the establishment of the Protestant ascendency. The first ((Orange Lodge® was founded in the village of Loughgall, County Armagh, on 21 Sept. 1795. It was a region and time of outrage, 12 or 14 houses of Roman Catholics being sometimes, according to disin¬ terested witnesses, wrecked in a single night. The association which began among the ignor¬ ant peasantry soon worked its way upward. The general disaffection toward English rule, which at that time as it does to-day per¬ vaded Ireland^ and in wdiich Roman Catholics, as a natural consequence of their oppressed condition, largely participated, tended much to identify in the mind of Protestants disloyalty with popery; and the rebellion of 1798 insep¬ arably combined the religious with the political antipathies. In November of that year the Orange Society had already reached the dignity of a grand lodge of Ireland with a grand mas-

ORANGEVILLE

ORANGUTAN

?ksy

ter» a grand secretary and a formal establish¬ ment in the metropolis ; and in the following >eais the organization extended over the entire piovmce of

Ulster and had its ramifications in all the centres of Protestantism in the other provinces of Ireland. In 1808 it extended A°r ˆU= >land. A grand lodge was founded at Manchester, from which warrants were issued for the entire kingdom: its seat was trans¬ ferred to London in 1821. Memorable in the history of the Orange Society was the election of a royal duke (Cumberland) in 1827 as grand master for England and as imperial grand mas¬ ter in 1828. The Roman Catholic Relief Act of the following year stirred up all antipathies of creed and race in the Ulster bigoted horde and emissaries were sent out to organize lodges in \ ales, Scotland, Canada, the Mediterranean region and in the other colonies. A formidable part of this zealous propagandism was its intro¬ duction into the army about 1824-26. No fewer than 32 regiments were proved to have received warrants for holding lodges in Ire¬ land and the English grand lodge had issued 37 warrants for the same purpose. The organ¬ ization was complete and extensive. The only condition of membership was that the applicant should be a Protestant and 18 years of age. In 1835 the association numbered 20 grand lodges, 80 district lodges, 1,500 private lodges and 200,- 000 to 220,000 members. Its worst effect was its supply of a constant incentive to party ani¬ mosities and deeds of violence. The spirit of fraternity which pervaded its members was a standing obstacle to the administration of the law; and confidence in the local administration of impartial justice by magistrates was de¬ stroyed forever for the Irish Catholic. An alleged Orange conspiracy to alter the succes¬ sion to the Crown in favor of the Duke of Cumberland led to a protracted parliamentary inquiry in 1835; the Orange Society had over¬ reached itself, and this inquiry, as well as a shocking outrage by an armed body of Orange¬ men, on the occasion of a procession in Ireland, so discredited the association that its respecta¬ bility has since gradually diminished. For sev¬ eral years the Lord Chancellor laid down a rule by which no member of the Orange Association was admitted to the commission of the peace, and the association became comparatively with¬ out influence, except among the very lowest classes of Protestants in northern Ireland. Of the colonial offshoots of the Orange Associa¬ tion, those of Canada have at all times been most active, and outrages against Roman Catholic churches and convents were frequent until re¬ cent years ; and on the occasion of the visit of the Prince of Wales (afterward Edward VII) to Canada, an attempt was made to force from his royal highness a recognition of the associa¬ tion, which was defeated by his own firmness and by the judicious counsels of his advisers. The Orangemen of British America constitute about 1,200 lodges, with about 150,000 members. The Repeal agitation in Ireland in 1848, the disestablishment of the Protestant Church of Ireland in 1869 and the Fenian and Nationalist associations were all violently opposed by the Orange faction. The Home Rule campaigns again called forth their animadversions, and more recently the Sinn Fein party and policy and the

Gaelic League program for an Irish

Ireland have aroused all the latent bigotry of this unchristian, undemocratic society. The society holds great demonstrations annually on 12 July, the anniversary of the Battle of Aughrim and (reckoning by old style) of the Boyne. Serious riots have attended some of these demonstrations of alleged loyalty. That the Orange Society has secured a grip on the British army was shown during 1914, when sev¬ eral officers at the Curragh and elsewhere, in¬ cluding General French (later marshal and vice¬ roy) and General Gough (later removed for in¬ efficiency in the battle of Picardy), were pre¬ pared to resign their commissions rather than lead a military contingent to enforce an act of the Imperial Parliament against the Orangemen of Ulster, who resisted that same edict. How¬ ever, the power of Orangeism is waning; the democratic, liberal atmosphere of the 20th cen¬ tury is not conducive to the growth of bigotry and Orangeism is being slowly choked to death, especially in the United States, where its dying efforts awaken little sympathy. In the United States the organization has four branches or classes; a supreme grand lodge, which is the highest jurisdiction in the United States ; State grand lodges, with jurisdiction over district and subordinate lodges in their respective States; district lodges, with jurisdiction over the fourth class, or subordinate lodges in their respective jurisdictions. In a number of States some subordinate lodges are under the direct juris¬ diction of the supreme grand lodge. State grand and district lodges exist in Pennsylvania, New York, New Jersey, Ohio and California. District lodges without State jurisdiction exist in Massachusetts and Michigan. There are up¬ ward of 400 subordinate lodges throughout the United States with a membership aggregating about 30,000. A higher branch of the order, known as the Royal Black Encampment of Israel, also exists in nearly all States of the Union. Its various branches are known as pre- ceptaries and its members are recruited from the full-degreed Orangemen. There is also a ladies' auxiliary, known as the Ladies' Loyal Orange Association of the United States. It has a total membership of about 20,000, with upwards of 200 lodges. The institution main¬ tains a National Home for the Care and Sup¬ port of Aged Inmates and Orphan Children at Hatboro, Pa. Consult Lecky, (History of England in the Eighteenth Century) (Vols. VII, VIII, London 1878-90); Lilburn, (Orangeism: its Origin, Constitution and Objects5 (18&).

ORANGEVILLE, Canada, town, county- seat and outport of Dufferin County, on a branch of the River Credit, 49 miles northwest of Toronto and on the Canadian Pacific Rail¬ way. It is a large grain shipping centre, has flour and woolen mills, foundries, machine- shops, casket works, furniture manufactories and other industries. Pop. about 2,340.

ORANGUTAN, o'rang-oo'tan, the Malay name, signifying (

massive, the legs short and bowed, and the arms and hands disproportionately long, reach¬ ing to the ankle, but the thumb is very short. Except for the face, hands and feet, the animal is thickly clothed with coarse, reddish-brown hair, which is especially long on the arms, where it converges to the elbow, the thighs and the beard of the male. There are no ischial callosities and no tail. Cheek-pouches are ab¬ sent, but old males have the face much broad¬ ened by the development of prominent fibrous warty protuberances and in this sex the canine teeth become much enlarged. In some respects this ape approaches man more closely than any other existing species, but in others it differs widely and resembles the lower apes. In size it is much inferior to the gorilla of equatorial Africa, seldom exceeding four feet in height, and it lacks the high sagittal crest, and particu¬ larly the prominent superciliary ridges, which give to the males of that species so ferocious an aspect. At the present time the orang is con¬ fined to the deep swampy forests of Borneo and Sumatra. It is arboreal in habit and builds nests of boughs and leaves among the branches of the trees. For this mode of life its struc¬ ture is eminently adapted, its long arms, crooked legs and great' strength enabling it to travel through the tree-tops with the greatest facility. To an equal degree these structures ill adapt it to terrestrial locomotion. It does not stand erect, as often represented, except now and then for a short time, and when supported, but in a semi-erect attitude, resting on the side of the inturned feet and on the knuckles of the hands, which, as a consequence, develop callos- sities. The orang lives exclusively upon a vege¬ table diet, consisting chiefly of fruits. The males especially have powerful voices, made possible by the great development of the larynx. Naturally' they are sluggish and sullen, but the disposition is mild. Stories of their great ferocity, and particularly of their habit of lying concealed in the branches of trees above path¬ ways, from which they reach down a foot to grasp men by the throat, are pure fables. In confinement one of their most interesting char¬ acteristics is their teachability and the changing expression of the face resulting from the great mobility of the lips. Consult Hartmann, An¬ thropoid Apes) (1886), in which many other authorities are given; Forbes, Allen's Natural History, > Vol. I (1897) ; and the books of Wal¬ lace, Forbes, Hornaday and other scientific travelers in the Malayan region.

ORATION ON THE CROWN, The. This oration, like the speech of Achilles in the ninth book of the (Iliad) and many of the finest speeches in the world, is a reply.. It is Demosthenes' final vindication of his entire life and policy against the censure of his life-long rival and adversary, Hischines. In 336 b.c., two years after the Macedonian defeat of Athens and Greece at

Chaeronea, Ctesiphon proposed in the senate the honor of a golden crown for Demosthenes in recognition of his services to the state as commissioner for the fortification of Athens and treasurer of certain public funds. The main purpose of the bill, however, was to affirm Athens' loyalty to the lost cause of dem¬ ocratic resistance to Macedonian imperialism. TFschines stopped the progress of the bill by an indictment analogous to a plea of unconstitu¬

tionality in our Supreme Court. For some six years while the success and the consolidation oi Alexander's conquests in the East hung in the balance neither side ventured to bring the suit to trial. But in 330 the party of Demosthenes found courage to press for a decision, ineie was some force in the technical pleas that e mosthenes' accounts had not been audited at the time of the introduction of the bill and that the proposed proclamation of the Crown in the the¬ atre was illegal. But everybody knew that the real issue was the charge that the allegation that Demosthenes had well served the state was false.

It was to be a duel between the two greatest orators of Athens. A huge popular jury and a large audience attracted from all Greece were to pass judgment on the policy of Athens for the past 30 years. The logic of fact favored HSschines. The Macedonians had won. But Aeschines was embarrassed by the narrow tech¬ nicality of his strongest pleas and by the sus¬ picion that his retrospective pacifism was the veiling camouflage of pro-Macedonian sym¬ pathies that verged on treason. His speech is very clever. But its effect is marred by these doubts of his sincerity and also by his strident insistence on the petty technicalities of his case and his tediously repeated demand that De¬ mosthenes shall meet this issue first in his reply.

Demosthenes is too shrewd to fall into that trap. He merely animadverts on the unfairness of the attempt to prescribe to him the order of his topics, and postpones his plausible and con¬ temptuous treatment of the two technical issues to a convenient place between two of the strongest patriotic passages of the speech. This leaves him free to review his entire political career and the relation of Athenian democracy to Macedonian autocracy in the chronological division adopted by TEschines himself for that portion of his argument. There is no space here for this historical detail Fully to appre¬ ciate the oration on the Crown one should come to it fresh from the perusal in chronolog¬ ical sequence of the (Philippics) and (01yn- thiacs) and other public orations of Demosthenes in Kennedy's translation. Failing that the late Prof. S. H. Butcher's admirable little book,

(Demosthenes, > in the Classical Writers Series, or the chapters in Jebb's Attic Orators^ or the historical introduction in Goodwin's edition of the

(Oration on the CrowiP will serve. Even without this historic background the oration may be enjoyed as the supreme expression of the sentiment that in a righteous cause it is better to have fought and lost all save honor than never to have fought at all. This is the meaning of the famous oath by Marathon and Salamis which detached from the context may seem in a rough English rendering a mere flight of rhetoric : ((They deceive you, men of Athens, they lie who tell you that it was a mis¬ taken policy for you thus to imperil your city for the salvation and enfranchisement of all the Grecian world. It was no error; no, by our fathers, who first faced the barbarian at Mara¬ thon, who held the lines of Platsea and manned the ships of Salamis and Artemisium — no, by the thousands who sleep in our national ceme¬ teries, brave men all, all worthy of like memo¬ rial honors, not onty those who succeeded, no not the victors alone.ˆ Only a professional student of Greek style can appreciate the

«

ORANG-UTAN (Simla, satyrus).

ORATIONS AGAINST CATILINE — ORATORIES

minute finish of Demosthenes' diction, rhythm and sentence structure. But the essential qua it\ of Ins oratory is apparent in any good transiatmn. It is neither the stately, elaborate rhetorical diffuseness of the tradition of Cicero, Burke and Webster, nor the matter-of-fact aridity of modern business oratory, nor the loose, familiar colloquialism of modern popular

6 iquienCe' It: is imPassioned logic, an indis¬ soluble blend of close, if sometimes sophisti¬ cal, reasoning and feeling. In this it resembles some of the more combative speeches of Lin¬ coln, and it also recalls Lincoln in its art of pressing the definite issue home in a series ol unanswerable questions and inescapable di¬ lemmas. There is less, of course, of Lincoln's supieme and almost unique quality, absolute fairness to the other side.

Paul Shorey.

ORATIONS AGAINST CATILINE. In

63 b.c., Lucius Sergius Catilina (Catiline), de¬ scendant of an ancient Roman patrician family and long a conspicuous figure in the political life of Rome, renewed his candidacy for the consulship. At the same time he began the organization of his famous conspiracy, rallying to his support the elements of discontent throughout Italy and planning for simultaneous uprisings at various points, in case he should encounter defeat at the polls. When in the autumn of 63 b.c. this defeat became reality, his adherents raised the standard of revolt at Faesulae (Fiesole) in Etruria. The news of

this uprising and of other details of Catiline's trea¬ sonable projects moved Cicero, as the first magistrate of the republic, to deliver against Catiline and his accomplices several vehement speeches. The first of these (((Quo usque tandem abutere, Catilina, patientia nostra®?) was de¬ livered 8 November before the Senate, where Catiline himself had had the presumption to appear in person. The orator assails Catiline's effrontery in being present among the very men he had marked for slaughter, and declares that the government has full knowledge of the plans of the conspirators. He urges Catiline to leave Rome with all. his followers. The second ora¬ tion ((

tain Allobrogian envoys, who happened to be in the city. Cicero, obtaining information of these schemes, arranged to surprise and capture the envoys as they were leaving Rome with in¬ criminating documents upon their persons. The evidence thus procured was laid before the Senate, which was then convened by Cicero in the 1 emple of Concord abutting on the Forum. In the third oration, delivered before the people, 3 ˆec- 63 b.c., the orator presents the details of these recent occurrences, not omitting to inform the people that the Senate had decreed a thanks¬ giving to the gods in honor of his success in unearthing the plots laid against the government. He promises to remain worthy of the con¬ tinued confidence of the people. The fourth oration against Catiline was delivered in the Senate, 5 Dec. 63 b.c., in the course of the for¬ mal debate concerning the penalty to be in¬ flicted on the arrested conspirators. Two courses were advocated by different groups in the Senate. One group, headed by Julius Caesar, urged that the conspirators be distributed among some of the provincial towns of Italy and kept in confinement for life. Cicero admits that this course of procedure would be simpler for him¬ self, as it is the more popular and will relieve him of the odium of having executed the de¬ cree of death against fellow-Romans. Yet he declares that duty compels him to support the proposition of the senator Decimus Silanus, who urged that the penalty of death be imposed upon those who had attempted not only to murder the Roman magistrates and senators, but also to devastate the city itself by fire. When it was urged that Roman law forbade the execution of Roman citizens without allowing them an ap¬ peal to the people, Cicero met this argument with the specious plea that men guilty of the monstrous designs of the indicted conspirators could not enjoy the protection of this privilege, since by these very designs they had forfeited all claims to their rights as citizens.

The fame of these four Catilinarian speeches lies partly in their authorship, partly in the im¬ portance of the events with which they deal. There can be no doubt of the grave menace to the government in 63 b.c. There wasˆ great social distress and political unrest. Unprinci¬ pled men with large political influence and ambitious designs were ready for a reckless as¬ sault upon existing institutions and vested rights. Yet Cicero, while

undoubtedly correct in his assertions as to the existence of a care¬ fully laid conspiracy, probably exaggerates the criminal intent of Catiline and his accomplices, and paints the personal character of Catiline himself in darker colors than warranted by the facts. All four of the orations abound in vehe¬ ment personal abuse and in turgid rhetoric, not a little of which is devoted to magnifying Cicero's own merits in saving the city from destruction. There is a translation by C. D. Yonge in the Bohn Library.

Charles E. Bennett.

ORATORIANS, or CONGREGATION OF THE ORATORY. The name of two religious associations in the Roman Catholic Church, the Oratory of Saint Philip Neri and the Oratory of Jesus. See Orders, Religious; Neri, Saint Philip; Newman, John Henry.

ORATORIES, The. See Orders, Re¬ ligious.

ORATORIO. A musical setting of a sacred theme, generally dramatic in character, consist¬ ing of choruses and solo voices with an orches¬ tral accompaniment. The name seems to be de¬ rived from the oratory of the churches in which it had its beginning. While technically its origin may be traced back to the first dramatic representation of Bible History, for practicable purposes its history as a distinct art form began about the middle of the 16th century, when Filippo Neri, a learned priest, instituted a series of public lectures on Scripture History in his church in Rome; and in order to make them the more attractive he arranged narrative dialogues on the subject matter of his discourses, inter¬ spersed with hymns of a type known as <(laudi spiritual^55 Pope Gregory XIII encouraged the development of the scheme, and no less import¬ ant a composer than Palestrina lent his aid by writing music for this special purpose. Neri died in 1595, and five years later there was pro¬ duced at Rome a sacred drama with music, en¬ titled (La Rappresentazione dell' Anima e del Corpo) ((The Soul and the Body5), written by Cavalieri, a Romail composer of note. By a singular coincidence, the year 1600 also saw the first performance of Peri's

The oratorio in Italy always retained its intimate assocation with Italian opera. In Ger¬ many, its origin also was the miracle-play; but it developed along quite a different path' — that of the passion music. For a time, composers absolutely limited themselves to the story of the Passion of Christ. Heinrich Schiitz may fairly be called the father of the modern

oratorio; since his work represents really the connecting link between the two styles out of which grew the oratorio of Handel and his followers. After Schiitz, the chorale, a hymn tune harmonized for congregational singing and distinctively a German contribution, became a regular feature of the oratorio and supplanted the plain-song which was used by the Italian composers as a

natural result of the Church influence on their work. The name of Bach, pre-eminent in musi¬ cal history, is most closely associated with his Church music. There are four oratorios from his pen extant — the (Christmas Oratorio, 5 which is really a group of six cantatas intended for performance on separate days, and three Passion oratorios, (Saint Matthew,5 (Saint John and Saint Luke) (the last named not of unquestioned authenticity) — and probably there were two more which have disappeared. The Saint Matthew Passion shares with the B minor Mass the distinction of filling the highest place in the list of Bach's works. A contemporary of Bach, whose proximity to the great composer has dimmed his real worth, Karl Heinrich Graun, was the last great composer of Passion music. His (The Death of Jesus, 5 a posthumous work, shared for many years the popularity of the (Messiah) and the (Creation.5

Handel is to-day best known for his long series of oratorios ; but he was more than 50 years old before he began to write them. Pre¬ vious to that, he had devoted most of his great energies to the production of operas and had become the most prominent living composer in that field. The Rlessiah5 is, of course, his best-known and best-loved oratorio, and is ac¬ corded by musicians first place among his works, though (Israel in Egypt5 is characterized by Rolland as <(the most gigantic effort which has ever been made in oratorio.55 A performance of the (Messiah) directly inspired Haydn, then advanced in years, to write his (Creation, 5 and the (Seasons,) Beethoven's only oratorio, (The Mount of Olives5 is not strongly char¬ acteristic of the composer and is marred by an inferior text. Spohr was the most successful oratorio writer of the early part of the last cen¬ tury, but he was eclipsed by Mendelssohn, on whom, with his (Saint PauP and (Eli j ah, ˆ fell the mantle of Handel. (Elijah) forms with the (Messiah5 and the (Creation, } the most popular group of oratorios in the present-day repertoire. Liszt's

The line of demarcation between the oratorio and other choral works of a religious char¬ acter is not v$ry definite ; and some examples of The Requiem, Te Deum, Stabat Mater and Magnificat are so elaborated and developed that they are closely akin to the oratorio proper, and in fact are often performed as oratorios. In the appended list are included some of the greater works which by their importance and architectonics are fairly to be classed with true oratorios.

List of Principal Oratorios.

Title

Apostles .

Beatitudes, Les.

Children's Crusade .

Creation .

Christmas Oratorio

Christus .

Dream of Gerontius. .

Eli .

Elijah .

Pranciscus . '

German Requiem .

Hora Novissima .

Israel in Egypt .

Judas Maccabaeus .

Judith .

Last Judgment .

Light of the World .

Manzoni Requiem .

Messiah .

Mors et Vita .

Mount of Olives .

Prodigal Son .

Redemption .

Requiem .

Requiem .

Rose of Sharon .

Saint Elizabeth .

Saint Ludmilla .

Saint Matthew Passion. . ,

Saint Paul .

Saint Peter .

Saul .

Seasons . .

Stabat Mater .

Woman of Samaria .

Composer

Elgar .

Franck .

Pierne .

Haydn .

Bach .

Liszt .

Elgar .

Costa .

Mendelssohn. . . .

Tinel .

Brahms .

Parker .

Handel .

Handel .

Parry .

Spohr .

Sullivan .

Verdi .

Handel .

Gounod .

Beethoven .

Sullivan .

Gounod .

Berlioz .

Mozart .

Mackenzie .

Liszt .

Dvorak .

Bach .

Mendelssohn. . . .

Paine .

Handel .

Haydn .

Rossini .

Bennett .

First

performance

3 Oct. 1903 Summer 1891 18 Jan. 1905

2 April 1798 Dec. 1734

29 May 1873

3 Oct. 1900 29 Aug. 1855

24 Aug. 1846 22 Aug. 1888 10 April 1868

3 May 1893

4 April 1739 1 April 1747

29 Aug. 1888

25 March 1826 27 Aug. 1873 22 May 1874

13 April 1842

26 Aug. 1885

5 April 1803 3 Sept. 1869

30 Aug. 1882 5 Dec. 1837

14 Dec. 1793 16 Oct. 1884

15 Aug. 1865 15 Oct. 1886

15 April 1729 22 May 1836

June 1873

16 Jan. 1739 24 April 1801

7 Jan. 1842

27 Aug. 1867

Bibliography. — Dickinson, Edward, (Music in the History of the Western Church (New York 1902) ; Kretzschmar, Hermann, (Ora- torien und weltiche Chorwerke5 (Leipzig 1910) ; Mees, Arthur, (Choirs and Choral Music) (New York 1911) ; (Oxford History of Music) (6 vols., Oxford 1901-05) ; Patterson, Annie W., (The Story of the Oratorio) (London 1902) ; Upton, George P., (The Standard Oratorios5 (Chicago 1893).*

Lewis M. Isaacs, Musical Critic and Composer.

ORATORY. A full treatment of this sub¬ ject would include the History of Oratory which, like other important educational subjects, has its philosophy of cause and effect, effort and achievement, and inherency and environment. This phase of the theme is treated in the arti¬ cle Oratory (q.v.). For a more extended study the reader is referred to the (History of Ora¬ tory from the Age of Pericles to the Present Time,5 by Dr. Lorenzo Sears. While the Ora¬ tion is recognized as the highest form of public discourse the term Oratory is here used in its broadest sense and includes all kinds of public speaking from the lowest to the highest. The subject will be treated under three main divi¬ sions, the Kinds of Discourse, the Plan of Dis¬ course and the Qualities of Discourse.

1. Kinds of Discourse. — 1. Business Re¬ marks. — Perhaps the lowest form of public speech is Business Remarks, which are usually made for the comfort or the welfare of the members or audience but have no bearing upon the object or discussions of the meeting. They should be brief, to the point and wholly without display; the chief temptation is to magnify them into a set speech.

2. Committee Reports. — Another low form of speech is the Report of a Committee through its chairman who acts as the spokesman of the committee. The report may be read as a con¬ cise statement adopted by the committee or it

may be given in substance from notes or records, but in all cases it should be devoid of any coloring in phraseology or manner which might betray the chairman's own prejudice or convictions.

3. Essays. — The Essay when read by the author to an audience rises higher in the scale and is a much used form of discourse ; when read by

another or a mere clerk, though it may be an important document such as a presidential message, it becomes a low form of public ad¬ dress and rarely claims much attention from the audience. Fundamentally an Essay should be didactic, critical and instructive in style ; though with more color of language and a high degree of mastery of the subject matter so that the eye may not be confined too closely to the page, it may become a highly effective speech.

4. Debates. — The Debate differs from all other forms of speech in that the speaker ex¬ pects a reply from opponents who hear him, his statements are made under the cross-fire of re¬ buttal and repartee and the debaters expect an immediate decision of the question by vote of the judges, the verdict of the jury or the voice of the people. The speaker may or may not choose his subject, but he finds himself in the attitude of attack or defense of some proposi¬ tion or resolution to be established or disproved, with the resultant condition of the victor or the vanquished. A good question for debate must have two sides of about equal strength, it should have some human interest at stake and be worth discussion. In preparation for debate the speaker should make a good selec¬ tion of material from books, magazines and newspapers, study both sides of the question, clear his mind of all mere notions or preju¬ dices for or against the proposition, and pre¬ pare a clear, logical outline or Debater's Brief setting forth the Burden of Proof and Pre¬ sumption, the main Issue, the argument and the law and authorities relied upon in trying the case. The logical trend of debate is treated in the article on Argumentation (q.v.).

5. Topical Speeches. — A Topical Speech, as the name implies, is a speech on some topic or subject chosen by the speaker or assigned to him. It is a somewhat informal speech made to a limited audience. It should be as brief as possible and rarely include more than ((three good points and three good illustrations.55 It has a wide range of subjects, some of which should be treated in a purely didactic way, while others may rise to the glow of conviction and give the flavor of good-will, pathos or humor. The kinds of Topical Speeches are:

(1) Toasts, or After-Dinner Speeches of va¬ rious degrees of importance. In recent years this form is much used by political aspirants for making public their ambitions and desire to (

(2) Speeches of Introduction of the Speaker to his audience, which should be brief and com¬ plimentary, but devoid of unwarranted assur¬ ances of the speaker's abilities.

(3) Before Classes, Clubs, Conventions and Associations of an educational, religious or benevolent nature, which should be didactic and very direct in

style.

(4) Gavel Speeches, in which the retiring president of an association presents that em¬ blem of authority to a new.ly elected president

who is not yet ready to give a formal Inaugural Address ; and the response by the president¬ elect who acknowledges the honor and asks the co-operation and support of the Association for his approaching administration.

(5) The Notification Speech of the Chair¬ man of a committee to a presidential nominee in which he reiterates the platform of the party as expressed by the nominating convention.

(6) The Acceptance Speech of a presidential nominee made several weeks after the notifica¬ tion in which he gives his mature interpreta¬ tion of the platform of the party and sounds the key-note of the campaign.

6. Addresses. — The Address is much more formal than the Topical Speech and is better suited to larger assemblies. There are six va¬ rieties as follows :

(1) The Salutatory which is an address of greeting or welcome. In college life it is usually given by the second honor member of the senior class on the commencement occasion, but it has its counterpart in practical life in the address of welcome to some noted statesman, philanthropist or other distinquished citizen or guest. It is necessarily complimentary in nature and requires good taste on the part of the speaker that his praise may not become fulsome or his admiration smack of hero-worship.

(2) The Valedictory is a formal farewell ad¬ dress usually made by the first honor graduate at the commencement exercises of a college. It calls up pleasant associations, enshrouds all shortcomings in a mantle of charity, extols those virtues which promise future success and attainment, and pledges loyalty to the treasured memories of the past. Such an address would be appropriate in practical life when a speaker retires from an important field of service. It admits of a high order of eloquence and should inspire hope and confidence in the administra¬ tion of a successor.

(3) The Commencement Address, usually provided by the senior class or the literary so¬ cieties, is a distinct college speech which inspires students to high standards of literary effort, lofty purposes and aims in life, and noble

char¬ acter. The form should be methodical, the style dignified, and the language a model of good English and rhetorical excellence. Great care should be exercised in the selection of the speaker who should be a literary man of high character, marked achievement and good de¬ livery.

(4) The Inaugural of the President of an association or of the nation, the governor of a State, or the chairman of a large and formal convention is an important kind of an address. The speaker should acknowledge the honor con¬ ferred upon him, pledge faithfulness to duty and proclaim his policy. He should not criticize his predecessor, but show a strong desire to build by the light of past administrations.

(5) The Political Address has for its pri¬ mary aim the interests of the party or its official candidates, and asks an expression of the will of the people in a vote on election day. The occasion and message of such an address ranges from the harangue of the stump speaker to the most dignified and learned discussion of vital national issues by some great statesman. The speaker should not be too statistical nor use the language of the political demagogue,

but try to be clear, candid and generous to op¬ ponents.

(6) Addresses Before Conventions, Congre¬ gations and other large bodies of people of similar tastes and convictions, not of a political nature, such as Teachers' Institutes, Chautau¬ qua assemblies, Synods, and Conferences, vary according to the occasion and the message, but they are distinctly unlike the other addresses named. They are generally of a professional, educational, scientific or moral order and deal largely with methods, motives and aims of work in a given sphere, of activity.

7. Lectures. — The lecture is a well recog¬ nized form of speech somewhat akin to the ad¬ dress ; yet it is more formal, bears the stamp of greater preparation and is used repeatedly in about the same language and form. There are two kinds :

(1) Lectures to Classes in Schools, colleges and other institutions, which should be didactic in style, precise in statement, methodical in ar¬ rangement, progressive in development and so presented that the students may fully compre¬ hend the subject treated and take notes for future study.

(2) Platform Lectures before popular au¬ diences the object being instruction and enter¬ tainment. No matter how scientific the subject it must be treated in a popular way with ample illustration and sufficient reduction of technical terms to common phraseology so that the au¬ dience

may fully understand the speaker. There is a large demand for the highest type of this form of public entertainment.

8. Sermons. — The sermon is a spoken dis¬ course by a duly ordained clergyman on some theme or text from the Bible and delivered as a part of a church service. There are six va¬ rieties as follows, the first three of which are named by Dr. Broadus from the standpoint of the subject or text, and the last three are con¬ sidered from the standpoint of the occasion:

(1) The Subject Sermon in which the text from Scripture only suggests the theme, the analysis of which and plan of treatment must be entirely constructed by the preacher.

(2) The Text-Sermon in which the analy¬ sis, headings and subdivisions are all inherent in the text, leaving the tactful preacher, as Dr, Shedd put it, <(to find the hidden skeleton.ˆ

(3) The Expository Sermon which is exe- getic in method — a purely Scriptural form of preaching — in which several passages or even a whole chapter may be expounded.

(4) Didactic Sermons relating to Church government, influences, beliefs, creeds or the ethics of religion.

(5) Exhortatory Sermons which are more emotive in nature and intended to move the will of the congregation to immediate action.

(6) Special Occasion Sermons, such as the dedication of a church, installation services, the institution of baptism or the sacrament, ser¬ mons on Thanksgiving Day, Christmas, Easter and on fraternity, memorial and funeral occa¬ sions.

9. Orations. — The oration, as we conceive it, is the loftiest type of public speech and it marks the highest attainment of the public speaker. It is dignified and formal in style, clear in logic, forceful in thought, sound in philosophy, eloquent in language, emotive and

persuasive in spirit, and, withal, it is constructed with the plot and motive of a great drama. It gathers up the salient facts of history and ex¬ perience bearing upon the subject discussed, holds them up in the searchlight of the present day and generation and weaves them into the fabric of the future. It moves the audience by persuasive, climatic impulses and stirs men to

action. _ It must spring from the orator's own conviction and bring a message that is genuine, unmistakable and generally optimistic. Its ob¬ ject is to educate and inspire the masses, elevate the standards of morality and citizenship, or bring about great civic reforms and national movements. The stamp of its influence is clear in the national life and character of the past, it is a vital, living force in the civil polity of the present and its promise of power and useful¬ ness in the future is so great that it should be placed in the curriculum of every college and university that lays claims to a thorough prep¬ aration of youth for the duties and responsibil¬ ities of life.

Perhaps owing to a failure to distinguish the oration from the other forms of speech which we have named the rhetoricians of the present day have not greatly improved the classification of orations given by the ancient Greeks and Romans. In view of the preceding discussions we believe that the terms commemorative, panegyric and civic will prove comprehensive and inclusive.

(1) The Commemorative Oration celebrates some great event of history and aims, as Dr. Sears states, at <(perpetuating something which is worth saving from oblivion and extending into the future what is too valuable to be re¬ stricted to the brief period when it was present among mankind.® It is a high and inspiring order of oratory. Noble deeds are idealized, the outgrowth of past events and their rela¬ tion to the needs of the present is shown and eloquent strains of warning or triumph mark the speech. Webster's two ((Bunker Hill Mon¬ ument® orations and Everett's oration on (

(2) The Panegyric Oration is a formal and elaborate eulogy upon some great person who has passed away. It is an old form of oratory practised by almost all the great orators of the world, and, having stood the test of ages, it will doubtless live as long as virtue is praise¬ worthy among men. It combines the strongest points of demonstrative oratory and employs the highest type of eloquence. The style must be elegant, the praise, truthful, the encomium specific and not general, and the finished life and its closed events held up as an inspiration to the living for future guidance. George Wil¬ liam Curtis' oration on ((Wendell Phillips® and James G. Blaine's eulogy on <(Garfield® are good illustrations of panegyric oratory.

(3) The Civic or National Oration is a deep, earnest discussion of great ethical principles, civic laws, social relations or economic move¬ ments necessary to the welfare and perpetuity of the state or nation. It has for its aim the elevation of standards of citizenship, national prosperity and international relations. Like the other forms of orations it employs the philoso¬ phy of history in forecasting future events, and rises to the loftiest eloquence whenever ques¬

tions of great human interest are considered. <(The Labor Problem,® (< Anarchy,® ((Arbitra- tion,® (

II. The Plan of Discourse. — All kinds of discourse should be constructed according to a good plan which will secure proportion, insure growth and prevent digression. Rhetoricians give variously from two to eight divisions of the discourse, but the simple outline, introduc¬ tion, main discourse and conclusion seem to meet the demands in all kinds of speeches.

1. Introduction. — The importance of the first impression is of great moment to the speaker as well as to the audience. With a good introduction the critical attitude of the audience gives place to open-mindedness and ac¬ ceptance of the truth as it is presented in the main discourse and enforced in the peroration. At the start the speaker must consider the oc¬ casion, the object of his speech and the mood of the audience he confronts. He may enjoy the support and sympathy of his hearers, or he may have their prejudice, false impressions or ignorance to overcome before he can discuss his subject successfully. To cover all cases we may say that the introduction should be local as to time, place and object of the speech, generally concrete and always definite in statement, def¬ erential to the audience and to the preceding speakers if there be any, conciliatory if concilia¬ tion is needed, dignified both in commendation and condemnation, calculated to awaken atten¬ tion and interest, brief as the occasion will allow, and it must name the subject or proposi¬ tion to be discussed.

2. Main Discourse. — The distribution of ma¬ terials, the statement of facts and the logical trend of discussion are closely allied to the sub¬ ject itself and must vary according to condi¬ tions ; but one of the following orders, or a combination of them, will apply to any kind of speech :

(1) The Historical Order arranges the facts, events, statements, proofs and conclu¬ sions, with regard to the time of occurrence. Antecedents relating to the past, circumstances relating to the present and consequents relat¬ ing to the present and the future are all ar¬ ranged chronologically. Webster's speech in the trial of Knapp for the murder of Capt. Joseph White, delivered 3 Aug. 1830, is an excellent illustration of the historical order of discus¬ sion.

(2) The Logical Order links all incidents, testimonies, proofs and arguments into a com¬ plete chain of argumentation, the whole subject being to convince the judge, jury or audience. (See Argumentation). Burke's speech on ˆConciliation with the Colonies,® delivered in the House of Lords 22 March 1775, illustrates the logical order.

(3) The Distributive Order arranges coex¬ isting matters into groups and

distributes these groups in their relation to each other and to the general aim of the speech. It often re¬ verses the historical order. This method is es¬ pecially adapted to the more eloquent styles of oratory, such as the panegyric or civic oration and has been employed by the greatest orators. It tests the tact and skill of the speaker who

must conform unswervingly to the three great principles of rhetorical structure, unity, climax

and proportion. . .

3. The Conclusion or Peroration — This is the crucial point for the skill of the speaker; it is the place of deepest interest and also of greatest peril. It leaves the final impression which may prove a triumph or a dramatic catastrophe for the orator. It should be care¬ fully prepared in thought, language and even in delivery. The essential requisites of a good Peroration are Summary, Brevity and Termi¬ nation and in formal oratory the heightening effect of eloquent language should be added.

III. The Qualities of Discourse. — Various qualities of discourse from Quintilian's three to Professor Bain's seven, have been described by rhetoricians. We suggest the following as inclusive terms for all speeches :

1. Clearness, which is the quality by which the thought and emotions are presented intel¬ ligibly to the audience. It deals especially with the diction and the syntax of sentences and the logic of thought. To insure clearness the speaker should cultivate the habit of clear thinking, study authors who are notably clear in style, have a definite knowledge of the sub¬ ject and the main issues, follow a well ordered plan of discourse and yield to wholesome crit¬ icism.

2. Force is that quality which renders dis¬ course capable of strong, vital utterance and energetic, expressive action. It is acquired by the selection of weighty idiomatic words whose meaning and phonetic constituents are full of power, by the use of strong, figurative language, by a skilful interweaving of short, energetic sentences with the necessary longer ones and by arranging the plan of discourse with special reference to climax and dramatic strength.

3. Persuasiveness is that quality of discourse which appeals to the will through the emotions. Persuasive passages should be in proper pro¬ portion to the thought-action of the speech and follow only when the minds of the

audience have grasped the situation and when the en¬ forcement of truth has been accomplished; hence persuasion is the special function of cli¬ maxes and the peroration. The language should be fraught with expressive words, pathetic or stirring associations of ideas and experiences, there should be a judicious use of expletives and striking figures of speech, and, above all, the speaker should manifest an earnestness of purpose and a full mastery of elocution or de¬ livery.

Robert Irving Fulton,

Dean of the School of Oratory, Ohio Wesleyan

University.

ORATORY, History of. Oratory first be¬ came a subject of particular study among the Greeks settled in Sicily on account of the gen¬ eral unsettlement of all titles to property in Syracuse in consequence of wholesale confis¬ cations. The exiles, on returning to their coun¬ try, applied to the government for restoration of their possessions, but that could be effected only by their appearing and appealing in per¬ son to the courts. In this emergency Corax, by drawing up a few simple rules for the or¬ derly and effective presentation of their claims and drafting a skeleton of an address to the court laid the foundation of the art of oratory

on which, 150 years later, Aristotle reared his inmmortal work on Rhetoric or Oratory, (

in fragments. In his simple but refined style he presents a contrast to Antiphon. His vocabulary is simple and pure, the vocabulary of common life; he makes little use of showy rhetorical figures, he excels in vivid description ; and he passes gracefully from the full and flowing periodic style to that of simple narrative. He was the first to fit the style of the speeches he wrote to the character of the client, who was to deliver them before the court. Isocrates (436-338 b.c.), an eminent teacher of oratory and one of the founders of the art in its highest development, was also by profession a logog- rapher. Twenty of his orations are extant, marked by great elegance of style, but inferior in natural simplicity to those of Lysias, and in fire and fervor to the orations of Demosthenes. To Isocrates Cicero awards the praise of hav¬ ing brought Attic oratory to perfection. Among his pupils were very many who attained high eminence as orators. From the scant rec¬ ords that are extant are gathered the names of 41 famous orators who are known to have come from the school of Isocrates; among

them the great Isaeus (390-353 b.c.), who, like his mas¬ ter, was a logographer and perhaps the most eminent representative of that profession. He was deeplv learned in the law, and was also a great political orator. In forensic oratory he was without a peer. Demosthenes is said by some ancient writers to have been one of his pupils. With Demosthenes and 3Eschines closes the .period of the grand Attic oratory.

After Greece fell under the Macedonian domination Grecian oratory had no longer any arena in public life and it degenerated rapidly. The tradition of the best days was, it is true, preserved in Aristotle's great treatise, and the monuments of Attic eloquence remained, but the virile eloquence of the great orators of Athens was ill fitted for the political circum¬ stances of enslaved peoples. The taste for ora¬ tory was industriously cultivated by the Hel¬ lenes of Asia Minor and the Greek cities as an elegant accomplishment, and in their hands it became merely one of the arts of decoration. A pompous, florid style, abounding in exquisite figures of speech, extravagant metaphors and empty but sonorous periods displaced the sane, temperate speech of the Athenian masters and exemplars of oratory. And it was while Greek eloquence was in this low estate that the Latins first became acquainted with the arts of Greece. Fortunately the works of the great orators and of the great theoretic expositors of the art, Isocrates, Aristotle, Theophrastus, were still extant, and in them was to be found the corrective of this debased Asian oratory. It was the good fortune of the greatest of the Roman orators, when he resorted to the Greek schools for training in the liberal arts, to have his studies from the first directed to the au¬ thentic works of those great masters, and not to the extravagances of the Asian school. Cicero's great rival in aftertimes, the orator Hortensius, was captivated by the glitter of Asianism, and sought to win verdicts in the courts by resonant sentences and flowery rhet¬ oric rather than by clear, calm argumentation commended by a chaste, temperate style of speech. Cicero's orations, of which 56 are ex¬ tant, are either deliberative and political, deliv¬ ered in the Senate or the forum, or judicial, forensic, all in defense of accused persons, vo^. 20— 4 4

with the exception of the memorable four ora¬ tions against Verres, in which Cicero acts as accuser and prosecuting attorney. He wrote three treatises on the subject of oratory, De Oratore, Orator and Brutus, and there are ex¬ tant two other treatises relating to the art of oratory, De Invcntione and Rhet orica which have been ascribed to him as author. In the treatise De Oratore he expresses his view of what the consummately accomplished orator should be. He must not be the mere rhetori¬ cian; neither should he be the mere technical lawyer or the keen political partisan ; but he should be the man of thorough education and perfect taste, who can speak on all subjects out of the fullness of his mental store, with variety and copiousness. Such is Cicero's ideal orator, an ideal which

unquestionably he ap¬ proached as nearly as any orator in antiquity, though of course even in his time it stood im¬ mensely remote. Though Julius Caesar, <(the greatest name in history,® was not by profes¬ sion an orator, he has been justly rated as sec¬ ond only to Cicero as a master of the art of oratory. It is not to be doubted that had he devoted himself to forensic practice and the oratory of the Senate he would not have been inferior in that career to any of the great ora¬ tors even of Athens. To Julius belongs the unique distinction of having quelled a rebellion by a speech. Quintilian, born about 80 years after Cicero's death, was a very eminent in- structor. in the art of oratory and wrote on the subject a practical systematic treatise, De Institutione Oratoria, remarkable for its sound criticism and faultless taste.

The triumph of Christianity was in part at least a triumph of oratory: the appointed chief means of disseminating the religion was preach¬ ing. The Apostle Paul was an orator of no mean rank. The apologies written in defense of the Christian religion in the 2d and 3d centuries and addressed, most of them, to the Roman emperors by Justin Martyr, Athenagoras, Melito, Apollinaris, Miltiades, Minucius Felix and others were, except that of the last named, in effect harangues written, not spoken. The style is oratorical; but it is oftenest of the debased Asian kind. Many of the Fathers of the Church, as Tertullian, Cyprian, Athanasius, Basil, Cyril of Jerusalem, the Gregories (of Nazianzum and of Nyssa), Augustine, Am¬ brose, were eminent as orators no less than as theologians and controversialists. In the Mid¬ dle Ages the art of oratory played no inconsid¬ erable part when employed for religious in¬ struction or moral exhortation by Bernard, Dominic and his Preaching Friars, Bonaven- ture, Thomas Aquinas, Berchthold of Ratisbon, Vincent Ferrer and Tauler.

Political oratory was meanwhile in abeyance. It had its revival in England in the times suc¬ ceeding the Revolution of 1686. Since that time the English bar and the British House of Commons have been almost continuously illus¬ trated by the genius of orators hardly or not at all inferior to those of ancient Athens. It was a crisis in the affairs of the little Syracusan Democracy that gave occasion for the first essay to formulate the laws of the art of ora¬ tory; and it is in great crises of states that the highest powers of oratory are called into action. As in England the question of war against the American colonies, the misdeeds of proconsuls

in India, the war with Revolutionary France, Catholic Emancipation, Abolition of the Corn Laws and Liberation of the Blacks, gave in¬ spiration to orators; so here in the United States the questions of Independence, of form¬ ing a Constitution, of Nullification, of Aboli¬ tion of Slavery, of

maintaining by arms the Union and of Tariffs, have called into exercise the oratorical powers of our Henrys, Otises, Hamillons, Clays, Websters, Sumners and

Phillipses. .

Bibliography. — Aristotle, 'Rhetoric'; Cic¬ ero, (Oratory and Orators) ; Cormenin, (Ora¬ tors of France> (1847); Crutwell, 'History of Roman Literature> (1898); Curzon, < Modern Parliamentary Eloquence> (1913) ; Goodrich,

(British Eloquence) (1861); Holyoake, G. J.,

(Public Speaking and Debate' (1895) ; Jebb,

(Attic Orators) (1876) ; Kline, R. E. P., Anal¬ ysis of Oratorical Style' (1914); Longinus, (On the Sublime' (1890); Mahaffy, 'History of Classical Greek Literature) (1880); Ma- goon, E. L., 'Orators of the American Revolu¬ tion > (1847) ; Mathews, W., 'Oratory and Ora¬ tors' (1879) ; Nicoll, W. J., 'Great Orators' (1880) ; Parker, E. P., 'Golden Age of Ameri¬ can Oratory' (1857) ; Power, J. O., 'Making of an Orator' (1906); Quintilian, 'Institutes of Oratory'; Reed, 'Modern Eloquence' (1901); Sears, 'History of Oratory from the Age of Pericles to the Present Time' (1896); 'The Occasional Address' (1897) ; 'After Din¬ ner Speaking' (1901); Tacitus, 'Dialogues de Oratoribus.'

ORATORY OF SAINT PHILIP NERI.

See Orders, Religious.

ORB-WEAVER, a spider of the group Orbitellarice, represented most familiar by the garden spiders of the family Epeiridcu, which form their webs on a flat plane in the form of concentric lines of thread sustained by cables radiating from the centre of the coil to various points of support. See Spiders.

ORBEGOSO, Luis Jose, loo-es' ho-sa' or-ba-go'so, Peruvian general : b. Chuquisongo, Huamachuco, Peru, 25 Aug. 1795; d. Lima, Peru, 1847. He was educated in the College of San Carlos, Lima, and entered the militia in 1815. He was a man of wealth and high posi¬ tion and engaging actively into military and political affairs attained great popularity among his countrymen. In 1833 he was chosen Presi¬ dent of the republic and though the election was not strictly legal he held the position with¬ out interference until 1834 when his predeces¬ sor, Gamarra, raised a rebellion against his au¬ thority. Several revolts followed and Orbegoso was defeated. He accepted the intervention of President Santa Cruz of Bolivia and the Peru-

Bolivian confederation was formed with Orbe¬ goso as President of North Peru. When the alliance was dissolved in 1836 he was exiled by Gamarra and his followers, but returned to Peru several years before his death.

ORBIS PICTUS. See Comenius, Johann Amos.

ORBIT, in astronomy, the path of a planet or comet; the curve-line which a planet de¬ scribes in its periodical revolution round its cen¬ tral body. The orbits of the planets are ellipti¬ cal, having the sun in one of the foci ; and the planets all move in these ellipses in accordance

with the law that a straight line drawn from the centre of the sun to the centre of any one of them, termed the radius vector, always de¬ scribes equal areas in equal times. Also, the squares of the times of the planetary .revolu¬ tions are as the cubes of their mean distances from the sun. The satellites also move in ellip¬ tical orbits. See Astronomy.

ORCA, a genus of whales. See Killer.

ORCAGNA, or-kan'ya, or ARCAGNOLO,

ar-kan-yo'lo, easel names of Andrea di Cione, Italian painter, sculptor and architect : b. about 1300; d. 1368. He belonged to the school of Giotto as a painter, but his energy and dramatic characterization indicate a great advance cn the Fatness and conventionality of the Giottesque style. His main works are three large frescoes, 'The Last Judgment' ; 'Hell' and 'Heaven' in the Strozzi chapel of Santa Maria Novella at' Florence. In the same chapel is an altar- piece marked with his name and the date 1357. It represents Christ handing the keys to Peter and a book to Thomas Aquinas. In the London National Gallery is his 'Coronation of the Vir¬ gin by Christ,' a large altar-piece which orig¬ inally belonged to the church of San Pietro Maggiore at Florence. All these works exhibit powers of exquisite design, graceful composi¬ tion and delicacy of coloring. The oroportions of the chapel of San Michele and its elaborate tabernacle furnish a magnificent testimony to his powers as a sculptor and architect, for he ranked first in his day as sculptor, painter and architect; and he was also reputed to be an excellent poet and one of the best, if not the best, goldsmith in Italy. His Or San Michele tabernacle is classed among the few very great Gothic structures in Italy. His mosaic work on the faqade of the cathedral of Orvieto is among the best of his age. Orcagna's figures are graceful and exceedingly well proportioned and expressive. There has been much trouble in distinguishing Orcagna's work from that of his brother Nardo and also from that of Jacopo di Cione.

ORCEIN, CtHtNOs, the chief ingredient of the red and purple dyestuffs

known under the name of archil. It is formed by the action of ammonia and oxygen on orcin, C7H8O2, and consists of two substances, one having the composition C14H13NO4, the other C14H12N2O3. When ammonia is added to a solution of orcin, and the whole is exposed to the air, the liquid assumes a dark-red or purple tint bv the absorp¬ tion of oxygen. On acidulating with acetic acid, a dark-red precipitate of orcein is ob¬ tained. Orcein is slightly soluble in water and freely soluble in ammonia and fixed alkalis, with a purple or violet color; it is very soluble in alcohol.

ORCHARD, Harry (real name Alfred E. Horsley), American assassin: b. Northumber¬ land County, Ontario, Canada, 18 March 1866. He killed eˆ-Governor Steunenberg of Idaho with a bomb in December 1905, was arrested, brought to trial, sentenced to death and later re¬ ceived commutation to life imprisonment. He made what purported to be a complete confes¬ sion in which he admitted himself a forger, ar¬ sonist and professional murderer. He claimed to have been employed by the Western Federa¬ tion of Miners in the commission of his crimes

and laid definite charges against its leaders, Hay- °°d» Moyer and Pettibone, who were tried for complicity in Orchard's crimes, but were acquitted. Orchard s confession, believed to be sincere by Rev. E. S. Hinks, dean of Saint Michael s Cathedral, Boise, Idaho, absolved the general membership of the unions from knowl¬ edge of the acts of the leaders, but laid the most serious charges against the officers of the unions. The labor leaders denounced the con¬ fession as a conspiracy against labor organiza¬ tions. It was published in serial form in McClure's Magazine and in book form,

ORCHARD. A collection of fruit-bearing trees, especially of those bearing deciduous fruits, as the apple, pear, peach, plum, cherry, apricot and quince. For oranges, olives and various cultivated nuts, the term "grove® is probably in more general u§e. American or¬ chard culture differs widely from European. European conditions require conservation of space and make necessary such artificial meth¬ ods of training as dwarfing, training upon walls, forming cordons and espaliers, and also that the fruit itself shall be of special attrac¬ tiveness with respect to size, color, flavor or some other desideratum. As a result, far more hand-work is required in European fruit planta¬ tions than in America. In America the inten¬ sive methods of Europe are rarely practised, since land is plentiful and cheap, and since the demand is for a large quantity of fruit rather than for fruit of exceptional quality. The trees, therefore, are left more nearly to nature,

aided by as little hand labor as possi¬ ble. As a consequence the orchards of Amer¬ ica are the most extensive in the world. Ac¬ cording to the United States census of 1900 the total number of fruit trees in orchards was 367,164,694, of which 55 per cent were apple, 27 per cent peaches and nectarines, 8 per cent plums and 4.5 per cent pears. In that year the yield of fruit was valued at $83,751,840; which was increased, in 1909, to $140,867,347. This had been increased over 50 per cent by 1917.

During the closing quarter of the 19th cen¬ tury, and especially during the last decade, the management of American orchards was de¬ cidedly improved. Prior to that orchards were largely mere adjuncts of the farm, supplying little more than the home need, or at most the small demands of local markets. As a result the trees were allowed, usually, to shift for themselves; harmful insects thrived, plant-dis¬ eases spread and the quality of the product was poor. As means of shipment of fruit were im¬ proved more distant markets could be supplied and the progressive men began to devote at¬ tention to their orchards. Great care is now taken in the selection of land and site for an orchard. Not only must the tree be considered with respect to its nourishment, but the effects of cold, heat, wind, light and other factors must be kept in view. Air drainage has been found to be of equal importance to water drainage. Orchards planted in hollows gener¬ ally fail because of the settling of cold air from the high ground, and good managers now avoid a situation where no draft of air will tend to keep the trees clear of such chilling influences. The land selected is thoroughly prepared by

plow and harrow before the trees are planted, instead of placing them in separate holes dug in the sod. The trees planted, rarely more than two years of age, are carefully trimmed root and branch, and set in rectangles or hexagons, the latter method permitting cultivation in three directions and being more economical of the land. Instead of allowing the land to grow up with weeds and grass as formerly, modern practice keeps it cleanly cultivated until mid¬ summer, and in many cases a "cover-crop® is planted for plowing under as a green manure in the following spring. During the first three to six or perhaps eight years, according to the kind of fruit, distances between trees, etc., many orchardists plant hoed crops between the trees to offset the cost of cultivation. Cereals and grasses are now almost never sown in orchards except to reduce the amount of nitrogenous food in the soil and then only when such food is so abundant that the trees are making too great a growth of wood to allow of profitable productivity. The cover-crops act more or less as checks to growth and thus help in the ripen- ing of the wood and the buds. They also serve to hold snow, and to check washing, puddling and leaching of the soil, and if they consist of beans or similar legumes, they enrich the soil with nitrogenous food derived from the air.

Thinning of the fruit has been found of dis¬ tinct advantage with many kinds, especially when the grower aims to supply the annually increasing demand for finer individual speci¬ mens. The objects gained are the removal of inferior, diseased specimens, the destruction of many insect pests and the saving of plant-food which can be utilized by the tree in the develop¬ ment of finer fruits or other parts. It is prac¬ tised most with such fruits as peaches, pears and apricots, these supplying a fancy market ; but is also gaining in favor with apples, plums and cherries. Often the practice removes two- thirds of the fruits set. But the number lost is usually more than offset by the increased bulk of the crop matured, and by the resultant price.

Whereas fruits, even peaches, were formerly marketed in bulk, they are now shipped in small individual packages, even apples being sent to market more and more in smaller pack¬ ages than barrels. This change has been brought about by the demand of consumers who dwell in cities, where they have small facilities for keeping perishable food-materials and must buy their fruit in small quantities, more often than in large amounts. Means of transportation and storage facilities have de¬ veloped in pace with this change in the market. Refrigerator cars have made possible the car¬ riage of products hundreds, or even thousands, of miles to a final market, and the erection of cold-storage warehouses at both the shipping and the receiving ends of the line has enabled producers and dealers to control the supply and regulate prices to a great degree. The disadvantage in such a method of marketing fruit is the poor quality, of fruits shipped long distances; as they must be gathered before their flavors have fully developed. See Agricul¬ ture; Fertilizers; Fungicides; Horticulture.

Bibliography— Bailey, (Cyclopedia of Amer¬ ican Horticulture5 (1900-02), and Principles of Fruit Growing5 (1900) ; Favor, E. H., (The Fruit-grower's Guide-Book) (Saint Tohn, Mo., 1911) ; Moore, S. W.. Practical Orcharding on

Rough Lands> (Akron, Ohio, 1911) ; Sears, F. C., Productive Orcharding5 (Philadelphia 1914) ; Thomas, J. J., (The American Fruit Culturist5 (1897), and many bulletins of the agricultural experiment stations, especially New York, Michigan, Wisconsin, California and Ver¬ mont; also the annual reports of horticultural and pomological societies, particularly the American Pomological Society, Western New York, Massachusetts, Michigan and Missouri horticultural societies.

ORCHARD GRASS, a genus of grasses closely allied to the Festuca. See Grasses in the United States.

ORCHARD ORIOLE. See Oriole.

ORCHARDSON, or'chard-son, Sir Wil¬ liam Quiller, Scottish painter: b. Edinburgh, 1835; d. 13 April 1910. He entered the Trus¬ tees' Academy and encouraged by the success of his exhibits in the Royal Scottish Academy's exhibitions went to London in 1863 where he contributed to the Royal Academy and other art exhibitions. In 1868 he was elected an as¬ sociate of the Academy, and in 1877 became an Academician. He was knighted in 1907. Orchardson's works consist almost entirely of historical and genre pictures and portraits. Later in life he often chose his subjects from the occupations and activities of the upper classes of to-day in England and Scotland. Some of his chief works are (The Challenge5 (1865) ; (Christopher Sly5 (1866) ; (Napoleon I on Board H.M.S. Bellerophon5 (1880), pur¬ chased under the terms of the Chantrev Be¬ quest; (Un Mariage de Convenance5 (1884) ;

(Salon of Madame Recamier5 (1885), in which many distinguished persons are introduced; (The Rift within the Lute5 (1887) : (The Young Duke; (1889); and portraits of the bishop of Saint Asaph, Professor Dewar, Vis¬ count Peel, Lord Kelvin and others ; for he ex¬ celled as a portrait painter. Almost all his paint¬ ings appeared in the Royal Academy exhibitions. He was a painter of brilliant technique with few rivals in certain effects of color and chiaroscuro. His coloring is delicate and luminous and he is a very artistic anl skilful draughtsman. Consult Armstrong, (The Port¬ folio5 (London 1895) ; Little, (The Art An¬ nual5 (1897).

ORCHESTRA, The, and Orchestral In¬ struments. The word orchestra, of Greek origin, denoted in classical times an open space in which dances were performed to the sound of various instruments. To-day it designates a corporate body of players upon various instru¬ ments ruled and directed by a conductor. The name orchestra is applied both to the perform¬ ers and to the instruments, because, in techni¬ cal language, the performers and the instru¬ ments are identified.

The so-called <(Symphony Orchestra55 of to¬ day, consisting of from 60 to 100 musicians, has been a development starting from a simple band, or group, of instruments and finally grow¬ ing into the complicated body of various and varied instruments that can produce almost every known kind of tone. In the course of time old instruments dropped out gradually and were supplanted by newer ones, a process that is still going on to-day. The Orchestra of to¬ day consists of four divisions ; (1) the ˆStrings,55

comprising the first and second violins, the

violas, the violoncellos and the double basses (or bass viols) which double the bass of the violoncellos; (2) the «woodwind,55 comprising pipes, or tubes, of wood (some furnished with a reed in the mouthpiece) through which the performer blows, stopping the holes on the pipe with his fingers placed on the keys, such as the flute, the clarinet, the oboe, the cor anglais, the bassoon, etc.; (3) the ((brasses,55 comprising the horn, the trombone, the tuba, etc. ; and (4) the ((percussion,55 such as the ket¬ tledrum, the side drum, the cymbals, the tri¬ angle, etc. These are sometimes called the "battery.55 To this group also belong all mis¬ cellaneous and toy instruments that are some¬ times called for by composers to give (

The orchestra is as old as the music drama, whose first librettists were zEschylus and Sophocles and whose first orchestra was a band of flutes and lyres. The first known record of any kind of concerted group of in¬ struments occurs in the magnificent (Ballet comique de la Reyne,5 performed in France in 1581 at the Chateau de Moutiers on the occa¬ sion of the marriage of the Duke de Joyeuse and Margaret of Lorraine.. The instruments were played by the dancers in full costume and were hautboys (oboes), flutes, cornets, trom¬ bones, viola di gamba, lutes, harps, a flageolet and 10 violins. These instruments, however, were not combined into a regular orchestra; but were separated into 10 groups (((dix con¬ certs de musique55). The violins were reserved for one particular scene, in which they played alone, five on each side. In another scene Neptune and his followers were supplied with lyres, lutes, harps, flutes and other instruments. In another scene "Jupiter descended from a golden dome in which were placed 40 musicians with new instruments.55

The beginning of the orchestra coincides with the revival of the lyric drama (practi¬ cally, then, a lost art) toward the close of the 16th century by a little group of men of letters and musicians, who, filled with the culture of the Renaissance, met in Florence at the house of Giovanni Bardi, Conte di Vernio, with the object of resuscitating a form of musical art. This ultimately resulted in the birth of the opera. The meetings were transferred to the house of Jacopo Corsi ; and it was in the Palazzo Corsi that (Dafne,5 words by Rinuccini and music by Peri, was privately performed in 1597. No trace remains of this first opera, which was succeeded by a greater work (Euridice,5 the book for which was also by Rinuccini and the music by Peri, ˆuridice5 was given for the marriage festivities of Marie de' Medici and Henri IV of France and it was also per¬ formed in public in 1600. Several noblemen took part in the performance. Behind the scenes Signor Corsi presided at the harpsichord (gravicembalo) assisted by three friends, who

played upon the chitarone (lute), viola di gamba and theorbo, or large lute. These in¬ struments, with the addition of three flutes used in a certain ritournella , or short interlude or “sinfonia® (see Orchestra Music), seem to have comprised the entire orchestra. A con¬ siderable amount of freedom must have been allowed to the performers, for in the score, published in Florence in 1600 and reprinted in V enice in 1608, the accompaniment (or or¬ chestral part) consists of little more than an ordinary figured bass.

A more important orchestra had also been used 10 months before the performance of (Euridice) in Rome (1600), for the perform¬ ance of the first sacred music drama or ora¬ torio, called (La Reppresentazione dell’ Anima e del Corpo) and written by Emilio del Cava- liere. This work was practically an opera, for it was given with scenes, decorations, acting, dancing, singing and recitative. The orchestra consisted of one lira doppia*, one clavicembalo, one chitarone and two flutes. No part was written for a violin ; but a note on the score slates that a good effect may be produced by playing a violin in unison with the soprano voice. The orchestra was entirely hidden from view ; but it was recommended that the various characters should carry musical instruments in their hands and pretend to accompany their own voices and to play the ritournelli inter¬ posed. A madrigal with full instrumental ac¬ companiment took the place of an overture. These two works, ‘therefore, of the year 1600 mark the entrance of the body of instruments destined, to become the Symphony Orchestra. At the beginning of the 17th century a change took place in the orchestra. Old wind instru¬ ments began to disappear and new ones to take their places : the delicate viols were deemed old-fashioned and had to give way to the new violin and violoncello. The famous opera of ˆrfeo,* which Monteverde brought out in Mantua in 1607, is considered a landmark in music and from it modern music finds its be¬ ginnings. But, although there were many innovations in the music, the orchestra was conservative in the matter of its instruments. In fact (Orfeo) was the last great work that was written for the conventional orchestra of the Renaissance. The score calls for 40 in¬ struments: two gravicembali (harpsichords), two organi di legno (little organs), one regale (little organ), two double bass viols, three viole di gamba, two chitaroni (deep lutes), two little violins, 10 viole di braccio (soprano, alto, tenor and bass) and a few ordinary violins of the style thpt Gasparo di Salo and Mazzini were making at this period, a clarino (shrill trumpet), three trompettes (with sordini), four trumpets, two cornets a bouquin, flutes shrill and deep, two oboes, and an arpa doppia (double harp). But although the orchestra in

In this work Monteverde called for two vio¬ lins, two viols (tenor and bass) and the con- trabasso da gamba (the double bass). Here it will be seen that he had the complete string quartet — soprano, alto, tenor and bass — and also the reinforcing second violin and double bass (doubling the bass). In a still later work called the (Incoronazione di Poppea, brought out in 1642, Monteverde used special instru¬ ments to produce certain effects; for instance, trumpets and drums for triumphal scenes; flutes for pastoral scenes ; and cornets and trom¬ bones for fantastic scenes. Monteverde, in fact, used his orchestra so dramatically and so pic¬ turesquely that Wagner copied his methods 300 years later in what the world in the middle of the 19th century was pleased to call the "Music of the Future.® Of particular interest is the orchestra for the oratorio of (San Gio¬ vanni Battisti,* by Alessandro Stradella (17th century), which is said to have been the means of saving his life by melting the hearts of the ruffians sent to assassinate him on the occasion of its first performance in the Church of Saint John Lateran, Rome. The date is said to be 1676. The work opens with a (Sinfonia,* con¬ sisting of three short fugues followed by a recitative and aria for Saint John. The accompaniment to some of the arias, or airs, is most ingenious and complicated, calling for two complete orchestras.*

Renaissance Instruments. — The lute, so famous in song and story, was the favorite mediaeval and Renaissance instrument. It was distinguished for its beauty of ornamentation as well as for its tone. It has a pear-shaped, or melon-shaped, body or back (proclaiming its Oriental ancestry), a low bridge with sound- post beneath it, a flat belly, pierced with from one to three sound holes in decorative roses and often beautifully inlaid with colored woods and mother-of-pearl. Attached to the body was a long neck, covered by a fingerboard divided with frets of brass, or catgut, into a measured scale. The strings were of catgut until the end of . the 17th century, when silver-spun brass strings were introduced. There were "single¬ neck® and "double-neck® lutes. The latter were known as theorboes, and after a time they ban¬ ished the "single-neck® variety. These "double¬ neck® lutes were known variously as archlutes, chitarroni and theorboes, according to size. The lute is now esteemed chiefly for its beauty of form and the ornamentation of the sound¬ board, or belly, frequently embellished with in¬ lays of tortiseshell, ivory, mother-of-pearl and rare woods. As the new violin tribe of instru¬ ments arose, the. lute fell into disuse and finally into oblivion with the viol familv, its gentle companions. The violin-makers destroyed many fine lutes for the sake of their valuable wood; but a number of fine specimens have happily escaped destruction and are preserved in mu¬ seums and in private collections. The lute- player did not use our system of notation. The special system by which his music was noted, written, printed and read by him was called

“Tablature.®

The “viol family® consisted of four sizes of instruments: (1) the treble, or discant, which always played the melody; (2) the viola da braccio (played with the arm), the tenor viol: (3) the viola da gamba (leg viol), corre-

sponding to the modern violoncello ; and (4) the violone (double bass), the bass viol which doubled the bass of the viola da gamba. From a small variety of the tenor viol, called violino piccolo, the beautiful violin was developed. An idea of the variety of tone that could be ob¬ tained from a <(concert of Viols® is realized when it is remembered that there were six kinds of viola da gamba, three for the bass and one each for soprano, alto and tenor — all with frets on the fingerboard. Then there were seven kinds of viola da braccio (arm viols), named great quint bass, bass and tenor, and four little ones. Rich amateurs bought entire sets of these instruments. Then there was the viola d’ amove (love viol), rather larger than the modern viola and supplied with seven cat¬ gut strings (the three lowest wound with silver wire) and below the neck and passing under the bridge seven additional strings tuned in unison with the others, vibrated (

Another instrument of the Renaissance orchestra was the lira, a kind of viol with 12 or 14 strings tuned in a very peculiar way, which permitted the player to find all kinds of chords in peculiar positions. Turning now to the wind-instruments, there were then as now two groups of woodwind and brass. The for¬ mer was known as the Bombardo, Bombardino, Bombardi, Pommer, Chalumeau, Schalmey, Schalmay, or Shawn family. They appeared in various sizes from soprano to bass. At first these instruments were not played directly by the lips, for the mouthpiece was enclosed in a bag. Later the bag was discarded and a reed was placed in the mouthpiece. In some instru¬ ments the reed was double; in others single. The type of the instruments with double-reed was a conical tube of wood with a bell at one end and a bent metal tube at the other contain¬ ing the double reed mouthpiece. There was a quartet of these : the oboe, or haut bois, or hautboy (high wood), was the treble; there was also an oboe d’amore, and an oboe di caccia, hunting-oboe (from which the cor anglais is thought to have been developed) ; and there were many other sizes and kinds that old records and writers refer to generally as shawms, chalumeaux and schalmeys — all oboes and bassoons of one kind, or another. Old oboes are called for in Bach’s scores, but after his time they dropped out of use. Sometimes a modern composer revives one for the sake of eccentricity, as Richard Strauss in his (Domestic Symphony) writes for the oboe d’amore.

The other group of wind instruments, also a large one, was known as Zinke. They required such force of lungs to play them that they were rapidly disappearing in Bach's time. These in¬ struments were made of wood covered with leather and had six holes for the fingers and one for the thumb on the lower side. One of the most important was the cornetto. Cornetti ap¬

pear in many of Bach's scores and are chiefly used to support the voices. All these Zinke instru¬ ments were associated with the trombones, or sackbuts. The Renaissance orchestra also in¬ cluded the harpsichord, gravicembalo, or clavi¬ cembalo (the name is spelled variously), and small portable organs called regale, or regal, positive and organo di legno. There were also harps and double harps (arpa doppia) and two classes of flutes — flutes a bee or <(block flutes j (that developed into the flageolet) ; and <(transverse flutes,® which appear to have super¬ seded the flute a bee about 1720. The flute a bee had a mouthpiece at the end, like the clari¬ net. There were eight sizes of flutes d bee, ranging from soprano to bass.

All through the Renaissance period and un¬ til the time of Lully it was customary to com¬ bine instruments of the same class only. There¬ fore, we read of a ((Paris 1681), there is a quartet of flutes, the lowest part of which is only possible on a bass flute. When the combination of wind and string instruments was found preferable, the feeble bass of the flute was insufficient and the larger kind of flutes, therefore, fell into oblivion.

Modern Instruments. — Various causes have contributed to the survival of certain instru¬ ments and the extinction of others. Quality of tone, mechanical practicableness and the fash¬ ions in vogue at different periods of combining instruments have been the causes which have preserved certain instruments and abolished others.

The Strings. — No instrument has had so great an influence on the development of the modern orchestra as the violin. It was devel¬ oped from the piccolo violino, a small instru¬ ment, whose chief recommendation was a shrill, piercing tone. This was experimented upon by the early violin-makers for many years until at last, under the hands of the Amati family and their pupil, Stradivari, the resonant and sweet- toned violin arose. The great work of the Crem- onese makers had been to perfect an instrument that would have a beautiful tone as well as a penetrating one. When the violin took its com¬ manding place in the orchestra, naturally it needed a stronger bass instrument to support it. Therefore, the old viola da gamba was devel¬ oped into the violoncello. For a long time, however, the viola da gamba lingered in draw¬ ing-rooms; for amateurs were loth to give it up. The tenor viol and the alto viol were com¬ bined into one instrument, the viola; and this explains why the viola is today sometimes called the (

In 1676 Scarlatti used a double orchestra consisting of two solo violins and violoncellos f?r the first and a large body of accompanying violins, tenors and oasses for the second. In Scarlatti's time the strings — violins, viola, vio¬ loncello and double-bass — constituted the real body of the orchestra. The wind-instruments were accessory and used only to give effect and variety.

2. The Woodwind. — The woodwind family consists of wooden tubes, or pipes, through which the performer blows. Most of these have reeds. These are subdivided into two groups: double-reed and single reed. The double reed instruments comprise the oboe, cor anglais and bassoons ; the single reed instruments, the clari¬ net tribe. All have a curious nasal, melancholy quality of voice, which was characteristic of the old chalumeaux or shawm family. The oboe is the most complicated of all the reed instruments. It is made in three pieces screwed together, forming a wooden pipe, or tube, with conical bore that widens out into a bell, shaped like a morning-glory. Along this tube are two ((speaker-keys,® worked by metal rods. The mouthpiece, called "staple* is supplied with a reed. The reed consists of two blades of thin cane attached by silken threads. The cor ang¬ lais is the tenor, or alto-oboe, standing in the key of F, a fifth below the oboe. It ends in a kind of ball instead of a bell and the mouth¬ piece containing the double reed is bent at right angles. The name is derived or corrupted from angle (bent) and corrupted into anglais : the English (anglais) have had nothing to do with the development of the instrument. It should, therefore, never be referred to as <(English horn® but as cor anglais. The oboe and cor anglais assumed their present appearance about the same time. They both preserve the peculiar ♦ harsh, plaintive family voice. The bassoon, the bass of the oboe group, has the same general tone on account of the double reed; but it has a comic quality about it and might almost be called the clown, or joker, of the orchestra. Mozart fixed the place of the bassoon in the orchestra. To-day there are three bassoons in the orchestra: first and second and double bassoon, an octave below the regular bassoon, doubling the bass, just as the double bass doubles the violoncello.

The clarinet has a cylindrical bore and a single reed. From a crude instrument of two keys and seven holes, has evolved the present day clarinet with 17 keys and 21 holes, seven of which are covered directly with the fingers and the others by keys. The basset-horn is the tenor clarinet, with two additional keys and a longer bore than the clarinet, taking its name from a German named Horn, who made a little bass clarinet in 1770 and named it for himself. Mozart used it often; for he

loved all clarinets. The bass clarinet resembles the ordinary clari¬ net, only the bell is turned upward. This is doubled by the contrabass clarinet, a big instru¬ ment over 10 feet long, folded up and ending in a big metal bell turning upward. The latter is also called the pedal clarinet.

The flute has no reed. It is a tube of three pieces called ((joints.» On the lower part are six holes to be stopped by the fingers. At about an inch from the head is a hole, across which the performer blows, i.e. throws the ((air-

stream® of his oreath against the outer edge of the hole, obliquely. Formerly the flute had no keys or levers. Its system of keys was de¬ veloped between 1823-1847 by Theobald Boehm, who continued the experiments begun by a Captain Gordon of Charles X's Swiss Guards. The flute is now a complicated instru¬ ment of marvelous agility. Sometimes it is made of silver. Modern composers usually demand two flutes and a piccolo. The piccolo is the little flute. It should properly be spoken of as the piccolo flute. It plays the upper octave of the flute, of which it is less than half the length. Its voice is shrill, wild and piercing.

3. Brasswind. — The brass wind consist of the French horn, trumpet, trombone, bass tuba, etc. The French horn was introduced into the orchestra about 1720. It is derived from one of the most ancient instruments. The horn is represented in painting and sculpture in the monuments of Assyria, Egypt and India. Orig¬ inally the horn was taken from the head of an animal, or it was the tusk of an elephant, whence its name ((oliphant® in the inventories of the Middle Ages. At first, it had no mouth¬ piece. The Romans had a huge metal horn, called Bucina, or Cornu, which was curved spi¬ rally and wound around the performer's body. In the old hunting-horn this idea was still fol¬ lowed: the tube passed over the player's right arm with the bell projecting over his left shoulder. This instrument was carried from the hunting-field into the orchestra without change. Haydn and Mozart showed the world its possibilities; and then Weber, Mendelssohn and Wagner made poetic and dreamy use of it. The horn was used in its simple form until after 1830, when valves, or pistons, were added. The instrument then became known as the ((chromatic horn.®

The horn of to-day consists of a great tube, over seven feet long, curved spirally for the performer's convenience of holding it. This tube becomes narrow toward the mouthpiece and widens toward the huge bell. The horn has no reed. The performer's lips do all the work. The ((crooks® are movable pieces of tub¬ ing inserted into the coils to alter the pitch. There are (

The trumpet is a descendant of the clarion. It is practically the soprano of

the horn family, but it moves in a higher region than the horn. Like the horn, it is a ˆtransposing instrument® (i.e., music written does not represent the real sounds) ; but, unlike the horn, it produces only ((open sounds.® It has a number of ((crooks,® or lengthening pieces. The scores of Bach and Handel call for many trumpets, because in their day the improvements had not been made that allowed one instrument to play all the notes required. When (

the Hebrews and Egyptians. Sackbuts were made in all sizes during the 16th century. The bass sackbut has come down almost without change to the trombone. The trombone is a slender, brass tube bent twice upon itself and ending in a bell. The two outer portions "slide® upon the inner one. There are seven "positions® for the "slide,® each giving a fun¬ damental tone and its harmonies. There are three varieties of the trombone : alto, tenor and bass. As a rule, there are three tenor trom¬ bones in the orchestra, but no alto nor bass. The bass tuba is an enormous instrument with a great bell standing upright, supplied with valves and a horizontal mouthpiece. It is over three feet long. It is a . descendant of the "serpent® of the Zinke family with the ophi- cleide (serpent-key) as the connecting link. Wagner made great use of the bass tuba, the deepest voice in the orchestra, the tone par¬ taking of trombone and organ. It has a com¬ pass of four octaves, and, having pistons, is a chromatic instrument (i.e., can play sharps and flats). Wagner gave the name tuben to a whole family, of which, however, the bass tuba is the only true tuba. Wagner's intention was to introduce a new tone color into the orchestra akin to that of the horns. These new instruments are modified horns and are arranged in two pairs — a high-pitched pair and a low-pitched pair. Wagner called them "tenor tuben® and "bass tuben,® which has added some confusion to modern nomenclature. There are many other kinds of brass instruments that belong to the military orchestra, but have no place in the symphony orchestra.

4. Percussion in the Symphony Orchestra. — There are two kinds of percussion instruments : those that produce musical notes and those that produce only noise, not notes. All of these are beaten or shaken. First of the percussion instruments that produce notes are the kettle¬ drums. The kettledrums are big copper basins, or bowls, over the heads of which a parchment is stretched, which, by means of screws, can be tuned to a musical note of definite pitch. They are ancient and were brought by the Crusaders from the East. The other drums are the "side® or "snare® (the military drum) with parchment heads and "snares® of catgut, and the big bass drum which always stands sidewise, and which is struck with a stick

ending in a soft, round and padded knob. The larger the drum, the more resonant the sounds. The triangle is a steel rod bent into three sides as the name shows. It is tapped with a "beater.® The sound is clear and sometimes silvery. The pitch is indefinite. The cymbals are round, thin plates, or discs, of copper, or brass, with a strap attached on the outside of each plate for the convenience of the player. Cymbals are rubbed together, or clashed. Cvmbals were known to the Egyptians, Greeks and Romans. The tambourine, a wooden hoop over which a parchment head is stretched and hung with little, metal plates called "jingles® or "bells,® is shaken, struck with the knuckles, or rubbed. It is sometimes called "tambour de basque.® The tambourin is a long, narrow drum, which the performer beats with one stick. This is the old mediaeval "tabor,® which was hung around the neck of the plaver by a cord and played with one hand, while he held the flageolet in the

other. This was the famous "pipe and tabor® combination that the wandering minstrel often played and which even performing animals were taught to acquire. Castanets are two hol¬ low pieces of wood held in each hand of the performer, who clinks them together. They make deep, hollow notes. They get their name from the Spanish word for chestnut, castaho, from the wood of which they are usually made. Spanish dancers use them to accent the rhythms as they dance; and they are often introduced in Spanish music to give "local color.® When a bell is required in the orchestra, composers give the impression of a deep toll, or a silvery chime, by some ingenious device. Saint-Saens has in his (Danse macabre } notes plucked on the harp to sound 12 o'clock; and Wagner for the "Bells of Montsalvat® in (ParsifaP origi¬ nated a row of steel pipes called "tubular chimes.® The chime of bells that we often hear in' certain pieces, and called, indeed, carillon, or glockenspiel, is made of a series of gradu¬ ated bars of steel, or bronze, which are struck by two small hammers.

Even more silvery resonant, and bell-like is the new instrument called the celesta, which was introduced by Tschaikowsky and seized upon with avidity by Richard Strauss. The celesta is a square instrument resembling an upright piano, or parlor organ. It has a key¬ board, like the piano, and also pedals. The sounds produced are fairy-like and charming. The xylophone is a primitive instrument, still used by uncivilized tribes. It consists of gradu¬ ated slabs of wood, on the principle of the child's toy harmonica and the glockenspiel. Sometimes a watchman's rattle — the cogwheel revolved against a hard, but flexible spring of wood, or metal — is used. When an anvil is required, as in (Das Rheingoldˆ to give an idea of the work of the Nibelungs, steel bars , are used. These are struck by a metal "beater.®

In the (Don Quixote Variations) Strauss introduces a "wind-machine,® —

a sort of barrel with some of the staves taken out and the space covered with black silk. This is revolved rapidly by means of a handle; and the silk coming into contact with some cardboard or wood conveniently placed for the purpose, makes a rushing, swishing noise like the wind blowing violently. The cuckoo is a toy instrument con¬ sisting of two tiny pipes mounted on a pair of tiny bellows. A plug is pushed in and pulled out to get the sound "cuck-koo® ; Haydn used it in his (Toy Symphony> ; but Beethoven in his (Pastoral Symphony imitated the sound of birds more artistically than by direct imitation. In this great work the clarinet calls cuck-koo in a realistic manner, while the nightingale re¬ plies on the flute and the quail answers on the plaintive oboe.*

Evolution of the Orchestra. — The first

great orchestra, certainly the first that has come down to posterity in records, originated in France in the days of Louis XIII. It was called the "Twenty-four Violins of the King® and reached its climax of perfection in the time of Louis XIV. The "Twenty-four Violins of the King® played in court entertainments, particularly the splendid ballets ; in churches ; in gai dens ; at supper; and for the king and his court to dance. Although called "Twenty-four Violins,® the orchestra consisted of violins, altos, tenors,

basses and it often played under Lulli (1632- o/;. Lulli was the first great conductor. He trained his men carefully and gave particular attention to ((the first stroke of the bow? Peo- P e travelled from England, Germany, Italy and elsewhere to hear Lulli's orchestra. Every¬ body admired the correct playing, the splendid rhythm, the perfection of the ensemble and the sweetness of the violins. Lulli beat time with a cane and created the traditions in con- ducting an orchestra which are in use to-day. Lulli s orchestra was large. Its chief instru¬ ments were violins in five parts; flutes — straight flutes d bee and "transverse? or "german — oboes, bassoons and double bass viols. "All these parts sounding together* writes a contemporary, "make a symphony so precise and agreeable that whoever hears the cTwenty-four Violins of the King> play all kinds of airs and dances confesses willingly that he never heard such suave and delicious harmonies before.* Contemporary literature is full of allusions to this famous organization. Hardly less famous was the orchestra called "Petits-Violins* which Louis XIV created for Lulli in 1655. At first it consisted of 16 play¬ ers ; but afterward it was increased to 21. This "Twenty-Four Violins* and the "Petits- Violins* often played together, making one Erge orches¬ tra. Sometimes Lulli added bag-pipes, guitars and hunting-horns,*

and once he introduced anvils (which the composer of

In the time of Corelli (1653-1713), the violin family became the very backbone of the orches¬ tra. Corelli was a great violin virtuoso and a composer. People forget that he was an orches¬ tral conductor of the first order. His 'orchestra in Rome was famous. Scarlatti was struck with his "nice management of his orchestra and the uncommon accuracy of his whole perform¬ ance ; and Geminiani relates that "Corelli con¬ sidered it essential that the bows should move exactly together up or down, and at his re¬ hearsals he would immediately stop if he saw one irregular bow.* Alessandro Scarlatti (1659-1725), was of importance to the develop¬ ment of the orchestra, not so much because of his conducting but because he wrote such fine orchestral accompaniments to the airs in his operas. The strings always formed the groundwork of his scores; but he also used oboes, flutes, bassoons, trumpets, drums and what was then unusual in Italy, horns. He often divided the strings into four parts and carefully balanced them with the wind instru¬ ments, but the latter were always subordinate to the strings. Rameau (1683-1774), also ex¬ tended the technique of the violins and intro¬ duced many new effects, for example pizzicato (plucked) chords. He also used the woodwind in a delicate and enchanting manner.*

Thus the orchestra had reached fine develop¬ ment with regard to technique and emotional expression in both France and Italy long before the Germans began to influence European music. John Sebastian Bach (1685-1750) stands be¬ tween ancient and modern music. Bach's con¬ tribution to the development of the orchestra is that he treated each separate instrument as if it were an individual and prepared the way for occasional solos in orchestral compositions. Bach wrote for a great many instruments which

were going out of fashion even in his time, such as the oboe d'amore, the oboe di caccia, the viola d'amore and the viola da gamba.

Handel (1685-1751), more of a cosmopolitan than Bach, made his orchestra a strong ally of his singers, whether in opera or oratorio, in both of which he became so famous. Handel conducted at the clavier, or organ, and impro¬ vised what might be called a filling in of musi¬ cal arabesque work. Handel's orchestra con¬ sisted of a smaller stringed band than we are accustomed to use to-day; but the violins were reinforced by a greater number of oboes and the basses by a far stronger body of bassooHs. Flutes were chiefly used as solo instruments, but sometimes they played in unison with the oboes. The bass instruments were trumpets (doubled ad. libitum) with drums for their natural bass; horns and trombones (alto, tenor and bass), when the character of the music called for them. The harp, viola da

gamba and other instruments that may be described as "soft were occasionally used for obligato ac¬ companiments, in which they sometimes played an important part. The organ was used throughout. Its part was provided for by the figures of the thorough bass, which served also for the harpsichord. With these means at his command Handel was able to accomplish all that his fiery genius suggested. His orchestra was divided into three sections: (1) the Con¬ certino, two violins and violoncello; (2) the Concerto Grossi, eight first violins, eight second violins, six violas, four to six violoncellos and four double basses; and (3) the Ripienist, or supplementary bass, consisting of six first vio¬ lins, six second violins, four violas, three to four violoncellos and three basses.*

Handel always sought for novel effects. He was the first to assert the personality of the violoncello; he appreciated the fantastic char¬ acter of the bassoon; he loved the quality of the oboe; and he brought out the kettledrums on several occasions. He used them as a solo for Jupiter's oath in 'Semele? Handel was considered "very noisy in his day. Next came Gluck (1714-87), who banished the harpsi¬ chord from the orchestra ; introduced the harp ; employed the clarinet with superb effect, and used the orchestra to add force to a dramatic situation. "Gluck gave the orchestra a new life,* writes Tiersot. "With him violins, oboes and trombones are not merely sonorous agents. They are living entities, personages of action. Through the orchestra he adds dazzling beauty to a temple scene, or a scene in the Elysian Fields; and by little touches on certain instru¬ ments here and there he can make us feel the mystery of the infernal regions. Gluck's great gift to the orchestra was to make it speak.* Haydn (1732-1809) was fortunate in having such a patron of music as the Prince of Ester- hazy, in whose magnificent home he lived for 30 years, conducting an orchestra of his own. When Haydn went to Eisenstadt the orchestra numbered 18 instruments. It was greatly en¬ larged as the years went by. The last sym¬ phonies that Haydn wrote are, therefore, much richer than his early ones. Haydn has been called "the Father of the Orchestra.* Haydn fixed the form of the symphony. Mozart and Beethoven were his pupils and followers, yet Haydn learned much from Mozart in the way of*

writing for instruments. Haydn's orchestra con¬ sisted of the string-quartet, two flutes, two oboes, two clarinets, two bassoons, two horns and two trumpets. He left the orchestra in shape for Beethoven to carry still farther. Haydn outlived Mozart ; and his last symphonies show the influence of Mozart. Mozart (1756— 91) drew surprising and new effects out of the

orchestra by his discovering that every instru¬ ment had its individual voice or quality of tone. He gave the orchestra what we may call "tone-color." To Mozart a violin was a violin, a flute a flute and so on ; and he wrote character¬ istically for each instrument. Mozart made great use of the clarinet.

*The orchestra as left by Mozart and Haydn consisted of first and second violins, viola, violoncello and double bass, two flutes, two oboes, two bassoons, two horns, two trumpets, kettledrums, and, occasionally, two clarinets. Neither Haydn nor Mozart used trombones. As an exception Mozart used them in the last scene of (Don Giovanni.**

In the First Symphony Beethoven (1 770— 1827), for the first time in the history of the orchestra, tuned the kettledrum in the key of the dominant instead of the key of the move¬ ment. In the (Eroica) (Third Symphony) he introduced three horns, — a novelty ! In every way Beethoven discovered and brought forward the capacities of each individual instrument. He gave each instrument a new dignity and a new standing. The viola, violoncello, double bass, horn, trombone and kettledrum were all brought forward and made solo instruments. The place of the clarinet also became established. No com¬ poser ever made the instruments converse as Beethoven. No composer ever made the strings so flexible, humorous, gay and languorous. Bee¬ thoven also was the first to take the violins up into the highest register — into the ethereal domain which Wagner exploited so marvel¬ lously. Weber (1786-1826) developed the woodwind and made poetic and romantic com¬ binations. He loved the clarinets; made a ravishing use of the horns ; and often subdi¬ vided the violins. Weber pointed out many ways of which Wagner made use. With Bee¬ thoven four horns and three trombones were ex¬ ceptional. Weber made this number the rule. Schubert (1797-1828) wrote in novel way for the trombones and used the woodwind beauti¬ fully. Mendelssohn (1809-47) gave clarity, polish and balance to the orchestra, besides writing beautifully and individually • for each instrument. Mendelssohn was a marvellous conductor. The influence of Hector Berlioz (1803-69) cannot be overestimated. He is called the <(Father of Modern Orchestration." Berlioz discovered the value of pianissimo brass effects ; the ethereal charm of harmonies on divided violins; the true worth of the viola; brought the harp back into the symphony orchestra ; grouped instruments into families to get chords of rich and different shades of tone- color ; substituted the tuba for the coarse ophicleide ; divided the strings ; and advocated the sunken and hidden orchestra, which Wag¬ ner realized in his theatre of Bayreuth. Liszt (1811-86) followed Beethoven, Berlioz and Wagner in his orchestration, which is always rich, heavy and full of "color." Liszt made great use of the harp. His Hungarian blood

showed itself in his stirring rhythms. Liszt also invented the Symphonic Poem. (See Orchestra Music). Richard Wagner (1803- 83) developed the art of orchestral coloring to a point before him unknown and undreamed. In addition to the new combinations that he devised among the instruments of the classic orchestra he introduced new elements, notably the tubas, a family intermediate between horns and trumpets, and the bass trumpet which figures in nearly all of his scores. He also greatly enriched the family of brasses.

In Lohengrin, Wagner uses, in addition to the usual strings, three flutes, one piccolo, three oboes, one cor anglais, three clarinets, one bass clarinet, three bassoons, three trumpets, four horns, three trombones, one bass tuba, three kettledrums, side drum, cymbals, triangle, tam¬ bourine and harp. On the stage and behind the scene he has two flutes, one piccolo, one oboe, three clarinets, two bassoons, four trumpets, three horns, three trombones, kettledrum and cymbals.

Tschaikowsky (1840-93), as a rule, kept to the old Beethoven orchestra, with the addition of the bass tuba. His prominent use of the low woodwind combined with violas and clarinets in their low range, with bassoons in their upper range, accounts in part for his weird and gloomy orchestral effects. Tschaikowsky's instrumen¬ tation is particularly novel in his (Casse Noi¬ sette Suite) (Nut cracker), in which he intro¬ duced the celesta (see above).

Richard Strauss (1864) has carried the ideas of Wagner still farther. His compositions tax the skill of performers to the utmost; for the Strauss orchestra requires virtuoso performers for the smallest instrument. The "battery" (instruments of percussion) has with Strauss acquired a new prominence. Strauss also calls for many new and unusual instruments. His (Don Quixote Variations) carry instrumenta¬ tion as far as possible unless a Chinese or¬ chestra be called on the field. Strauss intri¬ cately divides his various instrumental choirs, setting one group in opposition, or juxtaposi¬ tion, to another, producing the most marvellous acoustical effects and almost staggering the brain and deafening the ear when the entire orchestra is invoked.

Of striking contrast is the orchestra of Debussy (1862-1918), who gets the greatest effect with the simplest means. To produce these effects Debussy employs many old scales and harmonic chords. His orchestra for (Apres midi d'un faun is composed of three flutes, oboes, clarinets, four horns, two harps, antique cymbals and strings. Debussy's instru¬ mentation is diaphanous, ethereal, delicate and opalescent in color. With the modern French composers orchestral music seems destined to enter new realms ; and there is a tendency to revive some of the antique instruments of the*

Renaissance. Modern ears seem to be tiring of great concussions of sound and to long for more subtle and poetic qualities of tone. Beauty rather than force seems to be the goal of the most up-to-date composers and conductors. See Band; Band, Military; Musical In- STRUMENTS.*

The principal Symphony Orchestras of the United States are, in order of their foundation: Philharmonic Society of New York (1842);

Symphony Society of New York (1878); Bos- ˆSymphony (1881); Philadelphia Orchestra (1900); Chicago Symphony (1891); San Fran- / \Sonr \ • ymPh°ny (1894) ; Cincinnati Symphony (1895) ; Los Angeles Symphony (1897); Min¬ neapolis Symphony (1903) ; Saint Louis Sym¬ phony (1904) ; Saint Paul Symphony (1905) ; Denver Symphony (1906) ;' Seattle Philhar¬ monic (1909) ; Denver Philharmonic (1911) ; and Kansas City Symphony (1912).

Bibliography.— Berlioz, Hector, < Grand 1 raite d instrumentation et d'orchestration) op. 9; Widor, Charles Marie, (Technique de l'or- chestre moderne faisant suite au Traite ˆin¬ strumentation de Hector Berlioz) (Paris 1910) ; Berlioz, (Les soirees de l'orchestre (Paris 1852) ; Corder, Frederick, (The Orchestra and how to write for it> (London 1896) ; Coerne, L. A., (The Evolution of Modern Orchestra¬ tion } (New York and London 1908) ; Gevaert, F1., (Cours methodique d'orchestration) (Paris and Brussels, no date) ; Henderson, W. J., (The Orchestra and Orchestral Music) (New York 1899) ; Henderson, W. J., XLV, pp. 89-91, 122-123) ; Prout, E., (The Orchestra* (2 vols., London 1897-99) ; id., (The Orchestra in 1800 and the Orchestra in 1900* (in Music, Chicago, Vol. IX) ; Singleton, Esther, (The Orchestra and Its Instruments* (New York 1917) ; and Thomas, Rose Fay, (Theodore Thomas* (New York 1911).*

Esther Singleton,

*Author of (Orchestra and Its Instruments .**

ORCHESTRA MUSIC. The forms of music written specially for the orchestra have developed and changed in accordance with the evolution and development of orchestral in¬ struments.

Symphony. — The most important of all orchestral compositions is the symphony, not only because of its breadth and dignity of form, but because the greatest composers have chosen it as the vehicle to express their highest musical ideas and their deepest emotions. The word symphony, sinfonia, or

sinfonie, was originally used to denote any passages of music that were thrown into relief, as it were ; or, in other words, purely instrumental passages in works whose chief interest was concentrated in the voice, or voices. Whenever the instruments, or instrument, played without the voices their work was called a symphony, or symphonies. Gradually the word symphony was used to de¬ scribe the introductory movement, or prelude ; and, in the course of time, it was used in the particular sense of describing the big composi¬ tion (in four separate divisions, or movements), which reached its greatest climax in Beethoven. The evolution of the symphony forms a long chapter in the history of music. In those in¬ troductions to his operas that Lulli (1633-87) produced in Paris, which became known as

*<(Overtures in the French style,** consisting of alternate quick and slow movements, usually dances, the germ of the symphony is found. Sometimes the symphonies composed for certain operas were of sufficient beauty and interest to warrant their performance in concerts. In early days the forms of music were more or less related. Madrigals, fantasias and dances were often strung together loosely. Out of this arrangement the suite was developed ; and from the suite ajose the majestic symphony.*

Various early composers produced sym¬ phonies that to-day are interesting only to the student. The Bach family were pioneers in this form; but it was Joseph Haydn (1737- 1809) who enlarged the sphere of the sym¬ phony, determined its form and developed its capacities of expression. From 1775 to 1794 Haydn wrote more than 40 symphonies, some of which— the (Military, 5 the (Farewell, etc — are still played. Next comes Mozart (1756— 91) with 49 symphonies, of which the most famous are the (G-minor) and the Jupiter.' Mozart, keeping to the form as arranged by Haydn wrote more than 40 symphonies. Next comes Beethoven (1770-1827) with his nine masterpieces, including the and (Im Walde* ; Schubert's and ˆymphonie fantastique) ; Liszt's (Dante) and (Faust* ; Dvorak's (From the New Worlds T schaikowsky's six colossal works, including the (Polish* and the and (Symphonie Domestica> ; and works by Gustav Mahler, Sibelius, Sinding, Saint-Saens, Vincent d'Indy, Chausson, Cha- brier, Sgambati (Symphony in B), Scriabine, Balakireff, Borodine, Glazounov, Rimsky-Kor-sakoff, and other French and Russian composers.*

*Overture. — Although this name was orig¬ inally given to the introduction to an opera, oratorio, or drama, the form and name have also been applied extensively to orchestral pieces intended solely for concert use. For¬ merly a simple movement (or, indeed, some¬ times an entire symphony) from a symphony was called on the program ((Grand Overture® or simply ((Overture.** For example, Haydn's symphonies are thus described on the pro¬ grammes of Salomon's London Concerts of 1791-94. Among the famous overtures that have been composed for independent perform¬ ance*

*are Beethoven's (Weihe des Hauses, * written for the opening of the Josephstadt Theatre, Vienna, in 1822; Schumann's (Bride of Messina,* (Julius Caesar,* Festival Overture and (Manfred* (written with incidental music to Byron's poem) ; Schubert's (Rosamunde* (1823); Mendelssohn's (Hebrides) ((Fingal's Cave*), (Calm Seas and Prosperous Voyage,* (afterward supplemented by incidental music) ;*

Bargiel's (Overture zu einem Tratierspiel5 (op. 18) ;

Overtures, which, although written for op¬ eras, are frequently heard on the concert stage are: Gluck's 'Alceste5 ; 'Iphigenie en Tauride,5 and 'Iphigenie en Aulide5 (perhaps the finest specimen of a dramatic overture) ; Mozart's 'Idomeneo5 (1781) ; 'Die Entfiihrung aus dem Serail5 (1782); 'Nozze di Figaro5 (1786) ; 'Don Giovanni5 (1787), and 'The Magic Flute5 (1795) ; Cherubini's 'Medea5 (1797) ; Mehul's 'La Chasse du Jenne Henri5 (1797) ; Bee¬ thoven's 'Coriolan5 (1807), 'Egmont5 (1810), and the four overtures to Fidelio (1806-07), of whch 'Leonore,5 No. 3, is the most famous; Weber's 'Preciosa5 (1820), 'Der Freischutz5 (1821), 'Euryanthe5 (1823), and 'Oberon5 (1826) ; Spohr's 'Jessonda5 ; Rossini's 'Giul- lanme Tell5 (1829); Berlioz's 'Benvenuto Cel¬ lini5 and 'Carnaval Romain,5 both for the cpera of 'Benvenuto Cellini5 (1838) ; Nicolai's 'Merry Wives of Windsor5 ; Wagner's 'Flying Dutchman5 (1843), 'Tannhauser5 (1845), 'Lo¬ hengrin5 (1850), 'Tristan and Isolde5 (1865), 'Die Meistersinger5 (1868), and 'Parsifal5 (1882) ; Smetana's 'Die Verkaufte Braut5 ; and Tschaikowsky's 'Tempest,5 'Francesca di Ri¬ mini,5 and 'Fatum5 ('Destiny5).

Symphonic Poems. — Symphonic poem is a name that Liszt invented for a new form of music that originated with him. In the sym¬ phonic poem the movements are not divided but lead continuously into one another and the music is descriptive of a place, a person, or a poetic idea. Liszt applies the title first to his 12 symphonic poems: 'Ce qu'on entend sur la montague5 (Victor Hugo), Tasso, 'Les Pre¬ ludes,5 'Orpheus,5 'Prometheus,5 'Mazeppa,5 'Fest klange,5 'Heroide fusebre,5 'Hungaria,5 'Hamlet,5 'Hunnenschlacht5 (Battle of the Huns), and 'Ideale.5 Saint-Saens followed with his Symphonic Poems: 'Le Rouet d' Omphale,5 'Phaeton,5 'Danse macabre,5 and 'La jeunesse d'Hercule.5 The form is very popular with modern composers and brilliant examples are Richard Strauss's 'Don Juan,5 'Macbeth,5 'Tod und Verklarung,5 'Till Eulen- sp:egel.5 'Also Sprach Zarathustra,5 and 'Ein Heldenleben; and Cesar Franck's 'Le chasseur vnud't5 ('Wild Huntsman5). Loeffler's 'La ■t de Tintagiles5 also

deserves mention.

Vdern tendency is to escape from the Hclcs of form and to produce, as it were, .ipressionist studies in music. Hence the old Suite which once was composed of dance- forms of the strictest kind — allemandes, giques, sarabandes, courantes, minuets, pavanes, branles, gavottes and passepieds has been chosen for many imaginative flights on the part of modern composers. Among these should be mentioned Bizet's 'L'Arlesienne,5 incidental music for Daudet's drama; Grieg's 'Peer Gynt5 for Ibsen's drama; Charnenfier's 'Impressions of Italy5 ; Tchaikowsky's 'Mozartiana5 and his "fˆebratH 'Casse Noisette5 (Nutcracker Suite), adapted from his music to Hoffman's fairy tale, consisting of 'Overture Miniature,5 'March,5

'Dance of the Sugar Plum Fairy,5 'Russian Dance,5 'Arab Dance,5 'Chinese Dance,5 'Mirliton5 and 'Dance of the Flowers.5 The 'Casse Noisette5 suite is considered a master¬ piece, exhibiting novelty of treatment, lovely melodies and quaint instrumentation. To this group of imaginative and poetic orchestral music belong Debussy's 'Prelude Symphonique5 to Mallarme's 'Apres midi d'un Faune5 ; Maurice Ravel's 'Mother Goose,5 a 'toy suite55; Albert Roussel's 'Le festin de l'araig- nee5 and 'Evocations,5 inspired by a trip in the Far East; Rimsky-Korsakoff's 'Antar,5 suite, and 'Scheherazade,5 an Arabian Nights suite; Scriabine's 'Poem of Ecstasy,5 and John Alden Carpenter's 'Adventures in a Perambulator,5

suite. , . . – . , . .

The theme and variations reaches its high¬ est development in Richard Strauss's 'Don Quixote,5 which exhibits all the resources and peculiarities of modern instrumentation. Vin¬ cent D'Indy's 'Istar5 (Variations) is also played frequently.

Ballet-music from classic operas holds a place in the modern orchestral repertory. Serenades, capriccios and such works as De¬ bussy's 'La Mer5 called ''a symphonic sketch,55 Paul Dukas's 'L'apprenti sorcier,5 called an "orchestral scherzo,55 and Granville Bantock's 'Pierrot of the Minute5 show a tendency toward beautifully written orchestral works of light style but masterly in treatment and demanding thd most finished work from all the per¬ formers in the orchestra. All of these are out¬ growths of Liszt's innovation in the symphonic poem and that other form which he named so happily "Rhapsody.55 Liszt's 'Hungarian Rhap¬ sodies5 (orchestrated from his piano composi¬ tions) threw a new life and fire into orchestral composition.

One more form frequently appears on the programs of orchestral concerts

— “The March.55 Among the best examples of marches are Tschaikowsky’s ‘Slavic5 and Liszt’s ‘Rakocsy.5 The ‘Rakocsy March5 on the national Hun¬ garian theme also occurs in the selections in Berlioz’s ‘Damnation of Faust,5 selections from which are often played as a sort of suite includ¬ ing the ‘Will o’ the Wisps5 and ‘Dance of the Sylphs.5 Berlioz’s delicately orchestrated ‘Queen Mab Scherzo5 from the ‘Romeo and Juliet5 symphony is often performed inde¬ pendently.

Bibliography. — Goepp, P. H., ‘Symphonies and their Meaning5 (3 vols., Philadelphia 1898-1913) ; Grove, ‘Beethoven and his Nine Symphonies5 (London 1896) ; Upton, George P., ‘The Standard Symphonies5 (Chicago 1891 ; new ed., 1896) ; Weingartner, Felix, ‘The Post- Beethoven Symphonists5 (tr. by Arthur Bles, London 1907) ; Torrefranca, F., ‘Le origine della sinfonia5 (in Revista musicale itaUana, Vols. XX, XXI and XXII, Turin 1913-15) ; Wagner, Richard, ‘Ein Brief von Richard Wagner fiber Franz Liszt’s Symphonische Dichtsungen5* (Leipzig 1857) ; Luboesch-Jena, W., ‘Zur Aesthetik des symphonischen Dich- tung5 (in Die Musik, Berlin 1902) ; Saint-Saens, Camille, ‘Franz Liszt and the Origin of the Symphonic Poem5 (in Etude No. 8, Philadel¬ phia 1910), and Jean-Aubry, C., ‘La musique francaise d’aujourd’hui5 (Paris 1916).

Esther Singleton,

Author of iThe Orchestra and Its Instruments ?

ORCHESTRION, or-kes’tri-on, a mechan¬ ical musical instrument of the pipe-organ vaiiety in which orchestral instruments are imitated and assimilated by skilful mechanism. Its invention by Michael Welte and its first ex¬ hibition at Karlsruhe dates from 1849. Since then considerable improvements have added to its usefulness as a substitute for an orchestra m places of amusement. Chief of these im¬ provements was the substitution in 1887 by the inventor s son Emil of his patented perforated roll with pneumatic action for the original un¬ wieldy and expensive wooden cylinders. In 1904 Emil’s nephew Edwin exhibited the Welte- Mignon pianoforte with the pneumatic per¬ forated roll attachment, autographically repro¬ ducing with perfect accuracy the technique of famous pianists. In 1912 the attachment to a pipe instrument produced the Philarmonic Organ. See Musical Instruments, Mechani¬ cal.

ORCHID, or’kid, the name of a group of monocotyledonous plants (order Orchidacece) containing more than 12,000 known species and many

thousands of varieties, many of which are highly valuable commercially. They are as a whole by far the most interesting order of plants of the entire vegetable kingdom, because of their extraordinary mode of growth and existence, their great age and endurance, their curious habits and the varied forms of their flowers, which are distinct from all other classes of plants, fine in texture and of glowing and exquisite colors. They are remarkable also because of their ready adaptability and free permission of cross-breeding or cross-fertili¬ zation, which also practically makes them more fascinating than all other orders or tribes of plants. This is true in their natural habitat, as well as under practical cultivation. This fact also accounts for the almost endless varieties of flowers and colors.

The flower of the orchid as a rule is made up of the following parts : sepals, petals, label- lum or pouch, and column or crest, resting on the modified hollow ovary, and bearing the one or two stamens and the two or three stigmas. The pollen-grains are aggregated into peculiar pollen masses. The structure of the flower is a modification of the typical three-part pattern of the lilies. A secondary bilateral symmetry is imposed on the flower, and four or five out of the original six stamens and one of the stigmas are suppressed. Often the flower un¬ dergoes a secondary torsion, inverting its po¬ sition. The labellum, which is a modified petal, is as a rule the most conspicuous part, and is the most wonderfully constructed, as well as the most important, organ of the flower, since through it insects, when in search of the sweet juices stored inside the spur or walls of the flower, are attracted and guided to the nectar and thus accomplish the benefits of cross¬ fertilization. It is in this way that so many new varieties are produced Ey the unconscious work of insects, and these are termed "natural hybrids® and are collected and brought to us from tropical wilds. But under cultivation this important work must be done by experts, using delicate camel's-hair brushes, and with a most careful eye and judgment as to the proper time. It is in this manner that the most beautiful

hybrids have been obtained, known as <(garden hybrids.®

Orchids are distributed over a large area of both the Eastern and Western hemispheres, and are divided into two general groups, — the East Indian and the South American. They are also classified according to their habit of growth and subsistence, as saprophytic, epiphytal and terres¬ trial. The first-named class includes species which grow mostly in wet and marshy places, and are of little value except for botanical pur¬ poses. The epiphytal group is by far the most valuable and most important of them all in every respect. The species of this section nr . often erroneously called ((parasites,® whei is a fact that not one of the whole orchid fam is really a parasite. Nearly all the memlv of this class, grow and thrive best upon iIk trunks and limbs of trees in mid air, s'mplv cling'ng to a single stem or

small limb, and, therefore, sometimes quite properly called air- plants. It is this group, too, which contains the most beautiful and most valuable snecies and varieties and the most varied colors. Their natural habitats are generally confined to tropi¬ cal and subtropical climates in both hemi¬ spheres, where the moisture-laden and humid atmosphere affords the most congenial nourish¬ ment to these wonderful plants. Several epiphy¬ tal orchids are found in the extreme southern parts of the United States, some of which are highly interesting and fairly valuable.

The terrestrial orchids are such as grow upon the ground and, therefore, have no need of the pseudo-bulbs or hypertrophied stems, which are peculiarly characteristic of the epiphytal section.

Of the other two classes, saprophytes and terrestrial, many varieties are indigenous throughout the United States and even as far north as Canada. These are what are known as the hardy native varieties, which have their resting season during the winter months, while all the epiphytal (sometimes called celestial) orchids, which are found only in tropical climates, have their periods of rest during the dry season. Therefore the cultivator pf these plants under glass must imitate nature as near as possible, giving them their season of rest after their new growth is finished, when water should be withheld gradually and only enough moisture applied to keep them alive until nature itself shows signs of fresh activity. This is the time the plants start in to develop and bring forth their flowers upon and from their previously matured and ripened growths or pseudo-bulbs, when moisture is again applied gradually, increasing the supply from day to day; and it is at this period that keen judgment must be exercised.

During the past 10 or 15 years orchids have become one of the most fashionable classes of plants — in fact no other flower has ranked so high in favor or is appreciated more to-day by the better and more highly cultured and aesthetic class of people both in Europe and America than is the orchid. From a commercial standpoint no flowers command the prices for floral decorations, both as plants in bloom and as cut flowers, equal to those of the many beautiful varieties of orchids which are now cul¬ tivated. Millions of dollars' worth of these plants are now in cultivation, both in commercial

as well as in private collections, although 25 years ago very few practical gardeners knew much about their cultivation ; previous to 1880 it was a rare treat to see even a few of the very ordinary varieties in bloom, and

then usually they were only found in private conservatories ; scarcely any commercial collections existed. Every year the demand is increasing, and thou¬ sands of dollars' worth of these rare plants are imported annually from South American countries, the East Indies, the Philippines and even from Australia. To keep up the supply many practical and experienced collectors are sent out to these distant tropical countries to gather the plants, and the time is fast ap¬ proaching when it will be almost impossible to collect any more plants within reasonable reach. In fact, so great has been the traffic that sev¬ eral South American governments have put an export duty upon the plants, while others have prohibited their further collection and exporta¬ tion, entirely from fear of their total extinc¬ tion.

This state of affairs has brought about the raising and cultivating of thousands of seed¬ ling orchids since 1895, and with it the crossing of desirable species and varieties in order to obtain a better and improved class of plants and more beautiful types of flowers. But this is a very slow process, and great patience and many years of time and labor are required to bring them to flowering maturity and size. Carna¬ tions and other flowers can be raised in a single year, and even roses in two or three years, but it requires from five, 10 or 15 years to raise orchid plants fit for blooming purposes, so that we may never expect to see orchids in over¬ abundance.

Treatment and Culture. — It is by no means as difficult a task to grow and cultivate these interesting plants as was supposed when orchids were first introduced to the public in this country during the year 1887, when a prominent florist, who practically is the pioneer in orchid culture, gave the first exhibition of these plants in midwinter in the city of New York. This was followed by annual exhibitions for several years, and people became interested in these wonderful plants. It was then thought next to impossible for anyone except an experienced gardener to manage them, and also that it would require specially constructed greenhouses ; but many fine flowers have been produced by lay¬ men in ordinary greenhouses — even in light and sunny windows many varieties thrive so well that thousands of people are cultivating orchids there. They, like other tropical and semi-tropical plants, require plain but careful treatment. They can be grown in ordinary flower-pots in a compost of a certain fibrous peat. The lower half of the pot is to be filled with potsherds and pieces of charcoal inter¬ mixed; then place the roots and rhizome of the plant in the peat, and fasten and pack it well. These plants can also be grown in earthen pans or wooden cribs, so that the plants may be thus suspended from the ceiling or in the windows. They require a continuous tempera¬ ture of from 55 to 70° F., not lowered during the night. Water should be applied sparingly at first, when the plants start into growth, and gradually increased as the plants require it. Frequent spraying or syringing, especially dur¬

ing the spring and summer season, is highly beneficial. This should be done, however, in early morning or after three o'clock in the after¬ noon. In the winter or during their time of rest, when the recently made new growth is maturing, water must be given with judgment and only enough to keep them from shriveling.

Nearly all orchids delight in sunlight, but of course are not to be exposed to direct burn¬ ing hot sunshine. A judicious shading is bene¬ ficial to their welfare. If such treatment is observed the plants, if healthy and thrifty to start with, will grow and flower as success¬ fully as any other plants.

Following is a list of the most popular varieties of orchids named in the order of their commercial importance, with the countries from, which they are obtained.

Cattleya. — The orchids of this genus un¬ doubtedly rank as the most popular and most valuable among all orchids. They also con¬ tain more species and varieties than any other, and are confined entirely to South America, where they are known by their common name of ((fleur de mayo,® because the majority of these varieties produce their gorgeous flowers in the month of May, generally the beginning of the wet season. Following are the principal named varieties :

C. mossice, C. speciossissima, C. percevilliana, and C. lawrenciana, all of Venezuela; C. labiata, C. warnerii, C. schroederii, C. harrissonii, C. in¬ termedia, C. gaskelliana and C. leopoldii, each Brazilian, and several other kindred varieties; also C. triannce (and many varieties), C. men- delii, C. gigas and varieties, all of the Andes or New Grenada; C. maxima, of Peru; C. dowiana, one of the most valuable and richly colored spe¬ cies, of Costa Rica ; C. citrina, of Mexico ; C. skinnerii, of Guatemala and Costa Rica ; and C. bowringiana, of Honduras.

Laelia. — This genus is closely allied to Cat¬ tleya, and includes the following species : L. purpurata, often called ((queen of orchids,® a native of Brazil; L. elegans, and its varieties; L. harpophilla and others, also of Brazil ; L. anceps and its many varieties; L. autumnalis, L. gouldiana, L. alba, L. albida, L. majollis, L. digbiana, all of Mexico.

Oncidium. — This genus embraces many beautiful and valuable species and varieties, among which the following are most promi¬ nent : O. varicosum and rogersii, the golden butterfly orchid; O. kramerii, mottled butterfly; O. sar codes, O. macranthum, O. marshallianum and many others, all of Brazil ; 0. papilio, the <(butterfly® of the West Indies and South Amer¬ ica ; 0. splendidum and O. cavendishianum of Mexico and Guatemala; O. tigrinnm of Mex¬ ico, and many others.

Odontoglossum. — This genus includes some of the most beautiful and grandest orchids in existence, and the only difficulty is that up to the present time their successful cultivation un¬ der glass is still unsolved in this country, although they are very successfully grown in some sections of Europe, where they command a higher value than almost any other orchid. The most important varieties of this species are : O. crispnm, O. pescatorce, O. albopnrpurea, O. harry anum, and kindred varieties, all of New Grenada or Colombia; O. grande, the ((baby® or¬ chid of Guatemala and Mexico; O. citrosmum,*

ORCHIDS

1 Lady s Slipper 2 Odontoglossum

V

•

-

of Guatemala, and 0. inseleyii leopardinum, of Guatemala and the Pacific slope of Mexico.

Permteria.— Flower of the Holy Ghost \Peristema elata), of Central America.

, , .ycaste. — Several species of Guatemala and Mexico.

Catasetum. — These are South American and more interesting than beautiful, except C. hun¬ ger othii, which is ivory white and very frag¬ rant.

Stanhopea. — A genus including one of the most curious of orchids, throwing its sweet- scented large flowers from the rhizome down¬ ward through its receptacle. Some six or seven varieties exist, natives of South and Central America.

Chysis. — Four or five species are found in Guatemala and Mexico. Very curious plants and flowers, one of which is the (

Schomburgkia. — A genus of very large and curious plants with inconspicuous great flowers. Schomburgkia crispum and S. undulatum are well-known species of South America and the West Indies.

Masdevallia. — A very curious genus with numerous varieties, bearing highly interesting flowers.

Epidendrum. — A very large genus with many valuable and showy varieties, nearly all of which are highly epiphytal in character. Many of this group are not very desirable.

Of East Indian orchids, first in importance is the genus Dendfobium, a very large and valu¬ able group, which includes a large number of species and varieties, all of which are found in the East Indies, Moulman, Assam and Burma, except two, found in Australia. The principal species are as follows : D. nobilis and its many sub-varieties ; D. wardianum, D. crassinoide, D. chrysotoxum, D. thyrsidorum, D. densiflo- rum, D. devonianum, D. falconerii, D. farmerii, D. chrysanthum, D. dalhousieanum, D. for- mosum, and many others of less importance, except D. bigibbum and D. phalcenopsis of Aus¬ tralia.

Phalaenopsis. — A genus of East Indian spe¬ cies called moth-orchids. This is one of the very rarest and most valuable genera and also the most difficult group to cultivate successfully, but their beautiful and really fantastic mini¬ ature bird-like flowers render them very desir¬ able. Most of them are natives of and found in the Philippine Archipelago, and in Burma and Siam. Following are the most valuable varieties : P. amabilis, P. grandiflora, P. schil- Icrianum, P. sanderianum, P. luddemaniana, P. casta , P. stuartianum, P. violacea.

Vanda. — This genus represents the tribe or order of Vandacea, which includes the Alrides, Saccolabium and Angrcecum. Prominent spe¬ cies are Vanda coerulea, V. tricolor and its varieties; V. insigne, V. lowii, V. batemanii, V. cathcartii, V. sanderiana, V. teras, V. kirnbal- liana, V. amesiana; SEerides odorata, A. field- ingii, A. lobbii , A. virens and many others; An- gr cccum sesquip'idale, A. eburneum-virens ; A articulatum, A. ellissii and A. leonii; Sacco¬ labium giganteum, S. blumei, S. guttatum, S. ampulaceum and others. Other semi-terrestrial forms are Calanthe veitchii, C. vestita (varie¬ ties occulata and rubra), A. turnerii, A. reg – merit, A. gigantea and a few other hybrids; Cymbidium lowianum, C. eburneum, C. gigan-

tcum, and C. mastersii; Ccelogyne cristata, C. alba (rare), C. lemoniana, C. flaccida, C. day- iana and C. pandurata; Phajus grandiflora , P. tuberculosa, P. wallichii, P. maculatus and P. humboldtii.

Cypripedium. — This genus, embracing the ladies' slipper, or slipper orchids, is the most important group of terrestrial orchids, and in¬ cludes a vast number of species from which have been raised a greater number of

rare hy¬ brid varieties than from any other class. While not as showy as many of other genera they are highly interesting to the hybridist, and from this standpoint are very valuable. Sometimes a single small plant of a new hybrid will sell for $500.

Bibliography.— Ames, O., and others, (Or- chidaceae5 (Bostop 1905-08) ; Baldwin, H., (Orchids of New England5 (New York 1884) ; Bohnhos, (Dictionnaire des orchidees hybrides5 (Paris 1895) ; Bugg, (Orchids5 (3d ed., Saint Louis 1912) ; Burbridge, (Cool Orchids and How to Grow Them5 (London 1874) ; Cog- niaux, (Dictionnaire d'iconographie des orchi¬ dees5 (Brussels 1897) ; Curtis, C. H., (Orchids for Everyone5 (New York 1910) ; Darwin, fertilization of Orchids by Insects5 (2d ed., New York 1877) ; Gibson, W. H., (Our Native Orchids5 (New York 1905) ; Linden, (Les orchidees exotiques et leur culture5 (Brussels 1894) ; Lindley, J., folia Orchidacea5 (London 1852) ; Miner, (Orchids, the Royal Family of Plants5 (Boston 1884) ; Moore, 'Illustrations of Orchidaceous Plants5 (London 1857) ; Muller, 'The Fertilization of Flowers5 (tr. London 1883); Sander, (Reichenbachia : Or¬ chids Illustrated and Described5 (tr. London 1886) ; Warner, (Orchidaceous Plants5 (Lon¬ don 1877-78) ; White, W. H., (Book of Or¬ chids5 (New York 1902) ; Williams, (The Or¬ chid Growers' Manual5 (London 1885).

ORCHIL. See Archil.

ORCHIS, the typical genus of the order Orchidacece. The roots of several species, as those of the 0. mascula and O. morio, when dried, form the European or indigenous salep. That prepared from the first-named species is said to be the best. Salep (q.v.) contains the principle called bassorin and a little starch, possessing similar properties to those of starchy and mucilaginous substances generally.

ORCHOMENUS, or-kom'e-nus, Greece, (1) an ancient Boeotian city, capital of the kingdom of the Minyae, situated at the north¬ western corner of Lake Copais (now Topolia) where it is joined by the Cephissus. The town extended from the marshy edges of the lake up the face of a steep rock hill, on which stood the acropolis. It sent 30 ships to the Trojan War, and at a later date became a member of the Boeotian confederacy. Its government was thoroughly aristocratic, and after the Pelopon¬ nesian War the jealous democratic Thebans de¬ stroyed it by fire, and sold its inhabitants as slaves 368 b.c. It was rebuilt in the reign of Philip of Macedon, but was again destroyed in 346, and never recovered its position. It was famous for its musical festival in honor of the Graces, who were specially worshipped in the city. In 1880-86 Schliemann excavated there a royal tomb or mausoleum, larger than the ((Treasury of Atreus55 at Mycenae (q.v.). (2)

A former city in Arcadia north of Tripolitza, on

a hill dominating the road to the north. Dur¬ ing the wars of the Macedonians and Achaeans it was a fortified post of considerable strategic value. Consult Leake, (Travels in Northern Greece) (London 1835) ; Muller, K. O., (Och- romenos und die Minyer) (Breslau 1844) ; Schliemann, (Leipzig 1881).

ORCIN, or'sin, in chemistry, also called orcinol, CtHsO::. It exists ready formed in some of the lichens which produce colorless matters themselves, but which yield coloring substances by reaction with water, ammonia or air. Orcin is also prepared artificially from orsellic acid by boiling in water, CsHsO*— C-Hs02 (orcin) +C02. On evaporation the orcin crystallizes in the form of colorless, six- sided, monoclinic prisms, which are soluble in water, alcohol and ether, and have a nauseous sweet taste, but no odor. In the hydrated state it melts at 57° C. and in the anhydrous state at 108° C. It is a di-hydroxy- toluene represented by the formula CeS3(CH3) (OH)2. It yields rhombic crystals and forms substitution products with bromine, chlorine and iodine. Orcin gradually turns red on ex¬ posure to the air.

ORCUS, or'kus, the Latin name for Pluto, hades or the infernal regions. See Pluto.

ORCUTT, William Dana, American author and typographic expert: b. West Lebanon, N. H., 18 April 1870. He is associated with the Plimpton Press, Norwood, Mass., and his published writings are (Good Old Dorchester,5 a narrative history (1893) ; (Princess Kellisto,5 fairy stories (1903) ; (Robert Cavalier, > a novel (1904) ; (The Flower of Destiny,5 a novel (1905) ; (The Spell,5 a novel (1909) ; (The Lever,5 a novel (1910) ; (The Moth,5 a novel (1912); (The Writer's Desk-Book5 (1912); (The Madonna of Sacrifice,5 a Florentine story (1913) ; (The Author's Desk-Book) (1914) ; (The Bachelors,5 a novel (1915).

ORCZY, or'chi, Baroness (Mrs. Montagu Barstow), English novelist and dramatist: b. Tarnaors, Hungary, 19th century. She was the eldest child of Baron Felix Orczy and studied painting at the Heatherly School of Art, Lon¬ don. She made several exhibits at the Royal Academy and in 1900 turned her attention to writing. She became a British subject through her marriage. She contributed a series of de¬ tective stories known as the (01d Man in the Corner5 series to the Royal Magazine and these were produced as a drama at the New Theatre, London, in 1905. Her other plays include

(The Scarlet Pimpernel,5 co-author with her husband;

ORD, ord, Edward Otho Cresap, Amer¬ ican soldier: b. Cumberland, Md., 18 Oct. 1818; d. Havana, Cuba, 22 July 1883. He was gradu¬ ated from West Point in 1839 and served in Florida and in California until the outbreak of the Civil War when he was promoted brigadier- general of volunteers and assigned to a com¬ mand in the Army of the Potomac. In 1862 he was made major-general and transferred to

a command under General Hallecx and dis¬ tinguished himself under Grant at Corinth. He was present at the capture of Vicksburg and in 1865 was appointed to the command of the Army of the James and the Department of Virginia with which he was present at the cap¬ ture of Richmond. Subsequently he was given charge of the Department of the Ohio and in 1866 he was mustered out of the volunteer serv¬ ice. He remained in the regular army in com¬ mand of the Departments of Arkansas, Califor¬ nia, Platte, and Texas successively and in 1881 was retired with the rank of major-general.

ORDEAL, certain acts which a person sus¬ pected of crime was made to perform solemnly and which would in the ordinary course of things be hurtful or fatal to him; if, however, he performed them without being injured, he t was declared to be innocent. These tests were called ordeals or judgments of God. As the results of them often depended on those who made the preparations, there was abundant op¬ portunity for deceit and malice.

The following ordeals were anciently iit vogue throughout Europe : The duel or wager of battle (see Combat), in which the conquered was held guilty; the ordeal of fire; of water; the corsned ; the trial of the euchaiist ; the test of the cross ; and the judgment of the bier. In the ordeal of fire the accused walked bare¬ footed over coals of fire, or over red-hot plowshares; or had to carry a red-hot iron in his hand ; or was made to walk through fire ; in the last case he was dressed in cloth covered with wax (the trial of the waxen shirt) ; if he was unhurt by the fire and the wax unmelted, he was considered innocent. In the trial by cold water (often applied to witches) the test would be whether the accused sank or floated ; if the latter, he (or she) was guilty; or the suspected party had to put his hand into boil¬ ing water and lift something out. In the corsned trial a priest put the corsned, or hal¬ lowed bread, into the mouth of the accused, with various imprecations. If the accused swal¬ lowed it he was freed from punishment. The test of the eucharist was applied chiefly among the clergy and monks. When they took the host it was believed that God would smite the guilty with sickness or death. In the trial of the cross, the accuser and the accused were placed under the cross with their arms extended or cross-

wise and who first moved his hands or suffered them to fall was held to be guilty. Or the accused was placed before relics and two dice were then produced, one marked with a cross. Of these one was taken up at hazard. If it happened to bear the sign of the cross the accused was acquitted. Finally the judg¬ ment of the bier was used in the trial of mur¬ der ; the murdered person was placed upon a bier and the accused made to touch the body. If blood flowed out, or foam appeared at the mouth, or the dead body changed its position, the suspected person was considered guilty. Superstition and artifice> gave to these cere¬ monies the highest authority; and even the em¬ perors were unable to .abolish them. The papal chair restrained them by improving the judicial system; after the 14th century ordeals became uncommon and in the 1 5th they were superseded by the canon law. which invented the oath of purgation, by which the accused was acquitted

on a solemn declaration of his innocence. The universal use of the Roman law also tended to abolish trial by ordeal. In the 16th century only the trial of the bier survived, and this continued even to the 18th. Besides this ordeal of cold water for sorcery (found in Prussia in the 17th century and in the neighboring countries in the first half of the 18th), witches were weighed, and if found to be light they were pronounced guilty. These foolish customs were gradually done away, when Thomasius (See Thomasius, Christian), succeeding in almost wholly anni¬ hilating the belief in witches. Yet as late as 1728 witches were weighed at Szegedin in Hun¬ gary. Roman law substituted in their place an equally cruel process, namely, the torture. Or¬ deals are still found among all the negro na¬ tions north of the Zambesi. When a man sus¬ pects that any of his wives have bewitched him, he sends for the witch doctor who makes an infusion of the plant called goho. His wives all drink it, each one holding up her hand to heaven, in attestation of her innocence. Those who vomit it are considered innocent, while those whom it purges are pronounced guilty and burned to death.

Some negroes on the coast of Guiana put into the hands of the accused herbs and barks of a peculiar character and suppose they have the property of burning the guilty. Ordeals of various kinds, but chiefly the trials by fire and by water, are found among the Chinese, the na¬ tives of Pegu, of Kongo, of the coast of Guinea and the tribes of Asiatic Russia. In Senegambia an application of red-hot iron is made to the tongue of the supposed criminal. In Siam the accuser and the accused were placed together in one spot and a tiger was let loose upon them. If one was spared, he was considered innocent; if both were destroyed, they were both deemed guilty; and if both were spared, they were com¬ pelled to undergo some more

certain test. In eastern Africa, among the Wanaka tribe, are the ordeals of the hatchet, of the copper kettle, of the needle and of the piece of bread. The first two were analogous to the hot iron ordeal and the last to the corsned of Europe. In the ordeal of the needle, a red-hot needle was drawn through the lips of the alleged criminal and if blood flowed from the wound, he was deemed guilty; but if none, innocent. In Madagascar the trial by ordeal is still generally practised by legal authority. The supposed criminal is made to drink a decoction of a poisonous fruit called the tangena, a small dose of which acts as an emetic, while a large dose is fatal. By manag¬ ing the size of the dose, those who administer it can decide the result. Consult Brunner, Hein¬ rich, (Deutsche Rechtsgeschichte> (Vol. I, Leip¬ zig 1906) ; Lea, H. C., (Superstition and Force) (Philadelphia 1892) ; 'Federico Patteta,> (Le Ordalie) (Turin 1890) ; Schroder, Richard, 'Lehrbuch der deutschen Rechtsgeschichte) (Leipzig 1902) ; Thayer, J. B., Preliminary Treatise on Evidence) (Boston 1896.)

ORDEAL OF RICHARD FEVEREL,

The (originally published in 1859) has its place in English literature not merely because it is a great novel, but because in writing it George Meredith charged the form of the novel with a higher spiritual and poetic intensity than had before seemed proper to it. In the hands of its greatest English masters, such as Fielding, VOL. 20 — 48

Scott, Dickens and Thackeray, it was essentially prose in quality. George Eliot, indeed, had made it the vehicle of thought and in the hands of Dickens and Reade it had been made the vehicle of a "purpose.® But Meredith, alone among novelists at the time of the publication of (Richard Feverelp while retaining the tra¬ ditional English form of the novel, its "humors,® its broad and leisurely presentation of character, its manner of narration, lifted it into a sphere of imaginative and spiritual intensity, which had hitherto been reserved for the poetic drama. The prose in which ' Richard FevereP is written is essentially different in quality from any prose previously employed on the novel ; for, while it has all the virtues of prose as usually under¬ stood, equal to all the customary conditions of the novelist's art, it has a power of kindling and flowering, in dealing with the higher moments and issues of the story, into an impassioned beauty, a spiritual fervor, for parallels to which we must go to the great poets. There are many poignant love-scenes in English fiction, but no other lifts us into the pure ether, "enskied and sainted,® of boy-and-girl first love as we are lifted in those rapt and radiant chapters in which Richard and Lucy meet by the river. And this poetic intensity gains in reality by the vitalizing presence everywhere in the book of an intellect¬ ual force equally unusual in a novel. A great poet and a great philosopher had, for the first time in

literary history, chosen to express them¬ selves in the form of the novel. The philo¬ sophic side in 'Richard FevereP finds concrete, so to say "portable,® expression in the constant lightning-play of the epigram. Sir Austin Fev- erel — Richard's father — keeps a private epi¬ grammatic diary called "the Pilgrim's Ship® — and this device, in varying forms, Meredith em¬ ploys to flash side-lights of interpretation on his characters and the progress of his story in all his novels. Among these epigrams, which are more highly charged with poetry and ˆspirit¬ uality® than the word epigram usually implies, two at least have passed into the language: "I expect that Woman will be the last thing civil¬ ized by Man® ; and "Who rises from prayer a better man, his prayer is answered.® 'Richard FevereP is the one book in which all Meredith's powers meet in a fusion nearest harmony. The faults of his style are as yet only indicated and the cryptic euphuism, the harlequinade of ver¬ biage, into which it was soon to degenerate do not cloud or deface it. 'The Ordeal of Richard FevereP and one or two of his poems, such as 'Love in the Valley, will probably be all that the future will care to, or be able to, read of George Meredith.*

Richard Le Gallienne.

ORDER, in botany and zoology, a division in classification greater than a family and less than a class. It is based upon broad criteria of structure. The distinctive suffix for names of orders in botany is – ales , as in Rosales, the order containing the rose. No such suffix is used in zoology. The principal orders in the animal kingdom are enumerated in the Table of Classi¬ fication in the article Anatomy, Comparative.

ORDER OF BUCKS. See Odd Fellow.

ORDER OF ODD FELLOWS. See

Odd Fellow.

ORDER OF PREACHERS. See Domin¬ icans.

ORDER OF SAINT JOHN OF GOD.

See Orders, Religious.

ORDER OF SAINT JOSEPH. See

Orders, Religious.

ORDER OF THE SNARES OF LOVE.

See Orders, Royal.

ORDER OF SOLOMON'S SEALS. See

Orders, Royal, Abyssinia.

ORDER OF UNITED AMERICAN MECHANICS. See United American Me¬ chanics, Order of.

ORDERS, Holy. See Holy Orders.

ORDERS, Religious. The primary con¬ ception upon which the theory of the monastic life is based is an extremely old one, the belief that it was possible for man to perfect his moral nature and to attain the highest degree of spirit¬ uality by resorting to austere discipline and bodily mortification having been common among both Jews and Pagans long before the beginning of the Christian era. In fact, one has but to turn to the Essenes, the Stoics or the Thero- peutae to find the germ of thought that was not only to inspire the asceticism of the early Chris¬ tian times, but that was to grow and expand into the more purposeful religious orders of our own day; for the ascetics, with their macer¬ ation of the flesh, and the anchorites, or her¬ mits, who retired from the world to strive to find spiritual strength in desert places, were the forceful influences in religious life, the ex¬ amples of spiritual contemplation, without which the great monastic orders could scarcely have been instituted. The first ascetics as a rule did not separate themselves from the world, but sought to find the spiritual perfection to which they aspired by means of prayer and mortifi¬ cation of the flesh, not by withdrawing from the company of men ; and even when, in the 3d century, the more zealous Christians were driven by persecution to find a place of refuge in the desert, they lived apart, in separate cells, such an idea as that of a common life or com¬ munity of interests being entirely foreign to their purpose. It was Saint Anthony who first gathered a class of disciples about his feet that he might teach them, from his own wis¬ dom and experience, how best to attain the spiritual heights upon which their longing eyes were set, and yet Saint Anthony formulated no hide-bound rule of life and announced no principles that would lead one to imagine that he had thought of uniting his individual dis¬ ciples into a formal congregation. Saint Pacho- mius, who about 315 a.d. built his first monas¬ tery in the Thebaid, had only a vague idea of the value of the community life, and not the least conception of the possibilities for which he was so firmly laying the foundation, the religious orders of the Middle Ages that were at last to become such a powerful influence in the evangelistic work of the world. Al¬ though the rule of Saint Benedict was

practi¬ cally the only one that had been adopted at the beginning of the 10th century, the monasteries up to that time had been under the control of bishops. In the 10th century, however, several separate communities formed themselves into congregations under the direction of a common superior, and it was then only that the word

"order® could be properly applied to any of the monastic institutions. This rule of Saint Bene¬ dict, which remained the popular monastic rule for centuries, provided a year's probation for novices, and bound each member after that period to constant residence within the monas¬ tery, unconditional surrender to the superior, canonical prayer, regular labor and lives of chastity and complete renunciation of the pleas¬ ures of the world. The rule of Saint Augus¬ tine, another formular for the religious life which was quite widely adopted during the early centuries, was at first intended exclusively for the clergy and was not adapted for the use of the monks, who were then reckoned among the laity. It was not until the 8th century, there¬ fore, when monks came to be regarded as entitled to clerical rank, that it was assumed by other than the regular clergy. The desire to give more austerity to the religious life, a movement which began to be noticeable in the 11th century, resulted in the establishment of several new orders. In almost each instance, while the rule of Saint Benedict was adopted, it was made more strict by special .statutes, and to those who aspired to great asceticism life in these congregations appealed strongly. On the other hand, institutions like that of the Trinita¬ rians, the Order of Grace and others that min¬ gled more freely with the world, were adopted by those who felt drawn to lives of action rather than to silent contemplation. To the mendicant orders, which appeared at about this time, many special immunities and privileges were given, and these were exercised every¬ where without regard to parochial rights or jurisdictions.

From the beginning of the 10th century the multiplication of these religious associations of men bound together by vows to live devotional lives separated from the world has been almost continuous. Local prescriptions, like the Refor¬ mation in England, Germany -and other parts of Europe, the Revolution and the later "Law of Associations® in France, the attacks of the Lib¬ erals in Spain and other forms of suppression have, from time to time, driven certain orders into extinction, but reorganization and rejuve¬ nation, as well as the institution of new orders upon more modern rules of life, have tended to obliterate nearly all traces of the damage done by the passage and enforcement of such un¬ friendly statutes. The most numerous bodies of monks, of course, are those of the Roman Catholic Church. In the Eastern Church nearly all the orders follow the rule of Saint Basil, while the monastic orders in the Church of England or the Protestant Episcopal Church in the United States have either adapted old rules of living to their own use or have formulated rules suitable to themselves. In

the Roman Catholic Church, however, monastic orders of men or women have been founded for almost every purpose. See also article Third Orders.

The following is a list of male orders and congregations that have attained any great de¬ gree of prominence in the religious world and that have houses in the United States :

Orders of Men.

African Missions, Society of the. — The Society of the African Missions was established in Lyons, France, where the mother house is located. In-the United States, the fathers of this society are in charge of the Catholic negroes in the diocese of Savannah, Ga.

Alexian Brothers. — A pious society founded in the beginning of the 14th century by one who is simply known as Tobias." The end of the order is two-fold: The sanctification of the Brothers, and the active exercise of charity toward the neighbor. See Cellites.

Atonement, Society of the. — The Society of the Atonement was established, 3 Oct. 1899, by the Rev. Father Paul, as a religious congregation of the Protestant Episcopal Church. Ten years later, 30 Oct. 1909, the congregation of friars, as well as the sisters and the Society's third order, were received into the Roman Catholic Church. The Society observes the rule of Saint Francis and has for its purposes: "(1) the reconciliation of Anglicans and other non-Catholics to the Apostolic See; (2) the reconciliation of sinners to God through the ministry of penance and the preaching of the Atonement; (3) sending missionaries to the heathen." Located near Garrison, N. Y.

Augustinians. — An order founded in Africa, in the 4th century, by Saint Augustine. It is devoted chiefly to intellectual and missionary works in America and Asia. In 1256 the various brotherhoods were united by Pope Alexander IV. See Augustinians.

Barnabites, or Regular Clerks of the Congregation of Saint Paul. — An order founded in 1533, by Saint Antonio Maria Zaccaria, for the purpose of combating the evil tendencies of the age by the organization of a congre¬ gation of secular clergy who should not retire from the world, but who should live in it and work for it, and diligently attend to their own sanctification while preaching reformation to others. Besides the usual three vows, its members took a fourth: Never to seek office or ecclesiastical

dignity, nor to accept any post outside of their order, without the permission of the Pope. With headquarters at Rome it has colleges in various parts of Europe.

Basilians. — An order taking its name from Saint Basil, bishop of Caesarea in Cappadocia. See Basilian Monks.

Benedictines. — An order established at Subiaco, in the 6th century, by Saint Benedict, the patriarch of monks in the West. See Benedictines.

Bernardines, or White Monks. — A particularly strict order of Cistercians instituted by Saint Bernard of Clairvaux, about 1115.

Black Friars. See Dominicans.

Blessed Sacrament, Congregation of the. — Founded by Pierre Julien Eymard, in 1856, as an effort to accentuate the honor paid to the Holy Eucharist, by the perpetual exposition and adoration of the Sacrament. The order has extended to all parts of the world.

Brigittines, or The Order of the Saviour. — Founded by Saint Bridget, about 1344, upon a constitution said to have been communicated by divine revelation. Its rule was that of Saint Austin. It is still represented throughout the European countries.

Capuchins. — The shape of a cowl was the bone of contention that at one time threatened the stability of the Franciscan order and that finally resulted in the insti¬ tution of the order of Capuchins. The reformer was Matteo di Bassi of Urbino, an Observantine friar, who, becoming convinced that the cowl worn by the friars of that day was not the cowl prescribed by Saint Francis, not only adopted a capuche of different shape, but, in 1526, obtained per¬ mission of Pope Clement VII for himself and his companions – to wear this habit and also to adopt the life of hermits, preaching the gospel in all lands, under the provision that they should present themselves annually at a general chapter of the Observantines. Matteo began his preaching, and was so successful in arousing public interest that the pro¬ vincial of his order had him arrested for apostasy. He was released from prison through the intervention of relatives of the Pope, and, shortly afterward (1528), a bull was obtained which authorized the union between the reformers and the Conventual branch of the Franciscans, allowed them to adopt the hermit life, sanctioned the wearing of beards and permitted the use of the long-pointed cowl. From that day the growth of the order was rapid. Although still subject to the Conventuals, and under the rule of a vicar-general, the order in 1859 adopted separate statutes in which all the hours for religious service, for mental prayer, for silence, for taking the

discipline, etc., were clearly prescribed. It was also stipulated that the order should have no revenues, but should live by begging, and every¬ thing about its churches and convents should be as poor and mean as possible. As to food, the friars were permitted to eat one kind of meat a day and wine was not forbidden, but it was specified that nothing should be said to dis¬ courage any member who might desire to diet himself more rigorously. Under this rule the order has produced many men eminent for their eloquence, their learning or their Christian virtue, one of the most illustrious being Saint Fidelis of Sigmaringen, who was martyred in 1622. Strangely enough, however, the founder Matteo resigned from the order because the Pope had decreed that Capuchins who did not remain in their monasteries should not be permitted to wear the long cowl. In 1617 the Capuchins were made exempt from obedience to the Conventuals, and, under its present title, the order v/ithstood the Revolution and other similar movements, and is widely represented to-day.

Carmelites. — Founded in the middle of the 12th century by a Crusader named Berthold who vowed to embrace the religious life if God would make his side vic¬ torious in battle. See Carmelites.

Carthusians. — The order of Carthusians was founded in the 1 1th century by Saint Bruno of Cologne, who resigned his position as scholasticus of the episcopal school of Rheims in order that he might retire from the world. The founda¬ tion of the new order was erected at Chartreuse, an upland valley, in the Alps, more than 4,000 feet above the sea. Although almost unapproachable, being surrounded on all sides by high crags, and while the soil was poor, the tem¬ perature low and the air charged with fog at almost all times, the site was gladly accepted, and here Bruno and his companions built their mother house, after the form adopted by the ancient Lauras of Palestine. In 1089 Bruno was summoned to Rome by Pope Urban II, who had been one of his pupils, and he never returned to Chartreuse, spending the remainder of his life in founding convents and promoting the interests of his order. Although it was many years before any statutes were framed for the Car¬ thusians, and while the complete code was not arranged and approved by the Holy See until the latter part of the 17th century, the writings of Peter the Venerable, abbot of Cluny, prove that their life was one of great austerity even without a written rule. " Their dress," he says, " is meaner and poorer than that of other monks; so short and scanty and so rough, that the very sight affrights one. They wear coarse hair shirts next their skin and fast almost perpetually. Their constant occupation is praying, reading, and manual labor, which consists chiefly in transcribing books. In spite of this rule, a rule so strict that the Church permits members of other mendicant orders to exchange their vows for those of the Carthusians while the Carthusian can pass to no other order, the success of its members in their search for the perfect life has been marked by great success." Since

1508, in accordance with the decree of Pope Julius II, the Carthusian monasteries in every part of the world have been under obedience to the prior of the Grand Chartreuse and the chapter-general of the order.

Charity, Brothers of. — The congregation of the Brothers of Charity, of Saint Vincent de Paul, was founded in Belgium, about 1809, by Rev. I. Triest, canon of Saint Bavon, Ghent. Founded for the purpose of procuring the sanctification of its members by the practice of the three simple vows and the observation of its constitution, its special object is the ministry of charity. I his ministry, which the Congregation exercises in its several establishments, consists chiefly in maintaining and ministering to the aged, the sick and the insane; in sheltering poor workingmen; in educating children of all classes, but principally the poor, the orphan, juvenile offenders and the deaf, dumb and blind, and by performing any other work of charity to which they may be called.

Charity, Fathers of the Institute of. See Rosmin-

IANS.

Chartreux. See Carthusians.

Christian Brothers. See Brothers of the Christian Schools.

Christian Brothers, Irish. — A religious congregation founded at Waterford, Ireland, in 1802, by Edmond Ignatius Rice, for the purpose of improving the education of the poor who were unable, under the penal laws, to procure Catholic education. The rules and system adopted were those of the institute founded by De la Salle, and the first school was opened at Mount Sion, in Waterford, 1 May 1804. The success of this venture was so great that similar establish¬ ments were opened in Dublin, Limerick and other cities, and the results were so satisfactory that on 5 Sept. 1820, Pope Pius VII, acting upon the memorial of the bishops of Ireland, confirmed the institute and granted it a constitution. At the time of the establishment of the system of national edu¬ cation, in 1831, the Brothers placed their schools under the direction of the board, but when it was found that its rules regarding the absolute separation of secular and religious teaching were tending to lead them from the spirit under which they had been founded, they withdrew their connection with the government and have since conducted their schools as an independent institute under the protection of the Church. The Brothers are bound by the usual religious vows and are under the direction of a superior-general.

Christian Doctrine, Fathers of the Congregaiion of. — The congregation of the Christian Doctrine is the out¬ growth of a society which was founded

by Marco Cusani for the purpose of adopting more systematic methods in the teaching of the doctrines of the Church. When organized in 1560, the membership was composed of a number of priests and laymen who confined their efforts to teaching the cate¬ chism to children on Sundays and to the ignorant peasantry on Church holidays and such other times as it was possible to reach them, but the influence of the association was so strongly for good that it attracted the attention and appro¬ bation of Saint Pius V. Both Clement VIII, in 1596, and Urban VIII, in 1627, made the confraternity the object of their favor, the latter issuing an order providing that members leaving the community should incur the penalty of apostasy, as if monks. Pope Paul V made the society an archconfra-

ternity, and as such it remained until modern times, when it assumed the title of Congregation.

Christian Instruction, Brothers of the. — This insti¬ tute, which has for its purpose the Christian education and instruction of youth, was founded at Saint Brieuc, France, by Abb6 John Mary de la Mennais. In 1891 it was approved by the Holy See.

Christian Schools, Brothers of the. — An educational institute founded by Abb6 J. B. de la Salle in the 17th century. See Brothers of the Christian Schools.

Cistercians. — The order of Citeaux, founded in 1098 by Saint Robert as an offshoot from the Benedictines, event¬ ually became one of the most flourishing and illustrious of all the orders of the Church, but is now so nearly extinct that but few traces remain, the storms of the Reformation and Revolution leaving few of its convents in Europe. The order was founded in 1098 in the desert at Citeaux, near Dijon, by Saint Robert, who had gathered some 20 zealous hermits about him. Together they entered upon a most austere rule of life, for never was the rule of Saint Benedict followed more rigorously. There was fasting from 14 September until Easter, little sleep and much hard labor, with prayer and religious contemplation as the only relax¬ ation. This was Saint Robert's ideal of the religious life, but he was not permitted to .follow it for long, being com¬ manded by the Pope to return to Molesme, his former charge. He obeyed the order promptly, leaving Alberic as his suc¬ cessor at Citeaux, and it was he who drew up the first statutes of the order, and who changed the color of the habit from brown to white. During more modern times there have been several reforms of the order, the most celebrated being that

which was instituted at La Trappe. See Trappists.

Congregation of Jesus and Mary. See Eudists.

Conventuals. See Franciscans.

Cordeliers. See Franciscans.

Crosier Fathers. See Holy Cross, Canons of the.

Divine Love of Jesus, Missionaries of the. — A missionary congregation, with mother house in Rome and a scholasticate at Saint John Kentius College, Wash¬ ington, D. C.

Divine Saviour, Society of the. — Originally organized at Rome (8 Dec. 1881) as the " Society of Catholic Instruc¬ tion," the name of the Congregation was subsequently changed to the present title, and papal approbation was granted 27 May 1905. In addition to the three vows, members take a fourth, of apostolic mission work. In the United States, the Society has representation in the diocese of Green Bay.

Divine Word, Society of the. — The Society of the Divine Word was founded by Rev. Arnoldeus Janssen in 1875. Its object is the promotion of missionary work among the heathen and the education of youth of all races.

Dominicans, or Order of Preachers. — An order founded in the 13th century by Saint Dominic. See Dominicans.

Eudists. — 'A congregation of secular priests founded by Pere Eudes of Normandy, in 1601. Established under the names of Jesus and Mary, the Congregation had for its object the training of the clergy and the giving of missions. The Eudists make no vows and wear the ordinary dress of the secular clergy.

Feuillants. See Cistercians.

Franciscans. — The order founded by Saint Francis of Assisi in the early part of the 1 3th century. See Franciscans.

Friars Minor. See Strict Observance, in this article.

Grey Friars. See Franciscans.

Holy Cross, Canons of the. — A religious order with mother house in Holland; represented in the diocese of Saint Cloud.

Holy Cross, Congregation of the. — The Congregation of the Holy Cross was founded in Le Mans, France, 1793, by Rev. James F. Dujarie. Its object was the rehabilitation of the Christian schools then almost destroyed by the Revolu¬ tion. At first it was composed only of Brothers, but, in 1837, candidates for the priesthood were admitted under the Rev. B. Moreau, who became the first superior-general. The Congregation received the approval of the Holy See 13 May 1857, as a religious society of priests and brothers, devoting their lives to educational work in universities, colleges and schools, and missionary work at home and in foreign countries. The Congregation was introduced into the United States in 1841 when the Rev. E. Sorin, afterward to become the head of the Society throughout the world, estab¬ lished a college in the primaeval forest of northern Indiana and called the place Notre Dame. From this humble begin¬ ning grew the University of Notre Dame, one of the largest and most advanced Roman Catholic educational institutions in America. The original band of 11 has developed into a community of 275 priests and brothers, conducting colleges in various parts of the United States and Canada. Its mem¬ bers also have charge of large missions in India, and the Congregation is noted for its progressive spirit and the zealous work and scholarly attainments of its members.

Holy Cross of Westminster, Order of the. — A religious order for priests and laymen of the Protestant Episcopal Church. It was founded in New York City in 1881, but was removed to Westminster. Md., in 1892. Its

objects are the cultivation of the spiritual life of its members and the performance of good works, especially those con¬ nected with missions, retreats, etc.

Holy Ghost, Congregation of the. — The Congrega¬ tion of the Holy Ghost, otherwise known as the Missioners of the Immaculate Heart of Mary, is the result of the union, in 1848, of these two societies. The Congregation of the Holy Ghost, had been founded in Paris, in 1703, by Claude Desplaces, a Breton, while the Missioners were organized by Francis M. P. Liebermann, about 1841. Finding that the two organizations were working along practically similar lines, it was decided to effect a fusion, the rule of the Fathers of the Holy Ghost, which had already been confirmed at Rome, being retained, while the constitution adopted should be that of the Missioners. Its objects remained the same: The perfection of its members and the evangelization of the blacks, especially the negroes of Africa. Since 1848 many educational institutions have been founded, and all have been conducted with skill and ability, the most important being the French Seminary at Rome. The Society is gov¬ erned by a superior-general elected for life, while the missions are conducted under the direction of bishops or vicars- apostolic chosen from the general body. Members take the three

ordinary vows of religion, and bind themselves to the Congregation, first temporarily, but afterward per¬ petually.

Holy Infancy, Brothers of the. — The Brothers of the Holy Infancy consecrate themselves to the care of chil¬ dren, the education of the young and the reformation of juvenile criminals. They direct a Roman Catholic protectory at West Seneca, N. Y.

Holy Saviour, Companions of the. — A congregation in the Protestant Episcopal Church established for clergymen and such laymen as may be preparing for holy orders. Its members pledge themselves that, while in the Congregation, they will keep a simple rule of prayer, meditation and study in divine things.

Immaculate Conception, Regular Canons of the. — Its object is the education of the clergy for parish work as well as the education of seminarians, and yet with many houses in Europe and 16 in Canada, the institute is not represented in the United States.

Jesuits, or Society of Jesus. — An order founded by Saint Ignatius Loyola in the early part of the 16th century. See Jesuits.

Josephite Fathers. — The Josephites, or Sons of Saint Joseph, a congregation founded in Belgium (1817) and devoted to the Christian education of youth. The title is also applied to the members of Saint Joseph's Society of the Sacred Heart for Colored Missions, a society which was established in Baltimore in 1871 and which now has charge of negro missions in many parts of the South and conducts several educational institutions for colored men and boys.

La Salette, Missionary Fathers of. — A congregation founded at the shrine of Our Lady of La Salette, by Philibert de Bruillard, bishop of Grenoble, in 1852, in commemoration of the apparition which had made the shrine so famous (19 Sept. 1846). The purpose of the Congregation is based upon the teachings of " Our Lady in her Apparition," and is (1) to labor for the conversion of sinners by the preaching of missions and retreats, and (2) to devote special attention to combating the crimes of the age that were " recalled by the sorrowful voice of the Mother of God at La Salette."

Lazarists. — The Congregation of the Priests of the Mission, founded in 1624 by Saint Vincent de Paul, have always been popularly known as Lazarists, probably because of the fact that they were early located at the College of Saint Lazare in Paris. The institution was founded for the direct purpose of preaching missions in country districts in order that the peasantry might be awakened to the danger of making bad confessions, but

the avowed object of its members as specified in its constitution, confirmed by Urban VIII in 1632, is (1) the sanctifications of its own members, (2) the work of preaching missions and (3) the training of an exemplary clergy. At the present time the Congregation has houses in almost every part of the world, many Asiatic missions having been placed in their charge at the suppression of the Jesuits, in 1773.

Marian Fathers. — An Italian congregation which has an American representation in the archdiocese of Chicago.

Marist Brothers, or Little Brothers of Mary. — An order founded at Lavalle, France, in 1817, by the Venerable Joseph Benoit Marcelin Champagnat. The object is the education of youth.

Marist Fathers. — The Marists, otherwise known as the Society of Mary, is a religious order founded, about 1816, by Very Rev. Father Colin, who desired to establish an association which should u.itte the work of education with that of preach¬ ing missions. In 1818 Pope Pius VII expressed his approval of the project, and, thus encouraged, Father Colin proceeded with his work of organization. From the beginning the Society has devoted itself to the foreign missionary field. In 1836, the Congregation of the Propaganda entrusted the organization with the work of spreading the faith in western Oceania, and while no Catholic priest had ever visited the islands, the Marist Fathers penetrated even to the most savage tribes and everywhere succeeded in making converts

to Christianity. Many missionaries were martyred by the cannibals, but, never discouraged, the Fathers returned to the work of civilization and salvation. The order is now represented in nearly every part of the world.

Mary of Montfort, Company of. — Founded by Blessed Louis Marie Grignion de Montfort in 1713, to preach missions and retreats and do missionary work. In the United States the Society has a house in the diocese of Brooklyn.

Mary of Paris, Society of. — Founded for the purpose of educational and missionary work, the Society is extensively represented in all countries. The members are also known as " Brothers of Mary."

Maurists. — The popular name for the members of the Congregation of Saint Maur, that offshoot from the Bene¬ dictine order which became so famous during the 18th cen¬ tury, especially for its literary achievements.

Founded, in 1618, by Dom Benard, as a more austere branch of Benedic¬ tines, it immediately received the support of high ecclesias¬ tical authorities, and its influence extended throughout the country. While its early history was marked by its fervor for the religious life, its later record was not so brilliant. Infected by Jansenism; overrun by a demand for a relaxation of almost every rule; tainted by the pseudo-philosophic spirit of the age, and, in some places, even by Freemasonry, the dissensions which were awakened by the opposing fac¬ tions would have been sufficient to have wrecked the order ultimately even if the suppression of 1792 had not come to put an end to its existence.

Mechitarists. — A congregation founded by Mechitar, an Armenian youth of an ancient Catholic family, in the early part of the 18th century. While a firm adherent of his Church, his love for his nation was so great that he determined to devote his life to the instruction and improve¬ ment of his people. From the time of his ordination as priest, in 1699, it was his ambition to found a convent from which his educational work might be conducted; but while he made several unsuccessful efforts, it was not until about 1717, when he obtained the right to the island of San Lazarrp, from the government of Venice, that he was able to see his hopes realized. There he founded the great Armenian convent from which the works of the Mechitarist presses go forth to all parts of the world in which there are Armenians to read them.

Mercy, Fathers of. — An order founded in 1808 by Very Rev. Jean Baptiste Rauzon, vicar-general of Bordeaux, for the restoration of religion in France after the Revolution. At that time the Fathers were known as " Missionaires de France." In 1834 the Society now called Fathers of Mercy was formed, its object being to give missions and retreats, to assist the parochial clergy in preaching and to conduct colleges, seminaries and other educational institutions.

Minorites. See Franciscans.

Missions, Congregation of the. See Lazarists.

Most Precious Blood, Congregation of the. — – The Congregation of the Most Precious Blood, otherwise known as Sanguinist Fathers, was founded in 1823 by the Venerable Caspar del Bufalo. The object of the new congregation was to counteract the evil effect that the French Revolution and the subsequent wars throughout Europe had had over the minds of the people. By preaching missions and giving retreats the Fathers called attention to the Precious Blood, and their efforts succeeded in arousing such a spirit of devo¬ tion that by 1840 the community had spread over the whole of Italy and into other parts of Europe. In 1843 the order

reached the United States and established communities throughout the Middle and Western States.

Nazareth, Brothers of. — A religious order for laymen in the Protestant Episcopal Church. Founded in 1886, its objects are " prayer and manual work."

Oblates. — A congregation of secular priests who, as their name implies, " offer themselves " to perform any duty that a bishop may assign. The first institution of this char¬ acter was founded in 1578, when Saint Charles Borromeo, archbishop of Milan, organized a band of zealous priests as the congregation of " Oblates of the Blessed Virgin of Saint Ambrose." The experiment proved so satisfactory that several other congregations have since been organized, c

Observantines. See Franciscans.

Our Lady of Lourdes, Brothers of. — A congregation founded in 1830 by Rev. S. M. Glorieux, who desired to institute an order whose duty it should be to care for the orphan, to promote the Christian education of the young, especially in the case of the poor, and to nurse and care for the sick and aged. By a decree dated 18 July 1892, Pope Leo XIII gave his full approbation to the order, which is widely represented both in this country and in Europe.

Passionists, or the Discalced Clerks of the Most Holy Cross and Passion of our Lord Jesus Christ, — ■

An order founded by Saint Paul of the Cross, who assumed the habit of the order with the sanction of the bishop of Alessandra, in 1720. A year later, having formulated his rule of life, he went to Rome seeking permission to found his order. Although he was not looked upon with disfavor it was 1737 before the last obstacle was removed and the first monastery established. In 1746 the rules of the order were confirmed by Benedict XIV and, shortly afterward, Clement XIV favored the Fathers by conferring upon them the church of Saints John and Paul, on the Coelian Hill. From that day the Congregation rapidly extended, first throughout Italy, and, afterward, into other parts of Europe, even obtain¬ ing a good foothold in England by 1842. Ten years later the order was introduced into the United States by Bishop O'Connor of Pittsburgh. There are few orders that follow a more austere rule, for the Passionists fast three days in each week, as well as through Advent and Lent, and sleep little, rising to say all the offices in choir at the canonical hours. Their habit is simple, if not mean, nothing being worn on the feet but sandals, and all the time not given to the work of giving or preparing for missions or retreats is devoted to con¬

templation. Beside the three usual vows, members of this order take a fourth, that they will at all times do their utmost to keep the memory of the Lord's passion ever alive in the hearts of the faithful.

Paulists. See Paulists.

Pi CPUS. — -There have been two congregations of Picpus, the first a reform of the Third Order of Saint Francis, which was instituted by Vincent Mussart in 1594; the second, a congregation founded by Pierre Coudrin, in the latter part of the 18th century. Having, like other seminaries, been dispersed by the French government, Coudrin formulated the plan for the organization of the Congregation which should not only undertake to prepare candidates for the priesthood and the missionary field, but should protest against the infi¬ delity of the times by maintaining a perpetual adoration of the Blessed Sacrament. So well did he plead his cause that he aroused the sympathies of high ecclesiastics, and, in 1805, he was able to open the first house of his Congregation in the Faubourg Saint Antoine, Paris. By 1817, when the full appro¬ bation of the Holy See was obtained, the Fathers of Picpus were in control of several important educational institutions, and, in 1825, a company of the priests of the order were sent to the Pacific islands by Leo XII, in the hope that they might convert the savage natives to Christianity. From that time most of their activity has been devoted to mission¬ ary endeavors, and the fact that their membership has included such men as Father Damien, whose work among the lepers will never be forgotten, explains the reason for their great success in the mission fields.

Pious Society of Missions. — Founded in 1835 by Venerable Vincent Mary Pallotti, its object being to preserve the faith among Catholic emigrants and to propagate the faith among non-Catholics and infidels. The Fathers started their first American Italian mission in New York City in 1883 and the society has since extended its influence throughout the United States.

Preachers, Order of. See Dominicans.

Premonstratensians. — An order of regular canons founded by Saint Norbert at Premontre, near Laon, in 1119. The rule of the order is that of Saint Austin, its habit is white, whence its members have frequently been known as " White Canons." While its founder imposed perpetual fasting and an entire abstinence from meat as an inviolable, rule, a gradual relaxation occurred, and from time to time the order was threatened first by one then by another of the several reform movements which were instituted. In spite of this it flourished and, at one time, there were more than a thousand Premonstratensian houses in various parts of Europe. Then came the religious disturbances in England, the Reformation, and,

finally, the Revolution, at the close of which only eight houses remained undisturbed. Since that time a few more houses have been opened, especially in England, but there is no comparison between the present almost impoverished institutions and the order which was once such a powerful influence in the religious life of

Europe. „ , _ . , ...

Recollects. — A branch of the Franciscan order which has been in existence for more than three centuries. Although originally (1597) the French branch of the reform movement led by the friars of the Strict Observance its members have guarded the austerity of their rule so zealously and have kept so free of any taint of Jansenism that many favors have been shown them, one being the order which placed them in charge of the convent at Jerusalem.

Redemptorists, or Congregation of the Most Holy Redeemer. — A congregation founded by Saint Alphonsus Maria de Liguori at Scala, in 1732, as the result of his exper¬ ience in evangelistic work among the poor. Both in the great cities like Naples and in the rural districts which he had visited for the purpose of giving missions Alphonsus had found a moral and spiritual destitution which appealed to him as most pitiable, and it was his desire to institute an order of zealous men who should be willing to strive to copy the life of Jesus Christ in all things, especially in following His example of evangelistic work among the poor and needy, that led to the formation of this congregation. Beset

by many obstacles and hindered by opposition from strong political sources Saint Alphonsus persisted in his work. One by one houses were founded in different parts of the papal states, gradually they spread beyond the Alps, and when, in 1749, Pope Benedict XIV approved its rule the Congregation was in a most prosperous condition. Origin¬ ally called the Congregation of the Most Holy Saviour, the name was changed to that of the Most Holy Redeemer, by order of the Pope, but its rule remained unchanged. The members not only take the three simple vows but make a fourth, a vow of perseverance until death in the institute, and their vow of poverty binds them to refuse all dignities and offices that may be tendered them outside the Congre¬ gation. The chief occupation of the Redemptorists is the preaching of missions and retreats to persons of all classes, but especially to those who are most neglected by other clergy. In fact so anxious was the founder that the Congre¬ gation would pursue this principle, that he

forbade its mem¬ bers to undertake any educational work that might distract their minds from the neglected poor to whom he desired them to devote their lives. The order, which still flourishes, is under the direction of a superior called the Rector Major who is elected for life.

ˆResurrection, Congregation of the. — Founded in Paris in 1836 and devoted to educational and missionary work; represented in the United States in Illinois and Kentucky.

Rosminians, or Fathers of Charity. — A congregation founded in 1828, by Antonio Rosmini, for the purpose of promoting works of charity of every sort, an aim which was fully realized, for during the first 10 years of its existence its members were engaged in preaching and teaching, in giving retreats, in visiting the sick, in missionary work at home and abroad, in caring for prisons and hospitals, in alms¬ giving and in general literary labors. During this period the order had extended to England and it is now represented by houses in almost every part of the world.

Sacred Heart, Brothers of the. — A congregation founded at Lyons, France, in 1820, by Pere Andre Coindre, a member of the Society of Missions. The two objects of the institution are (1) self-sanctification by devotion to the Sacred Heart, and (2) the Christian education of youth in schools, asylums and colleges. In September 1900, at a general chapter held in France, two new provinces were established, one for the United States and the other for Canada. A novitiate house for the United States was opened at Metuchen, N. J., in June 1901, and this is now the official residence of the provincial of the order.

Sacred Hearts of Jesus and Mary, Congregation of the.-— Also known as the "Congregation of Picpus"; founded in France in 1769, for the perpetual adoration of the Blessed Sacrament and the promotion of devotion to the sacred hearts of Jesus and Mary. In 1825 the evan¬ gelization of the Sandwich Islands was entrusted to the Society. The congregation is represented in California, Texas and Massachusetts. See also Picpus in this article.

Saint Charles Borromeo, Congregation of the Mis¬ sionaries of. — A congregation founded by Bishop Scalabrine at Piacenza, Italy, in 1887, its object being to provide mis¬ sionaries to the Italian emigrants to North and South Amer¬ ica. Although the scope of work and aim of the Congregation is restricted to this field, the institution of the order met with the warmest approval of Pope Leo XIII, and his letter of 1888, addressed to the archbishops and bishops of America, in which he expressed his interest in the purpose of the new organization, did much to further its work in this country.

Saint Edmund, Society of. — An English congregation with an American house at Swanton, Vt.

Saint Francis Seraphicus, Poor Brothers of. — An institute founded 24 Dec. 1857 by Philip Hoever, principal of Saint Peter s Parish School, Aix-la-Chapelle, Germany. Its object is the promotion of the Christian education of youth.

Saint Gabriel, Brothers of. — An institute founded in 1705 by the Blessed Louis Marie Grignon de Montfort. Its object is the education and Christian instruction of youth as well as the care of deaf, dumb and blind institutions and orphan asylums.

Saint John the Evangelist, Society of Mission Priests of.— Founded by several ritualistic clergymen of the Church of England, at Cowley, England, in 1865, the objects of this society are to assist its members in striving Christian perfection and to work for the advancement of Gods glory by conducting missions and retreats, and by such other methods as He may suggest. The first company of bathers arrived in the United States in 1872, and they are now extremely influential, especially in High Church circles Saint Joseph, Order of.— A title that has been borne by two communities: (1) the Order of Priests of the Mission ot Saint Joseph, a congregation founded by Jacques Cretenet at Lyons, in 1640. Its purpose was devotion to foreign missions. It was suppressed by the Revolution. The pres¬ ent bearer of the name is the Order of Saint Joseph, a teaching order founded at Grammont, Belgium, in 1817, by Canon yˆ£[˚mbrUgghfiI ltS PˆP036 bein£ the improvement of the

anSrstrg,'a?cnia2eesCh,,'lren ˚f ˆ ˚f 'h=

Saint Joseph's Society of the Sacred Heart. — See Josephite Fathers, in this article.

Saint Viateur, Clerics of. — The community of the Clerics of Saint Viateur was founded in 1835 by Very Rev. F. L. M. J. Querbes, pastor of Vouries, near Lyons. Its objects are educational.

Salesian Fathers. — The order of Salesians is a society of priests and lay brothers founded by Don Bosco, a priest of Turin, Italy, in 1864. In 1874 the order received the approval of Pope Pius IX. Its primary object is the rescuing of poor, homeless boys from the street, providing them with food and shelter in the institute of the Society. There they receive a sound moral and religious education as well as practical instruction in some one of the arts, sciences or branches of trade, according to their inclination or ability. The Society is also engaged in other educational work.

Sanguinists. See Most Precious Blood, Congrega¬ tion of the, in this article.

Strict Observance, Friars of the. — An austere branch of the Franciscans established by Blessed John de Puebla, on the Sierra Morena, in Spain, 1489. The branch, however, soon became a separate congregation and so remained until the various factions of the Observantines were reunited as " Friars Minor," by Pope Leo XIII, 4 Oct. 1897.

Sulpicians. — A society of priests founded in 1642 by Abb6 Jean Jacques Olier at the seminary of Saint Sulpice in Paris. The members devote themselves to the direction of theological seminaries. The Sulpicians established a house in Montreal early in the 17th. century, for the education of the Indians. Until 1900 a very large proportion of the Catholic Clergy of North America were trained by thesociety. In the United States the most famous house of the society is that of Baltimore, Md.

Sylvestine Benedictines. See Benedictines.

Theresians. — A name applied to those Discalced Car¬ melites who live under the reform rule of Saint Theresa.

Trappists. — A reform of the Cisterian order instituted in 1662 by Armand Jean le Bouthillier de Ranee. Assuming control of the abbey of La Trappe, in 1660, he found it in a most deplorable condition. The Cistercian rule had been so far relaxed that many of the members had ceased to live in community, and de Ranee devoted all his efforts to the res¬ toration of regularity and order. Establishing what he. called the " Strict Observance of the Cistercian Order," he succeeded in persuading some monks of the Strict Observance to come to his assistance, and together they completely restored the discipline of the monastery. From La Trappe this austere rule spread into other parts of Europe where it met with such instant favor that some of the most flourishing monastic houses in the world are now those of the Trappist reformers.

Vincentian Friars. See Lazarists.

White Friars. See Carmelites.

Xaverian Brothers. — A teaching institute founded at Bruges, Belgium, by Theodore James Ryken, in 1846. The purpose of the founder was to organize " a congregation of men who would willingly sacrifice their lives to the Christian education of youth," an object which has been adhered to so closely that the order has long been regarded as one of the most successful teaching institutes of the Church.

Oratories.

The Oratory which has been such an important factor in the evangehstic work of the Roman Catholic Church, espe- 9ˆ v m England, had its inception in the mind of Saint Philip Neri, a native of Florence in the 16th century. Always con¬ spicuous for the purity of his life and the desire to do good for young men, he early gathered about him a number of sympathetic souls who were ready to follow his guidance in order that they might lead a life of greater religious regularity. Although still a layman he preached to them in private, teaching them how to show more zeal for God, without retiring from the world. In 1551, upon the advice of his confessor, Philip received holy orders, but even then he con¬ tinued to receive his congregation in private, either in his own room or in a larger chamber, and it was from these daily colloquies that he evolved the system of evening exercises which has always been maintained by his Congregation. This consists of a popular devotional exercise, a few hymns and a. plain sermon preached, somewhat conversationally, directly at the hearts of the people. These exercises, which were held on every week-day evening .except Saturday, became so popular that, in 1558, he obtained permission to build a chapel the church of Saint Jerome. He called it an oratory , and it was from this that his Congregation obtained its name. It was at about this time that Philip's work attracted the attention of some of the most zealous churchmen in Europe, and so many of them joined him that, ln J564, he felt justified in assuming charge of the church of Saint John the Baptist which had just been completed at Rome. In 1575 the Congregation had so increased in num- bers that it was deemed necessary that they should have an establishment of their own, and, the old church of the Valli- celli being ceded to them, Philip began the erection of the

present edifice, called the " Chiesa Nuova," on the old site. At its completion he rejoined his Congregation, the consti¬ tution of which had already been approved by Pope Gregory XIII, and remained in Rome until his death, in 1595. The conception which was the basis upon which Saint Philip founded his Congregation was that there were people in the world who were not in sympathy with the work of the monastic orders but who might be reached if sought in another way. He proposed, therefore, that his Congregation should be composed of simple priests. They should take no vows, and while they should be bound by a certain rule of life while associated with the community, they might with¬ draw without reproach at any time. To his followers he taught his methods, imbuing them so zealously with the spirit of his work that it is still conducted as if he himself were present to direct it. Instead of taking a combative position he assumed one of tranquillity. Instead of going out in search of sinners he sat in his

own room and let them come to him. He abhorred all that savored of the systematic; he made few attempts at the exposition of doctrine, and he avoided the catechetical schools. Instead he accepted the inevitable, the conditions which he knew he could not change, and simply tried, as Cardinal Newman said, " to sweeten and sanctify what God had made very good and man had spoilt." With unaffected humility and love he gathered " his family " around him, and they, convinced by the elo¬ quence of his personal character, took up his work and fol¬ lowed him. For nearly three centuries the work of the Oratory was confined to Italy, but, in 1847, Dr. Newman introduced it into England. The first house was instituted at Mary Vale, or Old Oscott, but, in January 1849 it was transferred to Alcaster street, Birmingham. A few months later Father Frederick Faber, one of the most eloquent m< i the Oratory has ever produced, opened another house at King William street, Strand, London, where, assisted by several of the priests from Birmingham, he soon gathered a large congregation of listeners. For about a year the London house was in affiliation and under the direction of the house at Birmingham, but as such a system was not entirely in keeping with the spirit of the constitution, which provided that each house should be independent, the London Oratory was released from its obedience to the older oratory in 1850, and, shortly afterward, it was transferred to Brompton, from which place it has exerted a wide influence over Catholic thought in England. During the history of the Roman Catholic Church other congregations have adopted the title of "The Oratory." In 1611 Cardinal de Berull of Paris organized a society of priests under this name, which, in 1614, was changed, by Pope Paul V, to " The Congregation of the Oratory of Our Lord Jesus Christ in France." Like the Italian Oratory of Saint Philip, the members of the French society were simple priests. As Bossuet says, its founder "preferred to give no other spirit to his company but the spirit of the Church itself, no other rule than her canons, no other superiors than her bishops, no other bond but charity, and no vows but those of baptism and ordina¬ tion." The object of this organization was chiefly to pro¬ mote the spirit of devotion among the secular clergy, a work which was partly conducted by the institution of seminaries for the education of candidates for the priesthood. At the death of the founder, in 1629, the Congregation was repre¬ sented by more than 50 seminaries, colleges and houses of retreat, while it was generally admitted that the Society had been the means of deepening the ecclesiastical devotion and strengthening its discipline, an influence which was already making itself apparent throughout the entire population. After the death of the cardinal the work was continued under the direction of Pere de Condren, who was followed by other good men and strong leaders, and while for a time its useful¬ ness as a Church organization was threatened by the influence of Jansenism, which found many converts among its members, the orthodox section finally proved the stronger, and

the bull was accepted by the vote of the Congregation in 1746. When other orders were immediately suppressed by the Revolution the Congregation's valuable w

Orders of Women.

The following is a list of the most promi¬ nent orders of women that have been or are now in existence in the Roman Catholic and Protestant Episcopal churches and that have houses in the United States :

All Angels, Community of. — A sisterhood in the Protestant Episcopal Church. Founded by the bishop of

Delaware and incorporated in 1895, its members are engaged in all kinds of educational and charitable work, including the care of a day nursery and orphanage for factory children. The order is under the direction of the bishop of Alabama.

All Saints' Sisters of the Poor. — An order estab¬ lished in the Church of England in 1851 by Rev. W. Upton Richards, and introduced into the United States by the bishop of Maryland in 1890. Its members have undertaken all kinds of charitable and educational works, ranging from fashionable boarding schools for young ladies to day mission schools for colored children.

Angelicals. — An order of nuns, followers of the rule of Saint Augustine, founded by the Countess of Guastalla, in

1530.

Annunciation of the Blessed Virgin Mary, Sisters of. — A society incorporated in 1893 to receive and care for incurable and crippled girls between the ages of 4 and 16 years.

Apostoline Sisters. — An order founded at Loda, Ill., 15 Aug. 1884, by Rev. Louis Heidemann. Its object is the education of youth.

Assumption, Sisters of the.— An order founded by Monsignor Affre, archbishop of Paris, jn 1839. It is chiefly an educational order. The Little Sisters of the Assumption nurse the sick poor in their own homes night and day; caring for the children and the house in order that the home may not be broken up during the illness of some of its members. For these services they accept no pay, not even food.

Atonement, Sisters of the Society of the. — Founded as a Protestant Episcopal religious order for women and received into the Roman Catholic

Church, with the other branches of the Society of the Atonement, 30 Oct. 1909.

Baptistine Sisters. — The Baptistines were founded in 1730 and the mother house, in Rome, was established in 1755. In the United States, the Sisters conduct orphan asylums and day nurseries in New Jersey and New York.

Bernadine Sisters. — An order of women devoted to educational work. The Bernadine Sisters of Esquermes conduct an academy in Nebraska. The Polish order of Bernadine Sisters of Saint Francis conducts both schools and orphanages in several cities of Pennsylvania, the mother house being at Reading.

Bethany, Sisters of. — An order founded in New Orleans, La., and now under the pastoral care of the Epis¬ copal bishop of that diocese. Its object is the care of neglected children.

Bon Secours, Sisters of. — Instituted by Monsignor de Quelen, archbishop of Paris, 1822, for the purpose of caring for the sick in their homes and for the orphans in asylums provided for them. The Sisters of Notre Dame de Bon Secours, founded in 1840, by Rev. Paul Sebastian Millet of Troyes, France, has practically the same object.

Blessed Sacrament Sisterhoods. — The orders of Blessed Sacrament nuns are of recent origin. Those of the Perpetual Adoration, as their name implies, devote their constant attention upon the devotions tc the Holy Eucharist. The Sisters of the Blessed Sacrament for Indians and Colored People is an American order, founded in 1889, by Mother Mary Katherine. Its purpose is the elevation, education and Christianization of the two races.

Blessed Virgin Mary, Institute of. — One of the few Roman Catholic orders of English origin instituted since the Reformation, it was founded by Mary Ward, the daughter of a gentleman of large estate, in 1611. A teaching Order of the highest class, it prospered from the first, and it is still a flourishing religious institute, being popularly known as " the Institute of the English Virgins." The rule of the order has always been practically the same as that of the Society of Jesus.

Carmelites. — The female branch of the Carmelites, founded in 1452 And reformed by Saint Theresa in 1562. It is largely represented in the United States, with mother house at Baltimore and 10 monasteries. (See Carmelites). The Carmelite Sisters of the Divine Heart of Jesus came to America in 1912 and now have houses in Indiana and TexaS.

Cenacle, Ladies of the. — An order founded in France in 1826, the Sisters

devoting themselves to the perpetual adoration of the Blessed Sacrament and to spiritual works, especially in giving retreats and teaching Christian doctrine. The Society now has several houses in the United States, the first having been established in 1892.

Charity, Sisters of. — There are many orders and branches of orders in the Roman Catholic Church which bear the name of Sisters of Charity. Some of them are also called " Gray Sisters," or " Gray Nuns," " Daughters of Charity," " Sisters of Saint Vincent de Paul," etc. The oldest order was founded in Paris in 1634, by Samt Vincent de Paul, assisted by Mile. Louise le Gras, and its consti¬ tution has never been changed. Instead of making perpetual vows the Sisters take the simple vows, which are renewed annually, when they also add a fourth vow, binding them¬ selves to care for the sick. The order of Sisters of Charity in the United States was founded by Mother Seton, who, after her conversion to the Roman Catholic faith, devoted her life to the charitable works of the Church. Her first

community, which was known as the Sisters of Charity of Saint Joseph, was established at Emmitsburg, Md., 31 July 1809. The Sisters of Charity of Cincinnati, Ohio, are a branch of the order founded by Mother Seton. The Sisters of Charity of Saint Paul are a congregation largely devoted to teaching. It was founded in 1704 by M. Chauvet, a French cur6, assisted by Mile, de Tylly. The Sisters of Charity (Irish) are an order which is very similar in purpose to that founded by Saint Vincent de Paul. Its members minister to the sick and poor in hospitals and at their own homes. It was founded in 1815 by Mrs. Mary Frances Aikenhead. The congregation of Sisters of Charity of the Blessed Virgin Mary devote themselves exclusively to the education of youth. The order was founded in Philadelphia, Pa., by Very Rev. Terence James Donoghoe, assisted by Mother Mary Francis Clarke, its first superior- general, on 1 Nov. 1833. The Sisters of Christian Charity devote themselves to educational work and to the care of poor and orphaned children. The Sisters of Charity of Nazareth are an American community, founded in 1812. The founders of Nazareth were Rt. Rev. J. B. M. David of Bardstown and Catherine Spalding. Branch houses were established in Bardstown in 1818 and at Saint Vincent's, Union County, Ky., in 1820, and in 1829 the Congre¬ gation was incorporated by the legislature of Kentucky under the title, " Nazareth Literary and Benevolent Insti¬ tution." On many occasions since their foundation the Sisters have performed heroic service, notably during the cholera epidemic, 1832-33, caring for the soldiers during the Civil War, in the yellow fever epidemic 'of 1878 and in other visitations of contagious disease. Out of the cholera

epidemic of 1833 grew their first orphan asylum, Saint Vincent's, in Louisville. The Sisters of Charity of Our Lady, Mother of Mercy, are a congregation founded by the Most Rev. John Zwyzen, archbishop of Utrecht, in 1832. Its purpose is the education of youth, as well as the care of the sick, aged and orphaned. The latest work undertaken by these Sisters is the care of the lepers at Paramaribo, Dutch Guiana. The order of Sisters of Charity of Providence was founded in Montreal 25 March 1843. Its work is educational and charitable, including the care of hospitals. The Sisters of Charity of Saint Elizabeth, the Sisters of Charity of Palletine, the Sisters of Charity of Saint Augus¬ tine and the Sisters of Charity of Our Lady, Mother of Mercy, are devoted to charitable and educational work. The Sisters of Charity, Servants of the Poor; Sisters of Charity of the Cross (Gray Nuns); the Sisters of Charity of the General Hospital of Montreal, the Sisters of Charity of Saint Louis and the Sisters of Charity of the Hospital of Saint Hyacinthe, are Canadian orders devoted to the care and education of the sick and poor.

Charity of Saint Vincent De Paul, Daughters of. — A society founded in 1633. The members are not bound by perpetual vows but take the simple vows of religion on the 25th of March of each year. The mother house is in Paris. There are two provinces in the United States where the Sisters conduct hospitals, insane asylums, orphan¬ ages, day nurseries, industrial schools and other establish¬ ments.

Cistercians. — The female branch of the order of Cistercian monks.

Cross, Daughters of the. See Grey Nuns of the Cross, in this article.

Cross and Passion, Daughters of the. See Pas- sionist Nuns, in this article.

Discalced Carmelites. See Carmelites.

Divine Compassion, Sisters of the.-— A. congregation founded in 1873 by Rt. Rev. Mgr. Preston. Its object is the mental and moral training of young girls.

*Divine Saviour, Society of. — A congregation insti¬ tuted in Italy for the purpose of caring for the sick in their homes. **

Epiphany, Society of the. — A Protestant Episcopal sisterhood, established in 1897 by the bishop of Washington, D. C. Its objects are the protection and training of the young, and the giving of spiritual assistance to women living in the world by providing retreats and religious instruction for them.

Faithful Virgin, Sisters of the. — An order founded in Normandy, about 1840. Its purpose is the care of orphans.

Felician Sisters. — Founded in Poland, in 1855. When suppressed by the Russian government, in 1864, the mother house was transferred to Cracow, Austria, where it is now located. The Congregation established its first house in the United States in 1874. It now has three provinces and conducts about 90 schools as well as orphanages, homes for the aged, day nurseries and homes for emigrants and working girls.

Good Shepherd. — There are several sisterhoods of the Good Shepherd. The oldest order, the Sisters of the Good Shepherd, was founded by Pere Eudes, of the Eudist Fathers, assisted by Marguerite l'Ami, in 1641. The Sisters of Our Lady of Charity of the Good Shepherd of Angers are a community founded by Mother Mary of Saint Euphrasia Pelletier, m 1827. The Sisters of Our Lady of Charity of Refuge were also founded by Pere Eudes (1651) and were

introduced in America by Rt. Rev. John Timon, bish >p of Buffalo, N. Y., in 1855. Each of these orders has for its objects the training of young girls to virtue, and the reformation of fallen women.

Good Shepherd Sisters. — There are now two branches of the sisterhood of the Good Shepherd in the Protestant Episcopal Church in the United States. The Saint Louis branch, incorporated in 1867, has charge over Bishop Robert¬ son Hall, the diocesan school for girls; the California branch. Sisters of the Order of the Good Shepherd, has charge over the Old Ladies' Home, the Sheltering Arms, three hospital missions and the parish visiting.

Grey Nuns of the Cross. — A community, founded in 1745, which takes its title from the color of the habit worn by the Sisters. For more than a century the activities of the community were confined to Canada but in 1857, a school was opened in Buffalo, N. Y., and 18 establishments are now conducted in the United States, including academies and other schools, hospitals, orphanages and homes for the aged.

Helpers of the Holy Souls, Society of. — A congre¬ gation which, instituted in Paris, France, was established in New York City in 1892. Its purpose is to visit and nurse the sick poor in their homes, and to provide religious instruction to children and adults, all its work being under¬ taken with the view of helping the souls in purgatory.

- *Holy Child Jesus, Sisters of. — A cloistered sister¬ hood devoted to the care and education of children.*

Holy Child Jesus, Sisterhood of the. — An order established by the Protestant Episcopal bishop of Albany, for the purpose of conducting educational and charitable works in his diocese.

Holy Communion Sisters. — There are two branches of the Sisterhood of the Holy Communion in the Episcopal Church, and both are established in New York City. The older branch, which was organized by Rev. Dr. Muhlenberg in 1852, was the first order of Episcopal Sisters to be established in America. Its members are engaged in parish visiting, nursing, the care of the altar service and clerical vestments, and in various kinds of educational and chari¬ table work. The younger sisterhood conducts a shelter for respectable girls.

Holy Cross, Sisters of the. — A congregation founded at La Mans, France, in 1839. Its objects are educational and the care of hospitals and orphanages. The first Ameri¬ can novitiate was opened at Bertrand, Mich., in 1844, and this was rapidly followed by schools for Indians and other foundations. During the Civil War, about 70 of the Sisters were in charge of several important military and naval hospitals. The Congregation now conducts more than 60 institutions, including one college, schools, hospitals and orphanages. The Congregation of the Sisters Marianites of the Holy Cross was founded in France in 1841, and established its first American mission in Canada in 1843 and in the United States, at New Orleans, in 1851. In 1861 the Sisters opened the asylum of Saint Vincent de Paul, in New York City. The members of the Congrega¬ tion take only simple vows and devote themselves to the care of the sick, the charge of orphans and the education of youth.

Holy Family. — There are several sisterhoods of the Holy Family. The oldest, the Congregation of the Sisters of the Holy Family, a colored sisterhood, was founded in 1842. The Sisters conduct educational and charitable establishments in the archdiocese of New Orleans. The Sisters of the Holy Family of Nazareth was founded in 1874 by Frances Siedliske, a noble Polish lady. The Sisters of the Holy Family in California devote themselves to the relief of the sick and the poor, caring for and educating very young children whose mothers are obliged to work. The Little Sisters of the Holy Family is a community founded at Memramcook, New Brunswick, in 1874. Its one purpose is the temporal care of educational institutions.

Holy Ghost, Sisters of. — An order founded in 1850 by. the late Archbishop Hennessy of Dubuque, Iowa. Its objects are: (1) The glory of the Holy Ghost, and (2) the promotion of Christian education. The order of the Sister-Servants of the Holy Ghost was founded in Stell, Holland, in 1889. There is no affiliation between these orders. The Congregation of the Daughters of the Holy Ghost was founded in Brittany in 1706, its members being known as the " White Sisters," from the color of their habit. When driven from France, in 1902, they were invited to the diocese of Hartford, by the late Bishop Tierney and they now have about 25 houses in, several dioceses' The Sisters of the Holy Ghost (for colored people) is an American society, established in 1886, and now conducts several houses in Texas.

Holy Heart of Mary, Sister-Servants of. — An order founded by Rev. Father Delaplace of Paris, France, in 1860. Its members conduct all kinds of works of charity

Holy Humility of Mary, Sisters of thf — A com¬ munity founded in France, in 1854, by Rev. John Joseph Begel, assisted by Miss Antoinette Poitiers. In 1864 the entire community, with its founder, immigrated to the United States, and settled near the village of New Bedford Lawrence County, Pa. The works of the Sisters include

arˆthp'rWn-

it ?? hospital in the diocese of Sacramento.

A COmrrmntiˆMf'S °J iESUˆ AND MaRY- SlSTERS OF THE. –

objects are /duStlonfl.01 Longueuil' ™ ««• Its*

ishedˆiif Sisterhood of the. — An order estab-

Enisconal bicjViˆr. \ ?eY G- p- Grafton, Protestant

SS bJ?h°p °/ F?nd du Lac- Its members are engaged TJrs kmds °i missionary and parochial work. Immaculate Conception, Sisters of the. — Founded

Famifv C6tbn 1820 kS a bfanch of the Institute of the Holy work ' ˆemhfls dev°te themselves to educational

schools in the SScˆoF Ne'w OrieaX""ˆ"" C°ndUC'S thf_aCULATE Heart of*

Mary, Sister-Servants of Most Rpv Pgpgam0n Lmndedm Quebec, in 1850, by hi Mr n P‘ F\JuI?e

fk thT or^e°rthe Th1 atK • °f thefSacr^d Heart, the first superior mThp df Tbe ohpPl °f the Congregation are two-fold:

of chfidren0rrT£° n°f S’” w°m?n< and (2) the education 75′ B- Lighters of the Immaculate Heart of wS lnstJutf.d m France, perform all kinds of charitable i?dUiCtmR academies, orphanages, female industrial schools, kindergartens, homes for working girls mental

fad wnammgTSCcC°0lS for .deaf-mutes, night refuges for home¬ less women, Indian missions, etc.

„„ I^ARNATE YOIrD A^D, Bl?ssed Sacrament, Sisters

T^PrC Aa f°Vnded at Lyons’ France, by Venerable

Jane Chezard de Matel, m 1625. The American foundation was made at Brownsville, Tex., in 1852. Although the order has many houses in various parts of the world they are independent of each other. The Sisters of Charity of the Incarnate Word are an American offshoot of the French community, having been founded by Rt. Rev. C. M. Dubois, bishop of Texas, in 1866.

Infant Jesus, Sisters of the. — A congregation devoted to the nursing of the .sick poor in their homes without compensation. The mother house and novitiate is in Jorooklyn.

Jesus, Daughters of. — A congregation founded for ° ^be Slcb Poor and the education of girls. In 1893 Sisters were sent from France to open the first pro- vincial house m America, at Three Rivers, Canada, and a lew years later they came to the United States, where they have several establishments devoted to the education of youth and the care of the sick and orphans.*

Jesus, Society of the Faithful Companions of. — A congregation instituted at Amiens, France, in 1820, by Mme. de Bonnault d’Houet (nee de Bengy). While its mam objects were and are the sanctification of souls and the improvement of female education, the order has been engaged in parochial school work for many years.

Jesus-Mary, Religious of. — A congregation founded Lyons, France, in 1811, by the Abbe Coindre. Its purpose is the care of orphan asylums and the education of young girls, especially in boarding schools.

La Sagessa, Sisters of.— An order founded in 1703 by the Blessed Louis M. Grignon de Montfort, assisted by Miss Louise Trichet, afterward Sister Mary Louise of Jesus. Its works are educational and charitable.

Little Company of Mary. — An order founded about 1870 in Nottingham, England. Its purpose is the care of the sick in their homes and in hospitals.

Little Sisters of the Poor. — An institute established m 1840 by M. la Pailleur, ■ the cur6 of Saint Servan, in Brittany, and formally approved by the Holy See in 1854. Its object is the establishment of permanent homes for the aged and infirm of both sexes without distinction of creed or nationality. The Sisters of the Poor of Nazareth is an English offshoot from the Little Sisters.

Loreto Nuns. — There are several orders of Loreto Nuns, the oldest being that of the Ladies of Loreto, founded at Munich, Bavaria, by Mme. Maire, in 1650. Its first American house was established at Toronto in 1847. — The Society of Sisters of Loreto, or Friends of Mary at the Foot of the Cross, was founded by Rev. Charles Nerinckz, a Flemish missionary, in 1812. Another branch of the Sisters of Our Lady of Loreto was established by Mrs. Mary Teresa Ball, at Rathfarnham, near Dublin, Ireland, in 1822. It was from this foundation that have sprung the many con¬ vents of Loreto nuns in Ireland. Although not affiliated, the objects of the orders are very similar. Their work is educational and missionary.

Mantellate Sisters. — A small congregation con¬ ducting a school in the diocese of Superior, Wis.

Marist Sisters.— An order founded by Father Colin of the Marist Order, in 1817. Its objects are educational.

Mercy, Sisters of. — An order founded in Dublin, Ireland, in 1827 by Miss Catherine McAuley, afterward mother superior. Besides the three vows the Sisters took a fourth to devote their lives to the service of the poor, the sick and the ignorant, an obligation which has been observed so zealously that the order has become one of the most important communities in the world. The sisterhood was introduced into the United States in December 1843, when

seven Sisters came from Carlow, Ireland, to establish a convent at Pittsburgh, Pa.

Mercy Sisters of.— The Church of England order ot Sisters of Mercy was founded about 1845 by Miss Lydia bellon at Devonport. The only vow exacted is that of obedience during community life, and members are permitted to withdraw from the convents at will.

Mercy of the Holy Cross, Sisters of. See Holy Gross, Sisters of the, in this article.

Misericorde, Sisters of. — An order founded in 1848 by Monsignor Bourget, assisted by Mme. Roselle Jette, afterward Mother Saint Lucie, superior-general. Its objects are tot care the S1CL and of homeless infants.

Mission Helpers, Institute of.— Founded at Balti¬ more, Md., m 1888, its Sisters visit the sick and poor in their homes and give religious instruction to children and aauits. I he direct object of the community is to advance the perfection and assist in the sanctification of the priesthood.

Most Holy Cross and Passion, Sisters of the. See Passionist Nuns, in this article.

Nostra Domina, School Sisters de. — A congregation established in Bohemia to conduct establishments for the care and education of youth. It has several houses of this character m the United States.

,, Notre Dame Sisters. — There are several orders of the Sisters of Notre Dame. That of the School-Sisters of ˆotre Dame was founded in 1803 by the Venerable Julie

lliart, assisted by her friend, the Viscountess de Gezain- lts object is the salvation of the souls of poor t 1 dJiej‘ Sisters of Notre Dame are a community

f.˚uaded at Montreal, Canada, in 1657, by the Venerable Mother Marguerite Bourgeoys. Its object is the instruction or youth. The Congregation of Notre Dame de Sion was founded at Paris in 1843; the Sisters of Notre Dame de Namur, in 1803.

Lady of Charity of the Good Shepherd, Sisters

_ See Good Shepherd Sisters in this article.

Uur Lady of Good Counsel, Sisters of. — A com¬ munity founded m 1894 by Bishop Labrecque of Chicoutimi. Its objects are solely educational.

G V R , Lady of the Holy Rosary, Congregation of. —

ounded at Rimouski, province of Quebec, Canada, 12 Sept. 1879, its object is the Christian instruction and educa¬ tion of the poor.

Our Lady of Lourdes.— The order of Our Lady of Lourdes was founded by Archbishop Perche of New Orleans, on 25 reb. 1883.

Our Lady of Mount Carmel, Sisters of the Con¬ gregation of. See Carmelites.

Our Lady of Perpetual Help, Sisters of. — An order rounded at Saint Damien, province of Quebec, Canada, by Kev. J. O. Brousseau, assisted by Mile. Virginia Fournier, afterward Sister Saint Bernard, the first superioress of the community. Its objects are educational.

Our Lady of Sion, Congregation of. — Founded at Strassburg, m 1842, by M. Alphonse Ratisbonne, of a wealthy Jewish family, in commemoration of an apparition of the Blessed Virgin Mary with which he claimed he was favored, and which had resulted in his conversion. The rule of the Congregation aims at the union of the active with the contemplative life, and its object, which bar never changed, is the care and education of converts from Judaism.

I he most important houses of the Congregation are located in Palestine and Syria.

Our Saviour, Regular Canonesses of the Five Wounds of. — A congregation founded at Lyons, France.

Its purposes are both educational and charitable.

Passionist Nuns. — The first convent of Passionist nuns was established in Coronato, in 1771, by Mother Mary of Jesus Crucified, and several convents have since been opened m other parts of Europe. In May 1910, five Pas¬ sionist nuns from Italy established their work in Penn¬ sylvania. The Sisters of the Most Holy Cross and Passion is a second Order of Passionist nuns.

Perpetual Adoration, Religious of. — The Congre¬ gation was founded at Brussels in 1857, and the members devote themselves, not only to the adoration but to all that tends to increase the devotion to the Blessed Sacrament.

A foundation of the Congregation was established in Wash¬ ington, D. C., in 1900. Among other congregations in the United States devoted to these purposes are: Benedictine Sisters of the Perpetual A.doration, with mother house at Clyde, Mo.; Franciscan Sisters of the Perpetual Adoration, mother house at LaCrosse, Wis.; Sisters of the Perpetual Adoration, m the diocese of New Orleans, and the Sisters of the Sacred Heart and of Perpetual Adoration, a French order with a convent at Fairhavcn, Mass. The Perpetual Adorers of the Blessed Sacrament are also termed Sacra mentine Nuns.

Pious Society of Missions, Sisters of the. — A congregation founded to assist the priests of the Pious Society of Missions in their work by acting as teachers and catechists.

Poor Clares. See Saint Francis, Sisters of. e Handmaids of Jesus Christ. — A congregation

of Sisters founded at Dernbach, Germany, in 1851, by

Miss Catherine Kaspers. Its rule, which was compiled by Rt Rev. T. P. Blum, bishop of Limberg, and its objects, which are' in the highest sense charitable, were approved by the Holy See in 1870. The order was introduced into the United States in 1868, by Rt. Rev. J. H. Luers, bishop

of Fort Wayne, Ind. _

Presentation of the Blessed Virgin Mary, Order of the. — An order founded in Ireland, 1777, by Miss Namo Nagle. At first there was no enclosure and members tooK simple vows only, which were renewed annually, but, m 1805 Pope Pius VII raised it to the rank of a religious order with 'solemn vows and strict enclosure. A fourth vow was then added by which the members bound themselves to devote their lives to the work of instructing poor girls in the precepts of the Christian faith.

Providence, Sisters of. — The Sisters of Providence, who also devote themselves to the instruction of young girls, were founded in Lorraine, in 1762. by the Venerable Jean Martin Moye. The first institution of the order m America was opened at Saint Mary s, near Terre Haute, Ind. 22 Oct. 1840. There are several branches ot tne Sisters of Providence, including the Oblate listers of Provi¬ dence, the Sisters of Divine Providence and the Sisters ot

Providence of Kentucky. , ,

Redemptorists. — The Sisters of the Order of the Most Holy Redeemer are affiliated with the Redemptorist order of monks. They are strictly enclosed and contemplative and assist the missionaries by their prayers.

Resurrection Sisters.— There are two orders ot Resurrection Sisters in the Episcopal Church of the United States. The Sisters of the Resurrection were insti¬ tuted by the bishop of Florida in 1891. Its members con¬ duct an educational and industrial school f

Sacramentine Nuns. See Perpetual Adoration, Religious of, in this article. . , T

Sacred Heart, Ladies of the. — The Society of Ladies of the Sacred Heart was founded at Amiens, France, by Pere Joseph Varin, S.J., assisted by Mile. Madeleine Sophie Barat, in 1800. The community, which is semi-cloistered and follows the rule of the Society of Jesus, has for its object the Christian education of youth in boarding a,nd parochial schools. The Missionary Sisters of the Sacred Heart devote themselves to the care of the sick and the orphan as well as to general educational work. The Sisters of the Holy Union of the Sacred Hearts, a congregation founded at Douai, France, in 1828, by the Abb6 Debrabant, restricts its efforts to works of an educational character, its rule and constitution were arranged from the somewhat mild rule prescribed for the Visitation Nuns by Saint Francis de Sales. The Mission Helpers of the Sacred Heart conduct classes in rural districts and immigrant settlements, visit the poor and sick in their homes, instruct women and children in penal institutions and conduct schools for the deaf and dumb, industrial schools for indigent girls and orphanages. The mother house is in Baltimore.

Sacred Heart of Saint Jacut, Sisters of the.— A French congregation in charge of domestic departments at

seminaries and rectories. , . c a a

Saint Agnes.— The Sisters of Saint Agnes were founded at Fond du Lac, Wis., 1 Aug. 1870. Its objects are both

charitable and educational. , , , .,

Saint Ann, The Sisters of, were founded at Vaudreuil, province of Quebec, Canada, by Monsignor Ignace Bourgot, in 1850. Its objects are chiefly educational.

Saint Augustine, The Sisters of, correspond to the Augustinian monks. WLile very old and widely represented in Europe there are but two branches of the order in America; the Sisters of Charity of Saint Augustine, established at Cleveland, Ohio, in 1850, by Sisters from Boulogne, France, and the Sisters of the Order of Saint Augustine now in char e of the Hospital of the Precious Blood, founded at Quebec in 1637, by Sisters from Dieppe, France.

Saint Basil the Great, Sisters of the Order of. — A congregation under the Ruthenian Greek rite, the members of which conduct schools and orphanages. The mother house is at Philadelphia.

Saint Benedict. — The order of Sisters, corresponding to the monks of Saint Benedict, was introduced into the United States by Rt. Rev. Boniface Wimmer in 1846. The first colony of Benedictine Sisters came from Eichstadt, Bavaria, and established their convent at Saint Mary's, Elk County, Pa. Many other convents have since been established 'in various parts of the country, including houses of the orders of the Benedictine Sisters of Perpetual Adora¬ tion, and the Oblate Sisters of Saint Benedict (Olivetaners). In 1906 Benedictine nuns from Basses, Pyrenees, France, established a house at taint Benedict, La., and are known as the French Benedictine Sisters.

Saint Bridget. — The Sisters of Saint Bridget, or the Order of the Holy Faith, was founded in Dublin, Ireland, in 1857. Its purpose is the care over the religious education of poor girls and boys.

Saints Cyril and Methodius. — A congregation estab¬

lished to conduct schools and orphanages. The mother

house is at Plymouth, Pa. . .,

Saint Casimir, Sisters of. — The Institute of the Sisters of Saint Casimir was founded in 1908 and has for its purpose the education of children of Lithuanian birth or descent. The mother house is at Chicago.

Saint Chretienne, Sisters of.— A congregation which conducts schools in several New England sections. The nrovincial house is at Salem, Mass.

Saint Dominic. — The order of Sisters, corresponding to the monks of Saint Dominic, was introduced into the United States by Rev. Thomas V llson m l 822; J'h<; ˆ u convent was established at Springfield, Ky., from which mother house convents have been established throug o the country. Their objects are educational and charitable. The Dominican Nuns of the Second Order are strictly cloistered and have perpetual adoration of Sacrament. The Dominican Sisters of the Third Order of Saint Dominic were brought to this country m 18 ,

by Rev. J. Rochford, O. P., then provincial of the order. The Sisters conduct parochial schools and institutions ior destitute children of both sexes. The community of .Domin¬ ican Sisters known as the Congregation of Saint Catherine de Ricci, was founded by Rt. Rev. Bishop McNeirny of Albany, N. Y., in 1880. Their objects are to give retreats for women and young girls, to prepare candidates for tne sacraments, and to offer prayers and penance for the con¬ version of sinners, especially drunkards and blasphemers. The Dominican Sisters of the Perpetual Rosary, as the name implies, are in charge of the management of the Perpetual Rosary in

America. Their house at Vest Hobo¬ ken N. J., was established in 1891 by Sisters from Bon Secours, France. The Dominican Sisters of the Sick Poor, are founded for the purpose of caring for the sick poor in their homes free of charge. The Sisters pf Saint Dominic of the Congregation of Saint Rose of Lima is a congregation founded by Mother Mary Alphonsa Lathrop, the daughter of Nathaniel Hawthorne, and has for its object the care ot those who are suffering from incurable cases of cancer.

Saint Dorothy, Sisters of. — A small congregation with mother house in Rome. It has three establishments in

the United States. . . „

Saint Francis. — The first mother house of the Francis¬ can Sisters to be instituted in this country was that of the Third Order of Saint Francis established by the late Bishop Neumann at Glen Riddle, Pa., in 1855. At the present time the following orders of Saint Francis are represented in the United States: The Little Franciscan Sisters of Mary, founded at La Bair Saint Paul, Canada, 1891; the Franciscan Missionaries of Mary, founded in British India about 1850; the Sisters of Saint Francis, founded by Very Rev. Pamfilo di Magliano, O.F.M.; the Sisters of Saint Francis of Mary Immaculate, founded in 1865; the Sisters of Saint Francis, established at Buffalo, N. Y., in 1874; the Sisters oi the Third Order of Saint Francis, founded by Rev. J. L. Bihn m 1869; the Sisters of the Third Order Regular of Saint Francis, incorporated as the Sisters of Saint F rancis of Oldenburg in 1885; the Sisters of Saint Francis of the Sacred Heart; the Franciscan Sisters, founded in 1872; the Sisters of the Third Order of Saint Francis of Assisi, M.C.; the Sisters of Saint Francis, founded in 1875; the School-Sisters of Saint Francis; the Franciscan Sisters for Colored Missions, established m 1881; the Franciscan Sisters of the Perpetual Adoration, founded by Rt. Rev. M. Heiss in 1864; Franciscan Sisters of Christian Charity, founded in Wisconsin 9 Nov. 1869; Fran¬ ciscan Sisters of the Sacred Heart, established in 1876; the Hospital Sisters of Saint Francis, founded in 1875; the Poor Sisters of Saint Francis of the Perpetual Adoration, estab¬ lished in 1875; the Sisters of the Poor of Saint Francis; the Sisters of Saint Francis, founded in 1890; the Franciscan Sisters of the Immaculate Conception, established 1891; the Missionary Franciscan Sisters of the' Immaculate Con¬ ception; the Felician Sisters, O.S.F.; the Sisters of the Third Order of Saint Francis, under the protection of Saint Kune- gunda, Polish; the Polish Franciscan School bisters; the Sisters of the Third Order of Saint Francis of the Congrega¬ tion of Our Lady of Lourdes, established 1877, and others. The Order of the Poor Clares is also well represented in the United States, the first Sisters having come from Rome, Italy, to open a house in Cleveland, Ohio, in 1875. As the Second Order of Saint Francis, the Clares are the oldest of the Franciscan orders

for women, its founder, the virgin Saint Clare, having been received by Saint Francis in 1212.

Saint John the Baptist, Sisterhood of. — An order in the Church of England, founded at Clewef, England, in 1851, and introduced into the United States in 1881. The work of its members is chiefly educational.

Saint John the Evangelist, Sisters of. — The sister¬ hood of Saint John the Evangelist of the diocese of Long Island is an American order in the Episcopal Church. Its work is chiefly charitable.

Saint Joseph. — There have been several sisterhoods of Saint Joseph, some of which have attained important posi¬ tions in the religious world. The Lay Hospitallers, Daugh¬ ters of Saint Joseph, was once one of the great orders of France. It was founded by Marie Delpech, at Bordeaux, in 1638, for the purpose of educating orphan girls, but it did not

EE

*to the'servSe of the noor £be™Selve+s *£ dev°te their lives by several hniup? \rF r Present they are represented*

Joseph of Ville mL Canada, one the Hospital of Saint

Mince in 1644 TfiolT be.en founded by Mile. Jeanne J? J°44.— The Sisters of Saint Joseph of the Good*

bishop of pUv C?n Siˆntl0nn^°Undej uy Henri de Maupas,

isn p oi l uy m 1650. Dispersed by the Revolution it

was reorganized in 1811. In 1836 six Sister U*

came to the United States at the request of Bishop Rosati of

Caron de°RtS' Theˆt est£blishe;d a hˆse of then- order at

aronaelet. The Sisters have always conducted all kinds of

charitable work, including the gratuitous instruction of poor chi dren and the care of such establishments as orphanages ms dutions or the deaf and dumb, Indian and negro mSS and Magdalen asylums. The Sisters of Saint Toseoh an offshoot from the Sisters of Saint Joseph of the Good Sheo

aSbonnefˆThPs f T°r'y'\Ca™da. in 1850 by Bishop L harbonnel.— The Sisters of Saint Joseph of Bourg were*

ˆ mnde(i by Monsignor Devie, bishop of Belley, in 1828 Its members are engaged in teaching and works of charity.- 1 he Congregation of Sisters of Saint Joseph of the Apparition was founded in France by Mme. de Vialard, in 1833. Its

Thˆ Wpir ˆfmB °y

XqS- drSt suPerior, and, as soon as possible, she established her Sisters m all the French colonies, where they devoted themselves to the education, the conversion and the civilization of the negro and other aboriginal races. The bisters of Saint Joseph of Peace, a community founded in Fngland, devote themselves to the training of girls for domestic service. In 1885 a branch of the sisterhood was established m Jersey City, N. J., by Bishop Wigger, and since that time the American house has extended the scope of its work until it now includes the care of the sick in their own homes, the care of a home and school for the blind, a hospital and a convalescent and summer home for poor working girls. The Hospital Sisters of Saint Joseph conduct hospitals in Chicago and W mooski, Vt. The Polish Sisters of Saint Joseph have a novitiate at Stevens Point, Wis.

Saint Joseph op Nazareth, Sisterhood of. — An order in the Protestant Episcopal Church established in 1892. Its objects are the mutual improvement in religious knowledge of its members, and the furtherance of religious belief by means of the religious and community life, and afterward the exercise of charity in teaching and training the young."

Saint Margaret, Sisters of. — An order of missionary and nursing sisters, established in the Church of England, at East Grmsted, England, by Rev. J. M. Neale, D.D., in 1855. In 1873 an affiliated house was opened at Boston, Mass., and the American members of the order are engaged in conducting all kinds of hospitals, sanitariums and homes for incurables in various parts of the United States and Canada. Much of the work of the order is devoted to needy colored people.

Saint Marthe, Sister Servants of. — The community of the Sister Servants of Saint Marthe was founded at Saint Hyacinthe, Canada, in 1890. Its members perform the housework for the diocesan seminary.

Saint Mary, Sisters of.— The institute of the Sisters of Saint Mary was founded by Rev. Dom Jerome N. J. Minsart at Namur, Belgium, in 1834, its object being the education of girls. In 1863 the order was introduced into the United States by Rt. Rev. John Timon, bishop of Buf¬ falo, N. Y.

Saint Mary, Sisterhood of. — Incorporated in New York in 1865, the Sisterhood of Saint Mary is one of the largest orders of the Protestant Episcopal Church. Its mem¬ bers conduct hospitals, sanitariums and various other chari¬ table and educational institutions in many parts of the United States.

Saint Mary and All Saints, Sisters of. — An order of colored women trained for work among their own people by the Protestant Episcopal Sisters of All Saints.

Saint Mary and Ladies Catechists, Missionaries of. — A congregation founded to work among the Indians and the poor. The mother house is at Mission, Wash.

Saint Monica, Sisters of. — An order established by the Episcopal bishop of Springfield, Ill., for the purpose of instituting an association of widows " for intercessory prayer and the restoration to the Church of the primitive vocation of consecrated widowhood." The members are engaged in charitable works.

Saint Saviour, Sisters of. — An order in the Protestant Episcopal Church in California. Its members are engaged in the education of young girls.

Saint Theresa of Jesus, Sisters of. — Also known as Theresian Sisters, a teaching congregation with mother house in Spain and several establishments in Louisiana and Texas.

Salesian Sisters of the Holy Eucharist. — A congre¬ gation engaged in educational work in Baltimore and Pittsburgh.

r,,rSfTTULfMoT!HC;R,-SlSTTERs Of the.— A charitable and IT A Q°/der ˆoufndfd ,ln Raiy and introduced into the

*Wichita SKanS m 1889' *tS firSt h°USe being established at*

Transfiguration, Sisters of the.— A Protestant Epis- Ikro !lsterb°od engaged in the care of homeless children and

rl ladies. Its labors are confined to Cincinnati, Ohio.

wo UfRSUIqINJ Nuns. — Tbe teaching order of the Ursulines was founded by Saint Angela Merici of Brescia, in 1537. Organized in Angela s kitchen as " The Company of Saint Ursula, its first objects were the nursing of the sick, the eaching of young girls and the sanctification of their own lives. At tms time the members remained in the world, took no vows and received communion in common once each month The conversion of the Society

into a religious order was chiefly the work of Mme. de Sainte Beuve, a French woman, who built and endowed a convent for the congrega¬ tion at Paris m 1610. Two years later Pope Paul V enclosed the nuns, placed them under the rule of Saint Austin, with so emn vows, including a fourth, binding them to devote their lives to the instruction of the young. The Irish Ursulines were established at Cork in 1771, by Miss Name Nagle, and the first Ursuhne convent instituted in the United States was founded by nuns from France at New Orleans 7 Aug. 1727.

• 5, j. me Sisters, a German congregation, conduct schools in the diocese of Bismarck.

Venerin1 Sisters. An Italian congregation, with Mass7 h°USe ln ˆ-ome which conducts a school at Lawrence,*

Visitation Nuns.— The Order of the Visitation was founded at Annecy m 1610 by Saint Francis de Sales, assisted y oaint Jane Frances, Mme. de Chantai, their object being to round a retreat for persons desirous of the religious life, but who were too weak, or otherwise undisposed, to enter an austere order. As the result there were few corporal auster¬ ities, and little confinement, although the employment of time was minutely provided for. In 1618 the rule of the enclosure was adopted, and, although teaching was not a part of the founder s plan, all the American convents have devoted their attention closely to educational work. The first v lsitation convent in the United States was established at Georgetown, D. C., in 1799.

Wisdom, Daughters of. — A congregation founded in France. In the United States, the Sisters conduct several educational establishments, a hospital and a home for cripples and defectives.

Deaconesses.

The office of deaconess was one that was well recognized m the Apostolic Church, for while it may be questioned whether the certain references in the New Testament which have so generally been associated with the government of deaconesses really applied to them or not, the fact remains that some of the earliest writers of the Church recognized their usefulness and formulated rules of conduct for them According to these rules it was necessarv that a woman, to be a deaconess, should have been the widow of but one husband and that she should have borne children. It is true that exceptions were sometimes made and that virgins were occasionally admitted to these organizations, but this was a rare honor, it being the opinion of the Church authorities that no woman who had not been a wife and a mother would be able to feel that sympathetic devotion to her work which was so necessary to its success. As that was the time prior to the

institution of sisterhoods and as the deaconesses were the only women who were officially authorized to assume Church work, there were many duties to which they were called. Among these was the care of the sick and poor, the ministering to those who were confined in prisons for con¬ science sake, the instruction of catechumens in the principles of their faith, assistance at the baptism of women, in addition to which they were supposed to exercise a general oversight over the female members of the cr ngregations, both in public and in private, and were obliged to make regular reports that the bishops and elders might not be uninformed as to the conditions existing among their people. The work of the deaconesses continued until the middle of the 5th century. In the Greek Church such orders existed until the 12th century. Gradually, however, the sisterhoods took their place in the Church, and it was not until the 19th century that they were again revived, this time by the Protestant churches, who felt the need of the assistance of women in conducting their religious work. The first order of deaconesses to be instituted in the modern Church was in 1835 when Pastor Fhedner of Kaisers werth, Prussia, estab¬ lished such a society in order that he might have an organized corps of nurses at his new infirmary, and the experiment was so successful that it was immediately copied by the Lutheran bodies in other parts of Europe. As instituted by Pastor Fliedner the " Order of Deaconesses of the Rhenish Province of Westphalia " was composed of three classes of members. The first class devoted themselves to the care of the sick poor and the rescue of fallen women by the means of Magdalen homes; the second class were engaged in teaching; while the third class, or visitation deaconesses, assumed the responsi-

bilities of the regula, parochial work. The members took no vows and. while plainly dressed, wore no distinctive habit.

In 1849, at the request of the American Church authorities. Pastor Fliedner brought four nurses to the United btates where he established a home in Pittsburgh. In the Episcopal Church the work of the deaconesses is almost as important as that of the sisterhoods, it being of very much the same char- acter It is largely represented in the South, the branches in Georgia, Alabama. Kentucky and Louisiana being import¬ ant factors in the religious work of the denomination. I he revival of deaconess work in the Methodist Church dates from about 1870, when the Bethany Society was organized in Germany. Like the Order of Deaconesses established by Pastor Fliedner, its members were devoted chiefly to nursing, a work which they conducted so successfully that there are now more than 200 of them

engaged m the various German hospitals. The first effort to introduce the order into the United States was in 1886, when Rev. J. M. Thoburn, at a conference held at Bellefontaine, Ohio, urged the advantage that the Methodists of this country would gam from the institution of a deaconess home or training school. As the result, Miss Jane M. Bancroft, later Mrs. Robinson was sent to Germany to acquaint herself with the work of the organi¬ zation and, in October 1887, a Deaconess Home was opened in Chicago. The next session of the General Conference signified its full approval of the movement and, in 1888, tne present system of permanent deaconess work was inaugurated under the direction of the Woman s Home Missionary Society. According to the rules of conduct the purposes ot the deaconesses are "to act as pastors assistants; to visit from house to house; to assist in evangelistic work; to conduct meetings, especially those for women and children; to conduct kindergartens, kitchengartens; and other industrial and edu¬ cational schools; to visit in prisons and police stations; to conduct orphanages, hospitals and other institutions of mercy , to nurse among the sick poor, etc., and to assist in office and clerical work." The Deaconess Society of the Methodist Episcopal Church was organized in 1895. It conducts hos¬ pitals, orphanages and schools, as well as other charitable works under the direction of its licensed deaconesses. I he German Methodist deaconess homes and hospitals are under the control of the German Central Deaconess Board, lhe work of its deaconesses comprises, beside hospital service, nursing in private families, parish work, free dispensaries, kindergartens, industrial and sewing schools, etc. It has /» deaconesses who operate five hospitals. _ rhe Maria " Deaconess Society in Germany, which now operates in association with the Bethany Society, was origma y organized by the Wesleyan Church. While now m perfect harmony with the sister institutions it still maintains its distinctive organization. Except in some few instances^ m the Protestant Episcopal Church the present-day deaconesses take no vows and may withdraw from the service of the Church at any time without reproach to themselves. I bey are usually disciplined during two probationary years, and, while they are unsalaried, they are assured of ample support, with a good home and tender care during sickness or old age. It is now customary in the United States for deaconesses to wear a habit, chiefly for purposes of recognition and protec¬ tion, and, generally, they now live in communities or homes.

John R. Meader.

ORDERS OF ARCHITECTURE, the

different styles of classic architecture as dis¬ tinguished by the character of the column, its base, shaft, capital and the superimposed en¬ tablature. These elements constituting the unit of a colonnade are taken account of in dis¬ tinguishing the various orders, of which there are five, the Doric,

Ionic, Corinthian, Tuscan and Composite. Each type of the column seems to have persisted in its main characteristics from the earliest times while undergoing minor modifications in the way of refinement in pro¬ portions and details.

The column of the Doric order presents a

tapering shaft resting upon the stylobate or platform. The shaft generally consisted of sev¬ eral parts called drums but in rare instances it was monolithic. It was grooved with semi¬ elliptical channels meeting in a sharp edge or arris. Surmounting the shaft the capital con¬ sisted of a circular cushion or echinus, so named from the sea-egg from which its curve was de¬ rived, and a square flat stone called the abacus. The capital formed the support for the entabla¬ ture, comprising the architrave, frieze and the cornice. The architrave or epistyle was the first series of horizontal stones, usually unor¬

namented, and forming a solid basis for the frieze above, which was divided by alternating parts called triglyphs and metopes. I he triglyphs were blocks, slightly projecting, carved with two vertical grooves and chamfered edges. These, save the two end ones, were placed above the centre of the columns and in the space mid¬ way between. The metopes were intervening square panels, often carved with architectural sculpture. Resting on the frieze was the cor¬ nice, consisting of a series of projecting mold- ings, the under side of the bed-molding being ornamented with square mutules having each 18 guttse depending from its under side. The gutter molding above protected the sculptured metopes from water.

The Ionic order, a development of the 5th century b.c., was characterized by greater slen¬ derness of proportion. The shaft was placed upon a base composed of one concave and two convex moldings of semi-circular profile , these in turn sometimes rested upon a square base block or plinth. The fluting of the shaft was semi-circular, consequently deeper than the Doric, and was separated by fillets. The capital comprised a bead, an echinus and an upper and characteristic band ending on both sides in a volute or scroll. The entablature was formed by an architrave of two or three flat faces and a frieze without triglyphs. The superimposed molding introduced a new feature in the row of narrow blocks or dentals under the corona.

The Corinthian order was a late develop¬ ment of the Ionic, resembling it in base and shaft, but differing in the form of the capital, which was ornamented with circlets of acanthus leaves surmounted by branching scrolls meeting at the corners in spiral volutes.

These three orders were invented by the Greeks, but were appropriated by

the Romans who modified them in certain unessential de¬ tails into types that pass as Roman Doric, Ro¬ man Ionic and Roman Corinthian. The latter, however, was the favorite order of Roman architecture. To the Romans belong, in addi¬ tion, two other orders; the Tuscan, resembling the Doric, but without flutings in the column or triglyphs in the cornice ; and the Composite, whose capital consisted of volutes modified from the Ionic and a lower circle of acanthus leaves derived from the Corinthian. This order ad¬ mitted a great variety of ornamentation.

ORDERS IN COUNCIL, orders issued by the English sovereign in accordance with the advice of the Privy Council, a body which has no legislative power, excepting so far as Parlia¬ ment may grant it. In times of emergency, however, the Privy Council has issued orders of a legislative character. Those instrumental in issuing such orders or carrying them out are generally relieved from all liability by a subse¬ quent act of indemnity. It was by orders in council that Napoleon's famous continental system was, met. See Continental System ; Berlin Decree.

ORDERS (ROYAL) AND DECORA¬ TIONS. The love of personal decoration is one of the fundamental instincts of human nature. Carlyle observes in 'Sartor Resartus) that (

as indeed we still see among the barbarous classes in civilized countries." The ambition to wear some mark that shall distinguish the nearer among his fellows is perhaps as strong to-day as it was in the romantic period of chivalry from which practically all the more venerable orders and decorations of Europe took their rise. Yet in this respect, as in so many others, Europe merely borrowed from the East, for though there may have been no regular institution of knighthood or orders as we understand the terms, among the nations of antiquity, nevertheless the same law of honorary selection was recognized among the Egyptians, Assyrians and Persians. In the old days, including those of Greece and Rome rings, gold chains, belts, "triumphal gifts," etc, conferred a distinction on personal merit, as discriminated from official rank and hereditary nobility, and were common to all classes. Furthermore, there are many Oriental titles that seem to illustrate the same general con¬ nection of ideas, as, for instance, the badges of great Japanese families, which bear a striking resemblance to the heraldry of Europe, while the peculiar and distinguishing marks of the various grades of the Chinese aristocracy, the so-called "buttons," are analogous to the <(pearls" that adorn the coronets of the hereditary nobility of the West. It is supposed that among the pre¬ historic Pelasgians

a "sash" indicated the same distinction as the torques and golden chains or collars of the Gauls, Celts and Teutons. Coming to later centuries, even our own times, we find that ribbons, chains and jeweled badges convey similar evidences of distinction and that the privilege of wearing them is still highly prized. Notwithstanding the fact that orders and decorations are frequently ridiculed by democratic peoples as "mediaeval relics of monarchy" and denounced as ((obsolete grew- gaws of vanity," it is interesting to note how firmly that alleged "antiquated custom® has taken root in other guises in the greatest of all democracies — the United Sta'tes. We may call it habit, fashion or human nature. Just as the two buttons on the back of a man's coat are a reminiscence of the civilian sword belt, so the wearing of innumerable ((badges" in everyday life is in reality a survival — or revival — of the time-honored system of orders and decorations, an outward expression of the inherent desire for such distinctions. All kinds of associations have their badges, which their respective members proudly expose on their coat-lapels or watch-chains. The European War especially gave occasion for the exhibi¬ tion in public of many and varied decorations, conferred by authority or self-adopted. In a class apart, soldiers and marines display their medals, crosses and chevrons indicating active service, conspicuous gallantry or wounds. Among civilians, the golden star on the service flag at home is a true decoration of honor; the purchaser of Liberty Bonds wore his decora¬ tion ; the little Red Cross badge denoted that the wearer had subscribed to that beneficent institution ; the college student wears the badge of his Greek letter society; the trade unions, clubs, boys' and girls' schools, etc., have their distinctive badges. Examples of this type could be multiplied ad infinitum; they serve to illustrate that decorations, as such, are by no

means despised. So far from being a modern invention or of recent development, the funda- mentals. of this remarkable manifestation lie buried in antiquity. It is safe to assume that if the wearers of these multifarious decora¬ tions did not regard them as honors, they would not so willingly exhibit them on their persons, for a decoration is essentially a reward for service rendered to a cause or a community. That a money gift can be no substitute for a decoration of honor is exemplified by the reverence with which the orders and medals of ancestors are treasured as family heir¬ looms: their value and glory only appreciate with time. While it is undoubtedly true that in Europe high decorations are frequently con¬ ferred as acknowledgments rather of social position than special merit, it has become a custom during comparatively recent years to affiliate to nobility the most distinguished among the aristocracy of art, science, literature, music and philanthropy, thereby honoring those who have largely contributed to human progress. For many centuries the highest honors were reserved exclusively for the profession of arms; there was

literally no limit to the rank to which a successful warrior might not aspire, from knight to emperor. Carlyle satirized this exclusiveness so long ago as 1833, when he looked forward to the day when "communities discover, not without surprise, that fashioning the souls of a generation by Knowledge (i.e., teaching) can rank on a level with blowing their bodies to pieces by Gunpowder." Not reckon¬ ing Switzerland, the United States appears to be the only great country wherein the services of civilians, however meritorious, pass unre¬ warded, except for the Gold and Silver life¬ saving medals issued by the Treasury Depart¬ ment; decorations are conferred only on the army, navy, police and fire departments. France has her Academy of ((Forty Immortals" and the Legion of Honor; Great Britain the Order of Merit and various other decorations for civilians; the Swedish Nobel Prize is interna¬ tional in its scope and has been awarded to several Americans, including the late President Roosevelt.

From a purely sentimental point of view, decorations possess a value that cannot be com¬ puted in terms of cash ; money cannot buy true honors — they must be earned. It was the rec¬ ognition of this sentiment that influenced Napo¬ leon in the institution of the ((Arms of Honor." In vain did old republicans, jealous of their new _ prerogatives, protest against the reintro¬ duction of such ((baubles" as unworthy of the citizens of a new republic. The consul, how¬ ever, was not to be dissuaded. ((You call them toys?" he answered, ((Well, learn that it is through such toys that men are led !"

A distinction must be drawn between the "knights" of ancient Rome and the mediaeval institution of chivalry; the former represented a class with variable rank, whereas the knight of chivalry preserved his distinction as such, even on the throne. There were also many other differences which distinguished the al¬ most sacerdotal character of the latter from the simple social grade of the former. Yet the Roman equestrians may in some respects have formed the model on which the Chivalric Order was founded. That order may be described as

of two kinds, the religious, or hierarchical, and the secular or military. The two classes of organized and duly constituted bodies of knighthood are: (1) the associations or frater¬ nities possessing property and rights of their own as independent bodies, and (2) honorary associations established for specified purposes by sovereigns within their respective domin¬ ions. To the former belong the three great religious orders created during the Crusades, the Templars, the Hospitallers and the Teutonic Knights. (See Orders,

Religious). While the strictly religious orders are now compara¬ tively extinct, the more secular orders which they inspired exist under almost every flag, though it is not improbable that many will automatically become obsolete owing to the dy¬ nastic upheavals following the European War.

The Knights Hospitallers of Saint John the Baptist in Jerusalem, afterward known as the Order of Saint John of Malta, formed the most powerful of all the religious orders, originat¬ ing about the middle of the 11th century by the erection of a hospital on the spot where, ac¬ cording to tradition, the <(Last Supper® had been held. The founders were Italians. The Pilgrims of the hospital were constituted knights by Baldwin I in 1104 and their rule was confirmed by Pope Pascal II in 1113. Driven from Jerusalem, and afterward from place to place by the martial vicissitudes of the times, they finally seized upon the island of Rhodes, which they retained until 1522, when, upon being expelled, they went to Malta, Avhich, with Gozo and Tripoli, was granted to them in fee. by Emperor Charles V in 1530. During the period of the Reformation, as well as in sub¬ sequent years, the Order was abolished in some portions of the country, and, in 1798, having been dispossessed from Malta by Napoleon, the Knights settled in the papal states, from which headquarters the Order has been to some extent revived. Originally the Order maintained a class for women, «The Ladies of the Order of Saint John,® which was founded by Agnes, ab¬ bess of the house of Saint Mary Magdalen, in 1099. So recently as February 1918 the Roman civil courts decided a lawsuit involving property vested in the Knights of Malta which had been wrongly held for 100 years.

The Order of the Holy Sepulchre was one of the most ancient of the early fraternities. Though attributed to. Saint Helena, it is be¬ lieved to have been instituted by Baldwin I, king of Jerusalem, about a.d. 1110. As origi¬ nally founded it was restricted to the priest¬ hood and this restriction was not removed until 1484, when Pope Innocent VIII incorporated it with the Order of the Knights of Saint John of Jerusalem. Two ineffectual attempts were made to sever the bond of union, but in 1496 Pope Alexander VI, who took so much interest in the Order that he may almost be regarded as its real founder, transferred the power of ad¬ mitting knights to the Holy See, and, from that time, the Order was changed from a religious association to a fraternity of chivalric char¬ acter.

The Templars originated about 1120, under Baldwin II, when nine gentlemen and two nobles appeared as Pilgrims at Jerusalem. Adopting the rule of Saint Augustine they took up their abode in the Holy City, and gradually extended their influence until they became one

of the most powerful confraternities, unde'r the name of ((Brethren of the Militia of the Tem¬ ple.® In an evil hour, however, they incurred the animosity of Philip le Bel and of Pope Clement V, and, in the year 1312, the latter announced the suppression of the Order in France. Although it is still doubtful whether the action of Pope Clement was just or unjust, his example was followed by the whole of Europe, and the final blow was struck when the last grand master, Jacques de Molay (q.v.), was executed at the stake, in France, in 1313. The Order has never been revived.

The Teutonic Order, the last of the great religious fraternities, was founded at Acre in 1190. Prior to its organization German pil¬ grims had received scant attention at the Holy City. Needy pilgrims from France and Italy found the Templars and the Hospitallers ready to receive them, so this new Order was formed .with the object of attending to sick and wounded Germans. In 1191 Frederick of Swa¬ bia gave the Order a constitution which estab¬ lished the rule of Saint Augustine and adopted regulations governing the practice of all duties. Regarding the treatment of the sick and the poor the regulations were similar to those of the Knights of Saint John, while the regula¬ tions respecting peace and war were identical with those of the Templars. With the sanc¬ tion of Pope Celestine III, Frederick gave the association the name of ((The Order of the Ger¬ man House of the Holy Virgin at Jerusalem.® The Order attained the height of its power in the 13th century, but this period of luxury was followed by one of anarchy. In the 15th cen¬ tury, after the Twelve-Years' War, it became feudatory to Poland. The original Order was abolished after the Peace of Cracow 1525, and its territories handed as fief of Poland to the Grand Master Albert, Margrave of Branden¬ burg, who took the title of (

At the head of the great secular orders which still maintain their pristine reputation stands the British Order of the Garter. Next in rank and antiquity is the Order of the Golden Fleece; which was not only the most important order , of the Austrian Empire, but is also the principal decoration of the Spanish Crown. Founded in 1429 by Duke Philip of Burgundy, the grand mastership was held by his house until Charles the Bold died without male issue in 1477, when it passed to his son- in-law the Emperor Maximilian of Germany. When the Hapsburg rule ceased in Spain at the beginning of the 18th century, the Golden Fleece became the subject of a violent quarrel. Spain and Austria each claimed the order, with the result that both countries retained it.

The third of the great mediaeval orders is that of the most sacred Annunziata, the prin¬ cipal order of Italy, founded in 1362 by Amadeo of Savoy. Called by Favin, ((the Order of the Snares of Love,® and known at various periods

BADGES AND DECORATIONS OF HONOR -plate l

1 ORDER OF CHRIST

(Pontifical).

2 SOCIETY OF THE

CINCINNATI (United States).

3 ORDER OF THE

THISTLE, with Cellar AttachmentGreat (Bri- tain, Scotland).

4 ORDER OF THE GARTER— the George Badge, with Collar At¬ tachment (Great Bri¬ tain).

5 ORDER OF ST. GRE¬

GORY THE GREAT (Pontifical).

6 ORDER OF THE GOLDEN FLEECE (Spain).

7 GUELFIC ORDER OF HANOVER.

8 ORDER OF THE BATH, Military Class (Great Britain).

9 GRAND ARMY OF

THE REPUBLIC (United States).

10 ORDER OF ST. MICHAEL AND ST. GEORGE (Great Bri¬ tain).

11 ORDER OF THE ROSE

(Brazil).

12 ORDER OF ST. PAT¬

RICK, with Collar At¬ tachment (Great Bri¬ tain, Ireland).

13 ORDER OF THE HOLY GHOST (France).

14 ORDER OF THE TOWER AND SWORD (Portugal).

15 ORDER OF THE HOLY SEPULCHRE (Pontifical).

16 LEGION OF HONOR

(France).

17 LOYAL LEGION (United States).

IS ORDER OF THE STAR OF INDIA (England, India).

19 ORDER OF ST. AN¬ DREW (Russia).

COPYRIGHT, 1910. BY F. E. WRIGHT

ORDERS (ROYAL) AND DECORATIONS

r/C'iy

C O (

as (< 'the Collar0 and ˆLoveknots,® for the rea¬ sons for which one must turn to tradition, its importance is indicated by the fact, that its chevaliers are styled t(cousins of the King,® all ol whom, with their wives, participate in the honor of this relationship to royalty.

d he only insignia of distinction ever author¬ ized by the Congress of the United States are the medals of honor for exceptional bravery in war and for life saving, which from time to time have been sanctioned by the government, b ranee, too, continues to show a distaste to chivalric orders and remains satisfied with its republican decoration, the Legion of Honor, which, however, is not so closely restricted as are the awards of honor made by the United States.

The following list with dates of institution shows the principal orders and other decora¬ tions existing in the various countries. With the collapse of the Russian Empire in 1917 and the introduction of republican forms of govern¬ ment in the German and Austro-Hungarian empires at the close of 1918, the data shown under those countries may possess only a his¬ torical interest :

Abyssinia. — The Order of Solomon's Seals or Order of Saint George (1874); Order of the Star.

Austria-Hungary. — The Order of the Golden Fleece, the wearers of which took precedence over all others at court functions; the military Order of Maria-Theresa (1757); the Order of Saint Stephen of Hungary (1767) for civil merit; the Order of the Iron Cross, founded by Napoleon in 1805, was extinguished in 1814 but re-established in 1816 by the Emperor Francis I as an Austrian order; the Order of Leopold (1808), a distinction for personal merit; the Order of Francis Joseph, for distinguished merit in all

classes (1849); the Military Foundation of Elizabeth Theresa, rejuvenated in 1771; and two decorations for women, the Order of the Starry Cross (1668) and the Order of Elizabeth (1898). The Cross of Merit for officers (1849) and for ordinary soldiers (1801); the Medal of Honor of Austria-Hungary (1877) was bestowed upon those who excelled in the arts and sciences; and the Souvenir Medal of the Jubilee (1898), a civilian decoration.

Belgium. — The Order of Leopold, civil and military (1832); the Order of the Iron Cross, a civil decoration (1867), took its rise from the Order of Civil Merit instituted in 1830; and the Military Cross of two classes (1885).

Bolivia.— The Order of the Cross of Christopher Colum¬ bus, of which there are three classes, is no longer conferred.

Brazil. — The constitution of 1891 suppressed all deco¬ rations except two medals of merit. The extinct orders were the Imperial Order of the Southern Cross (1822), the Order of Pedro I (1826), the Imperial Order of the Rose (1829), the Order of Christopher Columbus (1890) and the Medal of Merit (1889).

Bulgaria. — The Military Order of Bulgaria (1879) includes a grand cross and four classes each for officers (and private soldiers; the Order of Alexander, to which is added the Medal of Merit (1881) ; the Civil Merit Order (1891) is for distinction in the arts and sciences, and the Military Cross is awarded for 20 years' service.

China. — The only order bestowed under the Empire was that of the Imperial Dragon (1862). After 1882 it became the Order of the Double Dragon, divided into five classes.

Denmark. — The Order of the Elephant is so ancient that its origin is lost in tradition. Originally a religious society, it was re-organized in 1693 and received its present name. The Order of the Dannebrog, which is conferred only upon natives, is also of great antiquity; it is said to have been founded by Waldemar II in 1219 in commemoration of a miraculous intervention in battle. In 1808 it was changed from a court honor to an honor of merit. Denmark also bestows medals for lifesavings, military service and inventions.

France. — In addition to the Order of the Legion of Honor, which was founded by Napoleon 19 May 1802, France has the following medals of decoration: The Military Medal, founded by Napoleon III; the Medal of Honor, founded by President McMahon; the Medal of Merit, founded by

Presi¬ dent Grevy; the Colonial Medal, founded in 1893 for military services in the colonies and countries under French protec¬ tion; the Medal of Honor, created by decree in 1897; the bronze Medal of Reward for bravery in the performance of duty, founded in 1899, and the Medal of Honor, in silver, for commercial workmen, founded by decree in 1900. The highly-prized Croix de Guerre was created for the European War, as was also the Medal of French Gratitude (1916),

awarded to those who have aided wounded men, the sick, the families of killed or those driven from their homes by invasion.

Germany. — There were numerous orders and decora¬ tions in the former German Empire, every kingdom, princi¬ pality and duchy of the Reich possessing its own distinctions. In Prussia, the Order of the Black Eagle (1701) was one of the most important; the Order of the Red Eagle (1705) was organized in 1712 as an order of the House of Hohenzollern; the Order of Civil and Military Merit dates back to 1667, was reorganized in 1840 as the Order for Merit and was later extended to the civil class for arts and science, to include 30 Germans and an equal number of foreigners. The " Ordre Pour le Merite " was the highest military service medal within the gift of the Emperor. The Royal Order of the House of Hohenzollern (1841); the Order of the Crown of Prussia (1901); the Royal Order of the Crown (1861); the Order of the Iron Cross originated in 1813, and the Order of William (Wilhelms-Orden) was founded by the last Kaiser in 1896. The Order of Louise, for women's service in war, was founded in 1814, and the Cross of Merit for women was created in 1871. There were other decorations for benevo¬ lence, Red Cross, etc.

Great Britain. — The highest distinction is the Most Noble Order of the Garter, established by King Edward III in 1348. It is now limited to the sovereign and such other descendants of George I as may be elected and to 25 Knights Companions; but sovereigns and princes of other countries, and extra Knights Companions, may be admitted by special statutes. Its abbreviation is " K.G.", and it is the highest order of knighthood. Its insignia and habit include the George — a gold medallion of Saint George and the Dragon, suspended from a blue ribbon; the Garter, which is worn below the knee of the left leg, and is made of dark blue velvet edged with gold, bearing the motto, Honi soit qui mal y pense (' Evil be to him who evil thinks "); a mantle of blue velvet lined with taffeta, with the star of the order embroidered on the left breast; a hood and surcoat of crimson velvet and a hat of black velvet; a gold collar weighing 30 ounces, and the star with the cross of Saint George in the centre, encircled by the Garter. The reigning Queen is Lady of the Order.

The Most Ancient and Most Noble Order of the Thistle dates to 1540, was

remodelled in 1687 and again in 1703. The order consists of the King and 16 knights. Its abbre¬ viation is K.r., and the badge, the gold Saint Andrew, is suspended from a green ribbon; its motto is, Nemo me impune lacessit.

The Most Illustrious Order of Saint Patrick was created in 1783 and revised in 1905. It consists of the King, a Grand Master, who is the Lord-Lieutenant of Ireland for the time being, and 22 knights. Its abbreviation is K.P., its badge, on a sky-blue ribbon, bears the motto, Quis separabit?

The Most Honorable Order of the Bath was originally established by King Henry IV in 1399. It fell into neglect during the 17th century but was revived in 1725. Remod¬ elled in 1815 and enlarged in 1845, it is now divided into three classes — Knight Grand Cross (A.C.B.), Knight Com¬ mander (K.C.B.) and Companion (C.B.). Exclusive of the King and princes of the blood, the first class is limited to 57 members for military service and 27 for civil service, besides distinguished foreigners who may be awarded the honorary degree. The second class is limited to 150 for military and 114 for civil service; while the third, the Companions, may number 1,056, of whom 732 may be for military and 324 for civil service. The badge, suspended from a crimson ribbon, bears the motto, Tria juncta in uno.

The Most Distinguished Order of Saint Michael and Saint George was created in 1818 and is generally bestowed on those who have rendered meritorious service in colonial or foreign affairs. Its motto is Auspicium melioris cevi; it is divided into three classes, Knight Grand Cross (G.C.M.G.), Knight Commander (K.C.M.G.) and Companion (C.M.G.); the first class is limited to 100 members, the second to 300, and the third to 725.

The Most Exalted Order of the Star of India was estab¬ lished in 1861 and frequently enlarged until 1911. Bestowed for services rendered to the Indian Empire, the badge bears the motto, Heaven's Light our Guide. It has three classes, Knight Grand Commander (G.C.S.I.), Knight Commander (K.C.S.I.) and Companion (C.S.I.), and is limited to the sovereign, a Grand Master (the Viceroy of India for the time being) and 44 members of the first class, 100 of the second and 200 of the third.

The Most Eminent Order of the Indian Empire (1877) is similarly bestowed as the foregoing order; it has also three classes but is less limited in number of membership. The abbreviations are, G.C.I.E., K.C.I.E. and C.I.E.

The Royal Victoria Order, founded by Queen Victoria in 1896, is restricted to British subjects who have rendered meritorious personal services to the

sovereign ; when conferred upon foreigners it is an honorary rank. There are five classes, G.C.V.O., K.C.V.O., C.V.O. and M.V.O. for the fourth and fifth classes.

The Order of the British Empire, created by King George in 1917, consists of five classes each for men and women, con¬ ferred for services rendered to the Empire at home or abroad.

The Order of Merit, established by King Edward VII in

1902, is bestowed for conspicuous distinction in arir}y> navy> government, art, science, literature, music, etc. I he late Miss Florence Nightingale was one of the recipients of this

r ˆThe Order of the Companions of Honour, founded by King George 21 June 1917, consists of one class, to which both men and women are eligible, and is closely limited as to number of recipients. It is a very special distinction.

The Distinguished Service Order (D.S.O.) was created by Queen Victoria as a reward for officers in the army and navy. Foreign officers who have been associated in naval and mili¬ tary operations with the British are eligible as honorary

The imperial Service Order (1902) is a decoration for members of the Civil Service of the Empire. No others are eligible. Women are included. Companions of the order

add I.S.O. after their names. . .. .. ,

The Imperial Order of the Crown of India (18/7) is limited to those who have held office under the Indian government; it includes native princes with their wives and other female

The Order of the Hospital of Saint John of Jerusalem in England is a modern creation dating from 1888. It concerns itself with hospital, ambulance and other charitable works, consists of Knights and Ladies of Justice, Chaplains, Kmgh s and Ladies of Grace and Esquires. Appointments to this

order carry no rank nor title. . , , ol1 R_;t:cu

The Victoria Cross, the most highly-prized of all British awards, is dealt with elsewhere. (See Victoria Cross). The following decorations were created during the European War. The Military Cross (1915), conferred on captains, commis¬ sioned officers of a lower grade and Indian and Colonial military forces. The Military Medal (1916), conferred on non-commissioned officers and men and women for indi¬ vidual or associated acts of bravery on the recommendation of a commander-in-chief on the field." The Distinguished Service Cross (formerly the Conspicuous Service Cross) was renamed in 1915 for "distinguished service before the enemy," and extends to all naval officers below the rank of •> lieutenant-commander. The Distinguished Service Meda (1915) is a naval decoration.

The Albert Medal (1866) is a reward for acts of heroism performed by civilians at sea or on land. .There are two grades — gold and bronze. The Edward Medal (1907) is awarded for heroism in life-saving in industrial employment. The Kaisar-i-Hind Medal (1900) is bestowed for services rendered in India, without distinction of race or sex.

Greece.— The Royal Order of the Redeemer, founded by the General Assembly of the Hellenes in 1829, is conferred for both military and civil distinctions.

Hawaii. — The orders formerly existing but now no longer conferred were the Order of Kamehameha I (1865), the Order of Kalakaua I (1875), the Order of the Royal Crown of Hawaii (1882), an Order and a Medal of Kapiolani (1880) and the Order of the Star of the Ocean (1886).

Italy — The Order of the Annunziata, already referred to, consists of but one grade. It was revived by Charles III in 1815 and again modified by Victor Emmanuel II in 1869, who restricted the number of knights to 20 m addition to the sovereign, the princes and some others. The Order of Samt Maurice and Saint Lazare was formed by uniting two orders, the first dating back to 1434 and the latter, it is said to the 10th century. New statutes were made in 1816 and limi¬ tations withdrawn. Other Italian orders are the military Order of Savoy (1815), the Civil Order of Savoy (1831), the Order of the Crown of Italy (1868) and the Order of Agri¬ cultural Merit (1901). ,

Japan. — The Supreme Order of the Chrysanthemum (1877) is conferred almost exclusively upon princes of the blood and foreign sovereigns; the Order of the Sun of Paul- lownia (1888) and the Eastern Sun (1875); the Military Order of the Golden Kite (1890), the Order of the Sacred Treasure (1888), the Order of the Crown, for women (1888) and the Medal for life-saving (1881). , .

Liberia. — The Order of the Beneficence of Liberia (1879); the Gold Medal of the Lone Star and the Order of Merit, bestowed for service in the civilization of Africa.

Luxemburg. — The Order of the Golden Lion of the House of Nassau (1858); the Order of the Oaken Crown (1849) and an order of Civil and Military Merit.

Mexico. — The Mexican orders no longer conferred were the Order of Our Lady of Guadalupe (1852); the Order of the Mexican Eagle (1865), a Medal for Bravery and the Order of Saint Charles, for women (1865). /

Monaco. — The Order of Saint Charles (1858).

Montenegro. — The Order of Independence (1855); the Order of Saint Peter (1851); a gold Medal for Bravery (1841) and a Medal of Devotion for patriotic service (1895).

Netherlands. — The Order of Willem (1 815) is a military distinction, and the Order of the Netherlands Lion (1815) is a recompense for civil merit. The Order of Orang- Nassau (1892); the Teutonic Order, the Commandery of Utrecht and the Order of the Golden Lion.

Persia. — The Order of the Sun and the Lion (1808); the Order of the Sun, for women (1873), and a Medal for the arts and sciences (1851).

Pontifical. — Several orders of importance are still con¬

ferred by the Holy See. The doubtful Order of the Golden Sour now the Order of Saint Sylvester, claims greater antiquity than any other Knightly Order on the presumption that it was instituted bv Constantine the Great and confirmed bv Saint Sylvester. Many reliable authorities, however, attribute its origin to Pope Pius IV in 1559. On 31 Oct. 1841 Pone Gregory XVI decreed new statutes restricting its appli¬ cations to zeal in the cause of the church and civil virtues and dividing it into two classes, Commanders and Knights. 1 he Order of the Holy Sepulchre, which is attributed to Pope Alexander VI and Godfrey of Bouillon was created with about the same motives as the Order of Saint John of nerusˆle:H It was confirmed by Pope Benedict XIV in 1746, and the decorations of its three classes are now conferred in the name of the Holy See by the Latin Patriarch at Jerusalem. ihe Order of Christ as conferred at Rome closely resembles the Portuguese order of the same name. In Rome, however, noble birth is not a requisite to admission. Other Pontifical orders are the Order of Pius IX, founded by Pope Pius IX 17 Tune 1847; the Order of Saint Gregory the Great, founded by Gregory XVI 1 Sept. 1831; the Order of the Moor, an art distinction, founded by Pope Pius VII 23 Sept. 1806; and the Order of Saint Cecilia, a

musical distinction, founded 17 June 1847 The Golden Rose is sent occasionally to high digni¬ taries, and sometimes to cities or churches, in recognition ot high type of character. It originated in the 13th century, and of late years it has been bestowed chiefly upon women ot

r°y Rumania.— The Order of the Star of Rumania (1877); the Order of the Crown of Rumania (1881); a Medal of Military Virtue (1872) ; a Medal of Merit for arts and sciences (1876) and a Medal for faithful service (1878).

Russia. — Under the old regime the conferrmg of an order by the Tsar carried with it a patent of nobility. The most important were the Order of Saint Andrew (1698); the Order of Saint Catherine, for women (1714); Order of Samt Alexander-Nevski (1725); Military Order of Samt George (1769); Order of Saint Vladimir (1782); Order of Samt Anne (1735)' three Polish decorations: Order of the white Eagle; Order of Saint Stanislas and the Order of Military Merit.

San Marino. — The chivalric Order of San Marino (1860).

Serbia — The Order, of Saint Lazare; Order of the White Eagle (1883); Order of the Cross of Takovo (1865); Order of Saint Sava (1883) and Order of Milosh the Great (1898). New military decorations were created during the European

W cir .

Siam. — The Order of the Nine-Pointed Star (1869) is a

religious decoration conferred only upon Buddhists, Order of the Great Crown (1884) is conferred only on royalties; Order of the White Elephant of Siam (1861) is the highest national honor; Order of the Siamese Crown (1869) and a Sacred Order containing a portrait of the king. . 0 .

Spain. — In addition to the Golden Fleece, which Spam shared with the former Austrian Empire, and the Military Order of Malta, which is the Spanish branch of the Order of Saint John of Jerusalem, Spain has several ancient decora¬ tions. Chief among these are the Military Order of Calatrava (1158); the Military Order of Saint Ferdinand (1811); the Military Order of Our Lady of Montesa (1319); the Military Order of Saint Hermenegilde (1814); the Royal American Order of Isabella the Catholic (1815); the Order Isabella II (1833)- the Illustrious Roval Order of Charles III (1771); the Order of Military Merit (1866); Order of Mane-Victoria (1871); Order of the Beneficencia, for humane and useful public service (1856); Military Order of Marie-Christine (1890) and the Order of Marie-Louise, for women only (1792).

Sweden and Norway. — Sweden possesses the only Masonic order in the world, the Order of Charles XIII founded by that monaren in 1811. It is bestowed only upon Freemasons of high rank. The late King Edward VII, as Grand Master of England, was a member of this order. The Order of the Seraphim dates from the 13th century; the Order of the Sword, or the Yellow Ribbon, originated in 1522; while the Order of the Pole Star was founded in 1748. Since the separation of the two kingdoms of Sweden and Norway in 1905 the orders remained with Sweden.

Turkey. — The principal Turkish orders are those of the Medjidieh (1851); the Nishan-i-Shefkat (1878), for women, and the Osmanieh, for distinguished civil or military service (1862). There are several minor Turkish decorations.

Venezuela. — The Order of Bolivar (1825); Order of Merit (1861) and a Medal of Public Instruction.

Zanzibar. — The Order of the Jeweled Star (1875) is the only decoration issued by the Sultan of this British protectorate.

Bibliography. — Addison, C. G., (The Knights Tdtnplars) (London 1852) ; Ashmole, E., (History of the Order of the Garter) (lb. 1715) ; Bedford, W. K. R. and R. Holleche,

BADGES AND DECORATIONS OF HONOR -plate ii

23

20 ORDER OF THE OAK

CROWN (Luxem¬ bourg) .

21 ORDER OF THE CROWN OF WUR- TEMBERG.

22 ORDER OF ST. JOHN

OF JERUSALEM.

23 ORDER OF THE ELE¬

PHANT (Denmark).

24 THE IRON CROSS

(Prussia) .

i 23 THE NICHAN BADGE (Tunis).

2G ORDER OF THE BLACK EAGLE (Prussia) .

27 APOSTOLIC ORDER OF ST. STEPHEN (Austria, Hungary).

28 MILITARY ORDER

OF WILLIAM (Neth¬ erlands).

29 ORDER OF THE SUN

AND LION (Persia).

30 ORDER OF ST. OLAF

(Sweden).

31 ORDER OF THE

MSHANI-MED.il- DIE (Turkey).

32 CONGRESSIONAL MEDAL OF HONOR, WAR DEPART – MENT .

33 KNIGHTLY ORDER OF ST. HUBERT (Bavaria).

!4 FAMILY ORDER OF LOYALTY O F BADEN (Germany).

15 ORDER OF LEOPOLD (Belgium).

36 ORDER OF THE BUST OF BOLIVAR (Venezuela).

‘ 37 ROYAL AMERICAN ORDER OF ISABEL¬ LA THE CATHOLIC (Spain).

I 38 ORDER OF THE RE¬ DEEMER OR SAV¬ IOR (reverse] (Greece).

39 ORDER OF THE SERAPHIM (Sweden, Norway).

10 ORDER OF THE

GOLDEN FLEECE (Austria, Hungary).

41 ORDER OF THE EASTERN RISING SUN (Japan).

12 THE VICTORIA CROSS (Great Brit¬ ain).

13 ORDER OF THE

GARTER, PRIN, I- PAL KING OF ARMS (Great Britain).

feld, (Geschichte unci Verfassung aller geist- lichen und weltlichen Ritterorden) (2 vols. Weimar 1841) ; Block et Magners, (Diction- naire de l'administration franqaise' (Paris 1905) ; Burke's edition of (The Book of Orders of Knighthood and Decorations of Honour' (London 1858) ; Cibrario, (Descrizione storica degli Ordini Cavellereschi' (1846) ; Cornish, F. W., (Chivalry' (London 1901) ; Daguin, A._, (Ordres de chevalerie autorises en France) (1894) ; Doran, J., < Knights and their Days) (London 1856) ; Elvin, C. N., (Handbook of the Orders of Chivalry' (ib. 1892) ; Froissart's (Chronicles' ; Gautier, L., (La Chevalerie' (Paris 1883) ; Gelbke, (Abbildung und Beschreibung der Ritterorden' (Berlin 1832-39) ; Giessen- burg, Baron D. van,

B. , (The Knights Hospitallers in England' (1857) ; Lehmann, G., (Die Ritter des Ordens Pour le Merite' (2 vols., Berlin 1913) ; Martin, J., (Les Decorations franqaise' (1912) ; Mazas, A., {Histoire de l'ordre royal et militaire de Saint-Louis' (3 vols., 1860-61) ; Metcalfe, W.

C. , (Book of Knights 1426-1658; with Knights made in Ireland 1566-1698' (1885) ; Milman, Dean, ˆHistory of Latin Christianity' (vol. VII) : (Process of the Templars' (1864) ; Mottart, F., (La Toison d'Or d'Espagne' (Brus¬ sels 1907) ; Panhard, F., L'Ordre du Saint- Esprit aux XVIIF et XIX siecles (1868); Perrot, A. M., c Collection historique des ordres de chevalerie civils et militaires' (Paris 1820) ; Porter, W.. (The Knights of Malta' (1884) ; Prutz, H., (Entwickung und Untergang des Tempelherrenordens' (1888) ; Round, J. H., < Peerage and Pedi¬ gree' (2 vols., London 1910) and (Peerage and Family History' (ib. 1901) ; Sainte Marie, H. de, dissertations Historiques et Critiques sur la Chevalerie' (Paris 1718) ; Salles, F. de, < Ordres religieux de chevalerie; Annales.de l'ordre de Malte ou de Hospitaliers de Saint- J ean-de- J erusalem ' (1889); Schreckenstein, R. von, die Ritterwiirde und der Ritterstand' (1886); Schulze, H., (Chronik sammtlicher bekannten Ritterorden und Ehrenzeichen' (Berlin 1855; supplements 1870 and 1878); Shaw, W. A.,

John of • Jerusalem 1014-1914' (London 1914). Henri Klein,

Editorial Staff of The Americana.

ORDINAL, that portion of the Anglican Book of Common Prayer (q.v.) which contains the offices for the consecration of bishops and the ordination of priests and deacons. So far it corresponds with certain offices in the Pontifical of the Roman Catholic Church. A commission appointed by the Crown in the year 1550, with the approval of parliament, prepared the original form which was amended two years later and again in 1562. Since the former date (1552) the Anglican Or¬ dinal always appears under one cover with the Book of Common Prayer. The American Or¬ dinal dates from 1792. Consult Proctor and Frere, (A New History of the Book of Com¬ mon Prayer' (London 1905).

ORDINANCE, (1) a law or order of a municipal governing body. (2) In England, an order or regulation issued by a power inferior to the sovereign. (3) Formerly, in England, a species of legislation issued by the sovereign, but not sanctioned by Parliament. In the United States the term is almost unknown in any sense except definition one, although in England the term by-law is used with this meaning. It has been held (99 Pa. 330) that a resolution of a council is but another name for an ordinance, and if it is a legislative act it is immaterial whether it is called a resolution or an ordinance, so long as the requirements essential to the validity of an ordinance be observed.

ORDINANCE OF 1784. See Boundaries of the United States.

ORDINANCE OF 1787, in American his¬ tory, an act of Congress passed in July 1787, to regulate the government of the western lands granted to the Ohio Company. The ordinance has been called <(the most notable law ever en¬ acted by the representatives of the American people." It marks the beginning of one of the most remarkable growths ever known in terri¬ torial expansion, and it has furnished the bases for the constitutions of several States. It is especially noted for three great provisions of all good government, its guaranty of entire freedom of worship, its perpetual prohibition of human slavery and the great prominence given to the matter of schools and education in the words ((Religion, morality and knowledge be¬ ing necessary to good government and the hap¬ piness of mankind, schools and the means of education shall forever be encouraged." The <(Ordinance of 1787" savs : ((Be it ordained by the United States in Congress assembled that said territory, for the purposes of temporary government, be one district, subject, however, to be divided into two districts, as future cir¬ cumstances may, in the opinion of Congress, make it expedient." This declaration is fol¬ lowed by 13 other sections, the first

12 of which provide for the management of affairs under a temporary government of the Northwest Terri¬ tory. The purpose of this paper is set forth as follows :

“ And, for extending the fundamental principles of civil and religious liberty, which form the basis whereon these republics, their laws and constitutions, are erected to fix and establish these principles as the basis of all laws, con¬ stitutions, and governments, which forever hereafter shall be formed in said territory to provide also for the establish¬ ment of states, and permanent government therein, and for

their admission to a share in the federal councils on an equal footing with the original states, at as early periods as may be consistent with the general interest: — It is hereby or¬ dained and declared by the authority aforesaid (United States), That the articles shall be considered as articles of compact between the original states and the people and states in the said territory and forever remain unalterable, unless by common consent.”

The articles referred to are six in number and form a definite compact between the United States as it then existed and the people of the Northwest Territory and the States that might afterward be formed from it. See Boundaries of the United States.

ORDINANCE POWER. See Municipal¬ ities.

ORDINATION, the ceremony by which bishops, priests and deacons, candidates for the minor orders and ministers of any denomina¬ tion are admitted to their specific office in the church. The Roman Catholic doctrine of ordination is confirmed by John xx, 21. 22, and the power of ordination is believed to be de¬ scended from the apostles through the bishops. Ordination is reckoned one of the seven sacra¬ ments of the Catholic Church. Orders in the Roman Catholic Church are normally conferred by bishops and the higher orders can be con¬ ferred by no other functionary. Holy orders are conferred normally on the Saturdays in any of the four Ember weeks, on the fifth Saturday in Lent, on Holy Saturday; but two grades cannot be conferred the same day on the same person. A bishop is normally ordained on a Sunday or on the festival of an apostle. The English Church also considers ordination as a real consecration, the power of communicating which has descended from Christ through the apostles and bishops. (See Apostolic Succes¬ sion). There is, however, a diversity of opin¬ ion on this point, the high-church party main¬ taining the dogma,

the broad and some of the low-church party denying it. For ordination in the English Church subscription to the 39 arti¬ cles and the declaration that the Book of Com¬ mon Prayer contains nothing contrary to Scripture are required. The ceremony of ordination is performed by the bishop with the imposition of hands on the person to be ordained. In the English Church ordination is a requisite to the exercise of a ministerial office ; but in some denominations ordination is not necessary for that purpose. In the Presby¬ terian Church ordination means the act of settling or establishing a licensed preacher over a congregation with pastoral charge and au¬ thority, or the act of conferring on a licensed preacher the powers of a settled minister of the gospel without the charge of a particular church, but with general power wherever he may be called upon to officiate. The Congrega-tionalists believe that the call of a congregation gives ministerial authority to a preacher. In the Methodist Episcopal churches the form of ordination closely follows that of the Protestant Episcopal Church, with omission of every form of expression which may appear to favor sacerdotalism.

ORDNANCE (variant of ordinance, from Latin, ordinare, to order). The word owes its application to military machines to an ordinance of Henry VIII of England, regulating the man¬ ufacture of cannon, and establishing a board charged with the care of the Crown fortifica¬ tions. In time cannon manufactured according

to the specifications of the decree came to be known as ordinance or ordnance. In its present usage, the term comprehends all ma¬ chines designed to hurl projectiles of any kind, shape or size by the agency of explosives. More particularly, it is understood to refer to mounted cannon as distinguished from those pieces such as rifles, pistols or other small arms usually held in the hand while being fired. In the modern system the term ˆgun® has come into general use for all forms, regardless of their power or of the uses for which they are designed. Mounted cannon to-day includes very many types differing one from another ac¬ cording to the use for which they are intended. In this work many ordnance types are treated under their own heads. See Armor Plate; Artillery; Coast Defense; Fortifications; Guns, History and Development of; Guns, Land; Guns, Naval; Gunnery; Machine Gun; Small Arms.

ORDNANCE, Department of, in the

United States War Department, that staff corps which superintends the design, production and supply of arms, ammunition and personal mili¬ tary equipment of the soldier and of certain other related military supplies. It is under the direction of the chief of ordnance and contains an establishment of 132 ordnance officers com¬ missioned as such in the regular army, together with 30 officers detailed for instruction each year,

reserve officers and enlisted men. The Ordnance Department has charge of all arsenals, ordnance depots and proving grounds. The employees at these are mostly civilians. See United States, Army of the; Army Organization.

ORDONEZ DE MONTALVO, Garcf,

Spanish writer, father of the novel of knightly adventure. He was born probably about the middle of the 15th century and he was very active at the close of it. He retold the old semi-mythological, semi-caballeresque stories of (Amadis de Gaula, recasting them in the Span¬ ish of his day; and to the three books thus re¬ formed he added a fourth which, it is generally conceded, was his own invention. The proofs of this are that the style, material and manner of treatment in the fourth volume are very different from those of the other three. A fifth book, (Las Sergas de Espandian,} by Ordonez de Montalvo, is a continuation of the Amadis stories. Ordonez de Montalvo was a soldier who saw many wars and finallv became governor of the city of Medina del Campo. But nothing is known of his life except such in¬ formation as incidentally appears in his works. Even his birthplace is in doubt. He seems to have taken his original version of the (Amadis* from the Portuguese, where the stories had long been popular ; 'but in working it over to have added much from his own vivid imagina¬ tion and experience. In the fifth.book, already cited, he continues the series with the adven¬ tures of the* son of Amadis. These Amadis stories of Ordonez de Montalvo were im¬ mensely popular in their day and had countless imitators, not in Spain alone, but in all the Latin countries (more especially in France) and in England. They created a new and freer literature, imaginative and bombastic and gen¬ erally untrue to human nature. Yet they formed the delight of Spanish readers for a whole cen-*

tury; and they only disappeared with the break¬ ing up of chivalry and before the ridicule of Uiem so persistently carried out in

peared they left their broad trail on the suc¬ ceeding literature of Europe; and

ORDOVICIAN, or-do-vish'an, in geology , a term introduced in 1879 by1 Lapworth for what Murchison had called the Lower Silurian as early as 1835; the term Silurian being used thereafter for the most part only of the Upper Silurian in Murchison's nomenclature. Hence the Ordovician system may be defined as the rocks of the period after the Cambrian (q.v.) and

before the Silurian (q.v.), the latter term being used in the sense explained above. The name Ordovician is derived from a Welsh tribe. The system in America has been vari¬ ously subdivided. The following units are now generally recognized, Lower or Canadian, Mid¬ dle or Mohawkian and Upper or Cincinnatian. These names are not used in other countries. The Cambrian passed without notable change into the Ordovician. The period was one of shallow but widespread epicontinental seas with local emergences and erosion. The water areas reached a maximum near the middle of the pe¬ riod, when more of North America was under water than at any other known time in its his¬ tory. Sandstones and shales were deposited in places, but it was notably a time of limestone formation, the Trenton being a very extensive limestone of mid-Ordovician age. In North America the period was brought to a close by folding disturbances which have been called the Taconic Revolution, producing a range of mountains on the present site of the Green Mountains. Simultaneous folding took place in the British Isles. This folding was accom¬ panied by rather general emergence of eastern United States, and the Cincinnati Arch took form about this time. Wide spread outcrops of Ordovician rocks occur in the Appalachian Mountains, in southern Wisconsin, in the Ozarks and at many other points. In many places the rocks of the system lie deeply buried by younger sediments. Europe was also widely submerged in Ordovician time, and there was extensive volcanism in the British Isles. Much of the oil and gas of Ohio comes from rocks of Ordovician age.

The life of the Ordovician showed marked advance over that of the Cambrian. Brachio- pods and Trilobites were very abundant. The long straight Orthoceras type of Cephalopods became numerous and were the largest animals in the Ordovician seas, attaining to lengths of over 10 feet. Fish remains, the oldest ver¬ tebrates known, are doubtfully reported from Ordovician rocks. Evidences of plant life are very uncertain. See Canadian Series ; Chazy Stage; Cincinnati Anticline; Trenton Stage, etc.

ORDWAY, John Morse, American edu¬ cator and chemist: b. Amesbury, Mass., 23 April 1823; d. 3 July 1909. He was graduated from Dartmouth College in 1844 and engaged in chemical work. In 1847 he was superintendent of the Roxbury Color and Chemical Companv's works at Roxbury, and in 1850 accepted a pro¬

fessorship in Grand River College, Trenton, Mo. After 1854 he re-engaged in chemical work; in 1869 was appointed professor of in¬ dustrial chemistry and metallurgy at the Massa¬ chusetts Institute of Technology, and in 1884 became a professor at Tulane University and its branch for women, Newcomb College.

ORE. An ore may be defined as any min¬ eral or aggregation of minerals

from which a metal or metals can be extracted at a profit. This definition is not exact, but is one often used by geologists and mining engineers. Since the prospect of profitable extraction is involved it follows that mineral containing- a certain per cent of a metal may be considered an ore in one region and not an ore in another. Thus pyr- rhotite containing 2 per cent copper would be called copper ore if situated where it could be worked to advantage, and would not be called a copper ore if situated, say, in Tibet. Again certain minerals formerly not considered as ores are not now. and other minerals not ores now will be considered such in the future. Bauxite is an ore of aluminum, but aluminum was not known a century ago. Similarly clay will be an ore of aluminum with the progress of metallurgy. Ores containing a relatively small proportion of the metal sought are termed lean or low grade, those containing a high per cent rich or high grade; the relative percent¬ ages depend on the value of the metal. Ore containing 1 per cent of gold would be ex¬ tremely rich. In the Lake Superior country iron ores containing less than 50 per cent iron are low grade. Metals may be disseminated through a rock in the native state or as chem¬ ical compounds of sulphur, oxygen, carbonic acid, etc. Gold and silver, the noble metals, occur native as does copper. An ore carrying native gold is called free-milling. In general it may be said that nine-tenths of the com¬ mercially important ores are sulphides, oxides, hydroxides, carbonates and native metals. For information on methods of extracting metals from their ores see Metallurgy, also Copper; Gold ; Iron, etc. For a discussion of methods of occurence of ores see Ore Deposits and Economic Geology. / i

ORE CRUSHING, See Gold Mining.

ORE DEPOSITS. It is impossible to draw a fixed boundary between those occurrences of metalliferous minerals that are to be regarded as ore deposits and those that are not. Gen¬ erally speaking an ore deposit is any occurrence of metalliferous minerals, large enough and rich enough to be worked at a profit. It thus ap¬ pears that a body of mineral might be properly regarded as an ore deposit under some condi¬ tions and not under others. Magnetite, which in places is an important ore of iron, is often found scattered through granite, yet no one would regard a granite ledge as an iron ore deposit. _ The exact point at which rocks con¬ taining iron oxides become iron ore bodies is determined by the factor of cost of extraction. A ledge containing a small percent¬ age of iron favorably situated might be profit¬ ably worked, whereas if situated in some re¬ mote locality it could not.

Whatever theory as to the origin of the earth may be held, it is certain that the useful metals were once original constituents of the rocks, either finely disseminated, or perhaps, as some

hold, concentrated as a heavier central core within the earth. In any case, these metals have been later concentrated into our present ore deposits, by a complex series of processes to be outlined very briefly below.

In a molten magma slowly cooling at great depths as the minerals crystallize out they may collect in aggregates, either from unequal cool¬ ing of the magma or from what we may call mineral attraction. It is fairly certain that bodies of chrome iron ore, of nickel-copper sul¬ phides, of magnetite and possibly platinum have formed by cooling from fusion. The nickel deposits of Sudbury, Ontario, and much of the magnetic iron ore of the Adirondack region of New York are believed to be of this origin. The process by which these ores have been formed is known as magnetic segregation. Again supposing the minerals distributed thinly through a cooled magma — an igneous rock — they may be concentrated into workable ore bodies, (1) by the decay of the rock when, after overlying strata have been uplifted and eroded, its constituent minerals are broken up and removed by air and water and only the more resistent are left. Thus are formed the so-called placer deposits, whence has come much of the world's supply of gold, also the principal tin deposits. The minerals removed in suspension or solution in surface water and the contained metals may be precipitated chem¬ ically, or by some form of organic life. Thus have beds containing various iron compounds been formed, the bog iron ores, and those car¬ bonates and silicates which after partial solu¬ tion and leaching out of silica are now repre¬ sented by the Lake Superior iron ore deposits.

Slowly circulating meteoric waters in their passage through the rocks may take into solu¬ tion metallic compounds which they encounter, and may deposit them in fissures as veins, or in irregular shaped caves as large masses of ore. Sometimes the waters slowly dissolve away limestone and replace it particle by particle with metallic minerals forming what are known as replacement deposits. Such is the origin of the well-known lead and zinc deposits of Missouri and Wisconsin.

In regions of igenous activity, particularly in mountainous areas, large masses of molten rock (magma) force their way into the adfacent rocks. These contain much water (magmatic water) which they give off as they cool and solidify, and this water sometimes carries away with it in solution metallic compounds. As the waters rise toward the surface along fractures

they cool and deposit much of their load as veins. By replacing the wall rock they may also form large irregular replacement deposits. Many of the great gold, silver and copper deposits of western United States have been thus formed by hot waters of magmatic origin, for example, those of Butte, Tonopah and Cripple Creek.

Classification. — Many attempts at classify¬ ing ore deposits were based on form and mode of occurrence. Lately geologists have realized that the form of a deposit was from a scientific standpoint less important than its origin. Schemes of classification have been devised which take into consideration both form and mode of origin, but the latest classifications are based wholly on origin. The following scheme is that proposed for metallic ore deposits by C. R. Van Hise:

1. Sedimentary

(a) Chemical precipitates

(b) Mechanical concentrates

((1) Residual deposits { (2) Stream deposits { (3) Beach deposits

2. Igneous

(a) Magmatic secretions

3. Metamorphic

(a) Deposited from gaseous

solution

f (1) Ascending waters

(b) Deposited from j (2) Descending waters

aqueous solution [(3) Ascending and descend'

ing waters

Many other and more elaborate schemes have also been proposed.

See Geology and Economic Geology. For bibliography see Economic Geology.

Revised by Prof. C. L. Dake.

OREADS, in Greek mythology, a name given to various nymphs of the mountains.

OREBRO, e're-broo, Sweden, (1) a town, capital of the lan of same name, on the Svart- Elf, near the western extremity of Lake Hj el- mar, 101 miles west of Stockholm. Its build¬ ings are almost entirely modern, having been erected after the great fire of 1854. One of these is a handsome Gothic town-hall. The only ancient buildings are the castle, on an island in the river, now used for public offices, and the church, which contains some interesting monuments. The manufactures comprise ma¬ chinery, chemicals, matches, etc., and there is a good trade. Orebro was the first Swedish town in which the Reformation was formally estab¬ lished (1529), and it was for a long time, of very considerable importance as the meeting place of the diet. Pop. about 25,000. (2) The

lan consists generally of undulating plains, watered by numerous streams, and containing many lakes. The only hilly district is in the north where there are several forests and valuable iron and other mines. The pastures rear fine cattle. The only exports of conse¬ quence are iron and timber, transmitted to Stockholm or Gottenburg.

OREGON, one of the United States, on the Pacific Coast, bounded north by the State of Washington, from which it is separated princi¬ pally by the Columbia River ; east by the State of Idaho; south by Nevada and California, and west by the North Pacific Ocean. The State lies between lat. 42° and 46° 18′ N. and between long. 116° 33′ and 124° 25′ W. Its extreme length from east to west is 395 miles, and from north to south 295 miles. Its area is 94,500 square miles of land surface and 1,092 square miles of water surface, divided (1917) as fol¬ lows :

Per cent of total Acreage acreage

In national forest reserves . 13,470,248

Indian reserves . 1 , 825 , 987

N ational park reserves . 164, 040

Public lands open to entry . 15 , 969 , 846

Not patented or otherwise classified

as to ownership . 3,152,993

Carey act lanuS . 360,382

Carey act lands pending . 62, 152

State school lands . 624,210

In cities and towns . 134,496

Cultivated lands . 4,930,396

Commercial timber . 9,547,116

Tillable lands (uncultivated) . 5 , 084 , 858

N ontillable lands . 5,826, 200

Railroad right of way . 35 , 556

22.014

2.984

0.268

26.099

5.153 0.589 0. 102 1.020 0.220 8.058 15.603 8.310 9.522 0.058

Total area

61,188,480 100.000

OREGON.

Estimated population, 888,243 COUNTIES

Pop.

18,076 Baker . 0 5

10,663 Benton . C6

29,931 Clackamas . F 4

16,106 Clatsop . C 2

10,580 Columbia . D2

17,959 Coos . C 10

9,315 Crook . 17

2,044 Curry . B 12

. Deschutes . H 8

(Pop. inc. in Crook Co.)

19,674 Douglas . D 10

3 701 Gilliam . J 4

5,607 Grant . M6

4,059 Harney . . .... L 10

8,016 Hood River . G 3

25,756 Jackson. . . . E 12

.... Jefferson . H 6

(Pop. inql. in CrookCo.) 9,567 Josephine . . ... . .D 13

Pop.

8,554 Klamath . G 12

4,658 Lake . Ill

33,783 Lane . DS

5,587 Lincoln . C 6

22,662 Linn . E 6

8,601 Malheur . P 10

39,780 Marion . F 5

4,357 Morrow.., . K4

226,261 Multnomah . F3

13,469 Polk . C 5

4,242 Sherman . 14

6,266 Tillamook . C 3

20,309 Umatilla . M3

16,191 Union . N4

8,364 Wallowa . P3

16,336 Wasco . H 4

21,522 Washington . E1 3

2,484 Wheeler . F 6

18,285 Yamhill . D4

Pop.

83 Waterloo . E 6

140 Westfall . 0 9

499 Weston . N 2

149 West Seaside,

Clatsop . C 2

55 Whitney . N 6

Pop.

317 Willamette . E4

376 Willamina . C4

1.616 Woodburn . E 4

325 Yamhill . D 4

233 Yoncalla . D9

Incorporated Cities, Towns, Villages, Etc.

205 Adams . M2

4,275 Albany . D 6

407 Amity . D 4

175 Antelope . 15

317 Arlington . J 3

5,020 Ashland . E 13

10.363 Astoria . Cl

586 Athena . N 2

190 Aurora . E4

144 Austin . N6

6,742 Baker City . 0 5

1,803 Bandon . A 10

69 Barlow . E 4

281 Bay City . . .C 3

149 Beaver Hill . B 10

(P. O. Coquille)

386 Beaverton . D3

536 Bend . H 8

77 Bourne . N 5

919 Brownsville . E 6

904 Burns . L 9

49 Butteville, Marion. E 6

587 Canby . E 4

364 Canyon City . M 6

149 Canyonville . D 11

386 Carlton . D 4

761 Central Point …. D 13 747 Clatskanie . D 1 .

240 Clatsop, Clatsop ..Cl

613 Coburg . D 7

1,009 Condon . J 4

250 Copperfield,

Baker . Q 5

1,398 Coquille . B 10

459 Cornelius . D3

4,552 Corvallis . D6

1,834 Cottage Grove _ D 8

433 Cove . 0 4

367 Creswell . D8

2.124 Dallas . . D 5

453 Dayton . D 4

335 Drain . D 9

82 Drewsey . N 8

523 Dufur . H 3

196 Dundee, Yamhill. . D 4

1,160 Independence ... D 5

239 lone . K 3

166 Island City . 0 3

785 Jacksonville . D 1C

415 Jefferson . D 3

258 John Day . M 6

725 Joseph . P 3

759 Junction City. . . . D 7 3 ,758 Klamath Falls. . .G 13

41 2 Lafayette . D 1

4,843 La Grande . N 4

1,253 Lakeview . J 13

1,820 Lebanon . E 6

185 Lexington . K3

70 Lonerock . K 4

86 Long Creek . L 6

230 Lostine . . . . P 3

2.400 McMinnville . D 4

364 Madras, Crook . . . H 6

2,980 Marshfield . B 9

14,118 Medford . D 13

1,280 Milton . N 2

i860 Milwaukee E3

210 Mitchell . J 6

493 Monmouth . D 5

119 Monument . L 5

378 Moro . 13

545 Mt. Angel . E 4

429 Myrtle Creek . . . . D 10 136 Myrtle Point . . . .B 10

119 Nehalem . C 2

957 New Astoria,

Clatsop . C 2

2,260 Newberg . E4

721 Newport . B 6

2,078 North Bend .... B 9 (455 North Powder 04

449 Nyssa . Q 8

467 Oakland . D 9

1,248 Ontario . Q 7

4,287 Oregon City . F4

4,460 Pendleton . M3

505 Philomath . D 6

250 Phoenix . E 13

197 Pilot Rock . M 3

252 Eastside . B 10

400 Echo . L 2

1,120 Elgin . 0 3

147 Empire . . B9

1,242 Enterprise. ..... P 3

405 Estacada,

Clackamas . F 4

13,572 Eugene . D 7

204 Fairview . F3

969 Falls City . C 5

311 Florence . B 8

1,772 Forest Grove. . .D 3

421 Fossil . J 5

532 Freewater . N 2

391 Gardiner . B 8

276 Gervais . D 4

64 > Glendale . C 11

423 Gold Hill . D 12

89 Granite . N 5

3,897 Grants Pass . C 12

342 Grass Valley .... D 13

28 Greenhorn . M 5

540 Gresham,

Multnomah . F 3

423 Haines . 0 5

186 Halfway . P 5

337 Halsey . D 6

191 Hardman . K4

58 Harney . M 9

453 Harrisburg . D 7

109 Helix . M2

880 Heppner . K 4

647 Hermiston . L2

2,016 Hillsboro . E 3

2,331 Hood River . G3

347 Houlton . E 2

283 Hubbard . E 4

680 Huntington . P6

295,463 Portland . E 3

348 Prairie City . M 6

1,042 Prineville . 17

1,359 Rainier . El

216 Redmond . H 7

334 Richland . P 5

187 Riddles . Oil

4,738 Roseburg . C 10

20,278 Salem . D 5

295 Scio . E 6

1,121 Seaside . C 2

495 Shaniko . 15

1,021 Sheridan . D4

115 Sherwood . . . E 4

1.588 Silverton . E5

110 Sodaville . E 6

1,838 Springfield . D 7

742 St. Helen . E 2

4,872 St.Johns . E3

103 St. Paul, Marion. E 5

318 Stanfield . L2

703 Stayton . E 5

138 Sublimity, Marion. E 5

237 Summerville . 0 3

643 Sumpter . N5

202 Sweet Home . E 7

4,880 The Dalles . H 3

1.352 Tillamook . C 3

5.41 Toledo . B6

309 Troutdale . F3

191 Turner . D 5

198 Umatilla . L2

1,483 Union . 0 4

992 Vale . P 8

69 Vernonia . D 2

793 Wallowa . 0 3

339 Warrenton . O 1

386 Wasco . 13

/ /

—

Q

12 5°

D

E

H

119 °

M

N

118°

117

rjammofi

46

Columbia

OlenwoDc Carnahan Clatsopl

SiOrjra

°01ncj

. v' zy 4VOu*

Tillamook Hoadˆ«oil?J.j A ˆ °v££3jB o'ClJU M bTa| M

fe;

Net arts Lookc Sand L

<0

Cascade Head,

-

Devils LnliWp Row LUdˆ Siletz 2«ijlMratt

OREGON

Statute Miles, 34.16 1 Inch

0 5 10_ 20_ 30_ 40_ hO

Rand McNally St Co.' New 11 x H Map of Orogoo . Copyright by Iiuod McNally St Co.*

Railroads _ _ Electric . – ■ . Steam and Electrio

• LEWIS

«r «

P°^0%

C. Foulweatlioip

Otter |“

luma Head ‘}\ ° °^/rT51c \ ”

Agate Beartf’ V’e Wv,

- .Tflaetcay ollullt

r&.M ..A

Taquina

Newport

kaqij Ovstcn ill / Winar”1

-Alscya Ba)»r$_

Wald’aGft-

r Wo. ‘ “4”^i S Ba ,:r L‘NCH°^NpL

Tidewater | — ■ ^_B E N TO N

_ _ I Alsea/

“*04 s ~ — 1 —

Fisher o P™Mr Gle^ok1^”^

‘i h!°me Minao

mV R I O

Mehnma

ii&JU-0”‘1

ihelburn

be 10 s*x Cs°

lkeycov S* ‘jzs*ry~

Crsbtii Balm .

Gri-KaoLaco,nb Bre water

i lasseFvr— ” -ˆtserun lain vietvH: Waterloo ,inn °(Sodaville cRachel\ /—r

•ownsrille

’Brownsvilleˆ-/; Foster- Buttes %> < itotte

„ . – f – r-aowland Crawfordsville

Pans ° ˆ (.•irgiWlaJrlsburg _/ˆN% v

Alphao Hortonˆ JunotioniCitjjN jPriccborb ˆ ˆ

Reed“ -B1»ch‘j” h.”hˆL lEy4wtfeST>«>Wsnaiiii8 Bluo R,’ MoKiutlefliridge’jjf I %0, jbiirKˆˆlohawk,ˆ «vm.

°Goldson

w .11 O *i>iaeniy

Hecetirt tt,S», .

Elmira

c*

Foley

ˆ Peltqia

V*

(l-iF J ///Culver <

N:’ c jt-jv/j Geneva oy // (ˆamonffto ■ – 1

|4ˆ_ _ t£Vfc“‘j Barney a

- \Qjˆ Lower Kridge’E VTeifcr’b.T

Vpllˆne Falfi’

f oGlst JgL T P-

‘ I (4/0 | r Butte/ (VooAvv/

Threejjstˆ/ Tumnloo? /Dcs ckutU / .

8

*F)orcDˆ)Tˆˆilˆ~~ – -ˆ£ˆlv\ev5TAvrSL_»ˆ \o*ˆ WˆiXatn.n*

■*Woahxnk – C °Wi,.l*

*t *“• Vˆ? ˆWalker// 1*

Gai

Winchester Bqj Lake:

Lowell

f- jˆ.iˆˆVtshurg tˆJElkton oUaWSt

■*feHo V Championˆ*

) nianti D,,ts

_Rujada ’ Disston

CTempleton I \A«b ,

1 Yoncallaft

lillwood 0 _ poles Valley0*

I Elko | Black Butte

• Head — –

? Isadora ˆ Oakland i’Suthcrlin /Deady ˆIloaglln

10

43

1 1

Ju„ “j

/Butterfield) I

J r

North oAˆesaoj I a tyee r'-

%r Fmˆyˆ WCooston *“l ‘ ˆ

North Pojnfˆtˆ lMarahfield *

Coos Ueitf&C oˆEaetsidˆ

Cape Arag(»ˆ“‘Sflnsotn VˆL! * ,rn,aˆ8 .

. ui.ry¥ineFCo OIOS* clE,el*’> d!,

ˆ B<» 'H H MelrA-ˆWaSElBte, " ""j

BuUardˆ”J1ˆSi»»”“8uV,Klf?,,**R“J EdRbn**<:tl9l,“‘V’U L

Pr*iSajXˆCo«i.ii ft *l°’” SooViaˆS .PKoseburg: koto,

Coqullle Polnlˆ iO “‘“/{Mlncoia Boro Sitltuml J**}*

ot Ruckle8ˆ°*

BanorofO V* f ~~ZT77~j4ˆru

Waldo Lakcˆj}

Malden P.e

OMtjgti

UI Itutairoi.u, ql

. ~.„Jond -T / I ˆrteˆi

v Lf‘ %&ttW

spr / lˆv.

‘Alllahe / Alme-la?.

12

Wedderbu rJh/fQ U R R Y

/((T Gold Heuch

42

r- . / Qslieeor i8\(

Gree»v1

Wilder t W ondcr

S Waters Cr.

-y,„

Elk Lake gy \ Lava Lakeys1 p*

;?WW °0 E s(c HUT

Cultiu Lake

m ^, ,.

‘] jjJ^ (Paulina

> ‘ I Lake t

0 Lap i no

“‘Davie LakeJ

Crescent

[Fremont 1 o

Fort Rookw

Mi lli can

“m

Hemstecli‘0

«Pe

0Fleetwood

oM’oodrow

.

©Sink ˆ q o Cliff

QˆfEieh Lake

0 Christmas Lake Valley o Connley o Lomft ViaU ˆ Chrietmae Lake .

Lakeo a o Buffalo Butte

Ylewpoint °m„.o

n Thorn Lake

o Arrow

Sherrill

Round • Silver Lake

Pfufifrl

VvˆGSi/wsr Lake

guntex •% >

Silver Lakeˆ

G Egli Iron Mt.j

Harney Lak?

H A R

K L A M A

teˆ Pk.

Jamsay Pk1ˆ_ Suln

f|srm

Alkali LakeliSn

J Prospect I =0 V, ‘ Rustler Peak‘d / fz .

A > “i

-9

, -.TWBuite Falls C wisenool House Gap /Mountain View , v ˆAEaeie Point

‘Triable Rock QLake Creek.

Wi.n„th

MJ

M^^gtal o ˆ gfinoy

Ki’crcntiuii

v-v i uters l r. 41 .50 – -ˆ-0 I central 1’.. int

JlO S F P H I M R,’ Crater Ukeˆ.&* m2*r Creek Jn

ˆ M • N jli c k s o n \ 1 1 1 c (* 4 1 Cr. „ . i°‘

Cape Ferreft,.

Mt. Emily-) Holland

B rook i AgaˆHar bor * *%aldoo

-1

fa&M

cˆyiiˆS °0 N J|®

‘ ier&ˆSrr Cr** Jo eˆk

l« V-VM files’ Cl ir

D E

L C N

O R T E

_ _ wu . j’Z <$k>Klam,

Dr,d.n)Pr°,ol,Lv’PPSrf,e ci||u«x

sklVOU ˆHoBuuoom ˆ>rd I Sˆjuniit I hf Vy oVMistletoe 1? ˆ

MT5*^ • Steamboat ^l|MW'all Crcc'kVStoinman -» l; \§ VI I ° ^m*iiiVrt»'/ t®hlte Point W, , . PinehurstH iln'WatJcius ° S'®,kl[°l| Colcstin.if ?'!k'y°" k'11V r P

S KII \» VjE. '

s L«

I ^ I

Kirk INDIANL _ | _3

A

Mev".R E S E R V AVT I 0 Nil

, » 1" ^ Ihiloqulo^U^ \ |

Lobert 3s

K

I %

• %

o Paisley

Clover Flat 0

Lake

Alert

Blue Joint Lake X

LorcUa

Vi stlllas

o

D< >g Lake

r, rr r j, . _ XS) Stone Corral %(iko Flagstaff Lake ^^jrffLower CampbellkLake Mugwump Lake d ^CamnJwU Lake I r- ' \K$wamp Lake 1

o Valley Falls n Anderson Lake ■

‘”’’’’-.Hart Mt.

W, ,

Plush xj/Jtiart Lake Crooks Peak

ioN’l*®, ‘

ˆGruaMld Lake

Guano J Valley I

m

s

IValle Lake

Catlow

Tiara0

I oSageview , Beckloy Eyrdugo

a WJlA R

- /

• o|Folly Farm

y V, •

\ Alberson

K Juniper 1

Kmtake

ˆ-VrtielakeJ l Han ns rQ Lake

A SHOE

UJ

SUverOity

l Ixihe

45

43

it

Fields o

o Oroville Tumtum Lake ˆ

Barren

Plains

Sage

124′

B

123°

P

122 °

G

120 o

119°

E u

M

V B

N

118°

O

- I 42

2660

Oiegon ranks seventh in size among the States and was admitted to the Union 14 Feb. 1859. There are 36 counties in the State. The popu¬ lation m 1910 was 672,765. The capital is Salem.

Topography. — Primarily Oregon is a moun¬ tainous State, two great ranges dividing it fiom north to south; the Coast Range from 10 to 30 miles from the ocean; the Cascade Moun¬ tains from 110 to 150 miles inland; and a third, the Blue Mountains, constituting a group in the northeast part. The Coast Range has an extreme altitude of 4,000 feet, and is largely covered with dense forests. The Cascade Mountains, an apparent continuation of the Sierra I\ evadas but with an entirely different geological history, have an extreme height of 7,000 feet, with several peaks rising 2,000 to 5,000 feet higher. Mount Hood reaches an alti¬ tude of 11,500 feet, McLoughlin or Pitt, 11,000 ar*d. Jefferson, 10,500 feet. The Cascades are heavily timbered on their western slope to the snow line. Four transverse ranges connect the Coast Range with the Cascades: the Cal-lapooia, Umpqua, Rogue River and Siskiyou Mountains. The Willamette River Valley, lying between the Coast Range and Cascade Moun¬ tains, and rising from the Columbia River to the Callapooia spur, is 150 miles long, from 10 to 70 miles wide, and is extremely fertile and contains the largest part of the population of the State. Eastern Oregan, embracing two-thirds of the State, is a high table-land, with little rainfall, and sparsely populated. There are fertile tracts along the rivers and lakes in the southern portion and in the Blue Mountains. The coast-line, which has an extent of 300 miles, is generally rugged and precipitous. There are, however, several bays or harbors, such as Tillamook and Coos, which are land¬ locked, with narrow entrances. Toward the south the coast runs to an angle ending in Cape Blanco.

Geology. — Oregon has had a varied geo¬ logical history. The older sediments of the State are to be found in the Blue Mountains and in the Siskiyou Mountains. These belong to the Pre-Cambrian, Palaeozoic and Mesozoic. In the Blue Mountains, metamorphic rocks, in¬ cluding serpentines, schists and gneisses repre¬ sent the earlier rocks. Igneous intrusives, often of a granitic nature are there also associated with the generally non-fossiliferous sedimen¬ tary rocks of Pre-Mesozoic age. In southwest¬ ern Oregon these early formations include similar metamorphic and igneous types of rock. The upper Mesozoic is represented by sand¬ stones and shales, of Cretaceous age, outcrop¬ ping within the drainage basin of the upper Deschutes, Crooked and John Day rivers of eastern

Oregon and along the Rogue, Umpqua and Coquille rivers in western Oregon. The Cascade and Coast ranges are of Tertiary Age, consisting of marine sediments and volcanic flows and tuffs. In the Cascades these rocks are basaltic and are in part probably a portion of the great fissure flows which buried the larger part of eastern Oregon to a depth of at least a mile. Later flows of a more andesitic nature, and probably issuing from isolated vol¬ canic cones, are represented within the higher Cascades, and especially in the vicinity of such volcanic peaks as Hood, The Sisters, Mount Jefferson and Mount Mazama (Crater Lake).

Glacial deposits of local nature occur in the lower reaches of the high valleys of the Blue, Stein and Cascade mountains. Gold, copper, silver and chromite have been obtained from mines within the Blue Mountains. The gold is mined both in quartz mines and as placer. Dredging operations are still in progress on the Powder River as well as along certain streams in western Oregon, where platinum has been obtained in small amounts. Some metal min¬ ing is to be found at several localities along the western flank of the Cascades. A quicksilver property at Black Butte (near Cottage Grove) has resumed operations. Although coal occurs in the sediments dipping beneath the Cascade lavas on the west side of the range, coal mining operations are confined to the Coos Bay and Nehalem basins in the coast region.

Rivers and Lakes. — The largest river is the Columbia, which forms three parts of the northern boundary of the State and flows nearly due west for oyer 300 miles, and is nav¬ igable to its mouth in the Pacific. Its great tributary, the Snake River, flowing north and serving as a boundary of a great portion of the State eastward, and its affluents, the Umatilla, John Day and Deschutes rivers, on the east side of the Cascade Range, and the Willam¬ ette on the west side, all flow into the Columbia. The Columbia has a drainage area of 245,000 square miles. The head of navigation for sea¬ going ships is at Portland, on the Willamette, about 100 miles inland. From here to the cas¬ cades navigation for river steamers is open the year around. Above the dalles the Columbia is navigable for 190 miles and the Snake River for 180 miles. The lower and upper stretches are now joined by a(govern¬ ment ship canal on the south side of the river. The Columbia is noted for its beautiful scenery and the great number of sal¬ mon taken from its waters. The Columbia Highway, a new scenic motor car roadway, is carved high on the cliffs along its southern bank between Portland and Hood River. Other well known rivers in the State are the Rogue, Coquille, Umpqua, Siuslaw, Alsea, Yaquina, Nestucca, Nehalem, Lewis and Clarke,. Clats- kanie, Youngs, Sandy, Hood, Owyhee, Malheur, Burnt, Powder and Grande Ronde. The principal lakes are Klamath, Goose, Warner, Salt, Christ¬ mas, Albert, Summer, Silver, Henry and Mal¬ heur. Crater Lake in the Cascades, 8,000 feet above sea-level, is the crater of an extinct

volcano, 10 miles in circumference, and sur¬ rounded by bluffs 2,000 feet high. It is the deepest body of fresh water in America. With its surroundings it constitutes a National Park. Goose Lake and Lower Klamath Lake lie partly in California.

Climate. — The climate can best be described by making a sharp distinction between west¬ ern Oregon, west of the Cascades, and eastern Oregon, east of those mountains. A warm oceanic current from Japan flowing southward along the Pacific Coast gives western Oregon a very mild winter climate. In the summer the northwest winds are cool. On the coast the mean temperature for January is 42.4° and for July 62.3°, while great extremes are rare. Properly speaking, the year in western Oregon is divided into two seasons, the wet and the dry, although the usual names of the four seasons are in general use. The rains begin

in September or October, continue to February or March and with lessened frequency and vol¬ ume into May or June. From May to August there is frequently little rainfall in western Oregon except along the coast line and in the mountains. On the coast the rainfall averages

89.6 inches; in the Willamette valley, 35 to 50.8 inches. Thunderstorms are rare. A climatic curiosity is the "silver thaw,® experienced occa¬ sionally in Portland — a freezing misty rain which sometimes tears down trees and wires by coating them with ice during a cold night. The three western valleys, the Willamette, Umpqua and Rogue, have distinct peculiarities, the more southerly approaching eastern Oregon in climate. Eastern Oregon is a land of much less rainfall and greater extremes of tempera¬ ture. The distinction between a wet and dry season does not exist. The mean temperature is 29.6° for January and 66.9° for July. In winter the extremes fall below zero, and some¬ times nearly 30° below. The rainfall averages

12.7 inches in the northeast and in the south- central portion only 6.5 inches. Thunder storms are not unusual.

Fauna. — Since Oregon has been populated and developed the grizzly bear, black bear, cinnamon bear, gray wolf, coyote, panther, catamount, wildcat, polecat, deer, antelope, elk and mountain sheep, all formerly very numer¬ ous, have retreated to the mountains or gradu¬ ally disappeared. The grizzly and cinnamon bear and the mountain sheep are virtually ex¬ tinct. There are still to be found in more or less abundance such animals as

silver foxes, martens, rabbits, squirrels, raccoons, porcupines, beaver, muskrats and seals, and rarely the river otter, while in the lakes and rivers are salmon, herring, trout, halibut, smelt and other fish. Crabs and clams are taken in large quantities. Oysters and shrimp are negligible. The birds include the eagle (scarce), hawk, pelican, cor¬ morant, gull, crane, vulture, buzzard, raven, crow, jay, robin, swallow, sparrow, humming¬ bird, swan, goose, duck and pigeon. Reptiles and insects of the more common varieties are numerous.

Minerals. — Oregon abounds in mineral wealth, but gold is the only product extensively mined. It is found mostly in the northeast, in the Blue Mountain region. Silver, lignite, coal, zinc, cinnabar, platinum, iridium, lead, antimony, iron, copper, magnetite and nickel are also found here. In 1908 the principal mineral productions included gold, 41,848 fine ounces; silver, 43,315 fine ounces; and coal, 77,017 short tons; and, in 1909, gold valued at $712,000, silver $37,000, coal $235,085. The building stones are granite, valued at $5,300; sandstone, $5,450; and lime¬ stone, $10,900. The production of mineral waters was 50,000 gallons, valued at $12,000, and the clay products had a value of $327,000. In 1917, under war conditions, 3,000,000 pounds of copper was produced, gold to the value of $1,920,000, and 280,000 ounces of silver. The war stimulated the production of chromium, and 12,000 tons was produced, principally in the John Dav valley and in the Waldo district and in Josephine County, the sale price rang¬ ing from $18 to 830 a ton. In 1916 coal to the value of $120,000 was mined, metals about $4,000,000, and non-metals other than coal, $1,- 500,000. Two large cement plants now are in operation in the State, each with a capacity of

1,000 barrels of cement a day. The limestone and other necessary ingredients are quarried near at hand. In 1857 over $20,000,000 in gold, mostly placer, was mined in Oregon.

Fisheries. — The canning of fish ranks second among the industries of the State, the Columbia River producing canned salmon valued at $6,530,939 in 1917, as compared with $1,643,324 in 1890. This industry, which is almost entirely the canning of salmon caught in waters of the Columbia River and its tribu¬ taries, has its centre in the city of Astoria. It was once carried on almost exclusively by the Chinese but now Portuguese and Swedish in¬ terests practically control. The industry dates back to 1866, and reached a record production in 1883 which afterward decreased. It is car¬ ried on also on the north side of the Columbia River, in the State of Washington, the value of the product of this latter State in 1890 being nearly a third of that of Oregon. The Colum¬ bia River has long been famous for its salmon, the product for the year 1895 "exceeding in value that of any other river in the United States or the world.® The exhaustion

of these fisheries has been averted by more rigid laws against impovident fishing, and by the artificial propagation of fish. Since 1898 several re¬ frigerating and freezing plants have been erected, and these, together with the use of refrigerator cars have made possible the ship¬ ment of hundreds of tons of fresh fish annually from Portland to the East and to European cities — a fact which has tended to check the increase in the canned product during recent years. There are a few canneries further down the coast, which add somewhat to the total product. The following figures are for the Columbia River :

YEAR

Cases

Value

1907 .

. 324,171

$1,763,490

1908 .

. 253,341

1,380,708

1909 .

. 274,087

1,760,088

1910 .

. 391,415

2,544,198

1911 .

. 543,331

3,052,164

1912 .

. 285,666

2,319,856

1913 .

. 266,479

2,012,387

1914 .

. 454,621

3,595,989

1915 .

. 558,534

4,305,292

1916 .

. 547,805

4,361,075

1917 .

. 555,218

6,530,939

As these figures include only the salmon actually packed in cans, there can be added at least 15 per cent for mild cured, salted and fresh used fish. The increase in the salmon output on the Columbia River for the past four years is credited to the system of retaining and feeding the fry before liberating them, in¬ augurated by the Fish Department of this State in 1910. Prior to 1910 the young salmon were practically turned out with the yolk sack at¬ tached, or as soon as the same was absorbed. At the request of the principal salmon packers on the Columbia River, who furnished the funds, the State installed retaining and feed¬ ing ponds at the State hatcheries, and at the present time all the fry are retained and fed from four to nine months before liberated.

Forest Resources. — About 38 per cent of the State of Oregon, or 36,000

square miles, was originally forested. Some of this area has been logged over and either cleared for agri¬ cultural use or has become restocked naturally with "second-growth® timber; but the great majority of the forested territory of the State

still remains in its pristine condition, untouched by the axe. The forests in Oregon are of great variety, due to the wide range in climatic conditions between the humid belt in the west¬ ern part of the State and the arid zone east of the Cascade Range, and between the equable temperature at sea level and the rigorous one at perpetual snow line on the mountains. There grow naturally in the State 75 varieties of trees — of which 32 are conifers, such as pines, hr, spruce and cedar; and 43 are broadleaf trees, such as maple, ash, oak, alder, cotton¬ wood, myrtle, madrone, etc. The hardwood trees are usually very much in the minority, oc¬ cupying an understory or occasional spots in the forest. The important commercial timber is al¬ most wholly of coniferous trees. The principal tree of the forests west of the Cascade Range is Douglas hr. It is a tree of great size in this State; reaching a diameter of 10, sometimes 12 feet, and a height of 275 feet and forming stands of almost tropical luxuriance that yield as high as 150,000 board feet of lumber per acre. It is the tree used largely in the State's new wooden shipbuilding industry. With the Douglas hr are found western hemlock, western red cedar, yew, noble hr, silver hr, white hr, and many other species of less commercial value or rarer occurrence. Close to the ocean is a strip of forest of great density and luxuriant growth in which Sitka spruce and Port Orford cedar, the principal sources of aircraft lumber, are found in their perfection, along with the other species mentioned above. Practically all the area west of the Cascade Range, except some prairies and meadows in the Willamette, Umpqua and Rogue River Valleys, was natu¬ rally forested. Probably 85 per cent of it is still in its virgin condition, but extensive log¬ ging operations and agricultural development are constantly reducing the amount of forest. East of the Cascade Range only about 15,000 square miles, or 23 per cent of the land sur¬ face, was naturally timbered ; the remainder being grassland or sagebrush desert. The prin¬ cipal timber tree in this part of the State is western yellow pine. It forms open forests of trees from 18 to 48 inches in diameter and yields a lumber which is much in demand. With the yellow pine are found sugar pine, lodgepole pine, western larch, white fir, juniper and occasionally other species.

On the upper slopes of the Cascade Range and Blue Mountains, the valuable commercial forest of the lower slopes gives place to a woodland of

such species as mountain hemlock, alpine fir, lodgepole pine, white-bark pine. Due to the rigorous climate, their quality and size is inferior to the Douglas fir and yellow pine forests of the lower elevations. Forests ex¬ tend to an altitude in Oregon of about 6,000 to 8,000 feet; but above 4,000 feet on the west side of the cascades and 5,500 feet on the east side, they are not of a quality to have present- day commercial value for lumber. Their value for watershed protection in the regulation of stream flow 'is, however, inestimable. The latest estimates indicate that there is in Oregon 444 billion feet of timber, of which 134 billion is in government ownership on the National Forests, 10 billion is in Indian reservations, and most of the remainder is in private ownership.*

The distribution of the 444 billion feet by species is about as follows :

species Per cent

Douglas fir . 63

Western yellow pine . 16

Western hemlock . 6

Western red cedar . 3

Spruce . 2

Sugar pine . 2

All others . 8

This is the estimated stand on the entire for¬ ested area. The amount of timber of com¬ mercial quality is somewhat less. Forest fires have -in the past wrought havoc in the forests of Oregon. The evidence indicates that fires have scourged these forests since time im¬ memorial. Before the advent of man they were caused by lightning, then by the Indians in their effort to make hunting easier or to get grass for their ponies, then by the first white settlers to clear land for their farms, and later by the careless or thoughtless loggers or camp¬ ers who allowed fire to escape. In the late summer after the dry season, the forests are exceedingly inflammable. The most startling feature shown by the land classification of this State is the extent of the burned areas, espe¬ cially in the coast ranges and in the northern half of the Cascades. These burned areas com¬ prise altogether not less than 7 per cent of the area of the State. Out of a total area, at one time timbered, not less than 18 per cent has been destroyed by fire. Happily, through the efforts of the timberland owners, fire pro¬ tective associations, the State Forester, and the Federal Forest Service, the forests

of Oregon are now well protected from fire and the annual loss of timber is greatly reduced, and the burned areas are rapidly being reforested. The earliest burns in the State of which we have record occurred in 1843. From that time down to 1903, fires of greater or less magnitude occurred yearly, mainly in the late summer and early fall when everything was driest. About 30 per cent of the timber of Oregon, and 57 per cent of the present timbered area — 13,153,546 acres— 'is in National Forests under Federal control. These National' Forests are divided into 16 administrative units, which occupy the < (permanent forest land® in the more rugged and mountainous parts of the State ; namely, on the Coast Range, Siskiyou Moun¬ tains, Cascade Range and foothills, and Blue Mountains. The mature timber on the National Forests is being sold and cut as opportunity offers, but under such regulation as insures the perpetuity of the forest. The National Forests are supervised and administered by the Forest Service, a bureau in the Department of Agriculture. Portland, Ore., is the headquarters of the United States District Forester having general supervision over the 43,000,000 acres of National Forest land in Oregon, Washing¬ ton and Alaska. The table on following page shows the National forests of Oregon and the headquarters of the supervisors in charge.

The State Forester, with headquarters at Salem, executes all matters pertaining to forestry within the jurisdiction of the State. He is the executive officer of the State Board of Forestry.

The timber of the National forests is being sold by the government at an average between

- *West Coast Lumberman, 15 March 1918. „*

776

OREGON

OREGON FORESTS

Cascade .

Crater .

Deschutes .

Fremont .

Malheur .

Minam .

Ochoco .

Oregon .

Santiam .

Siskiyou . .

Siuslaw .

Umatilla .

Umpqua .

Wallowa .

Wenaha .

Whitman .

Supervisor's headquarters

Eugene

Medford

Bend

Lakeview

John Day

Baker

Prineville

Portland

Albany

Grants Pass

Eugene

Pendleton

Roseburg

Wallowa

Walla Walla, Washington Baker

$2.50 and $3 per thousand feet, according to the value of the varieties of timber. Of the amount of revenue received by the government from this source, 25 per cent of the net re¬ ceipts is paid into the State treasury for appor¬ tionment among the counties of the State in which National forests exist, for the benefit of the public schools and roads, and 10 per cent is expended for the improvement of roads with¬ in the forests. Grazing privileges for stock are also permitted by the Forest Service upon the reserves, for which a graduated scale of fees is charged per season, based upon the year¬ long rate of 60 to 64 cents per head for cattle, 75 to 80 cents per head for horses, 36 to 38 cents per head for swine and 15 to 16 cents per head for sheep and goats. The year-long graz¬ ing rate is higher on the coast forests because of better growth and comparatively longer sea¬ sons. The State also receives 25 per cent of the net revenue from this source, which is ap¬ portioned among the counties and applied in the same manner as in the case of the timber sales fund, and 10 per cent of the net receipts is applied to improvement of roads within the reserves. The gross receipts from timber sales within the forests of Oregon for the fiscal year ended 30 June 1914, amounted to $159,549.99, and for grazing privileges, $84,072.97, making a grand total of $243,622.96. The number of stock grazed within the forests of Oregon dur¬ ing the fiscal year period ending 30 June 1914, was cattle, 97,920; horses, 11,098; hogs, 433; sheep, 872,829; goats, 33.

There are also immense water power advan¬ tages in the National forests, which are being conserved for the benefit of the public, and title to which is never transferred outright to individuals or corporate interests. Home¬ steads not exceeding 160 acres in extent may be acquired within National forests under the act of 11 June 1906 (34 Stat. 233) on lands chiefly valuable for agriculture, not needed for public purposes, and the occupation of which for agricultural purposes will not interfere with the purposes for which National forests were created. If, considering all the circumstances, any land is considered to have a greater value for agriculture than for other purposes, it will be recommended for entry under the above act. The Forest Homestead Law is not a means of securing valuable timber lands under the home¬ stead laws, since it must appear that land is chiefly valuable for agriculture before it will be opened to settlement and entry.

Lumbering. — Next to agriculture, the manu¬ facture of lumber is the leading industry of Oregon. Two and one-half billion feet of tim¬ ber was sawed in the mills of the State during

1917, and the annual value of Oregon lumber products was over $30,000,000 even before ship¬ building had become the important industry it; became in the war years of 191 7-18. Lumber¬ ing always has and still constitutes fully 60 per cent of the State's industrial activities. Most of the lumber cut in 1917 was fir, although on account of the demand by the government for air-plane stock, probably 25,000,000 or 30,000,000 feet of spruce were cut in the last half of the year, Oregon's lumber is marketed all over the world. Ships of every nation come into the Oregon harbors to carry it away. California is another heavy purchaser and thousands of cars are sent overland by rail. Oregon sells its lumber in all the northern group of States west of the Mississippi. The finished product of the Oregon mills, such as sashes and doors, is sent as far east as New York and the New England States. Furniture manufacturing has developed rapidly in the last decade. Portland is the principal furniture manufacturing centre west of Chicago. It has a score of plants, of which fully half a dozen are of major impor¬ tance. The furniture output ill a recent year had a value of $4,500,000, It was sold south as far as Los Angeles and east as far as Denver and in all the intermediate territory.

Shipbuilding. — While Oregon is primarily an agricultural and lumbering State, her great¬ est progress in the year 1917 was in industrial pursuits. This was due almost entirely to the development of the shipbuilding industry and to other activities growing out of the World War. Portland under wTar conditions became the principal wooden shipbuilding centre on the Pacific Coast. Including one plant at Van¬ couver, Wash., the city by January 1917, had nine wood-shipyards in operation. The Van¬ couver plant is included because Vancouver is directly across the Columbia River from Portland and for all commercial purposes is a part of Portland. These wood-shipyards in the State outside of Portland in January 1917 included three at Astoria, one each at Marsh¬ field, Tillamook, North Bend, Saint Helens and Columbia City. These wood-shipyards had already launched an aggregate of 37 vessels and had contracts for 148 additional, many of which were in course of construction. These plants are equipped with an aggregate of 74 ways and had 33 additional ways projected. The Oregon yards could launch an average of one wooden ship every other day. These ves¬ sels vary in size from 3,500 to 4,400 tons. Port¬ land is the home of four steel-shipyards. These plants received contracts for an aggregate of 55 vessels; most of this work being done on government contracts. The steel vessels cost an average of approximately $1,700,000 each. The standard type of construction in the Ore¬ gon yards is for 8,800-ton ships.

The shipbuilding industry in Oregon and Vancouver, Wash., represented (4918) an in¬ vestment of nearly $25,000,000 and gave em¬ ployment to nearly 20,000 men of whom about 15,000 were employed in Portland. Shipbuild¬ ing also gave great impetus to many closely re¬ lated industries,

such as the construction of steel and wooden lifeboats, brass and steel fixtures, galvanized iron, sheet metal, engines and machinery of various sorts used in ship¬ building.

OREGON

Gilford, Portland, Ore., Photo.

Gifford, Portland, Ore., Photo.

1 Sugar Pine along road from Medford to Crater Lake 2 Oregon Fir, "the king of commercial woods" — so named by the French. The Oregon Douglas Fir is one

of the finest of commercial woods. The trees grow to great height and girth — trees from 12 to 15 feet in diameter are giants, but Oregon has hundreds of thousands of fir trees 10 and 12 feet in diameter. The tree shown is well over 12 feet in diameter

OREGON

OREGON

V

RpVV&iVˆ

jpiˆ i;

; >V •

r! JRitefcr.-

m / « mmi

1 \ V

1 Laying out frames at a Portland, Ore., wood shipbuilding plant. Notice the size of the timbers TTn

2 Shipment of Scotch Marine Boilers for Balboa. Portland has the largest Scotch Marine boiler plant in the United States

OREGON

1 The largest log cabin in the world. Dimensions 206 feet by 102 feet; 72 feet high, supported by 64 pillars 54 feet high. More than 1,000,000 feet

board measure in the building

2 Sample of Douglas Fir Timber used in construction of vessels in State of Oregon

OREGON

777

Agriculture. — In western Oregon, notably in the valleys of the Willamette, Umpqua and Rogue rivers, the soil is chiefly a dark silt loam. The hills have a somewhat heavier red soil and the mountains are timbered heavily and used for grazing. In the eastern part,

the soil is lighter silt loams and sandy loams in general, with more or less alkali in spots, but is very fertile under irrigation. In the northeast, the Columbia basin and the Blue

Mountain valleys, extensive areas of naturally fertile wheat lands are found; in the south¬ east, the cultivation of crops is as yet less fully developed but the land is extensively used for grazing purposes. The total number of farms in Oregon in 1900 was over 30 times as great as in 1850 and 40 per cent greater than in 1890.

In 1910 it was 27 per cent greater than in 1900.

The total acreage has also increased rapidly, being over 23 times as great as in 1850. The increase from 1900 to 1910 was 16 per cent on farm lands and 28.4 on improved land, in spite of the inclusion of an Indian reservation of 484,000 acres as a MarnV in the former census.

For the year 1917 the best available figures indicate that Oregon produced and sold farm products as follows :

Cereals.

CROP

Quantity

bushels

Value

Wheat .

Oats .

10 600 000

$27,265,000

7,000,000

13,000,000

820,000

6,000,000

22,000,000

Barley .

Rye .

Corn .

Hay (tons) .

. 3,100,000

. 1,350,000

Total cereals and hay .

$76,085,000

Dairy Products.

Quantity (lbs.)

Value

Butter . . .

$6 , 000 , 000

Cheese .

... 13,126,000

2,670,000

Milk and cream (gals.) . . . .

... 26,000,000

18,000,000

Total dairy products . .

$26,670,000

Fruit

Products.

Quantity

Value

Apples (boxes) .

4,250,000

$4,325,000

Peaches (boxes) .

1,320,000

800,000

Pears (boxes) .

1,000,000

990,000

Apricots (crates) .

70,000

57,000

Blackberries .

... 15,000,000 lbs.

600,000

Cherries .

4,300,000

a

200,000

Currants .

2,000,000

(C

750,000

Gooseberries' .

3,600,000

u

230,000

Loganberries .

... 32,000,000

a

1,250, 000

Plums .

4,000,000

a

200 , 000

Prunes . . .

... 30,000, 000

u

3,670,000

Raspberries .

5,000,000

it

400,000

Strawberries .

8,000,000

410,000

Total fruit products . $13,912, 000

Oregon produced and sold approximately $25,000,000 worth of fresh and dried vegetables, many of which were exported or sold in dis¬ tant parts of the United States. The aggregate value, therefore, of Oregon farm products marketed in 1917 was $141,687,000. The fruit¬ growing industry is most extensive in the region lying between the Cascade and Coast ranges.

Irrigation. — In western Oregon in the Wil¬ lamette Valley and Coast counties there is a very heavy rainfall and irrigation is. not . used, but irrigation of hay lands (resulting in an

extra cutting) is reported from the Rogue River valley in the southern part of this sec¬ tion.. The greater part of the eastern section is semi-arid, but the soil, as a rule, is very pro¬ ductive when there is sufficient moisture. There are numerous rivers and the available water- supply of the section as a whole is large. In the counties bordering on the Columbia River, irrigation is generally practised where water is available and the remainder of the area is de¬ voted to dry-farm wheat raising. A great part of the territory south and west of these coun¬ ties is used both for dry farming and irriga¬ tion, and the higher lands for grazing purposes. In the Rogue River Valley in Jackson and Jo¬ sephine counties, hay is the only crop usually irrigated, but a number of systems have been started or projected for the purpose of supply¬ ing orchard lands with water. The total num¬ ber of irrigators in Oregon in 1900 was 4,636, while in 1909, 6,669 farms were irrigated, 14.7 per cent of the number of farms in the State. The total area irrigated grew from 388,310 acres, in 1900 to 686,129 in 1909. This was 16.1 per cent of the improved land in farms. The area to which enterprises existing in 1910 were capable of supplying water was 830,526 acres, and the total acreage included in existing pro¬ jects completed or under way in 1910 was

2,527,208.

Livestock. — Oregon is the home of an important livestock industry. The total value of the hogs, cattle, sheep, horses, mules and goats owned in the State was estimated in 1917 at $100,000,000. At Portland the Union Meat Company, which is a subsidiary of the Swift Packing House enterprise of Chicago operates a large packing-plant, which attracts livestock from the region west of the Rocky Mountains. The products of this plant are sold both locally and in the territory tributary to Portland and in normal times some of it is exported. Portland is a principal livestock centre of the Pacific Coast, a modern stockyards being operated in that city. These yards in 1917 handled 9,910 head of cattle, 5,499 calves, 221,687 hogs, 140,-887 sheep, 6,933 horses and mules. These stockyards have had a large influence' in the livestock industry of the State. Before this market was established in Portland most of the hogs consumed in that city were brought in from Nebraska and other points in the Middle West. Now Oregon produces all its own hogs.

There is excellent pasturage in Oregon and horses, cattle, swine and sheep are raised in large numbers. On 15 April 1910 the total value of all livestock on farms and ranges was $63,241,898. Of this, cattle represented $18,158,- 690 (including $6,810,643 in dairy cows) ; horses, $29,305,821; mules, $1,418,018; asses and burros, $166,593; swine, $1,598,583; sheep, $12,219,522; goats, $374,671. Of the foregoing total, livestock to the value of $58,243,921 was reported from farms; $4,997,977 ran on the range. The table on the following page shows the changes since 1850 in the numbers of the most important domestic animals on enclosed farms.

The number of dairy cows in Oregon in 1901 was almost 13 times as great as in 1850 and 7.3 per cent greater than in 1890. Nearly 18 times as many neat cattle, other than dairy cows, were reported in 1900 as in 1850. Ore-

YEAR

Dairy cows

Other neat cattle

Horses

Mules and asses

Sheep

Swine

1918 .

227,000

683,000

309 , 000

2,448,000

309,000

1910 .

172,402

552,146

271,111

10,324

2,696,779

217,496

1900 .

122,447

577,856

287,932

7,751

1,961,355

281,496

1890 .

114,156

406,492

224,962

4,946

1,780,312

208,259

1880 .

59,549

356,693

124, 107

2,804

1,083,162

156,222

1870 .

48,325

71,872

51,702

2,581

318,123

119,455

1860 .

53,170

100,961

36,772

980

86,052

81 , 615

1850 .

9,427

32,302

8,046

420

15,382

30,325

gon produced about 15,000,000 pounds of wool in 1917, with a value of approximately $6,500,- 000 (war-time prices). In 1910 the census re¬ ported the value of the wool clip $3,306,179. The State still is one of the biggest wool pro¬ ducers in the Union. The census notes a slight decrease in number of fleeces, but increase in weight and value. Portland is the principal wool market on the Pacific Coast and in this particular is second only to Boston in the United States at large. All the wool produced in the Northwest west of the Rocky Mountains is marketed in Portland.

Manufactures. — Oregon is destined to be one of the great manufacturing States of the West, if. not of the entire country. The natural advantages of the State are extensive, furnish¬ ing raw material for its various manufactur¬ ing enterprises and its streams furnish abun¬ dant water power of approximately 20,000,000 horsepower or one-third of all the undeveloped water power in the United States. This is lo¬ cated in the Columbia Basin. (Senate Docu¬ ment 676, 60th Congress, 2d Session). Of this amount, over 3,000,000 horsepower is within economical transmission distance of tidewater at Portland. The total developed water power in Oregon in 1917 amounted to 158,186 horse¬ power. The principal industries include steel and wood ship-building, much stimulated by the war, car and shop construction, pulp and paper manufacturing, fruit and fish canning, furniture, cordage, flouring-mills, rubber products, lum¬ ber and timber, printing and publishing, slaugh¬ tering, meat-packing, leather tanning and the manufacture of woolen goods. In 1915 there were reported by the United States census, 2,320 manufacturing establishments employing $139,- 500,379 in capital and 35,449 persons, expend¬ ing $63,257,821 for raw materials, $26,614,328 in wages and having an annual output valued at $109,761,951 exclusive of the ship-building in¬

dustry. . The 22 ship-building plants in the State in 1917 reported 23,450 wage-earners and products valued at $162,000,000, as compared with 14 establishments, 199 wage-earners and products valued at $320,715 in the same indus¬ try in 1890. The Columbia River has become the centre of the wood ship-building industry in the United States, Portland building more wooden vessels than any other city in the coun¬ try. In steel ship-building, the Columbia River district stands second on the Pacific Coast. In furniture manufacturing, Oregon is fast com¬ ing to the front as a furniture centre. The furniture industry of the State for 1917 totalled $5,500,000. The largest pulp and paper plant in the entire West is located in Oregon. Eight woolen mills of large capacity are located at Portland, Pendleton, Oregon City, Bandon, Salem and Stayton. Flour-milling reflects the

large wheat-growing interests of the State, the production of this cereal amounting to 14,350,- 000 bushels of wheat, 10,600,000 bushels of oats, 11,000,000 bushels of barley and 400,000 bushels of rye in 1917. The flour-milling industry gave employment to 750 wage-earners in that year and had a product valued at $15,500,000, as com¬ pared with 281 wage-earners in 1890, and a product valued at $4,184,473.

Oregon is the principal woolen manufactur¬ ing centre in the West. Six important woolen mills now are in operation in the State. Most of them in 1918 were working on government contracts but their normal output consists of woolen cloth, blankets and other high-grade materials. A large amount of Oregon's native wool is consumed in these mills. The industry has more than doubled in the last five years and now employs about 1,000 men and women. Most of the output is marketed on the coast, but recently large shipments have been sent east and considerable volume has been ex¬ ported. In 1917 the woolen manufacturing plants gave employment to 875 wage-earners and had products valued at $2,750,000 as com¬ pared with 358 wage-earners and products val¬ ued at $614,932 in 1890. The importance of this industry in Oregon is largely a result of the extensive stock-raising interests of the State. Two large wool warehouses are located in Port¬ land, having in storage some 20,000,000 pounds of wool annually.

The State is rapidly learning the economic advantage of preserving its orchard and garden products, either by canning or by evaporation. The dried fruit and vegetable industry is one of recent development in Oregon. Two large plants now are in successful operation, one at The Dalles and one at Salem. These plants are prepared to handle about 10,000 tons each of apples and cherries, in addition to thousands of tons of peaches, prunes, berries and other fruits. They also handle some 10,000 tons of mixed vegetables and the same quantitv of po¬ tatoes. The greatest benefit that the dried fruit and vegetable plants yield to the State is in the utilization of

products that otherwise would go to waste. Another important enterprise is paper manufacturing. Oregon City is the cen¬ tre of this industry. Native wood is used in the manufacture of pulp and . paper. The power for the operation of these plants is gen¬ erated by the falls of the Willamette River. The mills of this State supply the paper upon which most of the newspapers vcest of the Rocky Mountains are printed. Great quantities of news stock also are exported to Australia and other points in the Pacific. Another im¬ portant new industry is the manufacture of loganberry juice. The headquarters are at Salem, where two large plants are operated.

Ihc loganberries are grown in large quantities in the i arming communities near Salem and this industry is gaining additional prominence every 5Jta£‘ . The value of the juice production for 1917 is estimated at $500,000. ‘Most of it is marketed in the East. The production has been h nn ted only by the quantity of berries produced by the farmers, as the demand for the juice lias hitherto beep greater than the supply. Rub¬ ber manufacturing promises to become an im¬ portant industry. Two new plants are operating m Portland. Both of them are growing. Be¬ cause much of the crude rubber used in the L nited States now is imported from Asia it must pass through the Pacific Coast ports in order to reach the eastern factories. The eco-nomic waste of sending this commodity across the continent in its crude state and then send¬ ing much of the finished product back is one of the most potent factors in encouraging the rubber industry in Oregon. A new enterprise of promise is the kaola plant in Portland, which produces cocoanut oil and its by-products. The dried copra for this plant is brought in from the South Sea Islands and Australia on vessels which carry lumber and other Oregon products cut.

Commerce. — Before 1886 the exports from Portland were mostly to San Francisco and Honolulu, gold dust and ores forming three- fourths of the shipments. Now the exports reach almost every part of the globe and con¬ sist largely of wheat, meat and timber products. The foreign commerce of the State, which emanates mostly from the Columbia River, runs into many millions of dollars annually, three-fourths of it being exports. The largest export countries are Great Britain, China, Japan and other Oriental ports, and the west coast of South America. The principal port is Portland at the confluence of the Wil¬ lamette and Columbia rivers. Astoria, another port, is at the mouth of the Columbia itself. There are also harbors for coastwise shipping at Port Orford, Rogue River, Coos Bay, Tilla¬ mook Bay and Yaquina Bay. A few of the important imports coming from the Orient are copra, crude rubber, spices, sisal and merchan¬ dise.

Banks and Banking. — There was a private bank in Portland as early as 1858. In 1865 the First National Bank — the first west of the Rocky Mountains, was established in Portland. In 1917 there were 83 national banks in opera¬ tion, 173 State banks and five trust companies. The volume of cash and checks passing through the Portland clearing house during 1917 amounted to more than $857,000,000. This is due largely to the growing jobbing business done in Portland which is a logical point of distribution for a trade territory of over 254,- 000 square miles, reached mostly by railroads of a (

$22,309,733.

Transportation. — In 1865 there were but 19 miles of railroad in the State, 248 nrles in 1875, 582 miles in 1880 and 1,695 miles in 1901. In 1916 there were 16 commercial steam rail¬ roads operating 2,944 miles of main line; com¬

mercial electric roads, 339 miles ; steam indus¬ trial roads, 46 miles, and street car lines amounting to 220 miles serving Portland, Eu¬ gene, Salem, Albany and Astoria, making a total 5aˆway trackage of 3,114 miles, besides 733 miles of electric railway track. Steamship lines ply regularly between San Francisco and Portland ana other Oregon ports, and river boats operate on the Columbia, Willamette and Snake rivers. The Union Pacific and the Southern Pacific are the two principal railroad lines. Common carriers, together with other public utilities in Oregon are under a State Public Utilities Commission.

Government. — New York and Iowa statutes were the models for the provisional govern¬ ment of Oregon and subsequent legislation fol¬ lowed these lines. The governor is elected for a term of four years and receives a salary of $5,000 per annum. Legislative sessions are held biennially and are practically limited to 40 days each, members serving without pav if the ses¬ sion extends beyond that period. "The legisla¬ ture has 30 members in the senate and 60 in the house, each of whom receives $3 a day and mileage. There are three representatives in Congress. There is a Supreme Court, with ap¬ pellate jurisdiction, the court consisting of seven judges, who are elected for six years and paid $4,500 a year. There are 20 Circuit courts with 28 judges. There are county courts, execu¬ tive and administrative in function, with one judge, elected for four years, who is also judge of probate, and two associate commissioners. The Circuit Court judges are elected one-third every two years. There is also a United States District Court. Justices of the peace are elected in every precinct and municipal courts may be created. The constitution authorizes any citi¬ zen of the United States, 21 years old and six months a resident of the State, to be a voter. New ballot laws, modeled on the Australian system, were

adopted in 1891. Of late years many governmental functions have come to be exercised by commissions created by the legis¬ lature. It has been a prevailing policy in Ore¬ gon to assign by law membership in such com¬ missions to one or more designated State offi¬ cers. Several of the most important commis¬ sions consist of or include the governor, secre¬ tary of state and State treasurer. By this proc¬ ess these offices have become much more power¬ ful and comprehensive in function than their titles would indicate. Oregon was the first State to operate extensively the initiative, refer¬ endum and recall, a method of government, therefore, sometimes known as the <(Oregon System.® Either proposed constitutional amend¬ ments or proposed statutes are easily placed upon the ballot by petition and are then either enacted or rejected by a simple plurality.

Finances. — There is no public debt in Ore¬ gon (1919). The State revenue from taxation as enrolled for the year 1916 was $2, 699,250 on a property valuation of $878,763,944. This does not include revenue received from State school money loaned, nor for school lands sold, or the interest on school loans. The legislative appro¬ priations for the two years 1915-16 were $6,290,- 655 and for 1917-18 were $6,361,375. The con¬ stitution prohibits the legislature from con¬ tracting any State debt exceeding $50,000, or as¬ suming the debt of any county, town or corpora¬ tion, except for purposes of war or to suppress

an insurrection. The cash balance in the treas¬ ury is about $1,000,000 annually.

Public Institutions. — At Salem are located the School for the Deaf; State Insane Asylum; State Tuberculosis Hospital ; School for the Blind; Boys' Reform School; State Industrial School for Girls; State Institution for Feeble¬ minded and the Oregon State Penitentiary. At Roseburg is located a Soldiers' Home and at Pendleton a second State Hospital for the in¬ sane.

Education. — In 1848, Congress gave the State an area of 3,387,520 acres of the public domain for free schools, and also gave 500,000 acres for a State university, and 90,000 acres for an agricultural college. The free school system has extended to every township in the State. In 1916 the children of school age numbered 209,028 ; the enrolment in public schools, 142,- 365 ; and the average daily attendance, 127,692. There were about

2,774 public schools, public school furniture and apparatus valued at $1,761,- 150; houses and grounds valued at $16,258,313, and 6,173 teachers. Their salaries for the year amounted to $4,014,955, and total expenditures $7,551,397. For higher education there were 169 standard public high schools in 1914-16, with 16,737 pupils, 22 private secondary schools, with 1,146 pupils, one public normal school and 8 universities and colleges for men and for both sexes. The colleges include the University of Oregon, at Eugene; State Agricultural College, Corvallis ; Reed College, Portland ; Pacific Uni¬ versity, Forest Grove; Willamette University, Salem; McMinnville College, McMinnville; Pacific College, Newberg; Philomath College, Corvallis. There is a federal government In¬ dian training school at Chemawa, near Salem, and a State normal school at Monmouth.

Religion. — The religious denominations of the State are given in the order of their strength and influence, as follows : Roman Catholic (42.9 per cent in 1890 ; 29.4 per cent in 1906) ; Methodist bodies (16.9 per cent in 1890; 18.1 per cent in 1906) ; Baptist (7.8 per cent in 1890; 9.4 per cent in 1906) ; Presbyterians (7.4 per cent in 1890 ; 9.1 per cent in 1906) ; and the Disciples of Christ or Campbellites (5.8 per cent in 1890; 8.7 per cent in 1906). The church membership in 1906 was 120,229. In 1890, 30,- 231 Roman Catholics were 42.9 per cent of the church population; in 1906, the 35,317 Catholics were 29.4 per cent. In 1921 the Roman Catholic church membership was reported officially as

67,123.

Indian Reservations. — There exist in Ore¬ gon the remnants of a large number of Indian tribes, most of which are aboriginal to this region, representing more than 10 distinct lin¬ guistic stocks. They have been collected largely upon five reservations, namely, Grande Ronde, Klamath, Siletz, Umatilla and Warm Springs, while some still live along or near the Columbia River, and depend upon fish and game for their support. Grande Ronde reservation is situated in the northwestern part of Oregon, in Polk and Yamhill counties, and contains an area of 93ˆ4 square miles. Approximately 10,000 acres are arable, being a fair quality of land, lying in the small valleys along the tributaries of the Yam¬ hill River. The Indians at Grande Ronde rep¬ resent the remnants of nine small tribes : the Clackamas, Cow Creek, Lakmiut, Mary's River, Rogue River, Santiam, Umpqua, Wapete and

Yamhill, numbering in all 402. The larger num¬ ber cultivate their own allotments and those ol the infirm members of their families. Oats and wheat are their principal crops. Klamath Reservation lies east of the Cascade Mountains, in Klamath and Lake counties, and embraces an area of 1,650 square miles.

History.— There is much uncertainty sur¬ rounding the early explorations of the North. Pacific Coast. Spanish and English navigators undoubtedly reached the Oregon coast in the 17th century. Captain Cook landed at Mootka Sound in 1778, and the French navigator, Laperouse, sailed along the coast in 1786. In 1789, two Americans, John Kendrick and Robert Gray, were sent out by Boston fur merchants, and in 1791 Gray gave the Columbia River its name. In 1805—06, the Lewis and Clark expedi¬ tion explored considerable of the Oregon re¬ gion. (See Lewis and Clark Expedition). In 1811 the American Fur Company established trading posts at Astoria. (See Astor, John Jacob). The northwestern boundary between the United States and Canada was fixed by the convention of 1818, as the line of 49° from the Lake of the Woods to the Rocky Mountains. West of this point the territory was to be open to both parties for 10 years. (See Northwest Boundary). By the convention of 1827, ratified in 1828, joint occupation was continued indefi¬ nitely. The Oregon question (q.v.) occupied the attention of Congress from 1820 to 1824. The Methodists founded a mission under Jason Lee in 1834, and the American Board (Presby¬ terian, Congregational, etc.), under Marcus Whitman in 1836. In 1839 the emigration of New Englanders commenced overland by way of the South Pass, and the Territory continued to receive settlers from the east and middle west by this route until the railway superseded the ox-team. In 1848 the California <(gold- fever» attracted a large quota of the territory's citizens away, but in 1850 the land-donation law, passed by Congress, had the effect of registering 8,000 citizens in Oregon, which was formally organized as a territory 3 March 1849. On 2 March 1853, Washington Territory was formed out of the northern half of Oregon. On 5 Nov. 1857, a State constitution was adopted ; and. 14 Feb. 1859 the State was admitted into the Union by Act of Congress under the constitution pre¬ viously ratified. From 1845 till 1855. there was sporadic warfare with Indian aborigines, and a resumption of the same occurred in 1858, and again in 1866-68, when occurred the Shoshone War, and in 1864—73, when the Modoc War prevailed. Since 1875 the Indians have been confined on the reservations.

Politics.— Under the provisional govern¬ ment, 1843-45, adopted by the people 5 July 1843, the executive power was vested in a com¬ mittee of three persons ; the legislative power was vested in a committee of nine persons, elected by the qualified electors. .giving to each district representation in ratio of its poulation, excluding lYidians; the judicial power was vested in a Supreme Court, consisting of one supreme judge and two justices of the peace, and a probate court. Oregon had a provisional governor (1845-49) and seven Territorial gov¬ ernors (1849-59). The first governor under the State Constitution was a Democrat. In presi¬ dential elections the State is regarded as safelv Republican, it having gone

Democratic in presi-

T-TT

OREGON

Multnomah Falls, 607 feet high, on the famous Columbia River Highway

Panorama of the Columbia River as seen from the Columbia River Highway

OREGON

OREGON

Cascades of the Columbia River

V I

OREGON — OREGON, UNIVERSITY OF

781

dential elections only in 1868, and split the vote m 1892. Of late years the legislature is always overwhelmingly Republican, but no such uni¬ formity exists in the election of United States senators and governors. In 1876 it was dis¬ covered that one of the Republican electors held a Federal office, and was consequently ineligible. Ihe Democratic governor issued a certificate to the minority candidate, but the two Republican electors filled the vacancy, and their position was sustained by the Electoral Commission (q.v.).

Governors of Oregon.

BEFORE PROVISIONAL GOVERNMENT

Dr. John McLoughlin, director of Hudson Bay Company and by courtesy called Governor of

Oregon . 1823-1843

First Executive Committee.. . 1843-44

Second Executive Committee . 1844-45

PROVISIONAL George Abernethey .

1845-49

TERRITORIAL

Joseph Lane . 1849-50

Knitzing Pritchett (acting) . 1850

John P. Gaines . 1850-53

Joseph Lane . 1853

George L. Curry . 1853

John W. Davis . 1853-54

George L. Curry . 1854-59

STATE

John Whiteaker . Democrat .

Addison C. Gibbs . Republican .

George L. Woods . “ .

Lafayette Grover . Democrat .

S. F. Chadwick (acting) .... “ .

William W. Thayer . “ .

Zenas F. Moody . Republican .

Sylvester Pennoyer . Democrat -Populist.

William P. Lord . Republican .

Theodore T. Geer . “ .

George E. Chamberlain . Democrat .

Frank W. Benson . Republican. . . . . .

Jay Bowerman (acting) . “ .

Oswald West . Democrat .

James Withycombe . Republican .

James Withycombe . “ .*

Ben. W. Olcott . “ .

1859-62

1862-66

1866-70

1870-77

1877- 78

1878- 82 1882-87 1887-95 1895-99 1899-1903 1903-09

1909- 10

1910- 11

1911- 15 1915-19 1919 1919-23

- *Deceased.*

Population. — There are 34 counties in Ore¬ gon, with population as follows :

COUNTY

“Rq Vpt .

1910

18,076

Rpnt.nn .

10,663

.

29,931

Clatsop .

16,106

10,580

. , .

Cone; . .

17,959

rVnnlc .

9,315

Curry .

Douglas .

• 2,044

19,674 3 , 701

5 , 607

4,059

8,016

25,756

Josephine .

9,567 8 , 554

4,658

.

33 , 783

Tyinrnln .

5 , 587

22,662

T.fpll'ipiir .

8,601

Marion .

39,780

4,357

Multnomah .

polk . .

226,261

13,469

4,242

6,266

20 , 309

16,191

8,364

16,336

21,522

2 , 484

18,285

1900

15,597

6,706

19,658

12,765

6,237

10,324

3,964

1,868

14,565

3,201

5,948

2,598

13,698

7,517

3,970

2,847

19,604

3,575

18,603

4,203

27,713

4,151

103,167

9,923

3,477

4,471

18,049

16,070

5,538

13,199

14,467

2,443

13,420

Total

672,765 413,536

The principal cities and towns are as fol¬ lows: Portland (207,214); Salem (14,094); Astoria (9,599) ; Eugene (9,009) ; Medford (8,840) ; Baker (6,742) ; Oregon City (4,287) ; Albany (4,275) ; Corvallis (4,552) ; Roseberg (4,738) ; The Dalles (4,880) ; Pendleton (4,460) ; and La Grande (4,843). In 1917 there were 908 post-offices of all grades ; and 297 periodi¬ cals, of which 33 were daily, 1 three times a week, 9 semi-weekly, 219 weekly, 4 semi-monthly and 29 monthly. The total population of the State in 1850 was 13,294; (1860) 52,465;

(1870) 90,923; (1880) 174,768; (1890) 313,767;

(1900) 413,536; (1910) 672,756. Of this number 103,001 are foreign born. Pop. (1920) 783,389.

Bibliography. — Barrow, (Oregon, the Strug¬ gle for Possession (1882) ; Bancroft, (History of the Northwest Coast> (1884), and (History of Oregon (San Francisco 1888) ; Buffinch,

*(Oregon and Eldorado) (1866) ; Gray, (History of OregotP (1870) ; Greenbow, (History of Oregon and California) (1844); Mosely, Ore¬ gon, Resources, Climate and Products) (1878) ; Mowry, (Marcus Whitman and the Early Days of Oregon (1901) ; Nash, (Two Years in Ore¬ gon * (1882) ; Nicolay, (Oregon Terri tory>*

(1846) ; Barnett, Reorganization of State Gov¬ ernment in Oregon- ; Eaton, (The Oregon Sys¬ tem* ; Schafer, Joseph, (A History of the Pacific Northwest* (New York 1917) ; Putnam, G. P., (In the Oregon Country* (New York*

1915).

Eric W. Allen,

Dean of the School of Journalism, University of Oregon.

OREGON, Ill., city, county-seat of Ogle County ; on the Rock River, and on the Chicago, Burlington and Quincy Railroad; about 90 miles in direct line

west of Chicago. It has con¬ siderable manufacturing interests. The chief manufacturers are foundry and machine-shop products, flour, pianos, street-sprinklers and dairy products. It has good schools and a public library. The waterworks are the property of the municipality. Pop. 2,227.

OREGON, a river in the western part of North America. See Columbia River, t /

OREGON, University of, the State Uni¬ versity, chartered in 1872 and opened in 1876 at Eugene. Its organization comprises (1) the College of Literature, Science and Arts, in¬ cluding general courses in liberal arts and special courses in course preparatory to medi¬ cine; course preparatory to law; course pre¬ paratory to journalism; course preparatory to engineering. The bachelors' degrees conferred are A.B. and B.S. The University is coedu¬ cational, number of women students being about 40 per cent of the total. It is supported mainly by State appropriation; tuition is free; the income in 1916 was $300,000. The library (1916) contained 65,000 volumes; the students numbered 1,650 and the faculty 150. (2) School of Law, a three-years' course, requiring two years' work in liberal arts for admission. (3) School of Architecture, a four-years' course.

(4) School of Commerce, a four-years' course.

(5) School of Education, a four-years' course. (6) School of Journalism, a four- years' course. (7) School of Medicine, a four- years' course in Portland, with two years' pre¬ paratory college work in Eugene. (8) School

of Music — piano, voice, violin, wind instru¬ ments, harmony and musical history. (9) Summer School, a six weeks' course. (10) School of Correspondence Study. (11) Gradu¬ ate School.

OREGON BROOK-TROUT, the rainbow trout (q.v.).

OREGON CITY, Ore., county-seat of Clackamas County; on the Willamette River and on the Southern Pacific Railroad ; about 14 miles south of Portland. The falls in the river, 40 feet in height, furnish extensive water¬ power which is used for the electric-light works and for the development of manufacturing in¬ dustries. The chief manufactures are flour, lumber, woolen goods, soap, paper, pulp and furniture. It has a House of the Good Shep¬ herd, public and parish schools and a public library. A passenger elevator, owned by the municipality, carries people up and down hill. The city ownf pure mountain waterworks. Pop. 6,600.

OREGON QUESTION, The. The Oregon question of boundary between the United States and Great Britain involved the right to the ter¬ ritory upon the Pacific Coast of North America extending inland eastward to the Stony (Rocky) Mountains and bounded upon the south bv the parallel of 42° N. lat., upon the north by the parallel of 54° 40′ marking the southern limit of what was formerly Russian America. The claim of the United States to this territory was based upon the discovery, 11 May 1792, of Capt. Robert Gray of Boston, who, in the ship Colum¬ bia, entered the river called Oregon by the In¬ dians. ((He passed its bar and anchored in the river, 10 miles above its mouth® and ((afterwards sailed up the river 12 or 15 miles and left it on the 20th of the same month, calling it Columbia after his ship.®

A second claim was based on the exploration . of Meriwether Lewis and William Clark sent out with a party by the United States govern¬ ment, in 1804, across the newly-purchased Louisiana territory. They followed the Mis¬ souri River to its headwaters, crossed the Rocky Mountains, reached the Columbia River and followed it down to the Pacific. They en¬ camped on the north side of the mouth of the Columbia, on Cape Disappointment, wintering there, 1805-06 and returned to Saint Louis in September 1806. (

Priority of settlement was claimed for the United States on account of the settlement made by the party sent out under the company of which John Jacob Astor was the head. ((Early in the spring of 1811, they made their establish¬ ment on the south side of the (Columbia) river, a few miles above Point George.® Great Britain took this post and others in 1812 after the be¬ ginning of war between the United States and Great Britain. By the first article of the Treaty of Ghent, 1814, which terminated the war, the posts were restored to the United States, the formal transfer occurring in 1818.

The United States last item of claim was based on the Treaty of Louisiana in 1803, with

France, and the Treaty of Florida in 1819, with Spain. By the latter, Spain conveyed to the United States all her rights, claims and pre¬ tensions to the country west of the Rocky Mountains and north of the 42d parallel. By the treaty of 20 Oct. 1818, between the United States and Great Britain, the boundary line be¬ tween the United States and British America was fixed on the 49th parallel from the Lake of the Woods to the Rocky Mountains. West of the Rocky Mountains, the line was not de¬ fined, but it was agreed that the Oregon coun¬ try with its harbors, bays and rivers, be open for the term of 10 years to the vessels, citizens and subjects of either power. The boundary was left unsettled and the agreement above specified was renewed in 1827, except that the time was left indefinite and the agreement

ter¬ minable at the discretion of either power upon a 12-months' notice to the other. The coun¬ try in question was a wilderness traversed by the hunters and trappers of the Hudson Bay Company and the Indians, the possession of which was not considered an issue of the first importance. In 1843 President Tyler's annual message called the attention of Congress to the Oregon boundary and stated the United States claim as embracing the country from the 42d parallel to that of 54° 40'.

The claims of Great Britain were similar to the claims of the United States. In 1778, the English Captain Cook visited and explored the northwest coast of America from latitude 44° northward. In 1792, 1793 and 1794 Captain Vancouver, for the English, surveyed the coast and its adjacent islands. In point of ((accuracy and authenticity® these discoveries were said to be superior to those of any other country.

<(In 1793, Mackenzie, a British subject, had crossed from the Rocky Mountains to the Pa¬ cific, exploring the upper waters of Fraser's River, which in process of time was traced to its junction with the sea near the 49th degree of latitude, thus forming in point of explora¬ tion a counterpoise to the exploration of that part of the Columbia which was first visited by Lewis and Clark.® An English expedition in¬ tended to anticipate the Astoria settlement, was a little late, not reaching Astoria till July 1811. Great Britain denied the validity of the Spanish claim to the Oregon country, practically on the ground that she was so much stronger than Spain that Spain could not make good her claim. The above claims and counter claims, with various modifications, were discussed at times by the diplomatic representatives of Great Britain and the United States from 1826 to

1846.

The Oregon question as an issue in Ameri¬ can politics was made prominent by a plank in the platform of the national convention of the Democratic party at Baltimore, the latter part of May 1844, which read, ((resolved, That our title to the whole of Oregon is -clear and un¬ mistakable, that no portion of the same ought to be ceded to "England or any other power, and that the reoccupation of Oregon and the rean¬ nexation of Texas at. the earliest practicable period are great American measures which this convention recommends to the cordial support of the Democracy of the Union.® The words reannexation and reoccupation implied that the territory in question had belonged to the United States, Texas under the Louisiana purchase and

Oregon by discovery, exploration, etc., till the United States left the claim to sovereignty over Oiegon in abeyance by the convention of joint occupancy with Great Britain. It must be rec¬ ognized that in 1844 the United States had no undisputed sovereignty over the territory on the Pacific Coast now belonging to the United Mates. Joint occupancy with Great Britain of the Oregon country was not sovereignty over it The California country belonged to Mexico. Ir the sovereignty of the United States was to extend from ocean to ocean, that power must acquire the California country from Mexico or exclude England from Oregon. The settlement ot the Oregon boundary had been discussed for some time previous to 1844 and it had been hoped that the treaty which was negotiated in 1842 between Mr. Webster and Lord Ashburton, fixing the line between Maine and Canada, would also fix the Oregon line; but such was not the case. James Buchanan, in a speech in the Senate, 12 March 1844, upon a resolution requesting the President to give notice of the termination of the joint occupancy of the Ore¬ gon country, pointed out clearly that England leased that territory to the Hudson's Bay Com¬ pany in December 1821 for 21 years and in 1838 renewed the lease for 21 years more; that the Hudson's Bay Company had six permanent es¬ tablishments on the coast, 16 interior and sev¬ eral migratory hunting parties, six armed ves¬ sels, one of them a steamer; that they hoped to keep British interests on the ascendant in the Pacific. Mr. Buchanan also showed that Great Britain was content to keep the status quo and that the only way to force her to act was to give the notice. The plank in the Democratic platform was considered decidedly aggressive in some sections of the country. As might have been expected, New England and the sections whose cities and shipping would be more at the mercy of the enemy in case of war were not so enthusiastic for an aggressive foreign policy as those States in the centre, west and south of the Union which were more remote from the ((firing line® and which were deeply inter¬ ested to see that the flag of the Union sweep through from ((sea to sea.® The discussions in Congress revealed calculation of the probabili¬ ties of war as the result of the notice. It was urged that Ireland was hostile to England and there might be a rebellion. Far more important was the fact that England received nine-tenths of her cotton from the southern United States; that war would cut off this supply and close the English mills with all the social distress involved, to say nothing of the loss of the markets the United States afforded for English manufactured products. In 1844, one-third of the foreign trade of the United States was with Great Britain. After Polk's nomination, it was brought out in the proceedings of Congress in June 1844, that so far back as the session of 1828-29, he had laid out a definite plan of policy for the United States including giving the no¬ tice and taking

the consequences. When, there¬ fore, Polk was elected in November 1844, the Democratic party considered its platform ap¬ proved by the country and it proceeded to carry out its policy of territorial aggrandizement. The cry of ft54° 40′ or fight® phrased the ultra aggressive sentiment on the part of the United States looking to push its territory to the Rus¬ sian line, while Great Britain seemed equally

determined to force the line of the Columbia River. War with Great Britain might involve the loss to the United States of all the Pacific Coast. Blaine in his (Twenty Years of Con¬ gressˆ attributes the emergence from a difficult situation to the foresight and ability of Cal¬ houn and of Buchanan. These gentlemen as well as Clay and Webster, when occupying the post of Secretary of State, had been willing to continue the line of 49° to the Straits of Fuca. There were serious objections to the Columbia River line. The most important of these, bar¬ ring consideration of national honor and pride, was the fact that there were no good harbors in the territory left to the United States south of the Columbia, whereas, if the line ran, as it does at present, on the 49th parallel to the Straits of Fuca, all Puget Sound with its waters sheltered from the storms of the Pacific and its branches accessible to a very large territory, would be¬ long to the United States. San Francisco har¬ bor then belonged . to Mexico. Within the United States, sentiment was divided. War with England would hurt the South seriously by cutting off her cotton market and possibly limiting what might become slave territory to the Southwest. The anti-slavery sentiment of the North had defeated Clay for the Presi¬ dency for his willingness to compromise on an issue on which it would brook no compromise. President Polk was a friend of General Jackson and peace was not an idol at whose shrine Jackson worshipped. The influence of other public men looking toward peace, their interests and rivalries, were to be considered. The Ad¬ ministration escaped from its ((54° 40′ or fight® position by taking the advice of the Senate in advance of the treaty. This course, unusual and in some_ cases highly undesirable, shifted the responsibility for action upon the shoulders of the Senate, at the same time allowing the Secretary and Great ‘ Britain to feel that the instructed action of the Secretary could not con¬ sistently be rejected by the Senate. It cleverly rescued the Administration, for if the Whigs insisted upon the line of 54° 40’, they put them¬ selves squarely upon Democratic ground. If they were willing to compromise on 40° dfg?r the sake of peace, it would hardly seem reasonable to taunt the Democrats with cowardice for act¬ ing upon Whig advice. When the resolution of notice passed the House in February 1846 ((the country at once became alarmed by the grow¬ ing rumors that the resolution of the House was a direct challenge to Great Britain for a trial of strength as to the superior title to the Oregon country.® The resolution, amended by the Senate and given a conciliatory tone, passed Congress. 23

April 1846. By that time the Ad¬ ministration must have seen its future course clear, for by the middle of June the diplomatic representatives of Great Britain and the United States had come to an agreement which was ratified by the respective countries and pro¬ claimed in force in August 1846. The line agreed upon was the parallel of 49° to the Straits of Fuca, thence following the middle, roughly speaking of that Strait to the Pacific. War with Mexico broke out contemporaneously with the passage of the amended Oregon notice to Great Britain and as a result of the war with Mexico and the Oregon treaty with Great Brit¬ ain, the United States acquired its present sov¬ ereignty over the great territory west of the

Rocky Mounains with a frontage of some 1,500 miles on the Pacific.

E. Benjamin Andrews, Late Chancellor of The University of Nebraska.

OREGON ROBIN. The "varied thrush"

(Merida ncevia or Ixoreus ncevius) which rep¬ resents the eastern robin in Oregon and north¬ ward to Alaska west of the mountains. It is dark slate-blue above and orange-brown in the lower parts, with a crescent of black on the breast, from the horns of which a line of black leads along the neck and through the eye. It makes its nest in bushes and lays greenish-blue eggs, clearly marked with spots and points of dark brown. It is a sweet singer.

OREGON SNOW-BIRD. See Snow¬

birds.

OREGON STATE AGRICULTURAL COLLEGE, founded in 1870 at Corvallis. The four-years' courses include agriculture, domestic science, mechanical, electrical and mining en¬ gineering and pharmacy, there are also a two- years' course in mining, a two-years' business course (added in 1901) and a winter course of four to six weeks in agriculture, and a prepara¬ tory department with a one-year's course. The college is coeducational and there are women on the faculty. The experiment station is con¬ nected with the College, though separately sup¬ ported, and farmers' institutes are organized under supervision of the faculty; in 1901, 11 such institutes were held with an attendance of 3,100. The income is derived chiefly from the land grant fund of 1862 and from Federal and State appropriation; tuition is free; in 1917 the annual income amounted to about $700,000. In that year there were 1,663 students in attend¬ ance and 162 members of the faculty. The library contained 37,000 volumes.

OREGON STURGEON. See Sturgeon.

OREGON TRAIL, an old emigrant route, about 2,000 miles long, extending from Inde¬ pendence, Mo., to Oregon City and Fort Vancouver on the Columbia River. It followed the valleys of the Kansas and Little Blue rivers to Fort Kearney, thence along the North Platte River, touching at Fort Laramie, through the Black Hills, touching at Independence Rock and Devil's Gate, thence into the Sweetwater River valley, through the Wind River Mountains, crossing the Big Sandy River and following the valley of the Bear River. To this point the trail was that used in reaching California, but a trail struck off to the southward at Soda Springs, and another slightly farther where the headwaters of Snake River were reached. The Oregon Trail continued along the Snake River Valley to Fort Boise, then northward across the Blue Mountains to the headwaters of the Col¬ umbia River, and along its course to Fort Van¬ couver, its course being practically that of the Union Pacific Railroad from the point of its touching Bear River. Across Nebraska the trial was indefinitely called "California," "Oregon," "Salt Lake" and "Mormon." An old Indian and buffalo trail, it was further defined by trappers and settlers and afterward blazed part of the way by Verendrye in 1742; and more definitely routed by the Lewis and Clark expedition in 1804, and by an Astor party establishing fur¬ trading posts in 1810-12. The trail continued in use, some slight variations being made in it, and in the later 30's several missionary expedi¬

tions passed over it; while in 1842 Fremont made the government survey of a route to the coast. From 1842 a constantly increasing tide of emigration poured over the trail. Efforts are now being made to have an automobile highway mark the course of the old trail. A map of the trail was published by the United States government in 1848, and others are in the (American Nation Series) (XIV, XVII), and in the (Quarterly of the Oregon Historical So¬ ciety > (1900-01). Consult Parkman, F., (The Oregon Trail> (1872) ; Meeker, E., (The Ox Team, or the Old Oregon TraiP (1906) ; Fre¬ mont, J. C., Expedition to the Rocky Moun- tains) (1850); Bancroft, (Oregon) (1890).

O'REILLY, o-ri'li, Count Alexander,

Spanish soldier: b. Dublin, 1725; d. Murcia, 23 March 1794. He entered the Spanish army when a boy, fought the Austrians in Italy, joined the Austrian army in 1757, and the French in 1759, and then returned to Spain. He served in the war with Portugal (1762), acted as governor of Havana, rebuilding the fortifica¬ tions dismantled during the British occupation, was governor of Madrid during the rising of 1765. He was governor of Louisiana in 1769, and acted there with great severity until his author¬ ity was established, when he showed himself at¬ tractive and

*liberal. He commanded an unsuc¬ cessful expedition to Algiers in 1775, but still retained the king's favor. After the death of Carlos III (1788) he was disgraced and retired from the army; he was subsequently appointed to the chief command of the Spanish *army in 1793, but died suddenly before reaching his army.*

O'REILLY, Charles, Canadian physician: b. Hamilton, Ontario, 19 June 1846. He was educated at McGill University, and engaged in practice in 1867. He was resident physician at the Hamilton City Hospital in 1867-75 ; and was medical superintendent at the Toronto General Hospital in 1875-1905, where he was responsible for the improvements which made it the present model institution. He organized the Toronto General Ambulance Corps in the North West Rebellion of 1885 ; was an examiner in clinical medicine at the universities of Toronto and Trinity; and was the first Canadian on the con¬ sultant staff of the surgical department of the Sisters of Charity Hospital, Buffalo. He is recognized as a foremost hospital expert.

O'REILLY, John Boyle, Irish-American author and journalist: b. Dowth Castle, County Meath, 28 June 1844; d. Hull, Mass., 10 Aug. 1890. He was apprenticed to a printer at nine, became a compositor and a reporter and was an active member of the Fenian Society, in whose interests he enlisted in May 1863 in the 10th Hussars. Three years later he was tried for treason and sentenced to death, a sentence com¬ muted to 20 years' penal servitude. From Dart¬ moor he was transported in 1867 to West Aus¬ tralia, whence he escaped in a boat furnished by the Rev. P. McCabe, and, having been picked up by the Gazelle, an American whaling ship, made his way to Philadelphia, where he was natural¬ ized. He removed to Boston almost immedi¬ ately, and became editor of the Pilot in 1870 and part owner in 1876. He accompanied the Fenian raid of 1870 as press correspondent, and was a prominent advocate of Home Rule for Ire¬ land. He wrote some good verse, notably that

on Australian themes: (Songs of the Southern Seas' (1873) ; (Songs, Legends and Ballads' (1878); (America' (1882), and (In Bohemia' (1886) ; and in prose, (Moondyne,' a novel deal¬ ing with penal life (1879); (The King's Men) (1884, with Robert Grant, ((J. S. of Dale," and J- F. Wheelwright) ; (The Irish Question' (1886) ; (Ethics of Boxing and Manly Sport) (1888), and < Stories and Sketches' (1888). Con¬ sult Roche, J. J., (Life of John Boyle O'Reilly' (Boston 1891).

O'REILLY, Robert Maitland, United States army surgeon: b. Philadelphia, 14 Jan. 1845; d. 1912. He was appointed a medical cadet in the United States army 7 Jan. 1864, and served through the remainder of the Civil War, taking .his M.D. at the University of Pennsylvania in 1866. He was appointed assist¬ ant surgeon in the army in 1867, remained in the service and was regularly promoted, reaching the rank of surgeon-general in 1902. He served in the Spanish War in the volunteer service as lieutenant-colonel and chief surgeon, and in 1909 was retired with the rank of major-general. He served for a time as personal medical adviser to President Cleveland.

OREL, o-rel, or ORLOFF, Russia, (1) a town, capital of the government of same name, on the Oka, 238 miles southwest of Moscow. It consists of narrow streets and houses built prin¬ cipally of wood, and has manufactures of linen, tanneries, rope-works, worsted-mills, etc. It is well situated for trade, communication by water with the Black Sea, the Caspian, the Baltic, and forming an important entrepot, especially for Petrograd and Moscow. Pop. about 91,051. (2) The government, bounded on the north by the governments of Smolensk, Kaluga and Tula, on the east by that of Voronezh, on the south by Voronezh and Kursk, and on the west by Tchernigov, has an area of 18,060 square miles, the surface being diversified with hill and valley, and watered by the Oka, the Desna, the Don and its tributary the Sosna. Stock- raising, the lumber business and agriculture constitute the chief industries. There is a con¬ siderable seasonal migration of the peasants to Petrograd, Moscow and southern Russia.

O'RELL, Max. See Blouet, Paul.

ORELLANA, Francisco de, fran-thes'ko de o-rel-ya'na, Spanish explorer of the Amazon : b. Truxillo, Spain, about 1500; d. Brazilian Guiana, 1550. He was a friend and fellow- townsman of Pizarro (q.v.), fought under him in Peru, founded the city of Guayaquil in 1537, and in 1540 accompanied the expedition across the Andes in search of El Dorado, and sailed down the Napo River with a few men to the Amazon, which he followed to its mouth, and, because of the stories he heard of women war¬ riors and women chiefs along its course called it the Amazon. The voyage, which was be¬ set with difficulties with natives and with mutiny, was completed in 1541. Upon his return to Spain he told amazing stories of the richness of the country he had explored and received its government in 1544. He died of malaria soon after his return to South America, where his expedition was entirely unsuccessful. Consult the contemporary account of his travels by his chaplain, Gaspar de Carvajal, reprinted at Se¬ ville in 1894, and (The Voyage of Francisco de Orellana down the River of the Amazons,'

translated by C. R. Markham from the (His- toria general de las Indias occidentals,' by An¬ tonio de Herrara, and published in the publica¬ tions of the Hakluyt Society, Vol. XXIV (Lon¬ don 1859).

ORENBURG, or'en-burk', Russia, (1) a town, capital of the district of the same name, on a slope above the right bank of the Ural, 990 miles southeast of Moscow. It has spacious and regular but ill-paved streets. The principal buildings are two gymnasia, several stone churches, two mosques, a governor's house, ex¬ change, custom-house, merchant house, abattoir and Bashkir caravansary. The chief manufac¬ turers are woolens, partly for army clothing, leather and soap. There are also many large tallow-melting houses. The trade, carried on principally by caravans from Khiva and Bok¬ hara, is very extensive. The chief exports are meat, hides, wool and dairy products. Pop. 93,- 600, comprising Russians, Kirghiz, Tatars and Jews. (2) An eastern district partly in Europe and partly in Asia, in the southern Urals, with an area of 73,254 square miles. The soil is in general good, but agriculture is very wasteful. The steppe to the east of the Urals, however, is barren. Stock-raising is an important industry. It has celebrated deposits of gold, platinum, cop¬ per, silver, coal, iron and salt, which are ex¬ tensively worked. Pop. about 2,000,000, 70 per cent Russian, the rest Mohammedans, chiefly Bashkirs.

OREODONTS, an extinct family (Oreo dontidce) of artiodactyl ungulates, the remains of which occur in the early Tertiary deoosits of North America, and are among the most primitive of hoofed mammals. Their skeletons abound in the Lower Miocene formations of Colorado and northward, especially in the White River beds. They are mainly animals not larger than sheep, with a very long tail and with four functional toes on each foot. The dentition is usually complete, though the in¬ cisors are sometimes rudimentary or even want¬ ing in the upper jaw; and all the genera ex¬ hibit, says Woodward, one very peculiar feature, namely, the degradation of the lower canine to the rank of an incisor, while the fore¬ most premolar is enlarged to usurp its function in opposing the moderately larger upoer canine. The best-known genera are Oreodon and Agriochoorus of the eastern foothills of the Rockies, and the larger Eporeodon of the Pacific Coast. Consult Woodward, (Vertebrate Palaeontology' ; Osborn, (Evolution of the Un¬ gulate Foot' (Trans. Amer. Philosophical Soc., U. S,, Vol. XVI, 1889) ; Cope,

1889).

OREOPITHECUS, the generic name given to the oldest known fossil ape, fragments of whose skeleton (jaws and teeth) have been re¬ covered from the Middle Miocene of Tuscany. They are interesting as exhibiting a compara¬ tively large animal (0. bamboli) , showing re¬ semblances both

to the Cercopithecidce and to the Simiidce, <(as if," remarks Woodward, ((they represented an annectant ancestral type."

ORESTEIA, The.

786

ORESTEIA

quence of a sin, as Schiller does in (Der Fluch einer bosen That.® The first play, the (Agamemnon, > is not only the poet's master¬ piece ; it is also one of the greatest tragedies in existence.

The scene opens at early morn in Argos. On the roof of the palace is the watchman looking for the beacon signal. He has been placed there by Clytemnestra, the spouse of the absent chieftain. We learn after a few verses that Troy has fallen. Most fearful conflicts are presented in the second play; but in the first the poet had another object — to get his audience in the right frame of mind1. We are oppressed with a vague sense of many crimes at the very beginning. The watchman declares that he will be glad to see his lord again. More he will not say. If the house could speak it might tell much. The chorus of elders enter and take us back in their song to thoughts of the army, when Agamemnon 10 years before led forth the flower of Argive youth to Troy.

The queen comes forth to offer sacrifice, and the chorus carry us back in a dactylic strain to the sacrifice of Iphigenia, which gives the keynote to the catastrophe. Clytemnestra re¬ lieves the anxiety of the elders by announcing that the Greeks have taken Priam's citadel. The description of the relay of courier-torches is one of the most famous passages in all Greek literature. Clytemnestra now dwells on the images of prostrate forms and ransacked houses in Troy. The chorus dismiss her in a rather short and ironical commendation. The theme changes to the trouble brought on in¬ nocent people at home. The action gradually moves toward Argos. Suddenly a herald enters with direct tidings. He addresses all the gods and blends sad memories with the joy of tread¬ ing his native soil again. Clytemnestra comes forth and addresses the messenger of her lord:

" Let him come quickly, loved of all the land.

And may he find the wife he left behind Unchanged, still faithful."

Then the king comes. In his chariot is Cas¬ sandra, Priam's daughter. Agamemnon speaks grandly of his victory. His wife receives him with protestations of love and fidelity. Her ex¬ pressions are exaggerated, because they are mendacious. But her joy is real — she has her victim. The

king is not deceived by his wife's hypocrisy in her outburst of superabundant love. Reluctantly he enters the palace with that pomp which he feels is a challenge to the envy of the gods. Cassandra remains in the car. The chorus give expression to the fears that besiege their souls. Here the. second part of the drama begins. The ode is brief, be¬ cause the catastrophe is approaching. Clytem¬ nestra comes out again for her second victim. But Cassandra heeds not her exhortations to alight, and impatiently the queen returns to the palace. The chorus urge the captive to de¬ scend ; but the prophetess merely utters a wild cry: ((Apollo, where hast thou brought me?® <(To the house of the Atreidai,® is the answer. <(Ha! So it is — a house accurst. It could tell of many a bloody deed. There stand the wit¬ nesses — little children slaughtered for a meal. Their own father ate them — Ha! What wouldst thou do? She lifts her hand. In the folds of the mantle he is caught. He falls in the bath.® The chorus believe the poor maiden is distraught — her words carry but half sense.

They marvel more and more, as she continues, and wonder how it will all end. I he inspired virgin now sees and prophesies her own fate. Cassandra enters the palace. The chorus are overwhelmed with suspense. Then the death- cry of Agamemnon is heard. They take coun¬ sel excitedly. As they approach the gate, the back-wall of the stage opens and discloses the interior. On one side of Clytemnestra, in the bath, lies the corpse of Agamemnon enveloped in an embroidered web, on the other the corpse of Cassandra. The elders expected to meet vEgisthus. But it is their queen that stands before them. She does not flinch. Triumphant she stands with the axe in her hand and shouts exultantly 'how the deed was done. The elders declare that she is wondrous bold to boast thus. But the queen replies :

" This corpse, I tell you,

Is Agamemnon, once my lord; — his death ' The work of this right hand, proud to have wrought A masterpiece so righteous."

Clytemnestra is magnificent even in her crime, upborne by her indomitable will. The elders mourn the fallen king. But the queen haughtily commands them not to prate of dishonor — he but paid the price for Iphigenia's death. Sud¬ denly FEgisthus enters with an armed retinue. He shouts with joy at the welcome sight: c(Day of Vengeance, thou has come! Agamemnon's father set before my father, Thyestes, his own children to eat. Feet and1 hands were hewn off and concealed beneath bits of roasted flesh. Thyestes ate of the repast. When he was aware of the food, he spat it out, upset the table and uttered this curse: (So fall the whole race of Pelops ! This is the crime for which Agamem¬ non's death atones P ® The elders are faithful to their king and denounce the assassin. FEgisthus warns them not to kick against the pricks. Clytemnestra steps between the soldiers and the elders.

The tragedy ends in the trochaic tetrameter which mediates between this play and the next, a prophecy of what is to come : the end is not yet — there is only a truce. Clytemnestra leads ˆEgisthus within: ((We control the palace henceforth; what we will is law.®

The (Agamemnon) is a drama of crime. The cChcephori) (Libation-Bearers) is a drama of revenge. There is1 still an echo of the storm; and in the third play, the ˆumenides, the drama of propitiation, the thunder dies away and the stormcloud lifts.*

An interval of 10 years separates the

mother (who had dreamed that she gave birth to a viper) to do what she dares not do her- seli. She plays only a secondary oart in the ˆ is of great dramatic importance; and there are some touches of extraordinary poetic beauty. The young men have retired and watch the procession unobserved. Electra prays to her father to send Orestes that the mui deress may die the death of retribution, As the chorus chant the dirge, she pours three libations, takes up the lock of hair, and in great excitement notes the resemblance to her own ti esses. Her passionate sisterly love finds beautiful expression in the wish that the hair had a kindly voice. No one in Argos possesses locks of equal sheen. She cannot assert with absolute belief that the fair offering came from her dear Orestes; but now she observes the footprints, like her own, the same form of heel, the print and mould in general. Orestes comes forward and reveals himself. His sister hesi¬ tates. to yield too hasty credence, but is finally convinced. The eloquent outburst, which Orestes cannot control, is truly dramatic. He calls upon Zeus to look down upon the father¬ less brood of the eagle. The chorus remind them of their duty, and they concert measures for vengeance. That Apollo will not betray him, Orestes knows, for the god had threatened him with exile, if he did not pay the guilty back, in like coin, blood for blood. The most important thing is to secure the aid of Agamemnon's shade. Brother and sister ap¬ proach the tomb and call on their sire to help them. Orestes kneels and prays that he may regain his sceptre.

There are 1,076 verses in the play, but not until we come to 560 do we see the plot on which the drama turns unfolded. An elaborate preparation for vengeance has been made ; then the action is rapid and decisive. The only de¬ lay is when .Clytemnestra begs for mercy.

Orestes bids Electra go within, while he and Pylades appear before the

gates as strangers from Phocis. They knock. Clytemnestra in great pomp comes forth. Orestes tells her that her son) is dead. She feigns sorrow and bids the attendants conduct the men to the guest's apartments. Then the queen bids the nurse, Kilissa, summon ZEgisthus with all speed. Her rustic homeliness and grotesque 'but natural in¬ consecutiveness of speech form an effective contrast with the tragedy that impends. Her pithy but illiterate babble about Orestes' baby¬ hood adds just the touch of nature desired to relieve the tension at the crisis. .TEgisthus ar¬ rives and enters the palace. Soon his shriek is heard. The incestuous dog has met his doom. The chorus withdraw to avoid suspicion. Dark¬ ness comes on and the scene shifts to the in¬ terior. A servant rushes to Clytemnestra's door and calls. The queen appears. The de¬ lineation is slight, but the portraval shows the same outline as in the Agamemnon. Even her defense, which to modern feeling is coarse, is in keeping with her unflinching shamelessness. She takes in the situation at a glance ; the hour for final settlement has come. She orders the servant to fetch an ax. Orestes enters, leaving the door open, through which can be seen the corpse of Tbgisthus. When Clytemnestra shrieks, Orestes draws his sword. Clytemnes¬ tra, baring her bosom, pleads with her son to forbear : < (On this breast didst thou often rest in sleep, from these nipples suck the mother's

milk.® , But Pylades warns him not to forget Apollo's high command, and Orestes orders his mother to follow : ((Here by the side of him you preferred to my sire the death-stroke will I give to you.® < (Woe is me ! The viper stings that I bare and reared.® ((Thou sayest true. Fulfilled's thy dream of terror. Thy act was sin — come now and die, e'en if that be sin.®

In this encounter of mother and son the dramatic interest of the trilogy reaches its high¬ est point. Orestes is constant to his purpose. Unlike Hamlet, he needs no occasions to spur on his dull revenge, no examples gross as earth to exhort him.

The dhorus sing an ode of exultation that justice has been done, and the scene shifts to the adjoining room, where two corpses are seen, Orestes standing near. Servants hold the net in which Agamemnon was entangled. A multi¬ tude of people assemble. Orestes bids the serv¬ ants unfold the web, the witness of the vilest stroke that was ever presented to human eyes.

The end of the play, where Orestes' justifi¬ cation is interrupted by spasms of approaching madness, affords a scene which gives scope to the poet's peculiar powers —

" Streaked with his mother's blood, but striving hard To tell the story ere his reason goes."

His act presses to his memory like damned guilty deeds to sinners' minds, as a legion of foul fiends environ him : ((Ha ! What are these? Women in dark mantles, serpents writhing round their heads. I must be gone!® (

The umenides is a drama of propitiation. It begins with the main catastrophe of the trilogy; hence the tumultuous rhythm in strik¬ ing contrast with the (Agamemnon. > The whole interest centres in Orestes. His grim pursuers, the Erinyes, form the chorus. They have chased their victim to Delphi ar>d have been cast into a deep sleep by Apollo. Orestes, exhausted, crouches before the altar. The aged priestess stands before the temple ready to per¬ form her daily duties. She enters, but returns in terror. An unexpected sight has driven her out. The interior of the temple is now dis¬ closed. Apollo promises Orestes not to for¬ sake 'him. Hermes conducts the fugitive and Apollo vanishes. The ghost of Clytemnestra rises and upbraids the sleeping furies. Their only answer is a snore. Again she chides, and they are aroused. Their aspect is so frightful ithat they almost create a panic in the theatre. Apollo drives the hideous creatures from his sacred temple, and the scene changes to the Acropolis at Athens. Many years have elapsed. Orestes kneels before the statue of Athena. He speaks as one whose guilt is mellowed by time. Trusting in Apollo, he awaits the final verdict. The Erinyes range themseltes in the orchestra chanting a song of vengeance. They are track¬ ing their victim to his doom. Athena enters and bids her strange guests disclose their mis¬ sion. The goddess resolves to establish the court of the Areopagus for trials of homicide. The herald proclaims silence. Athena takes her seat as presiding judge. The Erinyes accuse

Orestes, who admits his guilt, but justifies his act and calls on Apollo to testify. When both sides have been heard, the jurymen cast their ballots secretly, Athena openly. The votes are found to be even. Athena pronounces Orestes free. But his accusers, the primaeval deities, are enraged because they are thus trampled down by younger gods. Athena allays their wrath, and they agree to remain in Athens; they will bless the people, become Eunienides (Gracious Goddesses). Athena places herself at their head and1 conducts them in solemn pro¬ cession to their new home in a cavern below the Areopagus.

The satyr drama, which concluded the tetra¬ logy, was the (Proteus^ We know nothing about the structure of the play.

The

Joseph E. Harry,

Author of cThe Greek Tragic Poets? etc.; Lec¬ turer o?i the Greek Drama at the Sorbonne.

ORESTES, o-res'tez, in Greek mythology, the son of Agamemnon and of Clytemnestra. Saved by his tutor with the assistance of Electra from the fate of his father, who was murdered by Htgisjhus, Clytemnestra's para¬ mour, Orestes was brought up in the house of his uncle Strophius, Prince of Phocis, and formed with 'his son Pylades that intimate friendship which has become proverbial. Called upon by the Delphian god to avenge his father, he hastened back to Mycenae. To conceal him¬ self he has recourse to artifice. His tutor and Pylades appear with an urn, which they pre¬ tend contains the ashes of Orestes. Clytemnes¬ tra hears the news of her son's death with a joy which she can hardly conceal; but she soon falls under his dagger. zEgisthus under¬ goes a similar fate. According to the Greeks, the murderer of his mother became a prey to the Erinyes or Furies. These terrible god¬ desses unrelentingly pursue the unhappy prince, and at last drive him to madness. From this, according to one story, he is released by worshipping the Furies, as the Eumenides (the Kindly), while according to another, told in Euripides, he was ordered to convey the statue of Artemis from Tauris to Athens.. In fulfill¬ ing his injunction, he meets with further adventures.

ORFILA, or-fe-la, Mathieu Joseph Bona- venture, French chemist, founder of the science of toxicology both in its therapeutic and legal bearings: b. Mahon, Minorca, 24 April 1787; d. Paris, 15 March 1853. He served in the merchant marine, studied medicine at Valencia, Barcelona and Madrid ; was sent to Paris by the Spanish government in 1807 ; and after the loss of his pension consequent on the war be¬ tween France and Spain lived there in poverty for a time. By 1811 he had become doctor of medicine, and his successful practice and mar¬ velous knowledge of chemistry made him quickly famous. He was naturalized, became professor of toxicology (1819) and of chemistry (1823), and was dean of the medical faculty from 1830 to 1848. He was famed as an expert witness, did much to reform French medical

education, and wrote

(1842).

ORFORD, or'ford, Earl of. See Walpole, Sir Robert.

ORGAN, a functional part of a living being. It is an essential quality of a living being (see Life) that it shall exhibit activities, the expres¬ sion or

product of organic constitution. Hence, any living being either vegetable or animal is termed an organism — the broadest possible name for the animate world as opposed to the inanimate.

Nature of Organs. — Organs may be spoken of in two senses. In common speech they are large functional parts of gross anatomy, such as roots, leaves or blossoms of plants, the limbs, the heart and blood-vessels, the lungs, the stomach, the liver and excretory glands, the generative parts, etc., of animals ; these are termed, properly enough, the respiratory, digestive, locomotive or reproductive organs, and so on. But each is made up of many parts, which unite to effect the great functions that characterize the group as a whole, and all are more or less interdependent. The number and diversity of these structures, large and small, visible and invisible, vary enormously in differ¬ ent plants and animals, and are the result of an organic evolution, that is, a struggle for existence among organs, or intra-evolution, as it has been termed by some German naturalists.

*Degrees of Organization. — Where the organs are few and simple, in some cases more than one distinct function being performed ap¬ parently by the same part, the animal or plant is said to be of simple or synthetic structure or organization : where the subdivision of labor in the organism is extensive, separate struc¬ tures doing each a more particular work for the benefit of the whole, the organization is said to be complex or specialized. Increase of specialization is regarded as an advance, hence we speak of Hower** and ˆhigher® animals, re¬ ferring to the less or greater degree of com¬ plexity and specialization of their organs. Com¬ parison of existing organisms, considered with reference to their activities, and a study of the phylogeny of animals and plants as revealed by palaeontology and embryology, establishes the truth of this standard of comparison, and throws light upon the evolution of organs. Tracing backward any particular group, as, for example, that of the digestive system, we find it less and less complex as we descend the scale of organization until we arrive at the simplest forms — the one-celled moners, which have no structure that our power is able to detect, the drop of undifferentiated protoplasm which constitutes their whole being accomplishing all the work of nutrition, locomotion and repro¬ duction. A little higher stands the amoeba (q.v.), and other protozoans and protophytans, in which a beginning of differentiation and structure appears in the presence of a nucleus, a vacuole, microsomes, etc. Still higher stand the sponges, coelenterates, and so on, whose comparative superiority is manifested by the assignment of certain parts with gradually in-*

creasing dcfimˆness to perform distinct offices, mn the higher organisms primarily differ from the lower ones only in the fact that they are composed of many cells in more and more com- p icated arrangement, while the lowest consist ot only a single cell ; hence in the last analysis, an organ can be defined only as a cell or group ot cells devoted to doing a special part of the labor required for the continued life, activities, and prosperity of the organism. This is only a corollary of the general doctrine of the cell as the seat of life. (See Cell). Of the origin of unction or organic activity we know nothing.

- *orJ?1 an<ˆ Symmetry. — Returning now to the ordinary sense of the word «organ» as a functional part, certain general facts may be considered. Among these are the form and symmetry of organs. The form is determined by the work to be done, the organ as an instrument assuming that shape and relative position m the body, and acquiring that structure, which will be most effective for the purpose. Many of the problems here which seemed so difficult to early investigators have been solved by the application of mechanical laws. Mechanical principles, controlling, to begin with, the origi¬ nal cell-division of the egg, and regulated in growth by external conditions, as gravity, air or water pressure, strains, muscle-leverage, etc., are no doubt at the basis of the symmetry which so remarkably characterizes the arrangement of organs throughout the living world. Two general types may be recognized — radial sym¬ metry and bilateral symmetry. The former is most characteristic of plants, where the majority of organs occur in circles around an axis (see Plants, Structure of; Flower; Phyllotaxis, etc.) ; and of such animals as the echinoderms, ccelenterates and many worms, whose organs are radially disposed about an oral-aboral axis, as in polyps and starfish. The superior orders generally, and the arthropods and vertebrates particularly, display bilateral symmetry in a marked degree in all their outward parts, the external organs being in pairs (with one im¬ portant exception in the higher forms) and these approximately, though not absolutely, alike. The internal organs of the vertebrates are by no means symmetrical at present, al¬ though they seem to have reached their asym¬ metry by evolution from a primitive paired con¬ dition. In insects and arthropods generally the internal parts show much bilateralism. Among mollusks the bilateral arrangement of the organs is normal, but one side is often developed at the expense of the other, even to the complete loss of the latter.*

Correlations. — As might be expected under such circumstances certain definite correlations exist between organs as to size and relative pro¬ portions. Thus in the human frame, the limbs are equal in length, the head is one-seventh of the total height, the internal organs must be of a relative

size in respect to one another and to the frame, and so on. The symmetry and cor¬ relation of organs is necessary to the continu¬ ance of healthful interacting functions.

At the same time homologous parts — that is, those structurally alike — may vary greatly among animals of the same class, according to the varying requirements of habits and environ¬ ment, as for instance among vertebrates, the lo¬ comotive organs are in the form of fins or pad¬ dles for aquatic species, wings for aerial crea¬

tures, and legs and feet for those of terrestrial habit ; and these may be vastly modified among the different groups, adapted to diverse habits, giving all the difference, for example, between the massive, shovel-like, digging-paws of the mole and the long slender legs of the antelope, or even the total disappearance of homologous parts, as in the snakes and limbless lizards. Such alterations of form adaptive to the re¬ quirements of environment and habit come about gradually, and are likely to require a cor¬ responding change in other organs, directly or indirectly; since all or many organs in the frame are dependent upon the coaction of others, and conditions of space, gravity, etc., require mechanical as well as physiological con¬ formity. The stomach, lungs, etc., of a long shm animal will be elongated and narrow, while those of a related but more compactly built species will be more globular. Sometimes, how¬ ever, the changes render some secondary organ unnecessary, and its continual disuse results in its gradual reduction and perhaps extinction, as has happened in the case of the loss of eyes by many burrowing or cave-dwelling animals. When Such a loss has become permanent in a type the remains may occur only in the em¬ bryonic stage, or may exist in adulthood, quite useless to the animal in its present condition. Such obsolete structures, of which the false hoofs of many ungulates, the "balancersˆ of flies and the appendix vermiformis in man are examples, are called vestigial organs, and were most difficult of explanation until this relation¬ ship was recognized.

Function Change.— Organs may not only change their form, but may also change their function. Many perform more than one func¬ tion, even in the higher animals, and often, espe¬ cially in the case of the limbs, this has produced a change of form as between the fore and hind limbs, relegating to one pair, say the hind limbs, the main work of progression, while the other pair assist in this respect only a little, but serve mainly as the means of seizing and holding food; most of the rodents afford examples of this case, of which the kangaroos and ,the ex¬ tinct iguanodons are extreme instances. But function-change has often been more radical, the original or primary service by an organ having been completely superseded by some other service, to accomplish which the organ underwent gradual transformation in accord¬ ance with change of habit and the arising of a

novel bodily need to which existing machinery could be adapted. The origin of lungs in air- breathing amphibians, reptiles and warm¬ blooded mammals and birds is directly traceable to the transformation for this new purpose of the swimming-bladder of fishes ; teeth came into existence as a relic of the hard scales of ancient fishes whose function was purely as an arma¬ ture, the structure and office surviving only in a few such forms as the gar (see Gar) ; the three pairs of "jaws" of crabs are struc¬ tures which, in the early history of the crusta¬ cean type were primarily swimming and breath¬ ing organs, but long ago lost those functions altogether and became fitted wholly for masti¬ cation of food. Similar examples in great num¬ ber might be drawn from both animals and plants. Indeed, it might be said that most if not all of the successful and persistent varia¬ tions have involved change of function on the

part of organs, the result of which in many cases was greater specialization.

For development of organs in the embryo see Embryology. See also Anatomy; Physi¬ ology.

Ernest Ingersoll.

ORGAN (Gr. bpyavov , Lat. organum, an in¬ strument), a name applied to several musical instruments that are in construction and prin¬ ciple somewhat closely allied ; but more dis¬ tinctively appropriated to the largest of these, the pipe-and-pedal organ, which may be briefly described as a wind instrument, the sounds of which are those of a great number of pipes of varying lengths. The sounds are produced by the admission to the pipes (as determined by the keys and stops moved by the performer) of compressed air conveyed to them along cer¬ tain channels, from a bellows worked by elec¬ tricity, hydraulic, human or other motive power. From its essential feature of construction the pipe-and-pedal organ, is incomparably the noblest and most imposing of musical instru¬ ments, being in majesty of tone and grandeur of orchestral effect, produced by a single per¬ former, without a parallel. As in the human voice, the tones of the organ are produced by the vibrations of the air in the tubes or pipes through which it is propelled. The three essen¬ tials of an organ are (1) a chest of cqm- pressed aid; (2) sets of pipes in communica¬ tion with this chest; and (3) a console of claviers or keyboards, by means of which this communication may be opened or closed at pleasure. The air is forced into the wind-chest by means of bellows or electric fans. To the upper part of

each wind-chest is attached a sound-board, a contrivance for conveying the wind to any particular pipe or pipes at pleasure. It consists of two boards laid horizontally. On the upper board are arranged parallel rows of pipes, the pipes in each row, regarded longitud¬ inally, being of the same timbre or quality of tone, but of a different quality when regarded laterally, that is, as they extend backward. Under each lateral row of pipes there is a groove or channel in the sound-board for the passage of air from the wind-chest to the perforations in the sound-board by which the pipes communicate with the grooves. Air is admitted into these grooves by means of valves or pallets, which are connected with the keys. On the depression of a key the valve is opened, and the compressed air rushes into the groove, and would, it is obvious, cause all the pipes communicating with that particular groove to sound their respective notes were it not for the register. The register is a slider which moves in other grooves in the sound-board, cut at right angles to those above mentioned, and communi¬ cating by perforations with the longitudinally arranged pipes ; it contains holes to correspond with these pipes. By drawing the register or stop the holes of one of these rows are opened, as then the holes of the slider are directly under the entrance to the pipes, and by pushing it they are closed. From this it is clear that by drawing several of these registers corre¬ sponding rows of pipes are opened. When a register is open air can be admitted into any of the row of pipes under which it is placed by simply pressing the key that opens the valve of the groove with which it communicates, The

series of pipes above each slider is called a stop. The principal stops of an organ are the open, stopped and double diapasons; the piinci- pal, dulciana, twelfth, fifteenth, flute, trumpet, clarion, bassoon, cremona, oboe and vox hu- mana. Those pipes of the various registers that open into each channel are so constructed that while one shall give a fundamental note, the others shall give the chords of that note. An organ may have several wind-chests filled by the same bellows, and several keyboards, each kevboard and wind-chest representing a distinct organ. In the largest instruments the number of these organs generally amounts to five. The most powerful of these is called the great organ; a smaller one the choir organ; another is called the swell organ, from the cir¬ cumstance of its being enclosed in a wooden

box with a front of louvre-boards, which can be worked by the player so as to give diminu¬ endo and crescendo effects to the sound; a fourth is called the solo organ, being employed for special solo stops, such as the hautboy, the flute-stop, the vox humana and others ; lastly, there is the pedal organ,

so called from its key¬ board being played by the feet. The keyboards for the hand are termed manuals, that for the feet the pedal. The most usual compass of the manuals is from CC (8 feet) to F in alt, lour octaves and a half ; that of the pedal from CCC to E or F, two and a quarter to two and a half octaves.

There are two kinds of organ pipes — flute pipes and reed pipes, of each of which there are several species. Flute pipes consist, first, of a foot, which is hollow, and receives the wind that sounds the pipe; second, of a body which is attached to the foot. Between the foot and the body of the pipe is a diaphragm or partition, having a small narrow aperture to let out the wind; over this aperture is the mouth, whose upper lip, being horizontal, cuts the wind as it escapes through the aperture and sets it in vibration, so causing the sound. The pipes are made either of pewter, of lead mixed with tin, or of wood. Th.e metal pipes are generally cylindrical, open at their extremi¬ ties and clear In their sound. The wooden pipes are square and generally stopped at their ex¬ tremities by a plug covered with leather, so as to be air-tight. The sound of these is softer. The longest pipes yield the gravest, the shortest, the most acute sounds. The pipes, however, which are stopped have only half the length of those that are open, for the same sound. The pipes vary in length from 32 feet or so, to the

size of the pipe of a very small key. The reed pipes consist of a foot to carry the wind to the reed, a thin tongue of hard brass, one of the extremities of which is fitted into a kind of mold by a wooden plug, and the other is left free to vibrate ; and in proportion to the length of that part of the tongue which is at liberty is the depth of the sound. After passing the reed the wind traverses a long pipe, wfaose dimensions and shape give character and quality to the sound.

The hand or barrel organs consist of a mov¬ able, turning cylinder, called a barrel, on which, by means of wires, pins and staples, are set the tunes it is intended to perform. These pins and staples, by the revolution of the barrel, act upon the keys within, and give admission to the wind from the bellows to the pipes. The hand- organ is generally portable, and so contrived that the same action of the hand which turns the barrel gives motion to the bellows.

The invention of the organ is attributed to Ctesibius (q.v.) of Alexandria,

about 200 b.c. An organ was presented by Emperor Coprony- mus to Pepin, king of France, about 755: and in ‘ 826 a water-organ was erected at Aix-la-Cha- pelle. The use of organs, however, was not common before the 14th century. At the be¬ ginning the instrument was very imperfect ; it had only from 12 to 15 broad and large keys, which were struck with the fist and produced the tones of the diatonic scale. The keys in time became smaller, and between the diatonic tones the semi-tones were inserted. In 1444 H. Drossdorf of Mayence built a great organ with a pedal. According to others, Bernhard, a German, organist to the Doge of Venice, built the first organ with a pedal between the years 1470 and 1480. Improvements succeeded quickly in the 16th century; the division of all the pipes into different stops was now invented, and the tone of the instrument was adapted to the tone of the choir. The bellows were par¬ ticularly improved when Christian Forner in the 17th century invented the windchest, by which an equal pressure of wind is obtained in all the bellows. Till then 20 to 24 pairs had often existed in one organ, requiring from 10 to 12 men to tread them. Later, hydraulic en¬ gines and electric motors were adapted to the purposes of working the bellows, and in many of the most modern organs, electric fan-blowers, supplying specially constructed air-chambers, have supplanted bellows. The adaptation of Venetian shutters to increase or reduce the tones of pipes enclosed in a box and called the swell, was due to an English builder, Abraham Jor¬ dan, who introduced the idea in 1712. Another Englishman, C. S. Barker (1806-79), inventor of the pneumatic lever, patented in 1863 a con¬ trivance for utilizing electric mechanisms. From both of these, with considerable improve¬ ments, the tubular-pneumatic and electro-pneu¬ matic actions have developed, giving a wonder¬ ful facility of touch and response to the 20th century pipe-organ, compared to the several pounds pressure which were required to force down any single key of the tracker actions of the older-type organs. The standard radiating •convex and concave pedal board, compared to the old straight pedal board, also increased fa¬ cility of pedal execution. The adaptation of the pneumatic action to the old draw stops and their combinations, which in modern organs are

replaced by tilting tablets and push-buttons, has also facilitated digital technique. The profes¬ sion of organist, formerly confined to men ow¬ ing to the great physical strain imposed, has thus been opened to women. Chief among in¬ ventors of recent date who contributed to these improvements are Robert Hope-Jones (1841- 1914) ; John Austin who in 1894 invented the universal air-chest ; and Cousans who invented the kinetic fan-blower; both of which have sup¬ planted the bellows. The wonder excited by the famous organs of former centuries has largely disappeared, through the familiarity of mod¬ ern days with the splendid creations to be found not only in churches, but in civic and concert halls, in department stores,

theatres and other places of amusement of large centres of population. Also by the instruments of ex¬ quisite tone and ornate appearance, installed in the homes of wealthy patrons, a specialty with certain organ-building firms. The perforated paper roll, accurately recording the technical performances of accomplished organists by in¬ genious adaptation permits these organs to be played mechanically. For secular purposes, pipe- organs also are frequently provided with or¬ chestral percussion stops, to reproduce the sounds of chimes, glockenspiel, triangle, drums, etc. Since the beginning of the 20th century, American built pipe-organs have taken fore¬ most position among the best produced in the world, and in 1914 there were 85 organ manu¬ factories in the United States employing over 3,000 persons; the gross value of their products for that year was $6,297,000. For modern de¬ velopments in organ construction consult Miller, G. L., 'The Recent Revolution in Organ Building> (New York 1913) ; also consult Aud- sley, G. A., 'The Art of Organ-Building) (2 vols., New York 1905) ; Broadhouse, J., 'The Organ Viewed from Within) (New York 1914) ; Cellier, A., (L'orgue moderne> (Paris 1913) ; Clarke, W. H., 'Standard Organ Build- ing) (Boston 1913) ; Dixon, 'Practical Organ Building' (London 1887); Hinton, H., 'Organ Construction' (London 1900) ; Lewis, W. and T., 'Modern Organ Building' (London. 1911); Locher, C., 'Dictionary of the Organ' (New York 1914) ; Matthews, J., 'A Handbook of the Organ' (London 1897) ; Statham, H. H., 'The Organ and its Position in Musical Art' (New York 1910) ; Warman, J. W., 'The Organ' (Aberdeen 1907) ; Wedgwood, J. I., 'A Com¬ prehensive Dictionary of Organ Stops' (Lon¬ don 1905) and 'Continental Organs and Their Makers' (London 1910) ; Williams, C. F. A., 'The Story of the Organ' (London 1903).

Charles Leonard-Stuart, Editorial Staff of The Americana.

ORGAN BIRD, a name applied to two different birds. (1) The Tasmanian crow-shrike, Gymnorhina hyperleuca, which has a single clear note and is sometimes taught to whistle or mimic. (2) The Amazonian wren, Cyphor- hinus cantans is noted for its flute-like song.

ORGAN MOUNTAINS, or SERRA DOS ORGAOS, Brazil. See Orgaos, Serro dos.

ORGAN-POINT, or PEDAL-POINT, a

musical term derived from the mediaeval or- ganicus punctus, and applied to the single tone, usually the tonic or dominant, held or main¬ tained by one of the voice parts, while the other parts move freely, without reference to the sus-

tained tone, except at the beginning and the end of the passage. In modern composition the organ-point is usually in the bass, hence the al¬ ternative term pedal-point, the organ pedal be¬ ing best adapted to sustain the long note. When an organ-point occurs in any other part than the bass, it is said to be inverted, and if in the soprano is called the ((hol ding-note,)) this term being also of mediaeval conception and the ori¬ gin of tenor from tenere, to hold, the voice by which the organicus punctus was generally sus¬ tained to an effective contrapuntal climax. In many modern compositions, especially pastor¬ ales, a double-organ or pedal-point on both tonic and dominant is frequently used. The prelude to Wagner's (Rheingold) contains the longest organ-point ever scored and consists of 138 bars.

ORGANIC CHEMISTRY. See Carbon

Compounds.

ORGANIC SENSATIONS. See Sensa¬ tion, Organic.

ORGANO-METALLIC COMPOUNDS,

in chemistry, compounds consisting of an or¬ ganic radical in combination with a metallic base. The alkyl radicals — methyl, CH3 ; ethyl, C2H5; propyl, C3H7; etc.— are the most familiar examples of organic bases which enter into combinations of this character ; and zinc, lead, tin and mercury are the most important metal¬ lic elements which combine with them. Zinc- ethyl, ZnCGITK may be prepared by the action of metallic zinc upon ethyl iodide, C2H5I. A non-volatile, crystalline compound having the formula C.TLZnl is formed at first, but under the influence of heat this decomposes into io¬ dide of zinc and zinc-ethyl. As thus prepared zinc-ethyl is a colorless liquid, which boils at 244° F. When exposed to the air it takes fire spontaneously, burning with a greenish flame. It may be converted, by slow oxidization, into ethylate of zinc, Zn(OC2H3)2. Three com¬ pounds of ethyl and tin are known, and two compounds of ethyl and lead. Boron and sili¬ con form compounds with ethyl, and these, al¬ though they contain no metal, are also called ˆorgano-metallic" bodies. Silicon-ethyl has the formula (C2Hr,)4Si, and may be prepared by treating zinc-ethyl with silicon-tetrachloride. It is a colorless liquid, boiling at 302° F. Several of its derivatives have a considerable theoretic interest, among these being a substance which has the formula SiCsH2oO, smells like camphor and behaves, chemically, like an alcohol. So¬ dium-ethyl has not

been isolated in the pure state, but a double compound of this substance and of zinc-ethyl has been prepared, having the formula NaC2H3 + Zn(C2H3)2. The organo- metallic compounds, especially those of magne¬ sium, are extremely useful for purposes of chemical synthesis. See also Grignard Reac¬ tion.

ORGANOTHERAPY, or OPOTHER¬ APY, the medical use of animals' organs or glands, or of their extracts. The use of the extracts of many of the viscera of lower ani¬ mals for their remedial effects in illness is of great antiquity. The savage who ate the heart of his courageous enemy had an inkling of a truth, even if the results were obtained only by what is now termed contagious magic, a form of animistic thinking. Ancient Chinese,

Indian, Greek and Roman medicine dealt largely with the fancied effects of eating cer¬ tain organs, but it has only been within the era of exact physiological chemical methods that physicians have been in a position to apply the principles of organotherapy along rational and individual lines. As Paracelsus was the first to show that it was not the entire drug that was valuable, but that each drug contained some ac¬ tive principle to the action of which its effects were due, and thus was the forerunner of the distinctly modern school of (so Brown-Sequard, who maintained (1869) that each organ of the body had an internal secre¬ tion which was an active agent, was the founder of the modern school of organotherapy. The full applications of these general truths are far from being in sight, especially when one con¬ siders the recent developments of knowledge concerning specific cytotoxins, cytolysins, etc. Claude Bernard may be said to have antedated Brown-Sequard when he discovered the glyco¬ genic function of the liver; but Brown-Sequard, with more brilliancy and fancy than fact, made the broad application that all the glands of the body — fiver, spleen, suprarenals, kidneys, testes, thyroids, ovaries, etc. — possessed internal secre¬ tions which passed into the blood and lymph and thus contributed to the metabolism of the body. Subsequent study has not borne out his theory, but it is known that certain glands and organs of the body do contain substances which are found only in those particular glands and organs, and which, extracted from the corre¬ sponding glands in the lamb, sheep, pig, cow, etc., and used hypodermatically, or by the mouth, have marked physiological actions and may be employed in therapeutics. Many of the extracts first devised by Brown-Sequard are now known to be worthless, particularly the extracts from the testicles of the ox and ram, which were to invigorate the old, and extracts of the brain, of the ovaries and of the mam¬ mary glands. All of these contain well-known compounds which are present in most of the tissues of the body, and beyond possessing cer¬ tain tonic properties, such as a good beef-tea would possess, their action is nil. Later study has shown, however, which of the organs con¬ tain practicable therapeutic principles, and further research will undoubtedly reveal others,

and may discover some in the organs now re¬ jected as containing nothing specific. The most important of these substances now used in medi¬ cine are derived from the liver, the stomach, pancreas, thyroids, thymus, suprarenals, pitui¬ tary and sexual organs of the more common domestic animals. Of these the digestive fer¬ ments pepsin and pancreatin, alpha iodine com¬ pound, thyroid, epinephrin from the suprarenals, and spermin from the testicles are the most important. The action of the digestive fer¬ ments is discussed under digestion (q.v.).

The peculiar symptoms that resulted from the taking out of the thyroid gland in men and animals drew attention to this organ and its effects on secretion. The close resemblances of certain diseased persons to man and animals deprived of this gland was noted, and it was soon established that myxoedema and cretinism (q.v.), two hitherto intractable diseases, were really due to diseases of the thyroid function. It was but a step, after finding the cause, to*

apply the remedy, thyroid extract, and these two previously hopelessly incurable diseases became amenable to treatment. At first fresh glands were used; later, extracts; still later, the active principle, called by a variety of names iodothyrin, thyoiodin, thyreoglobulin, etc. Thy¬ roid extract causes, in addition to its effects in metabolism, a fall of blood-pressure through dilatation of the blood-vessels, and a slight de¬ pressing action on the heart in large doses. It also increases the nervous irritability of the heart-muscle by reason of its action on the vagus nerve. Small doses of the drug adminis¬ tered during a considerable period of time cause symptoms comparable to exophthalmic goitre (q.v.). The diseases for which it is used are cachexia strumipriva, following surgical re¬ moval of the thyroids; goitre of the hyperplas¬ tic follicular variety, a form which is associated with diminished formation of thyroid substance ; myxoedema, sporadic cretinism ; certain obscure skin-diseases and obesity. It is also used as a general metabolic stimulant. Within a few years an extremely active and powerful sub¬ stance has been discovered in the suprarenal glands. It has received various names, suprare- nin, adrenalin, etc., all of which are closely allied products that represent as nearly as possi¬ ble the active principle or principles of this gland. This substance in the human body is probably of great importance in maintaining the tension of the blood-vessels, and it also bears some relation to the sugar-oxidizing prop¬ erties of the liver or pancreas, or both. The effects of adrenalin, used hypodermatically, are immediate. It causes a marked rise in the blood-pressure, due to its stimulating the mech¬ anism that constricts the blood-

vessels; it slows the heart and causes it to beat more strongly; it depresses the breathing centres somewhat, dilates the pupils and slows down the peristaltic movements of the intestine. In medicine it is extremely useful as a local application to con¬ strict blood-vessels, lessening hemorrhage, re¬ ducing inflammation, stopping discharges of the mucous membranes. It is thus particularly val¬ uable in sore throat, running from the nose, inflammation of eye, hemorrhage from the nose or from the stomach. It has a certain value in some forms of diabetes, especially in bronzed diabetes, in rachitis, in spasmodic asthma and in the treatment of shock of any description, particularly if associated with loss of blood- pressure. The use of the active principle of the suprarenals is only just begun.

The pituitary gland contains a number of substances which exercise quite remarkable in¬ fluences on bony and fatty growth. Further¬ more the pituitary stands in close relation to the thyroid and suprarenal glands. All of the endocrinous glands stand in very close relation the one to the other. All organotherapy should consider the interaction of the various glands.

In the sexual glands substances rich in nu¬ cleins and phosphorus are present. Many of these have received names, but few have been isolated in sufficiently pure form to be useful in therapeutics. Those that are now avail¬ able stimulate metabolism, and some are of value for counteracting the undesirable effects of the removal of some one of the organs of generation, as in castration or in ovariotomy. Consult Jelliffe and White, < Diseases of the

Nervous System > (3d ed., 1919). See Poly¬ glandular Endocrinopathies.

Smith Ely Jelliffe, M.D., Editor of (Nervous and Mental Monograph

Series P

ORGANZINE. See Silk and Silk In¬ dustry.

ORGAOS, Serra dos, sar'ra dosh or- gownsh', or ORGAN MOUNTAINS, Brazil, a portion of the Serra do Mar cordillera, 40 miles northeast of the city of Rio de Janeiro, so called from their resemblance to the pipes of a church organ, as viewed from the sea. The highest peak is 6,500 feet.

ORGAZ, or'gas, Francisco, Cuban poet: b. Havana, Cuba, 1815; d. Madrid, Spain, 1873. He was educated in Havana, entered journal¬ ism and in 1839 went to Madrid where he took up his residence. His first volume of poetry, (Preludios del Arpa> (1841), won for him rec¬ ognition as one of the best lyrical poets of Span- ish-America; he also wrote two dramas and several historical works besides a second vol¬ ume of verse (Las Tropicales) (1850).

ORGETORIX, or-jet‘6-riks, Helvetian chief : d. about 62 b.c. He was a man of vast wealth and power and intrigued to gain sov¬ ereign power, endeavoring to persuade the Helvetii to emigrate to Gaul. His designs were suspected and he was brought to trial, but died, supposedly by his own hand, before a decision was rendered. Consult Caesar’s Commenta¬ ries,) Book I, and (Dio Cassius, > xxviii, 31.

ORGIES, or’jis, or ORGIA. See Bacchus.

ORIANA. (1) The mistress of Amadis de Gaul, the legendary hero of mediaeval chivalry. According to romance she was the daughter of Lisuarte, the English monarch. Queen Eliza¬ beth was often styled (

acter in Beaumont and Fletcher’s play, (1607). (4) The title of a

poem by Tennyson in which the name is intro¬ duced as a constant refrain (1830).

ORIANA, The Triumphs of, the title of a

book of madrigals composed in honor of Queen Elizabeth, which Thomas Morley compiled and printed in 1601.

ORIANI, o-re-a’ne, Barnaba, Italian as¬ tronomer: b. Garegnano, Italy, 1752; d. 12 Nov. 1832. He was ordained to the priesthood, studied astronomy under Lagrange, assisted Reggio and De Cesaris in measuring the arc of the meridian, and his calculations proved Ceres, which Piazzi discovered in 1801, to be a planet, not a comet as Piazzi had supposed. He was director assistant in Brera Observatory at Milan in 1802 and was editor of the (Effemeridi As¬ tronomic!ˆ in 1778-1830. He was created a count by Napoleon and published (Tables of Uranus) (1785) ; (Spherical Trigonometry) (1806), etc.

ORIBASIUS, or-i-ba’shi-us, Greek phy¬ sician to the Emperor Julian the Apostate: b. Pergamon (or Sardis) about 325 a.d. ; d. about 400. He studied in Cyprus under Zeno, became attached to Julian during the Oriental exile of the latter, accompanied him to Gaul, and,

after his accession in 361, was appointed quaes- tor of Constantinople. But after Julian’s death, when the Christians again obtained the upper hand, he was banished among the Danubian barbarians. He was recalled during his last years. Oribasius is reputed the first to describe the salivary glands.

Under Julian's direction he summarized the medical lore of the day. A Latin version of the 6th century has been edited by Bussemaker, Daremberg and Molinier.

ORIEL COLLEGE, Oxford, England, founded in 1326 by Edward II on the sugges¬ tion of Adam de Brome, his almoner, for a provost and 10 fellows, and first named the College of Saint Mary, derived its present title from La Oriole, the name of a house presented by Edward III, into which it moved two years later. The buildings of Oriel College are among the finest in Oxford. The college now consists of a provost, 12 fellows and two pro¬ fessorial fellowrs and has 12 scholarships, ten¬ able for five years and four exhibitions tenable till the end of the 20th term from matricu¬ lation. The value of each of these scholar¬ ships and exhibitions (during residence) is £80 per annum. Candidates for the exhibitions must be deserving persons in need of support at the university. No one is eligible to a scholarship who has attained the age of 20 years or who, being a member of the uni¬ versity, has passed two years since matricula¬ tion. The college has presentations to 15 liv¬ ings. Among its distinguished alumni are Mat¬ thew Arnold, Barclay, Butler, Clough, Hamp¬ den, Thomas Hughes, Langland, Prynne, Sir Walter Raleigh, Cecil Rhodes, Wilberforce, etc., and several leaders of the Tractarian move¬ ment, Arnold, Keble, Newman, Pusey and Whately.

ORIEL WINDOW, a bay window of an upper story supported by brackets or corbels. In some cases the support is derived from a pier or engaged column carried from the ground with the upper part corbeled out to meet the

Oriel Window, Balliol College, Oxford.

floor of the projecting window. Formerly no distinction was made between this and a bay window which rose from the ground.

In France and England the oriel window is a feature of late Gothic and early Renaissance architecture, both in civic and domestic build¬ ings. It is a favorite characteristic of Ger¬ man architecture where, placed at the angle of a building, it is sometimes carried up through

two or three floors and covered with a roof. It began to appear in the earlier Middle Ages and by the 15th century was in general use, chiefly above entrance gateways. Many fine reproductions of oriel windows appear in the modern American architecture of collegiate institutions and civic buildings. The word probably signifies "gilded porch® and originally was applied to the altar recess of a small oratory or chapel.

ORIENTAL REGION, one of the primary

divisions of the earth considered with refer¬ ence to its fauna; a zoogeographical province. It embraces the whole of southeastern Asia south of the Himalayan watershed, from Belu- chistan to the Philippines and including all the Malayan archipelago as far as Celebes. It is separated from the Australian region by "Wal¬ lace's Line.® See Zoogeography.

ORIENTAL RESEARCH, the investiga¬ tion and interpretation of ancient remains in the Near East.

Egypt. — Modern Oriental research com¬ mences with the expedition of Napoleon Bona¬ parte to Egypt in the summer of 1789. This expedition was accompanied by scientists and artists, who published the results of their ob¬ servations in a great work entitled description de l'Egypte) (1809-13). The antiquities col¬ lected by that expedition became the property of the conquering British and formed the foundation of the Egyptian collections in the British Museum. Among these was the famous Rosetta Stone. This monument, which became the key to the interpretation of all Egyptian literature and civilization, was a slab of black granite containing a portion of a decree in honor of Ptolemy V. Epiphanes, 205-181 b.c., written in ancient Egyptian hieroglyphics, the more modern Egyptian demotic script and Greek. By means of this trilingual inscription the Egyptian script was deciphered somewhat by Young in England and completely by Cnam- pollion in France, in the years 1821-32 or at least a comprehension of that script was es¬ tablished by their efforts, although scientific accuracy was not attained until more than 60 years later, principally through the labors of Brugsch, Erman and Maspero. The decipher¬ ment of the Rosetta Stone led to a desire to obtain more inscriptions, and in 1828-29, a Franco-Italian expedition was sent out, headed by Champollion and Rosellini, to examine the most important ruins of Egypt and copy pictures and inscriptions, the results of which were published both by Paris and Turin. In 1842-45 the Prussian government sent out a similar expedition under Lepsius, which explored the whole region of the monuments from the Sudan to Sinai and the Syrian coast, bringing back casts, drawings, maps, plans and (a new in¬ vention) squeezes of inscriptions, together with a considerable amount of antiquities and papyri. This expedition, the results of which were pub¬ lished in 12. great volumes in 1859, placed the study of Egyptian art and civilization on a permanent and scientific basis.

The period of excavation commenced in 1850, with the mission of a French scholar, August Mariette. The first and greatest of his discoveries was the Serapeum or tombs of the sacred Apis bulls at Memphis, 64 in all, the erection of which extended through the period

from 1300 to 50 b.c. In 1858 the khedive ap¬ pointed Mariette conservator of Egyptian monu¬ ments, with authority to conduct excavations where he would in Egyptian territory, and es¬ tablished at Cairo the Bulak Museum. From this time until his death in 1881 Mariette exer¬ cised the exclusive privilege of excavation in Egypt. His explorations were enormous in extent, including all the well-known ruins, and more of the great discoveries of Egyptology were made by him than by any other man. No systematic report of his excavations, as such, has ever been published. He was con¬ cerned principally in the discovery and recovery of antiquities, a method of excavation which inevitably results in the destruction of a great amount of material archaeoloeically valuable, and his publications concern themselves with the antiquities discovered, not with the method of their discovery.

Mariette was succeeded by his pupil, Gaston Maspero (1881-86, 1899-1916), who instituted a careful system of protection and preservation of antiquities and ruins and constructed a large new museum (1902) to contain the magnificent collection of portable objects which resulted from the numerous excavations now conducted, notably at Deirel Bahri and Karnay. Revising the policy of his predecessor Maspero not only himself conducted excavations systematically at numerous sites on behalf of the Egyptian Museum, but also extended the privilege of ex¬ cavation on liberal terms, but under careful scientific supervision, to foreign museums, so¬ cieties and individuals. Taking advantage of this change of policy the Egypt Exploration Fund was organized in 1881, supported by money collected in almost equal parts in England and America, with the direction in the hands of the English contributors, and from that time to this the fund has continued a series of excava¬ tions, dividing its share of the finds between English and American museums and institu¬ tions. This organization was supplemented later (1896) by Petrie's Research Account, also Anglo-American, out of which developed the British School of Archaeology in Egypt (1905). The French established on a lavish scale the Mission Archeologique Frangaise au Caire (1881), reorganized later (1901) as the Institut Frangais d'Archeologie Orientale au Caire. The Germans officially established the German In¬ stitute of Archaeology and attached its chief archaeologist to the German general consulate at Cairo. Later, in 1899, the Orient Gesellschaft was formed, somewhat on the principle of the Egypt Exploration Fund, except that its field was the Near East in general and not Egypt only. Excavations have been conducted not only by these agencies, but further by various museums and institutions, such as the Liverpool and British museums in England, the Metro¬ politan,

Boston and Pennsylvania museums and Harvard and California universities in this country and by numerous authorities and private individuals here and in England, France, Ger¬ many, Italy and Austria continuously from 1883 or thereabouts until the present day, the Ameri¬ cans even continuing their work throughout the World War.

The objects found in these excavations are almost incredibly numerous. Besides the magnifi¬ cent collections in the museum at Cairo, there are to-day important collections of Egyptian antiqui¬

ties in the British Museum, the Louvre, Berlin, Turin (here is the famous Papyrus Prisse), New York, Philadelphia and Boston, with smaller but important collections elsewhere too numerous to mention. Besides the monu¬ ments and papyri belonging to those periods which we commonly call Egyptian, written in Egyptian characters, there have been found, mainly in the Fayum, vast quantities of papyrus fragments, containing parts of Greek manu¬ scripts. Among these have been discovered sev¬ eral lost works, such as Aristotle's Constitu¬ tion of Athens, > plays of Menander, poems of Sappho, Pindar, Bachyllides and others less famous. Some of the classical fragments con¬ tain important new readings in Homer, Herod¬ otus, Xenophon, Sophocles, etc. Other frag¬ ments, sayings of Jesus and various heretical gospels, apocalypses and the like possess theological value. Immense quantities of let¬ ters, deeds and documents of various descrip¬ tions, written on fragments of papyrus or on potsherds, have revealed with photographic minuteness the every-day life of the people of the Fayum district in the centuries immediately preceding and succeeding our era and in doing so have thrown a perfect flood of light on Graeco-Roman government and civilization in the Eastern Mediterranean in that most im¬ portant period which saw the origins of Christi¬ anity. These discoveries may be said to have revealed the so-called koine or common, popu¬ lar Greek of the Hellenistic period, and pro¬ foundly modified if not revolutionized the linguistic study of the Septuagint and the New Testament. Apparently, moreover, we are still only at the beginning of these discoveries, for millions of papyri still remain unstudied in the hands of museums and private collectors and more are constantly being discovered.

Explorations and excavations in Egypt have also thrown welcome sidelights on certain points of world history. Discoveries of zEgean pot¬ tery have enabled scholars to date with con¬ siderable accuracy the Minoan civilization of Crete. The discovery of cuneiform tablets at Tel el Amarna in 1888 threw much light on the conditions in hither Asia and especially in Palestine in the pre-Israelite period of the 14th century b.c., and the discovery of the records and documents of a Jewish colony at Ele¬ phantine (Jeb) in upper Egypt has both modi¬ fied somewhat formerly existing views regard¬ ing the religion and the history of the Jews at and

immediately after the Exile and also furnished scholars with most valuable material for the study of the western Aramaic dialect, in which about one-half of the biblical books of Daniel and Ezra are written. Following Egyptian civilization, Egyptian exploration, particularly in latter years, has extended itself southward to Nubia and the Egyptian Sudan, the ancient Ethiopia, increasing greatly our knowledge of the past history, political, re¬ ligious and ethnological of that region and its interrelations with Egypt and the civilized world, and incidentally furnishing scholars with a mass of inscriptions (the so-called Meroitic, from Meroe, excavated by Budge in 1902 and Gar- stang and others since 1910) in a script and language as yet undeciphered. Sinai, also, has been included in the field of Egyptian research, and more particularly the explorations of Flinders Petrie have collected considerable

material and given us valuable information touching Egyptian history and Egyptian mining and metallurgy in that region from the time of the Old Empire onward and also have thrown some light on the inter-relations of Egypt and Asia. Of late, furthermore, attention has been paid by explorers to the collection and study of the Christian (Coptic) and Moslem remains with which Egypt abounds, but which earlier explorers and scholars had overlooked or disre¬ garded.

The object of modern explorers and ex¬ cavations, however, has not been, like those of Mariette, merely or primarily the collection of objects. Beginning with Petrie's excavation of Tanis in 1883 archaeology has been pursued as a science, excavation has been directed toward the collection and interpretation of all the in¬ formation to be obtained bearing on the his¬ tory and nature of the site explored, the loca¬ tion of each object found, in relation to all its surroundings, the careful observation of strata marking eras and periods and an exact plotting, mapping and photographing of the work stratum by stratum. The most distin¬ guished and successful of these scientific ex¬ plorers, to mention very few out of many, have been Flinders Petrie, Naville, Griffith, deMor- gan (for a time director of antiquities), Reis- ner, Borchardt, Davis, Garstang and Grenfell and Hunt, to whom is due particularly the discovery and decipherment of the vast papyrus hoards. Scientific exploration has also resulted in the preservation in situ and the careful pro¬ tection of ancient remains, temples, tombs, palaces and in some places whole towns, so that there is no part of the world where the trav¬ eler can so readily visualize the past as in Egypt. Even where great modern improvements have required a destruction of antiquities, like the flooding of a section of the country by

the huge Nile barrage at Assuan, the region affected has first been carefully explored, exerything which could be removed excavated and removed and what must be lost studied and exactly plotted and pictured.

In no other country have such extensive excavations been conducted as in Egypt, and in no other country have so large remains of antiquity been discovered, extending over so long a period. Egypt has preserved for us the most continuous record of the existence of man on the earth and his development, and Egyptian research has furnished the most complete and typical cross section of the history of the human race. Remains of palaeolithic man have been discovered in deep borings in the Nile Valley, giving evidence of the occupancy of the country in pre-historic, geological periods, a hundred or a few hundred thousand years b.c. Later strata show the development from palaeolithic to neolithic occupancy. What we may call civilized occupancy begins perhaps about 7000 b.c. At that time Egypt was peo¬ pled by a race somewhat different in type from the classical Egyptian, burying its dead with the body doubled up and the head and hands not infrequently severed from the body. They knew how to make bricks and they built towns, in part at least of brick. They wove linen and dressed leather for clothing; they made pottery of a great variety of forms and of extremely artistic shapes by hand, not being acquainted with the use of the potter's wheel, and by hand

also they cut stone vases of perfect form out of the hardest rock. They knew, furthermore, how to make a glaze both ior this pottery and for their rock carvings. In the latter times they were acquainted with the use of copper, but their tools and weapons were still com¬ monly made of flint, and their flint knives arid lance-heads were finished more admirably than those found anywhere else in the world.*

These people gave way at a still very early date to another people with a higher civiliza¬ tion, which we call the Egyptian, a composite race connected with the Semites of the East, the Libyans to the West, and the Cushites, com¬ prising such tribes of modern times as the Galla and the Somali, to the south and south¬ west. Gradually the small states of upper Egypt were united in one kingdom and those of lower Egypt in another kingdom. The earliest exact day of which we possess a record comes from the northern kingdom, the kingdom of the Delta. In 4241 b.c. a solar calendar of 365 days was adopted ; the same, with slight modifications, which has been handed down from that time to our present. Late Egyptian tradition tells of a dynasty of gods in lower Egypt and a dynasty of demigods in upper Egypt before we come to the first of the 31 dynasties of men, that is to sober, human his¬ tory. But until very recently the beginnings even of the dynastic period were commonly regarded as mythical. Recent excavations at and about Abydos, however, have revealed a number of tombs of the very first dynasty, in¬ cluding that of the founder, Menes, himself, and we now commence recorded Egyptian his¬ tory proper, in accordance with ancient tradi¬ tion, with the first dynasty, about 3400 b.c. At that time Egypt was already united in one great empire, including both the southern and the northern kingdoms, but evidently a long political history lay behind this union. The Egyptian religion, as we know it from the records and monuments of that time, also evinces a long period of development ; and while the early hieroglyphic writings of which we have now obtained abundant remains are rude and very different from the hieroglyphics of later times, they likewise show a long period of previous development. Progress, very slow up to this period, now becomes amazingly rapid. With the third Egyptian dynasty, a little before 3000 b.c., having its headquarters at Memphis, we come to the true copper age. Men had found proper instruments with which to cut stone ; and the first buildings of hewn stone appear .at this time. A century and a half later, about 2900 b.c., we are in the midst of the pyramid age, 3000-2500 b.c. So rapidly had architecture and the arts of sculpture and painting connected with it developed, that, while the first stone building was built not much before 3000 b.c., the period of the 5th dynasty (ca. 2750-2625) marks the zenith of Egyptian art, no structures of a later date equaling those 'of this period, while its sculptures and wall paintings are un¬ surpassed by those of any later time. In gen¬ eral the Egyptian of this early

period had al¬ ready reached that condition of luxury, effem¬ inacy and exclusivism which seems to us such a characteristic feature of Egyptian civilization, and which, in striking contrast with the civili¬ zations of Babylonia, Greece and Rome, pre¬ vented Egyptian civilization, in spite of the high

standard it attained within itself, from exerting any proportionally important influence on the development of the civilization of the world, ine object of the Egyptians was to shut them¬ selves out from the barbarism, uncleanness and angers of the outer world, which outer world threatened them particularly from the side of Asia, from which side, as we have already seen, there had been already before this time irrup¬ tions. They built a wall to protect themselves from invasion by the Semites on the northeast, and beyond this wall they con¬ cerned themselves only with the Sinaitic peninsula, which they controlled for the purpose of mining copper, turquoise and malachite. There was of necessity, it is true, some sort of intercourse for purposes of com¬ merce with the peoples of Asia, and objects found in the tombs of the early empire show contact with still more distant regions, but such commerce was conducted by middlemen, foreigners, who visited Egypt, not by Egyptians who visited foreign lands. Only toward the end of the 6th dynasty (ca. 2625—2475 b.c.) was a somewhat more aggressive disposition shown. Egypt was spreading southward, and military expeditions were also conducted beyond Sinai; but these seem to have been due to an unrest then prevailing in the Asiatic world, and result¬ ing aggression from that side. The results of that aggression seem to have been some sort of catastrophe, for immediately following the 6th dynasty ensues a long period of compara¬ tive darkness, due apparently to invasion from without and the temporary eclipse of the Egyp¬ tian state.

With the 11th dynasty comes a period of restoration of prosperity and power in Egypt, reaching its climax in the 12th dynasty, and ex¬ tending altogether over a period of almost 400 years, concluding in the first part of the 18th century before Christ, the period of the middle kingdom. This was considered by the Egyp¬ tians of a later period, not without justice, as the greatest of all the periods of Egyptian his¬ tory. It was not a time of conquest. Possibly the old frontier was extended somewhat to the south, chiefly for the sake of the gold mines in Nubia. The copper and malachite mines of the peninsula of Sinai were also reclaimed, but further than this no conquests were undertaken in Asia. It was rather a period of internal development; a period in many ways like the mediaeval period in Europe,

the period of feudal development. Above all it was a period of literature, the golden age, to which all suc¬ ceeding ages looked back. Poetry and romance flourished, and much of the literature contained in the papyri of later times consists of copies from compositions of this period. Egypt now also had somewhat more communication with the outside world than under the early king¬ dom. We find records of travel and notices of commercial and political couriers, who travel with <(bricks in their bosoms® into barbarous and unclean lands.

In the early part of the 18th century came another catastrophe; the Hyksos invasion and conquest. A movement of the nations far away to the north and northeast brought into Asia Minor and Mesopotamia peoples from Europe, Sycthia or central Asia, who possessed horses. The effects of the displacements thus caused were pressure on the Egyptian front, which

gave way, and in part that collapse was due to the possession and use in war of the horse, which had been introduced, and passed on to the Hyksos by the northern invaders.

From about 1788 to 1580 b.c., during the time while the land was in possession of these foreign and barbarous peoples, Egyptian his¬ tory is an almost complete blank. With the 18th and 19th dynasties, approximately 1580— 1205 b.c., the country entered upon a new period of prosperity, during which its relation to the outside world was very different from that of the past. The struggle with the Hyksos and their final expulsion made Egypt for the time being a warrior nation. Her Pharaohs not only drove out the Hvksos, but followed them into Asia, conquered all Syria up to the Taurus Mountains, and even conducted campaigns across the Euphrates into the land of the Mi¬ te1111! in Mesopotamia. This resulted necessarily in close intercourse with the kingdoms and principalities of Asia Minor, Assyria and Baby¬ lonia, and the correspondence of the monarchs of this period with foreign potentates and with the subject rulers in Syria, the records of ex¬ peditions, treaties and the like possess a new kind of interest, in that they present a view of world history. We meet the peoples of Cyprus and Crete, the Hittites of Asia Minor, the Mit- anni of Mesopotamia, the Babylonians and As¬ syrians, and numerous kings of petty states throughout Palestine and Syria. We read of elephant hunts near Aleppo, and obtain glimpses of forests where none now exist. It was a nervous, restless era, and the period of an ap¬ parently brilliant but really flashy and preten¬ tious development. It was a time of tension, one great struggle, in which Egypt, at first successful, extending her sway as far as the mountains of Asia Minor and the Euphrates, finally found herself battling for life against new forces pressing on her from the north and east. Her first great opponents were the Hittites, but with and following these came hordes of people driven out of their homes in Asia Minor, the H

£erean Islands and further westward by pressure from behind, descending by land and sea on Syria and Palestine, and al¬ most forcing entrance into Egypt herself, while at the same time other hordes pressed in from the east, until all her Asiatic possessions were overrun and wrested from her. As it was a period of political unrest, so it was a period of religious unrest, and that religious unrest helped to precipitate the political catastrophe, namely, the reformation of Amenhotep IV, or Akhenaten, who built his new capital at Amarna, and the counter reformation which re¬ stored the supremacy of Thebes and its priest¬ hood, and established hierocracy in Egypt.

From the beginning of the 11th century on¬ ward Egyptian history, so far as political power and mental and moral development are con¬ cerned, is in general a history of decadence and retrogression. Such revivals of power and activity as occur henceforth are due to con¬ quests from without and the establishment of foreign dynasties. Libyans and Ethiopians struggle for the mastery, and occasionally Pharaohs of these foreign dynasties intervene in Asiatic politics. Then comes the period of Asia's conquest of Egypt. The Ethiopians are driven southward to Meroe, and first the As¬ syrians, and then, after a brief intermission

under Libyan dynasts, the Persians conquer and annex Egypt to the great Asiatic empires of the East. Next follows the Empire of Alex¬ ander, and the brilliant Graeco-Egyptian period of the Ptolemies ; then Roman rule, with its abundant prosperity and high culture. But Egypt is no longer Egyptian; her rulers, her literature, her culture are alike foreign. Then comes the Arabic conquest, when even the rem¬ nants of the ancient language disappear; and so it is as a Moslem Arab province that Egypt passes under Turkish rule, and ultimately under the English protectorate. All these periods have been enlightened bv Egyptian research.

Assyria and Babylonia. — Assyrio-Baby- lonian research may be said to begin with the tentative excavations of Rich at Babylon in 1811. Others before that date had identified the ruin mounds of Babylon and Nineveh, and copies of Babylonian and Persian cuneiform in¬ scriptions had already made their way to Europe, but Rich made the first serious survey of the mounds of Babylon. In 1820 he made a similar exploration in the ruin mounds of Nineveh and Calah. The inscriptions secured by him at these sites formed a nucleus for the later great Assyrian and Babylonian collections in the British Museum.

More than 20 years elapsed after Rich's death before any systematic

excavations were undertaken. Then through the influence partly of Julius Mohl, one of the secretaries of the Societe Asiatique, who had seen in London the inscribed' material gathered by Rich in Assyria and Babylonia, the French government was in¬ duced to create, for purposes of investigation, a vice-consulate at Mosul, nearly opposite Nine¬ veh, and Paul Emil Botta was sent out to fill this position. After some rather unsuccessful excavations at Kuyunjik, on the site of ancient Nineveh, Botta was led by the reports of the natives to undertake excavations at Khorsabad, 20 miles to the northeast. Excavations were conducted at this site by Botta from March of 1843 to October of 1844, and by his successor, Victor Place, from 1851 to 1855, at the expense of the French government, which also published the results in monumental form. These results were the systematic and scientific excavation of a palace of Sargon, king of Assyria, 721-705 b.c., which was adorned with a large number of magnificent bas-reliefs and other works of art. The French expedition also discovered a considerable number of inscriptions in the cuneiform script on stone and clay. .

Shortly after Botta commenced his work of excavation, Austen Henry Layard visited Mosul on his return from Persia to Constantinople. His enthusiastic report secured for him a small sum of money from Lord Stratford de Red- cliffe, the British Ambassador, with which he returned to Mosul in the autumn of 1845 and commenced excavations on a very small scale at the mounds of Nimroud, on the banks of the Tigris, a few miles below Mosul, the remains of the one time Assyrian capital city of Calah. With very limited resources, but with remark¬ able success in the discovery of sculptures, bas- reliefs, inscriptions and the like, Layard con¬ tinued to excavate at Nimroud, Kalah Shergat, the most ancient capital of Assyria, still further to the southward, and at Kuyuniik (Nineveh), until midsummer 1847. In 1849 he was again sent out to Assyria and for almost three years

conducted excavations for the British Museum at the sites already mentioned, making one brief and unsatisfactory expedition to Babylonia. The wonderful success which Layard achieved in monumental results, and possibly still more the remarkable ability with which he presented these results in graphic form, connecting them also with the Bible story, aroused an interest which has continued to the present day, and which will forever make the name of Layard illustrious in connection with Assyrian explora¬ tion. . Tr1

In 1851, while Place was excavating at Khor¬ sabad, an admirably equipped expedition, sent out by the French government under the direc¬ tion of M. Fulgence Fresnel, was exploring Babylonia and conducting tentative excavations at various sites in that region. The material results of this expedition were, unfortunately, lost by the overturning of a raft on the

River Tigris. At the same time the attention of the English was called to Babylonia by the work of Loftus, who, sent out as an attache of the Turco-Persian Frontier Commission, took oc¬ casion to explore Babylonia and conduct some small excavations at Warka (Erech). The Assyrian Excavation Fund was organized in 1852, and, under the general direction of Sir Henry Rawlinson, excavations were carried on by Loftus, Taylor and Rawlinson himself at various sites in Babylonia, including Erech, Ur, Eridu, Larsa and Borsippa, the sister city of Babylon, and by Hormuzd Rassam at Nineveh. None of th se explorers undertook the scien¬ tific excavation of sites, but rather sought to recover inscribed material, which, in the form of clay tablets and cylinders, they found in large quantities, especially Rassam, who, with¬ out knowing it, excavated a large part of tne library of the Assyrian king, Ashurbanipal

(668-626).

From 1855 to 1872 there was a long period of inactivity, so far as excavationˆ were con¬ cerned, the attention of scholars 'being directed to the study of the numerous inscriptions which had been brought back to England and France, the key to the decipherment of which had just been discovered. As in the case of the Egyp¬ tian inscriptions, so here, it was a trilingual in¬ scription which furnished the clue to the de¬ cipherment. As early as the commencement of the 19th century various scholars had essayed to read the cuneiform inscriptions brought back from Persepolis and elsewhere, and dif¬ ferent scholars succeeded at various times in deciphering a few characters, but not in read¬ ing an inscription. On the face of a cliff, in a huge space especially prepared for the pur¬ pose, its lowest part some 300 feet above the ground, in the mountain pass at Behistun in Persia, Darius, so tradition said, had caused a long inscription to be engraved. Of this in¬ scription Sir Henry Rawlinson on various oc¬ casions, between the years 1835 and 1839, at considerable expense and much bisk of life and limb, succeeded in obtaining complete copies. It was clearly written in three languages, but what the languages were was unknown. Raw- linson assumed that the first was Persian, similar to the language of the Avesta. It was not until 1846 that he was able to complete and publish the decipherment of the Persian cuneiform text. The Persian cuneiform proved to be syllabic, an adaptation, vastly simplified,

-ˆe .comPlex Semitic Babylonian of the t iid inscription. This, the most important text for students of Assyriology, Rawlinson did not

veaˆens?ndeCTPi,henng U fiv-e .more weary >ears UoM). lhe second inscription, the neo-

nS,1QmteXivWaJSnot,satisfactoriIy deciphered un¬ til 1SVU. lhe decipherment of these inscriptions was naturally an epoch-making event, and for this as well as for the great service which he rendered in publication (he was the general • editor of the Cuneiform Inscriptions of West¬ ern Asia, published by the British Museum), Kawlinson s name stands deservedly at the head of the honor list of Assyriology.

George Smith, then an employee in the British Museum, discovered among +he frag¬ ments of clay tablets brought by Rassam from Nineveh, an Assyrio-Babylonian flood legend, strikingly similar in many respects to the flood story of the Hebrew scriptures. The publica¬ tion of this story aroused such interest that the Daily Telegraph of London at once put at the disposal of the British Museum a thousand guineas to send Smith to Kuyunjik to search for more fragments. This expedition opened a new era of excavation. In the following year Smith was again sent to Kuyunjik bv the Brit- lsh Museum. In 1875 he was sent out for the third time, but died, without accomplishing any¬ thing, in 1876. Rassam then consented to take up once piore the work of excavation for the British Museum. Besides excavating at Nine- veh and Calah, he explored in this campaign (1877-82) the hitherto unknown Assyrian site of Balawat, where he found great bronze doors with inscriptions and reliefs of Shalmaneser II, 859-826 b.c. He also conducted excavations at a number of Babylonian sites, Borsippa, Cutha, Sippara and others, from which he secured an almost incredible number of inscribed clay tab¬ lets. His work was conducted, like that of the English explorers in general, for the purpose of obtaining inscriptions, with no attempt at a complete and scientific excavation of the sites explored.

At the same time that Rassam resumed his work of excavation, DeSarzec was appointed French consul at Basra, in southern Babylonia. Led by. reports of the natives, he commenced excavations at some ruin mounds in that region, known as Tello, where he found a quantity of statues dating from the third millennium b.c., executed with remarkable skill in hard diorite and covered for 'the most part by inscriptions in cuneiform characters, the first monuments of art discovered on the soil of Babylonia. These monuments were purchased at once by the French government for the Louvre Museum, and DeSarzec commenced a systematic explora¬ tion of Tello, the ancient Lagash, which he conducted at intervals until the time of his death in 1903, when he was succeeded by Cap¬ tain Gros. The result of these excavations has

been the discovery of an enormous quantity of inscribed clay tablets

belonging to a most re¬ mote period, as well as statues, inscribed bronze and silver figures, vases and other objects, showing a remarkable development of art in that region at an extremely earlv period. These results have been magnificently pub¬ lished in monumental form.

American interest in Babylonian exploration dates from the year 1884, when an expedition headed by Dr. William Hayes Ward, called

the Wolfe Expedition, from the fact that the funds were provided by the liberality of Miss Catherine Lorillard Wolfe, of New York, was sent out, under the auspices of the Archae¬ ological Institute of America, to examine ruin sites in ancient Babylonia and report on the prospects, scientific and practical, of excavations m that region. . In 1887 a somewhat similar Ueiman expedition was sent out, which con¬ ducted tentative excavations in two burial mounds, Hibba and Surghul, in southern Baby¬ lonia. Both of these expeditions reported favorably on Nuffar, the site of the ancient Nippur, as a place for excavation. In 1888 the DU'/j0n'aiˆ Exploration Fund was organized in I hiladelphia and an expedition was sent out under the auspices of the University of Penn- svlvania, with the present writer as director. The site selected for excavation was Nippur, where systematic explorations were conducted under Peters, Haynes and Hilprecht intermit¬ tently until 1900. The main work of the ex¬ cavation at Nippur was directed toward the great Temple of Bel, the chief religious centre of that region from a period long antedating 4000 b.c. Some 40,000 or more inscriptions, clay tablets and fragments of clay tablets, stone monuments and the like were recovered, and our knowledge of the history and civilization of Babylonia was carried back 2,000 years or more. The texts of these tablets are being published by the University of Pennsylvania in a noble series of volumes, but the real work of interpretation has scarcely yet begun.

The success of the Americans in securing remains of such great antiquity aroused fresh interest everywhere. The English resumed for a brief time their abandoned work at Nineveh, and they, and even the Turks, conducted some unimportant excavations in Babylonia. The French excavations at Tello, then lying dor¬ mant, were resumed, and finally, in 1897, a new expedition of investigation was sent out by the Germans. In 1899 the German ((Orient Ge- sellschaft® was organized, and excavations com¬ menced at Babylon under the direction of Dr. Koldewey, a member of the former German expedition to Hibba and Surghul, which ex¬ cavations continued until the war. The French excavations at Khorsabad were scientific, the English excavations in Assyria and Babylonia and the French excavations at Tello were very successful antiquity hunts. The American ex¬ cavations at Nippur were semi-scientific, but lacked equipment and training to make them entirely so. The German excavations at Baby¬ lon

were thoroughly scientific, and although the explorers found no such relics of great antiquity as the French and Americans (for, owing to the thoroughness of Sennacherib's destruction, the Babylon unearthed by the Ger¬ mans is relatively modern, practically the work of Nebuchadnezzar), nor such great masses of inscribed objects as were found by the English, French and Americans, they have given us a knowledge of the construction of Babylonian temples, palaces, streets and dwellings such as none of the others have given. Further the Germans introduced the plan of publishing sys¬ tematically, at short intervals, reports of prog¬ ress, Mittheilungen, in addition to the fuller scientific publications issued at the close of the whole work. As a result scholars have been able to follow and in a way co-operate in

their work. In 1903, under Dr. Andrae, they commenced a similar excavation of Kalah Shergat, on the Tigris, the ancient Ashur, the original capital and home of the Assyrians, which was continued until 1914 with results which have considerably changed our ideas of early Assyrian history. The earliest temple of Ishtar at this site dates from the close of the third millennium, but below this were still archaic Sumerian remains. The early city was destroyed by fire by conquerors supposed to belong to the Mitanni-Hi'ttite movements, and then out of the composite of these peoples with Semites and Sumerians grew the new Semitic state and religion of Assyria. Like the excavations of Babylon the excavations at Ashur have thrown much new light on town and temple building, on sepulture and the like. The Germans also conducted some slight ex¬ cavations at Fara (Shurippak) in southern Babylonia, and just as the war broke out they, were commencing the great undertaking of a thorough and scientific exploration of the mounds of Warka, the ancient Erech. Un¬ fortunately, while extremely scientific, the Ger¬ man exploration of Babylonia and Assyria has been also political, a part of their elaborate system of controlling the country, and hence since 1900 they have thrown obstacles in the way of all other explorations but their own.

The interest aroused in America by the suc¬ cess of the work at Nippur led to the organiza¬ tion in 1900 of the Ur Expedition, through the energy and enthusiasm of Dr. E. J. Banks, and permission was applied for to excavate Mug- heir, the traditional Ur of the Chaldees. For three years this permission was held up by the Turkish government, under the influences just indicated, although during that period similar permission to excavate at various Babylonian sites was freely granted to the Germans. At last in 1903 the Ur Expedition was disbanded. Just at that moment the despatch

of American ships to Beirut led to the unexpected issuance of the firman which had been so long delayed. Simultaneously a new organization was formed, called the ((Oriental Exploration Fund of the University of Chicago,® which accepted the fir¬ man issued on behalf of the Ur Expedition, and in the winter of 1903-04 excavations were conducted by this organization, under the direc¬ tion of Dr. Edgar J. Banks, at Bismaya, the site of the ancient Adab, not far from Nippur, an important city, hitherto quite unknown; presumably in this like many more of the almost countless sites which dot the great Babv- lonian plain.

Besides these legitimate excavations there has been also a vast amount of destructive dig¬ ging in Babylonia. From an early period old cities were used as quarries from which to obtain the material for new ones. So Seleucia, Ctesiphon and Bagdad were built largely out of bricks from Babylon. To this industrial exploitation of ancient remains has been added in the last half century the illicit excavations of natives in search of inscriptions to be sold to foreign museums and collectors. Hundreds of thousands of inscribed clay tablets have been excavated in this manner, and probably as many more destroyed, in addition to the incalculable loss of other objects. Many sites have been absolutely riddled, so that no future scientific excavation can make them tell their story. The

feeble efforts of the Turkish antiquities service have been quite unable to check this destruc¬ tion, and unfortunately foreign museums, and especially the British, instead of combining to stop these illicit excavations, have encouraged them, because they furnished objects for their collections. Fortunately the number of ruin mounds in Babylonia is almost countless. There everything was built of clay, and even monu¬ ments of stone are few. Only in Assyria the palaces and temples were frequently faced with stone, stone monuments were freely used, and the rooms of temples and palaces were often wainscoted with slabs of stone carved in bas- relief. Only the British Museum and the Louvre possess fine collections of these stone monuments; but collections of clay tablets from Assyria and Babylonia numbering hundreds of thousands are scattered among many museums, notably London, Paris, Berlin, Constantinople and Philadelphia, and private collections too numerous to mention.

Persia. — Research in Persia is closely con¬ nected with research in Babylonia, and it was indeed through the decipherment of the cunei¬ form inscriptions found at Behistun in Persia, on the road from Bagdad to Hamadau, that the key to the decipherment of the Babylonian inscriptions was discovered. Rich visited and described Persepolis as well as Babylon and Nineveh, and other early explorers copied in¬ scriptions there and elsewhere in Persia; but no excavations were conducted until 1851. These first excavations at the site of Susa, conducted bv the English explorer,

Loftus, and Colonel Williams, head of the Turco-Persian Frontier Commission, were, however, of very small extent. Thirty years later M. and Mme. Dieulafoy conducted excavations of a more extensive character at the same place, enriching the Louvre Museum in Paris with very many beautiful colored tiles, and published an ac¬ count of their discoveries, a large work in many volumes, and a briefer and more popular work, (L'Acropole de Susa) (1890) ; but even these excavations were very superficial.

In 1895 the French government concluded a treaty with Persia, by which it received ex¬ clusive rights of excavation, and in 1897 M. J. deMorgan, at that time Director of Antiquities in Egypt, was appointed Director of Excava¬ tions in Persia. While no other part of Persia has been explored beneath the surface, since that date systematic and extensive excavations have been conducted at Susa by deMorgan and his associates for the French government, and the results have been published with remarkable promptitude and in admirable form for the student. The explorers have 'been notablv suc¬ cessful in discovering a large amount of in¬ scribed material, their most important dis¬ covery, and one of the most important in the annals of Oriental research, being a large stele, carried off by the Elamites from Babylonia, containing the code of laws of Hammurapi, king of Babylon about 2100 B.C., bv more than a thousand years the earliest code of laws ever discovered anywhere, and one which profoundly influenced all the later legislation and civiliza¬ tion of western Asia, but which was manifestly a codification, enlargement and application, like Alfred's code in England, of laws and customs having already a long history of growth behind them. A not inconsiderable part of the treas-

ures found at Susa are Babylonian, and As¬ syrian statues or inscriptions carried off by the Elamites in their raids or conquests. Lying along the valleys of the Karun and the Kerkha, which, descending from the Persian mountains, find their way to the Persian Gulf along with the Tigris and Euphrates, Elam is almost a part of Babylonia, and the excavations at Susa show that their civilization was practically identical. The relation between them for about 2,500 years was similar to that of England and Scotland, Elam representing Scotland. They warred with one another, and raided and con¬ quered one another from the beginning of the third millennium onward. The earliest in¬ scriptions from Susa are in the Babylonian script and language. Later we find inscriptions in the same script and the language of the Elamite mountaineers, the so-called Anzanite, out of which ultimately developed, apparently, the neo-Susian, the second language of

the Behistun inscription, known only from that in¬ scription, written in a simplified form of cunei¬ form with less than 90 signs, as over against the 500 more or less of the Babylonian. From this again seems to have developed the Persian script of 36 or 37 characters found in the Be¬ histun inscription, and in a few short rock and vase inscriptions.

Assyriology. — Unlike the Egyptian the Babylonian civilization was from the outset international, and as a result the cuneiform script came to be widely used from a very- early period. Invented by the Sumerians, it was adopted and applied to their tongue by the Semites in Babylonia. In Elam it was first used, as already pointed out, with the Sumerian language, but afterward was employed to write the native Anzanite language. Later, modified and simplified, it was used for the neo-Susian and the Persian. By the beginning of the sec¬ ond millennium the Semitic Assyrians were using the Babylonian cuneiform script in a somewhat simplified form, while a little earlier the Cappadocians of Asia Minor had already begun to use both the Babylonian script and language in clay tablets. At about 1400 b.c. Syrian and Palestinian princes were using the Babylonian cuneiform even in their correspond¬ ence with the Egyptian overlord; the Hittites and the Mitannians were using it both for Babylonian and their own languages, as re¬ vealed by clay tablets found in Egypt and Asia Minor; and a little later the people of Armenia were using it for inscriptions in their own tongue, the so-called proto-Armenian, on the rocks in the region of Lake Van. Up to the present time cuneiform inscriptions have been discovered in no less than eight languages covering a vast extent of territory and a period of 3,000 years and more, from the close of the fourth millennium to 50 b.c. The decipherment and interpretation of these inscriptions on clay, stone, glass, ivory and metal constitute what we

know as Assyriology. . . . . ,

The interpretation of these inscriptions, with the other discoveries made by excavations in Babylonia, Persia and Assyria,. enables us to trace the course of Babylonian civilization from about 7000 b.c. At that period the inhabitants of Babylonia were already organized into com¬ munities, building fortified towns, the central point of importance in which was the temple of their god. They made pottery; they manu-

factured bricks, although using in their struc¬ tures for the most part unburned bricks. One people seems to follow another, or perhaps rather the strata show differences of develop¬ ment. The bricks made at the beginning are never excelled. Pottery of a high grade ap¬ pears in certain early strata, only to disappear again, giving way to inferior goods. As early,

apparently, as 5000 b.c. the principle of the arch was discovered. A system of drainage had been developed. Huge canals were dug to direct and control the inundations of the Ti¬ gris and Euphrates. City communities were sufficiently large and well organized, socially and politically, to undertake constructions of great size, involving the work of large num¬ bers of men extending over a long period. In the latter half of the fourth millennium we begin to meet with written records and enter upon what we may call the historical period. The Sumerians, who invented the complicated cuneiform script, evidently brought it from some mountainous region, perhaps from the Persian mountains through the Elamite plain ; and at the period when we first meet that script it evidently had a long period of de¬ velopment behind. The people using it, the Sumerians, were already in the copper stage of civilization. They occupied principally the south of Babylonia. In the north were chiefly Semitic peoples, who very shortly adopted and adapted the Sumerian script, and Baby¬ lonian civilization resulted from the amal¬ gamation of the Sumerians of the south and the Semites of the north. In the first half of the third millennium, about the period of the great pyramid builders of Egypt, we find in southern Babylonia a remarkable sculptural development, having its centre at the town of Lagash. From about this period also date the earliest long religious texts, synchronous with the pyramid texts of Egypt. It must be said, however, that while we find such synchronisms there is no apparent connection of Babylonian and Egyptian civilization in these earlier peri¬ ods. Each goes on its own independent way. These earliest religious texts show us that in the first half of the fourth millennium Baby¬ lonian civilization stretched up the Euphrates almost, if not quite, to the Mediterranean. The Semites of northern Babylonia constituted part of a larger whole. Aleppo is mentioned side by side with Kish in Akkad, or northern Babylonia, and Nippur in Sumeria, or south¬ ern Babylonia, as one of the three great cult cities. Throughout the whole of the third mil¬ lennium b.c. various city states north and south strove with one another for the hegemony, while Elamites and Babvlonians engaged in a continuous struggle.. Toward its close, just when Egypt was going into a. state of eclipse due apparently to Semitic invasions, the Semitic element finally prevailed over the Sumerian, the north over the south, and an actual empire was established embracing the whole of Baby¬ lonia. Babylon became the centre of culture, religion and literature, and Babylonian civiliza¬ tion became Semitic, the Sumerian language, however, continuing to be used until almost the commencement of the Christian era as a church language, as Latin was used in Europe through the Middle Ages.

Bv the close of the third millennium Baby¬ lonian civilization had crept northward up the

Tigris and founded a new centre at Ashur. Early in the second millennium there were great upheavals in the north and movements downward from Asia Minor of Indo-European peoples who sacked and burned both Babylon and Ashur. These movements, which resulted in Egypt in the Hyksos conquest, resulted east¬ ward and northward in the establishment of the Kassite dynasty in Babylonia ; of the kingdom of the Mitanni in Mesopotamia, westward of Assyria ; and of the dominance of Hittites and Egyptians further westward still in that trans- Euphratean region which up to this period had been Babylonian, and where the influence of the Babylonian script, literature and religion still continued largely to prevail.

Politically Babylon loses influence from that time, although it continues, until its destruction by Sennacherib, in 689 b.c., to be the great religious and cultural centre of all Hither Asia, playing from Persia to the Mediterranean and from the Black Sea to the Persian Gulf a role comparable to that played by Rome in Europe during the Dark and Middle Ages. Politically Assyria forges gradually to the front, becoming first the dominant factor in the valleys of the Tigris and Euphrates, and then a great world power, full of the lust of conquest, destructive rather than constructive, overturning and ex¬ ploiting kingdom after kingdom, and empire after empire, until in the 7th century it ruled the world, from Persia on the East to Egypt on the West, and from the mountains of Armenia northward to the Persian Gulf and Arabia southward. Its devastations open the way finally for a great invasion of wild Scyth¬ ian hordes and Nineveh falls toward the close of that century, to be succeeded for a brief period by a new empire of Babylon, by the Lydian kingdom in Asia Minor, by the Median kingdom to the east and the Egyptian to the west. A little later these are merged in the mighty Persian empire, which sought to con¬ struct and unify, while it conquered, the whole of Hither Asia, the region included in our re¬ view. The history of our region from this time onward is not one of research and exploration, derived from cuneiform texts and monuments, but is known from the literarv remains of Greece and Rome and Judaea. In Babylonia and Assyria, along the Euphrates, and in Meso¬ potamia there are abundant remains of the Seleucidan, the Sassanian, the Parthian and the brilliant Arabic periods, but so far research and exploration has concerned itself almost entirely with the more ancient material, leaving the remains of these later periods untouched.

Palestine. — While the keenest interest in Egyptian and Babylonian excavations was aroused by their relation to the Bible, explora¬ tion in Palestine, the Bible land proper, com¬ menced at a much later date and has been pros¬ ecuted with less energy than the similar work in those regions. The first important work was done by an American, Rev. Dr.

Edward Robin¬ son of New York. In 1838 (and again in 1852), accompanied by Eli Smith, an American mis¬ sionary in Beirut, he explored the Holy Land, identifying for the first time on rational grounds the greater part of the ancient sites of the coun¬ try, a work of historical topography. The sec¬ ond move in exploration, a direct result of Robinson's work, was also made by America, the United States government sending out an ex¬

pedition in 1847 under Lieutenant Lynch of the navy to explore the Jordan and the Dead Sea. The interest aroused by Robinson's publications affected England and the continent of Europe still more than America, and during the next two decades a number of travelers and ex¬ plorers visited the country, including the Prince of Wales and Dean Stanley. Van de Velde of the Dutch navy prepared a map, as the result of his visits ; William Smith compiled a dictionary of the Bible, and Sir G. Grove visited the Holy Land to study the places he was to describe in that work; Baroness Burdett-Coutts, anxious to furnish Jerusalem with a proper water supply, contributed £500 to make a plan of Jerusalem and its environs, and in 1864 Sir C. W. Wilson made the survey for this, including an accurate map of Jerusalem, with plans of the sacred sites.

Finally, in 1865, the Palestine Exploration Fund was organized for the purpose of under¬ taking a scientific and complete exploration of the country, and commenced its work by ex¬ cavations at Jerusalem, under Sir Charles War¬ ren (1867-70), which were valuable in deter¬ mining the topography of the temple area, al¬ though almost nothing was found in the way of antiquities. At the same time (1868-79), partly connected with the Palestine Fund, partly independent of it, Sinai and the ((Desert of the Exodus® were mapped and explored by Sir C. W. Wilson with a party of Royal Engineers, and by Professor Palmer of Cambridge. Then followed (1871— 77) a careful survey of Western Palestine, under the direction of Conder and Kitchener, assisted by naturalists, archaeologists and linguists, so that the result was not merely a carqful and accurate physical map of the country, but a study of all ruins of any sort visible on the surface, of the climate and the geology, of the fauna and flora, of place names, with a view to identifying ancient sites, and much more; all of which was published in the monumental memoirs of the fund, which has also, since 1869, published quarterly statements (to which have been added latterly annual vol¬ umes) giving a current view not only of their work, but of all matters of interest concerning Palestine.

An American Palestine Society, similar to the British Palestine Exploration Fund, had been formed simultaneously with the latter, to which had been assigned the country east of the Jordan, and an expedition was sent out to ex¬ plore that country. Unfortunately this expedi¬ tion accomplished little

or nothing, and the American society shortly disbanded. In 1881 Conder was commissioned by the British Palestine Exploration Fund to do the work which they had undertaken, but the strained relations of the British and Turkish govern¬ ments brought this survey to a speedy con¬ clusion, after only 500 square miles had been surveyed. Later this work was done in part by a local engineer, Dr. Schumacher, of the German Temple Colony at Haifa, sometime an American citizen, but later a German, first for the British Palestine Exploration Fund, but after 1884 for the German Palestina Verein (organized in 1878). In 1883-84, also, Profes¬ sor Hull, Director of the Geological Survey of Ireland, conducted for the fund a geological survey of the Arabah, the great depression con-

taining at its lowest point the Dead Sea. The geographical survey was finally completed by the survey in 1913-14 of the region known as the Negeb, extending from Beersheba south¬ ward to the Egyptian frontier. On the whole Palestine has been explored, mapped and sur¬ veyed as far as anything above ground is con¬ cerned, with great thoroughness (in Western Palestine especially every foot of the surface has been minutely covered), and the results made available in scientific publications and popular volumes, in maps and casts and pic¬ tures, to a very large public. In fact nothing comparable has been done for any ancient country.

It must be said that this exploration yielded very small results in ancient monuments and inscriptions of importance and indeed such of the latter as have been found were found by the natives or by accident. These are the Moabite Stone, containing an inscription of Mesha, a king of Moab in the 9th century b.c., found by a German missionary, Klein, at Dibon in 1868 and later largely destroyed by the Arabs, what remains being preserved in the Louvre ; secondly, a Hebrew inscription, possibly of the time of King Hezekiah, found by boys bathing in the Siloam tunnel, beneath the hill of Ophel and dealing with the construction of that tun¬ nel, now in the museum at Constantinople ; and thirdly, a Greek barrier inscription from the temple of Herod, found by Clermont Gan- neau in use as a tombstone in an old grave¬ yard in Jerusalem, also at Constantinople. More important for the history of Palestine, however, than any of these inscriptions found in Pales¬ tine itself, was the discovery in 1888, already referred to, by the natives, at Tel el Amarna in Eg3ˆpt, of about 300 clay tablets written in the Babylonian cuneiform script, from kings, petty princes and Egyptian representatives in Palestine, northern Syria, Mesopotamia and Babylonia to the Egyptian overlord, about 1400 b.c. The discovery of these inscriptions made it plain that at that date, antedating the Hebrew

conquest, Palestine possessed a civilization largely identical with that of Babylonia and that writing on clay tablets was practised in that region.

This discovery led to the belief that exca¬ vations in Palestinian sites would result in the discovery there of similar inscriptions on clay and probably also of stone inscriptions like the Mesha monument and the Siloam inscription from the Hebrew period. On behalf of the Palestine Exploration Fund, which had con¬ ducted no excavations since the conclusion of Warren's work at Jerusalem in 1870, Petrie, the Egyptian explorer, made a reconnoissance in 1889 and conducted tentative excavations at the mound of Tel-el-Hesy, the ancient Lachish, in the extreme southwestern part of Judaea, on the borders of the Philistine plain. In the following year the Palestine Exploration Fund entered upon a systematic campaign of scien¬ tific excavation under the direction of Dr. F. J. Bliss of Beirut, an American. Excavations were conducted at Lachish (1890-93), at Jeru¬ salem (1894-97), where the southern wall of the city was excavated and traced and from 1898 to 1900 at various sites in the Shephelah, the foothills between Judaea and Philistia, in¬ cluding Tel es-Safi, the ancient Gath, and Tel Sandahannah, the ancient Marissa, where a

Seleucidan city was explored, but the excava¬ tions came to a close before the Hebrew city beneath could be examined. Later, the natives unearthed the necropolis of this city, and, in 1902, Dr. Thiersch of Munich and the present writer had the good fortune to discover in that necropolis elaborately decorated tombs contain¬ ing Greek inscriptions belonging to a Sidonian colony settled at Marissa, then the Edomite capital, in the Seleucidan period, the only dis¬ covery of this sort yet made on Palestinian soil. More complete and much more extensive than any of the foregoing was the excavation of Gezer by R. A. S. Macalister, formerly Dr. Bliss' lieutenant (1902-03 and 1907-09), the ac¬ count of which is contained in three volumes of the monumental memoirs of the fund. This was followed in 1911-12 by Mackenzie's excava¬ tion of the neighboring Beth Shemesh.

Besides these excavations of the Palestine Exploration Fund, excavations have also been conducted during the present century by Dr. Sellin of Vienna, at Taanach, on the plain of Esdraslon, and at Jericho in the Jordan Valley. Just before the outbreak of the World War he had also commenced excavating in the. neigh¬ borhood of Shechem. Dr. Schumacher for the German Palestine Society and the Orient Gesell- cshaft excavated Mutesellim, the ancient Me- giddo, and a Harvard University expedition partially excavated Samaria, finding, appar¬ ently, the lower part of Ahab's palace. Im¬ mediately before the war excavations were con¬ ducted on the hill of Ophel, south of the temple at Jerusalem, under English and Jewish aus¬ pices. Under various auspices also there have been explorations of the synagogues of Galilee, the tumuli and stone remains of

the East Jordan country, and the Nabataean-Edomite rock city of Petra. In 1900, through the efforts of the late Professor Thayer of Harvard, an Ameri¬ can Oriental school, similar to the schools of archaeology at Rome and Athens, was estab¬ lished at Jerusalem, to give American students an opportunity for study and research in the Holy Land itself, and to secure continuous and systematic investigation. In 1903 a similar German institution was established and at about the same time the French Dominican monks established an Ecole Biblique. These three in¬ stitutions have not only undertaken various minor explorations and excavations ; they are also centres of observation to study and make known all that is found or done in Palestine.

Besides the scientific and legitimate exca¬ vations above described, there has also been in the latter years much structural excavation for new buildings at Jerusalem and an enor¬ mous amount of illicit digging by natives to obtain antiquities to sell to tourists and collec¬ tors. Especially immense numbers of graves and tombs have been opened and robbed, so that some ancient sites now resemble nothing more than rabbit warrens and the destruction of ancient remains as a result of this sort of antiquity-hunting has been, probably, in pro¬ portion to the amount of those remains, much greater than in any other ancient country.

On the whole the results of excavations in Palestine have been disappointing. Of the expected inscribed clay tablets there have been found in all only about half a dozen, Babylonian and Assyrian, of no great importance ; of Hebrew inscriptions, a seal cylinder or two, and

a few potsherds and jar handles. In general, the more interesting and important discoveries have been pre-Israelite. At Gezer, where the excavations were most complete, there was un¬ earthed a pre-Israelite open-air temple or place of worship, consisting of huge stones set up in alignment, connected with an ancient system of caves ; also a remarkable shaft tun¬ nel of the same period, cut through the solid rock to a source of living water beneath. From these excavations, with what has been obtained from Babylonian and Egyptian sources, espe¬ cially the latter, we are able to restore some¬ what the history of Palestine before the Philis¬ tine and Hebrew conquests. Before the middle of the third millennium the country was in¬ habited bv a primitive and barbarous people, living largely in caves dug out of the soft rock and using stone implements. By the middle of the third millennium, the time of the great Semitic develonment in Egypt and Babvlonia, these were replaced or overlaid by Semites, using copper, who

built overhead cities and organized city states ; but who adapted and developed certain of the practices of the earlier inhabitants, religious and otherwise, and who especially developed enormously, but for dif¬ ferent purposes, their cave-cutting habits. As a part of Amurru, the West Land of the Baby¬ lonians, these soon came into contact with out¬ side civilization, .Egean, Egyptian and Babylo¬ nian, adopting from the latter in the second millennium the cuneiform script and the Babylonian language for their apparently scanty official correspondence. Compared with the surrounding civilized regions they were very backward. Under Thutmosis and his suc¬ cessors in the 16th century Palestine became a part of the Egyptian empire, retaining, never¬ theless, the Babylonian script and tongue for official use. With the development of the Hit- tite power in the 15th century Palestine became in part a battleground between Egypt and that power. About 1400 b.c. the Amarna tablets reveal a number of city states, nominally under Egyptian suzerainty, crumbling away before invasion from without. When this period of disintegration comes to an end we find the Philistines, apparently from Crete, in posses¬ sion of the coast, and the Hebrews, in the main an Aramaean people, but using the kindred language of Canaan, struggling for the posses¬ sion of the land as a whole. This is the com¬ mencement of the Biblical period, for which we have excellent literary sources in the Bible, supplemented somewhat by Assyrian-Babylonian and Egyptian monuments, but on which exca¬ vations in Palestine have shed little light. The Hebrew period is singularly barren of struc¬ tural, architectural and inscriptional remains. The visible remains of the past, such as they are, with the exception of the rock cuttings — tombs, holy caves, cities of refuge and the like — which are extraordinarily abundant and be¬ long to all periods, date generally from later periods, the Judaeo-Roman of Herod, at Jeru¬ salem and Samaria ; the Hellenistic, beyond Jordan, to which belong the magnificent ruins at Amman and Gerash ; or the time of the Cru¬ sades, which was an age of massive building that left its mark on the whole land

Syria Outside of Palest'ne.— Excavations were conducted at various points on the Phoeni¬ cian Coast in 1860 and 1861 by a French expe¬

dition under the direction of Renan, without important results. In 1888 native stone-cutters at Sidon discovered the so-called Alexander sarcophagi, which, with the sarcophagus of a Sidonian king, Tabnith, were excavated by Hamdy Bey and carried to Constantinople. These Sidon sarcophagi rank among the art treasures of the world. In 1901-02 a Phoenician temple was excavated at Sidon for the Turkish government by Macridi Bey. Through the in¬ terest in Oriental archaeology aroused in the German emperor by his visit to the East, a German expedition was sent out in 1901 to explore and restore the ruins of the temples at Baalbek and in connection with this some ex¬ cavations were conducted in the Hellenistic

Gerash, beyond Jordan. At the same time the Sultan presented to the Kaiser the small but remarkable ruins at Mesheytta in Moab and in 1903, under the direction of Dr. Schumacher, these were removed bodily to Berlin to adorn the New Friedrich Museum.

The surface antiquities of Northern Syria southward to the Hauran were explored, in¬ scriptions collected and the like a half a cen¬ tury and more ago by two French scholars, de Vogue and Waddington, and various schol¬ ars have visited and described the Palmyrene region. At the beginning of the 20th century a far more complete work of surface explora¬ tion was carried out by the American Archae¬ ological Expedition to Syria, under the auspices of Princeton College and the direction of Howard Crosby Butler. In the 70's of the last century the British undertook some very superficial excavations at Carchemish (Jerabis), the capital of a Hittite kingdom on the Eu¬ phrates. In 1911 the British Museum resumed a more systematic excavation of this import¬ ant site, under the general direction of Hogarth, which was stopped by the war. In 1886 and again in the following decade, the Germans conducted excavations at the small mound of Sinjerli, northward of Aleppo, which resulted in the discovery of a town and palace of rather rude construction, with Aramaean and Hittite inscriptions and sculptures of the 8th and 9th centuries b.c. With these exceptions no ex¬ cavations have been conducted in Syria. We know from Babylonian inscriptions that north¬ ern Syria was a centre of culture and Aleppo a famous cult foundation as early as the first part of the third millennium b.c. ; from Egyptian and Assyrian inscriptions and from the Hebrew scriptures we learn of numerous important cities throughout Syria in the succeeding pre-Chris¬ tian millennia and especially of Damascus. From Greek and Roman sources we know of the mighty cities of this region in t'he early Christian centuries and particularly of Antioch. Surface exploration also has brought evidence of the boundless prosperity of Syria in those ages and almost countless ruin mounds dot the whole country; but so far as excavation is con¬ cerned Syria is as yet practically virgin soil.

Asia Minor. — The famous excavations of Schliemann at Hissarlik, the site of ancient Troy, gave us our first glimpse of the civiliza¬ tion of the Mycenaean period and showed _ us the existence of long eras of succeeding cities, going back certainly into the third millennium b.c., Troy being an outpost on the north of that brilliant yEgean, pre-Grecian civilization which seems to have bloomed at its richest in

Crete in the middle of the second millennium B c- Excavations at

Pergamos, Assos, Ephesus and bardis with smaller excavations at Cyzicus, Halicarnassus and elsewhere, conducted by- English, Germans, Americans and Austrians, have revealed remains of the later Greek and Graeco-Roman periods. Only at Sardis, where c Americans, under Howard Crosby Butler of Princeton, explored on a magnificent scale for five years (1909-14), until their work was stopped by the war, were remains found of an earlier Asian culture, in the shape of inscrip¬ tions in the as yet undeciphered Lydian lan¬ guage. Since Texier published his (L'Asie Mineuer> (1841) various scholars have explored and described surface remains from all parts of the country. Among the most noteworthy of these are the excavated rock cones existing by thousands in Cappadocia (described by Ster- rett, Wolfe expedition, 1888). From Cappadocia also there have been brought, since 1887, a num¬ ber of clay tablets with cuneiform inscriptions, which show the influence of Babylonian civiliza¬ tion and culture in Asia Minor as early as the latter half of the second millennium b.c. Further eastward, through Armenia, inscriptions have been found in cuneiform characters, cut in the rock, partly in the Assyrian language and partly in the native language of the country, which have now been deciphered, giving evi¬ dence of the existence of powerful kingdoms in that region in the 10th century and thereabouts, rivals at times of the Assyrian power.

Explorations by various tiavelers of the in¬ terior portions of Asia Minor revealed, besides numerous Greek and Latin inscriptions of the Christian and classical period, rude figures and hieroglyphic inscriptions cut in the rocks or carved out of stone, from the Mediterranean on the west to Armenia on the east and from a point a little south of the Black Sea on the north far into Syria on the south. By compari¬ son with similar inscriptions and carvings found at Carchemish, known to be a Hittite capital, these were assumed to be Hittite and to show that Hittite power and influence covered a wide territory, comprehending a large part of Asia Minor and northern Syria. One of the finest Hittite inscriptions was found by the Germans at Babylon and the Bible records mention Hittites in southern Palestine at and long before the Hebrew conquest. Egyptian inscriptions testifv to a great Hittite empire which disputed with Egypt the possession of Syria from the close of the 15th to the close of the 13th century. The Assyrians record a struggle with powerful Hittite states in north¬ ern Syria from the 10th century on, culminat¬ ing in the capture and destruction of Carchem¬ ish, in 717 b.c. Finally, excavations in 1906- 07 at Boghaz-Keui, the ancient Hatti, in north¬ ern Asia Minor, by the German scholar, Winck- ler, furnished us with a great number of clay tablets in cuneiform script, some in the Baby¬ lonian, some in the Hittite language and some bilingual, containing among other things the Hittite version of the famous treaty between Rameses II, Pharaoh of Egypt, and Hattusil, emperor of the

Hittites, 1271 b.c. This discov¬ ery seems at last to have solved the Hittite problem, and to enable us to form a general idea of the early history of Asia Minor : along the coast a fringe of HIgean culture; in the in¬ terior various Asian peoples of language and

connection unknown to us ; Babylonian com¬ merce and culture penetrating into Cappadocia in the latter part of the third millennium ; Indo- European invasions from the north by a horse using, chariot driving people, the formation of new states under their domination, the invasion of Mesopotamia, and the sack and destruction of Babylon and Ashur early in the second mil¬ lennium. . This resulted in the establishment of the Kassite dynasty in Babylon, of the kingdom of the Mitanni in Mesopotamia, of the founda¬ tion of the great Hittite culture and empire, extending finally over all Asia Minor, and the first encroachment of Indo-Europeans on the vEgean civilization in the capture and occupation of Troy. The Hittite empire reached its cul¬ mination in the 1 5th century b.c., when it was reaching out beyond Asia Minor southward, struggling with Egypt for the possession of Syria. Apparently even at this time, however, the Hittites were subjected to a pressure from behind, driving them southward. The empire of Hatti comes to an end about 1200 b.c., and the Hittites are pushed out of Asia Minor by the Muski ; but until the close of the 8th cen¬ tury a number of Hittite states exist in north¬ ern Syria, contending with Assyria for the su¬ premacy of that region. Of the following movements in Asia Minor and of the history of that country we have knowledge only from Assyrian inscriptions, and those rock-cut in¬ scriptions of the people of Armenia to which reference has already been made. Asiatic peo¬ ples, some of whom have left us a few little fragments sufficient to determine the fact of their existence and our ignorance of their lan¬ guage, struggled with one another and with the Assyrian invaders. Finally in the 7th century one of these peoples, the Lydians, established a great empire with its seat at Sardis, while the Greeks occupied that fringe along the coast for¬ merly occupied by the 2Egean civilization ; and Indo-Europeans pushing in from the East oc¬ cupied Armenia. So far research has enabled us to outline the history of Asia Minor before written history begins.

Arabia.— Up to the present time no work of excavation has been conducted in Arabia. Various travelers have explored and mapped the country, from the time of the Danish Nie¬ buhr (1761-64) onward. These include Burck- liardt (1814-16), Burton (1853, 1877-78),

Palgrave (1862-63) and others. These earlier travelers explored the country, visited Mecca and studied Arabic life and habits, but did little in the way of collecting or copying in¬ scriptions. This was done principally by Hal- evy (1870-71), Doughty (1876-78) and Glaser (1882-94) in the south, and Euting and Huber (1883-84) in the north. These explorations

were conducted under the greatest difficulties. Halevy traveled as a poor Jew; Doughty lived as a Bedouin; others professed Islam to ac¬ complish their purpose; some, like Huber, lost their, lives at the hands of fanatical natives. The inscriptions collected by Euting in northern Arabia, show us the Aramaeans inhabiting that region in the 6th century b.c. The inscriptions from southern Arabia reveal the existence there as early as 1000 b.c. of civilized peoples using alphabets derived from the so-called Phoenician alphabet. We are able to trace the successions and names of certain kings and peoples, and some light has been thrown on the ancient

religion and religious practices of the Arabs. Shortly before the beginning of the Christian era compienced the movement from Arabia of the Nabataeans, who occupied eastern Syria as far northward as Damascus, their chief centre being Petra. These were followed by another movement in the first centuries of our era, which established the Lakhmid state on the western confines of Babylonia, and the Ghas- sanid on the eastern confines of southern Syria. Beyond this, research in Arabian antiquities has not proceeded up to the present time.

General Results — The general results of oriental research in Egypt and western Asia, covering in all a period of somewhat more than a century, have enabled us to trace the history and development of civilization from about 7000 b.c. At that time, research has now shown, there existed independent centres of civilization in Egypt and Babylonia, which coun¬ tries were occupied by city-building and civilized peoples. By the middle or end of the fourth millennium a conventionalized script had been developed out of picture writing, independently in each of these countries, and the civilization of each region had assumed those definite types which we know respectively as Egyptian and Babylonian. From this point on we have in 'both cases written records, but no well-de¬ termined system of chronology until much later. The civilization of Egypt, while attaining in the matter of art, architecture and literature a very much higher development than that of Babylonia, was always singularly self-centred. Babylonia was more concerned with practical life, and the application of knowledge to material conditions. . Babylonia, moreover, was always in contact with the world about it, and its civilization affected the civilization of sur¬ rounding regions to such an extent that it may fairly be claimed as the ancestor of later West¬ ern civilization. Egypt gave little to the outside world and received little from it, but, on the whole, what it received was greater than what it gave. It is Egyptian art, the painting on the Egyptian tombs, which gives us a vivid pictuie of "the manner of Egyptian life; it is the in¬

numerable clay tablets and business documents of Babylonia which enable us to restore in de¬ tail the laws, rules, customs and commerce of the Babylonians.

The earliest civilization of Babylonia was non-Semitic, developed among the people of the south, commonly designated as Sumerian. The earliest inscriptions are written in the Sumerian language, and even as late as the Assyrian time magical and religious texts continued to be written in the same tongue. By 3000 b.c. the Semitic peoples of Akkad, or northern Baby¬ lonia, had adopted and adapted the civilization of Sumerian Babylonia, and this Sumerian Semitic civilization became by the middle or close of the third millennium b.c. to all intents and purposes the civilization of the whole re¬ gion from Persia on the east to the Mediter¬ ranean on the west.

In the first half of the second millennium Egyptian and Babylonian civilizations were brought into contact with one another, and with another civilization of equal rank and al¬ most equal age which had developed to the west and north. By the 15th century b.c. a period of high culture, having several independ¬ ent centres, was attained in this ancient world.

One of these was the Mycenaean or zEgean civilization, having its central point in Crete and the islands and shores of the ˆgean Sea. So far at least as Crete was concerned, this had its own system of writing, which has not yet been deciphered. Another centre was Egypt, at this period politically dominant in Syria, although the civilization and culture of the lat¬ ter region continued to be Babylonian. Another centre was Babylonia, which had communicated its writing, its religion and its art to the neighboring regions of Elam, Mesopotamia, Syria, Assyria and, to some extent, Armenia and eastern Asia Minor. Still another was the Hittite in Asia Minor, which was, however, ruder than the rest. At this period a belt of civilization seems to have extended vaguely from China on the east to Spain on the west, and from the Danube on the north to Nubia on the south; but the highly civilized portion consisted only of the territory from Elam to Greece, and from the Hellespont to Ethiopia.

Then came a catastrophe similar in cause and result to the Dark Ages which followed the brilliant period of the Graeco-Roman civilization in the 4th and following centuries of our era. Barbarians, acquainted, however, with the use of iron, which made them formidable to the copper-using civilized peoples, pressing in from the north, overwhelmed the Mycenaean-zEgean civilization, reduced Egypt to a condition of depression, and for a time almost annihilated both Assyria and Babylonia. The movements of the northern peoples, driving southward and rendering foot-loose zEgeans and Hittites, forced these into the Semitic countries, expel¬ ling in turn from

their homes the Aramaean hordes, who as Habiri passed into Palestine, and as Suti into Mesopotamia and Babylonia. These Dark Ages may be said to have come to an end about 1000 b.c. At least at that time a new civilization begins to dawn: As to the Dark Ages of the Christian era we owe two. great discoveries, one material and the other spiritual, which largely changed the character of the suc¬ ceeding civilization, namely, gunpowder and the printing-press, so to these Dark Ages, of the earlier time we owe the discovery of iron, or perhaps its adaptation to practical use, and the invention of a real alphabet, the so-called Phoe¬ nician, two discoveries which conditioned the new civilization that came into being at or about 1000 b.c. Out of these Dark Ages devel¬ oped on the spiritual side the religion of the Hebrews, and on the economic cultural side the Aramaean race of middle men, which so greatly helped by its common tongue and its international commerce to weld all Hither Asia into one, and to prepare the way for amalga¬ mation in that great world culture which de¬ veloped westward in Greece and Rome from 500 b.c. onward.

Bibliography. — Egypt: Publications of

Egyptian Exploration Fund : deMorgan, (Re- cherches sur les Origines de TEgypte) (1896— 97) ; Renou f» (The Egyptian Book of the Dead> (1896) ; Maspero, (Egyptian Archaeology > (1893); Erman, (Egyptian Life) (1894); Breasted, (Ancient Records of Egypt } (1906) ; (History of Egypt from the Earliest Times to the Persian Conquest (1911); with others, (Sacred Books and Early Literature of the East* (Vol. II, 1917) ; Petrie, Researches in Sinai > (1906) ; Mueller, (Egyptological Re-*

SeaTCfeS> (1906~.10); King and Hall, (Egypt and \ estern Asia in the Light of Recent dis- coveries (1907). Assyria-Babylonia. — Rich. Babylon and Persepolis5 (1839); Layard, .Nineveh and its Remains, 5 and 'Monuments of Nmeyelp (1849) ; 'Nineveh and Babylon5 series of 'Monuments of Nineveh5 (1853) ; Botta and Flandin, 'Monuments de ˆ 9-50) ; Place, 'Ninive et Assyrie) (1866-69); Loftus, 'Chaldsea and Susiana) (1856); Smith, 'Assyrian Discoveries) (1883); Rassam, 'Asshur and the Land of Nimrod (1897) ; DeSarzec and Heuzey, 'Decouvertes en Chaldee, > (1887-) ; Peters, 'Nippur> (1897); Banks, 'Bismya) (1912); Johns, 'The Excava¬ tions at Babylon (1912); Rogers, 'History of Babylonia and Assyria5 (1915) ; King, 'History of Sumer and Akkad5 (1910); 'History of Babylon) (1915) ; Harper, 'The Code of Ham- murapi> (1914) ; Jastrow, 'Civilization of Baby¬ lonia and Assyria5 (1915); 'Aspects of Reli¬ gious Belief and Practice in Babylonia and As¬ syria5 (1911); with others, 'Sacred Books and Early Literature of the East) (Vol. I, 1917) ; Handcock, 'Mesopotamian Archaeology5 (1912). Persia. —

Dieulafoy, 'L'Acropole de suse5

(1890) ; deMorgan and others, Memoirs of 'Delegation en Perse > (1900-). Palestine and Syria. — Publications of Palestine Exploration Fund and of the Deutscher Palastina Verein; Robinson, 'Biblical Researches5 (1841) ; Lynch, 'Expedition to the Dead Sea and the Jordan5 (1849); Petrie, 'Tell el-Hesy5 (1891); Bliss, 'A Mound of Many Cities5 (1894) ; Bliss and Dickie, 'Excavations at Jerusalem5 (1898); Handcock, 'Archaeology of the Holy Land5 (1916); Vincent, 'Canaan5 (1907); George Adam Smith, 'Historical Geography of the Holy Land5 (1901) ; 'Jerusalem5 (1907) ; Peters, 'Early Hebrew Story5 (1904); 'Re¬ ligion of the Hebrews5 (1914) ; Renan, 'Mis¬ sion en Phenicie5 (1864) ; Hamdy Bey and Reinach, 'Necropole Royale a Sidon ; (1892-96) ; Hogarth, 'Carchemish5 (1914). Asia Minor. — 'Puchstein, Boghazkoi5 (1912) ; Garstang, vThe Land of the Plittites5 (1910). Arabia. — Ho¬ garth, 'Penetration of Arabia5 (1904) ; Doughty, 'Arabia Deserta5 (1888) ; Huber, 'Journal d'un voyage en Arabie5 (1891) ; Euting, 'Reise in inner Arabien5 (1896) ; Bent 'Southern Arabia5 (1895). General. — Maspero, 'History of the Ancient Orient5 (1895-99) ; Hil- precht, 'Explorations in Bible Lands5 (1902) ; Breasted, 'Ancient Times5 (1916) ; Hall, 'An¬ cient History of the Near East5 (1913) ; Hand¬ cock, 'Latest Light on Bible Lands5 (1913) ; Cobern, 'The New Archaeological Discoveries5

(1917).

John P. Peters,

Author of ' Nippur or Explorations and Ad¬ ventures on the Euphrates, 5 etc.

ORIENTATION, the adjustment and maintenance of itself by an organism in its proper position toward its environment; the acts of perceiving, assuming and controlling its normal attitude and movements in reference to gravitation, direction, equilibrium and other re¬ quirements of its relations to space. The ability to keep right side up, to face or move in a determined direction, to place one's self as a whole in any desired attitude, to bring the vari¬ ous parts of the body into definite relations with other parts, to maintain equilibrium, and con¬

stantly to control and utilize this power, are the elements of the faculty of orientation, which seems in some degree necessary to every living thing, and whose phenomena in their higher manifestations surpass present human powers of explanation.

The faculty is essentially a mental perception of a necessity for a muscular

act; but so in¬ cessant and habitual is it, at least in animals possessing the power of moving, that its exer¬ cise is ordinarily unconscious, and belongs to the realm of automatic reflexes, or at least to that of subliminal consciousness.

The proof of this appears in the partial inability of young animals, notably of the higher classes, to adjust themselves to their surround¬ ings. Babies have to acquire a knowledge of relative direction, distance and proportion by slow degrees. So simple a matter as bringing the hand to .the mouth must be learned; the first difficulty in learning to walk is to acquire the power of maintaining equilibrium ; and this must be acquired anew when a grown person attempts some novel method of locomotion, as skating or the riding of the bicycle. Proof appears also in the loss or destruction of the power of orientation which follows the derange¬ ment of the brain or nervous system by cer¬ tain drugs or diseases. A symptom of intoxi¬ cation is staggering, and when the intoxication is excessive ability to stand or to use the limbs definitely disappears, — the power of co¬ ordination is lost. Some forms of insanity have a similar effect; and a characteristic of the disease locomotor ataxia is that it deprives its victim of the power of control of equilibrium (q.v.) and of the muscles used in walking; it is not muscular weakness but disorganization of the power of co-ordination. If the affected per¬ son is able to walk at all he finds it impossible to turn without falling; or when he moves will start off at right angles to the course he intended to take. A similar defect of power accompanies great sleepiness — our heads droop and we totter and nrogress aimlessly until well aroused. Persons walking in the dark, with nothing to guide them but the touch of the feet upon the floor, find it hard to walk straightly or firmly. Orientation, then, that is the power to maintain a proper relative attitude, to comprehend direction, and to control loco¬ motion, depends originally upon sensation and experience, combining many factors, both psy¬ chical and physiological, often not easily sep¬ arable.

At the basis lies the faculty for equilibrium, the ability to feel and to keep one's self right side up. It is a notable fact that animals stricken with death when free to turn, as are those in the water, turn upon their backs — the part of the body that in life is kept away from the ground. This is a matter of gravity — the dorsal half of the body is the heavier. How do such creatures as fishes and low marine animals know how to resist this inclination in life, amd hold themselves in the opposite or whatever may be their normal attitude toward the plane of the horizon? The only explanation is that they possess a sense of equilibrium which is supposed to reside primarily in certain organs, whose office is supplemented by various sensa¬ tions, as of feeling, sight and hearing, the in¬ fluence of each varying in proportion according to the degree of nervous organization of the

animal, its structure, size, shape, the medium in which it operates, etc. In the case of man and the animals nearest to him, balance is maintained by constant muscular response — in large part unconsciously, of course — to the sensations of tension and pressure in muscles, tendons and joints; to the wavering suggestions of pressure upon the soles of the feet or upon the bones and flesh of this side of the body or that, as the weight is shifted; to suggestions from the eyes with reference to fixed objects, or from the ears as sounds vary in intensity, or even from the interior of the body, where organs or contained fluids report movements which must be corrected to restore the centre of gravity. The broad examples of this, which are matters of commonplace experience, such as the leaning away from a weight carried in one hand, or the outstretching of an arm to counteract a slip of the foot, or the swerving outward when rounding a curve at a rapid pace, are only large illustrations of the minute adjustments which go on incessantly in main¬ taining the equilibrium of animals. Underly¬ ing these adjustments, however, is the faculty, before alluded to, of perceiving when the body is in equilibrium, and this is believed to reside especially in certain organs represented in man by the labyrinth of the ear, and in the lower animals by the homologues or analogues of this structure. These are sufficiently described and illustrated in the article Ear, and consist essentially of some movable particle at the end of a nerve-filament, which, by its change of place as the body moves, informs the mind of the direction and degree of the departure from a state of equilibrium. Prominent among these special organs are those of the lateral line in fishes, whose perceptions of vibrations make them akin to organs of hearing; but the higher purpose of which is believed to be equilibrial. With these and similar organs in the. lower ranks of animals the complicated labyrinth of the ear in the higher vertebrates and in man is allied by descent; and unquestionably the semi¬ circular canals are the seat of our perception or sense of levelness, change of direction, relative position, acceleration of movement, rotary motion, and all the rest. The orientation of the body thus depends primarily upon the index furnished by the inner organs of the ear.

Whether this is to be regarded as a (

The literature of the subject is mainly French and German, the latest summary being

Hartmann, (Die Orientierung) (Leipzig 1902) ; and Loeb, ‘Comparative

Physiology of the Brain> (New York 1902). Consult also Wat¬ son, J. B., (Behavior) (New York 1904).

ORIENTE, Cuba, the extreme eastern province formerly Santiago de Cuba (q.v.).

ORIFLAMME, or AURIFLAMME, the former royal standard of France, originally the church banner of the Abbey of Saint Denis, and borne by the counts of Vexin, patrons of the church. It was presented by the abbot to the lord protector of the convent whenever it was necessary to take up arms for the preser¬ vation of its rights and possessions. It was a piece of red taffeta fixed on a golden spear, in the form of a banner, and cut into three points, each of which was adorned with a tassel of green silk. When Philip I afterward united Vexin to the possessions of the crown, it fell to him to bear the banner as protector of the abbey. It was then carried with the armies, and eventually became the great standard of the kingdom. Since the time of Charles VII it has never been carried into battle.

ORIGEN, or'i-jen, ecclesiastical writer, surnamed Adamantius : b. Alexandria 185; d. Tyre 254. He was early instructed by his father in the Christian religion. His teachers were Clement of Alexandria and Ammonius. In his earlv youth he gave proofs of greatness of soul. When his father was thrown into prison during the persecution of Severus, Ori- gen exhorted him to die rather than apostatize. After the martyrdom of his father in 202 he maintained his mother and sister by giving in¬ structions in grammar. At 18 he was appointed to instruct the believers in Alexandria. Males and females crowded to his lectures. To escape calumny he mutilated himself, thinking the act justified by the New Testament, though after¬ ward he expressed sorrow. for the act. After the death of Severus (211) Origen went to Rome, where he gained friends and admirers, and subsequently, at the request of Bishop De¬ metrius, continued his instructions at Alexan¬ dria. A popular tumult compelled him to flee to Palestine (215). He was permitted by the bishops there to preach in their assemblies, afterward returning to Alexandria. On his way to Cesarea, in Palestine (22 7), he was or¬ dained presbyter by the bishops who were there assembled. This laid the foundations for the persecutions which embittered the remainder of his life. Demetrius maintained that he alone had the right to ordain Origen. Pie deprived Origen of his priestly office, prohibited him from teaching in Alexandria, whither he had returned, banished and excommunicated him. This sentence was confirmed at Rome and by most of the other bishops. But the Churches of Greece and Asia sustained Origen, who de¬ nied that he was guilty of the errors of which he was accused. In the year 231 Demetrius died, and Origen enjoyed tranquillity. The per¬ secution under Maximin forced him to remain for two years in concealment. When peace was restored to the church in 237,*

he took advan¬ tage of it to travel to Athens. He then went to Arabia to refute Bishop Beryllus, who affirmed that the divine nature of Christ did not exist before his human nature. Beryllus recanted, and thanked Origen for his instructions. In the Decian persecution Origen was thrown into

prison, and subjected to the extreme sufferings, from whose severity he died.

Few authors have written so much as Ori- gen; few men have oeen attacked with such virulence, both during his life and after his death. He was reproached with blending the Christian doctrines with Platonism, particularly in his book, (De Principiis) ; but he (fives his opinions only as a possibility; moreover, ((here- tics,» he says, ˆcorrupted his writings.® He has been accused, witnout reason, of favoring materialism. His double achievement was to ((destroy gnosticism and to give philosophy a recognized place in the creeds of the Church.® Of his works, besides the one just mentioned, there are extant only his (Exhortation to Mar¬ tyrdom,) commentaries, homilies and scholia on the Holy Scriptures, nothing more of which we have than free translations. His critical talent is shown in his 'HexaplaP of which an edition was published by Montfaugon, and afterward by F. Field (1875). In 1896 further portions of the (Hexapla' were found at Milan. His work against Celsus is the most complete defense of Christianity of which antiquity can boast. His works were edited by Lommatzsch in 25 volumes ; the most recent edition has been issued by the Berlin academy. Consult Begg, (Christian Platonists of Alexandria) (1886); Fairweather, (Origen and Greek Patristic The- ology) (1901) ; Freppel, (Origene) (1868) ; Harnack, (History of Dogma) (Vol. II, 1899) ; Moller, Eeschichte der Kosmologie der Grie- chischen Kirche bis auf Origines) (I860) ; Thomasius, (Origines) ; the volumes in the (Ante-Nicene Fathers } series; and the Ency¬ clopedia of Religion and Ethics) (1917).

ORIGIN OF SPECIES BY MEANS OF NATURAL SELECTION, a remarkable work by Charles Darwin, published in London, 24 Nov. 1859. In it the author expounded the famous theory known as Darwinism. The book created a profound sensation not un¬ mixed with consternation. A torrent of ana¬ thema was poured over the head of the scientist whose patient observations in the great labora¬ tory of nature had led him to the now generally accepted doctrine of Evolution. Theologians and laymen prophesied ruin to religion and morality if that doctrine were accepted. Never¬ theless the work, slowly at first, but with in¬ creasing rapidity,

made its wav to general recog¬ nition and more or less qualified acceptance, and its anathematizers were gradually con¬ strained to find a modus vivendi between their creeds and. the theories propounded in the (Origin of Species. > The revolution in scien¬ tific doctrine and scientific method brought about by the publication of this work was so far-reaching that 21 vears after its appearance Professor Huxley declared there was no field of biological inquiry in which the influence of the (Origin of Species) was not traceable: that the foremost men of science in every country were either avowed champions of its leading doctrines, or at any rate abstained from oppos¬ ing them. But it is not only in physical and natural science that the influence of this work can be faced to-day; it has been said, perhaos prematurelv, that one must seek back to New¬ ton or even Copernicus to find a man whose influence on human thought and methods of looking at the universe has been as radical as

that of Darwin. His originality has been as¬ sailed; Lucretius, Kant, Laplace, Buffon and Erasmus Darwin (grandfather) have been brought forward as the real originators of the fertile idea which has taken its name from Charles Darwin. Undoubtedly, he received in¬ spiration. from a study of what had been done by his predecessors, but whereas the old theo¬ ries produced no results, those of Darwin had a mature vitality that compelled recognition.

ORIGINAL SIN, the sin which all the de- scendantˆof Adam inherit from their first pro¬ genitor. The doctrine of Original Sin is a first postulate of Christianity in the scheme of man's redemption by Christ. The first explicit state¬ ment is to be found in Saint Paul (Rom. v. 12 et seq.) : ((As through one man sin came into the world, and death by sin, and so death penetrated to all men, because all sinned . . . for

if by the trespass of one the many died, much more the grace and the gift in the grace of the one man Jesus Christ abounded to the many.® The ante-Nicene Greek Fathers say little about the doctrine, and this only incidentally. When they do mention the subject it is always in the spirit of Saint Paul's statement, that all man¬ kind fell in Adam, and that through this first sin death entered into the world, the will be¬ came weakened, reason obscured, and concu¬ piscence disordered. There is also little to be gathered from the Latin Fathers of the ante- Nicene Age, for the doctrine had not become the subject of controversy, and so awakened but slight theological discussion or formulation. Wherever mentioned by them, the prevailing idea at bottom was the Pauline doctrine of the fall of the human race in Adam, with its dire consequences, which are to be remedied only by the grace and merits of Christ.

Saint Augustine (q.v.). was the first Latin Father to treat it systematically

and extensively in his controversy with the Pelagians in relation to grace, free-will, predestination, etc. His teaching is succinctly stated in the following passage: KHe (Adam), exiled after sin, bound his offspring also, which by sinning he had cor¬ rupted, as it were in the root, under the penalty of death and condemnation, so that all progenv iborn of. himself and his wife. . .should draw to itself original sin, and thence be drawn through diverse errors and pains to that last and endless torture with the angels, who de¬ serted and corrupted (others), and with those who. inherit and share in their portion.® (Eu- chirid. ch. 10). Saint Augustine's exposition of the doctrine exercised a great and lasting in¬ fluence throughout the subsequent centuries, and has been, in its broader outlines, followed by the theologians of the Middle Ages. A more defi¬ nite and scientific formulation grew up with the development of the stricter methods of scho¬ lastic philosophy, which reached its complete ex¬ pansion in the 13th century. Saint Thomas Aquinas, (q.v.), the greatest theologian of the scholastic, period, declares that the essence of original sin consists in the <(privation of original justice,® understanding by original justice that state in which Adam was created and lived prior to the fall, with all the. gifts of grace which God had bestowed upon him with the view to his supernatural end in ultimate possession of the Divine Vision. All this Adam forfeited when he fell, and that forfeiture passed by natural

*generation to all his descendants. In this view original sin is not a positive evil added to human nature, but the deprivation of a super¬ natural good originally bestowed upon the race in the headship of Adam. Following this orig¬ inal loss, as a penalty of Adam's transgression, came the direful consequences of death, the confusion and disorders of all the human facul¬ ties, and the sting of concupiscence. This is the accepted teaching of the Roman Catholic Church, and the Council of Trent defines as of faith, that Adam lost original justice, not only for himself, but also for us; that he <(poured sin, which is the death of the soul, into the whole human race,** and that this sin comes, not by imitation of Adam's transgres¬ sion, but by propagation from him.*

The reformers of the 16th century generally held to a very strict interpretation of the Au- gustinian view, and regarded original sin as a complete corruption of the will and reason. Luther held that it consisted in concupiscence. The Lutheran and the Reformed Churches both held similar views regarding original sin, fol¬ lowing Calvin rather than Zwingli, who looked upon it as an evil or disease, and only as a sin when a commandment was thereby transgressed. The Arminians and Socinians, on

the. other hand, discountenanced the ecclesiastical view of the doctrine. While the Protestant Church maintained that Jesus alone was absolutely free from original sin, the Roman Catholic Church exempts the Virgin Mary from its dominion. Uniform adhesion to the Augustinian dogma on the part of the reformers was by no means the case. From Luther's dispute with Erasmus, who would only admit a weakness of the free¬ will and not its destruction, up to the present time the doctrine has been variously defended and attacked, philosophers as well as theolo¬ gians taking part in the controversy. Kant showed the moral signification of the doctrine, and represented original sin as an inherent tendency in man's nature to evil. Rationalism, on the other hand, taught with Pelagius that it was only a weakness of man's nature with re¬ gard to knowledge and his power for good. According to Hegel original sin is nothing else than the necessary finitude and limitation of our nature. In recent times orthodox theolo¬ gians, such as Olshausen, Hengstenberg and others, have stood up for the Augustinian doc¬ trine, while those of the liberal school have modified it in various ways. Consult Clemm, (Christliche Lehre von der Siinde) (1897) ; Fisher, G. P., (History of Christian Doctrine1 (New York 1896) ; Harnack, A., (History of Dogma* (Boston 1897-1900) ; Tennant, F. R., 'Sources of the Doctrine of the Fall* (New York 1903) ; Tulloch, John, 'Christian Doctrine of Sin* (New York 1877) ; Hodge, Systematic Theology* (1871) ; Mackintosh, R., ' Chris¬ tianity and Sin* (New York 1914) ; Landis, 'Doctrine of Original Sin* (1885) ; Muller, (Christliche Lehre von der Sitnde* (1888).*

ORIGINS OF CONTEMPORARY

FRANCE, The. (The Origins of Contempo¬ rary France, like his work in criticism and philosophy, exemplifies certain general concep¬ tions which Hippolyte Adolphe Taine (1828- 93) put forth insistently from the beginning to the end of his career. Man is not a free agent. His course of action is determined by great un¬ conscious forces or pressures, such as race,*

environment, and his relation to the past. A religion, a work of art, a form of government, do not represent free creations and free choices of the human spirit. They are products just as the compounds in a chemical laboratory are products, the result of combinations of ele¬ ments, and they should therefore be studied scientifically.

It was the results of the Franco-Prussian War that deflected Taine's attention from more purely literary and philosophic studies to a con¬ sideration of the unhappy state of his own land. France had been conquered, the empire sud¬ denly and unexpectedly overthrown, the Com¬ mune had started to revive the excesses of the revolution. What was the

destiny of France? Through what form of government could the forces that are France most effectively express themselves ? These were the questions which forced themselves upon him. They could be answered only by a study of the past, and Taine began to apply to the history of his country the method and the theories which he had al¬ ready applied to literature.

In the many volumes of this history he was therefore treating France as a parallelogram of forces of which he was to find the diagonal. In the French Revolution these forces which were to make or wreck his country had been re¬ leased and could be studied in freest play. But before beginning his study of the Revolu¬ tion proper he summed up the social and politi¬ cal situation as it existed in France in the 18th century in what has been generally recognized as the most brilliant portion of his work, the volumes on 'The Old Regime' (l'Ancien Regime), which were to deal with the 18th century and the marshalling of the forces that brought on the cataclysm.

Taine loved startling effects, and they were here ready to his hand. On the one side he had the brilliant and sumptuous life of the court, on the other the misery of starving peasants. The greatest economic, social and political up¬ heaval in history was impending, and in the minds of the philosophers were being prepared the new doctrines that were to hurry in the climax. Taine's powerful imagination and ex¬ traordinary command of style gave this stupend¬ ous drama a presentation worthy of the theme and of the writer.

He was now ready to make his study of 'The French Revolution which to him was a conflict of ideas and forces rather than of individuals. The role of the revolutionary leaders is therefore subordinated; for the most part they are carried along by movements which they are powerless to check and unable to guide ; and the implication everywhere is that the cataclysm was the result of lack of any strong central control. A rereading of these volumes to-day shows how close a parallelism is presented between the work of the Jacobins in France and that of the Bolsheviki in the collapse of Russia. (The Modern Regime,* the least interesting section of his work, was the title of the later volumes which carry us on only into the earlv period of the 19th century.*

*Taine's enthusiasm for the method of science led him to claim that he worked with entire detachment and studied the . transformation of France as a naturalist studied <(the metamor¬ phosis of an insect.** His own conclusions on life and his theories of development were, how-*

ever, so strongly held that he most readily found in history what his theories had led him to seek. As artist and master of style, he out¬ ranks any of the later French historians. His theories on historical method were powerfully to influence his successors, though many of them, less strong in temperament and philo¬ sophic bias, were to cover the same ground more thoroughly if far less brilliantly than their master vvhom they frequently disowned. Nor was his influence confined to historians. 1 he naturalistic novelists like Zola were only too willing to assume the dignity of (< scientists® after having regarded the life of their hero or heroine as a naturalist regards ((the metamor¬ phosis of an insect.®

The validity of Taine's historical work and the sufficiency of his erudition have in the present century been frequently impugned by historians more methodical but less gifted. The most important of these attacks on Taine is the volume of Aulard, (Taine Historien de la Revolution Frangaise) (1907). For a French estimate of Taine consult Giraud, (1909, 4th ed.).

Christian Gauss.

ORIHUELA, o're-wa'la, Spain, city in the province of Alicante, 13 miles northeast of Murcia and 15 miles from the Mediterranean, on the Murcia-Elohe Railway. The town ex¬ tends on both sides of the river Segura and is situated in a very beautiful and fertile region. The town was captured by the Moors in 713, and was recaptured by James I of Aragon in 1265. It is the seat of an episcopal see and has an episcopal palace dating from 1733. There is also a Gothic cathedral of the 14th century, and a town hall with important archives. It for¬ merly possessed the University of Orihuela but this was closed in 1835. It has a normal school and a theological seminary. The surrounding district produces fruit, wine, oil and cereals and the town has a considerable trade in them. It also manufactures silk, linen and woolen fabrics ; and has tanneries, dyeworks and oil and flour mills. Pop. about 35,072.

ORILLIA, o-ririT-a, Canada, town and port of entry of Simcoe County, Ontario, on the west shore of Lake Couchiching, on the Grand Trunk, Canadian Northern and Canadian Paci¬ fic railways, 86 miles north of Toronto, 28 miles northeast of Barrie. It is a favorite fish¬ ing and summer resort. It has an opera house, collegiate institute and a provincial lunatic asy¬ lum is located there. It enjoys a thriving trade in lumber and farm produce ; has manufactures of leather, foundry products, lumber, shingles and planing and grist mill products; and has electric light, water and sewerage systems. Pop. about 6,828.

ORINOCO, ori-no'ko, Venezuela, one of the three great South American rivers, rising in the Sierra Parima, on the Brazilian frontier, near lat. 3°

40′ N., long. 64° W., and after a winding course of over 1,500 miles, during which it forms part of the boundary with Colombia, flowing into the Atlantic through a many-mouthed delta between long. 60° 20′ and 62° 30′ W., opposite the island of Trinidad. The area of the drainage basin is estimated at 368,600 square miles. Its exact sources were not discovered until 1886. It flows at first west by north, a mountain stream, as far as long.

67° W. A little below Esmeralda, in long. 65° 50′ W., it divides and sends off to the south, the Cassiquiare, a natural canal 180 miles long with a rapid trend to the Rio Negro, a tributary of the Amazon. The Orinoco and Amazon are also connected by the Pimichin stream and the Terni branch of the Atabapo, an affluent of the Orinoco. Other important tributaries are the Guaviare, the Meta, Apure, Arauca, Caura and Caroni. Two remarkable rapids occur in the upper parts of the Orinoco, called the Atures and Maypures, the one in lat. 5° 8′ N., the other about 36 miles lower down. These rapids consist of a countless number of little cascades succeeding each other like steps, and, where numerous, islands and rocks so restrict the bed of the river that out of a breadth of 8,000 feet there only remains an open channel of 20 feet. From these rapids the river is navigable to its mouth, a distance of about 870 miles.

At 600 miles from the ocean it is from 5,000 to 6,000 yards wide; at Angostura or Ciudad Bolivar, 370 miles from its mouth, 7,500 yards; and in March 65 fathoms deep. About 120 miles from the Atlantic its delta of 8,500 square miles begins. Of upward of 50 mouths which reach the ocean along 165 miles of coast line, only seven are navigable. The waterway prin¬ cipally used by ocean-going vessels, which pene¬ trate up to Ciudad Bolivar (Angostura), is Boca de Navios, varying in width form 3 Y\ to 23 miles. Most of the larger affluents are also navigable for considerable distances, the Meta, , for instance, to within 60 miles of Bogota. As a rule the river floods the dis¬ tricts adjoining its banks from May to January, the country under water sometimes measuring 100 miles across. The magnificence of the scenery on the banks of the Orinoco is beyond description. Forests of great extent are filled with aromatic trees; birds of beautiful plum¬ age are common, and hordes of monkeys dis¬ port themselves among the branches. Beyond these forests enormous plains extend their verdant surfaces farther than the eye can reach. The whole course of the main stream is in Venezuela, except where it forms the boundary between Venezuela and Colombia. Consult Guzman, (La exploracion del Orinoco) (in (La Espana moderna, Madrid 1902) ; Humboldt, Alexander von, (Travels in South America) (London 1877) ; Mozans, H. J., fol¬ lowing the Conquistadores : Up the Orinoco and Down the Magdalena) (New York 1910) ; Triana, S. P., Town the Orinoco in a Canoe) (London 1902).*

9RIOLE, any of certain passerine birds, distinguished by the predominance of a golden hue in their colors. The orioles of the Old and New Worlds belong to quite distinct families. The American orioles constitute, with the black¬ birds, the meadow-larks, boblinks and cow- birds, the family Icterides, of which the}'- are often considered to form a subfamily (Icte – vines) and which is related on the one hand, through the meadow-larks, to the starlings (Sturnides) of Europe and on the other, through the bobolink, to the finches (Fringil – lida).' From the other members of the family the orioles may be distinguished by the slender, acute, slightly decurved bill, small, weak feet and the strongly contrasting black with yellow, golden or reddish colors of the males and the

usually plainer females. Practically all of the 40 or so species of American orioles belong to the typical genus Icterus whose species abound in tropical America, where tney are called trou¬ pials, caciques, or banana birds. Within the limits of the United States seven species occur, but three of these are really Mexican birds which wander over our southwestern border and another is a rare straggler from South America. Several of the tropical species are imported as cage-birds. The Baltimore oriole, golden robin or liangnest (/. galbula), the male of which is about eight inches long and bears the rich golden and black coio. s of Lord Baltimore's livery, is one of the best known and most con¬ spicuous migratory birds of the east. It oc¬ cupies the entire territory east of the Rocky Mountains and northward into Canada and in winter migrates to Central and South America. From the Rocky Mountains to the Pacific it is replaced by the closely related I. bullocki. The Baltimore oriole is noted alike for its great beauty, its vivaciousness, its clear, loud whistle constantly repeated in May and June and its skilfully woven, pensile nest, formed of grasses and fibres and suspended from the endmost twigs of high branches, often of elm and syca¬ more trees.

The orchard oriole (/. spurius) has a similar range somewhat curtailed northward and west¬ ward. It is a smaller bird and the adult male is black and reddish chestnut, but assumes these colors only when three years old ; the young male resembles the female in being olive-green and dull yellow, but in the second year has a black face and throat. In habits it generally re¬ sembles the Baltimore oriole, but it is pre-emi¬ nently a denizen of orchards and its song, nest and eggs all present specific differences.

The orioles of Europe and of the Old World generally, except Africa, belong to the family Oriolidce, which is related to the birds-of-Para- dise.

The best known species is the golden oriole, which has a stout bill and bright yellow plumage with black wings and tail. Like our orioles it constructs a hanging nest. Certain species of orioles of the genus Mimeta, inhabit¬ ing islands of the Malay Archipelago, so exactly resemble associated species of friar-bird (Phile¬ mon) that Wallace considers them to be true mimics. Consult American and European orni¬ thologies generally; Jordan, (Birds of India) (1862) ; Knowlton, F. H., (Birds of the World) (New York 1909) ; Wallace, (Tropical Nature)

(1878).

ORION, d-re-dn/ Philippines, a pueblo of the province of Bataan, Luzon, situated near the west shore of Manila Bay, five miles south of Balango. It is on the principal road of the province. Pop. 10,370.

ORION, o-ri'on, (1) in astronomy, one of Ptolemy's constellations and the most marked in the heavens. It is divided by the equator into two nearly equal portions. When the location of its bright stars is known, many of the sur¬ rounding ones may readily be found by align¬ ments; (2) in Greek mythology, an heroic youth, son of Hyrieus of Hyria, though other origin has also been attributed to him. Eos became enamored of h'm. The gods were jealous of her love and Artemis at the command of the gods slew him with her arrows in the island of Ortygia. He was of such gigantic size that

when standing in the middle of the sea the water only reached his shoulders. According to an¬ other legend, he died of the sting of a scor¬ pion. Various other legends of the hero are found in Greek mythology.

ORISKANY, o-ris'ka-ni, Battle of, in American history, an engagement between the British and Indians and the American forces, near Oriskany, N. Y., 10 miles from Fort Stan- wix, 6 Aug. 1777. The opposing forces each numbered about 800 men. The Americans, un¬ der General Herkimer, started to relieve Fort Stanwix, which was besieged by Saint Leger, Brant and his Indians. At Oriskany he halted and attempted to concert an attack and a sor¬ tie. The plan miscarried. Herkimer advanced and was attacked by the Indians and Tories in a deep ravine. The battle raged furiously for hours, despite a terrific ' thunderstorm and was one of the most cruel and bloody of the Revolu- tipnary War. Each side lost a third of its number. The Americans remained masters of the field, although badly disabled. The sortie from the fort was a success and badly crippled the enemy. General Herkimer was mortally wounded in the battle and died several days later.

ORISKANY STAGE, in geology, the low¬ est group of the Devonian system, so called from Oriskany Falls, N. Y., northeast of Utica, and apparently

the northern limit of the stage in New York, the name being due to the New York Geological Survey. In Maine it is several thousand feet thick, but is much thinner in west¬ ern New Jersey, eastern Pennsylvania, Mary-, land, Virginia and West Virginia. It also oc¬ curs in Ontario and crops out in southern Illinois.

ORIZABA, 6-re-sa'ba, Mexico. One of the chief cities of the State of Vera Cruz; situated 81 miles southwest from the port of Vera Cruz and 182 miles southeast from the City of Mex¬ ico, on the line of the Mexican railway, at the entrance to the coffee zone. Its elevation is 4,030 feet above sea level and its climate throughout the entire year is delightful. In the immediate vicinity are several cotton mills which combined, employ some thousands of operatives. Within the city limits are located the great Santa Gertrudis jute mills, owned in England, the Moctezuma brewery, cigar fac¬ tories and a number of other industries and the Mendizabal hospital. In a nearby suburb are stone and marble quarries which annually sup¬ ply enormous quantities of building material of very superior quality; and to the south, toward Cordoba, which is situated in the centre of the tropical fruit interest and tributary to Orizaba, are great sugar cane plantations and sugar mills. In the vicinity of Orizaba is a wealth of water power which is sufficient for every need, during a part of the year. The most notable structures are the State Normal School, completed at a cost of $500,000, the City Hall, pld Cathedral, cotton mills, jute mills, brewery and Hotel de France. The" streets are all paved with stone. The street railway system extends several miles into the country in three directions. The Pre¬ paratory College maintains a technical museum and two public libraries — one connected with the Preparatory School and the other with the ˆC-rcel Munjrinal® — 12,000 volumes in all. Pop. about 48,000.

CHESTNUT-SIDED WARBLER (above). BALTIMORE ORIOLE (below).

ORIZABA, Mexico, a volcanic peak, 60 miles west of Vera Cruz, on the boundary be¬ tween the states of Puebla and Vera Cruz. It was called by the ancient Mexicans Citlatepetl, or Mountain of the Star (from citlalin , star and tepetl, mountain), probably from the cir¬ cumstance that ((when in a state of eruption the llame at its summit appeared, when seen from a distance, like an immense star on the verge of the horizon, w as one historian states : < (but more probably because, on the side of the mountain, was a temple in pre-Columbian times, in which the (sacred fire was ever kept burning on the open top of the pyramidal structure; in full view of the inhabitants of the surrounding valleys.** It has an altitude of*

18,200 feet and is the first land visible on approaching the coast in the direction of Vera Cruz. Its most considerable eruptions known to history took place between 1545 and 1566. In common with the other great volcanoes of Mexico, Popocate¬ petl, Tuxtla and Jorullo, it seems to have lost most of its activity and to be in a state of repose.

ORKNEY (ork'ni) ISLANDS, Scotland, an archipelago forming a single county, sepa¬ rated from the northern coast of Caithness, by the Pentland Firth, from six to eight miles broad. There are in all 67 islands of con¬ siderable size, with a number of smaller dis¬ persed over the archipelago. They extend from lat. 58° 42′ to 59° 23′ N. ; long. 2° 22′ and 3° 25′ W. ; aggregate area, 390 square miles, or 249,- 565 acres, of which about 107,000 are under culture. Among the larger islands are Pomona or Mainland, Hoy, South and North Ronaldsay, Westray, Sanday, Eday, Stronsay, Ronsay and Shapinsay. Of the whole about 28 are usually inhabited, although five or six do not contain a dozen inhabitants each, the rest being islets too rocky to attract settlers. Hoy is the only island of the group that can be called mountain¬ ous and here the highest elevation is but 1,600 feet. With the exception of a granitic district near Stromness, the islands are of old red sand¬ stone formation. The climate is moist, but not cold, being tempered by the Gulf stream that sweeps around the shores. Oats, turnips and hay are the chief crops and 16,000 acres of land are devoted to permanent pasture. The com¬ mon breeds of sheep, cattle and horses were small, but since the introduction of good stock from the south, have become large and valuable. Rabbits and poultry are numerous. The herring and cod fisheries compensate in some parts the absence or defective development of other re¬ sources and large numbers of lobsters are annually sent to London. The principal manu¬ factures are hosiery, made by the females and the building of boats, making of sails, nets and cordage. The chief town is Kirkwall.

As the Orcades mention is made of the islands by several ancient geographers and clas¬ sical writers, Ptolemy, Pliny the Elder, Mela, Solinus and others; the prehistoric monuments include the Stenness (q.v.) monoliths, the Mseshowe tumulus and a Pictish fort. It is probable that the Piets" possessed the islands until the subversion of the Pictish kingdom in Scotland by Kenneth IT. In 1099 thev were as¬ signed by King Donald Bane to the king of Norway and remained in nossession of the Norwegians until the middle of the 13th cen¬

tury, when Magnus, king of Norway, trans¬ ferred them to Alexander, king of Scotland. In 1911 the population of the Orkney Islands was 25,897.

ORLANDO, Vittorio Emanuele, Italian

statesman : b. 1860. A native of Sicily, he was for many years professor of constitutional law at the University of Palermo. In the Boselli administration he was minister of the interior. He was much criticized for the latitude he al¬ lowed the neutralist and pacifist agitators. Per¬ ceiving the danger of their machinations, he rigorously suppressed the movement. Succeed¬ ing Boselli in the premiership in October 1917, he gained prestige by the moral courage he exhibited at the time of the Italian disaster of the Caporetto. He organized national re¬ sistance to the Austro-German invasion and in a series of patriotic speeches sustained the spirit of the country. He was principal Italian dele¬ gate at the Inter-Allied Peace Conference in Paris.*

ORLANDO, or-lan'do, Fla., city, county- seat of Orange County, on the Seaboard Air Lines, about 100 miles south by west of Saint Augustine. It is in a fruit growing region and its principal industries are connected with the marketing of the fruit of the surrounding country. Pop. (1920) 9,257.

ORLANDO FURIOSO ((The Raging Roland), a romantic epic in ottava rima, by Lodovico Ariosto, is probably the most bril¬ liant literary achievement of the Renaissance in the 16th century. The masterpiece of the great Ferrarese poet was begun about 1506 and was first printed in 1516. Originally in 40 cantos, constantly revised by the author, in its final form in the edition of 1532, published one year before Ariosto's death, it contains 46 cantos. Taking the popular subject and char¬ acters of Boiardo's (Orlando innamorato) (q.v.), Ariosto completed the unfinished nar¬ rative of his predecessor and developed the poetic romance in Italy to its utmost perfection.*

Boiardo's romance of chivalry had broken off at the point where the victorious pagan hosts were besieging Charlemagne in Pans. Ariosto conducts his poem to the final discom¬ fiture of the Saracens and the triumph of the Christian world. From the Titanic fury of Orlando's jealous frenzy, the central episode of the poem, to the delightful idyll, the love of Angelica for Medoro, the cause of the here '? madness; from that exquisite extravagance Astolfo's fantastic journey to the moon i: search of his friend's lost senses, to the ti umph of Discord in the Moslem camp, the poet, blending earnestness and irony in inimi¬ table fashion, leads his charmed readers from one surprise to another. The desire to flatter his patrons, the militant ecclesiastic, Ippolito d'Este and the cardinal's brother, Alfonso I, Duke of Ferrara, caused Ariosto to emphasize the roles of Ruggiero and Bradamante, the fabulous ancestors of the house of Este. Thus Boiardo's original protagonists, Orlando, Ri- naldo and Angelica descend into secondary importance, while the trials and final union of Ruggiero, the paynim hero, and the virgin war¬ rior, Bradamante, the sister of the Christian paladin, Rinaldo, become in the version of the courtier poet the

main theme.

The charm of the narration, the beauty of the introductions, the wonderful variety ot events, the magic of the style, captivated the nublic Between 1536 and 1560 one editor alone brought out 30 editions of the Written for a later and more polished society, this fanciful epic shows a distinct progress m refinement, taste 'and restraint over Boiardo s romance. The elegant society of the day saw itself mirrored in the courtliness, the chivalric love, the perfect knighthood of the Orlando furioso. Gifted in imagination and aesthetic sense, handling the ottava rima with masterly suppleness, harmony and variety of rhythm, Ariosto has produced in his poem, through its elegance, serenity and sheer beauty, the perfect expression of the later Italian Renaissance. Consult Ermini, Filippo, 'L'Orlando furioso) (critical text of the editions of 1516, 1521, 15o2, Rome 1909-13) ; Rajna, Pio,*

E. G., (The king of court poets) (London 1906).' The translation by Wm. S. Rose now to be found in Bohn's Library (London 1902- OS) is superior to the older renderings ot Harington or Hoole.

Alfred G. Panaroni.

ORLANDO INNAMORATO (< Roland

Enamored }), the most famous work of Matteo Maria Boiardo, is an Italian romance of chiv¬ alry in ottava rima. Begun about 14/2, this vast narrative poem was interrupted at the end of the second book by the war between the Vene¬ tians and the Duke of Ferrara (1482). In the last 10 years of his busy life as a state official, Boiardo had added nine cantos to his third book, when the descent of Charles Vlll of France into Italy and the death of the poet in the same year (1494) left his task unfinished. The incomplete work contains in all 69 cantos. Written for the brilliant court of Ferrara, whose sovereign, Ercole I, was Boiardo s patron, the (Orlando innamorato welded in admirable fashion the epics of Charlemagne and the romances of the Arthurian tradition. Bor¬ rowing from the Carolingian poems the ever- popular heroes of chivalry and from the Breton cycle the Oriental magic, the monstrous giants, the love potions and the supernatural char¬ acteristics of the Arthurian legends, Boiardo infused a new element by making love the central theme, a procedure that appealed im¬ mediately to the courtly and more . cultured nobility of the Renaissance. Thus it is the love of Orlando and Rinaldo for the beautiful Princess Angelica of Cathay*

which is t'he main¬ spring of this lengthy epic. Added interest in the theme was found in the threat of the vic¬ torious Turks, who, under Mahomet II, had been menacing Italy at this very time. Pagans and Christians vying in friendly and in mortal rivalry, great infidel hosts attacking Christen¬ dom from every direction, marvelous adven¬ tures and mysterious expeditions to every clime, all the multitudinous episodes of the mediaeval folklore are consummately united. The com¬ plicated plot is skilfully constructed, the story is developed with mastery, the characters, though external, are fresh and real. The suc¬ cess of Ariosto's (Orlando furioso) (q.v.), the evident defects in style — a ruggedness of versification, an excess of Lombard dialecticisms, a sobriety of language, quickly attracted the re¬

forming hands of Tuscan purists, whose rifaci- menti, while polishing and embellishing the form marred the epic simplicity and directness of the original. The most famous of these revisions, that of Francesco Berm (1542), for three centuries completely eclipsed Boiardo s version. It was only in the 19th century that the original text was reconstituted and that the author recovered his true position as the woithy predecessor to Ariosto. Consult Pamzzi, Antonio, (Orlando innamorato, Orlando fu-

rioso, > with an essay on the poetry of the Italians (London 183CE34) , Studj su M. M. Boiardo > (Bologna 1894) ; Rose, Wil¬ liam Stewart, (The Orlando Innamorato (a prose translation from Berni's nfacimento, London 1823). A critical edition of the text is by F. Foffano (Bologna 1906-07).

Alfred G. Panaroni.

ORLEANS, or'le-anz (Fr. or-la-an), the name of several princely houses of trance, lords of the county (later the duchy) of Or¬ leans. In 1344 it was an appanage of the cadet branch of the reigning Valois, and under the Bourbons it held a corresponding place ihe various families of Orleans may be distin¬ guished as follows: 1st, dating from 1344, containing the single name of Philippe, 4th son of Philip VI. He died in 1375, his 40th year, without legitimate heirs, the duchy therefore reverting to the Crown; 2d, dating from 1391, when Louis, Count of Valois, b. 1372, d. 140/, received the duchy from his bi other, Charles VI, and terminated in .1498 by the accession of the then incumbent to the throne as Louis XII; this Louis (q.v.) was son of the poet Charle of Orleans (see Orleans, Charles, Duke of) ; the 3d, like the first, began and ended with a single duke, Jean Baptiste Gaston (q.v.), brother of Louis XIII, who held it from 1626 to 1660; the 4th important grant of the title was to Philippe, brother of Louis XIV, b. 21 Sept. 1640; d. 9 June 1701, the founder of the House of Orleans-Bourbon, of which only one member has been king of France, namely, Louis Philippe (q.v.). ˆ See various names under the heading of Orleans.

ORLEANS, Charles, Duke of, commonly called Charles d'Orleans, French poet and soldier, count of Angouleme : b. Paris, 26 May 1391 ; d. Amboise, 4 Jan. 1465. He succeeded to the duchy in 1407 on the death of his father, Louis, and like him took a prominent place in French politics, becoming a leader of the party opposing Burgundy and England. Wounded at Agincourt, he was taken captive to England and imprisoned there, probably with little or no severity, being so important a hostage, until 1439. He then married Marie de Cleves, niece of Philippe the Good of Burgundy and thus aroused suspicion against himself at court, where alliances with Burgundy were not looked upon with favor. Charles d'Orleans spent his last years in seclusion from public activity, but was famed as an entertainer and hospitable patron of poets and artists. His poems, includ¬ ing chansons, rondeaux, ballades, etc., some in French, some in Latin, and some in English, written during his captivity, are intensely sub¬ jective, entirely free from patriotic feeling or any thought save for his own sorrows, joys and loves. They were edited by d'Hericault (1874).

Consult Beaufils, (Etude sur la Vie et les Poesies de Charles d'Orleans) (1861).

ORLEANS, Helene Louise Elisabeth,

Duchess of, wife of the Duke of Orleans, Ferdinand, son of Louis Philippe: b. Ludwigs- lust, 24 Jan. 1814; d. Richmond, England, 18 May 1858. The daughter of Friedrich Ludwig, Grandduke of Mecklenburg-Schwerin, she mar¬ ried 30 May 1837, lost her husband 13 July 1842 and devoted herself to the education of her sons, the Comte de Paris (see Paris, Louis Albert Philippe, Comte de), and the Due de Chartres, in whose behalf, in 1848, after the abdication of Louis Philippe, their grandfather, she appealed in vain to the National Assembly. She removed, first to Ems, then to Eisenach and finally to England. She was a woman of many accomplishments. Consult Schubert, bi¬ ography > ˆ(1877) .

ORLEANS, Henri, Prince of, French ex¬ plorer, eldest son of Robert, Due de Chartres: b. Ham, near Richmond, Surrey, England. 6 Oct. 1867 ; d. Saigon, Indo-China, 9 Aug. 1901. At 22 with Bonvalot he traveled through central Asia to Tonquin; received the medal of the French Geographical Society in 1890, having traveled through India, Afghanistan and Japan in the interval ; and in the next six years ex¬ plored Abyssinia (1891), Laos and Siam, Mada¬ gascar (1894) and Tibet and Yunnan (1895- 96),

discovering the sources of the Irawady on this last journey. He gained great popularity in France, notably by his bold colonial policy, which was a constant source of irritation to England ; and yet his bid for the favor of the army in his defense of it during the Dreyfus case was unsuccessful, being rather too open. His experiences in Abyssinia led him to criticise harshly the Italian officers in captivity there, and in 1897 he was challenged to a duel and wounded by the Count of Turin. Early in 1901 he left France for Annan, where he died in August. He wrote (Six Mois aux Indes) (1889) ; (De Paris au Tonkin et travers le Thibet inconmP (1891); (Une Excursion en Indo-Chine) (1892) ; (Autour du Tonkin> (1893) ; and (A Madagascar (1895).

ORLEANS, Jean Baptiste Gaston, Duke of, third son of Henry IV of France, and brother of Louis XIII : b. Fontainebleau, 25 April 1608; d. Blois, 2 Feb. 1660. His char¬ acter was weak and yielding, and he was con¬ tinually involved in plots, first against his brother, Louis XIII, and Richelieu, and then against Anne of Austria and Mazarin. In 1626 he was made Duke of Orleans and he married Mary of Bourbon, Duchess of Montpensier. A mere tool of Cardinal Richelieu's enemies at court, he entered a conspiracy against Riche¬ lieu's life, which was discovered and crushed. The Duke lived temporarily at peace with Richelieu, only to join Marie de' Medici, his mother, in a new intrigue against the minister in 1631, which resulted in the complete triumph of Richelieu and the flight of the Duke to Lorraine. There in 1631 he married Margue¬ rite, sister of Charles IV, Duke of Lorraine. He returned to France in 1634; plotted to kill Richelieu in 1636, purchasing his own pardon by sacrificing the lives of his accomplices; joined the plot of Cinq Mars in 1642, but again escaped punishment ; and after the death of Louis XIII became lieutenant-general of the

realm (1643). But his part in the Fronde, where he was clearly the tool of De Retz, was too flagrant to be passed over, and in 1652 he was banished from court to Blois. Consult his (Memoirsˆ written by Mile, de Montpen¬ sier (q.v.).

ORLEANS, Louis Albert Philippe, Comte de Paris. See Paris, Louis Albert Philippe, Comte de.

ORLEANS, Louis Philippe Joseph, loo-e

feˆlep zho-zef, Duke of, great-grandson of the Regent of France, Philippe, Duke of Orleans: b. Saint Cloud, 13 April 1747 ; d. Paris, 6 Nov. 1793. Duke of Montpensier during his grand¬ father's last years, and from 1752 to 1785, Duke of Chartres, he succeeded his father in the last named year. He married, in 1769, Louise Marie Adelaide, daughter of the Duke of

*Penthievre, showed himself a voluptuary like the Regent and governed by strange whims. The accusa¬ tion of cowardice brought against him for his part in the battle of Ouessant and the refusal to make him grand-admiral, in spite of his hereditary right to that post, made him a bitter enemy of the court. In 1787 he was a member of the Assembly of Notables and as such de¬ clared against the ministerial proposals and was exiled as a result. With the approach of the Revolution he gave up his rank, became a pronounced republican, joined the Jacobins (1789), assumed the name of Citizen Philip Egalite, voted with some degree of moderation in the Constituent Assembly, but in the conven¬ tion joined the Mountain and voted for the death of the king. This action seems to have opened the eyes of his colleagues to his ap¬ parent desire to be made king himself, and 6 April 1793 the arrest of all members of the Orleans family was voted by the Convention. He was accused of high treason but was de¬ clared innocent by theˆ tribunal of the Depart¬ ment Bouches du Rhone. Shortly afterward, he was brought before the Revolutionary Tribunal in Paris and, by it, condemned to death and executed the same day (6 Nov. 1793). Consult the exhaustive article by Monin in (La Grande Encyclopedic) ; and the biog¬ raphies by Tournois (1842-43), Montjoie (1796), Ducoin (1845) and Cretineaus-Joly (1862) ; also Carlyle, (French Revolution.**

ORLEANS, Louis Philippe Robert, ro-

bar, Duke of, son of the Comte de Paris : b. Twickenham, England, 6 Feb. 1869. He was educated in France at Eu and Stanislas College and afterward studied at Sandhurst Military College, England. He was exiled, together with his father, by the law of 23 June 1886, and entering the British army, he served in India for two years. In 1890 to rouse Orleanist sympathy he returned to France and attempted to enter the army as a French citizen. He was sentenced to two years' imprisonment on 6 Feb. 1890, but was pardoned and sent out of France in June of the same year, the government real¬ izing that his punishment might aid the Royalist cause. He traveled extensively in Asia from 1890 to 1895. In 1894 upon the death of his father he became the recognized leader of the Royalists. He married 5 Nov. 1896 Maria Dorothea, archduchess of Austria but separated from her. He led an expedition, in 1905, to explore the northeast coast of Greenland and adjacent sea; and followed this with another in

*1907 to the Kara Sea. He made a collection of the letters of several of the Bourbons. Among his published works are (Un croisiere au Spitzberg5 (1905); (A travers la banquise) (1907); (La revanche de la banquise**

(1909); (Chasses et Chasseurs arctiques) (1911).

ORLEANS, Philippe, Duke of, son of Louis XIII, styled "Monsieur® during the. reign of his brother Louis XIV : b. Saint Germain, 21 Sept. 1640; d. Saint Cloud, 9 Tune 1701. He was the founder of the existing house of Orleans. Originally Duke of Anjou, in 1660 he succeeded Jean Baptiste Gaston, Duke of Orleans (q.v.), his uncle. In 1661 he married Henrietta, sister of Charles II of England, of whom he was very jealous, even resenting the favor shown her by Louis, who made use of her in effecting his alliance with the English king in 1670. Henrietta died in the same year, possibly poisoned; and in 1671 the Duke mar¬ ried Charlotte Elizabeth, daughter of the Elector Palatine. He fought in the Nether¬ lands against William of Orange with such success that his royal brother relieved him of command, fearing his growing prestige. His two daughters by his first marriage were Marie Louise (1662-89), wife of Charles II of Spain, and Anne Marie (1669-1728), wife of Victor Amadeus of Savoy; by the second marriage he had a son, Philippe (q.v.), and a daughter Elizabeth Charlotte (1676-1744), who married in 1698 Leopold of Lorraine.

ORLEANS, Philippe, Duke of, son of Philippe of Orleans and nephew of Louis XIV : b. Saint Cloud, 2 Aug. 1674; d. Versailles, 2 Dec. 1723. According to the custom established by his father he bore the title of Due de Char¬ tres as eldest (only) son. He was able but some¬ what profligate ; married in 1692 at the wish of Louis XIV, Mile, de Blois, the king's daughter by Mme. de Montespan : quickly made himself famous as a soldier by his exploits at Mons (1691), Steenkirk (1692) and Neerwinden (1693) ; and like his father was practically re¬ moved from the army because of the spite of Louis XIV until his father's death. He was defeated at Turin in 1706 by Prince Eugene, but more than regained his laurels in Spain in 1708 by the brilliant capture of Lerida. His success and the rumor of intrigues with the English to make him king of Spain enforced renewed retirement in 1708. The successive deaths of the Dauphin and the Duke and Duchess of Burgundy and their son in 1711-12 were laid by gossips to his door, but he seems to have been more occupied at this time with alchemy, arts, letters and a life of pleasure than with politics. By right of birth he became (1715) regent during the minority of Louis XV. His policy was bold, quite the reverse in its details from that of Louis XIV. He restored the power of the nobles ; withdrew laws against Protestants ; aimed at canceling the revocation of the Edict of Nantes; joined the Quadruple Alliance, and in other ways showed himself a friend of England; attempted to reform French finance, but made bad worse by acting on the advice of John Law (q.v.) ; and even after 1723 when the king came of age retained much actual power for a time through Cardinal Du¬ bois (his old tutor), whom he had made Prime

Minister. On the death of Dubois, he became himself Prime Minister in August 1723 and held office until his death the following December. Consult the biographies by La Motte, Capefigue and Baudrillart; and the histories of the re¬ gency by Lemontey, Piossens, Marmontel, Lacretelle and Wiesener; as well as the

ORLEANS, France, a city, capital of the department of the Loiret, situated on the right bank of the Loire, 77 miles southwest of Paris. A magnificent bridge of nine arches connects it Avith the populous faubourg of Saint Marceau. The houses are well built, but the streets in general are narrow and crooked. It has some handsome public squares, a Gothic cathedral ; two hotels-de-ville ; the Palais de Justice; the Musee, containing a curious collection of local antiquities; the theatre, and other edifices worthy of notice. The manufactures and trade o'f the place are considerable, but have lost much of their former importance. There are several worsted and cotton mills, numerous sugar refineries, vinegar works, breweries and manufactures of hosiery, ironmongery, pottery, etc. Orleans was the Gallic Genabum destroyed by Caesar 52 b.c., and rebuilt as Aurelianum, whence the corruption Orleans. Philip of Valois erected Orleans into a duchy and peerage in favor of his son, and Orleans has since con¬ tinued to give the title of duke to a prince of the royal line of France. Philip the Fair in¬ stituted a university here in 1312, which formerly had great celebrity. In 1428 the city sustained a siege against the English, and was relieved by the Maid of Orleans (see Joan of Arc), whose statue in bronze stands in one of the public squares. It was taken and retaken more than once in the Franco-German War in the latter part of 1870. Pop. about 75,000.

ORLEANS, Isle of, Canada, in the Saint Lawrence River below Quebec at the head of the estuary 650 miles from the ocean. It is dependent to Montgomery County, is about 22 miles long and has an area of 70 square miles. On account of its numerous grace vines Jacques Cartier first named it the Isle of Bac¬ chus, in 1535. The soil is fertile, well-wooded, and fruit culture is the chief industry. The villages along its shores are popular picnic and summer resorts, and include Beaulieu, Saint Pierre, Sainte Famille, Saint Francois, Saint Jean, Saint Laurent, d'Orleans being usually affixed to particularize them. General Wolfe encamped here in 1759 before the siege of Quebec.

ORLEANS, TERRITORY OF, in Ameri¬ can history, a name formerly apnlied to a sec¬ tion of the United States. When the large tract of northwest territory was purchased from France by the United States in 1804, under1 the name of Louisiana, the district was divided by Congress into territories, called the District of Louisiana and the Territory of Orleans, the latter being the present area of the State of Louisiana. In February 1811, an act was passed "to enable the people of the Territory of

Orleans to form a constitution and State Government,® and .on 12 April 1812 another act was passed for the admission of the State of Louisiana into the Union. See Louisiana.

♦

.

.

.

•

‘

‘

‘

.

■

‘

- *i*

‘

■

•*» »»

‘

4

Vol. 21, ORLEY TO PHOTO

Americana

Y/.

THE

ENCYCLOPEDIA

Jl

AMERICANA

JT

imwr

UjilVEHSAL MfOWLEDGE. t

In Thirty Volumes

i) > *> »

1922

THE ENCYCLOPEDIA AMERICANA

CORPORATION

NEWYORK CHICAGO

Copyright, 1919

EY

The Encyclopedia Americana Corporation

Copyright, 1922

BY

The Encyclopedia Americana Corporation

COMPOSITION, ELECTROTYPING, PRESSWORK, BINDING BY

J. B. LYON COMPANY, ALBANY, NEW YORK

JAN 18 1922

©CLA654317

PARTIAL LIST OF CONTRIBUTORS TO VOLUME XXI

BABASINIAN, V. S.

Professor of Chemistry, Lehigh University

PHENOL

BAXTER, FLORUS R.

Chief Chemist, Vacuum Oil Company

PETROLEUM

BEACH, CHARLES F.

American Lawyer in France

PARIS

BERG, CLARA DE LISSA

New York City

PETRARCH'S SONNETS

BERRY, EDWARD W.

Professor of Paleontology, Johns Hopkins University

PALEOBOTANY

BIEDLER, H. H., M.D.

Johns Hopkins University Hospital

OSTEOLOGY, HUMAN

BROOKE, TUCKER, M.A., Litt.B.

Professor of English, Yale University

PERICLES, PRINCE OF TYRE

BRUBACHER, A. R., Ph.D.

President of New York State College for Teachers

PARENT-TEACHER ASSOCIATIONS PEOPLE'S INSTITUTES

BURPEE, LAWRENCE J.

Secretary International Joint Commission, Ottawa

OTTAWA, CANADA

BURROUGHS, BRYSON

Curator of Paintings, Metropolitan Museum of Art, New York

PAINTING IN THE UNITED STATES

CARMAN, E. A.*

Brigadier-General, U. S. A.

PAMUNKEY, AND TOTOPOTOMOY PEACH TREE CREEK PENINSULAR CAMPAIGN OF 1862 PERRYVILLE, BATTLE OF, AND THE KENTUCKY CAMPAIGN OF 1862 PETERSBURG, MILITARY OPERA¬ TIONS AGAINST PHILIPPI, ENGAGEMENT AT

CHAMBERLAIN, CHARLES J., Ph.D.

Professor of Morphology and Cytology, University of Chicago

PARTHENOGENESIS

PETROTOME

CLELAND, HERDMAN F., B.A., Ph.D.

Professor of Geology, Williams College

PALEOLITHIC PERIOD, THE

CORNYN, JOHN HUBERT, B.A., LL.B.

Birmingham Southern College

PASTORAL POETRY PfiREZ GLADYS, BENITO

COUMBE, CLEMENT W.

Technical Art Expert

ORNAMENT

PAINT

PAPYRUS

PARCHMENT

COX, KENYON, N. A., A.M., D.Litt.

Member of American Academy of Arts and Letters.

PAINTING, EDUCATION IN

CRAIG, ANNE THROOP

Dramatist

PAGEANTRY

CREIGHTON, JAMES E., Ph.D.

Professor of Logic and Metaphysics, Cornell Uni¬ versity

PHILOSOPHY, HISTORY OF

CUSHMAN, ROBERT EUGENE, A B.

Associate in Political Science, University of Illinois

PARTY ORGANIZATION IN LEGISLA¬ TIVE BODIES

DAKE, CHARLES LAWRENCE, A.M.

Associate Professor of Geology and Mineralogy, School of Mines and Metallurgy, University of Missouri

PALEOZOIC ERA

DICKINSON, THOMAS H., Ph.D.

Associate Professor of English, University of Wis¬ consin

PHILASTER, OR LOVE LIES A-BLEED- ING

DUTTON, GEORGE B., Ph.D.

Assistant Professor of English, Williams College, Williamstown, Mass.

PENDENNIS

EISELEN, FREDERICK CARL, Ph.D., D.D.

Professor of Old Testament Interpretation, Garrett Biblical Institute

PENTATEUCH

EISERHARDT, EWALD, Ph.D.

Professor of German, University of Rochester

PARZIVAL

PETER SCHLEMIHLS WUNDERSAME GESCHICHTE

ELLWOOD, CHARLES A., Ph.B., Ph.D.

Professor of Sociology, University of Missouri

PATRIARCHAL SYSTEM

* Deceased

Contributors to Volume XXI — Continued

ESTES, DAVID FOSTER, D.D.

Professor of New Testament Interpretation, Hamil¬ ton Theological Seminary, Colgate University

PAULINE EPISTLES PETER, EPISTLES OF PHILEMON, EPISTLE TO PHILIPPIANS, EPISTLE TO

FITZGERALD, JOHN J.

Secretary Paterson Chamber of Commerce

PATERSON, N. J.

FOX, JAMES J., S.T.D.

Of the Catholic University, Washington, D. C.

PAPACY

PAULISTS

GARNER, JAMES WILFORD, Ph.D. *

Professor of Political Science, University of Illinois

PETITION, RIGHT OF

GILLIS, JAMES M., C.S.P.

New York City

PENANCE

HALLER, WILLIAM, Ph.D.

Instructor in English, Columbia University

PEPY'S DIARY

HANFORD, JAMES H., A.M., Ph.D.

Associate Professor of English, University of North Carolina

PARADISE LOST PARADISE REGAINED

INGEN, GILBERT VAN

Curator of Invertebrate Paleontology, Princeton University

PALEONTOLOGY

INGERSOLL, ERNEST

Naturalist

OX

JELLIFFE, SMITH ELY, M.D.

Editor, "Journal of Nervous and Mental Disease "

PARANOIA

KLEIN, HENRI F.

Editorial Staff of The Americana

PANKHURST, MRS. EMMELINE

PERSIA

PETROGRAD

KOESTER, FRANK, C.E.

Author of " Modem City Planning and Mainte¬ nance "

PARKS, PUBLIC

LADD, GEORGE TRUMBULL, D.D., LL.D *

Emeritus Professor of Moral Philosophy and Meta¬ physics, Yale University

PHILOSOPHY

LAWRENCE, WILLIAM WITHERLE, Ph.D.

Professor of English, Columbia University

PEARL, THE

LEWIS, BURDETTE G., A.B.

Commissioner of Department of Institutions and Agencies, State of New Jersey

PENOLOGY

LITTLE, CHARLES E., A.B., Ph.D.

Of George Peabody College for Teachers

PEABODY COLLEGE FOR TEACHERS

LLOYD, JOHN URI, Ph.M., Ph.D., LL.D.

President Lloyd Library, Cincinnati, Ohio

PHARMACY

LOISEAUX, LOUIS A., B.S.

Associate Professor of Romance Languages and Literatures, Columbia University

PAUL ET VIRGINIE

MacCALLUM, WILLIAM G., M.D.

Professor of Pathology and Bacteriology, Johns Hopkins University

PATHOLOGY

MACDOUGALL, DUNCAN

New York City

PAGEANT

McConnell, carl p., d.o.

Late Chairman Department of Education, American Osteopathic Association

OSTEOPATHY

McCREA, NELSON G., Ph.D.

Anthon Professor of the Latin Language and Litera¬ ture, Columbia University

OVID, PUBLIUS OVIDIUS NASO

McDonnell, john b.

Editorial Staff of The Americana

PANAMA CANAL

MEEHAN, THOMAS F., A.M.

Editorial Staff of “ America,” New York

PARISH SCHOOLS, ROMAN CATHOLIC

MIMS, EDWIN, Ph.D.

Head of the English Department, Vanderbilt Uni¬ versity

OTHELLO

MITCHELL, S. C., Ph.D., LL.D.

President of Delaware College *

PENDLETON, EDMUND

MOLYNEUX, PHILIP

Editor of the Oxford University “ Gazette ”

OXFORD UNIVERSITY

MOORE, J. PERCY

University of Pennsylvania

PHEASANTS

MOSES, MONTROSE J., B.S.

Author and Translator

PEER GYNT

PELLEAS AND MELISANDE

* Deceased

. Contributors to Volume XXI— Concluded

OAKLEY, S. A.

Editor Peoria “ Star ”

PEORIA, ILLINOIS

PANARONI, ALFRED G., B.S.

Instructor in Romance Languages, College of the City of New York

PAESE DI CUCCAGNA, IL

PFEIL, STEPHEN *

Formerly of the Philadelphia “ Press ”

PARCEL POST

PENNSYLVANIA

PHILADELPHIA

RISTEEN, A.D., Ph.D.

Director of Technical Research, The Travelers In¬ surance Company, Hartford, Conn.

PENDULUM

PHOSPHORUS

SCHIERBRAND, WOLF VON, Ph.D., LL.D. *

Author of “ America, Asia and the Pacific,” *etc.*

PALI LANGUAGE AND LITERATURE PEHLEVI LANGUAGE AND LITERA¬ TURE

PERSIAN ART PERSIAN LANGUAGE PERSIAN LITERATURE PERSIAN MYTHOLOGY

SCHUCHERT, CHARLES, A.M., LL.D.

Professor of Paleontology, and Curator of the Geo¬ logical Department, Peabody Museum of Natural History, Yale University

PALEOCLIMATOLOGY

PALEOGEOGRAPHY

SCHULMAN, A. G.

Department of Art, College of the City of New York

PAINTING, TECHNIQUE OF

SHARPLESS, ISAAC, LL.D., L.H.D.

Dean of T. Wistar Brown Graduating School, Haverford College, Haverford, Pa.

PENN, WILLIAM

SHERMAN, STUART P., Ph.D.

Professor of English, Un versity of Illinois

PERICLES AND ASPASIA

SINGLETON, ESTHER

Author of “ Famous Paintings,” *etc.*

PAINTINGS OF THE GREAT MASTERS

STONE, WITMER, A.B., A.M.

Academy of Natural Sciences, Philadelphia

ORNITHOLOGY

TRENT, WILLIAM P., LL.D., D.C.L.

Professor of English Literature, Columbia Uni¬ versity

PARISH REGISTER, THE

TUCKER, MARION, Ph.D

Prof ess r of English, The Polytechnic Institute of

Brooklyn

OUT OF THE CRADLE ENDLESSLY ROCKING

WALTON, WILLIAM

Author “ Chefs d’CEuvre Expo, Universelle 1889 ”

PAINTING

WARD, HENRY B., A.M., Ph.D.

Professor of Zoology, University of Illinois

PARASITES

WAXMAN, SAMUEL M.

College of Liberal Arts, Boston University

PASCUAL LOPEZ PEDRO SANCHEZ PEPITA JIMENEZ

WELLS, BENJAMIN W., Ph.D.

Author of “ Modern German Literature,” *etc.*

p£re goriot

PHfiDRE

WHITFORD, H. N.

Yale School of Forestry, New Haven, Conn.

PHILIPPINE ISLANDS

WIENER, LEO

Professor of Slavic Languages and Literatures, Harvard University

PAN TADEUSZ

WIENER, NORBERT, Ph.D.

Editorial Staff of The Americana

PESSIMISM

WILCOX, MARRION, A.B., LL.B.

Coeditor of Encyclopedia of Latin-America

PARAGUAY

PERU

PERUVIAN ARCHAEOLOGY PHILIPPINE LANGUAGES AND DIA¬ LECTS

WRIGHT, CHARLES H. C., A.B., B.A.

Professor French Language and Literature, Harvard University

PASCAL, BLAISE PENSfiES

WRIGHT, HERBERT F., Ph.D.

Division of International Law, Carnegie Endow¬ ment for International Peace

PANGE LINGUA GLORIOSI CORPORIS MYSTERIUM

PANGE LINGUA GLORIOSI PRkELIUM CERTAMINIS

* Deceased

KEY TO PRONUNCIATION.

a far, father

a fate, hate

a or a at, fat a air, care

a ado, sofa

a all, fall

ch choose, church

e eel, we

e or e bed, end

e her, over: also Fr. e, as in de ;

eu, as in neuf; and oeu, as in boeuf, coeur; Ger. 6 (or oe), as in okonomie.

e befall, elope

e agent, trident

ff off, trough

g gas, get

gw anguish, guava h hat, hot

h or h Ger. ch, as in nicht, wacht hw what

I file, ice

i or 1 him, it

i between e and’ i, mostly in

Oriental final syllables, as, Ferid-ud-din

j gem, genius

kw quaint, quite

n Fr. nasal m or n, as in embon¬

point, Jean, temps

n Span, fi, as in canon (can'yon),

pihon (pen'yon)

ng mingle, singing

*

nk bank, ink

6 no, open

o or o not, on 6 corn, nor

6 atom, symbol

o book, look

oi oil, soil ; also Ger. cu, as in beutel

6 or oo fool, rule

ou or ow allow, bowsprit

s satisfy, sauce

sh show, sure

th thick, thin

fh father, thither

u mute, use

uoru but, us

u pull, put

u between u and e, as in Fr. sur ,

Ger. Miillcr

v of, very

y (consonantal) yes, young

z pleasant, rose

zli azure, pleasure

‘(prime), ” (secondary) accents, to indicate syllabic stress

RLEY, or’li, Bernaert (Barend, Bernhard) van, Dutch painter : b. Brussels, about 1493; d. there, 6 Jan. 1542. He studied in Italy between 1509 and 1515 and imitated the Italian masters, especially Raphael. Returning to Brussels he was ap¬ pointed court painter to Margaret of Parma (1515) and to her successor Maria of Hungary (1520). While he began his career as a follower of Gerard, David, he altered it after his Italian travels, but in his modeling and color scheme he never forsook the traditions of the Dutch school. His works indicate keen power of ob¬ servation and a delicate perception of beauty in form and expression. Among the best of them are (Scenes from the Life of Saint Thomas and Saint Matthew* (altarpiece), in the Imperial Museum, Berlin; (Sorrows of Job* (triptych) in the Brussels Museum; (The Flight into Egypt* (in the Liverpool Royal Institu¬ tion) ; (Worship of the Holy Trinity) (Liibeck, Saint Mary’s Church), and (The Holy Family) (in the Dresden Gallery). He also furnished designs for wall hangings which were executed in Brussels tapestry, of which there is an ex¬ ample in the Louvre, (The Imperial Hunt,* executed for the Emperor Charles V.

ORLOFF, or-lof’, a Russian noble family, founded 1689 by Ivan, who was condemned to death by Peter the Great, but pardoned for his bravery and coolness. His grandson Grigori (1734-433), fought in the Seven Years’ War, be¬ came the paramour of Catherine II, to whom he gave the famous Orloff diamond, or Koh-i- Nur, weighing 193 carats, and now a crown jewel. But she dismissed him for Potemkin. His brother Alexei (1737-1808) plotted against Peter III, and in 1770 won

the battle of Tchesme and the name Tchesmensky. The Orloff breed of horses is named after him and is a cross of his introduction into Russia. Grigori Vladimir (1777-1826) spent his last years in Paris, wrote in French on Italian his¬ tory, and edited a polyglot Krylof. Alexei Fedorovitch (1781-1861). a general in the Na¬ poleonic wars, and a famous diplomat, in 1833 effected the Treaty of Unkiar-Skelessi, giving Russia the sole right to pass the Dardanelles. His son Nikolai (1827-85) advocated religious toleration and the abolition of corporal punish¬ ment.

ORLOFF (or'lof) DIAMOND, The. See

Diamond; Orloff.

ORLOP-DECK, in naval architecture, the

lowest deck, consisting of a platform laid over the beams in the hold of a ship of war, whereon the cables were usually coiled, and containing also cabins and storerooms. In merchant vessels it is often a temporary deck. It was first ap¬ plied to the single deck of a small vessel.

ORMAZD, or'mazd. See Ormuzd.

ORMEROD, or'me-rod, Eleanor Anne,

English entomologist: b. Sedbury Park, Glou¬ cestershire, 11 May 1828; d. Saint Albans, Eng¬ land, 19 July 1901. She acquired her knowl¬ edge of entomology through her own investiga¬ tions, devoting herself especially to the study of injurious insects. Her advice was sought, and specimens of harmful insects were sent her from all over the world. She w s the first woman to be honoured with a fellowship in the Meteorological Society (1878), and with the de¬ gree of LL.D. of Edinburgh University (1900), and in 1882 was appointed honorary consulting entomologist to the Royal Agricultural Society. She published (Cobham Journals) (1879) ; (Guide to Insect Life) (1884) ; (Annual Reports of Observations on Injurious Farm Insects> (1877 et seq.), *etc.* Consult the autobiography and correspondence, edited by R. Wallace

(1904).

ORMOC, or-mok', Philippines, a pueblo of the island of Leyte, situated on the Bay of Ormoc, on the western coast of the island, 35 miles southwest of Tacloban. It is surrounded b}' a stone, breastwork with three ruined forts. It has an important hemp trade. The Bay of Ormoc affords the only safe anchorage on the west coast of Leyte during typhoons. Pop.

8,200.

ORMOLU (French or moulu, Aground gold**), in the etymological meaning of the word, ground gold leaf used as a gilt pigment; and by an extension of the term a compound of copper, zinc and tin (sometimes called ((mosaic gold**);. or a paste of mercury and gold, used for gilding.

ORMOND, or'mund, Alexander Thomas,

American philosophical writer: b. Punxsutawney, Pa., 26 April 1847; d. Grove City, Pa., 18 Dec. 1915. He was graduated at Princeton in 1877 ; was professor of philosophy and history in the University of Minnesota, 1880-83; of men¬ tal science and logic at Princeton, 1883-98: and McCosh professor of philosophy at the latter institution from 1898. He was president of

Grove City College from Aug. 1913 until his death. He published (Basal Concepts in Philos¬ ophy } ; foundations of Knowledge) (1900).

ORMOND, Duke of. See Butler, James.

ORMULUM, or'mu-lum, in early English literature, an English metrical translation of the Gospel history. See English Literature.

ORMUZ, or'muz, or HORMUZ, an island in the Persian Gulf, on the north side, near its entrance. It is about 12 miles in circumference, has a rugged appearance, is. entirely destitute of vegetation, has several of

the high peaks white from an incrustation of salt, and abounds in iron, copper-ore, and rock-salt. Ormuz was once the emporium of all the riches of India, the receptacle for the gems of Samarkand and Bokhara, and for the manufactures of Europe and Asia. The Portuguese had possession of it from 1515 to 1622, when it was captured by the English and given to the Shah of Persia, who dismantled the city, transferring its com¬ merce to Bender Abbas, on the opposite coast. The town of Ormuz stood on a plain on the north side of the island; and although now only a few scattered ruins, it once contained 4,000 houses.

ORMUZD, or'muzd, or ORMAZD, su¬ preme deity, literally ((Lord Wisdom, » in the Zoroastrian religion. The word is a broken down form of the Avestan ((Ahura Mazdaw and the old Persian "Auramazda,® and these three forms are interchangeable in modern usage. Ormuzd, in the Zoroastrian religion, is repre¬ sented as the head of the heavenly host and the Lord of all that is good and true. He, however, shows his origin as a sun-god in that he is the great master of light. But even in the old Per¬ sian inscriptions he is depicted as the creator of all good, the distributor of rewards and punish¬ ments, and the beneficent guardian of mankind. As the religious ideas of the Persians pro¬ gressed, Ormuzd is more and more represented as a wholly spiritual being; and in the <Avesta> his spiritual attributes are constantly contracted with the non-spiritual attributes of Ahriman. Here was taking place exactly what was taking place in Egypt. One powerful divinity was gathering to himself all the better attributes of many of the primitive racial gods. There are traces of pantheism in the Persian religion even at a later date; but Ormuzd gained his ascend¬ ency, not from this but from a dualism shared by him and Ahriman. He is the good princi¬ ple, who is continually at war with Ahriman, the bad principle, and the Zoroastrian conception of him was a very noble one, free from any traces of anthropomorphism and from any rec¬ ollections of nature worship. The influence of this concept on Judaism and Christianity was undoubtedly great, and Ormuzd approaches closely to Jehovah as a high type of the ideal of a national religion. (See Avesta ; Zoroas¬ ter). Consult Darmisteter, (Ormazd et Ahriman* (1887); Dhalla, M. N., 'Zoroastrian Theology from the Earliest Times to the Present Dav) (New York 1914).

ORNAMENT. Derived from the Latin ornare, to adorn. The artistic embellishment of the work of craftsmen, especially in archi¬ tecture and the industrial arts. Ornament con¬ sists of an additional refinement in beautifying a useful or decorative object. Its sphere is

strictly limited to the following confines: (1) The utility or purpose of the object ornamented must not be interfered with. (2) The orna¬ mentation must be fitting to the object in style, construction and material. (3) The ornament must enhance the interest in the object, that is to say must mean something and not be a pur¬ poseless addition. (4) Ornament must not hide the nature of the article embellished. The form and style of ornament must be selected to be in accordance with the surface to which it is at¬ tached. The sources drawn upon to supply ornamental motifs consist chiefly of the fol¬ lowing: Geometrical configurations, plant and animal forms, and (more rarely) the human figure. The surfaces available are, of course, in the flat or in relief. In the latter case applied ornament can be used, that is to say the ornament can be attached to the original finished object. Ornament, therefore, can be divided into three basic branches : High relief, low relief and flat. Another important element entering into the art of ornamentation is con¬ sistency in style, the avoidance of anachronisms in period decoration.

History. — Extreme simplicity of ornament is the general rule with prehistoric man, and also with the primitive peoples, in the decoration of their utensils and weapons. Thus we have paleolithic remains (especially from the south of France and Switzerland) from the period of the mammoth and reindeer, which exhibit ornament very similar to that characteristic of the huntsman and primitive tribes of the pres¬ ent day. Waved lines, concentric circles, spirals and uncouth figures are the main motifs. Orna¬ ment from the later Stone Age shows an ad¬ vance in some points in the decoration, especi¬ ally of pottery, and we get even colored orna¬ ment. The Bronze period brings us chiefly geometric ornament. The Early Iron Age has left us remains of plastic ornamental motifs of birds, horses, *etc.* Roman influence follows and we get the plant motifs of North Europe. In the Merovingian period (500-750) we al¬ ready find ornament in colored glass pastes, colored stones set cloisonne. The excavations of Schliemann (Troy, Mycenae, Tiryns) brought forth ornamented antiquities displaying geo¬ metric motifs (wave, zig-zag, spiral, etc.) peculiarly similar to Oriental ornament of the period, as also do those from Cyprus. Only gradually do we find the attempt made to rep¬ resent animals with stiff lines; these are de¬ veloped at last in the oldest ("archaic** style) Greek vases. With the Assyrians we find linear ornament (guilloches) and motifs bor¬ rowed from the vegetable kingdom, such as rosettes, blossoms, palmettes, *etc.* The same must be said of the ancient Egyptians, the lotus flower and aquatic plants prevailing. Along¬ side these came conventionalized

animals (scarabs, the uraˆus snake, the sparrow-hawk). For textile ornament the Egyptians developed geometric patterns. But it is in Hellenic art that we discover the grandest scheme of orna¬ mentation. Here ornament was developed to a systematic science, so that every decorated space received only that style of motif best suited for that special purpose, forming fixed types. Meanders and palmettes are the chief linear and vegetable ornament. The Etruscans advanced from the crude impasto to their bucchero ware

decoration using a roller with carved intaglio motifs to string out a continuous series of medallions or other “repeat” designs on their pottery. The Romans in their burial chambers (columbaria), on the walls of their country villas, and at Pompeii, etc., show their love of richly-colored mural ornament (Greco-Roman) in which the perfected human figure developed by the artists of Athens finds plentiful display. And it is from this ancient ornamental work (rediscovered in the 15th century) that the great Renaissance ornament grew. The Byzan¬ tine ornament, taken from the Oriental, was limited to vegetable and linear forms, relying for its attractions on the clever color contrasts. With the Arabs, Moors and Persians ornament relied on the late Greek and Byzantine elements brought out in great richness and fantasy. Oriental influence is seen also in the book orna¬ ment (illumination) of the old Irish and Rus¬ sian monasteries. Much of the Persian deco¬ rative cult of the Middle Ages is derived from the East Indian, the Chinese and even the Japanese. And, it must be remembered, the art of the eastern Asiatics is chiefly one of orna¬ ment. In the 18th century this Oriental style influenced greatly European decoration. Going back again, the Greco-Roman ornament led to the Romanesque and ruled strictly in the archi¬ tectural interiors from the 10th to 13th cen¬ turies. Taking its elements from a study of nature, it reproduced, in fantastic liberality, the animal figures which make up its system. With the arrival of the Gothic style we revert again to vegetable motifs chiefly, later to naturalistic depiction, degenerating soon to overloading and meaningless display. In Italy the Renaissance was utilizing the classic simplicity or the rich

Greco-Roman ornament disclosed in the exca¬ vations of Pompeii. The beauty of the work was infectious and France and Germany, the Netherlands and later Spain were importing Italian artists to decorate the palaces with Renaissance ornament. But the dainty refine¬ ment of French artists naturally soon gave na¬ tive qualifications to the Italian style and the Rococo came into being with all its light coquetry and fantastic figures and contortions. In Germany ornament de¬ generated into the Barock with its heavy osten¬ tation. But the grace and playful lightness of Rococo gave place to the Louis XVI style with its return to the severe classic ornament, fol¬ lowing, for the most part, a close imitativeness of the antique patterns. This again was fol¬ lowed by the "Empire style," even stiffer in ornament than the former. And with the 19th century we arrive at the outcome of the artist to cast aside the thralls of past styles and to achieve freedom of originality and genius. The French termed the period Art Nouveau, the German called it Jugend (Youth). With a few certain prominent exceptions the ornament was mediocre, tending to refinements perhaps or even vigor, according to the exponents. But New Art bids fair to be soon forgotten as an independent entity. Technique is mastered and prettiness effected often, but of master minds none has arisen.

Masters of Ornament. — Space forbids more than mention of a few of the "little masters" of the French styles and those artists who aided from their genius. To Renaissance

belong Ducerceau, Philibert Delorme, Etienne Delaulne (Stephanus), Rene Boivin, Pierre Woeriot. To Louis XIII style belong Vouet, Stella, Adam Philippon, Abraham Bosse, Gedeon Lesgare, Jacquard, Toutin, Jousse. Leaders of the prolific Louis XIV style are Jean Lepautre, Charles Lebrun, Jean Marot, Daniel Marot, Charles Andre Boule, Jean Berain, Gilles Lesgare, Bernard Picard, Gribe-li'n, Vauquer, Toro. To the Regency period belong Robert de Cotte, Gilles Marie Oppenort, Antoine Watteau, Claude Gillot. Leaders in the origination of the Louis XV style are Boffrand, Delajoue, Meissonnier, Cuvilliees, Blondel, Eisen, Boucher, Pillement. Louis XVI style is largely due to Lacotte, Vien, Sa-lembier, Queverdo, Delafosse. And to Percier and Fontaine are chiefly due the Empire Style.

Bibliography— Semper, Dr. G., (Der StiP (Munich 1879) ; Day, L. F., (Ornament and its Application5 (New York 1904) ; Jones, Owen, (The Grammar of Ornament5 (London 1880) ; Jacobstahl, (Grammatik der Ornamente) (Stuttgart 1890) ; Heideloff, C., (Les Orne-ments du

Moyen Age5 (Nuremberg 1847, in French and German) ; Braun and Gruner, Specimens of Ornamental Art5 (London 1850) ; Dolmetsch, <Ornamentenschatz) (Stutt¬ gart 1897) ; Speltz, A., (Styles of Ornament5 (New York 1906) ; Guilmard, D., (Les Maitres ornemanistes5 (Paris 1880) ; Meyer, F. S., (Handbuch der Ornamentik5 (Leipzig 1911; trans. (Handbook of Ornament,5 London 1896); Riegl, (Stilfragen: Grundlegungen zu einer Geschichte der Ornamentik5 (Berlin 1893) ; Pfeifer, (Die Formenlehre des Ornaments5 (in (Handbuch der Architektur,5 Stuttgart 1905) ; Gehrung, (Renaissanceornamentik5 (Kaiserslauten 1895).

Clement W. Coumbe.

ORNAMENTAL GRASSES. See Grasses in the United States.

ORNAMENTAL PLANTS. See Plants.

ORNAMENTS RUBRIC, The, a rubric in the Book of Common Prayer about which there has been much controversy. It is set down as follows, just before the Order of Morning Prayer: “And here it is to be noted that such ornaments of the Church and of the ministers thereof, at all times of their minis¬ tration, shall be retained and be in use as were in this Church of England, by the authority of Parliament, in the second year of the reign of King Edward the Sixth.” Ornaments in this connection have been defined by a Committee of the Privy Council as “all articles used in the divine service.” The.. Puritan opposed the retention of the rubric in 1661, but it has re¬ mained despite powerful efforts to eliminate it. For the controversy regarding its interpreta¬ tion see Ritualism, and consult Parker, (The Ornaments Rubric5 (Oxford 1881).

ORNDORFF, William Ridgely, Ameri¬ can chemist : b. Baltimore, Md., 9 Sept. 1862. He was educated at Baltimore City College and in 1884 was graduated at Johns Hopkins Uni¬ versity. Subsequently he studied at the uni¬ versities of Greifswald, Berlin, Heidelburg and Munich. In 1887-90 he was instructor in chemistry; in 1890-98 assistant professor of organic chemistry, in 1898 of organic and physi¬ological. chemistry, and since 1902 professor of

organic and physiological chemistry at Cornell University. In 1890 Dr. Orndorff was special agent of the United States census and has served on the jury of awards at most international ex¬ positions of recent years. He is contributor to the American Chemical Journal, Berichte der deutschen Chemischen Gesellschaft, Journal of the American Chemical Society and the Journal of Physical Chemistry. He has published laboratory Manual of Organic Chemistry } (1894) and a translation of E. Salkowski's laboratory Manual of Physiological and Pathological Chemistry) (1904).

ORNITHODELPHIA. See Monotre—

MATA.

ORNITHOLOGICAL SOCIETIES IN THE UNITED STATES, began with the formation of the Nuttall Ornithological Club in Cambridge, Mass., in 1872-73. The study of birds had been an important part, previously, of several societies and institutions for re¬ search, but only about Boston were there enough bird students at that time to form a special society, since the large group of orni¬ thologists then resident at Washington was en¬ gaged in the more general field afforded by their biological society. Among the founders of the Nuttall Club were William Brewster, Ruthven Deane, J. A. Allen, H. A. Purdy, C. J. Maynard and Ernest Ingersoll. The club increased and have published occasional memoirs of value. This club was the prime mover in organizing, in 1884, the American Ornithologists' Union (ordinarily called «A. O. U.®), patterned after similar organizations in Europe. Its fellows and members are limited to persons of a certain high standard of scientific attainment, while its ˆassociates® include several hundred ama¬ teurs. Its annual open meetings are held in different cities, and are called ˆconferences® ; while occasionally it participates in an inter¬ national congress. The A. O. U. publishes The Auk, a quarterly of high scientific value, edited by J. A. Allen. Of more local character are such associations as the Delaware Valley Ornitholog¬ ical Club, founded at Philadelphia in 1890, which issues an annual publication, Cassinia, edited bv Witmer Stone; the Cooper Ornitho¬ logical Club (1893), which devotes itself to the bird-life of the Pacific Coast and Alaska; it has sections in San Francisco and Los Angeles, and publishes an illustrated magazine, The Condor, every two months, edited by Joseph Grinnell ; the Maine Ornithological So¬ ciety, founded in 1893 and centralized in Port¬ land, which publishes a modest journal; the Nebraska Ornithologists' Union, begun in 1893 at (he State University; the Wilson Ornitho¬ logical Club, originating at Oberlin College,

Ohio, and fostered by Prof. L. Jones, which issues a quarterly, The Wilson Bulletin, devoted to bird life in the Central States. In close con¬ nection with these, but devoting its energies to the protection of birds and the education of children, is the National Association of Audu¬ bon Societies (q.v.). Many local bird clubs, however, exist in the United States and in Canada, such as the Mcllwraith Club, at Lon¬ don, Ontario, the Bird Lovers in Cleveland, Ohio, etc

ORNITHOLOGISTS UNION, Ameri¬ can. See American Ornithologists Union.

ORNITHOLOGY, the science which treats of birds. It is susceptible of such a broad inter¬ pretation that it is difficult to define its limits with accuracy, and of late years certain Of its branches haye become to such an extent matters of popular interest that we are coming to use the term ((bird study® to distinguish them from purely scientific ornithology. Ornithology proper, then, may be said to treat of the classi¬ fication of birds, — both the phylogeny of the group as a whole and the definition of the numerous species and varieties — which in¬ volves anatomical, morphological, embryologi-cal, and physiological investigations and studies of both the living and dead bird. Geographic distribution and migration also form important branches of ornithology, and though the former pertains equally to other branches of zoology, as well as to botany, it has nevertheless been studied very largely from the side of the birds.

Structure. — Birds, being eminently aerial, the anterior pair of limbs are modified into wings, and the bones of the hand are so much reduced that portions of two digits only remain. The peculiarities of feathers and other acces¬ sories to flight are described elsewhere. See Flight; Plumage.

Considering other peculiarities in the general structure of birds, we find the skull bones to be united to a remarkable degree, so that almost all traces of the components are lost. In the head of the adult bird, besides the skull proper and the lower jaw, are only four separate bones, excepting the hyoids that support the tongue. These are the two quadrates, which lie between the articulating surface of the lower jaw and the skull — a peculiarity of birds as compared with mammals, in which the man¬ dibles articulate directly with the skull, and showing their closer alliance with reptiles ; and the two pterygoids, which connect the quadrates with the palate. The skull is poised upon the spinal column by a single condyle, as in reptiles, and

not by two condyles, as in mammals. The eye of birds is relatively very large, and the ear is situated rather below and behind it, but does not protrude externally and the situation of the opening is not noticeable, except for the slightly different . sort of feathers that usually cover it. No living birds are provided with teeth, the mandibles being covered with a horny sheath forming the bill, which has sharp¬ cutting edges, and is modified in form accord¬ ing to the habits of the various species. The feet of birds show even a greater degree of adaptive modification than the bill, and inas¬ much as these two are the onlv parts of a bird not covered by feathers, it is not sur¬ prising that all the older classifications were founded almost exclusively upon them. The ankle bones (as'well as the bones of the wrist) are lost very early in the development of the bird, and become entirely combined with the ends of the adjoining bones, so that the so-called tarsus, a fusion of all the tarsal bones, includes, in addition, the metatarsal elements, and is more properly known as the <(tarso-metatarsus.® The fibula in most birds is more or less reduced, the lower portion ending in a sharp point, and not reaching the end of the tibia, as is familiar to us in the «drum stick®

Ernest Ingersoll,

of the chicken. The femur and a large portion of the tibia are covered by the skin of the body so that the entire external part of the bird's leg is in reality the foot, the long <(tarsus)) with its usual horny covering corresponding to the flat portion of the human foot, while the bend where the feathering begins is the heel. In other words, the average bird carries its heel high up in the air and walks or grasps with the toes, which are at the other end of a very long instep. The toes themselves are never more than four, — usually one directed backward and three forward, making a grasping foot. Some¬ times, however, one of the front toes is re¬ versed, as in the woodpeckers, or all may point forward, as in some swifts. Certain wood¬ peckers have but three toes, while all birds which habitually walk, and most of

those that swim, exhibit a great reduction or total loss of the hind toe.

The modifications in webbing and other pe¬ culiarities of foot-structure are very numerous. Most swimmers have two webs, uniting the three functional toes, while the cormorants, pelicans, etc., in which the hind toe is well de¬ veloped, have three webs.

The neck of birds is usually long, the verte¬ brae moving easily upon one another, so as to permit great flexibility. The body cavitv is well encased by the bony structure, but owing to the length and construction of the ribs is likewise very flexible. Its most peculiar characteristic is the remarkable development of the sternum or breast-bone, which is expanded into a broad, flat structure. Sometimes, as in the ostriches and their allies (non-cerinate or ratite birds) it is smooth on the anterior surface, but in other living birds (carinate) it is provided with a vertical keel. It is to this that the great flight-muscles of the breast are attached ; and while the presence or absence of a keel was formerly looked upon as of primary importance in trac¬ ing the ancestry of birds, it is now regarded more as an indication of the extent to which the power of flight has been lost. On the back of the body cavity is another solid, bony struc¬ ture known as the sacrum, formed by the fusion of the lower vertebrae and the pelvis. The clavicles or ((collar bones** of a bird also present a peculiar appearance, being usually firmly ossified at their lower extremities, form¬ ing a V-shaped bone known as the furculum or popularly the ˆwish-bone.**

As to the soft anatomy of birds, a character¬ istic avian structure is seen in the thick-walled muscular gizzard, which is a prominent feature of the stomach of all birds which devour hard substances such as grain, horny insects, etc., though practically absent in birds of prey and fish-eating species whose food is soft. All birds with well developed gizzards swallow small par¬ ticles of gravel, sand, etc., which by the action of the muscular walls grind up the food that they have swallowed and render it suitable for digestion,, performing, as it were, the work of the molars or grinding teeth of mammals.

The complicated voice-organ or syrinx, _ com¬ prising the lower portion of the larynx, is an¬ other organ peculiar to birds, and the arrange¬ ment and number of the muscles that contract the horny rings by which the vocal chords are controlled, have recently been found to be of fundamental importance in avian classification.

This organ is only highly developed in the singing birds (0 seines) .

Classification. — Owing to the great amount of attention that has been devoted to systematic ornithology through long periods of years, we find that it is through this branch also that the ˆscience® of nomenclature has reached its pres¬ ent formidable development. Although of equal importance to all systematists, it is the ornithol¬ ogists who have been responsible for the earlier and the more important codes that have been formulated to govern the formation and adop¬ tion of our technical systematic names. From the time of Aristotle scientific literature has been full of attempts to classify birds. The earlier schemes naturally dealt with external characters only, and as feathers were common to all, the only available parts were the bill and feet. There were two grand divisions. Water Birds and Land Birds, while under these came the waders, swimmers, divers, *etc.* ; the birds of prey, gallinaceous birds, Fissirostres, Coniros-tres, Tenuirostres, *etc.*

In 1813 Merrem proposed to separate the birds with a smooth breast-bone (ostriches, etc.) from the rest of the class — which all possess a keel on the sternum. This was an important advance, and the first recognition of the modern groups Ratitce and Carinatce. In 1827 a French¬ man, L'Herminier, made an extended study of the skeletal structure of birds and brought to light many points of relationship between birds hitherto regarded as distinct and vice versa. The cranes and herons were shown to be wrongly associated, and similarly the gulls and petrels, while the relationship between the gulls and the plover tribe was pointed out. Thus were the long accepted groups of ((waders** and ((swimmers** rudely shattered and the external resemblance in foot-structure was shown to be superficial.

The classification of birds, always a puzzle, now became still more complex, and all parts of the avian structure were investigated in the hope of reaching some set of characters that would prove the solution of the problem. The idea seemed to be then prevalent — and is still so in the minds of some systematists — that some one part of the bird's structure would fur¬ nish characters upon which a satisfactory classi¬ fication could be established. Nitzsch made numerous anatomical investigations, but his most important discoveries were in connection with pterylography, showing that the number and shape of the feather-tracts differed widely in different groups. McGillivray and Muller studied the soft anatomy, and the latter was the first to divide the passerine birds into Occines (singing birds) and Clamatores, by pointing out the difference in the number and character of the vocal muscles. Sundevall considered the physiological side of the subject and was the first to define Altricial and Precocial birds — those

respectively that are hatched helpless and reared in a nest and those that run about as soon as leaving the egg. Up to this time classi¬ fication meant a search for similarities with the object of arranging species in definite groups and families. In the minds of some the whole matter was one of mathematical exactness and in this connection the circular system outlined by Swainson in his (Geography and Classifi¬ cation of Animals) is interesting reading. There now came a revolution in the classification of

birds, as well as of other groups. In 1859 Darwin published his ‘Origin of Species, > and ™,s work, as well as that of Alfred Russell VY allace, soon put classification in a new light, u realized that the birds of to-day are the terminal branches of a great family tree of bird-life whose trunk and early limbs are far back in the geological past, where they merged into the trunk which has produced the modern reptiles. Some of our present bird-families, notably those most numerous in species, are comparatively recent developments, suited in every way to prevailing conditions; while others, usually with few representatives, are the remnants of ancient groups which be¬ long much farther back on the tree, and have barely survived to the present time. The significance of fossil-forms now become evi¬ dent, as well as the fact that birds could not be arranged in a lineal series and preserve their proper relationship. It was also clear that in tracing the phylogeny of birds all sorts of char¬ ters must be taken into consideration ; since modification in one part may have been import¬ ant at one time, or in one group, while in an¬ other group some other part was the seat of variation.

The principal contributors to the modern classification of birds are as follows :

Huxley in 1867 made a study of birds’ skulls and demonstrated the importance of the arrange¬ ment of the bones of the palate as an aid to classification, defining the several types of palate-structure known as dromaeognathous, des-mognathous, schizognathous and aegithog’nathous. Garrod and Forbes made important” addi-Uons to

our knowledge of the muscular anatomy of birds and in 1888 Fiirbringer published prob¬ ity the greatest treatise on avian phylogeny that has yet appeared. One of his most im¬ portant discoveries was that of the descent of the ostriches and their allies from flying ances¬ tors, showing them to be a degenerate and not a primitive group.

In spite of the vast amount of attention that has been given to the subject, we are still far from solving the problem of avian classification.

1 he great rarity of fossil birds leaves gaps in the system which it is almost hopeless to expect to fill ; and although ornithologists are pretty well agreed upon a numDer of the leading groups, their exact phylogeny will remain a matter of guesswork unless comparative embry¬ ology shall solve the problem. It is a well-known fact in zoology that the embryonic de¬ velopment of the individual in the main repre¬ sents the palaeontological development of the species; and if embryo birds have been saved and studied by zoologists, instead of the empty shells of the eggs, we might to-day be much farther along on our way.

. The present views of bird-classification are briefly as follows: We have two distinct branches of existing birds, the degenerate Ratitce and the Carinatce. The former represented by four orders: 1, the Apteryxes of New Zea¬ land; 2, the cassowaries and emus of the Aus¬ tralian region; 3, the rheas of South America; and 4, the ostriches of Africa and Arabia.

Among the Carinatce we have, first of all, the tinamous (Crypturi), a sharply defined group of birds recalling the gallinaceous type in external appearance, but with many points of re¬

semblance to the Ratitce. The penguins (Sphc - nisei) are a degenerate group of somewhat doubtful affinity, which Dr. Stejneger regards as differing more from any of the remaining birds than they do from each other; while other authorities place them as a distinct order, ibut in alliance with the loons. The latter, together with the grebes, form a natural order Py - gopodes, while the petrels and albatrosses form another, Tubinares. The relationship of the auks (Alcidce) has been in some doubt, but they are now most frequently placed near the gulls (Gavice). The latter have much in common with the plover and sandpipers (Limicolce), and the sheathbill (Chionis) is in many

respects intermediate; together with the bustard (Otidi-dee) they seem to form another natural order. Three other groups of «water» birds constitute well defined groups: (1) The Anseriformes, ducks and geese, with the outlying horned screamers (Palamedea) and flamingos; (2) the storks and herons; and (3) the Steganopodes, or totipalmate swimmers; that is, cormorants, pelicans, *etc.* The last-named bear affinity to the hawk-tribe (Accipitres) , which, with the American vultures, form a distinct group, their only other alliance being a possible one with the herons through the secretary bird (Serpen-tar la) . We have left the cranes < Gruidce) , rails (Rallidce) , and trumpeters (Psophiidce) , which form an order Gruff ormes ; and several very puzzling forms which are generally placed in the neighborhood of the rails, though they have no near relatives and some, at least, are generalized forms descended from earlier branches of the family tree and consequently exhibiting characters possessed by several dis¬ tinct modern families. Such birds are the seriema, sun-bittern and kagu.

We next have the great gallinaceous assem¬ blage, near which are placed the sand-grouse (Pterocles) and the pigeons (Columbce). While that curious bird, the hoaetzin, the representa¬ tive of a distinct order, seems in some respects a connecting link between the gallinaceous type and the plantain-eaters (Musophagidce) , which stand near the cuckoos. From this point we pass to a number of groups, some of them very sharply defined, others less so ; as, for instance, the woodpeckers (Pici), parrots (Psittaci), owls (Striges), whip-poor-wills, *etc.* (Capri-tnulgi) , swifts (Cypseli) , humming-birds (Tro-cjiili) , *etc.* The complete separation of the owls from the hawks seems borne out by all modern researches and their true position is probably m the neighborhood of the Caprimulgi. Last of all come the Passeres, divisible into two sub¬ orders and comprising far more species than all the other orders combined, but so hopelessly are the species interrelated that only a very few clearly circumscribed families can be distin¬ guished, of which the swallows (Hirundinidce) are one of the best. Just which species of pas-seiine birds are the highest; that is, the most specialized, is a matter concerning which there is much difference of opinion and the thrushes, crows and finches have each been awarded the honor.

The following scheme, slightly modified from that ot Dr. H. Gadow, will show approximately the present ideas erf classification. Phylogeneti-cally we may regard the Colymbomorphce and Pelagomorphce as branches of one stock, while

the Alectromorphce came away independently. The CoraciimorpJuE have branched off from the last named, the hoactzin and the plaintain-eaters representing one point of alliance. The Ratitce, on the other hand, are a degenerate group prob¬ ably from the same ancestry as the tinamous.

Rathve.

The Ostrich tribe and certain Fossil allies.

Carinate.

Colymbomorphce :

I. Sphenisciformes, — Penguins.

IT. Colymbiformes, — Grebes and loons.

III. Procellariiformes, — Petrels and alba¬ trosses.

Pelagomorphce: •

I. Cinconiiformes, — 1 , Cormorants, etc.; 2 herons; 3, storks.

II. Anseriformes,— 1, Palamedea; 2, ducks and geese ; 3, flamingos.

III. Falconiformes, — 1, Cathartse; 2, hawks, *etc.*

Alectromorphce :

I. Tinamiformes, — Tinamous.

II. Galliformes, — 1. Hemipods; 2, gallinae; 3, hoactzin; 4, sand grouse; 5, pigeons.

III. Gruiformes,— 1, Sun-bitterns; 2, rails; 3, cranes; 4, trumpeters; 5, seriema.

IV. Charadiiformes, — 1, plovers, etc.; 2, gulls and auks.

Cora dim orphan:

I. Cuculiformes, — 1, cuckoos, etc.; 2, par¬ rots.

II. Coraciiformes, — 1 Coraciae; 2, owls; 3, caprimulgi ; 4, swifts; 5, colies; 6, trogons; 7, woodpeckers.

III. Passeriformes, — 1, . Eurylaemidae ; 2, clamatores ; 3, menuridse; 4, oscines.

The number of species of birds is enormous and a very large portion of ornithological litera¬ ture has to do with their description, a work which is still progressing; for though it is probable that nearly all the distinct forms of bird-life have been discovered and described, there is still an abundance of closely allied geo¬ graphic races to be distinguished. This refine¬ ment in separation of species and ˆvarieties" in ornithology early reached a point far in advance of that attained in any other group of verte¬ brates and the effects of peculiar environment md isolation in the evolution of species was oparently first clearly recognized from the udy of birds. In some countries, notably in 'forth America, the birds have been so closely ramined over large areas that it is possible to ace the exact effect of peculiar climatic confitions upon color, and parallel examples are furnished by several different types of birds. The recognition of large numbers of closely allied geographic races, while deplored by those who would keep our nomenclature within the limits of convenience, is of the greatest import¬ ance in broader scientific research. Not only are valuable data thus obtained for the study of the evolution of species in its relation to geo¬ graphic, distribution and environment, but by recognizing certain peculiarities, however slight, as characteristic of birds breeding in a certain district, it is possible to identify the same form in its winter quarters or en route ; and already data are being collected in the United States

which before long will throw much light upon the exact course of the migration. The recog¬ nition of these geographic races in ornitho¬ logical nomenclature resulted in the adoption by many ornithologists, notably Americans, of a tri¬ nomial system instead of the binomial system of Linnaeus, and geographic forms are now denoted by a <(subspecific" name attached to the generic and specific ones, as, for example, Melospiza melodia fallax. This very materially alters our old conception of a species, just as the theory of evolution modified the conception of orders and families, and we are now coming to

recognize that species and subspecies (they differ only in degree) as we find them to-day are forms differentiated from one another in variable degree, some perfectly distinct, others so slightly as barely to be appreciable. The at¬ tempt to denote the degree of variation, by any system of names is bound to express merely in¬ dividual opinion and this explains much of the constant controversy over nomenclature.

The beauty of birds has appealed to the artis¬ tic side of many men and many early orni¬ thologists were artists and regarded the colored plates in their books as of perhaps more im¬ portance than the text. As examples of orni¬ thological works of this sort may be mentioned Catesby's c Natural History of Carolina,' Wil¬ son's (American Ornithology,' and Bonaparte's supplement to it ; the elephant folios of Audu¬ bon and the many sumptuous works of John Gould. Of recent years the perfection of pho¬ tographic apparatus has made possible the pho¬ tography of living birds in all the functions of life, which has proved of great-scientific value. By thus bringing together accurate pictures por¬ traying widely scattered species we have ma¬ terial from which valuable deductions are likely to be made. See Animals, Classification of; Birds.

Bibliography. — General works are Gadow, Brehm's (Thierreich' (Vogel) ; Newton, dic¬ tionary of Birds) ; British Museum, Cata¬ logue of Birds' ; Coues, hey to North Ameri¬ can Birds' ; and Cassells, the Royal, the. Stan¬ dard and the Cambridge 'Natural Histories,' especially Evans, (Birds' (1900), in the last named series. Newton's dictionary' (1896) contains an immense bibliography relating to systematic and faunistic ornithology. For the United States the early standard works were the 'Ornithologies' of Audubon, Wilson and Nuttall. The publication by Spencer F. Baird (1859) of the 8th volume of the 'Pacific Rail¬ way Reports,' dealing with the birds of the country in accordance with advanced knowledge, started a new epoch in the study. This was stimulated again by the publication, first in 1872, of Elliott Coues' (Key to North American Birds,' which has since passed through many editions. The most important and latest manual is Robert Ridgway's (Birds of North and Mid¬ dle America,' begun in 1901 ; and the best books for the general history and the identification of North American birds and Chapman's hand¬ book to the Birds of Eastern North America' (New York 1912) and Bailey's handbook to the Birds of Western United States' (Boston

1902).

Witmer Stone,

Academy of Natural Sciences, Philadelphia.

ORNITHOPODA, a group of dinosaurs, now included in the Orthopoda (q.v.).

ORNITHORYCHUS. See Duckbill.

ORNITHOSAURIA, the pterodactyls. See Pterosauria.

ORNITHOSCELIDA, a group named by Huxley to include certain genera of dinosaurs (I guano don, Megalosaurus, etc.), which (<present a large series of modifications intermediate in structure between reptiles and 'birds,® though there is no reason to believe that they are directly ancestral to the birds.

ORNITHOSTOMA, the generic name of a huge pterodactyl from the Cretaceous rocks of Kansas, which is probably identical with Pteranodon. See Pterodactyls.

OROBANCHACE.3E, the broom -rape fam¬ ily. The general properties of this family of plants are astringency and bitterness. The calyx is equally divided into four or five teeth, per¬ sistent, inferior ; the corolla hypogynous, ir¬ regular, persistent, aestivation imbricated; stamens, four; ovary free, one-celled, with two carpels; style, one: stigma two-lobed, divided transversely to the carpels; fruit capsular. The Orobanchacece are herbaceous parasites, with scales in place of leaves. They attach them¬ selves to the roots of different plants, and have received the name of broom-rapes from the ravages they are supposed to commit among plants of the broom family. The different species, attach themselves to different plants, as the Orobanche major to broom and furze, O. ramosa to hemp, O. rubra to thyme, O. hederce to ivy. The central cellular portion of the stems is surrounded by fibro-vascular bundles, which connect themselves with those of the plants to which they attach themselves. They have also tubers and ordinary

roots, from which it is supposed they may derive nourishment from the soil. See Cancer-root; Broom Rape.

OROBUS. See Bitter Vetch.

OROGRAPHY, a term applied to the study of mountains, their chain, branches, *etc.* The study includes the method of measuring the heights of mountains by trigonometrical survey. The great difficulty to be encountered in this method of measurement arises from the optical illusion occasioned by the different states of the density of the atmosphere, causing a pro¬ portionate change of refraction, which may, however, be corrected by hygrometric observa¬ tion. In modern times it has been usual to ascertain the heights of mountains by baro¬ metrical observation. See Barometer; Geog¬ raphy ; Mountains ; Surveying.

OROHIPPUS. See Horse, Evolution of.

OROIDE, or OREIDE, an alloy, a sub¬ stitute for ormolu. There are two formulae for composing it. In the first the ingredients are copper, 100.0; tin, 17.0; magnesia, 6.0; sal-ammoniac, 3.6; quicklime, 1.80; argol or unre¬ fined tartar, 9.0. In the second, less brilliant than the former, zinc is substituted for the tin. The metals are first melted; the other in¬ gredients, after being thoroughly incorporated together by powdering and mixing, are slowly added; and the whole is kept in a state of fusion for about an hour, and the scum re¬ moved from time to time.

ORONH YATEKHA, <(burning sky,® Mo¬ hawk Indian : b. on the reservation of the Six Nations, Brantford, Ontario, Canada, 1841 ; d. Augusta, Ga., 4 March 1907. He attended Toronto University, Canada, and while there organized one of the first ((Wild West® shows in which he and some of his Indian friends played the leading parts. With this he made frequent trips about the neighboring towns and thus earned money enough to pay his college expenses. This show made the Indian bo}r a well-known figure in Canada and along the bordering American States. On the occasion of the visit of the Prince of Wales to Canada in 1860, Oronhyatekha was elected by the Six Nations Indians to deliver, in their name, an address of welcome to the future king, Edward VII. The latter was so impressed with the vivacity, intelligence and oratorical powers of the young Indian that he invited him to Eng¬ land to continue his studies in Oxford. The offer was accepted and Oronhyatekha entered the famous English

centre of learning under the protection of Sir Henry Ocland, though it was generally understood in Canada that his ex¬ penses were being paid by Queen Victoria. Oronhyatekha was graduated in medicine from Oxford. On his return to Toronto he married a granddaughter of the famous Mohawk] chief, Brant. He ■ became a well-known figure in medical circles and secret society lodges. In 1902, at Chicago, he was elected president of the National Fraternal Congress. With the secret societies of his ancestors in mind, he evolved the idea of the Independent Order of Foresters, which he founded in 1881 and of which he remained Grand Ranger until his death. In behalf of this organization he traveled extensively throughout the United States and Canada, where he had the reputa¬ tion of being a very forceful and ready speaker in both English and Mohawk. He was the most prominent among the speakers at the Indian centennial held at Tyendinaga, Canada,

4 Sept. 1884. He was a student of things Indian and has left a valuable treatise on the Mohawk language.

ORONO, oTo-no, Maine, town, Penobscot County, on the Penobscot River and the Maine Central Railroad, seven miles northeast of Ban¬ gor. It was settled in 1774, and! became a town in 1806. Its chief industry is the manufacture of lumber, and it contains a number of lumber mills, also pulp and paper mills. It is the seat of the University of Maine, including the agri¬ cultural college and the experiment station. Pop. 3,133.

ORONTES, o-ron'tez, the classic name for the modern Aasi, or Nahr-el-Asi, a river rising on the east of 'the Anti-Libanus, in a natural basin of rock, the site being marked by an an¬ cient monument. It flows north through the plain of Hamah to the Lake of Antioch, and thence southwest into the Mediterranean Its' entire course is about 200 miles, though its valley was, for many centuries, the highway to and from Egypt.

. OROPUS, o'ro-pus, town of Attica, in an¬ cient Greece, situated on the frontier of Bceotia and celebrated as the site of the temple of Amphiaraus. It was a famed place of pilgrimage in the ancient world. Consult Diirrbach, <De

Oropo et Amphiarai SacrcP (Paris 1890) and Frazer, J. G., (Pausanias) (Vol. II, London

1898; 1913).

OROSIUS, o-ro'si-us, Paulus, Spanish his¬ torian and theologian: b. Tarragona, Spain, about 390 a.d. He became a Christian presbyter, resided a considerable time with Saint Augus¬ tine at Hippo and wrote, at his suggestion, a general history of the world, (Adversus Paga-nos Historiarum Libri VII, > to prove that the Christians were not to blame for the downfall of the Roman Empire as the heathen alleged. He tries to picture the wretchedness and evils of the heathen perioid in as dark colors as pos¬ sible, making use of the works of Livy, Tacitus, Suetonius, and other Roman writers. His his¬ tory, however, is regarded by scholars as being of little value, though it long enjoyed a great popularity, and was translated into Anglo-Saxon by Alfred the Great with modifications and ad¬ ditions. Orosius is also said to have written a work on the errors of Priscillian and Origen, and still other writings are attributed to him. His history has been edited by Zangemeister (1882), and several English translations and editions of Alfred's translation have been pub¬ lished. Consult Morner, T. de, (De Orosii Vita) (Berlin 1844).

OROTAVA, o-ro-ta'va, Canary Islands, a town in the northwest of the island of Tenerife, formerly the capital and court of the principal kingdom of the Guanches. It is regularlv built, and among its buildings are a beautiful church with three naves, and an English church. In a valley east of the town is a botanic garden. Orotava is a summer resort much frequented by European health seekers. It has an export trade in wine and cochineal. Pop. about 12,000.

O'ROURKE, Edmund. See Falconer, Edmund.

OROVILLE, Cal., city and county-seat of Butte County, on the Southern Pacific, the Western Pacific, and the Northern Electric railroads, 75 miles north of Sacramento. It is located in a region with large fruit-growing, stock-raising and other agricultural interests and nearby are Feather River Canyon and the Falls of Fall River. The city has a Carnegie library, fruit and olive packing and curing sta¬ tions, railroad repair shops, *etc.* Pop. 3,340.

OROZCO Y BERRA, o-ros'ko e ber'ra, Manuel, Mexican historian: b. City of Mexico, 8 June 1816; d. there, 27 Jan. 1881. He studied both law and engineering and became editor of El Porvenir in 1846. He held numerous posi¬ tions of trust under the government, was pro¬ fessor in the National Military School and be¬ came judge of the Supreme Court of the nation in 1863. In 1852 was appointed director of archives, and later he was director of the National Museum and Councillor of State dur¬ ing the regime of Maximilian. After the return of Juarez to power, Orozco was imprisoned for a while. On his liberation he devoted his time to archaeology and kindred studies. Orozco had a very logical and scientific mind; and no name stands higher as a scientist than his in Mexico. His vast scientific work is a mine of wealth in all that relates to ancient Mexico. He was the first great "Americanista® in his own land and since his day none of his countrymen have sur¬ passed him in Indiologv and profound knowl¬ edge of ancient Mexico. Among his published

works are (Geografia de las lenguas y carta etnografica de Mexico* (1864), *and (Historia de Mexico,* his most famous work (1880-81).

OROZCO Y JIMENEZ, Francisco, Mex¬ ican bishop and historian : b. Zamora, Mexico, 19 Nov. 1864. fie was educated at the College of Jacona, Mexico, the South American College and Gregorian Universitv, Rome, and in 1887 was ordained to the priesthood. He was suc¬ cessively professor of Latin at Zamora Semi¬ nary, professor of philosophy, theology, Scrip¬ ture, liturgy and Hebrew in the University of Mexico, chaplain of Saint Francis' and vice¬ rector of the School of Arts, Zamora, and vice¬ rector of the Seminary at Mexipo City. From 1902-12, Dr. Orozco y Jimenez was bishop of Chiapas and in the latter year was transferred to the see of Guadalajara. In Januarv 1917 the Carranza government ordered his deportation. He established the first electric plant and erected a public monument to Las Casas at S. Cristobal Las Casas, Mexico. The bishop was president of the labor section at the Catholic Congress of Oaxaca. He has published (Colec-cion de documentos para la historia le Chiapas,* and numerous contributions to the religious press.

ORPHANS' COURT, in Pennsylvania and a few other States, where it occupies a position similar to that of the surrogate; devoted largely to probate matters, such as the granting of letters of administration; to take proc £ of wills and to direct and-control estates and the settle¬ ment of accounts of executors and adminis¬ trators. See also Court.

ORPHEUS, or'fus, in Greek mythology, an important personage, surrounded by a multitude of legends, which invariably associate him with Apollo and the Muses. To him is attributed the application of music to the worship of the gods. Apollo presented him with his lyre, and the Muses instructed him to use it, so that he moved not the beasts only, but the woods and rocks with its melody. Having lost his wife, Eurydice, by the bite of a serpent he descended to Hades to try and get her back. His music so moved the infernal deities, Pluto and Proser¬ pine, 'that they consented to her return to earth, only her husband, whom she was to follow, must not look back till they had reached the upper world. This condition the impatient Orpheus violated and lost his wife forever. He is said to have met his death at the hands of a band of furious women engaged in the mvstic rites of Bacchus. He is represented as one of the Argonauts, and to him is ascribed the origin of the so-called Orphic mysteries connected with the worship of Bacchus. The bulk of the poems attributed to Orpheus in modern times have been proved to be forgeries of Christian grammarians of the Alexandrian school. A portion of them, however, belong to the time of Onomacritus, or earlier, and include hymns, a theogony, a poem called (Minyas, or the Descent Into Hades) ; oracles and songs for initiation, and sacred legends. Among those who have investigated the Orphic writings are Ottfried Muller, Grote and Lobeck. See also Apollo; Bacchus; Eurydice; Muses.

ORPHEUS C. KERR, the pseudonym of

Robert Henry Newell (q.v.).

ORPIMENT, the native mineral, yellow sulphide of aiasenic, AS2S3. It forms rhombic trimetric prisms of translucent lemon-yellow color. Its specific gravity is 3.45, and its hard¬ ness 1.5-2. It is very poisonous. It was for¬ merly used as a pigment and was known as kings yellow.

ORPINE, or LIVE-FOREVER, a per¬ ennial herb (Sedum telephium) of the family Crassulacece. It is a native of Europe and northern Asia, whence it has been-introduced in cool climates throughout the

civilized world. Though it produces few blossoms it spreads rapidly by means of its roots. Thrifty speci¬ mens attain heights of 15 to 18 inches, bear obtuse, oval, toothed, fleshy leaves, and pink or sometimes white flowers in dense rounded cymes, both terminal and lateral. Several horti¬ cultural varieties are used in rock-gardens and places where little attention is required.

ORR, or, Hugh, American inventor: b. Lochwinnoch, Renfrewshire, Scotland, 13 Jan. 1717 ; d. Bridgewater, Mass., 6 Dec. 1798. He came to America in 1737 and settled at Bridgewater, where he began work as a gunsmith and manufactured edged tools. In 1753 he invented a machine for dressing flax, and his other in¬ ventions were many. He was an ardent patriot in the Revolutionary War, and erected a foundry, where he cast cannon and shot for the army. After the war he ‘became a member of the Massachusetts senate.

ORR, James, Scottish theologian : b. Glas¬ gow, 11 April 1844; d. 6 Sept. 1913. He was educated at Glasgow University and the Theo¬ logical Hall of the United Presbyterian Church. He entered the ministry and was pastor of East Bank Church, Hawick, 1874-91 ; in 1895 lectured in-Chicago on German theology, and in 1897 lec¬ tured on the Elliot and Morgan foundations at Allegheny, Pa., and Auburn, N. Y. He was professor of church history in the United Pres¬ byterian Theological College, Scotland, 1891-1901 and from 1901 until his death was profes¬ sor of apologetics and theology in the Glasgow College of the United Free Church. He took a prominent part in the union of the United Presbyterian and Free churches. He pub¬ lished ‘The Pulpit Commentary > (1891); (The Christian View of God and the World* (1893) ; (The Supernatural in Christianity) (1894)’

(Early Church History and Literature > (1901) •’ <The Progress of Dogma* (1902); ‘David Hume> (1903); ‘The Image of God> (1905) *‘Problems of the Old Testament considered in Relation to Recent Criticism* (1906) • ‘The Resurrection of Jesus* (1908) ;• ‘Sidelights of Christian Doctrine) (1909); ‘History and Liter¬ ature of the Early Church * (1913).

ORR, James Lawrence, American legis¬ lator: b. Claytonville, S. C., 12 May 1822; d. Saint Petersburg, Russia, 5 May 1873. He was graduated from the University of Virginia in 1842 admitted to the bar in 1843 and estab¬ lished a law practice in Anderson, S. C., also editing the Anderson Gazette. He was elected to the State legislature in 1844, served two terms, and in 1848-59 was a member of Con¬ gress, officiating as speaker of the House in the 35th Congress. A strong opponent of secession, he opposed it as long as possible, and then fol¬

lowed the lead of his native State. He com¬ manded one of the first Confederate regiments

raised in South Carolina, but in 1862 entered the Confederate Senate, of which he was a member until the close of the war. He was the first governor of South Carolina after the restoration of her rights as a State of the Union, serving from 1866-68, and in 1872 was appointed Minis¬ ter to Russia, where he died in the following year.

ORRENTE, or-ran'ta, Pedro, Spanish painter: h. Montealegre, Murcia, about 1560; d. 1644. It is supposed that most of his instruc¬ tion was had from El Greco, whose friend. he was. _ He devoted himself to Scriptural themes, working at Toledo, Valencia, Cuenca, Madrid, Seville and elsewhere. Orrente belongs to the naturalistic school. His best-known works are 'Departure of the Israelites, > in the Madrid Academy; (Miracle of Saint Ildefonso,* in To¬ ledo Cathedral; (John the Baptist,* now in Vi¬ enna; and 'The Adoration of the Magi ,* in the Prado, Madrid.

ORRERY, or'e-ri, Earls of. See Boyle.

ORRERY, in astronomy, a machine for representing the motions of the planetary bodies. .Distinct names have been given to various mod¬ ifications of it : the planetarium, which exhibits the orbital paths of the planets and their satel¬ lites; the tellurium, which shows the motions of the earth causing day and night, the seasons, and the variable length of the former as depend¬ ent upon the latter ; the lunarium, which shows the motions of the moon; and the satellite ma¬ chine, chiefly intended to represent the motions of Jupiter and his satellites. The ordinary °£rUT was invented by George Graham about 1700, and first patronized by the Earl of Orrery. Steele, probably supposing the earl to be the first promoter if not the inventor of it, called it by his name. The contrivance is useful rather in aiding the . conceptions than in elucidating truths ; hut it is mischievously faulty owing to the impracticability of representing in mbdel anything like the proportions subsisting among the planetary bodies.

ORRIS ROOT, the rhizome or under¬ ground stem of a white-flowered species of iris,

/. j norentina, a native of the south of Europe. In a dried state it is well known on account of its communicating a grateful odor, resembling that of violets. It was formerly much employed in

medicine, but is now little valued except as a perfume. It is exported from the Mediterra¬ nean in considerable quantities, and, among other uses, is employed in the manufacture of tooth powder. See Iris.

ORRVILLE, Ohio, village of Wayne County, on the Pittsburgh, Fort Wayne and Chicago, the Cleveland, Akron and Cincinnati and the Wheeling and Lake Erie railroads. 15 miles south of Akron. It contains a wood-pre¬ serving factory, mattress works and drill fac¬ tory. It enjoys local fame as a horse mart.

I he village owns the water-supply system and the electric-lighting plant. Pop. 4,107.

1 Achille d', Italian sculptor;

b. Naples, 1845. He received his training at the Loyal Institute of Naples and afterward at Rome. He first attracted general attention by his remarkable work 'The Parasites) at the Naples Exposition of 1877, His 'Proximus Auus followed in the same satiric vein against the smug bourgeoisie It is now in the National

Gallery, Rome. There is a statue of Alphonso of Aragon by him at Naples; other works are (Boy Carrying Water Jars> and (A Sailor's HeadP perhaps his greatest works.

ORSINI, or-se'ne, Italian noble family dat¬ ing back to the 8th century. Popes Paul I (757) and Eugene II (824-827) were of this name. In the 11th century the Piedmont branch were prominent among the members of the Guelph party, even opposing Frederick Barbarossa. But the Roman branch is better known, espe¬ cially for its rivalry with the Colonna family, beginning at the close of the 13th century and standing for the Church as against its rival for (he people. The first great name in this branch is Nicholas III, who was Pope from 1277 to 1280. Even in the city of Rome the Orsini built strong fortresses, thanks to the connivance of Eugene IV, one of them covering the site of the Marcellus Theatre. They boldly opposed the

attempt of Henry IV to assert his power in Rome, and the most notable part of their strug¬ gle with the Ghibelline Colonnas was the mad and unrestrained fighting of 1333-35, which by its abuses paved the way for the brief Roman republic under Cola da Rienzi. The important members of the next centuries were: Virginio: d. 18 Jan. 1497, a famous condottiere, who fought for the Pope, then for the king of Na¬ ples and finally for Charles VIII; Niccolo, count of Petigliano: b. 1442; d. 1510; head of the Angevin party, and later leader of the Vene¬ tians against the League of Cambrai ; Vincenzo Maria, who became Pope Benedict XIII in 1724; and Fulvio Orsini (1529-1600), an antiquarian and author of (Familise Romame)

(1577).

ORSINI, Felice, fa-le'cha, Italian revolu¬ tionist: b. Meldola, December 1819; d. Paris, 13 March 1858. He studied at Imola and Bou¬ logne, took part in several plots against the pontifical government, was condemned to the galleys for life at 25, was pardoned by Pius IX, became a leader of the rising of 1848 and after the fall of the republic engaged in several unsuccessful plots. He was arrested and im¬ prisoned in 1854, escaped to England, where he made a living as a lecturer on the papacy. Hoping that the death of Napoleon III would be followed by a general Italian rising, he made his way to Paris in December 1857, and 14 Jan. 1858, with his two accomplices, threw three bombs at the emperor and empress in the Opera. Many were killed by the explosions, but Napoleon and Eugenie were unhurt. Orsini was executed with one of his accomplices, the other being pardoned at the empress' request. He was the author of (Austrian Dungeons in Italy > (1857) and (Memoirs and Adventures >

(1857).

ORSOVA, dr'shd-vo, Rumania, a frontier town on both banks of the Cerna at its conflu¬ ence with the Danube, near the Vaskapu or Iron Gates, 92 miles east of Belgrade. Old Orsova, the Roman Tierna, on the west bank of the Cerna, has a modern harbor, is a station for the Danube steamers and an important railway junction. Pop. about 4,610. New Orsova (pop. about 3,500), on the opposite bank, was a fortified town held by Austria 1878-1918, who also were masters of it between 1716 and 1738; the Turks held it both before 1716 and after 1738. In 1890-96 a costly canal and other

works were made in order to facilitate naviga¬ tion at the rocky bend called the Iron Gates.

ORSTED, er'sted, Hans Christian, Danish physicist: b. Rudkjobing, on the island of Langeland, 14 Aug. 1777; d. Copenhagen, 9 March 1851. He studied from 1794 at Copen¬ hagen University, became (1800) adjunct pro¬ fessor of the medical faculty and started lec¬ tures on chemistry. After traveling (1801-03) through Holland, Germany and spending a year in Paris, he was appointed (1806) pro¬ fessor of physics at the Copenhagen University. He was the discoverer of electro-magnetism, as shown in (Experimenta circa effectum conflictus electrici in acum magneticanV (Copen¬ hagen 1820). In 1824 he founded a society for propagating the science of natural philosophy and became (1829) director of the Copenhagen Polytechnical School. He wrote (Ideen zu einer neuen Architektonik der Naturmeta-physik> (Berlin 1802) ; (Ansicht der chemischen Naturgesetze) (ib. 1812) ; (Tentamen nomen¬ clatures chemicas omnibus linguis scandinavo-germanicis communis } (Copenhagen 1814) ; ˆNaturlarens mechaniske DeeP (ib. 1844; 3d ed., 1859) ; (Aanden i NatureiP (Copenhagen 1849-50) ; (To Capitler af det Skjonnes Naturlare) (Copenhagen 1845). A collective issue, in nine volumes, of his works was published under the title (Samlede SkrifteU (Copen¬ hagen 1850-51). A bronze statue was erected in Copenhagen in 1876 in honor of the discov¬ erer of electro-magnetism, one of the most revo¬ lutionary scientific discoveries of modern days, and the Copley Medal was awarded him by the Royal Society of England. Consult Hauch and Forschhammer, (Orsteds Leben> (Span-dau 1853) ; Beaumont, Elie de, (Memoir of OrstedP Alexander's translation in Smith¬ sonian Institution, Annual Report, 1868 (Wash¬ ington 1869).

ORTEGA, Juan de, Spanish monk and writer; credited with the authorship of (Lazarillo de TormesP the first of the picaresque or vogue novels, which set the vogue for this type of fiction. Theˆ work appeared anonymously but in 1605 Jose de Ligiienza, a Hieronymite monk, attributed the work to Fray Juan de Ortega. In 1607 Vatere Andre, and in 1608 Andre Schott, named Diego Hurtado de Men¬ doza as the author, and it was not until 1880 that Morel-Fatio discredited the latter state¬ ment as untenable. (See Lazarillo de Tormes). Consult Morel-Fatio, A., (Etudes sur Espagne> (Paris 1888; 2d ed., 1895); Mark¬ ham, (Sir) C., (Life of Lazarillo de Tormes) (London 1908).

ORTEGAL, or'te-gal (Sp. o-ta-gal'), Cape. See Cape Ortegal.

ORTELIU.S, ORTEL, or OERTEL, er'tel, Abraham, Flemish geographer : b. Ant¬ werp, 4 April 1527 ; d. there, January 1598. He was wealthy, traveled in England, France, Ger¬ many, Italy and had a wide acquaintance with the geographers of his time. In 1570 he pub¬ lished his (Theatrum Orbis TerrarumP a col¬ lection of maps with short descriptions of the various countries in Latin. This was long a standard geographical authority in Europe, and there are various editions in Latin, French and German. Several of the maps are of great interest for the early cartography of America.

Ortelius published other geographical works, such as (Synonymia Geographica) (1578) and Htinerarium per Nonnullas Galliae Belgicae Partes) (1584). He amassed a museum of coins, antiquities, *etc.* He was appointed royal geographer by Philip II in 1575.

ORTH, orth, Bertrand, Canadian Roman Catholic prelate: b. Algert, Rhine Province, Prussia, 5 Dec. 1848. He received a theologi¬ cal education at the American College in Lou¬ vain, Belgium, and was ordained in 1872, when he was sent to Oregon as missionary to the Indians. He remained in that position until 1890, when he was appointed United States post chaplain at Camp Harney. In addition to his missionary work he had edited the Catholic Sentinel of Portland and taught in various Catholic colleges. In 1900 he was consecrated first bishop of Victoria, Vancouver Island; in 1903 was elevated to the archbishopric and re¬ signed in 1908.

ORTH, Godlove Stoner, American legis¬ lator: b. near Lebanon, Pa., 22 April 1817; d. Lafayette, Ind., 16 Dec. 1882. He was gradu¬ ated from the Pennsylvania College at Gettys¬ burg, admitted to the bar in 1839 and began his law practice in Lafayette, Ind., where he at once interested himself in politics. In 1843-50 he was a member of the State senate, and in 1861 was appointed one of the five commission¬ ers to consider the possibilities of a peaceful solution of the impending troubles. His sympa¬ thies were on the Union side, and after a brief term of military service he was elected to Con¬ gress and gave support to the policy of Lincoln. He was in the 39th, 40th, 41st, 43d, 46th and

47th Congresses. In 1875 was appointed Min¬ ister to Vienna.

ORTHIS, a large genus of palaeozoic brachiopods (q.v.), typical of the stropho-menaceous family Orthidce, which lived in such abundance and variety from the Ordovician to the Carboniferous periods that they are known from all over the world and the Ordovician and Silurian formations alone have yielded no less than 400 species. American specialists, it should be said, subdivide the genus into a dozen or more subgenera. The orthids have a shell, squarish in outline, with the surface covered with radiating striae or costae ; the valves more or less convex; the' small or dorsal valves, some¬ times nearly flat or slightly concave. A dis¬ tinguishing feature of the genus is that the well-developed hinged area is usually divided by a large, open delthyrium. A deltidium is developed only in younger growth stages. Con¬ sult Woods, H., (Palaeontology } (4th ed., Cam¬ bridge 1909) ; Zittel-Eastman, (Textbook of Palaeontology } (1900).

ORTHITE, natural hydrated silicate of aluminum, iron, calcium and cerium, with long, straight prismatic crystals (hence its name), which occur in feldspar. Its formula is H2(CaFe)4(AlOeSLChe. Its specific gravity is between 3.37 and 3.8, its hardness between 5 and 6. Orthite occurs in granite, gneiss, syenite and other rocks ; usually is of a brown¬ ish or yellowish color and contains small quantities of many rare elements, such as lan¬ thanum, yttrium and didymium. It is found in the Urals and in Sweden, Norway, Greenland and the Atlantic States.

ORTHOCERAS, or-thos'e-ras, a genus of fossil cephalopods, allied to the nautilus, having straight, tapering, smooth-chambered shells, with the siphuncle central, which occur from the Silurian to the Trias. It forms the type of a family Orthoceratidce, some of the species of which must have been more than six feet long and one foot wide. Related groups had shells curved in various degrees, thus approaching the coiled nautilus form.

ORTHOCLASE, a variety of monoclinic feldspar, called common or potash feldspar, owing its scientific name to the rectangular cleavage of its crystals ; it is a silicate of alumi¬ num and potassium, with the general formula IGALSieOie; and occasionally has some sodium in place of the potassium. The percentage of silica, is usually 65 and of potash about 12. The color is white or green, sometimes rose or yel¬ lowish; its specific gravity is 2.53 to 2.59, and its hardness 6. It may be transparent or opaque. It is an essential component of many stones,

such as granite, syenite, porphyry, trachyte and gneiss. It is found in larger masses enclosed in granite and other igneous or metamorphic rocks. It is unaffected by acids, save hydrofluoric ; but is decomposed by water containing carbonic acid, the alkali being removed and clays being formed.

ORTHOGRAPHY, in architecture, the geometrical scheme of an elevation of a build¬ ing or section thereof ; in music, the art of recording effects and tones by the proper con¬ ventional characters ; in general, the art of set¬ ting down words correctly as regards their component letters according to accepted usage. See Phonetics; Spelling; Spelling Reform.

ORTHOPAEDICS (Greek, opdog t straight, + iralg } child), a branch of medical science relating to the cure of natural deformities; not, as the name implies, restricted to children, al¬ though childhood is usually favorable to treat¬ ment. The practice of orthopaedics includes prophylactic or preventive treatment and cura¬ tive treatment. The object of the first is to prevent deformities in children who, from the delicacy of their constitution, are exposed to them. Its means are hygienic ; and its aim is to aid by natural means the symmetrical develop¬ ment of the body. Among these means one of the most important is pure air. Children have been known to recover from an incipient de¬ formity of the spine or members merely by be¬ ing sent to the country. The compressed-air bath has been used with success as an auxiliary in this branch of treatment. Muscular exercise methodically applied is another resource of great importance. It has the advantage not only of developing the muscles, but of aiding diges¬ tion and secretion. Treatment by curative orthopaedics has been applied with success to a great variety o.f malformations both of spine and members. The manufacture of apparatus for the mechanical treatment of deformities has become a distinct branch of business, and there are in various countries numerous institu¬ tions where such treatment is systematically given. The paralysis incident to an attack of poliomyelitis, or infantile paralysis, yields to protracted treatment of the affected parts, by electric stimulation, manual treatment, exercise, *etc.*

ORTHOPHOSPHORIC

Phosphoric Acid.

ACID. See

ORTHOPODA, an order of herbivorous dmosˆurs (q.v.), in the classification of Gadow which includes as subordinate groups the planti¬ grade Stegosauri and the digitigrade Ornitho-poda of Marsh. The group-characters are anatomical, especially those of the pelvis, which are very bird-like, and of the jaws, the pre-maxilla having no teeth. Consult Gadow, Am¬ phibia and Reptiles* (1901).

ORTHOPTERA, or straight-winged in¬ sects, one of the Linnaean orders of Hexapoda, which has undergone least change in the hands u rR0 j rn syst9m.atists. The three regions of the body are distinct ; the head is large with strong, biting jaws, and long or short filiform antennas ; the prothorax is usually greatly de¬ veloped, and may form a shield partly covering the mesothorax ; and the abdomen is usually full and terminated by a pair of claspers in the male and a more or less prominent ovipositor in the female. The anterior pair of wings are of little use in flight, but they are thickened and serve as covers to protect the broad, membranous, netted-veined hind wings, which, when not in use, are folded longitudinally like fans and con¬ cealed beneath the covers. In some genera wnigs are absent. Being of terrestrial habits and seldom flying far, the legs are well de¬ veloped for running, leaping, or, as in the mole-crickets, for burrowing. There is a gradual change without any sudden metamorphosis from the larva to the imago, the pupa being active and differing from the adult only in the un¬ developed wings and reproductive organs; nor do the larvae differ greatly in appearance. The eggs are usually laid on the ground and some¬ times, as with the grasshoppers, in nests or cells. With the striking exception of the mantids, almost all of the species are strictly herbivorous and among them are some of the most serious pests with which the husbandman has to contend. One characteristic of this group is the presence of sound-producing struc¬ tures, by means of which, in some families by rubbing, in others by concussion, or by a com¬ bination of both methods, are produced the noises familiar to use as the “chirping** of crickets, the “calling** of katydids, “whirring** of grasshopper (qq.v.), *etc.* Examples of how much sounds are made are furnished by the locusts and grasshoppers, which produce sounds in several ways. The Acridiidce rub the inner surface of the hind Femora, upon which there is a row of minute

spines, against the outer surface of the fore wing. In this case each fore wing serves as a fiddle and each hind leg as a fiddle-bow. The Locustidce and Grydillidce rub together the upper surface of the front edge of the hind wings and the under sur¬ face of the fore wings. This is done while the locust is flying, and the result . is a crackling sound. The Acridiidce have auditory organs on the sides of their abdomens, while the “ears** of the Locustidce and Gryllidce are on the front legs. This consists of a peculiar arrangement of the veins and cells of a portion of each fore wing near its base. This arrangement differs in the different species, but in each it is such that by rubbing the fore wings together they are made to vibrate, and thus produce the sound. The principal families are the Forficulidce or

earwigs, the blind Hemimeridce, the Blattidce, or roaches, the Phasmidce , or walking-sticks, the M ant idee, or praying insects, the Gryllidce, or crickets and mole-crickets, the Locustidce, or green grasshoppers, and the Acridiidce, or locusts, all of which are elsewhere described. Consult the (Textbooks* of Comstock, Pack¬ ard, Carpenter and others; and Howard, (The Insect-book* (1901), which contains an exten¬ sive bibliography of the group.

ORTLER-SPITZE, ort’ler-spit’se, or ORTLER, Italy, a mountain in the Tyrol, on the borders of the Engadin, 70 miles south¬ west of Innsbruck. It is about 12,802 feet high, and the loftiest peak in the Tyrol. The sum¬ mit commanding one of the most extensive views in the Rhsetian Alps was long considered inaccessible and was first ascended in 1804.

ORTMANN, Arnold Edward, American Palaeontologist: b. Magdeburg, Prussia, 8 April 1863. He studied at the universities of Jena Kiel and Strassburg, gaining the Ph.D. diploma at Jena in 1885. After doing military service in Germany he was sent to Zanzibar, Africa (1890-91), in search of natural history specimens. He came to the United States in 1894, was made curator of invertebrate palaeontology (1894-1903) at Princeton, and became (1903-) cura—

A?r ˆPvert:ehrate zoology at Carnegie Museum, Pittsburgh. He was professor of phys¬ ical geography at the University of Pittsburgh from 1910. In 1911 he was given the degree Sc.D. by the University of Pittsburgh. He was a member of the Princeton Arctic Expedition in 1899. He has written among numerous other works Grundziige der Marinen Tiergeogra-phie* (1886) ; Continuation of Die Decapodon in Bronn’s Klassen und Ordnungen des Tier - reiche’s (1898-1900) ;

(Tertiary Invertebrates of the Princeton Expedition to Patagonia* (1902). Besides being associate editor of the American Naturalist he has written many articles for the periodicals.

ORTOLAN, a European yellowish-brown bunting (Emberiza hortulana) famous as a dainty. It is migratory, spreading over north¬ ern Europe in summer to breed, and making its nest in bushes or small trees, and singing pleas¬ antly. Toward autumn, when it begins to migrate southward, it is plump and regarded as excellent eating. These birds are caught in great numbers at that season along the shores of Italy and the eastern Mediterranean, and are kept in confinement and fed for some time until they become exceedingly fat and delicate, and form a table luxury. The favorite method of preparing the. ortolans for table consists in roasting them in egg shells — a mode of cookery borrowed from the ancients, among whom these birds brought very high prices. In former times the island of Cyprus formed a chief depot for the exportation of these birds, which were pickled in spices and vinegar and packed in casks containing from 300 to 400 each. From 400 to 500 casks are annually exported from Cyprus.

ORTON, or'ton, Edward, American edu¬ cator and geologist : b. Deposit, N. Y., 9 March 1829; d. Columbus, Ohio, 16 Oct. 1899. He was graduated from Hamilton College in 1848, and later studied at Andover and at Harvard and entered the ministry. In 1856 he took the chair

of natural science at the Albany State Normal School, from 1859 to 1865 he was principal of the preparatory academy of Chester, Orange County, N. Y., accepting in the latter year the chair of natural science at Antioch Col¬ lege, Yellow Springs, Ohio, where in 1872 he was elected president. In 1873 he was called to the presidency of the newly-founded Ohio State Agricultural and Mechanical College, which has since become the Ohio State Uni¬ versity. His university work was of great value, as he was a natural teacher and organizer in addition to his scholastic attainments. He was assistant on the geological survey of Ohio, in 1869-77, and in 1882 was appointed State

geologist, which position he filled until his death, and he frequently served on, and wrote sections of the reports for, the United States geological surveys. He resigned his presidency of the col¬ lege in 1881, but continued to fill the chair of geology during his life. In 1896 he was presi¬ dent of the Geological Society of America. Among his works are (Economic Geology of Ohio* (1883-88) ; (Petroleum and Inflammable Gas) (1887), *etc.*

ORTON, Edward, Jr., American industrial chemist : b. Chester, N. Y., 8 Oct. 1863. He re¬ ceived (1884) the degree E.M. at Ohio State University and became (1884-88) chemist and superintendent of blast furnaces. The regular manufacture of high silicon alloy of iron, ˆferro-silicon,** in the United States was intro¬ duced first by him, at the Bessie Furnace, New Straitsville, Ohio, 1887-88. In the latter year he entered the ceramic industries of Ohio, managing several plants till 1893. He was the first to start the agitation (1893) that brought into being (1894) the first United States school for teaching the technology of the clay, glass and cement industries and he was director till 1916. From 1902-06 and from 1910-16 he was dean of the College of Engineering of Ohio State University, and from 1899-1906 he was State geologist of Ohio. He has written (Clays of Ohio and the Industries Established Upon Them) in Ohio Geological Survey, Vol. V (1884) ; (The Progress of the Ceramic Industry) (1903), besides a number of technical articles and reports published in the periodicals.

ORTON, James, American Congregational clergyman, naturalist and traveler: b. Seneca Falls, N. Y., 21 April 1830; d. on Lake Titicaca, Peru, 25 Sept. 1877. He was graduated from Williams College in 1855, pursued theological studies at Andover and entered the ministry in 1860. He was professor of natural science in Rochester University in 1866, and the next year conducted an exploring party of students across South America, on the geology and physical history of which he was an authority. He was professor of natural history in Vassar College 1869-73, and at the time of his death was at¬ tached to an exploring expedition in Peru. His works include (The Andes and the Amazon> (1870); Underground Treasures* (1872); (Liberal Education of Women) (1873); Com¬ parative Zoology1* (1875).

ORTYGAN. See Button-quail.

ORURO, o-roo'ro, Bolivia, a department lying in the western part, bounded on the west by Chile, on the south by the department of Potosi and on the north by the department of La Paz; area, 21,350 square miles. It is the

smallest of the departments of Bolivia. The Andes Mountains follow the western boundary, and the Cordillera Real the eastern ; the depart¬ ment lies in the Titicaca Basin. The surface is mostly an elevated plateau, rarely sinking below the level of 12,000 feet ; the salt lake of Allugas is situated in the eastern part. There are numerous marshes and saline plains, the soil in general is unfitted for agriculture and the climate is cold. There is considerable mineral wealth, particularly in tin, silver and copper, and mining is the chief and most profitable in¬ dustry; cattle are also raised in some sections. Pop. about 145,000, of which a considerable portion are Indians.

ORURO, Bolivia, city, capital of the de¬ partment of Oruro, within four miles to the east of the Desaguadero River, 125 miles south¬ east of La Paz. It is on a plain over 12,000 feet above sea-level, about 10 miles north of Lake Allugas. It was founded in 1590, and during the 17th century was very prosperous, owing to the mines in the vicinity, having at that time over 70,000 inhabitants. Later the mines were abandoned, the population declined rapidly and a portion of the city fell into ruins. During the last decade of the 19th century, a railroad connecting it with Antofagasta, Chile, has been the means of reviving its prosperity to a certain extent. Tin is mined in the vicinity, and con¬ siderable quantities of tin, as well as copper and silver, are exported. Pop. 25,000.

ORVIETO, or-ve-a'td, Italy, a city and episcopal see in the province of Peruggia, Umbria, 78 miles by rail northwest of Rome. It is built on an isolated tufa rock, 1,327 feet above sea-level, and 765 feet above the junction of the Paglia and Chiana, is surrounded by mediaeval walls and is reached from the rail¬ road depot by a funicular or inclined railway. The cruciform cathedral (1290-1580), one of the most beautiful and richly adorned speci¬ mens of Italian Gothic, is built of black and white marble, and measures 295 feet by 109. The fagade is unsurpassed in richness of ma¬ terial and in the beauty of its mosaics, sculp¬ tures and elaborate ornamentation. The in¬ terior also is magnificently decorated with sculptures and with paintings by Luca Sig¬ norelli, Fra Angelico and other noted Italian artists. Two other churches of the 11th cen¬ tury, the bishop's palace, the Jesuit College, Saint Patrick's Well (1527-40), with its 250 steps, and the palaces Petrungeli and Gualtieri deserve special notice, the former for its fine collection of paintings and the latter for its cartoons by Domenichino, Annibale Caracci and other eminent masters. Orvieto, called in the 7th century a.d. Urbs Vetus, of which its pres¬ ent name is a corruption, is supposed to occupy the site of the Etruscan Volsinii. It was cre¬ ated

an episcopal see in 509 a.p., and in the Middle Ages it gave shelter to 32 popes ; the papal palace, converted into a municipal mu¬ seum jn 1898, has numerous interesting local antiquities, including the contents of an Etrus¬ can necropolis discovered on the east side of the town in 1874. The chief trade of the city is in cattle, grain, wine, oil and silk. Pop. with suburbs about 20,000.

ORYX, o'riks, a genus of antelopes repre¬ sented by the addax, Beatrix antelope, beisa and other species, found chiefly in northern Africa.

The gemsbok of southern and central Africa is another ally. These antelopes are of compara¬ tively large size. The horns are very long curved and ringed. These form powerful and effective weapons for defense, and a wounded oryx is a dangerous animal for a man to approach. Their desert habitat is indicated by the prevalent reddish-white uniform tint of their coats, almost the only distinguishing color-marks being upon the face. These ante¬ lopes are now greatly reduced in numbers, and some of the northern species are nearly extinct One or another species is often depicted upon the monuments and mural paintings of ancient hˆgypt, most frequently, probably, the beisa tq.v.). 1 he species most generally known as

the oryx is O. leucoryx.

OS, Gregorius Jacobus Johannes van,

Dutch painter: b. The Hague, 20 Nov. 1782; d. Paris, France, 11 July 1861. After taking a prize at Amsterdam (1809) and being awarded a gold medal at Paris (1812) he accepted em¬ ployment as a designer and enamel painter at tne porcelain manufactory at Sevres. He was eminently successful in the portrayal of flowers mit and other still-life, but he also produced several landscapes. He was known among his hrench admirers as the «Rubens of flower painting. } So great was his scientific accuracy lr-J*rawint= plants that he was engaged to fur¬ nish most of the illustrations in the (Flora BatavaF

OS, Jan van, Dutch painter (father of the preceding): b. Middelharnis, Holland, 1744; d the Hague, 1808. His studio was at The Hague thioughout his artistic career; here he was director of the Academie des Belles Lettres, being a poet as well as a painter of flow¬ ers, fruits, landscapes, marines and animals His flowers are inferior to those of Van Huy-sum, whom he made his model, but his works are to be found in all important collections and a picture of his entitled (Flowers in a Vase' ™lth a Cat on the Table> sold in 1883 for

OS, Pieter Gerardus Van, Dutch painter, Sun preceding: b. The Hague, 1776; d.

there, 1839. Although he was trained in art by ms father, the flower painter, he made Paul 1 otter his model, and painted many famous landscapes with cattle in the foreground, and his works were eagerly sought by connoisseurs trom all parts of Europe. After serving in the campaign of 1813—14 he produced several battle scenes, some of which are in the Museum at Amsterdam. He was also an excellent etcher.

OSAGE, o'saj, Iowa, city and county-seat of Mitchell County, on the Red Cedar River and on the Great Western and the Illinois Central railroads, about 95 miles in direct line northeast of Fort Dodge. It is the com¬ mercial and industrial centre of a large pro¬ ductive agricultural region in which there are extensive dairy, nursery and stock-raising in¬ dustries. It is the seat of the Cedar Valley Seminary, and it has the Sage Public* Library. The city owns and operates the waterworks Pop. 2,878.

OSAGE, a river which has its rise in the prairies of eastern Kansas and enters the State of Missouri at Bates County, flows east and northeast, joins the Missouri River about 10

iT1c1nenSAbeIow Jef?erson City and has a basin of 15,000 square miles. It is about 495 miles long and navigable, part of the year, 200 miles from the Missouri. It is a winding stream with many deep curves of nearly parrallel sides. It is known in Kansas as the Marias des Cygnes.

OSAGE ORANGE (Toxylou pomiferum or Machura pomifera), a tree of the order of L') ticacece, growing wild in the southwestern parts of the United States. It was first found near a village of the Osage Indians, which fact, connected with the globular form and golden color of its fruit, originated its popular name, but it has no botanical relationship to the true orange. The Osage orange, also called <(bow-wood (by French-American writers bois d'arc) and WdlowwoodC is a striking and 'beautiful lactescent tree, growing 30 or 40 feet high ; its foliage is not unlike that of the orange tree but more glossy and polished and of a bright green color. Its branches spread widely into a broad head; its flowers are dioecious, small, pale yellowish green; the barren are about 12 in number, borne in a very short, almost sessile, racemose panicle. The fruit has about the size and appearance of a large orange, yellow when ripe and roughened on the outside, containing a mucilaginotiS fluid, insipid and uneatable.

1 he sap of the young wood and leaves is milky, and contains a large'proportion of caoutchouc; the color of the wood is a bright yellow; its grain is fine and elastic, on account of which property it is employed by the southern Indians for bows. _ The young branches, beset with sharp, straight thorns, have suggested the em¬ ployment of the tree for making live hedges, which succeed admirably where the winters are not so severe as to kill the annual growth. Treated as a hedge plant, it has many excellent chaiacters but in order to form a compact growth, two shearings in a season are requisite. It is easily cultivated and propagated, and pieces of the root planted out in the nursery, with the tips just exposed above the earth, will readily grow; seeds procured from fertile trees may be sown in broad drills, a quart of seed producing at least 5,000 plants. The bark affords a strong fibre of a flaxy character and the bark of the root is used by the country-people of the Southern States as the material for a yellow dye.

OSAGES. A French corruption of <(Waz-hazhej* their proper name, a tribe of North American Indians of Siouan origin, now as the Osage Nation occupying a reservation in northeast Oklahoma on the east bank of the Arkansas River. In the 17th century they wˆere living in an extensive region between the Arkansas and Missouri rivers, and were early allies of the French, distrusted by, and in frequent warfare with, the neighboring Cherokee, Chickasaw, Creek, Choctaw and other Indians. The first historical notice of the Osage comes from Marquette (1673) who nlaces them on the Osage River, vdiere they remained until their removal in the 19th century farther westward. In 1714 the Osages formed an al¬ liance with the French against the Foxes, who were badly defeated at Detroit. From this time on they appear to have been at almost constant war with the surrounding tribes in some of

whom their very name inspired terror. At the beginning of the 19th-century nearly half

of the Great Osage, under Big-track, migrated to the Arkansas River district. In 1804 the Arkansas Osage were estimated to number about 600, the part of the tribe left behind on the Osage River about the same number; and the little Osage somewhat less. But Morse, in 1821, Porter in 1829, the United States Indian Office in 1843, all estimated the Osages as from 4,000 to 5,000. In 1906, after the division of the tribal land and trust fund provision, there were still about 2,000 Osages under the care of the Indian Office. By a treaty between the United States and the Osage Nation, the tatter in 1808 conceded to the former all their lat Is east of a line running south from Fort Cla. to the Arkansas River, and those west of the Missouri River, comprising the present State of Missouri and the northern part of Arkansas. Again in 1825, in 1839 and 1865 their territory was gradually reduced and finally confined to their present reservation by act of Congress in 1870. The Osage Nation is said to be the rich¬ est community in the world. They own nearly 1,500,000 acres of land, worth not less than $10 an acre. Besides this they have in the United States treasury $8,562,690 derived since 1808, mainly from the judicious sale of superfluous lands. By Act of 28 June 1906 an equal di¬ vision of the lands and the funds of the Osage was provided for.

OSAKA, 6-sa’ka, or OZAKA, Japan, the second largest city of the empire, and one of the three imperial cities, on the island of Hondo, at the mouth of the Yodo in the Gulf of Osaka, 20 miles by rail southeast of Kobe, and 27 miles southwest of Kioto. It is the least picturesque of Japanese cities, but is the foremost commer¬ cial mart of the entire Orient. The city cover¬ ing an area of 27 square miles lies upon either bank of the river Yodo and upon an island in the middle of the river; the manv intersecting canals and the bridges (over 1,000) spanning

these give the Venetian effect. The rich busi¬ ness and manufacturing section is on the south bank of the river, and the western quarter is monopolized by the shipping interests. The island in the midst, which is the heart of the city, bears the poetical name of Nakanoshima, while anciently Osaka itself was known as Naniwa, meaning Mashing waves.®

In the upper town, the fine castle, the granite of its walls of astonishing size, was con¬ structed by Hideyoshi's orders in 1583. In its construction between 30,000 and 60,000 laborers were employed night and day for three years. The palace, built afterward in its precincts and destroyed in the civil war of 1868, was perhaps the most magnificent structure in Japan. Another notable edifice is the Sumiyoshi tem¬ ple founded by the consort of the 14th emperor. Among modern buildings are the Mint, the central post office and the new Bank of Japan, a most imposing edifice. The fine modern har¬ bor protected by a mole has a depth of 28 feet at low water, and hundreds of steamers and sailing craft ply between its wharves and the ports of Formosa, Korea and China. Osaka is the headquarters of the Osaka Chosen Kaisha line. There is an excellent street railwav sys¬ tem, and. a belt line half encircles the city. Cotton spinning is the principal of its numerous manufacturing industries; three-fourths of the operatives are women and girls; other im¬ portant manufactures are those of iron and

steel products, glass, boots and shoes, bricks, chemicals, matches, tobacco and clocks ; ship¬ building is also a considerable industry. The foreign settlement is on the deltaic island of Kawaguchi. Osaka was opened to foreign trade and residence in 1868. Destructive fires visited Ut city in 1910 and 1912. Pop. (1920) 1,252,972.

OSCAR. See Esker.

OSAWATOMIE, os-a-wot'o-me, Kan., city in Miami County near the Osage and Pottawat¬ omie rivers, and on the Missouri Pacific Rail¬ road, 60 miles southwest of Kansas City, Mo. Its name comes from the two rivers mentioned. It is in a stock-raising and agricultural section, and in a natural gas belt. A few settlers were in this section about 1850, but in 1855 the place was organized by the Emigrant Aid Society as a (<free-State settlement John Brown (q.v.) was interested in this settlement, and for a time lived on a farm nearby. On 30 Aug. 1856 the town was attacked by a band of pro-slavery sympathizers; John Brown and his friends made a vigorous resistance, but were

finally overcome. A monument has been erected in commemoration of this event and there is a park known as the John Brown Memorial Park. The city is the division headquarters for the Missouri Pacific Railroad, and has the railroad shops, machine shops, flour mills and large stock yards. It is the seat of the State Insane Hospital opened in 1866, which has over 1,000 patients each year. Some of the prominent buildings are the city library, city hall, the Agnew Opera House, a Masonic temple, the churches and schools. The city adopted the commission form of government in 1914. It owns and operates the sewage, water -and elec¬ tric-lighting plants. Pop. 4,772.

OSBORN, Bradley S., American naval officer: b. Rye, N. Y., 16 Aug. 1828; d. 6 May 1912. He went to sea at 10, and served in the Chinese navy as coxswain, in the Argentine navy as commander, and was an admiral in the Mexican navy. In the Civil War he served under Du Pont, Worden and Farragut, receiving honorable mention by the latter. As volunteer naval scout in the Spanish-American War he was the first to discover the proximity of Cer-vera's fleet off Curaqoa, 14 May 1898, for which he received the thanks of the government. He served in the Arctic and Antarctic oceans and in 1900 he became flag-officer commanding the United States Veteran Navy with the rank of commodore. He published (Osbon's Hand Book United States Navy* (1864) ; and (United States Veteran Navy List) (1900).

OSBORN, Henry Fairfield, American

palaeontologist : b. Fairfield, Conn., 8 Aug. 1857. He graduated from Princeton University in 1877 and in 1880 was assistant professor of anatomy there; from 1891-1910 was professor of zoology at Columbia University and on 4 Dec. 1906-was elected secretary of Smithsonian Institution, but declined the office. He was vice-president of the American Museum of Nat¬ ural History (1901-08) ; trustee, 1901 ; and presi¬ dent since 1908. He explored for fossil verte¬ brates in western United States from 1891 ; in Fayum desert, Egypt, 1907; was active in founding New York Zoological Park under aus¬ pices New York Zoological Society as chairman executive committee (1896-1903, 1907-08) ; vice-president 1897-1909; president since 1909. Since

1900 he has been palaeontologist of the United States Geological Survey. He has published Erom the Greeks to Darwin ' (1894) ; Evolu¬ tion of Mammalian Molar Teeth) (1907) : (The Age of Mammals' (1910); (Men of the Old Stone Age' (1915) ; over 400 scientific papers, addresses and memoirs on zoology, vertebrate palaeontology, comparative anatomy, embryology, zoogeography, anthropology, evolution, *etc.*

OSBORN, Herbert, biologist, entomologist and teacher : b. Lafayette, Wis., 19 March 1856. He was educated at Iowa State College and oc¬ cupied positions from assistant to professor of zoology and entomology there 1880-98. He was State entomologist of Iowa 1898; professor of zoology and entomology, Ohio State University 1898-1916; research professor thereafter. Among his professional writings are (Pediculi and Mallophaga of Man and Domestic Animals ' (1891) ; (Insects Affecting Domestic Animals) (1896) ; (The Hessian Fly in the United States) (1898) ; (The Genus Scaphoideus) (1900) ; and many articles in scientific journals.

OSBORN, Sherard, English author and navigator : b. Madras, India, 25 April 1822 ; d. London, England, 6 May 1875. He entered the navy in 1837 and was ordered to the East In¬ dies, where at 17 he commanded a ship in the blockade of Quedah. In 1849 and in 1852-55 he was in command of one of the ships in the ex¬ peditions of Austin and Belcher sent in search of Sir John Franklin. He served in the Cri¬ mean War; in China, and Japan in 1857-59; and in 1862 commanded a squadron for the sup¬ pression of piracy. He was made rear-admiral in 1873. He wrote (Stray Leaves from an Arctic Journal' (1852) ; (Que¬

dah : Stray Leaves from a Journal in Malayan Waters> (1857) ; (The Career, Last Voyage, and Fate of Sir John Franklin' (3 vols., 1860) ; (The Past and Future of British Relations in China,' *etc.*

OSBORN, Thomas Ogden, American law¬ yer: b. Jersey, Ohio, 1832; d. Washington, D. C., 27 March 1904. He was graduated from the Ohio State University in 1854 and then studied law. At the outbreak of the Civil War he or¬ ganized and became colonel of the 39th Illinois Volunteers ; commanded four regiments at the capture of Fort Sumter, and rose to the rank of major-general of volunteers. He returned to his practice after the war, was treasurer of Cook County, Ill., and manager of the National Soldiers' Home; he served as member of the commission appointed to settle disputed claims between United

States and Mexico, and in 1874 — 85 was United States Minister to Argentina.

OSBORNE, Dorothy, English letter writer: b. 1627 ; d. 1699. She was the daughter of Sir Peter Osborne and married Sir William Temple in 1655. Her husband's schemes are said to have been aided by her and she was a friend of Queen Mary II. But it is in her letters, written to Temple during her prolonged engagement while her parents were delaying her marriage, that the world's interest in her centres. These letters to her fiance form a superlative corre¬ spondence which is universally admired, and the few that appeared appended to Courteney's (Life of Temple' called forth Macaulay's high praise. A fuller collection of these delightful letters was edited and published (London 1888) by E. A. Parry under the title of (The Love

Letters of Dorothy Osborne,' a later edition appeared in New York in 1901, and in Every¬ man's Library. The charm of this 17th century correspondence retains its freshness to this day.

OSBORNE, John E., American public official: b. Westport, N. Y., 19 June 1864. He received a high school education and at the age of 16 was apprenticed to a druggist in Vermont. Subsequently he was graduated in medicine at the University of Vermont. He removed to Rawlins, Wyo., was appointed assistant surgeon of the Union Pacific Railway, established a wholesale and retail drug establishment in 1882 and since 1884 has been engaged in raising live¬ stock. He served one term as member of the Wyoming territorial legislature and in 1888 was chairman of the territorial penitentiary commission. In the same year he was elected mayor of Rawlins, and from 1893 to 1897 was governor of Wyoming. He was delegate to the Democratic National Convention of 1896 and served as member of the 55th Congress in 1897— 99. In the latter year he was Democratic candi¬ date for United States senator in the Wyoming legislature. Since 1912 he has been a member of the Democratic National Committee. On 21 April 1913 Mr. Osborne was appointed First As¬ sistant Secretary of State, from which post he resigned 14 Dec. 1916. He was a candidate for the United States Senate at the November elec¬ tions of 1918.

OSBORNE, Oliver Thomas, American physician: b. New Haven, Conn., 14 Nov. 1862. He received (1884) his M.D. degree at Yale and that of A.M. in 1900. He did postgraduate work (1885) at Leipzig, and (1886)

he started to prac¬ tise medicine at New Haven. He was made pro¬ fessor of therapeutics at Yale Medical School in 1911, then professor of materia medica, therapeutics and clinical medicine. He has been chairman of the medical board of Gaylord Farm Tuberculosis Sanatorium. From 1908 he has been editor of the therapeutic section of the Journal of the American Association. He was a member of the revision committee of the United States Pharmacopoeia. He has written (Diphtheria' (1890) ; (Therapeutic Uses of Or¬ ganic Extracts' (1902) ; Untroduction to Materia Medica and Pharmacology' (1906) ; (Mixtures of the United States Pharmacopaeia' * (1913) ; (The Prevention and Treatment of In¬ fections' (1915).

OSBORNE, (Samuel) Duffield, American author: b. Brooklyn, N. Y., 20 June 1858; d. 20 Nov. 1917 ; graduated at Brooklyn Polytechnic Institute in 1875 ; at Columbia in 1879; Colum¬ bia Law School in 1881 ; received the degree of A.M. from Columbia in 1882, and practised law in New York 1881-92. He was assistant secre¬ tary and, later, acting secretary of the Brooklyn department of city works in 1893-94, and spent much of the following years in travel and ar¬ chaeological research in Italy, Sicily and Tunis. He published (The Spell of Ashtaroth' (1888) ; (The Robe of Nessus' (1890) ; (The Secret of the Crater' (1900) ; (The Lion's Brood' (1902) ; (The Angels of Messer Ercole' (1907) ; En¬ graved Gems : Signets, Talismans and Orna¬ mental Intaglios ancient and modern' (1912) ; also many short stories, essays, poems and ar¬ chaeological papers in periodicals.

OSBORNE HOUSE, a large English villa, formerly the residence of Queen Victoria,

situated near East Cowes in the Isle of Wight and where she died, 22 Jan. 1901. Ed¬ ward VII, to whom it was left, presented it to the nation. Part of it is used as a convalescent home for officers of the army and navy, and part as a naval college.

OSBOURNE, Lloyd, American author: b. San Francisco, Cal., 7 April 1868. He was educated at Edinburgh University, traveled ex¬

tensively and, accompanying his stepfather, Robert Louis Stevenson, to Samoa, was at one time United States consul there. He wrote in collaboration with Stevenson (The Wrong Box' (1889) ; (The Wrecker' (1892) ; and cThe Ebb Tide) (1894). Among his own works are (The Renegade' ; (The Queen vs. Billy > (1900); (The Motor-Maniacs) (1902); (Three Speeds Forward) (1906); (The Adventurer* (1907); (Infatuation' (1909); (The Kingdoms of the World) (1911) ; (A Person of Some Im¬ portance' (1913), and in conjunction with Aus¬ tin Strong, two plays.

OSCANS. See Osci.

OSCAR I (Joseph Francois Bernadotte), king of Sweden and Norway: b. Paris, 4 July 1799; d. 8 July 1859. He was educated at the Lycee Louis le Grand and after his father had been chosen Prince-Royal of Sweden (see Bernadotte) he joined him in that country, and was proclaimed Duke of Sudermania. During the reign of his father he was three times, in 1824, 1828 and 1833, viceroy of Norway, where he made himself popular by his good adminis¬ tration. He afterward continued to study in retirement until the death of his father (4 March 1844) the social and political questions of the day. Parliamentary reform, Jewish emanci¬ pation, the freedom of the press and great eco¬ nomic development, were notes of his reign. He resigned the government in 1857 to his eld¬ est son (afterward Karl XV). He wrote sev¬ eral works on political subjects, one of which, (On Penal Laws and Establishments for Re¬ pression, } has been translated into French and German. He also composed an opera, and vari¬ ous other pieces of music. Oscar II (q.v.) was his third son.

OSCAR II, king of Sweden and Norway up to 1905, after that of Sweden: b. Stockholm, 21 Jan. 1829; d. there, 8 Dec. 1907. He was a grandson of Napoleon I's famous general, Mar¬ shal Bemadotte, king of Sweden. He was trained in the navy and at the University of LJpsala, and ascended the throne in 1872, in succession to his brother, Charles XV. That the severance of the union between Sweden and Norway in 1905 was peaceful was in no small way due to the tact of King Oscar, and he de¬ clined to permit any prince of his house to be a candidate for the throne of Norway. He was recognized as a talented sovereign, speaking at least 10 languages, being well versed in naval and military history and general literature, and winning laurels as critic and poet. Among his writings are (Some Contributions to the Mili¬ tary History of Sweden 1711-13' (1859-65)- (Memories of the Swedish Fleet> (1858), and translations from the German of Goethe's (Tasso) and Herder's <Cid.) He was elected an honorary member of the Berlin Academy and of the Imperial Society of Naturalists of

Moscow. His collected works appeared in

1875-90. They were rendered into German by Jonas (verse 1877, 1888; prose 1891).

OSCEOLA, os-e-6'la, or AS-SE-HE-HO- LAR, that is, wBlack Drink," Seminole chief : b. near the Chattahoochee River, Ga., 1804; d. Fort Moultrie, S. C., 30 Jan. 1838. His paternal grandfather was a Scotchman. After his fa¬ ther's death his mother married a white man named William Powell, from which circum¬ stance he has been mistakenly regarded as a half-breed under that surname. He was not a chief by descent or even by formal election, but he early manifested qualities of leadership. He showed his boldness in opposing the cession of the Seminole lands in Florida. But his passive opposition was roused in 1835 to open hostility; his wife, the daughter of a fugitive slave, was seized and carried into slavery; in his anger Osceola threatened the Indian agent, General 1 hompson, so rudely that he was seized, impris¬ oned and kept in irons for six days. Osceola pre¬ cipitated the second Seminole War by massacring Thompson and four others a few months later, 28 Dec. 1835. His men who had killed Major Dade and his 110 soldiers on the same day were unsuccessful (31 December) in a fight with Clinch, but they took refuge in the Everglades, emerging now and again, as in the assaults on Micanopy and Fort Drane, never winning a bat¬ tle, but always led with great skill and daring, and keeping the country in terror. Two years after, October 1837, he was seized by Gen. Thomas Jesup, with whom he was conferring under a flag of truce, and who excused his treachery by Osceola's alleged disregard of treaties. With several followers he was im¬ prisoned at Saint Augustine, and then at Fort Moultrie, where broken in spirit by the be¬ trayal, he died in a few months.

OSCEOLA'S REBELLION. See Sem¬

inole War.

OSCI, or OSCANS (Greek, Opikoi), an Italian people who appear to have been the original occupants, at the earliest known period, of central Italy from Campania and the borders of Latium to the Adriatic. The Oscans were subdued by the Sabines, a people from the Apennines on the north, of whose previous history little is known and who probably adopted the language and customs of the conquered, with what modifications cannot be ascertained. The Oscan language

was closely allied to the Latin, of which it was probably a parent stock. It ap¬ pears to have been spoken in the provinces long after Latin became the official language and it was used officially long after “the Roman conquest.

OSCILLATING CURRENT. See Elec¬

trical Terms.

OSCILLOGRAPH, a form of D’Arsonvel galvanometer, having a reflecting mirror, in which the moving parts are so light and the range of moyement so small that the rapid variations in alternating and pulsating currents are easily followed by the ray of light reflected from the mirror. By reason of the persistence of vision, the rapidly moving spot of light actu¬ ally appears to the eye as a complete curve of current or pressure from an alternating current dynamo. Consult Robinson, L. T., <The Oscil¬ lograph and Its Uses) (in Transactions of the American Institute of Electrical Engineers Vol XXIV, New York 1905).

OSCINES, os’i-nez, a group of passerine birds possessing highly developed vocal organs, and including most of the ˆsinging-birdsˆ of the world. See Ornithology.

OSCOTT (os’kot) COLLEGE, near Birmingham, England, a Roman Catholic insti¬ tution founded in 1752 as a college and sem¬ inary for priests. It played a considerable part in the education of English Catholics when they were yet excluded from the English uni¬ versities. The school is also called Saint Mary’s Seminary. The courses in secular sub¬ jects qualify for the degree of B.A. in the Lon¬ don University.

OSCURA MOUNTAINS. A range in the southeastern part of Socorro County, N. Mex. It rises out of the wide desert east of the Rio Grande, presenting to the west a very steep front, 3,000 feet high, of rugged granite slopes surmounted by cliffs of east-dipping limestone which

constitutes the summit and east slope. The length of the range is about 20 miles. Highest summit is Oscura Peak, altitude 8,732 feet. Profitable mines of silver lead occur at the north end of the range and the abandoned copper camp of Estey is on its southeastern slope.

OSEL, e'zel, or OESEL, Esthonia, an island in the district of Saaremaa-Osel in the mouth of the Gulf of Riga and after Seeland the largest island in the Baltic. It is 45 miles long; area, 1,010 square miles. The principal town, Arensburg (pop. 5,000), is on the southeast coast. The coast is generally bold and the in¬ terior undulating. The soil, gravelly and not naturally rich, becomes productive by careful culture, and raises corn for export, hemp and flax. The pastures are good, the forests large, the fisheries valuable and its breed of ponies is celebrated. Pop. 66,000, chiefly Esthonian. Suc¬ cessively in the hands of Danes, Swedes and (1721) Russians, it was captured in 1918 by the Germans during the Great War.

OSGOOD, oz'gud, Samuel, American sol¬ dier and legislator: b. Andover, Mass., 14 Feb. 1748; d. New York, 12 Aug. 1813. He was graduated from Harvard in 1770, engaged in a mercantile career, but public affairs absorbed much of his attention, and in 1775 he was a captain of minute-men at Lexington. For a time he acted as aide to Gen. Artemus Ward, but in 1780 entered the Continental Congress, where he served until 1784. In 1785-89 he was commissioner of the United States Treasury, the first to occupy that office; and in 1789-91, Postmaster-General. Later he was speaker of the New York assembly and in 1801-03 super¬ visor in New York. From 1803-13 he was naval officer at the port of New York.

OSGOOD, Samuel, American clergyman and author : b. Charlestown, Mass., 30 Aug. 1812; d. New York, 14 April 1880. Graduated from Harvard in 1832, and from the Cambridge Divinity School in 1835, he was later editor at Louisville (Ky.) of the Western Messenger, was pastor of a Unitarian church at Nashua, N. H., in 1837-41, and of the Westminster Church, Providence (R. I), in 1841-49. From 1849 until his resignation in 1869 he was pastor of the Unitarian Church of 'the Messiah, New York. In 1870 he took orders in the Protestant Episcopal Church. Among his publications

were (Studies in Christian Biography5 (1851); (God with Men > (1853) ; (American Leaves5

(1867).

OSGOOD, William Fogg, American mathematician : b. Boston, 10 March 1864. He was graduated (1886) at Harvard and studied (1887-89) at the University of Gottingen, then (1890) at Erlangen. He was appointed in¬ structor of mathematics (1890-93), then assist¬ ant professor of mathematics (1893-1903) and since 1903 professor at Harvard. From 1899— 1902 he was editor of Annals of Mathematics and (1909-10) of Transactions of the American Mathematical Society, being president of the latter society 1904-05. He has written (Intro¬ duction to Infinite Series5 (3d ed., 1906) ; (Lehrbuch der Funktionen-theorie) (1905-07); (First Course, in Differential and Integral Cal¬ culus } (1907); (Madison Colloquium Lectures5 (1914), besides numerous monographs pub¬ lished in the mathematical journals.

OSGOODE, William, Canadian jurist: b. England, 1754; d. 1824. He was educated at Christ College, Oxford. After a brilliant course in law he was called to the bar and in 1792 removed to Upper Canada, where he be¬ came the first chief justice of that colony. He co-operated with Governor Simcoe in organizing Upper Canada and in 1794 was made chief jus¬ tice of the province of Quebec. He resigned his post in 1801 and returned to his native land, where he afterward filled several important public appointments. He is the author of Re¬ marks on the Laws of Descent5 (London 1779).

O'SHAUGHNESSY, o-cha'ne-sT, Arthur William Edgar, English poet : b. London, 14 March 1844; d. 30 Jan. 1881. In 1861 he became a junior assistant in the library of the British Museum, and in 1863 assistant in the zoological department. He won recognition as an author¬ ity in herpetology. But he was better known as a poet, his volumes being (An Epic of Women5 (1870) ; (Lays of France5 (1872), a free para¬ phrase of the lais of Marie de France; (Music and Moonlight5 (1874) ; and (posthumously) (Songs of a Worker.5 With his wife he col¬ laborated in an admirable children's book, (Toyland5 (1875). Consult the (Life5 by L. C. Moulton (1894).

OSHAWA, osh'a-wa, Canada, town and port of entry of Ontario County, Ontario, near Lake Ontario, and on the Grand Trunk, Canadian Pacific and Canadian Northern railroads, 33j4 miles northeast of Toronto. Its harbor on Lake Ontario is called Sydenham. Its industries include manufactories of engines and machinery, agricultural implements, foun¬ dry products, furniture, flour, leather, carriages, white wear, musical instruments, *etc.* Pop.

7,436.

O’SHEA, o-sha’, Michael Vincent, Amer¬ ican educator : b. Le Roy, N. Y., 17 Sept. 1866. He was graduated (1892) at Cornell and was appointed professor of psychology and educa¬ tion at State Normal School, Mankato, Minn. (1892-95). He became professor at Teachers’ College, Buffalo (1895-97), and professor of education at the University of Wisconsin (1897 —). He has given numerous lectures on education in America, England and Scotland. In 1910 he was chairman of the International Congress of Home Education at Brussels, and

was president of the Society of College Teach¬ ers of Education (1911-12). He has written ‘ Aspects of Mental Economy > (1900) ; Educa¬ tion as Adjustment (1903); (Dynamic Factors in Education) (1906) ; (Linguistic Development and Education } (1907) ; (Social Development and Education > (1909) ; Everyday Problems in Teaching) (1912) ; and is joint author of (The Child and His Spelling) (1914), *etc.* He was editor-in-chief of (The World Book Encyclo¬ paedia* and editor of the Wisconsin Journal.

OSHIMA, o-she-ma’, Japan, a name sig¬ nifying <(great island,® applied to numerous island dependencies of the empire. The chief are (1) Oshima or Vries Island southwest of the entrance to the bay on which stand Tokio and Yokohama; (2) Oshima off the southwest extremity of Hokkaido, opposite Fukuyama ; (3) Amami-Oshima one of the largest islands of the Liu-Kiu Archipelago (q.v.).

OSHKOSH, Wis.., city, county-seat of Winnebago County, on Lake Winnebago at the mouth of the Upper Fox River, and on the Chi¬ cago and Northwestern, the Chicago, Milwaukee and Saint Paul and the Soo Line railroads, about 75 miles northwest of Milwaukee and 85 miles northeast of Madison, the State capital. It was settled in 1836, and in 1853 was chartered. The city was greatly damaged by fires in the years 1859, 1866, 1874 and 1875. It is in a region where there has been extensive lumbering inter¬ ests, and although the forests have

disappeared in some sections lumber is still a leading indus¬ try. The chief manufactures are lumber and lumber products, as furniture, matches, sash, doors, matches and blinds, trunks, carpets, wagons and carriages. It manufactures also machine products, grass twine, rugs, carpets, flour, canned goods, tobacco, boilers, washing machines, gas engines, cement miners, truck cabs, toys, typewriters . and agricultural imple¬ ments. The capital invested in industry is $12,375,000 and the total output is valued at $17,500,000.. About 6,500 hands are employed in the industries. The bank resources amount to $12,672,000, with clearings aggregating annually $26,198,727. It has a large trade, as the city is the commercial centre of a considerable por¬ tion of Winnebago and the adjoining counties. Lake Winnebago is noted for its fish and sports¬ men find in the vicinity good hunting grounds. Yachting in summer and iceboating in winter are favorite sports on this lake. The prom¬ inent buildings are the government building, city hall, courthouse and the churches and schools. It has Saint Mary's Hospital and about three miles distant are the State North¬ ern Hospital for the Insane, the county hospi¬ tal for the incurable insane and the county almshouse. The city is also the home of three remarkable sculptural works — a statue of Carl Schurz, a bronze statue of the Indian Oshkosh and a bronze group in honor of city Civil War soldiers. Oshkosh is the seat of a State normal school and has public and parish schools and a public library. The city is under the com¬ mission form of government. The assessed valuation in 1919 was $35,410,880, with a tax rate of $1.95 per $100. Pop. (1920) 33,162.

OSIANDER, o-ze-an'der, Andreas (classi¬ cized form of Hesemann), Lutheran theolo¬ gian : b. Gunzenhausen, near Nuremberg, 19 Dec. 1498; d. Konigsberg, 17 Oct. 1552. As first

evangelical preacher at Nuremberg, he exerted himself in furthering the Reformation and Lutheranism, taking part against Zwinglius on the subject of the Lord's Supper. He was also present in the conference at Marburg in 1529 and at the Diet of Augsburg (1530). His re¬ fusal to consent to the Augsburg interim in 1548 cost him his position at Nuremberg. By Duke Albert of Prussia, on whom one of his ser¬ mons had produced a strong impression, he was appointed preacher and first professor of theology in the newly-erected University of Konigsberg and vice-president of the bishopric of Samland. Meanwhile, in 1549, he became in¬ volved in a theological dispute, which was em¬ bittered by his obstinacy. In a discussion, (De Lege et Evangelio,* he maintained that justifi¬ cation is not a judicial or

forensic act in God, but_ contained something of a subjective nature, as the imparting of an interior righteousness, brought about in a mystical manner by the union of Christ with men. These views he continued to maintain till his death. Consult Moller,

(Andreas Osianders Leben und ausgewahlte Schriften* (1870).

OSIER, o'zher, the popular name of those species of willow (q.v.) which are used chiefly for basket-making and other wickerwork. They are of low bushy growth and they are the more valuable in proportion to the length, slenderness, suppleness and toughness of their branches. The common osier (Salix viminalis), a com¬ mon native of wet alluvial grounds in many parts, of Europe, is cultivated to supply ma¬ terial for basket-makers and is often planted to prevent the banks of rivers from being washed away. See Willow.

OSIRIS, o-si'ris, in Egyptian mythology, meaning «full of eyes,® the Greek form of the word, ((Hesri® or (<Asiri.® He was the son of Seb, the Earth, and Nut, the Sky, the brother and husband of Isis and the father of Horus. He is styled the Manifester of Good, Lord of Lords and King of the Gods. At Abydos was one of his most sacred shrines, and tradition said that there his head had been buried. Great pilgrimages were made to this city and the dead were brought from far-distant parts to be buried in its sacred soil. In the Egyptian theogony he represented the sum of beneficent agencies, as Set of evil agencies. Osiris, after having conquered all Egypt, established good laws and institutions and becoming a sort of culture divinity to the people whom he found in ignorance and barbarism according to tra¬ dition, fell a prey to the intrigues of his brother Set. Osiris set out to visit the whole world and continue his mission of culture, and it was during his absence that Set took advantage of conditions and set himself to undo the good done by Osiris. On the king's return Set plotted to destroy him. To do this, he secretly took his measure and had a fine box made exactly hU size. This he brought to a feast at which Osiris would be. He offered to make a present of the box to any one who would fill it exactly. Osiris, finally got into the box, on which Set and his accomplices shut it and threw it into the Nile, down which it floated to the sea. After a very long search Isis found the body and brought it back to Egypt. Set again got it, cut it and scattered the parts over the land, up and down the river. Isis gathered them uo

and buried them and each burial place became sacred. He is represented under many differ¬ ent forms and compared sometimes to the sun and sometimes to the Nile. In particular his S°n ,was • suPP °sed to animate a sacred bull called Apis and thus to be present continually among men. Sometimes he is represented as a man crowned with a mitre, a globe, a lotus-uWer,°r an elePhant's trunk; sometimes with the body of a man and the head of an ox, ibis or other animal ; sometimes he holds a stick sometimes a phallus in his hand. He holds in some representations a whip in one hand and a scourge in the other. He has frequently the horns of a bull. Mythologically he resided in the under-world and was the ruler of the dead.

The worship of Osiris was introduced into Rome but the rites proceeded to such an excess of licentiousness that it was at length pro¬ hibited by law. Consult Budge, Wallis, 'The Gods of the Egyptians > (London 1904) ; Er- , Aeffyptische Religion5 (Berlin 1905) ; Wredemann, ' Religion of the Ancient Egyptians5 (New York 1897).

OSKALOOSA, os-ka-loo'sa, Iowa, city, county-seat of Mahaska County, on the Chicago, Burlington and Quincy, the Iowa Central and the Chicago, Rock Island and Pa¬ cific railroads, about 65 miles southeast of Des Moines. It was settled in 1843 and incorpo¬ rated in 1853. It is the commercial centre of a fertile agricultural and stock-raising region. In the vicinity are large deposits of coal, lime¬ stone and fire-clay. The chief industries are flour milling, manufacturing vitrified brick, wagons, iron and brass goods, fire hydrants, furnaces, silos, caskets, heaters and woolen goods. It has a large meat-packing plant and coal and brick yards. The principal buildings are the post office, the church, school and li¬ brary buildings. A bronze statue of the In¬ dian chief Mahaska adorns the principal square. The educational institutions are the Penn Col¬ lege, opened in 1873 under the auspices of the Friends, the Oskaloosa College, under the auspices of the Disciples of Christ, a busi¬ ness school and a public library. The Society of Friends of the State of Iowa hold their an¬ nual meeting here. Pop. 9,466.

OSLER, os'ler, Britton Bath, Canadian lawyer : b. Simcoe County, Ontario, 1839 ; d. 1902. He was educated at Toronto University and was called to the bar in 1862. He prac¬ tised for some time at Dundas and at Hamilton but removed to Toronto in 1882. He soon ac¬ quired a national reputation as an expert law¬ yer in criminal cases. In 1885 the Dominion government secured his services in the trial of Louis

Riel, and for many other cases of nation-wide interest.

OSLER, Sir Edmund Boyd, Canadian financier and legislator: b. Tecumseh Parson¬ age, Ontario, 1845. He was educated at Dundas. In 1896 he was president of the Toronto Bond Trade and is head of the Toronto financial house of Osier and Hammond. He is presi¬ dent of the Dominion Bank of Canada and director on the boards of numerous industrial enterprises and director of the Canadian Pa¬ cific Railway Company. He was created a knight in 1912 and has been member of the Dominion House of Commons for West To¬ ronto since 1896. In 1896 he was one of the

representatives of Canada at the Congress of Chambers of Commerce held in London.

OSLER, Sir William, Canadian physician: b. at Bondhead, Tecumseh, Ontario, 12 July 1849; d. Oxford, 29 Dec. 1919. He studied at 1 rimty College, Toronto, the Toronto School of Medicine and McGill University, where he graduated M.D. in 1872. He continued his studies at University College, London, Berlin and Vienna and was appointed professor of physiol¬ ogy and pathology in McGill University, Mont¬ real, and to the chair of clinical medicine in the University of Pennsylvania in 1884. He was chosen as the Galstonian lecturer in the Royal College of Physicians, London, England, in 1885, and as the Cartwright lecturer in the College of Physicians and Surgeons, New York, in 1886. In 1889 he was appointed professor of the principles and practice of medicine in Johns Hopkins University and chief physician to the Johns Hopkins Hospital, Baltimore, po¬ sitions which he resigned in 1904 upon his ap¬ pointment as regius professor of medicine in the University of Oxford, England. A writer of international repute in various American and European medical journals as well as in other fields, he is the author of (Clinical Notes on Smallpox5 (1876); (Histology Notes5 (1882); ‘Cerebral Palsies of Children5 (1889); ‘Prin¬ ciples and Practice of Medicine5 (1892); a standard modern work which had reached a fifth edition in 1903; ‘Chorea and Choreiform Affections5 (1894); ‘Lectures on Abdominal’ Tumors5 (1895) ; ‘Angina Pectoris and Allied States5 (1897) ; ‘Cancer of the Stomach5 (1900); ‘Science and Immortality5 (1904); ‘Counsels and Ideals5 (1905); ‘Thomas Lin-acre5 (1908); ‘A Way of Life5 (1914), and is editor of ‘A System of Medicine5 (2d ed., 1915). He was created a baronet in 1911.

OSMAN DIGNA, os-man’ dig’na (“Os¬ man the Bearded55), Sudanese

chief: b. 1836; d. 1900. He was of Turkish extraction, a slave trader who suffered financial losses be¬ cause of English interference with his trade; raised an army in 1881-82 to assist Arabi Pasha against the British; as chief of the sheiks of Eastern Sudan contributed largely to Gordon's capture and death by blocking the approach to Khartum, through Suakim; was the hero of a long and costly siege at Tokar in 1887-88; joined the Mahdi in the rising of 1899, and in 1900 was captured and imprisoned at Rosetta.

OSMAN NURI PASHA, noo're pash'a, called Ghazi, "the Victorious,55 Turkish gen¬ eral b. Amasia, Asia Minor, 1837; d. Con¬ stantinople, 5 April 1900. He saw service against the Druses in 1860 and in Crete in 1867-69, fought in the Yemen campaign of 1871, became marshal in 1876 and in the war with Russian, after bold and brilliant manoeuvres, oc¬ cupied Plevna, which he was forced to sur¬ render 10 Dec. 1877, in spite of his heroic at¬ tempt to break through the forces of his be¬ siegers. He was returned to Turkey after the Treaty of San Stefano, entrusted with the re¬ organization of the Turkish army and was Minister of War 1880-85 and marshal of the palace after 1880. Consult Levaux, 'Ghazi Os¬ man Pacha5 (1891). See Russo-Turkish War.

OSMANIE, os-ma'ne-a, Imperial Order

of. See Orders, Royal.

OSMANTHUS, genus of trees of the natural order Oleacece, of which about 13 species are indigenous to North America, China and Japan. The species O. americaxnus is called devilwood in southern United States. It at¬ tains a height of 45 feet and a diameter of one foot. Other species are grown as ornamental shrubs in China and Japan.

OSMELITE, the same as Pectolite (q.v.).

OSMIUM, a metallic element of the platina group, commonly found with iridium (q.v.) and the heaviest and most infusible of metals. It was discovered by Tennant in 1804. Osmium-iridium is found in Neoyanskite and Syfferskite as very hard black grains ; as a cubic or obtuse rhombohedral crystal it is bluish white, with violet lustre and greater hardness than glass. The element has the atomic weight 195 and the high specific gravity of 22.5. Osmium can be fused only by the heat of an electric arc. It forms three chlorides, OsCk, OsCl3 and

OsCh; the oxids, OsO, OS2O3, OsOz, 0s03 and OsO.», commonly called osmic acid, which has pungent and poisonous vapors, is extremely volatile and is a powerful oxidizer. In alloy with iridium, osmium is used for pointing gold pens.

OSMOSIS, the diffusion of fluids through membranes. If a septum composed of either organic (such as a bladder) or inorganic (such as porous earthenware) be interposed between two liquids holding different substances in so¬ lution, the liquids will pass through the septum carrying some of the matter in suspense with them; that is, they will diffuse one into an¬ other. This phenomenon is called osmosis. The liquids pass through the interposed medium at different rates, gradually getting slower until, they are said to be balanced. If a bladder filled with a solution of sugar be immersed in water, seven parts of water (by weight) will enter the bladder while one part of sugar escapes into the water. The action of the liquid parting with its soluble matter is called endosmosis, the flow of the liquid receiving it exosmosis. Both must act simultaneously, one cannot exist independ¬ ently of the other ; together they constitute the phenomenon of osmosis. Endosmosis usually takes place in the direction of the denser liquid, although there are some exceptions, such as ether, alcohol, etc., which act like liquids heavier than water. This diffusion has variously been explained by capillary attraction, unequal absorption and chemical action, but the real explanation of osmosis appears to be along the lines of the kinetic theory of gases, which exert a pressure quite analogous to that of dissolved substances. In order to have osmosis take place the liquids on either side of the interposing septum must be of unequal osmotic pressure. See Chemistry.

Osmosis plays an important part in plant physiology. The plant cell consists of a mass of protoplasm enclosed within a flexible or¬ ganic membrane (the cell wall) and enclosing a fluid. This membrane is permeable to water and generally, though not always, to all sub¬ stances it may hold in solution; but the proto¬ plasm itself is only permeable Jo water contain¬ ing such substances as it requires for its nutri¬ tion — it would seem to be endowed with the power of selection. Thus cells in different plants or cells in different parts of the same plant possess very different powers of osmosis

• OSNABRUCK

The osmotic pressure varies from two at¬ mospheres in rare cases to 100 in certain tissues exposed to much loss of water by evaporation or

by the presence of a medium of high osmotic pressure. The pressure within a cell may be measured by putting it in a medium which just causes it to show signs of losing its contents; another method depends on the fact that a soluble lowers the freezing-point of its solvent by an amount proportional to its osmotic pres¬ sure. Water is the only solvent in plant life. When a cell becomes full or swollen it is said to be turgid, but this turgidity is constantly relieved by osmosis taking place from cell to cell and by final evaporation. As soon as the osmotic pressure in one cell falls below that of a cell or cells with which it is in juxtaposi¬ tion, osmosis takes place and thus a fair degree of ‘equilibrium is maintained. The supply of foodstuffs is kept up in a like manner. Os¬ motic pressure is enhanced by electrolytic dis¬ sociation (see Dissociation) which takes place in plant life on account of the presence of acids and salts (electrolytes) of various kinds which are found in solution both in and surrounding all plant life. The phenomena of osmosis still present a fertile field of research for the scien¬ tific mind. See Absorption; Solutions. Con¬ sult Findlay, A., (Osmotic Pressure) (New York 1913) ; Jost, L., (Lectures in Plant Phy¬ siology* (2d Eng. ed., Oxford 1914) ; Morse, H. N., (Osmotic Pressure of Aqueous Solutions) (Washington 1914) ; Philip, J. C., Phys¬ ical Chemistry: Its Bearing upon Biology and Medicine* (New York 1913).

O.SMUN, Thomas Embley (« Alfred Ayres®), American orthoepist : b. Montrose, Ohio, 26 Feb. 1834; d. New York, 26 Oct. 1902. He was graduated from Oberlin College and later studied medicine in Paris and Berlin. In 1859 he returned to the United States and set¬ tled in New York. Resolving to make a life-work of the purification of the English language as used in the public press, he became an author¬ ity on the use of English and also attained dis¬ tinction as a dramatic critic. Subsequently he taught elocution, and in 1891 he appeared as Shylock in Boston and other New England cities. He was one of the editors of the Stand¬ ard Dictionary. > He published (The English Grammar of William Cobbett* (1884) ; (The Orthoepist* (1880) ; Some IllUsed Words* (1901), *etc.*

OSMUNDA, a genus of tall ferns with large stout rootstocks and sporangia borne on the veins of reduced leaves. One species, the royal fern (O. regalis), is cultivated on account of its elegant appearance. It grows in clumps of two to five feet in height, and is well adapted for open moist places, where the soil is rich and shade thin, or even where full sunlight falls.

Other well-known species occurring in America are the cinnnamon fern (O. cinna-momea) and the interrupted fern (O. clayton-iana).

OSNABRUCK, os'na-briik, Germany, a town of Hanover, Prussia, on the Haase, 70 miles west Of Hanover. In the old town the streets are generally narrow and the houses low ; but the new quarters have wide and handsome streets and fine residences. The chief buildings are the ancient Protestant churches of Saint Catherine and Saint Mary ; the Roman Catholic

cathedral (13th century) ; the Protestant and Roman Catholic gymnasiums, the townhouse with statues (1889-90) of German emperors on the faqade ; the Friedenssaal (Hall of Peace) restored in 1890; the museum (1889), the new hospital, teaching colleges, libraries and the commercial school. Osnabriick has iron and steel works, railway workshops, machine-shops, iron-foundries, wire-works, paper-mills, flax and cotton-mills, bleachfields, tile-works, breweries, *etc.* There are iron mines and stone quarries in the vicinity. Osnabriick gave its name to the coarse linen known among English-speaking people as osnaburgs. It was created a see in 888, and in 1082 was surrounded hy walls. It after¬ ward entered the Hanseatic League, but never became a free imperial city. The negotiations for the Peace of Westphalia, which ended the

ir * ears' War, were carried on here. Pop.

65,967.

OSORIO, Manoel Luiz, ma'noo-el loo-eth o-so re-o, Brazilian soldier: b. near Pelotas, Brazil, 10 May 1808; d. Rio de Janeiro, Brazil, 4 Oct. 1879. He entered the army at an early age and in the Civil War in Rio Grande do Sul, 1839 — 45, he attained distinction. In the campaign in Uruguay in 1851-52 he was again prominent and at the outbreak of the Para¬ guayan War in 1865 was made commander-in¬ chief, but was superseded by Caxias in 1866. He was made lieutenant-general in 1867 and con¬ tinued to serve until 1869, when he was seriously wounded. He entered politics after the war, became senator in 1877,

and from 1878 until his death was Minister of War. He was created Marquis of Herval by the government, but his chief title of honor was (<0 Legendario" (the Fabulous) bestowed upon him by his soldiers for his bravery.

OSPREY. See Fish-hawk.

OSSA, os'a, Greece, the classic name of Kissavos, a mountain 6,408 feet high, in the northeast of Larissa, overlooking the Gulf of Saloniki. The Vale of Tempe separates it from Olympus, 9,794 feet high, and to the southeast¬ ward is Mount Plessidi — ancient Pelion — 5,308 feet high. These three mountains are re¬ nowned in Greek mythology, and the classic phrase ((piling Ossa upon PelioiU refers to the giants Ephialtes and Otus arranging to place Ossa upon Pelion to aid them in reaching the summit of Olympus. This conception is said to have been suggested by the conical form of Ossa and the flat summit of Pelion. The seats of the Centaurs and Giants are located in the neighborhood of Ossa and Pelion.

OSSEIN, os'e-in, the organic basis of bone allied to gelatine. If a bone is placed in acid, 20 per cent hydrochloric, the inorganic mat¬ ter (salts, etc.) is dissolved out and by repeated washings only the organic matter remains. This retains the shape of the bone without its hard¬ ness. It will not dissolve in cold water, but if boiled with dilute, mineral acid it reduces to gelatine. Ossein is closely related to, if not identical with, the collagen of the connective tissues. Bone also contains a mucoid and an albuminoid. See Bone.

OSSETES, os'ets', a people of the central Caucasus region, supposedly of Iranic origin, because of their native name (Iron) and phys¬

ical characteristics, although there is a tradition among them that they came from the region of the Don in Russia. They are tall, and have broad heads, but are by no means as attractive appearing as their neighbors of the Caucasus. 1 heir religion is an admixture of Moham¬ medanism and Christianity. Consult Chantere, (Recherches anthropologiques dans le Caucase) (Paris 1887), and Kovalevski, (The Customs of the Ossetes } (in the Journal of the Royal Asiatic Society, 1888).

OSSETIC (os-set'ik) LANGUAGE, an

Iranian language spoken by the Ossetes (q.v.) of the Caucasus. It is analytic in form. Cases are formed by postpositions. There are three

verbal tenses, past, preterite and future, with in¬ dicative, optative, subjunctive and imperative moods. Auxiliary verbs aid in the formation of compound tenses and of other voices than the active. The chief dialects are Ironish or Irish, and Tagaurish, Digorish and Taulish. Of these Tagaurish is the most important for the linguist and phonologist. Folktales and the Bible represent the literature of this remnant of an ancient language. Both the Armenian and Rus¬ sian alphabets are used. The language is spoken by about 125,000 people. Consult Hiibschmann, (Die Sprache der Osseten> (Strassburg 1903); Rosen, <Ossetische Sprachlehre) (Berlin 1844) ; Sjogren, (Ossetische Sprahlehre) (Saint Peters¬ burg 1844).

OSSIAN, osh'T-an, or more correctly, OISIN, appears in Gaelic literature and legend as the son of Finn, or Find, the hero of what has been styled the Fennian or Oisianic cycle of tales and poems current in Ireland and the high¬ lands of Scotland. Finn is the hero of all these tales and poems, as Arthur is of the Arthurian cycle; Oisin is his poet and bard, as well as his son. This Oisianic cycle exists side by side with a heroic cycle which consists of about 30 tales, forming one of the most complete epic cycles to be found in any literature. They are tales of battle, narratives of adventure, all circulating round the person of the hero Cuchulaind. They are mixed prose and verse and many of them are extant in manuscripts written about the 12th century. The Oisianic cycle is of a differ¬ ent period. Finn, the heroic figure, is a less legendary and mythological personage than Cu¬ chulaind; he lives in the 3d century at the time when the Romans occupied Great Britain and moves through the story almost like a histori¬ cal character ; the supernatural is relatively in¬ frequent in his adventures, and he fights his battles as a leader of mercenaries engaged, after the. country has been conquered, in keeping the native races of Scotland in check. These stories are found in good manuscripts of the 15th cen¬ tury and their style points to the fact that a stage of culture has been reached by the rude inhabitants of North Britain very different from that described in the heroic cycle, where Medb, queen of Connaught, contends with Mac Nessa, king of Ulster, for the possession of the brown bull of Cualnge, and Cuchulaind defends Ulster single-handed and discomfits with his unaided sword the valor of whole armies. In the heroic cycle the characters are completely mythological, but -they are distinctly described as to their dress or arms. In the Oisianic cycle the figures of the actors become more vague; there is an exaggeration in the reported exploits of the

warriors, although the excitement of the hunt and the riot of the royal drinking bout, as therein depicted, are evidently clear transcripts from the primitive life of their period. There is one important point to be noted with regard to these two types of ancient Celtic literature in Scotland. They are as distinct in style, color and development as in their dramatis persona. They belong to different eras, and their heroes never meet on the same stage; the hero of the earlier cycle has vanished when Finn, the Oisianic warrior, comes upon the battlefield.

This is a very important point in deciding one of the virulent literary controversies of the 18th century. The Celtic legends as they were preserved orally or in manuscript attracted the fancy of James MacPherson (q.v)., a Scot¬ tish schoolmaster, who published what he averred to be translations from (<the Gaelic or Erse® in the shape of <(Fragments of Ancient Poetry® (1760), and subsequently produced <Fingal> (1762) and <Temora> (1763), after¬ ward collected into a single volume under the title <The Poems of OssianP There was much merit in these works as poems. The descrip¬ tions of scenery were often beautiful and ap¬ proaching the sublime, and the wildness of high¬ land mountain and lake was vividly portrayed. But apart from the want of detail in the account given of the dress, buildings and social life of the personages introduced there was one circum¬ stance that proved these poems to be anything but translations of a connected <(Gaelic or Erse® composition. The heroes of the heroic cycle were made to mingle with the heroes of the Oisianic cycle in the narrative. And this was not all. MacPherson never produced during his lifetime the original poems which he averred were in his possession. After his death, how¬ ever, some manuscripts were found in which fragments from both periods of genuine ancient poetry were found patched together in a cento with some very indifferent Gaelic of his own, and so arranged as to form a sort of counter¬ part to his (Poems of Ossian.® The more re¬ cent studies in Gaelic literature have furnished us with this solution of the Ossian controversy; and have made it apparent that, while Mac¬ Pherson might have been at liberty to fuse cer¬ tain ancient poems, as Fitzgerald has done, in his Omar, to produce a beautiful romance of his own, he committed a grave and unpardonable error in attempting to forge originals to sup¬ port his

claim that his work was a translatibn pure and simple. Consult Simpson, (Poems of Ossian) (1857) ; McLauchlin, (The Book of the Dean of Lismore) (1862) ; Nutt, (Ossian and the Ossianic Literature> (1899) ; Rolleston, T. W., (Myths and Legends of the Celtic Race> (New York) ; Windische, (Die Altirische Sage und die Ossianischen Gedichte) (1878).

OSSIAN-NILSSON, os'si-an-nels's5n, Karl Gustaf, Swedish poet: b. Lund, 1875. He received his education at the university of his native town and entered the teaching profession. He won a literary reputation in 1900 with (Fem dikter> and < Masker. > This was enhanced by other works such as <Hedningar) (1901) ; <Ornar> (1902) ; (Svart och hvitC (1904) ; (Amerikaner och byzantiner> (1905); (Orkester) (1907); <Flygskeppet> (1910); <Prastgarden> (1911) ; the novels <Barbarskogen) (1908; 7th cd., 1913); <Slatten) (1909); <Hafvet> (1910);

(Odets man5 (1912); Lille Benjamin* (1913); and the metrical drama (Fagel Fenix) (1912).

OSSIFICATION, the process of bpne formation, which in all cases essentially consists of the deposition of earthy or calcareous matter. It may exhibit two modes of occurrence. Bone may be formed by the deposition of earthy or osseous material in fibrous membranes, that is, in tissues composed of fibres and cell elements. The flat bones of the skull or cranium are de¬ veloped in this first manner. No granulai or intermediate stage is observable in this process, the earthy matter being simply deposited in spaces which result from absorption. In the second mode, exemplified in the formation of the long bones of the skeleton, the osseous ma¬ terial is deposited in a primary basis of gristly or cartilaginous kind. Ossification in (his lat¬ ter Instance is, therefore, said to begin in carti¬ lage, just as in the previous case it began in membrane. The process of ossification in carti¬ lage exhibits activity at several distinct and marked points of its extent. These points are the active centres of bone-growth, and are hence called centres of ossification. The limy material is, therefore, diffused from these centres through¬ out the extent of cartilage, the blood vessels of the adjoining parts bringing supplies of ma¬ terial from which the earthy matters are de¬ posited within the cartilaginous basis. The cor¬ puscles of the cartilage are seen to be arranged in verticle rows, and the calcareous matter, de¬ posited in the form of granules, is thrown in around them. The nuclei of the cartilage cells are left unossified, a space also being kept free around each nucleus, which

becomes one of the lacunae or minute cavities seen in a microscopic section of bone-tissue. The first deposits of bony matter are of an irregular and thick de¬ scription, this form of ossification, if persisted in, producing cancellated bony tissue ; while by a subsequent process of absorption of the spaces in the cancellated tissue, and by the further dep¬ osition of bony matter, the irregular tissue is converted into compact bone. The gradual growth of bone takes place by a continual de¬ velopment of the cartilaginous basis between the various centres of ossification, and in this new basis earthy matter is as continually being formed.

True ossification may also occur abnormally in living textures and as the result of diseased conditions. This is particularly likely to take place in the muscles, as in those of the right shoulder of the infantryman, which is irritated by his rifle, or of the thighs of the cavalrv-man. The ossification of the muscles may also form part of a progressive general disease. Deposits of limy matter may take place within the coats of blood vessels, rendering them fri¬ able and readily ruptured. The valves of the heart may become calcareous, and calcareous degenera¬ tion may even affect tumors and other products in themselves* of abnormal nature. A distinc¬ tion ought to be made between mere calcification as just indicated, and true ossification, or the formation of bone. But in either case the dep¬ osition of limy matter forms the basis or essential feature. The gall-bladder may thus be converted into a hard limy sac or bag, and even the pericardium or investing sac of the heart may occasionally exhibit a high degree of calci¬ fication. See Bone.

ot*S?SˆING’ 0SSln-ing> formerly SING W.1JNJU, N. Y., village in Westchester County, on the Hudson River, and on the New York Central and Hudson River Railroad, about 30 ™|cs north of New York. It was settled about 1698, incorporated as a township 2 May 1845 and as a village some years later. The name Sing Sing, by which it was known until 1901, comes from an Indian word meaning a stony place. One of the State prisons is located here, just outside the village limits,

and is known as Sing Sing prison; hence the villagers desired a change of name, and chose Ossining. The village, located upon rocky hills, overlooks Tappan Bay and a long and beautiful part of the river. In the early part of the 18th century silver, copper and some gold was found here, and considerable capital was expended in de¬ veloping mines which never proved productive. The chief manufactures are. shoes, leather, ma-chmery, foundry products, pills, porous plasters, drills and plated goods. The trade is chiefly m its own manufactures and farm products. Some of the places of interest are the Croton Aqueduct Arch, 88 feet span and 70 feet above water, and the arched highway bridge. The State prison, a large white building made of dolomite, a coarse marble quarried nearby, was founded in 1826. Capt. Elam Lynds brought here 100 convicts from the State prison at Au¬ burn and put them to work to wall themselves in. Men only are confined here. The village has long been noted for its educational institu¬ tions; it has Holbrook, Saint John's and Mount Pleasant Military academies, the Roman Cath¬ olic Foreign Mission Seminary, Ossining Seminary for young women, public and parish schools and a public library. There are six churches. The two banks have a combined capital of about $200,000. The government is vested in a president and nine trustees. The president and three trustees are elected each year. The village owns the waterworks. Pop. 10,739. Consult Ingersoll, (Hudson River and Catskill Mountains-* ; Scharf, (History of West¬ chester County > (Philadelphia 1886).

OSSOLI, os'so-le, Sarah Margaret Fuller,

Marchioness, American writer: b. Cambridge-port, Mass., 23 May 1810; d. off Fire Island beach, 19 July 1850.' She was remarkable for her precocity and her association with Emerson and other eminent literary men, rather than for her own productions. She was taught at six to read Latin, and early made herself acquainted with English and Continental literature. She taught in public and private schools in Boston and Providence, and frequently visited Brook Farm (q.v.), though she never resided there and had no confidence in the final success of that enthusiastic experiment. In 1840-42 she was editor of the Dial, which numbered Emer¬ son and other distinguished writers among its contributors. In 1844 she removed to New York and became literary critic of the Tribune. In that capacity she worked effectively toward the increase of public interest and the improve¬ ment of public taste in literary, artistic and other matters.. She visited Europe in 1846, met there leaders in literature, art and philanthropy, married in 1847 the Marquis d'Ossoli ; was in Rome during the siege of 1849, when she served in the hospitals ; embarked with her husband for New York, but perished almost in sight of

port during a severe storm. The position she took in the American literary world of the time would perhaps be not wholly intelligible to one now reading much of what she wrote. Her critical articles are her best by far, many being brilliant and exhibiting what Higginson calls ((the power of putting a high thought into a sentence? She strove to abolish the colonial spirit in American thought and letters, and con¬ temporaries bear witness to the reality and ex¬ cellence of the service. Consult the (Memoirs) by Emerson, Clark and Channing (W. H.) (1852); and the biographies by Howe (1883); and Higginson (1884) ; < American Men of Let¬ ters) series.

OSSUNA, o-soo'na, Duke of. See Osuna, Pedro Tellez y Giron, Duke ©f.

OSTADE, os'ta-de, Adrian van, Flemish painter: b. Haarlem, 10 Dec. 1610; d. there, 2 May 1685. He studied under Frans Hals. His pictures exhibit an exact imitation of nature, and contain realistic respresentations of subjects which in other hands would have been mean or commonplace, such as the interiors of ale¬ houses or kitchens, with Dutch peasants smok¬ ing, quarreling or drinking, and he puts such expressions into the heads of his characters that their coarseness is lost in our admiration of their truth and animation. His coloring is rich and clear, his touch spirited and free and all his works are highly finished. His later works were somewhat overwrought. He was also a good etcher; Jan Steen was a pupil of his. Among his pictures (which are generally small) may be mentioned (The Smoker* ; (The Drinker* ; <The Dancer? He also painted many portraits.

OSTADE, Isack van, brother and pupil of the preceding, Flemish painter: b. Haarlem, 2 June 1621; d. there, 16 Oct. 1649. He at first applied himself to paint the same subjects as those which had brought such a brilliant reputa¬ tion to his brother, but soon abandoned taverns and kitchens for scenes in the open air, both summer and winter landscapes, and with such success that at the time of his death .he was rapidly rising to be a rival to his brother. Original in style, his pictures are remarkable for good composition, masterly drawing and solid painting. Many of them are in England, where they were valued before his fellow-coun¬ trymen came to a knowledge of his genius. Among the most valued of them are (A Vil¬ lage Inn) ; (View of a Frozen Canal* ; land¬ scape and Cottages? (Village Scene> (show¬ ing cavalier on gray horse, horsemen with red cloak and post wagon) ; (Winter Landscape in Holland? The (Halte-de Voyageurs* and (Vue de Village> were sold (1865) for upward of $5,000 each.

OSTEITIS, inflammation of the sub¬ stance of bone. In its chronic forms it may result, in suppuration ; in caries, a decay of the bone in particles ; or in necrosis, a decay of the bone in slices. Removal of the diseased bone may be required.

OSTEN-SACKEN, os'ten-sak'ken, Baron Charles Robert, Russian entomologist: b Saint Petersburg, 21 Aug. 1828; d. 1906. He was educated in his native city and became con¬ nected with the Imperial Foreign Office in 1849. He came to the United States in 1856 as secre-

tary of legation at Washington and in 1862 became Russian consul-general at New York. In 1871 he resigned his public office but re¬ mained in the United States until 1877. With Mr. H. Loew he studied the Diptera of North America, and published numerous papers on this subject and two catalogues.

OSTEND, os-tend', Belgium, a seaport town and pleasure resort, in the province of West Flanders, on the North Sea, 67 miles northwest of Brussels. Ostend is connected by rail with all parts of Belgium, France and Ger¬ many; and steamers ply regularly to and fro from London and Dover. It was strongly for¬ tified prior to 1865, since when the fortifications have been replaced by fine promenades. It has a healthful situation, although on a low sandy coast, and is resorted to for sea bathing, etc., by about 50,000 visitors annually. Along the sea front is a massive digue or esplanade of stone and terra-cotta, three miles long, forming a fine promenade. The public buildings include the Flotel de Ville, three churches (one finished in 1883), an English church, large Kursaal, barracks, *etc.* The harbor is not easy of access, but has been greatly improved since 1898; the basins within are extensive, giving 32 feet at high water, and form the termination of a magnificent line of canals stretching like a netˆ work into the interior, and furnishing admirable facilities for commerce. The manufactures are unimportant, the chief being linen, sail cloth and tobacco. Shipbuilding is also carried on. Cod and herring fishing are considerable indus¬ tries, and an important branch of trade is oysters, fattened here in large salt reservQirs, and transported as far as Paris.

Ostend was founded in the 9th century, walled in 1445 and regularly fortified in 1585 by the Prince of Orange. In the great struggle to throw off the yoke of Spain it sustained a memorable siege from 4 July 1601 to 28 Sept. 1604, during which the besieged lost about 50,000 men, and the Spanish besiegers more than 80,000. Pop.

43,002.

During the Great War Ostend was for a short time the capital of Belgium; but it was captured by German forces on 15 Oct. 1914, suffered considerably at their hands and later from British air attacks.

In March 1919 the town of Ostend furnished the Minister of the Interior with a list of the sums claimed before the Peace Conference for reparation in respect of the war damage which the town had suffered. Ostend expended about 20,000,000 francs ($4,000,000) in forced requisi¬ tions ; while the damage done to public buildings was valued at 57,000,000 francs ($11,400,000), or a total of 77,000,000 francs ($15,400,000), with¬ out counting the losses caused to private indi¬ viduals. During the war Ostend was bombarded 187 times, and 271 persons were killed and 436 injured in the shelling.

OSTEND MANIFESTO, The, a term used in the diplomatic history of the United States since 1854. In that year, 9 October, a dispatch was forwarded to the United States government by the American ministers. at the courts of Great Britain, France and Spain, who had met in the city of Ostend, by the govern¬ ment's request, to discuss the Cuban question. The dispatch declared that, if Spain would not sell Cuba, self-preservation required the United

States to take the island by force, and prevent it from being Africanized like Haiti. They ad¬ vised offering $120,000,000 for the island. The suggestion was not approved in the United States by statesmen or politicians and was strongly condemned.

OSTEOLEPI.S, a genus of fossil long, slender crossopterygian fishes, peculiar to the Lower Old Red Sandstone of Scotland. It is characterized by smooth rhomboidal scales, by numerous sharply pointed teeth and by having the two dorsal and anal fins alternating with each other. This, with Diplopterus, etc., consti¬ tutes the family Osteolepida, represented in America by the genus Megalichthys of Carboni¬ ferous and Permian formations.

OSTEOMALACIA (also called Mala-costeon and Mollities Ossium), a disease oc¬ curring most frequently in women, but some* times in men, characterized by softening of the bones through progressive disappearance of the earthy salts. It affects the different parts of the skeleton, and deformities are often caused by it. It is mainly confined to adults, does not ordinarily attack the aged, and among women is likely to be associated with pregnancy, or to follow child-bearing, abstention from which af¬ fected women should strictly practise. It may progress for years, and then end in fatal com¬ plication with lung disease, or through exhaus¬ tion. The causes assigned are many, but their determination is as yet incomplete. Surgery has sometimes proved more efficacious than medical treatment in this disease, which de¬ mands the most thorough hygienic care in all cases.

OSTEOLOGY, Human, that branch of anatomy which treats of bone or of bones. The bony element of the body is for the mainte¬ nance of form and motion, support of weight and muscles, and the protection of the internal organs. It is one of the hardest structures of the body, possessing a certain degree of tough¬ ness and elasticity. See Bone.

Development of Bone. — In the foetal skeleton the long bones of the limbs are cartilaginous. Hence there are two kinds of ossification, intracartilaginous and intramem-braneous, and to those must be added the sub¬ periosteal. In intracartilaginous ossification the cartilage-cells increase rapidly in number and arrange themselves in rows, the cells being closely packed and wedged together. The in¬ tracellular matrix of the cartilage is semi¬ transparent. Lying below this cartilaginous layer near the centre of ossification is a layer composed of osteoblasts. The bones of the vertex of the skull are entirely formed by intra-membranous ossification.

Marrow. — The marrow differs in. com¬ position at different periods of life and in dif¬ ferent bones. In the young it is a transparent reddish fluid . of tenacious consistency, free from fat, and contains minute roundish cells. In the shafts of the adult long bone the marrow is of a yellow color and contains a large quantity of fat and areolar tissue. In the flat and short bones, in the articular ends of the long bones, in the bodies of the vertebrae, in the base of the cranium, in the sternum and ribs, it is of a red color, consisting of albumen and extractive matter with a mere trace of fat.

Nourishment of Bone.— This is derived from the numerous blood vessels and lymphatic glands. Those of the compact tissue are derived from a dense network of vessels ramifying in the periosteum. From this membrane vessels pass into the minute orifices of the compact tissue.

Bones of the Human Body.— The skeleton of the adult consists of 206 distinct bones. The spine proper or vertebral column includes 26; the cranium, 8; the ossicles of the ear, 6; the face, 14; os hyoides, sternum and ribs, 26; upper extremity, 64; lower extremity, 62.

Long, Short, Flat and Irregular Bones. — I he long bones, found in the limbs, are built to sustain the weight of the trunk and confer the power of locomotion. A long bone consists of a lengthened cylinder, a shaft with two ex¬ tremities. The shaft is a hollow cylinder, the walls consisting of a dense compact tissue of great thickness. They are the humerus of the arm, radius and ulna of the forearm, carpus, metacarpus and phalanges of the hand; the femur of the thigh; tibia and fibula of the leg; tarsus, metatarsus and phalanges of the foot. Where a part of the skeleton is intended for strength and compactness and its mo¬ tion is at the same time slight and limited, it is divided into a number of small pieces united together by ligaments. The separate bones are short and compressed, as, for ex¬ ample, the bones of the carpus and tarsus. These bones in their structure are spongy throughout except at their surface, where there is a thin crust of compact tissue. Where the principal requirement is either extensive pro¬ tection or the provision of broad surfaces for muscular attachment, the osseous structure is expanded into broad, flat plates, as seen in the bones of the head, pelvis, foot and hand. The irregular or mixed bones are such as from their peculiar form cannot be grouped under the pre¬ ceding heads. They are the vertebrae, sacrum, coccyx, temporal and sphenoid.

The spine is a flexuous and flexible column formed of a series of bones called vertebrae. They are 33 in number exclusive of those which go to form the skull, and have received the names cervical, dorsal, lumbar, sacral and coccygeal, according to the position they occupy; seven cervical, 12 dorsal, five lumbar, five sacral and four coccygeal. The sacral and coc¬ cygeal vertebrae consist at an early period of life

of nine separate pieces, which are united in the adult, so as to form two distinct bones, the sacrum and the coccyx. Each typical vertebra consists of two essential parts, an interior solid segment or body, and a posterior segment or arch. The bodies of the vertebrae are piled one upon the other, forming a strong pillar, for the support of the cranium and trunk, the arches forming a hollow cylinder behind for the pro¬ tection of the spinal cord. The different vertebrae are connected together by means of the articular processes and the intervertebral cartilages while the transverse and spinous processes form levers for the attachment of muscles. Between each pair of vertebrae aper¬ tures exist through which the spinal nerves pass from the cord. The peculiar vertebrae of the cervical arc the atlas and axis modified from the other vertebrae to admit of the nodding and rotary movement of the head. The atlas sup¬ ports the globe of the head, the axis forming

a pivot upon which the head is rotated. To the atlas and axis are attached the muscles of the neck and spine.

The large triangular bone situated at the base of the vertebral column at the upper and back part of the pelvic cavity is called the sacrum (q.v.).

The coccyx, the extreme end of the spinal column, in shape resembles a cuckoo's beak. It is formed of four small rudimentary ver¬ tebrae. It articulates with the sacrum and is attached to the levator and sphincter-ani mus¬ cles, the gluteus maximus, and the coccygeus muscles.

The superior expansion of the vertebral col¬ umn is called the skull, and includes the cranium and the face. See Skull.

The hyoid bone is named from its resem¬ blance to the Greek, upsilon. It is called the lingual bone because it supports the tongue. To it are attached the muscles of the throat.

The sternum is a flat narrow bone situated on the median line of the front of the chest, and to it are attached some of the muscles of the chest and adbomen, articulating with the clavicles and seven costal cartilages on each side.

The ribs are elastic arches of bone which, with the intercostal muscle, form the thorax. They are 12 in number on each side. The first seven are connected behind with the spine, and in front with the sternum through the inter¬ vention of the costal cartilages. The next three, or

false ribs, articulate with the costal cartilage of the seventh rib; the next two, or floating ribs, are free. To the ribs are attached the muscles of the chest, abdomen, throat, back and diaphragm.

The anterior portion of the skeletal founda¬ tion, so to speak, of the arms, is called the clavicle, or collar-bone. See Clavicle.

The scapula forms the back part of the shoulder. It is a large flat bone triangular in shape, situated at the posterior aspect and side of the thorax between the first and eighth ribs. To it are attached the muscles of the shoulder, arm and thorax.

The humerus is the longest bone of the up¬ per extremity. It consists of a shaft and two extremities, articulating above with the scapula and below with the ulna and radius. To it are attached the muscles of the arm, the forearm and thorax.

The ulna is a long bone placed at the inner side of the forearm parallel with the radius and articulating with the humerus, forming the elbow-joint.

The* radius is situated at the inner side of the forearm parallel with the ulna, with which it articulates, forming at its lower end the wrist-joint. The ulna and radius form the attachment for nearly all the muscles of the arm, hand and fingers. See Arm.

The hand is subdivided into three seg¬ ments, the carpus or wrist, the metacarpus or palm, and the phalanges or fingers. See Hand.

The os innominatum, or hip-bone, forms the side of the pelvic cavity. It is divided into three portions, the ilium, ischium and pubis. If ar¬ ticulates with its fellow of the opposite side, the sacrum and the femur. It forms the attach¬ ment of the muscles of the thigh, abdomen and pelvis.

The longest bone in the skeleton, to which are attached the muscles of

the leg and thigh, is the femur (q.v.).

The patella (q.v.) protects the front of the knee-joint and increases the leverage of the quadriceps extensor muscle. The tibia, situated at the front and inner side of the leg, beginning at the knee, is long and narrow, with enlarged extremities, articulating with the femur, fibula and astragalus. The fibula is situated at the outer side of the leg, is smaller than the tibia, and forms with it the attachment of the mus¬ cles of the leg and foot. The bones of the foot consist of three divisions, the tarsus, meta¬ tarsus and phalanges. See Foot; Ossification; Osteology, Comparative. Consult Dwight, T., (Clinical Atlas* (Philadelphia 1907) ; Fraser, J. E. S., (Anatomy of the Human Skeleton) (ib. 1914) ; Gegenbaur, C., (Lehrbuch der Anatomie des Menschen) (7th ed., 2 vols., Leipzig 1899).

H. H. Biedler, M.D., Johns Hopkins University Hospital.

OSTEOMYELITIS, inflammation of the inner lining membrane (endosteum) and the marrow-cavity of bone, a disease of rare oc¬ currence, mostly following amputations, al¬ though occasionally following in the train of other diseases. .It also follows wounds whereby the medullary canal is exposed to the air, such as gunshot wounds, compound fracture, *etc.* The inflammation is due to pyogenic infection, is generally acute and extends from the mar¬ row to the osseous structure itself. Chills, sweats and high fever sometimes accompany the usual symptoms of pain and swelling, with a purulent discharge appear sloughs of tissue and dead bone. The disease usually ends fatally bv general infection. Surgery alone is practicable in the direct treatment, with such medical and hygienic accessories as the physician may pre¬ scribe.

OSTEOPATHY. The essential features of osteopathy as a school of the healing art is its mechanical viewpoint of the bodilv organism. The human body is a complete organism con¬ structed after a definite mechanical plan of which every tissue, organ and part has a distinc¬ tive arrangement, position and function. Every unit of the structure is in mathematical con¬ cordance with all other parts and the whole after the manner of any complex and unified mechanism. Bio-physics and bio-chemistry of the organism explain the known and verifiable phenomena. It is upon this solid and modern scientific ground that the school of osteopathy has built its foundation.

It is a biologic axiom that structure deter¬ mines and controls function. Given an intact structure, a mechanism that is mathematically correct, it is reasonable to infer that function will be

normally operative. The osteopathic school accepts this as fundamental. If struc¬ ture is distorted or disarranged, order or health accordingly will be impaired. It is ob¬ vious that gross derangement of the structure will disturb harmonious action of its parts; but osteopathic practice not only accepts this as true, but applies the same principle to all tissues, even to a minute degree. The development and application of this principle to everv portion of the organism, the mechanical construction of the tissues and their possible innumerable dis¬

placements and derangements, is the basis of the theory and practice of osteopathy.

The Body is a Vital Organism. — Bio¬ logically the human mechanism is something more than a mere machine; it is a vital organ¬ ism. Therefore, it is conditioned from within, and every part conditions every other part and the physiologic unity of the whole. Although structure modifies and controls function, still the two are inseparable, for it is function that produces structure. Derangement of mechanism registers its effects structurally, and change in character of functioning will also be expressed structurally. The structural expression, if cor¬ rectly interpreted, is osteopathically invaluable.

It may be said that life is function; and it is the function of self-repair that exemplifies the vital completeness of the body. The body contains inherently, active and potential, all the necessary properties for growth, development and repair. Nothing can be done that will add a morphologic or physiologic unit to the organ¬ ism. But much can be accomplished to influence properties and forces that are disorganized to the point of functional discord, as well as to stimulate and develop active and potential ones.

The human body being an adaptable vital organism, the environment of structure and function comprises the essential feature in the field of therapeutics. Not only must the assem¬ blage of the parts be precise in a mechanical sense, as is demanded of any mechanism, for it to operate normally, but function must be neither abused nor disused or else the function¬ ing process will be abnormally conditioned. Both anatomically and physiologically consid¬ ered disease is a condition of the organism. An harmonious environment, as expressed through sanitary and hygienic influences, is an essential requirement of normal functioning. The influence of these forces upon nerve im¬ pulse, circulatory channel and the chemism of the body is basic to the

physiologic action. Growth and development exemplify functional action of the organism, and depend upon not only an intact anatomical, but also upon a consonant hygienic and dietetic, environment. Thus upon broad, but nevertheless definite bio¬ logic grounds, the health problem primarily deals with the anatomic and physiologic adjust¬ ment of cell, tissue and organic environment. It is not a problem of extraneous or foreign stimulation or inhibition, but instead of biologic normalization, of the inherent and complete properties, active and potential, of the vital organism.

The Importance of an Intact Structure. —

A diseased condition presents physiologic forces that are at variance from the normal as to time, rhythm, quantity. In other words they are natural forces but not normal forces. The structural mechanism may be distorted or mal¬ adjusted by physical forces, as any machine may be, so that order and harmonious action are not forthcoming, or physiologic functioning through environmental change and adaptation may also result in discord. In either instance it is evident that a deranged structure lowers resistance, impairs nutrition and thus predis¬ poses to the many exciting causes of disease; for any condition or force that disturbs nervous equilibrium, vascular equalization or chemical co-ordination produces a definite effect upon the character of organic functioning. Then it is

equally evident that rectification of the structural derangement and functional environment is the logical remedy.

The tendency of the organism under all con¬ ditions is . toward self-repair and physiologic unity. It is manifestly impossible to transfer a vital spark to the organism. Treatment of any kind whatsoever can go no further than a certain guidance or control of its bio-physics and bio-chemistry. This is the beginning ‘and end °* th?raPy;. and in order for it to be really efficacious, it must be consonant with these forces, for the reparative and healing powers are inherent qualities.

An organ is an instrument for functioning and the degree of its mechanical intactness within a definite minimum establishes a certain ratio of. normal function. Beyond this mini¬ mum, with most organs, there is a superabun¬ dance of tissue that may be called the margin of safety. There is not only a superabundance of tissue, but also of mechanism, as instanced, for example, ‘by. inflammatory reaction, substitution, vmariation and adaptation upon the part of the various tissues. Thus the completeness of the structural plan, the physiologic inherent properties and, beyond all, the function of self¬ repair are basic considerations.

The Cause of Disease. — The essential thing in practice is to find the cause of disorder and remove it if possible. Osteopathy’s claim to a school of the healing art rests with its es-ta’blishment of a distinctive etiologic diagnosis °.f disease. Every school pays allegiance to the rich heritage of common medical knowledge. These facts are many but their value depends upon the interpretation and the use made of them. Osteopathy accepts this data and makes use of it in so far as the verifiable facts are applicable and demonstrable at the bedside. In addition to this, osteopathy presents consider¬ able new material. But it is the osteopathic concept, the principles universally exemplified, that are of commanding importance. Every disease or disorder is in its final analysis a con¬ dition of the organism that is not compatible with the normal, must be in accordance with natural law and is scientifically demonstrable if the sequential chain can be elucidated. Oste¬ opathy through its clinical research has clearly demonstrated the mechanistic origin of many disorders. This principle is applicable to every tissue of the body. Every structural derange¬ ment of tissue is at least potentially a cause for disease. If a definite order of the structure is an essential to health, then disorder of tissue will, in accordance to natural law, be followed by ill-health. Thus, osteopathically viewed, a fundamental cause of disease rests with the character of the bio-physics. The status of the osseous alignment, esoecially of the vertebrae which enclose and protect so many vital centres, the character of muscle tonus, the condition of the ligaments and the position and functional development of the viscera are all of basic con¬ sideration in the health problem. Conforma¬ tion, configuration and poise, whether of spinal column, . torso, abdomen, pelvis, or of the body as a unified mechanism, and the elasticity and resiliency of tissue, all attest physiologic prin¬ ciples of first importance. The intact ana¬ tomical condition exemplifies the primary hygi¬ enic law. Any divergence from this intactness is of first consideration to the osteopath.

There are many factors that will disorganize or disarrange the structural mechanism : over¬ fatigue, ill-habits, deleterious environment, in¬ sanitary conditions, unhygienic surroundings, dietetic errors, mental disturbance, prolonged exposure to cold or heat, trauma, *etc.* Trau¬ matic injury is far from being the only cause of maladjustment. An inbalance of muscles, due to fatigue, a slumped posture, cold, etc., are common sources of mechanical derangement. Vital reacting to environment is always ex¬ pressed structurally, of which abuse and dis¬ use of function are everyday examples. The locality, character, extent, as well as the time factor, of the pathogenic changes are the im¬ portant features.

These changes initiate a distinctive osteo¬ pathic pathology. The stress and strain con¬ comitant with environmental reaction and adaptation, if carried beyond the normal lim¬ itations, is certain to disturb physiologic unity with a consequent lowering of tone and re¬ sistance of tissue. These are the first changes involving nerve impulse, circulation and chem-lsm of the body. In other words, these are pathogenic factors that antedate and give origin to many well-known symptom grouns and morbid states. This condition renders the bodily organism subject to the influences of pathogenic bacteria and other secondary and exciting causative factors of disease. Syn¬ chronously . with lowered resistance and im¬ paired nutrition a diminished immunity is cer¬ tain to develop. The initial lesion is frequently a localized maladjustment, of tissues that, either through its. definite location involves innerva¬ tion and . circulation of a tissue or organ, or through its nutritive impairment favors multi¬ plication of micro-organisms. Owing to the importance of the spinal structures and their functions much attention is given these tissues, although every section of the body is thor¬ oughly examined, both structurally and func¬ tionally, in accordance with characteristic osteo¬ pathic procedure and the several other scientific methods.

Equally important are the action and free¬ dom of nerve impulses, the character of vas¬ cular tissue and its unreserved flow, the integ¬ rity of the cerebro-spinal circulation, the unim¬ peded drainage, the complete elimination, the thorough co-ordination of chemical forces, and, through these, the ability of the organism to establish immunity. All of these are intimately interrelated ; in fact, co-ordination and corre¬ lation of the organism as a concatenated whole, structurally and functionally is completely ex¬ pressed by the function of self-repair and the power of the tissues to prevent infection. His¬ torically, osteopathy is the first school to recog¬ nize the facts that functional integrity is de¬ pendent upon a mechanically intact structure and a harmonious environment and that chemical immunity may be thus

established, and, moreover, what is of far greater import¬ ance, to actually apply this basic conception to the detailed bodily mechanism in its entirety.

. The recognition of a distinct osteopathic etiology and pathology establishes a new and characteristic method of diagnosis, though all scientific methods of diagnosis are recognized and adapted in accordance with the osteopathic concept. The diagnostic characteristics of the osteopathic school are those features that are

dependent upon a deranged or maladjusted mechanism — maladjustment of the apposed interosseous tissues, tightening, thickening or laxness of ligaments, and adhesions and vari¬ ous changes in the articular tissues, contraction and contracture of muscles, displacement of organs and the innumerable giosser changes of spinal, pelvic and thoracic conformation all of which can be shown distinctly to disturb functional integrity, are among some of the principal osteopathic signs and symptoms. Thence, in response to the vital reaction, through the media of nerves, circulation and chemical forces, there follow impairment ot bodily equilibrium, of elasticity and resiliency of tissue, of dynamic and static requirements of joint functioning, of organic structure, func¬ tion and relationship.

Significance of Osteopathic Adjustment.

_ The body being a complete vital organism

endowed with the wonderful function of self-repair, and even with an excess of structure and mechanism, is frequently . capable, when disordered, of restoring functional integrity, but in other instances owing to severe or pro¬ longed disturbance of structure or function extraneous aid must be instituted after the manner of structural, environmental, surgical or dietetic adjustment in order that a normal physiologic unity may assert itself — and this is osteopathy. Frequently when the correct osteopathic treatment is applied the commonly accepted natural history of disease is changed. The disorder

may be either aborted, lessened or many possible complications prevented. Thus osteopathic prognosis comprises character¬ istic and distinctive factors. And the possi¬ bilities in the field of preventive medicine are greatly increased.

It should be emphasized that osteopathic treatment is neither a routine method nor a movement cure, but instead a definite manual adjustment of the maladjusted parts. Every treatment is as individual as the mechanical problems presented. These problems are in¬ numerable, depending uoon character and ex¬ tent of tissue involved, whether vertebral, pelvic, torso, etc., the many secondary factors that may complicate the disease, and the various inherited and environmental conditions that may predispose or add to the disease picture. The treatment of a disorder is composed of . many factors, and commonly speaking the value of a therapy is dependent upon a true evalua¬ tion of all the forces and processes that have entered into the production of the diseased condition. The characteristic feature osteopathically is the mechanistic one somewhat paralleled by the adjustment methods demanded in the restoration of any complex mechanism. But in the liberation and rectification of the dynamic forces when the structure is deranged (and that give origin to a morbid state that must necessarily precede the various symptoms or manifestations of disease), by adjustment of the tissues to a point of normalization and by attention to the maintenance of a harmonious regimen, one should not lose sight of the fact that there is something more than can be ex¬ plained in terms of mechanism though this constitutes the solid groundwork of the bio¬ logic sciences. In reality the ‘body is a vital organism.

Discovery of Osteopathy.— Dr. Andrew Taylor Still of Kirksville, Mo., discovered oste¬ opathy. He was born in Virginia in 1828; d 1917. Dr. Still was educated as a physician and surgeon of the regular school. When the Civ n War broke out he was located at Baldwin, ICan., and served as a surgeon to the Northern forces. From an early period he had been a close observer of nature, spending much time and thought in natural history pursuit, and having a decided inclination to inquire into the why of things. In his early life the dissection of animals was of special interest to him which later was followed by the dissection of many human subjects. Anatomy and the laws of nature therein expressed had been for 70 years or more the one commanding interest of his life. This combined with a distinct genius along mechanical lines laid the foundation for the science and art of osteopathy. One of his early inventions is an important part of the reaping machine. .

At an early period in Dr. Still's professional career he lost several of his own children from cerebro-spinal meningitis. They had the best attention that medical skill could give. This seems to have been a great stimulus to his future life work. Dr. Still realizing that the doctors had done the best they knew how did not ascribe the tragedy to the inscrutable ways of Providence, but instead, fully believing, that the practice of drug medication is basically wrong, set himself the task of discovering if possible a scientific method of therapy. This was the driving and commanding force that later developed into the school of osteopathy.

Dr. Still was a skilled surgeon of no mean ability, particularly as his art pertained to mechanical adjustments of fractures and dis¬ locations. The restoration of function in this class of cases, especially the pronounced effect of these comparatively grosser corrections upon the liberation of vessels and nerves, followed by normalization of tissues, gives an inkling . of the restorative properties of nature. This with his commanding knowledge of anatomical structure, particularly from the living or dynamic standpoint, with a decided tendency to investigate and experiment are additional fac¬ tors that led to his discovery.

The osteopathic discovery came very grad¬ ually. In some of the first experiments it was found that pressure on the occipital nerves cures certain kinds of headache; that adjust¬ ment of the cervical and dorsal vertebrae will frequently cure goitre; that alignment of the lumbar vertebrae will cure many cases of dysentery; that correction of the spinal joints will be followed by restoration of partially paralyzed nerves of the legs. These with many other similar experiences over a period of many years were the early incidents that led to the discovery of osteopathy.

In the early days of osteopathic investiga¬ tion Dr. Still arrived at the definite conclusions that disease is largely a condition of the mech¬ anism depending upon the structural status of the tissues, that all remedies for relief and cure are contained within the organism, and that adjustment, normalization of structure and en¬ vironment represents the remedial law.

In 1874 Dr. Still's discovery was definitely announced. He spent his remaining years in perfecting the idea and making practical that

the human organism is a self-reoarative and set t-recuperative vital organism; that by vntue of these attributes the organism contains actively or potentially, the essential properties tor growth, development, repair and cure-that normal circulation, nervous equilibrium and chemical co-ordination are the essentials of health; and that ill-health is initiated, active or predisposing, by some maladjustment of structure, bone, muscle or other soft tissue or organ, so that vascular tissue, nervous structure or chemical force is impaired. The impairment

may be caused by trauma, environment, infec¬ tion, diet, *etc.*

Dr. Still writes: “Osteopathy is based on the perfection of Nature’s work. When all parts of the human body are in line we have health When they are not the effect is dis¬ ease. When the parts are readjusted, disease gives place to. health. The work of the osteo¬ path is to adjust the body from the abnormal to normal; then abnormal condition gives place to the normal and health is the result of the normal condition.

“Man cannot add anything to this perfect work nor improve the functioning of the normal body. Disease is an effect only. Man’s power to cure is erood at least in so far as he has knowledge of the right or normal position, and so far as he has the skill to adjust the bones, muscles and ligaments and give freedom to nerves, blood, secretions and excretions.® Dr. Still has constantly emphasized the fact that the “rule of the artery is supreme,® and that the beginning of disease is first character¬ ized by interference to complete freedom of vascular channels.

The development of osteopathy has been de¬ pendent upon a more complete understanding of living anatomy, a detailed knowledge of every tissue in not only its mechanical relation¬ ship, but also of its functional significance. Disease being expressed by anatomical change, accompanied by functional perversion, from the norm, a thorough knowledge of the intact structure is demanded. In order to restore normal completeness of the mechanism, both the statics and dynamics of its component parts and of the mechanism as a whole must first be elucidated. This demands a certain skill of diagnostic ability as well as

efficiency of manual adjustment.

Dr. Still says: ((To repair signifies to re¬ adjust from the abnormal condition to the con¬ dition of normal. You as osteopaths can go no farther than to adjust the abnormal condition, in which you find the afflicted. Nature will do the rest. Order and health are inseparable, and when order in all parts is found, disease cannot prevail, and if order is complete and disease should be found, there is no use for order. If order and health are universally one in union, the doctor cannot usefully, physio¬ logically or philosophically be guided by any scale of reason, otherwise.

<(If health is perfect, it only proves perfect harmony in the physiological action of the body in all its parts and functions. Any varia¬ tion from perfect health marks a degree of functional derangement in the physiological de¬ partment of man. Efforts at restoration from the diseased to the healthy condition should present but one object to the mind, and that is

to explore minutely and seek variation from the normal.

<(It is only the perfection of the organism and the connected oneness that is the keynote to osteopathic practice. Every part has a duty to perform not only for its own maintenance, but also for the health and harmony of the interrelated whole. This is part of the law of supply and demand, which is absolute through all nature. It is important to know the exact place that each organ and tissue occupies in its normal position. It is only by knowing the normal we are enabled to detect the abnormal. Each organ seems to be a creator of its own fluid substances. We must know the nerve and blood supply and the drainage.

(<With anatomy in the normal properly un¬ derstood, we are enabled to detect conditions that are abnormal. It may be that by measure¬ ment we can discover a variation one-hundredth of an inch from the normal, which, though in¬ finitely small, is nevertheless abnormal. If we follow the effects of abnormal straining of liga¬ ments, we easily come to the conclusion that derangements of one-hundredth part of an inch are often probable of those parts of the body over which blood vessels and nerves are dis¬ tributed, whose duties are to construct, vitalize, and keep a territory, though small in width, fully up to the normal standard of health. My object is to emphasize the importance of looking after local causes that go on with

their irritation.®

Definite results in practically every field of disease were obtained before any possible lab¬ oratory demonstration could be secured, such as the scientific world has to-day, that clearly revealed the biologic integrity and complete¬ ness of the vital organism. Dr. Still suggested the antigens in the blood long before any one else, and also anticipated the fact of immunity. Not only did he emphasize the absolute im¬ portance of a free flow of pure blood and an unobstructed lymphatic drainage, but also of an uninterrupted nerve impulse as well as the cir¬ culation of the cerebro-spinal fluid. All of this he considered as fundamental requirements in order that health may be maintained. These are necessary attributes for self-growth, self¬ development and self-repair. They establish that a unified whole for every part is recipro¬ cally conditioned.

Coexistent with this are the attributes of a physical mechanism. Vital functions are con¬ ditioned and. amenable to the structural laws of physics. This fact determines the value of the science of osteopathy — its practicalness. Owing to the structural character of the organism, its definite plan and great complexity much atten¬ tion is paid to anatomical minutiae. To adjust mechanically, as the art implies, requires an exact knowledge of structure and its expressed mechanical principles. This naturally enjoins considerable detail knowledge as well as experi¬ ence and skill.

The term osteopathy is derived from the Greek: osteon, bone; pathos, suffering. This was suggested because the bony framework comprises an important part of the physical body, which frequently becomes maladjusted, resulting in impairment of the organism; and because the bones are used as levers for the adjustment of the tissues.

Legislation. — The legislative history of osteopathy comprises one of its interesting and important chapters. The writer is under obliga¬ tions to the legislative department of the Ameri¬ can Osteopathic Association for considerable of the following material.

Osteopathy received its first legal recogni¬ tion in Vermont in 1896. In 1897 Missouri, Michigan and North Dakota legalized the prac¬ tice. Iowa enacted a law in 1898, and South Dakota, Illinois and Tennessee in 1899.

The contention of regular medical practi¬ tioners who opposed these laws was that the osteopaths should take the regular medical ex¬ amination. The evident prejudice against oste¬ opaths of those making this contention was an argument against the fairness of such an ar¬ rangement, but it was evident to the public that osteopathy was really a separate and distinct science. Osteopaths were not taking a funda¬ mental part of existing medical practice and. calling it by another name just to avoid laws and educational standards, as has been since done as to osteopathy by variously named practices. The course of the early osteopathic college which required 20 months and did not pretend to prepare its graduates for major sur¬ gery compared very favorably with the then quite commonly prevailing course of 24 months in medical colleges in which time major surgery also was supposed to be covered. As to its differences from medical belief and practice, as a matter of fact it was so different that such of its fundamental ideas as that vertebrae are often subluxated and cause interference with spinal nerves and produce disease in the organs these nerves supply were ridiculed, at that time, by the medical profession. There was, thus, no confusion in the public mind as to osteopathy being distinctly different from the accepted idea of medical theory and practice and it was given separate recognition.

As new osteopathic schools sprang up over the country, some good, some mere, diploma factories, and as the imitators and impostors that inevitably attach themselves to any worthy idea began to distribute themselves throughout the States, it became evident that the earlier laws recognizing osteopathy needed amplifica¬ tion in order that the public might be assured of efficient osteopathy practice and the earlier laws were variously changed and amended to this end.

By way of enacting a law which would be both fair to the osteopathic profession and at the same time raise the profession's standards and ensure the best possible osteopathic services to the public, in 1901, though there were but 13 osteopaths in Montana at that time, the Montana legislature, against the usual medical contention that osteopaths should be regulated by the medical board and persistent plans to bring that about, overwhelmingly sanctioned a bill which provided for a State board of oste¬ opathic examiners. This board was to be com¬ posed of three graduate osteopathic physicians to be appointed by the governor of the State and whose duties would be to pass upon the school credentials of all applicants in (<anatomy, phy¬ siology, chemistry, pathology, obstetrics and theory and practice of osteopathy and such other branches as are taught in well regulated and recognized schools of osteopathy and deemed

advisable by the board.® This law was the first

of its kind. .

This form of law having been in considera¬ tion by those interested in other States was adopted in the years following in a number of States. Because of its fairness and efficiency in practical administration and its piactical possibilities in continuously raising the standard ot osteopathic practice and increasing the worth of the service that osteopathic physicians render the public, it has become the most common form of regulating the osteopathic system of practice.

It has for years been the law which the osteo¬ pathic profession has favored in contradistinc¬ tion to laws which force the osteopathic prac¬ titioner to be examined by boards composed entirely of medical men or even medical boards on which the osteopathic profession is given minor representation.

A recent resolution unanimously passed by the American Osteopathic Association in con¬ vention assembled outlines the profession s leg¬ islative stand: <(That it is the. sense of this association that medical examining boards on which osteopathy is given minor representation are not just to osteopathic physicians in their practical administration and that it is. impossible for such boards to give examinations which are the most practical test of efficiency… .

«We endorse the Independent Board of Oste¬ opathic Examiners as the fairest and most efficient medium for the regulation of osteo¬ pathic

practice.®

Under medical board regulation discrimina¬ tion has been often practised against osteopathic applicants and justice been such a variable quantity that the osteopathic profession has, because of this, been consistent in asking for separate regulation, but, while this is true, it does not constitute the fundamental reason for the stand which the osteopathic profession has continuously taken in demanding separate regu¬ lation and examination of osteopathic applicants rather than regulation which causes osteopathic applicants to be tested by a medical examination given by drug school practitioners. The es¬ sential reason for the profession's contention against the latter arrangement is epitomized in the words of the above-quoted resolution,— it is impossible for such boards to give examina¬ tions which are the most practical tests of efficiency.® The reason that it is impossible is because of the distinct difference between the education received by an osteopathic physician through the better osteopathic college and the education received by the drug school practi¬ tioner through the medical college, a difference existing not in length or thoroughness or prac¬ ticalness of course, for there the osteopathic college does not suffer by comparison with the average medical college. A difference which lies rather in character of education, the distinc¬ tive and definite nature and features of which do not confine themselves to the difference be¬ tween the instruction in . classes in materia medica and drug therapeutics in a medical col¬ lege and the instruction in the classes in prin¬ ciples and practices of osteopathy which take their place in an osteopathic college. The fun¬ damental distinction antedates the therapeutic phase for it is the etiologic diagnosis of human ailments that controls and determines therapy, and which viewpoint must necessarily permeate

all the medical sciences and render a distinctive, definite and harmonious interpretation of exist¬ ing facts as they pertain to the broad etiologic concept upon which the system is built. Herein is contained the essence of the osteopathic school, and by virtue of its

practical efficiency at the bedside the osteopaths claim the rights and privileges to provide for, develop and safe¬ guard its basic principles.

. This difference in character of education existing, it is the belief of the osteopathic pro¬ fession as to State board tests, — that the same State board examination which tests the practi¬ cal worth and fitness of the drug school practi¬ tioner to administer to the .public does not and cannot, at least at the present time, best test the practical worth and fitness of an osteopathic practitioner to render osteopathic service to the public and vice-versa.

The prime object of all regulation of the practice of the healing art ‘being to ensure to the public the best possible professional service, the test which does not and cannot ensure this has not conserved its end. As, because of the dif¬ ference indicated, only those themselves having been osteopathically educated would be qualified to test as to whether an applicant possessed a practical working osteopathic education, the public is best served as to regulation of osteo¬ pathic practice by having State board of osteo¬ pathic examiners or committee provided.

Osteopathy, ((A system, method or science of healing,® as it is designated by a number of State laws is now regulated in its practice by all but a few of the States of the Union and by a number of the provinces of Canada. As the osteopathic colleges have continuously raised their standards and length of courses from the 20 months course of the early classes of the parent school to the present uniform four-year course, the various laws regulating the practice at present have come to indicate these increased standards.

The largely predominate form of regulation is the law providing for a State board of osteo¬ pathic examiners. These boards are composed entirely of osteopathic physicians. The follow¬ ing States have such boards of examiners : Arkansas, Connecticut, Florida, Georgia, Idaho, Kansas, Louisiana, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, North Carolina, Penn¬ sylvania, South Dakota, Tennessee, Vermont, Washington, the Territory of Hawaii and the province of Saskatchewan.

In the following States, osteopathy is recog¬ nized by having representation on the regular medical boards of examiners. The laws in these States are termed composite board laws : Ari¬ zona, Colorado, Indiana, Kentucky, Massachu¬ setts, Mississippi, New York, New Jersey, Okla¬ homa, Oregon, Texas, Utah, Virginia, Wis¬ consin and Wyoming. California also has osteopathic representatives on the

medical board, but the law is otherwise much different from the laws in the last-named list of States. Province of Alberta has a composite board.

Ohio and Rhode Island have osteopathic committees to pass upon the osteopathic appli¬ cants. Delaware and West Virginia and also in the province of British Columbia and Alberta the examining board is authorized to call in an osteopathic physician to assist in the examina¬ tion of the osteopathic applicants, and the law

is so constructed that this can be done in Illinois, Iowa, Nevada, New Hampshire, South Carolina and the Territory of Porto Rico, the osteopathic physicians being examined and licensed in these States by the regular medical board. In Alaska the law stipulates there shall be no discrimina¬ tion against any particular school. In Mississippi, Nevada, District of Columbia, and the Canadian provinces, except Winnipeg, that have not al¬ ready been named, the practice is permitted, though neither authorized nor prohibited by statute. An adverse statute in Winnipeg is not invoked and the practice is permitted, in Eng¬ land, Ireland, Scotland, France, Germany, Swe¬ den, Italy and South America countries osteo¬ pathic physicians are permitted to practice, medical regulations applying only in some limiting features.

Colleges and Organizations.— The parent college, The American School of Osteopathy, Kirksville, Mo., was established in 1892. Since then several other colleges have been founded. The present number includes, in addi¬ tion to the above: College of Osteopathic Physicians and Surgeons, Los Angeles ; Chicago College of Osteopathy; Philadelphia College and Infirmary of Osteopathy; Des Moines-Still Col¬ lege of Osteopathy; Massachusetts College of Osteopathy, Boston; Central College of Oste¬ opathy, Kansas City; and Kansas City College of Osteopathy and Surgery. Upwards of 8,000 students have been graduated.

The minimum requirements for matriculation in the Associated Colleges is: «A diploma from a high school course or its equivalent education, together with satisfactory proof that the applicant is the lawful holder of such di¬ ploma and that the same was procured in the regular course of instruction.® The course of study in an osteopathic college ((shall cover four calendar years of not less than

32 weeks each year, and at least 10 months must have inter¬ vened between the beginning of any course and the beginning of the preceding course.® The minimum required curriculum is a course of 4,320 hours covering the usual sciences taught in a medical college, but, of course, from the osteopathic concept.

The A. T. Still Research Institute, Chicago, is a scientific organization founded by the pro¬ fession whose special purpose is the develop¬ ment of the science of osteopathy through laboratory investigation. Its buildings and laboratories are well equipped. Considerable re¬ search work has been prosecuted along osteo¬ pathic lines, which is from time to time pub¬ lished in bulletin form.' An important part of the work to date has been experimental verifi¬ cation of the osteopathic lesion, the functional and organic effect of maladjusted structure, on animals. This has clearly demonstrated that structural perversion compromises organic in¬ tegrity.

The American Osteopathic Association is the national organization, comprising several thou¬ sand members. Annual conventions are held. The Association publishes a monthly scientific journal, and a monthly popular journal, both devoted to the advancement and development of osteopathy. Each State and many of the cities have thoroughly established local societies.

Bibliography. — Ashmore, (Osteopathic Mechanics) ; Burns, (Basic Sciences' (3 vols.) ; Clark, (Applied Anatomy' ; and (Diseases of

Women*; Deason, Physiology*; Hazzard, (The Practice of Osteopathyˆ ; Herald of Osteopathy ; Hulett, (The Principles of Osteopathy* ; Jour¬ nal of the American Osteopathic Association; Journal of Osteopathy ; McConnell and Teall, (The Practice of Osteopathy* ; Osteopathic Health ; The Osteopathic Physician ; Osteopathic Truth; The

Osteopathic Magazine ; Riggs, cThe Theory of Osteopathy* ; Smith, (Manhood ; ; Still, cThe Philosophy of Osteopathy* ; id., (The Mechanical Principles and Philosophy of Oste¬ opathy* ; and (Osteopathy Research and Prac¬ tice* ; A. T. Still Research Institute, (Clinical Osteopathy* ; Tasker, (The Principles of Oste¬ opathy* ; The Western Osteopath; Willard, Legislative Writings as follows: (Composite versus Independent Examining Boards,* Oste¬ opathic versus Medical Colleges,* and (The Present Legal Status of Osteopathy.*

Carl P. McConnell, D.O., Late Chairman Department of Education , American Osteopathic Association.

OSTEOSTRACI. See Ostracophores.

OSTERHAUS, os'terhous, Hugo, Amer¬ ican naval officer: b. Belleville, Ill., 15 June 1851. He was graduated (1870) at the United States Naval Academy and rose in successive promotions till he became (1901)r commander, captain (1906) and rear-admiral in 1909. After serving in the several squadrons he was ap¬ pointed to the Naval Academy (1892-95, 1897-99 and 1901-03). He commanded the Cincinnati from 1904-05, was member of the board of in¬ spection and survey (1905-07), commanding the second division, Atlantic fleet (1910) and com¬ mander-in-chief Atlantic fleet (1911). In 1913 he was retired.

OSTERHAUS, Peter Joseph. German-American military officer : b. Coblenz, Germany, about 1823; d. Berlin, Germany, 4 Jan. 1917. He emigrated to the United States and at the outbreak of the Civil War joined the Union army in which he was given rank as major of volunteers, subsequently attaining the rank of brigadier-general, and serving as chief of staff under Gen. Kirby Smith. He acted as United States consul at Lyons, France, after the war, but ultimately returned to Germany, where he engaged in manufacturing business. At the time of his death he was the oldest pensioner of the American army.

OSTERHOUT, os'ter-hout, Winthrop John Vanleuven, American botanist: b. Brooklyn, N. Y., 2 Aug. 1871. He graduated (1893) at Brown University and was instructor of botany there from 1893-95, teaching botany also at Woods Hole, Mass., 1894-95. He studied (1895-96) at the University of Bonn, then returning to America as instructor (1896-1901), assistant professor (1901-07) and asso¬ ciate professor (1907-09) at the University of California. He was assistant professor of 'bot¬ any (1909-13) at Harvard University, then be¬ coming professor. He has written Experi¬ ments with plants* (1905);

Agriculture for Schools of the Pacific Slope* (1909), in col¬ laboration with E. W. Hilgard, besides many contributions to the botanical and bio-chemical periodicals.

OSTIA, os'ti-a, Italy, an ancient city of Latium, formerly the port of Rome, at the mouth of the Tiber, six miles from Rome by

the Via Ostiensis. It was founded by Ancus Martius in the 7th century B.C., who established saltworks at its site, which long continued to supply Rome and the neighborhood. Ostia also supplied Rome with corn from Sicily and Sar¬ dinia. It was not, however, till the wars with Carthage rendered it of importance as a naval station that it appears in history. From Ostia Claudius sailed on his expedition to Britain, and it was a favorite resort of the Emperor Nero.

The decline of Ostia appears to have been due to the constant filling up of the river, from which its site is now two or three miles dis¬ tant. Claudius constructed a new harbor with great labor about two miles north of Ostia, which communicated with it by a canal. It was called the Portus Augusti, and afterward, when enlarged by Trajan, the Portus Trajani. The new port became the seat of a town called Portus Ostiensis or simply Portus. It com¬ municated directly with Rome, and soon began to encroach on the trade of Ostia, which, how¬ ever, continued to flourish until its destruction by the Saracens in the 9th century. Its ruins are about half a mile below the modern village, founded by Gregory IV in 830, and strongly fortified, which is now a place with about 1,000 inhabitants. The ruins of Portus are on the right bank of the Fiumicino, about two miles from the coast.

Modern excavations at both places have re¬ vealed a number of interesting remains of an¬ cient public buildings, temples, shrines and tombs. An electric tramway connects with Rome. Consult the article on the excavations by Professor Dante Vaglieri in the Cosmopoli¬ tan Magazine for March 1912.

O.STIAKS, os-ti-aks', a primitive Finnish race who dwell in the Siberian governments of Tobolsk and Tomsk. They consist of three tribes, distinguished from each other by cus¬ toms and language and live almost exclusively by fishing. Their language, of which the dia¬ lects are numerous, is classed as a branch of the Samoiedic, a language of Turanian stock. At present their aggregate amount may be esti¬ mated at 30,000. Christianity has made some headway among them, but the old superstitions have been fused with it. Of uncertain

origin, though possibly Mongolian stock, are the Si¬ berian Yenisei Ostiaks, on the Yenisei, between the Upper and Lower Tunguska. They speak an entirely different language from all the other Ostiaks, and for a long period have completely adopted Mongolian customs.

OSTIARIUS (door-tender), one of the four minor orders in the Catholic Church, the other three being lector, exorcist and acolyte. It is definitely mentioned as early as 251, and the form of ordination, with the symbolic de¬ livery of the church keys, was fixed before the 6th century. The duties are those commonly associated with the sacristan. The four minor orders are now usually conferred on the same day, being preceded perhaps by a year by the ceremony of conferring the tonsure and fol¬ lowed by the separate ordinations to the sub-diaconate, diaconate and priesthood.

OSTRACISM (Gr. ostrakon, shell), an ancient mode of judgment by which, according to the Athenian law, a citizen was consigned to banishment. It was not a punishment for any

offense actually committed, but a precaution against the projects of personal ambition and the excessive growth of individual power and influence. When it was decided by the popular assembly and senate that a citizen should be banished, no name being mentioned in the pre¬ liminary discussion, the voting took place in the following manner: A place in the agora was enclosed by barriers, with 10 gates for the 10 tribes. By these the voters entered and de¬ posited their votes, written on a shell or piece of tile. The archons counted the votes, and the person against whom the plurality was given, provided there were more than 6,000 votes, was obliged to leave the city within 10 days. The period of banishment was usually 10 years. Ostracism did not include forfeiture of prop¬ erty and was not considered a disgrace. Among die distinguished persons ostracized were Themistocles, Aristides and Cimon, son of Miltiades. Similar methods of procedure ex¬ isted in Argos, Megara, Miletus and Syracuse. Ostracism seems to have been introduced to Athens by Cleisthenes (q.v.) in 510 b.c., but not to have been used until it was employed

against Hipparchus in 488—4-87 b.c. Consult the various histories of Greece and Busolt, G.,

(Die Grieschische Staats-und Rechtsalterumer) (2d ed., Munich 1892) ; Gilbert, (The Constitu¬ tional Antiquities of Athens and Sparta) (tr.. London 1895).

OSTRACODA, an order of Entomostraca or small Crustacea (qq.v.), in which the body is unsegmented and completely enclosed in a bivalve shell or carapace. The shell is attached to the body only on the dorsal side, where there is an elastic divaricating ligament whose action is opposed by an adductor muscle. When the valves are opened seven pairs of appendages are exposed. These are two pairs of antennae, a pair of stout chewing mandibles, two pairs of maxillae and two pairs of locomotory legs. All of these appendages except the mandibles are more or less concerned with swimming and creeping. Besides tactile organs there is a median eye and sometimes a pair of eyes. The sexes are always separate. Sometimes the eggs are carried within the female's shell, but usually are deposited on water plants. The young pass through a nauplius stage with three pairs of appendages, but are peculiar in the presence of a bivalve shell. Numerous species inhabit both fresh and salt waters and many are known in the fossil state, being first found in the Cam¬ brian strata, reaching their zenith in Ordovician times, and assuming their modern forms in the Cretaceous. The most frequent are the species of the fresh-water genus Cypris (q.v.), lively little animals found in great numbers in ponds and* aquaria. Cypridina is marine, and has the shell excavated in front to permit the passage of the very prominent antennae. It has both paired and median eyes and a large heart. Consult Packard, (Zoology) (1897) ; Cam¬ bridge Natural History) (Vol. IV, London

1909).

OSTRACODERMI, a suborder of plec-tognath fishes, according to the classification of Jordan (see Ichthyology), composed of the trunk-fishes, puffers, porcupine-fishes and their allies, which have the body (<inclosed in a three-, four-or five-angled box or carabace, formed by polygonal bony scutes, firmly jointed at their edges,*1 and are without a spinous dorsal fin.

This term has also been used as a synonym of Ostracophori (see

Ostracophores).

OSTRACOPHORES, a subclass of small fishes (Ostracophori or Ostracodermi) , com¬ posed of very early Palaeozoic forms with per¬ sistent notochord and endoskeleton not calci¬ fied; mandibles and true paired fins are appar¬ ently absent. The exoskeleton was well de¬ veloped and the head and anterior portion of the trunk was usually covered with plates, which in many form solid-and extensive shields, making the fish look much like a horseshoe crab; indeed the remains of many were at first mistaken for those of crustaceans, arachnids or even gigantic beetles. The mimicry of the con¬ temporary eurypterids (see Eurypterus) was very close. Louis Agassiz first recognized them as fishes. None of these fossils exhibit the slightest trace of ordinary jaws, or of a seg¬ mented axial skeleton in the trunk, or arches for the support of paired limbs. The dermal armor is remarkable for the extent to which vascular spaces are developed in its middle layer; in the oldest and simplest forms no bone-cells have been found in any part of the armor. There is always a shield covering the top of the head, and usually another over the ab¬ dominal region; and opposed to the latter is a ventral armature which meets the dorsal plate at each side in an open suture. The tail seems always to have been flexible, though scaly in some species. The mouth, according to Wood¬ ward, must have been on the ventral side, with the nasal sac or sacs just in front of it. The gill-pouches opened outwardly into a covered space communicating with the exterior by a posterior orifice. Eyes are distinct, and other cephalic organs, as ears, and a pineal eye may be inferred from impressions in the interior of the head-plates. Traquair regards certain dis¬ coveries as showing some close relationship be¬ tween ostracoderms and primitive sharks. Gaskell and Patten, in very different ways, con¬ sider the ostracophores as stages in the de¬ velopment of the vertebrates (q.v.) from the eurypterids.

Four orders are recognized in the class. The oldest and simplest is the Heterostraci, repre¬ sented by the family Pteraspidce , whose species occur in various parts of the world in forma¬ tions from the later Silurian and early Devo¬ nian ages. The hard shield in these fishes, some of which were a foot in length, is formed of a few plates, well fused in the adult, each plate of which is unlike anything else in the Chor¬ data, for it consists of three layers, — an inner or nacreous layer of lamellae, a thicker middle layer of polygonal cancellae and an outer layer of dentine. Dermal sense-organs are well de¬ veloped and arranged in canals within the mid¬ dle layer, opening externally by a double series of pores. Pteraspis and Cyathaspis are well-known genera. Associated with this group by Traquair and Zittel-Eastman on later informa¬ tion are the family Coelolepidee, formerly con¬ sidered

sharks ; and the more familiar Psammo-steidce, which extend the range of the group into the Upper Devonian. A second order, Anaspida, consists of a few species ornamented outwardly with tubercles, but no armature of fused plates. The third order, Aspidocephali, or Osteostraci, consists of many forms found in the Upper Silurian and Lower Devonian, and especially in the Scotch Old Red Sandstone,

which have a broad solid head-shield, consisting of three layers, the outer or hard vaso-dentine ; the body of these fishes were covered with quadrangular scales ; they had no paired ap¬ pendages, but moved by means of a small dor¬ sal fin and the heterocercal tail. This group is one of those most studied by Hugh Miller, Murchison and other early geologists, and has been the object of special treatises by Huxley, Lankester, Brandt, *etc.* Trematastpis is a genus representing an allied family.

A fourth order, Antiarcha, contains that re¬ markable form Pterichthys and allied genera of the family Asterolepidce. These were small fishes of robust form, the head and forward parts heavily armed with large tuberculated plates united into a solid buckler by lateral plates. The hinder part of the body, small fleshy dorsal fin, set near the tail and the heterocercal tail itself are covered with small scales, except in the finny portions. The most extraordinary feature in this curious primitive fisfi were the paddle-like appendages, closely resembling in shape and action the flippers of a marine turtle, which were articulated by a complex joint just behind and beneath the corners of the mouth and were completely armored. They formed swimming organs analogous, but not homologous with the pectoral fins of later fishes. These and their allies, Asterolepis, Bothriolepis, etc., are found in the Devonian rocks of both Europe and North America. Consult Gaskell, W. H., (The Origin of the Vertebrates1* (1908) ; Patten, W., (The Evolution of the Vertebrates and their Kin* (1912); Woodward, (Vertebrate Paleontology* (1898) ; Zittel-Eastman, (Textbook of Paleon¬ tology* (Part II, 1902) ; Traquair,

(Fossil Fishes … in the Silurian Rocks of the • South of Scotland* (1899). See Ichthyology.

OSTRICH, a great African running-bird (Struthio camelus). The ostriches constitute a genus (Struthio) and a family (Struthionidceˆ , of the group Ratitae (q.v.), characterized by having but two toes, the third and fourth, of which the former is much the larger and bears a short hoof-like nail ; an almost equally unique internal feature is the symphysis of the pubic bones. The ostrich is by far the largest of existing birds, attaining a height of seven to eight feet and a weight of 300 pounds, and was exceeded by only a few more or less closely related extinct ones. There are no true down feathers, but the contour-feathers are soft and lax, with free barbs and no aftershaft and are distributed uniformly over the skin without any arrangement into pterylae and apteria. On the body the plumage is black or blackish, with the quill plumes of the wings and tail white; the head and neck are nearly, and the legs quite, naked. The head is remarkably small for a bird, the eyes large and the beak flat ; the horny covering of the latter is peculiar in being com¬ posed of several pieces separated by soft skin, instead of being continuous as in most birds. The gape is straight and reaches to a point beneath the eye. The absence of functional wings and tail, the elevated back, the stout, column-like legs with padded toes, the long, erect, curved neck and the great size, all com¬ bine to produce a very unbird-like aspect and to give a peculiar appropriateness to the name <(camel-bird,** applied to the ostrich by old writers.

Formerly the ostrich was abundant through¬ out Africa and a great part of the southern half of Asia. In the latter region it is now re¬ stricted to a few of the more inaccessible deserts, and in Africa is no longer found in the wild state, in Egypt or near the northern and southern settlements, but is still abundant throughout the intervening territory wherever sufficiently extensive and solitary wastes exist. Some zoologists consider that but a single species ranges over this whole vast territory; others — and this is the prevailing opinion at present — have distinguished three: Struthio camelus of northern Africa, S', australis of southern Africa and S. molybdoplianes of Somaliland. In the first the naked parts of the skin are pink, in the second bluish and in the last lead-colored ; the eggs of the first have a surface of ivory-like smoothness, in the other two they are pitted. Wherever abundant, ostriches live on the plains in association with zebras, hartebeestes, gnus, *etc.* Like these ani¬ mals they are extremely alert and wary as well as timid. So fleet are they that even

the Arab on his blooded steed can seldom overtake one single-handed, and even when hunted in relays, as the birds circle about their favorite territory, one or more horses are frequently sacrificed to the chase. When in full flight a full-grown ostrich is said to cover 25 feet at a stride. They are also captured for the sake of their plumes by means of pitfalls, shooting with poisoned arrows and in other ways. During the breeding season they form family parties con¬ sisting of one male and several females. The latter deposit their eggs to the total number of 50 or 60 in a shallow depression surrounded by a slight rampart of earth. Many of the eggs are broken, some of them to be devoured by the male, others to supply soft food to the young so that the brood of young seldom exceeds 20 or 30, many of which fall a prey to carnivorous animals. The male exclusively incubates at night, while during the day the females take turns in guarding the nest or incubating the eggs. During the breeding season the male protects his family faithfully and if driven to extremities fights viciously, kicking sideways or directly forward so powerfully that men and even horses are reported to have been killed by the blows. Although herbage is their chief food, everything edible is eaten, and their habit of swallowing every kind of hard object, just as other birds do gravel, to complete the grinding apparatus of the gizzard, 'has given to the digestive capacities of the ostrich a wholly undeserved notoriety. They are very fond of water and bathe when opportunities offer.

Domestication of the Ostrich. — Although the flesh is but little used, the eggs of 'the ostrich are much esteemed for food by native Africans, and their shells serve a useful pur¬ pose in the construction of vessels and imple¬ ments. But it is their plumes which have given a mercantile value to ostriches from ancient times till now. To furnish a ready supply as the wild birds became scarcer in accessible re¬ gions, domestication has been resorted to. This is said to have been practised by native tribes for many years, and about the middle of the last century was begun by the Frenoh in Algiers and the English in Cape Colony. In the latter place there are said to be now upward of 300,000 domesticated ostriches, yielding an an-

nual revenue of $5,000,000. Ostrich farming in the United States is still in its infancy, but promises to become an important industry' ' The first experimental importation of ostriches was made into California in 1882, and at the present time about 1,500 of these birds are to be found on the pioneer ostrich ranches of California Arizona, Texas and Florida. Large, level' grassy fields are. enclosed by strong high fences' mj0™ corrals in which the general flock runs! Ihe breeding birds are separated in pairs or sets of one cock and two hens in smaller pens. A single pair will sometimes produce as many as 35 young, the average loss of which is as low as. 10 per cent in California, but much higher in Arizona. By the removal of the eggs as soon as laid and rearing them in incubators the output is much increased. In Africa a

ioo e tno r *:)ir<ˆs .ˆas keen known to produce loo eggs, from which 133 young were raised in. a single year. The chief sources of loss are injuries, by the parent birds, cold, dry food, and in Africa an infectious disease. The newly hatched young are the size of a full-grown barnyard hen, and when well fed increase in height so rapidly that by the end of six months they nearly equal their parents. At first they are sheltered at night in brooding boxes, but are turned loose during the day to feed on green alfalfa or other succulent plants, which are, with an abundance of water, their nearly exclusive diet. Dry food is very likely to cause fatal digestive disturbances in the young. The old birds require but little care and are fed on any vegetable matter, but principally upon chopped beets, cabbage, oranges and corn. The plumes from the wings and tails of the fully grown birds are the most valuable and are cut or plucked once or twice a year, each bird yielding about $50 worth annually on the Amer¬ ican ranches, but very much more than that on the African farms. When the American stock has become thoroughly acclimated this indus¬ try will probably yield rich returns, as some of the South African farms are reputed to pay 40 per cent net profit on the investment. Ex¬ periments in ostrich breeding are being tried in Mexico, Central and South America.

Consult Mosenthal and Harting, (Ostriches and Ostrich Farming1 (1877) ; Martin, (Home Life on an Ostrich Farm1 (1891) ; Duncan, Report United States Department of Agricul¬ ture for 1888.

OSTRICH FERN, a genus (Pteretis) of ferns of the family Polypodiacece. The best-known species (P. strut hiopteris) , a native of Europe, has fertile fronds which resemble ostrich plumes; its sterile ones, which often attain a height of 10 feet, form a handsome vase-like mass of foliage. It may be readily propagated from offsets and is one of the most easily, cultivated native ferns. P. nodulosa, the

American species, is a similar plant.

OSTROGOR.SKI, os'tro-go'ski, Moisei Ikovlevitch, Russian political scientist: b. Grodno, Russia, 1854. He was educated in Rus¬ sia and in France and was elected member of the first Russian Duma. He made a close study of the American political system and in 1889 published articles on this subject in Annates des Sciences Politiqnes. He published later in French his authoritative and exhaustive work, (La democratic et l'organisation des partis poli-

tiques1 (2 vols., 1903). Of this work Fred¬ erick Clarke published an English translation, to which James Bryce furnished a preface (2 vols., 1902 ; 2d edt, 1908). In 1910 the second volume appeared in slightly altered form under the title (Democracy and the Party System in the United States. 1 He also wrote (La femme au point de vue du droit public: Etude d'histoire et de legislation comparee1 (1892; English translation entitled < The Rights of Women: A Comparative Study in History and Legislation 1

(1893) .

OSTROGOTHS, os'trogoths, a people of the Gothic, race who lived at a very early time in the region between the Don and the Dniester and the Black Sea and the headwaters of the Volga. They were conquered by the Huns 375 a.d. In 479 they under Theodoric crossed the Alps into Italy, which they completely con¬ quered; in 552 they were themselves signally defeated and Italy became a part of the Byzan¬ tine Empire, the Ostrogoths as a separate na¬ tion then ceasing to exist. See Goths.

OSTROLENKA, o'stro-lyen'ka, Poland district town on the Narev, 22 miles southwest of Lomzha at the junction of the Lapy-Malkin and the Ostrolenka-Piljava railways. It was founded in 1427, was the scene of the victory (1807) of the French under Savary over the Russians, also of the victory (1831) of the Russians under Diebitsch over the Poles under Skrzynecki. During the recent World war this town changed from Russian to Teu¬ ton occupation several times. Its inhabitants in 1910 numbered 15,985, the majority being Jews.

bs-trof'ske, Alexander Nikolayevitch, Russian dramatist : b. Mos¬ cow, 12 April 1823; d. on his Kostroma estate, 14 June 1886. He studied at the Moscow Gym¬ nasium and University and, before obtaining his

law diploma, was appointed registrar of the Commercial Court. Here he gained a close acquaintance with the local commercial world, its manners, traditions and viewpoints in their mediaeval condition. And his plays relate chiefly to the conflicts, culture and education of this isolated Russian body of merchants. His first work (1847) was (Scenes from the Life of Samoskvoretshi,1 a Moscow city quarter This was followed by his best comedy, We Can Settle with Our Own Peopled He was a writer of considerable power and origin¬ ality and added many perfect and vivid life types to the repertoire of Russian comedy. Others of his best works are (The Poor Bride1 (1852); (Poverty is no Cause for Shame) (1854); (A Lucrative Situation (1857); <The Storm > (I860), a drama; (A Warm Heart1 (1869). He did a clever translation of Shakes¬ peare's (The Taming of the Shrew1 as well as several of the pieces of Cervantes. His collec¬ tive works have been published in 10 volumes (Saint Petersburgh 1885; 9th ed. with biog¬ raphy by A. Nos, Moscow, 1890; later ed., 1896). (See Storm, The). Consult Patouillet, J., (Ostrovski et son theatre1 (Paris 1912).

OSTWALD, ost'valt, Wilhelm, German chemist: b. Riga, 2 Sept. 1853. He studied, from 1872, at Dorpat. becoming (1875) assist¬ ant in the physical institute of the university and teaching, from 1877, as privat-docent. He was made (1881) professor of the Riga Poly-

technikum and was appointed (1887) professor of physical chemistry at the Leipzig University. On the institution of the German-American ex¬ change of professors he was the first (1905-06) appointed to Harvard. His first work was de¬ voted chiefly to problems of chemical affinity, and he is considered the leader in modern chemico-physics. Of special importance is his research into electric conductivity of the or¬ ganic acids, the parallelism between electrolytic dissociation of these acids and their powers of reaction. Other subjects investigated by him are the color of ions, catalysis, galvanic poten¬ tial differences, *etc.* He has written (Lehrbuch der allgemeinen Chemie) (Leipzig 1885-438; later ed., 1903) ; (Grundriss der allgemeinen Chemie) (ib. 3d ed., 1899) ; (Elektrochemie5 (ib. 1894-95) ; (Vorlesung en fiber

Natur phi¬ losophy (ib. 1902; 3d ed., 1905); Conversa¬ tions on Chemistry5 (1905—06). He founded the (Klassiker der exakten Wissenschaften,5 a collection of reprints of the old treatises on fundamental laws (1889, 150 numbers). He also has published Zeitschrift fur physikalische Chemie (Leipzig 1887), in collaboration with van't Hoff, and since 1901 Annalen der Natur-philosophie (ib.). Consult Walden, (Wilhelm Ostwald5 (Leipzig 1904) ; Slosson, E. E., (Major Prophets of Today5 (Boston 1914).

OSUNA, o-soo'na, Pedro Tellez y Giron,

Duke of, Spanish soldier: b. Valladolid, 1579; d. castle of Almaceda, 1624. His caustic and satiric wit twice forced him to leave the Span¬ ish court, to which he returned through the favor of the Duke of Lerma, after distinguish¬ ing himself in the Netherlands. He. opposed the expulsion of the Moors, thus bringing upon himself the charge of religious infidelity. In Sicily, where he was viceroy (1611-15) and in Naples, where he held the same position (1616— 20), he did much for the improvement of the common people, but was an enemy of the clergy in general and of the Inquisition in particular. He probably aimed to build up an Italian king¬ dom for himself, and in 1620 was recalled, ar¬ rested, subjected to a three years' secret trial and imprisoned in the castle of Alameda, where he poisoned himself.

OSWALD, oz'wald, Saint, king of Ber-nicia, in Northumbria, England, from 634 to his death, 5 Aug. 642. His father, Ethelfrith, had been one of the most powerful of the Saxon monarchs, but on his death the kingdom was overrun with invaders and Oswald, his son, was banished and took shelter among the Scots in Iona. Here he became converted to Chris¬ tianity, which he resolved should be the re¬ ligion of his kingdom. In 636 hs recovered the throne of Northumbria and requested the monks of Iona to send missionaries for the conversion of his pagan subjects. In response Aidan came with a band of mission¬ aries and established himself as bishop in the island of Lindisfarne. In a few years the whole north of England was converted, to the faith. Meanwhile Penda, king of Mercia, was persecuting the Christians, and at length de¬ clared war on Northumberland. A battle took place at Masetfelth, and Oswald was slain. His severed head was recovered and carried to Lindisfarne, and that and other relics were finally deposited with Saint Cuthbert's coffin in Durham Cathedral. He was canonized as a

king and martyr, his festival being celebrated 5 August. Consult

Churton, (History of the Early English Church.5

OSWALD, Eleazer, American soldier and journalist: b. in England, 1755; d. New York, 30 Sept. 1795. He came to America in 1770 through sympathy with the patriot cause. In 1775, under Benedict Arnold, whose secretary he became, he served as captain at Ticonderoga and also at Quebec, where, Arnold being wounded, Oswald took command with great efficiency. In 1777 he rose to the rank of lieu¬ tenant-colonel. He engaged in the business of printing and publishing in Philadelphia and in New York, and politically was in violent opposi¬ tion to Hamilton and the Federalists. He af¬ terward entered the French army, in which, at the .battle of Jemappes, he commanded an artil¬ lery regiment. The French government sent him on a secret mission to Ireland, after per¬ forming which he returned to New York.

OSWALD, Felix Leopold, American nat¬ uralist: b. Namur, Belgium, 6 Dec. 1845; d. 27 Sept. 1906 He was graduated from the Uni¬ versity of Brussels in 1865 and studied later at Gottingen and Heidelberg He became a phy¬ sician; later abandoned the practice, came to the United States and devoted himself to natural history. He published (Summer-Land Sketches5 (1880); (Physical Education5 (1882) ; (Days and Nights in the Tropics5 (1887); (The Bible of Nature5; (Body and Mind5 ; (Zoological Sketches5 ; *etc.*

OSWALD, Richard, British diplomat: b. Scotland, 1705; d. 1784. He spent several years in America and after his return to England en¬ gaged in mercantile pursuits in London. At the close of the War of the Revolution, Oswald, be¬ cause of his especial knowledge of American conditions, was selected by the Earl of Shel¬ burne as one of the English envoys to ne¬ gotiate the Treaty of Paris. Oswald was very well disposed toward the new nation and even favored the cession of Canada to the United States. He also furnished bail to the amount of £50,000 for Henry Laurens.

OSWALD VON WOLKENSTEN, os’-

valt fon vol’ken-stm, German poet : b. Groden, 1377, of Tyrolese nobility; d. 2 Aug. 1445. His was a very active, irregular and adventurous life. Already at the age of 10 he was wander¬ ing over the world ; he traveled over all Europe and the Orient as far as Persia and Arabia. From 1400 he was in his native land, engaged in fighting landowners and other feuds. He met great vicissitudes, spending some time in prison. He accompanied, from time to time, the campaigns, serving under Emperor Sig¬ mund especially. His poems relate largely

to these episodes and show many weaknesses, such as in metric construction, style, etc., but they are of a similar character to other 1 5th century productions. His poems were first published by Weber Innsbruck 1847). A large edition was brought out by Schatz and Roller in Denk - mdlern der Tonkunst in Oesterreich (Vienna 1902), later a smaller work by Schatz (Got¬ tingen 1904). Schrott made translations (Stuttgart 1886). Consult Weber, B., (Oswald von Wolkenstein und Friedrich mit der leeren Tasche5 (Innsbruck 1850) ; Zingerle, (Oswald von Wolkenstein5 (Vienna 1870).

OSWEGATCHIE, os-we-gach'i, Fort, a former French fortification near Ogdensburg, N. Y. It was also called Fort Presentation and Fort La Galette. In 1760 it was taken by the British and called Fort William Augustus.

OSWEGO, os-we'go, Kan., city and county-seat of Labette County; on the Neosho River and the Missouri, Kansas and Texas and the Saint Louis and San Francisco rail¬ roads,. 132 miles south-southeast of Topeka. The river furnishes excellent water power and there are a number of mills, including flour¬ mills. It is also the centre of a grain and live¬ stock region, and there is some coal in the vicinity. A public library is maintained by the Library Association. Pop. 2,317.

OSWEGO, N. Y., city, port of entry, county-seat of Oswego County, on Lake On¬ tario at the mouth of the Oswego River and at the northern terminus of the State Barge Canal. It is on the Delaware, Lackawanna and Western, the New York, Ontario and Western and the New York Central and Hudson River railroads, about 35 miles north by west of Syracuse. Oswego was founded in 1724 as a trading post and military station. It was incor¬ porated as a village in 1828 and in 1848 was chartered as a city. It was one of the most important places on Lake Ontario and in wars which took place along the northern frontier it was always considered a vantage ground and its possession was contested. In the French and Indian War and King George's War, Colo¬ nel Mercer built here two forts, strong for the times, 1755. In August 1756, the place was captured by General Montcalm, who

destroyed the forts. This capture of Oswego was con¬ sidered one of the important events of the French and Indian War. About 30 men on each side were killed or wounded and 1,690 of the British were taken prisoners. Oswego was made the centre of the military operations along the lake and, in the year 1/59, General Am¬ herst started from this place with a force of 10,000 men, for Quebec where Wolfe was in command. Oswego was the meeting place, in 1766, between Sir William Johnson and Pontiac, and at this meeting the latter submitted to the> British. In the War of 1812 this place was again a disputed point. Its good harbor was always an attraction. On 6 May 1814 a British force attacked the place and captured it. After peace was restored, the place prospered and grew steadily as an important lake port and a shipping point for the products of the rich farms of the vicinity. When the West began to develop as a wheat country and the grain was at first sent East to be manufactured into flour, Oswego was one of the chief points of manu¬ facture and reshipment. The grain elevators and flour-mills were then prominent features along the river and canal. The opening of the flour-milling industry in the West, near the wheat-fields, deprived the city of its great in¬ dustry, from which loss it did not recover for years. The excellent water power was finally used for manufacturing other products and the city has now a large starch factory, ma¬ chine-shops for oil-well supplies, boiler and engine works, knitting-mills, car-spring works, match and cigar factories, shade cloth mills, pump works, also manufactories of tools, glu¬ cose, gears and underwear and breweries. The

lake trade has increased and the city exports manufactured goods, farm products and fruit. The harbor, with its outer and inner haven, which can accommodate large steamers, has been so improved that the quantities of coal, lumber and grain brought here for reshipment can be handled with great rapidity. The ex¬ ports total nearly $4,000,000 yearly and the imports about $1,500,000. The beautiful parks, the drives, especially near the lake and along the river, fine residences and grounds, all make an attractive city. Some of the places of in¬ terest are the old Fort Oswego (q.v.), the present Fort Ontario, which overlooks the har¬ bor, the government building, the State arsenal, the courthouse and city hall. Oswego is noted for its State normal and training school, founded by Edward Austen Sheldon. It has fine public and parish schools, a home for the destitute, two orphan asylums and the Gerrit Smith Library. The government is administered under a charter of 1896 which provides for a mayor, who holds office two years, and a council. The waterworks are qwned and operated by the municipality. Pop.

(1920) 23,626.

OSWEGO, a river in New York, formed by the junction of the Oneida and Seneca rivers in the northern part of Onondaga County and flowing north by west enters Lake Ontario at Oswego It is 24 miles long and has a fall of 120 feet from its source to the lake. By means of a canal and locks, the river has been made navigable some distance from its mouth.

OSWEGO, Fort, the name of the fort built by the French about 1724, on the site of what is now the city of Oswego. Later Fort Ontario was built on the opposite (right) of the Oswego River. See Oswego.

OSWEGO BASS, the large-mouthed black bass. See Bass.

OSWEGO TEA, a name given to several species of labiate plants of the mint-like genus Monarda, particularly M. fistulosa and M. didyma, natives of North America, because of the occasional use of an infusion of the dried leaves as a beverage. The infusion is said to be useful in intermittents and as a stomachic. Some other species of Monardo are used in the same wav and are not uncommonly culti¬ vated in gardens for ornament, where they are sought by bees.

OSYMANDYAS, os-I-man'di-as, Egyp¬ tian king, said by Greek writers to have reigned during the period between Menes and Moeris, and to have invaded Asia with a great army, penetrating as far as Bactriana. According to Diodorus, on his return he erected great works at Thebes, among which was a monument of unequaled magnificence, the Osymandeion, but this is supposed to be identical with the Rameseum on the west bank of the Nile at Thebes, built by Rameses II, with whom, how¬ ever, there is much difficulty in identifying Osymandyas himself, whose exploits appear to be mostly of a fabulous character. Consult Diodorus, i, 47-49; Tzetzes, ˆhiliades,* iii, 892; iv, 620; Budge, (A History of Egypt) (1902).

OTAGO, o-ta'go, New Zealand, a south¬ ern provincial district of South Island, bounded west, south and east by the Pacific, and on the

north by Canterbury and Westland. Area 25,487 square miles. Mountains rise in the west to 6,000 feet; the south and east are agricultural ; the orchards in the central portion produce apricots, peaches and grapes. Gold is the principal mineral. The caoital is Dune¬ din, other towns are Port Chalmers, Oamaru, Invercagill, *etc.* Otago was settled in 1848 by a body of Scotch Free Churchmen. Pop. (esti¬ mated 1916) 206,622. See New Zealand.

OTAHEITE, o-ta-he'te or o-ta'he-te, an island in the Pacific Ocean, now known as Tahiti. See Tahiti.

OTALGIA, earache; specifically neural¬ gia of the ear. Its attack is usually sudden, the pain coming on at once with full intensity. It is often associated with other ailments, of which it may be only a local symptom, and fre¬ quently arises from disorders of the teeth. Neuralgic pains in other parts of the face often follow it. When otalgia is very intense it extends to the temple and nerves on the same side of the face, in which it causes acute pains. It frequently departs suddenly and re¬ turns again generally to the same ear. The treatment when the disease is symptomatic must depend upon the cause. Ordinarily ear¬ ache is due not to otalgia, but to otitis media, or inflammation of the middle or tympanic por¬ tion of the ear.

OTARU, o'ta-roo, Japan, the chief town on the west coast of Hokkaido on the south shore of lshikari Bay and connected by rail with Sappora and the coal region of lshikari. There is a fine breakwater and sheltered har¬ bor, and a marine experimental station. It has important herring and other fisheries and a large trade. Interesting archaeological remains have been found in the vicinity. Pop. 91,000.

OTAVALO, ot-a-va'Jo, Ecuador, town, province of Imbabura,25 miles northeast of Quito. It was settled in 1534; in 1868 it was completely destroyed by an earthquake and many of the inhabitants were killed. Since then it has been well rebuilt and has several mills manufacturing cotton and woolen goods. Pop. about 8,600.

OTCHAKOFF, o-cha'kof, Russia. See

OCHAKOF.

OTERO, Miguel Antonio, public official: b. Saint Louis, 17 Oct. 1859. He was educated at Saint Louis University and Notre Dame University,

Indiana; and became city treasurer, Las Vegas 1883-84; clerk San Miguel County

1889-90 ; clerk of the United States District Court, 4th Judicial District of New Mexico

1890-93; governor of New Mexico 1897-1906; treasurer of New Mexico 1909-11; president board of penitentiary commissioners and parole board 1913-16. He was a delegate to the Republican National conventions 1892, 1900, 1904, 1908; chairman New Mexico dele¬ gation 1900, 1904; chairman New Mexico dele¬ gation Progressive National Convention 1912. He is officer or director in several large busi¬ ness enterorises.

OTERO, Rafael, Cuban dramatist: b. Ha¬ vana, 1827: d. there, 1876. His first comedy was performed so early as 1842. Several oth¬ ers were afterward presented at Matanzas and Havana, among them El Coburgo,* (Del Agua

Mansa,' (Mi Hijo el Frances* and (Un Novia del DiaP He further wrote two works of fic¬ tion, (La Perla de la Diaria) (1866) and Can¬ tos Sociales) (1868). Much of what he wrote remains in the files of periodicals.

OTFRIED, ot'fred, Alsatianˆ theologian and poet: b. about 800; d. about 875. He was the author of one of the earliest specimens of composition in the German language. After having become a monk of the abbey of Weis-senburg, in Alsace, he studied under Rabanus Maurus, abbot of Fulda. He then returned to his monastery, where he opened a school of literature and wrote a variety of works in prose and verse. The most important of these is a rhymed version or paraphrase of the Gos¬ pels in Old High German, still extant, in which there are some passages of lyrical poetry. He completed it about 868 and dedicated it to Lud¬ wig, king of Germany. An edition of it was published by Piper in 1898 and modern Ger¬ man translations by Rapp (1858), Kelle (1870); and Pfeifferl, (Otfried im Gewanae seiner Zeit) (1905).

OTHELLO, a tragedy by Shakespeare, which, although popularized by the acting of Richard Burbage, the greatest of Elizabethan actors, was not printed until 1622 in what is known as the first quarto. The text of this edition is some 150 lines shorter than that of the first folio (1623), which is the authorita¬ tive text. There is little external

evidence as to the date of composition, but the internal evi¬ dence points to a date between (Hamlet) and (King Lear) — probably 1604. There is no bet¬ ter evidence of Shakespeare's power to trans¬ form crude material than the contrast between the clumsy story as given in Cinthio's (Heca-tommithP and the play itself. He humanized the characters, gave coherence to a very loose-jointed, rambling story and turned the almost absurd murder of Desdemona into one of the noblest concluding scenes in dramatic litera¬ ture. The plot has the simplicity and sym¬ metry of a classical drama, violating only the unity of place. The reason for the masterly .plot is that it proceeds from the mind of Iago, whose brilliant intellect and masterful will dominate the play. He is, perhaps, the great¬ est impersonation of evil in Shakespeare's plays, if not in literature. His attempts to find some motives for his deeds were happily char¬ acterized by Coleridge as <(the motive-hunting of a motiveless malignity.® Complete master of his mind and will, cynical in his views of virtue and love, unscrupulous in his intrigues, he pursues his conquests until at last he is de¬ stroyed by a power he cannot understand. In striking contrast is Othello, a primitive, child¬ like, magnanimous man, who after a life of adventure and romance finds himself in a highly-civilized and somewhat decadent Ital¬ ian life, whos'e subtile mind he cannot compre¬ hend. His love for Desdemona, leading to the happy consummation of marriage, is as roman¬ tic as any of his hairbreadth escapes and <(moving accidents by flood and field.® When at last he is convinced of her infidelity he utters some of the most eloquent and some of the saddest words ever written by Shakespeare. His trag¬ edy is due in part to the nassion of jealousy, but it is not an ignoble jealousy, rather the

agony of being compelled to hate that which he supremely loves. Desdemona, ((the sweet¬ est innocent that e'er did lift up eve® suffers passively — like a dumb creature, tortured with¬ out cause by the being she adores. Her utter innocence and purity and her timid childlike¬ ness represent the triumph of virtue over evil, but at the same time reveal the mystery of human suffering as goodness suffers

vicariously in the struggle with evil. «The tragic loading of the bed® upon which she and the great war¬ rior lie is a suggestion of the mystery which constitutes tragedy in the Shakespearian sense of that word. An interesting contrast is af¬ forded in Browning's ˆuria,* in which the consolation of religion, and especially the hope of immortality, relieve the tragic intensity of the play.

Edwin Mims.

OTHMAN, oth-man, or OSMAN I, surnamed Ghazi, «the Victorious,® Turkish sul¬ tan, founder of the Ottoman or Osmanli em¬ pire, which was named after him : b. Sukut, Bithynia, 1259; d. 1326. In 1288 he succeeded his father, Ertoghrul, as chief of a Turkish horde in Phrygia, and in 1299, after successful campaigns which put the eastern part of Asia Minor in his hands, proclaimed his independ¬ ence and took the title of sultan. Nicsea (1304), Marmora (1307) and Broussa (1326) came un¬ der his sway, and in his last years he made Karahissar his capital and issued a regular coinage. He was succeeded by his son Orkhan.

OTHMAN, or OSMAN II, sultan of the Turks: b. 4 Nov. 1605; d. Constantinople, 20 May 1622. The son of Ahmed I, in 1618 he came to the throne as 16th sultan and successor of his deposed uncle Mustapha I. He was de¬ feated at Choczim (1621) by Sigismund III, king of Poland; attempted to suppress the Janizaries, but was captured by them and im¬ prisoned. He was killed in prison by the grand vizier.

OTHMAN IBN AFFAN, third Moslem caliph: b. Mecca, about 565; d. Medina, 656. Mohammed's secretary and lieutenant, he mar¬ ried successively the prophet's two daughters, and in 644, after the death of Omar, was chosen caliph by the six appointed by Omar, of whom one actually wished Othman's elec¬ tion, each of the others pressing his own claims. Othman was then old and feeble, and not by nature over energetic in his prime, but he seems to have carried things with a high hand. He occupied Persia (645-647), eastern Africa and Nubia (651), began the spread of Islam in the islands of the Mediterranean, dared remove from their offices the tried gen¬ erals of Abu Bekr and Omar to make room for his kinsmen and favorites, and raised a storm of disapproval by sitting in the very seat of Mohammed instead of two steps below it, like his two predecessors. He attempted to in¬ troduce a definitive revision of the Koran. A great plot, embracing all his early rivals and the sectaries who differed with him, was formed; the caliph having broken his promise to appoint new governors, was besieged and was assassinated by Abu Bekr at Medina. His rule, though

disturbed at home, was the be¬ ginning of the imperial growth of Islam, thanks to the conquest of Cyprus, Armenia,

North Africa, *etc.* Consult Muir, Sir William, (Annals of the Early Caliphate > (1883).

OTHO I, o'tho (The Great), founder of the Holy Roman Empire: b. 23 Nov. 912; d. 7 May 973. He was son of Henry I and was elected and crowned king of Germany at Aix-la-Chapelle in 936. His reign of 36 years was an almost uninterrupted succession ' of wars. After a 14 years' struggle he subdued Bole¬ slav, duke of Bohemia; wrested the duchies of Swabia, Bavaria and Lorraine from the dukes of Bavaria and Franconia and gave them (in 949). to his sons Ludolf and Henry and to his son-in-law Conrad, count of Worms, respec¬ tively. He delivered the Italians from the op¬ pressions of Berengar II, married the widow of Lothair, their first king, and was crowned king of Lombardy (951). In 955 he crushed the Hungarians on the Lechfeld. In 961 he was crowned king of Italy and in the next year emperor by Pope John XII. But shortly after John made an alliance with Adalbert, king of Upper Italy, to drive the Germans out. Otho the following summer marched against Rome, drove John out, deposed him and placed Leo VIII in the papal chair, though this proceeding is recognized as uncanonical and Leo is reck¬ oned an anti-pope. The Byzantine court re¬ fused to acknowledge Otho's claim to the im¬ perial dignity; but he defeated the Greek forces in Lower Italy, and the eastern emperor, John Zimisces, gave the Greek princess Theophania to Otho's son Otho in marriage. He was at once the greatest political and military power of the West, and he succeeded in putting an end to the divided allegiance of his clergy be¬ tween throne and church.

OTHO II, called Der Rote («The Red®), Holy Roman Emperor: b. Rome, 955; d. there, 7 Dec. 983. He was the youngest son of Otho I. His elder brothers had all died before their father, who caused him to be crowned joint emperor (967), the first instance of the kind in German history. He assumed power in 973 and subdued the revolt of several powerful vas¬ sals, including his cousin, Henry II, duke of Bavaria. In Italy he suppressed a rising under Crescentius and then attempted to drive the Greeks from Lower Italy; but they called in the aid of the Saracens from Sicily and Otho suffered a total defeat near Cotrone, Calabria, 13 July 982 and with difficulty made his es¬ cape on a vessel. He died before fresh plans of conquest against Greeks and Arabians could be executed.

OTHO III, called Mirabilia Mundi (((Wonder of the World®), Holy Roman Em¬ peror: b. July 980; d. 23 Jan. 1002. He was son of Otho II, and the last of the male branch of the Saxon imperial house. He was only three years old when he succeeded his father. In 996 he marched into Italy and crushed a fresh insurrection fomented by Crescentius. He was crowned emperor in 996 by Gregory V. He again crossed the Alps in 998 to suppress a second rebellion under Crescentius, whom he caused to be beheaded. On the death of Greg¬ ory, .Otho raised his old tutor, Gerbert, to the pontificate as Slyvester II. Peace in Rome was, however, only temporary, and until his death Otho was mostly employed in quelling disturb¬ ances in various parts of Italy. Some historians

assert that his death was due to poisoning, an act of revenge on the part of the widow of Crescentius. The emperor was a strict religion¬ ist, much given to penances and pilgrimmages.

OTHO IV, Holy Roman Emperor: b. 1182; d. 19 May 1218. He was the son of Henry, Duke of Saxony. He was educated at the court of his uncle, Richard I of England, was chosen by the Guelphs as rival king to Philip of Swabia in 1198, was recognized as sole king in 1208 and was crowned emperor at Rome, 4 Oct. 1209. However, the emphasis which he placed upon imperial sovereignty in Italy displeased the Pope, who excommunicated him' in 1210 and in 1212 declared Frederick II the true king of Germany. He finally relin¬ quished the struggle against Frederick and re¬ tired to his possessions in Brunswick.

OTHO, or OTTO, I, king of Greece, sec¬ ond son of King Louis of Bavaria : b. Salz¬ burg, 1 June 1815; d. Bamberg, 26 July 1867. He "was educated at the University of Munich, was nominated king of Greece by the London Conference 7 May 1832 and chosen to this of¬ fice by the Greek National Assembly 8 August. Until 1 June 1835 he was guided by a regency. Upon coming to his majority he showed him¬ self too weak, too easily influenced by his Bavarian courtiers, and, above all, too much under Russian control to win the confidence

of the people. He was compelled to grant a constitution, the working of which was ham¬ pered by factional strife. Internal discord, financial difficulties and open breaks with Great Britain and France followed and 24 Oct. 1862 he was deposed by a provisional government and returned to Bamberg. The only work of any importance that he accomplished for Greece was the organization of a system of education; a stronger man in his place would probably have profited by the repeated opportunities given Greece to acquire some territory of Tur¬ key. He was succeeded by Prince George of Denmark.

OTHO, Marcus Salvius, Roman emperor: b. 32 a.d. ; d. 69 a.d. He was for a time gov¬ ernor of the province of Lusitania (Portugal) and joined Galba when the latter rebelled against Nero. On Galba's accession in 67 Otho became the royal favorite and was made con¬ sul ; but when Galba appointed Piso as his successor, Otho, securing the allegiance of the Pretorian Guard, had Galba and Piso murdered and was proclaimed emperor in 69. The east¬ ern provinces acknowledged him as emperor, but in Germany Vitellius was proclaimed by the legions of the lower Rhine. At first suc¬ cessful, dissensions broke out among his gen-ereals, the forces of Otho were finally over¬ thrown by Vitellius at Berbriacum, in Italy, and the emperor killed himself after reigning three months and a few days. Consult Hender¬ son, B. W., (Civil War and Revolution in the Roman Empire, 69-70 a.d. (1908).

OTHO OF FREISING, fri' zing, German chronicler of the Middle Ages: b. about 1114; d. Morimund, 21 Sept. 1158. He was the third son of the Margrave Leopold IV of Austria and Agnes, daughter of the Emperor Hein¬ rich IV. In his 14th year he was made pro¬ vost of the Institute of Kloster-Neuburg but studied at Paris. He entered ˆ 1 130) the Order

of Cistercians at Morimund, Burgundy, be¬ came (1132) abbot of this monastery and (1137) then Bishop of Freising where he up¬ held the external conditions of the Church while he instituted successfully internal re¬ forms. He was one of the earliest to introduce the Aristotelian philosophy into Germany. From 1147-49 he accompanied the unfortunate crusade of Conrad III. He brought out . his so-called (Chronicles > (1143-46) in eight books, treating the history from the philosophic side, under the title (De duabus civitatibus,5 with great purity of diction and grip on the material. More valuable as a useful source is his (Gesta Friderici imperatoris) (continued to 1156) by him, then finished by Ragewin. This work was instigated by the emperor. _

His works were first published by Euspinian (Strassburg 1515), then by Wilmans in Monumenta Germanide historica, Scriptores,5 vol. 20 (special edition Hanover 1867), translated by Kohl (Leipzig 1894). Consult Hashagen, (Otto von Freising als Geschichtsphilosoph und Kirchenpolitiker5 (ib. 1900) ; Schmidlin, <Die Geschichtsphilosophie und kirchenpo-litische Weltanschauung Ottos von Freising5 (Freiburg 1906).

OTHO OF NORDHEIM, nort'him, Duke of Bavaria: d. 11 Jan. 1083. He was a descendant of the powerful Saxon family of the counts of Nordheim. Agnes, widow of Henry III, gave Otho the duchy of Bavaria in 1061, in order to have his help in the fight which she foresaw would be waged against the claims of her son Henry IV to the empire. Otho, however, took sides with her enemies; Henry was seized in 1062 and Anne was de¬ posed. This treachery of Otho was never for¬ gotten by Henry IV, who in 1070 caused Otho to be accused of a conspiracy against the em¬ peror. Otho in consequence was deprived of his duchy and forced to submit. He made sev¬ eral attempts to regain his territory and power and in 1077 secured the election of Rudolph of Swabia as German king. Otho remained in arms against Henry until his death. Consult Vogeler, Adolf, (Otto von Nordheim5 (Min-den 1880).

OTIS, Bass, American artist: b. New Eng¬ land, 1784; d. 1861. He first came into public notice as a portrait painter in New York, and nothing is known about his previous years of study. In 1812 he settled in Philadelphia, where his only known genre picture, < Interior of a Forge,5 hangs in the Pennsylvania Academy of Fine Arts. His portraits include those of Presi¬ dent Jefferson; Alexander Lawson; the painter Jarvis, and Dr. Physick, and one of himself. Some of his works he reproduced in mezzotint, and he is said to have produced the first litho¬ graph in America.

OTIS, Elisha Graves, American inventor: b. Halifax, V.t., 3 Aug. 1811; d. Yonkers, N. Y., 8 April 1861. He worked on a farm; was a carriage maker 1838-45, and was head of manu¬ facturing concerns in Albany, Bergen Heights, N. J., and Yonkers. His great invention, that of a safety device for an elevator so that it can¬ not fall even if the cable on which it is hung should break, was perfected for use in the last-named factory and probably did more to increase the value of city real estate by making tall buildings possible than any other invention

of the century. Otis also invented a special and independent engine for elevators, as well as a staple machine, a steam plow, a rotary oven and a safety bridge, which although without a draw does not impede navigation. The great elevator business begun by him was continued by his sons, Charles Rollin and Norton Prentiss Otis.

OTIS, Elwell Stephen, American soldier : b. Frederick, Md., 25 March 1838; d. 21 Oct. 1909. He was graduated at Rochester Univer¬ sity in 1858 and at Harvard Law School in 1861 ; entered the Union army in 1862 as cap¬ tain of the 140th New York Infantry and took part in many battles. Disabled for duty by a wound at Petersburg, 1 Oct. 1864, he was dis¬ charged from the volunteer service with brevet rank of brigadier in 1865 ; in 1866 became lieu¬ tenant-colonel of the 22 d Infantry; served in the YVest 1867-85; in the campaign of 1876-77 reducing Sitting Bull to submission, and was organizer and head of the Leavenworth School of Infantry and Cavalry from 1881 to 1885. He commanded at Assiniboine, Mont., 1885-90; from 1890 to 1893 was superintendent of the recruiting service, his rank in the latter year being full brigadier; and, after commanding the departments of the Columbia (1894—97) and of the Colorado (1894-98) and the department of the Pacific (1898-99), was appointed commander of the United States forces in the Philippines and military governor. He was a member of the Philippine Commission 1899. In May 1900 he retired from the governorship of the Philip¬ pines; in June was promoted major-general, and in October became commander of the de¬ partment of the Lakes, a post which he held until his retirement from active service in March 1902.

OTIS, Fessenden Nott, American sur¬ geon : b. Ballston Spa, N. Y., 6 March 1825 ; d. New Orleans, 24 May 1900. He was grad¬ uated from the New York Medical College in 1852; was surgeon of the New York police department in 1861 ; lecturer on genito-urinary diseases at the New York College of Physi¬ cians and Surgeons 1862-71 and clinical pro¬ fessor there from 1871 to 1890. Among surgical instruments invented by him may be cited the urethrometer and the dilating catheter. He was the author, among other works, of Ure¬ thral Strictures) (1877) ; < Genito-Urinary Diseases) (1883). .

OTIS, George Alexander, American sur¬ geon: b. Boston, 12 Nov.

1830; d. Washington, D. C., 23 Feb. 1881. He was graduated (1849) at Princeton and (1851) at the medical de¬ partment of University of Pennsylvania, con¬ tinuing his studies in London and Paris. He settled (1852) at Richmond, Va., ‘but moved (1854) to Springfield, Mass. At the outbreak of the Civil War he was appointed surgeon of the 27th Massachusetts Volunteers and was mustered in in 1861. Serving throughout the war he received four brevets for distinguished service. In 1864 he was made curator of the Army Medical Museum and placed in charge of the division of surgical records. Among other works he wrote (Surgical History of the War of the Rebellion) (unfinished). For some years he edited the Virginia Medical and Surgical Record and remained a regular contributor

thereafter. In 1880 he was promoted to the rank of major and surgeon in the regular army.

OTIS, Harrison Gray, American orator and statesman, nephew of James Otis (q.v.) : b. Boston, Mass., 8 Oct. 1765; d. there, 28 Oct. 1848. He was graduated from Harvard in 1783, studied law and was admitted to the bar in 1786. He was a member of the Federalist party in Congress, 1797-1801, and United States senator, 1817-22. He had previously sat in the Massachusetts legislature, and he took an active part in the Hartford Convention of 1814, and was mayor of Boston in 1829. In the Senate he opposed the extension of slave-holding ter¬ ritory. His published works include (Letters in Defense of the Hartford Convention > (Bos¬ ton 1824) and (Orations and Addresses.) Con¬ sult Loring, J. S., (The Hundred Boston Orators > (Boston 1854).

OTIS, Harrison Gray, American soldier and journalist: b. near Marietta, Ohio, 10 Feb. 1837 ; d. 30 July 1917. He was apprenticed to a printer at 14 and had a few months’ education at Lowell, Ohio (1856-57), but was graduated (1857), after a commercial course, at Granger’s College, Columbus. In 1860, while residing at Louisville, Ky., he was sent as delegate to the Chicago Republican National Convention that nominated Lincoln for President. Serving throughout the Civil War he rose to lieutenant-colonel oi volunteers by brevet, and was present in the western Virginia field (1861) and from Bull Run bridge to Antietam* (1862). After his discharge he published a small paper at Marietta, became official re¬ porter of the House at the 1866-67 session of the Ohio legislature, then served (1867-70) in the government printing office at Wash¬ ington. In 1876 he moved to Santa Bar¬ bara, Cal., where he conducted the Press, and in 1882 he became identified with the Los Angeles Daily Times, acquiring control

by 1886. Offering his services on the outbreak of the war with Spain he was commissioned brigadier-general of volunteers (1898) and served in the Philippines and later during the Filipino insur¬ rection. His brigade captured (1899) Caloocan. In his conduct of the Los Angeles Times he relentlessly opposed union labor, for which action the Times building was dynamited (1910) and 21 employees killed. In 1911 the McNa¬ mara brothers confessed their participation in the crime, thereby placing the act clearly on the shoulders of the labor union and creating a prolonged legal prosecution of the greatest public interest.

OTIS, James, American Revolutionary statesman: b. West Barnstable, Mass., 5 Feb. 1725; d. Andover, Mass., 23 May 1783. He was graduated from Harvard in 1743, studied law in the office of Jeremiah Gridley at Boston, was admitted to the bar at Plymouth, but after two years of practice _ there settled in 1748 in Bos¬ ton, where he quickly attained eminence in the courts. During his rise in the law, he found an avocation in the study of the classical and English literatures, and published (The Rudi¬ ments of Latin Prosody) (1760), a work of careful scholarship. He was appointed attor¬ ney-general, but this post he resigned rather than support the writs of assistance, applica¬ tion for which had been made in the Massa¬ chusetts Suoreme Court. These writs were

warrants permitting general search for smug¬ gled goods, and Otis was entirely convinced of their illegality. In February 1761 the matter came to debate before the court. Gridley ap¬ peared for the crown and Otis and Oxenbridge Thacher, another well-known lawyer, for the opposition. Otis' speech, occupying some four or five hours and marked by an argument of great learning and intellectual force, has been called the prologue of the Revolution. John Adams, whose notes taken in the court-room and later revised are the only authority for the content of this great effort, declares that ((then and there was the first scene of the first act of opposition to the arbitrary claims of Great Britain.® Decision was reserved; and though some writs were granted,

none was ever enforced. In 1761 Otis was elected to the legis¬ lature, where he gained a high reputation for his eloquence and patriotic earnestness. From this time until 1769 he was the pre-eminent leader of thought in that discussion and de¬ velopment of opinion which preceded the war. In 1762 he published (A Vindication of the Conduct of the House of Representatives of the Province of Massachusetts Bay.5 a broch¬ ure of ((exasperating candor,® of which John Adams said : <(How many volumes are con¬ centrated in this little fugitive pamphlet … !® This is regarded as a chief source for sub¬ sequent arguments against Parliamentary taxa¬ tion and in favor of free speech. It was fol¬ lowed by two others, (The Rights of the Brit¬ ish Colonies Asserted and Proved5 (1764), which maintained a conciliatory tone and was therefore displeasing to the extremists, and Considerations on Behalf of the Colonies5 (1765), increasingly bitter, and satisfactory to his previous critics. Otis was a prominent member of the Stamp Act congress, which met at New York in October 1765; in 1766 was elected speaker of the general court, but did not assume office because of the negative of the governor. In 1768, after Townshend's bill for the taxation of the colonies had been gassed by Parliament, the general court despatched to the remaining colonies a second circular-letter, urging unity in some plan toward common pro¬ tection. This letter was drafted by Otis and corrected by Samuel Adams. Bernard, royal governor, demanded the recall of the letter as traitorous, and Otis made a speech, advocating non-compliance, which the Royalists thought might be the <(most violent, insolent, abusive and treasonable declaration® ever uttered. But the legislature did not vote for the recall of the circular. Otis was now whollv occupied with public interests, writing for the press and addressing political gatherings. In 1769 he was accused' in England of treason by the customs commissioners, and replied by a denunciation of the commissioners in the Boston Gazette. He thus became involved in a quarrel with Robinson, one of the commissioners, during which he received a wound of the head which is supposed to have brought about his sub¬ sequent insanity. He was awarded £2,000 dam¬ ages, but refused to claim the sum upon receipt of a written apology. During the rest of his life he was subject to fits of aberration, and though he was in the legislature in 1771 and for a brief time resumed his Boston practice, he continued in general unequal to public and professional duties. While in an unbalanced

condition he took part in the battle of Bunker Hill. He was killed bv a flash of lightning. More than any other American Otis gave the impetus and direction to the struggle for in¬ dependence. Consult the

biographies by Knapp in (Sketches of Eminent Lawyers, Statesmen and Men of Letters5 (1821) and Tudor (Bos¬ ton 1823) ; also Tvler, M. €., ‘Literary History of the American Revolution5 (New York 1897) ; and the ‘Life5 by F. Bowen (Boston 1847).

OTITIS, or OTITIS MEDIA, inflamma¬ tion of the tympanic cavity of the ear. It may be either acute or chronic; and may come on during the course of certain febrile affec¬ tions, especially scarlatina, or in consequence of a scrofulous, rheumatic or gouty constitution ; or it may be excited by direct causes, as ex¬ posure to currents of cold air, violent syringing or ‘probing, *etc.* The acute form is . usually ushered in with sudden pains, coughing and buzzing noises, and by increased deafness. Un¬ less prompt relief measures are taken, suppura¬ tion follows, and the membrane of the tym¬ panum becomes ulcerated and pus discharges follow, or inflammation of the dura mater and abscesses in the brain may be established. In less severe cases there is usually considerable persistent damage, and an obstinate discharge of matter is a frequent sequence of the disease. The treatment of so serious an affection must be left solely in the hands of the medical practi¬ tioner. The symptoms of the chronic and less acute varieties of otitis are unfortunately so slight, that they are often neglected, until the patient finds the sense of hearing in one or both ears almost completely gone. In these milder forms, the general treatment is to com¬ bat the diathesis on which they frequently de¬ pend, and to improve the general health. Small blisters occasionally applied to the nape of the neck or to the mastoid process are often of service in very chronic cases. If there is any discharge, the ear should be gently syringed once or twice a day with warm water, after which a tepid solution of sulphate of zinc (one grain to an ounce of water) may be dropped into the meatus and allowed to remain there two or three minutes.

OTO, 6’ to, an Indian tribe of North Amer¬ ica of Siouan stock. They dwelt formerly in eastern Nebraska, south of the Platte River. The remnants of the tribe, numbering about 400, now share a reservation in Oklahoma with the Missouri, with whom they have a common language.

OTOCYON. See Cape Fox.

OTOLITH. See Anatomy ; Ear.

OTOMACO, o’to-ma’ko, a South American Indian tribe, dwelling in the Orinoco forests of central Venezuela. They are very savage and represent a very low state of Indian culture. No adequate study of

them has yet been made, but it is supposed that they constitute a sepa¬ rate linguistic stock. Consult Chamberlain, A. F. (in Journal de la Societe des Americanistes de Paris, New Series, Vol. VII, Paris 1910) ; and Tavera-Acosta, ‘En el Sur5 (Ciudad Bol¬ ivar 1907).

OTOMI, o-to’me, or OTHOMIS (Na-huatl otomitl, wanderer), one of the most an¬ cient and most widely scattered Indian tribes in Mexico. Previous to the appearance of the

Toltecs, by whom they were driven to the mountainous regions of the country, they were settled in the valley of Mexico. On the de¬ cline of the Toltec power they returned, but were afterward dislodged by the Aztecs At a later period part of their territory was re¬ gained. They ‘became partially civilized before the appearance of the Spaniards by whom they were conquered Some of the bands accepted Christianity. They occupy the mountainous portions of the states of Queretaro, Hidalgo and Guanajuato, and numerous bands are found in several other portions of the country. Their language is one of the most unpleasant of all ndian dialects, but many of the people converse m Spanish, and have become Mexican citizens. A grammar and dictionary was published in l/o7, and several small religious works in the native tongue have been issued.

, Strait of, passage between

the Adriatic and Ionian seas, separating the southernmost part of Italy from Albania. Its minimum width is 45 miles between Cape Glossa, Albania, and Otranto, Italy.

OTSEGO, ot-se’go, a lake in Otsego County, N. Y., the main source of the Susque¬ hanna River. It is a beautiful body of water; along its shores are many attractive cottages* but it is noted chiefly for its connection with James Fenimore Cooper (q.v.). Cooperstown (q.v.) is on the south shore.

OTSEGO BASS. See Whitefishes.

OTTAR OF ROSES. See Attar of Roses.

OTTAWA, ot'a-wa, Canada, city, capital of the Dominion of Canada and of Carleton County, in the province of Ontario, at the con¬ fluence of the Ottawa and Rideau rivers, and on the Canadian Pacific, Canada Atlantic (Grand Trunk), Canadian Northern, and New York and Ottawa (New York Central) railroads, about 120 miles west of Montreal. The Chaudiere Falls, in the Ottawa River, are 600 feet wide and 40 feet high. A road bridge spans the river immediately below the falls, while the Canadian Pacific Railroad bridge crosses some distance above, and a large combined railway and road bridge an equal distance below. The Rideau Falls, so called by the early French explorers because of its curtain-like appearance, carry the waters of the Rideau River into the Ottawa, toward the eastern end of the city. These, falls, as well as the Chaudiere, supply extensive water power. A careful estimate places the available water power in the immedi¬ ate neighborhood of Ottawa at 200,000 horse power, while within a radius of 45 miles there is a total of 1,000,000 horse power. Ten bridges cross the Rideau River within the city limits. A beautiful driveway has been designed which is to engirdle the city, 30 miles of which have been constructed. The Ottawa River and its tributary, the Gatineau, are the routes by whidh timber is brought down to Ottawa from the great northern limits.

. Industries, etc.— Around the Chaudiere are a number of large industries, for the most part connected with the cutting and manufac¬ ture of lumber. The cut of timber in the Ottawa Valley has been nearly 700,000,000 cubic feet in one year, and almost every foot was prepared for market in the Ottawa and Hull

lumber mills. Besides the lumber industry proper, there are large mills and factories, both on the Ottawa side and in the neighboring' citv of Hull, for the manufacture of matches, ir? durated fibre ware, wooden ware, pulp 'and paper, as well as flour mills, tanneries, brick and tile works, foundries, machine-shops, railroad car and repair shops, furniture factories, carri¬ age works. There are some 180 factories, em¬ ploying 17,000 hands. Ottawa is the centre of a good farming district, and within a few miles of the city, on the Quebec side of the river, are extensive mineral deposits, iron, asbestos, phos¬ phate of lime, mica, zinc, plumbago. Electric railways cover every section of the city, and extend out of town east to Rockliffe Park, and west to

Britannia-on-the-Bay, on the south side of the Ottawa, and Victoria Park, on the north or Quebec side.

Principal Buildings. — The Parliament and government buildings, situated on Parliament Hill, 125 feet above the river, and covering about four acres of land, are built in the Italian Gothic style, of Canadian sandstone quarried in the Ottawa Valley, and Devonian sandstone frorii Potsdam, N. Y. The foundation-stone was laid by the Prince of Wales (later King Edward VII) in 1860. The original buildings, including the Victoria Tower, 180 feet high and the library, cost about $8,000,000. The Parliament building was (with the exception of the library) destroved by fire 3 Feb. 1916, and is now (1918) in course of reconstruction. The growth of the country in recent years has neces¬ sitated the building of a fourth large building, known as the Langevin Block, facing the Houses of Parliament, but outside the grounds, and since its completion, government business has increased so rapidly that many large build¬ ings have had to be leased for departmental use, in various parts of the city. Other promi¬ nent buildings are Rideau Hall, the official resi¬ dence of the governor-general, the nost office, city hall public library, banks, churches, colleges and schools. Important buildings erected within recent years include the Victoria Museum, which accommodates the Geological Museum and the National Art Gallery, and is the temporary meeting place of the Domin¬ ion Parliament; the Royal Mint, the Astronomical Observatory; the National Archives; the building devoted to the customs and state de¬ partments ; and the Chateau Laurier, a magnifi¬ cent hotel operated by the Grand Trunk Rail¬ way.

Churches, Educational Institutions, Li¬ braries, etc.— There are two cathedrals, Church of England and Roman Catholic, as well as six hospitals, orphanages and homes for the aged and the friendless. Under the school laws of the province separate systems of schools are maintained for Protestants and Roman Catholics. The chief educational institutions are the Uni¬ versity of Ottawa (Roman Catholic), the Pro¬ vincial Normal School, affiliated with Toronto University, the Model School, Collegiate Insti¬ tute, Ladies' College, Saint Joseph's College, and a number of special schools in charge of the Oblate Fathers, three theological schools, a number of private academies, and the public and . separate schools. There are several li¬ braries, ch'ef of which is the Library of Par¬ liament, which contains over 200,000 volumes,

besides some valuable manuscripts. Next to Toronto, Ottawa is the chief intellectual centre of the Dominion and is the headquarters of the Royal Society of Canada. Representatives from a number of foreign countries, including a United States consul-general, are stationed at Ottawa. The Pope is represented here by a special envoy. The head office of the Bank of Ottawa is here.

History, Government, *etc.* — Champlain gives us the first account of what is now the site of Ottawa, but it was not until the end of the 18th century that the first white settler, one Philemon Wright, a New Englander, cut a home for himself out of the woods on the Hull side of the river. Wright acquired prop¬ erty on the south side as well and transferred the site of the future capital to one Nicholas Sparks as payment for farm labor. Sparks re¬ luctantly accepted the land. His descendants are now among the best-known and wealthiest families of Ottawa. In 1826 the British Gov¬ ernment sent out Colonel By to survey and construct the Rideau Canal, to connect the Ottawa with the Saint Lawrence at Kingston. The engineers and laborers engaged upon the canal formed the nucleus of the future city, which was at first called Bytown. Sir John Franklin, returning home from one of his Arctic voyages, laid the corner-stone of the canal locks in 1827. In 1854 Bytown was incor¬ porated as a city and the name changed to Ottawa. In 1858 Queen Victoria selected it as the capital of Canada, much to the disgust of the rival cities of Montreal, Quebec and Toronto. The first Dominion Parliament was held here in 1868. The government maintains a large experimental farm a mile or two south¬ west of the city. Hull (q.v.), across the river and in the province of Quebec, is one with Ottawa in commercial and industrial matters, but entirely separate in municipal government. The government of both cities is vested in a mayor and corporation. Pop. (1900) 58,193; (1910) 87,062; (1916, local estimate) 105,000.

Lawrence J. Burpee.

OTTAWA, Ill., city, county-seat of La Salle County, at the confluence of the Fox and Illinois rivers, on the Illinois and Michigan Canal, and the Chicago, Burlington and Quincy and the Chicago, Rock Island and

Pacific rail¬ roads, about 80 miles southwest of Chicago. It was settled as farm land in the early part of the 19th century, but was not incorporated until 1837. It is in a productive agricultural region, in which are extensive deposits of fire-clay, glass-sand and bituminous coal. It has consid¬ erable manufacturing interests. The chief estab¬ lishments are glass factories, potteries, agricul¬ tural implement shops, saddleries, carriage fac¬ tories and organ and piano factories. It has a large trade in brick, tile, sewer pipe and other manufactures, and in farm and dairy products. Some of the prominent buildings are the Illi¬ nois Appellate Court building, the city and county buildings, the Ryburn Memorial Hos¬ pital and the church and school buildings. Its educational institutions are Pleasant View Col¬ lege, under the auspices of the Lutherans, Saint Francis Xavier Academy (Roman Catholic), public and parish schools, a high school library, and Reddick's public libraries. It has four beautiful parks. The city charter, in accordance

with the State law of 1871, provided for a mayor, who holds office two years, and a coun¬ cil ; but now the government of the city is on the commission plan. The city owns and ope¬ rates the waterworks. Pop. (1920) 10,816.

OTTAWA, Kan., city, county-seat of Franklin County, on Marais des Cygnes River, and on the Missouri Pacific, the Atchison, To¬ peka and Santa Fe, and the Southern Kansas railroads; about 40 miles southeast of Topeka. It is in a farming and dairy section. The place was named for the Ottawa Indians who emi¬ grated from Ohio in 1833. The town was founded by John Tecumseh Jones, a Pottawat¬ omie missionary, who taught the Ottawas. The Santa Fe Railroad shops, employing 400 men, are located here. It has flour mills, carriage works, creameries, grain elevators, brick and tile yards and a furniture factory. There is con¬ siderable trade in livestock, dairy products, nursery stock, grain, wool and fruit. It is an attractive, residential city, with well-kept streets and fine parks. It is noted for its moral tone and as being an educational centre. It is the seat of Ottawa University, a Baptist institution which had, in 1917, 388 students. It has the summer educational and social gathering called the Ottawa Chautauqua Assembly, the second (in point of time) (< Chautauqua® in the United States. It has also a free public library. There are very many church edifices, and the place is often called ((The City of Churches.® The water system and electric-lighting plant are municipally owned. In 1913 the commission form of government was instituted. At least 90 per cent of the population are native-born white Americans. Pop.

9,018.

OTTAWA, Ohio, village, county-seat of Putnam County, on the Blanchard River, and on the Findlay, Fort Wayne and Western, the Cincinnati, Hamilton and Dayton, and the De¬ troit, Toledo and Ironton railroads, and the Ohio Electric road. It is about 90 miles north¬ west of Columbus. It is in a farming section, and has several industries connected with farm products and stock-raising. Its chief manufac¬ tures are flour, lumber and lumber products, clay products, beet sugar and dairy products. Pop: 2,167.

OTTAWA, a river of Canada, the chief affluent of the Saint Lawrence, forming for the main part of its course the boundary between the provinces of Quebec and Ontario. It rises on the high land which divides the basin of Hudson Bay from that of the Saint Law¬ rence, in lat. 48° 30’ N., and for 300 miles, from its source to Lake Temiscamingue, runs from northeast to southwest. In portions of its course the river is very irregular in width, be¬ ing lost in lakes through which it flows, while in others the waters contract to 40 or 50 yards and in many places forming beautiful cascades, fall over precipitous rocky ledges. Lake Temis¬ camingue is 67 miles long, and varies from a few hundred yards to nearly 10 miles wide. On leaving Lake Temiscamingue, the river, sud¬ denly changing its direction, flows to the south-, east for 400 miles, widening at its outlet into the expanse of water known as the Lake of Two Mountains and finally discharges into the Saint Lawrence at the Saint Ann’s Rapids, above the island of Montreal. Calumet and Allumette islands, 75 and 95 miles respectively

OTTAWA, CANADA

Parliament Buildings — Front

Raft of timber on the Ottawa River at Ottawa, showing the library of Parliament and the Parliament Buildings

OTTAWA, CANADA

Showing the Central Section, Chateau Laurier, locks of the Rideau Canal, the old Parliament Building, the Ottawa River and the Laurentians in the distance

above the city of Ottawa, belong to Quebec.

ˆ1X-jmtl es-aˆove city of Ottawa the

rapids begin, which terminate in the Chaudiere Falls, 40 feet high. The Ottawa is navigable from its junction with the Saint Lawrence to the falls, and is connected with Lake On¬ tario at Kingston by the Rideau Canal. The river is of considerable commercial importance, from the immense quantity of fine timber cut 9F hs banks, and on those of its tributaries, the chief of which are the Gatineau, Mada-wasca, Coulogne and Lievre. The Gatineau is 440 miles long, and the other tributaries men¬ tioned vary in length from 130 to 205 miles. I he drainage basin of the Ottawa and its tribu¬ taries is estimated at 86,000 square miles. The river was first explored by Samuel Champlain m 1613. Up to the early years of the 19th cen-tuiy it was the thoroughfare of explorers and iur traders from Montreal to ‘ the far West The projected Georgian Bay Canal (440 miles long), which would halve the distance between Montreal and Sault Saint Marie, as compared with the Welland Canal route, would follow the Ottawa River the greater part of the way.

OTTAWA, University of, conducted by the Oblate Fathers of Mary Immaculate, was established in 1848 by the Rt. Rev. J. E. Guigues, O.M.I., D.D., at Ottawa, Canada. Under the presidency of the Very Rev. Father Tabaret, O.M.I., DD., the institution attained a high degree of prosperity. Originally incorpo¬ rated under the title of “College of

Bytown,® this institution received, in 1866, the title of “College of Ottawa,® together with the power of conferring university degrees. In 1883 its char¬ ter was so amended as to extend its original powers. The university received at the same time extensive powers of affiliation, in virtue of which, all the degrees conferred by the faculty are officially recognized in the Dominion and in all other British possessions. By a brief, dated 5 Feb. 1889, the Sovereign Pontiff, Leo XIII, raised the University of Ottawa to the rank of a Catholic university, with all the privileges conferred on such universities.

The program of studies includes (1) The theological course, which extends over four years. (2) The philosophical course which is both the crowning of the collegiate course and basis of all professional studies. Students may take their degrees both in sacred theology and philosophy. (3) The course of arts, which ex¬ tends over four years, at the end of which the student may receive the diploma of bachelor of arts or bachelor of literature, after having passed the prescribed examinations. (4) The collegiate course, extending over three years and embracing all the matters necessary for matric¬ ulation. (5) The commerical course. The number of students attending all departments in 1916-17 was 700. These are recruited all over the Dominion, but largely from Ottawa and the surrounding district.

OTTAWA INDIANS, or OTTAWAS

(from adawe, to trade, to buy and sell), an important American tribe of the Algonquian family formerly residing in the region of the Ottawa River in Canada, and when first met with by early French explorers, inhabiting the Manitoulin Islands and the northwest shore of the Michigan Peninsula. They comprised the Kiskakons, the Sinagos and the Keinouches.

They believed in a Great Creator whose eye was the sun by day, and the moon and stars by night, and who therefore could see all things everywhere, night and day, and from whom it would be impossible to hide any actions, either good or bad. They were governed ’ by 21 precepts, or moral commandments, which bear a striking resemblance to the Decalogue. They also believed in certain deities who were governed by the Great Spirit over all, and who presided over various places as a country, mountain, river, lake or island ; they were care¬ ful not to express anything which might dis¬ please such deities. Michabon, the “great hare,® presided over the earth and created men from animals. Mirabichi was the “god of the waters.® The Ottawas

became the allies and friends of the French, and also of the Hurons, by which latter friendship they incurred the hatred of the Iroquois, and from whom, after the overthrow of the Hurons, they fled to the islands at the mouth of Green Bay, and thence to the country of the Sioux beyond the Missis¬ sippi. Becoming embroiled with the Sioux they were driven back, a band settling at Mackinaw, and afterward at Arbre Croche, and another band near Detroit. The Ottawas aided the French in their last war for Canada, but Pon¬ tiac (q.v.), chief of the Detroit Ottawas, would not surrender and organized a deep-laid con¬ spiracy for the massacre of the English, in which, however, the Arbre Croche Ottawas would not join. About this time the tribe con¬ sisted of about 1,500 persons. During the Rev¬ olution and in the War of 1812 they were under British influence. They joined in treaties made in 1785 and 1789, but took arms with the Miamis soon after, again making peace in 1795, and a band about this time making a settlement on the Miami River. Numerous treaties ceding territory around Lake Michigan to the United States followed. A part went south of the Missouri in 1833, where they lost their identity. A band of Ottawas in Ohio, on 31 Aug. 1836, ceded 49,000 acres of land at Maumee, and 200 removed to 34,000 acres on the Osage, south of the Shawnees. Those remaining became scat¬ tered. The emigrants prospered for a while, but ill-advised building projects occasioned financial troubles, and, having asked for and obtained a reservation, by common consent they removed to Indian Territory in 1870. In 1836 the Michigan Ottawas ceded all their lands ex¬ cept reservations, and an option was granted them of taking up lands in severalty on these reservations by the treaty of 1855. They are mainly located in Michigan and there are a few in Oklahoma. In 1836 the Ottawas and Chippewas surrendered Manitoulin Island and the _ 23,000 islands in Georgian Bav to the British Crown. There are under 4,000 Ottawas in the United States and about 750 in Canada. Con¬ sult Blackbird, < History of the Ottawa and Chip¬ pewa Indians of Michigan > (1887) ; and Hodge, (Handbook of the Indians of Canada* (1913).

OTTAWA UNIVERSITY, founded in 1865 at Ottawa, Kan. It was incorporated un¬ der the joint control of the Baptists and the Ottawa Indians; the legislature set apart 20,000 acres from the Indians' reservation for the university, with the provision that two of the six trustees should be Indians. This arrange¬ ment did not prove entirely satisfactory, and in 1873 an adjustment was made that placed the

university entirely under the control of the Bap¬ tist denomination. There is a preparatory de¬ partment, and in addition to the regular college instruction, there are courses in pedagogy and business. The college work is arranged in two courses, classical and scientific, leading to the two degrees of A.B and B.S. All courses are open to women. The library in 1916 contained 10,000 volumes ; the productive funds amounted to $253,000, and the annual income was $43,000. The students (1916) numbered 400, and the faculty 19.

OTTENDORFER, oten-dor-fer, Oswald, German-American journalist: b. Zwittau, Mo¬ ravia, 26 Feb. 1826; d. 16 Dec. 1900. After studying law at Prague and Vienna he came to this country after the revolutionary disturb¬ ances of 1848, and, settling in New York in 1850, soon became editor of the New Yorker Staats-Zeitung and later (having married the lady who owned the property) its proprietor. Under his management it became the most in¬ fluential German daily in America and after 1861 was independent in politics. He built and endowed an educational institution in his native town, founded a home for aged and poor men on Long Island and established the Ottendorfer Free Library in New York.

OTTER, Sir William Dillon, Canadian soldier: b. near Clinton, Ontario, 3 Dec. 1843. He received his education at Upper Canada College, Toronto; served for 22 years in the Queen's Own Rifles, active militia of Canada, and since 1883 permanent militia. He saw active service during the Fenian Raids of 1866 and 1870. In the NorthWest Rebellion of 1885, Otter was in command of the Battle-ford column; in the Boer War he commanded the first contingent from Canada. In 1905 he was made brigadier-general and major-general five years later. In 1910 he became inspector-general and chief military adviser to the Min¬ ister of Militia. He was knighted in 1913 and during the War of 1914-18 served as director of internment operations.

OTTER, a carnivorous mammal of the subfamily Lutrin-ce of the weasel family (Mustelidce). There are two genera, Lutra, including the true otters, and Enhydris, includ¬ ing the sea-otter (q.v.). The otters differ from the weasels chiefly in their webbed feet and aquatic life. The body is elongated and aver¬ ages, exclusive of the tail, about two and one-half feet in length; the tail being somewhat tapering, but

flattened, and serving as an effi¬ cient rudder to guide the swimming movements of the animal. The legs are short, but muscu¬ lar, and exceedingly mobile; each foot possess¬ ing five webbed toes. The lips are whiskered; the ears short and the eyes large and prom¬ inent. The under fur is short, closely set, and woolly, and the outer coat of longer and coarser hairs, of dark-brown hue. In habits the otters are chiefly nocturnal animals, swim¬ ming about at night to prey on fishes, of which they are great destroyers, leaving many mangled after merely eating part of the flesh. They wander about a great deal in winter, going across the fields from stream to stream. The burrow is constructed near the waters' edge, the nest being situated at some depth in the bank of the river and lined with grass and leaves.

The American otter (Lutra canadensis)

averages about four feet in length, inclusive of the tail. The fur is of a lustrous brown color. It inhabits America generally, but is most plentiful in Canada, being rare on the Atlantic border of the United States. The Mackenzie River and other streams running into the Arctic Sea form noted haunts of the Canadian otter. It is chiefly noted for its fur, which is much valued commercially. A peculiar winter habit of this otter consists in numbers of these ani¬ mals selecting a sloping bank of a river or a ridge of snow, and sliding down the sloping surface upon their bellies, the fore-legs being bent backward, while by means of the hind legs a swift forward impulse is given to the body. This sport (for such it really is) may be con¬ tinued for a considerable time, the whole proc¬ ess reminding one of schoolboys similarly amus¬ ing-themselves. These animals are caught in steel traps, which are set generally near the entrance to the burrow, and they have been exterminated in almost all the easily accessible streams of the country.

The European otter (L. vulgaris) inhabits Europe generally, and is a well-known denizen of Scotch rivers and streams. To the salmon it is particularly destructive, a pair of otters de¬ stroying an immense number of fish, and, as already remarked, leaving large numbers in a mangled condition after each meal. The pursuit of fishes is carried on with great dexterity by the otters, the lithe body accommodating itself quickly to all the turns and gyrations of the finny prey. This otter, although usually of an untamable and somewhat ferocious disposition, can occasionally be domesticated to a very per¬ fect extent. A species (L. nair) is said to be tamed in India by fishermen and used for hunt¬ ing fish ; and in Great Britain tame otters have occasionally been kept for a similar purpose. The otter is still hunted for sport by means of

dogs (see Otter-hound) bred and trained to their work. When brought to bay the otter will defend itself with great pertinacity and. will successfully meet any single dog of ordinary strength. When forced to the water the otter swims deftly and remains for very long periods concealed and swimming beneath the surface. On Maigre days the Roman Catholic Church permits the flesh of the otter to be eaten. It is said to be dark-colored, rank and of fishy taste. The fur is used, but not to any great extent. The sea-otter, Enhydris , is confined to the shores of the North Pacific. It is more aquatic than the species of Lutra, and has been found as much as 15 miles from land. Its tail is flattened as a paddle. It only walks with the greatest difficulty. The fur of the sea-otter is rare, silky and valuable. Consult Coues, (Fur¬ bearing Animals) (1877); Stone and Cram, (American Animals> (1902), and works on British and East Indian mammals.

OTTER or ANCON SHEEP, a breed

of sheep, which arose in Dover, Mass., in 1791, from a long-bodied ram which was deformed in that its legs were extremely short and bent outward, or bowed, like those of an otter. The progeny of this ram when mated with an or-dinarv ewe were often deformed like the sire, and for a long period the breed was easily maintained in that district, where it was es¬ teemed because unable to iumn over low walls and fences. This case is of great scientific

interest as an example of Mendelian dominance (see Heredity) in a sire and also as an ex¬ ample of how a sudden variation or sport may be perpetrated. It is also of interest to note that when, after a time, care was no longer taken to maintain the breed, on account of the introduction of the quiet merinos, it disap¬ peared by crossing with ordinary sheep: the last typical specimen recorded died in 1813 Consult Humphreys, D., (On a New Variety in the Breeds of Sheep* (Philosophical Trans¬ actions of the Royal Society, London 1813).

OTTER CREEK, a stream rising on the southern boundary of Rutland County, Vt. hows north-northwest through Rutland and Ad¬ dison

counties and empties into Lake Cham¬ plain near Ferrisburg. It is 90 miles long and is navigable for eight miles from its mouth. It supplies excellent water power to a number of towns, the most important of which are Ver-gennes, Middlebury and Rutland.

OTTER-HOUND, or OTTER-DOG, a

large, rough-haired, powerful, hardy and courageous breed of hounds, cultivated espe—

y m, Great Britain to assist in otter-hunting, lhese dogs must be able to follow the game into the water and fight it in its retreats. A fair specimen will stand two feet tall and weighs 65 to 75 pounds. Consult Lee, (Modern Dogs* (1897).

OTTER-SHREW, a very large South African aquatic shrew, which has a strange re¬ semblance in appearance and habits to an otter. See POTAMOGALE.

OTTERBEIN, other-bin, Philip William,

American United Brethren clergyman : b. Dillen-burg, Germany, 4 June 1726; d. Baltimore, Md., 17 Nov. 1813. He was ordained in the Re¬ formed (German) ˆChurch ministry at Herborn in 1749 and in 1752 was sent as a missionary to America, where he first settled at Lancaster, Pa., thereafter having charge of the congrega¬ tions at Tulpehocken and York, Pa., and of Frederick, Md. At Lancaster he experienced what he termed a change of heart and as a re¬ sult introduced the innovations of class-meet¬ ings, open-air meetings and prayer-meetings, and frequently made lengthy itinerant tours, founding what later became a new sect, the United Brethren in Christ. In 1774 he assumed charge of the parish at Baltimore where he re¬ mained for nearly 40 years. He was a man of great learning and wide influence ; he co-oper¬ ated with the Methodist preachers who came to Pennsylvania and Maryland ;. the movement which he headed gradually developed a sepa¬ rate organization ; in 1800 he was elected bishop ; and at his death the church had in its service about 100 preachers and 20,000 members. Consult (Life, * by Drury (1884).

OTTERBEIN UNIVERSITY, founded in 1847 at Westerville, Ohio, under the auspices of the United Brethren in Christ. It was char¬ tered with full university privileges, and was the first educational institution established un¬ der the control of the United Brethren; it was named in honor of Philip William Otterbein (q.v.). Its organization includes a college de¬ partment, a preparatory department, with a three-years'

course, and postgraduate, normal, music and art departments. The college work is arranged in two courses, classical and philo—

sophical, leading to the degrees of A.B. and Ph B. The university has been coeducational from the first; and there is a dormitory for the women students on the campus. The Chris¬ tian Association building was the first of its kind in the State. In 1916 the library contained 19,000 volumes; the buildings and grounds were valued at over $525,000; the productive funds amounted to $250,000, and the annual income was $55,000. The students numbered 510 and the faculty 27.

OTTLEY, ot'li, Robert Lawrence, Eng¬ lish Anglican clergyman: b. Richmond, York¬ shire, 2 Sept. 1856. He was educated at Ox¬ ford. took orders in the Established Church, was principal of Pusey House, Oxford, in 1893, has been rector of Winterbourne Basset, Wilt¬ shire, from 1897 and canon of Christ Church, Oxford, and Regius professor of pastoral the¬ ology at Oxford since 1908. He has published (Lancelot Andrewes) (1893); (The Doctrine of the Incarnation* (1895); (Aspects of the Old Testament* (1897); <The Hebrew Proph¬ ets* (1898) ; (Short History of the Hebrews* (1901); (The Grace of Life* (1903); cThe Religion of Israel* (1905); (Christian Ideas and Ideals* (1909); <The Rule of Faith and Hope* (1911); (The Rule of Life and Love* (1915) ; (The Rule of Work and Worship*

(1915) .

10/.PTˆ0, King of Bavaria: b. Munich 1848; d. Furstenned, near Munich, Octo¬ ber 1916. Otto Wilhelm Luitpold Adalbert Woldemar became king in 1886, when his elder brother, King Ludwig II, was declared insane, ihe latter drowned himself and his doctor — who tried to save him — in Starnberg Lake. But Otto had already been declared insane as well, some 10 years earlier, and had been con¬ fined near Munich under restraint. His uncle fˆnce fuitPold, acted as regent from 1886 to 1912, when he died. It was then decided to depose the insane ((king in name only** and make his cousin, Ludwig

III, the present ruler, king in his stead. The family taint overcame Otto in the early seventys. Though he displayed no sign of intelligence or any human qualities, his enormous natural physical strength held out for over 40 years of his incarceration.

OTTO, John Conrad, American physician : ?• near Woodbridge, N. J., 1774; d. 1844. In 1792 he was graduated at Princeton with the degree of A.B., after which he attended the medical department of the University of Penn¬ sylvaniaˆ where he was graduated with the degree of M.D. in 1796. He established his practice in. Philadelphia and from 1813 to 1838 was physician and* clinical lecturer at the Penn¬ sylvania Hospital. Dr. Otto was the first phy¬ sician to report haemorrhagic disposition as an hereditary trait in certain families. Consult his Account of an Haemorrhagic Disposition in Certain Families* (1803).

OTTO. See Otho.

OTTO ENGINE. See Internal Combus¬ tion Engine.

OTTO AND LANGEN ENGINE. See

Internal Combustion Engine.

OTTO OF ROSE. See Attar.

OTTOIA, ot-to'ya, a genus of fossil an¬ nelids found m the Burgess shale of certain formations in British Columbia. It has an

elongated cylindrical body, made up of several segments. The mouth is surrounded by a ring of hooks.

OTTOMAN (ot'6-man) EMPIRE, or EMPIRE OF THE OSMANLIS (Osnah Vilayeti), formerly comprehending all the tributaries really or nominally under the do¬ minion of the Sultan of Turkey. See Turkey.

OTTUMWA, o-tum'wa, Iowa, city, coun¬ ty-seat of Wapello County, on the Des Moines River, and on the Chicago, Burlington and Quincy; the Chicago, Rock Island and Pacific; the Iowa Central ; the Chicago,

Milwaukee and Saint Paul and the Wabash railroads, about 80 miles southeast of Des Moines. It was settled in 1849 and in 1851 was incorporated. It is in a productive agricultural region and in the centre of Iowa's great bituminous coal-fields. It has good water power which combined with abundance of coal tends to develop manufactur¬ ing industries. The chief industrial establish¬ ments are mining and agricultural implement works, foundries, iron works, pork-packing plant, flour mills, starch factory, coal and lum¬ ber yards, manufactories of boilers, engines, tools, wagons, brick and tiles, cigars, grain elevators, stoves and candy. It is the trade and manufacturing centre of southern Iowa. The prominent buildings are the United States government buildings, the Young Men's Chris¬ tian Association building, opera-house, the Union Railroad Station, courthouse, churches, schools and library. The educational institu¬ tions are Saint Joseph's Academy, a high school, public and parish schools and a public library. It is under the commission form of govern¬ ment. The waterworks are municipal property. Pop. 23,003.

OTUMBA, o-toom'ba, Mexico, town, state of Mexico, on the Mexican railroad, 30 miles northeast of the City of Mexico. It is the ancient Indian pueblo of Otompan, inhabited probably by the Otomi Indians. Here Cortes defeated the Aztecs in a desperate battle 7 July 1520 during his retreat from the City of Mexico. Pop. 2,500.

OTWAY, ot'wa, Thomas, English drama¬ tist: b. Trotton, Sussex, 3 March 1652; d. Tower Hill, London, 14 April 1685. He was educated at Winchester College, and at Christ Church, Oxford. An appearance on the stage in Mrs. Aphra Behn's company in London in 1671 was unsuccessful and he returned to Oxford for a time, only to leave without a de¬ gree in 1674, and after a year in the army to return to London as an author. (Alcibiades) (1675) and (Don Carlos > (1676), especially the latter, which may be paralleled with Schil¬ ler's play, being taken from the same French original by St. Real, were unusually well received and won for Otway the favor of Betterton. Adaptations of Moliere and Racine followed, one of which, (The Cheats of Scapin, > held the stage for 100 years. In 1678 Otway essayed the comic with the prose play friendship in Fashion,) another great success in his own day, though marked by much indecency. But Otway did not profit by his success, what with drink and various amours, notably his passion for Mrs. Barry, who played in most of his plays and was mistress of the Duke of Roch¬ ester. He left London for the army (1678— 79), and upon his return wrote (The Orphan y

(1680), a comedy called (The Soldier's Fortune) (1681), (Venice Preserved > (1682) and another comedy, (The Atheist* (1684). The two com¬ edies are little better than worthless ; whereas the two tragedies, (Venice Preserved) ranking the higher, are by far the most powerful of the contemporary stage, being remarkable par¬ ticularly for the simple and strong delineation of the passions, and being generally held the most pathetic and provocative of tears of the whole English drama. Otway wrote much mis¬ cellaneous verse, satires, dedications, prologues and epilogues, but all contemporary and early biographers agree that he died in want, though they differ as to details. (Venice Preserved* enjoyed a European repute, there being ver¬ sions in French, Dutch, German, Russian and Italian; with (The Orphan* and (The Soldiers Fortune) it is contained in the (Mermaid Series > (1891). (See Venice Preserved). A complete edition of Otway is that by Thornton (1813). Consult De Grisy, (Etude sur Thomas Otway* (1868) ; Mosen, (Ueber Thomas Otways Leben und Werke* (1875) ; Lowenberg, (Ueber Otways und Schillers Don Carlos * (1886).

OUACHITA (wash'i-ta) COLLEGE, es¬ tablished at Arkadelphia, Ark., in 1886, under the control of the Baptist denomination. The work of the college is in two courses, classical and literary, and the degrees of bachelor of arts and bachelor of letters are conferred. There is also a preparatory department. The college is coeducational, and the number of women in attendance averages about one-half the total number of students. The income is derived from tuition fees, there being no endowment; in 1917 the income amounted to $75,000; the grounds and buildings were valued at about $100,000. The library contained 7,000 volumes; the students numbered 375 and the faculty 26.

OUAKARI, wa-ka're, a South American monkey of the genus Brachyurus, remarkable for the extreme shortness of the tail, and for the great length of the whitish hair upon the body, while the head is almost bald and the bare skin of the face is brilliant red. These small monkeys abound in the Brazilian forests, where three species are known, and one of which (B . nakaria) is among those most often seen and best liked as pets. Consult Bates, H. W., (The Naturalist on the River Amazon.*

OUANANICHE, wa-na-nesh', a land¬ locked relative of the Atlantic salmon, named Salmo ouananiche, and often written winni-nish, wananiche and in various other ways. It inhabits various lakes and ponds in eastern Quebec and Labrador, but is most familiar in and about Lake Saint John, north of Quebec. From most of its stations it can go to and return from the sea if it pleases, but never seems to do

so. This salmon differs very little from a typical salmon except ih its smaller size, and most ichthyologists have held it, and the similar Sebago salmon, to be only local varieties of Salmo salar ; but Jordan now re¬ gards both as separate species. The largeness of the eye and of the black spots are conspicu¬ ous distinguishing characteristics among others. ((As a game fish,® says Jordan, ((those who have had experience with the ouananiche think it has no equal. They may be taken at any time between the going out of the ice and the middle of September, though the best fishing is said

to be late in May. During the early part of the season it may be taken with bait of worms, pork, pieces of chub or even ouananiche itself along the shore of Lake Saint John. It is occasionally taken then with the artificial fly, but fly-fishing for the ouananiche is usually not a successful method of capturing it.® The lit¬ erature of American angling abounds with de¬ scriptions of this fish and its sport, and special treatises upon it have been written by Mc¬ Carthy, Chambers, Van Dyke and others.'

OUBLIETTE, oo-bli-eF, a secret dun¬ geon or pit constructed in old castles, forts and other buildings, in which were confined persons condemned to perpetual imprisonment or to secret death. It was usually entered by a stair¬ case or steps reaching to the top of the cham¬ ber. in the floor of which was an opening into the dungeon. This opening served also for the admission of light and air.

OUDENARDE, oo'de-nard', or OUDE-NAARDE, Belgium, town in the province of East Flanders, on the Scheldt, to the south¬ west of Ghent 15 miles, and at the junction of the Brussels-Kortrijk, the Oudenarde-Mous- cron and the Blaton-Ghent railways. It con¬ tains a number of remarkable buildings, among them the recently restored late Gothic, 16th century Rathaus with its portals by Paul van der Schelden, a masterpiece in wood carving; the Walpurgis Church (partly Romanesque of the 12th century and partly 14th and' 15th century Gothic) ; the Liebfrauenkirche, an 18th century transition edifice; the School of Music, Bishop's College, *etc.* Its chief industrial re¬ sources

are derived from the linen and cotton factories, bleacheries, dyeing establishments and tanneries. The old tapestry industry exists no more. This was the location in 1708 of the decisive victory of the allies under Marlborough and Prince Eugene of Savoy over the French under Vendome and the Dukei of Burgundy. It belonged to France from 1745ˆ18. In 1910 it had a population of 6,956. Consult de Pauw (La conspiration d'Oudenarde, 1342) (Ghent 1879). The town fell within the area of the German occupation early in the European War.

OUDH, owd, or OUDE, British India; (1) a town (also called Ajodhya) on the right bank of the Gogra, 77 miles east of Lucknow and forming part of the municipality of Fyzabad. It is greatly venerated by Hindus ; but its ancient temples are in ruins, and its only structures deserving notice are a mosque built by Babar, and some Mohammedan tombs. Pop. 23,000. (2) A province politically attached to

and forming with Agra the United Provinces of Agra and Oudh (q.v.) prior to 1901 known as the Northwest Provinces. Oudh is bounded on the north by Nepal and on the other sides by Agra, the lieutenant-governor of which ad¬ ministered Oudh as chief-commissioner from 1877 to 1902. Oudh is distinguished by an in¬ dependent judicial system. The area is 23,966 square miles ; the surface mostly level, very fertile and watered by the Gogra, Gunti and other tributaries of the Ganges. The Ganges itself forms nearly all its southwest boundary. There is a large forest area in the north. Oudh was formerly a Mogul province, and became subordinate to the British after the battle of Kalpi in 1765. In 1801 Gorakhpur and some other eastern districts were annexed from this

territory to the British dominions. In 1819 the vizier thiew off his nominal dependence on the Mogul sovereign and assumed the title of king. A disputed succession, and partial revolt in 1837, were the chief subsequent events until

1856, when complaints of misgovernment led to the annexation of the country to the British dominions, an annual pension of £120,000 being settled on the king. This measure, however, produced much dissatisfaction, and when, in

1857, the Mutiny broke out, most of the Oudh sepoys joined it, and the siege of Lucknow resulted. (See Indian Mutiny). Agriculture has made great advances, the area under crop having largely increased. Wheat, barley, rice, sugar, indigo and other products are raised in

large quantities ; in some districts a vast amount of nitre effloresces on the soil. Over 73 per cent of the population is engaged in agricul¬ ture; the province contains what is probably the densest rural population of any equal area in the world. Oudh is rich in historical sites. The province includes the two divisions of Lucknow and Fyzabad. Lucknow is the capi¬ tal ; other towns are Myzabad, Shahabad and Bharaich. Pop. 12,558,004 (predominantly Hindu; Mussulmans 1,700,000). See United Provinces of Agra and Oudh.

OUDINOT, oo'de-no, Charles Nicolas,

Duke of Reggio, French marshal : b. Bar-Ie- Duc, France, 26 April 1767 ; d. Paris, France, 13 Sept. 1847. Entering the army he had at¬ tained the rank of captain at the outbreak of the Revolution. He joined forces with the populace but crushed' an uprising in his native district in 1790, and in 1794 was given command of a brigade. In the war with Prussia and Austria he won distinction, in 1799 became gen¬ eral of division, and was thereafter much trusted by Napoleon, receiving the command of 10 battalions in 1805. He was at Austerlitz and Jena, and at Ostrolenka, Russia, in 1807 he routed the Russians; at Friedland in 1807 and at Wagram in 1809 his bravery was so marked that after the latter battle he was made marshal of France and) Duke of Reggio. In 1810 he occupied Holland, and in the unfortu¬ nate campaign against the Russians in 1812 he earned high praise for his skilful generalship. In the battles between the French and the allies he played a prominent part, was defeated at Gross Beeren and engaged at Leipzig; and he was loyal to Napoleon to the last, but after the restoration of the Bourbons took office under them. In 1823 he led the invading army into Spain, acted as governor of Madrid for a time, and became governor of the Invalides in 1842.

OUDINOT, Charles Nicolas-Victor,

Duke of Reggio, French general, son of the preceding: b. Bar-le-Duc, France, 3 Nov. 1791; d. Paris, France, 7 July 1863. He was a promi¬ nent figure in the war in Algeria, was later appointed commander-in-chief, and in 1848 led the attack upon Rome. For 'his protests against the coup d'etat in 1851 ha was arrested, but his release followed shortly, whereupon he re¬ tired from public life.

OUGREE, oo'gra', Belgium, town in the province Liege, on the Maas and the Liege-Namur Railway. . It has extensive blast fur¬ naces, rolling mills, machine works and coal mines. In 1910 it had 17,088 inhabitants.

OUIDA, we'da, pen name of Maria Louise [de la] Ramee, English novelist: b. Bury, Saint Edmunds, 7 Jan. 1839; d. Florence, Italy, 25 Jan. 1908. Her father, Louis Ramee, was said to be of Norman (Jersey) extraction; her mother, Susan Sutton, was English. In her teens she went to live in London and began to write for Colburn's New Monthly Magazine and for Bentiey's Magazine. Originally pub¬ lished in serial form as (Granville de Vigne : A Tale of the Day,5 her first novel appeared in book form as (Held in Bondage5 (1863). Using as a pseudonym her Christian name as pronounced by a babv sister, there speedily fol¬ lowed <Strathmore) (1865) ; (Chendos) (1866) ; and (Under Two Flags5 (1867), which estab¬ lished her reputation as a story-writer. Ex¬ ceedingly dramatic, abounding in high-pitched sentiment and attractive description, unconven¬ tional, of doubtful morality and taste, they possessed, however, undoubted literary merit with a strong popular appeal. Among notable later books were (Tricotrin5 (1869) ; (Puck5 (1870) ; (A Dog of Flanders, and Other Stories5 (1872) ; (Two Little Wooden Shoes5 (1874). In 1874 Ouida went to live in Flor¬ ence where she wrote (Moths5 (1880) ; (In Maremma5 (1882); (Bimbi: Stories for Chil¬ dren5 (1882); <Ruffino) (1890); (The New Priesthood5 (1893) ; (The Mascarenes5 (1897) ; (The Waters of Edera5 (1900); (Street Dust5 (1901). She acquired considerable wealth by her writings but due to her extravagant mode of living and her pride in refusing assistance of friends she was always in financial difficulties. The Italian government made her a generous grant of money ; the British government granted her a civil list pension which was augmented by another from the English Literary Fund, but her last years and death were marked by tragic poverty.

OUIMET, we'me , Joseph Alderic, Ca¬ nadian statesman : b. Sainte Rose, Quebec, 20 May 1848. He was educated at the Seminaire de Sainte Therese and at Victoria University, Cobourg. In 1870 he was called to the bar and practised thereafter at Montreal where he was soon recognized as one of the foremost legal lights in the province. From 1873 to 1896 Ouimet sat in the Dominion House of Commons as Conservative member for Laval. In 1887-91 he was speaker of the

House and served as Minister of Public Works from 1892 to 1896. For the 10 years from 1896 to 1906 Ouimet served as puisne judgeof the Court of King's Bench of Quebec province.

OUISTITE, wis'ti-ti. See Marmoset.

OULESS, oo-les, Walter William, Eng¬ lish painter: b. Saint Heliers, Jersey, 21 Sept. 1848. He was educated at Victoria College in his native town, and at 16 became a student at the Royal Academy, where he was a constant exhibitor after 1869. He was elected an asso¬ ciate in 1877 and a full member in 1881. About 1872 he applied himself to portrait-painting, in which he attained a high rank. Among his sitters were Darwin, Bright, Cardinals New¬ man and Manning, Lord Roberts, Frederic Har¬ rison and the Duke of Cambridge. He was awarded a gold medal at the Paris International Exhibition of 1878, and also at the Berlin Ex¬ hibition of 1886.

OUNCE, (1) the snow-leopard (q.v.) ; (2) in South America the jaguar (q.v.).

OUNCE, a twelfth part of any magnitude, whether of length, surface or capacity. In Troy weight the ounce is the 12th part of the pound; in avoirdupois the ounce is the 16th part of a pound. See Weights and Measures.

OUR AMERICAN COUSIN, an English comedy by Tom Taylor, produced in 1858. There is a Yankee character in the play, origi¬ nally created by Joseph Jefferson (q.v.). Lin¬ coln was in attendance at a performance of this comedy at Ford's Theatre, Washington, when he was assassinated.

OUR LADY OF ANGELS, Seminary of,

Niagara Falls, N. Y., the ecclesiastical depart¬ ment of Niagara University (q.v.), founded 21 Nov. 1856. The object of the seminary is the training of candidates for the Catholic minis¬ try. The scholastic year extends from Septem¬ ber to June and consists of two terms. The first term ends on the 1st of February; the second ends with the close of the scholastic year. The course of studies embraces two years of philosophy and four years of theology. Reci¬ tations are in Latin. Two oral and two written examinations are held every year. Scholastic disputations in dogmatic theology and philoso¬ phy and the solving of (<cases of conscience55 in moral theology are> a part of the regular class work. The seminary is under the care of <(The Priests of the

Congregation of the Missions55 (Vincentians or Lazarists). <(01d Niagara55 as the seminary is affectionately called, celebrated its 60th anniversary in 1916, with a commemoration of the hundreds of priests ((men rich in virtue and endowed with wisdom,55 who from its classes entered the min¬ istry and throughout the nation in the churches, schools and charitable institutions which they were instrumental in creating, reared noble monuments to their zeal, devotion and selfi-sacrifice.

OUR LADY OF GOOD COUNSEL,

Sisters of. See Orders, Religious.

OUR LADY OF THE HOLY ROSARY,

Congregation of. See Orders, Religious.

OUR LADY OF LOURDES. See Or¬

ders, Religious.

OUR LADY OF LOURDES, Brothers

of. See Orders, Religious.

OUR LADY OF MERCY, Military Or¬ der of. See Orders, Religious.

OUR LADY OF PERPETUAL HELP,

Sisters of. See Orders, Religious.

OUR LADY OF SION. See Orders, Re¬ ligious.

OUR MUTUAL FRIEND, a novel by Charles Dickens, published in England in 1864-65. The scene is laid in London and its imme¬ diate neighborhood. Among the characters which this story has made famous are Miss Jenny Wren, the doll's dressmaker; Bella Wil-fer, The boofer lady55 ; the Golden Dustman, Mr. Boffin ; and Silas Wegg, employed by Mr. Boffin, who is at first delighted with the serv¬ ices of (<a literary man with a wooden leg.55

OURAY, oo-ra', Indian chief : b. Colorado, 1820; d. Los Pinos Indian agency (Colo.) 24 Aug. 1880. He was the leader of the Uncom-

pahgre Utes, and while protecting the interests o ± his tribe was friendly to the whites, with whom he always kept faith. He spoke both h'nglish and Spanish. Several times he visited Washington to appeal on behalf of his people.

OURAY, Colo., town, county-seat of Ouray County, on the Uncompahgre River and on the Denver and Rio Grande Railroad 160 miles west-southwest of Colorado Springs. It

1Sratˆn elevatlon o£ over 7,000 feet, at the base of Mount Hayden, and in a region of grand mountain scenery. Its hot springs make it a favorite health resort. It is also the local trade centre and shipping point of the surrounding mining region, which is rich in gold and silver it contains a miners' hospital. Pop. 1,165.

OURIQUE, o-re'ke, Portugal, town in the province Alemtijo, and celebrated on account

/iiSf iVlctA0,70us battle of this name gained mu i? i Alfonso j over the Moors near here. I he battle assured him the kingdom of Portu¬ gal.

o'roo pra'too, Brazil, city, state of Minas Geraes, 175 miles north of Rio de Janeiro; elevation, 3,800 feet. Rich gold deposits were found in the vicinity and the chief industry was formerly gold-mining, but the mines have mostly been abandoned and the prosperity of the city has in consequence de¬ clined. It was originally the capital of Minas ˆTerife-S' .t the state government was moved to Minas in 1894. It is built on several hills and surrounded by mountains ; the streets are narrow and irregular, but some of the modern houses are well built. It is connected with Rio de Janeiro by rail, and with the towns to the north and east by highway, and carries on an active trade. Pop. 15,000.

OUSE, ooz, England, (1) a river of York¬ shire also called the Northern or Yorkshire Ouse, formed by the junction of the Swale and Ure, and after a southeast course of 45 miles, uniting with the Trent to form the estuary of the Humber. Its principal affluents are the Wharfe and the Aire from the west, the Don from the south and the Derwent from the north. (2) The Great Ouse rises near Brack-ley in the county of Northampton, flows in a general northeasterly direction, traverses the counties of Buckingham, Bedford, Huntingdon, Cambridge and Norfolk, and falls into the Wash at King's Lynn, after a course of 156

miles, for the latter two-thirds of which it is navigable. Among its affluents is (3) the Little Ouse or Brandon River which, after a course of 30 miles, joins it at the confluence of the river Stoke, and the New Bedford and Wisbech Canal.

OUSELEY, ooz'li, Sir Frederick Arthur Gore, English composer and musician: b. Lon¬ don, 12 Aug. 1825 ; d. Hereford, 6 April 1889. He was a son of Sir Gore Ouseley (q.v.). He was graduated B.A. in 1846 from ChristChurch, Oxford; succeeded to the baronetcy by his father's death in 1844, took orders, and held several metropolitan curacies from 1849 to 1851. Having graduated as doctor of music at Oxford in 1854, he was appointed precentor of Here¬ ford Cathedral in the following year, and also became professor of music in the university. In 1866 he was made a canon residentiary of Hereford Cathedral. From earliest childhood

Ouseley showed remarkable musical ability and extraordinary accuracy of ear. He composed an opera of great promise when only eight. His published compositions include two ora¬ torios (The Martyrdom of Saint Polycarp) (1855), and (Hagar} (1873) ; nearly 100 an¬ thems, and many other compositions of a reli¬ gious nature; besides overtures, glees, solos and quartets. He wrote three valuable works on musical theory: (A Treatise on Harmony> (1868) ; (A Treatise on Counterpoint, Canon and Fugue) (1869) ; and (A Treatise on Musi¬ cal Form and General Composition (1875). He was the founder of the church and college of Saint Michael, Tenbury (1856), and to it bequeathed his splendid musical library.

OUSELEY, Gideon, Irish Methodist mis¬ sionary: b. Dunmore, Galway, 24 Feb. 1762; d. Dublin, Ireland, 13 May 1839. His father, who belonged to a family settled in Ireland since 1625, was a deist, who, however, brought up his son with a view to his entering the Ro¬ man Catholic priesthood. A frivolous youth was followed by marriage at 20 and by the dissipation of both his own and his wife's for¬ tunes. A severe gunshot wound deprived him of the sight of one eye; at the same time he came under the influence of pious Methodist soldiers, was converted in 1789, began work as a preacher; in 1792 he and his wife opened a girls school at Sligo, and in 1799 he was re¬ ceived into the Methodist conference. For 50 years he preached the gospel, largely

in the nine Ulster counties, addressing thousands of gatherings, dhiefly in the open air at fairs, wakes, etc., and generally speaking from horse¬ back. During the rebellion of 1798 he was in peril for his life; but the heart-reaching power of his discourses, his fire and enthusiasm, joined to the Irish grace of humor, made his zealous labors acceptable not only to Wesleyans but to other Protestant denominations. He would preach as many as 20 sermons a week. He was the author of some controversial works including (A Short Defence of the Old Reli¬ gion (1812); (Rare Discoveries > (1829) Con¬ sult the <Memoir> by Reilly (1847); and the <Life) hy Arthur (1876).

jPPˆˆEY, SlR Gore, English diplomat and Orientalist: b. Limerick, Ireland, 24 June 1770; d. Beaconsfield, Buckinghamshire, Eng¬ land, 18 Nov. 1844. In 1787 he went to India, where ’he engaged in business, and also gave considerable attention to the study of Oriental languages and customs, particularly the Persian, Bengalese and Hindu. After his return to Eng¬ land he was created a baronet (1808), and in 1810 was appointed English Ambassador Extraor¬ dinary to Persia, and through his intimate knowledge of the Persian language and his skil¬ ful diplomacy was successful in arranging a treaty between England and Persia, which was concluded in 1812 but never finally ratified. He was also instructed in 1813 to mediate between Russia and Persia, and through his efforts a treaty was signed suspending war between the two nations. In 1815 he returned to England, snd in 1820 was admitted to the privy council.’ He was an able Oriental scholar, was one of the founders of the Royal Asiatic Society of Lon¬ don, and in 1842 became president of the So¬ ciety for the Publication of Oriental Texts ‘The Guhstan of Musle-Huddeen Shaik Sady

of Sheerez> was printed under his direction (1809); his own work, biographical and Ex¬ planatory Notes on the Persian Poets’ was published after his death (1846).

OUSELEY, Sir William, English Orien¬ talist: b. Monmouthshire, England, 1767; d. Boulogne, France, September 1842. . He was educated privately and later in Paris, but in 1788 he entered the army. Tiring of military life and desirous of continuing his study of Oriental languages, he left the army in 1794 and entered the University of Leyden. There¬ after he devoted himself to further study and to literature, and was knighted in 1800, but in 1810 accompanied his brother, Sir Gore Ouseley, Amabssador to Persia, as his private secretary. He published (Persian Miscellanies) (1795);

(Oriental Collections > (1797-99) ; (Travels in Various Countries of the East* (1819-23), and translated the geography of Ibn Haukal (1800).

OUSELEY, Sir William Gore, English diplomat: b. London, 26 July 1797 ; d. there, 6 March 1866. He was the son of Sir William Ouseley (q.v.). He was early engaged in the diplomatic service ; and in 1825 was con¬ nected with the British legation at Wash¬ ington, and at that time married a daugh¬ ter of Van Ness, governor of Vermont. He later was appointed to several respon¬ sible diplomatic positions in South Amer¬ ica; and was sent on special missions to the United States and to Central America. He pub¬ lished (Remarks on the Statistics and Politi¬ cal Institutions of the United States* (1832) ; (Notes on the Slave Trade) (1850) ; and (Views in South America, from Original Draw¬ ings* (1852). He was created K.C.B. in 1852.

OUSSANI, Gabriel, American Oriental¬ ist: b. Bagdad, Asiatic Turkey, 1 Aug. 1875. He was educated at the Patriarchal Seminary, Mosul, Turkey, at the Propaganda, Rome, also at Paris and at Johns Hopkins University, Baltimore, under Paul Haupt. He was or¬ dained priest of the Chaldean rite and came to New York in 1900, was Fellow in Semitic languages at Johns Hopkins in 1901-04, and professor of Hebrew, ancient history and Ital¬ ian at Cathedral College, New York, and lec¬ turer on Biblical and Oriental history and archaeology at Saint Joseph's Seminary, Dun-woodie, N. Y., in 1904-07. In 1907 Dr. Oussani was appointed professor of early church history, Old Testament history and patrology and librarian at Saint Joseph's Seminary. He visited the ruins of Assyria and Babylonia and traveled in the Levant for purposes of research. He is member of the American Oriental Society and the Society of Biblical Literature and Exegesis. He is a frequent contributor to periodicals and reviews and contributed also to (The Catholic Encyclopedia.)

OUSTER, in law, the act of dispossessing one, as of a freehold or chattels real. An ouster differs from a trespass in that the latter is

temporary and usually without claim to the property. Ouster of a freehold may be effected in three ways ; by abatement, or wrongful entry before the heir or devisee, at the death of the person seized; by intrusion, or entry before the reversioner or the remainderman, at the death of the tenant for life; by disseisin, or expulsion of the person lawfully in possession.

Ouster of chattels real is effected by disseisin only. In disseisin the expulsion must be forcible or fraudulent.

OUT OF THE CRADLE ENDLESSLY ROCKING. In the New York Saturday Fress of 24 Dec. 1859 appeared a lyric poem by Walt Whitman entitled (A Child's Remi¬ niscences^ In the following year this title was changed to (A Word out of the Sea.* The poem has finally come to be known by its initial line, (Out of the Cradle Endlessly Rock¬ ing^ and has established itself not only as one of the* finest of Whitman's lyrics but as one of the most suggestive and impressive poems in American literature. It is a reminiscence of a night in May in the poet's boyhood, on the coast of northern Long Island, under the moon¬ light, where a mocking-bird is calling for its dead mate, the sea is singing its song of death and the boy (<is listening, absorbing, translat¬ ing.® Few poems have so entirely and ex¬ quisitely fused nature and human emotion ; the ^setting® formed of moonlight, the sea and the bird, is no mere background: in its reaction upon the boy it is the very soul of the poem (compare (When Lilacs Last in the Dooryard Bloomed,* q.v.). In his chant of the mocking¬ bird Whitman has succeeded more nearly than any other poet in rendering articulate the bird's song of joy and pain. From this song and the song of the sea, says the poet, <(a thousand singers, a thousand songs, have started to life within me.® Perhaps no other poem has with such pure emotion suggested the subtle and in¬ describable awakening of a poet's genius. Whitman's power of phrasing and wide variety of rhythm and harmony so entered into the making of this poem that the sympathetic reader leaves it with the sense of having wit¬ nessed a miracle, of having actually shared a profound emotional experience.

Marion Tucker.

OUTAGAMI, a name applied to the Fox Indians (q.v.).

OUTCROP, an exposure of rock. Spe¬ cifically the term is limited to an actual expos¬ ure of the bedrock, without soil cover. The term,

however, is used in a more expanded sense to indicate an area where a given bed of rock is the formation next under the surface soil, even though not actually exposed. For example, the Cambro-Ordovician outcrops over most of the central Ozarks, mean not that the Cambro-Ordovician actually is exposed over all that area, but that it is the rock next beneath the soil cover.

OUTDOOR THEATRES have recently found a wide revival in every part of the world, particularly in our own Western States. The uncertainty of the weather has always been a factor tending to retard the growth of the theatre but-of-doors, making the perform¬ ances periodical or fitful, even in countries where fair weather is invariable. The classic performances in the amphitheatres of Athens, it will be remembered, were part of the reli¬ gious seasonal celebrations and were not peren¬ nial. In this regard it should be remarked that the Shakespearean theatre was not an outdoor theatre, as it has been so often described, but a roofless theatre ; and, therefore, something quite distinctive. On the other hand, the pres-

ent-day garden theatres of Italy, like the thea¬ tres of ancient Greece, are wide open to all the winds. The most renowned of these are the stately garden theatre of Villa Sergardi, near Sienna in Tuscany; the little garden theatre, Villa Marlia, near Lucca, one of the best of its kind in all Italy; and, the largest garden theatre in that country, at Castelnuovo, near Palermo. This last has a wall of stucco built at the back of the stage lawn with painted scenery: a highly artificial and incongruous effect in a garden theatre. The Royal Garden Iheatre in Dresden, Saxony, is one of the largest and best equipped on the Continent. In the United States a number of such theatres are owned by private persons; notably the (Outdoor Players) extraordinarily beautiful Nature Theatre, belonging to Miss Marie Ware Laughton, at Peterboro, N. H. ; one in the grounds of R. R. Conklin, Huntington, Long Island; a remarkably handsome, solid structure on the estate of George C. Booth, Cranbrook, Mich. ; another at Brookside, Mount Kisco, N. Y. ; and many more attached to universities and other

educational institutions (see College Dramatics). A world-famous theatre is that built at Point Loma, near San Diego, Cal., by a theosophical order, the Universal Proth-erhood Organization.

These, like practically all the large com¬ pleted outdoor theatres of the United States, have been fashioned after the Greek model. Exceptions are found in those theatres that are rustic from necessity or by design. Of the latter type a fine specimen is the Redwood Forest Theatre of the San Francisco Bohemian Club, made famous ‘by its annual original (Bohemian Jinks, 5 in which men of national and international celebrity have been concerned. These festivals (for men only) have been partly described in the club volume edited by Mr. P. Garnett (San Francisco 1912) and a more recent list of the performances has been published in a special bulletin of the American Pageant Asso¬ ciation. For excellent decorative and mechanical lighting effects for evening performances out of doors, consult the article in the Architectural Review (Boston, September 1916) by Mr. Claude Bragdon, an architect of accomplish¬ ment in this department, who spent many months in experimentation to achieve his re¬ markable effects. While many of the classics have been largely adapted to the outdoor theatres of all kinds, there exists, at the same time, a stronger and quite successful tendency toward bending writers to originate plays for the strict conditions of the open air. For the English outdoor play of the 17th and 18th cen¬ turies, consult Greg, W. W., (Pastoral Poetry and Pastoral Drama) (London 1906), the most important work on the subject, containing a valuable bibliography. The French work on pastoral plays is Marsan, Jules, (La Pastorale Dramatique) (Paris 1905). The German standard authority is Klein, J. L., (Geschichte des Dramas) (Vol. V, Leipzig 1867).

Bibliography. — Budd, Katherine C.,

(Every Lawn a Theatre > (in World’s Work , Vol. XXII, New York 1912) ; Cheney, S., har¬ den Theatres) (in Country Life, New York, March 1915) ; Craig, Gordon, (Open Air Thea¬ tres > (in the Mask, Florence, Italy, October 1909) ; Dickinson, T. H., (The Case of Ameri¬ can Drama* (New York 1915), contains a chap¬

ter on ((The Theatre in the Open” ; Hackett,’ F., (Open Air Performance (New Republic, New York, 12 June 1915) ; Savits, Jocza, (Das Natur-theater* (Munich 1910) ; Stevens. A. S., (The Open-air Theatres of France* (in the Metropolitan Magazine, Vol. XXIV, p. 133, New York 1906) ; Stoll, H. F., ˆNotable Open-Air Theatres in

America) (in the Theatre, New York, July 1911); Waugh, Frank A., (Garden Theatres* (Boston 1917), the standard work in English on the subject.

In the broader lines of outdoor theatricals consult articles listed under the special head¬ ings : College Dramatics ; Community Drama ; Festival; Masques; Pageant.

OUTLANDERS. See Uitlanders.

OUTLAWRY, an ancient custom in Great Britain of putting a person out of the protec¬ tion of the law; thus an outlaw could be killed at sight like a wild beast; but once captured, his life was in the king's hands. Outlawry in civil proceedings was formally abolished in 1879. In an act passed in 1870, however, abol¬ ishing forfeitures for treason and felony, it was expressly stated that nothing in the act was to affect the law of forfeiture consequent upon outlawry. But there is little need now for outlawing absconders from justice, since in most, cases they can be laid hold of under treaties of extradition with foreign countries. The effect of outlawry is the forfeiture of the goods of the outlaw to the Crown, and he can¬ not receive and hold property given or devised to him. In the United States, outlawry was recognized in the Colonial days, but since the War of the Revolution the practice has been obsolete.

OUTLIER, an isolated mass of younger rock entirely surrounded by older sediments. Outliers are usually the result of normal erosion, as for example the hard layer of rock capping a mesa (q.v.), which has been separated from the continuous layer with which it was once connected. Contrasted with out¬ lier is inlier, a mass of older rock entirely sur¬ rounded by younger beds, as where an anticline (q.v.) has been planed down by erosion, ex¬ posing the older beds at the centre. Outliers and inliers may be formed in other ways.

OUTRAM, oo'tram, Sir James, English soldier: b. Butterley Hall, Derbyshire, 29 Jan. 1803; d. Pau, France, 11 March 1863. He was educated at Marischal College, Aberdeen, and in 1819 went to India, where after commanding for some time a bodv of irregular troops he was appointed adjutant to the 23d Bombay Native Infantry. From 1835 to 1838 he was employed in subduing the rebel chiefs of the Mahhi-Kanta. In the last-mentioned year, as adjutant to Lord Keane, he took part in the Afghan War, and distinguished himself at the capture of Khelat, and by his dangerous ride in disguise through the enemy's country (1839). In various other capacities he displayed military talents of a high order, as well as admirable administrative

qualities. In 1842 he was ap¬ pointed commissioner to negotiate with the Ameer of Sindh, in which position he adopted views at variance with the aggressive policy of Gen. Sir Charles James Napier, and the con¬ sequence was an acrimonious correspondence between the two. soldiers, carried on, however, by both in a spirit of good faith. Sir James

had the satisfaction in the end of knowing that his views were confirmed by the directors. His opponent gracefully styled him publicly the Bay¬ ard of India. In 1843 he defended the resi¬ dency of Haiderabad against 8,000 Sikhs; was resident of Baroda 1847-51 ; Oudh in 1854. He successfully conducted the war against Persia. He landed at Bushehr 27 Jan. 1857, and by a series of brilliant victories brought the war to a satisfactory conclusion in three months. At the beginning of the Mutiny he had command of two Bengal divisions, and was chief commis¬ sioner of Oudh. During the first relief of Lucknow, however, he waived his rank and served as a volunteer under Havelock. He commanded at Lucknow until the second relief (by Sir Colin Campbell), directed the evacua¬ tion, and held the place until the third, relief. He was made lieutenant-general and was created a baronet in 1858. He was the author of several works on his campaigns.

OUTREMONT, oo'tr-mon, Canada, town in Jacques Cartier County, province of Quebec, on the Canadian Pacific, the Canadian Northern and Grand Trunk railroads, five miles north¬ west of Montreal. It is in the main a residen¬ tial suburb of its great metropolitan neighbor and has none other than small local manufac¬ tures. The Cedar Rapids and Shawinigan Falls furnish valuable water power. Pop. 4,820.
OUTWASH PLAIN. See Valley Train.

OUTWORKS, in warfare. See Fortifi¬ cation.

OUVRARD, oo'vrar, Gabriel Julien,

French financier: b. near Clisson, Loire-In- ferieure, 1770; d. England,

1846. Ouvrard be¬ came prominent as a financier during the Revo¬ lution, especially under the Directoire, when he became very wealthy. He lent huge sums to the state and also to Spain. Under the Napoleonic regime his financial operations grew apace and in 1802-04 he loaned the govern¬ ment about 300,000,000 francs. The great mili¬ tary campaigns of Bonaparte were financed by Ouvrard. A break with the emperor came and Ourvrard passed the years 1810-13 in prison. He was afterward sentenced to a term in prison for illegal methods on the Stock Ex¬ change. After his release he went to live in England. He published a volume of (Memoires) (1826).

OUZEL, oo'z'l, an old name, derived from the German, for several thrush-like birds of Great Britain and the United States. The name is sometimes applied in England to the black¬ bird (q.v.), and to the larger thrush (Turdus torquatus), distinguished by the broad lunate stripe of white across the breast and sides of the neck, which is provincially known as ring, rock, mountain or tor ouzel. The name is also given, in the form ((water-ouzel,® to a small wren¬ like bird (Cine his aquaticas), congeners of which occur in various mountainous parts of the world, all very similar in appearance and habits. One species (C . mexicanus), is com¬ mon in the Rocky Mountain region — a small, robust, short-tailed, short-winged, dark-colored bird which haunts the mountain-streams and is commonly known as (<dipper,® on account of its remarkable facility in diving. Its food consists almost exclusively of snails, young insects and other organisms which live in and about the

streams; and it has the power of seeking these under water, not only by diving, but by partly swimming and partly walking with fluttering wings along the bottom in search of its prey, remaining there ((two or three minutes® if it pleases. It is a common bird in both the Rocky Mountains and in the Coast Ranges ; and makes a large globular nest of mossy materials which it lodges in some crevice near a stream, often beneath the veil of a cataract. Consult Muir, in Scribner's Monthly (1878) ; Keyser, (Birds of the Rockies* (1902) ; Coues, < Birds of the Northwest (1874); and British ornithologies.

OVAMBO, o-vam'bo, the Herero name for a people of the Bantu race residing in German Southwest Africa, calling themselves the Aajam-bo or <(rich ones.® They are divided into sepa¬ rate tribes, among which the best known is the Aa'ndonga, and are said to number about 80,000. They are of very dark complexion, tall and robust and remarkably ugly, and are physically much like their neighbors, the

Herero (q.v.). The hair is short, crisp and woolly. The men often shave it off, leaving the crown untouched ; but the women stiffen it with a kind of red paste, in the manner practised in many other parts of Africa. The principal ornaments are heavy iron anklets, a profusion of cowries and other shells and beads of every size and color, so arranged as to hide a considerable part of the person. The men also wear a leather clout. Their staple food is grain and they are primarily agriculturists. The houses are of a circular form, with a circuit of 16 feet and a height not much exceeding four feet. These huts, ar¬ ranged in groups, are enclosed by strong pali¬ sades. The domestic animals are oxen, sheep, goats, pigs, dogs and poultry. The arms con¬ sist of bows and arrows, a dagger, assegais and knob-kerries. Though thus provided with weapons the Ovambo are peacefully disposed and industrious. There is a sharp division of labor between the various tribes. In the higher castes of nobles and priests, descent is traced by the mother. The chiefs have a despotic rule and there is a strong belief in sorcery.

OVANDO, 6-van'do, Nicolas de, Spanish soldier and administrator : b. Valladolid, Spain, about 1460; d. Madrid, Spain, about 1518. He was commander of the Order of Alcantara and politically one of the most powerful men of his day in Spain, where he was high in favor with Ferdinand and Isabel, joint sovereigns of the Spanish domains. In 1501 he was appointed successor to Boabdilla as governor of Hispani¬ ola; in February 1502 he sailed from Spain with a fleet of 30 ships and 2,500 persons in his com¬ pany and landed at San Domingo. Almost his first act as governor was to refuse aid to Colum¬ bus whom he would not allow to land at San Domingo and he permitted months to pass with¬ out sending aid when he knew Columbus was in sore straits at Jamaica. His treatment of the Indians was cruel in the extreme and one of the blackest deeds in his career was his treacherous massacre of the 84 caciques of Queen Anacaona at Xaragua and her subsequent execution. In the course of his despotic rule the number of Indians in his province was re¬ duced to 60,000 in 1507 against 500,000 at the arrival of the Spaniards. Aside from his treat¬ ment of the Indians Ovando was an able gover-OVARIOTOMY — OVEN

nor and the colony flourished. He was recalled in 1509.

OVARIOTOMY. See Ovary.

OVARY, one of the paired glands which form the essential part of the organs of genera¬ tion in the female, and produce the eggs or ova; it is homologous to the testis of the male, where spermatozoa originate. The ovaries are two elongated oval bodies, flattened from above downward, one on each side of the uterus, at¬ tached to the broad ligament. Each ovary is about one and one-half inches in length and one-third inch thick. It consists of many ovi¬ sacs or Graafian follicles or vesicles (in which the ova are developed), embedded in a stroma or framework, and also of blood vessels, nerves and lymphatics and is invested with a serous covering or membrane derived from the peri¬ toneum. In females who have never menstru¬ ated, the surface of the ovary is, smooth ; after menstruation has been established it is rough and marked with scars, due to the rupture and closure of the Graafian vesicles. At undeter¬ mined periods, from puberty on, probably at or near the time of menstruation, the fluid (liquor folliculi) within certain ovisacs increases, dis¬ tention of the sacs occurs and a rupture at the weakest point,. with discharge of the ovum. This is ovulation, the function of the ovary. Most physiologists believe that ovulation is as¬ sociated with menstruation, but some writers contend that menstruation may occur without accompanying ovulation, and vice-versa. Usu¬ ally the ova, when discharged, are conveyed through the Fallopian tubes (q.v.) to the uterus. If the ovum unites with the spermatozoa of the male it becomes impregnated or fertilized. After the discharge of the ovum the Graafian vesicle usually fills with blood, which coagulates. The coagulum, squeezing out the serum, be¬ comes decolorized, its periphery assumes a yel¬ lowish color and the resultant spot is the corpus luteum. The corpus luteum of pregnancy is larger and remains for a longer time than that formed when pregnancy does not occur. Ovarian grafting now occupies a recognized position in pelvic surgery, operations having been followed by most excellent results.

Diseases of the Ovaries. — The affections of the ovaries mav be classified as malformations, displacements, functional disorders, inflamma¬ tions and tumors. One or both ovaries may be congenitally absent. This condition is rare, and when it does occur it generally coexists with a want of development of the vulva, vagina and uterus. Sometimes the ovaries are undeveloped. In both these conditions the women lack constitutional vigor and develop¬ ment. Displacement of the ovary into the in¬ guinal canal, or labia majora (hernia), is gen¬ erally congenital, but may be caused by a strain or fall. Prolapse or dislocation of the ovary, causing it to sink downward toward the pelvic floor, results from a disturbance of the delicate adjustment of

the organ, by an abnormal in¬ crease in its weight, a weakening of its sup¬ ports or an unusual traction upon it. The functional affections are neuralgic in character. Ovarian neuralgia (ovarialgia or oophoralgia), of which the principal symptom is sharp local pain, is frequently associated with hysteria or other neuroses, headache, intercostal neuralgia, etc., and it may be caused by a local engorge¬

ment or induration pressing on sensitive nerves. Inflammation of the ovary (ovaritis or oophor¬ itis) may be acute or chronic. The acute form is often preceded by hyperaemia, or an excess of blood-supply at the time of the monthly period, from some obstruction of the venous circulation. Pain in the ovarian region, espe¬ cially during menstruation, inability to walk and painful defecation are the principal symp¬ toms of acute ovaritis. The inflammation is frequently associated with pelvic cellulitis and peritonitis and may be caused by injuries, gonorrhoeal infection, puerperal sepsis and the acute exanthemata. Sometimes abscesses form, or sterility results. Chronic ovaritis is usually the result of an inflammation, acute or sub¬ acute, but may be caused by self-abuse, sexual excitement, *etc.* The connective tissue of the ovary thickens,' decreasing the size of the organ (cirrhosis) and tends to the formation of cysts, that is to say, cystic degeneration. A sickening pain, tenderness and reflex neuralgias are symptoms. The tumors of the ovary are carcinoma, fibroma and papillomatous tumors. Pathological atrophy sometimes accompanies excessive obesity, while prolonged pressure by adhesions or tumor, interference with the vas¬ cular supply and removal of the uterus also cause this condition. Physiological atrophy follows the menopause. Hypertrophy may be caused by any inflammatory process which stops short of the formation of pus, as chronic con¬ stipation, prolapsus of the ovary, *etc.* Pure hypertrophy is very rare as is also tuberculosis of the ovary.

Ovariotomy. — This is the operation of modern surgery for removal of ovarian tumors or of ovaries themselves. It was first per¬ formed in the 18th century by Ephraim Mc¬ Dowell of Kentucky, and long considered ex¬ ceedingly dangerous, but has been performed with great and increasing success, especially since the adoption of antiseptic treatment. See Anatomy, Comparative; and consult Refer¬ ence Handbook of the Medical Sciences) (Vol. VI, New York 1916).

OVEN, a closed, box-like chamber of any description in which a considerable degree of heat may be generated, used for baking, heating or drying any substance. The term is usually restricted to a

close chamber for baking bread and other food substances; but ovens are also used for coking coal, in the art of metallurgy, in glass-making, pottery, *etc.* There is now a great diversity in the shape and materials of construction and modes of heating ovens. The old type of baker's oven, still very largely used, is a low arched chamber either of brick with a tile or stone sole, or built entirely of stone. The door is in front and the pans of dough are put in with a long wooden spade. In one class of. these ovens the fireplace or furnace is placed in the front corner, with an opening admitting the products of combustion directly into the. oven, while there is an exit flue on the other side. A remarkable apparatus for the economic preparation of food both as regards the expenditure of fuel and the saving of waste is the Aladdin Oven, invented by Edward At¬ kinson, of Boston. This apparatus has been developed from a study of the Scandinavian Cooking Box, much used in Norway and Swe¬ den. This box consists of an outer case of

wood or other non-heat-conducting material, lined with hair felt. Into this cavity a metallic box, containing food with sufficient liquid heated to the boiling point, is placed and tighly closed in. The heat is thus retained for a long period, completing the process of cooking. On this basis was devised an outer oven of non-heat¬ conducting material in which, separated by a sufficient space for the circulation of heat, is placed a metallic oven or cooking chamber. Heat is passed from the top of a round-wicked kerosene lamp through a hole in the bottom of the outer oven. This heat passes around the entire inner oven, the products of combustion passing out at the same orifice at which the heat entered. There is no direct communication be¬ tween the lamp or source of heat and the cook¬ ing chamber. By this apparatus a normal tem¬ perature can be maintained for a definite num¬ ber of hours, either at the temperature of sim¬ mering or stewing at about 160° F., or at the temperature for baking and roasting not ex¬ ceeding 300° to 320° F. By suitable arrange¬ ments thereto very little difference in tempera¬ ture is found between the top and the bottom of the oven. The heat can be regulated by the size of the lamp and height of the flame. Meats, fish, vegetables and puddings can be cooked in the same

chamber without the flavor of one being imparted to the other, the heat being kept below the distilling point of the animal fats or of the fruit and vegetable juices. In this appa¬ ratus two pounds of kerosene oil are computed to do the work of 120 pounds of anthracite coal burned in the ordinary stove or range and to do it in a more wholesome and appetizing manner. The patents on this apparatus have been dedicated to public use.

OVEN BIRDS, birds belonging to the sub¬ family Furnarince , in the family Dendrocolap-tidce (tree-creepers). The oven-birds are found in tropical America and Argentina and are all of small size and feed upon seeds, fruits and insects. They walk on the ground with great ease. Some of these forms appear to frequent the shore, where they feed upon small mollusks and crabs. They are said to be exceedingly tame : the best-known species (Furnarius fu-liginosus) haunting village gardens and seeming to court the company of man. Their popular name is derived from the form of the nest which they construct. It is built of straws and dried leaves mixed with clay and resembles an oven in its conical shape, being about eight inches in diameter. The walls are about an inch thick. The aperture exists at the side and the interior is divided by a partition-wall into two rooms, in the inner of which the eggs are deposited. The nest is placed on a high and generally exposed site. Other species make strange nests of various kinds, one being a mas¬ sive cylinder of mud.

In the United States the name oven-bird is commonly given to the golden-crowned water-thrush, a small terrestrial warbler, which builds a covered nest on the ground in the woods. See Water-thrush.

OVENSHINE, Samuel, military officer: b. Pennsylvania, 2 April 1843. He entered the Union army at the outbreak of the Civil War in 1861 and was commissioned 2d lieutenant, rising to the rank of captain in 1864. He con¬ tinued in the army after the close of the War

and in 1898 was appointed brigadier-general of volunteers and in 1899 was made brigadier-gen¬ eral of regulars and in the same year com¬ manded a brigade in the Philippine Islands. He retired after over 30 years' active service.

OVERBECK, o'ver-bek, Johann Fried¬ rich, German painter: b. Lubeck, 4 July 1789; d. Rome, 12 Nov. 1869. He became very early imbued with the spirit of romanticism (q.v.) and on commencing his art studies at Vienna 1806, found at the Academy congenial friends in

Pforr, Vogel and others of the same school. Their devotion to the old Flemish and Italian masters met with much criticism and opposition in the Academy and in 1810 Overbeck who was called by his father ((the young German Ra¬ phael,® left for Rome where he associated him¬ self with Schadow in the development of their common ideals. In the following year Cornelius joined their company and a little later Philip Veit and J. Schorr united with them in the formation of an artistic brotherhood. Their headquarters was the studio in the monastery of Saint Isi¬ dore, and they professed their object to be the religious and moral in art. Their aim was the revival of German art on the lines quatrocen-tists of Italy. They were first known as the Monastic Brotherhood of Saint Isidore and later as Nazarenes (q.v.), of whom Over¬ beck was the acknowledged leader. The first important work which they executed was the history of Joseph in the (Casa Zuccara) near the Trinita de'Monti, then occupied by Consul-General Bartholdy. Overbeck painted there the (Selling of Joseph) (1816), the cartoon for which is now in the city museum at Frankfort. He also contributed (The Seven Lean Years) (1851). Five of the frescoes illustrating Tasso's Jerusalem Delivered) in the villa of the Marchioness Massimi are also his work. He decorated with frescoes the church of Santa Maria at Assisi, and among his numerous oil paintings examples are to be found in Saint Martin's Church, Lubeck, the New Picture Gal¬ lery at Munich and the Berlin National Gal¬ lery. The last remarkable pictures which he executed were the (Coronation of the Virgin,* now in the City of Mexico; and 1 Jesus De¬ scending from the Hill of Nazareth,* in the museum of Antwerp. All his work is distin¬ guished by refined drawing, noble composition and a profound spirit of devotion, and these characterize the 40 well-known designs illustrat¬ ing New Testament history, all of which have been engraved, and some of them printed in colors. Among the founders of the German Romantic School of painting Overbeck is the only one who kept unfalteringly to the original program of the Nazarenes. His productions are of rare excellence in the perfection of the grouping, in directness and simplicity of expres¬ sion and a purity of outline which recalls Peru-gina and the earlier style of Raphael. A sin¬ cere religious spirit pervades every conception, and the corporeal is dominated by the spiritual in all his refined ascetic forms and faces. It would seem that his love of the ecclesiastical and monastic type of character, and his enthu¬ siasm for medisevalism, had much influence in his conversion to the Roman Catholic Church (1813). He exercised great influence as pro¬ fessor in the Academy of San Luca at Rome, and his most noted pupils were S. Steinle and

Fuhrich. Consult (Lives > by Atkinson and by Howitt; Dohmes, <Kunst und Kiinstler des 19. Jahrhunderts) (1883-95).

OVERBURY, o'ver-ber-i, Sir Thomas, English_ author : b. Ilmington parish, Warwick¬ shire, 1581 ; d. London, 15 Sept. 1613. He was graduated at Queen's College, Oxford, and was called to the bar of the Middle Temple, and was knighted in 1608, He became adviser to the Earl of Rochester, then Robert Carr, at the court of James I, and provoked the anger of the Countess of Essex by endeavoring to dis¬ suade his friend from marrying her. Rochester had the address to procure the imprisonment of Overbury in the Tower of London, where he was slowly poisoned by secret agents and at the end of the year Rochester married the countess. Three years later it became apparent that there had been foul play in Overbury's death : four subsidiary agents were condemned and exe¬ cuted, but Carr (then Earl of Somerset) and Lady Essex, though convicted and imprisoned until 1621, were finally pardoned. Overbury was highly cultured and was credited by Jon-son with the introduction into court circles of intelligent appreciation of literature and art. His best remembered work is his (Charac¬ ters,) published as an appendix to his poem (A Wife) (1614). Selections from Charac¬ ters y were issued in The Cornhill Booklet for August 1901. His works were edited by Rimbault in 1856.

OVERCOMERS, a name commonly ap¬ plied to a religious society originating in Chi¬ cago i-n the latter part of the 19th century, but now dwelling at Jerusalem, where they style themselves the ((American Colony in Jerusalem.ˆ They have all property in common and have abolished among themselves the institution of marriage. They profess to have discovered the true interpretation of the Bible, by which all nations are to be brought into liberty, righteous¬ ness and love.

OVERFLOW BUG, the carabid beetle (Platynus maculicollis) , common in California. At times its numbers increase at such a rate that it becomes a nuisance, but it is very bene¬ ficial as it destroys

several species more ne¬ farious.

OVERLAND ROUTE, a popular term applied to the route to California as distin¬ guished from the route via the Isthmus of Pan¬ ama. Also a term first used for the route from Europe to India via Egypt, the desert and Suez. It was in contradistinction to the Cape route which was by water only. It became more ap¬ plicable in 1837, when the route was across the European continent by Marseilles; in 1845, when that by Trieste followed; and in 1872, when that via the Mount Cenis tunnel and Brin¬ disi came into use. It also came into use in 1899 for the land route from Victoria, B. C., to the Alaskan gold fields.

OVERLAP. See Unconformity with Overlap.

OVERMAN, Lee Slater, American legis¬ lator: b. Salisbury, N. C., 1854. In 1874 he was graduated at Trinity College, North Carolina; was for some time employed as a teacher; and was private secretary to governors Vance and Jarvis. In 1878 he was admitted to the bar and began his law practice at Salisbury. He was

elected to the lower house of the North Caro¬ lina legislature in 1883, 1887, 1893 and 1900, and was chosen speaker in 1893. He was president of the State Democratic Convention in 1900 and in 1903 was elected to the United States Senate. Senator Overman was reelected in 1909 and 1914; became chairman of the Rules Committee in 1913 and was also active as a member of the Judiciary Committee.

OVERSEAS NEWS SERVICE, a Ger¬ man news association which, in 1917, was pur¬ chased by a syndicate representing the German government and partially merged with the Wolff Bureau, which had also come under the control of the government. See Press Asso¬ ciations and Wolff Agency.

OVERSEERS OF THE POOR, in the

United States, are county officers whose duty is to make provision for the maintenance of the poor of the county. In New York and a few other States this duty devolves upon the county supervisors. In Great Britain overseers are public officers appointed annually in every urban district for the purpose of raising by rate on the inhabitants the sums necessary for the relief of the poor, and applying such sums to their relief. They have been appointed since the time of Queen Elizabeth by the important poor law act then passed. Their appointment must take place on the 25th of March, or within a fortnight thereafter. In urban

districts the justices make the appointments, unless the local government board transfers it to the local coun¬ cil. In London the councils of the metropolitan boroughs act as overseers. Peers, members of Parliament, clergymen, barristers, attorneys, doctors, military and naval officers and others whose avocations require continual personal at¬ tendance are exempt from serving the office. All who are not exempted by some statute and even women are liable to be appointed, and it is an indictable misdemeanor to refuse without good cause to serve when duly appointed. The office is gratuitous, and no person is to be ap¬ pointed overseer who is directly or indirectly concerned in any contract for the supply of any goods, materials or provisions for the workhouse or for the relief of the poor of the district.

OVERSKOU, Thomas, Danish dramatist: b. Copenhagen, 11 Oct. 1798; d. 1873. When only 20 years of age he had become possessed of some dramatic talent and began to play minor parts. In 1842 he retired with a pen¬ sion ; in 1849 he became manager under Her-berg, whom he succeeded in 1856, but in 1858 retired. His first play, (1826,) written in 1826, was a pronounced failure, but his other dramas were of considerable merit and were success¬ fully staged. The most noteworthy of these were (Oestergade og Vestergade) and (Cap-riciosaP He also published (Den danske Skue-plads, i dens Historie, fra dens Begvndelse til vor Tid) (History of the Danish Theatre, 7 vols., 1854-76). His original comedies were published in five volumes (1851-52).

OVERSTONE, Samuel Jones Loyd,

Baron, English financier : b. London, England, 25 Sept. 1796; d. there, 17 Nov. 1883. He was graduated from Cambridge in 1818, entered the banking-house of his father (who had been a Welsh dissenting minister) and became its head

before its consolidation with the London and Westminster Bank. He was a member of Par¬ liament for Hythe in 1819-26 and became a

recognized authority on questions of finance. He strenuously opposed the introduction of limited liability and greatly aided in defeating the proposal for a decimal currency, but did not engage in politics after 1833, when he was defeated as candidate to Parliament for Man¬ chester. He was the author of many valuable tracts on questions of finance, and the Bank Act of 1844 was directly due to the influence of his writings. In 1850 he was created Baron Overstone and Fotheringhay.

OVERT, in law, evident, undisguised ; .an overt act signifies an act which may be clearly proved and was manifestly intended. The mere contemplation of or intention to commit a crime is not an act amenable to human laws ; but the moment an overt act is manifest the person so acting is amenable to the laws. In the United States two witnesses must bear testimony to the same overt act or a confession be made in open court in order to secure conviction.

OVERTHRUST. See Fault.

OVERTON, James Bertram, American plant physiologist : b. Richmond, Mich., 23 Dec. 1869. He was graduated at the University of Michigan in 1894 and in 1901 took the degree of D.Ph. at the University of Chicago. In 1894-95 he was assistant principal of the high school at Black River Falls, Wis., in 1894—95 senior master in mathematics at Saint John's Military Academy, Delafield, Wis., in 1895-98 and in 1901 assistant in botany at the University of Chicago. From 1901 to 1904 Mr. Overton was professor of biology at Illinois College ; in 1904-07 was instructor in botany; in 1907-12 assistant professor; in 1912-15 associate pro¬ fessor of plant physiology, and after 1915 pro¬ fessor at the University of Wisconsin. He is member of several scientific societies, American and foreign.

OVERTON, John Henry, English Angli¬ can Church historian : b. Louth, Lincolnshire, 4 Jan. 1835; d. Gumley, Lincolnshire, 17 Sept. 1903. He was educated at Lincoln College, Oxford, took orders in the English Church and was curate of Quedgeley 1858-60; vicar of Legbourne 1866-83 ; rector of Epworth 1883-99; and rector of Gumley from 1898. He be¬ came canon of Lincoln Cathedral in 1879; canon of Peterborough in 1903, and was Birkeck lec¬ turer on ecclesiastical history at Trinity College, Cambridge, 1902-03. He was the author of (The English Church in the 18th Century5 with C. J. Abbey; (William Law: Non-juror and Mystic ; (Life in the English Church 1660-17145 ; (Life of Christopher Wordsworth, Bishop of Lincoln5 ; (Evangebcal Revival in the 18th Century5 ; (John Wesley5 ; (The Eng¬ lish Church in the 19th Century 1880-1833 5 ; (The Anglican Revival5 ; (The

Noniurors5 ; and (posthumously) (Some Post-Reformation Saints5 ; and (History of the English Church from the Accession of George I to the End of the 18th century.5

OVERTON, Richard, a Brtish pamphle¬ teer flourishing in the first half of the 17th century, probably from about 1630-65. He spont part of his earlv life in Holland, but upon his return about the time when the Long Parlia¬

ment opened commenced publishing anonymous attacks on the bishops. He next turned to the¬ ology and wrote a tract on (Man's Mortality,5 which excited much comment, and soon follow¬ ing the publication of this tract a small sect arose known as ((Soul Sleepers,55 who adopted a modified form of his doctrines as portrayed in this tract. This was suppressed by the House of Commons and Overton branded a heretic. He then began a violerft attack on the clergy in a series of pamphlets for which he was arrested, but his authorship could not be proven and the charge against him dropped. In 1646 he became involved with Lilburne in his case against the Lords and was imprisoned, but found support in the army and after a year of con¬ finement was released. His imprisonment had not diminished his democratic zeal, for he at once took up with the London levelers and was one of those who presented to Fairfax the (Plea for Common Right and Freedom.5 On 28 March 1649 he was again arrested and sent to the Tower, and even while there managed to issue a (Defiance 5 to the government, but through lack of sufficient evidence he was re¬ leased on 8 November. In 1655 he became im¬ plicated in the projected uprising of the level¬ ers, fled to France, obtained a commission from Charles II, and some months later re¬ turned to England to bring about an insurrec¬ tion. Of his later history little is known except that he was imprisoned in December 1659 and again on 22 Oct. 1663, probably for attacks on the government of Charles II. The most im¬ portant of his numerous works are (New Lam¬ beth Fair Newly Consecrated, etc.5 (1642) ;

* Articles of High Treason Exhibited Against Cheanside Cross5 (1642) ; (Man's Mortality5 (1643) ; (The Arraignment of Mr. Persecution5 (1645) ; (An Alarum to the House of Lords5 (1646) ; (The Outcries of the Oppressed Com¬ mons5 (1647) ; (A Picture of the Council of State5 (1649) ; (Overton's Defiance of Act of Pardon5 (1649) ; (The Baiting of the Great Bull of Bashan5 (1649), *etc.*

OVERTURE, in music, an introductory symphony, chiefly used to

precede great musical compositions, as oratorios and operas. The Germans have composed overtures for poetical works, as Beethoven's overture to Goethe's (Eg-mont.5 Overtures are often played independ¬ ently of the work for which they were written, as at the beginning of concerts ; but their highest office is to convey to the intelligent lover of music the whole character of the following piece or to concentrate its chief musical ideas so as to give a sort of outline of it in instrumental music. The latter mode of composing overtures was first conceived by the French, and such is the character of the overtures of their great composers, among whom may be classed Cheru¬ bini. Carl Maria von Weber, in the overtures to the (Freiachutz5 and (Oberon,5 in which the general character of the following piece is given, has observed this rule, which did not exist when Mozart composed his admirable overtures to (Figaro5 and (Don Juan.5 In the oldest overtures the fugue was the chief part, preceded by a grave and closing in the domi¬ nant. Another form came into vogue at a later period — three musical parts, in different move¬ ments — an aJIegro. an andante and again an allegro or presto, were united. At present the

most usual form is a brilliant and passionate allegro, preceded by a short, solemn passage. See also Prelude.

OVID, Publius O vidius Naso, Roman poet: b. Sulmo (Sulmona), high among the Apennines, almost due east of Rome, 20 March 43 b.c. ; d. Tomi (Kustendje), on the Black Sea, south of the mouth of the Danube, 17 or 18 a.d. His family belonged to the class of wealthy landowners, and he and his brother, who died, however, in early manhood, were edu¬ cated, as was usual, for an official career. In the short sketch of his life given in <Tristia,) iv, 10, he tells us that, despite his best efforts, all that he wrote took metrical form, and al¬ though, to please his father, he persevered and actually filled several minor offices, poetry soon claimed him for her own. Twice married and soon divorced, he took as his third wife a lady of the great Fabian house, who remained faith¬ ful to him in his exile, though neither she nor his daughter shared it with him His own gifted and winning personality,

coupled with an ungrudging admiration of the genius of others, won for him the friendship of all the poets of his time, especially of Propertius, and of Tibul¬ lus, whose untimely death he laments in one of his few poems of true pathos OAmoresF iii, 9). With the poet Hhnilius Macer, Virgil's friend, he spent more than a year abroad, visit¬ ing Athens, the famous coast towns of Asia Minor, and especially Sicily, by whose beautiful scenery and legendary associations he was com¬ pletely captivated. His works show the in¬ fluence of his travels, though most of the material is supplied by his multifarious reading.

During the reign of Augustus, Rome became for the first time a really imperial city, and the external splendor of the capital was matched by the distinction of its fashionable society. All the arts of life were called into play to lend a finer polish and a keener zest to social inter¬ course. Wit and good manners took the place of religion and morality. Of this gay and cul¬ tivated society, with its worship of the senses, its cynical worldly wisdom and its love of bril¬ liant rhetoric, Ovid is a typical member. In the first period of his literary activity he treats almost exclusively of love, regarded always as desire, never, at least on the part of the man, as devotion. To this time belong: (1) <Amores,) in three 'books, poems for the most part asso¬ ciated with a certain Corinna. (2) 'Heroides,* 21 love letters written by women of the Heroic Age. The first 15 are to their husbands or lovers. The last six — Paris to Helen, Leander to Hero, Acontius to Cydippe and the replies in each case — are now regarded as probably Ovidian though their authorship has long been a matter of dispute. (3) (De Medicamine Faciei, } on the beautifying of the face. (4) (Ars AmatoriaP in three books, regarded by Macaulay as Ovid's greatest and most char¬ acteristic work. ((Perhaps the most immoral poem ever written.® (5) (Remedia Amorist a companion to the 'Ars,* but in no way com¬ parable with it. He wrote also a tragedv, 'Medea,* much praised by ancient critics, which has not come down to us.

About the beginning of the Christian era he undertook the composition of two works of far wider scope and somewhat different character, the (Metamorphoses) and the 'Fasti.* The first of these, in 15 books, is deservedly his

best-known work. The stories of the Greek mythology, involving an amazing variety of transformations from primaeval chaos to the change of Julius Caesar into a star, are retold with inimitable grace and liveliness, and most ingeniously linked together, like the tales of

(The Arabian Nights,* into an unbroken series. The book has had an immense influence upon modern literature in England notably on Mar¬ lowe, Spenser, Shakespeare, Milton and Dryden, and was a storehouse of subjects for the painters of the Renaissance. The (Fasti, * originally in 12 books, of which, however, the last six were never completed and published, is an account of the astronomical phenomena and the Roman festivals of the first six months of the year. The inquiry into the origin of the feasts and their ceremonies gives occasion for some entertaining stories from Roman my¬ thology and early history.

Ovid was still engaged upon these works when, toward the end of the year 8 a.d., an im¬ perial edict ordered him to leave Rome on a specified day and proceed to Tomi, on the deso¬ late shores of the Euxine. His books were ex¬ cluded from the three public libraries of Rome, and, while his property was not confiscated, no hope of recall was held out. The reason for his banishment is still a mystery. In the poems of exile, Ovid repeatedly ascribes his fate to two causes, his poetry (carmen) especially the (Ars Amatoria,* and a “mistake® {error) not ((guilt®

(scelus), for which his eyes were responsible. But he steadilv refuses, to state the nature of this error, on the ground that he is unwilling to pain Augustus a second time. The (Art of Love,* which had been published nearly 10 years before, while it may well have been the ultimate cause, could hardly have been the act¬ ual occasion of the edict, and it has been thought not improbable that he was involved in the in¬ trigue of the younger Julia, the emperor’s granddaughter, with Silanus, a scandal which was coincident with Ovid’s ruin. He wrote at Tomi c Ibis, } a learned invective against an enemy at Rome, and a fragment of a poem on fish, ‘Halieutica,* also eulogies of Augustus and Tiberius which have not come down to us. The loss of the poem on Augustus is especially to be regretted, as it was written in the native Getic dialect. But the two important produc¬ tions of these melancholy years are the five books of (Tristia) and the four books of ‘Epistulae ex Ponto.* These elegies are ad¬ dressed to his wife, to his friends, to Augustus, and give expression to the poignant sorrows of his present lot and his passionate longing for home. Boissier calls his appeals to Augustus a ((delire d’adulation.® But it was all in vain, and he died a few years after the accession of Tiberius, broken hearted, though much be¬ loved bv the people of Tomi.

Ovid’s work is characterized by remarkable smoothness and variety of expression, by the liveliest fancy, and a positive genius for graphic description, but he wrote with too great facil¬ ity to learn the lesson

of self-restraint. Never¬ theless he is an incomparable story teller, and would to-day be famous for his mastery of the technic of the short story. With the exception of the ‘Metamorphoses* and the ‘Hab’eutica* which are written in hexameters, all his poetry is cast in the form of the elegiac distich, and this he brought to such perfection

that the Ovidian couplet became the model for all modern work in this measure. See Metamorphoses.

Bibliography. — The best text is that of Merkel, revised by Ehwald (Leipzig 1889-94). The <Amores) were translated into English verse by Christopher Marlowe and (in part) by Dryden, the (Ars Amatoria) (in part) by Congreve and by Dryden, the (Heroides) (in part) by Dryden, Book I of the (Tristia) by Arden (New York 1821), *Palmer’s edition of the (Heroides) with the Greek translation and commentary of Planudes was, issued in 1898. Garth gathered into one volume (1st ed., Lon¬ don 1810) versions of the (Metamorphoses) by various hands, Dryden, Addison, Congreve, Pope, Rowe, Gay and others, including himself. Golding’s famous translation first published 1567, was reprinted in London 1904. Two ex¬ cellent translations have recently appeared in the Loeb Classical Library, (Heroides and Amores) by Showerman (New York 1914) and (Metamorphoses) by Miller (2 vols., 1916). Consult Nageotte, (Ovide, sa vie, ses ceuvres) (Dijon 1872) ; Sellar, ‘Horace and the Elegiac Poets) (Oxford 1892) ; Boissier, (L’Opposition sous les Cesars* (Paris 1892) ; Lafaye, (Les Meta¬ morphoses d’Ovide et leur modeles grecs) (Paris 1904) ; Butler, (Post-Augustan Poetry* (Oxford 1909) ; Rand, (Ovid and the Spirit of Metamorphosis* (in ‘Harvard Essays on Class¬ ical Subjects, * Boston 1912).

Nelson G. McCrea,

Anthon Professor of the Latin Language and Literature, Columbia University.

OVIEDO, o-ve-a’tho, Juan Antonio, South American clergyman: b. New Granada, 25 June 1670; d. Mexico City, 2 April 1757. He was

graduated from the University of Guatemala and shortly afterward became professor of philosophy there; then for some time taught philosophy in Mexico and theology in Guate¬ mala ; became procurator at Rome and Madrid ; then was appointed rector of Mexico and was twice provincial of the Jesuits of Mexico. His writings are mainly historico-religious, dealing mostly with the ecclesiastical history of Mexico and California.

OVIEDO, Spain, (1) a town in the As¬ turias, capital of a province of the same i.ame, 230 miles northwest of Madrid. It is walled, and has clean but irregular, streets. The Gothic cathedral (a part of which dates from the 9th century), university with 900 students, meteorological observatory, courthouse and hos¬ pital are the chief buildings. There are manu¬ factures of firearms, explosives and ordnance. In 1809 Oviedo was given up to pillage for three days by Ney. Pop. about 53,269. (2)

The province, area, 4,205 square miles, is situ¬ ated on the Bay of Biscay, and bounded by the provinces of Santander, Leon and Lugo. It has a wild and stormy coast, and a mountainous interior better adapted for pasture than agri¬ culture. Great numbers of cattle, goats and swine are raised and its horses are celebrated; linens, woolens, leather, etc., are manufactured, and coal is exported. Pop. 706,816.

OVIEDO Y VALDEZ, e val-dath', Gonzalo Fernandez de, Spanish historian: b. Madrid, 1478; d. Valadolid, 1557. In 1513 he received a government appointment in the newly-

discovered island of Hispaniola, and with few intervals spent the rest of his life there. Named by Charles V historiographer of the Indies, he wrote his 'Sumario de la Historia General y Natural de las Indias Occidentales) (1535 et seq. in 21 volumes). He wrote also <Quinqua-genas,* so entitled from its consisting of 50 dialogues, in which the author is the chief in¬ terlocutor, and fragmentary chronicles of Ferdi¬ nand and Isabel and Charles V. Much other work of his is still in manuscript.

OVIPAROUS ANIMALS are those that produce their young by eggs hatched after ex¬ clusion from the body of the parent, the de¬ velopment of the embryo thus not taking place within the parent's body. Except the mammalia, all animals are either oviparous or ovovivipa-rous ; the latter mode — not essentiallv different from the former — being comparatively rare. Even those invertebrate animals

which multi¬ ply by gemmation and division have also a true reproduction by ova.

OVIPOSITOR, an organ developed in relation to the orifice of the genital ducts of female insects, whose normal function is to place the fertilized egg in a position most suit¬ able to its proper development. When typically developed the ovipositor consists of three pairs of stiff or membranous unjointed styles or gonapophyses, of which the anterior or lower¬ most closely ensheathes the other two. The three pairs together form a tube into the base of which the oviduct opens and along which the eggs are conducted to the situation selected for their deposition. The homology of these styles is not fully settled, but the generally accepted and best supported view is that they represent the embryonic appendages of the seventh, eighth and ninth abdominal segments, from which they are directly developed in at least some cases. In the entire orders of Lepidoptera, Coleop-tera and Diptera, as well as in many representa¬ tives of other orders, no true ovipositor is developed. In such cases the terminal segments of the abdomen may form a retractile and pro¬ tractile tube serving as an egg-conductor. The Orthoptera, Odonata, Hymenoptera and Hem-iptera exhibit the organ in its highest state of development, and variously modified to meet various conditions. In the locusts it has the form of a stout sickle-blade, permanently ex-serted, and efficient in splitting plant tissues for the reception of the eggs. The sawflies have the margin of the outer sheath serrated for cutting slits into leaves, etc., while the cicades com¬ pletely shatter twigs by the power of their ovipositors. Some of the ichneumon flies (q.v.) have ovipositors remarkably adapted to their parasitic habits ; in the long-tailed ichneumon-fly, for example, the organ is filamentous and so long and powerful that it is capable of pene¬ trating the solid wood of tree trunks to a depth of several inches, reaching and depositing eggs within the burrows of woodborers on which the ichneumon-fly larvae subsist.

The most remarkable of all modifications of the ovipositor, however, is found among the ants, bees and wasps, in most of which it be¬ comes a most efficient and beautifully con¬ structed poisoning apparatus or sting, which consequently is possessed by the females alone. The sting, like other ovipositors, consists of three pairs of styles, but the middle pair are

united into a single barbed piece grooved on the ventral side, and partly ensheathing the inner pair of very acute piercing darts. The outer pair form a protecting sheath to the sting proper. Within the abdomen is a tubular venom gland, with a reservoir and duct opening into the base of the grooved piece. When in opera¬ tion the latter and the two darts work alter¬ nately in and out, penetrating deeper and deeper into the wound into which they conduct the venom. The male genital armature of in¬ sects is derived from essentially the same embryonic parts as the ovipositor and sting of the female, but never reaches the same struc¬ tural complexity and serves solely as a clasp¬ ing organ during copulation. Consult Packard, (Textbook of Entomology } (1898).

OVIS, a genus of the family Bovidce and subfamily Ovince, including the sheep (q.v.).

OVULE, an outgrowth of the carpel of a plant where, by fertilization with pollen, a seed is formed. It is the homologue of the macro¬ sporangium of the pteridophytes (see Ferns and Fern Allies), and contains the embryo-sac or macrospore. The ovule con¬ sists of the nucellus, which is surrounded by one or two integuments, and is attached to the carpel by a stalk known as the funiculus, at a place called a plasenta. If the nucellus and funiculus are in a line, the ovule is atropous; if the nucellus is bent back on the funiculus it is anatropous ; and if the nucellus is itself bent the ovule is compylotropous. The ovules are always enclosed among the angiosperms in the cavity of the ovary, or seed-producing organ. They are developed as a rule from the margin of the carpels, but several exceptional modes of development exist. The gymnosperms (q.v.) have no ovaries. See Seed.

OVUM, an egg. See Embryology; Egg.

OWARI, o-wa’re, or BISHIU, be’shoo, Japan, a densely peopled province of the empire, on the island of Hondo, south of Mino, west of Mikawa, east of Omi and Ise. Owari Bay lies on its southern border. The soil is very fertile and the province produces vast quantities of clay suitable for all grades of pottery and chinaware. Seto, near the capital, Nagoya, was the original home of ceramic art in Japan, be¬ ing introduced thither from China in the 13th century. Enameling is also an important in¬ dustry of the province.

OWATONNA, o-wa-ton'na, Minn., city, county-seat of Steele County, on the Straight River and on the Chicago and North Western; Chicago, Rock Island and Pacific and the Chicago, Milwaukee and Saint Paul railroads; about 65 miles south of Saint Paul. It was settled in 1855 and incorporated in 1865. It is in an agricultural region in which corn, wheat and nursery stock are important products. The chief manufactures are dairy products, flour, foundry and machine-shop products, soap, butter tubs, churns, automobiles, carriages, seeders, engines and fanning mills. The prominent buildings are the courthouse, two opera-houses, city hospital, the church and school buildings. There are three parks, four steel bridges and a large number of fine resi¬ dences. The educational institutions are the State School for Dependent and Neglected Children, the Pillsbury Academy, Sacred Heart

Academy, public and parish schools and a pub¬ lic library which contains several thousand volumes. The government is vested in a mayor who holds office two years and a council. The city owns and operates the waterworks. Pop.

(1920) 7,252.

OWEGO, o-we'go, N. Y. (((place where the valley opens"), village, county-seat of Tioga County, on the Susquehanna River at the mouth of the Owego Creek, and on the Delaware, Lackawanna and Western, the Lehigh Valley and the Erie railroads, about 30 miles east ot Elmira and 20 miles west of Binghamton. It was settled in 1785 by James and Robert McMasters and others. It was chartered as a village in 1827. An Indian village, on the site of the present Owego, was destroyed by Gen¬ eral Clinton in 1779. It is in a farming section, but has considerable manufacturing interests. It contains steel bridge works, mica works, leather glove factory, wagon works, cigar fac¬ tory, saddlery, silk glove factory, piano factory and other manufacturing industries. Owego has considerable trade in lumber, farm products and in its own manufactures. The educational institutions are the Owego Free Academy, union and graded schools, one parish school and the Coburn Free Library. There are seven churches. The three banks have a capital of over $200,000; the an¬ nual business exceeds $800,000. The govern¬ ment is vested in a president and six trustees; three of the trustees are chosen each year by popular vote. It is also a favorite summer resort. There is a colored population of about 10 per

cent of the whole. Pop. 4,147.

OWEN, o'en, David Dale, American geolo¬ gist : b. New Lanark, Scotland, 24 June 1807; d. New Harmony, Ind., 13 Nov. 1860. He was educated at Hofwyl, Switzerland, and accom¬ panied one of his brothers in 1827 to the United States, his father being the author of the socialistic undertaking at New Harmony. He made a special study of geology and natural science, and his investigations took him over a large portion of Indiana and Iowa. He made a government geological survey of Iowa, Wis¬ consin and Minnesota, beginning in 1848, and 1852-57 was engaged in a geological survey of Kentucky. He was appointed State geologist of Kansas in 1857-59. Among his publications are reports of his surveys of Indiana and Arkansas (1858-60).

OWEN, Sir Douglas, English barrister : b. 1850. He received a private education and also attended King's College School. He ac¬ quired an international reputation as an ex¬ pert on maritime insurance and transportation ; he has served on many government committees in connection with maritime affairs, and lectured at the London School of Economics and the Royal Naval War colleges. In 1914 he became chairman of the Advisory Committee of the State War Risks Insurance Office. He was knighted in 1915. His publications are (Digest of the Law of Marine Insurance) ; declaration of War; a Survey of the Position of Bel¬ ligerents and Neutrals in Maritime War} ; (Ocean Trade and Shipping) ; 'London, the Port of the Empire* ; 'Ports and Docks.*

OWEN, John, English epigrammatist: b. Llanarmon, Wales, 1560; d. 1622. He re-

ceived his education at Winchester School and at Oxford; became Fellow of New College in 1584 and in 1591-94 taught at Trelleck in Mon¬ mouthshire. He was made headmaster of the new free school at Warwick in 1594. Owen is but remembered for his Latin epigrams. Con¬ sult the collection (Johannis Audoeni Epigram-matum Libri

Tres) (1606) and the English translations of Hayman (1628); Harflete (1658); Peck (1659); Harvey (1678) and the French of Renouard (Paris 1794).

OWEN, John, English Non-Conformist clergyman : b. Stadhampton, Oxfordshire, Eng¬ land, 1616; d. Ealing, Middlesex, England, 24 Aug. 1683. He was educated at Oxford Which he left rather than submit to Land's new stat¬ utes and early espoused the Parliamentary cause in the Civil War. In 1642-46 he was pastor at Fordham, Essex, from which he was ejected; and in the latter year took charge of a Presby¬ terian congregation at Coggeshall, Essex, and there introduced independent church govern¬ ment. He was appointed private chaplain to Cromwell in 1649, and in 1651 was dean of Christ Church, Oxford, where he was vice-chancellor of the university in 1652-57. Losing favor with Cromwell, he was removed from his office as dean in 1660, and though offered a parish in Boston, Mass., in 1663, and the presidency of Harvard College in 1670, declined both and was pastor of an independent church in London. In spite of the act of uniformity, he was tolerated and his preaching permitted. He devoted much time to literary work. He was a stout champion of the fullest religious liberty, and one of the most celebrated of Puritan, divines. His most notable work was an Exposition of the Epistle to the Hebrews 5 (1668-84). His collected works were published in Edinburgh in 1850-55 and in Philadelphia in 1865-69. Consult (Life) by W. Orme (1820) and Moffatt, (The Golden Book of John Owen5

(1904).

OWEN, Mary Alicia, American author : b. Saint Joseph, Mo., 29 Jan. 1858. She was educated at private schools and at Vassar Col¬ lege and turned her attention to the study of Indian lore; her discoveries in Voodoo magic were important and she was admitted to tribal membership with the Indians and to their secret societies. She also made a study of the gypsies, and published (Voodoo Tales) ; (Oracles and Witches5 ; (FolkLore of the Musquakie Indians> ; (Prairie Tribes of the Algonquin Indians5 ; (The Sacred Council Hills> ; (Rain Gods of the American Indians) ; besides deliv¬ ering many lectures on these subjects. She is president of the Missouri FolkLore Society and a distinguished member of other folklore and scientific societies.

OWEN, Sir Richard, English naturalist : b. Lancaster, 20 July 1804; d. Richmond Park, 18 Dec. 1892. He studied at the University of Edinburgh, began practice in London as a surgeon in 1826, became

lecturer in comparative anatomy at Saint Bartholomew's Hospital in 1829, later was conservator of the Hunterian Museum of the Royal College of Surgeons until 1856, and in 1836—56 was first Hunterian pro¬ fessor of comparative anatomy and physiology. In 1838 he received the Wollaston gold medal of the Geological Society and in 1840 became the first president of the Microscopical Society.

From 1856 to 1883 he was superintendent of the natural history collections of the British Mu¬ seum. In 1887 he obtained the removal of these collections from the museum and their estab¬ lishment at South Kensington as a museum of natural history. He was the first Rede lecturer at Cambridge in 1859, and received numerous foreign distinctions, including the decorations of many orders and the Cuvier prize (1857). In 1857 he assisted David Livingstone (q.v.) in the preparation of the latter's (Missionary Travels and Researches in South Africa, 5 and in 1861 published an edition of the posthumous papers of John Hunter. Among the more im¬ portant of his own works were (Odontography 5 (1840-45) ; Comparative Anatomy and Physi¬ ology of Invertebrates) (1843) ; Eritish Fossil Mammals and Birds) (1846) ; (On the Anatomy of Invertebrates 5 (1 866—68) ; Eossil Remains of Extinct Mammals of Australia) (1877-8) ; Ex¬ tinct Wingless Birds of New Zealand5 (1879) ; and Experimental Physiology5 (1892). By 1856 he had won recognition as the leading anatomist and palaeontologist of his time. He was created K.C.B. in 1854. His scientific labors were extensive and continuous, and he was an active and often bitter controversialist. He was with Cuvier a pioneer in vertebrate palaeontology, and made to the study many im¬ portant contributions, including prominently a paper on (Archaeopteryx 5 (1863). His discov¬ eries also were numerous. He was among the first to work toward a concise nomenclature in anatomy and to originate the theory of germ plasm. Consult Eife5 by his grandson (1894).

OWEN, Robert, English socialist: b. New¬ town, Montgomeryshire, North Wales, 14 May 1771 ; d. there, 17 Nov. 1858. He established a small cotton-spinning works at Manchester, and later became known as a successful manager of large mills, and was the first to use Sea Island cotton. In 1794—95 he organized the Chorlton Twist Company, which operated the New Lanark mills, near the falls of Clyde, founded by his father-in-law, David Dale. There were 1,300 employees at the latter, nearly 500 being pauper children. As illustrating the thoroughgoing nature of the social experiment here made, in 1806, during the American em¬ bargo, the mills were stopped for four

months, but the employees were paid full wages. In 1814 a new company was established to operate the mills, as the old partners were hostile to Owen's social schemes. This included the names of William Allen, Joseph Fox, Jeremy Bentham and other noted philanthropists and retormers, and was organized on the principle ((that all profits beyond 5 per cent per annum on the capital invested shall be laid aside for the religious, educational and moral improve¬ ment of the workers and of the community at large.55 The employment of young children was stopped,, a new system of education estab¬ lished, the houses improved and insurance funds established; and the community of New Lanark became noted for the prosperity of its people. In 1813 Owen published (New Views of Society, or Essays upon the Formation of Human Character,5 and in 1826-44 a (Book of the New Moral World,5 in which he advanced and developed his socialistic views, insisting unon an absolute equality among men. In 1817 he presented a report to a Parliamentary

committee on the causes of poverty and means of avoiding it. In 1829 he gave up the man¬ agement of the Lanark Mills, and devoted his time and entire fortune to the propagation of his socialistic doctrines. He set up two social communities on his own plan, one at Orbiston in Lanarkshire, another at New Harmony, Ind. (1824-28). They proved signal failures, the latter costing him $200,000. In his later years he became a believer in Spiritualism. He is re¬ garded as the founder of infant schools and of Socialism in England ; many of his followers were active in the Chartist movement. His chief conclusions were that there is some¬ thing fundamentally wrong in all religions — a conclusion he first reached when 10 years old ; and that ((of all truths the most important is that the character of man is formed for and not by him."

Consult his own incomplete biography (1857-58) ; Holyoake, (Life and Last Days of Robert Owen5 (1871) ; Jones, (Life, Times and Labours of Robert Owen5 (1890) ; Podmore, (Life of Owen5 (1906).

OWEN, Robert Dale, American social re¬ former: b. Glasgow,

Scotland, 9 Nov. 1801; d. Lake George, 17 June 1877. He came to the United States in 1824 with Robert Owen (q.v). In 1826 he received from Fanny Wright 860 acres of unimproved land at Nashoba, near Memphis, Tenn., for the purpose of establishing under white direction a settlement of liberated negroes. This scheme failed. In 1827 he es¬ tablished at New York with Fanny Wright The Free Inquirer , a socialistic, agnostic and Malthusian publication. In 1832 he returned to Indiana, where in 1835 he was elected to the legislature as a Democrat. He was chosen to Congress in 1843 and 1845. A measure con¬ cerning the Oregon boundary, introduced by him in 1844, became the basis of the settlement of 1846. He was prominent in the founding of the Smithsonian Institution (1845) and in the remodeling of the Indiana constitution (1850). In 1853 he was made charge d'affaires at Na¬ ples, in 1855 Minister. After his return (1858) he was active as an abolitionist. He was, at least in later days, a firm believer in Spiritual¬ ism, and in this connection were written some of his most interesting works, such as, foot¬ prints on the Boundary of Another World5 (1859), and (Debatable Land between this World and the Next5 (1872). Others of his writings are (The Personality of God and the Authority of the Bible5 (1832), and (Pocahon¬ tas : A Drama5 (1837); ˆThreading My Way5 (1874), an autobiography covering the first 27 years of his career.

OWEN, Robert Latham, American lawyer and legislator: b. Lynchburg, Va., 6 Feb. 1856. Senator Owen began his career as a teacher in the Cherokee Orphan Asylum, but studied law and began practice in 1880. From 1881 to 1884 he was secretary of the board of education of the Cherokee Nation; and was. owner and editor of the Indian Chieftain in 1884, and United States Indian Agent for the First Civil¬ ized Tribes, in 1885 to 1889. He organized the First National Bank of Muskogee, and was its president from 1890 to 1900, being also inter¬ ested in banking, farming and cattle. He re¬ covered from the United States government nearly $9,000,000 for Choctaws, Chicasaws and

Cherokees. He was a member of the Demo¬ cratic National Committee from 1892 to 1896. When Oklahoma was admitted to the Union Mr. Owen was elected United States senator from that State for the terms 1907-13 and 1913— 19; reelected in the latter year. He became chairman of the Committee on Banking and Currency in 1913, and was one of the framers of the Federal Reserve Act.

OWEN-GLASS CURRENCY BILL,

better known as the Federal Reserve Act, was framed by Senator Robert Latham Owen of Oklahoma and Representative Carter Glass of Virginia in conjunction with Secretary of the Treasury McAdoo. The bill was introduced in both the Senate and the House on 27 June 1913. It passed the House 19 Sept. 1913, and the Senate, with amendments, 20 Dec. 1913 ; and was then sent to conference. It was thence reported with some changes back to the Con¬ gress, and was passed finally by the House 23 Dec. 1913, and by the Senate the following day; the President signing it immediately.

OWEN MEREDITH. See Lytton, Ed¬ ward Robert Bulwer.

OWEN SOUND, Canada, town and county-seat of Gray County, Ontario, a port of entry at the mouth of Sydenham River, and at the head of its estuary (12 miles long) called Owen Sound, an outlet on Georgian Bay, Lake Huron. It is a terminal of branches of the Grand Trunk and Canadian Pacific railways, 122 miles northwest of Toronto, has one of the best harbors on the lakes, a dry dock, a large trade in grain and lumber and steamboat com¬ munication with all the principal lake ports. It has manufactures of agricultural and mill machinery, sewing machines, cement, bolts and screws and furniture, and lumber and flour mills, and large grain elevators. There are high and public schools and a library. Power is obtained from Eugenia Falls. Pop. 12,559. A United States consular agent is resident.

OWENS, o'enz, John Edward, American actor: b. Liverpool, England, 4 May 1824; d. near Towson, Md., 6 Dec. 1886. He made his first appearance as an actor in Philadelphia in 1841. In 1849 he was manager of the Baltimore Museum, and in 1852 opened Brougham's Ly¬ ceum in New York; later, manager of the Charles Street Theatre in Baltimore and after¬ ward starred successfully for several seasons. In 1864—65 he played at Wallack's Theatre, New York, in (Solon Shingle,5 and in London. He starred in various stock companies and in 1882-83 made his last engagement in New York at Madison Square Theatre in (Esmeralda. 5

OWENS COLLEGE, Manchester, Eng¬ land, was established under the will of John Owens, a Manchester merchant, who died July 1846, and left about $500,000 for the purpose of founding an institution for providing or aiding the means of instructing youths over 14 years of age, in such branches of learning and science as are now or may be hereafter taught in the English universities, subject to the im¬ mutable condition that no student, professor, etc., shall be required to make

any declaration or submit to any test of their religious opinions, and that theological and religious subjects shall form no part of the teaching of the college. From 1851 to 1873 the college occupied a private

house, when it removed to a handsome Gothic building erected by public subscription. The success of the college led to a proposition, which received considerable ecclesiastical op¬ position, to incorporate a university, with several affiliated colleges located in different towns, but having its seat in Manchester. In 1880 Victoria University was instituted by royal charter, with power to grant degrees in arts, sciences and law, a supplemental charter, granted May 1883, giving power to grant de¬ grees in medicine. Owens College was incor¬ porated with Victoria University in 1904. Uni¬ versity College, Liverpool, was incorporated with Victoria University from 1884 to 1903, and the Yorkshire College, Leeds, from 1887 to 1904. A women's college, under the direction of the professors of Owens College, is also affiliated, and Victoria University grants degrees or cer¬ tificates to women. See Manchester Uni¬ versity.

OWENS LAKE, a lake in Inyo County, southeastern California, east of Mount Whit¬ ney of the Sierra Nevadas, 18 miles long and 10 miles wide. It receives the waters of the Owens River (q.v.), but has no visible outlet, and its waters are very salt.

OWENS RIVER, a river of southeastern California, rises in the southern part of Mono County, flows southeast and then south, and empties into Owens Lake (q.v.) ; length, 175 miles. Its course is through a desert valley with the Sierra Nevada on the west and the Inyo Mountains on the east; its volume of water is considerably diminished during the summer season, some of its branches drying up entirely. A branch of the Southern Pacific Railroad parallels it for the.greater part of its course.

OWENSBORO, o'enz-bur-o, Ky., city and county-seat of Daviess County, on the Ohio River, and on the Illinois Central, the Louis¬ ville

and Nashville and the Louisville, Hender¬ son and Saint Louis railroads, about 41 miles southeast of Evansville, Ind. It has steamer connections with all the principal river ports. It is in a farming and stock-raising region, and near are forests, coal and oil fields. In the vicinity are deposits of iron, lead, zinc and fire clay, and stone quarries are nearby. The chief manufactures are tobacco products, alcohol, wagons, carriages, electrical supplies, brick and tile and iron products. It has an extensive trade in tobacco products, coal, farm products, livestock and manufactures. The prominent public buildings are a government building, county courthouse, jail and the high school. Its educational institutions are Saint Francis Acad¬ emy, public and parish schools. The mayor holds office four years. The waterworks and electric-light plant are owned and operated by the city. Pop. (1920) 17.424.

OWL CREEK MOUNTAINS, a small

range of ridges of limestone, granite and schist forming a western extension of Bighorn Moun¬ tains in central Wyoming. They contain gold, copper, gypsum and phosphate. Consult report by N. H. Darton (published by 59th Congress, 1st Session, Doc. No. 219, 1906).

OWL PARROT. See Kakapo.

OWLET MOTHS, a section of the family Noctuidcp , containing small species. The Noc-

tuidce is an immense assemblage of night-flying moths made up of hundreds of genera and thousands of species, and represented in all parts of the world. They are as a rule of less than medium size and of dusky tints, and are closely allied to the tiger-moths (Arctidce), from which they may be distinguished by the subcostal nervure of the hind wing anastomos¬ ing with the radial only near the base of the cell. In the fore wing the fourth and fifth radial nervures fork from the third which is connected by a cross-nervule with the second. The frenulum is present and the first maxillae are well developed. The caterpillars are not hairy as a rule, and 10 prolegs are usually present. The pupa is sometimes naked and subterranean, lying within a rude cell of clay ; sometimes enclosed in a cocoon made partly of leaves, etc., on the surface of the ground.

OWLS, nocturnal birds of prey of the group Striges. The owls form a compact, clearly circumscribed group solidified by many common

characters, but the question of their relationship to other ‘birds is one which ornithologists have found most puzzling. Formerly they were united with the other birds-of-prey, but the raptorial bill and claws, in which the resemblance to the hawks is most striking, may well be only adaptations to simi¬ lar predaceous habits. On the other hand it is equally probable that the soft plumage, highly developed sense-organs, etc., are adaptations to nocturnal activity. As a result of more funda¬ mental anatomical studies systematists now agree in the close relationship of the owls to the night-jars and their kindred (Caprimulgi) as a suborder (Striges), in the order Coraciiformes. This suborder consists of a single family (Strigidce) , including all the owls of the world, and embracing two subfamilies and a great number of species. The very character¬ istic physiognomy of the owls results chiefly from the development about the eyes of areas of radiating feathers, or facial discs, supported by a ruff of peculiar stiff recurved feathers. Frequently the head is ornamented by paired tufts of longer, erectile feathers called horns or ears, though they have nothing whatever to do with the sense of hearing. The general plum¬ age is very soft and fluffy, making noiseless flight possible and giving an exaggerated idea of bulk. The feathers have no aftershaft; and some species, like the snowy owl, have the feet and toes thickly feathered to the claws, giving them a peculiar booted appearance. The head is always remarkably large, and the bill strongly hooked and cered. A peculiarity of the large, strongly clawed feet is the versatility of the outer toe, which may be directed for¬ ward, outward or completely backward and paired with the hallux at will. In correlation with their keen perceptions the sense-organs are greatly developed. The great staring eyes look directly forvvard, and, owing to their form, can rotate but slightly in their sockets, a peculiarity which explains the owl’s habit of following with the head any object at which its gaze is directed. The somewhat cylindrical or truncated conical form of the eye results from the great develop¬ ment of the bony sclerotic or focusing ring. Unlike most birds the upper, and not the lower lid is chiefly employed in closing the eye, which is further protected by a conspicuous nictitating

membrane Although many differences in the degree of its development are presented, owls are almost the only birds that may be said to have an external ear approaching that of mam¬ mals. It is concealed beneath the feathers, but, when best developed, as in the short-eared owl, covers the entire side of the head, and is pro¬ vided with a prominent marginal fold of skin or (<operculum.® In this case the openings are asymmetrical, one being directed upward, the other downward, and in the great gray owl and its immediate allies even the skull bones are asymmetrical. The barn owls are separated from all of the others as a subfamily Strigincz. They have the furculum complete and ankylosed with the sternum, and the latter with an entire posterior margin. The remaining owls (Bubonina) have the furculum free from the sternum and either very thin or incomplete in the middle, and the posterior border of the sternum, notched. Not less than 50 genera and 250 species of owls, varying in size from a spar¬ row nearly to a small eagle, have been described, and many exhibit several color-phases. The group is absolutely cosmopolitan.

Owing to their nocturnal habits, their ways are less well known than those of most birds, but in general are much alike. With the notable exception of such species as the snowy owl and hawk-owl, they seek concealment dur¬ ing the day in dark retreats, but become active after nightfall. Their prey consists of snails, insects, mice, birds, rabbits or even larger animals, according to the size of the species, which, they approach on noiseless wing and usually grasp with one foot, after which it is borne away to a perch and torn to pieces. A few species feed on fishes, and one even on crabs, but none on vegetable matter. Undi¬ gested portions., as bones, hair and hard parts of insects are ejected in pellets from the mouth. Their voices present some variety; some hoot, some whistle, but the cry of many resembles a shrill laugh. Owls breed very early, many of them in late winter, and deposit their nearly spherical, white or whitish, eggs in holes in trees or rocks, in nests deserted by other birds or rudely constructed by themselves on the ground or in trees. One species, the American burrowing owl, nests in communities in or among the burrows of prairie-dogs, but the as¬ sociation does not assume the happy relation sometimes described. The young are interest¬ ing objects, thickly covered with down, usually white.

The mystery surrounding their nocturnal habits and their often lugubrious cries have made owls suitable objects of superstition among all peoples and in all ages. Among the ancients the owl was regarded on the one hand as a portent of dire calamity and its appear¬ ance near a sick chamber an omen of death; on the other, it was the bird of wisdom, the sym¬ bol of the goddess Athene. How deeply

fixed and widely spread is the belief in the owl as an evil omen, is shown by the frequencv of its oc¬ currence in all literatures and folklores. The Hindus have an interesting myth of the crow (night) and the owl (moon), contending for supremacy. Among the American Indians the owl figures in many legends. One told in the Kootenay tribe is to the effect that the wicked owl was in the habit of carrying off crying chil¬ dren. Through trickery it was finally killed

and its body burned by the coyote, but its spirit rose from the ashes as a swarm of blood-suck¬ ing mosquitoes. See the names of various species as Barn Owl, *etc.*

For an account of the numerous species of owls of the United States consult Baird, Brewer and Ridgway, (North American Land Birds* (1874); Newton, (A Dictionary of Birds) (Lon¬ don 1896) ; Bendire, (Life Histories of North American Bird's,* Part I (Washington 1892), and works mentioned under Birds ; and for an¬ cient and mediaeval superstitions Gubernatis, (Zoological Mythology) (1872).

OWNERSHIP is the dominion of a thing real or personal, which one has the right to enjoy and to do with as he pleases, even to spoil or destroy it as far as law permits, except that he is prevented by some agreement or covenant restraining such right. An owner con¬ tinues to have the same right although perform¬ ing no acts of ownership, and although another may perform such acts without his knowledge or against his will ; but an owner may lose his right in a thing if he permit it to remain in the possession of a third person for sufficient time to enable the latter to acquire a title thereto. Any thing or property may be the subject of a joint ownership by two or more persons having an equal right to it. Ownership as applied to one's title to property is the right by which a thing belongs to a particular person to the ex¬ clusion of all others. The foundation of owner¬ ship is possession, but it is not sufficient as against one who can show a better right. Ownership is divided into perfect and imper¬ fect: it is perfect when it is perpetual and when the thing owned is unencumbered with any real right toward any other person than the owner; imperfect when it falls short of this.

OWOSSO, d-wos'6, Mich., city in Shiawas¬ see County, on the Shiawassee River and on the Grand Trunk, Michigan Central and Ann Arbor railroads, about 80 miles west by north of Detroit and 30 miles north by east of Lan¬ sing. It was settled in 1836 by A. L. and B. O. Williams and Elia Comstock and chartered as a city in 1859. It is in a

farming region and has considerable manufacturing interest. The chief industrial establishments are furniture factories, which have about 650 employees ; cas¬ ket factory, 250 employees ; screen door and window factory, 250; car shops, 150; sugar works, 200 ; miscellaneous, about 200 ; and malle¬ able iron products, 400 men. The prominent public buildings are the churches and schools. It has a business college, a Carnegie library, an armory and convention hall. There are eight churches. The three banks have a combined capital of $300,000. It has commission form of government with mayor and two commissioners. The waterworks are owned and operated by the municipality. Pop. 12,575.

OX, a bovine animal; that is, a ruminant of the subfamily Bovina, which includes the typical species of the large family Bovida (q.v.) ; more specifically, an adult castrated male of some domesticated breed. An uncas¬ trated adult male is a <(bull,® a female a <(cow,® a young individual of either sex a <(calf,® a yearling female a (<heifer,** a young castrated male a ((steer** and a bull castrated when mature a ((stag.** The herd collectively is spoken of as ((Gxen** or ((cattle.® Hence, by extension, all

the Bovina; are spoken of as cattle, wild or tame, a list of which follows. The group is characterized by its large size and bulky form and by various minor characteristics, of which the foremost is the roundness, smoothness, hori¬ zontal up-curving growth and comparative shortness of the horns. Like the other sections of the family, antelopes, sheep, goats, etc., oxen are easily recognized but rather difficult to de¬ fine technically. The history of the group be¬ gins, so far as known, in the Lower Pliocene (Siwalik) formations of India. The oxen ap¬ parently originated in that part of the world and reached Europe and North America in the time represented by the Upper Pliocene rocks. In some of the earlier species the females seem to have been hornless ; but the type quickly assumed its proper form and some of those fossil in the Siwalki beds are closely related to our modern domesticated cattle. Europe pos¬ sessed in the Pleistocene, or

period just preced¬ ing the Glacial Period, a widespread, gigantic long-horned species named Bos primigenius and another species (B . br achy cents') with much shorter horns. Both seem to have survived the Glacial Period in sufficient strength to reoccupy the continent after the recession of the ice ; and they constituted the great forest oxen, which Csesar found in his campaigns in Gaul and Ger¬ many and to which, not distinguishing them, he gave the general name urus. Some survived as late, at least, as the reign of Charlemagne, and from them were derived, no doubt, the modern domesticated races of the Western World, possibly with some small and later ad¬ mixture of native Eastern species. These cattle were tall, strong and seem to have differed mainly in the comparative length and shape of the horns ; and there seems no doubt that a remnant of Bos primigenius, nearly, or, as some believe, quite pure, exists in the white cattle preserved in the Chillingham estates in the north of England (see Chillingham White Cattle) ; it is also regarded as certain that the Holstein breed is a direct descendant of this species. The other (short-horned) species has long been extinct, but was apparently the pro¬ genitor of the great body of European domestic cattle, whence have been derived the herds of America, South Africa, Australia and, in fact, all the world except the Orient.

The domestication of cattle began in pre¬ historic times ; and some Asiatic species now extinct may have supplied the stock represented as in the service of the civilized nations of ancient Persia, asia Minor, Syria and Egypt by the early carvings and paintings which have come down to us, but they may have been de¬ rived from one or both of the species above mentioned. They were carried to Carthage and westward and to southern Europe when the civilizations of Greece and the Italian Peninsula arose and some were no doubt gradually taken by Roman settlers into western Europe as fast as it was subjugated, where they would be crossed with the larger, hardier short-horned local races of Gaul. Apparently the native cat¬ tle of the British Isles were of the long-horned (B. primigenius) stock only; but when what now is England was conquered and colonized by the Romans and later by the Saxons, Nor¬ mans, etc., the better short-horned cattle which they brought with them were substituted first in

the south of England and gradually elsewhere, replacing the British long-horns everywhere ex¬ cept in the extreme north, where the red High¬ land cattle perhaps represent them to this day. The Friesian and Holstein breeds of the Netherlands and the semi-wild Spanish cattle are regarded also as nearly direct descendants of these aboriginal

long-horned oxen and from the Spanish stock, transported to South and Cen¬ tral America in the 16th century, came the vast plains-ranging herds of the Argentine pampas, Mexico, Texas and neighboring States. It was not until comparatively recent times that care and improved methods of breeding began to develop in England, northern France and the Netherlands the improved breeds now so dis¬ tinct and valuable for beef or for milking. Most of the early cattle brought to eastern North America seem to have been of the short¬ horned English variety ; and these, keeping pace with European development by intelligent selec¬ tion and the frequent importation of foreign sires of high quality and mingled with the western ˆscrub" cattle, have produced the excel¬ lent varieties now to be seen in the United States and Canada.

Nearest to our domestic cattle are two East Indian species, the gaur and the gayal (qq.v.), which are domesticated to some extent by the people west of the Bay of Bengal. Closely re¬ lated is the banteng (q.v.) of Sumatra. The common humped or Brahman cattle (see Zebu) of India and eastward represent a distinct spe¬ cies, of which no wild herds remain and which has been bred into many distinct varieties, of which one of the most aberrant is the Abyssin¬ ian sanga. The yak (q.v.) of Tibet and the diminutive forest-ox (see Anoa) of Celebes, bring the list of oxen down to the buffalos. Of these (see Buffalo) the East Indian species still exists in wild bands in the jungles of India and the Malayan Peninsula, but has been do¬ mesticated for a very long period and is used as a beast of draft and of burden throughout southeastern Asia and in many parts of tropical Africa. Africa has two native species, neither in domestication. A fourth species inhabits Mindanao, one of the Philippine Islands. The bisons (q.v.), composed of the American bison and the aurochs, neither of which have been domesticated to any practical extent, both of which are extinct except in small protected herds, complete the list of the bovine animals of the world.

Consult standard zoologies, especially the writings of Blanford upon the mammals of India, Persia and Abyssinia; Lydekker, (Oxen, Sheep and Goats of the World* (1898) ; and the authors cited under Bison, Buffalo, *etc.*

Ernest Ingersoll.

OX-BIRD, or OX-EYE. See Dunlin.

OX-BOT, a bot-fly (q.v.) attacking meat cattle; a warble-fly. The well-known ox-bot or breeze-fly of Europe is Hypoderma bovis, and until

about 1890 it was believed by naturalists that the very similar flies prevalent in North America were the same, but it is now known that they belong to a second species (H. lineata) locally known in the southwestern United States as heel-fly. The larvae or warbles are called ˆgrubs** by American stock-raisers, and affected cattle are said to be ˆgrubby.** These and vari¬ ous allied species parasitic upon domestic and

wild animals, and even upon humanity in cer¬ tain tropical regions, constitute the family Gistridce. In the case of the American ox-bot (H. lineata) the flies appear early in spring and haunt feeding cattle, hovering especially about their legs, where they deposit their eggs mainly upon the hairs overhanging the hoofs. The egg is barely visible to the un¬ aided eye, is cigar-shaped and has one end formed into a clasping appendage by which it is attached to the hair. Five or six are placed in a close row on each hair. The cattle lick themselves and gather these eggs upon the tongue, where they hatch, and the maggots make their way into the gullet, where they catch on the walls, force their way through by means of the sharp spines about the head, and nest in the wall-tissues of the throat until they have undergone a molt. They remain here many weeks, then make their way to the skin of the neck and work along beneath it to the back, where during winter the presence is shown by the swelling of the hide over them. There is evidence that some of the larvae, at any rate, bore their way into the skin instead of entering by the gullet. These grubs are nourished by the pus and serum produced about them by their movements. Some weeks later, or toward spring, the maggots reach maturity, molt again, become nearly an inch long and at last force their way out through the skin ; they then drop to the ground, the larval skin dries and stiffens and the maggot within separates itself from this old. integument and turns into a pupa stage, which is speedily completed, allowing the fly to emerge in time to produce a brood before the end of the summer. The knowledge of this life-history was gained only as recently as 1890, mainly through the investigations of Dr. Cooper Curtice; and it is not yet known whether the eggs and young of H. bovis pass through

a similar series of events.

The damage done by ox-bots is very great, and is due to the perforation of hides by the escape of the maggots; loss of milk and beef due to the fretting and often stampeding of the cattle when the flies are laying their eggs ; and general depreciation of the stock. The insect is so uncommon that it may be disregarded east of the Alleghanies ; but it is exceedingly numer¬ ous and troublesome in the Mississippi Valley and Southwestern States, and the cattle there, especially in Texas, betray the greatest terror in the fly season, rushing headlong when a fly ap¬ pears, and if possible dashing into the water and staying there. In addition to the harm to beef and milk caused by the nervousness, ex¬ haustion and interference thus produced, one-half of the hides that reach market from the infested regions show perforation by warbles, and suffer a discount in price which on the average will amount to a third of the value of perfect hides. Consult Bauer, (Monographie der CEstriden) (1863) ; Ealand, E. A., (Insects and Man} (London 1915) ; Howard, (The In¬ sect Book* (1901); Osborn, Hnsects Affecting Domestic Animals) (United States Department of Agriculture, 1896).

OX-BOW LAKES. See Meanders.

OX-EYE, a popular name for several com¬ posite plants. In America the name is most widely applied to Heliopsis , three species of which are distributed from Nova Scotia to

Florida and westward to Arizona. They are perennials which bear abundant yellow flowers in the fall, but are not so popular in gardens as members of the genus Helianthus, the sun¬ flowers. The ox-eyes of Europe are a species of Buphthalmum, which are sometimes grown in America in hardy borders. They have large flower-heads with long yellow rays, and re¬ semble sunflowers. Being showy and of sim¬ plest culture they are worthy a place in gardens. In the New England States the name is given to the black-eyed susan (Rudbeckia hirta), and to the ox-eye daisy (Chrysanthemum leu-canthemum) . See Daisy.

OX-GALL, the bile of the ox, a greenish bitter fluid secreted by the liver of the animal. After being clarified it is suitable for various uses in manufactures and the arts, especially in the mixing of colors for water-color painting, its effect being both to increase their fluidity and to fix them. Another employment is as a cleansing agent in scouring wool, *etc.* It is also used in medicine, either in concentrated mass or

powdered after being dissolved in alcohol and rendered clear, as a stimulant to the flow of bile and as compensation for the lack of the secretion of bile. It is further useful in the form of enemas.

OX-PECKER. See Buffalo-bird.

OX-WARBLE. See Ox-bot.

OXALIC ACID, a dibasic organic acid which takes its name from the occurrence of its acid potassium salt in common sorrel (Oxalis acetosella). The same salt is found in other plants, notably the garden rhubarb, and the free acid is found in the leaves of the sugar beet. Calcium oxalate is common in many varieties of lichens. Oxalic acid is commer¬ cially prepared by heating sawdust, preferably that of the soft woods, with caustic soda and caustic potash by hot air with the addition of steam. The temperature required is about 570° F. At a lower temperature a large proportion of acetic acid is formed. The immediate product is oxalate of soda, which may be ob¬ tained in granular form by digesting the mass with boiling water and evaporating the filtrate. To prepare the acid in the free state, the sodium oxalate is boiled with milk of lime, and the calcium salt so obtained is decomposed with sulphuric acid. The product thus obtained con¬ tains some oxalates, and to get rid of these the crude acid is dissolved in a 10 to 15 per cent dilution of hydrochloric acid, and crystal¬ lized. It is then melted > and recrystallized to remove the hydrochloric acid. Anhydrous oxalic acid may be obtained in the form of octahedral crystals, by allowing a solution of oxalic acid in sulphuric acid to stand for some days. The anhydrous acid has the formula COOH.COOH, or H2C2O4, sublimes at 355° F., forming white needle-like crystals, which grad¬ ually absorb water from the air, falling into powder. The oxalic acid of commerce contains two molecules of water, crystallizes in the mono¬ clinic system and is readily soluble in water and in alcohol. The hydrated crystals give off their water of crystallization when heated to 21 2° F. or when allowed to stand for some weeks over concentrated sulphuric acid. Heated to about 300° F., oxalic acid decomposes with the formation of carbon monoxide, carbon

dioxide, water and formic acid ; a small quantity of oxalic acid also subliming at the same time, without change. When heated with concen¬ trated sulphuric acid, it breaks up into water, carbon monoxide and carbon dioxide, the latter two gases being given off in equal volumes. Solutions of oxalic acid are decomposed in the presence of a bright light, yielding water and carbonic acid. This action may be measurably prevented or retarded by the addition of vary¬ ing proportions of thymol. Oxalic acid forms two series of definite, crystallizable salts, ac¬ cording as one or both of its typical hydrogen atoms are replaced. The neutral oxalate of ammonia is used, in the laboratory, as a reagent for the detection of lime, since it gives, with a salt of calcium, an insoluble, white precipitate of calcium oxalate. Neutral oxalate of potas¬ sium reacts with ferrous sulphate to form a double oxalate of iron and potassium, which possesses powerful reducing properties, and is used as a photographic developer in wet plate processes. The acid oxalate of potassium (also known as salts of lemon, or salts of sorrel) is used for different purposes in the arts. Ow¬ ing to its powerful oxidzing properties oxalic acid itself is used in calico-printing and in indigo dyeing as a ˆdischarge.® It is a constit¬ uent of several important dyestuffs. It is used also in various bleaching processes, especially the bleaching of straw and flax, and in the whitening of leather. In domestic economy it is employed for cleaning and polishing articles of brass and copper, for cleaning woodwork, removing ink stains, *etc.* For these purposes the oxalate and quadroxalate of potassium are equally efficient.

Poisoning by Oxalic Acid. — There is reason to believe that poisoning sometimes re¬ sults from the frequent use of some cheap effervescent drinks in which citric acid is adulterated with oxalic acid. The hydrated crystals bear a close resemblance to Epsom salts, and being sometimes mistaken for them lead to fatal poisoning. Carelessness in domes¬ tic use also may result in poisoning. Oxalic acid is ranked as a corrosive poison, though, if taken in dilute solution, there may be no evi¬ dence of corrosion. The symptoms of this poisoning are heat and severe pain in the mouth, throat and stomach, difficulty in swallowing, a sense of constriction, vomiting — perhaps of blood — muscular cramps, sometimes convul¬ sions, and purging, in some cases attended with blood. The lips, mouth and throat are at first red and swollen, then white. If the poisoning is severe the pulse is small and thready, there is a cold, clammy perspiration, then collapse, and, it may be, death. For treatment, first neutralize the poison by giving milk of lime, with a large excess of slaked lime, chalk, whiting or even whitewash from the wall, if no other form of lime can be obtained ;

then give a purgative dose of castor-oil, allay pain, and give stimulants if signs of collapse be present. Emetics are rarely needed and any liquid other than milk of lime should be sparingly used, if at all.

OXALIC ACID FERMENTATION.

Free oxalic acid is produced as the result of fer¬ mentation by the action of the mould Asper¬ gillus niger upon a nutrient solution containing glucose, at a temperature of 60° to 70° F, The

acidity increases progressively in the solution to a certain maximum, then gradually dimin¬ ishes and eventually disappears. By the addi¬ tion of calcium carbonate to the solution the oxalic acid may be fixed in the form of the insoluble calcium oxalate. About half of the glucose present is thus converted into oxalic acid, the remainder being consumed in the growth of the mould.

OXALIS, a genus of herbs and shrubs of the family Oxalidacece. The species, of which there are about 200, are mostly natives of the warm parts of South America and Africa, but some are well-known weeds, called wood-sorrel, in the north temperate zone ; many have tuberous or bulbous roots. The genus is gen¬ erally characterized by digitate or ternate com¬ pound, clover-like leaves which (<sleep55 at night or in very cloudy weather, that is, the leaflets assume a resting position at such times. The flowers generally close under similar conditions. The seeds, which are contained in a capsular fruit, are thrown to considerable distances when the fruit bursts open. The best-known Amer¬ ican species is the common wood-sorrel (O. acetosella) . It is also a native of Europe and western Asia. Naturally it grows best in shady places and is often found covering the ground as thickly as grass, its little white, rosy-veined flowers appearing in abundance throughout the season. Probably the next best known is the violet wood-sorrel (O . violacea), a native of the eastern United States. It inhabits similar localities but has pinkish violet flowers. The tuberous roots of some species are used for food in western South America.

OXALURIA, a morbid condition of the system, in which a prominent symptom is the presence of crystallized oxalate of lime in the urine. See Urine.

OXENBRIDGE, John, English colonial divine in America: b. Daventry, Northampton¬ shire, 30 Jan. 1608; d. Boston, Mass., 28 Dec. 1674. He was educated at Cambridge and Ox¬ ford, preached for a time in

England and later in the Bermudas, whither he made two voyages, held a curacy at Beverley, was pastor of a church at Berwick-on-Tweed, held a fellow¬ ship at Eton from 1652 until ejected at the Restoration (1660), and as a preacher was driven from the exercise of his office by the Act of Uniformity. In 1669 he came to New England, and on 4 May 1670 was ordained pastor of the first church at Boston. In 1672 he was appointed a licensor of the press. Among his works are (A Double Watchword> (1661); (A Seasonable Proposition (1670); (A Sermon at the Anniversary Election of Governor5 (1672).

OXENDEN, Ashton, British clergyman: b. Broome Park, 1808; d. 1892. He was edu¬ cated at University College, London ; was holder of the living of Pluckley, Kent, in 1849-69, becoming honorary canon of Canterbury in 1864. In 1869 Oxenden was made bishop of Montreal and primate and metropolitan of Canada. Ill health compelled his resignation in 1878, after which he ventured to England and was later vicar of Saint Stephen's, Canter¬ bury. He published (The Cottage Library5 (6 vols., 1846—51) ; (The Pathway of Safety5 (1856) ; (The Home Beyond5 (1861) ; (The Parables of Our Lord Explained5 (1864); (A

?winT?istory the Christian Church) (1864) • <My First Year in Canada' (1871) ; <A Simple Exposition of the Psalms> (1872) ; <The Chris- <1877> ; (Counsel to the Confirmed) (1878); (Touchstones) (1884); (Short Com¬ ments on the Gospel > (1885). Consult his autobiography (London 1891).

OXENFORD, ok'sen-ford, John, English dramatist and critic : b. Camberwell, London 12 Aug. 1812; d. London, 21 Feb. 1877. He was educated for the law and admitted to the bar in 1833, but chose a literary career. He translated from the German several notable works, among them (Conversations of Goethe. > For 30 years preceding his death he was dramatic critic on the London Times. Among his plays are (Mv fellow Cl.ˆ (1835); <The Two Orphans> ;

(Twice Killed> (1835); <A Day Well Spent. >

OXENHAM, ok'sen-am, John, English novelist. He was educated at Victoria Uni¬ versity, Manchester, and was for some time resident in this country. Returning to England he gave up commercial pursuits and turned to literature. He has published (God's PrisoneU (1898) j (Rising Fortunesˆ (1899) j Princess of Vascovy) (1900); <Our Lady of Deliverance> (1901); (A Modern Masquer> (1901); <John of Gensau) (1902); <Under the Iron FlaiP (1902) ; (Bondman Free) ; (Mr. Joseph Scorer* ; (Barbe of Grand Bayou* (1903); (A Weaver of Webs) ; <Hearts in Exile* (1904); (The Gate of the Desert* ; < White Fire* (1905) ; (Giant Circumstance> (1906) ; <The Long Road> (1907) ; (Pearl of Pearl Island) (1908); <Great-Heart Gillian* (1909) ; <Lawristons) (1910) ;

(Their High Adventure) (1911) ; (Mary All-Alone) (1913); (Bees in Amber) (verse); (Broken Shackles* (1914) ; (Everywoman and War* (1915). His war-time hymns and verse, such as (For the Men at the Front,* (All's Well,* (The King's Highway* and (The Vi¬ sion Splendid,* struck deeply sympathetic chords and have attained great circulations.

OXENSTIERNA, oks'en-shar-na, Axel, Count, Swedish statesman : b. Fano, 16 June 1583; d. Stockholm, 26 Aug. 1654. He studied theology and later law at Rostock, Witten¬ berg and Jena; at 20 entered the diplomatic service of Charles IX; was his Minister to Mecklenburg in 1606; entered the Senate in 1609; was head of the regency during the last days of Charles IX and through the minority of Gustavus Adolphus; became Chancellor of the Realm in 1612; acted as regent during the prolonged absence of the king; effected the Peace of Stolbova with Russia (1617) ; in 1626 was made governor-general of Prussia and in 1629 concluded the Peace of Altmart with Poland. After the death of Gustavus Adolphus at Liitzen in 1632, Oxenstierna received almost unlimited powers, directed the Protestant league against Austria and held it together for four years. He returned to Sweden in 1636 and became the leading spirit in the regency of Christina, using all efforts to bring about peace with Germany. The Peace of Bromsebro, con¬ cluded in 1545 as the result of negotiations un¬ dertaken by his son John, the Swedish plenipo¬ tentiary to Germany, was highly displeasing to the queen. His obstinate opposition to Chris¬ tina's plan of naming her own successor widened the breach between them, and he gradu¬ ally withdrew from public affairs. He was,

next to Cardinal Richelieu, the ablest diplo¬ matist of his age. He founded a Swedish colony on the Delaware in 1638.

OXENSTIERNA, Johan Gabriel, Count, Swedish statesman: b. 1750; d. 1818. One of his masters was the critic, Olof Bergklint, after which Johan spent a year in the employ of the chancery and then was made secretary of lega¬ tion at Vienna in 1770. After four years there he returned to become king's chamberlain, after which he held several high offices at court, and from 1792 to 1801 was marshal of the realm. In 1786 he became one of the first members of the Swedish Academy. He translated Milton and a part of Tasso into Swedish,

his liteiary fame rests in his poetic works, <Skordarna) and (Dagens Stunder.* His works appeared at Stockholm (5 vols., 1805-26). Con¬ sult Lamm, M., (J. G. Oxenstierna, en gustavi-ansk natursvarmares lif och dikt> (Stock¬ holm 1911). V

OXFORD, oks'ford, England, a celebrated university city and county borough, the capital of Oxfordshire, 54 miles northwest of London (6314 miles by rail), is situated on a lowlying bank at the confluence of the rivers Thames (locally called Isis) and Cherwell. The rivers are crossed by several bridges, the principal of which are Magdalen Bridge, over the Cher¬ well, and Folly Bridge, over the Isis. In early times the city was surrounded by a wall, a por¬ tion of which still exists, intact, in New Col¬ lege Gardens. 1 he castle of Oxford, famous for the Empress Matilda's escape over the frozen Thames in 1141, has disappeared, but the keep, built in the time of Rufus, remains entire, and is included in the precincts of the prison. The principal street, colloquially «The High,** has a length of about 1,000 yards, and its greatest width is 85 feet. It is adorned by several of the noblest structures of the city, including Brasenose, All Souls University, Queen's and Magdalen Colleges, Saint Mary's (the university church), the New Examina¬ tion Schools, together with quaint old houses. The botanic gardens, dating from the 17th cen¬ tury, add to the beauty of the street.

Educational Institutions. — The most in¬ teresting buildings are the colleges, component parts of the University of Oxford (see Ox¬ ford, University of), but separate corporations, possessing property apart from the university. The buildings of the university proper are situ¬ ated mainly between Broad and High streets. The most remarkable is the Bodleian Library^ founded by Humphrey, Duke of Gloucester, built between 1444 and 1480, and restored by Sir Thomas Bodley about 1610. South of the Bodleian is the beautiful Radcliffe Camera (or Camera Bodleiana), erected 1737-49 to contain the books presented

by Dr. Radcliffe to the uni¬ versity, but now used as a reading-room for the Bodleian. A new building for the Radcliffe Library has been erected in the precincts of the museum by the munificence of the Drapers' Company of London. North of the Bodleian stands the Clarendon Buildings, built from the proceeds of Clarendon's (History of the Great Rebellion. > It was until 1830 the home of the Clarendon Press, but is now utilized for the various university offices. Westward of the library is the Sheldonian Theatre, designed by Wren, and presented by Archbishop Sheldon, a

large semi-circular chamber, capable of seating 4,000 persons, and used by the university for the conferment of degrees and other public func¬ tions. The university also possesses the New Examination Schools, the Taylor Institution, with the University Galleries and Ashmolean Museum; the Science Museum, the large uni¬ versity parks with the beautiful walk known as Mesapotamia, the Indian Institute and the Botanic Gardens. New laboratories and a new building for the Radcliffe Library have been erected in close proximity to the Science Museum. The New Schools are used for university lectures as well as for examination purposes.

The most remarkable of the various college buildings is Christ Church. The great quad¬ rangle (Tom Quad) is the largest in Oxford; the gateway was begun by Cardinal Wolsey, completed from designs by Wren, and contains the famous bell known as <(Great Tom.® Christ Church is also remarkable for its magnificent dining-hall and staircase and its library. The cathedral, situated in the college precincts, ful¬ fills also the function of a college chapel. Not less interesting is Merton College, with its ancient chapel and the <(Mob Quad,® the earliest quadrangle in Oxford. New College, a per¬ pendicular building of the late 14th century, is due to the munificence and to the architectural skill of the great prelate, William of Wykeham. Its chapel, cloister and gardens are among the sights of Oxford, and its large quadrangle re¬ mains, except for the addition of a third story, much as it appeared to the founder's eye. Mag¬ dalen College is famous for its exquisite

tower, its chapel and cloisters and the water walks, known as Addison's Walk. The buildings of All Souls College are also rich in architectural association, and every college has some feature of peculiar interest. The chapel and garden buildings of Saint John's, the library of Corpus Christi, Dr. Johnson's rooms at Pembroke and the general effect of the quadrangles of Corpus Oriel, Wadham, Balliol and University are illustrations of this. Modern additions to the architecture of Oxford have not been uniformly fortunate, but the latest additions to Brasenose and New College and the Examination Schools are worthy of the traditions of the university. Several of the colleges, notably Worcester, Saint John's, Wadham, Merton, New College and Trinity, have also beautiful gardens, and Christ Church possesses the famous Broad Walk in the Meadow. There are several colleges for women, the most important of which are Somer¬ ville College, Lady Margaret Hall, Saint Hilda's Hall and Saint Hugh's Hall. Mansfield Col¬ lege (perhaps the most successful piece of re¬ cent building in Oxford), intended for the edu¬ cation of men for the Non-Conformist ministry, was established in 1889; and buildings were opened in 1893 for Manchester College, re¬ moved from London in 1889.

Libraries. — The Public Libraries Act was adopted in 1852 and a library opened two years later. The present building, forming part of the new townhall, was opened in 1895, and contains lending and reference departments, general ladies' newspaper rooms, and a chil¬ dren's reading-room and library. The library contains over 25,000 volumes. Special features are a large collection of local books and a

Braille library for blind students of the uni¬ versity.

Public Buildings and Charitable Institu¬ tions. — Notable buildings not connected with the university are the new municipal buildings containing the townhall, public library, police station and court, and the various city offices, the Corn Exchange, numerous schools, the Radcliffe Infirmary, the Warneford Lunatic Asylum on Headington Hill, the Martyrs' Me¬ morial, the Pusey Memorial House, with its Chapel of the Resurrection, and the New Theatre.

Churches. — Oxford is the see of a bishop. Christ Church, the cathedral church of the dio¬ cese, originally belonged to the priory of Saint Frideswide. Besides being the cathedral church of. the diocese it is also the college chapel, but is of greater antiquity than the college, having been built in the 12th century. Saint Mary-the- Virgin, the

university church, finely situated nearly in the centre of the High street, is con¬ spicuous by its richly decorated tower, terminat¬ ing in a beautiful spire 189 feet high. It ranks as one of the finest Gothic structures in Ox¬ ford. The church of Saint Martin's or Carfax was removed in 1896 to afford more room at the crossing of the four great thoroughfares, High street, Queen street, Cornmarket and Saint Aldate's. The ancient tower has been preserved. All Saint's Church is a Queen Anne building in the classic style, of which it is an excellent ex¬ ample. Saint Mary Magdalene presents several beautiful features, and has acquired much ad¬ ditional interest from the Martyrs' Aisle, added as a fit accompaniment to the Martyrs' Me¬ morial, which stands close to it, near the spot where Ridley, Latimer and Cranmer suffered martyrdom. The most important of the other ecclesiastical edifices in Oxford are the churches of Saint Aldate, Saint Giles, Saint Peter in the East, Saint Thomas, Saint Barnabas, &nd the Roman Catholic church of Saint Aloysius. Saint Peter in the East is very ancient, and possesses Saxon as well as Norman work; it has a large crypt. Several handsome churches have been recently erected, Saint Philip and Saint James' and Saint Margaret's in the north; Saint Matthew's in the south and Saint Mary and Saint John's in the east, the last served by the Cowley Fathers, an active Anglican brother¬ hood. The city contains also places of worship for Methodists, Congregationalists, Baptists, Brethren and other non-conformist bodies. During the 19th century the city has been en¬ circled by extensive residential surburbs. Less than two miles from Oxford stands, close to the river, the Norman church of Iffiey, one of the most perfect pieces of Norman architecture in England.

Public Works, Government, *etc.* — The

prosperity of the city depends mostly on the university, but a considerable trade is carried on in grain, and a cattle market is held twice a. month. The city is governed by a council, consisting of a Mayor, 15 Aldermen and 45 councillors, of whom three aldermen and coun¬ cillors are elected by the university. It returns one member to Parliament. Since 1892 the city has been lighted by electricity, it has a modern drainage system, an excellent water supply and municipallv-owned tramwavs. Pop. about

53,048,

High Street, College Buildings, Saint Mary's Church and Bodleian Library

n ■

*

* y >

OXFORD — OXFORD MOVEMENT

73

. Bibliography.— Britton, 'History and An¬ tiquities of the Cathedral Church of Oxford* (1836) ; Davenport, 'Notes as to Oxford Castle* (1877) ; Dearmer, (Cathedral Church of Ox¬ ford* (1897) ; Fletcher, (History of the Church and Parish of Saint Martin (Carfax), Oxford) (1896) ; Green and Robertson, (Studies in Ox¬ ford History, Chiefly in the Eighteenth Cen¬ tury, > ed. by C. L. Stainer (1901); Headlam, 'Story of Oxford* (Mediaeval Town Series, 1912) ; Hurst, 'Oxford Topography* (1899) ; Ingram, 'Memorials of Oxford* (1837); King, 'Vestiges of Oxford Castle) (1796) ; Lang' 'Oxford: Brief Historical and Descriptive Notes) (1893) ; Little, 'Gray Friars in Oxford^ (1892); Madan, 'Rough List of Manuscripts Materials Relating to the History of Oxford Contained in the Printed Catalogue of the Bod¬ leian and College Libraries > (1887) ; Marshall, 'Oxford* (Diocesan Histories) (1882) ; Moore, 'Historical Handbook and Guide to Oxford) (1878) ; Ogle, 'Royal Letters Addressed to Ox¬ ford, and Now Existing in the City Archives) (1892) ; Phillips, 'Geology of Oxford and the Valley of the Thames) (1871); Plummer, 'Elizabethan Oxford: Reprints of Rare Tracts* (1887) ; Rogers, 'Oxford City Documents, Fi¬ nancial and Judicial, 1268—1665 } (1891) ; Selin-court, 'Oxford from Within (1910) ; Skelton, 'Oxonia Antiqua Restaurata) (1823); 'Turner, 'Selections from the Records of the City of Ox¬ ford, with Extracts from the Documents Illus¬ trating the Municipal History, Henry VIII to Elizabeth) (1880) ; Wood, 'Survey of the An¬ tiquities of the City of

Oxford,* composed in 1661-66, ed. by Andrew Clark (1889-99) and part 25 of the Victoria County History (1907).

J. Lockhart Dougan, Chief Librarian, Public Library, Oxford.

OXFORD, Mass., town in Worcester County, situated on the New York, New Haven and Hartford Railroad, 10 miles south of Worcester. It contains an old Universalist church, a public library, woolen mills, shoe fac¬ tories, *etc.* There are also many historic land¬ marks of the Huguenots, a colony of whom settled here. Pop. 3,820.

OXFORD, Miss., city and county-seat of Lafayette County, on the Illinois Central Rail¬ road, 75 miles southeast of Memphis, Tenn. It is a cotton growing region and has a cotton gin and mill. It has two public schools, one for the colored race ; it is the seat of the State University and in connection with its public schools affords a splendid educational centre. It was built in 1836, but was burned during the Civil War. Oxford is surrounded by farm lands well adapted to the raising of clover, corn, cotton, berries, fruits and vegetables. Pop. 2,150.

OXFORD, N. C., town, county-seat of Granville County, on a northern branch of the Tar River, and on the Southern Railroad, 42 miles north of Raleigh. It is in a fertile to¬ bacco and cotton-growing region, has a large trade in tobacco and contains several tobacco warehouses and manufactories, also a sawmill, furniture factory and an iron foundry. It has two orphan asylums, one for colored children, the other under the charge of the Masonic fra¬ ternity. It has no public high school, but is the seat of the Horner Military School (non-sec¬ tarian) and of the Oxford Female Seminary

(Baptist, 1850), with secondary and collegiate departments, and Granville Test Farm. Pop.

(1920) 3,606.

OXFORD, Ohio, village in Butler County, on the Cincinnati, Hamilton and Dayton Rail¬ road, about 35 miles north by west of Cincin¬ nati. It is in an agricultural region and its chief industries are connected with farm prod¬ ucts. It is noted as an educational centre; it is the seat of Miami University (q.v.), Oxford College (q.v.) and Western College. Pop. 2,200.

OXFORD CLAY, in geology, a term used by English geologists of the lower division of the Middle Oolitic (see Oolite), making up with calcareous sandstones the Oxford (or Middle) Oolitic group, and so corresponding to one of the upper sections of the Jurassic. It is a blackish, brownish or dark blue clay, rich in fossil ammonites and belemnites.

OXFORD COLLEGE, a college for women established in 1849 at Oxford, Ohio. Besides the regular collegiate work, there are courses in music and art, and provision for postgraduate work; there is also a preparatory department. The collegiate work is arranged in three courses, classical, literary and scientific, leading to the degrees of A.B., B.L. and B.S. There are about 150 students and 17 instructors.

OXFORD MOVEMENT, a religious movement in the Church of England which originated among certain members of Oxford University. Its aim was the revival of reli¬ gious life and doctrine in England on a purer and more primitive basis. The Church of Eng¬ land in the early part of the 19th century was in a condition in which reform was sorely needed. The fervid spirit of John Wesley and his suc¬ cessors had kept the spark of spiritual life still glowing in the heart of the masses, and the Roman Catholic Church as a consequence of Catholic Emancipation was rehabilitating itself. There were two main parties in the Church of England. There was the great Evangelical party who “whether they were admired as Evangelicals, or _ abused as Calvinists, or laughed at as saints, were inheritors not ot Anglican traditions, but of those which had grown up among the zealous clergymen and laymen who had sympathized with the great Methodist revival and whose theology and life had been profoundly affected by it.® This party numbered many men of power among its ranks who kept alive the spirit of such pious and ear¬ nest leaders as Hervey, Romaine, Cecil, Venn, Fletcher, Newton and Thomas Scott. They trusted less in ordinances, or in ecclesiastical rites and traditions, than in the stirrings of the individual soul toward God, private study of the Scriptures and constant prayer.

In contradistinction to these Low Church¬ men were the old-fashioned High Churchmen who had existed in the Established Church since the time of Laud. They clung to the learning of such theology as had become the heritage of the Church through the teaching of a line of solid divines from Hooker to Water-land. Bishop Wilson of Sodor and Man in his ‘Sacra Privata) was their model of practical and personal devotion, but they also drew for their religious life upon the stores of Andrewes, Jeremy Taylor and Ken. They preached calm, scholarly sermons, which embodied a gospel of

common sense ; but did not appeal to the heart of the middle or lower classes. Besides these two great parties there was rising in the Church a spirit of free thought which should afterward develop into the Broad Church party of Stan¬ ley and Jowett. Connop Thirlwall and Julius Hare had become strongly tinged by the influ¬ ence of recent German critical speculation, and Whately, Hawkins and Milman were look¬ ing for a wider field of religious life and con¬ viction which should be bounded neither by the conventionalities of the Evangelicals, nor £he somewhat frigid dignity and strictness of the High Church party.

The two chief leaders in the movement which was to bring a new life into the English Church were men of the very highest gifts — John Keble and John Henry Newman. There were two sides to the spirit of this movement; one was theological, the other moral. As illus¬ trating these two aspects of religious life it is impossible not to cite the (Christian Year,5 which appeared in 1827 and embodied the es¬ sence of (Tractarian) theology while it was warmed by the most pure and exalted ethical, if not ascetic, temper and tendency. When New¬ man began his ministry his sermons were re¬ markable for this same practical tone. His holiness Necessary for Future Blessedness) was preached in 1826, before he was appointed vicar of Saint Mary's, and it struck the keynote of all his subsequent pulpit utterances. It was this intense moral earnestness that gave power and impetus to the new movement.

The political condition of England had much to do with the origin of the Oxford movement; Whig Erastianism was in the ascendant in Par¬ liament; nor should the influence of the Ro¬ mantic movement in literature with which the name of Walter Scott is associated be left out. When the definite movements began, the Re¬ form Bill had just been passed, and it looked as if the government were about to invade the rights of the Church. It was at this time that a sermon of Keble's fired the train. <(On 14th July 1833,55 we read in Cardinal Newman's (Apologia, 5 (<Mr. Keble preached the assize ser¬ mon in the university pulpit. It was published under the title of (National

Apostasy.5 I have ever considered and kept the day as the start of the religious movement of 1833. 55 The speaker described England as <(a nation which had for centuries acknowledged as an essential part of its theory of government, that, as a Christian nation, she is also a part of Christ's Church, and bound, in all her legislation and policy, by the fundamental laws of that Church.55 He proceeds to charge the nation with now dis¬ avowing this principle, a course which implies ((a direct disavowal of the sovereignty of God. If it be true anywhere that such enactments are forced upon the legislature by public opinion, is Apostasy too hard a word to describe the tem¬ per of such a nation?55

The effect of Keble's sermon was to cause a meeting at Hugh James Rose's parsonage at Hadleigh, Suffolk, between the 25th and 29th of the same July. Next in authority to Rose as leader in the movement (after Keble, New¬ man and Pusey) was William Palmer, and he has himself described the feelings with which the (<Conspirators,55 as they were styled, met on that occasion. ((We felt ourselves assailed by

enemies from without and foes within. Our prelates — insulted and threatened by ministers of state. … In Ireland— 10 bishoprics suppressed. What was to come next? …

We were overwhelmed with pamphlets on Church Reform. Lord Henley, brother-in-law of Sir Robert Peel, Dr. Burton, and others of name and influence led the way. Dr. Arnold of Rugby ventured to propose that all sects should be united by act of Parliament with the Church of England. Reports were prevalent that some of the prelates were favorable to al¬ terations in the Liturgy. Pamphlets were in wide circulation recommending the abolition of the creeds (at least in public reading) …

the removal of all mention of the Blessed Trin¬ ity; of the doctrine of baptismal regeneration; of -the practice of absolution.55 The party pon¬ dered over what was the best means of open¬ ing the eyes of churchmen, and it was resolved at Hadleigh that this could only be done by writing, by publishing certain declarations, cer¬ tain manifestos, and thus to carry out the spirit of Keble's sermon. In this way were born what Mozley afterward called ((that portentous birth of Time55 (The Tracts for the Times.5

The first tract appeared 9 Sept. 1833. It was written by Newman. He wrote, as he says, under the conviction ((that ancient religion had well

nigh faded out of the land through the political changes of the last 150 years, and it must be restored.55 In the introduction he as¬ serted the doctrine of Apostolic succession, and the ministerial power to give absolution. The early tracts produced a profound sensation. They wakened men's minds, and in many quar¬ ters the cry was raised that they contained ((Romanism)5 in disguise; yet they quoted the Prayer Book, and the most authoritative Eng¬ lish divines and even bishops were puzzled how to regard them. They were supplemented by the (Churchman's Manual,5 which explained the nature and claims of the Church and its ministers. In 1834 the party was joined by Edward Bouverie Pusey (q.v.), and he early contributed an elaborate tract on lasting.5 Between 1835 and 1840 the ((Tractarians,55 as the promoters of the Oxford movement were called, had swollen to the dimensions of a large party. As a protest against its alleged Romanizing tendency a monument was erected in Oxford to the martyrs of the Reformation, Cranmer, Ridley and Latimer, but the ((Memo-rial55 had little effect in arresting the progress of the movement which was on its way to win the coming generation of English clergy to maintain the doctrines of Apostolic Succession, Baptismal Regeneration, Priestly Absolution, the Real Presence in the Eucharist, and the Divine Character of the Church. But in a short time the authorities both of Oxford Uni¬ versity and of the Church of England became alarmed. Sumner, bishop of Chester, was the first to condemn the movement by denouncing in 1838 <cthe undermining of the Protestant Church by men who dwell within her walls . . who sit in the Reformers' seat and tra¬

duce the Reformation.55 The Tractarians un¬ doubtedly made mistakes and showed impa¬ tience, exaggeration and little consideration for the scruples of those who did not accept their teachings. When the tract was published enti¬ tled (On Reserve in Communicating Religious

Knowledge,0 they ventured on dangerous ground, and touched on topics not relevant to their main crusade, laying themselves open to

the charge of avowing the principle of keeping back part of the counsel of God. But the for¬ mation of a ((Romanizing)0 section in the Tractarian party was not justifiably charged against them until the publication of Tract 90, in which Newman attempted to show that the 39 Articles of the Church of England could be so inter¬ preted as to harmonize with the teaching of the Roman Catholic Church. This was the turning point in the history of the movement. The Tractarian doctrine was condemned by the Heads of Houses at Oxford. The bishop of' Oxford forbade the publication of such views, and Newman yielded. The Tractarian candi¬ date for the professorship of poetry, a man of undoubted genius, was defeated, and Mr. Ward, another Tractarian, dismissed from his mathe¬ matical lectureship at Balliol, and the climax was reached when Pusey was accused and found guilty of preaching doctrine contrary to that of the Church of England and was sus¬ pended from preaching within the university for two years. Finally a movement was set on foot to procure a vote of censure on Ward's (The Ideal of a Christian Churchy in which the Roman Catholic Church was set forth as that ideal and the English Church condemned as not fulfilling it. The motion was passed by a majority of 58 members of the Convocation, and only failed of being ratified by the vice-chancellor through the interposition of a legal technicality. On 3 Oct. 1845 Newman re¬ quested the provost of Oriel to remove his name from the books of the college and uni¬ versity, and on the 8th completed his (Essay on the Development of Christian Doctrine) ; two days afterward he was received into the Roman Catholic Church. A host followed him.

The movement within the Church of Eng¬ land itself continued under the leadership of Pusey, who deplored Newman's secession to Rome and who even in its early days, to quote Newman, had been <(able to give a name, a power and a personality to what was without him a sort of mob.00 The Gorham judgment (1850), in which the judicial committee of the privy council — which, being a civil court, the Tractarians claimed had no valid authority to act in ecclesiastical cases — decided that belief in Baptismal Regeneration was not necessary in order to hold a benefice in the Church of England, was followed by further secessions, among them, Manning. The Oxford revival, begun in the Church of England, profoundly affected all the Reformed churches, and while laying stress on ceremonial, on orderly and comely worship in the sanctuary and on the claims of the early Church and its creeds, laid no less emphasis on spirituality of life as an essential prerequisite for the priests and ministers cf the Church. Consult in addition to the biographies and works of the outstanding figures of the movement whose names are men¬ tioned in this article.

Brown, E. G. K., his¬ tory of the Tractarian Movement (1856) ; Church, R. W., (The Oxford Movement (1891) ; Holland, H. S., (The Mission of the Oxford Movement (in ˆPersonal Studies,0 1905) ; Newman, <Apologia) (1864), vitally important Mozley, T., (Reminiscences) (1882) ; Overton, (The Anglican Revival0 (1897) ;

1 hureau-Dangin, (The Anglo-Catholic Re¬ vival in the 19th Century0 (Eng. trans., 1915) ; Ward, Wilfrid, (The Oxford Movement0 (1913); (The Library of the Fathers0 (1838— 85) ; (Library of Anglo-Catholic Theology 1

(1841). An exhaustive bibliography by Canon S. L. Allard appears in Vol. XII of the Cam¬ bridge History of English Literature0 (1915).

OXFORD UNIVERSITY, England, at Oxford (q.v.), its foundation by tradition, as-scribed to Alfred the Great, who had a mint in the city, is believed to have its authentic origin in the quarrel between Henry II and Becket, when the king, about 1164, directed an ordi¬ nance against the partisans of Becket, to the effect that all clerks possessing revenues in England and resident in Paris had to return in three months (<as they loved their revenues.00 Philip II of France was aiding Becket, and Henry forbade English clerks to study at Paris. Just after the edict the schools of Ox¬ ford became very flourishing and assumed the character of the contemporaneous university; the existence of doctors of various faculties as well as of masters and scholars being recorded about 1187 in connection with the celebrated visit of Giraldus Cambrensis. The earliest public document known to exist, which applies the title of university (universitas) to the schools of Oxford is one which dates from 1201. In 1214 the bishop of Lincoln, the eccle¬ siastical superior of the monks gathered within his diocese, appointed a chancellor for their government, and the constitution which arose out of such elements has been molded into its present form in part by the authority of the Crown and of Parliament, in part by the in¬ herent self-governing power of the university itself. The first chancellor known to have been appointed was Robert Grossteste, about 1224, who was afterward bishop of Lincoln. Other authorities represent that its first charter was that granted to it by Elizabeth in 1570, when it was enacted that henceforth the uni¬ versity should be known by the name of ((The Chancellor, Masters and Scholars of the Uni¬ versity of Oxford,00 and by no other name, upon which its privileges depended until the passing of the Oxford University Act of 1854. The elective franchise was conferred upon the uni¬ versity in 1604, since which time it has

returned two members to Parliament.

The collegiate system at Oxford dates from the 13th century. At first the students who congregated at the university had no special places of abode provided for them, but had to find accommodations for themselves. As the students found it cheaper to unite and rent a single house in which they might live together than to provide each for himself, they fre¬ quently did so, forming halls, hostels or inns. Sometimes, for the sake of giving greater facilities to study, sums of money would be given or bequeathed to the university for the erection of buildings in which the students might live without any more expense than was necessary for their maintenance. The first who went further than this was William of Durham, who, dying in 1249, bequeathed a sum of money to the university to provide a permanent endowment for the maintenance of a certain number of <(masters.00 The first pur¬ chase was made in 1253, and with this purchase originated University College. There were

two other colleges founded during the same century — Balliol College, in 1263, and Merton College, founded at Maldon in Surrey in 1264, and removed to Oxford before 1274. This last college is said to have been the first in which the collegiate system in its modern form, or a form resembling the modern one, was instituted, the college being made a separate corporation, with a separate charter and separate statutes. The first statutes of University College as a separate corporation are dated 1280. At the beginning of the 14th century, while there were no more colleges than the three just mentioned, there were about 300 halls. As the number of colleges increased, and their growing endow¬ ments attracted greater numbers of students, the halls declined in numbers, especially since the attendance of students diminished in the centuries following the 14th. At the beginning of the 16th century the number of colleges had increased to 10, while that of the halls had declined to 55. There are now 21 colleges, all of which are separate corporations, and, with two exceptions, have endowments for fellows and scholars. At Christ

Church the fellows are distinctively called “students® (ordinary students being, of course, called undergradu¬ ates). All Souls College has no scholars or undergraduates, except a small number of “Bible-clerks,® and Keble College has no fel¬ lows. The fellows and scholars at Oxford hold pretty much the same position as at Cambridge (see Cambridge, University of, and Fellow¬ ship). Besides the colleges, there is one pub¬ lic hall, Saint Edmund Hall. It is not a sepa¬ rate corporation, and has no endowments for fellows, and it will be united to Queen’s Col¬ lege on the occurrence of the next vacancy in the prineipalship, as Saint Mary’s Hall has been incorporated with Oriel. The following are the names of the colleges in the order of their reputed foundation, each being separately noticed in the body of this work: University, Balliol, Merton; Exeter (founded 1314), Oriel (1326), Queen’s (1340), New College (1379), Lincoln (1427), All Souls (1437), Magdalen (1458), Brasenose (1509) Corpus Christi (1516), Christ Church (1546), Trinity (1554), Saint John’s (1555), Jesus (1571), Wadham (1612), Pembroke (1624), Worcester (1714), Hertford and Keble. The two last mentioned date from last century. Hertford is the resto¬ ration of an old foundation, while Keble (which is a “new foundation® and not a college in the strict sense) was founded in 1870 for the edu¬ cation solely of members of the Church of England; it enjoys the privileges (except as re¬ gards the academical status of its head) which are possessed by other colleges in the univer¬ sity. There are also three private halls, gov¬ erned by “licensed masters® ; and since 1884 one college and four halls for women have been established, Somerville College and Lady Mar¬ garet, Saint ‘Hugh’s and Saint Hilda s halls. Women cannot become members of the uni¬ versity or take degrees, but are admitted to the university examinations, and the names of those who pass or take honors are officially pub¬ lished. The largest of the colleges is Christ Church, established in 1546 by Henry VIII, from funds collected by Cardinal Wolsey; it is commonly known as “the House® (“2Edes Christi®). In the 15th century an enactment

was passed requiring all students who joined the university to become members of some college or hall, and this condition continued to be the law until 1868, when persons were permitted, under certain conditions, to enjoy the privileges of the university without so doing, keeping their statutable residence in approved houses or lodging in the town. Those who avail them¬ selves of this permission are called (<non-col- legiate students.® They are exempt from the heavy expenses inseparable from living in col¬ lege rooms and pay small tutorial fees.

The constitution of the university is fixed by the act of 1854, which modifies that granted by the act of Elizabeth. The style or title by which the corporation is known is The Chan¬ cellor, Masters and Scholars of the University of Oxford. Legislation in university matters has to be prepared by the Hebdomadal Council, and pass through two bodies, the Congregation of the University and Convocation. There is also another body, the Ancient House of Con¬ gregation, made up of the necessario regentes and regents ad placitum, whose functions are confined to ratifying the nomination of exam¬ iners and to the granting of ordinary degrees. The House of Convocation consists of all who have been admitted to the degree of master of arts, provided their names 'have been con¬ stantly kept on the books of some college or hall, or of the delegates of non-collegiate students, and in the last resort Convocation has supreme control over the action of the univer¬ sity. Congregation consists of all masters and doctors resident in Oxford, and most matters are settled by it, appeals to the superior body of Convocation against a decision of Congrega¬ tion being rare. The Hebdomadal Council con¬ sists of certain officials and certain members elected by Congregation. The official members are the chancellor, the vice-chancellor and the two proctors. The elected members are six heads of colleges or halls, six professors and six members of Convocation of not less than five years' standing. The members of Convo¬ cation elected may be either heads of houses or professors. The election takes place once in three years. The elected members hold office for six years, and half of them are chosen on every occasion. They meet every Monday in term time (whence the name of the body), and when convoked by the vice-chancellor. All leg¬ islative measures originate with them, but most of the ordinary business of the university is transacted by boards of delegates or curators elected or appointed ad hoc.

The principal officers of the university are the chancellor, the high steward, the vice-chan¬ cellor, the two proctors, the public orator, the keeper of the archives and the registrar. The dignities of chancellor and high steward are almost purely honorary, and are usually con¬ ferred on noblemen. The vice-chancellor, who is nominated by the chancellor from the heads of colleges, and chosen in the order of their election as heads, holds office for four years, and is now, in fact, the supreme executive and judicial authority of the university. The prin¬ cipal duty of the proctors is to maintain the discipline of the university, but they also serve ex officio on most of the university boards and delegacies.

There are over 100 professorships, lecture-

ships and readerships in the University of Ox¬ ford, besides the lectureships, etc., in the sep¬ arate colleges. The university professors de¬ liver lectures on the subjects for which they hold their professorships, but attendance on these lectures is compulsory on none of the students.

The colleges are corporate bodies distinct from the corporate body which forms the uni¬ versity. They are not subject to laws and reg¬ ulations made by the university; they manage their own property, elect their own officers and even the proctors have no power within their walls.. Some university professors are entitled to privileges and emoluments in colleges, and in many matters the colleges and the univer¬ sity recognize each other's regulations. But the true key to the intimate relations existing between the university and colleges is to be found in the fact that the great majority of the members of the university belong to the col¬ leges and all members of the colleges are mem¬ bers of the university.

The old distinctions separating undergradu¬ ates into different classes (peers and their eldest sons, fellow and gentlemen commoners) have disappeared. <(Scholars,):> that is students who by competitive examination have obtained a place on the foundation of a college — carrying with it a stipend of $400 — wear gowns differ¬ ing from those of ordinary students or ((commoners.® Every student on entering his college is assigned to a tutor, who is responsible for the direction of his studies, and to whom he may apply for advice. The morning is devoted to attending lectures, or to private reading; the afternoon or the early part of it is universally surrendered to outdoor exercise ; the evening after ˆhall® (the common name for dinner), is given by reading men to their studies, as well as to the social and literary meetings which form so much of the charm of college life. There is a university club, known as the Union Society, in whose hall there is held a weekly debate on some public topic. There are also a dramatic club and various musical societies which give performances regularly during term, besides many social clubs. The expenses of liv¬

ing at Oxford vary as the students; on the most economical system they cannot be brought below $800 per annum. The total number of undergraduates on the book is about 3,600, but the number of those resident is usually 3,000. During the Great War the members were re¬ duced almost to the vanishing point.

There are four terms in the university year at Oxford; Michaelmas term, which lasts from 10 October to 17 December; Hilary or Lent, from 14 January to the day before Palm Sun¬ day; Easter term, from the Wednesday after Easter to the Friday before Whitsunday, and Trinity or Act term, from the day before Whit¬ sunday to the Saturday after the first Tuesday of July; Michaelmas and Hilary terms are kept by six weeks' residence in each and Easter and Trinity terms either by three weeks' resi¬ dence in each or by 40 days' residence in both jointly.

The degrees conferred by the university are those of bachelor and master in arts; bachelor and doctor in divinity, civil law, medicine, let¬ ters, science and music and bachelor and master in surgery. The most important function of the university, 'however, is the conferring of de¬

grees in arts. Twelve terms of residence are required for the degree of B.A., which must be taken before any other degree (except those of B. Litt. or B. Sc. and bachelor or doctor of music) can be conferred. No further residence is necessary for any degree, and no residence whatever is required for degrees in music. Candidates for the degree of B.A. must pass three distinct examinations : Responsions (known among undergraduates as *Smalls®) before the masters of the schools (six in num¬ ber) ; first public examination (Moderations or ˆMods®) before the examiners known as moderators (in the pass school six, in the clas¬ sical School seven, in the mathematical three) ; and the second public examination (or (<Greats))) before the public examiners (six in the Pass School, five in the school of literce humaniores, and three, four or five in each of the other eight honor schools, namely, mathe¬ matics, natural science, jurisprudence, modern history, theology, Oriental studies, English lit¬ erature and modern European languages). Can¬ didates are admitted to pass Moderations at their second term, and to a Final Pass School as soon as they have passed Moderations. Honors may be obtained in each of the two public examinations. The first consists of an examination in Scripture, or an alternative Greek or Oriental book, and in either classics or mathematics for a pass or honors. Candi¬ dates are

admitted to the honors examination only from the fifth to the eighth term from their matriculation, and are put to a much severer test than candidates for a mere pass. The successful candidates are arranged by the moderators according to merit in four classes, in each of which the names are published in alphabetical order — a feature of Oxford honor lists. In the second public examination honors are conferred in each of the nine honor schools already mentioned. Successful candidates are arranged by the public examiners in four classes according to merit, and their names pub¬ lished in these classes in alphabetical order. Candidates in the Pass School are examined in three subjects chosen from the following four groups: (1) Classics, classical history, Sanskrit and Persian; (2) Modern languages and his¬ tory, political economy and a branch of legal study; (3) Mathematics and six branches of natural science ; (4) Religious knowledge. Not more than two subjects may be chosen from any one group, but one of the subjects must either be classics (two books in Greek or one Latin and one Greek), Sanskrit, Persian or a modern language (either French or German, with composition and literary history). A B.A. may proceed to the degree of M.A. without fur¬ ther examination or exercise, in the 27th term from his matriculation, provided he has kept his name on the books of some college or hall, or upon the register of non-collegiate students, for 26 terms. In the case of all other degrees (except honorary ones) some examination or exercise is necessary.

Affiliated colleges are Saint David's College, Lampeter (1880) ; University College, Notting¬ ham (1882); Firth. College, Sheffield (1886); University College, Reading (1899) ; Hartley University College, Southampton (1903) ; Exe¬ ter Diocesan Training College (1906) ; Royal Albert Memorial University College, Exeter (1908), and a number of colonial universities.

Students accredited from these affiliated col¬ leges are admitted to the Oxford public exam¬ inations after a reduced period of academical residence, they are not required to pass Re¬ sponsions, and can take

their B.A. degree after eight terms' residence, provided they have ob¬ tained honors at either the first or second public examinations.

The University of Oxford possessed the patronage of few church livings in its own right, but through an act of James I, Roman Catholics are disabled from presenting to any ecclesiastical benefice and their rights within 25 of the counties of England and Wales are made over to this university, those in the other 27 counties being conferred on that of Cambridge. Many of the colleges possess considerable ecclesiastical patronage. There are between 30 and 40 scholarships and exhibitions in the gift of the university, besides those belonging to the various colleges and halls. Of international im¬ portance are the Cecil Rhodes scholarships, dat¬ ing from 1902, each of the annual value of $1,500, to be held by students from every im¬ portant British colony, from Germany and from every State and Territory of the United States of America. There are also several valuable prizes, such as the Stanhope, for a historical essay; the Newdigate, for an English poem; and the Gaisford, for composition in Greek prose and verse. The Radcliffe traveling fel¬ lowships are awarded to enable students of natural science to prosecute their studies abroad. Consult Clark, <The College of Ox¬ ford (1891) ; Corbin, <An American at

Oxford) (1903) ; Fulleylove and Thomas, <Ox-ford) (1904) ; Gribble, (The Romance of

Oxford Colleges* (1911); Hutton, (Literary Landmarks of Oxford* (1903) ; Lang, A., ˆOxford Notes) (1879) ; Lyte, (History of the University of Oxford) (1886) ; Rashdall, Uni¬ versities of Europe in the Middle Ages) (1895) ; Smith, Goldwin, (Oxford and Her Colleges) (1895) ; the series of (College Histories) and the (University Calendar* ; Vallace, (01d Colleges of Oxford) (1912), and the Stu¬ dent's Handbook to the University and Colleges of Oxfords

Philip Molyneux,

Editor of the Oxford University < Gazetted

OXIDASE, any member of a certain group of enzymes, which are distinguished, as a class, by their power of inducing the direct oxida¬ tion of sugars and certain other substances. The chemistry of the oxidases is very imper¬ fectly known, but the group appears to be widely distributed in the vegetable kingdom, and it probably plays an important role in the chem¬ ical changes that occur in the growing plant. Oxidising enzymes are also found in animals. Artificial oxidases

have been prepared by Davy-Henault from faintly alkaline solutions of gum treated with solutions of manganese salts.

OXIDE, in chemistry, a compound formed by the direct union of oxygen with a metallic base or with an organic radical. The oxides may be classified, in a general way, as acid, basic and neutral. An acid oxide is one which has acidic properties or which combines with the elements of water to produce an acid. Sul¬ phur trioxide, S03, is a familiar example of this class of oxides, as it unites directly with water to produce sulphuric acid. Basic oxides are

those which have basic properties or which are capable of uniting with acids so as to produce salts. Calcium oxide (lime), CaO, is of this character. Neutral oxides are those which are neither acid nor basic in any marked degree. The magnetic oxide of iron, FesO.1, is an ex¬ ample of this class. The oxides are also classi¬ fied in accordance with the proportion of oxy¬ gen and base that they contain. When two oxides of the same base are to be distinguished, that which contains the more oxygen in pro¬ portion to the base is sometimes called the per¬ oxide, the other being called the suboxide. CuO, for example, may be called copper per¬ oxide, and Cu20 copper suboxide. These par¬ ticular terms, however, are not used as gen¬ erally as formerly and are usually applied to the highest and the lowest oxides in a series of more than two. The term protoxide is some¬ times applied to a neutral oxide which con¬ tains a single oxygen atom in combination with one atom of a divalent base or with two atoms of a monovalent base. An oxide containing one, two, three, four or five atoms of oxygen. is called the monoxide, dioxide, trioxide, tetroxide or pentoxide of the corresponding base. Occa¬ sional departures from this simple rule will be met with in modern chemical nomenclature, but in such cases the anomaly is due to some pe¬ culiarity in the behavior of the oxide or to the difficulty of changing a name after it has once been definitely adopted, even though it be erro¬ neous when judged by correct principles. The gas whose formula is NO, for example, is com¬ monly known as nitrogen dioxide, as though its formula were N202. A sesquioxide is an oxide containing three atoms of oxygen to two of the base; the name being derived from a Latin word signifying ((one and a half.® Sesquioxide of iron, for example, has the formula Fe2Os. See Peroxides.

OXLEY, oks'li, James Macdonald, Cana¬ dian author and lawyer : b. Halifax, Nova Scotia, 22 Oct. 1855 ; d. 1907. He was graduated from Dalhousie University, Halifax, in 1874, studied at Harvard in 1876-77

and was ad¬ mitted to the bar in 1878. He practised law in Halifax in 1879-83, when appointed legal adviser in the Dominion Department of Marine and Fisheries. He resigned from this office in 1891 and engaged in the life insurance business in Ottawa and Montreal. Beside (Nova Scotia Decisions> (1880-83), of which he was joint editor, he has written a long series of boys' books, such as (Donald Grant's Development (1892); (Archie of Athabaska> (1893); (In the Swing of the Sea* (1897) ; (Fife and Drum at Louisburg) (1899), etc., and (Lhasa at Last: a Tourney to the Forbidden City of Tibet

(1900).

OXNARD, oks'nard, Cal., city in Ventura County, on the Southern Pacific and V entura County railroads, 65 miles northwest of Los Angeles. It contains a public library, beet-sugar mills and refinery, machine shops, wood¬ working establishments, *etc.* The city owns the water-supply system. Pop. 4,417.

OXUS, ok'sus, or AMU DARYA, a moo'-

dar'ya, a river of central Asia. It is formed by the confluence of the Pamir and Ab-i-Panja rivers in the Pamirs. The Pamir, which flows from Lake Victoria, 13,400 feet above sea-

level, and the Oxus after the confluence of the Ab-i-Panja and the Pamir, form the greater part of the boundary between Afghanistan and Russia. This part of the river is about 680 miles long; the course is first for about 150 miles in a direction, in general, westerly, then north for 120 miles, then west-northwest for about 50 miles, then southwest for 100 miles. Here it leaves the mountains which have previ¬ ously come down almost to its banks and runs about 260 miles west through plains, which are particularly wide along its southern bank. From the confluence of the Kunduz near the begin¬ ning of this stretch to the mouth there are no affluents on the southern bank, for all streams to

the south are swallowed up by the sands of the desert. The greatest width of the Oxus at flood is over 1,000 yards, its greatest current is nve miles per hour. The stream is fordable at a few places in the plains. Elsewhere it is crossed on rafts made of inflated skins or on ferries worked by swimming horses. At Charjui the river is crossed by a railroad bridge on the Merv-Bokhara line. The river is navigable be¬ low Charjui, which is about 150 miles from the Afghan border, and there is a regular serv¬ ice by flat-bottomed paddle steamers as far as Pata Kissar. Consult Rawlinson, Sir H. C., *The Road to Merv) (Proceedings 5 of the Royal Geographical Society, new series, Vol. I, London 1879) ; Krapotkin, <The Old Beds of the Amu-Darya) (Geographical Journal, Vol. XII, London 1898).

OXY-ACIDS, according to older chem¬ ical usage, are acids which contain oxygen ; those containing hydrogen without oxygen being called hydracids. Nitric acid, HN03, for example, was called an oxy-acid, while hydro¬ chloric acid, HC1, was called a hydracid. The term oxy-acid is not often used in this sense at the present time, but organic acids which con¬ tain the radical hydroxyl, OH, are frequently called oxy-acid, or, more correctly, hydroxy-acids. The organic acids of the lactic acid series, for example, may be regarded as derived from those of the acetic acid series by the substitu¬ tion of a molecule of hydroxyl for an atom of hydrogen and they are, therefore, oxy-acids or hydroxy-acids, according to the more modern terminology. Acetic acid, for instance, has the formula CHs.COOH, and glycollic acid (which belongs to the lactic acid series) has the formula CH2OH.COOH. Glycollic acid may, therefore, be regarded as oxy-acetic acid or hydroxy-acetic acid, if considered as being derived by substituting OH for one of the hydrogen atoms of the methyl group in the acetic acid. Lactic acid itself may be regarded as hydroxy-propionic acid, the formula of propionic acid being C2H5.COOH, while that of lactic acid is C2H4OH.COOH. Oxy-acids are thus alcohols at the same time as they are acids.

OXYACETIC ACID. See Glycollic Acid.

OXYGEN. See Liquefied and Com¬ pressed Gases.

OXYHEMOGLOBIN. See Hemoglobin.

OXYHYDROGEN LIGHT. See Cal¬ cium Light.

OXYRHYNCHUS, Egypt, an ancient town, now represented by Bahnasa on the Bahr Yusuf or Joseph Canal, about 100 miles south of Cairo.

The site presents mounds of ruins, covering an area unsurpassed by few ancient Egyptian towns. Opened and explored since 1897, these mounds have yielded rich finds in papyri con¬ taining many precious treasures of lost classi¬ cal and early Christian literature. Greek papyri unearthed in 1897 and in 1903 include 3d cen¬ tury fragments of the “logia55 or “Sayings of Jesus.55 . (See Agrapha). Among the Latin papyri is a fragment of the epitome of Livy’s history covering books 37-39 and 49-55. On the back of this papyrus is written the largest piece of the New Testament on papyrus yet discovered, namely, the Epistle to the Hebrews. Another fragment comes from the Septuagint version of Genesis — a century older than extant vellum manuscripts of the same book. Among other Greek papyri is a 1st century b.c. copy of an epinician ode, by a poetess, per¬ haps Corinna, the rival and reputed teacher of Pindar; epigrams by Leonidas, Antipater and Amyntas ; part of a philosophical dialogue in which the tyrant Pisistratus is one of the speak¬ ers; a long 2d century papyrus contained an invocation to a goddess, and on the back an account of a miraculous cure effected by Im¬ hotep, the Asclepius of the Greeks and the 2Esculapius of the Romans. Other finds com¬ prise portions of the works of Homer, Herod¬ otus, Thucydides, Sophocles and other classical authors, commercial and legal documents, private letters, etc., throwing interesting side¬ lights on social life in Egypt during the Greek and Roman dominations. In early Egyptian times called Pempte, the capital of a nome, here the Oxyrhynchus or “sharp-mouthed fish55 was worshipped, while at Cynopolis (Dog Town), the neighboring city, the dog was revered, as recorded by Plutarch in the quarrels that arose between the two cities over the mutual revilings concerning the respective sacred animals. Oxyrhynchus had a flourishing Greek colony under the Ptolemaic dynasty. With the advent of the Christian era convents were established which attained a population of over 20,000 monks and nuns, to whom are due the wealth of ancient literature preserved and since discovered among the ruins. Consult Grenfell, B. P., and Hunt, A. S., (The Oxyrhynchus Papyri5 (Lon¬ don 1898-99), and (New Sayings of Jesus and Fragment of a Lost Gospel from Oxyrhynchus5 (London 1904).

OXYRHYNCHUS, the name given by the Greeks to a fish of the Nile (Mormyrus oxyrhynchus) , formerly reverenced by the Egyptians, who refrained from eating it. It was sacred to the goddess Hathor and is fre¬ quently represented on sculptures and coins. The Egyptians embalmed and buried the oxy¬ rhynchus with great pomp. It has a long snout and a pseudo-electric organ. Its modern name is “mizdeh.55 See Mormyrus.

OXYSALT, or OXISALT, a salt of an oxy-acid. See Oxy-acids.

OXYURIS, a genus of small thread-worm parasite in man; the male of O. vermicularis is about one-sixth of an inch and the female about half an inch long, and inhabits the rectum of children and of old people in numbers, setting up inflammation. See Nematoda; Thread¬ worm.

OYAMA, oya'ma, Prince, Japanese field-marshal: b. Satsuma, 1842; d. 1(3 Dec. 1916.

He was a cousin of the famous Saigo I aka-mori, who headed the Satsuma Rebellion of 1877-78. Oyama fought on the side of the Imperialist forces during the war of the res¬ toration, and was one of the earliest students of foreign military methods, having been dis¬ patched to Europe by the government at the time of the Franco-Prussian War, when he attached himself to the Prussian forces, remain¬ ing at his post until the conclusion of the siege of Paris. Shortly after his return the Satsuma Rebellion broke out and Oyama commanded a brigade of the Imperial forces dispatched against his cousin. Oyama did not hesitate to apply his Western skill and experience to the undoing of the rebels, and in September 1877 he returned in triumph to Tokio. He was soon afterward promoted to the rank of lieutenant-general and appointed chief of the general staff. In 1880 he was again given a portfolio as Minister of War. In 1894, when war with China broke out, he went to Manchuria in com¬ mand of the second army, which captured Port Arthur and Wei-Hai-Wei. His record took the form of a succession of triumphs, and at the close of the struggle he was promoted to the rank of marquis. By 1898 Oyama had been advanced to the status of field-marshal. In the war with Russia, Oyama acted as commander-in-chief, and added to his reputation by a series of victories. A princedom was be¬ stowed upon him for this achievement. The Princess Oyama was among the first of the girl students to be sent abroad by the empress in the early seventies, and spent many years in the United States.

OYER (oi'er) AND TERMINER, ter'- mi-ner Court of. See Court.

OYOMEI PHILOSOPHY. Wang Yang-ming (q.v.), pronounced Oyomay in Japanese, propounded a system of thought, which re¬ produced and expanded in Japan, from 1650 to 1850, fed the minds of almost every one of the men who created New Japan. In place of the original Chinese religion, when the forefathers worshipped a personal god, Confucianism sub¬ stituted an abstract entity devoid of personality. After Confucius (q.v.) had set down in literary form the traditions and teachings of. the an¬ cients, in the canon of the Five Classics, these books became the basis of all Chinese culture and the point of departure for all philosophic discussion, during 25 centuries, the . com¬ mentaries being countless and the derivative literature uniquely voluminous, among, which the names of Mencius (q.v.) and Chu Hi (q.v.) are the chief. The former expounded the sys¬ tem of the sage, making it a political organon, with a strong flavor of democracy — so much indeed that when the Chinese heard of the government of the United States of America, they imagined that <(the barbarians® had got their ideas from Mencius ! After the long strug¬ gle with Taoism (q.v.) and Buddhism, Con¬ fucianism, in its mediaeval statement by Chu Hi, issued, not merely as a canon or a ritual, but as a pantheistic-creed. According to . this, the one abstract principle evolved out of itself the Great Absolute (Ri), primordial cause of all existence. In its motion, the male principle was produced ; in its rest, the female. Thus heaven

and earth were made and through the supreme cause eternally continuing its activities, all things, animate and inanimate, came into being. This breath of nature (Ki), or the energy ani¬ mating these two ever-acting principles, which never cease working, follow fixed, inscrutable and immutable laws. To be in harmony with these laws is man's chief end of being, -the system of Chu Hi was eclectic, for he sought to show that in the various schools of thought much the same substance of truth was taught; and also conservative; and indeed these were largely accepted as the teaching of the past. Yet against this scientific philosophy and critical erudition based on realism was the idealistic intuitionalism of his contemporary Lu (b. 114U a.d.) whom the Japanese call Riku, who con¬ sidered that the keeping of the heart aright was the beginning and aim of all study. He how¬ ever, wrote little, but Oyomei (Wang Yang-ming), his first great follower, was a man, skil¬ ful with pen and tongue, of infinite wit, rich in humor, apt in illustrations and possessed of a fine literary style. Instead of repeating past wisdom, he sought to find all truth within his own heart. The heart and Ri are one. If a man knows his own heart, he knows the way and heaven. To act is to know. If we do not act right,

we do not know. (Exitus acta probat). All knowledge is useless that is not expressed in acting. The system of thought elaborated by Chu Hi, when introduced into Japan in the 17th century, won the adherence of educated men, displacing Buddhism, which, was aban¬ doned to the lower classes. As in China, it was adopted as the official orthodoxy by the government, for in it the Yedo usurpers saw a formidable ally and support for their despotism. Thinkers of different mind ran the risk of ban, persecution or death. Yet already, disciples of Oyomei had begun to expound and apply a doctrine possessing so peculiar a charm and one harmonizing so subtly with the Japanese tem¬ perament. To them, as led by Oyomei, the whole universe was incessantly surging on to higher spheres of development and calling upon men to join its glorious advance. Moreover, their good works were quickly manifest in philanthropy, the economic improvement of the landscape, the fertility of the fields and the morals of society. Nakae Toju (1608-49), the pioneer expounder of Oyomei, was popularly known as <(the living Confucius.® Another champion of Oyomei has left a superb monu¬ ment in his engineering feats of irrigation, but had to suffer for alleged heresy. and died officially disgraced, in exile. The Japanese thinkers went further in their conception of cosmic force, and using the modes of thought so long in use among the Zen (contemplative) sect of Buddhists, they reached conclusions, curiously akin to those of the modern evolu¬ tionists, which prepared the way for the enor¬ mous vogpe in recent years of the Occidental theorists in the physical sciences. The dragon was their favorite symbol of the supreme power of the universe. They sought even to penetrate behind the mask, which change imposed on all things. In spite of the hostility of the orthodox academicians in Yedo and the terror of the censorship, the new ideas of Oyomei, which called for a reconstruction of society and gov¬ ernment, steadily gained ground. Satsuma, Choshiu, Hizen, Tosa, the provinces whence

nearly all the great statesmen of modern Japan have arisen, formed the stronghold of this philosophy, while in Echizen, Yokoi, who sent the first students to America, was its chief ex¬ pounder. Most of the

generals and admirals, . distinguished in the wars with China and Rus¬ sia, were brought up in the Oyomei philosophy. Action, which looked to political reconstruction, began at Osaka in 1837, when Oshiwo, a famous Oyomei scholar, led a revolt, which in time of famine opened the granaries to the starving poor. While Bushido (q.v.) was taught only for practical benefit and never became a phi¬ losophy, Oyomei fed the men who hungered for intellectual justification of their protests against the Yedo despotism and of their actions, techni¬ cally lawless but inherently righteous. Their proceedings,ˆ in overthrowing dualism, restoring the Mikado's supremacy, abolishing feudalism, tolerating Christianity and granting freedom of conscience, were all, in their minds, the logical result of Oyomei, which thus demonstrated its true nature. At the antipodes of the quietism and conservatism, both of the archaic and the neo-Confucianism,. Oyomei meant stimulus, prog¬ ress, an alert mind that welcomes the new, when it is demonstrably true, and confesses fault when discovered, even in the old ideas and time-honored custom. Nothing so explains the cause and reason for the New Japan, excelling in potency by its interior force all foreign in¬ fluences, as does this intellectual discipline, be¬ gun nearly two centuries before Commodore Perry, and which gave the nation its new mind. Yet. even in this history, the trend of the true genius of Japan is discerned — which is ever impatient with the abstract and is eager for the practical. Oyomei, as expounded in Japan, transformed mediaeval Confucianism into an im¬ mediate working principle for the individual, while calling for a vital relation between knowl¬ edge and action. In this light, Japan is no "enigma," and the Japanese are not "Oriental," according to vulgar ignorance or associations, but are normal. See Wang Yang-ming.

Bibliography. — Henke, N. G., <The Philos¬ ophy of Wang Yang-ming) (Chicago 1916) ; Griffis, W. E., (The Japanese Nation in Evolu¬ tion (1907) ; Knox, transactions of the Asiatic Society of Japan* (Vol. XX) ; Okakura, the Awakening of Japan (1904) ; Armstrong, R. C., (Light from the East; Studies in Japan¬ ese Confucianism) (Toronto 1914).

OYSTER BAY, N. Y., town in Nassau County, on the north coast of Long Island, on an inlet of Long Island Sound, and on the Long Island Railroad, about 15 miles east of New York and 28 miles from City Hall. It is con¬ nected by steamers with New York and the large sound ports. Its name comes from its principal industry — cultivating oysters. It is a favorite watering-place. Sea Cliff, (Pop. 2,108) and Farmingdale (Pop. 2,091) are villages in the town. Contains the home of late ex-Presi- dent Roosevelt. The government is adminis¬ tered by

town meetings held binennally. Pop. exclusive of Sea Cliff and Farmingdale, 16,097.

OYSTER-CATCHER, a shore-bird of the

plover family, several species of which con¬ stitute the genus Hcomatopus. The bill is of great length, pentagonal at its base, slightly bent upward and flattened or compressed at the apex, which is truncated. Oyster-catchers fre—

quent both seacoasts and inland waters, picking up small mollusks, crustaceans, sandworms, *etc.* They are 18 to 20 inches long, and their plumage is handsomely variegated with black, white and brown, so that the Old World species (H . ostralegus) is often called “sea-pie” in Eng¬ land. The familiar American species is H. palliatus, it is white below, blackish brown on top, with a band of white on the wings. It is to be found in all parts of the country, but is rare northward of the middle parts. Consult Elliot, (North American Shore Birds) (1895) ; Newton, A., (A Dictionary of Birds0 (London 1896) ; Sandys and Van Dyke, (Upland Game Birds* (1902).

OYSTER-CRAB, or PEA-CRAB, a

small crab (Pinnotheres ostreum) which dwells inside of the shells of American oysters as a commensal (see Commensalism). Other species inhabit other host-shells in various parts of the world, one associated with a Mediter¬ ranean Pinna being the subject of some pleasant classical legends. These small crabs are excel¬ lent eating, but the difficulty of getting them in any considerable quantity makes them a costly dainty.

OYSTER-FISH, a local name for the tautog (q.v.).

OYSTER PLANTS, VEGETABLE OYSTER, SALSIFY, or SALSAFY, a bi¬ ennial composite herb (Tragopogon porrifol-ius). When in flowers it is about four feet tall, bears grass-like leaves and showy, purple flowers, which close before noon. It is a native of Europe, whence it has spread as a weed to many countries. The cultivated varieties are grown for their gray tap-roots, which are often a foot long and two inches in diameter, and which suggest the flavor of oysters. The seed should be planted in deep, rich, well-drained soil as early in the spring as the ground can be worked, the drills being 15 or 18 inches apart.

The plants must be cleanly cultivated until their tops cover the spaces between the drills. In late autumn part of the crop should be dug, the remaining part being allowed to stay until spring. Freezing does not harm the roots; in¬ deed, they are believed to be better flavored if so treated. The stored roots are very apt to shrivel, become tough and lose flavor. Cool, moist storage, or pits, or especially burial in dry, clean sand obviate this difficulty. The plant succeeds best in cool climates and should be in every home garden. As a commercial vegetable it is of far less importance than parsnips and carrots.

OYSTER-SHELL BARK-LOUSE. See

Scale Insects.

OYSTERS, lamellibranch or bivalve mol¬ lusks of the family Ostreida, more strictly, edible species of the genus Ostrea, though tfie name is sometimes applied to other Pelecypoda, as the hammer oysters and pearl oysters of the family AviculidcB. In the true oysters (Ostrea) the shells are irregular, the two valves unequal and the hinge without teeth. The animal is attached to some submerged object by the left valve, which becomes hollowed out to receive the body, while the right valve, which is free, is flattened or may be even concave from above. The shells are closed by a single adductor mus¬ cle, popularly called “heart,” which extends

from about the centre of one valve, through the animal, to the other. The edges of the mantle are free from each other and are fringed upon the margin. The gills (called ((beard® in cook-‘books) are nearly equal and coherent dorsally, and the labial palpi are triangular. The oysters are peculiar in that the intestine does not run through the heart, which lies anterior to the muscle, while the foot is small or even entirely absent, a result of the sedentary life.

About 70 recent species of Ostrca are recog¬ nized, mostly inhabitants of the warmer seas. The most important species are the common oysters of Europe (O. edulis et al .),* the Ostrea) virginiana of the

eastern coast of America, and the Japanese oyster (O. cucul-lata) . The first-mentioned species occur from Norway and the Baltic to England and into the Mediterranean, another species of less import¬ ance (O. adriatica) taking their place in the eastern Mediterranean and the Black Sea. At one time O. virginiana ranged along our whole eastern coast, from the Gulf of Saint Lawrence to the Gulf of Mexico, and was used extensively by the Indians, but since the growth of civiliza¬ tion there it has disappeared from the whole coast between Nova Scotia and Cape Cod. There still remain beds in the Bay of Chaleurs and around Prince Edward Island. It has been introduced at points on the Pacific Coast. On the Pacific Coast two native species are eaten, O. conchophila of California and 0. lurida of the coasts farther north. In the tropics species belonging to the subgenus Alectryonia become attached to the roots of the mangroves and are exposed at low tides ; these are the so-called <(tree oysters® or mangrove oysters.

Oysters, like all other mollusks, reproduce exclusively by eggs. Our O. virginiana has the sexes separate, but the European oysters and one of the Pacific species are hermaphroditic. The Eastern oyster is very prolific, producing from 10,000,000 to 60,000,000 eggs. Fertiliza¬ tion takes place by the admixture of the ova and sperm in the water. From the eggs there hatch out small, free-swimming larvae, which swim about until after the first appearance of the shell, and thus aid in the distribution of the species. They swim by means of a ciliated velum or foot, and the valves of the horny larval shell are symmetrical like those of a clam, while the single muscle uniting them is not the same as that which appears in the adult. After a few days this free life ceases and the young become attached by the left mantle fold, which secretes a limey deposit at its margin. They are known as <(spat® and grow rapidly, feeding upon the microscopic life in the water which is conveyed to the mouth by the cilia covering all parts of the body, and especially the gills and labial palpi. When large enough for transplantation the young are termed <(seed oysters.® As will be seen from the foregoing, the oyster needs some solid sup¬ port upon which to attach itself, otherwise it would sink in the mud and become smothered. In nature this support is furnished by reefs of rocks or by banks of old oyster shells.

On the natural oyster beds a very small percentage of the eggs is ever fertilized and vast numbers of the swimming larvae are de¬ stroyed by failure to secure attachment, or by being swallowed by certain surface-feeding

fishes or by numerous lower .animals, which, like the adult oysters, sweep their food into the mouth by ciliarv action. Many young oysters are destroyed by a host of enemies that prey upon them ; others are suffocated by luxuriant plant and animal growths, including older in¬ dividuals of their own species, or by sedimen¬ tary deposits ; sudden freshets kill great num¬ bers ; storms tear them up and cast them ashore, and those which, like the ˆraccoon® oysters, live on tidal flats are sometimes de¬ stroyed in great numbers by ice in the winter or by too long exposure to the sun's rays . in summer. Notwithstanding all this destruction the oyster is so prolific that, except along the New England coast north of Cape Cod, where a change in physical conditions has proved detrimental to its existence, the beds have con¬ tinued to extend until subjected to the destruc¬ tive influence of the white man, and have be¬ come the foundation for the development of a mutualistic fauna and flora almost as rich, varied and complex as that of a coral reef.

Culture. — As long as the market for East¬ ern oysters was limited to a relatively narrow belt along the seaboard, and before the popu¬ lation of some parts of this region had reached its present congested state, the extensive nat¬ ural beds of Chesapeake Bay. and other parts of the coast afforded a sufficient supply. In¬ creasing demand long since led to overfishing, which menaced the natural beds and compelled the development of new ones by planting suit¬ able barren bottoms, often in regions where the oyster does not naturally breed. Extensive acreage has thus been developed and rendered productive, especially in Long Island Sound and other regions where suitable riparian laws secure the rights of private ownership. At¬ tempts to establish close seasons and similar legislative devises have proved of little avail and have generally led only to more intensive harvesting during the open season. With the further widening of the market, due to im¬ proved transportation facilities and the intro¬ duction of the refrigerator car, the demand has severely pressed upon all sources of supply. This healthy condition of the oyster industry has stimulated a serious interest in the prob¬ lems and possibilities of oyster culture and has led to the survey of suitable grounds for plant¬ ing, from New Tersey to Texas. Vast neg¬ lected areas in the shallow bays and sounds along many parts of our coast could, by intelli¬ gent preparation and planting to oysters, be transformed from unproductive mud banks into rich sources of food supply and revenue. But no one should venture into this field without a full understanding of the complex biological and physical factors involved. To do otherwise is to invite disappointment and financial loss.

The successful maintenance of planted oys¬ ters is dependent upon

the proper consideration of the character of bottom, the depth, tempera¬ ture and density of the water, the food supply for the growing oysters, the rate of sedimen¬ tation and the methods of collecting the market¬ able oysters, combating enemies and many minor matters.

Selection of a suitable bottom is of prime importance, and the ideal condition is found in one presenting a firm substratum of stones or clay covered bv two or three inches of loose organic mud. The first furnishes a foundation,

the latter a suitable nidus for the growth of the minute organisms which constitute the oysters food. Rocky, clayey or sandy bottoms are generally poor food producers, and the latter are peculiarly liable to shifting by cur¬ rents with a resulting burial and destruction of the oysters. Deep, soft mud engulfs and suffocates the oysters. Too rapid a deposition of sediment has the same result and is especially fatal to young and small oysters.

As indicated by their extensive geographical distribution oysters naturally withstand a range

m«tTˆ)eratllre from below freezing to above A) , but when subjected to these extremes they undoubtedly deteriorate and in time succumb. In common with other organisms oysters grow most rapidly in warm waters and find their optimum temoerature between oU and 70 . If it ‘be desired to establish self-perpetuating beds it is important that the tem¬ perature should reach an even higher point during the summer in order to stimulate nat¬ ural reproduction. Being naturally brackish water animals oysters do not thrive in water of full S63. salinity and become of very poor quality when the percentage of salts falls too low. In commercial quantities they inhabit water of densities between about 1.008 and It is important to so locate beds that shall be free from inundating freshets. While oysters are generally planted in shal¬ low bays and coves at depths of from one to five or six fathoms luxuriant natural beds are found from above low* water to a depth of

20 fathoms, and in Long Island Sound planting is practised to 15 fathoms.

The food of ovsters consists of a great va¬ riety of minute animals and plants, protozoans, the eggs and swimming larvae of many kinds of sponges, worms and mollusks, including their own, the spores of algae and especially the minute plants known as diatoms. The latter live in enormous numbers on the surface of the mud in shallow bays, and during warm weather multiply with great rapidity. As they constitute the bulk of the oyster's food the im¬ portance of determining their abundance in ad¬ vance is self-evident. The other organisms chiefly belong to the associations that become established on the oyster beds and their occur¬ rence need not be so carefully predetermined. It is possible to establish highly successful beds at some distance from the diatom garden if strong tidal or other currents pass from the latter to the former. The existence of such currents is beneficial in many other ways also than as food carriers. They sweep the beds clean of sediment, ensure a ready supply of oxygen and increase the fecundity of the beds by bringing the ova and spermatozoa in con¬ tact and by carrying the young swimming spat to suitable places of attachment.

All of these conditions having been satisfac¬ torily determined and the site for a bed located the planter first marks its boundaries by stakes or buoys. The bottom is then smoothed and cleared of snags and debris either at low tide or by means of tongs or dredges according to the depth. If the bottom is covered by more than an inch or two of mud it is prepared by strewing it with an even layer of shells, gravel, slag, cinders or similar material. These fur¬ nish a foundation, and, if the bed be suitably related to a spawning ground, serve at the same

time as a ((clutch)) on which the spat will settle. In this case nothing further need be done but to await developments and care for and protect the beds. But if this is not the case young or "seed® oysters must be provided. These are usually from one to one and one-half inches in diameter and are obtained either by dredging the gravel and shells from natural beds or by spreading on the bottom suitable shells or other "clutch® to collect the spat; when they are raised and spread over the prepared bottom, usually to the extent of 300 to 600 bushels per acre. While very soft bottoms are usually un¬ favorable for planting they may sometimes be prepared by covering with a layer of brush and it is probable that either by this method or by building open platforms many such places will be utilized in. the future. From one to four years, depending on the richness of the food supply, are

required to mature sea oysters. In order to make a portion of the supply available each year the bed should be staked off into three or four sections, only one of which is dredged annually, the others remaining undis¬ turbed to collect spat and mature their growth.

Among the teeming life of the oyster beds are found many plants and animals which are more or less destructive, especially to the young and thin-shelled oysters. Strong growths of eel grass and algae, as well as boring sponges and similar animals, should be kept in check by mowing or dredged and removed when neces¬ sary. A more serious pest is the gastropod mollusk (Urosalpinx) , which perforates the shells and destroys young oysters, especially southward; starfishes, which often sweep over the Long Island Sound beds in such vast armies that all but the very largest oysters arc de¬ voured; and drumfish and stingrays, the former of which creates great havoc in New Jersey, the latter in California. Strong stockades of stakes are a sufficient bar to the larger fishes. Prompt and energetic use of great mops in which they become entangled will greatly re¬ duce the number of starfishes, which can be used as fertilizers on the land. Large: numbers of drills may be captured by the use of an in¬ genious box dredge provided with a screen cover which excludes the oysters while the drills drop through its meshes into the interior. Cer¬ tain sponges and annelids also injure the oysters.

For a few weeks previous to marketing many oyster farmers transfer a portion of their crop from the beds in deeper waters to warm shal¬ lows, where the greater abundance of food causes them to fatten and improve in flavor. Such oysters are highly esteemed and have an enhanced, value. This process must not be con¬ fused with “plumping,® which, though also known as fattening, consists simply in changing the oysters to waters of a lower density for a few days. As a result they absorb water and become bloated. They gain nothing in nutrient value and deteriorate in flavor, but appearing plump and full find a ready sale at a higher price.

While the practicability of some forms of pond culture in the United States has received experimental demonstration and enormous pos¬ sibilities for future extension of the oyster in¬ dustry by this means are indicated, the demand has not yet led to the employment of the capital required for its development on a commercial

scale. Important advantages of pond culture lie in the possibility of increasing fecundity by artificial propagation and more efficient collec¬ tion of the spat, the control of the food supply and the exclusion of enemies. The immediate prospects are that the next practical step in the development of oyster culture in this country

resulting from decay or from pollution or otherwise. One of the forms of greenness to which oysters are subject is due to the presence of copper, and appears to be damaging to the quality of the oyster, if not actually poisonous.

Recent available statistics of oyster produc¬ tion are here tabulated :

United States

Atlantic Coast

Gulf Coast

Pacific Coast

Pounds

Value

Pounds

Value

Pounds

Value

Pounds

Value

Oysters, market, from public areas .

103,641,000

$4,416,000

72,413,000

$3,303,000

31,225,000

$1,112,000

2,300

$800

Oysters, market, from private areas .

74,652,000

8,305,000

64,642,000

7,239,000

7,956,000

381,000

2,055,000

686,000

Oysters, seed, from public areas .

26,960,000

1,035,000

22,436,000

- 948,000

4,522,000

87,000

1,800

200

Oysters, seed, from

private areas .

28,056,000

1,957,000

27,252,000

1,944,000

700,000

6.200

104,000

6,500

Total oysters .

233,309,000

$15,713,000

186,743,000

$13, 434, 000ˆ44, 403, 000

$1,586,200

2,163,100

$693 , 500

will be in the direction of raising in artificial enclosures seed oysters for planting beds on natural and prepared bottoms.

Cultural methods have attained a high degree of perfection in various European countries, es¬ pecially in France and Holland, and in Japan. In France O. edulis and allied species are culti¬ vated in oyster parks. The (<spat55 is collected on fagots of brush, tiles or other collectors placed in proximity to spawning beds. The <(seed55 oysters are then removed to partially enclosed growing-ponds admitting the tides through sluices and flood-gates. When fully grown they are fattened and flavored in small enclosed ponds or ((claires. While in these their diet of diatoms gives them a green color that is no sign of inferior quality. While some of these refined methods will doubtless serve as

the basis of a future oyster culture on parts of the Atlantic seaboard, the simpler Japanese methods seem better adapted to the culture of the oysters of our Pacific Coast. The oyster culture of Japan reaches its highest develop¬ ment in the Inland Sea and is concerned chiefly with O. cucullcita. As in France, the exact methods employed differ greatly with the locality, but in general the farms are in shallow brackish waters, where the great tidal rise and fall leaves large areas exposed at low water. They are laid out with reference to the direc¬ tion of the currents, topography of the bottom, etc., and each is enclosed by a bamboo fence or hedge. This area is then planted with bam¬ boo stakes stuck into the ground and variously laid out in straight parallel fences with suitable alleys and aisles or in .groups arranged in rows, circles, *etc.* These serve to collect the spat and to hold the growing oysters. In districts where growth ceases in two years two sets of fences arranged alternately are employed, one set being culled and rebuilt each year. In other districts the oysters are moved annually from shallow into deeper water until the end of the third or fourth year, the shallows near the shore being employed for spat collection, the moderate depths for growing bottoms and the deeper waters of each farm for fattening.

Oysters appear under certain conditions to be poisonous, whether on account of ptomaines

About five-eighths of these come from arti¬ ficial beds.

In the United States oysters are collected from the beds, whether natural or artificial, in two ways. In the shallower waters they are taken by means of oyster-tongs, which are like two long-tined rakes, hinged so as to open and close like shears. In deeper water (down to 15 or 20 fathoms) recourse is had to the dredge worked by steam or sail boats. This is a rec¬ tangular iron framework, about four feet across, with sharp edges, or with long teeth upon one side, while attached to the other is a large open-work bag of cord or iron. This dredge is dragged over the bottom, the teeth or sharp edges tearing the oysters loose, when they are caught in the bag and brought to the surface. See also Pearl.

Bibliography. — The importance of the oyster industry has led to the development of an extensive literature to which the following, chiefly government publications, are introduc¬ tory: Brooks, W. K., (The Oyster) (Baltimore 1915) ; Brooks et al., (Report of the Oyster Commission of the State of Maryland5 (An¬ napolis 1884) ; Dean,

(Present Methods of Oyster-culture in France) (Bull. U. S. Fish C. 1890) ; Dean, (European Methods of Oyster-culture) (ib. 1891) ; Dean, (Japanese Oyster-culture) (ib. 1903) ; Huxley, (Oyster Industry of England5 (English Illustrated Magazine, Vol. I) ; Ingersoll, (The Oyster Industry) (Tenth Census Report, 1881) ; Kellogg, J. L., (Shell-fish Industries5 (New York 1910) ; Moore,

(Manual of Fish-culture5 (Washington 1897) ; Moore, (Report on Oyster Beds of Louisiana5 (Rep. Lb S. Fish Com., 1899) ; Ryder, Prin¬ ciples of a Rational System of Oyster Culture5 (ib. 1886). . Numerous additional biological, cultural and statistical papers may be found in the publications of the United States Bureau of Fisheries, including in the earlier volumes some translations of important papers by European authorities. The commissions of Maryland, New Jersey, etc., have also issued important reports, generally of more local interest.

OZ.7ENA, a discharge of fetid, purulent or sanious matter from the nostrils. It is a symp¬ tom rather than a disease, and may arise from

ulceration of the membrane lining the nostrils or from caries of the adjacent bones.

OZANAM, d’za’nan’, Frederick, French author, professor and philanthropist: b. Milan

Apnl 1813; d. Marseilles, France, 8 Sept.’ ˆ u • • • ˆ the second son of an eminent physician, Antoine Ozanam, a descendant of a long line of scholars and scientists and of Jewish extraction. Soon after the birth of Frederick, the family returned to their native aty, Lyons. Great care was exercised in the early education of the boy. The teacher who exerted the most influence over young Ozanam was Abbe Noirot. He was the youngest of 130 pupils , but nearly all the time he was a pupil in this famous school he led his class. He was well versed in the grammar and literature of English, German, Hebrew and Sanscrit, and was one of the eminent French scholars of the time. At an early age his writings attracted the attention of such men as Lamartine and his

as¬ sociates. After finishing his college course he began the study of law. It was while a law student in Paris that he formed the acquaint¬ ance of and became friends with Marie Ampere, the mathematician; Chateaubriand (q.v.) ; Lacordaire (q.v.), and a number of the writers and professional men of France.

His first public work was an attack on the doctrines advanced by the Saint Simonians. In reply to Ozanam's attack on their doctrines, the Saint Simonians accused the followers of Ozanam of doing nothing but advance theories. In May 1833, Ozanam and a few chosen com¬ panions held a meeting to consider ways and means of combating the Saint Simonians. At the suggestion of Ozanam it was resolved that they should unite in giving personal service ((to God in the persons of the poor, whom they were to visit at their own dwellings and assist by every means in their power.® This meeting was really the beginning of the Society of Saint Vincent de Paul (q.v.). The members of this new organization were to do more than give alms ; they were to place their intelligence, their education, their special knowledge of law and science, and their general knowledge of life, at the disposal of the poor.

Ozanam is regarded as the founder of the now great Society of Saint Vincent de Paul ; but he always, in his humility, repudiated the title of founder. ((We were eight,® he would say. He was one of the first, if not the first, to introduce Dante to the French people. His thesis on Dante when, in 1838, he went up for the degree of doctor of laws, electrified Paris. His audience wept, applauded and at the close rose en masse and expressed their appreciation. He was only 26 years of age when he was ap¬ pointed to the municipal chair of law in Lyons. Later he accepted the chair of foreign literature at the Sorbonne. When he began his work at the Sorbonne he was 27 years of age and had just been married. His work here showed that he was a master among instructors, a leader among students of literature ; but his great aim was <(to make men of his pupils,® to impart to them manliness, vigor and love of work.

In 1843 he was one of the group who founded the literary association called the (<Cercle Catholique.® Some of those interested

in this movement were Lacordaire, Montalem-bert (q.v.), De Ravignan and Bautain. Ozanam was made president. His speech on the literary duties of Christians was one of the great at¬ tractions of the first year. He shone as a scholar and an orator, defending the Catholic Church

against its opponents with great vigor, and he was recognized as a most industrious student ; but he is best known to-day for his personal service to the poor and the ignorant and his advocacy of the work of the Society of Saint Vincent de Paul. His best-known books are (Les Poetes Franciscains) ; (Dante's Divina Commedia) (Les Germains. > Consult O Meara, (Life and Works of Ozanam > ; bet¬ ters of Ozanam. >

OZARK (o-zark') MOUNTAINS, a pla¬ teau region, from 1,200 to 1,800 feet above the sea-level, extending with gradual upliftings from the southern part of Illinois into Missouri, then sloping down enters Arkansas and Indian Territory and extends into Kansas. The high¬ est point is Pilot Knob, in Iron County, Mo. The hills are in separate peaks or knobs, and not in continuous ridges. The irregularities which show mountain-making processes as ex¬ isting are not visible here ; the Ozark Moun¬ tains or Ozark Plateau belong with the oldest mountain regions of the world, and denudation is slowly and surely removing the last remnants of once lofty mountains. A small area of Pre-Cambrian rocks is exposed in the Saint Fran¬ cois Mountains,; the remainder of the plateau consists of rocks of Cambrian and Ordovician Age. The region was probably peneplained in Tertiary time, and has since been uplifted and dissected. On the southern slope are large forests.

OZOCERITE, o'zo-se'rit, a mixture of the solid hydrocarbons left behind by the evaporation of petroleum in situ. It is wax¬ like, occasionally with a fibrous structure, and usually consists of an aggregate of minute doubly-refracting needles. Fracture often conchoidal. Ozocerite varies in consistency from that of soft putty to that of beeswax. The melting point varies from 50° to 90° C., and attains the maximum value in the best material. The specific gravity is 0.9-0.98. The color by reflection is greenish or yellowish brown, green or black; by transmitted light a thin lamina appears brown or reddish brown. Ozocerite is often found together with pe¬ troleum, and as an impregnation or in fissures in sedimentary rocks. It is found in largest quantities in Gallicia, Rumania, Baku and Utah. The Gallician mines were formerly worked by hand, but now employ electrical power. The methods of extracting the wax vary from hand¬ picking to the use of boiling water. The result¬ ing wax is refined by sulphuric acid and char¬ coal, and is known as ceresine. It is used to adulterate beeswax; to make candles for hot countries, oils, and a substance like vaseline, as an electrical insulator, and to polish the heels and soles of shoes. The annual production of ozocerite in Gallicia is about 2,650 tons. See Elaterite; Hatchettite.

OZONE. See Liquefied and Compressed Gases; Allotropy.

p

Pi lie sixteenth letter of the English -and various other alphabets, is the sharp labial consonant pronounced when, the lips being closely compressed, they are separate by a forcible emission of the breath. Like k and t, it is a pure mute or surd, involving no action of the vocal chords: it differs from b in that fo is sonant: with the same compression of the lips as in p, the effort to pronounce b involves the vibration of the vocal cords. The form of this letter, P, comes from the Latin alphabet: the same speech element is called pi in Greek and its form is T, v. while in the Greek alphabet our character P is called rho, equivalent to r. In early Phoeni¬ cian writing the element p was represented by a vertical stroke curved or crooked to the left at the top(*l) : this form was also used in early Greek, but with crook directed to the right, (p): afterward the crook was made angular, (j”), and finally the two downward strokes were made of one length (O. In early Latin the p had the form (f) which finally became P. The surd labial p is freely interchanged with b, f and v, for they are all of the class of labials and dentilabials.

Languages springing from a common orig¬ inal differ from one another in the preference they show for p, b, f or v. The English lan¬ guage has very few words of Germanic origin beginning with p : such words in English are nearly all of Latin, Greek or Celtic origin. Latin p by Grimm’s law (q.v.) corresponds to English f, as pater (father). English p cor¬ responds to Latin b, as lip, cognate with labium. In German very many words of Latin origin, as palatinatus (from palatium), papa, pains (stake), persona (parson), pavo (peafowl), preebenda (prabend), piper (pepper) become pfalz, pfaffe, pfal, pfarrer, pfau , pfriinde, pfef-fer, *etc.* The digraph ph was originally used by the Latins to represent the sound of the Greek letter phi ($, <f), which must have been dif¬ ferent from the sound of the Latin letter *; else the Greek words philosophia, pharmakon, phonaskos, etc., would have been written filo-sofla, farmacum, fonascus, as the modern Ital¬ ians write everywhere* for ph — filosofia, fisica, Filomena, *etc.* There are no native Eng¬ lish words beginning with p followed by n, s or t ; but there are many such words of Greek origin: in those words the p is silent. The p between m and t in attempt, contempt, etc., is introduced to facilitate the utterance of the m: but in such words as

exemption (exemshun), redemption (redemshun), etc., there is no need of this mediating p and it is silent in correct pronunciation. See Alphabet; Phonetics.

10 miles southwest of Lodz, with which it has communication by means of an electric rail¬ way. Paper and agricultural implements are manufactured and there are also textile mills. Pop. 39,000.

PACA, pa'ka, William, signer of the Declaration of independence: b. Wye Hall, Hartford County, Md., 31 Oct. 1740; d. there, 1799. He studied at Philadelphia College, where he was graduated in 1758, and in the Middle Temple in London ; practised law in Annapolis ; became a patriot leader; was a member of the legislature 1771-74, of the committee of cor¬ respondence 1774, of the Continental Congress 1774-79, and of the State senate 1777-79. His career as judge began in 1778, when he became chief judge of the Maryland Superior Court; from 1780 to 1782 he was chief judge of the Court of Appeals for Admiralty and Prize Cases. In 1782-86 he was governor of the State; in 1788 was a member of the State convention which ratified the Federal Constitution ; and for the last 10 years of his life was United States district judge. His wealth and influence had been lavishly given to the Revolutionary cause, and he more than any one man perhaps over¬ came the opposition in Maryland to that cause.

PACA, a large agouti-like animal (Coclo-genys paca) of eastern South America, robust in form, with a broad, swollen head, caused by the great expansion of the zygomatic arches, and large e}res and ears. It is about two feet long and a foot tall ; the tail is a mere rudiment and the color brown, marked with rows of ob¬ long whitish spots. It lives near water in which it is much at home and digs shallow burrows in which a single young one is produced annu¬ ally. It remains hidden by day and seeks its plant-food by night, often making destructive forays upon plantations, especially of sugar¬ cane. The flesh is edible and the hide is useful for leather. Another less common species is re¬ corded.

PACAY, pa-ka', a Peruvian leguminous tree (Pros o pis juli flora) related to the mesquite. The pure white, flaky matter in which the seeds are embedded is used as food, and the pods, which are nearly two feet long, serve for feeding yattle. A gum, called mezquit gum, is also obtained from the plant. The name pa-cay is also applied to Inga Feuilli, another Peruvian leguminous plant.

PACCANARISTS, a religious congrega¬ tion of the Catholic Church, founded in Rome, in 1797, under the name of Regular Clergy of the Faith of Jesus, by Nicolao Paccanari, by whose name they came to be known popularly. The founder intended the congregation to carry ■ on the work of the Jesuits, just then sup-

PABRIANICE, pa'byq-nye-tse, Poland, a manufacturing town in the district of Piotrkow,

pressed, but upon the re-establishment of the latter m 1814 the Paccanarists were merged with them.

■n * pak-ka-re-tam'bo, or

PACCARITAMPU, Peruvian cave south of Cuzco, on the Vilcamija River, reputed among the Incas as the place where Manco Capa and his brothers appeared first on earth, and styled House of Dawn,® in Quicha Paccaritampu.

The same idea is prevalent in numerous mythologies of the American Indians. The sun came out of a cave in the morning and went into one in the evening. As the Peruvian upper classes of pre-Columbian days claimed that they were the children or descendants of the sun, they designated their starting place as the House of the Dawn.® This was symbolical and equivalent to saying that they came from the realms of the sun. The place from which the sun people came into Peru, according to the commonly accepted tradition, also became known as the Paccaritampu or House of the Dawn® or beginning.

PACCHIAROTO, pak-ke -a-ro'te, Jacopo, ?l?uan pamter: b-Sienna, 1474; d. France, 1540. When a boy he showed a taste for devotional art and was placed in the studio of Bernardino Fungai, a Siennese artist of contemporary fame. In 1535 he headed a conspiracy against the government of the city and after concealing himself in a grove fled

for his life to France, where he worked under Rosso, the famous Ital¬ ian painter, sculptor and architect, who had been invited to court by Francis I. While his main works in fresco and oil are at Sienna, his (Saint Francis of AssisP and (Madonna and Child ' in the Munich Pinakothek are among the gems of that collection. His style shows the influence of Perugino, and possibly of Raphael (q.v.). According to some authorities, the better of the works attributed to Pacchiaroto are really due to one Girolamo del Pacchia, while Pacchiaroto's work was at best mediocre.

PACCIOLI, pa-cho'le, PACIOLI, or PACIUOLO, Luca de Borgo, Italian mathe¬ matician : b. Borgo San Sepolcro, Tuscany, about 1440 ; d. about 1515. He traveled in the East in his youth and joined the Franciscan Order. He became famous as a teacher of mathematics in Florence, Rome and Venice. He wrote (Summa de Arithmetica, Geometria, Proportione et Proportionalˆ (1494; 2d ed., 1523), which covered completely the mathe¬ matical field of his day and was the first great work on mathematics after the Latin Euclid of 1482. Fra Luca is considered the inventor of bookkeeping on modern or quasi-modern lines.

PACE, a measure of length, used as a unit for long distances. The Latin pace was meas¬ ured from the mark of the heel of one foot to the heel of the same foot when it next touched the ground, thus stretching over two steps; while the English pace is measured from heel to heel in a single step. The Latin pace was somewhat less than five feet; the American mil¬ itary pace at the ordinary marching rate is two and one-half feet and at double-quick time three feet. The pace, measured separately for each individual, is the usual working unit in the con¬ struction of military maps in the field.

PACER. See Horse, Trotting and Pacing.

. PACHACAMAC, pach-a-ka/mak, ruined city and temple in the district of the same name in Peru. The village now occupying the site is called La Mamacoma and is the terminus of a railway from Lima, 20 miles to the northwest, and is situated near the Rio de Lurin. The an¬ cient city, a sacred city and quasi-Mecca of both the Incas and the earlier Yuncas, was devoted to Pachacamac, the supreme god and

creator of all in the Yunca theogony, and in the time of the Incas to a temple of the sun. The outlines of the old city are clearly visible; it had broad, regular streets and its entire site, a lofty hill, projecting out to sea, was elaborately terraced. On its top was the temple of Pachacamac, about <-00 yards long and 150 wide. A cemetery sur¬ rounds this temple and is very rich in remains of the pre-Incan civilization, especially house¬ hold utensils, which were buried with the flexed corpses. The Inca convent on lower ground is an adobe building, 116 yards long and 67 wide and contains 18 cells. The remains of tiny huts at the foot of the hill probably point to pilgrim¬ ages to these shrines, being no doubt inns for the entertainments of the pious visitor. Pizarro sacked the shrine in 1523, destroyed a wooden idol and it is said carried away 1,700 pounds of gold and 1,600 of silver. Consult Squier, <Peru> (1853) ; Uhle, M., <Pachacamac) (Philadelphia 1903); Wiener, <Perou et Bolivie) (1880).

The district of Pachacamac is an adminis¬ trative division of the province and department of Lima, with about 1,300 inhabitants. The same name is borne by an island off the coast of Peru near Lurin.

,_?ACHECO, Francisco, fran-thes'ko pa¬ cha ko, Spanish painter and writer on art : b. Seville, 1571 ; d. there, 1654. As a theorist in the art of painting Pacheco occupies a unique position in the history of the Seville school. His pictures are elaborate in their skilful em¬ bodiment of the principles he expounded in his (Arte de la Pintura> (the Art of Painting). His treatise, however, did much for art in Spain, and he was the master of both Alonzo Cani and Velasquez, the latter of whom became his 'son-in-law. In his (Last Judgment (painted for the nunnery of Saint Isabel) he introduced his own portrait, and ambitious and learned as many of his pictures are his small portraits, some of them in crayon, are among the best of his works. Good examples are to be seen in the two churches at Alcala de Guadairo near Se¬ ville and in the Madrid picture-gallery.

PACHMANN, pah'man, Vladimir de,

Russian pianist: b. Odessa, 27 July 1848. He studied music with his father, an amateur vio¬ linist and with Dachs at the Vienna Conserva¬ tory; made his first appearance in 1869; after eight years of retirement made his first tour; again retired for two years; in 1882-83 played successfully in Vienna, Paris and London ; came to the United States in 1890 ; and toured in 1899 and 1900.

PACHOMIUS, pa-ko'mi-us, Saint, Egyp¬ tian ascetic of the 4th

century: b. Thebaid, about 292 ; d. Proii, Egyptian Thebaid, about 348. In early life he was drafted as a conscript in the army of Maximin and at Thebes met Christians, whose teaching so interested him that on the conclusion of the campaign of Maximin against Constantine and Licinius he was baptized and

embraced the life of an anchorite. His guide in his choice was Palemon, who accompanied him to Tabenna, an island in the Nile, where they took up their residence. In 326 he founded the first monastic community and he is spoken of by the learned Tillemont as ((the institutor not only of certain monasteries, but of the con¬ ventual life itself, and of the holy communities of men devoted to religious life.® His sister is said to have founded the first convent. The movement spread rapidly and according to Palladius (q.v.) at their death their monastery and convent contained 7,000 inhabitants. (See Monachism). Consult Amehneau, (Etude historique sur Saint Pakhome et le cenobitisme primitif dans la Haute Egypte) (Paris 1887) ; Griitzmacher, (Pochomius und das alteste Klos-terlebeiP (Freiburg 1896) ; Ladewze, P., {Le cenobitisme pakhomien) (Lovain 1898).

PACHUCA, pa-choo'ka, Mexico, capital of the state of Hidalgo, 68 miles by railway north¬ east from the City of Mexico; elevation about 8,000 feet above the sea. Three railways — the Hidalgo and branches of the Mexican and Mexican Central — supply transportation facil¬ ities. The Sierra Madre Oriental rising on three sides form an ampitheatre in which the city is situated and from which it looks out toward the southwest upon a rich and highly cultivated plain. These mountains are honeycombed with producing mines down to the very door of the city itself, within the boundaries of which are several important establishments for treating ores, some of which have been in operation since the early days of mining in this district. The mountains behind the city form the northeast boundary of the valley of Mexico and within their shadows is produced almost or quite one-third in value of the annual output of Mexico. The city is essentially a mining community and is not especially noted for any other industry.

It has a strong financial institution — the Bank of Plidalgo — with a capital of $1,000,000, a branch of the National Bank and an agency of the Bank of London and Mexico. There are two public libraries, containing together over 5,000 volumes, and a number of churches and schools. Bartolome de Medina, who in 1557 discovered the patio process of amalgamating ores, which is still largely in use by Mexican miners, lived in Pachuca. Pop. about 37,000.

PACHYDERMATA, pak'i-der'ma-ta, the name formerly applied to a division or order of mammalia including the elephants, tapirs, hippopotamus, rhinoceros, swine and hyrax — all of which forms were distinguished by their thick skin, by their non-ruminant habits and by their possessing more than one hoof on each leg. This classification has, however, given place to a more scientific and natural arrange¬ ment, in which the several forms are placed according to fundamental structural affinities. Thus the elephants form a distinct order, the Proboscidea. The rhinoceros and tapirs are included in the division Perissodactyla of the ungulate order ; the hippopotamus and swine are arranged in the section Artiodactyla of the same order; while the hyrax has a separate order — Hyracoidea — to itself. See Ungulata.

PACIFIC OCEAN, also formerly called the South Sea, the largest of the five great basins of the hydrosphere, extending for 133° of latitude and 180° of longitude, between the

west coast of the North and South American continents and the east coast of Asia and Aus¬ tralia. It exceeds in compass the whole of the four continents taken together, and occupies more than a third part of the earth's area. On the west it borders on the Indian Ocean, on the north it communicates with the Arctic Ocean by Bering Strait, on the south it is bounded by the Antarctic Ocean and on the east it joins the Atlantic at Cape Horn. Within this enormous circumference it includes the numerous islands composing the groups of Aus¬ tralasia, Polynesia, Melanesia and Micronesia, the islands on the west coast of America and those on the east and south coasts of Asia. The Pacific Ocean is divided into — (1) the north Pacific, bounded on the south by the tropic of Cancer, and comprising in the north and wes_t Bering Sea and the Sea of Okhotsk, the Jap¬ anese Sea, the East or North China Sea and the Yellow Sea, and in the east the Gulf df California; (2) the central Pacific, stretching between the tropics, and comprehending the greater part of the numerous and beautiful in¬ sular groups known by the collective name of Polynesia; and (3) the

southern Pacific, or South Sea proper, extending from the tropic of Capricorn to the Antarctic Ocean, and not diversified by many islands. The Pacific Ocean receives most of its affluents from the Asiatic Continent, the principal rivers being the Amur, Hoang-ho and Yang-tse-kiang ; while from South America, owing to the proximity of the Cordilleras to the coast, it receives no stream of any consequence, and from North America only the Yukon, Columbia and the Rio Colo¬ rado.

The islands of this ocean are so numerous that it is difficult to give an enumeration of them, even in groups. Commencing on the American coast south of the Strait of Magel¬ lan, and proceeding north, an uninterrupted chain lines the shores of Chile and terminates in the large island of Chiloe. Many islets occur along the stretch of coast farther northward, and at the equator, about 700 miles west from the mainland, is the interesting Galapagos group. Northward along the coasts of Mexico and the United States are the Revillagigedo, Alijos, Guadalupe and several other small groups, while lining the coasts of Canada and Alaska is a chain of large islands, including among others those of Vancouver and Queen Char¬ lotte. Turning west the Kodiak Archipelago lies at some distance off the east coast of Alaska, and the still larger chain of the Aleu¬ tian Islands, curving southwest from the ex¬ tremity of that peninsula and terminating the groups of the Pacific, so far as they belong to the American continent. On the opposite continent of Asia the islands commence with the Kurile chain, stretching southwest from the extremity of the Peninsula of Kamchatka and afterward continued in the same direction by the far more important islands of Japan, the Philippines and other large islands of the In¬ dian Archipelago. In the south region of the Pacific, beyond the tropic of Capricorn, the islands are few in number, but include the im¬ portant group of New Zealand. Between the tropics the principal groups are, north of the equator, the Hawaiian, Ladrone or Mariana and Caroline Islands; and south of the equator, the Marquesas, Low Archipelago, Society, Friendly,

Fiji, New Caledonia, New Hebrides and Solo¬ mon groups.

The bed of the Pacific is composed largely of red clay, with extensive sections of blue and coral muds, Globigerina, Radiolarian, Diatom and Pteropod oozes, and in the eastern portion and south of Australia and New Zealand is fairly regular, ranging from 1,000 to 2,000 fathoms in depth. In the north, northwest and the south, east of New Zealand, are extensive deeps, the, Tuscarora deep east of Kamchatka, the Kurile Islands and Japan, having a depth greater than 4,000 fathoms, the Aldrich deep east of New Zealand, over 5,100 fathoms. Be¬ tween Guam and Midway islands (q.v.) the United States telegraph ship Nero in 1900 sounded a depth of 5,269 fathoms. The Fiji, Ellice, Solomon and Tonga islands lie on a plateau southeast of New Guinea, and New Zealand is, as it were, a peninsula of this plateau. The slope of the Asiatic continental shelf is much less than that of America. The mean depth of the Pacific is about 2,300 fathoms. See Ocean.

The general laws regulating winds, tides and currents suffer fewer modifications in the Pacific than in narrow seas. The tidal wave, commencing at the equator, diverges from it toward the poles and, proceeding with great velocity and without an obstruction, is scarcely perceptible among the central islands of the Pacific. Hence in the Low Archipelago, at Bow Island and Tahiti, the rise is only one foot and at the Sandwich Islands two feet. It is only when, by the proximity of a mainland dimin¬ ishing the depth of the water, or by any similar cause the natural course of the wave is chanced, or obstacles to its progress are interposed, that an accumulation takes place, and high tides are formed. In the Pacific, however, these never attain the maximum heights for which some parts of the Atlantic and Indian oceans are celebrated. In the solitary instance of Cook's Inlet, Alaska Territory, the rise is as high as 28 feet; but on all the west coast of America it is usually below 10 feet, and only in the Bay of Panama varies from 13 feet to 15 feet.

The prevailing winds of the Pacific, like those of other great seas, are divided into regu¬ lar or trade winds and variables. The trade winds of the Pacific are not so regular in their limits as those of the Atlantic, and this irregu¬ larity extends over a much wider region in the case of the southeast trade wind than in the case of the northeast. The cause of this is the greater number of islands in the South Pacific Ocean, which, especially in the hot season, dis¬ turb the uniformity of atmospheric pressure by local condensations. The northeast trade wind remains the whole year through within the northern hemisphere. In the middle of sum¬ mer (about July) the zone within which it blows extends from about the Mariana or Ladrone islands, in 146° east

longitude, to near the coast of North America (Lower Cali¬ fornia), and its southern limit begins to the south of the islands mentioned, in about lat. 13° N., gradually descends toward the east to about 8° N., and then rapidly rises again to about 20° N., near long. 115° W. In winter (about January) this zone extends from Borneo and the Philippine Islands to the American coast; and its southern limit, beginning about the northeast of Borneo, keeps between 2° and 4°

N. latitude until about long. 170° W., when it gradually rises to about 10° N. lat., at about 100° W. long. The southeast trade wind, on the other hand, advances beyond the equator, both in summer and winter, still preserving its original direction; in summer (July) to about 7° or 8° N. lat., and in winter (January) to about 5° N. lat., at 160° W. long. In July the zone of this trade wind extends from New Guinea and Australia to the neighborhood of the South American coast ; and its southern limit, beginning off the coast of Australia, about lat. 24° S., gradually rises to about lat. 16° S., at long. 130° W., and then sinks again to about lat. 24° S. off the coast of South America. In January, on the other hand, the western limit of the southeast trade wind, is about long. 175° W. ; and its southern limit, commencing there about the equator, sinks gradually till it touches the Marquesas Islands, and then more rapidly till it reaches about 33° S. lat. off the South American coast. In the region lying to the west of this zone, and stretching from New Guinea and the Solomon Islands southeastward, there are no regular winds. West winds, accompanied by rains, here alternate with calms. Some¬ times also irregular warm, moist winds reach this region from the north, but the regular northeast trade wind never visits it. The zones of the two trade winds are separated by re¬ gions of calms and of light winds, the limits of which vary of course with the varying limits of these zones. In the Chinese seas the terrible typhoon occasionally rages and may occur at any season of the year.

The following table exhibits the mean velocity of t'he currents of the Pacific Ocean in 24 hours :

South Pacific Ocean.

Southern equatorial current . 24 miles.

Cross current . 20 “

Current of Cape Horn . 18 “

Humboldt's current . 15

Current of Mentor . 16

General current of Australia . 12

Periodical currents of Australia { £ ˆseaˆ lan<L

North Pacific Ocean.

Northern equatorial current . 30 miles.

Equatorial counter current . 15 “

Monsoon current of the Carolines . 3 “

Japan current . 31 “

Current of N. W. coast of America . 16 “

Current of Kamchatka . 8

Bering’s current . 14 “

The periodical current of the west coast of Mexico, occasioned by the monsoons of this coast, resembles them in its alternations. It extends from Cape Corrientes to the Cocos Islands, preserving a nearly uniform breadth of 350 miles. It was first noticed by Hum¬ boldt. See Qcean Currents.

The Portuguese were the first Europeans who entered the Pacific, which they did from the east. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien. Magellan sailed across it from east to west in 1520-21. Drake, Tasman, Bering, Anson, , Byron, Bougainville, Cook, Vancouver, Laperouse and others traversed it in different directions in the 17th and 18th cen¬ turies. Consult Bancroft, H. H., (New Pa¬ cific (San Francisco 1912) ; Brigham, W. T., (Index to the Islands of the Pacific (Hono¬ lulu 1900) ; Burney, (Chronological History of

Discoveries in the South Sea* ; Enock, C. R., (Secret of the Pacific (New York 1912) ; Flint, J. M., Contributions to the Oceanogra¬ phy of the Pacific5 (Washington 1905) ; Fox, F., (Problems of the Pacific5 (Boston 1913) ; Colquhoun, (Mastery of the Pacific5; Thom¬ son and Murray, (The Challenger Expedition5

(1880-95).

PACING. See Horse, Trotting and Pacing.

PACINI, pa-che'ne, Filippo, Italian an¬ atomist: b. Pistoia, 1812; d. 1883. He was educated at Florence and at Pisa, and in due. time Aas appointed to the chair of anatomy at the University of Florence. In 1835 Pacini re¬ discovered the peripheral nerve terminations de¬ scribed by Vater in 1730. He wrote extensively on anatomy, pathology and therapeutics. His most important work is one on artificial respira¬ tion, which described the methods employed by him in resuscitating new-born children.

PACINI, Giovanni, Italian composer: b. Catania, 1796; d. 1867. He studied under Marchesi and Furlanetto and in 1813 brought out his first operatic effort, (Annetta e Lu-cindo.5 By 1834 he had added 41 operas to his list and was the most successful composer in Italy in -his time. He established a school of music at Viareggio and pupils from all over the world flocked thither to receive instruction. He again began to compose after 1840 and added about 50 more operas to his list, includ¬ ing (Medea5 (1843) ; (Saffo5 and (La Regina di Cipro5 (1846).

PACINIAN CORPUSCLES, or PACIN¬ IAN BODIES (also called corpuscles of Vater), elliptical concentrically striated bodies of cellular tissue, capillary vessels, a watery fluid, granular material and epithelioid cells; first described by Filippo Pacini in 1840. Into each corpuscle runs the axis-cylinder of a nerve (probably covered by the sheath of Schwann), terminating in a bulbous enlargement, or branching so that each nerve-fibral has a sim¬ ilar terminal knob. These corpuscles are the <(peripheral end-organs55 of certain sensory nerves and in the human being are found chiefly in the subcutaneous tissue of the palms of the hands and the soles of the feet, but have been found also in the genital organs, the nip¬ ples and

other portions of the body. They are found in lizards, snakes, birds and mammals. They are tactile organs.

PACINOLO, PACCIOLI, or PACI-MOLO (Lucas di Borgo), an Italian mathema¬ tician: b. Tuscany, c. 1450; d. c. 1510. He was a Franciscan monk and taught mathematics at Florence, Venice, Padua, Naples and Rome. His chief work, (Summa de Aritmetica, Geometria, Proportione et Proportiorralita5 (1494), is important as being the first treatise on mathe¬ matics ever printed, and as embodying the re¬ sults of mathematical research up to that time. A treatise on bookkeeping (published 1495) is also attributed to Pacinolo. See Finger Nota¬ tion.

PACINOTTI, pa'che-not'te, Antonio, Ital¬ ian physicist : b. Pisa, 1841 ; d. 1912. He re¬ ceived his education at the University of Pisa, where he was professor for two years. In 1864 he removed to Bologna and in 1873 to the University of Cagliari. After 1882 'he was

again at Pisa. In 1860 he invented a dynamo with a special type of ring armature windings.

PACIUS, pa'se-us, Friedrich, Finnish com¬ poser and violinist: b. Hamburg, Germany, 1809; d. 1891. His violin instruction was re¬ ceived from Spohr. In 1834 he settled in Hel¬ singfors as teacher of music at the university. He is the author of the national songs Wart-land,5 (Suomis Sang,5 (Soldatgossen5 ; the great operas, (Kung Karls Jakt5 and dorelen5 and the operetta, (Prinsessan of Cypern.5 Pa-cius was one of the greatest performers of his time on the violin.

PACKARD, pak'ard, Alpheus Spring,

American educator: b. 1798; d. 1884. He was educated at Bowdoin College; was tutor there in 1819-24 and from 1824 to 1865 held the professorship of Greek and Latin languages and literatures. In 1869 Dr. Packard was appointed Collins professor of natural and revealed reli¬ gion and also librarian. In 1882-84 he was acting president of Bowdoin. With Cleaveland he wrote (The History of Bowdoin College, with Biographical Sketches of its Graduates5 (1882). He wrote many articles for period¬ icals and edited (Xenophon's Memorabilia Socratis,5 with English notes (1839; 3d ed., 1843) and (Works of the Rev. Jesse Appleton, with a Memoir5 (1836-37).

PACKARD, Alpheus Spring, American zoologist : b. Brunswick, Me., 19 Feb. 1839 ; d. Providence, R. I., 14 Feb. 1905. He was graduated from Bowdoin in 186L and the Maine Medical School in 1864 ; and was for

three years a special student under Agassiz at the Lawrence Scientific School, Harvard Univer¬ sity. From 1865-66 he was librarian and cus¬ todian of the Boston Society of Natural His¬ tory; and from 1867-78 curator, and then di¬ rector, of the Peabody Academy of Science. In 1871-73 he was State entomologist of Massa¬ chusetts ; from 1877-82 he was a member of the United States Entomological Commission, par¬ ticipating in several scientific expeditions under their charge. In 1878 he became professor of zoology and geology at Brown University. His most important contributions to science have related to the classification and anatomy of the arthropoda, especially insects ; he proposed a new classification of insects, and regrouping of the phyla of the arthropoda. As an evolu¬ tionist he is one of the founders of the Neo-Lamarckian school, to which he gave that name. His writings include (Guide to the Study of Insects5 (1869) ; <The Mammoth Cave and its Inhabitants,1 with F. W. Putnam (1872) ; (Our Common Insects5 (1873) ; (Life History of Animals5 (1876) ; (Half Hours with Insects5 (1877) ; Unjurious Insects of the West5'(1877) ; development and Anatomy of Limulus Poly¬ phemus5 (1885); (Entomology for Beginners5 (1888) ; (Textbook of Entomology5 (1898) ; (Lamarck, the Founder of Evolution, his Life and Work5 (1901). He was one of the found¬ ers and for 20 years editor-in-chief of the American Naturalist.

PACKARD, John Hooker, American phy¬ sician : b. Philadelphia, 15 Aug. 1832; d. 20 May 1907. He was graduated from the Uni¬ versity of Pennsylvania in 1850; was acting surgeon in the United States army (1861-65) ; and surgeon to the Episcopal Hospital, Phila-

delphia (1863-84). He was also surgeon to two other hospitals in his native city, the Penn¬ sylvania (1884-96) and the Woman's (1876-77). He published c Minor Surgery } ; (Lectures on Inflammation ; (Operative Surgery, } *etc.*

PACKARD, Joseph, American Protestant Episcopal clergyman : b. Wiscasset, Me., 1812; d. 1902. In 1831 he was graduated at Bowdoin College, in 1834-36 taught at Bristol Col¬ lege, Pennsylvania, and

entered the ministry in 1837. In 1836-90 he held the chair of sacred literature in the Protestant Episcopal Theo¬ logical Seminary of Virginia. He was profes¬ sor emeritus after 1890; in 1872-85 served on the committee for revision of the Bible and was dean of the seminary for 15 years. He wrote (Questions on the Gospels* (1855); commentary on Malachi in Lange's Comment¬ aryˆ (1874) and contributions to ecclesiastical periodicals. Consult his autobiography, Recol¬ lections of a Long Life* (Washington 1902).

PACKARD, Lewis Richard, American

classical scholar: b. Philadelphia, Pa., 1836: d. 1884. In 1856 he was graduated at Yale and made postgraduate studies at Berlin. He be¬ came assistant professor of Greek language and literature at Yale in 1863 and after three years was made full professor. Mr. Packard was elected president of the American Philological Association in 1880 and in 1883 was made second director of the American School of Classical Studies at Athens. He was joint editor of the (College Series of Greek Authors *(1885 et seq.). Consult his (Studies in Greek Thought* (a collection of essays, 1886).

PACKARD, Silas Saddler, American edu¬ cator: b. Cummington, Mass., 28 April 1826; d. New York, 10 Oct. 1898. He was educated at the Granville Academy, Ohio, and engaged in teaching at 17. He originated an admirable system of commercial training and in 1858 or¬ ganized with Bryant and Stratton a business college in New York, which later became the Packard Commeicial School. He founded the Niagara River Pilot in 1853 and! edited it until 1856, and in 1868-70 published Packard's Monthly. He was president of the congress of business education at the World's Fair in 1893, and author of numerous textbooks, among which are (The Packard Manual of Bookkeep¬ ing and Correspondence) ; and (The Packard Arithmetic.)

PACKARD, William Alfred, American classical scholar, son of A. S. Packard (1 798— 1884) and brother of A. S. Packard (1839-1905) : b. Brunswick, Me., 1830; d. 1909. He was graduated at Bowdoin College in 1851 and in 1857-58 studied at the University of Gottin¬ gen, Germany. Subsequently he was appointed to the chair of Latin language and literature at Princeton University. He was a frequent con¬ tributor to the Princeton Review and the Pres¬ byterian Review. He published an improved translation of Curtius' (Griechische Geschichte.*

PACKER, pak'er, Asa, American capitalist: b. Groton, Conn., 20 Dec. 1806; d. Philadelphia, 17 May 1879. He worked at the trade of tan¬

ning, then as apprentice to a carpenter, went to Pennsylvania in 1822, and in 1823 took charge of a boat on the Lehigh Canal, and later con¬ nected himself with coal-mining and the trans¬ portation system between Pottsville, Pa., and

New York as a builder of locks and boats for the canal system. In 1844 he was a member of the Pennsylvania legislature. The Lehigh Val¬ ley Railroad was projected by him, and was completed from Mauch Chunk to Easton in 1855. As a Democrat he served two terms in Congress (1853T57). Out of the great wealth which he acquired he made many generous public gifts, the founding and endowment of Lehigh University (q.v.) being his most con¬ spicuous benefaction.

PACKER COLLEGIATE INSTITUTE,

a secondary school for girls, located in Brook¬ lyn, N. Y. It was chartered in 1853 and opened to students in November 1854; it stands on the site of the building of Brooklyn Female Academy (founded 1845), which was burned in De¬ cember 1852. The work of the institute is in three departments, elementary, academic and collegiate; the elementary work is in seven grades, the academic fn four and the collegiate in two. Though the institute is a high school and confers no degrees, the work of the collegi¬ ate department overlaps the first two years of a regular college course.

PACKING INDUSTRY. See Meat Pack¬ ing; Meats and Meat Production.

PACO, a name of the alpaca (q.v.).

PACTOLUS, pak-to'lus, Asia Minor, the classic name for the modern Sarabat, a small Lydian stream anciently celebrated for its golden sand, the reputed source of the wealth of Croesus. It is now comparatively worked out. It rises on the north side of Mount Tmo-lus, flows past Sardis, and has its outlet in the Hermus.

PACUVIUS, pa-ku'vi-us, Marcus, Roman tragic poet, nephew of the poet Ennius: b. Brundisium, about 220 b.c. ; d. Tarentum, about 130 b.c. He was a student under Ennius and not only a poet but a painter as well, as is shown by the many allusions to his picture of Hercules in the Forum Boarium. Most of his tragedies < followed Greek models ; such were the (Antiope* and the (Dulorestes,* the lat¬ ter being adapted from Euripides' Uphigenia in Tauris) ; among native plays by him the one most often mentioned is the (Paulus,* written in honor pf

Lucius ZEmilius Paulus. He also wrote satires, but of this great body of work nothing but a few quotations by grammarians and rhetoricians has come down to us; these are edited by Ribbeck in <Scse-nicae Romanorum Poesis Fragmenta) (Leipzig 1897). Consult Muller, (De Pacuvii Fabulis*

(1890).

PADANG, pa-dang', Sumatra, two Dutch residences or provinces on the west coast of the island, known respectively as the Highlands and the Lowlands of Padang; also the capital city of the Lowlands of Padang at the con¬ fluence of the Padang Aran and the Padang Idel, which are very shallow and so make a poor harbor. The present port of Padang is Emmahaven, separated from Padang by a hill known as the Apenburg because of the apes there. The city has government workshops, barracks, schools, hospitals and churches, and was the earliest Dutch city in Sumatra (1666). It does business with the interior of the island by rail, and exports nutmegs, coffee, cinnamon, rattan, copra, tobacco, gum and hides. The

city has a European and a Chinese quarter, in which there are a few stone houses; elsewhere bamboo is used. The climate is hot and not very healthful. The city has several consulates. Pop. about 90,000. The capital of the High¬ lands of Padang is Fort de Kock. Pop. 2,290.

PADDINGTON, England, a metropolitan and parliamentary borough of London, imme¬ diately north of the city of Westminster. Area, 1,356 acres. Bays water is a well-known resi¬ dential district and was a favorite haunt of artists in the 18th century. The borough re¬ turns one member to Parliament. Pop. abou,t 142,551. Consult Bates, (The

Playground of Paddington* (1902) ; Robins, ‘Paddington, Past and Present* (1853).

PADDLE, a wooden implement with a wide, Hat blade which is used without a fixed fulcrum in propelling and steering canoes and boats, the operator spooning thˆwater toward him. In canoes a double-headed paddle is sometimes usecl, being dipped alternately on either side. The paddle is found as a substitute for the oar in many parts of the world.

PADDLE-FISH, SPOON-BILL CAT, or SPADE-FISH, a singular ganoid fish (Polyo - don spathula) of the sturgeon tribe, Cliond-rostci (q.v.), which takes its name from the extraordinary spatulate prolongation of the nasal bones and upper jaws into a thin, spade¬ like, mud-digging instrument, measuring a third to a quarter of the total length of the fish. It abounds in the more sluggish parts of the rivers of the Mississippi Valley and of the Southern States, and occasionally reaches a length of more than six feet and 75 to 100 pounds in weight. In general form it resembles a sturgeon, but the skin is destitute of plates or scales, except on the upper lobe of the tail, and is a dull greenish mud-color in hue. The gill-apertures are of large size, and the gill-covers are prolonged backward nearly to the middle of the body. The mouth is large and provided with teeth in the young, but they disappear as the fish grows older.

The paddle-fishes “feed chiefly on mud and minute organisms contained, stirring it up with the spatulate snout.** Their spawning habits are little known, but apparently the eggs are voided as soon as the water where each fish lives reaches a fair degree of warmth ; at this time they ascend the streams and bayous, swim¬ ming near the surface, and are caught by means of seines. At other seasons they may be caught on set-lines. Formerly the flesh, which resembles that of the sturgeon, was eaten only by the southern negroes, but now it finds a sale in many local markets, and is frequently smoked and sold for sturgeon. The greenish black roe is also coming into demand for the making of caviar. Another closely related form (Psephr-urns gladius) lives in Chinese rivers, and the two species constitute the order Selochostomi family Polyodontidcc, fossil remains of which are found in Wyoming as far back as the Eocene. Consult Jordan and Evermann, ‘Amer¬ ican Food and Game Fishes) (1902), and other authorities therein cited.

PADDOCK, pad’ok, Algernon Sidney, American lawyer and politician : b. Glens Falls, N. Y., 9 Nov. 1830; d. Beatrice, Neb., 17 Oct. 1897. He studied law and removing to Ne¬ braska in 1857 was admitted to the

and became prominent in the political lile of the Territory. In 1859 he was delegate to the Territorial Republican Convention, and in 1860 and 1864 to the National Republican Conven¬ tion. In 1861 he was appointed secretary of the Territory, holding this position till 1867 when Nebraska was admitted to the Union, for a part of this time acting as governor. In 1868 he declined an appointment as governor of Wyoming Territory. In 1875 he was elected to the United States Senate and again in 1887, while between his two terms in the Senate he was for four years a member of the Utah Commission. While in the Senate he was a member of several important committees, in¬ cluding the committee on pensions, on public lands, on post offices and on public buildings, and during his last term was chairman of the committee on agriculture and forestry.

PADDY-BIRD, the name among English-speaking persons in the East for various birds frequenting rice fields, especially small white egrets of several kinds.

PADELLA (Italian, from Latin patella, a small flat dish), a shallow vessel used in illumi¬ nations. A number of them are partially filled with oil or grease, in the middle of which is placed a wick, and are then placed so as to bring out when lighted the outlines of a build¬ ing or the slope of a rising ground. The idea originated in Italy.

PADEMELON, a small, naked-nosed kan¬ garoo of the genus Halmaturus, specifically H. tketidis, of New South Wales. It inhabits brushy districts and with others of its race in Australia and Tasmania is hunted for the sake of its flesh and hide.

PADERBORN, pa'derborn, Germany, a town and espiscopal see in the Prussian province of Westphalia, at the sources of the Pader, 50 miles southeast of Munster. It is an old town, with narrow streets and antique houses. It has a fine recently restored cathedral, with a tall and massive tower which, as well as the crept, be¬ longs to the 11th century — both in the Ro¬ manesque style ; while the body of the church, 345 feet long, is of the 13th century. It has also a fine market place, an ancient townhouse and several other ancient churches and chapels. The city was much favored by Charlemagne. Throughout the Middle Ages Paderborn, which was a Hansatown, was the seat of a bishop who was also a temporal prince. The bishopric was secularized in 1803 and was taken over by Prussia. The industries include

printing, flour, soap, glass, beer and tobacco. The ground on which it stands teems with mineral springs. The university which existed at this place from 1614 was suppressed in 1819. Pop. about 27,000, mostly Roman Catholics.

PADEREWSKI, Ignaz jan, pianist and composer; first premier of the Polish Republic: b. Kurilovka, Podolia, Poland, 6/18 Nov. 1860. He began studying music at the Warsaw Con-servatorium under Raguski at the age of seven and went on his first concert tour in 1876-77, touring Russia, Siberia and Rumania. He be¬ came teacher of the pianoforte at his first academy in 1879 and three years later went to Berlin, studied under Urban and Wiierst and, finally, at Vienna under the distinguished teacher Leschetizky. In 1887 he made his for-

mal appearance as a concert pianist in Vienna and 1889 in Paris, from which time his career has been an ever-extending triumph, he being universally regarded as the most brilliant execu¬ tant on the piano since Liszt. He gave a series of recitals in London during May 1890 and toured America in 1891, where he has fre¬ quently appeared since. By a deed of trust, 15 May 1900, he established the Paderewski Fund, to be held as a permanent trust for the purpose of aiding musical education in the United States, and particularly for the support and encouragement of American composers. Prizes are offered every three ye^rs for the best compositions submitted by American-born composers to a selected board of judges. The first competition was held in 1902, when three prizes of $500 each were awarded: for a symphony, T he Seasons (Henry K. Hadley); a composition for chorus, solos and orchestra, A Star Song (Horatio W. Parker), and a sextet for wind instruments (Arthur Bird). The exact terms of the trust provide (1) $500 for the best orchestral composition in symphonic form; (2) $300 for a composition for solo instrument with orchestra; (3) $200 for a piece of chamber music. In the second competition, in 1906, only one award ($500) was made, for an Onver-ture Joyeuse, to Arthur Shepherd of Salt Lake City. M. Paderewski's first wife died young, leaving a son. He married, secondly, *Mme.* Gorski in 1899. Between

1913 and 1918 he appeared frequently in the United States, and during the war played an active part in the relief of Polish war sufferers and in the public propaganda to restore the independence of Po¬ land. He became Premier on 17 Jan 1919, and in April of that year he presented the case of Poland to the Peace Conference in Paris.

PADILLA, pa-fhel'ya, Juan Lopes de, Spanish warrior: b. Toledo, about 1490; d. 24 April 1521. A the outbreak of the in¬ surrection of the Castilian towns against the arbitrariness of Charles ' V, the Santa Junta entrusted him with the command of the forces of the communeros. The Junta first tried to enthrone the insane queen Joanna. It offended the nobles, however, by its democracy, and replaced Padilla by the less competent Don Pedro de Giron. After several successes his force was defeated by the royal army at Villalar, 23 April 1521. He himself was wounded and taken prisoner and executed on the following day. The two letters in which, shortly before his execution, he took leave of the town of Toledo and of his wife Maria Pacheco, were known in Spain as models of magnanimous feeling and touching simplicity. Both he and his widow, who defended Toledo for some time after his death, until she was compelled to take refuge in Portugal, have be¬ come the subject of numerous dramas and poems.

PADILLA, Bolivia, capital city of the prov¬ ince of Tomina and department of Chuquisaca, 90 miles northeast of Potosi. Originally called Laguna, the city now bears the name of Manuel Asencio Padilla, a patriot of this province, killed at Villar, 14 Sept. 1816. Pop. about 1,700.

PADISHAH, in Persia, a title assumed by-or applied to the shah, derived from pati, lord (protector) and shah (king, prince). It is also

applied to the sultan of Turkey and in India to the British sovereign.

PADMA, Hindu goddess of fortune and beauty, wife of Vishnu. See Sri.

PADUA, pad'u-a, or PADOVA, pa'do-va, Italy, a university city, capital of the province of the same name, 22 miles west of Venice, on the Bacchiglione. It is surrounded by a lofty wall flanked with bastions, and is entered by seven gates. It is connected by canals wkh the Adige and the lagoons of the Adriatic. The streets and squares are usually lined with colon¬ nades. The largest and finest of the piazzas is the Piazza Vittorio Emanuele, formerly called the Prato della Valle, which

is planted with trees, surrounded by a running stream and adorned with numerous statues of distinguished townsmen and other Italians. The principal buildings are the townhouse or Palazzo della Ragione, an immense pile extending along the market place, erected between 1172 and 1219 and remodeled in 1420, standing upon open arches and containing a large hall adorned with fine mural paintings, about 400 in number; the late Renaissance Duomo or cathedral built in the 16th century, possessing a fine library, rich in rare books and manuscripts, and of which Petrarch, who was canon of the cathedral, is reckoned one of the founders; the baptistery of the cathedral, a fine Lombard building of* the 12th century, its walls and cupola entirely cov¬ ered with frescoes; and the Church of Saint An¬ thony. . The most famous establishment in Padua is the university, one of the most an¬ cient in Europe, said to have been founded early in the 13th century by Emperor Frederick II, but according to other accounts not founded till 1260, and sanctioned by Pope Urban IV in 1263. It was long renowned as the chief seat of law and medicine, and is celebrated for its long list of notable professors, including Galileo, puglielmini and Fallopius, and for its students, including Dante, Petrarch and Tasso. The average annual attendance of students is 1,500. In connection with the university is a botanic garden, the oldest in Europe, containing some of the earliest specimens of trees and plants once rare, but now generally diffused; a library of over 200,000 volumes and an observatory. The manufactures include silk fabrics, ribbons, cat¬ gut, chemicals, machinery, automobiles, etc., and like the trade in cereals, oils, wines and cattle, are increasing. Padua is the see of a bishop and the seat of several superior courts and pub¬ lic offices. It claims to have been founded shortly after the destruction of Troy by the Trojan Antenor. Under the Romans it be- < ame a flourishing municipal town, but on the decline of the empire was sacked first by Alaric and then by Attila. Its great modern restorer was Charlemagne, under whose successors it successfully asserted its independence. In 1318 it fell under the domination of the Carrara family, and in 1405 under that of Venice, whose fortunes it has since followed. Among the distinguished men to whom Padua has given birth are the historian Livy, Sperone Speroni, a writer of tragedies in the 16th century; Man¬ tegna; the poet Cesarotti. Pop. of city 50,000, with communal suburbs 96,250.

PADUCAH, pa-du’ka, Ky., city, county-seat of McCracken County; at the confluence of the Tennessee and Ohio rivers, and on the

Nashville, Chattanooga and Saint Louis, the Illinois Central and the Chicago, Burlington and Quincy railroads, about 35 miles in direct line east by north of Cairo, Ill., and 80 miles south¬ west of Evansville, Ind. A splendid modern railway bridge which cost $4,500,000 spans the river here. There is steamer connection with Mississippi, Ohio and Tennessee river ports. It was settled in 1821 by James and William Pore, and was incorporated 11 Jan. 1830. Dur¬ ing the Civil War the city was occupied by General Grant in September 1861. It is in a productive agricultural region ; in the vicinity . are forests of hard and soft wood and deposits of fire-clay, glass sand, zinc and fluorspar ; limonite is found within 30 miles, and coal, in rich veins, within 60 miles. It has extensive manufacturing interests ; the chief manufactures are pig iron, lumber, veneering, building ma¬ terial, spokes, rims, staves, headings, barrels, curtain poles, furniture, stoneware, pottery, sad¬ dles, collars, harnesses, tobacco products, knit goods, canned goods, brooms, brick, proprie¬ tary medicines, boxes and flour. It has a large ore milling plant and novelty works, in all 91 manufactories giving employment to about 3,000 persons and the two railroads employ about 1,200. There is an extensive wholesale trade in clothing and food products, and in its own manufactures. The prominent public buildings are the United States government building, municipal buildings, churches and schools, Car¬ negie library. The educational institutions are Saint Mary's Academy, a high school, public and parish schools and a number of private schools. There are 23 churches. The six banks have a combined capital of $1,350,000; the bank clearings are annually about $50,000,000. The government is administered under a commis¬ sion form of government with mayor and four commissioners. The city owns and operates the electric light plant. Pop. (1920) 24,735.

PiEAN, a word originally meaning ˆhelper® or <(healer. Homer applied it to the physician of the gods on Olympus. The title was later transferred to Apollo, and was used in hymns as his epithet. By a second transferrence, the hymn itself became called a paean, and later similar invocations to the other gods came to be known by that name. Paeans were sung to ward off evil, as before a battle, on the march or when a fleet sailed out of harbor. They were also sung after a battle in token of gratefulness to Apollo. Paeans were also sung at public funerals and at banquets. Pindar and Bacchylides were among the

more noted au¬ thors of paeans. Consult Fairbanks, A., (A Study of the Greek Paean) (New York 1900).

P7EDOGENESIS, the reproduction of ani¬ mals while in the immature or larval stage. Thus certain salamanders (Amblystoma) pro¬ duce eggs which develop into adults when the parents still retain the gills and are aquatic in their habits. (See Axolotl). More strictly paedogenesis is applied to parthenogenesis (q.v.) in the larval stage. Best known instances are certain flies (Miastor), where the larvae pro¬ duce eggs which develop without fertilization, inside the body and these finally escape by eat¬ ing their way out, the parent being destroyed as a consequence.

PˆEONIUS, Greek sculptor of the 5th cen¬ tury b.c. : b. Mende, Thrace. He is best known

through his statue of Victory erected at Olympia about 420 b.c., in commemoration of some bat¬ tle, probably Sphacteria. The pedestal was tri¬ angular and about 30 feet in height. The figure of Nike is represented in flight, with feet barely touching the pedestal, the weight of the figure being supported mainly by the draperies. Other figures at Olympia were ascribed to Paeonius. Consult Gardner, E. A., <A Handbook of Greek Sculpture) (London

1911).

P7EONY, a genus (Pceonia) of the order Ranunculacccc. With one exception (P. brownii), native to the Pacific Coast, the species are natives of Europe and Asia, and improved varieties and hybrids of the original wild sorts are found in most gardens, being valued for their hardiness, easy cultivation and large, attractive flowers. They are of two dis¬ tinct groups : the herbaceous and the shrubby. The former group is the larger; they are per¬ ennials with tuberous rootstocks, large pinnate leaves and flowers ranging through all shades of red to white and yellow, the varieties culti¬ vated being mostly the double forms. The plants will grow in almost any soil, but thrive best in rich, rather moist deep loam. The crowns should be set two inches below the sur¬ face and the ground, especially close to the plant, kept free from weeds. All weakly stems should be removed. When once established, annual dressings of stable manure should be given and the plants left undisturbed. Prop¬ erly treated, pseonies will often

prove satis¬ factory for 25 years without removal or re¬ newal. P. officinalis, a native of southern Europe, produces large flowers abundantly dur¬ ing late spring. P. albiflora, a native of Siberia, blossoming about a month later than the pre¬ ceding species, has fragrant flowers. Most of the cultivated varieties have been developed from these two species by Japanese and Chinese gardeners who have been cultivating and cross¬ ing them for centuries. The roots of P. albiflora are used by the Tartars for food. Several species are known as Chinese pseonies, but this term is more widely applied to hybrids and varieties of a more extended list than to the native Chinese kinds. They are fragrant and double-flowered. P. tenuifolia, or the ˆfern-leaved® pseony, is a native of Russia. Its blooms are single. The tree-pseony (P. nioutan) often grows six feet tall, is much branched, and prolific of blooms ranging up to 12 inches across. It is somewhat less hardy than the common paeony, and in the North is often grown as a greenhouse plant. It is a native of China, where it has long been cultivated and where there are hundreds of varieties. In America it is less known than the first two species. When grown out of doors the tree-paeonies should be mulched with litter or leaves if in exposed places, especially north of Philadelphia. Paeonies are propagated by division of the root clusters, in the case of the herbaceous forms, and by cuttings of the young wood, or by layer¬ ing, with the tree forms. The latter are also multiplied by grafting in early spring under glass upon the tubers of the herbaceous sorts. New varieties are produced from seeds ob¬ tained from the single flowers by fertilizing them - with pollen from the double flowers. These seeds are sown in September : some ger-PAER — PAE2

minate the following spring, others not till a year later. Only a very few seedlings among thousands prove worthy of perpetuation. Con¬ sult Harding, A., <The Book of the Pseonv) (Philadelphia 1917).

PAER, pa-ar', Ferdinando, Italian com¬ poser. b. Parma, Italy, 1 June 1771 ; d. Paris, France, 3 May 1839. He was educated in Venice! summoned to the court of Vienna in 1795, and in 1801-07 was chapel-master at Dresden. After the battle of Jena he was attached to Napoleon's court, where he was imperial composer; in 1812-27 he directed the Italian grand opera at Pans, and in 1831 was elected to the Academy. He had received the cross of the Legion of Honor in

1828. His work is rich in melody and his greatness as an Italian composer is unques¬ tioned, yet of his voluminous work little is remembered. He was at one time joint con¬ ductor with Rossini at the Theatre Italean. His best known operas are <Griselda) (1796); <Camilla) (1801); (Agnese> (1819).

PAESE DI CUCCAGNA, II, (<The Land of Cockaigne)), obviously influenced by the French naturalistic school of writers, in par¬ ticular by Zola. Matilde Serao in her massive canvas, (I1 paese di cuccagna) (1891), has de¬ scribed the destructive blight of the state lot¬ tery on all classes of Neapolitan society. En¬ dowed with the quick eye of the born journal¬ ist, which sees and notes the varied phases of the teeming life of a great city, this ener¬ getic and gifted novelist has caught with her usual felicity the every expression of the multitude of gamblers, from the bootblack and little seamstress who risk their meagre suste¬ nance, to the impoverished nobleman who seeks to retrieve the fallen fortune of his house.

The book unfolds like a great panorama in a series of episodes which portray the various strata of society madly bent on pursuing the mirage of suddenly acquired affluence, (The Land of Cockaigne.) The author excels es¬ pecially in her street scenes, in the study of crowds in action, in the multicolored hurly-burly of the Neapolitan population. Particularly fine is the opening scene of the lottery drawing with its intensified suspense, its paroxysm of excitement, and the utter dejection of the dis¬ appointed players. The description of the pro¬ cession and miracle of San Gennaro, incom¬ parable in its portrayal of the ecstatic religious fervor and gross superstition of the assembled worshippers, can well bear comparison to the procession in D'Annunzio's (Triumph of Death) and the famous pilgrimage in Zola's (Lourdes.) The minor characters, especially those low in the social scale, are drawn 'by a master hand.

The style, at times too insistent on elabora¬ tion of detail, pulsates with the life of Naples and reflects the speech of its people as only Serao can convey it. While not as perfect a work as the author's admirable sketches of Neapolitan life, episodic in treatment and over¬ intent on the thesis, (I1 paese di cuccagna) is Matilde Serao's most famous novel and a vivid, intense agonizing picture of a great evil. Con¬ sult Benedetto Croce, (La letteratura della nuova Italia) (Bari 1915, v. 3) ; Rene Doumic, (Un roman de moeurs napolitaines) in La Revue des Deux Mondes (July 1898) ; The Atlantic Monthly, < Serao's II paese di cuccagna> (August 1892) ; Henry, James, (Notes on novel¬

ists > (New \ Ork 1914). For an Eriglish transˆ lation consult (The Land of Cockayne) (NeW York 1901).

Alfred G. Panaroni.

PZESTUM, pes'tum, ancient Greek city of Southern Italy on the west coast of Lucania and the present Gulf of Salerno (in ancient times Sinus Puestanus) . It was founded as early as the beginning of the 6th century b.c. by colonists from Sybaris under the name of Posidonia (that is, ((sacred to Poseidon,® or Neptune), and attained great prosperity in the next cen¬ tury and a half. The city was conquered by the Samnites of Lucania, about 400 b.c., who probably Italianized its name into Paestum. It did not regain its old position even when a century later (273) it became a Roman colony, but is famed in Roman poetry for its roses. It was sacked in the 9th century by the victori¬ ous Saracens, and in the 11th by Robert Guiscard. The poor village of Pesto, a railway station, now occupies the site, which has, how¬ ever, two remarkable Doric temples, one to Poseidon, the tutelar god, and one to Demeter. Consult Labrouste, (Les temples de PaestunP

(1877).

PZETUS, pe'tus, Caecinna. See Arria.

. P AEZ, pa'ath, a South American Indian tribe, supposed to constitute a separate linguis¬ tic stock. The tribe inhabits about a score of villages in the Central Cordilleras, to the west of Bogota, Colombia. They live by hunting and wear little raiment despite the cold region in which they dwell. They weave hats, mats, rugs and cloth from magney fibre, and are also familiar with the working of gold. A house in which either a birth or death occurs is at once committed to the flames. The tribe numbers about 2,000 individuals. Consult Brinton, D. G., (The American Race) (New York 1891).

PAEZ, Jose Antonio, Venezuelan patriot and soldier: b. Araure, 13 June 1790; d. New York, 6 May 1873. He was of native stock and with a body of llaneros, trained like himself as herdsmen, about 1810 joined the patriot army, in which he became division commander in 1819. He administered a severe defeat to the Span¬ iards in 1821 and in 1823 captured their last port, Puerto Caballo. Jealous of his successor in 1826 he attempted rebellion but was concili¬ ated by Bolivar, who made him military and civil chief of Venezuela, thus

paving the way for the war of Venezuelan independence in which Paez was the prime mover. In 1831-35 he was President of the new republic, and held the same office 1839-43 after acting as com¬ mander-in-chief during Vargas' administration and putting down two serious rebellions. In 1846 he was appointed dictator during the race war; in 1848 refused the presidency; later headed a rebellion against Monagas, but was defeated and imprisoned for several months ; spent eight years in banishment ; returned to Venezuela in 1858; was minister to the United States in 1860; became commander of the army in 1861 ; and was again driven into exile in 1863 by a revolution against his lieutenants, to whom he had entrusted large powers. The Federalist party was successful and Paez, leader of the Centralists, passed the remainder of his life in New York. Consult his < Autobiografia) (1867).

PAGAN, pa-gan', India, a town of Upper Burma, on the east bank of the Irawady, 90 miles southwest of Mandalay. Pagan was founded in 847 a.d., and was the capital of Burma until 1298, when it was abandoned dur¬ ing a Chinese invasion. The remains of Bud¬ dhist temples and pagodas cover an extensive area, and are of great archaeological interest. Some of them are still occupied by priests, and the town has a population of about 6,000, chiefly Buddhists.

PAGANINI, pa-ga-ne'ne, Niccolo, Italian violinist: b. Genoa, 18 Feb. 1784; d. Nice, 17 May 1840. His father discerning the talents of his son put him at an early age under the best masters to learn the violin, and his public ap-perances began at the age of nine. In his 12th year he went to Parma, where he was taught counterpoint by Rolla (see Rolla, Alessandro) and Ghiretti. In 1797 he performed in the cities of Lombardy and afterward in the principal cities of all of Italy. He settled at Lucca, in 1805, where he was appointed principal violinist to the court chapel. In 1808 he left Lucca, and for five years lived an

obscure and rambling life in Italy. In 1813 he reappeared before the world, and performed at Milan. He remained in Italy till 1828, suddenly appearing, and, after exciting unbounded enthusiasm by his public performances, as suddenly departing. In the year mentioned he visited Austria and Ger¬ many, appearing first in Vienna. The wonder which he excited was caused not merely by his extraordinary skill, but also the extraordinary stories circulated concerning his career and by his personal appearance, which had something weird and even demoniacal in it. His imitation of the flageolet, and his rendering of whole pieces on the G string were feats of astounding technique. The emperor of Austria appointed him his chamber virtuoso, and the king of Prussia his director of music. After visiting the great towns of Germany he proceeded to France and Great Britain. In Paris he pro¬ duced an unprecedented sensation, and, as in Germany, made immense gains. While in Eng¬ land his profits amounted to $85,000. He re¬ turned in 1834 to Parma, where he purchased the villa Gajona. Among his many composi¬ tions, one of the most celebrated is the Carni¬ val of Venice. > Consult Ivapp, J., <Paganini) (Berlin 1913) ; Stratton, S. S., (Niccolo Pa¬ ganini ; His Life and Work) (New York 1907).

PAGANS (Lat. pagani, those who live in the villages, pagus), those who remained uncon¬ verted to Christianity and the worship of the true God. While the cities were the centres of Christian life the remote villages (pagi) were still in pagan darkness, and their inhabitants kept up the practice of idolatry and the creed of polytheism. The men of the village, pagans, among the Latin races corresponded to the men of the heath, heathens, among the Teutonic races. The explanation has also been given that the pagans or ˆrustics® were so termed in con¬ trast to the <(soldiers of Christ.® The term pagan, though formerly with the cognate ((pay-nim® applied to Moslems, is not properly ap¬ plied to Jews or Mohammedans since these wor¬ ship the one God, the Jehovah, of Christians and Jews. The Mohammedan term kafir, mean¬ ing <(unbeliever,® is likewise withheld from Jews and Christians. The Jewish analogue of

<(pagan® is goy, translated (<gentile® (q.v.) meaning, (<one who belongs to the nations® (of Greece and Rome).®

PAGE, Carroll Smalley, American legisla¬ tor: b. Westfield, Vt., 10 Jan. 1843. He was educated at the People's Academy, Morrisville, Vt., and at Lamville Central Academy, Hvde Park, Vt. For many years he was a dealer in raw calfskins and acquired interests in vari¬ ous

banking, manufacturing and other enter¬ prises. In 1869-72 he was member of the Ver¬ mont house of representatives, in 1874-76 of the senate, and from 1872 to 1890 was member of the Republican State Committee. He was delegate to the Republican National Conven¬ tions of 1880 and 1912; was register of probate in 1880-91 ; savings bank examiner in 1884-88, and governor of Vermont in 1890—92. On 21 Get. 1908 Mr. Page was elected to the United States Senate for the unexpired term (1908-11) of Redfield Proctor, deceased. He was re¬ elected for the terms 1911-17 and 1917-23.

PAGE, Curtis Hidden, American educator and editor : b. Greenwood, Mo., 4 April 1870. In 1890 he was graduated at Harvard Univer¬ sity, after which he studied at Paris and at Florence. He was instructor in French and lec¬ turer on English literature at Western Reserve University in 1891-92; instructor in French at Harvard in 1893-94 ; lecturer and tutor 1895-1906; adjunct professor 1906-08; professor of Romance languages and literatures. 1908-09 at Columbia; professor of English literature at Northwestern University 1909—11 and since 1911 Winkley professor of English language and literature at Dartmouth College. In 1905 he was associate editor of Poet Lore and of the Pathfinder the following year. Professor Page has translated (A Voyage to the Moon,* by Cyrano de Bergerac (1899); (Songs and Son¬ nets of Ronsard) (1903) ; (The Best Plays of Moliere* (2 vols., 1907) ; <Tartuffe) (1909) ; {The Man who Married a Dumb Wife,* by Anatole France (1915). He is a contributor of poems, essays and stories to leading magazines and has edited (British Poets of the Nineteenth Century) (1904); ˆRabelais* (1905); <The Chief American Poets) (1905) ; (Golden Treas¬ ury of American Songs and Lyrics * (1914).

PAGE, David Perkins, American educa¬ tor: b. Epping, N. H., 1810; d. 1848. He re¬ ceived his education at Hampton Academy and for several years was principal of the High School at Newburyport. From 1845 to 1848 he was principal of the Albany State Normal School. He published (Theory and Practice of Teaching, or the Motives of Good School Keeping) (1847), a work of permanent value to educators. Consult the edition of 1886 in which there is a short biography of the author by W. H. Payne.

PAGE, John, American legislator: b. Rose-well, Va., 17 April 1744; d. Richmond, Va., 11 Oct. 1808. He was graduated from William and Mary College in 1763, where he was inti¬ mate with Thomas Jefferson. He served under Washington in an expedition against the French apd Indians, and during the American Revolu¬ tion acted as a member of the committee of public safety and as lieutenant-governor

of the commonwealth, sacrificing to the cause of the colonies a large share of his private fortune. He served in Congress in 1789-97, and in 1802

was elected governor of Virginia. In 1805 he was appointed by President Jefferson commis¬ sioner of loans for Virginia, which position he held until his death.

PAGE, Richard Lucian, naval officer, sol¬ dier: b. Clarke County, Va., in 1807; d. Nor¬ folk, Va., 1901. Page entered the United States navy as midshipman in 1824 and in 1855 he reached the grade of commander. During this period his service was the usual routine of sea and shore duty. At the outbreak of the War of Secession he resigned and entered the Con¬ federate service as commander in the navy. He fortified the mouth of the James River and other points on the coast, and then established large ordnance foundries at Charlotte, N. C., which he managed for two years. In 1864 he was made brigadier-general and placed in com¬ mand of the outer defenses of Mobile Bay. His defense of the forts against Farragut's bombardment wa$ a magnificent exhibition of courage and endurance. After the war Gen¬ eral Page resided in Norfolk where he was for several years superintendent of schools.

PAGE, Thomas Jefferson, American naval officer, grandson of John Page (q.v.) : b. Shelly, Gloucester County, Va., 4 Jan. 1808; d. Rome, Italy, 26 Oct. 1899. In 1853-56 he was lieuten¬ ant-commander in explorations of the La Plata region in South America, and in February 1855 his vessel was fired upon from a Paraguayan fort. Resigning in 1861 he then entered the Confederate service, was commissioned commo¬ dore and in 1862 was sent to England to take charge of a cruiser. As, however, he was pre¬ vented from taking the ship out he secured the command of a small iron-clad at Copenhagen, which was soon after seized from him while in a Spanish port. Leaving the service he sub¬ sequently resided in Argentina and in Florence, Italy. He wrote (La Plata, the Argentine Con¬ federation, and Paraguay > (1859).

PAGE, Thomas Nelson, American lawyer and author: b. Hanover County, Va., 23 April 1853. He was educated at Washington and Lee University, studied law for a year at the University of Virginia, was admitted to the bar, and established himself in practice at Richmond. His avocations became literature and lecturing. Perhaps no post-bellum writer has depicted with so rare a skill the negro and white life of slavery, war-time and reconstruction. His ren¬ dering of the Virginia colored dialect in such stories as (Marse Chan,* first printed in the Century (1884) ; later in the collection (In Old Virginia) (1887), assumed a real philologi¬ cal importance. Among his further writings are (Befo' de War,} poems by A. C. Gordon (1888) ; (On Newfoundland River) (1891) ; <Elsket) (1891); <The Old South, > essays (1892) ; (Red Rock* (1898) ; (Gordon Keith* (1903); (Bred in the Bone) (1904); (The Negro* (1904) ; (The Old Dominion) (1908) ; (Robert E. Lee) (1911) ; (The Land of the Spirit* (1913) ; (The Stranger's Pew) (1914). In 1913 he was appointed by President Wilson as Ambassador to Italy. He is a member of the American Academy of Arts and Letters. See In Ole Virginia.

PAGE, Walter Hines, American publisher: and diplomat: b. Cary. N. C., 15 Aug. 1855; d. Pinehurst, N. C., 21 Dec. 1918. He was edu¬ cated at Randolph-Macon College, Va., and

Johns Hopkins University, abandoned teaching for literary work and became editor of The Forum 1890-95, literary adviser to Houghton, Mifflin and Company, publishers, 1895-99 ; and editor of The Atlantic Monthly 1896-99. He was one of the founders of the publishing house of Doubleday, Page and Company in 1899; the editor of World's Work from 1900 to 1913, and from 1913 to 1918 during the arduous period of the Great World War was American Ambassador to Great Britain. He received the degree of D.C.L. from Oxford University in 1914. He was the author of numerous magazine contributions and of (The Rebuilding of Old Commonwealths) (1902).

PAGE, William, American artist: b. Al¬ bany, N. Y., 23 Jan. 1811 ; d. Tottenville, Staten Island, 1 Oct. 1885. He studied under James Herring and Samuel F. B. Morse, at the Acad¬ emy of Design, and lived 11 years in Italy, copy¬ ing the Italian masters and especially Titian. He spent much time in analyzing the methods of that master and was so successful in imitating his style and coloring that one of his pictures was seized by the Florentine authorities as an original

Titian which was being conveyed out of the country. In 1836 he was elected a mem¬ ber of the National Academy, of which he was president, 1871-73. Among the portraits painted by him are those of John Quincy Adams, the Brownings, Charlotte Cushman and others, in¬ cluding a full-length likeness of Admiral Farragut, which was purchased and presented to the emperor of Russia. His chief paintings are (The Holy Family) (1837) ; (The Last Interview) (1838) ; (Ruth and Naomi* (1880).

PAGEANT, paj -ent. The exact derivation of this word is uncertain. The pageant in the old-world sense was originally a spectacular street procession, with more or less symbolical figures and tableaux mounted on movable plat¬ forms or trolleys. Most of the early references are contained in Sharp, T., dissertation on the Pageants or Dramatic Mysteries, anciently per¬ formed at Coventry) (Coventry 1825). Ob¬ serve that in this title the pageant is very properly bracketed with the mystery, for noth¬ ing can be more certain than that it developed hand in hand with the medkeval mystery play. With the abatement of superstition that fol¬ lowed the passage of the year 1000 a.d., when so many gloomy prophecies went for nought, the people took heart of grace and called for entertainment: and if they might make merry in the field and in the shop, why not also in the church? Hence the ecclesiastical play, and the steady growth of the community folk play, under many secular forms, up to the advent of the Elizabethan dramatists in England, and of Corneille in France. The earliest recorded pageant in England was in 1236, on the occasion of a royal marriage at Canterbury. Pageantry was for a long time an important adjunct to coronation festivities, and was extremely popu¬ lar with the people. In the 15th century a king of England granted a parcel of land and the money with which to build a pageant house to the Company of Weavers. Not the least of the services of this guild was that while they wove the most beautiful of English tapestries thev also carried the joys of pageantry to the highest pitch of those days. In the following century the pageant festival at Kenilworth Castle

in honor of Queen Elizabeth created a tradi¬ tion of splendor. The lord mayor's show in London, and the parades of labor and other fraternities, with their banners and tableaux, are but lean and limp survivals of the old pageants. Even to this day many of the cities of Great Britain, France, Holland, Belgium, Germany, Italy, etc., commemorate their great men and the proud events of their history by processional pageants of the citizens in the costumes of many periods.

In the United States the celebrations of Mardi Gras in New Orleans and elsewhere in the South, the Festival of the Veiled Prophet in Saint Louis and other harvest festivals, the flower festivals of Southern California, with that of La Portola in San Francisco, are all direct descendants of the older forms of pageantry. In 1863, at Saint Louis, an early form of indoor war pageant was presented in a series of his¬ toric tableaux entitled ((America as it was, and America as it is.® But the pageant in its late development is usually a far cry from these simple parades and spectacles. Episodical and dramatic construction, historical in content, educational and social as well as aesthetic in its aim, the writers, composers, designers and all other artists implicated, have nowadays a scope for creative energy that was quite beyond the compass of the old regime. (See Community Drama). With the two already mentioned types in point of structure (the parade and the dramatic) it should be observed that there are also two main types in respect to content: (a) the social, concerning itself with some didactic phase, as illustrated by the Educational, the Renaissance and the Perfect City pageants; (b) the historical, envisaging the development of a given community, as shown in the Deer¬ field, Westchester, Peterborough, Illinois, Cape Cod and Indiana pageants. The historical pageant has been described by William Chauncy Langdon as ((drama in which the place is the hero and the development of the community is the plot… . The modern pageant is an

instinctive expression in dramatic form of the new community spirit ; and as there never be¬ fore was such a community spirit in the his¬ tory of the world, so there never was such an expression of it… . Folk-play would be a

more technically correct expression.® The same writer, Mr. Langdon, in reviewing the fact that the technique of the historical pageant has reached a remarkably high standard in the United States, expresses himself conservatively in the following words: <(In variety of form, in the pageant use of symbolism, in music, color, dance, in the crystallization of the civic value of the pageant — in these respects I believe we may fairly claim that the American pageant has made some advance upon the English.® Educational centres have turned to the

pageant form, not only for the furtherance of their im¬ mediate pedagogical ends, but also for draw¬ ing the attention of elders to the educational system, persuading them to co-operation and to the unifying of the whole community life. The pageant spirit primarily seeks to encourage people of all classes and ages belonging to the institution or locality promoting the occasion to involve themselves in democratic and festal fashion in the preparations and performances. The list of the most important of recent pag¬

eants, with the names of the pageant authors, is as follows :

English Pageants.

1905. The Sherborne Pageant. (L. N. Parker).

1906. The Warwick Pageant. (L. N. Parker).

1907. The Saint Edmundsbury Pageant. (L. N. Parker). The Liverpool Pageant — a procession. (D'Arcy de

Ferrara).

The Oxford Historical Pageant. (Frank Lascelles). The Portchester Pageant.

Romsey Millenary Pageant. (F. R. Benson).

The Saint Albans Pageant. (H. Jarman and P. Carr).

1908. The Chelsea Historical Pageant. (J. Harry Irvine). The Dover Pageant. (L. N. Parker).

Winchester National Pageant. (F. R. Benson). Gloucester Historical Pageant. (G. P. Hawtrey). The Quebec * (North America) Tercentenary Cele¬ bration. (F. Lascelles).

1909. The Colchester Pageant. (L. N. Parker).

The Bath Historical Pageant. (E. Baring).

The English Church Pageant. (Hugh Moss).

Stepney Children's Pageant at London. (L. N.

Parker and F. J. H. Darton).

The National Pageant of Wales at Cardiff. G. P. Hawtrey).

The York Pageant. (L. N. Parker).

1910. The Army Pageant at London. (F. R. Benson).

The Chester Historical Pageant. (G. P. Hawtrey). The Ilford Children's Pageant. (L. C. F. Robson). The Pageant of South Africa at Cape Town. (F.

Lascelles).

1911. The Pageant of London. (F. Lascelles).

The West Dorset Historical Pageant at Bradpole. (E. Lloyd).

Mid-Gloucestershire Historical Pageant of Progress. (Miss May E. Cull).

1912. Oxford Millenary Pageant.

♦British in form, spirit and subject matter and therefore included in this list.

Pageants in the United States.

1908. Pageant of Education, Boston, Mass. (Lotta A.

Clark and Mrs. Cyrus A. Dallin).

Founders' Week Pageant-Parade, Philadelphia, Pa. (One of the best modeled parades ever held in America: In form it approached the pageant. (Ellis P. Oberholtzer).

1909. Pageant of the Italian Renaissance, Chicago, Ill. One

of the finest pieces of pageant writing accomplished in America or England. (Thomas Wood Stevens). Bronxville Pageant of Westchester County, N. Y. The first and one of the most complete American pageants of the historical type. (Violet Oakley and Eugene Sanger).

Lake Champlain Tercentenary Indian Pageant. Exclusively Indian; performed by members of an Indian Tribe. (L. O. Armstrong).

Pageant of Illinois, Evanston, Ill. White Man's civilization, and

destruction of Indian tribal life of the West. (Thomas Wood Stevens). Hudson-Fulton Celebration. Consult Hall, E. H., “ Fulton-Hudson Celebration, 1909:” Albany 1911).

1910. Ripon Historical Pageant, Ripon, Wis. By the

faculty and students of Ripon College. (J. F. Taintor).

Pageant of Old Deerfield, Deerfield, Mass. (Margaret M. Eager).

MacDowell Memorial Pageant, Peterboro, N. H.

(George P. Baker and Mrs. Edward MacDowell). Pageant of the Perfect City, Boston, Mass. The Boston civic pageant of 1915, also. Presented the development of the home. There were 2,000 par¬ ticipants including a tribe of Iroquois Indians. (Lotta A. Clark).

1911. Pageant of the History of Minnesota, Saint Paul,

Minn. (L. W. Ziegler and Lilly A. Long). Pageant for Independence Day’, Chicago, Ill. Shows grovyth of the idea of freedom. (T. W. Steven and K. S. Goodman).

Pageant of Thetford, Vt. The first of a series on the “ New Country Life.” (William Chauncy Langdon).

1912. Historical Pageant, Schenectady, N. Y. (Constance

D. Mackay).

Historical Pageant, Philadelphia, Pa. One of the largest and most important of pageants. Realistic. Over, 6,000 participants. (Ellis P. Oberholtzer). Y. W. C. A. Foreign Pageant (Composed by a com¬ mittee of which Miss H. L. Boutelle was chairman. Given simultaneously in some 75 different cities during the “ World’s Week of Prayer ”).

Pageant of Saint Johnsbury, Vermont. (W. C. Langdon).

1913. Pageant of the Old South ehurch, Boston, Mass

Indoors. (J. L. Smith and H. C. Greene).

Irish Pageant at New York. Indoors. (Anne Throop Craig).

Wisconsin Pageant, University of Wisconsin. (T. W. Stevens) .

Pageant of Meriden, N. H. Education in the New Country Life. Music by Arthur Farwell. (Lotta A. Clark).

Pageant of Darien, Conn. Pageant of the Com¬ muter. Music by Arthur Farwell. (W. C. Langdon).

1914. Progress of Women. Presented by the Men's League

for Woman Suffrage, in the 69th Street Armory, New York. (Hazel Mackaye).

Romance of Work. Presented by the Association of Working Women in the 69th Street Armory, New York. (Mary P. Beegle).

" The Padres " and " The Pathfinder." Pageant-dramas presented at Santa Cruz, Cal. (Perry Newberry).

The Pageant of Nevada History, Reno, Nevada. (Jeanne E. Wier).

Pageant of Cape Cod, Bourne, Mass. Celebrated the completion of the Cape Cod Canal. Music by Daniel Gregory Mason. (W. C. Langdon).

1914. Pageant of St. Louis. Presented with the " Masque

of Saint Louis," by Percy Mackaye. One of the most renowned of all pageants. (T. W. Stevens). Pageant of the Champlain Valley, Plattsburgh, N. Y. (Margaret M. Eager).

Pageant of Chicago, Ravinia, Ill. (Ruth Coffin Col¬ lins.)

Roger Bacon Pageant, Columbia University, New York. (John Erskine).

Historical Pageant of Georgia, Atlanta, Ga. Given indoors by the D. A. R. (Mrs. W. L. Peel).

1915. Pageant of Austin, Texas. Music by Frank LeFevre

Reed. (W. C. Langdon).

Brooklyn Historical Pageant, New York. (Virginia Tanner).

Pageant and Masque “ The Golden Legend of Cali¬ fornia.” Presented at the Exposition Park, Los Angeles, Cal. (Alfred Allen).

1916. Pageant of Indiana, Indianapolis, Ind. Shows the

drama of the development of the State as a com¬ munity from its exploration by La Salle to the centennial of its admission to the Union. Music by Charles Diven Campbell. (W. C. Lang¬ don.)

Pageant of Yale University, New Haven, Conn. Probably the largest of all pageants in point of numbers. There were 7,000 performers. See Col¬ lege Dramatics. (J. R. Crawford).

The Pageant of Bloomington and Indiana University. Music by Charles Diven Campbell. (W. C. Lang¬ don).

The Masque and Pageant of Play, Northampton, Mass. (Margaret M. Eager).

The Cornell Pageant, Ithaca, N. Y. (Marjorie Barstow).

Shakespeare Festival, Columbia University. (Pro¬ fessor Abbott).

Shakespeare Masque, Wellesley, Mass. (Mrs. Laura Palmer Ingalls). ‘ j*

Shakespeare Tercentenary Masque, New York City.

(Arthur Farwell, Percy Mackaye). (

Cupid and Psyche, Yale School of Fine Arts, New Haven, Conn. (John J. Chapman, Horatio Parker, Jack Randall Crawford).

The New Vision, a Masque of Modern Industry, Buffalo, N. Y. (John Lund, Hazel Mackaye). Shakespeare Tercentenary Civic Festival, Boston, Mass. (Lotta A. Clark).

Christmas Mystery, Duquesne, Pa. (Thomas Wood Stevens).

1917. Community Pageant, Boston, Mass. (Mrs. Pearl M.

Keating) .

Pageant of Womanhood, Boston, Mass. (Marie Ware Laughton).

Historical Pageant of Florida, Tallahassee, Fla. (Thomas Wood Stevens).

The Cornell Pageant, Ithaca, N. Y. (Marjorie Bar¬ stow).

The Drawing of the Sword, a war masque, Carnegie Institute of Technology, Pittsburgh, Pa. (T. W. Stevens, B. Iden Payne).

Caliban, by the Yellow Sands, a Masque, Boston, Mass. (Arthur Farwell, Percy Mackaye, F. Stan¬ hope).

American Red Cross Masque, Huntington, L. I.

(Joseph Linden Smith and T. W. Stevens). Semi-Centennial Pageant, Drew Theological Semi¬ nary, Madison, N. J. (Marie Moore Forrest).

1918. Masque of the Titans of Freedom, George Washing¬

ton and Abraham Lincoln, Urbana, Ill. (W. C. Langdon).

For complete lists of pageants, and for all details of construction, selection and production, music, costumes, etc., consult the bulletins of the American Pageant Association. See the articles Community Drama, Festival, Mas¬ ques, Pageantry ; also the bibliographies under those headings.

Bibliography. — Anon., Selective List of Books on Pageants) (in Drama, No. 10, p. 238, Chicago 1913) ; Anon., Special Pageant num¬ ber of the Survey, New York, 4 July 1914; Baker, G. P., (American Pageantry and its Proper Development (in Art and Progress, Vol. IV, p. 831 Boston 1913) ; (The Pageant and Masque of Saint Louis (in The World's Work, August 1914) ; Bates, E. W., (Pageant and Pageantry > (Boston 1912); (Bibliotheque Dramatique de M. de Soleinne) (Vol. V, Paris 1844, contains an excellent list of books on (Fetes, Pompes et Solemnites Publiques*) ; Brown, F. C., (The American Pageant Associa¬ tion (in Drama, No. 9, p. 178, Chicago, Febru¬ ary 1913) ; Brown, F. C., <First American Civic Pageant: Cave Life to City Life> (in Theatre, Vol. XIII, p. 43, New York 1911) ; Davol, R., handbook of American Pageantry) (Taunton, Mass., 1914; embodies excellent hints for directors and others, and is also valuable for numerous photographs of groups in action) ; Fairholt, F. W., (Lord Mayor's Pageants* (London 1843-44) ; Farwell, Arthur, (Music for the Fourth of July) (in (The Cele¬ bration of the Fourth of July by means of Pageantry, > New York 1912) ; Hatcher, O. L., (A Book for

Shakespeare Plays and Pageants) (New York 1916) ; Hirsch, S. M., (The Pageant Drama Revived* (in Review of Re¬ views, New York, September 1913) ; Langdon, W. C., (New York Conference on Pageantry) (in Drama, No. 14, p. 307, May 1914) ; Lang¬ don, W. C., Suggestions for the Celebration of the Fourth of July by Means of Pageantry > (New York 1912) ; Parker, L. N., historical Pageants* (in Journal of Social Arts, Vol. LIV, p. 142, London 1906) ; Oberholtzer, E. P., his¬ torical Pageants in England and America* (in Century Magazine, Vol. XLVIII, p. 416, New York 1910) ; Spencer, M. L., (Corpus Christi Pageants in England: A Study of Mediaeval Cycle Plays) (New York 1911) ; Spender, C. M., (The Educational Aspects of Pageants and Pageantry *(in Journal of Education, London, February 1911) ; . Tanner, Virginia, (The Pageant of the Little Town of X* (Boston 1914; gives excellent instructions for pageant planning) ; Turnbull, G., (English Historical Pageants *(in the World's Work, Vol. XV, De¬ cember 1907) ; Wade, H. T., (What the Pageant Does for Local History* (in Review of Reviews, Vol. XLVIII, p. 328, New York 1913) ; Withington, R., (A Manual of Pageantry* (Bloomington, Ind.,. 1914) ; id.,

(English Pageantry: An Historical Outline) (Cambridge, Mass.).

Duncan Macdougall.

PAGEANTRY, paj'en'tre. The production of pageantry has become prominent in America since the advent of the 20th century, in some respects following the longer established Eng¬ lish models, but developing in others certain relations to the industrial and educational im¬ provement of towns or smaller interior social groups, which give it a somewhat distinctive

character. This local improvement function may be traced in this country, especially since 1910, in the lists of "Civic Pageants® "Commun¬ ity Pageants,® and sectional "Historical Page¬ ants® which have been noteworthy in a num¬ ber of our States. There has been all manner of pageantry production illustrative of varied topics, since its recent especial popularity has been established, but the

development of it for the type of social group improvement cited above, has been characteristic of the members of the American Pageant Association, who haye studied methods for its production in this way as a peculiarly useful agent for community vitalizing. An interesting element of this de¬ velopment in its use is that it has gone hand in hand with the gradually increasing recogni¬ tion of the importance of recreational facilities in all our communities, urban and country dis¬ tricts, alike, and has added to this, substantial lessons in the historic associations of places in ways to increase citizens' pride in their local¬ ities, and further, has presented opportunities for illustration of local industries and publicity for them in such manner as materially, in al¬ most every instance of such experiments, to give new impetus and prosperity to them. This form of pageantry and its application deserve thus to take a place as representative in this country, at least, and the procedure followed in producing it, and applying it in this special way, by those directors who have made it distinct¬ ive, is a valuable example for others wishing to organize such festivals with a like object, in their localities.

The director in this community improvement type of pageantry has either been a resident of the community, or has taken up residence there on purpose to familiarize himself with its in¬ terests and activities so that he may illustrate and advertise them properly in his pageant: Technically the procedure has been in the pre¬ liminaries, like any other organization of forces for public celebrations. An initial committee of the most substantial and energetic citizens is formed to support the enterprise financially and actively. In some instances of small com¬ munities of good promise, at the recommenda¬ tion of the director, the enterprise has been financed initially by one or another of our phil¬ anthropic organizations instituted for educa¬ tional improvement, such as the Russell Sage Foundation, which materially aided in the pio¬ neer work of this special form of local improve¬ ment pageantry. It may be seen that a director in these enterprises, must be one able himself to see the possibilities in any given community, industrially and otherwise, and to know how the celebration of its history and activities through a festival of pageantry entered into by the citizens may be a means of advancing its local interests. He must also be confident and enthusiastic enough to inspire the citizens them¬ selves with like belief in the enterprise. It becomes more than an ordinary public celebra¬ tion, thus, bearing on the face of it the need of special qualities of social sympathy in the director, and a sincere desire to aid the pros¬ perity of the community in which he organizes it.

With the initial committee in the community organized, and the ways

and means seen clear for the support of its efforts, subcommittees are formed for the organization of such groups as will portray historic episodes in the produc¬

tion, episodes illustrative of the industrial life of the place, and the further incidental scenes of a symbolic or lyrical nature usual in these pageants. A special committee takes charge of the costumes and properties, and another of arrangements for orchestral and vocal sup¬ port to the performance.

In the notable pageants of this kind in this country, the director-in-chief is most frequently the author of the book and as well of the lay¬ out for production altogether, and sometimes of the music scheme, even if not the composer of the full score. For working out the detail special talent is engaged as a rule, and so far as possible this talent is called upon in the locality where the production is to be, since it is part of the object of these pageants to stimulate preferably, local abilities by giving them the opportunities the festival presents.

The performers are always local persons, in this representative type of pageantry, if the artists on the producing staff may not be al¬ ways so. It has been the special aim of the pageant producers in these cases to inaugu¬ rate and maintain a strongly local social feel¬ ing in the preparation of their pageants, in order to make them peculiarly an expression of the esprit de corps of the townsfolk, recrea-tionally and as to sympathetic interest and pride in their history, their industries and especially in the possibilities of their community in the matter of prosperity and growth. The repre¬ sentation through pageantry of the pioneer en¬ thusiasm expended by their ancestors in found¬ ing a community, is employed to inspire its modern members with renewed confidence in their natural heritage of energy, — while spirited reproductions of scenes from their own current industrial life, encouragingly sum up their ac¬ complishment, and its promise of prosperity.

In the small country communities where this recreational and educational festival has been tried, the people participating have been farmers and hardworking folks for the most part, but their rehearsals for their production have been enthusiastically attended and car¬ ried on, and have proved a source of social enlivenment for the two months or so re¬ quired for them. Great interest Mas been taken in these cases, in the preparation of costumes and properties, in the unearthing of heirlooms and old possessions for use in these

capacities, and, among the actors, in the reproduction of the life scenes in which they knew their own ancestors were actually the original participants. In such ways the pageantry produced in the rural districts and small country towns has had an intimate interest it has not had in the large urban communities — and similarly in the rural districts it has responded to a more unique need, a hunger for social enlivenment and need of industrial energizing.

William Chauncy Langdori, who _ has been a notable ‘pioneer in the rural application of pageantry in this country — with those of his colleagues who have followed his example — has made it in noteworthy instances, actually an altruistic application of the arts to social im¬ provement, in a most comprehensive sense. His work is thus under the head of purelv amateur enterprise, in the best sense. It will be seen that the emphasis relative to its usefulness must be laid upon its ethical impulse, and the effect of this upon the public spirit in the place

PAGEANTRY

.3

O

cS

ft

w

ID

c

to

’O d

si

4-»

_T O

« 03

§_£

2-

J*-E

^5

O cc

t3 c 0 >

l-t

P» o P. < D cC

d) u

in

i

P3 c«

ID -S ^T3

Vi o

o w

« ?

s|

M

ID C

o «

to «

MiS c u •a 0 £ 3

Jl73 w

<D ■!-> >1 3 -m 2

HtS P

c

<D

•O

cs

O

cS

u

0)

P«

O

u

p<

Out-of-door auditorium and part of stage space, banked and beautified by appropriate natural means, of the Rose Mary Garden Theatre, Huntington, L. I. It shows an

excellent arrangement of watercourse to be used in the action of the Red Cross Pageant of Thomas Wood Stevens

5$ .gpp; ˆ

¥ M-!

of its production, rather than upon its features as a spectacle, or even as an artistic object lesson, although these pageants have served to discover and inspire local talents in the arts, in many instances, and by reason of expert and sympathetic direction of local amateur talent, have often resulted in artistic, and not alone ethical object lessons. They have been not crude, but excellent and beautiful in effect.

Relative to its technical form, the most note¬ worthy models have been arranged in general after the plan of structure of all the main types of pageantry, as established already in England, though varied and modified to fit local material to be illustrated by them, and accord¬ ing to the taste of the director.

The usual outline of structure is as follows :

A.

A Herald presents a prologue, and enters thereafter be-* tween scenes to recite introductory or explanatory matter, fulfilling the function of a Greek chorus.

This herald is sometimes replaced by a chorus like that m Greek drama, which introduces the explanatory matter either directly through the words of songs, or symbolically through dance evolutions, or tableaux.

B.

The herald is often succeeded by a lyrical prelude of dance and music, the dance usually of the modern “ Interpreta¬ tive ” order, symbolic of the subject of the pageant it intro¬ duces. Occasionally where it has been appropriate to the historical subject matter, folk dances or other conventional dances are introduced as prelude or interludes.

C.

The First Episode proper now takes place, following one or both of these introductory passages. It is usually a directly dramatic scene presenting some representative historic incident of the period or periods which contribute subjects to the pageant. Such incidents often focus about the person of a famous individual of the period or the locality which the pageant celebrates.

‘ D.

The further dramatic scenes of the pageant follow in their order, to the conclusion, with usually lyrical symbolic inter¬ ludes between each two of them, or some introductory recital by the herald, as has been stated. Sometimes the interludes are varied from the allegorical, fanciful type, and are con¬ stituted of scenes illustrative of the industries of the place, and their progress from early times. This would be in cases where the industrial development of the place was inci¬ dental to a main historical theme, and not in itself the main theme.

E.

The finale is tableau, epilogue, by herald, lyrical passage: one or more of them, in which are summed up in allegorical or at least poetic form, the main theme and moral, that is, the concluding argument, presented by the whole spectacle. A march past of all characters is also a frequent feature of the finale.

A certain unity of plot is preferably regarded in the plan of the successive dramatic scenes, a given relation of them to the theme or moral to be developed through the agency of the pro¬ duction. It has been the aim of the leading pageant producers to create a standard in the structure of these compositions. The American Pageant Association (see footnote) has aimed particularly to educate those who wished mem¬ bership in its body, in the technical understand¬ ing of such dramatic planning of structure and detail as should make the pageants they pro¬ duced distinctly artistic compositions, _ and not loose processional or panoramic affairs, with parts ill related to each other or to any con¬ crete central theme. This artistic consistency and unity is regarded by the specialists in pageantry, in the production of no matter what type of pageant they present under the several heads in the technical classification they em¬ ploy, a classification in which the main types are

termed: Panoramic pageant, dramatic pageant, epic pageant, pageant drama, dramatic festival, lyrical drama. The detail of distinctions among these is mainly useful to specialists, but briefly they may be stated as follows :

A Panoramic Pageant consists of a long series of scenes and incidents, depicting historical developments, and not strongly focused about one main event.

A Dramatic Pageant is focused about some main event and the moral to be deduced from it, and is more concrete accordingly in its form.

An Epic Pageant deals with some particular epic event and is treated romantically rather than with any emphasis on an ethical theme. In form it may be like the preceding, or still more concrete and focused on personal action and special period, as is the following —

Pageant Drama: A drama on a grand scale with a heroic and romantic theme, and produced with the spectacular features of pageantry, that is, splendor of group masses and broad lines of action throughout its scenes.

A Dramatic Festival is one in which spectacular features, dances, choruses, tableaux, etc., are co-ordinated in poetic or allegorical illustration of a chosen subject; or it is a cele¬ bration of the spirit of some holiday in such form as presents a well-composed spectacle, and does not consist of mere loose features ih a haphazard merrymaking.

A Lyrical Drama may be defined as one with dramatic theme and central action, but conveyed in poetic forms of discourse and song, and having its main features threaded, so to speak, upon choric passages, that is, passages of dance scenes, symbolic tableaux and group movements, and the like.

As to the theme of the usual pageant, which is of the historical and community improvement or educational order, it may be summed up as the moral and promise to be deduced from local or general history and from the special activi¬ ties, political, industrial or educational of a place or epoch.

Pageantry in the United States and England during the period of its coming into such con¬ spicuous recent popularity, peculiar specializa¬ tion and application to community improvement has been used in this country and England to illustrate and improve local agriculture, manu¬ facturing, commerce, arts and education. Pioneer life in our country has been a favorite theme, and incidents of the early settlers' contact with the Indiansˆ are introduced into most of our State historical pageants. (A reference to the specifi¬ cation of subjects in the lists of pageants in the foregoing article Pageant will indicate representative productions illustrating these sev¬ eral themes.) Pageantry is at its best out of doors, and the most noteworthy pageants of the local history type have been produced so. Certain types of pageantry, given indoors, would rather come under the head of epic dramas, heroic dramas on a grand scale, for as a rule, given in the limited setting of a theatre they are more appropriately composed in the more concrete dramatic forms. If, indoors, they yet have the character which is specifically one of pageantry — that is, the carrying of the plot or theme predominantly by group action, rather than the action of individual persons — they come properly under the head of pageantry, but in the classification of pageant-drama de¬ fined above, for they have in such case the features of both forms of composition.

A word relative to choice of special site for an out-of-door pageant will be practical for would-be producers.

A producer must have in mind the neces¬ sity of mutual adaptation of site and produc¬ tion to each other, and out of doors a site cannot be made to order to any great extent, and so must, so far as possible, be found to order. It is to be realized especially in select-

ing a site that in order to properly enclose the scene pictures, the choice should be made of space which is some approach to an amphi¬ theatre in form. It needs at least, at a suit¬ able distance from the central action space, sloping ground, or background, and if possible side-fringe of trees, rising ground or rock wall — something to give it frame and modified distribution of light to set off the action and aid effective entrances and exits.

Some body of water, a stream or pool, is apt to be indispensable to certain scenes of almost every out-of-door pageant. In country districts a site combining these needs to a suffi¬ cient extent is usually possible to find. Pro¬ duction in other localities, large outdoor arenas, athletic fields, etc., may require artificial aids to the spectacular effects. The more artificial aids may be dispensed with, however, the bet¬ ter for the beauty of the outdoor production in every case. A wooden platform is an abomination out of doors, as also are artificial scenery pieces. If such must be used, a camou¬ flaging of leafage should be employed to con¬ ceal their unreality which in the open air is wholly devoid of the illusion with which indoor lighting softens it.

The choice of colors for out-of-door pro¬ ductions is also one requiring special study given it in every instance. More brilliant colors and combinations may well he used out of doors and at the greater distances covered than are permissible indoors. The effects of light and shadow in a special site, should be con¬ sidered and utilized in grouping and in appli¬ cation of color schemes. The effects of dis¬ tances in the scene space, relative to the action of groups and individuals, must be experi¬ mented with by the director. No outdoor site may have the rules of the indoor theatre ap¬ plied to it without modification and special adaptation. The matter of acoustics is also an important one out of doors. Because the use of the voice out of doors is more difficult than indoors, the lines of pageantry are as a rule reduced to their simplest possible compass, enough to carry the needed information and little more. But this must be done with good dramatic speech, with as much beauty as pos¬ sible in language. But particularly is it neces¬ sary to remember that a strictly rhythmic prose, or a well-turned pentameter verse will enable a speaker to make his voice carry out of doors, with more ease than lines written without re¬ gard to rhythm or the quality and juxtaposition of syllabic

sounds they contain. This presents another problem for the writer of a pageant book, for the new pageantry which is to main¬ tain an artistic standard of composition and production. It is well wherever possible to plan the action on a pageant site where the natural background of wooded land, rocks or walls may be made available as a sounding board for what dialogue enters the scenes, for the recitations of the Herald, or the singing of the choruses. If nothing whatever is natur¬ ally provided in the available locality, artificial backgrounds for this purpose may be erected, but should always be camouflaged with such effects as will relate them beautifully or appro¬ priately to the setting which nature provides. The actor as well as the playwright has a problem here in the use of voice in the open

air, for speech. An utterance not too quick, with precise regard to rhythm in phrasing, and to rounded tone, is essential. It is for this reason that for important character roles in pageantry and outdoor plays, professional ac¬ tors are sometimes indispensable, or a risk of loss of the dialogue to the audience is incurred. But the director who is experienced or who will experiment with care in each new site, can aid clever amateurs to properly deliver their dialogue, or will know whether it can, only be properly delivered by a professional actor who can adapt himself to difficult acoustics in a site where thev are imperfect and cannot be im¬ proved. English pageantry is notable for its substantial magnificence of spectacular effects and costuming, and as a rule, for a higher literary type of book than our American page¬ antry — as yet. With more finish in this last respect, and with the adaptation of a more solid magnificence like that of the English pageantry, added to the theatric aptness in attaining pic¬ turesqueness and telling action which our own producers show on occasions, a highly artistic type of heroic, dramatic and spectacular compo¬ sition may be developed from our American Pageant forms as they are now constructed and produced by their representative directors and the authors and composers who contribute to them. Consult Craig, A. T., (The Aesthetic of an Outdoor Play5 in Drama (May 1918). See Pageant.

Footnote. — The American Pageant Association was formed in 1911-12, for the express purpose of bringing to¬ gether teachers, dramatic writers and producers, social settle¬ ment directors, and playground leaders, who were interested in this valuable form of elaborating their recreation periods, in schools or community centres, in sociological work in larger civic fields, or in producing entertainments for artistic education, and so on, that they might give

each other the benefit of their several experiments in the development of this form of dramatic production and its kindred forms, technically, and as to working organization, that is, as an art, and as an educational social force. Its founder and president was William Chauncy Langdon. Its first members were: Percival Chubb, Peter W. Dykema (now of Saint Louis and University of Wisconsin, respectively), Percy Mackaye, Thomas Wood Stevens, Canstance d'Arcy Mackaye, Hazel Mackaye, Elizabeth Hoar, Charles Farns¬ worth and Mrs. Charles Farnsworth (of Teachers College), Frank Chouteau Brown, Lotta Clarke, William E. Bohn, Anne Throop Craig.

Anne Throop Craig.

PAGET, paj 'it. Sir James, English sur¬ geon: b. Great Yarmouth, Norfolk, England, 11 Jan. 1814; d. London, 30 Dec. 1899. He studied in Saint Bartholomew's Hospital, London, be¬ came a member of the Royal College of Sur¬ geons in 1836, and a fellow in 1843. He was a corresponding member of the Institute of France. He was consulting surgeon at Saint Bartholomew's Hospital, and sergeant-surgeon to the queen, and was created a baronet in 1871. He was vice-chancellor of the University of London, president of the Royal College of Sur¬ geons, and delivered many important lectures on his surgical work. He discovered the cause of trichinosis in 1836, and made great advances in the study and treatment of tumors, of dis¬ eases of the. bones and joints, and neurotic cases exhibiting surgical symptoms. He also contributed to the advance of physiological re¬ search. A disease of the breast and osteitis deformans, a bone disease, are known after him. He published (Lectures on Surgical Pathology5 (1853) ; (Clinical Lectures5 (1875) ; *etc.*

PAGET, Violet ((< Vernon Lee®), English essayist and critic : b. 1856. Since 1871 she has made her home in Italy, devoting herself in the main to the study of Italian art and literature. She is a brilliant though not always a convinc¬ ing writer, fluent and discursive, and not infre¬ quently subtle as well, and possesses the power of holding the reader's interest, no matter what subject be chosen. Among her works, all of

which have appeared over the signature of ((Vernon Lee,® are ‘Studies of the 18th Cen¬ tury in Italy) (1880) ; ‘Belcaro: Essays on Sun¬ dry ˆsthetical Questions) (1882); (Ottilie: an 18th Century IdylP (1883) ; ‘Euphorion,) es¬ says (1884); ‘Miss Brown, > a novel (1884)- (Juvenilia,) essays (1887); ‘Renaissance Fan¬ cies and Studies) (1895); ‘Limbo,) essays (1897); ‘Genius Loci) (1899); ‘Hortus Vitae Essays on the Gardening of Life) (1903) ‘Genius Loci) (1905) ; ‘Pope jacynth) (1905) ‘The Enchanted Woods) (1905); ‘The Spirit of Rome) (1905); ‘Sister Benvenuta) (1906); ‘The Sentimental Traveller) (1907) ; ‘Gospels of Anarchy) (1908); ‘Laurus Nobilis) (1909); ‘The Tower of Mirrors) (1914) ; ‘Louis Nor-berC (1914).

PAGO, pa’go, island of the Adriatic in the bay of Quarnero and district of Zara, Dalmatia ; a Jugo-Slavia possession. The canal of Morlacca separates the island from the mainland. Area, 81 square miles ; pop. 7,000. The capital city, bearing the same name, lies in the deep Val-lone di Pago, which is hemmed in on every side save where the Bocca di Pago gives ap¬ proach ; the city has important saltworks and a population of about 4,000.

PAGO-PAGO. See Pango-Pango.

PAGODA, pag‘6-da, a word of antique Persian origin meaning an idol-temple. It is now applied to almost any building in India, Burma or China, having a tower-like form and built for religious or memorial purposes, as, for example, a Buddhist tope, or one of the highly ornamented, bell-shaped dagobas of Burma. In its properly restricted sense, how¬ ever, the pagoda is a form of tower peculiar to China and indicative of the ancient nature-worship that has given way only superficially among the common people to the imported doc¬ trines and services of Buddhism, Islam and other introduced cults.

These beautiful towers are scattered all over the empire in thousands and are the most char¬ acteristic feature of the landscape; but in southern China great numbers were destroyed in the wars of the last century. They are al¬ ways polygonal, have massively thick walls in¬ tended to last for centuries, and invariably have an odd number of stories, in some cases as many as 13, and rising to a height of 200 feet. The material is usually brick, but sometimes cut-stone is used, and each story is indicated by a projecting roof-like structure, curving up¬ ward at the eaves, and hung with bells or other pendants. These eaves

give the whole an ap¬ pearance of a pile of tile-roofed houses termi¬ nating in a peaked roof. Pagodas are usually highly ornamented and often are covered with glazed and colored slabs of potteryware, rarely with metal. The celebrated porcelain pagoda of Nanking, destroyed from superstitious motives by the Tai-ping rebels in 1853, was very high,

and was faced with blocks of fine blue porce¬ lain.

The interior of a pagoda may contain statues and figures of mythical deities and thus have the significance of a temple, or it may be erected as a memorial of some great man or event and furnished only with descriptive tablets. Every one has been built by private munificence.

The idea prompting the erection of most, if not all pagodas is religious, standing in close connection with feng-shui (literally, wind and water), the strongest of Chinese doctrines or superstitions, for they exert, as the people be¬ lieve, a most powerful influence in controlling certain supposed currents in earth and air, which are held to be important agents in modi¬ fying for better or worse climate, crops, health and even the ordinary actions of man. It was fear of this geomantic influence, possibly hostile to their plans, that led to the pagodas being thrown down all along the Yangtze Valley by the Tai-pings, so that only a single one of im¬ portance now remains near that river.

“ pagsAn, pag-san’, a mountain on the island of Luzon in the Philippines, a peak of the Cordillera del Norte, on the intersection of the boundaries of Ilocos Sur, Cagayan and Ilocos Norte provinces; height, 7,330 feet. At Pagsan a spur leaves the main range, which forms the boundary between Ilocos Sur and Ilocos Norte. The southern slopes of Pagsan are drained by the Anayan and the Caluan, which unite to form the Tinog River, a tribu¬ tary of the Abra.

PAGURUS, or PAGURIDˆl. See Her¬ mit-crabs.

PAHANG, pa-hang’, Indo-China, one of the federated Malay states under British protection, on the east coast of the Malay Peninsula, be¬ tween 2° 28’ and about 4° 50’ N. and 101° 30’ and 103° 30’ E., to the north of Negri Sembilan and Johor, east of Perak and Selangor, south of Kelentan and Trengganu and west of the bor¬ dering China Sea. The state is 210 miles long, 130 wide, with 112 miles of coast and an area of about 15,000 square miles. It takes its name from the Pahang

River, which drains the region and is navigable for large river boats 200 miles from its source, but too shallow for commerce of importance. Pahang in ancient times was called Indrapura. It was ruled by the Siamese until the 16th century; then by refugees from Malacca, who founded a royal line, between the members of which there was bitter war in 1855ˆ-65. In 1887 a treaty was signed with the British governor of the Straits Settlements; in the following year a British resident was appointed to protect British interests, but dis¬ order broke out again and was only quelled by the armed interference of the Straits governor; in 1895 Pahang joined the Malay Federation. The state is fertile with regular and sufficient rains and is cooler than the western coast of the peninsula. The important industry of Pa¬ hang is gold-mining; the Raub mine and other lodes along the river are successfully worked by European capital ; electricity is carried to the mines seven miles distant by overhead wires. The population is about 90,000; 134 being Europeans and Americans; about 70,000 Ma¬ lays and aborigines of other stocks ; the rest Chinese and Hindus, especially Tamils. The

capital is Kuala Lipis ; there are four adminis¬ trative districts.

PAHARIA, or MALER, a northern sec¬ tion of the Dravidian race, inhabiting the Raj-mahal Hills, Bengal, India. See Dravidian.

PAHLANPUR, or PAHLUMPUR. See

Palanpur.

PAHLAVI (pa'la-ve) or PEHLEVI LANGUAGE. See Persia, Language and Literature.

PAHLEN, pa'len, Peter Ludwig, Count of, Russian statesman : b. Palms, Esthonia, 28 April 1745 ; d. 1826. He fought in the war with Prussia (1761-62), against Turkey (1769) and against Sweden ; was ambassador to Sweden (1790) ; was governor-general of Courland (1795) and later of Finland: was made a Russian count in 1799 and

Prime Minister, Foreign Minister and mili¬ tary governor of Saint Petersburg in 1800. These high offices he used to further the con¬ spiracy against the Tsar Paul I, which resulted in the assassination of that monarch in 1801. Alexander I distrusted Pahlen and retired him. His son, Peter (1778-1864), a great Russian general, fought in Asia in 1796; against the French 1812-14; and in Poland in 1831. He was Russian Minister to Paris from 1835 to 1841. His younger brother, Frederick (1780-1863), was Minister to Prussia, to Rio Janeiro and to Munich, a signatory of the Treaty of Adrianople in 1829 and later governor of Kher¬ son.

PAHOEHOE, a Hawaiian term used to describe moderately smooth to billowy lava surfaces, as contrasted with the roughly craggy and cindery types known as aa.

PAILLERON, pa-ye-ron, Edouard Jules Henri, French dramatist: b. Paris, France, 17 Sept. 1834; d. there, 19 April 1899. He was a clerk in a notary's office until 1860, when his first work, a volume of satirical poems and a play, was published, after which he devoted himself to literature. His plays, written in both prose and verse, attained considerable popularity. He was elected to the Academie Frangaise in 1884 as a result of the success of his (Le Monde ou Ton s'ennuie) (1883). Among his plays are (Le Mur mitoyen) (1861) ; (L'Age Ingrat' (1879) ; (La Souris) (1887), *etc.*

PAIN, Barry, English humorous author and journalist: b. 1867. He was educated at Cam¬ bridge, was for a time an army tutor and in 1890 removed to London. He has published (In a Canadian Canoe ' (1891) ; (Playthings and Parodies) (1892) ; (Stories and Interludes) (1892) ; (Graeme and Cyril' (1893) ; kindness of the Celestial' (1894) ; (The Octave of Claudius) (1897) ; (Wildmay and Other Stories of Women) (1898) ; (Romantic History of Robin Hood' (1898); < Eliza' (1900); <Anothei Eng¬ lish Woman's Love Letters' (1901) ; (The One Before' (1902).

PAIN, a sensation felt in animal bodies, al¬ ways disagreeable and varying in degree from a slight uneasiness to intense agony. It is a very important sign in some diseases and is nearly always associated with an inflammation, an ulceration or a solution of continuity in some of the tissues of the body. But in health

also certain sensory stimuli, the general tend¬ ency of which is hostile to the welfare of the organism, are capable of producing pain. Grie-

singer stated that the essence of pain lies in a disturbance of the organization of the nerve at some point in its course. It has, however, been shown that pain is a distinct sensation, not to be confused with mere unpleasantness and on the skin localized in spots not sensitive to pres¬ sure or temperature. Those parts of the body which are most subject to injury are supplied with nerves in the largest quantity.

Were it not for sensibility to pain, important parts of the body might be irreparably injured without the knowledge of the individual. This sensibility undoubtedly differs in degree in both men and animals. Persons of a highly excit¬ able temperment usually feel pain intensely, especially if they are predisposed to neuralgia. Pain is called acute, when sharp and violent; lancinating, when of a stabbing or darting char¬ acter; lacerating, when there is the sensation of tearing; burning, when it resembles the pain of a burn. Pains are also distinguished as smarting, stinging, griping, bearing-down, gnaw¬ ing, biting, *etc.* These differences do not reside in the quality of the sensation of pain itself, which is uniform, but in the concomitant sensa¬ tions. The degree of pain is not always in proportion to the gravity of a disease and may be masked by other symptoms in a severe af¬ fection. Extensive ulcerations may occur in the stomach and intestines, for example, attended with very little pain. Cartilage is believed never to be the seat of pain. Pathological changes in insensitive parts of the body, however, may cause pain. Pain is frequently sympathetic or reflex, occurring in a portion of the body re¬ mote from the seat of disease or irritation; for example, in disease of the hip-joint pain is felt in the knee. The feeling of pain is always re¬ ferred to the periphery of the sensory fibres, no matter what portion of the sensory tract has been irritated. <(Lesions of the brain are rarely accompanied by sensation in that organ, but often bv severe pain referred to the extremities.” Under certain conditions the sense of pain may be lost independently of the other sensations.

While pain is but a symptom, it should, if possible, be relieved, though the cause may not be removed. Painful sensations are asso¬ ciated with a depression of the circulation. Pain exhausts nervous energy, interferes with sleep, interrupts the appetite and digestion, and if long continued may shorten life. For treatment, re-* move the cause, enjoin rest, apply locally hot water or poultices, sinapisms, counter-irritation, and anodyne linaments. Anodyne or narcotic drugs, although of value, should be used cau¬ tiously. Regulation of the diet and attention to the condition of the bowels is important.

PAINE, Albert Bigelow, American author and editorˆ b. New Bedford, Mass., 10 July 1861. He was educated in the public schools of Xenia,

Ill. From 1899-1909, he was editor of the League department of Saint Nicholas Mag¬ azine. Among his works are (Rhymes by Two Friends' (1893) ; (The Autobiography of a Monkey' (1897) ; (The Bread Line' (1900) ; (The Ship Dwellers' (1910) ; (Mark Twain: A Biography' (1912); (The Boys' Life of Mark Twain' (1916) ; Mark Twain's Letters'

(1917).

PAINE, Charles Jackson, American sports man . b. Boston, Mass., 26 Aug. 1833 ; d. 12 Aug. 1916. He was graduated at Harvard College and entered the army as captain of the 22d Massa¬ chusetts infantry 8 Oct. 1861. He served with distinction during the Civil War; was appointed brigadier-general of volunteers in 1864; and in 1866 was brevetted major-general. He became prominent as a yachtsman. The Puritan, May-flower and \ Volunteer, owned by him, were sue-cessful defenders of the America's cup.

. PAINE, John Alsop, American archaeolo¬ gist: b. Newark, N. J., 1840; d. 1912 He re¬ ceived his education at Hamilton College and at Andover Theological Seminary. He con¬ ducted botanical work for the board of regents of the State of New York in 1862-67 and in 1867-69 held the chair of natural science at Robert College, Constantinople. In 1872 Paine was archaeologist to the expedition sent out to the district east of the Jordan by the Palestine Exploration Society. In 1889-1906 he was cu¬ rator of the Metropolitan Museum of Art in New York City.

PAINE, John Knowles, American organist and composer: b. Portland, Me., 9 Jan. 1839; d. Cambridge, Mass., 25 April 1906. In 1858-61 he studied in Germany, in 1862-73 was in¬ structor in music at Harvard and in 1875 be¬ came professor of music there. He composed the music for the 'CEdipus Tyrannus) of Soph¬ ocles, as performed in the original at Cam¬ bridge in 1881; the (Centennial Hymn) to Whittier's words for the Exhibition at Phila¬ delphia in 1876, and the Columbus march and hymn of the World's Columbian Exposition of 1893. Among his further works are the opera (Azara) ; 'Spring Symphony*;

the canta¬ tas, (The Nativity* and 'The Song of Prom¬ iseˆ choruses to Aristophanes' 'Birds*; sym¬ phonic poems; music to the (Tempest) ; and an overture to (As You Like It.*

PAINE, Martyn, American physician : b. Williamstown, Vt., 1794; d. 1877. In 1813 he was graduated at Harvard and from 1816 to 1822 practised his profession af Montreal, Can¬ ada. In the latter year he removed to New York City. He was one of the founders of University Medical College in 1841, Which afterward became the medical department of New York University, and where Paine was professor of medicine and materia medica in 1841-67. He published 'Cholera Asphyxia of New York) (1832); Medical and Physiolog¬ ical Commentaries* (1840-44) ; Hnstitutes of Medicine) (1847; 9th ed., 1870); 'Review of Theoretical Geology* (1856).

PAINE, Robert Treat, signer of the Decla¬ ration of Independence: b. Boston, 11 March 1 731 ; d. there, 11 May 1814. He was grad¬ uated at Harvard at 18, studied theology, was chaplain to the New England troops in 1755, and in 1759 was admitted to the bar and be¬ gan to practise law in Boston. He repre¬ sented Taunton in 1768 at the convention called to discuss Sir Francis Bernard's dissolution of the general court ;- conducted the prosecution of Preston and his men for the Boston Mas¬ sacre (1770), and the impeachment of Peter Oliver for receiving money from the king and not from the colony; served in the general assembly of the State (1773-74), in the Pro¬

vincial Congress (1774-75), and in the Conti¬ nental Congress (1774 — 78), being a signer of the Declaration and a member of various im¬ portant committees. He was a delegate to the State convention of 1779, which adopted a con¬ stitution; was attorney-general of Massachu¬ setts (1780-90) ; and sat as judge of the Su¬ preme Court (1790-1804). Consult Sanderson, J., 'Biography of the Signers of the Declaration of Independence* (Philadelphia 1823).

PAINE, Robert Treat, American poet, son of the preceding: b. Taunton, 9 Dec. 1773; d. Boston, 13 Nov. 1811. His baptismal name, Thomas, was changed in 1801 bv act of Legis¬ lature, that he might bear his father's name and not that of the famous deist. He was gradu¬ ated at Harvard in 1792, was then in business for a time, but devoted most of his attention to journalism and' poetry. His journal, the 'Federal Orrery, 5 was given up after two years. His marriage with an actress in 1795 shut him out of Boston society and alienated his father. The son practised law with some success and. much brilliancy, but he soon

fell into wayward courses and died in poverty. His best known poems, which were popular, but practically without value, were ‘The Invention of Letters,* • delivered at Cambridge in 1795; ‘The Ruling Passion* (1797) ; the patriotic song, ‘Adams and Liberty > (1798); and the bitter political poems, ‘The Jacobiniad* and ‘The Lyars.*

PAINE, Thomas, political and religious radical: b. Thetford, Norwalk, England, 29 Jan. 1737; d. New York, 8 June 1809. His father was a Quaker staymaker. Paine thought of being a sailor, and made one small voyage, then was a staymaker at Sandwich, Kent, a tobac¬ conist at Lewes, Sussex, and an exciseman. He was discharged from the excise in 1765, but three years later received another appoint¬ ment at Lewes, Sussex, being dismissed in 1774. In London he met Franklin who gave him letters of introduction to leading men in Amer¬ ica. In 1774 he separated from his wife, for causes that are not clear, and came to America, arriving in Philadelphia in December 1774. Here he became the editor of the Pennsylvania Magazine for 18 months. Hostilities having commenced between the mother country and the colonies, Paine wrote his well-known pam¬ phlet, ‘Common Sense* (1776). The object of ‘this pamphlet, written with much vigor, was to recommend the separation between the Colonies and Great Britain. After war was declared he gave up his position on the magazine and joined the staff of General Green. In 1777, while with the army, he wrote the first of a series of political appeals called the Crisis, the first number of which started with the words, ‘These are the times that try men’s souls.® This was written at a time when the American cause, seemed lost. But in every village and city in the colonies, the burning words of Paine, which were also ordered read to the army, aroused new courage. Other numbers of the Crisis were published at short intervals. He left the army to become secretary to the Committee of Foreign Affairs. In January 1779 he resigned from his secretaryship because of a controversy with Silas Dean, whom Paine accused of attempting to profit by his agency by conveying secret supplies from France. But in November of the same year, the State

of Pennsylvania testified that it approved of Paine's position in this matter, by appointing him clerk of the assembly. While clerk on a salary of $2,500 he started the subscription which resulted in the forming of the Pennsyl¬ vania Bank (later known as the Bank of North America). In 1785 Congress, in recognition of his services during the war, voted to him the sum of $3,000. The State of New York also gave him 300 acres of land in. New Rochelle. In 1787 he embarked for Europe, carrying with him his model of his iron bridge, on which he had spent many years. He went first to Paris, and then to England. On the appearance of Burke's Reflections on the French Revolution } he wrote the first part of his Rights of Man> in answer to Burke. The second part was published in 1792, and on the 21st of May of that year the government issued a proclamation against wicked and sedi¬ tious publications and, though not naming, alluded to the Rights of Man.} On the same day the attorney-general started a prosecution against Paine. Paine escaped into France where he was chosen a member of the National Convention, by twTo districts of France, and be¬ came the member from Calais. In the conven¬ tion he became one of the leading figures. At the trial of Louis XVI he voted against the sentence of death and urged that the king be imprisoned and then banished to the United States. This conduct offended many, and in 1793 he was excluded from the convention on the ground that he was a foreigner (although he had been naturalized). He was arrested and committed to the Luxembourg. Just be¬ fore his confinement he had finished the first part of his (Age of Reason* on which he had been working for years. This he gave to a friend, Joel Barlow, and it was published in London and Paris in 1794. On the fall of Robespierre he was released from prison, after a narrow escape from death, and again took his seat in the convention. In 1795 the second part of his (Age of Reason* was published, and the third part in 1807. (The Age of Rea¬ son, being an Investigation of True and Fabu¬ lous Theology) created the greatest stir of any book of its time. It caused a change in the public feeling toward him, and lost him his friends in America. Considered at that time a bitter attack upon religion, it is seen to-day that it only presented the deism of the 18th century. In May 1796 he addressed to the Council of Five Hundred a work called (The Decline and Fall of the System of Finance of England,* and also published a pamphlet,

(Agrarian Justice.* In October 1802 he ar¬ rived again in America, after a controversy with Washington, landing at Baltimore. He found that his former friends had turned against him, and that his (Age< of Reason * caused him to be looked upon with suspicion. For some years he lived on his farm at New Rochelle He died in New York 8

June 1809, and was buried on his own farm. In 1819 his bones were taken to England by William Cor¬ bett, but were refused burial, and were scattered throughout the land. Paine has received such strong extremes of praise and execration that it is hard to form a clear picture of the man. The only source of unbiased information re¬ garding him must be found in his own writ¬

ings. He took a leading part in the political affairs of at least two countries, France and the United States, and was a deep hpver of liberty. He possessed much native vigor of intellect and was a writer with a spirited argu¬ mentative style. Washington, Jefferson, Frank¬ lin and Randolph have praised highly his efforts and contributions to the cause of the colonies.

It might be added that but for his attacks upon religion, Paine's position would be higher. But his <Age of Reason,* unscholarly as it was, in many ways broke ground for the serious biblical criticism that was to come. It was written not to attack religion but, in his own words, (<to show a higher form of religion.* Paine was not an atheist, as has been popu¬ larly believed, nor are the popular stories of his drunkenness true. His services to the American cause were lasting and important. The political pamphlets, letters and addresses of Paine, which were many, may be found in his works. Conway published the best edition of Paine's works in 1893-96. The earlier lives of Paine, (The Life of Thomas Paine,* by James Cheetham (New York 1809), (The Life of Thomas Paine* by Francis Oldys (London 1791) are marked with bitter hatred for Paine and do not give a true picture of his life or works. The Rife of Thomas Paine* by M. D. Conway (1892), is the standard. Consult his works, edited by M. D. Conway, of which there are several editions; also Taylors ˆLit¬ erary History of the American Revolution

(1896).

PAINESVILLE. A city 29 miles north¬ east of Cleveland, Ohio, the county-seat of Lake County, connected by the Lake Shore and Michigan Southern, the New York, Chicago and Saint Louis and the Baltimore and Ohio railroads and by electric lines to Ashtabula, Fairport and Cleveland. It contains many in¬ dustrial establishments, a grain elevator, flour mills, iron foundries, machine shops and brick yards. The municipality owns and operates its own waterworks and

electric plants for lighting the town. It receives considerable commercial importance from the fact that Fairpoint, making a fine natural harbor on Lake Erie, is but three miles away. The town boasts of a large public library, containing over 5,500 volumes, and a non-sectarian college for women (Lake Erie College) which dates as far back as 1859. The town itself was founded in 1800-1802, but was not incorporated before 1832, receiving its present charter as late as 1902. The rich agri¬ cultural and mining region in which Paines-ville is situated contributes considerably to its prosperity. Pop. 7,272.

PAINLEVE, pan'le-va, Paul, French

mathematician, scientist and statesman: b. Paris 1863. He studied at the Lcole Normale Superieure 1883-86, graduating docteur es sciences in 1887, the* same year being member of a mis¬ sion to Germany. From 1 887—92 he was in¬ structor in mechanics at the University of Lille, became lecturer at the Sorbonne, from 1895 to 1903 taught mathematics at the Lcole Normale, was appointed professor of mathe¬ matics at the University of Paris and later at the Polytechnique. In 1900 he was elected a member of the Institut. In October 1915 Briand appointed him Minister of Public In-

structions and Inventions for Public Defense and in 1917 he became Minister of War. His Published works are (Legons sur le frottemenC (1895) ; 1 Lemons sur la theorie .analytique

desequations differentielles) (1897), and with Emile Borel (L'Aviation> (1910; German trans. 1911).

PAINS AND PENALTIES, Acts of. An

act of legislation passed in England providing for the imposition of punishment without trial upon anyone clearly guilty of treason or similar serious crimes. No capital punishment, how¬ ever, can be imposed under this statute. In the United States such legislation never 'has been enacted, nor ever could be, since there is a constitutional

clause forbidding all bills of at¬ tainder.

PAINT. Coloring material prepared for coating a surface and thereby distinguished from dyeing or staining matter.

History. — The ancient full gamut of pig¬ ments consisted of : White, an earth from Melas ; red an earth called sinopis (red ochre) from Cappadocia; yellow from the Attic silver mines; black, from charred plant life. Green appears next in their category brought from the copper mines ; then followed the imperial pur¬ ple of Tyre. White lead was used by the an¬ cients, being found near Athens in form of a face powder in a potterv box dating from 400 b.c. Theophrastus, Pliny and Vitruvius give a description of its manufacture from lead and vinegar (as used to this day) ; it is later known as ((minium album.® Yellow ochre was used by the Egyptians, Greeks and Romans ; Theophras¬ tus terms it ((oichra.® Pots of it were found in the Pompeii ruins. Naples yellow, as a true antimonial yellow, is found in the yellow enamel of Babylonian bricks, 2,500 years old, and 13th century pottery of Persia contains such a yel¬ low. Verdigris pigment (viride Grcecum) was used by the Romans. Theophrastus, Pliny and Vitruvius show vermilion (cinnabar) was known in their day. Indigo has been used by the East Indians from very distant times and also by the ancient Egyptians; Pliny calls it <(indicum.® The Chinese have been producing Indian ink for over 2,000 years.

Pigments: Their Nomenclature and Com¬ position. — Pigments technically are dry sub¬ stances, usually in pulverized form, or in lumps easily pulverized, which by the addition of a liquid medium, technically called a vehicle or carrier, are applied by painters to surfaces which it is desired to color. Pigments are properly restricted to the dry coloring matters which enter into ’the composition of paints but the word is frequently used as a synonym for paint. A pigment is therefore a (<color,® the word ((color® being used indiscriminately of a compound of various pigments, or of a ground pigment ready for the addition of the suitable oil or carrier. Thus in the commercial world the pigments put up in cans ready for use at paint stores are commonly termed ((colors.® Strictly speaking, the term pigment should not be applied to any substance unless it has the inherent power of its own to impart color to other substances with which it mav be mixed. Adjunct substances such as starch, glue, finely ground silex, quartz, etc., possessing no color¬ ing matter of their own are often added to true pigments with no other purpose than that of

adding weight without changing the original color of the pigments in combination and by some manufacturers are termed pigments al¬ though not entitled to the name.

In this article all pigments have been classed into groups of certain colors, and under each group are treated all which belong to it by be¬ ing nearer in tone than to any other group. The whites are first considered as this group is the most important of all, nine whites form the base upon which nearly all tints are made by the addition of colored pigments. White lead is the best known and most important of the white group. Although known from ancient times it has only been manufactured on a large scale for a little over 200 years. The usual process employed in its manufacture is that known as the (<Dutch process® — a chemical process in which there is produced the corrosion of the lead metal by the agency of dilute acetic acid fumes, carbonic acid, hydrogen, oxygen and heat.

Whites.

White Lead. — Composed of about 75 per cent lead carbonate and 25 per cent lead hydroxide. (<Dutch Process® is made by slow double corrosion in the presence of acetic acid (vinegar) and carbonic acid from fermentation of tan bark or dung. “Quick Process® is by direct action of acetic acid, the acetate of lead subjected to carbonic acid gas. The former is the better product.

Flake White (white lead, ceruse, blanc d’argent, blanc de plomb, Kremser Weiss). — A purified white lead.

Lead Sulphate (Freeman’s white lead). — Little used on account of many defects.

Sublimed White Lead. — Composed of 75 per cent lead sulphate, 20 per cent lead oxide, 5 per cent zinc oxide.

Calcium Carbonate (Paris white, whiting, alba whiting, white mineral primer). — Very in¬ ferior for paints.

Zinc White (Chinese white, blanc de zinc, Zinkweiss). — An oxide of zinc, producing a very hard, brittle, vitreous surface.

Baryta White (permanent white, blanc fixe, Permanentweiss). — Made, as its name implies, from barytes.

Lithopone (oleum white, Beckton white, Charlton white, ponolith, Jersey Lily white, Orr’s white). — A double precipitate of sul¬ phide

of zinc and sulphate of barium.

Sulphopone. — Similar to the last named but sulphate of calcium displaces sulphate of barium.

Yellows.

Yellow Ochre (Roman ochre, golden ochre, mineral yellow, brown ochre, Oxford ochre, ocre, jaune, gelber ochre). — A ferric hydrate. The mineral usually contains silica, gypsum, iron and copper purites as impurities.

Cadmium Yellow (Orient yellow, aurora yellow, orange cadmium, sulphide of cadmium, Jaune brilliant, jaune de cadmium, Cadmium-gelb). — Cadmium sulphide.

Aureolin (cobalt yellow, Jaune de cobalt, Kobaltgelb).— A compound of the nitrites of cobalt and potassium. Very transparent in oil or water color.

Lemon Yellow (baryta yellow, barium chromate, yellow ultramarine, permanent yellow, jaune d'outremer).

Gamboge (gomme-gutte, Gummigutt). Yellow pigment of the gum resin Garcinia. A mixture of water-soluble gum and a resin soluble in alcohol, chloroform, *etc.* Unstable as water-color, but in oil (if a resin be added) ap¬ pears to stand light.

Indian Yellow (piuri, purree, peori, jaune indien, Indischgelb). — Made at Monghyr, Ben¬ gal, from cow-urine. It is an impure salt of euxanthic acid. Unstable in linseed oil, more durable in poppy; quite durable in water-color.

Mars Yellow (Mars orange, artificial ochre, jaune de Mars) —Species of artificial odhre produced by precipitating an iron salt (usually green vitriol) with alum by the agency of caustic soda, potash or lime. Permanent if carefully prepared.

Naples Yellow (jaune de Naples, jaune d'antimoine, Neapelgelb, giallo di Napoli). — Under this title are: (1) The English mixture of cadmium yellow or a deep cadmium with a white; (2) the true Naples yellow — a basic lead antimoniate. The first (imitation) is per¬ manent in oil, the latter liable to darken if sulphuretted hydrogen gets at the lead. As a water-color it quickly darkens.

Yellow Lake (brown pink, citrine lake, yel¬ low madder, Italian pink, quercitron lake). — Best is obtained from quercitron bark. For¬ merly prepared from Persian, Turkish or Avig¬ non berries. None recommended for artists' colors because very fugitive in oil or water-colors.

Chrome Yellow (chrome, chromate of lead, jaune de chrome, Chromgelb) — Should be neu¬ tral lead chromate of pure yellow tint. Orange and reddish hues obtained by adding lead oxide. All lead chromates are fugitive more or less but last longer preserved in oil varnish.

Burnt Ochre (American sienna). — Made from raw sienna with high percentage of ferric oxide and is mahogany color. Not favored be¬ cause muddy…

Vanadium Yelloiv. — Costly and very fugitive.

King's Yellow (orpiment, jaune royal, Ko-nigsgelb). — Yellow arsenic sulphide. Very lovely but fades badly in oil or water-color.

Reds.

Vermilion (cinnabar, vermilion, Zinnober). — Ground mineral mercuric sulphide.

Madder (pink madder, rose madder, madder carmine, madder red, Rubens madder, madder purple, madder lake, madder brown, carmin de Garance, laque de Garance, Krapplack). — Pro¬ duced from madder plant or artificially from alizarin and purpurin (anthracine derivatives). The madders are not truly permanent.

Mineral Lake (pink color, laque minerale). — A precipitate, caused by the action of neutral potassium chromate solution with a stannic chlo¬ ride solution, dried and calcined. Strictly per¬ manent.

Light Red (burnt ochre, rouge anglais, brun rouge). — Should be burnt yellow ochre, a per¬ manent pigment.

Venetian Red (rouge, crocus, colcothar, ca¬ put mortuum vitrioli). — At first was a native ferric oxide or red hematite less purplish than Indian red, but is now artificial ferric oxide from calcining green vitriol. Less brownish than light red. Permanent.

Indian Red (Persian red, Indian red ochre).

— Made from red ochre or red hematite. Has slightly purplish tinge and contains about 95 per cent ferric oxide. Most comes from India, where it is native, but some is calcined. Genuine is permanent.

Red Ochre (red hematite, red iron ore, scar¬ let ochre, red chalk, ruddle, bole, sinoper, sinopis, rubrica, miltos, terra rosa). — All are native ferric oxide or iron peroxide combines in dif¬ ferent proportions of clay, chalk and silica, and range from cherry red, reddish brown, to yel-low brown. Italian terra rosa shows pinkish tinge (probably artificial).

Para Vermilion. — A para-nitraniline lake. One marketed shows 90 per cent barytes, 5 per cent zinc oxide and 5 per cent para-red. Solu¬ ble in linseed oil.

Indian Lake (lac lake, Lack-lack).- Lac resin secretion of the East Indian lac insect, (see Lac). Less fugitive than crimson lake,

more so than madder.

Carmine and Cochineal Lakes (carmin, laque cramoisie, crimson lake, purple lake). — Precipi¬ tated coloring matter of the cochineal insect. (See Cochineal). Very fugitive.

Red Lead (minium saturnine, mine rouge, mine orange, mennige, rosso saturno). Beauti¬ ful orange red composed of two molecules pro¬ toxide of lead with one molecule binoxide. Quickly discolors in contact with sulphuretted hydrogen. Not practical for water or oil.

Greens.

Terre Verte (green earth, terre de Verone, grime Erde, terra verte). — The earth minerals glauconite and celadonite. Very permanent in oil or water-color.

Viridian (emerald oxide of chromium, vert pannetier, vert de Guignol, vert emeraude, Mittler's green). — Hydrated sesquioxide of chro¬

mium produced by calcining a mixture of boric acid and potassium bichromate. Valued by ar¬ tists for the purity and transparency of its bluish green ; blending with other colors.

Cobalt Green (Rinmann's green, vert de co¬ balt, vert de zinc, Kobaltgriin). — Produced by combining by heat oxides of zinc and cobalt. A beautiful green, permanent in oil and water-color.

Emerald Green (cupric aceto arsenate, Schweinfurt green, vert Paul Veronese). — More opaque and brighter than Scheele's green, but also very poisonous. Produced from verdi¬ gris and white arsenic. Forbidden for house¬ hold purposes.

Scheele's Green (cupric arsenite, Swedish green, Mittis green). — Arsenitd of copper. Too poisonous for use.

Malachite Green (green verditer, green bice, mountain green, green carbonate of copper, vert de montagne, Berggriin). — A ground copper mineral found on most continents, but Russian preferred for its color.

Verdigris (basic copper acetate, vert-de-gris, verdet de Montpellier Griinspan). — An ancient pigment, but has tendency to darken. Is now preserved from alteration by copal varnish or hard paraffin.

Blues.

Ultramarine (lapis lazuli, Lasursteinblau, outremer, bleu d'azur). — Genuine is very costly, being produced by heating selected pieces of lapis lazuli, then immersing in cold water or

vinegar; it is then washed, dried and carefully ground and purified. Nearly transparent in water or oil-color and permanent.

Artificial Ultramarine (new blue, French b ue permanent blue, aniline blue, Guimet's blue).— Analyzes same as above natural prod¬ uct, but is produced from kaolin (china clay), silica, sodium sulphate, sodium

carbonate, sul¬ phur, charcoal and resin.

jr Blue (cobalt, bleu de Thenard,

Kobaltblaii). — Three pigments so designated:

(1) A combination of alumina and cobalt oxide

(2) Leithner's or Thenard's blue, a cobalt phos¬ phate with aluminum base. (3) Aluminous co¬ balt arseniate. All permanent except to influ¬ ence of ammonium sulphide.

Coeruleum (coelin, cerulean blue, bleu celeste, Coelinblau). — Produced by precipitating potas¬ sium stannate with cobalt chloride, washing precipitate, mixing with pure silica and heat¬ ing. Rather greenish blue. Permanent.

Prussian Blue (Turnbull's blue, Antwerp blue, Berlin blue, prussiate of iron, Chinese blue, Saxon blue, bleu de Berlin, Pariserblau). — These include three varieties : (1) Soluble Prussian blue, potassio-ferrio ferrocyanide. Less stable than the others. (2) Insoluble Prussian blue, produced by oxidizing Turnbull's blue with nitric acid, is more permanent than the first. (3) Turnbull's blue, or Gmelin's blue, can be produced by precipitating a ferricyanic acid solution with ferrous sulphate solution. A good color but not as pure as the second, and fades quicker. The common commercial Prus¬ sian blue contains proportions of all the above.

Cyanine (Leitch's blue). — A mixture of co¬ balt blue with Prussian blue.

Indigo. — Derived from the Indig of ero tine-toria, a leguminous shrub. In the plants the coloring matter is a colorless glucoside which, in combining with water, splits up into a sugar and indigo. Not fast to light as oil or water-color, but is more durable preserved in gum copal. Its high cost forces its being substituted by ultramarine or Prussian blue.

Smalt (royal blue, Dumont's blue, zaffre, bleu de smalte). — Combination of cobalt with potassium silicate. The dark glass is fused, subjected to cold water, then ground fine and washed. Moisture and carbonic acid in the air attack it.

Browns.

Raw Umber (Levant umber, terre d'ombre, umbra, Kolnischeerde,

terra ombra). — Best comes from Cyprus. Differs from the ochres in having a good proportion of the higher oxides of manganese and less water. The mineral is ground, washed, dried. When heated to ac¬ quire a reddish hue it is termed burnt umber, the ferric hydrate becoming red ferric oxide.

Burnt Umber. See above.

Raw Sienna (terre de Sienne, Sienaerde, terra di Siena). — Obtained from Tuscany and the Hartz Mountains. A browner variety of yellow ochre with large proportion of ferric hydrate. Used in oil, water and fresco colors. Fades yellower with time.

Burnt Sienna. — Produced by roasting raw sienna, which gives it a warm reddish brown tone, exceptionally translucent. Permanent.

Vandyke Brown. — Three different pigments sell under this name: (1) Calcined brown ochres. (2) A dark variety of colcothar. (3)

A brown earth containing much organic (bitu¬ minous) matter and oxide of iron with hydrate. The two first are permanent, the last not.

Cappagh Brown (euchrome, mineral brown). —An earth extracted from the Cappagh Mine in Ireland. It is more reddish than raw umber and contains ferric hydrate and ferric oxide with manganese. Produces a good oil color but permanence is doubted.

Bistre (bister, Braunerlack, Russbraun). — Produced from the tarry soots of certain burnt woods, especially beech. Not used in oils. Fades, by oxidization, in light.

Asplialtum (bitumen, mineral pitch, Ant¬ werp brown, mummy, asphalt brown). — Made from the well-known mineral. (See Asphalt). Those varieties most free from the paraffin hydrocarbons are preferred for pigments. It is ground in oil or turpentine. They have a ten¬ dency to injure contiguous pigments and are not used greatly by artists. The Egyptian mummy submitted to heat, then ground (including the bones) is declared to make a better palette color than asphalt alone.

Prussian Brown. — In the commercial prod¬ uct the soluble potash salt has detrimental ef¬ fects and should not be used as a pigment till it is purified from it.

Sepia. — The dark-brown pigment obtained from the ink-bag of the

cuttlefish. It is pre¬ pared by solution in soda or ammonia, then strained and precipitated by neutralizing the alkali with hydrochloric acid. It is then washed and dried. It is not light-fast and is not used in oil.

Blacks.

Indian Ink (Chinese ink, Tapanese ink, encre de Chine, chinesische Tusche). — This consists mainly of lampblack, produced from oil or pine-wood, combined with gelatine and scented with musk, camphor, cloves or rosewater. The oil used is sesame, Cannabis sativa or Dryandria cordata. The soot is combined with size made from fish glue and parchment. The paste, made into sticks, is subjected to hammer-blows, and, after being shaped as desired, is very slowly dried. It cannot be used in oil but is a first-class water-color. The good grades are permanent.

Lamp Black (noir de lampe, noir de fumee, noir d'houille, Russ). — Soot created from im¬ perfect combustion of resin, oils or fats, paraf¬ fin, coal tar oils, or even coal oil, caused by in¬ sufficient air supply. The extreme fineness of the microscopical particles renders it exceedingly smooth. It is a gray black and permanent.

Charcoal Black (blue black, vine black, Frankfort black, noir de vigne) .— Charcoal produced from non-resinous woods coarsely ground, washed to release soluble mineral mat¬ ter. Being hygroscopic, it must.be thoroughly dried if ground in oil. That gained from wil¬ low, maple and bass have been used successfully as a pigment, but nutshells (cocoanut espe¬ cially) produce the best. If carefully washed and properly carbonized it is permanent. The German pigment is made chiefly from charred grapevines.

Ivory Black (noir d'ivoire, Elfenbein-schwartz). — Made from charred ivory waste. Permanent.

Graphite. — The so-called black-lead or plum¬ bago used for pencils and stove polish is also utilized as a pigment, but it is usually mixed

with a heavy base, such as silica. It has many defects. Its chief use at present is as a lubri¬ cant. „ , .

Mineral Black. — Generally a finely ground heavy black slate, but it needs mixing with car¬ bon and lampblacK to give it. depth. As its grinding quickly ruins the mills it is not favored by paint manufacturers.

Coal. — Both anthracite and bituminous coal finely ground have been used as pigment.

With the above knowledge of the constitu¬ tion of the various pigments we see they can be classified as mineral and organic. Of the first we have the native ores such as ochre, terre verte, ultramarine; artificially prepared are aureolin, cobalt blue, viridian, *etc.* Of organic we have (animal) Indian yellow, carmine, sepia, etc.; of vegetable origin we have gamboge, in¬ digo; artificially produced are Prussian blue, *etc.*

Mixed Paints.— Until quite recent years the market supplied only dry ground pigments or the same ground in oil. And, when the paint manufacturers attempted to produce and sell 2 “ready-mixed® paint, ready for the painter s brush, to the house painter and decorator they had a hard task before them. The difficulty in manufacture lay in necessarily overcoming the tendency of pigments ground in oil and supplied with the correct amount of driers and vehicle from “settling® to the bottom of the package, of separating according to the different specific gravities of the elements combined, or even of hardening. The successful solution of the prob¬ lem is due to Americans (generally claimed by New Englanders) and is due to the discovery that the conditions are fulfilled practically by intermixing a solution of silicate of soda (“water glass®) with the linseed oil paint.

Zinc oxide next displaced the silicate of soda as it holds up white lead well. To retain the natural moisture, water (not over 4 per cent) is used frequently.

Inert Fillers or Extenders.— Nearly all mixed paints contain proportions of inert mat¬ ter used to increase their bulk, a condition brought about, largely of necessity. Some pig¬ ments in their unmodified form are too heavy for practical use alone, such as white lead. Others are too light or bulky, as lampblack, graphite, *etc.* Some, again, are too powerful of tone and too expensive to be applied to

sur¬ faces without reduction. In the commercial use of prepared paints fillers must, therefore, not -be considered as adulterants or substitutes. While they may reduce the prime cost of the paint, they often improve the quality and the practicability. Figuring chiefly among these inert fillers are: Barytes, barium sulphate, barium carbonate, several forms of silica, cal¬ cium carbonate, white mineral primer, clays (silicate of alumina), kaolin, asbestine, gypsum, charcoal.

Vehicles. — In order that pigments may be applied to a surface thinning liquids must be added which possess binding qualities so that the pigments may be adhesively retained upon the surfaces to which they are applied. Such liquids are called vehicles or. carriers. Nearly all oils are waterproof and will shed water. but only a few have the property of solidifying into a hard waterproof surface coat and these latter are called fixed oils.

Flax and poppy are the only plant seeds of

importance in the paint industry as producers of fixed oils. Poppy-seed oil is in some respects superior to linseed oil, the fact that the Utter is by far the cheaper has made it the well nigh universal oil for use as a pigment vehicle.

Volatile oils are used in painting for rectify¬ ing some defects in the fixed oils, that are used as binding vehicles in exterior pamting and for what is called flatting in interior work. Their use enables a painter to put on a heavier coat of pigment with less linseed oil than would be pos¬ sible with the use of linseed alone since the volatile oils mix intimately with the fixed oils render them more fluid. The principal volatiles in use are soirits of turpentine, or oil of turpen¬ tine, naphtha and benzine. A widely used vehi¬ cle is tnng oil, produced from the wood oil tree (Aleurites Cor data), made in China. Fish oil obtained from menhaden and refined has been found a good substitute for linseed oil. The tung oils of China and Japan are very good me¬ diums (some declare the best) for waterproof and marine paints. Poppy seed oil is a favored medium for artists' colors. Turpentine is used largely for diluting or dissolving pigments. Benzine (or benzol) is extensively used in the manufacture of ready-mixed paints; acting both as diluent and as liquid dryer ; its low cost has no doubt been an incentive.

Driers. — While linseed oil dries by oxida¬ tion in the air, it is

frequently necessary to ac¬ celerate its action by the addition of certain siccatifs. The desired function of a drier in oil paint is to accelerate the absorption of oxygen to create a film of dry, hard, insoluble substance on the outer surface. There are two classes of driers: resin driers and oil driers. Oil driers are produced by heating linseed oil combined with a salt of oxide of lead and manganese to from 500° to 600° F. This is reduced with ben¬ zene or turpentine or both. The “resin® driers, known also as “Japan driers® are composed of metallic salts or bases fused with resin and lin¬ seed oil, then reduced with benzene or turpen¬ tine. They dry quickly as a varnish. The lat¬ ter kind of driers has defects not contained in the oil driers.

Paint Statistics. — The census of manufac¬ tures for 1914 states the following: With 585 paint manufacturing establishments having a combined capital of $99,673,137, employing 13,349 wage-earners, the product amounted to $112,- 409,000. Of bone, carbon and lampblack the product amounted to $1,464,000, $535,000 and $929,000, respectively. Mineral pigments of the United States marketed in 1913 were valued at as follows: Ochre, $173,944; umber and sienna, $20,000; metallic paint, $171,264; basic lead car¬ bonate, $18,112,219; red lead, $2,127,976; . li¬ tharge, $2,524,707; orange mineral, $71,625; lith-opone, $2,170,445; Venetian red, $116,195.

Bibliography. — Bersch, J., (The Manufac¬ ture of Paints and Pigments,* translated by A.

C. Wright* (London 1901) ; Church, Sir A. H., (The Chemistry of Paints and Painting) (Lon¬ don 1915); Friend, J. A. N., (An Introduction of the Chemistry of Paints1* (New York 1910) ; Gardner, H. A.., and Schaefer, J. A., (The Analysis of Paints and Painting Materials) (New York 1911) ; Gardner, H. A., (Paint Re¬ searches and their Application (Washington,

D. C., 1917) ; Holley, C. D., (Analysis of Paints and Varnish Products* (New York 1912) ; Hall, C. H., (The Chemistry of Paints and

Paint Vehicles > (New York 1906) ; Hurst, G. H., (Painters' Colours, Oils and Varnishes > (London 1896) ; Ingle, H., (Manual of Oils, Resins and Paints for Students) (London 1915) ; Jennings, A. S., (| Commercial Paints and Painting> (London 1914) ; <Paint and Colour Mixing) (London 1915) ; Ladd, E. F., and Holley, C. D., (Paints and their Composition) (Fargo, N. D., 1906) ; Smith, J. C., (The Manu¬ facture of Paint J (London 1915) ; Toch, M., (Materials for Permanent Painting* (New* York 1911) ; (The Chemistry and Technology of Mixed Paints> (ib. 1907).

Clement W. Coumbe.

PAINT, Luminous, a phosphorescent sub¬ stance used as a coating for surfaces. The phenomenon of phosphorescence, which gives to luminous paint its distinctive character, has nothing to do with phosphorus, whose lumi¬ nosity is due to slow oxidation. The first discovery of a substance emitting light with¬ out oxidation belongs to the early part of the 17th century, when sulphide of barium (Bologna stone) and chloride of calcium (Homberg's phosphorus) were discovered. Sulphide of calcium dates from 1768; sulphide of strontium is the latest discovery in this kind. Any of these substances, if enclosed in a sealed glass tube and exposed to sunlight, and then carried into a dark room, appears at first brilliantly luminous and long afterward like a hot body cooling. Practical application has been made of the property in the produc¬ tion of luminous paint, the above compounds being ground and mixed with a vehicle, as in ordinary paint and laid on the surface that is to be made luminous. A modern improve¬ ment of this method is the admixture of a small amount of radioactive matter, which makes the paint independent of exposure to daylight. Luminous paint is used chiefly for the dials of watches or compasses for use at night.

PAINTED DESERT. This name is ap¬ plied to the wide area of plateaus and low mesas extending along the east side of the valley of the Little Colorado in northern central Ari¬ zona. To the north it extends along the top of the east wall of Marble Canyon of the Colo¬ rado River; to the south it ends near the Santa Fe Railroad which crosses it from Holbrook to Winslow. Along the east side rise the Echo Cliffs to the north and farther south the high plateaus and buttes of the Hopi Indian pueblos. Thus defined its length is about 100 miles and width 15 to 20 miles. Most of it lies at an alti¬ tude of nearly 5,000 feet. The climate is arid with annual rainfall averaging about six inches and consequently the vegetation is scant. Vast areas of the rocks are bare or nearly so. These rocks which are upper Permian and Triassic in age lie nearly level in a succession of low steps rising to the east. They

present a great variety of colors, red, pink, chocolate, purple, lavender, pale green and gray, which suggested the name Painted Desert applied by Ives and Newberry in 1858. Consult Gregor, H. E., The Navajo County, U. S. Geol. Survey, Water Supply Paper 380, and Profes¬ sional Paper 93; Darton, N. H., Reconnaissance of Western New Mexico and part of Arizona, U. S. Geol Survey, Bull. 365, Darton, N. H., Guide Book of Santa Fe Railroad, U. S. Geol.

Survey Bull. 613; James, G. W., Hndians of Painted Desert Region* (Boston 1903).

PAINTED QUAIL'. See Quail.

PAINTED TERRAPIN or TORTOISE.

See Turtle.

PAINTING, in the fullest meaning of the word, signifies the application of color to any surface, for the purpose of making it more at¬ tractive to the eye, or as a preservative of the substance painted, but in this article the word is restricted to the art of painting, that is, the art of representing objects, real or imaginary, on a flat or nearly flat surface by the use of designs in line and color. Leaving out of account the designs of bison and reindeer made by pre¬ historic man in the caves of Europe, the origin of this art, like that of several others known to civilization, is lost in the mists of those pre¬ historic ages on the banks of the Nile which the researches of modern Egyptologists have pushed back, apparently, to the distance of 80 centuries. Some few traces of it among the unknown autochthonous races who preceded the long lines of the dynasties of Upper and Lower Egypt have been but recently assigned to their proper sources ; the art of the dynasties of the Pharaohs and the Ptolemies, notwithstanding their duration by centuries, presents certain striking characteristics which distinguish it from all others. It was strictly a conventional and symbolic art, largely an official art, devoted to the service of the monarch and of religion and within these limits, a decorative art. Sculp¬ ture was subservient to architecture and paint¬ ing — except on the walls of the tombs and in the papyri — to sculpture. Our knowledge of painting is derived from the very numerous examples preserved on the walls of the temples and the tombs, on the mummy cases and the sarcophagi, on the funeral tablets and the illumi¬

nations and vignettes on papyrus and linen. The conventions in which the art remained bound — with but few exceptions — were estab¬ lished in the earliest ages ; they embraced all design, religious and secular, requiring that hu¬ man figures and those of animals should be represented in profile, defined by an outline and in flat color; for landscape and architecture ihere.was adopted a curious and ingenious com¬ bination of drawing, both in ground plan and in elevation, to express the scene in the simplest and clearest manner possible. The background was left blank, or filled with a flat tint; the required lucidity and directness of expression forbade the use of linear or aerial perspective, or any attempt at modeling or variation of the conventional local color. On the inner and outer walls of the temples the outlines were incised, sometimes very deeply, — the figure within these outlines frequently rounded down to the bottom of this incised outline; on the walls of the tombs the painter replaced this outline with one made by his brush. He worked directly on a coat of white stucco, applied over a rough-cast to conceal the joints and the roughness of the masonry wall; of colors — de¬ rived mostly from mineral sources — he had, at the most flourishing period of the art, as many as 18 or 20, as we know from wooden palettes of the 18th dynasty, which have been found. These colors were mixed with water and gum tragacanth, possibly with honey ; some

mummy cases of the later dynasties have been painted in encaustic and in some cases the eyes and eyebrows of the mummy masks are in en¬ amel. These colors have retained their bril¬ liancy to a remarkable degree through the ages ; very few of the paintings are cracked. The artist worked with brushes of reeds or rushes, the ends of which were soaked in water until their fibres separated and they were adapted to the finest and most delicate work. In the papyri — as in the many hundred copies of the Book of the Dead extant — the illustrations stretch along the top of the page, like head-pieces, or are inserted as vignettes, or initials, or full-page pictures. In many cases they are merely outline sketches in black or red. In gen¬ eral, figures of men are colored a dull red and those of women a light yellow, the

gods and the genii of the dead may be of positive greens and blues and the animals are frequently spotted. The colors are always pleasing and harmonious and on the largest wall spaces a comprehensive and well sustained color-scheme is frequently found, designed and carried out with true artis¬ tic skill. On the outer walls, exposed to full sunlight and in the deepest recesses of the tombs, the colors are most vivid ; in the inter¬ mediate chambers of the tombs they are more quiet and discreet, to suit the tempered light. See Egypt.

Greek and Roman Painting — In the mid¬ dle of the 6th century before Christ, Greek painting was technically no farther advanced than that of Egypt or Assyria. Greek writers speak with the same enthusiasm of the works of their great painters as of those of their sculp¬ tors, but it is only by these descriptions and by some supposed copies and adaptations in the work of the craftsmen, mural painters and mosaicists, of the decline of the art under the Roman domination, that we can form some definite conception of these masterpieces. It is noticeable that the rhetoricians are especially impressed by the ability of the painters to repre¬ sent objects so naturally as to mystify the spec¬ tator. The development of the art through its various phases can be fairly well traced in the wall paintings discovered in Etruscan tombs ; it practically embraced all subjects, mythology, history, scenes from daily life, landscape, . ma¬ rines, portraits, animals, tragic and satirical representations, still-life, ornament and decora¬ tion and miniatures. Composition, order, linear and aerial perspective, chiaroscuro, a knowledge of the human figure extending to foreshorten¬ ing, action, expression by gesture and by coun¬ tenance, all were included. The color work was even extended to the tinting or painting of statues (though there seems to be no proof that the Greeks colored the nude parts of their mar¬ ble statues) and to the moldings, triglyphs and other ornaments of their architecture. Praxi¬ teles (q.v.) when asked which of his works in marble he valued the most, replied: <(Those on which Nikias (the painter) has set his mark.® In Pompeii, the painted portions of the tem¬ ples are always finished in stucco or plaster. Portrait painting was apparently more in favor among the Romans than among the Greeks. The long series of painted vases — from the earliest examples of the “Pelasgic® or pre-Homeric period down to the disappearance of the art about 65 b.c. — was but one of the

• , features of this comprehensive school of paint¬ ing. The only examples of easel pictures which have been preserved are a few small paintings on marble and slate, found in Herculaneum and in Etruscan

tombs.

Apelles introduced the use of a glaze or var¬ nish over the completed tempera painting. In the latter, the colors were tempered with a glue, a gum, honey, white of an egg, juice of the fig, milk, or other glutinous substance, soluble in water, that served to bind them ; or with wax or some resin, when these materials had been ren¬ dered by any means vehicles that could be worked in water. In tempera painting colors were applied to the dry wall; in fresco (See Fresco), to the wall while the plaster was still wet. Both methods are found in Pompeii; the backgrounds always in fresco and generally, the architectural framing and ornaments; the small figure panels in the centre are generally painted in tempera on the fresco background. In fresco, no colors except earths were used, and these were protected by an encaustic var¬ nish, which also served to give them more brilliancy. Encaustic painting was used only for pictures on tablets or on canvas; in this process naphtha, or spirits of turpentine, or any volatile, ethereal oil that will evaporate, leaving the wax colors firmly fixed, can be used as menstrua to liquefy the wax. In the usual method, when the colored sticks of wax and resin have been melted over a fire the colors are applied broadly with a brush and then blended by means of a metallic instrument, a spatula or cestrum (generic name cauterium) , at times used very hot. The same instrument is used to finish the painting by taking, while still hot, cold wax colors and blending and grading them on the first painting. The colored sticks of wax and resin, softened by the addition of an oil, may be applied from a hot palette with a brush and then melted and modeled with the cestrum. The same sticks, softened by the addition of an oil, may be used directly, like crayons of pastel ; or, when dissolved in an essential or volatile oil, applied with a brush ; but these two methods, not involving the use of heat, are not, strictly speaking, encaustic painting. In all cases, the ancients prepared their walls very carefully before painting, thq final surface re¬ ceiving a firmness and consistency almost equal to that of marble. Their colors were almost exclusively mineral, the only animal substance known being the slimy matter of the Murex (q.v.), mixed with chalk. This purple is un¬ known to the modern palette.

Byzantine and Early Mediaeval. — The in¬ fluence of ancient art on that of the early Chris¬ tians was long in disappearing — notwithstand¬ ing the widely divergent tendencies of the new religion. Inheriting the Jewish aversion to idol¬ atry and to works of material imagery, the Fathers of the Church declaimed against all art¬ ists — Tertullian denounced them as persons of iniquitous occupations. The paintings and deco¬ rations in the Roman catacombs

— rediscovered at the end of the 16th century — especially those in the earliest cemeteries, bear a great resemblance to the ancient wall paintings. Or¬ pheus playing on his pipes reappears as the youthful and beardless Christ surrounded by his sheep, and Hermes Kriophoros, carrying a ram on his shoulders, as the Good Shepherd. The

bearded type of the Saviour, with which we are familiar, was not generally adopted till later, in the earliest mosaics. As the Church increased in numbers and power the primitive prejudices disappeared, but early Christian painting shared in the general decline of all the contemporary art of the empire. Occasional efforts were made by the emperors to check this decadence, by Constantine and by Valentinian, Valens and Gratian in the 4th century; and in the 5th by Theodoric at Ravenna, the capital of the Ostrogothic kingdom in Italy. The first men¬ tion of church painting is found in a canon of the council held at Illiberio (Granada), Spain, about 305 a.d. ; but the mediaeval wall paint¬ ings have nearly all disappeared — very largely by conflagrations. Our insufficient knowledge of the early mediaeval painting is principally de¬ rived from the mosaics, the most important being at Ravenna and Rome, and from the miniatures and the illuminated manuscripts. In Byzantium, the mosaic wall decorations were not confined to the churches but were also employed to celebrate the deeds and the power of the monarchy, as in the Chalke, the great state hall of Justinian's palace. With the establishment of the Lom¬ bards in Italy, the ideals, the freedom and spirituality of both the Church and its art, fell into even stricter bondage. The subject of the Crucifixion first appears in painting in the latter part of the 6th century, the figure of the Saviour frequently clad in a long purple robe and sometimes wearing a regal crown. The classical period of early Christian art came to a close with the outbreak of the Iconoclastic schism, in the beginning of the 8th century.

The mediaeval style was formed by the grad¬ ual union of these classic traditions with the hereditary art of the Western barbarians con¬ quered by the empire or who overran it. Each of these races

contributed an individual note — the Irish monks excelled in illuminating manu¬ scripts, their art being continued by the Anglo-Saxons ; under Charlemagne mural painting, both sacred and profane, was greatly in favor, though nothing now remains save miniatures ; but these primitive impulses did not extend south of the Alps until the Romanesque period, ending in the 13th century. The first indications of Gothic art appear in the miniatures toward the close of this period — in the angular and broken folds of the draperies, indicating that tendency which was to ((govern the human sense of form in all its modes of expression, down to handwriting.®

Later Mediaeval-Gothic. — It was in France that the so-called Gothic architecture took its origin ; and there, too, that the other arts took the lead in Europe, in the middle of the 12th century. Painting gradually escaped from the domination of the priestly order ; the painters became specialists, working exclusively at mural paintings, particularly so in the northern coun¬ tries. Hence, a certain growth of individuality of conception, a tendency toward subtlety and mysticism, an attempt at realism, including study from nature — the whole, as yet, much hampered by tradition. After the middle of the 14th century there appeared very definite signs of an appreciation of the full capacities of the art of painting and serious attempts to realize them. In this art, including miniature painting in books, France took the lead, as she had done in architecture. The development of vol. 21 — 8

Gothic architecture, as it diminished the spaces for wall paintings, greatly increased that of the windows, and thus gave a great impetus to the noble art of glass painting. In the 14th century, distinct schools of painting begin to appear, as, in Germany, those of Prague, of Cologne, of Westphalia, etc., and even the names of individual artists become known; the panel paintings of the French and the Flemings bear a general resemblance to those of the Lower Rhine; but in Italy the art, both in con¬ ceptions and in technical methods, followed distinct national lines — preparing the way for the Renaissance. Foremost among these pre¬ cursors were the Tuscans, Niccola Pisano (q.v.), the sculptor, and Giovanni Cimabue (q.v.), the painter. The first great epoch in modern paint¬ ing is considered to have been that signalized by the mature works of Giotto di Bondone (q.v.) (1276-1336), a pupil of Cimabue, who was acclaimed by his contemporaries as the greatest genius in the arts of Italy. To their astonished eyes, Giotto's power of presenting objects natu¬ rally was so great that ((the thing itself® was reproduced. With this he

combined a great command of the arrangement and execution of monumental mural painting and a freedom from the traditions both of the Byzantine manner and the Northern Gothic, while reproducing in his works many of the decorative ideas of the an¬ cients. Chief among his followers was Andrea di Cione, called L'Arcagnuolo, or, in the contracted form, Orcagna. The painters of the school of Sienna ranked almost in importance with those of Florence; and in the Campo Santo of Pisa are still preserved some of the greatest monuments of fresco paintings, ex¬ ecuted by various artists of this closing period of the Middle Ages.

China and Japan.— The technique of the art of painting in China and Japan is founded pri¬ marily on the caligraphic dexterity which was the chief ideal of the older Chinese painters and their Japanese followers, and which is still held in high honor. The ancient art of handwriting was based upon a system of representing or symbolizing the thing indicated, and both it and the art of painting were fettered by traditions that were as binding as those of Egyptian art. Linear design has remained the important ele¬ ment even in painting, the outline being always retained. As an art primarily decorative and suggestive, and not realistic, its fundamental principles differ widely from those of all the European schools. The Japanese themselves compare their art of painting — which they con¬ sider the richest and most important, the most intimate expression of the national character — - to ˆsketching.® (La peinture japonaise a la caractere d'une esquisse , says the official work published by the Japanese Imperial Commission at the Exposition Universelle of Paris, 1900). As a sketch, or, rather, as a work in which only the essentials are retained — appealing to more artistic and more intelligent taste than the finished realistic picture — these paintings dis¬ pense with careful definition, with chiaroscuro and perspective, qualities neglected by both the Chinese and Japanese masters in their search for idealistic design and decorative feeling. The care bestowed upon the line leads to a very skilful characterization and suggestiveness in design — marred by the limitations and conven¬ tions of both national arts; the generally tern-114

pered and restricted color scheme permits of the most subtle and beautiful tones and of a very artistic rendering of aerial perspective in

the landscapes, especially in the Japanese. The painter does not hesitate to leave his canvas or his paper untouched in spots so as to concen¬ trate on the principal motif ; he is in search of an abstract beauty, not of that of the individual — in accord with the Buddhist principle of the social development rather than of that of the individual. This is peculiarly true of the Butsu-ye, or picture of the true Buddhist school, which is distinguished from the works of the secular artists by certain distinctive qualities. In China, notwithstanding the number of epochs which the art of painting has traversed and the varying influences to which it has been sub¬ jected, it has retained throughout a general unity of principles. The Japanese claim that in deriving their art from the Koreans, the Chinese and the Hindus, they had bettered their instructions and given their own style to the art — a greater charm and subtlety of line, a greater delicacy and beauty of tone in the color. Both nations refer the origin of their art to a legendary era, the Japanese claiming 13 cen¬ turies of duration and the Chinese historians ascribing the invention of painting to Che-hoang, minister of the Emperor Hoang-ti, in the 27th century before Christ, contemporary with the introduction of writing by Tsang-hie — these two personages considered by some au¬ thorities to have been identical. No satisfactory record of an individual painter, however, ap¬ pears before the 3d century a.d., nearly 200 years after the introduction of Buddhist pic¬ tures and images from India. According to an ancient Japanese writing, the history of pictorial art began in that country in the reign of the Emperor Yuriaku (457-479 a.d.), introduced by a Chinese painter of royal descent, Nanriu or Shinki. It is probable that Japanese art took its real birth at the period of the introduction of Buddhism in the middle of the 6th century.

Persia and India. — It was from China that Persia originally derived the arts of architec¬ ture, painting and ceramics ; for the second of these, the general principles and the technical methods, even to the vellum upon which the paintings were executed, were Chinese. Later, many of the elements of the art were adopted from that of the Arabian Caliphate, an art which had been born in Egypt and developed in Syria. Under the dynasties of the successors of Genghis Khan (1199-1335 a.d.) painting in Persia assumed definite forms and character¬ istics ; indeed it is asserted to have been bor¬ rowed from Turanian, Dravidian, Greek, Sassanian, Mongol and European sources. During the Mohammedan domination its influence was extended to India, where it succeeded the native traditions. The art of the two countries under the Mongol emperors was practically the same ; in both the ancient mural paintings having almost completely disappeared, it is preserved only in the miniatures. Modern Hindu

painting and sculpture are both in lamentable decadence ; the former, never having even undertaken to represent nature, is content with traditional and decorative formulas.

For painting of Europe after the close of the Mediaeval epoch, see Renaissance Paint¬ ing; Post-Renaissance Painting.

Bibliography. — (Histoire de l'Art dans l'Antiquite' (1882-1904) ; Maspero, 'L'Archeologie Egyptienne) ; Woltman and Wocrmann,

(History of Painting' (1891) ; Girard, 'La Peinture Antique' (1895) ; Prisse d'Avennes, 'Histoire de l'Art Egyptien' ; Crowninshield, 'Mural Painting' ; Collignon, (Manuel d'Archeologie Grecque' ; Martha, 'L'Archeologie Etrusque et Romaine,' 'L'Art Etrusque' ; Brunn, 'Geschichte der griechischen Kiinstler' (1889) ; Milligen, (Peintures antiques et ineditcs de vases grecques' ; Lau, 'Die griechischen Vasen' ; Man, 'Pompeii, its Life and Art' ; Muther, (Geschichte der Malerei' ; Bayet, 'L'Art Byzantin' ; Peratre, 'L'archeologie Chretienne' ; Wornum, (The Epochs of Painting' ; 'Histoire de l'art du Japon.- Ouvrage publie par la Com¬ mission Imperiale du Japon a l'Exposition Universelle de Paris' (1900) ; Anderson, (The Pic¬ torial Arts of Japan' (1886) ; Gonse, 'L'Art Japonais' ; Paleologue, 'L'Art Chinois' ; Kakasu Okakura, 'The Ideals of the East, with Special Reference to the Arts of Japan' (1903) ; Las¬ sen, Undische Alterthum Kunde' ; Schnaase, 'Geschichte der Kunst in Alterthum' (1874) ; 'Grande Encyclopedic, articles Inde, Hindou-isme' (1893) ; Maindron, 'L'Art Indien' ; Gayet, 'L'Art Persan' (Libraires-Imprimeries Reunies, 1895) ; De la Marche, 'Les Manuscrits et la Miniature' ; Blanc, 'Histoire des Peintres de toutes les ecoles.' See for further bibliog¬ raphy under Post-Renaissance Painting; Re¬ naissance Painting.

William Walton,

Author ' Chefs d'CEuvre Expo, Universelle

1889.’

PAINTING, Education in. The education of the painter is to-day altogether different from what it was in the Middle Ages and the Re¬ naissance, and this difference is largely de¬ pendent upon a different conception of the social status of the artist. In the mediaeval world the painter was a craftsman, like the carpenter or the smith. Often, indeed, he had been trained as a goldsmith before he became a painter. The individual artist might rise to some eminence and consideration, but as an artist he was a member of a mechanical trade which no one would have thought of putting on a level with the learned professions. To-day the painter, the sculptor, the architect, is a pro¬ fessional man, like the lawyer or the physician, and his education is planned, as nearly as pos¬ sible, on the lines of theirs. As long as the artist was considered a tradesman he was edu¬ cated like a tradesman ; that is, by apprentice¬ ship to a master of the craft. In a modified form this apprenticeship system was in force as late as the 18th century, but its character can best be understood by considering it as it was practised in the 15th.

In the 15th century, then, the-master painter kept a shop, a bottega, which differed in no essential particular from the shop of any other tradesman, and his business was to supply any¬ thing that was wanted in the way of painting, from the ornamentation of a chest or the paint¬ ing of a sign to the production of an altarpiece or the frescoing of a palace wall. He maintained a force of journeymen and appren¬ tices, and it was no more expected that he should produce with his own hands everything which left his shop than it was expected that

the master joiner should plane every board or the master mason lay every stone. To such a

toward 3 t b°y Th° ?howcd any disposition toward art was bound out, at the age of 12

or o, tor a term of years. He was to give ins services in any capacity in which they were available and a sum of money was paid the master, who, in return for this premium and semce engaged himself to teach the boy his trade 1 he apprentices swept out the shop, ran errands waited on customers, ground colors prepared canvases and panels, pricked cartoons and pounced them upon the wall, set the palette and cleaned the brushes of the master. At odd times they copied the master's studies and always they watched his methods and learned how he did things and by what succession ot processes a picture was produced. At the end of his term of apprenticeship the boy had learned enough to be useful and was worth a wage. He became a journeyman and was tree to stay with his master or to engage him¬ self to another. At this stage of his evolution he was intrusted with more important work designed borders and gilded halos, painted backgrounds or draperies from the master's studies, made studies himself for the less im¬ portant parts of pictures, finally painted entire pictures himself under the master's supervision and on the master s account — pictures which were almost indistinguishable from the master's owjn and were frequently signed by him before delivery to the customer who had ordered them.

If the young painter were unambitious he might remain at this stage all his life. If he were determined to be a master in his turn he probably traveled a little and engaged himself to this or that more celebrated master that he might study other methods than those he had learned, pick up other traditions and familiar¬ ize himself with the best work that was being done in his art. When he could do what his masters did as well as they did it, and hardly until then, he was ready to observe nature for himself, to allow his own temperament to influ¬ ence his work, to become, perhaps, a creator and an innovator, and to teach others all that he had been taught and all that he had learned for himself, so that they might begin, as nearly as possible, where he left off.

The typical education of a modern painter is as different from this as possible. He begins his special education later than did the mediae¬ val painter, having spent some years in ordi¬ nary schooling, perhaps even in securing a college training. He may have done a little des¬ ultory drawing during this time, but about the age of 20 or later he decides to become a painter and begins his serious education in art. He begins it not as an apprentice, but as a student; not in a shop, but in a school. If the school is. a great state institution or one con¬ nected with a university, it will afford lectures on the theory and history of art, to which, likely enough, he will pay little attention. It will be in a great city, where he will be able to visit museums which

have gathered together the art of many ages and many countries, and to see exhibitions where almost as many methods of work are exemplified as there are individual exhibitors. Even in default of museums and exhibitions he will infallibly have access to many cheap publications which, by some of the applications of photography, will give him a

fair idea of the results, attained by the art of the past and the present; of its methods he will know nothing. Meanwhile he will be set down before a plaster cast or a living model and bidden to draw. He will be more or less thoroughly grounded in anatomy and perspec¬ tive and other sciences, above all in the science ot aspects, but he will have practically no in-st ruction whatever in his craft. His canvases and colors, like his brushes, he will buy ready •made. His master he will see twice a week, •i"i \ minutes, and that master's criticisms will be directed exclusively to the justness of ns observation and the truth of his rendering of nature. The master's own work will be car¬ ried on in another place, in quiet and in soli¬ tude, and the student will know nothing of it except, now and then, to see the completed pic¬ ture. The more intelligent and conscientious the master the. less likely he will be to attempt leal technical instruction, for he will feel that his own methods are tentative, suited to himself alone, and of doubtful validity or permanence, while he will be hampered by our modern re¬ spect for individuality and the fear of destroy¬ ing something more precious than anything he can supply.

After three to five years' work on this sys¬ tem our student will be able to draw with fair accuracy anything set before him, to distinguish its values, even to copy its color with some approximation to success. On the other hand he will have exercised little either his inven¬ tion or his memory, will know nothing of orna¬ ment and little of design, and will be entirely in the dark as to what he wishes to do with his acquired science, while he will have had no practical experience of the thousand and one processes that go to the production of a picture. Likely enough he will never have made a trac¬ ing or squared up a sketch; almost certainly he will never have arranged a drapery; quite certainly he will, no more than his master, know anything of the proper management of oil colors, of the use of vehicles or of the com¬ position and permanence of pigments. For a time he will try to do outside the school what he has always done in it, and will be surprised that no one cares for the result. Then it will perhaps dawn upon him that he has learned a science but not an art, he will flounder and experiment, and, if he is a man of force and originality, he will invent

an art of his own and methods that will somehow serve his needs It he is of a cool and logical mind he wili ic cognize that his training was vastly better than none and will, in default of a better, recommend it to others or help to give it to them If he is of a warm and emotional tem¬ per he will condemn it as useless or worse and tell those who consult him to get alone without it.

It is obvious that the results of these two educations must differ as greatly as the condi¬ tions which produced them. The modern painter may readily be a man of broader cul¬ ture and wider outlook than the painter of the Renaissance; with anything like the same origi¬ nal force he will probably be a more personal and individual artist ; he will certainly know a great deal about the aspects of nature that the Renaissance painter never dreamed of. Just as surely he will be the inferior of the Renais¬ sance painter, both as designer and as crafts-

man, will rarely attain complete mastery of his tools and will try to substitute the charm of his personal sentiment and his individual view of nature for that assured rightness which comes of an accepted body of traditions and the possession of tried methods. What modern art has gained in variety and in the perception of new truths it has lost in weight and coherence. Each artist works in his own way for the at¬ tainment of self-expression and does little to¬ ward the building up of a great school.

It is easier to see the weakness of modern education in painting than to devise a remedy, and those who are most opposed to the modern academic system seldom suggest anything to take its place. There are many reasons why the old apprenticeship system could hardly be revived. There are such multitudes of students to-day that it would be impossible to find mas¬ ters for them, and our masters have, in general, nothing for apprentices to do. They are no longer at the head of great workshops, turning out a multiplicity of diverse products. Each is engaged in a more or less narrow specialty, pro¬ ducing work which is valuable only as it pos¬ sesses his personal quality and exhibits his per¬ sonal touch, and his patrons would resent the

intrusion of any hand but his own as little less than commercial dishonesty. The modern student also knows too much of the art of all times and countries to choose a single master and docilely follow his teaching. It is doubtful if modern conditions have not rendered forever impossible anything like a local school of painting.

The conditions of mural painting do, indeed, entail something like the old apprenticeship sys¬ tem, and in the growing demand for the deco¬ ration of public and private buildings there is a hope for the revival of older methods of edu¬ cation. It is recognized that a decorative painter may properly have a corps of assistants, and while these assistants are not likely to be mere beginners, but will already have had an academic training, they are enabled to supple¬ ment it with the practical instruction of a mas¬ ter in the methods of creating a work of art.

How far a similar instruction can be en¬ grafted on our academic system is the prob¬ lem that should most seriously occupy the directors of our schools of art. The rigid discipline in drawing and painting from nature need not be relaxed — in its way it is admirable and should be strengthened rather than weak¬ ened — but it should be pointed out that the ability to imitate form and color is a tool, not an end, and that the creation of a work of art is something different from the production of a life-study.

To this end the student should be thoroughly grounded in ornament, both as a training of taste and an exercise in design, and the study of nature should be, as far as possible, sub¬ ordinated to artistic creation, the structure and appearance of things being learned as they are required for expression. In this way they would be learned both more permanently and more easily. The student's memory and imagi¬ nation would be educated as well as his eye and his hand, and in the creation of an actual work of art, under the guidance of his master, if that work of art were no more than a painted border or bit of scrollwork, the im¬ portance of sound technical methods would be

readily appreciated. Such students as had any real talent for painting would be vastly better trained than most of our painters now are, while the others would have a chance to be¬ come competent workmen in some of the minor decorative arts instead of adding to the world s too great stock of bad pictures.

And while it must be insisted upon that the education of eye and hand

can hardly begin too early, if technical mastery is to be attained, a*nd that we must be willing to sacrifice some¬ thing of the education of a gentleman to the education of a painter, it would be well if some tincture of mathematics, of history and of letters could be given to take the place of that college training which must of necessity be foregone. See also Architecture, Educa¬ tion in; Sculpture, Education in.

Kenyon Cox.

PAINTING, Technique of. Painting as one of the fine arts may be defined as the ap¬ plication of color on a surface for decorative purpose; or the representation of natural or imagined objects bv means of colors applied on a surface in such a manner as to produce an illusion of reality in form, light and shade and color. It is to the last form of painting, known as pictorial representation, that . we shall chiefly devote our attention in this article.

Painting may be divided into fl) monochro¬ matic painting, including drawing in pencil, charcoal, ink and crayon, *etc.* (see Art Draw¬ ing), in which class, pictures of objects are rendered in various shades of one color ; and (2) polychromatic painting in which the artist seeks to express not only the form, light and shade, but also the full charm of color dis¬ played by objects. According to the subject represented, painting may be grouped as fol¬ lows: (1) historical, including religious and mythological works; (2) portraiture; (3) genre — the representation of domestic life; (4) animal; (5) still-life — pictures of fruit, flowers, pottery and other inanimate obiects; (6) landscape and seascape.

To be able to express himself fully in his work, the painter must know anatomy in figure and animal painting; aerial and linear perspec¬ tive in landscape and marine painting; and the principles of pictorial composition (see Art Drawing) in all the forms of pictorial representation. He must also have a good working knowledge of the theory of color, the chemistry of paints, oils and varnishes, and the special technique of the particular form of painting he is pursuing. The subject of paint¬ ing, therefore, will be ‘treated here in two sec¬ tions. In the first part, the technique of paint¬ ing of which there are several kinds will be described; in the second, the history of the origin and development of the various schools of painting in general will be told.

The technique of paintirtg refers to the artist’s manipulation of his purely material equipment in his effort to reveal to his fellow beings his impressions of the varied beauties .of nature in form, color and

perspective. It in¬ cludes the preparation of the foundation, or ground upon which the painting is executed, and the proper use of the pigments, vehicles and preservative agents. To render the coloring substance applicable, it is mixed with manv dif¬ ferent kinds of binding materials or media, giv¬ ing rise to as many different processes of paint-

ing, viz., encaustic, tempera, fresco-buono, fresco-secco, spirit fresco, stereochromy, oil' pastel and water-color. The particular technique of each will now be described.

Encaustic Painting.— Encaustic (Gk. ey/cav-Ctikoc, enkaustikos, burnt in) is a process of painting used by the ancients and revived in modern times in which the colors are mixed with wax and resin and liquefied by heat. It was peculiarly an ancient Greek method of pictorial expression, as in Greece the process reached its highest development. Several mummy masks have been found that prove the knowledge of encaustic painting by the Egyp¬ tians, but it was not adopted by them till after the Macedonian conquest. The Greeks used it not only in flat tints to cover plain surfaces or sculptured ornament, but also to model the subtle human form. The British Museum, the Louvre, and the Metropolitan Museum of Art, New York, possess good examples of Greek en¬ caustic portraits (chiefly from Fayum, Egypt) together with the cestra, braziers and other im¬ plements used in the process. Many of the mural paintings in Pompeii were also executed in this medium. In modern times the secret of the process was largely lost despite the many attempts of the savants to solve the riddle, un¬ til 1884 when MM. Cros and Henry published in Paris their now famous monograph entitled (L'Encaustique et les autres procedes de la peinture chez les anciens, historique et tech¬ nique,) in which they fully restore the encaustic process. They describe four varieties, based upon a thorough study of existing examples of and writings on encaustic painting. These are as follows :

(1) Colored sticks of wax and resin are melted over a heater either in separate cups or on a metallic palette with depressions for the colors.

The tones are then applied hot on the surface to be painted, with a brush and ‘blended with a hot cestrum. To give grada¬ tions to the modeling, the intermediate tones are applied with a hot cestrum from the cold wax colors on the cooled palette.

(2) Similar to the first process but with the addition of an oil to facilitate the work.

(3) Cold applications of the preceding mix¬ ture conveyed to the surface to be painted, and modeled with cold cestra.

(4) Cold brush-painting with colors of wax and resin dissolved in an essential and volatile oil such as spirits of turpentine. Strictly speaking, the last two processes are not encaus¬ tic, because there is no ((burning in.55

In the last century many mural paintings have been produced in a wax medium that represents but a variation of the fourth process described above. Pictures in this manner were executed by Hippolyte Flandrin in Saint Vin¬ cent de Paul and Saint Germain des Pres in Paris; by Andreas Muller in the National Gal¬ lery, Berlin ; and by Fernbach in the Hohenstaufer Hall of the Royal Palace in Munich. Wax painting for mural decoration is popular with our contemporary mural painters because of its several advantages. These are: (\) its durability; (2) its matt surface and atmospheric tones; (3) its impasto, equaling that of oils, and (4) its quick-drying qualities.

The authorities on the subject are Cros and Henry (L’Encaustique et les autres procedes de la peinture ches les anciens5 (Paris 1884) ;

Richter, O., Donner von, (fiber Technisches in der Malerei der Alten5 (Munich 1885) • Crowmnshield, (Mural Painting5 (Boston 1887) ; Laurie, (Greek and Roman Methods of Painting’ (Cambridge 1910).

Tempera. — The Italian word tempera orig¬ inally meant any fluid vehicle with which color¬ ing matter may be mixed, including oil. At present it is applied) in a restricted sense to a form of opaque water-color process in which the binding substance is one of the following : (1) yolk of egg; (2) yolk and white of egg beaten together and diluted with the juice from young shoots of the fig-tree or with vinegar; (3) size, in which there is no egg but a thin glue, as gums arabic and tragacanth, glycerin, honey, milk or pieces of parchment boiled down. The size tempera is considered the best as the coloring matter in yolk of egg tends to make yellows deeper, turns red into orange and blue

into green. The solvent for all is water. The brushes used are of sable or camel's hair; and any dry surface as paper, canvas, panel or plaster is favorable.

Tempera paintings are characterized by sharp and clear definition (the rapid drying of the color does not permit any blending) ; flat, bril¬ liant and atmospheric tones; and matt surface. Their main weakness is that they are very per¬ ishable. As the colors are soluble in water they are ruined by contact with moisture either on the surface or from behind. Besides* the paint is liable to peel if applied in more than one coat, or when too much egg or size has been used, and is easily defaced by friction. In fact, to preserve pictures in this medium, it is neces¬ sary to coat them with an oil varnish.

A thorough study of the paintings of the ancients — the mummy cases and papyrus scrolls of Egypt, the wall paintings of Babylon, Assyria and India, and the panel and wall decorations of ancient Greece and Italy — re¬ veals the fact that the tempera process was used extensively by them from time immemorial. In Mediterranean Europe it prevailed until the 14th century when it gradually gave way to the growing popularity of fresco. In the north of Europe ft was much in vogue for panel pic¬ tures until about the year 1400 when the superior oil medium was perfected by Hubert and Jan Van Eyck. At the end of the 15th century tempera completely ceased to be used in all countries. In modern times efforts were made in England, France and Germany to re¬ vive iff but so far with little success. At present it is mostly used for painting theatrical scenery. Among the existing examples of tem¬ pera painting by Renaissance masters may be mentioned the famous (Portrait of Isotta da Rimini5 by Pietro della Francesca in the National Art Gallery in London; the (Portrait of an Old Man with Red Cap5 by Albert Durer in the Louvre, and the (Three Graces5 from Botticelli's (Allegory of Spring5 at Flor¬ ence.

Consult Pereira, <Leitfaden fiir de Tem-peramalerei5 (Stuttgart 1893) ; Cennino Cennini, (Trattato5 (Eng. trans. by Mrs. Herringham, London 1899) ; Friedlein, (Tempera und Temperatechnik) (Munich 1906).

Fresco Painting.— Fresco is a form of mural painting executed upon wet or fresh plaster. The term is derived from the Italian al fresco which means fresh. It is often indis-

criminately applied to all kinds of mural paint¬ ing from tempera to encaustic. This is im¬ proper and unnecessary. In true fresco the colors are not mixed with wax as in encaustic nor with any kind of glue, size or yolk of egg as in tempera; but either with pure -water or with water and lime, and applied on the wall while the plaster is still wet.

The technique of buon-fresco, as true fresco is sometimes called, to distinguish it from the false is as follows : The wall to receive the fresco is usually of well-dried and uniformly hard brick. A double wall with an air space is the best. To prepare the wall it is necessary to cover it with two kinds of plasterings — the arriccio or rough cast, and the intonaco or finishing coat. The arriccio which is composed of two parts of sand to one of lime is usually less than half an inch thick and is applied in two or three successive coats. Its surface is roughened the better to hold the finishing coat, and is left to dry for a very long time. When thoroughly dry, it is ready to receive the in¬ tonaco on which the fresco is painted. After saturating the arriccio with water, the intonaco, which is composed of well-prepared lime and fine sand, is spread in two thin coats, the whole being about one-tenth of an inch thick. A trowel or wooden float is the tool used for spreading the plaster. The intonaco is not laid all at once but in parts, according to the space which the artist expects to be able to cover in a single day. When the picture is so small that it can be completed in a day, the outline is transferred directly from a well-prepared cartoon to the intonaco. If, however, the pic¬ ture is large, requiring several days or more in its execution, the cartoon is transferred to the arriccio before any of the intonaco is laid. The artist indicates the portion he can paint in a day and the mason who is specially trained for the work prepares it with the intonaco. When the day's work is done, any of the plaster that has not been painted upon is removed and is beveled at the edges of the finished work. On the following day the mason joins closely another patch of plaster to the edge of the portion painted upon the previous day, and so on.

The cartoon is usually a carefully prepared outline drawing of the subjeot of the same size as the fresco is to be and is transferred to the wall by pouncing. The method of pouncing is as follows : The outlines of the cartoon are pricked with a large pin of wood or bone. Some

powdered charcoal is then spread on a piece of soft muslin which is tied up like a bag. The cartoon is attached to the wall and the bag is briskly rubbed over it. On removing the cartoon, an impression of the subject will be found on the wall.

The brushes used in fresco are long and supple and of bristle, marten, sable or otter. The palette is generally made of tin with a rim around it to prevent the colors from running off. It has a cup in the centre for pure water which is the vehicle for fresco. The colors employed are for the most part the earthen kind and several of the mineral. Those de¬ rived from animal or vegetable sources must not be used as they cannot stand the action of lime. A good palette for this work includes the following pigments: lime white (bianco San Giovanni) ; yellow ochre and Naples yel¬

low ; light red, Venetian red and burnt sienna ; terre verte and oxide of chromium; raw and burnt umber; cobalt and ultramarine blue ; burnt vitriol (purple) ; and earth black. A specially prepared vermilion is also used.

Of all the forms of painting buon-fresco is the most trying to the artist. He must work rapidly and bit by bit; consequently he cannot see the effects of the colors upon each other. Besides when dry the colors appear lighter and warmer than when first applied to the gray plaster. To cope successfully with all these difficulties, the artist must have long practice and consummate technical skill. The special qualities of fresco are: (1) durability, as the plaster in drying, forms a thin layer of car¬ bonate of lime over the painting, protecting it against moisture and moderate friction: (2) a matt surface, enabling the picture to be seen equally well from all points of yiew; and (3) clearness, brilliancy and luminosity of color.

We are not certain in what country the fresco process was first used ; but it is an estab¬ lished fact that it was known to the ancient Greeks as evidenced by the fragments of painted plaster recently discovered by Schliemann in the prehistoric palace of Tiryns. Marvelously preserved specimens too were found in Pompeii and Herculaneum, notably a small specimen now in the Vatican, known as the ((Aldobrandini Wedding,)X and named from the villa near which it was found. The early Christians of Rome also used it in the decoration of the walls of the catacombs. In the Middle Ages this form of painting gave way almost entirely to mosaic. The 14th century, however, saw its revival in Italy, chiefly due to the epoch-making work of the

Florentine Giotto (1276-1336). His decora¬ tions in fresco of the chapel of Santa Maria dell'Arena created a widespread movement in its favor. Soon it became the leading medium of art expression of his contemporaries and suc¬ cessors and culminated in the sublime achieve¬ ments of Michelangelo's ceilings of the Sistine Chapel and Raphael's stanze in the Vatican. Since the 18th century fresco painting has grad¬ ually fallen into disuse, and all attempts recently made in England and Germany to revive it have met with little success. At present, it is only pursued by a few Siennese mural decorators.

Of the early treatises on the technique of fresco may be mentioned (Mount Athos Hand¬ book ' (Hermeneia, date uncertain) ; Cennino Cennini, (Trattato della Pittura} (English trans¬ lation by Christiana J. Herringham, London 1899). Modern manuals include Tavlor, W. B. Sarfield, (A Manual of Fresco and Encaustic Painting) (London 1847) ; Cremer, F. G., (Vol-standige Anleitung zur Fresco-MalereP (Diisseldorf 1891) ; Ward, (Fresco Painting, its Art and Technique) (London 1909).

Fresco-Secco. — The form of painting known as fresco-secco is a 'spurious kind of fresco in -which the colors are laid on to the plaster after it had been allowed to dry thor¬ oughly. It is used in ordinary house decoration where the true fresco method is impracticable. The process is as follows: After plastering the wall with two coats of lime and sand as in true fresco it is allowed to dry. The surface of the plaster is then rubbed with pumice stone to re¬ move the irregularities ; and in the afternoon of the day before the artist intends to do the painting, the wall is saturated with water con-

taming a small infusion of lime. The following morning, after again moistening the wall, the artist traces the outline by pouncing and com¬ mences the painting. When during the process ot painting the wall becomes too dry, a syringe is employed to moisten it. The colors used are mixed with water or with water and lime as in buon-fresco. The advantages of fresco-secco are convenience and ease of execution. On the other hand, works produced by this system are opaque and heavy and the fixation of the pig¬ ments are not as complete as in true fresco.

. Spirit: Fresco. ((Spirit frescoˆ is the name given to a process of mural painting invented by T. Gambier Parry in 1883 and used with success by Sir Frederick Leighton in his decorations at the South Kensington Museum, England. Great durability is claimed for it by its inventor, and it is now very popular in Great Britain. The W-u t0 Panted in ((spirit frescoˆ is prepared with two coats of plaster as in true fresco ; and the surface of the second coat or intonaco is left rough, as all smoothing nrocesses destroy its porosity - a quality which is absolutely essen¬ tial m this system of painting. The use of plas-tei of Paris and cement are avoided for the same reason. When thoroughly dry, the wall is well drenched with the special medium of the pigments used in this process, diluted in one and a half its bulk of spirits of turpentine. The recipe for the medium as given by Mr. Gambier Parry is as follows : elemi resin (gum elemi) two ounces by weight; pure white wax, four ounces by weight; oil of spike lavender, eight fluid ounces; and artists' copal resin, 20 fluid ounces. A few days after spraying the ground is. painted thickly with two coats of the medium, slightly diluted with about a third of turpentine and mixed with equal parts of powdered white lead and gilders' whitening. Before proceeding to paint on it, the surface, thus prepared, is al¬ lowed to dry for two weeks, at the end of which time it becomes a luminous white, so that all color tones applied on it assume the clearness and brilliancy of true fresco. The painting is done boldly and solidly, using spike oil freely as the solvent. The theory of the process is the saturating of the ground with a solution that forms at the same time the vehicle of the pig¬ ments, so that when dry, the whole forms a homogeneous mass. The advantages claimed for it are: (1) durability; (2) power to resist damp and foul air; (3) luminosity of color; (4) a dead surface. Consult Parry, T. Gambier,

(Spirit Fresco Painting) (London 1883).

Stereochromy or Water-Glass Painting. — Stereochromy (from the Greek orepeoq, stereos, solid, firm and xpuva, chroma, color) is a form of mural painting invented by the German chemist, Dr. J. N. Von Fuchs, in 1825, in which water-color is applied on dry plaster and fixed afterward by spraying with a sub¬ stance known as water-glass (a silicate of potas¬ sium or of soda). Several different kinds of water-glass are employed. The formulas for the three most generally used areas follows:

(a) Potash Water-Glass, , composed of 15 parts of pulverized quartz or pure quartz sand;

10 parts well-purified potash; one part powdered charcoal.

(b) Soda Water-Glass: 100 parts of quartz;

60 parts anhydrous sulphate of soda; 15-20 parts powdered charcoal.

(c) Double Water-Glass : 100 parts of

quartz; 28 parts of purified potash; 22 parts of neutral anhydrous carbonate of soda; six parts powdered charcoal.

In preparing the wall-surface for painting in water-glass three coats of plaster have to be laid. The first two coats are composed of four parts of coarse quartz sand, infusorial earth and powdered marble, mixed in certain proportions to one part of quicklime, slaked with distilled water. The last coat is composed of eight parts white quartz sand, powdered marble, and infusorial earth to one part quicklime. When the plaster is dry it is sprayed with a solution of hydrofluo-silicic acid to remove the thin crust of carbonate of lime which forms on it during the process of drying. It is then satu¬ rated with two applications of potash water-glass diluted with distilled water, and when dry is ready to receive the painting.

The colors are ground with distilled water only. They are the same as in true fresco with the exception of lime white for which zinc white has to be substituted, as the former does not chemically combine with the water-glass. The colors may or may not be mixed with white. When white is mixed with the pigments, the painting is like an opaque water-color. When white is not used, the work corresponds to transparent water-color. The palette is con¬ structed with small pans to hold the colors. At the end of the day's work the remaining color may either be replaced in the bottle or kept moist in the pan with distilled water.

. The actual process of painting in . this method is comparatively easy. The artist can paint thinly or in full impasto and may retouch the work at any time. When finished, the picture is sprayed several times with the fixing water-glass, diluted with half its volume of hot water, by means of a special sprinkler. The water-glass penetrates through the plaster to the wall, and in drying binds pigments, plaster and wall into one mass of silicate.

Stereochromy was practised considerably in Germany in the second half of the 19th century especially by Kaulbach, Pettenkoffer and Schraudolf. About the same time Godfried Guffens and Jan Swerts worked in this medium in Belgium. In England, Maclise and Herbert

adopted this process in their mural decorations in the Houses of Parliament. Consult Kiem A., (Die Mineral-MalereP (Wien 1881); Kremer, F. G., cBeitrage zur Technik der Monumental-Malverfahren) (Diisseldorf 1895) • Thomas, W. Cave, (Mural Decoration) (Lon¬ don —).

Painting in Oil.— In oil-painting the pig¬ ments are ground in and mixed with an oil var¬ nish and applied on metal, panel or canvas specially prepared. The process arose in north¬ ern Europe where the moist climate was not favorable for the development of tempera or fresco. The discovery of the medium has al¬ ways been attributed to the brothers, Hubert and Jan Van Eyck, who flourished in Belgium about 1400 a.d. But this is erroneous, for as a matter of fact, olive, flax and nut oil were used in their works by painters long before the Van Eycks. . On the authority of Eastlake whose f Materials for a History of Oil Painting) is considered a classic, Aetius, a medical writer of the early part of the 6th century describes at great length linseed and nut oil as used by gil¬ ders and encaustic painters of his day. Besides,

there is evidence to the effect that the medium was used in England as far back as 1239. It is true, however, that about the year 1400, the oil process became well established, due no doubt to the Van Eycks who, according to the writings of the Italian historian Bartolommeo Facio, had made a thorough study of the works of the preceding authorities. The system grad¬ ually gained popularity all over Europe — so much so, in fact, that by the end of the 15th century, it had become the dominant form of the graphic arts.

The methods of work of several of the old masters representing as many different schools of painting will now be described. The tech¬ nique of Hubert Van Eyck was as follows : A panel of well-seasoned oak was prepared by being covered with gesso which is the Italian word for gypsum, or plaster of Paris. On this non-absorbent surface he first made a careful outline drawing in ink or black chalk. He then primed the whole with a light, thin and uniform wash of color diluted

with varnish, permitting the drawing to show through. This dry, he painted-in the shadows with a wash of trans¬ parent brown. On top of this .monochrome he finally painted the subject in full color, taking care to keep the light parts so thinly covered with paint that the light ground peered through. This is the most primitive form of painting known ; nevertheless, it introduced the idea of painting on a prepared monochrome which was, taken up and used by the early Flemish and Dutch painters including Rubens, Teniers and Ruysdael. Rubens, however, improved greatly upon the method of the Van Eycks. In his work, brushwork and vivacity of handling gen¬ erally became important qualities. He, too, painted shadows thin and transparent but loaded in the light parts. Rembrandt, besides the nu¬ merous other qualities which characterize a great artist, had great technical skill. He loved rough surfaces and indulged greatly in glazing (brushing transparent colors without admixture of white over a dried undertone) and scumbling (dragging opaque color over the undertone). His brushwork, too, was vigorous and convinc¬ ing. Frans Hals, whose technique is the model for a great many modern portrait painters, dis¬ carded the monochrome system for direct paint¬ ing. He laid in the shadows thinly, the middle tints substantially and the lights heavily. Titian first laid in his subject in substantial body-color but in simple colors, using, probably, white, yel¬ low ochre, light red and black. After letting this first painting dry for several months, he glazed and reglazed with rich colors every part of the canvas including the high lights. He also scumbled or superimposed opaque color here and there until the work showed that rich surface for which his paintings are famous. His method resembles that of Rembrandt with the difference that Rembrandt indulged more in the scumbling process while he gave prefer¬ ence to glazes. The practice of all the modern painters is based upon one or another of the several methods described.

The materials and tools used in oil-painting include the foundations, pigments, media, driers, brushes, palette and palette knife. The founda¬ tions or the materials on the prepared surfaces of which the painting is executed include metal, wood academy-board and canvas. The rough¬ ened surface of thin sheets of copper or zinc

make the finest grounds for oil-painting, but are not much used for large pictures on account of the great weight of the metal. Panels of well-seasoned oak or mahogany also make excellent surfaces and have been extensively used. Sketches and small studies are frequently made on a foundation known as academy-board, formed by covering with size and paint a sur¬ face made by pasting together several sheets of

cardboard. Canvas for oil-painting is the most in vogue. It is prepared as follows: After stretching it tightly on a wooden stretcher, its surface receives a sizing coat of glue and water. When dry it is covered with three successive coats of white lead in oil slightly tinted with black, to produce a gray color.

The colors used by the Renaissance masters were practically the same as those known to ‘the ancients, namely, white-lead, whitening (calcium carbonate), gypsum (plaster of Paris), yellow ochre, raw sienna, vermilion, red oxide of iron, burnt ochre, burnt sienna, lapis lazuli (ultramarine), malachite, terre verte, raw umber, bituminous earth, burnt ivory and lake (extracts of woods, fruits and berries). In recent times very many artificial chemical colors have been added, swelling the list given above to about 215. Out of these only about 15 are now generally used. All the others are fugitive : some of them are affected by sulphur gas or coal smoke ; others by light ; and others again are permanent when used alone, but deteriorate when mixed with other colors. The following pigments are recommended by the leading chemists and are used more or less by our best contemporary painters : zinc white — ivory black — yellow ochre — strontian yellow ■ — cadmium yellow — cadmium orange — ver¬ milion — rose madder — madder lake deep — burnt sienna — cobalt blue — French ultramarine — emerald oxide of chromium — viridian — burnt umber.

The medium in which the colors are ground and with which they are mixed in the process of painting is a combination of an oil and a varnish. Many different kinds of oils and varnishes were used in the various stages in the development of the process. Among the oils may be mentioned linseed, poppy and walnut oil ; and among the varnishes, damar, sandarac, amber, copal, shellac and mastic. At present linseed oil and mastic varnish are mostly used, as they form the most reliable vehicle. Lin¬ seed oil is the oil extracted from flax seeds; and mastic varnish is the resin obtained from a small evergreen tree which grows in the Le¬ vant. To hasten the drying of their pictures some artists mix their pigments with one of several so-called ˆdriers® now on the market, as, for example, copal megilp. Our best chem¬ ists, however, prohibit their use where perma¬ nence is desired, and recommend pure spirits of turpentine as the best and only reliable drier.

The brushes employed in this system are made of sable and hog’s hair, flat or round. The palette on which the colors are mixed, con¬ sists of a thin square or oval piece of wood, generally walnut or pear, hollowed out at one end with a hole through which the thumb is

passed. Before laying the pigments on the panel or canvass, they are mixed on the palette with the palette knife — a strip of horn or flexible metal and generally triangular in shape. Some painters of the modern impressionistic

school use the knife as much as the brush in the actual process of painting. Consult East-Jake, Sir Charles, (Materials for a History of Oil Painting* (London 1847-69) ; Berger, Beit rage zur Entwicklungsgeschichte der Maltechmk) (Munich 1897-1904) ; Dalbon, (Les origines de la peinture a l'huile) (Paris 1904) ; Ludwig, (t)ber die Grunsatze der OelmalereP (Leipzig 1876) ; Vibert, (La science de la peinture^ (Paris 1890) ; Toch, (Materials for Permanent Painting* (New York 1911).

Pastel. — Pastel is a process of painting in which variously colored crayons are used. The name is derived from the Italian word pastello — a little roll of paste — referring to the paste into which the colored crayons are first made.

The materials used in the practice of this art include pastels or colored crayons, tinted paper or specially prepared millboard or can¬ vas, and fixative. To make pastels, the coloring substance is first mixed with a colorless base. This combination is then worked by means of a mucilage into the consistence of a soft paste which is formed into small cylinders about two inches long and three-eighths of an inch in diameter. The colors employed are with few exceptions those which are used in oil-painting. The bases or the materials employed to impart body to the colors and to secure light gradua¬ tions or tints include chalk, pipeclay plaster and oxide of bismuth. Gums arabic and tragacanth are used to bind the molecules of some of the crayons and beeswax of others. The pastels . are sold in boxes assorted either for flesh tints or landscape tones. A box usually contains 40 or 50 crayons, hard, medium and. soft, giving for each color the gradation of tints from white to the natural tone.

Almost any kind of paper may be used in pastel painting, but those are

most suitable which best retain the fine powder of the crayon. The kind specially manufactured for the pur¬ pose is the pumice paper — a paper prepared with a coat of starch and charged with pumice powder. To the surface of this papei the pastels adhere tenaciously and are easily blended on it. Besides, a painting executed on this paper can be retouched as often as is neces¬ sary without fear that the surface will refuse the crayon. Some pastelists use panels of wood, millboards and even canvas prepared with a pumiced surface. The paper, panel or canvas can be had tinted in many colors — blue, gray, buff, straw, olive and drab. A warm gray is preferred by many for portraits, and a low-toned olive tint is best adapted for landscape studies.

The method of working in pastels is as fol¬ lows : the general tones of the subject are first rubbed on to the surface of the paper or panel wdth hard pastels, using the fingers or a stump made of gray paper or the pith of the willow. On these the work is continued and finished in decided touches for accent and texture which are left undisturbed. In comparison with oil-painting, pastel handling is decidedly easy. A skilful artist can complete a study in one sitting. This facility and rapidity are due to the nature of the dry colors used, which may be removed at will, superimposed, left and resumed at any stage and carried to any degree of finish. It forms, therefore, an invaluable medium in which to secure memoranda from nature in

cases where it is necessary to seize fugitive effects of light and shade. For the same rea¬ son it is very useful for composing arrange¬ ments of color in pictures.

Like all the other forms of painting it has its qualities and defects. Its qualities include charm, delicacy, refinement and brilliancy of color. On the other hand, paintings in this medium are easily effaced and injured by foul air or damp. Therefore, when finished, they are generally ((fixedw by a special fixative — the fixatif Lacaze — and placed under glass.

It is uncertain to whom is due the merit of the invention of pastel; but there is no doubt that the German landscape painter, John Alex¬ ander Thiele (1685-1752), and his contemporary, the Venetian Rosalba Carierra (1675-1757), were the first to carry the art to perfection. Admirable pastel studies of heads and figures in red, blue and black were made by the French¬ men, Boucher, Watteau and Greuze, and in full color by Nattier (1685-1766), Chardin (1699-1779)

and Quentin de la Tour (1704-88), universally proclaimed the greatest pastelist of all times. The first to produce pastels of land¬ scapes and marines was Simon Mathurin Lantara (1729-78). In England, John Riley (1646-91) was the first to practise the art. Later Francis Cotes (1725-70), a pupil of Rosalba Carierra, and John Russel, R.A. (1747-1806), produced pastels which are vigorous and bril¬ liant in color. On the whole, it may be said that in England and still more in the United States this art has never reached a high state of development. In short, pastel is essentially the art of France.

Water-Color Painting — What is known as water-color is a form of painting in which the medium is water slightly enriched by gum honey or glycerin to make the colors adhere. It was used extensively for decorative purposes by the mediaeval monks in. their illuminated manu¬ scripts. The art of painting pictures in water-colors, however, was not evolved from these manuscripts, but rather from the pen drawing on paper by the old masters. The Renaissance painters frequently shaded their drawings with flat auxiliary washes of bistre, sepia or India ink. Later the pen outlines were replaced by markings with the brush and full modeling *was undertaken, in the brown or ink washes, result¬ ing in the full water-monochrome. These monochromes were sometimes tinted to sug¬ gested color. In the early part of the 18th cen¬ tury the water-color painters of England often used gray or neutral tint in their distances and a brown in. their foregrounds. The progress from this modified monochrome to painting in full color was made by the gradual introduction of blue into the gray, and gold, red and green into the brown. The artists who were the first to produce polychromatic water-color pictures are Paul Sandby, Robert Cozens and Thomas Girtin who flourished in England during the latter half of the 18th century. In J. M. W. Turner (1775-1851) the art reached its highest state of development. In continental Europe and in America water-color has for generations been undervalued as a slight and frivolous medium and has been consequently little prac¬ tised. However, since. 1870, when its qualities became better known, it has been employed by many eminent artists of France, Germany and the United States as an independent form of

expression. At present there are special water-color societies in London, Berlin, Paris and New York which hold annual exhibitions.

As practised to-day, there are three kinds of water-color painting. The first, called trans¬ parent water-color, is based upon the principle that the light is to come from the paper. The color is applied in relatively thin, flat and trans¬ parent washes depending upon the light paper to give the luminous effect. For example, the pale portion of a greenish blue sky near the horizon on a sunny day will be painted with cobalt blue and a tinge of bamboge, much di¬ luted with water. The light paper will de¬ cidedly peer through this transparent wash making the tone a light and luminous greenish blue. In the darker portion of the sky, as at the zenith, the color applied will be less diluted with water and consequently less transparent ; the paper will shine through less making the tone a deeper blue. In the second form of water-color painting light gradations are ob¬ tained by mixing opaque white with the pig¬ ments and is, therefore, called opaque water-color. The third process consists in the free use of transparent, semi-transparent and opaque tones and is the system now most gen¬ erally employed. Water-color pigments are sold either in porcelain trays or in tubes. In the tray system the colors are taken up from the trays by the brush charged with water; in the tube system the colors are pressed out from the tubes on to the palette where all mix¬ ing takes place. The objections to the tray colors are that they wear out the brushes, and it is impossible to get out a sufficient amount of color at once for certain purposes. Con¬ sequently tube colors which are more conven¬ ient are more popular. The brushes used in the water-color process are either camel-hair or sable, and the best papers are those named Whatman, Canson, Creswick and Harding. Consult Herrick, H. W., (Water-Color Painting) (New York 1882) ; Monkhouse, Cosmo, (The Earlier English Water-Color Painters) (2d ed., London 1897) ; Hamerton, (The Graphic Arts) (Boston 1882).

A. G. Schulman, College of the City of New York. PAINTING IN THE UNITED STATES. The record of American painting does not pre¬ sent the regular developments that are found in the histories of the great schools. There has been no artistic tradition strong enough to unify the efforts of succeeding generations of artists nor has there been for any considerable length of time a settled direction to popular taste. True, in the last century there appeared here an art with certain qualities more or less peculiar to itself and recognizable as differing from what was going on elsewhere, but its whole course was but the time of a man’s life, and the ties that held it together were more the

result of comparative isolation than any vital demand of national individuality. Our most characteristic artists are found in the latter part of this era which bequeathed to them a steady and single-minded outlook on their work while at the same time the new conditions granted them vivifying contact with the more vigorous arts of the Old World. To-day it is difficult to discern differences in aim between American and foreign pictures.

At the time of the planting of the American

colonies the great European nations with the exception of England were in the midst of epochs of important artistic accomplishment, but Dutch, Flemish, Spanish, Italian, German and French painting left negligible or no re¬ sults in the New World and no work of art of any merit seems to have found its way here in the early days. When the need for art made itself felt, after the great material* difficulties had been overcome and life was somewhat stable, the most prosperous colonies being Eng¬ lish it was from England that the artists came. They were called upon to paint portraits, and stiff lifeless effigies they made — imitations of Lely or Kneller. It was poor English work.

The earliest known painter of any excellence was John Smybert, a Scotchman who came to America in 1728 with Bishop Berkeley. He lhad studied under Sir James Thornhill, the best-known artist in London at the time, where he was a fellow-student with Hogarth. Smybert settled in Boston and painted many portraits, of which the most ambitious is the Family of Bishop Berkeley, now at Yale College, a com¬ position of eight figures. His work was richer in color and more suave in aspect than that of the other early painters, who being engravers or else trained by engravers executed their paintings somewhat in the manner of engrav¬ ings. Each part was finished separately and the adjoining part fitted to it as well as might be, producing hard dry edges and a total lack of atmosphere. In spite of these crudities or per¬ haps somewhat on account of them and cer¬ tainly on account of the artists' simple and childlike point of view their pictures have a charm and also a very real decorative value in the interiors for which they were intended. The most worthy examples of this type of work are found in the portraits of Jonathan Black¬ burn who settled in Boston about 1750.

Both Smybert and Blackburn served as models for the one painter of real talent in the colonies, J. S. Copley. He was born in Boston in 1737 and was trained by his step¬ father, Peter Pelham, an engraver of

merit and also a painter of portraits. In Pelham's house he had the opportunity of coming in contact with all that Boston afforded in the arts, as well as becoming cognizant of the engravings of the excellent portraits which were beginning to be produced in England. The knowledge of these Copley put to use in adapting from them gen¬ eral arrangements for his own youthful work as well as elegant accessories, rich costumes, jewels and the like — luxuries which the colonies could not furnish at that time. He was immediately successful and painted a great number of por¬ traits (about 275 are known) before his de¬ parture for England just before the Revolution. Up to that time his work improved steadily. In England where he also prospered his paint¬ ings lost their peculiar flavor and he worked more and more in the manner of the acccom-plished English artists of that day so there ap¬ pears but slight resemblance between his late pictures and those executed in America.

Benjamin West, a Pennsylvanian, was of the same time as Copley. In the face of great diffi¬ culties he began the study of art (the story says he got pigment from the Indians) and soon made his way to London where he won the no¬ tice and friendship of King George III and

attained a position of eminence. He was instru¬ mental in inducing the king to found the Royal Academy and on Reynolds' death he succeeded to his position as its president. His 'bombastic pictures of religious, historical or allegorical subjects were executed in a formula vaguely founded on that of the then popular Italian eclectic painters of the 16th and 17th centuries. They were highly appreciated by his royai patron and many others of the time but have since fallen into complete disfavor. His lasting work was the encouragement he gave, during his whole career, to the young American paint¬ ers who went to London to study, all of whom were his pupils.

Charles Wilson Peale was one of these. Though born in Maryland, his career shows him to have had the Yankee characteristic of ingenuity in any position he turned to — army officer, politician, mechanic, painter, he was all in turn, besides being the founder of the first

American museum situated in Philadelphia where art works, curiosities and natural history specimens were exhibited. His portraits are like those of the earlier painters, stiff and wooden, but are the best which America could show for 15 or 20 years after Copley's de¬ parture. Another ingenious pupil of West's of about this time was Robert Fulton who after a passable success in his painting early aban¬ doned it .to devote himself entirely to his me¬ chanical inventions.

A new phase of this period of American painting which displays an accomplishment worthy to be considered with the best of English contemporary work was ushered in on the return of Gilbert Stuart, a painter of great talent. He was born in 1755 in Newport, R. I., studied and practised his profession in England from 1775 until 1792 when he came back to his native country. Although a pupil of West no traces of West's influence appeared in his out¬ put. He founded himself rather on the English portrait-school then at its highest development. He was fortunate in his sitters, who included many of the prominent people of the early years of the republic, and he fixed for us the accepted type of likenesses of Washington. Three por¬ traits of Washington it appears were executed from life — the first was destroyed, the second, a full length for Lord Landsdowne and the other the unfinished head now in the Boston Museum. From these he made many replicas, varying much in degrees of excellence. Stuart's interest centred in the heads of his sitters. He was apt to slur over all the other parts and never attempted elaborate compositions.

The best known of the later pupils of West were Allston, Malbone, Morse and Sully. These were the last of the Americans who accepted complete allegiance to the English school and with them ends the first period of painting in America. Washington Allston's importance is greater than his pictures. He was one of the few who felt the influence of the character of West's subjects and he was the first in America to paint pictures of an imaginative and poetic bent. His contemporaries rated him as a genius while we of to-day can only find in his work a sweet sensitiveness or a yearning for great things which he was unable to realize. He was of that not infrequent type of American artist who when withdrawn from the stimulus that

excites, him seems incapable of accomplishing what his career under more favorable conditions promised. S. F. B. Morse, one of the excellent portrait painters that America has produced, had in some of his works a rare feeling for vitality and character. His inventions were, however, too engrossing for his art and from the time he began to

develop them he ceased to paint.

Malbone during his stay in London studied the English miniaturists, Cosway, Plimer and the others, to such advantage that his work in this branch of art remains the best that America has produced. Thomas Sully was born in England but came to America when an infant and learnt here the rudiments of his art. West's tutelage left no marks on his work but he formed himself with happy results on the study of Lawrence, Raeburn and Romnev. His career in America was long and successful. He lived until 1872.

With the growth of wealth and power in the early 19th century came a sense of national self-confidence which with the severance of the de¬ pendence of America upon the mother country brought about the gradual weaking of the force of English precedent. The younger artists re¬ lied more on the training that could be got at home and when they went abroad it was as artists not as students. They traveled in vari¬ ous places without attaching themselves to any one teacher. The changed conditions of life too in which the aristocracy of the older period was giving place to the crude force of the new democracy made itself felt in the pictures. Chester Harding who had been a peddler, inn¬ keeper, sign-painter as well as artist, John Neagle and. Henry Inman, who both worked somewhat in the style of Stuart and Sully, were then the principal portrait painters. William Mount and R. Caton Woodville began painting genre pictures of American subjects which were much prized by the picture buyers. But the principal activity was manifested by the landscapists. It was the period alluded to in the first paragraph of this article when painting in America had a character of its own. The delight in native scenery and the belief in its superior grandeur to anything the Old World could furnish were prevalent among both the public and the paint¬ ers and furnished the common point of view which is the first requirement of a school of art. The high prices paid for these landscapes, the highest which any group of American artists have ever received, as well as the comments of the time, show their wide popularity. The ar¬ tistic centres of other days, Boston and Phila¬ delphia, with their traditions of colonial aris¬ tocracy yielded their places to New York, as that city owing to its commerce became the wealthiest of the country. The National Acade¬ my of Design was founded there in 1826. Most of the popular landscapes were those of views within reach of New York, particularly scenes of the Hudson River Valley, from which the popular name of the whole group, the Hudson River School, is derived. The New York pic¬ ture buyer has thus the added interest of a knowledge of the localities represented; the pleasure of recognition of familiar sites being always a satisfaction for those who are new to the appreciation

of art.

Thomas Doughty was the first of the group

in that he painted many pictures of the Hudson River Valley without too obvious foreign influ¬ ence. Asher B. Durand, somewhat his junior, did not devote himself exclusively to painting until middle age, up to which time he had worked at his profession of engraving. He traveled abroad, studied Constable and Turner and was interested particularly in the facts of landscape. He might be called the realist of the school in distinction to the idealist Thomas Cole who like West attempted allegorical sub¬ jects and ethical teachings in his pictures. Cole was born in England but came to America when 19 and soon took up the life of a wandering artist, doing whatever jobs he found. He later visited England, France and Italy and his pic¬ tures, more professional in appearance than those of his contemporaries, show the effect of his longer contact with Europe. His greatest success was with series of pictures of which the (Voyage of Life,* with figures typifying in¬ fancy, youth, manhood and old age in boats on a river, and (The Course of Empire,* four views of the same landscape showing four stages of the history of a city from settlement to destruction, were famous types.

The younger men ranged themselves under Durand or Cole according to their tempera¬ ments. Many of them started as engravers and their close imitation of detail often displays the engraver's method. John F. Kensett was the chief of those who followed Durand. He por¬ trayed the native scenery as he and his clients saw it with successful financial results and his pictures which were once the furor of collectors still appeal in some instances on account of their probity and sincerity. As late as 1873, the year of his death, his vogue was unabated as is shown by the sale of the pictures and studies left in his studio for over $150,000.

Frederic E. Church who had a greater talent than any of the school was a pupil of Cole, from whom or from Turner's pictures of the¬

atrical effect he imbibed the love of the ((grand subject.® And to make his subjects grand he not only chose the most immense views such as the (Heart of the Andes,* or the most famous remains of art such as the excellent picture of the Parthenon, but combined physical and artistic wonders in one picture, as in the vEgean Sea where the Golden Horn, the Acrop¬ olis, a rock temple, sunset, rainstorn, a double rainbow are crowded together with ingenuity and considerable skill.

There were many artists who gained fame and fortune at this time, but the few names chosen are representative ones and may stand for the accomplishment of the whole number. Their success was confined to America with the exception of Church who won a considerable admiration from abroad. By the end of the third quarter of the century their popularity showed signs of waning. Artists who had had a thorough training in Munich or Paris had re¬ turned and their criticisms were beginning to have effect. The old order was passing and its descendants, men like Wyant, Martin and In-ness, who inherited certain of its principles were enough in touch with foreign art to see and avoid the circumscriptions of their predecessors. With the enlightenment of the public, the assured connection between artist and client came to an end. Even Tuckerman, the enthusiastic chroni¬

cler of mid-century artists, admits that from European standards American artists were remunerated far beyond the market value of their pictures. It was due, he says, to the (<sud-den prosperity of an imperfectly educated class® who ((with little discrimination, and as a matter of fashion devote a portion of their newly ac¬ quired riches to the purchase of paintings.®

Of the landscapists who followed, Alex¬ ander Wyant more than the others was affil¬ iated with the Hudson River School. His foreign training was secured in Germany. He painted native scenes in the spirit of Durand, but in place of a dry insistence on detail he succeeded in enveloping his paintings in an at¬ mosphere and in expressing a poetic mood. Homer Martin was of the same calibre but more intense. His outside influences came from -the French and some of his later paintings have an aspect which approaches that of the Impres¬ sionists. The merit of George Inness is still more prominent. Distinctly a visionary and romantic he combined the rich color of a Dela¬ croix or a Dias with American motives. He had a lofty and what might be called a religious out¬ look on nature and many of his pictures have a grandeur that would be acknowledged in any

company.

The most personal artist that America has produced, Winslow Homer, should be men¬ tioned at this point. He began as an illustra¬ tor, making drawings for a magazine during the Civil War. His work at that time, as later, was distinguished by the grim determination to express the significant quality in each person or thing portrayed. His subjects at first did not differ from those of the figure and genre painters, his contemporaries, whose general training was similar to his, but he had what they lacked, a great talent and an inherent sense of what was properly the distinctive province of painting. When later he came in touch with foreign art (the influence of Courbet counts largely in his development) he was stimulated to great progress, keeping distinct his own point of view the while. In his youth he painted soldiers, negroes, genre pictures, such as were the subjects of his drawings for re¬ production. These gave place to scenes of life in wild places with hunters, or fishermen, or sailors ; to rugged landscapes of the seashore, or forest, or mountain streams — powerful pic¬ tures with a scorn for prettiness or decorative effect. All his works are imbued with the qualities which one likes to think of as Ameri¬ can ; they are straightforward, vigorous, even to uncouthness at times, and self-reliant. He was the Abraham Lincoln among painters.

Albert P. Ryder, also a distinct personality, is the antithesis of Homer in temperament. A poetic dreamer, timid and self-questioning, he produced but little. Certain of his pictures, however, rank with the best achievements of American art. No American has equalled his intensity of realization of imaginative themes. His training has been native and more or less haphazard. Each of his little pictures seems to be a fresh experiment but he attains a deep glow of beautiful expressive color at times and a rare quality of fused surface. His realm is the borderland between fancy and reality. He paints visions of old legends — fairy stories, gaunt trees by moonlit streams, boats on lonely

seas. It seems almost impertinent to attempt to trace the parentage of so personal and sen¬ sitive a talent, but those who take an interest in such matters may find it was fostered by the smaller and simpler imaginative works by Cole or by an admiration for Turner.

Before proceeding to the present stage in our genesis, that of the painters thoroughly trained in foreign countries, mention must be made of George Fuller, who escaped from the tyrannies of fact by bathing his scenes in a dull, hazy atmosphere, where all outlines are blurred and all colors take on a tawny shade; and also of Thomas Eakins, who though he spent some time in Paris under Gerome, never attempted the French methods of his fellow-students in the Beaux-Arts School. He was an uncompromis¬ ing realist. His favorite subjects were por¬ trayals of surgical operations at hospitals, prize¬ fights and the like, and his portraits, dull and heavy in color and surface, have a vigor of characterization and an intellectuality that gives them distinct value as documents of our time.

With certain reservations, what may be called the national period of American painting ends with these men. The beginning of our present cosmopolitanism took place not long after the middle of the century, when William M. Hunt returned from abroad and began prac¬ tising his profession at a time when the Hudson River painters were in the heyday of their success. He had studied under Couture and was deeply influenced by J. F. Millet long pre¬ vious to that artist's general recognition. His eloquent championship of the French art which he represented was instrumental in preparing for the change which was soon to take place. A gentleman of impressive personality, he never lacked his circle of admirers, but his art was alien to the public at large. The disassociation between artists and public which now prevails in America seems to have been inaugurated in his case. It is hard for this generation to ap¬ preciate how his excellent portraits could not have appealed to the people of the 60's or his subject pictures, generally arrangements of models, which were in a style compounded of Couture and Millet. In his decorations for the Albany State House, now covered over, he gave America her first mural paintings in a monu¬ mental style.

John La Farge was a friend and coworker of Hunt. He was born in America of French parents and took up the study of painting under Couture in Paris. He was a man of wide knowledge and attainments, and the profession of art was one of several possibilities which were open to his varied talents. His chief ac¬ tivity was in the field of decoration of wall surfaces and more famously of windows in stained glass in a method of his own, the foun¬ dation of which was a glass

made of two or more colors fused together imperfectly in the same piece instead of flat colors formerly used. La Farge's example has been widely felt, par¬ ticularly in church decoration, but in both his career and in that of Hunt the promise of the talent seems inadequately fulfilled.

While Inness, Homer, Hunt and La Farge were working their way to a somewhat re¬ stricted appreciation, the general taste was still loyal to the great reputation of the time of the Civil War and before. It remained so until the

late 70's. By then a number of young artists, thoroughly equipped in the Munich and Paris schools, had returned home and were sending their works to the exhibitions of the National Academy. Dissatisfaction with the places which their pictures were accorded in these exhibitions led to the formation of the Society of Ameri¬ can Artists in 1877. For more than a score of years the exhibitions of the society represented the European influence in American art, at the end of which time the European ideals having generally prevailed and the aspect of the ex¬ hibitions of the rival associations having be¬ come practically the same, the society was merged into the academy. Since the formation of the society with the exception of the work of a few artists of strong individuality or of those who were formed under the old regime, American painting has echoed either the Munich or the French fashions. The most famous of the Munich men are William M. Chase and Frank Duveneck. In the category of those who have imported the rapid and vigorous develop¬ ments of the French school the names are many. From the impressionist movement which produced John Twachtman, Alden Weir and recently Ernest Lawson, up to the late phase of the disciples of Cezanne, which has given us Maurice Prendergast, John Marin and Max Weber, Americans have expressed their ver¬ sions, often very personal ones, of the aesthetic ideals of Montmartre and Montparnasse. Arthur B. Davies has retained up to recently his independence from the foreign ideals of the time. In his earliest work he showed him¬ self a romantic of the Ryder sort but with a greater vitality than that artist. His pictures of legend and fancy or of noble landscape peopled with creatures of his imagination are distinguished by a very individual composition and an exquisite sense of color and form. He has lately exercised his rare gifts in a method adapted from the principles of the so-called Cubists, whose prophet is Picasso, a developer of the style of Cezanne.

. Of the cosmopolitan painters, two have at¬ tained worldwide fame

— Whistler and Sar¬ gent. Both made Europe their home. James McN. Whistler was a contemporary of La Farge and the junior of Hunt by but 10 years. His artistic training was entirely European, only a few years of his youth having been spent in this country. Super-refinement and sensi¬ bility are the keynotes of his character. Strange to say he was influenced by the most rugged of all 19th century painters, Gustave Courbet, whose work was the stimulus to so much of the later art. Whistler was egotistical and con¬ ceited, but in his painting he displayed a real genius. His work at various times shows widely different inspirations — Courbet, as has been mentioned, certain contemporary English paint¬ ers, Velasquez and the early 19th century Japanese — but always has the same charm of sensitiveness and delicacy. His themes were those of reality, but the vagueness and mystery of twilight pervade his lovely canvases. He painted portraits in which the subjects appear to have the artist's own characteristics of ner¬ vousness and preciousness; landscapes in which a view that may be of factory chimneys and ugly bridges is made to look as exotic as a glimpse of Tokio in a print by Hiroshige;

pictures where a London garden resort at night with strolling or dancing pleasure-seekers in prosaic clothes takes on the aspect of a festivity in a fairy-tale. He ranks with distinction among the group of Frenchmen of whom Degas and Manet are the principal names.

John Sargent has had even less connection with America than Whistler. He was born abroad of American parents, studied in Paris under Carolus Duran and has since lived con¬ tinuously in England. His career has been un¬ varyingly successful both in popular approval of the better sort as well as in the admiration of his fellow-artists. His work, largely por¬ traits, from the first assumed the manner for which he is still famous, a striking likeness accomplished with a swift and fluid brush¬ handling. He does not seem to interest him¬ self in profound characterizations as much as in peculiarities of appearance so that in certain instances his work approaches to the border of caricature. In the last few years he has con¬ fined himself to a series

of paintings of re¬ ligious subjects for the decoration of the Bos¬ ton Public Library and to small pictures of landscapes with figures, all of which are marked by the same remarkable vision and the same nimbleness of hand that his portraits ex¬ emplified. Contemporary portrait painting in this country has been largely influenced by his work.

Only the fewest necessary names out of the many that might have been mentioned have been commented upon in this cursory account. Our art history might be epitomized in one paragraph as follows: From the end of the 17th century when the practice of art began in the colonies up to the second quarter of the 19th century it was purely English and this English period was prolonged in isolated cases for the lifetime of its representatives. The native school had its rise in the early part of the 19th century, attained about 1825 pre-emi¬ nence which lasted until the late 70's, and which was wrested from them by the foreign-trained artists. Among the latter were working certain painters who 'infused qualities of the native school with the foreign outlook, but broadly speaking the later painters are frankly cosmo¬ politan and have taken their places, often highly honored ones, in the company of their fellow-artists of Europe.

For the sake of brevity, qualifications which should have been made to some of the state¬ ments of this article have been omitted. Isham's (History of American Painting) (which contains a bibliography) is recommended to those who wish fuller information as to the facts. Consult Bryant, L. M., (American Pictures and their Painters) (1916).

Bryson Burroughs,

Curator of Paintings, Metropolitan Museum of

Art, New York.

PAINTINGS OF THE GREAT MAS¬ TERS. The 12 most famous paintings are : Leonardo da Vinci's {Last Supper, > (Mona Lisa) ; Raphael's (Sistine Madonna* ; (Madonna of the ChaiH ; (La Belle Jardiniere* and transfiguration*; Michelangelo's (Last Judg¬ ment ; Rembrandt's (Night Watch) ; Correg¬ gio's (Nativity) (Notte) and (Magdalen Read¬ ing* ; Rubens' (Descent from the Cross-* ; and Guido Reni's (Aurora.) An entire encyclopedia

would be required to catalogue, classify and de¬ scribe all the celebrated paintings of all the great ancient and modern masters and

to show the progress of art and the characteristics of the “schools,® or various groups of painters. Here is given an account of the most celebrated paint¬ ings and kinds of paintings, from ancient times to the present; in other words, from the Greek Zeuxis to the Spanish Zuloaga, — a period from 450 b.c to the year 1919. The article is ar¬ ranged thus: I. Ancient; II. Early Christian Art; III. Religious; IV. Portraits; V. Military, Guilds and Historical Events ; VI. Landscapes ; VII. Marines; VIII. Animals and Birds; IX. Flowers, Fruits and Still Life; X. Architecture; XI. Genre; XII. Mythological and Fanciful; XIII. Bibliography.

I. Ancient. — Painting was highly developed 4,000 years ago, as wall-decorations in Egyp¬ tian tombs show. No Grecian paintings have come down to us, but there are records of artists and their works. The (Taking of Troy> and (Visit of Odysseus to Hades,* painted by Polygnotos of Thasos in the public hall of Del¬ phi, were admired by Pausanias, who saw them 600 years after their execution. (Helen,) painted by Zeuxis of Heracleia (born about 450 b.c.) for a temple of Hera in Croton, was one of the great works of antiquity. Zeuxis painted a (Bunch of Grapes* so perfectly that some birds flew toward it and pecked at the shining globes. Parrhasios of Ephesus invited Zeuxis to come and see his new picture. On arriving in the studio Zeuxis asked him to draw aside the curtain and show it to him. The cur¬ tain was the picture! Apelles of Cos, who worked between 350 and 310 b.c., was considered even greater than those painters. His (Venus Anadyomene,* «the goddess rising from the sea, executed for the temple in Cos, was carried to Rome by Augustus, who remitted tribute to the island because of it. Apelles also painted a por¬ trait of Alexander the Great, *as Jupiter, for which he received 20 talents (about $25,000). Roman painting followed Grecian styles. In Julius Caesar’s time Timomachus of Byzantium enjoyed a great reputation. His (Ajax and Medea,* celebrated in epigrams, was bought by Caesar for 80 talents ($100,000) and placed in the temple of Venus Genetrix.

II. Early Christian Art. — The ideal of the Christian, differing from the Greek, developed a new art; but the earliest examples of Chris¬ tian painting (Catacombs of Rome and Naples) show classical treatment : Christ as Orpheus taming wild beasts by the sound of his lyre; Christ as a shepherd; Elijah going to heaven in a chariot like Apollo’s, *etc.* Paintings were figurative and expressed doctrines. In the first years of the Christian Church the Virgin was represented alone and as an Orante — her arms extended in the act of prayer as then practised. After the Council of Nice (324 a.d.) churches were dedicated to the Virgin, and she was represented as Queen of Heaven. After the Council of Ephesus (431 a.d.), when the doctrine of the Incarnation

was established, the Virgin and Child were painted together. The art of the painter followed the teachings of the pulpit. (See Christian Doctrine, Development of). The “Assumption® — the Virgin coming to life and rising bodily into the air — began to be painted in the 11th century. The “Coronation

t°! .th(v} lr?r-n>-became P°Pular in the 13th cen-Vy’ T1Crˆ Irglf! as the “Immaculate® one dates after die Conned of. Trent (1545), which settled Alary s genealogy. As the Immaculata Mary stands apart from mankind, even from her son.

he hist pictures show her standing on the moon and crowned with stars — a poetic idea Murillo (1618-82), who painted the most icautiful examples of the ((Immaculate Con¬ ceptionˆ (particularly the one in the Louvre) placed the crescent moon in the clouds below’ the feet of the Virgin. The «Madonna in

ub0ryu:r,S-ttll?g or standing in the clouds with the child in her lap, or in her arms — was a painter s vision . rather than an ecclesiastical Deab , ˆde its appearance in the time of

<tut jae ‘ tbe finest examples is his

Madonna di Foligno,) named from the town

hohgno m the background. It shares a room m the Vaticmi with Raphael’s (Transfiguration > and the Last Communion of Saint Jerome > bv Domemchino (1581-1641) x the <Sistine Ma¬ donna) (Dresden), also represents the Madonna in glory.

III. Religious. — Giovanni Cimabue, born in Florence in 1240, is the connecting link be¬ tween the ancient and modern idea. Cimabue ends the long Byzantine line of painters tLat had flourished in Italy from the time of Constantine to the 13th century. His most cele¬ brated Madonna was painted for the church of Santa Maria Novella, Florence, to which it was escorted from the artist’s studio in a

triumphal procession. It has never been removed. In the angular Byzantine type of the ((Madonna of San¬ ta Maria Novella, :)) there is an attempt at human expression and the Child holds out his hand in a way that was novel in the 13th century. The adoring Angels are conventionally By¬ zantine. Giotto (1266-1337), the shepherd boy discovered and trained by Cimabue, was the first to seek inspiration from nature. His frescoes in Florence, the life of (Saint John the Bap¬ tist) (Peruzzi Chapel) and the life of <Saint Francis) (Bardi Chapel), became models for future generations. While Cimabue and Giotto were fusing new life into Byzantine traditions, the Sienese painters were doing the same. Duccio di Buonensegna (1260-1340) produced a < Ma¬ donna and Child) surrounded by 20 angels, six saints and four patrons of Siena. The work was carried in a procession to the Cathedral of Siena. Duccio shows more grace and charm in his figures and faces than the Florentine masters. Simone Martini, often called Simone Memmi (1284-1344), holds the same place in the Sienese School that Giotto does in the Florentine. Painting now developed rapidly in Italy and in the Low Countries, where Jan (1391-1440) and Hubert van Eyck (1 366— 1426) perfected the art of painting in oil. Most of the early or ((pre-Raphaelite® paint¬ ings were religious, although the madonnas and saints appearing in them are models from the artists' friends or families, and the land¬ scape backgrounds familiar and loved scenes. The ((Madonna and Child)) was the most popu¬ lar of all subjects. Sometimes they are repre¬ sented alone, sometimes with the little Saint John, or with Saint Anne, or Saint Joseph or with a group of saints. The madonnas of Raphael are the best loved. The (Sistine Madonna) (Dresden) is, perhaps, the most

famous of all paintings. It was painted on canvas for the Cistercians of San Sisto of lacenza in 1515—16 and sold by a later generation of monks to Augustus 'ill of Saxony. Altar hangings are seemingly drawn back to reveal the vision of the Virgin floating in heaven holding a child of mysterious beauty and surrounded by angel heads and clouds.

, °Pe Sixtus looks upward and Saint Barbara looks downward at the two angel children, who gaze in rapture at the beauteous Virgin. Next in popularity comes the (Madonna della Sedia)

' parted in 1515. This <(Madonna of the Ghair is full of tender maternal feeling and £ "Tensely human. Almost as beloved is the Madonna with the Infant Christ and Saint John (Louvre), known as (La belle Jardiniere.) Little Samt John holds a cross before the Child who looks at his mother questioningly. The landscape is exquisite and

the pose of the Vir¬ gin graceful and distinguished. The .same gf? apaPP.ears in the < Madonna del Cardellino) (Uflizi) in which Saint John offers Jesus a goldfinch, whence the name. Raphael's (Holy Family) known as <The Pearl,) passed into England to Charles I with the Gonzaga col¬ lection When Philip IV purchased it, he ex-c aimed : ˆ (<This is my pearl!)) The name has clung to it. Another famous work is the (Vir-gm of the Rocks) (Louvre and replica in Rational Gallery, London) by Leonardo da Vinci (1452-1519). Of particular grace and fanciful loveliness are the madonnas by Botti¬ celli (1447-1510) : (Madonna of the Magnifi¬ er „ (Louvre), < Madonna of the Melegrana) (Uffizi) and 'Rosebush Madonna) (Uffizi). Ihe Madonna of the Cherries) (Vienna) by Iitian; the (Madonna of the Cut Pear) (VmnmO by Differ (1471-1528) ; and the <Meier Madonna (Darmstadt and copy in Dresden) by Holbein (1497-1543) are celebrated.

The (Annunciation) was the next favorite subject to the Madonna and Child. The angel Gabriel always stands on the left side of the spectator. Early pictures show him empty-handed In the great pictures of the Renais¬ sance he bears the ((Annunciation Lily.)) The greatest of all ˆAssumptions® is the one by Titian (1477-1576) in Venice. The (Adoration of the MagP (illustrating the doctrine of the Epiphany), afforded a fine opportunity for wealthy men of distinction to pose as the Three Kings offering gifts to the Holy Child. Among the greatest are by Ghirlandajo (Hospital of the Innocenti, Florence) ; Botticelli (Uffizi and Hermitage); Veronese (Dresden), Lochner (15th century) in Cologne Cathedral; and Rubens (Antwerp and Prado, Madrid). Cor¬ reggio's <Notte) (Night) or <Nativity> (Dres¬ den), is an (Adoration of the Shepherds.) It is particularly famed for its effect of light which radiates from the Holy Child. One of the most celebrated of all pictures is the (Last Supper,) Leonardo da Vinci (1452-1519), painted on the wall of the Refectory of Santa Maria delle Grazie, Milan. It has almost faded from view. «The Descent from the Cross,® Rubens (1577-1640), another masterpiece, was removed from Antwerp. Cathedral for safety during the German invasion in 1914. Raphael's ' Transfiguration) (Vatican) left unfinished by Raphael, was hung over his bier. The most famous head of Christ is, the <Ecce Homo)

(Dresden), Guido Reni (1575-1642). The most noted modern pictures representing Christ are the ‘Light of the World) (Keble College, Ox¬ ford), Holman Hunt (1827-1910), and ‘Christ before Pilate) (John Wanamaker, Philadel¬ phia), Munkacsy (1844—1900). Other religious paintings in the front rank among masterpieces are (The Last Judgment 5 (Sistine Chapel) by Michelangelo (1475-1564) ; the ‘Last Judg¬ ment (Campo Santo, Pisa) attributed to Or¬ cagna (about 1308-68) and also to the Loren-zetti brothers of Siena; the great altarpiece, the ‘Adoration of the Lamb,5 by Jan and Hubert van Eyck (Saint Baron, Ghent, panels in Ber¬ lin), ‘Paradise) (Doge’s Palace, Venice) with its 1,000 figures by Tintoretto (1518-94) ; ‘Mar¬ riage at Cana,5 by Tintoretto; the ‘Mystic Marriage of Saint Catherine) (Louvre) Cor¬ reggio (1494-1534); ‘Marriage of Cana) (Louvre) by Veronese (1528-88); and ‘Holy Grail5 series (Boston Public Library) by Edwin Abbey (1852-1911).

IV. Portraits. — All great painters were great in portraits. They earned the chief part ot their income by this means. Portrait-painting became an independent art in the 15th century. The Flemish and Italians executed marvels. The ‘Man with the Pink) (Berlin) by Jan van Eyck (1381-1440) ; the ‘Banker and His Wife> (Louvre) by Quentin Massys (1466-1530) ; and the ‘Old Man and Boy) (Louvre), the former with a terrible nose, by Ghirlandajo (1440-94), are remarkable examples of direct painting. Gentile Bellini (1426-1507) and Giovanni Bel¬ lini (1428-1516) are among the earliest Italian portrait-painters. Gentile’s ‘Portrait of Sultan Mahomet IP (Lady Layard) is famous, and Giovanni’s, ‘Doge Loredano5 (National Gal¬ lery, London) is a great work of art. Donors of altarpieces frequently had themselves repre¬ sented on the panels and outside shutters and sometimes in the important central panel kneel¬ ing in adoration of the Virgin and Child. Wealthy merchants and artistic princes de¬ lighted in having themselves reproduced in magnificent attire in Adoration of the Magi. Female saints, as well as the Madonna, afforded the painters opportunity for perpetuating the faces and figures of loved ones. These won¬ derful women that look upon us from canvases, centuries old yet ever young and lovely, are real women dear to the painter, — his wife, or his love. For example, Raphael’s ‘Sistine Madonna5 and ‘Saint Cecilia5 (Bologna) are idealized studies of “La Fornarina55 (Barberina Palace), his one love; and Andrea del Sarto’s handsome though shrewish wife, Lavinia Fede, posed for the ‘Madonna of the Harpies5 (Pitti) and ‘John the Baptist5 (Pitti). The most famous of all portraits

is Leonardo da Vinci's 'Mona Lisa5 (Louvre), with the en¬ chanting smile, the wife of Francisco del Giocondo, whence its name 'La Gioconda.5 Among Titian's magnificent portraits are : 'Lavinia,5 his daughter (Pitti) ; 'Man with Glove5 (Louvre) ; and 'Portrait of Himself5 (Berlin). Raphael's great portraits are 'La Fornarina5 (Barberini Palace, Rome) ; 'Pope Leo X, with Cardinals Guilio de' Medici and Luigi de' Rossi5 (Pitti) ; 'Pope Julius II5 (Uffizi and replica Pitti) ; and 'Balthazar Cas-tiglione5 (Louvre). The 'Portrait of a Tailor5 (National Gallery, London), by Moroni (151 0—

78), is a masterpiece. 'Beatrice Cenci5 (Bar¬ berini Palace, Rome), by Guido Reni (1575— 1642), occupies a place by itself. The ' Concert } (Pitti) by Giorgione (1475-1511), is a group of portraits, superbly rendered. Hans Holbein the younger (1497-1543), painted masterpieces: 'Erasmus5 (Louvre) and 'Georg Gisze5 (Ber¬ lin) head his list.

Velasquez (1599-1660) produced magnifi¬ cent works: 'Pope Innocent X5 (Doria Palace, Rome); four pictures of the young 'Baltazar Carlos5 (Prado, Madrid) and 'Las Meninas5 (Prado) or 'Maids of Honor,5 in which he painted himself painting the group, are usually considered the greatest. The list of Rem¬ brandt (1606-69) is long. In addition to many of 'Saskia,5 his wife, and himself, those of 'Elizabeth Bas5 (Rycks) and 'Old Woman5 (Petrograd) are notable. Frans Hals (1584-1666), is ranked with Rembrandt. His 'Laugh¬ ing Cavalier5 (Wallace, London) ; 'Nurse and Baby5 (Berlin) and 'Jester5 (Rycks) have never been surpassed in dash, vigor and breadth. Of Rubens (1577-1640) 'Helen Four-ment5 (Hague) is the loveliest of the many of his second wife. The 'Chapeau de Poil5 (National Gallery, London), is another famed example. Of Anthony Van Dyck (1599-1641), 'Charles I5 (Louvre); 'Children of Charles I5 (Turin) ; and 'James Stuart, Duke of Rich¬ mond5 (Metropolitan Museum, New York), are masterpieces. 'Cardinal Richelieu5 (Louvre), bv P. de Champaigne (1602-74), is noted. Hogarth (1697-1764) is one of the masters of portraiture: 'Lavinia Fenton as Polly Peachum5 and the 'Shrimp Girl5 (National Gallery, London) stand high. The beauties of the court of Charles II, particularly 'Barbara, Duchess of Cleveland,5 as 'Minerva,5 by Sir Peter Lely (1618-80), deserve their reputation. The French Nattier (1685-1766) painted with lovely color and fancy: 'The Duchesse de Chartres5 (Stockholm) in mythological cos¬ tume is exquisite. In the front rank are placed Thomas Gainsborough (1727-88) and Sir Joshua Reynolds (1723-92). Gainsborough's 'Mrs. Siddons5 (National Gallery, London) ; 'The Blue Boy5 (Duke of

Westminster) ; and the ‘Duchess of Devonshire5 (the stolen pic¬ ture recovered and bought by the late J. P. Morgan) and the ‘Hon. Mrs. Graham5 (National Gallery, Edinburgh) are noted for their distinction and style. Sir Joshua Rey¬ nolds list of superb works is too long to enu¬ merate. ‘Mrs. Siddons as the Tragic Muse5 (Duke of Westminster and sold in 1919, replica Dulwich) ; ‘Nellie O’Brien5 (Wallace, Lon¬ don) ; ‘The Strawberry Girl5 (Wallace) ; and ‘Age of Innocence5 and ‘Angel Heads5 (both in the National Gallery, London) are the favor¬ ites. George Romney (1734-1802) is celebrated particularly for his lovely portraits of ‘Lady Hamilton.5

Ameifcan painters succeeded early in por¬ traiture. Gilbert Stuart (1775-1826) is noted for his ‘Washington5 (Museum of Fine Arts, Boston). ‘General Dearborn5 (Art Institute, Chicago) is another fine example. Among other notable works are ‘Alexander Hamilton5 (Metropolitan Museum, New York), by John Trumbull (1756-1843) ; ‘Fanny Kemble5 (Pennsylvania Academy of Fine Arts, Phila¬ delphia), by Thomas Sully (1783-1872) ; ‘Mr.

.

.

1 I

-

J 1

>•

‘

and Mrs. Izard' (Museum of Fine Arts Bos-ton), by John Singleton Copley (1737— 1815) - 'Portrait of the Artist's Mother' (Louvre)' Whistler (1856-1916); (Beatrice Goelet' (pri¬ vately owned) and 'Carmencita' (Metropolitan Museum, New York), by John S. Sargent (1850) ; and 'Lady with the White Shawl' (Pennsylvania Academy of Fine Arts Phila¬ delphia), by William M Chase (1849-1916)

Among other famous modern portraits are

Lady with the Glove,' his wife, painted in i809, (Luxembourg), by Carolus-Duran (1837) and 'Daniel Zuloaga and his Daughters' (Luxembourg) by Zuloaga (1870).

V. Military, Guilds and Historical Events. — In the Low Countries civic guilds and mili¬ tary companies were fond of having their por¬ traits painted in groups. Chief among these paintings is Rembrandt's (Night Watch' (Rycks), one of the most celebrated of all pamtmgs. His 'Syndics' (Hague), a group of cloth-merchants, and (Lesson in Anatomy' (Hague), a group of doctors, come next. The 'Banquet of Arquebusiers' (Rycks) by Bar¬ tolomeus Van der Heist (1630-70) is a wonder of realistic painting and splendid color. 'Saint George's Guild Banquet' and 'Saint Andriaen's Doelen' and other groups (Haarlem), by Frans Hals (1584-1666) are magnificent. Famous military works are : 'Friedland — 1814' (Metro¬ politan Museum, New York) by J. A. Meissonier (1813-91) and 'Champigny' (Metropoli¬ tan, New York), by Detaille (1848). Pic¬ tures commemorating historical events are numerous. Rubens painted many such, includ¬ ing the famous series of 'Henri IV and Marie de Medici' (Louvre). Notable works are: Velasquez's 'Surrender of Breda' (Prado Madrid) ; the 'Peace of Munster' (National Gallery, London), by Ter Borch (1608-81) ; the 'Coronation of Napoleon' (Louvre), by David (1748-1825) ; and the 'Signing of the Declara¬ tion of Independence,' 'Surrender of Burgoyne,' 'Surrender of Cornwallis at Yorktown' and 'Resignation of Washington' (Capitol, Washington), by John Trumbull (1756-1843) ; 'Washington Crossing the Delaware' (Metro¬ politan Museum, New York), by Leutze (1816— 68), is entirely imaginary and owes its popu¬ larity to the subject.

VI. Landscapes. — Beautiful landscapes ap¬ pear in early Italian and

Flemish pictures, but are subordinate to the figures. The first great painter of light and air was the French Claude Lorrain (1600-82), who painted in and near Rome. Although his pictures have classical and scriptural titles, the interest centres in the landscape. The ’Embarkation of the Queen of Sheba’ (National Gallery, London), is a fine specimen. The Dutch were early noted for their landscapes. The most famous Dutch landscape painter was Jacob van Ruysdael (1625-82). His ’Bird’s Eye View of Haar¬ lem’ (Hague) and ’Waterfall’ (Dresden) are among his best works. The ’Avenue of Mid-delharnais’ (National Gallerv, London), by Meindert Hobbema (1638-1709), is an extraor¬ dinary work. The great English line starts with Thomas Gainsborough (1727-88), whose ’Market Cart’ (National Gallery, London) shows him at his best, and John Constable (1776-1837), whose ’Hay Wain’ and ’Valley Farm’ (National Gallery. London) are repre¬ sentative. ’Crossing the Brook’ (National Gal-VOL. 21 — 9

\ejy> London) by J. M. W. Turner (1775-1851) is considered one of the greatest land¬ scapes ever painted. Constable greatly in¬ fluenced the ’’Barbizon School’’ of F’rench painters, who worked in the Forest of Fontain-bleau. Famous pictures of this group are ’Dance of the Nymphs’ (Louvre) and ’ Ville d’Avray’ (Metropolitan Museum, New York) bv Corot (1796-1875) and ’The Gleaners’ (Louvre) and ’Angelus’ (privately owned, Paris) by Millet (1814—75). American land¬ scapes of fame are: ’Niagara Falls’ (Corcoran, Washington), Frederick Church (1826-1900); ’Sunset in the Woods’ (Corcoran, Washing- *V3/1 ˆ anc* f Delaware Valley’ (Metropolitan Museum, New York) George Inness (1825-74) ; and ’Harp of the Winds’ (Metropolitan Museum,) New York), by Homer D. Martin

VII. Marines. — The most famous marines

Wave> (Louvre) by Courbet (1819-1878) ; the ’Raft of the Medusa’ (Louvre) by Gericault (1791-1824); ’Fighting Temeraire’ (National Gallery, London) by Turner, and the ’Slave Ship’ (Museum of Fine Arts, Boston) also by Turner (1775-1851) ; ’Fog Warning’ (Museum of Fine Arts, Boston) by Winslow Homer, (1836-1910) ; ’The Breaking Wave’ by Thomas Moran (Carnegie, Pittsburgh) ; ’The Wave’ (Pennsylvania Academy of Fine Arts, Philadelphia) by Alexander Harrison (1853); ’Roaring Forties’ (Metropolitan Mu¬ seum, New York) by Frederick J. Waugh (1861); and ’Beaching the Boat’ (Hispanic Society, New York) by Sorolla (1862).

VIII. Animals and Birds.— Animal paint¬ ing is ancient. Splendidly

drawn animals often appear in Egyptian wall-paintings. The horses of Micon of Athens were famous. Leonardo da Vinci was one of the first Italians to paint horses well. Horses and other animals appear in the pictures of the Adorations of the Magi and Adoration of the Shepherds and the ass occurs in the Flight into Egypt and Christ's Entry into Jerusalem. Early in the 17th cen¬ tury animals began to take a conspicuous place in pictures. Rubens' horses in his Adorations of the _ Magi are splendidly painted. Rubens also painted camels. Very spirited are his pic¬ tures of the chase. Frans Snyders (1579-1657), who studied with Rubens, depicted with skill and vigor wild beasts, domestic animals, dead game and barnyard fowls. He also painted the animals in some of Rubens' works. Sny¬ ders took pleasure in representing a fight of animals or birds. In the 17th centurv the Dutch began to appreciate the beauty of animals graz¬ ing in green meadows; and their combination of landscape and animals has never been sur¬ passed. Paul Potter (1625-54) is as great a landscape as an animal painter. His 'Young Bull' (Hague) is the most famous of all ani¬ mal pictures. His 'Cow Reflected in the Pool' (Hague) is, however, a better work of art. The horses and cattle of Albert Cuyp (1605— 91) are superbly executed; and his landscapes are so full of golden glow and misty air that he is called "the Dutch Claude." The 'Prom¬ enade' (Louvre) is his most famous work. Mauve (1838-88) specialized on sheep and his many works are of uniform excellence. Nearly every gallery of any size has a cow or cattle by Constant Troyon (1810-65), one of the Barbizon group. His 'Cattle going to

Work) (Louvre) is one of the most popular of all animal pictures. The (Sheepfold ' (Metro¬ politan Museum, New York), by Charles Jacque (1813-94) is startingly true to life. The chickens scratching in the straw are as realistic as the sheep. The (Horse Fair) (Metropolitan Museum, New York) by Rosa Bonheur (1822— 99), so full of dash and vigor is known far and wide. Her (Oxen Ploughing) (Luxem¬ bourg) is of equal merit. The European gal¬ leries contain fine examples of the great French animal painters, Jean Baptiste Oudry (1686-1745) and Frangois Desportes (1661-1743). George Morland

(1763-1804) was famed for his pigs. The subject is not pleasing, but Morland's composition, coloring and technique make his paintings attractive. He is a master of so-called (<rustic genre.® His works command high prices. The most beloved of all English animal painters is Sir Edwin Landseer (1802-73). (The Hunted Stag,' (Alexander and Diogenes,' (Dignity and Impudence,' (King Charles Spaniels) and (Shoeing the Bay Mare' are among other favorites in the National Gal¬ lery, London.

Birds have their specialists. They often ap¬ pear as accessories in early Italian and Flemish masters, particularly the parrot. The great painter of the feathered tribe was Melchior de Hondecoeter (1636-95). He depicted living birds of rare plumage, fowls and dead game. Very famous is his (Floating Feather' (Rycks) representing a group of chickens, geese and ducks in an attractive landscape. A tiny yellow feather dropped by a young duck floats on the pool. This is so lightly painted that it seems as if a breath would blow it away.

IX. Flowers, Fruits and Still Life. — The Dutch are noted for their flowers, fruits and still life. Jan van Huysam (1682-1749) pro¬ duced works of great decorative beauty. His flowers are lovely, true to life and are beauti¬ fully arranged. Often he makes a tour de force by painting a dew drop trickling down a velvet or satin petal. His fruit pieces are equally fine. David De Heem (1570-1632) painted fruit, flowers, plates of oysters, cheese and bread, crystal glasses half full of wine, musical in¬ struments and still life. Rachel Ruysch (1664—1750) was famous for her <(flowers." She often paints them growing around a log or lichen-covered stump in the woods, with butterflies hovering around them. For still life, particu¬ larly pots and pans, Willem Kalf (1630-93) has never been surpassed, although his pictures are nearly equalled by our American William M. Chase.

X. Architecture. — Artists of the 17th cen¬ tury had a great fancy for painting the ruins of ancient architecture in Rome and its vicinity. The fashion seems to have been set by Claude Lorrain, the French painter, and popularized by Piranesi, the etcher. In the paintings of Gentile Bellini (1427-1507) architecture becomes more than a background for Venetian and Constanti¬ nople scenes. Antonio Canal (1697-1768) called Canaletto, made a special study of Vene¬ tian architecture. He visited England and painted (Eton College) (1746), a masterpiece. His* pupil, Francesco Guardi (1712-93), almost equals him. His paintings show more color, but are less truthful in details.

The Dutch became famed for their archi¬

tectural paintings. The two Hendricks Van Steenwyck, Pieter Neefs (1578-1656) Berck-heyde (1630-93) and Emmanuel de Witte (1607-92), represented the interiors of churches with vanishing perspectives and much attention to minute detail and effects of light and deep shadows. The pictures of Jan van der Heyden (1637-1712) give faithful views of Dutch towns, market-places, little houses with ((crow-stepped® roofs — all finished in miniature style. More artistic are the works of Pieter de Hooch (1632-81), valuable for interiors and exteriors of comfortable Dutch homes with courtyards arches, red brick tiles and open doors, through which light and air circulate freely. The mosques of Gerome (1824—1904) are notable triumphs of architectural painting. One of the most striking feats of modern painting has been accomplished by Claude Monet (1840-), who painted a superb series of the fagade of Rouen Cathedral under varied atmospheric effects and at different times of day and night.

XI. Genre. — Genre is the name given to a class of painting that represents scenes of or¬ dinary life. Genre pictures are of small size and much studied and finished. The style was carried to perfection by the ((Little Masters® of the Low Countries: Ter Borch (1608-81); Metsu Q63CD67) ; Ver Meer of Delft (1632-75) ; Pieter de Hooch (1636-81) ; Jan Steen (1626-79); Teniers (1610-94); Ostade (1610-85) ; Frans Mieris (1635—81) ; Gerard Dou (1610-75); and other Dutch and Flemish painters. People sitting in a courtyard or in a well-furnished room enjoying a meal, or sing¬ ing to lutes; a lady taking a music lesson; a doctor calling on a patient; a lady dressing be¬ fore her toilet table; an officer bidding fare¬ well to his love; a messenger delivering a let¬ ter ; a card-party ; an oyster supper ; a cavalier drinking with friends; an old woman peeling apples; a butcher's shop; a kitchen; a village fair, or kermesse; a company of merry-makers at an inn ; a family giving and receiving presents on Saint Nicholas day; a boy blowing soap bubbles ; a girl opening a window ; and skating scenes were all materials for the painters of genre.

In these pictures all the details of furniture, glass, china, household articles, fruit, flowers, food and musical instruments are rendered with minute care. The costumes of the 17th century — velvets, satins, lace-collars, fur-trimmed sacques, jewels and plumed hats are marvelously reproduced. Ter Borch's (Satin Gown,' also called (Parental Advice' (Rycks), is one of the most remarkable exhibitions of texture ever seen on canvas. Another Cady in White Satin' (Dresden), by Ter Borch, is almost its equal. Ter Borch's (Music Lesson ' (Louvre) and ˆOfficer with a Letter' (Dresden) are famous also. Other celebrated genre

pictures are: Jan Steen's (Merry Home Coming) .(Rycks); Ceast of Saint Nicholas Day' (Rycks) ; Car¬ rot's Cage' (Rycks) ; (Quack Doctor' (Rycks) ; ˆDancing LessoiP (Rycks) ; Dou's (Dropsical Woman) (Louvre) and (Woman with a Pitcher' (Metropolitan Museum, New York), bv VerMeer of Delft. The Card-Players' (Dresden), by Caravaggio (1569-1669) would be classed as genre if it were not so large. Other works depicting scenes of everyday life but which cannot be called genre because of

S5ze are : (Marriage a la Mode5 'National Gallery, London), by Hogarth; 'Benedicite5 or t1"ˆn,Benedlction) (Louvre), by Chardin (1699— 1779) ; 'L'accordee de Village) (Louvre) by Greuze (1725-1805); the (Huguenot Lovers) (privately owned), Sir John Millais (1829-96) ;

Spanish Marriage5 (Metropolitan Museum' New York), Fortuny (1838 —74) ; and 'Duel after the Masquerade) (Chantilly and replica Walters Gallery, Baltimore) Gerome (1824—

1904).

XII. Mythological and Fanciful. — Some of the most beautiful pictures represent mythologi¬ cal, allegorical or fanciful subjects. In this class are Botticelli's 'Venus5 (Uffizi) and 'Spring5 or 'Primavera5 (Academy, Florence) • Raphaels 'Iriumph of Galatea' (Farnesina, Rome) ; Guido Reni's (Aurora 5 (Rospigliosi Palace, Rome) ; 'Parnassus5 (Louvre) An¬ drea Mantegna (1431-1506); 'Sleeping Venus5 (Dresden), Giorgione (1478-1510), Titian's (Bacchus and Ariadne5 (National Gallery, London) ; Veronese's (Rape of Europa) (Doges Palace, Venice); Veronese's (Vision of Saint Helena-' (National Gallery, London) ;

(Embarkation for Cytheria) (Louvre), Wat¬ teau (1684— 1721); the (Cruche cassee5 (Louvre), Greuze (1725-1805) ; (Jeanne

d Arc (Metropolitan Museum, New York), Bas-tien Le Page (1850-84); Correggio's 'Reading Magdalen5 (Dresden) ; 'Saint Genevieve Marked with the Divine Seal5 (Pantheon, Paris) Puvis de Chavannes (1824-98) ; and the 'Mirror of Venus5 (privately owned), Sir Ed¬ ward Burne-Jones (1833-98).

XIII. Bibliography.— Alexandre, (Histoire de la peinture militaire en France) (Paris 1889) ; Anderson, M. S., (The Study of Modern Painting with illustrations of the works of European and American artists) (New York 1914) ; Bell, R. H., (The Philosophy of Paint¬ ing' (New York 1916) ; Berenson, B., (The Central Italian Painters of the Renaissance) (New York 1897) ; ib., Florentine Painters of the Renaissance (3d ed., New York 1909) ; ib., Forth Italian Painters of the Renaissance) (New York 1907) ; ib., 'Venetian Painters of the Renaissance5 ; Bryant, L. M., (Pictures and their Painters5 _ (New York 1907) ; Brinton, C., (Modern Artists) (New York 1908) ; Cortis-soz, R., (Art and Common Sense) (New York 1913) ;.Cox, K., 'Old Masters and New5 (New York 1905) ; ib., Concerning Painting) (New York 1917) ; Crowe and Cavalcavelle, (History of Painting in Italy5 (London 1864) ; ib., (The Early Flemish Painters) (London 1857) ; Davies, R., Fix Centuries of Painting5 (London 1914) ; Dilke, Lady, French Painters of the 18th Cen¬ tury5 (London 1898) ; ib., French Painters of the 19th Century5 (London 1899) ; Hamerton, P. G., 'Imagination in Landscape Painting5 (London 1896) ; Harrison, B., Fandscape Painting5 (New York 1909) ; Head, Mrs. H., (How to Enjoy Pictures5 (New York 1914) ; Holber, A., 'The Barbizon Painters5 (New York 1915) ; Huneker, J. G., Fromenades of an Impressionist5 (New York 1910) ; Innes, M., 'Schools of Painting5 (New York 1911) ; Kugler, Htalian Schools of Painting5 (Lon¬ don 1891 ; new ed., 1907) ; ib., 'German, Flemish and Dutch Schools of Painting5 (Lon¬ don 1898) ; Lafarge, J.. (One Hundred Master¬ pieces of Painting5 (New York 1912) ; Laurie,

A. P., (The Materials of the Painters' Craft in Europe and Egypt from the Earliest Times5 (London 1910) ; McFall, H., 'A History of Painting5 (8 vols., London 1911) ; McSpadden, J. W., Famous Painters of America5 (New \ork 1907); Meynell, W., (Some Modern Artists and their Work5 (London 1883) ; Michel, E., (Great Masters of Landscape Paint¬ ing5 _ (Philadelphia 1910) ; Monkhouse, C., Fritish Contemporary Artists5 (New York 1899) ; Moore, G., (Modern Painting5 (London 1893) ; Phythian, J. E., Fifty Years of Modern Painting — Corot to Sargent5 (New York 1908) ; Reinach, S., 'Repertoire de peintures de moyen age et de la Renaissance5 (2 vols.,

Paris 1905) ; Ruskin, J., ‘Mornings in Florence5 (London 1875-77) ; ib., ‘Modern Painters5 (5 vols., London 1843-60) ; Salter, Emma G., ‘Na¬ ture in Italian Art: a study of landscape back¬ ground from Giotto to Tintoretto5 (London 1912) ; Singleton, E., ‘Great Pictures5 (New York 1900) ; ib., ‘Famous Paintings5 (New

\ork 1901) ; ib., ‘Modern Paintings5 (New

York 1911) ; ib., ‘What to See in European Gal¬ leries5 (New York 1915) ; Van Dyke, J. C., ‘Text Book of the History of Painting5 (New York 1897) ; ib., ‘The Meaning of Pic¬ tures5 (New York 1903) ; Veyran, L. de,

‘Peintres et dessinateurs de la mer5 (Paris 1901) ; Viardot, L., ‘Wonders of European Art5 (New York 1874) ; Wedmore, F.,

‘Masters of Genre Painting5 (London 1880) ; Witt, R. C., ‘How to Look at Pictures5 (New York 1911) ; Wright, W. H., ‘Modern Painting5 (New York 1915).

Esther Singleton, Author of (Famous Paintings ,5 *etc.*

PAIRING, in legislative and other assem¬ blies, a practice by which two members belong¬ ing to opposite parties or factions agree that both shall be absent for a specified time, or that both shall abstain from voting on a particular question. Thus a vote is nullified on each side. The terms pairs and pairing-off are also fre¬ quently used.

PAIS, pa’es, Ettore, Italian archaeologist: b. Borgo San Dalmazzo, 1856. Pais was elected director of the Museo Nazionali of Naples and also member of the Royal Academy of that city. His numerous archaeological publications include ‘Storia di Roma5 (1898); ‘II riordi-namento del museo nazionali di Napoli5 (1902) ; ‘Pe.rche fui esonerato dalla direzione del museo nazionali di Napoli?5 (1905) ; ‘Ancient Legends of Roman History,5 translated by M. E. Cosenza (1905) ; ‘Ricerche storiche e geogra-fidie siill’ Italia antica5 (1908; English transla¬ tion entitled ‘Ancient Italy: Historical and Geographical Investigations,5 by C. D. Curtis, 1908) ; ‘Storia critica di Roma durante i primi cinque secoli5 (1913).

. PAISH, pash, Sir George, English econo¬ mist: b. 1867. In 1881-88 Paish served as sec¬ retary to the editor of the Statist; from 1888 to 1894 was sub-editor, and from 1894 to 1900 assistant editor of that journal. After 1900 he was joint editor. He is a governor of the Lon¬ don School of Economics and member of the departmental committee of the Board of Trade on Railway Accounts and Statistics in 1906-08.

He has also served as adviser to the Chan¬ cellor of the Exchequer and the British Treas-

ury on financial and economic questions in 1914-15. Paish was knighted in 1912. He vis¬ ited the United States during the Great War of 1914—18 in connection with international finan¬ cial arrangements incident to the great _ con¬ flict. His publications include (British Railway Position) (1902) ; (Railways of Great Britain) (1904); <Railroads of the United States> (1913) ; (Capital Investments in Other Lands) (1909; 1910); (Savings and Social Welfare)

(1911).

PAISIELLO, pa'e-zyel'lo, or PZESIELLO, Giovanni, Italian composer: b. Taranto, 9 May 1741 ; d. Naples, 5 June 1816. After having received his musical education in the conserva¬ tory of Saint Onofrio at Naples in 1776 he went to Saint Petersburg, where he produced the opera (I1 Barbiere di SivigliaP After remain¬ ing at Saint Petersburg for eight years he re¬ turned to Naples by way of Vienna, where he composed 12 symphonies for large orchestra, and wrote the opera (In Re Teodorod In Naples he remained for 13 or 14 years, from 1785 to 1799, and during this time he composed some of the operas which were produced at the Neapolitan Theatre, and he was also made chapel master to Ferdinand IV. In 1802 he went to Paris to organize the music of the chapel of Napoleon, and while there excited much jealousy, but it was not until 1804, when his opera Proserpine1* had been produced and proved a failure, that he returned to Naples. Paisiello produced between 95 and 100 operas, besides 100 masses, requiems, *etc.* Among the most prominent of his operas may be mentioned Pal finto al veroC composed in 1777; (I1 Marchese di Tulipano) ; Pina, o la Pazza d'Amore) ; cLa Molinara.*

PAISLEY, paz'li, Scotland, a manufacturing town of Renfrewshire, on

the White Cart, about three miles above its confluence with the Clyde and seven miles west-southwest of Glas¬ gow. It consists of an old town on the west or left and a new town on the east or right bank of the river, communicating by three handsome bridges. The most noteworthy building is the restored Abbey Church of a monastery founded in 1164 by Walter, son of Alan, the first of the house of the Stewarts. Other noteworthy edi¬ fice are the new county buildings; the old county buildings and prison, a quadrangular pile in the castellated style; the townhall, an im¬ posing building in the classical style; the Neil-son educational institution; the buildings con¬ taining the free library and museum; the Coats Observatory and the Coats Memorial Church (Baptist). The city has several parks and owns a great part of its public utilities and work¬ men's houses. Paisley has been long noted for its manufactures, especially of textile goods. The shawl manufacture, introduced about the beginning of the present century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, though the chief industry is that of sewing cotton, for which Paisley is celebrated all over the world. Wilson, the ornithologist, the poet Tannahill, and Professor Wilson (Christopher North) were natives of Paisley, which possesses a bronze statue of the ornithologist and of the poet. Paisley, the mediaeval Passeleth, is a town of ancient origin, having been at one time a Ro¬ man station under the name of Vanduara. Pop.

84,499. Consult Brown, (History of Paisley) (Paisley 1886).

PAIVARINTA, pae-va-ren' ta, Pietari,

Finnish author: b. 1827; d. 1913. Coming of a poor family, his early years were passed in a hard struggle to secure a competence and a position of influence. He was successful and for nine years sat in Parliament. His first work was a description of the social life of his country in the martial period of Charles XII entitled (Seurahunnan kosto,* which was fol¬ lowed by intimate descriptions of Finnish peas¬ ant life. Some of his shorter works have ap¬ peared in Swedish in the collection (Bilder ur LifvetP while others have been translated into German, Norwegian, Flemish and Russian.

PAIXHANS, pek'san', Henri Joseph, noted French general: b. Metz, 22 Jan. 1783; di Jouy-aux-Arches, 20 Aug. 1854. He en¬ tered the artillery after being graduated at the Lcole Polytechnique, fought under the empire with great bravery, especially at the siege of Paris in 1814, and in 1848 be¬ came division commander. From 1830 to 1848

he was a member of the House of Deputies. Paixhans invented a howitzer called by his name, which carried a hollow shot and cylin¬ drical, conically pointed shells, also of his in¬ vention. During the Crimean War he investi¬ gated the concealment of floating batteries. He wrote several valuable studies of army and navy ordnance.

PAIXHANS GUN. See Ordnance.

PAJOU, pa'zhoo, Augustin, French sculp¬ tor: b. Paris, 19 Sept. 1730; d. there, 8 May 1809. He became a pupil of Lemoine and won the Prix de Rome in 1748, after which he studied for 12 years at Rome. Upon his re¬ turn he was elected to the Academy and was employed by Louis XVI to make statues of Buf-fon, Descartes, Pascal, Bossuet and Turenne. In the Louvre may be seen (Pluto Holding Cerebus in Chains,* Psyche,1* and a bust of Madame du Barry, together with other works executed by him. The sculptures of the Salle de l'Opera at Versailles and the ornaments of the cathedral of Orleans and of the Palais Bourbon are typical samples of his work.

PAKAWA, pa-ka-wa'. See Pinto.

PAKENHAM, pak'en-am, Sir Edward Michael, British soldier: b. County Westmeath, Ireland, 19 March 1778; d. near New Orleans, La., 8 Jan. 1815. He was a lieutenant in the British army in 1794 and served with distinc¬ tion under his brother-in-law, the Duke of Wellington, in the Peninsular and French campaigns. He rose to the rank of major-general in 1812. In 1814, after the death of General Ross at Baltimore, he was appointed to the command of the British forces there. He led the expedition against New Orleans, where his forces were defeated by General Jackson and was killed* in battle 8 Jan. 1815. See New Orleans, Battle of.

PAKHOI, pak-hoi', China, treaty port in the province of Kwang Tung, on the Gulf of Tong King, 275 miles south by west of Canton There are Chinese and European sections, the latter built on the top of a high bluff. There is an extensive export trade in anise oil, indigo, fish, hides, etc., and imports of cottons and woolens, opium and petroleum. Its history as a

treaty port dates from 1876. In normal years the imports average about $13,000,000 in value, with exports aggregating about $700,000. Pop

20,000.

PALACIO VALDES, pa-la'the-o val'das, Armando, Spanish novelist : b. Entralgo, As¬ turias, 4 Oct. 1853. He was educated at Oviedo and at Madrid, devoting especial attention to the studies of jurisprudence and political econ¬ omy. His first literary efforts appeared in La Revista Europea, in the form of sparkling es¬ says, which were so popular that the author became editor of the Revista in 1875. He di¬ rected the fortunes of this review until 1878, after which he confined his efforts to fiction. In 1881 he brought out (E1 senorito Octavio,* which betrayed the author's powers of character analysis and delineation and also his descrip¬ tive powers. It was followed in 1883 by (Marta y Maria,* the author's masterpiece, and a splendid portrayal of the struggle of a soul in choosing between a spiritual and contemplative life and an earthly love. Meanwhile several critical works had appeared from our author's pen, of which the chief are (Los oradores del Ateneo) (1878) ; (Los novelistas espanoles* (1878) ; (Nuevo viaje al Parnaso) and (La literatura en 1831) 5 (1882). In 1884 Palacio Valdees published (E1 Idilio de un enfermo,* which is a most interesting autobiography. (Jose* appeared in 1885 and is one of the best tales in Spanish of those dealing with life on the sea. Other works appearing in rapid succession were (Riverita) (1886); <Maximina) (1887); <La Hermana San Sulpicio> (1889) ; (E1 quarto poder,* dealing with journalistic life (1888). In 1892 appeared (La espuma) and (La Fe,* which, although very popular abroad, were execrated in Spain, the former being construed as an at¬ tack on the aristocracy and the latter on the Catholic Church. Other works more after the author's early style followed, including (E1 maestrante> ; (E1 origen del pensamiento) ; (Los Majos de Cadiz* (18%) ; (La alegria del capitan Ribot* (1899); (Tristan, 6 el pesimismo) (1906). Consult Blanco-Garcia, (La literatura espanola en el siglo XIX) (pt. II, 2d ed., Madrid 1903) ; Baxter, (A Great Modern Spaniard (in The Atlantic Monthly, Boston 1900) ; Davidson's introduction to his transla¬ tion

of <Jose* (ib. 1900) ; Howells, W. D. (in Harper's Magazine, New York 1886).

PALACKY, pa-lats'ke, Frantisek, Bo¬ hemian philologist, critic and historian : b. Hodslavitz, Moravia, 14 June 1798; d. Prague, 26 May 1876. He studied philology and history at Presburg and Vienna, and in 1831 was ap¬ pointed historiographer to the states of Bo¬ hemia. In the compilation of a general history of Bohemia, he searched libraries and archives in Bohemia and in Germany and Italy. In the political agitation of 1848 Palacky was the leader of the Slav or national party, as op¬ posed to the German. His great work is his (History of Bohemia) (in German and Bo¬ hemian, 5 vols., Prague, 1836-67). It has high repute for conscientiousness, thoroughness and accuracy. Among his many other works is one on the most ancient monuments of the Czech tongue, and in 1872 his Political Testament ; (Geschichte des Hussitentums* (1868), and (Geschichte des Hussitenkriegs) (1872-74). <(Father Palacky,** as he was fondly called,

though himself a Protestant, was regarded by Roman Catholics generally with perfect confi¬ dence, even with veneration. He persistently but vainly opposed the reconstruction of Austria on a German-Hungarian basis, and in 1861 when he was elected into the Austrian House of Lords, he declined to attend.

PALEOBOTANY. See Paleobotany.

PALEOGEOGRAPHY. See PaleogeogRAPHY.

PALEOGRAPHY. See Paleography.

PALEOLOGUS, a Byzantine family name which first became prominent about the middle of the 11th century, when a George Palseologus is reported as a prominent supporter ot the Nicephorus Botaniates. The family reached the im¬ perial throne in 1260 in the person of Michael VIII. This emperor successfully undertook many expeditions to Greece and the Archi¬ pelago, and used in vain his utmost endeavors to heal the schism between the Roman and Greek churches. His successor on the throne was his son, Andronicus II (reigned 1282-1328), under whose reign the Turks commenced in earnest a series of assaults on the Byzantine dominions. Andronicus attempted to oppose them with a force composed of mercenaries, but with small success, as these troops, with per¬ fect impartiality, attacked both his enemies and his subjects. To pay them, he was com¬ pelled to levy such imposts as

nearly destroyed Byzantine commerce. He associated his son, Michael IX, with himself in the government, and was dethroned by his grandson, Andronicus

III (reigned 1328-41), an able warrior and wise ruler. He won several victories over the Bul¬ garians, the Tatars of the Golden Horde and the Serbians, and diminished the oppressive im¬ posts of the previous reign. He failed, how¬ ever, in his expeditions against the Catalans and the Turks made various forays extending even to the Balkans and Thrace. By his subjects he was affectionately called (<Father of his Country.® His son, John VI (reigned 1355-91), a weak and voluptuous prince, attempted in vain both by force and bribery to stop the progress of the Turks; at last the Pope, moved by his urgent entreaties, backed by a promise to submit the Greek Church to the Pope's suprem¬ acy, urged the Hungarians and Serbians to arm in defense of the Greek emperor, but the result was only an additional triumph to Sultan Amurath. The imbecile emperor was several times deposed, and, on his final reinstatement by the sultan, acknowledged himself as his vassal for the capital and a small tract along the Propontis and Black Sea. Indeed, so de¬ graded had the Byzantines become, that they obeyed the Sultan Bajazet's summons to aid him in reducing Philadelphia, the last Greek stronghold in Asia Minor. His son, Andronicus

IV (reigned 1355-73), who had been associated with him in the government, died in exile. Manuel II (reigned 1391-1425) pursued the same tactics as his father, John VI, and with the same result. The allied army of the Hun¬ garians, Germans and French, which he had summoned to his aid against the Turks, was totally routed at Nicopolis by Bajazet, and Con¬ stantinople itself closely besieged. The in¬ vasion of Asia Minor by Timur, however, com¬ pelled the sultan to withdraw his whole force;

and his subsequent defeat and capture at An¬ gora in 1402, and the contests among his sons for the supremacy, gave the Greek empire a breathing space. Having aided Mohammed I in his contests with his

brothers, Manuel was, by the grateful sultan, presented with some dis¬ tricts in Greece, Thessalonica and on the Euxine. John VII (reigned 1425-49), was pressed by the Turks and urgently besought the Pope for aid from the West, promising to use his influ¬ ence in bringing about a union of the Greek and Latin churches under the primacy of Peter. To this end he journeyed to the Council of Florence, where in July 1439, the union of the churches was agreed to. The agreement, how¬ ever, was rendered null by the opposition of the clergy and people of the East. The Pope, however, saw that it was for his interest to fulfil his part of the agreement, and accord¬ ingly persuaded Wladislas of Hungary to lead his forces against the Turks, but this only hastened the downfall of the Palseologi. John's brother, Constantine XIII (reigned 1449-53), heroic scion of a degenerate race, accepted the crown, after much hesitation, knowing his total inability to withstand the Turks, and even then took the precaution of obtaining the sultan's consent before he exercised the imperial au¬ thority; but some rebellions in Caramania baffling Sultan Mohammed IPs efforts to quell them, the emperor was willingly persuaded by his rash .advisers that the time had now ar¬ rived for rendering himself independent of the Turks. The attempt brought swifter destruc¬ tion on the wretched remnant of the Byzantine empire, for Mohammed invested the capital by sea and land, and after a siege, lasting from 6 April to 29 May 1453, Constantinople was taken by storm and the last of the Palseologi fell fighting bravely in the breach. A branch of the family ruled Montferrat, Italy, from 1306 to 1533. The Palseologi had married into the ruling houses of Hungary, Serbia and a niece of Constantine XIII married Ivan, Tsar of Russia. This marriage was advanced re¬ peatedly by subsequent tsars of Russia as the basis of their claim to European Turkey. Con¬ sult Gibbon, Edward, (Decline and Fall of the Roman Empire, > edited by J. B. Bury (New York 1898-1900), and Pears, Edwin, (The De¬ struction of the Greek Empire) (ib. 1903).

PALEONTOLOGY. See Paleontology. PALEOZOIC. See Paleozoic.

PALEPHATUS, Greek mythographer. The period in which he flourished is uncertain, but there are many references to him as the au¬ thor of a large work dealing with the Greek myths for which he furnished explanations either historical or allegorical in character. Of this work there remains to us only a synopsis called ' nepl 'Atcictuv' (On Incredible Things), which for centuries was a favorite text in schools. For the text consult Westermann, ' MvOoypatyoi ' (Brunswick 1843), and Festa, N., (Mythographi GraecP (Vol. Ill, Leipzig 1902). Consult also Wipprecht, F., (Qu3estiones Palse-phateae) (Leipzig 1892).

PALESTRA (Greek, ˆwrestling-school®), originally a school for the training of Greek youth in gymnastic exercises. At first private, such schools were afterward supported by the state, and in the most comprehensive sense a

palaestra was a public place set apart, and under official direction, for exercises in wrestling and various forms of athletics. In these schools or gymnasiums special privileges were given to athletes training for contests in the public games. The name palaestra is also applied to wrestling and athletics themselves.

PALAFOX Y MELZI, pa'la-foH' e mal'- the, Don Jose de, don ho-sa' da, Duke of Saragossa, Spanish patriot: b. Aragon, 1780; d. Paris, France, 16 Feb. 1847. When very young he was appointed an officer of the royal body¬ guard and in that capacity accompanied Ferdi¬ nand VII to Bayonne in 1808. Palafox escaped the capture which befell his royal master and fled to Saragossa which he defended as captain-general of Aragon in two sieges in 1808-09, but was captured by the French and imprisoned (1809-13) at Vincennes. He then returned with the king to Spain, and was confirmed as cap¬ tain-general of Aragon. Later he turned against Ferdinand VII and in 1833 joined the forces of Queen Isabella. He was created Duke of Saragossa in 1836.

PALAIHNIHAN, pa-lih'm-han, or PIT RIVER INDIANS, an American family of Shastan stock comprising numerous tribes living in the northeastern part of California, in the basin of the Pit River, hence the local or com¬ mon name of Pit River Indians (q.v.). Seven distinct tribes of these people were known in the days of 1849, but they are now almost ex¬ tinct. They are of a low type of the American aborigines. Consult Dixon, R. B., in American Anthropologist , n. s., Vol. VII (Lancaster, Pa.,

1905).

PALAIS DE JUSTICE, pa'la de zhus'tes, (French, palace of justice), a French court¬ house, more specifically, the courthouse of Paris. Rouen also contains an edifice which is a remarkable example of the Flamboyant style of Gotnic. See French Architecture; Paris; Brussels.

PALAIS ROYAL, pa-la rwa-yal, a collection of buildings in the Rue Richelieu in Paris, composed of a palace, public gardens, shops, , cafes and restaurants. The nalace was built in 1634. (See Paris). It was built

for Cardinal Richelieu in 1629-36 by Lemercier. He bequeathed it to Louis XIII. It later be¬ came the residence of the Orleans Bourbons. Here Napoleon installed the Tribunate. At the Restoration it was repurchased by the Duke of Orleans. He formed the Cours de Nemours and built the Gallerie d'Orleans. At the Revo¬ lution of 1848 the Palais Royal was appro¬ priated as the domain of the state and called the Palais National. On 23 May 1871, during the struggle between the army of Versailles and the Communists, it was set on fire. The left wing and part of the central pavilion were de¬ stroyed, but the galleries an<I the Theatre Frangais weTe preserved. The destroyed wing has been rebuilt and other portions of the palace have also been restored. The Theatre Frangais and the Theatre du Palais Royal form part of the buildings.

PALAMEDES, pal-a-me'dez, in Greek my¬ thology, a hero, the son of Nauplius and Clymene. Although figuring prominently in the later ac¬ counts of the Trojan War, he is not referred to in the Homeric writings. Having discovered

that the madness of Odysseus was only feigned, and having brought him to the leaders before Troy, Palamedes is said to have become an object of hate to that hero. Odysseus smug¬ gled into the tent of Palamedes a letter from Priam and then had him stoned to death for treason. His father in turn shipwrecked the Greeks on the promontory of Caphareus by false lights. He is represented as skilled in learning, and his name is connected with the invention of letters, numbers, money, weights and measures, checkers, the lighthouse and dice.

PALAMON AND ARCITE, Theban princes, who both loved Emilia, sister of Hip-polyta,.and were imprisoned by Theseus. Boc¬ caccio narrates their history in the ˆeseide,* which was used by Chaucer for (The Knight's TaleP In 1487 appeared Anne de Greville's poem in French, (Palamon and ArciteP and in 1634 Fletcher's (Two Noble Kinsmen) dealt with the same theme. There were two plays, now lost, dealing with this story, one by Edwardes, produced for Elizabeth at Oxford in 1566, and one mentioned by Henslowe as per¬ formed in

1594. The story is also told by Dryden in <Fables) (1700).

PALANAN, pa-la'nan, Philippines, a pueblo of the province of Isabela, Luzon, on a river, five miles from the Pacific Coast, at the foot of the Sierra Madre Mountains, 36 miles east of Ilagan. A mountain trail begins at this point and Palanan is the trade centre for the sur¬ rounding region. It was here that Aguinaldo was located and captured. Pop. 1,140.

PALANDER AF VEGA, pa-lan'der av va'ga, Adolf Arnold Louis, Swedish naval officer and explorer: b. Karlskrona, 1842. In 1868 he was with the Nordenskjdbd expedition to Spitzbergen and was again a member of the expedition of 1872-73. In 1878-79 Palander was navigator of the Vega in the search for the Northeast Passage. He was awarded a pension by the Riksdag; was made aide-de-camp of Oscar II ; created a knight and also made an admiral. He was Minister of State in 1901-05 and published an account of his search for the Northeast Passage.

PALANPUR, pa-lan-poor', PAHLANPUR, or PAHLUMPUR, native state of In¬ dia in the province of Gujarat, Bombay division, south of Rajputana. The state is crossed by the Rajputana-Malwa Railway, on which the town of Palanpur, capital of the district, is a junc¬ tion for the British cantonment of Deesa. The native state has an area of 1,766 square miles and population of about 222,627. A political agency including this and other surrounding states contains 6,393 square miles and has a population of 467,691. The town, with a popu¬ lation of about 17,799, like the state and the agency, suffered terribly from plague, so that the population has decreased enormously.

PALANQUIN, pal-an-en, PALANKEEN, or PALKI, a vehicle commonly used in India and Oriental countries. It is a sort of litter or covered carriage, borne on the shoulders of four porters, eight of whom are attached to it and who relieve each other. It is usually provided with a bed and cushions, and a curtain, which can be dropped when the occupant is disposed to sleep.

PALATE, the roof and the superior aspect of the mouth or oral cavity toward its hinder or posterior portions. Anatomists are accustomed to speak of the hard and the soft palate. The former is constituted by the palate and superior maxillary bones; the latter is the more or less mobile prolongation of the hinder part of the roof or lining membrane of the mouth which is attached to the posterior border of the hard

palate. The hard palate supports the tongue when that organ is employed in tasting, in the. production of articulate sounds, in mastication and in swallowing. The membranes and tissues which cover the bones forming the hard palate are of thick conformation and are closely bound to the surface of the bones. The tissues are thinner toward the middle line of the palate or raphe. The palatine glands exist in a row on each side of the hard palate and are most nu¬ merous and of larger size as the hard palate is continued backward to form the soft palate. The mucous membrane of the hard palate is of a whitish color, this appearance being produced by a thick layer of epithelial cells covering the membrane.

The soft palate exists only in the crocodiles out of the class Mammalia. In the Cetacea it forms a muscular canal, which prolongs the hinder nostrils downward and backward, and is thus adapted to the breathing-process of these aquatic forms. In the anteaters the soft palate is nearly eight inches in length. It consists in all of mucous membrane and muscles and forms a semi-partition between the mouth and the hinder nostrils. In front it is attached to the hard palate. Behind it is free, and in the middle a pointed process, the uvula, is situated. This is found fully developed only in man and the apes. Its upper surface, or that next the nasal passages, is convex and is prolonged to form the floor of the nose. The lower or under sur¬ face is concave, so as to adapt it to receive the back of the tongue; and on this surface the soft palate bears a median ridge, showing the early stage of its formation, when it consists of two halves. Non-union of these halves and of those of the hard palate produce the deformity known as cleft palate. This is likely to interfere with nutrition in the child and with articulation, and may be complicated by harelip. It can and should be remedied by operation in early in¬ fancy. Mucous glands are abundantly distrib¬ uted in the membrane forming the soft palate, these structures secreting the mucus which serves to lubricate the throat during the pas¬ sage of food. Above these glands muscular tis¬ sue is found and the upper surface is formed of mucous membrane of the nasal passages al¬ ready alluded to. The uvula, depending in the middle of the soft palate, gives to the latter the appearance of a divided or double arch. This structure, the uses of which are undetermined, consists of numerous mucous glands and a mus¬ cle known as the azygos uvulae. The uvula varies in length in different subjects and at different times in the same person. Its perma¬ nent elongation gives rise to an irritant cough produced by its tickling the throat, and for the relief of this complaint its lower border is fre¬ quently excised.

In front the soft palate becomes continuous with the tongue and

pharynx or back part of the mouth through two mucous and muscular folds

on either side known as the anterior and poste¬ rior pillars of the fauces. The anterior arch of each side exists as a curve from the uvula to the side of the tongue. The posterior arch begins at the uvula, follows the free edge of the soft palate and ends at the side of the pharnyx. The pillars of each side separate or diverge in a triangular manner from their point of origin and within the triangle of each side a tonsil is contained.

The muscles of the soft palate number five pairs. These are the levatores palati, which laise the soft palate and bring it to the horizon¬ tal position in swallowing. The tensores palati draw the soft palate downward and tighten it, and their action also includes the keeping patent and open of the Eustachian tube. The palato-glossi and palato-pharyngei muscles form the bulk of the arches of the soft palate ; and the azygos uvulae muscle constitutes the last struc¬ ture of this description included in the soft pal¬ ate. The tonsils or amygdalae (ˆalmond-like®) are placed between the palatine arches. The substance of each tonsil contains numerous fol¬ licles, which open externally by 12 or 15 open¬ ings, and more deeply placed are masses of adenoid or lymphatic tissue similar to the Pey-er's patches (q.v.) of the intestine. The tonsils are liable to hypertrophy and inflammatory af¬ fections, and are excised for disease without leaving any bad effects. Enlarged tonsils may obstruct the breathing and may produce deaf¬ ness by occlusion of the Eustachian tube. (See Tonsilitis). Both the hard and soft palate are supplied with blood by the descending pala¬ tine branch of the internal maxillary artery, and with nerves by the palatine branches of the superior maxillary nerve. The use of the soft palate is chiefly to close the posterior nares or nostrils and so to prevent the escape of the food by the nose in swallowing; during which proc¬ ess the palate is elevated by the levator muscles from its usually dependent position to the hori¬ zontal position. In the latter position it lies upon the back of the pharnyx and so closes the nares.

The arches of the palate assist in swal¬ lowing. The anterior arches during deglutition contract, so as to prevent the food from return¬ ing into the mouth ; while the posterior arches contract at the sides and so preclude the escape of food into the nose. The whole process of swallowing is performed firstly by the mass of food being brought to the back of the tongue. The lower jaw being next closed to afford a fixed point for the action of the muscles which raise the larynx, the food is sent into the ele¬ vated pharynx by the pressure of the tongue on the palate. The posterior palatine arches and soft palate prevent the escape of the food into the nose at this stage ; the anterior pala¬ tine arches and tongue prevent it returning to the mouth ; the epiglottis is shut over the upper opening of the larynx so as to prevent the food entering the windpipe ; and by the action of the constrictor muscles of. the pharynx the food is finally shot into the oesophagus or gullet, along which tube it is propelled to the stomach by the peristaltic contraction of its muscular walls. See Mouth; Nose and Throat; Pharynx; T ONGUE.

PALATINATE, The, (1) a comprehensive term for two states of the German Empire, which, until 1620, were united. The name Pala¬

tinate (German, Pfalz) was originally given to the imperial castles dispersed over the German Empire, in which the emperors resided alter¬ nately, with a view to maintain .order by their presence and to administer justice impartially in all the provinces of the empire. The palatine or count palatine was the highest civil and judicial officer in these castles. Finally, the title was retained by only two of the territorial mag¬ nates of the empire, whose states were distin¬ guished as the Upper and Lower Palatinate, or as the Palatinates of Bavaria and the Rhine. The Upper Palatinate was included in the circle of Bavaria and was bounded north by the county of Baireuth, east by Bohemia, south by the county of Neuburg, west by Bavaria and the territory of Nuremberg. Its capital was Amberg. The Lower Palatinate (Palatinate of the Rhine) - was contained in the electoral circle of the Rhine and was situated on both sides of the river. It was bounded by the territories of Mainz, Katzenellenbogen, Wurttemberg, Baden, Alsace, Lorraine and Treves. It was composed of the Palatinate proper or Electoral Palatinate on the right bank of the Rhine, one of the most fertile countries in Europe, and of the princi- . pality of Simmern, the duchy of Deux-Ponts (Zweibriicken), the half of the county of Spann-heim and the principalities of Veldenz and Lautern. The counts-palatine of the Rhine, whose original seat was Aix-la-Chapelle, in the 11th century were already in possession of the office

and of the lands pertaining to it, and were among the most powerful princes of the Ger¬ man Empire. In 1227 the entire Palatinate fell into the possession of the house of Bavaria and underwent a series of successions until 1619 when Frederick V, of the Simmern line, who had succeeded in 1610, was put to the ban of the empire for aspiring to the crown of Bohemia. (See Germany; Thirty Years' War). His electorate and estates were given in 1623 to Maximilian, Duke of Bavaria. Charles Louis, son of Frederick V, recovered the Lower Pala¬ tinate by the Peace of Westphalia (1648), and a new electorate, the eighth, was created for him, with the office of high-treasurer. The Upper Palatinate and the former rank of the elector-palatine in the electoral college remained with Bavaria. In 1742 the electorate fell to the Sulz-bach line, represented by Karl Theodor, and in 1777 he succeeded to the electorate of Bavaria, a portion of the estates of which, however, fell to Austria. This was accompanied by the re¬ covery of the old electoral office of the Pala¬ tinate and the transference of the grand-treas- urership to Brunswick. Toward the close of his reign the Palatinate was conquered by the French. He died without issue in 1799 and was succeeded by Maximilian Joseph, Duke of Zweibriicken. At the Peace of Luneville (1801) he was compelled to surrender the Palatinate. The possessions on the left bank of the Rhine were annexed to France, a considerable part of the remainder was given to the Grand-Duke of Baden and the rest was distributed among other princes. At the Peace of 1814 the German states recovered their possessions on the left bank of the Rhine and the Palatinate was re¬ distributed among Bavaria, Baden, Hesse-Darmstadt and Prussia. The portion belonging to Baden is included in the circles of Mann¬ heim, Heidelberg and Mosbach ; the Darmstadt

portion constitutes ihe provinces of Starken-burg and Rheinhessen. Bavaria received the whole of the LTpper Palatinate and the portion of the Lower Palatinate forming the Bavarian circle of Rheinpfalz. The Prussian portion was added to the Prussian province of Rheinland. The area of the Rhenish Palatinate is 2,372 square miles (pop. 937,085) ; of the Upper Pala¬ tinate, together with Regensburg, which

is joined to it into one province, is 3,862 square miles (pop. 1,600,284). Speyer is the capital of the Rhenish Palatinate, Regensburg that of the Upper Palatinate. The population of Speyer is about 23,000. Consult Nebenius, (Geschichte der Pfalz) (Heidelberg 1874).

(2) The term palatinate or county palatine came into use in England during the 13th cen¬ tury, the counts or earls-palatine ruling over entire counties, acting as independent princes, exacting feudal rights and contributions and simply swearing homage and fealty to the king. The principal counties palatine were Lancaster, Chester, and Durham. In the colonial days of the United States Maryland was granted to the Baltimore family as a county palatine on the model of Durham.

PALATINE ANTHOLOGY, a Greek anthology compiled in the 10th century by Con¬ stantine Cephalas. For several centuries it was lost but in 1606 Salmasius found it in the Pala¬ tine Library, Heidelberg. It was first published in Brunck's (Analecta } (1776). Consult Thack¬ eray, (Anthologia Grseca* (London 1877).

PALATINE HILL (Lat. Palatium, later Mons Palatinus) , the most central, the earliest settled and (save for the Capitoline) the most famous and important of the seven hills of Rome. About 130 feet above the Tiber and 36 more above the sea-level, the hill is an irreg¬ ular quadrilateral and to this shape is due the name of the Roma quadrata, the primitive city which the legend attributes to Romulus. The name Palatium, which the Romans connected with the Arcadian city Pallantium, is probably related with Pales, an Italian rural divinity. On the Palatine the Lupercalia was celebrated in honor of Romulus; there were the ancient temples (of Victory, Jupiter Stator and the Magna Mater) in the days of the early re¬ public, the residences of Cicero, Marcus Scaurus and others in the last period of the republic and at the beginning of the principate Augustus' own home (to which fact the use of the word ˆpalace® from the Palatium is due), the temple of Apollo dedicated in 28 b.c. and the Latin and Greek library. Tiberius and Caligula built additions to Augustus' palace ; the latter emperor bridged the Capitoline to the Palatine. The Palatine was no longer used as an imperial residence after the time of Alex¬ ander Severus and there was no more splendid building there until Pope Paul III built the villa called Orti Farnesiani. Excavations of the hill began in 1762 under Bianchi's superintend¬ ence and was renewed a century later by Rosa at the expense of Napoleon III. The Italian government purchased the Farnese Gardens in 1871 and now has charge of excavations.

PALATKA, pa-lat'ka, Fla., city, county-seat of Putnam County, on the Saint John's River, and on the Florida East Coast, the Flor¬ ida Southern, the Georgia Southern and Florida and the Jacksonville Atlantic Coast Line rail¬

roads, 47 miles in direct line south of Jackson¬ ville. It is the centre of a prosperous agricul¬ tural and fruit region, is in daily steamer com¬ munication with Jacksonville and exports large quantities of oranges, sugar, cotton and cypress lumber. It is also popular as a winter resort. It is the seat of the Putnam County High School and of the Saint Joseph's Academy and Day School (Roman Catholic). Pop. 5,102.

PALAWAN, pa-la'wran, Philippines, the most southwestern island of the archipelago, lying west of Mindoro, Panay and Negros; it is bounded on the west by the China Sea, which it separates from the Sulu or Mindoro Sea; area, 4,027 square miles ; with dependent islands, 5,238 square miles. It is one of the largest islands of the Philippines, and from its geographical position one of the most important, as it lies in the trade route between India and China and Manila.

Topography and Climate.— The island is long and narrow in shape; the greatest length from northeast to southwest is 278 miles, and the width averages only 17 miles, and is no¬ where more than 30 miles, being only Al/2 miles in the centre. The coast is indented with nu¬ merous sounds, gulfs and bays, most important among them Malampaya Sound (q.v.). A mountain system which divides Palawan into two watersheds extends the length of the island following the general direction of the coast; the highest summit of this system is Mantalingajan in the south (6,843 feet) ; the average height is from 2,500 to 3,000 feet; between the summits are high tablelands. There are a num¬ ber of rivers, which are all short; in the north¬ ern part there is a lake which opens into the ocean by a subterranean river. The climatology of the island shows two seasons, the southwest monsoon or wet season and the northeast mon¬ soon or dry season ; the heat is not extreme ; malarial fevers are common on some parts of the coast. Earthquakes are relatively rare.

Forests and Fauna. — The mountains are very heavily wooded, the forests contain valu¬ able building, dye and medicinal woods, includ¬ ing ebony, sandal, logwood, bamboo, ipil (a very hard wood), apiay, camphor, gum mastic, molave; a number of the trees found in Pala¬ wan exist nowhere else in the Philippines. Dammar, a gum which

exudes from a large tree, is found in many places in deposits in the earth, which have, however, never been fully worked. The nipa palm grows luxuriantly along the rivers, and rattan is an important article of export. There are also numerous plantsˆ of varied character, including orchids and pitcher plants ; among the latter is a trail¬ ing variety, the pitchers of which will hold a pint and a half of water.

The wild animals of Palawan are not very numerous; there are several varieties of the monkeys, also the pakda or big ape, and porcu¬ pines; the birds are mostly of unusual species. Reptiles are abundant ; alligators are commonly found in the lakes and swamps, and the pythons are unusually large, specimens over 22 feet long having been found.

Industrial Resources. — The resources of the island are as yet poorly developed. The chief industry is the raising of cattle, hogs and goats ; goats and fowls are bartered with the ships along the coast. Rice, tobacco, nutmegs,

sweet potatoes and other food products are raised for home consumption, and there are a few primitive manufactures also for domestic use. Edible birds' nests are found in large numbers in the rocky caverns of the coasts; they are of excellent quality, being considered second only to those of Penon de Coron (q.v.), and have brought twice their weight in silver in the Chinese market. Honey and wax are also collected and brought to the coast for trade. There are no roads, except a few portages, but a number of trails ; the rivers also afford means of transportation near the coast. Only the coast is suitable for agriculture.

People and History. — Next to the Visayans, the dominating race of the northern and central parts of the island are the lagbanuas (q.v.), a peaceful and docile race of mixed Malay and Negrito blood. The Moros pre¬ dominate in the southern part, south of the 10th parallel of latitude. Previous to the 18th cen¬ tury Palawan was a part of the sultanate of Borneo; in the early part of that century, the Spaniards

established several garrisons in the northern part' of the island for the purpose of protecting their dominions on the north from the Moro pirates, and the island was soon afterward ceded to Spain. In 1885 a special attempt was made by the Spanish government to colonize Palawan by offering settlers free transportation and other privileges, but this failed. An attempt to establish a convict settle¬ ment was also unsuccessful, and Spanish au¬ thority was recognized only along the coast. The United States troops occupied Palawan in the early part of 1902, and in June of that year civil government was established in that part of the island lying north of the 10th parallel of latitude. This region with its dependent islands is known as the province of Paragua. Its capital is on the island of Cuyo. The part south of this parallel, known as the country of the Moros, is as yet without civil government. The most important town of Moro Palawan is Puerto Princessa, which has not 2,000 inhabi¬ tants. The island of Balabac, lying south of Palawan, is governed in accordance with the terms of the treaty with the Sultan of Sulu. At Iwahig near Puerto Princessa there is a modern penal colony on liberal lines. On the small island of Cuban there is a leper colony. Population of the island about 35,000.

PALAWAN PASSAGE, the route through the Balabac Strait and along the east coast of Palawan, used by vessels in the trade between China and Manila during the latter part of the southwest monsoons, because more sheltered than the China Sea route to the west of Pala¬ wan. This route was first explored in 1850 by Captain Bates of the British navy, and soon afterward generally adopted.

PALAY, a tropical African climbing plant (Cryptostegia grandi flora) of the 'milkweed family. Its stalk-fibres, which are strong and white, are spun into a very fine yarn ; and its milky juice forms a kind of caoutchouc. It is used' for this latter purpose in Burma.

PALAZZO PITTI, pa-lat'so pit'te, a palace in Florence. See Florence.

PALE, in heraldry, a figure of the group known as ordinaries, consisting of a broad perpendicular band in the middle of the shield.

Several charges of any kind are said to be fin pale® when they stand over each other per¬ pendicularly, as do the three lions of England.

A shield divided through the middle by a perpendicular line is said to be (<parted per pale.® When divided into an even number of parts by perpendicular lines, it is ((paly of® so many pieces.

PALE, The English, Ireland, a name ap¬ plied in the 14th century to that part of Ire¬ land which was completely under English rule, to distinguish it from the parts where the old Irish laws and customs prevailed. It varied in extent at different periods, consisting of Dublin and more or less of the neighboring country.

PALE OF SETTLEMENT, that part of Russia within which Jews are allowed to reside. The Pale was established in 1791 to prevent the Jews of White Russia, who came under Russian dominion in 1772, at the first partition of Poland, from spreading throughout Russia. Its boundaries have varied from time to time ; in 1904 it contained the governments of Bessarabia, Vilna, Vitebsk, Volhynia, Grodino, Yokaterinoslav, Kovno, Minsk, Moghilef, Podolia, Poltava, Taurida, Kherson, Chernigov and Kiev. Within these governments the Jews were not in general permitted to settle outside the cities and towns. They were allowed to live in Poland also, but this was not considered as part of the pale. Under certain narrow re¬ strictions, they were also permitted to live in Courland, the Caucusus and Turkestan. They were entirely excluded from Finland, and ex¬ cept in the case of convicts and their children, from Siberia. In Moscow, too, they were sub¬ ject to particularly narrow restrictions. In 1903 the restrictions on the Jews were somewhat mollified. In 1904 the pale of settlement might be left by merchants of the first guild and their families, per¬ sons possessed of a higher education, those who had completed the military service before 1874 and skilled artisans. The same classes were permitted to reside in villages. Unre¬ stricted rights of residence were accorded to veterans of the Japanese War, manufacturers and counsellors of commerce. Restriction to the pale has been abolished by the Russian revolu¬ tionaries in 1917 along with all other religious and racial disabilities.

PALEA, plural PALE2E, the bracts, usu¬ ally membranous and colorless, on the receptacle of a composite plant between the florets ; the chaff. Also the bracts immediately surround¬ ing the fertile leaves organs in .grasses. See Bract; Flower.

PALEARIO, pa-la-a’re-6, Antonio, more

correctly, Antonio dei Pagliarici, and accord¬ ing to his Latinized title Aonius Palearius, Italian religious innovator : b. Veroli, Roman Campagna, 1500; d. Rome, 1570. He was a teacher of rhetoric at Perosa, Siena, Padua, Lucca and Milan, whose reputation had spread over all Italy and abroad. He made his home especially at Siena, and in 1567 was brought be¬ fore the Holy Inquisition at Rome, and three years later suffered martyrdom at the stake. His principal work is a

long Latin didactic poem, (De Immortalitate Animarumfi Famous as his poetic and theological writings were,

equally popular was the work attributed to him, (Del Beneficio de Giesu Christo Crocifisso* (1548), which was translated into several lan¬ guages, but in 1549 was suppressed by the In¬ quisition. It was published at Cambridge, Eng¬ land (1853), and at Leipzig with a German translation by Tischendorf (1856). Ranke maintained it to be the work of a Benedictine monk, Benedetto of Mantua. Consult Young, (Life and Times of Antonio Paleario) (London 1860) ; Bonnet, (Aonio Palerio) (Paris 1863).

PALEMBANG, pa-lem-bang', Sumatra, Dutch residency in the southeastern part of the island; also the capital city of the residency. The country is drained by the Musi (or Moesi) River, along the banks of which there are valu¬ able supplies of petroleum. An alluvial plain r and plentifully watered, it is very fertile. Its native inhabitants are Moslem Malays, except a race called Orang-Kubu, living by the chase in the thickest jungles and exhibiting a very primitive culture. Palembang residency has an area of 53,497 square miles and a population of about 700,000, of whom 373 are Europeans, 1,876 Arabs and 6,451 Chinese.

Its capital city of the same name lies on both banks of the Musi, 80 miles from its mouth, in a swampy region, the houses being sometimes built in the very stream. The old Javanese name for the city seems to have been Malayo, so that it may be the Malajour of Marco Polo and the Mo-Lou-yu of the Chinese geographers. An attempt has been made to prove that the town was once held by Hindus, an occupation like that in Java. The main building is an 18th century mosque. Coffee and pepper are ex¬ ported; and there is some trade in silks, carv¬ ings and goldsmiths* wares. The Dutch built a factory here in 1618, but the country remained independent until 1812 when it was occupied by the English. It passed to the Dutch after 1825. Pop. over 60,000.

PALENQUE, Mexico, the most individual and distinctively interesting of the ruined cities belonging to the pre-Columbian civilization of America.

Palenque lies in the foothills, on both sides of the mountain stream Otolum, or Otula (the Place of Falling Stones). It is some six miles from Santo Domingo del Palenque, Chiapas. Owing to the dense tropical vegetation which abounds in this district the ruins have been but very imperfectly explored. But enough has been ascertained concerning them to fix their char¬ acter undoubtedly as a very important pre-Columbian religious centre. The absence of fortifications of any kind and the open char¬ acter of the buildings together with their peculiar structure would seem to indicate this ; and the mythological scenes depicted in the stucco work within several of the edifices con¬ firm this opinion.

Owing to its peculiar character, its one-time undoubted importance, its proximity to other places visited by the Spaniards shortly after the Conquest and the fact that it is mentioned in none of the accounts or reports of this period, would seem to indicate that Palenque was a deserted city previous to the discovery of Yucatan and Mexico. Up to the time the ruins were discovered in 1746 and officially brought to the attention of the Spanish government, apparently their existence had not been known

except to the aboriginal inhabitants of the sur¬ rounding district. But commencing shortly thereafter and continuing down to the present time, numerous partial examinations and ex¬ plorations of the ruins, official and private, have been made ; yet not enough of a sufficiently-extended character has been done to definitely settle the relationship of Palenque to the other civilizations iby which it was surrounded, either at the time of its foundation or subsequent growth to power and influence.

Many of the original buildings of Palenque must have disappeared; in fact, Calderon, one of the first to describe the city says that he counted 206 buildings, most of them more or less in ruins. Of these the most dis¬ tinctive and important is the edifice known as the ˆPalace.ˆ This stands upon a pyramid some 60 feet high, which rises from a narrow plain on the left bank of the river. Up the eastern side of the pyramid, which is 263 by 310 feet square, runs a broad stairway centrally placed. There was probably a similar one on the north. The sides of the pyramid were originally faced with blocks of cut stone, but these

are now dis¬ placed and many of them thrown down by the excessive growth of tropical vegetation. This was the more easily effected since the mass of the pyramid is composed of earth and loose stones. The ˆPalace® crowning the pyramid is 240 feet long and 180 wide. It is surrounded by a narrow passageway formed by the summit of the pyramid. The Palace has over 40 doors, 9 feet wide and 8ˆ2 high, facing outward on to this passageway. These lead, on the north and east, into one long corridor-like apartment run¬ ning along both these sides and 60 feet around the south end and 40 feet around the west side, a total distance of over 500 feet, without an intervening wall or obstruction of any kind. On the west, the whole length of the cor¬ ridor contains only two divisions, while on the south there are five, two of which are pierced by connecting doors. Within this great cor¬ ridor runs a second corridor of like width fac¬ ing on an immense patio or courtyard. Half of this corridor is taken up with one long room running round the north and east sides. Many doors open from this latter corridor into the courtyard, which is divided into four nearly equal parts or smaller courts. In these courts are subsidiary buildings, one of which contains seven rooms, one quite large. From the patio rises a great tower 30 feet square at the base, and standing 60 feet above the level of the court, in five sections consisting of the base proper and four stories. It is probable that the 100 or more doors of the palace were covered with curtains which would have been sufficient protection in a tropical climate. In the rooms of the building, on the stairways and outer walls is a luxuriant display of excellent stucco and bas-reliefs showing well-executed human figures and stucco tablets. The edifice is plastered throughout. Numerous stone stair¬ ways connect the corridors and the rooms with the courts. Underneath the ˆPalaceˆ and within the pyramid are numerous rooms, all of which so far as explored are plastered. ‘They are apparently the same in form as the upper rooms and connected with them by stairways. They are said to have once contained decorated tablets; but if so the dampness has destroyed them. A similar building in form and position

to the “Palace® is the “Temple of the Three Tablets.® The incline side of the pyramid from which it rises is 110 feet on the sloping side. The Temple itself is 76 feet long, 25 feet wide and 35 high. In the fagade are five wide doors; on the walls between are well-executed bas-reliefs in stucco and on the corner front walls are columns of hieroglyphics. One long room takes up the front of the building and from this three doors lead each into a back room. Here are two large stone tablets and nearly 400 sculptured hieroglyphics, which are supposed to have been used either for educational purposes or for the administration of the law. “The Temple of the Beau Relief® contains a life-sized figure sitting on a throne terminating on the right and the left in finely executed tiger’s heads. The whole, which is in stucco, is one of the best pieces of native modeling found in America. The building is also situated on a pyramid and is 20 feet square by 25 feet high. Another noted building in Palenque is the Temple of the Cross, not so much on account of the edifice itself as through the famous “Palen¬ que Cross® that once stood within its shrine. It stands upon a stone-faced pyramid which measures 134 feet up the sloping side. The Temple is 50 feet long, 31 feet wide and 40 high. It has three wide doors in the fagade, and be¬ tween them tablets in stucco and other skilful decorations. The space between the outer doors and the corners are covered with hieroglyphics; and the sloping roof with artistic stucco decora¬ tions. On the roof is a two-story structure 35 by 30 feet and 16 feet high, also decorated in elaborate stucco. The Temple consists of an outer room from which doors lead into three rooms at the back. In the centre or larger of these rooms on the rear wall was the tablet of the cross, or rather the three tablets of the cross, which are now in the National Museum in Mexico City. (See Cross of Palenque). The Temple of the Sun, which stands on a twin pyramid almost as high as that of the Temple of the Cross, is similar to the latter in form and plan. It is still more remarkable than the other buildings for its variety of fine stucco work and ornamentation. It has the same dis¬ position of stucco work and hieroglyphics on the fagade, which is 38 feet long, the depth of the building being 28 feet. On the rear wall of the inner sanctury is the tablet of the Sun con¬ sisting of three slabs, the centre of which con¬ tained the main subject, the offering to the sun, and the other two, like those of the cross, are covered with explanatory hieroglyphics. The space covered by the tablets is 8 by 9 feet. Near here is an aqueduct of stone 217 feet long. But it was at one time evidently longer. North of the palace are the foundations, mounds and other remains of 11 buildings; and on a hill to the east is another foundation and around it other ruins. At least two ancient bridges exist north of the Palace, one of which is 56 feet long by 42 wide and built of large hewn blocks of stone; while another lies some distance

west. Some way south, in the tropical forest, are two other pyra¬ mids of considerable height, while in every direction are still the evidences of a once popu¬ lous centre. Consult Bancroft, H-H., (The Native Races of the Pacific States> (5 vols., San Francisco 1883) ; Bandelier, A. F. A., Re¬ port on an Archaeological Tour, in Mexico

1881 J (Cambridge 1885); Charney Desire, (Ancient Cities of the New World' (New York 1887) ; Holmes, W. H., (Ancient Cities of Mexico' (Chicago 1895); Morgan, L. H., (Houses and House Life of the American Aborigines' (Washington 1881) ; Mandslay, Sir Alfred, <Biologia Centrali Americana: Archae¬ ology' (London 1897) ; Penafiel, Antonio, (Monumentos del arte mexicano antiguo' (Ber¬ lin 1890) ; Spence, (The Myths of Mexico and Peru' (1913); Stephens, J. L., incidents of Travel in Central America, Chiapas and Yuca¬ tan' (17th ed., 2 vols., New York 1867-71).

PALEOBOTANY. The science of the ex¬ tinct plants and plant assemblages of the globe. That branch of paleontological science dealing with the endless succession of plants which have inhabited the earth since life first came into existence. Its story is the history of vege¬ tations and their interactions with complex and ever-changing environments through eons of time that resulted in populating the earth's sur¬ face with a succession of floras and finally in the production of the relatively modern and highly specialized races of flowering nlants. Its aim is not the mere assembling of facts, but the understanding and interpretation of these facts in their relation to the evolution of indi¬ viduals and communities and earth history.

History. — Despite the great abundance of fossil plants in the countries of the classical world surrounding the Mediterranean, the lime¬ stone quarries of the Greeks, the petrified for¬ ests of Nubia and the vast public works of Im¬ perial Rome, none of the writers of antiquity mention fossil plants, although some of them carried on a lively discussion regarding the na¬ ture of animal fossils. Petrified wood is not recorded until about the middle of the 13th century (Albertus Magnus) and fossil foliage not before the latter half of the 17th century (Major Lhwyd). The earlier commentators explained fossils as due to the mystical action of the stars or the mysterious working of spiritual forces like the vis lapidifica of Avicen-nia or the virtus formativa of Albertus Magnus or the stone-making spirit of Sperling. Nothing was farther from the accepted thought than that fossils were the remains of real organisms that once lived, the nearest approach to such a view being that they were some of the models used

by the creator, or that they had developed from abortive germs of animals and plants that had become lost in the earth. After the view that fossils were the remains of organisms had gained many adherents they were regarded as evidence of the universal deluge — an interpre¬ tation suggested by Martin Luther in 1539. This flood theory or diluvial hypothesis found numerous advocates throughout the 17th and even far into the 18th century. For example, in the transactions' of the Royal Society for 1757 James Parsons figures numerous fossil fruits from the early Eocene deposits of Shep-pey in the Thames estuary. These he thought would furnish evidence of the season of the year in which Noah and the rest of creation were obliged to take refuge in the ark, and he concludes from the maturity of these fossil fruits that the deluge commenced in the fall of the year and not in the spring as his con¬ temporary Dr. Woodward had supposed. Johann Jacob Scheuchzer (1672-1733) was the

great exponent of the flood theory, publishing his Herbarium Diluvianum at Zurich in 1709, and even figuring the bones of one of Noah's less fortunate brethren which he found among the fossil leaves at Ocningen and which sub¬ sequently proved to be the bones of a large Miocene amphibian. The flood theory passed through various phases of opinion. At first the fossil plants were regarded as similar to those still growing in the vicinity — a natural enough belief when the universal acceptance of the Mosaic cosmology and a world but 6,000 years old is borne in mind. Subsequently when the differences in the fossils became apparent they were thought to represent forms still existing in the tropics that had been swept to Europe and buried by the waters of the flood. When with the progress of knowledge of tropical nlants this last view became untenable it was thought that the fossils represented plants that had been exterminated by the fjood, and from this it was but a slight step to the opinion advocated by Volkmann, which appealed to many, that the antediluvian vegetation was of a far higher order than that of the present, with none of the thistles or other weeds of modern times, and that our modern forest trees are the degenerate descendants of delightful Adamitic fruit trees — a phytological fall paralleling and ascribed to the fall of man. Gradually it came to be recognized that fossil plants were not only un¬ like recent ones, but that they were very an¬ cient and not merely antediluvian, but pre-Adamitic, a view first advocated by Blumen-bach (1790). The first year of the 19th cen¬ tury saw the publication of the (Beitrage zur Flora der Vorwelt) by Ernst Friedrich von Schlotheim (1764—1832) in which 14 plates of fossil plants were published and these plants were segregated into 5 classes and 12 orders based upon the method of preservation. The next work of importance with a somewhat dif¬ ferent point of view, as its title indicates, was the (Versuch einer geognostisch-botanischen Darstellung der Flora der Vorweltd published in parts from 1820-38 by Kaspar Maria von Sternberg (1761-1838). The vegetation of the world was divided into three periods — an older insular period characterized by the coal plants ; a period marked by cycadean types, which cor¬ responds roughly with the modern Mesozoic, and a period introduced by fucoidal remains and characterized by dicotyledonous leaves, which corresponds with the modern Cenozoic. The real nestor of paleobotany, however, was Adolphe Theodore Brongniart (1801-76), son of Alexandre who was associated with Cuvier in his great work on the Paris Basin. Brong¬ niart commenced publishing on fossil plants at the early age of 21 and in 1828 in his Prodrome to the (Histoire des vegetaux fossiles) he drops the prevailing point of view

and treats fossil plants as none the less plants, endeavoring to fit them into the natural system of classification of Jussieu, and recognizing the true position of the gymnosperms a generation or more before the students of the modern conifers arrived at the same point of view. Brongniart maintained that there had been a steady progress from lower to higher forms. He believed in a gradu¬ ally ameliorating climate, and divided the vege¬ tation into four periods, the first extending from the beginning to the end of the Car¬ boniferous, the second corresponding to the

early Triassic (gres bigarre), the third includ¬ ing the later Triassic, the Jurassic and Cre¬ taceous, and the fourth making up the Tertiary and Quaternary or Cenozoic. He thus laid the foundations of the science in a broad way and was the inspiration of numerous students who grew to productivity under his tutelage and example. During the remainder of the 19th cen¬ tury a vast body of literature was built up by an ever-increasing number of students of whom the most illustrious were H. R. Goeppert (1800-84) of Silesia, Franz Unger (1800-70) of Styria, Oswald Heer (1809-83) of Switzerland, Gaston de Saporta (1823-95) of France and C. von' Ettingshausen (1826-97) of Austria. In Britain W. C. Williamson (1816-95), following the pioneer work of Witham (1833) and Bin-ney (1868), succeeded in placing the anatomical study of petrified plants of the Carboniferous on a solid foundation, and this phase of activity is still assiduously cultivated by a considerable number of contemporary British botanists, among whom D. H. Scott unquestionably stands at the head. In France the most active con¬ tributors in recent years have been Bernard Renault (1836-1904) to the anatomical side and C. Rene Zeiller (1847-1916) to all phases of the subject. Probably the most capable of con¬ temporary paleobotanists is A. G. Nathorst of Stockholm.

The pioneer workers in North America were J. W. Dawson (1820-99) in Canada, and Leo Lesquereux (1806-89) and J. S. Newberry (1822-92) in the United States. Unger in his (Genera et Species Plantarum FossiliunP had essayed a complete manual of the subject as early as 1850, but a sufficiently large body of facts had not yet been accumulated to give his work lasting value, although it was of immense importance at that time. This task was ac¬ complished by W. P. Schimper (1808-80) in three volumes of text and one of plates of the (Traite de paleontologie vegetale) (1869-74). A less usable work covering the same field in a different way was the (Paleophytologie) con¬ tributed by Schimper and Schenk to Zittel's (Handbuch der Palaontologie) which was com¬ pleted in 1890. More recently A. C.

Seward has essayed to cover the field in a four-volume work on fossil plants (1898-1918) in which little space is devoted to other than the morphological aspects of the subject and in which the flower¬ ing plants are entirely omitted. Other of the more important treatises on paleobotany are listed in the bibliography at the end of the article.

Methods of Preservation. — Fossil plants have been preserved by two principal methods. They either became water-logged and buried in sediment ranging from mud1 to sand, or were infiltered by some mineral solution or were replaced molecularly by silicic acid, cal¬ cium carbonate or other mineral substance. The first method is called inclusion and the degree with which the details are preserved in the resulting impression depends on the fineness of grain of the sediment. Very fine muds pre¬ serve every detail with great fidelity. There¬ fore shales, which are simply lithified muds, furnish beautiful fossils, as in the roofing shales that overlie so many coal seams. The redeposition of calcium carbonate in the form of travertine often entombs well-preserved plant remains as do the alluvial muds of river

Hood plains. Volcanic dust falling in water forms an admirable matrix. Impressions of plants constitute the bulk of the objects with which the paleobotanist has to deal. The sub¬ stance of the enclosed plant fragment may re¬ main as a carbonaceous film, it may be replaced by salts of iron or other mineral or it may be entirely dissipated, leaving merely the impres¬

sion. Occasionally lignified remains such as those from certain localities in the Upper Cre¬ taceous may retain their internal structure more or less intact and by special methods may be sectioned and studied microscopically. The fire¬ clays of the coal measures often furnish beauti¬ ful impressions in dark tints on a light drab background, and some of the ligiit-colored clays of the Upper Cretaceous of South Carolina, where the leaf substance has been replaced by iron oxide, yield handsome red impressions.

Plant remains are often found in a good state of preservation in nodules of iron or calcium carbonate. Coal or lignite beds are simply ex¬ amples of the inclusion of vegetable debris en masse. In coarse sediments, or occasionally in finer materials such as tuffs or travertine, more resistant objects like seeds or stem frag¬ ments have left nothing but the cavity or cast, and such objects often furnish satisfactory subjects for study. Amber or other fossil resin has also frequently preserved mum¬ mies of plants or other organic remains, especially delicate ob¬ jects like flowers. The cuticu-larized integument of pollen grains or spores is very resist¬ ant and is frequently preserved. Similarly the cuticles of leaves retaining the outlines of the epidermal, cells and the stomata are often found to be intact after the remaining tissues have become completely disorganized. These can sometimes be peeled from the fossils and mounted for microscopical examination or if this is impossible colloidan casts of the surface can be made and by the proper han¬ dling of the illumination yield satisfactory microscopic details. The second and third methods of preservation, or more gen¬ erally a combination of infiltra¬ tion and replacement, are usu¬ ally termed petrifaction. The internal structure of the plant material is conserved with more or less perfection according to the rapidity of permeation be¬ fore the tissues rotted and the completeness with which re¬ placement took place. If this happened before the tissues be¬ came disorganized thin sections may be ground and the his¬ tology elucidated. Petrified woods, especially of coniferous trees, either silicified, calcified or ferruginized, are common at many geological horizons. More delicate plant fragments are only rarely preserved in this way. Such remains, where the replacement has been by cal¬ cium carbonate, characterize cer¬ tain horizons of the English Coal Measures, and similar <(coal balls® have been discov¬ ered more recently in Moravia, Westphalia and Russia. Silici¬ fied plant fossils are found at certain horizons in the Fermian of Saint Etienne and Autun in France and often the most delicate thin-walled tissue such as cambium and phloem is well preserved.. The stumps of Cycadeoidea from the American Lower Cretaceous are silicified, usually denoting a burial in sandy deposits, and range in perfection from those of the Lower Cretaceous of Maryland which are little more than sandstone casts to some of the won¬ derfully preserved stumps of the Black Hills

Fig. 1. — Diagram Showing the Geological History and Increasing Complexity

of the Vegetable Kingdom.

and Wyoming in which even the embryos in the ovules are completely preserved.

General Principles.— The general principles which paleobotany has elucidated or illustrated can be but briefly indicated. First among these is the _ fact, roughly traced in the subsequent discussion, that the history of plants shows a gradual transformation from early simplicity to later complexity and a progressive differentia¬ tion of both structures and habits in the suc¬ cessively higher groups, thus exemplifying the universal principle of evolution. The original scene of plant activity was in the water. Gradu¬ ally the main theatre of operations was trans¬ ferred to the land and the distinction between vascular and cellular plants in this respect is analogous to the distinction between vertebrate and invertebrate animals. Each successive group of plants that appeared upon the scene illustrates a second great principle — that of adaptive radiation. That is, by progressive modifica¬ tions (the mutations of Waagen) groups be¬ came dominant, as, for example, the Lepidophytes, Arthrophytes and Pteridosperms of the Carboniferous or the Cycadophytes of the Mesozoic or the Angiosperms of the Cenozoic; their members became adapted for a great variety of environments and tended to occupy all of the available situations on the land or in some cases became secondarily adapted for an aquatic existence, like the water ferns or the various aquatic angiosperms. Paleobotany shows one group after another thus dominat¬ ing, becoming specialized during the process and then waning or becoming entirely extinct. The accompanying diagram illustrates the suc¬ cessive dominance of different plant types and the increasing complexity of the vegetable king¬ dom as a whole. (Fig. 1). Another principle is illustrated by the progressive loss of plasticity as organisms or organs became complex and specialized. It was the simpler organisms that outlasted the complex or gave origin to new types. The more complex lost their power of adaptability to change and readily succumbed when such changes in their

environment came. For example, it was not the complex arborescent lepidodendroids that gave rise to the modern club mosses, nor were the lofty calamites the progenitors of the modern mares tails, but in each case simpler forms saved the phylum from extinction. Fern synangia may have given rise to seeds by modification and peripheral steriliza¬ tion, but no seed has or ever will become modi¬ fied into a synangium. Thus evolution either of organs or organisms is non-reversible. The earlier forms of the successive plant groups, in accordance with the a priori conclusions of evolutionary philosophy, are in general syn¬ thetic or generalized in structure, i.e., they com¬ bine features of various categories that subse¬ quently became characteristic of diverging lines of evolution. Thus all of the earlier plants had motile Sperms, none had true vessels such as characterize the wood of angiosperms, cryptogamic or centripetal wood formation was an almost universal feature, and many other similar characters could be mentioned. The Sphenophyllales were synthetic in that they combined certain characters of their fern an¬ cestry with features that subsequently became stereotyped in the Lepidophytes and Ualamites — they are thus considered as representing an

approach to the common ancestor of the bal¬ ance of the Lepidophytes and of the Arthro¬ phytes. The earliest ferns show combinations of features that subsequently became the property of different fern families; while the Pterido¬ sperms combined the characters of ferns and cycadophytes. Another principle illustrated by paleobotany is that known as recapitulation, or the fact that, theoretically at least, the ontogeny or development of the individual is an epitome or abridgment of the phylogeny or development of the race. This principle is, however, diffi¬ cult of application since its underlying factors are unknown and the ontogeny may .show accel¬ eration, modification or obsolescence that renders the bearing of recapitulation question¬ able unless corroborated by other lines of evi¬ dence. A familiar instance of the retention by the seedling of ancestral adult characters is furnished by the conifers, most of which have needle leaves on the shoots of the juvenile forms while with age these needle leaves of the long shoots are replaced by scales as in an adult pine or become reduced to concrescent leaves with a cyclic instead of a spiral arrange¬ ment as in the juniper, or become reduced to scales while the shoot (phylloclad) functions as a leaf as in Phyllocladus. From these changes in foliage in the earlier part of the life his¬ tory of the various conifers it is inferred that the scale leaves of Pinus, the double leaf of Sciadopitys, the phylloclad of Phyllocladus, the concrescent cyclic leaves of the Cupressaceae and

the deciduous habit of the larch (Larix) and bald cypress (Taxodium) are all derived characters. Another principle is derived from the study of persistence of organisms or organs. Such conservative organisms as the Bacteria or the Cyanophyceae have existed unchanged for millions of years. Conservative organs are those like roots, whose functions and environ¬ ment have remained uniform for ages. Thus all roots are found to be much alike in their organization. Various enthusiasts have pro¬ claimed the conservatism of the vascular cylin¬ der, while others conceive that the parts con¬ cerned with spore or seed formation are more conservative. Foliage in general is apt to be conservative in both form and structure, as witness the similarities in the fronds of the Cycadophytes retained from the Permian to the present during which their stem structure and especially their fructifications varied through wide limits. Ginkgo leaves have an equally long history and many existing angio¬ sperms acquired their distinguishing leaf form during the Upper Cretaceous. Another general principle derived from the study of the geological distribution of plants — a prin¬ ciple for the most part unrealized by biologists or meteorologists — is that relating to geological climates, of which plants are the most satis¬ factory known tests. The early paleobotanists drew extreme pictures of former vapor-laden atmospheres and tepid torrid climates, but these are found to have no basis. On the other hand it has become increasingly clear of late years that the sort of climate under which the his¬ tory of man has been passed is an abnormal climate from the standpoint of geological his¬ tory. From the first appearance of terrestrial plants in the Devonian down to the present there are only two periods at which it is pos-

sible to distinguish anything approaching cli¬ matic zoning. For example, Devonian plants are known from Ellesmere Land on the north to Australia on the south and no differences are discernible in the floras from lat. 85° and those contemporaneous in central Europe. This uniformity and cosmopolitan distribution con¬ tinues throughout the Lower and Upper Car¬ boniferous. In the Permian, however, there are well-marked floral provinces succeeding widespread glacial conditions. Again from the late Triassic throughout the Jurassic and Cretaceous there were no polar, temperate or equatorial zones — the same plants are found within a few degrees of the poles as within a few degrees of the equator. Even in the earlier Tertiary tropical floras

extended half way across the temperate zones and temperate for¬ ests are known from within five degrees of the pole. At the close of the Tertiary the successive glaciations of the Pleistocene changed all this cosmopolitanism and to-day man is living in a Pleistocene climate, with well-marked cli¬ matic zones and seasonal variations. The prin¬ ciple may be stated thus : That for geological time, as a whole, climates have been more uni¬ form than at present and marked variations from this uniformity are occasional and are the concomitants of glacial conditions, both ap¬ parently the results of a similar but little under¬ stood cause.

Relation to Other Sciences. — Paleobotany both contributes to and borrows from the other earth sciences. Its relation to botany in the accepted sense of that term is peculiar since Paleobotany is the botany of all geological time while botany is that of but one geological period, namely — the present. It is now quite im¬ possible to obtain a broad foundation for phy¬ logenetic, morphological or distributional studies of existing plants without a consideration of their extinct ancestors. In the interpretation of the far distant past paleobotany and its sister science paleozoology contribute funda¬ mental data to geology, not only in furnish¬ ing the (<medals of creation,® which constitute the best basis for a geological chronology yet discovered; not only as comprising the subject matter of the biology of the past, which is a legitimate part of earth history; but in the elucidation of the climate and other physical conditions of past times, subjects which may be embraced under the terms of Paleoclimatology and Paleoecology. Paleogeography, or the Physical Geography of past times, also derives some of its most important facts from the study of the character and distribution of fossil organisms.

Thallophyta. — As a convenience and be¬ cause of their lack of importance as fossils the old term Thallophyta will be used for the great mass of thallus plants, formerly thought to constitute a single sub-kingdom but now known to represent several phylse. The thallophytes embrace plants of the simplest type, but they exhibit nevertheless a very wide range in the structure and degree of differentiation of the vegetative body and in their methods of reproduction. The plant body may be a single minute and often motile cell multiplying by fission, or the thallus may be an aggregate of cells with a well-marked physiological division of labor, and differentiated into parts analogous

to the roots, stems and leaves of the higher plants, and with a

corresponding histological complexity. The thallus best-known plants to the non-botanist are bacteria, such fungi as molds and toadstools and seaweeds. With but few exceptions marine plants are thallophytes, although immense numbers are also found in fresh water and in various terrestrial habitats. In general the larger and more com¬ plex are marine and some of these are among the most gigantic of plants. The thallophytes are primitive types and their existence unques¬ tionably antedates the geological record, al¬ though they are now known in considerable variety from the pre-Cambrian. They furnish little that is of paleobotanical interest since they are either so slightly resistant that they have left only illy defined impressions in the rocks, or, if they had hard parts as in the so-called calcareous algae, these, while they are often abundant, as in the various limestones of Paleozoic, Mesozoic and Cenozoic age, add little to the knowledge obtained from a study of existing forms. They are, however, of great philosophic interest since they point to the steps in the evolutions of the first life forms and since also they are unquestionably the ances¬ tors of the land plants which appear in the Devonian deposits and from which all of our existing terrestrial vegetation has been evolved. A few of the more important fossil types will be briefly enumerated. Proterozoic algae are represented by the large concentrically lami¬ nated calcareous deposits known as Cryptozoon, as well as by other forms referred by Walcott to the genera Weedia, Collenia, Newlandia, Kinneyia, Greysonia, *etc.* Thousands of ob¬ scure tracings in the Paleozoic and later rocks have been described as fossil seaweeds but large numbers of these supposed fucoids have been shown to be the casts of trails, burrows and similar tracks of worms, trilobites and other marine organisms while others are rill or cur¬ rent markings of non-organic origin.. Never¬ theless there is no reason for doubting the presence of algae from the pre-Cambrian on¬ ward, particularly when the supposed fossils show a carbonaceous residue as in the genus Spirophyton of the middle Devonian. The genus Nematophycus of the Silurian and De¬ vonian includes gigantic forms with their in¬ ternal structure preserved, the silicified stems of N. logani being sometimes several feet in diameter. The Diatomaceae (Bacillariaceae), whose siliceous frustules accumulate as oozes in the present marine and fresh waters, occur as fossils from the lower Jurassic onward. They are somtimes present in the Tertiary as relatively pure beds many feet in thickness and made up of billions of tests of these tiny forms, as in the Niocene Calvert formation of Mary¬ land and Virginia, or in the Pliocene of Cali¬ fornia. The Chlorophyceae of green algae in¬ clude many doubtful fossil forms and numerous others that are well authenticated, particularly in the somewhat unique group of Siphoneae. Joints of the.

verticillate or tubular calcareous forms occur in the older Paleozoic (Cambrian to Silurian) where they are represented by the genera Ascosoma, Primicorallina, Sycidium, Callithamnopsis, etc This type becomes ex¬ ceedingly common at certain Mesozoic and Cen¬ ozoic horizons, as in the Mediterranean Trias-PALEOBOTANY

sic (Diploporella, Halorella, Triploporella), or the middle Eocene of the Paris Basin. Asso¬ ciated with the foregoing-are species of Codiaceae (Girvanella, Sphaerocodium, Halimeda, Ovulites), Dasycladaceae (Acicularia, Cymo-polia, Vermiporella, Diploporella, Gyroporella) . The Characeae or Charophyta as they are some¬ times called are a somewhat isolated group of fresh and brackish water forms, the stoneworts. They are doubtfully recorded from rocks as old as the Devonian and their calcare¬ ous fruits (oogonia) are present in considerable abundance throughout the Mesozoic and Cenozoic. The Rhodophyceae (Florideae), or red

rangial growth and spore formation are pre¬ served (Peronosporoides). Other specimens show zygospores or conidia (Zygosporites, Cladosporites, Haplographites, Oochytrium, etc.). Foliage preserved as impressions fre¬ quently show traces of leaf spot or other fungi and many undoubted remains of this sort have been described. All of these types of fungal remains are exceedingly common at all hori¬ zons where petrified or other plant tissues oc¬ cur, but their nature largely precludes systematic study. It can be safely asserted that the fungi were of very ancient origin and were already present in great variety in the older Paleozoic.

[Courtesy of Johns Hopkins University]

Fig. 2. — Geological History of the Fern Phylum (Pteridophyta).

algae, include one family, the Corallinaceae, that is of considerable geological importance, being represented as early as the Ordovician by So-lenopora, and commonly throughout the Meso¬ zoic and Cenozoic (Lithothamnium, Lithophyl-lum) . These are the nullipores or reef-forming types. Paleozoic bacteria have been known since 1879 and a considerable number of supposed species have been described by Renault. Pro¬ terozoic bacteria have recently been described by Walcott. Traces of fungi are commonly met with from the Devonian onward. These are usually in the form of mycelial hyphae, both nonseptate (Phycomycetes) and septate (My-comycetes). They occur in fossilized plant tis¬ sues, and occasionally the minute spores or traces of oogonia or sporangia are present. Berry has recently described forms in petrified Eocene palm wood in which various stages of spo-VOL. 21 — 10

Microscopic forms of both algae and fungi are .present in abundance in oil shales and in some bog ores of iron from the Silurian down to the present time.

Bryophyta. — The Bryophyta or moss plants, comprising the existing mosses and liverworts (Hcpaticce) , which occupy so prominent a place in some evolutionary schemes are almost en¬ tirely unknown as fossils, and such as are known are either inclusive in character or con¬ fined to relatively recent periods. For a char¬ acterization of the Bryophyta the reader is re¬ ferred to the article Mosses. These plants were never of large size, nor have they ever become truly fitted for terrestrial existence. Their ab¬ sence in the geological record cannot be at¬ tributed to their perishable nature since much more delicate objects have been abundantly preserved at various geological horizons. While

they have been recorded from the Paleozoic, especially by the early students, these forms usually resolve themselves into fragments of Lepidophyte, Arthrophyte or Coniferophyte foliage. None are

conclusively known earlier than the Mesozoic and the liverworts ante¬ date the true mosses in the record, furnishing therefore conclusive evidence of the latter group being unknown in rocks older than the Tertiary.

Pteridophyta. — The Pteridophyta as here understood is restricted to the fern phylum — the Filicales — the so-called fern allies (club mosses and horsetails) being grouped in the phylae Arthrophyta and Lepidophyta. The Pteridophyta are a very ancient stock, always megraphyllous and phyllosiphonic. The fructi¬ fications are borne upon but slightly modified foliage leaves and were never strobiloid. The known forms are prevailingly homosporous, although heterospory must have been evolved early in their history since the Pteridosperms are clearly derived from the early, at least pre-Devonian fern stock. Among existing ferns the Rydropterales, or so-called water ferns, of somewhat questionable relationships, are also heterosporous.

Living ferns are usually segregated into two major groups — the Eusporangiate and Leptosporangiate according as the sporangium develops from a group or from only a single cell. While this distinction is not without ex¬ ception, it is one not observable in fossils, where the mature features must be relied upon. On the whole the Eusporangiate sporangia are large, attached by a broad base, with a wall more than one cell thick, and without a definite annulus, though some of the cells may foe thickened ; moreover in the Marrattiales, one of the important orders from the paleobotanical viewpoint, the sporangia are united to form synangia, which by some students are thought to be a modification of the sporangiophore so prominent in the Arthrophyta, and vestigial in the Lepidophyta. In the present treatment the Pteridophyta are segregated into the four classes — Coenopteridae, Eusporangiatae, Lepto-sporangiatae and Hydropteridae — which will be considered separately.

The Coenopteridae or Prinofilices comprise a group of Paleozoic ferns known almost en¬ tirely from the anatomy of stems and petioles, the features of which are probably overesti¬ mated in discussing their inter-relationships. The group is considered to have been much wider than is indicated by our knowledge of the two families Botryopteraceae and Zygopteraceae, and in the accompanying phylogenetic diagram is used as the starting point of the fern phylum.

Without attempting to formulate ‘the theoretic charters of the Eofilices or setting diagnostic bounds to the Coenopteridae as here used we may pass to a brief consideration of the two known families.

The Botryopteraceae at present embraces three genera- Grammatopteris and Tubicaulis based upon Permian stem anatomy and Botryopteris based upon stem and sporangial struc¬ tural remains ranging in age from the Lower Carboniferous to the Permian. Little is known of the habits or fronds of these types and they have not been definitely correlated with ma¬

terial preserved as impressions. They had slen¬ der monostelic stems exarch in Grammatopteris and Tubicaulis, endarch in Botryopteris, with scalariform or reticulate tracheids. In B. forensis the sporangia were pedicellate in groups of from two to six on the ultimate divi¬ sions of compound fronds. They were pyri¬ form with walls of two layers of cells and on one side had an annulus several cells in width suggesting comparison with the Osmundales. The leaftraces vary from rectangular in Bram-matopteris and oval in some species of Botry¬ opteris to omega shaped in other species of that genus.

All known Botryopteraceae were small plants thought to have had slightly fleshy pinnules, and abundantly clothed with epidermal hairs.

The family Zygopteraceae is based largely on a variety of structural remains of petioles, ‘although the stem anatomy and sporangial structure are known in several instances. They range in age from the Devonian (Clepsydrop-sis) to the Permian. The leaf traces show a variety of complexities of form and histology and in cross section range from an hour glass or H shape to the stellate form of Astero-chlsena.

The sporangial characters show considerable variation. In Zygopteris the sporangia were grouped and annulate much as in Botryopteris. In Diplolabis and Stauropteris an annulus was not developed; the former had the sporangia grouped in sori or synangia while in the latter they were borne singly on the ultimate divisions of the frond. The class as a whole shows re¬ lationships with the Ophioglossales, Osmundales and Marattiales.

The Eusporangiate class of ferns comprise two known orders, the Ophioglossales and Marattiales, the former regarded as very primi¬ tive by. most students and but slightly repre¬ sented in the fossil state, although the Paleo¬ zoic Rhacopteris and Ophioglossites and the Mesozoic Chiropteris have often been consid¬ ered as representing this order.

The Marattiales, on the other hand, had an extended geological history. In the present state of our knowledge, confused as it is by the resemblance of Pteridosperm microspo¬ rangia to Maratteaceaus synangia, it is difficult to give a satisfactory estimate of the relative importance of the Marattiales in the Paleozoic, but they certainly occupied a prominent posi¬ tion, and this prominence, rests on the evidence of the cosmopolitan frond genus Pecopteris, the stem anatomy of the forms referred to Psaran-ius and its allies, and upon a variety of fruc¬ tifications. The Psaroniaceae were tree ferns sometimes 50 feet or more tall, with fronds in cases where actual connection has been estab¬ lished of the Pecopteris type, and arranged in crowded spirals (Psaronius polystich-Caulop- terius impressions), in four vertical rows (Psar¬ onius tetrastichi) or in two opposite vertical rows (Psaronius distichi-Megaphyton impres¬ sions). A very large number of species have been described from the Upper Carboniferous and Permian. They have been favorite objects of histological investigation since they are com¬ mon in a petrified condition in Saxony, France and elsewhere. Anatomically the stems have a complex system of laterally elongated, concen¬ tric curved steles of scalariform tracheids sur¬ rounded by phloem and immersed in a paren-PALEOBOTANY

chymatous ground mass with some sclerotic bands below the leaf gaps. Some of the poly¬ arch roots show secondary wood but none has been observed in the stems, the central one cauline and the outer ones giving off numerous leaftraces and adventitious roots. Outside the sclernchymatous zone which bounds the stem proper is a very broad zone, formerly thought to be cortical, consisting of closely packed ad¬ ventitious roots embedded in a dense felt of hairs which spring from both the stem and the roots. The petioles usually show a single horse¬ shoe-shaped trace although sometimes a second lies within the first. The occasional presence of lacunae in the root cortex of some of the species suggests a swampy substratum.

Pecopteris fronds represent the one type among the many familiar fernlike fronds of the Paleozoic that is frequently found in a fruiting condition. Some have been demon¬ strated to have been borne upon Psaronius stems and this is probable of the majority. The fructifications are of a variety of types. Those known as Asterotheca

had large synangia in two rows one on either side of the median vein on the under surface of the pinnules each consisting of five or six sac-like confluent spo¬ rangia forming a close ring. Other confluent synangia known as Ptychocarpus characterize an Upper Carboniferous and Permian series of Pecopterids. These synangia consist of five to eight Sporangia united laterially to form a close ring and adherent to a central receptacle and embedded in continuous enveloping tissue. They discharged their very numerous small spores through apical pores and greatly resemble the arrangement in the modern genus Kaulfussia. A third Paleozoic type is Danaeites and Parape-copteris in which each pinnule bore two con¬ tinuous rows of ovid sporangia more or less united and embedded in the lamina and opening by apical pores. A fourth type known as Scolecopteris shows the sori in two rows and consisting of four or five long-pointed pendant sporangia more or less confluent proxmiad united internally for about one-third their length to a central stalk, suggestive of the modern genera Marattia, Kaulfussia and Angiopteris, particularly the first. Other fructifica¬ tions (Grand 'Eurya, Dactylotheca) have par¬ tially or entirely free exammulate sporangia. Many other supposed marattiaceous fructifi¬ cations have been described from the Paleozoic rocks, e.g., Hawlea, Urnatopteris, Renaultia, Sphyropteris and Discopteris.

The Marattiales were represented in Triassic floras by numerous widespread forms variously referred to the genera Marattia, Marattiopsis. Angiopteridium, Angiopteris, Danaea, Danseop-sis, Pseudodonceopsis, Asterotheca, Tseniop-teris and Macrotaeniopteris. They occur on all the continents and make a particularly large display in the late Triassic (Keuper and Rhaetic) at which time palustrine, often coal-form¬ ing, conditions with apparently identical species of plants occur from the Arctic to the Antarctic and from Tonkin and Australia to Virginia. California and Chile. The identity of these Triassic Marattiales with existing forms rests on the form and venation of the fronds, the arrangement and structure of the sporangia, and even the spores.

The Marattiales were less dominant in the overlying Jurassic and they were still more

reduced during the Lower Cretaceous (Angiop¬ teridium, Nathorstia, Taeniopteris) .

Subsequent to Lower Cretaceous times Marattiaceous remains are

infrequent although occasionally brought to light in the Upper Cre¬ taceous and Tertiary. A Marattia is described from the English Eocene and a second from the French Oligocene.

The order Osmundales includes the two re¬ cent genera Osmunda and Todea with large sporangia arranged in small groups, in linear and often confluent sori, or clustered around the axis of the much reduced fertile pinnae. An annulus is represented by a group of thick-walled cells below the apex. These stand some¬ what apart from the balance of existing ferns and are wide-ranging forms, some of which are found on all the continents, Osmunda being cosmopolitan and Todea antipodean. Aside from morphological considerations the evidence that _ the Osmundales constitute a relatively primitive line of fern evolution is furnished by impressions like Todea Lippoldi Slur from the Lower Carboniferous of Silesia, petrified spo¬ rangia such as Todeopsis primceva Renault from a similar French horizon or Sturiella from the German Upper Carboniferous, and finally by the phylogenetic series of petrified stems de¬ scribed by Kidston and Gwynne Vaughan, among which the genera Bathypteris, Anomor-rhcea, Thamnopteris and Zalleskya come from the Upper Permian (Thuringian) of the Ural region. Space does not permit a description of their histology but it may be pointed out that the order appears to have been derived from an ancestor with a solid stele like the Ccenop-teralian species Diplolabis Rcemeri and to have undergone an evolution more or less paralleling that of the Zygopteraceae. The stem is contin¬ ued by Jurassic and Lower Cretaceous species of Osmundites from South Africa, New Zea¬ land and Canada, and by Tertiary species from England, South America and Hungary. Im¬ pressions of both sterile and fertile fronds allied to Todea are abundant and cosmopolitan in the late Triassic and Jurassic and continue into the Cretaceous, while Osmunda-like fronds are common throughout the Lower and Upper Cretaceous and Tertiary in all parts of the world.

A class of ferns including the existing hetero-sporus Rhizocarps or so-called water fern in¬ cludes the order Hydropterales and possibly an extinct order the Sagenopterales. The two ex¬ isting families, Marsiliacese and Salviniaceae, are small, more or less widespread aquatic forms. The Salvinaceae contain the genera Azolla and Salvinia with between 15 and 20 existing species of the warmer regions and the leaves of the latter, not appreciably different from those of the existing species, are found throughout the Tertiary period.

The Marsiliaceae consists of three genera — the monotypic Brazilian Regnellidium, Pilularia with about six species and Marsilia with over

50 widely distributed existing species. The last has been found fossil as early as the Upper Cretaceous but is rare and more or less un¬ certain in the fossil state. The extinct genus Sagenopteris is based for the most part on groups of two to five large asymmetrical reticu¬ late veined pinnules borne digitately at the apex of a long and rather stout stipe, and

found as impressions from the Triassic to the Cretaceous. Associated with some of the older forms are oval or spherical bodies thought to represent sporocarps.

The remainder of the living and fossil ferns excepting certain illy understood extinct types such as the Devonian and Lower Carboniferous Archseopteridae and the Mesozoic Tempskya, may be grouped together in the Leptosporangiate or Eufilicalean order Polypodiales, al¬ though there is some evidence for recognizing the Gleicheniales and Matoniales as independent orders.

The Polypodiales embrace the great majority of living ferns and include the most specialized and abundant families. Without taking space to give their diagnostic characters, it will be de¬ sirable as well as interesting to glance at the geological record of the various families.

The family Schizaeacese with between 75 and 100 existing, mostly tropical species, segregated into the genera Schizaea, Lygodium, Mohria and Anemia, appears to be present as early as the Upper Carboniferous in the genus Senftenbergia. Triassic forms are not cer¬ tainly recognized but the Jurassic genus Klukia shows fructifications that render its reference to this family conclusive. During the Lower Cretaceous the genus Ruffordia of Europe and America appears to represent the genus Anemi while Schizaeopsis, found in a fruiting condition in the Lower Cretaceous of Virginia, represents Schizaea. The genus Acrostichopteris, based upon sterile fronds which range from the bottom to the top of the lower Cretaceous, and found in both Europe and America also almost certainly represents an extinct type belonging to this family. In the Upper Cretaceous petrified sporangia

of the Schizaea type have been found in Japan (Schizceopteris mesozoico) . Undoubted species are common and widespread during the Tertiary.

The ‘family Gleicheniaceae embraces about 100 tropical and subtropical gregarious species now segregated to form the genera Gleichenia, Platyzoma, Dicranopteris and Stromatopteris — the last monotypic on New Caledonia and Platyzoma monotypic in northern Australia. The family is evidently an old one and appears to be present as early as the Carboniferous in the genus Oligocarpia which had sphenopte-roid foliage and circular sori consisting of from 6 to 10 pyriform sporangia with a com¬ plete transverse annulus (Zeiller 1888, vide Scott, 1908). The Carboniferous genus Gleich-enites Gbppert and the dichotomous branch¬ ing genera Mariopteris Zeiller and Diplothmema Stur are all now considered as probable Pteridospermophytes and it is evident that the Gleich-enoid habit of growth was common in both Paleozoic and Mesozoic and is without especial bearing on botanical relationship. The family is not known to have been abundant in the Triassic or Jurassic, the Keuper genus Merten-sides of Fontaine being often referred to the Marattiales. A species of Gleichena with well-marked fructifications is, however, recorded from the Keuper of Switzerland and the genus is known from the Rhaetian of Franconia. Juras¬ sic species are recorded from California, India, Italy and Poland. Throughout the Cretaceous Gleichenia becomes almost worldwide in its

distribution. While the number of species has probably been excessively multiplied the records show 15 Lower Cretaceous forms. No less than 25 different species have been re¬ corded from the Upper Cretaceous. Gleichenia becomes much less abundant in the Tertiary and all of the known Tertiary records are pre-Miocene. Four species are known — two Oligocene species in Saxony, an Eocene or Oligocene species in Nevada and a middle Eocene species in the south of England.

The family Matoniaceae, with but two ex¬ isting species of Borneo and the Malay Penin¬ sula, was prominent in older Mesozoic floras from the Upper Triassic through the Jurassic, at which time it was represented by a variety of widespread species referred to the genera Lac-copteris and Matonidium. Still more inter¬ esting is the family Dipteriaceae with a single existing genus, Dipteris, with but four species confined to the Malayasian region and found growing in association with Matonia. The Dipteriaceae became dominant slightly

earlier than the Matoniaceae and the magnificent fronds of some of the species are exceedingly common in the Triassic at which time the genera Dictyophyllum, Clathpopteris, Thauma-topteris and Camptopteris are represented. They had lyre-shaped fronds of large size, consisting of many separate or slightly united, serrate-margined and netted-veined pinnules, arranged digitately on a forking stipe. Clathropteris and Dictyopillum survived into the succeeding Jurassic where they were on the wane, becoming replaced in the Cretaceous by forms more like the modern Dipteris and re¬ ferred to the genus Protorhipis (Hausmania).

The family Hymenophyllaceae, comprising the existing filmy ferns, is practically unknown in the fossil record although several Paleozoic genera (Hymenophyllites, Rhodea, Acrocarpus) have been referred to it upon insufficient grounds.

Without mentioning the various small mod¬ ern families unknown in the fossil state there remains the two families Cyathaceae and Polypodiaceae. The former are almost exclusively tree ferns in the modern flora. They are represented in the Mesozoic by Coniopteris, Dicksonia and Thyrsopteris, to which Denn-staedtia is added in the Tertiary.

The Polypodiaceae, which comprise the bulk of existing ferns and exhibit a very great vari¬ ety in form and habit, are relatively modern. Some at least of the older Mesozoic species which are referred to the form genus Cladolphlebis belong to this family. Cladolphlebis which appeared in the Triassic became cosmopolitan in the Jurassic and Lower Cretaceous where it was associated with species of Onychiopsis, Asplenium, Dryopterites, *etc.* Pteris, Onoclea and other genera are added in the Upper Cre¬ taceous and a great variety of generic types appear in the Tertiary (Adiantum, Polypodium, Acrostichum, Oleandra, Woodwardia* etc.).

Arthrophyta. — The Arthrophyta constitute a well-marked phylum and comprise plants ranging in size from herbaceous forms to large trees and found from the oldest horizons con¬ taining land plants down to the present. They are characterized by invariably articulated and prevailingly-ribbed stems, the leaves in whorls (verticillate) at the nodes and free or more or

less connate, dichotomously compound in the earlier groups (Pseudoborniales, Protocalamariaceae), palmately laciniate in some Spheno-phylleae, progressively reduced during the his¬ tory of the phylum until in the modern forms the stems and branches perform most of the photosynthesis. They are all sporangiophoric and strobiloid, although there is a considerable ranere of variation in morphological and histo¬ logical details. Some are homosporous and others heterosporous. The phylum is unique in that it attained its maximum development in the Paleozoic and has been practically unrep¬ resented since Triassic times except by the single genus Equisetum, which survives to the present with less than two score ubiquitous and rather uniform species. The phylum appears to have been of Pteridophytic origin and to have been primitively megaphyllous. Taxonomically it corresponds rather closely with the Articulatse of Lignier and the Sphenopsida of Scott. As known at the present time it consists of two classes — the Sphenophyllae and the Calamarise, and the latter includes three rather well-defined groups or orders, namely — the Psuedo-borniales, the Equisetales and the Calamariales — the last including two families, the Protocalamariaceae and the Calamariaceae.

The most primitive of these subordinate groups constitutes the class and single order Sphenophyllales of the class Sphenophylke. This was a synthetic alliance of mostly small forms that combined certain fern characters with those of the Calamarise on the one hand and the Lepidophyta on the other. They are regarded as representing the specialized de¬ scendants of a pro-Sphenophyllum stock which was more truly intermediate between the Arthrophyta and Lepidophyta and which is sup¬ posed to have flourished in pre-Devonian.

Sphenophyllum ranged from the Devonian to the Permian and was practically cosmopolitan except for its partial extinction in Gondwana Land during and immediately subsequent to the Lower Permian glaciation. A considerable num¬ ber of rather uniform species based for the most part upon the impressions of the slender jointed ribbed stems with nodal whorls of cuneate leaves (hence the generic name) are known. The ribs did not alternate at the nodes and consequently the leaves of successive whorls were superposed and not alternating. The leaves, normally six to a whorl and cuneate with entire or toothed

apical margins, were fre¬ quently dichotomously laciniate and in some forms with numerous narrow leaves in each whorl these are legitimately regarded as cor¬ responding to the laciniate segments of the digitately-leaved species. The stems branched frequently at the nodes. The fructifications were fairly large cones, superficially resembling those of calamites. The stem anatomy was characteristic and sufficiently unique. In the centre there was a triangular strand of primary wood without any pith or parenchyma and either triarch or hexarch in structure, with the protoxylem or primitive spiral elements at the angles and centripetal in its development. The spiral elements sometimes pass into articu¬ late tracheids and the later and more central tracheids are pitted. Secondary wood formation commenced early in the ontogeny by the activity of a normal cambium. The secondary wood

had its elements very regularly arranged and consisted of radial series of large tracheids with bordered pits, chiefly on their radial walls. Interspersed among the tracheids were vertical strands of parenchyma connected radially by short cells or strands that did not form con¬ tinuous medullary rays. Beyond the normal cambium was the phloem surrounded by internal periderm formed by a phellogen, first in the cortex and subsequently passing inward until it arose in the phloem itself. In Sphenophyllum insigne, a Lower Carboniferous form of Britain and Silesia, the stem was rather larger than the average although still not over a centimeter in diameter, and differed in having continuous medullary rays, so that the complicated system of vertical and radial parenchyma of the later forms may have been a derived rather than a primitive feature. The leaf anatomy presents no unusual characters except its strong mechani¬ cal construction, thus precluding the idea ad¬ vanced by some botanists that the Sphenophylla were aquatic forms. The root anatomy shows no features of special interest. At least seven types of cone organization are known, indi¬ cating generic differences unsuspected from the external appearance or vegetative habits of the plants. In some fructifications the slender cones consisted of a central axis with whorls of proximally connate bracts, the latter with long imbricated pointed tips. Each bract bore two slender, one long and the other short stalked sporangiophores, so that there were two con¬ centric series to each whorl of bracts. A single pendulous sporangium was borne at the tip of each sporangiophore. The spores were some¬ what variable in size which has been inter¬ preted as indicating incipient heterospory and appear to have been all of one kind. A second type (Bowmannites) had similarly connate whorls of imbricated fracts, each of which en¬

closed three concentric verticils of short-stalked bisporangiate sporangiophores. A third type (S. fertils) had peltate bisporangiate sporangi¬ ophores but was unique in that both the dorsal and ventral lobes were fertile, i.e., the sterile bracts or morphologically dorsal foliar lobes were replaced by sporangia-bearing fertile lobes. A fourth type (S. majus) had lax cones made up of repeatedly forked bracts each with four sessile or verv short-stalked sporangia on their upper (morphologically ventral) surface. A fifth type (S. trichomatosum) had a single sporangium near the axis on each bract. In a sixth form (S . marginatum) the sporangi¬ ophores were borne on the axis instead of on the bracts. A seventh and remarkably com¬ plicated type known as Cheirostrobus is often made the type of a distinct family, the Cheiro-strobaceae. It is unfortunately known only from a few petrified cones from the base of the Lower Carboniferous of Scotland. These cones were large, three to four centimeters in diameter and about 10 centimeters long, and consisted of closely packed verticils of compound sporophylls, each consisting of three upper (ventral) fertile lobes and three lower (dorsal) sterile lobes. Each of the fertile lobes or sporangi¬ ophores bore four radially elongated homo¬ sporous sporangia. The second class of arthrophytes — the Calamariae, include three or¬ ders, the ancient Pseudoborniales, the Calamari¬ ales comprising the large and diversified calam-

ites of the Paleozoic and the Equisetales, spar¬ ingly represented in the Paleozoic, somewhat more abundant in the Mesozoic and represented in the existing floras as the sole survivors of the whole arthrophyte phylum. The Pseudoborniales are imperfectly known, being based upon impressions from the upper Devonian of Bear Island. The main stems were of consid¬ erable size, reaching 10 centimeters in diam¬ eter, with non-alternating ribs. The leaves, of relatively larger size, were in whorls (probably in fours) short-stalked and palmately and re¬ peatedly dichotomous. The fructifications were long, lax cones with whorled sporophylls re¬ sembling reduced vegetative leaves and the sporophylls bore sporangia on their lower sur¬ faces. These important plants, unfortunately too little known, show decisive evidence of mega-phyllus ancestry. The Protocalamariaceae, which are common in the Devonian and Lower Carboniferous, occurring as late as the Pottsville formation of the Upper Carboniferous, are generally referred to the genus Archse-

ocalamites, although the terms Bornia, Proto-calamites, Asterocalamites, etc., have also been used. The stems most frequently preserved as casts were often of considerable size; they show low, flat, non-alternating ribs separated bv shallow furrows ; the internodes were of unequal lengths and the lateral branches were irregularly grouped at some and not at other nodes. The leaves were free and in whorls ; they were narrow and lanceolate or repeatedly dichotomous with linear or filiform segments. According to Renault the pith cavity was large and surrounded by a woody cylinder of wedge-shaped groups of tracheids with secondary rays. A carinal canal was located at the apex of each primary group and the primary rays were shut off by interfascicular wood early in the course of secondary thickening. In a stem from the basal Carboniferous of Scotland a considerable arc of centripetal wood was formed inside the carinal canal. Such incomplete accounts as are available indicate that the cones may have ex¬ hibited variations comparable with those among the Sphenophyllas. In the cones described by Renault there were no sterile bracts and each sporangiophore bore four sporangia, while in other cones (Pothocites) sterile bracts appear to have been more or less developed. The leaves suggest the Pseudoborniales and some of the Sphenophyllse ; the stele was like that of a calamite, while the absence of sterile bracts in some of the cones suggests the Equisetales. There can be no doubt but that the Proto¬ calamariaceae represent a more synthetic group than the Calamariaceae although probably an¬ cestral to them and the Equisetales. The fam¬ ily Calamariaceae was one of the dominant groups of plants during the Carboniferous and various of its members often reached a large size with a corresponding complexity of struc¬ ture. Pith casts upwards of 30 feet in length and 12 inches in diameter have been recorded and Grand'Eury estimated the height of some of the French calamites as about 100 feet and with a trunk diameter of several feet. Second¬ ary wood was usually formed, although the common mode of preservation was as casts of the fistular medullary cavity. The vascular bundles usually alternated at the nodes. The

foliage of the Carboniferous forms comprised two main types, namely, Asterophyllites, in which the leaves were linear univeined and gen¬ erally free from the others of the nodal whorl. This type of foliage was very common and it would seem that the bulk of the calamites had foliage of this sort. The second type of foliage known as Annularia was like the former in habit but the leaves were relatively broader, of unequal lengths in each whorl, and appear to have been slightly connate proximad. It is impossible to correlate foliar branches with stem casts, cones and structural material, so that while all of the parts

of the calamites are well known, in different examples it is neces¬ sary to maintain these different categories for the different classes of remains. The foliage varied considerably not only from species to species, but on the same plant, and while the two foregoing types constitute useful form genera it is not always possible to differentiate sharply between them. The genus Nematophyllum of the West Virginia Permian shows greatly elongated linear leaves from 10 to 20 in a whorl and suggests a modification in the di¬ rection of the Triassic Schizoneura and Neocalamites. Schizoneura, a type of the Permian and Triassic, had leaves which were at first united in a sheath or in several broad sheath segments that subsequently split into a varying number of multiple-veined divisions. Neocalamites of the Triassic had free univeined leaves in some of the late Triassic species greatly re¬ sembling those of Annularia. Phyllotheca, a Permian and early Mesozoic type, had acicular slightly connate univeined leaves and sporangia borne on peltate sporangiophores alternating with whorls of sterile bracts. Nematophyllum, Schizoneura, Neocalamites and Phyllotheca are all based upon impressions so that a knowledge of the structure or the details of organization of their fructifications is unfortunately wanting. Structurally calamite leaves show a central trace surrounded by a broad zone of mesophyll. Sev¬ eral generic types of calamites have been based upon stem anatomy. These include Arthropitys Uhe Calamites vara of British botanists) in which the pith was large and hollow except peripherally, with persistent diaphragms at the nodes. Surrounding the pith was a ring of collateral vascular bundles, the protoxylem in all but the youngest stems being disorganized to form longitudinal passages known as carinal canals. The wood was entirely centrifugal in its development. Secondary wood formation started early and consisted of scalariform or radially pitted tracheids and variable rays which continued with undiminished width through the vascular cylinder or tapered outward or were abruptly shut off by interfascicular wood. The cortex consisted of an inner thin-walled zone of cells and an outer denser zone in which there was a very great development of periderm. The courses of the leaf traces was somewhat varied and more complicated than in the Equise¬ tales, otherwise Arthropitys was much like an Equisetum with the addition of secondary thick¬ ening. A second type known as Anthrodendron and confined to the British coal measures had a thin zone of wood in which the primary bundles .were widelv separated by the principal rays which consisted of elongated fibrous ele¬ ments (prosenchyma) within which there were

secondary rays of parenchyma like those of the secondary wood. In the latter the tracheids are reticulate and the infra nodal canals very large. A third type, Calamodendron, of the European Upper Carboniferous and Permian, had radical bands of prosenchyma containing secondary rays between the normal rays and the radial bands of secondary wood. The roots of calamites preserved as impressions, of wide¬ spread occurrence, are known as Pinnularia. Structural root material, known as Astromyelon, shows a usually persistent pith surrounded by a ring of centripetally developed primary wood alternating with groups of primary phloem. The

alternate equidistantly with usually twice as numerous sterile bracts, connate or free basally flexed and imbricated proximally. In some species the spores appear to be all of one kind (homosporous) , although they are somewhat unequally developed. Other species were hct-erosporous although both microspores and meg¬ aspores were borne in the same region of the cone. Still other species had radial sterile plates connecting the sporangiophores with the ad¬ jacent bracts, thus enclosing each group of four sporangia in a radial compartment. Although the sporangiophores were borne on the cone axis midway between the whorls of sterile

zone of secondary wood was wide; the endo-dermis appears to have been double ; and the cortex was very thick with large lacunar inter¬ cellular spaces, denoting a swampy or aquatic habitat. Great numbers of a variety of calamite cones are known from impressions, as the large cones of Macrostachya, the more openly con¬ structed cones of Huttonia, and the curious cones of Cingularia. The two types Calamostachya (Volkmannia) and Palaeostachya are also represented by a considerable amount of petrified material with the structure preserved. In Calamostachya the whorls of peltate sporan¬ giophores, each bearing four pendant sporangia

bracts their supplv bundles have a common origin forking at the nodes

and that of the sporangiophore passing upward more or less across the interval of the internode and then bending downward and entering the sporangi¬ ophore, thus indicating that although widely removed from the bracts the sporangiophores were morphologically their ventral appendages as in Sphenophyllum. Calamostachya is usu¬ ally, but not invariably, associated with the Asterophyllites type of foliage. Petrified mate¬ rial of Palaeostachya is less common than that of Calamostachya. The former cones differ in having the sporangiophores inserted in the axils

of the bracts and inclined upward — features usually discernible in impression material. The bracts were imbricated and more or less connate proximad. The sporangiophores, half as numer¬ ous as the bracts, bore four pendant sporangia from their peltate tips. Some cones appear to have been homosporous and others heterosporous. It has been commonly assumed from the axillary position of the sporangiophores that Palaeostachya was more primitive than Calamostachya, but in one species at least of the former the supply bundles pursue a similar at first ascending and subsequently descending course similar to what obtains in Calamostachya.

the bracts. The sporangiophores were ligulate and divided distad and each division bore two large pendant sporangia.

The final order of the Calamanae, the Equisetales, consists of the single family Equisetaceae and comprises at the present time the single genus Equisetum with 25 to 30 rather uniform, widely distributed, mostly small and chiefly temperate species of scouring rushes or mares' tails. The cones are terminal on fertile shoots or on branches from the vegetative shoots and entirely lack sterile bracts. They consist of peltate sporangiophores carrying from five to 10 homosporous sporangia. The rhizomes or

Some of the Palaeostachya cones were of large size and they are usually associated with the Annularia type of foliage. Macrostachya is the name applied to exceedingly large cones of calamites preserved as impressions. They show considerable variation and are said to have been heterosporous. Huttonia includes large cones somewhat resembling those of Macrostachya but more open and characterized by a disc-like protective flange pendant from the bract whorls. Cingularia comprises long and lax cones with widely spaced whorls of coherent bracts at right angles to the axis, subtended by whorls of non¬ alternating sporangiophores, equal in number to

underground stems of the species with annual shoots commonly form tubers and these often occur abundantly as fossils as in the Lower Cretaceous of Maryland. The Equisetales were represented by a number of small and imper¬ fectly known Paleozoic species referred to the genus Equisetites. During the Triassic they were represented throughout the world by stem casts, often of large size, with alternating ribbed stems and the leaves united into sheaths at the nodes. They continued as not uncommon types throughout the Jurassic in all parts of the world, decreasing gradually in size and abundance dur¬ ing the later Mesozoic until their status and

size in the Cenozoic floras was much as in the existing flora.

The generalized geological ranges of the various arthrophyte groups as well as their relative importance at different periods and their filiation are shown in the accompanying dia¬ gram (Fig. 3).

Lepidophyta. — The Lepidophyta occupy a somewhat isolated position among vascular plants although there are not wanting students who connect them with the Hepaticae or the Spenophyllales on the one hand, and with the seedbearing plants on the other The phylum includes the tiny existing quillworts and herba¬ ceous clubmosses as well as the often gigantic Lepidodendrales which occupied such a

promi¬ nent position in Paleozoic floras.

Features which serve to unite the somewhat diverse members of this phylum are the small simple leaves, spirally arranged and not vertil-late as in the Arthrophyta. All the known Lepidophytes are microphyllous, the only departure from a simple type of leaf being-the double leaftrace in the Paleozoic Sigillariopsis. A second consistent feature is the presence of branch gaps and the absence of leaf ga'ps in the vascular cylinder, which is thus cladosiphonic, with an exarch protostele. A third feature is the apparently simple relation between the spo¬ rangium and the sporophyll, which can be inter¬ preted as due to progressive sterilization ac¬ cording to Bower's well-known theory, or may be explained as a reduction from the same or similar sporangiophoric ancestors that give rise to the Arthrophytes phylum.

The Lepidophyta are prevailing strobiloid and are known from the Devonian to the present. Some are homosporous, other heterosporous while still other Paleozoic forms had practically crossed the boundary that separates spore production from seed formation. Fur¬ ther details are best given in the discussion of the various types which follow. The mutual relationships of the different members of the phylum are shown in the accompanying dia¬ gram (Fig. 4) and in the light of present knowledge may be expressed in tabular form in the following manner:

Order Lypidodendrales

Family Bothrodendraceae Lepidodendraceae Sigillariaceae

_ , T .. , (Family Lycopodiaceae

Order L.ycopodmles j " Selagmellaceae

Order Isoetales— Family Isoetaceae Order Psilo tales— Family Psilotaceae

It will make for clearness to consider the existing forms and their fossil representatives before describing the wholly extinct Lepidoden¬

drales. The Lycopodiales comprise two fam¬ ilies. The Lycopodiaceae include two genera, Lycopodium . and Phylloglossum. Lycopodium has about 100 widely distributed existing species of mostly perennial erect or trailing herbaceous forms of Shaded woods, marshes, etc., some tropical species, epiphytes. But one kind of spores are formed and the sporangia are borne on or in the axils of scarcely modified foliage leaves more or less distinctly aggregated into strobili.

Fossil species of Lycopodium or Lycopodites, which is often preferred as a less definite name, are especially liable to be confused with the foliage of some of the Lepidodendrales or Coniferophytes unless represented by fructifica¬

tions. Among the rather numerous forms re¬ ferred to Lycopodites and scarcely different from the existing forms may be mentioned L. Stockii, Kidston from the Lower Carbonif¬ erous, L. Gutbieri, Gopp, and L. Reidii, Pen-hallow from the Devonian ; L. macro phvllus, Goldenberg; L. Zeilleri, Halle from the Upper Carboniferous; L. lanceolatus (Brodie) and L. Scanicus, Nath, from the Upper Triassic; L. falcatus, L. and H. L. tenerrimus, Herr ; L. victories, Seward from the Jurassic; and L. cretaceum, Berry from the Upper Cretaceous. While Lycopodium like forms were never ap¬ parently very different from what they are at present, they represent a very ancient line and were present as a minor element associated with the diversified arboreal Lepidophyte flora of the Paleozoic.

The genus Phylloglossum contains a single reduced species of Australia and New Zealand and is unknown in the fossil state.

The second family, the Selaginellaceae, con¬ sists of the single genus Selaginella with about 500 species of mostly mesophytic small plants not differing greatly from the Lycopodiaceae except that after the mother cell stage the spores differentiate into micro and megaspores. The foliage is usually dimorphic and both foliage leaves and sporophylls have a ligule. The cones are not highly differentiated from the vegetative leaves. Sometimes but one megaspore is developed in a sporangium and fertilization may take place before shedding, thus illustrating steps in the acquisition of the seed habit. Fossil species of Selaginella, unless they are fruiting, are not certainly distinguish¬ able from Lycopodites, nevertheless several un¬ doubted species have been recorded from the Carboniferous (Selaginellites Saissei Zeiller, S. primeuvus Goldenberg, 5*. elongatus Gold, S. ciliatus Kidst). Less authentic species are recorded from Mesozoic and Cenozoic deposits

of widely scattered regions.

The second order, the Isoetales, consists of the single genus Isoetes with about 60 existing aquatic or palustrine species with a reduced tuberous stem and a crowded rosette of grass¬ like ligulate leaves, which are relatively larger than in the majority of Lepidophytes. Microspores and megaspores are produced, both characterized by their large size and by the formation of trabeculae or strands of sterile tissue often completely dividing the sporanglia cavity. Secondary thicking occurs and morpho¬ logical resemblance to the ancient Sigillaris and modern Monocotyledons have frequently been insisted upon although without logical basis. Fossil forms are exceedingly rare, Saporta rec¬ orded a form from the Lower Cretaceous (Barremian) of Portugal (Isoetites Choffati). Aside from untrustworthy records Isoetes oc¬ curs in the Oligocene of France and the Mio¬ cene of Switzerland.

The third order, the Psilotales, is one which has excited a great deal of discussion. It com¬ prises the two genera Psilotum and Tmesipteris ; the former with two species of both tropics and the latter with a single Australasian species, although more are frequently recognized. Both genera are considered to be more or less sap¬ rophytic. The sporophylls of Psilotum consist of a much shortened bifurcated axis bearing a bilocular or trilocular synangium producing but one kind of spores. In Tmesipteris the

sporphylls alternating with foliage leaves or more or less zonal in their development, consist of a short axis terminating in a pair of lan-cellated lobes and bearing adaxially an elon¬ gated bilocular slightly stalked synangium, and producing but one kind of spores. Both genera show a decided tendency toward repeated branching of the sporophylls, a feature much emphasized by Thomas, Scott and Bower, but believed by the writer to be without significance. Whether the sporophyll be regarded as morpho¬ logically a branch or a leaf is disputed.

Those who accept the latter view regard the Psilotales as

sporangiophoric and closely related to the Spenophyllales. Others consider that the necessities of nutrition of large spo¬ rangia with many spores resulted in the forma¬ tion of sterile plates such as occur in Isoetes and in the sporangia of some of the Lepido¬ dendrales and regard the bi-or trilocular sporangia of the Psilotales as septate unilocular sporangia. The view that these masses of ster¬ ile tissue may represent vestiges derived from sporangiphoric ancestry has not been sufficiently emphasized and will be referred to in a sub¬ sequent paragraph. Meanwhile it may be said that the action of Scott and others in separating the Psilotales from the Lepidophytes and group¬ ing them with the Arthrophytes is greatly to be deprecated. The fossil history of the Psil¬ otales is unknown. Various fragmentary speci¬ mens described as Psilotales are without value. Among the doubtful forms that have been re¬ lated on the Psilotales are the Devonian genera Psilophyton, Dimeripteris and Pseudosporochus and the Permian genus Gomphostrobus.

The order Lepidodendrales merits a more extended consideration. It consists of three well-marked families, the Bothrodendracese, Lepidodendraceae and Sigillariaceae, very promi¬ nent in Paleozoic floras. Although herbaceous remains are known the vast majority of the Lepidodendrales were arborescent and some of them reached a height of 100 feet or more. The most ancient of these families, the Bothrodendracese, unites in many respects the features that later characterized the Sigillaraceae on the one hand and the Lepidodendraceae on the other. The Bothrodendraceae are especially characteristic and cosmopolitan during the De¬ vonian and Lower Carboniferous. A number of generic types have been recognized although our information regarding them is vague in a good many particulars. Bothrodendron, or Cyclostigma as it has frequently been called, is not very different in appearance from some species of Sigillaria. The stems were dichotomously branched. Bolsters are usually wanting and the leaf scars are remote, small and circu¬ lar or rhomboidal; they show a central leaf trace scar and two lateral parichnos scars ; im¬ mediately above and close to the leaf scar is a small lignlar pit. The leaves were small, linear lanceolate, univeined and more or less persist¬ ent. _ In one species (B . punctatum) the self-pruning of branches resulted in the large scarred impressions known as Ulodendron. The term Rhytidodendron has been used for some species and recently the genus Poroden-dron has been proposed for certain forms from the Lower Carboniferous of Russia and Spitzbergen that were formerly referred to Bothro¬ dendron. Anatomically the stems show either a small prth or a solid core of wood with ex¬

ternal protoxylem. The secondary zone of wood was thin and the cortex was less differen¬ tiated than in the Lepidodendrales.

A cone, Lepidostrobus Olryi Zeiller, which is considered to have belonged to Bothroden¬ dron minutifolium is of the usual Lepidostrobus type with elongated sporangia. A small cone with a histology that suggests its having been borne by Bothrodendron mnndum lacks the radially elongated sporangia and instead has them extended upward inside the sharply flexed bracts and is conspicuously ligulate. It bore microsporangia in the distal and megasporangia in the proximal region. Another type of cone Lepidostrobus Zeilleri, which may belong to Bothrodendron tenerrimum, appears to lack sterile bracts.

Another genus, distinguished from Bothro¬ dendron by the surface ornamentation of fine raised lines between the remote leaf scars, is Pinakodendron. Several species have been de¬ scribed and in one, P. Ohmanni, the megaspo¬ rangia were borne on the basal adaxial faces of the sporophylls of the same size and form as the foliage leaves on certain parts of the branches* but not terminal as were most Lepidophyte cones.

Other genera of somewhat doubtful affinity are Leptophlceum in which the leaf scars are more crowded, and Omphalophloios in which rhomboidal bolsters were developed. Lepti-phlceum occurs in the Devonian or Lower Car¬ boniferous of North America, Europe, Asia and Spitzbergen while Omphalophloios is found in both America and Europe.

Other related forms are referred to the genus Archasosigillarea or Protolepidodendron. The most remarkable of these is a large trunk from the Middle Devonian of New York, five meters in length and 38.5 centimeters in diam¬ eter at the swollen butt, and 12 centimeters in diameter at the distal end. In appearance the slender arching bifurcating branches with the subulate falcate persistent leaves gave it a weird aspect. The swollen base and tapering stem indicate some secondary thick¬ ening. At the base rootlets similar to these of Stigmaria are preserved. The leaf cushions at the base are distant and irreg¬ ular. Higher up they are in vertical rows on ribs separated by angular furrows as in Sigil¬ laria while still higher up they pass gradually into typical rhomboidal spirally arranged Lepidodendron bolsters. The leaf scars are in the upper part of the bolsters, obovate in form or slightly cordate above, and show a subcentral leaftrace scar

flanked by crescentic parachnoi with a well-marked ligular pit immediately above the margin.

Protolepidodendron thus unites the features of Lepidodendron and Sigillaria in one syn¬ thetic type and it seems probable that the ma¬ jority of Devonian forms that have been re¬ ferred to these two genera really represent Protolepidodendron. Other species have been recorded from various European Devonian lo¬ calities.

The majority of Lepidodendrons were tall trees reaching in some cases a height of 40 meters, with a straight shaft unbranched for a long distance above the ground, with a dense crown of dichotomously forked branches cov¬ ered with crowded masses of long narrow simple spirally arranged leaves, and with large

terminal cones. The leaves were ultimately shed from the older portions of the trunk and the geometrically sculptured stems are among the commonest of Carboniferous fossils afford¬ ing the characters by which several hundred species have been distinguished and utilized for stratigraphic purposes.

The essential features of the surface mark¬ ings are of considerable importance. The leaf cushions or bolsters were crowded in spiral arrangement with angles above and below, and rounded sides (rhombic), always longer than broad and truncated above the middle where the abscission of the leaf occurred. The leaf scar is subcircular and shows three scars, a central one representing the leaf trace and laterals on each side known as parachnoi. Just above the leaf scar is a small triangular print left by the ligule, while below the leaf scar there are frequently two rounded prints or de¬ pressions on either side of the keel which like the parachnoi are tracts of thin-walled tissue which functioned as aerating tissue. Other markings of an ornamental character are fre¬ quently present on the bolsters. With the de¬ cay of the cortex the characteristic Lepidodendron features gradually become obliterated. If merely the epidermis is gone the resulting fea¬ tures are those of Bergeria once thought to represent an independent genus. If

decay has removed part of the cortex the forms are known as Aspidaria, and if all of the outer cortex is gone showing the imbricated leaftraces it is known as Knorria.

Anatomically the stem is monostelic with centripetal primary wood which may extend to the centre or enclose a pith. There is usually a considerable development of centrifugal secon¬ dary wood consisting of scalariform tracheids and medullary rays. Primary phloem has been recognized but there is some doubt regarding the presence of secondary phloem or of any persistent cambium. In forms that have not been demonstrated to have formed secondary wood secondary thickening takes place in the outer cortex through the development of a periderm.

Leaf traces, collateral in structure, pass off from the stele without leaving any gaps and pass obliquely through the cortex to the leaves, each leaf receiving a single bundle. The cortex is of great thickness and variable according to age and species. Usually there is an inner parenchymatous zone poorly preserved. The outer cortex consists of thicker walled elements, usually with an enormous development of phel-loderm, which served for mechanical support.

The leaves had a single central vascular bundle surrounded by a sheath of transfusion tissue and the stomata were commonly restricted to two deep grooves on the lower surface. What corresponds to the roots in higher plants are peculiar organs known as Stigmaria, which as casts or impressions are among the common¬ est Coal Measure fossils, particularly in the underclays beneath the coal seams. In com¬ plete specimens the main axis is seen to divide into four main forks which run horizontally and branch dichotomously. The surface is smooth or irregularly wrinkled and covered with well-spaced umbilicate scars to which in well-preserved material cylindrical radiating rootlets are seen to diverge. These are slightly constricted at the base and lack roothairs. The

main axis consists of a central pith, a ring of centrifugal wood accompanied by phloem and surrounded by a cortex with abundant peri¬ derm. Sometimes no distinction between pri¬ mary and secondary wood is observable while in other specimens centripetal primary wood is present. The rootlets show a different anatom¬ ical arrangement each containing a monarch stele with radial vascular strands connecting the protoxylem with groups of cortical tra¬ cheids. They arise from the inner margin of the primary wood although the

outer cortex is continuous with that of the main axis.

Stigmaria have frequently been found at¬ tached to both Lepidodendron and Sigillaria trunks. There has been much discussion re¬ garding the morphological nature of Stigmaria since they do not conform to the usual morphol¬ ogy of true roots, but whatever their morpho¬ logical homologies, physiologically they are roots.

The fructifications of the Lepidodendraceae have been described under a variety of generic names, the most common being Lepidostrobus. Lepidostrobus had an axis similar anatomically to a vegetative twig and bore numerous spirally arranged sporophylls each bearing a single, very large radially elongated sporangium on its adaxial surface. The sporophyll had an up¬ turned blade and these formed an imbricated protective surface. Between the sporangium and the blade a ligule was present. It seems probable that the Lepidodendrons were always heterosporous, the two kinds of spores being produced on different parts of the same cone or upon different cones. The microspores were small, tetrahedral in form and very plentiful. The megaspores were relatively very large, few in number, tetrahedral in form, with a hairy surface and commonly opening by apical flaps. The prothallus within the megaspore is occa¬ sionally preserved and even archegonia have been recognized. In another cone genus, Spencerites, the sporangia were united to the spor¬ ophyll by a distal neck and the spores were winged. In some Lepidodendron cones large masses of sterile tissue are developed within the sporangia suggesting a vestigial sporangiophore and in Mazocarpon the large sausage¬ shaped megaspores are embedded in a solid parenchymatous tissue.

Still another type of Lepidodendron fructifi¬ cation was Cantheliophorus in which the spor¬ ophylls were commonly deciduous. Each spor¬ ophyll bore two large sporangia separated by a median sterile plate interpreted as represent¬ ing the sporangiophore of the ancestral pros-phenophyllum stock.

The vast majority of stem impressions rep¬ resent minor variations of the common Lepido¬ dendron type. In the genus Lepidophloios the bolsters were very prominent and became re¬ cumbent in old age so that the normal leaf scar appears to be at the base. The Halonia branches with their spirally stalked deciduous cones appertain particularly to Lepidophloios, which, anatomatically was, exactly like Lepido¬ dendron.

The Sigillariaceae were much like the Lepido¬ dendrons in essential

features but different con¬ siderably in habit. They attained their maxi¬ mum development in the Upper Carboniferous and gradually waned during the Permian al¬ though they appear to have survived into the

Lower Triassic. The trunks were generally massive and for the most part unbranched, giving them a peculiar appearance and at one time suggesting a relationship with the cycadophytes, since discredited. Stem impressions, which, like those of Lepidodendron, are ex¬ ceedingly common throughout the Coal Meas¬ ures, can readily be distinguished by their verti¬ cally arranged scars often on prominent ribs, by the slight development of bolsters and by the scars being wider than high with the angles at the sides and rounded above and below. Very many species have been described and the variations observed are very useful for strati¬ graphic purposes and have resulted in an elab¬ orate analysis of the types of surface orna¬ mentation. These fall naturally into two main groups — the Eusigillarise with ribbed stems and the Sub-sigillarise with smooth stems.

The Eusigillarise show broad longitudinal ribs separated by furrows and are segregated into two subordinate groups, i.e., Favularia, in which the ribs are separated by zigzag furrows and the scars transverse furrows and Rhytido-lepis, in which the ribs are separated by straight furrows and are often much broader than the close set or spaced scars. Where the furrows are broad and intercalated narrow ribs without leaf scars are developed the forms are some¬ times set apart under the name Polleriana, and when transverse furrows appear the forms are grouped under the name Tasselata.

Various stages of preservation yield char¬ acteristic surface features thought to indicate distinct genera by the older student but useful now as descriptive terms. Thus when partially decorticated the inwardly enlarging strands of aerochyma result in vertical rows >f pairs of large mammilae and such stems have been called Syringodendron. Petrified material of Sigillaria is rarely found. The pith was very large

and the vascular cylinder thin and sometimes broken up into separate bundles. Tracheids reticulate or scalariform increasing in size centripetally. Secondary wood consisting of radially ar¬ ranged scalariform and pitted tracheids, cen¬ trifugal in development with narrow medullary rays. Cortex was thick with an inner soft zone and an outer mechanical zone as in Lepidodendraceae. The leaf traces had an inner cen¬ tripetal primary strand surrounded by a centri¬ fugal secondary zone. The leaves are much like those of Lepidodendron with a central con¬ centric vascular strand surrounded by a consid¬ erable development of transfusion tissue. In some instances the strand is double. The cuti¬ cle was dense and the stomata were confined to the two furrows on the lower side which were clothed with multicellular hairs.

The cones of Sigillaria, usually going by the name of Sigillariostrobus, are common as impressions, but are practically unknown in a petrified condition. They were often very large, being as much as five or six centimeters in diameter in S', nobilis. They agree in having long peduncles covered with needle-like bracts. The fertile part bears crowded sporophylls of somewhat variable shape with flexed and im¬ bricated distal blades. The sporangia were sometimes attached for nearly their whole length to the adaxial face of the sporophyll while in other cases they are thought to have been attached distally. Some cones are known to have been heterosporous and this was prob¬

ably the rule throughout the family. It was formerly thought that both the Lepidodendraceae and Sigillariaceae became extinct with the Paleozoic but cones considered to be re¬ lated to the Lepidodendracese and named Lycostrobus are recorded from the Upper Triassic (Rhaetic) of Sweden, and certain re¬ mains from the Lower Triassic (Bunter) of Europe, known as Pleuromeia and sometimes made the type on a separate family, are now believed to represent the Sigillariaceae. Pleu¬ romeia, which is imperfectly known, is repre¬ sented by stem casts of simple stems 9 to 10 centimeters in diameter, the surface covered with remote rhomboidal, Clathraria-like, leaf-scars. Basally the stem separates into four lobes suggestive of Stigmaria or Isoetes and covered with rootlet scars like those of Stig¬ maria. Poorly preserved terminal cones of crowded imbricated sporophylls are also known. The form of the stem and the growth separa¬ tion of the leaf scars indicates secondary thick¬ ening; decorticated specimens resemble Knorria ; and the thin central cylinder all point to a close affinity with the true Sigillarias. The cone genus Poecilitostachys from the Triassic of France also indicate a third

surviving type of the Lepidodendrales.

There remain for consideration two ex¬ amples which indicate that some of the Lepidophytes had definitely progressed beyond hetrospory to what amounts to the acquisition of the seed habit. The first of these, Lepidocarpon, comes from the Lower Coal Measure of England. The cone was of the Lepidostrobus type in all its immature details. Only a single megaspore reached maturity in each sporangium practically filling the whole cavity, and as it matured it was enclosed with a com¬ plete investment (integument or velum) which grew up from the adaxial surface of the sporophyll and open by only a narrow apical micropylar slit. At maturity the whole sporo¬ phyll with its integumented megasporangium was shed as a closed seedlike reproductive body.

The second spermophytic Lepidophyte type, known as Miadesmia and coming from the Lower Coal Measure of England, was borne on a slender herbaceous form. Each sporophyll bore a ligule like those of the vegetative leaves and had a fringed lamina. The megasporan¬ gium was attached to the proximal adaxial face of the sporophyll and developed a single magas-pore which filled its cavity, and was enclosed in an integument arising from the proximal region of the sporophyll which completely invested the megasporangium except for a circular micro¬ pylar opening at the beaklike distal apex of the sporangium. The microphyle was surrounded by numerous integumental hairs or tentacles which probably facilitated fertilization. Some megaspores are filled with prothallus. The whole sporophyll was shed at maturity. In some respects Miadesmia was more advanced than Lepidocarpon and while neither are morphologi¬ cally homologous with the seeds of the other spermophytes, they are physiologically true seeds which apparently did not evolve further along lines leading to higher plants as did the seeds of the Pteridospermophytes.

It cannot be said that there is any unanimity of opinion regarding the phylogenetic position of the Lepidophyta. Some students regard

their origin as entirely independent of the Arthrophyta while others regard them as probably distantly related to the pro-Spheno- phyllum stock that represented the Arthrophyte ancestral line. At the other end of the phylum there are students (Seward, Potonie) who con¬ sidered that the Araucariales and perhaps the balance of the Coniferophytes diverged from the Lepidophyte stock, while others justly doubt that the phylum had any higher issue.

The view advocated here, an oninion fre¬ quently advanced, is that the Lepidophyta repre¬ sent a group of forms derived by reduction from more megaphyllous ancestors, and that the prevailingly simple relationship between the sporangia and the sporophylls is due to simplification or reduction from sporangiophoric ancestors closely related to the theoretical pro-Sphenophyllum type. This view is based in part on a consideration of the paired sporangia of Cantheliophorus with their central sporangia-phoric plates, on the ventral pad of Spencerites, the core of sterile tissue in Mazocarpon, the sterile plates in various Lepidostrobus sporangia and the stalked sporangia of the modern Psilotales. A consideration of the details of morphology and the fossil record, too extensive a subject for presentation in the present brief review, leads to the conclusion that the Lepidophytes are not related to any of the higher seed plants and never gave rise to more highly organized types.

Pteridospermophyta. — The recognition and partial elucidation of the seedferns of the Pale¬ ozoic is one of the outstanding paleobotanical achievements of the last decade. It is needless to dwell on the immense advantages which seed¬ bearing confers on the plants which have ac¬ quired this habit. The mere fact that seed plants are the dominant existing plants is suffi¬ cient proof of this. Over a generation ago Stur suggested that the fronds of Neuropteris, Alethopteris and others form genera of fernlike fronds exceedingly common in the Paleozoic, were probably related to the cycads since they were never found in a fruiting condition like normal ferns. Subsequently the anatomy of certain petrified stems showing a combination of fern and cycad characters led to the proposal of a group, the Cycadofilicales, for these inter¬ mediate types. Meanwhile the structure of a considerable number of Paleozoic seeds suggest¬ ive of cycads, ginkgos and gnetales had been described, but beyond correlating some of them with Cordaites little was known of the plant which bore the majority. In 1903 Oliver and Scott succeeded in proving that certain seeds (Lagenostoma) were borne on fronds of the Sphenopteris type and these in turn were at¬ tached to stems known as Lyginodendron. This discovery stimulated an interest in the subject and a succession of discoveries followed so that enough is now known

to warrant consider¬ ing a large number of the supposed Paleozoic ferns as Pteridosperms or seed ferns. The manifestly primitive characters show in one fea¬ ture or another, such as the more or less free nucellus, the complex vascular supply of the seeds, their total lack of an embryo, the fact that both megasporangia and microsporangia were borne upon but slightly modified foliage leaves of decompound fernlike fronds, and vari¬ ous recondite histological characters, justify re¬ garding the seed ferns as representing a dis¬

tinct phylum — the Pteridospermophyta. They were gymnospermous in habit and some stu¬ dents regard them as a subordinate class of gymnosperms — a taxonomic term that has out¬ lived its usefulness for other than descriptive purposes.

The Pteridospermophyta may be tentatively characterized as plants with the habit and to a large extent the anatomical features of ferns, but differing in producing integumented mega¬ sporangia or seeds borne on the usually but slightly modified fernlike foliage and never aggregated into true strobili, having secondary thickening in both stems and roots.

From the rapidly increasing contributions to the knowledge of the Pteridosperms it will suffice to describe a few of the better known forms. Among these the best known is Lyginodendron, or Lyginopteris as it is more* properly called. Lyginopteris represents a group of species with slender, scrambling, mostly unbranched, stems of considerable length bearing large forked decompound fronds upward of a metre in length and long known under the name of Sphenopteris Hceninqhausi, whose persistent petioles (Rachiopteris) were almost as large as the main stem on which they were arranged in a two-fifth spiral. The roots (Kaloxylon) were partly adventitious. The stem cortex was fibrous and reticulate and was clothed with spines and capitate glandular hairs. The seeds (Lagenostoma) were borne in lobate cupules, while the pollen was on the other and more reduced fronds in rosettes of six or seven fusiform bilocular sporangia (Crossotheca).

Lyginopteris was monostelic with a large pith containing sclerotic tissue. Primary wood of five to nine collateral strands. In all but the most immature stems there is a broad zone of secondary wood of pitted tracheids and medul¬ lary rays. The cambium was persistent and is sometimes petrified, as is the phloem. The cor¬ tex comprises a thin periderm and an inner poorly preserved soft cortex and an outer cortex characterized by radial bands of fibrous tissue. Leaftraces

mesarch and double. Anomalous features are the occasional formation of in¬ verted secondary wood by the intrusion of the camibrium through a foliar gap.

The seeds, five or six millimeters in length, were borne in a lobed cupule and were orthotropous and radially symmetrical, with a single integument confluent with the nucellus except distad. The free part forms a plug and the pollen chamber was hence reduced to a conical slit. The integument was supplied by nine vascular strands which ran to the apex which formed a fluted dome or radially septate canopy at the apex of the barrel-shaped seed.

The microsporangia were found in connection with vegetable fronds and are of a type known as Crossotheca. Other types of microsporangia may well have been present in different species of Lyginopteris, as for example those called Telangium, in which the sporangia are concresent proximad. A second genus of seed ferns which is fairly well known is Heterangium which had long slender angular stems with large and graceful forked (Sphenopteris elegans Brongn.) fronds arranged in a three-eighths spiral. While the evidence is less con¬ clusive than in Lyginopteris there are good rea¬ sons for considering the seeds known as Sphaerostoma as those of Heterangium. Hete-

rangium had a monostolic stem like Lyginopteris but the pith was replaced »by mesarch primary wood as in some recent ferns, ihe secondary zone was thin. The seeds (Sphaerostoma) are small with an inner integument and an outer integument or cupule, both with an elaborated vascular supply. The free apical part of the nucellus is a relatively flat plinth surmounted by a central dome or lagenostome which is surrounded by an annular pollen cham¬ ber. The free apical part of the integument formed a frill or canopy with eight radial crests around the micropyle. Heterangium had a greater range than Lyginopteris being found from the Lower Carboniferous to the Permain. Seeds of Lyginopteris or Heterangium are found in the French coal measures associated with the frond genera S phenopteris

elegans,

. S. dissecta and S’, obtusiloba.

A second family type to which at least four genera are referable is the Medullosacese. These are characterized by the enormous development of the fronds of the Neuropteris and Alethopteris type with petioles several centimeters in diameter. This enormous display of foliage is doubtless to be correlated with the peculiari¬ ties in the anatomy of the stems. The most primitive known genus, one indicating the point of departure of the other and more specialized members of the family, is Sutcliffla of the Eng¬ lish Lower Coal Measures.

Sutcliffia had a large pithless central stele of centripetally formed wood from which meristeles branch and divide and fuse irregu¬ larly and eventually give rise to leaftraces, a large number of which enter each petiole where their structure is concentric. Secondary wood is but feebly developed. The next stage in the evolution of these forms away from the Heterangium type is furnished by Medullosa anglica which is polystelic with normally three steles, each developing secondary wood. The stems were as much as seven or eight centi¬ meters in diameter and bore spirally arranged decompound fronds with decurrent petioles. Many adventitious roots were formed.

Without stopping to dwell on the histologi¬ cal details we pass to the exceedingly complex Medullosas of the Permian in which the steles become very numerous and are differentiated into inner ((star rings® and outer <(plate rings® systems, the latter forming a peripheral zone which is an almost closed woody cylinder. Successive extrafascicular zones of wood and bast were developed in several species. The leaf traces which are at first concentric break up into strands with external protoxylem, several from different levels of origin entering each petiole. The peculiar arrangement in these later Medullosas is a necessary outcome of large polystelic stems with secondary thicken¬ ing and appears to have constituted a rather impractical experiment in attempting to de¬ velop secondary thickening around numerous steles in a single stem. If the theory advocated by Worsdell, Chodat and others is substan¬ tiated it would appear that certain of the Permian Medullosas solved this problem in the mechanics of stem structure by suppressing the centripetal portions of the steles while the centrifugal and continuous nortions character¬ ized forms which passed by gradations into the Cycadophytes. Scott and Solmslaubach on the other hand regard the Medullosacete as a highly

differentiated derivative of a Heterangium-like ancestor which became so specialized that it became extinct during the Permian.

Other genera that appear to belong to this family are Colpoxylon, Rhexoxylon and pos¬ sibly Steloxylon, all based upon fragments of petrified stems from the Paleozoic of Europe, Africa and Asia.

Medullosa petioles are referred to the genus Myeloxylon and structural material has been described from both Europe and America. The foliage of Medullosa was of the frond types known as Neuropteris, Alethopteris and Linop-teris all of which were exceedingly abundant and cosmopolitan in the later Paleozoic floras. Impressions from the Scotch Carboniferous show large Rhabdocarpus seeds attached to the fronds of Neuropteris heterophylla and similar but still larger seeds attached to Belgian specimens of Neuropteris obliqua.

The microsporangia appears to have been four valved and terminal on naked pedicels in N. heterophylla or marginal on orbicular or cuneate pinnules as in Potoniea, N. gigantea and N. Carpentieri. Although no seeds have been found in actual connection with alethop¬ teris there are good reasons for believing that some species at least (e.g., A. lonchitica, A. serlii) bore seeds of the Trigonocarpus type. The latter, which are often exceedingly com¬ mon as impressions and casts, as described from petrified material are elongate-oval radially symmetrical. The testa is thick and consists of an outer flesh (sarcotesta), a shell (sclerotesta) and an inner flesh. The shell has three longi¬ tudinal ribs which characterize the seeds when preserved as casts after the decay of the outer flesh. Less prominent lines are intercalated between the main ribs. There was a long tri¬ angular micropylar canal leading to a small pollen chamber in the apex of the nucellus and the latter is free to the base.

Other genera that may represent sporangia of different types of Medullosaceae are Codo-notheca, Schiitzia, Whittleseya, Dolorophyllum and Ottokaria (?).

The bulk of the remaining types which are referred to the Pteridospermophyta are based upon anatomical studies of stem or petiole fragments ranging in age from the Devonian (Kaiymma) to the Permian and will not be described in the present connection. In addi¬ tion to these, several types of fronds formerly referred to the ferns have been proven to be seedbearing. Thus fronds referred to Pecopteris Pluckeneti but probably represent¬ ing P. sterzeli, had

slightly reduced pinnules bearing terminal oval seeds with a thick sar¬ cotesta giving the impressions the appearance of having narrow wings. This discovery is of special interest since typical Pecopteris fronds have been shown to have constituted the foliage of Psaronius (an undoubted fern) and they frequently show fern fructification of the Asterotheca or Scolecopteris type. A second fern, Aneimites fertilis, from the Appalachian Pottsville had small bilaterally symmetrical seeds on the somewhat reduced pinnules, the fleshy sarcotesta giving the impressions the appearance of having narrow wings. Other associations of seeds and fronds not found in organic union are the frond species Eremopteris arte mi see folia and the seeds Samar op sis acuta,

the frond species Aneimites bellidulus, and the seeds Lagenospermum Arberi.

It has been suggested that the Gondwana genera Glossopteris and Gangamopteris were Pteriosperms, but there is as yet no basis for this view. The peculiar Permian frond genus of Asia and North America known as Gigantopteris is found in constant association in the latter country with flat cordiform alate seeds borne in the concavity of an abovate reduced pinnule with the Gigantopteris venation and as¬ sociated with these are detached two ranked strobiloid organs consisting of similar bract like pinnules bearing small oval pendant micro¬ sporangia — not true cones but definitely more strobiloid than any demonstrated Pterido-snermophyta.

It is evident that the Pteridospermophyta constituted a large and varied plexus of syn¬ thetic seed plants our knowledge of which is too imperfect to warrant an extended discusson of their phylogenetic relations. That they were descended from the ferns is obvious, but whether from the more complex Coenopteridae (e.g., Asterochlaena) through the polystelic Medullosacese or from a simple protostelic form of Botryopteraceae through Lyginopteris is debatable. They seem to show an as yet un¬ demonstrative relationship with the Paleo¬ zoic Marattiaceae. Within the phylum Scott regards them as showing two

lines of descent, one through the evolution of a single stele and leading in the direction of the Cycadophytes and the other toward polystely which eventually became extinct. Chodat on the other hand regards Lyginopteris as a true fern with specialized megasporangia without higher issue, while he considers the Medullosaceae as the ancestors of the Cycadophyta.

Whatever the details of descent the Pterido¬ spermophyta in some of their forms undoubt¬ edly stand in an ancestral relationship to the Cycadophytes and they may well have merged in their earlier manifestations with the same stock that gave rise to the Cordaitales and Ginkgoales.

Cycadophyta.— No existing group of plants has excited more interest in recent years than the existing cycads (order Cycadales). Before the peculiarly organized Mesozoic forms were understood, the wealth of foliar impressions of cycad-like fronds in the Mesozoic rocks through¬ out the world and similar less abundant remains in the later Paleozoic, led to the conclusion that the cycad line was simply another example of an ancient, persistent, rather uniform, stock de¬ rived from the ferns, whose existing represen¬ tatives were the straggling survivors of a type which attained its maximum development in the older Mesozoic. The researches of Carruthers, Solms, Laubach, Nathorst, Lignier and Wieland have shown that the group was large and diver¬ sified and includes at least two extinct orders very different from the existing cycads; that its origin is to be looked for among the seed ferns rather than the true ferns ; and that exist¬ ing cycads represent relatively modern and never very abundant derivatives of this ancient stock.

In sketching the morphology of the Cycad¬ ophytes the reader has to bear in mind that we are dealing with an extensive group that ap¬ peared in the record as early as the Carbonifer¬ ous (Westphalian) and continued to the present, and that aside from the recent forms and a few

exceptional fossil forms like the Rhaetic Wielandiella and the Lower Cretaceous Cycadeoids and Williamsonias, we have only the remains of foliage as a clue to relationships and practically no information regarding anatomy or fructifica¬ tions ; the latter we infer from the analogy of known forms were highly variable. As sketched in the following paragraphs the Cycadophyta are somewhat arbitrarily segregated into three subordinate groups — the aberrant

Cycadeoidales, which are not as far removed from the second group, the Mesozoic and existing Cyca¬ dales. The third group, for which the inap¬ propriate name Williamsoniales is retained, in¬ cludes the balance of the Cycadophytes. It is not a compact group and the progress of dis¬ covery will doubtless show it to be unnatural. In its beginnings it approximates the Pteridos¬ permophyta and also shows points of possible contact with the Gnetales and Ginkgoales. In its more evolved members (e.g., Williamsonia) it approximates the Cycadeoids to such an ex¬ tent that Wieland and other authorities group the former and the latter together. The two points of view are entirely in agreement regard¬ ing the facts and differ merely in the placing of the boundary between the two groups — a not very serious difference in an evolving series of forms.

The Cycadeoidales appear to represent an evolution from the older Williamsoniales stock and according to our present knowledge they are confined to the Jurassic and Lower Cretace¬ ous. Their prevailingly tuberous trunks are in¬ dividually abundant in a silicified condition in certain sandy strata of those ages, particularly in the Portland Dirt Bed of the Isle of Wight, the Patuxent formation of Maryland and the Morrison beds of the Freezeout Hills in Wyom¬ ing. By far the largest number have been found in the similar strata of the Dakota formation, which outcrops in the Black Hills rim. Similar remains in less abundance, have been found in France, Italy, Galicia and elsewhere. Their wonderful preservation and exceptional mor¬ phological features have resulted in unusually painstaking researches which have shown that the group as a whole was one of rather limited variation and stereotyped organization, rela¬ tively no more abundant in Jurassic and Lower Cretaceous time than are the* Cycads in existing floras. The salient features briefly enumerated are a tuberous or short columnar stem, some¬ times an aggregate of tuberous stems, as in some species of Encephalartos. The stem was encased in a heavy armor of persistent leaf bases, which largely obviated the necessity for the development of a thick zone of mechanical woody tissue in the stem. The interstices of leaf bases were filled with multicellular scales (unicellular hairs in the Liassic C. Micromyela Moriere) corresponding to the ramentum of ferns, in some cases (as in the genus Cycadella) very long and enclosing the whole trunk in a felt-like mass. This ramental covering appears to have facilitated their subsequent silicification, so that normally the fossil trunks show the ra¬ mental areas as prominent partitions, separat¬ ing the subrhombic angular cavities left by the leaf stalks which had decayed or were shed be¬ fore fossilization. Among the leaf bases occur numerous short axillary branches each termi¬ nated by a solitary fructification or flower. The

anatomy of the stem is much like that of

the cycads. There is a thick cortex, a com¬ paratively thin vascular cylinder and a very large pith containing secretory sacs rather than gum canals. The vascular bundles are collat¬ eral, the protoxylem is next the pith (endarch) and the few spiral marked tracheids are soon replaced by scalariform tracheids which appear to characterize the phylum, although pitted tracheids are recorded in Cycadeoidea micro-niyela. In the leaves, however, the structure is mesarch, suggesting their pteridophytic an¬ cestry. The leaf traces are single and direct and thus more simple in their arrangement than in existing cycads.

The axillary branches bear reduced leaves or bracts spirally arranged and are of a length to bring the terminal dower at about the general level formed by the persistent leaf bases. The branch axis expands into a subhemispherical or conical receptacle. At its base and immedi¬ ately beyond the enclosing bracts was inserted a whorl of compound microsporophylls, united into a continuous sheath proximad, expanding distad into a bipinnate frond with alternate pin¬ nae, all of which, except the apical and basal pairs, bearing two rows of synangia, suggesting those of a marattiaceous fern, the whole greatly resembling a. fertile fern frond rather than a verticil of stamens, and like the former circinate in vernation. The surface of the receptacle above the staminate collar is beset with slender pedicels each bearing at its extremity a single orthotropous seed, the interspaces packed with sterile appendages known as interseminal scales, which expand apically so that only the micropylar part of. the seed reaches the surface and the whole is compact and simulates a closed peri¬ carp. The whole fruit-like body is ovoid or turbinate in shape, several centimeters in length, the surface a mosaic of the expanded tips of the-interseminal scales, between which the micropylar tubes of the seeds protrude. The microsporophylls are only preserved in imma¬ ture strobili. They have disappeared at a later period but their former presence can usually be inferred from the basal shoulder that marks their insertion on the receptacle. The probabili¬ ties are that all the

cvcadeoids were bisporangiate, although this is disputed in the case of some species. The seeds are very small as compared with those of living cycades and have a two or three layered testa, prolonged upward into a micropylar tube the outer palisade layer of which at the shoulder where it joins the seed being expanded by radical extensions forming five or six radial wings. The cavity of the seed is completely filled by a large dicotyledonous embryo which in its developments, unlike any living gymnosperms, destroys all of the endo¬ sperm.

A variety of cycad fronds are found in the deposits which have yielded the petrified trunks, but our information regarding their actual foli¬ age is furnished by small unexpanded petrified material which show pinnate fronds of the Zamia type, circinate in veination with erect pinnules. It seems probable from the large number of cones in the same stage of development in some trunks and their complete absence in other large trunks, that seed formation was the culminating event of many seasons of vegetational activity, possibly occurring but once at the maturity of the plant, but more probably repeated at in¬ creasing intervals throughout life.

Fronds indistinguishable from those of cycadeoids are cosmopolitan from the Triassic to the Upper Cretaceous, but there is no means for determining to what an extent they belong to the cycadeoids and the probabilities are strongly in favor of considering most of them as the fronds of the order that I have termed the Williamsoniales. The Williamsoniales com¬ prise a much more protean and long-lived group of forms, unfortunately known almost entirely from impressions. They appear in the later Paleozoic in the genera Plagiozamites, Ptero-phyllum and Sphenozamites, are very promi¬ nent in the Triassic, Jurassic and Lower Creta¬ ceous' and are still present but in reduced num¬ bers in the Upper Cretaceous after the cycade¬ oids had become extinct. The nature of their remains precludes a concise summary of their .features. Both the very abundant foliar re¬ mains as well as such fructifications as have been preserved indicate a much wider variability than among the other two orders of cycadophytes. The sole feature that at present can be considered as probably characteristic of the order is the relative slenderness and elongation of the stem and the frequency with which it branched, often dichotomously. It is not possi¬ ble to consider the various foliar types in the limits of the present paper, a subject requiring much study and never adequately discussed and only a few of the more representative types will be mentioned. Among these one of the most remarkable is the genus Wielandiella from the Rhaetic of

Sweden. Wielandiella had an elon¬ gated slender stem not over two centimeters in diameter, with repeated dichotomies, prevail¬ ingly naked except in the region of the forks where it bore spirally arranged rather reduced fronds of the Nilssonia or Anomozamites type. In each fork was a subsessile fructifica¬ tion surrounded by bracts. These fructifica¬ tions are met with in two forms, probably representing different ages and states of preservation. In the one it consists of a small pyriform axis separated from the ped¬ uncle by a swollen striated collar bearing oval microspores on the surface of greatly re¬ duced scale-like sporophylls. Ovulate structures on the pyriform axis appear to have been vesti¬ gial. In the second type the axis is hidden by the linear bracts but its surface reveals a regu¬ lar pattern of interseminal scales between which the micropylar tubes project, indicating an ovu¬ late organization like that of the cycadeoids and Williamsonia.

Another old genus is the Rhaetic genus Cycadocephalus, also from Sweden and based on impressions of a large fructification 10 centi¬ meters long and seven centimeters in diameter. The peduncle is slender and shows no leaf or bract scars. No trace of a central ovulate receptable is discernible, the head consisting of a cluster of linear microsporophylls with a keel¬ like midrib on their inner faces and bearing on either side of this midrib linear pointed synangia.

A third Rhaetic genus is Weltrichia from Franconia, based upon a funicular fructification, the cup of which was formed by the concrescent bases of about a score of broadly linear microsporophylls, the whole 10 centimeters in length and nine centimeters in diameter. The free lanceolate apical portions of these bear linear appendages five to eight millimeters long

attached to their inner faces, comparable with the synangia of Cycadocephalus. No traces of ovulate structures are known, so it cannot be determined whether either Cycadocephalus or Weltrichia were unisexual or bisexual.

As previously mentioned, a variety of frond genera of late Triassic, Jurassic and Lower Cretaceous ages are found from Japan and New Zealand on the east to California and Alaska on the west, and from Franz Josef Land, Spitzbergen and Greenland on the north to Graham Land on the south. No continent is without an abundant representation. Associated with these frond genera at many localities, par¬ ticularly in India, England and southern Mex¬ ico, are the objects commonly referred to the genus Williamsonia.

The most celebrated of these is perhaps Williamsonia gig as, discovered early in the last century in the Jurassic outcrops along the York¬ shire coast, and the basis for Williamson's his¬ toric restoration. These have been found in or¬ ganic union with foliage and stems. The stems (Bucklandia) were slender, five centimeters in diameter, covered with rhomboidal leaf scars, with a crown of Zami-like fronds about two feet long, and bearing at the summit slender pedun¬ cles 20 to 30 centimeters long, covered with spirally arranged scale leaves and terminated with an ovulate receptacle bearing pedicillate seeds similar to those of Cycadeoidea, sur¬ rounded by bracts or sterile sporophylls united proximad to form a disc or cup. No trace of microsporophylls are certainly known in this species, although the probabilities are that it was bisporangiate, in fact certain staminate discs have been referred to this species by vari¬ ous students.

Naturally a very large number of different species of Williamsonia have been described from a variety of Mesozoic horizons and locali¬ ties, but few of these show essential features or have been exhaustively investigated. A very characteristic form (W . virginiensis) occurs in the Lower Cretaceous of Virginia and another in the Upper Cretaceous of Delaware.

Among the better known forms are W. spectabilis, from the Yorkshire Jurassic, which shows a funicular disc prolonged into linear lanceolate microsporophylls bearing on their inner faces fertile pinnae carrying reniform synangia. A central ovulate receptacle is want¬ ing. W. whitbiensis , also from the Yorkshire Jurassic, is similar to the preceding, but the fertile pinnae are reduced and the reniform synangia are borne on either side of the midrib along the inner face of the free part of the microsporophylls.

Still another type is W . mexicana, from the Lias of Southern Mexico, in which the cup is deeply campanulate with 10 short, narrow, free lobes bearing two rows of lateral synangia.

The only petrified Williamsonia known is the imperfectly preserved W . Scotica , from the Jurassic of Scotland, which shows hairy bracts, no traces of microsporophylls and a central receptacle consisting of interseminal scales and pedicellate seeds exactly similar to Cycadeoidea.

An interesting and more reduced type, whose affinities indicate the survival to the middle Jurassic of the Wielandiella type, is one made the basis of the genus Williamsoniella. If the various parts are correctly correlated vol. 21 — 1 1

they show slender frequently dichotomous stems bearing scattered leaf scars and believed to have borne the associated type of foliage known as Taeniopteris vittata. In the stem forks are pedunculate bracteate fructifications consisting of a whorl of cuneate microsporo¬ phylls, bearing five to six sessile reniform synangia on either side of the inner keel. Within the whorl of microsporophylls a pyri¬ form receptacle with a sterile crown is covered with small interseminal scales and short stalked seeds like those of Williamsonia and Cyca¬ deoidea.

Remarkably well-preserved fronds from Greenland and elsewhere described as Cycadites have recently been shown to possess a double midrib separated by a stomatal groove, and these forms have consequently been made the basis for a new genus, Pseudocycas, although nothing is known of the plants which bore these anomalous fronds.

A frond genus that deserves mention is Podozamites to which a very large number of often detached pinnules have been referred, some of which are with difficulty distinguished from the coniferophyte genera Nageiopsis, Araucaria, *etc.* These are widespread and more or less abundant from the Triassic to the Upper Cretaceous. In the more perfect specimens Podozamites shows a slender rachis with some¬ what irregularly spaced parallel veined lanceo¬ late pinnules, often deciduous. Podozamites may well be composite. In certain species the pinnules appear to be borne on definite short shoots, and the associated fructifications (Cy-cadocarpidium) consist of loose cones of sporo¬ phylls much like the vegetative leaves and bearing proximad ovules with pointed wing¬ like appendages. Podozamites in some of its forms may thus constitute a point of contact between the cycadophytes and coniferophytes or it may really belong with the latter phylum and have no cycadean relationship.

The’ Cycadales have tuberous or columnar, sometimes subterranean, sparingly or not at all branched, stems, covered with persistent leaf bases, bearing a crown of large compound leaves and apparently terminal dioecious stro-bilae (truly lateral). The cortex is thick, the vascular cylinder thin and the pith large. Bundles are collateral and endarch in the stem, but often misarch and even concentric in the leaf traces and strobilar axes. The leaf traces girdle the stem, entering leaves on the opposite side from which they separate from the vas¬ cular cylinder.

The existing cycads constitute a rather com¬ pact group of nine genera and about 110 spe¬ cies indigenous-in the warmer regions of both hemispheres — Cycas, with some 16 Oriental spe¬ cies, and Zamia with about 30 occidental species being the dominant genera. Besides Zamia the genera Miscrocycas, Dion and Ceratozamia are American ; Encephalartos and Stangeria are African, while Cycas, Macrozamia and Bow-enia are Asiatic or Australian. In individual abundance they do not play a leading role in any forest assemblage, although the small Stangeria paradoxa forms thickets in south¬ eastern Africa and Macrozamia spiralis forms a scrub over considerable areas in eastern Australia. For trunk-forming plants they are inconspicuous and vary from the dwarf Zamias

with underground stems or epiphytic forms to some of the species of Cycas which reach a height of 20 metres and live to a great age.

The Cycadales and presumably the majority of the fossil cycadophytes send down a primary root which continues as a tap root, often ap¬ proaching the trunk in size. All the forms have compound leaves. The leaves are in whorls crowning the stem or the branches in branched forms, giving a strikingly handsome appearance. Each whorl alternates with a whorl of scale leaves. The whorl may consist of but a few to over 100 fronds, varying in size from a length of 10 centimeters to more than three meters, and the fronds may have but a few to as many as 250 pinnules. The struc¬ ture is xerophytic and the pinnules generally have entire margins. They vary from lanceo¬ late to linear

and acicular. In some Zamias and Stangeria the margins are serrate. In Dion they are thorny and in Encephalartos they are inequilaterally lacerate.

A feature reminiscent of ancient habits and shared only by Ginkgo among existing seed plants is the fertilization of the egg cells by multiciliated swimming sperm cells.

The histological and morphological details of the Cycadales belong to modern rather than paleobotany and need not be dwelt upon in this connection.

Both the staminate and ovulate sporophylls are always aggregated in strobili, which are compact and rather uniform throughout the order, except that in Cycas the ovulate stro-bilus instead of being compacted in a cone con¬ sists of rosettes of sporophylls resembling re¬ duced foliage leaves in which ovules replace the lower pinnae or teeth.

The fossil record of the Cycadales is ex¬ tremely meagre. It includes certain not con¬ clusively determined ovulate cones from the Keuper of Switzerland, resembling those of Zamia ; and more convincing carpellary leaves, like those of the modern Cycas, from the top of the French Triassic (Cycadospadix hen-nocquei), from the Kimeridgian of Italy and Scotland (Cycadospadix pasianianus) and from the Rhaetic of Sweden (Cycadospadix integer), which demonstrate the presence of true Cyca¬ dales in the late Triassic and Jurassic. The Cretaceous records are few and not especially trustworthy. During the Tertiary a few un¬ doubted remains of cycads occur at scattered localities, demonstrating a more extended geo¬ graphical range than obtains at present. Thus there are two species of Zamia in the-lower Eocene along the shores of the Mississippi embayment. A third species occurs in the basal Eocene of Belgium and a fourth in the late Oligocene or lower Miocene of -Chile. Oligocene species include a Zamia from France, an Encephalartos from Greece and a not certainly identified Ceratozamia from northern Italy. The Miocene records include a Zamites and a Cycadites from Switzerland.

Coniferophyta. — The Coniferophyta corre¬ sponds almost exactly to the Gymnospermse of the older students. Their outstanding char¬ acteristic is the exposed ovules discovered by Robert Brown in 1827. This feature has ceased to be diagnostic since it is common to the Pteriodspermophyta and Cycadophyta, and is evidently of ancient lineage. Although prob¬ ably more continuously and abundantly repre¬

sented in the geological record than any other group of plants, it cannot be said that our knowledge of either the comparative morph¬ ology or the geological history of the phylum warrants a dogmatic view of their phylogeny.

All the known coniferophytes are woody plants with pronounced secondary growth; nearly all are trees and it is extremely doubtful if the group ever contained herbaceous forms. They show rather uniform xerophytic structure, due possibly to the character of the water-con¬ ducting tissues or to the evergreen foliage, since of the existing species only the bald cypress, ginkgo, the larch and Glyptostrous are decidu¬ ous. They usually cannot compete successfully with angiosperms under genial conditions. Structurally the bundles are collateral and a primary persistent cambium develops all of the secondary tissues. The water-conducting tissues are tracheids with bordered pits, and true ves¬ sels are found only in the Gnetales. Both mega and microspores are normally formed in cones (strobili), which are never bisporangiate.

The Araucariales and Taxales are dioecious while the Coniferales, Cordaitales and Ginkgoales are monoecious. The sporophylls follow the leaf arrangement and are hence spiral or cyclic. The staminate cones have two or more sporangia to the sporophyll, hence these are less numerous than in the Cycadophytes. They are exceedingly variable and very characteristic for genera. The ovulate cones are varied and their morphological interpretation has been warmly debated for a century. A digest of the various opinions advanced is given by Worsdell (An¬ nals of Botany, Vol. 18, p. 57, 1904). Polli¬ nation is effected through the agency of the wind (anemophily). The stock is of great antiquity and contemporaneous groups are to be regarded as divergent or convergent and not directly filiated. It has been demonstrated be¬ yond reasonable doubt that the Cordaitales, Ginkgoales and Cycadophytes are alike related to the Pteridosperms and Ferns. In the case of the Coniferales and Araucariales this is not so certain and some students (Renault, Camp¬ bell, Potonie, Seward) consider the later groups as of Lepidophytic origin. The most interesting order from an evolutionary standpoint — the Gnetales — since they seem to form a connect¬ ing link with the amentiferous Dicotyledonae have an ancestry completely unknown, although they show certain structural and developmental points of contact with the Cordaitales, Ginkgoes and Cycadophytes.

In the present treatment the coniferophytes are grouped in six orders

— Cordaitales, Ginkgoals, Taxales, Araucariales, Coniferales (Pinales) and Gnetales which are best dis¬ cussed separately. The' oldest of these orders, long since extinct, is the Cordaitales. The Cor¬ daitales were exceedingly abundant and pre¬ sumably-varied at several horizons in the Paleozoic, and the synthesis' of a study of impressions of their foliage and fructification, pith casts and petrifactions enables us to draw a satisfactory picture of their general appear¬ ance and habit, although as yet it is usually im¬ possible to correlate specific foliar impressions with petrified stems and seeds. They were tall and relatively slender trees with trunks that were frequently over 100 feet in height and un¬ branched except at the crown Where their spirally arranged foliage of simple and often

large parallel veined leaves were displayed. Leafform has been used as a basis for the three forms genera — Eucordaites, with spatulate blunt tipped leaves often several inches in width and two or three feet in length; Dorycordaites, with pointed leaves approaching those of Eucordaites in size; and Poacordaites, with narrow linear leaves. The parallel veined leaves unbranched in Poacordaites but re¬ peatedly forked in Dory-and Eucordaites re¬ semble those of corn and the early writers con¬ sequently considered Cordaites as a monocotyle¬ don.

The stem has the general features of a modern conifer except for the much larger pith which was often discordal as a conse¬ quence of the rapid elongation of the stem, so that casts yield characteristic forms described by the early writers as Artisia or Sternbergia. Structurally, the wood, commonly known as Araucarioxylon or Dadoxylon, was centrifugal with the narrow spiral protoxylem lying at the periphery of the pith, succeeded radially by spiral tracheids soon passing into scalariform elements which after an interval pass into pitted tracheids greatly resembling those of the modern Araucariales. The bordered pits, limited to the radial walls of the tracheids, usually in two or more rows and so densely crowded in alternating series that they tend to be hexagonal in outline. The rays were nar¬ row, originally they may be three cells wide but those of the secondary wood are usually

one or at the most two cells wide. The phloem, of sieve tubes, parenchyma and some bast fibres, was like that of modern conifers. The leaf traces were often double as in some Pteridosperms and Ginkgo. The bark was thick but is usually not well preserved. The roots were feebly developed for suc-h large trees, diarch in structure with a broad zone of secondary wood, conforming histologically with that of the stem. The leaf structure is comparable to that of a cycad pinnule with collateral bundles and the stomata were confined to the lower sur¬ face.

The fructification shows considerable varia¬ tion. The catkins, as commonly preserved as impressions under the name of Cordaianthus show an elongated axis with bracteate pedicels bearing the alate bilaterally symmetrical cor¬ date seeds. Petrified material shows the staminate catkins to consist of a thick axis bearing spirally arranged bracts between which the microsporophylls were inserted, either singly or massed near the apex. Each microsporophyll consists of a pedicel surmounted by three or four or more vertically elongated pollen sacs which split longitudinally, and contain large pollen grains which often show a group of prothallial cells. In appearance the ovulate cones are much like the staminate. The axis is thick and clothed with spirally arranged bracts many of which are sterile. In the axis of others are found short stalked ovules with bracteoles. The ovules had two integuments— an outer fleshy one and an inner one which be¬ came crustaceous. The ovule shows a nucellus with a large pollen chamber and a beak like micropylar canal. The pollen grains found in the canal and pollen chamber are larger than those in the pollen sacs with their mass of prothallial or antheridial cells more extensively developed and it is hence inferred that the

habit of forming pollen tubes had not yet been developed and motile sperms were formed directly.

The seeds of numerous species are common as impressions and have frequently been found in a petrified condition. They exhibit con¬ siderable variation in size and form and com¬ monly go under the name of Cordaicarpus.

Several additional types of Cordaitean wood anatomy are known. These include Mesoxylon of which several species have been described from the English Carboniferous, which help bridge the gap between Cordaites and the family Poroxylaceae of the Carboniferous and Permian. Both Mesoxylon and Poroxylon de¬ velop centripetal xylem

in the primary wood. A third familv the Pityeae, based on large trunks from the Lower Carboniferous of Scot¬ land, is chiefly distinguished by the wide rays. Other anatomical genera in the Cordaitean plexus include Callixylon of the Upper Devonian of Europe and America, Caenoxylon of the Russian Permian, Mesopitys of the Permian, Parapitys of the Middle Carboniferous and Archaeopitys of the Lower Carboniferous of Kentucky. Evidently much remains to be learned before these and other as yet unknown Cordaitean forms can be properly allocated. The Cordaitales show clearly their origin from the same ancient plexus that gave rise to the Pteridosperms. They likewise show points of contact with the later coniferophyte orders especially with the Ginkgoales, Taxales and Araucariales.

Ginkgoales. — The Ginkgoales as a group can be characterized only by the features of the single existing species and these may be misleading when applied to remote ancestral forms. This obvious conclusion must be borne in mind in the attempts to relate these forms to the ancient Cordaitales on the one hand and the modern Abietineae on sthe other. Thus the formation of pits on the tangential walls of the tracheids at the end of the annual ring is a purely physiological response to an alternation of growth and resting periods and is due to climatic changes, as is the deciduous habit, and it is very probable that neither of these char¬ acters was present in early Mesozoic forms or has any phylogenetic significance. Similarly the paired sporangia appear to represent a reduc¬ tion from the more numerous sporangia of the Mesozoic species.

The modern Ginkgo has a persistent primary cambium, collateral bundles, double lerf trace, no wood parenchyma, resin ducts in both pith and portex, tracheids with radial opposite pits separated by so-called bars of Sanio. The leaves are comparable anatomically with those of cycads but are simple and deciduous. They are borne on either long terminal shoots or in tufts at the apex of short auxiliary shoots — the latter habit shared by some fossil species of Baiera. The pollen is slightly winged and is formed in microsporangia which are normally in pairs, pendant from the expanded tips of sporophylls arranged in loose catkins in the axils of scale leaves at the end of short shoots. The megasporangia are also normally in pairs, although but one ovule matures, and are at the end of a long stalk whioh is morphologically a shoot and in some Mesozoic species bore more than two ovules. The sperms are ciliated and free swimming as in the Cycadophytes and

Pteridophytes. Ginkgo was formerly con¬ sidered a member of the family Taxaceae al¬ though its resemblance to cycads has long been known. It appears to have been derived from the Paleozoic plexus of Pteridospermophyta, and shows points of contact with .both the Paleozoic Cordaitales and the Mesozoic Williamsoniales. All three groups probably had similar ancestors, but there is no evidence that the Ginkgoales have been ancestral to any existing group of Coniferales. The modern Ginkgo is the most isolated as well as the oldest existing arborescent form, its stock being represented in the fossil record continuously from the Per¬ mian to the present. The leaves are so charac¬ teristic that there is little uncertainty regarding their determination, although some of the older forms referred to the Ginkgoales, simulate such digitate fern fronds as Schizaea, and some of these are of questionable identity. The limited space forbids more than a mention of the extinct genera that have been referred to this order and which in some cases do and in other cases do not belong to this stock. Some of these genera are Ginkgophyllum, Saportaea, Trichopitys, Dicranophyllum, Rhipidopsis, Whittleseya, Psygmophyllum, Gomphostrobus, Trichophyllum, Faildenia, Phcenicopsis and Czekanowskia. Some of these such as Saportaea and Rhipidopsis seem clearly to represent early variants of the Ginkgo type but the two fossil genera that stand out beyond all question are Ginkgo itself and the allied genus Baiera — the latter segregated on account of the short petiole and the repeated dichotomy of the leaf blades to form narrow elongate ultimate segments in which the veins no longer fork. The modern Ginkgo sometimes furnishes in¬ stances of more than the usual number of pol¬ len sacs and ovules, and its leaves also fre¬ quently become divided to simulate those of Baiera. Both Baiera and Ginkgo appear at least as far back as the Permian and become abundant and varied throughout the Triassic, Jurassic and Lower Cretaceous, where fre¬ quently the seed's, immature fruits and the pol¬ len bearing catkins, as well as the leaves, are found fossil. Baiera attains its maximum range somewhat earlier than Ginkgo, and its dis¬ tribution appears to have extended beyong the known range of Ginkgo in South America, South Africa and New Zealand. It is evidently a waning type during the Upper Cretaceous and becomes entirely extinct before the close of that period. Ginkgo, on the other

hand, has been found in the Tertiary of Greenland, North America, Europe and Asia, the characteristic Ginkgo adiantioides being abundant and scarcely distinguishable from the still existing species. The latter, long thought to be extinct except as preserved by cultivation in the temple gardens of China, and Japan, has recently been reported in a wild state in western China.

Gnetales. — This order includes but three existing genera which differ widely in habit, habitat, anatomy, gametophvtic structures and in endosperm and embryo formation, and yet having a thread of common characters denoting their community of origin. Ephedra, with about 30 species of low straggling shrubs with jointed ribbed stems and reduced leaves, inhabits the more arid parts of both the Eastern and Western hemispheres. It is the least specialized of the three genera and more like the Conif¬

erales. Gnetum, with about 26 species of both the Eastern and Western tropics, comprises small trees or woody lianas with opposite, netted veined, dicotyledonous-like leaves, and is most advanced in the direction of the angio¬ sperms. The third genus Tumboa (Wel-witschia) is a remarkable monotvpic form of western South Africa with a shortened swollen axis and but two, excessively long, parallel veined leaves, and is obviously most specialized (aberrant). All of these modern forms are evidently the end products of an ancient and diversified group which unfortunately has not been certainly recognized in the -older fossil floras — Gnetopsis of the Carboniferous (Stephanian) of Europe and North America being, according to Oliver and Salisbury, a pteridosperm related to Cortostoma. Gnetum has been definitely recognized in the Pliocene of Holland while several species of Ephedrites have been recorded from the Turassic, Cretaceous and Tertiary. The relationship of these latter can¬ not, however, be regarded as established be¬ yond suspicion. Leaves suggestive of Gnetum are also present in the Lower Cretaceous of Virginia. -

The point of chief interest in the Gnetales is their angiospermous characters shown in their possession of true vessels (absent in all other gymnosperms, in their broad rays, the presence of companion cells in the bast, the incipient perianth of the infloresence, the floral morphol¬ ogy, the details of sporogenesis, fertilization and embryogeny with the elimination of archegonia, the organization of eggs and the dicotyle¬ donous embryos). Such of these features as were known to the older morphologists sug¬ gested that the Gnetales were to be looked upon as representing the progenitors of the

flowering plants and this view, which has long been in dispute, has recently come into prominence again and is supported by a considerable body of evidence. Lang and Thompson have shown that the Gnetales are undoubtedly related to the rest of the gymnosperms and are not to be considered true angiosperms, as Lige advocated. On the other hand the attempt to consider them as a reduction series from the Mesozoic Cycadeoidales must be considered an abortive speculation. Some light on their geological history is greatly to be desired since the most recent work with the existing forms indicates an ancient and collateral relationship with the balance of the Coniferophyta going back pos¬ sibly to the same pteridosperm plexus from which the Cordaitales took their origin. Hence comparisons of the gnetalean flower with the fructifications of existing conifers is obviously futile. In the other direction the least aber¬ rant genus, Gnetum, while in no sense a (<missing link,® furnishes good grounds for consider¬ ing an as yet unknown group of gnetalean forms as the ancestors of the angiosperms through the primitive amentiferous • families.

Taxales*. — The Taxales are dioecious and they differ from all other Coniferophytes except the Ginkgoales and Gnetales in that true cones are not organized, the ovules developing into seeds with a partially fleshy testa (aril) or cu-pule. Normally only a single ovule of the sporophyll reaches maturity in the modern forms although more seem to have been devel¬ oped in extinct genera like Palissya.

The Taxales contain but eight of the 36 ex-

isting genera of the Coniferophytes and only about 75 of the 325 existing species. At least two and probably three lines of descent are obvious. The first of these is the stock of the family Taxaceae, which is regarded as primitive and a probable offshoot of the Cordaitales by some students, and is considered a modern re¬ duction series by others. Whatever the intri¬ cacies of morphological legerdemain it can be positively affirmed that the Taxaceae go back at least as far as the late Triassic and are hence more ancient than the ancestors assigned

for them by nonpaleobotanical students. Moreover the disconnected geographical distribution of the 17 existing species is a conclusive indication of an extended geological history, as is the greater geographical range of all of the genera in the past than they attain at the present time. The fossil record, in addition to occasional spe¬ cies of Taxus (Taxites) and Tumion (Torreya) from the Cretaceous to the present, includes the Triassic genus Palaeotaxus, the Lower Creta¬ ceous genus Cephalataxites, the Upper Creta¬ ceous genus Cephalotaxites, Cephalotaxosper-mum, Vesquia, Taxo-torreya, *etc.* Cephalotaxus fruits have been found in the Pliocene of Europe and all of the other existing genera ap¬ pear to have been well represented during Cenezoic times.

-That the resemblance of Cephalotaxus to Ginkgo and of Taxus to Cordaianthus, the com¬ plex vascular anatomy of the seeds, the absence of resin canals, are not illusory features of the existing species is indicated by the foregoing brief survey of the fossil forms. The second line of descent in the Taxales is represented by the family Podocarpaceae often made to include two subfamilies, the Podocarpeae and the Phyllocladoideae, while some students consider the latter to represent a third evolutionary line.

The Podocarpaceae are to-day almost as dis¬ tinctively characteristic of the Southern Hemi¬ sphere as the Taxaceae are of the Northern. They comprise over 50 of the 72 existing spe¬ cies of the order. Podocarpus is easily the dominant genus with over two score existing species and is found in all the southern conti¬ nents, where they form extensive stands com¬ parable to those of Pinus in the North Tem¬ perate zone.

The Phyllocladoideae are to-day confined to the Australian-New Zealand region, but both subfamilies have an extended geological history. Probably their oldest authentic representative is Palissya (Elatocladus) of the Triassic and Jurassic which had dimorphic foliage and re¬ markable lax cones made up of flat lanceolate foliar like sporophylls with two rows of small seeds in cupules on their upper (ventral) sur¬ face. Palissya, to which 10 or 12 species have been referred, is abundantly represented by sterile twigs in the older Mesozoic of Europe, Asia and America, as well as in the Arctic and Antarctic regions.

Another equally old genus, of great interest but not completely known, is Stachytaxus which has two or three species in the Rhaetic of Swe¬ den and Greenland. It had yewlike leaves and loose cones, each sporophyl] of which bore a pair of large seeds on their upper (ventral)

face, which are compared by their discoverer (Nathorst) with the modern Dacrydium. Po¬ docarpus itself contains about a score of fossil snecies which appear to have been abundant and

rather widespread during the Tertiary and are doubtfully recognized *in the Upper Cretaceous. The allied genus Nageiopsis, represented in the modern flora by the Nageia section of Podocar¬ pus with about* a dozen broad leafed species ranging from Japan to the East Indies and New Caledonia, is exceedingly abundant in the Lower Cretaceous of North America and is represented in the English Wealden and the Asiatic Neocomian. It has also been recorded from the English Jurassic and the Mesozoic of New Zealand. Phyllocladus occurs throughout the Tertiary of Australia and various suppos¬ edly related genera such as Phyllocladites of Spitzbergen and Protophyllocladus of North America and Asia are present in the Upper Cre¬ taceous. Wood known as Phyllocladoxylon has ‘been described from strata as old as the Jurassic.

The difficulty of correctly determining foliar specimens and the lack of structural fossil material of this order leaves much to be de¬ sired in the knowledge of the geological history of the order, but such information as is avail¬ able cannot safely be ignored by weavers of phylogenetic hypotheses.

Araucariales. — The ordinal rank of the Araucariales, first clearly emphasized by Sew¬ ard and Ford, receives abundant confirmation from a consideration of their organization and geological history. The difficulties of homolo-gizing their morphology with that of the Coniferales or Taxales has led to endless discussion and to the hypothesis, previously mentioned, of regarding them as independently derived from Lepidophytic ancestors. The existing forms, about 15 in number, are segregated into the large-leafed genus Dammara (Agathis) with four or five species of the East Indian — New Zealand region, and Araucaria with 10 or 12 species of South America and the Oriental re¬ gion. They are dioecious and form large and complex cones in which the morphological dis¬ tinction of leaf and bract is eliminated. The ovules are solitary and the pollen sacs are free and pendulous. Features of the vascular anat¬ omy made much of by morphological specula¬ tors are the persistent leaf traces, the absence of. resin canals, bars of Sanio, and wood paren¬ chyma. The tracheids are characterized by crowded alternating and often flattened bor¬ dered pits, indistinguishable from those of the Cordaitales. Foliage leaves only are present, there being no traces of the scale leaves so

char¬ acteristic of the Coniferales. The existence of a variety of Mesozoic genera which combine some of the features of Araucarian vascular anatomy with Abietinaceous characters and the cone and foliar habits of a variety of genera (Widdringtonites, Brachyphyllum, Raritania Thuites, Androvettia, Araucariopitys, Wood-worthia, etc.) has led some students to regard the Araucariales as derived by reduction from the Abietiniaceae, which are usually considered the most modern and specialized coniferophytes. This ingenious hypothesis entirely ignores the geological record, and the cone and foliar habits of the forms, here regarded as the more sig¬ nificant.

For a more exhaustive discussion of this order, see article Araucariales, as only a sum¬ mary of the geological history of the order will be given in the following paragraphs. Petrified wood from the Paleozoic cannot be accepted as an indication of the presence of this order since

the wood anatomy is practically indistinguish¬ able from that of the Cordaitales, hence the term Araucarioxylon may be of dual signifi¬ cance. The Upper Carboniferous and Permian genus Walchia had foliage like that of the mod¬ ern acicular leafed Araucaria, bossed pith casts caused by the interlaced sclerenchyma fibres at the periphery of the pith, spirally arranged leaf cushions, Araucarian wood anatotny and single seeded cone scales, and is commonly regarded as an early member of this order, as is also the Carboniferous genus Schizodendron (Tylo-dendron), and the Permian genera Gomphostrobus and Ulmannia. Permian leafy twigs have been referred to the genus Araucarites and various older Mesozoic genera such as Albertia and Pagiophyllum probably belong in this alii-, ance. Undoubted Araucarian wood and single seed cone scales are cosmopolitan during the Jurassic and continue unabated throughout the Lower and Upper Cretaceous. Dammara foli¬ age and conescales likewise become cosmopoli¬ tan during the Upper Cretaceous, and extinct genera such as Pseudoaraucaria, with two-seeded sporophylls, and Protodammara, with three-seeded sporophylls, have also been de¬

scribed. The order appears to have continued its worldwide range well into the Tertiary for unquestionable Araucarian remains of this age have been recorded from the New Siberian islands north of Asia, North and South Amer¬ ica, Europe, the East Indies, on the border of Antarctica. Africa then as now is without records. That the Araucariales began to dwin¬ dle in the late Tertiary and during the Pleisto¬ cene is shown by their absence at those times through the northern hemisphere, their pres¬ ence on Kerguelen Island and in the Pleistocene of the Falkland Islands and their subfossil oc¬ currence beyond the present range of the exist¬ ing species.

Coniferales. — The Coniferales as here understood is an order coterminous with the family Pinaceae of the older botanists and would possibly be more appropriately termed the Pinales. The details of structure and distribu¬ tion belong more properly to recent botany (see article Coniferales), and such as are mentioned in the present connection will be introduced in the brief sketch of the three families into which the order is segregated. These are the Taxodiaceae, Cupressaceae and Abietineaceae.

The family Taxodiaceae comprises eight ex¬ isting genera and about 13 existing species char¬ acterized by a nearly complete coalescence of bract and scale, wingless pollen and spiral phyl-lotaxy. The extinct species greatly outnumber the existing and the family has evidently passed its climacteric stage and seems destined to ex¬ tinction. Moreover none of the genera have more than three existing species (Athrotaxis), three have but two (Sequoia, Taxodium, Glyptostrobus), and four have but one (Sciadopitys, Cunninghamia, Taiwania, Cryptomeria). Their restricted range is also an indication of former greatness. Thus Glyptostrobus is Chinese, Scia¬ dopitys is Japanese, Tawania is confined to For¬ mosa, Cunninghamia and Cryptomeria are Chino-Japanese, Athrotaxis is Australian, Se¬ quoia is confined to the Pacific and Taxodium to the Atlantic border of North America. The family is unrepresented in Europe, South Amer¬ ica or Africa at the present time. Its fossil his¬ tory constitutes one of the romances of paleo¬

botany illustrating the antiquity, growth to cos¬ mopolitanism and subsequent wane of the vari¬ ous types. The oldest known genus that ap¬ pears to represent this family is the Permian and Triassic Voltzia, with dimorphic distichous foliage, long, slender, cylindrical cones of imbri¬ cated three to five lobed sporophylls, and two or three winged seeds. There are at least half a dozen species known and they are

recorded from Europe, Asia and South America, but not certainly from North America.

Another ancient and truly cosmopolitan genus was Cheirolepis with distichous twigs, short pointed leaves and five lobed two-seeded sporophylls. A genus of doubtful affinities is leptostrobus of the Jurassic of Asia and North America, although Sequoia appears toward the end of that period (Portlandian). In the Lower Cretaceous the more noteworthy genera are Sphenolepis and Athroaxopis, although Sequoia is undoubtedly represented by foliage, cones and structure material at widely separated localities.

The Upper Cretaceous genera are Geinitzia, which may belong to the Araucariales; Ceratos-trobus and Microlepidium, European genera; Cunninghamiostrobus, a Japanese genus based upon structural cone material ; Cunninghamites, which had numerous species in Greenland, Europe and North America; and Sequoia which is abundant and recorded from all the conti¬ nents except Africa and Australia, and from Spitzbergen on the north to Graham Land on the south. During the Cenozoic, especially dur¬ ing the older Tertiary, Sequoia continued una¬ bated and is recorded from all the continents except Africa. Athrotaxis is recorded from Europe, Cryptomeria is found in Europe and the Arctic, while Taxodium and Glyptostrobus are found everywhere throughout the northern hemisphere in the greatest abundance, and both genera are still present in Europe as late as the early Pleistocene.

The most obvious characteristic of the family Cupressaceae is the cyclic arrangement of the reduced leaves, a feature which, acquired early in their history, has continued unchanged from the Cretaceous to the present. The cones are small and are hard or fleshy at maturity. The existing genera are nine in number and contain about 80 species, of which 40 per cent belong to the genus Juniperus. The smaller genera show apparent anomalies of distribution coupled with an extended history.

There are a number of Mesozoic genera of which Brachyphyllum (Echinostrobus) is the most prominent, and including Raritania, Thuites, Androvettia and presumably Moriconia and Inolepis, which have been investigated anatomically and which show various combina¬ tions of the following features : sclerotic pith, lateral pits of ray cells, branched leaftraces, mucilaginous resin canals, uniserial spaced bor¬ dered pits of the tracheids passing into alternat¬ ing and sometimes mutually flattened series, transfusion tissue not lateral to the foliage strands but showing a tendency to surround the phloem.

These and other features are re¬ garded in some quarters as indicating that these genera are descended from the Abietineaceae and should be included in the order Araucari¬ ales — a view that has received but slight ac¬ ceptance and one that is dissented from in the present article.

/

The family history goes back to Widdringtonites of the Triassic, and to Palaeocyparis and Brachyphyllum of the Jurassic. These are not altogether conclusive in their testimony, but the family springs into unquestionable prominence during the Upper Cretaceous at which time in addition to Brachyphyllum, Thuja, Thuites, Juniperus and disputed genera like Androvettia, Moriconia and Inolepis, there were well-marked species of Widdringtonites, and Frenelopsis in which the foliar features are substantiated by fructification characters, which in the case of the valvular cones of the Actinostrobinse are unmistakable. The genera Callitris, Cupressus, Chamaecyparis and Libocedrus appeared in the Eocene, while many of the Cretaceous genera survived into that time and attained an ex¬ tended range.

The family Abietineaceae is characterized by almost completely distinct bract and scale, by winged pollen, short shoots, needle leaves and various recondite anatomical features of un¬ proven phylogenetic import. They are admit¬ tedly the most complex morphologically, and are usually regarded as the most modern family of Coniferophytes, although some students con¬ sider them to represent the ancestral stock from which the Araucarialea, Taxales and the Taxodiaceae and Cupressaceae have been derived by reduction. Whichever view finally prevails there can be no question but that in the light of present knowledge they have much the shortest geological history. There are nine genera and about 125 existing species, of which more than half belong to the genus Pinus, and they form extensive forested areas in the North Tem¬ perate Zone, to which they are practically con¬ fined. Extinct genera are rare and include the Upper Cretaceous Prepinus, Entomolepis and Plutonia. Among the still existing genera Pinus has numerous extinct species and goes back to the Lower Cretaceous

(Pinites or Ahie-tites). Cedrus goes back to the Lower Creta¬ ceous, Picea and Abies to the dawn of the Upper Cretaceous, while Tsuga, Pseudotsuga and Larix are exclusively Tertiary and Recent. The family is especially varied and widespread in the relatively short period from the Oligocene to the Recent.

Angiospermophyta. — In contrasting the angiosperms with the coniferophytes or with any of the other great groups of seed plants one is impressed with the lack of knowledge of both recent and fossil forms. Making their ap¬ pearance in the geological record during the Lower Cretaceous they soon outdistanced all competitors and from the Eocene to the present they have been the dominant plant group. Over 100,000 existing species are known and the fossil forms, even in the relative short period of their dominance, probably out¬ number the recent, so that vast numbers of species and very imperfect knowledge render a generalized presentation impossible. The an¬ giosperms undoubtedly show the most perfect adjustment of the plant organism to a strictly terrestrial existence. Adaptable to a degree un¬ equaled in other phylae they inhabit the most di¬ versified environments and some have second¬ arily invaded the sea margins as well as the lakes and streams, while others have become parasites, saprophytes or epiphytes. The modi¬ fication of their flowers for securing cross pol¬ lination through the agencies of insects or birds

is well known as are the various modifications of fruits and seeds for dispersal by wind, me¬ chanical ejection, * floating, passing unharmed through the alimentary tract of birds or mam¬ mals, sticking or clinging to fur or feathers, *etc.* (see articles Cross Fertilization; Disper¬ sal). Ranging in size from tiny aquatics to giant trees several hundred feet tall and ranging in their life span from that of a single season to several thousand years they are the most im¬ pressive members of the vegetable kingdom. Fruits are confined almost exclusively to an¬ giosperms and are apparently one of the effects of fertilization as specializations for protection and dispersal of the seeds. The variety of fruits is almost as great as that of flowers and must be considered an important factor in the success of the angiosperms as well as one of their prime benefits to humanity. It seems more than a coincidence that the evolution of a group of plants of the capacity of the angiosperms in which, as in some of the cereals, 30 per cent of the total weight of the plant is stored as elabo¬ rated food in the seeds, should have been con¬ temporaneous with the evolution of the warm¬ blooded animals. At any rate it seems certain that human civilization could not have evolved but for the evolution

of this plant phylum. The angiosperms are so numerous and present so many morphological diversities that it is im¬ possible to give a succinct characterization (see articles Botany; Seed Plants). Their outstand¬ ing feature is angiospermy itself, i.e., pollination results in ‘bringing the pollen spores in contact with a receptive surface of the carpel (stigma) and not with the ovule, as in all other known seed plants. All known angiosperms have closed ovaries and no other phylae have. At the same time it should be recalled that aneiospermy was itself a product of evolution and that some time a series of fossil forms may be discovered showing this character in the formative stage. Anatomically angiosperms are characterized, the dicotyledons normally and the monocotyle¬ dons primitively by the vascular system of the stem constituting a tubular cylinder (siphonostele) of collateral bundles and having leaf gaps. • The wood is marked by the presence of vessels arising through cell fusion — a feature common to the gnetalean coniferophytes and one absent in certain specialized families of angiosperms such as the Cactaceae and Crassula-ceae and in other possibly primitive families such as the Trochodendraceae. The improved conductive and supporting tissues of the angio¬ sperms result in a general improvement in stor¬ age tissues and in a great expanse of foliage and consequently a greatly increased produc¬ tion of nutritive materials. These histological features as well as the floral morphology to be alluded to presently are features of the sporo-phyte generation. The history of the male gametophyte does not differ materially from that which obtains in the various gymnosperm phylse but the female gametophyte is not only more reduced but its development is asso¬ ciated with new and peculiar features. Free nuclear division in the egg is wanting (a feature common to Gnetum and Tumboa among the Gnetales). The process of what is commonly called double fertilization is a strictly angiospermous characteristic. Among the units or¬ ganized in the embryo sac is what is known as an endosperm nucleus. One sperm unites

with the egg nucleus and the result of this union is the embryo, the second sperm nucleus unites with the endosperm nucleus and the re¬

sult of this union is the trophophyte or endo¬ sperm which furnishes the nutriment for the developing embryo and the subsequent germi¬ nating plantlet. This course of events is strik¬ ingly uniform throughout the phylum and is unknown in other plants. Those who consider the formation of seeds as the most important characteristic of a definite group of vascular plants (Spermophyta) ignore the history of the origin of the seed habit and the result is no more natural than the Exogenous and Endogen¬ ous classes or than one which attempted to use homospory and hespory to define natural groups of the remaining vascular plants. Moreover such a treatment is confronted with the neces¬ sity of defining a flower. If a flower is con¬ sidered as a group of sporophylls in order to include the gymnosperms it then includes many of the so-called flowerless plants. If, on the other hand, the gymnosperms are placed in their correct perspective and a flower is defined as a group of sporophylls associated with a perianth the limit of the flower corresponds almost ex¬ actly with the limits of the phylum (except Gnetales) and the necessity, if such exists, for abandoning the convenient term flowering plants, as some students have advocated, is obviated. The popular concept of a flower is too firmly intrenched to warrant any attempt to arrive at a more philosophical morphology and the fact that the floral envelopes are lacking either primitively or by reduction in some groups is no more pertinent than the fact that some flowers consist entirely of floral envel¬ opes and lack sporophylls. The presence of floral leaves (calyx and corolla) surrounding the sporophylls and derived both from sterilized sporophylls and bracts appears to have been conditioned largely by the habit of entomophily. Although the primitive floral envelopes were probably protective in their function certainly their subsequent history and great diversity of detail are the result of entomophily. In the more primitive flowers the sporophylls tend to be free and the axis tends to be elongated with the members in a spiral arrangement. Evolu¬ tion of the flower proceeded along the lines of reduction in axial length until the members passed to a cyclic arrangement when they tended to become definite and fewer in number and at length became confluent to a greater or less de¬ gree. The three marked stages are termed hypogynous, perigynous and epigynous and all grades of intermediate stages are present. In¬ equalities of growth result in other diversities. The members tend to evolve from a radial sym¬ metry (actinomorphic) to a bilateral symmetry (zygomorphic) or to an isobilateral symmetry with two planes of symmetry and with the halves unlike.

Systematists segregate angiosperms into two series — monocotyledons and dicotyledons, and there has been almost endless discussion as to

which line was the more primitive. Both were present in the Cretaceous so that history fails to shed any light on the problem. Formerly gymnospermous and other remains from the older rocks were thought to represent mono¬ cotyledons but none such are now recognized. Modern opinion tends in the direction regard¬ ing the distinctions between these two groups

as largely cumulative and that the number ot the cotyledons and the correlative characters are of less phylogenetic importance than was formerly believed. The view is here advocated that the angiosperms are strictly monophylatic, that the monocotyledons are not primitive, nor did the primitive angiosperms exhibit combined monocotyledonous and dicotyledonous char¬ acters, but that the dicotyledonous type is the more primitive, and that it has given rise to the monocotyledonous stock, not, however, as a single or monophyletic line of evolution but by one such line combined with several reduc¬ tion series derived from different regions in the dicotyledonous plexus. Systematists have long recognized the similarities between the monocotyledonous arums, pondweeds and screw -pines on the one hand and the dicotyledonous peppers and willows on the other, as well as the convergence of certain Ranalian groups and the water plantains. The case of the water-lilly family is a classic instance of a group of dicotyledonous origin which has essentially reached the monocotyledonous category. Anal¬ ogies - between the amphisporangiate ˆflowers3* of the aberrent Cycadeoideas of the Mesozoic and such dicotyledonous flowers as those of the Magnolia have furnished a basis for a theory of angiosperm descent which while fascinating is believed to be illusory. More definite evidence for a revival of the old view that the angiosperms are related to the gymnosperms through the amentiferous dicoty¬ ledons and some gnetalean type similar to Gnetum has recently been accumulated. This evidence comprises the character of the in¬ florescence, the floral morphology, the details of sporogenesis, fertilization and embryogeny, the organization of vessels in the wood, the broad rays, companion cells in the bast, the habit and foliage, the dicotyledonous embryo, the elimination of archegonia and the organiza¬ tion of eggs. The foregoing considerations are derived entirely from a study of recent forms since no certainly determined fossil forms of Gnetales are known, and no known fossil angiosperms throw any light upon their phylogeny.

The taxonomy of the angiosperms is still in a most unsatisfactory state. The chief steps in their classification have been taken by Ray

(1703), Jussieu (1789), De Candolle (1819), Endlicher (1836-40), Brongniart (1843), Braun (1864), Bentham and Hooker (1862-83), Eichler (1883) and Engler (1892). While very imperfect and founded to a too great degree upon floral morphology the classification pro¬ posed by Engler and derived largely from Eichler is the most satisfactory, and it has the additional advantage of having been elaborated as a comprehensive systematic treatise (see arti¬ cle Botany, Classification).' The Monocotyle¬ dons and-Dicotyledons may now be briefly characterized. In the former many of the forms are herbaceous which argues for modern¬ ity. Anatomically the bundles are closed (amphivasal) , are without cambium, and are scattered through the parenchymatous ground mass of the central cylinder. Sometimes the bundles indicate a primitively circular arrange¬ ment such as obtains in the dicotyledons and the theory that a tubular central cylinder with foliar gaps was an ancestral condition accords with the view of phylogeny here advocated.

This does not mean, however, that the mono¬ cotyledons are strictly modern and monophyletic. The flowers tend to be trimerous and chalazogamy has not been observed. There is a greater reduction of sporogenous tissue in the megasporangium. There is one seed leaf or cotyledon which is terminal in position while the stem tip is lateral. The leaves are poorly differentiated into blade and stalk and tend to be entire, sheathing and lack stipules. The venation is closed and the primary and lesser systems are so sharply contrasted that the leaves are commonly considered parallel veined, and even when the latter feature is less obvious as in the arums and many tropical forms the con¬ trast in calibre just mentioned remains obvious. In the dicotyledons the stem shows a tubular

and hence prevailingly netted veined and this results in all degrees of lobation and division of the laminae.

Historically the oldest known angiosperms are found in the Lower

Cretaceous of Green¬ land, North America, Europe and New Zea¬ land. These earliest known types do not ap¬ pear to be primitive (only the foliage and secondary wood structures are known), and an extended early but unknown period of evolu¬ tion seems to be demanded. By the close of the Lower Cretaceous both monocotyledonous and dicotyledonous angiosperms are not uncommon. These include palms and most of the principal families except the most specialized such as the orchids among the former and the composites among the latter. A second modernization of

[Courtesy of Johns Hopkins University] Fig. 5.— Geological History and Phylogeny of Vascular Plants.

cylinder (siphonostele) of collateral bundles, a persistent cambium form secondary phloem and xylem, both of which elements arise through cell fusion. Secondary thickening re¬ sults in a relatively larger display of assimila¬ tive tissue (foliage) and a branching habit. The cotyledons are two in number and lateral in position and during germination the growing points and cotyledons are liberated by the elongation of the hypocotyl as contrasted with the monocotyledonous tendency to free the root and stem tip by the elongation of the co¬ tyledon which functions as an absorbing organ suggestive of the <(foot>:> of pteridophytes. The dicotyledonous flowers tend to be four or five merous. The leaves are well differentiated into petiole, blade and frequently stipules are present. The venation is graduated and open

the flowering plants took place at the dawn of the Tertiary and a third modernization in the Miocene. The Miocene floras were much like those of the present, but were richer in arbores¬ cent types and the forms were more widely distributed than they are at the present time. The bulk of the herbaceous vegetation appears to have been relatively modern in its evolution and those large groups or parts of groups that are especially characteristic of existing temper¬ ate floras, such as the Crucifers, Borraginaceae, Labiatae, Composite, Umbelliferae, Krameria-ceae, Papilionaceae, etc., were relatively very modern and their main evolutionary deployment seems to have been largely Pleistocene and post¬ glacial. The subject is much too large for treatment in the present article but a somewhat full discussion of the

geological history of the

angiosperms will be found in the Proceedings5 of the American Philosophical Society (Vol. LIII, pp. 129-250, 1914).

Conclusion. — The mutual relationships of the various groups of vascular plants that have been briefly discussed in the preceding para¬ graphs are shown in Fig. 5, which aims to rep¬ resent graphically their phylogeny as . under¬ stood by the writer and their relative import¬ ance throughout geologic time.

Bibliography. — Arber, E. A. N., (Glossopteris Flora) (1905) ; Berry, E. W., (Lower Cretaceous5 (Baltimore 1911); (Upper Cretaceous) (ib. 1917); (Tertiary of Southeastern North Araerica) (Washington 1916) ; De Saporta, G., (Le monde des plantes avant l'appari-tion de rhomme) (Paris 1879) ; De Saporta and Marion, (L'Evolution du regne vegetal5 (3 vols., ib., 1881—85) ; Heer, Oswald, (Primaeval World of Switzerland5 (2 vols., London 1876) ; Jong-mans, W. J., Palseobotanische Literatur) (3 vols., Jena 1910—13) ; Kidston, R., Palaeozoic Flora) (1886) ; Potonie, H., (Lehrbuch der Pflanzenpalaontologie5 (Berlin 1899) ; Renault, B., <Cours de botanique fossile) (Paris 1881-85) ; Schimper, W. P., (Traite de paleontologie vegetale5 (3 vols., ib. 1869-74) ; Schimper, W. P. and Schenk, (Palaophytologie5 (Munich 1890) ; Scott, D. H., (Studies in Fossil Botany) (2d ed., London 1908-09) ; Seward, A. C., (Fossil Plants5 (3 vols., Cambridge 1898; 1910; 1917) ; id., (Wealden Flora5 (2 vols., 1894-95) ; id., (Jurassic Flora5 (2 vols., 1900-04) ; Solms, Laubach, (Fossil Botany5 (Oxford 1891) ; Stopes, M. C., (Cretaceous Flora5 (2 vols., 1913— 15) ; VVard, L. F., Sketch of Paleobotany,5 con¬ taining extensive bibliography (Washington 1885) ; id., (The Geographical Distribution of Fossil Plants5 (ib. 1889) ; Zeiller, R., Elements de paleobotanique5 (Paris 1900) ; id., (Revue des travaux de paleontologie vegetale5 (in Revue Generate de Botanique, Paris 1903 et seq.).

Edward W. Berry,

Professor of Paleontology, Johns Hopkins University.

PALEOCENE, the lowest (oldest) epoch of the Cenozoic Age, embracing in North America the Puerco and Torrejon beds of New Mexico, and the Fort Union formation of the region east of the northern Rocky Mountains. None of these, are marine formations, and it is believed that at this period the continent had substantially its present outlines and mountain ranges ; but the Appalachians were worn al¬ most to levelness, and the plateau and mountain region on the Pacific slope were much less elevated than now. It is probable that Asia and Alaska were connected by land. The climate was semi-tropical in character, and the interior of the country contained large lakes and water¬ courses. (<Vast stretches of subtropical and more hardy trees were interspersed with swamps where the vegetation was rank,55 says Osborn, <(and accumulated rapidly enough to form great •beds of lignite. Here were bogs in which bog-iron was formed.55 The animal fossils show a general resemblance to Mesozoic types, and consist largely of reptiles, such as huge turtles, crocodiles, lizards, with many fresh-water shells. The conditions at the time in South America seem to have been much the same; but in Europe the fossils of the Paleocene show that many of the beds were of marine origin,

and that the climate was cooler than in America. Consult Scott, (Land Mammals in the Western Hemisphere5 (New York 1913).

PALEOCLIMATOLOGY. Climatology

treats of the changes in the atmosphere, geographically and in time. At the basis of these variations is temperature, and the source of the heat is nearly all solar. The earth is internally hot, but almost nothing of this heat attains the surface. It has been well said that the atmosphere is a kind of blanket put about the earth to keep it warm. The reason for this is that the air is transparent to those rapid vibrations of ether received from the sun which we know as light. On reaching the ground, however, a considerable portion of the light is transformed into much slower vibrations, which -we perceive as heat. Now if there were no atmosphere, these heat vibrations would pass off into space and be lost; the result would be that the burning heat of the unmodified sun¬ light would be turned into almost the intense cold of outer space at night. This is prevented by the atmosphere, which retains the heat and thus moderates and equalizes the temperature on the surface of the earth. Of the various gases which compose the

atmosphere, the oxy¬ gen and nitrogen are transparent to both the quick light vibrations and the slower heat ones ; they could not therefore alone modify tempera¬ ture in any great degree. The carbonic acid gas and especially the water in the air, on the other hand, while transparent to light, are more nearly opaque to heat vibrations, and it is due to them that the heat is retained. The larger proportion there is of them in the air, there¬ fore, the more equable will be the temperature. This explains why deserts, with their dry at¬ mosphere, suffer such changes of temperature between day and night, while the moist atmos¬ phere of oceanic islands gives them such even climates.

It must not be understood that all sunlight is thus turned into heat, as a portion is ab¬ sorbed in passing into the atmosphere and another part is reflected back as light and not transformed; it is the remaining portion that is thus effective.

The effects of the atmospheric changes not only condition the geographic distribution of the kinds of life, but also react physically and Ichemically on the lithosphere, so thalt the weathering of the rocks and soils is different in the cold and warm and in the wet and dry areas. It is well known that the mechanical alteration of rocks is greatest in cold climates, high altitudes, and deserts, while the chemical changes are most marked under warm, moist conditions. In fact, an abundance of moisture in warm ‘climates stimulates a rich vegetal and bacterial growth that liberates much carbonic acid, and this, along with tire oxvgen of the air, brings about the highly decomposed soils of tropical lands.

The surficial areas of the present isothermal climatic belts, according to A. Supan, are as follows :

Warm

zone

Temperate

zones

Cold

zones

Northern hemisphere… ,

53.3

31.8

14.8

Southern hemisphere ….

45.4

45.1

9.5

Average .

49.3 38.5 12.2

or as 8 is to 3 and 1

PALEOCLIMATOLOGY

171

Paleoclimatology, on the other hand, is the study of the succession of climates, as observed in their reactions on the inorganic and organic materials throughout the geologic ages. The methods of study in the two sciences are there¬ fore very different. In climatology, observa¬ tion is direct, for we are living under the in¬ fluence of the actual climates and so can study their character and effects upon the things alive and dead, while in paleoclimatology the atmos¬ phere is not present, and the methods of study are indirect and determined from its operations upon the plants and animals of the past and upon the earth's sedimentary rocks.

During the first half of the 19th century, it was assumed by most astronomers and geolo¬ gists that the earth began as a star, a small, hot, self-luminous body. In the course of time, the earth was said to have slowly cooled, and finally to have become non-luminous and en¬ crusted, attaining only very recently its cooled climate and polar ice caps. We therefore see that the older geologists believed that the cli¬ mates of the past were warm and equable the world over; the idea that the earth had recently passed through a glacial climate came into gen¬ eral acceptance only during the latter half of the previous century. More recently geologists have learned that the earth has had many cooled climates, most of which were localized, while at least three were glacial ones, affecting the whole earth. We now know, moreover, that the climates of the geologic ages have varied much,

and through the added results at¬ tained by biologists and paleontologists re¬ garding the biological regions of the warmth-loving plants and animals, it is seen that a new science — paleoclimatology — is in develop¬ ment.

The plants and animals are also self-regis¬ tering thermometers, and the marine ((life thermometer® indicates vast stretches of time of mild to warm and equable temperatures, with but slight zonal differences between the equator and the poles. The great bulk of known marine fossils are those of the shallow seas, and the evolutionary changes recorded in these (medals of creation5 are slight throughout vast lengths of time that are punctuated by short but decisive periods of cooled waters and great mortality, followed by quick evolution, and the rise of new stocks. The times of less warmth are the miotherm and those of greater heat the pliotherm periods of Ramsay.

On the land the story of the climatic changes is different, but in general the equability of the temperature simulates that of the oceanic areas. In other words, the lands also had long-endur¬ ing times of mild to warm climates. Into the problem of land climates, however, enter other factors that are absent in the oceanic regions, and these have great influence upon the climates of the continents. Most important of these is the periodic warm-water inundation of the con¬ tinents by the oceans, causing insular climates that are milder and moister. With the vanish¬ ing of the floods somewhat cooler and certainly drier climates are produced. The effects of these periodic floods must not be underesti¬ mated, for the North American continent was variably submerged at least 17 times, and over an area of from 154,000 to 4,000,000 square miles.

When to these factors is added the effect upon the climate caused by the periodic rising of mountain chains, it is at once apparent that the lands must have had constantlv varying climates. In general the temperature fluctua¬ tions seem to have been slight, but geographi¬ cally the climates varied between mild to warm pluvial, and mild to cool arid. The arid factor has been of the greatest import to the organic world of the lands.

It is seemingly clear that the variability in the storage of solar radiation by the earth's at¬ mospheric blanket and by oceanic waters and the consequent climatic variations of the past and present are due in the main to topographic changes in the earth's crust. These surficial

changes alter the configuration of the continents and oceans, the air currents (moist or dry), and the oceanic currents (warm, mild or cool).

On the other hand, a great deal has been written about the supply and consumption of the carbonic acid of the ancient climates as the primary cause for the variable storage of warmth by the atmospheric blanket. A greater supply of carbon dioxide is said to cause in¬ crease of temperature, and a marked subtraction of it to bring on a glacial climate. This aspect of the climatic problem is altogether too large and important to be entered upon here. It is permissible to state, however, that the glacial climates are irregular in their geologic appear¬ ance, are variable latitudinally, as is seen in the geographic distribution of the tillites be¬ tween the poles and the equatorial region, and finally that they appear in geologic time as if suddenly introduced. These differences do not seem to be conditioned in the main by a greater or smaller amount of carbon dioxide in the at¬ mosphere, for if this gas is so strong a con¬ trolling factor, it would seem that at least the glacial climates should not be of such quick development. On the other hand, an enormous amount of carbon dioxide was consumed in the vast limestones and coals of the Cretaceous, with no glacial climate as a result; though it must be admitted that the great limestone and vaster coal accumulations of the Pennsylvanian were followed by the Permian glaciation. Again it may be stated that the Pleistocene cold period was preceded in the Miocene and Plio¬ cene by far smaller areas of known accumula¬ tions of limestone and coal than during either the Pennsylvanian or Cretaceous, and yet a severe glacial climate followed.

Briefly, then, we may conclude that the markedly varying climartes of the past seem to be due primarily to periodic changes in the topographic and geographic forms of the con¬ tinents and oceanic areas, plus variations in the amount of heat stored and distributed by the oceans.

The factors in paleoclimatology are four in number, and’ stated in the order of their his¬ toric development are as follows :

(1) Tillites. — Glaciers of to-day deposit in front of themselves either sheets of glacial bowlder clays or moraines that are composed of heterogeneous materials such as unconsolidated sand and muds and rocks that are subangular and rounded along with others that are facetted and striated. These are the glacial tills of the Scotch geologists, while the ancient ones of like origin, but now consolidated into hard rock formations, are known as tillites.

PALEOCLIMATOLOGY

Our knowledge of glacial climates had its origin in the Alps and chiefly through the studies of De Charpentier between 1815 and 1834, and of Louis Agassiz beginning in 1836. From their teaching we now know that alpine glaciers and vast continental sheets of ice, thousands of feet thick, covered widely many parts of the world, not only polar lands but temperate parts as well, during the Glacial period. Through a study of the present glaciers and the work they do in spreading the tills far and wide over the lands as they melt and retreat, geologists have learned to discern in the tillites their significance as to the former glacial and locally cooled climates. Curiously, in early Permian time glaciers were widely spread to the north and south of the equator and not at all in northern temperate and arctic - areas, resulting, however, in cool and semi-arid climates in North America and northern Europe. In fact, tillites are known as far back in geologic time as the early Proterozoic, and others are present in formations deposited in Ordovician, Silurian, Devonian and Eocene times.

(2) Paleontology. — On the basis of the present distribution of life (zoogeography), paleontologists have long been aware, through their studies of the fossils, that variations in the climates of the past may be discerned more especially in the higher plants, insects, corals, shelled cephalopods and foraminifers. When explorers in Arctic America brought the in¬ formation that whole beds of limestone in that region are made of Silurian corals, and that in the Tertiary of Greenland occur leaves of the bread-fruit tree and other warmth-loving plants, it became apparent that these places must at times have had warm climates like those of Italy and Florida at present. In the course of a century of biologic and paleontologic en¬ deavor paleontologists have learned much re¬ garding the zonal distribution of ancient life. Therefore when thev encounter an abundance of fossil corals and especially coral reefs and limestones made up of large forms of foramini¬ fers in far northern lands such as Alaska and Spitzbergen, they regard this as conclusive evi¬ dence that the waters in which they lived were warm. Marine reefs of the present and past, built by calcareous algae, sponges, calcareous hydroids, corals and tubiculous

worms, and banks of thick-shelled bivalves, are all known to be indicative of warm and shallow waters. Gastropods with thick calcareous opercula are evidence of the same nature. Marine shell faunas in great variety of forms are of warm waters, while in cool to cold ones there is usually a great duplication of but a few species. Assemblages of large insects point to warm climates, while small ones show reduced tem¬ perature. Large-shelled cephalopods, like those of the Ordovician, Silurian, and more especially of the Jurassic and Cretaceous, bespeak warm waters.

On the lands, ringed woods are nearly al¬ ways indicative of climates with winters, while palms, tree ferns, cycads, magnolias, figs, planes, tulip and bread-fruit trees are of warm climates. Trees and shrubs occur in far less variety under cool climates than is the case in warm ones. Turtles, snakes, lizards and dinosaurs do not live in cold climates, while mammals are in

greatest variety in temperate areas and in the semi-arid regions of the tropics.

(3) Topography and Paleogeography. — Geologists have long been pointing out that the earth's history is cyclic or periodic in nature. For very long times the lands are low and more oi less widely flooded by the oceans. Then the climate throughout most of the world is oceanic, that is, it is warm, moist and nearly uniform. The lands are base-leveled and the geologic for¬ mations are essentially of the seas and oceans. Thin deposits and widespread limestones and calcareous shales are characteristic of these times, along with the formation of coal beds. Subsequently the earth for a time loses its iso¬ static balance and readjusts itself through in¬ ternal rearrangements. The lands in relation to the strand lines are then higher and much larger, while their borders are apt to be elevated into mountain chains, and the climates are cooled or may become even glacial. Zonal and arid climates, from tropical to cold, are preva¬ lent. The oceanic overflows are then also least in area, and the geologic formations, because of accelerated erosion, tend to be coarse and of greater thicknesses, together with the presence of fresh-water deposits that are usually barren of fossils and often red in color. It is essen¬ tially at these times that gypsums and salts and glacial deposits are laid down. The organic world then also loses its ecologic balance, is stimulated to change, and forced to readapt it¬ self through evolution to the altering environ¬ ment.

The climates of entire areas may be greatly altered by the formation of some new land or mountain range, or through the birth of a land-bridge uniting two continents, for these may divert or even bar air and oceanic currents. Think, for instance, of what would happen to northwestern Europe if the Panama bridge were deeply beneath the sea so that the equatorial currents flowing into the Caribbean would pass into the Pacific. There would be no Gulf Cur¬ rent to warm western Europe, and it would be as cold and inhospitable as Labrador. When mountain ranges are high, they divert the air currents and extract from them their moisture, causing one mountain side to be moist while the other may be more or less arid. And it may make a great deal of difference to the local cli¬ mate as to how the mountains trend. Finally, when most of the continents are large, high and mountainous, as at present, then the earth has cooled to glacial climates.

(4) Petrology. — Johannes Walther was one of the first to direct attention to the sedimen¬ tary formations of the ancient seas, and more especially to those formed by fresh water and by the air, as having within themselves a cli¬ matic record. He pointed out that the deserts of central Asia are red in color, that carmine-red dunes are wandering across Arabia, while yellows are of wide distribution in Trans-Caspia and in Africa. In ‘temperate regions, the soils are chiefly gray, yellow or brown in color, while in tropical ones they are red and the laterites are brown-red. In America Joseph Barrell has written much on the same subject. It is now evident that the color and chemical content of the geologic formations are largely connected with climate. Alternations in color from red deposits to gray and white sandstones

and conglomerates, with coal beds such as occur in the American Carboniferous succession, ap¬ pear to indicate wide swings of climatic change from warmth and semi-aridity to cooled, humid and probably even cold climates. Accumula¬ tions of salts and bedded gypsums are indicators of dry climates, while widespread formations of limestones

are looked upon as evidence of warm-water seas. On the other hand, coal beds are usually regarded as formed in swamps under temperate to cool climates. Loess is ac¬ cumulated dust blown out of the deserts into moist grass-covered areas. Finally, all mud¬ stones that are “sun-cracked” are evidence of seasonal exposing and the drying out of the contained water by the atmosphere. This phe¬ nomenon is particularly common in the oxidized red formations that were laid down under more or less arid climates. Through an understand¬ ing of the present operations of the laws of na¬ ture, we thus learn how to discern their effects throughout the geologic ages, and to see that the rocks, like the living organisms, have within themselves the records of their originations and something of their ancestral histories.

Charles Schuchert,

Professor of Paleontology, and Curator of the Geological Department, Peabody Museum of Natural History, Yale University.

PALEOGEOGRAPHY. Geography is the science which describes the earth’s surface, in¬ cluding the distribution of the living things upon it at the present time, and more especially of mankind, the dominating influence among the organisms. Paleogeography, on the other hand, treats of the succession of geographies of the past, i.e., the prehistoric geographies, as known to geology and paleontology. In other words, paleogeography is the synthesis of the earth sci¬ ences based on the record of the rocks of the earth’s surface. The term paleogeography was first used by T. Sterry Hunt in 1872 for “the geographical history of ancient geological pe¬ riods,” but it is only since 1896 that it has come into wide usage.

When, in the beginning of the 19th century, geologists began to perceive the vast significance of the doctrine of the Scotch geologist Hutton, who taught that “the ruins of an earlier world lie beneath the secondary strata,” and, further, that great masses of water-deposited rocks have been upheaved and thrust into mountain ranges, only to ‘be later worn away by atmospheric agencies, it was but natural for them to look for the lands that had furnished the materials of these upheaved rocks. In this way the science of paleogeography had its origin, but because of the scantiness of geologic knowledge a cen¬ tury ago, the embryo science was almost wholly of a descriptive and not of a carto¬ graphic nature.

The French were the first to discern paleo¬ geography, and it was Llie de Beaumont, be¬ tween 1829 and 1852, who led the way by point¬ ing out that the water-laid rocks had been ele¬ vated from time to

time and pushed up to form the mountain chains of the earth's surface. We now know that where the seas have endured for many millenniums, and in the geosynclines of the continents where vast thicknesses of strata have accumulated, here later on a moun¬ tain range will rise and a new land be formed. The cause of these periodic risings of the moun¬

tains is the continual shrinking of the earth's mass, resulting in the shortening of its circum¬ ference, and in the buckling up of its surface into mountain ranges. When an over-ripe apple dries out and becomes smaller in mass, its skin wrinkles, and in the same way the earth shrinks into a smaller mass and its surface from time to time wrinkles into mountain ranges. These great changes in the earth's surface also bring about alterations in the atmosphere, and at times even produce severe glacial climates that affect the whole earth outside of the tropical regions. Furthermore, because of these changes, there come about marked alterations in the evolution and distribution of life.

The evolution of the earth's surface is cyclic in nature. During the longer part of each cycle, the lands are being leveled and reduced to a peneplain, and at these times the oceans flood the continents most widely. The long accumu¬ lations of shrinkage constantly going on within the earth attain the breaking stage, and the re¬ sulting movements produce on its surface high lands and mountain ranges. Then the seas be¬ gin to retreat more and more and are drawn into the oceanic basins, the continents at the same time attaining their largest 'size and great¬ est altitudes. In this way erosion again be¬ comes active and another cycle of deposition and continental flooding is started. The sands and muds and the solution materials of the rivers are but the fragmented and dissolved mountains and high lands in transit to the oceans. For every gram of land transported into the marine waters, there is just so much water displaced. The result is that during the long quiet second part of the cycles, when the earth's crust moves but little, the oceans are constantly rising and flowing ever more widely over the continents. The oceanic level at rare intervals is also lowered by hundreds of feet over wide areas in the tropical region by the subtraction of the water and the piling of it upon the land as ice in the polar and temperate regions. The closing events of the cycles, or, better, periods of time, are known as the "dis¬ turbances," but during some of them mountain making was by no means localized, for moun¬ tains may have been elevated almost simultane¬ ously in several continents or even throughout most of the world. The times of widespread mountain making are known as "revolutions" in

the history of the earth. In general it may be said that as the earth periodically shrinks, the lands become widely elevated in relation to the strand-line, while the oceans subside in com¬ pensation to the reduced mass.

More than 17 such cycles are recorded in geologic history in North America, and in this way the continent has been flooded over areas varying between 154,000 and 4,000,000 square miles by great inland shallow seas. These facts show how greatly the geography of the geologic past has been undergoing change. To-day we are living in the last phase of the first part of a new cycle, and the oceans have already begun their spread over the continents, as is demon¬ strated by the inland or marginal seas such as Hudson Bay, North Sea, Baltic Sea, and the continental shelves that border all continents.

filie de Beaumont, at least as early as March 1831, in his geologic lectures in the College of France and at the Paris School of Mines, used

to outline to his students the relation of the lands and the seas in the centre of Europe at the different great geologic periods. His first printed paleogeographic map appeared in 1833, and in the following year the Sicilian geologist Gemmellaro published six maps of Italy and De La Beche one of England. In America the first to show paleogeographic maps was Arnold Guyot in his Lowell lectures of 1848, but it appears that James D. Dana was the first to publish such maps, three of which were in¬ cluded in his epochal work of 1863, the Manual of Geology. Of world paleogeographic maps, Jules Marcou published the first one in France in 1866, but the most celebrated of these early greater attempts was the well-known map pub¬ lished .by the Viennese paleontologist Neumayr in 1883.

Since 1833 there have appeared not less than 500 different paleogeographic maps, and of this number about 210 relate to North America. Nevertheless, paleogeography is still in its in¬ fancy, and most of the maps embrace too much geologic time, all of them showing the changes that transpired during tens of thousands, and

some of them during millions of years. Mari¬ ners' maps show the conditions of the strand¬ lines at the times of their making, and those made even 50 years ago have to be revised again and again if they are to be safely followed by the coastal navigator and by the engineer. There¬ fore paleogeographic maps should ever tend toward depicting smaller amounts of geologic time, if they are to show the actual relation of water to land and to illustrate the movements of the periodic floodings. Moreover, the an¬ cient shore lines of the paleogeographic maps are all more or less hypothetic and are drawn in sweeping curves, unlike modern strands with their islands, bays and headlands. Also the an¬ cient lands are usually drawn as almost feature¬ less, and only rarely do the maps indicate the probable drainage. In the course of time, paleogeographic maps will show the features of the lands, such as the mountain ranges and volcanoes, the climatic zones, and something as well of the distribution of the life of the time depicted, while the seas will be shown with their probable depth, temperature and currents.

As yet, no one has attempted to picture the geographies back of the Cambrian — a vast time almost devoid of recognizable fossils. This means that all of our attempts are limited to the last half of geologic time, which has an abundance of fossils in formations that usually have not been greatly altered 'by the dynamic forces of the earth's moving crust or litho¬ sphere.

Paleogeography is the synthesis essentially of the sciences of geology and paleontology. The discerning of the ancient geographies is based mainly on eight factors. These, stated in the order in which the data are used, are as follows :

(1) The Formations. — The units in geology are the geologic formations, masses of rock either stratified or unstratified, of one kind or of various kinds, formed in the seas and oceans or on the lands, with or without fossils, and composed either of sediments, conglomerates or igneous materials. Their present geographic distribution is the first basis for deciphering the geographies of the past.

(2) Superposition. — The geologic age of a

formation is determined first through super¬ position. It naturally follows, if in a given area there are several superposed formations which have not been disturbed through crustal folding, that the lowest

one must be older than those above. Also that when they are cut by igneous rocks these crystalline masses must be younger than the formations through which they rose when molten.

(3) Paleontology. — In general practice, when a formation has fossils, these, along with superposition, determine its limits and its geologic age. Fossils are the basis of most geologic chronology, because all life is in the constant state of change comprehended under the term organic evolution. The individuals change into different species or even genera, and the species of an assemblage die out or migrate elsewhere or are added to by the intro¬ duction of new ones of local origin or by immi¬ grants. In other words, the organic assem¬ blages constitute a series of automatically placed time cards. Therefore any fauna or flora in¬ dicates more or less accurately the geologic time of its existence. Fossils, furthermore, tell much about the environment in which they lived, whether in the seas or oceans, on the lowlands or highlands, in the swamps, rivers or lakes, and whether the climates were cold, temperate or tropical. In all of this the paleontologist is guided by the distribution of life as it is at present, and by the Hutton-Lyell principle that at all times the laws of nature have operated uniformly and as we see them to-day.

(4) Petrology. — The petrologic factor shows the significance of the macro-and microstruc¬ ture of the rocks. Through the operation of the phenomena of the present, the geologist is guided in his interpretation of the rocks, as to whether they were formed in the water or by the winds, in the seas and oceans or in the rivers and lakes, or on the dry lands under pluvial or arid climates. Also as to the probable depth of water in the seas, the amount of its agitation, and whether the rocks were formed near to or far from the shores. The environment automatically impresses itself upon the accumulating sediments, just as it brings about the evolution of all living things.

This method also distinguishes the igneous or once molten rocks from those of sedimen¬ tary origin, and helps to point out not only the proximity of volcanoes, but, what is far more important in paleogeography, the former posi¬ tion of mountain ranges now all eroded away except their roots.

(5) Diastrophism. — The geologic record of the lands is locally a discontinuous one, but in the inaccessible ocean basins it is probably con¬ tinuous. Consequently what any geologist sees is but a fraction of the record, and these frag¬ ments of knowledge he pieces together into one continuous geologic history, embraced in historical' geology. Everywhere the geologic sequence is full of ˆbreaks,® which are also

known as ˆintervals” of time, when no record was being made other than that of erosion. These breaks or intervals have shown that the recording goes on now here and now elsewhere, and that it is periodic and cyclic in nature, as discussed earlier in this article.

(6) The Time Factor — Geologic time is exceedingly long, measured by human standards.

The Paleogeography of Early Cretaceous Time (Benton Formation) in North America.

On the basis of radium disintegration, it appears that geological work has been going on for at least a billion years. This factor then emphasizes the importance of the breaks in paleogeography, and directs attention to them as representing land intervals that endured thousands or even millions of years.

(7) Permanence of the Oceanic Basins. — In the first half of the 19th century it was widely held that all parts of the oceans had been

land, and that all of the lands had been be¬ neath the sea. The latter half of this statement is now known to be true, for over most of the continents occur marine strata, though they are almost exclusively those of shallow seas. Not more than 1 per cent of them are deposits like those of the great oceanic depths, and be¬ cause of this fact the belief is now general that the continents have never been covered by deep oceans. In other words, the continents

of to-day have always existed, but it does not naturally follow that they have always had their present shape. The truth is, rather, that from time to time their outlines have been greatly changed by the overflowing oceans, and at times they may have been united to each other by land-bridges (q.v.), like that of Panama to-day.

The oceanic basins appear to be the most constant features of the earth's surface, and while their shallow-water areas have changed much in the course of geologic time, yet the actual or deeper parts of the oceanic basins have long had about the shapes that they have at present. The Pacific has been the most con¬ stant in shape, as it seems that the Atlantic and Indian oceans greatly altered their outlines during Paleozoic and Mesozoic times. Be¬ cause of the increase of water with time, it is also probable that all of the oceans have in¬ creased somewhat in area, and in depth as well.

(8) Present Geography. — The present geographic, map is the base over which is drawn a given paleogeography. The time will come when but one geography will be shown, and that will be the paleogeography of the time illustrated by the map, but for some time yet the present geography is necessary for the orientation of the ancient one.

Charles Schuchert,

Professor of Paleontology and Curator of the

Geological Department, Peabody Museum of

Natural History, Yale University.

PALEOGRAPHY, or PALAEOGRAPHY,

pa-le-og'ra-fi, the study of ancient handwriting from surviving examples: distinguished from Epigraphy in that Paleography takes cognizance of writing executed with such instruments as a reed (calamus) or a style (stilus , graphium) on papyrus, waxed tablets, parchment or other substances, which in different ages have ful¬ filled the uses of paper, while Epigraphy has to do with inscriptions cut in stone, metal or other enduring materials. Sometimes the term Paleography is employed in a wider sense, as comprehending the art of reading ancient writ¬ ings and such a critical knowledge of all their

circumstances as will serve to determine their age, if they happen to be undated, and their genuineness in the absence of any formal au¬ thentication. For these purposes the paleogra¬ pher needs to be acquainted with the various sub¬ stances, such as bark, leaves, skins, paper, etc., which have been used for writing; with the various manners of writing which have pre¬ vailed and the changes which they have under¬ gone; with the various forms of authenticating writings, such as seals, signets, cachets, signa¬ tures, superscriptions, subscriptions, attestations, etc., which have been employed at different times with the various phases through which the grammar, vocabulary and orthography of the language of the writing with which he is dealing has passed; and with more or less, as the case may be, of the history, laws, institu¬ tions, literature and art, of the age and country to which the writing professes to belong.

Of ancient Greek and Roman written docu¬ ments a certain number have come down to our time; and selections from these as well as from later manuscripts are used in this article to illustrate the sort of materials that form the subject matter of Paleography. These writings

are, so far as the most ancient ones are con¬ cerned, on papyrus or on waxed tablets, while the less ancient documents are on vellum or on paper. (See Paper; Papyrus; Vellum). The tablets as used by the Greeks and Romans— called by the Greeks deltoi, deltidia, ptyktoi, pinakes and by the Romans; tabules, tabellce, pugillares, ceres, were usually of wood, but sometimes of ivory; they had a raised margin round the edges and the surfaces were covered with a thin layer of wax — hence the name commonly given to them by the Romans, ceres, plural form of cera, wax: the Greek names all mean thin boards, tablets, and deltos, deltidion, furthermore indicate one of the original forms of such tablets — that of the Greek letter A. The tablets were used for tem¬ porary memoranda as we use slates ; for use in schools they were usually strewn with sand, instead of being covered with wax. Two or more tablets held together by rings or other fastenings which served as hinges were termed by the Romans caudex or codex (block of wood), or, according to the number of tablets so held together, ceres duplices, triplices, quad¬ ruples, quintuplices, etc., book of two, three, four and five tablets) ; by the Greeks a two¬ leaved book of tablets was called pinax tripty-chos, tetraptychos, pentaptychos and so on.

The history of Greek Paleography, so far as it can be written from extant materials, begins with b.c. 3d century and ends with the close

of the 15th century and the introduction of the art of printing. During that period Greek hand¬ writing is seen to have passed through two phases — that of the uncial or large letter and that of the minuscule or small letter ; the begin¬ ning of the 9th century marks the time of transi¬ tion, though naturally survivals of the anti¬ quated unical letters may be noted in documents long subsequent to the year 800, and on the other hand anticipations of the minuscule not a few are seen in manuscripts dating from an earlier period. Both the uncial and the minuscule are seen in two styles — the set, or more formal, and the cursive. The difference between the capital letters and the uncial is no doubt a result of the difference in the materials upon which the in¬ scriptions were made. When the letter E (ep¬ silon) was to be carved on stone or bronze, it was manifestly easier to give it that form than the uncial form 6; the same is to be said of 2(ff, f) and & (w) ; but in writing, with a style on a waxed tablet, or with a reed or a quill pen (the use of the latter can be traced no farther back than the 6th century) on papyrus or parch¬ ment, the uncial form is the more convenient ; and as the transition from capitals to uncials was due to the difference of materials on which the inscription was made, so no doubt the change from uncial to minuscule is, at least in part, due to the general use of vellum and later of cotton and linen paper.

The earliest examples of Greek uncial writ¬ ing extant have been discovered in Egypt and in the ruins of Herculaneum and they are on papy¬ rus. Those from Herculaneum are certainly of a date not later than a.d. 79, when the town was destroyed; probably they were all written during that century. Of the papyri from Egypt there are a few whose downward date-limit is accurately ascertained. The earliest Greek manuscripts extant were discovered at the vil-

lage of Kurob, Egypt, by Flinders Petrie, of the University of Dublin, 1890. These are of a date certainly prior to b.c. 235, and comprise frag¬ ments of classical writings and records of a pro¬ bate court, some dating from the reign of the 2d Ptolemy, the rest from the reign of the 3d Ptolemy. Of the handwriting of these docu¬ ments Professor

Mahaffy of Dublin says that it “varies from large, clear, splendid writing to the most fugitive and illegible cursive?* Prior to Petrie’s discovery the most ancient Greek manuscript document extant was an astronomi¬ cal work entitled <E vddijov rexvi now in the Louvre collection. This has, written on the back, deeds bearing dates equivalent to b.c. 160; the writing is in set uncials of simple style, executed with a fine light stroke, without exag¬ geration of forms in the letters; in these re¬ spects it seems a fair type of the writing in vogue during the second or third centuries pre¬ ceding the Christian era. In a tomb near Mon-falat was found, 1849, a fragmentary papyrus containing portions of the Uliad* ; it dates from not later than b.c. 1st century; the text is in slender uncials, very regular. The Louvre col¬ lection contains also fragments from the (Iliad, J which date from perhaps the 2d century of our era. A fragment of poetic lines, supposed from the lost Temenides of Euripides, together with a few lines from the Medea, is in the private library of Firmin-Didot, bibliopole, of Paris, the date of which is not later than b.c. 161, a docu¬ ment of that year having been added. One of the most important discoveries hitherto made of Greek papyri in Egypt is that of one containing two orations by Hyperides, now in the British Museum; it is a roll, 11 feet long, in unusually good preservation. The writing is elegant, in set uncials, which, however, are often linked together without raising the pen ; this document is certainly not more recent than b.c. 1st century. The Herculaneum Greek papyri are usually written in neatly-formed and regularly-spaced uncials.

Of tablets inscribed with Greek uncial writ¬ ing, very few have come down to us. There are two in the British Museum. These are from Memphis and on one are traced some verses in large, roughly-formed letters, whose date can only be conjectured to fall within the 1st century of our era. In the Cabinet des Medailles at Paris is a set of five tablets on which are scribbled alphabets ; also, in a more current hand, a contractor’s accounts. Finally, a tablet from which the wax is worn has in¬ scribed upon the wood characters in ink : it dates probably from the 4th century.

The firmer and smoother surface of vellum favors a more exact style of writing and a firmer hand, but no Greek manuscript on vellum of a date earlier than the 4th century is known to exist. The earliest examples of manuscripts on vellum are the three famous codices of the Bible and of these the conjecturally most ancient — the Codex Vaticanus is probably of the 4th century. The writing, in its original condition, must have been very perfect as a specimen of penmanship but nearly the whole of the text has been traced over by a later hand, probably in the 10th or 11th centuries, a small number of words only

being left untouched. Written in characters of uniform size, without enlarged initial vol. 21 — 12

letters, the manuscript has all the simplicity of great antiquity. The Codex Sinaiticus (q.v.) bears the same tokens of antiquity and is by its discoverer, Tischendorf, judged to be older than Vaticanus, but the writing of Sinai¬ ticus is not so pure as that of Vaticanus and if that is a criterion of age, Vaticanus is the older. The Codex Alexandrinus (see Alexandrian Version) is referred to the middle of the 5th century ; it has enlarged letters at the beginnings of paragraphs ; the writing is more elegant than that of Sinaiticus. In all three codices we find simplicity and regularity the leading features ; the round letters are formed in symmetrical curves; G C, etc., finishing off in a hair-line, thickened at the end into a dot ; horizontal lines fine, those of S H and © being either in the middle or high in the letter ; the base of A and the cross-stroke of II also fine, and as a rule, kept within the limits of the letters and not projecting beyond,

From the 5th century there have come down to us fragments of an illustrated Homer, in which the writing is somewhat taller than in the three codices, the cross-stroke in G is ab¬ normally low down, the stem of P (Rho) is

reKNCUNCorTTepˆn.TtJYM t>c€ NXKH0ei> KxeuJceKri XHNGXKROMeNmoToynfc

Greek Uncial (Cod. Alex.), 5th Century.

(tekvcjv cov TcepnzaTovv

raf ev aTir/deia nadcjg evto

Titjv zkafiopLtv aizo rov ■K[ai}p[o}Q) 2 John 4.

not produced below the line. To the same century is probably to be referred also the palimpsest Codex Ephraemi, an incomplete New Testament with the letters imper¬ fectly erased, and homilies of Ephraem Syrus written over them (see Palimpsest) ; the Octateuch, whose leaves are divided between Paris, Leyden and Saint Petersburg ; the illus¬ trated Genesis in the Cottonian Library; and the Dio Cassius of the Vatican.

The uncial writing of the 6th century shows signs of degeneration in larger characters, more heavily formed and not so completely written,

cross-strokes in such letters as A, A, II, T, produced and terminating in heavy points. The Dioscorides at Vienna is the type of the 6th century uncial writing. Other manuscripts of the 6th century are a palimpsest Homer and palimpsest fragments of Luke, with Syriac text written above both ; palimpsest fragments of Matthew and Isaiah, at Dublin; fragments of the Pauline epistles from Mount Athos ; a copy of the Gospels written in silver and gold on purple vellum the leaves of which are scattered among several libraries; fragments of the (Eusebian Canon) ; the Coislin (Octateuch) ; and the Vienna (Genesis. >

A new style of Greek uncial writing appears in the beginning of the 7th century, round let¬ ters becoming oval and the other letters later¬ ally compressed ; the writing slopes to the right, and accents and breathings are introduced. The slanting style continued in use through the 8th and 9th centuries. These characteristics (ex¬ cept the accents and breathings) are seen in the following facsimile of two lines from a mathe-

matical treatise of the 7th century. In this manuscript the abbreviations are numerous.

f~7f> ‘rsJrn xn’tc Try e * y cxhl njy o cTfKAf’rewp a Mfypzepc cTCp

Greek Uncial (Math. Treatise), 7th Century.

(7 rpur [ov)[pev] y[ap) rravT[og] orepeov cxyp[dToq\

7 rpog Tt p ereupov evxepeoTtp —)

A papyrus in the Imperial Library, Vienna, of a.d. 680, bears signatures in slanting uncials ; and the same style is seen in other manuscripts of the same and of later date. In an 8th cen¬ tury manuscript, the Venetian Old Testament codex, are a few lines in

round uncials, but in a style so labored as to prove the discontinuance of that form of writing. Toward the end of the 9th or the beginning of the 10th century, the minuscule writing was well established and the uncial was in disuse, except for church-service books. The uncial character having thus become in some degree a “sacred® form of handwriting, the tendency was at once toward conservatism, i.e., strict retention of the forms once adopted and reversion to antique forms, rather than progress in new directions. In this way the sloping uncials become again more up¬ right and rounder.

The cursive uncial writing is seen in papyri discovered in Egypt, and now deposited in the principal libraries of Europe. Till Flinders Petrie’s discovery, the most ancient example of the cursive style known as extant was S. collec¬ tion of documents penned by Ptolemseus, a Greek, who became a recluse devotee in the temple of Serapis at Memphis about b.c. 173. A fairly continuous series of writings exists, illustrating the changes in cursive uncial hand¬ writing for several centuries. For the earlier period the papyri are supplemented by the ostraka, or potsherds, on which in Egypt, under the Roman Empire, were written publicans’ re¬ ceipts for payment of taxes, *etc.* A few waxen tablets also remain . to show the style of early Greek cursive writing.

Greek Cursive, 163-162 B.c.

(vcj) vpuv y pcv xpypa-rffopEva Ev’kafiEiav Trpoopupevuv ypiov de)

In the above specimen the letters are erect and written with great exactness; in successive centuries they are written with less precision and more sloping. Then, there is more com¬ bination of letters, and that necessarily leads to essential changes in the form of the letters themselves, those suffering changes which most readily combine with others. To this class of letters belong to the A, E, T, P (i.e., the Greek character for our R), IT and -A

The minuscule letters were a natural de¬ velopment of the cursive uncials ; they are the source of the lower-case Greek characters at present used in print. But in the process of change from uncial cursive to minuscule, there were some curious transformations. For ex¬

ample, the three letters B, H, K, which in their uncial as in their capital forms are quite distinct, had, in the early minuscule, shapes not readily distinguishable from one another; and it is worthy of note

that our present lower-case Greek characters /?, y, «, are descended from uncial rather than from these early minuscule forms.

It is different with other minuscule char¬ acters, e.g., p, vy 0, 3, <7, 7 r, which have under¬ gone very little change since the 9th century. This will appear from the following specimens ; which, however, exhibits the letter y in a form that has not been perpetuated. It is like the present lower-case y turned upside down, but it is, as y is not, a legitimate minuscule modi¬ fication of the capital H (the Greek letter eta) :

Greek Minuscule (Euclid), 888 a.d.

(£7 n ro ABT ETr'nredov dixa rpyQycrETai OMN etutteSov (ha ra avra dr/ K[at] y ano)

See below in the Pompeian graffiti the form of the letter H. In this manuscript is seen also the disused form of K, and the reader will notice how closely it resembles y.

Latin Writing. — No ancient Greek writing in capital letters is extant. The use of capitals for book-writing, if ever it existed among the Greeks, ceased prior to the date of the most ancient papyri that we possess. It is dif¬ ferent with the Latin. Specimens of very an¬ cient Latin writings exist in which the letters all are capital, and there are two styles of an¬ cient. Latin capitals — the "square® and the "rustic.® The difference between these two is, that in the former the horizontal lines are at right angles with the vertical strokes, as in our capital types; while in the rustic there is less regularity in that and other respects, as ap¬ pears from the following specimen. Rustic capitals, being more convenient in shape, were in more general use, and most of the manu¬ scripts in capitals which have survived are in this character.

IfjlATVAQVfPfOimiVAUfAMKOfUXCDG'l

MilAAUUtOJrtQJUilCUCAXIfUlOtOfU

Roman Rustic Capitals (Virgil), 3d or 4th Century.

(Testaturque deos iterum se ad proelia cogi Bis iam italos hostis haec altera foedera).

The earliest specimens of the rustic hand extant are the papyrus rolls recovered from the ruins of Herculaneum which must neces¬ sarily date from a time prior to a.d. 79. Vellum manuscripts in this hand are

executed with great precision. The large scale of the writing and the extensive surface of a costly material covered by it. must have made works written in rustic capitals very high-priced. There are in the Vatican Library two copies of Virgil written in this style, neither of them probably older than the 3d or 4th century. No manuscript in square capitals is extant of date earlier than the end of the 4th century,. the oldest being portions of a Virgil, in the Vatican and at Berlin. Next in date, but much more recent, seem to be the Virgilian fragments at Saint Gall.

. Latin uncial writing differs from the capital in the rounded forms of A, D, E, H and M, as seen in the accompanying specimen, except that here the bow of the A is in most places ˆblind.® Another point of difference is, that in the uncial some of the letters rise above or fall below the line. The earliest specimens extant belong to the 4th century and in them the writing is so well established that we may ‘believe it to have been already practised for generations. Uncial writing persisted as an ordinary book-hand, till in the 8th century it was supplanted by the re¬ formed small writing of the Carlovingian school. Examples of uncial writing are the Vercelli (Gospels, } a palimpsest Cicero (De Republica) in the Vatican, and a fragment of a commentary on an ante-Hieronymian text of the Scriptures at Fulda. All of these are of the 4th century. From the 6th century are the two codices of Livy, at Paris and Vienna, and the Gaius at Verona.

semble those of the more cursive graffiti found on the walls of Pompeii.

Roman Cursive (Graffiti), 1st Century.

(censio est nam n st?r magna habet pecunijam]).

jAmr/BfjlU < juxeiCNO fcANUASXeCUURJSBO N A ONN AlUAOSt eNfcV

Latin Uncial, 5th or 6th Century.

(Jam tibi ilia quae igno rantia saecularis bo na opinatur ostendam).

Between uncial and cursive lies the style ˆhalf-uncial.® Apparently as early as the 4th century a set style of small writing was in use, which partly followed in its formation the characters of Roman cursive writing, while in some of its letters it retained the uncial forms. It appears in marginal notes on some early

CpircoptmttHumiNNOCehfe

rucun hjoi4odfˆilr?tocjtumcoˆ

*vttcioM6nuf4eriorHrn?flefti

Latin Half-Uncial, 509-510 a.d. ˆ

(episcopi manum innocentefm) —

[linjguam non ad falsiloquium coeg[isti] — nationem'anterioris sententi[ae) —) .

manuscript. But beginning with the end of the Sth century there is extant a series of manu¬ scripts written wholly in this hand. In the specimen here given the B, D, M, N, R and S are seen to approximate in form to the same letters in Latin minuscule writing. The agree¬ ments with uncial are patent.

Of Roman cursive writing we possess speci¬ mens dating from the 1st century of our era. Tn a box unearthed, 1875, in the house of L. Caecilius Jucundus, at Pompeii, were found 27 libelli or waxen tablets containing records of various legal transactions ; and at different times, 1786-1855, 25 other waxen tablets, some dating from a.d. 131, were found in ancient mines at Verespatak (anc. Alburnus Major, in Dacia). In both sets of tablets the writing is much alike, and the forms

of the letters re¬

Roman Cursive (Dacian Tablet), 167 a.d. (descriptum et recognition factum ex libello — erat Alb[umo] maiori ad statione Rescuii in quo scri — id quod i[nfra] s(criptum] est).

In this early cursive hand are seen the be¬ ginnings of minuscule writing. The slurring of the strokes, whereby the bows of the capital letters were lost and their more exact forms modified, led the way to the gradual develop¬ ment of the small letters. The letter A is formed by a main stroke supporting an oblique cross-stroke above it; so too P and R having lost their bows, and F, throwing away its bar, are formed by two strokes placed in relatively the same positions, but varying in their curves. The main stroke of B dwindles to a slight curve, and the two bows are transformed into a bent stroke or loop to the left of the long stroke, so as to resemble our script d. This form of B persists in cursive writing till the 6th century. The D resembles the uncial form of that letter; the E is represented by the old form || found in inscriptions and in the Falis-can alphabet. The G in the Dacian tablet shows the first outline of the g of later writing; in the graffiti the H, by losing the upper half of its second upright limb, comes near to being the small h. In the Pompeian tablets (as also in the graffiti) M has the four-stroke form. In the Dacian tablet it is a rustic capital, almost an uncial M. The O is formed by two strokes almost like a.

From the date of the Dacian tablets to the 5th century no specimens of Roman cursive writing exist. Fragments of two imperial re¬ scripts in cursive writing on papyrus are ex¬ tant, in which are seen the same characters as in the Dacian tablets, with certain differences and modifications ; but they are even more diffi¬ cult to read than the latter. The same is to be said of another fragment dating from 572.

Roman writing of the different styles — capital, uncial, half-uncial and cursive — be¬ came known to the Western nations and formed the basis of the different national styles of writing known as the Lombardic, the Visigothic and the Merovingian. An important influence in determining the ultimate forms of our print and script characters was the reform of writing instituted bv Charlemagne 789. The abbey of Saint Martin of Tours was the principal centre

from which the reformation of the book-hand spread. In the 9th century the minuscule had attained a degree of elegance and clearness that left little to ‘be desired, a’s appears from the following specimen :

Jˆapereminom cotuuˆWi rue utl quod emm ˆoccrvv/tcrcurTc/o/pulˆco eft-panCc* iXuvcmfilium Cˆuocai > xAiornc7»cmAf > m

Caroline Minuscules, 9th Century, (accipere mariam coniugem tuam quod enim ex ea nascetur de spm/u sanclo est. Pariet autem filium et uocabis nomen eius Iesum).

From that style to our modern characters, whether script or print, was an easy step.

Paleography may be said to have been founded by the learned French Benedictine, Jean Mabillon, whose (De Re Diplomatica) (1681, fob; reprinted 1709 and 1789, in 2 vols. fol.) is still, perhaps, the most masterly work on the subject. With the (Nouveau Traite de Diplomatique) (Paris 1750-65, 6 vols. 4to) of the Benedictines of Saint Maur, and the (Elements de paleography (Paris 1838, 2 vols. 4to) by M. Natalis de Wailly, is the great authority for French paleography. English paleography is perhaps less favorably repre¬ sented in Astle’s (Origin and Progress of Writing) (London 1803) than Scottish paleog¬ raphy in Anderson’s and Ruddiman’s (Diplo-mata Scotise5 (Edinburgh 1739). Muratori treats of Italian paleography in the third vol¬ ume of his great work, (Antiquitates Italicae Medii 7EvV ; and among later works on the same subject may be mentioned (Diplomatica Pontificia5 (Rome 1841) of Marino Marini. The paleography of Greece is ‘ustrated in (Paleographia Grseca5 (Paris 1708) of Montfaucon. Spanish paleography may be studied in (Biblioteca de la Poligrafia Espanola5 (Madrid 1738) of Don C. Rodriguez. Of works on German paleography it suffices to name Eckard’s Hntroductio in Rem Diplomat¬ ically5 (Jena 1742), Heumann’s (Commen-tarii de Re Diplomatica5 (Nuremberg 1745), Walther’s (Lexicon Diplomaticum5 (Gottin¬ gen

1745) and Kopp's (Paleographia Critica5 (Manheim 1817). Hebrew paleography has been elaborated by Gesenius in (Geschichte der Hebraischen und Schrift5 and other works. The great work on paleography generally — one of the most sumptuous works of its class ever published — is (Paleographie Universelle) (5 folio vols., Paris 1839-45) of M. J. B. Silvestre.

Consult Mas Latrie, J. M. J. L. de, (Dictionnaire de paleography (Paris 1854) ; Moore, M. F., (Works Relating to English Palaeography5 (London 1912) ; Saunders, W., (Ancient Handwritings: Manual for Students of Paleography) (Walton-on-Thames 1909) ; Silvestre, J. B., (Paleographie universelle > (Paris 1841) ; Thompson, E. M., (Greek and Latin Paleography > (London 1894) ; Thoyts, E. E., (How to Decipher and Study Old Docu¬ ments : A Guide to the Reading of Ancient Manuscripts5 (London 1893) ; Wailly, J. N. de, (Elements de paleography (Paris 1838) ; Quaritch, B., Catalogue of Manuscripts and Books Illustrating the Science of Paleography5 (London 1893).

PALEOLITHIC PERIOD, The. The

second period of prehistoric man is the Paleo¬ lithic (Greek, paleos, ancient, and lithos, stone), the first period being the Eolithic. In this stage of his development man made his implements of flint by chipping off flakes until the desired form was obtained, but as far as known he never polished them afterward, the art of polishing stone implements being introduced near the beginning of the Neolithic. It is on this basis, — the absence of polished stone im¬ plements in the deposits of the Old-Stone Age and their presence in those of the Young-Stone Age, — that the names Paleolithic and Neo¬ lithic are given. The makers of Paleolithic im¬ plements probably did not belong to a single race of men, but rather to several races. Of these races two seem to have been especially important: the Neanderthals, who lived during the older Paleolithic and the Cro-Magnons, who replaced them, and who seem to have been the dominant people of the younger Paleolithic. In general, it can be said that during the period under discussion man became progressively more dextrous in making stone implements and that toward its close, when bone and ivory were replacing stone, skill in working1-flints de¬ clined.

Proofs of Antiquity. — Great difficulty is

often encountered in determining the age of the remains and implements of paleolithic man ; many mistakes have been made and

investiga¬ tors have differed widely as to the interpreta¬ tion of the same evidence. Nevertheless, -when all the evidence is carefully studied, it is found that the broad outlines of the history of the Old Stone Age can be accepted, even though the details are sometimes in doubt.

The proofs of man's antiquity and the rela¬ tive age of his remains and implements are determined by several lines of evidence:

(1) The association of his remains and im¬ plements with the bones of extinct animals is a convincing proof of man's antiquity when it can be established that these bones and tools were deposited at the same time. For example, in France, England, and elsewhere the bones of extinct elephants, rhinoceroses, lions, and other animals are found with the remains of man. In other deposits the arctic woolly rhinoceros, woolly mammoth, and reindeer are found with his skeletons and tools. These animals have long been extinct in the countries in which their remains are now found, and the climate in these countries has radically changed since then.

(2) The proof of the age of man's remains is also afforded by deposits in caves as the rela¬ tive age of his implements and bones is shown by the superposition of the layers in which they occur. No one cave affords a comnlete record of the Paleolithic Period, 'but by piecing to¬ gether the evidence from different caves the relative antiquity of cave deposits Las been un¬ raveled, so fchat it is now often possible to tell the age of the deposit from the stage of de-. velopment of the implements, as well as from the animal remains. A single example, that of Kent Cavern, Devonshire, England, will suffice to illustrate this method of determining the relative age of deposits. As the material which partly filled the cavern was excavated, three distinct layers were encountered, in addition to two sheets of stalagmite, a rock formed by lime dripping from the roof of the cave.

(a) The surface was composed of dark earth containing mediaeval remains, Roman pot¬ tery, and objects of iron, bronze, and stone,

showing that man inhabited the cave at intervals from Neolithic to Roman times.

(b) Below this surface layer was a bed of stalagmite one to three feet thick. This cov¬ ered a reddish deposit known as cave-earth, which contained a number of relics made of stone, bone, and horn. The flints were shaped into tools designed for various purposes. The bone implements were in the form of pins, awls, barbed-harpoons, and neatly formed needles. Associated with these implements were the bones of extinct animals, among which were fragments of the skeletons of the cave hyena, horse, rhinoceros, gigantic Irish deer, wild boar, bison, mammoth, cave bear, cave lion and sabre-tooth tiger. All of these animals are of species now extinct, not only in England, but throughout the world.

(c) The bottom of the cave was filled with broken fragments of rock (breccia) containing the remains of the cave bear, together with flint implements of a much cruder type than those in the layers above.

It is evident from this description that thou¬ sands of years were required for the filling of this cave. The bones of bygone animals that either had their lairs in the cave or whose car¬ casses were dragged there by ancient extinct carnivors is proof of the great antiquity of the lower deposits. The last of these animals, so far as we know, disappeared many thousands of years ago. The thickness of the stalagmite beds formed by lime drip is another evidence of the antiquity of the underlying deposits. A bed of stalagmite, one to three feet thick, probably required a very long time for its formation, although favorable conditions might have caused a rapid deposition. The oldest of these deposits are many thousands of years old, but ancient as they are they were, nevertheless, laid down long after the ape-men had disap¬ peared from the earth.

(d) In the valleys of the river Thames in England; or the Somme, Marne, and Seine in France; of the Inn in Austria; of the Rhine in Switzerland, and in the valleys of other European rivers are found series of terraces or benches. A careful study of these terraces shows that during glacial times the rivers flow¬ ing from the great ice sheets spread vast de¬ posits of sand and gravel over the broad sur¬ faces of their valleys. In many valleys these deposits were built to a height of 100 to 150 feet. Several times during the Glacial Period the ice sheets advanced, and at other stages, called interglacial, the glaciers practically or entirely disappeared from Europe and North America and the climate in these continents became warmer than it is at present. During these interglacial stages the streams flowing through

the valleys are believed to have had smaller volumes and much less sand and gravel in proportion to the volume.. Consequently they .were able to cut into their ancient beds, forming narrower channels, through which they transported their own. loads of sediment. In this way successive river terraces were formed, a descending series of gigantic steps along the sides of the valleys. In many valleys there are four of these terraces which corre¬ spond to the several glacial stages ; in others

there are only three terraces. In general (<the high terraces" are the oldest ones. The coarse river gravels of the high terrace of the Eure, for example, contain remains of an extinct elephant and of an extinct horse, showing that these animals lived when a broad stream carry¬ ing coarse gravel flowed at least 90 feet above the present stream. It is in or on the gravels of the high, middle, and low terraces and underly¬ ing the materials later deposited on them that the artifacts of man are found. Along the river Seine the ((high terrace, 90 feet above the present level of the river, corresponds to the first glacial stage, whereas the ((low terrace** is only 15 feet above the river and was built of gravels deposited much later when the river was nearly of its present size. The ((high ter¬ race®. contains the bones of animals of the first interglacial stage, but none of man nor of man's stone implements, whereas the lower terraces have yielded flints of prehistoric man and the bones of more recently extinct animals.

(e) During parts of the second and third interglacial stages, the climate of Europe was arid and the fine dust of the glacial deposits was swept up and transported by the wind un¬ til it slowly settled over the continent. The time at which these dust or loess deposits were laid down can be dated by the fossils they con¬ tain and also by the stage in the development of the flint implements embedded in the loess, and the loess, in turn, when its age is known on other evidence, gives the age of the human, artifacts.

(f) The tools which man made were gradu¬ ally improved as he acquired greater skill and had better models to copy. Consequently, the older implements are, in general, cruder than the later ones or of a different type. Such evi¬ dence must be carefully weighed, however, since the skilled worker of later times occasion¬ ally discarded a partially worked flint because of some flaw in the stone and sometimes lost a flint which had been merely roughly fashioned. Such crude, unfinished flints have sometimes led to the belief in a greater antiquity than they possess.

Climate.— Geological evidence points to the Glacial Period as the time when paleolithic man lived in Europe and Great Britain. The Glacial Period, or Great Ice Age, was not a period of continuous cold but, as has been said, included stages when the ice largely withdrew from the continent. These are called intergla¬ cial stages. It seems well established that the Great Ice Age in Europe consisted of four glacial and three interglacial stages, and that it was during the second or third interglacial stage,— more likely during the third, — that paleolithic man reached Europe.

The fossils of animals and plants found with the remains of very ancient men (Chellean and Early Acheulean) show that the climate was warmer at that time than it is now in Eng¬ land, France, and Germany. The southern mam¬ moth (E . meridionalis) , straight tusked ele¬ phant (E . antiquus), and soft nosed rhinoce¬ ros (R . merckii), hippopotamus, sabre-tooth tiger and hyena indicate that the climate was genial. The leaves of the sycamore, maple, willow and Austrian pine, found in deposits of the third interglacial stage near Paris, denote a temperate climate, and an increasingly milder climate is indicated by the presence of the box,

fig tree, and canary laurel in slightly later de¬ posits. The habit of these last two trees of flowering in winter shows that the winter tem¬ perature was not cold. The plants of still younger deposits (late Acheulen) show that the climate was again becoming colder. The in¬ creasing cold finally culminated in what is called the Fourth Glacial Stage. It was during this time of refrigeration that the men of the younger Paleolithic Period lived.

Classification of the Paleolithic Period.

Various classifications of the Paleolithic Period have been offered, each of which is based upon important principles. It has been divided into the Age of the River Drift Man and the Age of the Cave Man. These divisions rest on the observation that the implements of the earlier Paleolithic Period are more fre¬ quently found in the gravels of

river terraces than in. caves and that later ones are found chiefly in caves and rock shelters. As the ani¬ mal and plant remains of the earlier Paleolithic indicate a genial climate, so the chief occur¬ rence of older paleolithic implements on the terraces formed by the rivers of the time seems to signify that in this stage man lived principally in the open, probably protected only by crude shelters of bark, as did the recently extinct Tasmanians. As the climate became colder with the approach of the Fourth Glacial Stage, more adequate protection was sought and that afforded by cave and rock shelters common in portions of Europe was used. These caverns and rock shelters were inhabited at least during the colder parts of the year. It is evident, however, caves and rock shelters would be used not only when the temper¬ ature was cold but also that when the climate was genial : for example, as a place of refuge during rain storms or when attacked by wild beasts or human enemies.

If the Paleolithic Period is divided accord¬ ing to the races which lived at the time, the terms Older and Younger can be advanta¬ geously used, since during the Older Paleolithic (Chellen, Acheuleanˆ Mousterian) Europe was inhabited by the brutish Neanderthal men with their broad, flattish skulls and ape-like postures. The men of the. Younger Paleolithic (Aurignacean, Solutrian, Magdalenian) were repre¬ sented by the Cro-Magnon race, characterized by great heads, large stature, and modern aspect.

Another classification is based upon the con¬ spicuous animals of the various stages.

Epoch of the Reindeer — Magdalenian

Epoch of the Mammoth and Woolly Rhineroceros (R. ticho-rhinus) — Mousterian

Epoch of the straight tusked Elephant (E. antiquus) and Merck's Rhinoceros (R. merckii).

The classification now generally accepted is based both on the characteristics of the races and upon their culture. It is as follows :

Old Stone Age: Paleolithic Period Younger Paleolithic Azilian Magdalenian Solutrian Aurignacean Older Paleolithic Mousterian Acheulean Chellean Prechellean Eolithic Period

Eolithic. — If man had suddenly appeared on earth in his present

bodily and mental state it would perhaps be unprofitable to search for his beginnings, but such was not true. Man was evolved from lower animals and his skill in making stone implements was acquired slowly and ‘laboriously. Because the ability to design and shape implements was of slow growth, it is evident that very early in his history the tools he used were those prepared for him by nature, such as he found in the river bed or in the shin¬ gle of the ocean shore. The difficulty of deter¬ mining whether such fragments were intention¬ ally broken by primitive man or were shattered by the forces of nature is evident. His require¬ ments in the way of tools being very simple and the supply of material in the form of natural flakes and fragments of flint being very plenti¬ ful, the inventive powers of man remained dor¬ mant for ages. The stone hammer and the stone knife were the original tools. Both were picked up ready-made. A sharp-edged, natural rock fragment served for one, and a nodule or fragment served for the other. When the edge of the flake became dulled by use, the piece was either thrown away or the edge was retouched for further use. If hammer or flake did not admit of being held comfortably in the hand, the troublesome points or edges were removed or reduced by chipping. The stock of tools in¬ creased slowly with the slowly growing needs. As these demands multiplied and the natural supply of raw material diminished, the acci¬ dental flakes were supplemented by the manu¬ facture of artificial flakes. The earliest stone implements are called eoliths and the period, the Eolithic period. It is a significant fact that in gravels of <(the higher terraces® eoliths have been found but no true paleolithic implements. It is possible that Pithecanthropus (see Man, Prehistoric Races of) was a maker of crude flint implements (eoliths) and probable that the Heidelberg and Piltdown men also made eoliths. Weapons and tools made from wood, however, without doubt, were the prin¬ cipal ones, just as they are with the gorilla to-day; but as they rapidly decay no trace of them remains.

Pre-Chellean Epoch. — Crude flint imple¬ ments believed by some investigators to ante¬ date the first well-established epochs of the Pal¬ eolithic (the Chellean) but to be subsequent to the Eolithic, are considered by others to belong to the Chellean. The general shape of the flint was due to chance and was adapted to a variety of purposes by crude flaking. It is possible that these stone tools were made by the Heidel¬ berg and Piltdown races.

Chellean Epoch. — The first well-defined epoch of the Paleolithic is the Chellean, named for the village of Chelles on the banks of the Seine, about eight miles east of Paris, where many implements have been found in alluvial gravels which form a terrace. The Chellean culture also occurs at Saint Acheul near Paris, in England, and in

Spain. In all of these deposits are found flints shaped by man in his early efforts to master his environment. As one would expect, these first attempts to fashion flints into implements are very crude, but it is evident at a glance that the workers were endeavoring to make tools of a definite form. The most distinctive implement of the

Chellean, as indeed it is of the next following epoch, has been given several names (coup-de- poing, boucher, faustkeil, hand-stone). The French term, coup-de-poina, which literally translated means ((stroke of the fist," is the one in most common use. ((Hand stone" Jias been suggested as an English equivalent. This tool is roughly almond-shaped, varying from about 4 to 10 inches in length, and in size and shape is not unlike two hands with the palms touch¬ ing. The form varies greatly from somewhat disc-shaped and oval to poniard shaped. It is a rather heavy tool which could be used for many purposes. A thick butt end fitted the hand and when held by this end it could be used for hacking or sawing, for drilling holes, for cutting and stabbing, for scrap¬ ing hides, and for other purposes. When held by the pointed end it could be used as a hammer. If it had been used with a helve or handle the edges would have been* chipped off by the violent blows it received, but the flakes produced by wear are minute and not coarse. The coup-de-poing was, in fact, the one in¬ dispensable, ((all around" implement. The gravel deposits of Saint Acheul alone are said to have yielded 20,000 specimens. It was al¬ most the sole implement used by the men of Chellean times. Mt was the outcome of long experience, and, in point of utility, combined the functions of the elaborate array of me¬ chanical tools which ultimately, under changed conditions of life, came into requisition." (Munro). In fashioning coups-de-poing a large number of flakes were broken off. The shape of some of the flint fragments was slightly modified by breaking off a corner or an edge and in this way a variety of small, crudely-made tools were obtained.

In the course of time flint tools were made for special uses and the use of the coup-de- poing was consequently gradually discontinued. This

development in the skill of working stone, however, was very slow and during the whole Chellean Epoch flint implements were crudely shaped.

No human skeletons of Chellean Age have been discovered. This is not surprising, as bones rapidy disintegrate when buried in gravels or left on the surface. The climate of France in this epoch was not very different from the present, as is shown by fossils of trees, leaves, and animals. Ancient elephants (E . antiquus), rhinoceroses (R. merkii), hippo¬ potami and sabre-tooth tigers, however, indi¬ cate a slightly warmer climate than now pre¬ vails in the same region.

During Chellean times Europe extended far beyond its present limits, the English Channel did not separate England from France, and Ire¬ land was joined to England. Spain was con¬ nected with Africa at Gibraltar, and Italy and Sicily were also joined to that continent. As a result of these land connections the Medi¬ terranean then consisted of two inland lakes.

Acheulean Epoch. — Acheulean implements have been found in at least 30 localities in France, England. Spain, Portugal, Italy, Ger¬ many, Austria, Russia, and Poland. In fact, the Acheulean workers probably lived in all that portion of Europe not then covered by the great ice sheet. The name Acheulean was given to the epoch because the industry of the time is typically represented' in the gravels of

the third terrace of the river Somme at Saint Acheul, France.

The implements manufactured by the men of Acheulean times are merely modifications of the Chellean. Ihe coup-de-poing , or hand-stone, is more skilfully made and, with few exceptions, the entire surface is flaked, whereas in the Chellean stage a part of the surface of the nodule is retained. It is, in general, lighter than the older tool ; and the edge, as a result of repeated chippings, is much better adapted for cutting. It is, however, not always easy to distinguish between the implements of the two epochs. In addition to the coups-de- poing are found planing tools, knives, drills, scrapers, and other artifacts whose use can merely be conjectured. It has been stated that from the beginning to the end of the Chellean and Acheulean there is not an implement that can be regarded as a weapon (Sollas). The explanation, apparently, is that the spears were made exclusively of wood as were those of the recently extinct Tasmanians. It has also been suggested that it was only after men began to live in caves that

they took to hunt¬ ing big game (Munro).

A large number of fragments of human bones and several entire leg bones were found in a recess in the banks of the Krapinica Brook, in Croatia, but there is doubt as to the age of these remains. Some investigators con¬ sider them to belong to the Acheulean epoch and others to the Mousterian.

During the greater part of the Acheulean epoch the animal life was practically the same as in the preceding epoch : the straight-tusked elephant, Merk's rhinoceros, a horse which is believed to be the ancestor of some of our modern draft horses, the hippopotamus, and other animals abounded. Besides the common Chellean animals were hyenas, brown bears, wild boars, and lions. Some of the lions and hyenas are ancestors of the cave types which appear in the succeeding Reindeer and Cavern epochs, i.e., in the Younger Paleolithic.

The climate of the earlier Acheulean, as shown by animal and plant fossils, was warm. This is also indicated by the distribution of the Acheulean camps which are, for the most part, in the open country on the divides be¬ tween rivers and on river . terraces. Later in the epoch a colder, dry climate is indicated by the plants preserved in the travertine of La CelleSous-Moret, near Paris. It is pos¬ sible that before the close of the epoch the con¬ tinental ice sheet of Scandinavia began to move southward. Some Acheulean implements are said to be associated with the remains of the woolly rhinoceros and mammoth, but this association. does not necessarily prove that the climate in the vicinity of the river Somme was cold, but may indicate instead that these animals, whose natural habitat was near the front of the ice, at certain times roamed south¬ ward and. mingled with warm temperate animals. That the climate in northern France was arid at times is proved by the presence of layers of wind-blown dust or loess, which cover the terraces of the rivers of northern France, southern Germany, and Austria.

Moustercan Epoch. — Because of the colder climate of the Mousterean epoch the folk of that time were forced to spend a portion of the year in caves and rock shelters; for this

reason their implements, hearths, remains of feasts, and their skeletons are preserved in much greater abundance and perfection than are those of the men of the preceding epochs. During the warm summer months they lived in the open country, as is shown by the occurrence of their implements in loess (dust) deposits and river gravels. Their remains occur in many places in Europe south of Scandinavia, the latter country being largely covered by the ice sheet of the fourth glaciation. Asia Minor also contains deposits of this epoch.

The name Mousterean was given to this epoch because of deposits found in the floor of a cave and under the cliff in front of it, at Le Moustier, on the Vezere River in south¬ western France. There seems to haye been a continuous residence in this cave during upper and middle Mousterean times and also during a part of the following (Aurignacean) epoch.

The Mousterean stone implements are modi¬ fications of those of the Acheulean but are superior in workmanship, variety, and design, and they were evidently made by the lineal descendants of the makers of the Acheulean implements. A change to a colder climate seems to have been the compelling cause for the im¬ provement in the implements and the explana¬ tion for the little progress in the manufacture of stone tools in Acheulean times is ascribed to the subtropical climate which offered little incentive to exertion. When the climate be¬ came colder Mousterean man was compelled to leave the open country and seek such natural shelter as he could find, and so became a cave-dweller, a troglodyte. He was compelled to rovide his ‘body with some kind of clothing or reeze; the easily gathered and abundant fruits no longer supplied him with food and he was forced to hunt .and having secured flesh to cook it. Necessity then required him to make tools of new design and better construction and some form of social organization must have arisen as the result of the living in caves. The coup-de-poing, or hand-stone, was still used, but this <(all around® tool was gradually sup¬ planted by implements designed for special pur¬ poses. A new method of manufacture, called the Levallois flaking, soon caused the disap¬ pearance of the coup-de-poing, because imple¬ ments made in this way were lighter, had bet¬ ter cutting edges, were made with less labor, and served equally well many of the purposes of the older implement. The Acheuleans shaped the coups-de-poing from a nodule of flint by chipping off bits with a hammer stone until the desired form was obtained, but they had also learned to make the Levallois flake which was produced by breaking

off a large flake so as to form one smooth, slightly convex surface. In preparing a nodule from which to manu¬ facture the Levallois flake, the nodule was first dressed to the desired shape ; then with a sharp blow a flake was detached which was later trimmed to final form. In Mousterean times this method of manufacture was perfected and Levallois flakes six to seven inches long and two inches wide were made. From similar flakes a variety of implements were made ; one of these, the Mousterean point, rarely four inches long, was carefully retouched so as to form a sharp point. The Mousterean point was probably used for cutting, piercing, and scraping hides. Scrap¬

ers of various kinds, awls and, for the first time, lance heads were also made. Spherical balls of limestone have been found which were probably used for bolas. Crudely made bone implements seem to have been manufactured in this epoch, but they are little more than bone fragments whose accidental shapes were useful.

A number of fragmentary skeletons of the makers of Mousterean implements have been unearthed and it is now possible to give an accurate description of the men of that time. The race is called the Neanderthal Race from a cave in a small valley of that name near Diisseldorf, Germany, where a skull of this race was unearthed. Remains of Mousterean men from at least 20 localities have been identi¬ fied. These skeletons are all of men of one type ; with large, broad, flat heads and strong jaws and teeth. (See Man, Prehistoric Races of). The remains of Neanderthal men have been found only in caves but their implements have been discovered in terrace deposits indi¬ cating that they lived in the open during favor¬ able weather.

The animals most characteristic of the Mousterean epoch are the mammoth, woolly rhinoceros, and the reindeer. The long hair which reached almost to the ground and the thick, soft, under-coating of fur shows that the mammoth was well adapted for a severe climate. (The food found in the stomach and mouth of frozen Siberian mammoths consisted of grasses, sedges, beans, and arctic crow-foot. In the winter the leaves and branches of small trees and shrubs were also eaten). The woolly rhinoceros (R . trichorhinus) was also protected by long hair and a thick under coating of fur. Besides-these larger animals there were arctic foxes and hares, the banded lemings and others. The occasional discovery of the remains of the straight-tusked elephant and Merck’s rhinoceros indicates that either in the warm summer months or during intervals of warmer climate these southern animals migrated into Europe from the south.

The evidence from the character of the fauna and floras as well as the fact that man lived in caves instead of in the open during the greater part of the Mousterean, points to a severe climate which forced man from the open plains to such natural shelter as he could find.

The best evidence at present indicates the fourth glacial stage as the time in which the Moustereans lived. It is estimated that the Mousterean epoch lasted about 30,000 years and closed about 25,000 years ago (Osborn).

Geography. — The geography of Europe dur¬ ing Mousterean times differed somewhat from that of to-day. Scandinavia was covered with an ice sheet which extended a short distance south of the Baltic Sea, and England, for a time at least, was joined to France.

Aurignacean Epoch. — The older Paleolithic includes the pre-Chellean, Chellean, Acheuleans and Mousterean, and is succeeded by the younger Paleolithic, of which the first epoch is the Aurignacean. With the older Paleolithic, the Neanderthal race disappears and a new race or races of men appear, differing from it in physical appearance almost as much as the Neanderthals differed from the ape-man. The kinds of animals, however, remain nearly the

same, although their relative abundance varies somewhat at different times. The reindeer was common and because of its constant association with the remains and implements of younger Paleolithic man this division is often termed ((the Reindeer Period.® The horse, bison, cave bear, and cave lion, as well as other animals, were also living in the regions occupied by man in Europe. In Italy the Aurignacean seems to have been the only younger Paleolithic cul¬ ture.

The love of personal adornment is shown in the perforated sea shells and back bones of fishes for use in necklaces, perforated teeth of various animals and beads made from ivory and reindeer horns which he wore. Bone tubes which served as flasks for pigment were made

from the cannon bones of the reindeer.

Aurignacean man was the first to use bone to any great extent for making tools. From this material he made such implements as pins, chisels, and shaft-straighteners (first called baton de command ements) . With him art seems to have had its beginning.

There was a marked improvement in the workmanship of the flint implements of this stage. One important flint was the graver (burin) used for making incisions in hard materials, such as stone, bone, horns, and ivory. Side scrapers (raclioirs), end-scrapers (grat-toir), flints shaped like a knift blade (chattel-perron-point), spoke-shaves and tools of other designs were made. Figures in outline of horses, bisons, rhinoceroses, elephants, stags and oxen represent crude attempts at art, but in some specimens the drawing is excellent.

During Aurignacean times the English Chan¬ nel was not in existence and man could walk from France to England or Ireland without crossing any natural barrier, other than rivers. The Baltic Sea was reduced to a fresh water lake. During this epoch the climate in western Europe became dryer and less severe than it was in Mousterean times as is shown by de¬ posits of loess.

Horses were abundant and were killed and eaten but, as far as known, they were never domesticated. Around one Aurignacean camp (Solutre) the bones of not less than 100,000 horses have been found. In this bone breccia remains of the reindeer and mammoth have also been unearthed.

The superb Cro-Magnon race appeared at the beginning of the Aurignacean and at about the same flme the Neanderthals disappeared. It is probable therefore that the extermination of the latter was brought about by these new arrivals. Skeletons of the Cro-Magnon race have been found in France, Wales, Italy, Spain, and Aus¬ tria. They were very tall men with an average height of six feet one and one-half inches and their brain capacity was larger than that of modern man.

Solutrean Epoch. — The Solutrean industry has an unexpected distribution in that it is not found in the lands bordering the Mediterranean. The artifacts of the epoch have, however, been found in England, France, Germany, Hungary, Bohemia, and Poland.

The Solutrean epoch is characterized by extraordinary skill in the manufacture of flint implements. At no other time in the Paleo¬ lithic

was the fashioning of implements from flint so admirable. The most perfect of these

flints are laurel-leaf and willow-leaf spear heads. These implements are evenly flat and remark¬ ably thin, so thin in some specimens as to be translucent ; but the character which especially distinguishes them is the beauty of the second¬ ary flaking (Solutrean retouch). In this proc¬ ess thin flakes were split off with great regu¬ larity, leaving long, shallow furrows which run from the edge of the implements up toward the middle; both sides of the laurel-leaf points have been dressed all over in this way.

Art which had such a promising beginning in the Aurignacean epoch was at a standstill, or even declined during the Solutrean epoch. The use of bone and ivory, however, continued, and bone and ivory arrow straighteners, spear points, awls, the first bone needles, and some primitive drawings and statuettes were made. The frequent occurrence among their remains of lumps of ochre and graphite shows that colors were used either for personal adornment, as was customary with the American Indians, or for paintings on the walls oi caves. The sud¬ den appearance of implements with the ((Solutrean retouch® suggests that possibly a new race had invaded Europe. That this is probable is further shown by the discovery of a few skele¬ tons (Briinn race) whose skulls are different from those of the Cro-Magnon race, and which are of as low a racial type as that of the Australian negroids. The skulls are unusually long for their width. This race did not drive out the Cro-Magnon race, but lived in Europe at the same time and from it the Cro-Magnons appear to have learned how to manufacture the beautiful Solutrean spear-heads. One possible cause for the lack of progress of art during this epoch is the slight amelioration of the climate which permitted man to live in the open, and, consequently,. the incentive of the cave dweller for drawing and carving was lacking.

Magdalenian Epoch. — The culture of the people of the Magdalenian is so unlike that of the preceding epoch that it is difficult to under¬ stand how the high art of this epoch could have been made by descendants of the Solutreans. Instead of beautifully made flint im¬ plements, the inhabitants of the Magdalenian caves manufactured stone implements of in¬ ferior workmanship and often of poorly selected stone. But the lack of a highly developed flint industry was fully compensated for by tools made of bone, horn, and ivory. A great variety of new kinds of tools and ornaments of bone was soon invented and the skill in the manu¬ facture of bone is as surprising as

the lack of skill in the working of flints. In the early Magdalenian the bone implements were similar and less varied than later in the epoch. The bone implements most commonly found are spear-heads, which at first were without barbs, but later were made with a double row; bone spear throwers, shaft straighteners, and bone fish hooks. Bone needles were beautifully made and were much superior to those of later times. <(The Romans, for example, never had needles comparable to those of the Magdalenian epoch.® (Lartet).

The art of Magdalenian times attained a high degree of development. This is seen in carvings of animals on bone and ivory; in engravings on bone, on slabs of stone, and espe¬ cially on the walls of caves and rock shelters.

The culmination of Magdalenian art is probably that found on the roof of the cave of Altamira in northern Spain, where a large number of figures, some of which are of life size, colored in black, red, yellow, and polychrome, repre¬ senting bison, horses, deer, and other animals are found. The drawing is of a high order and could not have been executed by any but skilled artists.

It is probable that the Cro-Magnon race was the dominant one during the Magdalenian epoch, and that they were the artists of this time. More than 30 kinds of animals .were portrayed by the artists and sculptors of this epoch and it is not surprising, perhaps, that the more impressive of them, such as the mam¬ moth and bison — though perhaps not the most abundant — were favorite subjects. Besides these animals they drew or engraved the out¬ lines of the rhinoceros, the horse, the ibex, the lion, the bear, and the deer. A few figures of women have been discovered but figures of men were rarely and crudely portrayed.

Azilian Epoch. — The Paleolithic period closed with the Azilian epoch. Instead of a form of art higher than that of the Mag¬ dalenian, better carvings, and tools of superior workmanship, such as one would expect, there is a deterioration in art and flint working. <(With the

advent of Azilian the realistic art of the Magdalenians disappeared and is sue- ‘ ceeded by rude attempts at geometrical or gen¬ eralized representations. There is no working in ivory; this material has disappeared with the mammoth, and stag’s horns take its place® (Sollas).

Numerous pebbles have been discovered which are painted on one side with various designs; dots, parallel lines, ladder-like pat¬ terns, forms which resemble the capital letters F, E, I, and other designs. What these symbols signify is not known.

The cause of the abrupt change in culture between the Magdalenian and Azilian, which has been characterized as a revolution rather than a development, is explained on two theories. The discovery in the deposits of the epoch of skulls of two different types, one extremely long headed and the other extremely short headed, is considered to indicate the possibility that the Azilian culture was introduced by new races and was not a development from pre¬ existing European cultures. It is also sug¬ gested that the Azilians no longer lived in caves but in the open country and that, consequently, art practically disappeared. Moreover, the disappearance of the mammoth and reindeer from Central Europe cut off the supply of ivory and reindeer horns and man was forced to use the greatly inferior stag horns for making harpoons and tools. Azilian men, like their predecessors, knew nothing of poftery and they had no do¬ mesticated animals or plants.

The Azilian epoch seems to have occurred at the very close of the last Glacial Stage as is shown by the absence south of Belgium of the reindeer, arctic fox, and arctic hare. The common animals were those of the present day, such as wild boar, wild cattle, roe deer, rabbit, brown bear, and field mouse. The Azilian culture had a wide distribution in Eu¬ rope and has been identified in Scotland, Eng¬ land, France, Germany, Austria, and Spain. The

Paleolithic is believed to have closed 7,000 to 10,000 years ago and was followed by the Neo¬ lithic period (q.v.).

Bibliography. — Avebury, Lord (Sir John Lubbock), Prehistoric Times) (7th ed., Lon¬ don 1913) ; Elliot, G. F. Scott, Prehistoric Man and his story) (London 1917) ; Geikie, J., (The Antiquity of Man in Europe) (New York 1914) ; Gregory, W. K., Ptudies of the Evolu¬ tion of the Primates1* (Bulletin American Mu¬ seum Natural History, Vol. XXXV, pp. 239-355, 1916) ; Keith, A., (The Antiquity of Man* (London 1914)

; de Mortillet, G. and A., Pe prehistorique origine et antiquite de l'homme* (Paris 1900) ; Munro, R., Palaeolithic Man and the Terramara Settlements in Europe* (Edinburgh 1912) ; Obermaier, Hugo, Per Mensch der Vorzeit,* Pt. I (Berlin 1912) ; Osborn, H. F., (Men of the Old Stone Age* (this work also contains an excellent bibliog¬ raphy of the subject, New York 1916) ; Sollas, W. .J., (Ancient Hunters* (London 1915) ; Wright, W. J., (The Quaternary Ice Age* (London 1914).

Herdman F. Cleland, Professor of Geology , Williams College.

PALEOLOGUE, pa'la'o'log', Maurice, French diplomat and author: b. Paris, 1859. He was employed in various capacities in the De¬ partment of Foreign Affairs and was sent on diplomatic missions to Bulgaria, China, Korea and other countries. He has written several works mostly dealing with literature. They in¬ clude (L'art chinois* (1888) ; (Vauvenargues* (1889); (Alfred de Vigny* (1892; 3d ed., 1908) ; Profils de femmes* (1895) ; Pur les ruines* (1897) ; (Le cilice* (1901) ; Pome, im¬ pressions d'histoire et d'art* (1902) ; (La cravache* (1904) ; (Le point d'honneur* (1907) ; Pante son caractere et son genie* (1909).

PALEOMASTODON, a genus of primi¬ tive elephants fossil in the lower Oligocene beds of the Fayoum, Egypt. The species varied in size from that of a tapir to that of a half-grown elephant and their frames and limbs were rather lightly built. The reduction of the dentition and certain other features point to still more primi¬ tive ancestors. The neck was relatively long, the skull long and narrow, having a high and crested occiput, and the front projecting into a long snout. Both jaws contained short, partly enameled tusks, those of the upper jaw curving downward somewhat divergently, and those of the lower jaw pointing straight for¬ ward.

PALEOMETEOROLOGY. See PaleoCLIMATOLOGY.

PALEONTOLOGY, the science of the ancient life that inhabited the earth during the vast periods of time which have antedated the age of man. This science dates back only to the beginning of. the 19th century, when William Smith, Cuvier, Brongniart, Lamarck, Blumen-bach and Schlotheim initiated the study of fos¬ sil life as a distinct branch of scientific research. It was christened "palaeontology** by de Blain-ville and Fisher von Waldheim in 1834. Erro¬ neous and fantastic ideas regarding the nature and origin of organic fossils had prevailed till the last decade of the 18th century, in¬ teresting accounts of which, as well as of the later history of the science, may

be read in the

works of Zittel, Lyell, Marsh and Weller. Since the early days this science has made rapid prog¬ ress until now its devotees are numerous, and they attempt to solve some of the most import¬ ant problems bearing upon the origin and evolu¬ tion of organisms, and upon the ancient life-history of the earth. The study of palaeontology is carried on by means of fossils (q.v.) which, defined in the words of Zittel, are <(all remains or traces of plants and animals which have lived before the beginning of the present geological period, and have been preserved in the rocks, » and hence the successful pursuit of this science is in large degree dependent upon intimate knowledge of the closely allied sciences, geology and biolog>r. This affiliation of palaeontology to the two sciences mentioned is easily traced in the literature. The early works were de¬ scriptions of fossils, often arranged as in Sowerby's < Mineral Conchology,> 1812-45, with¬ out reference to their biological classification or to their relation as members of the fauna of a particular formation. In later works the tend¬ ency to diverge along two distinct lines is very apparent and at the present day we have two more or less widely separated schools of palaeon¬ tologists : (1) those whose work is more inti¬ mately associated with that of the geologist; and (2) those who are essentially biologists. The former (stratigraphers, palaeontologic geologists, geological biologists) are more interested in unraveling the relations of fossils to the rocks in which they are found entombed, in studying the order of succession, the evolution, the migration of fossil faunas in the stratified rocks, in developing the use of index fossils, that is, of particular genera and species of fos¬ sil plants and animals as indicators of particu¬ lar geological formations; and, by the study of the geographic distribution of fossil faunas, in solving the problems of <(facies development, » and of palaeogeography or ancient physical geog¬ raphy. The second group of palaeontologists confine their attention almost wholly to de¬ scription of the morphology, embryogeny, and phylogeny or genealogy of fossil organisms, and give only incidental notice to the geologic as¬ sociations of the fossils they

handle.

Palaeontology has been of great aid to zool¬ ogy and botany in clearing up mooted questions of classification, in explaining the origin of va¬ rious obscure structures seen in modern plants and animals, and in adding to our knowledge of the determining factors of geographic dis¬ tribution. The strictly utilitarian side of pa¬ laeontology, involving the application of a knowl¬ edge of index fossils to determination of the proximity of beds of ore, coal or building. stone, or to ascertainment of the depth of oil, gas or water-bearing strata, has not yet been ac¬ corded due recognition by those most interested in the exploitation of such economic materials, with the result that large sums of money have been expended in fruitless search ‘for non¬ existent treasures.

The rocks of the earth’s crust are classified according to their periods of origin into four great groups, each of which represents an era of immense duration, measured in millions of years. These eras are again divided into periods, represented by systems of rock forma¬ tions, of which 13 are generally recognized, and the periods are again subdivided into epochs, ages, stages and episodes, each of these smaller

elements being represented by its corresponding rock-unit. With exception of the Archaean and Algonkian systems at the bottom of the scale, from which no satisfactory fossil remains have yet been obtained, each of the systems has been found to contain an assemblage of fossil or¬ ganisms quite peculiar to itself, and not found in its entirety in any other system. This as¬ semblage of fossil organisms in any system or in any geological formation constitutes its fossil fauna, which is an imperfect synopsis of the ancient life that formerly inhabited the vicinity of the ocean, lake or land basin in which the particular system or formation originated.

The faunas of two formations of consecutive age have as a rule many species in common, and on the other hand the faunas of two forma¬ tions representing widely separated periods of time are found to be quite unlike, and to have few species and even few genera in common. The two extremes of such dissimilarity are naturally seen in the Cambrian and Pleistocene faunas at opposite ends of the geologic time-scale.

Table of Systems, Periods and Epochs, with Dominant Types of Life.

Eras

Periods and Systems and Dominant Types

Epochs

Quaternary

Recent

(Man, Lamellibranchs)

Pleistocene

v/vil\/uUlv

Era of Verte-

• Tertiary

Pliocene

brates

(Mammals, Gastropo—

Miocene

3 million years

da. Insects, and land

Oligocene

plants)

Eocene

Cretaceous

Upper

(Pterodactyls, Dino¬ saurs, Echinoids)

Lower

Mesozoic

Jurassic

Upper

Era of Reptiles

{ (Dinosaurs, Crabs,

Middle

7 million years

Ammonites)

Lower

Triassic

Upper

(Amphibia, Ammon—

Middle

ites)

Lower

Permian *

Upper

(Amphibia)

Lower

Carboniferous

Pennsylvanian

(Land plants, Crinoids)

(Coal measures)

Mississippian

(Subcarboniferous)

Paleozoic

Devonian

Upper

Era of Inver-

(Fish, Goniatites, Cor—

Middle

tebrates

18 million

als)

Lower

years

Silurian

Upper

(Crinoids, Corals, Eu—

Middle

rypterids)

Lower

Ordovician

Upper

(Graptolites, Orthocer—

Middle

atites, Trilobites)

Lower

Upper

Cambrian

Middle

(Trilobites)

Lower

Proterozoic

Algonkian

Life not well

known

Time 2 years

Archean

No evidence of life

* Sometimes given as a division of the Carboniferous.

While formations of different ages contain diverse faunas, it is found that a single forma¬ tion presents essentially the same fauna in all

portions of its area of distribution, whence it follows that the fossil contents of a formation are, in general, characteristic of that formation, and that they serve as a means of identifying it in widely separated districts.

These general laws are subject to certain exceptions due to the influence of ((facies de¬ velopment, }) the variations of faunal expression consequent upon changes in the physical condi¬ tions of life. These facial changes, when un¬ derstood, assist rather than render more difficult the correlation of distant faunas, and their elucidation greatly aids the restoration of the ancient physiographic conditions.

Comparison of the successive fossil faunas with each other and with the modern fauna shows that there has been a slow but continu¬ ous progress in the expression of each fauna from that of Cambrian age with its unfamiliar lowly primitive types, to the highly organized animals and plants that form the dominant types of the modern fauna and flora. This progress is manifested in the successive members of the different races of animals that have descended from Cambrian ancestors, by their passing through a particular stage of evolution in each successive period, epoch and stage. Recognition of this stage of evolution enables the palaeon¬ tologist to correlate entirely new faunas or species with the known faunas of standard sections or scales.

It must not be inferred that all races living at the present day have descended from Cam¬ brian ancestors. Many of our well differentiated forms of modern life can be traced back only to the beginning of the Tertiary, or into the Meso¬ zoic, or perhaps late Palaeozoic, where they are represented by species whose distinguishing characteristics are less well developed so that they can scarcely be separated from contempo¬ raneous ancestors of other races. Such early ancestral types which seem to possess in poten¬ tial state the characters of two or more later de¬ scendant races are known as “generalized types.®

There are also numerous groups of fossil organisms that appeared

during early days, mul¬ tiplied, attained their climax, during which they were for a time perhaps the dominant forms of land or sea, and then declined and eventually became totally extinct. Such extinct groups are eminently characteristic of the periods in which they lived.

Facies Development and Faunal Changes.

- — Facies is the peculiar expression of the physi¬ cal and faunistic characters of a formation at a particular point, and it is determined by the combination of climatic, physiographic, bathy¬ metric and other conditions reacting upon the organisms of the neighborhood. Some forma¬ tions, like the Devonian, present several varied facies in a limited area; others, like certain deep-water limestones of Ordovician and Car¬ boniferous age, spread with scarcely any change over vast spaces. The chief types of facies are the littoral, corallic, sub-littoral or pelagic, abyssal, estuarine, fresh-water and terrestrial. The characteristics of each of these, with the organisms peculiar to it, are here passed in review.

A “littoral® facies is represented by deposits formed at the shore and in the shoal water con¬ tiguous to it. It comprises conglomerates, sand¬ stones, shales and marls, and its organic con¬

tents consist of the remains of animals and plants of beach and shallow water habits. Such are the heavy-shelled mollusks, notably those that feed on marine plants, also abundant worms, heayy-shelled crabs, acorn barnacles and hydroids. This facies is more common than any of the others, for the larger part of the sedimentary rocks have been made up of the products of continental erosion deposited near the coast.

Fossil coral reefs have been recognized in formations of nearly all ages and constitute a “corallic® facies. They are in all cases of shallow water origin, and their presence in ancient rocks has been generally accepted as evidence of the uniformly warm temperature of the seas in which they flourished. In the an¬ cient reefs the coral structure has usually been obliterated by a metamorphic process called diagenesis, and the coral rock has become a dolomite. Such are the Guelph dolomites of the Silurian of New York and Ontario. Fossil coral reefs often afford faunas of many species and abundant individuals. The corallic facies of a formation is always associated, on its land¬ ward side, with a sparsely fossiliferous lagoon or saltmarsh phase, represented by red shales, containing gypsum and salt as in the Salina

beds of New York, and on the seaward side by a series of highly fossiliferous beds, usually limestones or calcareous shales, which corre¬ spond to the deposits of the open ocean. These latter deposits usually abound in fossils of distinct pelagic type, such as cephalopods, brachiopods, sea-urchins, crinoids, crustaceans and thin-shelled mollusks.

“Sub-littoral® or “pelagic® facies comprise the deposits laid down in the deeper water of the continental shelf, and form an intermediate phase between the littoral and abyssal types. The rocks are mostly of organic origin (lime¬ stone and lime shales), with fine-grained sandstones and clay shales. As a rule they con¬ tain an abundance of well preserved fossils, in¬ cluding the remains of all kinds of animals that inhabit the open sea, together with some members of the littoral fauna. Deposits of this class, with their characteristic faunas, such as graptolite shales, ammonite and pteropod limestones, have often very wide distribution, and are hence of great value for determination of geologic horizons.

“Abyssal® facies is the type characteristic of the greatest depths of the ocean. It is repre¬ sented in modern time by the foraminiferal and radiolarian oozes, and by green and red muds. It is recognized among ancient rocks by radiola¬ rian cherts of Palaeozoic and Jurassic age of Europe and Australia, by the chalk of Creta¬ ceous age of Europe and North America, and by the Pliocene Barbados earth, which latter is evidence of upheaval of great ocean-depths in comparatively recent times.

The three remaining types of facies, “estua¬ rine,® “fresh-water,® and “terrestrial,® are asso¬ ciated with spread of continental conditions. The estuarine or brackish water facies presents lagoon, bayou and estuary deposits of sand¬ stones, conglomerates and clay shales, some¬ times alternating with limestones formed during temporary transgression of the ocean. The fos¬ sils of such deposits are species of animals that lived in brackish water, mingled with remains

of the fresh-water and land fauna and flora that were carried down by river waters and en¬ tombed in the estuarine deposits. The nodular shale of Carboniferous age at Mazon Creek, Ill., is a renowned example of this type of facies. Its varied fauna comprises amphibians, fish, clams, river-snails, land-snails, scorpions, spi¬ ders, myriopods, insects and crabs, together with abundant ferns.

ˆFresh-water® and ˆlacustrine® facies are de¬ posits formed in fresh-water swamps and lakes, important in the Devonian, Carboniferous, Jurassic and Tertiary systems. The Devonian deposits, known as Old Red Sandstone in Europe and as Catskill standstone in the United States and Canada, consist mostly of red and gray sandstones and shales containing fish and plant remains. The swamp deposits of Car¬ boniferous and later times are represented by beds of coal, lignite and clay shales, all contain¬ ing abundant plant remains, and rarely relics of the insect, crustacean and vertebrate life. Dur¬ ing the Cretaceous, Jurassic and Tertiary Periods, extensive lakes existed upon the several continents, and their sandstone, shales and lime¬ stone deposits have afforded hosts of vertebrate and vegetable remains, specially those of the Rocky Mountain region and Europe. Occa¬ sional beds of this facies abound in fresh-water snails and insects, as notably at Florissant, Colo. Angular breccias, conglomerates, sandstones, shales and clays comprise the deposits of the terrestrial facies, a type which has not yet been satisfactorily investigated in all its phases. The various deposits originated either as the resid¬ uals from denudation, or as flood-plain, desert and prairie deposits. They are important sources of fossils in some cases (flood-plain and prairie phases) but as a rule their mode of origin has not been conducive to preservation of organic remains.

All of these facies are being developed in different parts of the world at the present day, and geologists find that they have been devel¬ oped more or less completely during all periods of geologic time. It is, however, worthy of note that the various marine facies greatly predom¬ inated in the older Palaeozoic, that the estuarine and swamp conditions were markedly developed during Carboniferous time in most parts of the world when they were associated with a remark¬ able increase of swamp vegetation, and that the lacustrine or fresh-water deposits were prom¬ inent during the Devonian and again during the Tertiary Periods. Each of the above-mentioned types of facies has its peculiar faunal or floral aggregation of fossils, and study of these fea¬ tures of any formation enables the palaeontolo¬ gist to determine the distribution of the land and water bodies, and even to form some im¬ perfect ideas regarding the nature of the climate, the topography of the land areas and the character and distribution of the

fauna and flora of each successive epoch and episode of time.

Palaeontology and Evolution. — The re¬ searches of palaeontologists upon the order of succession of fossil organisms, and upon the various modes of development of certain types from their embryonic to their adult stages, have brought to light many facts supporting the doc¬ trine of evolution, and have also demonstrated the origin and mode of evolution of many races

of living and extinct organisms. The results of these investigations along lines of profound interest may be found in the works of Beecher, Bernard, Clarke, Cope, Hyatt, Jackel, Jackson, Koken, Neumayr, Packard, Schuchert, Scott, Smith and Williams whose more important con¬ tributions are cited in the bibliography at the close of this article. See Evolution.

Periods of Geologic Time and Their Faunas. — The following sketch of the series of extinct faunas that have succeeded each other as inhabitants of the waters and lands of the earth involves an elementary knowledge of the most important types of animals and plants. (See preceding Table of Systems, etc.) The history actually begins with the close of pre-Cambrian (Algonkian) time when the distribu¬ tion of land and water was very different from what it is now. Regarding the life of the Archaean we know nothing and of that of the Algonkian very little. Many rocks of the latter system were originally of sedimentary origin, but they have been so thoroughly metamor¬ phosed that few traces of their organic contents remain. The remnants discovered are of types similar to those of the succeeding Cambrian fauna, and include worms, linguloid brachiopods and crustacean remains. The extensive graphite deposits of the pre-Cambrian rocks are by some authors considered as evidence of original organic deposits.

Cambrian. — The Cambrian system is repre¬ sented mostly by littoral and shoal-water de¬ posits containing an abundant fauna, which, while of primitive type, is remarkable on ac¬ count of its high degree of differentiation. Some of the Cambrian rocks, notably the cal¬ careous shales, in regions of slight metamor¬ phism (New Brunswick, Newfoundland and Scandinavia) abound in fossils. Elsewhere the sandstones, conglomerates and limestones are poor collecting grounds. This fauna, estimated to contain 1,000 species, comprises representa¬ tives of all the seven sub-kingdoms of inverte¬ brate animals, and of 12 out of 30 classes. Vertebrate remains have not been found in

Cambrian rocks. The entire fauna is marine, and the dominant types were trilobites, inar¬ ticulate brachiopods and shells usually referred to the pteropods. The trilobites form the most interesting elements of the fauna. Compared with those of later times they are more loosely built, and they present many features indicative of primitive types ; characters which are seen only in the embryos of later forms. The brachiopods, of which 120 North American spe¬ cies are known, are almost entirely of the in¬ articulate type, with thin, rounded or spatulate, phosphatic shells, while there were a few members of the articulate group with trans¬ verse, calcareous shells. The hyolithoid shells, with triangular elongate form, are abundant. Sponges are recognized. The corals are doubt¬ fully represented. The echinoderms are repre¬ sented by a few rare cystoids. Among the gastropods there are coiled shells and limpet¬ like forms in the middle and upper horizons. The lamellibranchs have a single minute genus, and the cephalopods likewise one minute form. Worm trails and burrows are abundant and various forms of ostracods are found in the finer grained sediments. Radiolarians and foraminifera have been found, some of the

latter being indistinguishable from modern species. The only probable plant known is re¬ ferred to the coralline algae.

The Cambrian fauna in its entirety shows a very advanced stage in the differential evolu¬ tion of organic types, and there is good reason to believe that long ancestral lines of fossil organisms originally existed in the pre-Cam¬ brian sediments, and further to anticipate that continued search in the less metamorphosed de¬ posits of that remote age will eventually bring to light some of those much sought for initial types.

Ordovician. — The fauna of the Ordovician, or age of graptolites, shows a marked advance in development of all its types over those of the Cambrian. It also shows a more distinct sep¬ aration into facies, of which the pelagic, em¬ bracing orthoceratite, brachiopod and trilobite limestones and the graptolite shale facies are the more prominent.

Most of the groups of ani¬ mals which were initiated in the Cambrian, en¬ joyed a rapid evolution in the Ordovician time. During that period the trilobites attained their climax in respect of variety and numbers. The Ordovician trilobites present considerable ad¬ vance over their Cambrian ancestors in respect of increased compactness of structure, perfec¬ tion of the eye-structure and elevation of the visual surface above the head, whereby the ef¬ ficiency of these organs must have been much increased. The cephalopods are represented by numerous orthoceratite genera, with straight or slightly curved shells, some of which were of great size, associated with closely coiled genera that resemble modern nautilus shells.

Among the brachiopods the inarticulate types, so common in the Cambrian fauna, oc¬ cupy a subordinate place and are represented by numerous species. The articulate order at¬ tained so great an expansion that 325 species of North American Ordovician brachiopods are known. The Polyzoa appear first in the lower Ordovician and are abundant and varied in the upper zones. Gastropods are common. Lamellibranchs are common, with several genera of generalized type; corals of various types are common. The hydroid corads formed extensive reefs during Chazy and Trenton time. Echinoderms include abundant cystoids, several crinoids and rare starfishes. The cystoids are especially abundant in the lower Ordovician, where their fragmentary remains form solid limestone beds of several feet thickness. Sponges are common in a few localities and in the Trenton limestone of the Mississippi Valley is found the much discussed Receptaculites. A pelagic facies is recognized in the radiolarian cherts of Great Britain, France and Germany. The graptolite facies of the Ordovician, by some authors considered to be an abyssal facies, occurs in the form of gray and black bitumi¬ nous shales and slates, in which numerous genera and species of graptolites are found arranged in definite zones that occupy the same relations to each other in widely separated parts of the world. This great dispersion and regular suc¬ cession of genera and species render the grap¬ tolites the most important index fossils for the Ordovician, an advantage which is, however, somewhat negatived by the difficulty attending their study. The group began in the upper Cambrian, attained wide distribution and various evolution during the Ordovician and

declined during the Silurian. These graptolite beds are well demarcated from the molluscan and brachiopod limestones and while they occur between the latter at various horizons through¬ out the general Ordovician and Silurian forma¬ tion scales of Europe and

America, they are best developed in basins where little of the other facies seem to have existed. The faunas of latest Ordovician time are known in only a few regions, since that period was one of compara¬ tively sudden uplift of continental masses, accompanied in many parts of the earth by for¬ mation of mountains. But the few late rem¬ nant faunas that found shelter in protected basins present a transitional phase between the normal Ordovician and the succeeding Silurian faunas. Late Ordovician time is represented in most parts of North America by a marked hiatus of unconformity indicating wide land areas.

Silurian. — The earliest Silurian fauna of North America, that of the Clinton group, con¬ tains a few relics of the Ordovician fauna lingering on among a host of new species and genera, which were introduced with the return of marine conditions over the interior sea basin. The American rocks and faunas of Silurian time indicate: first, muddy waters of the Clinton epoch, followed by clear seas of Niagara time inhabited by a luxurious fauna, and in which pure organic limestones were deposited. Subse¬ quently the shallow mediterranean Guelph Sea of America became dotted with extensive coral reefs, and toward the end of Silurian days the epicontinental seas were again largely drained to form lagoons, tidal mud-flats and salt lakes of Salina time. Then ensued a short period. of wide land-emergence before the early Devonian transgression began. Facies development is well marked and it is worthy of note that the various facies occur in the same relative order and at equivalent horizons in widely separate regions ; evidence that the causes which in¬ fluenced their development in Silurian time acted simultaneously during successive epochs over the entire northern hemisphere. The mollusk-trilobite limestone of Niagara age in North America is duplicated by that of similar age in England (Wenlock), Sweden (Gotland) and central Europe (Bohemian). The Eurypterus fauna of the Salina group of New York is duplicated by the contemporaneous water-limestones of the English Ludlow and the Bal¬ tic Rotzikiill beds. The corallic facies of the American Guelph is of the same age and char¬ acter as that of the English Dudley, Swedish Gotland and Bohemian dolomites; and finally the Monograptus shales of Great Britain, Bo¬ hemia, Brittany, Scandinavia and New York are all of lowest Silurian age. Another inter¬ esting feature of the Silurian fauna is its di¬ vision into two well-marked types — a northern or Baltic-British-American type and a southern Bohemian-Mediterranean phase, the species of which are quite distinct. All of the Silurian faunas of North and South America and of Asia are of the northern phase, and the Bohe¬ mian-Mediterranean type appears to be merely a local facies. It is of interest

that the Silurian fauna of Australia contains representatives of both types.

The chief characteristic of the Silurian fauna is the great evolution of the crinoids, corals, the spire-bearing brachiopods and the

Eurypteridae. Protozoa are rare; sponges and corals attain a remarkable variety and abund¬ ance, and in many districts the latter formed extensive reefs. The graptolites begin to decline Cystoids take second rank after the crinoids, whose sudden expansion is expressed t rˆat*0 about 450 Silurian soecies to less than 50 from the Ordovician. The brachiopod fauna, while no larger, differs from that of the Ordovician in the increase of the spire-bearing types and in the remarkable development of marticidate types with large solid shells. La-melhbranchs offer no important changes. Gas¬ tropods are numerous. Tentaculites, usually referred to the pteropods, occur by myriads associated with ostracods. The Silurian Cephalopods comprise straight-shelled Orthaceras, curved and turreted forms and coiled Nautilus!

lhe Arthropoda are represented by rare bar¬ nacles, numerous ostracods, some phyllocarida, rare scorpions, spiders and insects as well as by the trilobites and eruypterids. The trilobites show a slight decrease in numbers, but a greater diversity of form over their Ordovician ancestors. The water limestones (of mud-flat origin) of the Salina of New York and equiva¬ lent European deposits afford abundant re¬ mains of Eurypterids (q.v.), some of which grew to be six feet long. These creatures resemble m habits and structure the modern horseshoe crab (Limulus). Rare scorpions, spiders and insect remains have also been found in these uppermost Silurian lagoon deposits, and they show no very great differences from similar types of the Carboniferous. Their presence in¬ dicates the existence of terrestrial life on the extensive continental areas that emerged toward the end of Silurian time. In these highest Silurian rocks, specially in the Ludlow beds of England, Scotland and Podolia, are found the earliest remains of vertebrate animals in the shape of primitive fish-

like creatures of the order Ostracodermi (q.v.).

Devonian. — The Devonian Period was one of constant local physiographic changes, and ac¬ cordingly its formations and faunas present a greater variety of facies than is seen in any of the older Paleozoic systems. There are two prominent types of the Devonian, each with its distinctive fauna: (1) The marine deposits of limestones, marls, shales and sandstones; (2) the continental or terrestrial phase, known as the Old Red sandstone in Europe and as the Catskill shales and sandstones in the eastern United States and Canada. This twofold as¬ pect of the deposits is more or less prominent in all the geological systems above the Devo¬ nian. . The Devonian fauna as a whole is dis¬ tinguished by the development of land vegeta¬ tion, by rapid evolution of fishes, lamellibranchs and of goniatite cephalopods, and by the decline of trilobites and practical extinction of the graptolites and cystoids. Other groups expanded. Sponges comparable with the mod¬ ern Venuˆ-flower-basket, flourished in shallow seas; corals are abundant and formed reefs in many regions. The Hydrozoa are represented by numerous reef-building stromatoporas, and by straggling survivors of the graptolites. Among echinoderms the cystoids are rare; star¬ fish and ophiurians occur commonly at a few localities, and the crinoids are the dominant types of this class, though not so abundant as in the Silurian. The blastoids are represented.

Worm-trails are common in the shales and sandstones of the middle and upper Devonian. A host of new brachiopods appears, while many Silurian genera run on. Lamellibranchs show a great advance over those of the Silurian, and in certain shale and sandstone formations they outnumber all other types of organisms. Gas¬ tropods of the family Capulidae are abundant, and minute pteropod shells often form solid limestone beds. Among cephalopods a new type of closely coiled shells, Goniatites, with slashed sutures, appears in the lower Devonian, evolves rapidly and reaches its climax before the close of the period. An extinct group of crustaceans, the Phyllocarida, with long strong caudal spines, reach a considerable development, especially in the Hamilton epoch. Eurypterids are rare, though represented by the gigantic Stvlonurus in the Catskill beds. The trilobites have many large and bizarre members, as well as a number of small, degenerate forms, during the early and middle Devonian, when they manifested a strong tendency to develop spines along the margin and on the surface of the carapace.

The Devonian is aptly termed the <(age of fishes,® for within its

limits this class enjoyed a great expansion. The lowest Devonian fish fauna is like that of the upper Silurian with numerous Ostracoderms. This is succeeded by a fauna a large number of acanthodian

sharks, which are indicated by their spines. No remains of any vertebrates higher than fishes are known in the Devonian.

Plant remains in the form of marine algae are found throughout the Devonian. Some of these, like Nematophyton of gigantic size, were long supposed to be the trunks of coniferous trees. Others with delicately branching fucoid leaves are common, especially in the Hamilton, Portage and Chemung groups. The continental phase of the Devonian has afforded the earliest examples of land vegetation, all prophetic of the succeeding Carboniferous types. Both the fauna and flora of the upper Devonian show marked affinities by gradual transitions to those of the Subcarboniferous. See Paleobotany.

Carboniferous.— The early part of the Car¬ boniferous period was marked by a continued recession of the sea, which had begun in late Devonian time, and during the Carboniferous the land areas seem to have reached a greater expansion than they have at the present day. These Carboniferous land masses were of very different forms and situation from the present day continents. An Arctic continent occupied the greater part of the Arctic zone and ex¬ tended by broad peninsulas southward toward the equator, over what are now eastern Amer¬ ica, eastern Asia, central Europe and the eastern Atlantic Ocean. Another, Indo-Afri- can continent, covered that part of South Amer¬ ica east of the Andes, extended across the south Atlantic, Africa, the Indian Ocean and Aus¬ tralia. An ocean spread over the present Pacific basin and also over Alaska, all of the United States west of the Mississippi River, Central America and the western part of South Amer¬ ica, while a great mediterranean sea of irregu¬ lar form encircled the globe and communicated at both ends with the Pacific Ocean. There was also a small Antarctic sea. Toward the close of Carboniferous time the ocean again trans¬ gressed and the land masses became for a time somewhat reduced in size. The Carboniferous

formations consequently present two well-marked facies : a marine facies with deposits of limestones and shales with mollusks, brachiopods, corals and foraminifera, more widely spread on the lower and upper Carboniferous ; and a con¬ tinental phase of sandstones, shales and coal¬ beds, holding abundant plants, and in some localities numerous insects, fish and amphibians. These facies as a rule occupy different basins, but occasionally they are found dovetailed into each other in such manner that their relative ages can easily be determined. The lands of Carboniferous time and especially the coastal swamps supported a dense and rank vegetation comprising more than 1,500 species of plants. Ferns, some of great size, were the most com¬ mon type. Calamites with fluted many-branched stems and variform foliage, were giant predecessors of our modern horsetail rushes (Equisetum). Lepidodendron and Sigillaria, related to clubmosses (Lycopodium), with trunks often five feet thick and 75 feet high; Cordaites with sword-shaped yucca-like leaves on a solid trunk 25 to 30 feet high ; and other great tree-like plants intermediate in nature between the ferns and cycads, formed the bulk of the forest growth. In the shelter of these forests lived numerous insects, mostly primitive cockroaches, also dragon-flies, one of which had wings over 20 inches across; primitive forms of locusts, crickets, grasshoppers and also scor¬ pions that were much like those of modern type. On the shores of the swamps lived large am¬ phibious myriopods whose bodies were armed with branching spines. Some land snails like modern Pupa and Zonites have been found. The fresh-water facies also contain remains of lizard-like amphibians (Stegocephalia), many of which have been found in hollow Sigillarian stumps.

The marine phase of the Subcarboniferous contains the first abundant foraminiferan de¬ posits. Minute Endothyra shells form the bulk of the Indiana oolitic limestone; Fusulina, like grains of wheat, and Schwagerina, a globular form, build great limestones in the upper Car¬ boniferous. Corals are not so abundant as in the Devonian and coral reefs are rare. Crinoids were locally very abundant, espe¬ cially in the Subcarboniferous beds at Burling¬ ton, Keokuk and Crawfordsville in the Missis¬ sippi Valley, where about 650 species have been found. The blastoids, with Pentremites as their most abundant type, attained their climax in the Subcarboniferous of America. Among the abundant bryozoa, one genus Archimedes, with its screw-like axis, is a good index fossil of the Subcarboniferous. Brachiopods were abundant as were also the Lemellibranchs. Gastropods present a number of heavy-shelled forms; among the Cephalopods, the orthoceratites have greatly declined ; nautiloids

abound, and the goniatites show great advance¬ ment over those of the Devonian, and toward the end of the period transitional types suggest¬ ive of the Triassic ammonites appeared.

The arthropod fauna of the Carboniferous is poor in trilobites, but eurypterids are common in some coal measure shales.

The Carboniferous vertebrate fauna, is of interest by reason of the sudden expansion of amphibian types in the upper part of the sys-Hun. The Stegocephalia (labyrinthodonts) are

represented by several genera, and consist of generalized types suggestive of the later croco¬ diles, lizards and snakes. Ihe fish-fauna is abundant, comprising sharks and ganoids. Ihe Waverly shales of Ohio have afforded numerous large lungfishes, and some fine examples of acanthodian sharks. Over 600 species of fish have been described from the Subcarboniferous limestones of America.

Permian. — During Permian time the conti¬ nental conditions were even more prevalent than during the Carboniferous, and accordingly the marine phase is much restricted in distribution and its fauna diminished in numbers. Both plants and animals are transitional between those of the Carboniferous and Triassic. Many types characteristic of the Palaeozoic have their last representatives, some of them, it is true, oc¬ curring abundantly, in the rocks of this .system. Productus, Orthoceras, goniatites, trilobites and the fenestellid bryozoa, which latter formed ex¬ tensive reefs in Europe, all become extinct with the close of the Permain. Other types, some of them initiated during the Carboniferous or earlier and continued into the Trias attain a considerable expansion, and give to the fauna a decided Mesozoic aspect. These are found among the lamellibranchs as well as among the ammonoids, fish and amphibians. The ammonoids attained a great expansion. The fish fauna of the Permian consists mainly of ganoids. Acanthodian sharks reached the climax of their evolution. The stegocephalian amphibians were varied and common, and were the dominant types of life. There were also snake-like mem¬ bers of this group, one of which was nearly 45 feet long. A new type of vertebrate appears in reptiles of land and fresh-water habits.

While the Permian flora is in general the same as that of the Carboniferous it contains some types not seen in the latter.

Mesozoic. — The Mesozoic fauna and flora are distinguished from

those of the Palaeozoic by the absence of trilobites, graptolites, orthoceratites, long-hinged brachiopods, tetracorallic and tabutate corals, cystoids, palaeocrinoids, blastoids, eurypterids, goniatites, acanthodian sharks, and the great lycopods. On the other hand this era is marked by the introduction of numerous new types and by the expansion of many invertebrate groups, land and marine reptiles, multituberculate mammals, cycads and conifers. During the era a great change in the expression of the life is apparent, in that the early Triassic life presents close analogies with that of the late Permian, while during the era an almost complete change takes place, and that of the upper Mesozoic, especially the vegetation, affords considerable resemblance to the early Tertiary.

Triassic. — * The wide extension of conti¬ nental areas continued from Permian into Tri¬ assic time with perhaps a slight increase, and in North America marine Triassic fossils have been found in only a few places in the far West The fauna as a whole is an impoverished one. The continental Trias, consisting of red beds in America, Europe and Asia, contains abun¬ dant remains of ganoid fish together with some cycads and conifers. In some regions these beds have afforded also numerous remains of often gigantic stegocephalian Amphibia, which at¬ tained their climax during this period. Small

amphibious precursors of the large marine Ju¬ rassic ichthyosaurs and plesiosaurs are found. The Theromorpha, reptiles exhibiting remark¬ able affinities with the carnivorous mammals, at¬ tained a great development in South Africa. The first turtles, crocodiles and dinosaurs occur here. The earliest mammalian remains consist of fragmentary jaws and multituberculate teeth of small animals supposed to be allied to the modern monotremes.

The marine Trias is found well developed in the Alps with extensions into Asia Minor, In¬ dia, Arctic regions, Pacific States and Australia. The number of species is comparatively small, though individuals are abundant. Foraminifera and calcareous sponges abound. Corals of per¬ forate and aporose genera formed extensive reefs in some

regions. Crinoids are represented. Sea-urchins were present. Among the brachiopods are a few remnants of Palaeozoic genera, while new families are surprisingly developed. The lamellibranchs begin to show considerable expansion and the first true fresh-water unios appear here. The marine gastropod fauna is abundant, with some old types and others of later Cretaceous and Tertiary aspect. The am¬ monites, which began in the Permian, show a wide differentiation of form and complexity, and attain the culmination of their evolution in the upper Trias. Over 1,000 species have been described. Ostracods are abundant.

Jurassic. — The facies development of this system is very varied ; the continental phase pre¬ dominates in America as the Newark or Con¬ necticut River sandstones, while the marine phase is most prominent in Europe and Asia. The Jurassic flora is quite similar to that of the Trias, made up of cycads and conifers which are forerunners of the recent pines. Among marine invertebrates the sponges and corals, largely of modern type, were so abundant as to form great reefs. Crinoids were abundant in in¬ dividuals, though genera and species were few; echinoderms and Bryozoa were common, while the brachiopods were restricted to a few fam¬ ilies. The lamellibranchs and gastropods in¬ clude the first representatives of a number of modern families. The ammonites are by far the most abundant and characteristic forms of mollusks, and by means of them the marine Jurassic of Europe has been subdivided into some 15 zones, each characterized by its par¬ ticular species. Belemnites, the solid cigar¬ shaped internal shell of squid-like cephalopods, are very abundant and varied, and the fossilized ink-bags of these creatures are common in some formations. The crustacean fauna shows a great increase of long-tailed decapods allied to prawns, shrimps and crayfish, and the earliest true crabs. Insects include dragon-flies, May¬ flies, termites, grasshoppers, crickets, walking-sticks and some beetles ; also occasional bugs, flies and ants. The ganoids with heterocercal tails take a subordinate role while those with homocercal tails and scaly rhombic plates pre¬ dominate. Sharks and rays and the first teleost, or modern bony fishes complete the Jurassic fish fauna.

The reptiles form the most interesting group of the Jurassic fauna, for during this period they reached the highest stage of their evolution both in variety and abundance. The Triassic stegocephalians and Theromorpha give place to voi.. 21 — 13

the terrestrial dinosaurs and the marine ichthyo¬ saurs and

plesiosaurs. The latter held some¬ what the same relation to reptiles that the whales of modern time hold to the mammals. Those sea lizards swarmed in the Jurassic seas where they preyed upon the fish. The dinosaurs held sway upon the land, not only during the Jurassic period, but also during the greater part of the succeeding Cretaceous. Another type of reptile prominent during Jurassic time and con¬ tinued into the Cretaceous was the group Pterosauria or flying lizards, of which the ptero¬ dactyl is the best known example. Other types of reptiles, as turtles and crocodiles, are more or less common. At the same time when the reptilian stock developed flying creatures there appeared the earliest known bird. (See Ar¬ chaeopteryx). The mammalian remains-of Ju¬ rassic time are known only by isolated teeth and jaws of small size and very rare, and all are re¬ lated to the marsupials and monotremes.

Cretaceous. — The flora of the lower Creta¬ ceous is like that of the Jurassic, but gradually the cycads diminish in importance and a host of angiosperms appear, very similar to the trees and shrubs of to-day. Many genera of recent tropical and temperate zone plants occur in the Cretaceous rocks of Greenland and northern Europe, facts cited as evidence of the mild cli¬ mate of those parts during Cretaceous time. The ammonites begin to decline and we see numerous dqgenerate types, last members of va¬ rious races, with shells loosely coiled, turreted, hook-like, or even straight, many of which are characteristic index fossils. The group becomes entirely extinct with the close of the Cretaceous.

The close of Cretaceous time terminated the middle or Mesozoic period of the history of or¬ ganic life and marked the extinction of a num¬ ber of types of animals which had for long epochs dominated the lands and seas. This ex¬ tinction is perhaps more evident here than at the end of the Palaeozoic, and its causes are wholly unknown. It is true that some groups (Ammonites) had already begun to show marked degenerate tendencies attendant upon race senility, but the majority of the groups became extinct at the height of their evolution, when they were represented by their most highly specialized types. It is possible that this very specialization rendered them more liable to in¬ jury by slight though abrupt climatic changes or by sudden variations in the depth of the seas in which they lived. The great land and marine reptiles, the flying lizards, the mososaurs and toothed birds all became extinct. Likewise the ammonites and belemnites, so characteristic of the Mesozoic, have not been found above the upper limits of that system.

Cenozoic. — The life of this era is like that of recent time, particularly

the marine life, for the terrestrial mammalian life of a large part of the system is very dissimilar to modern animals. The early classification of this system was based upon the increasing percentage of still living species found of both plants and animals fossil in the deposits. (See Paleobotany). Some of the distinctive types of invertebrates were of larger size than usual. Sponges and corals are abundant only in restricted localities. Foramin¬ ifera, Radiolaria, echinoderms, Bryozoa, lamelli¬ branchs and gastropods are present in great variety while crinoids, brachiopods and cephalo-

pods are comparative rarities. The preponder¬ ance of crabs, with a number of extinct genera, over the long-tailed, lobster-like decapods is very marked. Acorn barnacles, often of large size, are common, and fresh-water snails and mussels, all of modern types, are abundant in the fresh-water deposits of both Europe and America. Insects of all kinds have been found in the Oligocene and Miocene deposits, espe¬ cially at Florissant and White River, Colo., and in the amber of the Baltic provinces, which lat¬ ter has furnished about 2,000 species.

But the greatest interest attaches to the ver¬ tebrate fauna of the Tertiary, for during the early days of this period the placental mammals outstripped the marsupials and monotremes and became the lords of the land, and toward the end of the period appeared man. The reptiles, which held so prominent a place during the Mesozoic, are reduced to the true lizards, snakes, croco¬ diles and turtles. The amphibia which, as Stegocephalia, had become almost extinct during the middle Mesozoic were resurrected in the Eocene as salamanders, toads and frogs, and continued thence till the present day. The fishes included numerous large sharks and a prepon¬ derance of bony fishes, of which many belonged to modern genera, such as perch, herring, carp, pike, catfish, eels breams and mackerel. Birds exhibit a continuously expanding evolution dur¬ ing the Tertiary and they are still expanding. See Mammals; Tertiary Period.

Conclusion. — The dominant types of the consecutive periods present on the whole an in¬ creasing degree of perfection of structure, and the

dominant types of one age are, as a rule, not related to the dominant types of the preceding age. These dominants are usually the most highly specialized members of the classes or orders to which they belong, and it is further to be noted that dominance and high specialization have in most cases been soon followed by de¬ cline and extinction. The small primitive forms of one period may evolve into the large domi¬ nant types of the next epoch and in their turn decline and disappear. In the invertebrates and lower vertebrates (fish, amphibia and reptiles) the rate of this evolution, and consequently the destiny of the race, is almost wholly dependent upon the presence and continuance of favorable conditions of existence, for these types have little or no ability to surmount physical diffi¬ culties. Among the higher vertebrates, enlarge¬ ment of the brain mass and of the mental facul¬ ties enables the animals to circumvent unfavor¬ able conditions to some extent, but they also are comparatively helpless. It is in man, with his highly-developed intellect and mechanical skill, that we see the only organism able not only to circumvent unfavorable conditions of life but actually to nullify them and to practically sub¬ jugate all other organisms or render them use¬ ful to him in his affairs. We have said that high specialization indicates approaching decline and extinction. That is true in respect of struc¬ tural evolution, but as regards intellectual evolu¬ tion, and the directions in which it may differ¬ entiate, we know next to nothing beyond the fact that intellectuality has up to the present time evolved with remarkable acceleration. In view of this it seems impossible to conceive other¬ wise than that man, under strong physical, moral and religious control, can have before

him any other than a future longer and more brilliant than his comparatively brief existence.

Bibliography. — The best accounts of the early history of the science of palaeontology may be found in Lyell, Principles of Geology) (11th ed., Vol. I, New York 1872) ; Zittel, ‘History of Geology and Palaeontology 5 (New York 1901) ; Marsh, (History and Methods of Palae¬ ontological Discovery 5 (New Haven 1879) ; Weller, (A Century of Progress in Palaeontol¬ ogy 5 (Journal of Geology, Vol. VII, 1899). For nature and mode of entombment and methods of collecting fossils, Geikie, (Textbook of Geology) (4th ed., Vol. II, New York 1903) ; Schuchert, directions for Collecting and Pre¬ serving Fossils) (Bulletin U. S. Nat. Museum, Vol. XXXIX, Washington 1895) ; White, C. A., delations of Biology to Geological Investiga¬ tion (in Report U. S. Nat. Museum for 1892). For the general principles of

palaeontology, Chamberlin, ‘A Systematic Source of Evolu¬ tion of Provincial Faunas5 (in Journal of Geol¬ ogy, Vol. VI, 1898) ; Clarke, (Indigene and Alien Faunas of the New York Devonian5 (in Bulletin 52, N. Y. State Museum, Albany 1902) ; Cope, Primary Factors of Organic Evolution (Chicago 1896) ; Huxley, (The Principles and Methods of Palaeontology5 (in Smithsonian In¬ stitution, Annual Report for 1869) ; Hyatt, (Bio-plastology and the Related Branches of Biologic Research5 (in Proc. Boston Soc. Nat. History, Vol. XXVII, 1895) ; ‘Cycle in the Life of the Individual (Ontogeny) and in the Evolution of the Group to which it Belongs (Phytogeny) 5 (in Proc. Amer. Acad. Arts and Sci., Vol. XXXII, 1897) ; Bernard, Principles of Palae¬ ontology 5 (in 48th Annual Report N. Y. State Museum, Vol. II, p. 131, 1897) ; Packard, (A Half Century of Evolution with Special Refer¬ ence to the Effect of Geological Changes on Animal Life) (in Proc. A. A. A. S., Vol. XLVII, 1898) ; Smith, T. P., papers (in Jour¬ nal of Geology, Vols. Ill to VIII, 1895-1900) ; Williams, (The Scope of Palaeontology and Its Value to Geologists) (in Proc. A. A. A. Sci. Vol. 41, 1892) ; Williams, the Correlation of Geological Faunas) (Bulletin U. S. Geological Survey, No. 210, 1903). Among the systematic Avorks are Woods, Palaeontology, Invertebrate) (Cambridge Press, 3d ed., 1902), the only ele¬ mentary work on this subject written in the English language; it is, however, devoted wholly to British fossils; Zittel-Eastman, text¬ book of Palaeontology) (New York 1900-02), a more technical, but thoroughly American work, the best for general purposes; Nicholson and Lydekker, (Manual of Palaeontology5 (2d ed., Edinburgh 1889) ; and Woodward, Out¬ lines of Vertebrate Palaeontology5 (Cambridge 1898), serve more special needs. The more val¬ uable works of a stratigraphic nature are Dana’s (Manual of Geology5 (4th ed., 1896) ; Geikie’s textbook of Geology5 (4th ed., Vol. II, 1903) ; Kayser’s (Geologische Formation-kunde5 (2d ed., Vol. II, Stuttgart 1902) ; and Freeh’s Pethaea Geognostica5 (3 parts, Stutt¬ gart 1883-1903) ; Grabau, A. W., and Shimer, H. W., (North American Index Fossils5 (New York, 1910) ; Hutchinson, H. N., (Extinct Mon¬ sters and Creatures of Other Days5 ; Lankester, E. R., Pxtinct Animals5 (New York 1905) ; Lucas, F. A., ‘Animals Before Man in North America5 (New York 1902) ; Lucas, F. A.,

* Animals of the Past* ; Lydekker, R., Geo¬ graphical History of Mammals* ; Nicholson, H. A., (A Manual of Paleontology* (2d ed., Edinburgh 1879) ; Osborn, H. F., (The Age of Mammals) (New York 1910) ; Scott, D. H., (The Evolution of Plants) ; Scott, D. H., Stud¬ ies in Fossil Botany* ; Scott, W. B., (A History of Land Mammals in the Western Hemisphere* (New York 1913) ; Shimer, H. W., (An In¬ troduction to the Study of Fossils) (New York 1914) ; Williston, S. W., (Water Reptiles of Past and Present* ; Zittel, Karl A., von, (Geschichte der Geologie und Palaontologie* (1899) ; Zit¬ tel, Karl A., von, (Text Book of Paleontology (trans by Eastman, London 1900). The last work has been completed to the Triassic only and discusses the successive faunas and forma¬ tions “M the Paleozoic in great detail.

Gilbert van Ingen, Princeton University.

PALEOZOIC ERA, the second great di¬ vision of geologic time and the first one in the sediments of which well-preserved organic re¬ main? have so far been found in abundance. It is preceded by the Proterozoic division and succeeded by the Mesozoic (mediaeval life) and the Cenozoic (recent life) time divi¬ sions in ascending order. The name signifie/ ancient life and has reference to the iharacter of the plant and animal life of ;he time, which was markedly unlike that of the present. As a time division, the Paleozoic is generally called an era, this term meeting with the recommendation of the International Geological Congress at its Bologna Convention in 1881. Dana in his (Manual of Geology * (5th ed.), however, used the expres¬ sion (<Paleozoic Aeon or Paleozoic Time,® and applies era to the next smaller subdivision. In this he has been followed by several authors. Though in its modern sense primarily used for a time division, the term Paleozoic is also ap¬ plied to that division of the earth’s crust which was formed during that time. And indeed this is the original use of the term, when it was coined for the reception of the fossiliferous rocks below the so-called Secondary or Mesozoic formations. The rocks thus named were for¬ merly included with the crystalline rocks of all ages as ((Primary,® but later on they were separated at least in part, as ˆTransition rocks.® Lyell, to avoid confusion, spoke of them as the ((Primary fossiliferous rocks.® The following parallel columns express perhaps as nearly as possible the correlation between the older and newer terms :

Older Newer

Quaternary 1 . Cenozoic or Cainozoic

Tertiary /

Secondary . Mesozoic

Transition (or primary fossiliferous. Paleozoic Primary . Proterozoic

In the formation scale the term ((group®

was recommended by the International Congress as of co-ordinate in rank with that of era in the time scale. This recommendation has not been very generally adopted in America, where the term group is commonly used for a smaller formation. ((Series® is sometimes used for such rock divisions as that corresponding to the Paleozoic Era but more commonly corresponds with epoch in rank.

The following subdivisions of the Paleozoic are recognized :

Carboniferous period and system.

Permian Epoch and series

Pennsylvanian Epoch and series

Mississippian Epoch and series

Devonian period and system Silurian period and system Ordovician period and system Cambrian period and system

Characteristic Life of the Paleozoic. — The

characteristics of Paleozoic life were very marked and stamp the Era as boldly contrasted with the succeeding Mesozoic. The Hydrozoa were represented by the group of Graptolites, wholly confined to the Paleozoic. Among corals the Tetracorolla (so-called from having four primary radiating lamellae or septa with reference to which the others are arranged), the honeycomb corals, the tube corals, and the chain corals are characteristic types practically unknown in post-Paleozoic

time. Among the Echinoderms, the two groups of Cystids and Blastids are wholly confined to the Paleozoic, while the Crinoids, or sea lilies, with few ex¬ ceptions are likewise restricted to the Paleozoic. Starfish, brittle stars and sea-urchins, while represented in Paleozoic rocks are more char¬ acteristically known from later strata. The Bryozoa, or sea moss, are well represented. These often constructed extensive reefs and in the Ordovician especially, gave rise to ex¬ tensive deposits.

Brachiopods are perhaps the most import¬ ant Paleozoic types, no less than 2,600 species having been described from the Ordovician and Silurian deposits alone. Several archaic fami¬ lies range from the Ordovician to the present time while modern types such as some of the Terebratuloid families begin in the middle or late Paleozoic. By far the largest number, however, end with the Carboniferous or before, while a few others run on past the close of the era.

Turning to the Pelecypods or bivalve mollusks, we find that their principal representa¬ tives belong to post-Paleozoic time. A primi¬ tive order represented by such modern types as the oyster and scallop (Pecten), alone has a prominent representation in the Paleozoic, where about 30 families are found. Of these more than one-half continued to exist beyond Paleozoic time, with few exceptions indeed down to the present time. Only 13 out of 40 families of this order (as now understood) are confined to the Paleozoic. On the other hand post-Paleozoic time is characterized by about 86 families. The gastropods are likewise essentially post-Paleozoic Mollusca, those of Paleozoic time being essentially primitive or archaic in character.

The cephalopods were well represented dur¬ ing the Paleozoic by the Nautiloidea. Of 40 families belonging to this class only three origi¬ nated in post-Paleozoic time and only one of these, the family of the true Nautilus, continued to the present time. Of the 37 Paleozoic fam¬ ilies three or four ran on past the end of the era. The straight-coned nautiloids, the bent cones and the loose-coiled cones are practically confined to the Paleozoic rocks, the close-coiled forms alone characterizing later horizons as well. The ammonoids on the other hand are

represented in Paleozoic rocks only by their more primitive types.

Among Crustacea, the Trilobites are wholly confined to the Paleozoic rocks, of which they constitute in many respects the most character¬ istic type of fossil. Their greatest develop¬ ment was during Cambrian and Ordovician time. The remarkable order of Eurypterid crustaceans is also confined to the Paleozoic, constituting the most characteristic type of certain formations. The only other type of crustaceans abundantly represented in the Paleozoic rocks is that of the small bivalve ostracods.

Paleophysiography of North America. —

The physiographic changes which the North American continent suffered during Paleozoic time may be summarized as follows : In early Cambrian time the greater part of the interior of North America was out of water, the eastern shore being probably a short distance east of the present Appalachians, and the west¬ ern shore on the western flanks of the Rocky Mountains. The southern shore was not far north of the present southern boundary of the United States. A narrow gulf extended north¬ ward along the Appalachians and probably connected with a similar gulf extending south¬ ward from the present Saint Lawrence Gulf. The land mass to the east of this trough has been called Old Appalachia and remained persistent throughout most of Paleozoic time. There is some reason to believe that a persistent trough also occupied the site of the Great Basin and that another persistent land mass lay to the west of that. The great interior, between these troughs, was land in early Cambrian, but gradu¬ ally sank with many minor fluctuations, to a maximum submergence in mid-Ordovician. It was again widely emerged at the close of the Ordovician when the Taconic Revolution raised mountains in New England. A gradual re¬ submergence in Silurian times, re-established the sea. In mid-Silurian it extended north¬ westward over what is now Hudson Bay and the Arctic regions beyond. Near the close of the period, the sea became much restricted or wholly enclosed and highly saline. In this North American dead sea, the great Silurian salt and gypsum beds of New York, Ohio and Michigan were deposited. At the close of the Silurian nearly the whole of the North Ameri¬ can continent became dry land and the sea was reduced to a narrow channel along its former eastern border. Toward mid-Devonian time this sea spread westward again to Michigan and southward to Indiana and the great Paleozoic coral reefs began to flourish. Many fluctua¬ tions and adjustments took place, the eastern

border of the sea growing shallower and the western deeper. In early Carboniferous time, the sands deposited in the eastern part of this mediterranean sea permitted the existence of only a sparse fauna, while in the region now known as the Mississippi Valley, great reefs of crinoids flourished. In mid-Carboniferous time, the interior sea extended to the foot of the Rocky Mountains, while the greater part of the region east of the present Mississippi River was converted into the fresh water morasses, in which the extensive coal beds of eastern North America were deposited. This condi¬ tion continued with slight changes through late

Carboniferous (Permian) time. At the same time western United States was the site of extensive enclosed seas, which under an arid climate gradually decreased in size, with the deposition of great beds of salt and gypsum. While this aridity existed in western United States and also in Germany, India, South Africa and Australia were colder than now and undergoing severe glaciation. The era was terminated by the great physiographic changes which accompanied the formation of the Ap¬ palachian Mountains and which has been called the Appalachian Revolution. This resulted in the permanent elevation of much of the North American continent. Marine deposits of the early Mesozoic are known only in the north¬ west, west and southwest. Later in Cretaceous time, the Great Plains region and the Atlantic border were resubmerged, but eastern North American remained continuously above water, with the exception of a slight submergence in the Hudson and Champlain valleys in late Pleis¬ tocene time.

Charles Laurence Dake, Associate Professor of Geology and Mineralogy, School of Mines and Metallurgy, University of Missouri.

PALERMO, pa-ler'm5, Italy (1) a seaport town, capital of Sicily, beautifully situated on the northern shore of the island on the Gulf of Palermo, surrounded by a fertile plain and partly enclosed by lofty hills. Its numerous spires, domes and towers give it a very imposing appearance when approached from the sea. Two main streets, the Via Vittorio Emmanuele and Via Macqueda, intersect the city at right angles to each other. Near the centre is an octagonal space, the Quattro Canti, lined with elegant buildings in different styles of Grecian architecture and adorned with numerous stat¬ ues. The two principal streets are opened into by a great number of others, mostly narrower and of an inferior description ; but all well paved with blocks of lava. There is now an ex¬ tensive system of electric tramways. Admirable places of resort are provided by the Marina and

the Flora — the former a superb terrace about 80 yards wide, stretching about a mile along the bay; the latter, commencing in the east where the terrace terminates in a magnificent public garden regularly and beautifully laid out, and adorned with statues, fountains and rustic tem¬ ples. Here is also a botanic garden of some ex¬ tent, and there are several other public gar¬ dens. The public edifices are nnmerous, but do not in general display much taste. The most important are the cathedral, the church of San Giuseppe, the church of San Salvatore, La Martorana, and other churches ; the royal pal¬ ace, finely situated and surrounded by beauti¬ ful gardens, a large and irregular pile of build¬ ings, among which the only great attractions are the chapel of King Roger (or Palatine Chapel), rich in mosaics, <(perhaps the most beautiful palace-chapel in the world, w and the observatory; the archiepiscopal palace; the national museum and picture-gallery; the communal library, with about 220,000 volumes ; the national library, with over 150,000 volumes; the university, at¬ tended by 1,200 students; the barracks, arsenal, courts of justice, theatres, hospitals and sev¬ eral literary and charitable endowments. Paler¬ mo has a good roadstead and harbor, which has

been recently improved, and a well-equipped shipbuilding yard and dry dock have been con¬ structed. The principal articles of export are sumach, wines, oranges and lemons, sulphur, tartar, olive-oil, citrate of lime, tomatoes, to¬ mato paste, asphalt, hides, dried vegetables, macaroni, *etc.* ; and among the imports are coal, grain, wood, petroleum, tobacco, iron and steel rails, sheets, bars, etc., cement, machinery, sul¬ phates, fish, *etc.* The total number of vessels that cleared from the port in 1900 was 3,732, with a tonnage of 1,677,234. The manufactures of the town include gloves, marble works, etc., and. there is a foundry. The fisheries on the coast are productive, and give employment to numerous hands. Palermo is the see of an archbishop, and the seat of a supreme court with jurisdiction over the whole island; of a criminal court for the province; of a commercial and several other inferior courts, and of several important public offices. Its foundation is at¬ tributed to the Phoenicians. From them it passed

to the Carthaginians, who made it the capital of their Sicilian possessions and the cen¬ tre of an external commerce. The Romans obtained possession of it in 254 b.c., made it a free town, and conferred upon it many impor¬ tant privileges, in consequence of which it in¬ creased rapidly and became very prosperous. After the fall of the Roman empire it remained, except for a brief vandal rule, a part of the Eastern empire, till in 835. the Saracens became its masters, and kept possession of it till 1071, when it was taken by Roger the Norman, who founded the kingdom of Sicily. Since then it has always continued to be the capital. It has repeatedly suffered from earthquakes. This and the other vicissitudes which it has undergone is probably the reason why so few remains to antiquity are to be found within it. Some, however, still exist in its environs, which, both on this account and their own intrinsic beauty, are in many respects more attractive than the town. During an insurrection which took place in January 1848, the town was bom¬ barded ; and Garibaldi seized it in 1860. Pop. about 325,000. (2) The province has an area

of 1,948 square miles. Its coast consists of a series of extensive bays and bold promontories. Its interior toward the south is traversed, east to west, by a branch of the Neptunian Moun¬ tains. The streams are numerous, but small. The soil is fertile. Pop. about 300,000.

PALES, pa'lez, in ancient Italy, a divinity who presided over fields and meadows, and was worshipped sometimes as a god, sometimes as a goddess, in which latter character Pales was identified with Vesta or Anna Perenna. The festival of Parilia or Palilia was celebrated 21 April, the anniversary of the founding of Rome, when milk and cakes of millet were offered. Shepherds begged forgiveness for any trespass their flocks might have 'made on sacred places, and prayers were made for the pros¬ perity of the flocks! Cognate with Pales are ˆpalatium,® a palace, and ((Palatinus,ˆ one of the seven hills of Rome, and this divinity, as protector of property and home, is among the earliest figures that occur in Roman mythology.

PALESTINE, also called THE HOLY LAND, CANAAN, JUDEA, and THE LAND OF ISRAEL, a classic region south¬ west of Syria. Its western shore forms the east¬

ward boundary of the Mediterranean Sea and its north, east and south boundaries, respec¬ tively, are the Mountains of Lebanon, the Arabian Desert and Arabia Petrsea. It is situ¬ ated between lat. 31° 30' and 33° 30' N. ; long. 34° 30' to 36° E. ; has a length north to south of about

110 miles, a breadth of 50 to 60 miles, and an area of about 10,000 square miles.

Topography and Physical Features. — The surface generally is mountainous, traversed by branches from the chain of Lebanon, one of which stretches south in a direction nearly parallel to the coast of the Mediterranean, form¬ ing the watershed between its basin and that of the Dead Sea; while another, turning more to the east, stretches along the left side of the valley of the Jordan. The mountains attain their greatest height, of about 9,100 feet, in Mount Hermon, where they first become de¬ tached from the principal chain. None of the other heights exceed 4,000 feet; but many are celebrated from the frequent mention made of them in the Bible, and from the events of which they have been the theatre. The most remark¬ able are Carmel, forming a promontory in the Mediterranean, on the southwest side of the Bay of Acre; Tabor, or the modern Jebel Tur, at the northeast extremity of the plain of Esdraelon ; Ebal and Gerizim, in the valley of Samaria; Gilead and Nebo, or Pisgah, on the east side of the Jordan; and Zion, Moriah, and the Mount of Olives, in and near Jerusalem.

Of limestone formation, the mountains abound in caves of all varieties of size and form, many of them of Scriptural importance. The earliest mention of a cave in Scripture is in the history of Lot (Gen. xix, 30). The next is at the death of Sarah, when Abraham bought the cave Machpelah for a burying-place. This is now contained within the limits of a mosque, at Hebron, and remains in all probability just as it was when the patriarchs were buried in it. The Moslems can give no real information re¬ garding it, for they will not enter it, dreading immediate death at the hand of Abraham's spirit, which they believe to reside in it. Caves are frequently mentioned in the books of Judges, Joshua and Samuel, but the only one specified is that of Adullam, which has been identified with the cave of Khureitun (the ancient Hareth), some five miles south of Bethlehem — a singular cave, or rather series of caves and chambers, extending for miles, to which the one entrance is an orifice not larger than a door, half-way down the almost perpendicular face of a precipice; this orifice is reached by a shelf or ledge of rock, along which one has to find the way cautiously to the cave. The interior is quite a labyrinth, with vaulted chambers re¬ markably dry and warm, but with no impure air. It could accommodate hundreds of men, all hidden in these far-extending chambers. There are caves at Deir-Dubban, not far from Khurei¬ tun, about half-way between Jerusalem and Eleutheropolis, but these do not correspond with the scenes in David's history; although these western ones are reputed to be David's cave, and the eastern (Khureitun), near Te-koah, Saul's caves or cave. That these huge caves

or grottoes at Deir-Dubban were used both for hiding-places and dwelling-places, both in Jewish and ‘Christian days, is quite evident; but whether this is the place of the Adullam

cave of David is not so plain. There were caves in Galilee also, The ((cotton cave,® or ((Kotton-Megharah,® under Jerusalem, is a wonderful cavity, extending under a large portion of the city. But though called a <(Megharah,® it is an old quarry, out of which Jerusalem was partly built, and therefore interesting, especially as the traces of the quarrymen are still visible in every recess.

Palestine has comparatively few plains, but has numerous valleys ; it is the country which Moses describes, (<a land of hills and valleys. The small plains are numerous, the large few; among them are the maritime plains of Phoenicia and Philitia, the river plain of Jordan, the in¬ land plain of Esdraelon, and the mountain plain of the Beka, between the two Lebanons. These are widely different from each other, though within a small territory. The sea plain from Gaza to Beirut are well peopled and tilled. Thei Jordan plain is nearly a_ waste of sand, that river making no further impression upon the levels on each side than merely to fringe itself for some 20 yards with verdure. The Esdraelon plain, or <(valley of Jezreel,® is a fine plain of considerable extent, fertile and well cultivated. In the district of El Huleh or ((the Waters of Merom® and in such lowlying districts as Merj-Sanur, between Samaria and Jenin, are marshes and at certain seasons wide tracts rendered almost impassable by the over¬ flow of streams. The heat during the greater part of the year, from April to November, dries up most of the marshes and scorches both hill and plain. In later ages this is more especially true, as formerly the extensive woods, or¬ chards, vineyards and olive-yards which clothed the country shut out the heat, cooled the soil, and retained the moisture.

Hydrography. — In Palestine from time im¬ memorial, wells and springs have been held in such veneration, that it is as much sacrilege to destroy a well as to defile a mosque or injure a tomb. The places

named from the En spring (or fountain) and the Beer (well), are very numerous. Among these are ((the Fountain of Two Calves,® En-Eglaim, near the Dead Sea; the «Fountain of Gardens,® En-gannim, of which name there were two cities, one in Judah and another in Issachar ; the <(Fountain of the Goat,® Engadi, now Ain Jiddi, on the shore of the Dead Sea, one of Judah's rocky springs; the <(Fountain of Sharpness,® or Swiftness, En-Haddah, one of the springs of Issachar' s plains; En-Rimmon, in the southern extremity of the land; the <(Fountain of the Fuller,® En-Rogel, the spring of Jerusalem, known in early ages, *etc.* Besides these there were many other foun¬ tains all over the land. There was Hagar's (<Fountain® or <(Well,® Beer-la-hai-roi, in the southern desert, near Beersheba; the (<Fountain in Jezreel,® by which Israel pitched in the battle between them and the Philistines ; and others. There are the ((wells® of the patriarchs in dif¬ ferent places — the Well of Abraham at Beer¬ sheba, now represented by two, still well filled and surrounded by large stone troughs ; the wells of Isaac, south of Gerar, Sitnah, Esek and Rehoboth, of which only the last can be said to have a representative, at Ruhaiben on the great Roman road; the Well of Jacob, dug out of a spur of Gerizim, and close by Joseph's tomb; the Well of Bethlehem, which David knew so well as no doubt the well of his shepherd-boy¬

hood ; the Well of Sirah near Hebron, where Abner was overtaken by Joabs messengers. There are a good many modern wells in use, which, though probably the remains of ancient ones, are unmentioned in Scripture. Few of these wells are properly kept, though none are gratuitously destroyed. Some have become quite unserviceable; and even Jacob's Well is in such a state of disrepair (the masonry in the upper part having fallen in) as to require almost a redigging before it can be of use. Elisha s Foun¬ tain still pours out its clear current though little care is apparently bestowed on it.

There is but one river worthy of the name in Palestine — the Jordan, one of the most tortuous of streams * always supplied with water, though often so considerablv beneath the verge of its banks as to be invisible from any distance. The Jordan originates in streams that come from Lebanon and Hermon, and unite in the Waters of Merom. It falls into the Dead Sea after a course of about 70 miles direct, or 200 including windings. Numerous streams find their way westward to the Mediterranean from Libanus and its prolongations or offshoots as far-as the Hills of Judah. Equally numerous streams flow eastward from the same range into the Huleh, Sea of Galilee, Dead Su-a and

Jordan. Antilibanus, sending its offshoots down the east of Jordan and forming the mountains of Golan, Gilead, Ammon and' Moab, is the watershed for a large tract of country between itself and the Ghor or Jordan Valley. Though the rivers are in general small, yet they are not mere summer brooks as many suppose. That but few of the innumerable wadys or watercourses are filled throughout the year is true ; but still there are several permanent streams which do good service in the districts through which they pass. Passing by what we may call (<Lebanon streams,® which are always vigorous, there is the Zerka, a few miles north of Caesarea; the Aujeh, a little north of Jaffa, and the Rubin, a little south of this last town ; and the Mukutta or Kishon (Kutta-Kishon) , which is sometimes, however, low. enough, so low that when it reaches the sea it is lost in the sands. None of these are navigable, but they are rivers all the year round, and wide enough to allow boats to ply on them for some little distance. There is a vast number of water¬ courses in every part of the land, which would make its irrigation minute and complete were the rain sufficient to fill these, or rather suffi¬ ciently regulated and distributed over the year to keep these always filled ; and were the land property covered and its soil protected by wood, so as to moderate the heat and prevent the ex¬ cessive evaporation. The words of Moses were true words when he called it <(a good, land, a land! of brooks of water, of fountains and depths that spring out of valleys and hills.® The whole. land bears marks of having been better watered than at present, and contains everywhere the remains of-artificial appliances, such as terraces, cisterns and wells, by which the rain was regulated and distributed.

The lakes of Palestine are three in number, Merom Tiberias and the Dead Sea, the first seven feet above, the last 1,250 below sea-level. For quiet beauty the Huleh, or <(Waters of Merom,® with the adjoining vale, are remark¬ able, and for subdued attractiveness the Sea of Tiberias ; but for brilliance there is nothing to

Scene on the Jordan River

W ff

*

■Pˆ-r*

‘*

5S*

gj£*vˆ ˆ

IwP’l

»~ #’ • Tha

p

Court of Antonio, Jerusalem

PALESTINE

199

ˆ01jnPared to the Dead Sea — the ancient Asphaltis. Whatever of tameness there may be about the former two, about this last all is grandeur, notwithstanding the aridity of its shores, and the discomforts of its exceptionally hot climate. The silvery sparkle of its waters arising from their saline and bituminous com¬ position gives a brightness to the scene which is enhanced, not neutralized, by the dark shadows of the Mountains of Moab. These lakes form three singular depressions or troughs, in the great natural groove or gorge extending from the Beka to the Arabah, about 200 miles. This extraordinary hollow, so far below sea-level, is kept in its present state mainly by its own heat. Were the climate to become temperate, the

Sea of Tiberias would rise greatly and transform the Jordan into a Rhine, in parts of the Ghor into a lake; the Dead Sea would swell up and overflow into the Arabah, producing changes in the whole of the southern region which it is impossible to calculate upon. The length of the Dead Sea is 45 miles ; its greatest breadth 12. The density of its waters varies between* 1,160 and 1,230 (pure water being 1,000). There are ancient shore-lines at a height of 1,200 feet on the surrounding hills.

Geology. — From the southern border of Palestine, where the hill-country of Judah be¬ gins, to the extreme north, there is almost un¬ varying limestone. In passing from Sardinia, Italy, Greece or Asia Minor there is an inter¬ esting resemblance, in color, feature and com¬ position, between the rocks of these regions and those of Syria. Syria is, as a whole, a rugged, hilly region composed of limestone of the Secondary period; a country seamed and torn by volcanic action from one end to an¬ other; long stripes of depression and ridges of upheaval running parallel ; the latter broken across and across into wide districts of table¬ land interspersed with hollows and valleys, with solitary hills or little groups of clustering peaks. The great masses of rock which con¬ stitute the mountains of Palestine and Lebanon are Jura limestone; compact, hard, not rich in fossils, and full of caverns and grottoes. This rock is everywhere the basis on which have been deposited in some parts extensive tracts of volcanic products ; as also chalk and chalky limestone, magnesian limestone (dolomite), sandstone, conglomerate, marl, *etc.* On the west of the Jordan and Arabah the chalk for¬ mation which prevails through the southern desert terminates with the desert; and the Jura limestone, beginning with the mountains south of Hebron, holds its course northward, form¬ ing the mass of the western hill-country of Carmel and of Lebanon. East of the Jordan and Arabah, where, around Petra, large masses of porphyry, sandstone and limestone lie in close proximity, the same Jura limestone extends northward through the Belkah and the moun¬ tains of Ajlun; and! is likewise the basis on which rest the vast volcanic tracts of Hauran, Jaulan and Lejah.

Flora and Fauna. — The flora of Palestine is large and varied; about 1,000 species have been noticed and the whole number is probably at least 2,000. Among the trees are the cedar, oak, ash, olive, palm, sycamore, oleander, wal¬ nut, *etc.* Wheat, barley and other grains are cultivated; the vine is almost neglected now,

save in the colonies, some of which have ‘had great success with the

orange crop.

The number of mammals inhabiting Pales¬ tine is large for the extent of the country, amounting to about 80 in number. Of the wild animals mentioned in the Bible the lion and the reem or unicorn, that is, the aurochs, are no longer found in Palestine. Among carnivorous animals are the wolf, the hyaena, the jackal, the leopard, on the sides of Carmel and Gilead or in the forests of Galilee; and the bear, in Hermon and Lebanon. The wild boar is common and much dreaded by the husbandmen on ac¬ count of the ravages it commits. Other mam¬ malia are the wild goat, the gazelle, the coney, hare, jerboa, rat, mouse, bat, *etc.* Of the birds of Palestine there are over 350 species; chief among them are the roller, bee-eater, hoopoe, Smyrna kingfisher, belted kingfisher, sun-bird, great shrike and bulbul. More noticeable than these brightly-clothed birds is the immense number and variety of the larger birds of prey — the vultures, eagles, falcons, griffons, kites, peregrines and buzzards, which abound in every part of the Holy Land, and are at first sight its ornithological characteristic. Reptiles are numerous. They include the land and the water tortoise, the crocodile (leviathan), the chameleon and a variety of lizards and serpents. Fishes are abundant in the Jordan and its affluents, and in the Sea of Galilee are found in immense shoals. The most numerous species are the barbel and the bream. Lower in the scale of animals are the scorpion, the locust, hornet, bee and grasshopper.

History.— The name Palestine, derived from the Hebrew Pelescheth, and meaning the land of the Philistines, occurs in this sense in sev¬ eral passages of the authorized version of the Bible, and in several others in the Hebrew, where it is translated Philistia. It is properly applicable only to the southwest-part of the country, stretching along the shores of the Mediterranean. It appears to have been first used in its more extended sense by Greek au¬ thors, and derived additional currency from its adoption by Josephus and Philo. The ancient name of the country was Canaan, which it evi¬ dently owed to the descent of its inhabitants from Canaan, the fourth son of Ham, and a grandson of Noah. When thus named, in the time of the patriarchs, it was parceled out among a number of independent tribes or na¬ tions ; the Kenites, Kenizzites and Kadmonites, on the east of the Jordan; the Hittites, Periz-zites, Jebusites and Amorites, in the hill-country of the south ; the Canaanites proper, in the centre, from the Jordan to the coast: the Gir-gashites, on the east shore of the Lake of Tiberias; the Hivites, in the north, among the ramifications of Lebanon ; the Philistines on the south, and the Phoenicians on the north coast. In the time of Moses the country east of the Jordan was conquered and divided amonˆ the tribes of Reuben and Gad and the half tribe of

Manasseh. Under Joshua the work of con¬ quest was carried on to the west of the Jordan: and the whole territory, though not to the ex¬ tent originally promised, allotted to the remain¬ ing half tribe of Manasseh and the other 10 tribes (1445 b.c.) ; the larger portion of the south falling to the tribes of Judah and Ben¬ jamin. Under Solomon the work of conquest appears to have been completed, and all the

land which was originally promised was in¬ cluded within the limits of his kingdom. Under his son Rehoboam the kingdom was rent in twain, and subdivided into the separate king¬ doms of Judah in the south and Israel in the north- (975 b.c.). The latter kingdom was often designated by the name of Samaria, its capital. The division of the country into tribes was com¬ pletely broken up by the Captivity, which car¬ ried away 10 of them to Assyria and supplied their place by a new colony; and by the subse¬ quent transportation of the remaining tribes of Judah and Benjamin to Babylon. (584 b.c.). After the destruction of the Babylonian Empire Palestine fell under the dominion first of the Persians and then of the Macedonians. . When Palestine became the cradle of Christianity with the birth of Jesus Christ, the Romans had* estab¬ lished their ascendency and divided the region into four provinces of Galilee m the north, Samaria, in the centre, Judea in the south and Perea, which included all the country east of the Jordan. Under Constantine Palestine, now regarded as the Holy Land, acquired new in¬ terest and recovered in some degree from the calamities by which it had been laid desolate ; and in 396* a.d.. on the division of the empire by Theodosius and the formation of two empires, a western and an eastern. Palestine became a province of the latter. This was its condition at the time when Islamism began to make its conquests. Palestine, unable to offer any resistance, soon fell a prey; and Omar, in 636, after taking possession of its capital, con¬ verted it into one of the provinces of his cal¬ iphate. The severities exercised toward the Christians having roused the indignation of Europe, gave rise to the Crusades, and Jerusa¬ lem became for a time the capital of a Chris¬ tian kingdom. Ultimately, however, Mohamme¬ danism prevailed, and Palestine sunk into a degraded

state; from which it is only now re¬ covering. It is only within the latter half* of the 19th century that the exploration of Pales¬ tine was first carried out systematically. The most valuable results have been those achieved under the direction of the (<Palestine Explora¬ tion Fund,® a society organized in 1865 for the • purpose of making an exhaustive exploration and an exact survey of the Holy Land. The triangulation of western Palestine was begun in 1871 and finished in 1877. A large and de¬ tailed map of the country has been published and an* immense mass of valuable information regarding topography, natural history, its inter¬ esting ruins, archaeological remains and holy places, etc., accumulated. A German society for the exploration of Palestine has existed since 1877. The present population of the coun¬ try is estimated at 650,000, the Arab element be¬ ing the prevailing one, and the Arabic lan¬ guage generally in use; fully 125,000 being Jews, whose numbers have increased through the Zionist movement. (See Zionism). The peo¬ ple consist partly of the fellahin or settled culti¬ vators, artisans, etc., partly of the nomad Bedouin, who live bv rearing cattle or by less reputable means. The country exports some grain, olive-oil, oranges, *etc.* Jaffa, Haifa and Acre are the chief ports, Jerusalem and Nablus the largest towns. Chapels and' monasteries be¬ longing to Greek Orthodox, Roman Catholic and various Protestant churches abound

throughout the land, and especially on and near the sites where the principal events connected with New Testament history were enacted. A feature of interest is the great amount of property acquired by the sultan since 1885 in the Jordan Valley and other places, and ad¬ ministered on progressive agricultural princi¬ ples.

The Nineteenth Century and After. — To

get a comprehensive outlook on affairs in Pales¬ tine during this period and to gauge the senti¬ ment of its population to-day and of the scat¬ tered children of Israel who look upon it as their national home, it is necessary to glance backward through the ages to the year 134, when Hadrian took Jerusalem, suppressed Bar Cochba's revolt in blood and expelled all Jews from Judaea, and trace the many, if feeble efforts of the oppressed people to regain their ancient heritage. A few from time to time migrated to the Holy Land, hut the country offered few attractions for traders and artisans. In the 13th and 14th centuries the Mongol and Tartar invasions wrought havoc in the Near East, and Palestine was laid waste with such barbaric thoroughness that it never entirely recovered. The early Turkish sultans were well disposed

toward the Jews, as the caliphs had been before them, and granted asylum to the refugees from the Spanish Inquisition. Later sultans were not inimical, even if not friendly disposed, and little waves of immi¬ gration from Poland, Russia, Austria and Mol¬ davia arrived at intervals. Napoleon, with his far-seeing instinct, proposed to found a Jewish state in Palestine during', the siege of Acre, but his proposal was coldly received in Jewry and was abandoned. A few thousand Jews, vir¬ tually all immigrants or the descendants of immigrants, eked out a wretched existence in the decayed towns of Palestine. They were supported to a large extent by the ((Chalukah,® or charitable funds to which the Jews of Eu¬ rope contributed, nominally for the support of poor scholars studying in the Holy Places. The revival of Palestine as a Jewish land may be said to date from about 1840, when Mehemet Aii's claim to Syria directed attention to that part of the Turkish dominions. Lord Palmerston, who had saved the Sultan from his Egyptian vassal, compelled the Turks to protect the Jews from the Druses and the Syrians, and instructed the British consul at Jerusalem to watch over the interests of all Jews. The first Anglican-bishop of Jerusalem, appointed in 1841. was a converted Jew. At the same time Sir Moses Montefiore and M. Cremieux, in an unofficial Jewish mission, re¬ awakened the interest of their coreligionists in Palestine as a country to which the persecuted Jews might go. Several small colonies were actually founded, and the Jewish population of the towns began to increase rapidly. The Jews of western Europe and America took little interest in the subject until it was forced upon them by the Russian ˆpogroms® in 1881— 82. Many of the refugees went to the Holy Land, and with help from the West, formed the Jewish colonies which, until the outbreak of the War of 1914, were prosperous. The political side of the movement is generally known under the name of Zionism (q.v.). The settlers suffered by the fall of Abdul Hamid,

lor the Young Turks made it clear from the outset that they would abolish all special privi¬ leges to alien races, and would compel, for example, Christians and Jews to serve in the army. At the outbreak of

the war in 1914 there were 125,000 Jews in Palestine, half of whom lived in Jerusalem. All that was needed to assure the growth of Palestine was an honest and benevolent administration, but this the Young Turks could not or would not provide. The course of the war, however, has consider¬ ably altered the prospects of Palestine. The British Palestine campaign was prosecuted with great vigor in the closing months of 1917 under General Allenby. On 31 October Beersheba was captured and Gaza was reached on 7 No¬ vember. The next part of the advance was comparatively simple across the plain of Philistia. The junction of the railway between Jeru¬ salem and Damascus was seized, and Joppa was taken on 17 November. Very difficult country was entered, however, when the British troops climbed into the limestone hills of Judaea. Turkish attacks were incessant; Allenby at¬ tacked the Turks northwest of Jerusalem so hotly that they were obliged to draw reinforce¬ ments from their lines south of Jerusalem. This made the road from Beersheba, south of Jerusalem, much easier. On 7 December Allen¬ by, again driving from the south, took Hebron, and moved swiftly on Bethlehem, occupying the Jericho road east of Jerusalem. Simultane¬ ously the troops to the northwest virtually joined hands with this force and reached the Schechem road, which runs out of Jerusalem to the north. Jerusalem was completely iso¬ lated and the surrender was made without a single shot having been fired into the city, or even into its outskirts. The capture of the capital thus effected, the troops gradually pushed northward, relieving the country, it is to be hoped for all time, of the Turkish usurper. The British occupation means that Moslem, Jew and Christian will receive impartial justice in a land sacred to all. Immediately the pro¬ posal for the establishment of a Jewish state in Palestine was touted everywhere, meeting with general favor among the several sections of Jewry. The British government, after a long and careful examination of the scheme, promised to use their best endeavors to carry it out. A large and thriving Jewish settlement in Palestine, under the supervision of Great Britain, or her Allies, would make for prog¬ ress in the Near East and would thus accord with British policy. It would serve also as a rallying-point for Jews all over the world, and it would confer a benefit also on the Chris¬ tian and the Moslem worlds, which are equally interested in the Holy Land and its undying religious memories.

Roads and Railways. — The Jaffa-Jerusalem Railway started in 1892 and was reconstructed two years later. Traffic has materially im¬ proved in consequence. The gross receipts rose from 519,409 francs in 1895 to 1,388,755 francs in 1911. Two tunnel sections are required to complete the Bagdad line in Asia Minor, bring¬ ing Syria through

Aleppo in direct communi¬ cation with Europe, although the sea route from Marseilles, Naples and Trieste is shorter and cheaper for passenger traffic. The main roads in Syria and Palestine, . according to the statistics of Dr, Arthur Ruppin in the summer

of 1916, have been built under private conces¬ sions or by the state, which employs forced labor, so that the war found the roads poorly built and very backward. Military require¬ ments, however, have repaired old roads and built new ones — five in number. The coast road has numerous breaks. With the abolition of personal service and larger outlays for main¬ tenance, a distinct improvement will follow, although much depends on the issue of the war.

Recent Internal Progress. — The opening.of a modern school in Jerusalem in 1856 by Elise von Herz-Lamel of Vienna, the founding in 1870 of the Agricultural School at Jaffa by the Alliance Israelite Universelle, and the attempt in 1878, which failed, to establish an agricul¬ tural settlement at Petah Tikwah in Judea by Jews from Jerusalem, were the beginnings of a new era for Palestine, which led to more extended colonization in the ’80s after the Rus¬ sian pogroms and after 1897 when the Zionist movement was organized by Herzl at Basle. The promotion of agriculture and handicraft has been affected naturally by the war, but the upward movement continues, with growth in population and resources to which all parts of the Jewish world contribute, chiefly, of course, Russian Jewry at home or in lands to which it may have emigrated. Without accepting the preferred statement of enthusiasts, there can be no doubt that under efficient administration and trained leaders, with diversified crops, the avoidance of needless charity to individuals, and through knowledge of land 4aws, rural Palestine may witness a new era. The salu¬ tary influence of the Anglo-Palestine Bank has already been proved, and the Jewish labor problem will present fewer difficulties in time. Farm schools, reafforestation stations, an agri¬ cultural college and an agricultural station, with farms and nursery, have all come into life. The urban development, with 85,000 out of the 100,000 Jews living in 12 cities, offers as serious problems but these will be overcome if pres¬ ent plans are realized. The Tel-Abib Jewish suburb shut off from traffic from Friday sun¬ down to Saturday sundown, with its streets lined with trees, its ample water supply, square-set concrete houses, surrounded by gardens, and 20 minutes by bus from Jaffa, which has there many of its public buildings, is an example of what can be done on modern lines in education, trade and industry. Miss Henrietta Szold has written at length on this subject in the Amer¬ ican Jewish Year

Book for 1915-16) (Phila¬ delphia Jewish Publication Society).

Consult Baldensperger, P. T., (The Immov¬ able East Studies of the People and Customs of Palestine* (London 1913) ; Huntirigton, H., Palestine and its Transformation (London 1911); Leach, C., (The Romance of the Holy Land*. (London 1911) ; Lees, G. R., (Village Life in Palestine) (London 1905) ; Sidebo-tham, H., (England and Palestine-* (London

1918).

See Bethlehem; Crusades; Jerusalem; Jews; Nazareth; other localities mentioned; and for Bibliography, Syria; Palestine Ex¬ ploration Fund.

PALESTINE, Tex., city, county-seat of Anderson County; on the International and Great Northern and the Texas State railroads, about 130 miles north of Houston. It was set-

tied in 1846, and was chartered as a city in 1846, receiving a new charter in 1905. It is in an agricultural region in which cotton is one of the principal products. In the vicinity are salt mines and deposits of iron ore. The chief manufactures are cotton products, iron prod¬ ucts and packed-beef. There is considerable trade in grain, cotton, fruit and vegetables. The prominent buildings are the railroad offices and shops, the Y. M. C. A. building, .the churches and schools. A point of interest is Fort Hous¬ ton, a stockade for protection against the In¬ dians in the early days. The government has been of the commission form since 1909. Pop.

(1920) 11,039.

PALESTINE EXPLORATION FUND,

founded 1864, and incorporated as a society in London, 22 June 1865, for the purpose of sys¬ tematic and accurate investigation of the Holy Land for biblical verification and illustration. Work began in 1865-66 to determine sites for investigation and to collect information ; it was continued from 1867-70 to verify the holy sites; from 1872-77 to survey western Palestine ; 1873-74 for archaeological research ; 1876 to explore the desert of the Tih ; 1881 for the survey of eastern Palestine. In 1881 an ordnance survey map of the country was published with descrip¬ tive volumes on the topography, physiog¬ raphy, archaeology, and other details. Not¬ withstanding opposition from Turkish authori¬ ties in 1882, since then the Dead Sea region and the Wady Arabah have been surveyed; the buried cities in the Tell el Hesy mound have been excavated; also sections of the south and southwestern portion of Jerusalem; and exca¬ vations have been carried on at Gath, Gezer, Beth-Shemesh and other localities. The sur¬ vey of southern Palestine began in 1914 under Captain Newcombe and Messrs. Wooley and Lawrence; operations were naturally sus¬ pended during the World War 1914-18, and the fighting in this region which ended in the oc¬ cupation of Palestine by the British. A Quarterly Statement since 1869 and an Annual since 1911 are issued by the society, which also maintains an interesting ˆPalestinian Museum® at its headquarters in London.

Following the British example German, Aus¬ trian, French and American explorations have been carried on. The ((Deutscher Palastina-Verein,® founded in 1878, made notable sur¬ veys east of the Jordan and excavations at Megiddo ; Austrian work was accomplished at Jericho and Taanach; French work in Petra, Moab, Edom and eastern Palestine. An Amer¬ ican archaeological educational institution is maintained at Jerusalem where also is estab¬ lished the well-known Dominican biblical and archaeological school.

Among important publications issued by the British Palestine Exploration Fund are (Survey of Western Palestine: Memoirs) (7 vols., 1881-86) ; Conder, (Survey of Eastern Palestine) (1889) ; Clermont-Ganneau, Archaeo¬ logical Researches5 (2 vols., 1896, 1899) ; Bliss and Dickie, (Excavations, 1894—97 } (1898) ;

Bliss and Macalister, (Excavations in Palestine, 1898-1900) (1902) ; Peters and Thiersch,

(Painted Tom'bs in the Necropolis of Marissa) (1905) ; Macalister, (The Excavation of Gezer5 (3 vols., 1912). Consult also Besant, W., ed., (Thirty Years' Work in the Holy Land,5 an

official summary of the society's work (London 1895) ; Conder, ˆPalestine5 (in (The World s Great Explorers and Explorations,5 London 1889). For French work consult Revue biblique from 1892; Revue de V Orient La > tin from 1893; for German work, Zeitschrift des deutschen Paldstina-V ereins from 1878.

PALESTINE PILGRIMS' TEXT SO¬ CIETY, a society founded in London in the early '80s with the object of collecting, trans¬ lating and publishing the early .descriptions of Palestine written by pilgrims between the early Christian centuries and the 16th. The originals were written in Arabic, Hebrew, Greek, Latin, Old French, German and Russian during a period covering about 13 centuries. Among the most celebrated of these are Saint Jerome's (Pilgrimage of the Holy Paula5 (382 a.d.) and Bohaedden's (Life of Saladin5 (1145-1232). Within 12 years after its foundation the society had completed its original program, having published 14 volumes and a general index (1887-97). The handling of the volumes has been turned over to the Palestine Exploration Fund.

PALESTRINA, pa-les-tre'na, Giovanni Pierluigi, (or Pietro Aloisio), Da, Italian

composer and reformer of ecclesiastical music: b. Palestrina (ancient Prseneste) 1526 (Haber), or 1514 (others) ; d. 2 Feb. 1594. He probably studied in the school of music of Gaudio Mell, and in 1551 was appointed by Pope Julius III, master of a choir of boys in the Julian Chapel, Rome, and was the first to receive the title of chapel-master. In 1554 he published a collection of masses dedi¬ cated to Pope Julius, who admitted him into the college of choristers of the Pope's Chapel. He was soon appointed chapel-master of Saint John Lateran, and six years later to the same post in Santa Maria Maggiore, in which he continued till 1571. About 1562 the Council of Trent, on reassembling, had taken up, among other subjects, the abuses which had gradually sprung up in church music and which had grown to an intolerable degree. Not only were masses founded on profane airs, often of the most frivolous kind, but the composers of the day, as their manuscripts show, not con¬ tent with working upon popular airs which suggested the most unbecoming associations, actually imported the words of the profane melodies into their scores. The work of reform was entrusted to the Pope Pius IV, who ap¬ pointed a commission to inquire into and regu¬ late the matter. As there was no music in existence such as the commission required, how¬ ever, and Palestrina, almost the only composer from whose works some

illustrative fragments could be drawn, was assigned the task of show¬ ing that the recommendations of the commis¬ sion were as consistent with art as with reli¬ gious usage.* In fulfilment of this important task he composed three masses for six voices, which by their artistic beauty and profound devotional feeling at once settled the question beyond1 dispute. One of them in particular, the (Missa Papse Marcelli,5 so called in gratitude to his patron, at once established for him a position in the highest rank of musical genius, a place to which the subsequent advance of musical science has only confirmed his claim. In reward for this great achievement of his,

Palest i ina was appointed in 1571 chapel-master of the Capella Giulia and musical director to the Congregation of the Oratory of Philip Neri. He also became teacher of the musical school founded by Nanini. He likewise under¬ took the revision of the chants of the Missal and the Breviary. A complete edition of his works was published by Breitkopf and Hartel (1885-93). The music of Palestrina is written in mediaeval Church modes and is lacking in emotional expression. It is, however, noble and majestic and well suited for the expression of religious sentiment. Consult Cametti, <Cenni Biografki di Giovanni Pierluigi da Palestrina) (1895), and the older work of Baini (1828).

PALESTRINA, Italy, a town in the prov¬ ince of and 23 miles east-southeast of Rome. It stands upon the slope of a hill and commands a magnificent view. It was a place of Greek origin, and had become important long before Rome existed. Known under the Roman Em¬ pire as Praeneste it attained great magnificence, and was often the residence of the emperors. It has numerous ancient remains, particularly those of an immense Temple of Fortune, but the. only modern building of note is the Barberini Palace. Pop. 7,000.

PALEY, pa'll, William, English divine and philosopher: b. Peterborough, July 1743; d. Bishop-Wearmouth, 25 May 1805. He was educated at Cambridge, and in 1766 became a fellow and tutor of Christ's College. In 1767 he was ordained a priest. He held the tutor¬ ship of his college for about 10 years, and his lectures during this

period, which were highly successful, contained the elements of his future works. In 1776 he married and gave up his fellowship. Law, bishop of Carlisle, had al¬ ready presented him with the living of Musgrave in Westmoreland, to which he retired; and he afterward received two other small liv¬ ings. In 1780 he became prebendary of Car¬ lisle, and in 1785 chancellor of the diocese. In 1794 he was made prebendary of Saint Paul's, and in 1795 sub-dean of Lincoln. His principal works are (The Principle of Moral and Politi¬ cal Philosophy) (1785) ; (Horae Paulinae> (1790) ; (View of the Evidences of Christianity) (1794); (Natural Theology, or Eviden¬ ces of the Existence and Attributes of the Deity collected from the Appearances of Na¬ ture } (1802). As a writer Paley was distin¬ guished by clearness and cogency of reasoning, force of illustration, and lucidity of arrange¬ ment. He had little claim to originality, and acknowledged in a general way his indebtedness to others and particularly to Tucker; but what he borrowed he generally set in a clearer light, and developed with the practical sagacity and strong common-sense which characterize the best English writers. In his (Moral and Political Philosophy) he follows the principles of Locke. He rejected the theory of a moral sense invented by Hutcheson to save the morality of the school of Locke, and founded his system purely on utilitarianism. His views may be summed up in his own words : Christian virtue is <(the do¬ ing good to mankind, in obedience to the will of God, and for the sake of everlasting happi¬ ness.)} The idea of the (Horae Paulinae,* long considered his most original work, is said to have been suggested by Doddridge. The Evi¬ dences of Christianity' is mainly founded on

Lardner's (Credibility of the Gospel History,' while Butler and others contributed to its com¬ pleteness, and much of the argument of his (Natural Theology' has been shown to be taken, without direct acknowledgment, from a work of Bernard Nieuwentyt, a Dutch philosopher of the previous century (1654—1718), on the Eight Use of Contemplating the Works of the Creator,' an English translation of which appeared in 1718-19. The celebrated illustra¬ tion of the watch is taken almost literally from Nieuwentyt. However, Paley made no claim for originality in anything but the presentation of his views, so he cannot be charged with plagiarism. His Evidences' and (Natural The¬ ology } are devoted to an attempt to prove the existence of God by the argument from design. Consult Albee, E., (A history of English utili¬ tarianism J (New York 1902) ; biographies of Paley by Meadley (1809); Edmund Paley (1824) ; and Lynam (1825); Stephen, <History of English Thought in the 18th Century' (New York 1881).

PALFREY, pal'fri, Francis Winthrop,

American lawyer and soldier, son of J. G. Pal¬ frey (q.v.) : b. Boston, Mass., 11 April 1831; d. there, 5 Dec. 1889. He was graduated from Harvard in 1851, was commissioned a lieuten¬ ant-colonel in the Civil War and served with gallantry. He resigned in 1863 owing to a severe wound and in 1865 was brevetted briga¬ dier-general of volunteers. From 1872 he was register in bankruptcy. He wrote (A Memoir of William F. Bartlett' (1879) ; (Antietam and Fredericksburg' (in ˆCampaigns of the Civil War' series 1882), *etc.*

PALFREY, John Gorham, American his¬ torian and Unitarian clergyman : b. Boston, Mass., 2 May 1796; d. Cambridge, Mass., 26 April 1881. He was graduated from Harvard LYiiversity in 1815, studied theology and in 1818 accepted the pastorate of the Brattle Street Congregational-Unitarian Church, Boston, suc¬ ceeding Edward Everett. He resigned in 1830 to accept the chair of sacred literature at Har¬ vard where he remained until 1839, during which period he was dean of the faculty and one of the three preachers at the university chapel. In 1835-43 he was editor of the North American Review and early allied himself with the anti-slavery movement; he delivered a course of lectures at Lowell Institute, Boston, in 1839 and in 1842, and in the latter year was elected to the Massachusetts legislature where he served until 1843. In 1844-48 he was secre¬ tary of the commonwealth of Massachusetts, and in 1847-49 served in Congress; from 1861-67 was postmaster at Boston and subsequently acted as United States delegate to the Anti¬ slavery Congress m Paris. He wrote much and forcibly in opposition to the slave power, was an editor of the Commonwealth in 1851 and contributed to the Boston Whig a series of articles, (The Progress of the Slave Power,' which attracted much attention. He allied him¬ self with the Free-soil party and was their candidate for governor in 1851. Among his publications are Evidences of Christianity' (1843) ; (The Relation Between Judaism and Christianity' (1854) ; (A History of New Eng¬ land from the Discovery by Europeans to the Revolution of the 17th Century' (1866), *etc.* The last is his greatest work and a supplemen-204

tary volume was added by his son F. W. Pal¬ frey (q.v.), (The History of New England from the Revolution of the 17th Century to the

Revolution of the 18th Century 5 (1890).

PALGHAT, pal-gat', India, town in Mala¬ bar district, Madras, 74 miles east of Beypur, and a station on the Madras Railway. It does a flourishing business with the western coast, has a Swiss Protestant missionary station, li¬ braries, reading-rooms, schools and Victoria Jubilee College. Captured by the English in 1768 it served as a base of operations against Tippoo Sahib. Pop. about 50,000.

PALGRAVE, pal'grav, Sir Francis, Eng¬ lish historian: b. London, July 1788; d. Hamp¬ stead, 6 July 1861. He was son of a Jewish stockbroker ; was carefully educated at home ; wrote a French version of the Homeric (Batra-chomyomachia5 at eight ; studied law ; was mar¬ ried and became a Christian in 1823, when he changed his name from Cohen to Palgrave, his mother's maiden name. He practised prin¬ cipally in pedigree cases, devoting himself to antiquarian studies ; contributed largely to the Quarterly and Edinburgh reviews ; edited for the Crown Parliamentary Writs,5 (Rotuli Cu¬ riae Regis, 5 (Kalendars of the Treasury of the Exchequer, > and (Documents and Records Illus¬ trating the History of Scotland5 ; and wrote (History of England5 (1831, only one volume), (The Rise and Progress of the English Com¬ monwealth5 (1832) ; (Truths and Fictions of the Middle Ages: the Merchant and the Friar5 (1837) ; (The Lord and the Vassal5 (1844), and (The History of Normandy and England5 (1851-64). He was knighted in 1832. His work, though faulty in some details, did much to revive popular and critical interest in the Middle Ages.

PALGRAVE, Francis Turner, English poet and critic, son of Sir Francis Palgrave (q.v.) : b. Great Yarmouth, 28 Sept. 1824; d. 24 Oct. 1897. He was educated at Charterhouse and Oxford, becoming fellow of Exeter College in 1846. He was employed in the education office after acting as Gladstone's private secretary for a time, and 1850-55 was vice-principal of Kneller Hall, a normal college at Twickenham. He became a friend of Tennyson with whom he passed many summers in Europe, and in 1884 resigned from the education office, in which he had risen to the post of assistant secretary. In the following year he succeeded his old friend John Campbell Shairp as professor of poetry at Oxford. He was a man of remarkable sweetness of character, sensitive and cultured; his book, (The Passionate Pilgrim5 (1858), is a spiritual autobiography, which also gives some light on the facts of his life. He is best known as the critical editor of (The Golden Treasury5 of English lyrics (1861; 2d series 1896), the first volume of which ranks as a classic anthol¬ ogy. He edited several other volumes of selec¬ tions, from Shakespeare (1865), of hymns (1867), of (Stories for Children5 (1868), of lyrics (1871), from Herrick (1877), from

Tennyson (1885), etc., and wrote (Visions of England5 (1881), and (Amenophis5 (1892).

PALGRAVE, William Gifford, English diplomat and Orientalist, son of Sir Francis Palgrave (q.v.): b. Westminster, 24 Jan. 1826; d. Montevideo, 30 Sept, 1888. He was edu¬

cated at Oxford; went to India immediately after graduation; and entered the Bombay na¬ tive infantry, which he soon left to become a member of the Society of Jesus and to under¬ take missionary work in southern India. In 1853 he went to Syria as a Jesuit missionary. He narrowly escaped death in the Damascus massacre of June 1861, being saved only by his perfect coolness and his wonderful knowledge of native dialects and customs. In England, Ireland and France he attempted to rouse in¬ dignation at the Syrian massacres. Napoleon III became interested in him, and in 1862 sent him across central Arabia to learn the feeling of the Arabs toward France, — an adventurous journey described in Palgrave's (Narrative of a Year's Journey through Central and Eastern Arabia5 (1865). He decided that there was no chance for Christian missions in Arabia, left (with the consent of his superiors) the Society of Jesus and entered the English diplomatic service. He was sent to Abyssinia in 1865, was British consul in Trebizond 1867, in Saint Thomas 1873, in Manila 1876, in Bulgaria 1878, and in Siam 1879, and in 1884 became minister to Uruguay. He wrote (Herman Agha,5 an Eastern romance (1872) ; (Essays on Eastern Questions5 (1872); (Ulysses: Scenes and Stud¬ ies in Many Lands5 (1887), and (A Vision of Life5 (1891), a mystical poem, published post¬ humously.

PALI LANGUAGE AND LITERATURE.

— The Pali is the tongue used in intercourse between the people of culture in the north of India for about 1,000 years from b.c. 700 on. It was owing to this medium of mental inter¬ change that such far-reaching reform move¬ ments as Buddhism and Jainism became pos¬ sible at all in the then totally disrupted condi¬ tion of the country as a whole. Pali is the idiom employed in all the earliest inscriptions in India, and had great influence in further developing the languages spoken in India. The canonical books of early Buddhism were written in Pali, about b.c. 450-250, and in the commen¬ taries on them. In these ancient writings the text itself is referred to as Pali. The etymo¬ logical derivation of this word seems plain. It means <(rule, canon, a series of canons.55 Pali, in fact, was generally used by the Buddhists

for the space of more than 1,000 years, and is still so used for sacred purposes in Siam, Ceylon and Burma. The first Pali book published by an Englishman was (Maha Vamsa of Ceylon,5 by George Tumour in 1837, he being then colo¬ nial secretary in Ceylon. An anthology of canonical verses, edited by Prof. Fausboll in 1855, also appeared. A very good dictionary of Pali, by R. C. Childers (1872— 75) was pub¬ lished. In 1882 the Pali Text Society under¬ took the collection and revised publications of the canonical texts.

There were two underlying causes which made Pali one of the great literary vehicles of the world. The political cause was the establishment of the great state of Kosala and Magadha, right in the heart of the settled Aryan part of India, along about b.c. 650, lead¬ ing irresistibly to a new standard speech, in¬ stead of the hitherto scattered dialects of the group of small commonwealths that had used indiscriminately vernaculars that bore to Vedic Sanskrit about the same relation as did the

different forms of speech in Italy to the Roman one, the Latin. When, therefore, Pali was adopted at the court of Kosala, at Savatthi, this fact led to a crystallization and concentration of language for that whole region (about the size of England and Scotland combined) and the surrounding country. And when Gautama Buddha (q.v.), himself a native of Kosala, de¬ cided on employing Pali in his teaching and propaganda work, there was made as important a step forward in the direction of literary unity as was the case when Luthers translation of the Bible in the Middle High German of his time inevitably helped that dialect to the su¬ premacy it has enjoyed in Germany ever since. Later, too, Buddha's disciples likewise compiled the scriptures of their new creed in Pali, and this form of the native idioms thus became paramount for a long time.

James Prinsep devoted his rare genius to the decipherment of the Pali inscriptions of northern India, notably those of King Asoka. It was largely due to his labors that Pali be¬ came generally recognized by Western science as the literary tongue par excellence of India. How

Pali, however, first originated is still an unsolved riddle. No pre-Buddhistic documents couched in it have so far been discovered.

Professor Franke indeed has shown in his admirable researches and acute deductions that Pali was a form of Sanskrit retaining much of the earlier forms and grammatical intrica¬ cies of Sanskrit which were lost in the later development of that tongue. He also has demonstrated that the type of Pali employed in the first Buddhistic writings was that of the Avanti district and of its capital, Ujjeni, a celebrated seat of pre-Buddhistic civilization. Mahinda, the disciple who took the Buddhistic texts to Ceylon, was a native of the Avanti country and presumably taught in Pali. The earliest canonical texts collected so far may be divided into three classes, or prithakas (liter¬ ally, “baskets®), namely, the Suttas (doctrine), the Vinaya (rules), and the Abhidamma (analytical exercises). Most of the earlier Pali writings of the order have come down to us in about the same shape in which they were resolved upon and later promulgated by the Council of Vesali, a century after Buddha’s death. It is pretty evident that some of these early books were lost in India, however.

Of other literary works in Pali, subsequent to the Buddha canon, three only seem to have survived. These are the (Melindha-penha,) edited by V. Trenckner and translated by Rhys Davids under the caption of (Questions of King Milinda,* a charmine book, a religious romance; then the (Netti PakaranaB edited by E. Hardy, and the ‘Petaka UpadesaP There are, how¬ ever, still extant in Burma a number of other Pali books by unknown authors. In fact, Burma seems to be a treasuretrove in Pali, as yet quite insufficiently explored. In its many Buddhistic convents there, it is known in a general way, there are hidden away rare manu¬ scripts in Pali. It is also surmised that Tibet, the west of China adjoining and, possibly, Japan may also hold surprises of the kind in store for the scientific world.

Bibliography. — Bode, Dr. Mabel, ‘Sasana-vamsa> (London 1897) ; Davids, R., ‘Buddhism) (ib. 1896) ; (Buddhist Psychology) (ib.

1900) ; ‘Dialogues of the Buddha) (Oxford 1899) ; ‘Buddhist India) (London 1903) ; ‘American Lectures) (3d ed., ib. 1908) ; Faus-bdll, V., <The Jataka> (7 vols., ib. 1877-1897) ; Forchhammer, E., ‘Jardine’s Prize Essay) (Rangoon 1885) ; Franke, O., ‘Pali und San¬ skrit J (Strassburg 1902) ; Geiger, W., ‘Mahavamsa und Dipavamsa) (Leipzig 1905) ; Muller, M., and Fausboll, V., ‘Dhammapada and Sutta Nipata) (Oxford 1881) ; Neumann, K. E., ‘Reden des Gotama Buddha* (3 vols.

Leipzig 1896-98) ; (Lieder der Monche und Nonnen) (Berlin 1899) ; Oldenberg, H., (The Vinaya Pitakana* (5 vols. London 1879-83) ; (The Dipavamsa* (ib. 1879) ; Senart, M. E., (In¬ scriptions de piyadasP (Paris 1881-86) ; Trenck¬ ner, V., ‘Milinda* (London 1880) ; Tumour, Geo., (The Mahavamsa) (Colombo 1837) ; Warren, H. C., ‘Buddhism in Translations * (Cambridge, Mass., 1896) ; Windisch, E., ‘Mara und Buddha) (Leipzig 1895) ; ‘Buddhas Ge-burt> (ib. 1908).

Wolf von Schierbrand, Author of ‘ America, Asia and the Pacific

(Germany : the Welding of a World Power’* ;

etc.

PALIMPSEST (Greek palin, back, again, psestos, rubbed), a written page prepared by erasure for being filled with new matter. Both the Greeks and Romans erased manuscripts for the purpose of again using the parchment. Cicero banters his friend the lawyer Trebatius upon his economy in using palimpsests in his correspondence, and expresses the hope that it is his own consultations and not Cicero’s letters that he erases. No ancient palimpsests have come down to us. Probably the use of them by the Greeks and Romans was attended with no disadvantage to literature. When, however, the Greek and Roman commonwealths had been overthrown, and almost all the ancient manu¬ scripts preserved in Europe were in the mon¬ asteries, the use of palimpsests began to pre¬ vail in the Middle Ages. It is still a matter of controversy whether literature has gained or suffered by the practice. On the one hand, it is held that but for the value of their material, the scraps of ancient manuscripts which have come down to us in the form of palimpsests would have been lost. On the other, it is be¬ lieved that valuable manuscripts have in this way been ruthlessly destroyed.

It was in the 7th century, when Caliph Omar had cut off the supply of papyrus furnished by Egypt, that a great deficiency of parchment was felt. This deficiency continued until the inven¬ tion of paper. The use of palimpsests increased until the 11th century, when it reached its height. Some declare that nearly the whole of ancient literature was thus lost in the 8th cen¬ tury. From the time of the Renaissance this practice was discountenanced; it was forbidden by edicts, but it did not entirely cease until the introduction of printing. In the East the use of palimpsests began much later, and never became so general as in the West. The scarcity of parchment was increased by the demand for legal documents. The monasteries of Bobbio, Fulda, Saint Gall and Mainz were among the most extensive manufacturers of palimpsests.

That which replaced the ancient manuscripts was writing of an ecclesiastical character, lives of the saints and copies of the church services,

At the Renaissance attempts were made to decipher the ancient and underlying writing on palimpsests, but it was not till the 18th century that any progress was made. Knittel (1701) deciphered fragments of a Bible of Ulphilas, and Bruno discovered some entirely new frag¬ ments of Livy and Cicero. Niebuhr and otheis made subsequent discoveries, and the subject was taken up systematically and pursued with great success by Angelo Mai (q.v.), librarian successively of the Ambrosian and Vatican liThe processes employed in deciphering palimpsests vary according to the nature of the manuscripts. Those which have been scraped and rubbed with pumice-stone and afterward bleached are nearly indecipherable. Those which have been merely washed with lime-water and dried are revived by chemical processes. V anous recipes which have been found successful are used successively till the right one is found. The result of the researches-made is on the whole disappointing, because the monks only made use of imperfect copies and fragments of ancient writings for their palimpsests, and carried on the .re-manufacture of clean parch¬ ments wholesale, mixing up various manuscripts cutting them into fresh shapes, and thus oblit¬ erating forever the connection of the original works. A verv large proportion of the discov¬ eries thus made are fragmentary, but many of the fragments are of great value. Among most remarkable discoveries of palimpsests in recent times is that of the Syriac version of the four Gospels by Mrs. Agnes Smith Lewis (q.v.) in Saint Catherine's Monastery, Mount Sinai

(1895).

PALINDROME, the name given to any verse or line which reads the same either for¬ ward or backward; for example, that which is put in the mouth of Satan — Signa te, signa, temere me tangis et angis (cross

thyself, cross thyself, you touch and torment me in vain), or as ((Madam I'm Adam.®

PALINGENESIS. See Recapitulation.

PALINURO, pa-le-noo'ro, Cape, Italy, promontory in southern Italy, jutting into the Tyrrhenian Sea, northeast of the Gulf of Poh-castro; in classical times Palinurum Promon-torium, and now sometimes called Cape Spar-timento. The end of the cape forms a rocky and dangerous peninsula, on which Roman fleets were wrecked b.c. 253 and 36. The name is Greek and is the origin (not the outcome) of the story of the death and burial of TEneas' pilot, Palinurus.

PALISADE CELLS AND PAREN¬ CHYMA, elongated cylindrical cells standing upright between the surface layer of the upper side of a leaf (q.v.) and the thicker layer of loose assimilation cells forming the under side. The palisade cells characterize the "palisade parenchyma,® which gives strength to the leaf and contains most of its chlorophyll.

PALISADES, The, a rocky cliff on the right bank of the Hudson River (q.v.), ex¬ tending from Fort Lee, N. J., to the hills of Rockland County, N. Y., a distance of about 15 miles. They are of basaltic trap rock, a formation which was intruded between layers of sandstone and shale, and cooling in a columnal form, gave these cliffs their peculiar

perpendicular formation. They are from 350 to 500 feet in height, broken and fantastic in appearance, and are considered one of the most remarkable and picturesque cliff formations m the world. A considerable amount of rock has been taken from the Palisades for building purposes, and it was feared that they would be badly injured and their beauty destroyed. I he two States of New York and New Jersey there¬ fore organized a commission in 1900, known as the Commission of the Palisades Interstate Park, to preserve their natural beauty.

PALISADES INTERSTATE PARK, a great free playground on the west shore of the Hudson River, in the States of New Jersey and New York, extending several miles from bort Lee northward. In 1900 the two States con¬ cerned organized a commission, known as the Commission of the Palisades Interstate Park, the object being ((to secure against vandalism and to preserve the natural beauty of the Pali¬ sades.® As now constituted the park is made up of four distinct

sections — the Palisades (q.v.), beginning at Fort Lee and extending 11ˆ2 miles northward; Blauvelt, an acreage lying back from the river, west of Nyack; Hook Mountain, a preserve that stretches en¬ tirely along the shore front of that rugged mountain promontory commanding the Tappan Zee, and at one point extending back over the summit to Rockland Lake ; and Bear Mountain and Harriman Park, a territory that has its shorefront in the heart of the picturesque high¬ lands of the Hudson, and extends thence back, over mountains and valleys, taking in primeval forests, lakes and streams, to the valley of the Ramapo River in the neighborhood of Tuxedo. Roadways have been constructed in recent years, old piles, drifts and rocks along the beaches have been removed, and walls and a shore path constructed, all of which have added much to the accessibility and appearance of the park. Over 15 docks have been constructed for the accommodation of boats and launches. The New Park Drive is the finest automobile road in the eastern part of the country. The Henry Hudson Drive from Englewood Land¬ ing is a beautiful pleasure drive. Camping is permitted under certain regulations as to loca¬ tion, payment of fees, *etc.* In the summer. sea¬ son several steamers stop at the Park landings, especially Bear Mountain. Several ferries also operate from the New York and Yonkers shores. The West Shore Railroad has a sta¬ tion at Bear Mountain. Work on the drives, approaches, spurs, etc., and landscape work are proceeding gradually due to limited appropria¬ tions and also to the delays in taking title, under condemnation proceedings, to pieces of land necessary for through routes. Expenditures by Commission, including contributions, appro¬ priations and land donations, total $13,119,419.

PALISOT DE BEAUVOIS, pa'le'zo de bo'vwa, Ambroise Marie Frangois Joseph, Baron de, French naturalist: b. Arras, 1752; d. 1820. He studied law and for some years practised in Paris, after which he became an official in his native province. He soon aban¬ doned official life, however, and began to travel, setting out in 1786 on a trip which took him to West Africa, Santo Domingo and North Amer¬ ica. In 1798 he returned to France, was made member of the Institute in 1806, and member of

PALISADES PARK

1 Model highway along the Hudson River in Palisades Park, built by the Park Commission

2 Geological wonder in Palisades Park. Rock was separated during some earth convulsion ages ago

PALISADES PARK

1 Playgrounds overlooking the Hudson River

2 Boy Scout Camp, combining education and recreation

the Council of the University of Paris in 1815. Palisot was opposed to slavery and during his American tour had altercations with William Wilberforce and Thomas Clarkson on the sub¬ ject. He published (Flore d'Oware et de Benin > (1804-21); Unsectes recueillis en Afrique et en Amerique* (1806-19); <Muscologie, ou traite sur les mousses > (1812) ; (Essai d'une nouvelle agrostographie> (1813); Refutation dun ecrit anonyme) (1814); and the comedy, RailleurP

PALISSY, pa-le-se', Bernard, French artist and philosopher: b. La Capella Biron (Lot et Garonne), according to D'Aubigne, 1499, ac¬ cording to other biographers about 1510; d. Paris, 1589. Having been selected in 1543 to draw up the plan of a government survey in his neighborhood the remuneration he received enabled him to carry on experiments in enamels, to which his attention had been accidentally turned, and on which he had for some time been engaged. Being ignorant of the art of the potter he had to grope his way, making experiments with all kinds of materials, which for a long time were unsuccessful. He was compelled at last, by his own account, to burn his furniture in order to keep his oven. The fatigue he endured in conducting himself all the operations necessary to the completion of his discovery was excessive. At length, after 16 years of

unremunerated labor (153&-54), he succeeded in producing a pure white enamel, affording a perfect ground for the application of decorative art. He was now able to produce works in which he represented natural objects grouped and portrayed with consummate skill. His reputation rapidly spread, and he acquired a patron in the Duke de Montmorency. His sculptures in clay and his enameled pottery once known became recognized as genuine works of art, and came into demand for the decoration of the houses of the great. Reli¬ gious persecution, however, which had spared him in obscurity, fastened on him as soon as he had begun to attain to wealth and distinc¬ tion. He was first imprisoned at Bordeaux on the charge of being a Calvinistic preacher (1562), and was threatened with death, when he was rescued by the Duke de Montmorency, who, to save him from the provincial author¬ ities, procured him the title of inventeur des rustiques fignlines du roi, with which he went to establish himself at Paris. Here he was patronized by Catherine de Medici, who gave him a site for his furnaces on the present situation of the palace of the Tuileries, where the remains of them were discovered in 1865. Here he continued to work for some years. He also gave for several years in Paris lec¬ tures on scientific subjects, the substance of which is probably contained in his (Discours Admirables) (1580). He was the first in France “to substitute facts and demonstrations in the teaching of science for mere hypothesis. He established a rational theory of crystalliza¬ tion, and his classification of salts was nearly perfect. His teaching again excited the jeal¬ ousy of his theological opponents. He was ar¬ rested in 1588 and thrown into the Bastile, where he died at the age of 90, according to D’Aubigne, who knew him personally; or of 80, according to his other biographers. His Complete Works* (1880) contain his famous autobiography. A monograph on the artistic work of Bernard de Palissy by C. De Lange and C. Borneman appeared in 1863-65. A biography of him has been written by Henry Morley (1852).

PALISSY WARE. See Palissy, Bernard.

PALK (pak) STRAIT, the northern and narrower part of the channel separating Ceylon from the southeastern coast of India, the south¬ ern and wider part being the Gulf of Manaar. The strait is 80 miles long, 40 to 85 miles wide, but shallow and scarcely navigable. The Pam-bam Passage broken with islands connects the two parts of the channel.

PALKI. See Palanquin.

PALL, pal (Lat. palla), generally, the covering of a bier, but specially applied to the small linen cloth, usually stiffened with card¬ board, employed to cover the chalice. The up¬ per part of the pall may be of silk, and colored according to the season. It is often richly em¬ broidered. While part of the corporal is some¬ times laid over the chalice as a covering, the pall or palla, according to Pope Innocent III, is not to be considered identical with the cor¬ poral. See Costume, Ecclesiastical.

PALL-MALL (pel-mel) GAME, an an¬ cient pastime in which a round box-wood ball was struck with a mallet or club and sent through a ring elevated upon a pole, standing at either end of an alley. The game was for¬ merly practised in Saint James' Park, London, and gave its name to the street called Pall Mall.

PALLACEZE, the stink-horn toadstools. See Fungi.

PALLADIAN ARCHITECTURE, a vari¬ ety of 16th century Italian architecture so named from Andrea Palladio (q.v.). It was founded upon % the Roman antique as inter¬ preted by the writings of Vitruvius, but rather upon the secular buildings of the Romans than upon their temples. It is consequently more applicable to palaces and civic buildings than to churches. A characteristic feature of the style is the use of engaged columns in fagades, a single range of these often running through the two principal stories. It was introduced into England by Inigo Jones, a follower of the Venetian school of Palladio.

PALLADINO, pal'la-de'no, Eusapia, fa¬ mous Italian medium: b. 1854; d. May 1918. Her mother died in giving her birth and her father was murdered by brigands a few years later. Of humble origin, she began to work as a kitchen-maid in Naples, and while serving in that capacity she was on one occasion in¬ vited by the family to take part in a spiritual¬ istic seance, from which it developed that she possessed remarkable psychic powers. In 1888 she attracted the attention of the scientific world; Professor Lombroso and other scientists went specially to Naples to investigate; com¬ mittees of investigations were held in Rome, Paris, New York, Cambridge and War¬ saw; Sir Oliver Lodge, Professor and Ma¬ dame Curie, F. W. H. Myers (author of Sur¬ vival After Deaths), Rlchet and Schiaparelli were attracted to and baffled by the mystic phenomena presented by this Italian woman. She converted the scepticism of Lombroso into a faith in spiritualism and led him to write a minute account of her physical peculiarities. A vast literature arose on the subject, and Pal-208

ladino became the greatest celebrity in the annals of psychical research in Europe and America. Despite the proven fact that she practised fraud at times, the supernormal char¬ acter of certain physical phenomena which oc¬ curred in her presence has never been explained. For over 20 years she remained an unsolved puzzle and defied solution at the hands of many sceptical investigators. She was able to pro¬ duce levitations of furniture, graspings by livid hands, the playing of musical boxes and appari¬ tions of the dead. She operated in the light as well as in the dark; a person of very ordi¬ nary intelligence, she did not appear to have understood herself the mysteries she provoked.

PALLADIO, pal-la'de'o, Andrea. Italian architect: b. Vicenza, Venetian territory, 30 Nov. 1518; d. Venice, 19 Aug. 1580. He was originally a stone-cutter, and at the suggestion of the poet and savant Trissino (see Trissino, Giovanni Giorgio), went to Rome for the pur¬ pose of studying ancient and modern art. Re¬ turning to his native country he designed many palaces and county houses of great beauty and dignity. His designs were also sought in Eng¬ land and other parts of Europe. Palladio be¬ longs to the masters who, in the 16th century, by the study of the works of Roman builders, created a new era in architecture. Among his works the Theatre degli Olimpici, in his native place, is the most important. Venice also owes to him many of her finest buildings. The villa built by Lord Burlington at Chiswick (since en¬ larged by James Wyatt) was from a design of Palladio, as was also a bridge at Wilton, the seat of the Earl of Pembroke. The majestic simplicity of antiquity was always present to his mind, and Algarotti called him the Raphael of architects. His published works include <Antichita de Roma5 (1554), and (Quattro libri dell' architettura.5 He also provided designs for Barbaro's edition of (Vitru vius5 and illustrated Caesar's Commentaries.5 His life was written by Temanza (1763). Consult the biography by Fletcher (1902).

PALLADIUM, among the Greeks, a statue or image of Pallas (Minerva), which is said to have fallen from heaven, and to have been found by Ilus, who placed it in a temple in his new city (Ilium). It was believed by the Trojans that their city would be invincible so long as it contained the Palladium. Ulysses and Diomedes, to remove this impediment to the capture of the city, are said to have carried it off.

The Romans, however, pretended that it was brought to Italy by ZEneas and preserved in the temple of Vesta at Rome. It was con¬ sidered holy and the protecting divinity of the city. The term palladium has figuratively ac¬ quired the sense of bulwark, protection, sanc¬ tuary.

PALLADIUM, atomic weight 106.20, a metal resembling platinum, discovered by Wol¬ laston (1803) while purifying a quantity of crude platinum. Occurs native in platinum ores, but principally alloyed with gold and silver in a gold ore from Brazil. Obtained from these ores by complicated processes which ulti¬ mately give the palladium as palladium cyanide. This decomposes on ignition, giving pure spongy metallic palladium. A ductile, malleable, white metal, specific gravity 11.50 and having the lowest melting point of all the platinum

metals. It is not acted on by atmospheric oxygen or moisture slowly attacked by strong nitric, hydrochloric, or sulphuric acids, but very easily by aqua regia. In the spongy form it has the power of absorbing gases. Freshly ignited palladium will absorb about 350 times its own volume of hydrogen at room tempera¬ ture and nearly twice as much when heated to the temperature of boiling water. It forms two compounds with oxygen' PdO, palladous oxide, and Pd02, palladic oxide. Two classes of salts are known related to these two oxides, the palladous salts being the most important. Palladium is used in the manufacture of many fine scientific instruments because of its proo-erties of hardness, color and resistance to the action of the atmosphere, and in jewelry and dentistry is replacing platinum. The nickel ores of Sudbury, Canada, are* capable of producing more than the present world's supply of this metal.

PALLADIUS, pa-lji'di-us, Greek patristic writer of the 4th century. His (Historia Lausiaca5 dedicated to Lausus, chamberlain of the Imperial Court, gives us the results of his journeys among the principal districts of the Roman Empire, where monks and hermits had settled. He is indeed the Herodotus of the early Church, whose self-chosen task was to travel from one religious house or colony to another, curiously inquiring about the life of each, and picking up from the gossip of the highway or actual observation a rich fund of information which has enabled him to give a living picture of the ascetic phase of church life in Palestine, Egypt and Syria. His works are published in Migne's (Patrologia Graeca5 (Vol. XXXIV). Consult Presschen, (Palladius and Rufinus5 (1897).

PALLADIUS, Peter, Danish leader of the Reformation: b. Ribe, 1503; d. 1560. Palladius was rector of a church at Odense in 1530, when he became a convert to the new doctrines of the Reformers. In 1531 he journeyed to Wittenberg where for six years he studied under Luther and Melanchthon, and was made a doctor of theology. Christian III appointed him bishop of Zealand in 1537 and also appointed him to the chair of theology at the university. Palla¬ dius worked earnestly and successfully, spread¬ ing the Reform doctrines throughout the 390 churches under his jurisdiction. He translated Luther's Little Catechism ; compiled a ritual and service book and published a revision of Pedersen's Bible in 1550. In all he prepared over 50 works in Danish and Latin, including the (Visitatsbog5 (1540). Consult the edition of his works bv Lis Jacobsen (1911 et seq.).

PALLADIUS, Rutilius Taurus ZEmili-anus, a Roman writer of the 4th century of our era. He wrote (De re rustica,5 a didactic work in 14 booˆs on agriculture, the topics being ar¬ ranged according to the seasons, and forming a sort of farmer's calendar. The first book is introductory, and the last, written in elegiac distichs, is a poem on the art of grafting, the other 12 containing accounts of the agricultural and gardening operations for each of the 12 months. Much of the work is simply borrowed from earlier writers. The poem was popular in the Middle Ages and there is an English translation of it belonging to the 15th century.

An English translation by Thomas Owen ap¬ peared in 1803, and others have followed.

PALLAH, or IMPALLA, a large reddish, bushranging South African antelope (JEpyceros melampus), called <(roibok55 by the Boers. The horns were lyrate, abruptly bent and were pos¬ sessed by the males alone. These animals were formerly numerous, but were not only especially a prey to the large carnivores, but were shot wrathfully by Boers and . sportsmen because they were extraordinarily suspicious and alarmed all the game in the neighborhood by loud whis¬ tling cries the moment they discovered a hunter's presence. Now, therefore,

they are rare. Consult the works of sportsmen-natural- ists in Africa; and Lydekker, (Book of Antelopes) (1896) ; Sclater, (Fauna of South Africa, Mammals) (1900).

PALLAS, pal'as, freeman and favorite of the Roman emperor Claudius : d. 63 a.d. He was a slave of Antonia, mother of Claudius; was set free by his master when he became emperor; together with Callistus and Narcissus was the real power during Claudius' reign ; in¬ duced the emperor to marry Agrippina, his own niece, and to adopt Nero; and with the con¬ nivance and assistance of Agrippina, now his mistress, poisoned Claudius and brought Nero to the throne. He was subsequently poisoned by Nero's order.

PALLAS, pal'las, Peter Simon, German naturalist and traveler: b. Berlin, 22 Sept. 1741; d. there, 8 Sept. 1811. He studied there, in Ley¬ den, and in England, devoting himself espe¬ cially to the classification of collections of zoo¬ logical specimens, and in 1768 was invited by Catharine II of Russia to become adjunct of the Saint Petersburg Academy and to lead a scientific expedition through Russia in Asia. This trip of exploration, undertaken with Sokoloff, Suyeff and Rytchkoff, and lasting more than six years, was his greatest work, the specimens collected forming the nucleus of the Academy's museum in Saint Petersburg. In 1777 he became a mem¬ ber of the Imperial Topographical Survey, and in 1787 was appointed historiographer of the College of Admiralty. He retired in 1796 and returned to Berlin not long before his death. His published works include a descrip¬ tion of his travels in Asia (1771-76), (Flora Rossica> (1784-1815) ; (Icones Insectorum5 (1781-98) ; a study of the Mongolian races (1776-1802) ; and a great and incomplete (Vo-cabularium Linguarum totius Orbis) (1787-89).

PALLAS, pal'as, in astronomy, one of the minor planets revolving round the sun between Mars and Jupiter. It was discovered in 1802 by Olbers at Bremen. It revolves round the sun in 4.61 years. The eccentricity of its orbit is 0.23969, and its semi-axis major is 2.77 times that of the earth's orbit. Its diameter is 172 miles. When nearest the earth in opposition, Pallas shines as a full seventh-magnitude star, with a decided yellowish light.

In Greek mythology, the goddess of wisdom. See Minerva.

PALLAVICINO, pal-la-ve-che'no, Fer-rante, Italian satirist: b. Piacenza, 1618; d. Avignon, 6 March 1644. He took orders ; be¬ came a canon of Augustine; had to escape to Venice because of his broken vows; wrote there against Odoardo, Duke of Plaisance, but

had to leave Venice in turn because of his im¬ moral life and writings; spent some time in Germany; again went to Venice, where he was imprisoned, but soon set f.ree ; then broke entirely with the Church and bitterly and foully attacked the Pope in (I1 divorzio Celeste.5 Venturing into France he was ar¬ rested by the papal officers, found guilty of heresy and beheaded.

PALLAVICINO, pal'la-ve-che'no, Sforza, Italian cardinal and ecclesiastical historian : b. Rome, 1607 ; d. there, 1667. He was educated in the Collegio Romano ; was made governor successively of Iesi, Orvieto and Camerino by Urban VIII; at 30 entered the Jesuit Order; soon afterward became professor of philosophy and theology in the Roman College; and made such a name by his philosophical treatises that he was chosen by the Catholics to write a party history of the Council of Trent which refuted the work of Paolo Sarpi.

PALLEN, Conde Benoist, editor, poet and essayist: b. Saint Louis, Mo., 5 Dec. 1858; de¬ scended from two of the oldest French families among the pioneers of the Louisiana Purchase. Dr. Pallen made his college course at George¬ town University, District of Columbia (A.B. 1880; A.M. 1883; LL.D. 1896); took a special course of study at Saint Louis University ; re¬ ceived the degree of Ph.D. in 1885. For 10 years (1887-97) he edited the Church Progress of Saint Louis ; since 1885 has been a well-known figure in the lecture field on literary, philo¬ sophical and economic subjects. He is author of (The Philosophy of Literature5 ; (Epochs of Literature5 ; (What is Liberalism5 ; (New Ru¬ baiyat5 ; (The Feast of Talarchus5 (dramatic poem) ; (The Death of Sir Launcelot, and Other Poems5 ; (The Meaning of the Idylls of the King5 ; and (Collected Poems.5 His inter¬ pretation and comments on the ((Idylls55 drew from Tennyson himself a personal letter of congratulation and appreciation. He has been a contributor to magazines for the past 30 years; Catholic revisory editor of (The New International Encyclopedia,5 and the En¬ cyclopedia Americana5 (1st edition), and man¬ aging editor of the (Catholic Encyclopedia5 ; president of The Encyclopedia Press, Inc., since

PALLIS, palMes, Alexander, Greek litera-teur : b. Pieraeus, Greece, 1851. Pallis became a firm advocate of the popular Greek speech as opposed to the literary language affected by the Church and press and gained notoriety by a popular version of the Gospel of Matthew, which appeared in the journal Akropolis. Riots ensued and the Synod prohibited all modern Greek versions of the Scriptures in Greece. In 1902 in Liverpool, England, he published his translation of the four Gospels and the following year witnessed the publica¬ tion of (A Few Notes on the Gospels accord¬ ing to Saint Mark and Saint Matthew.5 In 1904 he was joint translator of Kant's (Kritik5 and in the same year published a version of the (Iliad.5 In 1906 appeared a version of Euripides' (Cyclops5 and in 1907 an original volume of (Poems.5 Pallis has for several years been engaged in mercantile pursuits in Liverpool. Consult Krumbacher, K., (Das Problem der neugriechischen Schriftsprache5 (Munich 1902).

PALLISER, pal'i-ser, Sir William, British inventor and engineer: b. Dublin, 18 June 1830; d. 4 Feb. 1882. He passed through the Staff College at Sandhurst, and in 1855 obtained a commission in the Rifle Brigade, was subse¬ quently transferred to the Hussars and retired from the army in 1871. Besides inventing the projectiles and guns which bear his name he devised many improvements in fortifications, *etc.* He was knighted in 1873, and for a few years sat in the House of Commons as Con¬ servative member for Taunton. See Projec¬ tiles.

PALLIUM, an article of ecclesiastical dress consisting of a band of white wool, some three inches wide, with two narrower bands of the same material, one of which hangs down the back and the other over the breast. It is em¬ broidered with four purple crosses. It is a part of the vestments of the pope, patriarchs and archbishops ; and is sent by the pope to the patriarchs and archbishops as a token that they are invested with the fullness of the episcopal office. It is sometimes,

though rarely, also sent to bishops. When a bishop is elected or ap¬ pointed to a metropolitan see, he at once so¬ licits the pallium from the pope within three months after his consecration or confirmation. The pallium is made from the wool of two lambs annually presented in the church of Saint Agnes, Rome, by the apostolic sub-deacons, and woven by the nuns of Torre de' Specchi, to whom alone belongs the privilege. The histori¬ cal origin of the pallium is not known or at least wrapt in such obscurity that no definite con¬ clusion has ever been arrived at. Some writers believe that it was first conferred upon bishops by the emperors as a mark of dignity, and then passed over to a purely ecclesiastical usage. _ It is only worn on occasions of great solemnity. Consult Thurston, (The Pallium' (London 1802) ; Vespasiani, <De Sacri Palli Origine' (Rome 1856).

PALM, pam, Johann Philipp, Bavarian bookseller and publisher: b. Schorndorf, Ba¬ varia, 1768; d. Braunau, Bohemia, 26 Aug. 1806. The firm of which he was a member published a pamphlet, ˆGermany in Her Deepest Humilia¬ tion) (1806), which was hostile to Napoleon and his measures. It was brought to the atten¬ tion of Napoleon, who ordered the arrest of Palm, had him tried by court-martial, and though the pamphlet was to the publisher merely trade matter, he was sentenced to death and executed at Braunau on the following day. This act aroused the deepest indignation in Europe as well as in Germany, where the hatred of the Germans for Napoleon was already intense. Consult Schultheiss, <Johann Philipp Palm>

(1860).

PALM BEACH, Fla., winter resort in Palm Beach County, on the Florida East Coast Railroad, the East Coast Canal and Lake \Vorth, 300 miles southeast of Jacksonville. Its climate, location and ample facilities for boating, bath¬ ing and fishing combine to make Palm Beach the most popular of winter resorts. There are a number of palatial hotels and beautiful parks. Farming and fishing interests are considerable and the reclamation of the Everglades is mak¬ ing a large acreage available for tillage. Pop. (permanent) 1,200; (winter) 6,000-7,000.

PALM BUTTER, OIL, SUGAR, WAX.

See Palms.

PALM-CAT, or PAL1VI-C I VET, any of

several animals of the civet family (Viverridcz) , and of the genus Paradoxurns, known also as tree-cats, toddy-cats, from their habit of climb¬ ing palm-trees to eat their fruit. They inhabit India and southeastern Asia, the Malay Archi¬ pelago, etc., and somewhat resemble large cats with comparatively short legs. The best known is the Indian species (P . niger), which is often kept about houses and subsists mainly on animal food, such as rats, small birds, lizards, *etc.* Consult Blanford, Jerdon, Blyth, Wallace and other authorities on East Indian zoology; and Allen's Natural History, article (Cats, Civets and Mungooses' (1894).

PALM-CRAB, a large burrowing land-crab which feeds upon cocoanuts. See Robber-Palm.

PALM-KALE, a variety of cabbage exten¬ sively cultivated in the Channel Islands and also in Italy. It grows to the height of 10 or 12 feet, and with a crown of leaves at top it has much the aspect of a palm.

PALM OIL. See Palms.

PALM SUNDAY, the Sunday next before Easter Day, so called because on that day is celebrated Christ's last entry into Jerusalem before his Passion, where palm branches were strewn in his way by the multitude. In some churches palms are employed as decorations at the services on this Sunday, and fragments of them distributed to the people.

PALM-SWIFT. See Swift.

PALM-WEEVIL, or GRUGRU, a large

curculionid beetle (Rhyncophorus palmarum). See Grugru.

PALMA, Giacomo, ja-ko'mo pal'ma, called II Vecchio, Italian painter: b. probably Serin-tola, near Bergamo, about 1480; d. Venice, 1528. He is supposed to have been a pupil of Giovanni Bellini, but little is known regarding his life. It may be divined from the pictures that go by his name that he imitated one after another several great artists of the Venetian school and many of his works have been attributed to Giorgione, whose coloring he took for his stand¬ ard of excellence. The Italian churches have multitudinous examples of paintings called <(Santa Gonversatione'' representing the Virgin and the Child, and the donor of the picture presented to them by his patron saint. . Of

these, large compositions Palma II Vecchio painted very many. He was also successful in myth¬ ological subjects, and his landscape backgrounds are exquisite. His works place him among the foremost painters of his time. Some of his best-known paintings are (Adoration of the Shep¬ herds' ; (The Holy Family'; (Mars and Ve¬ nus' ; <The Mystical Marriage of Saint Cath¬ erine' ; (Divine and Heathen Love'; Portrait of Andrea Palladio in his Youth.'

PALMA, Giacomo, called II Giovane, Italian painter, grand-nephew of the Elder Palma: b. Venice, about 1544; d. there, 1628. His early work was excellent, comparing in fresh coloring with Titian, who greatly influ¬ enced him. Later his vicious mannerism grew so as to be a predominating feature of his work.

Hence Lanzi called him the last good and first bad painter of Venice.

PALMA, Ricardo, Peruvian author: b. Lima, Peru, 7 Feb. 1833. He was exiled to Chile in 1860 as a result of implication in a political revolt, but upon his return became secretary to President Balta. Later he served as senator and then was assistant in the Na¬ tional Library. After the sack of the library by the Chileans in 1881 he reorganized it, gathered remaining fragments and assisted by gifts from foreign governments succeeded in reopening the library in 1884. In 1886 he pro¬ moted the agitation which resulted in the expul¬ sion of the Jesuits from Peru. He is the au¬ thor of several works of fiction, some poetry, the historical work (Anales de la Inquiscion de Lima> (1863), (Poesias> (1887) and <Tradi-ciones y articulos historicos) (1899), record¬ ing the traditions and legends of Peru.

PALMA, Thomas Estrada, Cuban patriot: b. Bayamo, Santiago province, Cuba, 15 July 1835; d. Santiago province, Cuba, 4 Nov. 1908. He studied law, but did not practise ; during the revolution of

1868-78 rose to be a gen¬ eral in the Cuban forces ; after nearly nine years of service was captured and imprisoned in Spain until the close of the insurrection. At the time of his imprisonment he had succeeded Cespedes in the rather empty honor of President of the Cuban provisional government. After his release he went to Honduras, where he be¬ came Postmaster-General of the republic. Later he removed to the United States, where he opened a school for Latin-Americans at Central Valley, N. Y. This institution he successfully conducted until the beginning of a fresh revolt in Cuba in 1895, when he was elected delegate-at-large and Minister Plenipotentiary of the Cuban republic and took charge of the well-known Junta in the United States, which pur¬ chased arms, organized filibustering expeditions and otherwise aided the army in the field. In 1901 Palma was almost unanimously elected President of the republic and on 20 May 1902 was inaugurated, the United States on that day turning over to the new government the admin¬ istration of the internal affairs of the nation. On 23 Sept. 1905 he was again elected to the office of President but resigned 28 Sept. 1906.

PALMA, (1) the capital of Majorca (q.v.), the largest of the Balearic Isles and of the Spanish province of Baleares, on the Bay of Palma indenting the south coast. The city, encircled by a fortified wall, stands in the midst of orange plantations and with its Moorish architecture has a very picturesque effect. It is one of the most aristocratic of European cities. A railway connects it with Manacoar on the east coast. Its chief edifice is the Gothic cathedral (1322-1601) ; it contains the tomb of King Jayme II of Aragon and a valuable collection of church ornaments. In the church of Saint Francis is the tomb of Raimon Lully (q.v.). Other notable structures are a fine ex¬ change (1426-46), an old Moorish palace, a 16th-century townhall and several fine modern buildings and institutions. Its numerous manu¬ factures include woven silks and woolens, jew¬ elry, etc., and it has considerable trade in wine, oil, cattle and agricultural produce. Its fine harbor is protected by a mole. Pop. about

68,000.

(2) A town of Sicily, 14 miles southeast of Girgenti. Pop. 11,702. (3) The name of one of the larger of the Canary Islands (q.v.).

PALMA CHRISTI. See Castor-oil Plant.

PALMIER, pal-mar', Vilhelm, Swedish chemist: b. Forsvik, Skaraborg,

1868. He re¬ ceived his education at the universities of Up-sala and Gottingen, held several teaching posi¬ tions and in 1907 was appointed to a chair in the Stockholm Technical College. He traveled in Germany, France, America, Switzerland and England. Ur. Palmaer has been secretary to the Nobel committee of the Academy of Sciences since 1900. His published works include (Ueber der Mirkungsart der Tropfelektroden) (1898) ; (Chemische Nachweisung der Konzentrations-anderungen bei TropfelektrodeiP (1899) ; (A Brief Account of Dr. V. Palmaer's Electrolytic Process for Producing Bicalcic Phosphate* (1904) and contributions in scientific journals and periodicals.

PALMAS, pal'mas, Cape. See Cape Palmas.

PALMER, pam'er, Alice Freeman, Ameri¬ can educator: b. Colesville, N. Y., 21 Feb. 1855; d. Paris, France, 6 Dec. 1902. She was gradu¬ ated from the University of Michigan in 1876. From 1877 to 1879 she was principal of the high school at East Saginaw, Mich., becoming in the last-named year professor of history in Welles¬ ley College. In 1882 she became acting presi¬ dent and later president of that institution, which position she retained till her marriage in 1887 to Prof. G. H. Palmer (q.v.) of Har¬ vard University. During her administration the standard of scholarship was raised, the number of students very greatly increased and several important buildings added. In 1892-95 she served as non-resident dean of the woman's de¬ partment of the University of Chicago. She took an active interest in educational and re¬ form associations, was a member of the Massa¬ chusetts State board of education from 1889.

PALMER, Anthony, American colonial governor : b. England, about 1675 ; d. Philadel¬ phia, Pa., May 1749. He was a merchant in Barbados for some time, but in 1707 purchased a large tract of land in Philadelphia where he then settled. In 1708 he was a member of the provincial council and served until his death. When Lieut. -Gov. George Thomas resigned in 1747 the government devolved upon Palmer, who was president of the executive coun¬ cil, and during the succeeding 18 months he administered the affairs of the colony with much ability. He conciliated the Indians and took precautions for the military defense of the colony against Spain and France, though op¬ posed by the Quaker members of the council. The ((Kensington District® of Philadelphia was originally a portion of his farm.

PALMER, Arthur Hubbell, American Ger¬ manic scholar: b. Cleveland, Ohio, 30 June 1859; d. 6 Nov. 1918; graduated at Western Re¬ serve University, 1879, and subsequently studied for two years in Europe.

From 1883 to 1891 he was professor of the German language and liter¬ ature and from 1886 to 1891 also served as librarian at Adelbert College. After 1891 he held the chair of German language and liter¬ ature at Yale University. Professor Palmer was a trustee of the American Scandinavian Founda-

tion of New York. He edited Riehl s 'Burg Neideck) (1893); Schiller's 'William Tell, with Introduction, Notes and Vocabulary ' (1898; 1915); Schiller's 'Thirty Years' War' (1899); Goethe's 'Hermann und Dorothea) (1903) ; translations of Bjornson's 'Poems and Songs' (1915).

PALMER, Sir Charles Mark, English iron¬ master and shipbuilder: b. South Shields, 3 Nov. 1822 ; d. London, 4 June 1907. He was educated for a commercial career in France ; was partner in several coal companies ; reformed the coal¬ carrying trade from the north of England by building screw colliers (1852), which drove the sailing brigs out of business; and at Jarrow established a great shipyard. Both iron and coal for this yard are supplied by Palmer's own mines. He introduced the use of rolled plates for men-of-war ; held several important govern¬ ment contracts ; and was a member of the House of Commons, 1874-1907. He was created a baronet in 1886.

PALMER, Edward Henry, English Orien¬ tal scholar : b. Cambridge, 7 Aug. 1840 ; d. Ara¬ bia, 1 Aug. 1882. He was educated at Saint John's College, Cambridge, and later made ex¬ tensive journeys of exploration in the East. In 1871 he was appointed professor of Arabic at Cambridge and from that time onward accom¬ plished a vast amount of literary work. In 1874 he was called to the bar. In 1882 he was engaged by the British government to assist in keeping the Arabs of the Sinai region quiet and preventing them from interfering with the Suez Canal, when he was captured and mur¬ dered with two other Englishmen. He had a remarkable knowledge of Oriental life and language and was a man of very varied gifts. His works include 'Oriental Mysticism' (1867) ; a 'Grammar of the Arabic Language' (1874) ; 'A Concise Dictionary of the Persian Language) (1876) ; 'The

Song of the Reed' (1877), comprising Persian verse translations and original poems; 'The Poetical Works of Beha-ed-Din Zoheir of Egypt, with a Metrical English Translation, Notes and Introduction' (1876-77) ; a translation of the Koran ('Sacred Books of the East,' 1880) ; a 'Life of Haroun Alraschid' (1881); an Arabic manual (1881); and a 'Simplified Grammar of Hindustani, Per¬ sian and Arabic' (1882). Consult 'Life' by Besant (1883).

PALMER, Erastus Dow, American sculp¬ tor: b. Pompey, N. Y., 3 April 1817; d. Albany, N. Y., 9 March 1904. His best-known works were 'Morning and Evening' ; 'The Angel of the Sepulchre' : 'The White Captive' ; 'Land¬ ing of the Pilgrims' (a group of 15 life-size figures intended for the Capitol at Washington). He also executed many portrait busts and stat¬ ues, including the statues of Washington Irving, Alexander Hamilton and Robert R. Livingston, the latter in the national Capitol. The Living¬ ston statue brought him a gold medal at the Centennial Exposition in Philadelphia in 1876 The 'Indian Girl' at the Metropolitan Museum in New York was the first full length figure he attempted.

PALMER, Frederick, author and war correspondent: b. Pleasantville, Pa., 29 Jan. 1873. He was graduated at Allegheny College 1893; acted as correspondent during the Greco-

Turkish War '97; Alaskan sledge journey, Philippine '98; March to Peking, 1900; Sibe¬ rian travel, 1902; with Kuroki's army for Colliers and London Times , 1904— 05; _ cruise American battleship fleet, 1908-09 ; Mexico and Central American travels, 1909; Balkan War, 1912; Mexico, 1914. Chosen as the one accred¬ ited correspondent to represent the American press with the British army, 1914-16, and vari¬ ous smaller campaigns. Author of 'Going to War in Greece' ; 'The Ways of the Service \ ; 'The Vagabond' (novel) ; 'With Kuroki in Manchuria' ; 'Central America and Its Prob¬ lems' ; 'The Last Shot' (novel) and 'My Year of the Great War.'

PALMER, George Herbert, American educator and classical scholar: b. Boston, 19 March 1842. He was graduated from Harvard in 1864, studied at the University of Tubingen, 1867-69 and at Andover Theological Seminary in 1870; and after serving as tutor in Greek at Harvard, 1870-73 ; assistant professor, 1873-83, and professor of philosophy, 1883-89, became Al¬ ford professor of natural religion there in 1889, and professor emeritus 1913. He published a rhythmic prose translation of the 'Odyssey' (1884) ; 'The New Education' (1887)

; ‘The Glory of the Imperfect’ (1898) ; ‘Self Cultiva¬ tion in English’ (1897); ‘The Antigone of Sophocles,’ a translation (1899) ; ‘The Field of Ethics’ (1901); ‘The Nature of Goodness’ (1904) ; ‘The English Works of George Her¬ bert’ (3 vols., 1905) ; ‘The Life of Alice Free¬ man Palmer’ (1908) ; ‘The Teacher’ (1909) ; ‘The Problem of Freedom’ (1912) ; ‘Intima¬ tions of Immortality, in the Sonnets of Shakes¬ peare’ (1912); and also edited the ‘Poems of Alice Freeman Palmer’ (1915). He received the honorary degrees of Litt.D. Western Re¬ serve, 1897; Princeton, 1912; LL.D. Michigan, 1894; Union, 1896; Harvard, 1906; Dartmouth,

PALMER, Herbert James, Canadian states¬ man : b. Charlottetown, Prince Edward Island, 1851. He received his education at Prince of Wales College, Charlottetown, and at King's College, Windsor, Nova Scotia, and in 1877 was called to the bar. He became a member of the Provincial Parliament in 1900 as a Liberal ; was attorney-general in 1908; and for a few months in 1911 was Premier. In 1910 he was a dele¬ gate to the Conference on Representation of the Maritime Provinces in the Dominion Parlia¬ ment, held at Saint John, New Brunswick.

PALMER, James Shedden, American naval officer: b. New Jersey, 1810; d. Saint Thomas, West Indies, 7 Dec. 1867. Entering the navy in 1825 as midshipman, he was made lieutenant in 1836. In the war with Mexico he commanded the Flirt, a blockade-schooner, in 1855 became commander, and when the Civil 'War broke out was with the Mediterranean squadron and in command of the Iroquois. Recalled from that station, he joined the blockading fleet under Admiral Dupont. In 1862 he was promoted to a captaincy, and in the passage of the batteries at Vicksburg held the advance of the Union vessels. At New Orleans and Mobile Bay he performed important services as flag-captain to Farragut, with whom his relations were most intimate. Made commander in 1863, he rose to the rank of rear-admiral in 1866, and until his

death was in command of the North Atlantic squadron.

PALMER, John McAuley, American soldier and politician : b. Eagle Creek, Scott County, Ky., 13 Sept. 1817 ; d. Springfield, Ill., 25 Sept. 1900. He attended Shurtleff College, Upper Alton, Ill., for a year, and later studied law and was admitted to the Illinois bar in 1839. He first entered politics in the campaign of 1840, when he actively supported Van Buren; in 1843 he was elected probate judge of Macou¬ pin

County; in 1847 was a delegate to the State Constitutional Convention; and in 1849 was elected county judge. In 1852 he was elected to the State senate and reelected in 1854. His opposition to the Kansas-Nebraska bill, how¬ ever, led him to sever his connection with the Democrats, and ally himself with the Republican party. He was active in the organization of this party, was president of the Republican State Convention in 1856, and delegate to the National Convention of the same year and that of 1860. He was one of the representatives of his State at the Peace Conference in Washing¬ ton 1861. At the outbreak of the Civil War he joined the army as colonel of an Illinois regi¬ ment, took part in the Springfield campaign, and in December 1861 was promoted brigadier-gen¬ eral ; in 1862 he was made major-general, in 1863 given command of the 14th corps and later of the Department of Kentucky. He took part in the operations against Island No. 10 (1862), led a division at Murfreesboro

(1862) and at Chickamauga (1863); as com¬ mander of the 14th corps he was en¬ gaged in the battles of Chattanooga (1863), Kenesaw Mountain and Peach Tree Creek (1864), and in the Atlanta campaign. After the war he continued his law practice in Illinois, and in 1868 was elected governor of the State; during his administration he steadily resisted special legislation and the granting of special privileges. In 1872 he left the Republican party and supported Greeley for the Presidency, and in 1876 was one of the most active supporters of Tilden. In 1890 he was nominated for United States senator by the Democrats, and elected, serving for six years. In 1896 he was nominated for the Presidency by the Gold Democrats, who refused to accept the regular nominations on account of the free silver plank of the platform. He wrote his autobiography, published under the title (Personal Recollec¬ tions of John M. PalmerP

PALMER, John Williamson, American author: b. Baltimore, Md., 4 April 1825; d. there, 26 Feb. 1906. He was graduated _ from the University of Maryland as a physician in 1847 ; was city physician in Baltimore, 1849-50, and subsequently went to China and India as a surgeon in the service of the East India Com¬ pany. He was connected with the staff of the Century and Standard dictionaries, and his care and accurate rendering of Hindu terms in those works has added much to the Western knowl¬ edge of Anglo-Indian terms. Among his pub¬ lications are (The Golden Dragon; or, Up and Down the IrrawaddP (1853) ; (The New and the Old; or, California and India in Romantic Aspects) (1859); (After His Kind,) a novel (1886) ; (The Poetry of Compliment and Court-ship) (1867); (For Charlie's Sake and Other Lyrics .and Ballads) (1901); and (Stonewall

Jackson's WayP one of the most popular bal¬ lads of the Civil War.

PALMER, Nathaniel Brown, American sea-captain: b. Stonington, Conn., 1799; d. 1877. He went to sea at 14 and in 1821 he commanded the sloop Hero which set sail from Yankee Har¬ bor in South Shetlands on an exploring expedi¬ tion. He discovered the land known as the Palmer Archipelago, which at the time was sup¬ posed to be a portion of the Antarctic continent. It is now called Palmer's Land, being located in lat. 63° S., near Tierra del Fuego. He followed a seafaring life until 1849 and was afterward a director of the Fall River line of steamships. Consult Greely, (American Discoverers of the Antarctic Continent (1912).

PALMER, Ray, American Congregational clergyman and hymnologist : b. Little Compton, R. I., 12 Nov. 1808; d. Newark, N. J., 29 March 1887. He was graduated at Yale in 1830; studied theology and entered the Congregational ministry. He was pastor of churches at Bath, Me., 1835-50, and Albany, N. Y., 1850-66; and secretary of the Congregational Union in New York City, 1866-78. He was the author of many sacred hymns, of which the best known is (My Faith Looks Up to Theep included in very many collections of church hymns and trans¬ lated into more than 20 languages. His pub¬ lished volumes are (Hymns and Sacred Pieces) (1865); (Hymns of My Holy Hours) (1868); (Voices of Hope and Gladness* (1880).

PALMER, Samuel, English painter : b. Newington, Lancashire, 27 Jan. 1805; d. Reid-gate, Kent, 24 May 1881. He was a pupil in the antique school of the British Museum, and received some inspiration from his acquaintance with William Blake. His studies were for two years continued at Rome (1837-39) after which he devoted himself to water colors and became a member of the Water Color Society in 1854, While belonging to the ideal school of Turner and Wilson he confined himself entirely to water color and etching, in both of which de¬ partments he reached the highest excellence. Among his best-known pictures which are suf¬ fused with profound poetic feeling are (Dream on the Apennines) (1864) ; (Curfew) (1870) ; and (The Waters Murmuring) (1877). His finest etchings include (The Sleeping Shep¬ herd* ; (The Skylark) ; (The Lonely Tower.* He translated the Eclogues of Virgil and in¬ tended to illustrate them, but only lived long enough to complete one plate, (The Opening of the FoldP

PALMER, Thomas Witherell, American legislator: b. Detroit, Mich., 1830; d. 1913. He was educated at the University of Michigan and

traveled extensively in Spain and in South America. He was engaged in real estate opera¬ tions from 1853 to 1872. In 1873 he was elected to the Detroit board of estimate and five years later became a member of the State senate. He was unsuccessful Republican nominee for governor in 1880, but became United States senator in 1883. President Har¬ rison sent Palmer as Minister to Spain in 1889 where he remained two years. Soon after his return he was elected president of the World's Columbian Commission.

PALMER, Walter Launt, landscape artist: b. Albany, N. Y., 1 Aug. 1854. After studying

under F. S. Church at Hudson, N.- Y., he be¬ came the pupil of Carolus Duran at Paris and developed great skill in landscape painting, specializing in winter landscapes. He was awarded a gold medal at the World's Colum¬ bian Exposition in 1893, honorable mention at the Paris Exposition of 1900 and subsequently received numerous other awards and honors. His Venetian scenes and snowy landscapes are remarkably effective and among his best productions are (Venice' (1882) ; (January' (1887) ; < Domes of La Salute) ; (End of a Win¬ ter Day'; (Under the Pines) (1896); Run¬ down at Walpole, N. HP (Buffalo Academy 1901) ; (Oaks in Winter' (1906) ; <The Glade' (1913) ; (The Sleeping Brook' (1914) ; (The Frozen Lake' (1915). He is a member of the National Academy; of the Society of Ameri¬ can Artists and the American Water-Color Society.

PALMER, in medkeval times a term applied to a pilgrim who had visited the Holy Land and carried on his return a branch of the palm for a staff as a memorial of his journey. The name was also given to itinerant monks or religious men who wandered from shrine to shrine without a fixed home.

PALMER, Mass., town, Hampden County, on the Chicopee, Swift and Ware rivers, and on the Boston and Albany and Central Vermont railroads, 14 miles east of Springfield. It in¬ cludes the villages of Palmer, Three Rivers, Bondsville, Thorndike and Duckville, of which

the first two are the most important. It was first settled in 1716 by John Kingston, and was incorporated as a town in 1775; for several years previous to its incorporation (1741-52) it was called Kingston. It is an enterprising industrial town and manufactures cotton and woolen goods, carpets, foundry and machine-shop products, wire, wire nails, hats, *etc.* It has a public and an association library and the Massachusetts Hospital for Epileptics. Pop. 9,896. Consult Temple, (History of the Town of Palmer, Mass.' (Palmer 1889).

PALMERIN (pal'mer-in) OF ENGLAND

(Palmerin de Inglaterra), a romance of chivalry in the style of (Amadis of Gaul,' and in this class of literature regarded as second only to it in point of merit. It is this book, which with (Amadis,' Cervantes saves from the holocaust in (Don Quixote.' It was long supposed to be the work of Francisco Moraes, a Portuguese, who published it in 1567 as a translation from the French, and in 1807 Southey published an English translation, at¬ tributing the original to Moraes, and credited him with modesty in not claiming the author¬ ship. It has since been found to have been the work of Leon Hurtado, and to have been pub¬ lished originally in Spanish, in Toledo, in 1547. This story is in some respects a continuation of (Palmerin de Oliva.'

PALMERIN DE OLIVA, pal-ma-ren' da o-le'va, a romance of chivalry, a feeble imi¬ tation of (Amadis of Gaul,' first published in Salamanca in 1511. It has generally been con¬ sidered to be of Portuguese origin ; but Ticknor, in his (History of Spanish Litera¬ ture,' asserts that the author of it was a car¬ penter's daughter in Burgos. This is one of the books against which Cervantes inveighs as re¬

sponsible for the mental condition of Don Quixote; and in the famous scene of the burn¬ ing of the books of chivalry, he says : "This Oliva, let it be hewn in pieces and burnt, and let not the very ashes be left." A continuation by the same author, (The Second Book of Palmerin,' which treats of the adventures of his sons, Primaleon and Polendos, appeared later.

PALMERSTON, pam'er-ston, Henry John Temple, Viscount, English statesman: b. Romsey, Hampshire, 20 Oct. 1784; d. Brockett Hall, Hatfield, Hertfordshire, 18 Oct. 1865. He was educated at Edinburgh University and at Saint John's College, Cambridge, being gradu¬ ated from the latter in 1806. He had succeeded in 1802 as 3d Viscount Palmerston in the Irish peerage, a title which did not disqualify him

from sitting in the House of Commons. In 1806 and 1807 he was the Tory candidate for Parliament from Cambridge University, and was both times defeated, but in 1807 was elected to Parliament from Newton, Isle of Wight. In 1809 he succeeded Lord Castlereagh as Secre¬ tary at War, and in 1811 was elected member of Parliament for Cambridge University. As Sec¬ retary of War he carried out a vigorous reform of the details of administration; regulated the finances, paid off arrears and reduced the previ¬ ous confusion of the War Office to order. He mainly confined himself in his Parliamentary speeches to the business of his department, but also spoke on Catholic Emancipation, of which he was always a supporter. He retired from office in the Wellington ministry in 1828 with others of the Canning party. In 1830 he be¬ came Foreign Secretary in the Whig ministry of Earl Grey, and from this time continued a mem¬ ber and leader of the Whig party. In 1831 he lost his seat for Cambridge, but was elected from Bletchingley, then from South Hants, and in 1835 from Tiverton, which borough he continued to represent till his death. It was during his service as Foreign Secretary that he earned a reputation for vigilance and energy in the conduct of foreign affairs, and espe¬ cially for guarding the interests of individual Britons abroad, which, while it increased his popularity at home, gained him enemies abroad. He succeeded in establishing and maintaining friendly relations with France so that the two nations acted in concert ; took a leading part in gaining the independence of Belgium, and in establishing constitutional government in Spain and Portugal. He supported Austria and Turkey against Russia, in the East, and took part in the war against Mehemet Ali. In Par¬ liament he supported the liberal policy of free trade and labor laws regulating hours, factory conditions, *etc.* He was Foreign Secretary till 1841, when the Whig ministry went out of office on the question of free trade in edrn, but on the Whigs' return to power in 1846 he again took that office, under Lord Russell. During the period of 1848-49 he manifested his liberal tend¬ encies and sympathy with the revolutionary party without actively interfering with the af¬ fairs of foreign states. Several of his acts in this administration aroused party criticism, espe¬ cially his favoring the cause of a Portuguese Jew at Athens, Don Pacifico, a naturalized Brit¬ ish subject, which caused a quarrel with Greece and nearly produced a war with France. This

was the occasion of a keen discussion of his pol¬ icy in Parliament, which resulted in a formal vote in the House of Commons approving the foreign policy of the government. In 1851 he unofficially expressed to the French Ambassador in London his approbation of the coup d'etat of Louis Napoleon, without consulting either his colleagues or the queen, ancj he was forced to resign. In the next year he defeated the Rus¬ sell ministry on the question of the Militia bill, but refused to accept a position in the cabinet under Lord Derby. In December 1852 he took office as Home Secretary in the coalition min¬ istry of the Earl of Aberdeen, and on the resig¬ nation of this ministry, in consequence of al¬ leged mismanagement of the Crimean War, he was, on the almost universal demand of the country, called to the premiership, and vigor¬ ously carried on the war with Russia. In 1857 Parliament, on the motion of Richard Cobden, passed a vote of censure on the conduct of the Chinese War; dissolution of the House gave Palmerston a majority, but in February 1858, he resigned, after being defeated on the Con¬ spiracy bill ; he returned to power in June 1859, and continued to hold the premiership during the remainder of his life and at the time of his death had held office for nearly 50 years.

Among the important events of his last ad¬ ministration were the American Civil War (with the recognition of the Confederate States as belligerents and the Alabama incident), the Prussian War against Denmark, which he op¬ posed, and the union of Italy, which he strongly favored. Consult the official <Life) by Dalling, continued by Ashley (1870-76) ; <Lives) by the Marquis Lome (1891) ; Sanders (1888) and Trollope (1882) and Francis. (Opinions and Policy of Viscount Palmerston) (1852).

PALMETTO. See Palms.

PALMETTO STATE, a name applied to South Carolina. The palmetto tree appears on the coat of arms of the State. See South Carolina.

PALMIERI, pal-mya're', Aurelio, Italian

missionary and author : b. Savona, Italy, 4 May 1870. He was educated at the Seminary of Maria and the Augustinian Convent, Naples. In 1885 he entered the Augustinian Order, was sent to Constantinople in 1894 and was ordained in 1895. He was successively professor of the¬ ology and canon law and assistant

pastor and missionary, Kadi-Keui, Constantinople. In 1905-07 he prosecuted Oriental studies in Rome and from 1907-10 was stationed at Cracow, Poland. He takes an active part in the bien¬ nial congress at Velehrad, Moravia, for the union of Christendom, and has traveled in Rus¬ sia making a collection of Russian publications for the Vatican Library. His publications in¬ clude (Die Polenik des IslanP (1902) ; (La chiesa russa> (1908); (Vita di Dositeo, Patri-arca di Gerusalemme) (1909) ; (I1 Progresso Dommatico> (1910) ; (Nomenclator theologise graeco-russic3e) (2 vols., 1910-11); (Theologia dogmatica orthodoxa) (1911). Dr. Palmieri collaborated in (Dictionnaire de theologie catho-liqueP (Dictionnaire de biographie et d'histoire ecclesiastiqueC and contributed to (Oriens Christianus,) (Civilta Cattolica,) fStudi re-ligiosip Rivista di apologia cristiana, *etc.*

PALMIRA, pal-me'ra, Colombia, town and capital of Palmira province, department of

Valle del Cauca, 160 miles southwest of Bo¬ gota, situated in the Llanos de Malagana, a plain famous as a thriving agricultural region. Tobacco is grown extensively. The town dates from 1794. Pop. 24,312.

PALMISTRY, the art by which one pro¬ fesses to discover the temperament and char¬ acter of any one, as well as the past and future events of his life, from an examination of the palm of his hand and of the lines traced upon it. As a considerable body of very complicated rules and directions have been laid down by authorities, ancient and modern, to enable the student to read the palm, palmistry claims to be regarded as a ˆscience,® or at least as a branch of an interpretative science of the hand in general, to which the name Chirosophy has been given. The other branch of this general science has been called Chirognomy, and is con¬ cerned with the interpretation of the form and character of the hand and fingers, while palm¬ istry treats of the palm only. The science was known to the early Chinese, to the ancient Greeks and was somewhat popular on the Con¬ tinent during the Middle Ages. The chief au¬ thorities on palmistry in recent times are two Frenchmen, M. le Capitain D'Arpentigny and M. Adrien Desbarrolles ; and it is on their works that modern English books on the sub¬ ject are chiefly founded. The observation of the fingers and joints on the hand is quite as important to the palmist as that of the palm itself. The thumb is generally regarded as chirognomically the most important part of the hand. The first, or upper phalange of the thumb, when well developed, shows the

presence of will and decision of character; the second, according to its development, indicates more or less logical power. What has to be considered by the chiromant proper is the (<mounts® of the hand, with the marks on them, and the lines in the palm. The ((mounts® are the elevations at the base of the fingers and thumb and in the ˆpercussion® of the hand — that is, the side of the palm which extends from the root of the little finger to the wrist ; it is so called because it is used in striking. They are seven in num¬ ber and are named from the planets. See Chiromancy.

PALMITIN, PALMINE, or TRI-PAL- MITIN, a fatty substance occurring quite com¬ monly in the natural fats and organic oils, and closely analogous to stearin in its chemical structure and deportment. It is especially abundant in palm oil, from which circumstance it derives its name. Tri-palmitin may be con¬ veniently prepared from palm oil by expelling the liquid portion by pressure, washing the solid residue with boiling alcohol to remove such other fats as it may still retain, and finally crystallizing from a solution in ether. By this process it is obtained in the form of white crystals which are scarcely soluble in alcohol but readily soluble in ether, and which melt at 144° F. Varieties of tri-palmitin are said to exist, however, which melt at 115° F. Chemic¬ ally, tri-palmitin is a compound of palmitic acid, C1r.H31.COOH, with glycerin, C3H5(OH)3; three molecules of the acid being combined with one of the glycerin, as indicated by the equa¬ tion 3CisH3i.COOH dr C3H.,(OH)3 = 3H.0 + C3Hr, (Ci.-,H3i.COO)3, the last formula on the right-hand side of the equality sign being that

of tri-palmitin. Two other compounds of pal¬ mitic acid with glycerin are also known, but they are of less importance. Mono-palmitin has the formula CaHsCOHLCCisHsi.COO), and melts at about 140° F. It may be distilled in a vacuum, but when heated in the air it breaks up with the formation of acrolein and other products. Di-palmitin has the formula CsH5(OH) (C15H31. COO) 2, and its melting point is given, by vari¬ ous authorities, at from 125° F. to 140° F. When a mixture of

glycerin and palmitic acid is heated for 24 hours at 400° F., all three of the palmitins are formed ; and when the product is shaken with lime water, and then extracted with ether, and the ethereal solution is evapo¬ rated, tri-palmitin, di-palmitin and mono-palmitin separate out in the order named. The palmitins are readily saponified by heating with caustic alkalis, and free palmitic acid may be conven¬ iently prepared by adding hydrochloric acid to an aqueous solution of potassium palmitate.

PALMS, trees or shrubs of the monocotyledonous family Palmacece, ranking in economic importance next to the grasses. The species, of which about 1,000 are recognized, belong to about 130 genera. The great majority of these genera consist of only a few species, in many cases of only one. Calamus (the rattan palms) is the largest genus, consisting of about 200 mostly Asiatic species with no representatives in the Western hemisphere. Geonoma and Bactris, American genera, each contain about 100 species. Another American genus, Chamce-dorea, has about 60 species. The Asiatic and Australasian genus, Licuala, contains about 30 species. Cocos, an American genus with the exception of the cocoanut, which is cosmopolitan within the tronics, also contains about 30 spe¬ cies. Desmoncus (American), Pinanga and Areca (Oriental) each contain about 25 species. Geologists and botanists are fairly well agreed that the palms represent a once more extensively distributed and more numerous group of plants and that they are now upon the decline. Fossil remains are preserved in the rocks of the Middle Cretaceous, and, in North America, in those of the Upper Cretaceous from Greenland south¬ ward; in both Europe and North America they are also found in the Tertiary rocks.

With few exceptions the individual genera and even the tribes which they comprise are restricted in their distribution ; certain tribes are African, others Asiatic or American, etc., and certain genera are found' in very small areas; for instance, Pseudophoenix sargenti is found only in certain of the Florida Keys and even there in limited numbers, and the species of Plowed) only in Lord Howe's Island, a tiny speck of land in the southern Pacific Ocean. Only one species (Chamcerops humilis) is an acknowledged native of Europe. The most noted exception to this rule is the cocoanut palm (Cocos nuciferg) which appears throughout the tropics upon maritime land. It is among the first plants to obtain a foothold upon newly-formed islands. As a group, the palms are almost restricted to tropical and subtropical countries ; the European species mentioned, however, extends as far north as latitude 44° ; an American species, the palmetto (Sabal almetto), to 35°; some Asiatic species to 34°. n the Southern hemisphere some American species reach latitude 36° S., some African

30° S. In Australia, latitude 35c S. is the limit; but in New Zealand one species reaches 38° S. There are, however, a few South American species which approach the perpetual snow line upon the mountains. With respect to habitat, the various species exhibit a wide range of adaptability, some, like the cocoanut, growing upon the sea coast, others wholly inland ; some in sand', others in rich alluvial soils ; some in swamps, others on dry hillsides ; some in ex;- posed places, others in the depths of the forest; some solitary, some in groups, some in forests or jungles to the exclusion of other trees.

In general, palms are erect, unbranched trees with buttressed bases. They often attain heights of 100 feet and at the summits of the usually smooth or slightly ringed columns they bear a rosette of large leaves each of which re¬ sembles in some kinds a fan and in others a feather. In some species of the latter type the leaves may exceed 40 feet in length and six feet in breadth. There are, however, excep¬ tions to the ordinary columnar habit of growth ; a few species are branching; some are low growing, even creeping; others are slender stemmed plants which climb by means of hooked spines ; some have flexible stems which extend from tree to tree in festoons and attain several hundred feet, 500 feet being common, and some writers placing the length at 1,500 and even more. In the ordinary species the flowers are borne in huge clusters which appear from within spathes that open in some cases with a report. The fruits are of various kinds, berries and drupes being perhaps most common. They are often enclosed in a fibrous husk, and fre¬ quently contain a hard nut. The flowers, which are generally small and individually inconspicu¬ ous, bear no relation in size to the fruit, which may be as small as a pea or, as in the double cocoanut, larger than a man's head.

While the grasses are of widest economic importance among plants the palms are em¬ ployed for the largest number of purposes. All parts of the various species are used, but in few do more than two or three parts find extensive employment. Many palms furnish good fuel, some useful timber, others masts and spars. The pith of certain species, especially of Metroxylon and Caryota supplies sago. The thin, pliant stems of many species of Calamus, known commercially as rattan, are widely used throughout the world for wickerwork and furni¬ ture. The terminal bud of several kinds is cooked and eaten like cabbage, such species be¬ ing known as "cabbage palms® — for instance, Euterpe oleracea. The leaves serve for thatch¬ ing houses, and as material for walls, mats, screens, shields, clothing, hats, bedding, cordage, twine, nets, *etc.* The spines of certain species are used for

tipping arrows and spears, for tattooing, for fish-hooks, *etc.* The fibre of the leaves of many species seems to offer useful paper-stock; that of others, for example, the piassaba fibre, derived from various species of Attalea (especially A. funifera) is exten¬ sively used for brushes of various kinds, ranging from hair-brushes to stable brooms and street-cleaning machines. The sap of several species is used for the manufacture of palm-wine and of arrack, the latter a spirituous liquor; it is also employed in making jaggery, a kind of sugar of some commercial imp®rtance.

For this latter purpose Phoenix sylvestris is perhaps the principal species. In some cases the sap is obtained by tapping; in others by cut¬ ting the terminal bud or even the trunk near the base.

The fruits of many species are useful. As food the cocoanut and the date are probably the most widely known and important. The former is employed not only as a fruit, but its contained liquid or ˆrnilk® furnishes a palatable drink either fresh or prepared as a wine. The kernel supplies the <(shredded coconut® employed in confectionery, cakes and puddings. It also yields cocoanut butter or oil. The fibre of the husk is widely used for matting and is very popular where great durability is essential, as upon the aisles of public halls. The shells make serviceable dippers, bowls and other utensils, or when carved and polished, attractive ornaments. The date palm supplies the Arab and other peo¬ ples of northern Africa and southern Asia with one of their chief foods, for which purpose it is commonly seen near dwellings, besides being planted extensively for commercial purposes. The chief commercial supplies come from Arabia, Persia and Mediterranean Africa.

Oils are obtained from the fruits of a large number of species, especially Elceis guineensis. Some of these oils are used for food, others for lubricating; some for illuminating; and others for soap and candle making. Usually these oils are orange-colored, violet-scented and sweetish. They are generally obtained bv boil¬ ing the ripe fruits in water, though also fre¬ quently by expression. Like butter, they

soon become rancid unless kept cold. Palm butter is a popular name for several of the kinds. A palm wax is secured from species of Copernicia, and is used like beeswax.

The seeds of many species are very hard and are used for manufacturing small ornamen¬ tal and useful articles such as knife handles, collar buttons, *etc.* Probably the best known of these is the so-called <(vegetable ivory® (q.v.) which is derived from the Phytelephas macro-carpa, a South American species with a short or even creeping stem, from which arise pinnate leaves often more than 15 feet long. The seeds of Areca catechu are mixed with lime and pepper leaves to make the notorious ((betelnut® (see Betel) of eastern Asia. The product is used as a stimulant.

The most remarkable palm of all is perhaps the palmyra, deleb or barossus palm (Borassus flabellifer) . This species is a native of southern Asia, the Australasian Archipelago, and western Africa, where it sometimes exceeds 100 feet in height. The leaves, which often exceed three feet in length, have spiny-margined petioles; the triangular fruits are about five inches in diame¬ ter, have a brownish or black, glossy, succulent, fibrous rind, and contain three seeds about as large as goose-eggs. Throughout India this is the commonest palm, and in Ceylon it occurs in extensive forests. It is employed for more pur¬ poses than perhaps any other plant, upward of 800 uses being recorded for its various parts. Its wood, palmyra wood, is heavy, dark, hard, durable, easily polished, difficult to cut across the grain but easy to cut with the grain. It is used for house-building, furniture, *etc.* The wood of some other palms is also known by this name and as porcupine-wood. The leaf stalks make excellent fences. The leaves are

employed for thatch, mats, umbrellas, fans, hats, baskets, as writing tablets, for ropes, twine, *etc.* ; the down at the leaf-bases for lint and for filtering liquids ; the sap yields sugar, palm wine and arrack; the fruit is cooked as an esculent; the young seeds are similarly em¬ ployed, and the young plants serve as pot-herbs. A large part of the population of southern India depends upon this plant to supply its needs — fuel, shelter, clothing, food, *etc.*

Among the most important palms the fol¬ lowing with their chief uses may be mentioned: Assai or Para palm (Euterpe edulis), a South American species whose fruits are macerated in water to make a popular drink called assai ; Bourbon palm, one of the most widely grown of greenhouse and house palms, usually called Latania

borbonica by florists, but properly La~ tania cornmersonii: double Seychelles, or sea-cocoanut palm (Lodoicea callipyge) , chiefly noted for its great size, slow growth, enormous seeds weighing more than 10 pounds (even, it is said, more than 30 pounds), which from their seeming malformation but more particularly from their formerly unknown origin, gave rise to numerous fabulous tales; curly palm (Howea belnioricma) , one of the best-known greenhouse palms, and popularly called Kentia belmoriana; fan-palm, any species with fan-like leaves ; fern-palm (Cycas revoluta), etc.), commonly raised in greenhouses; fish-tail, wine or toddy palm {Cary ota urens), a source of jaggery, arrack and palm wine; flat palm {Howea fosteriana), a favorite greenhouse palm popularly known as Kentia fosteriana; raphia palm {Raphia) , •which furnishes the raphia used by florists and nurserymen for tying up plants ; Royal palm {Oreodoxa regia), so named in expression of its majestic appearance, and one of the most popular avenue-palms of warm countries ; um¬ brella palm {Hedyscope canterburiana) ; walk¬ ing-stick palm {Bacularia monostachya) ; wine palm {Cary ota urens; Phoenix sylvestris; Borassus flabelliformis, and Cocos butyracea) ; gomuto or areng palm {Arenga saccharifera) , which furnishes fibre used for cordage, canvas, etc., and sugar, wine, vinegar, etc.; inaja palm {Maximiliana regia), the spathes of which are used as baskets and as cooking utensils ; doum palm {Hyphcena thebaica), one of the few branching palms; talipot palm {Corypha um-braculifera) , noted for its prodigious fertility in flowers, the number of blossoms upon a sin¬ gle tree having been estimated at 60,000,000, the inflorescence attaining a height of 30 feet above the crown of leaves. The <(palm® of the Bible is believed to be the date-palm, which is one of the commonest species in Syria at the present time. The so-called Panama-hat palm {Carlu-dovica palmata) is not a palm botanically, but a member of the family Cyclanthacece.

With the exception of the date and the cocoanut, palms are little cultivated, the wild species being relied upon for commercial purposes. Even these species and those used for sugar, arrack, etc., are usually planted in favorable sit¬ uations and allowed to shift for themselves after once becoming established or even be¬ fore. For ornamental purposes, however, more or less care is given the young trees used in warm climates for bordering avenues, and as lawn or garden specimens.

During the closing decade of the 19th cen¬ tury palms sprang into popularity as greenhouse

and house plants, for which purposes, and for decorating halls, churches, hotels, lobbies, etc., about a dozen species have become deservedly popular, not only because of their graceful ap¬ pearance, but because of their ease of cultiva¬ tion. Many other species are also found in pri¬ vate conservatories. In the United States the chief centre of palm production for these pur¬ poses is the Middle Western States, but the South is also increasing its area devoted to or¬ namental palms. The plants are nearly all grown from imported seeds sown in warm greenhouses. In some cases the seeds require months or even more than a year to germinate ; but usually a month or two is sufficient. In many cases the young seedlings resemble one another, whether they will develop into pinnate¬ leaved or fan-leaved specimens. At all times ample water and good drainage are essential ; shading is also generally beneficial. The plants generally succeed best in well-rotted sod ob¬ tained from rather light soil rich in humus. Scale-insects and the red spider are the chief enemies; the former may be controlled with kerosene emulsion (see Fungicide) ; the latter by forcible spraying, moist atmosphere and by evaporated (not burned) sulphur. The fumes of burning sulphur are fatal to the plants.

Consult Bailey, (Standard Cyclopedia of Horticulture > (New York 1900-02) ; Martius, (Historia Naturalis PalmarunP (Munich, 1823-50) ; Kerchove de Denterghem, (Les Palmiers) (Paris 1878).

M. G. Kains, Crop Expert.

PALMYRA, pal -mi’ra, Arab Dominions, the Hebrew Tadmor, City of Palms, an ancient city of Syria, now in ruins, 140 miles east-north¬ east of Damascus, lat. 34° 24’ N., long. 38° 20’ E. It was founded or enlarged by Solomon in the 10th century b.c. It is situated in an oasis of the Syrian Desert, with a ridge of hills to the west and an extensive plain on the east. It is said tO’ have been a bulwark of the kingdom of Israel against the wandering tribes of the desert, and was an entrepot for the trade be¬ tween Damascus and the Mediterranean, from which it drew considerable wealth. Palmyra was little heard of in history until the time of the Roman Empire. It is mentioned as having been attacked by Mark Antony, who hoped to find in it the means to pay

his troops; but the Palmyrians transported their goods beyond the Euphrates, and he was compelled to leave with¬ out accomplishing his object. During the earlier period of the empire it was independent, and carried on a considerable trade with Persia, India and the Mediterranean. Subsequently, about 130, or according to other authorities later, it submitted to Rome, and became a Roman colony. The protection of Rome against its neighbors, the Parthians and the Persians, was of value, while the yoke of so distant a mistress was not heavy. It became the faithful ally of Rome in her wars against the Eastern powers. During the reign of Gallienus (260-68), Odenathus, the ruler of Palmyra, rendered such effectual assistance against the Persians that that emperor gave him the title of Au¬ gustus and recognized him as his colleague. Odenathus was succeeded by his widow, Zenobia, to whom Palmyra chiefly owes its fame, and who took the title of Queen of the East.

She was besieged in Palmyra by Aurelian and compelled to surrender. On his departure the Palmyrians revolted, on which Aurelian re¬ turned and destroyed the city (273 a.d.). He permitted the inhabitants to rebuild it, but it never recovered its importance. The remains of Palmyra are chiefly of the Corinthian order, with the exception of the temple of the Sun, which is Ionic. They are supposed to belong to the period of Odenathus and Zenobia. (See Zenobia). Consult Wright, (An Account of Palmyra and Zenobia) (1895).

PALMYRA, Mo., city, county-seat of Marion County, on branches of the Chicago, Burlington and Quincy Railroad, about 14 miles northwest of Hannibal and five miles west of the Mississippi River. It was settled in 1818, laid out in 1819 and incorporated in 1855. It is in a farming country and the chief manufactures are connected with farm prod¬ ucts. It has a pickle factory, creamery, flour and grist mill and a carriage factory. The educational institutions are Centenary High School (M. E. South), founded in 1884, and the Saint Paul's College (P. E.), founded in 1848 as the Ingleside Female College, and pub¬ lic and parish schools. Pop. 1,964.

PALMYRA FIBRE. See Fibre. PALMYRA WOOD. See Palms.

PALNI (pal'ne) HILLS, mountain range of southern India, joining the Eastern and Western Ghats, in the district of Madura, Madras presidency. The soil is fairly fertile and affords excellent pasturage. The climate is equable, comparatively dry and healthy, and there is a sanatorium at Kodikanal, 47 miles northeast of Madura.

PALO, pa'lo, Philippines, a pueblo of the island of Leyte, situated on the northeast coast at the mouth of the Malo Malo River, six miles south of Tacloban. It is an important road centre, being connected by road with Tacloban and other important towns to the south and west. Pop. 17,740.

PALO ALTO, pa'lo al'to, Cal., town ii* Santa Clara County, on the coast division of the Southern Pacific Railroad, 33 miles south¬ east of San Francisco and 18 miles northwest of San Jose. It was settled in 1891 by the open¬ ing of the Leland Stanford Jr. University (q.v.) which is located here. In 1892 a num¬ ber of people established homes in Palo Alto on account of the university. It was incor¬ porated in 1894. Palo Alto is a ˆuniversity town,® with but few industrial establishments. The planing mills have about 30 employees, and there are stores sufficient to supply a limited amount of the local needs. There are eight churches, a high school, elementary graded schools, Manzanita Hall, a preparatory school for boys and two preparatory schools for girls. The one bank has a capital of $100,000. The town is governed by a board of five trustees. The town owns the water and electric-light plants and has a good sewerage system. Pop.

(1920) 5,900.

PALO ALTO, Tex., the name of a plain, or field, eight miles northeast of Brownsville (q.v.), Cameron County, where was fought, 8 May 1846, the first important battle of the war between the United States and Mexico. Gen-

eral Taylor with 2,000 United States troops was on the Rio Grande opposite Matamoras ; and General Arista with a force of 6,000 Mexicans tried to cut him off from Point Isabel which was the base of United States supplies. Taylor attacked and defeated Arista; the Mexicans re¬ treated to Resaca de la Palma. The United States loss was nine killed and 44 wounded, two missing; the Mexicans, 102

killed and 128 wounded. Consult Howard, ˆGeneral Taylor) (1892); Bancroft, <History of Mexico) (Vol. V).

PALOLO, an annelid (of the genus Eunice viridis) found in great abundance in the sea near the coral reefs of tropical islands. They are taken in large numbers in autumn in nets by the islanders, who esteem them, when roasted, as a great delicacy. The body, about a foot long on the average, tapers toward both ends, and along each side are tufts of gills. An American species (E. fucata) abounds in vari¬ ous parts of the West Indies and Gulf of Mex¬ ico, but is not eaten.

These worms are interesting mainly on ac¬ count of their extraordinary breeding habits. During the most of the year the worms lie coiled up in burrows in rotten coral-rock, or other friable material. When the eggs have ripened within the body, and the time for their discharge has come (which happens in early November in the south Pacific, and in July in the West Indies), the hinder part of the worm, which contains the ovaries and sexual organs, creeps backward out of the burrow, and strug¬ gles to get away, while the forward vital part holds on to its burrow. This takes place simul¬ taneously with all the millions of worms in a district. After a little struggle the posterior part breaks away and swims with great rapidity to the surface, vast swarms rushing together to the top, where they are devoured by fishes and birds, and in the South Seas are netted by men, women and children, by the thousand. Almost at once each worm bursts, discharging the eggs in a shower, and when all are gone the worm ceases its backward flight, collapses and dies. On no other occasion is the worm seen to leave its submarine burrow.

PALOS, pa-ids', Spain, a former important seaport town of Andalusia, in the province and 10 miles southeast of Huelva, on the left bank of the Rio Tinto, near the Gulf of Cadiz, where Columbus fitted out his ships, and whence he sailed on his first voyage for the discovery of the New World in 1492. The convent at the gate of which Columbus appeared as a poor stranger, and asked bread and water for his child, is still standing here. Palos is now an unimportant village.

PALPI, the organs or appendages, consist¬ ing of stalked or jointed processes, found in connection with the mouth of many invertebrate animals, and which appear to be chiefly devoted to the exercise of the sense of touch, the means by which the animal explores the surface upon which it walks, and probably in some cases of taste also. Thus, in many insects palpi are borne by the ˆmaxillae® or lesser pair of jaws (maxillary palpi), and by the ˆlabium® or lower lip (labial palpi). The labial palpi in butter¬ flies form the cushion-like organs by which the

elongated proboscis or tongue is protected when at rest; and the small maxillary palpi of these

insects are sometimes known as palpuli. In bees, etc., the labial palpi are of great relative length. In Arachnida (spiders, scorpions, mites, etc.) the maxillary palpi are largely developed. In the spiders these organs in the males are concerned in reproduction, and in the females they are terminated by hooked claws. In the scorpion the same structure forms powerful nipping-claws or chela. In the higher crusta¬ ceans (lobsters, crabs, etc.) certain of the jaws bear palpi. Consult Packard, (Zoology) (1897).

PALPITATION, abnormal movement or beating of the heart, sometimes violent and spasmodic ; sensible to the patient and causing discomfort or distress. Its immediate mechan¬ ics is an over-stimulation of the excitability of the muscular structures of the heart, due to disturbed action of the nerve structures which regulate its movements. The predis¬ posing and exciting causes of palpitation are numerous; for example, an excitable tempera¬ ment; bodily and mental exhaustion; inanition; deterioration of the blood as in scurvy, chlorosis and spanaemia; violent exercise or emotion; mental shock; dissipation; dyspepsia. Tobacco and alcohol by their poisonous action also cause palpitation. Disorders of the sexual apparatus in women is frequently accompanied by palpi¬ tation, which is common in youth and middle life, especially among those engaged in sedentary occupations. In short, whatever tends to dis¬ turb the orderly action of the nervous system may induce palpitation, which is sometimes ac¬ companied by symptoms of choking (globus hystericus), vertigo, ringing in the ears, im¬ paired vision, partial unconsciousness, a clammy coldness of the extremities and the fear of death, due to general nervous agitation. When palpitation arises from actual or organic dis¬ ease of the heart it is sometimes spoken of as symptomatic; when due merely to disturbed ac¬ tion of the heart or to disorders elsewhere it is frequently called functional, though it is always but a symptom. When occurring with organic disease it often causes more anxiety to the patient than the disease itself. The heart's action is constantly being balanced by the two nervous systems, the sympathetic, overaction of which causes increase in its rate of contrac¬ tion ; and the autonomic, overaction of which causes a slowing. Thus an over sympathetic stimulation — as occurs in many hyperthyroid states for example — or an under autonomic action, as in any paresis of the vagus, will cause a tachycardia. In treatment, remove as far as possible the exciting cause, enjoin abso¬ lute rest,

keep the feet warm, sometimes give hot drinks — milk, cocoa and hot water contain¬ ing a little baking-soda are useful. Valerian and aromatic spirits of ammonia are often valuable. Severe cases should be under the care of a physician. Consult Bayliss, Gen¬ eral Physiology* ; Higier, (Vegetative Nervous System* (in Nervous and Mental Disease Monograph Series).

PALSY. See Paralysis.

PALTSITS, pal'sits, Victor Hugo, Amer¬ ican historian: b. New York, 12 July 1867. He was educated in public and private schools, Cooper Union and Columbia University. From 1888 to 1907 he was connected with the Lenox Library, New York, was State historian from 1907 to 1911 and since 1914 has been keeper of

manuscripts at the New York Public Library, where since 1915 he also has had charge of ex¬ hibitions and since 1916 has held in addition the pGSt of chief of the division of American his¬ tory. Mr. Paltsits has edited several volumes of documents and has written (Bibliography of the Works of Philip Freneau * (1903) ; bibli¬

ography of the Works of Father Louis Henne¬ pin J (1903); (Lewis and Clark Bibliography for Original Journals of Lewis and Clark* (1904) ; bibliography of the Writings of Baron LahontaiP (1905) ; (Scheme for the Conquest of Canada in 1746* (1905) ; 'The Almanacs of Roger Sherman, 1750—61 J (1907); 'The Manu¬ script Division of the New York Public Library*

(1915).

PALUDAMENTUM, a white cloak, which the commander of the Roman army put on in time of war. Sometimes, however, the color may have been crimson, and in the case of the emperor himself it was purple.

PALUDAN-MULLER, pal'ooHdan-miil'ler, Frederik, Danish poet; b. Kjerteminde, on the island of Funen, 7 Feb. 1809; d. Copenhagen, 29 Dec. 1876. In 1828 he entered the University of Copenhagen and while a law-student there attracted attention by his poem 'Raab til Polen* (1831) and a drama 'Kjarlighed ved HoffeC ('Love at Court*) (1832). His first poem of note was 'Dandserinden* (1833), followed in 1834 by the lyric drama 'Amor og Psyche* and by two volumes of ' Poesier* (1836-38). His later works include 'Venus* (1841, a dramatic poem) ; 'Dryadens Bryllup* (1844) ; 'Tithon) (1844); <Tre Digte* (1854), among them the lyric drama based on the life of the Indian sage 'Kalanus* ; 'Nye Digte* (1861); and the two prose works, 'Ungdomskilden* ('The Fountain of Youth*) (1865) ; and 'Ivar Lykkes Historie* (1866-73), a novel. His chief work is 'Adam Homo,* a poem in ottava rima. An edition of his poems in eight volumes appeared in 1878-79. See Adam Homo.

PALUDISM (Lat. palus, palud-, a marsh), malarial poisoning ; disease or disposition arising from malaria (q.v.L

PAMBAN-MANCHE, or SERPENT BOAT, the native name for a long canoe used on the Malabar coast. They are from 30 to 60 feet in length, not more than three feet in beam and are hollowed out of a single tree. The largest are rowed by about 20 men, double-banked, and can attain a speed of 12 miles an hour.

PAMELA, pa-me'la, or VIRTUE RE¬ WARDED, a novel by Samuel Richardson, published 1741-42. It was the first work of its author, who began what is called the modern analytic novel. It won instant applause and a wide circle of readers, all classes of society fol¬ lowing with close attention the shifting fortunes of Pamela Andrews, a serving-maid whom the son and heir of the family dishonorably pursues. Richardson created a new era in fiction when he chose a girl of the humble class for heroine, and made use of everyday contemporaneous persons and scenes of the purposes of the novel¬ ist. Thus the story of incident and the analysis of character came into English fiction, and thus the modern novel traces its development from Richardson. It was satirized and parodied in 'Joseph Andrews* by Fielding.

PAMIR (pa-mer') PLATEAU, The, or THE PAMIRS, West-Central Asia, an ele¬ vated region described as a "huge boss or knot,*' north of the Hindu-Kush Mountains, connecting the Himalyan and Thian-Shan mountain sys¬ tems. (See Himalaya). The plateau is about 150 miles

long by 150 miles broad, nine-tenths of the area being mountainous and the rest pas¬ ture-land. The name applied to the valleys is derived from the Persian pai and mir, signifying “the foot of mountain peaks” ; the region is called also by the Persians Bam-i-dunyd (“the roof of the world”). The territories belonging to Russia, China, Afghanistan and Britain meet in the Pamir region, and until the completion of the Anglo-Russian surveys in 1895 demonstrated its strategic valuelessness, owing to climate and physical conditions, it was a fertile source of political dispute. The plateau has a general elevation of more than 13,000 feet, dominated by still loftier ridges and summits attaining a maxi¬ mum altitude of 25,800 feet in Mustagh-ata, in the Sarikol range, and covered with perpetual snow. On the plateau are several small lakes, and the sources of the Oxus. From November to April the Pamirs are snow-bound and prac¬ tically inaccessible, while in the spring and sum¬ mer the high winds make traveling very un¬ pleasant. The great part of the surface is bare and barren; the native Kirghiz, however, find a certain amount of pasture for their cattle in summer, and in favored localities there is some cultivation. The “roof of the world** is cele¬ brated throughout central Asia,- and notwith¬ standing its physical drawbacks, two recognized trade routes have traversed it east to west for ages.

PAMLICO, pam-le’ko, a so-called river in North Carolina, really an estuary of Tar River, opening into Pamlico Sound. It is 40 miles long, from one to eight miles wide and navi¬ gable for steamers which can enter the sound. Several small streams flow into the Pamlico River.

PAMLICO, a sound or lagoon on the coast of North Carolina, the largest lagoon on the east coast of the United States. It is about 80 miles long and from 15 to 30 miles wide. It is separated from the Atlantic Ocean by long, nar¬ row, sandy islands — bars or beaches — the point farthest out being the famous Cape Hatteras. Pamlico and Neuse rivers or estuaries enter the sound, and the outlets on the east are Hatteras and Ocracoke inlets. The northern part is shallow, connecting through Crotian Sound with Albermarle Sound; the central and southern area has a depth of 21 feet or more. Fish, oysters and wild fowl are abundant. Sev¬ eral small islands skirt the shore ; Roanoke, at the northern extremity of the sound, is the largest.

PAMLICO INDIANS, a former American tribe living on the Pamlico River in Beaufort County, N. C. They were greatly reduced in number by the smallpox in 1697, and were prac¬ tically exterminated bv the Tuscarora War in

1711.’

PAMPA, pam’pa, or BAMBA, a Quichua word meaning “plain, ** applied to various great plains in South America, and also occurring in proper names, for example, Riobamba, Moyo-bamba, Ayapampa (“Plain of Death”), and

Cochabamba («Lake Plain®). Rarely, as in Peru along the Ucayali River, forested plains are spoken of as pampas; the typical pampas are stretches of treeless plain, varied with rolling prairie, their vegetation being annual or peren¬ nial herbaceous plants, with a few shrubs. Water courses are absent, but there are many lakes or pools of rather brackish water. The predominance of grasses, especially varieties of the cereals, make the pampas in general an ideal feeding ground for steers, horses and sheep. A marked botanical feature of the pampas is a huge thistle apparently indigenous to the North¬ ern hemisphere.

In common usage pampa or the pampas is confined to a great plain in Argentina, the ad¬ ministrative district of Pampa Central, with. General Acha as capital. Here to a certain de¬ gree the original nature of the vegetation has been altered by tree planting, so that much of the plain, which many years ago was opened up for cattle grazing by Roca’s successful expedi¬ tion against the Indians of this region, now no longer grows the pasto amargo, but only grasses better suited for sheep. These are tended by Gauchos, Spanish and Indian half-breeds. The pampas have been scientifically studied by d’Orbigny, Darwin and Roth. Beneath a layer of thin vegetable mold, there is 40 or 50 yards of reddish clay, with an admixture of fine sand of chalky infiltrations, apparently proving re¬ peated inundations in geological time. There is a rich prehistoric fauna, notably remains of machaerodus, hippidimus, mylodon, megatherium and mastodons ; in the whitish lacustrine de¬ posits near the surface fragments of terra-cotta and primitive tools, as well as bones (some of prehistoric animals), engraved and polished by man.

PAMPA AULLAGAS, owl-ya'gas, or POOPO. See Aullagas.

PAMPANGA, pam-pan'ga, Philippines, a province of the island of Luzon, situated in the southwestern part of the island, bounded on the north by Tarlac, on the east by Bulacan, on the south by the Bay of Manila and on the west by Zambales; length, 37ˆ2 miles from north to south ; greatest width, 34 miles ; area, 2,209 square miles. The province is high in the north and mountainous in the northwest and west but low and marshy in the south ; along the shore of Manila Bay and for several miles inland the country is covered by canals and the estuaries of the Grande de la Pampanga River. The principal products are rice (raised in the low¬ lands of the south), sugar, sweet potatoes, gabe, tobacco and cotton. Agriculture is the chief occupation of the inhabitants, but mechanical industries are also quite extensively developed; the most important are weaving and the manu¬ facture of sugar, the fisheries of Pampanga are increasing in importance, and there is a large local trade in nipa, sugar, honey, sacks, *etc.* There are roads connecting all the towns, and connecting the province with Manila, Cavite, Tarlac and Nueva Ecija; the Manila and Dagupan Railroad crosses the province from south¬ east to northwest, passing through the larger towns, and has been an important factor in the industrial development of the province. The great majority of the people are Pampangos (q.v.). Civil government was established in the province in February 1901. Pop. 224,000.

PAMPANGA, Rio Grande de la, re'o gran'da da la pam-pan'ga, one of the four great rivers of Luzon, Philippines, is formed in the northern part of Nueva Ecija by the junction of a number of streams that drain the western slopes of the Caraballos Sur, flows southwest and south through the province of Nueva Ecija and Pampanga and empties into Manila Bay through a delta of eight mouths. It drains a large territory, and has numerous tributaries, chief among them the Rio Chico de la Pam¬ panga; in the rainy season it overflows its banks in the lower part of its course, and these in¬ undations make fertile soil for the cultivation of rice. It is about 120 miles long, and the means of a large local trade.

PAMPANGOS, a group of tribes of the Philippine Islands inhabiting the province of Pampanga, Luzon and single localities in Nueva Ecija, Bataan and Zambales. They are of the Malay race, and at the time of the Spanish conquest of the islands had a civilization and writing of their own. In Pampanga they use their own langauge, which is spoken exclusively in that province.

PAMPAS, pam'paz (Sp. pam'pas). See

Pampa.

PAMPAS CAT. The grass, straw or wild¬ cat (Felis pajero) of South America, common on the grassy plains. Hudson, in (A Naturalist in La Plata* (1892), describes it as not unlike the European wildcat in its robust form and dark color, (<but a longer, more powerful ani¬ mal, inexpressibly savage in disposition.®

PAMPAS DEER, a small deer (Cervus campestris) of the plains of southern South America, having antlers of three points each.

PAMPAS GRASS, the most beautiful and the most important commercial ornamental grass (Cortaderia argentea). It is a native not of the pampas of South America, but of the well-watered higher lands of Brazil and Argen¬ tina. It grows in large clumps, has leaves often more than six feet long, and flowering stems frequently exceeding 10 feet in height, surmounted by great graceful plumes (panicles) of silvery-white flowers which may be more than two feet long. This beautiful plant is grown in large quantities in California and sold for use in decoration, the plumes often being dyed with aniline in various tints. Out¬ side of California, which is the only country where this grass is grown for market, the plants are cultivated for ornament in parks and gardens, but in the north they need protection with leaves or litter during the winter. They will grow in any good garden soil with no special attention. There are several horticul¬ tural varieties whose flowers are pink, carmine, purple and intermediate tints. Two related species are of some importance; uva grass (C . saccharoides) , a native of Brazil, fur¬ nishes considerable sugar, and C. jubata, a plant even more graceful than the pampas grass. Neither is grown in the United States, the former being very tender and the latter little known.

PAMPAS DEL SACRAMENTO, pam'¬ pas del sak-ra-men'to, Peru, great plain in the northeastern part of the republic, between the Ucuyali and Aullaga (or Huallaga) rivers; area, 60,000 square miles. It is crossed by ex-

cellent waterways, has a rich vegetation and was settled in the 18th century by Jesuit mis¬ sionaries, but is now almost deserted.

PAMPELUNA, pam-pa-loo'na, or PAMPELUNE, panp:lun, variant spellings of Pam¬ plona (q.v.).

PAMPHILUS, pam'ff-lus, Greek painter: b. between 390 and 350 b.c. He and Eupompus were the founders of the Sicyonian school of painting. He was the teacher of Apelles and Melanthus and was famous for scientific ac¬ curacy in drawing and perspective. He made his pupils pay him a talent (about $2,000) for a course in painting. Among his works famous in antiquity were (The Battle of Phlius) ; (The Voyage of Ulysses) and (Family Group. }

PAMPHILUS, Saint, a priest of Caesarea, by birth a Phoenician, who for refusing to sac¬ rifice to idols was cast into prison. He was a theological teacher at the famous catechetical school at Alexandria and collaborated with Eusebius in writing (The Apology for OrigenP Persisting in adherence to the Christian faith, he was condemned to death (309) and suffered martyrdom by decapitation 16 February, the day on which his festival is celebrated.

'PAMPHLET, a name applied to an ephem¬ eral publication, occasional and not periodical, commonly discussing some question of public or special interest at the time. There are thus two distinct classes of pamphlets, the one ad¬ dressed to the general public, and discussing some question of immediate though probably of temporary interest. Political pamphlets form the type of this class. The other is ad¬ dressed to a special class of readers, and dis¬ cusses something connected with their particu¬ lar interests or pursuits. Pamphlets of both classes are now to a great extent superseded by the opportunities of discussion afforded by reg¬ ular periodical literature. They still, how¬ ever, serve many important uses. Pamphlets have at various times since the introduction of printing exercised a very important influence, especially in this country, and in general in all times of political and religious excitement pamphleteers have been both numerous and vehement. They have comprised all sorts of men from scholars and men of genius to the most vulgar and venal of partisans.

PAMPHYLIA, pam-fil'i-a, ancient division of Asia Minor, bounded on

the north by Pisidia, on the east by Cilicia, on the south by the Medi¬ terranean (Gulf of Adalia) and on the west by Lycia. Its coast line measured 75 miles, and its extent north and south was about 30 miles. The geological formation is peculiar, the entire surface of the country having been greatly changed since classical times by continuous fluviatile deposits of carbonate of lime. The region was never an independent kingdom, so far as we know, but was successively subject to Lydia, Persia, Macedonia, Pergamum and Rome. The population in early times seems to have consisted of an admixture of Semitic and Indo-Germanic elements. There were Greek settlements at Perge, Aspendus, Side, Cibyra and Attalia, and remains of Pamphylian in¬ scriptions show that the dialect of Greek used there resembled both Cyprian and Arcadian and hence was a very early form. Consult Ram¬ say, (Historical Geography of Asia Minor*

(1890) ; Radet, (Les villes de la Pamphylie) (1890, in Revue Archeologique) ; and Lanck-oronski, (Stadte Pamphyliens und Pisidiens*

(1890).

PAMPLONA, pam-plo'na, PAMPELUNA, or PAMPELUNE, Spain, capital city of the province of Navarre, situated near the French border, 200 miles northeast of Madrid, in a plateau 1,400 feet above sea-level, on the right bank of the Arga River and on the railway from San Sebastian to Saragossa. There is, an old and a new quarter. The former with its narrow streets has changed little since the city was the capital of the French kingdom of Navarre; but the new part is regularly laid out. The main objects of interest are a cathedral, .begun by Charles III in 1397, the historic hall where the Cortes of Navarre used to meet, the churches of San Nicolas and San Saturnino and several fine promenades and boulevards, La Taconera being the best; nearby are the gorges of Mayo and Roncevalles. A citadel built by Philip II has been reinforced by more modern fortifications; the city is an important point strategically. The main industries are the man¬ ufacture of leather, linens, paper, flour, soap, strings for musical instruments and wines. There is a great market at Pamplona from 29 June to 18 July. The city may have been a Roman colony, Pompeiopolis, but the derivation is not certain. It was taken from the Arabs by Charlemagne in 778, passed to Ferdinand of Aragon in 1512, was held by the French during the Peninsular War and figured in the

Carlist insurrections. Pop. 30,000.

PAMUNKEY, pa-munk'i, a river in Vir¬ ginia, formed by the junction of the North and South Anna. It joins the Mattapony at West Point and forms the York River. From the source of the South Anna to the York is 100 miles. The Pamunkey Indians have a reserva¬ tion on the Pamunkey River.

PAMUNKEY, pa-munk'i, and TOTOPOTOMOY, two streams in Virginia, the banks of which were the scenes of military operations during the Civil War. When General Grant withdrew from the North Anna (q.v.) on the night of 26 May 1864, he moved rapidly by the left to cross the Pamunkey, about 33 miles east. General Sheridan, with Torbert's and Gregg's cavalry divisions, preceded the infantry in the afternoon and at nine o'clock next morning had crossed the Pamunkey and occupied Hanover Town, near which place, on the Hanover Court House road, one of Gen. W. H. F. Lee's cavalry brigades was met and forced back toward Hanover Court House. On the morn¬ ing of the 28th Gregg's cavalry division, ad¬ vancing on the Mechanicsville road, had a severe engagement with the Confederate cav¬ alry near Hawes' Shop (q.v.) and, aided by Custer's brigade, drove it bavk upon the in¬ fantry at the Totopotomoy. General Lee had early information of Grant's movements, and on the 27th put his army in motion to interpose between him and Richmond. Early's corps crossed the South Anna, and by midday of the 28th was in position with its right near Beaver Dam Creek, its left on the Totopotomoy, near Pole Green Church, four miles from Hawes' Shop. Anderson's corps formed on Early's right and covered the road from White House, on the Pamunkey, by Old Church, Bethesda

Church and Mechanicsville to Richmond. Hill's corps and Breckenridge's command extended on Early s left to near Atlee's Station, crossing the Virginia Central Railroad a mile north. On the afternoon of the 28th the Sixth and Second Union corps crossed the Pamunkey at Hunt¬ ley's, four miles above Hanover Town, and took position across the Hanover Court House road at Crump's Creek, and the Fifth corps crossed at Hanover Town, the left near the Totopotomoy, an affluent of the Pamunkey, which it entered two miles below Hanover Town. The Ninth corps crossed at midnight. The

Second, Fifth and Sixth corps formed a line in front of Hanover Town, 17 miles from Richmond, the Sixth on the right, the Second m the centre and Fifth on the left! At noon of the 29th Barlow's division of the Second corps advanced on the road from Hawes' Shop to Atlee s Station, small bodies of Confederate cavalry falling back before it to the other side of the Totopotomoy, where the infantry was found strongly entrenched. Warren's Fifth corps took position on the Shady Grove Church road, skirmishing with the enemy. Wright's Sixth corps moved on the right of the Second, occupying for a time Hanover Court House, and then closing in to the left, and the Ninth corps moved between the Second and Fifth, pushing out on the road to the Pole Green Church. There was incessant skirmishing dur¬ ing the 30th in an effort to develop the Con¬ federate position, and late in the day Early's corps attacked Warren's Fifth corps near Bethesda Church and attempted to turn its left, but was repulsed. To relieve the pressure on Warren, Hancock at seven p.m. was ordered to attack, and Brooke's brigade carried the first line of rifle pits occupied by the Confederates. On the 31st Birney's division crossed the Toto¬ potomoy and carried the enemy's advanced line on the right of the Richmond road. General Wilson's cavalry division moved to Hanover Junction and destroyed the railroad bridge over the North Anna, at the same time defeating the Confederate cavalry and driving it from Mechump's Creek; and Sheridan with two divisions of cavalry, was sent to occupy Cold Harbor, driving the enemy out, and was di¬ rected to maintain his position at all hazards. On 1 June Warren moved out to develop the Confederate position and found it intrenched strongly in his front, beyond clear ground, swept by artillery fire. He lost 200 killed and wounded, extended his line some distance to the left and was attacked in several places dur¬ ing the day and quite severely on the right just before dark. Everywhere General Grant had found General Lee confronting him in strong works, and determined again to retire from his direct advance toward Richmond and to throw his troops rapidly to the left to Cold Harbor (q.v.). This movement began on the night of 31 May, the corps moving successively from the right. Consult (Official Records) (Vol. XXXVI) ; Humphrey, (The Virginia Campaign of 1864— 65) ; Wather, (History of the Second Army Corps) ; The Century Company's bat¬ tles and Leaders of the Civil War> (Vol. IV).

E. A. Carman,

PAN, in Greek mythology, a rural divinity. Comparative philology, showing that the name is related to pastor (Latin, ((shepherd))), agrees

with the results of modern mythological study, which traces its various attributes back to an original god of the flocks, so that we can credit neither the decadent explanation of his name, from the Greek word meaning ((all,)) by his be¬ ing the son of Penelope and all the suitors, nor agree with the Stoics who made of him a god of the universe, the ever-present spirit of nature in all things. It seems evident that Pan was originally a shepherd god of Arcady; indeed the figure that Arcady cuts in modern pastoral poetry seems to be due entirely to its mention in classic authors in connection with the pastoral god. Considered as a typical shepherd Pan naturally develops into hunter, fisherman and, in time, warrior; and ((Panic fear® or "panic® is explicable as an extension of the unreason¬ ing terror that seizes a flock of sheep. Another school of mythologists stress the fact that Pan was an Arcadian god, make his various rural activities merely those of the normal Arcadian and explain his warlike functions by noting that the Arcadians were often mercenaries ; but this scheme fails to explain the myth of Pan's love of Selene, the moon-goddess, which is per¬ fectly explicable if we reckon the god a shep¬ herd who must "watch by night.® The Arca¬ dian myths of Pan's birth are many; the commonest make him son of Zeus and Callisto, or of Hermes and a daughter of Dryops and associated him closely with Dionysus. The myth and the cultus of Pan spread slowly through Greece. He was not worshipped at Athens until after the battle of Marathon, where the panic of the Persian army was ac¬ credited to him. Compare Browning's poem 'PheidippidesP In Rome Pan was identified with Faunus or Inuus and later confused with the Satyrs, so that Panes and Panisci were spoken of; moreover his nature was sensu¬ alized somewhat, so that in early Christian times he became par excellence the god of Greek heathenism. Hence the myth of the death of Pan at Christ's birth; and hence too, be¬ cause of the representation in art of Pan as a horned being half-man, half-goat, the popular picture of the devil. Earlier Greek art, it must be remembered, made of him merely a beautiful young shepherd, only occasionally giving him horns, such as were worn by other divinities of nature, notably the river-gods. Consult Wies-eler, (De Pane} (1875); Roscher, (Ueber Selene und Verwandtes) (1890); Stuart, (The Great God Pan> (1913).

PAN-AMERICAN CONFERENCE OR CONGRESS, a title given to the meetings of delegates from various countries of North, Central and South America to consider ques¬ tions of mutual interest. A desire for the uni¬ fication of the different American nations was felt as early as 1826, when the Panama Con¬ gress, then projected, failed to meet. In 1831, 1838 and 1839-40, Mexico called a meeting, but there was no

response. In 1847-48, Bolivia,' Chile, Ecuador, New Granada and Peru sent delegates to a meeting, but they adjourned without effective results. Another fruitless meeting was heid at Santiago in 1856, Peru, Chile and Ecuador being represented. In 1846 Peru called a conference at which eight repub¬ lics met to organize a Latin-American Union and "to organize into one family the former Spanish colonies.® No report was made of this

meeting. In 1878 still another meeting was held without results. In 1881 invitations were issued by James G. Blaine, then Secretary of State of the United States, for a Latin-American Con¬ gress to be held in Washington the following year, but the project was abandoned. In 1888— 89 South American jurists met, but made no political recommendations. Finally, 10 May 1888, President Cleveland was authorized to call an International American Conference to meet in Washington the following year. Dele¬ gates were then present from all the govern¬ ments of South and Central America except Santo Domingo. The object was the further¬ ance of international comity and commerce, including a customs union, sanitary regulations, intercommunication, uniform weights and measures, a common silver coin and a plan of arbitration. The only practical result was the establishment of the International Bureau of American Republics. On 22 Oct. 1901 dele¬ gates from 19 countries were present at a con¬ ference in the City of Mexico to consider ar¬ bitration, an international court of claims and the reorganization of the Bureau of American Republics. Many resolutions were adopted and the congress adjourned to meet at Rio de Janeiro, 23 July 1906. Among the subjects con¬ sidered by this congress was the Drago or Calvo Doctrine forbidding governments to col¬ lect privately debts by force. Elihu Root was present and spoke of the desire of the United States to have fair and friendly relations with all other Pan-American powers. The Confer¬ ence referred many points to The Hague Con¬ ference, especially the collection of international debts without recourse to arms. A number of valuable recommendations were made regard¬ ing recognition of patents, trademarks and copyrights. Municipal

sanitation was also dis¬ cussed at length. The fourth meeting of the Conference was held at Buenos Aires, 9 July 1910. At this time the name of the Bureau of American Republics was changed to the Pan-American Union. This bureau is supported by contributions, and Andrew Carnegie led with $750,000 while $250,000 was. added by the 20 republics, this having been invested in a per¬ manent house in Washington for the bureau, which has collected a large library of litera¬ ture bearing on Pan-American topics. A Pan-American scientific congress has also been or¬ ganized and held sessions in Chili in 1908, and Washington, D. C., in 1912. A Pan-American Commercial Congress met at Washington in 1915 and discussed ways and means for meet¬ ing the usual conditions growing out of the World War and hampering commerce in the Americas.

PAN-AMERICAN EXPOSITION, a fair held in Buffalo, N. Y., from 1 May to 1 Nov. 1901. Financially it was a failure, due largely to President McKinley's assassination, which caused a temporary closing. The total cost of the exposition was $8,860,757.20 ; the total receipts $5,478,589.37. See Exposition, Industrial.

PAN-AMERICAN UNION. The official international organization of the 21 inde¬ pendent republics of North and South Amer¬ ica maintained by them in Washington for the development of commerce and trade, inter¬ course and good understanding and the pres¬

ervation of friendship and peace among them.

It is controlled by a governing board com¬ posed of the Secretary of State of the United States, who is chairman ex-officio, and the dip¬ lomatic representatives in Washington of the other American republics. It is administered by a director-general, who is elected by this board, and is, therefore, an international officer. He, in turn, is assisted by a large, trained ex¬ pert and clerical staff who compile information, make research investigations, prepare reports and publications, answer inquiries, receive vis¬ itors and conduct correspondence. The Pan-American Union occupies a building on 17th street, between B and C streets near the en¬ trance to Potomac Park in Washington, which has been described by a great French architect as (<combining beauty of architecture, nobility of expression and practical usefulness more than any other official structure in the United States." It has sometimes been described as the Capitol of the Western Hemisphere in the Capital of the United States. Erected through the munificence of Andrew Carnegie and the contributions of

all the American republics, it stands as a beautiful and useful monument to the cause of Pan-American solidarity and relationship.

In its practical work of spreading accurate information about the American republics and making them better acquainted, not only with themselves but with other countries of the world, the Pan-American Union publishes an illustrated monthly Bulletin, with English, Spanish, Portuguese and French editions, which is circulated all over the Americas and Europe and is an attractive record of the general prog¬ ress of each American country. It also pre¬ pares, prints and distributes descriptive pamphlets of each constituent country of the Union, reports on a great variety of subjects and other data of an informative character. Last year it distributed nearly 1,000,000 pieces of printed matter relating to the American repub¬ lics, but all of these were sent out in response to requests or to persons, firms and institutions interested.

One of the notable features of the Pan-American Union is the Columbus Memorial Library, the largest up-to-date collection in the world of practical Pan-Americana. This library contains nearly 45,000 volumes indexed with 150,000 cards, nearly 2,000 maps and atlases and 25,000 photographs. On the tables of its read¬ ing room can be found the principal newspa¬ pers and other publications of the Latin-Amer¬ ican countries.

Perhaps a feature of the Pan-American Union which appeals to the interests of the world is its governing board, or international council, which makes the Pan-American Union a real league of peace amorjg the American nations. On the first Wednesday of every month in * the governing board room of the Pan-American Building, around a great oval table, with the chairs carrying the names and escutcheons of the constituent governments, there meets this council made up of the Sec¬ retary of State of the United States and the highest representatives in Washington of the other governments. From one to two hours they consider ways and means of so administering the Pan-American

Union as to develop the closest relation¬ ship among the American republics and to insure permanent peace among them. Since the reorganization of the Pan-American Union in 1907, following the Pan-American Confer¬ ence held at Rio de Janeiro in 1906, there has been no war between any two American re¬ publics, and the moral influence of this council has probably prevented several wars on the American continent. It has been said that the Pan-American Union is a working league of nations which might be well described as the prototype of a World League to preserve peace.

Through the educational informative work of the Pan-American Union and the efforts of the United States and other governments, the commerce exchanged between the United States and the 20 Latin-American countries has grown in the last 12 years from approxi¬ mately $500,000,000 to $1,750,000,000. The Pan-American Union has, moreover, devoted its energies to making the study of the Spanish and Portuguese languages and the geography, his¬ tory and characteristics of the Latin-American countries popular among the educational insti¬ tutions of the United States. It has tried to do a corresponding service for the United States in the Latin-American countries. It favors the movement for the exchange of college profes¬ sors and students between the educational insti¬ tutions of the United States and Latin-America. It regularly provides the leading newspapers of North and South America with information about the various Pan-American countries which will make them better acquainted with, and more interested in, each country. In many respects the Pan-American Union can be de¬ scribed not only as a great active organization for the development of commerce and cultural relations and the preservation of peace, but an international bureau of information for the Western Hemisphere. Any person seeking in¬ formation of whatever character relating to Latin America will have his inquiry carefully considered and answered if he addresses the Pan American Union, Director General, Wash¬ ington, D. C.

The present executive staff of the Pan-American Union includes the following: John Barrett, director-general; Francisco J. Yanes, assistant director; Franklin J. Adams, chief clerk and editor of the Bulletin; W. C. Wells, chief statistician; W. A. Reid, chief trade ad¬ viser; C. E. Albes, assistant editor; V. A. Wood, chief accountant; Angel C. Rivas, Span¬ ish translator and assistant editor; C. E. Bab¬ cock, acting librarian.

PAN-GERMANISM, a movement, origi¬ nating in German imperialism and the German race-consciousness, born of the establishment of the empire, having for object the uniting of all European people of

Germanic stock wherever located into one great national unit. The movement crystallized Anally in the founda¬ tion of a society styled the universal German League (Allgemeiner dcntsclier V erband) on 9 April 1891. On 1 July 1894 the name was changed to the Pan-German League (All deutscher V er¬ band) and at the same time was founded the official organ of the League, the Pan-German Gazette (Alldeutscher Blatter). Some persons prominent in the Pan-German movement dis¬ claimed all ulterior motives on the part of the vol. 21 — 15

League in regard to political affairs and ter¬ ritorial acquisitions abroad, asserting the while that the sole object of the movement was to spread a knowledge of German culture — man¬ ners, customs, social polity, etc., throughout the world. They asserted their belief that there was much in German home life, education, govern¬ ment, social policies, etc., that was of prime interest to the rest of the world and a knowledge of which would result in great benefits, both material and spiritual, to the human race as a whole. Others identified with the movement expressed most pronounced beliefs in regard to the ultimate destiny of the Teutonic peoples, whose culture they regarded as so superior to that of the rest of mankind that they deemed it the duty of all Germans to. further its progress and extend its power abroad so that ultimately by sheer weight of its worth it might become a world culture and the world, mentally, if not politically, might become a German world. The Pan-Germans from time to time gave expres¬ sion to their policies, especially in regard to a strengthening of national consciousness ; they advocated determined colonial and emigration policies, and sought to safeguard German in¬ terests abroad through energetic diplomatic in¬ tervention. In 1903 the League formulated its program as follows: (1) To quicken the patriotic self-consciousness of Germans, and to offer opposition to all movements antagonistic to national development; (2) To treat and solve all questions bearing upon the bringing up of children and higher education in the Ger¬ manic sense; (3) To watch over and support all German national movements in all countries where Germans have to sustain a struggle in support of Germanism, with the object of em¬ bracing and uniting all Germans on the globe; (4) To promote an active German policy of interests in Europe and across the seas, and especially to further the colonial movement to practical results.

In the four years from 1898 to 1902 the mem¬ bership of the League grew from 12,000 in 82 branches (28 outside of the homeland) to 21,-

924 in 217 branches. With the opening decade of the 20th century the Pan-Germans, now wielding a vast influence, began to extend their activities to the ends of the earth and to pour forth a stream of literature in the shape of books, pamphlets and newspaper articles in an effort to catch up with the Anglo-Saxon world movement launched years before. Indeed, the Pan-Germans of the more radical type early recognized in Great Britain the one great ob¬ stacle to the realization of their ideals. The latter had had the ear of the world for genera¬ tions and the Germans, though late in the field, were determined to make up for lost time by intensive and sedulous propaganda.

Thus far we have dealt merely with the Pan-German movement as regards its origin, development, aims and methods. In the course of the late war popular propaganda in Allied countries charged the Pan-Germans with al¬ most every crime and misdemeanor under the sun, and with being in accord with the ruthless policy of the Imperial German Government. Much of this had best be forgotten; it served its purpose by keeping the people keyed up to the effectual prosecution of the war and its continuance would only serve to keep alive

racial bitterness and hatred. Few previous to the war would have believed it possible that the press of all countries — both of the Entente and its opponents — could be prostituted to the de¬ gree we witnessed during the war. However, it is important here to examine the connection between the Imperial German Government and the Pan-German movement, if any such existed. Undoubtedly very many officials high in the councils of the Empire were also prominent in the Pan-German movement, but the degree to which they influenced or were influenced by the latter we are unable to determine. We have, however, the repeated assertions of the German authorities that the Pan-German movement was the work of but a very small group of the Ger¬ man people, and that it had at no period of its history received any official sanction.

Pan-Germanism carried on its work in the open; its aims and objects were published to the world and its literary product reviewed in the

press of all countries. In Germany, itself, the movement was not widely acclaimed. It was vigorously opposed by a not inconsiderable num¬ ber of men in public life and also by the Social¬ ists, whose prominent leaders took advantage of every opportunity to denounce it as a menace to the German working class, contrived by the militaristic caste as the advance guard of their grasping imperialistic policy. In Pan-German¬ ism we have, therefore, a movement of a very small but very powerful group organized to further German culture, if not German domina¬ tion, throughout the world. This movement was recognized and commented upon in other coun¬ tries ; it was opp©6ed by influential men and by a great political party in Germany itself ; it never received any recognition from the imperial Ger¬ man government, although at times the policies of both were identical ; during the war every utterance of a German imperialist or militarist was imputed to the Pan-Germans and their coterie, perhaps more often than not erro¬ neously, since many of such utterances were made on individual responsibility in an effort to main¬ tain the morale of the German nation at home as well as on the fighting front. The collapse of the empire in 1918 proved the greatest setback Pan-Germanism had ever received. It saw the realization of its aims and ideals postponed in¬ definitely, and to the world in general the movement appeared dead. That it did not die, however, was shown by the public pronounce¬ ments of the League during the sessions of the Peace Conference, more especially soon after the terms of the peace treaty had been communicated to the representatives of the new German government. See War, European : Historical Introduction and Chronology.

Bibliography. — Bernhardi, F., von, Ger¬ many and the Next War5 (1911) ; id., (Britain as Germany's Vassal 5 (1912) ; Biilow, Prince von, (Imperial Germany5 (1912) ; Chamberlain, H. S., foundations of the 19th Century5 (London 1910) ; Dix, A., ˆDeutschland auf den Hochstrassen des Weltwirtschaftsverkehr5 (1901) ; Eisner, K., (The Pan-German Society) (in Current History, New York, January 1916) ; Fried, A. H., (The German Emperor and the Peace of the World) (London 1912) ; Haase, E., (Weltpolitik, Imperialismus, und Kolonial-politik) (Berlin) ; Lichtenberger, H.,* (Germany and Its Evolution in Modern Times5 (London

1913) ; Sarolea, C., (The Anglo-German Prob¬ lem5 (London 1912) ; Gaevernitz, (Der Englische Imperialismus5 ; Tannenberg. (Gross-Deutschland: die Arbeit des 20ten Jahrhundert5 (1911); Treitschke, H. G. von, (Deutsche Geschichte in 19ten Jahrhundert 5 (5 vols., Leipzig

1875-95) ; Usher, R., (Pan-Germanism 5 (New York 1913-14) ; Woltmann, L., f olitische Anthropologie5 (1903).

PAN TADEUSZ (Master Thaddeus). Under the influence of Homeric studies, but more especially of Goethe's (Hermann und Dorothea,5 Mickiewicz began to write his superb epic, fan Tadeusz,5 and published it in 1834. The poet intended to treat Master Thad¬ deus as the Polish hero whose life and love was to be a parallel to that of Hermann, hence he chose a similar name for his poem. But, as he proceeded, the sum total of Lithuanian life in the beginning of the 19th century obtruded itself upon his vision, and the title now no longer corresponded to the matter in hand. The critic Gostomski has admirably characterized fan Tadeusz5 as something like a musical symphony which begins with an idyllic theme, through which may be heard the harsher tones calling to battle or the plaintive notes of an elegy. These themes uniting render perfectly the essence of Lithuania. Dissonances appear, the theme grows, the martial and elegiac notes prevail. Then, as the battle theme subsides, a new melody strikes the ear. We hear the cry of despair and of a suffering soul, a mighty tragic storm approaches, and all ends with a song of overwhelming contrition. The poetic symphony ends with a superb, harmonious finale, in which the previous motives are united.

In the Middle Ages the executive branch of government was feebly developed as compared with the legal side, hence it became necessary for the winning party to make forcible in¬ roads in order to enforce, the legal decision. This state of society prevailed in Lithuania up to the 19th century, and such an inroad was called in Polish zajazd. Mickiewicz used the theme of an old feud between two houses and the zajazd, in order to depict in epic form the whole of the late Lithuanian past, and, at the end of the poem, allowed the feud to subside, the parties uniting in welcoming into Poland Napoleon, from whom salvation was expected. The critical literature of fan Tadeusz5 is very large. Probably the best work is W. Gostomski's (Arcydzieeo poezyi polskiej A. Mickiewicza Pan Tadeusz5 (Krakowie 1894). In English a study may be found in Monica M. Gardner's (Adam Mickiewicz5 (London 1911, ch. 6, pp. 155-182). fan Tadeusz5 was translated into English (London 1885) by Miss Maud Ash-hurst Biggs; a new translation by Prof. George R. Noyes was published in London 1917.

Leo Wiener.

PANA, pa'na, Ill., largest city in Christian County, on the Baltimore and Ohio, the Cleve¬ land, Cincinnati, Chicago and Saint Louis, the Illinois Central and Chicago and Eastern Il¬ linois railroads, 32 miles

southeast of Springfield. It was settled about 1845; incorporated 1867, taking its name from an Indian tribe which in earlier days inhabited this region. It is located in the fertile corn belt; corn, hay, wheat and fruit being the principal products. Underlying the region surrounding Pana is an

extensive coal field and there are numerous coal mines furnishing employment to over 1,500 miners. Its excellent railroad facilities make it an advantageous manufacturing city. There are a soda-fountain factory and woodworking establishments.

It is distinguished by having the highest alti¬ tude of any city in Illinois. It has five ward schools, one parochial school and a large town¬ ship high school; a free public library; a large Y. M. C. A., Huber Memorial Hospital, a beau¬ tiful city park of 40 acres; over 14 miles of paved streets with an adequate water supply system. It has a City Court with concurrent jurisdiction to that of the Circuit Court of the county. . Pana was settled in 1853 and incor¬ porated in 1867. It has an aldermanic form of government under the general law of the State Pop. 6,122.

PANˆTIUS pa-ne'shi-us, Rhodius, Stoic philosopher : b. Rhodes, about 180 b.c. ; d. Rome, about 110 b.c. He spent most of his life in Rome disseminating the tenets of Greek and more especially of Stoic philosophy. Here he enjoyed the friendship of Laelius and the younger Sapio. He subsequently traveled extensively in the East and visited Egypt and on his return opened a Stoic school at Athens. He really belonged to the middle Stoic or Eclectic school and borrowed from Plato and Aristotle. Only fragments of his writings are extant to-day. His chief treatise was one on ˆ Duty, ˆ from which Cicero in his (De Officiisˆ has drawn much material. Consult Van Lynden (De Panaetio> (1802); Schmekel, (Die 'Philosophic der mittlern Stoa> (1892).

PANAMA. A country of Latin America, bounded on the north by the Caribbean Sea, on the east by Colombia, on the south by the Pacific

Ocean, and on the west by Costa Rica. We'dind in the interior a great number of hills and mountains, a few being extinct volcanoes. These have no geological connection either with the North American Cordilleras or with the Andes. The only systematic ranges are a bit of the Costa Rica central divide, which runs over into western Panama, and on the Atlantic Coast further east the Cordillera de San Bias. The detached and irregular hills are often sep¬ arated by streams, greatly subdivided, whose banks (like the hillsides and, indeed, the greater part of the country) are covered with dense tropical vegetation. The exceptions to this rule are a few treeless uplands along the Pacific side between the Costa Rica border and the Gulf of Panama. The rivers and streams are the ill-named Rio Grande and the Chagres, which have been factors in the Canal Zone problems; the Tuyra and the Bayano, in the eastern and central regions; and in the western region, where the water-parting is more dis¬ tinctly marked, many rivulets that flow from the central range northward to the Caribbean or southward to the Pacific. The area of the republic was officially given in 1916 as 32,380 square miles. Of the Canal Zone (see Panama Canal) the area is 474 square miles. Political aspects of the acquisition of this strip, the pre¬ cise terms of the grant, etc., are examined and stated in the section History.

Climate. — The chief hydrographer of the Panama Canal, Mr. F. D. Willson, writes that on the Isthmus average temperatures decrease

approximately one degree Fahrenheit with every 330 feet increase in elevation. The in¬ fluence of the Caribbean Sea, lying to the wind¬ ward, is shown in the climate of the Atlantic Coast, which is nearly of the moist and equable oceanic type; but climatic conditions on the Pacific slope and throughout the interior ex¬ hibit many of the characteristics of the conti¬ nental type because the prevailing winds over these sections blow from off the Isthmian land areas. A large percentage ot the rainfall comes in the form of afternoon tropical showers, the period from 2 o'clock p.m. to 3 p.m. being the hour of heaviest rainfall as a general rule. Al¬ most the only general storms that visit the sec¬ tion of the Isthmus traversed by the canal are the so-called «northers» during the period from pr November to April, inclusive. Characterized by steady winds of a velocity of 30 or more miles per hour, these ˆnorthers® may or may not be accompanied by heavy rain¬ fall. The winds alone are usually of insuffi¬ cient force to hinder navigation at the Atlantic entrance of the canal; the high waves accom¬ panying these storms, however, were injurious to shipping interests before the breakwaters that now protect the inner bay were

constructed. £,0 avera&e annual sea temperature is about 82 F-on the Caribbean Coast and 80° F. on the Pacific side. The absolute range on the former side is only about 12° F., while on the latter (at Balboa) the absolute range is 29° F. Hail has fallen in the Canal Zone or vicinity three times since observations were begun in 1906. \ ater spouts have been seen at both canal entrances. Generally _ speaking, the climate is unnecdthful . except in those places where modern sanitation methods have eliminated the causes of tropical diseases.

Seismology. — Before the occupation of the Canal Zone by the commission from the United States there had been 28 recorded earthquakes but only one or two that can be classed as de¬ structive possibly the shock which occurred in 1621 and certainly that, of 7 Sept. 1882. Since 1904 _ seismic disturbances were thought to be negligible except during the fiscal year U13-14 and in 1915. During the former vear 87 shocks were recorded at Ancon. Of these 55 or 56 were of comparatively local origin less than 200 miles distant; 31 or 32 were tremors from shocks of remote origin. Nearly all of the local shocks appeared to originate about 115 miles southwest of Ancon Hill in Los Santos Province. Ten of these were felt generally over the Isthmus, and the shock of 28 May 1914 damaged sliefitly the new Adminis¬ tration Building at Balboa. In 1915 sharp shocks were felt on 24, 25 and 26 January and on 28 June. These did not originate in the Zone, and caused little damage there or else¬ where on the Isthmus.

Tides. On the Pacific side the average tidal range for consecutive tides is about 12.5 feet, the maximum spring range occasionally exceeding 20 feet ; but at the northern entrance to the canal the average tidal range is only about 0.9 foot, and the extreme range ap¬ proximately two feet. Within and beyond this tidal area we find a coral formation of a com¬ paratively recent date, which fringes both the Pacific and Caribbean coasts and extends in¬ land several miles near the rivers.

Chagres River, The. — This famous river is formed by the confluence of two streams at Dos Bocas, the main stream originating among the

mountains of the San Bias cordillera, where peaks 2,000 to 4,000 feet in altitude are found. Mr. Willson says that although nearly the en¬ tire country from headwaters to the neighbor¬ hood of the canal is clothed with vegetation, much of which is dense, the slopes are so pre¬ cipitous and rock lies so near the surface that severe tropical rain storms cover its banks with small torrents and cascades, from time to time causing the river to rise suddenly and to discharge almost incredible volumes of water. Its drainage area before it reaches the canal is 1,320 square miles. In the upper reaches there are two canyons, each about a mile in length, and a number of rapids. By damming its waters at Gatun, the engineers of the commis¬ sion have formed the dominating feature of the Panama Canal — Gatun Lake, which has an area of 164 square miles at an elevation of about 87 feet above sea-level and contains 192.24 billion cubic feet of water.

Fortifications. — Modern defensive works are maintained only in the neighborhood of the canal. General Goethals (see Bibliography) writes: ((In 1910 Congress voted in favor of fortifying the canal and, subsequently,, of hav¬ ing a garrison permanently located within the Zone. These defenses consist of seacoast forti¬ fications for the protection of the entrances against naval attack and land defenses around the locks, the most vulnerable features of the canal, against any force that might be landed from an attacking fleet for raiding purposes.®

Political Divisions, Population, Cities. — The republic of Panama is divided into eight provinces as follows:

PROVINCES

Capitals

Population

of

Capitals

Bocas del Toro .

9,000

6,000

30,000

15,000

6,000

8,000

50,000

7,000

Penonom6 .

Colon .

David .

Chitre .

Los Santos .

Los Santos (Las Tablas) Panama .

Santiago .

The number of inhabitants was given as 450,000 in 1916. (Pan-American Union, Latin America, Washington 1916). The estimates for 1911 and 1912 were, respectively, 337,000 and 341,000, exclusive of the Canal Zone. In the republic as a whole the mestizos are most numerous (about 190,000 to 200,000) ; whites about one-fourth as many.

History. — Columbus landed on the Isthmus in 1502. Then came further exploration and in its train colonization, still in the first quarter of the 16th century. In the more flourishing days of Spanish rule in that century and the next the country in general and the city of Panama in particular enjoyed the advantages coming from the shipment of South American silver and gold. But this prosperity had so dropped at the close of the 18th century that Panama was largely isolated from Colombia and took comparatively little part in the various re¬

volts that culminated in Colombian independ¬ ence in 1819. Two years after that date, how¬ ever, the people of Panama proclaimed their independence and became part of the old re¬ public of Colombia. This was a strongly cen¬ tralized government held together by little but Bolivar's personal influence and power. It was shattered in 1831, the year after his death, and three new republics were formed, namely, Venezuela, Ecuador and New Granada. The last named included the Isthmus. Strangely enough the form of government of the new republic was practically identical with that which had brought it to revolt against Colom¬ bia, and equally ill-adapted to its heterogeneous elements. Moreover, there was no simple and speedy means of intercommunication such as might have welded the country into some national unity. In the existence of this type of government is the philosophic key to the history of both the old republic of Colombia down to 1831, and after that date of New Granada, the United States of Colombia, and the republic of Colombia (the present name of the country). It was in the very nature of things that as New Granada had broken from Colombia, so Panama, New Granada's re¬ motest part, must break, or attempt to break from New Granada. A state's rights or Fed¬ eralist party did rapidly rise throughout New Granada. In 1840 revolutions broke out in most of the provinces. An independent <(State of the Isthmus,® containing the provinces of Panama and Veraguas, was proclaimed in 1841, but the Centralists were successful, the revolu¬ tion was suppressed, and the old regime was restored. The sentiment against this method of government steadily increased until in 1855 by an act of the Congress of New Granada at Bogota the autonomous state of Panama was erected out of the Isthmian provinces. But the sincerity of this act may well be questioned and its aim was probably political and the purpose to crush the Federalist party for good and all. But the attempt of the national government to revoke its act, and, it seems, to provoke a revo¬ lution, and then in crushing that revolution to put a stop to all Federal agitation, over-reached itself. The revolution in behalf of the new constitution was completely successful. For a score of years and more Panama, like the other states in the Colombian Union, enjoyed (more or less interruptedly) its individual rights. A Centralist uprising in 1885, however, effected a return to old conditions. The former state of Panama was again ruled from Bogota, and be¬ came a department called Panama. This de¬ partment was divided into four provinces, Chiriqui, Veraguas, Azuero and Panama ; the last named province occupied the eastern half, ap¬ proximately, of the department of the same name, with which it is very easily confused.

During this revolution in 1885 the United States landed marines to protect the transit of the Isthmus between the cities of Colon and Panama, a circumstance of material assistance to the Centralist insurgents, but an act under¬ taken simply for the sake of interoceanic and transisthmian commerce. That it could have been for any reason other than this is im¬ possible, since the right and duty of the United States to preserve neutrality in the Isthmian strip was due to a treaty made in 1846 with the government of New Granada, a government not

in existence in 1885. In short, the obligation was one to a territory and not to any power; and if to any power simply to that in control of the Isthmus, no matter what its relation to the original treaty-making power.

After 1885 the relations of Panama with Colombia were no closer nor more familiar than before. Several revolts took place, and in July 1900 under the lead of Porras, later a leading candidate for the vice-presidency of the republic, a desperate but unsuccessful at¬ tempt was made bv a Liberal army to get con¬ trol of the city of Panama. In 1903 a more successful plot was planned, growing out of the discontent of the people of Panama with the attitude of Colombia toward the Panama Canal Treaty with the United States. Whether through fear that the United States would in time gain sovereignty over the canal — there was an old saying that the canal when built would become the southern boundary of the United States — or a hope that the bid for the canal might be largely increased, the Colom¬ bian Congress refused to ratifv this treaty and adjourned 31 Oct. 1903. By the terms of the Spooner bill this made the Panama Canal ap¬ parently an impossibility and the Nicaragua Canal a certainty, for the President had been bidden to treat for the Panama Canal, and if such negotiations failed, to carry through the project of the Nicaragua Canal. In short, the people of Panama would have been deprived of the fulfilment of their hopes of renewed com¬ mercial importance by this inexplicable action of the Colombian Congress, had not the

revolu¬ tion planned as early as the summer of 1903 offered a solution. How the desire for auton¬ omy, the desire for a canal and the desire for the money to be paid for the canal, respectively, bulked in the minds of the revolutionary Diot¬ ters it is difficult to say. The foregoing sketch of Panama's oolitical history would show at least that a revolution for purely political rea¬ sons was a possibility. The mixture of motives amounts to little more than a coincidence of several impulses, each of which alone would have been sufficient. On 3 Nov. 1903 — that is three days after the adjournment of the Colom¬ bian Congress — the municipal council of the city of Panama proclaimed the independent republic of Panama. There was no bloodshed. An army of 400 Colombians (mostly boys be¬ tween 12 and 14) arrived 4 November in Colon, whence its general with his staff went to Panama ; and upon his refusal to acknowl¬ edge the new reoublic, of which he knew nothing until the evening of the 4th, was im¬ prisoned for a few days, but on the 7th with his army was shipped back to Cartagena from Colon. In the meantime upon 6 November the United States recognized the new republic, be¬ ing satisfied that there was not the slightest in¬ ternal opposition to its establishment. France's recognition followed 10 November, and soon afterward like action was taken by Germany, England and Russia. The remarkable haste with which the provisional government was recognized by that of the United States is not without precedent; in a Senate debate 5 Jan. 1904 Senator Lodge pointed out that in 1848 the French republic was recognized after three days and that the republic of Brazil had received formal recognition within two days after its formation. It is to be noticed also that Pan¬

ama's government may justly be reckoned a ˆresumption® of previous independence. As to the action of our government in landing marines to protect the TransIsthmian Railroad its defense lies in an appeal to the Treaty of 1846, to the precedent of 1885, when the Cen¬ tralist cause was as much (and as uninten¬ tionally) aided as it was checked in 1903, and to the principle that it is the Isthmian com¬ merce that we aim to protect by keeping the strip neutral rather than any government, and hence that an appeal from any established power in the Isthmus for protection of the railroad must be met by speedy and unhesitating action. The objections to this' view of the case and the disagreement with the actions of the existing administration came from various sources: first, as in the case of the New Haven petition sent to the Senate 11 Jan. 1904, from unparti¬ san constitutional experts; and second from the opposition in Congress and the supporters of the Nicaragua route, who saw their last chance to win.

The New Haven petitioners simply asked the Senate to make a careful and delib¬ erate investigation. The opposition in Con¬ gress (and in the press) urged that the revolu¬ tion in Panama was fostered if not actually started by the Republican administration (Roosevelt's) and the landing of troops was for the purpose of preventing Colombia from subjugating the rebellious department; in fine, that both revolution and recognition grew out of pure self-interest in the proposed canal. Whatever the merits of these arguments, the in¬ ability of the Democratic caucus to bind its members to oppose the Canal Treaty, the in¬ structions from the Mississippi legislature to the senators from that State, and 11 Jan. 1904 the practical confirmation of the nomination of W. I. Buchanan to be Minister to Panama by the tabling of Senator Morgan's motion to re¬ consider, seemed to show that the actual opposi¬ tion was political and temporary.

The provisional government founded 3 November was in the hands of a iunta con¬ sisting of J. A. Arango, Tomas Arias and Federico Boyd. The last-named member of the junta arrived in the United States on 18 De¬ cember and late the same day a Canal Treaty was signed by Secretary of State John Hay and the Minister from Panama to the United States, Philippe Bunau-Varilla, who had been formally received at Washington eight days be¬ fore. This treaty closely resembles the conven¬ tion made with Colombia; the compensation is the same ; but the canal strip is made wider and the powers granted 'to the United States are larger. The junta named above took control of the government, being assisted by the fol¬ lowing provisional cabinet : Minister of Gov¬ ernment, Eusebio Morales; Minister of Fi¬ nance, Dr. Manuel Amador Guerrero (later elected President) ; Minister of Foreign Affairs, F. V. de la Esprilla; Minister of Justice, Carlos Mendoza; Minister of Public Instruc¬ tion, N. Victoria; and Minister of War and Marine, M. de Obarrio, Jr. On 27 December a general election of delegates to a national convention took place. In most instances mu¬ nicipal authorities acted as electors, the scheme of manhood suffrage originally promulgated hav¬ ing proved impracticable. Four delegates were chosen from each province except Panama, which elected eight, making a total of 32,

These delegates, meeting 15 Jan. 1904, were called to frame a constitution and to elect a President. The provisional government ratified the Canal Treaty 2 Dec. 1903, and five days afterward the treaty was submitted to the United States Senate for ratification by that body. On 16 Feb. 1904 Guerrero was elected President, with Arosemena, Obaldia and Men¬ doza as designados, or vice-presidents.

Article 2 of the treaty between the United States and the Republic of Panama, which was ratified by the United States Senate 23 Feb. 1904, and went into effect 26 Feb. 1904, pro¬ vided for the cession, in perpetuity by Panama, of a strip of territory adjacent to the canal, as follows :

((The Republic of Panama grants to the United States in perpetuity the use, occupation and control of the zone of land and land under water for the construction, maintenance, opera¬ tion, sanitation and protection of said canal of the width of 10 miles, extending to the dis¬ tance of five miles on each side of the centre line of the route of the canal to be constructed; the said zone beginning in the Caribbean Sea, three marine miles from mean low-water mark, and extending to and across the Isthmus of Panama into the Pacific Ocean to a distance of three marine miles from mean low-water mark, with the proviso that the cities of Pan¬ ama and Colon and the harbors adjacent to said cities, which are included within the boundaries of the zone above described, shall not be included within this grant. The Re¬ public of Panama further grants to the United States in perpetuity the use, occupation and con¬ trol of any other lands and waters outside of the zone above described which may be neces¬ sary and convenient for the construction, main¬ tenance, operation, sanitation and protection of the said canal or of any auxiliary canals or other work necessary and convenient for the construction, maintenance, operation, sanitation and protection of the said enterprise. The Re¬ public of Panama further grants to the United States in perpetuity the use, occupation and con¬ trol of all islands within the limits of the zone above described, and in addition thereto the group of small islands in the Bay of Panama named Perico, Nacs, Culebra and Flamingo. })

In compensation the United States paid $10,000,000 for the concessions and agreed to pay $250,000 annually, beginning in the 10th year after the ratification of the treaty. The uneasy conditions prevailing throughout the Central American countries during 1907 and the early part of 1908 were particularly manifest in Panama, especially as the time for the election of a new President drew near.

This uneasiness caused some apprehension at Washington lest the Canal Zone might become affected in some way. Charges had been made by one of the political parties that frauds had been perpetrated in the previous elections and that the members of the opposition party had not been allowed to register. A request was, therefore, sent in May 1908 to the United States to appoint a commis¬ sion to assure a fair election. In order to pacify all the political elements Secretary of War Taft was sent to Panama. Ricardo Arias, Sec¬ retary of Foreign Relations, was the candidate of the Government party for the presidency and Jose Obaldia was the candidate of the

Liberal party in opposition to the government. The latter, while popular with the people, was not so with the government and apprehension was expressed lest the former should use the power of the government and police forces to hold a dummy election and declare himself elected. Upon his arrival Taft decided to ap¬ point American representatives to observe the elections which were to be held on 12 July, and made it plain to the political parties that if frauds were permitted that might lead to dis¬ order, riot or insurrection the United States would preserve order according to the terms of the treaty. A commission of electoral in¬ quiry was appointed by Panama to investigate and a list of the actual voters in each polling precinct was made. Thereupon Arias withdrew from the contest and Obaldia was elected al¬ most without opposition.

Government. — By the provisions of the con stitution adopted 13 Feb. 1904, the country has a centralized republican form of government. The executive authority is vested in a President elected for a term of four years by popular vote; the President is assisted by a cabinet of five members. The legislative branch of the government consists of a single body of depu¬ ties called the National Assembly and the mem¬ bers are elected for four years. The sessions of this Assembly are held at the city of Pan¬ ama once every two years, and extraordinary sessions may also be called by the President of the republic. The judicial branch comprises a Supreme Court of five judges, appointed by the President for a term of four years ; a Superior Court and several Circuit Courts (appointments to both made by the Supreme Court for four years) ; and Municipal Courts, whose judges are appointed by those of the Circuit Courts for one-year terms. For local government the re¬ public is divided into eight provinces, each of which in turn is divided into municipal dis¬ tricts. The affairs of the provinces are admin¬ istered by governors, appointed by the President of the republic for one-year terms, and those of the municipal districts by

mayors and municipal councils, the latter elected by direct vote for two years, the former (the mayors or <(al-caldes®) appointed for one year by the provin¬ cial governors.

Education. — The Department of Public In¬ struction has charge of all elementary, sec¬ ondary and special schools and establishments of learning, both public and private; of the Pedagogical Library and of the National Mu¬ seum. The system of public education includes the kindergarten, for children five and six years of age, and primary schools for children of the ages seven to 14; these primary schools being or¬ ganized in six grades, for which official courses of study are provided; and the instruction must be under official supervision even when given in private schools or at home. An obligatory course of only three years is established in rural schools. Among the special institutions above referred to are the School of Arts and Crafts, the National School of Music, the College of Commerce and Languages, the National Insti¬ tute and a recently established school for the instruction of native Indians. (Consult (Report of Commissioner of Education, > Washington 1915, and Pan-American Union handbook (Pan-amaP Washington 1916). In 1917 the National

Assembly authorized tile executive to found and maintain a Pan-American University in Panama City. The university is to give preference to courses in Spanish and English literature, trop¬ ical medicine and law. The National Institute of Panama is to serve as a base for the new university. Altogether the government main¬ tains 398 public schools throughout the prov¬ inces. There are about 375 teachers in these schools and about 22,000 pupils (excluding 1,720 children enrolled in the schools of the Canal Zone). There are also about 12 private insti¬ tutions and about 60 young men and women are being educated in the United States and else¬ where at the cost of the Panama government.

Industry and Commerce.— The cultivation of bananas on a large scale and of cacao, sugar¬ cane, tobacco, rice, maize, etc., on a small scale, should be mentioned. Agriculture is practi¬ cally undeveloped

because of poor transporta¬ tion facilities. The sugar industry is import¬ ant in Los Santos and Veraguas, but could be greatly extended. The cocoanuts and pineap¬ ples of this region deserve their good report. Stock-raising is also an important branch (es¬ timated number of cattle about 200,000; horses, 15,000; mules, 2,000; pigs, 30,000; and goats, 5,000). Mining is carried on in the Darien dis¬ trict and Veraguas Province; pearls are obtained at the Pearl Islands, Panama Bay, and coral and sponges are found near the coasts. Forest prod¬ ucts are both valuable and interesting. Manu¬ factures are few and unimportant. Chocolate, mineral waters, ice and soap are made for local consumption. The government maintains a monopoly in the production of tobacco, cigars, cigarettes and salt, and lets these to individuals. A law fixing the responsibility of employers for accidents to workmen was passed by the Con¬ gress of Panama on 6 Nov. 1916, and was pro¬ mulgated in the Gaceta Oficial 10 days later. One of the features of the law is that if insur¬ ance companies are established in the country, employers may insure their employees for the amounts which would be due them in case of injury by accident while at work. The part of the law that provides for indemnity to victims of accident became effective 16 May 1917, while the remainder of the law went into effect on 16 Feb. 1917.

Chief exports are bananas, cocoanuts, coco-bola wood, ivory, nuts, medlar juice, mother-of- pearl, hides, tortoise shell, rubber (from trees scattered in the forests), skins, ipecac, sarsa¬ parilla, brown sugar, cacao and balata. Chief imports are rice, cigarettes and cigars, sugar, lard, coffee, kidney beans, eggs, candles, choco¬ late, Indian corn (maize), cheese, beer, food pastes, petroleum, gasoline, leather, butter, leaf-tobacco, *etc.* In the last normal year before the European War (1913) imports from the United States were valued at $6,378,702.29 ; from Great Britain, $2,465,431.54 ; from Germany, $1,078,- 167.72; from France, $336,816.38; from China and Japan, $266,772.62 ; from Spanish America, $238, 684.48 ; from Belgium, $208,539.98; from Italy, $168,881.59; from Spain, $162,574.09. The total foreign trade in that year was $16,780,- 027.59 (imports valued at $11,397,000.05 and ex¬ ports $5,383,027.54). In 1914 the total imports were valued at $9,885,475 and the exnorts at $5,163,000. Of the total imports $6,396,275 came from the United States (exclusive of canal ma¬

terials), $1,835,890 from Great Britain, $460,455 from Germany, $211,725 from France, $109,090 from Italy and $300,835 from Belgium. In 1916-17, 38,000 quintals of sugar were pro¬ duced. Imports in 1916 totaled $9,397,365 and exports amounted to

$5,706,725. Of the im¬ ports $6,674,990 came from the United States (exclusive of canal materials), $1,267,145 from Great Britain, $143,290 from France, and $38,590 from Italy. In the same year (1916) the chief exports were bananas, $2,370,555 ; cocoanuts, $805,825; balata, $461,000; tallow, $333,280 and hides, $284,205.

Banking and Finance. — The monetary sys¬ tem is based on the gold standard, its unit being the balboa, divided into 100 centesimos and rep¬ resenting 1.672 grammes of gold .900-fine, or 1.5046 grammes of pure gold, equivalent to $1 currency of the United States. In actual circulation are silver half balboas, locally called pesos, and fractional silver and nickel coins, together with currency of the United States on a par basis. The revenues of the republic declined 30 per cent after July 1914, the causes being (as stated in Proceedings of the First Pan-American Financial Conference) Washing¬ ton 1915) the diminution of imports due to the European War and the establishment (by the government of the Canal Zone) of com¬ missaries privileged to import merchandise without payment of duties. On 26 Oct. 1915 an extraordinary session of the National As¬ sembly was held to consider pressing financial problems. A contract with New York finan¬ ciers (1915) provided for the establishment of the Bank of Panama, one-fourth of the directors to be named by the government of Panama. That bank, acting as fiscal agent and depository of the Republic of Panama, has power to issue legal tender notes up to the value of its capital. The revenue for 1916 was $5,311,000 and the expenditure $5,823,000. The budget for the biennial period — 1 Jan. 1917 to 31 Dec. 1918 — was planned to balance at $7,198,170. The republic has $6,000,000 in¬ vested in the United States and $750,000 capital in the Bank of Panama. A loan of $3,000,000 was negotiated in New York in 1915 for the con¬ struction of the Chiriqui Railway.

Transportation. — Steamships from the United States and Europe, from South Amer¬ ica and the West Indies, enter the port of Colon on the north coast ; on the south coast, Balboa, the Canal Zone's Pacific port, is visited regularly by steamers from both north and south. A railroad three miles long connects Balboa with Panama City, from which the main line of the Panama Railroad extends to Colon, 48 miles. Other railway systems are those of the Bocas del Toro region, 151 miles of narrow-gauge track designed chiefly for the service of the banana industry and of the Pedregal, David and Boquete south-coast dis¬ tricts. The latter, when completed, will be about 52 miles in length. In 1917 a conces¬ sion was granted for the construction of a railway on the Atlantic Coast from the mouth of the Chagres southwest to Almirante, about 31 miles. The Chirique line is about 80 miles in length. The great difficulty experienced in constructing and

maintaining good roads on land through the tropical jungles directs at¬ tention to the possibility of improving and uti-232

lizing the rivers for transportation. At pres¬ ent, the Tuyra River is navigable for many miles by small craft, and the same may be said of a number of other streams; but it is also true that floods during the rainy season (see Climate) prohibit continuous use. The gov¬ ernment is planning extensive improvements in various parts of the country to facilitate com¬ munication and internal development. Pro¬ vision was made in the 1917 budget for the construction of new roads and the repair of old ones, for the building of bridges, wharves and warehouses, *etc.* On 26 Sept. 1916 the new port of Mandinga, about 80 miles from Colon, was opened. An appropriation of $200,000 is made for roads from Penonome to Puerto Posado and from Ancton to Penonome, an¬ other from the latter place to Cahecera and to Rio Chico.

Police, Post and Telegraph Offices. — No

army is maintained, its place being taken by a national police corps of 1,000 officers and men. There are 96 post offices, handling about 2,500,000 pieces of mail-matter annually; 37 telegraph offices and two wireless-telegraph stations. The government in December 1916 appropriated $25,000 for the installation and maintenance of a telephone line in the province of Colon, along the Atlantic Coast, starting from the city of Colon and terminating in Santa Isabel. Construction was begun 1 Mar. 1917. A concession for the establishment and maintenance of electric plants and telephone systems throughout the republic was granted by the government of Panama in March 1917. It was provided that the American concessionaire, when employing labor in accordance with the terms of that concession, must give preference to natives of Panama and must retain them in the proportion of at least 50 per cent. There are telegraph cables from Panama to North American and South American ports and from Colon to the United States and Europe.

Bibliography. — Abbot, W. J., (Panama and the CanaP (New York 1914) ; Alfaro, R. J., (Limites entre Panama y Costa Rica) (Pan¬ ama 1913) ; Anderson, C. L. G., ‘Old Panama and Castilla del Oro) (Boston

1914) ; Bishop,

F. , (Panama, Past and Present* (New York 1913) ; Bullard, A., or Edwards, A., (Panama) (revised, New York 1914) ; Bunau-Varilla, P., (Panama) (London 1913) ; Constitution of Panama* (Panama 1909) ; Franck, 'Things as Thev Are in Panama) (London 1913) ; Payne,

G. H., 'Panama, Past and Present* (New York 1912) ; Bo let in de Estadistica (monthly, Pan¬ ama) ; 'Legal Code of Panama) (6 vols., Pan¬ ama 1917); Pensa, H., La Republique et le Canal de Panama* (Paris 1906) ; Streitberg, T., 'La Republique de Panama' (Brussels 1913).

Marrion Wilcox.

PANAMA, capital of the Republic of Pan¬ ama, situated on a coral peninsula running into the Gulf of Panama. It has no actual port, but vessels anchor safely between the mainland and a chain of islands. Founded near the Pacific Coast in 1519 by Pedrarias Davila, Panama be¬ came wealthy in the days of the Peruvian mines, and was the oldest and richest colony in America in 1671 when it was taken, looted and burned by the buccaneer, Sir Henry Morgan (q.v.). The present city, six miles from the site of the old, was built two years after, and with its granite

fortifications was long the strongest Spanish fortress on the Pacific. 4 he rush of gold-hun¬ ters to California in 1849 renewed its pros¬ perity somewhat and in 1855 procured for it rail¬ road connections with Colon, a new port on the Atlantic. Beside mere reshipping business it has the large part of the export trade of what is now the republic (and was the department) of Panama. The government buildings is one of the city's most creditable new structures in point of architecture, and has been designed rather ingeniously to serve a variety of pur¬ poses, the east and west wings being given over to the offices of the executive departments, while in the south wing are the National Assembly rooms and in the north the National Theatre. The buildings of the National Exposition of Panama, which threw open its doors hospitably in-1916, are also noteworthy. Striking con¬ trasts of past and present, the ancient and the extremely modern, are offered by such buildings as Santo Domingo church or the moderately old cathedral, on the one hand, and on the other every token of modernity — the tramways, auto¬ mobiles, electric lights, modern shops, *etc.* Panama is the social and commercial, as well as the political centre of

the country; in it the revolution against Colombia was carried out 3 Nov. 1903. Pop. 37,600.

PANAMA, Isthmus of, the tongue of land connecting the central and southern American continents and varying in width from 31 to a little more than 110 miles, the former measure¬ ment being taken from the Gulf of San Bias and the latter including Azuero Peninsula. The Isthmus runs east and west with a double curve in either coast line, so that the western hollow made by Mosquito Bay on the north side and the eastern indentation of the Gulf of Panama on the south side, each with a cor¬ responding bulge opposite, give the entire Isthmus the shape of a recumbent S or of the sign of variation. In this more extended use of the term the words Isthmus of Panama are applied to the entire Republic of Panama (q.v.), that is, what was formerly the isthmian segment of Colombia (q.v.). The term is also used to designate the eastern and narrower part, cor¬ responding roughly with the Miocene causeway between the northern and the Neotropical regions (see the article on Latin America — section Fauna and Flora), to which the name of Darien was originally applied. The isthmus was reached by Columbus in 1502, and was crossed in 1513 by Balboa, who “from a peak in Darien” discovered the Pacific. The cities of Panama and Nata were colonized before 1520. The Isthmus was also the scene of the Darien scheme of colonization fathered by William Paterson. In spite of its having been known so long to European explorers, large parts of the Isthmus remained as a virgin field for ethnologists, geographers and naturalists long after the first Canal Commission from the United States undertook the great constructive work. The geologist of the Isthmian Canal Commission contributed to the Scientific American, 18 Oct. 1913, pp. 303-305, a study of the geological con¬ ditions on the Isthmus, giving prominence to the fact that there are, within the Republic of Panama, high mountain groups, but few, if any, mountain ranges, properly so called. “The older geographies,” he writes, “informed us that

the North and South American Cordilleras were practically one

continuous chain from Alaska to Cape Horn. This is quite incorrect, for the mountains of Panama … are units quite

distinct geographically from the greater north¬ ern and southern continental ranges. Further¬ more, they have had a different origin, for they are not due to folding by lateral pressure, but originated from intrusions of volcanic rocks, as necks, cores, masses and irregular dikes.® These intrusive rocks are of five types : basalts, diorites, andesites, granodiorites and rhyolities. They were extruded in a molten condition through volcanic agglomerates, breccias and tuffs : through sandstones, limestones, argillites and shale beds, mostly of Oligocene age. A fact that any serious student will notice is that the bedded rocks cut by these bodies of igneous or volcanic rock are not well consolidated, except in the vicinity of the higher mountains where they have undergone such induration as the heat of the great masses of ejected lava occasioned. The basalt, the esite and rhyolite extrusions are principally post-Oligocene, <(and seem to be largely Miocene in age.® The diorite is, at least in part, pre-Oligocene, probably of Eocene time. The fact that the earthquakes are co¬ extensive with these mountain groups is evi¬ dence that the latter have been pushed up be¬ yond the supporting power of their foundations and are even now settling back to adjustment. This consideration has an obvious bearing upon the problem of the <(slides® in Culebra Cut. (See Panama Canal). Both Gold Hill and Contractors' Hill are examples of such settled-down masses. Within the Canal Zone there are only two peaks that attain approximately 1,000 feet in altitude; and no summits within 30 miles of the Canal Zone are higher than 2,000 feet. In fact, this marked depression is so extensive that no mountains above 4,000 feet in height are found within 100 miles of the canal's terminal ports. In the western regions, however, and in those districts long the subjects of contention on account of the conflicting claims of the Republic of Panama (as inheritor of Colombia's con¬ tentions) and Costa Rica, we find high moun¬ tains, attaining 11,000 feet in two instances, and unquestioned evidences of much more recent plutonic activity. (For climate, fauna and flora, hydrography, ethnology, etc., see Panama ; Panama Canal).

PANAMA CANAL, a waterway connect¬ ing the Atlantic and Pacific oceans, cut through the Isthmus connecting the continents of North and South America. Its opening has solved the problem of international commerce which first intruded itself on the Western World in 1453 when Constantinople fell to the Turks and the great land routes to India and the Orient were closed to Christian Europe. Within half a cen¬ tury of the event Columbus set forth on his memorable voyage in search of a route to the East. When he reached

the West Indies the natives told him of a strait through which it was possible to travel westward to the great sea over which lay an unhampered road to India.

Balboa also heard the legend of a water route to the west and explored the Isthmus of Panama in an endeavor to locate it. After his time the discovery of this mysterious stream furnished the chief incentive to most of the

exploration up and down the coast. While the strait remained undiscovered, the search for it gave birth to the idea of digging a waterway which would connect the two oceans. To Her¬ nando Cortez, conqueror of Mexico, belongs the honor of first proposing the construction of this water route. His plans were cut short by the treachery of his followers, but he en¬ couraged his cousin, Alvaro de Saavedra Ceron, to continue the project, and the latter finally elaborated plans for four routes — Darien, Nicaragua, Tehuantepec and Panama — the identical routes which received so much attention in the 19th century. With the abdi¬ cation of Charles V, who was favorable to the project, all interest in it was abandoned by his successor, Philip II. Interest in an interoceanic route was revived from time to time, however, and especially after the peoples of the Isthmus severed their political connection with Spain about 1823. Henry Clay was fully alive to the importance of the canal project, the completion of which (speaking in 1825), he said, (<will form a great epoch in the commercial affairs of the whole world.® In 1826 Aaron H. Palmer of New York entered into a contract with the Republic of Central America to con¬ struct a canal capable of accommodating the largest vessels afloat. Failing to enlist the financial aid then deemed necessary ($5,000,000), Palmer's contract came to nought. President Jackson sent Charles Biddle to Nicaragua and Panama to examine the different routes, but the mission was nullified by the subsequent action of the President and Senate.

After the Mexican War, which planted the Stars and Stripes on the Pacific Coast, the commercial necessity for a transisthmian canal was recognized. Various plans were made and with each decade the need for the canal became more imperative. Several times a canal under American control seemed assured, but some difficulty of a political nature always arose. While discussion concerning a canal was rife, enterprising Americans had in 1855 linked up the Pacific and Atlantic coasts of the Isthmus of Panama by means of the Panama Railroad, which for a time relieved the congestion of transcontinental

communication. The Civil Wˆar precluded for several years the construc¬ tion of a canal, and before America was again ready to' consider the project seriously the French had undertaken to engineer and finance the construction of a canal.

In 1876 Count Ferdinand de Lesseps became head of a committee which proposed to study the Isthmian Canal project. Its first meeting was held in May 1879, and was attended by 135 delegates, of whom 11 were from the United States. The ˆInternational Congress® decided that the Panama route was the most feasible, the most practicable route, having the Bay of Panama and the Gulf of Limon as terminals of a sea-level canal, which it was estimated would cost $240,000,000. Meanwhile in 1878, Lucien N. B. Wˆyse and associates had secured a concession from the Colombian government granting the exclusive privilege of constructing and operating a transisthmian canal for a period of 99 years.

The French Company. — As a result of the deliberations of the International Congress a company was organized on 17 Aug. 1879 under

the title Compagnie Universelle du Canal Inter-oceanique de Panama, with Count de Lesseps as president. The Wyse concession was pur¬ chased for 10,000,000 francs ($2,000,000) and the company set about making exact detailed surveys. The company was capitalized at $80,-000,000, in shares of $100 each, which were opened to public subscription. The plan adopted by de Lesseps was for a sea-level canal 30 feet in depth, 72 feet bottom width and an estimated length of 47.2 miles, involving the excavation of 160,000,000 cubic yards of rock and earth, at a cost now placed at $168,000,000 within a period of nine years. Beginning in February 1883 actual excavation was entered upon and within a short time there began to arise those serious obstacles which had been foreseen by the trained engineers who had voted against de Lessep's project at the con¬ ference. It was found that the estimates were far too low. By the middle of 1885 scarcely one-tenth of the estimated minimum excavation had been effected, and it

was evident to all that the program originally outlined could not be carried out. Severe criticism and passionate discussion of the enterprise took place in France and the credit of the company being seriously impaired it was deemed necessary to resort to irregular and corrupt practices. Many mem¬ bers of the French legislature were corrupted. De Lesseps relinquished the directorship in 1887 and returned to France to be tried and dis¬ graced in the courts of his native land. In the same year the lock-type of canal was adopted, but it was now too late to save the enterprise, and in 1889 the Civil Court of the Seine ap¬ pointed a judicial receiver. The company was declared to be bankrupt, and examination showed that 80,000,000 cubic yards of earth and rock had been excavated at a cost of $265,-938,600; of this sum only $156,654,687 was actu¬ ally expended at Panama. The company was dissolved by the court and a liquidator appointed to take charge of the property and to carry out the enterprise if possible and with power to cede any or all of the assets to a new company. Extensions of time were secured from the gov¬ ernment of Colombia. The New Panama Canal Company was organized in 1894 with a capital stock of 65,000,000 francs or 650,000 shares of 100 francs ($20) each. Fifty thousand shares were given Colombia for a further extension of time, leaving about $11,700,000 as working capital. The assets and property of the old company were transferred to the new by the liquidator and a commission of 14 engineers was appointed to investigate the project. Their report was favorable and excavation went on slowly, the new company expending about $9,- 000,000 and excavating 5,500,000 cubic yards by the close of 1899. Meanwhile, public sentiment in the United States had become strongly im¬ pressed with the desirability of a transisthmian canal under American control. The Nicaragua route was generally favored by members of Congress and others, a fact which caused ex¬ treme anxiety to those interested in the New Panama Canal Company. The directors of the latter decided to bring the comparative merits of both the Nicaragua and Panama routes be¬ fore th» American government. The full report of the technical committee of the latter com¬ pany was laid before President McKinley in December 1898. In March of the following

year the President was authorized to make an exhaustive investigation as to the most practi¬ cable and feasible route for a transisthmian canal that should be under the complete conti ol of the United States and the absolute property of the latter. The President thereupon ap¬ pointed the first <(Isthmian Canal Commission® which was composed of the following mem¬ bers: Rear-Admiral John C. Walker,

U. S. N.; Hon. Samuel Pasco ; George S. Morison ; Lieut. -Col. Oswald H. Ernst, U. S. A.; Lewis M. Haupt, C.E.; Alfred Noble, C.E. ; Col. P. C. Hains, U. S. A.; Wm. H. Burr, C.E. ; Prof. Emory R. Johnson. The commission examined the project of the New Panama Canal Company both at Paris and at Panama, and thereafter tried to have the company state definitely the conditions and terms under which its property and rights might be transferred to the United States. The company was reluctant to state its terms explicitly and as a result the commis¬ sion reported in favor of the Nicaragua route in November 1901. When this report became known in France, the New Panama Canal Company was at once reorganized with new executives and immediately offered its property and rights in the canal to the United States for $40,000,000. This change of front on the part of the company, who saw their last chance of disposing of their property slipping away, caused the commission to make a supplementary report, in which it advocated the Panama route as the most feasible in view of the altered conditions.

A long and somewhat acrimonious discus¬ sion of the relative merits of the Nicaragua and Panama routes ensued in Congress and not until June 1902 did legislation (Spooner Bill) pass authorizing President Roosevelt to acquire the rights and property of the New Panama Canal Company for a sum not to exceed $40,- 000,000 and to secure by treaty with Colombia the perpetual control of the territory needed for operating the canal ; the law also provided for the prosecution of the work by an Isthmian Canal Commission consisting of seven members to be appointed by the President.

The American Enterprise. — After the en¬ actment of the Spooner law, the provisions of which are outlined above, negotiations were entered upon with Colombia for a concession. If unable to secure a satisfactory title to the property of the New Panama Canal Company, or (<to obtain by treaty control of the necessary territory from Colombia,® the President was empowered to negotiate with Costa Rica and Nicaragua for a concession, and having secured the privileges desired, to construct the canal by the Nicaragua route. The purchase price to be paid the New Panama Company was not to exceed $40,000,000, including the Panama Rail¬ road, and before paying oyer the money to the company the President was required to assure himself of the validity of the title to the prop¬ erty to be transferred and to await the ex¬ change of ratifications of a satisfactory treaty with Colombia. The Attorney-General of the United States .was promptly instructed to make the investigation concerning the validity of the title held by the New Panama Company, and his elaborate opinion, together with the data upon which his opinion was

based, was laid before the President on 25 Oct. 1902. The Isthmian Canal Commission had previously investigated

the title and nature of the concessions involved, as had also the Senate Committee on Interoceanic Canals. The commission's report con¬ tains a full historical and analytical discussion of the subject of concessions. The relations of the original Panama Canal Company to the New Panama Canal Company were set forth, and the opinion expressed that the New Pan¬ ama Canal Company was able to sell its conces¬ sion and property to the United States, pro¬ vided the representative of the rights of the old company, the "liquidator,® gave his approval of the sale, and united with the new company in the offer to sell. Shortly after this report was made the New Panama Canal Company offered to sell out to the United States, and the liquidator gave his consent to the sale.'

Treaty with Colombia.— The treaty grant¬ ing to the United States the concession and rights necessary for the construction, operation and control of the Panama Canal was signed by Secretary Hay and the Colombian charge a affaires, 22 Jan. 1903, and ratified without change by the United States Senate, 17 March following. It is a lengthy treaty, containing 28 articles, but is remarkable for the concise¬ ness and directness with which each provision is stated. The Canal Commission did not con¬ sider it necessary for the United States to ac¬ quire sovereignty over the territory adjacent to the canal. The desirability for the United States of having the sole and undivided owner¬ ship and control of the canal when constructed was emphasized, and the recommendation was made that the compensation to be paid by the United States should be definitely fixed either as a single payment, or as a predetermined annual payment, or as a combination of these two methods. The treaty authorized the New Panama Canal Company to sell out to the United States; exempted the Panama Railroad Company from its financial obligation to Co¬ lombia, and gave the United States a lease for a period of 100 years, renewable at the option of the United States, of a

strip of land 10 kilometers wide across the Isthmus of Panama. The United States not only recognized the sov¬ ereignty of Colombia over this leased strip, but “disavows any intention to impair it in any way whatever, or to increase its territory at the expense of Colombia or of any of the sister republics in Central or South America.® The United States secured the right to construct the canal and harbors, to establish free ports at the termini of the canal, to maintain hos¬ pitals and drainage and sanitary works along the line of the canal and its dependencies, and to install waterworks and a sewerage system in Colon and Panama, with the authority to “collect equitable water rates during 50 years.® Colombia agreed not to cede or lease to any foreign power any territory in the Department of Panama, and .the United States guaranteed that no country should be allowed to seize such territory. It was provided that the canal should be neutral in perpetuity, in conformity with the treaty of 18 Nov. 1901, between the United States and Great Britain ; but the United States reserved the right to protect the canal.

The unexpected rejection of the treaty by Colombia in the summer of 1903 at once put a new phase on the question and the promoters of the Nicaragua route again advanced their project and once more discussion was rife in

regard to the relative merits of the two routes.

Treaty with Panama. — The successful re¬ volt of Panama from Colombia in November 1903, as fully described under Panama (q.v.), and the immediate recognition of the new re¬ public by the United States and other govern¬ ments, however, confined the canal question to the Panama route. The provisional govern¬ ment of Panama at once arranged a new treaty with the United States government for the con¬ struction and control of the canal, differing from the treaty with Colombia in that the Canal Zone was enlarged, and greater powers granted to the United States. This, known as the Hay-Varilla Treaty, was signed at Wash¬ ington 18 Nov. 1903 and ratified in Panama 2 Dec. 1903. By its terms the United States guarantees and will maintain the independence of the Republic of Panama. Panama grants the use in perpetuity of a zone 10 miles wide, and its exclusive control for police, judicial and other purposes; cedes territory for sub¬ sidiary canals and the coast line within the zone; and if police and other matters in the cities of Panama and Colon prove unsatisfac¬ tory, the United States may intervene. The canal is to be neutral and open to the world’s commerce. For these grants the United States agreed to

pay $10,000,000 on the ratification of the treaty and $250,000 yearly beginning after 10 years. The sovereignty of Panama over all her territory to be recognized.

Plan and Organization. — On 4 May 1904 the United States took possession of the canal site and property. Major-General Whitfield Davis was appointed head of the Canal Com¬ mission with gubernatorial powers within the zone, his assistants being William Barclay Par¬ sons, New York, William H. Burr, New* York, Benjamin M. Harrod, Louisiana, Carl E. Crin-sky, California, and Frank J. Hecker, Michi¬ gan. The preparatory work was begun on the plan of high-level locks, as favored by Congress in 1902. The average summit-level proposed was to be 85 feet above mean tide. This was to be secured by a dam at Bohio, the most important structure of the high-level canal. The dam proposed by the French Panama company was 'to be of clay founded upon a variety of material — hard clay, soft clay, sand, gravel, *etc.* The Isthmian Canal Commission decided upon a core-wall-and-earth dam, the core-wall to be carried down every¬ where to rock, the latter being reached in places at a depth of 128 feet below sea-level. On 19 Dec. 1904, however, the chief engineer of the Isthmian Canal Commission laid his report be¬ fore the Congressional Committee of Com¬ merce. He was in favor of a return to the original plan of a sea-level canal as the best and cheapest in the end. The cost was esti¬ mated at $300,000,000 and the time of construc¬ tion 20 years.

Early in 1905 the Engineering Committee (Messrs. Parsons, Burr and Davis) also issued a report recommending a sea-level canal, which they estimated could be completed in 10 or 12 years for $230,500,000. As outlined by them the canal was to extend 49 miles from the 36-foot depth mark in Colon Harbor to the similar depth-mark in Panama Harbor, and with a bottom width of 150 feet, was to be 30 feet in depth. As regards the natural features

of the Isthmus, the first section from the At¬ lantic to Bas Obispo is 29 miles of low, marshy and unhealthful surface, thick with tropical

vegetation ; work here was facilitated by the considerable amount of excavation done by the French, and a stretch of completed wajerway. The second and most difficult section of the canal was in the hill ground from Bas Obispo to Pedro Miguel, 7.91 miles, and known as the Culebra Cut. The route was so well chosen, however, that it afforded the lowest crossing in the ridge between the oceans. The third section from Pedro Miguel to the Pacific, nine miles, is similar to the Atlantic side, low, marshy and unhealthful. The greatest diffi¬ culties to be overcome were in keeping the floods of the Chagres under control and the cut through the rocky height of Culebra, the isth¬ mian backbone and continental divide rising 300 feet above sea-level, nine miles from the Pacific.

In consequence of the recommendations a series of radical alterations were made in the United States canal program for 1905, but on 30 March, Secretary Taft sent to President Roosevelt a drastic statement concerning the whole scheme, which was acted upon with such promptitude, that an executive order was issued on 3 April, reorganizing the Canal Commission. Theodore P. Shonts was appointed chairman, Charles E. Magoon was appointed governor of the Canal Zone and also to serve as Minister to Panama; John F. Wallace, chief engineer;- Rear-Admiral M. T. Endicott, U. S. N. ; Brig.-Gen. Peter C. Hains, U. S. A.; Col. Oswald H. Ernst, Engineering Corps, U. S. A. ; and B. M. Harrod. A comprehensive list of in¬ structions concerning the duties of the new commissioners was issued. In Tune Mr Wal¬ lace was succeeded by Mr. J. F. Stevens as chief engineer. Among other recommendations of Secretary Taft was the formation of an advisory board to consider the best design of canal. A board of consulting engineers was appointed, which after several sittings divided on the plan of canal.

Sanitation. — • Meanwhile preparatory work proceeded upon the canal cuttings but during the summer of 1905 the work of excavation was virtually t suspended. The mortality had proved alarming and Governor Magoon di¬ verted most of the labor to sanitary work. Attention was devoted to the draining and oiling of marshes for the destruction of mos¬ quitoes propagating malaria and yellow fever, to the sewerage systems of the Isthmus, and to a good water supply for the cities of Panama and Colon with the result that the mortality from yellow fever was soon completely re¬ duced. The housing, provisioning and entertain¬ ment of the laborers in the Zone were also arranged. Colonel William C. Gorgas of the Medical Department of the Army began the remarkable work of sanitation, without which it is doubtful if the canal could ever have been completed, certainly not without an appalling loss of human life. General Gorgas's interest¬

ing book, Sanitation in Panama,* contains the best account of the admirable achievements in this department. We have no means of telling (General Gorgas says, in effect) what was the sick rate of the French during the period of construction under the old French company, from 1881 to 1889, but we know that it was very

large. We can safely calculate that their con¬ stant sick rate was at least 333 per 1,000, or one-third their force. Now our force during the 10 years of construction averaged 39,000 men. If we had had a similar constant sick rate, we should have had 13,000 sick employees in our hospitals every day during the 10 years of construction. As it was, we had onlv 23 per 1,000 sick each day, a total of 900 for the whole force; that is, we had about 12,000 fewer men sick every day than had the French. This 12,000 men per day saved from sickness must be credited to the sanitary work done on the Isthmus. Now let us consider the totals: We had an average of 900 men sick every day. For the year, this would give us 328,500 days of sickness, and for the 10 years, 3,285,000 days of sickness. If our rate had been 300 per 1,000, a very moderate figure compared with what it was under the French, we should have had 11,700 sick every day. For the year this would have given us 4,270,500 days of sickness, and for the 10 years 42,705,000, a saving of 39,420,000 days of sickness during this period. This saving must be credited -to sanitation. Again, it cost us about $1 a dav to care for a sick man on the Isthmus. The commission cared for the sick free of charge. Therefore every day of sickness prevented lessened the expense that the commission had to bear by $1. It follows that the commission saved by the work of its sanitary department, if we con¬ sider the whole 10 vears of construction, $39,-

420,000.

This represents only one phase of the saving due to sanitation. We must further consider that, if 300 men out of every 1,000 had been sick every day, the efficiency of the other 700 would have been correspondingly decreased. The other 700 would have been more or less debilitated and more or less depressed, and the amount of work turned out daily by each man would have been considerably less than it act¬ ually was for the employees enjoying good health and cheerful surroundings. The com¬ mission would have had to pay considerably higher wages if the Isthmus had continued to bear the reputation it had alwavs borne during the years preceding 1904; if, for instance, it

had been known that three out of every 10 men going to work on the canal would be sick all the time, and that two out of everv 10 would die each year, and that the whole 10 would be dead at the end of five years. Great loss was caused in the first years of the American as¬ sumption of the task by the demoralization among the working force, and almost stoppage of work, which took place during periods of exacerbation in the yellow fever period or when prominent employees died of that disease. Great loss also occurred to the French on this account. Those most familiar with the condi¬ tions state that a larger sum ’in dollars and cents was saved to the commission in these ways than was saved by the direct decrease in the number of sick. Considering all these factors an estimate was made that the sum of $80,000,000 was saved to the United States by the sanitary work done on the Isthmus during the 10 years of construction. This is the purely commercial side of the question. Of much greater importance is the moral argu¬ ment that can be adduced from the saving of

VEmpilonado

Las -©elicias

/Ruins of Old Panama

West Breakwater

REPUBLIC V

\Pta.Paitillp

JlpjCNAMANIANCˆV]gk NCHORAGE/ ‘

Toro Point i L.H.

riV.NA.MA £

J^^WfCAmAL REP.—, op > anam^) A

.Limon *Pi.*

Jararnillos

S/ERR* H

gatum

Plight of 3 Lockjrz

JR :‘oGrcinclcO io Grande Xv

$

iNaranjitos

Pta.Ouinea *J77*.

Balboa Hill °

1000

Lorenzo^

CHANGARM1

gatˆ

S Pta

Bruja _

ˆ TORTOLlTAPl

a i. JLTagTOLO COCOVI I. ‘

mmm

panama

Araijan

D

ˆ Puebl; Rio Pii

PANAMA CANAL ZONE

PANAMA CANAL - ‘

PANAMA RAIL ROAD - ■

PANAMA RAIL ROAD (RELOCATED)

SELONES I,

Scale of Miles

Copyright,

,scovalo°

Panama Canal was opened on August 15, 1914, according to the proposed elevations shown hereon On May 21st, 1919 there was still a working force of 20,182.

life and suffering that results from such meas¬ ures. During the 10 years of construction, the commission lost hy death only 17 out of every 1,000 of the employees. That is, from the whole force of 39,000 men, 663 died each year, and for the whole construction period the loss was 6,630 men. If the sanitary conditions had remained as they had been up to 1904, and the commis¬ sion had lost, as did the French, 200 employees out of each 1,000 men on the work, that would have made the loss 7,800 men each year, and 78,000 during the whole construction period. It is evident, therefore, that 71,370 human lives were saved by the work of the sanitary de¬ partment during the building of the canal.

The distinguished author refers to the sani¬ tary work done in the Canal Zone as the first great demonstration that the white man can (or could, if such measures were generally adopted and applied) live as well in the tropics as in the temperate zones.

Lock-Canal Plan Adopted.— The report of

the board of consulting engineers was submitted to the Senate Committee on Interoceanic Canals and extended deliberations took

place upon the two problems of a high-level lock canal to cost $147,000,000, and not over eight years to build, and a sea-level waterway to cost about $250,- 000,000 and from 12 to 15 years to build. On 17 May 1906, the majority report of the Senate committee in favor of a sea-level type of canal was submitted by Senator Kittredge. Notwith¬ standing this report the idea of a lock canal prevailed in the end. On 15 June 1906, Con¬ gress in committee of the whole voted in favor of a high-level lock canal by a majority of 110 to 36, and on 21 June the Senate also declared for a lock canal. President Roosevelt signed the bill on 29 June 1906. Thus the long-dis¬ cussed question was finally settled and work was at once more vigorously entered on. Under the direction of Chief Engineer Stevens com¬ mendable progress was made by the early part of 1907. Friction developed, however, between the members of the commission and the Wash¬ ington authorities, and, in 1907, when it was proposed that the commission should remove from Washington to the zone and do its work on the field of operation instead of at a dis¬ tance, Chairman Shonts and Chief Engineer Stevens resigned. President Roosevelt then radically reorganized the commission, under date of 1 April 1907. The earlier policy of taking men from civil life to superintend and execute the work was abandoned as a failure. The new commission was made up of govern¬ ment officials and was attached to the War Department under the immediate authority of the Secretary of War. The commission was constituted as follows : Lieut.-Col. George W. Goethals, corps of engineers, chairman; Major David DuB. Gaillard, corps of engineers; Ma¬ jor William L. Sibert, corps of engineers; Rear-Admiral H. H. Rousseau, civil engineer, U. S. N. ; Hon. Joseph C. S. Blackburn, Colonel Wil¬ liam C. Gorgas, medical department, U. S. A.; and Mr. Jackson Smith. Mr. Smith resigned in 1908, and Major H. F. Hodges was appointed to fill the vacancy. Senator Blackburn resigned in 1909, and was succeeded by Maurice H. Thatcher. The latter resigned in 1913 and was succeeded by Richard L. Metcalf, who served until April 1914, on which date — the canal be¬

ing then essentially finished — the Isthmian Canal Commission was abolished, and attention given to the organization of an operating force. In the course of the work many details were altered and at the conclusion of the work the canal plan was as follows: sea-level approach channel in Limon Bay 4.5 miles long, 500 feet wide at bottom and 41 feet deep below mean sea-level; straight strip of sea-level canal for 5.5 miles to Mindi where there is a slight bend followed by a straight channel for 1.5 miles to the locks at Gatun, three in number with a com¬ bined lift of 87 feet to the summit level of Gatun

Lake, favored by the construction of an earth dam of unusual dimensions extending across the valley at Gatun. The flow of the Chagres into the lake is discharged from the latter by a concrete spillway. The normal summit level of the lake is 85 feet, but pro¬ visions are made so that the water surface can be carried at any level between 80 and 87 feet, a matter of the greatest importance during the

Diagram of spillway, Gatun dam.

dry season. The locks at Gatun are close to¬ gether and vessels pass directly from one lock into the next. All three locks are in duplicate, corresponding locks adjoining with only a dividing wall between, making it possible for a vessel to ascend one set, while another vessel descends the adjoining set of locks. Each lock has a usable length of 1,000 feet and a usable width of 110 feet. From the locks at Gatun there was no digging necessary for 17 miles except for an occasional hill-top or mound be¬ cause of the great depth of the lake. The chan¬ nel for 3.5 miles from the locks is perfectly straight, with a depth of 75 feet and is 1,000 feet wide. At this point there is a great bend

Diagram of the Gatun dam, spillway, and locks.

in the canal followed by a straight channel for 4.5 miles to near Bohio, where there is a slight bend. From Bohio to Buena Vista the canal is 1,000 feet wide, after which it again runs

with only two bends for five miles to Tabernilla. For three miles to near San Pablo the channel width is only 800 feet. The lake narrows

past San Pablo and over the site of Gorgona. It retains a width of from 500 to 800 feet to Bas Obispo, where the great Gaillard (Culebra) Cut is entered. For 8.1 miles through the cut the bottom width is only 300 feet, with a mini¬ mum depth of 45 feet at normal lake level. The end of the high level is reached at the Pedro Miguel lock, also in duplicate, by which a descent (or ascent) of 30 feet is made to the 55-foot level of Miraflores Lake, 1.30 miles in length, with 500-foot channel and 45 feet in depth. There are two locks in duplicate at Miraflores, with a combined descent (or ascent) of 45 feet at Pacific high tide or 65 feet at low tide, by which tidewater is again reached. The

canal runs 2.5 miles to Balboa,. after which it becomes a deep water channel in Panama Bay for a distance of nearly five miles. To sum up, the length of the canal from deep water to deep water is 50 miles; length from shore line to shore line, 40 miles; bottom width of channel, maximum, 1,000 feet; bottom width of channel, minimum, in Gaillard Cut (otherwise known as Culebra Cut), “300” feet; locks in pairs, 12; locks, usuable length 1,000 feet; locks, usable width, 110 feet; Gatun Lake, area, 164 square miles; Gatun Lake, channel depth, 45 to 85 feet; Gaillard Cut (Culebra Cut), channel

Cross-section of lock chambers and walls at Gatun.

a. Passageway for operators.

b. Gallery for electric con¬

duits.

c. Drainage gallery.

d. Culvert in centre wall.

e. Culverts under lock floor

■alternating with those from sidewalls.

f. Wells opening from lateral

culverts into lock cham¬ ber.

g. Culverts in side walls.

h. Lateral culverts.

depth, 45 feet; excavation by the French, 78,- 146,960 cubic yards; excavation by the French useful to present canal, 29,908,000; estimated value to canal of excavation by the French, $25,389,240; value of all French property there, $42,799,826; work begun by the Americans, 4 May 1904: excavation accomplished to 31 March 1915 (when only about 6,000,000 or 7,000,000 cubic yards remained to be excavated in canal

proper), 232,440,945 cubic yards; concrete, total for canal, excluding terminals, 4,844,566 cubic yards; time of transit through completed canal, 10 to 12 hours; time of passage through locks, three hours; relocated Panama Railroad, length, 47.11 miles; Canal Zone, area, 436 square miles; canal and Panama Railroad forces actually at work in September 1913, about 37,000 (includ¬ ing about 5,000 Americans) ; payment to New Panama Canal Company (for the French prop¬ erty), $40,000,000; payment to the Republic of Panama, $10,000,000; estimated total cost of the canal, $375,000,000 (estimate given by General Goethals).

Slides. — The engineers of the canal had to deal with peculiar conditions in the shape of huge masses of earth and rock which slid into the canal excavation both before and since ~ completion. These slides made up 29,431,000 cubic yards of the total American excavation of 232,353,000 cubic yards, or 12ˆ4 per cent and 30 per cent of the excavation at Culebra. Slides developed where the side slopes of the exca¬ vation were left too steep to provide a stable bank. /The West Culebra slide involves 68 acres with about 11,000,000 cubic yards of excavation, the East Culebra an area of 55 acres and 8,000,- 000 cubic yards, and the Cucaracha slide 50 acres and 5,300,000 cubic yards. In September and October 1915 these slides suspended navi¬ gation on the canal.

The Canal in Operation. — On 7 Jan. 1914 the self-propelled steamer, the crane boat Alex. La Valley, made the first passage of the canal and on 15 Aug. 1914 commercial traffic was inaugurated. On the latter day the steamer Ancon made the passage in 9 hours and 40 minutes. The canal has since been in operation, except during the period September 191 5— 27 March 1916, when the slides interfered with navigation. In the two years ending 14 Aug. 1916, exactly two years from its inaugural open¬ ing, 2,097 vessels aggregating 7,046,407 tons passed through, with cargoes aggregating 9,031,613 long tons. In

the fiscal year ending 30 June 1917 1,876 vessels made the passage of the canal. These had a net tonnage of 6,009,- 356 tons and carried 7,2 29,255 tons of cargo. The tolls collected from vessels passing through the canal from its opening to 1 Jan. 1917 aggre¬ gated $9,461,717. In the same period the operat¬ ing and maintenance charges amounted to $14,717,072, leaving an operating deficit of

$5,255,355.

Tolls. — Panama Canal toll rates are the fol¬ lowing: (1) On merchant vessels carrying pas¬ sengers or cargo, $1.20 per cent vessel ton (each 100 cubic feet) of actual earning capacity. (2) On vessels in ballast without passengers or car¬ go, 40 per cent less than for those of class 1. (3) On naval vessels, other than transports, colliers, hospital ships and supply ships, 50 cents per. displacement ton. (4) On army and navy transports, colliers, hospital ships and supply ships, $1.20 per net ton, the vessels to be measured by the rules that are also em¬ ployed in determining the net tonnage of mer¬ chant vessels. In time of war, as at other times, the canal may be used by all navies, according to treaties now in force which provide that it ((shall be free and open to the vessels of com¬ merce and war of all nations and shall never be blockaded, nor shall any right of war be

PANAMA CANAL

Copyright by Underwood & Underwood

1 Battleship Ohio Passing through Culebra Cut, out

toward Pacific

2 Turning a Ship around in Culebra Cut

3 Looking North from West Terminal, Miraflores, show¬

ing inclines from lower to upper locks

4 Steamship Panama in Upper Chamber, Gatun Locks,

Gatun Lake

exercised nor any act of hostility he com¬ mitted within it.®

1 he Canal in its Relation to International Commerce. — An interesting and valuable study of the effect of the canal upon international trade competition, by Mr. Hutchinson (see Bibliography) , contains the following reference to new opportunities created by the cutting of this canal : <(A vast region bordering the Pacific, with huge population and enormous resourcesˆ crying out for economic development, is being brought into a new relationship with the older economic sections of the world best able to aid them in the fulfilment of their desires.® The author says truly that many Pacific countries need European and American capital, need im¬ migrant population, need the stimulus and di¬ rection of American or European enterprise. Their latent resources cannot be developed fully in the absence of transportation facilities, railways, roads, harbor and street improvements, modern sanitation, public works of all sorts. Their industries need the introduction of mod¬ ern equipment and methods. In brief, the At¬ lantic must supply the Pacific. With the open¬ ing of the Panama Canal, a new facility of intercourse has been created. Goods, tourists, agents, mails, emigrants, can now reach many of the Pacific countries more quickly and con¬ veniently. New growth of economic, commer¬ cial, social and intellectual intercourse inevitably follows. The geographical position of the canal and the trend of development in the Pacific countries, as the writer points out, are such that the eastern portions of the United States are most favorably situated to play a part in this new growth. With reference to many Pa¬ cific regions the industrial eastern part of the United States has hitherto been at a disadvan¬ tage compared with Europe ; but the handicap is either converted into an advantage by the canal, or greatly reduced. In those regions where the United States has already held some advantage, her position is greatly strengthened by the facilities offered by the new route.

Bibliography.— Bakenhus, R. E., Knapp, H. S., and Johnson, E. R., (The Panama CanaP (New York 1915) ; Bullard, A., (Panama, the Canal and the People) (rev. ed., New York 1914) ; Goethals, G. W., Government of the Canal Zone' (Princeton 1915) ; id., (The Pan¬ ama Canal — an Engineering Treatise' (New York 1916) ; Gorgas, W. C., Sanitation in Panama' (New York 1915) ; Hutchinson, L., (The Panama Canal and International Trade Competition' (ib., 1915) ; Nixon, Lewis, (Canal Tolls and American Shipping' (New York

1914) ; Oppenheim, L. F. R., <The Panama Canal Conflict between Great Britain and the United States of America' (Cambridge 1913) ; Sibert, W. L., and Stevens, J. F., (The Con¬ struction of the Panama Canal' (New York

1915) . For the details of the work, engineer¬ ing problems, sanitation rules, zone police, etc., consult files of the Canal Record, official jour¬ nal of the Isthmian Canal Commission (Ancon 1907 et seq.).

John B. McDonnell, Editorial Staff of The Americana.

PANAMA CONGRESS, a congress of rep¬ resentatives of various American nations held at Panama, June 1826, for the discussion of mat¬ ters of interest to the American peoples. The

meeting was originally intended only for South and Central American delegates, but the minis¬ ters of Mexico, Colombia and Guatemala at Washington formally invited the United States to be represented. After some friction in con¬ gress two delegates were appointed, but at the congress 22 June 1826 the American delegates were not present, one having died en route and the other having been delayed in transit. Chile and Brazil approved of the congress but did not send delegates. Ten sessions were held.

PANAMA-PACIFIC INTERNA¬ TIONAL EXPOSITION. See San Fran¬ cisco — Panama-Pacific International Expo¬ sition.

PANAS, Photinos, French surgeon and ophthalmologist : b. in Cephalonia, one of the Ionian Islands, 30 Jan. 1832; d. 1903. After an elementary course in medicine at Corfu, he went to Paris, where in 1860 he was graduated from the School of Medicine. Three years later he became a naturalized citizen of France and was then appointed associate professor and surgeon to the Central Bureau. In 1864 he became ophthalmic surgeon to the Bicetre hos¬ pital, in 1865 to the Midi and Lourcine hos¬ pitals, in 1868 to the Saint Louis and Saint

Antoine hospitals, in 1872 to the Lariboisiere hospital, and in 1877 to the Hotel Dieu. In 1879 he was appointed professor of clinical ophthalmology in the Ecole de Medicine. Panas rendered valuable service in the Franco-Prus- sian War and achieved some renown through his introduction into France of Lister's methods and by his operations in ovariotomy. He was more widely known, however, for his writings in medical journal on subjects connected with his specialty, and for his works on ophthal¬ mology, the most important of which are Wegons sur le strabisme,' *etc.* (Paris 1873-93) ; (Legons cur les keratites' (1876) ; (Legons sur les affections de l'appareil lacrymal' (1877); cLegons sur les retinites' (1878) ; (Anatomie pathologique de l'oeil, ' with Remy (1879) ; (Sur le glaucome et les neoplasmes intraoculaires' (1893) ; (Traite complet des maladies des yeux' (1894); (Legons de clinique ophthalmologique' (1899), *etc.*

PANATHENZEA, Greek festivals, cele¬ brated at Athens in honor of Athena. The Panathemea were distinguished into the greater and the less, in both of which three kinds of games were exhibited, conducted by 10 presi¬ dents. On the first day were races with torches in the Ceramicus ; on the second, gymnastic exercises and imitations of naval fights ; on the third, contests of music and declamation, and dramatic representations. An olive crown from the groves of Academus and a vessel full of sacred oil were the rewards of the victor. Then followed the sacrifices and the sacrificial feasts.

PANAY, pa-nl', Philippines, the most north¬ western island of the Visayan group, lying a little to the southeast of the centre of the archi¬ pelago, bounded on the east by Iloilo Strait, and on the west by Mindoro Sea; area 4,611 square miles. . The largest of its dependent islands is Guimaras (243 square miles), lying to the southeast of Panay.

Topography. — The shape of the island is roughly triangular. A mountain range extends from the peninsula of Buruanga in the north¬ west to the extreme south and from Maymagui

Mountain, in the centre of this range, another mountain system extends to the east and north. The island is thus naturally divided into three provinces. There are three large rivers, the Panay, Jalaur and Aclan, and numerous smaller streams. The coast on the east and north is well indented with bays and harbors.

Industrial Resources. — The chief industry of Panay is agriculture; cotton, corn, chocolate, pepper, coffee, tobacco, sugar, rice and copra are raised ; the last three are the staple crops, and of excellent quality. There are also large numbers of livestock raised, cattle, carabao and horses, excellent grazing lands being found in all parts of the island. The horses raised in the province of Iloilo are very highly prized throughout the archipelago. The forests are valuable ; among the more important woods are molane, ebony and sibucao, large quantities of which are exported ; honey, wax and pitch are also gathered in considerable quantities. The mineral resources have n'ot been scientifically developed ; gold is found and is mined in small quantities ; and fine marbles and tonalite are quarried to some extent ; there are deposits of gypsum, marl and iron ; quicksilver and copper are also reported. The mechanical industnes are well advanced and produce for export ; fine fabrics of pineapple fibre, jusi, sinamay and cotton are manufactured; also sugar sacks, hats and palmleaf baskets; the woven fabrics of the province of Antique are especially well known, the looms giving employment to over 12,000 women; lime of good quality is manu¬ factured in Iloila. The fisheries are also valu¬ able, particularly those of the island of Guimaras. Within the three provinces there are excellent road systems ; but as the mountains are almost impassable the trade between prov¬ inces is entirely by sea ; there is also a large foreign trade, the town of Iloila (pop. 60,000) being next to Manila in commercial importance.

People and History. — The people of Panay are almost entirely of Visayan race ; a few thou¬ sand wild Mundos and a few Negritos live m the mountains. This island was a stronghold of the Filipino insurrection ; it was first occupied by United States troops in the early part of L899 but the island was not completely pacified until January 1901. The island was divided into three provinces (in accordance with the natural divisions), Antique, Capiz and Iloila; the former Spanish commandancia of Concep¬ cion was consolidated with Iloilo. Pop. of island, 743,646.

PANAY, Philippines, a pueblo of the prov¬ ince of Capiz, island of Panay, situated a few miles inland from the northern coast, three miles southeast of Capiz, the provincial capital. Pop.

15,500.

PANAY RIVER, a river of the province of Capiz, island of Panay, rises on the eastern slopes of the Tapas Mountains, flows north and empties into the sea near the town of Capiz ; length, 38 miles. It is one of the most important rivers of the island of Panay, has five chief tributaries, and drains the greater portion of the province of Capiz. It has a high-jide depth of 13 feet at its mouth and is navigable for large native craft for a considerable distance.

PANCHATANTRA, pan-cha-tan'tra, an old collection of apologues and stories in Sans¬

krit. Vishnusarman is represented as the nar rator of the stories and author of the book. The Panchatantra has been frequently revised. Wilson had three widely varying manuscripts before him while he drew up his analysis of the work. Kosegarten, who first edited the Sanskrit text, used 11 varying manuscripts. In these he recognized two versions, one simple, the other more extended and elaborated. Neither of these can be the first form of the work, which must have been a still more ancient

Some of the apologues contained in the Pan¬ chatantra occur in the Mahabharata, others originate in Buddhist books, and several abridgments or imitations occur elsewhere in the Sanskrit.

The 'Panchatantra' is one of the works 'styled in India as 'Nitishastras' (shastra , ((book of knowledge,® and niti, "conduct®) , writ¬ ten for the instruction of kings and all those called to take a share in the government. The five books of which it is made up form as many distinct sections related to each other by a preface in which a king, after taking the advice of his councillors, entrusts to a Brahman the training of his three sons. The Brahman com¬ poses the Panchatantra for the edification of the young princes and by the reading of that work he succeeds in overcoming their idleness and in developing their minds.

The first book has for its title 'Mjtrabheda' (<The Disunion of Friends'). It aims at ac¬ quainting kings with the danger incurred by lending ear to the insinuations of those who seek to sow divisions between a prince and his faith¬ ful subjects. The second book, 'Mitraprapti' ('The Acquisition of Friends'), shows how ad¬

vantageous it is for men to unite and help each other. The third book, <Kakolukiya) ((The War of the Crows and the Owls') demonstrates the danger of trusting to untried men or to enemies. The fourth, 'Labdhapranasana> (cThe Loss of Acquired Good5), proves that we fre¬ quently lose by imprudence what we had ac¬ quired with difficulty. The fifth and last book,

(Aparikshitakaraka ' ((Inconsiderate Conduct ') , shows the danger of being precipitate. The narrative is interspersed with sentences, max¬ ims, thoughts, extracts from legal codes, poems and dramas. Consult Frazer, (Literary His¬ tory of India) (1896) ; Kosegarten, 'Pantcha-tantrum' (1848ˆ59) ; Lancereau, 'Pantchatan-tra,' French version (1871) ; Schmidt, 'Panca-tantra, Textus Ornatior,' German version

(1901).

PANCOAST, Henry Spackman, author and educator: b. Germantown, Pa., 24 Aug. 1858. He was educated at Germantown Acad¬ emy and by private tutors. Studied law, ad¬ mitted to the bar in 1882 but retired from prac¬ tice in 1887 to devote himself to writing and teaching. Received degrees of L.H.D., Trinity, 1912; A.M., University of Pennsylvania, 1913. Author of Representative English Literature) (1892); introduction to English Literature) (1895, 3d ed. 1907) ; (Study Lists, Chronological Tables and Maps' (1908) ; introduction to American Literature' (1898; revised ed. 1911) ; 'A First Book of English Literature' (with P. V. D. Shelly; 1911); Standard English Poems' (1900); Standard English Prose' (1902) ; 'Early English Poems' (with J. D.

Spaeth; 1911); <A Vista of English Verse> (1911); (English Prose and Verse> (1915). Also monographs on questions of Indian Rights and contributions to magazines.

PANCOAST, Joseph, American surgeon : b. Burlington, N. J., 1805; d. 7 March 1882. In 1828 he was graduated at the University of Pennsylvania and began teaching surgery in 1831. For a long period he was connected with various hospitals in Philadelphia ; was pro¬ fessor of surgery in the Jefferson Medical Col¬ lege from 1838 to 1847 and professor of anatomy from 1847 to 1874. He resigned in the latter year, becoming professor emeritus, and was succeeded by his son, William H. Pancoast. He was a remarkably skilful operator, devised many improved methods, and made some important discoveries. Besides contributing to leading medical journals, he translated and edited vari- • ous works, and published (A Treatise on Op¬ erative Surgery® (1844; 3d ed., 1852) and <A Treatise on the Structure, Functions and Dis¬ eases of the Human Sympathetic Nerve> (1831).

PANCOAST, William Henry, American surgeon: b. Philadelphia, 1835; d. 1897. In 1856 he was graduated at the Jefferson Medical College and subsequently studied in London, Paris and Vienna. He established his practice in Philadelphia and during the Civil War was superintendent of a hospital there. He joined the faculty of Jefferson Medical College in 1867 and in 1874 succeeded his father as professor of surgery there. In 1887 he was one of the founders of the Medico-Chirurgical College of Philadelphia, where he became professor of anatomy and clinical anatomy. Dr. Pancoast punished a report in 1884 concerning the anatomy of the Siamese twins, which attracted wide attention.

PANCRAS, Saint, or PANCRATIUS

(((Victor in every game®) a Christian martyr, who at the age of 14 defied the decree against Christianity issued by Diocletian and was ac¬ cordingly put to death (304). He is regarded as the patron saint of children and there are many churches dedicated to him in England, Italy, France and Spain, and his festival is cele¬ brated on the anniversary of his death (12 May).

PANCREAS, pan'kre-as. The pancreas 7r av-xpeag (all flesh) is a large abdominal gland which has the double purpose of produc¬ ing a digestive secretion which is poured into the upper part of the small intestine (duod¬ enum), and of regulating the utilization of sugars and starches in the body. The latter function is carried on by an internal secretion which passes directly into the blood. The pancreas of the calf is used for food under the name of the ((stomach sweetbread,® in distinction to the «neck sweetbread,® which is the thymus gland. In man the organ is irregularly prismatic in shape, is reddish-yellow in color, and lies with its long axis across the posterior wall of the abdo¬

men behind the stomach at the level of the first and second lumbar vertebrae. It has been variously compared in shape to a hammer, to the letter «J» placed on its side, or to a dog's tongue. The right-hand end is the larger and is termed the head. A slightly narrower por¬ tion connects the head with the body of the gland which in turn terminates in an elongated

portion called the tail. The average dimensions of the gland are six to eight inches (15. to 20 centimeters) in length, one and a half inches (three and a half to four centimeters) in breadth, and one-half to one inch (one and a half to two centimeters) in thickness. In weight it aver¬ ages two to three and a half ounces (60 to 100 grammes). The head of the organ lies just to the right of the vertebral column, and is en¬ circled by the loop formed by the duodenum as it leaves the pyloric end of the stomach. The body extends to the left behind the stom¬ ach, and the tail usually touches the hilum of the spleen. Unlike the other abdominal organs the pancreas does not have a special artery from the aorta, but derives its blood supply through the branches from the celiac axis and the superior mesenteric artery. Its nerve sup¬ ply comes through the branches of the celiac plexus, which are non-medullated, but provided with ganglia, and penetrate to the ultimate structural units of the organ, which they sur¬ round in fine networks. The gland pours its external secretion into the duodenum through a long duct (duct of Wirsung) running from left to right the length of the organ. It begins through the union of small ducts from the lobules in the tail and, increasing in size through the receipt of numerous tributaries, as it proceeds, finally reaches the head of the gland. On leaving the pancreas it joins the common bile duct, and together with this, passes obliquely through the wall of the second part of the duodenum three or four inches (8 or 10 centimeters) from the stomach, usually at the summit of a little elevation of the mucous mem¬ brane, called the papilla of Vater. It may, however, empty into the bile duct itself a short distance from the intestine. A second duct, the duct of Santorini, is usually subsidiary to the main duct and may empty into the duodenum by a separate opening a short distance above the papilla of Vater, or it may connect with the main duct. Sometimes it is of large size and may serve as the chief excretory duct of the gland. Anomalies of the pancreas are occa¬ sionally seen, such as division of the organ into two parts connected by a thin bridge of gland substance containing the duct,, or an accessory pancreas may be found in one-half to one per cent of the cases. This is a mass of gland

tissue with a duct opening into the alimentary canal and lying in the wall of the stomach, duodenum, or other portion of the small intestine. In the embryo the pancreas is developed from two distinct entodermal out¬ growths from the wall of the duodenum and the junction of the bile duct with the duodenum respectively, spoken of as dorsal and ventral buds, the latter of which is double. The dorsal portion, which. is much larger than the ventral, forms the body and the tail of the gland, and also a part of the head. It contains the duct of Santorini, but the larger part of the dorsal pan¬ creatic duct joins the duct of the smaller ven¬ tral pancreas and gives rise to the main excre¬ tory canal of the gland, the duct of Wirsung. In structure the pancreas resembles the parotid gland, and for this reason is sometimes termed the abdominal salivary gland. It belongs to the group of tubulo-racemose glands and con¬ sists of groups of secretory cells or lobules held together by a stroma of loose connective tissue,

which also carries the ducts, vessels and nerves of the organ. In the lobules two types of cells may be distinguished, the secreting cells, which make up the bulk of the organ, and groups of cells of a different type found in the centre of the lobules, which were first described by Langerhans in 1869, and are called pancreatic islands. The secreting cells, when at rest, con¬ tain coarse granules which disappear when the gland is actively secreting. The islands of Langerhansˆwhich vary in size from a few cells to several millimeters in diameter, develop from the smaller ducts after the gland has. attained a considerable degree of development in the em¬ bryo. They are composed of spheroidal or polygonal cells, distinct in appearance from the secreting cells, and produce an internal secre¬ tion which is discharged directly into the blood vessels. The external secretion, or pancreatic juice, plays an important part in the digestion of proteins, fats and carbohydrates . (see article Digestion). It is a clear, alkaline fluid of which it is estimated that from 16 to 26 ounces (500 to 800 cubic centimeters) a day are secreted. Its most important constituents are three en¬ zymes, or their preliminary forms, called zymo¬ gens, namely a protein-digesting enzyme, called (trypsin, a starch-digesting

enzyme called amylopsin, and a fat-digesting enzyme called steapsin (lipase).

The mechanism of secretion is supposed to be as follows : When food leaves the stomach and enters the duodenum, the acid of the gastric juice produces from the mucous membrane of the intestine a substance called secretin. This is absorbed by the blood and is carried to the pancreas which it stimulates to activity, though the secretion is also to some extent under the control of the secretory fibres of the vagus and splanchnic nerves. The pancreas . furthermore produces an internal secretion which is appar¬ ently formed by the cells of the pancreatic islands. This is thought to be essential for the proper metabolism of sugar in the body, and in diabetes (see article Diabetes) these portions of the gland usually show more or less degenera¬ tion or shrinkage. The view now held is that sugar exists normally in the body in a combined form, but that in diabetes this power of com¬ bining is to some extent lost and the combining substance which forms the bond between the tissues and the sugar is supposed to be sup¬ plied by the cells of the pancreatic islands. Be¬ sides the changes observed in diabetes, there are numerous other forms of disease of the pan¬ creas. Among these may be mentioned acute or chronic inflammatory changes (pancreatitis), cysts and tumors. Of the latter, cancer is one of the commonest, and is generally secondary to a similar growth in. the stomach. The symptoms of these conditions comprise pain (usually high up in the abdomen), digestive dis¬ turbances, the passage of bulky, light-colored, fatty stools, jaundice, loss of weight, *etc.* A characteristic manifestation, known as fat necro¬ sis, is sometimes seen in which, as the result of the escape of pancreatic secretion into the sur¬ rounding fatty tissue areas of necrosis develop owing to the action of the fat digesting ferment.

PANCREATIN, a substance secreted by the pancreas, and often administered in medi¬ cine for the correction of certain digestive dis¬ orders. The commercial supply that is used in

medicine is mostly obtained from the pancreas of the hog, and is best known in the form of a grayish, amorphous powder, usually with a tinge of yellow, and with a faint, characteristic smell. Pancreatin is not a definite chemical substance, but contains several distinct fer¬ ments. Its composition varies, moreover, with the source from which the substance is pre¬ pared, and with the state of activity of the particular pancreas from which it is extracted. One of its normal components, steapsin, is an exceedingly powerful agent, for effecting the

emulsification of fats, and it is even able to partially separate them into free glycerin and free fatty acids. Another constituent, trypsin, converts coagulated albuminous substances into soluble peptones, resembling pepsin in this re¬ spect, although its action is somewhat different. Pancreatin, for example, is effective only in an alkaline medium, while in the case of pepsinˆ the medium must be acid. Another constituent, amylopsin, converts starches and other amylace¬ ous substances into sugars ; and a fourth fer¬ ment that is present possesses the power of coagulating the casein of milk.

PANDA, or WAH, an animal (JElunis ful-gens) of the raccoon family, which inhabits the eastern Himalayas to a height of about 12,000 feet. It is equal in size to a large cat, and has remarkably glossy reddish-chestnut fur, darker below, with a white face and a long ringed tail. It seems to be the remnant of a once very widespread group which in the early Tertiary Period was numerous in Europe, explaining the present curious distribution of the family, for all other existing raccoons are American. The animal is described as inhabiting forests and feeding almost entirely on vegetable food; but it eats eggs and insects when it can get them. Most of its time is spent upon the ground, but it has semi-retractile claws and is able to climb trees. It is said to be rather a dull-witted, defenseless creature, reminding one of the kinkajou. Consult Flower and Lydekker, ˆlammalia5 (1891) ; Blanford, (Fauna of British India: Mammals* (1888).

PANDAN, pan-dan’, Philippines, a pueblo of the province of Antique, island of Panay, on the west coast near the Bugang River, 661 miles north of San Jose de Buena Vista. It is on the coast road and has a good anchorage ground. Pop. 13,800. There is a small pueblo of the same name (pop. 2,143) on the north coast of Catanduanes Island, near Albay, Luzon.

PANDANUS. See Screw-pine.

PANDARUS, pan’da-rus, Trojan hero, son of Lycaon. He was given by Apollo a bow with which he became famous as an archer. In the war between the Greeks and Trojans he broke the truce, and after wounding Menelaus and Diomedes was slain by the latter. He also appears in Shakespeare’s (Troilus and Cressida) as a procurer, whence the English word ˆpander.®

PANDAVAS, pan’da-vaz. See Mahab—

HARATA

PANDECTS, The, the most important compilation of the Roman law, prepared by several scholars at the order of the Emperor Justinian (q.v). It is also called (The Digest.* It was an attempt to form a complete system of law from the commentaries of the great

jurists. Ihe work was done by a committee composed of the jurist Tribonianus and 16 others learned in law ; it was begun in 530 A.n. and completed in 533. The magnitude of the task becomes apparent from the fact that about 2,000 various treatises were consulted, and from these about 9,000 extracts appear. One-third of them comes from Ulpian, one-sixth from Paulus, one-twelfth from Papinianus, and the rest from 36 other writers. The Pandects, with the Codex Justinianus, became the law for the Roman Empire. When the Lombards invaded Italy in 568, they overturned almost all the few remaining Roman institutions, the law courts among them. In Ravenna, however, the Roman law was still taught ; and the Lombards allowed their Roman subjects to be judged according to the Roman law. The Codex, which begins with an invocation to the Trinity, and contains a great deal of legislation on ecclesiastical mat¬ ters, was held in esteem by the clergy; but the Pandects were at first ignored as being the work of pagan jurists. In the last part of the 11th century, however, there was a great revival of the study of Roman law. Irnerius of Bo¬ logna, the greatest teacher of his time, renewed the study of the Pandects, which, together with the Codex, became the basis of all mediaeval legislation. The Pandects may justly be con¬ sidered the most famous collection of law ever made. In both its central idea of codification and its content and plwaseology it has pro¬ foundly influenced subsequent legislation, in¬ cluding that of New England and the United States.

PANDORA, in Greek mythology, the first woman ; so called because she received gifts from all the Olympians. She was the creature of Prometheus, and the gods came down to see her and conferred their gifts on her. Athena instructed her in all works of female skill. Aphrodite endowed her with beauty and fascination. Hermes inspired her with a de¬ sire of pleasing, and taught insinuating words. Athena

carried her thus equipped into the as¬ sembly of the gods, and all admired the work. She became the wife of Epimetheus, a mortal, brother of Prometheus, and brought sorrow into the world by opening, in her curiosity, a box containing the blessings of life; all these escaped, save Hope. This is clearly a late and philosophic addition to the myth.

PANDOURS, pan'doorz, or PANDOORS, the name formerly given to the Servian or Raitzian irregular foot-soldiers coming from the village of Pandur, in the county of Sol, in Lower Hungary, who in 1750 were made regular troops. The term is now used in Hungary and Croatia for mounted constabulary or guards.

PANEL, (1) in law, a schedule, or roll of such jurors as the sheriff returns to pass upon any trial; and impaneling a jury is returning their names in such schedule of parchment. In Scottish law the prisoner at the bar is the panel. (2) In carpentry, a tympanum or square piece of thin wood, sometimes carved, framed or grooved in a larger piece, or between two up¬ right pieces and two cross pieces. (3) In ma¬ sonry, a face of hewn stone. (4) In bookbind¬ ing, a depressed part of the sides within a relatively elevated bordering portion ; or a space on the back between bands. (5) In mining, a system of coal mining in which the projected

winning is divided into large square allot¬ ments, divided by massive walls of coal, instead of placing the whole working in one undivided arrangement. The pillars are left very large, the room small ; the - pillars are worked out, props being substituted ; these are knocked out, and the goaf filled up by the caving down of the ceiling. (6) In painting, a piece of wood — oak, chestnut or white pop¬ lar — on which, instead of canvas, a picture is painted. The earliest paintings in oil were gen¬ erally executed on panels, which were composed of various pieces of wood, cemented together with cheese glue; and this glue, or cement, caused each portion to adhere so firmly that such panels were considered stronger than those which consisted' of one piece of wood only.

pangasinAn, pan-ga-se-nan', Philip¬ pines, a province of the Island of Luzon, in .the western central part of Northern Luzon at the head of the Gulf of Lingayen ; length, east and west, 56 miles; width, 33 miles; area, 1,316 square miles. The province is mountainous in the northeast, and also near the western bound¬ ary; the rest of the surface is flat, sloping toward the sea, and near the coast is very low

and frequently inundated by the rivers. There are numerous rivers, of which the Agno is largest and most important. The staple crop is rice, though this is often injured by floods; sugar, corn, tobacco and cocoanut are also abundantly cultivated; the nipa palm grows luxuriantly. There are abundant deposits of salt, and also gold, copper, iron, magnetite and sulphur. The important industries beside agri¬ culture include the making of nipa wine, the weaving of buri and manufacture of mats, hats and sacks, and boat building. The Gulf of Lingayen affords excellent commercial facilities; the commerce is carried on almost wholly by the Chinese. Many of the rivers are navigable for some distance ; well constructed roads ex¬ tend all over the province, and the Manila and Dagupan Railroad also crosses the province. Pop. 343,686, mostly Pangasinans.

pangasinAns, a group of tribes of the

Philippine Islands inhabiting the province of Pangasinan, Luzon and some localities in the province of Zambales, Nueva Ecija and Benguet. They are of the Malay race, and at the time of the arrival of the Spaniards had a civilization and written language of their own. Their language is now generally spoken in the province of Pangasinan. They are Christians.

PANGE LINGUA GLORIOSI COR¬ PORIS MYSTERIUM, the first line of one of the finest of mediaeval hymns, composed by Saint Thomas Aquinas (d. 1274) for the Office of Corpus Christi. The metre and the opening line are imitated from Venantius Lortunatus, and the poem itself consists of six stanzas of three lines each with triple rhyme in the middle and at the end. In the Roman Breviary, how¬ ever, it is divided into stanzas of six lines each by halving each of the original lines. This hymn is sung in the solemn procession to the Re¬ pository on Maundy Thursday, also in the pro¬ cession of Corpus Christi and of the Porty Hours Devotion. Stanzas 5 and 6 (stanza 6 forms the doxology) are sung as a special hymn (Tantum Ergo) and prescribed for the Benediction of the Most Blessed Sacrament. Critics have been unanimous in their praise of

this work of Saint T homas. Pimont says that the alternating triple rhyming is a new feature in mediaeval hymnody. Neale declares that this hymn contests second place among those of the Western Church with the ‘Vexilla Regis, y the (Stabat Mater, > the (Jesu dulcis memonaP and one or two others, leaving the ‘Dies Irae1* in its unapproachable . glory.® Driffield goes farther and says that “it excels all these in “its peculiar qualities, its logical neatness, dramatic precision, and force of almost argu¬ mentative statement.® Translations of this hymn have not been many or felicitous (consult the (Dictionary of Hymnology*). the best ones perhaps being those of Wackerbarth, Caswall, Neale and Donahoe. A fine rhymed transla¬ tion, preserving the metre of the original, was published with the text and notes by Hugh T. Henry in the American Ecclesiastical Review (March 1890).

Herbert F. Wright.

PANGE LINGUA GLORIOSI PRˆ- LIUM CERTAMINIS, the first line of a hymn generally credited (e.g., by Dreves, Mearns and others) to Venantius Fortunatus (6th century), although sometimes ascribed (e.g., by Gerbert, Bahr Pimont) to Claud-ianus Mamertus (5th century). In the manu¬ scripts, several of which go back to the 8th century, the hymn contains 10 stanzas (exclud¬ ing the closing stanza or doxology) of three lines each (tetrameter trochaic catalectic un¬ rhymed). In the Roman Breviary, the hymn is assigned to Passion Sunday and ferial offices from then to Wednesday in Holy Week, also to feasts of the Finding of the Holy Cross, of the Exaltation of the Holy Cross, of the Crown cf Thorns and of the Five Wounds. In this Breviary, the hymn is divided into two, the first five stanzas being said at Matins, the second five at Lauds; and each line is subdivided into two so that the stanza contains six lines. The entire hymn is sung on Good Friday during the Adora¬ tion of the Cross, immediately, after the Improperia}) or ˆReproaches.ˆ This hymn, like the ((Vexilla Regis, }) suffered many emendations (eg., “lauream® was substituted for “praelium® in the first line) at the hands of correctors of the Breviary under Urban VIII. The corrected form remains to-day in the Roman Breviary. The more notable translations (consult the dic¬ tionary of HymnologvU are those by Aylward, Caswall, Campbell and by Neale. A fine trans¬ lation, preserving the metre of the original, was published with the text and notes by Hugh T Henry in the American Ecclesiastical Review (March 1891).

Herbert F. Wright.

PANGENESIS, a theory advanced by Dar¬ win to account for the phenomenon of heredity, and especially to explain the (alleged) inherit¬ ance of acquired characters (effects of. use and disuse of parts) which formed the basis of the theory of evolution of Lamarck. (See Lamarck¬ ism). The problem was to form a hypothesis bv which changes in any part of the body could so affect the germ-cells that the parental peculiarities should reappear in succeeding generations. Darwin supposed that every cell of the body gives off at every stage of its existence minute particles, or gemmules, which when furnished with proper nutriment will give rise to parts similar to those from which

they were derived. These gemmules are col - lected from every part of the body to form the sexual elements, and their development in tm next generation forms a new being.. lo ex¬ plain the fact that characters mav skip a gen¬ eration, he assumed that the gemmules may lie dormant for a time. This theory was weak in that it assumed the existence of particles ot which we have no other evidence, and it was shortly disproved by Galton. If these gem¬ mules are constantly given off they must be carried by the blood, and hence if introduced into another animal they must affect the progeny. Galton introduced into the blood oi silver-gray rabbits the blood of rabbits of other colors, in some cases to the extent of half the blood, but the offspring invariably showed no trace of change of color. Brooks in his Heredity) (1883) modified the theory so as to avoid Gal ton's experiment, but the theory has been dropped in later years, and has only a historic interest. Consult Darwin, 'Variation of Animals and Plants under Domestication (1868), and the authorities mentioned under Heredity.

PANGO-PANGO, pang'go-pang'go, or PAGO-PAGO, a harbor on the south coast of the island Tutuila, Samoa. It is L-shaped, with the greatest length (17 miles) from east to west. It is landlocked, and in every way one of the finest harbors in the Pacific. It was ceded to the United States as a naval and coal¬ ing station in 1872, and the cession was confirmed by a treaty signed in 1878, by which the United States was given the right to establish at the harbor a station for coaling, naval sup¬ plies, freedom of trade, commercial treatment as a' favored nation, and extra-territorial con¬ sular jurisdiction. It was occupied by the United States in 1898, with the purpose of util¬ izing its advantages as a coaling and supply station; and by the agreement of 1899, the is¬ land of Tutuila came into the possession of the United

States. See Samoan Islands.

PANGOLIN, or SCALY ANTEATER.

See Manis.

pangutarAn, pang-oo-ta'ran, a group of small islands of the Sulu Archipelago, lying in the Sulu Sea, south of the Philippines and 100 miles or more northeast of Borneo. The group includes 13 islands of which the two lar¬ gest are Pangutaran, 44 square miles, and Pan-ducan, 14 square miles ; the area of the whole group is 72*4 square miles. The islands are moderately high, and are very heavily wooded. The chief industries are fishing and agriculture which is carried on in the rudest and most primitive manner. The island of Pangutaran is low and level ; it is thickly populated and carries on a considerable trade with Sulu.

PANHANDLE, The, a long, narrow strip of land, resembling the handle of a pan, gener¬ ally projecting from a State or Territory, as the Panhandle of West Virginia, or the Pan¬ handle of Idaho. There is also a well-known projection in Texas called the Panhandle.

PANIC, in finance, and commerce, a period of numerous business failures and reduced values, causing loss of confidence by the public, and denoting insecurity and danger to money values and credits. When a panic occurs the banks are besieged by depositors, money is hoarded and

general financial distrust ensues. The most noted financial panics since 1750 were as fol¬ lows :

1763. Amsterdam. Heavy failures in Holland. England and Hamburg.

1773. Holland. Failures exceed $50,000,000.

1793. England, owing to French war. Government issued $25 , 000 , 000 Exchequer bills.

1799. England. Panic at Liverpool. Government lent $2,500,000 in Exchequer bills on goods.

Eighty-two failures at Hamburg.

1814. England. 240 banks stopped payment.

1825-1826. England. 770 banks stopped payment owing to failure of South Sea bubble companies. Owing to the distress occasioned by the consequences of this panic, families in Yorkshire were reduced in . J 1829 to live on bran. From the same cause about

200,000 families emigrated to the Continent, America, etc., in four years.

1831. Calcutta. Failures, $75,000,000.

1837. United States. “ Wild Cat ” crisis.

1847. England. Owing to excessive railway speculation.

Failures, $100,000,000. Discount rate, 13 per cent. 1857. United States. Failures $555,000,000. Minor crisis in England.

1866. London. Owing to over-speculation. Total failures above $500,000,000. The last of the serious panics. 1873. United States. Heavy failures in New York and elsewhere.

1884. Grant and Ward and Marine Bank failures.

1885. London. Much temporary disturbance owing to

expected Russian war.

1890. London. Baring crisis. Liabilities guaranteed by English banks.

1892. Financial crash in Australia.

1893. United States. The silver crisis, also by some at¬

tributed to fear of changes in tariff by the Demo¬ cratic party.

1907. United States. Crisis brought about by reckless specu¬ lation and improper management of financial institutions.

1914. Worldwide, due to the war.

Financial panics and their causes have been the subject of interminable discussion, contro¬ versy and theory. They occur with a degree of regularity, and appear to follow certain rules. While undoubtedly artificial, growing out of the established monetary systems and methods of credit, yet once a panic is on, it seems to have to run its course, and business men and financiers shape their affairs to meet the condi¬ tions. One of the theories of regularly recur¬ ring panics is under-consumption, growing out of the fact that in modern business the money has to go through the payrolls to be spent and returned to the banks, and since profits are taken off most transactions, it follows that all of the money is not returned to circulation, and this scarcity of money tends to increase, and after some years hard times and panic follow. Another theory is the changing value of gold, on which we base all financial trans¬ actions. Increased production of gold may or may not keep pace with increased commerce and commercial activity, and when a dispropor¬ tion develops some people suffer, and panic ensues. Alternate inflation and contraction of currency seems a sure cause of financial panic. Banks are allowed to issue paper money under certain conditions safeguarding the public; they issue much more than can be redeemed in coin. There is further inflation by checks and notes, until it has been customary to report banking deposits as five or six times the total coin in a country. Then something happens to tie up a lot of money, and everybody is short, and postpones paying bills, so that we&k business houses fail and drag down others with them; a period of contraction has set in; stocks tumble in value; speculations push them further down ; rentals reduce and real estate values fall, wages and prices are lowered and several years

of hard times usually follow. The doing of large business through stock companies, whose securities constitute a convenient form of in¬ vestment, is regarded as another prolific source of panics. The man who is pinched throws his stock on the market, and the more there is thrown the lower it goes; the speculator sells short and the public loses faith in that stock, when there is absolutely nothing wrong with it, only with the holder who cannot carry it. Stocks are also used to build up fictitious values on temporary earning power, and when the interest is reduced there is more tumbling of values. It is apparent that the monetary sys¬ tem of the world needs revision, but just how has never been made clear. Possibly the vio¬ lent strains put upon financiers during the World War, and the experiences undergone may result in a bettering of methods, so that panics will be a thing of the past. That money panics are properly named is evident from the way

in which the various great financial cen¬ tres of the civilized world have withstood the shock of the World War. At first it appeared so unparalleled a calamity that it was doubted if the soundest financial institutions could sur¬ vive the certain heavy drains for cash. The pressure was felt first in Austria, where the Vienna Exchange closed 27 July 1914. The Berlin and Paris exchanges followed, while the London and New York stock exchanges closed on the morning of the 31st. During the four days, stocks in New York had declined about 10 points on the average, and a deluge of selling orders was imminent. So the governors de¬ cided that closing the exchange was the only course open. In the meantime the rate of dis¬ count was advanced from day to day, and on 1 August the Bank of England fixed it at 10 per cent.

The moratorium was invoked to save the situation. The British government declared it in existence on 4 August for 30 days, appli¬ cable to long term bills of exchange ; this was later extended so that it lasted three months. France, Russia, Austria-Hungary, Italy and practically all European countries followed this precedent, and established a moratorium lasting several months, while Germany covered the situation by ruling that foreign balances could not be sued for under three months. In the United States there was a general extension of time on all classes of indebtedness. The English banking system had to bear the prin¬ cipal weight of the first blow, being the ((world's banker,® and creditor of banks and large mer¬ cantile houses all over the globe. At first gold passed into London, but later the tendency was toward the United States, owing to the heavy expenditures here for war materials. Redis¬ counting was resorted to, and saved the situa¬ tion, these rediscounts being treated as cash deposits. The British government stood back of the rediscounts of the Bank of England, and this gave universal confidence and prevented runs on the banks. The German financial situa¬ tion was handled in much the same way, the discounts being extended as the situation de¬ manded. Conditions in the United States at the outbreak of the war in July and August 1914 were better for resisting a panic than ever before. The system of Federal Reserve Banks (q.v.) established in 1913, was just ready to

go into operation, and was admirably adapted to rediscounting, in fact it was designed to meet just such emergencies, though no one had antici¬ pated such immediate need. The banks had the power to increase their circulations under the act of 1908, and thus conserve their gold, and this was immediately taken advantage of. The national banks of New York City increase* d their currency notes about $100,000,000 the first month of the war. On 16 Nov. 1914, the 12 regional banks were opened for business, ami rediscounting was carried on easily, lhese exceptional experiences seem to point the way for preventing in the future most of the evils of great financial panics. It is likely that periods of commercial depression will come again, but the banks of all countries now know how to meet such emergencies, and protect each other, while governments are inclined to stand back of the banks.

PANINI, pa'm-m, Indian philologist: b. Salatura (near modern Attock), Punjab, 4th century b.c. ; probably the oldest writer on grammar whose works are extant, although he quotes the names of 64 predecessors He is reckoned among the sages of the Puranas. Nothing is known of his life. His grammar is in eight books, divided into chapters, and con¬ taining 3,996 rules or sutras. Its method is wholly different from that of European gram¬ marians. The separate chapters treat the vari¬ ous phenomena of language as they appear in a the various forms of speech; hence the work is strictly a philosophical treatise, requiring to be studied as a whole, and not conveying sectional information in a form classified foi reference according to the European model. His style is condensed, obscure and difficult to the YcJˆein student. He is the first who has classified the philological principles of grammar, as dis¬ tinguished from the mere forms or parts ot speech. He did not treat of syntax, and in¬ flections are not formally given, but must be obtained by a collation of separate rules, lhe grammar of Panini has been often annotated. Its chief critic is Patanjali (q.v.). The chief edition of Panini is by Bothlingk (1887), and that of Patanjali's <Great Commentary* by Kielhorn (1878-85).

PANIPAT, pan-i-put', or PANIPUT, In¬ dia, town in the district of Karnal, Punjab, about 52 miles north of Delhi, on the Grand Trunk and the East India railroads. It is a strategic centre and was the scene of the negotiations of Duryodhana and Yudishtliira at the beginning of the 12th century b.c., of the Mogul victory of Baber over Ibrahim Lodi, which established the Mogul power in North India in 1526, of

Akbar's victory over the Afghans in 1556, which reassured the existence of the Mogul Empire, and of the Afghan vic¬ tory of 1761 over the Mahrattas, which prepared the way for English rule. It exports a coarse sugar.

PANITAN, pa-ne-tan, Philippines, a pueblo of the province of Capiz, island of Panay; on the Malinannang River, seven miles south of Capiz, the provincial capital. Pop. 10,020.

PANJAB, pun-jab', PUNJAB, or PUN-JAUB. See Punjab.

PANJANDRUM, the name applied to an imaginary personage of power and influence ; a

burlesque monarch or Great Mogul. The word was originally coined by Samuel k°otc m a long string of rigmarole as a test for Macklin, who boasted of his memory. It is also called the Grand Panjandrum.

PANJIM, capital of Goa, Portuguese India.

PANJNAD. See Punjnud.

PANKHURST, Mrs. Emmeline, English

"suffragette® leader : b. Manchester, 1854. ˆ She was educated in Paris and married in 1879 to Dr. Richard M. Pankhurst, who had been a member of the first woman suffrage society, founded by John Stuart Mill. She later served on the committee for promoting the Married Women's Property Bill, which was originally drafted by Dr. Pankhurst and subsequently be¬ came law. In 1886 Mrs. Pankhurst joined the Fabian Society in London and the Holborn Women's Liberal Association ; she seceded in 1892 and became a member of the Independent Labor Party, running as its candidate for the Manchester School Board, though unsuccess¬ fully. In 1893 she was elected a poor law guardian of Manchester, serving five years. On the death of her husband in 1889 she was appointed registrar of births and deaths. To¬ gether with her daughter Christabel she founded, in 1903, the Women's Social and Po¬ litical Union (W.S.P.U.) and two years later inaugurated her well-known campaign of violent suffragism. On 13 Feb. 1908, she headed a deputation of 13 women to the House of Com¬ mons, thus starting a three days' riot, for which she received six weeks' imprisonment. In October she faced a similar charge and with her daughter was sentenced to three months, but was released before expiry of the term. In 1909 she conducted a lecturing tour in the

United States and Canada. She led another deputation in 1910 to the Prime Minister, Mr. Asquith, who refused to see her. Four days later she marched on the same errand at the head of some hundreds of women. She was again arrested, but discharged. In March 1912 many of her followers, armed with hammers, indulged in an extensive window-breaking campaign among the West-end stores. With two others she drove to Downing street and threw a stone through a window, which resulted in two months's imprisonment. On 5 March the W.S.P.U. headquarters were raided by police, when Miss Pankhurst escaped to France. Within five days 124 women were arrested and Mrs. Pankhurst was sentenced to nine months' imprisonment for conspiracy. She adopted the <(hunger strike® and was released on 24 June. Meanwhile, her example animated her follow¬ ers to continue the campaign of outrages. A bomb was placed in the Home Secretary's office ; attempts were made to fire the residences of ministers and the Theatre Royal in Dublin, where a hatchet thrown at Mr. Asquith struck the late Mr. Redmond instead. Acid was poured into letter-boxes throughout the country and much mail matter was destroyed. During January 1913, 50 women were arrested for win¬ dow smashing; windows were broken in Lam¬ beth Palace and in the Jewel Room at the Tower of London; hundred of orchids were destroyed at Kew Gardens, where a tea pavilion was also burned down; golf links were dam¬ aged; a house in course of construction for Mr.

Llovd George was burnt at Walton Heath; railway stations were set on fire; several man¬ sions, racecourse stands and a church were de¬ stroyed; the historic Smeaton Tower at Ply¬ mouth was attacked and a bomb placed in Saint Paul s Cathedral. Mrs. Pankhurst openly ac¬ cepted the responsibility and declared herself the instigator of these acts. On 3 April 1913 she was sentenced to three years' imprisonment. Owing to ˆhunger-striking® she was several times released and rearrested, and finally dis¬ charged on 24 July. Her militant policy alien¬ ated much sympathy from the cause of woman suffrage. During the European war she devoted her energies to work of a useful,

national char¬ acter, in the course of which she visited Russia and America, while her second daughter, Sylvia, was arrested and sentenced in Australia for po¬ litical agitation.

Henri F. Klein, Editorial Staff of The Americana.

PANMIXIA, in the theory of organic evo¬ lution, the cessation of the operation of natural selection. The process of the survival of the fittest, says Parker, has a reverse side, which has been termed the elimination of the unfit. Of the varieties that appear, some are less competely adapted to their surroundings than the majority, and these (the conditions remaining the same) tend to become destroyed owing to their unfitness to cope with their environment. The result of this process of elimination (apart altogether from the selection of progressive variations by which evolution, according to the theory, proceeds) is to keep up a certain stand¬ ard of efficiency in the organs of the members of the species. Under certain conditions this sustaining influence, as we may term it, of nat¬ ural selection may be suspended; the organism may be placed under conditions in which natural selection acts with reduced effect or does not act at all. There is, under such circumstances, no ˆelimination of the unfit® ; and, as a result, fit and unfit survive indiscriminately, interbreed and produce offspring, the ultimate outcome in the course of generations being a gradual de¬ terioration in the whole race.

This suspension of the influence of natural selection or panmixia acts more commonly on single organs than on the entire organism. Thus if, owing to some change in surrounding conditions, an organ is no longer kept up to the previous degree of efficiency by the elimina¬ tion of the individuals in which the organ in question is imperfectly developed, and, as these cross with one another, offspring is produced in which the organ is below the efficient standard ; and by a continuance of this process through a series of generations, it is supposed that the organ gradually dwindles in size, and may al¬ together disappear. The cetaceans furnish good examples of the process. Consult Parker and Haswell, (Textbook of Zoology* (1897).

PANNINI, pan-ne’ne, Giovanni Paolo,

Italian painter: b. Piacenza, 1695; d. 1768. He studied under Luti and Lucatelli in Rome. His work was limited to interior and exterior deco¬ ration in Rome and its neighborhood and is of a very high order. His (Interior of Saint Peter’s* and (01d Ruins) now repose in the Louvre and the National Gallery, London, con¬ tains (The Pyramid of Cestius) and the New York Metropolitan Museum contains Cardinal

Polignac Visiting Saint Peter's.* Other ex¬ amples of Pannini's work are housed in Naples, Florence, Madrid, Vienna and London. The Quirinal contains some frescoes by him.

PANNONIA, pa-no'ni-a, in ancient geog¬ raphy, a Roman province on the Danube, in¬ cluding what is now western Hungary, Slavonia and Bosnia, eastern Austria and Styria. Neither the origin of the name nor of the inhabitants, the Pannonians, is anything certain known, but the people may have been of Illyrian stock with an admixture of Celtic due to a Cel¬ tic invasion in the 4th century b.c. They were conquered by the Dacians about 50 b.c. Octavian defeated them in 35-34 b.c., but they rose a generation later and Pannonia was finally con¬ quered in 9 a.d., but not occupied save on the frontier until 102-107 a.d., by Trajan. The prin¬ cipal cities planted by the Romans were Vindo-bona (Vienna), Carnuntum (near Deutsch-Al- tenburg), Savaria (Szvonbathely) , Arrabona (Raab) , Siscia (Sissek), Poetovio (Pettau), Aquincum (Altofen), and Sirmium (Mitro-vitza). Trajan divided the province into a lower and an upper Pannonia. In the beginning of the 5th century Valentinian III of the Western Empire ceded Pannonia to Theodosius II of Byzantium, who surrendered it to the Huns. It was occupied by the Ostrogoths about 450 a.d., by Theodoric of Italy in 488, by the Lom¬ bards in 527 and by the Avars in 568. Then came the influx of the Slavs.

PANO (pa'no) INDIANS, a South Amer¬ ican tribe living along the banks of the Ucayali and Huallaga rivers in Peru. They were for¬ merly very numerous but now number less than 2,000. During the 1 7th century the missionaries persuaded many of them to gather in the mis¬ sion villages. They were of a rather low grade, but understood hieroglyphic writing on bark. When the missions were broken up, in 1767, most of the Panos returned to their savage life, form¬ ing numerous small tribes. They have always been friendly to the whites. They are expert boatmen and build canoes some of which are 40 feet in length.

PANOAN INDIANS, a South American family comprising upward of 20 tribes and occupying the forest regions of Peru, Bolivia and Brazil. Among the better-known tribes are Cashibo, Conibo, Mayoruna, Pano, Remo and Setebo. They are a savage race in all that the name implies and several of the tribes practise cannibalism. They have steadily decreased in number during recent years.

PANORAMA, a picture representing a wide or general view, as of a

large tract of country, so exhibited a part at a time by being unrolled and made to pass continuously before the spec¬ tator. It was invented in England in 1787 by Robert Barker. See also Cyclorama.

PANPIPE, an ancient wind instrument, the precursor of the organ (q.v.). It was formed of seven, eight or nine short hollow reeds, fixed together by wax and cut in graduated lengths so as to produce a musical scale. The lower ends of the reeds were closed and the upper open and on a level so that the mouth could easily pass from one pipe to another.

PANPSYCHISM (Greek pan, all, and psyche, soul), the theory that all things are es¬ sentially of a mental nature. In other words,

it is the theory that all the phenomena to which we are accustomed to attribute a purely physical character are really associated with or consti¬ tuted by minds oi their states or perceiving, feeling, willing and reasoning. It is foreshad¬ owed in the animism (q.v.) which precedes natural science, in which every natural occur¬ rence such as the falling of rain, the motion of the sun and stars, or the growth of plants, is interpreted in anthropomorphic terms. In this stage of civilization, however, instead of an actual assertion of the existence of a psychical aspect in every physical occurrence, there is merely a lack of distinction between mind and matter. True panpsychism crystallizes out in Greek philosophy, as the original hylozoism be¬ comes conscious of itself. The interpretation of the world in terms of form and identifica¬ tion of this form with idea is the essence ot Platonism. This idea, it is true, is not in any individual consciousness; in Neoplatonism, how¬ ever, the ideas of particular things come to be emanations from the one mind that is conscious of them — that is, the quasi-divine idea of the good. Stoicism (q.v.) also draws the necessary conclusion of panpsychism from its two the¬ ories of pantheism and of the psychical nature of God. This type of panpsychism is character¬ istic of many forms of European and Oriental mysticism. However, the name panpsychism is often confined to a different type of theory, which is due to Leibnitz. Here the mental nature of matter does not

consist merely in a substantial unity between thought and its ob¬ jects but in the existence of concrete acts of perception or feeling or of mental states of a lower (though yet definite) level, inseparable from every physical phenomenon. In the phi¬ losophy of Leibnitz the material world consists in an aggregate of dimly perceiving and dimly perceived monads or souls. Fechner combines a strict . parallelism of mind and body with a pantheism and a belief in the omnipresence of mind. Clifford develops an atomism in which both mind and matter are built up of units of mind stuff. Clifford's theory is known as the mind-stuff theory. It is very like certain forms of present day empirical realism, in which sense-data and their relations are supposed to build up mind indivisibly in physical atoms and psychichal monads, qualitatively determined by the latter, and finding its most advanced expres¬ sion in the intelligence of the higher animals. In this theory all matter is composed of ele¬ ments, essentially psychial, internally — mind, externally — matter. Consult Clifford, W. K., in Vol. Ill, Mind o. s.

PANSLAVISM, a general name for the ef¬ forts of the Slavonic races in Europe for a unity of civilization and literature. An anonymous work, the (European Pentarchy) (1839) and the writings of A. Gurovski, made a considerable impression in favor of a union under Russia ; while later events favored the Austrian head¬ ship; but none of these projects ever possessed a reasonable chance of realization. The mere fact that the Slavonic race comprises nations so bitterly hostile as Russia and Poland, not to speak of geographical and political difficulties, and of such diversities of religious creed as are contained with the range of Christianity and Mohammedanism, made any attempt to unite t,hq

scattered elements of such a race in a voluntary political union impracticable.

The most important effort put forth toward the realization of a political union of the Slavs was in 1848, when, stimulated by the rival efforts at union of the German nations and especially by the summons to Bohemia to send her full contingent to the German Parliament, the Sla¬ vonic clubs summoned a congress of all the Slavs in the Austrian Empire, with a view to confer on the constitution of the empire. The congress met at Prague on 2 June. The various nations represented were classified in three departments: the first, consisting of the Bohe¬ mians, Moravians, Silesians and Slovaks or Western Slavs; the Poles and Ruthenians form¬ ing the Eastern Slavonians ; the Slovenians,

Croats, Serbians and Dalmatians the southern division. Each of these divisions chose 16 mem¬ bers, who formed a committee, with Palacky at their head, who drew up a plan of confederation and alliance among the various nationalities of the empire. The proceedings of the congress, however, which had to be conducted in German as the only common means of communication, could not be brought to a formal conclusion and the congress was interrupted by a Slavonic in¬ surrection, which proved futile. After 1866 re¬ newed but unavailing efforts were made by the scattered Slavonians of Austria to form a union among themselves, in order to counter¬ balance the preponderance of the German and Magyar races…

A great Slavonic congress held at Moscow in 1867 was also practically fruitless. An im¬ portant product of Panslavism, however, is the work of its numerous scholars and authors in literature and philology, formulating exact prin¬ ciples for a comparative science of the Slavic tongues. Foremost in fostering the intellectual growth of Slavonic aspirations was Archbishop foseph George Strossmayer (q.v.), who founded the South Slavonic Academy in 1867, Agram University in 1874 and was largely instrumental in reorganizing the entire educational and reli¬ gious system of the Austro-Siavonic regions. (See Bohemian Language; Czech Litera¬ ture). Due to the initiative of Czechs and Poles, a second Congress of Slavic nations was held in Prague in 1908, when resolutions were passed in favor of Slavic unity. The Russo-Turkish War of 1877— 78 originated in the un¬ dercurrents of Panslavism, as also the Balkan Wars of 1912 and 1913, while they contributed to the Great European War of 1914-18 the as¬ sassination of the crown nrince of Austria which precipitated the conflict. For further developments of Panslavism see Bohemia; Czechs and Czecho-Slovaks ; Rtjssia; Slavs; War, European. Consult Levine, L., ‘Pan-Slavism and Euronean Politics) (New York 1914) : Vrba, R., (Russland und die Panslavis-mus) (2 vols., Prague 1913).

PANSY, an annual or imperfectly peren¬ nial herb (Viola tricolor) of the family Violacea. It is a native of Europe where it has been in cultivation for at least 400 years, and whence it has been taken to all cool temperate climates of the civilized world. The plant, which is rarely more than six inches tall, bears long-petioled, heart-shaped leaves and large irregular flowers which slightly resemble the human face. Its name is a corruption of the

French, pensce, thought, and its old folk-name, heart s ease,** signifies remembrance, a double reason for its popularity. Few flowers show the effects of care in selection more than the pansy. Naturally the blossoms are borne upon rather short stalks and are less than a third the size of improved varieties, which often attain a diameter of three inches. In dry climates fresh seed must be imported annually, since home-grown seed, even of improved strains, is apt to produce flowers inferior to the imported, each year emphasizing the deterioration. The cultivated pansies are grouped in strains rather than as individual varieties, and as a rule ex¬ hibit mixtures of blue, white and yellow, al¬ though some kinds are all of one color. Pansies thrive best upon rather heavy loams well drained and well supplied with plant food and humus. In the United States and other countries where the air becomes very dry dur¬ ing the summer, the plants generally fail dur¬ ing the hot months, even when planted in shady places, the most favorable situations. Hence, in such climates the seed is usually sown in cold frames during August or September, kept cool and moist by a rather thick mulch of loose straw until the plants appear, and then these are protected from drying winds. Being toler¬ ably hardy the plants can be left in the frames during winter, previously having been trans¬ planted from the seedbed so as to stand about two inches apart. In the spring they may be allowed to blossom where they stand or may be transplanted to garden beds as soon as the ground can be worked. After flowering in these beds for a month or six weeks they should be replaced by geraniums or other heat-loving plants.

PANTHEISM (Greek, pan, all, and theos, god), in philosophy, the doctrine of the iden¬ tity of God and the material universe. The doctrine stands midway between atheism and dogmatic theism. There are only three ways in which the philosopher can deal with the idea of the existence of God, that is, of a being who is the cause or original sum of all being. He may deny his existence altogether, or may infer psychologically that there is a God, and proceed to the inference that he is the first cause of all things, but leave unexplained the nature of the relation between God as cause and other exist¬ ences as effects. Finally, he may proceed to reason back from the effect to the cause, and show a necessary connection between them. The last process is the source and explanation of pantheism. The origin of the idea of a

God with the theist and the pantheist is the same. It is by reasoning upon ourselves and the sur¬ rounding objects of which we are cognizant that we come to infer the existence of some Su¬ perior Being upon whom they all depend, from whom they proceed or in whom they subsist. Pantheism assumed the identity of cause and effect, and the consequent adequacy of each effect, rightly interpreted, to indicate its cause. Matter, not less than mind, is with it the neces¬ sary emanation of the deity. The unity of the universe is a unity which embraces all existing variety, as proceeding from it in a way neces¬ sarily explicable by the result. Hence each existing thing contains all the explanation of its own existence which it is capable of receiving.

The earliest school of Greek philosophy, the

Ionian, in as far as it admitted any theism, was essentially pantheistic; and to the same school of pantheism belong Epicurus and Lucretius in ancient, and Giordano Bruno in modern times. The atomic theory, or the origination of all things in conscious atoms, is the culminating theory of this school. The Sankhya of Kapila, one of the most celebrated Indian systems of philosophy, in which probably developed the Buddhist religion, was the chief representative of pantheistic tendencies in the East. Kapila enumerates 25 first principles of things : of which the first (mulaprakriti) is matter; the second (buddhi), intelligence; the third (alian - kara), self-consciousness. Speusippus, the sis¬ ter's son and successor in the Academy of Plato, might be called an ultra-pantheist. He taught, what may possibly be considered the true logical culmination of the doctrine, that the Divine or Best is first indeed in rank, but is chronologically the last product of development. He defined happiness as the habit of conformity to nature. The soul, according to him, was a higher union of the arithmetical and the geo¬ metrical, or extension harmoniously shaped by number. The Stoics, differing widely from the school of Epicurus, may also be numbered among the adherents of pantheism. Their doc¬ trine was that whatever is real is material. The universe as a whole possesses consciousness, and this consciousness is deity. The world undergoes a constant evolution, the elements of water, earth and air being evolved out of fire, which again absorbs them, and the process con¬ tinues in an eternal cycle. The human soul and the deity, which are one in nature, act and react on each other. Intelligence, whether in man or the deity, they considered as consisting chiefly in force. Perhaps there is nothing which seems more opposed to pantheism than the mysticism of the Alexandrian school, and par¬ ticularly of Plotinus, which makes of God so pure an abstraction that even

thought, without being separated from individuality, cannot attain to it. Yet from the bosom of this school a prolific source of pantheism has arisen. Dionys¬ ius, the pseudo-Aeropagite, a Christian philoso¬ pher of the Neoplatonic school, introduced it among his speculations, in which the particular is derived by a series of gradations, as genus and species, from the universal. John Scotus Erigena, the founder of the scholastic philoso¬ phy of the Middle Ages, gave this speculation a realistic turn, making God the essence of the world, and the universal, the genus, the species and the individual so many particular develop¬ ments which actually succeed each other. Eckhart, a German philosopher of the beginning of the 14th century, also a disciple of Dionysius, and often regarded as the father of German philosophy, taught some views which were de¬ veloped in a pantheistic direction by some of his followers. Eckhart held that the works of creation were eternally in God in idea or con¬ ception; this was developed into a pantheistic doctrine of the eternal existence of ideas or types of all things. Giordano Bruno, like Epi¬ curus and Lucretius, taught that monads are the elements of all existing things. God is the imminent cause of the universe. Power, wis¬ dom and love are his attributes ; but he is the monad of monads, the minimum because all things are external to him; the maximum

because all things are in him. He produces the worlds freely, but by an inner necessity of his nature. The worlds are nature realized ; God is nature working. Stars are moved by the souls that reside in them. God is in all things, as being in things that exist, or beauty in ob¬ jects that are beautiful.

No modern pantheist has acquired a greater renown than Spinoza, probably because none has developed his doctrines into a system so comprehensive or with a logic so rigorous. A disciple of Descartes, he founds upon that mas¬ ter's definition of cause a system in which he develops the relation of God to the universe in a series of propositions, graduated like a suc¬ cession of consequential demonstrations in mathematics. According to Spinoza the essence of God is existence,

and he has two funda¬ mental attributes, extension and thought. All things which exist are modes of God's attri¬ butes. Their existence is necessary, and all changes which take place in them, whether affecting intelligent or non-intelligent beings, are necessary. God alone is free, and he is free because he acts by an inner necessity and is not controlled by any other being. It may be added that Spinoza combats the apparent inference from his doctrine, that the sum of things which exist is God. Things are diverse, complex and limited, while God is one, simple and infinite. They are not God, but only the necessary modes of his attributes. Among mod¬ ern pantheists a place is also due to Leibnitz. According to him all souls are monads, or atoms containing active powers consisting in ideas. God is the primitive monad ; all other monads are its fulgurations. Bodies, as plants and minerals, are aggregations of sleeping monads with unconscious ideas. The relations of the monads are purely mechanical, and their co-operation is determined by the theory of pre-established harmony. The French philosopher Diderot recognized God in natural law, truth, beauty and goodness ; for Leibnitz's monads he put atoms and gave them sense in place of ideas, which became thought in organized be¬ ings. Finally, the modern doctrine of evolution, when it assumes a transcendental form and car¬ ries speculation as to the origin of things be¬ yond the range of inferences founded on the observation of nature, is necessarily pantheistic. See Atheism; Deism; Theism; Theosophy.

PANTHEON, anciently a name applied to a temple or shrine dedicated to the gods. The most historical pantheon is that erected in Rome by Hadrian 117-138 a.d. and dedicated by him as a temple to all the gods. For 13 centuries it served as a Christian church, having been dedi¬ cated by Boniface IV about the year 607. It is 188 feet in circumference and is covered by a dome 142 feet in span. The entire height is 141 feet. Raphael and Victor Emmanuel II are buried in the Pantheon. Another noted struc¬ ture bearing this name is the Pantheon of Paris (church of Saint Genevieve), for a description of which see Paris.

PANTHER, a large cat, in North America usually a cougar;, in South America a jaguar; in India or Africa a leopard.

PANTHER-CAT, a name locally given to several spotted wildcats ; most often, probably, to the ocelot (q.v.).

PANTIN, pan'tan', France, town in the de¬ partment of the Seine, just

without the forti¬ fications of Paris. It has a number of thriving industrial establishments, including sugar mills and refineries, railroad car shops, boiler works, chemical and perfume works, glass works, oil¬ cloth mills, *etc.* Pop. 36,359.

PANTOGRAPH, an instrument by the aid of which maps, plans and designs may be copied mechanically, either on the scale on which they are drawn or on an enlarged or reduced scale. It is made in a variety of forms.

PANTOLAMBDA, a primitive ungulate fossil mammal, occurring in North America and Europe but confined to the Eocene period. It developed the full series of 44 teeth with the upper molars of the selenodont type. The feet were stocky and postlike, closely resembling those of the elephant. The Pantolambdidae never reached the length of body of its cognate type among the Amblypoda, the Coryphodon, which in some cases was as great as 10 feet. Consult Osborn, H. F., (Evolution of the Amblypoda) (in Bulletin of the American Museum of Na¬ tural History, Vol. X, p. 169, New York).

PANTOMIME, the name given by the Romans to an actor in a dramatic performance consisting of dance and gesture. This sort of representation appears to have been indigenous to Italy. The modern Christmas pantomime in Great Britain is a spectacular play of a bur¬ lesque character, founded on some popular fable, and interspersed with singing and danc¬ ing, followed by a harlequinade, the chief char¬ acters in which are the harlequin, pantaloon, columbine and clown.

PANTOPODA, or PYCNOGONIDA, a

group of marine spider-line, but hard-shelled arthropods, which is classified near the horse¬ shoe crabs (Limulus). The body (cephalo - thorax) is so small and the limbs are so large that the animal, which may span two or three inches in large species, seems all legs, and a popular name alorig the New England coast is <(no-body crab.® There are four pairs of equally large many-jointed walking legs, in ad¬ vance of which are two pairs modified into chelate mouth-organs, and a third pair upon which, in the breeding season, the male carries the eggs cemented to these appendages. The abdomen is represented by only a small tail-like part posterior to the legs. A metamorphosis occurs in most species, and the larva looks something like a nauplius, but is not equivalent to it. These curious creatures live from the shore-line to deep water.

PANUCO, pa’noo-ko, (1) river of Mexico, rising in the plateau north of the City of Mexico and flowing generally northeast. It forms part of the boundary of Tamaulipas and Vera Cruz and receives the waters of several smaller streams before emptying into the Gulf of Mexico near the city of Tampico (q.v.). Its bar has been removed by elaborate engineering works and the river mouth is now a fair port. (2) A district about this river, so called by Cortez and his followers. It was partially con¬ quered by Cortez in 1522, but in 1526 was granted to de Guzman, who was independent of Cortez.

PANYASIS, Greek epic poet of the 5th century b.c., ranked one of the five great epic poets of Greece for his poems on Heracles and on the Ionic migration. He was born in Hali¬ carnassus, and is thought to have been the uncle of Herodotus. His few fragments are edited by Kinkel (1877) ; the most important are on wine, its use and abuse.

PAOAY, pa-6-i’, Philippines, pueblo or town, province of Ilocos Norte, Luzon, three miles inland from the western coast, on a small lake ; 12 miles south of Laoag. It is on the main highway. Pop. 12,743.

PAOLA, pa‘6-la, Kan., city, county-seat of Miami County, on the Missouri Pacific, the Missouri, Kansas and Texas and the Saint Louis and San Francisco railroads, about 40 miles . south by west of Kansas City. It was settled in 1855 and in 1869 was chartered as a city. It is in a fertile agricultural country and in a natural gas belt. Coal deposits are in the vicinity; cultivating grain and stock-raising are prominent industries in this section. The trade is chiefly in wheat, corn, livestock and coal. It is the seat of the Ursuline Academy, and has public and parish schools and a free public library which contains about 6,000 volumes. The city owns the water-supply system. Pop.

3,207.

PAOLI, pa‘6-le, Pasquale de, Corsican pa¬ triot : b. Morosaglia,

Corsica, 26 April 1725 ; d. near London, England, 5 Feb. 1807. He was educated at the Jesuits' College at Naples, and in 1755 was appointed captain-general by his countrymen, then struggling for their independ¬ ence against Genoa. By his energetic efforts the government and military resources of the island were reformed, and he maintained a protracted and generally successful struggle with the Genoese. The latter, however, first made an agreement with France to garrison the places held by them in Corsica, and finallv, in 1768, sold the island to France. After a brief struggle Paoli was obliged to yield, and fled to England. Here he remained 20 years, till the Revolution of 1789, when he was recalled by the National Assembly and made lieutenant-general of Corsica. Dissatisfaction with the extreme measures of the revolutionists in France soon led him to throw himself into the arms of Eng¬ land; in 1793 a British army was landed in Cor¬ sica, and through his influence the crown was offered to George III, in 1794. Paoli, however, did not obtain the government of the island and withdrew to England and was pensioned by the British government. His remains were re¬ moved to Corsica in 1889. Consult biographies by Arraghi (1843) and Bartoli (new ed., 1891).

PAOLO AND FRANCESCA, a poetic drama in four acts, by Stephen Phillips, based on the famous passage in Dante's (Divine Comedy > (II Purgatorio, Canto V). Paolo has been sent to fetch home Francesca, the bride of his stern warrior brother, Giovanni, tyrant of Rimini. Absorbed in his military enterprises, Giovanni commends Paolo and Francesca to each other's society with perfect faith in their loyalty to him. They, on their part, with no thought nor wish other than their duty to brother and husband, are overpowered by the irresistible call of youth to youth.

" Unwillingly he comes a wooing: she

Unwillingly is wooed: yet shall they woo."

Giovanni, discovering their guilt, is driven both by passion and his social code to destroy them, though he destroys thereby all that he loves in the world. (Paolo and Francesca > belongs to the best of Stephen Phillips' work and when first published (1899) it was hailed as ushering in a new era in the poetic drama of the English-speaking world. It contains many passages of great beauty and has a singular pictorial qual¬ ity; but as drama it halts and loiters by the way instead of moving swiftly and surely to its tragic end. The prose interludes in the tavern and in the opening scene of Act III, are as foreign to the

tale as they are to the versifica¬ tion, while Paolo's soliloquy and the meeting of Paolo and Giovanni at the chemist's shop are awkward and thoroughly old-fashioned ex¬ pedients. The only touch of novelty in dra¬ matic treatment is in making the thwarted maternal instincts of Giovanni's housekeeper do service, in place of the customary villain, in arousing his suspicions. As a play, (Paolo and Francesca) has neither the passionate sweep and dramatic intensity of d'Annunsio's Fran¬ cesca da RiminP nor the breathless atmosphere of mystery and impending doom in which Mae¬ terlinck has enveloped an almost identical theme in (Pelleas and Melisande.* It is essen¬ tially lyric in character in spite of its tragedy. This quality is exquisitely expressed in Giovan¬ ni's closing lines, as he looks upon the dead lovers :

. . " She takes away my breath.

I did not know the dead could have such hair.

Hide them. They look like children fast asleep."

(Paolo and Francesca) was first performed in London in 1902 and in New York in 1906.

PAPACY, the doctrine of the Roman Cath¬ olic Church relative to the authority of the Pope, that is, the Papacy, was officially promul¬ gated by the Council of the Vatican in 1870. The primacy, it teaches, over the entire Church was conferred by Christ on Peter; and this primacy was one, not of mere dignity, but of full and supreme jurisdiction. This supreme authority is exercised by the bishops of Rome ((for none can doubt ; and it is known to all ages, that the holy and blessed Peter, the prince and chief of the Apostles, the pillar of the faith, and foundation of the Roman Catholic Church, received the keys of the kingdom from our Lord Jesus Christ, the savior and redeemer of mankind, and lives, presides, and judges, to this day and always, in his successors, the bishoos of the Holy See of Rome, which was founded by him, and consecrated by his bloods Hence, the council continues, the Roman See possesses a superiority of ordinary power over all other sees; and this power of jurisdiction is immedi¬ ate, so that to it all bishops, pastors and the laity, both individually and collectively, are bound to submit, not only in matters which be¬ long to faith and morals, but also in those that appertain to the discipline and government of the Church. In virtue of this supreme power, the Roman Pontiff claims the right of free com¬ munication with the bishops of the entire world and their flocks. To him as to the supreme tribunal, in all causes, the decision of which be¬ longs to the Church, recourse may be had and from his judgment there is no appeal. The

sertion that it is lawful to appeal from him to an ecumenical council is condemned as false. The infallibility of the Pope in doctrinal mat¬ ters is thus defined :

“We teach and define that it is a dogma divinely revealed, that the Roman Pontiff, when he speaks ex cathedra, that is: when, in discharge of the office of pastor and doctor of all Christians, by virtue of his supreme Apostolic authority, he defines a doctrine regarding faith or morals to be held by the Universal church, by the divine assistance promised to him in blessed Peter, is possessed of that infallibility with which the divine Redeemer willed that his Church should be en¬ dowed for defining doctrine regarding faith or morals, and that, therefore, such definitions of the Roman Pontiff are irreformable of themselves and not from the consent of the Church.”

It is not now maintained that the full sig¬ nificance of the Petrine primacy was manifest from the first in the life of Christianity; but rather, that there was, from the beginning, to borrow Cardinal Newmans words, a certain element at work, or in existence, divinely sanc¬ tioned, which for certain reasons did not at once show itself on the surface of ecclesiastical affairs, but gradually with the expansion of the Church, and in response to the needs of the times, developed into full vitality. What was the date of Peter’s first appearance in Rome is not clear. Critics of all shades agree that Peter was in Rome in 64, when the Christian com¬ munity was already established and that he suf¬ fered martyrdom there during the reign of Nero. Roman Catholic writers lay stress on the testimony of Eusebius and Jerome who re¬ fer to tradition in proof that Peter had been in Rome before 64. The earliest picture that we have of the Christian Church presents the community rather than the bishop. The writ¬ ings of Clement seem to point out the com¬ munity as the seat of authority: the letter ascribed to Ignatius of Antioch addresses the Cnurch of the Romans; and Pope Soter in 170 speaks as in the name of the community, rather than in his own. But the march of events rap¬ idly brought about two results, the domination of’ the bishops over the various churches and an active pre-eminence of Rome over the oth¬ ers. After the fall of Jerusalem, Rome, the po¬ litical mistress of the world, soon became

the centre of Christianity; other bishops began to consult Rome on ecclesiastical matters. Poly¬ carp, the disciple of Saint John, had recourse to Anicetus on the vexed question of the Pas¬ chal celebration, though, it is true, he de¬ clined to abandon the Asiatic for the Roman custom. In 194 Pope Victor took steps to en¬ force the Roman discipline by the excommuni¬ cation of recalcitrants. From the middle of the 2d century, the Gnostic and Montanist contro¬ versies served to bring the Roman authority into prominence. To the Church of Peter as to the witness of traditional doctrine disputes were referred. The imperial government, too, recognized the precedence of the Roman bish¬ ops over all others; the Emperor Aurelian, in 274, decided that the Christian Church property in Antioch should be dealt with as the bishops of Rome and Italy thought fit. In 256 Cyprian of Carthage speaks of Rome as the seat of the primacy. During the 4th and 5th centuries the Roman primacy looms larger and larger. The facts which indicate this rising domination are admitted by Protestant historians as well as by Roman Catholics. Newman cites as suffi¬

cient evidence for the 4th century the following passage from the Anglican Bishop Barrow .

“The Pope’s power was much amplified by the impor¬ tunity of persons condemned or extruded from their places, whether upon just accounts or wrongfully, and by faction, for they, finding no other more hopeful place of refuge and redress, did often apply to him; for what will not men do whither will not they go in straits? Thus did Marcion go to Rome and sue for admission to communion there, bo Fortunatus and Felicissimus in Saint Cyprian, being con¬ demned in Africa, did fly to Rome for shelter ; of which absurdity Saint Cyprian doth much complain.. So likewise Martianus and Basilides in Saint Cyprian, being ousted of their sees for having lapsed from the Christian piofession did fly to Stephen for succor, to be restored. So Maximus the Cynic went to Rome to get a confirmation of his election at Constantinople. So Marcellus, being rejected for hetero¬ doxy, went thither to get attestation of his orthodoxy, ot Saint. Basil complaineth.”

Many other instances of Papal interference for the restoration of bishops or the appoint¬ ment of new bishops and the designation of

others to act as vicars of the Pontiff are also cited from Barrow. While the apologists of the Papacy and its antagonists agree upon the facts, they differ in their respective interpreta¬ tions of them. What one side considers as evi¬ dence of the universal recognition accorded to the primacy, the other treats as evidence of an ever-widening policy of ((papal aggression. The Protestant theologians, besides, throw em¬ phasis upon a few notable cases of remonstrance addressed by bishops of other sees to the ac¬ tions of Roman pontiffs, and see in Cyprian s acknowledgment of the primacy nothing more than an acknowledgment of pre-eminent dig¬ nity. The definitive recognition of the spiritual primacy is found in the great Council of Chalcedon, presided over by the legates of Leo I (451). The 630 bishops there assembled ac¬ cepted as authoritative the profession of faith imposed by the Pope ; they are reported to have unanimously exclaimed : ((What Leo believes we all believe; anathema to him who believes anything else. Peter has spoken by the mouth of Leo.® The removal of the empire to Con¬ stantinople was fraught with far-reaching re¬ sults on the Roman world in temporal as well as in spiritual affairs. In the 9th century writ¬ ers is found a story that, on his withdrawal from Rome, Constantine granted to Pope Sil¬ vester, Rome, Italy and the Western Islands. This famous donation of Constantine was treated as authentic by the canonists and jurists of the Middle Ages. ((It is,® says the latest English Roman Catholic historian of the Papacy,

“ a prophecy after the event. Paganism, abandoned, and soon to be persecuted by its Pontifex Maximus, without the conviction that makes martyrs, and long a hollow formality was dying. Christians had the State in their hands. What was more, they showed the fiery zeal, the proselytizing spirit, the exuberance in quarrels among themselves,, which are signs of a youth rich in hopes, bent upon shaping its own victorious future. Heathen Rome invited them to subdue it. Public policy required that the centre of administration should be at the heart of the Empire. The balance of power was displaced. Neither Pope Silvester, nor any Pope for centuries, dreamed of disowning the imperial rule; from the Goths in Italy they suffered grievous things as the first sub¬ jects of Constantinople. But Rome left to herself was Rome in the hands of the Papacy; fronting the West and the bar¬ barians, Constantine had imitated Alexander, who in setting up his throne in Babylon in 330 b.c. — a curious coincidence — and assuming the tiara, left Europe free to follow its own fortunes. • Such was the real donation, not understood at the time by Pope or Emperor, which never lost its force until the northern nations grew into a world as rich ..as cultivated and as haughtily self-conscious as the Greek.”

The capture of Rome by Alaric in 410, the subsequent invasions of Italy by Attila the Hun

and Genseric the Vandal, reduced the imperial authority to the shadow of a great name, and the wane of Byzantine influence was accom¬ panied by a corresponding growth of political power in the Papacy in whom the people found their only protection and succor against the barbarians. For a brief interval the genius of Justinian, with the military successes of Belisarius and Nares, brought the popes once more under the sway of Constantinople. With the rise of the Lombard power in Italy the doom of the Western Empire was sealed. By his vain effort to extirpate the use of images in worship the Emperor Leo the Isaurian (726) drove the * Roman and Italian populations to transfer their civil allegiance to the Papacy, which, through the wisdom, administrative ability, virtue and apostolic zeal of Pope Gregory the Great (590-604) had become the national centre of Italy. The pontificate of Gregory is a luminous phase in Papal history. It witnessed the rise of the Benedictine Order whose monks established Christianity in England and initiated the work of civilizing Europe. The Anglican Bishop Creighton summarizes the immediate and sub¬ sequent results of this mission :

“While dangers were rife at Rome, a band of Roman missionaries carried Christianity to the distant English, and in England was founded a Church which owes its existence to the zeal of the Roman bishop. Success beyond all that he could have hoped for attended Gregory’s pious enter¬ prise. The English Church spread and flourished, a dutiful daughter of her mother-church of Rome. England sent forth missionaries in her turn, and before the preaching of Willebrod and Winifred heathenism died away in Friesland, Franconia and Thuringia. Under the new name of Boniface,

Jiven him by Pope Gregory II, Winifred, as archbishop of lainz, organized a German Church, subject to the successor of Saint Peter.”

The middle of the 8th century saw the alli¬ ance of the Papacy with the Franks. The last of the Merovingians had become a puppet in the hands of Pepin, the mayor of the palace. The nobles offered the crown to Pepin, who con¬ sulted Pope Zachary. The Pope replied: (<Let him be King in name, who is in fact so,® and Pepin was anointed by the deputy of Zachary (751). This fact became a precedent, in the public law of Europe, for the Papal claim of indirect authority over temporal sovereigns.

The grateful Pepin bestowed on Pope Stephen III large territories which he had wrested from the Lombards; and in return he received from him the title of Patrician of Rome, an event that opened the way to the es¬ tablishment of the empire which with the Pa¬ pacy was to constitute the unity of Christendom. Pepin's son, Charlemagne, was crowned em¬ peror by Pope Leo III, in Saint Peter's, at Rome, on Christmas Day, 800. When under the descendants of Charles, the shortlived unity of the empire was broken up into separate states the Papacy stood forth in the minds of men as the paramount authority in the political, as it was in the spiritual, world. ((The Church,® writes Barry,

"instead of breaking up as Charles' monarchy had broken up, into petty and opposed principalities, is centralized in the West. A supreme court of appeal is set up in the sight of mankind, its charter the Bible, its weapons spiritual, but entailing penalties in this world. For deposition, interdict, excommunication, greater or less, carry in their train for¬ feiture of dignity, good, life, and the Holy See can reckon on sentiments which become the foundation of order, in the State and in the Church."

Pope Nicholas I exercised his supremacy in both realms (858-867). He obliged the Frank¬

ish King Lothair II to take back the wife whom he had attempted to divorce. He deposed the powerful archbishops of Cologne and Treves who had sided with the king, and against the opposition of the Byzantine emperor he con¬ demned Photus, who had intruded himself into the patriarchate of Constantinople. About this time appeared the famous False Decretals, which were embodied in the canon law of Eu¬ rope. This collection of decrees was first pre¬ sented at the Synod of Quercy in 857, when the Frankish bishops were contending for al¬ leged rights and privileges against their metro¬ politans. It purported to be the work of Isidore of Seville. There had been a genuine

collection edited by this author. But the present volume contained, besides some authentic decrees, the Donation of Constantine, several forged decrees and acts of spurious synods. The author is generally supposed to have been a Western Frank. His object was to set up an entire im¬ munity for the clergy and to present the Pope as. not only supreme ruler in ecclesiastical af¬ fairs, but also the supreme appellant judge in even secular causes. The bishops were exalted and protected against their immediate superiors, but, on the other hand, they were reduced to something like a condition of feudal vassalage to the Pope. In short, the rights of synods, metropolitans, clergy and laity were swept away. The general conception embodied in these decretals was woven into the laws of Christendom during the Middle Ages.

The middle of the 9th century was charac¬ terized by a rapidly spreading confusion and civil and moral disorder throughout Europe. The most signal exercise of Papal authority was the conferring of the empire on Charles the Bald by John VIII. The Saracens, the Nor¬ mans and the Slavs were carrying their victo¬ rious arms into southern, western and central Europe. Italy was the scene of incessant strife. The popes were unable to resist the attacks and oppression of Italian nobles and Norman chiefs. As the power of the great vassals of the crown increased, the disintegration of the empire con¬ tinued its course ; and something akin to an¬ archy prevailed. The condition of the Papacy reflected the evils of the times. Disorders in elections, corruption in administration, license in morals, mark the Papal history of this period. In the House of Theophylact the Pa¬ pacy almost assumed the character of an heredi¬ tary monarchy. The lowest depths of degrada¬ tion were reached when Alberic of Tusculum made his son, a vicious boy of 12, Pope under the title of Benedict IX. After holding the position for some time, Benedict sold it to Gregory VI, in order to get married. There was another claimant known as Silvester III. Benedict endeavored to resume the sover¬ eignty. Monks like Peter Damian and Hilde¬ brand deplored and endeavored to mitigate the universal disorder. The empire had passed to the German House of Otho. Henry III endeavored to put an end to the degradation by deposing the three unworthy claimants and appointing a German to the throne of Peter (1046). Not¬ withstanding the powerful influence and reso¬ lute endeavor of the monk Hildebrand the reign of misrule continued till he himself became Pope, under the name of Gregory VII. He set about the reformation not only of Rome but of

ihe entire Church, recalled the clergy to the vows of their profession, took severe measures against the universal vice of simony and as¬ serted the Papal claims against the secular pow¬ ers. A long struggle of much vicissitude against the imperial power ended by the humili¬ ating capitulation of Henry IV at Canossa (1076). The influence of the universities, es¬ pecially those of Paris and Bologna, contrib¬ uted, by their teachings in law, philosophy and theology, to establish the majesty of the Pa¬ pacy as the supreme authority in the opulence of power ascribed to it by the Decretals of Gratian. The Crusades gave exercise to the popes claim of suzerainty over all the temporal rulers of Europe. The Papal dominions were enriched in 1115 by the Countess Matilda's bequest of her extensive possessions. A long quarrel with the emperors concerning the right of. ecclesiastical investitures ended in a further triumph of the Church over secular feudalism ; the Concordat of Worms, however, conceded to the emperors the right to send deputies to the election of Ger¬ man bishops and of investing them with the re¬ galia before episcopal consecration. This was the first of the concordats between the Papacy and the states which indicate the growing rest¬ lessness of the civil powers. About the middle of the century a more serious conflict arose be¬ tween the popes and the Hohenstaufen em¬ peror, Frederick Barbarossa, who undertook to restore the imperial authority over the Italian states and establish his sway over both clergy and laity. The genius of Alexander III tri-umohed; and Frederick, like Henry IV, was obliged to submit (1177). Everywhere, how¬ ever, the young nations of Europe, developing their national codes, and becoming conscious of their strength, were, at the end of the 12th and the beginning of the 13th century, showing signs of restiveness under the dominion of the Church. In England Henry II began his strug¬ gle with Thomas of Canterbury. The consti¬ tutions of Clarendon claimed almost as much for the civil power as was demanded afterward by Henry VIII. Fearful that Henry might join hands with Frederick, the Pope temporized. But when the death of Becket stirred up the people against the king, the Plantagenet was compelled to sue for peace no less humbly than the Hohenstaufen. In the reign of Innocent III the power of the Papacy reached its zenith. A man of lofty character, indomitable courage and great political insight, he dictated to the rulers of France, Germany and England. For a short time the arms of Venice brought Con¬ stantinople under his spiritual sway. By the help of the Crusaders he

crushed, with great severity, in northern Italy and southern France the sects which disputed the authority of the Church.' The new orders of Saint Francis and Saint Dominic, powerful in their primitive fer¬ vor and virtue, renewed the religious spirit in every country and awakened in the consciences of the people the old devotion to the Church and its sovereign ruler. Innocent, more con¬ spicuously than any of his successors, acted as an independent Italian prince, expelled the im¬ perial officers from the domains which Matilda had given to Rome; and under him the states of the Church became an autonomous kingdom. Thenceforward we see the Pope strengthened and burdened with a temporal sovereignty ; and

more than once, in subsequent history, the ne¬ cessity of defending it becomes a serious em¬ barrassment to him in the discharge of his of¬ fice of Spiritual Father of Christendom. Though Innocent was successful in asserting his feudal authority, the resistance offered to him indicated that the mediaeval awe of the Pa¬ pacy was rapidly passing away. Some of his acts rankled in the hearts of the peoples and bore fruit in later times. To trace the effect of his intervention in the affairs of England, by absolving the nation from its allegiance to King John, and by annulling, as vile and base, Magna Charta, the foundation of English lib¬ erty, would carry us to the days when, in a darker hour, another Pope, by a similar act of absolution, and of deposition of the sovereign rendered definitive the breach between England and the Holy See.

Another and a final struggle between the Papacy and the German emperors opened with the reign of Frederick II. Frederick attempted to reduce the popes to a state of dependence on the imperial authority. Gregory IX and Innocent IV vigorously resisted and after a long and demoralizing struggle overcame him; and the popes did not rest easy till the last of the Hohenstaufens, a mere youth, was beheaded (1286). With Frederick perished the empire which, under Charlemagne, had arisen as the temporal element that in union with the spir¬ itual Papacy had formed the theocracy of the Middle Ages. Though the feudal Papacy had conquered the empire it was not destined long to survive it.

The French influence introduced into Italy soon dominated the elections and popes were chosen with a view, not to the interests of the Church, but to those of the French king. In the reign of Boniface VIII (1294—1303) the Papacy and the secular power closed in a death struggle from which the state rose victorious in the person of Philip

the Fair of France. Al¬ ready, by the instrument known as the Prag¬ matic Sanction, Louis IX had claimed for the Gallican Church freedom of patrons from Papal interference, freedom of election to chapters and immunity from Papal taxation without the consent of the Crown and the Church. The chief sources of revenue exacted by the popes about this period were the fruits of the first year taken from vacant livings and from money left by previous incumbents ; the annates taken from benefices conferred by the Pope; taxes for the confirmations of bishops and for pallium fees; taxes for dispensations; Peter's pence; tributes from secular princes and religious insti¬ tutions placing themselves under the protection of the Pope; the feudal tax from the vassals of the Pope. The popes widely exercised the right of presenting to benefices; granting ((ex-pectances* to benefices; nominating to certain reserved prebends and bestowing others in com-mendam. 'When Philip imprisoned a Papal legate the great struggle was on. In reply, Boniface issued the Bull Clericis Laicos, declar¬ ing that the civil authority possessed no jurisdic¬ tion over ecclesiastics. He summoned the lead¬ ers of the French clergy to Rome. Philip and his lawyers answered that the Pope had no au¬ thority on temporals and that his collations to benefices were null and void. Another letter from Boniface told Philip, <(Let no one persuade

you that you are not subject to the chief of the Heavenly hierarchy.® Philip burned the letter. Then came the Bull Unarn Sanctam, declaring that every human creature is subject to the Roman Pontiff. The end came when, after be¬ ing maltreated at Anagni by the minions of Philip, he died, in prison, abandoned by all, 11 Oct. 1303. With him the mediaeval Papacy passed away. For centuries afterward canon¬ ists and theologians continued to recite the right of the Pontiff to take away and to give crowns; but the world took no notice of the claim. Henceforward the Pope is for history the spirit¬ ual ruler of the Catholic Church and the sover¬ eign of a small and gradually diminishing Italian state which, in 1870, was, against the protest of the Pope, absorbed in the kingdom of Italy. Even the most hostile historians of the Papacy concede it as much merit as is given it in the

temperate words of Barry:

While it leaned on the people its triumph was assured; when it submitted to the feudal system, it courted disaster. Then the royal authority took away its rod of dominion; the king became Pope; the Ptpntifex Maximus retired into the holy place before him. Crimes, abuses, usurpation, scandals, and a secret change about religion in the thoughts of men account for this latter-day revolution. But it is difficult to imagine how Europe could have survived from the fall of the empire to modern times, had there been no central, supreme, and acknowledged power like the Papacy, guardian, at once, of faith, learning, and civilization. That it always rose to the height of that great enterprise will not be maintained by the historian, but its benefits outnumbered by far its abuses; and the glory is not dim which hangs round its memory, when we call to mind that it consecrated the beginnings of a peaceful Christian Europe, and watched beside the springs of art, science, industry, order and freedom.

By the transfer of the Papal Court to Avig¬ non the Papacy passed under French influence, which along with the relaxation and disorders that attended its residence there seriously im¬ paired its prestige (1305-77). Its return to Rome was the signal for the great schism of the West, in which Pope and anti-Pope con¬ tended for the allegiance of a distracted Chris¬ tendom till the Council of Constance restored order by the election of Martin V in 1417. With the passing of the temporal Papacy, the spiritual supremacy of the Pope in the Roman Catholic world became more emphasized. The extent of Papal authority and prerogative in the Church was explicitly defined by the Vatican Council. A decree of the Council of Constance, which assembled in 1414, in order to terminate the Western schism, had declared the Pope to be inferior to a general council. The French clergy, in 1682, subscribed to a set of formulae, known as the Gallican Articles, which affirmed that the consiliar authority is above the Pope, and, consequently, that ex-cathedra Papal utter¬ ances are not irreversible until confirmed by a General Council. After a prolonged debate, during which it was manifested that the decrees of Constance were intended to apply only to the occasion which gave them birth, and that the Gallican doctrine had been repudiated by the Church, the Vatican Council settled the question by the definition given above.

The long endurance of the Papacy, during ages which have seen the disappearance of every other European institution that was in ex¬ istence when the Papacy arose, and of so many others that were, but are no longer, while it stands, is a fact which has arrested the atten¬ tion of every serious historian. It is appealed to by the Catholic

apologist as evidence that the

Church is not a mere human institution. To arrive at an impartial estimate of the Papacy, the historical student needs carefully to dis¬ tinguish its spiritual element — essential and abiding — from its secular adjuncts, which wax large and wane with the vicissitudes of time. (See Catholic Church; Church States; Pope; Temporal Power; related references and biographies of different popes). For a classical explanation and defense of Papal supremacy consult Cardinal Newman's (Anglican Diffi¬ culties' (Vol. II, 1898) ; or in (The Chair of Peter,' by John Nicholas Murphy (1883) ; con¬ sult also Barry, W. F., (The Papal Monarchy from Saint Gregory the Great to Boniface VIII' (New York 1902) ; Creighton, M., his¬ tory of the Papacy' (6 vols., London 1902-04) ; Greenwood, A. D., (The Empire and the Papacy in the Middle Ages' (London 1902) ; Milman, H. H., (History of Latin Christianity' (4 vols., New York 1903) ; Nielson, F. K., his¬ tory of the Papacy in the Nineteenth Century' 2 (vols., New York 1906) ; Ranke, L. V., his¬ tory of the Popes During the Last Four Cen¬ turies' (3 vols., London 1908-12).

J. J. Fox, S.T.D.,

Of the Catholic University, Washington, D. C.

PAPAIN, a digestive ferment isolated from the juice of the half-ripe fruit of the tropical papaw tree (Carica papaya). The juice is used in the West Indies to make meat tender. Pa¬ pain is a grayish powder, soluble in water and glycerine, insoluble in alcohol, ether and chloro¬ form. It digests fibrin and albumen more readily than pepsin, and in alkaline, neutral and acid solutions. It is used in some forms of dyspepsia, as a solvent of false membranes in croup and diphtheria, gastritis, infantile diarrhoea and for the removal of warts. As a solvent it is used in solution (5.15 per cent) in equal parts of water and glycerine. It has been recommended as a galactagogue and an anthel¬ mintic. It is sold in powdered and tablet form and also as a glycerole.

PAPAJO (pa'pa-ho) INDIANS, an Amer¬ ican tribe of the Piman family originally oc¬ cupying a large part of Arizona. Branches of the tribe extended into Mexico. They were early christianized by the Jesuits and Francis¬ cans and are nearly all devout Roman Catholics. They .were once recognized as citizens by Mexico, but after the annexation of the Arizona country by the United States, the Papajos lost not only their citizenship but their lands and water rights, and were persecuted

by the white settlers. During the early part of the 19th century they were almost constantly at war with the Apaches. They now number about 4,000, live on reservations and are devoted to agriculture. »

PAPAL GUARANTEES, Law of, a law

passed in 1871 by the Italian legislature with a view to adjusting the disputes between the papal curia and the civil government. It had all the appearance of a liberal, even generous, attempt at conciliation and the establishment of mutual independence. Its principal provisions were as follows: (1) The Pope was secured the stand¬ ing of a sovereign power with a court, special ambassadors at Rome, separate postal and tele¬ graphic communication with other countries, and an annual salary of 3,225,000 francs from

the national exchequer. (2) The Vatican and Lateran palaces, etc., were settled on Pope Pius IX and his successors. (3) The placet or exe¬ quatur of the king was not to be required as a ratification of acts of papal authority m ecclesi¬ astical matters. Bishops were not obliged to take oath of allegiance to the king. (4) ihe clergy were granted the right of assembling. (5) ‘ While the ecclesiastical courts were to have the right of deciding cases brought before them without any appeal against their decisions to the civil courts, the aid of such courts in enforcing her decisions was to be denied to the Church. The opinion of the Liberals was that this meas¬ ure gave a Pope too much independence, and when it was submitted to the Powers England refused her sanction. Finally the Pope decided not to consider the Law of Papal Guarantees but to remain at Rome in his own right, without asking anything of the civil government.

PAPAL STATES. See Church States.

PAPAL VESTMENTS. See Costume, Ecclesiastical.

PAPANTLA, pa-pant’la, Mexico, town in the -state of Vera Cruz, 115 miles northwest of Vera Cruz, on a well-watered plateau. It is in the

centre of the vanilla district and has a popu¬ lation of 10,000. About seven miles from the city is a famous teocalli with other ancient ruins, all overgrown with tropical vegetation.

PAPARRHIGOPULOS, pa”pa-re-gop’oo-los, Constantine, Greek historian: b. Constan¬ tinople, 1815; d. Athens, 26 April 1891. His father, uncle, brother and other relatives hav¬ ing been beheaded after the Revolution of 1821, he left Turkey and was educated at Odessa under the patronage of the Tsar. In 1851 he became professor of Greek history in Athens. He wrote various monographs in Greek history, and collected in 1858 and 1890, and, in Greek, a (History of the Greek People5 (1860-74), which he abridged and rewrote in French under the title (Histoire de la civilisation hellenique) (1878). Both these works aim to show the unity and continuity of Greek history, and es¬ pecially to rehabilitate the inconoclastic em¬ perors and show the importance of their reigns.

PAPAVERACE2E. See Poppy.

PAPAW, a popular name for several dis¬ tinct fruits. The papaw of the tropics (Carica papaya) is a small palm-like tree of the ’family Caricacece. It has usually an unbranched stem, which bears a crest of alternate leaves in the axils of which are borne racemes of small flowers, followed by yellow fruits sometimes a foot long and containing a large quantity of black seeds. The immature fruits are cooked like squashes, and some persons eat the ripe ones raw. In climates free from frost the plants are grown as a home vegetable or fruit.

Other papaws are members of the genus Asimina of the family Annonacece. The best known of these is probably A. triloba, a small tree native to the southern United States, but represented as far west as Kansas and as far north as Michigan and New York. The flowers, which are two inches in diameter and appear with the leaves, are at first green but change to purplish-red with yellow centres. The fruits are dark brown, from two to six inches long, and highly aromatic. As a garden fruit this species seems worth attention; selection should

reduce the size of the large stones and modify the flavor. A few improved varieties have been disseminated. Apart from its fruit the tree is of considerable value for ornamental pui poses.

PAPE, pap, Eric, American painter : b. San Francisco, 17 Oct. 1870. He was educated in Paris under Boulanger, Lefebvre, Constant, Doucet, Blanc and Delance, and at the Ecole des Beaux-Arts under Gerome and Laurens. He has lived in England, France, Germany, Mexico and Egypt. In 1897 he was instructor in the Cowles Art School of Boston and in 1898 founded the Eric Pape School of Art of which he remained conductor until 1913. Mr. Pape has exhibited 22 pictures at the Pans Salon, the Chicago Exposition and the Munich Kunst Austellung 1897; 120. paintings at the Omaha Exposition 1899, Paris 1900, 100 paint¬ ings at Buffalo 1901, and Saint Louis 1904. He designed a large monument to commemorate the founding of the Massachusetts Bay Colony and was master of the pageant at Gloucester in 1908. Mr. Pape planned and produced the Woman's Titanic Memorial performance in Boston, and directed the Italian Festa perform¬ ance in Massachusetts in 1915. He has painted many portraits, also made a series of portrait-drawings for (Ellen Terry's Memoirs 5 and has illustrated many important works. He has also attempted landscapes, in which field his best efforts are (Early Morning. Annisquam ; A Rreezv Morning5 ; and (The Dying Day.5

PAPEITA, pa-pa-e'te, or PAPEETE,

Society Islands, capital of the French islands oi Polynesia, on the northeastern coast of the island of Tahiti. It has a good harbor,, is the commercial centre of the neighboring islands and has a large export trade ; it is also the most important French naval station in the Pacific. It contains a cathedral, a courthouse and other French government buildings. Pop. 3,617.

PAPELINE. See Poplin.

PAPER (Fr. papier; Lat. papyrus; Gr. nanvgop), a thin fabric or web composed of vegetable fibres felted together in sheets.

The word paper is derived from papyrus, probably the Egyptian name (with a Gieek termination) of a sedge or bulrush of the Nile and marshes of Egypt. The plant was used by the Egyptians to make thin sheets primarily for writing upon, though some were used for wrapping. They stripped the rind from the long stems, exposing the pith which was then cut into thin strips. These were laid out flat side by side, forming a layer upon which other strips were laid at right

angles to the first. The two layers were then compressed so as to adhere to each other. Sometimes, perhaps gen¬ erally, three layers were superposed. The article thus formed was called papyrus.

Classification. — The commercial classifica¬ tion of paper is based primarily upon the different uses to which it is to be put. Log¬ ically the different kinds of paper fall into two groups: (1) paper for recording and (2) paper for mechanical or practical purposes. The first group may be subdivided into (a) “writing55 paper, this being on the whole the best in quality is accordingly known as “fine55 paper, and (b) “printing55 papers, again subdivided into “book55 and “news.55 The second group in¬ cludes many varieties, the most important being

(wrapping, }) but this, too, has many subdivi¬ sions. The classification of paper adopted by the United States Census Bureau follows pretty closely this logical idea and is as follows: (1) “news,® in “rolls® and “sheets,® (2) “book,” including “cover,® < <plate,)) “lithograph,® “map,® ((wood cut,® “cardboard,® (<bristol board,® etc.,

(3) <(fine,® including <(writing,® “ledger,® etc.|

(4) ((wrapping,® including ((manila® (made from rope or directly from jute, hemp and other strong fibres), (5) “straw® (at one time used for printing, but now relegated principally to the wrapping board classes), (6) “bogus manilas® (so called from their being imita¬ tions of genuine manilas, although composed of wood fibres), (7) “boards,® including “binder boards® (used for binding books), “pulp boards,® “straw boards,® “news boards® (made from old newspapers). “Boards® in general are used for making paper boxes and for many other purposes; finally (8) “mis¬ cellaneous,® including “tissues,® “blotting,® “building,® “roofing,® “carpet lining,® “hanging® (wall), *etc.*

According to the special census of manufac¬ tures taken for 1914 the paper mills of the United States in that year made upward of 250

distinct kinds of paper. Although the largest relative values were in fine papers, the larger tonnage by far was that of printing paper. The following figures of output quoted from that census afford a basis for accurate comparisons: Printing paper, 1,973,603 tons; writing paper, 195,351 tons; other fine papers, 52,377 tons ; heavy wrapping paper, 98,780 tons ; light wrapping papers, 399,593 tons; building and roofing papers, 243,908 tons; tissue papers, 115,401 tons; blotting paper, 14,157 tons; paper boards — pulp board, strawboard, bind¬ ers' board, trunk and press boards ; leather board, trunk and press boards; leather board, *etc.* — 1,208,795 tons.

Materials. — The foundation or basis of all paper is cellulose. All vegetable growths con¬ sist of (1) fibres mainly composed of cellulose and (2) various cellular and intercellular mat¬ ters such as resins, *etc.* Paper is made of the fibres with as little as possible of the inter¬ cellular matter adhering to them.

Chemically, cellulose (q.v.) is a carbohy¬ drate, with the approximate formula, C0H10O5. But the fibres of which paper is ordinarily made are not pure cellulose; three types of cellulose compounds being recognized. These are: (1) nearly pure cellulose, typified by cotton ; (2) pecto-cellulose, typified by flax; and (3) ligno-cellulose, typified by jute, and including practi¬ cally all the pulp-wood fibres. All of the paper fibres in use carry to a greater or less extent a percentage of wax, fat, lignin, mineral salts and traces of other substances, cotton having the least.

Speaking generally, cellulose is resistant to the commoner solvents, and, therefore, may be readily freed from extraneous matters by chemical action. It is, however, subject to cer¬ tain changes in the conditions prevailing in paper-making processes, resulting in the forma¬ tion of oxy-cellulose and hydro-cellulose. The former is apt to be produced in the bleaching bath, as a consequence of the absorption of oxygen from the atmosphere, in cases where the bleaching is carried on under exposure to sun¬ light, or at a temperature unduly high. Its

presence renders the paper in which it is con¬ tained brittle and weak, and faultv in taking dye and holding its purity of color. Hydro¬ cellulose is the result of a combination of the cellulose with water, resulting usually from the action of ferments in the presence of weak acids or alkalies. It is not wholly objectionable in all cases, being intentionally produced in the manufacture of grease-proof paper.

The typical linen fibre is hexagonal, or at least polygonal in cross-section, rarely round, with gently tapering ends. After treatment for paper making these ends are frayed out into a number of threads known as “laminae.® A very narrow canal runs the length of the fibre. There are liable to be also minute nodules or bulbs strung along the fibre, but these are com¬ monly crushed in the paper-making processes. Cotton fibre is flat or ribbon-like, with a canal much more pronounced than that of linen. Generally the cotton fibre twists in drying. Esparto fibre has a short smooth and round fibre, usually tapered at the ends, but often blunt. It, too, has a well-marked longitudinal canal. The fibre of straw is shorter and thicker than that of esparto, and not being so flexible exhibits kinks where it has been bent. It has also the peculiarity of the spiral cell, found in the bagasse of the sugar mill and in bamboo. In jute fibre the canal is very irregular, and there are numerous characteristic striations and markings. This fibre, though longer than that of straw and esparto, is much shorter than cot¬ ton or linen. Manila fibre is three times as long as jute, and is one of the strongest used in paper making. In this fibre the longitudinal canal is strongly marked. China grass or Ramie fibre is very nearly the same length as that of linen, but flat like cotton and twice as wide. Wood fibres as found in pulp are flat with a number of twists, as in cotton, but very much shorter. Those from coniferous woods are broader than cotton, and those from de¬ ciduous woods are narrower. The following table shows the length and breadth in fractions of an inch of the principal fibres used in paper making.

NAME OF FIBRE

Length in inches

Breadth in inches

Cotton .

1 . 1811

0.0098

Linen .

0.9842

0.0078

China Grass or Ramie .

0.8661

0.0197

Paper Mulberry .

0.4724

0.0098

Adansonia .

0.4724

0.0078

Manila .

0.2756

0.0078

Bamboo .

0. 1575

0.0059

Sugar Cane Bagasse or Megasse …. Wood, Coniferous .

0.1181

0.1811

0.0059

0.0118

Jute .

0.0984

0.0086

Esparto .

0.0591

0.0047

Straw .

0.0591

0.0059

Wood, Deciduous .

0.0394

0.0078

News paper, in countries where suitable woods are plentiful, is generally made from wood pulp. Elsewhere rags, straw, esparto and other materials are used. The cheaper qualities are made of “mechanical® wood pulp ; a better quality of “chemical® pulp, either alone or with a percentage of esparto, a combination pos¬ sessing excellent characteristics. The highest grades of book paper are made from linen and cotton rags, but a very large and increasing

percentage is made from wood pulp, princi¬ pally chemical pulp, mechanical or ground wood pulp being used only in the cheaper grades, and with, generally, some admixture of cotton and linen fibre from rags. The two principal varieties of chemical pulp, namely, “sulphite® and “soda,® are both used extensively in book papers, a mixture of the two being desirable, as the sulphite pulp alone has a tendency to be harsh and semi-transparent. The best quality of “fine® papers are made of linen rags, chemi¬ cal wood pulp and cotton rags being used for the lower grades. The best Bible paper is made of rag fibres with starch added to give opacity. The Oxford India paper is made under secret formulas, but successful imitations can be had. Featherweight papers are made entirely of esparto, very little sizing being used. Thick plate papers are made by rolling two or more webs of paper together while still wet. Art papers are coated with a mineral surface like China clay in size. Imitation art papers have about 25 per cent of China clay mixed in with the pulp, and this is brought to the surface by the calendering process. Writing papers of the highest grade are made of linen rag fibre ex¬ clusively. Lower grades have an admixture of cotton, and still lower a percentage of esparto or chemical wood fibre. Wrapping papers are made of all kinds of fibres, but in this country rags for this purpose have been practically superseded by cheaper fibres, notably wood pulp, jute, hemp refuse, old rope and twine, clippings and trimmings from higher grade paper stock and old paper. Boards are made of wood pulp, straw, old

newspapers and other fibrous waste materials, according to the par¬ ticular purposes for which they are intended. Tissue papers are made from a variety of fibres ranging from the manila hemp to wood pulp, the better class being of hemp and rag fibre well beaten and without size. Copying paper is very similar, but has a small addition of mineral matter to give it greater bulk. The papers produced in other countries comprise all those enumerated above and many other varieties or “specialties.®

From the 1914 census figures for the amount of materials consumed in the United States by the paper mills in that year an authoritative comparison may be made as to the relative pro¬ duction of the various kinds of paper. Pulp wood consumed totaled 4,470,763 cords; of which 1,892,739 cords were spruce, 602,754 cords were hemlock, 328,513 cords were poplar, and 817,057 cords of all other woods including principally balsam fir, southern pine, white pine, white fir, cottonwood, tamarack and gum. The total includes also 768,056 cords of spruce and 61,644 cords of poplar imported — chiefly from Canada. A rather large proportion (not specified) of this oulp wood was ground and made directly into paper by the mills which make both pulp and paper. Other mills which make only paper purchased a total of 1,521,980 tons of pulp — classified as ground pulp, 379,263 tons; soda fibre, 155,635 tons; sulphite fibre, 436,196 tons; sulphate fibre, 16,414 tons; me¬ chanical screenings, 4,806 tons; and chemical screenings, 21,245 tons. Included in the total were 153,463 tons of ground pulp; 5,289 tons of soda pulp; 261,172 tons of sulphate pulp and 88,497 tons of sulphate pulp imported — mostly

from Canada. Rags, which title included cot¬ ton and flax waste and sweepings, amounted to 361,667 tons, of which 88,664 tons were im¬ ported. Manila rope amounted to 64,256 tons. Jute bagging and waste totaled 56,914 tons, nearly all imported. Old and waste paper sup¬ plied 1,509,981 tons of paper stock, used largely in the making of paper boards. Straw con¬ sumed amounted to 307,839 tons ; and all other paper stock, 97,276 tons, practically all imported grasses and foreign fibres.

Mention has been made of four descriptions of wood pulp — ground, sulphite, soda and sul¬ phate. The distinctions between these classifi¬ cations follow :

Ground Wood Pulp. — Grinding is confined to woods. Spruce is used chiefly, though other kinds of conifers are used to a limited but in¬

creasing extent. Trees upward of 10 or 12 inches in diameter are felled and transported to the pulp mill either (1) in logs or (2) sawed into lengths of usually four or two feet. Some¬ times the wood is peeled in the forests but usu¬ ally it has the bark removed at the mill by a “barker® or Crossing machine.® The “blocks® of wood two feet in length are brought into con¬ tact with a rapidly revolving vertical disc set with knives at an angle to the surface after the fashion of a plane, which shave off the bark as the block is rotated before them. Imperfections such as knots, gum seams and decayed portions, if left after barking, are removed by placing the blocks under a “splitter” which splits off the imperfect portions, but usually the block is suit¬ able for “grinding® as it comes from the barker. It is then placed in the “grinder.® This consists of a sandstone or emery cylinder about four feet in diameter and up to 30 inches breadth of face set upon a shaft directly driven by a water wheel at great speed. The ((stone® is enclosed in a steel case with openings or (<pockets® at two or three points in the circumference. The wood, being placed in these pockets, is forced by hydraulic pressure “s*ide-on® against the surface of the revolving stone. The object is to disintegrate the wood by a sort of tearing rather than cut¬ ting action and upon the condition of the stone, the relative speed and pressure, the quality of the pulp mainly depends. A continuous flow of water on the stone prevents charring of the wood through friction and carries away the fibrous particles as they are rapidly separated from the block. The pulp is known as “hot ground® if a minimum quantity of water is used, and <(cold ground® if a large supply of water is run on the stone. Hot ground fibre is longer and drier, and is better adapted to the making of news print paper for use on quick¬ running presses. Cold ground pulp makes a stronger and more cohesive paper used in book printing on slow presses. The continuous use of from 75 to 100 horse power is required to produce a ton of pulp in 24 hours. Sometimes as much as 500 horse power is applied to one stone. The pulp-laden streams of water from the different grinders are then converged and directed upon a series of vibrating “screens® which strain therefrom the coarse particles. In some mills the pulp is <(refined® by passing through a grinding mill of two horizontal stones, similar to a flouring mill. The flowing pulp stream passes downwaVd through the

centre of the upper stone, and the “refined® pulp is gathered at the perimeter. If the pulp is to he used at once for making paper in the same establishment, it either goes to the “reducers® withdiaw a large Quantity of the water thereby increasing the consistency of the liquid to a pulp mass, which is then stored in tanks; or, if it is to be transported or stored for future use, it passes from the screens in the same di¬ luted condition to the “presses.® The press consists of. a revolving drum covered with a very fine wire mesh which permits the water to be drawn through and discharged while the pulp fibres are deposited on its surface. The thin film of pulp being allowed to build up layer on layer is removed as fast as it reaches a suit¬ able thickness for handling. The sheets of pulp thus formed, containing water and pulp in about equal proportions, are folded up into “laps® averaging 25 pounds in weight each, go into a hydraulic press to have the surplus water re¬ moved, and are then in convenient shape for handling and transporting. This form is known as “mechanical0 pulp. In the market it is known as “wet® or “dry0 ; the former containing 50 per cent of water, the latter about 7 per cent • — having been air-dried before baling.

Sulphite Pulp. — The two most important chemical processes for making pulp are the “sulphite® process and the “soda® process, both used principally in reducing coniferous wood to pulp, although the soda process in a some¬ what modified form is used in treating straw, if intended for high grade papers, and in England for esparto. In the sulphite process the wood is prepared as for the ground wood process. The prepared blocks of pulp wood are then “fed® lengthwise to a “chipper® or set of knives which, revolving with great speed, transform the wood into small “chips.® The purpose of this is to facilitate the permeation of the wood by the “liquor® in which the chips next are im¬ mersed in the “digester.® The digester is a mas¬ sive upright stationary steel vessels of an aver¬ age capacity of from eight to 20 tons of wood, usually lined with cement or other material un¬ affected by acids. The liquor with which the digester is filled after the chipped wood is intro¬ duced is a solution of bisulphite of lime. The making of this liquor is an important feature of this process as upon its correct chemical compo¬ sition the quality of the pulp largely depends. It is made by passing the fumes of sulphur burning in especially designed “retort furnaces® either into a “tower® filled with limestone over which water is trickling or through “tanks® con¬ taining lime in solution with water. The result in both cases is the formation of a solution containing bisulphite of lime, and usually a small percentage of bisulphite of magnesia. Hence, the name

“sulphite® pulp. After the digester is filled with chips and liquor it is closed hermetically, steam is forced in under pressure of 80 to 100 pounds and the chips are allowed to “cook® from 8 to 12 hours. Then the contents are discharged into “blow-pits® or vats beneath. These blow-pits have perforated bottoms through which the sulphite liquor drains away; and the pulp is washed by a stream of water which removes all traces of the liquor. The pulpy mass is then screened and pressed and put up in laps, similarly to the manner in which ground wood pulp is treated. In the

process of “cooking® the intercellular portions of the wood are dissolved and the nearly pure cellulose fibre remains. Much care is neces¬ sary to stop the cooking at just the right point so as to leave the fibre properly freed from the surrounding substances, but’ unimpaired in strength. A process producing a sulphite pulp of superior strength and quality is made by a longer cooking (48 hours) at a much lower steam pressure (15 pounds). The bulk of the wood is reduced nearly one-half, whereas in the ground wood process both the cellulose and intercellular matter are preserved and the pre¬ pared wood (dry) and pulp are nearly the same, weight for weight, the only loss being in the mechanical process of removing the imperfectly ground wood. For high grades of paper “sul¬ phite® is bleached. The sulphite liquor is put to a practical use in tanning; or is fermented and distilled, producing 15 gallons of 95 per cent alcohol for each ton of wood pulp made.

The Soda Process. — For this purpose poplar, basswood, beech and similar deciduous woods are used. The wood is prepared in chips as already described and cooked in lead-lined digesters, generally stationary, containing an 8 per cent solution of caustic soda. Steam at 100 pounds pressure is admitted and the cooking is continued for 8 to 10 hours. The pulp is discharged into iron tanks and “washed® thoroughly — to remove the freed organic mat¬ ter and the alkali. The washing is so done as to use a minimum quantity of fresh hot water, as the “recovery® of the soda from the liquor used in washing is an important feature of this process. It is so successfully performed that in some mills as high as 90 per cent is recovered. The liquor is first “evaporated® under a partial vacuum by steam until it is of about the fluidity of melted pitch. In this state it passes into a revolving drum-like “furnace® where combus¬ tion is set up by means of a flame from an ad¬ joining fire-box, burning wood or coal, which coming in contact with the pitchy liquor ignites it. The residue is a “black ash® which is then causticized with lime and becomes

suitable for use again. After thorough draining the pulp goes to screens which remove coarse fragments and dirt, and thence to the machine which con¬ verts it into “half-stuff board.® Soda-pulp, partly on account of the nature of the wood itself and partly on account of the drastic treatment, is of a much softer quality than sulphite, has a shorter fibre and, therefore, less strength and the yield is less per cord of wood, rarely exceeding 50 per cent. It requires bleaching to fit it for use in all except dark-colored papers, as with¬ out bleaching it is of a brownish color. This process is conducted while the board is still wet, by subjecting it to the action of a bleaching powder bath at a temperature of 60° F. for from four to six hours. Or an electrolytic bleach may be employed. It is then thoroughly washed in drainers to remove every trace of chlorine.

Sulphate Pulp. — • In this process only pine is used, and the liquor in which it is boiled is sodium sulphate. In some mills a proportion up to 30 per cent of caustic soda is added. The boiling continues for 30 hours during which the sulphate becomes sulphide. The formation of hydro-cellulose is encouraged, and the resulting pulp makes a very strong and tenacious paper.

Straw Pulp. — The straw of wheat and rye afford the most suitable fibre for straw paper, although oat straw is also much used on account of its long fibre, being generally mixed with wheat fibre. The yield from the raw material is about 40 per cent of cellulose. It is first put through a chopper which cuts it into small pieces in which condition it is carried by an air-blast to a sieve where the straw is caught and the dust and dirt carried along on the blast. Thence it goes to the ‘boilers where it is charged with from 12 to 16 per cent of caustic soda. Under a pressure of 60 pounds of steam and at a temperature of 300° F., it is boiled for six hours, at which time it is in the “half-stuff® condition, and will flow readily through a pipe into the Hollander, where it is washed and dis¬ integrated. Esparto and other grasses receive practically the same treatment, but do not re¬ quire so high a boiler pressure nor so long boil¬ ing. All of these grass fibres are

bleached — usually in the breaker.

Bamboo Pulp. — The successful development of a treatment of bamboo fibre which makes it available for an excellent quality of book paper adds enormously to the paper sources of the world, as it is estimated that bamboo constitutes about 80 per cent of the total of all wood growths. The stems are crushed and chipped to small fragments which are first boiled in hot water to remove an objectionable starchy fill¬ ing. They are then boiled with a 20 per cent solution of a combination of three parts caustic soda and one part sulphide at 170° F. under 120 pounds pressure for one hour, and at 162° and 80 pounds pressure for four or five hours longer. The yield of dry pulp is about 45 per cent of the dry weight of seasoned wood.

Rags. — Cotton rags, consisting as they do of the nearly pure cellulose fibre and linen rags, being composed of fibres which have al¬ ready undergone a treatment of maceration and “retting® to remove the intercellular matter, have only to be “cleaned® and separated into the individual fibres to prepare them for paper¬ making proper. The cleaning is ‘both mechan¬ ical and chemical. The various preparatory steps are threshing, picking, sorting and cutting into small pieces. The last is commonly done by machinecutters, though for fine papers it is often done by hand. The cut pieces go to a duster, and for high grade paper are washed again. These pieces are next boiled from 12 to 18 hours under steam pressure of 45 pounds in a weak solution of quicklime or caustic soda, contained in revolving boilers, usually horizon¬ tal, called “rotaries.® This “kills® the colors and “starts® the grease and dirt so that when the cooked stock is placed in a “washer,® the im¬ purities are readily separated, leaving the fibres quite clean. This washing is usually done in a “breaker® or “Hollander,® which consists of a rapidly revolving iron “roll® mounted in an oval-shaped tub and set with dull steel “blades.® The roll revolves over a “bed plate® and draws the “stock® through between the roll and plate, dragging the fibres apart while cleansing them. The Hollander is often made with two rolls operating in contrary directions. It is neces¬ sary, however, if the stock is to be used for high-class papers, to bleach them with some compound of chlorine. The “half stuff® is then

let down rnto vats or “drainers® where the liquor is allowed to drain off.

Converting the Pulp into Paper.— Paper¬ making, in the restricted

sense, begins with assembling the pulps and other materials, and mixing them thoroughly, at the same time further disintegrating the fibres. This is done in a “beater® or oval-shaped tub of an average capacity of about 1,000 pounds of paper in which revolves a horizontal roll with steel blades on the surface, running parallel with the shaft after the manner of a paddle wheel. These knives are of varying design — zigzag, elbow, knee and similar angular shapes. As the roll revolves the blades draw the “stock® between their edges and a “bed plate® of steel, thus “dragging out® or separating the fibres. In some beaters the bed also is set with knives so as -to produce a shearing action with those of the revolving roll. The character of the re¬ sulting pulp is determined in large measure by the sharpness or dullness of the knives. In the making of grease-proof and Kraft papers the roll is usually of stone, and the bedplate may also be of the same material, the action being one of grinding instead of shearing. The time required in the beater for the various papers and fibres is as follows : linen and cotton for bond paper, 10 to 12 hours; rags for writing papers, five to seven hours ; chemical wood pulp for book papers, four to six hours ; cheap printing and newspapers, one and one-half to three hours; soft cotton fibre for blotting paper, one to one and one-half hours. It is, therefore, obvious that the character of the paper to be made is very largely determined in the beater, and this becomes the most im¬ portant of the paper-making machines. This fact has led to the invention of several forms designed for special manufactures. For the highest class of rag papers the beater is of the old Hollander type, than which none is better. For cheaper papers higher speed in the reduc¬ tion to pulp is desirable, and devices to ac¬ celerate the mixing and circulation of the com¬ ponents of the pulp have been added. In order that the machine may be used for different types of paper, the bedplate in some makes is in removable sections which may be replaced with others to produce a different quality of pulp, and the knife rolls also may be changed.

It will suffice from this point onward to describe the process of making news paper which is essentially the same as in all kinds of paper with certain modifications of which the most important will be noted. The beater is “furnished® with sulphite pulp and ground wood pulp in the proportion of about one to three. Other kinds of paper have their appropriate “furnish.® Sometimes a small percentage of kaolin, calcium sulphate (gypsum), barytes or other mineral “filler® is used, the quantity vary¬ ing with the kind of paper to be made. In recent practice starch, formerly in use as “size,® has become an important filler. Its high cost, however, restricts it to high. The filler im¬ proves the color, surface, opacity and “feel,® and improves its

printing properties. “Size® which is resin in a saponified form is added and has the effect in the final drying process of forming a kind of “varnish,® rendering the paper less absorbent. It also helps “fix® or hold the “filler,® increasing the strength.

Coloring matter, which in news paper is gen-allv “aniline blue,® is put in, usually in solution, the object being the same as that of adding bluing to a batch of newly-washed clothes in the laundry — to give distinct whiteness. In the finest papers ultramarine and cochineal arc the dyes used. When cream or pinkish shades are desired appropriate dyes are employed. In making colored cover papers and similar stock the matter of dyes is of much greater import¬ ance, and the whole series of permanent mineral and vegetable dyes are drawn upon. (See Dyes). A scientific selection must be made as certain paper stock will absorb satisfactorily only dyes of acid reaction, while other “stuff® will require basic dyes. Often the best and most permanent results are obtained only by a combination of dyes of both reactions, the basic dye precipitating the acid dye. Basic dyes are as a rule of less permanency than acid dyes, but give higher brilliancy of coloring.

The coal-tar dyes most largely in use in paper making are the following:

Basic Dyes

Acid Dyes

Yellows

Auramine

Chrysoidin

Metanil yellow Quinoline

Naphthol yellow Naphthol orange Paper yellow

Reds

Magenta

Grenadine

Rhodamine

Eosine

Cotton scarlet Metanil red

Blues

Methylene

Victoria

New blue

Paper blue

Soluble blue

Greens

Brilliant green Malachite green Diamond green

Browns

Bismarck

Vesuvine

Violets

Crystal violet Methyl violet

Acid violet

Blacks

Jet black

Coal black

Brilliant black

The prevailing practice in “furnishing® the beater is to add to the pulp first the loading, then the dye, then the size of resin, etc., and finally the alum, mixing in thoroughly each component before the next in course is added.

Alum is added as a mordant to <(set® the color and also to <(free® the resinic acid in the size and “set® or deposit it. The term is a technical one as ordinary alum is no longer used, but aluminum sulphate. After a thorough mixing in the beater the pulpy mass or “stock® is usually passed through a “refining engine,® the most common type of which is known as the <(Jordan.® The purpose bf the Jordan is to supplement the brushing out and mixing which has already occurred in the ((beater® and to shorten the fibres if desired. It consists of a cone which revolves in a stationarv conical case, the outer surface of the cone and inner surface of the case being set with numerous blades, the two sets of which can be made to approach as near each other as desired. The relative position of the blades determines the

length of the stock which continuously passes between them. After leaving the “Jordan,® the stock is ((screened® and then pumped upon the paper machine proper, having been thinned or diluted at various points of its passage so that when it comes upon the machine it behaves in all respects like an absolute fluid. The Fourdrinier machine on which all news paper is made may be divided into the <(wet® part and the “drying® part. On the wet part of the paper is “formed® and given a consistency which prop¬ erly entitles it thereafter to be called paper, the rest of the. process consisting in still further increasing its consistency, drying it, giving it surface, *etc.* The liquefied stock, having come to the machine, flows from the “head box® through a wide aperture or mouth over an (< apron® of waterproof cloth, and upon an end¬ less horizontal wire cloth moving forward con¬ tinuously. The relative rate of uflow® and “speed® of the machine determine the thickness or ultimate weight of the paper. The speed of the stock sideways is limited by two endless rubber bands about one inch square called ((deckles,® one at each edge of the “wire.® In modern fast-running news paper machines the width of the web may reach to 200 inches. In the machines making the better class of book paper and writing papers ‘the widths are gen¬ erally somewhat less than 100 inches. The length of the endless wirecloth belt varies from 60 to 100 feet, the distance of travel, there¬ fore,

from the apron to the couch rolls being from 30 to 50 feet The speed of travel of the wirecloth belt varies widely according to the quality of the output. High-speed news machines make up to 500 feet per minute. Machines which make good writing paper run about 60 feet to the minute. The cloth of which the wire belt is made has about 60 or 70 meshes to the running inch.

As the pulp flows on to the wire it contains 90 per cent, or more, of water. The water im¬ mediately begins to drain off through the wire and the fibres to deposit upon its surface. Through various devices so much of the water is removed that when the film of fibres reaches the point where the wire returns on its back¬ ward course, it is sufficiently compact or “felted® to be separated from the wire and’ conveyed by (<f elts® to and through the (<presses® of which there are two or three. The presses are mas¬ sive rolls in pairs, the paper supported by woolen endless C(f elts® passing between them. After this the paper readily carries itself and, passing over a short gap, it enters the “dryers.® They are cast-iron cylinders from 20 to 30 in number varying on different machines from three to four feet in diameter, arranged in two horizontal tiers, one above the other. The paper passes partially around each dryer, going alternately from one tier to another, conveyed by endless canvases called ((dryer felts,® which serve to press the paper against the surface of the dryers heated by a constant passage of steam inside. Returning to the first formation of the sheet it is interesting to note the variety of means employed for disposing in the quickest possible time and within the most limited space of the vast amount of water in which the fibre is at first suspended. First, gravitation draws the water through the wire cloth. This is facili¬ tated by a large number of small ((table® rolls immediately under and supporting the upper

part of the wire which, as they revolve, tend by capillary attraction to carry away the water and thus hasten its flow through the wire. The <(shake? which gives to the wet end of the wire a lateral movement back and forth, intended to distribute the fibres evenly and prevent

their arranging themselves longitudinally or in the direction of the flow, tends also to hasten the draining off of the water. A slight grade up¬ ward toward the couch roll also aids in an equal distribution of the pulp. This grade is ad¬ justable so that the character of the deposit may be controlled. The wire, carrying the paper, passes over a series of (<suction boxes® which have perforated tops and are subject to the ac¬ tion of exhaust pumps. The water is drawn through the wire and away through the suction boxes. Before the paper leaves the wire, it passes under a heavy (<couch roll® which both presses out the water and by reason of being covered with a (<jacket® of felt with exceedingly long nap, constantly absorbs water of which it is ingeniously rid by a "guard.® .A recent im¬ provement is a hollow suction couch roll, 1 he «wet® presses act in the same way as the couch roll, pressing out and absorbing more water. But notwithstanding all these devices, the paper r63.clics the dryers with usually not exceed 30 per cent of stock in the sheet, the rest being water which has to be dried out as the PaPˆT passes over the dryers at the rate often of 500 feet a minute. Water marks are produced by a <(dandy,® a skeleton cylindrical roll covered with wire cloth, mounted over the <(wire® between the first and second suction boxes, and resting on the web of paper. The design for the water mark is raised on the surface of the dandy and impresses itself on the paper. "Laid® paper is made with a dandy so covered with wires as to make an impression of parallel lines running lengthwise about an inch apart crossed at right angles by lines quite close together. The dandy also helps ((form® or solidify the paper. In passing through the drying cylinders the paper web is carried on endless belts of dry felt, which serve to keep the web smooth and tight and prevent cockling. The number of drying cylinders of the Fourdrinier machine varies ac¬ cording to the type. On high-speed news paper machines there may be as many as 36 drying cylinders : on the slower fine-paner. machines there are rarely more than 20. The diameter of these cylinders ranges from 48 to 60 inches, and they are arranged in series, usually with a pair of heated steel smoothing rolls of small diam¬ eter near the end. The drying rolls are heated by steam, the temperature gradually in¬ creasing toward the end of the series. As the web shrinks in drying, the rolls in a series are of successively smaller diameter, so that the relative length of the surface traversed shall be that of the drying web.

Machine or Tub-Sizing.— Fine papers, be¬ sides sometimes being "sized® in the beater, are usually sized on the paper machine, the web passing through a "tub® of some heated gelat¬ inous mixture ("animal size®). This tub is a tong vat placed between the two series of dry¬ ing rolls. The paper web is floated on the size and thence

passes to a pair of rolls which squeeze out the excess, and so through the re¬ maining drying cylinders. The paper is either dried (1) wholly on the machine or (2)

partially, and then after being cut into sheets is hung in ((lofts® to complete the drying. Al¬ though the web when it leaves the dryers is uniformly smooth, it lacks the quality of sur¬ face desirable in printing. It is, therefore, passed through the “calenders,® a series of chilled-iron rolls with polished surfaces ar¬ ranged in a ((stack,® the paper going in at the top and passing out at the bottom to the reel. This is practically an ironing process and bv the regulation of the pressure of these calender rolls the requisite amount of <(surface® is given to the paper. Book and fine papers are often “supercalendered® or passed through a second stack of calenders after the paper has been taken from the paper machine.

Coated Paper.— To meet the requirements of certain kinds of presswork, some papers are “coated® on one or both sides with china clay or other mineral substance, which gives an ex¬ ceedingly smooth surface without the hardness of supercalendered papers.

Cylinder Machines.— The distinguishing feature is the use of a drum covered with wire (instead of the horizontal endless wire of the “Fourdrinier®) which operates the same as the pulp press, already described. Several cylinders can be used on the same machine, each making a separate web, all of which are brought to¬ gether before passing into the press, thus mak¬ ing paper of as many (<plies® as there are cylin¬ ders. This principle is taken advantage of to make composite papers, one ply being of one quality, another of another, and also to make very heavy papers.

Cutting. — When the paper leaves the calen¬ ders and is reeled, it may be considered to be made. All that remains is to trim off the rough or ((deckle edges® on the “slitter® where as it unwinds from the reel it passes between rapidly revolving knife-like discs. If it is de¬ sired to divide the width of the sheet it is done at this point by adding one or more sets of ˆslitter blades® according to the number of divisions of the sheet desired. Finally comes the ((winder.® If the paper is intended to be marketed in rolls it is wound on either an iron “core® or, as is now more usually the case, on a core made from heavy tough -paper, until the desired diameter is reached, when the rolls are taken away to the ((finishing® section where they are <(finished,® that is, wrapped in stout paper securely pasted and

marked. They are then ready for shipment. “Sheet® paper was formerly cut into sheets by a ((cutter® attached to the paper machine, but as the speed of the machines has increased this practice has been almost entirely abandoned and now it is usual to run the paper into rolls which are taken to the finishing section and cut into sheets on a cutter, the sheets then being “counted® and done up into <(bundles.®

Sizes. — Jn the United States, if not else¬ where, the paper-maker has so conformed to the various demands of the consumer that standard sizes which were originally adhered to are, except in the case of writing papers, almost obscured by the great variety of special sizes. Four-fifths of the news paper is in rolls varying in length of roll (that is, width of web or sheet) usually from 30 inches to 75 and in diameter from two to three feet. The Inter¬ national Paper Company exhibited at the

Types of Modern Paper Machines

Interior View of Coating Deoartment of a Modern Paper Mill

Buffalo Exposition the largest roll ever made, being 152 inches in length and weighing 4,000 pounds, and the sheet unrolled would reach six miles. Some of the common standard sizes of news sheets are, in inches, 20 X 30, 24 X 38, 30 X 40, 32 X 44, *etc.* The sheets are

put up in bundles generally of two reams of either 480 or 500 sheets to the ream and are either (<folded® in quires or put up <(flat® or <(lapped® (one ream dovetailing into the other). Book paper is generally in sheets, although the use of web presses requiring rolls is extending to book and magazine publishing. The sheet sizes are many of them the same as news paper. The principal sizes of fine papers are anti¬ quarian, 31 X 53 ; cap, 13 X 17; double cap, 17 X 28; columbier, 23 X 34; crown, 15 X 19; demy, 16 X 21 ; double demy, 16 X 42; elephant, 23 X 25; imperial, 23X31; post, commercial, 11 X 17; double post, 19 X 30 ; folio, 17 X 22; double folio, 22X34; royal, 19X24; super¬ royal, 20 X 28. Wrapping paper and boards are furnished in both standard and special sizes. In recent years wrapping paper to a consider¬ able extent has been prepared for the market in what are called ((counter rolls,® which are set upon the counter in a frame and torn to the size needed for the particular parcel to be wrapped.

Hand-made Paper. — The ((hand® process came into existence at a very early period and still survives in some countries, notably in Japan. But the output of hand-made paper is very limited, except in Oriental countries, where, in contrast' with the high development of the art elsewhere, the adherence for cen¬ turies to this antiquated process is a striking mark of their backward civilization. The method of making paper by hand has remained practically the same as it was more than 2,000 years ago. The pulp is diluted with water in a vat in which is immersed a <(mold® or rectangular frame, on the top side of which are stretched parallel wires near together with others at right angles (woven wire cloth is now generally used). Upon this <(mold® is tightly held a ((deckle® or wooden frame. On with¬ drawing the (<mold® from the vat in a hori¬ zontal position, the water within the deckle drains off, leaving the wires coated with fibres, the operator meanwhile shaking the mold so as to evenly distribute them. The film of fibres or paper is then stripped from the mold and laid upon a felt. Paper and felt are piled alter¬ nating, forming a <(post,® which is then pressed to extract the water.

History.

The existence of papyrus has been traced back to 2400 b.c., and no doubt it then had been in use a long time. In China and other parts of the world a similar article, made from rice stalks in practically the same way, is known to have been in use several hundred years b.c., and is supposed to have come down from a time even then remote. The Egyptian papyrus — ■ the material, but not the art — was introduced probably about 325 b.c. into Europe as a consequence of the conquests of Alexander of Macedon and was used there very

generally until the 8th century, when, together with parchment, it began to be replaced by paper made quite differently upon a principle which has survived to the present day.

Early Paper. — Papyrus is lost sight of in the 12th century. The new paper was of Asiatic origin. Its fundamental difference from papy¬ rus was that the raw material in making paper was first reduced to pulp, that is, the natural structure was broken down so as to separate the component fibres, which were then re¬ arranged to form a lamina or thin sheet. In China, Formosa, Korea and very likely else¬ where in eastern Asia this principle was used certainly before the Christian era. Though, as Pliny truly says, <(the remembrance of past events depends upon paper (papyrus),® with the irony of fate, paper has failed to record its own origin, and much of the early history of the art is left to conjecture.

As early as 156 b.c. the Chinese made pulp from the small branches of the mulberry tree, various barks, bamboo, leaves, *etc.* In Korea the paper mulberry was chiefly used and the Japanese having begun to cultivate this tree made paper from it about 610 a.d. It is still to-day almost the only raw material used by them. The portion used is the inside bark. The probable course that paper-making took was from China and other Oriental countries to the eastern extremity of the Mediterranean (Persia and Arabia, about 620 a.d.), whence the Saracens carried the practice of the art to Spain after their conquests of that country in the 8th century. The consequent disruption of commercial relations with the Egyptians cut off the supply of papyrus and facilitated the substitution of true paper in Spain and other parts of Europe. Paper from Damascus had at about the same time found its way into east¬ ern Europe, but the first paper mill in Europe was established by the Saracens in Spain. It appears that the Saracens used cotton for paper from a very early time and were probably the first to find that old cloth fabrics also answered the purpose very well. In Spain flax was the first material used and then cotton. The paper imported into Europe from Damascus was like¬ wise made of cotton ; 1085 is set as the date when <(rags® were first used in Spain and 1100 for the first appearance of linen paper. The spread of the industry throughout Europe was slow, and its route and early development can¬ not be surely traced. Italy had its mills soon after Spain; France first learned to make paper in 1189; in Germany the first mill was built in 1390, while for the beginning of paper-making in England 1330 is given as an uncertain date. The western hemisphere was reached in 1690, when a mill was .erected at

Germantown, Pa., by William Rittenhouse. It is a curious sequel that to-day there is absolutely no paper made in Egypt, which supplied the civilized world for so many centuries with papyrus, ’and that the Chinese and other Orientals who contributed the fundamental principles of modern paper¬ making have made little or no progress them¬ selves in developing the art. Although they have characteristically adopted Western ma¬ chinery to a limited extent, they still in the main cling to archaic methods of making paper, which in that country is of slight commercial importance. The industry is now practically confined to Europe and North America. From the time rags began to be used in Europe, they rapidly displaced other materials on account of the economy of the double use of the fibre. Rags held sway in the paper industry for many

centuries, but not entirely to the exclusion of numerous other materials. Esparto (q.v.), which is a Spanish grass, containing an espe¬ cially good fibre, and other similar grasses, as well as straw, have long been used. In 1765 Schaeffer of Ranslon published a book printed on 60 varieties of paper made from as many different materials. Somewhat more than 100 years ago, under the stimulus of greater de¬ mand, the substitution of machinery for man¬ ual labor and the development of chemistry, attention was directed afresh to the use of fibre derived directly from the original growth as a substitute for rags. An impetus was given to the manufacture of paper from straw (first used about 1800), which has made it until recently an important factor in paper-making.

In 1719 Reaumur first suggested the use of wood. Sporadic experiments to this end were made, but without noteworthy results until finally they culminated in the present mechani¬ cal and chemical processes of producing pulp from wood. Since it has been demonstrated that paper can be made from almost any kind of vegetable fibre, it only remains to discover new methods of treatment or improvement .in old methods which will render more varieties of fibres commercially available. It is thus merely a question of cost of

material and of conversion.

Processes of Manufacture —Leaving out of consideration papyrus and rice paper, the reduc¬ tion of the raw materials to pulp has always been a preliminary to making the paper. So far as we know this was done by the Chinese and kindred nations, the first pulp-makers, by beat¬ ing the raw materials into a pulpy mass, with simple hand tools. They also at a very early date disintegrated the materials by either soak¬ ing them or boiling them in lyes. They thus originated two processes of making pulp which, though much modified, are still in vogue.. As the Japanese and Chinese still depend principally upon hand implements for macerating the raw materials, we must look elsewhere for the earliest application of machinery for this pur¬ pose. Whether paper-makers used machinery before the introduction of rags is not clear, but it is highly probable that they did. Cer¬ tainly machines driven by water power were in use soon after the adoption of rags. They were a sort of trip hammer which pounded the rags into pulp. In the first mill erected in Germany in 1390, such a machine driven by water power was used to prepare rags. Water power was also used in a paper mill in Tus¬ cany some time in the same century. Whether at first rags were <(cooked® before being beaten is not certafri, but it was not long before it became customary to so treat them. The fabrics were first weakened with caustic and then macerated in a ((beating engine.® The ((Hol¬ lander engine,® the precursor of almost all mod¬ ern types, was invented in 1750, and essentially as originally designed is still used. The great¬ est advance in the history of paper-making was made when toward the close of the 18th cen¬ tury a machine driven by power and making paper continuously was substituted for this single-sheet hand process. Modern paper-mak¬ ing may be considered to date from that time. Roberts, a Frenchman, working in a hand paper mill in France, is credited with this invention,

and in 1799 his machine was installed by Fran¬ cois D;dot at Essone, France. In 1803 bour-drinier and Donkin introduced essentially the same machine into England, where it was put into successful operation in the following year. That machine, in principle the same as those in universal use to-day, is known by the name of Fourdrinier, the maker, but not the inventor.

It multiplied the productive capacity of labor enormously. Although a continuous web of paper was produced, it was invariably cut into sheets, for it was nearly 100 years before the invention of the web

printing-press created a demand for paper in the form of rolls. Second only in importance to Roberts' invention was that of Dickenson, an English paper-maker, who, in 1809, invented the ((cylinder» machine, a modification of the "Fourdrinier,® which has played an important part in the manufacture of wrappings, paper boards and generally the coarser grades, while the Fourdrinier is su¬ preme in the book, news and writing-paper fields. The machines in use in the United States were:

In 1872, Fourdrinier' 299, Cylinder 689.

In 1900, " *£ 663, " 569.

Great improvements have been made not only in the paper machines proper, but in the other machinery used in pulp and paper-mak¬ ing, and the use of raw materials has been revolutionized so that paper-making as a whole made an enormous stride since the day of Rob¬ erts, but still his time must be regarded as an epoch in the history of the industry.

Growth of the Industry.— The earliest use of paper was for writing purposes. . As the art of writing was for so many centuries confined to a small portion of the world s population, and as few copies of books were made, the con¬ sumption of paper must have been very limited compared with many other commodities. But the invention of printing which led to the mani¬ fold production of books gave a great stimulus to the industry. It is probable that the use. of paper for numerous mechanical and practical purposes is of comparatively modern origin except that it has always been used more or less for wrapping. But paper was too much of a luxury to be used freely for wrapping until recent times, and even now, for example, in Italy as a usual thing frugal shopkeepers do not furnish wrapping paper, and not uncom¬ monly the buyer, if he wishes his parcel wrapped, takes with him the paper, usually an old newspaper or sheets from a child's copy book; these he uses as long as they will hold together. There has been at all times a re¬ ciprocal relation between paper-making and many other arts and industries, progress on the one side stimulating progress on the other. Thus, for example, improvements in printing have not failed to meet a response from the paper-maker with cheaper product. The use of web presses for printing newspapers has stimu¬ lated improvements in the process of making paper which reduced its cost and the reduction in price in turn has been a very important fac¬ tor in the .growth of the printing and pub¬ lishing industries.

The production of paper is now centred principally in the United

States, England, France, Austria-Hungary, Belgium, Holland and Scandinavia. These countries lead both in

the methods of manufacture and the quantity of output. In general there is a striking rela¬ tion between the intelligence and progressive¬ ness of a country and the quantity of paper consumed. It follows as a corollary that the United States has a greater per capita produc¬ tion than any other country. The total number of paper mills in the world is between 4,000 and 5,000, including numerous small establishments in China, Japan and other Oriental countries, where paper is made mostly by hand, but no reliable statistics exist to show the total produc¬ tion of the world. A rough estimate would make the world's production upward of 9,000,- 000 tons annually. This is approximately three times the world's annual growth of cotton; the significance of this comparison is that it indi¬ cates the insufficiency of rags as raw material and the importance of the inventions which have led to so general a use of wood pulp.

Modern Conditions. — If we take the United States as a type the most important factors in paper-making are raw materials (spruce and poplar wood, rags, straw and old papers), water power and fuel. About three-quarters of the total tonnage of paper made in the United States is composed of wood pulp. The percen¬ tage made from rags is very small, not more than 5 per cent or 6 per cent, but the value of the rags used in the last census year was $6,- 595,000 as compared with $9,837,000, the value of the wood used, demonstrating that rags are used chiefly in the highest grades of paper. Water power is not only indispensable for mak¬ ing ground wood pulp but is generally relied upon to drive the beating engines and other heavy machinery. Coal is required principally for producing heat to dry the paper, but also for additional power.

Other important conditions affecting the pro¬ duction of paper are the existence of good transportation facilities and the proximity of large markets. All these factors combine to put the United States at the head of the paper¬ making countries. An advantage which Amer¬ ican

ingenuity itself has created is the superior¬ ity of its paper machinery, especially in point of capacity ; American machinery being, as a rule, larger and operated at greater speed than that of other countries. It is this fact that more than compensates for the much higher scale of wages prevailing here than in any other paper-producing country, even after due allow¬ ance has been made for the superior character of American workmanship. The machine ten¬ der, for example, who receives $3 and upward a day in the United States, in England receives $1.66, in Germany $0.75, while in Italy, Scandi¬ navia and other countries even less. The ex¬ porting of American paper machinery has a decided tendency to neutralize the advantage that the United States paper-maker might have if it could be kept for his own exclusive use.

Combinations.— The most striking of recent changes in the industry in the United States is the consolidation of many mills under one own¬ ership and management. Already a majority of the ((news,)} ˆwriting® and (<boards® mills have thus come together, forming the largest com¬ panies in the world in their respective branches. There is a national organization of paper manu¬ facturers of the United States known as the American Paper and Pulp Association, founded in 1878.

Production. — The special census of manu¬ factures taken for 1914 showed that in that year the total number of establishments in the United States engaged in making paper of all kinds, paper boards and wood pulp was 718. Of these, 495 made paper exclusively; 160 made both wood pulp and paper; and 63 made pulp exclusively. These 718 concerns were capital¬ ized at $534,625,600, and employed 88,457 hands to whom they paid in the year $53,245,639 in wages. The raw materials consumed by these factories cost them an aggregate of $213,181,- 286, and the value of the products turned out was $332,147,175. These products consisted of 1,313,284 tons of news paper in rolls and sheets, valued at $52,942,774; book paper, plain, 786,626 tons, valued at $58,496,221 ; other book paper, coated, plate, lithograph, map, woodcut, cover paper, etc., 148,353 tons valued at $15,103,250; cardboard, Bristol board, card middles, ticket board, etc., 83,010 tons, valued at $5,376,434; writing paper, 195,351 tons, valued at $228,637,- 257 ; other fine papers, 52,377 tons, valued at $5,417,661 ; wrapping paper, manila, 77,878 tons, valued at $7,070,254; heavy wrapping, 98,780 tons, valued at $3,588,357 ; wood or bogus ma¬ nila, 353,987 tons, valued at $17,975,636; Kraft papers, 109,752 tons, valued at $6,949,244; all other wrapping papers, 241,001 tons, valued at $13,789,262; paper boards — pulp

board, strawboard, news board, binders' board, trunk board, pressboard, leather board, *etc.* — 1,208,795 tons, valued at $39,493,174; hanging paper, 96,527 tons, valued at $4,488,910; tissue paper, 115,401 tons, valued at $11,535,720; blotting paper, 14,-157 tons, valued at $1,457,897; building, roofing, sheathing, and asbestos paper, 243,908 tons, val¬ ued at $9,475,733; all other papers — poster, tag stock, etc., 130,459 tons, valued at $9,890,641. This production, as measured by its aggregate value, shows an increase in the 10 years since 1904 of 76 per cent. The industry finds its greatest development in New York (17 per cent), Massachusetts (13.1 per cent) and Maine (12.1 per cent), Wisconsin shows an increas¬ ing interest (9.4 per cent), Pennsylvania (7.7 per cent), Ohio (7.0 per cent), Michigan (6.6 per cent) and New Hampshire (5.3 per cent) also contribute a substantial proportion of the country's total output.

Exports. — The paper export business of the United States was insignificant until 1878 when the (<paper and manufactures thereof® exported amounted to about $1,000,000. For the year 1914 the amount was $11,023,774; and 12,036 tons of wood pulp, valued at $529,741. The ex¬ ports consist largely of news paper which goes principally to England and Australia.

Bibliography. — Andes, L. E., (The Treat¬ ment of Paper for Special Purposes) (London 1907) ; Clapperton, G., Practical Paper Mak-ing) (London 1907) ; Cross, C. F., and Beven, E. J., (A Textbook of Paper Making) (London 1916) ; Dawe, E. A., (Paper and Its Uses* (Lon¬ don 1914) ; Hunter, D., (Hand Made Paper and Its Watermarks) (New York 1916) ; Maddox, H. A., (Paper: Its History, Sources and Manufacture) (London 1916) ; Post's Paper Mill Di¬ rectory of the United States) (New York 1916) ; Stevens, H. P., (The Paper Mill Chemist) (London 1908) ; Weeks, L. H., (History of Paper Making in the United States) (New York 1916) ; United States Foreign and Domes-

tic Commerce Bureau, Special Consular Reports No. 73, (Paper and Stationary Trade of the World* (Washington 1915) ; United States Plant Industry Bureau, Circular 82, (Crop Plants for Paper Making)

(Washington 1911) ; also the United States Department of Agricul¬ tural Bulletins 72, 309, 322 and 404.

Revised by Richard Ferris.

PAPER-BIRCH. See Birch.

PAPER CURRENCY. See Currency.

PAPER INDUSTRY IN AMERICA. In

1690 William Rittinghuysen, an experienced paper-maker from Broich, Holland, entered into partnership with William Bradford (q.v.), the first American printer, and together they opened the first paper mill ever established on Amer¬ ican soil. It was located on a creek since known as Paper-Mill Run, conveniently near Philadelphia, and here a very fair quality of paper was manufactured out of pulp made from the rags of the home-grown flax. As the colo¬ nists had no other paper mill for fully 20 years, when William de Wees opened a rival establish¬ ment in close proximity to the first one, the en¬ terprise was a profitable one, in spite of the fact that the making of paper by hand— the only method known in those days — was a labo¬ rious and costly process. This primitive system was in vogue in America until 1756, when the first pulp-engine was introduced in this country from Holland.

Within less than 15 years, there were 40 mills in various parts of Pennsylvania, Delaware and New Jersey that were turning out an aggregate annual product valued at more than $500,000. In 1794 another large mill was established at Troy, N. Y., by Websters, Ensign and Seymour, and, during the same year, a mill for the manu¬ facture of coarse wrapping paper from the bark of the basswood-tree was opened at Fairhaven, Vt., by Matthew Lyon. This was the first es¬ tablishment in the United States to attempt to make use of anything except rags for pulp.

In the ordinary paper mills the method of manufacture was still a crude process. To make paper the pulp was floated in vats, at the side of which stood the workmen, mold in hand. This mold was of wire cloth, around the outer edges of which a rim was formed by superim¬ posing a thin frame called a “deckle,® which prevented the pulp from flowing off, and left the water no other escape than through the bot¬ tom of the mold. Into this the pulp was dipped and, as the water drained away, the pulp was left in the form of a thin layer covering the bottom of the mold. At this point it was given to another man — a

workman known as the Voucher® — whose duty it was to remove the mold. This was done by the application of a piece of felt to which the pulp adhered in the form of a thin sheet; a second piece of felt was then placed on top of this; to this felt another pulp-mold was applied, and this process was continued until the pile of alternate layers of pulp and felt had attained the requisite height. From this pile, or "post," as it was called, all the water was thoroughly expressed, and the pulp, separated from the felt, was pressed, and hung upon the "tribbles,® or lines in the drving-room. This portion of the process completed, the sheets were still rough and somewhat like blot¬ ting-paper, so it was necessary to dip thorn in

size, and to press and dry them again before they assumed the character of a finished Prod¬ uct. Laborious as this method was, it was the only process known until after the beginning

of the 19th century. .

The first marked improvement in the art oi paper-making came with the introduction of the Fourdrinier machine. This invention was originally conceived by Louis Robert, a woik-man in Francois Didot's paper-mill, at Essotic, France. In 1799 he secured a patent for a proc¬ ess of making paper by an endless web-machine, but, as he was financially unable to carry such an idea into effect, he sold his rights to Legei Didot, who took the patent to London. In 18U4 he persuaded two brothers, Henry and Sealy Fourdrinier, both wealthy London stationeis, of the practicability of the scheme, and finally transferred his interests in the. invention to them. As the result, the machine has since borne their name.

In the meantime the paper-making industry in the United States had enjoyed steady growth. By 1810 the number of mills had increased to 185 and their annual product was valued at more than $800,000. Already the demand for rags had become so great that the manufac¬ turers, finding the domestic supply utterly in¬ sufficient, had commenced to import them. In 1817 the first power-mill in the country began operations at Pittsburgh, Pa., and, about the same time, Thomas Gilpin and Company, of Wilmington, Del., commenced to make paper by machinery. These machines, however, were of American invention.

Although the Fourdrinier machine was in use in England as early as 1806, it was not introduced in the United States until 1820. That it

had revolutionized the making of paper there could be no doubt. By its use a seven-vat mill which had previously been oper¬ ated at an annual expense of $13,000, could now be run for a sum not in excess of $3,600, and yet, while the American manufacturers knew all these facts, the cost of such machines was so great that they hesitated to introduce them. The machine utilized an endless web of wire cloth. As it revolved a stream of liquid pulp flowed over it evenly, the precipitation of the water through the cloth being so nicely adjusted that it was completed at the very moment in which the pulp-sheet met an endless belt of felt, which not only removed the pulp from the wire, but bore it on, through the heavy metal rolls which pressed it. separated it from the felt, and passed it over the steam-heated cylinders upon which it was dried, expelling it, at last, in a condition ready to be polished and cut into sheets.

As rag pulp is still used in the making of ex¬ pensive grades of paper, the preliminary process to which rags are subjected is interesting. First cleansed and softened by being boiled in a strong lye of caustic alkali or lime, the rags are then placed in a washing machine, in which a heavy cylinder, with knives attached, partially macerates them. Everything except the vege¬ table fibre itself is then removed, a solution of bleaching powders is added and the mass is left in stone vats to bleach as long as may be neces¬ sary. This process completed, the substance left is taken to the beating engines, where, after it has been thoroughly washed with water to re¬ move all trace of the chlorine, it is reduced to

pulp and transferred to the Fourdrinier ma¬ chine. Of course, during the past hundred years, so many changes have been made in this mechanism, so many modifications and improve¬ ments, that it is difficult to realize that it bears any relationship to the original invention.

In 1809 an English manufacturer named Dickenson perfected another invention for mak¬ ing paper. It was called a Cylinder-machine,® and differed from the prior invention by being fitted with a hollow,

perforated, wire-gauze- covered cylinder, which operated directly in the pulp-vat by drawing out the water and leaving the sheets of pulp on the gauze, by which it was conveyed to the felt belt, and, thus, through the couching-rolls. In other respects it followed the principles of the Fourdrinier machine.

The American invention, which was first used in 1817, was of similar construction, but no other machine was known in this country until 1820, when the Gilpins imported machinery for making paper. In 1822 John Ames, of Springfield, Mass., invented a new cylinder-machine, and, in 1829, this invention had been so improved that its general use was assured. It was in this year that straw and grass were first used in making paper by Shryock, of Phila¬ delphia; in 1830 the manufacture of Fourdrin¬ ier machines was commenced in Connecticut by Phelps and Spofford, and, in 1831, the discovery of the value of chlorine in cleansing pulp-fibre permitted the use of hitherto unavailable sub¬ stances for paper stock. By 1850 there were only five mills in this country that still clung to the hand-made process of paper-making, and paper-machines had been so greatly improved that laid paper was, at last, produced by that method.

The general use of straw paper began in 1857. Some three years previous to this time, a Frenchman, A. C. Mellier, had succeeded in converting several vegetable fibres, notably straw, into pulp which he believed would be suitable for use in the manufacture of paper. The process, which has since borne his name, was neither a difficult nor a costly one. The straw was first thoroughly soaked, and, after it had been cleansed, was boiled, at a tem¬ perature of not less than 310° F., in a solution of about 4 per cent of caustic soda. Although Mellier peddled his idea from one end of the country to the other, the big manufacturers of paper did not seem to consider the scheme a practicable one, and three years, therefore, elapsed before he was able to persuade anybody to invest their money in his project. The man who finally undertook to manufacture paper by this process was J. B. Palser, a member of the firm of Howland and Palser, but the factory which they established at Fort Edward. N. Y., for the express purpose of carrying Mellier's idea into effect proved an excellent investment. In 1859 Palser himself patented some important

improvements upon the process, and from that day straw paper became one of the staple grades on the market. One of the direct effects of this innovation in the paper industry was the rise in price of rye straw. Of course, straw paper was by no means a perfect product,

and was not entirely suited to many of the purposes for which it was used. Thus, for example, the silicious character of the straw was shown in the hard, brittle surface of the paper, a factor which alone represented a great disadvantage, from the printer's point of view, for such paper wore out type about twice as fast as the softer surfaced paper had done. Moreover, the glassy surface of the paper did not tend to durability, and yet, in spite of all these objectionable feat¬ ures, nearly all the newspapers were printed upon it, even until after the Civil War, but no great regret was felt when it was finally super¬ seded by wood-pulp paper.

The quarter of a century that passed be¬ tween 1830 and 1855 was largely an experi¬ mental period in the history of paper-making. During this time every substance that could possibly have possessed the requisite fibrous qualities was put to the test. Rags were out of the question, even straw was rapidly becoming too expensive, and other fibres had proved gen¬ erally unsatisfactory. In 1854 Wells and Burgess, of London, obtained a patent for a chemical wood pulp, and, a year later, Hugh Burgess, of Pennsylvania, invented a process by which the wood of the poplar might be used. The use of ground wood pulp dates from 1844, when a German, named Keller, invented a wood-grinding machine of such practicability that Voelter, the manufacturer, quickly pur¬ chased the invention. It was Voelter who first conceived the idea of grinding wood by stones and it is due to this development of the original machine that he is so commonly credited with having been its inventor. About 1847, having perfected his improvements, Voelter began to use the ground wood pulp, and, about two years later, the same system was adopted by the French manufacturers at Souche. The use of this material in the United States was first made by Alberto Pangenstecher, whose factory was located at Stockbridge, Mass., but, while he was very successful in making paper from ground wqod, itˆ was not put into printing-paper until 1867, when Wellington Smith, Warner Miller and William E. Russell adopted that process. Since the introduction of wood pulp, the paper industry has grown with groat rapidity. . Whereas, in 1850, the 500 mills, with their capitalization of about $18,000,000, were producing paper to the value of about $17,- 000.000 per annum, in 1870 tne number of mills had increased to 669, and the annual production to $48,436,935. The following table, compiled from the last report of the United States census, shows the status of the industry since 1880:

American Paper Industry.

1880

1890

1909

1914

Number of establishments .

Capital .

Wage earners .

742

$48,139,652

25,631

$8,970,1.33

57,366,860

749

$89,829,548

31,050

$13,204,828

78,937,184

777

$409 , 348 . 505 75,928 $40,804,502 267,656,964

718

$534,625,000

88,857

$53,246,000

332,147,000

W ages .

Value of product .

In 34 years the value of the production has increased nearly six times, while the capitali¬ zation has increased 11 times. During the years from 1880 to 1900, the pound price was slowly but steadily lowered. Since then it has increased, and some grades have reached the former level.

Of the 718 factories credited to the paper industry, but 495 make paper exclusively; 63 are pulp mills, and 160 make both paper and pulp. They consume annually 4,500,000 cords of wood, mostly spruce, and one-half of this they import, chiefly from Canada. About 10 per cent of the pulp used is also imported, and 40 per cent of the sulphite fibre. Of the $213,000,000 spent for materials, $40,000,000 is for wood; $32,000,000 for sulphite, and $20,- 000,000 for old paper, which latter is mixed in with the new in the news print and other cheap grades of paper. Of the $332,000,000 products, that classed as book is the largest, $74,000,000, but this does not mean that this all goes into books, for this grade includes most of the magazine paper, and a large amount used for miscellaneous printing. The newspapers consume the greatest tonnage, but the quality is lower, and the annual value is about $53,- 000,000; however, their illustrated supplements are often printed on book paper. The wrapping paper totals $49,000,000, writing paper $29,- 000,000, paper board $39,000 000, tissue paper $12,000,000, building and roofing paper $10,000,- 000, wall paper $5,000,000, and cardboard $5,- 000,000. The balance of

$56,000,000 is divided among the infinite variety of paper articles and objects supplied to the public.

A change in the paper industry of the United States came about shortly after 1909, owing to news print paper being put on the free tariff list. There is much more wood in Canada than remains in New England and the Central States, and labor also is cheaper there. Paper manufacturers began to invest in Cana¬ dian properties, and soon a large percentage of the American supply came from over the bor¬ der. Then the World War came on, Canadian mills were short of help and curtailed produc¬ tion and the pulp supply from Scandinavia ceased. The result was a shortage of paper in the United States and prices went kiting. The newspapers and other publishers claimed that the manufacturers of paper squeezed the mar¬ ket, and an investigation followed, resulting in a fine of $2,500 being levied on each of half a dozen men prominent in the paper combine. Thereafter the government took a hand, and large users of paper were notified that they must reduce the quantity utilized from 5 to 15 per cent.

Revised by Richard Ferris.

PAPER MONEY. See Money, Paper.

PAPER-MOUTH, a fish. See Crappie.

PAPER-NAUTILUS. See Argonaut.

PAPER PULP. See Paper.

PAPHLAGONIA, paf-la-go'ni-a, in ancient geography, a division of Asia Minor, bounded on the north by the Black Sea (Pontus Euxinus), on the east by the river Halys, sepa¬ rating it from Pontus, on the south by Galatia and on the west by Bithynia. Besides the Halys (now Kyzyl-Irmak), the waterways were the Amnias (Goek-Irmak) , and the Parthenius

(Bartin-Chai). The coast was fertile, the inte¬ rior well wooded, game abundant, the principal .industry sheep-raising, and the people famous horsemen. The region was subject nominally to Lydia, Persia and Macedonia in succession, still keeping its own actually independent princes. After Alexander's death Paphlagonia and Cappadocia became a part of Pontus, and then a Roman province. The chief city was the Greek colony of Sinope.

PAPHOS, pa'fos, two ancient cities on the island of Cyprus. The earlier, called <(01d Paphos® (Palaepaphos) was founded by the Phoenicians on the southwest coast near the mouth of the river Bocarus, possibly in the 10th century b.c., and was the sacred city of Aphro¬ dite, probably not the Greek goddess but the Semitic Astarte, whose famous temple, the ob¬ ject of pilgrimage in the pre-Christian era, is now entirely destroyed, save for a fragment of the cyclopean masonry still preserved at Kuklia, the present town. The new city (Neapaphos), 10 miles northwest of the old, was a Greek col¬ ony, of great marine and commercial import¬ ance; in Roman times it was the capital of the island; it is now called Baffo. Consult Cob-ham, (Bibliography of Cyprus) (1886) ; Ohne-falsch-Richter, (Kypros) (1893) ; Enlart, (L'Ile de Chypre) (1897, in (Bulletin de la Societe Geographique)).

PAPIAS, pa'pi-as, Christian writer, bishop of Hierapolis. He is described by Irenseus and later writers as a (<hearer of John and a com¬ panion of Polycarp.® He suffered martyrdom at Pergamus in 163 a.d. He was one of the ear¬ lier believers in the millennium, that is, the per¬ sonal reign of Christ on earth for a thousand years after the resurrection of the dead, and was the author of five books of commentaries on the sayings of our Lord (A oycoy K vpianuv 'E ZfjyyctTi), a few fragments of which are ex¬ tant. It is from them that we learn that Saint Matthew's Gospel was traditionally believed to have been written in Hebrew, and the evangelist Mark to have been the interpreter or amanuen¬ sis of Peter in writing the Third Gospel. Con¬ sult Hall, (Papias and His Contemporaries* (1899) ; Weissenbach, (Das Papiasfragment bei Eusebius* (1874) ; (Die Papiasfragmente fiber Marcus u. Matthaus* (1878).

PAPIER-MACH6, pap-i-a' ma-sha, mashed or pulped paper made into some form other than the familiar paper sheets. It is usually mixed with glue, sizing or paste to give it greater hardness, and borax or phosphate of soda may be added as a fire resistant. It is commonly formed by forcing the pulped mixture into a mold under pressure and allowing it to dry. Wall ornaments, cornices, ceiling dec¬ orations and the like are frequently molded in papier-mache; picture frames and boxes, es¬ pecially with ornamental tops as for snuff or the toilet table, or for souvenirs, are easily made in this way and may be colored or var¬ nished at pleasure. Anatomical models and so-called wax figures may also be produced in this manner. Sometimes the papier-mache is made by pasting or gluing sheets of paper together and pressing them when soft into the form which it is desired to give them, but it is be¬ coming more common to speak of such articles as being made simply of paper.

PiA?IIT10’ a Senus of butterflies (q.v.), popularly known as ˆswallow-tails® from the prolonged appendages of the posterior margin of the hind wings. The technical characters of the genus are found in the venation of the wings : internal vein of hind wing wanting, its place occupied by the submedian ; median and submedian veins of fore wing united by a cross- .vem» from the submedian end of which a short internal vein arises. The caterpillars are smooth and fleshy, and when disturbed pro¬ trude from the region of the thorax a pair of soft filiform “stink-horns* giving an offensive odor. 1 he chrysalids are angulated and naked and are suspended by a loop of silk passed about the middle and by a silken button at the caudal end. Although the imagos vary greatly, they are usually of large size and showy colors. Probably upward of 500 species are known, abounding in tropical countries; the genus is very poorly represented in Europe, but North America has nearly 30 species. Among our best known Eastern species are P. asterias , a hand¬ some black and yellow form ; P. turnus, with the wings a rich yellow bordered and barred with black, and P. troilus, generally rusty black with the posterior half of the hind wing green¬ ish blue. . The Ajax butterfly (P. ajax) is one of those interesting species which exhibit sea¬ sonal polychromatism. It sometimes resembles the Asterias. The P. philenor is another black species, but it lacks the yellow spots and shows a beautiful greenish reflection on the upper sur¬ face of the wings. The caterpillars of papilios are somewhat destructive, to. particular plants, but have not the economic importance of the cabbage butterflies (Pieris , etc.), which, like them, have the front legs well developed and are placed with them in the family Papilionidce.

PAPILLA. See Skin and Skin Diseases.

PAPIN, pa’pm (Fr. pa-pan), Denis, French physicist: b. Blois, 22 Aug. 1647; d. England, about 1714. He practised medicine for a time at Paris, but turned his attention to physical sciences, assisted Huygens in the con¬ struction of the air-pump, and during a visit to England was admitted a Fellow of the Royal Society. Being a Protesant, the

revocation of the Edict of Nantes prevented his return to his native country, and on leaving England he settled at Marburg, in Germany, in 1687, as pro¬ fessor of mathematics. But he again came to England in 1707. The real importance of Papin's many researches and experiments was long unperceived. He invented the double air-pump and the air-gun, a ˆdigester® for cooking by means of liquids under produced atmospheric pressure, and the safety-valve, first used in the <(digester.® In 1690 he constructed the first steam-engine with a piston, and in the same year a boat with a paddle wheel revolved by a water-wheel supplied by means of a pumping-engine. Consult Thurston, cGrowt-h of a Steam Engine) (1878) ; Gerland, <Life) (1881).

PAPINEAU, pa-pe-no, Louis Joseph,

Canadian politician: b. Montreal, Quebec, 1786; d. Montebello, Quebec, 24 Sept. 1871. He was educated at the Seminary of Quebec, studied law and was admitted to the bar, and was elected in 1812 to the Canadian assembly. Dur¬ ing the War of 1812 he was captain of militia, and in 1815 he was elected speaker, which office he held for over 20 years as leader of the

French-Canadian party. He was continually at variance with the royal governors and in 1827 Lord Dalhousie adjourned Parliament and re¬ signed rather than allow Papineau to take his seat as speaker. He disapproved the union of Upper and Lower Canada, and in 1834 framed the ((Ninety-two Resolutions® which were sent to England in exposition of the grievance and demands of his compatriots. In 1834 he con¬ sulted with William Mackenzie, the revolution¬ ary leader of Upper Canada, regarding the con¬ solidation of their forces. In 1837 he attended the meeting in which a revolution was decided upon, and a warrant was issued for his arrest for high treason, though he had fled to the United States at the outbreak of the rebellion. He escaped to France, but was pardoned in 1845 and returned to Canada. He again en¬ tered Parliament in 1847, but finding himself without influence retired in 1854. Consult De Celles, (Louis Joseph Papineau) (in Makers of Canada series, 1910) ; Read, (The Canadian Re¬ bellion of 1837 *(1896) ; Kingsford, (History of Canada* (1887-98).

PAPINI, pa -pe'ne, Giovanni, Italian philos¬ opher: b. Florence, 1881. In his native city he founded a review, Leonardo, of which he be¬ came editor and to which he contributed sev¬ eral articles under the nom de guerre of Gian Fal.co. His philosophy is purely pragmatism, of

which he is the ablest living exponent in his country.. His published works are (I1 crepus-colo dei filosofp ; (La coltura italiana) ; (I1 tragico quotidiano : favole e colloquP (1906); (I1 pilota cieco) (1907); (L'Altra meta : saggio di filosofia mefistofelica) (1911); (Le memorie d'Iddio* (1911).

PAPINIANUS, pa-pm-i-a'nus, .TEmilius,

Roman jurist: b. about 146 a.d. ; d. 212. He accompanied the Emperor Septimius Severus as praetorian prefect to Britain and was put to death by Caracalla. Papinianus was the chief of all the Roman jurists. His most important writings were his 37 books of (Ouaestiones> (legal questions) and 19 of <Responsa) (de¬ cisions). A few fragmentary portions exist as excerpts. These works were, until the prepa¬ ration of the Pandects by Justinian, the main repository of jurisprudence connected with the exposition of original authorities. In the Pan¬ dects (q.v.)* many extracts from him appear, forming about one-twelfth of the total number there given. Consult Brinz, <Die Berliner Fragmente vorjustinianischer Rechtsquellen*

(1884).

PAPPENHEIM, pap'pen-him, Gottfried Heinrich, Count. German military officer : b. Franconia, Germany, 29 May 1594; d. Leipzig, Germany, 17 Nov. 1632. He was educated at Altdorf and Tubingen, entered the army and as a colonel in the battle of Prague, 1620, was distinguished for his bravery. In 1623 he was appointed by the emperor to the command of a regiment with which he served in Lombardy until 1625, and in 1626 he crushed an insurrec¬ tion in Upper Austria in which 40,000 peasants were killed by. his forces. At Magdeburg with General Tilly in 1630 he is charged with great cruelty; he fought with Wallenstein at Leipzig in 1631, and was fatally wounded at the battle of Liitzen in 1632. He was a man of indomitable courage, but rash and impetuous. Consult Hess,

(Gottfried Pappenheim* (1855).

PAPPUS, Greek mathematician. He lived at Alexandria toward the end of the 3d century of the present era. His great work, {A Math¬ ematical Collection, > is the source of all our knowledge of ancient Greek mathematics. Only a mutilated portion of the original eight books is extant and this contains, besides geometrical problems and theorems, an essay on mechanics. These fragments were published by Hultsch at Berlin in 1876-78.

PAPPUS, the downy appendage that crowns many single-seeded seed-vessels, such as the down of the dandelion, *etc.* It represents the calyx of the flower and may be pilose, with the threads unbranched, or plumose, with feathery threads; sessile, with the threads resting directly on the achenes ; or it may be supported on a longer or shorter beak. It acts as a parachute in directing the fruit when it becomes separated from the parent plant. The term pappus may also be applied to other forms of a persistent calyx, as a crown or a circlet of scales.

PAPUA. See New Guinea.

PAPUAN SUBREGION, a faunistic sub¬ division of the Australian Region which em¬ braces the mountainous, heavily forested islands of the Papuan Archipelago, north of Australia. See Zoogeography.

PAPYRUS. The word is derived from the Greek rcaKvpog, a reed plant known as cyperus papyrus or papyrus antiquorum, belonging to the family cyperacece (sedges). Its prolific growth in Egypt was utilized by the natives in ancient times for making a medium on which to write, also from its bark were made cordage and sails and its roots were used as fuel. Papy¬ rus has been used as a medium for writing on from the very earliest antiquity; some speci¬ mens of papyrus documents found in Egypt are attributed to the third dynasty (4,000 years before our era). The ancient papyrus writings of the Egyptians are in several kinds of script: hieroglyphic, hieratic and demotic. Theo¬ phrastus (3d century b.c.) describes the Egyp¬ tian method of manufacturing paper from this plant. The stem was cut into two equal parts, from which, when the outward rind or bark was taken off, they separated the thin film, of which the stem is composed, with a sharp-pointed in¬ strument. The pellicles or thin coats, being flaked from the stalk, they laid upon a table two or more over each other transversely and glued them together, either with the muddy and gelatinous water of the Nile, or with fine paste made of wheat flour; after being pressed and dried they made them smooth with a roller, or sometimes they rubbed them over with a solid glass hemisphere. These operations constituted

the Egyptian papyrus as far as the art of mak¬ ing it has been discovered. The-size of this paper seldom exceeded two feet in length, but it was often smaller; it had different names, according to its size and quality. The largest was termed “Imperial,” which was also the finest quality. This was used for letter paper by the more prominent Romans. The next kind the Romans termed “Livian” paper and it was named after Livia, wife of Augustus; this kind measured 12 inches each leaf. A third kind was named “sacerdotal” and its size was 11 inches. The papyrus in use in the amphi¬ theatre was nine inches in size. This writing

material became so popular among the ancient nations that its production became the chief article of commerce of Egypt, Alexandria being its chief centre. Many ancient manuscripts (called diplomas in paleography) have been unearthed in Egypt, especially at Fayoum (see Manuscripts). The papyrus plant and the documents written on this medium were both termed charta by the Romans. When the Egyp¬ tian manufacture of papyrus was at its greatest commercial height (it had become a monopoly) each leaf had to be marked with a stamp to maintain its authenticity and value. The Egyp¬ tians generally made it up in a roll (volumen) , in lengths up to 46 feet and a width never ex¬ ceeding 10 inches. The papyrus that was in use in Europe was of Egyptian importation up to the end of the 10th century. For a long period all diplomatic instruments were written on papyrus because of its beauty and adaptability, the sheets being fastened together to any re¬ quired length. Parchment gradually superseded papyrus in the 7th century, and the discovery of paper-making lessened the demand for papyrus still more. Paper was made in Egypt probafbly as early as 600 a.d. from cotton. The pontifical chancellery, till the middle of the 12th century, used papyrus in issuing its bulls; the Merovingian kings wrote their documents on papyrus all through the 7th century; and we find in France documents inscribed on papyrus up to the end of the 8th century. While papyrus was poorly fitted for use as book (codex) pages and made up into a roll (volumen) for this reason, we find, in the Merovingian period, papyrus made up into pages to form books, but frequently intercalated with a leaf of parchment between the gatherings to give solidity and consistence to the work. After the collapse of the Egyptian papyrus factories Sicily continued to manufacture the material for papal use ; but this product was of inferior quality as is seen in examining the last papal bulls on this material. Very many ancient volumina of papyrus have been brought to light in modern times; no less than 150 rolls were found in a chest in the ruins of Herculaneum in 1754; they are so badly charred as to

be, for the most part, too brittle to allow unrolling. The Grecian papyri found in Egypt (a great number at Arsenoe, capital of Fayoum) are, in large numbers, in the museums of Vienna, Lon¬ don, Berlin, Paris, Petrograd, Cairo, *etc.* The largest known papyrus roll is that found in 1855 behind Modinet Habu, on the Nile. It is in the British Museum and facsimiles with translations were published by the trustees in 1876. The volumina are of greatly varying lengths; the Harris papyrus measures over 131 feet and is in London ; the medical papyrus of Ebers, in Leipzig, is over 65 feet. The rolls are found inscribed in Egyptian, Greek, Latin, Arabic, Hebrew and Syrian. See Paper; Vel¬ lum ; Pai&hment, *etc.*

Clement W. Coumbe.

PARA, pa-ra', GRAN PARA, or GRAO PARA, grown pa-ra', maritime state of the Brazilian Confederation, lying on either side of the Amazon, bounded on the north by the Guianas (except Brazilian Guiana, a part of Para) and the Atlantic, on the east by the Atlantic and the states of Goyaz and Maranhao, on the south by Matto Grosso and on the west

by Amazonas. Its area is 443,903 square miles. It has mountain ranges and plateaus on its interior boundaries, but its most striking physi¬ cal characteristic is its great alluvial plain traversed by the lower waters of the Amazon and Tocantins systems, so that the state is unusually fertile and has remarkable facilities for commerce and transportation. There are settlements on nearly all the rivers: San Jose on the Jary, Almeirin on the Paru, Cameta on the Tocantins, Souzel, Porto de Moz and Villarinho on the Xingu, Santarem on the lapajoz, Obidos on the Trombetas, Macapa on the mouth of the Amazon and Para or Belem on the Para. The india rubber trade, which is now valued at $35,000,000 a year, is build¬ ing up towns in the interior away from the rivers. Cacao, vanilla, sarsaparilla, coffee, sugar, hides, copaiba and Brazil nuts are the other leading products and exports of the state, which probably has large mineral wealth awaiting capital. The climate is equable and comparatively healthful in spite of the floods along the

river courses. The only railroad is from the capital, Para (q.v.), to the coast. Pop. about 568,000.

PARA (originally Santa Maria de Belem, that is, Saint Mary of Bethlehem; and hence called Belem, the present official name), Brazil, capital city of the state of Para, lying north¬ east of Rio Janeiro on the Rio de Para, south of the island of Marajo, 55 miles from the Atlantic. It is connected with Braganga on the coast nearly 80 miles distant by a railway, and is an important port, the only one of the state; it has regular steamboat connections with Brazilian, European and North American ports, and is the seat of a United States consul. An episcopal city, it has a cathedral built in 1720, when the city was in its 106th year, a govern¬ ment palace, a library, lyceum, theatre, botan¬ ical garden, two seminaries, electric street rail¬ roads, electricity and gas lighting. There are several banks. Para is the greatest rubber shipping port in the world; of approximate an¬ nual exports of $39,000,000, $35,000,000 are for rubber. Cacao, Brazil nuts and hides are among the other exports. Imports are valued at $16,000,000. The city is cosmopolitan, and most of the whites are Portuguese. Pop. 200,000.

PARA, Rio de, arm of the sea, forming the embouchure of the Tocantins River on the northeast coast of Brazil, near the mouth of the Amazon, from which it is separated by Marajo Island. The island's southwestern boundary, the Paranan, carries some of the water of the Amazon to the Para. The two rivers were no doubt formerly connected even more closely. The Para is 138 miles long, 20 miles wide op¬ posite the city of Para and 40 miles wide at the mouth. It gives its name (which originally meant ˆriver,® and occurs in so many com¬ pounds, for example, Paraguay, Parana, Pa¬ ranan, Parananagua) to the state and city of Para.

PARA, a Turkish and Egyptian coin, the 40th part of a piastre, valued at one-fifth of a cent.

PARA, or AS.SAI, PALM. See Palms.

PARABLE, a fictitious narrative, usually brief, intended to illustrate some ooint in moral or religious teaching. As used bv the ancient

Greeks it meant any literary illustration. The parable is, therefore, of the class of fictitious narratives of which the simile, myth, fable and allegory are other examples. (See Speech, Figures of). In the Bible the parable is fre¬ quently used to illustrate the teacher's meaning. The

descriptions in the Biblical parable keep well within the limits of natural probability and always has for object some spiritual mo¬ tive with a scope limited to inculcating a single lesson. The parables of Jesus were uttered to illustrate religious truth and in some instances to veil it, as in the parable of the sower (Matt, xiii, 8-23), in which the responsibilitv of apper-ceiving and applying the lesson is thrown upon the auditor. The word parable occurs 48 times in the Four Gospels and but twice elsewhere in the New Testament. Commentators have essayed the classification of the Bible parables into theoretical, parables of grace, prophetic or judicial, *etc.* Consult Bruce, A. B., (The Para¬ bolic Teaching of ChrisC (4th ed., New York 1911) ; Dods, M., (Parables of Our Lord) (2 vols., ib. 1912) ; Lithgow, R. M., <Parabolic Gospel) (ib. 1914) ; Guthrie, T., (The Parables) (London 1866) ; Trench, R. C. T., (Notes on the Parables of Our Lord) (New York 1882) ; Winterbotham, (The Kingdom of Heaven } (ib. 1898).

PARABOLA, in mathematics, a plane curve and that one of the conic sections obtained by cutting the surface of a cone with a cir¬ cular base by a plane parallel to one of the elements. Its characteristic property is that every point therein is equidistant from a given point called the focus, and a given straight line called the directrix.

Construction by Points. — (See Fig. 2). Let F be the focus and the line DN the direc¬ trix, and draw FD perpendicular to the direc¬ trix. The point A, midway between F and D, will be on the curve, by definition, and is called the vertex. Take any distance DM>DA, draw PMP' perpendicular to DF, and, with F as a centre and DM as a radius, describe an arc. This arc will intersect PMP' in two points, P and P', which will give two points on the parabola. Proof: FP=DM=PN. \P is on the parabola by definition.

Construction by Continuous Motion (See Fig. 2). — Fasten a string at S, one end of a right triangle, and the other end at F, making the length SPF=SN. With the triangle in any position, with the short side against a straight edge on DN, bring the string taut against the triangle with a pencil point at P. Move the triangle along the straight edge, that is, along the directrix, keeping the string taut and the pencil-point against the moving tri¬ angle. The pencil will trace the parabola, since in every position PF = PN.

History. — The parabola is, with the excep¬ tion of the circle, the oldest of the historic curves, tradition ascribing its discovery to the Greek mathematician Menaechmus (350-330 DC.) , as incident to an attempt to solve the problem of the two mean proportionals, to which the famous Delian problem of the dupli¬ cation of the cube has been

reduced by Hippoc¬ rates of Chios. The object of this problem is to find two quantities, x and y, such that a : x — x :y = y : b, which requires that the equa¬ tions x2—ay and y2 = bx shall be satisfied simul-

laneously. Since these are equations of para¬ bolas, the problem requires the determination of the co-ordinate of the point of intersection of the two curves. The parabola is also re¬ markable as the first curve whose area, in¬ cluded between the curve and any chord, was obtained. This is considered to be the greatest mathematical achievement of Archimedes (287-212 b.c.) , introducing the (<method of ex¬ haustions, w in many respects the same as that of the integral calculus. The parabola occurs

and x = p + r cos 0 ; substituting these values in (1) and solving for r we find as the polar

-

equation of the curve (2) i •

1 — cos 0

Diameter of the Parabola.— A diameter of any curve is defined to be the locus of the mid¬ dle points of a system of parallel chords.

Let (xi, 3>i) and (x2 , y?) be the co-ordinates of P, and P2, the extremities of the chord Pi Pa (Fig. 2) and (x, y) the co-ordinates of the

frequently in the arts and sciences. The cables of a suspension bridge loaded uniformly hang in a parabola; the path of an unresisted projectile, as a cannon ball or a watersprout, is a para¬ bola; railwav curves are frequently parabolas; and beams loaded in particular ways often bend into parabolic shapes.

Equation of the Parabola in Cartesian Co¬ ordinates.— The normal or simplest form of the equation is obtained by assuming the prin¬ cipal axes, that is, the line through the focus perpendicular to the directrix, as the X-axes and the tangent at the vertex as the Y-axes. (See Fig. 1). Denote the co-ordinates of any point P by (x, y), and the distance VF by p. Then FP2ˆ=» (x — P)2 + y2 and VP = DMrar + p and (x + py= (x — p)2 + y\ which reduces to the equation of the parabola in the standard form (1) y2=4 px.

Equation of the Parabola in Polar Co¬ ordinates. — Assuming F as the pole and r and 0 as the co-ordinates of P, we have y~r sin 0

middle point. Since yi2=4/>.ri and yˆ=Apx2, y i — yi 4 p 2 p

- = - = — — m, where m is the slope

X2 — X1 y2 + yi y

of the chord. That is, the equation of a diameter

2 p

is y = — , which proves every diameter to be m

parallel to the principal diameter, whose equa—

7 r

tion is y = 0. This occurs when m — tan — =o© ,

2

showing the principal axes as bisector of its chords at right angles.

Equation of the Tangent. — Since the y — yi 4 p y — yi _ 2 p

secant - ~ - becomes - —

x — Xi y2 + yi x — Xi yi

when yi the equation of the tangent, de¬ fined as the limiting position of the secant as P2 approaches Pi, reduces to the form (3) yyi= 2 p (jr-Kri). The right line y=mx+b inter-

sects the parabola y~ — 4 px in general in two

1

points, determined by x — — (bm — 2p) ±

_ m2

2 V P2 — bpm. These become coincident when _P

b — » affording as the equation of the tangent

m p

in terms of its slope, (4) y = ti'u r + — . By

m

transformation of co-ordinates, the equation of the parabola referred to any diameter and the tangent as its extremity may-be shown to retain

the normal form (5) y'~=4px', and it follows that (3) will also retain the same form. By assuming y or y , as the case may be, equal to zero

we find the x intercept of the tangent equal to x or x', that is, the sub-tangent is bisected at the vertex.

To Construct a Tangent. — By virtue of the foregoing property, when the point is on the curve, construct the ordinate of the point and lay off the length of the abscissa to the left of the vertex. Connect this point on the diameter with the point on the curve. If the point is outside the curve, draw the diameter of the curve through the point, lay off the distance measured on this diameter from the point to the curve to the right of the temporary vertex, and draw the chord through the point thus deter¬ mined parallel to the tangent at the temporary vertex. The line through the points in which this chord cuts the curve and the given point will be the required tangents.

The Normal. — Since the normal is the per¬ pendicular to the tangent at the point of tangency, its equation becomes (6) y — yi = y i

- - (x — x2), which cuts the axis at the point

2p

2p + Xi.

The Subnormal is, therefore, constant and equal to 2p. This property enables us to con¬ struct the directrix and the focus by laying off p to the left and to the right of the vertex, p being obtained by bisecting the subnormal. The focal radius FP = FN = Xi + p, whence the angle FNP = the angle NPL; that is, the nor¬ mal bisects the angle between the focal radius and the diameter through any point. This prop—

erty causes rays of light at the focus to be reflected in parallel rays and is made use of in parabolic reflectors. The two tangents y —

p _ 1

vix + — and y — — x — pm are perpendicu-m m

lar and intersect at the point whose abscissa is p ; that is, perpendicular tangents intersect on the directrix.

The Latus Rectum is the double ordinate through the focus and is equal to 4p. The tan¬ gents constructed at the extremities of the latus

rectum intersect on the directrix, and are, therefore, at right angles. The area of the par¬ abola included between any chord and the curve

is given by the formula area = 2 sin 0

rx'

1 1 y dx' =

J 0

2 V 2 p sin 0

x

4

- sin 0.

3

1

(2 p) - =s

2

4

- of the area of the parallelogram constructed

3

with the chord and x’ as its sides.

Rectification of Parabola. — The length of a parabolic arc is obtained as follows (see Cal¬ culus) :

//dx\ 2 1 1 _

[1 + (—)r -dy = — yVy2 + P2 + my’ 2 p 2

P , _

— log (y + Vy2 + p2) + C.

2

If the arc begins at the vertex, then j = = 0 when

P

y = 0 or 0 - log p + C\ whence

2

1 _ p y + Vy2 + p2

S = — y V y2 + — log - .

2p 2 p

Radius of Curvature. — The radius of curva¬ ture of the parabola at the point (x, y) is given bv the formula

p“ 3

H -) -

y2 2 (p2 + y2)f.

- . = ± -

d2y

P2

P2

dx2 y2

J. Brace Chittenden, Ph.D.

PARABOLANI, men whose duty in the early Church was to attend on the sick and dis¬ eased. The term was originally applied to gladiators, and is derived from the Greek pciraboJos, reckless, in allusion to the courage with which these laymen nursed those who suf¬ fered from infectious diseases. Such function¬ aries were attached to all the principal churches of the East, and at Alexandria they formed a corps of 500 men. Theodosius the younger in¬ creased this number to 600, because plagues and contagious diseases were common in Egypt. This emperor placed them under the jurisdic¬ tion of the chief magistrate, but they were ap¬ pointed by the bishop, whose directions they were bound to follow. As the parabolani were

bold and indifferent to death, laws were enacted to prevent them from exciting seditions which Were particularly common at Alexandria. Their number was limited by Theodosius, and they were forbidden to attend at public assem¬ blies and courts of justice, unless they had some business there sanctioned by the law. More than once they showed themselves de¬ serving of suspicion, as for example at the Council of Ephesus in 449, when a Syrian monk named Barsumas, at the head of a band of armed parabolani, committed outrageous ex¬ cesses and terrified the council into granting his ˆemands.

PARABOLOID, in geometry, a solid figure traced out by a parabola revolving round its principal axis. It is a characteristic property of paraboloids that they have no centres except in the extreme cases, when they have an infinite number of centres. There are three varieties of paraboloids, elliptical, hyperbolic and oara-bolic.

PARACATU, pa-ra-ka-too', Brazil, town in the eastern part of the state of Minas Geraes, 450 miles northwest of Rio Janeiro, on the river of the same name, which is an affluent of the Sao Francisco. The city dates from the middle of the 18th century, in which it was the centre of a rich auriferous district. The gold-washings are no longer of value; cattle, hides, sugar-cane and coffee are its important prod¬ ucts. Pop. about 15,000.

PARACELSUS, par-a-sel'sus (Philippus Aureolus Theophrastus Bombastus von PIohenheim), Swiss physician, chemist, and charlatan : b. Maria-Einsiedeln, Canton Schwyz, 17 Dec. 1493; d. Salzburg, 23 Sept. 1541. He acquired considerable real knowledge of med¬ icine and chemistry, but spent his time in searching for a universal specific and the philosopher's stone. In his wide travels, ex¬ tended to the East, he derived, in addition to the arts of alchemy and magic, a knowledge of certain remedies not then familiar to Conti¬ nental physicians, and by this means effected numerous cures which brought him high pres¬ tige. In 1526 he became professor of medicine in the University of Basel, and there he burned publicly the works of Avicenna and Galen and declared himself the monarch of physic. He drew about him a school known as the Para-celsists, and claimed among his discoveries that of indefinitely prolonging life. In 1528, owing to a quarrel with the magistracy, he left Basel for a wandering

existence in Switzerland, Alsace and southern Germany. His methods of puffing long prevented a just estimate of him; but he is now seen to have enriched medicine and chemistry, and especially to have made great contributions to, if not to have founded, modern pharmaceutics. A complete edition of his works (Latin) appeared at Basel in 1589. Consult the (Life) by Hartmann (1887).

PARACHUTE, a mechanism of an um¬ brella shape, about 20 or 30 feet in diameter, attached to balloons, by means of which the aeronaut may descend slowly from a great height. It has a hole at the top to prevent oscillation. In 1783 the French physician Lenormand made several experiments with parachutes of 30 inches in diameter at Mont¬ pellier; and shorty after the machine (enlarged

to something like its present dimensions) became well known through the public descents of Blanchard in Paris and London. Garnerin was the first to suggest their use for balloonists in case of accident. See Balloon.

PARACLETE (parakletos , a counselor; encourager, admonisher or comforter), in the English translation of the Bible, the Comforter, the Holy Ghost. Jesus promised to his disciples (John xiv, 16) that his Father would send them another Comforter, the Spirit of Truth, who would abide with them forever, teach them all things (ver. 26), and bring all his sayings to their remembrance. It is also the name of a monastery near Troyes which Abelard founded and where he was buried.

PARADIN, a vegetable poison. See Herb Paris.

PARADISE, the garden of Eden. The word is originally Persian and signifies a park. It has been introduced into modern languages as a name for the garden of Eden (see Eden) and hence of any abode of happiness. In gen¬ eral, the heavenly abode of the blest. Numer¬ ous scripture passages refer to Paradise as the equivalent of heaven, a place where those who die in the Lord shall dwell with him forever. No very definite conclusion can be drawn by considering the very numerous Bible references, but Milton typified the popular idea in his (Paradise LosP (q.v.). Some sects undertake to dogmatize concerning Paradise as the place where the souls of the righteous await the final resurrection and entry into heaven. But sci¬ ence recognizes neither Paradise nor heaven. The Mohammedan idea of Paradise is that of a beautiful watered area — the opposite of a desert — inhabited by

celestial beings of both sexes, who take their fill of sensual delights. The Puritanical idea seems to have been a place where -saints and angels mingle and spend most of their time playing harps and singing the praises of the Deity. All sorts of concep¬ tions between these two have been advanced, and many learned theologians have written vol¬ uminously on the topic, but without adding to the sum of the world's knowledge of life be¬ yond the grave. According to the accounts in Genesis II, Exodus III, Numbers XIII, Para¬ dise was a place of mountains, with four rivers flowing with milk and honey. Some texts in¬ dicate an earthly location, as those in Genesis, but generally it appears as a heavenly region. Consult Salmond, (The Christian Doctrine of Immmortality) (1895); Sharman, H. B., (Teaching of Jesus About the Future } (1909) ; Dobschutz, E. A., (Eschatology of the Gospels)

(1910).

PARADISE-BIRD. See Birds of Para¬ dise.

PARADISE FISH, or FISH OF PARA¬ DISE, small Oriental fish (F'oly acanthus viri-dicaudatusy allied to the climbing-perch (Ana - has), which belongs naturally in the fresh-water streams, and is extensively bred in aquariums by the Chinese, on account of its brilliant color¬ ing. Fantastic varieties, with greatly extended and modified fins and tail, have been developed.

PARADISE LOST, a blank verse epic in 12 books, was composed by John Milton in blindness between the years 1658 and 1665 and published in 1667. Originally conceived, in dra-

matic form, as early as 1640, it is the fruit of the study and meditation of a lifetime, the fulfilment of Milton's long-cherished ambition to write a poem which after times would not willingly let die. In (Paradise Lost* the re¬ ligious and moral ideals of Puritanism receive

their most permanent expression, but the poem embodies also the broad and humane culture, the sense of poetic beauty and the imaginative fervor of the English Renaissance. Though the subject was one which had been often treated, Milton owed little to any specific work on the fall of man, the Bible and the Greek and Latin classics being the chief sources of his literary inspiration.

In Milton's mind the theme of 'Paradise LosL was the worthiest that poet ever had. To him the fall of Adam was not onlv a literal fact; it was the most momentous event in his¬ tory, involving as it did the destinies of all mankind. The subject was one which gave full scope for the sublime poetic genius of which he felt himself to be possessed. He ranges be¬ yond the immediate story of the fall to the causes of that event in the revolt of Lucifer and to its consequences in the sufferings of man and his ultimate salvation through the sacrifice of Christ. The action moves in illimit¬ able space: from the glittering plains of heaven we descend to the abyss of hell, and we wing our way with Satan up through chaos to the newly-created universe, which hangs by a chain from the celestial battlement and of which, ac¬ cording to the Ptolemaic astronomy which Mil-ton uses, the centre is our earth. Nor are the personages involved in the epic narrative less tremendous.

The poem begins with a marvelous descrip¬ tion of Satan and the mighty spirits who fell with him rolling stunned and agonized on the burning lake of hell, whither they have been driven by the hosts of heaven. Though blasted and overwhelmed by almighty power their spirit is undaunted. In Satan, Milton has por¬ trayed for all time the type of the rebellious soul. He is no vulgar devil, but an archangel ruined, the worthy antagonist of God and man, cursed with the sin of pride, but commanding admiration for his unconquerable purpose, his indomitable courage, and his suoerib powers of leadership. The two first books, which deal with the plot in hell to injure the Almighty bv ruining his creature man, represent, by general agreement, the loftiest heights of Milton's im¬ agination. The third, in which the fate of man is discussed in heaven and the sacrifice of Christ proposed, is theological and on the whole less interesting. In the fourth the scene and tone of the poem entirely change. We behold the newly-created Adam and Eve amid the beauties of an idyllic paradise. Satan learns that God has forbidden them to eat the apple of the tree of life and resolves to make his assault on the weaker Eve. But God, lest man should ibe left to fall in ignorance, sends Raphael to tell him the story of the revolt in heaven, to reiterate the prohibitory warning and to apprise him of the nearness of the enemy. In this way the narrative is rounded out after the fashion of the ancient epics, and many matters

relating to the construction of the uni¬ verse and position of Adam and Eve explained. Our first parents are also allowed to tell, with

engaging naivete, the story of their first ex¬ periences on earth. The stage is now set for the final struggle. Through a clever trick and by appealing strongly to her vanity Satan in¬ duces Eve to eat the apple. Adam, fully con¬ scious of the tragic consequences impending, but allowing his passionate love to sway his judgment, resolves to share her fate. The rest of the poem is devoted to a portrayal of the effects of the fall. Evil has broken in and Paradise is shattered. The agony of a sinful conscience afflicts the unhappy pair. They cower before the stern mandate of exile and the more mysterious and terrible fate of death which is foretold. Yet at length they seek reconciliation with God, and he, in accordance with his plan of mercy, sends Michael not only to unroll before Adam's eyes in vision the pageant of humanity suffering and sinning for his sin, but also to prophesy salvation through Christ and to hold out the promise that Adam may, through self-conquest, win in time an in¬ ward paradise, far happier than the Eden he has lost. The poem thus contains within itself the wider motive of 'Paradise Regained, > but true to the title and to the specific theme, Milton returns at the end to the picture of the exile and the note with which he closes is one of merely tempered sadness.

" They, hand in hand, with wandering steps and slow

Through Eden took their solitary way."

The greatness of (Paradise Lost) lies pri¬ marily in the imaginative grandeur with which Milton conceives and depicts the scenes and characters of his cosmic story and in the ma¬ jestic utterance which makes his verse the supreme example of the ((grand style** in Eng¬ lish literature. To read and enjoy Milton is to dwell for a time on the high places of thought and feeling, to respond to a trumpet call to rise up in heart and embrace a world of super¬ human magnitude as seen through the medium of a pure and lofty spirit. For it was a funda¬ mental principle of Milton's creed that he who would write well of laudable things, ((ought himself to be a true poem,** and the quality which underlies the geatness of (Paradise Lost) is the moral and spiritual beauty of Milton's nature, that loftiness of spirit which prompted Wordsworth to say of him :

" His soul was like a star and dwelt apart."

Many critical problems have arisen in con¬ nection with this poem. The most important discussions have concerned themselves with the theme and the hero. Technically Milton is writing, as he says, of the fall of man as a historical event and a theological fact. But even to those who reject the Calvinistic beliefs upon which ‘Paradise Lost) is based there re¬ main in the poem the fundamental human ex¬ periences of rebellious pride, of energy per¬ verted to an evil purpose, of temptation, sin, repentance, reconciliation to the will of God ; and these Milton has handled with profound insight and abiding truth. The question of the consistency or inconsistency of Milton’s thought need not trouble the modern reader. We do not ask from a poet a new theological system, but a concrete and imaginative embodiment of accepted beliefs and a grasp of the fundamental human reality which they contain. It is true that Milton’s God is unsatisfactory even on’

poetic grounds, that the endeavor to express immaterial reality in terms of time and space often results in gross absurdity. But such lim¬ itations, imposed on Milton by the nature of his subject, are amply compensated for by the power and beauty which abound in the ac¬ counts of Satan, Adam and Eve, by the vivid¬ ness and energy of both the grand and the idyllic scenes, by the moral fervor which per¬ vades the poem, and by the skill with which the narrative as a whole is handled. To say, as one must say, that the hero is Adam, is not to deny that Satan is the most interesting figure or that Milton was led by his own experience as a rebel against constituted authority to en¬ noble his resistance until it wins from the reader an undue measure of sympathy. What Milton never does is to forget for a moment that Satan is a perverted being. His ultimate frustration illustrates the power of God, with the co-operation of man’s righteous will, to make evil itself the instrument of good.

The fame of (Paradise Lost) has endured,

despite the changes of thought and taste, through all ages since

Milton's own. Notwith¬ standing the attacks leveled at it by men like Taine and Scherer its claim to hold rank among the masterpieces of world literature has never seriously been questioned. Its influence on poetry has been enormous. As an in¬ tellectual and imaginative heritage of the Eng¬ lish speaking peoples it is second only to the King James version of the Bible and to the plays of Shakespeare.

Editions: (Poetical Works* (ed. by David Masson; 3 vols., 1874, ff.) ; Poetical Works)

(1879); Raleigh, W. A., (Milton> (1900);

(Paradise Lost* (ed. by A. W. Verity, 1892-95) ; Criticism: Addison in The Spectator, 31 Dec. 1711-3 May 1712; Mark Pattison, 'Milton*

(1879); Raleigh, W. A., 'Milton* (1900);

Trent, W. P., (John Milton) (1899). A list of the numerous books and special articles dealing with (Paradise Lost) will be found in E. N. S. Thompson's (Topical Bibliography of John Mil-ton.) Consult also Cambridge History of Eng¬ lish Literature) (Vol. VII, pp. 469-479).

James H. Hanford,

Associate Professor of English, University of North Carolina.

PARADISE REGAINED. Paradise Re¬ gainedˆ a blank verse epic in four books, was undertaken bv its author, John Milton, as a sequel to (Paradise Lost) at the suggestion of the Quaker, Thomas Ellwood. Though com¬ posed perhaps as early as 1666 it did not appear until 1671. It is characteristic of the Puritan, to whom life presented itself as a moral strug¬ gle, that Milton should have chosen as his theme not the crucifixion but the temptation of Christ. The poem is thus more truly the complement of Paradise Lost.* As Adam fell from his happy state through failure to resist temptation by Satan so Christ regained Paradise for man by proving victorious in a similar trial.

Milton has taken as his basis the scriptural account of the temptation in the wilderness. The first of the three crises — the temptation to satisfy physical hunger by turning the stones to bread — is treated simply.. The second — the of¬ fer of the kingdoms of the earth — is elaborated by dialogue and description until it constitutes the greater part of the poem. Satan, frustrated

in his first attempt, spreads before the eyes of Christ a royal banquet, representative of the power of wealth in its lowest physical form. When this is rejected he offers glory, then em¬ pire with a subtle show of furthering Christ s work. Milton here seizes the opportunity to de¬ pict with majestic sweep of language the varied pageant of the nations — the barbaric magnifi¬ cence of the East, the splendors of imperial Rome, and finally, as a climax, the nobler in¬ tellectual glories of classic Greece. When Christ has answered all the tempter's sophis¬ tries with penetrating insight and has resisted even the lure of ancient wisdom as a means of furthering his ministry on earth, Satan, con¬ futed and desperate, catches him up to the pin¬ nacle of the. temple and bids him stand upright in his uneasy station or cast himself down, "safely if Son of God.® With Christ's reply "also it is written. Tempt not the Lord thy God,® the triumph is complete.

" He said and stood.

But Satan smitten with amazement fell."

Ministering angels bear the Saviour down to a flowery valley and heavenly choirs sing anthems of the victory (<over temptation and the Tempter proud® whereby he has potentially

" regained lost paradise.

And frustrated the conquest fraudulent."

Paradise Regained) lacks the brilliancy and color of (Paradise Lost) and has never claimed the same interest and enthusiasm from multi¬ tudes of readers. It is the work of a man to whom the interests of the world meant little in comparison with religious truth and the welfare of the soul. Yet the greatness of Milton's genius is nowhere more apparent. In the highly concentrated action two great forces stand face to face. The Satan of (Paradise Regained* is a meaner figure than he (<who durst defy the Omnipotent to Arms,® but he possesses an even greater subtlety of intellect. The Saviour is a Godlike man, divinely calm and strong. The contest between the two is more significant be¬ cause it takes place not in the physical arena but within the soul. As a harmonious work of art (Paradise Regained) has even been held by some critics to be superior to (Paradise Lost.* Consult the works on Milton listed under Para¬ dise Lost) and also Gilbert, A. H., (The Temp¬ tation in Paradise Regained-* (Journal of Eng¬ lish and Germanic Philology, Vol. XV).

James H. Hanford.

PARADOX, that which runs counter to general idea and expectation, . and appears ac¬ cordingly to be incredible and incomprehensible, especially in literature or science. The word means literally (<contrary to opinion,® but it has been extended and is now generally employed to describe that which is manifestly or apparently contradictory on its face, hence absurd, as a statement to the effect that a man is heavier after cutting off a leg.

PARADOXIDES, a fossil trilobite of the Cambrian series of North America and Europe. See Trilobites.

PARADOXURE, a civet of the Oriental genus Paradoxurus, of which there are 10 or a dozen species popularly called palm-civets (q.v.). The tail is not prehensile but may be curiously coiled.

rPARAFFIN (Latin, parum affinis, without affinity), a white, waxlike substance, solid at ordinary temperatures, which may be obtained by the distillation of carbonaceous materials, or of oily or coal-bearing shales. Crude petroleum oil is now the chief source of the commercial supply of paraffin. The oil is subjected to a process of fractional distillation, by which naph¬ tha, kerosene, light mineral oil and heavy min¬ eral oil are successively obtained. The distilla¬ tion is usually carried on until further applica¬ tion of heat would be likely to cause carboniza¬ tion , and the paraffin is then left in the heaviest, least volatile portions. When the process is correctly conducted, the paraffin crystallizes out when the heaviest oil is allowed to stand in the cold ; and it is afterward purified by washing with benzine and by such further treatment as may be required. Paraffin is somewhat lighter than water, is insoluble in nearly all of the ordi¬ nary solvents and is not affected readily by acids or alkalies. It is not a definite chemical sub¬ stance, but consists of a mixture of hydrocar¬ bons in varying proportions — chiefly of those designated as ((paraffins» (q.v.). It melts readily and without decomposition, but its melting point varies with its composition and may range from 120°. F. to about 200° F. It is

greatly used for making candles, either alone or when mixed with a small proportion of stearin. It is also used in quantity for coating acid tanks, for waterproofing paper and other fabrics, for pro¬ ducing a high gloss in fine laundry work, and is an excellent electrical insulator, being used for impregnating the cotton coverings of elec¬ trical conductors, rendering the cotton imper¬ vious to moisture. The method of waterproof¬ ing paper with paraffin is interesting. A roll of paper is led through a trough of melted paraffin and then passed between rollers to preserve an even surface. Sometimes a knife or scraper contacts the wrong side of the paper, on which little or no paraffin is desired. Paraffin is often called ˆparaffin wax.® See Paraffins.

PARAFFINS, in chemistry, the series of hydrocarbons that have the general formula C n FLn + 2. They are all distinguished by a marked chemical inertness and derive their name from this circumstance. (Compare Paraffin). The paraffins occur in nature in petroleum oil and they are also obtained by the destructive dis¬ tillation of coal, peat, carbonaceous shale and numerous other substances. They may be ipughly separated, from petroleum, by frac¬ tional distillation ; but their exact separation, when mixed in such a general manner, is at¬ tended by the greatest difficulty. Many of them may be prepared, however, by heating the iodides of the alcoholic radicals with metallic zinc. Ethane (C2H6), for example, may be ob¬ tained by treating metallic zinc with iodide of methyl, CH3I ; the reaction in this case being Zn + 2CHJ = C2H0 + Znl2. The best known of the paraffins are as follows, the temperatures opposite them being their boiling points :

Methane. , Ethane … Propane. . Butane … Pentane. . Hexane… Heptane . . Octane … Dodecane. Hecdecane

ch4

(Gaseous)

C2He

a

C3H, ,

«

C4H10

34° P.

c.,h12

C6H14

100°

158° F.

C7H1S

210°

CsHis

255°

C12H26

396°

ClgH34

532°

The paraffins belong to the fatty series of hydrocarbons (see Fatty Compounds), and their constitutional formulae, therefore, consist entirely of open chains, though these chains may be branched, as will presently appear. The for¬ mula for propane, for example, may be writ¬ ten CH3 — CH2 — CHs. Any one of the paraf¬ fins may be regarded, from a structural point of view, as derived from the preceding number of the series by substituting the radical methyl (CHs) for a hydrogen atom. Thus if one of the hydrogen atoms in the right-hand methyl group of the foregoing formula for propane be itself replaced by CFL, we shall have the new compound CFL — CFL — CH2 — CH3, which is butane. A paraffin which contains only two methyl radicals is said to be a ((normal paraf¬ fin® ; and in the table of boiling points given above, the corresponding paraffins are all sup¬ posed to be ((normal.® Methane, ethane and propane are not capable of existing in any but the «normal® form; but the higher paraffins

may also exist in isomeric forms. In introduc¬ ing the methyl radical in propane, for example, we replaced one of the hydrogen atoms in the right-hand CH3 group ; but we might equally well have replaced one of those in the central CFL group, and in that case the resulting com¬ pound would have had the structural formula

CHa

CH3— CH — CH3;

and while this compound still has the empirical formula C4H10, and is still known as ftbutane,® there is obviously no reason for supposing that it would have the same physical and chemical properties as the butane which contains only two methyl groups. There are, in fact, two bu¬ tanes known. One of these ((fnormal butane®) bods at 34° F., has a specific gravity of 0.600, and may be prepared by the action of zinc upon ethyl iodide at 300° F. The other (known as <(iso-butajie,» ((trimethyl-methane® or Secondary butane®) boils at about 3° F. and may be pre¬ pared by heating aluminum chloride with iso¬ butyl iodide ; the isobutyl iodide being prepared by the action of hydriodic acid upon isobutyl alcohol, which, in turn, is obtained by the fermentive action of “Bacillus butylicus® upon sugar or glycerine. The higher members of the paraffin series admit of an increasingly great number of isomeric modifications, many of which have not yet been studied, nor even pre¬ pared. Dodecane, for example, may exist in as many as 355 different isomeric modifications.

PARAGUA, pa-ra’gwa, Philippines, a prov¬ ince including the part of the island of Palawan that lies north of the 10th parallel of latitude, the Calamianes Islands (q.v.) and the Cuyo Islands (q.v.); area of the mainland, 1,366 square miles, with the dependent islands, 1,635 square miles. The mainland of Paragua is mountainous, the central mountain range of Palawan extending from northeast to south¬ west; the rivers are numerous but short, as in the rest of the island. The staple crops are to¬ bacco, rice, sugar and vegetables, but nothing is raised for export ; the forests are valuable and extensive; and gold, lead and other miner¬ als are found. The most important industries are stock-raising and the gathering of edible birds’ nests. Cowries are also gathered in the

islands and exported. The only mechanical in¬ dustry is the weaving of textiles for home use. Civil government was established in this prov¬ ince in 1902 and the capital located at Cuyo, island of Cuyo. Pop. of the entire province, 49,850; of the mainland, 25,000.

PARAGUARI, pa-ra-kwa-re', Paraguay, de¬ partment and capital city of the department in southern Paraguay. The city, 35 miles south¬ east of Asuncion, is situated on an eminence overlooking a tributary of Lake Ipoa, and is on the railroad between Asuncion and Encarnacion. There is much trade in tobacco from Villa Rica and the surrounding country. The city, founded in 1775, was the scene in 1811 of a victory over ar. invading army from Argentina. Its growth has been remarkable. Pop. 10,000.

PARAGUAY. A country of South Amer¬ ica, enclosed between Brazil, Argentina and Bolivia. Estimates of the total area range be¬ tween 122,000 square miles and 196,000 square miles. The chairman of the delegation of Paraguay to the first Pan-American Financial Conference estimated the superficial area at 445,000 square kilometers ; the Pan-American Union handbooks give 507,640 square kilo¬ meters, or 196,000 square miles.

National Boundaries, *etc.* — The country is divided into two sections by the Paraguay River, the eastern section being called El Paraguay Oriental and the western El Gran Chaco or El Paraguay Occidental. On the north it is bounded by Bolivia and Brazil ; on the east and southeast by Brazil and Argentina; on the south and west by Argentina.

A consequence of the government's efforts to encourage immigration and colonization is seen in the establishment of the following colonies : Villa Hayes Colony, nearly opposite Asuncion in El Gran Chaco, settled by families from Switzerland, France, Italy, Belgium, Germany, Austria and Spain ; San Bernardino Colony, set¬ tled principally by Germans; Colonia Jˆacional, on the railway from the capital to Villa Encarnacion; Nueva Alemania Colony, in the department of San Pedro ; Elise, or San An¬ tonia Colony, in the department of San Lorenzo de la Frontera; Nueva Australia Colony, con¬ taining Australians, English and Paraguayans; Colonia Cosme, in the department of Caazapa, also inhabited by Australians; Colonia Guil¬ lermo Tell, a Swiss settlement ; and the Hohenau Colony, a small community of German, Brazilian

and Paraguayan coffee planters.

Topography and Hydrography.— The gen¬ eral level of the Chaco and the lowlands of the western part of El Paraguay Oriental is ap¬ proximately 250 or 300 feet above that of the sea; the eastern side of Paraguay is, however, much higher, with the exception of the extreme southeast, which is a lowlying, swampy region. An extension of the plateau or highlands of Brazil is seen in the northeast, the so-called Sierra of Amambay, with lateral spurs running toward the Paraguay River. Through the cen¬ tre of the country, from Villa Encarnacion toward the northeast, run the cordillera of Villa Rica and the Caaguazu Mountains ; and a trans¬ verse range, crossing the Parana River into Brazil, forms the great cataract of Guavra. These ranges have an elevation above sea-level of 1,500 to 2,000 feet. The position of Para¬ guay Oriental has been aptly compared with

that of the State of Illinois, for its southern boundary is at the confluence of two great rivers, and more than 800 miles above Buenos Aires and the La Plata estuary. Of these rivers, one, the Paraguay, forms the western boundary below Asuncion, while, »above the capital, it passes between the eastern and western divi¬ sions of the republic, as already stated; the other, the Parana, separates Paraguay from the Argentine republic and Brazil on the south and southeast. A large part of the territory lying between these great streams is not yet well known. The Pilcomayo River, flowing south¬ eastward from Bolivia, forming the southern boundary of Gran Chaco, and joining the Para¬ guay below Asuncion, is navigable for a dis¬ tance of 150 miles from its mouth. The Parana flows 1,367 miles from its source in Goyaz, Brazil, before uniting with the Paraguay; the latter is about 1,800 miles long; both have large tributaries in Paraguay Oriental.

Mineral Resources and Soils.— The north¬ ern part of Paraguay is covered with limestone, while the southern is of sandstone formation. Marble is reported as abundant in the north, iron in the south. Several veins of copper have been found. Other minerals, according to semi¬ official statements, are kaolin (in the depart¬ ments of Caapucu, Ibicui, Quiqlio, Villa Rica, Cordillera, Villeta and Luque) ; talc; graphite; serpentine stone; basalt (near Villa Encarna¬ cion) ; manganese in several deposits that are thought to be extensive. There are four dis¬ tinct varieties of soil, namely, .(1) sandy, either white or red, the latter being fertile; (2) a good argicultural soil, consisting of clay and quartz, oxide of iron, lime and miscellaneous substances; (3) humus, characteristic of forest lands; and (4) the black alluvial

deposits, pre¬ vailing in western Paraguay.

Climate. — Paraguay is regarded as a sani¬ tarium by the inhabitants of some of the neigh¬ boring countries; and it is quite true that the capital and its suburbs are moderately health¬ ful. The mean temperature at Asuncion is about the same as that of Cairo, Egypt ; Hong¬ kong, China; and Caracas, Venezuela, while the mountainous interior regions are decidedly cooler. Rain is abundant throughout the year ; snow is entirely unknown ; storms, with accom¬ panying high winds and very severe thunder and lightning, occur frequently.

Flora and Fauna. — Eastern Paraguay is covered with virgin forests of great lianas, pindo and enbocaya palms, orange and banana trees, timbo brush, interspersed with great grasses and flowering plants. West of the Paraguay lies the Chaco region, covered largely with marshes, heaths and yatai palms. Quebracho forests oc¬ cupy the higher regions. The jaguar is the most formidable denizen of the wild, but there are also the puma, tiger cat, marten, tapir, pole¬ cat, peccary and deer. There are large alligators and many venomous snakes. Boas reach a great size, but are very inoffensive. Paraguay is famed for its birds. Flies and gnats are veri¬ table pests Lt the wild regions, but apparently disappear with the clearing and cultivation of the land.

Religion and Education. — Article III (Pt. I, Chap. I) of the constitution provides: <(The religion of the state is the Roman Catholic Apostolic; Congress, however, shall not have

the power to forbid the exercise of any other religion within the territory of the republic. The chief prelate of the Paraguayan church shall be a Paraguayan.® Article VIII de¬ clares: (<Primary instruction is compulsory,® directing Congress to ((promote by all possible means the instruction of the citizens.® Pro¬ fessors at the national college are appointed by the President of the republic, though nominated by the council of that institution. The entire educational system was, from 1609 to 1767, entrusted to the Jesuits; the tendency to nation¬

alize it has grown strong principally during the last 40 years. In all schools the Spanish lan¬ guage is taught, and the Guarani, though still the tongue of the common people everywhere outside of the larger towns, is gradually being displaced; it is even prohibited within the col¬ lege precincts. The educational system adopted by the government provides for rural schools, with three grades ; elementary schools, with four grades; and more complete schools with six grades (consult Report of the Commis¬ sioner of Education for the year ended 30 June 1915, Washington 1915). An agricultural school is being established at Ypacarai, with two instructors, who have been educated abroad, in charge of courses of study. The system of employing teachers for special sub¬ jects, which prevails in secondary schools throughout South America, is applied to a cer¬ tain extent in Paraguay's elementary schools.

Industry and Commerce. — Forest and Agriculture. Woods which are valuable on ac¬ count of their extraordinary durability and powers of resistance are characteristic forest products; many of these being so heavy that they sink when thrown into the water: Dyewoods of many varieties, medicinal and resin¬ ous trees, wild vanilla, etc., are found. The chief and most distinctive product of the coun¬ try is yerba, the (<Paraguayan tea,® also called yerba mate; sugar cane, cotton, tobacco, mandioca, rice, maize, coffee, textile plants (cara-guata, ibira, etc.), oranges, bananas and grapes are successfully culitvated. A memorandum submitted by the delegation of Paraguay to the First Pan-American Financial Conference, held at Washington in 1915, contains the statements that the "artificial cultivation® of yerba mate, tried until recently without good results, has finally been successful, and now extended plan¬ tations of it may be seen ; that the cultivation of tobacco is being perfected, thanks to the efforts of the Banco Agricola; that the yield of cotton of fine quality, with long, silky and strong fibre "is proportionately superior to that of any other cotton-raising country® ; that sugar cane, rice and Indian corn are cultivated with easily-won success ; and that the list of agricul¬ tural products, some of them unknown else¬ where, includes mamon, mandioca, taistago (from which castor oil is locally extracted), coffee, wheat, olives, coco, ramie, barley, van¬ illa, cinnamon, *etc.* Forests cover about one-half of the total area, and these contain "an incalculable wealth in woods for construction and for cabinetmaking,® of which the follow¬ ing are of demonstrated utility : curupay and lapacho, both very durable; incienso, a strong and flexible wood ; ibiraro, considered a good substitute for tealcwood ; cedar and petereby, the latter as well as the former suitable for cabinetmaking; timbo and ibyrapyta, both very

abundant, and the latter useful as a material for paving-blocks; laurel, used for railway ties; guayaybi with qualities similar to those of hick¬ ory; palo santo, “suitable for axle bearings, in place of metal® ; quebracho the axe-breaker, etymologically, and well-known industrially as a source of tannin and as resistant material for railway ties. Among the numerous resources on which the country depends, cattle raising is mentioned as one of the most profitable, pas¬ ture-land being abundant, well watered and pro¬ vided with natural shelter for the animals.

The tobacco industry reached the maximum figures in 1916, the entries in the market amounting to 77,804 bales in the first 11 months of the year, or 13,830 bales more than in the previous year. Only 61,000 bales were ex¬ ported in the 1916 period, as low water in the river temporarily obstructed exportation. The normal tobacco crop is about 22,500,000 pounds. The livestock industry, which is counted as the chief source of wealth in Paraguay, has been developing recently and is receiving a new impulse under the prospect of the establishment of a packing house by manufacturers from the United States. The exports of live animals to Argentina have not varied greatly in the last four years, the figures being as follows : 1913, 39,564 head; 1914, 24,385; 1915, 29,509; 1916, 29,940. The yerba crop of 1916 amounted to 7,206,227 pounds. Quebracho exports in 1916 reached 21,136 tons. Sugar is produced to the amount of 1,600 tons annually. A census taken of the livestock in Paraguay in 1915 gave the following figures: Horned cattle, 5,249,043; sheep, 600,000; horses, 478,000; mules, 17,000; asses, 18,000; hogs, 61,000 and goats 87,000. Among the’ cattle countries of South America that have cattle for export, Paraguay is said to occupy second place, with 11.8-head per square kilometer and 5,249 beeves for each 1;000’ in¬ habitants of’ the country.

Some Characteristic Industrial Products. — The very moderate activity we have ob¬ served in the industrial life of Paraguay is directed; chiefly to forest industries, such as the production of tannin at Puerto Casado, Puerto Sastre, Puerto Max, Puerto Maria, Puerto Galileo, and other places. The preparation of woods for exportation is carried on at the Nogues and Pinasco plants, at Puerto Medanos and many other points that are connected with ports of shipment by private railways. Ex¬ ploitation of Paraguayan tea (yerba mate) is to a large extent controlled by the organiza¬ tion known as The Industrial Paraguaya.

In the making of the very beautiful nanduti lace, Paraguayan art and

industry unite, con¬ tributing equally to a charming product — the artistic tradition being an inheritance from the early days of the Spanish occupation, while the exemplary patient labor in the execution of traditional lace designs is, of course, a charac¬ teristic expression of that limited art-impulse of _ the aborigines which is associated with patient workmanship. Excellent hammocks are made by the same painstaking folk. As meri¬ torious products we mention also the native cigars, the great variety of preserved fruits (native fruits in native cane sugar), and the extract from the leaves of a native orange tree which is known commercially as petitgrain or oil of petitgrain, of which 101,717 pounds were exported in 1916.

PARAGUAY

Imports and Exports. — The values of for¬ eign commerce for the year 1915 were, for imports $2,340,510 and for exports $5,409,858; a total of $7,750,368 only; for 1916, imports $4,651,525 and exports $4,807,460, a total of $9,458,985, whereas in 1913 the total was $13,- 539,744 gold and $9,441,807 even in 1914, when the effects of the European War were first apparent. Before the war an increase was noted from year to year, and the chief sources of imports were then in Germany, England, Argentina, France, Spain and Italy; the articles imported being textiles, foodstuffs, hardware, fancy goods, wines, spirits, drugs and chemi¬ cals, ready-made clothing, chinaware and crock¬ ery, hats, rugs and carpets, shoes, jewelry and railway or tramway materials. The principal exports are livestock, wool, dried beef, oranges, tobacco, cocoanut bran, essence of petitgrain, extract of quebracho, yerba mate, palms and many kinds of wood. Commercial interchange with the United States during the years 1910— 17 was on a footing of small values for exports from Paraguay — only about one-third as much as the total of Paraguay's imports from the United States during that period. In 1914 Paraguay's exports to the United States were valued at $10,668, and her imports from the United States at $413,937; but in 1915 the figures were : Paraguay's exports to the United States valued at $292,410 and imports from the United States, $209,148. Imports from the United States in 1916 amounted to $570,000, and ex¬ ports to $228,000. Paraguay's total imports in

1916 were $4,530,000, and exports $4,710,000.

Political Divisions, Cities and Population. — The Republic of Paraguay is divided into 20 electoral districts, which in turn are subdi¬ vided into 93 departments. The districts are numbered I to XX. Their populations, capi¬ tals and populations of the latter are as follows :

DISTRICTS

Population

Capital

Population

I .

34,580

Villa Concepcion . .

12,600

II

37,429

San Pedro .

8,926

III

36, 195

Altos .

8,715

IV .

30,262

Barrero Grande …

9,143

V

31 , 182

San Jose .

9,120

VI .

19,274

Aios .

6,283

VII

32,297

Villa Rica .

26 , 000

VIII

25 , 886

Hiaty .

7 , 096

IX

28,531

Caazapa .

16,341

x

28,418

Yuti .

10,953

XI .

22,978

Villa Encarnacidn.

12,496

XII

30 , 365

San Ignacio .

5,121

XIII

22,535

Ibicui .

10,253

XIV .

30,454

Quindy .

11,943

XV

38,822

Paraguari .

10,328

XVI

28 608

Itaugua .

8,820

XVII

37 , 435

Luque .

16,501

XVIII

38 , 633

Ita .

12,329

XIX

16,563

Villa Oliva .

3 , 504

XX .

37,193

Villa del Pilar .

6,697

Area,

square

miles Population

Total . 65,000 (607,640

Chaco Territory* . 100,000 i 25,000

[100,000 uncivilized Indians

Grand total . . 165,000 732,640

* In dispute with Bolivia.

Army and Navy. — -The Paraguayan army is drilled, trained and armed on the German model. It comprises about 100 officers and

2,500 men, distributed in five centres. The

Mauser is the infantry arm. A two-year com¬ pulsory service law has been in operation since 1914, but it appears to be enforced only in the case of refractory elements of the population. The navy is composed of a number of converted merchant vessels armed with modern guns. The largest is about 600 tons gross register.

Banking and Finance. — The Banco de la Republica (authorized capital $20,000,000 gold, $6,000,000 already subscribed) and the Banco Mercantil del Paraguay (authorized capital, in terms of the depreciated currency described under Monetary System, 25,000,000 paper pesos and 20,000,000 paid in, both have headquarters in Asuncion. The Banco de Espana y America, with main offices in Buenos Aires, has a branch in Asuncion (capital $2,200,000 gold). Some of the smaller cities have agencies of the fore¬ going. The normal banking rate is 12 per cent annually. The Banco Agricola (capital orig¬ inally 15,000,000 pesos legal money and recently increased fo 30,000,000 currency pesos) has offi¬ cial standing as an institution authorized to as¬ sist farmers and manufacturers with loans at a reduced rate of interest and also to supply ad¬ vice and instruction in regard to methods of cultivation.

The internal debt, as stated in the Financial Congress, was $559,675 gold and 11,564,572 cur¬ rency pesos; to which amount $394,119 gold and 33,913,373 currency pesos are to be added as the aggregate of individual claims for damages sustained (<during past epochs of revolution." The balance of the treasury's debt to the Banco de la Republica, of $615,995.43, was adjusted by grant of a privilege connected with a certain tax imposed on exports. The recent issue of 60,000,000 pesos, paper, has nearly doubled the amount outstanding, which is now 125,000,000 pesos equivalent to 8,333,000 gold pesos, approxi¬ mately. In 1919 the amount of the foreign debt, arising from the loans of 1871 and 1872 made in London, was $3,679,705. The gov¬ ernment's chief sources of income are customs duties on imports and exports, land and postal taxes, internal consumption revenues, *etc.*

Monetary System. — The nominal unit of Paraguay's monetary system is the gold peso of Argentina weighing 1.6129 grammes of gold .900 fine, or say 1.4516 grammes of fine gold (par value $0.96475, currency of the United States), but in actual circulation we find only inconvertible notes of almost incredibly slight purchasing power. Large amounts may be ((reduced to gold" theoretically at the rate of

1.500 per cent, according to an authoritative state¬ ment in the Pan-American Financial Conference Proceedings, 1915. The fact that practically no gold or silver coins circulate in Paraguay, the currency being limited to the depreciated paper, is mentioned in Latin American Monetary Sys¬ tems and Exchange Conditions, by Joseph T. Cosby (New York 1915). Mr. Cosby adds: <(No provision is made for the redemption of the outstanding notes, with the exception of a small volume of notes known as Moneda Nacional" — this national money being guar¬ anteed by a gold reserve of one-tenth of the issue, and having a stable value on that basis. When fractions of the paper peso in the form of nickel coin were placed in circulation, the paper currency depreciated so rapidly that the intrinsic value of the nickel coins soon ex-PARAGUAY

ceeded their monetary value. Therefore, those coins, tending to disappear from circulation, occasionally are sold as curiosities. Only in foreign remittances do we note the employment of exchange payable in gold and commanding a high premium.

Waterways, Railroads, Post Offices, *etc.* —

River steamboats maintain communication be¬ tween the capital and the city of Buenos Aires, and a railway, with train ferry across the Alto Parana from Posadas to Villa Encarnacion, also connects the same cities. The upper reaches of the Paraguay River above Asuncion and, to a limited extent, the lower Alto Parana are navigable — in many places precariously; even below Asuncion, indeed, the channels shift suddenly and are hard to find. Travel and transportation between Paraguay and the great world outside are thus difficult, inadequate and controlled by a single foreign state; naturally, therefore, the landlocked country is seeking now by pacific arrangement, as it sought in the last century by force of arms (see History), its exits and its entrances — among which there is to be mentioned the projected line of railway from Asuncion to Parana, near the magnificent falls of Yguazii, and thence by a Brazilian line to the Atlantic Ocean. The baffled yet ad¬ mirably hopeful country has 400 post offices and 2,000 miles of telegraph lines, with stations at all the chief towns from Asuncion southward. There are wireless telegraph stations at Asun¬ cion, Encarnacion and Concepcion.

Government. — The constitution of 1870, now in force, vests the powers of the government in three co-ordinate branches, the legislative, executive and judicial. The National Congress, consisting of Senate and Chamber of Deputies, meets each year at Asuncion. Senators, elected by the people, by universal suffrage, one senator for each 12,000 inhabitants, serve for six years. Deputies, similarly chosen, but in the propor¬ tion of one for each 6,000, serve four years. ((The executive power,® says the constitution, ((shall be vested in a citizen, to be called Presi¬ dent of the Republic of Paraguay. In case of sickness, absence from the capital, death, resig¬ nation or dismissal of the President, the execu¬ tive power shall be exercised by the Vice-President.® Both President and Vice-President are chosen by an electoral college, serve for four years and <(cannot be reelected except after the lapse of two presidential terms.® The electoral law of 30 Nov. 1916 provides for 20 senators and 40 deputies. The senators and deputies receive each $3,000 per month. Nu¬ merous provisions of the constitution are designed to guard against the revival of dicta¬ torships, or undue extension of the powers of the executive (see section History). In re¬ gard to the cabinet, article 104 provides : <(Five ministers or secretaries, respectively called of the Interior; Foreign Relations; the Treasury; Justice, Worship and Public Instruction; and War and the Navy, shall attend to the busi¬ ness of the nation, and legalize with their signatures the acts of the President. Those acts without their signatures shall have no efficacy.® To the foregoing, the Ministerio de Fomento (department of promotion) has been added, making the number of cabinet members at present (1919) six instead of five. These ministers are responsible to Congress. The

judicial power is vested in a Supreme Court, consisting of three justices and having ((the right to inspect and supervise the action of all inferior courts® — that is, in practice, the courts of appeal, and criminal, police, first instance, and justices' courts.

An interesting side-light is thrown upon the constitutional provisions designed to curtail the chief executive's authority when we recall the circumstances that prior to the war with the Triple Alliance Paraguay had no debt, either domestic or foreign. Her first foreign loans were negotiated in 1871-72 at London; and on 31 Dec. 1901 the debt thus contracted amounted to $4,787,077.86. On the same day, the Brazil¬ ian and Argentine indemnities, results of the war, amounted to $9,876,466 and $9,563,990 respectively.

History. — Sebastian Cabot, in 1527, explored the Parana, and sailed

up the Paraguay to the mouth of the Bermejo in the following year. Hoping that a passage to the land of gold and silver mines, Upper Peru or Bolivia, would be found in some part of this great river-system (a hope which still leads explorers along the courses of the Pilcomayo and Bermejo), 300 Spanish adventurers, in 1536, proceeded up the Paraguay to the site of the present city of Asuncion, where they built a fort. This out¬ post became a centre of military enterprise, and, after 1609, of missionary work among the natives. The Spanish province of Paraguay em¬ braced the whole region south of the Portuguese possessions in Brazil and east of the Andes until 1617; but when Buenos Aires was made a provincial capital the jurisdiction of the gover¬ nors, afterward viceroys, at that city extended over the settlements on the Paraguay and its tributaries, as well as those on the Parana and La Plata. The Argentine general, Belgrano, in¬ cited the Paraguayans to revolt against Spain in 1810. On 14 May 1811 Pedro Juan Caballero with a few companions took possession of the Spanish barracks, and the next day compelled Governor Velasco to divide his authority with two leaders of the revolution. An assembly which began its sessions on 11 June 1811 re¬ nounced allegiance to Spain, and this declaration was ratified by the Congress which assembled for the first time on 1 Oct. 1813, and on the 12th vested the executive branch of the govern¬ ment in two consuls, Dr. Jose Gaspar Rodri¬ guez de Francia and Fulgencio Yegros. Dr. Francia became dictator (1813—40) . After his death the Paraguayans experimented with a government of four military officers, which was superseded by a triumvirate on 23 Jan. 1841 ; the triumvirate in turn was replaced by two consuls on 12 March, and next, from 1844 to 1870, the whole power of the state was grasped by Carlos Antonio Lopez and his son and suc¬ cessor Francisco Solano Lopez. The younger Lopez made deliberate preparations for a War of conquest. When the time was ripe for action, he issued, through Congress, a declara¬ tion of war against Argentina, 18 March 1865. Argentina, Brazil and Uruguay formed an alli¬ ance to oppose him. Paraguay was defeated and almost depopulated in a struggle which ended with the death of Lopez, 1 March 1870. A com¬ parison of the official census of 1857 with that of 1873 shows, allowance being made for increase at the normal rate between 1857 and 1865, that

Paraguay lost more than 1,200,000 inhabitants during the war — her entire population, except 28,746 men and 202,333 women and children. It is proper to assume exaggeration in the earlier census, while the later one was undoubtedly de¬ fective; but, even so, the disaster must be re¬ garded as the severest that any small nation in recent times has sustained, rising from such a trial still resourceful and independent. To Brazil, Paraguay ceded the territory on the north and northeast; to Argentina, by the treaty of 3 Feb. 1876, the district south of the Piicomayo. But a distinguished arbitrator, the President of the United States, 12 Nov. 1878, awarded to Paraguay a district north of the Piicomayo, which Argentina claimed. During the last decade the resort to arms for the de¬ cision of political disputes has not been discon¬ tinued; and if we review the entire period since 1870 (see section Government) we realize the force of the statement that <(only three presi¬ dents (under the Constitution then adopted) have been allowed by revolutionists to complete the term of office.® Recent disturbances of the public order were those of 2 to 4 July 1908, which led to President Ferreira's resignation ; of 1910 and 1911, when Manuel Gondra and Albino Jara were compelled to resign; of 22 March 1912, in view of which President Pena and his Cabinet took refuge on foreign war¬ ships; of 27 April to 13 May the same year, when the revolutionary efforts came short of success, and within a week Eduardo Schaerer was elected to the presidency for the four-year term beginning 15 Aug. 1912; of January 1915 (the Escobar revolt) when another revolution¬ ary failure was recorded and martial law was declared. On 19 July 1915 a treaty was signed with Bolivia, the aim of both countries being to secure, if possible, a just and amicable settle¬ ment of difficult questions relating to the boundary dispute and conflicting titles to the Chaco.

Bibliography. — Decoud, J. S., (A List of Books, Magazine articles and Maps relating to Paraguay' (Washington 1904) ; financial Con¬ ference, Proceedings of the First Pan Ameri¬ can, 24-29 May 1915 ' (Washington 1915) ; Koebel, W. H., (Paraguay) (New York 1917) ; Lopez Decoud, A., (Album Grafico de la Republica del Paraguay' (Buenos Aires 1911) ; Mitre, B., (Cartas Polemicas sobre la Triple Alianza y la Guerra del Paraguay' (Buenos Aires (1871), and (Guerra del Paraguay' (Tomos II-VI of Archivo del General Mitre, Buenos Aires 1911-13) ; MacDonald, A. K., pic¬ turesque Paraguay' (London 1911) ; Molins, W. T., (Paraguay: Cronicas Americanas> (Bueno's Aires 1915) ; Mosqueira, S., (Ideales> (El Paraguay, pp. 157-211, Washington 1913) ; Pan American Union, <Latin America) (Wash¬ ington 1916), and <Paraguay) (Washington 1914) ; Robertson, J. P., and Robertson,

W. P., (Letters on Paraguay) (London 1839) ; Valen¬ tin, W., Paraguay: das Land der Guaranis) (Berlin 1907); White, E. L., <E1 Supremo: a Romance of the Great Dictator of Paraguay' (New York 1916) ; Yubero, G., (E1 Paraguay Moderno' (Asuncion 1915).

Marrion Wilcox.

PARAGUAY RIVER, South America, the largest affluent of the Parana River (q.v.), with its source in the plateau of the Matto Grosso,

Brazil, about lat. 14° 24' S., near the town of Diamantino. It flows southward through Brazil, forming for some distance the boundary with Bolivia, and enters Paraguay at Confluencia, where the three states meet, then continues the remainder of its course southward through the republic to which it gives its name. At Tres Bocas on the Argentina frontier the Paraguay flows into the Parana. Its total length is about 1,300 miles.

PARAGUAY TEA. See Mate.

PARALLAX, a term used in astronomy to designate the displacement . in the apparent di¬ rection of a heavenly body caused by a change in the position of the observer. Let A and B be two points from which the body P is con¬ ceived to be viewed. An observer at A will see the body as if on the celestial sphere in the direction A P. An observer at B would see it

in the direction B P. It is evident that the difference of these directions is equal to the angle at P between the lines A P and B P. It follows that if the length of the line A B, and its direction, are accurately known, and if the observers can determine simultaneously the ex¬ act direction in which the body, P, lies, the angle P of the triangle will also be known. Then the distance A P or B P of the body-from either of the observers can be computed by trigonometric methods. The following are the principal applications of Parallax in astron¬ omy : The distance and direction of a planet or other heavenly body, has to be calculated by the astronomer, in the first place, as if they were measured from the centre of the earth. But the observer is necessarily on the earth's surface. Parallax is then the difference be¬ tween the direction from the centre and that from any station which the observer may chance to occupy. The right ascension, declination and distance of the body will all be different according as it is measured

from the earth's centre, or from the eye of the observer. We thus have Parallax in R. A. and in Dec., which is mostly used in the case of the moon and planets.

The only method of determining by direct measurement the distances of the bodies of the solar system is through observations of their parallax. It is evident that the nearer the body, the greater will be its parallax. Hence, in order to measure a distance in this way, it is necessary to choose the times when the body is nearest to the earth. The moon, being much the nearest of all the heavenly bodies, has the largest parallax of all. Its average value is a little less than 1° (about 57′ 2″) ; but, when nearest the earth, it exceeds 1°. Being so large, even the ancient astronomers were able to meas¬ ure it and thus determine approximately the dis¬ tance of our satellite. Measures of the moon's parallax in modern times have been made by comparing its altitude, or declination, as it passes the meridian, at different observatories in the two hemispheres. The Greenwich Observa¬ tory and that of the Cape of Good Hope have used their observations for this purpose.

Determinations of parallax can be made

without the observer changing his position on the earth's surface, because as the earth rotates on its axis the observer is carried around with it. He thus sees the moon or a planet in differ¬ ent directions, according to the different points of its apparent diurnal course. The general effect of parallax, as we can readily see, is to make the moon or a planet appear somewhat nearer the horizon than it really is. If a body is rising in the east, the change thus produced in its apparent direction from the observer in¬ creases its right ascension. In the west the same effect diminishes the right ascension. Thus, by making observations of the moon or a planet in the east and in the west

alternately, its parallax, and therefore its distance, can be determined. This change is called the diurnal parallax. The diurnal parallax of Mars has thus been determined by various observers. If the position of the sun on the celestial sphere could be determined with the utmost precision, its distance could be measured by its diurnal parallax. But as this luminary cannot be seen at the same time with the stars in its imme¬ diate neighborhood, it is not possible to make any very exact determination of the sun's paral¬ lax by direct observation. What is done in¬ stead of this is to measure the parallax of various planets, using the principles explained in theoretical astronomy. (See Astronomy, Theoretical). In recent times those asteroids which came nearest to the earth have been mostly used for this purpose; in particular, the discovery in 1898 of an asteroid moving in so remarkable an orbit that it periodically ap¬ proaches nearer the earth than any other heavenly body except the moon will lead to a value of the solar parallax far more accurate than can be determined by any other method. See Asteroid.

Annual Parallax is that due to the motion of the earth in its orbit. It is applied only to the fixed stars. By the parallax of a fixed star is meant the difference in its direction, as seen from the sun, and from either extremity of the earth's orbit. It is, therefore, equal to the angle subtended by the radius of the earth's orbit when seen from the star.

The determination of annual parallax is far more difficult than that of diurnal parallax since, on account of the great distances of the stars, their yearly parallactic displacements are, in the great majority of cases, wholly beyond our powers of detection by any instrumental means which we possess. It was not until 1838 that the processes of practical astronomy had become sufficiently refined to permit the direct measurement of the parallax of any star. In this year Bessel determined the distance of the small, 5.6 magnitude, star 61 Cygni ; the an¬ nual parallax of this is but 0.41 which corre¬ sponds to a distance of eight light years. The nearest of all the stars so far discovered is a brilliant double star of the southern heavens known as Alpha Centauri ; the annual parallax of this is 0.76, which corresponds to a distance of 4.3 light years. All earlier determinations of parallax were made by direct measurement at the telescope ; very recently, however,- an extraordinary increase in accuracy has been at¬ tained by the employment of photographic methods and this work is being so vigorously prosecuted at many of the larger observatories that our knowledge of the absolute distance of

che nearer stars is each year becoming rapidly extended. See Astrophotography.

Simon Newcomb.

PARALLELISM, a parallel or comparison used in any sense of the word parallel. By Spinoza the term is used to suggest that every material object has corresponding to it an ideal counterpart. In psychology the word is used of the connection between matter and mind, notably between brain processes and mental processes.

In literature parallelism is a double state¬ ment of the same notion, either by simple varia¬ tion of the idea or by negation in the second member of the opposite of the statement in the first.

PARALLELISM, in biology, is another name for what is more commonly termed convergence, expressing a phase of organic evolution. It appears in accordance with a law that similar methods and necessities of physical growth in reaction to the environment will produce likeness of bodily form and adapta¬ tions in animals of different stocks, as, for example, marine mammals and fishes, birds and insects, or between animals of the same order; and in the last-named case (most frequently observed among insects) it is often disputable whether many of the instances are to be at¬ tributed to parallelism or to mimicry (q.v.). The similarity noted above is most manifest in the field of locomotion where virtually the same mechanical problems must be met by very different kinds of animals, as, for example, in overcoming the resistance and tenuity of the water by fishes, and of the air by flying birds and bats. Here the objects to be gained by process of adaptation of a vertebrate type of structure to the same purposes, and in similar media, are buoyancy, progression and agility, and the continued effort to attain them have produced in creatures very unlike one anbther otherwise similarity in outline of body, and in instruments of propulsion (wings or fins and tail), which in some cases is very striking. Such parallelism in adaptation results from the fact that, as Osborn states it ((Origin of Life,1 1917), <(the production of externally similar forms in adaptation to similar external natural forces,);* is one of the laws or modes of organic evolution.

. PARALLELOGRAM, in mathematics, a quadrilateral rectilineal figure which has its opposite sides parallel. See Geometry.

PARALLELOGRAM OF FORCES. See

Mechanics.

PARALLELS. See Geometry.

PARALLELS OF LATITUDE. See

Latitude.

PARALYSIS, a loss of muscular power, whereby contractility is either abolished or greatly diminished. Loss of sensation, general or special, was formerly spoken of as sensory paralysis, to distinguish it from a loss of muscu¬ lar motion, or motor paralysis. At the present time the term paralysis is usually limited to de¬ noting motor paralysis, and defects in sensation are considered under the head of disorders of sensation.

Palsy is a term rarely used by physicians, but popularly it is a synonym for paralysis. Paresis is a partial or incomplete motor paralysis, but

the term is seldom used by physicians except as referring to a disease of the insane, known also as general paresis (q.v.) or paretic de¬ mentia, in which gradually increasing motor paralysis and disorders of sensation are promi¬ nent.

Paralysis may affect either the voluntary or the involuntary muscles. It may be limited to one muscle or group of muscles, constituting a local paralysis, or it may involve those of various parts of the body, or nearly all the voluntary muscles, and is sometimes associated with sensory disturbances, such as impairment of common sensation, or alterations in the tem¬ perature of the skin. Paralysis is not a disease, but the result of some mechanical obstruction, of some functional disorder or structural dam¬ age in the nervous system (to nerves, nerve-centres, nerve-cells or other constituents), Or of degenerative atrophy of the affected muscles. As a consequence of the conditions named, either the proper transmission of motor nervous impulses is

prevented, or the debilitated mus¬ cles are not capable of contracting, though the impulses may be normally transmitted.

If paralysis is long continued, degenerative changes occur in muscular and nerve fibres, re¬ sulting in wasting of the parts supplied by the nerves affected, and consequent oermanent in¬ ability of these parts to perform their functions. Some of the causes of paralysis are pressure of a tumor, or of a broken bone, as of the skull or a vertebra; an exudation of bload (due to dis¬ eased arteries, external injuries, etc.) ; an em¬ bolus disintegration of nervous tissue by soft¬ ening or thickening; an accumulation of serum, or other results of inflammation. It may occur without any discoverable lesion, as in hysteric or emotional paralysis, in alcoholic paralysis, in decubitous paralysis, due to pressure on a nerve from lying for a long time in one position, and in temporary paralysis due to drugs or hypnotic or hysteric conditions.

The forms of paralysis are numerous. The names assigned to them usually refer to the situation in the neuromuscular apparatus of the damage, lesion or defective activity producing the paralyses; to the condition of the muscles affected; or to the extrinsic causes of certain paralyses or the discoverers of those causes. The forms of paralysis include : Acute ascend¬ ing (Landry's paralysis), often fatal, beginning in the muscles of the feet and ascending to the other muscles of the body — cause not known; birth, due to injuries at birth; bulbar, due to changes in motor centres of the medulla ob¬ longata; Bell's, a facial paralysis (see Bell's Palsy) ; central, due to a lesion of the brain or spinal cord; cerebral, due to an intercranial lesion ; crossed, paralysis of one side of the face and the other side of the body; crural, chiefly affecting the thigh or thighs; diphtheritic (also post-diphtheritic), a partial paralysis chiefly of the muscles of the soft palate and throat, often following diphtheria; Cruveilhier's or progress¬ ive muscular atrophy; divers', or caisson disease (a.v.) ; galloping, a rapidly progressive form of general paresis; Indian-bow, paralvsis of the thyro-arytenoid muscles; infantile, or poliomye¬ litis anterior; ischemic, a local paralysis due to a stoppage of the circulation by an embolus, a thrombus, etc.; lead, due to lead-poisoning; multiple, a complication of local paralyses;

neural, originating in the nerves; and spastic, a variety marked by rigidity of muscles and heightened tendon-reflexes.

Paralysis is further distinguished with refer¬ ence to its course, as

syphilitic, traumatic, toxic, etc., according to the nerve, muscles or part specially affected; as, obturator, ulnar, brachial, dental, *etc.* A paralysis may be reflex, due to peripheral irritation. Monoplegia is a paralvsis of a single part of the body; diplegia, a bilateral paralysis, affects like parts on either side of the body.

The two most extensive forms of paralvsis are hemiplegia (q.v.), paralysis of one side of the body, and paraolegia, paralysis of the legs and lower part of the body. In both forms there may be a loss of sensation as well as of motion. Although hemiplegia is usually the re¬ sult of a cerebral hemorrhage or embolism, it may result from lesions of the spinal cord, or as a hysteric complication. Paraplegia is due to some lesion in the spinal cord.

The treatment of paralysis must depend very largely upon the cause, and should be in the hands of a physician, although the patient can assist materially by faithful attention to hygienic measures, and by exerting the will-power upon more delinquent muscles. Passive movements of the muscles by various forms of massage and the use of electricity are of value, but must be carefully employed, or they may do harm. Acute ascending paralysis as described by Landry in 1859 is characterized by a weakness beginning in the legs, proceeding to complete paralysis, extending usually within a few days to the body muscles and to the arms and terminating fatally in the majority of instances by involvement of the respiratory muscles. It is regarded as a symptom — complex rather than a disease. It is always dangerous, death oc¬ curring even after several weeks. Treatment is not very promising unless some definite etiological factor can be made out. Thus sal-varsan appears to have caused a recovery in one case in which there had been a previous syphilitic infection.

Paralysis agitans is essentially a disease of advancing years, rarely occurring before 40 and mostly after 50. Heredity plays but a small part in the etiology of the disease for which it is usually impossible to assign a direct cause. Worry, grief, fright, overwork, hardship, ex¬ posure or acute disease appear to be the excit¬ ing causes. Its characteristic feature is the tremor, which is usually also the first symptom of the disease. The speech is often altered in the disease, the true nature of which is still unknown. It is of slow progress and may be of many years' duration, death being usually due. to an intercurrent disease. Avoidance of excitement is important, warm baths afford some relief and a combination of active and passive movements has been found very bene¬ ficial in many cases. Care must be taken not to fatigue the patient. The drugs most com¬ monly administered are the mydriatics, bella¬ donna, atropine, hyoscyamine,

hyoscine and duboisine sulphate. Care must be used in their administration as they are poisonous in large doses.

Diphtheritic paralysis is a sequel of diph¬ theria involving the paralysis of certain muscles. It is treated as multiple neuritis. After the

acute stage has. passed, fats, tonics, especially strychnine and cod-liver oil, a course of gal¬ vanism and massage of the affected muscles are resorted to with success in nearly all cases.

PARAMARIBO, par-a-mar'ibo, Dutch Guiana, South America, the capital of the col¬ ony. on the west bank of the estuary of the Surinam River, 10 miles above its outlet on the Atlantic Ocean. It is a well-laid-out town, with substantial buildings and an excellent harbor defended by two forts. The whole trade of Dutch Guiana centres in Paramaribo. Pop about 37,035.

PARAMATTA. See Parramatta, New South Wales.

PARAMECIUM, or SLIPPER ANIMAL¬ CULE, an oval, flat infusorian very common in pond water or in vegetable infusion. Each Paramecium is covered with rows of cilia which lash it through the water and drive food-par¬ ticles into an aperture which serves as mouth. As the food-particles enter they take bubbles of water with them, and are moved round and round in the living substance until they are digested or got rid of. There are two (excre¬ tory) contractile vacuoles; the large nucleus has a small one (paranucleus) lying beside it; be¬ neath the thin rind there are remarkable eversible threads. A paramecium often divides trans¬ versely into two; these two repeat the process and with continually diminishing size rapid multiplication may thus proceed for a while. It has its limits, however, and then two indi¬ vidual infusorians conjugate, exchange some of the material of their paranuclei, and separate. Thus they seem to renew their youth. See In¬ fusoria.

PARAMETER, in mathematics, a term ap¬ plied to a constant quantity

entering the equa¬ tion of a curve. The term is principally used in discussing the conic sections.

PARANA, pa-ra-na', state of the Brazilian Confederation, bounded on the north by Sao Paolo, on the east by the same state and by the Atlantic, on the south by Santa Catharina and the northeastern tip of Argentina and on the west by Paraguay and Matto Grosso. The main northern and western boundary is the Parana (and the Paranapanema) ; and the Iguassu forms the greater part of the southern boundary. The Ivahy and Piquiry flow north¬ west into the Parana ; but, like the Iguassu, they are filled with rapids and unfit for navigation. The short coastline has the excellent harbor of Paranagua; and the coast is picturesque, but hot, humid and fatal with its yellow fever. In the forest-covered interior, which is only par¬ tially explored, the climate is more equable and much cooler; the temperature averages about 17° C., with a winter mean of 14° and a sum¬ mer mean of 18° ; and the rains are abundant. Manioc, Indian corn, coffee and cotton grow on the coast, and the cereals and fruits of the northern and central United States in the in¬ terior. There are valuable (but unexplored) supplies of iron, mercury and gold, and there are coal deposits. There are valuable pine for¬ ests, and the state is a great source of the supply of matte. The port of Paranagua is connected by a railroad with the canital city of the state, Curitaba (pop. 50,000). The area is

85,451 square miles and the population, largely increased by German and Polish immigration, is nearly 406,000.

PARANA, or BAJADA (ba-ha-dii') DEL PARANA, Argentina, capital of Entre Rios province, on the left bank of the Parana, the terminus of a branch railroad from Concep¬ cion. It is connected by daily steamer with Santa Fe on the west bank of the Parana. It is well laid out, with straight unpaved streets, telephone and street car service and other mod¬ ern improvements. The city was founded in 1730; was the federal capital 1852-61; is the location of the provincial university, and has steamship connections with Buenos Aires; ships of 6,000 tons come up the Parana as far as this. But the city is not so prosperous as it was 50 years ago. Pop. 65,000.

PARANA, the second largest river of South America, with a length and discharge greater than those of the Mississippi and a drainage area nearly as large. Its annual flow is three times that of the Saint Lawrence and five times that of the Nile. It is the principal tributary of the great estuary called the Rio de la Plata, which it forms by its

juncture with the Uruguay. The Parana itself is formed by the confluence of the Paranahyba, which is some¬ times considered its upper course as being the axial stream, and the Rio Grande, the true up¬ per course. The latter rises only 60 miles from the coast on the west slope .of the Sierra de Mantiqueira, near Itatiaya; flows east across Minas Geraes; separates that state from Sao Paolo, and receives the Sapucahy and the Mosy-Guassu before its juncture with the Paranahyba (q.v.) at the meeting-point of Matto Grosso, Minas Geraes and Sao Paolo. The Rio Grande itself is sometimes called the Para or Parana, but the latter name is more properly used of the double stream, which flows southeast across the Brazilian plateau with several splendid cataracts and many great rapids, the most nota¬ ble being at Salto Guaira, the beginning of the river's middle course, in which it is the bound¬ ary between Brazil and Paraguay, and then be¬ tween Paraguay and Argentina. It joins the Paraguay river (q.v.) just above Corrientes, which takes its name from this juncture, and then flows a little west of south through Argen¬ tina, turning to the east at Rosario, and a few miles above Buenos Aires joining the Uruguay. In general the upper course of the Parana is navigable save at the falls of Urupupunga and Guaira and at the rapids extending 150 miles below Guaira ; most of its minor tributaries join with cataracts, that of the Iguassu, which, apart from the Uruguay, is nearly the only con¬ fluent from the left, being the most majestic. Through the Argentinian plain the river is broad and easily navigable ; near the embouch¬ ure there is a constantly shifting delta, the main difficulty of navigation. Ships of 10,000 tons drawing 23 feet of water easily make their way 400 miles from the ocean to Rosario. Steam¬ ers drawing 13 feet ply from Corrientes to Asuncion, on the Paraguay River, at any sea¬ son, and at high water to the juncture of the Iguassu. The depth of the river varies greatly with rains and melting snows, and the volume is much greater at Corrientes than below. The Parana is 2,720 miles long from its source to

the Plata. Consult Hutchinson, cThe Parana*

(1868).

PARANAQUA, pa-rii-na-gwa, Brazil, port of the state of Parana (q.v.), southeast of Curitiba, the capital, and on the southern side of the Gulf of Paranagua, which is navigable for vessels of 300 to 400 tons and is separated from the Atlantic by the Ilha do Mel. Rail¬ roads built by French enterprise connect the city with Curitiba and with the harbor at An¬ tonina ; and there is regular steamboat connec¬ tion with Hamburg, because of the German colonists in the state and the valuable exports of mate, hardwoods, cereals and sugar. Pop.

6,000.

PARANAHYBA, pa-ra-na-e'ba, or PARNAHYBA, par-na-e'ba, Brazil, (1) a city and seaport of the state of Piauhy, on the river of the same name, about 10 miles from the coast and 50 miles north of Pernambuco, with which and Natal it has rail connections. It is an un¬ healthy town, but of importance as the seaport for the region. Cotton and sugar are the prin¬ cipal exports. Pop. (estimated) 20,000. (2)

A river of northeastern Brazil, rising between the Serra das Mangabeiras and the Serra Gurgueia, and forming the Foundry between Maranhao and Piauhy. It is more than 630 miles long, has no rapids in its course to the northeast and is navigable for 400 miles. It empties into the Atlantic through six mouths, forming a large delta, to the east of which is the citv of Paranahyba (q.v.). The affluents of the river are the Gurgueia, Piauhy, Poty and Longa from the right and the Balsas on the left. (3) An affluent of the Parana (q.v.), rising on the bound¬ ary of the states of Goyaz and Minas Geraes in the Serra dos Vertientes. It forms the line between the two states mentioned, re¬ ceives at the left the Velhas and the Tepico rivers and on the right the Corumba and the Meia Ponte, and joins the Rio Grande de Pa¬ rana (or Parana), with which it forms the upper waters of the Parana (q.v.). The Pa¬ ranahyba occupies the axis of the Parana basin, but cannot be reckoned the true headwater of the Parana because of its short course and small volume of water as compared with the Rio Grande. Above its juncture it forms sev¬ eral cascades and rapids. It measures alto¬ gether more than 520 miles.

PARANOIA, one of the types of the psychoses. It is characterized by a marked hereditary predisposition, a slow development of persecutory

ideas, almost from childhood, with increasing inability to get on in the world, and it usually terminates in a mild type of men¬ tal disintegration. Its subjects are the people with pronounced mental twists, sometimes anti¬ social, more often able to get along in society if they are able to be let alone. The disease is one of great importance, and yet the conduct of those affected is often so closely allied to the average conduct of the environment that it be¬ comes extremely difficult to come to the de¬ cision of mental irresponsibility in many of these cases. Although a rare disease, it is par¬ ticularly important to recognize it, since par¬ anoiacs are often very dangerous lunatics. The murderer of Garfield was an example. A typi¬ cal case usually starts wrong in the world, with

a mental instability inherited from intensely neuropathic parents. Some type of mental dis¬ ease or extremism or pronounced crankiness or violent temper is present in the crankiness of most of these cases. Throughout the de¬ veloping period these children are usually dif¬ ferent from other children; their intellects may be as bright as others; very often they are precocious, but irregularly so, being generally below par; they are apt to be less gay, less expansive; are characteristically introspective, frequently very egotistic and inclined to live within themselves. They think that their parents are less fond of them and show favors to their brothers and sisters. They thus come to be very subjective and live in a realm of fancies and ideas, are notoriously poor ob¬ servers of fact as entities and poor scholars in the exact sciences. If they are recognized as different in these early stages much may be done for them by appropriate psychoanalysis. After reaching years ot independence these patients find it difficult to get along with peo¬ ple. They are suspicious and quarrelsome and soon come to believe that they are the objects of special plots and persecutions. The early childhood ideas may be a nucleus for this delusional type of thinking. This false inter¬ pretation of conditions about them becomes more and more fixed in their minds until it is systematized and everything is woven into the fabric of this belief. Many persist in this state for years. They may be engaged in business, but are more apt to follow some solitary pur¬ suit. Here their eccentricities, if coupled with a small modicum of talent, are put up with and they go along as actors, painters, musicians, writers! inventors, etc., earning perhaps a bare living or being half supported by friends, while they are laying the foundations of a ˆcareer.® Often the ideas of persecution lead to the de¬ velopment of intense hatred, it may be of an individual as a personal aggressor or as a hindrance to the cause of truth, of liberty, of freedom, *etc.* It thus comes about that

many paranoiacs are attracted by the doctrines of anarchy and it is notorious that regicides are prominently represented in this diseased type. Some of these patients at periods of excite¬ ment suffer from hallucinations; they see faces, hear voices plotting against them, *etc.* Some¬ times these voices seem to accuse them of im¬ moral acts. From ideas of persecution they often graduate into ideas of grandeur (see Gen¬ eral Paresis). Sometimes the voices appear to tell one of these that he is elected by God to be the savior of his people and in response to either set of hallucinations he may kill. Mystico-erotic ideas are very frequent in women of this nature and many are found studying Oriental philosophies and mystic symbolisms from fakirs who hold their hands and teach them breathings, intestinal lavage and various forms of massage — all of which contribute to their erotic tendencies. One feature is very characteristic in this disease — its onesidedness. On many of the topics of general conversation the paranoiac is rational and often a charming talker; but touch the core of his delusional state and he is transformed. Some part of his think¬ ing necessary to bring about mature judgments along certain lines is defective. This defect has never yet been seen by the microscope, but

theie seems to be little doubt that some organic brain defect may develop. Most of these cases are hopelessly incurable. A few remit, are ap¬ parently self-controlled for a time and then de¬ velop-The majority go on to a mild form ot dementia, but the breakdown is very slight, although the delusions usually persist and domi¬ nate the patient's whole thought and actions, lhe anti-social patients are best confined in sanatoriums. They are nuisances to all and are better under the strict regime of an institu¬ tion. Much can be done by early individual training to render these defectives self-support¬ ing. Consult Jelliffe and White, (Diseases of the Nervous Systemˆ (3d ed., 1919).

Smith Ely Jelliffe, M.D., Editor, (Journal of Nervous and Mental Dis¬ ease. >

PARANTHRACENE. See Anthracene.

PARAPEGM, in ancient times the name given a tablet fixed to a pillar or wall and on which laws and proclamations were engraved.

PARAPET, (1) in fortification, a work, usually of earth, intended to protect the troops within the ramparts, as well as the pieces of artillery used in the defense. It has three sloping surfaces, an outer, upper and inner; but the upper surface slopes very gently downward and outward. It is intended for the defenders to rest their rifles or muskets on when firing. The defenses round the roofs of castles are also called parapets. (2) In architecture the term parapet is applied to the structures placed at the edges of platforms, balconies and roofs of houses to prevent people from falling over.

PARAPLEGIA. See Paralysis.

PARASANG (Gr. tt apaoavyrjc from Persian parsang or farsang), the denomination of a lineal pleasure among the Persians of antiquity, and still used by them. In Xenophon's account of the Retreat of the Ten Thousand he gives the length of each day's march in parasangs, and modern travelers agree with the estimate he makes of its length, namely about 30 Greek stadia. Herodotus makes about the same esti¬ mate, which in English miles would be a little less than three and one-half. Strabo, the geographer, reckons it as an arbitrary measure of 30, 40 or even 60 stadia, and the nature of the ground traveled over may sometimes have had some influence in determining the question. The derivation of the word, which means ˆstone-at-the-end,® points to the fact that the Persians, like the Romans, marked out their great highways by means of stones, inscribed with the. distance in one case from the Persian capital, in the other from the <(golden mile¬ stone® (milliarium aureum) which Augustus set up in the Forum near the temple of Saturn.

PARASELENE, in astronomy, a mock moon, not unlike the Parhelion, or mock sun. The Paraselene is common in the polar regions. See Halo.

PARASITES. A parasite is an organism which draws its sustenance from some other living thing on the surface of which or within the body of which it lives. The organism upon which it depends is known as the host. Either parasite or host may be equally either plant or animal. The nlant parasites, which include such forms as molds, rusts and especially bacteria, are found in and upon all sorts of plants and

animals and are the cause of a variety of diseases that assume in different places and at different times great economic importance for man and also affect him directly and seri¬ ously in the form of a multitude of human diseases. The phytoparasites just noted are not specifically discussed under this heading, but are treated in individual articles dealing with the groups mentioned. The zooparasites that form the subject of this special discussion are less widely known. They stand in the same relations both to plant and animal hosts that have been enumerated above for the phyto¬ parasites. Recent discoveries have shown them to be of far-reaching importance in their at¬ tacks upon domestic animals and still more as the cause of human diseases. The group of animal parasites is not a systematic subdivision for the animals embraced under this heading are related biologically rather than structurally. Some branches of the animal kingdom like the Echinoderms contain no species of parasitic habit; among the vertebrates only a couple of types like the lamprey and the hag-fish mani¬ fest a parasitic habit; still other groups like the mollusks and sponges possess a few para¬ sitic species. On the other hand the large ma¬ jority of the flat worms and round worms are parasitic although in these phyla some small groups like the Turbellaria are free living. Among other groups like protozoa and arthro¬ pods the balance between free living and para¬ sitic forms is more nearly even. This situation emphasizes the fact that parasitism is an ac¬ quired habit and this fact is abundantly demon¬ strated by the structure of parasitic species which shows, a general likeness to that found in the free living forms yet manifests modifi¬ cations directly relating to the discharge of function under conditions of parasitic existence.

The secondary character of parasitism is still further demonstrated by the wide range in degree and type of dependence exhibited by different species. In fact the various grades merge into one another so perfectly as to produce a scale of dependence that passes almost unbroken from the free living type to the most extreme parasitic organism.

These conditions are well illustrated by the barnacles (Cirripedia) . At one end of the series stand the ordinary sessile species which are sometimes attached to the external surface of a whale as to rock or a floating object in the ocean and have no special biological rela¬ tion to. the organism which serves them for mechanical support. Contrasted with this are forms that seek a location within the jaws of the whalebone whale and profit by the organ¬ isms carried past them in the current of water surging through the plates of baleen while the whale is feeding. While these fall within the class of messmates or commensals and are not far removed from such as are true parasites,

yet it will be noted that they do not draw sustenance from the animal itself. One member of this same group, Sacculina, has acquired a true parasitic habit and has become radically modified in the process. The adult is a shape¬ less mass firmly attached beneath the (<apron® of a crab. Its relationship to the barnacles is evident when one considers the free-living young and the first stage after settling down on the abdomen of the crab which serves as host. The antennae used by other barnacles

purely as organs of attachment develop here into an extended system of rootlets which permeate the body of the crab and serve to absorb food for the parasite.

Transition to parasitism is exemplified equally by various types of flies. There are those which live upon decaying material ; others in which the mouth parts are adapted to pierc¬ ing that suck the blood of various hosts, move from individual to individual and lead a vigorous independent existence. Finally the sheep tick (Melophagus ovinus) is really only a highly modified biting fly that has lost its wings, given up largely the power of independ¬ ent movement and assumed a more intensive parasitic existence.

The relation between the parasite and the carnivore is well illustrated by leeches. In this group there are those species which manifest a purely carnivorous habit; others that para¬ sitize upon larger animals and remain only long enough for a single meal while still others re¬ main attached to the exterior of fish or turtles as permanent external parasites.

One sees in the temporary parasitism of the mosquito or bedbug evidently the first step toward the stationary parasitism of the fleas and lice, but such ectoparasites or epizoa are after all less highly specialized than the endoparasites or entozoa. Ectoparasites which are very common on the surface of aquatic animals are reduced among air-living species to the members of the group of arthropods whereas the soft-bodied forms like protozoa and flukes that occur on the

external surface of water-living hosts have been necessitated to accept a more favorable location when the host entered upon a terrestrial existence and the external surface was hardened to the horny skin of the higher vertebrate. Natural open¬ ings furnish points of entrance by which such ectoparasites were led to invade the mouth, lungs and alimentary canal or the cloaca and bladder where are found to-day species whose close relationship to forms parasitic on the external surface of related water-living hosts is too clear to fail of recognition. Most of the entozoa belong to the systematic groups of protozoa, trematoda, cestoda and nematoda. They represent the most highly specialized members of the group and have become modi¬ fied by adaptations to the parasitic mode of existence which are most numerous and strik¬ ing.

The majority of internal parasites are found in the alimentary canal or some organ con¬ nected with it and owe their introduction to the contamination of food or drink. Yet there is no part of the body which is immune to para¬ sitic attacks as certain species occur regularly in the muscular system, or the circulatory sys¬ tem, while even the brain and special sense organs are not without such guests.

It is interesting to note that certain species which are ordinarily free-living may under cir¬ cumstances assume a parasitic habit. Thus protozoa common to slime of ponds or streams when introduced accidentally into the human alimentary canal may find possibilities for de¬ veloping temporarily in the rectum. Nematodes like the vinegar eel have been found as appar¬ ently successful inhabitants of the human blad¬ der and small leeches common in the wayside

pools when drawn into the throat by man or animals drinking may thus become accidental parasites of a temporary character.

Schaudinn has called attention to the ease with which slime-inhabiting species of micro¬ scopic animals, especially protozoans, may acci¬ dentally gain access to the alimentary system of man, and find there conditions such that they may indefinitely continue their existence. Small roundworms (Rhabditis nigrovenosa) thrive apparently equally well in the mud or in the lung of the frog, although the method of re¬ production becomes modified in the second in¬ stance.

The relations of animals to one another show also many degrees of dependency which suggest another line of origin for the parasitic

habit. In the simplest case of dependency the weaker form receives shelter or even only trans¬ portation from point to point. Such are the conditions for those forms which take up their abode upon floating objects in the water, the backs of whales, or the outer surface of the shells of crabs and mollusks. Some, indeed, seek more sheltered positions, as for instance among the windings of a snail's shell or within the mouth of the whale. In the latter case the animal secures not only the best of protection but is able to pick up stray morsels of food as well. The dependent secures board as well as lodging from the host, and the relation is known as commensalism (q.v.). In some in¬ stances, however, it may be of mutual advan¬ tage, and some return may be rendered for the services performed. In the latter case the re¬ lation is known as mutualism, or symbiosis. The association here is well illustrated by that of the anemone which is regularly found at¬ tached to the shell of a hermit-craib. The anemone secures transport from point to point, greater freedom from injury, together with less dependence upon environment, than is ordi¬ narily true, of sensile organisms, while at the same time it appropriates stray morsels which fall from the jaws of the crab while feeding. On the other hand, its presence on the shell favors the concealment of the crab, and its stinging tentacles ward off possible attack. The advantage of the association is demonstrated by the solicitude with which the hermit-crab trans¬ plants the anemone when forced by growth to take a new shell for its habitation.

Diametrically opposed to this mutual ad¬ vantage which has grown out of the association of lodgers and messmates is that in which the return is purely onesided, namely, true para¬ sitism. The parasite lives at the expense of his host without rendering any service in re¬ turn, and yet with such prudence as not to endanger the life of his supporter until at least his own life-history is completed. The pre¬ cision of the relation is evinced for. instance by the life-history of the ichneumon-flies. The eggs are deposited in cases on the back of caterpillars ; the larvae penetrate the body of the latter and, beginning with the least important organs, devour the tissue of the host until with its complete 'destruction each larva is ready to metamorphose into the fly. It is but a short step from the position assumed by some lodgers in the mouth-cavity to that taken by most parasites in some region of the alimentary canal, or in one of the various organs connected with it; and yet the transition is not always to in-

ternal parasitism (endoparasitism) . Existence on the external surface of the host, which dis¬ tinguishes the ectoparasite, though rare on ac¬ count of the greater dangers involved, presents examples of an equally intense parasitic habit. Beneath the abdomen of the crab occurs often a curious sac-shaped body (Sacculina) which is a near relative of the barnacles, a group of typical sessile forms. The relationship is little evident from the inspection of the adult, but is clearly demonstrated by study of the life-his¬ tory. The young organism settles down on the crab, similar in form and development to a young barnacle, but develops organs of attach¬ ment which ramify through the body of the crab as do the roots of a tree through the soil, and are the sole means of obtaining nourish¬ ment. Accompanying the assumption of the parasitic habit comes the striking degeneracy ol organs connected with the active life and the development merely of the reproductive function. Ihe adult Sacculina consists of little more than a mass of reproductive organs pro¬ ducing large numbers of eggs.

Effects of Parasitism. — The effects of parasitism, which are dependent upon the de¬ gree to which the animal has acquired the para¬ sitic habit, are equally evident and similar in parasitic forms, whatever their line of origin. The organs and function of locomotion are the first to suffer. Adult parasites possess little if any means of movement and such locomotor organs as are present in the embryo, and are related to a period of free existence or to a change of host, disappear with the attainment of the adult location. Hand in hand with the degeneration of the locomotor organs goes the reduction in the muscular and nervous systems. Organs of special sense, also, become atrophied or are entirely lost, and the parasite is degraded to the level of a mere vegetative organism by the disappearance of these characteristically animal structures.

On the other hand, while the parasitic life is an easy existence, it is equally a dangerous one for the species. Were the eggs to be de¬ posited and the young developed at the point where the adult lives, the existence of the parasite and its host would find an evident and not distant limit. The necessary migration to the external world and search for new hosts involve large elements of chance. Thus for the preservation of the species a superabundant fecundity is required to meet these overwhelm¬ ing odds. In conformity to this the repro¬ ductive system of the true parasite reaches an extraordinary stage of development, and pro¬ duces an enormous number of offspring. It is noticeable that the same changes are brought about in the worm and in the crustacean. Un¬ like as they are at the start parasitism has de¬

graded them to the same physiological level. Those organs which characterize the animal are lost and there remains merely a superdeveloped reproductive system. It is wise in this connec¬ tion to emphasize the fact that the parasites do not constitute a group of systematic value. The forms are classified in distinct and separate branches of the animal kingdom, and a given parasite is often more closely related to free-living species than to other parasitic forms. The majority of animal parasites occur to be sure among the lower groups so that the single-celled animals (Protozoa), the worms, and the von.
21 — 19

‘Crustacea, furnish the larger number of para¬ sitic animals, although instances of parasitism are not wanting in higher groups, even among the vertebrates.

Parasites do not originate in vitiated organs, as the ancient worthies of medicine would have it, nor are they the result of any pe¬ culiar temperament, as another school has held in time past. They have been introduced into the body of the host from without, and are found in a given location because the germs oi embryos were brought to that point by some chance, and have maintained it during growth. The method of cure is equally evident. No amount of imagination can compass it, for it depends upon the removal of the par.asite and the prevention of the introduction of further germs or embryos. The same line of reasoning applies with equal distinctness to other dis¬ eases, and if followed will materially aid in dis¬ pelling many popular illusions of the day on medical subjects.

Endoparasites. — The endoparasites of man have been centres of attention during recent years by virtue of discoveries which have dem¬ onstrated their importance in the etiology of disease. To be sure the occurrence of tape¬ worms, and of the larger roundworms, is re¬ corded in the first medical writings of the Greeks, and also in the still earlier chronicles of the Hebrews and Egyptians, and in a few instances their relation to disease was accurately stated. Now more than 150 species are recorded for the human host, and the discoveries of recent years have been particularly fruitful among the lower groups of these organisms. For instance, it is now known beyond question that a small parasite in the red corpuscles is the cause of malaria (q.v.), one of the most widespread and costly of human diseases. Quite recently also smallpox, yellow fever and a number of tropical diseases of considerable importance have been attributed to the presence of other minute animal parasites. Although not yet demonstrated it may

well be that the causes of many infectious diseases which have hitherto been sought in vain among the bac¬ teria are eventually to be found among micro¬ scopic animal parasites.

In the opinion of the medical profession 200 years ago there was no disease, real or imagi¬ nary, which was not due to the presence and efieet of some kind of parasite. More careful study has shown the extreme character of this view, and has given some insight into the actual effects of the parasite upon the host. In gen¬ eral such effect is related to the proportional size and number of the parasites, although there is an evident difference between such parasites as are active and growing and those which are encysted and passive. The draft on the host is first for food supply, which evidently depends upon the size and fertility of the parasite; in the second place upon the amount of space oc¬ cupied, which will be of importance only where the number of parasites is large or the space occupied is limited; and in the third place, active parasites produce by their movements a certain irritation and inflammation of the tis¬ sues of the host. Certain species which actually devour the tissues of the host introduce an ele¬ ment of danger in the destruction of essential organs and through weakening the walls of blood vessels or perforating the intestinal canal,

so that the secondary consequences may he entirely out of proportion to the actual de¬ struction caused. Excessive effects are, how¬ ever, due to more intricate causes. The ex¬ treme anaemia which is consequent upon the parasitism of certain species (Necatur americanus) is due to the constant abstraction of blood by the parasite, and the consequent great reduction in the vitality of the host. The inju¬ ries caused in the intestinal wall afford places of easy attack for pathogenic germs which may be present. Many investigators have also shown that certain species of parasitic worms produce definite poisons (toxins) whidh affect particularly the nervous system and the forma¬ tion of blood. The continued production and giving off of such substances explain the appar¬ ently excessive results of parasitism, and the production for instance of pernicious anaemia by certain

tapeworms, such as Dibothriocepha-lus.

Causes and Results. — The life-history of the parasite is intimately connected with the habits of the host, and frequently includes al¬ ternation of generations in that one generation is passed within the host and another either outside as a free-living organism or in a differ¬ ent host; or it may be that the larval form occurs in one host, while the adult is found in another. Thus the larval form of one tape¬ worm occurs in the mouse, and the adult is found in the alimentary canal of the cat. The complications which occur are too extensive to permit of detailed consideration here, but the relation of the two hosts is regularly such that the transition from one to the other is achieved by natural means. The life-history gives a clue to the means by which the parasite gains introduction to the host, and in the absence of knowledge concerning the development it is difficult if not impossible to say at what point the evil may be combated. A rational prophy¬ laxis for malaria was not given until the life-history and the method of introduction of the parasite into the human host were laid bare. In general the causes of human parasites are to be found in the disregard of personal cleanli¬ ness on the part of the individual, in too inti¬ mate association with pet animals, from which come a number of important parasites, in the contamination of the water-supply by sewage or waste, in lack of care in the preparation of food and, of course, frequently in the element of chance.

Parasitic diseases did not affect savage man widely. While conditions of existence were very unsanitary, those who fell seriously ill were deserted and a new place of habitation sought out. Thus the sources of contamina¬ tion were left behind and the epidemic stopped. When man began to live in fixed communities opportunities were given for rapid increase in the number of his parasites and for their transmission to others. Food and drink were readily polluted and epidemics became frequent and virulent. Thereby the race developed in the course of a long period a certain immunity such as is seen to-day in the resistance of the black race to the evil effects of hookworm dis¬ ease. This was acquired doubtless at a fearful cost in human life as evidenced by the present effects of new diseases on non-acclimatized races or groups.

With the development of community sanita¬

tion and especially with the emphasis on pure water, and with general education in personal hygiene the abundance of animal parasites and

the chances of infection have been markedly reduced. The use of foot coverings and less intimate association with domestic animals are also important factors. The demand for good food with consequent greater care in raising, preparing and distributing food products also tends to reduce and ultimately to eliminate zooparasitic diseases. When national customs or prejudices run counter to the favorable influ¬ ences mentioned, certain animal parasites may become abundant and serious, but the increasing knowledge and intelligence of man will ulti¬ mately control and zooparasitic diseases will disappear. Thereby man will surmount the greatest barrier to the control of the tropics and the utilization of its wonderful riches for the welfare of the race.

Bibliography. — Blanchard, R., ‘Traite de zoologie medioale) (Paris 1885—90) ; Braun, M., ‘Die tierischen Parasiten des Menschen) (Wurzburg 1915) ; Cobbold, T. S., ‘Parasites) (London 1879) ; ‘Human Parasites) (1882); Fantham, Stephens and Theobald, ‘The Animal Parasites of Man* (London 1916) ; Leuckart, R., ‘Die Parasiten des Menschen und die von ihnen herriihrenden Krank-heiten) (Leipzig 1879-1901) ; Manson, P., (Tropical Diseases) (London 1898) ; Ralliet, A., ‘Traite de zoologie medicale et agricole)

(1893— 95) ; Stiles, C. W., Many valuable pa¬ pers, chiefly in “Bulletins® and “Reports® of the Bureau of Animal Industry, and of the Hygienic Laboratory of the United States De¬ partment of Agriculture; Ward, Henry B., ‘Parasitic Worms of Man and the Domestic Animals) (Lincoln 1895) ; Articles in Wood’s .‘Reference Handbook of Medical Science* (New York 1913-18) ; ‘Data for the Determi¬ nation of Human Entozoa> (in Illinois Medical Journal, October 1912).

Henry B. Ward,

Professor of Zoology, University of Illinois.

PARASITIC ANIMALS. These are gen¬ erally tabulated under the headings of protozoa, worms and insects. Of the Protozoa group, P. rhizopoda, some amoebae are parasitic, P. sporozoa are all parasitic, and there are nu¬ merous parasitic forms of the P. infusoria. The two first mentioned are productive of ma¬ laria in humankind. Of the Scolecida group, S’, trematoda — liver flukes — the S’, cestoda — tapeworms — and the four genera of S’, acan-thocephala, are all parasitic; the S’, nematoda — roundworms — are also mostly parasitic. Of the Annelida group, some species of A. chceto-poda — sandworms — are parasitic, while most species of A. hirudinea — leeches — are ecto¬ parasites, or temporary parasites ; some leeches

are carnivorous. Of the Insecta group, besides many plant parasites the group of animal para¬ sites include pediculidce — lice; menibranacci — bedbugs ; aphaniptera — fleas ; mallophaga — bird lice; pupipara — sheep lice; culicidce ; mos¬ quitoes and other diptera ; ichneumon flies; and among the Arachnida group of spider parasites, are mites, water mites, itch and mange mites and ticks. See Parasites; Parasitic Diseases.

PARASITIC CONE. See Cone.

PARASITIC DISEASES, the name ap¬ plied to such human and animal diseases as are

caused by animate agents, of which there are leuM tyˆeS parasites and infectious agents. VYhile the latter produce “infectious diseases,® they are in a sense parasites, though they may also be saprophytes — vegetables organisms liv¬ ing upon dead organic matter. The true para¬ site, however, is not an infectious agent ; it confines its habitat to certain localities of the living body and remains there. It is milder in action; its life being intimately bound up with that of the host upon whom (or which) it lives, there seems to be an absence of “intent® to destroy that host. On the other hand, the infectious agents enter every tissue of the liv¬ ing body and destroy it as speedily as may be. Yet parasites and infectious agents are not necessarily distinct organisms, for types of the former exist harmlessly in perhaps every human bod}’. See Pneumonia.

The various diseases are dealt with in sepa¬ rate articles. They may be produced by vege¬ table or animal parasites, while a third form of infective diseases, such as influenza, whoop¬ ing cough, smallpox, measles, typhus fever and mumps, . have not been definitely traced to micro-organisms. The diseases arising from vegetable parasites are erysipelas, infective endocarditis (affecting the internal membrane of the heart), gonorrhoea, suppuration and blood poisoning. Specific bacilli, those which always provoke the same disease, cause typhoid fever, cholera, . yellow fever, infective meningitis, diphtheria,

pneumonia, Malta fever, Weil's dis¬ ease (a form of jaundice), tetanus, relapsing fever, plague, glanders, leprosy, tuberculosis, madura foot, actinomycosis, asperghosis and other fungus diseases. To animal parasites (protozoa) are due the tse-tse fly disease, sleeping sickness, amoebic dysentery, syphilis (unknown origin), malaria, Kala-azar (an Indian fever) and black-water fever. The filaria or nematode parasitic worms are found in various organs and in the blood. Scarlet fever and hydrophobia have also been traced to organisms. Investigations carried out in Alexandria, Egypt, during 1916, into the spread and incidence of intestinal protozoal infections of British troops and natives in the Near East revealed three new human intestinal protozoa. The following list shows the localities of the human body and the principal parasites that are found in them :

Entozoa.

Blood . Filaria sanguinis hominis.

Brain . Acephalocystis multifida.

Bronchial glands . Filaria bronchialis.

Bronchial tubes… Eustrongylus bronchialis.

“ “ . Strongylus bronchialis.

Capsule of crystalline… Distoma mobium.

Crystalline . Monostoma lentis.

Duodenum . Distoma crassum.

Eye . Filaria oculi.

Gall bladder . Distoma hepaticum.

“ “ . Fasciola hepatica.

Hepatic duct . Distoma lanceolatum.

Intestines . Ankylostoma.

. Anthomia canicularis.

. Ascaris alata.

. “ lumbricoides.

. . “ mytax.

. Bothriocephalus cordatus.

“ . . “ latus.

. Cysticercus tenuicollis.

. Distoma heterophyes.

. Ditrachyceras rudus.

. Eustrongylus gigas.

. CEstrus hominis.

. Pentastoma constrictum.

Intestines .

U

U

u

u

u

u

u

u

u

Kidney .

a

u

Liver .

u .

u . • • . .

«

Muscles .

U

Omentum .

Ovary .

U

Portal and venous sys¬ tem …

Portal and venous sys¬ tem .

Skin and areolar tissue .

u a

Spleen .

Urinary bladder .

U

u

Venous system .

« a

Pentastoma denticulatum. Taenia acanthotrias.

“ elliptica.

flavapuncta.

“ lophosoma.

mediocanellata.

“ nana.

“ solium. Tricocephalus dispar. Sclerostoma duodenale. Eustrongylus gigas.

Ascaris renalis.

Tetrastoma renale.

Taenia nana.

Acephalocystis endogena. Pentastoma constrictum. Echinococcus hominis. Trichina spiralis. Cysticercus cellulosae. Echinococcus hominis. Hexathrydium pinguicola. Polystoma pinguicola.

Bilharzia haematobia.

Distoma haematobium. Dracun cuius medinensis. Filaria medinensis. Echinococcus hominis. Dactylius aculeatus. Diplosoma crenatus. Spiroptera hominis. Hexathrydium venarum. Polystoma venarum.

Ectozoa.

This class includes the varieties of lice, the chigoe and itch-insect, which infest the skin, cellular tissue and the hair.

The chief vegetable parasites, Entophyta, those living within the body, and Epiphyta, those living on the exterior, occur as follow’s: In the stomach, Torula cerevisiae (also in the bladder) ; Sarcina ventriculi. The Oidium albi¬ cans or thrush-fungus occurs on cutaneous and mucous surfaces ; in the mouth, where also Leptothrix buccalis is found. The bones of hands and feet and deep tissue are affected by Chionyphe carter! On the scalp, Microsporon audouim; Trichophyton sporuloides ; Achorion lebertii. The skin, Pucoinia favi; Achorion schoenleinii; Microsporon furfur; follicles of hair, Microsporon mentagrophytes. See Bac¬ teriology; Disease, Germ Theory of; Para¬ sites; Pathology.

PARASITIC FISHES, about a dozen very small eel-like fishes, of the sand-eel family O phidiidcB , and the genera Fievasfer and Encheliophis, are parasitic or commensal in other marine animals, and have some curious modifications. _ They frequent the hollows in the bodies of jellyfishes, the breathing chambers of starfishes and sea-cucumbers, and sometimes insinuate themselves between the layers of

the mantle of pearly mussels and other bivalves. Cases are known where they have become coated over with pearl and so imbedded in the interior of the shell. These parasitic fishes have totally lost their pelvic and caudal fins ; and the vent has been moved forward from the ordi¬ nary anal position to near the throat. One species (F. affinis) is especially common on the pearl-oyster banks of western Mexico.

PARASITIC PLANTS, plants which live upon and at the expense of other plants to which they become attached. The group is not well defined, since many of the lower forms have saprophytic habits also, or may develop them under favorable conditions and since some higher plants exhibit more or less parasitic tendencies. All members of the group are alike

in their method of feeding: sticking organs (haustoria) are developed within the host-plant's tissues, their office being to absorb the liquids which the host-plant obtains from the soil and the food elaborated by the green parts of the host. It is assumed by botanists that this habit has resulted in sexual degeneracy, so that in some cases sexuality appears to have been lost entirely. As a consequence of this the vegetative functions are in many cases re¬ markably developed. In other cases the life-history is remarkably complex, especially among the lower fungi, for instance, apple-rust. (See Apple, paragraph Diseases). The flowering parasitic plants may or may not contain chlorophyl, in the former case being able to utilize the carbon dioxide of the air in the manufac¬ ture of a part at least of their food; in the latter case being dependent nearly if not en¬ tirely upon the host. Familiar instances of the former are bastard toadflax and mistletoe; of the latter, broom-rape and dodder. This last (see Dodder) is remarkable also because its seeds germinate in the ground, send up slender leafless, thread-like stems, and after becoming attached to a host die at their lower extremities. Single individual plants of some species of dodder have been known to feed upon more than half a dozen different species of host-plants at the same time. From an

economic standpoint, the parasitic fungi are of most im¬ portance. Among these are the so-called plant diseases ; for instance, the smuts and rusts of cereals, the blight of strawberries and potatoes, the mildew of gooseberries and grapes, *etc.* There are also several diseases attributed to bacteria; for instance, pear blight and melon wilt. Still other members of this group are parasitic upon insects. The common house fly is frequently found stuck fast to walls and windows and surrounded by a yellowish ring of spores of a plant parasite. Young fish in hatcheries are often destroyed in immense num¬ bers by a slime mold. Horses occasionally suffer from a lung parasite of vegetable origin. And even man is not exempt ; he is sometimes at¬ tacked by ringworm and barber's itch. The at¬ tacks of these parasites are due largely, if not wholly, to unsanitary conditions, carelessness, neglect, or some other similar cause and they may be prevented by proper attention.

PARASOL, an umbrella or covering for the head, which was used among the ancients, not for the purpose so much of preservation from the rays of the sun as in religious ceremonies and processions. In certain festivals the young females who celebrated them bore, among other sacred instruments, the parasol : it was, in fact, one of the most ancient marks of dignity that we find indicated either by relics of art or by authors. In process of time, when the Romans began to lay aside the simple habits of their forefathers, the parasol, by a natural transition, began to be used for the purpose to which it is still applied. The matrons particularly used to be followed by slaves, whose office was to pro¬ tect the delicacy of their charms by intercepting the solar heat by the agreeable shade of the parasols. They were constructed of wands or twigs, disposed in such a manner as to admit of their being put up or down, in much the same way as those used at the present day. See Umbrella.

PARA.SUCHIA, an order of extinct crpco-diles. See Herpetology.

PARAY-LE-MONIAL, pa-ra-le-mo-ne-al, France, town in the department of Saone-et- Loire, on the Bourbince, about 170 miles in direct line southeast of Paris. It is one of the oldest towns in France, and is famous for hav¬ ing been the home for many years of Margaret Mary Alacoque, a Visitation nun, who gave the world an account of remarkable revelations made to her regarding the devotion to the Sacred Heart of Jesus. To this nun may be given the credit, in a great degree, of the present magnitude of the League of the Sacred Heart (q.v.). She died at Paray-Le-Monial, 17 Oct. 1690. Pop. 3,000. Consult

Tickell, (Life of Blessed Margaret Mary* ; Bougand, (Histoire de la bienheureuse Marguerite Marie)

(1894).

PARBUCKLE, a method of raising or lowering any cylindrical body, such as a barrel, by -an inclined plane. It consists in throwing a rope round a post fixed on the level from which the object is to be lowered, or to which it is to be raised, making the ends of the rope of the same length and passing them under and round the object to be raised or lowered. In raising or lowering the object one or more men, standing on the higher level, take hold of each end of the rope, and shorten or lengthen the amount of rope paid out according as they wish to raise or lower. By this method the barrel, or whatever else it may be, is made to serve as a pulley for itself. The resistance at the two ends of the rope is just one-half of the weight of the object as felt on the inclined plane, or one-fourth of that weight at each end separately.

PARC2E, par'se. See Fates.

PARCEL, was formerly used as an adverb or semi-adverb, having the meaning of ((partly® or ftin some measure® ; as in the expressions ˆparcel-blind,® ((parcel-deaf,® ((parcel-gilt® or ftparcel-learned.® In the law of real estate and conveying of property, the word is used for a portion of land named in the transaction of buying or selling, and so also of a description of property set forth in a conveyance, together with its boundaries, with a view to its easy identification. In nautical usage, a parcel is a wrapping of tarred canvas on a rope, to prevent chafing. It is cut in long, narrow strips, well tarred, and made up into rolls before it is laid on the rope. The rope is usually warmed, then parceled and then served.

PARCEL POST. The generic name for a service performed by governmental agencies and comprising the collection, forwarding and delivery of packages through the mails. It cor¬ responds in a general way with the service per¬ formed by the express companies, which until the summer of 1912 were in exclusive posses¬ sion of the field in the United States. At the time mentioned nearly all European and one or two South American nations, as well as Japan in Asia, were provided with systems for the transportation of merchandise in retail quanti¬ ties, but within generous weight and bulk limits, at considerably less than one-third the cost of expressage in this country. The United States post office would receive no parcel of merchandise

over four pounds in weight and

charged a prohibitive uncial rate. In Belgium the maximum weight transportable in the mails was 132 pounds; in Russia it was 120 pounds-in Germany, Switzerland, Hungary, Rumania' Luxembourg, Sweden and Norway the permis¬ sible mailable weight was 110 pounds, while in Austria there was no legally prescribed limit. But the parcel post charges being four or five times the prevailing freight rates, the use of the mails for very heavy shipments was prac¬ tically precluded. Only 5 per cent of the num¬ ber of packages forwarded by express in this country weigh over 100 pounds and universal experience attests this to be the usable limit of the service. In Great Britain, where the maximum mailable weight was 11 pounds, a package express service had been instituted ' by the railways themselves. Fish, game, and farm and dairy products, for instance, could be shipped 50 miles at the rate of about 12 cents (sixpence) for parcels up to 24 pounds and one-half cent a pound for greater weights with¬ out limit. For longer distances the rate in¬ creased, but the highest charges were 18 and 30 cents, respectively, for 10 and 24 pounds carried a distance of 200 or more miles, with a 1% cent pound rate for greater weights. Railway transportation rates in England are graduated down to two pounds for all classes of freight and a collect and delivery service is attached in all cases. The minimum parcel post rate in Continental Europe is about six cents per package. Comparisons are difficult because of the variations in the tariffs and practices, the rates being zonal in some countries, while m others there are no differentials for distances. Taking the most comparable items we find that in England 10 pounds of any kind of merchandise could be shipped 50 miles by rail¬ way express and delivered to the designated consignee for 16 cents; in France a parcel of like weight (5 kilograms or 11 pounds) could be sent any distance by post and delivered for 16 cents; in Germany and Austria the postal rate for parcels up to 11 pounds in weight would be six cents for distances of 46 miles or less, and 12 cents for greater distances, with an additional charge of two and a half cents for delivery in cities and five cents in

rural districts. The maximum rate for such a parcel would, therefore, be 17 cents, delivery charge included. The average rates of seven foreign countries for a postal parcel of five kilograms delivered in the first zone (approximately 50 miles) was eight cents; the minimum express rate in the United States was 25 cents for the least weight and distance. Besides being high in cost the express company service is incom¬ plete — deliveries and collections are made only in urban communities. Both defects are irre¬ mediable. The rural free delivery system main¬ tained by the government as a public service could not be articulated with an express busi¬ ness conducted for profit by 10 separate private corporations. The 25-cent rate is an irreducible minimum, representing as it does the per parcel expense for way-billing, recording, transcribing bookkeeping and intercorporate accounting be¬ tween express and railroad — the expense being the same for a one-pound package as for a car¬ load. By the affixment of a postage stamp of the required denomination these economically indefensible and wasteful processes would be eliminated.

The cost of collecting and delivering parcels of 10 pounds and upward in weight, ascertained by express company and mercantile experience, is about five cents. According to postal experi¬ ence the cost is much less for smaller parcels: The railway mail pay for transporation is one cent per pound for 250 miles, or two cents for

10 pounds for 50 miles. A parcel post rate of eight cents for 11 pounds within a zone of 50 miles (which is the averaged European rate) would, therefore, be quite feasible in the United States. The introduction of zonal rates into the parcel post of this country was strongly com¬ bated, but the unfairness to local shippers of flat rates that would be high enough to prevent an enormous postal deficit is self-evident. And, to say nothing of their killing effects on the short-journey traffic, embracing nearly the entire business, such rates would cheat the govern¬ ment on the long journey. A weight limit, if too low, would hinder the free movement of the traffic most in need of the facilities afforded by a parcel post. Express company shipments aver¬ age 33 pounds in weight ; the country merchant deals in lots approximating 100 pounds; in the Harm-to-kitchen® trade a worth-while market basket would not weigh under 50 pounds. The Parcel Post Law, adopted in the form of a rider to the postal appropriations bill of 23 Sept. 1912, embodied a zonal rate system. The rates, however, were made needlessly high — the postage on a 10-pound parcel sent a distance of 50rniles was 32 cents, four times the feasible rate in this country and the averaged foreign rates. The zoning was

absurdly complicated by the division of the national area into blocks of 30 miles square. The weight limit was fixed at

11 pounds. Notwithstanding these drawbacks an enormous traffic in small parcels immediately developed. The law contained a provision per¬ mitting the Postmaster-General by administra¬ tive act, with the concurrence of the Interstate Commerce Commission, to change the rates, zones, weight limit and classification of the par¬ cel mail in such manner as to produce the best results. The weight limit was increased during the summer of 1913 to 20 pounds for all zones and in January 1914 to 50 pounds in the local and first and second zones. These two zones have been consolidated ; the zoning has been otherwise simplified and there has been a radical reduction of the scale of rates. An epitome of the present parcel post tariff for the nearer zones follows :

Local

Zones

1 and 2,

Zone 3, 150 to 300

WEIGHT IN POUNDS

rate

150 miles

miles

1 .

5c

5 c

6c

2 .

6

6

8

3 .

6

7

10

4 .

7

8

12

5 .

7

9

14

10 .

10

14

24

20 .

15

24

44

30 .

20

34

weight limit

40 .

25

44

50…

30

54

For the fourth zone the rate is seven cents for one pound and increases four cents with every additional pound; for the fifth zone the initial rate of eight cents increases six cents with each added pound; for the sixth zone it is nine cents for one pound and eight cents for each pound additional ; for the seventh zone the rate is 11 cents for one pound and 10 cents added for each pound above that; for the

eighth zone the rate is 12 cents for each pound, which applies to all

points more than 1,600 miles from the office of mailing, including Alaska, Hawaii, the Canal Zone, Guam, Tutuila, the Philippines and Shanghai. Zone keys are pro¬ vided for each mailing office whereby the zone of any office of address can be ascertained with¬ out the use of maps.

The domestic parcel post reaches more places .than any other transportation agency, and small parcels may be sent long distances at less cost than in any other postal service in the world. The rates for nearby zones are particularly ad¬ vantageous and encouraging of direct dealings between producer and consumer. Special treat¬ ment is accorded to shipments of farm prod¬ ucts weighing between 20 and 50 pounds. Parcels may be insured against loss or damage and sent C. O. D. • The government will assume liability in the former case up to $100, the rates being graded from 3 to 25 cents according to the amount of insurance. C. O. D. collections will be made up to $100. Parcels, furthermore, may be registered, without insurance, for a small fee — a privilege which is taken mostly by mail order houses, but also by others who wish to keep a receipt as a record. On the basis of the latest official reports the number of registered pieces is approximately 37,000,000 in a year; the number insured about 35,000,- 000, and the number sent C. O. D. about 7,000,000. The C. O. D. collections amount to nearly $50,000,000 in a year, for which about $450,000 were received in money order fees. The fees for registration and insurance in 1917 amounted to $3,237,195. The total weight of parcels handled was about 2,000,000,000 pounds, with an average of about two pounds, and seven cents postage paid ner parcel, indicating a postal revenue of about $70,000,000 from this source.

The first consequence of the institution of the parcel post on the express companies was a drop of about 20 per cent in their annual operating revenues. In its report of 1913 the Inter¬ state Commerce Commission asked to be relieved of its duty to ((determine the ex¬ tent to which the parcel post should super¬ sede the express system,® saying, that a proposition to reduce the postal rates might conceivably be destructive of existing com¬ panies before adequate provision had been made by the government to take over all of their business. One of the five larger com¬ panies discontinued operations on 1 July 1914. Under regulations prescribed by the Interstate Commerce Commission and put in force 1 Feb. 1914, the gross income from express forward¬ ing operations gradually increased and by 1916 was restored to nearly its previous an¬ nual normal of about $100,000,000, the real¬ ized net income for the year mentioned having been $10,614,727. The regulations fixed the forwarding charges on the basis of the most direct route between any two given

points ; they abolished double rating (for shipments carried over the lines of more than one company) and effected ˆsubstantial® reductions (about 8 per cent) in class rates which, of course, did not make them competitive with postal rates. Commodity rates remain at about their pre¬ vious level. The rules thus prescribed have been adopted by nearly all the States as regulatives

of their intrastate express business, with result¬ ing advantages to both shippers and forwarders, particularly the elimination of the difficulty of quoting the correct rate. The greater part of their operating revenue is now derived by the express companies from transportation, in wholesale quantities, of commodities requiring quick delivery; and this field will be occupied by them permanently unless the government o-the railroads themselves should establish an ex¬ press freight service. While the parcel post absorbed about $20,000,000 per annum of pack¬ age express business, it developed three times that amount on its own account ; and the po¬ tential growth of the parcel post has only be¬ gun. What has been witnessed is merely indicative of the enormous volume of traffic that has remained immobile for the lack of means to move it conveniently and at rates which it could bear.

Stephen Pfeil.

PARCENARY, in law, is the state or estate of two or more persons, called parceners, who hold title, as equal heirs to land, each with a right to a separate share of it, even though undivided. This, of course, carries with it no benefit of survivorship.

PARCHE, one of the small but gorgeous coralfishes known best as <(butterfly-fish® (q.v.).

PARCHIM, a town in Germany, in the republic of Mecklenburg-Schwerin, situated on the Elbe, about 20 miles southeast of Schwerin, on the railway from Ludwigslust to Neubrandenburg. It is an ancient town, founded about 1200, and surrounded by walls in the ancient style, and contains many interesting buildings including its quaint Gothic townhall. It is perhaps best known as the birthplace of Field-Marshal von Moltke, to whom a monu¬ ment was erected in 1876. Parchim is now a busy industrial town, manufacturing cloth, celluloid, etc., and is one of the richest cities of Mecklenburg, owning much of the surrounding land. Pop. 10,600.

PARCHMENT, a specially prepared ani¬ mal skin used for several purposes. The ordi¬ nary method of treatment of the skin is as fol¬ lows : It is first fleeced or depilated, then scraped, polished, treated with lime, then stretched and dried. Sometimes it is rubbed down, with pumice-stone. Ordinary parchment is made from the skins of sheep, ewes or lambs; the skin of the ewe is more esteemed than that of the sheep, but the lamb-skin is preferred on account of its whiteness as well as being finer. That made from the skins of stillborn lambs is known as ((virgin® parchment and closely imi¬ tates the quality of vellum. (See Vellum). For drumheads parchment made from calves or she-goats is usual, that of wolves is preferred ; but for kettle-drums parchment of asses-skin is favored. Pigskin specially prepared as parch¬ ment is used for covering liturgical books and for sieves. One qualification needed is that the skin be thoroughly freed from grease. As to the origin of parchment, the invention is tradi¬ tionally said to have been made through Eu-me.nes II wishing to establish a library at Pergamos, but the importation of papyrus from Egypt was made difficult through his having differences with the latter country, so the in¬ vention was brought about to supply a substi-PARCHMENT — PARDEE

tute, about 190 b.c., and his celebrated library was made up of works written on the skins of goats. Thus the term parchment was probably derived from Pergamos, but the Persians and other Asiatic peoples had been using the skins of animals to write their records on long before this time. Greek authors speak of rolls, or royal dipters, of the Persians formed of strips of leather, and the Jews sent a copy of the Scriptures to Ptolemy transcribed on skins ; the use is perpetuated by the Jews of copying their sacred books on tanned strips of skins. Pliny says that Cicero declared he saw the entire poem (Iliad } written on this substance. The Romans termed parchment charta pergamena. With the perfection in the art of preparing parchment the most valuable books (codices) were made of this medium instead of the former papyrus rolls (volumind), though the use of the latter article (see Papyrus) remained in use for many years later, on account of its much smaller cost and the facility of procuring it. At the time of Pliny parchment was a dirty yellow tone as the process of whitening it was yet unknown ; it was, however, already being tinted in purple to heighten the gold and silver lettering of sump¬ tuous manuscripts.

This staining, in the Chris¬ tian era, was reserved for the sacred books and the usage has continued to modern days. Stain¬ ing in black also was done for prayer-books. The most ancient manuscripts on parchment date back to the 3d century and the most ancient deeds are not anterior to the end of the 7th cen¬ tury. From that time on parchment displaced papyrus everywhere. From the 5th to the 15th century practically all manuscripts and, from the 8th century, most charters are written on parch¬ ment. And with the growth in favor and de¬ mand a true industry grew up in its production and workers became known as pergaminarii. But this increasing consumption brought also with it inadequate supply and the natural steady increase in price and, in order to economize, less important or antiquated documents were used over again after erasing or washing out the former inscriptions. These parchments util¬ ized a second time are termed palimpsests, and, by the use of chemical reagents many extant pieces have had their earlier writing restored sufficiently to be deciphered. Saint Isidor of Seville writes that the first parchment-makers only knew how to make the yellow kind, but later the secret of bleaching was discovered in Rome. But, he says, as it soiled easily and fatigued the eyes besides, this discovery found little success. ˆIndependently of the new se¬ cret, ˆ he adds, ((one distinguishes three sorts of parchment, the white, the yellow and the. pur-ple.® By the 13th century parchment was the principal substance used in writing in the Euro¬ pean centres of learning. It was made in most of the abbeys, but in Paris was the great mart and great sales took place during the Lendit fair opening on the second week in June and held on the Saint Denis plain. At this great sale the university and its members, together with the royal ˆparcheminiersˆ had the privi¬ lege of first choice in selecting their share, after which the retailers were permitted to sup¬ ply themselves. The preparation of parchment varied during the Middle Ages according to time and location ; that used for manuscripts till the 10th century has generally a high polish and

is very fine and white. Then the quality be¬ comes irregular, being often rough, thick, poorly degreased and transparent. Paper was coming' into use (see Paper) and displacing parchment, and the discovery of the art of printing killed the slower process of calligraphy. By the 15th century we have donats, calendars, Bibles, the Fust and Schoffer Psalterium (1457) generally printed on parchment. Often these are evident imitations (decorative initials and all) made to deceive as written and not impressed in the much cheaper process, for parchment was too expen¬ sive in comparison

with the now common paper. Parchment codices are generally made up in gatherings of four leaves (quaterniones) as¬ sembled in larger or smaller numbers to make up a book; the format varies also considerably. The roll (volumen) form was still used, how¬ ever, in making up deeds, single sheets being sewn end to end, some to a great length. Parch¬ ment in recent years is in very reduced use, chiefly for wills and other deeds and for book¬ binding and for drums and the friskets of the printers' press. See Papyrus ; Vellum ; Paper ; Manuscripts, *etc.*

Bibliography.— Lalande, J. J., (Art de Faire le Parchemin) (Paris 1762) ; Leist, (Urkund-lehre) (Leipzig 1893) ; Peignot, E. G., (Essai sur l'Histoire du-Parchemin et du Velin) (Paris 1812) ; Wattenbach, W., (Schriftwesen irn Mittelalter) (Leipzig 1896).

Clement W. Coumbe.

PARCHMENT, Vegetable, a substance first introduced in 1853. It is made by dipping ordinary unsized paper for a few seconds in concentrated sulphuric acid mixed with one-half its volume of water and then quickly re¬ moving all trace of the acid. The mixture is allowed to cool before being used. This simple treatment produces a remarkable change in the paper. It acquires a parchment-like texture ; turns translucent, especially when thin ; and be¬ comes about five times stronger than ordinary paper. Vegetable parchment is also impervious to water, but is rendered soft and limp when dipped into it. A solution of chloride of zinc acts on paper in a similar way. In the manu¬ facture of vegetable parchment a roll of paper is by a mechanical arrangement pulled through a vat containing the sulphuric acid (the time of immersion being from 5 to 10 seconds for thin paper), next through water, then through a weak solution of ammonia, and once more through water. It is afterward passed through felt-covered rollers, and then calen¬ dered. In recent years it has come into general use as a sanitary covering for bread, and other foods, both prepared and semi-prepared, can¬ dies, *etc.*

PARDEE, George Cooper, American phy¬ sician and political leader: b. San Francisco, Cab, 25 July 1857. He was educated at the University of California, at the Cooper Medical College, and at the University of Leipzig, Ger¬ many. In 1885 he returned to California from abroad, began the practice of medicine as an eye and ear specialist, and was soon recognized as one of the leaders of his profession. He was also active in public life, was a member of the Oakland board of health and city coun¬ cil, and carried on a vigorous and successful campaign in behalf of pure water and against the licensing of poolroom gambling.

In 1893

a reform movement in city politics was organ¬ ized and he was elected mayor for two years; in this office he compelled the corporation own¬ ing the waterworks to reduce its high charges, and dealt with the railroad strike of 1894. In 1898 he was a candidate for the Republican nomination for governor, but was not nomi¬ nated, and in-1900 was a delegate to the Repub¬ lican National Convention. In 1899 he was ap¬ pointed a regent of the University of Califor¬ nia. In 1902 he obtained the Republican nomi¬ nation for governor, and after a vigorous cam¬ paign was elected; the most important opposi¬ tion to his election came from the labor element on account of his action during the strike of 1894. He served as governor until 1907. He was a member of the National Conservation Commission 1907-09, and was appointed chair¬ man of the Conservation Commission of Cali¬ fornia in 1911. He was a delegate to the Pro¬ gressive National Convention in 1912, and was a presidential elector in the same year.

PARDO, par'do, Manuel, Peruvian states¬ man: b. Lima, Peru, 12 Aug. 1834; d. there, 16 Nov. 1878. He was educated in Chile and in Europe, paying much attention to the study of law and political economy. For a time he was in government employ, then retired to private life, but in 1865 was appointed secretary of the treasury by President Prado, which office he filled with great ability. In 1869 he was elected mayor of Lima and in 1872 was elected to the presidency. His inauguration was opposed by Tomas Gutierrez, the minister of war under President Balta, who dissolved congress, im¬ prisoned Balta and declared himself dictator. Pardo was compelled to flee, but when the dicta¬ tor was killed in an uprising of the populace he returned and took the office 2 Aug. 1872, the first civilian President of Peru. His adminis¬ tration was one of great benefit to the country. He improved the financial condition of the coun¬ try, aided the advancement of science and lit¬ erature, crushed a rebellion in Moquegua and upon the expiration of his term of office in 1876 prepared to retire from public life, but was elected to the senate, of which body he was

president when assassinated in 1878. His death was mourned as a national calamity.

PARDO-BAZAN, par'do-ba-than', Emilia, Spanish novelist and critic : b. La Coruna, Galicia, 1852. In 1891 she established and en¬ tirely wrote a critical review, (Nuevo Teatro CriticoH Her literary reputation in Spain was won by her works of fiction, generally classed as naturalistic, most satisfactory in picturesque delineations of Galician landscapes and man¬ ners. Among them are (Los pazos de Ulloa) ; <La piedra angular* ; (Pascual Lopez) ; the col¬ lection of short stories, (Cuentos de Marineda* — Marineda being La Coruna — ; (Una Cristiana) ; and its sequel, (La Prueba.* Among her critical writings is a prize essay, (Estudio de las Obras del Feijoo* ; (San Francisco de Asis,* and (La revolucion y la novela en RusiaP The descriptive volumes, (Mi romeria* and (De mi tierra,* contain patriotic views of local scenes. She is the author of five plays.

PARDON, remission, by official act, of the penalty of crime; also the document granting such pardon. The custom dates from remote antiquity, and was usually exercised by the sovereign only. In England the king has sole

power to pardon, but there are legal restrictions attached to its exercise. By power granted by the Constitution of the United States, the Presi¬ dent may pardon all Federal offenses except impeachment.

Many reasons for giving this power to sov¬ ereigns and other chief executives have been assigned, among which may be mentioned the following: As a reward for actual reform of the criminal while in prison and for good con¬ duct there, to mitigate the harshness of laws in their application to particular cases, the proba¬ bility or possibility of the innocence of the accused person, for reasons of state, *etc.*

Offenses against the various States in this country are pardoned by official acts of such States, generally by the governors thereof. In some States pardons are granted by pardoning boards, and in others concurrence by the legis¬ lature is necessary.

The President of the United States may par¬ don before indictment or conviction, and his power to pardon, within constitutional limits, cannot be modified by legislation.

A pardon may be absolute or given on con¬ dition precedent or subsequent, and it mav be merely a commutation of punishment. A

con¬ dition precedent must be performed before the pardon takes effect, and a breach of a condition subsequent annuls the pardon, with the effect that the prisoner may be compelled to serve his full term, after a hearing before a court which decides whether he has violated the con¬ dition. Usually an absolute pardon effects a removal of all legal disabilities, but forfeited property or fines are never returned. A pardon secured through fraud or deception is void. Pardons are usually sought by means of peti¬ tions, together with affidavits and letters of persons stating the grounds upon which leniency is asked.

PARDOW, par'do, William O'Brien,

American Jesuit priest: b. New York, 1847; d. 1909. In 1864 he was graduated at the College of Saint Francis Xavier, and subsequently studied at Woodstock College, Md., and in France. In 1891 he was president of the Col¬ lege of Saint Francis Xavier, New York; was provincial superior of the New York and Mary¬ land province of his order in 1893 ; assistant at Saint Ignatius Loyola, New York, in 1901—03 ; lecturer at the Jesuit Institute in 1903-06; and assistant at the Gesu, Philadelphia, in 1906-09. He was a very eloquent preacher, by many considered the foremost of his time, and was also prominently identified with the Modernist movement.

par£, pa-ra, Ambroise, French surgeon: b. Bourg Hersent, near Laval, department of Mayenne, 1517; d. Paris, 20 Dec. 1590. He studied in Paris and in 1536 attached himself as surgeon to the army destined to serve in Italy under Marshal Rene de Montejean. In 1542 he accompanied the Viscount de Rohan during his campaign at Perpignan. In 1552 he became surgeon to Henry II, under whose suc¬ cessors (Francis II, Charles IX and Henrv III), he held the same post. His enemies were numerous among the physicians, who accused him of having poisoned Francis II. It was for¬ merly believed that Pere was a Protestant, and that he was saved from the massacre of Saint Bartholomew by Charles IX, hut M. P. Valet

h.U' proved that he was a Catholic. He intro-j ced improvements in

the treatment of gun¬ shot wounds, in the operation of trepanning, and in amputation. He also introduced or re¬ stored the practice of tying up divided arteries and operated on articular concretions. A note¬ worthy edition of his works was nroduced by Malgaigne in 1840-rl. See the (Life> by Pauf-mier (1884), and Paget, (Ambroise Pare and his Times) (1897) .

PAREGORIC (Greek, Traprjyopinoc, sooth¬ ing) an opiate, the camphorated tincture of opium. It is composed of opium, benzoic acid, camphor, oil of anise, honey and dilute alcohol. Every fluid ounce contains two grains each of the opium, acid and camphor and two minims of oil of anise. It is an anodyne and antispas-modic and is much used to allay cough, relieve pain in the stomach and intestines, and to induce sleep. Many parents rely on this preparation to quiet young children and relieve pain in the stomach; but great harm results from too frequent doses because of the susceptibility of young children to opium. Though a compara¬ tively weak preparation of opium, if given re¬ peatedly or in a large dose it may act as a poison.

PAREIASAURUS, or PARIASAURUS,

a genus of extinct reptiles. See Theromorpha.

PAREJA, Juan de, hoo-an' da pa-ra'ha, familiarly called <(E1 Esclavo,® Spanish painter: b. Seville, 1606; d. Madrid, 1670. He had, while a mere boy, been purchased by the painter Velasquez as a slave and was of Moorish par¬ entage. Constantly employed in the painting-room of Velasquez, whom he had accompanied to Madrid in 1623, he became inspired with a passion for painting and secretly copied the works of his master whom he accompanied to Italy, taking every opportunity of perfecting himself in his art. As Philip IV was in the habit of visiting the studio of Velasquez and turning every picture the face of which was to the wall, he one day turned a picture which Pareja had completed with great care and placed in the king's way. When the king asked who the painter of the work was, Pareja fell on his knees and asked Philip to protect him. uSuch a painter as that,® replied the monarch as he turned to Velasquez, (<ought not to be a slave.® Velasquez gave the newly found artist a deed of manumission and took him to be his pupil. A fine portrait of Paraja by Velasquez is shown in the collection of the Earl of Rad¬ nor. Pareja's (Calling of Saint Matthew) (1661) is in the Prado Gallery at Madrid, and in the Hermitage at Saint Petersburg is a very beautiful portrait by him. In the chapel of the Recollects at Madrid is his cSaint John the Evangelist, Orontius and the Madonna* ; and the (Baptist, of Christ* is in the Santa Trinidad at Toledo. These pictures exhibit him not only

as a learned and skilful disciple of his master, Velasquez, but as very much of a genius in his own way who has much of the style of the best schools of Genoa and Venice in his work, which shows, at times, a strong reflection of the Flemish masters. While his early work was purely imitative, he became later in life as cos¬ mopolitan as his master, with whom he traveled constantly and thus had a chance to study the best in art. His conception and coloring arc little inferior to those of Velasquez.

PARELLA, a name given to some of those crustaceous lichens of commercial value which are used to produce archil, cudbear and litmus. The name more strictly belongs to one species, Lecanora parella , and the red or crimson dye prepared from it. See Archil.

PARENCHYMA, in anatomy , zoology and botany, the soft tissue of organs: in anatomy it signifies the true tissue as distinct from con¬ nective tissue; in zoology it is generally ap¬ plied to that of open tissue, as of the lungs and liver ; in botany to the substance of leaves, as the green palisade-parenchyma® Qf the up¬ per surface of a leaf, or the ˆspongy paren¬ chyma" of the lower surface. The characteris¬ tic feature of parenchyma of plants is that the cellular tissue is shallower and encloses inter¬ cellular spaces ; whereas in prosenchyma it is deeper and without cellular interspaces. See Tissue; Leaves.

PARENT, pa'rari', Etienne, Canadian jour¬ nalist and cabinet officer : b. Beauport, near Quebec, 2 May 1801 ; d. Ottawa, 23 Dec. 1874. He was educated at the Seminary of Quebec and at the College of Nicolet. At 21 he became editor of Le Canadien, an old and influential journal published in French, which position he resigned in 1825 in order to study law. He was called to the bar in 1828, but practised for only a brief period, becoming translator, and subsequently librarian, of the legislative Assembly of Lower Canada. He again edited Le Canadien in 1831-42, suffering imprison¬ ment in 1837-38 because of political opinions published in his newspaper. Upon the union of Upper and Lower Canada into one province in 1841, Parent was elected to its assembly from Saguenay; but. in 1842 he resigned in order to accept an appointment as clerk of the executive council. In 1847-67 he was assistant secretary for Lower Canada, and in 1867 he was ap¬ pointed Acting Assistant Secretary of State for Canada. Throughout, his career he continued to write for Le Canadien,- bringing effective sup¬ port to . the French-Canadian party. He was deeply interested in the improvement of in¬ dustrial. conditions and an advocate of political

and religious, reforms. He was a lecturer of repute and. did much to popularize that form of instruction in Canada. Author of (Du travail chez l'homme,* (L'Industrie comme moyen de conserver notre nationalite,* and (Importance de l'etude de l'economie politique,* published in (Repertoire Nationale) (1848) ; (De l'importance et des devoirs du commerce* (1852) ; (Considerations sur le sort des classes ouvrieres* (1852), *etc.*

PARENT, Simon Napoleon, Canadian

statesman: b. Beaufort, Quebec, 12 Sept. 1855; d. 7 Sept. 1920. He was graduated at Laval Uni¬ versity in 1881 and was called to the bar in that year. He engaged in practice in Quebec, attaining eminence in his profession. He served on the municipal council of Quebec in 1890-94, and was mayor of that city in 1894—1906. In 1890-1905 he represented Saint-Sauveur in the legislative assembly of Quebec; was Minister of Lands, Forests and Fisheries in .1897-1900, and from 1900 until he retired from public life in 1905 he was Prime Minister of Quebec. He became chairman of the Transcontinental Rail¬ way of Canada in 1905.

PARENT AND CHILD. See Law of

Family.

PARENT-TEACHER ASSOCIATIONS.

Associations of parents and teachers came into being as a co-operative agency between the parents and the public school. The need for such associations is due to parental ignorance of educational procedure ; to parental indulgence of childhood weaknesses to the injury of the children; to the teachers' ignorance of child development ; and to the lack of authority by school officials to compel obedience. By a common association the attention is focussed on the child and his educational problems. The parent becomes acquainted with the difficulties besetting the teacher by seeing the school activi¬ ties and

by following his child into his place in the school organization. In so far as the parent can comprehend, he is made to see the educational process applied to his child and his sympathetic interest is elicited. The teacher learns the mental and moral characteristics of the parental antecedents of the child and makes contact with the home atmosphere. The teacher by getting a sympathetic understanding of the child's homelife, gets a clearer knowledge of the child's mental habits and capacities. The clearer point of view by both parent and teacher sheds light on problems of school discipline and re¬ moves obstacles in the child's relations to school authorities.

A parent-teacher association usually con¬ sists of all the parents who send their children to the same public school building, and all the teachers who teach in that building. An asso¬ ciation may be formed of all the parents and teachers of an entire community. If the com¬ munity is large, with more than three school buildings, building associations give better re¬ sults than community associations. A central association composed of the building associa¬ tions is sometimes found profitable. The or¬ ganization is simple, needing no more officers than are necessary to conduct meetings, arrange programs, receive and expend small sums of money. Since education is the fundamental purpose it is necessary that the principal or superintendent be the guiding spirit of the association. When the parents become the leading element in the association, the pur¬ poses of the association will frequently become social or even political to the neglect of the child's educational interests.

The activities of parent-teacher associations start properly and effectively with exhibitions of school work to which the parents are in¬ vited. From the school exhibit the parents enter intelligently into the school's problems. Methods of teaching particular subjects may be presented. Special activities such as play¬ grounds or community dances may be explained. Important phases of child life may be presented. Many parents as well as children are poorly acquainted with the difficult period of adoles¬ cence. Vocational guidance can be made clear to parents and children. Home study, an ever-vexatious question, may be adjusted. Home social diversions may be restricted and guided. A school library may be started or augmented by the association. School equipment may be improved by laying right foundations in pa¬ rental intelligence and interest. New schoolhouses mav be secured. Right sanitation may

be established. All the legitimate interests of the child and the school

are promoted by a right use of a parent-teacher association.

The education of the American parent is an important part of our educational problem. The immigrant parent is our chief concern but by no means our only concern. Parents often lose control of their children because they cannot intelligently follow the studies of their children in school. The child who finds that his excursions into algebra of Latin or biology carry him beyond the range of his parents' achievements may lose respect for his parents. Membership in a school social organization may set up a false sense of importance and in¬ dependence in the child. The child's ambitions may reach out beyond the limits of the parents' vision. How to educate the parent up to the child is no mean question. How to help the father and mother understand the first three of the seven <(ages of man® is a large under¬ taking. The parent-teacher association offers an organized scheme for this education of the parent and will show much common ground between parent and teacher. It will help the parent better to know his own child. See Education, Elementary.

A. R. Brubacher,

President of New York State College for T eachers.

PAREPA-RO.SA, pa-ra'pa-ro'sa, Euphro-syne Parepa de Boyesku, British opera singer : b. Edinburgh, Scotland, 7 May 1836; d. Lon¬ don, England, 21 Jan. 1874. She was the daughter of Georgiades de Boyesku, a Wallachian nobleman, and was educated by her mother. In 1855, she made a successful debut at Malta where she appeared under the stage name of Parepa, and in England the following year. She possessed a soprano voice of re¬ markable power, and sang in the title-roles of (Camilleˆ <La Reine Topaz, > (Victorine) and other operas, with great success. She was mar¬ ried in 1864 to an English army officer, Henry de Wolfe Carvel, who died the next year. In 1866 she made her first tour of America and in 1867 was married to Carl Rosa, a noted violinist, operatic manager and conductor with whom she formed the Parepa-Rosa Company. Her success continued unbroken until her death, which occurred while she was preparing her part in an English version of (Lohengrin.) She excelled in oratorio.

PARESIS. See General Paresis ; Insan¬ ity.

PARHELION, in astronomy, a mock sun, having the appearance of the sun itself, and seen by the side of that luminary. Parhelia are sometimes double, sometimes triple and some¬ times more numerous. They appear at the same height above the horizon as the true sun, and

they are always connected with one another by a white circle known as the parhelic circle. This circle is due to the reflection of the sun's rays by the vertical faces of ice-crystals in the air, which assume a definite orientation in fall¬ ing. The parhelia appear where the parhelic circle crosses and reinforces the two halo circles around the sun at distance of 22° and 46° respectively. The halos show the colors of the rainbow with the red inside. They are due to the fact that 22° and 46° are approximately the

angles of least dispersion, and hence of the greatest transmission of light, for ice prisms with angles of 60° and 90° respectively. Very rarely parhelion-like concentrations of the parhelic circle are observed at 180° or 120° from the sun. These are known as anthelia or paranthelia, respectively. See Halo.

PARIA, pa're-a or pa-re-a', (1) gulf of the Atlantic between Trinidad and Venezuela and almost hemmed in by land, being connected with the ocean by the Boca de Dragos or Dragon's Mouth, at the north, and by the Boca del Soldado or Soldier's Mouth, at the south. These straits are about 10 miles wide, are very dangerous and were first sailed through and named by Columbus in 1498. The gulf (some¬ times called Golfo Triste) furnishes good an¬ chorage. It measures 100 miles in length and 40 in width, receives the northern waters of the Orinoco as well as the Colorado, and is full of fish. (2) A peninsula, jutting to the east from the mainland and forming the northern side of the Gulf of Paria. It is formed by a bold picturesque ridge of mountains. (3) The extreme eastern point of this peninsula is called the Cape of Paria (or Punta Panas).

PARIAH, pa'ri-a, a low class of Hindus in the Tamil country in Madras. They belong to the class of agricultural laborers and are com¬ monly employed as servants by Europeans. They are avoided as unclean by

all castes pro¬ fessing Brahmanism, yet are superior to some other castes in the Tamil country. The name is derived from parai, a large drum, the Parai-yans being the hereditary drumbeaters at festi¬ vals and similar occasions. The caste numbers nearly two and a half millions. It corresponds to the Malas in the Telegu country. The Holeyas in the Kanarese country and the Mahars in the Deccan. They performed notable service under Chie, their numbers furnishing a large proportion of the sepoys, and many of them are in the Madras Miners and Sappers branch of the service. Many of them have dis¬ tinguished themselves by ability after being educated, their intelligence being decidedly nor¬ mal. The word has come into common use in English as descriptive of any class degraded socially. Consult Lapique, L., Le probleme anthropologique des Parias et des caste homologues, chez les Dravidiens) in (Bulletin de la Societe d'Anthropologie de Paris) (Vol. VI, 1905).

PARIAH DOG, one of those dogs which are masterless and run wild in many Oriental cities. The name is derived from that given to the outcast or lowest servant class in India where, as also in Constantinople and other cities, such dogs are extremely numerous. In many cities they form almost a distinct breed, being of large size and generallyof a dirty yellow or black¬ ish color. The hair is short and smooth, and the ears pointed and erect. They possess the canine instinct of running in packs and frequently take possession of certain districts after nightfall. A very useful service is performed by them in Constantinople, where they act as scavengers and devour the garbage which is not otherwise removed. Their wits have been sharpened by this precarious mode of life and they are said to be possessed of unusual intelligence and cun¬ ning. By the Mohammedans they are con¬ sidered unclean and the faithful are defiled

by accidental contact with one of them. Pariah dogs fall into five classes, namely, (1) A wild breed of a reddish-brown color inhabiting the lower ranges and jungles of the Himalayas; (2) those inhabiting districts in which turnspits are frequently met with; (3) those of Sumatra which are distinguished by their fox-like ap¬ pearance and their bushy pendulous tail; (4) the indigenous Javanese animal. (5) To these should be added the Egyptian dog already men¬ tioned, which seems to be in many ways dis¬ tinct from the other four classes.

PARIAN CHRONICLE. See Arundel Marbles.

PARIAN MARBLE, the most celebrated statuary marble of antiquity. It

is white, of mellow tone, and large-grained. It received its name from the island of Paros (q.v.), where it was quarried. See Marble.

PARIMA, pa-re'ma, Sierra de Sierra,

mountain range of Guiana, Venezuela and Brazil. The eastern end of the range is known locally as the Sierra Pacaraima. This range of mountain forms an extensive, irregular up¬ land plateau sloping toward the valley of the Amazon and to the right and left of it. The Orinoco flows on three sides of the range, which has as its southwestern boundary the Rio Negro and reaches east to the Essequibo. A bare plateau it is with old sandstone super¬ ficial strata and a granite core. The range reaches its highest points in Sierra Maraguaca, Duida and Yamari, which are over 7,000 (the first two over 8,000) feet high. The roughest and most defined part of the Parima range is that which extends into Venezuela.

PARINI, Giuseppe, joo-sep'pe pa-re'ne, Italian poet: b. Bosisio, a village of the Milan¬ ese, 23 May 1729; d. Milan, 15 Aug. 1799. He studied theology and was ordained a priest in 1754. His interests were always literary, lather than ecclesiastical. He was an instructor suc¬ cessively in the Scuole Palatine and the Brera College, at Milan, and held office for three years in the city government under Napoleon. His chief work is (I1 Giorno) ((The DayO, a biting satire on the Italian nobility. He wrote also some excellent odes, and was always most skil¬ ful in the arts of versification. There is an edition of the (Giorno) by Borgognoni (1892). Consult Dumas, (Parini, Sa Vie ses Oeuvres son Temps> (1878) ; Cantu, (L' Abate ParinP (1891) ; Cerquetti, (I1 testo piu sicuro delle Odi di Giuseppe ParinP (Osimo 1892).

PARIS, or ALEXANDER, was the second son of Priam, king of Troy and Hecuba, and is set forth in Homer as the cause of the Trojan War. Before his birth his mother dreamed that she had brought forth a fire-brand, which re¬ duced Uion to ashes, and Priam, learning this, gave her next son to be exposed by a shepherd on Mount Ida. Here the babe was suckled by a she-bear and the shepherd discovering this after five days, gave him the name of Paris, and undertook his rearing. The name of Alex¬ ander was given him later for his valiant de¬ fense of certain heroes. On Mount Ida he fell in love with the nymph CEnone, daughter of a river god. Their happiness was interrupted one day bv the appearance of Hermes leading before Paris the three goddesses Hera, Athene and Aphrodite. At the bridal of Peleus and Thetis,

PARIS

Eris, or Ate, goddess of strife or mischief, had thrown down a golden apple on which was in¬ scribed ((to the fairest woman.® Hermes called upon Paris to decide which of the three god¬ desses present was entitled to the gift, for each of the three claimed it as hers by right. Hera promised to the beautiful shepherd power and dominion if he would decide in her favor; Athene offered fame and wisdom ; Aphrodite pledged herself to send him the loveliest wife in the world. The judgment of Paris was made in favor of the goddess of love, and when he one day brought a bullock for sacrifice at a festival in the city of Troy, he was recognized by his sister, Cassandra, the prophetess, and acknowledged by Priam as his son. With the aid of Aphrodite he carried off Helen, the beauteous wife of Menelaus, king of Lacedaemon, and returned with her to Troy. This was the cause of the Trojan War, for Agamemnon joined his brother Menelaus in a campaign in which Troy was besieged for 10 years and even¬ tually sacked. Homer has given us vivid ideas of the beauty of Paris and has described him as fond of minstrels and of beautiful women, as well as skilful in war. His lightness of char¬ acter is also dwelt upon by the poet. After the fall of Troy, he returned to Mount Ida and the nymph CEnone to be healed of the wound he had received from the arrow of Hercules shot from the bow of Philoctetes. But CEnone re¬ pulsed her faithless lover, who died of his wound. In Greek art he is represented as a beardless young man of handsome form, wear¬ ing a Phrygian cap, and generally seated with the apple in his hand as in the statue bv Eu-phranor in the Vatican. The Judgment of Paris is the subject of vase paintings. See Iliad; Homer; Trojan War.

PARIS, pa-res, Gaston Bruno Paulin, French philologist: b. Avenay (Marne), 9 Aug. 1839; d. Cannes, 6 March 1903. He was son of a noted father Paulin Paris (q.v.). In 1872 he became professor of French language and literature at the College de France, succeeding his father, and in 1895 director of that institu¬ tion. In 1896 he was elected to the academy. A pupil at Bonn of Diez, he did much to carry forward the study of Romance philology which the former had practically founded. He and Paul Meyer founded Romania, a romance jour¬ nal. He was one of the greatest of. French critics and a very profound and able philologist. His knowledge was wide as his

preparation had been deep. He devoted himself principally to the language and literature of his own country, and he used all his efforts to arouse in his pupils a love and appreciation of the best in literature. (A Poetical History of Charlemagne) (1866) ; (Poetry of the Middle Ages> (1885) ; and 'French Mediaeval Literature) (1888), are his most important publications.

PARIS, pa-re, Louis Albert Philippe D'Orleans, Comte de, French nobleman, grand¬ son of Louis-Philippe : b. Paris, 24 Aug. 1838; d. Stowe House, Buckinghamshire, England, 8 Sept. 1894. His father was killed by an acci¬ dent in 1842, leaving him heir to the French throne. After the revolution of 1848 he resided for a time at Claremont Park, Surrey, where he was educated by his mother, and where Louis-Philippe died in 1850. He made a journey to Syria in 1859 in company with his brother, the

Due de Chartres, and on his return to England he published an account of the journey under the title of (Damas et le Libeau.5 In 1861 - during the American Civil War, he, with his brother, the Due de Chartres, served as volun¬ teers in the Union army in order to gain a prac¬ tical knowledge of military affairs, and were for some time on the staff of General McClellan. On his return to Europe in 1862 he married his cousin, the Princess Marie-Isabelle, eldest daughter of the Due de Montpensier. Under a nom de plume he began about this time to contribute to the Revue des deux Mondes. On the outbreak of the Franco-German War he desired to serve against the enemies of France, but was not allowed by the French authorities to do so. After the war, however, he was ad¬ mitted a member of the first national assembly, and his property was restored to him. On the death of the Comte de Chambord, in 1883, the Comte de Paris was recognized as head of the royal house of France. Under the expulsion bill of 1886 — a measure due to the fear of the French republicans that the royalist party was becoming too strong — he, and the other royal princes, were forbidden to reside in or enter France. The same year his eldest daughter was married to the crown-prince of Portugal. He published a valued (Histoire de la Guerre Civile en Amerique (1874— 75), which has ap¬ peared in an English translation; and (De la Situation des Ouvriers en Angleterre5 (1864). During his latter years he lived the retired life of an English nobleman.

PARIS, par'is, Matthew, English mediaeval historian: b. about 1200; d. about 1259. He en¬ tered the Benedictine order at the monastery of Saint Alban's in 1217, and on the death of Roger of Wendover in 1236

succeeded to the post of historiographer and began the continu¬ ation of the (Chronica Majora,5 a record of English history kept at the monastery. In 1246 he was invited by Hacon IV of Norway to ad¬ just the affairs of the abbey of Saint Benet Holm in Trondhjem province, and in 1248-49 thoroughly reorganized the establishment and received extensive gifts from the monarch. His great chronicle ends abruptly at May 1259. He carefully revised the work of the early com¬ pilers on the ‘ Chronica, 5 extending to the end of 1188, and the contribution of Wendover (1189-1235) and prepared an abridgment called the (Historia Minor5 (1067-1253). His narrative is extremely accurate ; he wrote brightly and with vigor, noted important hap¬ penings of foreign lands, and did not spare his censure when he thought it needed. Paris also prepared an abridgment of the ‘Chronica Ma¬ jora5 covering the period 1067-1253 which con¬ tains a few incidents not recorded in the larger work; and he wrote the ‘Vitae Abbatum S. Albani.5 Consult Gross, C., ‘Sources and Liter¬ ature of English History5 (London 1900) ; Jessopp, A., ‘Studies of a Recluse5 (London 1893) ; Plehn, Hans, ‘Politische Character Matheus Parisiensis5 (Leipzig 1897) ; Potthast, A., ‘Bibliotica Historica Medii 2Evi5 (Vol. II, Berlin 1896). *

PARIS, Paulin, French philologist and his¬ torian : b. Avenay, Marne, 1800; d. Paris, 1881. He became an assistant in the manuscript de¬ partment of the National Library, and an ex¬ pert in the decipherment of oldFrench literature,

his work marked by ceaseless energy, good taste and a pleasing style, extending over 50 years. He was elected a member of the Academy of Inscriptions in 1837 and from 1853— 72 was pro¬ fessor of mediaeval history in the College de h ranee, where he was succeeded on his retire¬ ment by his eminent son Gaston Paris (q.v.). His principal works are the catalogue of (Manuscrits frangais de la bibliotheque du roP (1836-48) ; and his edition of the (Grandes chroniques de France > (1836-40). Among his numerous other works are notable selections from manuscripts, <Romancero frangais, > (Garin le LˆherainP

(Berte aus grans pies,* (Romans de la table ronde> and a French translation of Byron (1830-36).

PARIS, par'is (Fr. pa-re), the capital and chief city of France, and the political, literary, artistic and social capital of Europe since the decline of Rome, situated in the northern part of France, on both banks of the Seine, in lat. 48° 50' N. and long. 0° 00' Observatoire. It is the second city in size in Europe, and the third centre of population on the earth, being sur¬ passed only by New York and London. The population, according to the census of 1911, is as follows: Paris, within the walls, 2,888,110; the Northern and Southern suburbs, 1,265,9 32; total for Greater Paris, 4,154,042. This is the de¬ partment of the Seine, with an area of about 184 square miles. To this should bp added half the population of the department of Seine et Oise, 458,808, which gives a grand total of 4,- 562,850 for Paris and the suburbs. It is the only considerable modern city which is com¬ pletely surrounded by a wall, and the popula¬ tion, in consequence of the confined area within the fortifications (about 31 square miles), is the densest in Europe. The following table gives the population at various times since the early part of the 13th century, before which no accu¬ rate census is found :

In 1220, under Philippe Auguste . 120,000

In 1250, under Louis IX . 130,000

In 1380, under Charles V . 150,000

In 1605, under Henry IV . 200,000

In 1715, under Louis XIV . 500,000

In 1810, under Napoleon . 600,000

In 1831, under Louis Philippe . 786,000

In 1851, under the Second Republic . . 1,053,000

In 1861, after the annexation of the faubourgs

within the fortifications . 1 , 696 , 000

In 1866, under Napoleon III . 1,825,000

In 1876 . 1,988,800

In 1886 . 2,344,000

For a thousand years prior to about the middle of the last century Paris was the largest city in the world. The defense of this metropo¬ lis is provided for by an elaborate system of fortifications, which were constructed between 1840 and 1845, at an expense of 140,000,000 francs. The enceinte, with its 94 bastions, is about 22 miles in length. The ramparts, aver¬ aging 32 feet in height, with a parapet 19 feet in width, are environed by a moat 48 feet in width, and a glacis. The approaches to the city are also commanded by 17 detached forts at different but relatively short distances from the walls. A second line of forts at a greater dis¬ tance from the ramparts has also been con¬ structed on the heights commanding the valley of the Seine. The area included within this elaborate system of fortifications is 400 square miles. The garrison in time of peace numbers 50,000 men. Thus Paris is the greatest fortified

camp in the world. But the experience of the late war has shown that fortifications, even the most elaborate, are of little value against modern artillery; the only real defense for the great city is the army. The administration of the city is shared between the Prefect of the Seine,, ap¬ pointed by the Minister of the Interior, and the municipal council elected for a term of three years — one from each quartier — by uni¬ versal suffrage. The annual budget runs to 375 or 400 millions of francs. The city is divided into 20 arrondissements, in each of which there is a mayor and a mairie, which is the office of the mayor, and constitutes a sort of city-hall for the arrondissement. Each of the arron¬ dissements is divided into quartiejs correspond¬ ing roughly to the wards of an American city. With 20 arrondissements there are 80 of these quartiers, each one of which has a distin¬ guishing name, as for example, the quarter of the Champs Elysees in the eighth arrondisse¬ ment, or the quarter of the Sorbonne in the fifth arrondissement. These quarters are in general of about the same territorial extent, but the pop¬ ulation varies greatly between about 10,000 and

110,000.

Early History. — Our knowledge of Paris and its people begins during

the Roman invasion of Gaul, in the spring of the year 53 b.c., at which time Julius Caesar convoked at Lutetia an assembly of the Gallic tribes. This is the first mention of what is now Paris in authentic history. Its annals thus commence in the (iCom-mentaries5 of Caesar, wherein, referring to that assembly, he mentions a collection of fisher¬ men's huts on the island in the Seine, which he calls Lutetia — probably and perhaps cer¬ tainly a Latinized form of the name by which it was then locally known. Strabo writes it Lucotocia, and Ptolemy Lucotecia, while the Emperor Julian dates a letter from the city call¬ ing it Louchetia. Of these various spellings, that employed by Caesar is the one commonly adopted, although the hill of the university was known for many centuries as C(Mons Lucotitius *In modern French it is written Lutece, and is understood to refer only to the island of the city, while Lucotece is the French name for the Roman settlement on the left bank. The deri¬ vation of the word has been the subject of much research. Scholars have attempted to trace it to Celtic sources, especially to the dialect of lower Brittany. Caesar in the (Commentaries* states that the inhabitants of the island in the Seine to which he refers formed a division of a clan or tribe, called the Parisii. Thus, he says, «The Parisii are inhabitants of a tract bordering upon that of the Senones, with whom tradition says they were once allied.® In the year 52 b.c., Labienus, the lieutenant of Caesar, marched upon Lutetia, and after a battle fought with the Parisii in the plain now covered by the southern suburbs, and of which an echo remains to this day in the name of the little village of Vi try (place of the victory) took formal pos¬ session of the island on behalf of the Romans. The etymology of the term Parisii has been no less a subject of dispute than that of Lutetia. It is, however, also traced to lower Brittany and to a Celtic word signifying a boat. The anaient, as well as the modern, emblem of Paris is a boat, as may be seen by the interesting carv¬ ing which ornaments the base of one of the

vaults of the roof in the Palais des Thermes. Thus the figure of a ship which serves every¬ where to identify the property of the city of Paris to-day, and which constitutes the hall¬ mark, so to speak, of the city,

harks back to the Parisii of Caesar and his (Commentaries.) Hilaire Belloc says, <(The triple prows which are seen on the lamp-posts of modern Paris are an emblem 1,500 years old, and without a break of continuity.® The Romans occupied Paris for

notably the Palais des Thermes at the Musee de Cluny, the amphitheatre, just out of the rue Monge, the arches of the aqueduct which crosses the valley of the Bievre at Arcueil — two of the arcades of which are preserved to this day, just outside the southern wall — and the ruins of the reservoir connected with it which were discovered in opening the rue Gay-Lussac.

Topography. — A modern traveler looking over the town from the heights of Montmartre, from the top of the Eiffel Tower or from the dome of the Pantheon, sees the city, spread out before him like a map, lying in a plain encircled on almost every side by distant and low hills, those on the north and east being farther re¬ moved than those on the south and west. Paris, therefore, is situated in what geologists call a basin or plain of greater extent than that occu¬ pied by any other modern capital, being scarcely ever less than 20 miles in diameter and in some places much more. The Seine enters this plain at the southeast corner, coming from the high¬ lands of Burgundy and Champagne, and, de¬ scribing a great arch or bow through the city, passes off and out at the southwestern corner of the plain.

On the west rises Mont Valerien, and on the north the hillocks of Enghien and Montmor¬ ency; the hill of the university or Mont Sainte Genevieve on the one hand, and the somewhat more conspicuous eminence of Montmartre on the other rising out of the plain. Paris .nat¬ urally divides itself into the Cite, the Univer¬ sity, or the left bank, and the Ville, or the right bank, and to be understood it must be looked at from these three points of view. Originally the town was all on the island, but even in the days of the Romans villas and country seats were built on either bank, especially £>n the north bank up toward the heights of Mont¬ martre, while on the south bank the Romans fixed their camp and at the same, time the em¬ peror's palace. We note that Julian the Apos¬ tate, who resided much of the time at Lutetia — which began about this time to be called Paris — was crowned emperor of Rome in the year 361 a.d., at a spot in the camp on the left bank, which is now located in or near the boule¬ vard Saint Michel, between the boulevard Saint German and the

Luxembourg. Julian was very fond of Paris, referring to it in one of his letters as aina chere Lutece ® (so writes wiith charming navete an ancient chronicler of the town), and praising it for its vineyards, its mild climate, the figs and the white grapes (which we still have) that the farmers of the suburbs fur¬

nished for his table, saying that Bacchus is the god of the Parisians because he is the father of joy. By the time of Philippe Auguste the city had extended on the right bank as far down the river as to what is now the eastern fagade of the Louvre, the foundation stones of which were laid by that monarch in the year 1223. The wall of Philippe Auguste extended from his palace of the Louvre in a wide loop north¬ ward and eastward to a point about the middle

Chateau

Savigny

lane Mcsnil

GRAND

‘incourt

Aulnay ˆ les Dondy

HUˆST.DENIS,

la Fontaine’

Villen euve i Cayenne

Fontenay d

ARGE1STEITI

Genuerillicrs

Min. Basset

Val Notre Dame

Rougemont

/la Cotirncuve

Redoute

(par is-ham burg)

Prancy

Aulnay

s.Bois

II ou ilk*:

Colo lubes

Crevecoeui

Pt.

Nantern

Bczons

lfoirie/

la Folie

Carrierres .

St. Oneu\ Station

SfjOMon

Cemetery

ll

Glnciere

./(*« Pavilions

Charlebourg

Engrats - de Javel

Le Rainey,

SriicUy/’

Ih Gjtre, Chateau

WFle. ˆ 1 \St. Denis

Bf.con ˆ Chateau

t’illeMe

Factory t

Courbev(jie\

V’ Casern#

Levallois

vix SM

‘Paulin

,1! o in a i 11 v i 1 It;

Nanterre

Carolines

Rond Point L de Courlevoieˆ Y

in till art re.

Villemonble

Loud >-•

‘Ft.dc Noisy

Jtedoute de . MontreuU ■’

rMhlen

clutnze

Butte*

Chaumont

Roma in

unay

tSabhflviUe

‘James /I*

Belleville

yPte.de

y.Iiomainville

R’dj! Montreuu

Fort res *

Baguolet

\ Malassise

~Ueˆfrio»iph’t

Mont Valericn

Chateau ■,

Menilmontaut

Neuilly

Plaisance

WPWdeia,

Concufdg

y Mont reau Chateau

’mont Chateau

Briquetj.

[haronne

Montreuil , sous Bois

Chateau \Fouilleuse Buzcnval

Ptnae V •Mtntlreuii

Cliaronne

taetuitf4

n R. de \ V > Fontena;

Auteui]

AˆFoutenay

sous BoDT5ˆ

Chateau

yˆMomPtioji t Behan ze))

ˆStation

ri nee n ties

St.Je(fn f Baptiste

Crenelle

1 Ft.(leS» Vincennes

■r:”\ x \Statum

Brie

sur Marne

Clnnd

Ch amjjˆdeˆ Manoeuvre, de V i\n1

No gent sur Marne,

ntj.s//

Monti ouge’

le Trtmbla\

\R. de lai Faisanden

‘Porcelain Mam

Jˆjˆ Glaylcre FAin{e\d’ AlUiCSˆ

(IIAKKXTO: TLK PONT—

M3 ;

d’Avray

la Ronce Chateau

Poulangis

Matakuf

le Station

Champlgny sur Marne

It a 118

Joiuville lerOuC

la Femme sans Tete /

faux:

lehCnnkres

GenuU^^^^Z

Maur les Fosse?

— nX’harentoneq Chateau Gaillard

linardStu. ,

FI. tie V a lives

Moutrouge

Ft.diTAicti

Montroiige//&£

la Croix/d’ ArceuiX

BajpHitMH

Hosptd

nicural

Ftklc Cliarcuton

ChalnpJgnolU

JV. Djden’la mait

Fleur y

;QA\Clainart

lFt.de

{lamp

Cliatillon

Gournay \ Chateau

P Alt IS

‘Part a \ VAnylais

Arc ue i

F tides llaulcsT” — iBruyercs \

de Cachunˆfˆ

Min*

Saquet

Cachan

ˆPte.

Chatillon

Ft.deˆ

Cliatillon

Iicnucvieres sur Marue

les Miches

\ FoutenSyd aux Roses

•T Tyivaux

\

-•Fit-de T\:ivau&

Cretcil

Steam Railroads Street Railroads Canals

Re i ne

Bourg

Min.

d’ Argentblanc

Irbiere _ —

Bonneuil

-surname

Plessis Picquet

Min.d’Ambode

la Saussaye

Pt. Bicttre

£

. *

-

.

■

■

r .

.

island of Saint Louis, as it now exists, and thence, across the river, in a smaller loop which crossed the rue Soufflot at the corner of the rue Saint Jacques, and passed near what is now the garden of the Luxembourg and close to Saint Germain des Pres, to a point on the river at the Tour de Nesle about on the site of the Institute. Great chains were hung across the river above and below to complete the forti¬ fication, and towers at either end buttressed the river. A fragment of the wall of Philippe Auguste still stands in a good state of preserva¬ tion at a point in the rue Clovis near the rue Cardinal Lemoine, just behind the Pantheon, and some less important traces of it are also still to be found on the right bank. Like most river cities, Paris grew down the river rather than up. The size of the city within the walls was increased by the mural enlargement of Henry IV, and later by the new and greater fortifications of Louis XIV. The grand boule¬ vard, on the right bank, from the Bastile to the Madeleine, runs along the line of the northern walls of Louis XIV, which were thrown down and demolished by Louis XV. The present walls were the . work of Louis Philippe. A project is now in hand to demolish them, at least in part, but up to the present the walls are intact and there is a disposition on the part of Parisians to insist upon maintaining the fortifi¬ cations, . although an interesting project for their demolition has been put forward which would give the city in their place a circle of parks and

extend the avenue des Champs Elysees to the terrace, at Saint Germain-en-Laye.

Civic Ait and Civic Charm. — Paris was the pioneer in the modern scheme of civil re¬ generation intelligently conceived and carried out in a large way. Accordingly it is now par excellence the city beautiful,

and the leader in the more deccrative.Jy aesthete features of mod¬

ern civic art. Historically and architecturally it ranks with Athens, Rome and Vienna as one of the three most wonderful cities of the world.. Since the work of the third Napoleon and his architect-engineer, Baron Haussmann ~ a work, it is fair to say, which has been and is zealously and intelligently carried forward under the republic — in opening new thorough-

Paris under Louis XIII.

fares and in the construction of many new and splendid public buildings, in virtue of the essen¬ tial physical regeneration of the city resulting from this construction and reconstruction which dates from the second empire, Paris has been incontestably the first of cities. Under the operation of the building laws and the regula¬ tions as to height, size, general character and style, pursuant to which Paris has been built and rebuilt for the past half century at least the city may be said to be built to a scale — the form and quality of the construction being pre¬ scribed, and each new house as it were com¬ mencing as and where the last house left off. Paris, is thus made to constitute architecturally a civic entity, an ensemble, (<a city with founda¬ tions, w and not a heterogeneous and promiscu¬ ous collection of houses, with a miscellaneous assortment of taste in their construction. There is for example a uniform sky line as much as a uniform street line, with no architectural mon¬ strosities, and with everything built under a central intelligent supervision, as part of a preconceived plan, which eliminates lawless in¬ dividualism and the architectural vagaries re¬ sulting from personal caprice. Thus everything is made to conform, as part of a substantial uniformity, and to square with prescribed canons of good taste in building. The streets of Pai\ accordingly display a xdeasing elegance which

is not the result of accident, and evince a. unity in the scheme of construction, which, without being monotonous, delights the sense of order and proportion by its form and fitness. We find men coming from all parts of the globe, and seeing here something better than mere wealth of luxury and amusement, something more than splendid nalaces, sumntuous edifices and a multiplicity of promenades, avenues and boulevards. To all men who reflect Paris has a charm quite independent of its external beauty. Among Americans of our heroic age, Thomas Jefferson, Benjamin Franklin, the Livingstons, Gouverneur Morris and Robert Fulton ; and among literary Englishmen, Richardson, John Wilkes, Horace Walpole, Gibbon, Hume and Sterne breathed with delight its intellectual atmosphere, and few men of later days are impervious to the fascination.

Paris at the opening of the reign of Louis XIV.

How to Account for Paris — its Raison d'etre. — Paris, like ancient Rome, and perhaps like earlier Babylon and in some degree like later Florence, grew great not primarily by commerce and trade nor by manufacture, but essentially as a city-state, as a capital, as the capital not alone of France but of the modern world. Consequently there is no basis for comparison with Pittsburgh, or Lille, or Man¬ chester as a manufacturing town, or with New York or London (her only rivals in wealth and population) in trade and commerce. Her pri¬ macy is in none of these things, although nec¬ essarily she is great in trade and considerable in manufacture. It is not easy to formulate and disclose the secret of this obvious pre-eminence ; but it is the pre-eminence of a capital pre¬ eminent. Paris is certainly exceptionally great in few things that makes a market town, while it is superlatively great in everything that makes a capital. Its evolution through the centuries has been along these lines, and its unique posi¬

tion among the great cities of the world is now based essentially upon the fact that modern civilized mankind has here its common seat and centre. There is in the Christendom of to-day a gravity of Paris. The whole world tends here; each individual from every country on the globe, going abroad or who has gone abroad these 1,000 years past,

came and comes here — merchant, artist, student or merelv curious traveler — each comes here necessarily and in¬ evitably, each finds here his heart's desire and contributes each his mite of money and admira¬ tion. Thus Paris is the sure goal of every traveler; wherever else he may go or stay, he comes here as to a capital, and stays here as in the capital. In this way alone, as it would seem, can one account for the material as well as the spiritual greatness of Paris, which has no other adequate foundation.

This distinctive fact in the psychology of Paris grows upon one as he comes to know and to love the great city and to feel at home within her walls — a fact, moreover, not likely to be minimized by those Americans who are something more than blind provincials. It is very certainly a fact that cannot be made away with or looked out of countenance by insular, racial or political prejudice, by local conceit or by sheer intellectual inaptitude — a fact, further¬ more, that appeals powerfully to the philosophi¬ cal student of modern history as well as to the enlightened man of the world. Napoleon, say¬ ing (<I know full well that London is a corner of the world, while Paris is its centre,® formu-. lated this idea. There is room for but one such city in such a world as ours at a time, and it takes 1,000 years to build; so that one may say, not merely as a rhetorical flourish, that what Rome was Paris is. She might still maintain this general capital position in the world — as Rome has done in matters of the spirit — al¬ though the France of which she is political capi¬ tal should one day lose her present command¬ ing position in the concert of Europe and sink, like Spain, to a fifth-rate power. Although, ac¬ cording to the common saying, Paris is France, it is something more; a sort of imperium in imperio, with a clientele as wide as the world, and a vogue that extends to the verge of civili¬ zation. She has moved the centre of the world's gravity away from the citv of the Caesars and fixed it in the valley of the Seine. Set like a jewel and crowned as a queen, she holds her position sure as the head and front of the modern world, with a distinction and a grace that she never seemed less likely to lose than to-day.

The University. — Alone among the great capitals of the world, Paris is the site of the old university of the nation. The university had its cradle as early as the latter part of the 8th century on the island of the city in the cloisters of the cathedral, between the church and the larger arm of the river on the north¬ erly side. The tradition is that the foundation dates from 780, when Charlemagne called the famous Akuin to Paris, and established a school for him at Notre Dame. An echo of the tradition — whatever the tradition itself may be worth — has come down all the way from the 8th to the 20th century. Saint

Charle¬ magne is the patron saint of the university, and every year on the 28th of January, which

is his day in the calendar, the schools take holi¬ day. The authentic annals, however, seem to commence with Pierre Abelard about 1107. Under him the institution still in the cloisters of the cathedral began to gain that international prestige which it has never lost. The pathetic romance of Heloise and Abelard lends a senti¬ mental interest both to the time and to the place. The site of the house where these unhappy lovers lived is marked by a plaque on a wall on the Quai aux Fleurs. Abelard is said to have conferred upon himself the degree of doctor of divinity while he was connected with the uni¬ versity. Henry II of England submitted to the great council of the university his quarrel with Thomas a Becket of Canterbury in the 12th century. In 1200 it received a royal charter

Paris at the close of the reign of Louis XIV.

from Philippe Auguste; in 1208 Innocent III gave it a papal charter; and in the 14th century Charles V conferred upon it the title of ((the eldest daughter of the kings.® The term ((university® as signifying a collection of schools of higher learning originated in Paris. It was first employed in connection with this institu¬ tion, in the Bull aS cientiarum fontem ® of Urban IV in 1264, wherein it is designated as the ((Universitas Parisiensis .® The degrees of bachelor and master of arts also originated here. The university remained on the island and under the shadow of the cathedral until the beginning of the 13th century, when it passed over into the rue de la Harpe on the left bank and slowly climbed up the hill of Sainte Genevieve. The first buildings of the faculty of arts were put up in what is now^the Latin quarter in the 13th century near the church of Saint Julien le Pauvre in the old rue du Fouarre. The uni¬ versity grew and prospered throughout the

lat¬ ter half of the Middle Ages under the patronage of the Church and of the kings. The Faculty vol 21 — 20

of Law and the School of Medicine were both founded in the 12th century, the law school dat¬ ing from 1160. From the beginning of the 13th century to the end of the 16th the Sorbonne was a sort of international theological parlia¬ ment which the nations and kings of Europe consulted on great political and religious ques¬ tions (as, for example, Henry VIII, of Eng¬ land, on the annulling of his marriage with Catherine of Aragon), and which assumed the function of pronouncing upon the orthodoxy of new books, condemning to destruction by fire such as were not conformed to its ideas. As early as the 16th century the university had from 12,000 to 15,000 students, drawn from every quarter of the earth. They all learned to speak an extraordinary mixture of French and Latin, in which the work of the schools was then carried on, and it was not until the end of the reign of Henry IV that this jargon was displaced by idiomatic French. Because Latin was the language of the university, the region of the schools was called the Pays Latin, or, in our modern phrase, the Latin quarter. Then the language was indeed Latin of a sort; now students from every land and all tongues, except Latin, stream through the streets of the ouarter with the polyglot Bohemianism of comradeship which has become such a Parisian * characteristic. During the Middle Ages there were at the university separate colleges for each of the four nations, France, Picardy, England and Normandy, with much rivalry between them. _ After the re-entry of Charles VII to Paris in 1437, the college of England was changed to that of Germany. Seals of these collegiate ((nations® are preserved in the British Museum. The university was governed by a rector for many centuries, who during the Middle Ages was the supreme power in all the territory of ((I'UniversitP both in civil and criminal affairs affecting the students. It was the privilege of the students to be condemned and hanged only by the court of the rector. It is an interesting fact that the messengers of the students in the Middle Ages, who carried letters and packages to and fro for them from their homes, were the forerunners of the post office system of Louis XI, which was the first attempt at a regular postal service anywhere. The annals of this great school reaching far back into the Dark Ages constitute one of the most fascinating episodes in history. The Uni¬ versity of Paris has, ever since about the end of the 12th century, been the intellectual centre of Europe, and the chief seat of light and learn¬ ing in the world. All the othej and later uni¬ versities, like Oxford and Heidelberg, have been modeled after it. No other university can compare to it in the number of dis¬

tinguished men it has numbered among its students. Thus, in the long roster are such names as Dante — second poet of mankind — Pierre Abelard, Frangois Villon, Pierre de Ronsard, Tasso, Rabelais, Clement Marot, John Calvin, Ignatius Loyola, Innocent III, Francis Xavier, Erasmus, Melanchthon, Pascal, Rollin, Saint-Pierre, Descartes, Voltaire, Rousseau, Robespierre, Diderot, Condorcet, Moliere, Racine, La Fontaine, Boileau, Lamartine, Sainte-Beuve, Victor-Hugo, Comte, Taine, Renan and all the moderns. At present there are ordinarily in Paris from 15,000 to 18,000 students in attendance on the courses of the

university (among them about 5,000 in the law school), together with several thousand more in the various technical, art and industrial schools which work independently of the uni¬ versity; for example, the College de France, the Beaux-Arts, the Polytechnic School, Lcole des Ponts et Chaussees, the School of Mines, the Normal School, the Conservatory of Music, Arts et Metiers, Hautes Etudes, the Lcole des Chartes, the School of Living Oriental Lan¬ guages, the special schools of art and architec¬ ture, *etc.* Thus there are always in Paris an average of not less than 25,000 students of one sort and another — not including the students in the various lycees and colleges — constitut¬ ing in the whole a very much greater number from the four quarters of the earth than are to be found elsewhere in any one place in the world; and the university of to-day, as much as ever, is in numbers and in worldwide influ¬ ence the first of schools of learning anywhere. The 27 libraries of the university contain in the aggregate, according to a recent enumeration, 1,188,000 volumes. The following statement of enrolment in 1914 and 1915 is furnished by the information department of the university:

On 15 Jan. 1914, there were enrolled 17,308 students, of whom 15,111 were males and 2,197 females; of the former 12,946 were of French and 2,165 of foreign citizenship, and of the latter 1,120 were of French and 1,077 of foreign citizenship. This total enrolment of 17,308 was distributed among the various faculties as follows: Law,

7,569; medicine, 4,397; sciences, 1,718; letters, 3,018; pharmacy, 606. On 31 July 1915 (after a year of war) the university had a total enrolment of 4,257, of whom 3,323 were males and 934 females ; of the former 2,385 were of French and 938 of foreign citizenship, and of the latter 663 were of French and 271 of foreign citizenship. The enrolment in the several faculties was as follows: Law, 1,165; medicine, 1,186; sciences, 751; letters, 959, and pharmacy, 196.

Public Instruction — the Free Schools. — The principle of free public instruction (in France dates from the Revolution, but the public school system of Paris in its present forrn is substan¬ tially the work of the Third Republic. It com¬ mences with the maternal schools (e coles maternelles) directed by women, which receive children of both sexes from two to six years of age, and give them care and elementary in¬ struction in reading, writing and ciphering. These schools are scattered throughout the city, but of course are especiallv designed for the poorer quarters where the many young mothers who are employed in shops and factories can place their infant children during working hours. Next come the primary schools, separate for boys and girls, which receive and instruct children from 6 to 13 years of age. Pupils go from these schools to the superior primary schools, and thence for secondary classical courses to the lycees and colleges, which confer the degrees of bachelor in letters and bachelor in science. A French boy usually takes his bachelor's degree when he is about 16 or 17 years of age. It is thus not the equivalent of the A.B. or B.S. in America, representing here on the contrary something like a. certificate of graduation from an average American city high

school. There are 10 superior primary schools, six lycees supported .by the city, and two by the state, and three colleges ; these lead to the university and the professional and technical schools. ' There is also a system of free public night schools for adults, both men and women. There are about 125 of these schools with some 12,000 pupils.

There are in connection with the various public schools about 400 libraries containing useful and instructive books to be loaned to the pupils. In addition necessary books and stationery are furnished free to all the pupils in the primary and superior primary schools. The city also furnishes to all the day scholars a dejeuner, that is, the meal at the noon hour, consisting of hot soup, meat and vegetables, prepared and served in the cuisine of the school. The children are supposed to bring in their little baskets a bit of bread and a bottle of wine, but when they do not, bread is also fur¬ nished. Some parents pay a small

fee when they are able, for this luncheon, but the poor pay nothing, and by a system of copper checks, which are given out to all the pupils every day and surrendered at each meal, it is impossible to know who pays and who does not. Shoes and clothing are also provided for children whose parents are unable to furnish them. The keynote of Paris public school administration is the absolute equality of the scholars while they are in school. The tendency to clothe school children in dark blue or black blouses makes this fairly easy. Elementary education is obligatory as well as free. Mixed schools are not tolerated in Paris. During the summer vacation the city provides excursions — from a day or two to a month in length — for the children of the poor, to the seaside or to the country, sometimes to Switzerland. Each child is required to keep a diary of his excursion whether it is long or short, which is subse¬ quently treated as an exercise in composition. The system of primary instruction is, upon the whole, an admirable one. It cares for and educates all the children of the city.

Churches. — Among the monumental build¬ ings that adorn the capital the cathedral of Notre-Dame holds the first place. Its founda¬ tions were laid upon the ruins of a temple of Jove, first about 375 a.d., and rebuilt again and again; the present edifice upon the original site having been begun in 1163. The choir was finished (in 1195, the fagade in 1218 and the towers in 1225. It was the first conspicuous embodiment of the Gothic ideal in church archi¬ tecture — the mother church from which has come down in ordinary generation that prolific family of Gothic churches throughout the world, which stands sentinel about the lie de France in a widening circle from Rheims and Amiens, from Rouen, Beauvais and Chartres to Cologne and Milan, to York, Canterbury and Lincoln and to the ends of the earth.

Notre-Dame de Paris is accordingly not only one of the oldest, largest and most interesting churches in the world, but it is architecturally one of the most impressive ‘buildings ever erected. Philip Gilbert Hamerton, than whom there is scarcely a more competent contempo¬ rary critic, says that if we leave out of view one or two Greek temples nothing ever con¬ structed by the hand of man has been so uni-

versally admired as the fagade of Notre-Dame —-and that is also almost true perhaps of the whole structure. There is about it an in¬ describable charm. Neither Saint Peter's nor Milan nor Saint Mark's so nearly satisfies the highest religious and aesthetic emotions.

Victor Hugo well characterized it as a ((vast symphony in stone.® And Hilaire Belloc, to whom the great church so poetically appeals, says: — (<To a man who knows and loves the city, there soon comes a desire to constantly communicate with the memories of the cathe¬ dral. And this desire, if he is wise, grows into a habit of coming close against the towers at evening, or of waiting under the great height of the nave for the voices of the middle age.® Although it is more than 700 years old it is in an excellent, almost perfect state of preserva¬ tion, the conscientious and intelligent restora¬ tion of the entire structure by Viollet-le-Duc at the middle of the last century leaving little to be desired. Its towers were the most con¬ spicuous monuments of mediaeval Paris, and from their base. all distances from Paris are cal¬ culated. It is interesting to note here that all the churches and historical monuments of France are catalogued by the Ministere des Beaux-Arts and that no restoration or so-called embellishments can be made without passing through the ˆservice d'architecture des Monu¬ ments Historiques® so ably directed by M. Paul Leon.

Next after Notre-Dame the most interesting church in Paris from an architectural point of view is the.Sainte Chapelle at the Palais de Justice. It is said to be the most perfect speci¬ men of pure Gothic architecture in' existence. It was built by Louis IX in 1245. Here for many generations until recently was celebrated every year at the opening of the courts in Octo¬ ber the «red mass,® attended by the bar and the judges in their scarlet robes. This mass is now said at Saint Germain l'Auxerrois. Dur¬ ing its long history this beautiful chapel royal has been the site of many coronations and other kingly ceremonies. Saint Julien le Pauvre, which in its origin goes back to the first cen¬ turies of the Christian era, is a little church in the Latin quarter built in the 11th century. It stands just out of the rue Saint Jacques in the rue Galande. It is interesting not only as a beautiful specimen of early Gothic, but also because it was for many years a sort of chapel to the university, where the council was con¬ voked, and where the rector had his official seat. Saint Germain des Pres, in the boulevard Saint Germain, founded by Childebert in 543, with its barbaric tower of the 9th century, is the most venerable monument on the left bank. Saint Eustache, at the markets, begun in 1532, a church

of great size and impressiveness; Saint Sulpice, near the Luxembourg, with its great organ and fine music; Saint Roch, in the rue Saint Honore from the steps of which Bona¬ parte, then a young officer of artillery, trained his cannon upon die mob at the commencement of the Revolution, and from which he may ac¬ cordingly be said to have set out on his extraor¬ dinary career; Saint Augustin in the boulevard Malesherbes, and Saint Clotilde near the Palais Bourbon, two modern churches of great size and beauty; Saint Thomas d'Aquin, the most fashionable church of the faubourg Saint Ger¬ main ; Saint Etienne du Mont, under the

shadow of the Pantheon, with its beautiful jube, or rood-loft, of exquisite workmanship, and the two graceful staircases ascending to it, the jube dating from 1609; the Madeleine, in the grand boulevard; Saint Vincent-de-Paul, with its splendid approach from the rue LaFayette, and Saint Germain l'Auxerrois at the Louvre, are among the most notable of the churches. The new and splendid church of the Sacre Cceur on Montmartre, commenced after the war of 1871, and conceived in expiation of the murder of the archbishop of Paris by the Commune, is the most considerable religious edifice which has been built in modern times. It has already cost upward of $8,000,000, and is still far from com¬ pletion. Paris is divided into 70 parishes, and there are in all about 140 places of worship, of which 86 are Catholic. Almost every sect in the world has a church in Paris, and religious services are conducted in all the principal lan¬ guages of civilized and semi-civilized mankind. The churches of Paris are among the most in¬ teresting features of the city, entirely apart from any religious consideration; so much of the stirring history of the town is written in the stones of her great churches.

Galleries of Art and Museums. — The Louvre with its unrivaled collection of objcts d'art is the chief art gallery of Paris. The Louvre itself was a royal castle from the days of Philippe Auguste until Louis XIV built the palace at Versailles. The existing structure which superseded the work of Philippe Auguste was begun by Francis I in 1541, and was added to and extended by his successors down to and including the third Napoleon. As finally com¬ pleted it constitutes the grandest urban palace in the world, and one of the most extensive and historically interesting buildings on the earth. Since 1793 the greater part of the interior has been occupied by the famous museum and art galleries of the Louvre, although the wing on the rue de Rivoli is occupied by the Ministry of Finance. It may be said to be the most import¬ ant public building in Paris. It has an un¬ rivaled situation on

the Seine and on the rue de Rivoli, facing the gardens of the Tuileries and the Place de la Concorde. It covers an area of more than 48 acres, and only the papal palace of the Vatican can be compared to it for size and magnificence. It is interesting to note by way of comparison that the public buildings in Philadelphia cover \l/2 acres, the Louvre being thus in area 10ˆ5 times as large. The galleries contain a vast collection of paintings, sculpture, objects of art and antiquities to which only the collections of the Pitti-Uffizi Gallery at. Florence and of the Vatican at Rome can fairly be compared. They are free, and open to the public at fixed hours daily. The next gallery in importance and interest is that of the Luxembourg, in the gardens of the Luxem¬ bourg adjoining the palace. It is a museum of no great size of living artists, opened in 1886. There is a plan now in hand to rebuild and en¬ large it by annexing the adjacent Seminary of Saint Sulpice. Among the great number of other collections may be mentioned the Musee Cluny, in the boulevard Saint Germain, dating from 1840, possessing not only the interesting Roman ruins of the ancient Palais de Thermes, but also a valuable collection of mediaeval furni¬ ture and objects of art from the Middle Ages; the Musee Carnavalet — the museum of the city

of Paris — containing an invaluable collection of objects connected with and illustrating the history of the city in all its centuries of exist¬ ence, located in the hotel of Madame de Sevigne, in the rue de Sevigne, in the Marais, once the centre of fashionable life, but now rather a neglected quarter; the Musee of Artillery at the Hotel des Invalides, containing a very large collection of arms, ancient, mediaeval and modern, of all sorts, cleverly displayed in a chronological order; also Napoleon's camp bed, some of his uniforms, the famous gray over¬ coat and many of his camp furnishings; the Musee of the Trocadero, which contains a col¬ lection of sculpture illustrating various phases of ancient and mediaeval architecture, being especially rich in early French churches and royal tombs, together with an interesting ethnographic exhibition ; the Musee Guimet ; the Musee Galliera, in a new and palatial structure of exceptional artistic beauty,ˆ in the rue Gal¬ liera, not far from the

Trocadero, etc.; the long list including more than 50 separate public col¬ lections of varied and general interest. No city in the world contains a greater number of valuable private collections, many of which are accessible to students and sightseers, on proper introduction.

Libraries, Books and Publications. — No

city was ever so rich in books and libraries and literary treasure as Paris. The Bibliotheque Nationale has always been unrivaled. It has been known in its long history successively as La Bibliotheque du Roi, Royale, Nationale, Im¬ perial, and now Nationale again. It was founded in the 14th century by John II, and then consisted of but 8 or 10 volumes ; it was housed at first in the Palais de la Cite. Charles V is sometimes called its founder be¬ cause he removed it to the Louvre and increased it to 910 volumes during his reign. Some books of Charlemagne's are said to be included in this first collection. Francis I transferred it to Fontainebleau, but it was brought back to Paris by Henry IV. Subsequently it was stored in various places in the city,, but was finally located in the Palais Mazarin, in the rue Riche¬ lieu, now more than 200 years ago, where it has since remained. Although it is a building of vast size, it has recently been greatly enlarged by a splendid addition in the rue Vivienne. Under Francis I it contained 1,890 volumes; 16,746 under Louis XIII ; 50,542 under Louis XIV; and about 100,000 at the time of the de¬ struction of the religious houses during the Revolution, at which time their libraries were incorporated with it. It now contains 4,050,000 printed books, 100,000 manuscripts, 2,500,000 plates, engravings, stamps and maps, and 120,000 medals and inscriptions. It is a public library, free for study, reading and reference, with no vexatious restrictions, at all times except holi¬ days. Other noted libraries are the Biblio¬ theque Sainte Genevieve, with 400,000 volumes and 3,500 manuscripts ; the Bibliotheque de l'Arsenal (which, after the Bibliotheque Na¬ tionale, is the finest in Paris), with 620,657 vol¬ umes, 10,000 manuscripts, 2,500 cases containing papers and documents from the Bastille, and 100,000 engravings; the Biblotheque Mazarine, with 250,000 volumes and 5,000 manuscripts; and the Bibliotheque de la Ville, with 400,000 volumes, 25,000 manuscripts and 75,000 engrav¬

ings and charts. There are also many technical libraries at the various schools and colleges of the university and elsewhere for the use of stu¬ dents and investigators. In addition to the libraries of the university (1,188,000 volumes), to which reference has already been

made, mention should be made of those of the Senate, of the Chamber of Deputies (250,000 volumes), of the Council of State at the Palais Royal, of the Institute, of the School des Beaux-Arts, of the School of Mines, of the Hotel des Invalides, of the Chamber of Commerce, of the several ministries (War, Marine, Colonies, Jus¬ tice, the latter containing 40,000 volumes), of the Conservatory of Music, of the Opera, of the Theatre Frangais, *etc.* The Archives Nationales must also be mentioned in any enumeration of Parisian libraries. It occupies the beautiful hotel Soubise, in the Marais, and, as its name indicates, contains a collection of national archives dating from the Merovingian kings, an immense number of charters, maps, letters, doc¬ uments of all sorts, of the kings, of the Parlia¬ ments, of the empire, and of the ancient Pari¬ sian jurisdictions like the Chatelet, the Chamber des Comptes, *etc.* From this enumeration of the literary treasure of Paris, it is clear that nowhere else are there such facilities for study and historical research as here. The city of Paris, moreover, maintains 79 free public libra¬ ries — two or more in each of the 20 arrondissements — for lending books to laboring people and students, at most of which reading-rooms, suitably warmed and lighted, are opened in the evenings for the use of persons who are en¬ gaged during the day. According to a recent enumeration made for the Library of Congress in Washington there are in the 17 principal public libraries of Paris a total of 8,750,657 vol¬ umes, as against 5,740,406 in the libraries in London and 3,430,094 in Berlin, or about as many books in Paris as in London and Berlin combined.

There are 146 daily newspapers in Paris (many of them in foreign languages), which is more than the total number published in New York, London and Berlin combined. The lead¬ ing daily papers are Le Figaro, a temperately ministerial organ and the organ of society, a paper that had a certain notoriety from espous¬ ing the cause of Dreyfus ; Le Gaulois, the organ of the Church and the old aristocracy, conducted by Arthur Meyer, a clever Jew who has been Christianized and has married into the fam¬ ily de Turenne; Le Matin, an enterprising, newsy paper ; Le Journal, a paper in favor with the mercantile and commercial classes; L'Echo de Paris and U Eclair, both journals of large circulation and influence ; I'Intransigeant, founded by Henri Rochefort, who was long one of the most accomplished men on the Paris press and whose paper is always implacably hos¬ tile (to the government; Le Journal des Debates, a conservative organ of high character but of no very large circulation; U Autorite, the Bono-partism organ of Paul de Cassagnac, the famous duelist, whose skill in journalism was quite com¬ parable to that of Henri Rochefort; I'Humanite, founded by Jean Jaures, as the organ of the ad¬ vanced

Socialists. It was at its foundation sup¬ ported actively by Anatole France &nd other literary men of Socialistic tendencies; La Croix, the Church organ par excellence, with an enor-PARIS, FRANCE

1 lie de la Cite

2 Boulevard de la Madeleine

■HHI

PARIS, FRANCE

Eiffel Tower

MaW*

PARIS, FRANCE

1 The Cathedral of Notre Dame

2 The Senate

PARIS, FRANCE

1 Pont Au Change and the Palais De Justice

mous circulation in Paris and the provinces ; Le Temps, the leading evening paper, conserva¬ tive and serious, and read by the best people; La Patne, a sensational evening organ, with an immense following; Le Petit Journal and Le P etit Parisien, the two great organs of the masses, each with a circulation exceeding 1,000,- 000 copies daily; La Libre Parole, edited with ability by the late Edouard Drumont, a violently anti-Semitic organ; La Gazette de France, an exceedingly conservative sheet, which dates back to 1631, making it, as it claims, the oldest newspaper in the world in any language. According to L'Annuaire de la Press e jranqaise et du Monde politique, there were a few years ago in Paris 3,442 periodical publications (of which over 1,400 were newspapers) , a number at least three times as great as that of any other city. Furthermore, the annual output of books from the Paris press is said to exceed the total output in the English language from all sources. Nothing suggests better than the foregoing statements the intellectual activity of the French capital.

Financial Paris. — Chief among the financial institutions of Paris are the Bank of France and the four great private banks, the Credit Lyonnais, the Comptoir National d'Escompte, the Societe Generale and the Credit Industriel et Commerciel. The banking business of the city is largely in the hands of these five institu¬ tions. The Credit Lyonnais has a sumptuous banking house in the boulevard des Italiens', a capital of 250,000,000 francs, a surplus of 100,- 000,000 francs, and real estate of the value of 37,000,000 francs, with deposits, 31 Dec. 1904, of 1,656,000,000 francs. It has 65 branches in Paris and the suburbs, 140 branches throughout France and 17 branches in foreign countries, including two in London. It has behind it the financial power and prestige of the Rothschilds, and its influence is felt in financial circles every¬ where. It is unquestionably the largest and most powerful private bank in the world. The Comptoir National d'Escompte has a capital of 200,000,000 francs, 61 branches in Paris

and the suburbs, 98 throughout France and 19 abroad. The Societe Generale has a capital of 500,000,- 000 francs, 102 branches in Paris and the sub¬ urbs, 306 throughout France and one in Lon¬ don. The Credit Industriel et Commerciel has a capital of 126,000,000 francs and 52 branches in Paris and the suburbs. These four institutions, with aggregate capital exceeding $200,000,000, thus furnish Paris about 280 banks, with 550 branches in France and 40 abroad. There are, of course, many other smaller bank¬ ing institutions in Paris, The Bank of France, like the Bank of England, is a private joint-stock bank, and not an institution of the state. It has, however, the sole right to issue bank¬ notes which are guaranteed by the state, and is thus peculiarly subject to governmental control. Its ordinary banking business (aside from the business it transacts for and with the govern¬ ment) is on the most extensive scale. The idea of a Bank of France originated with Francis I, who established, in 1543, at Lyons, the first na¬ tional bank. But the bank in its present form was organized in February 1803 by the First Consul, with a capital of 30,000,000 francs, which has since been increased from time to time, until it is now 182,500,000 francs. Napoleon's name

heads the list of the first subscribers to the capital stock of the bank. The limit of note issue fixed by the government is 4,000,000,000 francs, or about $800,000,000. This limit is, however, generally exceeded, and, by a late re¬ port of the bank, it appears that there were then outstanding notes to the amount of 4,510,000,- 000 francs. The gold and silver treasure of the bank, on the same day, was 4,750,000,000 francs, which amounts to the enormous sum of $950,000,000. The bank has 445 branches through¬ out France. The chief office is in the rue de la Vrilliere, in the old hotel de la Vrilliere, to which extensive additions have been made from time to time. It contains a handsome apartment of the 18th century, called the Gallere Doree, to which visitors are admitted. The cellars and vaults of the bank are of elaborate construction, and can be flooded with water at a moment's notice on an alarm of attempted burglary. The remarkable financial strength of Paris never¬ theless contained within itself an element of weakness for the country, in that a large pro¬ portion of French savings were systematically exported abroad to needy foreign states, while domestic development was neglected. English treasury bills, exchequer bonds, bankers' accept¬ ances and other sorts of English short-dated securities quickly find their way to Paris, and a volume of the best short-time New York paper is also always found in the thick portfolios of the Paris bankers. For many years previous to the war the rate of the Bank of France had fluctuated very slightly,

being generally maintained> at 3 per cent. During an economic crisis it was raised to 3ˆ2 per cent on 29 Jan. 1914; to AZ2 on 30 July 1914; to 6 per cent on 1 Aug. 1914, and reduced again to 5 per cent 19 days later, at which figure it still remained in May 1919. Before the war Paris was the ready money centre of the world, for nowhere was there a larger stock of available funds than in France. ((We are perhaps the biggest money¬ lenders in the world,® said a French finance minister in 1911, but he deplored the non-exist¬ ence of (<organisms the sole object of which should be to assist small business men and manufacturers.® Paris was the only finan¬ cial centre in the world through which, for example, such transactions as the cash payment of $40,000,000 in gold coin for the Panama Canal, or even the payment of the $20,000,000 in gold which we made to Spain for the Philippine Islands, could have been arranged. Both these payments were made over the counters of the Bank of France. The war of course modified essentially the ordi¬ nary operations of the bank. With the com force i't issued bank notes without reference to the legal limit and is financing the government in the larger way. The gold reserve has been very largely 'increased.

La Bourse. — The Bourse was founded in 1734, but the Change de Paris, out of which the Bourse grew, has a history running back to the first years of the 14th century (1304 a.d.). Stockholders, or agents de change, operated for many years in the old rue Quincampoix in the Marais, and later in the Place Vendome and in the hotel de Soissons, on the site of which now stands the Bourse de Commerce, which is the Parisian Produce Exchange. The present Bourse or stock exchange building was

begun in 1808, when Napoleon laid the corner¬ stone. It was completed in 1826 and opened by Charles X. The Palais de la Bourse, as it is called, is a handsome building, in the Graeco-Roman style, surrounded by a series of 82 Corinthian columns, 33 feet high and 3*4 feet in diameter. The setting and the architectural effect are fine, suggesting the temple of Ves¬ pasian in the Forum at Rome. The

length (exterior) is 225 feet; the width, including the new wings, 215 feet; and the height 100 feet. The hall is 105 by 57 feet, with wings on either side in the recent addition, about 40 by 60 feet each in size. It is a shapely and commodious room, and the decorations are artistic. The Bourse stands in a block by itself, facing the fine Place de la Bourse, which is about midway between the boulevard Montmartre and the Bank of France. While there are 1,100 seats in the New York Stock Exchange, and near 5,000 (4,085 in 1919) jobbers and brokers on the Lon¬ don Stock Exchange, there are only 70 member¬ ships in the Bourse. They are, therefore, more valuable than memberships in any other ex¬ change in the world, being worth at present from $350,000 to $500,000. The position of agent de change is a quasi-goyernmental one, the appointment to the office being by the Min¬ ister of Finance, and the operations of the Bourse being, at least indirectly, under the con¬ trol of the state. The membership, or, as we say, the seat, is a life estate, which can be disposed of by will to a son or nephew only, and that subject to governmental approval. The hours are from 12:30 to 3 o'clock each business day. The agents de change have an exclusive privi¬ lege of negotiating transfers of public funds and the sole right of buying and selling securi¬ ties of all kinds on the Exchange. The annual amount of business transacted in ordinary times is estimated at 100 milliards of francs, or $20,- 000,000,000. The foreign list, which is dictated by the government, consists of the obligations of all the other nations of Europe, except Ger¬ many (Russian, Spanish and Turkish securities were generally favorites), the bonds of the more solvent and responsible countries of South America, and of Egypt and Morocco. The bonds and stocks of some foreign railways are also listed, as well as those of many foreign industrial concerns, like the Rio Tinto mines in Spain, the Suez Canal, *etc.* Few American securities have yet been listed, but just before the war efforts were successfully made to increase this list. German securities are never dealt in, and English investments are not. favorites. There is, however, some trading in English consols. The obligations of the Credit Fonder are also largely dealt in. This is a financial institution of enormous resources — quasi-gov- ernmental in character — organized in 1852, for the purpose of lending money, primarily on the security of real estate. It is said to be one of the fundamental institutions of public credit in France, and is of great service to the communes in advancing them money for public works. Its securities are a favorite investment. La Cou¬ lisse, a sort of loose association of unlicensed agents, whose transactions are purely specu¬ lative and carried on during business hours, corresponds in a way to the ((Curb® of the New York Stock Exchange. La Petite . Bourse, a somewhat similar organization, carries on spec¬ ulative transactions in the daytime, before and

after the hours of the Bourse. La Bourse du Soir is the name for a group or groups of spec¬ ulators who meet and trade or speculate in the evening, suggesting roughly the famous evening meetings of stockbrokers at the old Windsor Hotel in New York.

The American Chamber of Commerce in Paris. — This institution was founded in 1894, mainly through the efforts and initiative of Dr. Stephen H. Tyng, then the Paris representative of the Equitable Life Assurance Society. It has its offices at 3 Rue Scribe, and represents in its corporate capacity the commercial interests of the United States in France. In 1919 it re¬ ported 700 active members (of which 284 were resident) and 72 honorary members, from among the most substantial class of American bankers, professional. people, manufacturers and merchants resident in Paris or interested in French business. The American Ambassador for the time being to the French Republic, and the consul-general of the United States in Paris, together with the presidents of the chambers of commerce in most of the chief cities of the United States, are honorary members. A li¬ brary and reading-room is maintained, and the work of the chamber is efficiently carried on. It is quite the first such institution in Europe and performs a very useful function both com¬ mercially and socially.

The Hotel de Ville. — In any history of Paris the Hotel de Ville and the events, political and revolutionary, which have occurred there must have a prominent place. Its history is bound up inseparably with what is best and most inspiring in the annals of the capital. For almost 550 years it has been the townhall of Paris, the centre of its civic life, and it has at every stage played a conspicuous part in the different revolutions as the rallying place of the republican or democratic party. Indeed, it may not untruly be said that universal suffrage and democracy in the modern sense were born there. It was in 1357 that Etienne Marcel — first of democrats, and the most famous of the ancient Prevots des Marchands — purchased for the city of Paris ((the House of Pillars® on the Place de Greve and established there the municipal head¬ quarters, which had theretofore been at the Parlour of the Bourgeois, on the other side of the river. This latter ancient municipal struc¬ ture — in reality the first Hotel de Ville — dated from the 9th century, and was built against the city wall at a place near the rue Soufflot. The House of Pillars continued to be the seat of the municipality until it was demol¬ ished by Francis I in 1532, to make room for the new Hotel de Ville, begun by him in that year and completed in the reign of Henry IV. It contained the residence and offices of the chief municipal functionary of the city, who was called

the Prevot des Marchands down to the Revolution, and thereafter Prefet de la Seine. This building was enlarged and reconstructed from time to time, and was finally destroyed in May 1871 by the Commune. The present building, which may be described as an enlarged reproduction <5f the original, was undertaken by the republic shortly after the war of 1871. It is, architecturally, one of the finest buildings in Paris, and one of the most beautiful municipal buildings in the world. It is a rectangular structure in the style of the Renaissance, with the most elaborate ornamentation, exterior and

interior. After the Grand Opera, it is the most sumptuous public edifice in Paris. The Place de 1 Hotel de Ville, formerly the Place de Greve (that is, river bank), was anciently the place of execution. In 1572, after the massacre of Saint Bartholomew, Catherine de Medicis condemned the Huguenot leaders to perish on the gallows here, and from that time to the close of the Revolution it witnessed a long series of political executions. The colors of the city of Paris — red, white and blue — have for centuries been the recognized colors of democ¬ racy. They became in 1775 the colors of the American republicans, and in 1789 of French republicans. So that the American flag and the French tricolor alike hark back to the banners that Etienne Marcel flung out, as the badge of his mediaeval republicanism, from the House of Pillars on the Place de Greve, at the middle of the 14th century. From that day to this the spirit of Paris has been democratic; it has always been more or less at swords' points with the crown, the head and front of the third estate.

The Senate and Chamber of Deputies. —

Next after the Louvre, the Palais du Luxem¬ bourg, which is the seat of the Senate, is per¬ haps the most notable palace in the city. It was erected in 1615-20 for Marie de Medicis, the widow of Henry IV, and was modeled in gen¬ eral after the Pitti Palace in Florence. Its name comes from the fact that it is built upon the site of the ancient hotel of the dukes of Luxembourg. It has at times been used as a prison, especially during the Revolution and shortly after. The Musee du

Luxembourg — a gallery of modern art — and the fine gardens of the Luxembourg adjoin it. The Senate chamber is a handsome room, richly decorated, in the part of the building next to the gardens. It is in form a double hemicycle, the larger with 300 seats and desks for the senators, the smaller for the president of the Senate. The light comes from the dome, and the general effect is dignified and imposing. The Palais Bourbon, in which the Chamber of Deputies has its seat, is situated on the left bank of the Seine, facing across the river to the Place de la Concorde. It was built by the Prince de Conde in 1722 at a cost exceeding 20,000,000 francs. In 1790 it was confiscated, and became national property. Both the Senate and the Chamber of Deputies (the procedure in each being essentially the same) are especially inter¬ esting to American visitors, not only as the legislative assemblies of the other great repub¬ lic of the world, but as exhibiting in their pro¬ cedure several striking contrasts to our own Senate and House of Representatives. The most notable, perhaps, is that, when the mem¬ bers speak, they address their fellow members (and not the presiding officer) from the tri¬ bune, a raised platform or pulpit in front of and a little below the desk of the president — which seems to have some advantage. They vote by blue and white cards or tickets de¬ posited in urns, which are carried about, when the vote, is taken, by the huissiers, the white ballot being for and the blue against the meas¬ ure under consideration. Another difference is ihat no member is entitled to speak on any ques¬ tion unless he has given notice in advance by inscribing his name on the list of speakers. The presiding officers wear full evening dress. They

call to order by ringing a bell, and the close of the session is announced by the president's putting on his silk hat.

The Palais de Justice and the Courts. — Few buildings in Paris are more interesting than the ancient Palais de la Cite. Situated near the western end of the island of the city, it was a royal residence continuously from the time of the Roman occupation to the latter part of the 14th century, since which time it has been exclusively devoted to the use of the courts. It was the seat of government under the Romans almost or quite from the com¬ mencement of their domination. And there¬ after under the successive dynasties that lived and ruled in Paris, for the thousand years from the Romanˆ evacuation to the end of the Hun¬ dred Years'. War, it was continuously the seat of the king's courts and of the Parliament of Paris, which, in their varying forms, were through the ages the supreme court. Aban¬ doned as a royal residence, and later presented to the Parliament by

Charles VII in 1431, it became the Palais de Justice, thus perpetuating its judicial character. . It has therefore been the seat of justice in Paris in one form or another from the time of Christ. Hilaire Belloc speaks of the “square mass of the Palais, whence, un¬ interruptedly, for 1,800 years the government has held its courts and its share in the adminis¬ tration of the town.ˆ It has of course been built and rebuilt again and again. The present building dates, from the reconstruction of Rob¬ ert the Pious in the 11th century. Louis IX in the 13th century and Philippe le Bel at the commencement of the 14th century made con¬ siderable additions to it. The Sainte Chapelle’ was the work of the former, and the tower at the northeast corner the work of the latter. The great tower clock dates from 1370, having been, however, reconstructed in 1685 and again in 1852. It is the oldest public clock in France. One of the most interesting features of the present building after the Sainte Chapelle is the Salle des Pas Perdus, an immense hail, con¬ sisting of two vaulted galleries 240 feet long, 90 feet wide and 33 feet in height, which serves as a sort of vestibule to most of the civil courts of first instance. It is the place where the avocats congregate when not engaged in the trial of their causes, and where they meet their clients. Many historical reminiscences attach to it. It dates from Louis IX, and was long known as the Grande Salle. Booksellers an¬ ciently had stalls there, and the clergy were for a long time permitted to perform there moral plays and farces. Visitors are shown the

kitchens of Saint Louis, in the oldest existing part of the building, next to the river. Near

by and in the same part of the palais is the

Conciergerie, a prison famous in French an¬ nals, where, for example, are to be seen the chamber in which Marie Antoinette was im¬ prisoned and the cell occupied by Robespierre. Among the numerous court rooms the most notable are the chambers of the Court of Cassa¬ tion and of the Court of Appeal, both large and sumptuous rooms, with superb decorations.

The great hall on the western side next to the Place Dauphine is called the Vestibule de Har-lay. It contains statues of the four French monarchs most conspicuous as legislators — Charlemagne, Philippe Auguste, Saint Louis and Napoleon. — and rivals the Salle des Pas

Pcrdus in size. Opposite the Palais de Justice, across the boulevard du Palais, is the Tribunal de Commerce, dating from 1866. It has a con¬ spicuous dome 135 feet in height. Most of the courts of general jurisdiction in Paris sit in one or other of these two buildings.

At the head of the judicial system of Paris is the Minister of Justice. He appropriately conserves the ancient title of Garde des Sceaux. The Ministry of Justice is in the Place Vendome. The Conseil d'Etat, with 45 members, which in some of its functions is a tribunal, and the Cour des Comptes, with 84 members, are at the Palais Royal; but all the other general courts are on the island, at the Palais de Jus¬ tice or the Tribunal de Commerce. First of the courts is the Cour de Cassation , with 45 judges, divided into three chambers. Next comes the Cour d'Appel, with 62 judges, divided into nine chambers. Then there is the tribunal of first instance, with 70 judges, divided into 12 chambers. These are the three superior tri¬ bunals of both civil and criminal jurisdiction. The Tribunal de Simple Police , a general court for petty offenses, sits also at the Palais de Justice; it is held by the Juges de Paix, sitting in rotation for short terms. The Tribunal de Commerce , a commercial court, with 21 judges, has its seat at the Tribunal de Commerce. There is also in each of the 20 arrondissements a civil court (Justice de Paix) of inferior ju¬ risdiction, and in each of the 80 c juar tiers a criminal court (Commissariat de Police) of limited jurisdiction. Such is a general outline of the judicial system under which Paris is governed. The jurisdiction of each of these courts is roughly suggested by their names. The tribunal of first instance is the ordinary court of general jurisdiction, from which there is an appeal to the Cour d'Appel, and thence in certain cases to the Cour de Cassation. Com¬ mercial cases, however, between merchants and traders are heard by the Tribunal de Commerce, which has exclusive jurisdiction in that class of cases. The procedure in all the trial courts is characterized by directness and simplicity. There are no juries in civil cases, and in crim¬ inal cases a majority verdict of the jury suffices.

The Observatory and the Mint. — The Ob¬ servatory has a history going back to 1371. The work was at first carried on in a building which stood on a site northwest of the hotel de Cluny, and which would now be in the middle of the boulevard Saint Germain. Charles

V provided the necessary instruments and charts and endowed two scholarships there for the study of astronomical science, the holders of which were called ((King's Scholars,® it being expressly pro¬ vided that they were to study only such works as were not forbidden by the Sorbonne. The present Observatory, however, was founded by Louis XIV in 1672. It is an institution of great reputation, and is in telegraphic communication with the most important of the other observa¬ tories of the world. It is situated at the end of the avenue de l'Observatoire, south of the Luxem¬ bourg. The meridian of Paris is traced through the large hall on the second floor, and the lati¬ tude of the south fagade is held to be that of Paris. The intersecting point of these two lines is the base from which all geographical and astronomical calculations are made. The me¬ ridian was first accurately calculated in the reign of Louis XV, although it had been fixed

at the Observatory in the preceding reign. The Academy of Sciences has traced it in various other parts of Paris; for example, through the church of Saint Sulpice, through the gardens of the Palais Royal and across the top of Mont¬ martre, at each of which places it is marked. At the Palais Royal a little cannon is set in the axis of the meridian, so that the sun by an in¬ genious contrivance can fire it off every day exactly at noon.

The Mint (Hotel des Monnaies) is a large and handsome building on the Quai de Conti east of the Institute, erected in 1771-75. The fagade is 400 feet long. The work shops where money is coined are well worth a visit. Aside from the French coinage, which in amount is the largest in the world, these ateliers coin much money for other countries, and also many medals of all sorts. The processes are freely shown and explained to visitors. The machines for the coinage of silver are especially interest¬ ing, 60 pieces of money being struck by each of them per minute, with a daily maximum capacity of 2,000,000 francs in value. The assaying and stamping of the gold and silver¬ ware of the jewelers is also done here. There is a museum (Musee Monetaire) in connection with the Mint, which contains a very complete collection of French coins, arranged chrono¬ logically, from the earliest times to the present day; also many foreign coins, among them a good collection of our United States coins, and, by way of a curiosity, a Chinese coin of 1700 b.c.

The Institute. — Chief among the literary organizations of Paris is the Institute. It is installed in the ancient College Mazarin, or the College

of the Four Nations, founded by Ma¬ zarin, situated on the left bank, at the end of the Port des Arts, opposite the Louvre. The building dates from the latter part of the 17th century, and stands on the site of the hotel de Nesle. During the Revolution it was used as a prison; but in 1795 it was ceded by the Con¬ vention to the Academies, or Societies of Savants, wdrich had theretofore been housed at the Louvre. The Institute, which was created 25 Oct. 1795, embraces the five academies, namely, the Academie Frangaise, founded about 1629 by Richelieu ; the Academie des Inscrip¬ tions et Belles-lettres, founded in 1635 by Col¬ bert ; the Academie des Sciences, founded in 1666; the Academie des Beaux-Arts, founded in 1819; the Academie des Sciences Morales et Politiques, founded in 1666, but suppressed in 1803 and re-established in 1832. Each of these academies has 40 members, except the Academy of Sciences, which has 66, and all except the Academie Frangaise have honorary, correspond¬ ing and foreign members. They are for the most part independent and separate bodies, but all five unite in an annual meeting ((under the dome® on the 25th of October, which is one of the great literary solemnities of the Paris year. The Academie Frangaise, the most distinguished of the five — its members being dubbed ((the 40 immortals® — is charged with a superintendence of the language the orthography and pronunci¬ ation, and with the publication and periodical revision of the Dictionnaire de I' Academie (last edition, 1878). The functions of the other four are sufficiently indicated by their names. The title (<Membre de l'lnstitute,® and especially the title, Gde 1' Academie Frangaise,® are objects of

ihe highest ambition of every literary man in b ranee. No other country has so complete an organization of its literary and scientific men as the Institute de France, and nowhere else are the leaders of thought so bound together and so marshaled for concerted effort under one roof as in these five academies. Vacancies as they occur are filled by ballot of the surviving members, each of the academies for itself, sub¬ ject to the approval of the government. No one is eligible except French citizens, but they need not be native born citizens. They

must, however, live in Paris.

. Assistance Publique.— Assistance Publique in Pans dates from the tax which Louis XIV imposed, in 1677, on the gross receipts of the theatres for the benefit of the hospitals and asylums. This tax exists to-day and for the same purpose. Until about 75 years ago it was paid personally by each person who entered the theatre as he bought his ticket, but at a separate window established for the purpose. Now it is 10 per cent of the price of the ticket and is assessed against the theatre itself. Numerous hospitals and asylums existed in Paris during the Middle Ages. The principal one was al¬ ways the Hotel Dieu, and it is still the first of Parisian hospitals. It is situated on the island of the city near Notre Dame. The present building was erected in 1868-78 at a cost of 45,000,000 francs. It is admirably fitted up with 828 beds. It is said to be the oldest hospital in Europe, having been founded in 660 a.d. under Clovis II. There are about 20 other general public hospitals in Paris, which have an aggregate of upward of 33,000 beds; among which may be mentioned La Pitie near the Jardin des Plantes, with 729 beds; the Charity Hospital, a large and ancient institution in the rue Jacob, and the military hospital of Val de Grace in the Latin quarter, formerly a Bene¬ dictine convent founded by Anne of Austria, but converted by Napoleon into a hospital for soldiers. The church connected with it, for¬ merly the convent chapel, is a splendid build¬ ing, being a reduced copy of Saint Peter's at Rome. The dome, 53 feet in diameter and 133 feet high, is one of the most conspicuous monu¬ ments of the left bank. Among the numerous asylums, the most notable is the Salpetriere, un¬ doubtedly the largest such institution in the world. It is situated near the Pont d'Austerlitz on the left bank, and was originally an arsenal built by Louis XIII, which was subse¬ quently converted into an asylum for aged and insane women. It consists of 45 huge buildings, having in the aggregate no less than 4,682 win¬ dows. There are 8,000 inmates. It is asso¬ ciated with the reform brought about in the treatment of the insane by Philippe Pinel, whose statue stands in the Place in front. There is a similar home for aged and infirm men at Bicetre, and there are numerous institutions for the care of children and for the treatment of special diseases. The number of patients an¬ nually received and cared for in the hospitals amounts to about 50,000 men and 40,000 women and 20,000 children. The average annual deaths are about 7,000 men, 5,000 women and 3,000 chil¬ dren. The Assistance Publique expends an¬ nually about 40,000,000 francs on these hospitals and other allied charities.

The Hotel des Invalides. — This great insti¬ tution was founded in 1670 by Louis XIV as

an asylum for his aged and disabled soldiers. With its high gilded dome, under which are the tombs of Napoleon, Turenne, Vauban, Jerome and Joseph Bonaparte and Marshal MacMahoti, it is one of the most conspicuous monuments of Paris. The buildings, which cover about 30 acres, were begun in 1671 and completed in 1675. They furnish accommodation for 6,000 inmates. The faqade of this vast structure is 660 feet in length. It stands about 600 yards back from the Seine, facing the Esplanade des Invalides, a fine open place about 900 feet wide, containing several rows of trees and ex¬ tending to the river opposite the Champs P.lysees. Close by is the Military School (Ecole Militaire) , another great block of buildings cov¬ ering 26 acres, the fagade of the main building being about a quarter of a mile long. It was founded by Louis XV in 1751. There are about 500 students, the greater part of the establish¬ ment being now used as a caserne. It faces the Champ do Mars — another great open square, 1,100 yards in length and 550 yards in width, ex¬ tending ‘to the river, opposite the Trocadero — which was originally designed for military manoeuvres, and was the site of many imposing ceremonies and pageants during and immedi¬ ately after the Revolution. The Tour Eiffel is built on the end next the river. It is a full 1,000 feet high (1,062 feet to the very top), be¬ ing thus the tallest monument ever erected, nearly twice as high as the monument at Wash¬ ington, and more than twice as high as the Great Pyramid. Commencing in 1867, some of the buildings of the International Expositions have been built on the Champ de Mars. It has, however, recently been condemned and is to be laid out in streets and built up in the near future. The Ministry of Foreign Affairs, one of the handsomest government buildings in Paris, adjoins it on the east along the Quai d’Orsay.

The Cemeteries. — There are more than 20 cemeteries in Paris, but at present much the greater number of interments are made in the newer cemeteries without the* walls. There are, however, but three within the city of any con¬ siderable size or of much general interest. The largest and finest is Pere Lachaise (Cimetiere de l’ Est), situated prettily on a hill, in the northeastern part of the city, commanding a fine view. It takes its name from Lachaise, the Jesuit confessor of Louis XIV, whose country seat formerly occupied the site. It dates only from 1804, and extends to but 110 acres, but it contains the graves and tombs of a great number of the most distinguished Frenchmen of the last 150 years. Many also of a much earlier date have been moved there, as, for example, the tom’bs even of Heloise and Abe¬ lard. It well repays a visit, and some careful study. Next in interest is the cemetery of Montmartre (Cimetiere du Nord), situated in the

northern part of town not far from the Church of the Sacre Coeur. The cemetery of Montparnasse (Cimetiere du Slid), on the left bank, dating, from 1824, is the third in interest of the Parisian burying grounds. It is not far from the Gare Montparnasse. The little ceme¬ tery of Picpus, near the Place de la Nation, in the garden of an ancient convent, contains the graves of many distinguished people of the Revolutionary epoch. It is of especial interest to Americans as containing the grave of La-314

fayette. These cemeteries are all much alike in appearance, and in general much resemble those of New Orleans, the greater part of the tombs being above ground. There is a crematorium at Pere Lachaise — the only one in Paris — with a columbarium in the Italian style as a depository for the ashes of the persons cremated there.

The Fountains. — After Rome no city is richer in fountains than Paris. There are dozens of them throughout the city, many of which are veritable works of art, and quite entitled to mention in any attempt to present a general view of Paris. The two large and beautiful fountains in the Place de la Concorde, constructed in 1836, contribute very much to the brilliance of that finest of Parisian squares. They each consist of a round basin 53 feet in diameter, above which rise two smaller basins surmounted by a spout from which a jet of water rises 28 feet in the air. The lower basins are surrounded by tritons and nereids, holding dolphins, which spout water into the second basins. The figures and the upper basins are bronze and the lower basins granite. These fountains produce a volume of spray, which under bright sunlight is superb. Two handsome modern fountains in granite ornament the Place du Theatre Frangais. Another of the great fountains is that of Saint Michel in the Place of the same name. It was constructed in 1860 and is 84 feet high and 48 feet wide, built into a wall. It consists of a niche in the form of a Roman triumphal arch containing a group of Saint Michael and the dragon in bronze mounted on a pile of rock, from which water gushes into three basins one above the other, flanked by bronze griffins of heroic size. At the sides of the niche are columns of red marble bearing bronze figures. The whole, though open to criticism in detail, constitutes a very imposing monument. The fountain of the Observatory, constructed in 1874, is a striking and original work, in the fine avenue of the

Observatory with its six rows of forest trees. This fountain consists of eight sea horses, a group of four allegorical figures bearing an armillary sphere and water-spouting dolphins and tortoises. The basin is 60 feet in diameter and a great volume of water is discharged into a square reservoir below the basin, with a fine effect. The fountain of Saint Sulpice was erected in 1847 in front of the church of that name and consists of three concentric basins of stone one above the other and is embellished with statues of heroic size of the four most celebrated French preachers: Bossuet, Fenelon, Massilon and Flechier. The volume of water is not great, but the fountain is a dignified and handsome ornament to the square. The foun¬ tain Moliere, erected in 1844 to the memory of the famous dramatist, stands on the rue Rich¬ elieu near the house where he lived and died. It is 51 feet high and 21 feet wide, with a bronze statue of the poet flanked by the muses of serious and light comedy. Nearby in the same street in the small square Richelieu, facing the Bibliotheque Nationale, is the fountain Richelieu, in bronze, dedicated to the four great rivers of France. It stands on the site of the old Grand Opera, to wash away the stain of the assassination of the Duke de Berry in 1820, who met his death there, under very tragic circum¬ stances. The fountain de Grenelle in the street

of that name near the rue de Bac, erected in 1739, is one of the finest of the old fountains. It consists of a crescent 100 feet in diameter and 38 feet high, in the centre of which stands a small Ionic portico with an allegorical group in white marble representing the city of Paris with the Seine and the Marne. Alfred de Mus¬ set died in 1857 in the house in front of which the fountain is built. The two fountains in the Jardin du Luxembourg — the old fountain de Medicis and the new one in memory of Dela¬ croix — the ancient fountain of the Innocents at the central markets, and the splendid foun¬ tain de la Victoire in the Place du Chatelet, erected in 1807 to commemorate the earlier vic¬ tories of Napoleon, are each of them notable monuments. A mention of the wonderful foun¬ tains at Versailles (((les grandes eaux))) in¬ comparably the finest in the world, completes the general view of the fountains of Paris.

The Seine and the Bridges. — No single feature gives to a visitor a stronger suggestion of ‘the imperial splendor of Paris than the in¬ stallation of the Seine. The river, which flows for a distance of between seven and eight miles through the city, is contained within high walls of the most massive masonry. On either side of the river from one end to the other there is a broad street, lined with trees, and

next to the river on the quai is a sidewalk or pave¬ ment. Below the quais and near the level of the water are the ports, also of masonry, where boats can land and freight and passengers be received and discharged. The walks along these shaded quais, with the river on one side and the busy life of the street on the other, are among the most interesting promenades in Baris. The bookstalls on the qua'is have long been famous. Passenger steamboats (bateaux mouches) ply up and down the river, making stops every few blocks and affording an excel¬ lent service for a fare of two cents at all sea¬ sons of the year. The 33 bridges which cross the river within the fortifications are among the most attractive features of the city, several being imposing works of art. The viaduct bridge at Auteuil is a mile and a quarter long, constructed throughout of masonry, with sev¬ eral galleries for vehicles and foot passengers beneath the railway line, and consists of 234 cross arches. It is a structure of exceptional beauty. The most famous of the bridges is per¬ haps the Pont-Neuf, which spans the river across the lower end of the island of the City. It is one of the oldest of the bridges, having been first constructed across both arms of the Seine in 1578. On the island, half way across the bridge, rises the equestrian statue of Henry IV. More traffic passes over this bridge than any other bridge in Paris, and perhaps more than over any other bridge anywhere, except possibly the congested traffic over London bridge. The Pont-Alexandre III is the newest of the bridges and was one of the notable con¬ tributions of the Exhibition of 1900 to the adornment of the city. It i*s a single steel span crossing the river so as to connect the Champs Elysees and the Esplanade des Invalides, afford¬ ing a direct passage from the Palace of the Elvsee to the Hotel des Invalides. Other nota¬ ble bridges are the Pont de la Concorde, which at the time of the destruction of the Bastille was paved with some of the stones of that famous prison : the Pont d'Austerlitz, a massive

work of masonry, recently widened, which after the Pont-Neuf is the most traveled of the bridges, connecting the two great railway sta¬ tions, the Gare de Lyon and the Gare d'Orleans; the Pont Notre-Dame

and the Petit Pont, which cross the two arms of the river at the island of the City in the line of the rue Saint Jacques and the rue Saint Martin, being thus situated precisely at the places of the first Roman bridges that crossed the river; the Pont des Arts, which is the only bridge in Paris which is simply a foot bridge, connecting the Institute and the Louvre ; the Pont au Change at the Chatelet and the Pont Saint-Michel at the Place of that name, which are beautiful specimens of the art of bridge building in stone. By means of locks and dams the river is kept at all stages of water at about the same height, the minimum depth being 10*4 feet, so that boats of 800 tons burden can come to Paris from Havre. This, in connection with the ex¬ tensive system of canals of northern France which centre in Paris, makes of the capital the second port of the country. It is equaled in tonnage only by Marseilles.

The Parks. — Paris is one of the most fa¬ vored of cities in the matter of parks. Al¬ though necessarily within the fortifications the area of parks and open spaces is relatively lim¬ ited, there are within and without the walls ■ — but within easy distance — including Fontaine¬ bleau and Versailles, about 200,000 acres of public parks, of which 20,000 acres are within 30 minutes travel from the centre of the city. The Bois de Boulogne and the Bois de Vin¬ cennes are the two largest strictly urban parks, the former being the most thronged and fashion¬ able park in the capital. It extends to upward of 2,250 acres and lies between the western forti¬ fications and the Seine. It was laid out in 1852, and since that time it has become the promenade not only of all Paris, but of all Europe. It is most frequented between 3 and 5 o'clock on summer afternoons. There is also a morning hour from 9 to about 11, when many ˆsmart® people drive and ride. The Hippodrome de Longchamps in the Bois de Boulogne is the principal race course in the neighborhood of Paris. Races take place there almost every day, in 'spring, summer and autumn. The Grand Prix is run on a Sunday at the beginning of June and is the greatest racing event of the year in Paris. The value of the stakes at the Grand Prix is usually be¬ tween 350,000 and 400,000 francs. Thus in 1913 i>t was 359,757 francs, plus 20,000 francs to the breeder. *In 1914 it was 358,000 francs plus the same 20,000 francs. This is the most valuable stake in the world. The Bois de Vincennes is on the other and less fashionable side of the city, and is not as frequented as the Bois de Boulogne. It is the forest in which Louis IX used to hunt and administer justice. It also contains about 2,250 acres. The other principal parks within the city are the Jardin du Luxem¬ bourg — a beautiful garden, in the Latin quarter, in the style of Le Notre; the Jardin des Plantes, dating from 1640 in the reign

of Louis XIII, with its museums of natural his¬ tory and zoology made famous by the labors of Cuvier and Buffon ; the Champs Elysees, most famous of city promenades ; the Parc Monceau, in an aristocratic quarter, anciently the property of the dukes of Orleans ; the Parc

de Montsouris, one of the most picturesque pleasure grounds in any city; the Parc des Buttes Chaumont, in a neglected quarter of the city, on the site of -the ancient gallows or gibbet of Montfaucon, where from about 1273 until the Revolution an uncounted multitude of male¬ factors were hanged; and finally the Jardin du Palais Royal and the Jardin des Tuileries in the very heart of the town. The boulevards are lined with trees — some of the wider streets having four or more rows — and many gardens in the courts throughout the city contain fine clumps of trees, so that on a bird's-eye view, as from the top of the Tour Eiffel, Paris seems almost to be built in a forest. There are, within the fortifications, nearly 400,000 trees under municipal supervision.

The Exhibitions. — Chief among the annual exhibitions in Paris is of course the Salon. It is held in the spring in the Grand Palais and is the principal artistic event of the year. Ordi¬ narily about 2,000 paintings and 1,000 pastels, water-colors, etc., are shown, in addition to the sculpture and the bronzes. It attracts artists and lovers and patrons of art from every part of the world. The Concours-Hippique, also held in the Grand Palais, is the Paris Horse Show. It dates from the early days of the Second Empire, and is the model upon which such shows elsewhere have been organized. It, too, is held in the spring. The agricultural show in the Galerie des Machines is what its name, indicates — an exhibition of agricultural machinery,, farm products, cattle and pedigree stock, horticultural productions, dairy products, poultry and wine. It is an annual fair. The culinary exhibition, which is held in midsummer in pavilions erected for the purpose in the gardens of the Tuileries, is a curious show, in¬ tended to promote competition and excellence among cooks and to stimulate effort in culinary matters. The Foire au Pain d'Epice (ginger¬ bread fair) is held in the Place de la Nation for the four weeks following Easter. It is the fair of the common people, with side-shows and merry-go-rounds and the like. It attracts enor¬ mous crowds, and is an interesting sight for visitors. The automobile shows, which for sev¬ eral years have been held in the winter at the Grand Palais, are notable events for persons interested in that industry. They attract the haut monde or <(tout Paris,® as the phrase is, and like the horse shows are almost as much social functions as exhibitions. International exhibitions have

been held in Paris in 1855, 1867, 1878, 1889 and 1900; Paris may accord¬ ingly be said to be the home of the interna¬ tional Exhibition. In 1900 there were 50,860,000 admissions to the exhibition — an unparalleled attendance. A great general international ex¬ hibition in 1921 to celebrate the semi-centennial of the republic has been proposed.

The Monuments. — Firs-t, perhaps, among the monuments that adorn the city is the Arc de Triomphe de l'Etoile, which stands in the spacious Place de l'Etoile, on an eminence at the head of the avenue des Champs Elysees. From this arc radiate 12 great avenues, like the spokes of a wheel, chief among which, after the avenue des Champs Elysees, are the avenue du Bois de Boulogne, leading to the park, and the avenue de la Grande Armee leading to Neuilly. This famous monument is the largest triumphal arch in existence. Its height is 160

feet, its width 146 feet and its depth 72 feet. The names of 172 victories of Napoleon and of 386 of his generals are carved into the arc, which consists of a main arch 67 feet high and 46 feet wide, intersected at right angles by a lower transversal arch. The work was begun by Napoleon in 1806 and finished by Louis Philippe in 1836. It is adorned with colossal trophies 36 feet high, with figures 16 feet high, its cost having been about 2,000,000 francs.

The Arc de Triomphe du Carrousel in the gardens of the Tuileries, built by Napoleon to commemorate his victories of 1805 and 1806, in imitation of the Arch of Severus at Rome, and formerly the chief entrance to the Palace of the Tuileries, is a notable structure. It was originally crowned with the celebrated Quadriga from the portal of Saint Mark's in Venice. Somewhat similar to these in general character are the Porte Saint Martin, in the grand boule¬ vard — a triumphal arch 57 feet in height, erected in 1674 in honor of Louis XIV ; and the Porte Saint Denis, another triumphal arch near by in the same thoroughfare, consisting of a single archway, 81 feet in height, built to com¬ memorate the victories of the grand monarch in the Low Country. These two monuments are all that remain of the wall of

Louis XIV, which was pulled down by Louis XV to make place for the grand boulevard.

The tomb of Napoleon under the dome des Invalides is a magnificent mausoleum, the tomb itself consisting of a sarcophagus of reddish-brown granite from Finland, weighing 67 tons, and being 13 feet long, 6ˆ4 feet wide and W/2 feet high. With its superb setting under the fine dome, it constitutes a most impressive memorial.

The Pantheon is in some respects the most imposing public edifice in ‘Paris. It stands on the highest ground on the left bank on the site of the tomb of Sainte Genevieve, the patron saint of Paris. It was built by Louis XV (1764_90) from plans by Soufflot, and was de¬ signed to be the church of Sainte Genevieve. But in 1791 the Convention converted it into a sort of memorial temple, naming it the Pan¬ theon, and inscribing on its front the words : «Aux grands homines la patrie reconnaissanteA It ‘is of most imposing appearance and dimen¬ sions, in form a Greek cross with equal arms, 370 feet long and 276 feet wide, surmounted by a dome 272 feet high and more than 75 feet in diameter, the lantern at the top of which is reached by a staircase of 425 steps. A huge colonnade consisting of 22 fluted Corinthian columns 81 feet in height, resembling that of the Pantheon at Rome, forms the portico, to which 11 steps ascend. The tympanum, 117 feet long and 23 feet high, contains a fine group of sculpture by David d’Angers. M’ira-beau was buried here in the spring of 1791; shortly afterward Marat, Voltaire and Rous¬ seau, and more recently Victor Hugo and Presi¬ dent Carnot. The bodies of Voltaire and Rous¬ seau were removed at the Restoration. The vaults also contain a considerable number of tombs of distinguished officers and soldiers of the Revolutionary period. The government is slowly decorating the interior with works of the best contemporary artists.

The Palais du Trocadeno, on the elevation in Passy, ‘opposite the Champ de Mars, upon which Napoleon planned to erect a palace for

the king of Rome, is a huge building in the oriental style. It consists of a circular edifice 190 feet in diameter and 180 feet high, sur¬ mounted by a dome and flanked by two mina¬ rets 270 feet high. On each side extend wings, 660 feet each in length, the whole in the form of a crescent. The main building contains a Salle des fetes with an immense organ, and has seats for 6,000 persons. This is the laigest auditorium in Paris. The palace contains im¬ portant museums of comparative sculpture and ethnography.

Mention ought also to be made of the Palais Royal with its garden, built and owned originally by Richelieu (1629-34), where he lrved at the end of his life and where he died in 1642, but it was thereafter long the property of the dukes of Orleans. The cafes and gardens of the palace were, during the Revolution, the rendezvous of democrats and malcontents gen¬ erally. It was here that Camille Desmoulins called the populace to arms in July 1789. It is now government property and the seat of the Conseil d'Etat. A proposition has been made on behalf of some American merchants to convert a part of the arcades surrounding the garden into a great American department store, or general magazine for the exploitation of American goods, wares and merchandise. The Palace of the Order of the Legion of Honor, instituted by Napoleon in 1802, is situated on the Quai d'Orsay, at the corner of the rue Solferino. It was burned in 1871 by the Com¬ mune, but has been handsomely rebuilt. The original jbuilding was erected in 1786, and was interesting as the scene of *Mme.* de Stael's re¬ unions during the Directory.

The Column Vendome, 142 feet high and 13 feet in diameter, constructed from German cannon captured in the Napoleonic wars, sur¬ mounted by the bronze statue of Napoleon as a Roman emperor, stands in the centre of the Place Vendome. It is one of the conspicuous monuments of the city. The column of July in the Place 'de la Bastille, erected by Louis Philippe, in 1831, celebrates the heroes who fell in the Revolution of 1830. It is 154 feet high and affords from its top a fine view of that part of the city, particularly of the ceme¬ tery of Pere 'Lachaise.

Other conspicuous monuments are the statue of the republic in the Place de la Republique, and the equestrial statues of Louis XIV in the Place de la Victoire, of Etienne Marcel at the Hotel de Ville, of Washington in the Place d'lena, of Joan of Arc — two, one opposite the Church of Saint Augustin and the other in the Place de Rivoli — and of Charlemagne in the Parvis de Notre Dame. The monuments of Gambetta at the Louvre, of Danton in the boule¬ vard Saint Germain, of Mo lie re in the rue Richelieu, of Shakespeare in the boulevard Haussmann, of Marshal Ney near the Observatoire, of La Fontaine in Passy, of Dante at the. College de France, of Voltaire on the quai at the Institute, are among the many fine monu¬ ments that adorn the city. There are in all ac¬ cording to a recent official report 1*88 statues of men. and women and 3,758 public clocks in Paris. If the statues of men and women in the parks and cemeteries are included, the total is more than 250. One monument of particular interest to Americans is the reduced copy of Bartholdi's (<Liberty Enlightening the World® in bronze,

on the Pont de Crenelle, presented to the city y the American colony in Paris, which has carved on its base simply the two great repub¬ lican dates, « 1776-1 789»

Theatres and the Opera.— The leading theatre of France is the Theatre Frangais — the house of Moliere, as Frenchmen affection¬ ately call it. It was founded in 1600 at the hotel de Bourgogne in the Marais, and was under the superintendence of Moliere from 1658 down to his death in 1673. The present house in the rue Richelieu, adjacent to the Palais Royal, was built in 1782, after bis death. The interior was destroyed by fire in 1900, but it was immediately restored and rebuilt (1,400 seats). It contains a valuable theatrical library, and many theatrical art treasures, notable among which is Houdon's famous statue of Voltaire in the foyer. This great theatre — perhaps the first playhouse in the world, in vir¬ tue of its history and what it has contributed to dramatic art in its three hundred and more years of existence — was given its present pre¬ eminence in 1680, when Louis XIV suppressed lts rival, the theatre of the Marais, and consoli¬ dated the troupe of Moliere which then still played at the hotel de Bourgogne, with the Theatre Guenegaud in the rue Mazarine, thus creating a single theatre for Paris and eliminat¬ ing all competition. This became what is now the Theatre Frangais, and has had a continued existence from that day to this. It was for a time at the end of the 17th century on the other side of the river near the Institute, where the rue de l'Ancienne Comedie still suggests its former establishment on the left bank. The Theatre Frangais — sometimes also called La Comedie Frangaise — stands, however, second in official priority to the Grand Opera, which is now the first play house in Paris. The opera house, a sumptuous edifice, bearing the inscrip¬ tion, c< Academic Nationale de Musique stand¬ ing at the head of the avenue de l'Opera, was commenced in 1861 and completed in 1874. It occupies a site prepared especially for it just off the grand boulevard, covering an area of nearly three acres. Although it is much the largest theatre building in the world, it is third among the great theatres in point of seating capacity, coming after La Scala at Milan

and San Carlo at Naples. It seats 2,200 persons. The site alone cost more than $2,000,000, and the building about 60,000,000 francs. It has an an¬ nual subvention from the government of 800,000 francs. No description can adequately convey a proper notion of the magnificence of the build¬ ing and of its lavish decoration. The Opera Comique, dating from 1761, which was de¬ stroyed by fire in 1887, has been splendidly re¬ built (1,500 seats), and stands next to the Grand Opera in the amount of its subvention. It re¬ ceives 300,000 francs annually from the govern¬ ment. The-Odeon (1,420 seats), dating from 1782, on the left bank, near the Luxembourg, ranks in some respects next to the Theatre Frangais, and is devoted chiefly to the per¬ formance of classical dramas. It is par ex¬ cellence the theatre of the Latin quarter. The four theatres just mentioned are the subventioned theatres, each receiving from the state a substantial annual subscription. They are consequently open the year round, except for a short time in midsummer. The Grand Opera and the Odeon give gratuitous

performances two or three times a year, in recognition of their public character. Other leading theatres are the Chatelet (3,400 seats), the largest theatre in Paris, dating from 1780, and devoted now mainly to spectacular plays, for which its large stage especially adapts it ; the Gaite (2,000 seats), dating from 1753, which affects light opera; the Vaudeville (1,100 seats), dating from 1792, a handsome theatre in the boulevard des Capucines, the character of which is fairly indicated by its name; the Theatre Sarah Bernhardt (1,699 seats) in the Place du Chatelet, conducted by Madame Bernhardt; the

fo0iiies Pramati9ues (1,600 seats), dating from 1831; the Antoine (1,000 seats), a new theatre that is attracting a good class of patronage by the uniformly high character of its productions;

fe/ˆmbigll‘Comique O*500 seats), dating from 1769; and the Palais Royal (850 seats), an at¬ tractive little theatre dating from 1789, are each of them well-known places of amusement. There are in all in Paris about 40 theatres of the first class, besides a great number of secon¬ dary _ playhouses. Such institutions as the Mouhn-Rouge, the Folies-Bergere, the Casino de Paris, the Olympia, the Concerts Rouge, the Concerts Colonne, the Nouveau Cirque, the Ambassadeurs and the Jardin de Paris have a worldwide reputation, while places like the Bal Bullier, the Bal Tabarin, the Palais de Glace, the Hippodrome, and all the rest of the cafes-concerts and cabarets artistiques et id omne genus, are not less known and appreciated by Paris qui s’amuse.

The Restaurants, Hotels and Street Life.

Paris is the home of high culinary art, and many of the famous restaurants, such as the Maison Doree (like Tortoni, Hardy, the Cafe Anglais and Durand, now only a memory), Paillard, Cafe de Paris, Cafe de la Paix, the Ritz, Voisin, Ciro, Marguery, Foyot, Tour d'Argent (dating from 1582, and thus possibly the oldest of restaurants), and des Ambassa¬ deurs have a worldwide reputation among bon vivants. Paris is also the city par excellence of hotels. No city has so many of them. The tendency is to small hotels, many of which maintain the highest standards of culinary ex¬ cellence, and cater for a very critical clientele Nowhere does one take his ease at his inn more perfectly — nowhere is he more absolutely chez lui — than in one of the countless little hotels of Paris. Among the great hotels, the Grand with its 1,000 rooms and superb location at the Place de l'Opera, is pre-eminent. Other large hotels of the first class are the Ritz and the Bristol in the Place Vendome, the Elysee Palace in the avenue des Champs Elysees, the Conti¬ nental in the rue de Rivoli facing the gardens of the Tuileries, the Terminus at the Gare Saint Lazare, the Regina, the Meurice, the Astoria, the Carleton, the Grand Hotel du Louvre near the Palais Royal, the Moderne in the Place de la Rcpublique, the Scribe and the Mercedes at the Place de 1'Etoile. Scarcely anything more impresses the visitor to Paris than the bright¬ ness and brilliance of the streets. They are kept scrupulously clean, and the wide asphalt sidewalks give opportunity for a life in the streets that is particularly pleasing. The cafes and restaurants set little tables in two or three rows on the sidewalks in front of their estab¬ lishments under awnings, at which at almost all seasons of the year many thousands of per-318

sons daily are entertained either for their meals or for the aperitif which all Parisians seem to take in the late afternoon. Whenever the weather is mild these seats and tables in the streets are occupied by a well-ordered throng until well after midnight, eating, drinking, smoking, reading, writing, chatting and hear¬ ing the music. 'In consequence of this fashion of outdoor life the streets of Paris are espe¬ cially brilliant. The plan and arrangement of the streets throughout the city, their width and the careful regulation of the traffic, facilitate easy and rapid transit, and consequently — in spite of

the density of the traffic — they seldom seem exceptionally crowded. There is almost never a ˆblock® in the movement of vehicles in the streets, although through the grand boule¬ vard and at certain corners elsewhere the traf¬ fic is much the densest in the world.

The Markets and Abattoirs.— The central markets, the cattle markets, the wine markets and the abattoirs, which supply Paris with food and drink, furnish some interesting statistics. The markets (Halles Centrales), of which the name and the location date from the foundation by Philippe Auguste in the 13th century, are vast structures, chiefly of iron, erected in 1874, consisting of 12 pavilions, between which run covered streets, 48 feet wide and 48 feet high, intersected by a boulevard 105 feet wide. The six pavilions on either side of the boulevard occupy a space of 182 by 136 yards, the whole market covering an area of 22 acres. Each pavilion contains 250 stalls, and under each of the pavilions are cellars of similar area. It is estimated that 15,000 vehicles are employed in and about the markets in the traffic incident to the business. In spite of their extent they have become quite inadequate and the municipal council has now in hand a project for enlarg¬ ing them by condemning the property to the east as far as the boulevard de Sebastopol, con¬ sisting of four blocks, for the erection of an ex¬ tension. In each arrondissement, there are, in addition to these central markets, one or more local markets of the same general character, under municipal control. The cattle market (Marche de la Villette), near the fortifications on the rue d'Allemagne, consists of three large pavilions, covering an area of 10 acres. The central hall is capable of containing 4,600 oxen, the one on the right about 7,000 calves and pigs and the one on the left 22,000 sheep. About 4,000,000 head of cattle annually enter the market. Nearby and adjoining the cattle market are the slaughter-houses (Abattoirs de la Villette), the buildings of which include 20 courts with 250 scalding-pans. Both the mar¬ kets and the slaughter-houses, which are kept exceedingly clean, are open at all times to the public. The cattle market and the abattoirs to¬ gether have cost the city upward of 60,000,000 francs and well repay a visit.

Underground Paris. — The most distinctive feature of Paris underground are the sewers, which have for centuries been among the won¬ ders of the capital. There were no covered sew¬ ers or drains in Paris prior to the reign of Louis XIII. Theretofore, there had been only open drains or gutters in the middle of the streets, such as may still be seen in some of the oldest streets of the French quarter in New Orleans, but about 1630 the present svstem was under¬ taken. It progressed at first but slowly, and

only since about 1854 has it been efficient and relatively complete. It consists of an elaborate network of drains covering the entire area within the walls, constructed of stone and concrete in the most substantial manner, divided into 15 classes, from the great sewers of the first class, which are 18 feet and 2 inches in height by 11 feet and 4 inches wide, down to the little drains a few inches in diameter, that connect each individual house with the street drain. The discharge is carried by a tunnel far down the river below the city, where. the hquid portion escapes into the river at Asnieres, while the solid parts are collected and utilized as fer¬ tilizer in the peninsula of Gennevilliers. xhe city is divided, for drainage purposes, into four parts, by the two main sewers which run at right' angles to the river under the boulevard de Sebastopol and the boulevard Saint Michel, respectively. These are discharged, not into the river, but into eight channels parallel with it, which in their turn receive the contents of. 15 tributaries fed by numerous smaller drains. The total length of the network is in excess of 900 miles, a distance about equal to that from New York to Chicago, or a railway journey of 24 hours by fast express trains, and the system as a whole is without an equal anywhere. The cleaning of the sewers is effected by boats and scrapers and there is a siphon system at the Pont de l'Alma for conducting the drainage under the Seine. Excursions are made by curi¬ ous visitors through some of the main sewers in electric boats and tram cars, which start periodically either from a point near the Made¬ leine or the Louvre, and go a distance of about five miles to the exit near the church of Saint Laurent in the rue Saint Martin or to the Place du Chat e let, or vice-versa. The sewers are util¬ ized not only for sewage and drainage, but also as conduits for the water and gas pipes, for the pneumatic tubes that are used by the post office for the transmission of mail matter and for telephone and telegraph wires; they are per¬ fectly ventilated and constantly patrolled by the men in charge of the service.

Below the sewers on the left bank are the Catacombs. They are the remains of ancient quarries, worked as far back as the Roman period, for the limestone of which Paris is built. They extend under a considerable part of the left bank. They were first used during the Revolution as depositories for bones and dead bodies removed from the cemetery of the In¬ nocents, which was closed at that time. They have, therefore, been charnel-houses and known as catacombs only from that period. Thev are open to visitors periodically, the entrance being at the Place Denfert-Rochereau. They are ex¬ tensive and rather curious, but very far from possessing the interest of the more famous

catacombs of Rome, Naples and Syracuse.

The latest and most presently and practi¬ cally important feature of underground Paris to the average man is the Metropolitan Under¬ ground Railway, which was opened in. 1900. It consists of lines running in various directions throughout the city, especially of a main line through the centre of town east and west, from the Porte de Vincennes to the Porte Maillot, a distance of about seven miles, and another more northerR line from the Place de la Na¬ tion to the Bois de Boulogne, making a loop of about eight miles in length. There are many

connecting branches touching the Place de 1 Opera and the railway stations, which bring the lines to practically every part of Paris. The fares are five cents first class and three cents second class for any distance. Automobile om¬ nibuses, carrying 30 passengers and weighing but 5,600 kilos, are run in connection with the Metropolitan, constituting the lesser arteries of the system of intramural transit, of which the lines underground constitute the main arte¬ ries; the omnibus fare is by distance and varies from two cents second class for a short dis¬ tance, to five cents for a first class for any distance. The 663 omnibuses (employing 10,700 horses), of which 418 were two-horse and 245 three-horse conveyances, have thus been super¬ seded.

No description of Paris underground would be quite complete without mention of the new and splendid station of the Orleans Railway line on the Quai d'Orsay, and the tunnel that runs under the quais and next to the river con¬ necting it with the main station, two miles dis¬ tant, at the Quai d'Austerlitz. It is regarded as an almost perfect installation, and served as a model for the similar work in New York by the Pennsylvania Railroad Company. The canals which traverse Paris, some of them un¬ derground for long distances, for example, un¬ der the Place de la Bastille and through the boulevard Richard Lenoir, are interesting dis¬ plays of engineering and building skill.

Bibliography. — Among the immense num¬ ber of books, historical

and illustrative, con¬ cerning Paris, the following, mainly French and American works, will be found especially valu¬ able : care should generallv be taken not to rely much on information from distinctively English sources — (Paris a travers les ages* (1875); Robida, (Paris a travers l'histoire* ; Joanne, (Paris illustre) (1881); Labedoliere, (Le Nouveau Paris) (1871) ; (Guide de Paris par les principaux Ecrivains et Artistes de la France* (1868) ; Martin, (The Stones of Paris) (1899) ; Haynie, (Paris Past and Present (1902) ; Lansdale, (Paris, Its Sites, Monu¬ ments, and History) (1899 — an accurate and very readable work) ; Bayet, (Precis d'Histoire de i'Art* ; Robinson, (Modern Civic Art) (1903) ; (Guide Pratique a travers le vieux Paris* (1903) ; (Memorable Paris Houses) (1888); (Paris and Its Story) (1904); Belloc, Hilaire, <Paris) (1904) ; Moriac, (Paris sous la Commune) (1871) ; Kaufmann, (Paris of To¬ dayˆ (1891) ; Bourdon, (Petite Histoire de Paris* ; Hugo, Victor, (Paris,* (Les Miserables) and (Notre Dame de Paris) ; Sue, Eu¬ gene, (Mysteries of Paris; the (Opera of Louise) ; Lacomb, (Bibliographie de Paris> (1886) ; Wolff, Jetta S., (The Story of the Paris Churches* (Oxford 1918). The Guides of Joanne to Paris and its environs (in French and English) are mines of accurate information.

Charles F. Beach, American Lawyer in Paris.

PARIS, Canada, a town and port of entry of Brant County, Ontario, on Grand River, on the Grand Trunk Railway, the Lake Erie and Northern Railway, and the Canadian Pacific Railway. It is connected with Brantford (7 miles) and Galt (14 miles) by the Grand Valley Electric Railway. The town has seven churches, three public schools and a high school, a public

library and three banks. It owns its lighting and water-supply systems; and is supplied for industrial purposes with natural gas, and elec¬ tric power from Niagara Falls. It is a busy industrial centre with potteries, plaster mills, knitting mills, flour and cloth mills and oil refineries. It has a refrigerating plant, and makes needles and shells for munition works. In the neighborhood are extensive gypsum beds and brick clay. Pop. about 4,600.

PARIS, Ill., city, county-seat of Edgar County, on the Vandalia Line and the Cleve¬ land, Cincinnati, Chicago and Saint Louis rail¬ roads; about 18 miles northwest of Terre Haute, Ind., and 110 miles east by south of Springfield. It was founded in 1825 and incorporated in 1849. It is in a productive farming section, in which wheat, corn and

broom corn are culti¬ vated extensively. The manufacture of brooms is a prominent industry. The streets are well kept and the city presents the appearance of fine homes of prosperous people. There are a children's home and a public library. The park has an area of 100 acres, about 70 of which is an artificial lake. In 1916 the commis¬ sion form of government was adopted. The electric-light plant and waterworks are owned and operated by the city. Pop. 7,985.

PARIS, Ky., city, county-seat of Bourbon County, on a branch of the Licking River and on the Louisville and Nashville and Frankfort and Cincinnati railroads, about 20 miles north¬ east of Lexington. It was settled in 1784 and in 1862 was chartered as a city. It is in an agricultural section, in the (<blue grass region.** The chief trade is in tobacco, grass seed, poultry, hemp and horses. The prominent pub¬ lic buildings are the courthouse, built in 1903, and the municipal buildings. There are public and parish schools and a library. The city owns the gas-plant. Pop. (1920) 6,310.

PARIS, or PARIS HILL, Me., village and county-seat of Oxford County, about 50 miles northeast of Portland. It is situated at an ele¬ vation of 800 feet and has fine scenery. Near¬ by is Mount Mica, which is notable for the variety of its deposits of rare minerals, includ¬ ing beryl and tourmaline. Novelties in wood are manufactured here. Pop., township, 3,436.

PARIS, Tenn., city, county-seat of Henry County, on a branch of the West Sandy River, and on the Nashville, Chattanooga and Saint Louis, and the Louisville and Nashville rail¬ ways, about 119 miles west of Nashville. It is in a fertile agricultural region, in which cotton and tobacco are the chief products, and has an extensive trade in grain, cotton, several kinds of tobacco and proprietary medicines. There are flour and lumber mills, and railroad repair shops in the town. Pop. over 4,730.

PARIS, Tex., city and county-seat of Lamar County, on the Texas and Pacific, the Saint Louis and San Francisco, the Gulf, Colorado and Santa Fe, and the Texas Midland railways. The town was founded in 1845. Its affairs are managed under a special charter, by a mayor and board of aldermen. The city has a well-equipped fire department and it owns the water¬ works and sewerage system, the latter being on the Waring system and the sewage being dis¬ posed of on a sewerage farm. The Federal government has a fine courthouse and post-

office building, and the county courthouse is an imposing granite structure. 1 here are two telephone systems, an electric railway, and elec¬ tric light and gas. The homes and business houses are nearly all owned by their occupants, and very little of the property is mortgaged. The city has a high school affiliated with the State University as one of its preparatory schools, and a private seminary for girls. The county and city jointly maintain a free hos¬ pital and the county poor farm. The electric railway maintains a park and summer theatre in the eastern suburbs. The lands surrounding Paris produce cotton, corn, oats, alfalfa, fruits and vegetables; while the industrial establish¬ ments comprise cottonseed-oil mills, flour mills, an iron foundry, candy factories, woodworking shops and mattress and broom factories. Pop.

(1920) 15,040.

PARIS, Declaration of. See Declaration of Paris.

PARIS, Treaties of. See Peace Treaties. PARIS, University of. See Paris.

PARIS BASIN, an oblong depression about 20,000 square miles in extent, in the Cretaceous rocks under and around Paris, filled in with richly fossiliferous Tertiary deposits. It was made famous by the palaeontological investiga¬ tions of Cuvier.

PARIS' GREEN, a poisonous pigment, a vivid light green in color, extensively used to kill the potato-bug and the cotton-worm. It is an insoluble mixture of the double salts of the acetate and the arsenite of copper, and was at one time extensively used as a pigment, especially for wall paper.

PARISH (Low Latin, parochia), in ecclesi¬ astical law, in England, a. certain territory or (<circuit of ground,® committed to the spiritual charge of one ecclesiastic having care of souls therein. The whole of England is divided into 10,000 parishes. Camden says that this division was made in England about the year . 630. Others refer it to a

decree of the council of Lateran held in 1179. A law of King Edgar, about 970, seems to confine the payment of tithes to the parish to which a person belonged ; and so it has remained ever since, and nowadays a man's parish in England is that in which the poor rate is collected from him. In the United States the word parish does not mean the same thing as in England, nor does it mean the same thing in all the States. The legal importance of parishes in England de¬ pends upon the fact that the rector of each parish is entitled to certain dues collected within it. From the first settlement of the United States there have been everywhere asso¬ ciations and bodies corporate or organized for ecclesiastical purposes, and these have been gen¬ erally called parishes. In New England they were originally the same as towns; that is, the persons composing a town, and acting as a town in civil and political matters, also acted as one bodv in religious or ecclesiastical matters ', and the 'parish had therefore the same territorial limits as the town. Afterward, as the towns grew more populous, they were divided for ecclesiastical purposes into different parishes, which were still territorial and were contained within local limits. There are many such par¬

ishes now in most of the States. At length, however, as a diversity of religious sentiment became developed, all religious opinions standing on the same footing in law, parishes began to be formed of persons associated by similar¬ ity of religious sentiment and not mere near¬ ness of residence, and therefore with little or no reference to their place of abode. These were called poll parishes, in distinction from territorial parishes. They are numerous every¬ where, and in the large cities may be considered as having taken the place of territorial parishes, which are almost unknown there. In Loui¬ siana, the word parish is used to designate a district separated and defined bv local limita¬ tions for merely civil and political purposes.

PARISH REGISTER, The, by George Crabbe, is the most notable poem of the vol¬ ume published by him in 1807, 22 years after the appearance of the last of the early group of his poems. In some respects, for example, in "the use of heroic couplets and of conven¬ tional diction, as well as in the absence of the more charming and inspiring elements of poetry, it held by his earlier work, but it was marked by a comparatively new and extraordinarily effective power to paint with resolute realism the lives and characters of the humbler in¬ habitants of an English village. Though in verse, it was really a valuable contribution, at an important juncture, to English fiction, de¬ spite the somewhat mechanical fashion in which the simple tales and

sketches were grouped under the heads of (Baptismsˆ (Marriages > and < Burials. > . With its flattering success Crabbe (<found himself,® and he followed the thus re¬ vealed line of his genius — not without showing development — in such works as (The Borough) (1810) and (Tales of the HalP (1819). Each of these has its partisans who would place their favorite above (The Parish Register, > but that seems sufficiently to reveal the essential Crabbe, and it has the advantage of being comparatively short. Hence for the reader who does not wish to remain unacquainted with the poet whom Byron — surely with (The Parish Reg¬ ister in mind — considered to be

“ Though Nature’s sternest painter, yet the best,”

there can be little doubt that the earlier work, which cheered the deathbed of Fox, may be the more safely recommended, although in it Crabbe does not reach the height of his power as a painter of the landscape of the eastern coast or exhibit strikingly those qualities of mellowness that seem to have made (Tales of the HalP delightful to Edward FitzGerald.

Upon the special excellencies of the poem there is little room, or need, to dwell. The introduction is admirable, especially in its pic¬ tures of the interiors of typical cottages. Of the tales, that dealing with the miller’s daugh¬ ter thrust out by her father, though conven¬ tional, is pathetic, yet not in such a moving fashion as the story of Phoebe Dawson, which particularly impressed Fox and in some memo¬ rable lines off description is perhaps inferior to no passage in Crabbe’s later books. His humor, never his strong point, is seen in the Gardener who delights to give botanical names to his children and to impress his friends with his learning. Of the character sketches it is not rash to praise those of Andrew Collett, ((the

blind fat landlord of the Old Crown Inn » the thrifty Widow Goe, the trinket-loving Catherine, and the ((noble peasant,® Isaac Ash-ord- .Yet some may hold that Crabbe reaches the height of his power at the very close, where be makes old Dibble, the parish clerk, describe the

rectors under whom he had served. For those who think Crabbe's conversations such as were never heard on earth, who are not interested in Sir Edward Archer, the "amorous knight® and the recalcitrant Fanny Price, (<lovely and chaste,® who object to stilted lines,' the admirer of (The Parish Register can af¬ ford little help, but he may confidently assure them that the poem will never lack admirers.

William P. Trent. PARISH SCHOOL. See School.

PARISH SCHOOLS, Roman Catholic.

A free school attached to a Roman Catholic parochial foundation in order to carry out the belief of the Roman Catholic Church that there should be a union of secular learning and reli¬ gious training for a complete education. Ex¬ perience having shown that the instruction re¬ ceived at home and at churc'h is not adequate for the requisite religious training of the child, the parish school, wherein religious, moral and secular training shall be imparted, was insti¬ tuted. Such schools have been in existence from the earliest ages, although the special form in which we know them at the present •day has been a development of the 19th cen¬ tury.

The new Code of Canon Law, promulgated by Pope Benedict XV as the universal law of the Church, on 28 June 1917, clearly outlines the Catholic position on the education question

Roman Catholic Parish Schools]

as can be seen from the wording of the fol¬ lowing Canons :

" 1113. Parents are bound by a most serious obligation to procure as far as possible the religious, moral, physical and civil education of their children and to provide also for their temporal welfare.

" 1372. 1. All the Faithful are to be brought up from childhood in such a way that not only nothing be taught them that is opposed to the Catholic religion and good morals, but so that religious and moral instruction hold the first place.

" 2. Not only parents but all who hold their place have the right and most serious duty to procure the Christian education of their children.

" 1373. Religious instruction must be given in the ele¬ mentary

schools, suitably to the age of the pupils.

1374. Catholic children must not attend non-Catholic, undenominational, or mixed schools, those namely that are also open to non-Catholics. It belongs exclusively to the .Bishop of the locality to judge under what circumstances and with what precautions against the danger of perversion, attendance at these schools may be tolerated.

1375. The Church has the right to found net only ele¬ mentary schools, but also secondary schools and schools for higher studies.

1379. If Catholic elementary and secondary schools do not exist, m accordance with Canon 1373, care must be taken, particularly by the Bishop of the place, that they be founded.”

The parish, school does not materially differ in method, organization or scope from the public schools under the direction of the civil authorities, except that it is controlled by the Roman Catholic diocesan officials and supported by the voluntary contributions of the Roman Catholic people, receiving no State aid.

Organization. — The schools are graded ac¬ cording to the customary primary, grammar and high school divisions of modern educational ideas. The teachers are mainly members of the religious orders instituted for the work of education, supplemented by lay assistants. The rector of the parish is the official director of the United States, March, 1918

ARCHDIOCESES, DIOCESES, VICARI-ATES-APOSTOLI C

Parishes with schools

Children

attending

ARCHDIOCESES, DIOCESES, VICARI¬ ATES-APOSTOLIC

Baltimore .

29,615

Denver …

Boston .

105

60,937

Dp.s Moi np < s

Chicago .

279

118,215

Detroit

Cincinnati .

123

32,473

Duluth .

Dubuque .

94

15,412

El Paso

Milwaukee .

156

37,734

Erie ….

New Orleans .

92

22,293

Fall River

New York .

188

94,139

Farsro .

Oregon City .

38

f7 , 000

Ft. Wayne

Philadelphia .

180

82 , 064

Galveston .

Saint Louis .

186

34 , 809

Grand Island

Saint Paul .

99

25,315

Grand Rapids …

San Francisco .

48

15,441

Great Falls. .

Santa Fe .

26

f3 , 294

Green Rav ■

Albany .

52

i9,838

Harrisburg . .

Alexandria .

18

1,943

Hartford… .

Alton .

66

10,569

Helena .

Altoona .

42

11,095

Indianapolis…

Baker City .

6

810

Kansas City .

Belleville .

74

10,113

La Crosse .

Bismarck .

11

2,387

Lead .

Boise .

9

fl ,435

Leavenworth .

Brooklyn .

114

74,241

Lincoln .

Buffalo .

132

37,917

Little Rock .

Burlington .

21

6 , 753

Louisville .

Charleston .

8

758

Manchester .

Cheyenne .

2

1416

Marquette .

Cleveland .

129

49 , 302

Mobile .

Columbus .

59

13,579

Monterey-Los

Concordia .

33

4,676

Angeles .

Corpus Christi .

32

12,225

Nashville .

Covington .

42

‘7,729

Natchez .

Crookston .

8

1 , 161

Newark .

Dallas .

33

f5 , 7 1 3

Ogdensburg .

Davenport .

47

6,970

Oklahoma .

Parishes with schools

Children

attending

ARCHDIOCESES, DIOCESES, VICARI-ATES-APOSTOLIC

1 Parishes

with schools

Children

attending

29

17,706

Omaha .

74

10,273

21

3,036

Peoria .

76

13,600

102

44,436

Pittsburgh .

180

61,496

11

3,373

Portland .

53

16,470

9

1,935

Providence .

41

t21,027

47

12,467

Richmond .

29

4,759

29

12,742

Rochester … .

62

22,983

22

f2 ,932

Rockford .

31

5,723

95

21,248

Sacramento .

11

f2 ,340

40

5,342

Saint Augustine .

19

+3,147

12

fl ,596

Saint Cloud .

33

6,789

89

18,357

Saint Joseph .

29

3,672

8

t 1 , 400

Salt Lake .

3

510

107

23 , 700

San Antonio .

66

7,646

44

10,837

Savannah .

17

t3 , 807

87

38,705

Scranton .

83

20,764

19

17,460

Seattle .

29

5,002

119

19,093

Sioux City .

65

8,801

49

17,568

Sioux Falls .

31

4,829

84

11,630

Spokane .

15

1,858

6

736

Springfield .

69

31 436

57

7,500

Superior .

25

4,496

25

t2 , 706

Syracuse . .

31

13,076

44

3,519

Toledo .

76

16,721

81

14,190

‘ ‘renton .

49

16,403

38

17,207

‘ ‘ucson .

7

t2,435

26

f8,224

Wheeling .

26

4,291

36

f5 , 2 7 7

Wichita .

46

3,773

Wilmington .

14

4,499

43

8,082

Winona .

40

6,415

25

4,129

Morth Carolina .

16

984

36

f5 , 318

ˆ.uthenian-Greek… .

125

11,598

131

61,394

19

4,248

Total .

5,748

1,593,407

40

t5,320

t Including academies. VOL. 21 — 21

each school. There is a diocesnn school hoard appointed hy the bishop to look after the gen¬ eral welfare of the diocesan school system, and a special diocesan superintendent, a priest, who is charged with the immediate inspection of the schools and who is responsible for the progress and efficiency of the classes.

The course of studies is prescribed by the diocesan board, which also controls the teach¬ ing staff In some dioceses these teachers hold State licenses to teach, or they must pass an examination equal to the requirements for such a license. In many schools in New York State the Regents' examinations are taken. Lay trus¬ tees have been appointed on some of the school boards, but this custom has not become general as yet. Normal schools for members of the teaching orders, training classes and all the formal details for the study of pedagogy have been instituted. A Catholic Educational Asso¬ ciation was organized 14 July 1904. which holds an annual National Conference attended bv delegates from all over the country, the delib¬ erations of which have done much to standard¬ ize the parish system of education, under the 40,000 teachers in the Catholic elementary and secondary schools. These teachers are drawn mainly from 85 distinct communities of the religious orders of men and women, of which about one-fifteenth are men. The elementary schools are almost entirely taught by women. The upkeep of these schools costs the Catholics of the United States they estimate about $12,- 000,000 a year. This does not include the orig¬ inal cost of the buildings or sites. All this is in addition to the ordinary taxes for State

schools. ,

With the growth of the general educational impulse and the development of the public school system there was an insistence by the Roman Catholic Church authorities on an equal impetus for the free parochial school. It must be remembered always that this opposition was not against the public school per se, but against the system that divorces religion from educa¬ tion or the ((national endowment of agnosti¬ cism® as it has been termed. In 1904 the offi¬ cial report showed 4,001 schools and 980,088 children in attendance. In 1910 the figures were 4,703 schools and 1,197,913 pupils. For official figures prepared by the authorities . of each diocese for the Catholic Directory giving the standing of Catholic parish schools in the United States, March 1918, see table p. 321.

History Roman Catholic schools have ex¬ isted in the United States from the earliest days of missionary effort. As early as 1598 they were in use in New Mexico and Florida and for English-speaking pupils in Maryland in 1636 As the church membership grew in num¬ bers and influence after the Revolution the movement for the establishment of elementary schools took on new vigor.. It can be traced best in the formal legislation of the church authorities on the subject. The first Provincial Council of the bishops of the United States, held at Baltimore, Md., in October 1829, expressed the wish that schools should be organized where youth may imbibe principles of faith and moral¬ ity along with human knowledge. In the three Plenary, or National, councils of the American hierarchy held also in Baltimore, the .first in 1852; the second in 1866 and the third in 1884,

the legislation is specific on the subject. What was an exhortation in the first and a prayer in the second became a command, emphatic and imperative in the third. In the First Plenary Council the bishops were exhorted in view of the evils which arose from the defective edu¬ cation of the youth, to have a school attached to every church in each diocese, and to pro¬ vide for the same and for suitable teachers from the revenues of the parish. In the Sec¬ ond Plenary Council the decrees laid down that the first, and in fact the only, remedy for the terrible evils of religious indifference and ot moral corruption would seem to be that in every diocese, each church should have its school in which the Roman Catholic youth should be trained in religion and good morals as well as in literature and the arts. In the Third Plenary Council, it was decreed that :

“ I Wherever a parish school does not already exist, one must be built within two years from the promulgation ot the decree, and maintained in perpetuity, unless the bishop on account of insuperable obstacles consents to a delay.?

“ II. Any priest, who, by culpable negligence, fails to erect and to maintain a school within that time, or who will not heed the repeated admonitions of the bishop, will

be liable to removal from his church.

“ III. Any mission or parish which fails to assist tne priest in erecting and maintaining a school to such an extent that owing to this negligence the school cannot exist, must be censured by the bishop, who will employ efficient and prudent means of obtaining the necessary support.

“ IV. All Catholic parents are obliged to send their children to parish schools, unless they provide for their Christian education either at home or in other Catholic schools, or else obtain permission for sufficient reason, approved by the bishop, and with due precaution and other remedies, to send their children to other . schools. What constitutes a Catholic school is left to the judgment of the

Other laws to give force to these decrees enact that candidates for the priesthood during their seminary course shall receive special train¬ ing with a view to the proper management of schools. Bishops are required to appoint a com¬ mission for the examination of all persons who shall apply for positions as teachers in the parish schools and to see that the schools be brought to that ((state of efficiency and perfection which the honor of the Church, the interests of the pupil, temporal as well as eternal, and the generous loyalty of the laity, unquestionably de¬ mand and deserve.® The end to be kept in view is ((that the parish schools may continue to grow stronger and more efficient and may prove to be a source of pride, of hope and of strength to the State no less than to the Church.®

As a consequence of this legislation parish schools are to be found in every centre through¬ out the land where the Roman Catholic congre¬ gation is numerous enough to support one.

The first schools in the United States were usually established under the auspices of some religious denomination. The first free parish school in New York was started by Saint Peter s parish, New York city,

in March 1800. It is the oldest free school in the city, the first public school not having opened until May 1806. By subsequent act of the legislature, passed in 1806, Saint Peter's school was empowered to receive its dile proportion of the taxes collected by the State for educational purposes. In the United States Catholic Directory 1845-49 it is stated, "There are common schools for both male and female children in most of the cities and towns of this diocese (Boston) having Catholic teachers. In Lowell they are supported

at the public expense, but in all other places at the expense of the parents of the children, aided by collections in the churches.® Lowell was a centre that had attracted a large Irish Catholic population and at the annual town meeting in May 1830 a committee was named to consider the expediency of establishing a separate school for the benefit of this part of the population. This committee reported favorably on such a school in April 1831. Bishop Fenwick writing to Lowell from Boston 26 March 1831, said:

" I see no impropriety in the Catholic school of your town receiving aid from the school fund, especially if the Catholics of Lowell have contributed their portion by the payment of taxes or otherwise toward the support of said fund. Common justice would entitle them to something out of it for the payment of their Master. But I really do not understand how. in this liberal country, it can be made a condition to their receiving anything that they, the Catholics, shall be m that case debarred from having a Catholic teacher, learn-Catholic books and being taught the catechism of the Catholic Church. We can never accept such terms.

• • • I would not give a straw for that species of educa¬

tion which is not accompanied with and based upon religion."

Under an arrangement then made with the Catholic pastor of Lowell, several schools were organized which were paid for out of the public taxes. They are spoken of in the State Board's report of 1851 as the

outcome of a (<wise and liberal policy,® but they lapsed after 16 years of trial with the rise of the Native Amer¬ ican movement and its consequent religious dis¬ turbances. The first Roman Catholic school in Boston was opened in 1820 and taught by Ursuline nuns. The Rev. John Thayer collected money in Ireland to have the project carried out.

In New York City in 1841 the school ques¬ tion played an important part in the State elec¬ tion.. The school funds in the city were then administered by a body known as the Public School Society. The Roman Catholics com¬ plained of unjust treatment at its hands and the agitation by them with Bishop Hughes at their head resulted in the formation of the present public school system of the city and the entire abolition of the old Public School Society. In his message to the legislature on 4 Jan. 1842, Governor Seward, presenting the subject of schools and the school fund to the legislature,- favored the consideration of the denominational free schools in the distribution of the taxes for educational purposes. In this he followed the teachings of his old preceptor, the famous Rev. Dr. Eliphalet Nott, president of Union College, who was asked by the governor to give him his views in writing on the subject that he might embody them in a message to the legislature. This he did and Governor Seward, in his mes¬ sage to the legislature 1 Jan. 1840, says:

“ The children of foreigners found in great numbers in our populous city and towns and in the vicinity of our public works are too often deprived of the advantages of our system of public education in consequence of prejudices arising from difference of language or religion. It ought never to be forgotten that the public welfare is as deeply concerned in their education as in that of our own children. I do not hesitate therefore to recommend the establishment of schools in which they may be instructed by teachers speaking the same language with themselves and professing the same faith. _ There would be no inequality in such a measure-Since it happens from the force of circumstances if not from choice that the responsibilities of education are in most instances confided by us to native citizens and occasions seldom offer a trial of our magnanimity by committing that trust to persons differing from ourselves in language or religion. Since we have opened our country and all its full¬ ness to the oppressed of every nation we should evince wisdom equal to such generosity by qualifying their children for the high responsibilities of citizenship.”

The establishment of the Department of Education practically as at

present constituted in New York, did not materially alter the situa¬ tion as far as the Roman Catholic view held it. Bishop Hughes put new energy into the estab¬ lishment of free parish schools and the example of the Roman Catholic body in New York had an equally potent effect on other sections of the country. Attempts were subsequently made to bridge the difficulty of the heavy double school tax by compromise! One known as <(the Poughkeepsie Plan,® was that of the pastor of Saint Peter's Church, Poughkeepsie, N. Y., who leased his schoolhouse to the local board of education at a nominal sum, the city authori¬ ties in return assuming all the expenses of run¬ ning the school. No religious instruction was given during the regular school hours and the teachers were under the control of the local school board. Many Roman Catholics, lay and clerical, condemned this plan, but it was toler¬ ated by the late Cardinal McCloskey, then arch¬ bishop of New York. This was in the early 70s of the last century. An adverse opinion by the superintendent of public instruction on the constitutionality of this plan caused its aban¬ donment in 1899. The controversy reached its climax in 1891, when the Roman "Catholics of the United States were divided into two oppos¬ ing parties, or what might be called the strict constructionists and the liberals, over the ques¬ tion.

Some time before Archbishop Ireland had made an arrangement at two towns in his dio¬ cese, Faribault and Stillwater, by which the parish schools there received State money. This he described as follows :

The plan to which allusion here is made is most simple. It accords both with State laws and Church requirements and on this account commends itself to all fair minded, in¬ telligent citizens. An existing Catholic school, which observation snows to be in all particulars fit to be put on a line with existing public schools, is adopted by the public school board and conducted during school hours under all the laws and regulations of the board as to teachers and pupils. The board is supreme in all that regards the imparting of the instruction required by its own programme and during all the time marked in this programme. In return the board pays the ipurrent expenses. No State money is paid out for sectarian instruction; there is no division of the school fund; there is not the slightest setting aside of State rights.

There .is on the other hand the serious advantage which all American citizens should appreciate — that Catholics have their children instructed under payments from the public fund to which they are contributors, together with their fellow citizens and the State has the satisfaction of bringing peaceably, and without violation of personal rights, under its direction, for the imparting of secular instruction,

multitudes of Catholic children who otherwise must keep aloof from it.

“ The Catholic conscience is satisfied under the plan. For while secular instruction is imparted there is no danger from Protestant or agnostic bias of teachers’ minds, and the legal school hours over, the buildings revert to Catholic control and religious instruction is given. Nothing more than this is marked in a formal letter from Rome, written in 1875, as needed in order that Catholic children may be authorized by bishops to attend State schools.”

The opponents of this plan contended that the archbishop’s advocacy of such a scheme un¬ settled the whole Roman Catholic position hitherto held on the education question. Com¬ plaint was made-to Rome against him and he drew up a memorial defending his position, which was submitted to the Congregation of the Propaganda. The decision on the plan — ((tolerari potest® (it can be tolerated) evoked further excitement. But the plan itself did not succeed owing to local secular opposition. The State superintendent of public instruction, Dr.

D. L. Kiehle (November 1891), said of it in regard to a ruling that the contract could not bind in any such conditions as that of retaining religious teachers :

“ A board of education cannot legally bind itself to follow any religious criterion in its choice of teachers, nor is it allowed to classify children according to their religion. And he adds that in case “ the presence of the sisters in the school displeases a certain class of persons, or the habit they wear had a significance which was not acceptable, the board had the right of inviting them to dress like other teachers or else to withdraw.”

The contract was therefore not renewed af¬ ter the first year.

In the decade 1907-17 there was a special development of high schools and academies in conjunction with the parish schools, the latest statistics showing 600 such high schools for boys and 580 for girls. Another move was the organization of schools for the use of foreign-born immigrant children or their native-born brethren with parents from some of the 98 dif¬ ferent countries and the 66 different

languages that figure in our immigrant statistics. Just before the World War stopped immigration Prof. Herbert F. Wright of the Catholic University made a study of this educational problem and secured these statistics of Catholic parish schools thus engaged in the process of Americanizing their pupils :

Teachers

Num-Religious

ber of

Enrol- -

- A—

-»

Lay

Total

NATIONALITY

schools

ment Women

Men

Belgian .

4

1,233

38

. .

1

39

Bohemian…

33

8,999

194

. .

5

199

Dutch .

1

205

4

. .

4

Flemish .

2

80

2

2

4

French .

103

37,928

850

57

66

973

German… .

424

125,792

2,985

96

52

3,133

Greek-

41

47

Ruthenian

32

3,042

6

. .

Hungarian . .

10

2,223

25

16

41

Italian .

70

17,957

308

2

82

392

Lithuanian . .

21

3,776

53

18

71

Polish .

276

97,744

1,651

9

140

1,800

Portuguese . .

1

215

4

. •

ii

4

Slavonian…

20

4,037

63

. .

74

Slovak .

34

9,764

157

. •

20

177

Slovenian…

12

2,654

55

- .

4

59

Spanish .

10

2,000

39

4

3

46

Syrian .

2

148

2

1

2

5

Total… Less 25 dupl cates .

Total…

. 1,055

i-

25

317,797

6,469

6,436

153

169

169

463

8

455

7,068

161

. 1,030

311,328

6,283

The average number of pupils in these schools was 300; and in each class 45. Of these pupils there were 3 per cent more girls than boys. Of the teachers 91 per cent were Sisters of religious orders; 2j4 per cent priests or Brothers and 6j4 per cent lay teachers. The Sisters predominate in the schools of all nation¬ alities except Greek-Ruthenian, where all but \2]/2 per cent are lay teachers.

When the archbishops met in New York for their annual convocation on 16 Nov. 1892, Mon¬ signor Satolli, the apostolic delegate, appeared before them and delivered a letter of instruc¬ tion from the Pope which he had received from Rome, and which contained 13 propositions ((For the settling of the school question and the giving of religious education.**

“ It is to be greatly desired,” the instruction said, ” and would be a most happy arrangement if the bishop agree with the civil authorities or with the members of the school board to conduct the school with mutual attention and considera¬ tion for their respective rights.

“ While there are teachers of any description for the secular branches who are legally inhibited from offending Catholic religion and morality — let the right and duty of the Church obtain of teaching the children catechism in order to remove danger to their faith and morals from any

quarter whatsoever. ,

“ We further desire you to strive earnestly that the various local authorities firmly convinced that it is more conducive to the welfare of the commonwealth than religion should by wise legislation provide that the system of educa¬ tion, which is maintained at the public expense and to which therefore Catholics also contribute their share, be m no way prejudicial to their conscience or their religion, r or we are persuaded that even your fellow citizens who differ trom us in belief with their characteristic intelligence and prudence will readily set aside all suspicions and all views unfavorable to the Catholic church, and willingly acknowledge her merit as the one that dispelled the darkness of paganism by the light of the gospel and created a new society distinguished by the lustre of Christian virtues and by the cultivation of all that refines. We do not think that anyone hereafter

looking into these things clearly will let Catholic parents be forced to erect and support schools which they can not use for the instruction of their children.”

The controversy was finally and conclusively settled by a letter of Pope Leo XIII to the bishops of the United States, May 1893, instruct¬ ing them to ˆsteadfastly observe” the decrees of the Third Plenary Council of Baltimore in re¬ gard to parochial schools.

Bibliography. — Burns, I., (The Catholic School System in the United States) (1908) ;

11., (Growth and Development of the Catholic School System in the United States* (1912) ;

111., (Catholic Education: A Study of Condi¬ tions (1917); Bulletins: The Catholic Educa¬ tional Association, 1904-17 ; Decrees of Plenary Councils* ; Shea, (History of Catholic Church in United States* ; (Catholic Directory* (1918) ;

(American Catholic Quarterly Review* (Oc¬ tober 1903) ; Report of Board of Examiners, Diocese of New York; Early Irish Catholic Schools of Lowell, Mass.; Report of Philadel¬ phia Diocesan School Board (1903); Report Supervisor Catholic Parochial Schools, Arch¬ diocese of Boston (1903) ; Report State Board of Schools, Massachusetts (1851) ; Bouquillon, (Education: To Whom Does It Belong?* (1891); Hollaind, <The Parent First* (1891); Conway, (The State Last* (1892).

Thomas F. Meehan, A.M.

PARJANYA, pur-jun’ya, in the mythology of the Vedas, the rain god. He is associated with the thunder and the lightning and like all the rain gods, is the promoter of vegetation. In a sense, he is a culture god. His wife was the earth (mother). Naturally, on account of the relation of the rain to the other elements, Parjanya’s name is often associated with the deities of the winds and the storms and with those of fire (as having its origin in the light¬ ning). Three hymns are dedicated to him in the Rig-veda, in which he is mentioned some 30 times. Consult Macdonell, A. A., (Vedic Mythology* (Strassburg 1897) ; (History of Sanskrit Literature* (London 1913).

PARK, Edwards Amasa, American theo¬ logian: b. Providence, R. I., 29 Dec. 1808; d. Andover, Mass., 4 June 1900. He was gradu¬ ated at Brown University in 1826 from Andover Theological Seminary in 1831 and was ordained pastor of the Congregationalist Church in

Brain¬ tree, Mass., in the last-named .year. He ac¬ cepted the chair of moral and intellectual philos¬ ophy at Amherst in 1835 and in 1836 was ap¬ pointed professor of moral and intellectual philosophy at Andover. From 1847-81 he held the chair of sacred rhetoric in that institution

and thereafter until his death he was professor of theology there. He was very successful as a teacher and he made the study of systematic theology intensely interesting. He attempted to divest theology of its artificiality. He edited the Bibliotheca Sacra until 1884, various trans¬ lations from the German and several memoirs. Among them (Samuel Hopkins) (Boston 1854) ; (Nathaniel Emmons* (Boston 1861) ; and wrote (Discourses on Some Theological Doctrines as Related to the Religious Character* (1885). Consult (Memorial Collection of Sermons* (Boston 1902), a memorial volume of his works in celebration of his 90th birthday (Bos¬ ton 1898) ; Storrs, R. S., (Memorial Address* (New York 1900).

PARK, Mungo, Scottish African explorer: b. near Selkirk, 10 Sept. 1771 ; d. Boussa, Africa, 1806. He studied medicine, and especially sur¬ gery, at Edinburgh University and in 1792 sailed for the East Indies as assistant medical officer on board the East Indiaman Worcester. He made some botanical studies in Sumatra, found there eight new species of fish; returned in 1793 and in 1795 was sent by the African Association to explore the course of the Niger. With but two attendants he proceeded up the Gambia and after extreme hardships reached Sego in 1796. He finally arrived at Falmouth in 1797 and in 1799 published his (Travels in the Interior of Africa,* which went through three editions in that year and made the author famous. In 1803 he became leader of an expedition despatched by the government for African discovery and in 1805 set out with instructions to follow the course of the Niger <(to the utmost possible dis¬ tance to which it can be traced.** He set out with a party consisting of his brother-in-law, Anderson, 45 English soldiers and numerous natives. By the time they had reached the place where they

were about to embark in canoes and float down the Niger to its mouth only seven of the whites were still alive. A few months later Anderson died. After having sailed over 1,000 miles in search of the mouth of the Niger and entered the rapids below Yuri, on the lower river, he ran into an ambush of the natives which lined both sides of the shore. In the attempt to escape Park and his three companions were drowned. He possessed the qualities of a great explorer and aroused British interest in African travels. Consult Memoir by E. Wishaw in Park's (Journal of a Mission to the Interior of Africa* (1815) ; Maclachan, (Life of Mungo Park.*

PARK, Roswell, American physician : b. Pomfret, Conn., 4 May 1852; d. 1914. He was educated at Racine College and Harvard, stud¬ ied medicine at the Northwestern University, and was adjunct professor of anatomy there 1879-82. In 1883 he became professor of sur¬ gery at the University of Buffalo and later sur¬ geon to the Buffalo General Hospital, and di¬ rector of the State Pathological Laboratory (also in Buffalo). He was one of the attend¬ ants upon President McKinley after the latter was shot. He has published <Lectures on Sur¬ gical Pathology* (1891) ; (History of Medicine* (1897); (TextBook of Surgery*; Principles and Practices of Modern Surgery* (1907) ; (Selected Papers, Surgical and Scientific*

(1914).

PARK CITY, Utah, city in Summit County, on the Union Pacific and Utah Central rail¬ roads, 30 miles southeast of Salt Lake City. It is a silver mining region, with valuable mines in the vicinity and contains sampling works, quartz-mills, *etc.* Pop. (1920) 3,393.

PARK COLLEGE, a coeducational insti¬ tution founded at Parkville, Mo., in 1875 through the exertions of Col. G. F. Parks and Rev. J. A. MacAfee. There is an academy con¬ nected with the college which prepares students for the college course and there are excellent buildings, dormitories and equipment. The president in 1919 was F. W. Hawley and there were 450 students attending college and 103 with the colors. The number of instructors was 18. The endowment of the college amounts to about

$500,000.

PARKE, John Grubb, American soldier : b. near Coatesville, Pa., 22

Sept. 1827 ; d. Wash¬ ington, D. C., 16 Dec. 1900. He was graduated from West Point in 1849, assigned to the topo¬ graphical engineering corps, and at the out¬ break of the Civil War he was appointed briga¬ dier-general of volunteers. He served under Burnside in North Carolina, was in command at the capture of Fort Macon, and in 1862 re¬ ceived promotion to the rank of major-general of volunteers. He was chief of staff of the Ninth corps at Antietam and South Mountain and served in that capacity under Burnside in the Army of the Potomac. He accompanied Sherman on his march to Vicksburg in command of the Ninth corps. In 1866 was retired from the volunteer service. He was in charge of the construction of fortifications in Maryland in 1867-68 and then became senior assistant in the office of engineers at Washington. He was pro¬ moted colonel of the corps of engineers in 1884 and in 1887 was appointed superintendent at West Point. He was retired at his own request in 1889. He published Compilations of Laws Relating to Public Works for the Improvement of Rivers and Harbors* (1877) ; Caws Relating to the Construction of Bridges over Navigable Waters* (1882).

PARKER, Alton Brooks, jurist: b. Cort¬ land, N. Y., 14 May 1852. He was educated at the Cortland Normal School, taught school for a time and then began the study of law. He was graduated from the Albany Law School, was admitted to the bar and entered upon the practice of his profession at Kingston. In 1877 he was elected surrogate of Ulster County and in 1883 was reelected. In 1884 he was a dele¬ gate to the Democratic National Convention and in 1885 President Cleveland offered him the office of First Assistant Postmaster-Gen¬ eral, which, however, he declined. In 1885 he was chairman of the Democratic State Com¬ mittee and in that same year was appointed a judge of the State Supreme Court to fill a vacancy, the next year being elected without opposition. In 1889 he was appointed to the Second Division of the Court of Appeals and when that court was dissolved was appointed a member of the General Term of the First Department, and in 1896 a member of the Ap¬ pellate Division. In 1897 he was elected Chief Judge of the Court of Appeals of his State. He wrote many of the important decisions of the Court of Appeals and served until his resig-

nation in 1904. During the period of his serv¬ ice on the bench he

abstained from taking any active part in practical politics and it was only because the leaders respected his personal wish that he did not become the candidate for gov¬ ernor of his State upon the Democratic ticket in 1902. The chosen candidate of that year ran so close to victory that the party leaders complained to him that his reluctance to run had lost the election of the party which had made him chief judge of the State. They then drew from him the promise that should the party throughout the nation in 1904 call upon him to serve as its candidate for President he would put aside his personal wishes. Having obtained this promise, the party leaders at once began to pave the way for his nomination on the Democratic ticket for the presidency in 1904. Judge Parker, although taking no part in the advancement of this campaign, adhered to his promise and took no action to prevent the nomination as he had done in 1902. The efforts of the party leaders were successful and Judge Parker was nominated for the presi¬ dency by the Democratic Convention at Saint Louis 9 July 1904. Immediately after the re¬ ceipt of the news of his nomination and of the contest which had occurred in the Convention over the money question plank in the platform, Judge Parker sent his famous (<Gold Telegram® stating his position upon the money question and offering the Convention the opportunity be¬ fore adjournment to substitute another candi¬ date if dissatisfied with his position upon that question. The Convention reaffirmed the nomi¬ nation of Judge Parker. The principal issue of the campaign arose upon Judge Parker's asser¬ tion of a heavy levy by the Republican Party upon the moneyed interests for campaign funds. He was defeated at the polls by Theodore Roosevelt. Judge Parker resigned from the Court of Appeals as soon as he and his asso¬ ciates could finish the writing of opinions in the undecided cases and before formally ac¬ cepting the nomination of the Democratic Con¬ vention. After his defeat, Judge Parker went to New York City and in November 1904 opened an office and since that time has continued to practise law in New York City. He is one of the most prominent of the attorneys practising there and has handled many important cases. He appeared for the city of New York in its fight for 80-cent gas and was finally victorious in that case in the United States Supreme Court. He had charge of the litigation out of which grew the government suit against the Drug Trust under which it was dissolved in 1907 and also of the subsequent litigation as a result of which a large number of the New York whole¬ sale houses who had been in the Trust, were compelled to pay heavy damages to the Parks firm in Cincinnati, which had been the principal foe of the Trust. He was counsel for Mayor McClellan throughout his fight against William R. Hearst, arising over the mayoralty election, in which Hearst sought to obtain

a recount of the ballots. He was attorney for Samuel Gompers, John Mitchell and Frank Morrison in their great battle with Judge Silas Wright of Washington, in which the judge sought to pun¬ ish the three labor leaders for contempt for an alleged violation of the court's injunction. In this case also Judge Parker was victorious in

the United States Supreme Court. But the case was before that court twice and on the last appeal there was a reargument. Such leisure as his law practice allows is largely devoted to public matters. He was president of the Amer¬ ican Bar Association in 1906. He was one of the organizers of the New York County Law¬ yers' Association and was its second president in 1909 and was reelected for the two subse¬ quent years. He was president of the New York State Bar Association in 1913 and 1914. He has presided at a number of Democratic State conventions and was the temporary chair¬ man of the Democratic National Convention in 1912. He belongs to numerous organizations like the American Peace Society, the League to Enforce Peace, the National Security League, American Academy of Jurisprudence. The ob¬ ject of each of these various organizations is to promote some public good and Judge Parker unselfishly devotes his valuable time and labor to these causes and to many others.

PARKER, Arthur Caswell, American ar¬ chaeologist: b. Iroquois, N. Y., 1881. He was educated at Williamsport Dickinson Seminary and later studied anthropology under Prof. F. W. Putnam. He was special assistant archaeologist at the American Museum of Natural History in 1901-02; field archaeologist at the Peabody Museum in 1903; ethnologist of the New York State Department of Education in 1904-06; since when he has been archaeologist of the New York State Museum. He edited the American Indian Magazine , the quarterly jour¬ nal of the Society of American Indians, in 1913-lb; and is author of 'Excavations in an Erie Indian Village* (1907) ; 'Iroquois Uses of Maize and other Food Plants* (1910) ; (The Code of Handsome Lake, the Seneca Prophet* (1913) ; (The Legal Status of the American Indians) (1915) ; 'The Constitution of the Five Nations) (1916), *etc.*

PARKER, Daniel, a Baptist innovator. See Baptists, Two-Seed-in-the-Spirit.

PARKER, Edward Harper, English Chi¬ nese scholar: b. 3 July 1849. He was educated at the Royal Institution School, Liverpool, and became a barrister of the Middle Temple. He intended to engage in the tea trade, studied Chinese, and as an interpreter traveled in Mon¬

golia 1869-71. He was then in the consular service in various parts of the world (1871-95), and since 1901 has been professor of Chi¬ nese in Victoria University, Manchester, and reader in Chinese, University College, Liverpool, since 1896. He is the author of Comparative Chinese Family Law* (1879) ; (The Opium War* (1887) ; China's Relations with Foreign¬ er (1888) ; (Up the Yangtze) (1892) ; 'Bur-ma) (1893) ; 'A Thousand Years of the Tartars* (1895) ; China* (1901) ; (John China¬ man* (1901); China, Past and Present* (1903) ; China and Religion) (1905) ; An¬ cient China Simplified) (1908) ; (Studies in Chinese Religion) (1910).

PARKER, Edwin Wallace, American Methodist Episcopal missionary bishop : b. Saint Johnsbury Vt., 21 Jan. 1833; d. Paini Tal, India, 4 June 1901. He was graduated at the General Biblical Institute, Concord, N. H., in 1857, and joined the Vermont Conference in that year. After two years' work as a pastor

he was ordained deacon and elder under the missionary rule of the New England Confer¬ ence and sailed for India, where he was sta¬ tioned first in the district of Bijnor and after¬ ward at Moradabad. On the organization of the India Conference in 1864 he became presid¬ ing elder, and in 1900 he was elected bishop of Southern Asia. Consult Messmore, J. H., (Life of Edwin Wallace Parker) (1903).

PARKER, Foxhall Alexander, American naval officer: b. New York, 5 Aug. 1821; d. Annapolis, Md., 11 June 1879. He entered the navy as midshipman in 1839, was attached to the West Indian squadron, and later transferred to the Philadelphia naval school, where he was graduated in 1843. He served on the Great Lakes, the Mediterranean, the Pacific, and on various coast surveys until 1861, when he was appointed executive officer of the navy yard at Washington, D. C. His capable manipulation of the forces at his command after the battle of Bull Run in 1861 went far toward restoring order and Confidence at Washington. He per¬ formed excellent service throughout the War, receiving the rank of captain in 1866. He sub¬ sequently served on various commands, was raised to the rank of commodore in 1872, and

was one of the founders of the Naval Institute at Annapolis in 1873. In 1877-78 he was in charge of the Boston navy yard, and in 1878, until his death, was superintendent of the Naval Academy at Annapolis. He published (Fleet Tactics under Steam) (1863) ; (Squadron Tac¬ tics under Steam ' (1863) ; (The Naval Howit¬ zer Afloat > (1865) ; (The Fleets of the World: the Galley Period) (1876) ; (The Battle of Mobile Bay) (1878).

PARKER, Francis Wayland, American educator: b. Bedford, N. H., 9 Oct. 1837; d. 1902. He was educated in the public schools and taught until the outbreak of the Civil War, when he enlisted and served until its conclusion, rising to the rank of colonel of volunteers. He was again engaged in teaching until 1872, when he went to the University of Berlin for special study in pedagogy, philosophy and psychology. He was later superintendent of schools at Quincy, Mass., and at Boston, and was prin¬ cipal of the Normal School, Cook County, Ill. He wrote a number of textbooks, some of which ran into many editions. Among them are (Tafks on Teaching' (1883) ; (The Practical Teacher) (1884); (Course in Arithmetic

(1884); (How to Teach Geography) (1885); (How to Study Geography' (1889), *etc.*

PARKER, George Howard, American zoologist : b. Philadelphia, 23 Dec. 1864. He was graduated at Harvard in 1887, later pur¬ suing special courses there and at the univer¬ sities of Leipzig, Berlin and Freiburg. He be¬ came assistant instructor in zoology at Harvard in 1888 and occupied different positions there, becoming professor of zoology in 1906. He has made special investigations concerning the anatomy and physiology of sense organs and animal reactions and has contributed ieports of them to the zoological periodicals. He was William Brewster Clark lecturer at Amherst College in 1914 and in that year was sent by the United States Government to investigate the Pribilof seal herd.

PARKER, Herschell Clifford, American physicist and explorer: b. Brooklyn, N. Y., 9

July 1867. He was graduated at the Columbia School of Mines in 1890, and was connected with the faculty there in 1891-1911, filling the chair of physics for some time before his resig¬ nation. He made explorations and first ascents in the Canadian Alps in 1897, 1899 and 1903; first ascents of the mountains Goodsir and Daw¬ son in British

Columbia, and of Hungabee, Del-taform, Biddle and Lefroy in Alberta, and ex¬ plorations of the Mount McKinley region in Alaska in 1906, 1910 and 1912. He made the first ascent of the highest peak of Mount Mc¬ Kinley in 1912. Author of (A Systematic Treatise on Electrical Measurements' (1897) ; and many contributions to scientific periodicals. He was one of the discoverers of "helium" and invented the "helioscope."

PARKER, Sir (Horatio) Gilbert, Canadian novelist : b. Camden East, Addington, Ontario, 23 Nov. 1862. He was educated at Trinity Col¬ lege, Toronto, in 1886 became associate editor of the Sydney (Australia) Morning Herald, and during his stay in Australia began to write plays. He traveled widely among the South Sea Islands and in northern Canada, and pub¬ lished a book of travel entitled (Round the Compass in Australia) (1892). His novels in¬ clude (Pierre and His People: Tales of the Far North) (1892) ; (Mrs. Falchion) (1893) ; (The Trespasser (1893); translation of a Savage) (1894) ; the Trail of the Sword' (1895) ; (When Valmond Came to Pontiac) (1895) ; (An Adventurer of the North) (1895) ; the Seats of the Mighty) (1896), a romance of the taking of Quebec; the Stolen Bonds' (1897) ; the Pomp of the Lavilettes) (1897) ; the Battle of the Strong) (1898) ; the Lane that had no Turning) (1900) ; the Right of Way) (1901); (Donovan Pasha' (1902); his¬ tory of Old Quebec' (1903) ; (A Ladder of Swords' (1904) ; the Weavers' (1907) ; (Northern Lights' (1909); (Cumner's Son' (1910) ; the Land of the People, and the State' (1910) ; the Judgment House' (1913) ; (You Never Know Your Luck' (1915) ; the World in the Crucible' (1915) ; the Money Master' (1915); the World For Sale' (1916) ; (Wild Youth and Another' (1919). His works of wide popularity exhibited a fin¬ ished method and much skill in characteriza¬ tion and description. In 1900 and 1906 he was elected to Parliament in the Conservative inter¬ est for Gravesend, in 1902 was knighted and in 1915 was created a baronet.

PARKER, Horatio William, American composer: b. Auburndale, Mass., 15 Sept. 1863; d. Cedarhurst, L. I., 18 Dec. 1919. His education was for the most part European, and in 1885 he graduated from the Munich Royal Conserva¬ tory. After that time he was professor of music in the Cathedral School of Saint Paul, Garden City, L. I., and organist of Holy Trinity Church, New York, until 1893, when he became organist of Trinity Church, Boston. After 1894 he was professor of the theory of music at Yale Uni¬ versity. His compositions rank high in Amer¬ ican music; they include the oratorio (Hora Novissima' (1893), the first American music given at an English musical festival; (A Wan¬ derer's Psalm' (1900), also given at one of the English festivals; the oratorio of (Saint Christopher' (1896) ; the

cantatas (King-Trojan' (1885); (The Kobolds' ; and (Harold

Harfagar) (1891) ; (The Dream King* (1893) ; (A Star Song) (1901) ; (The Leap of Roushan Bey} (1914). With Brian Hooker as> librettist, in 1911 he won the Metropolitan Opera House $10,000 prize with the opera <Mona,) and in 1915 the Los Angeles $10,000 prize with the opera (Fairyland. y In 1915 he wrote the ora¬ torio (Morven and the Grail > for the centenary celebration of the Handel and Haydn Society of Boston. Among other compositions are symphonies, overtures, chamber music, piano¬ forte and organ numbers and numerous songs. In 1902 he received the degree of Mus. Doc. from Cambridge University.

PARKER, Sir Hyde, English admiral : b. Devonshire, England, 1739 ; d. 16 March 1807. He entered the British navy, served in the war of the American Revolution, where in 1776 he commanded a small squadron, and for services in the North River was knighted in 1779. He was promoted rear-admiral in 1793, vice-ad¬ miral in 1794, and appointed commander-in- chief at Jamaica in 1796. He returned to Eng¬ land in 1800, was given command of the Baltic fleet and moved northward to check the meas¬ ures of the armed neutrality formed by Russia, Sweden and Denmark. In the battle of Copen¬ hagen he had no share, it being an independent move of Nelson's, who was second in command and more daring than his commander. Parker compelled Sweden to remain inactive by his appearance before Carlskrona, and was pre¬ paring to move upon Cronstadt when the death of Emperor William ended hostilities. He was shortly afterward succeeded by Nelson, and thenceforward until his death lived in retire¬ ment.

PARKER, Joel, American Presbyterian clergyman and educator: b. Bethel, Vt., 27 Aug. 1799; d. New York, 2 May 1873. He was grad¬ uated at Hamilton in 1824, and after studying at the Auburn Theological Seminary was or¬ dained in the Presbyterian Church. He was pastor at Rochester in 1826-30; organized the Dey Street Church in New York and was its pastor until 1832, when he went to a pastorate in New Orleans; and in 1838-40 he was in charge of the

Tabernacle Presbyterian Church on Broadway, New York. Upon its being closed he became president of the Union Theo¬ logical Seminary and occupied the chair of sacred rhetoric. He later held charges in Phil¬ adelphia in 1842-54, in New York at the Bleecker Street Presbyterian Church in 1854— 63 and at Newark, N. J., in 1863-68. He was for a time associate editor of the Presbyterian Quarterly Review and was author of (Lectures on UnitarianisnP (1829) ; (Reasonings of a Pastor* (1849) ; (Pastor's Initiatory Catechism* (1855), *etc.*

PARKER, Joel, American statesman : b. Monmouth County, N. J., 24 Nov. 1816; d. Philadelphia, Pa., 2 Jan., 1888. He was grad¬ uated from Princeton in 1839, admitted to the bar in 1842 and established a law practice in Freehold, N. J. He engaged in politics with much zest, and in 1847 was elected to the New Jersey legislature; and in 1852-57 he was prosecuting attorney of Monmouth County. At the outbreak of the Civil War he was appointed major-general of volunteers and in 1862-66 was governor of New Jersey, giving loyal support to the policy of the national administration.

He was again elected governor in 1870, and in 1880 was appointed associate justice of the Supreme Court of New Jersey, and reappointed in 1887.

PARKER, John Henry, English archaeolo¬ gist: b. London, 1 March 1806; d. Oxford, 31. Jan. 1884. He began his career as a bookseller in Oxford in 1832. Later he superintended many excavations in Rome, and was the author of (The Archaeology of Rome* (1874—84), a work of importance on the walls, aqueducts and tombs of the Eternal City. His other pub¬ lications are a (Glossary-of Architecture) (1836), an important aid to the revival of Gothic art; (Introduction to the Study of Gothic Architecture* (1849) ; (The A B C of Gothic Architecture.*

PARKER, Joseph, English Congregational clergyman: b. Hexham-on-Tyne, Northumber¬ land, 9 April 1830; d. London, 28 Nov. 1902. He studied at University College, London, in 1853 became pastor of the Congregational church at Banbury, and in 1858-69 was pastor of the Cavendish Street Church at Manchester. In 1869 he began his larger ministry at the old Poultry Chapel of London, the congregation of which was transferred in 1874 to the City Temple, Holburn Viaduct. He became one of the best-known preachers in England. His views were liberal, and he spoke with a ready command of vigorous English. In 1887 he vis¬ ited the United States where he delivered an eulogy

on Henry Ward Beecher, with whom he had been on very intimate terms. He was twice chairman of the Congregational Union of England and Wales, and published several works, including (Ecce Deus) (1868) ; Springdale Abbey* (1869) ; ˆhe Paraclete) (1874) ; (The People's Bible,* (<discourses upon Holy Scripture, forming a pastoral commentary® (25 vols., 1885 et seq.) ; (Tyne Chylde* (1883) ; (Christian Profiles in a Pagan Mirror) (1898) ; and (A Preacher's Life,* an autobiography (1899). Consult Adamson, William, (Life of Joseph Parker * fNew York 1903).

PARKER, Lawton S., American portrait painter: b. Fairfield, Mich., 7 April 1868. He studied at the Lcole des Beaux Arts, Paris, and in 1892 was appointed professor of the Saint Louis School of Fine Arts. He became director of art at Beloit College in 1893, presi¬ dent of the New York School of Art in 1898-99, and of the Chicago School of Fine Arts in 1903. Among his sitters are Martin A. Ryerson, J. Ogden Armour, N. W. Harris, Harry P. Judson and Peter S. Grosscup, his portraits be¬ ing marked by excellent characterization. He received the silver medal at the Saint Louis Exposition in 1904; gold medals at the Inter¬ national Exposition, Munich, in 1905, and at the Paris Salon in 1913 ; and was awarded the medal of honor at the Panama Exposition in

1915.

PARKER, Linus, American bishop of the Methodist Episcopal Church, South : b. Oneida County, (N Y.?) 1829; d. New Orleans, La., 5 March 1885. He went to New Orleans when a youth and found employment, studying Latin, Greek and other branches in his leisure time, and at the age of 21 entered the Louisiana Conference. He was for four years a circuit rider, then becoming pastor of various churches

in New Orleans and later presiding elder of his district. He edited the New Orleans Christian Advocate in 1870-82 and sat in the quadrennial sessions of the General Conference held during that time. He was elected bishop in 1882.

PARKER, Louis Napoleon, English drama¬ tisˆ and composer: b. Calados, France, 21 Oct. 1852. He was educated at Freiburg and the Royal Academy of Music, and was director of music in Sherborne School, Dorsetshire, 1877-96. In the latter year he removed to London and in 1898 was made a Fellow of the Royal Academy of Music. He is the author of many cantatas, such as <Silvia) and the (Twenty-third Psalm,) as well as many other musical composi¬ tions and of a large number of plays. Among the latter may be cited “Change Alley,) and (The Man in the Street.* He has also trans¬ lated (Magda * ; (L’Aiglon) ; (Cyrano de Ber¬ gerac^ and other dramas.

PARKER, Matthew, second Protestant archbishop of Canterbury: h. Norwich, 6 Aug. 1504; d. Canterbury, 17 May 1578. He en¬ tered Corpus Christi College, Cambridge, in 1522, and was graduated in 1525. Two years afterward he was ordained priest, and elected Fellow of his college. His favorite studies were the Scriptures, the church fathers and other ecclesiastical writers. In 1535 he was made chaplain to Queen Anne Boleyn, who shortly before her death commended to his care her daughter Elizabeth. This appointment carried with it the deanery of the College of Saint John the Baptist at Stoke-by-Clare, in

Suffolk. He early imbibed Reformation prin¬ ciples and, in 1537, after the death of Anne Boleyn, Henry VIII made him one of his chaplains, and about five years afterward ap¬ pointed him canon of Ely. In 1544 he was appointed to the mastership of Corpus Christi College, Cambridge, for which he compiled a new body of statutes ; and in the following year was elected vice-chancellor of the univer¬ sity, and presented with the rectory of Land Beach. In 1547 he married Margaret Harl-stone, the daughter of a Norfolkshire gentle¬ man. In 1552 he was elected prebendary and afterward dean of Lincoln ; but on the acces¬ sion of Mary to the throne was stripped of these as well as his other preferments. A por¬ tion of his time he now spent in translating the psalms into English verse. He also wrote a treatise, <De Conjugio Sacerdotum,* defend¬ ing the marriage of priests. When Elizabeth succeeded to the throne he was raised to the archbishopric of Canterbury, his consecration taking place 17 Dec. 1599. During his 15 years' primacy he labored to make clear the belief and discipline of the Church, and published his "Advertisements* for the regulation of divine service. In 1568 was published under his direc¬ tion and his expense the Bishops' Bible, which was a revision of the text founded on Cranmer's translation ; he was likewise prominently associated with those who drew up the Book of Common Prayer. He edited the histories of Matthew of Westminster, Matthew Paris and others; and had a considerable share in the work <De Antiquitate Britannicse Ecclesiae.* Archbishop Parker was the founder of the Society of Antiquaries. His valuable collection of manuscripts relating to the civil and ecclesi¬ astical history of England he presented to his

own college at Cambridge and founded a num¬ ber of valuable fellowships there. Consult Wife and Letters of Matthew Parker* (Parker So¬ ciety, 1853) ; Strype, Wife and Acts of Mat¬ thew Parker *(1824) ; Hook, Wives of the Archbishops of Canterbury* (1872).

PARKER, Peter, American Congregationalist clergyman, physician and diplomat: b. Framingham, Mass., 18 June 1804; d. Washing¬ ton, D. C., 10 Jan. 1888. He was graduated at Yale in 1831, took his M.D. there in 1834, and, having taken the theological course as well, was ordained in the ministry in that year and sent to China as a missionary. He estab¬ lished a hospital for diseases of the eye at Canton immediately after his arrival, but found other needs for medical attention so urgent that he admitted a wide variety of cases, 2,000 pa¬ tients being cared for in the first year. He gained fame as a surgeon, acted in the capacity of a preacher, and also trained a

number of na¬ tives in medicine and surgery. He closed his hospital during the war between China and England in 1840 and revisited the United States, but returned to China in 1842 and reopened the hospital, increasing its staff and capacity. He severed his connection with the American Board of Missions in 1845, and while retaining charge of the hospital acted as interpreter for the United States embassy, serving as charged'affaires when the minister was absent. He returned to the United States for the benefit of his health in 1855, but in the same year accepted an appointment of the United States government as a commissioner to China, with power to revise the treaty of 1844. He re¬ mained in China in connection with this work in 1855-57 and then resigned. He was a re¬ gent of the Smithsonian Institute from 1868. Author of (Journal of an Expedition from Singapore to Japan* (1838) ; (A Statement Re¬ specting Hospitals in China) (1841) ; (Notes of Surgical Practice Among the Chinese> (1846), *etc.*

PARKER, Theodore, American clergyman and social reformer : b. Lexington, Mass., 24 Aug. 1810; d. Florence, Italy, 10 May 1860. He was the youngest of 11 children and received his early education at home. He took the arts course at Harvard, studying at home and visit¬ ing Cambridge for the examinations ; and though he was unable thus to obtain a degree in course, that of M.A. was conferred upon him honoris causa in 1840. In 1834-36 he studied at the Cambridge Divinity School, and after preaching as a candidate was ordained 21 June 1837 and installed as pastor of the West Rox-bury Unitarian Church. It was soon noised about that he was not in agreement with the Unitarian position of the time. His outspoken¬ ness had already won for him the reproach of "infidel,* and many of the Unitarian clergy had found exchanges of pulpit with him inconvenient before his discourse on (The Transient and Permanent in Christianity) at the ordination of C. C. Shackford at South Boston, 19 May 1841. In this sermon Parker denied the special authority of the Bible, the supernatural origin of Christianity and the supernatural character and divine mission of Christ. It is perhaps not surprising that most pulpits were now closed against him, and that his name was asso¬ ciated with those of leaders of irreligion. His

own congregation gave him steadfast support. He did not withdraw from the Unitarian Church, believing, apparently, that that Church was lib¬ eral enough to suffer a freedom of thought even so great as his ; while the Church never formally expelled him from its ministry, being, it would seem, reluctant to afford him the prestige which might result from such action. But he was thenceforth actually an independent preacher. In 1846 he became pastor at Boston of what he always called the (<Twenty-eighth Congregational Society.® Services were held until 1852 in the Melodeon, and in 1852-59 in the Music Hall, whose 3,000 seats were generally fully occupied. The regular membership was never large, but all shades of religious dissatis¬ faction there assembled, and many others were drawn by Parker's championship of humani¬ tarian endeavors, especially of anti-slavery re¬ form. In this cause (<probabIy no one — not Garrison, not Phillips himself,® says Frothingham, (<did more to awaken and enlighten the conscience of the North.® He was a leader in the committee of vigilance, received runaway slaves, fought the rendition of such and aided their escapes. For many years he was a popu¬ lar lecturer, and to this activity gave much time. Both in the pulpit and on the platform he had none of the arts of the practised orator, but carried weight rather by his massive knowledge, deep conviction, frankness and vigorous and often picturesque English. Ill-health compelled the foreign sojourn during which he died. He was editor of the Massachusetts Quarterly Re¬ view in 1849-51, and wrote, besides sermons, several works, including 'Historic Americans) (1870) and (Views of Religion5 (1885), which have been collected by F. P. Cobbe (1870). For his peculiarly individual religious beliefs consult Clarke, (Parker and his Theology) (1859) ; and the (Lives) by Frothingham (1874) and Chad¬ wick (1901); (The Works of Theodore Par¬ ked (10 vols., Boston 1912).

PARKER, Willard, American surgeon : b. Hillsborough, N. H., 2 Sept. 1800; d. New York, 25 April 1884. He was graduated from Harvard in 1826, studied medicine and took his degree there in 1830, when he accepted a pro¬ fessorship in the Berkshire Medical College, Pittsfield, Mass. In 1836 he accepted the chair of surgery in the Cincinnati Medical College, but removed in 1839 to New York, where he had been appointed professor of surgery in the College of Physicians and Surgeons, which posi¬ tion he held for 30 years. He established a large practice in New York and as a surgeon he took high rank, rpaking many advances in methods as well as important discoveries. He established the first college clinic in the United States at the College of Physicians and Surgeons in 1840; organized the New York

Pathological Society in 1843; the New York Academy of Medicine in 1847, of which he was president for many years after 1856. From 1865 he was president of the State Inebriate Asylum at Binghamton, where his conduct of the management was very successful. He was consulting physician at the leading New York hospitals and connected with many medical organizations.

PARKER, William Belmont, American editor: b. Hasbury, England, 19 Sept. 1871. He came to the United States in early youth, was

graduated at Harvard in 1897, and in 1898-1902 was assistant editor of the Atlantic Monthly. He was literary adviser to Houghton, Mifflin and Company, New York, in 1902-04; instructor in English at Harvard in 1904-05 and lecturer in that subject at Columbia in 1905-08. He was advisory editor of the Associated Sunday Magazines in 1906-08, and literary editor of the World's Work in 1908. He was editor and literary adviser to the Baker and Taylor Com¬ pany in 1909-12, and literary adviser to the Century Company in 1912. He was business manager of the Churchman in 1912-14, and has been an editor with S. Pearson and Son since 1914. He edited Lowell's (Anti-Slavery Papers5 (1903) ; Sir Philip Sidney's (Certaine Sonets5 (1904) ; (Complete Poems of Edward Rowland Sill5 (1906) ; (The Wisdom of Emerson5 (1909); and was joint editor of (Letters and Addresses of Thomas Jefferson5 (1905). Au¬ thor of 'Life of Edward Rowland Sill5 (1915).

PARKER'S CROSS ROADS (Tenn.), Engagement at. On the morning of 11 Dec. 1862 Gen. N. B. Forrest, with about 2,500 cav¬ alry, left Columbia, Tenn., to operate in the western part of the State and fall upon General Grant's communications with Columbus. On the 13th he reached the Tennessee River at Clifton, about 50 miles east of Jackson, crossed on a flatboat, and on the 16th reached Lexing¬ ton, where he met 700 of the 11th Illinois Cav¬ alry and two guns, under command of Col. R. G. Ingersoll, and routed Ingersoll, capturing him and nearly one-fourth of his command. Two detachments were now sent to cut the Mobile and Ohio Railroad at points north and south of Jackson, and on the 19th Forrest, with the remainder of his command, not over 600 men, moved on the town, and was met by a force of infantry and cavalry, which disputed his advance, but which was gradually driven back until within reach of the defenses of the place, when Forrest withdraw and, uniting his command, turned north on the line of the rail¬ road. He captured Humboldt and Trenton, at the latter place taking and paroling its garrison of 700 men. Several small posts were captured and the railroad destroyed as far as the Ken¬

tucky line. On the 25th he retraced his steps toward the southeast, closely followed by Gen¬ eral Sullivan with 4,000 men. On 31 Decem¬ ber, at Parker's Cross Roads, a few miles north of Lexington, Sullivan's leading brigade of 1,500 men, under Col. C. L. Dunham, intercepted ForresFs march, but Forrest attacked it and drove it eastward and southward from the crossroads. The fighting lasted several hours, during which time Sullivan came up with Col. J. W. Fuller's brigade, and at 3 p.m. struck Forrest's rear and soon defeated him, taking 400 prisoners, six guns and several caissons and ammunition-wagons. The Union loss was 27 killed, 140 wounded and 70 missing. The Confederate loss in killed and wounded is not known. Forrest continued his retreat, brushed away the Sixth Tennessee Cavalry that had been sent to Intercept him at Clifton, and 1 and 2 Jan. 1863 recrossed the Tennessee River, having destroyed the railroad at many points between Jackson and Columbus, also a large quantity of stores, and claiming that with a loss of less than 400 men he had killed, wounded and captured nearly 2,500. Consult

(Official Records* (Vol. XVII); Greene, (The Mississippi) ; The Century Company's (Battles and Leaders of the Civil War* (Vol. III).

PARKERSBURG, par'kerz-berg, W. Va., city, county-seat of Wood County, on the Ohio River at the mouth of the Little Kanawha, and on the Baltimore and Ohio Southwestern, the Ohio River and the Baltimore and Ohio rail¬ roads, about 65 miles north of Charleston, the State capital, and 75 miles in direct line south¬ west of Wheeling. The city is connected by steamers with the river ports on the Ohio. It was settled in 1773; in 1820 was incorporated, and chartered as a city in 1863. Near by is the island where once lived Harman Blenner-hassett (q.v.). It is in an agricultural region; in the vicinity are valuable clay and coal de¬ posits, gas and petroleum wells and several mineral springs noted for their medicinal qualities. The chief industrial establishments are oil refineries, oil-well supply works, foundries, machine shops, flour and lumber mills, veneer works, furniture factories, shovels, clothing, glass, porcelain, shoes. It has an

ex¬ tensive trade in manufactured goods, farm products and coal. The prominent buildings are the city hospital, government building, city-hall, courthouse, some of the school buildings. Saint Joseph's Hospital, Masonic Temple, Y. M. C. A. The educational institutions are the Academy of the Visitation (R. C.), the new $400,000 high school, public and parish elemen¬ tary schools and a public library. A new $450,000 passenger bridge spans the Ohio River connecting Belpre, Ohio, with Parkersburg. A railroad bridge, one and one-third miles long, crosses the Ohio. It was opened in 1871 and constructed at a cost of $1,000,000. Three fine bridges span the Little Kanawha. The loca¬ tion near the raw material, and the facilities for transportation combine to make Parkers¬ burg an important manufacturing city. The city is governed on the commission plan since 1911. Pop. (1920) 20,050.

PARKES, parks, Elizabeth Robins («C. E. Raimond,** "Elizabeth Robins®), American author and actress : b. Louisville, Ky. She was married to G. R. Parkes, an actor, in 1885, and has spent much of her life in London, where she has appeared in several Ibsen roles. She has published (The Fatal Gift of Beauty and Other Stories*; < George Mandeville's Hus¬ band* ; <The New Moon* ; (An Open Ques¬ tion ; (The Magnetic North*; (A Dark. Lan¬ tern ; (The Convert ; (Under the Southern Cross) ; (Come and Find Me) ; (The Mills of the Gods) ; (The Florentine France) ; <My Little Sister) ; (Way Stations.*

PARKES, Sir Harry Smith, English diplo¬ matist: b. Birchills Hall, near Walsall, Stafford¬ shire, 24 Feb. 1828; d. Peking, China, 21 March 1885. He was orphaned at the age of five years, remaining under the care of an uncle and re¬ ceiving his education at King Edward s grammar school. The death of his uncle caused him to go to China to make his home with a cousin at Macao, in 1841. He there began the study of the Chinese language and in 1842 he was appointed secretary and first interpreter to Sir Henry Pottinger, the British Plenipotentiary at Hongkong. Although then but 14 years of age he accompanied Sir Henry's expedition up the Yangtze-kiang to Nanking, took part in the

capture of Chingkiang and the surrender of Nanking and was present at the signing of the peace treaty. He continued in the consular service, mastering the language and becoming an adept in dealing with the Chinese, and in 1854 he was appointed consul at Amoy. In 1855 he was secretary to the mission to Bangkok, where he took a leading part in concluding the first European treaty with Siam. He became acting consul at Canton in 1856, where he was brought into

contact with Mandarin Yeh, whose open defiance of China's treaty obligations to England culminated in the seizure of the British ship Arrow and her crew, 8 Oct. 1856. Parkes immediately summoned the aid of the British governor of Hongkong and Admiral Sir M. Seymour was sent to his assistance. Canton was taken in December 1857 and Parkes became practically governor of the city, a po¬ sition he held for nearly four years. He suc¬ ceeded in restoring order in the city, revived trade, made it safe for foreigners to enter the city and did much to conciliate and win the confidence of the Chinese. While still engaged in this work in 1860 hostilities were renewed in the north and Parkes was ordered to the as¬ sistance of Lord Elgin. It was while acting as a commissioner to arrange a meeting between the British and Chinese authorities that Parkes and other British and French officers were taken prisoners by the Chinese, subjected to tortures and herded with the worst elements in the prison; they were confined there 11 days before they were removed to a Chinese temple. They were then informed that they were to be executed, but the sentence was sus¬ pended Owing to the capture by the British of the Summer Palace. Parkes and his companion, Loch, were then permitted to return to the British lines but most of the other prisoners had died under the harsh treatment they re¬ ceived. In punishment for the treachery of the capture and the murderous severity with which the prisoners who died were treated, Lord Elgin burned the Summer Palace, which had previously been looted by the French. _ After accompanying the British embassy to its new residence in Peking, Parkes returned to his post in Canton where he remained until the city was restored to the Chinese in October 1861. He returned to England on leave of absence, was knighted in 1862 and in 1864 was sent to Shanghai as consul. In 1865 he was appointed Minister to Japan where for 18 years he not only ably served British interests but gave considerable assistance to the Japanese Liberals. He was transferred to Peking as British Minister there in 1882, and also became Min¬ ister to Korea with whom he concluded a satisfactory treaty. He succeeded in securing the immediate repudiation of the Chinese proc¬ lamation of 1884, by which all French residents might be poisoned, but died in the following year through overexertion incurred in the disturbances incident to the French attack upon Tongking. Consult Lane-Poole, (Life) (2 vols.,

1894).

PARKES, Sir Henry, Australian states¬ man: b. Stoneleigh, Warwickshire, 27 May 1815; d. 27 April 1896. His father was a

farmer; the son became an ivory turner and in 1839 emi¬ grated to Sydney. For several years his life was a hard struggle with poverty. He entered

politics as a leader of the “anti-transportation- ists)} ; founded in 1849 The Empire, a liberal organ which he edited until 1857. In 1854 he was elected to the legislative council, in which he led the fight for responsible government, and he was a member of Parliament for East Sydney (1858-61), colonial secretary (1866-68), and again a member of the colonial parliament (1871), becoming Prime Minister of New South Wales in 1872. His cabinet remained in office until 1875, and he was again Prime Minister 1878-82 and 1887-89. He was a prominent adherent of the cause of Australian federation, insisted on democracy as the basis of any such scheme and successfully opposed Wentworth’s plan of a bicameral legislature, with colonial peers in the upper House. He was a personal friend of Tennyson, and himself wrote several volumes of verse and prose; among the latter being Australian Views of England) (1869); ‘Federal Government in Australia) (1890) ; (Fifty Years in the Making of Aus¬ tralian History) (his autobiography, 1892) ; (An Emigrant’s Home Letters } (1897). Con¬ sult his political autobiography; Lyne, Rife of Sir Henry Parkes) (London 1897) ; and an article by Marin La Meslee in Revue des Deux Mondes (1892, Tome III).

PARKESBURG, Pa., borough in Chester County, 44 miles west of Philadelphia, on the Pennsylvania Railroad. It is situated in a thriving agricultural region, and has iron and chemical works, and a Hour mill. Pop. 2,522.

PARKHURST, park’herst, Charles Henry,

American Presbyterian clergyman: b. Framing¬ ham, Mass., 17 April 1842. He was graduated at Amherst in 1866, studied theology at Halle 1869-70 and at Leipzig 1872-73, taught in Williston Seminary 1870-71, was pastor of the Con¬ gregational church of Lenox, Mass., 1874-80, and from the last named date was pastor of the Madison

Square Presbyterian Church, New York, until its amalgamation with the First Presbyterian Church. His work as president of the Society for Prevention of Crime, notably his personal study at first hand of the problem of crime in New York, led to the famous Lexow investigation of the charge that the police were in league with metropolitan criminals. He wrote, besides some philological studies and various contributions to periodicals, (Forms of the Latin Verb illustrated by the Sanserif (1870); 'The Blind Man's Creed) (1883); (The Pattern on the Mount) (1885); 'Three Gates on a Side} (1887); 'What Would the World be Without Religion?) (1888) ; 'The Swiss Guide> (1889); 'Our Fight with Tammany) (1895); 'The Sunny Side of Christian¬ ity > (1901); 'Talks to Young Men and to Young Women) (1897) ; 'Guarding the Cross with Krupp Guns) (1900) and (A Little Lower than the Angels) (1909).

PARKHURST, Howard Elmore, Ameri¬ can musician and author: b. Ashland, Mass., 13 Sept. 1848; d. 18 Aug. 1916. Beside musical com¬ positions he wrote 'The Birds' Calendar) (1894); 'Songbirds and WaterfowP (1897); (How to Name the Birds1* (1898) ; 'Trees, Shrubs and Vines of Northeastern United States) (1903) ; (A Complete System of Harmony) (1908) ; 'A Complete Method for the Organ) (1911) ; 'The Church Organist) (1913) ;

'The Beginnings of the World's Music) (1914) ; Rambler in Music Lamp (1914).

PARKIN, George Robert, Canadian edu¬ cator and author: b. Salisbury, New Brunswick, 8 Feb. 1846. He was educated at the Univer¬ sity of New Brunswick and at Oxford Univer¬ sity, England. While at Oxford he was asso¬ ciated with a number of men who later became leaders in the imperialist movement in England, and Parkin is credited with influencing them to a considerable degree. He returned to Canada, and in 1874-89 he was principal of the College School, Fredericton, meantime continuing his connection with the imperialist cause. In 1889 he discontinued his labors as a teacher in order to become a lecturer for the Imperial Federa¬ tion League, in the interests of which he traveled throughout the empire. He became also Cana¬ dian correspondent for the London Times, la¬ boring to secure a better acquaintance between Canada and England. He was principal of Upper Canada College, Toronto, in 1895-1902, continuing, however, his support of Imperialism. In 1902 he became organizer of the Rhodes Scholarship, and is considered in a 'large meas¬ ure responsible for the successful execution of the plan. Author of

Reorganization of the British Empire) (1882) ; Imperial Federation (1892); Round the Empire) (1892); Rife of Edward Thring > (1897); Rife of Sir John Macdonald) (1907) ; (The Rhodes Scholarships) (1912).

PARKINSON, James, English physician and paleontologist: b. about 1755; d. London, 21 Dec. 1824. He was engaged in the practice of medicine at Hoxton in 1785, at which time he attended lectures on surgery given by John Hunter. He experienced some difficulties owing tio his political activities and was the author of several publications on the affairs of his time. He made some valuable collections and notes on geology and paleontology; was a Fellow of the Royal College of Surgeons; and an original member of the Geological Society on its forma¬ tion in 1807. He was author of numerous medi¬ cal treatises but his most important works are 'Organic Remains of a Former World)(3 vols., 1808-11) ; 'Outlines of Oryctology) (1822).

PARKINSONIA, a genus of tropical trees and shrubs of the family Ccesalpiniacece. The species, of which there are less than 10, have short spines, bipinnate leaves, yellow or whitish flowers arranged in loose terminal or axillary racemes, and more or less twisted compressed pods. The best-known and most widely popu¬ lar species is the Jerusalem thorn (P. aculeata). It is probably a native of America, but is culti¬ vated throughout the tropics, in many parts of wffiich it is naturalized. From its frequent em¬ ployment for hedges and from its gorgeousness when in blossom it is often called the Barbados flower-fence. Its bark yields a white fibre which might be valuable f-or paper-making, but is rather weak and short for most purposes. It is fairly hardy in the Southern' States and will thrive in the driest situations. As a greenhouse plant it is difficult to grow. Parkinsonia torre-yana is a native of the Southwestern States where, like P. microphylla . it is known as "palo verde® from its green branches. Three species are natives of South America and one of South Africa.

PARKS

1 The Fountain, Central Pane, New York

2 Lake Alvord, Golden Gate Park, San Francisco

PARKMAN, park'man, Francis, American historian : b. Boston, 16 Sept. 1823 ; d. there, 8 Nov. 1893. He prepared for college at Chauncey Hall School, in Boston, entered Harvard in 1840 and was graduated in 1844. During his college course he determined to write the his¬ tory of the struggle between France and Eng¬ land for the possession of the New World, but kept his purpose a secret. In college he gave particular attention to history and literature, and attained considerable distinction as a his¬ torical student. On his vacation trips also he visited many of the localities of which he was afterward to write, and studied the life of the Indians of Maine. He kept diaries of all these excursions in which he recorded in detail his observations and impressions. After leaving Harvard he spent two years at the Law School but never entered upon the practice of law. Feeling the need for a fuller understanding of Indian character and life, he spent five months in the West, living among the Dakotas and other tribes. This gave him just the kind of first¬ hand knowledge he desired, but the hardships to which he was exposed undermined his constitu¬ tion and brought upon him the weakness of the eyes and general ill health from which he suf¬ fered for the rest of his life. From that time he devoted himself to the completion of the work he had planned. He several times visited Canada and Europe, making a careful exam¬ ination of the numerous manuscripts of the period concerning which he wrote and also studied closely life in several monasteries for the better comprehension of the spirit of monasticism and of Roman Catholic ecclesiasticism. From 1853 to 1863 his health prevented him from doing any historical work and at this time he gave his attention to horticulture, in which he was particularly successful; he wrote sev¬ eral valuable horticultural papers and (The Book of Roses,) still a recognized authority. In 1868 he was overseer of Harvard, resigned this position in 1869 and became professor of horti¬ culture; and in 1875-88 was a Fellow of Har¬ vard. The courage and persistency with which he overcame the obstacles of ill health and ruined eyesight were truly heroic. Often he could work only a few minutes at a time , he had all documents and manuscripts read to him taking as few notes as possible and dictated from' his notes; yet he brought to full

comple¬ tion the great work he had planned. His first book, (The Oregon Trail, > an account of his travels in the West, appeared in 1849; his one work of fiction, Wassail Morton, > in 1856 In 1851 he issued the ‘Conspiracy of Pontiac, and in 1865 ‘The Pioneers of France in the New World,) the first of the series ‘France and England in North America. > The rest of the series appeared as follows: ‘The Jesuits in North Am erica) (1867) ; ‘La Salle and tne Dis¬ covery of the Great West5 (1869) ; The Old Regime in Canada> (1874); (Count Frontenac and New France under Louis X1V; (1«//; , ‘Montcalm and Wolfe) (1884). This last con¬ cluded the series but left an important period untreated; the gap was filled by the publication of ‘A Half Century of Conflict5 (1892). Parkman chose for his subject a theme entirely un¬ touched by other .writers and dealt with it so suc¬ cessfully as to obtain pre-eminent rank among historians. His histories are not philosophical,

yet are written with a breadth of view and a sense of proportion that mark the philosophic spirit. Nowhere does he show his power more clearly than in his sympathetic and vivid por¬ trayal of many widely different characters. He combined to an unusual degree the merits of both the scientific and literary historian. None of the most scientific of modern histori¬ cal students have surpassed him in thorough and exhaustive research, while his literary style is marked by a clearness, beauty and dramatic power that give to his histories the fascination of the best of romance. Consult Farnham,

C. H., ‘Life of Parkman5 (Boston 1901) ; Sedgewick, H. D., ‘Francis Parkman) (Boston 1904) ; Vedder, H. C., ‘American Writers of Today) (New York 1910).

PARKS, Leighton, American Protestant Episcopal clergyman: b. New York, 10 Feb. 1852. He was graduated at the General Theo¬ logical Seminary in 1876, was ordained deacon in that year and priest in 1877. He was rector of Emmanuel Church, Boston, in 1878-1904, since when he has held the charge of Saint Bartholomew’s, New York, succeeding David H. Greer who resigned upon being elected bishop of the diocese. Author of ‘His Star in the East) ; ‘The Winning of the Soul and Other Sermons> (1893) ; ‘Moral Leadership and Other Sermons) (1914).

PARKS, Public. Cities as a rule are not sufficiently appreciative of the necessity and de¬ sirability of adequate park systems. They are usually satisfied with a few meagre, dust:covered squares, scattered

throughout the business section, and certain large acreages in inaccessi¬ ble locations, principally used for athletic and picnic parties. The park system of a city, how¬ ever, necessarily receives the care and attention in its design and execution that is given to civic centres and other portions of the city. They are laid out in a broad spirit and with a free hand, and space should not be spared.

There is slight danger of planning parks cm too large a scale, there having been few in¬ stances, if any, of cities having reduced the size of their parks, once laid out. At one time there was considerable criticism concerning the extent of Central Park in the city of New York, which is two and one-half miles long and one-half mile wide. To-day, however, the pio-posal to erect in it a building of the highest artistic character is vigorously opposed and pub¬ lic opinion would not countenance the slightest reduction in its area.

A modern system of a city is planned in a systematic manner. It should consist of paiks of varying sizes and design, each adapted more or less particularly for certain purposes. In a general way, parks increase in size in piopoition to the distance from the business centre, and for the purposes to which they are to be de¬ voted they are grouped into four or five classes.

Those parks of the smallest size are gener¬ ally located in the most congested parts of the city to relieve the pressure of business. They are not, however, so large as to have a. dis¬ organizing effect, or cause undue inconvenience to traffic and the dispatch of business. Those of the next largest size are, as a rule, in the crowded residential and tenement districts and they are of varying sizes, of from one to four

Mocks, or more, in area. Those of the third class are located in the outskirts of the residen¬ tial portion and are usually of great extent. These are the principal parks of the city and are connected by boulevards and parkways. The fourth and largest class often consist of large undeveloped areas of land, purchased by the city and rented out partially for farming purposes and partially held as forests, from

which the wood may be cut and sold in such quantities as will not deplete its growth. From lands such as these latter, cities in many Euro¬ pean countries derive large and increasing rev¬ enues, while portions of the land may be sold from time to time as the city grows.

The number of parks in a city should be large, particularly as regards the smaller ones. An important principle in park design is to have the number and location such that every portion of the city shall be within easy walking dis¬ tance of at least one small park. As to loca¬ tion, they should be arranged as a part of a system and not merely set down haphazard and wherever room may be had. They afford ex¬ cellent terminal points for streets and avenues, and, when made a part of a proper system, add unity and variety to a city's plan.

The larger parks should be connected by boulevards, or, for the sake of variety, water communications, either for pleasure purposes or commercial use. If the waterways are for commercial use, they should be laid out with grass plots and lined with boulevards, as is the usual custom abroad.

The properties best adapted for park pur¬ poses are often of the least value for other uses. Steep hills, cliffs or rock formations, swamps, ponds, lakes and streams render land expensive for utilization as building sites, but, on the contrary, supply the natural features most easily transformed into interesting parks.

Small parks may be either of a strictly formal nature, or laid out on a more or less rural plan, with cascades, flower beds and an abundance of trees. Running water is always a feature of interest, but stagnant water should not be per¬ mitted, as being a breeding place for mosqui¬ toes, which are likely to become a great nuisance.

Most large foreign cities are abundantly supplied with small parks. Berlin has a large number, as has Vienna, but in the latter city there is an arrangement known as the ((Ring,ˆ which adds to the effectiveness of the parks. Dresden and Stockholm also have a large num¬ ber of small parks. In addition, in certain for¬ eign cities, there are spacious squares, which, though devoid of grass, shrubbery or trees, still have to a certain extent the effect of parks, being embellished with fountains, obelisks, monuments, electroliers, *etc.* A well-known ex¬ ample of this latter is the Place de la Concorde, Paris, which, however, is bounded on two of its sides by parks ; others are (the Raadhus-Plads, Copenhagen, the eastern end of Unter den Lin¬ den in Berlin, the Dam in Amsterdam and the Place de l'Hotel de Ville in Paris. Owing to the traffic passing through them, they are neces¬ sarily

open.

If these open spaces are too large, they have the effect of dwarfing the surrounding build¬ ings. Such is the case in certain Squares found in Moscow and in Petrograd in the Place Dvort-

sory, the Place Krasnaia and the Place des Theatres, which are merely large open spaces paved with cobblestones. While these spaces could have been laid out as parks with trees and grass plots, it may be that they have re¬ mained open as spaces for possible military parades.

One of the most important features of a park system is accessibility. The greatest at¬ tention should be paid to so arranging the parks and transportation lines that the public may be provided with quick, cheap and convenient means of access to the parks, for otherwise they lose the greater part of their usefulness.

Every city as a rule should have at least one large park within easy walking distance of a con¬ siderable part of its population and the other parks within easy reach by surface or other lines of transportation at a single fare. River and island parks are reached by bridges or by boats operated by the city. If transportation facil¬ ities to the parks are not ample the parks are of little use. The greater part of the city's popu¬ lation labors six days a week, with but few opportunities for recreation other than on the seventh day; much effort is being made to afford on that day all possible facilities for the needed recreation.

In character, the parks of a city should be varied ; those of small size, surrounded by build¬ ings of architectural interest, should be of a more formal character, that is, laid out on a more regular plan, with walks, terraces, ave¬ nues, lakes, fountains, flower beds, statuary, ornamental electroliers and other features of a similiar sort than those situated in more distant portions of the city. The latter are preferably of a more rural character, primaeval and undis¬ turbed in general effect. The main park of the city may partake of both these characteristics, portions being adapted to the one scheme and other portions to the other. In its appeal to its multitudinous users, they contain features cal¬ culated to appeal to the tastes of each and all seeking recreation.

The entrances to such a park have gener¬ ally a monumental character and often have a central mall, laid out in a formal manner

and flanked with statues. Promenades and walks, large flower beds, botanical gardens, zoological gardens, lakes with aquatic birds, facilities for rowing in summer and for ice skating in win¬ ter, artificial geysers, small streams and rivers with artificial falls, rock formations, bypaths, music stands, summer-houses, shelter-houses, drinking fountains, refreshment stands, concert pavilions, tennis and croquet grounds, wading pools for children, playgrounds with swings, carousels and the like, sun-dials, ornamental bridges, free singing birds, squirrels and other small animals, driveways, bridle paths, reser¬ voirs, observation towers, decorative kiosks and other features all go to make such a park attractive to visitors of all classes. The fore¬ going indicates the arrangement and location of parks, while the following give some con¬ crete examples of parks in certain representa¬ tive cities. For example, the city of Berlin has been laid out and its development planned up to the year 2000, when, it is estimated, the city will have a population of 10,000,000. With 4,-000,000 inhabitants at present, Berlin is the third largest city in the world. Before its suburbs —

the principle of which are Charlottenburg, Schoneburg, Rixdorf and Wilmersdorf — were incorporated in it, its population was 2,091,000, and the area of its parks was as follows :

Nine parks, covering 776 acres ; 147 small decorative plots, 254 acres ; three tree nurseries, 42 acres ; one school garden, 74 acres ; a total of 1,146 acres. In addition, the length of streets planted with trees is 106 miles. Around the trees are 262 garden plots having an aggregate area of 237 acres. There are also 99 acres of grass plots utilized as children’s playgrounds, ranging in size from to 17 acres each.

The park area of Charlottenburg (pop. 309,- 400) on 31 March 1912 was 618 acres. On the same date the total area of the city was 5,790 acres. In addition to its parks proper, the city maintains four tree nurseries in which 174,000 young trees were growing at the end of March 1912. At the same time the municipal green¬ houses contain 87,885 flowering plants, 1,399 palms and 2,408 decorative plants, of

an ag¬ gregate value of $10,460. During the course of the year 456,643 plants, worth $27,000, were used in the parks, in the street boulevarding and about the schools, hospitals, *etc.*

Berlin-Schoneburg possesses its own munici¬ pal gardens, covering 50,000 square yards, which, when entirely completed, will comprise 11 green¬ houses, 125 hotbeds, a botanical section in¬ tended to supply schools with demonstrative specimens and a municipal free nursery. On the average, 300,000 plants, including about 50,- 000 bulbs, are used each year for setting out in the city flower beds. The park commission's budget for the fiscal year 1913-14 amounted to

$72,195.

Great attention has been paid throughout Germany to the subject of parks, not alone within the cities, but also without, certain munic¬ ipalities owning from 10,000 to 40,000 acres, which, considered from the standpoint of forest conservation, bring in a steady and ever-increasing income. In fact there are instances of certain cities, instead of collecting taxes, pay¬ ing dividends to their citizens each year out of the proceeds derived from their lands and other municipal owned utilities.

Within Greater London the total park area is approximately 17,800 acres, of which the 17 government parks comprise 56,857 acres, the 13 city parks, 6,491 acres, in addition to the suburban parks, of 5,057 acres and the borough parks, of 266 acres. The principal parks are Victoria, with 250 acres, Battersea, 200 acres, Hempstead Heath, 250 acres. The last named is a high tract of land lying in the northwestern part of the city, with few artificial features. Besides these there are four royal parks, Saint James, Green, Kensington Gardens and Hyde Park, the best known being the last named, the rendezvous of high society and royalty, particu¬ larly during the spring and summer months. Kensington Gardens is a veritable arbor, trees, shrubs and flowers from every clime being found on every hand. Other parks are Putney Heath, Regent's Park, Richmond Park, on the Thames and the numerous small squares and open places, many being around churches. The total upkeep is approximately $600,000 per an¬ num for the entire park system.

The parks of Paris are divided between those within and those without the fortifications, the

latter being found in all directions at varying distances up to Forests of Fontainebleau, cover¬ ing between 40,000 and 45,000 acres, which, al¬ though over an hour's ride from the city, is claimed with pride by every Parisian. Of the parks within the city, the most famous is that of the Tuileries (56 acres), overlooking the Seine on the right side, and, therefore, being on the line dividing the city. Formerly the grounds of the royal palace, the Tuileries have seen many vicissitudes. To-day they are the property of the French Republic, the only park in Paris so owned. At one end is situated the famous Paris art museum, the Louvre, and at the other, in the Place de la Concorde, is the beginning of the Champs Llysees, the famous parked boulevard extending northwesterly to the Arc de Triomphe. To the right is one of the fashionable shopping streets, the Rue de Rivoli. The arrangement of the park is rather formal, the embellishments, semi-classical sculpture, monuments, etc., being in keeping with the architecture of the palace of the Tuil¬ eries and the Louvre. Its central location makes it exceedingly popular, particularly for the working people employed in its vicinity.

Another park of the same size is the Luxem¬ burg Gardens, situated around the palace of the Luxemburg. Less formal, and filled with many objects of historic interest, it i3 a favorite spot with the student population of the <(left bank® of the Seine. Other interior parks are the aristocratic Parc Monceau (23 acres), filled with examples of the finest French sculpture and completely timbered; Montsouris Park (38 acres), with its meteorological observatory; Jardin des Plantes (58 acres), with its botanical treasures ; and the Buttes-Chaumont Gardens (57 acres), formerly the gallows field of the city, reclaimed in 1865 for park purposes, has become one of the most attractive spots in the city.

Outside the fortifications is the Bois de Boulogne (2,100 acres), a natural wooded park with lakes, running streams, winding roadways and two race tracks. The Bois, as it is known, is the aristocratic afternoon park of the city, and here and on the Champs Llysees on the way to the Bois may be seen everyone who con¬ siders himself of any importance. On the op¬ posite side of the city is the Bois de Vincennes, a similar park of the same size. While its natural features are much the same as the Bois de Boulogne, it is somewhat less accessible and less popular. There are two other parks, among the many that surround Paris, that have a particular attraction for visitors — those at Saint Cloud and at Versailles. Both were formerly the seats of French royalty. The latter, taken in connection with the palace, is a striking example of the geometrically formed park, which, if split in

two in the centre and one-half superimposed over the other, is sup¬ posed to show an absolute bilateral similarity. It is divided by a Grand Canal. The principal attraction is the playing of the great fountains, which, on account of the great cost — upwards of $2,000 per day — takes place once a month during the summer, and, in addition, the numerous objects of historical and romantic in¬ terest, for it was here that the French court had its greatest splendor.

In the city of New York are many notable

parks, the best known ‘being Central Park (840 acres), situated in the practical geographical centre of the borough of Manhattan, New York City proper. It was purchased for park pur¬ poses, plans were worked out and develop¬ ment was begun between the years 1853 and 1863, work being begun in 1857. It extends from 59th to 110th street and from 5th to 8th avenues, and is situated conveniently to all the principal car lines of the city. It is wooded in part, with a large number of foreign trees and shrubs, and has a series of winding roads, paths and by-ways from one end to the other. Besides its natural, features-it has many additional at¬ tractions, for instance, a “Zoo,® which is visited by thousands every year, a greenhouse wherein are exhibited splendid examples of exotic plants, and in which flower shows are sometimes, held. A large lake, ponds and running streams are other of the attractions, and facilities for row¬ ing in summer1 and skating in winter are pro¬ vided. Of permanent value the year around as a place much visited is the Metropolitan Museum, situated on the 5th avenue side, and the American Museum of Natural History, located just outside, on the western side. Two city water reservoirs, an obelisk, a Revolution¬ ary fort, the “Mall,® with its concert stand, and many monuments are other points of interest. It is cut by only one cross street (having a car line), but the street is below the surface of the park and properly bridged over.

The land included in Central Park cost originally $5,028,844. In 1906 its value was esti¬ mated at $236,500,000, and to-dav it is worth probably over half a billion dollars — an ex¬ ample of the reason for

which European cities make it a rule to buy parks and lands for specu¬ lative purposes.

Other parks are Pelham Bay Park (1,756 acres) with a shore front of upwards of 10 miles, along Long Island Sound, and two islands; Bronx Park (719 acres), containing the New York Botanical Gardens and the Zoological Park, the most important of its kind in the country. Bronx Park, with its natural woods and other features, including a river, spacious boulevards, etc., is a favorite spot with thousands of persons from the lower "East Side® of New York City, as the lines of* com¬ munication run direct. Van Cortlandt Park (1,132 acres), on the Hudson River side of the city, is the favorite public recreation park of New York, particularly so for golf, track and other outdoor sports, including skating.

Brooklyn contains several notable parks: Prospect Park (516 acres), the site of the Revolutionary battle of Long Island. The effort of its sponsors has been to keep it as nearly in its natural; condition as possible, and entire freedom is given to children to play in any part. In particular, it contains a "Parade® of about 40 acres for athletic sports ; Dyker Island Park (144 acres), overlooking the Nar¬ rows; Bay Ridge Park, overlooking New York Bay; Forest Park (535 acres), adjoining Queensborough, filled with natural attractions for the lover of outdoor life; and Fort Greene Park (30 acres), around the site of the Revolu¬ tionary fort of the same name. In Staten Island is Silver Lake Park (300 acres), well laid out with drives, tennis courts, *etc.*

Both in New York and in Brooklyn are in¬ numerable smaller parks — breathing spaces —

and between certain of the parks are connecting boulevards of note, timbered and parked, from 200 to 400 feet in width. ' The most noted of these perhaps is Riverside Drive and Park, ex¬ tending from 72d street northward along the Hudson River. It follows the natural contour of the littoral, and is flanked on one side by some of the handsomest residences and apart¬ ment-houses of the city, and on the other by the river bank with its primaeval timber. Un¬ fortunately, access to the water's edge is dif¬ ficult, as the New York Central has the right of way, but plans are being formulated for the bridging over of the tracks so that park pur¬ poses may not be interfered with.

Philadelphia is well supplied with parks, the most beautiful being Fairmount (3,242 acres), and Wissahickon Driveway on the Schuylkill

River. The city park commission in 1888 formulated plans for the systematic improve¬ ment and addition of the park system, so that now within a radius of 25 miles from the city hall there is an area of upwards of 8,500 acres devoted to this purpose, including open spaces, river fronts, boulevards, *etc.*

Boston has perhaps the most complete sys¬ tem of parks and playgrounds in America ; in fact, the modern playground and recreation-park movement may fairly be said to have had its beginnings for Americans in Boston. The city stands at the head of those communities which have actually achieved their aims in this direction. There are within the city 3,574 acres of land devoted to park and playground pur¬ poses, over one-tenth of the total land area of the city. Of this area, 2,692 acres are under the control of the city and 882 acres under control of the State. The Common with an area of 48 acres, and the Public Garden, with an area of 24 acres, lie almost at the centre of the city. No district is without its park or playground, no part of the community without an easily ac¬ cessible breathing spot. A State-appointed Metropolitan Park Commission has developed in the environs of the city a supplementary system of parks. North of the city lies the Middlesex Falls Reservation, containing over 3,000 acres of hills and woodland. To the south lies the Blue Hills Reservation of 4,232 acres. The banks of the Charles River and the ocean beaches are included in the general scheme and all the larger units are joined by means of a system of well-kept boulevards. Education features are provided at the Marine Park, the Franklin Park Zoo and the Arnold Arboretum.

Baltimore, 2,277 acres, the best known be¬ ing Patterson Park, Carroll Park and Druid Hill ; Chicago has a system whereby within 10 minutes walk one can find a park. In, size they run from 3 to 75 acres. The best known are Lincoln Park, Washington Park and Jackson Park, the last named being the site of the World's Columbian Exposition, 1893. In gen¬ eral the lagoons for which the exposition was famed have been left, and are now a veritable network of waterways. The park commission of Chicago bas endeavored to combine its parks with the idea of recreation, and probably the most nearly complete system in the country is the result. Washington, the Federal capital, has a well-developed park system, including Potomac Park. Lincoln Park. Meridian Hill Park, Logan Park, Garfield Park. The Mili¬ tary Park of Newark, N. J., is well developed

as also Battery Park of Charleston, S. C., Gor¬ don Park, Cleveland, is becoming one of the show places of that city. Garden City, Long Island, and Forest Hills a few miles distant are among the most interesting modern civic de¬ velopments in America from the point of view of the park and landscape architect. Akron, Ohio, has a fine public playground and rest spot in Perkins Park. Grant Park, Atlanta, Ga., has undergone considerable improvement and has many features of interest. Saint Augustine and > Jacksonville, Fla., have very interesting parks with subtropical plants and trees of great in¬ terest to visitors from the bleak North. Belle Isle, Detroit, ranks among the best developed public parks in the United States and Washing¬ ton Park, Albany, N. Y., is also among the best developed civic park areas. Seaside Park, Bridgeport, Conn., has great natural advantages, being located on the Atlantic shore ; it has undergone considerable improvement in recent years and is among the more noteworthy de¬ velopments in park design and maintenance. Keney Park and Elizabeth Park, Hartford, Conn., are noted for their scenic and floral beauty.

The foregoing are examples of parks for large cities. Smaller cities as a rule in the past have done comparatively little to provide parks and recreation grounds. However, with the introduction of modern city planning, numerous American cities are now providing park systems previously not dreamed of, for instance, in a comprehensive city planning re¬ port for Bethlehem, Pa. (65,000 population), plans were prepared for a chain of parks, boule¬ vards and recreation grounds which may be considered adequate and serve as a good ex¬ ample for a city of this size. The several parks developed and now under development are, Monocacy Park, Sand Island Park and Lehigh River Park within the city limits, and Saucon Park just outside of the city limit but within the jurisdiction of the city planning commission.

Frank Koester, ‘ Consulting Engineer and City Planning Expert ;

Author of c Modern City Planning and

Maintenance d

PARKSVILLE, Mo., village in Platte County, 10 miles northwest of Kansas City, on the Missouri River, and on the Chicago Great Western

and the Chicago, Burlington and Quincy railroads. Park College was founded here in 1875. There are stone quarries and it is a shipping point for willows for riprapping. Pop. 765.

PARLEMENT, in French history, before the Revolution, a name applied to certain su¬ perior and final courts of judicature, in which also the edicts of the king were registered be¬ fore they became laws. Of these the chief was that of Paris, but there were no fewer than 12 provincial parlements, at Toulouse, Grenoble, Bordeaux, Dijon, Pau, Metz, Besanqon, Douai, Rouen, Aix, Rennes and Nancy. These, though not actually connected with that of Paris, in¬ variably made common cause with it in its struggles with the royal power. Of these parle¬ ments the most celebrated, most influential and historically, most interesting, was that of Paris. It dates back to the Curia Regis of the Frankish kings. The former assembly was composed of vol. 21—22

the dignitaries of the court (lay and ecclesias¬ tical), who were accustomed to meet at the call of the king and under his presidency, or that of some one appointed by him, to act for him. Thus, in its origin, the parlement of Paris was a distinctly royal council. As such it looked after all cases involving the royal interests. In addition to this it heard appeals from the lower courts, especially where denial of justice or unnecessary delay was charged. On account of its royal origin it became, especially under the Carolingian rulers, the court in which the higher nobility and those connected with the king's household were tried. Its functions were also extended, more broadly, to those living under the protection of the sovereign. These various functions threw upon the parlement an amount of work very much greater than had originally been intended it should have to perform. Grad¬ ually this work was systematized and divided into three distinctly defined sections, known as (1) Conseil de Roi ; (2) Chambre des Comptes; and (3) the Parlement proper. Notwithstand¬ ing these divisions, the parlement continued to be composed of the nobility up to the reign of Louis IX, in the 13th century; but by this time the three divisions above indicated had become very definitely defined. In the reign of Philip IV (1285-1314) the upper bourgeoisie began to be represented in the parlement which already consisted of three chambers, the <(Grand' Chambre, w or the meeting of the par¬ lement as a whole; the <(Chambre des enquetes,ˆ a sort of committee of the Grand' Chambre, which took charge of preliminary investigations of all kinds and handled a vast amount of detail work, which could more easily be taken care of by it than by the parlement as a whole; and finally the <(Chambre des requetes® which, as its

name indicates, handled all petitions made to the parlement. During the occupation of Paris by the English (1417-36) the parlement of Paris continued to meet and transact its business regularly at Poitiers.

The French parlement can scarcely be called a parliament in the English sense of the word, because it never really ceased, theoretically at least, to represent the interests of the sovereign. The members were appointed by the king, some¬ times on his own authority and to represent his own interests, but generally, especially from 1400 onward, from a list of eligibles presented by parlement. Thus no one could become a member of parlement who was displeasing to the king or who was known to oppose his in¬ terests. But gradually the principle of nomi¬ nation became a dead letter and by the reign of Francis I membership in the parlement was openly purchased. This, combined, with the fact that in the reign of Louis XI (1467) the irremovability of the members had become a fixed principle, tended to rapidly make of that body a (<nobility of the. robe,‘0 which, as it grew in power, became excessively jealous, of its own prerogatives and determined on strengthening its own position. Membership in the parlement began to pass from father to son as the order and rank of nobility. The sovereigns aided these pretensions by creating new members of parlement and collecting large sums from them for the favor of the appointment. In 1604 an arrangement was reached between the members of the parlement and the king whereby the

former paid into the royal treasury one-six¬ tieth of their income in return for the royal confirmation of the principle that their parlia¬ mentary office should, at their death, pass to their heirs. The growth of power and import¬ ance of the parlement naturally soon began to make it look more to its own interests than to those of the sovereign. As early as the reign of Louis XI it began to endeavor to modify the royal decrees or to change or reject them, and the king’s confirmation

of the irremov¬ ability of the members was really a concession to their growing power and ability to oppose the royal will. From this time on a quiet strug¬ gle for power continued between the parlement on the one hand and the various sovereigns of France on the other, until finally in the reign of Louis XIII, the parlement sought to impose its will upon the king and upon his Minister, Richelieu, but failed in the attempt, thanks to the ability and determination of the latter. In the reign of Louis XIV the struggle was con¬ tinued, and again the parlement finally lost out, and in the end found its powers greatly re¬ stricted, everything but its judiciary functions having been taken from it. This placed the parlement in the position of an antagonist at¬ tempting to gain from the Crown the powers and privileges of which it had been deprived. In 1771 the parlement was dissolved, all offices declared vacant and a new parlement created with restricted powers and emoluments. At this time provision was made for doing much of the judicial work of the parlement by the establish¬ ment of six superior courts, a really good and sound legal and legislative move, but one that was naturally very unpopular with the would-be ruling class, who composed the old parlement, and with the people as a. whole, who sided with the members of the parlement rather than with the Crown, whose acts were considered arbi¬ trary and illegal. This brought the parlement and the people closer together and tended con¬ tinually to widen the breach between the former and the* Crown. Thus the parlement, though in the beginning it had no object in opposing the sovereign other than the securing of its own individual interests, became logically the cham¬ pion of popular* rights and the will of the people as opposed to the autocratic power of its rulers, who were not slow to recognize the position into which the parlement had drifted. Rapidly the parlement became the emblem of widesweeping reforms in the government of the nation and the rights of the people. Had the parlement really been representative of popular interests it might have had a different influence on the history of popular rights in France; but it was all along bent on recovering its old privileges and powers and had little or no interest in the claims of the masses, which it bitterly opposed whenever any reforms were advocated that tended, in the interest of the general public, to restrict or curtail in any way its ancient privileges and emoluments. Finally, in 1790, the parlement of Paris and also all the provincial parlements were abolished by the National Assembly, who found that they were bent on looking after their own interests as privileged bodies, as opposed to those of the French people as a nation.

The chief importance of the parlements of France is to be found in the fact that they acted as practically national judiciary bodies at

a time when the presence of such bodies was necessary for the safety of the nation. On account of their practical unity of aims and the close contact of the provincial parlements with that of Paris and with one another, they gradu¬ ally unified the customs laws of France so that they obtained practically the force of one great body of written laws and laid the foundation of French law, which was built, for the most part, on justice and right.

Bibliography. — Aubert, (Histoire du parle¬ ment de Paris, 1515) (1894) ; Bastard d'Estang, Vicomte de, (Les parlements de France) (Paris 1857); Beugnot, (Les 01im) (Paris 1839ˆ18); Boutaric, (Actes du parlement de Paris) (Paris 1863-67) ; Cherule, (Dictionnaire historique des institutions, etcP (Paris 1874) ; De Breuil,

(Stilus curie parlamentP (Paris 1909) ; Esmein, 'Histoire du droit frangais* (Paris 1901) ; Flammermont, (Remonstrances du parlement de Paris aux XVIIIe. siecle) (Paris 1888-98) ; Guilhiermoz, (Enquetes et proces> (Paris 1892); Langlois, (Textes relatifs a l'histoire du parlement) (1888) ; (Les origines du parlement* (Paris 1890) ; Luchaire, (Histoire des institu¬ tions monarchique de la France) (Paris 1891) ; Viollet, (Histoire des institutions politiques) (Paris 1903).

PARLER, or ARLER, Peter, German architect ; b. probably Cologne, about 1333 ; d. about 1397. He was a son of Heinrich Par-ler, also a famous architect of Cologne, and brother to Johannes Parler, who in 1359 be¬ came master architect of the cathedral of Freiburg. The name is thought to be cor¬ rupted from Arler, and members of the family were known also as Von Gmiind, from the birthplace of Heinrich and others of the family connection. In 1356 Peter was architect on the Prague Cathedral, of which he is known to have built the choir. The members of the family are listed in Klemm's (Allgemeine deutsche Biographie.* Consult also Neuwirth's (Peter Parler von Gmiind und seine Familie* (Prague 1891).

PARLEY, Peter. See Goodrich, Samuel Griswold.

PARLEY, military term, designating an oral conference with the enemy. It takes place under a flag of truce and usually at some spot, temporarily neutral, between the lines of the opposing armies. The advance of the mes¬ senger is usually announced by sound of trum¬ pet or beat of drum as well as by the signal of the white flag of truce. The messenger chosen is designated as a ˆparlementaire,** a term used by all nations, including Great Bri¬ tain and the United States.

The parlementaire becomes the agent of all non-hostile intercourse between belligerent armies, his duties covering every form of communication between the opposing armies. He may be accompanied by three persons, usually a drummer, bugler or trumpeter and an interpreter. These persons, however, ma.y not enter the enemy's lines ; and the parlementaire may not demand reception by the commanding officer, but must, if re¬ quested, deliver his written message or put an oral message into writing to be delivered to the commander. The party advancing under a flag of truce is not to be fired upon, but on the other hand is supposed to select a quiet period and avoid recklessness in his advance, and if

he advances under heavy enemy fire and is injured he has no cause for complaint; nor may a truce party advance at night. The party sending the parlementaire ceases firing as an announcement of sending a truce party, further announcement being made by ((beating a par¬ ley® with trumpet or drum. The commander of the enemy army may not refuse to receive the message of the parlementaire, but he may declare formalities and conditions under which he will receive him and fix the hour and place at which he must appear. Unnecessary repe¬ tition of visits need not be permitted and in case of abuse of the white flag the commander in reprisal may refuse to receive the truce party. The parlementaire and his escort are inviolable except when he abuses his privileges in an effort to obtain information or other advantage. In such case he may be detained but word must be sent to his commanding officer and his detention must be of as brief duration as is consistent with safeguarding the secrets he has secured. The rules are 'clearly defined in the < Rules of Land Warfare, Annex to Hague Convention No. iv, 18 Oct. 1907. } Consult (Rules of Land Warfare, United States Army, 1914) (War Department, Washington

1914).

PARLIAMENT, Acts of. See Acts of Parliament; Great Britain —

Parliament.

PARLIAMENT, British. See Great Britain — • Parliament ; London.

PARLIAMENT, Houses of. See London.

PARLIAMENTARY ELECTIONS ACT.

See Corrupt Practices Acts.

PARLIAMENTARY LAW, the system of rules, practices and customs which regulate the procedure of deliberative assemblies, often re¬ ferred to as rules of order, and deriving its name from the British Parliament, where the first complete system of procedure was evolved. Assemblies differ both in their character as legal or voluntary and also in the nature of the right of membership. Individual assemblies often have special rules which are called stand¬ ing rules. While the rules of procedure of deliberative assemblies may, and do, vary greatly in detail, there are, however, four principles common to all on which parliamentary law is founded. These are: (1) justice to all; (2) consideration of one proposition at a time; (3) majority rule; and (4) the safeguarding the rights of the minority. The will of an assembly is the will of a majority of its members ; this is the deliberate will and forms the cardinal principle of parliamentary law. The chief officer of an assembly is variously termed chair¬ man, president, speaker, *etc.* His office is to direct the business and apply all the rules impartially. Other officers are usually a vice-president or vice-chairman, secretary, treasurer, *etc.* Members of an assembly meet on an equal footing and it is incumbent on all to have the business of the meeting transacted according to the rules, special or general, governing such assembly. Business is introduced by a motion or resolution made on the floor by a member who has arisen, addressed the chair, and secured recognition from the presiding officer. Such motion or resolution must be seconded by an¬ other member; it is thereupon stated by the

presiding officer after which it is deemed to be in the possession of the assembly for debate. Members now may take the floor in turn but it is the province of the chair to make them confine their remarks to the question before the house. A member may speak a second time on the same question only after all other members who wish to speak have spoken once. The judgment of the assembly on a proposition is determined by voting either by ballot, by ayes and nays, or by yeas and nays. The two modes last named are viva voce. In the yea and nay

method the secretary calls the roll and records the vote of each member as he responds. The chairman votes when the voting is by ballot and in other cases generally only when his vote can change the result.

Motions or resolutions fall into four main groups: (1) those that are never in order ex¬ cept when there is no other business before the house, of this class are motions to rescind or repeal and the motion to expunge from the record; (2) the so-called subsidiary motions or motions made to dispose of or modify other motions or to cut off debate. These subsidiary motions are given below in the order of prece¬ dence from the weakest to the strongest ; any of these may be made while one or more above it in the list are pending but may not be made if one below it in the list is pending. If four such motions were pending in addition to the principal motion which they are designed to modify, the one last made is the first to be voted on. The list of subsidiary motions fol¬ lows : (a) To postpone indefinitely; (b) To amend (of equal rank with a to which it does not yield); (c) to refer to committee; (d) to postpone to a certain time; (e) to move the previous question (the effect of which is merely to shut off debate and bring the ques¬ tion to a vote) ; (f) to lay on the table (the effect of which is an indefinite postponement). The question may be taken up again when there is no other business before the assembly by a motion to take from the table. (3) The inci¬ dental motions form the third group and arise out of questions, main motions or rules. All require a majority vote except suspension of rules which requires two-thirds. The incidental motions are: (a) To withdraw a motion; (b) to read papers or documents; (c) to suspend rules; (d) the question of the consideration; (e) a point of order (by which a violation of rule is pointed out). In such case the chair decides the point; an appeal from his decision does not lie in cases where the rule states plainly the course of action to be pursued; (f) motion to reconsider. (4) Privileged motions constitute the fourth main group. They deal with the needs of the assembly. They prevail over all others and among themselves the order of precedence is as given below: (a) call for order of the day; (b) questions as to privilege; (c) to take a recess; (d) to adjourn. (5) To fix the place or date for reassembling. Con¬ sult Cushing, L. S., (Rules of Proceeding and Debate in Deliberative Assemblies) (Phila¬ delphia 1914) ; Gregg, F. M., (Handbook of Parliamentary Law> (1910), a veritable mine of information on its subject; Fox, E. A., Parlia¬ mentary Usage) (1902) ; Hinds, A. C., (House Manual) (1909) ; Reed, Thomas B., (Manual of General Parliamentary Law) (1898) ; Roberts,

H. M., (Rules of Order0 (1904) ; Waples, R., (Handbook of Parliamentary Practice) (1901); Pardo-Suarez, (Practicas parliamentariasP

PARLIAMENTARY REFORM. See

Great Britain — The Political Parties.

PARMA, par'ma, Alessandro Farnese, 3d

Duke of. See Farnese, Alessandro.

PARMA, Italy, the capital of the province of the same name, on the Parma, which divides the city into unequal parts ; Parma is 55 miles by rail northwest of Bologna. .The town is en¬ circled by the Rampari, a promenade laid out on the site of the former fortifications. The old Roman Via ZEmilia traverses the town centrally east to west, forming the principal street, at its widest section named Corso Vittorio Emanuele ; and the Strada Garibaldi, another important street, intersects it north and south. Both are laid with tramways. Of the four principal squares the chief is the large and handsome Piazza Grande, near the centre of the town. Among the principal buildings are the Duomo or cathe¬ dral, begun in 1058, partly Romanesque and partly Gothic, with a fine octagon tower and a dome in the centre, the interior painted in fresco by Correggio; the baptistery, in the Lombard-Romanesque style (1196-1270), and cov¬ ered externally with curious bas-reliefs ; the church of La Steccata; the church of San Gio¬ vanni, which, with other churches and buildings, contains paintings by Correggio and by Parmi-giano, the latter of whom was born there and both of whom lived there. Other buildings and places of interest are the ducal palace (now the prefecture) ; the Palazzo della Pilotta, compris¬ ing a museum of antiquities, a gallery of valu¬ able paintings, and library of over 320,000 vol¬ umes ; and the university founded in 1512, with faculties of law, medicine and science, 42 pro¬ fessors and over 600 students. The chief manu¬ factures are of silk, cottons, woolens, felt hats, *etc.* Traces of a prehistoric pile-village of the Bronze Era and of an Etruscan town, precede the authentic history of Parma as a Roman colony. Pop. about 54,000. Parma, the prov¬

ince, has an area of 1,250 square miles, and population of about 300,000. It is watered chiefly by the Taro, the Parma and the Enza, all of which fall into the Po. It is covered by branches of the Apennines on the south.

PARMENIDES, par-men'T-dez, Greek phi¬ losopher, head of the Eleatic school: b. Elea, in southern Italy, and flourished about the middle of the 5th century b.c. In 460 he went to Ath¬ ens, with his pupil Zeno, and made the acquaint¬ ance of Socrates, then a young man. He was held in high esteem by both Plato and Aristotle for the depth of his intellect and the loftiness of his character. His only writings consist of a didactic poem, <On Nature, > in epic verse, com¬ posed in the Ionian dialect.

PARMENIO, par-me'ni-o, or PARMEN—

ION, Macedonian general under Philip and Alexander the Great : b. about 400 b.c. ; d, Ecbatana, 329. A trusted counsellor and able lieu¬ tenant of Philip, he carried to a successful issue many campaigns during his master's life. In 356 he defeated the Illyrians ; and in 342 car¬ ried on a successful campaign in Euboea. While he was on a war mission in Asia Minor, Philip was assassinated; and Parmenio used his influ¬

ence in behalf of Alexander whose accession was thus assured. Alexander also had great confidence in him, although deprecating the con¬ servative prudence of the older man. While Parmenio was in Media, his son, Philotas, was found guilty of treason-against Alexander and executed, and soon after his excution the father, too, was put to death ; either because Alexander feared that he would attempt to take vengeance for the death of his son, or because the son implicated him in the plot.

PARMIGIANO, II. See Mazzola, Fran¬ cesco.

PARNAHYBA, par-na-e'ba, a river of northern Brazil. See Paranahyba.

PARNASSUS, par-nas'us, in ancient geog¬ raphy, a mountain in Phocis, near the Gulf o'f Corinth and the frontier of Bceotia and Attica. To the northeast lies the plain of Cephissus, to the, west the plain of Amphissa, to the south two narrow valleys. The site of Castalia, a fountain of inspiration and of the temple of the Delphic Apollo (on the southern slope), Parnassus has become a symbol of poetry and belles-lettres. The name Parnassus is also given to the whole range of

mountains.

PARNASSUS, Pa., borough in Westmore¬ land County, on the Allegheny River, 17 miles northeast of Pittsburgh, on the Pennsylvania Railroad. It is situated in a region devoted to agriculture, lumbering and coal mining, and has glass works, white lead and linseed-oil factories, and manufactures car equipment. Pop. 2,578.

PARNELL, par'nel, Charles Stewart, Irish

political leader : b. Avondale, County Wicklow, 27 June 1846; d. Brighton, Sussex, 6 Oct. 1891. He was educated at Magdalene College, Cam¬ bridge, which he left without a degree. In 1872-73 he visited the United States, and in 1875 was elected to Parliament as member for County Meath. He allied himself with Joseph Biggar and began the policy of obstructing parliamentary proceedings, in order to bring pressure to bear on the government, and obtain concessions for Ireland. In 1879 he was chosen first president of the recently started Land League ; he now visited the United States a second time to raise funds for the League, and was well received by even the most extreme of the Irish party. At the general election of 1880 he was elected for three Irish constituen¬ cies, but chose to sit for Cork, which he repre¬ sented to the last. He now became the chair¬ man of the Irish parliamentary party. The methods of the Land League, especially the system of <(boycotting,® warmly advocated by Mr. Parnell, and the general state of Ireland, led the Gladstone government to bring in a Crimes Bill and an Arms Bill in 1881, both of which were passed, but not till after violent op¬ position from the Parnellites in Parliament. A Land Act was passed in the same session, and as the government saw that an attempt would be made to* thwart its operation, Parnell was arrested and lodged in Kilmainham Jail with several of his supporters. In reply to this a ((No Rent® manifesto was issued, which caused the suppression of the Land League, but boy¬ cotting and crime continued. In the spring of 1882, by what has been called the ((Kilmainham Treaty,® Parnell was set at liberty, having

promised to lend some assistance in checking crime. In 1886 Gladstone definitely declared in favor of Home Rule, and gained the support of Parnell and his party; in that same year the Home Rule Bill was introduced, and after its rejection Parnell and Gladstone were in close alliance. In 1887 Parnell and others of his party were accused by the London Times of complicity with the crimes and outrages com¬ mitted by the extreme section of the Irish Na- ‘ tionalist party. To investigate these charges a commission of three judges was appointed by the government in 1888, with the result that, after a great deal of evidence received from both sides, a report was laid ‘before Parliament in February 1890, acquitting him of the graver charges against him; and he obtained £5,000 ($25,000) damages in a suit for libel against the Times. In 1890 he was proved the guilty corespondent in the divorce case of Captain O’Shea, and afterward married Mrs. O’Shea. The affair, however, ruined his political career. The Irish party at first reappointed him their chairman, but shortly afterward a letter from Gladstone to John Morley was published stat¬ ing that if Parnell continued to be leader it would be “disastrous in the highest degree to the cause of Ireland,® which, of course, im¬ plied that the support of Gladstone and his party would be withdrawn from Parnell. He was then deserted by the great majority of his parliamentary followers, and the Irish priest¬ hood made a determined stand against him. He by no means tamely acquiesced in this position of affairs, but fought vigorously to the last to maintain his position as leader of the Irish people, thus overtasking his strength and break¬ ing down his health. Parnell as a speaker was reserved and dignified; he had an unusual knowledge of parliamentary law, which he used most effectively, and for a time he completely dominated his party, making it a force both re¬ spected and feared in English political life.

Consult Hansard, Parliamentary Debates) for 1875-91; Bryce, (Studies in Contemporary Biography> (1903); Mahoney, (Life of ParnelP (1886) ; McCarthy, Justin, (A History of Our Own Time* ; Moore, Parnell and His Island) (1887) ; O’Brien, (Life of Charles Stewart ParnelP (1888) ; O’Connor, (The Par¬ nell Movement (1890) ; O’Shea, K., (Charles Stewart ParnelP (New York 1914) ; Sherlocke, (Life of ParnelP (1887) ; (Memorial Volume to Charles Stewart Parnell,* with a biography by Walsh (1892).

PARNELL, Thomas, Anglo-Irish poet: b. Dublin, Ireland, 1679; d. Chester, England, July 1718. . He was educated at Trinity Col¬ lege, Dublin, took orders in the Church of England in 1700, and in 1706 was made arch¬ deacon of Clogher. He was intimate with Pope, whom he assisted in his transla¬ tion of Homer and wrote the essay prefixed

to it, (Essay on the Life, Writings and Learn¬ ing of Homer) (1715). In 1713 he was ap¬ pointed prebend of the cathedral of Dublin through the influence of Swift, and in 1716 was made vicar of Finglas. He was the inti¬ mate and associate of the foremost English and Irish writers of his day, among them Gay, Arbuthnot, Pope and Swift. His poems were published by Pope in 1721 and in 1758 a second volume entitled (The Posthumous Works of

ParnelP was also published. Consult Gold¬ smith, (Life of Parnell.)

PAROCHIAL SCHOOLS. See Parish Schools, Roman Catholic.

PARODY, a literary composition in which the style, form or expression of dignified writ¬ ings are closely imitated, usually in a humorous or satirical manner. Among English parodies the best are the famous (Rejected Addresses of James and Horace Smith. * The term is also applied to burlesque musical works.

PAROLE (from the same term in French meaning “word**), a term used in law and in military affairs. In law, something done ver¬ bally or by word of mouth, in contradistinction to what is written ; thus an agreement may be by parole. Evidence also may be divided into parole evidence and written evidence. (See Evidence). (2) In military affairs, . when a prisoner of war receives full liberty within cer¬ tain limits on promising not to attempt to escape he is said to be on parole ; or he may get leave to depart from custody on promising that he will return at the time appointed ; or he may give his parole not to fight again during the continuance of the war. The release of prisoners of war on parole came into use with the disuse of the old custom granting the captor right to hold his captives indefinitely for ransom. At first it was only extended to officers in exceptional cases. Breach of parole is reckoned infamous in all civilized nations. The word parole is also used as a password ; a word given out each day in orders by the com¬ manding officer in camp or garrison, by which friends and foes may be distinguished. It is used as a check on the countersign. The parole is sent sealed in the form of an order to those entitled to it. It differs from a countersign in being given only to officers, or those who inspect and give orders to the guard. The Hague Conference of 1889 defined the condi¬ tions of parole and provided that prisoners of war may be liberated on parole only when their country so authorizes. If paroled each person so liberated binds himself,, on his personal honor, to fulfil all the conditions of the parole: and his own government is in honor and duty bound to require of him no services in any way

conflicting with his observances of the fulfilment of the conditions of his parole. If the government objects to the condition of the parole it should return to captivity the per¬ son so paroled. A person found bearing arms against the government by which he has been paroled, or against its allies, may be tried by military court in which case conviction usually means the sentence of death. Consult Higgins, A. P., (The Hague Conference and other International Conferences> (New York 1909) ; Scott, J. B., <Texts of the Peace Conference at the Hague 1899 and 1907) (Boston 1908) ; < Instructions for the Government of the Armies of the United States in the Field) ; Spaight, J. M., (War Rights on Land) (London 1911).

PARONYCHIA, in botany, the name of a genus of plants of the family Silenacece, known popularly as the nailworts, or whitlow-worts. They are tufted herbs, distinguished as having no corolla, the flowers consisting of a five-parted calyx, five stamens and a pistil, some¬ times five-parted. About 50 species are known, those of the United States being mostly per-

ennials. They are natives of the temperate and warmer regions, a very few varieties being found in semi-tropical localities.

PAROPAMISUS, par-6-pam'i-sus, the Greek name of a part of the Hindukush Range to the west of Kabul and forming the border of Kohistan. It has, in modern times, come to be applied, in a somewhat more restricted sense, to the watershed between Herat and the fron¬ tier of Russia, along the river Kushk which lies at an elevation of about 1,000 feet above sea-level.

PAROQUET. See Parrot.

PAROS, pa'ros, an island of the Cyclades in the Greek Archipelago, four miles west of Naxos from which it is separated by a channel from four to six miles. It is nowhere more than 15 miles long or nine miles wide. It has a perime¬ ter of 36 miles and an area of 82 square miles. In the centre of the island rises Mount Hagios (Helias or Saint Elias),

to an altitude of about 2,400 feet. The summit of the mountain which occupies the entire island is largely composed of fine marble; the best variety, called Uychnites,® were at one time much used in Greek statuary. The marble quarries are no longer worked, but the old roads to them are plainly to be seen. The fertile soil grows vines and grain. The capital city of the island Paros (now Parikia) was settled first by Cretans and then by Peloponnesians. Its people joined the invading Persian armies in 490 and 480 b.c. After Marathon, Miltiades (q.v.) attempted to reduce the city, but was unsuccessful. A year later, defeated by Themistocles, it entered the Athenian league. After the downfall of Macedon the city came into the hands of the Ptole¬ mies. In 197 it was restored to Athens by the intervention of the Romans; and half a century later became subject to Rome. The island was the birthplace of Archilochus. Pop. about

10,000.

PAROTID GLAND. See Salivary

Glands.

PARQUETRY, ornamental inlaid wood¬ work, generally used for floors. Sometimes, however, wainscots, walls and even ceilings are paneled in parquetry. The designs are geo¬ metric patterns executed in differently tinted woods. Parquet flooring had long been in use in France but it became popular in the reign of Louis XIII. The rectangular designs used in parquetry are much larger than those used in marquetry (q.v.).

PARR, Catherine, English queen, sixth wife of Henry VIII : b. 1512; d. Sudeley Castle, 5 Sept. 1548. The daughter of Sir Thomas Parr, master of wards and controller to Henry VIII's household, she was well educated, and thanks to her wealth was married when a mere girl to Edward Borough, then to John Neville, Baron Latimer, who died in 1542; and, though apparently engaged to Sir Thomas Seymour, brother to Lady Tane, 12 July 1543, became the wife of Henry VIII. To her step-children, and not only to the young Edward VI, the heir ap¬ parent, to whom she may have been tutor, but to Mary and Elizabeth, who had been declared illegitimate and who, because of her influence, were restored to their rank as princesses, she showed tender love and great kindness. To her influence was due much o*f the love of

learning later shown by Elizabeth. She also did much to mitigate the severity of the six articles and to restrain Henry VIII from exces¬ sive cruelty against the recusants. The story that her life was endangered by a plot accusing her of heresy and that she assured the king that in matters of religion she had never argued with him nor objected to his remarks save to profit by his wisdom, thus saving herself and bringing discredit on the lord chancellor and her other enemies, may not be wholly free from additions and changes at the hands of Foxe, who tells it, but it is none the less charac¬ teristic. During the absence of the king at the siege of Boulogne she acted as regent (1544). A few months after the king's death Catherine married Sir Thomas Seymour, probably in April 1547. She died in September of the next year, a month after bearing him a daughter. Her purity, grace and learning made her a very attractive figure. She showed herself strongly interested in the universities and wrote several devotional works.

PARR, Louisa Taylor, English novelist: b. London, about 1848; d. November 1903. Her earlier years were spent in Cornwall, and in 1869 she was married to a physician and made her home in Kensington. Among her novels are (How it all Happened) (1868) ; (Dorothy Fox) (1870); <The Prescotts> (1874); (Gosau Smithy) (1875) ; (Adam and Eve) (1880) ; <Robin) (1884); (Loyalty George) (1888); <Dumps) (1891) ; (The Squire) (1892) ; <Can this be Love> (1896) ; (The Follies of Fashion. >

PARR, Samuel, English classical scholar and clergyman: b. Harrow, Middlesex, 26 Jan. 1747; d. Hatton, Warwickshire, 6 March 1825. After two years at Cambridge University he became an assistant master at Harrow School, and in 1776 head master of Colchester School. Taking orders in the Established Church he be¬ came perpetual curate of Hatton, and in 1820 was appointed to a prebend's stall in Saint Paul's Cathedral. He possessed a wonderful memory, was a brilliant talker and esteemed a weighty scholar, but his reputation does not seem justified by his writings, which with a memoir by John Stone appeared in eight vol¬ umes in 1828. Consult also Field, (Memoirs of Dr. Parr> (1828) ; De Quincey, <Dr. Samuel Parr on Whiggism in its Relations to Litera¬ ture.)

PARR, Thomas, or OLD PARR, English

centenarian, supposed to have lived to be 152 years old: b. according to tradition, 1483; d. London, 14 Nov. 1635. His home was Winning-ton, near Shrewsbury; there he entered service in 1500, was married in 1563, and in 1588 (at 105) did penance in the church of Alberbury for incontinence. He married again in 1605, and in 1635 was sent as a

<(piece of antiquity® to court by the Earl of Arundel. The change of air killed the old man. It is more than du¬ bious that .the tradition as to Parr's age is cor¬ rect. The story in its popular form is given in John Taylor's (The Olde, Olde, Very Olde Man) (1635). Consult Fortnightly Review (London April 1869), (Sir G. C. Lewis and Longevity. 5

PARRAL, par-ral', HIDALGO DEL PARRAL, or SAN JOS£ DE PARRAL,

Mexico, city of the state of Chihuahua, a little

more than 120 miles southeast of Chihuahua. Its wealth is in its silver mines, which have been worked for years and are now run by American capital; the old mines, Jesus Maria, Mina, Prieta and Tajo, are in the centre of the city; seven miles northeast of Parral is Minas Nuevas. There are ore-crushing machines in the city. Parral is also famous for its aguardiente and other vinous products. Pop. about 15,000.

PARRAMATTA, par-a-mat'a, or PARA¬ MATTA, New South Wales, Australia, a city of Cumberland County, on the Parramatta River, 14 miles (by rail) northwest of Sydney. It lies west of Port Jackson; has broad streets, detached houses, street railways, a beautiful park and a large orphan asylum. It is the site of Sydney reservoir; is itself a railroad centre; and is connected with Sydney by rail and by steamer. Only the Sydney settlement is older than that at Rosehill, as Parramatta was first called. It was the first shipping port for Aus¬ tralian grain, and the surrounding country is now full of orange groves and orchards. There are woolen manufactures, salt works and cop¬ per-smelting furnaces near the city. Pop. about 15,000.

PARRAS DE LA FUENTE, par'ras da la fwan'ta, Mexico, city of the state of Coahuila, 83 miles west of Saltillo and 34 mil'es east of the salt lagoon ot Parras. It is about 1,800 feet above sea-level in a fertile district growing or¬ chard fruits, grapes and cotton, and with silver mines near. The principal industries are the manufacture of wines and

brandies, some cot¬ ton-spinning and silver refining. Pop. about

25,000.

PARRHASIUS, pa-ra'shi-us, Greek painter: b. Ephesus, 4th century b.c. ; d. about 388. Ac¬ cording to the account of Seneca he purchased an old man as a slave and employed him as a model for his Prometheus, torturing him in such a way as to obtain a vivid representation of the bound and agonizing Titan. With Zeuxis he was one of the leaders of the Ionian school of painting. He painted (Ajax Wrestling With Ulysses for the Arms of Achilles.-* His artis¬ tic contest with Zeuxis is famous. The picture of the latter, it was said, attracted the birds to peck at the painted fruit, while Zeuxis himself was deceived by the representation of a curtain which Parrhasius depicted upon the wall with such exact truthfulness as ito give the impression that it concealed a picture. He was credited with having been the first great master of cor¬ rect drawing and the management of light and shade to convey rotundity. He dealt chiefly with mythological subjects.. He was remark¬ able for purity of tone in painting and exquisite modeling of forms. None of hrs work sur¬ vives ; and it is known only through the descrip¬ tions and criticisms of it given in classical writ¬ ers. Yet it long survived as models and a source of inspiration for Greek artists. Consult Xenophon, (Memorabilia> III, 10.

PARRICIDE, (1) the murder of either parent. (2) The murder of any ascendant or person entitled to reverence. By Roman law the term included the murder of either parent, a brother or sister or any child. By Scots law it includes only parents or grandparents. By French law it includes any legitimate ancestor, and is treated with great severity, as it is by The

laws of many other European countries. In the United States and England the punishment is the same as for an ordinary murder. (3) The person who commits such a crime.

PARRIS, par'is, Samuel, American clergy¬ man : b. London, England, 1653; d. Sudbury, Mass., 27 Feb. 1720. He studied at Harvard, was in commerce at Boston, but subsequently was ordained, and in 1689-96 was first minister of Danvers, then part of Salem. He started the Salem witchcraft delusion in 1692 by beat¬ ing Tituba, a South American slave of his, until she confessed herself a witch. The notion spread,

and during the 16 months of its preva¬ lence, 17 persons were put to death. In these cases Parris was active for the prosecution. Charges were brought against him by his parish in 1693, and though he admitted his error, he was dismissed in 1696. He afterward preached in Stow and Concord, and for six months in 1711 at Dunstable. Consult Fowler, (Life and Character of Rev. Samuel Parris* (1857).

PARRISH, par'ish, Edward, American pharmacist: b. Philadelphia, 31 May 1822; d. Fort Sill, Indian Territory, 9 Sept. 1872. He was graduated at the Philadelphia College of Pharmacy in 1842 and engaged in practice in Philadelphia.. In 1864 he became professor of materia medica at the College of Pharmacy, and from 1867 until his death he occupied the chair of practical pharmacy. He was actively associated with the founding of Swarthmore College and was its first president, in 1868-TO. He was a member of the committee of revision of the United States Pharmacopoeia in 1850 and in 1860; was one of the original members of the American Pharmaceutical Association, serv¬ ing as its president in 1868. He died of fever while acting as United States peace commis¬ sioner to the Indians. He wrote (An Introduc¬ tion to Practical Pharmacy* (1856) ; (The Phantom Bouquet> (1863) ; (As Essay on Edu¬ cation * (1866).

PARRISH, Maxfield, American ˆ artist and mural decorator: b. Philadelphia, 25 July 1870. He studied at the Pennsylvania Academy of Fine Arts and was later a pupil of Howard Pyle. Haverford College gave him the LL.D. degree. As an illustrator, he is well known for his posters and magazine covers. He designs in flat tints, strong and delicate outline, and elabo¬ rately detailed ground, or background. He has illustrated (Mother Goose in Prose* ; Washing¬ ton Irving's Knickerbocker's History of New York) ; Kenneth Grahame's (Dream Days* and (Golden Age* ; (The Arabian Nights* ; (Eugene Field's (Poems of Childhood* ; and other humorous works with signal success. The (Bulletin Board* is among the best known of his paintings, and his principal mural decora¬ tions are in the possession of James J. Storrow, Boston; Mrs. Harry Payne Whitney, Westbury, L. I., and Hotel "Knickerbocker, New York; Hotel Sherman, Chicago; Palace Hotel, San Francisco. Curtis Publishing Company, of Philadelphia have 16 of his panels. He is a member of ' the Society of American Artists, National Academy of Design, honorary member of Philadelphia Water Color Club.

PARRISH, Stephen, landscape painter and etcher: b. Philadelphia, 9 July 1846. He first exhibited in the Pennsylvania Academy (1878)

and 1879 in the New York National Academy. Since then he has produced a series of land¬ scapes, usually large canvases, showing much power of expression and poetic feeling. Among these may be mentioned (The Road to Perry's Peak, } (Low Tide,* <Evening) and others, ex¬ hibited in New York, Boston and other Ameri¬ can cities, London, Liverpool, Munich, Paris, Vienna and Dresden. One of the foremost American etchers, especially notable is his treatment of American coast scenery, as in the series (Cape Ann to Marble Head.* The sub¬ jects of his earlier work were mostly taken from the New England coast and harbors, and in later years from the Connecticut Valley.

PARROT, the name applied generally to birds of the very strongly marked order Psittaci, the members of which are distinguished by the large size and arched form of the upper mandi¬ ble, which terminates in an acute point over¬ hanging the shorter lower mandible. The upper mandible is freely hinged to the skull and its sides are frequently serrated or cut into teeth¬ like processes. The nostrils are situated in the cere, at the base of the mandible. By the re¬ version of the fourth or outer one the toes are paired a disposition fitting the feet admirably for climbing. The two front toes are united at their bases by membrane, the hinder toes being free; and the adaptation of the feet is com¬ pleted by the short stout tarsi, covered with rough granulated scales. The bill also aids these birds greatly in their peculiar mode of locomotion among the tree tops. The wings are of moderate size; but the tail may be short or elongated, and in some instances assists in climbing. Unlike that of most other birds the tongue is soft and fleshy throughout and serves with the upper mandible as a prehensile organ. In some species it is bushy or fringed. Par¬ rots abound in the warm and tropical regions of the world, but rarely extend into the Tem¬ perate zone except in the Australian region-. There distribution presents many remarkable features : thus, while none occur in the Philip¬ pine Islands, species are extremely numerous in the Celebes, Solomons and intervening groups. They are particularly abundant in Central and South America and their fossil remains are found within the Arctic circle. The food ordi¬ narily consists of seeds, fruits, buds and flow¬ ers, but rarely of tubers or even insects. These birds break

open the hard husks of nuts, etc., by aid of their beaks, with great ease and dexterity. They are slow and clumsy walkers, but good climbers and strong fliers. Parrots are monogamous in habits and are said to mate for life. . Their nests are generally con¬ structed in the holes of trees, occasionally in earth banks. At other than the breeding season they are gregarious and, with rare ex¬ ceptions, arboreal. The classification of the parrots is by no means settled; but nicest re¬ cent schemes do not depart widely from that proposed by Count Salvadori, who divides them into six families, of which the Psittacidce or true parrots is subdivided into six subfamilies and comprises, in its 56 genera and about 400 species, the bulk of the order, among them the macaws (q.v.) and parrakeets. The other families are the Cacatuidce or cockatoos (q.v.), with 6 genera and 30 species; the Loriidce or lories, with 14 genera and 85 species, found

chiefly in Australian regions and the Moluccan groups, the Cy clo psittacidce , with 2 genera and 18 species, of the same region, the String opidce, containing only the remarkable nocturnal and terrestrial owl-parrot or kakapos of New Zealand, and the Nestoridce, formerly of six species, but three are now extinct, another equally remarkable New Zealand parrot, one variety (N . Kea) of which has acquired the unique habit of killing sheep for the purpose of feeding upon their kidney fat.

Of all this great assemblage of about 560 species of parrots the vast majority inhabit the Australian and Malayan region and South America; Europe has none and the United States only two, both probably doomed to early extinction. The Carolina paroquet or parrakeet (Conurus carolinensis) formerly ranged throughout the coastal plain from Virginia to Florida. A few colonies remain in the neigh¬ borhood of Lake Ocheechosee in the latter State. The other variety known as the Louisi¬ ana paroquet (C. C. Ludovicianns) formerly ranged the Mississippi Valley to the southern shores of Lake Erie, and west to Oklahoma. It is now found only in southwestern Arkansas and northwestern Louisiana. The Carolina paroquet has its head and ireck vellow, with orange shadings, the shoulders and thighs orange and the rest of the plumage dazzling green. The Louisiana variety is bluish or pea¬ cock green and is somewhat larger in size. These birds were formerly gregarious and roamed irregularly in large flocks which sub¬ sisted on fruits, nuts and grains. During the breeding season it was likewise colonial and laid its roughish, white elliptical eggs in hollow trees. These species are not true parrakeets, but stand between the macaws and true parrots. Another species

found in the United States along the Mexican border is the Thick-billed parrot (Rhynchopsitta pachyrhyncha) , a Mexi¬ can species, occurring in considerable numbers sometimes in Arizona.

Many exotic species of parrots are exhibited in zoological gardens or by bird fanciers, some of the best known of which may be mentioned. The gray parrot (Psittacus erythacus) of west¬ ern Africa is the form which acquires the power of talking in ereatest degree. The ex¬ tent to which these birds can imitate the vari¬ ous tones of the human voice is astonishing and is one of the most remarkaible instances of readiness to acquire an accomplishment of no -utility to themselves known among the lower animals. These parrots grow exceedingly docile, and may live to a great age, instances being on record of birds attaining an age of 70 or more years. Of almost equal repute as a «talker» is the Mexican double yellow-head (Amazona oratrix).

American species of parrots number 190. Of them all the macaws (Anodorhynchus) are the largest. The great Blue macaw is three feet in length and is found most abundantly in Paraguay and Brazil. The Blue-and-Yellow macaw is 30. inches in length, and is adorned also with hues of orange and olive-green. The Red-and-Blue macaw is the most -brilliant of all, scarlet red above and underneath, with a blue-black and bright yellow shoulders. It has a wide range from Mexico to the valley of the Amazon. The Green parrakeet of Argentina

PARROTS, PARRAKEETS AND MACAWS

. Purple Capped Lory. 2. Leadbetter’s Cockatoo. 3. Red and Blue Macaw. 4. Ring Necked Parralceet. 5. Kakapo. 6. Blue-Crowned Hanging Parrot. 7. Rosy-Faced Love-bird.

8. Common Gray Talking Parrot. 9. Rosella Parrakeet. 10. Grass Parrakeet, or Budgerigar.

PARROT-FISHES

(Myopsitta monachus) is abundant, ranging southward to Patagonia. Of the narrotlets, or so-called ˆLove-Birds,® there are 14 American species in the territory from Mexico to Brazil. The green parrots are American in their dis¬ tribution, a familiar form being the Amazonian Blunt-tailed parrot (Chrysotis amazonicus) . This bird is colored a bright green, and pos¬ sesses a blue strip across the forehead; while the cheeks, tips of the wings and throat may be colored red or yellow. It chiefly inhabits the Orinoco territory, but extends southward on the continent. Some 45 species of this par¬ rot are found throughout tropical America. The lories (Loriida ?) possess a bill of more slender form than the preceding species, with a wavy or sinuous margin. The plumage is brilliantly colored, mostly crimson and green ; and in some cases it has been proved that the females are red and the males of the same species green, although the red and green lories were for¬ merly considered to be generically distinct. Some of the species are remarkable among parrots because of the elongation of the papillae of the tongue into brushes of filaments, on which account they are styled brush-tongued parrots. They feed largely on the nectar of flowers. The lories are particularly character¬ istic of the Moluccas and New Guinea, where many of them are the most richly colored of all birds.

The parrakeets constitute the largest sub¬ family {Paicc ornithine?) of the Psittacidcc; and are characterized by the generally small size of the body and of the beak, the upper mandible being also less convex or arched than in the true parrots. The tail-feathers are very long and form graceful and trim. The islands of the Eastern Archipelago form the chief habitat of these birds, but species also occur in India, Cochin China, Ceylon and Australia. Among the most familiar forms included in this sub¬ family are the Rose-ringed and Alexandrine parrakeets. The former (Palccornis torquata) is found in India and also on the eastern coasts of Africa. It averages 15 inches in length, the tail making up nearly two-thirds of tl is. The body-color is a bright green, the specific name being derived from the presence of a pink circle around the neck. The Alexandrine parrakeet (P. alexandri) of India is a nearly-allied species. These birds may be taught to speak with distinctness. From three to four eggs are produced, the nest being situated in holes of trees and similar places.

The ground parrakeets of Australia are so named from their terrestrial habits, these forms never perching on trees, but inhabiting flat grounds, and living in plains or among the reeds and grass swamps. They generally live in solitary pairs. The nest is of simple con¬ struction and situated on the ground. The com¬ mon ground parrakeet

of Australia (Pezoporus terrestris) possesses a green and black plum¬ age, the tail being similarly colored, and the body-feathers having each a band of dark-brown hue. It measures about 12 inches in length, inclusive of the tail The grass par¬ rakeets of Australia, of which the common cage-bird, the small warbling parrakeet (Melop - sittacus undulatus) is a good example, are also to a great extent terrestrial in habits. They inhabit the central flat lands of Australia and feed on the seeds of the grasses covering the

plains. They perch on the eucalypti or other trees during the day, and the eggs are deposited in the hollows of the trees. The English name of the species above mentioned is derived from the warbling notes they emit — a sort of song differing widely from the general coarse screech of the parrot tribe. The genus Neo-phema also includes several representative forms of Australian grass parrakeets. Among other interesting forms of these peculiar birds are the Pygmy parrots, tiny forms scarcely three inches in length, inhabiting the Papuan Islands, and the Bat parrots (Loriculus) of Australia, so-called because of their bat-like habit of hanging head downward. They not only sleep in this position, but often hang thus in groups, caressing and feeding one another. Of the true ˆLove-birds® (Agapornis) there are nine species, the best known being the Rosy-faced species.

Parrots take very naturally to domestication, and in their native countries many species fre¬ quent human habitations or have even become more or less completely domesticated. During the luxury-loving period of the Roman Empire the African species were first brought to Europe as pets or food, and since then fully three-fourths of the known species have been exhibited in Europe and America. The favor¬ ite cage birds are the talking gray and green parrots of Africa and South America, respec¬ tively. They are readily taken by means of snares or bird lime and decoys, or the young are taken from the nest and raised by hand. Some of the smaller species breed readily in confinement. The chief requisites to success in keeping them are plenty of good fresh food, both dry and succulent, cleanliness and oppor¬ tunity for exercise.

Consult Greene, W. T., (Parrots in Captiv¬ ity* (3 vols., London 1884-87), and (Parrakeets: their Breeding and Management (London 1898) ; Knowlton, F. H., (Birds of the World) (New York 1909) ; Page, C. N., (Parrots and Other Talking Birds* (Des Moines 1906) ; Ridgway, R., (The Birds of North and Middle America) (Bulletin No. 50, United States Na¬ tional Museum, Washington 1916).

PARROT-FISHES, fishes of the large marine family Scaridce, allied to the wrasses. The body in this family is oblong, with the back arched, dorsal fin long and low, tail short, square and powerful, scales large and round and head terminating in a parrot-like beak, con¬ taining numerous small teeth fused into a single mass. These fishes are mainly tropical, herbiv¬ orous, usually of brilliant coloration and of little value, in the estimation of North Ameri¬ cans, for either food or game. The smaller ones usually lurk about weedy shores, hiding and feeding among the algae ; larger species are to be found about coral reefs. In Hawaii several species are regarded as excellent to be eaten raw, and are caught regularly by native fisher¬ men ; and others are daily trapped and brought to market in the West Indies, especially about Porto Rico, where they go under the general name of oros. The best known, probably, is the turquoise blue parrot-fish or ((tumble rose® {Scams cceruleus). which sometimes weighs 15 or 20 pounds, and is caught from Virginia to Brazil. Another common and important one on the Florida coast and throughout the West In-346

dies is the guacamaia (Pseudo-scarus guacamaia), which is usually about two feet in length. Consult Jordan, J. D., (A Guide to the Study of Fishes) (New York 1905).

PARROTT, par'ot, Robert Parker, Ameri¬ can inventor and ordnance expert : b. Lee, N. H., 5 Oct. 1804; d. Cold Spring, N. Y, 24 Dec. 1877. He was graduated at the United States Military Academy in 1824, for the next five years taught natural and experimental science there, saw active service against the Creeks in 1836 and in the same year became captain of ordnance and a member of the Ord¬ nance Bureau in Washington. He resigned his commission immediately after to become super¬ intendent of the West Point Iron and Cannon Foundry at Cold Springs, N. Y. Utilizing the process of hollow casting and cooling patented by General Rodman and using shrunk hoops of wrought iron he perfected the cannon called by his name which showed such wonderful dur¬ ability in the Civil .War, during which his deal¬ ings with the Federal government were marked by rare lack of greed and an evident unwilling¬ ness to take personal advantage of the needs of the army. He severed his connection with the Cold Spring Foundry in 1867.

PARROTT RIFLE. See Ordnance.

PARRSBORO, parz'bur-o, Nova Scotia, seaport town, port entry and county-seat of Cum¬ berland County, situated on a strait connecting Minas Basin with the Bay of Fundy, 23 miles southwest of Athol, on the Cumberland Railway and the Coal Company Railway. There is a considerable trade in coal and lumber and there are saw, grist mills and a shipbuilding yard. The town has modern waterworks and an elec¬ tric-lighting plant. Pop. 2,856.

PARRY, par'!, Charles Christopher, Amer-can botanist : b. Admington, Gloucestershire, England, 25 Aug. 1823 ; d. Davenport, Iowa, 20 Feb. 1890. He came to the United States with his parents in 1832 and was educated at Union College and at Columbia University, taking his degree in medicine. He engaged in practice at Davenport, Iowa, in 1846, but in 1849 became assistant surgeon to the Mexican Boundary Survey and afterward devoted himself to scien¬ tific researches. He traveled extensively through the southwestern and western portions of the United States studying the flora of the country and in 1867 he became botanist for the Pacific Railroad survey. He was botanist of the United States Department of Agriculture in 1869-71, and arranged the botanical collections of the Smithsonian Institution. He was afterward bot¬ anist to commissions of inquiry in San Domingo and remote regions of Mexico. He gathered a collection of more than 18,000 botanical speci¬ mens; discovered hundreds of species, of which more than 50 bear his name; and acquired an international reputation. Author of (Botanical Observations in Western Wyoming5 (1874) ;

(Revision of the United States Pacific Coast Species of Arctostaphylos5 (1883) ; (The North American Genus Ceanothus5 (1888), *etc.*

PARRY, Sir Charles Hubert Hastings,

English composer: b. Bournemouth 27 Feb. 1848; d. near Worthing, 7 Oct. 1918. Educated at Eton, Oxford and Stuttgart, he became an underwriter at Lloyd's in 1871, where he suf¬ fered serious financial losses that ended his busi¬

ness career in three years. He then devoted him¬ self to composition and gradually worked his way to the front rank of English masters. His (Scenes from Prometheus Unbound5 was per¬ formed in 1880 and the

(First Symphony5 in 1882. A more ambitious work, the oratorio (Judith,5 was produced in Birmingham in 1888, the first example of a type peculiarly his own. A remarkable series of sacred and secular can¬ tatas followed, but his purely orchestral works, excepting the (Symphonic Variations5 (1897), were less successful than his works for chorus and orchestra. Among his distinctive choral compositions are Milton's (L' Allegro ed il Pen-seroso,5 the song from Tennyson's (Lotos Eat¬ ers5 and the psalm (De Profundis.5 A series of short cantatas issued from 1903, including (Voces Clamantium,5 (The Soul's Ransom5 and (Beyond these Voices,5 based on Biblical epi¬ sodes. He wrote (The Evolution of the Art of Music5 and (The 17th Century5 for (The Oxford History of Music5 and various lectures delivered as professor of music at Oxford.

PARRY, Sir William Edward, English navigator: b. Bath, England, 19 Dec. 1790; d. Ems, Germany, 8 July 1855. He entered the navy in 1803 and was lieutenant on the Alex¬ andria, a frigate employed in protecting the whalers of Spitzbergen (1811-13). In 1818 he joined the Arctic expedition of Sir John Ross, as second in command. The venture proving unsuccessful, Parry was given command of an expedition in 1819, and with the Hecla and Griper succeeded in reaching long. 114° W., earning thereby the £5,000 reward offered by Parliament to the ship which should first reach that point. On this expedition he entered Baffin Bay and discovered Barrow Strait, Prince Regent Inlet, Melville Sound, Banks Strait and Wellington Channel. He wintered at Mel¬ ville Island and returned to England the fol¬ lowing year. In a second expedition to the Arctic regions (1821-23) he spent two winters on the east coast of Melville Peninsula wait¬ ing for the breaking up of the ice, which did not take place, and in studying the Eskimos and collecting scientific data. A third Arctic ex¬ pedition resulted in the wrecking of the Fury at Prince Regent Inlet. In 1827, with the con¬ sent to the Admiralty, Parry attempted to reach the North Pole by Spitzbergen. Leaving the Hecla at Turenberg Bay, he started for the pole in two steel boats fitted with steel runners, to be used as sleighs on the ice. The party, which consisted of 28 men, had provisions for 70 days. It gained a point farther north than any then reached (82° 45'), the farthest north reached for 48 years. Parry was knighted in 1829, made admiral in 1852 and in 1853 was ap¬ pointed lieutenant and deputy governor at the Greenwich Hospital. He wrote (Voyages for the Northwest Passage5 (1821) ; 'Narrative of an Attempt to Reach the North Pole in Boats5 (1827). Consult Parry, Edward, 'Memoirs of Admiral Sir W. E. Parry5 (London 1857).

PARRY ISLANDS, Canada, an Arctic archipelago*of Franklin territory, north of Mel¬ ville Sound, Barrow Strait and Lancaster Sound. The

principal islands are Bathurst, Cornwallis, North Devon, Melville and Prince Patrick, all of which have no permanent settlements. Parry (q.v.) in 1819 wintered on Melville Island and the islands and sur-

rounding region were thoroughly explored dur¬ ing the Franklin Research expeditions. They are bleak and inhospitable; the coasts precipi¬ tous and rocky, and glaciers cover the interior.

PARSEES, par'sez (((Parsis,® people of ancient Persia), the small remnant of the fol¬ lowers of the ancient Persian religion of Zoroaster (Zarathustra or Zerdusht). The re¬ lation in which Zoroaster stood to the Iranian faith has been much discussed ; his existence has even been denied ; and it is difficult to state clearly the original principles of the Zoroastrian faith. (See Zoroaster; Avesta; Zend). At first the doctrine was monotheism; and Zoro¬ aster taught the existence of but one deity; the Ahura-Mazdao (Ormuzd), the creator to whom all good things, spiritual and material, belong. But his speculative philosophy was a dualism. The two sides of Ahura-Mazdao and Angro-Mainyush (Ahriman), who represented Good and Evil, God and the Devil, and Parseeism be¬ came a characteristic dualism.

The Zoroastrian creed flourished up to the time of Alexander the Great, but rapidly de¬ clined under his successors. Ardashir (Artaxerxes) (212 a.d.), a native Persian, attempted the restoration of the partly lost, partly for¬ gotten books of Zoroaster, which he effected through the inspiration of a Magian sage, chosen out of 40,000 Magi. The sacred volumes were translated into the vernacular and distributed, and fire-temples were built throughout the length and breadth of the land. The Magi or priests were all-powerful and hated Greek civili¬ zation. (<Far too long,® wrote the king, t(for more than 500 years, has the poison of Aristotle spread.® The Jews have left us some account of the oppression to which they as unbelievers were

exposed in Persia. In return the Magi were hated by the Jews. From the period of its re-establishment the Zoroastrian religion flour¬ ished till, in 651 a.d., the Persian army under Yezdegird was routed by the caliph Omar. The Zoroastrian population was converted to the Mohammedan faith ; the remnant that would not apostatize were subjected to severe oppression and persecution. Several thousand <(Guebres® are still found in Persia, mainly in Yezd, Ker¬ man and at Teheran. Others found a home on the west coast of India, chiefly at Bombay, Surai, Ahmedabad, where they now live under English rule and form one of the most re¬ spectable and thriving sections of the commu¬ nity, to the number of over 100,000. Parsee traders have also settled at Calcutta, Madras, Aden, Zanzibar, in Burma and in China, where they bear equally with their poorer brethren in Persia the highest character. Their general ap¬ pearance is prepossessing, and many of their women are beautiful. They conform to the laws of the country they inhabit; and its language is also theirs, except in the ritual of their religion, when Zend is used by the priests as laity. They value highly an English education, and not a few have studied law in England. Conspicuous among Parsee merchant-princes was Sir Jamset-jee Jejeebhoy. In 1891 there were 89,994 Parsees in India, 60 per cent of them in Bombay.

Parsees eat nothing cooked by a person of another religion; and touch neither beef nor pork. Marriages can only be contracted with persons of their own caste and creed. Polyg¬ amy, except after divorce, is forbidden. Per¬

sons convicted of unchastity are put to death. Their dead are not buried, but exposed on an iron grating in the Dakhma, or Tower of Silence.

Ahura-Mazdao being the origin of light, his symbol is the sun, the moon, the planets and fire. Temples and altars must be fed with the holy fire, brought down from heaven and the contamination of whose flame is punishable with death. The priests themselves approach it only wdth veiled face, and only touch it with sacred instruments. Parsees never consider fire and light as anything but emblems of divinity. Their ethical code may be summed up in the three words — purity of thought, of word and of deed.

Consult Bharucha, (Zoroastrian Religion and Customs > (1893) ; Haug, (Essays on the Sacred Language, Writings and Religion of the Parsees) (2d ed., by West, 1878) ; (Dosab-hai Framji Karaka, C. S. I.,

(History of the Parsis) (2 vols., 1884) ; Hovelacque, (L' Avesta, Zoroastre, et el Mazdeisme) (1880) ; Jackson, A. V. W., (Persia Past and Present* (New York 1906) ; Menant, Delphine, (Les Parsis > (Paris 1898) ; Modi, J. J., (The Religious Sys¬ tem of the Parsis* (Chicago 1893) ; (Early His¬ tory of the Parsis) (Bombay 1905).

PARSIFAL, par'se-fal, name of an opera by Richard Wagner. The fable of the drama is founded on an episode in the Arthurian cycle, which Wolfram von Eschenbach put into metri¬ cal form in his Perceval, and the pursuit of the Holy Grail, and this appears to have been the source of Wagner's inspiration. The com¬ poser took three years to complete his work, finishing the outline of his music scheme in 1879 and the orchestration in 1882, the year in which the opera was first performed at Baireuth. He places the scene at Monsalvat, Spain, in the Castle of the Holy Grail. Klingsor, the malignant magician, has thrown his spell over Amfortas, formerly a Knight of the Holy Grail, who has been wounded by the Holy Spear, which he has been dispossessed of by the sor¬ cerer. Klingsor hopes to gain control of the knights through the lovely Kundry, who will seduce them to break their vow of chastity. Parsifal is cast out from the castle by the knights because of his indifference to the Holy Grail, which they adore. But he is impenetrable to the spells of Klingsor and the charms of Kundry, and finally recovers the Holy Spear from the magician. He has been brought to a sense of the Holy Grail's significance and im¬ portance and starts out in search of it. He is eventually crowned king by the Knights of the Holy Grail. ' Kundry repents and dies after baptism in hope and peace ; while the wound of Amfortas, which no salve has been able to close, is healed by contact with the Holy Spear. <Parsifal) was first produced in the United States in December 1903, in New York City. See Wagner, Richard.

PARSIS. See Parsees.

PARSLEY, a biennial herb (Carum peiro-selinum) of the order Umbelliferce. During its early stages the leaves are arranged in a rosette and rarely rise more than six inches above the ground, but when in flower the plant may be three feet tall. It bears pinnate leaves divided and subdivided in threes, and in cultivated vari¬ eties greatly divided. It is a native of southern

Europe, where it has been cultivated for cen¬ turies as a ((sweet herb® and whence it has been carried to civilized countries throughout the world. In some regions it has become natural¬ ized. Formerly it was employed in medicine, but now is used principally as a garnish or as a flavoring ingredient in soups, stews, dressings, etc., for which purpose the ˆmoss-curled® vari¬ eties are most popular. The <(fern-leaved® sorts are more dainty, and the <(plain® rather coarse. Hamburg parsley is a variety with large carrot¬ like roots, which are boiled and served like other roots or used for flavoring soups, stews, *etc.* The plant succeeds best in rich, light loam well supplied with nitrogenous plant-food. Since the seed is very slow to germinate, it should be soaked before planting and some radish seed planted with it to mark its position and thus permit of early cultivation. The plants are thinned to stand about six inches asunder in rows 18 inches apart and given clean cultiva¬ tion throughout the season. In the autumn the roots may be transplanted to the greenhouse or a window-box for a winter supply of leaves, or they may be left in the ground until spring, when they will furnish a supply. The frequent removal of the leaves and the cutting out of the flower-stalk when it first appears will extend the season of production until new plants are in bearing.

PARSLEY, Giant. See Cow-parsnip.

PARSNIP, a biennial herb (Pastinica saliva) of the family Ap-iacece. Its stout, grooved, hollow stem which rises from a rosette of radical odd-pinnate leaves, often grows more than four feet tall. The small yellow flowers are followed by disc-shaped fruits (((seeds®), which retain their vitality only one year. The plant is a native of western Asia and adjacent Europe, where it was cultivated before the Christian era, and whence it has been taken by man to all civilized countries in temperate cli¬ mates. In many places it has become a trouble¬ some weed in neglected fields, and as such it loses its thick root and may even become an annual. Its roots, which often attain a length of 18 inches and a diameter of three or four inches at the crown, are used as a vegetable and as food for livestock. The plants succeed best in deep, fairly rich, well-drained but moist loam, free from stones and other obstructions. The seed, being, slow to germinate, should be sown very early in the spring and some radish seeds sown with it. The radish plants which appear quickly will show the positions of the rows and thus permit early cultivation. They must be re¬ moved promptly when

the parsnip plants appear. The rows should be about 18 inches apart and the plants six inches asunder in the rows. Clean cultivation must be given until the plants shade the ground. Since the roots are improved by frost if left in the ground they need not be stored ; but if stored they must be kept moist to prevent their shriveling and thus becoming tough. In the spring the roots should be used before growth starts, because they quickly be¬ come acrid. There are a few short-rooted vari¬ eties which are adapted to shallow and' stony soils.

PARSON, in English law, the rector of a parish; also, in a general sense, one that has a cure of souls, a clergyman, or minister of the gospel. He is called parson (Latin persona),

because the Church is represented in his per¬ son. A parson in England has for life the freehold of the parsonage house, glebe, tithes and other ecclesiastical dues. The modes of be¬ coming parson involve four requisites, namely, the taking of holy orders, presentation, institu¬ tion and induction. The duties of a parson are principally ecclesiastical, such as carrying on di¬ vine service in the parish church, administering the sacraments, preaching, *etc.* A parson during his lifetime may lose his parochial preferment either by cession, in taking another living, by consecration ; on promotion to a bishopric, when all other preferments become void; by resigna¬ tion, but only when accepted by the bishop ; and lastly by legal deprivation, for heresy, infidelity, gross immorality or other causes.

PARSON-BIRD, or POfC-BIRD, a small

bird (Prosthemadera novce-zealandice) , one of the honey-eaters, a native of New Zealand and the islands of Australia. Its plumage is jet-•blaek, with metallic iridescence, except two prominent globular lappets of white feathers on each side of the throat, which look like the white lawn <(bands® of a Church of England clergyman. It has a fine song, great powers of mimicry for which it is popular as a cage bird. Its flight is embellished with somersaults and other remarkable antics.

PARSONS, par'sonz, Albert Ross, Amer¬ ican musician and archaeologist : b. Sandusky, Ohio, 16 Sept. 1847. He was educated in Buf¬ falo, N. Y., and Germany, 1867-72, and became prominent as a specialist in musical pedagogy and technics, and he has also devoted much study to archaeology. As a pianist and a com¬ poser of pianoforte music he gained considerable attention and he has acted as

a critic of music. He has lectured on Dante and other literary subjects, designed the symbolic pyramid mausoleum at Greenwood cemetery, and has written < Wagner's Beethoven) (1870) ; (Parsifal, or the Finding of Christ through Art1 ; (Science of Pianoforte Practice1 ; (The Secret of Wagner's Genius1 ; (New Light from the Great Pyramid1 (1893) ; (Cornet Joseph Parsons1 (1897); (The Road Map of the Stars1 (1911); (Surf Lines1 (1913); <Religion and Philosophy1 ; <The Virtuoso Handling of the Piano, Advanced Exercises1 (1917) ; (An Evening Prayer1 (poem, 1917).

PARSONS, Alfred William, English painter : b. Beckington, Somersetshire, 2 Dec. 1847. He has made his specialty water-color landscapes of English scenery, executed with great dash yet lightness of touch, accuracy of drawing and dazzling color. His pictures have been awarded medals at Paris (1889) ; Chicago 0893) and Munich (1893). He also designs in black and white, and in collaboration with E. A. Abbey (q.v.), has furnished illustrations for <01d Songs1 ; (A Quiet Life1 ; Herrick's poems, (She Stoops to Con¬ quer1 ; (Alone1 (from Wordsworth's Sonnets); the (Warwickshire Avon1 and (Notes on Japan1 (text* also by Parsons); (The Danube from the Black Sea to the Black Forest,1 and for Harper's Magazine and other publications. Among the most characteristic of his paintings are (When Nature Painted All Things Gay1 (1887), brought by the Chantrey bequest; and (A Mid-May Morning.1

PARSONS, Charles, American artist : b. Manchester, England, 8 May 1821 ; d. 1910. He was educated in New York; studied art at the National Academy; was elected an A. N. A. in 1860; worked as a lithographer 1838-61; and became director of the art department of Har¬ per and Bros., for whose publications he fur¬ nished many illustrations, and from whose em¬ ploy he retired in 1889. He won some repute as a landscape painter and exhibited at the Na¬ tional Academy and the exhibitions of the Water Color Society. His best known paintings are <Salem) (1876) ; <November) (1877) ; (Gravesend Bay> (1878) and (01d Orchard)

(1884).

PARSONS, Sir Charles Algernon, English inventor and shipbuilder: b. 13 June 1854. He was the fourth son of the Earl of Rosse and was educated at Saint John's College, Cambridge. He established the electrical and engineering works of C. A. Parsons and Company at Heaton, Newcastle-on-Tyne and the Parsons Marine Steam Turbine Company as well as electrical supply companies at Cambridge and Scarborough. He invented the Parsons Com¬ pound steam turbine, introduced in 1884 and later improved; non-skid chains for auto¬ mobiles ; the auxetogramophone and a geared turbine. He was elected to the Royal Society in 1898; was justice of the peace in North¬ umberland and was knighted in 1911. He de¬ livered the Rede Lecture for 1911, which he later published, (The Steam Turbine) (1912).

PARSONS, Charles Lathrop, American chemist: b. New Marlboro, Mass., 23 March 1867. He was graduated at Cornell University in 1888 and in 1890-1911 he was professor of chemistry at New Hampshire College. In 1911 he was appointed chief mineral chemist at the Bureau of Mines, Washington, D. C. His re¬ searches on the atomic weight of beryllium won for him the Nichols medal in 1904. He has contributed many scientific papers to chemical journals and government bulletins, and with Prof. A. J. Moses is author of (Mineralogy, Crystallography and Blowpipe Analysis) (1895— 1911) ; (Beryllium, Its Chemistry and Literature) (1908).

PARSONS, Frank, American lawyer and political economist: b. Mount Holly, N. J., 14 Nov. 1854; d. Boston, Mass., 26 Sept. 1908. He was graduated from Cornell in 1873; studied law and was admitted to the bar in Boston. He rewrote several law treatises, including Morse (On Banks and Banking,* Perry (On Trusts, > and May (On Insurance,* and in 1892 was appointed lecturer on law at Boston Uni¬ versity. He became known through his books and lectures as a student of political economy. From 1897 to 1900 he was professor of history and political science at Kansas Agricultural Col¬ lege, and in 1900 became professor of political science at Ruskin College, Trenton, Mo. He was dean of the university extension depart¬ ment there, and lectured for the University Ex¬ tension Association of Chicago. In 1901—02 he was an expert witness before the United States Industrial Commission on the public ownership of railroads, telephones and telegraphs. His publications include (The World's Best Books) (1892) ; (Our Country's Need) (1894) ; (The Drift of Our Time) (1898) ; (Rational Money*

(1899) ; (The New Political Economy* (1899) ;

‘The Power of the IdeaP (1899) ; (The Bondage of Cities) ; (The City for the People) (1900) ; (Direct Legislation (1900) ; (The Story of New Zealand) ; /The Heart of the Railway Problem) (1906) ; (The Railways, the Trusts and the People.* He was among the leaders of the progressive economists and an earnest advocate of the public ownership of monopolies.

PARSONS, Herbert, American politician: b. New York, 28 Oct. 1869, son of John Ed¬ ward Parsons (q.v.). He was educated at Yale, the University of Berlin, Harvard Law School and the Metropolis Law School, and was admitted to the bar in 1895. He was alderman in New York in 1900-03, and served in Congress in 1905-11. He was president of the Republican county committee in 1905-10 and was an effective worker for the nomina¬ tion and election of Charles E. Hughes for governor. He is senior member of the law firm of Parsons, Closson and Mcllvaine. In 1915 he was delegate-at-large at the New York State Constitutional Convention ; was appointed a member of the Republican National Commit¬ tee for 1916-20; and in 1917 was commissioned major in the Aviation Reserve Corps.

PARSONS, John Edward, American law¬ yer: b. New York, 24 Oct. 1829; d. 16 Jan. 1915. He was graduated at the University of New York in 1848 and was admitted to the bar in 1852. He engaged in practice in New York and gained a high reputation. In 1891— 1910 he was counsel for the American Sugar Refining Company, successfully defending the company’s interests in its trial under the Sher¬ man Act in the Supreme Court, and winning a favorable decision in January 1895. In the course of an investigation of alleged weight frauds in 1909 he, together with other officials of the company, was indicted. The trial re¬ sulted in a disagreement and was not retried. He was a director of the Metropolitan Trust Company, was actively interested-in the wel¬ fare of several hospitals and in the work of Cooper Union.

PARSONS, Lewis Baldwin, American sol¬ dier and lawyer : b. Genesee County, N. Y., 5 April 1818; d. Flora, III, 16 March 1907. He was graduated from Yale in 1840, from the Harvard Law School in 1844, and established a law practice in Alton, Ill, where he was city attorney in 1846-49. At the outbreak of the Civil War he entered the Union army as captain of volunteers, served through the war, with promotion, was chief of river and railroad transportation of the national armies and was retired in 1866* with the rank of brevet

briga¬ dier-general of volunteers. He afterward de¬ voted himself to law practice, and in 1895-98 was president of the Illinois Soldiers' and Sailors' Home.

PARSONS, or PERSONS, Robert, Eng¬ lish Jesuit and controversialist: b. Nether Stowey, Somerset, 24 June 1546; d. Rome, 15 April 1610. He was educated at Oxford, was elected fellow of Balliol in 1568, and in 1574 became its dean. In 1574 Parsons went to the Continent, and on his way to Italy stopped at Louvain, where he was probably received into the Roman Catholic Church, and at Rome entered upon his novitiate in the Society of Jesus (1575). In 1578 he was ordained priest

and made English penitentiary at the Vatican. With Edmund Campion (q.v.) and several secu¬ lar priests he arrived in England in 1573 under instructions from Aquaviva, general of the order, to aid the secular clergy and on no ac¬ count to discuss political questions. At that time the Jesuits were forbidden to set foot in England on pain of death ; and Parsons landed at Dover in a military disguise. He encour¬ aged the secular priests, then closely in hiding, converted many of the nobility and set up a secret press, which was transferred from place to place at his order, and printed controversial tracts, among them Parsons' (Brief Discourse) (1581) and Campion's well-known (Decem Rationes1 (1581). Campion was at last seized, but Parsons escaped to Normandy (1581). He continued, however, to devote his energies to the restoration of the Roman Catholic Church in England, and did everything possible to pro¬ mote the attempted invasion of England in 1588 by Philip II of Spain, which ended so disastrously in the defeat of the Armada. He used his influence with the Catholic courts of Europe to save Mary Queen of Scots. For a short time in 1588 he was rector of the Eng¬ lish College at Rome, and in 1582-92 estab¬ lished various schools and seminaries in France and Spain for English Catholics. From 1597 until his death he* was-rector of the English College and later was made prefect of the Jesuit mission. By virtue of this office, con¬ firmed to him in 1606, he* had direct control of all foreign

seminaries governed by the order. He was an indefatigable worker, an unrivaled controversialist, and a* writer the clearness and simplicity of whose English has been highly praised. • His (Book of Resolution, or the Christian Directory1* (1582, and subsequently enlarged) was often reprinted, and Dean Stan¬ hope prepared a Protestant edition of it (1700). Consult Foley, (Records of the English Prov¬ ince of the Society of Tesus) ; Gee, (The Jesuits' Memorial1 (1690) ; More, (Historia Provincise Anglicanae Societatis Jesu) (1660).

PARSONS, Samuel Holden, American soldier: b. Lyme, Conn., 14 May 1737; d. Big Beaver River, Ohio, 17 Nov. 1789. He was graduated from Harvard in 1756, admitted to the bar in 1759 and engaged in law practice at Lyme. For 18 years he was a member of the State assembly and is accredited with originat¬ ing the idea of a general colonial congress. At the outbreak of the American Revolution he was appointed colonel and stationed in Massa¬ chusetts. He planned the capture of Ticonderoga executed by Ethan Allen, and after the evacuation of Boston by the British was trans¬ ferred to New York, there he participated in the battles of Long Island, Harlem Heights and White Plains, and later served under Wash¬ ington in New Jersey. He was a member of the board which tried General Andre, and in that year was promoted major-general and succeeded to the command of General Putnam, which he held until the close of the war. After the war he resumed his law practice, was ap¬ pointed by Washington in 1789 the first judge of the Northwest Territory and took up his residence near Marietta, Ohio, where he was drowned in the Beaver River in the same year. Parsons has been accused of giving informa¬ tion to Sir Henry Clinton concerning the state

of the Federal armies, and letters are said to be in existence written by him to that general. A refutation of this charge was written by George B. Loring. Consult Hall, C. S., (Life and Let¬ ters of Samuel Holden Parsons > (Bingh'amton 1905) ; Loring, G. B., (A Vindication of General Parsons) (Salem 1888).

PARSONS, Theophilus, American jurist: b. Byfield, Mass., 24 Feb. 1750; d. Boston, Mass., 30 Oct. 1813. He was graduated from Har¬ vard in 1769, studied law, was admitted to the bar in 1774, and began practice in Falmouth, Me., but his prospects were interrupted by the almost total destruction of that place by the British in 1775. He then returned to Byfield, where he studied law for several years, and laid the foundation of the vast legal knowl¬ edge for which he was afterward distinguished. Settling in Newburyport he there established

a large practice, and taking an active interest in politics allied himself with the conservatives, who later became the Federalist party. He was, in 1778, a member of the ((Essex Junto,® which opposed the adoption of the State constitution approved by the legislature. The pamphlet en¬ titled (The Essex Result,) undoubtedly written by him and circulated widely throughout the State, did much toward the rejection of the constitution. He was a member of the conven¬ tion which, in 1779, framed the constitution ultimately adopted by Massachusetts, and he also served as a member of the convention which ratified the Federal Constitution in 1788. His attitude toward the latter was extremely favorable, and the ˆProposition® presented by John Hancock and usually credited to him was written by Parsons. After the adoption of the Constitution he took no further active part in politics, but devoted himself to his profession, and under his instruction John Quincy Adams (q.v.) gained a large share of the legal skill which afterward made him a national figure. In 1800 Parsons removed to Boston, and in 1806 was appointed chief justice of the State Su¬ preme Court, which office he oocupied until his death. As a lawyer and a justice he enjoyed an enviable reputation, standing at the head of his profession in his State. His decisions upon the laws governing real property, marine insur¬ ance and pleading were regarded as of highest value and he earnestly strove to lessen the de¬ lays of the law in bringing cases to trial. A collection of his decisions was published in 1836 under the title Commentaries on the Laws of the United States, by Theophilus Parsons, late Chief Justice of Massachusetts.1 Consult Knapp, S. L., (Biographical Sketches of Emi¬ nent Lawyers) (Boston 1821) ; memoir by his son, Theophilus Parsons (1859) ; Stone, E. F., Carsons and the Constitutional Convention1 (Salem 1899).

PARSONS, Theophilus, American author, son of Theophilus Parsons (q.v.) : b. New¬ buryport, Mass., 17 May 1797 ; d. Cambridge, Mass., 26 Jan. 1882. He was graduated in 1815 at Harvard,* where he became, in 1847, Dane professor of law. He founded the United States Literary Gazette and wrote much in support of Swedenborgian doctrines. He pub¬ lished a (Treatise on the Law of Contracts1 (1853) ; dements of Mercantile Law1 (1856) ; (Memoir of Chief Justice Parsons1 (1859); Caw of Partnership1 (1867); (Deus Homo1

(1867) ; ‘The Infinite and the Finite) (1872) ; and (The Rights of a Citizen of the United States >• (1875).

PARSONS, Thomas William, American poet: b. Boston, 18 Aug. 1819; d. Scituate, Mass., 3 Sept. 1892. He went to Europe at 17 and spent several years in Italy, where he de¬ voted himself to the study of Dante ; and on his return to Boston in 1843 he studied at the Har¬ vard Medical School, practised dentistry in Bos¬ ton and London and devoted the last 20 years of his life to literature. He wrote (Ghetto di Roma) (1854)’; (The Magnolia) (1867) ; (The Old House at Sudbury* (1870) ; ‘The Shadow of the Obelisk* (1872) ; and (Circum Praecor-dia* (1892), all poems of much lyric beauty, but too elevated in tone and thought to be pop¬ ular, his (Lines on a Bust of Dante) first printed in 1841 being the exception. Parsons is better known as the “poet® of Longfellow’s (Tales of a Wayside Inn,* and best as the author of a matchless version of parts of Dante’s (Divina Commedia,* namely the (Inferno) entire (1867), and much of the ‘Purgatorio,* with scanty fragments of the ‘Paradiso.* An edition of his poems appeared in 1893.

PARSONS, Usher, American surgeon: b. Alfred, Me., 8 Aug. 1788; d. Providence, R. I., 19 Dec. 1868. He studied medicine with Dr. John Warren in Boston and in 1812 entered the United States navy as surgeon’s mate. At the battle of Lake Erie he was acting sur¬ geon on the U.S.S. Lawrence and in recog¬ nition of his services was promoted full sur¬ geon. He afterward served under Perry on the frigate Java, and in 1820 he resigned and returned to private practice at Providence. He was professor of anatomy at Dartmouth Col¬ lege in 1820-22 ; and of anatomy and surgery at Brown in 1823-28. He was president of the Rhode Island Medical Society in 1837-39 and was the first vice-president of the American Medical Association in 1853. Author of (The Art of Making Anatomic Preparations) (1831) ;

(Sailors’ Physician* (1851) ; (The History of the Battle of Lake Erie* (1852), *etc.*

PARSONS, William Barclay, American civil engineer: b. New York, 13 April 1859. He was graduated from Columbia in 1879, and from the Columbia School of Mines in 1882. He at once entered the service of the Erie Railroad, resigning aftei a few years to take up general practice as consulting engineer. In 1894 he became chief engineer of

the Rapid Transit Commission of New York, and de¬ signed and carried out the underground railway there. He has been connected professionally with railroad construction in various parts of the world, especially in China. He was. a member of the Isthmian ‘Canal Commission (1904) and of the board of consulting engi¬ neers of Panama Canal (1905) ; and brigadier-general, chief of engineers of the State of New York, and has been trustee of Columbia University since 1897. Besides contributing to various periodicals and to the (Encyclopaedia Americana,* has published ‘Track* (1885) ; (Turnouts) (1885) ; (An American Engineer in China) (1900).

PARSONS, Kan., city in Labette County, on the Saint Louis and San Francisco and the Missouri, Kansas and Texas railways, about

125 miles in direct line south by east of Topeka. It was settled in the early ((settlement days® of Kansas, but was laid out and incorporated in 1871, and in 1873 was made a city of the second class. It is in a productive agricultural region and the commercial centre of quite an extent of territory. The chief industrial estab¬ lishments are grain elevators, creameries, flour and feed mills, foundry, agricultural imple¬ ments works, and railroad car, repair and ma¬ chine shops. The Missouri, Kansas and Texas Railroad has its general offices in this city. There are two parks, well-kept streets and good road’s leading into Parsons. The prominent buildings are the State Hospital for the Insane, the Masonic Temple, the Y. M. C. A. building, churches, schools and the Missouri, Kansas and Texas station and office building. The educa¬ tional institutions are the high school, public and parish elementary schools and a public library. Natural gas is in general use for light¬ ing and for fuel. Pop. (1920) 16,028.

PARSONS, Pa., borough in Luzerne County, two miles northeast of Wilkesbarre, on the Delaware and Hudson and the Central of New Jersey railroads. It is situated in a coal and oil region and1 manufactures tinware and silks. Pop. 5,638.

PARSON’S CAUSE, a famous case in Vir¬ ginian colonial history, growing out of acts passed by the house of burgesses in 1755 and 1758, whereby the salaries of the clergy, fixed at 16,000 pounds of tobacco, were made pay¬ able in currency, the price being fixed at the rate received for the tobacco in years of nor¬ mal crops. The original law, fixing the amount of tobacco to be paid the clergy by the planters was enacted in 1696 and was revised and re¬ enacted by the king in 1748. The acts of the house of burgesses, temporarily suspending pay¬

ment in tobacco, were due to shortage in crops and a consequently increased value which made the usual 16,000 pounds an exorbitant assess¬ ment. The act of 1755 passed without protest from the clergy; but in 1758 the matter was taken to the king and an order of council an¬ nulling the act of the house of burgesses was obtained. The act applied to all classes of debtors, but the case became known as the <(Parson's Cause® from the fact that the clergy were the only class of creditors to protest. The case was tried in the court of Hanover County, Va., 5 Nov. 1763, Col. John Henry presiding, and Patrick Henry, his son, appearing as counsel against the clergy. Patrick Henry's speech, denouncing the action of the king in breaking his compact with the people and over¬ riding the action of the legislature brought him into widespread public notice, marking the first of his impassioned appeals for the maintenance of the people's established rights under English law. His declaration that the king by his own conduct toward a legally enacted law from being the father of his people had degenerated into a tyrant and had forfeited all rights to his subjects' obedience to his order regarding that law was met with cries of ((Treason!®; but the jury returned a verdict of one penny dam¬ ages, although the court rendered a decision against the validity of the law. Consult Henry, W. H., 'Patrick Henry* (Vol. I, 1891); Tyler, M. G, (Patrick Henrv) (in the 'American Statesmen Series* (1887).

PARSONS COLLEGE

PARTHENOGENESIS

PARSONS COLLEGE, located at Fairfield, Iowa, established in 1875 under the con¬ trol of the Presbyterian Church. In 1855 Lewis B. Parsons of Buffalo, N. Y., bequeathed $37,000 to <(endow an institution of learning in the State of Iowa.® In 1874 the Presbyterian Synod of Iowa and the people of Fairfield donated $30,000 to a fund for the establishment of a college in that city, with the aid of the Parsons endowment. The work of the college is arranged in three courses, classical,, scien¬ tific and philosophical, which lead respectively to the three degrees of A.B., B.S., and Ph. B. ; there is also

a normal training course, a busi¬ ness course and a preparatory department. The productive endowment of the college was in 1914, over $230,000 a year; and the buildings were valued at considerably over $220,000.

PARTAB, or PERTAB NARAYAN SINGH, Sir Maharaja, an Indian Prince: b. 1855. The grandson and successor of the famous Maharaja Man Singh of Mahdauna, who was prominent during the Indian Mutiny. Sir Parta'b comes from an ancient Rajput family of warriors distinguished by its loyalty to Great Britain. In 1878 he went to Kabul as a member of the mission under the leadership of General Sir Neville Chamberlain, and in 1897 accompanied the Mohmand expedition as aide-de-camp to General Ellis. In 1898 he served in the same capacity with General Lockhart in the Tirah campaign on the Indian Northwest frontier. When Indian troops were being sent to quell the Boxer rebellion in China in 1900, Sir Partab persuaded Lord Curzon, then Vice¬ roy of India, to let him accompany the expedi¬ tionary ˆ force. On the outbreak of the Euro¬ pean War the old warrior, though in his 60th year, insisted on fighting with the British in Europe, taking with him his nephew, a youth of 16. He actually served at the front through¬ out the whole course of the war, expressing his desire to fall on the battlefield. During two terms as regent and one as Prime Minister he ruled over Jodhpur, an Indian state three times as large as Belgium, and from 1902 to 1911 he reigned as Maharaja of Idar, a state of 2,000 square miles in the Bombay Presi¬ dency. He voluntarily abdicated the throne in favor of his adopted! son in order to assume the regency of Jodhpur. That came to an end in 1916, and Sir Partab, after a brief visit to India, returned to the Western front, to devote himself entirely to fighting. He is a member of the Legislative Council of the Northwest¬ ern Provinces of Oudh.

PARTERRE, par-tar', in old French gar¬ dens, the open part in front of the house or dwelling, in which flower beds and closely cut lawn were intermingled according to a regular plan. Also a name for the pit or orchestra space in French theatres.

PARTHENIUS, par-the'm-us, Greek ele¬ giac poet and grammarian of the 1st century b.c. He was a native of Nicaea in Bithynia, was taken to Rome as a prisoner in the war with Mithridates; but he was soon freed, and became the friend, possibly the Greek teacher, of Vir¬ gil, and the intimate of, Cornelius Gallus. Virgil borrowed from him' a line in the first Georgic (437). For Gallus he comoosed, in prose, a resume of love myths suited for elegiac

poetry, which still exists under the title Ilfpi epuTMuv TuiVr/paTuv, <On Love's Sufferings,* and is edited in Sakolowski and Martin's (Mythographi Graeci* (1896-1902). Only a few fragments of his many poems, elegies, epicedia and other literary work, remain.

PARTHENOGENESIS. When an em¬ bryo develops from an egg without fertiliza¬ tion, the phenomenon is called parthenogenesis. Instances of parthenogenesis are found in all groups of plants from the algae to the highest flowering plants, but the most thorough studies have been made in the ferns and flowering plants. In the water fern, Marsilia, the egg is usually fertilized normally, but sometimes develops without fertilization. The parthenogenetic behavior may occur spontaneously, but may be induced by excluding sperms and rais¬ ing the temperature or by chemical stimulation. In any case, it is easily determined whether the embryo has resulted from a fertilized egg or from an egg without fertilization ; the normal embryo being capped by a mass of mucilaginous material resulting from the disorganization of the neck cell and ventral canal cell, while both these cells appear intact above a parthenogenetic embryo (Figs. 1 and 2).

Fig. 1. — Marsilia. Archegonium containing a normal embryo: the section shows eight cells of the embryo m, and mucilaginous mass formed by the disorganization of the neck canal and ventral canal cells. Greatly magnified.

Fig. 2. — Similar figure of a parthenogenetic embryo: n neck canal cell; v, ventral canal cell. Greatly magnified.

Similar cases of parthenogenesis have been found in several of the common ferns. In the Gymnosperms, parthenogenesis is extremely rare and no case has been described in very great detail; but in the Angiosperms, detailed investigations have been made in various groups. It is interesting to note that the common dan¬ delion is regularly parthenogenetic, the embryo developing from the egg without fertilization. In this case, no reduction of chromosomes (see Chromosome) precedes the formation of the egg; consequently, the egg has as many chromo¬ somes as if a normal egg, with the reduced number, had been fertilized by a sperm. It is not known what stimulus starts the develop¬ ment. Some species of Everlasting (Antennaria alpina) are# always parthenogenetic while others (Antennaria dioica) are just as regularly fertilized in the normal way. In the partheno¬ genetic forms, there is no reduction of chromo¬ somes ; while in

normal forms, the reduction takes place, _ so that the egg has the reduced number, which is doubled by the entrance of the sperm. In the Meadow Rue (Thalictrum purpurascens) , the egg sometimes develops

parthenogenetically and sometimes is normally fertilized, so that this species illustrates the transition from normal fertilization to partheno-‘ genesis. The egg which is to develop parthenogenetically has twice the number of chromo¬ somes characteristic of the normal egg. The Hawk Weed (Hieracium) is parthenogenetic. Gregor Mendel, whose name has become famous, so that we speak of Mendelism and Mendelian hybrids, crossed species of Hieracium and was uneasy because the results did not agree with his work on peas. He did not know that the plant was parthenogenetic and that the pollen, which he applied with such patience, did not take effect. There are cases of partheno¬ genesis in the lower plants, like Chara crinita (Stonewort) among the algae and Saprolegnia (Water Mold) among the fungi. In some familiar laboratory types, like Spirogyra and Zygnema (Algae) and Mucor (Fungi), where the two conjugating gametes are alike in size and shape, a union sometimes fails to take place and a gamete rounds off and forms a spore without any fusion. Such spores are called parthenogenetic spores or azygospores. In any case, parthenogenesis is to be regarded as a sport or freak, a deviation from the normal course of development. Consult Coulter and Chamberlain, (Morphology of Angiosperms* ; Overton, J. B., Parthenogenesis in Thalictrum purpurascens) (Botanical Gazette, Vol. XXXIII, 1902, p. 363).

Charles J. Chamberlain.

PARTHENON, The. See Athens.

PARTHENOPE, in Greek mythology, a siren cast up by the sea on the

shore of Naples. She was said to have drowned herself for love of Ulysses. Parthenope, the ancient name of Naples, was connected with this myth. The name Parthenope was also borne by the daughter of Stymphalus, with whom Hercules was in love.

PARTHENOPEAN (par”the-no-pe’an) REPUBLIC, a name given to the state into which the kingdom of Naples was transformed by the French republicans in 1799. < This name was chosen because in the earliest times the city of Naples was called Parthenope. Ferdinand I, king of the Two Sicilies, having joined in 1798 the coalition formed against France, the French general, Championnet, entered Italy at the head of an army, and after having defeated the Austrians in Rome, he invaded the Neapoli¬ tan territory and took Naples, 23 Jan. 1799. The republic was then proclaimed, and though at first the change of government was far from being relished by the Neapolitans, they very soon became reconciled to it. It was, however, very shortlived, for on 20 June Cardinal Ruffo, at the head of a mixed body of troops, took possession of the city, and the republic, which had existed only five months, terminated.

PARTHIA, in classical geography, either all the region between the Euphrates and Oxus rivers and the Caspian Sea and the Indian . Ocean, or, in a narrower usage, the district bounded by Media, Hyrcania, Ariana, Mar-giana and the Caramanian desert. The latter use of the term applies to the original home and the former to the empire of the Parthians, who seem to have been of Turanian stock migrating from Central Asia into Iran, where

they learned an Aryan tongue, practically equiv¬ alent to Persian. The capital city of the Par¬ thians was Hecatompylus ; the main product of the country, its splendid horses ; and the chief characteristic of the nomad and simple living Parthians, their skill in cayalry battle, notably their ruse of pretended flight, in the midst of which they shot backward from their unerring bows — the origin of the phrase ((a Parthian shot,® of which ((parting shot® seems a corruption. They were subdued in succession by the Assyrian, Median and Persian mon¬ archies, then fell to Macedon and to the Seleu-cidae, but in 250 b.c. they ‘established their in¬ dependence of the Syrian kingdom of the Seleu-cidae after a successful revolt led by Arsaces, who claimed to be of the Persian royal line, and, backed by the Magi, became! the first king of the new realm and conquered to the Indus in the east and

to the Caspian in the west. This spread of the old Persian national religion and of the new Parthian empire was most successfully carried out by Mithridates I, king 174-136 b.c. The inevitable clash with Rome came in 53 b.c., when Crassus' army was anni¬ hilated at Carrhae. Ventidius gained a slight victory over the Parthians in 38, but Antonius was severely defeated in 35, and no Roman army won a decisive victory over them until 115 a.d. in the reign of Trajan. Even then Rome gained no permanent footing in the Parthian empire. In 217 at Nisibis a battle was fought which gave neither side the victory and assured peace. In 226 the Arsacid dynasty came to an end with the defeat of Artabanus IV, and the Persian Sassanidae became rulers of the country. Members of the Parthian royal family continued to maintain their power in the mountainous districts of their native coun¬ try, more especially in Armenia, for several centuries, where they were protected by the Romans for political reasons. Consult Gardner, P., (The Parthian Coinage) (London 1827) ; Rawlinson, (The Sixth Great Oriental Monarchy) (1873), and (The Story of Parthia) (in (Story of the Nations> series, 1893) ; Wroth, W., (Coins of Persia> (London 1903).

PARTICULAR BAPTIST. See Baptists.

PARTINGTON, Mrs. An American humorist. See Shillaber, Benjamin Pen-hallow.

PARTITION, in law, is the division which is made between several persons who own land, goods, chattels or other property which belong to them as coheirs or coproprietors. Techni¬ cally it applies to the division of real estate between copartners, tenants in common, or joint tenants, and the object is to establish that to which each of the coproprietors is severally entitled. Voluntary partition is made by the owners of an estate, by the conveyance of such part to each other which is to be owned by him. Compulsory partition is effected through special laws providing that remedy. Any kind of property or thing of value, whether real or personal, which is the subject of joint ownership can be the subject of partition, the right of partition being an incident of joint ownership. In law it has been held that a hus¬ band and wife, being one. cannot partition an estate held by them. This has been largely remedied by the married woman's acts. In any event this could be accomplished by conveying

it to a third, who could reconvey to each in equal shares. Occasionally the question of di¬ vision is left to arbitration. A partition is often effected by a single deed executed by all the par¬ ties in interest, whereby to each is assigned a share, or else by mutual conveyances between the parties. Generally the same effect is given to an agreement for partition as to an act of partition. Partition by judicial proceedings is frequently effected by an ordinary action at law. In the United States the practice in these cases is usually regulated by statute. The title of an applicant for partition to possession must be clear or the action cannot be maintained. The fact that property sought to be partitioned is subject to liens, easements, or a lease, will not generally prevent partition. Mines, mill privileges, water power, and oil and gas under the surface of the earth, have all been the sub¬ ject of partition proceedings. The courts have refused to partition property which would im¬ pair its usefulness to the public. The court in granting relief through partition proceedings does not act ministerially and its object is to adjust equitably the rights of all the parties in interest. See Tenancy; Real Property.

PARTITION TREATIES, the name given two treaties made between France and England and the Netherlands in 1698 and 1700, for the settlement of the Spanish Succession. See Treaty and Treaties.

PARTNERSHIP, has been variously de¬ fined, in one instance as <(a voluntary contract between two or more legally competent persons, to place their money, effects, labor, skill, or some or either of them, in lawful commerce or business, with the agreement that there shall be communism of the profits thereof between them.® However, it would hardly be possible to form a definition that would meet every case. Contract between partners is essential; it may be verbal or in writing, and the partners must have accepted its terms. An agreement to share profits is an element essential to partner¬ ship, and if such does not exist there is no partnership. The manner of sharing the profits controls the test of partnership. One cannot against his will, or by the conduct of others, be made a partner, but in some jurisdictions under certain circumstances one may be held liable to third parties as a partner, who receives a share of the profits in place of some other consideration. The accepted rule is that per¬ sons sharing the profits of a business are not liable as partners to third persons, unless they are

in fact partners or have so conducted them¬ selves as to hold out to the public that they are partners. In the United States the commercial idea is that a partnership or firm is an entity separate and distinct from the members com¬ posing it. It is so treated in accounting, in¬ debtedness being entered against the firm and not against the individual members. Within the firm itself, accountants make the firm debtor to each partner for what he contributes to the common stock, and each partner is made debtor to the firm for all that he takes out of that stock. Thus partners do not become debtors and creditors of one another as to the firm's business, but are always debtor to or creditor of the firm. The partners are regarded as agents of the firm for the transaction of its business, and sureties of the firm in case of its

failure. This commercial view, however, is not established in the law, where the partnership is •not recognized as distinct from its individual members. The law regards each partner as acting as principal for himself, and as agent for each of the other partners. To this vari¬ ance between the commercial view and the legal view is to be attributed much of the conflict of authorities in various States on the many important questions involved.

Partnerships are grouped for classification under four heads : general, special, limited and joint-stock. The general partnership is the association most commonly found in business. The special partnership is one formed for a particular transaction: it is often called a par¬ ticular partnership. A limited partnership is one in which the liabilities are not equal as be¬ tween the partners, but limited as to some of them. A joint-stock company is a partnership in which the interests of the partners are represented by shares which may be transferred to other owners without dissolving the part¬ nership.

A secret partner is one whose relation to a firm is unknown to the public, and a silent or dormant partner is one who takes no active in¬ terest in the management of the business affairs of the firm, but receives a share of the profits.

A nominal partner is one who, though known as a partner, does not share in the profits. A liquidating partner is a member of a partner¬ ship which has dissolved, who has charge of winding up the affairs of the company. A special partner is one who is a member of a firm under a statutory limitatio'n.

It must be borne in mind that the existence of a partnership depends

upon questions of both law and fact, and that the proper de¬ termination of these questions is frequently the subject of conflicting opinions of upper courts.

A nominal partner is one who, though known as that in all cases, the question of the existence of a partnership depends on the agreement be¬ tween the parties and their intention as same may appear from all the surrounding facts. Persons receiving a debt, the payments on ac¬ count of which are measured by the profits of a business, are not partners; neither is one a partner who is employed as an agent or servant, and receives a part of the profits as his remu¬ neration, but the investment of capital in the busi¬ ness, in addition to rendering services, tends to show the relation of a partner rather than that of employee. Participation in losses tends to show a partnership, but the absence of it tends to show merely a loan ; sharing expenses or. losses alone does not constitute a partner¬ ship. One. lending money to another engaged in conducting a business, under a contract to receive a part of the profits in the place of in¬ terest, or in addition to the interest, is not a partner, unless he has the usual rights and powers accorded to a partner; one receiving a fixed amount, having no. relation to the profits, in consideration for services or property, is not a partner. An important distinction exists be¬ tween sharing gross, receipts, and net profits; ‘ sharing the former is not evidence of partner¬ ship, neither is the division, of the results of a joint venture, such as raising a crop. Proof as to the conduct or relation of the parties may be. such as to show the existence of a partner¬ ship, such as the fact that the alleged partner

assumed charge and direction of the business ; the conducting of the business under a firm name and the keeping of partnership books may all tend to prove the existence of partnership. Clubs, associations, societies, etc., formed for the purpose of social or political objects and not for profit, are not partnerships. The joint own¬ ing of property from which they obtain a profit from its use, does not necessarily constitute a partnership of the owners but may become such through

an agreement to carry out a joint ven¬ ture in which the owners share in the profits and losses.

In entering into a contract of partnership all the general rules of law governing contracts are applicable ; generally such contracts are not re¬ quired to be in writing, except in the case of some statutory provision. In many jurisdictions it is held that a partnership, the object of which is to own or deal in realty, must be set forth in writing. As title to real property cannot be legally vested in the firm, it is held by one of the individual members in trust for the firm. Hence the widow of a deceased partner has been held to have dower rights in such real estate after the firm's debts are paid. A part¬ nership that is to begin after the expiration of one year must be in writing, and it is advisable that a contract for a partnership which is to last for a longer term than one year be in writ¬ ing. Persons who can make a valid contract are capable of entering into partnership. One not of age may become a partner, but would have the right to rescind his contract, as same would be voidable. A partnership with an in¬ sane person is valid, if the parties to the con¬ tract were ignorant of the condition of the insane person. A married woman may become a partner, and in some jurisdictions, the partner of her husband. No corporation can become the partner of a person, or any other corporation, unless its charter so permits. Any number of persons may form a partnership. A partnership is void which is created for any object or pur¬ pose which is prohibited by law, or which is contrary to public policy. In the absence of a statute authorizing a firm as such to sue, an action must be brought in the individual names of the partners; the same is true of actions brought against partnerships. A firm name is not necessary in law, although it is generally adopted as a matter of commercial etiquette; such name cannot rightfully be used for any purpose other than-that connected with the partnership transactions. The firm name is not a part of the ˆproperty® of the firm, but is a part of the ((goodwill.® It thus has a salable value and so is one of the assets of the firm. A purchaser of the goodwill of a firm buys the right to use the firm's name. One partner acting for the firm binds the other partners.

The capital of a firm is the sum contributed by the members for the purpose of conducting the partnership business, and is distinguished from the partnership property, which includes everything that the firm may own; the capital may consist of money or property, or the use of property, and may be contributed in different amounts. Upon the dissolution of a partnership the capital is returned, and the proportionate profits, as agreed, divided. In the event of the death of a partner the assets of the firm vest in the surviving partners, and it

becomes the duty of the surviving partner, or partners, to

settle up the business, and to account to the representative of the deceased partner for his interest.

A partnership may be dissolved, changed or modified at any time by the members, provided that such is not contrary to law. The failure of a partner to fulfil the terms of the agreement of partnership does not necessarily nullify the agreement, but it may be the basis of an appeal to the court for a dissolution. Each partner has the same right to share in the management of the business unless otherwise stipulated in the agreement. The law imposes a very strict duty on the part of partners, their relations with each other, and absolute good faith is demanded ; one partner is liable to the others for a strict account of all matters conducted by him that are within the general scope of the business of the partnership. A partner will not be allowed to buy for his personal benefit a claim against his firm but will be held to have bought it for the benefit of his firm, nor will a partner be allowed to obtain a renewal of a lease of the premises occupied by his firm, or to deal in the property of the firm for his own benefit, and if he uses the firm's funds for spec¬ ulating, he must account to the firm for the money and for the profits.. A partner must ac¬ count for any benefits obtained by him from the information secured in the course of the busi¬ ness of the partnership. Except that the agree¬ ment prohibits it, a partner may engage in a business which does not compete with the busi¬ ness of the partnership and is not inconsistent with his duties as a partner. A member of the firm is not entitled to any compensation for extra services under any circumstances, except in the case of an agreement, unless it is neces¬ sitated by the wilful negligence of his partner. The partners have a right to insist that accu¬ rate accounts be kept of all the transactions of the firm and legally they have access to the books at all times.

Unless there is some agreement to the con¬ trary, the acts of the majority control. The rights of the minority, however, must be af¬ forded every protection and they must have an opportunity of presenting their objections. Members of a firm cannot expel a partner unless that right is given by their agreement. A part¬ nership is liable for any loss or injury caused to one who is not a member of the firm by one of the partners acting in the ordinary course of the firm's business or with its authority; the partnership is also liable for money misap¬ plied by one member of the firm who is appar¬ ently acting for it. A judgment creditor can proceed against the individual property

of part¬ ners without first obtaining execution against the firm property, except that this be contrary to the provisions of the statute governing the partnership.

A partnership may be dissolved at any time by mutual consent, and unless so dissolved the partnership does not terminate until the part¬ ners cease to carry on the business. It may be dissolved by the court when one of the part¬ ners refuses consent upon various grounds — unprofitableness of the business, fraud, damag¬ ing conduct, *etc.* On the dissolution of a part¬ nership it is desirable to give public notice, this prevents a partner becoming liable to third persons for the acts of his former partners. Partners cannot sue each other in law but

courts of equity have jurisdiction to demand accountings and to make a settlement of part¬ nership affairs. Any change in the membership of a partnership effects a dissolution, and if the business continues it is a new firm. See also Agreement; Contract. Consult Burdick, F. M., (The Law of Partnership: Including Limited Partnership) (Boston 1917).

Henry M. Earle.

PARTNERSHIP ASSOCIATIONS. See

Corporations, Legal.

PARTON, Arthur, American artist : b. Hud¬ son, N. Y., 1842 ; d. 1914. He began landscape painting as a pupil of W. T. Richards in Phila¬ delphia, and has developed a particular talent in the portrayal of scenery in clouded sunlight, or the semi-darkness of declining day. He has been charged with subduing his landscapes with too prevailing a gray tone, but his handling is vig¬ orous as well as imaginative. All his pictures are pleasing and suggestive. This is seen in his (NightfalP (1881) ; and his Palisades in Win-ter) (1885) ; (Loch Lomond) ; (Night in the Catskills* ; (Evening — Harlem River*; (The Ledge) (1913) ; and (A Spring Morning)

(1914).

PARTON, James, American author: b. Canterbury, England, 9 Feb. 1822; d. Newburyport, Mass., 17 Oct. 1891. He was brought to the United States in 1827 and received his education here. His first literary employment was on the staff of the Home Journal of New York. In 1855 appeared his Pife of Horace Greeley,* of which over 30,000 copies were sold, and which was followed in 1857 by his Pife of Aaron Burr.* Of this work nearly 20,000 copies were sold during a period of great com¬ mercial distress. His success decided him to make literature his life work and this he com¬ bined with lecturing on political and literary subjects. In 1875 he removed from New York to Newburyport, Mass. He married Sara Pay-son Willis (Fanny Fern) a sister of N. P. Wil¬ lis ; and on her death in 1872 he married her daughter by her former husband, Charles E. Eldridge. It was followed by (Life of Andrew Jackson* (1859-60), a collection of (Humorous Poetry of the English Language, from Chaucer to Saxe) (1856) ; (General Butler in New Or¬ leans* (1863) ; Pife and Times of Benjamin Franklin* (1864) ; (Famous Americans of Re¬ cent Times) (1870); (Washington* (1872); Panny Fern) (1873) ; Wife of Thomas Jeffer¬ son (1874) ; Wife of Voltaire) (1881) ; ‘’Thomas Jefferson (1874); Waricature and Other Comic Art* (1877) ; (Noted Women of Europe and America) (1883); (Captains of Industry) (1884) ; (Triumphs of Enterprise, Ingenuity and Public Spirit } (1871); (Topics of the Time) (1871) ; Waricature in all Times and Lands* (1875). He was an extremely entertaining writer and a literary force in his day.

PARTON, Sara Payson Willis (<(Fanny Fern®), American writer, sister of N. P. Willis (q.v.), and wife of James Parton (q.v.) : b. Portland, Me., 9 July 1811; d. Brooklyn, N. Y., 10 Oct. 1872. Married early to C. E. Eldridge of Boston and left at his death dependent upon her own resources, she turned to literature, and under her pseudonym, ((Fanny Fern,® soon be¬ came widely known. Pern Leaves, * the first of her collection of sketches, was published in

1853 and 70,000 copies were sold in a short time. This was followed by Wittle Ferns1* (1853) ; (Fern Leaves, 2d Series) (1854) ; (Ruth Hall,* a semi-autobiographical novel (1854) ; Pose Clark) (1857) ; (Fresh Leaves1* (1857) ; and (The Play Day Book* (1857), all of which once enjoyed a considerable popularity, some of them being translated into French and German. For 16 years she contributed a

weekly article to the New York Ledger. She was married to James Parton in 1856.

PARTRIDGE, par'trij, Alden, American educator and soldier: b. Norwich, Vt., about 1785; d. there, 16 Jan. 1854. He was graduated at West Point in 1806 and acted as assistant pro¬ fessor and afterward professor of mathematics there from that time until 1813. He was pro¬ fessor of engineering 1813-16 and superintend¬ ent from January 1815 to November 1816 and from January to July 1817. He resigned in 1818 and became the principal of an exploring survey sent out in 1819 to determine the north¬ west boundary of the United States. In 1820 he founded in his native town the American Literary, Scientific and Military Academy (known as the Norwich Military Academy). In 1834 this was granted a charter by the State and incorporated as Norwich University, with Partridge as its president. At the invitation of other States he subsequently founded similar institutions in Harrisburg, Pa., Portsmouth, Va., Pembroke, N. H., and Brandywine Springs, Del. He was surveyor-general of his native State in 1832 and a member of the Vermont legisla¬ ture in 1833-34 and 1839.

PARTRIDGE, Bernard, English artist and cartoonist: b. London, 11 Oct. 1861. He was educated at Stonyhurst College and was engaged in stained-glass designing and decorative paint¬ ing in 1880-84. From 1884 he has occupied him¬ self in illustrating for the press and for book publishers. Since 1891 he has been with the London Punch, of which he is chief cartoonist.

PARTRIDGE, John, English astrologer and almanac maker: b. East Sheen, Surrey, 18 Jan. 1644; d. Mortlake, Surrey, 24 June 1715. He was bound to a shoemaker in early youth but contrived to teach himself Latin, Greek and Hebrew, by means of which he gained a knowledge of astrology and he seems to have studied medicine at Leyden. In 1680 he issued the. first of his almanacs, (Merlinus Liberatus,1* which with its rarely perfect equivocation soon gained popular favor and quack imitators. Swift, in 1708, prompted in part by a spirit of jest and wishing also to check the flood of quack almanacs, published his Predictions . . by Isaac Bickerstaff,1* in which he prophesied the death of Partridge at 11 o'clock at night on the 29th of March. On the 30th he published the announcement of the fulfilment of the prophecy; so thoroughly convincing the public of its truth that Partridge was unable to estab¬ lish the fact that he was living and he made no further issues of his almanac until 1714, prob¬ ably deterred by Swift's continuance of the jest in Plegy on the Death of Mr. Partridge) (1708) and Vindication of Isaac Bickerstaff * (1709).

The name Isaac Bickerstaff was taken by Swift from a sign in Longacre. Steel made use of it in the Tattler in 1709; and others used it in signed newspaper and periodical ar¬ ticles for many years.

PARTRIDGE, William Ordway, Ameri¬ can sculptor and author: b. Paris, France, 11 April 1861. He studied at Columbia Univer¬ sity and then received his art education at Paris, Florence and Rome. Adelphi College, Brooklyn, N. Y., conferred on him the degree of M.A. also. Among his works of sculpture are (General Grants an equestrian statue for the Union League Club, Brooklyn ; the statue of Alexander Hamilton, Brooklyn ; the group, (Christ and Saint John,5 in the Brooklyn Mu¬ seum of Fine Arts; the statue of Hamilton and the Scherinerhorn Memorial at Columbia Uni¬ versity; the statue of Shakespeare and the bust of Edward Everett Hale at Chicago ; the Kauff¬ man Memorial, and the baptismal font in the church of Saint Peter and Paul at Washington, D. C., and others. He has written (Art for America1* ; (The Long Life of a Sculptor5 ; (The Technique of Sculpture5 ; (The Angel of Clay5 ; (Nathan Hale, the Ideal Patriot5 ; (The Czar's Gift5.

PARTRIDGE, a name properly designating a common European game-bird (Perdix cinerea) but applied with little discrimination to a variety of gallinaceous fowls. In the United States the name is given to the ruffed grouse and spruce grouse and with greater appropriate¬ ness to a number of birds more or less closely resembling the European partridges and quails. (See Grouse.) Taken in the wide sense the family Tetraonidce includes all of these birds, the American partridges being the subfamily Odon-tophorince , which is sometimes united with the Old World partridges under the name Perdi-cince or Perdicidce. The latter comprises about 150 species, distinguished by the absence of the serrated edge of the lower mandible, common in the American types. They avoid woodlands and are commonly found in cultivated grounds in groups up to 20 or 25 birds. The Odonto-phorince have the bill very short and thick, more so than in the European partridges. Like them, the nostril is covered by a scale, but

is not filled with short feathers. The lower mandible is more or less distinctly toothed near the end. Both toes and tarsi are naked and the latter scaly, which characters, with the com¬ pletely feathered head, offer a ready distinction from the grouse. This group is strictly Amer¬ ican, but most of the 40 or 50 described species are confined to Central and South America. Many of the species have the head ornamented with graceful crests of very characteristic forms in the different genera ; and remarkably rich and varied color-patterns occur, especially in the males of those species in which the sexes differ. Seven species representing four genera and divided into a number of subspecies and local races, are found within the boundaries of the United States. With a single exception all are western and southwestern and most of them may be considered as an overlapping of the Mexican fauna.

The exception just noted is that of the most prominent and familiar of these birds — the bob-white, which is popularly, if unfortunately, known both as partridge and quail and is de¬ scribed in this Encyclopedia under Quail.

Of the western species the mountain par¬ tridge or plumed quail (Oreortyx pictns), of the Pacific coast region, especially the mountainous parts of California, Oregon and Washington,

is distinguished by the pair of slender black plumes which ornament the head. Those of the male are nearly four inches long and curve gracefully backward; in the female they are much smaller. The extremely handsome colors are similar in the two sexes. These birds are not well known to gunners, are extremely wild, and the coveys scatter quickly by run¬ ning, taking wing only when hard pressed, when they rise and fly with extreme swiftness. The call of the male is a pleasant whistling note. The eggs are buff-colored. The California partridge or helmet-quail (Lophortyx califor-nica) has a crest of several club-shaped feath¬ ers, which are erect and curve forward. The male is very richly adorned with soft grays, warm browns and slaty blues, variously marked with black and white. The female is much plainer and has a smaller crest. They have been seen in flocks numbering 500. A paler, grayer variety (L. c. vallicola) is known as the par¬ tridge or valley quail of California and it has been introduced into the Pacific States north¬ ward. When flushed, this species is said almost invariably to fly into a tree. Its notes are harsh and very peculiar. The eggs are spotted and laid in a very carelessly made nest or on the bare ground. Gambel's partridge (Lophortyx gambeli) is

similar to the last, from which the male is distinguished by the greater amount of black in the plumage, particularly on the face and belly. It is exceedingly abundant in Texas, Arizona and New Mexico, from which it spreads through the surrounding States, espe¬ cially into California and Nevada. It is equally at home in the mountains and lowlands. The Massena partridge (Cyrtonyx montezumoe) , also known as the <(fool quail55 because of its failure to sense danger and make an escape fiom the hunter, is a bird of Mexico rather than of the United States, within which it is found only in western Texas, Arizona and New Mexico. The sexes are very unlike, the male having the sides of the head white fan¬ tastically striped with black, and the under-parts dark thickly spotted with white. The crest is depressed, brush-like and on the occiput. Many of these partridges are extremely variable and numerous subspecies and races of some of them have been described. They are also said to read¬ ily hybridize, at least under domestication. The several crested and plumed partridges described give a fair picture also of those occurring in South America, most of which belong to the same or similar genera.

The partridges of the Old World are not clearly distinguished as a group from ours. They are found in most temperate and tropical countries from England and China to Australia.

The common or gray partridge (Perdix cinerea) chiefly inhabits the cultivated fields of Britain and the Continent. Mating takes place in February, the males frequently engaging in combats for the possession of the females. The eggs, numbering from 10 to 15, are deposited at the end of May or beginning of June, the female taking upon herself the entire duties of incubation, although the male, after the young birds are hatched, shares the duties of his mate. The partridges are exceedingly solicitous re¬ garding the welfare of the young. The parent birds will run before the sportsman and by flut¬ tering in an opposite direction will strive to

distract his attention from the neighborhood of the nest. Selby mentions that he has seen two partridges successfully engage a

carrion-crow in battle in defense of their young. These birds in autumn and winter collect in flocks of small size, known as ˆcoveys,® but they separate in spring to pair and incubate. The food consists chiefly of grass, young seeds and also of insects ; and the birds feed in the early morning and late in the evening. The roosting place of the covey is generally in the middle of a flat field.

The red-legged partridge (Caccabis rufa) is common in certain parts of England, having been introduced from the Continent, where it is common. It is found in France, southern Eu¬ rope generally, and in Guernsey and Jersey. The flesh is of a less succulent and tender char¬ acter than that of the common partridge. It inhabits healthy places chiefly, but otherwise closely resembles its more familiar neighbor in habits.

The true English quails belong to the genus Coturnix, which has the nostrils feathered be¬ neath the covering scale, the bill more slender than in the partridges, the wings somewhat pointed and the tail very short. They are migratory and thus have spread very widely. The common or Messina quail (C. communis) is colored much like our bob-white but is smaller, more slender and far inferior from a sportsman's point of view. Rather extensive at¬ tempts have been made to introduce the quail into the United States but, in part owing to its migratory habits, in part to the changed condi¬ tions they have failed. Naturally this species inhabits a large part of Europe, Asia and Af¬ rica. Except for the fact that it is migratory and does not form coveys, its habits are closely similar to those of the bob-white (see Quail).

The partridges are readily domesticated and even in the wild state will frequently associate with fowls in the barn yard when food is scarce in the winter. The eggs may be secured and incubated under a bantam hen which naturally cares for the young. Besides the bob-white many of the crested partridges have been thus bred and are familiar sights in the aviaries of zoological gardens and bird fanciers. Consult Knowlton, F. H., (Birds of the World) (New York 1909).

PARTRIDGE-BERRY, CHECKER-BERRY, or SQUAWBERRY, a perennial

evergreen trailing vine (Mitchella repens) of the family Rubiacece. It is a native of North America and is found from Nova Scotia to Florida and westward to Minnesota and Texas. The leaves are round, small and glossy; the flowers white or pinkish, tubular, in pairs and very fragrant; the fruits bright scarlet, often two united in one, persistent during winter, almost flavorless. In shady places, on dry soil, the

plants seem to thrive best; they are, how¬ ever, found in moist situations. They are favorites in rockeries and wild gardens and are easily propagated by root-division. The genus, which comprises very few species, one Japanese, another South American, is named in honor of Dr. John Mitchell, one of America's early botanists, a Virginian correspondent of Lin¬ naeus. The names partridge-berry and checker-berry are also sometimes given to Gaultheria procumbens, which is better known popularly as wintergreen and boxberrv.

PARTRIDGE PIGEON, or SQUATTER PIGEON (Geophaps scripta), a habitant of the interior of Eastern Australia. It is a light brown above with three black bars on the side of the head. Like the bronze-winged pigeons it has a large metallic area on the wing cov¬ erts, but this is greenish to purple instead of bronze. The partridge pigeons are found usu¬ ally in pairs, or in small companies, and live wholly upon the ground. See also Bronze Wing.

PARTRIDGE-WOODPECKER, an oc¬ casional local name for Colaptes auratus , the eastern golden-winged woodpecker or flicker. See Woodpecker.

PARTS OF SPEECH. See Grammar; Language, Science of.

PARTURITION. See Obstetrics.

PARTY BALLOT. See Ballot.

PARTY EXPENDITURES. See Cor¬

rupt Practices Act.

PARTY ORGANIZATION IN LEGIS¬ LATIVE BODIES. Party organization in the United States is extra-constitutional. That is, American constitutions, State and national, make no provisions for parties and party leader¬ ship. Indeed, it would be safe to say that early American statesmen did not encourage or facili¬ tate party organization and control. In Eng¬ land, on the contrary, and in other countries in which the cabinet system of government pre¬ vails, party organization is part and parcel of the government itself. The Prime Minister and his cabinet are the leaders of the majority party in Parliament and hold office often by reason of that leadership; the opposition party is equally well recognized; and therefore the parties which hold power can be held rigidly accountable for the use to which they put that power. But while it was possible to avoid making

definite provision for political parties in American government, it was not possible to prevent their development or to stop the exercise by them of important powers in ad¬ ministering government. Consequently, in the United States we have not abolished the politi¬ cal party nor its power and influence; we have not been able to get along without it; we have merely, by refusing to give it a recognized place in our governmental system, compelled it to work indirectly and informally. The result has been that the organization of parties in our legislative assemblies has been carried on by party leaders perhaps not themselves the mem¬ bers of any legislative body and not responsible in any open or direct way for their conduct.

Purposes of Party Organization.— Party organization in legislative bodies seeks to ac¬ complish two main purposes. The first of these is the control of legislative policy in such a way as to further party interests. If a party has succeeded in electing a majority in the legis¬ lature by going before the people on a definite platform of proposed legislation, it is highly important that the party effect an organization in the legislature that will enable it to redeem its campaign pledges. Secondly, the party leaders wish to be in a position to distribute to loyal party members the patronage available in the selection of the officers, committeemen and other attractive positions which form a part of the formal organization of the legislature. It is important also for the party to capture these

places if it is to hope to control legislative policy effectively.

The Machinery of Party Organization.

— (a) The Party Leaders. — There must be party leadership in order to insure the efficient carrying out of party policy. That leadership may assert itself in several ways. In the first place it may rest upon the shoulders of one man, the boss. Usually the party boss has built up a strong grip on the party, personal in character, and too often by methods which will not bear the light of publicity. He is usually unwilling to expose his past record to the scrutiny of a campaign for

public office and contents himself with remaining a private citi¬ zen, exercising control over those whom by his power he has placed in office. It is very sel¬ dom, in fact, that the boss actually becomes a member of a legislative body or holds any office in it. The organization of the legislature is, however, his work, and the nominal leaders receive their instructions from him. However, the era of the more or less irresponsible party boss is passing away, and as political parties have become more democratic in character party leadership is apt to fall on the shoulders of a man chosen for that purpose by his asso¬ ciates, either by common consent or by formal election. If the party has a majority in the legislature, the party leader will frequently, though not invariably, become speaker of the lower house because of the opportunities open to the speaker to control legislative procedure in the interests of the party. However, it is sometimes more advantageous to have the recognized party leader occupy the chairman¬ ship of one of the most important committees, such as the committee on ways and means in Congress or revenue and taxation in a State legislature. When the party is in the minority in the legislature it does not haye the power to secure for its leader any official recognition, but it designates him as its floor leader or (<minority leader® and places upon him the re¬ sponsibility of looking after the party interests in debate and various other matters.

(b) The Caucus. — The party caucus is the whole group of party members in a legislative body meeting to determine party policy. As the autocratic boss declines in power and the party becomes more democratic in organization, the caucus takes on more and more authority. Party caucuses have been more influential in governing the policies of Congress where party leadership has been less centralized than in State legislatures, where the boss or an oli¬ garchy of bosses has more frequently thrived. The caucus in the main does two kinds of work. It may create the formal party organ¬ ization by naming its candidates for speaker, committee chairman and so forth. In many cases the caucus in so choosing the party officials merely ratifies the choice of a smaller group of party leaders who have previously met and prepared a ((slate.® The second fac¬ tion of the caucus is to determine whether the party as such shall take a definite stand upon a question of legislative policy and what that stand shall be. This goes far toward estab¬ lishing a real test of party regularity, because when the party has declared a certain bill pend¬ ing before the legislature to be a party meas¬ ure every member of the party is supposed to

vote for it under the heavy penalty of ostracism from the party. Of

course relatively few meas¬ ures are definitely party measures and upon all others no attempt is made to control the discre¬ tion of the individual member.

(c) Committees. — Effective party organiza¬ tion demands that the majority party have a majority on every legislative committee. As a rule the destiny of legislative bills rests in the hands of the committee to which they are re¬ ferred. It may quietly pigeonhole a bill or delay reporting it until too late for action. The chairmen and majority members of import¬ ant committees may exert enormous power oyer their colleagues by their power to suppress bills in which those colleagues are interested. In these committees also corruption and bribery are most likely to thrive. Persons seeking special privileges or protection from legislation which is objectionable to them may frequently achieve their desires by exerting secret and corrupt influence upon committee members. Dishonesty in such matters is hard to prevent and hard to detect. In addition to these regular legislative committees to which bills are re¬ ferred, many legislative bodies provide for the appointment of special committees with unusual powers to determine matters of procedure and the order in which bills shall be taken up for action by the legislature. Such a committee is the committee on rules of the national House of Representatives ; and in the State legislatures the ((steering committee,® as it is called, which is usually appointed at the close of the session for the purpose of deciding which of the numer¬ ous bills still pending ought to be brought up for consideration in the short time remaining. These committees have, of course, wide dis¬ cretion in reporting or killing legislation, and when controlled by a political party offer large possibilities for the domination of legislative policy in the interests of the party. In general it may be said that in spite of the many evils connected with the committee system in legis¬ lative bodies, it is hard to see how committees could be entirely dispensed with.

Proposals for Needed Reform — From the foregoing discussion it is evident that at least two evils result from our present system of party organization in legislative bodies. First, it is usually quite impossible to centre upon the party or on individuals definite responsibility for legislative evils. Second, such a system makes it easy for corruption and dishonesty to thrive undetected. While no one will claim that party influence should be eliminated from legislative bodies, there are several methods suggested by which it is hoped to eliminate the existing evils. These remedies fall into two groups. The first group comprises those which seek to fix responsibility upon the party for the good or bad results of its work. Here are to be found the proposals for

the introduction of the English cabinet system into State govern¬ ment, the enlargement of the control of the executive over the legislative policy and the development of a budget system. By giving the party clearly defined and adequate power in legislation those schemes would make it im¬ possible for the party to evade its just respon¬ sibility. The second group of reforms is less revolutionary in character and aims in general at the minimizing of the opportunities for cor-360

ruption and illicit influence. Such are the rigorous corrupt practices acts and anti-bribery statutes, requirements of publicity in committee hearings, publication of campaign fund con¬ tributors, contributions, etc., and in other stages of legislative procedure rigorous laws forbid¬ ding or regulating lobbying.

Much valuable work is being done by various organizations, such as voters' leagues, which keep close watch of legislative proceedings and try to inform the citizens regarding the work which their representatives are doing. Little permanent reform can be expected unless it is supported by an alert and intelligent public sentiment.

Bibliography. — Beard, C. A., (American Government and Politics) (rev. ed., New York 1914) ; Bryce, J., (The American Common¬ wealth* (rev. ed., ib. 1915) ; Holcombe, < State Government in the United States) (1916) ; Macy, Jesse, (Party Organization and Ma¬ chinery* (1904) ; Munro, (The Government of the United States* (New York 1919) ; Ostro-gorski, M., (Democracy and the Organization of Political Parties* (New York 1902) ; Ray, (An Introduction to Political Parties and Practical Politics* (rev. ed. 1919) ; Reinsch, Paul S., (American Legislatures and Legis¬ lative Methods* (1907) ; Woodburn, J. A., (Po¬ litical Parties and Party Problems in the United States* (1903); Young, J. A., <The New American Government and Its Work* (1915).

Robert Eugene Cushman, Associate in Political Science, University of Illinois.

PARTY SYSTEM. See Convention, Political; Elections; Vote, Voters, Voting; Ballot; Primary, Direct; Primary, Presi¬ dential; Caucus; Congress; and the parties by name.

PARTY-WALL, in law, is the wall that separates two houses or adjoining properties. Such a wall, together with the land uoon which it stands, belongs equally to the owners of the two properties, half belonging to the one and half to the other; and unless the wall has stood for 20 or more years, each can legally do what he likes with his own half, even to cutting it away. It is common practice for the party who builds a house adjoining another to pay a just proportion of the expense of the party-wall to the party who built the same. By English com¬ mon law, where the wall is, as above indicated, partly on both lots or properties, the adjoining proprietors are considered as tenants in com¬ mon of the wall and of the land on which it stands. Neither owner of a party wall may legally extend the walls of his building fur¬ ther than the middle of the party wall, or main¬ tain a window in the side toward the wall. If a party wall is destroyed, neither party can legally (in most States) rebuild same (except upon his own land) without the consent of the other party thereto.

PARVATI, par'va-te, in Hindu mythology, a divinity; a daughter of the mountain, also called Durga (q.v.). The word itself in Hindu means "mountain born.** She was said to be a reincarnation of Um, and she was called Parvati because she was a daughter of Himavat (Himalaya Mountains) ; or because simply, ac¬ cording to a later version or evolution of the myth, she was born in the mountains. When

born she was white, red and black, the typical colors of Brahma, Vishnu and Siva from the combined glances of whom she was born. Later she divided herself into three forms which became respectively the wives of Brahma, Vishnu and Siva. Consult Wilkins, W. J., (Hindu Mythology* (London 1900).

PARVIN, Theophilus, American physi¬ cian: b. Buenos Aires, Argentina, 9 Jan. 1829; d. Philadelphia, 29 Jan. 1898. He was grad¬ uated at the University of Indiana in 1847 and took his M.D. at the University of Pennsylvania in 1852, whereupon he established himself in practice at Indianapolis. He was professor in the Medical College of Ohio in 1864-69, at the University of Louisville in 1869-72, and was subsequently professor of obstetrics and dis¬ eases of children at the Indiana Medical Col¬ lege and at Jefferson Medical College, Phila¬ delphia. He was president of the Indiana State Medical Society in 1861, and of the Amer¬ ican' Medical Association in 1879. Author of cThe Science and Art of Obstetrics* (1886). Editor of (Winchel on the Diseases of Women*

(1887).

PARVISE, the open or enclosed space in front of a church or cathedral, especially in France. When the bishop held court he sum¬ moned delinquents to appear before him in the parvise, and at Saint Rhadegunda's Church at Poitiers the episcopal court at the west end of the church is well defined with five entrances, coped wall, kneeling angels and lions. At Amiens and Liseux the raised platform of the court still remains and traces of the same con¬ struction are apparent at Lichfield. The term is also applied to a room over the porch of a church which formerly was a watch house or lookout, but which in modern times has been applied to various uses.

PARZIVAL. Wolfram von Eschenbach's (Parzival* is a Middle High German epic com¬ posed early in the 13th century. Its verse as a rule has four accents, two successive verses always being combined by a rhyme. It is divided into 16 books and in part (books 3-12) is based on the Old French (Perceval le Gallois* by Chrestien de Troyes. But the lat¬ ter remained a fragment, and Wolfram's poem excels it by greater depth of thought and feel¬ ing, and a higher standard of morals. Orig¬ inally Parzival belongs to those simpletons popu¬ lar in folklore who in foolishness and inno¬ cence accomplish some great deed. This old theme is remodeled and ennobled in our poem. The hero is endowed with that virtue which the Germanic peoples consider the highest — faithfulness, and he passes through a change of mind typically Christian in character which enables him to attain his aim. The aim itself is set high and is of a double character. In its worldly aspect it is represented by King Arthur and his followers (see special article) who hunt after glory and pleasure, who indulge in heroic deeds, the worship of women, adven¬ tures, festivalˆ and the like. In its worldly and spiritual aspect it is represented by the king of the Grail and his followers who, while doing justice to the world, try above all to fulfil the highest commandments of God. The Grail (q.v.) symbolizes this ideal, and he who comes nearest to it is to be king of the Grail. Parzival first wants to become an Arthurian

knight and then strives for the kingship of the Grail. Apart from its symbolic meaning, the Grail is with Wolfram a precious stone of miraculous power granting food at will and preserving the life of king Anfortas, if he looks at it. Its original connection with the Lord's Supper and Crucifixion can still be traced in Wolfram's poem. Book 1 and 2 deal with Parzival's parents, especially his father, Book 3 takes up the story of Parzival him¬ self. His mother brings him up in a lonely forest, but the hoy leaves her in order to be¬ come a knight. He first leads the life of a guileless adventurer until old Gurnemanz teaches him the noble laws of worldly knight¬ hood. He wins the beautiful Kondwiramur for a wife and leaves her only in order to visit his mother. Unawares he comes to the castle of the Grail. There religious fervor and true humanity should make him ask about the wonders of the Grail and the sufferings of its king Anfortas. But regard for courtly man¬ ners controls his behavior, he suppresses the all-important questions and must leaye the cas¬ tle. It is true, he is afterwards received at the Round Table of king Arthur, yet on account of his behavior at the castle of the Grail he must withdraw also from the company of Arthur. Now Parzival quarrels with God because He allowed him to fall into disgrace, and sets out to win the Grail in spite of Him (Books 3-6). For years he roams about in vain, comforted only by his love for Kondwira¬ mur. At last the hermit Trevrizent teaches him that man lives in sin and can not accomplish anything great unless called 'by God. In deep¬ est humility and with a purified soul, Parzival resumes his faithfulness to God and not until now has he a chance to win the Grail (Book 9). This change in Parzival is depicted be¬ tween the descriptions of the adventures of Gawain, a nephew of Arthur and first knight of the Round Table, who crowns his accomplish¬ ments by conquering the castle of the magician Klinschor and winning the love of the haughty Orgeluse, but who in spite of all his attempts fails to gain the Grail (Books 7-8, 10-13). With the 14th book Parzival comes again into the foreground. After he has defeated Gawain, he is received at the Round Table for a second time. In his half-brother Feirefis, he learns to admire pagan knighthood and is at last called to the Grail. Now he asks the decisive question about the sufferings of Anfortas. The latter recovers from his pain, Parzival is elevated to the kingship of the Grail and reunited with his be¬ loved wife Kondwiramur. The expression in Wolfram's <Parzival) is original and even peculiar, the thoughts have a tendency to mvsticism, the outer world is given most of the space, and yet the spiritual element breaks forth in places with controlling power. For such and other reasons the poem is not easy to read. But it seems fair to sav that

before Dante's (Divina CommediaC no other poem of the Middle Ages has so much to say to the modern mind as Wolfram's 'Parzival. > Con¬ sult edition in (Deutsche National-LiteratuU (Vol. V, 1882-98); free, but excellent < trans¬ lation into Modern German with illuminating explanations and notes bv W. Hertz (5th ed., Stuttgart and Berlin 1911) ; English translation by Weston, Y. L. (1894); Vogt, F., Geschichte der mittelhochdeutschen Literatur (2d

ed., pages 37-41, Strassburg 1902) ; Golther, W., (Die deutsche Dichtung im MittelalteU (pp. 206-224 and 578, Stuttgart 1912).

Ewald Eiserhardt.

PAS-DE-CALAIS, pa-de-ka-la, France, a northeastern department bordering on Dover Strait and the English Channel. Area 2,606 square miles, five-sixths of which are culti¬ vable. Its coast, extending about 80 miles, pre¬ sents a long tract of low sand-hills, but near Boulogne it forms a lofty crumbling cliff. The interior is generally flat, and intersected by canals; the streams, too, though short, are gen¬ erally navigable. The principal harbors are Boulogne and Calais; the capital is Arras. The soil, though marshy in several places, is fertile, and produces cereals, vegetables and large oleaginous crops. Its chief minerals are in¬ different coal, good pipe and potter's clay, and excellent sandstone. It has numerous iron-foundries, glass-works, potteries, tanneries, bleach-works, mills and factories of many kinds.

PASADENA, pas-a-de'na. Cal., city in Los Angeles County, on the Atchison, Topeka and Santa Fe, the Los Angeles and Salt Lake and the Southern Pacific railroads, at the head of the San Gabriel Valley, 25 miles from the Pacific Ocean and nine miles northeast of Los Angeles. The Pacific Electric Railway connects Pasadena with neighboring cities, including Los Angeles, the Orange, Riverside and San Bernar¬ dino counties having one of the largest electric railway systems in the world. The city was set¬ tled by Spaniards in 1771. In 1873 a colony from Indianapolis, Ind., settled there and began raising fruit. In 1886 it was chartered as a city. Pasadena is a famous health and winter resort, on account of its equable cli¬ mate and beautiful scenery. It is at the foot of the Sierra Madre range, which protects the city on the north and east, and on the west and south are broken ranges of high hills. It is surrounded with large fruit farms. Pasadena is a residential city, but its manufacturing estab¬ lishments are substantial. They include large packing houses, drying establishments, can¬ neries and flour mills, together with a number of smaller industries. Large

quantities of fruit are exported annually. A unique fea¬ ture of Pasadena is the “Municipal Farm.® Early in its history, the people recognized that the question of sewerage would have to be solved in some unusual way. Far from the ocean and surrounded by hills and mountains, only the wash of Arroyo Seco to depend on for drainage, it seemed as if the beautiful healthful city would soon become the home of disease. The city purchased a ranch of about 300 acres, six miles out, and by means of a large outfall pipe, the flow from the sewers was spread upon this land. About 60 acres were planted with walnut trees, and quite a large acreage was devoted to alfalfa. Enough alfalfa was raised to supply food for the horses of the fire and street departments, and left a large overplus for sale. The prominent public edifices are the churches, schools, hotels, and municipal buildings, and Pasadena Hospital. The educa¬ tional institutions are the Throop College of Technology, the Pasadena Army and Navy Academy, Academy of Holy Names, Nazarene University, Stickney Memorial School of Fine Arts, high school, many fine public and

private schools, and an extensive public library, which has seven branches in various sections of the city. In 1913 Pasadena adopted the com¬ mission form of government. The waterworks ˆnd electric light plant are owned by the city. Pop. (1920) 45,354.

PASARGAME, pa-sar’ga-de, ancient capi¬ tal of Persia. The origin of the name is un¬ known. It was originally borne by one of the most important tribes of Persia to which be¬ longed, according to Herodotus, among other important historical personages, Darius and Cy¬ rus. Cyrus is reported to have built, after his final victory over Astyages, a town which he named Pasargadae, after his own native tribe. And there he erected a palace and a magnifi¬ cent tomb for himself. This historical fact led to the identification of the ancient city which stood upon the Plain of Murghab, some 40 miles northeast of Persepolis on the road forming the principal highway between Shiraz and Ispa¬ han. The ruins are surrounded by the moun¬ tain barrier of the plain, which formed its chief protection against attacks from an

enemy. At Pasargadae the Persian sovereigns were in¬ vested with the insignia of office, in the sanctu¬ ary of the goddess of war. The city being the capital was rich in material wealth and art; and for that reason it was several times plun¬ dered. All this wealth was surrendered in 336 to Alexander, who on his return from India, finding the city had been plundered in his ab¬ sence and the tomb of Cyrus treated in like manner, ordered Aristobulus to restore the lat¬ ter. The description of the tomb given by Aristobulus at this time has made possible its identification with the tomb of the ruins of Murghab. The information furnished by the other historians of this period relative to Pasar¬ gadae agrees with the account of it furnished by Aristobulus. It is quite possible that a town much older than the time of Cyrus existed on the site of Pasargadae and that the conqueror enlarged and beautified it and made it his capi¬ tal, at the same time changing its name. Among the striking buildings of the ruins of Pasar¬ gadae is a massive stone platform or stone-crowned terrace, which bears the modern name of the "Throne of the Mother of Solomon® or sometimes "Solomon's Throne.® This is be¬ lieved by some to have been a royal audience platform erected by Cyrus previous to his at¬ tempts to beautify the city. It may, however, have been used for religious ceremonies of a nature such that it was necessary that they should be performed in public where the assem¬ bled people could view them. In this case the platform structure may easily have belonged to the buildings of an older age than that of Cyrus. Not far away are the remains of an ancient temple, now known as "Solomon's Prison,® and near this are two altars with ruins of edifices. These are of stone and evidently were used in the ancient fire worship. South of these latter is the ruined corner of a once massive building on which is the inscription; "I Cyrus the King the Achaemenian® cut in cuneiform letters in Old Persian, Elamitic and Babylonian. A ruined building nearby bears the same inscription. This latter, a vast edi¬ fice, is now locally known as "Audience (or Reception) Hall.® In this pile of ruins is a shaft over 30 feet high made of limestone. By

some this is supposed to have been the site of a former palace, probably dating to the time of Cyrus. Not far away is a huge limestone monolith, five feet broad, two feet thick and over 12 feet high, on the surface of which is carved a bearded figure supposed to represent Cyrus. The figure is crowned and is depicted with two pairs of wings. The cuneiform in¬ scription that once crowned it leaves no doubt as to the meaning of the carving, for it reads, "I Cyrus the King of the Achaemenians.® This inscription was still in place during the first half of the 19th century and drawings and copies of it of that period are in

existence. But the feature of the ruin in which most in¬ terest has centred is the “Tomb of Cyrus® al¬ ready mentioned. This is a low stone, house¬ shaped building surmounting a sixtier terrace of stone, rising from a base 50 feet long by 40 feet wide. The summit of the monument is 35 feet above the ground; while the tomb proper is 18 feet high, 17 feet broad and 20 feet long. The whole is constructed of a very hard and fine limestone. Near this Tomb of Cyrus are the ruins of a building which was probably the temple and residence of the Ma-gian priests, who were the guardians of the tpmb. The identity of this tomb has been estab¬ lished beyond doubt through the descriptions and records left of it by persons in the train of Alexander who paid the place two visits. Consult Curzon, (Persia and the Persian Ques¬ tion (London 1902) ; Herzfeld, (Pasargadae Untersuchungen zur persischen Archaeologie) (Leipzig 1908) ; Hranische Felsreliefs) (Vol. II, Berlin 1910) ; Jackson, A. V. W., (Persia Past and Present (New York 1906) ; Sykes, (History of Persia) (Vol. I, London 1915).

PASAY, pa’si, Philippines, formerly Pineda, pueblo, province of Rizal, Luzon; six miles southwest of Pasig, the provincial capital. It is on the coast road. Upon application of the municipal council, the name of the town was changed from Pineda to Pasay by the Philip¬ pine Commission in 1901. Pop. about 15,000.

PASCAGOULA, pas’ka-goo’la, Miss., city and county-seat of Jackson County, 38 miles southwest of Mobile, Ala., on the Pascagoula River and on the Louisville and Nashville and the Pascagoula-Moss Point northern railroads. The city is on an inlet of the Gulf of Mexico, which furnishes good anchorage ; is in a pro¬ ductive fruit and lumber district; and has a fish and oyster industry. There are shipyards, and a United States government dock and naval machine shops. Pop. 6,082.

PASCAGOULA RIVER, a river of the State of Mississippi, formed in the southern part of Greene County by the junction of the Leaf and the Chickasawhay rivers. It flows south into Pascagoula Bay, Gulf of Mexico, through an estuary of two mouths. It .is 250 miles long, is navigable for small steamboats for some distance, and is used as the outlet for the pine timber cut in the surrounding region for the New* Orleans market.

PASCAL, pas’kal’, Blaise, French author and philosopher: b. in the old Auvergnat town of Clermont-Ferrand, 19 June 1623; d. Paris 19 Aug. 1662. He belonged to a family con¬ nected with the magistracy, and his father and sisters were all of superior intellectual ability

just as Pascal himself proved to be one of the greatest and most comprehensive geniuses that the world has known. His mother died when he was a mere child. Pascal's intellectual pre¬ cocity soon showed itself and extraordinary stories, perhaps exaggerated by affection and admiration, are told by his sister in her biography. However, in spite of a frail consti¬ tution and over-nervous temperament, he gave himself, as he grew up, not only to social diver¬ sions but to intense intellectual study, especially to mathematics and to physics. His sister de¬ clares that he composed a treatise on sounds at the age of 12; at 16 he wrote an essay on conic sections, and between 1640 and 1642 he invented an arithmetical machine.

In 1646, while living with his . family at Rouen in Normandy, Pascal became converted to Jansenism after an accident to his father, during whose convalescence various Jansenist books were brought into the household. This conversion was, however, not a definitive one to a religious life. He undertook experiments on atmospheric pressure, wrote a study on the vacuum, had controversies with the Jesuits who denied its possibility, and in 1648 he conducted, with his brother-in-law Perier, important ex¬ periments simultaneously in Paris and in Au¬ vergne to determine atmospheric weight. After the death of Pascal's father in 1651 he had a ˆworldly® period until about 1654, during which time he was intimate with people like the Due de Roannez and the Chevalier de Mere. They were not mere men of fashion, but persons of experience and literary appreciation, who un¬ doubtedly helped to transform Pascal's views from those of a secluded student, enlarging his appreciation of the different phases of life, and giving grace and smoothness to his style. Toward the end of this period he renewed many of his scientific experiments, worked at the theory of probabilities, invented the hydrau¬ lic press and certain other practical appliances, besides writing, in all likelihood, a treatise on love. Whether he himselt actually went through an emotional experience is a matter of discussion. The now discredited carriage acci¬ dent at Neuilly in which Pascal came near los¬ ing his life was placed in November 1654. But, whatever the reason, Pascal underwent a new crisis, partly under the influence of his sister

Jacqueline who had become a nun in the Jan¬ senist convent of Port-Royal. This is usually called his ((second conversion.® He now felt the conviction of true faith, and in spite of physical suffering and mental anguish was happy in his sense of mystical insight into Christian belief. At once he stood forth as a defender of Jansenism. In 1656 he began the publica¬ tion of the Provincial Letters, > which are the climax of religious polemic, and. during the rest of his life he was planning his unfinished masterpiece, published as his <Thoughts.) In his last years he bore with stoical firmness bodily pain increased by his ascetic mortifica¬ tions, until his frail form already overburdened by his intellect gave way beneath the physical and mental strain. The transcendent name of Pascal appears in the annals of many branches of intellectual endeavor. To what has been re¬ corded above in physics, religion and philosophy should be added his achievements ranging from the foundations of mathematical calculus to the first establishment of public omnibuses for the

transportation of passengers. But it is in reli¬ gious thought that his fame rests on the most popularly appreciated foundation. His scien¬ tific training led him, even apart from emotional tendencies, to sympathize with the determinism of the Augustinian Jansenists. His scientific achievements go to show that he did not dis¬ dain, as some people assume, the power of rea¬ son, but even as a man of science, his method was synthetic rather than rationally analytic as was the method of Descartes. Pascal distin¬ guishes in his <Thoughts) between the esprit de geometrie and the esprit de finesse, the latter of which partakes of the spirit of synthetic feeling as intuition which often accomplishes so much that cold reason cannot reach.. This tendency comes out strongly in Pascal's own religious views. He is ready to admit the help of the calculation of probabilities in coming to the conviction of God, but ((the heart has its reasons (or arguments) that reason itself does not know,® and these are the direct knowledge, through faith, of the truth of religion. Conse¬ quently, Pascal is impatient at those who, like his early opponent the Frere Saint-Ange, relied on rational proofs alone. To him there was something suprarational, which gave a truer insight and conviction. Incidentally we are also helped to understand why Pascal was willing to use the arguments of the sceptic Montaigne, who, like himself, sought to destroy the pride of reason, though without Pascal's ulterior pur¬ pose. The many sidedness of Pascal's philo¬ sophical genius has caused students to give him different descriptive epithets. Some have nar¬ rowly called him a pyrrhonist or sceptic like Montaigne, because of his destructive criticism of reason. Some have seen in him pre¬

eminently the pessimist; others the .Christian stoic and ascetic. At all events he is the re¬ ligious mystic and ((fideist,® whose certainty was reached as much by argument as by conviction by miracles which he himself had witnessed, like the miraculous healing, from disease of his own niece by the application of a thorn from the crown of thorns. Pascal has been called by some by his critics insane, but even the hard hearted cannot deny the dignity of his struggle against physical and mental suffering and the majesty of his victory. See Provincial Letters.

Bibliography. — The standard edition of Pascal is in the series of the (Grands Ecrivains de la France } and is edited by Leon Brunschvi.cg with the help of P. Boutroux and F. Gazier (14 vols., Paris 1904—14) . Important studies of Pascal are Strowski, F., ˆPascal et son temps) (3 vols., Paris 1907-09) ; Giraud, V., 'Pascal, l'homme, l'oeuvre, l'influence) (1905) ; Bou¬ troux, E., (Pascal J (1900). Consult also passim Sainte Beuve's (Port-Royal, > and in English, Viscount Saint Cyres, (PascaP (New York

1909).

Charles H. C. Wright, Professor French Language and Literature, Harvard University.

PASCAL'S TRIANGLE, also known as FIGURATE NUMBERS, in mathematics, certain series of numbers originally studied by the Chinese and by the Greek geometers in connection with geometric figures, especially polygons and pyramids and used by Pascal to determine the coefficients of the expansion

(a + b)n whenever n is a positive integer. The arithmetical nature of the numbers will be seen from the following table:

The nth number in any row is here the sum of the first n numbers of the preceding row. The figurate numbers proper begin with the third row. The third, fourth, …. rows are

called the first, second . series of figurate

numbers. . The table has the interesting prop¬ erty that its diagonals, extending upward from left to right contain the binomial coefficients, i. e., the coefficients in the expansions of

a + b, (a + b),2 (a + b),3 ….

If instead of the natural numbers 1, 2, 3, … . which form the second row of the table above, we start out with series whose common differ¬ ence is 2, 3, 4, … . we may form other sets of figurate numbers. Thus :

1

3

5

7

9 …

I. 1

4

9

16

25 …

II. 1

5

14

30

55 …

III. 1

6

20

50

155 …

or

1

4

7

10

13 …

I. 1

5

12

22

35 …

II. 1

6

18

40

75 …

III. 1

7

25

65

140 …

The name figurate, as already intimated, is derived from the fact that the series I and II are connected with arrangements of points in a plane or in space. Thus in the following ar¬ rangement, obtained by constant enlargement of a triangle.

• • •

• • • •

• • • • •

the number of points in the successive horizon¬ tal rows is 1. 2. 3, 4, 5, … . and the total number in the first one, two, three, . .

rows is 1,3, 6, 10, 15, . . … the series I of the first table. If the start is made from a

square, instead of a triangle, the resulting num¬ bers are 1, 4, 9, 16, … . being series I of the second table. In the same way series I of the third table corresponds to the case of a pentagon; and so on. The several series I are known as the triangular, square, oentagonal, …. numbers, and collectively as polygonal numbers. The series II corresponds in the same way to pyramids in space (e.g. piles of round shot), and are called pyramidal numbers. The general formula for the nth number of the polygonal series for polygon of r sides is

i[(r — 2)n* — (r — 4)n] ; the corresponding pyramidal number is ifen(n + 1) [(2n + 1) (r — 2) — 3 (r — 4)].

Consult Pascal, B., (Traite du triangle arithmetique) (Paris 1665) and Maire, Albert, (L'CEuvre scientifique de Blaise Pascal : Bibliographie critique et analyse) (ib., 1912).

PASCHAL I, pas'kal (Latin, Paschalis, pas=ka'lis), Saint, Pope: b. Rome; d. 10 Feb. 824. He was abbot of Saint Stephanus and succeeded Stephen V in 817. He crowned Lothaire, son of Louis le Debonnaire, emperor in 823. Consult Mann, H. K., (Lives of the Popes) (Vol. 2, London 1906).

PASCHAL II (Raniero, ra-ne-a'rd), pope: b. Bieda, Tuscany, about 1050; d. 21 Jan. 1118. A Cluniac monk, he came to Rome and was there made a cardinal. He succeeded Urban II in 1099, but was opposed for a time by the anti-pope, Clement III. He had a long contest with the Emperor Henry IV, and also with Henry I, king of England, respecting the right of investiture. When the former visited Rome, to be crowned by the Pope, the latter refused to perform the ceremony unless Henry yielded the matter in dispute. Thereupon Henry caused Paschal to be seized by his troops, but the Romans rose in behalf of their pontiff, and Henry retired from Rome, but carrying the Pope with him. After a captivity of two months, Paschal under pressure of durance, conceded in part the emperor's claim to the right of the investiture ; but this concession was afterward canceled in two councils. Con¬ sult Franz, E., (Papst Paschalis IP (Bresleau 1877) ; Monod, B., (Essai sur la rapport de Paschal II avec Philippe P (Paris 1907).

PASCHAL I, anti-pope : d. 692. He was a Roman archdeacon elected by a portion of the Roman populace and supported by the exarch of Ravenna in 687. Still another portion ad¬ hered to Theodorus II, but Sergius I was finally declared successor of Conon in the pon¬ tifical chair. Paschal was then pronounced a magician, arrested and shut up

in prison where he died in 692.

PASCHAL III (Guido di Crema, gwe'dd de kra'ma), anti-pope: b. Lombardy; d. Rome, 20 Sept. 1168. He was nominated in opposition to Alexander III in 1164, through the influence of the Emperor Frederick I (Barbarossa) and assumed the name of Paschal III. He con¬ tinued in power while Alexander was absent at Benevento. . He canonized Charlemagne at the request of Frederick, but this action was not ratified by the Church.

PASCHAL CHRONICLE (Lat. Chronicum Paschale, also Chronicum Alexandrinnm, Constantino politanum, or Fasti Siculi), a

chronicle named from being based upon the Easter canon, containing an outline of events from Adam to 629 a.d., arranged in chronolog¬ ical order. It is believed to be the work of a Byzantine author who compiled it in the reign of Heraclius (610-41), using earlier records, except that the last 30 years appear to have been written from a personal knowledge of contem¬ porary history. The work has many faults and the earlier chronicles are imperfect but it never¬ theless constitutes a valuable record. The manuscript copy in existence was made in the 11th century and is in the Vatican library. It was published in Dindorf's (Corpus scriptorum historia byzantinae) with a preface and com¬ mentary by Du Cange (1832) ; and in Minge s (Patrologia graeca) (xcii). Consult Gelzer,

< Sextus Julius Africanus und die byzantinische Chronographie) (1885) ; Van der Hagen, (Observationes in Heraclii imperatores methodum paschalenP (1736) : Krumbacher, (Geschichte der byzantinischen Litteratur) (1897).

PASCHASIUS, pas-ka'sT-us, Radbertus, or RADBERT-PASCHASE, French theological writer: b. Soissons, about 786; d. Saint-Riquier, 26 April 865. He entered the monastery of Cor¬ bie in 814, and subsequently became its abbot, a position he resigned about 851 in order to give his full attention to literary labors. He then retired to

Saint-Riquier. He was a member of the Synod of Paris and in. 849 he attended the Assembly of Chiersy in his capacity as abbot. Author of (De Corpore et Sanguine Domini ; (Exposito in Lamentationes JeremiaP ; (De Fide, Spe et Caritate) ; <De Partu Virginis) etc A collected edition of his works was edited by Sirmond (Paris 1618).

PASCO, Samuel, American soldier and politician: b. London, England, 28 June 1834; d. 13 March 1917. His family emigrated to Prince Edward Island and finally settled in Massachu¬ setts. He studied at Harvard University, receiv¬ ing his M.A. in 1872. From 1859-61 he was prin¬ cipal of the Waukeenah Academy. In the Civil War he served in the Confederate Army in the 3d Florida Volunteers and was wounded and cap¬ tured at Missionary Ridge in 1863. After the war he resumed his position at the Academy and in the following year moved to Monticello, Fla., where he was clerk of the Civic Court. In 1868 he was admitted to the bar and began his political career. From 1876-88 he was chair¬ man of the Democratic State Committee; was president of the Constitutional Convention of 1885 ; a member of the Florida legislature in 1887 ’and speaker of the house of representa¬ tives. In 1880 and 1908 he was a presidential elector and served as United States senator from 1887-89. He was also a member of the Democratic National Committee 188ˆ]9W mid of the Isthmian Canal Committee 1897-1905 From 1910-11 he was appointed commander of the Florida division of the U.C.V. with the title of major-general, and was then made honorary commander for life.

PASCO, a city in Peru. See Cerro df.

Pasco.

PASCUAL LOPEZ is the ˆautobiography of a medical student of Santiago” written by the Condesa Emilia Pardo Bazan. This work which appeared in 1879 belongs to that famous Span¬ ish family of picaroon tales whose immortal an¬ cestor (Lazarillo de Tormes) furnished a model

for so many European works. (Gil Bias* is his cousin on the French side and <<Cypriano> of Calderon’s (Magico Prodigioso’ is his

Spanish prototype. Pascual, however, being a modern, does not sell his soul to the devil, but to a pro¬ fessor of chemistry who in the popular mind is on intimate terms with the ((old up.* . 1 ascual is one of the most finished rascals in literature. He is no moral prig who having mended his ways recounts in maturer years the escapades ot his youth. He leaves us as unregenerate as he was when we first met him. . A shiftless, stu¬ pid, ungrateful scapegrace he is, yet always win¬ ning. His elastic conscience permits him to borrow hard earned pennies with one hand and distribute easily won dollars with the other. His good angel «Pastora» seems many a time on the point of making Pascual a useful member of society, but all his attempts at reform are extremely shortlived. -His language is full of picturesque student slang and smacks of the soil of Galicia. It is in the stories of her own Galicia when she is not preoccupied with natu¬ ralistic formulas that Pardo Bazan is at her best. Here she is mainly concerned with her story which is exciting enough to satisfy the most adventuresome taste. A critical estimate of this novel may he found in the collected works of Pardo Bazan. There is an American edition annotated by W. I. Knapp, published by

Ginn and Company.

Samuel M. Waxman.

PASDELOUP, pa'd'-loo, Jules Etienne,

French musical conductor: b. Paris, 15 Sept. 1819; d. Fontainebleau, 13 Aug. 1887. He was educated at the Paris Conservatoire, where he was awarded the first prize for solfege in 1832, and for piano in 1834. He founded in 1851 an orchestra whose members were gathered from the Conservatoire students and through his pro¬ duction of the best new compositions did much to awaken popular appreciation of them. In 1861 he began the popular Sunday concerts which he continued for 23 years, ˆgovernment granting him a yearly subsidy of 25,000 francs. He was a member of the Legion of Honor.

PASENG, a Persian name of the male of the wild goat, whence have sprung the domestic races; the female is called Hioz." See Goat.

PASHA, pash'a, BASHA, a title of rank in Turkey; formerly an

honorary title of a prince of the blood; latterly a title of the higher mili¬ tary and civil officials. The badge of the pasha was originally a horsetail waving from the end of a lance, which was crowned with a gold or silver ball. There are three military grades of pasha; and these are symbolized by the number of horse tails borne before the pasha on state occasions. Admirals and governors may have the title of pasha which is bestowed also upon other servants of the government, or rather of the Crown, by whom the honor is given and by whom alone it may be taken away. Originally a tail on the end of a lance was borne before the Mongolian chief as a sign of his rank and by way of a standard. Now three tails are the symbol of a general in chief; two tails, of a general; and one tail, of a brigadier.

PASHICH, PASHITCH or PASITCH, pashich, Nicola, Serbian statesman: b. Sait-char, 1846. He studied at Belgrade and at Zurich, afterward practising as an engineer. He fought in the Turkish War in 1876-78, and

later became a leader of the Radical party. He was implicated in a plot against King Milan and was exiled in 1883-89, when he was per¬ mitted to return to Serbia. He later became mayor of Belgrade and in 1891-92 he was Prime Minister. He was Ambassador to Rus¬ sia in 1893-94 and in 1899 was again convicted of plotting against King Milan, but was par¬ doned. He was Minister of Foreign Affairs in 1904-05 and Prime Minister in 1906-08. He was credited with piloting his country through the Austrian crisis of 1909 and was again ap¬ pointed Prime Minister in 1912. He resigned in 1913 because of criticism concerning his Bul¬ garian policy, but was pursuaded to reconsider his decision and remain at his post. His min¬ istry was overthrown in May 1914 but the op¬ position had not the strength to form a min¬ istry and he was recalled. He was in office during the Austrian crisis of 1914, terminating in the European War and remained in power during the enforced flight of the government from Belgrade to Corfu and its return to Bel¬ grade after the signing of the armistice.

PASHKOFF, pash'kof, Vasili Alexan-drovitch, Russian religious reformer : d. Paris, 8 Feb. 1902. He was a member of the Russian aristocracy, a colonel of the Imperial Guard and a personal acquaintance of Alexander II. In 1874 he became interested in the preaching of Lord Radstock and finally accepted that noble¬ man's views of Christianity. From that time he devoted his life to evangelical work, opened his palace to all classes for religious meetings at which he preached, and founded several or¬ ganizations tor religious study. He required none of those who accepted his views to leave the national church, but merely to live the sim¬ ple life of early Christianity according to the principles of the Gospels. He devoted almost all his fortune to helping the poor and unfortu¬ nate. After the death of Alexander II who had favored him, his preaching was condemned as ˆprejudicial to the state® ; his public meet¬ ings were prohibited and he was finally exiled. He continued his work in England, Austria, Rome and Paris till the time of his .death and the (<Pashkovski Sect,® which he had founded in Russia, still continued its work to a certain extent. He had a very large following in Rus¬ sia. Consult Eclectic Magazine vol. 139, 3d series, pp. 344-350.

PASHT. See Bubastis.

PASIG, pa'sig, Philippines, pueblo, capital of the province of Rizal, Luzon ; on the north¬ west shore of the Laguna de Bay at the mouth of the Marisquina River, eight miles east of Manila. It suffered considerable damage by fire and otherwise during the Filipino insur¬ rection of 1897 and only a few of the stone houses remained standing. It is an important road centre and has a large trade. Pop. 25,000.

PASIG, the outlet of the Bay Lagoon (q.v.) into the Bay of Manila, at the city of Manila, length 10 miles. It has several important tribu¬ taries, is navigable for native boats and light craft and is the chief means of communication between Manila and the Bay Lagoon and the provinces on its shores.

PASINI, pa-ze'ne, Alberto, Italian painter: b. Busseto, near Parma, 1820; d. Turin, 1899. He began his career as a lithographer, but sub¬

sequently became the pupil of Theodore Rous¬ seau and other artists at Paris and formed his style as a painter of Oriental genre in the course of travels through Turkey and Persia. He has also admirably caught Spanish atmospheric effects and customs. He was eminently suc¬ cessful in his chosen department of art and rivals the best French

artists of the Oriental school in the brilliance and truthfulness of his pictures, a good specimen of which, (Entrance to a Mosque,* hangs in the New York Metro¬ politan Museum. His works differ very greatly from the tendency of the modern school of painting in that they are executed with great care and in fine and elaborate detail.

PASIPHAE, pa-sif'a-e, in Greek mythol¬ ogy, the daughter of Helios, the sister of Circe and the wife of Minos. Minos failed to per¬ form certain vows and Poseidon caused her to become enamored of a bull. She was the mother of the Minotaur. See Dˆdalus ; Minos and Minotaur.

PASKEVITCH, pas-kye'vich, Ivan Fedorovitch, Count of Erivan, Prince of Warsaw, Russian field-marshal : b. Pultova, Russia, 19 May 1782; d. Warsaw, Russia, 1 Feb. 1856. He was a page at the court of Emperor Paul and in 1800 entered the army, where he rapidly won distinction and under Yermolaff in 1826 he waged such successful war against the Persians that he succeeded to the command in the follow¬ ing year. He conquered the fortified Armenian towns of Etchmiadzin, Nakhitchevan and Erivan and in 1828 concluded the peace of Turkman-tchai. In 1828-29 he made two successful cam¬ paigns against the Asiatic Turks and took Kars, Erzerum and other strong places. He was made Count of Erivan and a field-marshal in 1830 and in that year crushed an uprising in Poland, where he was in command. In 1831 he succeeded to the chief command of the ar¬ mies in Poland and though his rule was severe there was no uprising even in the troubles of 1848-49, when Paskevitch stopped the interven¬ tion of Hungary in behalf of the Poles by marching 200,000 men into Hungary itself. He succeeded to the command of the Russian army in 1854, but resigned after meeting reverses at Silistria. Consult Tolstoy, (Essai biographique et historique sur le Field-marechal Prince de Vasovie (Paris 1885).

PASLEY, pa'sle, Sir William Charles,

British general and military engineer : b. Esk-dale Muir, Dumfriesshire, 8 Sept. 1780; d. Lon¬ don, 19 April 1861. He was educated at the Royal Military Academy at Woolwich and in 1797 was commissioned second-lieutenant in the Royal Artillery. He was transferred to the Royal Engineers in 1798 and served in Minorca, Malta, Naples and Sicily, reaching the rank of captain in 1805. He later served in the defense of Gaeta against the French and in Spain and Holland. He was in command of the Plymouth Company of Royal Military Artificers in 181 1— 12, and in 1812-41, he was director of the Royal Engineer establishment at Chatham. He was knighted in

1846 and became general in 1860. He was connected at various times with military schools, in the improvement of which he was deeply interested; and as a writer on military engineering he performed notable service to his profession. Author of (Essay on the Military Policy and Institutions of the British Empire)

(1810) ; (Military Instruction (3 vols., 1814— 17) ; (Practical Operations of a Siege) (2 vols., 1829-32) ; (Limes, Cements, Concrete, etcP

(1838), *etc.*

PASPALUM, a genus of grasses; the car-petgrasses. See Grasses of the United States.

PASQUE FLOWER, a hardy perennial herb (Pulsatilla pulsatilla) of the family Ra-nunculacece. It is a native of Europe in stony places and well drained soils, and has been in¬ troduced into gardens in cool climates as an ornamental plant. It is very hairy, bears tripin-nately divided leaves upon slender stalks and blue or reddish-purple blossoms which are often more than two inches in diameter. Its name, “pasque,® is the old French for Easter, about which time it blossoms, a habit which has made the plant a favorite in old-fashioned gardens. Its petals are often used to color Easter eggs. Several other species of the genus have been called by this name, notably the American pasque flower (P . patens), common in low ground in the northern central United States.

PASQUIN, pas’kwin, PASQUINO, or PASQUINADE, a lampoon or short satirical publication, deriving its name from Pasquino, a tailor who lived in Rome in the 15th century. He was celebrated for his wit and satire. After his death a mutilated or broken statue was resurrected and placed near his shop, and on this were posted all satires, rhymes, libels, etc., hence the name pasquin or pasquinade. The Roman populace made use of these satires to express themselves in a manner that was pro¬ hibited by laws against the freedom of speech.

PASS CHRISTIAN, Miss., town in Harri¬ son County, on Mississippi Sound, and on the Louisville and Nashville Railroad, 75 miles southwest of Mobile, Ala. It is one of the larg¬ est and most popular winter resorts on the Gulf of Mexico, the winter temperature averag¬ ing 60° F. It has a water front of over six miles, along which extends a shell-paved avenue, lined with magnolias and live oaks. There are also numerous promenading and fishing piers, and facilities for boating and bathing. It is in an agricultural and livestock raising region, and has a packing establishment and a large oyster business. Pop. about 2,500.

PASSAGLIA, pas-sa'ya, Carlo, Italian theologian: b. Lucca, 2 May 1812; d. Turin, 12 March 1887. He was educated at Rome, be¬ coming a Jesuit at 15; in 1844 became professor at the Collegium Romanum. Four years after¬ ward he was exiled from Italy by the expulsion of the Jesuits, but returned to Rome in 1849 and founded the (Civilita Cattolica. ˆ In 1853 he published a three-volume defense of the dogma of the Immaculate Conception, in which he was a firm believer. But in spite of his orthodoxy his allegiance to the Pope faltered on the question of temporal power; in 1858 he left the Jesuit Order, aroused by the ideal of Italian nationalism, and attacked the position of the Pope in his famous letter, 'Pro Causa Italica ad Episcopos CatholicosP which was put on the (Index. > Passaglia left Rome and in 1861 became professor of moral philosophy in the University of Turin. His organ (1862-66), II Mediatore, renewed the attack on the tem¬ poral power of the Pope. He was a member of the first Italian Parliament, in which he

attempted to form a liberal Catholic party. Consult Biginelli, 'Life of Passaglia. >

PASSAIC, N. J., city, in Passaic County, on the Passaic River, and on the New York, Sus¬ quehanna and Western, the Erie and the Dela¬ ware, Lackawanna and Western railroads, about 10 miles northwest of New York City. It was settled in 1692, and until 1852 was called Aquackanonk Landing. It was incorporated as a village in 1869 and in 1873 was chartered as a city. It is near the scene of several of the engagements of the Revolutionary War; Wash¬ ington crossed the Passaic River at Aquack¬ anonk Landing in 1776 when he was retreating through New Jersey. Passaic is both a manu¬ facturing and a residential city. The good water power which was available had a great influence in attracting industries to the city, and the water is such as to be of great value in the bleaching and dyeing industry.

Eighteen thousand persons are employed in the various industries, which have a capital of $48,000,000 and whose products are valued at $53,000,000 per year. The largest industry in the city is the manufacture of woolen and worsted, closely followed by cotton and linen. Passaic manu¬ factures more textiles than any other city in New Jersey, and one-third of the handkerchiefs made in the United States. Other large in¬ dustrial establishments are rubber works, silk mills, bleacheries and dye works, chemical works, belting and packing plants, leather and metal works. Twelve grade schools and one high school, recently erected at a cost of over $300,000, comprise the public school system. There are also five parochial schools and one private school. There are six parks in the park system, and all are being rapidly developed. Public playgrounds are maintained in the vari¬ ous parts of the city. The commission form of government has been in force since 1911. The assessed valuation in 1918 was over $50,000,000. Pop. (1920) 63,824.

PASSAIC, a river of New Jersey, which rises near Morristown, in Morris County, flows first south, then east on the line between Mor¬ ris and Somerset counties, then northeast be¬ tween Morris and Essex counties, crosses a corner of Passaic County and flows south into Newark Bay. It is about 100 miles long and navigable for small vessels as far as Passaic (about 11 miles). At Paterson there is a fall of 72 feet, about 50 feet of perpendicular de¬ scent. The extensive water power has been utilized for manufacturing, and by means of dams and canals has been distributed to many manufactories.

PASSAMAQUODDY (pas-a-ma-kwod'i) BAY, an inlet of the Bay of Fundy, forming a part of the boundary between Maine and New Brunswick, 12 miles long and eight miles wide at the entrance. It receives the waters of the Saint Croix River. It is deep, sheltered by several islands lying at the entrance and affords excellent harbors. The fisheries also are im¬ portant. The rise of the tide averages 25 feet. Eastport, Maine, is on one of the islands at the mouth.

PASSAMAQUODDY INDIANS, an

American tribe of the Algonquin family, re¬ siding in the vicinity of Passamaquoddy Bay and the Saint Croix River in Maine and in

New Brunswick. During the period of the co¬ lonial wars the tribe fought with the French. The word Passamaquoddy is said to mean the (<place where there are plenty of pollock." The people of this tribe who, in historical times at least, were never very numerous, belonged to the Abnaki confederacy and were linguistically very closely related to the Malecite. The Penobscot and Passamaquoddy tribes have in the Maine legislature a representative who is allowed to speak only on matters concerning the interests of the Indians of these two tribes, and especially of the reservations. There are from 400 to 500 Passamaquoddy Indians in the United States and a somewhat smaller number in Canada.

PASSAROWITZ, pas-sa'ro-vits, or POS-SCHAREWATZ, po-sha're-vats, Servia, a town, near the Morava, 10 miles south of the junction of the Morava and the Danube, at the foot of Sopot Mountain, and about 35 miles southeast of Belgrade. Pop. about 14,000. It is capital of an administrative department of the same name, with an area of more than 1,600 square miles and a population of 231,029. The city was the scene of negotiations for a peace between Turkey on one side and Austria and Venice on the other, 21 July 1718, by which Austria got Temesvar, Belgrade and part of Servia, Venice's rights in Herzegovina, Albania and Dalmatia were recognized, and the Morea was restored to Turkey. Passarowitz was cap¬ tured by the Germans in 1915.

PASSAU, pas'sow, Germany, a town of Lower Bavaria, in a mountain defile at the con¬ fluence of the Ilz, Inn and Danube, 91 miles by rail east-northeast of Munich. It stands on the southeast frontier of the republic and consists of four parts — Passau proper, on the tongue of land between the right bank of the Danube and the left bank of the Inn ; Innstadt, on the right bank of the Inn ; Anger, a suburb on the left bank of the Danube, adjoining it Oberhaus, a fort strongly situated on a height 417 feet above the river; and Ilzstadt, also on the left bank of the Danube, but likewise traversed by the Ilz. Intercommunication is provided by numerous bridges. The principal buildings are the cathe¬ dral, a handsome modern structure in the Ital¬ ian style, with a bell-shaped cupola ; the bishop's palace; church of Saint Michael; the Jesuit College, now converted into a lyceum ; the townhouse, gymnasium and library, the school of agriculture and the Training School for Teachers. The manufactures consist of iron, copper and earthenware, porcelain, crucibles. There are also several extensive breweries. Passau is an old town and is famous for the treaty signed in

1552, when Charles ‘V., intimi¬ dated by the victories of Maurice of Saxony, was compelled to recognize the. Protestants and to grant them religious toleration. Pop. about

22,000.

PASSAVANT, pa-sa-van, William Alfred,

American Lutheran clergyman : b. Zelienople, Pa., 9 Oct. 1821 ; d. 3 June 1894. He was graduated from Jefferson College in 1840, from the Lutheran Theological Seminary, Gettysburg, in 1842, was ordained in the same year and accepted a pastorate in Baltimore, Md. He was in charge of a parish in Pittsburgh 1844-55, after which he devoted himself entirely to edi¬ torial and philanthropic work. He founded

numerous hospitals and orphanages in different cities and, co-operating with A. Louis Thiel, founded in 1870 Thiel College at Greenville, Pa. He labored assiduously to secure funds for these institutions, collecting, it is estimated, over $1,000,000 for them. The Order of Deacon-nesses was introduced by him into the United States. He edited the Missionary at Pittsburgh (1845-61) till it was merged with the Lutheran, of which he was coeditor, and in 1880 he founded the Workman at Pittsburgh, of which he was editor until his death. Consult Ger-berding, G. H., (Life and Letters of W. A. PassavanD (Greenville, Pa., 1906).

PASSE (pa-sa) INDIANS, a South Amer¬ ican tribe of the Arawakan family, formerly very numerous in northwestern Brazil, but now as a tribal organization nearly extinct through absorption into other tribes and crossing with the whites. The race is noted for handsome figures, fine features and bright complexions, nearly approaching the Caucasian type. They have a powerful native priesthood and bury their dead in circular graves. They have al¬ ways been friendly to the whites and are a peaceful, industrious race. Many of them lived in the mission villages in the 18th century.

PASSENGER PIGEON, the American

wild pigeon (Ectopistes migratorius) , so named from its former conspicuous habit of passing from one part of the country to another in im¬ mense flocks. These movements were not migratory in the proper sense of the term, how¬ ever, except in the northern parts of

the birds' range, but were movements en masse in search of food. These birds were resident through¬ out the year south of Canada and the most northern States, which they were compelled to leave in midwinter when the ground was covered with snow. Early travelers and ob¬ servers astonish us by their accounts of the immense numbers of these pigeons which used to move about the forested interior of the country previous to its general settlement, state¬ ments confirmed by records and recollections of men still living. Audubon once computed that the continuous stream of pigeons he saw on one of many occasions included more than 1,100,000,000 birds, and would consume more than 8]/2 million bushels of grain daily.

These enormous numbers do not appear to be at all exaggerated from the actual details of the case. Wilson similarly calculated that a flock observed by him was 240 miles long, and numbered 2,230,272,000 pigeons, while the food-supply was estimated at 17,424,000 bushels of grain a day.

In fact, however, grain became the food of pigeons only after fields of rice, wheat, oats, etc., began to be planted, and never formed an extensive part of the feed, since the birds did not settle upon and attack the growing or ripen¬ ing fields, but only gleaned among the stubble. Their food consisted mainly of the smaller acorns and thin-shelled nuts, especially beech¬ nuts, and .a variety of berries and small fruits; and where such material was plentiful they gathered in vast congregations, which thronged upon the trees, until branches would break with their weight, and covered the ground so thickly, turning over the leaves in search of something to eat, that the moment one rose upon the wing another was ready to take its

place. The pigeons would remain at such "roosts® as long as the food-supply held out, and in May or early June would make their nests in company, sometimes so loading the trees that they would break down. The nests were rude platforms of twigs, holding two roseate white eggs, or sometimes only one.

Such congregations were more often seen in the Great Lakes region than elsewhere, and there, in the first two-thirds of the 19th century, settlers would gather and kill or catch the birds in great quantities, while the wild carniv¬ orous animals from far and near would as¬ semble to the feast. At first the killing was done only for home needs, each family per¬ haps salting a few barrels of the bodies; but later, when transportation facilities improved, large numbers were taken and packed for sale elsewhere; and other large numbers were cap-turd alive especially of the young, by being tolled into pens by spreading food, and then transferred to other enclosures, where they were kept and fattened for market. Men made a business of this, going from place to place wherever pigeons abounded, and sometimes capturing 200 dozen or more in a day. Audu¬ bon records that in 1805 he saw schooners at the wharves in New York city loaded in bulk with pigeons caught up the Hudson River and sold for one cent each. In addition to this market use, a very large demand arose among so-called sportsmen for pigeons to be shot at when released alive from spring-traps merely as an amusement and test of marksmanship. As many as 20,000 were used on a single occasion in some "tournaments® before this reprehensible form of recreation could be prohibited by en¬ lightened public sentiment crystallized into law. This incessant slaughter and persecution, to¬ gether with the clearing away of large acres of forest, rapidly destroyed the pigeons, the disappearance of which was greatly hastened by a series of very cold winters and late, stormy springs between 1860 and 1870. Under the pro¬ tection of the game laws the bird seems gradu¬ ally becoming more numerous in its old haunts, and may revive in considerable numbers, since food remains abundant for it, and natural enemies are diminished.

The passenger pigeon has a total length in the male of 17 inches, one-half of which be¬ longs to the narrow, gracefully pointed tail. The female is much smaller. The upper parts generally are a variable blue, the neck richly glossed with metallic golden violet, and the lower purplish or brownish red, fading behind into a violet tint, nearly white beneath the tail. The wing-quills are blackish, with a bluish bor¬ der, and the wing-coverts obscurely spotted. The middle ones of the 12 tail-feathers are brown, the others pale blue on the outer web and white on the inner web. The wings are long (eight and one-half inches) and pointed, and the flight of the bird remarkably swift and powerful, rivals that of the homing pigeon, which in general this bird resembles as a type of the Columbidce.

This species was never known west of the eastern border of the plains, but originally oc¬ curred through all eastern North America as far

north in summer as Hudson Bay.

Consult Wilson, Audubon, Godman, Nuttall. DeKay. Richardson and early American writers generally; and Baird, Brewer and Ridg-vol. 21 — 24

way, ‘Birds of North America^ (1874) and Mershon, W. B., ‘The Passenger Pigeon’ (New York 1907); Stewart Baker, ‘Indian Pigeons and Doves> (London 1913). See Pigeon.

PASSENGERS. See Common Carrier.

PASSERE.S, or PASSERIFORMES, a

group of birds comprising over half of all classified birds. In its subdivisions of families, genera, species and subspecies, it embraces the greater number of the small, familiar and pre¬ dominantly migratory or passing birds, more or less related to the ordinary house sparrow. See Ornithology.

PASSI, pas’se, or PASSY, Philippines, town, province of Iloilo, island of Panay, at the junction of the Malinao and Jalaur rivers; 25 miles north of Iloilo, the provincial capital. Pop. about 15,000.

PASSING-BELL, the bell sometimes rung to call for the people’s prayers for the dying in their hour of agony. The usage of tolling a bell while the soul is said to be “passing® from earth is at least as old in England as the days of the Venerable Bede (673-735), who tells us that at the death of Saint Hilda, one of the nuns of a distant convent, as she was sleeping thought she heard the sound of the passing-bell calling her and her companions to prayer.

PASSINI, pa-se’ne, Ludwig, Austrian painter: b. Vienna, 9 July 1832; d. 1903. He was the son of the copper-plate ? engraver, Johann Passini, and under his father’s direction pursued his art studies at the Vienna Academy. In 1850 he went with his parents to Trieste and later to Venice, where he devoted himself to painting in water-colors. In 1855 he took up his residence in Rome and began his series of architectural pictures, and interiors with figures. From 1873 he lived at Venice, and the brilliant aquarelles which he there execute! reveal a remarkable talent for delineating racial types and a profound sympathy with the life and spirit of the common people. His masterly technique has commanded the admiration of critics and been the model and inspiration of younger artists. He discovered artistic

beauties in Venice, which other artists had passed by unnoticed, and he was largely instrumental in making them known. He was also a good portrait painter. Among his principal works are ‘The Choir of Saint Peter’s Church* (Ber¬ lin National Gallery); ‘The Catechism*; ‘The Girls’ SchooP ; (Vespers in Saint Paul’s at Rome.* He has also painted some clever por¬ traits in water-color, notably that of the Em¬ press of Austria. He is undoubtedly the first water-color painter of his country. ‘The Tasso Reader) ; ‘Pumpkin Vender) (Vienna Mu¬ seum) ; ‘Curious People on a Bridge* (Breslau Museum) ; (Mass at Chioggia> (Metropolitan Museum, New York).

PASSION, suffering, applied especially to the sufferings of Jesus, which are solemnly commemorated by Christian churches every year. Good Friday is the anniversary of the crucifixion, as Easter Day is of Christ’s resur¬ rection, these days being led up to by the whole season of Lent (q.v.), the seven and a half weeks preceding Easter (q.v.).

PASSION CROSS, a form of the Latin cross having a long stem and short traverse near the top, supposed to present the proportions of

the cross upon which Christ suffered. It is used in Christian churches, and in the Roman Catholic Church often bears a representation of the figure of Christ. A passion cross ele¬ vated three steps, or degrees, is called a cross of Calvary; the three steps being explained by heralds as signifying hope, faith and charity.

PASSION FLOWER, a plant of the genus Passidora, of the family Passifloracece. The species, of which about 100 have been described, are mostly natives of tropical and subtropical America, a few extending as far north as Pennsylvania, and a few natives of the Aus¬ tralasian Archipelago. The great majority are vines, but some are herbs, shrubs and trees. They are characterized by variously lobed, simple, alternate leaves with axillary tendrils ; and perfect flowers of remarkable shape and often of high coloring, though green and’ yellow are the prevailing tints. The early Spanish settlers in America are responsible for the popular name of these plants. They fancied the

flower to typify the passion of Jesus; the 10 colored parts of the floral envelope being supposed to represent the apostles, with the ex¬ ception of Peter and Judas Iscariot; the showy corona of filaments suggesting the crown of thorns, or, to some, the halo ; the five stamens typifying the wounds in Jesus' hands, feet and side; the three styles representing the nails, and the column from which the stamens and pistil arise, the pillar used in the scourging. Other parts of the plant were similarly treated, for example, the pointed leaves symbolized the spear-head, and the tendrils, the cords. (Con¬ sult Folkard, (Plant Lore, Legends and Lyrics).

A large number of the species are cultivated in greenhouses. They are graceful in foliage, and their large, often showy flowers, borne singly in the axils of the leaves or in axillary racemes, are valued as curiosities. They vary in their ease of propagation and cultivation, some being easy to raise from seed, some from cuttings, *etc.* Several are hardy out of doors as far north as Washington, D. C., others tender even in the Gulf States.

Among the best known are P. incarnata, pop¬ ularly called Maypop, and P. lutea. The former is a well-known weed from Pennsylvania south¬ ward and westward ; the latter from Pennsyl¬ vania southward. Both are cultivated for orna¬ ment in gardens and greenhouses. The fruit of maypops is edible. P. quadrangularis is a trop¬ ical American species commonly called granadilla. . Its fruits are highly prized in the West Indies and southern Florida. Several other species bear edible fruits ; for example, P. edulis, sometimes erroneously called granadilla; P. lauri folia, the water lemon or Jamaica honey¬ suckle ; and P. alata; all South American species.

PASSION MUSIC, the musical rendering of certain portions of the Catholic Church's liturgy in the week preceding Easter, now called, but improperly, by non-Catholics, Pas¬ sion Week, its proper name being both in the Latin and the Eastern church Holy Week — Hebdomas (or Septimana) sancta, major, etc., and dfido gag dyia , /. ityah , *etc.* In the calendar of the Latin Church, Passion week is the week which begins with Passion Sunday (Dominica Passionis) , the fifth Sunday of Lent: the sixth Sunday is Palm Sunday (Dominica in Palmis,

kopTt] to)v f3cuov) in the Latin and Greek churches. On that day the history of our Lord's Passion, as recounted in the Gospel of Matthew, is chanted alternately by three clerks in holy orders, one rendering the

narrative portion (evangelista) , another the words spoken by Jesus (Christus) , the third those spoken by the apostles, the high priests, *etc.* In the afternoon or evening of the Wednesday, Thursday and Friday of Holy Week the office of Matins and Lauds is chanted, the most striking feature of the musical service being the rendering, on Holy Thursday and Good Friday, of the Lamentations of the Prophet Jeremiah in most appropriate plain-chant melodies ; this service is called Tenebrce because by gradual extinguishment of all the lights the interior of the church is left in darkness. In the morning service of Holy Thursday (Maundy Thursday) is chanted the hymn of triumph,

Pange, lingua, gloriosi corporis mysterium,

Sanguinisque pretiosi quern in mundi pretium

Fructus ventris generosi Rex effudit gentium.

On Good Friday, in the morning service, the history of the Passion according to Saint John is chanted. Deeply impressive, in the service of this day, is the dramatic rendering of the Improperia or ˆreproaches® of Jesus to the Jew¬ ish people, while the clergy and people are do¬ ing reverence to the representation of the Cruci¬ fied : ((Popule mens, quid feci tibi? aut in quo contristavi te? *etc.* — ((My people, what have I done to thee, or wherein have I vexed thee?® and this strophe of one chanter is taken up by a second with : “Quia eduxi te de terra Aigypti parasti crucem salvatori tuo .® After each im-properium one choir chants, in the Greek lan¬ guage, ((Holy God,® to which a second choir responds (<Holy God® in Latin : then alternately in Greek and Latin the two choirs chant <(Holy Strong,® ((Holy Immortal, have mercy on us.® In the morning service of Holy Saturday the grand prose composition, Exultet, is sung to the finest melody in the whole repertoire of church music.

PASSION-PLAY, a species of mystery-play which was exceedingly popular in the Mid¬ dle Ages. It was acted in Holy Week. Such plays were frequent in Provence, northern France and Italy, Spain, Portugal and England. After the Reformation they were repressed in Germany excepting in those regions where the population still remained faithful to the Roman Catholic Church, that is, in Bavaria, the Tyrol and the Salzburg Alps. In the 18th century Carl Theodore and King Maximilian Joseph I forbade the performance of such mysteries in Bavaria, making an exception in the case of the villagers of Oberammergau, where the play had been enacted since 1633. These villagers had es¬ caped contagion from the plague that was rag¬ ing in their neighborhood, and made a vow to perform such a play every 10 years.

This they have done and their representation of the drama has drawn thousands of visitors from all parts of the world. There are about 600 performers and the character of Christ is taken by a man remarkable for his religiousness and sanctity of life. The passion-play was introduced into Spanish America by the Spaniards; and si-Ul rude passion plays may be seen in several Latin-American countries to-day. Even at the begin¬ ning of the 20th century an Indian version of

the passion-play was a feature of the life of several Mexican towns. In such plays all the actors were Indians. Consult Grein, (Das Oberammergauer PassionspieP (1880) ; Stead, (The Passion Play* (1890).

PASSION WEEK, the week before Holy Week, which latter is the last week in Lent, and was styled by the primitive Christians the ((Great Week.®

PASSIONATE PILGRIM, The, a collec¬ tion of 20 sonnets published in 1599 by W. Jaggard and attributed to Shakespeare. Of the total number only five, however, are clearly proved to be Shakespeare's, others being by Barnfield, Marlowe and Raleigh. The author¬ ship was for a time undisputed but in later edi¬ tions Shakespeare's name was withdrawn from the title page.

PASSIONISTS, a very ancient order of monks under the jurisdiction of the Roman Catholic Church. See Orders, Religious.

PASSOVER (Hebrew pesach, Aramaic Pascha, a sparing), the Jewish feast to com¬ memorate the sparing of the Israelite first-born and the escape out of Egypt. It falls on the first full moon of the spring, from the 14th to the 21st of the month Nizan. (See Easter). At this festival the Israelites, while they re¬ mained in possession of Palestine, assembled in the tabernacle, and from Solomon's time in the temple. During the eight days of the feast they were commanded to eat only unleavened bread, because their hasty departure from Egypt obliged them to take their dough with them unleavened; hence the name of

(<Feast of Un¬ leavened Bread.® Every family ate, on the evening of the first day, a lamb roasted whole and served up without breaking a single bone. Offerings of firstlings of the flocks and herds, and first-fruits, were presented in the temple. The Passover was and indeed with the ortho¬ dox Jews still is the principal Jewish annual festival. The Seder is the great Jewish family reunion of the year. Wherever the traveler may be the rest of the year, his mind rests not in the spring until he is safely home again, .so he may take part in the Seder around the family table.

The master of the house occupies the seat of honor at the head of the table. He is clothed in his best, over which he wears his white linen death shroud — the Kittel. A skull-cap of silk or velvet covers his patriarchal head, and he rests his arms on soft pillows enclosed in shams of immaculate whiteness. At his right sits his wife — at his left his eldest son; guests, sons, daughters and servants, if there be any, occupy the remaining seats at the table, and symbolize the equality of all, before man and God, and commemorate the one time slavery of all Israel. On the table directly in front of pater-familias is a plate on which three flat cakes — known as matzoth, are placed, each covered with a spotless white cloth or napkin. Close at hand is a dish which contains a portion of the shoulder or the shank of a lamb, with a small bit of meat at¬ tached, roasted on the coals almost to the point of charring. In this dish one may also observe an egg, peeled of its shell, that has been roasted hard in hot ash. A third dish contains a goodly portion of horseradish or other bitter herb, and a fourth holds the Charoseth — a cement-like

paste made of nuts, apples, raisins and spices of various kinds.

Each of these dishes has its peculiar signifi¬ cance. The number (three) of the cakes signi¬ fies the three national divisions: Priests, Levites and Israelites. The matzoth represent the un¬ leavened dough which the Israelites carried with them o.n their flight out of bondage; the shank-bone or shoulder blade represent the paschal lamb — which was by far the most im¬ portant feature of the Passover in the days of the temple ; the bitter herbs stand as a reminder of the bitter days of slavery in the kingdom of the Pharaohs.

These preliminaries having been properly set in place, the ceremony proper begins. The hands are washed and various blessings are re¬ cited appropriate to the occasion. The master of the house, breaking one of the three matzoth in two, and pointing to the roasted bone and

egg, lying before him, recites in Chaldaic, ((Lo ! this is the bread of affliction, which our fore¬ fathers ate in the land of Egypt; let all those who are hungry enter and eat thereof ; and all who are in need, come, and celebrate the Passover.®

The youngest male member of the family then asks the classic ((four questions,® the head of the house and all those about the table reply, in Hebrew or in English: ((Because we were slaves unto Pharaoh in Egypt, and the Eternal, our God, brought us forth from thence with a mighty hand and an outstretched arm; and if the Most Holy had not brought forth our an¬ cestors from Egypt, we, and our children, and our children's children, would still continue to be slaves to the Pharaohs in Egypt.®

As the story of the Exodus rolls on, each of the various dishes is taken in turn, and its significance explained in picturesque language. A portion of the Hallel is next recited, and the reply closes with a benediction, in which is ex¬ pressed the hope that the Holy Temple will be rebuilt and the ancient rites and sacrifices re¬ stored. The hands are again washed, and after pronouncing grace over the matzoth, the meal proper is served.

The first celebration of the Passover was on the eve of the departure of the Israelites from Egypt. A second celebration in the second year afterward is recorded in the ninth chapter of the book of Numbers. Further celebration was enjoined until the wanderers had reached the land of Canaan — which was 39 years later.

In the days of the Second Temple this festi¬ val was observed in a most elaborate manner. In the year 65 a.d., we are told, 3,000,000 Jews visited Jerusalem for the celebration of the Passover, and in the days of Nero at the Passover celebration 265,500 lambs were slain, also indicating an attendance of nearly 3,000,000 Jews. The city could not accommodate all that came from far and near. Tents were accord¬ ingly thrown up outside of the city walls. The Roman authorities, fearing the spread of sedi¬ tion during these days, took extraordinary police precautions to prevent political disturb¬ ances.

The Passover celebration of to-day differs, of course, from that of 2,000 years ago; yet it differs only in so far as the changed civil and economic conditions have had their effect on Jewish life. The sacrifices are not made and the journey to Jerusalem is not undertaken, for

the Temple has been destroyed these many cen¬ turies. Nevertheless, apart from these features, the celebration of the Passover by the orthodox does not differ materially from the Passover as it was celebrated by Jesus and his disciples and the Jews before his day.

PASSOW, pas'so, Franz Ludwig Karl Friedrich, German philologist: b.- Ludwigslust, Mecklenburg, 20 Sept. 1786; d. Breslau, 11 March 1833. He was educated at Gotha and Leipzig, in 1807 was Greek professor at Wei¬ mar, and in 1815 became professor of ancient literature at Breslau ; in 1829 director also of the museum of art there. His (Greek-German Lexicon) (1819-24) formed the basis of Liddell and Scott's (Greek Lexicon.) Other works of his are (TurnzieP (1818) ; (Elements of the History of Greek and Roman Literature and Art> (1816). Consult Sandy, J. E., (A History of Classical Scholarship* (Vol. Ill, Cambridge 1908) ; Wachler, (Passows Leben und Briefe)

(1839).

PASSPORT, a warrant of protection and permission to travel granted by a competent au¬ thority to persons moving from place to place. In some European states no person is allowed to leave the country without a passport from his government giving him liberty to do so ; and passports may be even required by the na¬ tives when they travel from one part of the country to another. In the United States the only species known are foreign passports. The regulations put in force regarding passports by different countries have naturally differed great¬ ly at different times, as during a time of war or internal disturbance compared with a time of peace ; and while persons coming from one country may have to provide themselves with passports, citizens of another country may be freely admitted. It is of advantages to 'be pro¬ vided with a passport even in countries where it is not demanded, as it furnishes a proof of the bearer's identity and nationality. In the United States passports, with description and portraits supplied by the applicant, are issued by the State Department at Washington. They are good for two years from date, renewable by stating the date and number of the old one. The fee required is one

dollar. They are issued only to citizens, native-born and natural¬ ized and the application must be supported by an affidavit of at least one credible witness who has known the applicant at least two years, stating that the applicant is the person he repre¬ sents himself to be and that the facts stated in the application are true to the best of the wit¬ ness's knowledge and belief. When the appli¬ cant is accompanied by his wife, minor children and maid servant, who is a citizen of the United States, it will be sufficient to state the fact, giving their names in full, the dates and places of their birth and the allegiance of the servant, when one passport will suffice for all. In such case, however, three photographs of each per¬ son should accompany the passport application. For a man servant or any other male in the party a separate passport will be required. For a woman, if she is unmarried, in addi¬ tion to the ordinary statements, she should state that she has never been married. If she is the wife or widow of a native citizen of the United States, the fact should be made to ap¬ pear in her application which should be made

according to the form prescribed for a native citizen, whether she was born in this country or abroad. A married woman's citizenship fol¬ lows that of her husband. It is essential, there¬ fore, that a woman's marital relation be indi¬ cated in her application for a passport, and that in the case of a married woman her husband s citizenship be established. A woman's passport may include her minor children and maid. Ap¬ plication forms are furnished by the State Department free of charge.

PASSY, Frederic, French political econ¬ omist and statesman : b. Paris, 20 May 1822 ; d. 12 June 1912, He was educated for the law but practised but a short time before accepting an appointment as auditor to the Council of State in 1846. He withdrew from politics after the coup d'etat of Napoleon III. He was one of the founders of the International and Perma¬ nent League of Peace in 1868 and became its permanent secretary. He served in the Cham¬ ber -of Deputies in 1881-89; and in 1881-1902 he was professor of political economy in sev¬ eral colleges. He was associated with Sir. W. R. Cremer in forming the Interparliamentarian Union for Arbitration and Peace; and was a member of the International Bureau of Peace at Bern, Switzerland. He was elected to the Academy of Moral and Political Sciences of the French Institute in 1877 ; was a commander of the Legion of Honor; and in 1901, he, with Henri Dunant, received the first Nobel Peace Prize. He was president of the Societ}ˆ of Political Economy for 70 years. Author of (Melanges economiques* (1858) ;

(De 1'En-seignement obligatoire) (1859) ; (La Guerre et la Paix* (1867) ; (L'Histoire et les sciences morales et politiques> (1879); (Historique du mouvement de la paix* (1905), *etc.*

PASSY, pa-se, France, a western suburb of Paris, since 1860 incorporated with the city. See Paris.

PAST AND PRESENT, a work by Thomas Carlyle, published in England in April 1843 and in May in the United States. It was written in seven weeks, as a respite from the harassing labor of writing (Cromwell.* In 1842, the Cam¬ den Society had published the (Chronicles of the Abbey of Saint Edmund's Bury,* written by Joceline de Brakelonde, at the close of the 12th century. This account of a mediaeval monastery had taken Carlyle's fancy; and in (Past and Present* he contrasts the England of his own day with the England of Joceline de Brake¬ londe.

PASTA, Giuditta, joo-det'ta pas'ta, Italian opera singer: b. Saronno, near Milan, 9 April 1798; d. Lake Como, 1 April 1865. Her maiden name was Negri, her ancestry was Jewish and her first attempts on the stage after her leaving the Conservatory of Milan met with little success. She married a tenor named Pasta in 1816, studied for a time with Scappa and made her first successes in Venice, Rome and Milan in 1819-20. At Paris she introduced the arpeggio embellishments to Rossini's music, which added much to her artistic fame. She made her first appearance in London in 1824, playing alternately there and in Paris. For 10 years her voice steadily improved and even when it began to grow weak her dramatic abil¬ ity was still crescent. As late as 1850 she sang

in England and her voice was said to retain much beauty when she was 60; but as has been suggested, her fame is due principally to her remarkable combination of fine singing and clas¬ sic acting. Bellini wrote <Sonnambula) (1831) and (Norma) especially for her; the same is true of Donizetti's (Anna BolenaP Among her other favorite roles were Romeo in Bellini's (Romeo e Giuletto,* Desdemona in Rossini's <Otello) and Nina in Paisiello's opera of that name.

PASTEL, in art , a colored pencil of pipe¬ clay, gum water and the required pigment. The executed work is also called a pastel or a draw¬ ing in chalk. See Crayon ; Painting, Tech¬ nique of.

PASTERN, that part of the leg of a horse between the “fet-lock® joint next the foot and the coronet of the hoof. The first phalanx of the foot is called the great pastern bone ; the second, the small pastern or coronary; the third, the coffin-bone, which is enclosed in the foot.

PASTEUR, pas-ter, Louis, French chemist: b. Dole (Jura), 27 Dec. 1822; d. Villeneuve l’Etang (Seine-et-Oise), 28 Sept 1895. He was educated at the Royal College of Besangon and the Ecole Normale of Paris from which he was graduated in 1847. The following year he be¬ came professor in the Lycee at Dijon, in 1849 professor of chemistry at Strassburg and in 1854 dean at Lille of the scientific faculty, which he organized. In 1857 he was made director of scientific studies in the Ecole Normale, in 1868 director of the chemico-physiological laboratory at the Ecole des Hautes Etudes and in 1887 per¬ manent secretary of the Academy of Sciences. In 1889 he withdrew from all other posts to give his entire attention to the management of the Pasteur Institute, built by popular subscription for the prosecution of research in the preventive treatment of infection. His first investigations, which aroused the wonder of the veteran chem¬ ist Biot and placed him high among the scien¬ tists of the time, had to do with optically active and inactive substances. His examination of two tartaric acids, one of which turned to the right the plane of a ray of polarized light while the second remained inoperative, proved that the inactivity of the latter was due to its being composed of two isomeric acids which diverted the ray with equal power in opposite directions. In his subsequent work, Pasteur applied these exacting methods of research, chemical and physical, to the solution of several complex phe¬ nomena. Fermentation had not then been ex¬ plained. Pasteur showed that the various changes involved in the process were the result of the presence and growth of a micro-organ¬ ism which he called the ferment. He was thus the founder of the science of bacteriology (q.v.), as he had previously been of stereo¬ chemistry (q.v.). He proceeded to demonstrate that the varieties of fermentation were due each to a special organism, and that when these at¬ mospheric germs were absolutely excluded no change took place. These discoveries proved of great service to the industries of brewing and winemaking, in which they substituted scientific certainty for guesswork. To prevent the deterioration of wines and beers, as also of milk, a process of heating, known as “Pasteur¬ ization,® was introduced and a large financial loss was avoided. In 1865 Pasteur began the

study of the silkworm disease, which had so impaired the value of raw silk as seriously to threaten the industry in France. He made in¬ vestigations in the plantations of southern France and was finally able to announce the re¬ sults of his experiments and the means to be taken for the extermination of the plague. The history of this investigation is of great in¬ terest. It was followed by a rapid increase in the annual value of silk and the re-establish¬ ment of prosperity in the trade. Pasteur's work in preventive medicine is probably his best-known achievement. The discovery of Edward Jenner (q.v.) had never been utilized. Pasteur generalized it by determining that as each variety of fermentation is originated by a specific fer¬ ment, so in the case of various maladies the infection depended on the presence of a specific microbe. He found that "cultures,® or artificial growths, of this microbe might be obtained and that by a certain succession of such cultures the virus of the microbe became so weakened, or "attenuated,® that by treatment with them ani¬ mals, though a slight attack of the given malady appeared, were rendered immune. The appli¬ cation of this result to cholera in fowls and anthrax in cattle and sheep was very important. Pasteur finally extended it to inoculation for rabies with beneficent effect. His discovery of the antitoxin followed (1885) long experimen¬ tation and was highly successful. For a de¬ scription of it see Hydrophobia. The Pasteur Institute was soon established and similar ones arose elsewhere. Pasteur was the recipient oi many distinctions, including election to the Na¬ tional Academy of Sciences in the United States. Among his principal works are: (Etudes sur le Vin> (1866) ; (Etudes sur le Vinaigre5 (1868) ;

(Etudes sur .la Maladie des Vers a Soie) (1870) ; (Etudes sur la Biere) (1876). Con¬ sult Bournand (Un Bierva faiteur de l'human-ite) (Paris 1896) ; Cooper, F. C.. (Louis Pas¬ teur J (a translation of Keim and Lumet's work, New York 1914) ; Devonshire, R. L., (Life of Pasteur > (translation of Vallery-Rodot's work, London 1911) ; Gruber, (Pasteurs Lebenswerk) (1896) ; Herter, C. A., (Les Microbes* (1878) ; (The Influence of Pasteur on medical science,* (Baltimore 1914) ; Vallery-Radot, <Vie de Pasteur) (1900). _ . j

" PASTEURIZATION OF MILK. See

Milk.

PASTICCIO, pas-tich'i-o, from the Italian signifying "medley,® an inartistic device among musical composers of the 18th century, which

consisted of adapting some of their earlier com¬ positions to a new text instead of writing new music for it. It was a common practice in the 18th century to revamp old music. Just as Shakespeare and other dramatists made use of old plays, which they brought up to date. But the composers of operas and other stage music took choruses and arias of older operas and adapted them or embodied them unchanged into new musical compositions, especially operas and musical comedies. Notable examples are the chorus *For unto us a child is born) from Handel's (Messiah, > originally the music of a madrigal written in 1712, and Glucks (Piramo e Tisbe) adapted to the best melodies of his earlier operas.

PASTILLE, pas'til or pas-tel', a sugared confection, also an aromatic paste for burning,

as a fumigator or disinfectant. It is composed of gum benzoin, sandalwood, spices, charcoal powder and other substances. See Troches.

PASTO, pas'to, Colombia, province of the department of Narino; also the capital city of the province, 100 miles southeast of Popayan, on the Rio de Pasto, a tributary of the Patia and at the southeastern foot of the volcano of Pasto, which is nearly 14,000 feet above sea-level. The city itself is about 8,500 feet above the sea-level, lies in a basin, two and a half by three miles in extent, of rare fertility and of brilliant verdure, has a college, a seminary, con¬ vents of the Franciscans, Dominicans and Augustinians and an episcopal palace, the Uni¬ versity of Narino; and is well built and laid out. It was founded in 1539; was twice burned during the war of independence, in which its inhabitants, mostly of Indian descent, showed rare loyalty to the Spanish crown, held Bolivar in check for some time and yielded only in 1822. The city was destroyed by earthquake in 1834. The main industries are manufactures of hats, blankets and pottery. Pop. about 30,000.

P ASTON LETTERS, the collected corre¬ spondence between 1424 and

1509 of the Paston family of Paston, Norfolk. Covering the period of the Wars of the Roses and written in the frankest and homeliest way, these letters give important information as to the manners and history of the 15th century, showing particu¬ larly how undisturbed by war the greater part of the people of England were. They comprise over 1,100 letters and some state-papers in the possession of the family. There was a bitter discussion as to the authenticity of these letters, as the manuscripts could not be found after Fenn's death. But years afterward several volumes of the letters were encountered. The Paston letters were first edited by Sir John Fenn in five volumes (1787-1823) ; a popular edition by Ramsey appeared in 1840; but the best edition is that in the Arber reprints by Gairdner, in three volumes (1872-75) and en¬ larged to four volumes (1900-01).

PASTOR, a genus of birds belonging to the Starling family, found in the north of Africa, Syria and India. The name derived from the Latin pastor, shepherd, is due to their habit of congregating around sheep folds. The beauti¬ ful rose-colored pastor (P. roseus) is the only European specimen and being a good singer is a favorite cage-bird. It is also called the locust bird owing to its partiality for locusts as food. Its plumage is generally of a blackish-violet color, but various parts about the shoulders and abdo¬ men are rose-colored. It has a prominent crest. In habits it much resembles the starling and it is of about the same size. Compare Mina—

BIRD.

PASTOR FIDO, pas-tor' fe'db, II («The Faithful Shepherd®), a pastoral drama by Gio¬ vanni Battista Guarini, played in Turin in 1585, but not printed until 1590. Composed in honor of the nuptials of a duke of Savoy, it has ap¬ peared in English in six different translations. It is the masterpiece of the author and its influ¬ ence can be seen in all subsequent literature of this class. It went through 40 editions during the author's life and has been translated into almost all modern languages.

PASTORAL. See Literary Forms.

PASTORAL EPISTLES. See Timothy and Titus, Epistles to.

PASTORAL LETTERS, circular epistles addressed by a diocesan bishop to those under his jurisdiction for purposes of instruction or admonition in matters of doctrine or discipline.

PASTORAL POETRY, Latin «pastor-alis,® relating to a shepherd, the description in verse of country life of an imaginary kind, in which the loves of shepherds and shepherdesses play a prominent part. As the modern pastoral poetry has continued to be based on the ancient classical pastoral poetry, which itself originated in the ceremonies performed in honor of the pastoral divinities, these latter have continued to form a part of the machinery of all pastoral poetry. Nymphs, satyrs and other imaginary inhabitants of the woodlands and the streams march through pastoral poetry as though of right they belong there, as in fact they do if lcng prior possession counts for aught. The pastoral, much in the form in which the classical writers present it, took root in the early life of the Greek people; but the customs and beliefs out of which the early pastoral sprang must be looked for nearer the beginning of the life of the wandering tribes who came later to form the Greek nation. As the life of the Greeks became more sedentary and the tendency toward culture and civic life more pronounced, the ceremonies, songs, dances and music with which the rural deities were honored began to assume a more complex character, due no doubt to the combina¬ tion of various tribal ceremonies and the further influence of adjoining tribes upon one another. Thus gradually grew up the ceremonies indi¬ cated, and as they grew they possessed a strong power over the imagination of the Greek people, learned and unlearned. It is not at all strange, therefore, that the paraphernalia of the greater and lesser divinities of nature should enter into the pastoral poems of Greece in pre-Christian days. In fact it would have been very strange had they not since they formed an integral part of the life of the nation. yElianus ascribes the in¬ vention of pastoral poetry to Stesi-Chorus whose real name was Tesia. But the title thus applied to him would seem to indicate that he simply extended the well-known songs and pas¬ toral poetry already in use for a long time in connection with the religious ceremonies held before the shrines of the pastoral divinities. According to the ancient grammarians pastoral poetry originated in the worship of Artemis; but this is nothing more than a personification of its origin, for Artemis was not only ((the healer® and the protector of all young; but she was looked upon as the goddess of flocks and the chase; and among the immortals she was the huntress. In all these respects she is the moon goddess, the patroness of all growing things. In Arcadia, especially, she was wor¬ shipped as the goddess of the nymphs. In this latter connection her surnames and epithets are almost all derived from the mo'intains, rivers and lakes. Tfcere she hunted with the nymphs and she held her dances in the forest with them and the 60 daughters of Oceanus. All this un¬ doubtedly takes pastoral poetry back to an age in the history of the race when the Greek people were as yet nomadic

and their chief culture god¬ dess was Artemis, the huntress, dancing in the forest, hunting with the bows and arrows pre-PASTORAL POETRY

sented to her by the music-loving Pan, or rid¬ ing, swift as the wind, in her chariot drawn by four stags with golden horns. The very an¬ tiquity of pastoral poetry and the sacred charac¬ ter that it long maintained are the causes that made it so deep rooted, surrounded it with the wood and water spirits and connected it with shepherds and shepherdesses out of a nation of whom it sprang. So extensive was the worship of Artemis and so elaborate the ceremonies, that there came into being much pastoral poetry that has completely disappeared.

Early Pastorals. — The oldest of the pastorals that have come down to us date from the 3d century b.c. and are ascribed to Theocritus to whom are attributed 31 idyls, in which are re¬ produced the language of the peasants and the life of rustics with their songs and beliefs. Some of these short descriptive lyrics are com¬ bined with short comic or dramatic parts, which show that the religious poetry of an earlier and more primitive age had already become, in a manner, divorced from its earlier associations. These poems of Theocritus are simple and, in a sense, natural if it is kept in mind that the su¬ pernatural characters that appear in them were as fully believed in as were the saints in the Middle Ages. Bion of Smyrna and Moschus followed Theocritus as pastoral poets. All of these seem to have gone to nature for their in¬ spiration and descriptions and they succeeded in creating a school which was widely imitated throughout the Greek and Latin countries. Of the Latin writers who seized upon the Greek pastorals, the greatest was Virgil (70-19 b.c.), who idealized the scenes and ideas presented by the Greek writers and made them deoend more upon imagination than upon observation. With him art stepped in and, in a sense, conventional¬ ized the forms, instinct, for the ancient Greek, with pregnant meaning. Here was the begin¬ ning of the real pastoral poetry, which was later on to take such a hold of western Europe, for Virgil set a fashion in his ˆeclogue® which was followed by Horace and other Roman poets; who tended to conventionalize more and more the machinery of the early Greek religious pas¬ torals, until they were finally worked into a condition suitable to appeal to Christian Europe.

Italy. — In the meantime there had sprung out of the old Greek and Latin pastorals rustic pastoral songs, often with much of the dra¬ matic in them in all the countries of Western Europe. These were probably due more to the pastoral worship and its ceremonies than to the work of the Latin and Greek pastoral poets. But the two combined to form or inspire the pastoral poetry of the Renaissance. As early as the 12th century the ˆpastourelles® made their appearance in Provence and a century later, at least, they were popular in all the Latin and Germanic countries. Early in the 14th century the pastorals became profoundly influenced by the new learning, or the revival of the study of Virgil and other Latin writers; and from this sprang the more modern pastoral poetry.. Dante, Petrarch, Boccaccio and other noted writers of the century wrote pastorals. The (Ameto> (1342) of the latter is the first pastoral romance written in the Italian tongue. It is partly in prose and partly in verse, the latter being used to express intensity of feeling. (.Ameto) be¬ came very popular and set the fashion for suc¬ ceeding poets. In it Boccaccio, under fictitious

names, expresses his secret love for Maria, daughter of Robert, king of Naples, in graceful and forceful prose and passionate and tuneful verse; and the new and yet familiar literary style of the (Ameto) fitting in so well-as it did, with the popular songs, and contrasting so strongly with the artificial and exotic literature of the period, appealed strongly to the Italian people then rising into nationality out of the ruin of things Roman. Dante also composed a pastoral of 12 eclogues imitated from Virgil, but containing an elaborate allegory. The work of Dante, Petrarch and Boccaccio, all of whom wrote Latin eclogues much after the manner of Virgil, marks the beginning of the pastoral movement, which, with numerous ups and downs, was to exercise a strong and lasting influence upon the literature of Western Europe into the beginning of the 19th century. Boc¬ caccio, in his (Ninfale Fiesolano,* gave a dra¬ matic turn to the pastoral ; and this, with the crossed love plot and secret personal history, became popular literary machinery for subse¬ quent Italian writers, who expanded the pastoral into drama as soon as the mediaeval mystery play had begun to lose ground in the popular estimation. Baptista Spagnolus, the Mantuan, who wrote during the last quarter of the 15th and the first part of the 16th century, used the pastoral, ins a semi-dramatic form, to satirize, through his rustic characters, the court, the church and the women of the day. Other writ¬ ers of dramatic pastorals were busy at this time. Of these the best, and most lasting and of far-reaching influence, was Poliziano, who in 1372 put upon the stage at Mantua, a pastoral-drama opera founded on the story of Orpheus and Eurydice,

and appropriately entitled <Orfeo.)

The happy choice of subject necessarily called for the music of Orpheus and gave a turn to the pastoral wEich undoubtedly had considerable to do with the subsequent develop¬ ment of the opera. Already little private court stages were springing up all over Italy, court pastoral drama was becoming very popular, and it was destined to exercise a powerful influence on the Italian tongue and literature, the latter of which it practically dominated in the final third of the 16th century, during which it pro¬ duced some of the best poetry then written in Europe. The requirements of these court thea¬ tres, the taste of the auditors, accustomed to the court ballad, and the tendency of previous pastorals made the musical part of the perform¬ ance of more and more importance and drove out of the dramatic pastoral the tragic tenden¬ cies noticeable in previous writers. Thus the pastorals were forced along the high road to opera, wEich finally dominated the pastoral ele¬ ment, originally the life of this form of dra¬ matic literature.

In 1573 Tasso presented, at the court of Fer¬ rara, his <Aminata,) a dramatic pastoral, which became at once very popular and came to be known throughout all the Latin countries, where its influence upon subsequent literature was considerable. Alvioso Pasqualigo, who fol¬ lowed Tasso, added the comic element to the dramatic pastoral, and Cristoforo Castelletti endowed it with the heroic and romantic; Guarini in his (Pastor Fido) (1590), made. the dramatic pastoral still more popular and wider reaching, and Ognaro, in his (Aloeo) (1591) added to the pastoral literature of Italy a pas-

toral devoted to fishermen. Thus the pastoral continued gathering to itself all the mechanical, poetical and human elements that led along the road to modern drama and opera, and especially the latter.

Spain.— Along this road the milestones are still standing. In 1504 Jacopo Sannazaro pro¬ duced his ‘Arcadia,* a non-dramatic pastoral, ■which set the fashion for many subsequent pas¬ torals and exercised

a strong influence on every literature of the Germanic and Latin countries, whose poets sang the glorious ((spirits of the wood,® the artificial shepherds and shepherd¬ esses and other rural characters, moving and acting unconcernedly in a brilliant world of supernatural beings. Sannazaro was the legiti¬ mate successor of Juan de Encina, Gil Vicente and Garcilaso de la Vega, who had introduced the Italian pastoral movement into Spain. The latter's 'El dulce lamentar de los pastores,* pub¬ lished in the first quarter of the 16th century, was widely read and extensively copied. Jorge de Montemayor, in his 'Diana* (1524), success¬ fully imitated (Arcadia,* and this Caspar Gil Polo continued in (Diana enamorada) (1564). This latter also exercised very considerable in¬ fluence upon the direction of the highway of pastoral poetry; and Cervantes himself bears witness to the popularity of these dramatic pas¬ torals, which influenced the creator of the sor¬ rowful knight to write Galatea1* (1584), a most charming and musical pastoral.

France, although rich in all the poetical elements that went to produce the pastoral drama and pastoral poetry in general, never attained any high achievement in this depart¬ ment of literature. There was plenty of pas¬ toral poetry produced in France, however; but it took a different direction, which was un¬ fortunate for its artistic development. The pastoral song, which is generally about love, G found high in popular estimation in south¬ ern France in the 13th century. In this latter form it dates back to the previous century; but it was undoubtedly of a much earlier origin. In fact, it seems to have been the survival of the old Roman May or Spring dances and cere¬ monies, which had been reacted upon by similar religious ceremonies of the Gaulish tribes; and out of this had sprung popular celebrations of the coming of the growing season. After the disappearance of the Latin religion these cere¬ monies survived under Christianity bv which they were in some measure early modified. As their real religious significance began to die out, the dances lost their sacred character, and the songs sung at them became the common property of those taking part in the Spring dances. These were repeated in various modi¬ fied forms and about them sprang up the pas¬ toral songs so popular in southern France dur¬ ing the period mentioned. Naturally, their in¬ fluence was most noticeable in Provence, be¬ cause of the stronghold which the Roman re¬ ligion, customs and civilization had secured there previous to the breaking up of the Roman Empire. These early pastoral songs spread over all France; but those of the North seem to have had their own independent origin much similar to that of the songs of Provence. When the influence of the Italian pastoral poetry reached France, the nation had long been

going through a preparatory course, which had made her not only ready to receive it but to assimi¬

late it; for France has ever been inclined to do things in her own way. So she proceeded to reshape the Italian pastoral and to blend it with her own “pastourelles** and her unnatural chivalric romances. The result was inferior to the pastoral poetry of Italy and Spain. Yet it had one merit. It was more or less na¬ tional in form and sentiment; and it therefore probably had more influence on succeeding French literature than it might have had, had it been more like the Italian and Spanish pastorals. The French pastoral continued de¬ veloping artificial qualities until it finally wore itself out by its own artificiality. The knights who went among the begemmed and lavishly-dressed nymphs were as gorgeous and unnatural as ever the imagination of chivalry produced. The greatest of the French pastorals, the ‘Astree* (1610) of Honore d’Urfe is a cul¬ mination of the tendencies of the times. Based on the ‘Aminta* of Tasso and the <Diana) of Montemayor it received its inspiration from the same source as the (Amadis) chivalric stories. It is written in prose, a long romance of the kind, the age delighted in. Camus de Pont-carre wrote a series of pastorals from the Christian point of view and avowedly to coun¬ teract the heathen tendencies of the popular ‘Astree* ; and Racon, imitating the ‘Astree,* wrote (Les Bergeries) (a pastoral drama 1625).

England. — Real pastoral poetry in England may be said to have begun with Edmund Spenser’s (Shepherd’s Calendar) (1579). Pre¬ vious to this, it is true, there had been realistic shepherd scenes in the religious drama; but they were all far from the spirit of the Euro¬ pean pastoral ; and they lacked the inspiration of the Latin mythology which had failed to get in England the hold upon the people that it had upon the Continental domains of the Romans. Alexander Barclay had written a long pastoral in 1552 and 11 years later Barnabe Googe wrote another. But both were very in¬ ferior to the work of Spenser, who aimed at simplicity and naturalness. The ‘Shepherd’s Calendar became popular; but it was soon overshadowed by Sir Philip Sidney’s ‘Arcadia* (1590). This romance, with its stately and formal characters, suited the spirit of the age and found many imitators who exaggerated its worst tendencies. About the same time three other popular pastorals made their ap¬ pearance and all were inspired by the same literary vision as the (Arcadia.) These were Robert Greene’s ‘Moranda,* Lyly’s ‘Galla-thea) and Peele’s ‘Arraignment of Paris.* The latter two were pastoral dramas, and as such became widely known. Greene also wrote two love romances in the Italian manner, ‘Never

too Late) and ‘Menaphon.* In 1590 Thomas Lodge published his ‘Rosalynde,* a fantastic romance, that has in it more true poetic form and expression than most of the pastorals of his day. About this time John Dickenson wrote ‘The Shepherd’s Complaint* an eclogue and ‘Risbas) ; Drayton his ‘Endimion and Phoebe > -and ‘Shepherd’s Garland* ; Barnfield, ‘The Affectionate Shepherd) and Lyly, ‘The Maid’s Metamorphosis.* Long after the influence of Tasso and other pastoral poets had died a natural death, England continued to produce pastoral poetry of a lighter sort, most of which was imitation of ‘The Shepherd’s Calendar.* The best of these were Nicholas

Breton’s ‘Passionate Shepherd1 (1604) ; Day’s ‘Isle of Gulls1 (1606) ; Fletcher’s (The Faith¬ ful Shepherdess1 (1610) ; Wither’s, (The Shep¬ herd’s Hunting1 (1615) ; Braithwaite’s ‘The Poet’s Willow1 (1613) ; (Shepherd’s Tales1 (1621) ; William Browne’s ‘Britannias Pasto¬ rals1 (1616) ; Phineas Fletcher’s (Piscatory Ec¬ logues1 (1633) ; Thomas Goffe’s (Careless Shep¬ herd1 ; Ben Jonson’s ‘Sad ShepherdNlOSS). From this date on serious bucolic pastoral poetry may be said to have ceased to occupy the attention of literary England. The pastoral idea, how¬ ever, continued to live in song in the style of Breton and Wither. Among the writers of this class are Lovelace, Stanley, Carew, Cartwright, Suckling and Herrick, the-latter of whom is by far the most natural and best. He was the first of the English pastoral writers to paint truthfully the beauties of rural life. About the same time Shirley’s Arcadia1 (1640) ; Fan-shaw’s (Pastor Fido1 (1646) ; and Willan’s ‘Astraea1 (1651) were converted into pastoral drama. For the next half century English pastoral poetry and especially the drama are inartistic, artificial and uninteresting. The be¬ ginning of the 18th century, however, saw a revival of the pastoral at the hands of such clever writers as Pope, Ambrose Philips, Steele and Gay. Their pastorals, however, fall short of their achievements in other literary fields. Gay’s (Shepherd’s Week1 was a return to the simplicity of the early pastoral verse and his influence on English literature was good. But the most influential of all the pastoral writers of the period was Allan Ramsay, whose (Gentle Shepherd1 written in Lowland Scotch,

brought that forceful tongue into favorable literary notice and paved the way for the coming Scotch literature. ‘The Gentle Shepherd1 continued popular into the middle of last century. From this time on the pastoral, as such, was dead in England, but its influence is seen in the work of Cowper, Burns, Shelley, Landor, Thomp¬ son, Tennyson and several modern Scotch writers.

John Hubert Cornyn, Birmingham Southern College.

PASTORAL STAFF, the official staff of a bishop or archbishop. The pastoral staff of an archbishop is distinguished by being surmounted by a cross, and is accordingly called a crozier. The pastoral staff is in the form of a shepherd’s crook. When carried by a bishop it was held in the left hand with the crook turned outward, indicating his jurisdiction over a diocese; when assumed by an abbot, it was grasped in the right hand, with the crook turned backward, showing that his jurisdiction was limited to the members of his own house. The pastoral staff is made of ivory or wood, enriched with precious metal or jewels.

PASTORAL SYMPHONY, The, or RECOLLECTIONS OF COUNTRY LIFE,

Beethoven’s Sixth Symphony F major, opus 68. The musician had a passion for the country, and has composed two pastoral symphonies of which the one here mentioned (1807) is the most famous. One passage of it suggests the sound of gnats buzzing in the evening twilight, and in some phrases are represented the notes of birds, and the murmur of winds and waters ; the prevailing tone is joyous. It was produced for the first time at Vienna, 22 Dec. 1808.

PASTORAL THEOLOGY, that section of theology which treats of the personal and offi¬ cial duties of a Christian minister in his church and parish. It covers particularly his relations with his parishioners as individuals and also those with the public at large as representing his church. In the Roman Catholic Church and the Church of England these duties devolve upon the curate.

PASTORALE, in music, a composition of an idyllic character; also a composition for a dance, generally in six-eight or twelve-eight time.

PASTORELS, a variant form of Pastoureaux (q.v.).

PASTORIUS, Francis Daniel, American colonist: b. Sommerhausen,

Germany, 1651; d. 1719. He visited England and there became a member of the Society of Friends and made the acquaintance of William Penn, to whose colony of Pennsylvania Pastorius, in 1683, emi¬ grated at the head of a company of Mennonites from Germany and Holland, and settled at Germantown, now a part of Philadelphia. Piety and learning were united in Pastorius to prac¬ tical energies and qualities of leadership, whereby the influence of his character was made deep and lasting among his followers. Within five years of his coming to America he signed a protest to the Friends' yearly meeting in Burlington N. J., which declared slavery to be unchristian, and which, as the first formal anti-slavery declaration made in this country, was celebrated by Whittier in his Pennsylvania Pilgrim.1 To the Germantown book of records Pastorius prefixed a Latin ode addressed to posterity, which was translated by Whittier. Pastorius also wrote a Geographical Descrip¬ tion of Pennsylvania1 (1700), which was orig¬ inally published with a German title.

PASTOUREAUX, pas-too-ro', bands of French peasants who attempted in the 13th and 14th centuries to better their pitiful conditions by appeal to arms. There were three of these risings. The first, in Berry in 1214, was aimed against both the feudal lords and the monas¬ teries, but was quickly and severely repressed; the second, in Flanders, in 1250 under the lead of the <(Master of Hungary,11 pretended to be a crusade to recover the Holy Sepulchre. Its members assumed priestly functions and de¬ nounced the wickedness of the clergy. Nothing could be done to check its excesses until the body numbering 60,000 or 100,000 men divided after leaving Paris into several companies, which were speedily attacked and slaughtered by the king's forces. The third rising of the Pastoureaux in 1320 was again composed of illumines and again under cover of a pretended crusade; it laid waste Berry, Saintonge, Aqui¬ taine and Languedoc, and killed 500 Jews at Verdun-sur-Garonne. Near Aiguesmortes they were hemmed in ; many died of starvation and others were hanged and imprisoned.

PASTURE, grass-covered land upon which domestic animals are placed to graze. In its broad application the term includes the unen¬ closed grazing areas of the western ranges, the Argentine pampas and the Russian steppes. In a narrower and more popular way it refers to the enclosed fields similarly used upon farms. Small enclosed pastures close to farm buildings

are frequently called paddocks. Since many things, especially drought, may occur to impair the productivity of pastures, it is customary to grow fodder crops, especially corn, in proximity to the pasture, and to cut this crop as occasion may require. This serves the double purpose of supplying the animals with needed food and preventing the injurious, close grazing of the pasture. An essential adjunct of pastures is an adequate supply of pure water available at all times to the animals; and a highly desirable feature is shade, best furnished by trees located at the highest points, the margins and on the poorest soil of the field.

Pastures differ from meadows in the char¬ acter and habits of the plants which grow upon them. Whereas meadow grasses and other plants are usually tall-growing and ready to cut all at one time, the herbage of pastures is gen¬ erally low-growing, and the various species reach maturity at various times throughout the season. The former are often ˆstooling® or ˆtillering® grasses, the latter creeping and mat¬ forming. The selection of species is largely dependent upon the climatic and soil conditions and also upon the length of time the pasture is to remain. For temporary pastures short¬ lived grasses are often used, but for the per¬ manent pastures the perennials and turf-forming species should be chosen. Timothy (Phleum pratense), the leading meadow and hay grass in the eastern United States, is sometimes seeded for pasture but its stooling habit, its inability to form a good turf and its liability to injury by the trampling of the animals, are decidedly against its use in pastures. For the Southern States, Texas blue grass, Bermuda grass, carpet grass, large water-grass are prob¬ ably in most general use, the first two par¬ ticularly.ˆ On light, sandy soils creeping bent-grass, Kentucky blue grass, red fescue and white clover are in popular use. On wet soils perennial rye-grass, redtop, or creeping bent-grass, and alsike clover are in general use. In regions where the rainfall is adequate and upon ordinary soils the following are general favorites : Kentucky blue grass, tall fescue, Canada blue grass, redtop, perennial rye-grass, orchard-grass and white clover. Red clover and alsike are also planted to some extent, but they are rather tall growing for pasture plants. The botanical names and characteristics of these plants are described under Grasses of the United States.

In general, the best pastures are formed upon well-drained, but moist, loamy soils, varying in quality from clay to rather sandy loam, but not usually including what are termed sandy and gravelly soils. As a prime necessity they must be rich in all plant foods, •especially nitrogenous and organic material. The former is essential to the luxuriant growth of herbage, the latter to improve the physical qualities of the soil, par¬ ticularly texture and water-retaining capacity. To supply these elements, barnyard manure is most frequently employed and, when properly cared for and applied, is best. It is insufficient, however, even with the droppings of the ani¬ mals, to keep the land in its best producing condition. Hence, commercial fertilizers must be applied liberally; phosphoric acid and potash at any season and nitrate of soda and other quickly soluble fertilizers in the spring or dur¬

ing the summer. These remarks apply to the annual management as well as to first prepara¬ tion. The land should be deeply plowed, thor¬ oughly harrowed to make the surface as fine as possible, the seed sown on a windless day — if possible just before a rain. Since little weeding can be done, it is highly desirable to purchase as clean seed as possible, the high price for ˆrecleaned® seed being more than repaid in the quality of the crop. Often for permanent pastures shortlived grasses may be mixed with the perennial sorts in order to choke weed-growth. The perennials do not suffer but soon gain possession of the ground. When the plants are growing well the field should be mowed close to the ground in order to destroy the taller weeds and prevent their production of seed; and this should be repeated several times each year until the grass has full possession. This labor may be lessened in many cases by turning sheep upon the pastures previously occupied by cattle or horses because the sheep eat many weeds that the other animals ignore. Harrowing pastures in early spring is con¬ sidered advantageous, since it admits light, heat and air and reduces the struggle among the plants. Reseeding pastures is generally not ad¬ visable, plowing and planting to other crops for several years being preferable.

It is generally found advisable to pasture the various domestic animals separately, since cattle and horses may annoy or even injure one another, and since sheep crop the grass so closely that they deprive the larger animals of their share. Dairy and beef cattle are generally pas¬ tured separately because of the differences in their general management. Great care must be exercised to pasture no more animals upon a given area than can be easily fed from it. When too many are present the animals not only kill out the grass but encourage the

growth of the weeds they will not eat. (See Lawn; Meadow). Consult Spillman, J. W., (Farm Grasses of the United States) (New York 1909) ; Sutton, M. J., (Permanent and Temporary Pastures > (Lon¬ don 1911).

PATAGONIA, pat-a-go'm-a, South Amer¬ ica, a name formerly used of all the southern part of the continent, but now used of the region bounded on the north by the Rio Limay and the Rio Negro, the Atlantic on the east, the Strait of Magellan on the south and the Andes on the west. The region, discovered by Magellan in 1520, was practically unexplored (save by Darwin in 1839) until 1869. Since then, however, it has been explored by Musters, Moreno, Moyano, Fontana, various officers of the Argentine army and scientists, and in 1896-99 by a Princeton University expedition, led by J. B. Hatcher. The country is a tertiary plateau with terrace-like drops to the sea-level at the coast, so that the etymology of the name seems to be from Quichua patacuna, "terraces.® There are many volcanic rocks, especially basalt; a few volcanoes even in the Andes, Fitzroy beingf the most important; and many large salt lakes. The climate is cold, the region lying between the isotherms of 14° and 7° C. At Rawson the temperature has a maximum of 31° C. in January and a minimum of — 7° C. in June. The climate and temperature closely resemble those of South Africa. The flora is

scanty in the extreme south and everywhere differs very remarkably from that of the sur¬ rounding country. Along the river courses there are willows ; peculiar vegetation marks the salt lagoons, and in the tertiary plateau the plants resemble those of the Mendoza, and there are many cactuses. The fauna also is scanty. The birds are of particular importance as showing many unusual instances of specialization. Fami¬ lies which everywhere else live in trees have here lost their arboreal habit and nest on the ground. There are wild horsed and cattle. The <(Patagonian giant" has been greatly exagger¬ ated; Mr. Hatcher gives the average height of the men as 5 feet 11 inches, weight 175 pounds, and of the women, height, five feet seven inches

and weight about that of the men. They were nomads. The Roca expedition of 1880 almost wiped them out. The entire re¬ gion was long unclaimed. Later it was dis¬ puted between Argentina and Chile, and was finally divided between these two powers, the Cordillera being the boundary by the conven¬ tion of 23 July 1881. The portion belonging to Chile is now known as Magallanes, while Argentine Patagonia consists of three political divisions: Rio Negro, Chubut and Santa Cruz; so that Patagonia has now no separate political existence. Consult Campbell, c Through Patagonia) (1901); Musters, (At Home with the Patagonians) (1871) ; Prichard, (Through the Heart of Patagonia) (1902) ; and (Reports of the Princeton University Expeditions to Pata¬ gonia, 1896-1899.)

PATALA, pa-ta'la, the Hindu lower re¬ gions, described-in the Puranas as seven in number, each being more than 3,000 leagues in depth though some authorities say there are eight Patalas. They are inhabited by demi-gods of various kinds and orders, who live luxuri¬ ously in splendid mansions, feasting on choice viands and fruits, and* quaffing delicious wines. They wander at will amid glorious forests along streams and by the side of lakes whose banks are covered with flowers, while the lotus floats upon the bosom of their waters. The Patalas should not be confounded with the Narakas, or infernal regions, with which they seem to be in no way related. They are the home, among other supernatural beings, of the Nagas or mythological serpents.

PATAMAR, a native sailing vessel common along the coasts of India. It is about 75 feet long, 20 feet broad and 12 feet deep, with a burden of about 200 tons. It has two masts, with lateen sails. Smaller ones have but a single mast. They have a prow stem the same length as the keel. It is fast, and on this ac¬ count was formerly much used in the carrying of dispatches; but in this business it has been replaced by steam launches.

PATAN, pa-or pu-tan', variant spelling of Pattan (q.v.).

PATANJALI, pa-tun'ja-li, Sanskrit gram¬ marian, who wrote about 140 b.c. (or possibly as late as 25 a.d.), a commentary called

Mahabhashya, or < Great Commentary,* on the previous work of Panini (q.v.), and especially on the criticism of Panini bv Katyayana ; this work, edited by Kielhorn 1878-85, is one of the most important sources of our knowledge of Sanskrit grammar. Patanjali, whether the

Grammarian or another, is the reputed founder of the Yoga system of philosophy, which pro¬ claimed that salvation and bliss were to be at¬ tained by the union of the individual soul with the great soul, Igvara, and that this can be at¬ tained by austere life and meditation. He is generally credited with being the author of the Mahabhalate ; but it is quite possible that there were two writers of the same name. If so, this would explain the uncertainty as to even the century in which the grammarian lived.

PATAPSCO, pa-tap'sko, a river of Mary¬ land, flowing into Chesapeake Bay, 14 miles southeast oJ the city of Baltimore. It enters the bay by a large estuary, which forms the harbor of Baltimore, and is navigable for the largest vessels. The entrance to the river is protected by Fort Howard, built upon a prom¬ ontory near where the Battle of Northpoint was fought in the War of 1812. See Baltimore.

PATAS MONKEY, a reddish guenon (Cercopithecus patas or Erytlirocebus patas) of western equatorial Africa. It is notable for its reddish color and its grayish checks and under parts.

PATCH, Edith Marion, entomologist: b. Worcester, Mass., 27 July 1876. Educated at universities of Minnesota, Maine and Cornell where she specialized in entomology. She or¬ ganized the department of entomology of the Maine Agricultural Station of which she has since (1903) been entomologist. Her work there, which has been conducted along experi¬ mental lines of a highly educational nature, has made her name well known throughout the United States and Canada. Her research deals largely with problems relating to ecology and economic entomology. She has written much for magazines and has published several stories quite different from her serious technical and official work. Among these are (Dame Bug and her Babies) (1913) ; (How Laddie Tells the Time O' Year> (1914).

PATCH, Kate Whiting, American writer: b. Elizabeth, N. J„ 22 Aug. 1870; d. 1909. She was married in 1893 to F. W. Patch, a physician of Framingham, Mass., and is the author of (Middleway * (1897) ; and the juvenile books,

(Rainy Days and Sunny Days* (1899) ; (01d Lady and Young Laddie) (1900) ; (Prince Yel-lowtop) (1903).

PATCH, Samuel, American athlete: b. Rhode Island, 1807; d. Rochester, N. Y., 13 Nov. 1829. He went to sea when very young, and later became a cotton-spinner at Paterson, N. J. He made a reputation for feats in diving, the leap which he took from the bridge span¬ ning

the Passaic, a distance of 80 or 90 feet, into the pool below the falls, attracting wide¬ spread attention, and he thereafter traveled over the country, diving from topmasts and bowsprits of vessels. At Niagara Falls he made a leap of more than half the height of the falls, but dissatisfied with this performance he ad¬ vertised a leap of 125 feet at the Genesee Falls, in which he lost his life.

PATCHES, are small pieces of silk or court-plaster used on the face to apparently heighten the complexion by contrast. During the 17th and beginning of the 18th century these fantastic ornaments were commonly worn by women and sometimes by men. In the United

States the practice was revived in the 20th cen¬ tury by fashionable people in some circles of society.

PATCHOGUE, pat-chog', N. Y., village Suffolk County, on the southern coast of Long Island, on Great South Bay, and on the Long Island Railroad, 51 miles east of New York. It was incorporated as a village in 1893. Its most important industries are oystering and fishing; it has good dock facilities, and is one of the chief harbors for the fish and oyster boats of the bay. It has also a cold storage plant, and a number of manufactures, including lace, paper, lumber and surveyors' supplies. It is a favorite place of residence, one of the popular summer resorts of Long Island and contains several hotels. It has fine residences, handsome churches, a high school and a public library. The governing body is a board of trustees, and the executive a village president, who holds office for a year. Pop. (1920) 4,031.

PATCHOULI, pat-choo'li, known in India as ˆpuchapat,® a perfume obtained from the dried leaves and branches of the Pagoste-mon patchouli,' a mint of India and China, where it is cultivated on a large scale; the plant has also been acclimatized in France. The branches and young leaves are highly odorif¬ erous, like sandalwood, but the perfume is much more intense. The essence obtained from them by distillation is a kind of heavy dark-brown oil, which nullifies the effect of an equal weight of any other vegetable perfume which may be

mixed with it. It is used in India to scent the costly Cashmere shawls, with the view of keeping out moths. Hence real Cashmere shawls were known by their scent, until the French, who had succeeded in imitating the fabric, found out this secret also, and imported the plant for a like use. In Asia it is also used for scenting ink-cakes, tobacco and hair-oil, and is everywhere valued as a preservative of woolens and linens from insects. The pure es¬ sence, having a disagreeably powerful odor, re¬ quires to be greatly diluted for the purposes of the perfumer.

PATE DE FOIE GRAS, pa-ta' de fwa gra (paste of fat liver), (<Strassburg pie,® a French article of food, made from the livers of geese, and much relished by epicures. It is a sort of potted meat considered a great delicacy, which is made in different parts of France, but chiefly in Strassburg and Toulouse. Fowls are fed and stuffed artificially with salted grain, chiefly Indian corn, which makes their livers grow abnormally large. These livers, prepared in a special way and covered with melted goose fat to keep them protected from the air, are usually packed in earthen pots, though of late the cheaper grades, especially the imitations made outside of France, are sometimes put up in tin cans.

PATELLA, the kneecap or kneepan, an irregularly oval bone covering the knee-joint, developed in the tendon of the large muscle of the thigh, which is made up of the rectus femoris, vastus internus and externus, vastus internus and the quadriceps extensor cruris. This muscle becomes narrowed down at its lower end, and forms the ligamentum patellae, which is attached to the front surface of the tibia, and is one of the important muscles in extending the leg. It has developed at its

lower end the sesamoid bone, the patella, over which it slides. It is a flattened bone of tri¬ angular cross-section, thickest in a vertical line in-the centre. Its front surface is rounded and is attached to the tendon of the muscles; its back surface is covered with cartilage and forms an important part of the knee-joint, artic¬ ulating with the femur at different places as this bone is moved. In front of the patella, separating it from the skin, is a bursa. Af¬ fections of the patella are not rare. Inflamma¬ tion of the bursa is common in those who are compelled to be on their knees continuously. A chronic condition known as <(housemaid's knee® results from this, and is often extremely difficult to treat. An equally common condi¬ tion is a mild inflammation of the synovial mucous membrane behind the patella.

This is a condition sometimes set up by violent athletics, excessive exertion as in tennis, football, skating, bicycling, *etc.* It usually follows some injury of the knee, and may result in partial stiffening of the joint. Rest, hot applications, and a plaster bandage are the best preventives of this condition. Following gross accidents, disloca¬ tion or fracture of the patella may occur. Dis¬ location is a rare accident, and usually is the result of direct violence. The patella may be dislocated either toward the inward or the out¬ ward side of the leg; most frequently the dis¬ location is outward. The sudden limitation of motion, together with the appearance of deformity, renders the diagnosis simple. Re¬ position is also easy. Fracture may result from direct violence, or it may result from sudden forcible stiffening of the great muscles of the thigh. Such a fracture is usually transverse, one portion of the bone remaining fastened by the stiff ligament, the upper portion usually be¬ ing pulled some distance — half an inch to two inches — away by the thigh-muscles. Treat¬ ment of this accident may be by rest and by bringing the parts together after absolute muscular relaxation, further keeping them in position by a plaster of paris bandage; or it may consist of the surgical procedure of wir¬ ing. In this operation an incision is made and the two fragments are drawn together and firmly fastened in position by means of silver wire. Plaster bandages are worn for several months, as in the conservative operation, and the results will vary greatly, according to re¬ sults of the inflammatory processes, and the per¬ sonal equation of the patient's own bone-vital¬ ity. The results in most instances are fairly satisfactory. A stiff knee may follow; a weakened knee is always to be expected.

PATELLAR REFLEX. See Knee Jerk.

PATEN (Latin, patina, a plate or dish), in ecclesiology, the plate or salver on which is placed the element of bread in the eucharistic service. In ancient times it was often made of wood or glass; but as the Church became more wealthy, patens were made of gold or silver, some richly ornamented with gems and enamels.

PATENT MEDICINES. This term is quite usually, but erroneously, applied to that class of medicinal preparations which are put up in uniform packages and which are offered for sale under distinctive trade marked or copy¬ righted names. These remedies, which are made in liquid, solid or semi-solid form, are articles of almost universal household use

throughout the United States, and are very fre¬ quently prescribed, either separately or in com¬ bination, by physicians. Patent medicines are usually combinations of well-known drugs. They are not (with very few exceptions) patented, but are more correctly designated as ˆProprietary medicines® (because those who manufacture them have proprietary rights in formulae, trade names, etc.) or “package medi¬ cines.® The term ((patent medicine® originated from royal patents, or marks of favor, granted by early English kings to the originators of meritorious medicinal compounds, and the name, as well as many examples of the prod¬ ucts, were brought to America by early immi¬ grants. Many widely used and generally known medicinal products were originally patent medicines, among which class might be cited Dover’s powders, paregoric, *etc.* Usually (but not always) these so-called patent medicines are sold as complete preparations, the formulae from which they are manufactured being the exclusive property of the manufacturer. In a majority of cases they originated with practis¬ ing physicians whose favorite prescriptions they were and some of them have been on the market over 100 years ; many over 50 years and a much larger number over 25 years. Many prepara¬ tions which originated as so-called “patent medicines® have been admitted to the United States Pharmacopoeia, the pharmacopoeias of other countries, the National Formulary and other similar works, and many meritorious and useful drugs have first been introduced to materia medica through their use in patent medicines. Many instances of such introduc¬ tions might be cited. Among these are quinine, echinacea and cascara. Many well-known patent medicines have been introduced to the public by the prescriptions of practising physicians. The place of ((patent medicines® in domestic economy is so well established that, during the World War when American industry was, by government restrictions, put on a (<win the war,} footing, the patent medicine industry was in¬ cluded among those industries, considered es¬ sential to public welfare, placed on the gov¬ ernment priorities list and allowed its full re¬ quirements of such necessities as sugar, alcohol, glycerine, coal, etc., which were denied (or al¬ lowed in reduced amounts), to many other industries. The American manufacture of package medicines dates back about a century and a half. Latest available United States Census Bureau

statistics (for the commercial census of 1914) show 2,271 establishments chiefly engaged in the manufacture of patent and proprietary medicines and compounds. The value of the output (at manufacturers' prices) was approximately $83,000,000 for 1914. It shows a. steady growth from the time of hist government statistics on the subject. Approxi¬ mately 25,000 people were employed in 1914; the invested capital was about $80,000,000. In addition to the 2,271 establishments engaged chiefly in the manufacture of patent medicines, there is a large, but undetermined, number of others with whom the manufacture of patent medicines is not the chief part of business. Many retail druggists manufacture one or more medicines which are sold under trade or pro¬ prietary names. No attempt has been made to secure data of this class of manufacture,ˆ but in the aggregate the number of preparations,

and the total output reckoned in terms of dol¬ lars is a very large sum.

The manufacture of patent medicines is carried on to some extent in practically every State in the Union, except Arizona, Idaho, Nevada, New Mexico and Wyoming. New York leads with 806 establishments, Illinois is second with 363, Pennsylvania third with 324, Ohio fourth with 252, Missouri fifth with 212, Massachusetts sixth with 162, Indiana seventh with 156, Michigan eighth with 142, *etc.* The patent medicine industry is known for the ex¬ tent and mechanical and sanitary complete¬ ness of many of its laboratories. Manufactur¬ ing is frequently done on a large scale, with modern machinery and appliances for testing and proving materials and products. In some instances the crude drugs used in the manufac¬ ture are grown for the manufacturers, in others they are gathered under the supervision of rep¬ resentatives of the manufacturers, and in a greatly larger number they are obtained from drug importers or millers, and every process of manufacture is carried on in the manufacturer's laboratory. In other cases partially prepared ingredients are. purchased and combined, and in still others the actual manufacturing is done by manufacturing chemists (several of whom have large and completely equipped plants for that purpose), while only the bottling or pack¬ ing is done in the establishment of the pro¬ prietor. Distribution of the product is usually through the wholesale drug houses and retail drug stores and 52 per cent of the gross business of wholesale drug houses is in this class of merchandise.

PATENT OFFICE, United States. See

PATENTS, The Laws of. The extraor¬ dinary industrial and commercial development of the United States during the 19th century was due primarily to three causes: Physical, social, legislative. The extraordinary natural wealth of the country was not fully appreciated even 25 years ago. Its vast agricultural possi¬ bilities were disclosed earlier in the century with the opening up and development of the great West. Its abundance of forest lands, of course, were recognized, but not its great min¬ eral resources, its great deposits of copper, its high grade iron ores, and the full meaning of the contiguity of these iron ores to vast coal fields bearing the richest deposits. These physi¬ cal resources, however, might not have yielded to such rapid growth were it not that a race of men was at hand singularly adapted^ to carry¬ ing forward the work of the country's develop¬ ment. The aggressiveness, courage, energy and brains necessary for the work were the result in part, perhaps, of the assimilation of strong men of different nationalities, and partly, per¬ haps, to the energy derived from climatic con¬ ditions. The vast industrial development, how¬ ever, which has gone forward with leaps and bounds in all sections of the country, would have been impossible had it not been for the wise laws which more than anything else have served as a stimulus to such development. It has been estimated that seven-eighths of our industrial enterprises are dependent directly or indirectly upon our patent system, or that such enterprises owed their being originally to our patent laws. The beneficence of our patent system is now pretty generally recognized, but

this attitude is of comparatively modern growth. The prejudice which existed against patents as monopolies during the 18th century and the early part of the 19th century was a perfectly natural one.

Patent History. — The granting of patents to individuals or guilds was of very early origin and reached its greatest abuse in England dur¬ ing the reigns of Elizabeth and James, when the granting of exclusive monopolies under letters patent to individuals or corporations for the

manufacture or sale of certain classes of com¬ modities or luxuries was an easy although scandalous method of filling the royal ex¬ chequer. The early monopolies were of two kinds, legal and illegal. To the first class be¬ long such as are conferred on the inventors of a new manufacture or the introducer of new trade, and to the second class belong the ex¬ clusive grants to individuals or corporations to manufacture and sell commodities or necessities of life, such as salt, tobacco, etc., thereby re¬ stricting trade and preventing those who had established such industries from obtaining a livelihood therefrom. The famous Statute against Monopolies, 1623, put an end, however, to these abuses, but the word <(patent® carried unfortunately the taint of its early abuse, and for a century or more patents were looked upon askance. The law of patents in its modern significance, however, did not begin to be under¬ stood until the 19th century had dawned. In the United States the law of patents rests not upon common law, but upon statutory provision. In early colonial days patents were issued by the Colonial governments. The earliest patent issued in this country appears to have been granted by the General Court of Massachusetts Bay Colony, in October 1641, to one Samuel Winslow for a process of manufacturing salt. The term of the patent was for 10 years and the grant was conditional upon works being established within the year. In 1656 Massa¬ chusetts Bay Colony granted a patent to John Winthrop, son of Governor Winthrop, with the <(sole privilege of manufacturing salt after his particular method® for a term of 20 years. Massachusetts, Connecticut and Pennsyl¬ vania were the principal members of the 13 original colonies which granted patents. The Articles of Confederation, adopted 12 July 1776, contained no provision for the granting of patents, but the States issued patents inde¬ pendently as the colonies aforesaid had previ¬ ously done. In 1785 James Rumsey obtained patents from the States of Maryland, Virginia, Pennsylvania and New York, for a new type of boat which during the previous year had had a trial on the Potomac River in the presence of George Washington.

The authority granted to Congress for the enactment of legislation affecting patents is de¬ rived from that article of the Constitution which empowers Congress to make laws which will promote the progress of the useful arts.

The first patent laws of the United States were enacted in 1790, and the person who had the honor of receiving the first patent issued by the United States was Samuel Hopkins of Vermont. The patent bore date of 31 July 1790, and was for a process of making pot and pearl ashes. If this early parchment is still in ex¬ istence, the owner is a fortunate man, for the

document is certainly a historical curio. It possesses a special interest as it bears the signa¬ tures of George Washington, as President, Thomas Jefferson, Secretary of State, and Ed¬ mund Randolph, Attorney-General. All the early patents bore the signatures of the Presi¬ dents of the United States, were usually em¬ bossed on vellum in folio size and bore the great seal of the United States. Three patents were issued in 1790 and 55 in all under the act.

The attitude of the public and of the courts up to this time was antagonistic to patents as a. rule. The old prejudice against monopolies still lingered in the minds of men, and the vast advantages to be gained by liberal laws as a stimulus to invention were not yet understood. If a question of right under a patent were brought up for trial, the presumption was gen¬ erally against the claims of the inventor. As time passed, however, and a broader and more intelligent spirit prevailed, more favorable laws were enacted and a more generous interpreta¬ tion of old laws crept in. Under the earlier dis¬ pensation the inventor was obliged to meet the enormous outlay that the securing of a patent demanded, or he kept his invention secret. The latter method has resulted in so many cases in what are known as lost arts.

The patent statutes received the serious at¬ tention of Congress in the late 30's and a num¬ ber of acts were enacted, which placed the patent system on a substantial basis. The in¬ terest taken in the patent laws and the public demand for an extension of the system are evinced by the fact that new statutes were enacted in the years 1836, 1837, 1839 and 1842.

The present patent laws of the United States are those of 1870, at which time the preceding acts and parts of acts, numbering over 20, were consolidated and revised, and the former period of 14 years allowed to a patent was extended to 17 years. Revisions have been made from time to time, and the patent law as revised is issued in pamphlet form by the government for distribution to those interested.

What is a Patent? — The term patent or letters patent is derived from litterce patentes, signifying that which is open or disclosed in contradiction to lettre de cache, that which is sealed or secret. Primarily the patent is to make known to the people the new invention and its uses and advantages ; secondarily it con¬ fers upon the patentee for a stated period a monopoly of the manufacture, use and sale of the patented article. This term is the keynote of the whole

principle upon which the patent system is built up, namely, disclosure. The dis¬ closure must be honest, absolute and unreserved. The penalty for mental crookedness or for igno¬ rance in giving out fully and freely the nature of the invention is severe and direct and is nothing less than forfeiture of the patent itself. The reason for this is perfectly logical and arises from the very meaning, spirit and nature of the relationship existing between the patentee and the government. The term of a patent is 17 years. The patent itself, however, is in the nature of a contract between the patentee and the government, presumably for their mutual benefit. The government grants to the inventor the exclusive right of manufacture and sale for 17 years on condition that the inventor shall disclose fully the nature of his invention or discovery, and shall allow the public the unre-PATENTS

stricted use of the invention after this term has expired. If he fail in making full disclosure, he has not lived up to the terms of his implied contract and the contract thereby becomes null and void. It sometimes happens that an in¬ ventor discloses freely part of the invention, but cunningly conceals some essential step in the process, but if the case is tested within the courts and the real facts are brought to light, the patent will be declared invalid. An interest¬ ing instance in point is one which came to view in connection with the entry of the United States as a belligerent into the Great War. The United States followed the procedure of Great Britain and France as to German and Austrian patents, issuing licenses to American manu¬ facturers through the Federal Trade Commis¬ sion to work the patents in this country. When this was attempted it was found that in very many cases one of the essential steps in the processes patented had been omitted in order to preserve secrecy. This being a direct viola¬ tion of the United States Patent Law, the in¬ complete patents were declared void. American manufacturers who discovered the missing links in the faulty descriptions were allowed to make application for patents under the complete de¬ scriptions, with the ultimate result that the original holders of the German patents are estopped from marketing in the United States the products thus patented without paying a royalty to the American holders of the complete patents. At the end of the term of 17 years the patent becomes public property, and the article may be freely manufactured by any one. It can never thereafter, as in so many cases in the Middle Ages, become a lost art.

Who May Obtain a Patent? — In order to secure a valid patent, the applicant must declare upon oath that he believes himself to be the true, original and first inventor or discoverer of the art, machine, manufacture, composition or improvement for which he solicits a patent ; that he does not know and does not believe that the same was ever before known or used ; and that the invention has not been in public use or on sale in the United States for more than two years before the application was filed, and that the invention has not been described in any printed publication for longer than two years prior to the filing of the application. Any one who can subscribe to the above conditions may apply for a patent, irrespective of race, color, age, or nationality. Minors and women and even convicts may apply for patents under our law. But it is provided that a lapse of a year between the filing of the application and its com¬ pletion forfeits the patent — except in such cases as the commissioner may permit a longer time. The rights in an invention are not lost by death, for an application may be filed by the executor or administrator, and the rights of heirs thereby safeguarded. The patent in this case would issue to the executor or administra¬ tor and would become subject to the adminis¬ tration of the estate like any other property left by the deceased. Even the rights of an insane person may not be lost, as the application may be filed by his legal guardian. If foreign pat¬ ents for the same invention have been previously issued, having been filed more than 12 months before the filing of the United States applica¬ tion, the patent would be refused. During the jarar n moratorium of nine months was allowed

by Congress beyond the 12 months prescribed in the law. The applicant must state his national¬ ity. It often happens that two or more indi¬ viduals have jointly worked upon the invention, and in this case the several inventors should jointly apply for the patent. Should they not so apply the patent when issued would be in¬ valid. If they are merely partners, however, and not coinventors, they should not apply jointly for a patent, as the inventor alone is entitled to file the application. He may, how¬ ever, assign a share in the patent to his partner, coupled with the request that the patent should issue to them jointly. It is of the greatest im¬ portance that these distinctions should be clearly understood ; otherwise, the patent may be ren¬ dered invalid. Joint patentees may each exer¬ cise independently all rights conveyed by the patent without making any accounting to the other owners. Each may make, use and sell the invention on his own account and may issue licenses to others for his own personal benefit.

What May be Patented? — Any new and useful art, machine, manufacture or composition of matter, or any new and useful improvements upon an old, or already patented article. The patent for an improvement does not affect the earlier patent. A patent may also be allowed on a new combination of old appliances, upon new designs and upon new compounds for use¬ ful purposes. The thing invented must be new and useful. These are conditions precedent to the granting of a patent. Of these two condi¬ tions by far the more important is the former, and it is concerning the interpretation of this word ((new}) and its bearing upon the invention that the principal work and labor involved in passing an application safely through the Patent Office is involved. When the invention has been worked out by the inventor and he is prepared to file his application, his attorney prepares the necessary papers, as provided for by law, namely : An oath, a petition, a specification con¬ sisting of a description of the invention and concluding with claims which specifically set forth what the inventor claims to be the novel features of the invention, and drawings which are prepared and filed with the case, and in due course the application is ready for examination in the Patent Office. The question of whether the invention is new is then considered, and the burden of proof that the invention is not new rests upon the Patent Office. The examination consists in searching through the files of the Patent Office among the patents that have been already issued, and through such literature as may bear upon the subject. If any reference is discovered that anticipates the invention, as de¬ fined by the claims of the specification, the ap¬ plicant is informed of the fact, and he is allowed to amend his papers and narrow the claims so as to avoid the prior patents, if possible. But no new material may be introduced in such amendment. If his attorney considers the posi¬ tion of the Patent Office untenable, he may pre¬ sent arguments to show wherein he believes that the inventor is entitled to a patent. It is thus seen that the question of whether an invention is new is one of fact, and one of the greatest importance, and upon the showing that the in¬ ventor is able to make during the prosecution of the case depends largely the future success of the patent. The evidence adduced in proving that the invention is not new must be tangible

and accessible. A patent would not be refused or overturned on a mere mental concept. There must be some evidence of a substantial charactei that serves to show that the earlier idea was reduced to practice or at least that there was such a description or drawing made, as would be sufficient for one skilled in the art to reduce the invention to practice. If it has not been actually reduced to practice, it must be a con¬ crete not an abstract idea.

It is essential that the application for a patent should be filed before the invention has been in public use or on sale for a period of two years. If the inventor has publicly used or sold his invention for a period of two years, it be¬ comes public property and he cannot regain the right to obtain a patent. He may, however, make models and experiment with his invention for a much longer period, provided he does not disclose his invention to the public or put it into actual use or on sale for a period of two years. The word <(useful® is not one which usually gives either the Patent Office or the inventor a great deal of trouble, as any degree of utility, however insignificant, will serve to entitle the inventor to a patent. It has often happened that an invention which appears, at the time the patent is applied for, to have no special utility, in later years owing to new discoveries or improvements in the arts is found to possess the greatest merit and value. Unless an inven¬ tion is positively meretricious, therefore, it is difficult to assume that it either has no utility or never will have any. Patents are granted for (<any new and useful art, machine, manu¬ facture or composition of matter, or any im¬ provement thereon.® It is seen from the terms of the statute that almost any creature of the inventive faculty of man becomes a proper sub¬ ject for a patent. The exceptions are very few. Patents will not be granted, for example, for any invention that offends the law of nature. Under this category may be mentioned perpet¬ ual motion machines. In case an application of this character is presented, the commissioner politely informs the applicant that the matter cannot be considered until a working model demonstrating the principle of the invention has been deposited in the Patent Office. Inventions of an immoral nature will not be considered. Medicines and specifics are not now proper sub¬ jects for letters patent, unless some important new discovery is involved. Under a recent rul¬ ing of the Patent Office hundreds of patents were suspended lest they might prove to be an aid to the enemy in prosecuting the war, or a menace to public safety.

Patented Articles Must be Marked. — Articles manufactured and sold under a patent must be so marked that the public shall have notice

that the article is a patented one. This notice consists of the word ((Patented,® together with the day and year when the patent was issued or the serial number of the patent. Dam¬ ages in an infringement suit cannot be recovered unless the defendant has such notice on the article itself that it is patented. The term of a United States patent is 17 years. This term cannot be extended except by special act of Con¬ gress. It is many years since a bill seeking an extension of the term of a patent has been passed by Congress.

Appeals. — If an application for a patent has been rejected, the applicant may appeal from

the primary examiner to the board of exam¬ inersin-chief. He may further carry the ap¬ peal to the Commissioner of Patents, and in case he is not satisfied with the latter decision, he may carry the appeal finally to the Court of Appeals of the District of Columbia.

Interference. — If two or more individuals shall have invented the same thing at or about the same time, interference proceedings may be instituted to determine which applicant is the original or first inventor. Interference proceed¬ ings are instituted between applicants whose applications are pending or between a pending application and a patent already issued, provided the latter patent has not been issued for more than two years prior to the filing of the con¬ flicting application. The proceedings are con¬ ducted before an examiner of interferences. Appeal may be taken from the examiner of in¬ terferences to the board of examiners-in-chief, and from the board of examiners-in-chief to the Commissioner, and thence to the Court of Appeals of the District of Columbia. Not all the claims for a patent are necessarily involved, only such as cover the particular feature of the invention which is declared to be in interference. The unsuccessful applicant by eliminating the claims or claim in controversy may procure allowance of the other claims not objected to, and have the patent issued. In determining the question of priority of invention, witnesses are examined and the proceedings are conducted much in the same manner as in a suit at law. The first step in the proceeding consists in filing with the Commissioner a preliminary statement made under oath, giving the date at which the invention was first conceived and reduced to some tangible form, such as the making of drawings, the construction of a model or the disclosing of the invention to another. The ob¬ ject of the subsequent examination and cross-examination is to substantiate the date of in¬ vention as claimed by the applicants respec¬ tively, and to establish the priority of

invention.

Infringement. — In case of an action for the infringement of a patent, the importance of the question of novelty appears from the special pleadings which the defendant may enter, which are as follows :

1. That for the purpose of deceiving the public the description and specification filed by the patentee in the Patent Office was made to contain less than the whole truth relative to his invention or discovery, or more than is neces¬ sary to produce the desired effect; or,

2. That he had surreptitiously or unjustly obtained the patent for that which was in fact invented by another, who was using reasonable diligence in adapting and perfecting the same; or,

3. That it had been patented or described in some printed publication prior to his supposed invention or discovery thereof ; or,

4. That he was not the original and first inventor or discoverer of any material and sub¬ stantial part of the thing patented; or,

5. That it has been in public use or on sale in this country for more than two years before his application for a patent, or had been abandoned to the public.

Damages for infringement of a patent may be recovered by action on the case in the name of the patentee or his assignee. The courts having jurisdiction over such cases have the

power — (1) To grant injunctions against the violation of any rights secured by the patent; (2) to allow the recovery of damages sustained ‘by the complainant through such infringement. In such a case the defendant is compelled to furnish an accounting showing the amount of the articles manufactured and sold and the prof¬ its derived from such sale.

Design Patents. — Design patents are issued for any new or original design whether it be a work of art, statue, bas-relief, design for prints or fabrics, or for any new design or shape or ornament in any article of manufacture. The scope of the design patent was formerly veiy broad, but recent decisions and enactments have greatly restricted its availability and a design patent cannot now be obtained unless it possesses some inherent artistic quality. Mere utility is not sufficient to entitle a new design to letters patent. The terms of design patents are 7 or 14 years.

Caveats. — The law providing for the filing of caveats was repealed by Congress in the }rear

1910. • «. ,

Assignments. — A patent or any interest therein may be sold or assigned like any other piece of property. An inventor may sell or assign his interest or a part interest in his invention, either before the application is filed or while the application is still pending. Under these circumstances the patent may be issued to the assignee or to the inventor and assignee jointly. The patent if already issued may be assigned by the owner whether he be the in ventor or an assignee. The . conveyance is effected by an instrument in writing, stating the conditions under which the patent is assigned, and the assignment should be recorded in the Patent Office.

Foreign Patents.

Canada, Dominion of. — The laws of Can¬ ada follow somewhat closely the practice in the United States. The term of a patent is lb years. The general practice, however, is to divide the fees, making payment only for a term of six years at one time. The patent is sub¬ ject to taxation after the first term of six yeais. Applications are subjected to examination as to novelty and usefulness, as in the United States. The application must be filed in Canada within one year of the date issue of the United States or other foreign patent. If the inventor neg¬ lects to file his application within the 12 months, the invention becomes public property. It is not permissible to import the patented article into the Dominion after 12 months from the date of the Canadian patent. Within two years from said date the manufacture and sale of the article under the patent must have been begun. Ihese exactions may be relaxed under certain condi¬ tions. The Canadian government may also en¬ dorse any patent as subject to the grant of

li¬ Great Britain.— The term of the patent is 15 years. Under the Patent Act of 1902 which went into force on 1 Jan. 1905, a limited ex¬ amination is made to ascertain whether the in¬ vention is novel. In the examination, the Patent Office officials refer to all British patents, the applications for which were filed during the 50 years immediately preceding the filing ot the application which is being examined, ihis examination is not as thorough in its scope as VOL. 21 —25

would at first appear, since publication in a foreign patent or in a periodical, while not pre¬ venting the grant of a British patent, may, m some cases, cause the British patent to be de¬ clared invalid by the courts. The application should, however, be filed before the invention is published in public print or becomes publicly known in Great Britain, except in cases where the application is filed under the provisions of the International Union. In Great Britain the true inventor should apply for the patent in his own name; but if the invention has been con¬ ceived in a foreign country, the first introducer may obtain the patent whether he be the true in¬ ventor or not. Under these circumstances, therefore, a foreign assignee may apply for the patent in his own name without the true in¬ ventor being made known. After the fourth year there are annual taxes, gradually increasing in amount. The patent should be worked in Great Britain within four years of the date of the patent, and is forfeited if work is suspended for one year. The 1918 Patent Bill contains a provision not heretofore compulsory, that the article patented must be made in Great Britain and declares the right of endorsing any patent as subject to the grant of licenses.

France — The term of a patent is 15 years. There is no examination as to novelty and the patent is granted to the first applicant whethei or not he be the true inventor. The patent must be worked in France within two years from the date of issue, and is subject to an annual tax. The life of the patent is conditioned on the payment of this tax and the grant is forfeited if work under it is suspended for two years. If these conditions are not complied with, the patent becomes public property, except when the patentee is a citizen or a subject of a country in the International Union, in which case the working should take place within three years of the filing of the application.

Germany. — The term of a patent is 15 years. The patent is issued to the first applicant, but if he is not the true inventor he should, before filing the application, obtain the written consent of the inventor. The

application is subjected to a rigid examination. The patent is subject to an annual progressive tax and must be worked within a period of three years, but under a treaty it is not necessary for a United States citizen to work a patent in Germany provided the invention is worked in the United States.

Austria. — The term of a patent is 15 years. The practice is somewhat similar to the practice in Germany, although the examination is gen¬ erally not so exacting. The patent is subject to an annual tax and it must be worked within a period of three years and is voided in case of a suspension of such work for one year

Hungary — The term of a patent is 15 years. The laws are similar to those of Germany.

Belgium — The term of a patent is 20 years. The first applicant obtains the patent whether or not he is the true inventor. There is a small annual tax and the patent should be worked within one year of the working elsewhere. I he patent expires if work under it ceases for one

year. ,

Italy.— The term of a patent may be for one year, six years or 15 years. The patent is granted to the first applicant. The patent is subject to an annual tax and the working must take place within two years. 1 he short term

patents are void if work under them ceases for one year, and the long term if the suspension is two years.

Russia.— The term of the patent is 15 years. The patent is subject to the payment of annual taxes and must be worked within five years. A suspension of work for two years voids the patent.

Spain. — The term of the patent is 20 years, subject to the payment of

annual taxes. It must be worked within three years. The patent expires automatically if work under it ceases for one year. The patent is issued to the first ap¬ plicant whether or not he be the true inventor.

Switzerland.— The term of the patent is 15 years, subject to an annual tax. Working must take place within three years, but in the case of citizens of the United States working in this country is accepted as fulfilling the require¬ ments. Only the true inventor or his assignee can obtain a patent.

Norway. — Term of patent is 15 years, sub¬ ject to a small annual tax. The patent must be worked within three years and becomes void in case of a suspension for one year. The ap¬ plication must be filed in the name of the true inventor or his legal representative. Applica¬ tion must be filed within six months of the publication of any prior patent.

Sweden. — Term of patent is 15 years, sub¬ ject to payment of an annual tax. The condi¬ tions are very similar to the laws of Norway, but the application should be filed before the issuing of a prior foreign patent. There is no specified time within which work under the patent shall begin.

Denmark. — The laws are similar to those of Norway.

Portugal. — The term varies from one to 15 years, the fees payable depending upon the term of the patent. Under the longer terms the patent must be worked within two years, and is forfeited in case of a suspension for two years.

Holland. — Term of patent is 15 years, sub¬ ject to annual taxes and compulsory licenses. Applicant presumed to be the inventor. Appli¬ cation should be filed before invention becomes publicly known. The application is examined before the issue of the patent. It must be worked within five years after issue.

Commonwealth of Australia.— Following the Act of Confederation in Australia the patent laws underwent an entire revision. The law now in force enables an inventor, under one application, to protect his invention in the six states forming the commonwealth. The states which have confederated forming the common¬ wealth are Victoria, New South Wales, Queens¬ land, South Australia, Western Australia and Tasmania. New Zealand is not a member of the commonwealth. The inventor or his as¬ signee should apply for the patent. The appli¬ cation should be filed before the invention is publicly used or

published in Australia, though a publication made more than 50 years ago Is not a bar to the grant, unless it is shown that the invention has been used in Australia within 50 years. The term of the patent is 14 years, a tax being due before the expiration of the seventh year. When a patent is not worked within two years, the patentee may be com¬ pelled to grant licenses on such terms as the court may deem just.

New Zealand.— The application should be filed before the invention becomes publicly known or is publicly used in New Zealand. The inventor or his assignee should apply for the patent. The term of the patent is 14 years, taxes being due after the fourth year and manu¬ facture must begin in New Zealand within three years.

British India. — The patent is granted for 14 years and closely follows the British practice. Is subject to annual taxes after four years and to compulsory licenses. Must be worked within four years. Where the inventor is not a party to application, the application must contain a statement of his name. Application must be filed before the invention is known or used in India.

Porto Rico. — It is possible to procure pro¬ tection for industrial property by registering a certified copy of the United States patent with the civil governor and complying with the other legal formalities. The term is 17 years and no taxes are assessed against the patent.

Philippines. — The modus operand! is the same as that just described as applying to Porto Rico.

Cuba. — Since Cuba has become an inde¬ pendent republic, it has established a patent system. The term of the patent is 17 years. Working should be established within one year. No taxes are levied against the patent.

Mexico. — The term is 20 years. No taxes are due after the issue of the patent.

South American Republics. — Patents are issued by. all the South American republics. The principal countries in which patent protec¬ tion is sought are Brazil, in which the laws are quite favorable to foreigners, Chile and Argen¬ tina. Patents are also frequently secured in Venezuela, Peru, Ecuador, Colombia and Para¬ guay, but only for certain classes of invention, owing to the expense involved in procuring the patents. In Argentina patents are issued for terms of five, 10 and 15 years and are subject to an annual tax. Work under the

patent must begin within two years and a suspension of such work for two years renders the patent void. In Bolivia the life of a patent is 10 years, during which period it is free of tax. A deposit of $150 is required as a guaranty that the patent shall be worked on Bolivian territory. In Brazil the life of the patent is 15 years, and an annual tax is levied. Manufacture under the patent must begin within three years, and a cessation of work under it for one year for¬ feits the grant. In Chile the patent runs for nine years and is free of tax. Manufacture under it must begin within two years and a cessation of two years renders it void. In Colombia the patent may run 10, 25 or 50 years, according to the character of the invention. It is free of tax for 10 years; must be worked within one year and is forfeited if work under it ceases for one year. In Ecuador the term of a patent is 10 years; no tax is levied; but work under the grant must begin within one year. In Panama patents are issued for terms of five, 10 or IS years, and work under them must begin within 20 months for the short term …. e years for the long term. No tax is levied. In Paraguay the term is nine years, free of tax. There are no regulations as to when manufacture must begin. In Peru the life of the patent is 10 years, and it is free of

tax. Work under the grant must begin within two years of its date. In Uruguay the term of the patent is nine years, and it is subject to an annual tax. The term within which work under the grant must begin is stipulated in the patent, and it becomes void if the work is suspended for one year. In Venezuela patents are issued for terms of five, 10 or 15 years, and are free of tax. Work under the short term must begin within six months, and under the long term within two years.

South Africa. — Patents were formerly issued by each of the four important states, Cape Colony, Transvaal, Kongo Free State and Orange Free State. In 1916 the Parliament of the Union of South Africa passed a general patent law replacing the several provincial laws. The validity of former patents and trade marks is preserved. Protection is granted to foreign patents only in case of countries granting reciprocal rights to citizens of the Union.

Japan has recently enacted a system of patent laws on a liberal basis. The term is 15 years, and taxes are levied after three years. Failure to operate under the patent in three years renders it void.

China has no patent laws nor patent office.

The conditions under which foreigners may file applications in the countries having patent laws vary very greatly and no attempt has been made to specify under what conditions appli¬ cations may be filed. In most countries, how¬ ever, the issuance of a prior foreign patent will either defeat the issuance of the patent subse¬ quently applied for in another country, or will render the patent invalid even if it is issued. Great care should be taken, therefore, to avoid having a foreign patent issue at such a time as to endanger the life of the patent at home.

International Union for the Protection of Industrial Property. — The members of the union are Great Britain, United States, France, Germany, Switzerland, Spain, Belgium, Italy, Netherlands, Denmark, Norway and Sweden, Portugal, Mexico, Serbia, Tunis, Brazil, Guate¬ mala, San Domingo, Australia, New Zealand, Dutch East Indies, Dutch West Indies, Japan and Cuba, Austria-Hungary and Ceylon. The subjects or citizens of each of the contracting states shall enjoy, in all the other states of the union, so far as concerns patents for inventions, trade or commercial marks and the commercial name, the advantages that the respective laws thereof at present accord, or shall afterward accord, to subjects or citizens.

It is not possible in the short space allotted for this article to explain at length the various provisions of the treaty. Suffice it to say that one of the principal advantages gained by the union is the greater liberality shown to inventors and the extension of the term within which they may apply for patents in foreign countries. Under the provisions of the Industrial Union, patents which would be lost or rendered invalid by the premature issuance of a prior foreign patent may thus be saved. By examining the list given above, it will be observed that all the principal countries in the world have become members of the union with the exception of Russia and Canada.

The Patent System an Industrial Foster Parent. — Probably there can be no better way of estimating the debt which the country owes to the patent system than by considering the

growth of certain industries whose existence is dependent, either directly or derivatively, upon the patent laws. In the class of agricultural implements it is interesting to note that in 1850 the amount of capital engaged in this class of industry was only $3,564,202. The growth has been startling and continuous as will be seen from the fact that the capital in 1860 had in¬ creased to $13,866,389. In 1914 it had increased to $338,531,673, while the value of the products had increased from $20,831,904 in 1860 to $164,086,835 in 1914, giving employment to 48,- 459 wage-earners. It is also interesting to note that through the entire range of agricultural implements from the crudest implement to the most complicated machine, the evolution is de¬ pendent almost entirely upon the patented im¬ provements which have produced newer and better articles and at the same time greatly cheapened the cost of production. In the class of sewing-machines the increase has been no less rapid. In 1860 the capital engaged in this class of enterprise was $1,494,450; in 1914, the amount of capital had risen to $34,467,000; whereas the value of the finished product had risen from $4,403,206 to $21,710,643. The auto¬ mobile industry, founded largely upon the patent system, was represented in 1899 by 57 establishments employing 2,241 hands, and with a total invested capital of $1,379,000. The yearly output was valued at $1,253,000. In 1914 there were 300 establishments making auto¬ mobiles and 971 making parts, besides 3,273 re¬ pair shops. They employed an aggregate of 152,039 hands; had a combined capital invest¬ ment of $312,876,000, and the yearly product was valued at $503,230,000. The typewriter in¬ dustry is almost entirely dependent upon patents, the increase being also striking. In 1890 there were 30 establishments, employing a capital of $1,421,783, and producing a product of $3,630,- 126; whereas in 1914, there were 107 establish¬ ments employing a capital of $30,988,000, and producing a product of $24,500,000. In electri¬ cal apparatus the inventions which have made ossible the enormous growth of this industry ave been almost entirely dependent upon patented inventions. In 1880 there were only 76 establishments and the capital employed amounted to $1,509,758: in 1914 there were 1,030 establishments and the capital invested amounted to $355,725,000, while the value of the product had increased from $2,655,036 to $335,170,000. The first phonographs and graphophones were produced in 1877. The annual products from this industry in 1914 amounted to $27,116,000. There are over 150 establishments engaged in the manu¬ facture of photographic materials and apparatus. In 1899 there were only 11 establishments, with a total invested capital of $3,348,000, and a yearly product valued at $2,072,000. In 1914 the capital of these establishments

amounted to $33,771,000, and the annual product amounts to $39,041,000. Many chemical processes are de¬ pendent entirely upon patents. Over $43,000,000 are engaged in the manufacture of glucose, yielding products to the value of over $52,615,- 000. The wood pulp industry is one which is dependent for its existence upon the patent sys¬ tem. It originated with the wood pulp patent of Volter in 1858, following with the soda fibre and sulphite fibre processes, and now shows a capital investment of $36,028,000 with annual

products valued at $20,526,000. To Charles Goodyear is due the greait impulse given to the rubber industry, owing to the introduction by him of the process of vulcanization. The amount of rubber and elastic goods and rubber boots and shoes now manufactured amounts to $300,994,000. The wonderful improvements which have been made in the iron and steel in¬ dustry have originated in almost every case from patented inventions. In 1914 the number of blast furnaces, rolling mills, forges and bloomeries comprised 567 establishments, with a capital of $1,720,653,000, employing 278,072 wage-earners, who receive in wages $210,923,- 000; with products to the value of $1,236,319,- 000. The records of the printing industry are full of interest, owing to the number of estab¬ lishments of which there is a record in the United States, amounting to 31,612. The capi¬ tal employed amounts to $632,027,000, and the amount of products $803,237,000. It is safe to say that almost every article which the printer touches owes its origin to some patented device or apparatus.

The growth of the Patent System is. also well illustrated by noting the increase in the number of patents issued from year to year. Between 1790 and 28 July 1836, only 9,957 patents had been issued. Between the years 1836 and 1850, 6,980 were issued, making a total of 16,937 up to 1850. During the year 1850, 884 patents were issued; during the years 1905-06, 31,837 patents were issued, and during 1911 the total number of patents issued reached the million mark. In 1918 the number of patents issued was 38,569, the serial number of the last issued in that year being 1,290,026.

The Patent Office. — The Patent Office is not an independent department of the government, ‘but is a branch of the Department of the In¬ terior. The Patent Office force consists of the Commissioner of Patents, about 400 examiners, including 45 principal examiners, two examiners of interferences, three examiners-in-chief, be¬ sides assistant examiners of various grades. The entire force of the Patent Office, including clerks, stenographers, messengers, etc., amounts to 800 persons. The year’s work in the Patent Office comprises the comparing of some 70,000 applications with the patents previously allowed — about 1,300,000. This is an amount of busi¬ ness double that of any other patent office in the world, and 30 per cent more than for the whole British Empire together. The average time of prosecution of a patent is 21 months, but many take longer, and there is a consider¬ able number which have been pending for five years, and some which have been under con¬ sideration for 15 years. The department is housed within the Patent Office build¬ ing at Washington. The quarters, formerly cramped and inadequate, have been enlarged by the withdrawal of the Department of the Interior to its own building. The fact that more modern and commodious quarters are not allotted to the Patent Office is due to no lack of funds on the part of the patent depart¬ ment, which is a paying institution. The busi¬ ness of the office shows a profit during the fiscal year ending 30 June 1910, of $19,824.75; this being the total excess of receipts over expenses for the fiscal year. The balance in the United States treasury due to the Patent Office amounted on 1 Jan. 1918 to $8,219,071.35. The

surplus usually amounts to over $200,000, but the Patent Office is not allowed to make use of this sum, as it can only use the amount of funds provided by Congress for the running ex¬ penses of the office, amounting to about $2,000,000 annually. The appropriation is often inadequate, and the work of the office is thus hampered by lack of funds. It is to be hoped that at some future time the large fund now deposited in the United States treasury to the credit of the Patent Office may be used in the erection of a modern building designed es¬ pecially to. perfect and facilitate the work of this most important department of the govern¬ ment.

Bibliography.— Elfreth, W. H., (Patents, Copyrights and Trademarks) (New York 1913) ; Fairweather, W. C., (Foreign and Colo¬ nial Patent Laws) (New York 1910) ; Haddan, R.,_ ‘The Inventor’s Adviser and Manufac¬ turer’s Handbook to Patents, Designs and Trademarksˆ (London 1913) ; Langner, L., (War Inventions) (New York 1917) ;

Moulton. H. F., ‘The Present Law and Practice Re¬ lating to Letters-Patent for Inventionˆ (Lon¬ don 1912) ; Talbert and Talbert, ‘How to Ob¬ tain a Patent) (Washington 1918) ; Thompson, W. P., (Handbook of the Patent Law of All Countries > (London 1915) ; Thomson, H. C, ‘Patents, Trademarks, Design Patents) (Bos¬ ton 1913) ; White, W. W., ‘Patents and Trade¬ marks Throughout the World* (New York

1912).

PATER, pa’ter, Walter Horatio, English

essayist: b. London, 4 Aug. 1839; d. Oxford, 30 July 1894. He was educated at King’s School, Canterbury (which he describes most exquisitely in his “imaginary portrait® of ‘Em¬ erald UthwartO and Queen’s College, Oxford, and in 1864 became a Fellow of Brasenose Col¬ lege. He had at first intended to take orders in the Church of England, and then, as his views changed, had thought of becoming a Unitarian minister, but in 1864 he had aban¬ doned both projects, and while perhaps not en¬ tirely abandoning belief in Christianity came to regard religious themes from a standpoint al¬ most purely philosophical. Out of the strong religious tendencies of his youthful days grew his later desire to interpret to his age the spirit of that of the past, and more especially of the Renaissance in literature and in art. His first published work was ‘The Renaissance : Studies in Art and Poetry) (1873), which brought him a select if not a wide circle of enthusiastic admirers. It was followed by ‘Marius the Epicurean: his Sensations and Ideas *(1885), a highly subjective study of the mental history of a Roman youth represented as living in the time of Marcus Aurelius. These two works exhibit to the full their author’s peculiar characteristics of style, the most pre¬ cise statement of thoughts and impressions, the utmost delicacy and refinement and rhythm whose charm* is rarely surpassed, a subtlety that perplexes and obscures at times, and a serious want of vigor. While <Marius) re¬ mains, perhaps, his greatest achievement, his ‘Imaginary Portraits) (1887) is his most thor¬ oughly delightful work. In the same vein as the four stories in this latter volume are ‘The Child in the House) (1894) and the ‘Esmerald Uthwart* and ‘Apollo in Picardy) included in

the Miscellaneous Studies) (1895). His other volumes comprise Appreciations' (1889) ; (Plato and Platonism' (1893); (Gaston de Latour,' an unfinished romance (1897) ; (Greek Studies' (1897). Pater's style is peculiarly his own and represents the extreme limit of ultra¬ refinement attained in English prose in the 19th century. It does not stimulate, it is true, but its charm is very great. (See Marius the Epicurean). Consult Greenslet, (Walter Pater' (1903).

PATERCULUS, pa-ter'ku-lus, Gaius Vel¬ leius, Roman historian : b. Campania about 19 b.c. ; d. after 31 a.d. His reputation as a his¬ torian rests chiefly upon his (Historiae Romanse' (in two books, Basel 1520), which purports to be a universal history though really dealing chiefly with that of Rome. There have been many editions of the work, among them Bur-mann's (1719) ; Ruhnken's (1779) ; Orelli's (1835); Kritz (Leipzig 1840); Halm's (1876) ; Rockwood (Boston 1893). Consult Teuffel, W., S., (Geschichte der Romischen Literatur' (Vol. II, Leipzig 1910).

PATERNOSTER, pa'ter-nos'ter, the open¬ ing words of the Latin version of the Lord's Prayer (q.v.).

PATERSON, Andrew Barton, Australian poet and journalist: b. Narrambla, New South Wales, 17 Feb. 1864. He studied law and finally turned to journalism in 1886; and ulti¬ mately became editor of the Town and Country Journal, Sydney. He writes under the pen name of ((Banjo." As a special war corre¬ spondent for Reuters Agency, the Sydney Morn¬ ing Herald and the Melbourne Argus, he went through the South African War and visited the Philippines, China and the New Hebrides for the Herald. In 1902 he wrote special arti¬ cles on the Australian labor question for the London Times and he was editor of the Sydney Evening News (1903-06). Among his published works are (The Man from Snowy River,' a volume of stirring narrative verse of which 32,000 copies were sold within a short time after publication; (Rio Grande's Last Race and other Verse' ; and (01d Bush Songs.' He has also published a successful novel, (An Outback Marriage.'

PATERSON, John, American soldier: b. New Britain, Conn., 1744; d. Lisle (now Whit¬ ney's Point), N. Y., 19 July 1808. He was graduated from Yale in 1762 and he engaged in law practice at New Britain; but in 1774 he removed to Lenox, Mass., where he continued his practice,

and in that year was elected a member of the Provincial Congress.. In 1775, after the battle of Lexington, he joined the Federal Army. Under his supervision the first redoubt at Boston was constructed, and he de¬ fended it with his men at the battle of Bunker Hill. He served in Canada and later under Washington in New Jersey, participating in the battles of Trenton and Princeton. In 1777 he was made brigadier-general. In the battle of Stillwater and at the defeat of Burgoyne he performed distiguished service, and later he was as the battle of Monmouth. He was mustered out of service as major-general in 1783 and subsequently joined the militia during Shay's Rebellion in 1786. In 1794 he removed to Lisle, N. Y., and afterward served four

terms in the legislature. He was the first pre¬ siding judge of Broome County, N. Y., and a member of Congress in 1803-05, after which he lived in retirement.

PATERSON, John, American mathema¬ tician and actuary : b. near Morristown, N. J., 1801 ; d. Albany, N. Y., 1883. After the early death of his father at Hamilton, Canada, he pursued his education while learning the print¬ ing trade at Buffalo. Having completed his apprenticeship, he found his way to Albany, N. Y., in 1823 and shortly after his arrival became associated with the Van Benthuysen Company, State printers. Meanwhile his apti¬ tude for mathematics and the sciences led him to study the languages, ancient and modern. He was honored in 1833 with election to the Albany Institute and in 1835 with the master's degree from Union College. He declined an appointment to the Smithsonian Institution and other preferment, and was engaged for some years in the press corrections of the monu¬ mental (Natural History of New York.' In 1851 he became State superintendent of weights and measures, and at the erection of the State insurance department in 1860 became its mathe¬ matician and then its actuary, retiring_Jn 1874. His only son, John Sherman Pat¬ erson, b. 1849; d. Albany, N. Y., 1917, in¬ herited his mathematical ability and served the actuarial bureau of the New York In¬ surance department for 50 years, 35 of which he was head of the bureau and supervised an astonishing development of insurance and ex¬ pansion in many new lines. He was member and Fellow of the Actuarial Society of America from its foundation in 1889. He revised and extended the tables of policy valuation con¬ structed by his father and which are in gen¬ eral use.

PATERSON, Robert, Scottish stonemason, immortalized by Scott as. ((01d Mortality": b. near Hawick, Scotland, 1715; d. Bankend,

England, 29 Jan. 1801. He served his ap¬ prenticeship as a stonemason with his brother near Lochlaben, and in about 1740 married and rented a quarry, making a business of carrying gravestones to Galloway. His house was burned, and he was taken prisoner on the re¬ treat of Prince Charles in 1745 because, it is said, of the fact that he was a Cameronian. While in England he became so interested in restoring and erecting headstones on the graves of the Covenanting martyrs that when released he remained with his family only a short time, and in 1758 deserted them, devoting the re¬ mainder of his life to the ((unusual business of his pilgrimage." The story as told to Scott by Joseph Train became the foundation of the novel, (01d Mortality.'

PATERSON, William, English financier, founder of the Bank of England: b. Skipmyre, Dumfriesshire, April 1658.; d. London, January 1719. He was brought up in England, may have been a peddler in his early days, but soon be¬ came a well-to-do merchant, and at 23 a member of the Merchant Taylors Company. He took part in planning the revolution of 1688 ; as early as 1691 proposed the formation of the Bank of England and in 1694 became one of its direct¬ ors. In 1695 he attempted to carry out a long cherished scheme of a free commonwealth and

emporium of trade in Darien ; the colony was entirely unsuccessful, and Paterson for a time lost his reason. On his return to Great Britain he promoted the Walpole Sinking Fund, the scheme of 1717 for the conversion of the na¬ tional debt, and the Union of Scotland and Eng¬ land. Paterson wrote several pamphlets on economic and political questions. Consult the <Life) by Bannister (1858).

PATERSON, William, American jurist: b. at sea 1745; d. Albany, N. Y., 8 Sept. 1806. He was brought to America by his parents when a child, was graduated from Princeton in. 1763, admitted to the bar in 1769 and engaged in practice in New Jersey. In 1776 he was a dele¬ gate to the New Jersey State constitutional con¬ vention and was appointed attorney-general of the State in that year, which office he held for 10

years. He was a delegate to the Continental Congress in 1789-81, and in 1787 a member of the National constitutional convention, where he proposed the ((New Jersey plan,® which was to leave in the hands of the <(sovereign States® practically all laws excepting those concerned with regulating commerce, levying duties and providing the means of war. There was to be one legislature in which each State should have one vote, and all executive and judiciary com¬ mittees were to be removable by Congress. This plan was opposed by Edmund Randolph, who presented the plan for a national govern¬ ment, and ultimately the two plans were merged in one and adopted. He was United States Senator from New Jersey 1789-90, governor of New Jersey 1791-93, and was appointed by Washington associate justice of the Supreme Court in 1793. The city of Paterson, N. J., was named in his honor. His letters have been published and edited by Mills, under the title of 'Glimpses of Colonial Society and the Life of Princeton College 1766-73, by One of the Class of 1763) (Philadelphia 1903).

PATERSON, William, Canadian states¬ man : b. Hamilton, Ontario, 19 Sept. 1839. He early entered business life, in which he was markedly successful. He was mayor of Brant¬ ford in 1872-73, and a member of the Canadian House of Commons in 1872-1911. He entered the Laurier Cabinet as Comptroller of the Cus¬ toms in 1896, and was appointed Minister of Customs of Canada in 1897, which office he oc¬ cupied until 1911. He was actively connected with the framing of the new customs tariffs of 1897 and 1907 ; and in 1911 was one of the Cana¬ dian representatives conducting reciprocity negotiations at Washington, D. C.

PATERSON, William Romaine, (pseud. Benjamin Swift), British novelist: b. Glas¬ gow, 29 July 1871. He was educated at Lau¬ sanne and at Glasgow University afterward traveling in Europe for the purpose of acquir¬ ing foreign languages. Author of 'Nancy Noon) (1896); (Siren City1* (1899); 'Sordon* (1902) ; (The Nemesis of the Nations* (1907) ; 'The Old Dance Master* (1911) ; (The Lady of the Night* (1913) ; 'What Lies Beneath* (1917), *etc.*

PATERSON, N. J., industrial city, the third in population in the State and the capital of Passaic County, situated 17 miles northwest of New York City, on the Passaic River, which for several miles, on the east and north, forms the

boundary line of the municipality. The city is built chiefly on a plain surrounded on the north and west by high hills. A portion of the town,

however, is situated on the hills rising from the north bank of the river and on the high ground around the point where the river descends to the level of the plain over the Pas¬ saic Falls. The descent is about 70 feet ; the perpendicular fall being some 50 feet. In the abundant power afforded by this waterfall is seen the reason for founding the city at this point, and its growth to one of the most im¬ portant manufacturing centres of the country.

Population. — The United States census of 1910 gave the population as 125,600 of whom 45,398 were foreign born. By 1920 the number of inhabitants of the city, according to the figures supplied by the United States Census Bureau, had increased to 135,866.

Transportation. — Three important railway lines pass through Paterson: the Erie; the Delaware, Lackawanna and Western, and the New York, Susquehanna and Western. Elec¬ tric street railroads radiate from the city in every direction. The “Hudson River Line** runs directly across country to the 131st street ferry, New York City. It is expected that long-continued efforts will soon result in inducing the United States government to do the work necessary to open the Passaic River to naviga¬ tion to Paterson from Passaic, four or five miles below, thus increasing freight facilities for the great manufacturing interests of Pater¬ son.

Industries. — Paterson is called ((The Lyons of America” because it is the principal silk manufacturing centre of the Western hemi¬ sphere. Condensed statistics of manufcctures in Paterson, received from the New Jersey Bureau of Industrial Statistics, for the year 1918, give 308 as the (<number of establishments** engaged in the manufacture of silk, including dyeing and finishing. This figure would appear not to include all of the smaller firms doing business with a few looms in rented quarters, for Davison’s Silk Trade Directory for 1919 lists over 600 firms in Paterson, including those in two or three small suburbs just beyond the municipal boundary. The following figures are from the Bureau of Industrial Statistics and are for silk manufacture in Paterson for the

year 1918; Capital invested, $59,996,849; value of goods made, $115,174,778; persons employed, 26,897; wages paid, $21,014,434. In addition to the above there were 16 establishments engaged in the manufacture of silk mill supplies, having a combined capital of $847,475, making goods to the value of $1,418,944 and paying $414,776 in wages to 664 employees. Other industries, each having a

capitalization of more than a mil¬ lion dollars are, machinery, 14 establishments, total capital, $3,938,415, value of product $7,320,547, wages, $1,940,660 paid to 1,913 per¬ sons. Under -this heading is included the manu¬ facture of locomotives, now relatively a some¬ what less important branch of Paterson indus¬ tries than in earlier years, though more than half the men (1,913) mentioned above worked in the one great locomotive shop; four brass foundries, total capital, $2,799,713, goods pro¬ duced, $2,462,985, wages, $832,723, paid to 865 persons; three establishments producing textile goods other than silk, capital, $1,966,905, value of

PATERSON, N. J

Passaic Falls, Paterson, N. J. The falls are within the city limits, about a half mile from the City Hall

PATERSON, N. J.

the ryehtWbackgtoundSt'rn ˆ Cen,rel SeCli°nS *he city taken from the heiO > te Passaic Falls - Garret

Mountain in

PATERSON

product, $1,859,486, wages amounting to $346,- 918 paid to 552 employees; shirts, eight factories with total capital of $1,479,800 and annual prod¬ uct valued at $3,970,614, paying wages amount¬ ing to $927,713 to 1,526 employees; structural steel and iron, five mills with

total capital of $1,147,968, producing goods valued at $1,121,381, paying $271,524 to 275 workers. There are other minor manufacturing industries, whose capital and annual product in nearly every case amounts . to hundreds of thousands of dollars. Among them are pipe works, steam boilers (not in¬ cluded in above enumeration), paper boxes, clothing, *etc.* During the World War the pro¬ duction of munitions in Paterson was of con¬ siderable importance. The New Jersey Bureau of Industrial Statistics gives the following figures for the manufacturing industries of Paterson, during the year 1918: capital invested: land and buildings, $13,199,385; machinery and tools, $23,878,937 ; bills receivable, stock in process of manufacture, cash in hand, $53,591,- 324; total, $90,669,646; value of materials used, $94,355,677 ; value of goods made, $164,486,162; total amount paid in wages $31,619,406; average number of persons employed: males, 23,834; females, 14,550; children, 14-16 years of age, 1,096; total, 39.480.

Banks. — Paterson has three national banks whose combined resources aggregate $21,500,- 000. There are six savings banks and trust companies with total resources of $53,414,731. The oldest of these, the Paterson Savings In¬ stitution, now in its 51st year, has resources amounting to $18,449,093 and deposits to the amount of $17,500,000.

City Government. — The city government comprises a mayor, elected for two years; board of finance; board of public works; board of fire and police commissioners; commissioners of public instruction; free public library trus¬ tees; board of park commissioners; board of health; commissioners of assessment of taxes, and a board of 11 aldermen, whose authority extends only over excise matters. The com¬ missioners are appointed by the mayor.

The total valuation for taxation in 1919 was $119,000,679, and the budget, or total, raised by taxation was $3,329,985.

Area, Streets, Parks, Cemeteries. — There are within the corporate limits of Paterson 5,357 acres or 8 36/100 square miles. The streets are paved about as follows : Asphalt, 7.52 miles; asphaltic macadam, .98 miles; brick, 7.79 miles ; granite, palisade and trap rock block, 7.56 miles; wood block, 4.42 miles; macadam, about 60 miles. Paterson has three parks of moderate area, but well kept, presenting pleas¬ ing examples of landscape gardening and af¬ fording somewhat exceptionally picturesque and charming distant views. Two of the parks are situated one at either end of the town and both border on the Passaic River. The East-side Park contains 60 acres and the

Westside 30 acres. The newer Sandy Hill Park is on high ground not very far from the centre of the city. There are also 23 small parks scattered throughout the city. Situated one at the east, the other at the west side of the town, are two cemeteries, beautifully laid out. In Cedar Lawn Cemetery is the costly mausoleum of the late Hon. Garret A. Hobart, Vice-President of the United States.

Public Buildings. — The city contains a considerable number of handsome buildings. The most important in the business section are the city hall (Carere and Hastings, architects), and on the square surrounding it, or within one block from it, seven modern and costly bank buildings, several large office buildings, The Hamilton Club — one of the finest club houses in New Jersey — the Elks' club house, the Young Men's Christian Association and the Young Women's Christian Association. Main street contains large and handsome department stores of metropolitan character and appoint¬ ments. The county courthouse is a costly struc¬ ture built of white marble. Adjoining the courthouse is the post office, of Flemish archi¬ tecture, and opposite, the high school, costing almost a million dollars. The most notable churches are the church of the Redeemer, Pres¬ byterian, Saint Paul's Protestant Episcopal, Saint John's Roman Catholic, Saint Joseph's Roman Catholic and the Second Presbyterian. The Danforth Memorial Library building is one of the most notable and beautiful public build¬ ings in the city. It was erected in 1903-04 as a memorial to the late Charles Danforth, with funds presented to the public library trustees by his daughter, the late Mrs. Mary E. Ryle, the cost of the building and grounds being up¬ ward of a quarter of a million dollars.

Education. — The efficient and progressive public school system includes 27 schools. The number of pupils is 23,000 and the number of teachers 744. The large and costly high school building, erected a few years since, is already too small to accommodate the rapidly increasing number of students and a second very large building has been provided for, construction of which will begin in 1919 or 1920. The school system includes normal training, manual train¬ ing and "disciplinary^ schools. The appro¬ priation for the department of public instruc¬ tion in 1919 was $1,040,741 and of this sum $672,165 was for salaries of teachers. There are several large parochial schools in Paterson and two or three private schools of good standing.

Libraries. — The Free Public Library system consists of the main library in the Danforth Memorial building, four branches in different

sections of the town, each in rented quarters, and a small branch in the Young Women's Christian Association. The library building and most of the books were destroyed by fire in 1902. The present Danforth Library build¬ ing was completed in 1905. The main library and branches together contain 76,377 volumes and the collections are steadily growing and very extensively used by the people.

Newspapers. — Three daily newspapers are published in Paterson and five weekly, two of which are in Dutch and two in Italian.

Religion. — There are nearly 100 churches in Paterson representing all the principal Chris¬ tian denominations. There are also several Jewish synagogues. There are a flourishing Y. M. C. A. and Y. W. C. A., each with a handsome building.

Charities. — There are three large and well-supported hospitals — the General Hospital, Saint Joseph's and Miriam Barnert Memorial Hospital — also an isolation hospital for con¬ tagious diseases. There are two orphan asy-

lums, an Old Ladies' Home and a Children's Day Nursery with a building erected, as a memorial to her daughter, by Mrs. Garret A. Hobart. Various smaller charities receive liberal support from the community.

History. — The town of Paterson was founded by, or had its origin in, the ((Society for Establishing Useful Manufactures^ (the S. U. M.), which was chartered by the legisla¬ ture of New Jersey in 1791, and in the summer of 1792 the site, by the <(Great Falls of the Pas¬ saic, J) was fixed upon as the location for the mills and the town. The charter of the society was drawn up by Alexander Hamilton, then Secretary of the Treasury, who was greatly in¬ terested in founding a system of American manufactures. He has often been considered the founder of Paterson (which explains the presence of his statue in front of the city hall) and there seems to be little doubt that he was the chief inspiring and perhaps dominating personality in the founding

and the first year or two of the history of the S. U. M. and that he influenced the newly-formed corporation in se¬ lecting the site for the town, but ((there is little evidence of any active interest on his part after the middle of 1 793.)) William Paterson, in whose honor the town was named, was gov¬ ernor of New Jersey at the time and signed the act of incorporation.

Cotton manufactures were the first and for many years the most important carried on, but have long since been superseded. Woolen and paper manufactures were also extensively car¬ ried on in the early and middle part of the last century, and it was here that Samuel Colt manu¬ factured the first of his revolving pistols. His venture in Paterson, however, was not a success. The first locomotive manufactured in Paterson was finished in 1837, after six months' labor upon it. It was not until 1840 that the silk in¬ dustry was successfully established by John Ryle, a young Englishman. At midnight on Saturday, 8 Feb. 1902, a fire broke out in the lower part of the city and rapidly burned its way through the heart of the business section of the town. Two bank buildings, the public li¬ brary, five churches, some of the largest stores and other prominent buildings and about 250 dwellings were destroyed. The scene was one of great desolation and the loss many millions of dollars, the citizens raised a large fund for the relief of the destitute and immediately set to work to build the city far better than before. In less than a month another calamity came, the greatest flood ever known in the Passaic Valley. Great loss of property followed in Paterson, and hundreds of the poorer class were again driven from their homes. In October 1903 another great flood occurred, causing heavy loss.

In 1902 there was a prolonged strike of silk workers with much disorder. Again in 1913 occurred a bitterly contested silk-workers' strike, some 23,000 employees remaining idle for nearly five months, and losing in wages about $5,250,000 Later labor troubles have been adjusted by arbitration and industrial peace seems to be in a fair way of attainment.

In the World War* Paterson took an hon¬ orable part, sending its full quota of men, over¬ subscribing four out of five Liberty Loans, doing a great Red Cross work, sending through its public library between 15,000 and 20,000

books and several tons of periodicals to the soldiers and in all ways meeting the demands of loyalty and patriotism.

Bibliography. — The late William Nelson of Paterson, long secretary of the New Jersey Historical Society, left unfinished a very ex¬ tensive and elaborate (History of Paterson. > This work, in three volumes, completed by Charles A. Shriner, is in course of publication in 1919. Consult also Clayton and Nelson, (History of Passaic and Bergen Counties, New Jersey) (Philadelphia 1882; chapters on the city of Paterson by William Nelson) ; Davis, J. S., (Earlier History of American Corporations> (Harvard University Press, 1917, Vol. I of this book, pp. 349-522, contains the most elaborate and scholarly study of the S. U. M. and the founding of Paterson that has been published) ; Shriner, C. A., (Paterson, N. J., for Manufac¬ turing and Residence) (published under auspices of the Board of Trade, Paterson 1890) ; Trum¬ bull, L. R., (History of Industrial Paterson* (Paterson 1882).

George F. Winchester, Librarian, Free Public Library.

PATHfC, pa'ta, Charles, French photog¬ rapher and pioneer in the motion picture trade: b. Paris, about 1873. In 1896, in conjunction with his brother Emile, and two others, he founded the now well-know firm of Pathe Freres. The firm started with two kinetoscopes, in which by dropping a coin, one was privileged to see a succession of tiny photos tumbling over one another and giving the effect of life action. The machine had been invented by Edison in America and copied in England by Robert Paul, who delivered the machines to Pathe. The firm members had each contributed less than $500 and after a time two withdrew, leaving the Pathe brothers to carry on the busi¬ ness alone. It was soon found necessary to change the kinetoscope pictures frequently. Charles purchased 20 additional machines, placed them in 20 different towns and switched the pictures in weekly rotation. Thus was born the first picture exchange on 6 June 1894. C. Francis Jenkins projected pictures from moving celluloid film on the wall of a jewelry store at Richmond, Ind., Not until two years" later did his invention attract general attention. Pathe meanwhile, had secured Lumiere's motion pic¬ ture camera, then just completed, and began to take his own pictures 10 or 15 feet at a" time. His projection apparatus was still imperfect; for a time he was his own cameraman, ship-ing clerk, manufacturer, salesman and demon¬ strator. Later with the development of im¬ proved projection apparatus in America the Pathe firm entered on the production of photo¬ plays. The one-room factory of 20 years ago is represented by a $2,800,000 concern in Joiri-ville, France, with branches in England and the United States, and offices and exchanges in all parts of theˆworld. The Pathe news film is familiar to all patrons of the cinema. The French government has made M. Charles Pathe a chevalier of the Legion of Honor.

PATHELIN, pat'lan', Maistre Pierre,

marks the beginning of French comedy with a work still admired for its comic force and resourceful exploitation of dramatic possibili¬ ties. Authorship and date are not established, but the original Pathelin farce, (Maistre Pierre

PathelirP was probably written and first acted between 1467 and 1470, and many signs point to the lawyer, ecclesiastic and poet Pierre Blanchet of Poictiers (1459-1519) as its author. Its immediate popularity is indicated by imitations, (Le Nouveau Pathelin* of 1474 and (Le Testament de Pathelin) of about 1485, and also by familiar allusions in the works of Villon, Coquillart, Gringoire and others. It penetrated to England and to Germany, was turned into Latin by Reuchlin as (Scenica pro-gymnastica* and was acted by his pupils at Heidelberg (1497). A more faithful Latin ver¬ sion by Connibert, (Patelinus alias veterator, nova comoedia,* appeared in Paris in 1512. The French play was printed with gradual mod¬ ernizations 25 times before the end of the 16th century and twice in the 17th. In 1706 Brueys used the plot for his (L'Avocat Pathelin,* and the old play, though commended by Moliere and La Fontaine, suffered passing neglect. It was twice printed in its early form in the 18th and often in the 19th century, most elaborately by Genin (1854), most conveniently with its com¬ panion pieces by Jacob in (Recueil des Farces) (1876). The farce tells in lilting octosyllabic couplets how Pathelin, a lawyer, buys cloth with no intention of paying for it, tricks the merchant, but is himself tricked by a shepherd client who uses the stupidity which Pathelin had taught him to feign, to defraud the counselor of his fee. There is a prose translation, with introduction and stage directions, by R. Hol¬ brook, Boston, 1905 and 1914.

PATHFINDER, a nickname given Gen. John C. Fremont (q.v.) because of his ex¬ plorations of the Far West from 1837 to 1853.

PATHFINDER, The. (The Pathfinder; or the Inland Sea,* third in the order of events of Fenimore Cooper's Leather-Stocking tales, was

published in 1840, 13 years after Natty Bumppo had ended his career in (The Prairie.* Although Cooper had questioned the wisdom of reviving that hero, and although he was at the time engaged in fierce litigations with the newspapers, he brought to his task the remark¬ able freshness and vigor with which he always handled the fortunes of his chief character. It is true that (The Pathfinder shows Natty at his old trick of guiding tender damsels through the dangerous woods, and that the siege at the blockhouse and the storm on Ontario are con¬ siderably like other of Cooper's sieges and storms. The book suffers little, however, from these parallelisms. Chingachgook has all his proud, affecting, forest stoicism and compe¬ tence. Natty, here commonly called La Longue Carabine, keeps in a hardy middle age his simple and honest nature, which is severely tested by his love for a young girl. She is a conventional heroine of romance who would not have deserved Natty had she loved him. But a certain soft amiability about her turns for a time, and convincingly enough, all the thoughts of the scout to the world of domestic affections. More talkative than ever before, he reveals new mental and moral traits. With the same touch of realism which had kept Uncas and Cora apart in (The Last of the Mohicans,) Cooper separates these lovers, not, of course, without certain fine gestures of renunciation which have the due romantic flavor, sends her to the arms of a younger suitor, and restores

the hero to his true home in the wilderness. The adventures of the plot are varied and stir¬ ring, particularly those on the water, which take authority from the fact that Cooper had as midshipman actually seen service on Lake Ontario. In language, method, ideas (The Pathfinder resembles the rest of the series, but it is a real distinction to be the only book which shows Natty Bumppo in love and the first which made important imaginative use of the Great Lakes.

PATHOLOGY (Gr. ™dog, suffering and 7oym, doctrine of disease) is the science which treats of all departures from the normal condi¬ tion of the animal or plant. Owing to the great range of variation in the anatomy and func¬ tional behavior of organs and tissues, it is difficult to set up a standard which may be considered as normal, and we are forced to adopt for this purpose the usual or average condition. Pathology treats of all abnormalities in the process of development of the individual and of their results. It considers all the unto¬ ward results of outward influences, be they physical or chemical, or of those more complex influences which we may designate biological, as well as those subtle characters of the organism itself which, often hereditary, render it more or less prone to these influences, and give it

the power of arranging a protection for itself and recovering its normal state.

Historical. — Within recent centuries the various subdivisions of pathology have acquired such importance and have been so systematically studied as to constitute almost independent sciences. The science of pathological anatomy, for example, is a development of the last 300 years, while that of pathological chemistry dates only from the middle third of the 19th century. Pathology in its broad sense, however, must be recognized as existing, though in a crude and imperfect form, even in the very beginnings of science. Throughout the history of medi¬ cine the student must observe the distinction between the products of objective investigations — the direct observation of nature — and the ever-recurring philosophical or speculative sys¬ tems of medicine built upon some fanciful or arbitrary foundation and rounded off with ap¬ parent logic to satisfy the innate cravings of man for order and completeness. To the former is due the real and steady progress of medicine, while only too often the systems based on speculation have retarded progress. Obser¬ vation and hypothesis are, however, so mixed together and entangled that it is not possible to consider one without the other.

The earliest beginnings of pathology are to be found in the writings of the Hindus, Chaldseans, Chinese and Egyptians, where, although medicine was under the sway of priests, and incantations were the main therapeutic agencies, there can still be recognized a vague knowl¬ edge of the more obvious diseases. In Greece the records contain only similarly obscure con¬ ceptions until about 400 b.c., when there arose the Hippocratic school, of which the most im¬ portant writings are attributed to Hippocrates himself. The great services of this school lay in their separating medicine from religion, in making abundant accurate observations on the symptoms and course of diseases, and in insti¬ tuting a rational hygienic and dietetic system

in the treatment of disease. The pathology of Hippocrates was a

humoral pathology with only the most meagre basis of anatomy or physi¬ ology, inasmuch as human dissections were not practised. The next advances were made by the Greeks in Alexandria, where the study of anatomy flourished under Herophilus and Erasistratus about 300 b.c. In Rome, Celsus, Aretaeus, and above all, Galen, who lived in the latter half of the 2d century, contributed not only to the knowledge of disease, but also to that of anatomy and physiology; and Galen, adopting and expanding the Hippocratic teach¬ ings, so welded together the knowledge of the times, filling the gaps by ingenious speculation, that his system, treating of the whole realm of medicine, became supreme in its apparent infal¬ libility, and dominated medical thought and prac¬ tice until the 16th century. During all this time no important advance was made, the literature consisting largely of compilations and transla¬ tions, preserved and transmitted to western Europe by the Arabs, all difficulties being de¬ cided by a reference to the authority of Galen. With the revival of learning and the intro¬ duction of the practice of dissecting the human body there arose those great medical reformers, Vesalius and Paracelsus, who pointed out er¬ rors in Galen's system. The former overthrew his supremacy so far as it referred to anatomy, and the latter endeavored to break the shackles of all authority and tradition. In the 17th century Harvey by his discovery of the circula¬ tion of the blood completed this overthrow from the physiological side. These men, however, formed no satisfactory substitutes for the uni¬ versal authority in medicine of Galen, and to satisfy this craving numerous more or less fanciful systems arose in the 17th and 18th cen¬ turies, which were concerned mainly with the nature of the processes of life, and made sweep¬ ing generalizations as to the relation of these to the pathology and treatment of diseases. De¬ scriptive anatomists, such as Malpighi, by the aid of the newly improved microscope added greatly during his period to the store of ana¬ tomical knowledge which Vesalius had so en¬ riched. It was not until the latter half of the 18th century, however, that there began with Morgagni, John Hunter, and his nephew and pupil, Matthew Baillie, the systematic study of pathological anatomy. In Morgagni's book, (De Sedibus et Causis MorborunP (1761), we have really the foundation of that study, and the museum of Hunter has formed a model for similar institutions all over the world. Great progress resulted in this century too from the studies of Haller and Wolff in the domain of physiology and embryology — all this regardless and, indeed, in spite of the ever-recurring speculations and systems which occupied so dominant a place in the medicine of the period.

The 19th century was ushered in by the epochal researches of Bichat,

who, in recogniz¬ ing the tissues and studying disease with refer¬ ence to them, rather than to regions or organs, made an advance overshadowed only by the later discovery of the cell. Following him came the Parisian school of pathological anat¬ omists including Corvisart, Laennec, Cruveilhier and others, whose teachings were carried to England and Germany by their many schol¬ ars. Rokitansky (1 804—78) , by taking advantage of the extraordinary opportunities offered in

Vienna, greatly advanced the knowledge of pathological anatomy. Doubtless the greatest name in the history of pathology is that of Virchow (1821-1902), who, spurred on by the discovery of the cellular structure of plants and animals by Schleiden and Schwann, soon convinced himself that every animal tissue is composed of and derived from cells, that no cell arises except as the offspring of a pre¬ viously existing cell, and that spontaneous gen¬ eration of cells is impossible. The application of these fundamental ideas to pathology resulted about the middle of the 19th century in the establishment of the doctrine of cellular pathol¬ ogy, which inaugurated the most important epoch in that science. The enormous amount of work which has followed has been entirelv a confirmation and elaboration of these principles. The. value of the experimental method, which has contributed so largely to exact pathological knowledge, although introduced by John Hunter and practised by Virchow and others, came into full general recognition especially by the work of Traube and of Cohnheim (1839-84).

During the last three decades of the 19th century the researches of Pasteur and of Koch, who have been followed by many workers in the fields opened by them, have shown the para¬ mount importance of the relation of micro¬ scopic plants and animals to the production of disease. Physiological chemistry, established as a science by Liebig in the middle third of the 19th century, has cleared up many obscure prob¬ lems. More precise methods of clinical re¬ search and experimental study of the problems of pathological physiology have added their im¬ portant results. The last decade has been marked especially by those investigations into the laws of immunity which have been crowned with such brilliant success and have conferred such inestimable practical benefits on mankind, the names of Metchnikoff, Behring and Ehrlich being most prominently associated with these advances.

Definitions and Classifications.— Although human pathology in its

broadest sense compre¬ hends the entire science of medicine, as distin¬ guished from the practice of the medical art, the term is sometimes used in a restricted sense as equivalent to pathological anatomy, the knowledge of which first placed pathology upon a scientific foundation. This knowledge is ob¬ tained by post-mortem examinations and by mi¬ croscopical study of diseased tissues (patho¬ logical histology). But not less important than the knowledge. of morbid structure is that of the altered activities or functions of the body in disease. This latter branch of pathology, which is. called pathological physiology, rests upon clinical observations and upon experiment (ex¬ perimental pathology). Even in the more com¬ prehensive works on pathology it is customary to include only a relatively small part of the subject matter of pathological physiology, the larger, part being assigned to works on clinical medicine. Both pathological anatomy and pathological physiology have been greatly ad¬ vanced by the aid of chemistry (pathological chemistry). The term <(general pathology® is used to include both general pathological anat¬ omy and general pathological physiology, and embraces the consideration of such topics as the nature and causes of diseases, morbid processes common to many diseased conditions and dis-

tin bailees of function resulting from such proc¬ esses. What is known as etiology, or the causa¬ tion of diseases, is a subject of such extent and complexity that only certain of its aspects are usually treated of in works on pathology, other aspects being referred to the departments of hygiene, including bacteriology and clinical medicine. The terms comparative pathology, gmimal pathology and vegetable pathology are self-explanatory. The limitations of the present article are such that attention will be given mainly to a necessarily brief presentation of some of the more important general patholog¬ ical processes, with particular reference to man.

General Principles in Pathology.— From what has been said of the scope of pathology it is evident that, as it is a study of the perversion of normal structure and func¬ tion, there must be in each instance some under¬ lying cause which brings about the disturbance.

In every case it is found in the last analysis that there has been

something which may be regarded as an injury either immediate or re¬ mote even to preceding generations, which has started the chain of events leading to the ab¬ normal state. Frequently it is very difficult or impossible to discover the nature of the injury, but this does not in any way affect the princi¬ ple and in each obscure disease the final dis¬ covery of the aetiological factor or cause re¬ veals some injurious agency. In many cases the injury is such as to produce peculiar and perfectly specific changes in the tissue or spe¬ cific disturbances of function, but in others the result is one that is the common effect of many causes. There are certain ways in which the body responds to injuries by stereotyped mech¬ anisms of a defensive character which act be¬ cause those are the common forms of response regardless of the nature of the attack, but there are others which are definitely aimed at the neutralization of a particular form of injuiy and these are specific and come into nlay only when that special injurv occurs.

It is easy to review in broad lines the types of injury, and reflection will show the class into which each special form of injury will fall. Thus there are physical influences which be¬ come injurious and in the same wav there are chemical injuries. As far as we know the whole race of bacteria act through their chemical effects although some of the larger animal para¬ sites may cause mechanical injuries. We can¬ not quite place tumors which cause both me¬ chanical and chemical injuries because we do no* know ahything about the reasons for their growth. Nor are we as yet quite sure about the importance of psychic influences in so tar as their ability to cause material injury is ˆ con¬ cerned. The natural normal growth and de¬ velopment and functioning of the body is to a great extent the result of physical and chemical influences and it is easily understood, therefore, that the withdrawal of some of these influences may produce a diseased condition in a negative way quite as well as the intensification of others

in a positive way. . ,

Immutable laws do exist according to which normal growth and nutrition and the function ing of all parts of the body proceed. Of many of these we are only slowly beginning to recog nize the existence through their being brought to our attention by being exaggerated or other¬ wise rendered conspicuous by disease. c<ucn is

the recent comprehension of the rules which govern the behavior of the body when ren¬ dered immune or when rendered abnormally sensitive.

Restitution to normal depends upon some innate tendency toward a normal form and in¬ terrelation of structure. This restitution is carried out by the aid of certain reparatory and compensating growths of tissue which are to some extent influenced by mechanical factors, but which aim to re-establish the balance of tissues and organs and the type form of the body. But this repair and compensation for the loss of tissue could not ordinarily take place were it not for those reactions which have been evolved through ages to protect the body and to pave the way for its restoration to normal. They are inflammation, fever and the develop¬ ment of immunity.

Immediate Effects of Injuries.— The nutri¬ tion and metabolism of the tissues are chemi¬ cal processes. Injuries of the most diiferent kinds may so disturb these processes as to produce changes in the appearance of the cells which have long been recognized as common to many sorts of disease. They may be of the nature of the wasting of the cells, or on the other hand various substances which are or¬ dinarily easily consumed or transferred else¬ where to be used in other chemical reactions may accumulate in or about the cells and become very conspicuous. Many of these rather heterogeneous changes have long been spoken of as degenerations and there is still much controversy as to their true sig¬ nificance. Thus fats of various soits may accumulate in visible globules in cells in which they do not normally appear. Much of this is undoubtedly due to impairment of the function or even the structure of the cell, but often it is difficult to draw any line between what is nor¬ mal and what is abnormal in this respect. So, too, the precise nature of the change in such organs as liver and kidneys which become swollen and opaque in some infectious and toxic diseases (cloudy swelling or parenchymatous degeneration) is not yet clear.

The abnormal distribution and disposition of mineral substances such as calcium and iron, or of pigments or crystals of unusual organic compounds, also form part of this theme and indicate in each case some disturbance of the metabolism of these substances.

When the injury to the cell is more pro¬ found and sufficient not only to disturb its func¬ tion and the disposition of extraneous or food materials, but to cause its death, the structural changes quickly become far more evident. The nucleus fades or disintegrates and dis¬ appears and the whole protoplasm coagu¬ lates into a solid mass

through the agency of certain ferments. Other ferments may in time dissolve and remove it, but in the meantime it appears as a hyaline pink staining mass (Amyloid is a curious translucent sub¬ stance, of little real importance, but prominent in the minds of pathologists, which resembles in appearance the hyaline material derived from coagulated cells and is deposited in the course of chronic infections in the crevices ot many tissues).

Thus the injury which is severe enough to cause the death of a cell allows it when it is bathed in the fluid of the body to become clotted

into a homogeneous mass or later to be dis¬ solved by ferments and removed.

Indirect Effects of Injuries. — The process of clotting or coagulation is an interest¬ ing and complex one which plays a part not only in the protective closure of in¬ jured blood vessels but in the solidification and exclusion from direct contact with the blood of all dead and harmful tissue. The blood clots when it comes in contact with a foreign body or with injured tissue. Thus it may clot in the heart or in the veins even from the passing stream if it flows over an injured part of the lining wall. Such a clot when formed in the streaming blood has a peculiar architecture and is called a thrombus. Portions of such a thrombus or indeed other undissolved substances may become loose in the blood stream and be carried to some narrow pass where they act as plugs (emboli) and by plugging the blood vessels obstruct the circula¬ tion to the corresponding tissue. If this ob¬ struction is complete and the tissue deprived of the nourishing blood it dies throughout that area and in time becomes clotted. Such a dead and coagulated area is known as an infarct.

Disturbances of the Circulation. — The

blood flows smoothly through all the tissues so long as the heart pumps properly with compe¬ tent valves to keep the stream aright. But any obstruction, whether it be due to a plug in the blood vessel or

a defect in the valve of the heart or a failure of the muscle of the heart, impedes the flow of the blood. Reflection will show that the failure to maintain the flow is as much an obstruction as an actual plug or the compression exerted by a tumor, on the aorta or vena cava. When any such obstruction pre¬ vents the access of blood to an organ that organ becomes anaemic, and it prevents the escape of venous blood, the organ becomes con¬ gested or hypenemic. In this sense the term chronic passive congestion explains itself. When the fault is in the heart itself such chronic passive congestion may be general and leads to characteristic changes in the organ. It is one of many causes of oedema or infiltra¬ tion of the tissue with fluid which has emerged from the veins or lymphatics to lodge in the crevices of the tissues. Other causes of oedema are in large part obscure, but we may mention a type which accompanies inflammation and another which seems due to the retention of salt in the tissues with a corresponding reten¬ tion of fluid.

Inflammation. — Any injury of the tissues whether physical or chemical may be followed by a prompt reaction on the part of the whole body, most intense in the immediate neighbor¬ hood of the injury. This reaction is an elabo¬ rate one, evidently the result of evolution and selection, which is essentially protective and aims at the neutralization of the injurious agent by the pouring of the blood with its somewhat specific neutralizing materials and its phagocytic cells upon the injured place. Eventually this is an aid in removing any tissue which is too much injured and in cleaning the site of injury for repair. The reddening and heat which accompany this increased and rapid blood flow in the inflamed area are familiar. The swelling is caused by the oedema of the part.

Fever. — Fever is an accompanying reaction on the part of the whole body which aims to maintain the body temperature at a high point, not especially by excessive heat production, but by controlling the dissipation of heat. It is not entirely clear how this aids the body to overcome infection or other injury, but it is suggested that the high temperature favors the production of neutralizing substances.

Immunity. — The actual production of neu¬ tralizing substances, especially constructed by the body to act upon and destroy the injurious chemical agency which has been introduced, is a subject of such extent that it is treated sepa¬ rately in the article on Immunity. It will suffice to say that there are several kinds of immunity, of which not all are due to the pro¬ duction of any specific soluble or

circulatory substance. Indeed most of these kinds seem to be due to peculiar natural or acquired prop¬ erties of the tissue cells themselves. Such are the natural forms of immunity, probably also the immunity from the effects of certain drugs such as morphia and arsenic and the lasting im¬ munity from such diseases as smallpox con¬ ferred by one attack. Nevertheless, there is a group of diseases caused by bacteria which produce powerful soluble toxines in which the blood of those who survive is for a time charged with a substance developed during the disease which is able to neutralize the toxin. This is the antitoxin which may be artificially produced in animals and transferred to the blood of man so as to protect from or cure the disease. Examples of this are found in diph¬ theria and tetanus. In the case of other dis¬ eases, such as typhoid fever, vaccination with the bodies of typhoid bacteria confers a definite immunity from attack and has obliterated the disease from modern armies.

Healing and Repair Regeneration. — Gen¬ eral mention of healing and repair has been made, pointing out the strong innate tendency toward the return of the injured organ or tissue to the closest possible approximation to the original form and arrangement. There is an immediate healing or patching of the in¬ jured place with fibrous tissue, no matter what was there before. This is carried out after the gluing together of the tissue surfaces by a clot of fibrin, and the principal part in the re¬ placement of this temporary adhesive material is taken by blood vessels and connective tissue cells. Thus this form of healing is effected not necessarily by the sort of tissue which is in¬ jured, but in all cases by fibrous tissue which in the end figures as a scar. Another even more broadly useful part of the reparatory process is the new formation of enough of the specialized tissue which was injured to make up the normal quota. Thus if a part of the liver is destroyed the rest increases in size and in the number of its cells until the normal amount of liver tissue ist once more reached. This form of repair may occur at a point far removed from the site of the injury. It is very well ex¬ emplified in cirrhosis of the liver, in chronic nephritis and many other conditions in which repeated injuries destroy the cells of the organ, but life is kept up because other distant cells multiply to replace those which were lost and to maintain the function of the organ as nearly as possible in its normal relations with other organs.

PATHOLOGY

Hypertrophy and Atrophy. — The extent of this regeneration depends to some degree upon the demands which are put upon the organ. Even in the case of uninjured organs an in¬ creased demand for functional activity is met by an increase in the number of cells or some¬ times an increase in the size of each and thus of the whole organ. When for any reason in¬ creased work is demanded of the heart it in¬ creases in size and the walls of its chambers become thicker and stronger. Such 'hypertrophy of the heart is ordinarily the response to an increased pressure or tension in the blood cur¬ rent. Inasmuch as the heart itself is the only source of energy to produce this tension it amounts to saying that the hypertrophy of the heart is due to increased resistance to the force of the heart beat, in overcoming which the heart grows larger and stronger just as does the blacksmith's arm with work. A quite dif¬ ferent set of processes lead to the wasting or atrophy of tissues when they are not used or when their nutrition is impaired. Examples are found in the diminution in size of paralyzed extremities or the organs and tissues of the aged.

Mechanical Injuries. — The application of such principles to the explanation of the effects of injuries in disease is quite simple in the case of most mechanical disturbances, although these, too, often draw in their train a long chain of intimately connected happenings. Most com¬ mon among these secondary results are the effects of the invasion of bacteria in tissues whose resistance is lowered by the injury or into Which the bacteria are directly introduced by the wounding instrument. More complicated consequences also occur as when a gall-stone obstructs the bile duct and causes jaundice with a tendency to hemorrhage which makes surgical interference a menace to life.

Chemical Injuries. — Chemical poisoning causes a very great variety of lesions in the tissues and disturbs the functions of the organs in manifold ways, sometimes by killing the cells, sometimes by diverting the materials for their nutrition. See Toxicology.

Bacterial Infection.— The diseases produced by bacteria form a very important division of pathology and the nature of the bacteria them¬ selves is discussed under bacteriology. For our purpose only pathogenic bacteria need be con¬ sidered, and of these a few such as the diphtheria bacillus cause disease by producing a powerful soluble poison which is absorbed into the blood and carried throughout the

body. Such bacteria really grow outside the body in a sense, inas¬ much as they are found in wounds or on mucous surfaces whence they spread their poison.

In case of other bacteria no such strong poisons have been demonstrated in cultures or filtrates from cultures, but it seems that in the body they must produce very strong injurious substances of some sort for they cause the death of cells with which they come into contact, and even the destruction of rather distant cells. These are bacteria which invade the organs and multiply within the body, or even in the blood stream, until great numbers are present. Cer¬ tain forms such as the streptococcus or staphy¬ lococcus may produce such a septicaemia and set up inflammatory reactions following the death of tissue wherever they lodge and form colonies. Puerperal septicaemia, carbuncles, boils, pneu¬

monia, pleurisies and peritonitis are among the effects of these pyogenic organisms.

Pneumonia is ordinarily caused by one or other of the types of pneumococcus and is a disease in which the lung becomes filled with an inflammatory exudate of fibrin and cells formed round the millions of pneumococci which find their way into the bronchi and air cells.

The typhoid bacillus taken in with food or water invades the whole body, but causes characteristic changes in the lymphoid ap¬ paratus of the intestine, mesenteric glands and spleen. A great swelling of this tis¬ sue is produced by the accumulation of new cells which may undergo necrosis so that in the exposed lymphoid structures of the intestine ulceration ensues.

The tubercle bacillus is distributed in many ways in the body and where it lodges produces commonly small grey nodules of non-vascular tissue rich in cells which tend to become confluent and to undergo necrosis. In other cases in which the resistance is not great the bacilli may cause an acute inflamma¬ tion with abundant exudate. This inflammation, especially in the lung, is quite as prone to be followed by a necrosis involving tissue as well as exudate, as is the case with the scattered tubercles. Combinations of these processes pro¬ duce the great destruction of tissue seen in pul¬ monary phthisis and other tuberculous diseases.

Another widespread disease of great im¬ portance, syphilis is caused

by the tre¬ ponema pallida, a thin spiral organism which produces very different changes in the three or four stages which are characteristic of the dis¬ ease. The primary lesion is an induration of the skin and underlying tissue,, the secondary lesions are various eruptions on the skin and mucosae, while the changes in the tertiary stage are in the form of large necrotic nodules (gummata) in bones and internal organs.

Great numbers of other diseases are. due to such bacterial invasion, but space forbids any discussion of these.

Animal Parasites.— Another great group of diseases is caused by the invasion of animal parasites usually very low in the scale of ani¬ mal life. Of these the most important are the protozoan or unicellular organisms which cause malaria, amoebic dysentery and the sleeping sick¬ ness of Africa, although new. forms are con¬ stantly being described. Malaria mav be re¬ garded as a type of such infections. The para¬ site is injected into the blood by the bite of a mosquito, and there goes through a cycle of development ending with division into many young spores, the emergence of which from the red corpuscles is accompanied by a chill. These spores enter other corpuscles and repeat the cycle. The mature forms when sucked out of the blood by another mosquito go through a different cycle in the body of the insect form¬ ing spores of another sort which reach the blood of a second human being by the next bite of the mosquito and start once more the human cycle. Similarly a great group of parasitic affection is due to the invasion of worms and occasionally even of insects.

Exanthematic Diseases.— Such diseases as smallpox, measles, scarlet fever, etc., appear to be caused by some parasite different from the bacteria. At present we are ignorant of the

nature of the organisms in this whole group of diseases, although it is certain that they present all the appearances of acute infections.

Anaemia and Leukaemia.— Many of the diseases already described as

associated with the production of some form of poison are accompanied by a destruction of the red corpuscles of the blood which leaves the body supplied with a pale watery blood and consti¬ tutes anaemia. When the causative disease is known we speak of a secondary anaemia. There is, however, a kind of severe anaemia of wThich the cause is not known, and since it is a pro¬ gressive and fatal disease it is called pernicious anaemia. Other curious conditions in which the blood is flooded with various leucocytes and other cells in enormous numbers are spoken of as leukaemias. Their nature is quite obscure, but it is known that in them as in the types of anaemia the bone marrow is very active in pro¬ ducing new cells.

Organic Insufficiency. — The partial or com¬ plete destruction of such organs as the thyroid, adrenal, pancreas, hypophysis and parathyroid give rise to profound disturbances, the nature of which is even yet but imperfectly known. For example, the destruction of the thyroid is followed by myxcedema, while what appears to be an increase in its activity or at least a per¬ version results in exophthalmic goitre. So too destruction of the pancreas or of the islands of Langerhans embedded in it is followed by diabetes, while equallv characteristic diseases ensue when decreased activity or overaction of the other organs of internal secretion arises. The fact that some of these diseases (notably myxoedema and cretinism, which are due to destruction or maldevelopment of the thvroid) may be cured or greatly ameliorated by the ad¬ ministration of extracts of the corresponding gland promises much for the future when the relations of those which are as yet imperfectly studied become known.

Mental Diseases. — Derangements of the functions of the brain are naturally the result of all sorts of diffuse and localized destructive or injurious processes which are as likely to affect that tissue as any other. Some bacterial infections produce inflammations of the sub¬ stance and covering of the brain and spinal cord (meningitis), while others acting more slowly cause not an acute febrile illness, but a chronic mental disease (syphilis causing gen¬ eral paresis). There are, however, many forms of insanity which crowd our asylums, but in which as yet we have not only failed to dis¬ cover the cause, but are even unable to recog¬ nize any structural changes in the brain. In addition to these of which some appear to be due to infection or intoxication, there are many cases of defective mentality due to hereditary maldevelopment of the brain or to some defect of internal secretion.

Congenital Malformations; Monsters. —

Great difficulty is met in the attempt to explain the origin of congenital malformations. That they are the result of peculiarities of the germ-cells or of disturbances in development is cer¬ tain, but the nature of these disturbances is obscure. Experimental embryologv, it is true, has shed some light upon them in showing that some may be produced by the action of in¬ jurious physical and chemical agencies during the incubation of the egg; and the evidences of

pressure, amniotic and placental adhesions, etc., in the malformed foetuses themselves explain others; but as to the origin of the greater num¬ ber knowledge is wanting. In many instances the same malformation occurs in several mem¬ bers of the same family and seems hereditary.

When only one individual is concerned there may be all grades of defective or superfluous de¬ velopment from such familiar conditions as harelip to those in which the medullary groove has failed to close (spina bifida), or in which the tissue which should form the brain has re¬ mained spread over a deformed spine so that only a thin membrane is there to represent the brain (acrania). Such extreme malformations as the latter are incompatible with life after birth.

When two individuals are concerned they may be practically perfect but united, as in the case of the Siamese twins, at some point in the body; or with a more marked malformation they become more or less completely merged in one another. Sometimes one is relatively per¬ fect while another very incomplete individual or part of one is fused into the body at some point and projects, as the so-called parasitic monster. A still more rudimentary mass, con¬ taining many of the tissues of a second indi¬ vidual, may be completely included within the body of the first and form there a sort of tumor called a teratoma. The simplest form of such tumors is the so-called dermoid cyst, which occurs most frequently in the ovary.

Tumors. — These are masses of atypical tissue which appear at some point or points in the body and proceed with an unlimited growth without serving any useful function, but rather to the injury of the organism. Much obscurity prevails as to their nature and origin, various theories ascribing their growth to disturbance of the equilibrium between tissues, to continued injury or irritation of the tissues, to congenital misplacement of embryonal cells which remain latent and begin to grow later, perhaps not un¬ til advanced age, and finally to protozoan parasites. During recent years many authors have

described structures in the cells of can¬ cerous tumors which they have regarded as parasites and the cause of the tumor growth, but as yet it cannot be said that there is con¬ vincing evidence as to the validity of anv of these supposed parasites, and investigators are practically as much in the dark as ever with regard to the causation of the growth.

Tumors are usually composed of cells which, although atvpical in form or arrangement, so closely resemble those normally present in the body — generally those in the immediate neigh¬ borhood or continuous with the primary growth — that they are regarded as developed from these analogous cells and are classified on this apparent histogenetic basis, their names being usually a combination of that of the tissue with the termination — oma. Thus a fibroma is a tumor derived from and composed of fibrous tissue ; an epithelioma, one composed of epithelial tissue; a lipoma, one composed of fatty tissue, *etc.* Sarcoma and carcinoma, how¬ ever, are so called from the resemblance of the former to flesh, and the latter from its fancied resemblance to a crab.

Tumors grow sometimes by the continual new formation of cells within themselves pro¬ ducing circumscribed, rounded masses which

push aside the surrounding tissue (benign tumors). Others rapidly invade by means of sprouts of cells the crevices of the surrounding tissue so that that tissue is destroyed, and on encountering lymphatic or blood vessels they penetrate their walls and distribute the cells into the blood or lymph stream so that new cell-colonies are formed in the organ in which these floating emboli lodge (malignant tumor). Such secondary tumor-masses are spoken of as metastatic nodules, and are always due to the transportation of cells. They may be very nu¬ merous and much more bulky than the primary growth.

Benign tumors may spring from the varipus forms of connective tissue, fat, fibrous tissue, bone, *etc.* ; from epithelium, neuroglia and so on. They produce disturbances only by their bulk and the pressure they

exert upon sur¬ rounding tissues. Malignant tumors may simi¬ larly arise from tissues of the connective type, from epithelium or from endothelium. They injure the organism not only by their bulk, but also by their destructive invasion of the sur¬ rounding tissues, and apparently likewise bv the elaboration of a poison which aids in producing the cachexia so frequently seen in these cases. The most important of the malignant tumors are the sarcomata, which resemble in structure embryonic connective tissue, and the cancers or carcinomata, which spring from epithelium, commonly in such situations as the skin, the lining of the stomach or intestine, the breast and “the uterus. Carcinomata are composed of communicating -masses or strands of epithelial cells imbedded in a framework of connective tissue.

The great loss of life caused by the various kinds of tumors renders their study a matter of extreme importance, and the discovery of their causes and of trustworthy methods for their prevention and cure, to which many in¬ vestigators are devoting their attention, con¬ stitutes one of the chief aims of modern med¬ icine.

Bibliography. — Consult Garrison, (History of Medicine.* Textbooks of pathology in Eng¬ lish are by Hamiliton, Green, Delafield and Prudden, Stengel and Fox, Mallory, Council¬ man Adami, MacCallum, Wells, Castellani and Chalmers, Manson (tropical diseases). Refer¬ ences to the literature will be found in many of these books and there are many journals devoted to the subject such as Journal of Experimental Medicine, Journal of Medical Research, Journal of Infectious Diseases, Journal of Pathology and Bacteriology, *etc.* Among the works on bac¬ teriology in relation to disease may be men¬ tioned those of Muir and Ritchie, Abbott, Park and Williams, Kendall, Hiss and Zinsser, Marshall.

William G. MacCallum, M.D., Professor of Pathology and Bacteriology, Johns Hopkins University.

PATIALA, put-e-a’la, or PUTTIALA,

. Sikh native state in the Punjab, lying in the Cis-Sutlej group, with the exception of a small part in the hills near Simla. Two railway lines cross the state and the Sirhind Canal irrigates a large part of it. The rajahs have long been faithful to England, showing their loyalty in 1857, and in 1898, when the rajah, who died in 1900, personally took the field in the Tirah cam¬ paign against the Afghans. The state has valu¬

able deposits of copper, lead, slate and marble; its area is 5,951 square miles, and population about 1,500,000, of which about one-third are Sikhs, one-fourth Mohammedans, and a small proportion Jains. The capital city is Patiala, on the Rajpura-Bhatinda Railroad; pop. 70,000.

PATIENCE, or BUNTHORNE'S BRIDE, a comic opera in two acts ; words by W. S. Gilbert ; music by Sir Arthur Sullivan : produced at the Opera Comique, London, 23 April 1881, and in New York at the Standard Theatre, 23 Sept. 1881. The play is a satire on the <(aesthetic movement® of the early '80s, a burlesque on the exaggerated and ridiculous form that movement developed among persons who, without natural taste of their own, tried to assume the attitudes and mimic the appearance of their intellectual superiors. The (<high priesc® of this absurd cult, Oscar Wilde, and his school of imitators, had for some time been satirized in the pages of Punch by Du Maurier and Burnand, so that the antics and the jargon of imaginary ˆaesthetic® circles had become familiar as household words. The witty ridicule of Gil¬ bert, set to the tuneful melodies of Sullivan, was mainly responsible for the early disap¬ pearance of that style of <(aestheticism.® Patience, a dairymaid, gives the title and sup¬ plies the contrast of a healthy ignorance of aesthetic idealities. The scene is laid in a coun¬ try of whimsical fancy; the plot is love, and develops around two poets and a host of love¬ sick maidens.®

PATINA, in the fine arts, the fine green rust with which ancient bronzes and copper coins and medals become covered by lying in particular soils, which, like varnish, is at once preservative and ornamental. An artificial patina is produced by the forgers of antiquities. The name is also applied to a bowl of metal or earthenware. See Paten.

PATKUL, pat'kool, Johann Reinhold, Livonian soldier : b. Livonia, Russia, about 1660; d. near Posen, Prussia, 10 Oct. 1707. He was of a noble family, received a military education and entered the army, but withdrew to enter upon a diplomatic career. He involved himself in intrigues which resulted in his being sum¬ moned to Stockholm, where, finding himself pre¬ condemned, he fled to Courland, and was branded as a traitor by the Swedish government. He entered the service of Augustus II, elector of Saxony and king of Poland, as privy councilor, and was largely responsible for the alliance of Russia and Denmark with Augustus against Sweden. He was accused later of treasonable relations with Austria and Sweden, and was arrested by Augustus. The Peace of Altran-stadt, which Augustus was compelled to

sign in 1706, stipulated the surrender of Patkul, who was tried by court-martial on the homeward journey of the Swedish troops, broken alive on the wheel, decapitated and drawn and quar¬ tered at a monastery near Posen. Consult Buchholz, (Beitrage zur Lebensgeschichte J. R. Patkulus> (1893).

PATMORE, pat'mor, Coventry Kearsey Dighton, English poet: b. Woodford, Essex, 23 July 1823; d. Lymington, Sussex, 26 Nov. 1896. He was the son of Peter George Pat¬ more, a writer of some note in his day, and pub¬ lished his first volume of poems in 1844, nar¬ rative pieces of little interest in themselves, but

displaying no little descriptive power and poetic insight. From 1846 to 1868 he was an assistant in the British Museum, and in 1854 published the first part of his most widely known poem, (The Angel in the Housed It was entitled (The Betrothal,) and was followed in 1858 by <The Espousal.* It proved popular both in Eng¬ land and this country, was parodied and occa¬ sionally scoffed at ; but many of its admirers as well as its critics failed to detect the mysti¬ cal significance its author intended it to have. Patmore was a mystic through much of his career, and in this work he was typifying heav¬ enly love by earthly affection. It was succeeded by (Faithful Forever > (1860), a poem of dis¬ appointed love, and (The Victories of Love,* a poem of bereavement (1862). Later volumes of verse include 'Amelia, Tamerton Church Tower) (1878), and (The Unknown Eros and Other Odes,* in which latter, mingled with much of mysticism, will be found at least two of the most touching poems in the English lan¬ guage, 'Toys* and (It was not Like Your Great and Gracious Ways.* Patmore was also the author of several volumes of prose, Principles of Art* (1889) ; (Religio Poetae* (1893) ; and Pod, Root and Flower > (1895). About 1868 he became a Roman Catholic, and some of his latest verse betrays his change of thought in this respect. At his best Patmore takes high rank as a poet and in spite of many trivialities his verse is more often melodious than other¬ wise. Consult Champneys, 'Memoirs and Cor¬ respondence of Coventry Patmore)

(1900) ; Claudel, Paul, ‘Coventry Patmore) (in Etudes franciscaines, Vol. Ill, Paris 1914) ; Gosse, E. W., ‘Coventry Patmore) (New York 1905).

PATMOS, Grecian island in the 7E gean Sea, off the coast of Anatolia, now called Patmo, Patimo, or San Giovanni di Patmo, once belonging to the vilayet of Jezairi-Bahri- Zefid. It measures 10 miles from north to south and contains about 15 square miles of rather rocky, unfertile soil. It once did a flourishing business with Ephesus, but at the be¬ ginning of the Christian era was a desert, used as a place of sequestration. Here Saint John was exiled and wrote the Apocalypse. At the close of the 11th century a monastery was built here in honor of Saint John, which had a very valuable collection of ecclesiastical manuscripts. Patmos was seized by Italy in 1912 during the Turco-Italian War. Pop. over 4,000, nearly all of which are Greeks. Consult Guerin, descrip¬ tion de Tile de Patmos et de Pile de Samos >

(1856).

PATNA, pat’na, more correctly PAT-TANA ((<the town®), India, (1) a city of Ben¬ gal, capital of a district of the same name and of the division of Bihar, on the right bank of the Ganges, 397 miles by rail northwest from Calcutta. The city proper is one and a half mile in length by about half that extent in breadth; but with its large suburbs stretches nine miles along the Ganges, and presents externally a striking appearance from the river, many large and handsome flat-roofed houses with carved balustrades being interspersed with temples, mosques and tombs, Saracenic gateways of red stone, large granaries, wide ghats, or stairs from the water and bastions projecting into the stream — the whole backed by a height on the land side. The adjacent cantonments at Dina-

pur are handsome and well laid out. Patna is a stronghold of Mohammedanism, and the chief seat of the opium trade. A large business is done in oil-seeds, rice, saltpeter, wheat, indigo, sugar and provisions. Among the manufactures are table-linens, wax candles, lacquered wares and bird cages; brocades, embroidery, pottery, toys, fireworks, gold and silver wire and leaf, glassware, boots and shoes, carpets and furni¬ ture. Patna has been identified with the anciqnt Pataliputra — Lotus City, which was probably founded in the 5th century b.c. Megasthenes, a Greek historian, who visited it about 300

b.c., describes it under the name Palibothra, and a Chjnese pilgrim of the 7th century a.d. has also left an account of it. The native name Azima-bad was given to it in honor of Azim, grandson of Aurungzebe, who was at one time its gov¬ ernor. The English, French and Danes had factories here formerly, but eventually the Brit¬ ish traders drove out their rivals. In 1763 dis¬ putes about transit duties arose between the East India Company's servants and the native government. The result of the war which fol¬ lowed was the expulsion of the native forces and the district coming into possession of the British. Patna was the headquarters of the Wahabi or Mussulman conspiracy of 1864. Pop. about 140,000. (2) The district has an area of 2,076

square miles. Pop. about 1,625,000. (3) The

division has an area of 23,675 square miles. Pop. over 16,000,000. (4) A native Rajput

state, feudatory to Bengal ; area, 2,399 square miles. Pop. about 300,000.

PATON, pat'n, Sir Joseph Noel, English painter: b. Dunfermline, Scotland, 13 Dec. 1821 ; d. Edinburgh, 26 Dec. 1901. He became first known to the public by his water-color painting of (The Combat between Bothwell and Balfour) (1838) ; and soon afterward grew into popularity as an illustrator of books and maga¬ zines. In 1843 he attended the art school of the Royal Academy in London, and exhibited in 1844 his well-known picture (Ruth Gleaning. > The following year he exhibited (Rachel Weep¬ ing for Her Children,* in 1846 'Oberon and Titania,* and (Christ Bearing the Cross.* He painted for Queen Victoria 'The Queen at the Deathbed of the Prince Consort.* He was more or less of a Pre-Raphaelite, but his drawing, while graceful, is sometimes weak, and his color lacking in harmonious arrangement. His skill as a sculptor and his learning as an archaeolo¬ gist were almost equal to his pictorial skill, and he wrote graceful verse and published (Poems by a Painter* (1861), and Spindrift5 (1867). In the latter year he was knighted. He made the drawing for the great glass windows which Andrew Carnegie had restored in 1884 in Dunfermline.

PATON, Lewis Bayles, Congregational clergyman and educator: b. New York City, 27 June 1864. He graduated at New York Univer¬ sity in 1884 ,(A.M. 1893) ; at Princeton Theologi¬ cal Seminary in 1890; studied at the Uni¬ versity of Berlin 1890-92; received the degree Of Ph.D. at the University of Marburg 1897 ; and D.D. at New York University 1906. He was ordained to the Presbyterian ministry in

1890, and transferred to the Congregational ministry in 1892. He was instructor 1892-93, and asso¬ ciate professor 1893-1900 of Old Testament exegesis and criticism at Hartford Theological

Seminary, and since then Nettleton professor. He was director (1903-04) of the American School of Oriental Study and Research in Pales¬ tine at Jerusalem; and is honorary secretary for the United States of the Palestine Exploration Fund. He edited (Recent Christian Progress> (1909) ; contributed to journals, encyclopedias and dictionaries of archaeology and religion, and published (Early History of Syria and Palestine: Jerusalem in Bible Times) (1908);

(Esther (International Critical Commentary), The Early Religion of IsraeP (1909).

PATON, William Agnew, American au¬ thor: b. New York, 20 April 1848; d .11 Dec 1918. He was publisher of the New York World (1877-81) ; connected with National Republican (1881-85) ; United States commissioner (1883) ; business manager of Scribner Magazine (1885— 87) He wrote Town the Islands: a Voyage to the Caribbees) (1887); Picturesque Sicily* (1897) ; (The First Landfall of Columbus* (1907) ; Tome Rule Ballads* (1907).

PATRAS, pa-tras', or PATR2E, pa'tre, a seaport of the northwestern Peloponnesus or Morea, on the Gulf of Patras, which leads into the Gulf of Corinth. The port is Unprotected and owes its importance to its position ; olive oil, wines, raisins and sheepskins are exported, and there are mills, foundries and cotton and silk factories. The city is essentially modern and lies some distance from the old town, which had a great commerce in the 5th century b.c., and again in the 1st when it was rebuilt by Augustus and became famed for its cloth man¬ ufactures and as the site of the Oriental wor¬ ship of Aphrodite. During the Middle Ages it was the chief commercial city of the Pelopon¬ nesus. Now the city is a station of the Austrian Lloyds and the Mediterranean and New York Steamship Company connects it with New York city. It has several consulates, among them one of the

United States; pop. about 40,000.

PATRIARCHAL SYSTEM (Greek, pa¬ ter, father, arche, rule). The extreme paternal form of the family in which the authority of the husband and father in the family has be¬ come so supreme that he is practically owner of all persons and property of the family group, the wife and children being reduced it not to the position of property at least to the position of subject persons. A second char¬ acteristic of the Patriarchal System is that the family organization usually included not only all persons related by descent through common male ancestors but also all persons received into the family by the ceremony of adoption and even all slaves and dependents. he patriarchal family, therefore frequently con¬ sisted of hundreds of individuals, and was a little political unit, the head of which was the

eldest living male… .

Classical pictures of the patriarchal system may be found in the description of the lives of the Hebrew patriarchs in the Old Testament. Practically all European and Asiatic peoples were in this stage of social development when they first appear in history. For this reason, Sir Henry Maine thought that the patriarchal family was the original type of family in the human species. (See , Family, History of) This view is contradicted, however, by the fact that the maternal family and the maternal system of relationship are much more wice> VOL. 21 — 26

prevalent among all uncivilized peoples. An¬ thropologists and sociologists now universally agree that the patriarchal system is a relatively late development in the history of the family.

It reached the acme of its development in early historic times among the Hebrews, Greeks, Romans, Hindus and Chinese.

The causes of the development of the patriarchal system were complex. Wife capture and wife purchase, together with the growth of the idea of property and persons, in the period of barbarism were doubtless contribut¬ ing causes. But the decisive factor in creating the patriarchal family was pastoral industry. The keeping of flocks and herds of domesticated animals necessitated the separation of families through their wandering over long stretches to secure pasturage, and at the same time the employment of a large amount of male labor. Under such conditions the husband gained great power over his wife,

as she was separated from her kindred, and as the owner of the flocks and herds which constituted almost the sole property of the group, his authority gradually became supreme in all matters.

But the fully developed patriarchal system received its stamp from that primitive religion which we know as ancestor worship. This re¬ ligion, deifying the departed male ancestors, tended to reinforce the authority of the house father, because he was the oldest living an¬ cestor, and the representative, so to speak, of the gods upon earth. Thus arose the patna potestas of the Roman father, that is, the power of life and death over all members of the family group. This power, however, could not well be exercised arbitrarily, as the house father was necessarily controlled by religious scruples and traditions. Disobedience to the house father was however, disobedience to the divine ances¬ tors' and hence was usually severely punished.

Among the Hebrews and some other peoples we find the patriarchal system without ancestor worship ; but in such cases the evidence seems to show that ancestor worship once existed, gut had been largely obliterated through the adoption of a higher religion.

The patriarchal system is now chiefly of in¬ terest because of its effects upon later history Inasmuch as all the chief historical peoples of Europe and Asia have passed through a patriarchal stage of development, the history of these peoples can scarcely be understood without a knowledge of the patriarchal system. Not only have our historical ideas regarding the family, but also those regarding property, government and religion, been influenced by the patriarchal system. Patriarchal ideas, it has often been pointed out, have been impedi ments to progress along these several hnes; but at the same time it must be acknowledged that no high degree of social organization, as Spencer insisted, would have been possible it there had not been a patriarchal stage of de¬ velopment.

Bibliography.— Coulanges, Fustel de, <■ i he Ancient City* (Boston 1882) ; Howard G. E., (History of Matrimonial Institutions (3 vols., Chicago 1904); McLennan, J. F., The Patri¬ archal Theory* (London 1885) ; Maine, H. S.,

(Ancient Law* (London 1885).

Charles A. Ellwood,

Professor of Sociology, University of Missouri.

PATRIARCHS, the three fathers of the Hebrew race, Abraham, Isaac and Jacob. The patriarchal government prevails in a state of society in which the people are not yet organ¬ ized into a nation, but consist of independent tribes, clans or families under the government of the head of the family. Later the title patri¬ arch was assumed by the presidents of the sanhedrim, which exercised authority over the Jews of Syria and Persia after the fall of Jeru¬ salem. The patriarchate of Tiberias for the Western Jews lasted till 415, that of Babylon for the Eastern Jews till 1038. From them the term was borrowed by the Christians, who applied it to the bishops of Rome, Constantino¬ ple, Alexandria, Antioch and Jerusalem. These patriarchs consecrated and supervised the archbishops and bishops within their jurisdic¬ tions. While with the patriarchate of Rome was united the primacy of the Roman see throughout the world (see Papacy), the four heads of the Eastern Church preserved the title of patri¬ arch. The Armenian, Abyssinian, Jacobite and Maronite churches have patriarchs of their own. The Patriarch of Constantinople is the primate of the Greek Church in the Turkish Empire, and bears the title of oecumenical. (See Russian Religion). The authority of the Patriarch of Moscow which extended over the Russian Church was superseded, during the reign of Peter the Great, by the holy synod. Consult Bingham, (Origines) II; Morin, <De Patri-acharum origine) ; Neale, ‘History of the East¬ ern Church } ; Riddle, ‘Christian Antiquities. >

PATRIARCHS MILITANT. See Odd

Fellow.

PATRICIANS (Latin, patricius, from pa¬ ter, father), the name given by the Romans to the members and descendants by blood or adop¬ tion of the original gentes of which the Roman people was composed, until the plebeians be¬ came a distinct class of citizens. The other sections of the Roman population, the clients and slaves, did not belong to the populus Romanus. During the first centuries of. the republic there was an almost uninterrupted struggle between the patricians and plebeians, in which the former fought hard to retain their exclusive rights, but which ended in the estab¬ lishment of the - political equality of the two orders; only a few insignificant offices remained the exclusive privilege of the patricians. The formation of a new aristocracy, founded on wealth and on the holding of the offices of con¬ sul, praetor and curule. aedile, made the patri¬ cians of still

less account. When the seat of government was removed to Constantinople, Constantine the Great, desirous of restoring the ancient Roman ranks, instituted a new patri¬ cian dignity, which was a mere personal title, and which could be acquired only by high birth and distinguished merits. Under the Carlovingians and the succeeding emperors the title of patrician denoted an exalted rank, and was connected also with the government of Rome and its provinces, and the support of the Papal See. Charlemagne assumed the title of a Roman patrician before he was declared em¬ peror, and Henry IV, as such, deposed Pope Gregory VII. In modern times a few noble families in the imperial cities were called patri¬ cians, because they were especially entitled to certain high offices. In some Italian cities the

title of patrician is still used to denote a mem¬ ber of the nobility. Consult Botsford, G. W., 'The Roman Assemblies) (New York 1909) ; Bryce, (Holy Roman Empire) (New York 1911); Burg, J. B., (Later Roman Empire* (London 1899) ; Foltz, 'Beitrage zur Geschichte des Patriciats in den deutschen Stadten* (Mar¬ burg 1899). See Rome; Plebeians.

PATRICK, Saint, the apostle and patron saint of Ireland. The date of his birth has variously been placed at from 373 to 389; and his death from 461 to 493. One tradition says he was born at Kilpatric, another at Dum¬ barton, Scotland, but the place of his birth, Benneventa, has never been definitely settled. Some authorities are inclined to place it some¬ where on the southwest coast of Britain, near the Irish Channel ; others as stoutly maintain it was in the north, while others place it on the 'Severn River. His Celtic name was Sucat, to which, as he seems to have been brought up as a Christian, the name of Patricius was probably added. His father, Calpurnius, a native Briton, seems to have been a man of some in¬ fluence in the community, a decurion, or mem¬ ber of the municipal council and apparently a friend of the Romans. His grandfather, Potftus, was a presbyter. When 16 years of age Patrick was taken prisoner by some Irish who made a raid on western Britain, and was carried off into slavery in Ireland (<near to the western sea.® After six years, he succeeded in making his escape to the Continent, probably to west¬ ern France, an uninhabited country through which he and those with him traveled 38 days suffering many hardships, before they came to an inhabited part of the country. There Patrick finally found refuge in the Monastery of Lerins, on an island off the west coast of Provence, where he seems to have remained for some years, after which he returned home to Britain. There he claims to have had a vision of himself going as a victorious

apostle of Christianity to the Irish. This he regarded as a divine call; and he went back to Autissio-dorum (Auxterre) in Gaul, where after a period of study and preparation, he was or¬ dained bishop together with two other pros¬ pective missionaries for Ireland. This work of preparation in Gaul seems to have covered 14 years, for it was not until 432 that he be¬ came bishop of Ireland on the death or retire¬ ment of the Irish bishop Palladius. He at once took possession of his new office, filled with enthusiasm for a work to which he seems to have long looked forward. It is probable that the Christian communities in Ireland were, at this time, confined to the south and west' of the island ; and the task before the new bishop was not only to minister to these and to hold them together, but also to gain the goodwill of the various local rulers, or as they styled themselves, kings. His knowledge of Irish and Latin was a very valuable asset in this work; and his experience of six years in the country had given him an insight into the char¬ acter of the people that he could probably not have learned as well in any other way. It is probable that he landed at the mouth of the river Vartrv in Wicklow at a place called In-verdea; and from there he went into east Ulster (Ulidia) ; and began his missionary work on the southwest side of Strangford

Lough, in a wooden barn given him for re¬ ligious purposes, by an Irish convert known as Dichu, a chief and a man of importance in that part of the island. True to his mission, he seems not only to have preached, but also to have done his best to interest in Christianity the rulers of the various districts, over whom was a head ruler or king called Loigaiie. Through the influence of Patrick, Fedilmid, brother of Loigaire, declared himself a Chris¬ tian and gave his support to Patrick and pre¬ sented him with an estate at Trim, to be used to found and support a church. Through his influence the bishop seems to have gained the protection of Loigaire, though the latter never deserted the faith of his ancestors, and thus to have been enabled to gain converts and to found churches in various parts of the island, though he seems to have given more of his attention to the north than to the south of Ireland. Many legends and traditions, most of them of a

miraculous character, are connected with this period of his work and with various parts of the island. It seems that he visited Rome (441-443), saw Pope Leo, got his enthusias¬ tic approval of the Irish work and brought back with him noted relics from the papal city.

On his return to Ireland in 444 he made Armagh the ecclesiastical capital of the island. The land on which the church here was built had been given him by King Daire of Oriel In his later years he was bitterly criticized and he finally resigned his office as bishop and retired probably to Saul in Dalardia where he died it would seem according to the best au¬ thority, in 461. He has left two important documents ; one of which is his Confessions, which is a sort of autobiography, written toward the close of his life, and the other, the “Let¬ ter to Coroticus,** the British king of Strath¬ clyde. In this latter document Patrick urges the Christian subjects to have nothing what¬ ever to do with the king until he repairs cer¬ tain very grave offenses against the Christians

in Ireland. ,

Saint Patrick seems to have been a man ot

very strong will power and very considerable executive ability. He must have been much of a diplomat to have achieved the success he did in the midst of warring factions at a period when the power of druidism was very strong in Ireland. Whatever may be doubtful about his life, there can be no doubt that he was a great organizer, and that his enthusiasm and his faith in his work inspired him to treat with kings and princes, as though they had been put there for his purposes of the spread of the Christian faith. He was a man of tireless action and enthusiasm in his work; and we are told that he founded 360 churches, baptized with his own hand 12,000 people, and ordained a great many priests Though, at the conclusion of his work, Ireland was still more pagan than Catholic, yet he had dealt a death blow to the religion of the druids, which was shoitly to disappear before the onward march of the ideas set into motion by him. He influenced strongly the Irish mind, and Celtic imagination has sur¬ rounded him with picturesque legends. He banished the snakes and toads out of Ireland, he performed the most astounding miracles in his contests with the druidical priests ; he con¬ founded his enemies by bringing down dark¬ ness upon them; and many equally wonderful

things tradition credits him with doing. His name is connected with

scores of localities throughout Ireland, and generally there is some local story connected therewith. At his death so great was the glory that there was no night for 12 days.

Bibliography. — Arch dekin, (Vitae et Mira-culorum S. Patrick Hibernise Apostoli, epitome) (Louvain 1617) ; Buillon, <Histoire de la vie et du purgatoire de Saint Patrice* (Avignon 1642); Bury, (St. Patrick and his Place in History) (London 1905) ; Coleonus, 'Vita Sancti Patrick* (1617) ; Cusack, (Life of Saint Patrick* (London 1870); Healy, John, 'The Life and Writings of Saint Patrick) (Dublin 1905) ; Morris, Hreland and Saint Patrick (London 1888) ; Newell, E. J., (Saint Patrick, his Life and Teaching* (London 1890) ; Olden, T., (Epistles and Hymns of Saint Patrick* (Dublin 1895); Perez de Montalvo, (Vita y Purgatorio de San Patricio* (Madrid 1627) ; Robert, (Etude Critique sur la vie de. San Patrice* ; Shearman, T. F., 'Loca Patriciana* (Dublin 1882) ; Stanihurstus, (De vita Sancti Patrick* (1587); Stokes, tripartite Life of Saint Patrick* (1887); Swift, the Life and Acts of Saint Patrick* (Dublin 1809) ; Todd,

J. H., (Saint Patrick the Apostle of Ireland* (Dublin 1861).

PATRICK, Saint, Order of. See Orders and Decorations.

PATRICK, Albert T., American lawyer: b. Texas, 19th century. He was engaged in practice when charged with inspiring the mur¬ der of William Marsh Rice, an aged millionaire, on 24 Sept. 1900. Patrick was convicted 26 March 1902 and was sentenced to be electro¬ cuted, but secured appeals which delayed the execution of the sentence. His sentence was commuted to life imprisonment by Governor Higgins in 1906 and he was pardoned by Gov¬ ernor Dix in 1912. The motive for the crime was supposed to be Patrick's inheritance of the Rice fortune through a bogus will. It was said that the conduct of the case during the 12 years cost Patrick and his friends $162,000.

PATRICK, Mary Mills, American college president: b. Canterbury, N. H., 10 March 1850. She was educated at Lyons College, Iowa, the State University of Iowa and at the universities of Heidelberg, Zurich, Leipzig, Berlin and Berne. She became president of the American College for Girls at Constantinople in 1890. She was a member of the Pyschological Congresses at Munich in 1896 and at Paris in 1900; and of the Philosophical Congresses at Paris, 1900, and ai Bologne in 1911. Author of Armenian Translation of TextBook of Physiology* (1876); (Sextus Empiricus and Greek Skepti¬ cism* (1899); (Sappho and the Island of

Lesbos* (1912), *etc.*

PATRICK, Simon, English Anglican bishop : b. Gainsborough, Lincolnshire, England, 8 Sept. 1626; d. Ely, Cambridgeshire, 31 May 1707. He was educated at Queens College, Cambridge, became rector at Covent Garden in 1662, in 1678 was appointed Dean of Peter¬ borough, became Bishop of Chichester in 1689, and of Ely in 1691. He defended the Reforma¬ tion, during the reign of James I, though in early life he had written against the Non¬ conformists. His views changed, however, later

and he favored the Nonconformists in many ways, and he did his best to lessen the mis¬ understanding and ill-will existing between them and the Anglicans. A man of vast learning and a wise ecclesiastic, he was the author of numer¬ ous devotional treatises, some of which are still read. A complete edition of his works (9 vols.) edited by Alexander Taylor and including Patrick's (Autobiography } was published in 1858. Among his published works are Con¬ formist and Non-ConformisD ; (Mensa Mystica) ; (The Heart's Ease) ; (The Parable of the Pilgrim) ; <The Christian Sacrifice > ; (The Dignity of the Christian Priesthood) ; Para¬ phrases upon the Books of the Old Testament > (10 vols., from Genesis to Solomon, 1695-1710). Consult Chamberlayne, T., <Memoir) (in (The Parable of the Pilgrim > (London 1839).

PATRIMONIUM PETRI, pat-ri-mo'- ni-um pe'tri, or PATRIMONIUM ECCLE-SliE, the territory of the papal government during the time when the temporal power of the pope was a reality. In a narrower sense it de¬ notes the territory nearest Rome which became the property of the papal curia in the 8th cen¬ tury. Dante, however, attributes the original territorial possessions of the Roman bishopric to the gift of Constantine.

PATRIOFELIS, a creodont animal found tossil in the Middle Eocene formations of Wyoming, which was about the size of a lion, but was of aquatic, or semi-aquatic, habits, and preyed much if not altogether

upon the turtles which abounded in the shallow waters of that region during Eocene times. It is regarded by some writers as a possible ancestor of the seals. See Creodonta.

PATRIOTIC SOCIETIES, in the United States are those organizations which aim to foster love of country through the celebration of important events in American history, and by keeping alive memories of the heroic sacri¬ fices of Colonial and other wars and the preservation and restoration of historic sites and monuments. Among the societies de¬ voted to the colonial period are : Society of Ma} dlower Descendants, Society of Co¬ lonial Wars, Order of the Founders and Patriots of America, Society of Colonial Dames of America, National Society of Colonial Dames, Society of Daughters and Patriots of America, Holland Society, New England So¬ ciety, American Flag Association, Society of the Ark and The Dove, Order of Washington, Order of Pequot and King Philip, National Society of Scions of Colonial Cavaliers.

In commemoration of the Revolutionary War there are numerous organizations includ¬ ing the Society of the Cincinnati, Sons of Revolutionary Sires, Society of the Sons of the American Revolution, Naval Order of the United States, Military Order of Foreign Wars, Saint Nicholas Society of New York and others. Subsequent societies were the General Society of the War of 1812, Veteran Corps of Artillery, American Order of the Louisiana, the Aztec Club (q.v.), Association of Mexican Veterans, Society of the Descendants of the Signers of the Declaration of Independence, the Society of the Dames of the Revolution, the Society of the Daughters of the American Revolution, Society of the Children of the American Revolution, Society of the United

States, Daughters of 1812, Daughters of the Re¬ public of Texas.

As the outcome of the Civil War the follow¬ ing were among the patriotic societies organ¬ ized: Military order of the Loyal Legion, Grand Army of the Republic with its adjunct — the Woman's Relief Corps, Union Society of the Civil War, Union Veteran Legion, Sons of Veterans, Union Society of .the Civil War, Society of the Army of the Cumberland, So¬ ciety of the Army of the Potomac, Society of the Army of Tennessee, Eleventh Army Corps Association, Second Army Corps Association, Thirteenth Army Corps Association, Union So¬ ciety of the Civil War, Military Order of the Medal of Honor, National Association of Naval Veterans (q.v.), Medal of Honor Legion (q.v.),

United Confederate Veterans, United Daughters of the Confederacy, United Sons of Confederate Veterans.

Other patriotic societies include the Order of Indian Wars of the United States, Society of Veterans of Indian Wars, Order of the Serpent, LTnited Spanish War Veterans, Society of the Army of Santiago de Cuba, Military and Naval Society of Porto Rican Expedition, Rough Riders Associaton, Society of the Caribbean, Military Order of the Carabao, National Society of the Army of the Philippines, Military Order of the Dragon, Military Order of Foreign Wars, Mount Vernon Ladies' Association, the George Washington Memorial Association, Ladies' Hermitage Association, National Society of Patriotic Women of America, Landmarks Club of Los Angeles, Colorado Cliff Dwellers' As¬ sociation, Thomas Jefferson Memorial Associa¬ tion and the American Scenic and Historic Preservation Society. Under the heading of patriotic societies may also be included the numerous State and local historical societies. See Historical Association. American.

PATRIOTS' DAY, in Massachusetts, the anniversary of the double battle of Concord and Lexington, 19 April 1775. The day was first observed in 1894.

PATRIPASSIANS. See Sabellius.

PA1RISTIC THEOLOGY, that section of Christian literature bearing particularly upon ethics and doctrine which is contained in the writings of early fathers of the Church, a term generally confined to writers of the first five or six centuries of the Christian era. They are generally classed as Patristic Fathers or Apos¬ tolic Fathers, who were nearest to and partly contemporary with the Apostles, namely Pseudo-Barnabas, Clement of Rome, Ignatius, Pseudo-Ignatius, Papias, Hermas and Polycarp; the ante-Nicene Fathers, who lived between 167 and the Nicene Council 325, and the post-Nicene Fathers. The Eastern and Western Church have each a group of authors who are recog¬ nized as fathers par excellence. Those of the Eastern Church are Athanasius, Easil, Chrysos¬ tom, Gregory .Nazianzen, Cyril of Alexandria and John of Damascus, while those of the West are Jerome, Ambrose, Augustine, Gregory of Rome, Leo the Great and Hilary of Poitiers — to whom are often added Bernaud of Clair-vaux, 1 homas Aquinas and Bonaventura. Con¬ sult Migne, T. P., (Patrologiae Cursus Com-pletus) (221 Vols., 1844-65) ; Pusev, E. B., li¬ brary of the Fathersˆ (47 vols. 1838-80) ; Lightfoot, J. B., (Apostolic Fathers (5 vols., London

1889-90) ; Farrar, F. W., <Lives of the Fathers >

(2 vols., Edinburgh 1889) ; Kruger, G., (History of Early Christian Literature) (Gillett's trans., New York 1897).

PATROCLUS, pa-tro'klus, the friend and brother in arms of the Greek champion Achilles, was the son of Mencetius, one of the Argonauts. On accidentally killing Clysonymus, in his early life in a game of dice at Opus, he saved himself by bight, and reached Thessaly where he was kindly received by Peleus, who educated him as the companion of his own son. He ac¬ companied Achilles to 1 roy, and remained, like him, inactive, when the anger of Achilles kept him from taking a part in the war. At length Achilles permitted Patroclus to go forth to battle, where he was arrayed in the armor of Achilles. Apollo stunned him and rendered him defenseless, and he was slain by Euphorbus and Hector. The Greeks recovered his body, which they interred with the highest marks of honor, and established solemn funeral games to his memory. Achilles then avenged his friend by challenging Hector and slaying him in single combat.

PATROL, a military term applied to the walking or marching round of a guard to watch and observe what passes, and to secure the peace and safety of a camp or other place. In the European War the word has been applied also to scouting parties sent out between the lines to gain information or to prepare for an attack in force. Also men on guard who go the rounds in the night; a detachment whose duty it is to guard ; or a policeman whose duty it is to patrol a certain district or beat for the protection of property and to preserve the. peace. Such policemen are frequently called patrolmen. In early American history the word patrol was applied to a military system adopted by the parishes of most of the Southern colo¬ nies, notably South Carolina. The patrol was a sort of police for the parish and was designed especially to prevent and subdue insurrections among the slaves. In South Carolina the patrol was established by law in 1704. The patrollers furnished their own pistols and horses. 1 hey rode from plantation to plantation and arrested all slaves who could not show

passes from their owners. This system soon became general through the South, and continued under various forms for many years.

PATROL, Insurance. See Insurance Patrol.

PATRON (from the Latin “Patronus® through the French “patron®). The word was directly connected with “pater,® father, and in its signification and use undoubtedly dates back to patriarchal days. Among the Romans, a name denoting a patrician who had plebeians under his immediate protection, and whose interests he supported by his authority and. influence. When Rome had conquered manj’ na¬ tions, noble Romans were, sometimes the patrons of whole cities and provinces, and such patron¬ age even descended by inheritance in some families. The Marcelli were patrons of the Sicilians because Claudius Marcellus had suc¬ ceeded in conquering Sicily. Patron was also the title of every advocate who represented the interest of another, his client. In later times the term patron was applied to every protector or influential promoter of the interests ot

others; hence the saints who were believed to watch over the interests of particular persons, places or trades were called patron saints. The patron became the guardian of a clients inter¬ ests and upheld these interests in the law courts. Patron and client were under a legal obligation never to accuse one another, down to before the Christan era. Even to-day throughout Latin countries the patron is a person of im¬ portance. In Spanish America the name is given to the head of a family or business by his employees; and the word is used in much the same sense as “boss® in English. One who provides food for a feast or entertainment is also designated the patron of the occasion. When a new business is opened with a dinner or reunion to celebrate the occasion the giver of the feast is known as the “patron® ; when a child is baptized there is a patron for the oc¬ casion. The person who freed his slaves in Roman days generally retained toward them the relationship of patron or protector, that is the old patriarchal relation of a father to his family; and this relationship was recognized in early Roman law — as the patronus pleaded for them in court or on special occasions, the word in Latin came to have the special meaning of lawyer. In an ecclesiastical sense, a patron has long had the meaning of one who has the right to present a “living® or other preferment to a clergyman. In Spanish countries this idea is carried further, and a captain of a ship or the landlord of a rented property or the keeper of an inn or hotel is familiarly called the (paˆlon

PATRON SAINT, the canonized saint who is sometimes credited with watching over, pio-tecting or interceding for certain persons, places, trades or institutions. Thus Saint George is commonly called the patron saint of England, Saint Denys of France and so on. In the Middle Ages every trade had its patron saint. Saint Clair was the patron of lamp¬ lighters; Saint Cloud of nailers; Saint Blanc or Blanchard of laundresses; Saint Peter of fisher¬ men ; and Saint Dunstan of goldsmiths. The patron of an individual is generally the saint by whose name he was baptized. In most Latin countries a person celebrates not only his birth¬ day but each of his saint's days. It often hap¬ pens that he may be required to celebrate one certain saint's day several times in the year, as that of Saint John or that of Saint Joseph. So it is common to add to such a name a specific to determine which John or Joseph it is. Thus we have "Juan de Dios® (John of God) in Spanish as a very common baptismal name ; and in French John the Baptist is so common that in some parts the French peasants are desig¬ nated "Baptist.® The same thing happens with J esus, which is a common baptismal name in Latin Catholic countries; and the curious com¬ bination Jesus Mary is frequently met with in men's names. This limits the name to one per¬ son, Jesus the son of Mary.

PATRONAGE, the right vested in a per¬ son, official, or political party, of appointment to offices and positions, the award of contracts, the disposition of emoluments, pensions, *etc.* Except in special cases, the right of appoint¬ ment to office was vested by the Constitution of the United States in the President, his selec¬ tions to be confirmed by the Senate, and up to the time of the Civil War, the President main-

tained actual as well as nominal control of ap¬ pointments. But during and after that period the patronage at the disposal of the national government increased at such a rate that the political manipulation of offices became exceed¬ ingly complex. Practical dictation to certain offices was gradually acquired by the senators who by courtesy secured the control of appoint¬ ments, each in his own State, although

in form, the initiative and the responsibility remains with the President.

In the field of State and local government, cities furnish the greatest display of the mis¬ use of patronage as appointments are numerous and elective officers few. Except in the matter of building contracts, supplies, etc., education, fortunately, has usually been considered outside the domain of politics, and teachers have been chosen primarily with a view to fitness for their positions. In the combination of Federal and local patronage, the number of voters who get, or expect to get employment in case of a party victory is so large that it tends to destroy true party balance. The need of controlling this power has led several States to enact civil serv¬ ice laws with the object of taking most of the appointive offices out of politics.

Experience shows that instead of being the support of the party system, patronage tends rather to its destruction. There are never spoils enough to (<go round® ; bitter factions grow up and their selfish strife disrupts the party. Patronage is in fact a concealed form of bribery; the giving of office or contracts as rewards for party service works insidious cor¬ ruption of political morality. A large propor¬ tion of voters regard offices as perquisites of the party, as gifts bestowed upon the faithful, rather than as positions of public trust, and as Horace Bushnell has strikingly observed, (<such a system would corrupt a nation of angels.®

Ecclesiastical patronage is the right vested in a church body or a layman to appoint a prop¬ erly qualified person to a vacant church ap¬ pointment. Marked by much contention and various abuses during the Middle Ages, the his¬ tory of ecclesiastical patronage goes far back into the centuries and still exists, to some ex¬ tent, in the Protestant churches of Europe. In the United States, ecclesiastical patronage is vested usually in the official body of laymen supporting a church, with the exception of Catholic churches where it is vested in the diocesan bishop on the general principles of the canons of the third and fourth Lateran coun¬ cils as decreed by the plenary councils of Bal¬ timore. See Church Government.

PATRONS OF HUSBANDRY. See

Grangers.

PATRONYMIC (a name taken from one's father), a term which designates a person in reference to some of his ancestors, either im¬ mediate or remote. In Sanskrit, Greek and Latin patronymics are very

common. In San¬ skrit they have 13 recognized terminations. In Greek the suffixes were ides, ions, iades, eides, etc., for the masculine, and ias, is, as, etc., for the feminine. Achilles is called by Homer both Pelides and 2Eacides, Peleus being his father's name and Abacus that of his grandfather. The Latins borrowed their patronymic terminations ides and is from the Greek. Among modern languages the Russian, Danish, German and

English have adopted patronymic terminations, the suffixes being respectively vitch, sen, sohn or son, and son. In Portuguese, Italian and Span¬ ish patronymics are very common. The Nor¬ man Fits, the Welsh Ap, the Irish O and the Highland Mac are prefixed to the paternal name, which thus becomes a patronymic. Patro¬ nymics may be derived from the name of father, mother, grandfather or remote ancestor. The latter is the case with most modern patro¬ nymics. In Russian patronymics have compan¬ ions, a matronymic, as for example ((Pavlovna,® the "daughter of Paul,® while the name <(Pav-lovitch® means the (<son of Paul.® In Spanish Christian or family names regularly become patronymics by the addition of ((ez.® Thus Gonzalez, a very common patronymic, is the ((Son of Gonzalo.® Consult Bradley, C. W., (Patronomatology) (Baltimore 1842) ; /Die Patronymica im Alt-Indischen) (Gottingen 1903). See Names.

PATROONS (Dutch, "protector® or "pa-tron®), a popular name applied in colonial days to a special class of settlers in the New Nether¬ lands. In 1629 the Dutch West India Company, in order to effect a permanent agricultural colo¬ nization of New Netherlands, granted a char¬ ter of (<privileges and exemptions® to any mem¬ bers of the company who would within four years plant a-colony of 50 anywhere in New Netherlands, except on Manhattan Island. These wealthy grantees were called Patroons, and were privileged to rule their colonies in ab¬ solute feudal style, the colonists being bound to them for a certain number of years. Each patroon was entitled to have as his absolute property 16 miles of land along any navigable river, or eight on each shore, and so far inland as convenient. The proprietors were empow¬ ered to hold civil and criminal courts, to ap¬ point magistrates and other local officers, and in general, to punish offenders against the law. The settlers were exempt from taxes for 10 years, but they had to pay certain rentals. Sla¬ very was introduced into these settlements, trade and commerce were greatly restricted and manufacturing was prohibited. This system was soon found to be disadvantageous, since it tended to debar the less wealthy class of indi¬ vidual colonists. In 1640 the charter was modi¬ fied and

extended to any good citizen of the Netherlands. The system gave New York, dur¬ ing the colonial period, a sort of landed aristoc¬ racy. The first and largest of numerous pa-troonships was Rensselaerswyck, a property which remained in the Rensselaer family until the middle of the 19th century. The charter of 1640 limited the period of settlement to three years, removed the prohibition against manu¬ factures and limited the extent of land grants to four miles along the coast or rivers and eight miles into the interior. Under the Eng¬ lish regime some of the regulations of the sys¬ tem were changed, and after 1775 the patroons, or (<Lords of the Manor,® became merely landed proprietors. The system occasioned some trouble between landlord and tenant, which culminated in 1839 in the anti-rent agi¬ tation (q.v.). Consult Alexander, D. S., (Po¬ litical History of the State of New York) (3 vols., New York 1906-09) ; O'Callaghan, E. B., 'History of New Netherlands) (2 vols., New York 1846).

PATTAN, pa-tan' (incorrectly PATAN, PATN, PUTTUN, or PATHAN: Hindustani, "city"), a common city name in eastern India. The two most important towns of this name are Pattan in Baroda, on the Sarasvati, in the prov¬ ince of Gujarat, Bombay presidency, with a large fraction of its population composed of Jains, who have 108 temples in this sacred city. Swords, lances and knives are made here, as well as a very beautiful sort of pottery. Pop. about 40,000. Pattan in Nepal, on the south bank of Baghmati, two miles southeast of Kat¬ mandu, has many beautiful ruined palaces and temples and a population of about 30,000. It was formerly the capital city of Nepal.

PATTEE, pat-te', Fred Lewis, American educator: b. Bristol, N. H., 22 March 1863. He was graduated A.B., Dartmouth, 1888; M.L., Dartmouth, 1915; Litt.D., Lebanon Valley Col¬ lege, 1915. He studied also at the universities of Gottingen, Edinburgh and Marburg and has been head of the department of English, Penn¬ sylvania State College, since 1894. He is the author of (A History of American Literature' (1896) ; (The Foundations of English Litera¬ ture' (1900); 'The Elements of Religious Pedagogy' (1909) ; (A History of American

Literature since 1870) (1915); three novels:

(Mary Garvin) (1902) ; (The House of the Black Ring' (1905); (The Breaking Point) (1911) ; and edited the (Poetical Works of Philip Freneau) (3 vols., 1902-07).

PATTEN, George Washington, American soldier and poet: b. Newport, R. I., 25 Dec. 1808; d. Houlton, Me., 28 April 1882. He was graduated from Brown University in 1825, from West Point in 1830, served in the Seminole wars and in the war with Mexico, and was brevetted major for gallantry at Cerro Gordo where he lost his hand. He served on various military commissions during the Civil War until 1864 when he was retired with the rank of lieutenant-colonel. As a poet he earned the title "poet-laureate of the army.® Among his lyrics are the well-known (Seminole's Reply } ; (Jovs that We've Tasted' ; 'Episode of the Mexican War.' He also published (Artillery Drill' (1861); (Cavalry Drill and Saber Exer¬ cise' (1863) ; (Voices of the Border,' poems

(1867).

PATTEN, James A., American gram spec¬ ulator : b. Freeland Corners, Ill., 8 May 1852. He was employed in the State Grain Inspection Department at Chicago in 1874-78 and after¬ ward engaged in business as a grain commis¬ sion merchant. He was mayor of Evanston, Ill , 1901-05. He attracted worldwide attention and much hostile criticism by his attempt in 1909 to corner the wheat market, and as late as 1911 his appearance at his firm's Liverpool headquarters placed him in danger of being mobbed.

PATTEN, Simon Nelson, American econo¬ mist and sociologist: b. Sandwich, Ill., 1 May 1852 He was educated at Northwestern Univer¬ sity,' Illinois, and the University of Halle Ger¬ many, taking the degree of PhD. at Halle in 1878. On his return to the United States he taught in the public schools, and in 1888 became professor of political economy at the University of Pennsylvania. He has contributed to socio¬ logical journals and written (Premises of Political Economy' (1885) ; 'Economic Basis

of Protection' (1890) ; 'Theory of Dynamic Economics' (1892) ; 'Theory of Social Forces (1896); 'Development of English Thought' (1899); 'Theory of Prosperity' (1902); 'Heredity and Social Progress' (1903); 'New Basis of Civilization' (1907); 'Product and Climax'

(1909); ‘Social Basis of Religion’ (1911); ‘Reconstruction of Economic Theory’ (1912). As a writer he is suggestive, brilliant and original, but some of his conclusions are regarded as unusual and are not accepted by sociologists; he has, however, advanced some theories of acknowledged value, particularly in his study of the dynamic forces of society, his discussion of value and price, and of the rela¬ tion of distribution to consumption, *etc.*

PATTEN, William, American zoologist : b. Watertown, Mass., 15 March 1861. He was graduated at the Lawrence Scientific School, Harvard, in 1883, and afterward studied at Leipzig. He was assistant in Lake Laboratory, Milwaukee, in 1886-89; professor of biology at the University of North Dakota in 1889-93; and has been professor of zoology at Dart¬ mouth since 1893. Author of numerous scien¬ tific papers in American and German periodi¬ cals, and of ‘The Evolution of the Vertebrates and Their Kin’ (1912).

PATTERN, in decorative art, a unit of de¬ sign used as a model for more or less repetition.

It is also used to signify the whole body of ornament covering a given surface. Thus a paper hanging for walls or a piece of textile fabric or an inlaid floor is decorated according to a pattern, or with a pattern, which will be laid out according to a general design including many minor parts. The colored plate gives many patterns of different epochs intended to be carried out in many different materials from which, indeed, the examples have been taken. Thus Figs. 1, 2, 3 and 5 are from Chinese and Japanese enameling on metal. Fig. 4 is a Japan¬ ese painted pattern, but the same pattern is car¬ ried out in enameled inlay and by piercing a thin board and the like. Figs. 6, 7 and 8 are from Indian and Persian manuscripts, the decorative accompaniment of the lettering, and very similar patterns are found in Oriental glazed tiles. Fig. 9 is from an Indian lacquered box; for the Indian work of this kind, though immeasurably inferior to the Japanese in finish and perfection of make, has often beautiful pat¬ terns applied to it. Fig. 10 is a Persian Niello, that is to say, an inlay of black upon a ground of white metal ; the ground in this case being mainly cut away so that the black inser¬ tion covers most of the field. Fig. H is the corner of a Persian carpet ; and this composition of conventional flowers should be compared with Fig 6 that the reader may see this illustration of the wonderful skill of the Persians in such design. The Persians have always been the most able composers of flower patterns and leaf pat¬ terns in which natural forms are not closely to lowed, but artistically conventionalized. Figs. 12 and 13 are from Persian enameled pottery, tiles and the like, and here again the power of this race over floriated

design is seen. rig. 14 is from a French inlay of wood, light upon dark, of the 17th century, and Fig. 15 is a later piece of work of the same character, though here the veining of the wood is allowed to affect the general composition of the pattern.

Figs. 16 and 21 are pieces of French em¬ broidery of the 17th and 18th centuries, the patterns being wrought with a needle upon the black and buff backgrounds. Fig. 17 is a painted cartouche, , perhaps intended for an heraldic escutcheon, though the bearings have not been put in. Fig. 18 is a wall decoration in color from the Chateau of Versailles. Fig. 19 is a piece of inlaid marble work of the 17th century. Fig. 20 is taken from a piece of Rouen ware, the most decorative variety of French faience and the earliest to reach artis¬ tic perfection, dating from the 17th cen¬ tury. Fig. 22 is from a gilded and embossed leather wall hanging, and Fig. 23 from an em¬ broidered wall hanging, each of the 17th cen¬ tury and probably of French origin, though the leather hangings of Spain are the more cele¬ brated. Fig. 24 is from a piece of French porce¬ lain of the 18th century, not from the royal manufactory of Sevres, but from one of the private manufactories of the time in which beautiful work was done. Figs. 25, 26 and 27 are textile fabrics of the 17th and 18th centuries. Such pieces were made for furniture covering and for curtains, but very similar patterns were woven on a small scale and in heavy and solid silk for ladies' wrear. Finally, Fig. 28 is a pilaster or stile of the woodwork in a drawing¬ room, painted in delicate flower patterns directly upon the wood.

Russell Sturgis.

PATTERSON, Carlile Pollock, American scientist and superintendent of United States Coast Survey: b. Shieldsboro, Miss., 24 Aug. 1816; d. Washington, D. C., 15 Aug. 1881. He was a son of Daniel Tod Patterson (q.v.), and entered the navy as midshipman in 1830. He served with the Mediterranean squadron until 1835, when he went to Georgetown University to study civil engineering. He was graduated in 1838 and was appointed to the Coast Survey. He afterward served

for a time at sea, attained rank as lieutenant in 1841, and in 1845 re¬ turned to the Coast Survey and was placed in command of a hydrographic party in the Gulf of Mexico. He retired from the navy in 1850, and became captain of the Pacific mail steamer Oregon. In 1861 he returned to the Coast Survey, of which he became superintendent in 1874. The work was extended to a general geodetic survey under his supervision.

PATTERSON, Daniel Tod, American naval officer: b. on Long Island, N. Y., 6 March 1786; d. Washington, D. C., 15 April 1839. He entered the navy as a midshipman in 1800, was attached to the frigate Philadelphia under Captain Bainbridge, and was captured when that vessel was overhauled by a flotilla of Tripolitan gunboats after striking a reef in 1803. He remained a prisoner until 1805, and in 1807 received the rank of lieutenant, becom¬ ing master-commandant in 1813. He com¬ manded the United States naval forces at New Orleans in 1814 and greatly assisted General Jackson in the defense of the city, receiving the thanks of Congress for his services. He cap¬ tured the pirate Lafitte (q.v.) and destroyed his defenses on the island of Barataria. In 1826-28 he commanded the Constitution, was navy commissioner in 1828-32, commanded the squadron in the Mediterranean in 1832-36, and

was then transferred to the command of the navy yard at Washington.

PATTERSON-BONAPARTE, Elizabeth,

an American woman who became the wife of Jerome Bonaparte and played a part in the modern history of France. See Bonapartes of Baltimore.

PATTERSON, James Colebrooke, Cana¬ dian lawyer and statesman: b. Armagh, Ireland, 1839. He went to Canada in 1857 and became a barrister in 1876, engaging in practice at Windsor. He was a member of the Canadian House of Commons in 1874—95, and in. 1891-95 he was Secretary of State and Minister of Militia and Defense. In 1895-1900 he was lieu¬ tenant-governor of Manitoba and Keewatin.

PATTERSON, Joseph, American banker: -b. near Norristown, Pa., 25 Sept. 1808; d. Phila¬ delphia, Pa., 25 Sept. 1887. He became a banker and during the Civil War, through his influence, the bankers of the country made a loan of $50,000,000 in gold to Secretary Chase, at the famous conference in New York, and $100,- 000,000 more in the year

following. Secretary Chase constantly sought his advice on the finan¬ cial policy of the administration. He was twice tendered the office of comptroller of the United States treasury which he declined as he did also the offer of the post of assistant-treasurer at Philadelphia. He was president of the Phila¬ delphia Clearing-House Association from 1869 until his death.

PATTERSON, Robert, American soldier and educator : b. near Hillsborough, County Down, Ireland, 30 May 1743; d. Philadelphia, Pa., 22 July 1824. He came to America in 1768 and settled in Pennsylvania, where he engaged in teaching, and in 1774 was principal of the academy at Wilmington, Del. He volunteered in the Federal army at the outbreak of the American Revolution, and rose to the rank of brigade-major. In 1779 he was appointed pro¬ fessor of mathematics in the University of Pennsylvania, in which office he remained for 35 years, acting as vice-provost in 1810-13. In 1799 he was chosen president of the select council of Philadelphia, and in 1805 was ap¬ pointed director of the mint by President Jef¬ ferson. He published (The Newtonian Sys¬ tem > (1808) ; a treatise on Arithmetic5 (1819) ; edited various works on mathematics and physics.

PATTERSON, Robert, American pioneer: b. Pennsylvania, 1753; d. near Dayton, Ohio, 5 Aug. 1827. He removed to Kentucky in 1775 and assisted in the construction of the fort at Royal Spring (now Georgetown), in defense of which he afterward fought bravely. In 1776 he was one of seven men who made the daring expedition to Fort Pitt in quest of ammunition, receiving on the return trip a severe wound from a skirmish with the Indians in which all the party were either killed or wounded. He fought under Daniel Boone at the battle of Lower Blue Lick, being second in command ; was colonel in the Miami expedition of 1782, and served under Logan in his expedition against the Shawnees in 1786. He built the first house in Lexington, Ky., in 1779, owned one-third of the city of Cincinnati, Ohio, when laid out (1788). and founded Dayton, Ohio (1804). Consult

DESIGNS

»

r

Patterson, J. H., Concerning the Forefathers)

(1903).

PATTERSON, Robert, American soldier: b. Cappagh, County Tyrone, Ireland, 12 Tan. 1792; d. Philadelphia, Pa., 7 Aug. 1881. He came to America when very young with his parents who settled in Philadelphia. He served in the War of 1812, afterward became a prominent merchant of Philadelphia, and was one of the ((five Colonel Pattersons® who nomi¬ nated Jackson for the Presidency. He organized, in President Jackson's honor, the great civic parade held in Philadelphia in 1833, and in the Mexican War served with distinction. He had already been commissioned major-general of volunteers in 1846, and in the latter war he commanded a division at Cerro Gordo, and directed the cavalry pursuit of the retreating Mexicans, backed up by infantry; and he finally occupied Julapa. At the outbreak of the Civil War he was mustered into service as major-general of volunteers and placed in command of the Department of Washington, where he rendered excellent service in training the raw recruits. He was retired in July 1861. In 1865 he published <A Narrative of the Campaign in the Valley of the Shenandoah) in explanation of his conduct of affairs, which received much at¬ tention and went far toward clearing away the censure to which he had been subjected for his conduct in that campaign.

PATTERSON, Robert Mayne, American Presbyterian clergyman: b. Philadelphia, 17 July 1832; d. 1912. He was official reporter of the United States Senate (1850-55), and was gradu¬ ated from Princeton Theological Seminary in 1859. He held Presbyterian pastorates in Pennsylvania, and edited The Presbyterian (1870-430) and The Presbyterian Journal (1880-93). He was a member of 13 general assemblies of the Presbyterian Church ; and was author of measures consolidating the synods and enlarging their powers (1880). He was also a member of the Pan-Presbyterian Councils held at Lon¬ don (1875); Philadelphia (1880); and Belfast (1884). Among his works are (What is our Duty* (1863) ; (Character of Abraham Lincoln > (1864)

; (Great Valley Presbyterian Church >

(1869); (Revival Council (1871); Presby¬ terianism in Philadelphia) (1873) ; (The Apos¬ tolic Church* (1874); <Our National Religion> (1876); (Pre-Millenialism> (1877) ; (Elijah the Favored Man* (1880) ; Usaiah and the Higher Critics* (1889) ; William Blackwood* (1894) ; (American Presbyterianism* (1896).

PATTERSON, Robert Wilson, American journalist, editor and publisher: b. Chicago, Ill., 30 Nov. 1850; d. 3 April 1910. He was gradu¬ ated at Williams College in 1871. He became a reporter on the Chicago Times after the great fire, and in 1873 became assistant night editor on the Chicago Tribune , subsequently acting as Washington correspondent, editorial writer, managing editor and succeeding Joseph Medill as editor-in-chief of the publication, as well as being president of the company.

PATTERSON, Thomas MacDonald,

American lawyer, editor and politician : b. Car-low County, Ireland, 4 Nov. 1839; d. Denver, Colo., 23 July 1917. His family emigrated to America in 1849, and he was sent to Asbury College and later to Wabash College, Ad-

mitted to the bar, he set up a practice at Denver, where he was also for many years editor-in- chief of the Rocky Mountain News and the Denver Times. He was city attorney for Den¬ ver in 1874; last territorial delegate from Colo¬ rado to the 44th Congress (1875-77)*; a mem¬ ber of the 45th Congress (1877-79) and mem¬ ber of the Democratic National Conventions of 1876, 1888 and 1892. In 1888 he was also Demo¬ cratic candidate for governor and a delegate to the Populist National Conventions of 1896 and 1900. From 1901-07 he was United States sena¬ tor, and was again nominated for governor in

PATTERSON, La., town in Saint Mary Parish, on the Atchafalaya River, 87 miles southwest of New Orleans, on the Southern Pacific Railroad. Lumber and sugar constitute the chief interests of the town. There are modern waterworks, a high school and a hos¬ pital. Pop. 2,998.

PATTESON, pat'e-son, John Coleridge,

English missionary and martyr: <b. London, 1 April 1827; d. island of Nukapu, Melanesia, 20 Sept. 1871. He was educated at Eton and Oxford, was elected Fellow of Merton in 1852 and in 1853 was appointed curate of Alfington, Devonshire. In 1855 he sailed with Bishop Selwyn to New Zealand, and the next 16 vears were spent in missionary labors in the Mela¬ nesian and other South Sea islands. He was consecrated bishop of Melanesia in 1861. He was greatly beloved by the Melanesians, whom he protected to his utmost against the white kidnappers of the Pacific. He was killed by the natives of Nukapu, one of the Santa Cruz group, in revenge, it is supposed, for relatives carried away by the white slavers. He is said to have spoken over 20 languages and dialects. He made translations from the Bible into the Mota language. Consult Yonge, C. M., (Life of John Coleridge Patteson) (1874) ; Awdry, Frances, (The Storv of a Fellow Soldier*

(1875).

PATTI, pat'e, Adelina Maria (originally Apela Juana Maria), Italian singer: b. Ma¬ drid, Spain, 19 Feb. 1843; d. W ales, 27 Sept. 1919. She was brought up in New York, where she was trained by Strakosch, who married one of her elder sisters, Amelia. Her wonderful voice, when she was only in her seventh year, saved her family from poverty. It was nearly ruined by overwork, however, and she only retired from the concert stage in time to save it. On 24 Nov. 1859 she made her debut in opera in New York as Lucia, and on 14 May 1861 in London as Amina, going in the next year to Paris, where she stayed until 1870, singing at the same time in Italian opera in London and Madrid. Her success every¬ where was tremendous, partly because of her personal grace and charm, but mostly due to her pure style and her clear, pure-toned voice, which had wonderful range. The Italian operas in which she most frequently sang were (Sonnambula,* (Lucia

di Lammermoor/ (I1 Barbiere di Siviglia,* (Don Pasquale,* (La Traviata,* (Rigoletto,* (Don Giovanni,* (I1 Trovatore,* (I Puritani *and (Ernani.* She occasionally sang Wagnerian songs in concert. In November and December 1903 she made an American con¬ cert tour, which was a great financial success, and which showed that her vocal powers were

only slightly impaired. She married 1868 the Marquis of Caux, equerry to Napoleon III, left him in 1877, was divorced in 1885, and married in June 1886 the tenor Niccolini, after whose death, 18 Jan. 1898, she married in 1899 Baron Gederstrom, with whom she lives at Craig-y-Nos, in Wales.

PATTI DE MUNCK, Carlotta, Italian concert singer, sister of Adelina Patti (q.v.) : b. Florence, 1840; d. Paris, 27 June 1889. She was first trained as a pianist, but devoted her¬ self to vocal music, and in 1861 appeared in concert in New York; her lameness prevented her from staying on the operatic stage. She sang in London in 1863, made several tours in Europe and America, and 3 Sept. 1879 married Ernest de Munck, a violoncellist. Her execu¬ tion was excellent, and her voice a remarkably high and flexible soprano.

PATTI, Sicily, town in the province of Messina, on the north coast of the island, 42 miles by rail southwest of Messina. There is a cathedral dating from 1300, in which is the tomb of Adelasia, mother of Count Robert of . Sicily. There are sandstone quarries in the neighborhood and the town has a shipping trade in olive oil, flour and fish. Industries include silk mills and potteries. Pop. commune 10,535; town 5,604.

PATTISON, pat'i-son, Dorothy Wynd-low, best known as "Sister Dora,® English nurse: b. Haukswell, near Richmond, York¬ shire, 16 Jan. 1832; d. Walsall, Staffordshire, 24 Dec. 1878. She was a sister of Mark Pattison (q.v.). In 1864 she entered a Church of England Sisterhood of the Good Samaritan at Coatham, adopting the name of (<Sister Dora.® The next year she was sent as nurse to a cottage

hospital at Walsall. She at once en¬ deavored to render herself a good surgical nurse, and from 1867 to 1877 was in sole charge of a new hospital at Walsall, built in 1867. She resigned in February 1877, in order to take charge of the municipal epidemic hos¬ pital at Walsall. She shrank from no labors, however difficult or repulsive, and her natural qualifications as a nurse were reinforced by the skill she acquired in surgery. She was greatly beloved by the poorer classes among whom she labored, and in her memory a window was placed in the Walsall parish church and a statue of her erected in Walsall in October 1886. Consult Lonsdale, Margaret, 'Sister Dora) (1880); Ridsdale, Elen, (Sister Dora)

(1 880) .

PATTISON, James William, American painter and author: b. Boston, Mass.. 14 Tune 1844; d. 29 May 1915. He enlisted in the United States army in 1863 and rose to the rank of sergeant before his discharge in 1865. He re¬ ceived his art education under James M. Hart, R. S. Gifford and George Inness in New York' and under Albert Flamm in Diisseldorf, and Luigi Chialivia in Paris. He painted a wide number of subjects including figures, domestic animals, landscapes and marines. He exhibited at the Paris Salon in 1879—81 and for many years at the National Academy and American Water Color Society in New York and the Pennsylvania Academy of Fine Arts and the Art Institute of Chicago, as well as in other exhibitions throughout the United States. He received a medal at the Saint Louis Exposition

in 1904. He was director of the School of Fine Arts, Jacksonville, Ill., in 1884-96; and from 1896 was faculty lecturer on the collec¬ tions at the Art Institute of Chicago. He also edited the Fine Arts Journal. Chicago, from 1910. Author of Tainting in the Seventeenth and Eighteenth Centuries) (1901) ; (Painters Since Leonardo) (1904).

PATTISON, Mark, English scholar and clergyman: b. Hornby, Yorkshire, 10 Oct. 1813; d. Harrowgate, Yorkshire, 30 July 1884. He was educated at Oxford, and in 1839 became a Fellow of Lincoln College, Oxford. In 1843 he took priest's orders in the English Church and was appointed a tutor in Lincoln College the same year. He was at this time a follower of Newman, but presently drifted away from

Tractarianism and became in his later years an extremely liberal member of the Anglican com¬ munion. In 1861 he became rector of Lincoln College and engaged actively in the work of university reform, and under him his college developed its resources and came into promi¬ nence in the university. He was a most thorough scholar, but often caustic in speech and always impatient of anything like pretense. He spent considerable time in Germany in lit¬ erary research and was curator of the Bod¬ leian Library and the Taylor Institutions. He had in view for a long time the writing of a history of learning, but of this only fragments were written. To the famous book (Essays and Reviews) he contributed tendencies of Religious Thought in England 1688-1 750, > and he was the author of Suggestions on Aca¬ demical Organization > (1868) ; a 'Life of Isaac Casaubon1 (1875), his principal work; (Life of John Milton1 (1879), which has often been repnnted; 'Sermons1 (1885); 'Memoirs1 (188o), a somewhat morbid piece of autobiog¬ raphy extending only to 1860. Consult Morley, John, 'Critical Miscellanies1 (Vol. Ill, Lon¬ don 1892) ; Tollemache, 'Recollections of Pat-tison1 (1885).

PATTISON, Robert Emory, American politician: b. Quantico, Md., 8 Dec. 1850* d Philadelphia, Pa., 1 Aug. .1904. He was 'ad¬ mitted to the bar in 1872 but soon turned his attention to politics, and in 1 877 — 82 was citv comptroller of Philadelphia. Owing to a split in the Republicans, in 1882 he was elected gov¬ ernor of Pennsylvania, although his party was in the minority, and served four years when he resumed his law practice. He was oresident of the Chestnut Street National Bank of the States Pacific Railway Commission in 1887-90 and in 1891-95 again served as gover¬ nor of his State.

PATTISON, Robert Everett, American Baptist clergyman and educator : b. Benson Vt.

9 Aug. 1800; d. Saint Louis, Mo., 1874 ' He was graduated at Amherst College in 1830 was tutor in Columbian College, Washington, D. C„ for a year, 'and afterward was professor of mathematics at Waterville College, Maine He was ordained in 1833 and held charges at Salem Mass., and at Providence, R. I. In 1836-39 he was president of Waterville College and sub¬ sequently was pastor at Saint Louis, and at J rovidence. He was president of the Western BaPBst Theological Seminary at Covington, Ky m 1845-48; professor at the Theological Semi¬ nary at Newton, Mass., in 1848-54; and in

1854-57 was again president of Waterville Col¬ lege. He was afterward professor of theology at Shurtleff College, Alton, Ill., and at the Union Baptist Theological Seminary, Chicago. Author of Commentary on the Epistle to the Ephesians' (1859).

PATTISON, Thomas Harwood, American Baptist clergyman : b. Cornwall, England, 14 Dec. 1838; d. Rochester, N. Y., 13 Feb. 1904. He was graduated from Regent's Park Col¬ lege, England, in 1862, came to the United States, and last occupied the chair of homiletics and pastoral theology at the Rochester Theo¬ logical Seminary. He published (Present Day Lectures' (1872) ; (The History of the English Bible' (1894); (The Ministry of the Sunday School' (1902).

PATTON, Francis Landey, American edu¬ cator and theologian, 12th president of Princeton University: b. Warwick, Bermuda, 22 Jan. 1843. He was educated at Knox College, Toronto, the University of Toronto and at Princeton Theo¬ logical Seminary, where he was graduated in 1865. He was pastor of the 84th Street Church, New York, 1865-67, of the Nyack Presbyterian Church 1867-71, of the South Church, Brooklyn, 1871, and of the Jefferson Park Presbyterian Church, Chicago, 1874—81. While in Chicago he edited the Interior, a religious weekly; was professor of theology in the Presbyterian Theo¬ logical Seminary, and was prominent in the anti-heresy movement in the Presbyterian Church, being prosecutor of Prof. David Swing (q.v.). He was moderator of the Presby¬ terian General Assembly in 1878. In 1886 he was elected professor of ethics at Princeton College, having removed to Princeton in 1881 to occupy a chair in the Theological Seminary, endowed by Robert L. Stewart and styled "Re¬ lations of Philosophy and Science to the Chris¬ tian Religion." In 1888 he was chosen presi¬ dent of Princeton University, then called the College of New Jersey, but adopting the title of university in 1896. His admiration was marked by great growth in the wealth and num¬ bers of students of the university. In 1902 he resigned, and a few months later was elected president of Princeton Theological Seminary. In 1891-92 he was prominent in the opposition within the Presbyterian Church to the action of Union Theological Seminary in upholding Dr. Charles A Briggs (q.v.), who was accused of heresy. He has published (The Inspiration of the Scriptures' (1869) ; (Summary of Christian Doctrine' (1874), and many papers on philo¬ sophical and theological

subjects.

PATTON, Frank Jarvis, American soldier and inventor: b. Bath, Me., 1852; d. New York, 12 Nov. 1900 After graduation from West Point in 1877, he was assigned to the 21st Infantry, rose to the rank of 1st lieutenant in 1884, and resigned from the service in 1889. He experimented much with electricity, and was the inventor of the multiplex telegraph system. Among other devices of his was that. of the gyroscope, used to determine the position of vessels in mid-ocean.

PATTON, Jacob Harris, American his¬ torian: b. Fayette County, Pa., 20 May 1812, d 1903. He was graduated from Jefferson Col¬ lege, Pennsylvania, in 1839, and from Union Theological Seminary in 1846. He was tutor in Union Seminary in 1843-46, in Nashville

University 1840-43 and in the New \ork Classical School in 1846-87. Among his publi¬ cations are (A Concise History of the Ameri¬ can People' (1869-82) ; (Yorktown, 1781-1881' (1882); (Natural Resources of the United States' (1888) ; Political Parties in the United States' (1902).

PATTON, Pa., borough in Cambria County, 65 miles northeast of Pittsburgh, on the Penn¬ sylvania and New York Central railroads. It has agricultural, coal mining and coke interests and manufactures bricks and fire-clav products. Pop. 3,628.

PATUXENT, pa-tuks ent, a river of Mary¬ land, which rises in the north of the State about 20 miles east of the city of Frederick, flows southeast and then south and empties into Chesapeake Bay through a large estuary. It is 90 miles long, is navigable for almost 50 miles and contains oyster beds of great value.

PATZCUARO, patz'kwa-ro, Mexico, city in the state of Michoacan, 30 miles southeast of Morelia and a little southeast of the lake of the same name, on the shores of which was the city of Tzintzuntzan, the capital of the Tarascas and the centre of the great Michoacan Empire. The present city, 7,500 feet above sea-level, occupies much the same site. It is an old and picturesque town. It contains the tomb of Vasco de Quiroga, an early bishop of Michoa¬ can and missionary to the Indians, and is famed for the handiwork of the natives, notably feather picture work, cloaks and furniture. There are sugar, tobacco and mining industries centred there. Pop. about 8,000.

PAU, po, Paul, French general: b. Monteh-mar, 29 Nov. 1848. He was

graduated at the Mili¬ tary Academy at Saint Cyr in 1867, and. at the outbreak of the Franco-Prussian War in 1870 he was a lieutenant in the infantry. He was seriously wounded in August of that year, losing his right arm, but returned to duty when recovered and was promoted captain in 1871 and received the Cross of the Legion of Honor. He remained with the army, became general of brigade in 1897 and of division in 1903. In 1911 he was offered the post of chief of the general staff, but declined it He was commandant of the 16th Army corps at Montpellier and later of the 20th Army corps of Alsace, and was in charge of important operations in Alsace in the early months of the European War. He repre¬ sented France on diplomatic missions to Russia, Italy and the Balkans in .1915, and in 1918 headed the French economic mission to Aus¬ tralia. He was a member of the Council of War in the European War and ranks among the foremost of the French military leaders of his day.

PAU, France, capital of the department of Basses-Pyrenees, on a lofty ridge on the right bank of the Gave-de-Pau, here crossed by a fine bridge, 58 miles east-southeast of Bayonne, and commanding a magnificent view of the western Pyrenees. It has several squares, notably the Place Royale, with a finely planted promenade and a marble statue of Henry IV, and the Place-de-la-Comedie, communicating with a suburb by a bridge which spans a. deep ravine. The most conspicuous and interesting edifice is the castle in which Henry TV was born, crown¬ ing a lofty peak at the western extremity of the

town, and overhanging the Gave. It is a huge, angular and irregular structure, flanked with towers, of which five still remain, the highest (the Tour de Gaston-Phoebus) or dungeon having a height of 100 feet, and another, called the Tour de la Monnaie, being the traditional asylum which Margaret of Valois gave to Cal¬ vin and other

persecuted reformers. The greater part of the castle was restored in good taste by Louis Philippe. Pau has a Court of Appeal for the departments of Basses-Pyrenees, Hautes-Pyrenees and Landes; courts of the first resort and commerce; an academy, college, museum, library, a winter palace, since 1896, in Beaumont Park, agricultural society and society of science, literature and art. The manufac¬ tures of Pau consist of napkins, excellent table linen, rugs, carpets, paper and leather. The trade is in wine, Bayonne hams, salt provisions, excellent chestnuts, printed cottons, iron, marble and leather. Pau has produced two sovereigns, Henry IV and Bernadotte (Charles XIV of Sweden). It is a favorite resort of the English in winter, having a mild, dry climate, with no sudden variations of temperature. It is a con¬ venient starting-place for travelers desirous of exploring the Pyrenees. Pop. about 37,000.

PAUER, pow'er, Ernst, Austro-English mu¬ sician : b. Vienna, Austria, 21 Dec. 1826; d. 1905. He was educated in Vienna and Munich and was successful, both as a director of musical societies and in giving historical oiano recitals. He was director of musical societies in Mainz (1847-51), when he went to London, where he became professor in the Royal Academy of Music in 1859. Though holding positions and doing extensive musical work in England he still retained close relationships with the Con¬ tinent where he continued to give concerts and recitals to large and critical audiences. In 1866 he was appointed pianist at the Austrian court, and he lectured in England and Ireland on the history of music from 1870 until his retirement to his villa at Jugenheim near Darmstadt in 1896. He was appointed professor of the Na¬ tional Training School for Music at Kensington Gore in 1876; in 1878 was a member of the musical board at Cambridge and in 1879 was appointed examiner there. He edited the works of various great composers and among his operas are (Don Riegoˆ (1849) ; cDie Braut-schau Friedrichs des Grossen' (1861V Pauer maybe said to have introduced the English, as a people, to German music which he made im¬ mensely popular in London and, later on, throughout Great Britain. He also did much to popularize old English musical compositions. He published (The New Gradus ad Parnassum.'

PAUL, Saint. See Saint Paul.

PAUL I, Saint: d. Rome, 28 June 767. He was the successor of Stephen III. his brother, in 757. He was ably supported in his pontificate by Pepin I, king of the Franks, who assisted him in disputes with the Lombards and the Byzantine emperor, who still laid claims to the exarchate and the Pentapolis. Consult Mann, H. K., (Lives of the Popes) (Vol. I, Part II, London 1902).

PAUL II (Pietro Barbo, pe-a'tro bar'bo) : b. Venice, 26 Feb. 1418; d. Rome, 28 July 1471. He was a nephew of Pope Eugenius IV ; be¬ came a cardinal in 1440, and exercised a very

strong influence over Nicholas V and Calixtus III. He succeeded Pius II in 1464. His first endeavor was to form an alliance of the Chris¬ tian princes against the Turks, who at the time threatened to invade Italy, but in this he failed, not because his plans were not well formed and opportune, but because he was forced to oppose the claims to absolute power of Louis XI of France. He sought to stem the pagan tendencies of the Renaissance spirit, and took stringent measures against the heretical teach¬ ings of some of the Humanists of the time, even to closing the Roman Academy, which had be come a hotbed of opposition to the papal claims and the progress of Christianity. Paul II pro¬ mulgated very severe laws for the punishment of those scholars and others who taught pagan doctrine or practised pagan immorality. Con¬ sult Creighton, M., (History of the Papacy > (Vol. IV, New York 1913) ; Pastor, L., his¬ tory of the Popes) (Vol. Ill, London 1910).

PAUL III (Alessandro Farnese, a-les- san'dro far-na'se) : b. Canino, 29 Feb. 1468; d. Rome, 10 Nov. 1549. Educated in Rome under conditions which brought him into contact with the ruling class, he went to Florence where his family connections enabled him to enter into close relations with the Medici. He was made a cardinal in 1493 bv Alexander VI, and subse¬ quently became bishop of Ostia and the dean of the Sacred College, and twice represented the Pope, during his absence, as legate in Rome. He was elected to the papal chair in succession to Clement VII in 1534. He had previously urged the summoning of a council of the Church and after he became Pope called a council to meet at Mantua in 1536, at Vicenza in 1538 and at Mantua again in 1542. Disputes between Charles V and Francis I prevented the assembly of the council on each occasion, but in 1545 it met at Trent. (See Trent, Council of). He was a vigorous suppressor of heresy, re-restab- lished the Inquisition in Italy, approved the Order of Jesuits, condemned slavery in 1537, established a very strict censorship of books and excommunicated Henry VIII of England. He very greatly advanced the interests of the Catholic Church and did much to establish its stability. Yet he was very much of a politician and he looked after the welfare of his rela¬ tives and his natural children, one of whom, Pietro Luigi Farnese, he made Duke of Par-mia and Piacenza. He is remembered gratefully in Italy as a liberal and judicious patron of art; and numerous notable buildings are due to his initiative. Michelangelo was appointed by him chief architect of the

Vatican and also of Saint Peter's at Rome. Consult Pastor, L., '■History of the Popes' (Vol. VIII, London

1908).

PAUL IV (Giovanni Pietro Caraffa) : b. Naples,. 28 June 1476; d. Rome, 18 Aug. 1559. He became archbishop of Brindisi in 1518, founded the. order of secular clergy known as Theatines in 1524, was made cardinal in 1530 and in extreme old age (1555) succeeded Marcellus II. He nevertheless displayed a vigor in his pontifical office, which had not been looked for in one of his advanced age and previous studious habits. He established a cen¬ sorship, completed the organization of the Ro¬ man Inquisition, undertook the alleviation of the burdens of the poor and the more vigorous

administration of justice, and also 'banished his own nephews from Rome on account of their dissolute life. He joined with France in the war for the conquest of Naples (1555-57) and condemned the provisions of the Peace of Augs¬ burg. With a view to reforming undesirable conditions in the Church he-established the secular clergy called Theatines (q.v.) of which he was himself the first and very active supe¬ rior. When he became Pope he used all his influence to improve the morality of the lives of the clergy and of the public in general. He insisted on the restoration of church property in England; and on Queen Elizabeth's accession to the throne he declared her illegitimate and, therefore, not legally queen. He got into trouble with other rulers and at home he was very unpopular on account of 'his want of tact and his enforcement of his own construction of morality. Consult Van Ranke, Leopold, history of the Popes5 (London 1908).

PAUL V (Camillo Borghese, ka-mel'lo bor-ga/se) : b. Rome, 17 Sept. 1552; d. there, 28 Jan. 1621. In the earlier part of his career he was prominent as a theologian, and in 1596 he became a cardinal. He succeeded Leo XI in 1605. He was a vigorous, able administrator and among important incidents of his pontificate were a conflict with Venice which resisted him so stoutly that he excommunicated the Doge and Senate, the establishment of the Congrega¬ tion of the Oratory, and the orders of the Ursulines and the Visitation ; and great activity in mission work in heathen lands. The arts also flourished under his direction. Consult Trollope, T. A., (Life of Paul V5 (1861).

PAUL I, Petrovitch, tsar of Russia, son of Peter III and Catherine II: b. 1 Dec. 1754; d. 24 March 1801. His father refused to acknowl¬ edge his legitimacy, and his mother treated him with great severity so that his naturally good disposition became morose, sullen and fitful. He succeeded her, in spite of her plans to ex¬ clude him from the throne, in 1796; removed all her favorites and punished his father's murderers. He released Kosciusko and other captive Poles, re-established the rule of male succession to the throne and bitterly opposed everything French, even suppressing pamphlets which approached Jacobin sentiments merely in containing such words as "citizen1* and "so¬ ciety.® After the French invasion of Egypt he formed an alliance with England against the republic, sending armies to Holland, Switzerland (under Khorsakoff) and Italy (un¬ der Suvaroff). The defeat of the second army followed close on the heels of the great vic¬ tory of the third. Suvaroff barely escaped, and Paul, won by Napoleon's artfulness and out of humor with his English allies, who refused to surrender to him the island of Malta, to which he held title through Louis XVIII, his royal guest, now broke with the English, joined Napoleon most heartily, dismissed Louis from Russia and formed with Sweden, Denmark and Prussia the armed neutrality, which was cal¬ culated to ruin England. But his despotism at home, his demands that everybody prostrate himself before him, and the rumor that he in¬ tended to disinherit his son Alexander, roused a plot against him, to which Alexander was privy. Paul wras to be forced to abdicate and Alexander would then become regent. But

when the conspirators broke into his room and bade him sign his abdication, he refused, at¬ tempted to make his escape and was killed, probably being strangled with a sash cord. Paul seems to have begun his reign with in¬ tention to govern well ; but his determination to rule as arbitrary monarch soon forced him into oppressive despotism which depressed the intellectual, spiritual and military life of the

nation. Suspicious beyond all his royal pred¬ ecessors, Paul I developed a spy system more extensive, far-reaching and effective than any¬ thing in the same line heretofore known among the Christian nations. This was followed up by the quick, certain and relentless punishment of those found guilty of disloyalty, or even sus¬ pected of it. Thousands of innocent victims were sacrificed to the inordinate fear of treach¬ ery which possessed the monarch. Yet there are numerous evidences that Paul I took his kingly office seriously. He permitted the peasants, for the first time in history, to take the oath of allegiance to the throne, thus giv¬ ing them a sort of legal recognition. He fol¬ lowed this up by prohibiting, in 1797, the lords from working their serfs on holidays, or more than three days a week, and the following year another decree made it illegal to sell peasants without lands in Little Russia. Paul I also separated the estates and income of the im¬ perial family from those of the state; and he established the rule of succession to the throne whereby it should pass from father to sou, and in case there were no son, to the eldest surviving brother. Consult Bienemann, (Aus den tagen Kaiser Pauls' (1886) ; Schiemann, (Die Ermordung Pauls und die Thronbesteigung Nikolaus P (1902) ; Waliszewski, K., (Paul P (London 1913).

PAUL, Charles Kegan, English publisher and author: b. White Lackington, Somerset, 8 March 1828; d. London, 19 July 1902. He was educated at Oxford, took orders in the Church of England, was made curate of Great Tew (1851) and Bloxham (1852), and after 10 years of teaching at Eton became vicar of Sturmin-ster, Dorsetshire. His views gradually devel¬ oped a positive character, and he, therefore, withdrew from his living and became reader for the publishing-house of H. S. King, to whose business he later succeeded. His firm published many important works and the Nine¬ teenth Century Review. In consequence of financial troubles the concern was transformed into a limited company, of which Paul was rqanager until his retirement in 1899. Toward the close of his life he entered the Roman Catholic communion. Among his works are William Godwin) ; biographical Sketches5 ; (Faith and Unfaith5; (Memories5 ; bet¬ ters of Mary Woolstonecraft5 ; biographical Sketches5; (Marie Drummond.5

PAUL, John. See Webb, Charles Henry.

PAUL, Lewis, English inventor: d. Brook Green, Kensington, April 1759. In 1738 he ob¬ tained a patent for a cotton and wool spinning machine, this patent comprising an invention now in use in most of the world's cotton-mills. This invention consists of two pairs of rollers, one of which revolves at a velocity greater than that of the other.

Factories were established to make use of his patent in Birmingham and Northampton. His invention never brought

Paul substantial returns, and was commercially successful only when later improved by Ark¬ wright. Among his other inventions are those of a carding-machine (1748) and another spin¬ ning-machine (1758). Paul was a correspond¬ ent of Dr. Johnson.

PAUL CLIFFORD, a novel by Bulwer, published in 1830. It derives its name from that of its hero, and the author's purpose in writing it was to appeal for an amelioration of the British penal legislation, by illustrating to what criminal extremes the ungraded severity of the laws was driving men who by nature were up¬ right and honest.

PAUL OF THE CROSS, Saint, Italian re¬ ligionist, founder of the Order of Passionists: b. (Paolo Francesco Danei) Ovada, near Genoa, 1694; d. Rome, 18 Oct. 1775. With a few associates he led a life of religious retire¬ ment on Mount Argentaro (Orbitelloj, where it was divinely revealed to him that he was to be the founder of an order, and even the habit was shown. The bishop of Alessandria per¬ mitted Paul to assume this habit, and, as a lay¬ man, to preach repentance. In 1727 he was or¬ dained priest, and in 1737 established on Mount Argentaro the first Passionist settlement. Bene¬ dict XIV formerly approved the order in 1741. Paul was canonized in 1867 ; his day is 16 November.

PAUL-DUBOIS, pol dou'bwa, Louis Frangois Alphonse, French economist: b. Paris, 1868. He received his education at the Lycee Louis-le-Grand, studied law and was appointed referee at the audit office. His published works are (Les chemins de fer aux Etats-Unis) (1896) ; (Les finances communales) (1898), which won him the Fancher Prize from the Academy of Moral and Political Sciences;

(Frederic le Grand d'apres sa correspondance politique-1 (1902), which was awarded the Montyon Prize by the French Academy; (L'Irlande contemporaine et la question irlandaise) (1907; English translation under the title Con¬ temporary Ireland,1 1908).

PAUL PRY, a comedy by John Poole, pub¬ lished in England in 1825 and often attributed to Douglas Jerrold. The character from which the play takes its name is that of a meddlesome mischief-maker drawn from one Thomas Hill, a journalist.

PAUL OF SAMOSATA, a heresiarch of the 3d century. He became patriarch of An¬ tioch in 260, and acquired great wealth. He caused the hymns of the Church to be abolished and others sung in praise of himself, and sur¬ rounded himself with a number of 3'oung and beautiful women. In defiance of the ecclesiasti¬ cal canons he held the office of ducenarius, a sort of procuratorship under the emperor. He was a friend of Zenobia, queen of Palmyra, an admirer of his eloquence. He taught that there was only one God, who is the Father; that the Word or Wisdom of God was not a substance or person, but was in the divine mind as reason in men ; that Christ was a mere man who ac¬ quired this Word or Wisdom of God, becoming by it both God and the Son of God, though both in an improper sense, and gradually ac¬ quiring his knowledge and virtues. His opin¬ ions were condemned in a council held about 264. Failing, however, to retract them he was

deposed at the Council of Antioch in 269. He passed the latter years of his life in obscurity. Consult Harnack, Adolf, (History of Doctrine1 (translated into English by Neil Buchanon, Boston 1898).

PAUL OF THEBES, Saint, early Chris¬ tian hermit : b. Thebes, Upper Egypt, 228 a.d. ; d. 340. He is the first well-known Christian hermit, as distinguished from the still earlier ascetics, of whom very little is known. Saint Jerome credits him with being the founder of monasticism. In 250 a.d., during the Decian persecution, he retired to a desert cave, and there lived until his death, a near-by spring and palm supplying him with food, clothing and shade. In later years ravens are said to have ministered to him, as to Elijah. He re¬ ceived in his seclusion Saint Anthony, whom he trained to became his successor in the es¬ tablishment of the hermit life. Jerome wrote his life, and rejected as incredible many of the fabulous tales told regarding him, which could scarcely have been more remarkable than those still narrated. His day in the Roman Catholic Church is 15 January. Consult his life by Joseph Bidez.

PAUL OF VENICE, or BROTHER PAUL (Fra Paolo). See Sarpi, Paolo.

PAUL VERONESE. See Veronese, Paolo.

PAUL ET VIRGINIE (Paul and Vir¬ ginia), the novel which made Bernardin de Saint Pierre famous and has caused many tears to flow since its publication in 1787, is the romance of two children of same age brought up according to nature by their families living in the tropical lie de France (Mauritius). Their childhood affection, grown later into love, is further intensified during a separation caused by Virginie' s trip to France; and after she perishes in the wreck of the ship which was bringing her back to the island and to Paul, he soon dies of a broken heart. This little work is the symbol of the ideals of a peaceful Utopia which the author had vainly tried to realize during his wanderings in early life. Friend and disciple of Rousseau, he was greatly influenced by the latter's ideas and even by his style. In (Paul et Virginie1 are found many imitations of <La Nouvelle Helo'ise,1 and Ber¬ nardin de Saint Pierre continues Rousseau's philosophy in contrasting natural goodness and social corruption. The novel, hardly more than a sketch, has little plot and is lacking in power of analysis or character study; it is besides en¬ cumbered with many sentimental dissertations on nature, the simple life, virtue, love, misfor¬ tune, death, *etc.* Withal it has a charm of its own which comes from a touching picture of childhood life with its joys and its sorrows, expressed in a style full of local color. De¬ scriptions of nature in the tropics with its luxurious vegetation, brilliantly colored birds, perfume-laden flowers and strange harmonies, contributed largely to the success of the book and reveal the author as a master painter, the first "artist11 writer in French literature. Be¬ cause of his influence on Chateaubriand and Lamartine, Bernardin de Saint Pierre is con¬ sidered as one of the precursors of Romanti¬ cism.

Louis A. Loiseaux.

PAULANITES

PAULICIANS

PAULANITES. See Orders, Religious.

PAULDING, pal'ding, Hiram, American naval officer: b. New York, 11 Dec. 1797 ; d. Huntington, N. Y., 20 Oct. 1878. He entered the navy in 1811, distinguished himself in the War of 1812, particularly at the battle of Lake Champlain. After the war he served on the Constellation of Decatur's squadron against the Barbary powers; in 1822-23 he was 1st lieu¬ tenant of the Sea Gull, said to be the first steam-vessel used in war, in an expedition by Porter against West Indian pirates; and he was made captain in 1844, after which he cruised for three years (1844—47) in the sloop Vincennes in East Indian waters. He commanded at the Washing¬ ton navy yard in 1851-54, and in 1854-57 was in command of the home squadron. In Decem¬ ber 1857 he arrested William Walker (q.v.), the filibuster, at Greytown, Nicaragua. He acted without instructions, and his conduct in apprehending Walker on foreign soil was not approved by President Buchanan, who relieved him of his command. The republic of Nica¬ ragua, however, presented to him a sword, and offered also a large tract of land, which the United States government did not allow him to accept. On the outbreak cA the Civil War he was called by Lincoln to Washington to assist Secretary Welles in putting the navy in trim; and in April 1861 he destroyed the navy yard at Norfolk, Va., to prevent its valuable stores from falling into the possession of the Con¬ federates. He was technically retired in 1861 on the age limit; but in 1862-66 was com¬ mandant at the New York navy yard; in 1866-69 governor of the naval asylum at Philadel¬ phia, and in 1870-71 port-admiral at Boston. He was promoted rear-admiral on the retired list in 1862. He wrote (Journal of a Cruise Among the Islands of the Pacific1 (1831). Con¬ sult Meade, R. P., (Life of Hiram Paulding1 (New York 1910).

PAULDING, James Kirke, American au¬ thor: b. Nine Partners, Dutchess County, N. Y., 22 Aug. 1779; d. Hyde Park, N. Y., 6 April 1860. At 19 he went to New York, the home of his brother William, and of William Irving, who had married Paulding's sister and who was the means of his acquaintance with Washing¬ ton Irving. In 1807 the two Irvings and Pauld¬ ing brought out the first copy of Salmagundi, a satiric literary periodical, which met with im¬ mediate success, but was discontinued at the end of a year, when the publisher refused to pay the authors. Paulding was not, however, dependent on his writings for support as he held a public office in New York City. In 1812 he gained fresh praise by a spirited national satire, (The Diverting History of John Bull and Brother Jonathan,1 which allegorizes the difficulties between Great Britain and the United States. The same theme was cleverly treated in prose in a pamphlet called (The United States and England,1 which brought him the post

of secretary to the board of navy commissioners. Much of his time and energy were spent in writing editorials for the New York Evening Post and in other political hackwork, and many of his literary ventures during this time were of little value and had small success. This is notably true of <The Backwoodsman1 (1818) an epic of pioneer life, and of a new seiies of Salmagundi (1819). But in the lighter vein of

humor and fiction he was more at home ;

(Koningsmarke,1 a story of the early Swedish settlers (1823), (John Bull in America, or the New Munchausen1 (1824), (The Merry Tales of the Three Wise Men of Gotham1 (1826), a (Chronicle of the City of Gotham1 (1830), and the ■ very successful story, (The Dutch¬ man's Fireside,1 are the best of his works. From 1825 to 1837 he was navy agent at the port of New York, and in the latter year be¬ came Secretary of the Navy, in which position he stubbornly opposed the introduction of steam-driven vessels into the navy. He retired in 1841, published a Revolutionary novel called (The Old Continental1 (1846), (American Com¬ edies1 (with his son, William Irving Paulding, 1847), and (The Puritan and His Daughter1 (1849), another historical novel. His verse was mediocre, the tongue-twisting lines beginning ((Peter Piper picked a peck of pickled peppers,11 which appeared in J Koningsmarke,1 being his surest claim to poetic fame. As a politician he was very conservative; his (View of Slavery in the United States1 defends the institution. His true literary strength lay in his fund of original humor. His selected works (1867-68) and his (Literary Life1 (1867) were edited by his son, William Irving Paulding.

PAULDING, John, American soldier: b. New York, 1758; d. Staatsburg, N. Y., 18 Feb. 1818. He enlisted in the Federal army at the outbreak of the American Revolution, served through the war and was three times taken prisoner. His fame rests upon his being one of the captors of Major Andre, for which serv¬ ice to the American cause he received a silver medal from Congress and a pension of $200. A monument was erected over his. remains at Peekskill, N. Y., in 1827 by the city of New York, and the monument erected at Tarrytown, N. Y., on the spot of the famous capture. has the figures of Paulding and his companions reproduced in the act of searching Andre for the secreted papers.

PAULICIANS, pa-lish'anz, Manichseans and Gnostics who in the 8th century assumed the name of Paulicians, from Paul of Samosata, bishop of Antioch, their leader, to save them¬ selves from persecutions, according to one view of their origin. Recent

investigation, however, would seem to show that the Paulicians had an independent origin. As iconoclasts they were favored or persecuted by the Greek em¬ perors according as the latter were favorable or otherwise to the worship of the images, which the Manichseans totally rejected. In the 9th century they were subjected to violent per¬ secution. Many of them were put to death; others fled to Mohammedan countries. When the Crusaders had opened a way to the middle of Europe, companies of this sect passed as pilgrims from the Holy Land up the Danube, and entered Italy with the Levant trade through Venice. The Vaudois and Albigeois sects (Waldenses and Albigenses) are said to have sprung from this stock. Such is the account given of them by Photius and Petrus Siculus, but a different view has been taken by modern ecclesiastical historians. According to these writers the sect was founded by one Constan¬ tine of Mananalis, who conceived so great a veneration for the Apostleˆ of the. Gentiles that he assumed his name. They rejected the

adoration of the Virgin and the saints, and refused homage to the cross; they denied the validity of the sacraments, interpreting spirit¬ ually baptism and the Lord's Supper; would not recognize any priestly dignity; and their public worship was altogether free from ritual. In the 9th century under Baanes, the Paulicians became very active and this led to the persecution already noticed. A remnant of this sect is said by a modern Greek historian to have survived at Philippopolis to the beginning of the 19th century, and many still existed in Armenia at this latter date. See Religious Sects. Consult Adeney, W. F., (Greek and Eastern Churches > (New York 1908) ; Conybeare, F. C., (The Key of TrutfP (the book of the Paulicians, Oxford 1898) ; Gibbon, Ed¬ ward, (Decline and Fall of the Roman Empire* (Vol. VI, London 1912) ; Lynch, H. F. B., (Armenia } (London 1901); Newman, A. H., (Manual of Church History) (Philadelphia

1900).

PAULINE EPISTLES, the name by which 13 books of the New Testament are commonly known, namely, Romans, 1 and 2 Corinthians, Galatians, Ephesians, Philippians, Colossians, 1 and 2 Thessalonians, 1 and 2 Timothy, Titus and Philemon. A 14th book, the Epistle to the Hebrews, has been widely regarded as from Paul's pen, but the marked variance in form, style, manner of reasoning and type of thought from the epistles generally recognized as his, has caused this epistle, which neither claims Paul as author nor was attributed to him by the earlier Fathers, to be at the present time all but unanimously regarded as non-Pauline.

Of the four first named of these 13 epistles, Paul's authorship has never been doubted by any sober criticism. The attempt of van Manen and a few other critics to revive the view of Bruno Bauer, that no writings at all of the Apostle have been preserved, have had no in¬ fluence on the general opinion of scholars. The claim that there are decided inconsistencies in these letters is dismissed with practical unan¬ imity as Hiypercriticism,** and it is recognized that in no period of the history of the Church before 125, soon after which the epistles appear to have been widely accepted, would the four chief epistles fit as they fit into the circum¬ stances of the apostolic age, so far as they can be known, as, for instance, the Judaistic con¬ troversy among the Galatian churches. But, to leave out of account the later unanimous tradi¬ tion of the Christian Church touching the Pauline epistles, before the close of the 1st century the Jetter of Clement of Rome to the church at Corinth decisively attested Paul's authorship of First Corinthians, and the like¬ ness which runs through the four great epistles makes testimony to one to be indirectly testi¬ mony to all. It would, indeed, be incredible that any writer of the 2d century, especially a Chris¬ tian chiefly intent on foisting on the Church at large under the name of Paul his own doctrinal views, could have conceived and depicted with such consistency and vividness such a nature as that of Paul, — fervid, profound, impetuous, self-mastered, tender, strong, a personality so rich in so many elements of character.

If the four chief letters are accepted as Pauline, because certified to by unanimous tra¬ dition, undisputed by sound criticism and suf¬

ficiently self-evidencing, it will follow for sim¬ ilar convincing reasons that First Thessalonians, Philippians and Philemon should also be ac¬ cepted, as, indeed, they are to-day by the great majority of unbiased critics. On careful con¬ sideration Second Thessalonians will commend itself as Pauline alongside the First Epistle, which in style it

strongly resembles, but not so closely as to necessitate the hypothesis of copy¬ ing, while the difference between the two epis¬ tles in the presentation of the eschatological teaching would be unnatural, if another were writing under the name of Paul. In spite of an unlikeness in style to the epistles already dis¬ cussed, the Pauline authorship of Colossians has found steadily increasing favor among critics, so that it is now quite generally accepted, espe¬ cially in view of the facts that the historical notices seem too natural to have been fabricated, and-that the errors against which it was directed prevailed in that form only early. If Colossians can be accepted as Paul's own, no reason re¬ mains for doubting his authorship of Ephesians, for the unlikeness in style to his earlier writings is no greater than was the case with its sister epistle, and the great likeness of Ephesians to Colossians, which has been used in argument against the genuineness of the former, is no more than might easily have resulted when two letters were written practically simultaneously. As touching 10 of the epistles then the tradi¬ tion of the Church has after long and keen de¬ bate been verified by the verdict of critical scholars, in most cases with practical unanimity, in the remaining cases by a decisive majority.

With the ((Pastoral Epistles, » so-called, First and Second Timothy and Titus, the case stands otherwise and is still open. The traditional and patristic attestation is as strong for these epis¬ tles as for the rest, for the rejection of them by the heretic Marcion should be explained as due to his hostility toward their teachings. The argument against accepting them is threefold: first, that no place can be found for them in the life of Paul so far as it is known to us from Acts ; second, that the style both in use of words and in general tone is decidedly unPauline, and, third, that they presuppose conditions ecclesias¬ tical and doctrinal which could not have existed in the Church till the 2d century. In answer to the first it should be said that, if Paul was released from his first imprisonment, there was opportunity for the composition of these let¬ ters and for all that carries with it, and that history and tradition are quite as consistent with release as with a fatal issue of his case. As to the second class of arguments it must be recog¬ nized that we do meet language and a literary tone in some degree new, although but a brief interval between their appearance and that of preceding letters could have elapsed, but this might be due to any of several things, the use of a literary assistant, for example, who some¬ what modified the Apostle's own style, and the existence of such circumstances can no more be positively denied than asserted. As to the third, it ought to be noted that there exist no stand¬ ards by which to measure the rapidity of de¬ velopment in the life and organization of the primitive churches; and further, that the ecclesi¬

astical constitution of the churches, the heretical views which seem later to have merged into Gnosticism and the hostile relation of the

Roman government, all seem less developed than we should expect to find them even as early as the year 100, much later than which those who doubt the Pauline authorship usually date their composition. Perhaps no positive answer can now be given to the problem as to the genuine¬ ness of the Pastoral Epistles, although there is a growing agreement that the historical notices which they contain are largely genuine, a fact which additionally complicates the problem. While the attempts to remove all the difficulties which surround these letters have not yet been fully successful, it seems on the other hand im¬ possible to disprove their Pauline authorship.

In the following survey of the several epis¬ tles and their various occasions and characters, no attempt has been made to date them abso¬ lutely, but only relatively by placing them in connection with other parts of Paul's work as a missionary. (For an approximation to the ab¬ solute dating see article New Testament Chro¬ nology).

What has usually been regarded as the earliest of Paul's extant writings is the First Epistle to the Thessalonians, but naturally it does not follow that he had never written such letters before, any more than that all which he wrote afterward have been preserved. On his second great missionary tour, after a short work at Philippi, his first work in Europe, Paul next preached at Thessalonica, now Salomki, then the capital of one of the four divisions of Mace¬ donia, and a busy and important city. Here for three weeks he preached in the synagogue, and then elsewhere to the Gentiles for we know not how long, possibly for months. But after a time the hostility of the Jews succeeded in driv¬ ing Paul and his companions out of the city, and passing through Berea he went on to Ath¬ ens, from which place

Timothy was sent back to Thessalonica, not to rejoin the Apostle until after he was established at Corinth. His news was such that Paul at once wrote to the church touching three points : after expressions ot glad¬ ness at their faith steadfast amid persecution, he assured them, in reference to calumnious ac¬ cusations of which the rumor had been brought to him, that he really was still profoundly in¬ terested in them, and had repeatedly endeavored to revisit them ; he warned them against heathen vices, and also against idleness and pauperism, and finally, he instructed them about the resur-Section of the believing dead at the return of Jesus which they were to expect. A second letter to the same church soon followed the first by which in some sense it was occasioned. It seems that the stress laid upon the expected return of Jesus had led some to regard it as imminent, and to correct this misunderstanding of his views Paul wrote again in much the tone and even the language of the first, but adding the corrective teaching that much must happen

before Christ comes… , . , .

Because of the very uncertainties which at¬ tach to it the Epistle to the Galatians may best be discussed next. The destination the place of writing and the date of this epistle are all un¬ certain and strongly disputed Those to whom it was addressed were formerly looked for with practical unanimity in the northern part of the Province of Galatia, but of late many scholars have located the Galatian churches in the south¬ ern part of the province, in the cities of Pisidian Antioch, Iconium, Derbe, Lystra and their vol. 21 — 27

neighbors. Certainly on this theory the Epistle gains greatly in vividness. The date and P*clce of writing go together, and hang somewhat on the answer to the question of destination. 11 the Galatians of the letter are to be found in northern Galatia, then it is all uncertain when and where the letter was written, after the ihes-salonian Epistles or before the Caesarean im¬ prisonment. On the South Galatian theory, it might even have preceded First and Second Thessalonians though probably not, and must have been written before Paul left Antioch for the last time, on his third tour. But whatever the uncertainties which thus surround the let¬ ter, when we take it up to read all is distinct. The Galatian churches had been approached by teachers who insisted that Christianity was in¬ complete and salvation impossible if keeping the law of Moses was not added to that simple faith in the crucified Christ which had been the converting message of Paul. To meet this condition he wrote with the

utmost aidoi ˆnd force, urging first that the message which he had presented jnust be adhered to because it had come to him by revelation and hence was finally authoritative, and then, not to rest in authority alone, that this view was the only one which was consistent with the facts of Judaism ltsell and with Christian experience; finally he sets forth the power of Christianity to secure a good life, the indwelling Spirit of God. While in his surprise and distress at the threatened apostasy of his converts Paul is much less considerate of form and phrases of address than is his wont, partly as a result the epistle is one of unsur¬ passed intensity, vividness and force.

After a stay of 18 months in Corinth where the Thessalonian letters were written, Paul left the church which he had founded there, and, having visited Jersualem and Antioch, estab¬ lished himself at Ephesus for a three years ministry in that city. During the latter part 9* this time disquieting rumors, reached him in various ways as to the condition of the Corin¬ thian Church. It was rent into factions ; it was tolerating gross immorality; the meetings tor worship were disorderly, and even the Lord s Supper was a scene of confusion; more than one question had come to be of such practical importance that the church consulted the Apostle about it by letter, and, finally, reiterated in¬ struction on the topic of the resurrection had become indispensable. Out of this situation grew the First Epistle to the Corinthians with its wealth of practical directions, warnings, in¬ structions and exhortations beyond all r aul s

other writings. .

To the first letter to the Corinthians he was later obliged to add a second. While much ot the purpose of First Corinthians seems to have been gained by it, at the same time disaffection against Paul and keen hostility to him appear to have even increased in some quarters so greatly that until this sentiment could be changed it seemed best not to revisit Corinth himse . He had sent both Timothy and Titus on special missions, and in his anxiety himself removed from Ephesus to Macedonia in order to know soonest and surest the condition of the church and their attitude toward himself, his anxiety being rendered keener from the nature of a let¬ ter which he had sent, which it had cost him pain to write and which might have been too severe in tone for his purpose, a letter which

can scarcely have been our First Corinthians, and must be lost, unless the acute but unverifiable suggestion of several critics is correct, and Second Corinthians (x-xiii) constitutes the ker¬ nel of the supposedly lost letter. In the state of mind natural to any ardent and affectionate nature in the face of intense and unscrupulous hostility Paul wrote the most personal of all his letters, a letter largely autobiographic in char¬ acter, by turns tender and severe, pleading and sarcastic, though these qualities are most strik¬ ingly present in the second part of the letter, which, as has just been said, some would sep¬ arate from the rest. In marked contrast to the Fi rst Corinthian Epistle, the great value of which lies in its practical instructions, the in¬ terest of the Second lies mainly in the revela¬ tions which Paul makes as to his history and sentiments and relations to friend and foe. The effect of the Epistle must have been salutary if not, indeed, completely satisfactory, for the letter to the Romans proves that he was soon after present in Corinth.

The Epistle to the Romans, the longest and apparently the most carefully prepared of all his epistles, was addressed to a church which he had not planted and which he had never visited. Naturally it must be more general in character than the rest, for there was nothing in the oc¬ casion of it which would limit its purport and scope. Having now completed the work which had pressed upon him in the Eastern world, having established Christianity in the great cen¬ tres of Syrian Antioch, Pisidian Antioch, Ephe¬ sus and Corinth, beside many less important places like Philippi and Thessalonica, the Apos¬ tle's eye now turned westward and his thought fixed itself next on Rome, the capital of the world, whither everything in the empire tended, whence influence radiated to every part of the empire. While of course the fact that Christian work was effective at Rome would not ensure that it would reach the upper classes elsewhere, yet the fact would immensely increase its in¬ fluence in the classes that might be touched. We have no historical basis as to when or how Christianity was planted at Rome ; we only know that it was in existence and that in the constant ebb and flow of migration the faith of its mem¬ bers was widely and favorably known. While to many there Paul with his

wide acquaintance would naturally be personally known, a sup¬ position with which the number of his greetings at. the end of the Epistle is in perfect harmony, yet to more he must have been still unknown, and doubtless not a few would by the persistent misrepresentations of his enemies have been brought into a temper of hesitancy and suspicion about him. Because he hoped soon to visit Rome, and because at the same time his pro¬ jected journey to Jerusalem would certainly de¬ lay the visit, how much he could not and did not foresee, he wrote a letter which might pre¬ pare the way for his later ministry with the church at Rome. With a dignity and thorough¬ ness worthy of the occasion, Paul proceeded to write his answer to the three great questions then dominating theological controversy: How can a man secure God's forgiveness and favor? What will be the life of a forgiven believer? How does this gospel of a grace that comes in¬ discriminately to Jew and Gentile on the sole condition of faith fit with the ancient promises to Israel, and how explain the failure of the

Jews to accept this gospel of Christ? Accom¬ panying his answer to these questions with statements which involve his conclusions on al¬ most every doctrinal point, the letter continues beyond the theological discussion to furnish a rapid summary of the duties of the Christian life with more stress than he elsewhere laid on the duties of the citizen toward those in public authority.

As perhaps the next letter after those to the Corinthians was written at Corinth, so after the letter to the Romans the next letters were writ¬ ten from Rome. There are four letters which were penned while Paul was living a prisoner in his own hired house in Rome, and three of the four, those to the Ephesians, to the Colossians and to Philemon constitute the most closely related group among the Pauline epistles. The only clue as to whether Philippians pre¬ ceded the others of this group in time or fol¬ lowed them is found in Paul's expressions of feeling as to whether he might expect release as the result of his appeal to Caesar. These statements are, however, too uncertain to justify positive conclusions as to the order of the four epistles. In character the Epistle to the Philip¬ pians is the least doctrinal in substance and the most affectionate in tone of all Paul's letters. Such doctrinal teaching as is found in this epistle is enwrapped in the incidental declara¬ tions of the Apostle or in his abrupt and stern denunciations of certain unnamed errorists against whom he warns

the Philippians. Their false doctrine seems to have been at least re¬ motely akin to that of the Judaizers whom he had combated in the Epistles to the Galatians and the Romans, possibly still more closely to that of the nameless faction condemned in Sec¬ ond Corinthians. The occasion of this letter was gratitude for the •once more repeated gifts of the Philippian Christians toward his sup¬ port, and its tone throughout is that of joy. Even when he speaks of his own privations, his expressions are in harmony with his injunction, <(Rejoice in the Lord alway; again I will say, rejoice.®

The Epistle to the Colossians is apparently, like that to the Romans, addressed to a church which Paul did not found and had never vis¬ ited, though its existence was probably due to the radiating influence of his long work at Ephesus, the metropolis of western Asia Minor. Epaphras, presumably the founder of the Colossian church, had visited Paul in his Roman im¬ prisonment, and we may well suppose that it was from him that Paul had learned the effect on Christian faith and life which the teaching of certain errorists was having. It is hard from the statements of the Epistle to deduce with certainty the exact nature of the views com¬ bated, but the errors seems to have been both speculative and practical. While on the one hand they involved an asceticism in closest har¬ mony with the practices of the Jewish Essenes, on the speculative side they anticipated to some extent the developments of later Gnosticism. To meet this false philosophy a true conception of the place of Christ and of his relation to the universe was needed; so the dominant note of the Epistle is the sole and supreme greatness of Christ, who by His unity alike with God and men obviates the necessity of angelic mediators and even precludes the possibility of their ac¬ tivity. This conception consistently carried out

cuts the ground from under false asceticism and every form of mere legalism, and no less re¬ quires and ensures the highest type of personal and social morality.

The sister epistle, to the Ephesians, includes a surprising number of the same thoughts and words, but they are used with a complete lack

of all apparent imitation to bring out a wholly different general idea. While here, too, Christ is exalted, the main thought is the oneness of all Christians, that the work of Christ' results in the removal of all barriers that separate men, notably of the hedge of the Mosaic law which had divided Jews and Gentiles. It has been plausibly held by many that the destination of this letter was a wider circle of readers than the single church at Ephesus, it being a circular letter to all the churches in the region, of which circle the churches at Ephesus and Laodicea would be positively known to us. On the one hand we know from Colossians that a letter was simultaneously dispatched to the Laodi-ceans ; on the other, doubt is cast on the present address, (<in Ephesus, » by a little but weighty evidence for its omission. Further that no per¬ sonal salutations are added is somewhat sur¬ prising when we remember how long Paul had worked at Ephesus, but natural if the letter was equally intended for other churches, and the conception of Christian unity which dominates the Epistle is admirably fitted to be the theme of a circular letter. This hypothesis, while not to be regarded as already proved, if, indeed, ever provable, seems well to suit the conditions of the case, and in some respects the Epistle gains in significance when thus regarded.

Another epistle, certainly dispatched with that to the Colossians, is the letter to Philemon, who was, as we infer, a well-to-do Christian residing at Colossae. One of his slaves, Onesimus by name, had run away, stealing as he left, and in far away Rome had come under the in¬ fluence of the same Paul under whose influence his master, Philemon, had earlier been con¬ verted. Paul had found the fugitive slave, now a changed man, to be very useful for service to himself, but unselfishly sent him home with a letter intended and admirably adapted to secure pardon and favor from his master, who is even bidden to treat him as a loved brother. This brief letter is not only a delightful bit of self¬ revelation on the part of Paul, but was ar¬ ranged with consummate tact to secure its pur¬ pose.

The three epistles, two to Timothy and one to Titus, usually called from the subjects which they chiefly treat the Pastoral Epistles, agree very closely in style, in matter, in the ec¬ clesiastical conditions pictured, and, finally, in the fact that their composition must, in the prac¬ tically unanimous judgment of scholars, stand outside the life of Paul as presented in Acts. If not genuine, their occasion and purpose and the time and place of their composition must remain a matter of unsupported conjecture. If they are authentic works of the Apostle, Paul must have been released from his first impris¬ onment at Rome, and have traveled widely in the further course of his missionary work, al¬ though no record of it is preserved outside these letters. During

this period of his life he must have made the visit to Spain, which he purposed when he wrote to the Romans, and of which some tradition remained in the churches;

he made a tour in Crete; he again visited Miletus, if not Ephesus as well; he found his way to Troas and Corinth and we know not how many other such cities, and he expected to spend a winter in Nicopolis. Probably before he reached Nicopolis he was arrested, taken again to Rome, had a preliminary hearing of his case, and with the expectation of a dreary winter in a chill dungeon he wrote to his be¬ loved Timothy to come if possible before win¬ ter and to bring with him a cloak and some parchments which had been left at Troas. From uncertain points on this route from Rome to Rome again letters had been dispatched to Timothy at Ephesus and Titus in Crete, per¬ haps the former from Macedonia, the latter from Corinth. These letters agree closely: in each Paul gives to the man addressed a certificate of appointment and authority, really intended to influence the churches over whom each was set and quite likely useful, not to say necessary, for that purpose; gives directions as to church life and administration ; gives serious warnings against a type of error which is not clearly de¬ fined, but seems a jumble of pagan philosophy and Jewish fable, not unlike the Colossian her¬ esy. While in these letters there is more of re¬ straint than was common to the Apostle, a fact which their semi-official character may explain, in the second letter to Timothy, in point of date the last attributed to him, he poured out his very heart in expressions of personal senti¬ ment and Christian experience and assurance, so tender, so strong, so fitting that from many critics who reject the most part of the Pastoral Epistles as interpolation or forgery of a much later date, these words at least have forced a recognition of themselves as of necessity gen¬ uinely Pauline.

Taken as a whole, no more remarkable series of letters has ever been penned than the Pauline Epistles. They have too often been regarded merely from the dogmatic and critical stand¬ point. Whatever the significance of the critical discussions for which they furnish large ma¬ terial, however rightly they have been considered important and profound, even inspired and au¬ thoritative statements of theological and ethical truths, beyond these they are personal communi¬ cations of a great soul to those whom he trusted, sometimes his beloved friends, and as such also they should be regarded. In them the practical leader, the profound thinker, the religious enthusiast, the friend sympathetic with others and himself hungry for sympathy, un¬ caps his very soul, and lets us see all lfis thoughts in their making,

hear the sob of his often lonely and disappointed spirit, count his heart-throbs, as it were ; and none ever better stood the test of such intimacy. Beside their worth to criticism and theology these letters greatly serve psychology and the study of Christian experience ; beside being historical sources and canonical Scriptures, they are also personal documents, invaluable to literature and life.

Bibliography. — • Clemen, (Die Chronologie der paulinischen Briefe) ; Conybeare and Howson, (The Life and Epistles of Saint PauP ; Farrar, (The Life and Work of Saint PauP ; Gloag, introduction to the Pauline Epistles* ; Harnack, (Die Chronologie der altchristlichen Litteratur* ; Knowling, (The Witness of the Epistles) ; Lake, (The Early Epistles of Saint

PauP ; Lightfoot, (Biblical Essays); McGiffert, (The Apostolic Age) ; Ramsey, (The Church in the Roman Empire y ; (PauI the Traveler and Roman Citizen); Shaw, (The Pauline Epistles) ; var Manen, (Paulus.)

See Antioch; Canon; Corinth; Ephesus; Galatia ; Rome ; Saint Paul; Saint Peter; Salonica; Timothy. See also the articles on the New Testament books mentioned at the beginning of this article.

David Foster Estes, D.D., Professor of New Testament Interpretation,

Hamilton Theological Seminary , Colgate Uni¬

versity.

PAULINUS, Pontius Meropius Anicius, Saint, ecclesiastical writer: b. Bordeaux, 353: d. Nola, 431. He-was consul at Rome and later prefect of the province of Campania. He mar¬ ried a very wealthy Spanish lady, Therosia, and became a man of very considerable note. Through the efforts of Ambrose he was induced to accept the Christian faith ; upon which he distributed his wealth among the poor; and though he remained in Spain he gave up his political offices and finally he was ordained a priest in 393 at Barcelona, after which he went to Rome. In

394 he retired from the world and lived as an ascetic at Nola, of which he was elected bishop in 409, a position he retained until his death. He was present at the Council of Ravenna (419) ; and his name frequently oc-curs. in the letters of Augustine and Jerome. He is best known as Paulinus of Nola. His festival is celebrated on 22 June. Many hymns and letters were left by him and have been col¬ lected by Muratori and Migne. Consult Buse,

(Paulin, Bischof von Nola, und seine ZeiP (1856); Lagrange, (Saint Paulin de Nole) (Paris 1882) ; Reinelt, (Studien fiber die Briefe des heiligen Paulin von Nola) (Breslau 1904).

PAULINUS OF YORK, Saint, an eccle¬ siastic of the 7th century, first archbishop of York: d. 10 Oct. 644. He was sent by Pope Gregory I in 601 to England where he labored under Augustine in the evangelization of Kent. By him he was consecrated bishop in 625, when he accompanied Ethelburga on her mar¬ riage to the heathen Edwin, king of North¬ umbria. For a long time he made no progress in his mission beyond baptizing the infant prin¬ cess; but at length Edwin and his court sub¬ mitted to baptism at York, in a wooden chapel dedicated to Saint Peter, the foundation of the minster* Easter Sunday, 627. Paulinus now carried the Gospel over Northumbria, but after six years' constant labor the death of Edwin in battle at Hatfield put a sudden end to his work, and he was obliged to flee before the Northum¬ brians. He went back with the widowed queen to Kent. In the same year he received the ˆpallium® as archbishop of York from Rome, but he never returned. In the -meantime he was made bishop of Rochester; and there he died and was buried in the chapter-house. Con¬ sult Bright, W., < Early English Church His¬ tory) (Oxford 1888) ; Plummer, A., <The Churches in Britain before a.d. 1000) (Vol. I, London 1911) ; Williams, H., (Christianity in Early Britain> (Oxford 1912) ; Cambridge Mediaeval History) (Vol. II, New York 1912).

PAULISTS, or PAULIST FATHERSˆ

the name familiarly given to the ((Congregation of the Missionary Priests of Saint Paul the

Apostle.)) This body of priests, the sole reli¬ gious congregation of clerics which is of Amer¬ ican origin, was founded in 1858. A short time prior to this date, five American converts to Catholicism had joined the Redemptorist' Order, and were actively engaged in

preaching mis¬ sions throughout the United States. These men were Isaac Hecker (q.v.), sprung of Ger¬ man Lutheran stock, and, a short time before his submission to the Catholic Church, a mem¬ ber of the Brook Farm community of <(Transcendentalists)) ; Clarence Walworth and Fran¬ cis Baker, both former Episcopalian ministers ; George Deshon, a classmate of General Grant at YVest Point, and Augustine Hewitt, who, reared in New England Congregationalism, had afterward joined the Episcopalian Church. The experience of these men in their priestly work, and their intimate knowledge of Ameri¬ can conditions, convinced them that the Re¬ demptorist Order, to which they belonged, would not adequately meet its opportunities in this country, unless it attracted a greater num¬ ber of American subjects, and became more at home in the language and national characteris¬ tics of the people. At that time nearly all the Redemptorists working in the United States were Germans. The five converts earnestly ad¬ vocated the establishment of a house to serve as the headquarters of the English-speaking members, which, with English as the language in common use, might help to attract a larger number of American recruits, so much needed in the missionary field. Both Archbishop Hughes of New York and Bishop Bayley of Newark heartily supported this project. The German members of the order looked upon it with disfavor. According to the constitutions of the order, any member, if in conscience he deemed it necessary, enjoyed the right of per¬ sonally laying any important question before the superior-general in Rome, without the per¬ mission of the local superiors. In 1855 a gen¬ eral chapter of the order had voted to abrogate this article of the constitutions. This decision, however, had not yet been approved by the Pope, and consequently was not yet definitively settled. The rector major, or superior-general, had, however, ventured to anticipate the action of the Holy See, so far as to issue a circu¬ lar letter prohibiting, under pain of expulsion, any American Redemptorist from leaving Amer¬ ica without express permission. The five Amer¬ ican Fathers taking their stand upon their con¬ stitutional right, delegated Father Hecker to go to Rome to lay before the authorities the project of establishing an English-speaking house, burnished with highly creditable testi¬ monials as to his exemplary life from his pro¬ vincial superior, Father Hecker sailed from New York, and arrived in Rome on 26 Aug. 1857. He was met by his superior with a de¬ cree of expulsion from the Redemptorist Order. Upheld by his confreres in America, whom he represented, Father Hecker appealed to the Propaganda ; and after some delay, he was at length vindicated by Pius IX, who gave to him and the other American Redemptorists advice and encouragement to found a new missionary community.

With an enthusiasm which has ever since characterized their congregation, the five priests entered upon their new vocation under the pat-

ronage of Saint Paul. Their twofold purpose — a purpose incorporated in their constitutions, and held before every Paulist as his ideal — was personal perfection and zeal for souls, out¬ side the Catholic faith. Lovers of America, and deeply penetrated with the national spirit, it was natural that they should lay special stress upon the cultivation of personal initiative, spiritual liberty, a high sense of honor and duty and the virtues of fortitude and fidelity. Hence, it is a characteristic of the Paulists, the follow¬ ers of Father Hecker, to aim at the highest possible legitimate development of the individ¬ ual, interfering with him only to the extent dictated by the common good and the require¬ ments of conventual discipline. It is in keeping with this spiritual scheme that, while the Paul¬ ists do not take the usual vows of religious orders, they live the life of the vows in strict¬ ness. This interior spirit of the congregation has been widely misunderstood ; it must be ap¬ preciated correctly, if one is to form a just judgment of the institute and of its founder. The absence of vows is not an indication that the Paulists wish to exempt themselves from any burden of the religious life; for, even had they solemn vows they would be no more de¬ voted to the evangelical counsels than they are at present. But, without vows, to live as though solemnly vowed, implies a spirit of individual conviction of enthusiasm and of free consecra¬ tion which best harmonizes with the interior and exterior vocation to which the Paulists devote themselves.

In carrying out their chosen work, the Paul¬ ists, though few in number, have left a clearly defined impress upon the course of the Catholic Church in America. It is chiefly due to them that a systematic and persistent endeavor to bring non-Catholics into the Church is now ex¬ tensively organized among the diocesan clergy. Their example is stimulating other religious so¬ cieties to fraternal emulation. In missionary work of this kind the Paulists are uncompro¬ mising in

presenting the doctrines and claims of Catholicity, while, at the same time, they care¬ fully avoid the polemical attitude which only arouses and exasperates religious prejudice. Another work in which they stand in the fore¬ most rank is the promotion of temperance. Ex¬ hortation to total abstinence is a characteristic of their mission preaching; and their printing-house in New York is the headquarters of the publication bureau of the Catholic Total Ab¬ stinence Society. The propaganda of the press was an early ambition of the Paulists. In 1865 they founded The Catholic World, a monthly magazine ; in 1870 they established for young readers a bi-weekly, The Young Catholic, which is now a monthly under the name of The Leader; in 1896 they began to issue a quarterly, entitled, The Missionary . which serves as the organ of the non-Catholic missions. Besides these periodicals, their presses turn out, annu¬ ally, hundreds of thousands of pages of . devo¬ tional, homiletic and apologetic literature. An¬ other feature of Paulist endeavor has been the observance, in public worship, of strict cere¬ monial, including only Gregorian music, highly developed in their imposing basilica at 59th street and 9th avenue, New York City. Re¬ cent figures give the number of Paulist Fathers as 64. They have missionary houses in New York, San Francisco, Winchester, Tenn., Chi¬

cago, Austin, Tex., and Portland, Ore.; and a house of studies at the Catholic University, in Washington, D. C. Consult Hewit, N. A., (Memoir of the Life of Francis A. Baker* (7th ed., New York 1889) ; Elliott, W., Rife of Father Hecker* (New York 1899).

James J. Fox, S.T.D.

PAULITES, or HERMITS Otf SAINT PAUL, an obscure religious order of men who take Saint Paul, the first hermit, as their patron. The order was established in 1250 by uniting the Hermits of Saint Augustine with those who lived under the rule of Saint Eusebius of Grau, who became the first superior of the new or¬ ganization. They now follow the rule of Saint Augustine. They are found in Italy, France, Spain, Germany and other countries. They usually wear a short cloak and cowl and go barefooted. They also wear a beard. There were various orders of Paulites. The earliest of these is believed to have had its origin in Hungary on the date above indicated. The order spread with considerable rapidity throughout northern Europe; and it attained to a strong position of influence in Hungary where it counted 170 cloisters. But owing to the fact that the order was involved in political intrigue most of its houses were suppressed in the

18th century; but a few still exist to-day in Poland. About 1420 the Paulites entered Portugal; but were suppressed about 150 years later. In France, the Paulites, popularly known as the (<Brothers of Death® had a short life • (1620-33). The <(Blind Sisters of Saint Paul® is an order founded in Paris in 1852, to assist blind women and children; and the Sisters of Saint Paul of Chartres (Hospitalers of Char¬ tres) appeared in the latter part of the 18th century with the avowed object of taking care of the sick and poor. Consult Currier, Reli¬ gious Orders.)

PAULO AFFON.SO, pow'lo af-fon'so, Falls of. See Sao Francisco.

PAULOWNIA, a genus of ornamental trees of the family Scrophulariacece. The species, of which three have been described; are natives of Japan and China. The best-known species (P . tomentosa) is catalpa-like in habit of growth, having stout, spreading branches and flowers in terminal panicles. The flowers, however, are bell-shaped and the fruits two-celled capsules instead of long pods. In favorable climates the trees become 40 feet in height; in cold localities they are often killed to the ground by frost, but send up numerous sprouts from the stump. At Montreal they are often planted for screens or specimens on lawns,- their rapid growth,, often amounting to more than 12 feet in a season, and their strik¬ ing foliage (leaves frequently a foot wide and two feet long), making them very interesting. At New York City the tree is hardy but its blossom buds are frequently killed by the win¬ ter. In this species the flowers resemble those of foxglove, are violet in color and fragrant. They appear in great profusion in April or May. An evergreen species has recently been discovered in southern China, and is said to be one of the grandest of floral spectacles when in blossom.

PAULS VALLEY, Okla., city and county-seat of Garvin County, situated on the Washita

River, the Gulf, Colorado and Santa Fe and the Atchison, Topeka and Santa Fe railroads, 55 miles south of the city of Oklahoma. A State

training school for boys is located here and there are cotton compresses and a bit and spur manufactory. The municipality owns the waterworks. Pop. 3,694.

PAULSEN, powl'sen, Friedrich, German philosopher: b. Langenhorn, Schleswig, 16 July 1846; d. 14 Aug. 1908. He was educated at Erlangen, Bonn and Berlin, became a lecturer at the University of Berlin in 1875, and profes¬ sor of philosophy and pedagogics there in 1873. Paulsen was a Kantian, and found in that philosophy the basis for the philosophic thought of the future. He held that Kant showed knowledge to be limited to the facts derived from the observation of the relations of phenomena in time and space. The power of value (or the good) is not demonstrable by science, but must be entrusted to faith. But science proves that there exists no scientific impossibility in belief in the indestructibility of that which possesses worth, of the freedom de¬ manded by the will and of a world beyond the reach of sense. Faith is in no danger of a real attack from science, but science may remove obstacles from the way of faith. The empir¬ ical view of the world remains incomplete and valid for only restricted human observation. Among Paulsen's more important works are (Entwicklunggeschichteˆ der Kantischen Er-kenntnisstheorie' (1875) ; (Griindung, Organ¬ ization und Lebensordnung der deutschen Uni- , versitaten im Mittelalter' (1881) ; (Geschichte des gelehrten Unterrichts auf den deutschen Schulen und Universitaten' (1885); (Realgym-nasium und humanistiche Bildung) (1889) ; <Ethik) (1889) ; (Einleitung in die Philosophy (1892; Eng. trans. 1895), a work of high lit¬ erary as well as philosophic value; (Immanuel Kant) (1898) ; (Kant, der Philosoph des Protestantismus) (1899) ; (Schopenhauer, Ham¬ let and Mephistopheles) (1900) ; and (Philosophia Militans) (1900; 2d ed., 1901). containing a vigorous reply to the (Weltratsel of Ernst Haeckel; (Das deutsche Bildungwesen in seine geschichtlichen Entwickelung> (1906); the same translated into English (1908) ; (Richtlinien der Jungsten Bewegung im hoheren Schulwesen Deutschlands) (1909).

PAULUS, pow'loos, Heinrich Eberhardt Gottlob, German theologian : b. Leonburg, near Stuttgart, Wiirtemberg, 1 Sept. 1761 ; d. Heidel¬ berg, Germany, 10 Aug. 1851. He studied in Tubingen,. Gottingen, London and Paris, mak¬ ing a specialty of Oriental languages and theol¬ ogy; in 1789 he was called to the chair of Oriental languages at Jena and in 1793 took the chair of. theology in that institution which he filled until 1803 when he accepted the same professorship at Wurzburg. In 1808 he be¬ came director of the department of public wor¬ ship at Bamberg, at Nuremberg in 1809 and in 1811 at Ansbach. In that year he accepted the professorship of church historv at

Heidelberg. Paulus was an earnest exponent of rationalistic theology. Among his best-known books are Wife of Jesus as the Foundation of an Original Work on Christianity' (1828) ; (An Exegetical Handbook of the Three First Evangels' (1830).

PAULUS, pa'lus, Julius, Roman jurist of the latter part of the 2d and the first part of

the 3d centuries a.d. He was a legal assessor under the emperor Septimius Severus, was exiled by Elegabalus, was recalled and became praetorian prefect under Alexander Severus. He wrote much. His commentaries on the civil law covered 16 books ; and those on the prae¬ torian (equity) law 78 books. In addition to this vast amount of legal work, he published 48 books of Questions' and (Answers' and many articles on a variety of other subjects. His (Sententiae' (in five books) presents, in a readable and succinct form, the entire civil and praetorian law. His (Institutes' for be¬ ginners was long a favorite among students of Roman law. More than one-sixth of the Digest of Justinian is taken from Paulus. Consult Huschke, (Jurusprudentiae antejustinianeae quae supersunt' (Leipzig 1879).

PAULUS -TEGINJSTA, ej-i-ne'ta, or PAUL OF 2EGINA, Greek medical writer, probably belonging to the latter part of the 7th century

a. d. His encyclopedic work, (Artis Medicae Principes,' translated into English in three vol¬ umes (1844-47), shows great erudition and good judgment, and is noteworthy for its informa¬ tion on early surgery. Paul was in high re¬ pute with the Arabians, who called him Al-Kawabeli, the Gynaecologist, and translated his (Principes' into Arabian.

PAULUS DIACONUS, di-ak'6-nus, <(Paul the Deacon," also called WARNIFRIDUS, and PAULUS MONACHUS, «Paul the Monk," the earliest of mediaeval historians :

b. Friuli,, about 720; d. about 800. He was

educated in the court of the Lombard kings at Pavia. On the capture of Desiderius, the last king of the Lombards, by Charlemagne, he re¬ tired to the monastery of Monte Casino, where he took the cowl. In 781 he was called to the court of Charlemagne. Paulus drew up a book of homilies from the Fathers, which was in gen¬ eral use throughout Europe during the Middle Ages. He also wrote a history of the bishops of . Metz, (Gesta Episcoporum Metensium,' which is to be found in the

second volume of Pertz's (Monumenta Germanise Historical In 787 he returned to his monastery at Monte Casino and spent the rest of his life in reli¬ gious and literary labors. Here he wrote his history of the Lombards, <De Gestis Lango-bardorum Libri VI, > his principal work. It is written in a lucid and elegant style, is prized for. its general truthfulness and contains a mass of information elsewhere unobtainable. It com¬ mences with the migration of the Lombards from Scandinavia to the. death of King Liut-prand. The best edition is contained in Muratori's /Rerum Italicarum Scriptores.' It is in¬ teresting and, in a sense, quite remarkable for the number of legends it contains, all of them poetical, and all relative to the early Germans. Paulus was also a writer of hymns and the author of numerous theological -\yorks, popular in their day. His history of the Lombards was translated into German by Reinhardt Jacobi and published in Leipzig in 1888 and an English translation was made by W. D. Foulke, who attached thereto good notes and biogranhv (Philadelphia 1907). ' y

PAULUS HOOK, formerly the name of the site of Jersey City, N. J., where fortifications were constructed by the Americans in 1776. The works were captured by the British

in September of the same year, but on 19 Aug. 1779 a party of American soldiers, under Lieut.- Col. Henry Lee (q.v.), retook and partially destroyed them. The British garrison was sur¬ prised and 159 prisoners were taken, with an American loss of two killed, three wounded. Paulus Hook was again reduced by the British, who held it until the end of the Revolution. The feat of Lee and his men was commemo¬ rated 21 Nov. 1903 by the dedication of a mon¬ ument on the Paulus Hook battleground. The memorial, erected under the auspices of the Daughters of the American Revolution, is a rough-hewn granite shaft standing in the mid¬ dle of a public square in Jersey City, and within the lines of the old fortification. An interesting feature of the dedication was the oration deliv¬ ered by Gen. Fitzhugh Lee of Virginia, a grand¬ son of <(Light Horse Harry.®

PAUMOTA, pa-oo-mo’ta, or PAUMOTU,

pa-oo-mo’too, native name for the Low Archi¬ pelago, a group of islands in the south Pacific. See Tuamotu Islands.

PAUNCEFOTE, Julian, Lord, English dip¬ lomat : b. Munich, Germany, 13 Sept. 1828; d. Washington, D. C., 24 May 1902. He was edu¬ cated at Marlborough College and in Paris and Geneva. He began the practice of law in 1852, was, for a time, secretary to the colonial minis¬ ter, Sir Samuel Molesworth, and in 1862 went to Hongkong where he practised law and be¬ came attorney-general in 1865. In 1872 he be¬ came chief justice of the Leeward Islands, in 1876 legal assistant under-secretary at the For¬ eign Office, and in 1882 permanent Under-Secre¬ tary of State for Foreign Affairs. In 1889 he was appointed Minister to the United States, and 1893, when the office of Ambassador was created, he was first to present his credentials as Ambassador. His marked diplomatic ability and evident friendliness toward this country did much to bring about cordial relations be¬ tween England and the United States. In 1890 he accepted the principle of arbitration for the Bering Sea dispute and in 1892 signed the treaty. He managed the Venezuelan dispute skilfully, and negotiated a general arbitration treaty be¬ tween Great Britain and the United States which was rejected by the Senate. He was most earnest in his efforts to abrogate the Clayton-Bulwer Treaty and negotiated and signed the treaty which supplanted it. (See Hay-Paunce- fote Treaty). He was British delegate to The Hague Peace Conference in 1899 and was raised to the peerage as Baron Pauncefote of Preston in recognition of his services there.

PAUPERISM (from Lat. pauper, poor;. The word, strictly speaking, applies not to tem¬ porary destitution, not at all to ((honest poverty,® but to chronic willing dependency. It is appli¬ cable to those who are partly supported by char¬ ity, as well as those wholly thus supported, if the condition is chronic. Destitution arising from such misfortunes as sickness or the death of the family bread-winner, is usually a curable condition, and does not often sink into pauper¬ ism except through the maladministration of relief, as when more is paid to the beggar than he could possibly earn, so confirming him in his degrading habit, and tempting his neighbors to give up their hard work and strike for the easier task and higher wages of beggary. The history of pauperism is, for the most part,

a history of the successive mistakes in poor relief of over-zealous

humanitarianism and un¬ wise charity.

Early History. — Imperial Rome presents the first notable instance of pauperizing by undue aid. Ambitious politicians gave free grain, not to the wounded and helpless, as Athens had done, but to all men residing in the capital who could prove themselves Roman citizens. This began when votes could thus be bought under the repubic. Julius Caesar found one-third of a million of these able-bodied pensioners and cut the number down one-half ; but Augustus allowed it to grow again. Marcus Aurelius, though a Stoic himself, gave these robust de¬ pendents bread and oil and meat. The strength of that world-conquering race was thus under¬ mined and the demand of the beggared popu¬ lace, <(Bread and games,® is recognized as the death cry of once invincible Rome. With Con¬ stantine, the succession of misdirected charity passed over to the Church. While the Chris¬ tian churches had been small in days of perse¬ cution they had shown, in intensified degree, the spirit of neighborly helpfulness that had existed among the Jews, whose Mosaic code is the most charitable of any ancient law. In the early Christian churches there was not much to give, and relief was seldom excessive or bestowed without due knowledge of the case. But with the patronage of the emperor there came to the Church great charitable funds to be given in a general way to applicants whose circum¬ stances in many cases would not be known. One-fourth of the Church funds in Rome were thus devoted to the poor. Charlemagne was the first Christian ruler to take a strong hold of poverty as a civil problem. He required bishops and nobles to provide for their poor. In 779 he forbade begging and imposed a poor-tax. He also provided institutions for widows and orphans, which were not sufficiently grounded, how'ever, to abide after his death. But religious benefactions of all sorts multiplied, many of them established as atonements for the sins of the rich donors. In the 15th century cities began to take up the problem of relief, but not of prevention or cure.

Modern Pauperism. — After the civil and social commotions in the 16th century conse¬ quent upon the Reformation efforts were made to cheapen necessities, to secure employment, to help the poor to help themselves. Public workhouses appeared before the end of the 17th cen¬ tury and there grew up a literature on the subject of poverty. But in the opening years of the 19th century prolonged wars again increased poverty and beggary. Germany, before the World War, showed she had learned the lessons of the past by wise administration of private and public re¬ lief, with friendly visitors, thorough investiga¬ tion and discriminating aid, and especially by compulsory old age insurance, said to have put 40,000,000 of her people beyond the fear of want in their last years. The general principles as to poor-

relief in all the German states, except Bavaria, are laid down by the Imperial law of 6 June 1874, amended by the law of 12 March 1894. The territory under this law is divided into local unions (Ortsarmenverbande) and provincial unions (Landarmenverbande) . Usu¬ ally a local union is a commune (Gemeinde) , while a provincial union consists of a large administrative division such as a circle (Krcis),

a province or a whole state. For the purposes of poor-relief a settlement is acquired by two years' continuous residence (after the age of 18), by marriage or by descent. A German in distress must be relieved by the local union in which he becomes destitute, and the cost must be refunded by the local union in which he has a settlement or by the appropriate provincial union. In communes poor-relief forms part of the ordinary local government business ; in towns the actual administration is carried out by a special committee under the presidency of the burgher-master. Poor rates are usually not levied. In most large towns the Elberfield sys¬ tem of unpaid district visitors is in force. Statistics of pauperism are not published regu¬ larly; the last issue related to the year 1885.

Under an Imperial law of 1883 and amending acts (codified in 1912), workmen must be in¬ sured against sickness and must themselves pay two-thirds of the contributions, their employers paying one-third. For accident insurance, under an Act of 1884 and amending acts, the con¬ tributions are paid entirely by the employers, and they, for mutual protection, have united into associations according to the nature of the industries in which they are engaged. The working of these insurance associations is con¬ trolled by government. For invalidity and old age insurances, under an Act of 1889, amended in 1899, the contributions are paid half by the workmen and half by their employers, while toward each pension the government grants an annual subsidy of 50 shillings. The employers are responsible both for their own and the workmen's contributions, but the latter may be deducted from wages paid subsequently. Con¬ tributions are paid by

the purchase of stamps from the post office; these are affixed by the contributing person to cards on which there are spaces for stamps for 52 weeks. When the contributions are complete, the card is handed in to a specified office and a certificate given in return. The old age pension is given on the completion of the 65th year (from 1916 on¬ ward) of the workman's age, contributions having been paid for 1,200 weeks (equal to about 25 14 years), a margin of five weeks being allowed each year. Austria cares for her poor by communes through the priests. Belgium has almshouses and compulsory labor for able-bodied dependents. Holland has been much praised for her labor colonies and numerous or¬ ganizations to relieve and remove poverty. In France the Church, save in the period of the Revolution, has had chief charge of the poor, and its best relief agencies have been the Sisters of Charity and its numerous charitable institu¬ tions, many of them founded by Francis de Sales and Vincent de Paul and others of more recent origin to meet modern needs. Under modern conditions the poor are assisted partly through public <(bureaux de bienfaisance® (welfare bu¬ reaus) and partly by private and ecclesiastical charity. They are partly under the care of the communes and partly. of the departments, both of which contribute, and ultimately under the supervision of government. The funds of the "bureaux de bienfaisance® are partly derived from endowments, partly from communal con¬ tributions and partly from public and private charity. In 1912, 19,366 bureaux expended $10,923,600 and assisted 1,260,000 persons ex¬

cluding 92,000 persons in Paris. Public as¬ sistance is rendered to poor or destitute chil¬ dren. At the end of 1912 the institutions for this purpose contained 231,300 children; the expenditure during the year amounted to $8,464,250. In 1912 the hospitals for the sick, infirm, aged or infants, numbered 1,892; they contained 231,517 beds, and at the end of the year had 68,700 patients, besides 75,540 aged and infirm inmates; their expenditures for 1912 ? mounted to $40,881,200. In the same year 987,000 persons received gratuitous medical assistance at home and 185,000 in hospitals, the expenditures for such purposes amounting to $5,800,000. At the end of 1912 the asylums for imbeciles, national, departmental and private, had 77,237 patients.

An act was passed in 1905 for the relief of the aged poor, the infirm and the permanently incurable, age limit, 70; but by the amendment of the Act, 5 April 1910, this was reduced to 65. The same amendment provided for limited help being given to those between the ages of 65

and 70. On 31 Dec. 1912, there were 310,000 such persons in receipt of the limited assistance, the total expenditure for 1912 having been $1,837,800. The Act of 1910 provided that the cost of the scheme should be borne by the commues, the departments and the State. The number of persons registered for relief has risen from 511,446 on 31 Dec. 1908, to 599,061 on 31 Dec. 1911, and to 644,461 on 31 Dec. 1912. The cost to the State alone for J910 was $9,600,000; for 1911, $9,920,000 and for 1912, $11,100,000. In addition, contributions of the departments and communes totaled $9 300-000 in 1911, and 10,158,600 in 1912; but it has to be remembered that the increased expendi¬ ture under this law is in part balanced by the diminished activities of the "bureaux de bien¬ faisance® in assisting invalids under 60 years of ˆhe Old-Age Pensions Law of 5 April 1910, as amended on 27 Feb. 1912, provides for all wage-earners old-age pensions toward which both employers and workers contribute. Con¬ tributions are to be paid up to the 60th year of the worker's life, and the State will contribute $20. This sum will be increased by one-tenth for every insured worker who has brought up three children of the age of 16. On 31 Dec. 1913 8,011,138 persons were registered under the cheme.

It is instructive to recall England's mistakes in poor relief, which are representative of Scot¬ land, Ireland and Wales also. In 1601 a great advance was made by the enactment of the poor law of Elizabeth. Begging had been forbidden in vain in previous centuries, but by that law all able-bodied paupers were required to work, under which requirement public workhouses developed. A serious backward step came in the Speenhamland law of 1795 by which a certain standard was set up as a "living wage® and all who fell short got an "allowance® from the pub¬ lic treasury. This of course encouraged em¬ ployers to give low wages and made workmen content to receive them. In about 40 years the nation was. startled to find its relief fund had quadrupled. Parliament investigated and found they had pauperized thousands by undue aid. In 1834 reforms were instituted by which "outdoor relief® was greatly limited and able-bodied persons were made ineligible for public

aid outside the poorhouses, which were made less attractive, only the plain necessities of life being provided. Nearly all except the aged and infirm were removed to special institutions pro¬ vided for the deaf and dumb and other de¬ fectives and for children. A poor law, under a variety of statutes, is now applicable to the three Kingdoms, by which paupers, under cer¬ tain conditions, are to be relieved in their own houses or lodged in workhouses or poorhouses built for the purpose. The law is administered by the Local Government Board, through boards of guardians elected for the purpose. England and Wales, including the metropolis and the municipal boroughs, are divided into 653 poor law unions, for each of which there is elected a board of guardians. In urban districts and in the metropolis guardians are separately elected, but in rural districts the rural district councillors act as guardians for the parishes they represent on the district council. Guard¬ ians are elected on the same popular franchise as district councillors. Women are eligible. In every civil parish overseers are appointed whose duty it is to make and collect the poor rate.

The amount expended in poor-relief for year ended 25 March for England and Ireland, and May 15 for Scotland (1913-14) was: England and Wales, $75,279,315; Scotland, $8,046,790; Ireland, $6,379,565; total United Kingdom, $89,703,670. For Scotland, the amount includes expenditure on buildings and loans re¬ paid and interest.

Under the Old Age Pension Acts, 1908 and 1911, every person over 70 years of age who is a British subject; who for 12 out of the 20 years up to the date of receiving a pension has resided in the United Kingdom (residence abroad is allowed to count in certain circum¬ stances) ; and whose yearly means do not ex¬ ceed $157.50, is entitled to a pension; provided he has not through idleness habitually failed to maintain himself and his dependents, is not in receipt of poor-relief (except medical and cer¬ tain other kinds of relief), is not a lunatic in an asylum, has not been a convict in prison during the preceding 10 years for a term of upwards of six weeks, or during the preceding two years for a term not exceeding six weeks, and is not disqualified by order of a court.

Under the National Insurance Acts, 1911 to 1916, also, provision is made for compulsory insurance against loss of health, for the pre¬ vention and cure of sickness and for compulsory insurance against unemployment.

In America. — In the United States, from early times, every town in New England, every county elsewhere, has had its poorhouse, where at first all kinds of dependents and defectives and many delinquents were herded together. In recent years they have been sorted out leaving in the poorhouses, as stated above for England, few except aged and infirm adults. Some Amer¬ ican cities have made the mistake of too gen¬ erous outdoor relief, by which, at certain times, one-tenth of the population of such rich cities as Chicago and Brooklyn have been tempted to become wholly or partially dependent. Char¬ ity organization societies by their teaching and the co-operation they have secured among the administrators of relief have largely reduced this evil and other abuses of charity.

Statistics.— The census of 1910 reported an almshouse population in the United States num¬

bering 84,198, of whom 57,049 were males and 27,149 females. Among this number were 2,486 children under 16 years of age. Of the whole number 42.6 per cent were foreign born and 57.4 per cent native born, including 7.5 per cent negroes. Of the foreign born the Irish were in largest proportion, with the Swiss next. Italy had the smallest proportional representation and Russia the next smallest. Regarding ages, 34.7 per cent were under 55 years ; 34.2 ner cent were between 55 and 69 years ; and 31.1 per cent were 70 and older. Nearly one-third of the entire number had been in the almshouses less than one year and were there temporarily to tide over a period of special stress. About two-thirds of them were either physically or mentally deficient. The men were principally unskilled laborers, but there was a comparatively large percentage of farm and agricultural laborers, and a consid¬ erable number of skilled laborers — carpenters, painters, glaziers, varnishers, *etc.* The females were mostly of the domestic service class.

During the year 1910, 88,313 persons were admitted to the almshouses of the country; 17,486 died; and 59,110 were discharged. Of this last number about two-thirds had been in¬ mates for less than a year. Three-fourths of those discharged returned again to the ranks of the self-supporting and the remainder were taken into the homes of relatives and friends.

The highest ratios to population of the alms¬ house paupers were in New Hampshire, Con¬ necticut and California, in the order named. In New Mexico there were no almshouses and in Oklahoma very few.

Louisiana, Wyoming and North Dakota were notable for their very low proportions. The number for the whole coun¬ try averaged 91.5 per 100,000 of population. The ratio for New England was 181.4 per 100,000 and for the West South Central section (Ar¬ kansas, Louisiana, Oklahoma and Texas), it was but 18.6.

The statistics of charitable institutions aid in throwing light upon the extent of aid given regularly to the deserving poor. The average of such institutions in the United States in 1910 was 444 per 100,000 of the population and the average number of persons succored annu¬ ally by each institution, 5,872. The total num¬ ber receiving such aid in 1910 was 5,409,556 and the amount expended was $111,498,155. In the Middle Atlantic section, the amount expended was an average of $2.35 for each inhabitant ; in the West South Central section it was 29 cents. No parallel can be drawn from such figures, for they exhibit only the aid given and not the need. It is to be said also that a very large sum of money is used in succoring the needy which does not pass through the treasuries of the benevolent societies and for which there is no accounting. The poorhouses in any case contain less than half of the chronic dependents, since there is among the poor a great dread of the ˆpoorhouse,® that inclines many who would in other days have gone there to become tramps instead and live by doles of food and clothes and money and by petty thieving, while there are also in every community many drunken and vicious persons who live altogether on the easy benevolence of others, besides a great number of widows and children supported regularly by relatives and by churches, not a few of these weakened by too much help until they willingly

receive and even expect and ask, if not demand, what they could by earnest effort get on with¬ out. A city officer of Cleveland, in 1903, esti¬ mated that one-tenth of that prosperous city in that prosperous

year received charitable aid. Dependents have been classified as (1) ab¬ solute dependents; (2) temporary dependents; (3) paupers; (4) temporary dependents likely to become paupers. In the first class have been placed the aged, children, the crippled, the in¬ curables, the feeble-minded, the blind, the deaf-mutes and the insane. In the second class the unemployed and widows with young children. In the third class professional beggars, tramps, degenerates. In the fourth class the sick and convalescents, the tuberculous, the inebriates and the drug habitues. Each of these classes requires different treatment and the foundation of all reform must lie in the restoration of self-respect in those who have abandoned it and the fostering of it in those likely to lose it.

Tramps. — The American poorhouse, with its few old and infirm inmates, and street beg¬ ging in American cities, which is everywhere forbidden, but almost everywhere tolerated to some degree by public officers and private citi¬ zens, are the smallest part of. the present Ameri¬ can problem of pauperism, which is chiefly con¬ cerned with able-bodied “tramps,® a term prop¬ erly applied to those whose beggary is not lo¬ calized but nationalized by constant travel from place to place. There are thousands who are tramps by choice, who tramp and beg rather than work even in the most prosperous times, especially in summer, when they can sleep out of doors without serious discomfort. Usually they ask for work, to evade the law against beg¬ ging, knowing very well that most persons will give them food or clothes or money to get them out of the way in a hurry, lest they steal or do some act of violence or revenge. The tramps know also that town authorities will usually give them free lodging in station-houses for a few nights each and that even if they are ar¬ rested, rather than bear the expense of support¬ ing them in jail for vagrancy, they will order them to ((move on,® sometimes even paying their fare to the next town. Stealing rides on freight trains is their common practice. They are gre¬ garious and camp together in the outskirts of towns, going from these camps singly to their house-to-house begging. The chief cause of pauperism, other than careless alms-giving, are the vices that waste both the purse and the per¬ son. Sensuality weakens mind and body and de¬ stroys self-respect and thus leads straight to chronic dependency.

Cures. — The Charity Organization So¬ ciety of New York reports that from 43 to 52 per cent of all applicants need work rather than succor. The approved cures of pauperism, in distinction from wise administration of tem¬ porary charity (see Charity), are: 1. A strong public sentiment against giving to unknown beg¬ gars. 2. Enforcement of laws against begging. 3. Philanthropic workyards where men out of

work can be temporarily sent while hunting a new job. 4. Self-supporting loan bureaus, managed by philanthropists, where goods can be safely pawned at moderate interest. 5. Farm colonies, to which the city poor can be sent to work in company with others, avoiding the dreaded loneliness of ordinary farm life. 6. Friendly visitors and social settlements, by which th'c

strong can give themselves upliftingly to the weak, in recognition that ((the lack of goods for the higher wants is not so bad as the lack of wants of the higher goods.® 7. Tenement-house reform. 8. Old age pensions. (See Old-age Insurance and Pensions). 9. Public and private efforts to protect the children of the poor, by proper child labor laws and compul¬ sory education laws, in their right to health, education and a favorable environment.

Bibliography.— Alden, P., and Hayward, E. E., (The Unemployable and the Unemplcyed) (London 1908) ; Conyngton, M., (How to Help) (New York 1909) ; Dawson, W. H., <The Va¬ grancy Problem* (London 1910) ; Devine, E. T., (Misery and Its Causes) (New York 1909) ; Henderson, C. R., 'Modern Methods of Char¬ ity > (New York 1904) ; Hollander, J. H., (The Abolition of Poverty) (Boston 1914) ; Hunter, R.,- 'Poverty* (New York 1904) ; Kelly, E., (The Elimination of the Tramp* (New York 1908) ; Money, L. G. C., Unsurance versus Pov¬ erty > (London 1912); Parmelee, M„ (Poverty and Social Progress* (New York 1916) ; Rubi'- now, I. M., (Social Insurance) (New York 1913) ; Squier, L. W., (01d Age Dependency in the FJnited States) (New York 1912) ; Withers, H., (Poverty and Waste) (London 1914).

P AU.SANIAS, Greek topographical writer of the 2d century a.d. His 'Hellados Periege-sis3 in 10 books is an itinerary of his extensive travels. Pausanias visited all the most import¬ ant places in Greece. He describes Attica, Megaris, Corinthia, Sicyonia, Laconia, Messenia, Elis and Olympia, Achsea, Arcadia, Boeotia, Pho-cis and Lacedaemon. His observation is accur¬ ate, and his descriptions simple and prac¬ tical. His work has been edited by Siebolis (1822) ; L. Dindorf (1845); Spiro (1893). The edition by Clavier and other (1814-23) contains text, French translation and notes. J. G. Frazier's (Pausanias' Description of Greece, * is the standard English translation (1898). Con¬ sult the valuable partial commentary in Harri¬ son and Verrall, (Mythology and Monuments of Ancient Athens) (1890).

PAUSILIPPO, pow-se-le'pd. See Posilipo.

PAUWELLS, pow'els, Ferdinand, Belgian historical painter: b. near Antwerp, 13 April 1830; d. 1914. He attended the academy at Ant¬ werp (1842-50) and attained pre-eminent skill as a colorist under the instruction of Mapper, who represented the newest school of Belgian painters. His first picture of importance, Bald¬ win I and His Daughter Johanna* (1851), was followed by (Coriolanus of Rome,* which latter obtained for him the ((Prix de Rome.® After an absence of four years in Italy he exhibited Deb¬ orah, the Prophetess*; (Rispah, Saul's Concu¬ bine, by the Corpse of her Son* (1856). His reputation reached its height during his resi¬ dence at Antwerp, where he painted (The Widow of Jacob van Artevelde* (1857), which is in the Brussels Museum; Vanished by AW (1861) ; 'The Call of Saint Clara* (1861) ; and other striking works. He became professor in the Art Academy at Weimar in 1862 and had a large following among the students. In 1876 he became professor in the Academy of Paint¬ ing at Dresden. In the meantime he painted numerous historical pictures, among them (Queen Philippina Ministering to the Poor in

Ghent) ; (Louis XIV Receiving the Deputation of the Genovese Republic) ; and seven wall pic¬ tures illustrating the life of Luther. Among his later works are 'Count Philip of Alsace Visit¬ ing a Hospital in Ypres) (1877) ; 'Admonition5 (Leipzig Museum 1879). Dramatic energy and power of facial expression, grandeur of style and brilliancy of coloring are the qualities of this artist who has had considerable influence upon modern painting. Yet he lacks power to express 'depth of feeling and strong characteri¬ zation so noticeable in the greatest of the older masters.

PAVANE, an ancient Italian dance, popular during the 16th century. It was adopted in Spain, France, England and Scotland and was a favorite pastime in court circles. It was a solemn, stately dance, sometimes accompanied bj a song.

PAVEMENT ANT, the small black ant

(Tetramorium cespitum) which has long been naturalized from

Europe, locating especially in the neighborhood of New York City, Philadel¬ phia and Washington, D. C. It commonly makes its nests in galleries under the pavements of garden paths and village sidewalks. These galleries may be destroyed by kerosene oil or by boiling water. It occasionally has been noticed as storing grass seeds in granaries. In Europe it practises many interesting customs, entertain¬ ing idle ants of other weaker species, and some¬ times deposing its own queens in favor of those of another race. See Ant. Consult Wheeler, W. M., (Ants: Their Structure and Behavior5 (New York 1910).

PAVEMENTS, the surfacing laid on a street or road to keep it in a condition capable of sustaining traffic. Pavements have been a leading feature of civilization in all historic ages, and their absence is evidence of a low degree of progress, if not of decay. The Ro¬ man Empire depended almost as much on its pavements as on its armies for keeping its vast dominion knit together, and Roman roads are to-day among the most valued legacies of Roman occupation in Great Britain and on the Continent. The more important Roman roads had a paved width of 16 feet, and while their grades were not what a modern engineer would approve, they answered satisfactorily the re¬ quirements of the era in which they were con¬ structed. The Dark Ages witnessed, among other signs of decline, the virtual disappear¬ ance of pavements, so far as public use was concerned, and it was not until a king of France was sickened to the point of vomiting by the odor of mud stirred by a passing vehicle that pavements began to be laid in Paris. The ‘spread of epidemics in the Middle Ages was doubtless helped along by the absence of pavements. The 18th century did not show much of an advance in this respect, and the records of New York prove that streets in the very heart of the city were in a condition that in these days would be most intolerable. Pav¬ ing is costly and the cities and towns of the colonial period, and for many years after, were governed with rigid and often shortsighted economy. It was not until the 19th century that paving came to be regarded as otherwise than a luxury, to be indulged in only when the de¬ mands of traffic made it cheaper to pave the

streets than to flounder through mud-holes and climb over hillocks.

The necessity of street-paving is no longer a subject of discussion. It is regarded as much a requirement of settled communities as water and public lighting, and without it the enormous traffic of leading urban thoroughfares would be impossible. The only questions are as to which pavements are best, and the problem is one for the individual

engineer on the individual job.

In the endeavor to secure a durable and therefore economical pavement for each partic¬ ular locality, with due regard to future as well as present traffic, many kinds of resistent ma¬ terials have been experimented with. Cast iron, at one time believed to be the ideal pavement, was soon discarded. The pavements now in favor include stone blocks (granite or trap-rock), wood blocks, vitrified brick, bituminous concrete or bitulithic, cement concrete and broken stone (Telford or Macadam).

Much of the recent advance in the art of lay¬ ing pavements has been due to the study of the functions of the pavement foundation. Formerly a hard earth bottom covered with a thick layer of sharp, clean sand was the engineer's desidera¬ tum. This practice has been superseded by the cement concrete foundation laid four to 12 inches thick according to the weight of traffic to be sustained. On this any of the various pavements excepting only the broken stone may be laid. This type of foundation is generally constructed as a monolith, but sometimes the loose stone of the concrete is put in place and then grouted. In either case the surface is as carefully crowned as is the finished pavement. Concrete mixing machines make the work rapid and much less costly than formerly. The machines not only mix the material, but also de¬ posit it anywhere in the width of an ordinary street. On wide streets two machines are used. In this way hand labor has been reduced to a minimum. The concrete foundation is allowed to set hard, which requires several days. If stone blocks or wood blocks or vitrified brick are to be used as the pavement, a layer of sand about an inch deep is spread over the founda¬ tion, just enough to bed the blocks. When the pavement is in place, fine gravel is worked into the crevices so as to fill them a'bout one-third of their depth, and hot liquid asphalt is' poured into that level. This operation is twice re¬ peated, thus filling the crevices to the pavement level with an absolutely waterproof binder. An asphalt pavement is laid upon the same foundation, the asphalt being mixed with crushed stone and spread in a layer some six inches deep, and solidified while still hot with a steam roller. Upon this layer is spread a two-inch layer of a sandy texture and a little richer in asphalt. The bitulithic pavement differs from the ordinary asphalt type in being a true bitumen concrete. The aggregate is made up of stone of various sizes: — to quote from a recent specification: (<Not more than 11 nor less than 5 per cent to pass 200-mesh; from 18 to 30 per cent to pass 40-mesh; from 25 to 55 per cent to pass 10-mesh screen; from 8 to 22 per cent to pass 4-mesh screen; not more than 10 per cent to pass the 2-mesh screen. The bitu¬ men factor is stipulated to be at least 7 per

cent and not more than 11 per cent. This pave¬ ment is also laid hot and rolled down with a heavy steam roller.55

Concrete pavemenls are generally laid in monolithic form, a single layer the full thick¬ ness of the pavement. They are laid in sections with expansion joints between, the latter being filled with asphalt. They are also laid upon old and wornout pavements in the form of grouting. The Telford and Macadam pave¬ ments depend upon the natural binding char¬ acter of broken stone packed together. There is no foundation laid for this type, the larger stone being placed at the bottom, and the pave¬ ment built up with graded smaller pieces, and the whole covered with a top-dressing of finely crushed stone. These pavements are not water¬ proof, as are the others described, and drainage from the bottom of the navement must be pro¬ vided for.

1 he estimated life of a newlv laid granite block pavement is 25 years; its first cost (1914) about $3.50 per square yard; and the average cost of maintenance, 12 cents oer square yard. Treated wood ‘block pavement costs $3 to $3.50 per square yard, lasts 20 years, and costs 15 cents to 18 cents per yard to keep in repair. Vitrified brick costs $3 per square yard, lasts 15 years, and costs 24 cents a yard annually for repairs. Asphalt and bitulithic pavements cost from $2 to $2.35 per square yard, last about 18 years, and cost for annual repairs about 28 cents per yard. Telford and Macadam pavements cost about $1 per square yard, last about 10 years, and cost about 18 cents a yard for re¬ pairs for the first two or three years, and up to 50 cents a yard for the following years.

Bibliography.— Agg, T. R., (The Construc¬ tion of Roads and Pavements) (New York

1916) ; Blanchard, A. H.,, (Elements of High¬ way Engineering) (New York 1915) ; Byrne, A. T., (Modern Road Construction > (Chicago

1917) ; Mullen, C. A., (Paving Economy, Road and Street > (Montreal 1916) ; Spalding, F. P., (Textbook on Roads and Pavements)

(New York 1912) ; Tillson, G. W., (Street Paving and Paving Materials) (New York 1912).

PAVIA, pa-ve'a, Italy, (1) a city of Lom¬ bardy, 19 miles by rail southwest of Milan, cap¬ ital of a province of the same name. It is beautifully situated on the left bank of the Ticino, here crossed by a bridge of eight arches, about two miles above its confluence with the Po. The bridge, of stone and brick, is covered with a curious roof supported by 100 granite pillars. Until 1876 Pavia was surrounded by its mediaeval walls, three miles in circuit, which have been replaced by handsome boulevards and public gardens. The Corso Vittorio Emanuele traverses the city centrally from south to north and contains its most important edifices, of which the chief are the cathedral, a large, heavy, unfinished structure, begun in 1486, crowned with a lofty dome and containing some good paintings, and a beautiful side chapel with the tomb of Saint Augustine; San Michele, a heavy marble edifice in the Romanesque style belonging to the latter part of the 11th century; Santa Maria del Carmine, a fine brickwork, Gothic church of imposing exterior, built in 1375, and possessed of good pictures; Santa Maria di Canepanova, in the cinque-cento style, by Bramante; and San Francesco, a 14th cen¬ tury building, with a mutilated faqade of pure Italian Gothic. Other edifices deserving of notice are the Castello or Castle, erected by the Visconti, 1360-69, on the site of the old palace

of the Lombard kings, now fitted up as a bar¬ rack ; the municipal buildings ; and several towers, once so numerous that Pavia was surnamed <(the city of the hundred towers.® The university, founded, it is said, by Charlemagne in 774, is one of the oldest in Italy, and about the beginning of the 16th century was attended by about 3,000 students. It has faculties of law, philosophy, science and medicine. The build¬ ings have several quadrangles surrounded by handsome arcades embellished with statues, busts, etc.; the library has about 136,000 vol¬ umes, and the collections include, among others, an excellent anatomical museum. There are also three colleges, a gymnasium, an ecclesiasti¬ cal seminary, a school of painting, a school of design and sculpture and a municipal museum, an institute of fine arts ; also a botanical gar¬ den. The public monuments include a statue of Italia and a monument of Garibaldi (1884). The chief charitable endowments are a large general hospital and a military hospital. Pavia has numerous modern industrial establishments, including iron foundries, engineering works, electric supply works, chemical works and cement factories, and it does an extensive busi¬

ness in wine, oil, rice, cheese, silk and fruxt. About four miles north of the city is the Certosa di Pavia, an old Carthusian monastery, now classed as a <(national monument,® with a magnificent Gothic church adorned with a splendid faqade, among the finest decorative works of North Italy. Pavia was a place of considerable importance during the reign of Augustus. It afterward came into the posses¬ sion of the Lombard kings, who made it their capital and erected many edifices, more remark¬ able for magnitude than taste. Near it, on 24 Feb 1525, the Imperialists defeated the French and took their king, Francis I, prisoner. Pavia has given birth to many distinguished men, among whom were Pope John XIV and Lanfranc. Pop. about 40,000. (2) The province of Pavia,

which extends on both sides of the Po, has an area of 1,288 square miles.

PAVIA, a province of Italy, in the Lom¬ bardy country. Through it run the Po, Ticino and other northern streams. The land is generally level and has long been noted for its fertility. Historically it is one of the best known districts of Italy and has been the scene of many fierce struggles. It contains an area of about 1,290 square miles and a population of over 500,000. Its capital is Pavia (q.v.). Its principal products are cattle, silk cheese wine, rice and oil.

t . PAVIA, Philippines, pueblo, province of Iloilo, island of Panay; at the junction of the iigon and Aganan rivers, eight miles north¬ west of Iloilo, the provincial capital.

PAVILION, in architecture, a turret or small building, usually isolated, with a tent-like loof. The name is also applied to a projecting portion of any building having a tent roof. The term pavilion was originally applied to any light open structure with a roof or canopy so provided as to give protection. It was so called on account of its butterfly appearance. This sense of the word is also used in the name pavilion hospitals® applied to the wings of hospitals. French architects call a prominently high, narrow portion of a building, especially if it has a high roof, a pavilion. See Tent.

PAVING. See Pavements.

PAVISE, pav'is, or PAVISOR, in the Mid¬ dle Ages, a large shield covering the entire body, and carried'by a soldier for his own pro¬ tection, as well as that of the archer before whom he stationed himself. The pavise was often six feet in height.

PAVLOV, a volcano of the Alaskan Penin¬ sula in long. 160°W., with an elevation of 7,500 feet above-sea-level. Its last active period was in 1903.

PAVY'S SOLUTION, a modification of the well-known Fehling's solution for the volu¬ metric determination of glucose and other re¬ ducing sugars, so named from Frederick Wil¬ liam Pavy 1829-1911, the English physician-specialist, author of (Researches on the Nature and Treatment of Diabetes' (London 1862), *etc.* An alkaline copper sulphate solution similar to a Fehling's solution is made to which a suffi¬ cient quantity of ammonia water is added to hold in solution all the copper when precipitated as cuprous oxide. The <(end point® of the analysis is determined by the disappearance of the blue color of the solution. See Fehling's Solution.

PAWN. See Pledge.

PAWNBROKERS (from ((pfant,® (<pawn,® a pledge, Old English), a class of small shop¬ keepers whose business is the loaning of money on personal pledges. In the United States and in Great Britain the business has assumed large proportions especially in the crowded sections of. metropolitan cities. The usury and other abuses to which the necessities of borrowers of this class are liable has led on the Continent to the establishment of charitable institutions (see Mjont-de-Piete) , where the business is conducted on benevolent principles. In Great Britain the same plan has been tried, but it has failed. The object which has been aimed at by monts-de-piete has here been at¬ tempted to be accomplished by placing the trade under certain legal restrictions. In most Latin countries and in Latin-American nations the pawnshops thrive to a degree unknown in English-speaking countries. There the pawn¬ shop may be said to be a national institution ; and the town must be a very small one indeed if it does not possess at least one pawnshop. In all Latin-American countries pawnshops are subject to strict legal restrictions; yet they do a thriving business in opposition to the govern¬ ment ((Montes de Piedad.® In the Middle Ages lending upon pledges was a trade almost ex¬ clusively pursued by Jews and

Lombards. In France, before the establishment of monts-de- piete, the trade was regulated by law. During the Revolution the monts-de-piete were at first abolished as a monopoly, but the abuses to which the restoration of private pledging gave rise soon led to their re-establishment and the prohibition of private pledging, which is still maintained.

The common law recognizes the property of the pawner in the goods he has pledged, which cannot be forfeited by, or taken in pledge for, the debts of the pawnee, who is responsible for their safe-keeping. On the other hand, the pawnee is recognized as having a qualified prop¬ erty in the goods, which cannot be put in exe¬ cution by a creditor of the pawner till the debt

for which they are pawned is satisfied. The property of goods of which the pawner is out¬ lawed is in the king. Perishable goods are at the risk of the pawner, if he does not redeem them in time. Goods pawned without a fixed time of redemption may be redeemed at any time within the life of the pawner. A broker who refuses to deliver goods pawned on tender of payment may be indicted. Both in Great Britain and the United States the pawnbroking busi¬ ness is regulated by law and in most States in this country licenses must be taken out and renewed annually. The pawnbroker is to use books and schedules as provided by law. The name and surname of the broker, together with the word (<pawnbroker,® are to be put in large characters over the outer door of his shop. The information to.be printed on pawn tickets must also be posted in a conspicuous part of his shop. Pawn tickets are to be given for pledges. Profits and charges are fixed by a schedule, of which the following are the principal provi¬ sions: Rate of interest on sums of $100 and under, 3 per cent per month or fraction of a month for the first six months and 2 per cent per month for the following six months ; on sums over $100, the rate is 2 per cent a month for the first six months and 1 per cent a month for the second six months. The ticket is good for one year only, but can be renewed upon payment of interest. If a person offers an article in pawn without giving a satisfactory account of the way in which he became possessed of it, or attempts to redeem an article without title, he may be detained by the broker and handed over to the police to be brought before a jus¬ tice and dealt with according to law. Goods entrusted to another by the owner for manu¬ facture, repair, etc., cannot be pawned ; and the owner may, on making oath that he believes a pawnbroker to have taken such goods, obtain a warrant to search his premises.

Under the law a poor person pawning a piece of jewelry valued at $20 is compelled to pay interest to the pawnbroker at the rate of $6 a year. In four years, if he requires the loan for such a length of time, he will have paid $24 interest or $4 more than the value of the loan. To relieve this condition of legal usury there was established in New York city in 1891, a Provident Loan Society, with a main office and numerous branch offices, where under a special charter loans could be made at a reduced rate of interest. The Provident Loan Society was organized by a number of New York philan¬ thropists for the express purpose of relieving the poorer classes. Its capital was increased in 1910 to $5,000,000. The society has met with great popularity and while primarily a chari¬ table enterprise, has been conducted at a small profit. The Provident Society rate of interest is 1 per cent a month or any fraction thereof, on small loans and 10 per cent a year on larger loans. A loan of $20 costs the borrower $2 a year as against $6 charged by the pawnbroker. The monts-de-piete of France are associated with hospitals, charity bureaus and city and town councils. The highest interest charged by them is 1 per cent a month : and in many cases, where the ((mont® is endowed, little or no in¬ terest is exacted. In Belgium the French sys¬ tem of monts-de-piete is followed and in both countries it is illegal for private individuals to

carry on a pawnbroking business. In Paris and some other large cities the “monts® act as sav¬ ings banks for laboring classes.

In Germany any city may prohibit pawn¬ shops ; and many have done so. By law there are German government, municipal and private pawn shops. One of the oldest of the Imperial pawnshops of Europe is that of Vienna known as the “Imperial Pawn Shop.® It was founded by Joseph I in 1707. In Russia the pawnshop business has long been in the hands of individ¬ uals; and there are only two cities in the em¬ pire, P etrograd and Moscow, which have na¬ tional pawnshops. (See Government Pawn¬ shops in France). Consult Levine, S. W., ‘A Treatise on the Law of Pawnbroking) (New York 1911) ; (The Business of Pawnbroking> York 1913) ; Tyler, R. H., (Usury, Pawns or Pledges

} (Albany 1873) ; ‘Report of Her Majesty s Representatives Abroad on Systems of Pawnbroking in Various Countries) (Lon¬ don 1894) ; United States Bulletin of the De¬ partment of Labor, No. 21 (Washington 1899).

PAWNEE INDIANS, (the “horn-wearers,® a name originating from their peculiar manner of wearing their hair), an American tribal con¬ federacy belonging to the Caddoan family. The Pawnees called themselves “Chahiksichhiks ,» “Men of Men.® They formerly resided in large numbers in the region now known as Nebraska, with cognate branches extending as far south as Texas. They were in constant warefare with every surrounding tribe, with the exception of the Omahas, Poncas and Otos. The Pawnees were known to the Spaniards as early as 1626 . and they are noted on Marquette’s map of 1673. By the ordinance of 1709 the enslavement of Negroes and Pawnees was made legal in Canada. Half a century earlier the settlers in New Mexico had already become well ac¬ quainted with the Pawnees, who frequently raided their settlements to secure horses, arms, clothing and provisions. This hostile attitude of the Pawnees continued for more than 200 years. Gradually however, they came into closer contact with the traders, who introduced among them the vices of white civilization ; and when the Louisiana Purchase agreement trans¬ ferred their territory to the United States, they were brought into still closer relationship with the whites in all the region lying between their home and Saint Louis, then the great Indian trading centre of the middle west. The trails to the west and to the southwest which passed through ‘the Pawnee country helped still more to accentuate the changes which had already begun to take place in the people who continued their f i iendly relations with the whites, when practi¬ cally all the other Indian tribes of the west were opposing the westward march of civilization. Many of them rendered good service as scouts in the United States army. Numerous treaties have been made and kept between the Pawnees and the American government. In 1818 most of the Pawnee tribes met in Saint Louis and concluded a peace with the United States and seven years later they recognized the sover¬ eignty of the United States over themselves and their lands; and by various other subse¬ quent treaties and agreements they gave up their right to the vast territory that they once lorded over. In 1876 the tribes finally removed to their reservation in Oklahoma where they

now reside. Sixteen years later they divided up their lands pro persona and became Ameri¬ can citizens.

The religion of the Pawnees was one of the most interesting of the aboriginal tribes of the United States. They were nature worshipers and they personified the winds, the storms and the elements in general, all of which were mes¬ sengers and attendants of Tirawa, the great Father. Their religious observances included several series of elaborate and picturesque cere¬ monies all of which were in charge of a power¬ ful priesthood. The Pawnee people were imagi¬ native and their ceremonies, myths and folk¬ tales are rich in symbolism and imagination. They also had numerous secret societies con¬ nected with their religious rites, ceremonies and superstitions. They cultivated Indian corn, pumpkins and beans, gathered wild rice and fruit and prepared jerked buffalo and other meats for winter use. They were excellent weavers, made pottery and artistic baskets and constructed warm and durable earth houses. In 1838 the Pawnees were estimated at over 10,- 000, while other estimates made them over 12,- 000. They now number probably less than 1,000. Consult Dorsey, G. A., 'The Pawnee-Mythology^ 'Traditions of the Skidi Pawnee) (1904); Dunbar, 'Pawnee Indians> (1880); Fletcher, 'The Hako> (1903); Grinnell, 'Paw¬ nee Hero Stories) (1889) ; Winship, 'Coronado Expedition > (1896).

PAWNEE ROCK. A rocky bluff jutting out into the valley of Arkansas River a short distance from the village of Pawnee Rock, Kan. It is on the old Santa Fe trail and is famous for having been the scene of many en¬ counters between the Indians and whites. The names and initials of travelers, from the early trappers to the forty-niners, are scratched on the. smooth ledges of Dakota sandstone of which the rock consists.

PAWNSHOPS IN FRANCE. See Gov¬ ernment Pawnshops in France.

pa-lux et, k. 1., city in Providence County, on both sides of the Blackstone River, at the head of deep-water navigation on the Pawtucket River and on the Aew York, New Haven and Hartford Railroad, four miles north of the business centre of Providence, and about 40 miles south by west of Boston. The city is connected by electric lines with many parts of Providence 'and with the nearby cities and towns. A fall of 50 feet in the Blackstone River at this place, together with the _ rapids, furnishes extensive water power which has been iustrumental in making Pawtucket an important manufacturing centre. The area is about nine square miles. Pawtucket was settled about 1654. The part of the city on the east side of the river was originally in Bristol County, Mass. In 1862 it came into pos¬ session of Rhode Island. The west part of the city was a village in the town of

North Provi-fcnce‘0-Ln J8‘4 this town was divided and the East Side and “West Side® were incorporated as a town, and chartered as a city in 1886

A-if?7nory lystem of Rhode Island began Apnl 179(J when a copartnership was estab¬ lished in Pawtucket for carrying on the spin¬ ning of cotton. Samuel Slater (qv) one of the partners, constructed a complete set of machines on which was made the first cotton

thread spun by water power in the United States. The first cotton factory building, which was the first in the United States, is still stand¬ ing. The chief manufactories are cotton and woolen mills, silk factories, foundries., machine shops, electrical supply works, wire works, yarn mills, hosiery mills, knit-goods factories, textile dyeing and finishing establishments, meat-pack¬ ing plants, lumber mills and lumber products, factories, boot and shoe factories, jewelry works, paper and wagon and carriage factories. The city receives annually large quantities of lumber, shingles and lath, cotton, coal, building-stone, brick, lime and cement. The Federal census for 1909 gives for Pawtucket over 300 manufacturing establishments, having a com¬ bined capital of over $40,000,000; over 16,000 employees ; products, $37,696,000. The increase from 1904 on the value of products was 47 per cent; increase of number of establishments, 26 per cent. Pawtucket has numerous fine churches and public and parish schools, a high school, English and classic school (private), a public library, founded* in 1876, and several private business and industrial schools. Its proximity to Providence gives Pawtucket the advantage of the educational institutions of that city. It has one Home for the Aged Poor (Roman Catholic), the Emergency State Hos¬ pital and societies for the amelioration of the poor. Several fine bridges cross the river. It has a State armory, Dagget Park and several other smaller parks or squares which beautify the city. A number of the business buildings and blocks have considerable architectural merit. The annual municipal expenditures for main¬ tenance and operation are about

$840,000. The chief items of expense are, for schools, $243,000; for waterworks, $78,000; for police department, including truancy, etc., $73,000 ; fire department, $86,000 ; municipal lighting, $39,200. The city owns and operates the waterworks, which were opened in 1878, and. which cost originally $1,333,000, and have since been enlarged at a cost of $500,000. Pop. (1920) 64,248. Consult Davis (ed.), (The New England States/ Vol. IV, pp. 2,533-2,534; Greene (ed.), (The Provi¬ dence Plantations) ; Grieve, Robert, Ullustrated History of Pawtucket y (Pawtucket 1897).

PAX, in Latin, peace, (1) in Roman myth¬ ology, the goddess of peace; (2) in ecclesiastics, a utensil in the Roman Catholic Church, formed usually of a plate of metal, chased, engraved or inlaid with figures representing the Virgin and Child, the crucifixion, etc., which, having been kissed by the priest during the Agnus Dei of the high mass, is handed to the acolyte, who presents it to be kissed by each of the ecclesi¬ astics officiating, saying to them Pax tecum (peace to thee). The decorations of the pax. are frequently very rich. The <(kiss of peace" was a custom or ceremony in use at very early times among Christians; and it would seem that it arose out of the practice of the men, women and children of the Christian sect saluting one another with kisses when they met together for public worship. This is more than probable since kissing in this way was an Oriental cus¬ tom to which the Jews had taken previous to the Christian era.

PAXO, pak'so (ancient Paxos, pak'sSs), the smallest of the seven Ionian Islands (q.v.), lying eight miles southeast of Corfu. It is

rocky, rises to a height of 800 feet, and has no fresh water supply, but is fertile, producing excellent olive oil, citrons, oranges and almonds. Facing it is the island of Antipaxos, which with it forms an eparchy in the administrative nome of Kerkyra, an island to which both Paxos and Antipaxos belonged in ancient times. Area, seven square miles; pop. about 5,000. Consult Ludwig Salvator, (Paxos und Antipaxos im Ionischen MeereP

PAXSON, Frederick Logan, American historian : b. Philadelphia, 23 Feb. 1877. In 1898 he was graduated at the University of Penn¬ sylvania and subsequently studied at Harvard. In 1903-06 he was connected with the depart¬ ment of history of the University of Colorado. In 1906 he was appointed assistant professor of American history, in 1907 junior professor at the University of Michigan, since 1910 he has been professor of American history at the Uni¬ versity of

Wisconsin. He also taught Ameri¬ can history at the summer sessions of the Uni¬ versity of Chicago (1909), California (1913), Michigan (1915) and Pennsylvania (1917). In 1910 Mr. Paxson was research associate of the Carnegie Institution. He has published (The Independence of the South American Republics> (1903) ; (The Last American Frontier > (1910) ; *The Civil War> (1911); (The New Nation) (1915) ;* Guide to Materials for United States History since 1783, in London Archives) (1914), with C. O. Paullin ; also reviews and papers on American diplomacy, transportation and the history of the far West. He edited the (War Dictionary) (1917, pub¬ lished by the Committee of Public Informa¬ tion).

PAXTON, paks'ton, Sir Joseph, English landscape-gardener and architect: b. Milton-Bryant, near Woburn, Bedfordshire, 3 Aug. 1801; d. Sydenham, 8 June 1865. He became superintendent of the gardens of the Duke of Devonshire at Chatsworth, in Derbyshire, where he designed the great conservatories. He also designed the Crystal Palace for the London International Exhibition in 1851, and soon after was knighted. In 1853-54 he superintended the erection of the new Crystal ' Palace at Syden¬ ham. He was a Liberal member of Parliament for Coventry from 1854 until his death. He edited the horticultural Register } ; the Maga¬ zine of Botany) ; the (Cottage Calendar) ; and was the author with Lindley of a (Botanical Dictionary) (1840); and (Paxton's Flower Garden) (1850-53), and independently of (A Practical Treatise on the Cultivation of the Dahlia) (1838).

PAXTON, William McGregor, American artist: b. Baltimore, Md., 22 June 1869. He studied under Bunker in Boston and at the Lcole des Beaux-Arts of Paris. He painted a portrait of President Cleveland and portraits of mftny other prominent persons. He has ex¬ hibited at leading exhibitions in the United States and is represented in the permanent col¬ lections of the Metropolitan Museum of Art and the Pennsylvania Academy of Fine Arts, the Boston Museum of Fine Arts, the Corcoran Gallery, Washington, D. C., and the Cincinnati Museum of Art. In Philadelnhia is his (Girl • Sweeping) and in New York (Tea Leaves) and (Sylvia.)

PAXTON, Ill., city, county-seat of Ford County on the Illinois Central and the Lake Erie and Western railroads, 81 miles east of Peoria. It is in an agricultural region, a ship¬ ping point for farm produce and livestock and contains flour mills, brick and tile works, car¬ riage, canning, furniture, broom and tile fac¬ tories. It is the seat of the Rice Collegiate In¬ stitute, a coeducational secondary school under the auspices of the Congregational church. It has waterworks and an electric-light plant, the former being owned by the city. Pop. about

3,000.

PAYAGUA (pa-ya-gwa') INDIANS, a

South American tribe residing in Paraguay. They were formerly very numerous in the Chaco region near Asuncion. They live in the swampy and wooded regions and consequently did not so much feel the pressure of civilization. Of late years they have decreased through absorp¬ tion into the mestzos. The Payagua, also spelled Payaya, was a very prominent Cohuilte-can tribe who occupied the region of Texas along the San Antonio River. Their head¬ quarters were near the site of the present city of San Antonio when they were first known by the whites. At the time when the Spanish mis¬ sionaries were colonizing and Christianizing Southern Texas the Payagua occupied territory from the Rio Grande to the Brazos. They be¬ came very much attached to the missionaries and took to mission life. Later on they seem to have been, at last, partially fused with the Xarame whom the priests had moved, with the mission, from the Rio Grande northward into the neighborhood of San Antonio. Both tribes have become extinct, at least in so far as main¬ taining any tribal organization is concerned.

PAYER, pi'er, Julius von, Austrian painter and Arctic explorer: b. Schonau (near Teplitz)

1 Sept. 1842; d. 1915. Educated at the military college of Wiener-Neustadt, he entered the Austrian army in 1859, and distinguished him¬ self at Custozza. While stationed in northern Italy he explored several groups of mountains in the Alpine region ; in 1869-70 took a promi¬ nent part in the second German north-pole ex¬ pedition ; and with Weyprecht directed an Austrian polar expedition which penetrated the sea between Nova Zembla and Spitzbergen and reached

79° north latitude (1871). In 1872 Payer and Weyprecht in a second expedition were hemmed in north of Nova Zembla in lat. 76° 30' N. They discovered the archipelago which they called Franz Josef Land (q.v.) in honor of the emperor, and Payer made a sledge journey through it almost to lat. 83° N. (24 March-26 April). After his return in 1874, Payer withdrew from the military service, studied art, and in 1884 exhibited his first im¬ portant picture, (The Bay of DeathP Others of his works are (The Death of Franklin* ; Abandoning the Ship* ; (Religious Service* ; and his best, (Never to Return. *He won medals in Munich (1883), Berlin (1886), and Paris (1889). Among his writings is, (Die Osterreich-Ungarische Nordpolexpedition in den Jahren 1872-74* (1876).

PAYMASTER-GENERAL, in the United States navy, the chief officer of the Board of ' Supplies and Accounts. In the United States Marine Corps the paymaster-general is the chief officer of the pay department. In the British

government the paymaster-general is a civil officer having the grade of minister ex officio ; receiving the moneys appropriated by Parlia¬ ment for the various State departments, and disbursing them in accordance with the orders of Parliament. The actual work of his office is conducted by a permanent staff headed by the assistant paymaster-general.

PAYMENT, in law, the discharge of a legal obligation by the delivery of money, or whatever is accepted by a creditor in lieu of money; but the creditor is not required, by law, to accept anything in payment exceot legal tender money. Payment should be made at the exact time and place agreed upon, or implied by law. Where no place of payment is designated the debtor must seek the creditor. If he fails to do this he may be considered in default. The effect of a valid payment is to discharge the debtor from his obligation. Payment must be made to the proper party, either to the person to whom the debt is due, or to his legal repre¬ sentative. In case of default of payment the creditor is entitled to proceed by process of law to enforce same. (See Contract). Where payment is made to one of several joint creditors, the debt is considered legally dis¬ charged even though the person receiving the money fails to account for it to his associates. See Debtor; Creditor; Legal Tender.

PAYN, pan, James, English novelist : b. Cheltenham, 28 Feb. 1830; d. London, 25 March 1898. He was educated at Eton and Cambridge and

was editor of Chambers' Journal, 1859-71. In 1882 he succeeded Leslie Stephen (q.v.) as editor of the Cornliill Magazine, retaining this position till 1896, when failing health obliged him to relinquish it. For many years he wrote exclusively for Chambers' Journal, and from 1888 the page of WVeekly Notes) in the Illus¬ trated London News was from his pen. The long series of his books begins with (Stories from Boccaccio) in 1852, and closes with (The Backwater of Life,* which appeared in 1899, the 69th work of which he was the author. (Lost Sir Massingberd) (1864) is the best known of his works, and its appearance in Chambers' Journal raised the circulation of the periodical 20,000 copies, and permanently estab¬ lished his popularity. Though in no sense an imitator of Dickens, Payn was not a little in¬ fluenced by the manner of the elder novelist. He possessed a lively, fluent style, an abundant fund of humor, and many popular writers of the present owe to him in his editorial capacity the first recognition of their talents. He was as much read in this country as in his own, and among the best of his books may be cited in addition to those alreadv named: Garlyon's •Year) (1868); Gwendoline's Harvest* (1870); Gecyl's Tryst* (1872); (At Her Mercy* (1874); (Fallen Fortunes) (1876); (By Proxy* (1876) ; (A Grape from a Thorn) (1881) ; (The Heir of the Ages) (1886); (The Eavesdrop¬ pers *(1888) ; Gleams of Memory* (1894) • (The Burnt Million> (1894) ; (In Market Overt* (1895); Another Burden) (1897); (The Backwater of Life) (1899, a collection of essays published after his death).

PAYNE, Charles Henry, American Metho¬ dist Episcopal clergyman and educator: b. Taunton, Mass., 1830; d. 1899. In 1856 he was graduated at Wesleyan University and subse-

quently studied at the Concord (N. H.) Biblical Institute. In 1857 he entered the ministry of the Methodist Episcopal Church. He held pastorates until 1876 and from 1876 to 1888 he was president of Ohio Wesleyan University. Thereafter until his death he was secretary of the Board of Education of the Methodist Epis¬ copal Church. In 1876 Dr. Payne served on the committee of revision of the (Methodist Hymnal.

) He published (Guides and Guards in Character Building.)

PAYNE, David L., American soldier, pio¬ neer and adventurer : ‘b. near Fairmont, Grant County, Ind., 30 Dec. 1836; d. Wellington, Kan., 27 Nov. 1884. His mother was a first cousin of Davy Crockett (q.v.). His education was meagre as that of the average country lad of his times but he was always an eager reader. At the age of 21, he became a pioneer in Doniphan County, Kan. He entered the volunteer military service as a private at the outbreak of the Civil War and served three years. In 1864 he was elected to the State legislature and also served as a captain of militia during the Price Raid. He again en¬ tered the army as a private in the 18th Regi¬ ment of the United States Veteran Reserve Corps, with which he was at Appomattox. In 1867 he was commissioned captain of a troop of cavalry in the 18th Kansas battalion, which was recruited and organized for service against the Indians of the plains. In 1868, he received a similar commission in the 19th Kansas Regi¬ ment, raised for a similar purpose. In 1870, he settled on a homestead in Sedgwick County, Kan., whence he was sent to the State legisla¬ ture in 1871. He then spent several years in the Rocky Mountains. Afterward he secured employment as an assistant doorkeeper of the House of Representatives, at Washington, until the summer of 1879, when he returned to Kansas and became interested in the movement to settle on vacant public lands in the Indian Territory. He soon became the recognized leader of the “Oklahoma movement, ® as it was known and, during the ensuing five years, was almost constantly employed in organizing and agitating the proposed settlement in the for¬ bidden lands. He led no less than eight in¬ vasions into the Oklahoma country, being ar¬ rested and removed as an intruder in each case by the Federal authorities. Essentially a sol¬ dier of fortune, outwardly frank and generous, of robust and picturesque physique and pos¬ sessed of a personality that was not lacking in magnetism, he easily became a hero in the eyes of the “colonists® or “Boomers,® as his followers were called, and they believed him capable of martyrdom in a holy cause. With the cool calculation of a demagogue and the swagger of a knight errant he combined the talent of an actor which enabled him to artfully play his part to the end. Yet, notwithstanding his obliquities and shortcomings, his success as an agitator made possible the opening of Okla¬ homa to white settlement much sooner than it would have been done otherwise and his pic¬ turesque career in that capacity was so unique as to insure him an indisputable place in the history of that State. While organizing another “colony® to invade Oklahoma, Payne died very suddenly. Payne County, Okla., was named in his honor.

PAYNE, Henry B., American statesman : b. Hamilton, N. Y., 30 Nov. 1810; d.

Cleveland, Ohio, 9 Sept. 1896. He was gradu¬ ated from Hamilton College in 1832, studied law and in 1834 removed to Cleveland, where he was admitted to the bar and established a law practice. In 1846 he entered politics, was State senator in 1849, and in 1860 attended the Charleston Convention, where he vainly en¬ deavored to check secession sentiment. Through¬ out the war he was a strong Union man, and in 1872 was a member of the convention which nominated Horace Greeley for President. He was elected to Congress in 1874, in 1880 and 1884 was a candidate for the Democratic presi¬ dential nomination, and in 1885-91 was United States senator. He was for many years actively connected with industrial, railway, mining and other enterprises.

PAYNE, Henry Clay, American financier and politician: b. Ashfield, Mass., 23 Nov. 1843; d. Washington, D. C., 4 Oct. 1904. He was edu¬ cated at Shelburne Falls Academy, Mass. ; in 1863 went to Milwaukee, Wis., where he entered business as cashier in a drygoods store, and rose from this position to be one of the leading business men and financiers of the State. From 1886 he was president of the Wisconsin Tele¬ phone Company, and from 1889 president of the Milwaukee Electric Light and Railway Company; he was president of the American Street Railway Association in 1893-94, and was appointed receiver for the Northern Pacific Railroad in 1893. He was also active in poli¬ tics and served as the secretary and chairman of the Republican county committee and of the State central committee. He was a member of the Republican national committee from 1880 till his death, and vice-chairman of the execu¬ tive committee. For years he attempted to have the representation of each State in the Republican national conventions based on the actual Republican vote and not the represen¬ tation of the State in Congress. From 1876— 86 he was postmaster of Milwaukee, and in 1902 was appointed United States Postmaster-General in President Roosevelt's cabinet, a posi¬ tion he retained till his death.

PAYNE, John, English poet and Oriental scholar: b. London, 23 Aug. 1842, and later re¬ tired to private life to devote his life to liter¬ ature. He studied for the bar and became a solicitor. He was one of a group of English verse-writers, including: also O'Shaughnessy (q.v.) and Marzilos (q.v.), that followed the leadership of the pre-Raphaelite poets. Among his original volumes are (A Masque of Shadows) (1871)

; ‘Intaglios* (1871); (Songs of Life and Death) (1872); (Lautrec) (1878); and (New Poems> (1880). He also made English ren¬ derings of Villon (1878), the (Arabian Nights) (1882-84) (Quatrains of Omar Khayyam*

(1898); and ‘Poems of Shemseddin Moham¬ med Hafiz of Shiraz) (1901); ‘Flowers of France) (poems from Ronsard and Saint-Amant (1907). See ‘Poetical Works of J. Payne) (2 vols., London 1902) ; Selections from the Poetry of John Payne* (New York

1906).

PAYNE, John Howard, American actor and dramatist, author of (Home, Sweet Home) : b. New York, 9 June 1791; d. Tunis, Africa,

10 April 1852. The date of his birth is com¬ monly given as 1792, evidently because of an effort on some one’s part to exaggerate his remarkable precocity, which was shown at 15, when, having left his boyhood home in Easthampton, Long Island, and having spent several years in Boston, where he was consumed with stage-fever, he became a clerk in a New York counting-house and spent his spare hours edit¬ ing The Thespian Mirror. After two years in Union College in 1809 he made his first ap¬ pearance on the stage as Young Norval in the Park Theatre, New York. A tour to London, 1812-13, followed, and there he wrote several dramas and adopted others, usually from the French. These are almost forgotten now. In (Clari, or the Maid of Milan, } an opera, ap¬ peared the song (Home, Sweet Home.) It was produced at the Covent Garden Theatre in 1823, and the music of the song was adapted by Henry R. Bishop from an old Italian melody. Payne knew intimately many English literary persons and corresponded with Coleridge and Lamb. In 1818 he brought out his very suc¬ cessful tragedy, (Brutus, > in which he would have taken the title role but for the objections of his manager, Kean, who became famous in the part. He renewed his labors as a critic of the stage, begun in The

Thespian Mirror, in London during 1826-27, as editor of The Opera Glass. He returned to New York in 1832, and in spite of the handsome sums received for (Brutus,) <Virginius) and (Charles the Second,) was continually in financial embarrassment. In 1841-45, and from 1851 to his death, he was United States consul at Tunis. His body was removed thence to Washington, D. C., in 1883. His homeless, wandering life adds pathos to his great and well-known song. Consult Brainard, C. H., (John Howard Payne) ; Harrison, Gabriel, (John Howard Payne) (1875), with an appendix containing Payne's juvenile poems and some of his dramatic criticisms; Hanson, W. T., (Early Life of John Howard Payne) (Boston 1913).

PAYNE, Joseph, English educator : b. Bury Saint Edmunds 1808; d. 1876. He gained an education practically through his own efforts, and in 1830 founded a grammar school for boys, which later became widely known as the Denmark Hill Grammar School. The Mansion House School at Leatherhead was founded by Mr. Payne in 1845. In 1872 Payne was ap¬ pointed professor of the theory and practice of education at the College of Preceptors. He condemned the Eton system as undemocratic and otherwise defective. He was the author of (Lectures on the Science and Art of Education> (1883) and (Lectures on the History of Education, with a Visit to German Schools>

(1892).

PAYNE, Oliver Hazard, American capital¬ ist : b. Cleveland, Ohio, 1842; d. 27 June 1917. In 1863 he was graduated at Yale University and served with the Ohio infantry in the Civil War, retiring with the rank of brigadier-general of volunteers in 1865. In the following year he entered the iron manufacturing field at Cleveland and subsequently added oil refining to his interests. After 1884 he carried on his business in New York. He was a director of the Standard Oil Company and of the American Tobacco Company. Mr. Payne also served as

vice-president of the Tennessee Coal, Iron and Railroad Company. He gave $500,000 to help establish the Cornell Medical School, and in 1913 endowed it with the sum of $4,500,000. The University of Virginia and Western Reserve were other institutions which benefited by Mr. Payne's gifts.

PAYNE, Sereno Elisha, American lawyer and legislator: b. Hamilton,

N. Y., 1843; d. 1914. In 1864 he was graduated at the Uni¬ versity of Rochester, studied law and in 1866 was admitted tp the bar. He became member of a law firm at Auburn and soon took an interest in Republican politics. He was suc¬ cessively city clerk, supervisor and district attorney of Cayuga County in the 70's, and from 1883 to his death was a member of Con¬ gress, with the exception of the 50th Congress. In 1899-1910 he was chairman of the Ways and Means Committee. He also attended all the Republican national conventions from 1892 until his death. He was a member of the Joint High Commission which met to arrange a reciprocity treaty with Canada. Payne was prominent in all tariff legislation during his time in Congress. He was a conservative of the old type and toward the close of his life found himself at odds with the progressive rank and file of his party. He received the honor of a state funeral in the House of Representatives.

PAYNE, Will, journalist and novelist : b. Whiteside County, Ill., 9 Jan. 1865. He went to Chicago from Nebraska in 1890 and began his career on the Daily News; in 1896 was financial editor of the Chronicle; 1897-1904 financial editor of The Economist. He published (Jerry the Dreamer> (1896); (The Money Captain> (1898); (The Story of Eva) (1901) ; (On Fortune's Road> (1902) ; <Mr. Salt> (1903); (When Love Speaks) (1906); (The Automatic Capitalist) (1909) ; (The Losing Game) (1909) ; and contributed numer¬ ous short stories tp leading magazines.

PAYNE, William Harold, American edu¬ cator: b. Farmington, N. Y., 12 May 1836; d. 1907. He was educated in the New York Con¬ ference Seminary. In 1858-79 he was State su¬ perintendent of the public schools of Michigan and in 1879-88 was professor of science and the art of teaching at the University of Michigan. He was president of Peabody Normal College in 1888-1901, when he was recalled to the Univer¬ sity of Michigan. He made translations of vari¬ ous pedagogical works, published monographs and addresses on educational matters, and wrote (School Supervision;) 'Education of Teach¬ ers); (Educational Doctrine); 'Contributions to the Science of Education.) He translated three of Compayre's best known works into English : 'History of Pedagogy) ; (Lectures on Teach¬ ing) ; (Elements of Psychology.)

PAYNE, William Morton, American liter¬ ary critic: b. Newburyport, Mass., 14 Feb. 1858; d. 11 July 1919. He was educated in the public schools; in 1874-76 was assistant librarian in the Chicago Public Library; after 1876 a teacher in the high schools of Chicago ; in 1884-88 liter¬ ary editor of the Chicago Morning News, and of the

Evening Journal 1888-92. From 1892-1915 he was associate editor of The Dial. He was lecturer on literature in the University of Wis-

COjS*iVn 1900 and in the universities of Chicago and Kansas in 1904, and became known as a critic of the modern prose and poetrv of differ¬ ent countries. He published (The New Educa¬ tion (1884); (Little Leaders) (1895); ‘Vari¬ ous Views’ (1902) ; ‘Editorial Echoes’ (1902) ;

(The Greater English Poets of the Nineteenth Century’ (1907); ‘Bjornstierne Bjornson’ (1910); ‘Leading American Essayists’ (1910). He also made translations from the Norwegian and contributed to numerous magazines.

PAYNE-SMITH, Robert, English theo¬ logian and oriental scholar: b. Chipping Camp-den, Gloucestershire, November 1818; d. Can¬ terbury, 1 April 1895. He was educated at Ox¬ ford where he gained tne Sanskrit scholarship in 1840 and a Hebrew scholarship in 1843. After taking orders in the English Church he spent a few years in parochial work, and in 1857 was appointed sub-librarian at the Bodleian library. He was regius professor of divinity at Oxford 1865-70, in the year last named be¬ coming dean of Canterbury. He was a mem¬ ber of the Old Testament Revision committee and belonged to the evangelical party in the Establishment. His greatest work was the ‘Thesaurus Syriacus’ (1868 et seq.), and among his other publications are ‘The Authen¬ ticity and Messianic Interpretation of the Prophecies of Isaiah Vindicated’; ‘Prophecy: a Preparation for Christ’ ; ‘Saint Cyril’s Com¬ mentary on Saint Luke’s Gospel’ ; ‘The

Third Part of the Ecclesiastical History of John, Bishop of Ephesus, now first Translated from the Original Syriac.' He also wrote commen¬ taries on Daniel, Genesis, Jeremiah and Sam¬ uel.

PAYSANDU, pi-san-doo', a port and de¬ partment of Uruguay, and its capital. The city, situated on a hill above the juncture of the San Francisco and the Uruguay, lies 170 miles north of Buenos Aires, with which, as well as with Montevideo, it has steamboat connections. A railroad runs to Montevideo and Salto. Founded in 1782 the city is well built and healthy, ranks all the Uruguayan cities except Montevideo in population, has a good educa¬ tional system, is the seat of several consuls and an American commercial agent, and is one of the great slaughtering and packing centres of the region. From there come the famous Pay-sandu ox-tongues. Pop. about 30,000.

PAYSON, Edward, American Congrega¬ tional minister: b. Rindge, N. H., 1783; d. 1827. In 1803 he was graduated at Harvard subse¬ quently studied theology with his father, who was pastor at Rindge. In 1807 he was appointed pastor at Portland, Me., where he remained until his death, 20 years later. He published several volumes of sermons, which were very popular and caused their author to have more than a local reputation. Asa Cummings pub¬ lished his complete works with a memoir (3 vols., Philadelphia 1846 ; 2d ed., 1859).

PAYSON, William Farquhar, American author: b. New York, 18 Feb. 1876. He studied at Columbia University, and from 1893-95 was on the staff of the New York Times. For two years he was managing editor of Vogue, and then took up work as literary adviser and vice-president of the Sturgis and Walton Company, publishers (1909-13). Among his publications are 'The Copymaker' (1897); 'The Title-

mongers' (1898) ; 'John Vytal' (1901) ; 'The Triumph of Life' (1903); 'Debonnaire' (1904), which in its dramatic form played throughout the United States in 1905—06 ; 'Barry Gordon' (1908) ; 'Periwinkle' (1910) ; 'Love Letters of a Divorced Couple' (1915).

PAYTA, pl'ta, PAITA, Peru, town and port of the northern part of the country, situated in a sort of amphitheatre about the bay. The city is little more than a port for Piura (q.v.), about 35 miles distant, within which a railroad nearly 60 miles long connects Payta. The harbor is excellent and the exports of cotton, tobacco, hides, hats and salt reach an annual value of about $6,000,000. There is an American consul in the town. Payta was sacked by the pirate Anson in 1741 and was

nearly wrecked in 1877 by a heavy fall of rain, reputed the first for 30 years. Pop. (estimated) over 5,000.

PAZ soldAn, pas sol-dan', Mariano Felipe, Peruvian geographer and historian: b. Arequipa, Peru, August 1821 ; d. Lima, Peru, 3i Dec. 1886. He was graduated in law at Are¬ quipa in 1847 and established himself at Lima where he was connected with various govern¬ ment offices, and was at one time secretary to the Peruvian legation at Colombia. He visited the United States in 1853 in order that he might inspect the prison systems, and afterward as di¬ rector of public works succeeded in making re¬ forms in Peruvian prisons. Under President Castilla he was Minister of Foreign Affairs, and Minister of Justice under Balta. He wrote 'Atlas geografico del Peru' (1861) ; 'Historia del Peru' (1866) ; 'Diceionario geo¬ grafico estadistico del Peru (1877) ; 'Historia de la Guerra del Pacifico' (1884).

PAZARDJIK, generally known as Tartar Pazardjik, a town of Bulgaria, in Rumelia, 25 miles northwest of Varna, with famous fairs in April. Pop. about 17,000.

PAZMANY, Peter, Hungarian clergyman and author: b. Grosswardein, 1570; d. 1637. At the age of 13 he became a convert to the Roman Catholic Church and in 1587 became a member of the Jesuit Order. Pazmany was the ablest leader of those opposed to the so-called Reformation in Hungary. He was suc¬ cessively provost of Furocz, bishop of Nyitra, archbishop of Esztergom, and after 1629 cardi¬ nal primate of Hungary. He founded the Paz-maneum in 1623 and in other ways did much for the cause of education in Hungary. Consult his works edited by Bognar (Budapest 1894 et seq.) and Schwicker, 'Peter Pazmany' (Cologne

1888).

PAZZI, pat'se, a wealthy and influential Florentine family which, led by one of its mem¬ bers, Jacopo Pazzi, was implicated in a con¬ spiracy against Lorenzo and Guiliano de Medici in 1478. The plot failed and Jacopo Pazzi and his accomplices were executed.

PEA, an annual vine (Pisum sativum) of the family Fabacece, commonly grown in gar¬ dens all over the world. Its botanical variety arvense is the field pea. Except in the color of the flowers — white in the garden sorts and various tints of blue in the field varieties — and in the seeds, the two are nearly alike in appear-ence, since both are

climbing vines with pinnate leaves, the odd terminal leaflet being replaced by a branching tendril. From its home in western

Asia and adjacent Europe, the pea has been taken by man to all civilized countries, but suc¬ ceeds best in cool climates. It has been cultivated since very early times, its seeds being found in Egyptian tombs, and has developed a very large number of varieties, most of which, because of the plant's great tendency to vary, have disap¬ peared, yet about 200 varieties of garden peas are offered annually by American seedsmen. These may be divided into early, medium and late; dwarf, half-dwarfed and tall; smooth-seeded and wrinkle-seeded; those with edible pods and those whose pods are not eaten by man. The wrinkle-seeded varieties are gener¬ ally considered superior in flavor to the smooth-seeded, though the "marrowfat® varieties are highly prized by many people. The edible-podded sorts, which are prepared for the table like string-beans, are less popular in the United States than they deserve to be. In general the low-growing, quick-maturing varieties are most popular among market-gardeners. The so-called French peas (petits pois) are known to gardeners as the French canner or Turkey pea. The garden varieties are grown mainly for their immature seeds which are used as a vege¬ table ; the field sorts are more widely em¬ ployed as "split® peas for soup-making, *etc.* They are also largely used ground for stock food, but for this purpose the meal is generally mixed with other meal to lessen its soddenness. The dried garden peas are also used for soups. The vines of both kinds make excellent fodder and hay, for which purposes peas are often grown with barley or oats. The dried mature vines are used for bedding farm animals.

Peas thrive best upon fairly rich, well drained, loamy soils ranging in quality from heavy clay to light sandy loam, but not very well upon gravelly or sandy soils. They must not be over-supplied with nitrogenous plant-food, because this tends to rankness of vine at the expense of productivity. The fertilizers are preferably applied during the previous year, and the ground is plowed in late autumn and left

rough until the spring, when, as soon as the ground can be worked, harrowing and seeding should be done. Spring plowing is also frequently practised. The seed should be sown an inch or two deep, in drills varying in distance apart with the height of the vines, the usual dis¬ tance being equal to the height. The tall grow¬ ing varieties are generally supported with “brush® or wire trellises. Except in keeping the surface clean and loose no cultivation should be given since unnecessary disturbance of the soil injures the roots. Field-peas are generally broadcast, but when drilling machines which do not split the seed can be used they are pref¬ erable. The plants are hardy,” being able to withstand light frosts without injury. They do not, however, succeed well in hot, dry weather, being subject to wilting and mildew, the tall kinds especially. The northern United States and Canada are the chief sources of dried peas in the markets, and these regions furnish prac¬ tically all of the seed sold by American seedsmen.

Peas, either green or mature, are highly prized as food for man and animals. They are rich in protein and are readily digestible when cooked until they become soft. Immense quan¬ tities of green peas are canned, the chief local¬ ities of this industry being Maryland, Delaware,

and New Jersey, where special mahchinery is used not only in their cultivation but in their preparation for canning. Perhaps the most re¬ markable machine is the “viner,® into which the vines are fed as they come from the field, and in which revolving beaters and cylinders re¬ move the green seeds as satisfactorily as a pea-thresher separates the dry one from their pods and vines. The average percentage composi¬ tion of dried peas is: Carbohydrates, 62.0; protein, 24.6; water, 9.5; ash, 2.9; fat, 1.0. Green peas average as follows: Water, 76.6; carbohydrates, 16.9; protein, 7.0; ash, 1.0; fat, 0.5. Edible-podded varieties average as fol¬ lows: Water 81.8; carbohydrates, 13.7; pro¬ tein, 3.4; ash, 0.7; fat, 0.4.

Several more or less closely related plants of the family Fabacece are called peas, each, however, with a modifying adjective. The best known of these are the following: Everlasting pea (Lathyrus latifolius) , a perennial, floriferous herb often planted in gardens for ornament, especially for concealing unsightly objects such as rubbish-heaps, stones, etc.; sweet pea (Lathy¬ rus odoratus) , a well-known garden annual flowering herb described under its popular name; glory pea, glory vine, or parrot’s bill (Cliannthus dampieri), a tender sub-repent shrub with unique, showy flowers, for which it is cultivated somewhat

in greenhouses but has not become widely popular be¬ cause of its proneness to the attacks of red spider and its difficult management ; hoary, pigeon, Toor, Kongo or Dhal pea (Cajanus indicus) , an Asiatic species widely cultivated in tropical countries for its seeds which are used for food; scurfy pea (Psoralea spp.), many herbs, shrubs, and sub-shrubs na¬ tives of various countries, where several are used as border plants in gardens; chick pea (Cicer arietinum) , an annual herb of western Asia and the Mediterranean region where it is largely cultivated for its ripe seeds which are used as food; and sea or beach pea (Lathyrus maritimus) , a native of seacoasts throughout the Northern hemisphere and valued in rocky and sandy gardens because of its ability to grow under very adverse conditions.

Insect Pests.— Of the score or more in¬ sects which feed upon the pea, the most trouble¬ some is probably the green pea louse (Nectaro - phora destructor) of the order Hemipfera. Like other plant lice (q.v.) this insect multi¬ plies very rapidly and in seasons favorable to it does prodigious damage, especiallv in regions which supply canning factories with peas. Be¬ fore the middle of Tune in 1900 the damage was estimated at $4,000,000, and that of the previous season at $3,000,000. In one season it spread havoc from New Brunswick to Virginia de¬ stroying approximately 50 per cent of the crop. Very early and very late planting have been sug¬ gested as preventive measures, as has also the avoidance of two successive leguminous crops upon the same land. As remedies, spraying with kerosene emulsion (see Fungicides) has been tried with indifferent success, but brush¬ ing the insects with special machines is more satisfactory. The) rows of plants are made far enough apart to permit of horse cultivation, which is given immediately after the brushing, so as to bury the insects before they can return to the vines.

The next most troublesome insect is the pea-weevil (Bruchus pisorum

) which lays its eggs upon the young pods into which the larvae bur¬ row, finally transforming to pupae in the mature seed from which the adults issue during late summer and autumn, although in the North they generally wait until the spring. The adults hibernate, lay their eggs, and die ; they do not reproduce in or feed upon stored peas. Fumi¬ gation with carbon bisulphide or hydrocyanic acid gas are often resorted to, the seed being enclosed in air-tight receptacles. Holding the seed over for a year in bins from which the bee¬ tles cannot escape is also recommended, as is also late planting, this last being thought to obviate egg laying, the insect not living until the peas come into flower.

Of the other insects which do serious injury the following are probably the commonest: Ash-gray blister beetle (Macrobasis unicolor) and several of its close relatives. These eat the leaves of peas, beans and several other legu¬ minous plants during early summer, though ear¬ lier in the year their larvae may have helped to hold the grasshoppers in check by eating their eggs. Spraying with Paris green and driving the insects to winrows of straw to be burned are recommended. Several cutworms often do serious injury (see Cutworm), as does also the boll-weevil (q.v.). The European pea-moth (Semasia nigricana) , a dreaded pest of foreign fields, is known to be an arrival in Canada and pea growers are dreading the possible spread of the insect. There are also several general feed¬ ing insects such as leaf-hoppers and plant-bugs which are occasionally troublesome to the agri¬ culturist.

PEA-CRAB, an English name for Pinno¬ theres pisum, known in the United States as the oyster-crab (q.v.).

PEA RIDGE, Battle of, a battle of the Civil War, fought 7-8 March 1862. Gen. S. R. Curtis had driven the Confederate troops out of Arkansas into Indian Territory, and made his headquarters at Fayetteville in the extreme northwest, when he heard that Van Dorn, with Price, McCulloch, Albert Pike, and some 25,000 men, were rapidly marching against him. The actual effective strength of the Confederates was by the official records, 16,202 infantry and cavalry and about 50 cannon. According to Van Dorn’s official report less than 14,000 were brought into the battle. Falling back to Sugar Creek, which half encircles a high plateau cut by ravines, called Pea Ridge, he strengthened his front. Van Dorn thereupon swung his army to the left and reached Pea Ridge in the rear of Curtis, to cut off his communications and reinforcements, thus making his elaborate frontal preparations worthless. Curtis at once faced his army to the rear, his left on the creek and his right on Elkhorn Tavern at the crest of the

ridge, the Confederate left being at the latter. On the morning of the 7th the Confederates made a fierce assault, which for a time seemed to carry all before it; but it was in two unrelated divisions. McIntosh and Mc¬ Culloch on the right ambushed and outflanked Osterhaus; Van Dorn and Price at Elkhorn Tavern decimated Colonel Carr's forces. The latter carried on a seven hours' fight till near the last without reinforcements — which could

not be spared him — so heroically that one-fourth of his troops were killed or wounded. The Confederate right was making a final effort to break the Union line and join the left, when Curtis brought in his last reserves, and in a desperate combat in the woods both McCulloch and McIntosh were mortally wounded ; where¬ upon their troops retreated, and Sigel rein¬ forced Carr and stopped the progress of Price, who was badly wounded. The Federals lost some guns and some ground, being driven half a mile beyond Elkhorn Tavern, which was the headquarters of Van Dorn on the night of the 7th, as it had been of Carr in the morning. On the morning of the 8th the Federals re¬ newed the fight, and Van Dorn, after a hard struggle, retreated. Van Dorn estimated the strength of the Union army at from 17,000 to 24,000. But the official records show their actual strength to have been 10,500 infantry and cavalry and 49 cannon. The Union troops lost 1,351, more than half of them from Carr's division; the Confederates probably lost as many, since Van Dorn says that his loss was between 800 and 1,000 killed and wounded and 300 missing.

PEA-TREE. See Pepper-tree.

PEA-WEEVIL. See Bean-weevil.

PEABODY, pe'bod'i, Andrew Preston,

American Unitarian clergyman : b. Beverly, Mass., 19 March 1811; d. Cambridge, Mass., 10 March 1893. He was graduated from Harvard in 1826, studied also at the divinity school, be¬ came in 1833 colleague of Nathan Parker at the South Parish Church of Portsmouth, N. H., and soon afterward sole pastor. In 1860 he was made Plummer professor of Christian morals and ethics at Harvard, and this post he held until his resignation in 1881, when he received an emeritus appointment, his attention being thenceforth given chiefly to literary work. In 1862 and 1868-69 he was acting president of Harvard. He was editor of the North Ameri¬ can Review in 1852-61, and besides more than 100 addresses and special sermons, published several

volumes including (L'ectures on Chris¬ tian Doctrine) (1844); Conversation: Its Faults and its Graces) (1856) ; Christianity the Religion of Nature) (1864) ; (Reminiscences of European Travel) (1868) ; (Manual of Moral Philosophy* (1873) ; Christianity and Science) (1874); Christian Belief and Life) (1875); (Moral Philosophy) (1887) ; (Harvard Reminiscences) (1888); (Harvard Graduates Whom I Have Known* (1890) ; (Masterpieces of

Cicero* (1912). Consult De Normandie, James, (Memorial Sermon on Andrew Preston Pea¬ body. }

PEABODY, Cecil Hobart, naval archi¬ tect: b. Burlington, Vt., 9 Aug. 1855. He was graduated from the Massachuetts Institute of Technology in 1877 and in 1878 was appointed professor of mathematics in the Imperial Agri¬ cultural College, Sapporo, Japan. In 1881 he was assistant professor of mechanical engineer¬ ing at the University of Illinois and in 1883 went to the Massachusetts Institute of Tech¬ nology where he has been associate professor of steam engineering and, since 1893, professor of naval architecture and marine engineering. He is member of the council of the Society of Naval Architects and Marine Engineers and

Fellow of the American Academy of Arts and Sciences, and in 1915 received the Order of the Rising Sun (Japan) third class. He has pub¬ lished 'Thermodynamics of the Steam Engine) (1889); <Valve-gears) (1892); (Naval Architecture) (1904); 'Thermodynamics of the Steam Turbine) (1911); Computations for Marine Engines) (1913).

PEABODY, Elizabeth Palmer, American writer and educator : b. Billerica, Mass., 16 May 1804; d. Jamaica Plain, Mass., 4 Jan. 1894. She engaged in teaching at 16 and later studied Greek under Emerson. She taught under Amos Bronson Alcott (q.v.), was for a time secretary to W illiam Ellery Channing and subsequently was largely instrumental in introducing the Froebel kindergarten system into the United States. Among her publications, which are chiefly of an educational character, are 'First Steps in History) (1833) ; Crimes of

the House of ˆAustria) (1852) ; ‘Kindergarten Cul¬ ture) (1870); ‘Kindergarten in Italy) (1872); (Reminiscences of William Ellery ‘Channing) (1880) ; ‘Letters to Kindergartners) (1886); education in the Home Kindergarten) (1887), *etc.*

PEABODY, Francis Greenwood, Ameri¬ can Unitarian clergyman and educator: b. Bos¬ ton, Mass., 1847. He was graduated from Har¬ vard in 1869, from the Harvard Divinity School in 1872, and in 1874—80 was pastor of the First Parish Church at Cambridge, Mass. From 1880-86 he was professor of theology in the Harvard Divinity School, and from 1886-1912 was Plummer professor of Christian morals at Harvard University, retiring as emeritus pro¬ fessor in 1912. He has published ‘Mornings in the College Chapel, First Series) (1896);

(Afternoons in the College ChapeP (1898);

(Jesus. Christ and the Social Question) (1900) ; ‘Religion of an Educated Man} (1903) ; (Jesus Christ and the Christian Character) (1905) ; ‘Mornings in the College Chapel, Second Senes) (1907) ; ‘Approach to the Social Ques¬ tion) (1909) ; ‘Evenings in the College ChapeP (1911) ; ‘Christian Life in the Modern World)

(1914).

PEABODY, George, American merchant and philanthropist: b. Danvers (now Peabody), Mass., 18 Feb. 1795; d. London, England, 4 Nov. 1869. His parents were poor, and after a common school education he became clerk in a grocery store at the age of 11. In 1812 he went to Georgetown, D. C., as clerk in his uncle’s grocery; but a few years later entered into partnership with Elisha Riggs in the whole¬ sale dry goods business, at Baltimore. Largely through his untiring industry the firm became prosperous and influential, and his partner re¬ tiring in 1829, he was left at the head of the business.. In behalf of his firm he had several times visited London, and decided to make that his permanent residence. He consequents sev¬ ered his connection with his American firm, established in London a banking and mercantile business under the firm name of George Pea¬ body and Company and amassed a large for¬ tune. This wealth he devoted largely to pro¬ moting education, giving most generously to several institutions. He gave $200,000 to found an institute with a free library and lecture course in his native town of Danvers; and to the city of Baltimore gave $1,400,000 for an

institute combining free library and lectures with an academy of music and an art gallery. In 1866 this institute was opened and he was present at the dedication ceremonies. He fur¬ ther gave $150,000 to Yale for a museum of natural history; the same amount to Harvard for a museum of archaeology and ethnology; $140,000 to Salem, Mass., to found the Peabody Academy of Science; and an endowment of $13,000 to the Newburyport public library. In 1862 he placed in the hands of trustees in the city of London $750,000 for the building of model tenement-houses for the poor to be let at moderate rents. This plan proved so suc¬ cessful and the houses were so well patronized that he later increased the fund to $2,500,000, it being known as the London Peabody fund. In 1851 he contributed $15,000 for the improve¬ ment of the United States exhibit at the London World's Fair ; and in 1852 gave $10,000 to the second expedition under Dr. Kane in the search for Sir John Franklin. Hence a part of the region discovered by this expedition was named in his honor Peabody Land. His last and most important gift was that of $3,500,000 for the promotion of education in the Southern States, under the control of a special board of trus¬ tees, and known as the Peabody Educational Fund (q.v.). The total amount of his gifts was between $8,000,000 and $9,000,000. His benefactions were so eminently wise and help¬ ful to the community that he was greatly re¬ spected and beloved in both England' and America. In 1866 he was given the freedom of the city of London, an unusual honor; and the queen sent him an autograph letter and a minia¬ ture portrait of herself, both of which are at the institute . in Peabody, Mass. A public funeral was given him in Westminster Abbey; and his remains were brought to the United States by the British ship-of-war Monarch, and buried with fitting honors at Danvers, Mass. (See Peabody College for Teachers; Peabody Educational Fund). Consult The 'Life by Hanaford (1870) ; Bolton, 'Poor Boys who be¬ came Famous) (1888); Curry, 'Brief Sketch of George Peabody) (1898).

PEABODY, George Foster, American banker: b. Columbus, Ga., 27 July 1852. He was educated in private schools and is president of the Broadway Realty Company, the Mexican Coal and Coke Company, the Compania Metal-lurgica Mejicana, and director in many other corporations. In 1896-1905 Mr. Peabody was treasurer of the Democratic National' Com¬ mittee. He is chairman of the State of New York Reservation Commission, director of the General Education Board, the Southern Educa¬ tion Board, the Hampton Normal and Agricul¬ tural Institute, the Tuskogee Normal and In¬ dustrial Institute, the Universitv of Georgia, the Skidmore School of Arts, the

New York Cham¬ ber of Commerce. In 1903 he received the honorary degree of A.M. from Harvard, that of LL.D. in the same year from Washington and Lee and in 1906 from the University of Georgia.

PEABODY, Henry Oliver, American in¬ ventor: b. Boxford, Mass., 13 May 1826; d. Point Allenton, Mass,, 28 July 1903. At the outbreak of the Civil War he was employed in an arms factory in Boston, and there invented the breech-loading gun known as the Peabody

rifle. It was manufactured in large quantities by a f rovidence establishment for the Turkish government. Its pattern was copied extensively in Europe, where it was not patented.

PEABODY, James Hamilton, American banker : b lopsham, Vt., 21 Aug. 1852; d. 23 N?v. 1917. He was educated in the public schools and going to Colorado engaged in busi¬ ness first as a bookkeeper and then as a mer¬ chant in Canon City. In 1885 when the First National Bank of Canon City was organized he was _ chosen vice-president, and later became president. He was also active in public life, was city clerk, member of the school board,' city treasurer and member of the city council; in 1885 he was elected county clerk on the Re¬ publican ticket. In 1902 he was nominated and elected governor of Colorado for a two years' term. . He was a prominent member of the Masonic fraternity.

PEABODY, Josephine Preston, American poet: b. New York, 1874. She was educated at Radclifife College and was instructor in Eng¬ lish literature at Wellesley College, 1901-03. In 1906 she married Prof. L. S. Marks of Harvard University. In 1909 her drama (The Piper) won the Stratford-on-Avon prize. This drama was presented throughout New England the following year and in New York in 1911. She is a contributor, especially of poetry, to leading magazines. (See The

Piper). She is the author of (01d Greek Folk Stories) (1897); (The Wayfarers: a Book of Verse) (1898); (Fortune and Men's Eyes:

New Poems with a Play> (1900) ; ˆMarlowe,* a drama infused with the Elizabethan spirit, and containing several beautiful lyrics (1901) ; (The Singing Leaves) (1903) ; (The Wings) (1905, a drama); (The Book of the Little PasV (1908) ; (The Singing Man* (poems, 1911) ; (The Wolf of Gu'bbio) (drama, 1913) ; <New Poems) (1915).

PEABODY, Robert Swain, American architect: -b. New Bedford, Mass., 22 Feb. 1845; d. 23 Sept. 1917. In 1866 he was grad¬ uated at Harvard University, and subsequently studied at the Ecole des Beaux-Arts, Paris. He established his practice in Boston in 1870 and from 1909 until his death was chairman of the Boston park commission. His principal works are the Boston Chamber of Commerce, the city hall of Worcester, Mass., the Chamber of Com¬ merce of Cleveland, Ohio, and Machinery Hall at the Columbian Exposition at Chicago in 1893. For many years Mr. Peabody was an overseer of Harvard and in 1900-01 was president of the American Institute of Architects and in 1902-05 and 1907-09 of the Boston Society of Archi¬ tects. In 1910 he was made an associate of the National Academy of Design. He published (A Holiday Study of Cities and Ports) (1908) and (An Architect's Sketch Book) (1912).

PEABODY, Selim Hobart, American edu¬ cator: b. Rockingham, Vt., 20 Aug. 1829; d. Saint Louis, Mo., 27 May 1903. He was grad¬ uated from the University of Vermont in 1852, appointed professor of mathematics and engi¬ neering at the Polytechnic College at Philadel¬ phia, Pa., where he remained from 1854-57 and was later connected with various educational institutions in the West. He was professor of physics and engineering at the Massachusetts

Agricultural College in 1871 and in 1878 ac¬ cepted the chair of mechanical engineering at the Illinois Industrial Academy at Champaign, Ill. He was elected president of that institu¬ tion in 1880 and under his administration it be¬ came the University of Illinois. He resigned the presidency in 1891 to become chief of the department of liberal arts at the World's Columbian Exposition. Among his publications are <Astronomy) (1869) ; (juvenile Natural

History* (3 vols., 1869) ; (New Practical Arith¬ metic (1872) ; (American PatriotisnP (1880); (Charts of Arithmetic (1900).

PEABODY, Mass., town, the world's lar¬ gest sheepskin _ town, Essex Countv, on the Boston and Maine Railroad, two miles west of Salem. It includes the villages of Peabody, North Peabody, South Peabody and West Pea¬ body. The town was incorporated in 1855 as South Danvers, and, in 1868, the name was changed in honor of George Peabody (q.v.), who was born there. The most important of its manufactures is leather, plain and morocco ; others are shoes, electrical supplies, tanning machinery, hair goods and glue. It contains the Peabody Institute, founded in 1852 by George Peabody, and the Eben Dale Sutton Reference Library. The institute is under the management of a board of trustees who report annually to the town government; it contains a library of 47,600 volumes (1916) and a lec¬ ture hall in which free lectures are given. The Sutton Library is under the control of the same trustees. In 1902 the Peabody Historical So¬ ciety presented the institute with a small safe containing pictures of the town, articles by leading citizens and newspapers, which is (<to be opened by the citizens of Peabody on or after 16 June 2002.® Pop. (1920) 19,552.

PEABODY-BIRD, the white-throated sparrow (q.v.), so called in northern New Eng¬ land.

PEABODY COLLEGE FOR TEACH¬ ERS. In 1867 George Peabody made his memorable donation to the cause of Southern education, giving first and last over $2,000,000 to a distinguished body of gentlemen from various Northern States as well as from the South. These gentlemen organized themselves under the title <(The Trustees of the Peabody Education Fund.® Peabody Normal College was established as the first central work of the Peabody Education Fund at Nashville, Tenn., in 1875. The institution grew steadily and received increased appropriations from the State of Tennessee as well as from the Pea¬ body Education Fund, using the grounds, buildings and equipment of the University of Nashville by courtesy of that institution. From the outset Peabody College was designed for the higher training of teachers and to encourage State support for normal schools and for the development of public education. It has re¬ mained true to that mission, changing and ad¬ vancing its curriculum as adapted to the larger aims in Southern education as related to the entire nation. As Peabody College grew in number of students and in influence, it became necessary to secure a permanent endowment and a more stable policy. From 1905 to 1909 these plans were worked on energetically and with success. For 30 years the college had run

successfully without a charter of its own and with no income except annual appropriations. In 1909 the institution was duly incorporated on 30 September under the title ((George Peabody College for Teachers.® Its new board of trustees held their first' meeting on 5 October of that year. George Peabody College for Teachers now received an endowment of about $1,750,000. In 1911 plans for new buildings on a new cam¬ pus were begun, and from that date to 1914 a successful campaign for additional funds was prosecuted, resulting in bringing to the college $1,500,000 of new endowment. The college now owns a very attractive campus of 50 acres ad¬ jacent to the campus of Vanderbilt University on the one side and the campus of Ward-Bel- mont College on the other, forming a group of about 125 acres of almost continuous campus in the best residential section of Nashville. Good physical surroundings of the college are, therefore, secured for all time. On the campus there are now five buildings of new fire-proof construction, designed in classical style, with special reference to Southern colonial archi¬ tecture. These five buildings have been erected at a cost of over $1,000,000. The total resources of the college are now nearly $3,750,000. The college has been organized on the quarter plan since 1908, following in the main the system which has been so successful at the University of Chicago. With Vanderbilt University there is a contractual arrangement by which students in either institution may choose as much as one-third of their studies in the other institution. This makes it possible for each institution to put all of its resources and energy into special departments without duplication. Thus there is created in resources and strength virtually a single institution backed by something like $8,000,000. Scholarships bestowed by the Pea¬ body Fund are given to a certain number of worthy students of the college. The degree of licentiate of instruction is conferred by the col¬ lege, and the student holding this degree is by law eligible, without any further examination, for any teaching position in the public schools of Tennessee. The university confers other degrees : master and bachelor of arts, letters and science. George Peabody College for Teachers has its alumni and former students in almost every kind of educational position throughout the South and the United States and foreign countries. Over 15,000 students have attended the institution and at

least 3,000 graduates have received diplomas from its faculty. At present the summer quarter is very popular with progressive teachers in active service, who come for six weeks or 12 weeks and receive instruction which they take back to their important positions throughout the entire South. The summer quarter has usually about 1,500 students. There are about 500 students in the fall, winter and spring quarters.

Charles E. Little.

PEABODY EDUCATION FUND,

founded in 1867 by George Peabody (q.v.) for educational purposes in the South. In the articles of endowment the words are that the money shall be used for promoting <(intellectual, moral and industrial education in the most desti¬ tute portion of the Southern States.® The first gift was securities amounting to $2,100,000 of

which $1,000,000 were Mississippi State bonds. The Mississippi bonds were afterward repudi¬ ated. Mr. Peabody gave $1,000,000 additional in 1869. Of this amount $384,000 were Florida bonds, issued while that section was a Territory, and for certain reasons such bonds had never been recognized as legal by the State. The fund was placed in charge of 15 trustees, men prominent in the United States — Robert C. Winthrop of Massachusetts was chairman.

The trustees held meetings annually, gen¬ erally in New York City. They filled vacancies caused by death or resignation and trans¬ acted such business as was necessary. The trus¬ tees had authority to spend the interest and 40 per cent of the principal the first two years; after that time the principal was to remain in¬ tact for 30 years, when the whole amount might be divided and distributed for educational pur¬ poses, as might be deemed best by the trustees. The rules governing the use of the fund were broad and precautions were taken not to in¬ terfere with established schools. Efforts were to be made to work with existing schools, to strengthen weak schools and to promote in gen¬ eral elementary education. No school should receive aid unless it had in attendance at least 100 students and maintained a school 10 months in the year. The district desiring a share of the fund should contribute twice the amount granted by the trustees. A school having an attendance of 100 pupils and complying with other conditions, might have $300 ; if *200 pupils were in attendance, it might have $600; and a school with 300 in attendance might have $1,000.

Normal and training schools for teach¬ ers received special attention. Scholarships were granted to many worthy pupils — at first $200 each, later $100. From the establishment of the fund to the end of the 30 years the total amount paid out was about $2,600,000. The greater part of this sum was used in Alabama, Arkansas, Florida, Georgia, Louisiana, Missis¬ sippi, North Carolina, South Carolina, Texas, Tennessee, Virginia and West Virginia. The policy of the trustees of the fund and their agents became a most powerful influence in develop¬ ing public education, universal and genuinely democratic, and made a marked impression on every type of school in the South, its chief in¬ strument being the Peabody College for Teach¬ ers (q.v.). Consult Little, C. E., < George Pea¬ body College for Teachers: Its Evolution and Present Status> (Nashville 1912) ; Reports of United States Commissioner of Education, in which will be found an account of the founda¬ tion and distribution of the fund.

PEACE (in law). See Breach.

PEACE, Breach of. See Breach.

PEACE, Religious (German, Religions-friede), a series of treaties by which, after the Reformation, the Protestant states were granted their religious liberty. There are two treaties which especially bear this name, that of Nurem¬ berg, signed by the Protestants on 23 July and confirmed by the emperor, Charles V, at Ratisbon, 2 Aug. 1532, and that of Augsburg, 26 Sept. 1555. By the treaty of Nuremberg the emperor pledged himself to summon a council to settle all religious differences, and both sides agreed to suspend hostilities until the council should be convoked, The Protestants gained

by this peace only a temporary security. The Peace of Nuremberg was renewed six times between 1534 and 1545. The victory of Charles over the Schmalkaldic League placed the whole of Germany at his mercy, when the declaration of war by the Elector Maurice compelled him to accept the Peace of Passau, 31 July 1552, by which the right of the evangelical states to the free exercise of their religion was

acknowledged by the emperor, who promised to convene a diet to settle the rights of the two religious parties and the rights of the imperial authorities. Sev¬ eral circumstances delayed the meeting of the diet, which took place at Augsburg in 1555, pre¬ sided over by the Archduke Ferdinand, and con¬ cluded the treaty known as the Religious Peace of Augsburg, which provided that no state was to be disturbed on account of its religion. Sub¬ jects were not forbidden to leave a state where their religion was persecuted, and the Protes¬ tants were to retain all the ecclesiastical bene¬ fices in their possession after the Peace of Passau. The Calvinists were not included in the provisions of this treaty, but by the Peace of Westphalia (1648), which placed the Cal¬ vinists on the same footing with the Lutherans, a permanent peace was established.

PEACE CONFERENCES. See Hague Court; Peace Treaties; War, European — Peace Conference.

PEACE CONVENTION, in American his¬ tory, a term used at the beginning of the Civil War. After the secession of several of the Southern States, Virginia on 1 Jan. 1861 invited the other secession States to send delegates to a conference in Washington, D. C., with the object of devising a plan whereby all differences between the North and the South might be peaceably settled. The conference met 4 Feb¬ ruary and delegates were present from 14 free States and seven slave States. Ex-President John Tyler was made presiding officer. A com¬ mittee of one from each State was appointed to draw up a report of <(what they may deem right, necessary, and proper, to restore harmony and preserve the Union.® Several minority re¬ ports were presented, but the majority report was adopted. It recommended a number of amendments to the Constitution, the substance of which was as follows: (1) In the Territories north of lat. 36° 30’ slavery was to be prohib¬ ited. In Territories south of that line the in¬ stitution was to remain as it then was, and no law was to be passed abridging the right of a man to take his slave thither. The status of new States was to be determined by the con¬ stitution adopted by them. (2) No new ter¬ ritory was to be acquired except by discovery or for naval and commercial stations or depots, without the concurrence of a majority of the senators from the free States and a majority of the senators from the slave States. (3) Neither the Constitution nor any amendment thereof was to be construed as giving Congress power to interfere with slavery in any State; nor to abolish it in the District of Columbia without the consent of the State of Maryland and of the owners, nor without compensation to the latter; nor to prohibit representatives and others from’ taking their slaves to the District and bringing them away again ; nor to prohibit slavery in any place under

the jurisdiction of the United States, if within a slave State; nor

to prohibit the inland slave trade between slave States, but not in or through free States. The slave trade in the District was prohibited. Sec¬ tion 4 provided for the delivery of fugitive slaves, section 5 for the prohibition of the for¬ eign slave trade, section 7 for the payment to owners by the United States of the value of slaves that might escape by reason of the inter¬ ference of mobs with Federal officers, and for (<securing to the citizens of each State the priv¬ ileges and immunities of citizens in the several States,® while section 6 ordained that sections 1, 3 and 5 and article 1, section 2, clause 3, and article 4, section 2, clause 3 of the Constitution were to be amended or abolished* only by the unanimous consent of the States. This report was offered to the Senate, which refused to act upon it, and it met a similar fate in the House, neither party being satisfied with it.

PEACE OF GOD, a cessation from private warfare which the Roman Catholic Church in France in the 10th and 11th centuries tried to impose upon the nobles of that country. The ecclesiastical authorities in several synods rec¬ ommended that all differences should be set¬ tled by the ordinary civil tribunals, and attempted to enforce obedience or at least com¬ pliance by threats of spiritual penalties. But these efforts were all in vain, the nobles refus¬ ing to submit to any of the minor courts — the only ones then existing. _ A compromise was arrived at which resulted in the establishment of what was known as the Truce of God (q.v.).

PEACE OF THE PYRENEES. See

Pyrenees, Peace of the.

PEACE RIVER, Canada, an important affluent of the Mackenzie (q.v.).

PEACE SOCIETY, an organization founded for the purpose of promoting uni¬ versal peace on a permanent basis among the nations. William Allen and Joseph Price or¬ ganized a peace society in London in 1816; but the first peace society on the European conti¬ nent was established in Geneva in 1830. At the International Peace Congress held in Lon¬ don in 1843 there were present 294 British, 37 American and six Continental delegates. The society, more or less a religious movement, asked the support of all denominations as well as of persons who oppose war on any grounds. It has always advocated a gradual disarma¬ ment by all the nations of Europe, but its main

contention is the necessity for adopting the principle of arbitration in international disputes. See American Peace Society; Carnegie En¬ dowment for International Peace; Peace Convention.

PEACE TREATIES. Although compara¬ tively few peace treaties were negotiated prior to the Middle Ages, the making of such agree¬ ments, as well as the observance of treaties in general between the great nations of the world, was one of the first phenomena to indicate the advance of civilization. In the history of international law there were few subjects that received earlier attention. The Greek and Roman historians devote much space to the sub¬ ject, while the fact that nations had given thought to this method of settling grievances ages before these chronicles were written is indicated by the references to such agreements which appear in the Old Testament writings as

well as by the records discovered upon the ancient monuments of Egypt and Assyria. Even the movement for universal arbitration, the principle which attained its culmination in The Hague tribunal, is almost as old as the records of history. It is true that the first instances of arbitration, especially those of Greece, were intermunicipal, rather than be¬ tween the different races. During the Middle ages the popes were frequently appealed to, and it was in response to such demands that Innocent III became the mediator between King John and his barons; Boniface VIII arbitrated the difficulties between Edward I and Philipps le Bel ; Leo X arranged affairs for Maximilian and the Doge of Venice, just as, in more modern times, Leo XIII adjusted the dispute of Germany and Spain in relation to the Caroline Islands. It was as early as 1603 that Sully suggested his plan for a ((Concert® of the 15 states, by which all international differences were to be decided. A century later the Abbe Saint Pierre proposed the organiza¬ tion of his “General League of Christendom,® but, although his international peace court was based upon a less ulterior motive than that of Sully, it had little effect except to inspire a hundred or more similar schemes which helped to prepare the world for the organization of the 19th century tribunal of arbitration at The Hague.

The most important treaty to which the United States has been a party was the Peace of Paris, the preliminaries of which were signed in that city 13 Nov. 1782. In announc¬ ing the settlement of these preliminaries John Adams wrote: <(We have been very industri¬ ous, having been at it forenoon, afternoon, and evening, ever since my arrival,® while Benjamin Franklin, who was also a member of the com¬ mission, added: (<We hope the terms we have secured will be satisfactory, though to secure our main points we may have yielded too much in favor of the royalists.®

Despite the fact that the treaty was so favorable to his interests, George III did not see fit to ratify it until 6 Aug. 1783. On the 3rd of the next September the definite treaty of peace, which formally acknowledged the ex¬ istence of the new republic as a nation, was signed, also at Paris, and 14 July 1784 it was duly confirmed by Congress.

The following list includes the most im¬ portant peace treaties negotiated by the various nations of the world :

Aarau. — At the conclusion of the religious war in Switzerland, which ended in a victory for the Protestants, 25 July 1712, the Treaty of Aarau was signed, 15 Aug. 1712! By its provisions the two religions were equalized through¬ out the Swiss provinces.

Abo. — A treaty signed by Russia and Sweden, 18 Aug. 1743. By its provisions Russia acquired the southern territory of Finland as far as the river Kymen, and the privi¬ lege of electing an ally as prince royal of Sweden.

Adrianople. — This important treaty between Russia and Turkey was signed at Adrianople, 14 Sept. 1829. By its provisions Turkey not only recognized the inde¬ pendence of Greece, but gave to Russia nearly all the rights she demanded, including the control of a part of the left bank of the lower Danube, as well as the Sulina mouth of that river; several districts on the northeastern coast of the Black Sea, with their important fortresses; the confirmation of the protectorate of the Tsar over the Danubian princi¬ palities, and the confirmation to Russian subjects of the rights of trade in Turkey, and the freedom of navigation in the Black Sea, the Danube and the Dardenelles. See Adrianople.

Aix-la-Chapelle. — The first peace Treaty of Aix-la- Chapelle was signed 2 May 1668, when France, in accordance

with the demands of the Triple Alliance (then composed of England, the Netherlands and Sweden), returned France-Comte to Spain in consideration of the cession of 12 fortified towns on the border of Spanish Netherlands. The second peace Treaty of Aix-la-Chapelle put an end to the famous war of the Austrian Succession. It was signed 18 Oct. 1748, and provided for the mutual restitution of conquests, except in the case of Austria, which was compelled to cede Parma, Guastalla and Piacenza to Don Philip of Spain, and to con¬ firm the rights that Prussia had acquired in Silesia. See Aix-la-Chapelle, Treaties of Peace.

Alais. — The last of the religious wars in France was ended by the peace Treaty of Alais, which was signed in 1629. By its provisions the Huguenots ceased to exist as a political party.

Alkmaar.— - It was in accordance with the provisions of the Convention of Alkmaar, signed October, 1799, that the Anglo-Russian forces under the command of the Duke of York evacuated the Netherlands.

Altradstadt. — The treaty of peace, dictated by Charles XII of Sweden, and which cost Augustus II of Saxony his possession of Poland, was signed 24 Sept. 1706.

America. — See Paris, in this article.

Amiens. — The Peace of Amiens was concluded 27 March 1802. By the provisions of the treaty, which was between ■Great Britain on one side and France, the Batavian Republic and Spain on the other, the former agreed to recognize the Ionian Republic and to restore all conquests with the excep¬ tion of Ceylon and Trinidad, on condition that France should abandon Rome and Naples and should restore Malta to the Knights of Saint John.

Ancon. — A treaty by the provisions of which Peru ceded important territories to Chile, was signed 20 Oct. 1883.

Antalcidas. — This treaty, which was signed by Antalcidas the Lacedaemonian with Artaxerxes, king of Persia, in 387 B.C., was made on behalf of Greece and in favor of Sparta. By its provisions the cities of Ionia passed to the Persians.

Antanarivo. — This treaty, signed 1 Oct. 1895, marked the conclusion of the troubles between France and the Hovas. By its provisions the

French protectorate over Madagascar was established.

Antony and Octavius. — In b.c. 40, Antony and Octavius were compelled by their own soldiers to make a treaty of peace. It was signed at Brundisium, and was the means of postponing for fully 10 years the final struggle between the two chief triumvirs.

Augsburg. — While, in one sense of the word, a religious peace treaty, the agreement which was concluded between the Lutheran and Catholic state of Germany at Augsburg, 25 Sept. 1555, exerted an important political influence at that time. By the provisions of the treaty each state was permitted to prescribe the form of worship to be followed within its limits. This triumph of the Reformation, how¬ ever, did not extend so far as to include the Calvinists.

Baden. — A treaty signed by the German Empire and France, 7 Sept. 1714. This, with the treaties of Utrecht and Rastadt, concluded that war of the Spanish Succession. By its provisions the Peace of Ryswick (q.v.) was ratified; the electors of Bavaria and Cologne were fully reinstated, and Landau was ceded to France.

Basel. — 5 April and 22 July 1795. See Basel, Treaties of Peace at.

Belgrade. — By this treaty signed between Turkey, Austria and Russia in September, 1739, Russia returned to Turkey her conquests in Moldavia and Bessarabia, and re¬ linquished her naval rights in the Black Sea, while Austria renounced her territory in Wallachia, Bosnia and Serbia. See Belgrade.

Bergerac. — A treaty of peace, establishing liberty of conscience, was signed between the Catholics and Protestants at Bergerac, France, 17 Sept. 1577.

Berlin. — Treaty of 1742. See Breslau, in this article.

Berlin. — On 21 Oct. 1866, Saxony signed a treaty of peace with Prussia by the provisions of which she agreed to pay 10,000,000 thalers as indemnity to Prussia for the part her forces had played in the struggle known as the Seven Weeks War.

Biac-na-bato. — This treaty was signed by Aguinaldo, as leader of the Philippine insurgents, and Spain, 14 Dec. 1897. By its provisions he agreed that the insurgents would evacuate all positions and would maintain a three years' armistice in return for a stated cash consideration. The latter condition was never fulfilled. •

Bordeaux. — A treaty of peace signed by Bouillon and his allies and Mazarine, after the siege of Bordeaux,- in July

1650.

Breda. — By the Treaty of Breda, signed between Eng¬ land, Holland, France and Denmark, 31 July 1667, the rights of England in New York and New Jersey, of France in Arcadia, and of Holland in Surinam, were confirmed by the Powers.

Breslau. — The treaty signed at Berlin by Lord Hynd-ford, as representative of Maria Theresa, queen of Hungary, with Podewilz, Minister of Prussia, 28 july 1742, is known as the Peace of Breslau, owing to the fact that the pre¬ liminary convention was signed at that place on 11 June.

By the provisions of this treaty Silesia was ceded to Prussia by Austria.

Brest-Litovsk. — A treaty of peace between Germany, Austria-Hungary, Bulgaria and Turkey on the one part and The Ukranian People's Republic " on the other part; signed 9 Feb. 1918.

Brest-Litovsk. — A treaty of peace between Germany, Austria-Hungary, Bulgaria and Turkey of the one part and Russia through the Bolshevik government of the other part, signed 4 March 1918. It was almost immediately renounced by several sections of the Russian people.

Bretigny. — This treaty known as " The Great Peace," was signed by Edward III of England and John II of France, 8 May 1360. See Bretigny.

Bromsebro. — By the provisions of the treaty of peace signed at Bromsebro, between Sweden and Denmark, in August 1645, the latter nation renounced its rights to rule over Jemtland, the island of Gothland, *etc.*

Bucharest. — This treaty, concluded 8 May 1812, ended the war

which had been waged between Russia and Turkey since 1806. By its provisions the Pruth and the Lower Danube became the established boundary between these countries. See Bucharest, Peace of.

Bucharest. — The treaty of peace concluding the Second Balkan War, signed 10 Aug. 1913, by Rumania, Greece, Montenegro, Serbia and Bulgaria, defining the boundaries of Bulgaria and formally recording the latter's renunciation of all claims in the Isle of Crete.

Bucharest. — A peace treaty between Germany, Austria-Hungary, Bulgaria and Turkey on the one hand and Rumania on the other, signed 6 May 1918.

Callias. — A treaty concluded at Sparta, June 371 B. c., in which Athens and Sparta and all their allies participated. Callias, from whose name the treaty derived its title, was one of the most prominent Athenian envoys.

Cambrai. — A treaty signed between Francis I of France and Charles V, 5 Aug. 1559, by which France not only per¬ mitted Italy to revert to the emperor, but also relinquished all claims over Artois and Flanders, her rights to the duchy of Burgundy alone being recognized. This treaty is sometimes called the " Ladies' Peace," because of the fact that the pre¬ liminary negotiations were undertaken by Louise, the mother of Francis, and Margaret, aunt of Charles.

Campo-Formio. — A treaty signed between France and Austria, 17 Oct. 1797. It provided that Austria should cede the Belgian provinces and recognize the Cisalpine Republic, retaining, on the other hand, a large proportion of the Venetian territories, while France retained the Ionian Islands.

Carlowitz. — The Peace of Carlowitz will always be known as one of the most memorable treaties in history: (1) because of the magnitude of the territorial changes involved; (2) because it marked the beginning of the down¬ fall of the Ottoman Empire as an aggressive power, and (3) because by taking part in a General Congress for the first time the sultan admitted the principle of intervention of the Powers for the general good. This treaty, which was for 25 years, was concluded 26 Jan. 1699, between Russia, Austria, Poland, Venice, and Turkey, by the mediation of England and the Netherlands. By its provisions Austria received that portion of Hungary lying between the Danube and Theiss, as well as Transylvania; Russia obtained Azof!; Venice retained the Morea, while Poland regained PodoLa and Ukraine.

Cateau-Cambresis. — A treaty between England, France and Spain, signed 3 April 1559, by which the two latter countries restored many of their conquests.

Cherasco.— This treaty, signed 6 April 1631, confirmed the Treaty of Ratisbon which had been concluded between Richelieu and Ferdinand II, thus ending the War of the Mantuan Succession.

China and Japan. — The treaty signed between China and Japan, 16 April 1895, not only compelled China to pay a heavy indemnity, but required the cession of Formosa, the recognition of the independence of Korea and other concessions.

Cimon. — The Peace of Callias (q.v.) is sometimes known as the Peace of Cimon.

Clair-on-Epte. — A treaty signed about a.d. 911, between King Charles, Duke Robert of Paris and Rolf. By its provisions a definite district was ceded to Rolf, upon condition that he would become the king's vassal. After having been admitted to baptism the king's natural daughter was given him in marriage.

Conflans. — It was this treaty, signed in October, 1465 between Louis XI of France and the dukes of Burgundy, Bourbon and Brittany, which marked the conclusion of the War of the Public Good. By its provisions Normandy was ceded to the Duke of Berry.

Constance. — The peace treaty concluded by Frederick Barbarossa and the Lombard League in 1183, by which the cities of the League acknowledged the overlordship of the emperor upon his renouncement of the regalian rights which he had previously claimed.

Constantinople. — See Pruth 1711, in this article.

Constantinople. — By this treaty signed between Russia and Turkey, 8 Feb. 1879, the provisions of the Treaty

of San Stefano (q.v.) were materially modified, and the sultan was compelled to pay a heavy war indemnity.

Constantinople. — The treaty of peace, signed between Turkey and Greece in December, 1897, officially concluded the Greek War.

Crepy-en-Laonnais. — By this treaty, signed between Francis I of

France and Charles V, the emperor renounced all claims to Burgundy, while Francis renounced all rights in Lombardy, Naples, Flanders and Artois.

Dennikon. — The peace treaty that was signed at Dennikon in 1531 established the principle of each canton's independence.

Dresden. — The Peace of Dresden concluded the second Silesian War. It was signed between Austria, Saxony and Prussia, 25 Dec. 1745, and its provisions confirmed Frederick the Great in his contention for the possession of Silesia.

Dyrrachium. — The first Macedonian War, which began in 214 b.c. was concluded by the Peace of Dyrrachium signed 205 b.c. This peace was of five years' duration.

El Zanjon. — Peace was declared between the Spanish forces and the Cuban revolutionists in 1878, when the Treaty of El Zanjon was signed. According to the provisions of the treaty General Gomez disbanded his army and retired to San Domingo, but the reforms which Spain had promised in return never materialized. As the result the standard of revolt was once more raised in 1895.

Evora Monte. — The treaty of Evora Monte con¬ cluded the attempt of Dom Miguel to capture the throne of Portugal. By its provisions he abandoned his claim to the crown in consideration of a pension of $60,000 per annum.

Falaise. — The engagement of fealty to Henry II taken by William the Lion, king of Scotland, in 1175, is generally known as the Treaty of Falaise.

Fleix. — This treaty of peace which was concluded between Henry III of France and the Huguenots, 26 Nov. 1580, was little more than a renewal of the Treaty of Ber¬ gerac (q.v.).

Foligno. — By the truce of Foligno, concluded between Napoleon and the JCing of Naples, February, 1801, the later ceded part of the island of Elba and abandoned all rights in Tuscany.

Fommanah. — A treaty of perpetual peace was con¬ cluded between Great Britain and the Ashantees, 13 Feb. 1874. By its provisions an indemnity of 50,000 ounces of gold was paid, supremacy over Adansi and other tribes was renounced, free trade was guaranteed and human sacrifices were abandoned.

Fontainebleau. — The preliminary convention of peace between Great Britain, France, Spain and Portugal, was signed at Fontainebleau, in 1762.

Fontainebleau. — The peace between the emperor and the Dutch was concluded 8 Nov. 1785. By its pro¬ visions the emperor, in lieu of 10,000,000 guilders, renounced his claims to the free navigation of the Schelde outside of his own domain, and all pretensions to Maescricht, *etc.*

Friburg. — A perpetual peace was negotiated between France and the Swiss cantons at Friburg, 29 Nov. 1516.

Fuessen. — By this peace treaty, concluded between Queen Maria Theresa of Hungary, and the Elector of Bavaria, 22 April 1745, the latter renounced all claim to the imperial crown in return for his lost territories.

Ghent. — The treaty of peace between the United States and Great Britain, which concluded the War of 1812, was signed at Ghent, 24 Dec. 1814. Its provisions included the mutual restitution of conquered territory, and the appoint¬ ment of a commission to settle the boundary dispute, and matters relating to islands in Passamaquoddy Bay. See Ghent, Treaty of.

Greenville. — The peace concluded between " Mad Anthony " Wayne and the Northwestern Indians, 3 Aug. 1795. The treaty, which made cession of an extensive territory to the Union, also guaranteed the safety of all settlers. See Greenville, Treaty of.

Guadalupe-Hidalgo. — The treaty of peace which concluded the war between the United States and Mexico was signed 2 Feb. 1848. It fixed the boundary line between the two republics, and, by its provisions, the United States paid to Mexico $15,000,000 for the territory which it gained by the new boundary, and also relieved Mexico from all claims of citizens of the United States for damage, agreeing to pay the same to the amount of $3,250,000. See Guadalupe-Hidalgo, Treaty of.

Guerande. — The civil war which established Montfort as Duke of Brittany was concluded by the Peace of Guerande, signed in 1365.

Guines. — The war between Henry VIII and Francis I of France was terminated by the Treaty of Guines, signed in 1547. By its provisions Boulogne, which had been taken by the English, was restored to the French upon receipt of an indemnity of 2,000,000 gold crowns.

Hague.— The treaty of peace between Spain, Savoy and Austria was concluded at The Hague, 17 Feb. 1717.

Hamburg. — The Treaty of Hamburg was concluded between Russia and Prussia, 5 May 1762.

Hodeiba. — The truce of Hodeiba was extorted from the Koreish by Mahomet in 628. As the result of its pro¬ visions hostilities were suspended for 10 years.

Hubertsburg. — «The Peace of Hubertsburg, which terminated the Seven Years' War, was signed by Prussia, Austria and Saxony at the castle of Hubertsburg, -IS Feb. 1763. By its provisions Prussia retained Silesia.

Jassy. — The Treaty of Jassy, concluded between Russia and Turkey, in 1792, extended the Russian borders to Dniester and gave to her the coast on which the city of Odessa soon arose.

Kainardji. — See Kutschuk Kainardji, in this article.

Karlowitz. — See Carlowitz, in this article.

Kiel. — By the treaty of peace signed at Kiel, 14 Jan. 1814, Denmark ceded Helgoland to Great Britain and Norway to Sweden, receiving Swedish Pomerania and Rugen as exchange from the latter.

Kimon. — See Callias and Cimon, in this article.

Kutayah. — By the treaty of peace signed here in May 1833, Turkey ceded Syria and the province of Adana to* Ibrahim Pasha.

Kutschuk Kainardji. — By this treaty of peace signed between Russia and Turkey, 21 July 1774, the sultan renounced his sovereignty over the Tartars in southern Russia and granted other territories and strategetical points in the Crimea and on the Black Sea.

Ladies' Peace. — See Cambrai, in this article.

La Rochelle. — The treaty by which Charles IX granted partial toleration to the Protestants, 6 July 1573, is known as the Peace of La Rochelle.

Lausanne. — The treaty of peace signed by Italy and Turkey, 8 Oct. 1912, by which Tripolitana and Cyrenaica were ceded to Italy.

Leoben. — A provisional treaty of peace concluded between Napoleon I and the Austrians, 18 April 1797. By secret provisions Napoleon promised to exchange the greater part of the mainland territory of Venice for the Netherlands. Its terms were modified by the Treaty of Campo-Formio (q.v.).

Lisbon. — The successful revolution of Portugal against Spain was officially terminated by the conclusion of the Treaty of Lisbon, 13 Feb. 1668. Although this treaty recognized the independence of Portugal, it provided for the cession of

Ceuta to Spain. * .. .

LODI> — The war of Milan and Florence with Venice, Naples and other states ended with the signing of the treaty of peace at Lodi, 9 April 1454. ˆ _ „

London. — The treaty of peace closing the First Balkan War, signed 17-30 May 1913 by Greece, Bulgaria, Mon¬ tenegro and Serbia, of the first part, and Turkey, of the second part. By this treaty Turkey ceded a large part of its territory in Europe, and the Isle of Crete, and confided to the monarchs of the neutral governments of Europe the disposition of the remainder of the Ottoman islands in the yEgean Sea, and the Peninsula of Mount Athos.

Longjumeau. — A treaty of peace between the Catholics and Protestants was signed at this town in France, 23 March 1568. Peace was of brief duration, however, as war was under way again within six months.

Lubeck. — A peace signed between Wallenstein, tor Germany, and the Danes, January 1629. In accordance with its provisions the Danes recovered all their former possessions, without the payment of indemnity. They were merely compelled to pledge themselves never again to interfere with the affairs of the empire. , _

Lund. — The treaty between Denmark and Sweden, adjusting the

difficulties that had led them to participate in the War of 1672 between France and Holland was negotiated at Lund, 26 Sept. 1679.

Luneville. — Historians have always held _ that the Peace of Luneville was especially distinguished in that it marked the beginning of the end of the Holy Roman Empire. It was a treaty concluded between the emperor and the French 9 Feb. 1801. By its provisions the Batavian, Cisalpine, Helvetic and Ligurian republics were recognized; the left bank of the Rhine was bestowed upon France; Tuscany was ceded to Parma, and the arrangements made with Austria by the Treaty of Campo-Formio were

C°n Mangalore. — The treaty of peace by which the British and Tippu Saib agreed to a restitution of conquests was signed at Mangalore, India, in 1784. _

Mersen-Rastadt.— See Rastadt, in this article.

Milan. — The treaty of peace between Austria and Sardinia was concluded at Milan, 6 Aug. 1849.

Monsieur. — The treaty forced upon Henry III of France by a powerful combination of Huguenots and " Mon¬ sieur," the Due d'Alencon, and whereby great concessions were made to the Huguenots, has since been known as the Peace of Monsieur. It was signed in 1576.

Montpellier. — A treaty of peace which was extremely unfavorable to the Huguenots was signed at the close of the siege of Montpellier, in 1622. , . . ˆ

Montpellier.— The second Treaty of Montpellier, which offered more tolerable terms to the reformers, was

signed in 1626. , ' „ , c

Monzon. — A treaty of peace between Prance and Spam was signed at Monzon in May, 1626. The negotiations were conducted so quietly that the interested parties (Savoy, the Grisons, the Venetians, etc.) knew nothing about the matter until their fate had been settled by the treacherous cardinal, Richelieu.

Munster. — The general peace which ended the Thirty Years' War was signed at Munster, 24 Oct. 1648. See also Westphalia, in this article.

Nanking. — Great Britain and China concluded a treaty of peace which terminated the so-called ” Opium war,” in 1842. By its provisions China was not only compelled to pay an indemnity, but was forced to cede Hongkong to Great Britain, and to open the ports of Canton, Amoy, Fuchow, Ningpo and Shanghai to British commerce.

Nantes. — The Edict of Nantes, issued by Henry IV of France, 13 April 1598, is also known as the Peace of Nantes, owing to the fact, that it put an end to the religious wars in France. See Edict of Nantes. . „

Naupactus. — The conflict known as the “ Social War waged between the Achaean League, in alliance with Philip of Macedonia, and the Aetolian League, in combination with Sparta, was terminated by the Peace of Naupactus, b.c. 217.

Nice. — A truce famous in history was concluded at Nice between Charles V and Francis I of France, in 1538.

Nicias. — The famous truce negotiated by Nicias during the Peloponnesian War, between the Athenians and Sparta, B.c. 421, has since been known as the Peace of Nicias.

Nikolsburg. — The preliminary peace terms, which were afterward confirmed by the Peace of Prague (q.v.), were negotiated at Nikolsburg, a town in Moravia, 26 July 1866. These terms acted as a truce in the war between Prussia and Austria.

Nimeguen. — See Nimwegen, in this article.

Nimwegen. — A number of treaties were concluded at Nimwegen, Netherlands, during 1678 and 1679. With subsequent treaties, including that of Westminster (1674); Fontainebleau (1679); Lund (1679); Saint Germaine-en-Laye (1679), etc., they succeeded in terminating the war between France and Holland, and their allies, which had been in progress since the attack of Louis XIV upon Holland, in 1672. The treaties signed at Nimwegen were as follows: Between France and Holland, 10 Aug. 1678; between France and Spain, 17 Sept. 1678; between the emperor and France and Sweden, 5 Feb. 1679; between Holland and Sweden, 12 Oct. 1679. By the provisions of the treaty all territories taken were restored to Holland upon her pledge of future neutrality; France and Spain exchanged some extensive territories; the emperor ceded Frieburg-im-Breisgau to France, and Charles IV, Duke of Lorraine, was restored to his duchy upon conditions to which he refused to give his assent. See Nimwegen.

Northampton. — The treaty of peace by the provisions of which

Edward III of England renounced all claims of dominion which had been assumed over the kingdom of Scotland was concluded with King Robert I, 4 May 1328.

Noyon. — The wars that arose from the League of Cambray were terminated by the treaty of peace signed by Francis I of France, Charles of Spain, Maximilian, the emperor, etc.,

3 Dec. 1516.

Nuremberg. — • The religious truce concluded between Emperor Charles V and the Protestants, 2 Aug. 1532, is known as the Peace of Nuremberg.

Nystad. — The Northern War between Russia and Sweden was terminated by the Peace of Nystad, concluded 30 Aug. 1721. By its terms Russia restored Finland, but received, in place of it, extensive territories, including Esthonia, Livonia, Ingria, part of Karelia, *etc.*

Oliva. — Sweden, Poland, the Empire and Brandenburg participated in the peace treaty which was concluded at Oliva, Prussia, in 1660. By renouncing Courland, Sweden obtained important concessions from Poland.

Olmutz. — The Olmutz Conference between Prussia, Austria and Russia, 29 Nov. 1850, put an end to the revolts in Hesse and Schleswig-Holstein. The Elector of Hesse was reinstated and Schleswig-Holstein was restored to Denmark.

Osnabruch. — See Westphalia, in this article.

Paris. — There have been many so-called treaties of Paris. See Paris, Treaties of. The following are the most important peace treaties:

1763. — A peace treaty was signed at Pajis, 10 Feb. 1763, between Great Britain on one side and France, Portugal and Spain on the other. By its provisions Great Britain received Canada, Prince Edward Island, Cape Breton, Dominica, Toba¬ go, Saint Vincent, Grenada, Mobile and all the territory east of the Mississippi from France, restoring to her in return Guadalupe, Miquelon, Martinique, Pondicherry and Saint Pierre, and ceding to her Saint Lucia. In return for Florida Great Britain restored Havana and ceded Louisiana to Spain.

1783. — The Peace of Paris, which terminated the Revoluntionary War, was signed between Great Britain on one side and the United States, Spain, and France on the other, 3 Sept. 1783. In addition to the

acknowledgment of the independence of the United States the treaty provided that the navigation of the Mississippi should be made free to all parties to the agreement; that Florida and Minorca should be restored to Spain; that France should control the region of the Senegal, *etc.*

1814. — The treaty popularly known as the “ First Peace of Paris,” was concluded between France on one side and Great Britain, Austria, Prussia and Russia on the other, 30 May 1814. In addition to acknowledging the independence of the Netherlands, Switzerland, and the German and Italian

states, many territorial changes were made, both by the treaty and at the Congress which met later at Vienna.

1815. — This treaty, known as the “ Second Peace of Paris ” was concluded between the same parties as the treaty of 1814, having been signed 20 Nov. 1815. By its terms France was reduced pratically to the limits of 1790; the sum of $1,400,000,000 was assigned as proper recompense to the allies for the expenses of the war, and, among other things, it was agreed that the fortresses of the northern frontier should not only be occupied by the allies for a term of five years, but that such garrisons should be paid by France.

1856. — By the Peace of Paris, concluded between Russia on one side and Turkey, Great Britain, France, and Sardinia on the other, 30 March 1856 Russia abandoned her claim to a protectorate over the Christians in Turkey, the neutraliza¬ tion of the Black Sea was proclaimed and several important territorial changes were made.

1 898. — The most recent Peace of Paris was concluded between the United States and Spain, 10 Dec. 1898. Accord¬ ing to its terms Spain relinquished her sovereignty over Cuba, and ceded Porto Rico, Guam and the Philippine Islands to the United States in return for the payment of $20,000,000.

Passarowitz. — By the Treaty of Passarowitz, concluded 21 July 1718, between Turkey and Austria and Venice, Venice ceded the Morea to Turkey, while Turkey ceded a large tract of territory, including Bosnia and part of Serbia, to Austria.

Passau. — A treaty concluded between the Elector Maurice of Saxony and King Ferdinand in behalf of Emperor Charles V. This agreement, granting freedom of religion to the Lutherans, was signed 16 July 1552.

Peace of Monsieur. — See Monsieur, in this article.

Peking. — -The Peace of Peking, concluded between China and Great Britain and France, Oct. 1860, provided for the ratification of the Treaty of Tientsin (q.v.), and arranged the payment of indemnities and other concessions on behalf of China.

Perpetual Peace, The. — See Friburg, in this article.

Persia. — The treaty of peace between Great Britain and Persia, at the conclusion of the war over the taking of Herat, was signed at Teheran, 14 April 1857.

Petersburg, Saint. — See Saint Petersburg, in this article.

Pinerolo. — An agreement reached between the English Commonwealth and France, 1655, by which further persecu¬ tion of the Waldenses by the Duke of Savoy was permitted.

Pleswitz. — Although finally signed at Poischwitz, the armistice between Napoleon and the Russian and Prussian sovereigns, concluded 1 June 1813, is usually known as that of Pleswitz, owing to the fact that the negotiations were chiefly conducted at that place.

Portsmouth. — ■ The treaty of peace between Japan and Russia, conducted through the mediations of the United States, was concluded 5 Sept. 1905, at Portsmouth, N. H. See Portsmouth, Treaty of.

Prague. — The first Treaty of Prague was concluded be¬ tween Ferdinand II, emperor, and the Elector of Saxony, Tn 1635. Byits terms the latter assumed control over Lusatia.

Prague. — By the second Treaty of Prague, concluded between Prussia and Austria, 23 Aug. 1866, the Lombardo-Venetian kingdom was annexed to Italy and the Germanic Confederation was dissolved.

Presburg. — The Peace of Presburg was concluded between France and Austria, 26 Dec. 1805. By its terms Austria ceded her Venetian territories to Italy; Tyrol, Passau, etc., to Bavaria, and her Swabian territories to the South German States. Bavaria and Wurtemburg were also made kingdoms.

Pretoria. — The treaty of peace that put an end to the South African War was concluded at Pretoria, 31 May 1902. By its terms Great Britain took possession of the Transvaal Republic, the Orange Free State, *etc.*

Pruth. — The Peace of Pruth, which is also known as the Treaty of Falczi, was concluded at Hush, between Russia and Turkey, 23 July 1711. By its provisions Peter the Great and his army were released from the blockade; and Charles XII of Sweden was permitted to return home without being molested, in return for territorial cessions made by Russia to Turkey.

Pyrenees. — The treaty of peace concluded between France and Spain, November 1659, not only arranged for the cession of considerable Spanish territory to France, but also provided for a marriage between Maria Theresa, Infanta of Spain, daughter of Philip IV, and Louis XIV of France.

Rastadt. — The agreement for the termination of the war between Austria and France was reached at the Congress of Rastadt,* in 1714.

Rastadt. — The treaty known as the Peace of Rastadt was the agreement which preceded the treaty of Baden (q.v.). It was concluded between France and Austria, 6 March 1714.

Reuil. — The treaty of peace between the French Parli-ment and the Court, at the conclusion of the “ First Fronde,” was signed at Reuil in 1649.

Roeskilde. — By the Treaty of Roeskilde, concluded 28 Feb. 1658, Denmark ceded Schonen, Halland, Bornholm and Drontheim to Sweden. .

Ryswick. — The Treaty of Ryswick, concluded between France on one side and England, the Netherlands and Spain on the other, 21 Sept. 1697, marked the end of French support of the Stuarts by the recognition of William III as king of England. Many conquests were restored and several territorial exchanges were made.

Saint Germain-en-Laye. — The peace Treaty of Germain-en-Laye was concluded in 1679 between France and Branden¬ burg. By its terms Brandenburg was compelled to cede the greater part of its Pomeranian conquests to Sweden.

Saint Petersburg. — The peace treaty between Russia and Prussia, by the terms of which the former restored all her conquests to the latter, was concluded 5 May 1762.

San Ildefonso. — The treaty of peace which concluded the revolution of La Granja was signed at the castle of Ildefonso in August 1836. By its terms Queen Maria Christina of Spain was compelled to restore the Constitution of 1812.

San Stefano. — A treaty of peace concluded between Russia and Turkey, 3 March, 1878. By the terms of this agreement, which terminated the Russo-Turkish War the independence of Rumania, Serbia and Montenegro were recognized; the principality of Bulgaria was created, while Russia was to receive important territorial cessions as well as a war indemnity of 300,000,000 rubles. This treaty was much altered by the Congress of Berlin which met in the following June. See Adrianople; San Stefano, Treaty

OF.

Sardinia. — The agreement by which Sardinia consented to assist Great Britain and France by. providing a military contingent to serve against Russia in the Crimean War is known as the Sardinian Convention.

Schonbrunn. — A treaty concluded between Napoleon I and Prussia, by which the latter ceded Cleves, Ansbach and Neuchatel to France. It was signed 15 Dec. 1805.

Schonbrunn. — The second treaty signed at Schonbrunn is also known as the Treaty of Vienna. It was concluded 14 Oct. 1809, between Napoleon I and Francis I of Austria; its terms provided that Austria should not only join the Continental system and pay a war indemnity, but that she should cede territories to Bavaria, Warsaw, Russia and France. Those ceded to France were formed under one government, the Illyrian Provinces, by Napoleon.

Serpul. — The Peace of Serpul, between the Russians and the Bokhariots, was concluded in 1858. By its terms the Emir pledged himself to remain a firm ally of Russia. Valuable territorial concessions were also made.

Seville. — A peace between Great Britain, Spain and France, concluded in 1729. It was this treaty that left Great Britain in possession of Gibraltar.

Shimonoseki. — The treaty of peace concluded between China and Japan 17 April 1895, and by the terms of which China agreed to recognize the independence of Korea, ceded to Japan the southern portion of the province of Shingking, the island of Formosa and the Pescadores; pay a war indem¬ nity of about $175,000,000, and open the ports of Shashih, Chungking, Hangchow and Suchow.

Sistova. — A treaty of peace concluded between Turkey and Austria, 4 Aug. 1791. The boundaries which were adopted under the provisions of this treaty were very similar to those of the Treaty of Belgrade.

Spain with America. — See Paris, 1898, in this article.

Stockholm. — A treaty concluded between Great Britain and Sweden by the terms of which the duchies of Bremen and Verden were ceded to George I as Elector of Hanover, in consideration of the payment of 1,000,000 rix-dollars.

Szathmar. — By the terms of the Peace of Szathmar, concluded between Karoly and Hungary, in 1711, the emperor agreed to redress all grievances, both civil and religious, besides promising amnesty to all adherents of Rakoczy's, and the restitution of many of the confiscated properties.

Szegeddin. — The treaty of peace which Hunyades extorted from the sultan of Turkey rescued a large Christian territory from the Moslem yoke. It was concluded 12 July

Tafna. — The peace signed between General Bugeaud, for France, and Abd-el-Kader, 30 May 1837, is known as the Treaty of Tafna.

Teschen. — The peace which ended the War of the Bavarian Succession was concluded at Teschen, between Austria and Prussia, 13 May 1779.

Thorn. — Two peace treaties have been concluded at Thorn between Poland and the Teutonic Order. The first treaty was signed in 1411; the second, in 1466. By these treaties the Order made important cessions to Poland.

Tien-Tsin. — A treaty concluded between China on one side and the United States, Great Britain, France and Russia on the other, 26 June 1858.

Tilsit. — The peace between France on one side and Russia and Prussia on the other was concluded at Tilsit in 1807. The treaty between France and Russia was signed 7 July, that between France and Prussia on 9 July of that year. By the terms of the peace a portion of Prussia was set aside as the grand duchy of Warsaw, another portion of Prussia was ceded to Russia, and a smaller portion to Saxony; Dantzig was made free; Prussian harbors were closed to the

trade of Great Britain; the Prussian army was reduced to 42,000 men and the Confederation of the Rhine and Joseph, Louis and Jerome Bonaparte were recognized. Russia, on her part, entered into a secret alliance with France.

Tolentino. — By this treaty concluded between Pope Pius IV and Napoleon, the pontiff ceded Avignon, Bologna, Ferrara, the Comtat-Venaissin, the Romagna and Ancona to France. The agreement was

signed in February 1797.

Turin. — A peace between France and Savoy was con¬ cluded at Turin in 1696.

Turin.— The armistice negotiated between Bonaparte and Sardinia in 1796 is known as that of Turin.

Turkmauchay. — By the terms of the peace treaty con¬ cluded between Russia and Persia in 1828, Russia acquired, among other cessions, control over Persian Armenia.

Ulm. — The armistice concluded in 1647 between the French and Swedish forces on one side and the Bavarians on the other has since been known as the “ Truce of Ulm.”

Unfortunate Peace. — This title is frequently applied to the Treaty of Cateau-Cambresis (q.v.).

Utrecht. — The Peace of Utrecht, which consisted of several separate treaties, was concluded in 1713 between France on one side and Great Britain, Holland, Portugal, Prussia and Savoy on the other. With the treaties signed later at Rastadt and Baden it terminated the War of the Spanish Succession, for, by its provisions, it stipulated that the crown of Spain, which should never be united to that of France, should revert to Philip V of Bourbon. The Protestant succession in England and Prussia’s rights as a kingdom were also reqognized. Among the several territorial changes. Great Britain received Newfoundland, Nova Scotia, etc., with the right to send African slaves to America; the Spanish .Netherlands, Sardinia, Milan and Naples were ceded to Austria; Sicily was given to Savoy by Spain; Portugal received additional territories in South America, while Prussia took Neuchatel and Gelderland upon the renounce¬ ment of its claims upon Orange. See Utrecht, Peace of.

Verdun. — The conflict between the sons of Louis the Pious, immediately succeeding his death, was the first great dynastic quarrel of modern Europe. By the Treaty of Ver¬ dun, the agreement of partition which followed the battle of Fontenay, in 843, the Teutonic principle of equal division among heirs triumphed over the old Roman principle which provided for the transmission of the individual empire.

Vergara. — The treaty between the Car lists and the Cristinos, in Spain, was terminated by a treaty concluded at Vergara 1 Aug. 1839.

Versailles. — The preliminary agreement which preceded the peace of

Frankfort (q.v.) was concluded between France and Germany at Versailles. 26 Feb. 1871. See Versailles. For the Peace Treaty 1919, see War, European.

Vienna. — Several treaties have been concluded at Vienna. Those of the greatest importance are as follows:

1725. — A treaty between Germany and Spain, concluded 30 April 1725. By its terms the two sovereigns confirmed to each other such portions of the Spanish dominions as were then in their possession, while Spain guaranteed the Pragmatic Sanction. By a secret treaty signed at the same time Germany agreed to endeavor to restore Gibraltar to Spain, and to use effort to place the pretender on the throne of Great Britain.

1 738. — A treaty between Charles VI of Germany and Louis XV of France, concluded 18 Nov. 1738. By its terms Austria ceded the Two Sicilies to Don Carlos of Spain, receiving the duchies of Parma and Piacenza in return; Lorraine was ceded to France, and the Duke of Lorraine received Tuscany. It was this agreement that terminated the War of the Polish Succession.

1864. — The treaty which ended the Schleswig-Hol¬ stein War was concluded between Austria and Prussia on one side and Denmark on the other, 30 Oct. 1864. By its terms the king of Denmark renounced all rights over Schleswig-Holstein and Lauenburg.

1866. — The treaty of peace between Austria and Italy, by the terms of which the former gave up Venetia to Italy, was concluded 3 Oct. 1866.

Villafranca. — The war of 1859 between France and Austria was brought to an end by the treaty signed at Villa¬ franca by Francis Joseph and Napoleon III, 11 July 1859. This treaty was preliminary to that of Zurich (q.v.).

Wedmore. — A treaty of peace concluded between King Alfred and the Danes (about 860) by which the latter bound themselves to remain peacefully on that side of England which lay north and east of “ Watling Street.”

Werela.— A treaty of peace was concluded between Sweden and Russia, at Werela, Finland, in 1790.

Westminster. — By the Treaty of Westminster, signed 19 Feb. 1674, the United Provinces relinquished their con¬ quests of the New

Netherlands to the king of England.

Westminster. — The so-called “ Peace of Westminster,” signed by France and England 13 Oct. 1655, admitting the freedom of the neutral flag.

Westphalia. — The Peace of Westphalia, which ter¬ minated the Thrity Years’ War, consisted of treaties signed at Munster and Osnabruk, the general peace being signed at Munster, 24 Oct. 1648. By its provisions Switzerland and Holland were declared independent of the German Empire;

Sweden obtained Hither Pomerania, Wismar, etc., with three votes in the Diet and a cash indemnity; France received most of Alsace, and was confirmed in the possession of other territories; Brandenburg received Further Pomerania, etc.; Lusatia went to Saxony; the Upper Palatinate to Bavaria; the Rhineˆ Palatinate reverted to the electoral house of the Palatinate, a new electorate being created for it; the Peace of Augsberg was confirmed (its provisions being also extended to the Calvinists) and autonomy was secured to the German States. See Westphalia, Peace of.

Znaim. — The truce between France and Austria which followed the battle of Wagram 12 July 1809, has since been known as the “ Armistice of Znaim.”

ZUrich. — The Peace of Zurich was concluded between France and Sardinia on one side and Austria on the other, 10 Nov. 1859. Based on the preliminary treaty signed at Villafranca (q.v.), its terms provided that Austria should cede Lombardy (except Mantua and Peschiera) to France, she ceding them to Sardinia. In return Sardinia assume responsibility for three-fifths of the debt.

PEACH, a small tree (Amygdalus persica) of the family Amygdalacece. It is supposed to be a native of China, whence it has been carried by man, by way of southwestern Asia and the ‘Mediterranean region, to all warm temperate climates throughout the civilized world. It has been cultivated since prehistoric times and to¬ day it ranks among the 12 most important fruits of the world. The original species is not iden¬ tifiable, and many botanists suppose that orig¬ inally the peach and the almond were identical. The two trees are much alike in habit and ap¬ pearance, and many intermediate grades of their fruit are known. The peach attains heights of 15 to 20

feet, bears lanceolate leaves singly, in pairs or threes, in the last case two of the buds usually being flower-buds with a leaf-bud between them. Flower-buds are also borne upon short spurs which live only two or three years. Since the flower-buds open in very early spring, before the leaves appear, they are fre¬ quently injured by frost. The fruits (drupes) vary greatly in size, downiness, color, adherence to or separation from the stone and color of flesh.

About 300 varieties are cultivated in the United States, popularly classed as clingstone and freestone, white-fleshed and yellow-fleshed. Price, a Texas horticulturist, has given a syste¬ matic classification as follows: (1) Peen-to race, flat, greenish-white, medium-sized, early varie¬ ties, suitable for cultivation only in the Gulf States; (2) South China race, flattened-oval, rather small fruits with curved apex; (3) In¬ dian or Spanish race, hairy, yellow, late, often streaked, firm fruits; (4) North China race, large, mostly cling or semi-cling fruits with slightly curved beaks; (5) Persian race, the common peaches, white or yellow-fleshed, cling or free, of the Northern and Central States, also cultivated extensively in Georgia, California and other great peach-producing districts. There are also smooth-skinned peaches, nectarines, which may originate from peach seeds, or from sport-buds upon peach trees, and are propagated and cultivated in the same way as peaches, but to only a small extent commercially.

Peaches are always propagated by means of seeds, which are usually stratified in sand dur¬ ing the autumn, and allowed to freeze during the winter in order to crack the shells and thus hasten germination. The seeds are planted in light soil six or eight inches asunder in rows two and one-half or three feet apart. The young plants are cultivated like other inter¬ tilled crops until they are large enough to be budded with the desired varieties. This is usually in June in the South, and from early

A TYPICAL PEACH BRANCH

PEACH

August to mid-September in the North. In the South the trees may be ready for setting in the orchard during the autumn; in the North the buds do not grow until the following spring and the trees are not ready for planting until the succeeding autumn. In the operation of budding the buds are set as close to the ground as the operator can place them, and when they start to grow the original top is removed so as to force all the food into the young sprout. When set in the orchard the young trees is buried at least as deeply as the point of union of stock and scion. Peach trees more than one year old from the bud are rarely planted be¬ cause they are less satisfactory than yearling trees.

The peach will succeed upon almost any soil if not too wet; it thrives best, however, upon light, sandy, gravelly or shaly soils, where the fruits are superior in color and flavor to those produced on heavier soils, though these latter may yield more succulent fruits. Heavy lands have a further disadvantage since they generally induce late and rank growths, which are not only at the expense of productivity but are very prone to be winter-killed. The inferior color of fruits on such land can be partially corrected by distant planting, and by admitting light and sun to the trees by open pruning. More import¬ ant than soil is situation. Since the blossom-buds open very early, the peach orchard should be situated on a northern slope, preferably on high ground where the coldness of the air will counteract the sun's warmth on thawing winter days and in early spring. The later they can be made to open, the better. For this purpose many growers spray their trees in early winter with whitewash so that the twigs will reflect r.ather than absorb the sun's rays. Nearness to large bodies of water is always desirable if the prevailing wind during winter and spring comes from that direction. The most successful peach areas in the North are on the eastern shore of Lake Michigan and the southerh shores of Lakes Erie and Ontario.

In the orchard the trees are planted about 20 feet apart, though upon very light soils, and when given special care as to pruning and tilling they may be set even 12 feet apart. Usually in such cases, however, each alternate tree is removed when the branches commence to interfere with one another. The land is deeply plowed and harrowed either in early spring or autumn, and the trees set in rectangles or hexagons, the latter being preferred in Cal¬ ifornia because a larger number of trees can be planted on a given area and the land can be kept cleaner, since it may be cultivated in three directions instead of two. In arid and semi-arid regions the orchards are irrigated. In regions where there is danger of late growth, they are sown with crimson clover, rye or some other cover crop, to check growth and

thus ripen up the branches already formed. In the following spring this crop is plowed under. Care must be taken, however, to prevent the undue accumulation, by this practice, of nitrog¬ enous plant-food in the soil, and for this rea¬ son also nitrogenous fertilizers must usually be withheld, since such tend to produce rank growth of tender wood. Potash and phosphoric acid fertilizers may be applied without stint. At planting time the trees must be severely cut back, only a small part of the main stem and

one or two buds upon the best placed twigs being allowed to remain. In subsequent seasons the twigs must be severely pruned back, usually less than half the wood produced being allowed to remain and often two-thirds being removed. Pruning should occur in the spring just as the buds are swelling, since at this time those that are living can be easily distinguished and the pruning done most judiciously. Summer prun¬ ing is rarely done, but thinning the fruit is a general practice. This operation is performed after the (<June drop,** when the imperfectly set fruits fall off. Many growers remove more than half the fruits set; others insist that the remaining fruit be from 5 to 10 inches apart. This practice results in a saving of plant-food and consequent annual productivity. It also increases the size and quality of the specimens. Even under the best of management the trees will seldom live much longer than 25 years, and in commercial orchards they rarely exceed 10 years of profitable service, having come into profitable bearing when three or four years old.

With perhaps no other fruit did methods of marketing change so radically during the clos¬ ing half of the 19th century as with the peach. In the fifties the fruit was generally sent to market in large baskets or even piled loosely in wagons. Now, although half bushel baskets are still used to some extent, small packages are the rule, a favorite package being a crate containing six veneer baskets each hold¬ ing two or four quarts. Another popular pack¬ age is the climax basket holding from 5 to

10 pounds, provided with a handle, and cov¬ ered with netting or a thin board. The fruit is gathered while still firm but when full grown and well colored. Enormous quantities of peaches are used as dessert and still larger amounts are canned or dried. In some sections peach brandy is also made upon a small com¬ mercial scale.

The peach is the victim of several insidious and inexplicable so-called diseases, as well as of several whose origin, life-history and control

have been fairly well worked out. Probably the most widely dreaded of the first group is yellows. This malady attacks all varieties of peaches, of all ages and on all kinds of soils.

1 1 appears on the tree, first as a tip growth late in autumn or before general growth in spring, the tips of twigs and especially of watersprouts and suckers when present being most often at¬ tacked. The small, stiff, narrow leaves of these growths stand approximately at right angles to the short stem. The second symptom is slender, the appearance of wiry shoots with stiff leaves developed on the trunk and main branches. Often these form tufts. Finally slender growths of new wood bearing small, narrow yellow or reddish leaves, appear often in great abundance in the centre of the tree. An infallible sign after the trees are in fruit is the red splotched fruit, the flesh of which is usually mottled red. Premature ripening of the fruit is common and decrease of size and increased fuzziness mark the second year's crop. Since no remedy has been discovered, and since the disease is con¬ sidered contagious, the trees should be dug out and burned as soon as possible. New trees may be planted where the old ones have stood. The disease is purely American, and has been known for over a century. Trees rarely live more than five years after being attacked. It is

more prevalent in Northern than in Southern orchards.

During the closing decade of the 19th cen¬ tury a new inexplicable disease called ˆlittle peach® appeared in the peach belt of Michigan and in western New York. The fruits con¬ tinue small and hard, the trees decline in vigor and die in a few years. No remedy has been discovered, and as the affection is contagious, grubbing and burning must be enforced.

Of the controllable diseases the following are the more common and destructive if un¬ checked. Fruit-rot or twig-blight (Monilia fructigena) destroys the young twigs and foli¬ age, especially in the centre of the tree. It is most commonly recognized by the rotting of

the fruits, which may hang as “mummy8 peaches for a year or more after they have destroyed the specimen. Since these mummies are sources of infection they should be gathered and burned. Further treatment consists in spraying the dormant trees in very early spring with a copper-sulphate solution (1 pound to 25 gal¬ lons of water). When the buds commence to swell, an application of Bordeaux mixture di¬ luted to 75 gallons should be given and another when the buds open. Other sprayings should be given as the fruit approaches maturity, a clear fungicide being used. Thinning of the fruit and the admission of light and air bv open pruning are helpful preventive measures. Leaf-curl (Exoascus deformans) seems to have a pronounced liking for some varieties, es¬ pecially soft, dark-leaved ones. The leaves be¬ come wrinkled, yellowish or reddish and con¬ torted, but are at first only somewhat blistered. It appears in spring, particularly in moist weather, and may defoliate the trees by mid¬ summer, though slight attacks seem to do no marked injury. Spraying before the blossoms open, as recommended above, and once after they fall, has been found effective. If the weather is dry and clear the last mentioned ap¬ plication may be omitted. Black spot (Clado - sporium carpophitum) appears as dusky dots upon the fruit, especially in damp atmosphere. Their confluence often checks the development of the part attacked and the fruit may crack open or be lopsided. Spraying as for fruit rot has been found satisfactory. See Fungicides.

Among the numerous insects which feed upon the peach the following are often trouble¬ some : Peach twig borer, the larva of a Euro¬ pean moth (Anarsia lineatella). It passes the winter as a larva, and in the spring burrows into the growing shoots, which fail to develoo. It has become a scourge in the Pacific Coast orchards, but is little known in the Eastern States. The fruit-tree bark-beetle (Scolytus rugulosus) , a general borer, often attacks the peach. Since it prefers ailing trees the girdling of unprofitable specimens is recommended, these trees serving as decoys for the females to lay their eggs in. The trees are to be cut and burned The peach-tree aphis (Myzus per sxccb) and the black peach aphis (Aphis persicce mger) are often troublesome but may be controlled with kerosene emulsion. Several leaf-chewing insects often cause damage; for instance, the peach-tree leaf-roller (Pytcholoma bersicana), and the New York weevil (Ichthycerys nova-boracensis), all of which are more or less per¬ fectly controlled by arsenites, lime being added

to prevent injury to the foliage. Several scale insects and bark-lice are often serious enemies. The most troublesome insects, however, are the

curculio (see Plum) and the peach-tree borer (/Egeria exitiosa) . This latter is the cat¬ erpillar of a clear-winged, day-flying, wasp-like moth, which lays its eggs usually near the ground on the trunks from midsummer until autumn. The larvae bore beneath the bark to the cambium layer, feed on the young wood, pass the winter in the larval form in little shel¬ ters made of peach gum, castings, etc., and after eating actively for several weeks in the spring, pupate for about three weeks. The adults emerge in the North during midsummer, in the South in late spring. The trunks of peach-trees should be examined during October and April, and the larvae grubbed out and destroyed. They are easily discovered by the castings and gum. Most frequently they are within six inches be¬ low or above the surface of the ground. See Fruit-Growing; Fruit Industry.

Bibliography. — Bailey, L. H., (Standard

Cyclopedia of Horticulture) (1914) ; Fulton,

J. A., (Peach Culture) (1899) ; Gould, H. P.,

(Growing Peaches: Varieties and Classifica¬ tion) (Farmers' Bulletin 633; Washington 1914) ; id., <Growing Peaches : Sites, Propaga¬ tion, Planting, Tillage, and Maintenance of Soil Fertility); and (Growing Peaches: Prun¬ ing, Renewal of Tops, Thinning, Interplanted Crops and Special Practices) (Farmers' Bulle¬ tins 631, 632; Washington 1915); Hume, (The Peer — To Group of Peaches) (Bulletin 62; Jacksonville, Fla., 1902) ; Powell, (The Chinese Cling Group) (Bulletin 54; Newark, Del., 1902); Price, (The Peach) (Bulletin 39; Gal¬ veston, Tex., 1896) ; Reimer, (The Honey Peach Group) (Bulletin 73; Jackson, Fla., 1904) ; Scott and Quaintance, (Spraying Peaches for the Control of Brown-Rot, Scab and Cur¬ culio) (Bulletin 440; Washington 1911) ; Waugh, F. A., (The American Peach Orchard) (New York 1913).

PEACH-TREE CREEK (Atlanta), Battle of. After the engagement at Smyrna Camp Ground (q.v.), 4 July 1864, General Sherman secured three crossings of the Chatta¬ hoochee River above Gen. J. E. Johnston's posi¬ tion, with good roads leading to Atlanta ; whereupon Johnston on the night of the 9th crossed to the east side of the river. On the 17th Sherman ordered a general advance on Atlanta, and by night the entire army formed a general line along the old Peach-tree road. On the night of the 17th General Johnston was re¬ lieved from command of the army confronting Sherman, and was succeeded by Gen. J. B. Hood. His army numbered about 51,000 men, strongly posted about four miles in front of Atlanta, on the south bank of

Peach-tree Creek, holding the line of that stream and the Chatta¬ hoochee for some distance below the mouth of the creek. On the 18th and 19th Sherman's army, with*General Thomas' Army of the Cum¬ berland on the right as a pivot, . swung to the right and, all advancing, closed in on Atlanta. General Schofield's Arnry of the Ohio occupied Decatur and then moved toward Atlanta. The Army of the Tennessee, under Gen. J. B. Mc¬ Pherson, destroyed several miles of the Augusta Railroad east of Decatur, and then closed in on that place. Thomas, after some sharp

skirmishing, put his heads of columns across Peach-tree Creek by several 'bridges, but there was a gap of two miles between him and Scho¬ field, which he partially closed on the 20th by two divisions of the Fourth Corps, Newton's division of the same corps being left on the Buckhead road, on the left of Hooker's 20th Corps. When Hood, on the 19th, knew that Thomas was crossing Peach-tree Creek, he de¬ termined to crush him before he could entrench, and then turn on Schofield and McPherson. General Cheatham's corps was Hood's right, Hardee's his centre and Stewart's his left. Cheatham was to hold his left on the creek to separate Thomas from Schofield and face Scho¬ field and McPherson, while Hardee and Stewart, moving by division in echelon from the right, went against the flank and front of Thomas to drive him back to the creek and then down it toward the Chattahoochee into the narrow space formed by the river and the creek, into a sort of pocket. The order was given to advance at 4 p. m. of the 20th and sweep the field. Bate's division, on Hardee's right, passing by Newton's left, found no enemy in its immediate front, and failed in an effort to reach Newton's flank. Walker's, division, in Hardee's centre, struck Newton's division, bent back both flanks and. after a severe struggle, was driven back with great loss. A part of Hooker's corps assisted Newton. Hardee was about to renew the attack on Newton, with Maney's and Cleburne's divisions, when Cle¬ burne was withdrawn to go to the extreme right, and Hardee gave up further attack. On Hardee's left Stewart made a furious attack upon Hooker, whose troops had not fully taken position. Geary's division had

crossed the creek more than a half mile above Howell's Mill, and was on high timbered ground, with its right thrown forward, and the 33d New Jersey was thrown to a bare hill some distance in advance. Williams' division was moving up to connect with Geary on the left and Palmer s division of the 14th Corps on , the right. Ward's division was near Collier's Mill, on Geary's left and rear, near the banks ˆof the creek to the rear and right of Newton's divi¬ sion, from which position its brigade com¬ manders led their men against the flank of Walker's division, engaging Newton. Stewart, moving by division in echelon, first struck the 33d New Jersey, almost enveloping it, driving it back and 'taking many prisoners. It then fell upon Geary, Ward and Williams, in quick suc¬ cession making a series of determined assaults, continuing until night, when he was finally re¬ pulsed and withdrew to the works from which he had advanced, with a loss of about 2,000 men. The Union troops engaged numbered about 20,000, the Confederates about 19,000. The Union loss, killed and wounded, was about 1,600, of which nearly 1,500 fell upon Hooker's corps; the Confederate loss, killed and wounded, was about 2,500. Consult (Official Records) (Vol. XXXVIII) ; Cox, (Atlanta' ; Van Horne, (History of the Army of the Cumberland' (Vol. II) ; Sherman, Personal Memoirs' (Vol. II) ; Tohnston, (Narrative of Military Opera¬ tions' ; The Century Company's (Battles and

Leaders of the Civil War' (Vol. IV).

E. A. Carman.

PEACOCK, Thomas Love, English novel¬ ist: b. Weymouth, Dorset, 18 Oct. 1785; d. Hal—

liford,*23 Jan. 1866. He was at first in mer¬ cantile life in London (1808-09) ; secretary to Sir H. R. Popham. In 1819 he was appointed to the East India House, and in 1836-50 was chief examiner to the company. He wrote some ambitious but artificial poems, such as (Rhododaphne, or the Thessalian Spell' (1818) ; but found his true field in the satirical novel, ˆHeadlong Hall' (1816); (Melincourt' (1817);

(Nightmare Abbey' (1818) ; (The Misfortunes of Elphin' (1829) ; (Crotchet Castle' (1831) ; Paper Money Lyrics and other Poems' (1837) ; and (Gryll Grange' (Fraser 1860). These maintain real humor, and

the later ones, if they lack for invention, are nevertheless, interesting from the frank expression of prejudice with which they abound. His characters are, how¬ ever, delightful, more ‘types than real living per¬ sonages. The lyrics interspersed through these volumes are Peacock’s best verse. His works were edited by Garnett in 1891.’ Peacock made the acquaintance of Shelley and his wife in 1812 while on a tour through Wales, and the friend¬ ship continued throughout the life of the more famous poet. On his death Shelley made Pea¬ cock his executor, together with Byron ; and the former was indefatigable in his collection of material of all kinds relative to the life and work of Shelley. Consult Brett-Smith, Pea¬ cock’s Memoirs of Shelley with Shelley’s Letters to Peacock’ (London 1909) ; Freeman, A. M., Peacock’ (New York 1911) ; Saintsbury, G. E.,

(Essays in English Literature 1780-1860’ (Lon¬ don 1890) ; Van Doren, Carl, (Life of Thomas Love Peacock’ (New York 1911) ; Vincent, L. H., (Dandies and Men of Letters’ (Boston

1913).

PEACOCK. See Peafowl.

PEACOCK, The. See Hornet, The.

PEACOCK-BUTTERFLY, a butterfly (Junonia ccenia) of medium size, so called from the ((eyes” on its wings, which resemble those on peacocks’ feathers. The forewings are of a reddish-brown color, with black, fawn and orange markings. The hind-Avings are similar in general color, but less red. This butterfly is known over nearly the whole of the United States, in some localities as the “buckeye.” The caterpillar is gray in color with longitudinal stripes, and orange bars and dots transversely, and it is studded with black branched spines throughout its whole length. It is to be seen on the mullens about the beginning of July.

PEACOCK AND EPERVIER, Battle of,

in the War of 1812. On 12 March 1814 Master Commandant Lewis Warrington ran the block¬ ade of New York harbor and sailed for south¬ ern waters in the new sloop of war Peacock (20 short 32’s and two long 12’s). On the morning of 29 April he sighted the British brig kpervier (16 short 32’s and two short 18’s), Capt. R. W. Wales. At 10.20 the two ships were at close range but the British gunnery was light and reckless whereas the American guns were well aimed and

steadily fired, with the re¬ sult that in 45 minutes the Ppervier was. hulled 45 times, her rigging was badly cut up, eight of her guns were disabled and her deck was a shambles, 23 of her crew of 128 having been killed or wounded. The Peacock's hull was not touched and she suffered only slight injury to her rigging, while only two of her crew were slightly wounded. Though chased by two

frigates, Warrington saved his prize and brought her into Savannah.ˆ From June to October he cruised near the Faroe and Canary Islands, burning or sinking 12 prizes valued at $493,000 and making cartels of two more. Con¬ sult Adams, (United States' (Vol. VIII, pp. 181-84) ; (American State Papers, Naval Affairs) (Vol. I, pp. 313—14) ; Barnes, James,

(Naval Actions of the War of 1812' (pp. 191-96) ; Cooper, J. F., <Naval History' (Vol. II, pp. 130-32) ; James, William, (Naval Actions' (pp. 39-42) ; Mahan, A. T., (War of 1812' (Vol. II, p. 258 et seq.) ; Roosevelt, (Naval War of 1812' (pp. 311-16); Spears, J. R., (History of Our Navy' (Vol. Ill, pp. 66-79) ; Wiley and Rines, (fhe United States' (Vol. V, pp. 481—

82).

PEACOCK-FISH, a European wrasse (Crenilabnis pavo) inhabiting the Mediterra¬ nean, so named from its gaudy colors.

PEACOCK-FLOWER. See Poinciana.

PEACOCK-PHEASANT, a small pheas¬ ant of the gorgeously ocellated genus Polyplec-tron, species chinquis, which inhabits the forests of the foothills of the Himalayas of Indo-China. The males have two or more — up to five — spurs on each leg. The hen lays but two eggs before sitting. The characteristic call of the male is a clear, strong whistle. The pea¬ cock (<eyes" from which it gets its name cover the long

feathers of the wings.

PEAFOWL, birds of the genus Pavo • the type of the subfamily Pavonina of the pheas¬ ant family (P hasianidcc) . The genus comprises two or perhaps three species of the Indo-China region and neighboring islands of southern Asia, one of which has been extensively domes¬ ticated as an ornamental bird in Europe and America. The common peafowl (Pavo crista-tits') is sufficiently familiar to require no de¬ scription beyond the rectification of a very common er,ror. The splendid plumes which are the chief glory of thi peacock are not the tail quills, but the tail coverts. When these are erected and spread the true tail quills are exposed at their base, and are quite plain and ordinary. They, however, furnish a support for the spread of the tail coverts.

The wooded hill-country of India and Cey¬ lon is the native home of the peafowl and here they are common in a wild state. When court¬ ing, the male struts like a turkey-cock, and usu¬ ally secures three or four hens. They com¬ monly live in small flocks. The wild pea-hen lays from six to eight eggs, and produces only a single brood in each year. The nest is of rude construction, and is placed on the ground, or rarely on low branches or in ruined buildings. The period of incubation extends over 25 or 30 days. The young birds of both sexes are feath¬ ered alike for the first two years; and in the third year the tail coverts of the male begin to develop. In cold climates, while the birds seem to thrive, they do not breed readily.

In Bengal, Java. Sumatra, etc., shooting the wild peafowl forms a favorite amusement, and large flocks of these birds are occasionally met with by sportsmen. In India peacocks are held sacred to certain castes and various supersti¬ tions are connected with them ; in Greek my¬ thology it was the favorite bird of Juno. The peacock was domesticated at a very remote

period and some uncertainty exists coucer ning the exact time of its introduction into Europe. From India it was probably brought to Persia and Media. Aristophanes speaks of ”Persian Peacocks.” Suidas terms it .the ”Median Bird.” The fleets of Solomon brought these birds to Judea. Alexander the Great brought them to Europe; and they were first seen in Rome about the end of the republic, and speedily became ob¬ jects of interest to the sybaritic tastes of the day. Pliny says that the orator Hortensius was the first who made a table delicacy of these birds, this worthy presenting them at a least given to ‘the College of

Augurs. \ itellius and Heliogabalus introduced at their feasts dishes composed of the brains and tongues only of peacocks. In the Middle Ages in Europe pea* cocks were still deemed meet dishes for. the tables of the great, although in modern times the. flesh is accounted coarse and tough. In an¬ cient Greece, in the time of Pericles, those birds brought high prices. From India they were also brought to Asia Minor, and thence into the Isle of Samos, where they were bred and consecrated to Juno, who was alleged in mythological legends to have adorned their tails with the eyes of her favorite, Argus. From Europe they were in turn introduced into Africa and America. A fossil form of the peacock was discovered in California in 1908 and has received the name Pavo Calif ornicits.

In domestication the food consists of grain of various kinds, but at times may be quite varied. The young in temperate climates usu¬ ally require some attention in rearing. They also lay more numerous eggs than in the wild state. The cry of these birds is popularly said to be repeated before the fall of rain. The pea¬ fowls are said occasionally to live to a great age; but from 20 to 30 years appears to be the average limit of their existence. The dark-blue-shouldered or japanned peacock is gen¬ erally regarded as a variety of the common spe¬ cies, but, as it breeds true, it has been described as a separate species. The male is the darkest of all peacocks, and the female almost white. From this variety doubtless has been developed the sacred white peacock of India. A some¬ what similar form, however, sometimes ap¬ pears as a sport from the common species. The Javan peafowl is certainly a distinct spe¬ cies (P . muticus) found in Burmah and Java. It has a neck of metallic green with golden glints, and a crest of a different form from the common species. The female in this spe¬ cies is almost as gorgeous as the male.

Consult Beebe, C. W., (Monograph of the Pheasants' (London 1915).

PEAKE, Elmore Elliott, American novel¬ ist : b. Decatur, Ohio, 25 March 1871. He has published (The Darlingtons' (1900); 'The Pride of Tellfair' (1903) ; 'The House of Hawley' (1904) ; (The Little King of Angel's Landing' (1906).

PEALE, pel, Charles Willson, American artist: b. Chestertown, Md., 16 April 1741; d. Philadelphia, Pa., 22 Feb. 1827. He turned from saddlery to portrait painting, received some instruction from J. S. Copley at Boston and in 1770 became a pupil of Benjamin West in London. In addition to portraiture, he studied mezzotinto engraving, modeling in wax and casting and molding in plaster, in all of

which he showed facility. In 1774 he opened a studio at Annapolis, Md., and in 1776 at Phil¬ adelphia. He was elected to the Pennsylvania legislature in 1779. In 1802 he opened at Phila¬ delphia Peale's Museum, including collections of portraits and objects of natural history. Peale was not only a collector of natural curiosities and a lecturer on natural history, but turned his hand to a half dozen or more means of liveli¬ hood. It is said that he himself sawed the ivory on which his miniatures were painted, molded the glass that covered them and made the shagreen cases that enclosed them. His considerable fame in the United States is due less to genius than to two fortunate circum¬ stances. For many years he was the only por¬ trait painter of worth in the colonies and widely in demand, and he associated his art with the name of Washington, who granted him 14 sit¬ tings and whom he portrayed in all guises, from colonel of Virginia militia, to bust portraits. Among his other subjects were Robert Mor¬ ris, Hancock, Gates, Baron de Steuben, Comte de Rochambeau, Franklin, Nathanael Greene, Jefferson, Hamilton, Monroe, Jackson, J. Q. Adams, Calhoun and Clay. Peale had 11 children, all of whom were named after famous artists. Three of these, Rembrandt, Raphaelle and Titian all became artists ; and his brother James gained a reputation as a painter of minia¬ ture portraits. Consult Dunlap, (History of the Arts of Design in the United States) (1834) ; Isham Samuel (History of American Painting) (New York 1890) ; Johnston, E. B., (OriginaI Portraits of Washington (Boston 1882).

PEALE, Patrick, a pseudonym of Gustav Anton von Seckendorff (q.v.), a German poet and novelist.

PEALE, Rembrandt, American artist and author: b. Bucks County, Pa., 22 Feb. 1778; d. Philadelphia, 3 Oct. 1860. He was second son of C. W. Peale (q.v.). In 1796 he estab¬ lished a studio at Charleston, S. C.,

where he remained until 1801. He then became one of West's pupils in London and for some time thereafter was occupied at Paris in painting por¬ traits of celebrities for Peale's Museum at Philadelphia, which his father had established sometime previous to this. In 1810 he began painting in Philadephia. Two of his great ex¬ hibition pictures, (The Roman Daughter* and (The Court of Death,* attracted much atten¬ tion. The latter was a canvas 24 X 13 feet, and contained 23 figures. The most of his time, however, was devoted to portraiture. He sev¬ eral times painted Washington, the portrait of 1823 being justly famous. The original was purchased by Congress for $2,000 in 1832 and many copies were ordered from the artist. This work, whose authenticity is sufficiently in¬ dicated by the fact that Chief Justice Marshall called it ((more like Washington himself than any portrait I have ever seen,® is a truly impres¬ sive delineation and has remained favorite among the general public. In 1829 he went to Europe and while there visited France and Italy; and finally, in 1833, he took up his residence in Lon¬ don, after having first returned to the United States. But his restless nature did not allow him to remain there and he drifted back to Philadelphia. His paintings include (Court of Death * (1820, Detroit Art Gallery) ; (The Ro¬

man Daughter * (Boston Museum) ; (Ascent of Elijah* ; and portraits of Gilbert Stuart, Thomas Jefferson, Mrs. Madison (New York Historical Society) ; Washington (Independence Hall, Philadelphia). Among Peale's writings were (An Account of the Skeleton of the Mammoth* (1802); (Notes on Italy* (1831) ;(Graph¬ ics* (1841); (Reminiscences of Art and

Artists * (1845). His technique was more accu¬ rate than that of his father; but his work has in general less life than that of the elder Peale. Consult Lester, C. E., (The Artists of America) (New York 1846).

PˆAN, pa'an', Jules Emile, French sur¬ geon: b. Mar bone, Eure-et-Loire, 1830; d. 1898. In I860 he was graduated in medicine at the University of Paris and was made prosecteur. From 1868 to 1892 he was employed as hospital surgeon in several institutions and in the latter year opened a private hospital. He was elected to the Academy of Medicine in 1885. He was the greatest French abdominal surgeon of his day. In 1864 he performed the first successful operation in France for removal of the ovaries. Many surgical and gynaecological instruments were invented or improved by him. He edited Nelaton, (Elements de pathologie chirurgicale) (1872) and published (De la scapulalgie et de la resection sc&pulo-humerale* (1860) ; (Ova-

riotomie et splenotomie* (1869) ; (Hysteroto-mie) (1873) ; (Legons de clinique chirurgicale professee a l'Hopital Saint-Louis) (9 vols., 1879-95) ; (Diagnostic et traitement des tumeurs de l'abdomen et du bassin* (1880-89).

PEANUT, a spreading, hairy, annual herb (Aracliis hypogosa) of the order Leguminosce. It grows about 18 inches tall, bears light green leaves and whitish flowers, after the fading of which the stems bury themselves in the ground, where the one to three-seeded yellowish pods mature. The plant is considered to be a native of Brazil, whence it was introduced into Eu¬ rope shortly after the discovery of South Amer¬ ica, and whence it has been carried by man to nearly all warm climates throughout the world. Since the Civil War it has been an important agricultural crop in the South, especially from Virginia to Georgia and in Tennessee, where the plant is known locally as ((goober-pindar,® ((ground-pea,® *etc.* The crop averages about 20,000,000 bushels annually, three-quarters of which is recleaned for roasting and sale as a luxury, either alone or in confectionery, *etc.* This use is distinctly American ; in the Old World the <(nuts® are used mainly for making oil and for stock-feeding. Peanut butter, soups, cakes, etc., are manufactured, but have not become widely popular. From 25 to 50 per cent of oil may be expressed from the shelled nuts, and this, if carefully prepared, is useful for cooking and in the arts. The ((hay® is fed to stock, as also is the cakes left after the oil is expressed. Pigs are often profitably turned upon the fields after the harvesting of the crop, and still more profitably upon unharvested fields. The cost of digging is thus saved and the pea¬ nuts make a good quality of pork, which, how¬ ever, is somewhat soft and should be hardened by feeding corn to the animals.

Peanuts thrive best upon very light, sandy loam, well supplied with lime. They are also favored by an early warm spring and a hot,

humid summer. The soil should be deeply plowed and finely harrowed, and the unshelled seeds at the rate of about two bushels to the acre, planted about an inch deep, at intervals of a foot in rows

about 30 inches apart, as soon as the weather has become settled in the spring. Until the plants shade the ground the surface must be kept loose and open and free from weeds, especially turf-forming grasses and sim¬ ilar weeds. Before danger of frost the plants are harvested with special implements, dried in loose shocks for two or three weeks, the pods removed and sent to “recleaning® establish¬ ments, where they are finished for market. Un¬ der ordinarily good management 50 bushels of “nuts® and two tons of straw should be obtained from an acre. In Europe the peanut is perhaps best known as ground nut and earth nut. See Peanut Industry, The.

PEANUT INDUSTRY, The. The people of the United States consume upward of $25,- 000,000 worth of peanuts annually, while during each year the country produces 20,000,000 bushels of peanuts, or 88,000,000 pounds. This is not a very large fraction of the total world’s supply, which amounts to about 600,000,000 pounds. The exportation from Africa and India to Europe reaches to about 450,000,000 pounds annually. Of this vast quantity about 50 per cent goes to France, the bulk of it being pressed for oil. The peanut is employed mainly as an adulterant of or as a substitute for olive oil and it is so excellent in quality that most people can¬ not detect the difference. Nearly all the olive oil that comes to the United States is at least mixed with part of the peanut. Peanuts fur¬ nish from 30 to 50 per cent of the weight of their kernels in oil. The latter is somewhat more limpid than olive oil. It serves excellently for lighting, though it does not give so clear an illumination as some other seed oils. Further¬ more, it is utilized to advantage in the making of soaps and as a lubricant in machine shops.

During the years between 1861 and 1865 pea¬ nut-oil was manufactured by at least four mills in the Southern States, and used as a lubricant by railroads for locomotives, by wood and cot¬ ton spinners for their spindles and by house¬ wives instead of lard as shortening in bread and pastry. Though the American peanut is finer, larger and better flavored than any other, it does not contain so much oil as the African nut, and the oil is not of so fine a quality. The oil of the peanut is utilized medicinally to some extent, and fullers of cloth get another employment for it in their business. The “cake® which is left after the oil has been expressed makes an ex¬ cellent feed for cattle, and is used as such to a great extent, particularly in Germany.

It is said that peanuts were introduced to the United States by the negroes imported from African slavery. Between 1865 and 1870 the cultivation in the United States spread with great rapidity, owing largely to the knowledge of plants gained by individual members of

the various armies which at one time or another occupied the eastern section of Virginia. Each year doubled and at times increased threefold its crop over that of the preceding year, so that this country, from being a large importer of West African nuts, was soon able to supply the do¬ mestic demand with the home-raised article. Wasteful methods of cultivation and the conse¬

quent impoverishment of the land have dimin¬ ished the yield of the peanut-producing terri¬ tory in Virginia, North Carolina and Fennessee very seriously.

Norfolk, Va., is regarded as the centre of the peanut trade, and Virginia produces a larger quantity than any other State. The lead¬ ing peanut counties are Southampton, Nanse-mond, Isle of Wight, Sussex and Prince George, ranking in the order named, and reporting, in the aggregate, about 75 per cent of the total acreage.

The Southern farmers do not prepare their peanut for market. The crop is delivered to “factories,® where the nuts undergo a process of cleaning and sorting. The peanuts are hoisted to the top of the factory building, where they are poured into hoppers, passing downward through chutes and being separated roughly into four grades by the mere action of gravity. The best ones are necessarily the heaviest, being the largest, having the biggest kernels and being most free from “pops.® The first, second and third grades are sold to venders of roasted pea¬ nuts, either directly or through jobbing-houses. The fourth grade goes into the hands of confec¬ tioners, to be used in the making of “burnt almonds® of a cheap sort, peanut candy and common chocolates. Peanuts of the lowest grades are shipped mostly to New York City. Consult Bailey, L. H., (Cyclopedia of American Agriculture) (New York 1907) ; Beattie, W. R., (The Peanut* (in Farmers’ Bulletin No. 431, Washington 1911) ; Roper, W. N., ˆThe Peanut and its Culture) (Petersburg, Va., 1905).

PEAR, a tree (Pyrus communis) of the natural order Rosacea. It is probably a native of western Asia and adjacent Europe, whence it has been introduced by man into all temperate climates of the civilized world. The chief pro¬ ducing countries are France and the United States, and in the latter the principal regions are New England, New York, Michigan and the Pacific Coast States, particularly California. Among the fruits of the United States the pear ranks fourth in commercial importance. It is distinctly a cool climate tree, but except certain inferior Russian varieties does not thrive on the cold Western

plains. Some of its hybrids with the Chinese sand pear (P . sinensis) do well in the South, but their inferior quality is against them. The Kieffer, Leconte, Garber and Smith varieties are most often planted; the first not only in the South, but very generally throughout the Eastern States. This is a chance hybrid be¬ tween the original species, which was grown for ornament by Kieffer, a Philadelphia nurseryman, and was introduced as an acquisition. It is famous for poor quality, but is extensively used as a substitute for the Bartlett, especially in can¬ ning. The Bartlett, a European variety known as Bonchretien, is the most widely cultivated pear in the United States, being popular in all the pear-growing regions. The most noted variety in point of quality is the Seckel, an American sort, which though of small size is considered the acme of the thousands of varie¬ ties cultivated throughout the world.

The pear is generally propagated by means of root-grafting, the scions for which are im¬ ported from France. These form what are called standard trees, which are usually planted 20 to 25 feet asunder in the orchard. Dwarf

trees are produced by grafting the pear upon quince stocks, which are also imported from France. They should not be planted closer than 12 feet, and a rod asunder is even better. The usual methods of planting are in rectangles, in “quincunx® form and in hexagons. The first two are popular in the East, the last on the Pacific Coast. The last is generally best be¬ cause, where distances are adequate, ground can be more economically employed and cultivation may be given in three directions.

The pear will grow upon almost any soil, but thrives best on well-drained heavy loams, ex¬ cept the Chinese hybrids which do best upon lighter soils. Air drainage is as important as water-drainage ; therefore, the orchard should be on high ground. The field should be deeply plowed and thoroughly harrowed before the trees are set, and throughout the season the land should be kept loose, open and free from weeds by frequent cultivation. About midsummer a cover-crop

should be planted to conserve the plant-food that might be wasted by leaching dur¬ ing the winter, and also to check the growth of wood and assist in the maturing of that already produced. If leguminous crops are employed for this purpose, they should obviate the necessity of fertilizing heavily, if at all, with nitrogenous fertilizers such as stable manure and nitrate of soda. (See Legume; Clover, etc.). Applica¬ tions of phosphoric acid and potash may be given liberally.

After the trees are set the tops should be pretty severely pruned, only two or three buds being left upon from three to five well-placed twigs, preferably near the ground. The ideal form for training the pear resembles that of a vase, because when attacked by pear-blight or fire-blight (see below) the tree can then often be saved, whereas if trained with only one trunk it usually cannot. Each main limb should be made to divide and redivide, thus forming a spreading tree with a somewhat hollow centre. Though the work during the first five years of the orchard's life may seem excessive its value will be appreciated in after years. Dwarf pears should also be trained in this form; but since* they must be kept dwarfed (below 12 feet) and since they have a tendency to develop into stand¬ ards, especially if the scion takes root above the quince stock, they must be severely cut back late each winter. Many growers advocate removing, fully two-thirds of the annual growth of the previous season. Care must be taken in prun¬ ing all pear-trees to save the gnarly twigs, which are generally of irregular thickness and direc¬ tion. These are the fruit-bearing spurs. They do not appear upon young trees.

The pear is more noted for self-sterility than most other perfect flowered fruits; the pollen of certain varieties is impotent upon the pistils of the same variety. Failure to set fruit may also result from a variety of causes, such as cold or rainy weather at blossoming time, dif¬ ference in time of opening of the flowers of ad¬ jacent varieties, impotent pollen or pistils due to overfeeding of the orchard, *etc.* To obviate self-sterility, two or more varieties should be chosen which blossom simultaneously, and these should be planted in adjacent rows, not more than three rows of a kind together — preferably two. „

Pears should be gathered when they will

readily separate from the twigs without break¬ ing the fruit-stalks. If allowed to hang upon the tree until fully ripe they usually lose flavor and become more gritty. When gathered they are usually hard and imperfectly colored, but if stored in a cool room and still air,

preferably in boxes or drawers, they will acquire both good color and flavor, besides obviating grittiness and decay at the core to a great extent. Freely cir¬ culating air, especially if warm, tends to shrivel the fruit, make it decay and impair the flavor. Winter pears may be left upon the trees until danger of frost is feared; then they should be carefully gathered and stored in cold well-venti¬ lated cellars, being removed for ripening to warmer quarters as needed.

Several of the diseases which attack the pear have been treated under the title Apple. The two most dreaded maladies are pear-blight and leaf-spot. The former is attributed to a species of bacterium which may gain entrance to the tissues at any ˆnaked® point such as a wound, tips of growing twigs, or, especially, through the nectaries and pistils of the flowers, to which it is conveyed by insects. The disease manifests itself by the blackening of the foliage which hangs on the tree. As the organism works its way down the limbs toward the trunk, it discolors the young tissues upon which it subsists just beneath the bark. In early spring there may be a somewhat saccharine exudation from affected parts of the trunk and limbs. In¬ sects carry infection from these places. Hence the advisability of examining the trees and re¬ moving diseased parts in late winter. Whenever the operation is performed the affected branch should be removed several inches below the point of discoloration. Many orchardists recom¬ mend sterilizing the tools after each operation, using a solution of bichloride of mercury. The disease is believed to be more prevalent upon light, rich and low soils upon which the growth is usually sappy. Some varieties, such as Duchesse d'Angouleme and Kieffer, are con¬ sidered fairly immune.

Pear-leaf blight (Entomosporium macula-turn) is distinct from the previous disorder, be¬ ing a fungus origin. It appears upon the twigs as black spots; upon the leaves as more or less coalescent reddish brown spots; upon the fruit as upon the leaf, the underlying tissues being hard and cork-like, badly attacked specimens often 'becoming lopsided and cracked. The trees are frequently defoliated from the falling of the leaves. Bordeaux mixture is considered a specific; many varieties formerly failures now being grown successfully where spraved. Ap¬ plications should be given at intervals of two weeks from the time the buds commence to swell until early summer, or, in wet seasons, later and more frequently.

Among the numerous other insects that feed upon the pear the following are probably best known and most easily controlled: Fall web-worm, Cecropia moth, eye-spotted bud-moth, white marked tussock-moth, red humped apple-tree caterpillar, codlin-moth; all of

which may be combated by spraying with arsenites. The San Jose scale and the oyster-shell bark-louse, like several of the above, attack pear and apple (q.v.) indiscriminately. (See Insecticide). Several borers are often troublesome, for in¬ stance, the sinuate pear-borer (Aqrilus sinu-

atus), a European species which tunnels irreg¬ ularly in the trunk; and the borers mentioned under Apple. Digging the insects out is the most satisfactory remedy. The larvae of the pear-blight beetle (Xyleborus pyri) ‘burrow in and cause the twigs to wilt. When discovered the withered twigs should be gathered and burned. The pear-slug (Eriocompoides lima-cina) is the larva of a saw-fly probablv intro¬ duced from Europe. The slugs, which feed upon the leaves, are covered with a slimy secre¬ tion to which powdered lime will adhere ; hence its use, and also that of road dust, as a remedy. Arsenites, hellebore, kerosene emulsion etc., are also used effectively. Indeed, forcible spray¬ ing with water or a heavv rain is often cura¬ tive. Unless checked this blight frequently skeletonizes the leaves of even large trees.

Probably the most troublesome pear-pest is the pear-tree psylla (Psylla pyricola), a flea-louse which seems to be confined to this tree.

It is most abundant . from Michigan to Vir¬ ginia and northward into which region it was probably introduced from Europe about 1832. The orange-colored eggs are laid upon the leaves upon which the red-eyed yellow larvae feed hy sucking the juices. Four or more gen¬ erations appear before frost, at the approach of which the adults hide for hibernation in crevices of the bark. Among the remedies rec¬ ommended, scraping the trunks, spraying in winter with crude kerosene and with kerosene emulsion when the buds expand, with a second application just before blossoming, are probably the most favored. The psylla has numerous nat¬ ural enemies; especially the larvae of ladv-bird beetles and of lace-wing flies. See Fruit-Growing; Fruit Industry.

Bibliography. — Bartrum, E., Nook of Pears and Plums) (New York 1902) ; Brackett, <The Pear and How to Grow It' (in United States Department of Agriculture, Farmers' Bulletin No. 482, Washington 1912) ; Ragan, W. H., Nomenclature of the Pear: A Cata¬ logue of the Known Varieties Referred to in American Publications from 1804 to 1907' fib. 1908) ; Waite, M. B., (Pollination of Pear Flowers' (in Bulletin No. 5, Vegetable Pathol¬ ogy Division, United States Department of Agriculture, Washington 1895); Field, Near Culture' (1858) ; Quinn, P. T., Near Culture for Profit' (New York 1869, 1883) ; Bailey, Liberty Hvde, (Cyclopedia of American Horti¬ culture' (lb. 1900-02) ; Jordan, Near Growing in New Jersey' (New Jersey Experiment Sta¬ tion Bulletin No. 142) ; Saunders, Unsects In¬ jurious to Fruits' (1889); Smith, Nconomic Entomology' (1896).

PEAR, Balsam, an annual, climbing herb (Momordica charantia) of the family Cucnr-bitacecu. It is a native of southern Asia and tropical Africa and has become naturalized in the West Indies. The plants attain heights, of about 10 feet, climbing by means of tendrils; bear large, dull green, maple-like leaves, yellow flowers, and oblong, yellowish, pointed fruits, for which, as well as for ornamental purposes, the plants are cultivated. They are commonly grown to cover small arbors or close in piazzas and porches. They can be grown wherever the cucumber will succeed and with about the same treatment. Under the name la-kwa the plants are grown by gardeners near large cities for sale to Chinese who either eat them in the green state after boiling, or the red pulpy arils sur¬ rounding the seeds after the fruit is ripe. . The seeds are oddly shaped and fantastically "sculptured," and are often used in home deco¬ rative work.

PEARCE, Charles Sprague, American artist: b. Boston, 13 Oct. 1851; d. 1914. He was a pupil of Bonnat at Paris and in 1885 established his residence at Auvers-sur-Oise, near Paris. His first exhibited picture was shown at the Paris Salon in 1876 and from that time on his paintings appeared in most of the international exhibitions of America and Europe. He was one of the first members, of the Society of American Artists, an associate of the National Academy, an officer of the Legion of Honor, a member of numerous for¬ eign orders. He was one of the jury of selec¬ tion for the World's Columbian Exposition in 1893, and was the recipient of many gold and silver medals and of the grand diploma at Berlin (1914). He began his work as an artist by painting historical scenes, but he gradually left this field for that of modern life ; his favor¬ ite subject being the peasant life of Picardy. In everything

except name and place of birth Pearce was European. His education, his as¬ sociations, his subjects and his manner of treat¬ ment are essentially French. He shows skill in composition and in technique; his drawing is always good, and his tones, though not deep, are harmonious. Among his works are ˆDe¬ capitation of Saint John Baptist' (1881) ; Nrelude' (1883) ; (Toilers of the Sea' (1884) ; Neturn of the Flock'; 'Meditation' ; several portraits, and decorations for the north hall of the Congressional Library (1896).

PEARCERITE. A silver ore consisting of sulpharsenite, AgoAsSe (or arsenical poly-basite). Occurs, disseminated in pink barite, and in siderite with galena at Aspen, Colo., also as ore at Marysville, Mont., and the Tintic dis¬ trict, Utah.

PEARD, Frances Mary, English novelist: b. Exminster, Devonshire, 1835. She is the 'author of numerous novels and historical ro¬ mances which have attained popularity both in Great Britain and United States. Among them are (Unawares' ; 'Schloss and Town' ; Nren-tice Hugh' ; 'The Horse and Away' ; 'One .Year' ; 'The Rose Garden' ; (A Madrigal' ; Near Neighbors' ; 'The Baroness' ; (Mother Molly'; Contradictions'; (Madame's Grand¬ daughter' ; (Alicia Tennant' ; (The Swing of the Pendulum' ; Naul's Sister' ; (An Inter¬ loper' ; 'Jacob and the Raven' ; 'The Career of Claudia' ; Nonna Teresa' ; Number One and Number Two' ; (The Ring from Jaipur' ; 'The Flying Months.' Miss Peard has also been a successful writer of stories for chil¬ dren. Of these the best known are (The Blue Dragon,' 'The Abbot's Bridge' and Scape¬ grace Dick.'.

PEARL, the substance forming the inner layers of the shells of nacreous mollusks, as pearl-oysters, abalones and others. In the mass it constitutes ((mother-of-pearl" ; when in. the form of a detached lustrous concretion it is called "a pearl," and regarded as a gem. . In order to make clear the nature of a pearl it is necessary to explain briefly the mode of forma¬ tion of the molluscan shell. The shell ordi-

narily consists of two distinct portions of dif¬ ferent composition. The

superficial epidermis, outer layers and margin of the shell are largely horny, while the inner part is composed of nu¬ merous layers of a crystalline carbonate of lime with relatively little animal matter. Both are secretions of the outer surface of the ˆmantle® (see Mollusca), which lines the shell, and by the free outer margin of which the shell grows in concentric additions to its mar¬ gins. The remainder or attached portion of the mantle is continually secreting calcium carbon¬ ate, which is added layer by layer to the inner surface of the shell, which thus increases in thickness. The iridescence is due to the fine irregular striations upon the surface. Now, if any foreign body like a grain of sand, an un¬ developed egg, a parasite or an image artificially placed there find lodgment between the mantle and the shell it seems clear that the shelly deposit must envelop it. It is probable also that it will act as an irritant and stimulate secre¬ tion at that point, and that it may be rolled about by slight contractions of the mantle, thus remaining free from adhesions to the shell and gaining symmetry. Taking advantage of this known fact, Chinese pearl fishers insert a tiny piece of flinty sand or hard bone between the shell and the body of the oyster. This irritates somewhat as does the lodging of a cinder in the eye of a human being, and the oyster proceeds to cover it with layers of the protective excre¬ tion which in time harden and become a beauti¬ ful pearl. Such detached portions of the shell, developed as concretions about foreign particles serving as nuclei, are found in many mollusks. Their character naturally partakes of the char¬ acter of the shell in which they are formed ; if that be opaque and dull so also will the pearls ; if it have the iridescence and translucency of mother-of-pearl, they will possess these same elements of beauty. It is vain, therefore, to expect to find pearls of value in common edible oysters, as people often do. Comparatively few mollusks have a well-developed nacreous lining to the shells, and only a few of these are adapted to the production of pearls of the tex¬ ture and lustre which is most prized. They be¬ long chiefly to the Aviculidce, or pearl-oyster family, and to the Unionidce, or family of the fresh-water mussels (q.v.).

The Aviculidce differ from the edible oysters in having a small foot and anterior adductor muscle, a well-developed byssus gland, which secretes a bunch of fibres, by which the animal is attached, and a thick mother-of-pearl layer to the shell. The true pearl oyster (Meleagrina margaratifera) has a very wide distribution, being found in nearly all parts of the Indian Ocean, the Red Sea, the warmer parts of the south Pacific, the Gulf of California, Caribbean Sea. There is, however, a very great difference in the color, size, thickness and texture of the shells, and the quality of the pearls produced in the

different localities. Pearls have been gathered commercially in many parts of the world, but most of the fisheries have had pe¬ riods of prosperity and decline, the latter usually resulting from wasteful overfishing. The oldest fisheries are those of Ceylon on banks covering an extensive area off the north coast. These have been fished at intervals from the beginning of the Christian era, and since

the British occupation have been under the con¬ trol of the government, which derives rich . revenue therefrom.

In America the most important fishing ground is in the Gulf of California, centring about La Paz, but extending to the mouth of the Colorado River. These fisheries were operated by the Indians at the time of the con¬ quest by Cortez, who exploited them for the benefit of the Spanish throne. The fishing sea¬ son lasts for about six months, from June to December. Formerly expert Indian and Mexi¬ can divers were employed. Several of these went together in one canoe, acting alternately as diver and helper. The water is so clear that oysters could be seen on the bottom in 50 or 60 feet. The diver, carried down by a large stone, would remain for about a minute and a half, and bring the oysters to the surface in his hands after cutting them loose with a knife carried for that purpose. In order to have the greatest possible lung expanse the divers always worked with empty stomachs, eating nothing until after the conclusion of the day's fishing. If abun¬ dant a basket would be lowered and filled. Working in this manner each diver would secure from 125 to 150 oysters daily and the total product for the season of 450 divers would be about 2,000 tons of oysters, yielding pearls and shell valued at about $400,000. At the present time the chief concessions are controlled by San Francisco firms, and the fishing is conducted by more modern methods. Each diving-crew se¬ cures about 300 oysters per day, which are col¬ lected by a schooner and carried ashore, where they are opened with knives and the pearls re¬ moved. Other American fisheries exist on the coasts of Guatemala and Panama and the island of Margarita. The Red Sea, many of the South Sea islands and the north coast of Australia also supports valuable fisheries. The latter is one of the most recently developed and has grown rapidly in importance. It is conducted by means of diving suits and is very productive, especially of mother-of-pearl, for the shells be¬ come here larger and thicker than elsewhere in the world.

Fresh-water mussels (Unionidce) are found in many streams and lakes of Asia, Europe and America. In the United States these mollusks

are exceedingly numerous in the Mississippi Valley, both in species and individuals, and are chiefly utilized in the States of Iowa, Wiscon¬ sin, Arkansas, Tennessee and Kentucky, but spasmodic periods of excited pearl-hunting in other States have occurred several times and have been productive. The mussels are secured by rakes, tongs, drags or simply by the hands; even a steam dredge is operated in connection with the Iowa button-factories. The value of the mussel fisheries of the United States is about $3,000,000 yearly, one-third of which is from shells. In Europe the supply is conserved by carefully opening the mussels for examina¬ tion by means of specially devised tools which do them no injury, and then replacing them in the water. Fresh-water pearls are especially valued because of the great variety and beauty of their colors and are, like the marine pearls, most likely to be found in shells which are dis¬ torted or otherwise imperfect in form and growth. The pearl button industry of the United States has reached about $9,000,000

yearly. The leading States of this industry are Tennessee, Kentucky and Wisconsin.

Bibliography. — Dakin, W. J., <Pearls) (Cambridge 1913) ; Herdiman, W. A., (Pearl Fisheries of Ceylon) (Washington 1905) ; Kunz, G. F., (Fresh-Water Pearls and Pearl Fisheries of the United States) (Washington 1898) ; Kunz and Stevenson, (Book of the Pearls> (New York 1908) ; (Gems and Precious Stones of America) (New York 1890) ; Saville-Kent, W., (Great Barrier Reef of Australia) (London 1900) ; Simmonds, Commercial Prod¬ ucts of the SeaJ (New York 1879).

PEARL, The, a Middle-English narrative vision-poem, with marked lyrical elements. <Sir Gawain and the Green Knight, > <Patience> and (Purity > are, with this piece, generally as¬ signed to a single author, since all are in the West Midland dialect, are preserved in the same manuscript and exhibit common stylistic and metrical characteristics. The name of this author is, however, not known, and the evidence for the ascription of the four poems to the same man is

not wholly conclusive. (The PearP may be conjecturally dated about 1370. It con¬ sists of 101 stanzas of complicated structure, with both alliteration and rhyme, arranged in 20 groups, consisting, with the exception of one group, of five stanzas each. The whole exhibits the most finished artistry, and may be justly re¬ garded as one of the most important of all the earlier poems in the English language. Its sensitiveness to nature, its moral elevation and its deep religious feeling are particularly note¬ worthy. After the conventional dream-setting, the poet, who has lost his (<pearl of great price,® beholds ’a beautiful maiden, in a land of sur¬ passing loveliness, who reveals to him the joys of’ Heaven, and consoles him in his trouble. Finally he sees in a vision the Heavenly Para¬ dise, with thousands of virgins adorned with pearls, the mystic brides of Christ. The whole has generally been held to be the poet’s expres¬ sion of personal grief at the loss of his little daughter, but this view has in recent years been challenged, and the whole interpreted as an alle¬ gorical presentation of purity, symbolized by the pearl, and personified by the maiden. The poet was obviously familiar with theological ma¬ terial, and was generally orthodox in regard to religious questions of his day.

The piece has often been translated into English. Miss Weston’s version in the original metre (in (Romance, Vision and Satire, } Bos¬ ton 1912) gives an excellent idea of the poem, as does also (The Pearl: A Middle English PoemP a modern version in the metre of the original, by Sophie Jewett (New York 1908). A convenient edition is that by Osgood, Boston 1906, with introduction, glossary and biblio¬ graphical references. The articles by W. H. Schofield and Carleton Brown deserve especial attention.

William Witherle Lawrence.

PEARL OF THE ANTILLES, a name given to the island of Cuba on account of its fertility and beauty. See Cuba.

PEARL ASH, crude potassium carbonate as obtained by the lixiviation of wood ashes, and the subsequent evaporation of the solution. It is a finer grade of potashes. In early days practically the whole supply of potash came from wood ashes, and great forest areas were

destroyed to get this invaluable chemical. With the spread of population the forests have be¬ come too valuable for such uses except in the most remote regions, where no other use ot the forests is possible. In some parts of Canada, and in a very few sections of the

United States pearl ashes are still produced, and there is also a supply from Russia and Austria.

There is a large difference in the polasti con¬ tent of various woods. Wormwood is credited with the largest percentage — 7.30; vetches have 2.76 per cent; nettles, 2.50 per cent; ferns, 0.63 per cent ; grapevines, 0.55 per cent ; rushes, 0.51 per cent; beech twigs and branches, 0.48 per cent ; oak barrel, 0.42 per cent ; pine, 0.04 o per cent. In the prevailing process the wood is burned in pits, ferns and vine stalks being added. The resulting ashes are dampened with water and placed in a cask with a perforated false bottom over which a layer of straw has been laid. Hot water is poured in, and the whole allowed to stand for some hours. The liquor is then drawn off from the bottom reser¬ voir by a faucet. If this is strong enough (32° Tw) it is boiled down at once; otherwise it is poured into the next cask to be leached. The residuum from the leaching has consider¬ able value for manure. The boiling down is done in cast-iron pots, and the dried out potash is heated to redness. The crude product is dis¬ solved in water to remove the insoluble sub¬ stances, the liquor evaporated and the dry product again calcined, when it is graded as ((American pearl ashes.® The commercial pearl ash contains from 65 to 77 per cent of potas¬ sium carbonate, 2 to 4 per cent of sodium carbonate, 11 to 21 per cent of potassium sul¬ phate and 3 to 7 per cent of potassium chloride. See Potassium.

PEARL BARLEY, a preparation of barley-grain. See Barley.

PEARL HARBOR, an inlet on the south¬ ern coast of the island of Oahu Hawaii, six miles west of Honolulu. It is landlocked and has a depth of from 50 to 60 feet, but there was a bar at the entrance with only 10 feet of water, thus making the harbor useless for large vessels. In 1884 the United States ob¬ tained from the Hawaiian king the exclusive right to establish a coaling and repair station at this harbor. Surveys were made in 1887 and 1897, and the removal of the obstructing bar to the entrance proposed; but nothing was done in the way of improvement of the harbor facili¬ ties until the annexation of the Hawaiian Islands by the United States in 1898. With the owner¬ ship of the islands an assured fact, the United States government proceeded to make of Pearl Harbor a first-class naval base. A channel four and one-half miles in length was dredged from the sea across the bar and coral reef, to the yard site, with a depth throughout of 35 feet, with a width through the ‘bar of 600 feet, and from that on, of 500 feet. This makes the harbor available for the largest vessels now afloat. The east and west locks provide ample pier accommodations for the discharging and of loading naval stores and supplies; for Pearl

Harbor is not intended to enter into commer¬ cial competition with Honolulu. The dredging of Pearl Harbor bar was completed toward the close of 1911 ; and an official entry into the locks was made by Rear-Admiral Thomas in the flag-PEARL MILLET — PEARSON

ship California on 14 Dec. 1911, thus indicating the completion of the work of opening the harbor through to the ocean. Provision was at once made to extend the government drydock to 1,000 feet. The caisson for the drydock was built in San Francisco, Cal., and towed to its destination in May of the following year. The width and depth of the drydock on the sills, at mean high water, is sufficient to permit the entrance of the largest battle ships. The dock as thus planned and executed is the largest in America. Buildings, shops, storehouses, offices, barracks and residences completed, or in the process of completion, promise to make Pearl Harbor one of the greatest drydocks and naval stations in the world, and a strong basis for the United States Pacific fleet.

Bibliography. — Goodrich, Joseph King, (The Coming Hawaii > (Chicago 1914) ; Thrum, Thomas G., (Hawaiian Almanac and AnnuaP ((Retrospect for 1911, 5 in 1912 Annual; Re¬ trospect for 1912, 5 in 1913 Annual; Retrospect for 1913, 5 in 1914 Annual, Honolulu 1912-13-14).

PEARL MILLET, sometimes called Egyp¬ tian Millet or Cat-tail Millet (Pennisetum spicatnm), not a true millet. It is a native of tropical Africa, and as grown in the United States is a tall (6 to 12 feet) coarse annual forage plant, with seed-spikes about one foot long and an inch in diameter, and affording a very large yield per acre, well adapted for soil¬ ing. It can be cut two or three times in the season. For this purpose it is sown at the rate of four pounds to the acre. If wanted for hay from 8 to 10 pounds must be sown, and it must be cut just before heading or it will be woody. See Grasses of United States.

PEARL OF ORR’S ISLAND, The, a

novel by Harriet Beecher Stowe, published in 1862. This story gives a truthful and entertain¬ ing picture of the people in a Maine fishing ham¬ let. The descriptions of the picturesque scenery of the island are graphic and accurate ; and the Pennel house, now known as the

((Pearl House,55 and the <(grotto,55 are still objects of interest to visitors.

PEARL OYSTER, a name popularly given to the Meleagris margaritifera , mollusks of the family Aviculidce, which are not true oysters. See Oyster; Pearl.

PEARL RIVER, a river of the State of Mississippi, formed by the junction of several streams. It rises in Winston County, flows southwest and then south, and empties into the Gulf of Mexico. Length about 300 miles and it drains an area of 7,000 square miles. In the latter part of its course it forms the boundary between Louisiana and Mississippi. The navi¬ gation is obstructed by sand-bars and snags, but it is navigable for flatboats for about 100 miles; while vessels of eight feet draft go up to Gainsville. See Boundaries of the United States.

PEARL WEDDING. See Wedding Anni¬ versaries.

PEARLY NAUTILUS. See Nautilus.

PEARSE, pers, Mark Guy, English Wes¬ leyan clergyman and author: b. Camborne, Cornwall, England, 1842. He was educated at Wesley College in Sheffield, studied medicine at Saint Bartholomew's Hospital, London, and in 1863 entered the Wesleyan ministry. He

held pastorates in Leeds, Ipswich, Bristol and other places, and in 1889 became missioner at Saint James Hall in connection with the West London mission, which position he filled for 14 years. He has devoted much time to literature of a religious character and has published (Daniel Quorm and His Religious Notions) (2 series) ; (The Christianity of Jesus Christ — Is it Ours?) ; (The Gentleness of Jesus) ; (West Country Songs) ; (Sermons for Children;5 (Mr. Horn and his Friends ;5 (Short Stories;5 (Good WilP ; (Simon Jaspar5 ; (Cornish Stories) ; (Homely Talks> ; (John Tregeno—

with5 ; (His Mark5 ; (The Old Miller and his MilP ; Rob Rat5 ; (Thoughts on Holiness) ; Rome Aspects of the Blessed Life) ; <Praise) ; (Jesus Christ and the People) ; (Short Talks for the Times) ; (In the Banqueting House5 ; (Gold and Incense5 ; <The God of Our Pleas¬ ures5 ; (The Story of a Roman Soldier.5

PEARSON, Charles Henry, English his¬ torian: b. Islington, 7 Sept. 1830; d. London, 29 May 1894. He was educated at King's Col¬ lege,

London, and Exeter College, Oxford; was elected Fellow of Oriel in 1855 ; was made lecturer in English literature at King's and shortly thereafter professor of modern history. In 1862-63 he edited the National Review; in 1865 he withdrew from his chair at King's, and in 1869-71 was lecturer on modern history at Trinity College, Cambridge. After an experi¬ ence (1871-74) as a sheep-farmer in South Australia, he was appointed by the minister of education of Victoria to prepare a report on the condition of education in Victoria (1877), and he presented a document of value, recom¬ mending many changes since introduced. He became professor of modern history at the Uni¬ versity of Melbourne and later head of the Presbyterian Ladies' College. In 1878 to 1892 he was a member of the legislative assembly of Victoria and from 1886 to 1890 minister of education, in which capacity he worked effec¬ tively toward reorganization and reform ; and in 1893 was made permanent secretary to the agent general. He returned to London in 1892. His chief publication is Rational Life and Character5 (1893), a work prophesying the decay of European civilization through the disappear¬ ance of independent character and genius, due to the increase of democracy in the highly civilized nations of the West; and the growing importance of Chinese and negroes in world politics and trade. Others of his works are Russia5 (1859) ; (The History of England during Early and Middle Ages5 (1867) ; (His¬ toric Maps of England during the First Thir¬ teen Centuries5 (1870) ; (English History in the 14th Century5 (1876); Rublic Education in Vic¬ toria5 (1878) ; Reviews and Critical Essays5 (1896). Consult Stebbing, William, (Charles H. Pearson; Memorial by himself, his Wife and his Friends5 (London 1900) ; Rational Life and Character5 (1913-14) in which he attempts to show that the white race is doomed to be dominated by the yellow and black races.

PEARSON, Cyril Arthurˆ English pub¬ lisher: b. Wookey, near Wells, England, 24 Feb. 1866. He was educated at Winchester College and joined the staff of Sir George Newnes and became manager of the latter's publications. He founded Pearson's Weekly, which met with success and subsequently started Home Notes ,

Pearson's Magazizne, Short-Stories, Royal Magazine, Lady's Magazine, M. A. P., and in 1900 his most important publication, the Daily Express, a half-penny London paper. In 1905 he secured control of the Standard and then of the Saint James Gazette. He has since es¬ tablished newspapers in various cities in Great Britain. He became president of the National Institute for the Blind, of the bresh Air Fund; vice-president of the Tariff Reform League, vice-chairman of the Tariff Commission (1903), and was at the head of many charitable move¬ ments. He was knighted in 1916.

PEARSON, John, English bishop and theo¬ logian : b. Snoring, Norfolk, 28 Feb. 1613 ; d. Chester, 16 Inly 1686. He was educated at Eton and Cambridge and took holy orders in 1639, and the following year he became chaplain to Sir John Finch, Lord Keeper of the Great Seal, and on the outbreak of the Civil War, chaplain to Lord Goring and later to Sir Robert Coke (in London). His first pastoral charge was Thorington in Suffolk. On the Restoration he was made prebendary of Ely, archdeacon of Surrey and master of Jesus College, Cam¬ bridge. In 1661 he was appointed Margaret professor of divinity, the following year master of Trinity College and bishop of Chester in 1673. He was a man of prodigious learning, and his (Exposition of the Creed' is still the best manual of textual and patristic theology in the English language. This was republished in two volumes (1890-91). He also a wrote a vindication of the authenticity of the Ignatian Epistles, (Vindiciae Epistolarum S. Ignatii' in answer to Daille, who had contended that they were spurious. This was followed by (Annales Cyprianici.' Two years after his death his (Opera Posthuma Chronologica' were pub¬ lished in London. Consult, Churton (Minor Theological Works' of Pearson (preface, Ox¬ ford, 1844) ; Cheltham, S., (John Pearson' (in (Masters in English Theology,' by A. Barry, London, 1877).

PEARSON, John Loughborough, English architect: b. Brussels, Belgium, 15 July 1817; d. London, 11 Dec. 1897. Trained in his profession by Ignatius Bonomi of Durham and by Salvin and Hardwick in London, he early displayed much skill in mediaeval design; was employed in several important restorations; and in Saint Peter's, Vauxhall, produced his first (1861) dis¬ tinctive work. He continued to devote himself to the development of Gothic, giving his atten¬ tion to no special phase, though he favored early pointed. His name is largely associated with certain London churches, among others, Holy Trinity, Bessborough Gardens ; Saint John, Red Lion square, and Saint Augustine's, Kil-burn. But he is perhaps equally well known for his cathedral restorations. He became archi¬ tect to Lincoln Cathedral in 1870, to Bristol Cathedral in 1880. He was also architect to Rochester,

Chichester and Wakefield cathedrals; was consulting architect to those of Exeter and Gloucester; and restored the upper part of the north transept front and the south aisles of choir and nave in Westminster Abbey. In 1879 he received a gold medal and the cross of the Legion of Honor at Paris. In 1879 he received «the greatest ecclesiastical opportunity which has been offered to any modern architect" in his appointment as architect for the new cathedral

of Truro, which has been described as the only Gothic work of modern times worthy of the name cathedral. The building was consecrated 3 Nov. 1887, and the completed part opened for service. Pearson's labors were not wholly ec¬ clesiastical, as he also designed county-seats, mansions and other structures. But these works, though excellent in their kinds, added little to his reputation. He was the real founder of the school of modern Gothic, which aims not to copy mediaeval precedent but to design anew in the mediaeval spirit.

PEARSON, Karl, English educator and sociologist: b. England, 1857. He was educated at King's College, Cambridge, and in Germany, admitted to the bar in 1882, and in that year was appointed professor of geometry at University College, London. In 1885 he was promoted to the chair of applied mathematics and mechanics and in 1911 to that of Gabon professor of eugenics and director of the laboratory for national eugenics at the University of London. He is recognized as an authority on eugenics. He received the Darwin medal from the Royal Society (1898). He has published cThe New Werther' (1880) ; <The Ethic of Free-thought' (1888); (The Chances of Death, and Other Studies in Evolution' (1897) ; (Enlarged Gram¬ mar of Science' (1899) ; (History of the Theory of Elasticity and Strength of Materials' with Todhunter (1886-93); 'National Life from the Standpoint of Science' (1901); (The Life Letters and Labors of Francis Gabon' (1914).

PEARSONS, per'sonz, Daniel Kimball,

American capitalist and philanthropist : b. Brad¬ ford, Vt., 14 April 1820; d. 1912. He was graduated from the Medical College at Woodstock, Vt., and practised medicine in Chicopee, Mass., until 1857. He 'subsequently entered the real estate business in Chicago in which he continued with great success until 1887 when he retired, but retained the office of director in the Chicago City Railway Company. He has de¬ voted much attention to philanthropic work, and his benefactions from 1890-1900 amounted to more than $2,500,000, much of which was given to more than 45 colleges, the Chicago

Theological Seminary and Beloit College in particular receiving a large share of the bene¬ factions, which ultimately exceeded $4,000,000.

PEARY, pe'ri, Robert Edwin, American Arctic explorer: b. Cresson, Pa., 6 May 1856; d. Washington, D. C., 20 Feb. 1920. He was graduated at Bowdoin College, and in 1881 en¬ tered the United States navy as a civil engineer with the rank of lieutenant. From 1884—85 he was assistant engineer in connection with the surveys for the Nicaragua Canal, and later engi¬ neer in charge of these surveys. In 1886 he made his first trip to the North, reconnoitring the Greenland ice cap, east of Disco Bay. In 1891— 92 as chief of the Arctic expedition of the Acad¬ emy of Natural Sciences of Philadelphia, he made further expforations, traversing Greenland from McCormick Bay to Independence Bay, in the northeast angle, a trip of 1,300 miles, consid¬ ered one of the most remarkable polar sledge journeys ever made. He discovered and named Melville Land and Heilprin Land, proved the convergence of the east and west coast of Greenland and determined its insularity. In 1893-95 he again visited Greenland, made a

thorough study of the tribes known as the Arc¬ tic Highlanders and discovered the so-called Iron Mountain, a group of three large meteorites. In the summers of 1896 and 1897 he made short voyages and in the latter year brought to the United States the meteorites of Cape York. In 1898-1902, he made his most important expedition in search of the North Pole, under the direction of the Peary Arctic Club of New York City. In August 1898 his ship, the Windward, had reached the northern side of Princess Marie Bay, where her progress was stopped by the ice. In December he left the ship, and by sledge reached Fort Conger. He returned to the fort again in April 1899, explored the region of Lady Franklin Bay, and rescued the instruments and records left by Greeley at the fort in 1883. From June to July he explored the Princess Marie Bay region, crossed the Ellsmere ice cap and estab¬ lished a line of caches from Cape Sabine to Fort Conger. In 1900 he again visited Fort Conger, and from there, sledging over the

ice, along the northwest coast, reached Cape Washington, lat. 83° 39', but finding further progress barred by an impassable sheet of water turned and ex¬ plored the east coast to within a degree of In¬ dependence Bay. In March 1902 he made an¬ other start from Payer Harbor, and traveling over the frozen Polar Sea reached Crozier Island, but after that finding every day's march more difficult, and encountering open leads and floes, he had to abandon his hope of reaching the Pole. He had gone as far as lat. 84° 19'. In August he sailed on his return voyage in the new Windward, which had been sent north by the club for him. Careful surveys were made at all stages, and much useful information gained ; he determined conclusively the northern limit of Greenland, proved that non-existence of land for a considerable distance to the north¬ ward and northeastward and determined the origin of the floe bergs and palseocrystic ice. In 1906 he reached 87° 6' in the Roosevelt, within about 203 miles of the Pole. On 6 July 1908 he embarked on the steamer Roosevelt for what proved his successful attempt to reach the long-sought-for goal. On 6 Sept. 1909 word was received from Peary that he had reached the Pole on 6 April 1909.

In recognition of his achievement, learned societies throughout the world honored Com¬ mander Peary in various ways. Besides the LL.D degree from the University of Edinburgh and a silver ship from the Royal Scottish Geo¬ graphical Society of Edinburgh, he was awarded the gold medals of the National Geographic Society (Washington), the Royal Geographical Society of London and of numerous foreign geographical societies. On 3 March 1911, by special act, he received the thanks of Congress and promotion to rear-admiral. (See Polar Research). He published (Northward, Over the Great Ice) (1898); (Nearest the Pole) (1907); (The North Pole) (1910); (Secrets of Polar TraveP (1917).

PEARYLAND, northeastern coast of Greenland, between Independence Bay and the 80th degree of latitude, which was discovered by Lockwood and Brainard in 1882 and named Hazen Coast. This was extensively explored by Peary 10 years later.

PEASANTS' WAR, or THE GREAT PEASANTS' WAR, a name given to the gen¬ eral rising of the German peasantry in 1524-25 and originally correlated with the ((Nobles' War,® a term applied to the attempt of the nobles to break free from the power of the princes. The Peasants' War was not an iso¬ lated incident, as is clearly shown by the second name given it above. It was an almost in¬ evitable result of

the increasing exactions laid upon the peasantry by their masters in a declin¬ ing feudal system; and it was not the first rising of its sort, for in 1502 and 1514 there had been great revolts called respectively the (<bundschuhe® and the ((League of Poor Con¬ rad,® and in 1515 an uprising in Carinthia and Styria had maintained itself for several months only to be put down by the emperor after great slaughter. Hence it is evident that the true cause of the Peasants' War was something ante¬ cedent in time and deeper-seated than the effects of the doctrines of Reformation, though the latter were prominent among the immediate causes. Luther, who, had he sided with the peasants, would have carried with him the great middle class and so assured the success of the cause, attempted compromise, urged upon the princes the justice of certain demands, sug¬ gested to the peasants the withdrawal of others, and after a short interval threw the weight of his influence against the insurgents by the pub¬ lication of his pamphlet (Against the Robbing Murdering Troops of the Peasants.) The re¬ volt .by this time had spread from the southern Black Forest through Austria, the Tyrol, Alsace and the lower Rhine. Its different hands in different places and with Metzler, Geier, Hip-peler and Rohrbach as leaders, had met with little success save in a few cities where they had worked from the inside, notably Heilbronn, Wimpfen, Dinkelsbuhl, Mainz and Trier. A trained soldier, Goetz von Berlichingen, had, however, been impressed as general, and while he was moving on Frauenberg the nobles had joined forces, practically at Luther's sugges¬ tion. Philip of Hesse, the Elector John and Dukes Henry and George of Saxony met the fanatic Miinzer, one of the foremost of the preachers of the revolt, at Frankenhausen, killed 5,000 of his men and took him prisoner, 15 May 1525, and executed him soon afterward. In southern Germany repression was equally swift and terrible ; the work was done in Alsace by Anton of Lorraine, and in Swabia by George Truchsess who destroyed Weinsberg, and then joined forces (10,000 men) with the electors of the Palatine and of Trier, marched to Frauen¬ berg, and, when the peasants had been deserted by Goetz von Berlichingen, defeated and prac¬ tically annihilated the army of 2,000 men under Metzler at Konigshofen. The atrocities com¬ mitted by the victors were in the way of a sanguinary warning. Sixty burghers were exe¬ cuted at Wurzburg and at Kitzingen 57 were blinded. Schweinfurt, Bamberg and other cities were heavily mulcted in money. The peasants of the mid-Rhine district had been defeated in the meantime 'by the forces of the Palatine. The general result added greatly to the burden of the peasants. Consult Bax, E. B., <The Peasants' War in Germany, 1525—26> (in (The Social Side of Reformation,* part II, London 1899) ; Cornelius, C A., (Studien zur Geschichte

des Bauernkricgs) (Munich 1862) ; Kautsky, K., ˆCommunism in Central Europe in the Time of the Reformation) (London 1897) ; Schapiro, J. S., (Social Reform and the Refor¬ mation J (New York 1909).

PEAT, the partially decayed and compacted remains of mosses and other marsh plants which have become covered with water during the process. Generally the plants grow lux¬ uriantly at the surface but die below and are submerged. The rate of growth is estimated to vary from one to four inches a year and the depth of beds has been found often to exceed 20 feet, but 10 feet or less is more common. The deposits are confined to temperate regions, in both Northern and Southern hemispheres, but especially in the north, where the plants most frequently found in such places are species of sphagnum moss. Peat bogs do not occur or occur but rarely in the warm tropics because the decay of vegetable matter is too rapid to permit of their formation. In the cool north tem¬ perate zone the areas covered by peat bogs are enormous. In Ireland estimates place the area of upland bogs at about a million and a quarter acres ; that of lowland bogs at more than a million and a half. There are thousands of acres in Germany, Sweden, Norway, England, Scotland, Holland, France and Denmark; and in Russia the area is estimated at 6,700 square miles. In Canada and the United States there are also enormous deposits.

The chief use of peat is for fuel, for which purpose it is most largely employed in Ireland where under the name of turf it is the princi¬ pal fuel. At a short distance below the surface the peat is brown and somewhat loose in tex¬ ture ; at greater depths it becomes more dense and ’nearly black; and in many cases it be¬ comes lignite. Owing to the presence of tannin, organic acids, various salts and iron in various forms, which make the substance antiseptic, the plants are so well preserved as to be readily identified and in some cases their perfect con¬ dition has led to experiments in their use for the manufacture of textiles from the fibre. Trees, fruit leaves and animal bodies are not infrequently found in as good condition as they might be expected to

be after long immer¬ sion in a tanning vat. This characteristic is, however, a decided disadvantage when the land is to be used for agricultural purposes, since the reclamation is slow even under the best of management; and as a fertilizer the pulverized peat must be allowed to weather for a con¬ siderable time before it can be profitably spread upon other land as a manure. As a manure it is often best applied after being used as an absorbent in stables, where its deodorizing qualities specially recommend it. It also readily gathers and holds the easily-lost nitrogenous salts voided by animals.

In the conversion of a peat bog into arable land drainage is the first requisite. Then ap¬ plication of lime, marl and other soil amend¬ ments must be combined with frequent turning of the surface to the weather, especially to the action of frost during winter. During the first years under crop the yields will probably be light if there is any yield at all. Hence it is often advisable to plant only coarse-feeding crops, such as corn and potatoes, which will require the frequent stirring of the soil.

Mineral fertilizers must be given liberally be¬ cause peat is usually very deficient in such in¬ gredients. And since stable manure seems to accelerate fermentation of the peat it should, be applied liberally. Owing to their general y low situation and the consequent settling ot cold air upon such areas, reclaimed peat bogs are often unsuitable for many crops which are likely to be injured by cold. They are, how¬ ever, often admirable for such crops as celery and onions, their fine texture and easy piepara-tion, after once being reclaimed, being decidedly in their favor. They are not, however, enor¬ mously rich in plant-food, etc., popular beliet to the contrary notwithstanding. American peat contains only about 0.13 per cent of potash, 0.21 phosphoric acid and 0.67 of nitrogen, the last usually in a slowly available form.

In the digging of peat for fuel the bog is partly drained by open ditches, and when the excess of water has disappeared the loose surface is removed and then rectangular ((turfs are cut with specially constructed spades, the blades of which are made in the form of a right angle. The turfs or “peats® are placed on end in little groups until dry, when they are stored under cover. In Ireland, where the operations are performed during spring and summer, men, women and children are employed. And in many cases where the turf is imperfect these people tread the fibrous mud until the peat can be pressed into shape by hand. Owing to its bulkiness, peat cannot be

shipped profitably to great distances. The charcoal made from com¬ pressed peat is superior to wood charcoal and even compares with coke. That obtained from uncompressed peat is used in tempering cutlery, etc., and as a deodorizer and antiseptic. (See also Bogs; Lignite; Coal, etc.; Mineral Pro¬ duction of the United States). Consult Rol¬ ler, 'Die Torf-Industrie* (Leipzig 1898) ; Ries, (Peat* (Mineral Resources, in United States Geological Survey Report for 1901, Washington 1902) ; Johnson, (Peat and Muck> (Hartford 1859) ; Storer, <Agriculture) (New York 1897).

PEAT-BOG. See Bog.

PEATE, pet, John, American Methodist clergyman and astronomer: b. Ireland, 6 Mgy 1820; d. Greenville, Pa., 25 March 1903. He came to the United States when very young, engaged in manual labor, but contrived to gain an education and was ordained in the ministry, holding various pastorates for a period covering 50 years. As an astronomer he won a national reputation, making a specialty of the manufac¬ ture of reflecting telescope lenses. He made over 20 lenses, each of which exceeded 20 inches in diameter; the largest one he presented to the American University at Washington, D. C.

PEAUCELLIER (po-sel-e-a) CELL, in mechanics, a form of linkage which possesses great theoretical and historical interest, because it was the first known apparatus by which an independent accurately straight line could be drawn without the use of a straight-edge, — that is, without resorting to the illogical expe¬ dient of paralleling some other straight line. It was discovered in 1864 by C. N. Peaucellier, an officer of engineers in the French army, who was tardily rewarded for it by the (<Prix Montyon® of the Institute of France. It con¬ sists of seven "links,® or bars of metal, which

are connected as shown in the illustration. Four of these are of equal length, and are joined together so as to form a rhombus, P C D B. Two other bars, equal to each other 'n length, but not bearing any necessary metrical relation to the first four, are pivoted to each other

at A, and to the original rhombus at B

by means of a seventh bar, DE, whose length is one-half the distance of D from A when the three points A, D and P are in the same straight line. The circle (shown dotted) upon which D is constrained to move would pass through A if it were sufficiently produced. When the various conditions here given are ful¬ filled, and the (<cell® is moved in any way, the point P describes a straight line which is per¬ pendicular to the straight line joining A and E. For a simple proof of this fact, and for an ac¬ count of other remarkable linkages discovered subsequent to Peaucellier's, consult Kempe, A. B., (How to Draw a Straight Line) (London

1877).

PEBRINE, a disease of silkworms. See Silkworms.

PECAN, pe-kan' (Carya olivceformis), an American nut tree found native in a restricted district in the southern part of the United States and in Mexico. In the United States its orig¬ inal habitat ranged from central Kentucky and southwestern Iowa southward nearly to the Gulf, following generally the river bottom lands. Of late years the commercial demand for this nut has led to its cultivation in plan¬ tations of considerable extent, and the area in which it is now successfully grown includes the southeastern part of Virginia ; the easterly third of North Carolina; all of South Carolina, Georgia, Alabama and Mississippi except their extreme northern parts; the southern part of Louisiana; the southeastern part of Texas, and the northern half of Florida. There are also occasional small plantings in the Pacific Coast States, and in central and northern California the pecan is proving more profitable than any other nuts. Generally speaking, the pecan does not fruit reliably north of the 39th parallel.

The earlier plantings of pecans in the United States were of seedlings grown from nuts of the wild trees, but the pecan is now successfully budded and grafted, and the later plantations are of nursery grown trees of choice varieties. In the nurseries the seedling trees are grafted or budded when two years old, and are sold two years later. At this age they range from four to seven feet in height, and it is custom¬

ary to set them from 40 to 60 feet apart, giving clean orchard cultivation between the trees. The soil best adapted to a prolific yield of nuts is a light sandy loam with clayey subsoil. On richer ground the trees make a more luxuriant growth, but the yield of nuts is smaller.

There are upward of 100 varieties of pecans now listed in the catalogues of the nursery¬ men, and each particular region of the pecan ((zone® has a dozen or more varieties especially adapted to its soil and climate. The favorite variety (where it can be grown) is the ((Schley.® This is one of the best in form and quality of kernel, is a regular, though not always a large bearer, and its nuts command the top price in the market. The (<Stuart® has been more ex¬ tensively planted than any other. Its nuts are medium to large, and of excellent quality, but the kernels are apt to crumble badly in the cracking machine. ((Van Deman® has been very largely planted, but has developed a tendency to scab, which has been disastrous to some planta¬ tions. It bears one of the largest of pecan nuts, of good flavor, thin-shelled and a good cracker in the machines ; and is an excellent seller in the market. Many other varieties are as good as these which are mentioned. Few varieties, however, succeed along the northern boundaries of the pecan country, and these * bear a smaller size of nut, though often are more prolific. For this section, ((Major,® <(Niblack,® <(Indiana® and (<Posey® are in favor.

The pecan trees begin to bear a few nuts about the third year after planting, but this early fruiting is not recommended, and crop¬ ping is postponed until the 10th or 12th year, from which time onward commercially valuable crops may be expected.

The yield ranges from 100 pounds up to 1,000 pounds per tree, depending largely upon its size and age. The larger part of the nuts reaching the market are from wild trees and bring up to 25 cents per pound, with an average of 15 cents. Named varieties bring (1916) up to 40 or 45 cents per pound, their cracked-out meats bringing 60 to 90 cents per pound at re¬ tail. At these prices they are by far the most valuable nut that can be grown in the United States. Consult United States Department of Agriculture, (Bulletin 700) (Washington 1916).

PECCARY, the native name of a genus (Dicotyles) of small pig-like animals forming the family Dicotylxdce , closely allied to the true swine, from which they differ in the character of their dentition and the more complex stom¬ ach and some other details. The canine teeth, generally so prominent in the male swine, do not protrude in the peccaries. The bristles are much thicker than in the pig and very long on the throat and head and nape of the neck. The peccaries possess a

cutaneous gland, situated on the rump, which secretes an offensive smelling fatty substance. The Indians cut away this pouch immediately on killing a peccary to pre¬ vent its contaminating the flesh.

The peccaries form the only indigenous rep¬ resentatives of the swine in America. There are three species of which the collard peccary (Dicotyles torquantus) and the white-lipped peccary (D. labiatus) are best known. They are said to interbreed readily. The former occurs abundantly in the northern parts of South America, but is found as far south as Patagonia. It is a habitant of Mexico, and is

numerous along the Rio Grande, and has spread northward into the United States into Texas and even as far as Arkansas. These animals go either in pairs or in small flocks, and inhabit holes in the ground, or the hollows of trees. The jaguars pursue them with great vigor. Their food consists of maize, potatoes, sugar¬ cane and similar materials as well as animal matter, and cultivated fields suffer much from their raids. The color of this species, which averages about three feet in length, is a dark gray, the bristles being each marked by rings of gray, straw-color and black, and a white band passes down each shoulder from the with¬ ers and round the throat, thus appearing as a kind of (<collar.» This species of peccary is readily domesticated. The flesh is savory, but less fat than pigs' flesh. Unlike the pigs but two young are produced at a birth.

The white-lipped peccary, found in Guiana and indeed all through northern South America, and as far north as Honduras, congregates in larger bands than the collared species. They appear to migrate in flocks from place to place, and are said to swim well. They are nocturnal in their habits and often invade plantations in great hordes, causing serious damage. They are also said to attack sportsmen with great cour¬ age when exasperated, and to inflict severe wounds with their sharp tusks. A white patch or strip exists across the chin and extends backward on each side of the jaw in this species. They are smaller than the collared peccary, being about 40 inches in length. They are preyed upon by the puma and panther, whom they attack

with such energy as to force them to take to trees for safety.

PECK, Annie Smith, American mountain climber: b. Providence, R. I., about 1856. In 1878 she was graduated at the University of Michigan, studied German and music in Ger¬ many ˆin 1884-85, and studied in the American School of Classical Studies at Athens in 1885— 86, specializing in Greek and archaeology. Miss Peck taught two terms in Providence schools; later became preceptress in the Saginaw High School ; teacher of mathematics in Bartholo¬ mew's School for Girls, Cincinnati; preceptress of the Montclair (N. J.) High School; profes¬ sor of Latin at Purdue University and at Smith College. She has lectured on Greek and Roman archaeology and other subjects since 1887. In 1895 she climbed the Matterhorn, in 1897 the peaks of Popocatepetl and Orizaba and in 1900 Funffingerspitze in the Tyrol. Miss Peck made record ascents in South America as follows: Mount Sorata in Bolivia was ascended to a height of 20,500 feet in 1904, and a peak of the Raura Range in Peru to the height of 18,000 feet in 1908, and Mount Huascaran, Peru, to a height of 21,812 feet the same year, and Mount Coropuna, Peru, to 21,200 feet in 1911. She has written <A Search for the Apex of Amer¬ ica5 (1911); (The South American Tour> (1914; 3d ed., 1917).

PECK, Charles Horton, American botanist: b. Sand Lake, N. Y., 1833. In 1859 he was graduated at Union College, Schenectady, N. Y., became professor in the Sand Lake Collegi¬ ate Institute and the Albany Classical Institute. In 1867 Mr. Peck was appointed head of the botanical department of the New York State Museum and in 1883 became State botanist.

He published <Boleti of the United States5 (1889) ; (Mushrooms and their Use) (1897) ; (Plants of ' North Elba, Essex County, N. Y.5

(1899).

PECK, George, American Methodist Epis¬ copal clergyman, brother of Jesse Truesdell Peck: b. Middlefield, N. Y., 8 Aug. 1797 ; d. Scranton, Pa., 1 May 1876. He began preach¬ ing in 1816, was presiding elder of the Susque¬ hanna District in 1824 and in 1835-40 principal

of

ˆ the Cazenovia Seminary. He edited the Methodist Quarterly Review (1840-48), and for the succeeding four years was editor-in-chief of the Christian Advocate, New York. He held pastorates at Scranton, Wilkesbarre, Provi¬ dence and Dunmore, and among his books are (Universalism Examined) (1826) ; (Scripture Doctrine of Christian Perfection5 (1841); (Rule of Faith5 (1844); (Reply to Bascom on Slavery5 (1845); (Christian Exertion5 (1845); Sketches and Incidents5 (1849); < Manly Character5 (1852); (History of Wyom¬ ing5 (1858) ; (History of Methodism within the Bounds of the Old Genesee Conference5 (1860); (Our Country5 (1865); (Life and Times of George Peck,5 an autobiography

(1874).

PECK, George Record, American lawyer: b. Steuben County, N. Y., 15 May 1843. He was educated in the common schools, served in the artillery during the Civil War, studied law and was admitted to the bar in 1866. In 1871 — 74 he practised at Independence, Kan. ; in 1874—93 at Topeka, and since 1893 at Chicago, Ill. From 1881 to 1895 he was general solicitor of the Atchison, Topeka and Santa Fe Railroad, and from 1895 to 1910 was general counsel of the Chicago, Milwaukee and Saint Paul Rail¬ way, since when he has been consulting counsel. In 1905-06 Mr. Peck was president of the American Bar Association. Peck has been a prominent member of the conservative wing of the Republican party.

PECK, George Wilbur, author and State governor: b. Henderson, N. Y., 28 Sept. 1840; d. Milwaukee, Wis., 16 April 1916. He moved to Wisconsin with his parents at the age of three. In his youth he learned the printer's trade and in 1860 bought a half interest in the Jefferson County Republican, which was pub¬ lished at Jefferson. He served as a private in the Fourth Wisconsin Cavalry in the Civil War for two and a half years and then returned to his newspaper activities. In 1866 he started at Ripon, Wis., a newspaper called the Represen¬ tative and later became the owner of the La Crosse Democrat. He parted with this publica¬ tion in 1874 and founded the Sun at La Crosse. Four years later he removed the plant to Mil¬ waukee and changed the name of the paper to Peck's Sun, which became noted because of his humorous sketches, notably the <(Peck's Bad Boy55 series, favorites

generally with boys of a generation ago. His best-known works are (Peck's Compendium of Fun5 (1880) ; ˆPeek's Sunshine5 (1882); <Peck's Bad Boy and His Pa5 (1882) ; (The Groceryman and Peck's Bad Boy5 (1883); (How Private Peck Put Down the Rebellion5 (1885); (Peck's Boss Book5 (1889) ; (Peck's Uncle Ike and the Red Headed Boy5 (1889); (Sunbeams — Humor, Sarcasm and Sense5 (1900); (Peck's Bad Boy with tht Circus5 (1906), and <Peck's Bad Boy with the

Cowboys' (1907). Mr. Peck was mayor of Milwaukee (1890-91) and governor of Wiscon¬ sin (1891-95). He became the State's executive in the revolt against the plan to make public school attendance compulsory, and after his term in office he returned to his love for print¬ ers' ink and for the hunting field, being almost as well known among experts in the shooting of wild fowl as he was among readers for his writings.

PECK, Harry Thurston, American critic and author: b. Stamford, Conn., 24 Nov. 1856; d. 1914. He was graduated at Columbia in 1881, was instructor in that institution in Latin and for a time in Sanskrit, and in 1888 became professor of Latin there, after study at the University of Berlin. He succeeded Prof. Charles Short as Anthon professor. In 1895 he became editor of the American Bookman, upon the establishment of that magazine, in 1898 an editor of the (International Cyclop3edia) and in 1900 of the (New International Encyclo¬ paedia. ' He was also at one time literary editor of the Commercial Advertiser. Among his publications are (The Semitic Theory of Crea¬ tion' (1886) ; <Suetonius,) with commentary (1889) ; (Manual of Latin Pronunciation'

(1892); (Roman Life in Latin Prose and Verse' (1895) ; (The Personal Equation' (1897); a rendering of (Trimalchio's Dinner,' with introduction (1898) ; (What is Good Eng¬ lish? and Other Essays' (1898). He also edited Harper's (Dictionary of Classical Literature and Antiquities' (1896). He also wrote two suc¬ cessful stories for children, (The Adventures of Mabel' (1889) and (Hilda and the

Wishes.' Among his works that stand apart from his classical and encyclopedic productions are (Greystone and Porphyry' (1899), collection of poems; The Life of Prescott' (1905); (Twenty Years of the Republic' (1906) ; lit¬ erature and Studies in Several Literatures' (1909), and (A History of Classical Philology'

(1911).

PECK, Jesse Truesdell, American Metho¬ dist Episcopal bishop: b. Middlefield, N. Y., 4 April 1811; d. Syracuse, N. Y., 17 May 1883. He was educated at Cazenovia Seminary, en¬ tered the Oneida Conference in 1832 and was pastor of various churches until 1837, when he accepted an appointment as principal of the Gouverneur Wesleyan Seminary. In 1841-48 he was principal of the Troy Conference Academy at Poultney, Vt., in 1848-52 president of Dickin¬ son College, Carlisle, Pa., and in 1854-58 secre¬ tary and editor of the Methodist Tract Society in New York. He spent the succeeding eight years in California as pastor and presiding elder. After his return eastward he continued his pastoral work, was one of the founders of Syracuse University and in 1872 he was elected bishop. Among his published works are The Central Idea of Christianity' (1855); The True Woman' (1857) ; The History of the Great Republic from the Christian Standpoint'

(1868).

PECK, John James, American soldier: b. Manlius, N. Y., 4 Jan. 1821 ; d. Syracuse, N. Y., 21 April 1878. Graduated in 1843 from West Point he took part in the Mexican War and was brevetted major for bravery at Malino del Rey. In 1853 he resigned from the service, but became brigadier-general of volunteers 9 Aug.

1861, and after service in the defensive works of Washington fought in the Peninsular cam¬ paign, distinguished himself at Williamsburg and Yorktown, and at Malvern Hill (1 July) was in command of the infantry forces of the Federal rear-guard. Promoted major-general (4 July), he remained until May 1863 in com¬ mand of the troops left for the defense of the important stragetic post at Suffolk, Va. He defended the position successfully against a su¬ perior Confederate force under Longstreet and Hill. Subsequently he was on duty on the Canadian

frontier, and on 24 Aug. 1865 was mustered out. He organized (1867) the New York State Life Insurance Companv at Syra¬ cuse and held its presidency until his death.

PECK, Samuel Minturn, American lyric poet: b. Tuscaloosa, Ala., 4 Nov. 1854. He was graduated from the University of Alabama in 1876 and later studied medicine in New York, but has not practised. He has published in verse Tap and Bells' (1886) ; (Rings and Love Knots' (1892); (Rhymes and Roses'; (Fair Women of To-Day' (1896); The Golf Girl' (1899), and in prose (Alabama Sketches' (1902) ; (Maybloom and Myrtle' (1910).

PECK, Tracy, American classical scholar: b. Bristol, Conn., 24 May 1838. He was grad¬ uated from Yale in 1861, studied in Germany, was professor of Latin at Cornell in 1871-80; and occupied the chair at Yale from 1880 to 1908. He was president of the American Philological Association in 1885-86 and director of the American School of Classical Studies in Rome 1898-99. He edited with C. L. Smith a series of Latin authors annotated for college use (12 volumes already issued), and published The Authorship of the Dialogus de Oratoribus' (1879) ; (Alliteration in Latin' (1884) ;

(Cicero's Hexameters' (1897), and a large amount of magazine literature. With other writers he annotated numerous college texts. After 1908 he lived in Rome, Italy.

PECK, William Guy, American educator: b. Litchfield, Conn., 16 Oct. 1820; d. Greenwich, Conn., 7 Feb. 1892. He was graduated from West Point in 1844, assigned to the corps of topographical engineers, and served under Gen¬ eral Fremont in 1845 on his third expedition to the Rocky Mountains. He was with the Army of the West in the Mexican War, professor at West Point in 1847-55, when he resigned from the army and accepted the chair of physics and civil engineering in the University of Michigan. He was professor in Columbia College from 1857, occupying at his death the chair of higher mathematics and astronomy in both . depart¬ ments of the college. He edited with his father-in-law, Charles Davies, the Mathematical Dic¬ tionary and Cyclopedia of Mathematical Sci¬ ence' (1855), etc., and wrote (Elementary Mechanics' (1859); (Popular Astronomy'

(1883).

PECKHAM, Rufus William, American jurist: b. Albany, N. Y., 8 Nov.

1838; d. Alta-mont, N. Y., 24 Oct. 1909. He studied at Al¬ bany and in Philadelphia, was admitted to the bar in 1859. He was a brother of W. H. Peckham (q.v.). In 1868 he was elected district at¬ torney of Albany County for three years ; during this time a daring express robbery occurred on the Albany railroad bridge and he successfully prosecuted the robbers and obtained their con-

viction. He was counsel for the Albany and Susquehanna Railroad in its suit against the Erie and had charge of several other import¬ ant cases. In 1881 he became corporation coun¬ sel for the city of Albany. An active member of the Democratic party, he was a delegate to the National Convention of 1876, where he sup¬ ported Tilden for the Presidency, and also to the convention of 1880. He was justice of the New York State Supreme Court from 188b to 1886, and was associate judge of the State Court of Appeals, 1886-95. In the last-named year he was appointed to the United States Su¬ preme Court by President Cleveland. Consult Taft, W. H., (The Anti-Trust Act and the Su¬ preme Court* (New York 1914).

PECKHAM, Wheeler Hazard, American lawyer: b. Albany, N. Y., 1 Jan. 1833; d. New York, 27 Sept. 1905. He was a brother of R W Peckham (q.v.). He was educated at Union College, Schenectady, admitted to the bar in 1856. In 1864 he settled in New York, where he acquired a reputation as a constitu¬ tional lawyer. He acted with Deputy Attorney-General O'Connor in the prosecution of the "Tweed ring.® He was appointed attorney-general of New York in 1884, but soon re¬ signed.

PECKSNIFF, a hypocritical personage in Dickens' novel, (Martin Chuzzlewit.* He is the father of two daughters, Mercy or ® Merry,® who married Jonas Chuzzlewit, and Charity, commonly called "Cherry.®

PECKVILLE, Pa., town of Blakely bor¬ ough in Lackawanna County, on the Delaware and Hudson, the Delaware, Lackawanna and Western and the New York, Ontario and West¬ ern railroads, six miles

northeast of Scranton. There are numerous coal mines and mining is the principal industry. The town has manu¬ factures of silk, powder, lumber and non and steel wsre. The municipality owns the electric-lighting plant. Pop. 5,345.

PECOCK, pe'kok, Reginald, English prel¬ ate: b. Wales, about 1395; d. Thorney Abbey, Cambridgeshire, about 1460. He was educated at Oxford, in 1431 was elected to the master¬ ship of Whittington College of London, in 1444 was made bishop of Saint Asaph and in 1450 was translated to Chichester. In 1455 he pub¬ lished the (Repressor of Over Much Blaming of the Clergy,* a reply to Lollard attacks and a critique of Lollard positions* subtle in argumen¬ tation and a pattern of the clear and vigorous English of the time. In a work called the (Provoker* he denied the authenticity of the Apostles' Creed, a revised version of which he had previously published. By this and similar writings he managed to secure the disfavor of every shade of belief then prevalent in Eng¬ land. He was cited before Bouchier, archbishop of Canterbury, in 1457, who, after Pecock's creed had been condemned, ordered him to recant on pain of death. He obeyed, retired from his bishopric and went into seclusion at Thorney Abbey. His books, 14 in all, were publicly burned.

PECOS (pa'kos) RIVER, the principal tributary of the Rio Grande of New Mexico and Texas, rising in San Miguel County, N. Mex., at the eastern base of Baldy Peak; it flows south

and southeast, enters the State of Texas and

•

empties into the Rio Grande River. In its upper course it flows through a narrow valley, and is one of the most important rivers of New Mexico for irrigation; large storage reservoirs have been built near Carlsbad and Hondo, N. Mex. Its length is about 800 miles, and its volume of water is greatly reduced during the summer months. Its drainage area includes more than 32,000 square miles.

PECTA.SE, pectic acid, pectin.

See Pectose.

PECTINID2E, a family of swimming bi¬ valve mollusks, comprising about 40 species commonly known as scallops, i hey are char¬ acterized by a shell sub-orbicular, regular, usu¬ ally with radiating ribs, but sometimes smooth, especially in deep water, beaks approximate, eared, the anterior ones most prominent, the posterior

ones a little oblique. Its members have rows of ocelli, very brilliant in some species, and delicate cresentic gills. Most mem¬ bers of the family attach themselves when young by a byssus, but they quickly release this upon occasion and swim away rapidly. Their agility is such that thev can leap out of an ordinary pail. The species number about 175, living on sandy bottoms, down to a considerable depth in all parts of the world, and have a large commercial importance. Many fossil forms re¬ main from Palaeozoic time. See Scallops.

PECTOLITE (New Lat. <(comb-stone®) , or OSMELITE (Gr. berf smell, and ˆ0oc, stone; so called because of its peculiar odor), one of the zeolites, a hydrous silicate of sodium and calcium, with the formula HNaCaaSisOo, of a grayish or whitish color and pearly or satiny lustre, commonly occurring in radiated masses of needle-like crystals, suggesting the form of a comb, whence the name. It is occasionally found tabular. It is isomorphous with wol-lastonite, and was long regarded as a weathered form of that mineral. It is subtranslucent, crystallizes in the monoclinic scheme, is soluble in hydrochloric acid, leaving silica. Its chief alteration product is talc. In hardness it is placed at 4.5 and in density at 2.88. It occurs in the British Isles, in Edinburgshire, Scotland, and in Wales, in Monzoni Valley, Tyrol, at Bergen Hill, N. J., *etc.*

PECTORAL CROSSES. See Crosses and Crucifixes.

PECTORAL SANDPIPER (Tringa maculata) popularly called the <(grass snipe,® and erroneouslv the <(jack snipe,® which is a dif¬ ferent bird. It is found in wet salt meadows near to but not along the seashore. See Sand¬ pipers

PECTOSE, PECTASE, PECTINE, PEC¬ TIC ACIDS, a group of closely related sub¬ stances, found in the cell walls of certain fruits and vegetables during various stages of ripen¬ ing and to which the power of forming a jelly is due. They are not crystallizable bodies, but can be precipitated from their solutions, in col¬ loidal or gelatinous condition by various re¬ agents. The unripe fruit contains Pectose which is insoluble in both water and alcohol, but which can be changed to soluble Pectine either by heating with dilute acids, or as dur¬ ing ripening by the action of a ferment-like body called Pectase, a substance belonging to the “clotting enzymes.® (See Enzyme). Pectase

is always present in the ripening fruit. Pectine is further changed by action of dilute acids or alkalis to a number of different but closely related bodies of rather uncertain composition called the Pectic Acids. These pectous sub¬ stances are composed of carbon, hydrogen and oxygen, exact composition unknown, and re¬ lated to that section of the carbohydrates, known as the gums. They are insoluble in water, alcohol or acids. Both pectose and pectine may be converted by the enzyme pectase into the gelatinous bodies pectosic acid and pectic acid, consecutively. These acids differ from pectine chiefly in their proportion of water. Pectine swells up and dissolves in water, yielding a viscid liquid which tends to gelatinize as the solution approaches concentra¬ tion. Pectase is universally present in green plants, being especially abundant in the foliage. It is believed to have ‘some special function con¬ nected with the changes taking place in cell membranes during the period of plant growth.

PECULIAR PEOPLE, an English reli¬ gious sect, who combine certain tenets of the Dunkards and Faith Curists. They are Perfectionists. They claim for themselves the possession of true and undefiled religion, and take their name from a scriptural phrase ((a peculiar people® (1 Peter ii, 9). To be a true Christian, with them, is to live without sin, as they profess to do. Their religion has neither mystery or straining effort. They see and can do all things ; young and old are equally competent to accom¬ plish this. All are permitted to preach and pray and all who attend their assemblies are members of their church. They reject creeds, sacraments and confessions ; they have no min¬ istry. It is one of their fundamental doctrines that James v, 14-15 is to be taken literally, and the British government has sometimes inter¬ fered, when their refusal to call in a doctor, or administer medicine, has endangered the life or practically caused the death of some member of the denomination. See Religious Sects.

PEDAGOGY. See Education, Elemen¬ tary; Education, The Study of.

PEDAL-POINT, a long-sustained tone in one voice while other voices proceed in inde¬ pendent harmonies. See Organ-point.

PEDDLER, or PEDLAR, a traveling salesman or merchant who carries his goods or merchandise with him from place to place. In most of the

United States, peddlers are required to take out a license and to conform to legal regulations, for the protection of the public. In Great Britain peddlers* are called hawkers.

PEDEE, pe-de', Great, a river of South Carolina. See Great Pedee.

PEDESTRIANISM. See Walking.

PEDICELLARI.7E. See Echinoidea.

PEDICULARIS, a genus of herbs of the family Scrophulariacece, some of which have rather large and finely colored flowers. They have the name louseworts (q.v.) because of an old belief that they produce a lousy disease in sheep. Their acridity renders them obnoxious to sheep; but cattle, goats and swine eat them. Continental Europe and the northern parts of Asia produce many species, as well as North America. P. sceptrum, or King Charles' sceptre,

is one of the principal ornaments of marshy grounds in northern Europe.

PEDIMENT, in architecture, the triangu¬ lar finishing above the entablature at the end of buildings or over porticoes. The moldings of the entablature bound the inclined sides of the pediment. When there are triangular finishings over doors and windows these are also called pediments. In the architecture of the Middle Ages small gables and triangular decorations over openings, niches, etc., are called pediments.

PEDLAR. See Peddler.

PEDOMETER, a small, clock-like mechan¬ ism which indicates the distance traveled by a pedestrian. The instrument is so constructed that it moves with the motion of the person carrying it, the indicator advancing one degree for each step taken.

PEDRARIAS DAVILA. See Davila, Pedrarias.

PEDREGAL Y CANEDO, pa-dra-gal' e ka-na'do, Manuel, Spanish statesman and politi¬ cal writer: b. Grado, in the Adriatic, 1832; d. Spain, 1896. He studied law and entered upon a political career, identifying himself with the Republican party, in the affairs of which

he took an active part during the period immedi¬ ately preceding the abdication of Amadeus I, in 1873. Under the Republican government he was twice Minister of Justice and once Minister of Finance, afterward retiring from public life until 1882 when he became deputy from Oviedo, and with the Republican leaders Azcarate, Salmeron, Labra and others, assisted in organizing the ((centralista):> which represents the highest principles of the radicals. He wrote (E1 poder y la libertad en el mundo antiguo) (1878) ; (Estudios sobre el engra-decimientoy la decadencia de Espana) (1878); ˆociones de hacienda publica) (1881) ; (Sociedades Cooperativas-* (1888) ; (Eleccion presidencial de los Estados-Unidos) (1892).

PEDRO II, pe'dro (Sp. pa'dro), king of Aragon, called The Catholic: b. 1174; d. Muret, 2 Sept. 1213. He succeeded to the crown in 1196; quarreled with the king of Navarre over his French fiefs; conquered the most of Provence, but gave it up to his brother Alfonso. He married Marie of Montpellier in 1204 and in the same year was crowned by the Pope, a political move calculated to facilitate his pro¬ jected conquest of the Balearic Islands, and to protect himself against his nobles and the rest¬ less Albigensians. He even made Aragon a papal fief, receiving therefor the title of Cath¬ olic. In alliance with Castile and Navarre he defeated the Almohades at Las Navas, 16 July 1212. But in 1213 he was defeated and killed at Muret by Simon de Montfort, against whom he fought in alliance with the Albigensians. Pedro II was skilled in Italian and Provengal verse and did much to introduce the Provencal style into Spain.

PEDRO I (Antonio Pedro Jose de Alcan¬ tara), called Dom Pedro, king of Portugal and emperor of Brazil: b. Queluz, near Lisbon, 12 Oct. 1798; d. there, 24 Sept. 1834. On the in¬ vasion of Portugal by the French in 1807, the royal family fled to Brazil where Dom Pedro became regent of Brazil in 1821. The Cortes angered the colony, a revolution took place and

Dom Pedro, placing himself at the head of the movement, was proclaimed protector and per¬ petual defender of Brazil. The country

being declared independent 1822, he was proclaimed constitutional emperor (12 October) and on 1 December was crowned. In 1825, Portugal recognized the independence of Brazil, and a treaty was made on terms highly unsatisfactory to the Portuguese. His father dying in 1826, Dom Pedro became king of Portugal, but im¬ mediately abdicated in favor of his infant daughter, Maria da Gloria, as the Brazilians feared that they were once more to be made dependent upon the mother country. The in¬ ternal discontent increased, and at length a popular tumult in Rio Janeiro compelled the emperor to abdicate in favor of his son, 7 April 1831, and to return to his native country. In the meantime the crown of Portugal had been usurped by his brother Dom Miguel. He landed at the island of Terceira, in the Azores, issued a decree in favor of Donna Maria, and with the assistance of French and English volunteers began a war which terminated in 1834 in the complete success of the queen's party. On 26 May an agreement was signed by which Dom Miguel was to leave the kingdom forever. He was appointed regent during his daughters minority, but died before it expired. See Brazil and Portugal, History.

PEDRO II (de Alcantara, da al-kan'ta-ra), called Dom Pedro II, emperor of Brazil: b. Rio Janeiro, 2 Dec. 1825; d. Paris, 5 Dec. 1891. He was the only son of the Emperor Pedro I, and succeeded to the throne on the abdication of his father 7 April 1831. He married the Princess Theresa Christina Maria, sister of Francis I, king of Naples, in 1843. Brazil prospered greatly under the rule of Pedro II, who was an enlightened ruler and did much to develop its resources in every direction. He was scholarly in his tastes and never sought to employ aggressively even the restricted powers which the Constitution permitted him. During his reign several foreign wars occurred, among them those with the dictator Rosas of Buenos Aires in 1851-52, with Uruguay in 1854-55 and 1864-65 and with Lopez of Paraguay in 1865-70. As a private individual he visited Europe (1871-72) and in 1876 attended the Centennial Exhibition in Philadelphia, being present and assisting at the opening ceremonies. In 1867 Dom Pedro opened the Amazon to the com¬ merce of all nations, and in 1871 a law was passed for the gradual abolition of slavery throughout Brazil; but it was very inefficiently administered. In 1888 a second law was passed providing for the immediate emancipation of the slaves. This turned the rich planters against Dom Pedro who was forced to abdicate in 1889. A pension was granted him by the new Brazilian government and he retired to Pans where he spent the rest of his life. Consult Dawson, T. C., (The South American Repub- ' lies > (New York 1903); and Mosse, B.; (Dom Pedro II, empereur du BresiP (Paris

1899).

PEDRO V, king of Portugal: b. Lisbon, Portugal, 16 Sept. 1837; d. there, 1861. He was the son of Dona Maria II, whom he succeeded under the regency of his father, Prince Ferdi¬ nand of Saxe-Cobtirg-Gotha, in 1853. The most important events of his minority were the con¬ clusion of the extradition treaties with France

and Belgium and the commercial treaties with the South American states. The regency of his father ended 16 Sept. 1855 and Pedro de¬ voted himself to strengthening the financia condition of the country and further industrial arts. He died of yellow fever contracted by assisting his plague-stricken subjects in 1861.

PEDRO, Dom, Duke of Coimbra, regent of Portugal: b. Lisbon, Portugal, 9 Dec. 1392; d. Alfarrobeira, Portugal, 20 May 1449. He was the second son of John I of Portugal; while very young commanded the first expedi¬ tion against Ceuta. He spent four years 1424— 28, in travel and visited even the court of Bag¬ dad where he was received with high honors. After the death of Edward I the people became dissatisfied with the regency of the queen and Pedro skilfully contrived his own appointment ter the office.- He proved a wise and tactful ruler and arranged the marriage between the young king Alfonso V, and his daughter Isa¬ belle in 1446. After the accession of the king a quarrel arose between Pedro and his brother, the Duke of Braganga, over the office of con¬ stable of the kingdom. The king took the part of Braganga, a civil war ensued and Dom Pedro was killed in battle at Alfarrobeira.

PEDRO THE CRUEL, king of Leon and Castile, not to be confused with Pedro IV of Aragon, who was called (<the Cruel,0 but more commonly <(the Ceremonious0 : b. Burgos, 30 Aug. 1334; d. near Montiel, 26 March 1369. He was son and successor (1350) of Alfonso XI, whose mistress, Leonor de Guzman, he impris¬ oned, and whose illegitimate children he perse¬ cuted cruelly. He was married to Blanche of Bourbon in 1353 and abandoned her in three days. The following year he married Juana de Castro and left her at the end of two days. These two desertions made him many enemies, for the friends of both women openly opposed and joined forces with his brothers who were in open rebellion. His general administration of Castile was very severe. On the death of the Seigneur of Biscay, Pedro imprisoned the ■two daughters and sought the life of the three-year-old son of the Seigneur, seized the prov¬ ince and killed Garcilasso de

la Vega, who at¬ tempted to interfere. He murdered his brother Fadrigue and the king of Grenada, while the latter was his guest, and picked a quarrel with Pedro IV of Aragon (also styled ((The Cruel0), who called in the help of the Castilian king's natural brother Henry of Trastamare at the head of the famous mercenaries, the White Com¬ panies. This war with Pedro IV continued from 1357-61. Henry established himself as king of Castile in 1366. He had been in exile in France ; but 'headed a body of exiles and another of mercenaries and was openly backed by the P ope, France and Aragon. Pedro persuaded Edward the Black Prince to espouse Jiis cause; and the latter invaded Castile in 1367 and defeated, the exiles at Najera. He and Pedro disagreed over the treatment of prisoners and other matters, and Edward went back to Guyenne where he was governor. Rebellious bands and parties sprang up everywhere. Henry returned, headed the new opposition and defeated Pedro at Montiel in 1369. Pedro was treacherously killed a few days after the battle. Consult Burke, (History of SpaiiP (1895); Merimee, (Histoire de Dom Pedro I, Roi de Castile) (1843) ; and

Garcia, (Castila y Leon durante los reinados de Pedro I, etc.J (1891).

PEDRO SANCHEZ. (Pedro Sanchez) of Jose Maria de Pereda centres in autobiographi¬ cal form about political life in Spain during the middle of the last century. It is one of the few novels of Pereda which deal essen¬ tially with life outside of his favorite Cantabrian hills and coast. Even so, the disillusioned hero after struggling as journalist and political office¬ holder at Madrid and in a provincial town, re¬ turns to his native village of the north. Fur¬ thermore the story of Pedro's youth affords the author an opportunity for describing the country about Santander. Pereda's dramatic account of the Revolution of 1854 in Madrid is told at first hand, for he spent his student days there during that period. As in all Pereda's novels the ethical and moral questions of life predominate in (Pedro Sanchez) but do not obtrude. Pereda, a realist, paints life as he sees it, and although he may be prejudiced in favor of rural life against city life with its artificial

manner of existence and its tempta¬ tions, in the main his strictures do not seem exaggerated. (Pedro Sanchez) is a forceful satire on the mania for office-holding in Spain. Through the hero we can see the author, a rugged, honest, and somewhat reactionary don flaying political corruption. The novel is writ¬ ten in Pereda's purest style. Pereda is one of the greatest stylists in Spanish literature, and must be counted among the masters of modern Spanish fiction. There is an abridged American edition with notes, vocabulary, and a full ac¬ count of the author and his work with a bibliography by R. E. Bassett, taken from the standard edition of Pereda's works (Vol. XIII).

Samuel M. Waxman.

PEEBLES, pe'blz, James Martin, Ameri¬ can physician and editor: b. Whitingham, Vt., 23 March 1822. He was graduated from the University of Pennsylvania,, receiving the de¬ grees of M.D. and M.A., and then pursued his studies further at the University of Chicago. He has owned and edited several newspapers, and in 1869 was appointed United States con¬ sul to Trebizonde, Turkey. He was president of the California College of Science for four years and of the Cincinnati Eclectic College for three years. Dr. Peebles was also the organizer of the Independent Order of Gopd Templars, and the first grand chaplain of this order. .He represented the United States Arbitration League at the International Peace Commis¬ sion of Europe. A member of many national institutions of science and learning, Dr. Peebles encircled the world five times, lecturing on travels, hygiene, spiritualism and social re¬ form. He was president of Peebles College of Science and Philosophy (1914). Of his many books and pamphlets may be mentioned (Seers of the Ages) (1875) ; Ummortality and our Homes Hereafter) (1880); (How to Live a Century and Grow Old Gracefully) (1884); <The Demonism of the Ages) (1902) ; (The Christ Question Settled) (1897); Vaccina¬ tion— A Curse) (1905) : <The Spirit's Pathway) (1906); Vive Tourneys Around the World) (1907); (Buddhism and Christianity _ Face to Face) (1909); (Spirit Mates — Marriage and Divorce) (1909); 'Death Defeated) (1910);

(How to Converse with the Dead) (1911) ; 'Ninety Years Young and Healthy — How and Why) (1913).

PEEBLES, Mary Louise Parmalee

(<(Lynde Palmer))), American author: b. Lansingburg, N. Y., 10 Dec. 1833; d. 26 April 1915. She was graduated from the Lansingburg

Academy in 1850 and in 1862 was married to Augustus A. Peebles. As a writer of juvenile books she has gained some reputation and among her works are ‘The Little Captain) (1861) ; (The Good Fight) (1865) ; ‘Drifting and Steering) (1867) ; (Jeannette’s Cisterns) (1882) ; ‘Where Honor Leads) (1894), *etc.*

PEEKSKILL, pek’skil, N. Y., village in Westchester County, on the Hudson River, and on the New York Central and Hudson River Railroad, about 40 miles north of New York City. It is connected by steamboats with New York, Albany and all the Hudson River ports. Because of its population, Peekskill is called ((the largest village in the country,)) the inhab¬ itants considering the village form of govern¬ ment to be the most advantageous. The village president and the board of trustees serve with¬ out compensation. Peekskill is noted for its long established industries and its manufactur¬ ing and commercial activities. Railroad and deep water facilities offer great advantages for manufactories. Its 65 industries employ about 2,750 operatives. Among manufactured prod¬ ucts are stoves, underwear, nightwear and dress goods, machines and engines, automobile parts, oilcloths, hats, cigars, yeast, vinegar, firebricks, bricks, charcoal products, cement blocks and reconstructed stone. A government shipyard is in operation here. Dairy farming on the most modern principles is also a flourishing industry of the neighborhood. The Westchester County National Bank and the Peekskill Savings Bank are two prosperous institutions. Saint Peter’s, or the “Old Church,)) was erected in 1767, and there General Washington as a lay reader of the Episcopal Church read services for his men when his army was stationed in the vicinity. Saint Gabriel’s Episcopal Academy for girls is a noted educational institution, and besides two high schools, eight elementary and parochial schools, there are business schools and a train¬ ing school for nurses in connection with the Peekskill Hospital. The Peekskill Military Academy, Westchester Military Academy, Mohegan Lake School and Worrall Hall Military Academy are located here, and other public institutions of interest are Saint Joseph’s Cath¬ olic Home for boys and girls, over 1,000 in¬ mates; the House of the Good Shepherd, a reformatory for girls, and Nazes Memorial Home for Children. The Field Public Library has over 7,000 volumes. There are munici¬ pally owned welfare stations, Y. M. C. A. and Y. W. C. A. organizations, theatre and movie houses. Well-equipped police and fire depart¬ ments are maintained, with most of the fire apparatus motorized. The water supply is an important village asset, with 30 miles of mains yielding a daily capacity of 5.000,000 gallons and a daily consumption of 3,750,000 gallons; 15 miles of trolley lines give regular transport service; there are 33 miles of sewer mains; and gas,

electric lighting and power service are unlimited for private and industrial needs. The property values are estimated at $9,001,625.70.

Peekskill village covers an area of six square miles of picturesque location, surrounded by famous country estates. The town maintains Depew Park, covering 67 acres, and named after ex-Senator Chauncey M. Depew (q.v.), who was born here. The former farm and summer home of Henry Ward Beecher lies two miles east of the village. At Verplancks Point, two miles below Peekskill, Hendrick Hudson anchored the Half moon , October 1609, and there his sailors had their first encounter with the Indians. Peekskill was settled in 1664 by the Dutch. The Indians had here a village called Sachoes, but the Dutch changed the name in honor of Jans Peek, a Dutch navigator. In 1665 royal confirmation was given and the ter¬ ritory was known as Ryck s Patent. In 1764 several families from England settled here. During the Revolutionary War, Fort Inde¬ pendence, just above the village, was occupied by American soldiers. Continental Village, a fortified camp a few miles northeast, was for a time the headquarters of Generals Parsons and Putnam. It was in Peekskill that Arnold heard of the capture of Andre. John Pauld¬ ing, the captor of Andre, is buried there m old Rural cemetery. Gallows Hill, in whose “Wayside Inn® Andre was detained after his capture, is about three miles distant.* On the north side of Gallows Hill is the spring from which the Mohicans drank. Pop. (1920) 15,868.

PEEL, Paul, Canadian artist: b. London, Ontario, 1860; d. Paris, 25 Oct. 1892. He studied at the Philadelphia Academy of Fine Arts, in 1880 entered the Royal Academy at London, and later at Paris was a pupil of Boulanger and Gerome. His studio was at Paris, and his work was French in its charac¬ teristics. He had a very delicate sense of color¬ ing, and his landscape effects were notably light and airy. His <How Bitter Life Is5 obtained honorable mention at the Salon of 1889. Among his other works are Two Friends) ; Wording the Stream) ; (In Punishment5 ; and (The Un¬ expected Meeting.5 In 1890 his <After the Bath5 was awarded a gold medal. It was pur¬ chased by

the National Gallery of Budapest. Queen Alexandra secured his ‘Two Friends5 for Buckingham Palace, while the city of Toronto purchased his (Fording the Stream,5 which is now in the city hall of that city.

PEEL, Sir Robert, English statesman: b. near Bury, Lancashire, 5 Feb. 1788; d. London, 2 Tuly 1850. He was graduated from Oxford in 1808; in 1809 entered Parliament as Tory mem¬ ber of Cashel, later exchanged for Chippenham, and in 1810 made his first speech in seconding the address to the throne. In 1811 he entered upon his official career as Under-Secretary of State for the Colonies, but in 1812 he was transferred to the Chief Secretaryship for Ire¬ land a post whose usual difficulties were at that time’ much increased by political disturbances. He greatlv improved the routine administration of the office, promoted secular education., and for the security of life and property established the Irish constabulary, thence known as ((Peelers55 But his Tory views and his opposition to Catholic emancipation dissatisfied the ex¬ treme members of the Catholic party who gen¬ erally referred to him as ((Orange Peel.55 In 1817 he was returned for Oxford, thus obtain¬ ing the chief parliamentary distinction in the

Tory party; and in 1818 he resigned the Irish secretaryship, whose peculiarly exacting labors he had long since found distasteful. He be¬ came chairman of the bullion committee in 1819, and on 24 May, in one of his great speeches, carried resolutions for a return to cash payments, in place of the depreciated paper then in circulation. In so doing he dittered somewhat from his party, but established his reputation as a financier. He was made Home Secretary in 1822 and secured an important reform in British criminal law, thus making effective the endeavors of Sir Samuel Romilly and Sir James Mackintosh; and in 1827 he re¬ tired from the ministry. In 1828 he became Home Secretary in Wellington’s Tory ministry and leader of the House. He made large re¬ trenchments in expenditures, allowed the im¬ portation of corn under a sliding tariff-scale, and by the new Metropolitan Police Act reor¬ ganized the London force (thence known as “Peelers55 and “Bobbies55) after the manner of the Irish constabulary. But the cause 9f Ro¬ man Catholic emancipation had now arrived at a point where the ministry must either support it or resign. For the sake of an expedient set¬ tlement of the question, the former course was decided upon, and “Orange Peel55 in a speech of more than four hours (5 March 1829) intro¬ duced the measure. This change in attitude lost him his seat as representative of Oxford (1829). He relinquished his ministerial post when the Tories were driven from

power in 1830, and upon the formation of a Whig ministry became the leader of the opposition. He resisted the Reform bill with much adroitness, and when it had been passed in 1832, organized a powerful opposition in the Conservative party, and by a temperate policy gradually regained for modi¬ fied Tory principles the influence of which Lib¬ eral advance had threatened to deprive him. In 1834 he formed with Wellington a cabinet, becoming First Lord of the Treasury and Chan¬ cellor of the Exchequer. But in 1835 he was beaten and resigned, but in 1841 he again be¬ came Prime Minister as First Lord of the Treasury, and at once proceeded to a thorough reorganization of the finances. In 1842 he car¬ ried a tariff measure based on the sliding-scale in operation since 1828; and in the same year a bill for the imposition of an income-tax. By 1845 a surplus of £5,000.000 had re¬ placed a deficit of £2,000,000. The potato-rot in Ireland and consequent famine made cheap corn a necessity, and the activity of the Anti-Corn Law League led Peel to declare in. favor of the repeal of the laws. Some of his col¬ leagues disagreed, and he resigned ; but he was soon once more in power, and on 27 Tan. 1846 presented the repeal to the House. The meas¬ ure was passed, but protectionists brought about his defeat on the Irish coercion bill, and he resigned. He gave a general support to the Whig ministry of Lord John Russell, and in the critical . time of 1847 he was one of the strongest supporters of the government which he backed up in its free-trade policy, and supported in its efforts to do away with the Jewish disabilities by process of law. On 28 Tune 1850 he made a speech in opposition to Palmerston's interference in the Greek ques¬ tion; and on the following day he was thrown from his horse while riding through Hyde Park and died from the effects of the fall.

Peel was an eminent statesman and parliamen¬ tary leader. In many notable ways he fur¬ thered justice and practical reforms, and his for¬ eign policy was wise and pacific. He was noted for private charities and made an important collection of paintings.

Bibliography. — Bagehot, Walter, <The Character of Sir Robert PeeP

(in (The Eng¬ lish Constitution and other Political Essays,* New York 1903) ; Dalling, (Sir Robert PeeP (1874); Doubleday, Thomas, (The Political Life of Sir Robert PeeP (London 1856) ; Guizot, F. P. G., <Sir Robert PeeP (London 1856) ; Holland, Bernard, (The Fall of Protec¬ tion, 1840-50) (London 1913) ; McCarthy, (Life of Sir Robert PeeP (1891) ; Montague, (Sir Robert PeeP (1888) ; Parker, C. S., (Sir Rob¬ ert Peel, his life and Private Correspondence) (3 vols., London 1891) ; Peel, Sir Lawrence, (Life and Character of Sir Robert PeeP (Lon¬ don 186G) ; Stanhope and Cardwell, (Memoirs by PeeP (London 1857) ; Taylor and Mackay, (Life and Times of Sir Robert PeeP (London 1846-50) ; Thursfield, J. R., (PeeP (in (Twelve English Statesmen Series,) London 1891).

PEELE, pel, George, English dramatist and poet: b. Devonshire, about 1558; d. about 1598. He was educated at Oxford, ultimately settled at London as a writer for the stage and was also known as an accomplished actor. He was the associate of Nash, Marlowe and Greene. Of the many dramas of which he was reputed to be the author only a few are certainly known to be his, among these being (The Arraignment of Paris> ; (The Chronicle History of Edward I> (1593); (The Old Wives' Tale* (1599); (David and Bethsabe) (1599). He wrote sev¬ eral pageants, and he also produced other mis¬ cellaneous writings from some of which Shakes¬ peare may have borrowed. His blank verse, though often tedious, not seldom rises to some¬ thing like real grandeur and force, and through¬ out his works many extremely beautiful lyrics will be found. His writings helped to prepare the way for Shakespeare. His works, edited by Bullen, appeared in 1888. Cpnsult Ward, (History of English Dramatic Literature.*

PEELE, John Thomas, Anglo-American artist: b. Peterborough, England, 1822; d. 1897. He early came to the United States, began por¬ trait painting, but later took up genre-work, in 1846, set up a studio at New York, and in the same year was made a National academician. In 1851 he returned to England, and there he afterward worked. His paintings numbered among others (Music of the Reeds) (1857) ; (Highland Supper* ; (Village SchooP ; (A Bit of Gossip* ; and (The Bird's NestP

PEEP-O'-DAY BOYS, a name ejven to the Irish revolutionists of 1784. (See Orange¬ men.) They were so named from visiting the houses of their enemies at daybreak in search of arms.

PEEPER, a popular name for several spe¬ cies of the family Hylidae or tree-frogs, which make a peeping noise in the early spring, when they go to the water for breeding purposes. The title belongs particularly to

the small yellowish thin-voiced Pickering's tree-frog (Hyla pickeringii) , common over all the eastern United States and in Canada westward to Mani¬ toba. This little frog hibernates during Decem¬ ber and January and in very cold seasons

through part of February. His is the first voice heard in the spring, either late in Febru¬ ary or early March, and he continues (<peeping® until the second or third week in May, at which time the other tree-frogs begin their piping. The peeper ranges in color from a light fawn color to a deep wood-brown, and his color varies according to the color of the place where he sits. He is marked with an oblique cross on his back and bars on his hind legs. In size he rarely reaches more than an inch in length. The peeper will become quite tame and may be kept quite successfully in a mossy fernery if fed properly. These little frogs eat prodigious numbers of mosquitoes and gnats, and are them¬ selves eaten by larger frogs. See Tree-frogs.

PEEPING TOM, a common name for an inquisitive person. It was originally <(Peeping Tom of Coventry,® a person who disobeyed the injunction not to look in the street when Lady Godiva (q.v.) rode by.

PEEPUL, PIPUL, PIPPUL, BO-TREE, or SACRED FIG, an East Indian tree (Ficus religiosa) of the order Urticacece. It often at¬ tains a height of 100 feet, bears heart-shaped leaves with attenuated points which act as drainage for dew in moist tropical forests. The fruits, which are about the size of a gooseberry, are little used for food. The trees are fre¬ quently planted around Hindu temples because tradition says that Vishnu was born under one of these trees, hence their sacredness. Bud¬ dhists revere this tree. It is a favorite food-plant of the lac insect and is valued on that account also. Its juice is used as bandoline and as a source of caoutchouc. As an ornamental tree it is specially attractive because the leaves upon their long slender petioles move with the slightest breeze.

PEER GYNT. Ibsen's <Brand> preached the philosophy of <c All or nothing.® Relentless, cruel, resolute, overriding in will, Brand went through everything that stood in his way to¬ ward gaining an ideal. Another play was needed as a compensating balance, as a com¬ plementary color to (Brand.) That is exactly what <Peer Gynt) is. Instead of the iron will of Brand, Peer is will-less; instead of sufficient, he is insufficient ; instead of resolute, irresolute. In all issues facing him, Peer goes around. <Brand* was published in Copenhagen, 15 March 1866. By December it had reached its fourth edition. The play

had a phenomenal reading success, and people became curious to know what Ibsen's next play would be. The dramat¬ ist, about this time, was relieved of financial worry by two money grants, one from the Norwegian government and the other from the Scientific Society of Trondhjem. This enabled him to give to his work an unfettered mind. He went with his family to Frascati, where, in the Palazzo rooms, he looked many feet down upon the Mediterranean, and pondered his new drama. He was soon writing to his friends of its imaginative character. The scenario for <Peer Gynt) and the first act were completed by 5 Jan. 1867. The details had been planned carefully, and folklore mixed with experience became the matrix for the inconsequent Peer's adventures. Ibsen's own studies in regional folktales had given him a goodly stock to draw from; and there are touches of family history in the play which are less evident than

Ase, who was a rough portrait of Ibsen's mother. This is his most fantastic piece, the one with the most formlessness about it. In it there are germs of ideas worked out more fully in later plays. Peer, the poet and dreamer, has none of Brand's polemics about him. If the world were full of lovable rascals like Peer, who dreams of being what he is not; or full of Stoics like Brand, inflexible, rentless, uncompromising — there would be little human progress.

Ibsen preserved a profund silence about the content of this drama. He begged of his pub¬ lisher, Hegel, to create as much mystery about it as possible. In his workmanship he became reckless with imagery. That is why (Peer Gynt} is so formless. He carries Peer from abandoned youth to senile old age in scenes of wild riot. This hero fights his way among nixies, wrestles in the coils of the Boyg — sym¬ bol of his own indeterminateness and confusion. He cares nothing for consequences, even though the Green-Clad Woman confronts him with an Ugly Brat, symbol of his lust. Out of sight, out of memory, that is the tragedy of Peer's romance with Solveig. And when the Button-Molder finally calls him to accounting — as Death, in the morality, calls to Everyman, Peer suddenly realizes that he has been a bungler

of life, with his motto, “To thyself be enough.® In the end, however, he is cleansed in the faith and hope and love of Solveig. (Peer Gynt} was issued 14 Nov. 1867, and the Norwegian public hailed it vociferously. The critics, in some quarters, were uncompromising in their censure, some sneering at the poetry of it. Whereupon, Ibsen wrote his now famous mes¬ sage : “My book is poetry, and if it is not, then it will be. The conception of poetry, in our country, in Norway, shall be made to conform to the book.® Many read satire into the play; others read into it motives never intended. So contrary were the views, that Ibsen threatened to write an autobiographical interpretation of it. ((Why cannot they read it as a poem?® he queried. That is the way it should be regarded. Even Ibsen used to confess that neither <Brand) nor (Peer Gynt) was intended by him for the stage. In 1874, however, he was arranging with Edvard Grieg for the music now so widely famous as the Grieg Peer Gynt Suite; but for the purposes of the music he was considering an adaptation of his original text. In 1906 scenes from the play were given by the Pro¬ gressive Stage Society of New York; but to Richard Mansfield is due the credit for the authentic American performance of (Peer Gynt/ at the Chicago Grand Opera House, 24 Oct. 1906. The stupendous task of preparation for a drama so dependent on its external scene for illusion undoubtedly added to the strain on the actor’s health, resulting in his death the fol¬ lowing summer. There are three supreme figures that stand as creative epitomes of the Stoic, the Fantasist and the Romanticist. These are Brand, Peer Gynt and Don Quixote. Ibsen’s two plays will come into their true posi¬ tion long after TA Doll’s House* and <Hedda Gabler* are dated and outworn.

Montrose J. Moses.

PEER AND PEERAGE. The original

sense of the word “Peer® was one of equal rank, qualities, endowments or character and it

is often used with this signification in English literature as far back as the time of Chaucer.

It is also frequently used in the sense of com¬ panion, associate or fellow. In Great Britain peer signifies a nobleman; in France the term formerly signified those who had a seat in the upper house. The dignity and privileges of peers originated with the growth of the feudal system. In the feudal system the principle was developed that

every association should take care of its own affairs, including the judicial decision of disputes among themselves and with their superiors ; and it became an obligation as well as a privilege of the vassal to appear at the court of the immediate lord on days of state and of the administration of justice. In France, at the time of the revolution by which Hugh Capet ascended the throne in 987, there were but seven secular prices immediate vassals of the Crown. When the Duke of France be¬ came king there remained but six, to whom were added the archbishop of Rheims as spiritual primate of France, and the bishop of Laon, with tne title of duke, those of Beauvais, Noyon and Chalons, with that of count; and at a later period, under Louis VII, also the bishop of Langres, because their dioceses were situated within the immediate domains of the Crown. The ancient principalities of peers were by degrees united with the crown ; only the spiritual lords maintained their titles. Richelieu, backed by Louis XIV, reduced the privileges of the peerage practically to a ques¬ tion of precedence. The peers were still per¬ mitted to be judged by the higher courts and to sit in Parliament. The revolution of the 18th century abolished the French peerage, but Louis XVIII re-established it after the model of that of England by the charter of 1814. In 1831 hereditary peerages were abolished in France.

In England the peerage originated as in France. ‘This dignity belongs to the five de¬ grees of nobility (duke, marquis, earl, viscount and baron), by right, which was not the case with the French nobility, though the idea of mesalliance does not prevail by any means to the same extent in England as on the continent of Europe. In the beginning all the Crown vassals appeared at court on the days of state, and attended the diets; afterward only those who were summoned to appear by writ. This custom grew at length into a rule, and the sum¬ monses were considered proofs of hereditary peerage. There is one lordship — the borough of Arundel — which confers the dignity of earl on its possessor by prescription. In regard to all other titles the peerage is personal, and descends in a direct line from male to male. The chief privileges of peers are that of a seat in the House of Lords, of a trial by persons of noble birth in case of indictments for treason and felony, and misprision thereof, and of ex¬ emption from arrest.

The House of Peers (or Lords) of Great Britain consists of all peers of the United Kingdom; the representative Scottish peers elected for each Parliament; the Irish repre¬ sentative peers elected for life and the lords spiritual. Many of the peers of Scotland and Ireland are also peers of England, Great Britain or the United Kingdom and hold their seats in the House of Lords under one of

these titles. The peers of the United Kingdom are those of prior to 1707 and those of Great Britain from 1707 to 1 Jan. 1801, See Parlia¬ ment,

PEERYBINGLE, pe'ri-bing-gl, Mrs,, m Dickens* (Cricket on the Hearth,5 the wife of John Peerybingle, a carrier. She is a cheerful little jvoman, whom her husband calls (<Dot,55 This pet name Dion Boucicault made the title of his dramatization of the story (1862!).

PEET, Harvey Prindle, American educa¬ tor: b. Bethlehem, Conn., 19 Nov. 1794; d. New York, 1 Jan. 1873. He was graduated at Yale in 1822, and in 1824 became superintendent of the American Asylum for the Education of the Deaf and Dumb at Hartford, the first institu¬ tion of its kind in the United States. In 1831 he was appointed president of a like institution in New York which position he occupied until 1868 when he resigned. He. found the supply of suitable books for use in his work decidedly insufficient and in 1844-46 published (A Course of Instruction for the Deaf and Dumb5 which came into general use. His other writings in¬ clude (Legal Rights of the Deaf and Dumb5 (1856), and other works on deafness and in¬ sanity.

PEET, Stephen Denison, American ar¬ chaeologist: b. Euclid, Ohio, 1830; d. 1914. In 1851 he was graduated at Beloit College and in 1851-53 was a student at the Yale Divinity School and in 1854 was graduated at Andover Theological Seminary. In the following 40 yea'rs he held pastorates in Wisconsin, Ohio and Illinois and in 1895 removed to Chicago. In 1878 he founded the American t Antiquarian and Oriental Journal, which he edited until his death. His published

works are (The Clan Cen¬ tres and the Clan Habitat of the Effigy Build¬ ers > (1891); (The Mound Builders: Their

Work and Relics5 (1892 ; 2d ed., 1903) (The History of the Explorations in the Mississippi Valley5 (1896) ; Prehistoric America5 (3 volsˆ 1890-99) ; (Ancient Monuments and Ruined Cities5 (1904) ; (Myths and Symbols5 (1905) ; (Aboriginal Religions in America5 (1905).

PEEWIT, a name applied in some parts of England to the lapwing plover (V anellus cris-tatus) ; and similarly sometimes to the black¬ headed gull (Larus ridibundus). See Gulls; Lapwing.

PEFFER, William Alfred, American atesman, journalist and author : b. Cumber¬ ed County, Pa., 10 Sept. 1831 ; d. 1912. He as engaged in farming in Indiana and Mis- >uri ; but being forced to leave there on ac-Dunt' of his open support of the Union, he ent to Illinois in 1862 and enlisted in the ederal army, where he was promoted to the ink of first lieutenant, and served as adjutant, ldge-advocate and quartermaster Mustered lit in 1865, he settled in Clarksville Tenn., nd began the practice of law. In 18/0 he loved to Kansas, where he continued his law ractice and established the Fredoma Journal nd Coffeyville Journal. In 1874 he was elected > the State senate, and was chairman of the 'gislative committee on the Centennial Exhibion in 1876. In 1880 he was a Presidential ector on the Republican ticket, and in 1881 e became editor of the Kansas Farmer, in bich he advocated government control of rail-Dads, the free coinage of silver and reduction

of the rates of interest, and opposed national banks and monopolies. Through his advocacy of these measures he became one of the found¬ ers of the People's party, and in 1891 was made the president of the national conference of that party at Cincinnati. In 1890 he was elected to the United States Senate on the Populist ticket; during his term he was chairman of the com¬ mittee on civil service, and was a member of the select committee on woman's suffrage. He maintained that the farmers ought to control the politics of the country. He subsequently allied himself with the Prohibition party and was their candidate for governor of Kansas in 1898. He has written (Geraldine, or What Mav Happen5 (1888) : <Peffer's Tariff Manual5 (1888); (The Way Out5 (1890); (The Farm¬ er's Side5 (1891) ; (Americanism in the Philip¬

pines5 (1900); (Rise and Fall of Populism in the United States5 (1900).

PEG WOFFINGTON, a novel by Charles Reade, published in 1852, and subsequently dra¬ matized under the title (Masks and Faces.5 This delightful tale of 18th century manners opens in the green-room of Covent Garden Theatre, where the Irish actress, Margaret Woffington, in the heyday of her fame and beauty, tricks the entire dramatic company, in¬ cluding Colley Cibber, the famous playwright and comedian, by personating the great tragic actress, Mrs. Bracegirdle.

PEGASUS, (1) in Greek mythology , a winged horse, the offspring of Poseidon and Medusa, which sprang from the body of the latter when Perseus struck off her head. He was called Pegasus because he was supposed to have made his appearance near the sources of the ocean. Pegasus was caught at the spring Pirene, in Corinth, by Bellerophon who made use of him in his conflict with the Chimaera and in subsequent wars. He was believed to have flown up to heaven and to have taken his place among the stars. But he left behind him traces of his residence upon earth. One of these long existed in the shape of the Hip-pocrene spring on Mount Helicon, which was popularly believed to have been caused by a blow from Pegasus' hoof. The same story is told of several other fountains in Greece. The muses of Mount Helicon are represented as paying special honor to Pegasus for his gift. Pegasus, in later days, became the steed on which the poet is carried into the realms of poetic fancy. (2) In astronomy the Flying Horse, one of the 20 ancient northern constella¬ tions, bounded on the north by Lacerta and Andromeda, on the south by Aquarius, on the east by Pisces and on the west by Equuleus and Delphinus. It is on the meridian in September at midnight. Alpha Pegasi is Markab, Beta Pegasi is Scheat and Gamma Pegasi is Algemb. These with Alpha Andromedae constitute the great square of Pegasus.

PEGGOTTY, peg'6-ti, in Dickens' (David Copperfield,5 a family name, belonging espe¬ cially to Clara Peggotty, the faithful nurse of David, who always addresses her by that sur¬ name. The other members of the Peggotty family are Clara's brother Dan, a retired sailor, and her nephew Ham, a Yarmouth boatman. With Little Emily and Mrs. Gummidge they all live in an old barge which they have converted into a tolerable dwelling.

PEGMATITE, a very coarse granitic rock, composed essentially of lamellar feldspar and quartz, frequently with white mica and some¬ times tourmaline and garnet. Pegmatite is dis¬ tinguished by the irregularity of its texture, the larger crystals together in one part and the smaller in another. The quartz will often be found in segregated masses with the tourmaline or garnet. Syenitic pegmatite is almost wholly of alkali-feldspar. Pegmatite occurs usually as a dike traversing other forms of igneous and crystalline rocks. It is best known com¬ mercially from its use as a source of feldspar in the manufacture of porcelain.

PEGOUD, pe'goo, Adolphe, French avi¬ ator: b. about 1883; d. 1915. In 1913 Pegoud became famed for his flying feats. He was the first aviator to fly his plane upside down and to loop the loop in the air. At the outbreak of the war with Germany in 1914 he joined the aviation corps of the French army. He was awarded the military medal in March 1915, and in April 1915 shot down a German Taube making prisoners its pilot and observer. Pegoud was officially credited with the destruc¬ tion of six German planes when he himself was downed by the foeman.

PEGRAM, pe 'gram, George Herndon,

American civil engineer : b. Council Bluffs, Iowa, 29 Dec. 1855. In 1877 he was graduated at Washington University and became construc¬ tion engineer of the Utah and Northern Rail¬ way; was principal assistant of C. Shaler, bridge engineer in 1878-80 and chief engineer of the Edge Moor Iron Company of Wilming¬ ton, Del., in 1880-86. In 1886-89 he was con¬ sulting engineer at New York; in 1889-93 con¬ sulting engineer of the Missouri Pacific system and from 1893 to 1898 chief engineer of the Union Pacific system. In 1898-1903 Mr. Pe-gram was. chief engineer of the Manhattan Elevated Railroad and since 1903 has been chief engineer of the Interborough Rapid Transit Commission and after 1912 also of the New York Railways Company. Mr. Pegram designed the Kansas City Elevated Railroad and the Union Station at Saint Louis and designed and built combined highway and railway bridge across Arkansas River at Fort Smith, Ark. In 1917 he was president of the American Society of Civil Engineers.

PEGRAM, John, American soldier : b. Petersburg, Va., 24 Jan. 1832; d. Hatcher's Run, Va., 6 Feb. 1865. He was graduated from West Point in 1854, appointed to the First Dragoons and in 1857 was made first lieutenant. He was assistant instructor of cavalry and in 1857-58 accompanied the Utah Expedition. In 1860 he served against the Indians in Mexico and at the outbreak of the Civil War resigned his commission (10 May 1861) and entered the Confederate army, where he was appointed cap¬ tain of cavalry. He was captured at Rich Mountain, and after his exchange was ap¬ pointed chief of engineers under General Bragg in Mississippi, later becoming chief of staff to Gen. Kirby Smith in Tennessee. In 1862 he was commissioned brigadier-general of cavalry, was engaged at Murfreesboro and commanded a division at Chickamauga. He was promoted to major-general and given command of Gen¬ eral Early's former division in the Army of Northern Virginia, fought in the battle of the

Wilderness and against Sheridan in the Shenan¬ doah Valley in 1864. He was fatally wounded in the battle of Hatcher's Run, near Richmond.

PEGU, pe-goo', Lower Burma, (1) ancient Malay kingdom, dating back to the 6th century, when the city of Pegu was built, destroyed in the 18th century, but rebuilt and from 1754 to 1852 a dependency of Burma, and now under British control as (2) a division of Lower Burma, with an area of 13,257 square miles and population of about 1,850,000, including five states or .districts, namely, Rangoon, Hantha-wadi, Tharawadi, Prome, (3) Pegu, the largest district of the division, with an area of 4,276 square miles and a population of about 350,000, mostly Buddhists. Rice is the principal crop of the surrounding country. In the district is the famous temple of Gautama Schwema-da, which its priests say is more than 2,300 years old. Rangoon is the largest city. (4) Pegu, town formerly the capital of Lower Burma, on the Pegu River, 47 miles by rail northeast from Rangoon. It has a population of 17,000, and is the terminus of a railroad running through Sittang and Thaton to Martaban, opposite the port of Moulmein. The town is noted for its great pagodas, some of them in ruins, and for the colossal recumbent statue of Gautema, 181 feet in length and 46 feet high at the shoulder; and other colossal figures representing Buddha and his predecessors. (5) Pegu, a navigable river rising in the Pegu Yomas, a range of hills (2,000 feet) dividing the valleys of the Irrawadi and Sittang rivers. It runs a course of 175 miles, and empties into the Rangoon River just below the city of Rangoon.

PEHLEVl LANGUAGE AND LITER¬ ATURE. The word is also written Pahlavi, Pahlevi; etymologically from Parthian, Par-thava, Pahlav. It is the name given by Zoroastrians to the ancient translations of the sa¬ cred scriptures of that creed. Firdusi, the great poet, mentions that Pehlevi books furnished him with many of his narratives. Ibn Mokaffa, the learned Arabian, speaks of Pehlevi as an idiom of Persia. It was, however, as has now been established, less an idiom than a mingling of Arabic and ancient Persian, as it was employed during the Sassanide dynasty — Semitic (Ara¬ maic) and Aryan (Zend) vocables being in an almost hopeless jumble, often Arab words with Persian endings, etc., and it is largely for this reason that many writers have reserved the term Pehlevi merely for that system of writing. To speak of this first, then, Pehlevi writing is a species of Arab adapted to Persian. The character of this mode of writing is cursive and very ambiguous, easily leading to misapprehen¬ sion and misinterpretation. Thus, for the let¬ ters n, u, r there is but one character, and so there is but one for y, d, g. It was, to put it in another form, on the surface at least, an attempt to .represent Persian consonantal and vowel sounds by Arabic signs, a manifest im¬ possibility. That explains, too, the arbitrary manner of expressing the Persian sounds by this means.

But all this shows but the seeming facts. In reality Pehlevi was pure Persian, though disguised in the writing of it to appear a bar¬ barous mixture of Arabic and Persian. Thus, some 400 or 500 Arabic words were in it writ¬ ten in Arabic characters, and when thus pro-

nounced certainly represented Arabic words. These words, however, comprised the stock of very common, everyday vocables, such as “house,® “king,® “horse,® “food,® *etc.* But the Persians in reality in reading them substituted for these words their own Iranian ones, making, for example, out of the Arabic “bisra® (meat) the purely Persian “gosht.® This supply of words thus re-Persianized in the reading and the system of “camouflage® necessary to hood¬ wink the Arab conqueror was called “Huzvaresh.® Parallel cases, though not

due to the same motive, suggest themselves in English. Thus, we read customarily such words as the Latin id est, i.e., as “that is,® or the sterling, the libra, as “pound.® Huzvoresh itself meant, quite characteristically, “alteration,® “disguise,® “perversion.® This disguised Persian (which for many years caused modern interpreters much difficulty) was, though, often transliter¬ ated into unadulterated Persian, Zend or Mod¬ ern Persian, and the Semitic element being wholly removed. Such texts are usually spoken of as Pazand (meaning “re-explanation®) or Parsee. Pehlevi, though, was written and spoken in a form of Persian which had already far advanced on the way to becoming a purely analytical language, grammar and syntax being simplified and declensional and inflectional end¬ ings having largely disappeared.

The study of the Pehlevi language was stimulated in 1871 by the discovery of 52 Peh¬ levi writings in the library of a Parsee high-priest in Bombay. Since then many more in¬ scriptions and manuscripts have been found, and doubtless others are moldering away in the collections of native literati or priests. What has so far been discovered refers in its contents to religious topics, texts on miscel¬ laneous subjects and translations of ancient Zend Avesta texts. Of the Pehlevi literature of between 226 and 881 a.d., the Sassanian period, therefore, and the first two centuries of Arab dominion, there have been preserved nearly 100 works. Chiefly these are the Pehlevi version of the Avesta; the Bundahish, being a species of Iranian Genesis; the Dinkart, i.e., matters of religion; the Dadistau-i Dinik, religious discussions; the Mainog-i Khiradj, doctrinal teaching; and the Arda-i Viraf Namak, a kind of Apocalypse. Of other Peh¬ levi literature nothing has been preserved, though indications and internal evidence point to the probability that there must have been quite a stock of it, historical works as well as fiction and lyrics, at the time when the Arabs, in 661 a.d., swept the Sassanide kings out of power. But even during the period of Arab power the Zoroastrian priests continued to write the old tongue/ as a dead language. The Mainog-i Khiradj is especially useful to the student of Pehlevi in affording glimpses of the Pehlevi of the earliest period. The rock inscriptions of Ardashir made the great Sas¬ sanian ruler of that name the central figure. All these Huzvaresh translations were them¬ selves taken from mere fragments of the Avesta, only one book of which, the Vendidad, having come down to us complete, . out of 21. From a philological point of view it is moreover of interest to note the gradual decay of gram¬ matical forms in the sffiw process of develop¬ ment to which the Persian idiom was sub¬ jected and which is clearly noticeable not only

in Pehlevi and Modern Persian but even in Old Persian, as distinguished from Zend. The process was, in fact, almost identical in every respect with the process of evolution through which the Romance tongues went in changing from the original Latin tongue, and even from the lingua rustica. For comparative philology there is a fund of information to be derived from observing the facts.

Bibliography. — Andreas, F. C., (The Book of the Mainyo-Khard in the Original PehlevP (Kiel 1882) ; Darmesteter, J., (Le Pehlevi et le ParsP (in Etudes Iraniennes, I, 14-43 Paris 1883); Harlez, C. de, (Avesta) (Paris 1881); Mills, I. H., (Yasna, Visparad, etcP (Oxford 1880-87) ; Muller, Fr., (Beitrage zur Erklarung des Minoig Chrad) (Vienna 1892) ; Peshotan, B.. (The Dinkard* (Bombay 1874) ; Stolze, F., <Persepolis) (2 vols., Berlin 1882).

Wolf von Schierbrand.

PEI-HO, pa-ho', the "North River,® some¬ times called Pai-ho, the "White River,® the largest river of northeastern China, draining a watershed of 55,000 square miles ; a river of North China, rising in the mountains on the Mongolian frontier of Manchuria, crossing the line of the Great Wall thrice, flowing tor¬ tuously to the southeast, receiving the Tung-hui 12 miles from the city of Peking, and join¬ ing the Sha-ho at Tung-shu, the port of Peking, where it becomes navigable for native boats. Near Tientsin the Hu-to-ho empties into the Pei-ho, and from here the river is navigable for small steamers. A little further down the Im¬ perial Canal connects it with the Hoang-ho and the Yang-ste-kiang. The Pei-ho empties into the Gulf of Pe-chi-li, about 350 miles from its source. It is closed by ice from November to March. At its mouth is the fortified town of Taku (q.v.) ; near the embouchure the Chinese were defeated by the French and English 19 May 1858, repulsed the English 25 June 1859, and were again defeated, the forts being taken, 21 Aug. 1860, by the allies.

PEINE FORTE ET DURE, pan fort a dur, the name given in Europe to a kind of punishment formerly inflicted upon a prisoner charged with felony if he refused to answer on his indictment. In an indictment for high trea¬ son a prisoner who was obstinately mute was liable to receive judgment and execution the same as if he had been convicted. In the lowest felony, or petty larceny, standing mute was also held equivalent to conviction,* and the prisoner received sentence and punishment accordingly. But in all other felonies the prisoner was re¬ quired to plead before a conviction could be obtained, hence if he

refused he was subjected to the peine forte et dure, “a judgment which was purposely ordained to be exquisitely severe, that by that very means it might rarely be put in execution.® The judgment for standing mute was as follows : That the prisoner be re¬ manded to the prison from whence he came and put into a low, dark chamber, and there be laid on his back on the bare floor, naked, unless where decency forbids ; that there be placed upon his body as great a weight of iron as he can bear, and more ; that he have no sustenance, save only, on the first day, three morsels of the worst bread ; and on the second day three draughts of standing water, that should be near¬ est to the prison door ; and in this situation this

should be alternately his daily diet till he an¬ swers. The penalty was abolished by George III. There are various cases on record of per¬ sons, including at least one female, who have died under the infliction of this penalty. The latest instance recorded of its administration is in 1741. It is said that only once was this penalty inflicted in America and that was in 1692, in the case of Giles Cory, charged with witchcraft, at Salem, Mass.

PEIPUS, pipoos (Russian, Tchudskoye-Ozero, that is, “Lake of the Tchuds”), a great lake lying about 30 miles south of the Bay of Narva in the Gulf of Finland, and partly sepa¬ rating the republic of Esthonia from the Rus¬ sian governments of Petrograd and Pskoff. It is about 48 miles long and 32 wide and covers an area of 1,020 square miles. It is joined by a broad and very deep passage (about 20 miles wide) to Lake Pskoff, which has an area of about 150 square miles. The entire lake system drains by the River Narova (45 miles) into the Gulf of Finland. The shores of Peipus are low and marshy, and in general heavily wooded, and the water very deep in places. There are several islands; Porka is the largest. Several rivers empty into this inland sea, on which there is a large volume of com¬ merce carried on by steamers. Fishing is an im¬ portant industry. A naval battle between the Russians and Swedes fought on this lake in 1702 was won by the former.

PEIRCE, pers or pers, Benjamin, American mathematician : b. Salem, Mass., 4 April 1809 ; d. Cambridge, Mass., 6 Oct. 1880. He was graduated from Harvard in 1829, was tutor there in 1831, and in 1833 was appointed pro¬ fessor of mathematics and natural philosophy. In 1842 he accepted the Perkins chair of mathe¬ matics and astronomy which he occupied until his death. Harvard gave him the degree of LL.D in 1867. He was consulting astronomer of the (American Ephemeris and Nautical Almanac, > 1849-67; and superintendent of the United States Coast Survey, 1867-74, personally conducting the expedition to Sicily for the pur¬ pose of observing the eclipse of the sun in 1870 and organizing various important expeditions. He assisted in the organization of the Dudley Observatory at Albany in 1855,. and through his efforts the observatory at Harvard was estab¬ lished. As an astronomer he made valuable in¬ vestigations and, discoveries and as a mathe¬ matician his work is of great importance. He was one of the founders of the American Acad¬ emy of the Arts and Sciences; a member of the American Philosophical Society; and an associate member of the Royal Astronomical Society of London. He was also an honorary member of many foreign intellectual societies. He prepared a series of mathematical textbooks for use in the university which made many de¬ partures from the beaten path and which have had a highly beneficial effect upon methods of teaching. His astronomical and mathematical treatises are of great scientific value and include ‘ Analytic Mechanics* (1855) ; ‘Linear Asso¬ ciative Algebra) (1870) ; ‘Ideality in the Physi¬ cal Sciences* (1881), *etc.* Consult King, ‘Ben¬ jamin Peirce, a Memorial Collection (1881).

PEIRCE, Benjamin Osgood, American educator: b. Beverly, Mass., 11 Feb. 1854; d.

14 Jan. 1914. After leaving school he learned the carpenter’s trade but decided to go to coL lege and entered Harvard, where he was gradu¬ ated in 1876. Upon his graduation he was awarded a traveling fellowship, and went to Germany for four years, receiving in 1879 the degree of Ph.D at the University of Leipzig. On his return to America Dr. Peirce special¬ ized in mathematical physics. From 1881 to 1884 he was assistant instructor in mathematics at Harvard, later becoming assistant professor, and in 1888 was appointed to the Hollis chair of mathematics and natural philosophy there. He was a member of the National Academy of Sciences; the American Mathematical Society} the American Physical Society ; and the Astronomical and Astrophysical Society of America; and was a Fellow of the American Academy of Arts and Sciences, and also of the American Philosophical

Society. He has pub¬ lished ‘Theory of the Newtonian Potential Function* (1899); ‘Experiments in Magnetism,* *etc.*

PEIRCE, Bradford Kinney, American Methodist Episcopal clergyman : b. Royalton, Vt., 1819; d. 1889. In 1841 he was graduated at •Wesleyan University and in 1846 became a member of the New England Conference. In 1844-45 he edited the Sunday-School Messenger and Sunday-School Teacher; in 1854-56 agent of the American Sunday School Union, and in 1855-56 State senator of Massachusetts. From 1856 to 1862 Mr. Peirce was superintendent and chaplain of the State Industrial School at Lancaster, Mass. Subsequently for 10 years he was chaplain of the house of refuge, Ran¬ dall’s Island, N. Y., and for about 16 years edited Zions Herald. He published ‘The Bible Scholar’s Manual* (1847) ; ‘Notes on the Acts* (1848) ; ‘The Eminent Dead> (1851) ; ‘Question Books for Sunday-School Scholars* (1849-52) ; ‘Trials of an Inventor* (1866) ; ‘The Word of God Opened> (1868) ; ‘A Half Century with Juvenile Delinquents) (1869).

PEIRCE, Charles Santiago Sanders,

American logician and psychologist, son of the great .mathematician, Benjamin Peirce (q.v.) : b. Cambridge, Mass., 10 Sept. 1839 ; d. at his home at Milford, Pa., 14 April 1914. He was graduated from Harvard in 1859. He published ‘Photometric Researches> (1878) ; and edited, with many additions, ‘Studies in Logic) by several members of Johns Hopkins University. He was the first to call attention (1878) to the principle of “pragmatism,** and the author of that title. For many years he was connected with the Geodetic Survey as physicist and mathematician. He wrote many memoirs and articles upon logic, psychology, metaphysics mathematics, astronomy, optics, chemistry, engi¬ neering and other scientific subjects covering an exceedingly wide range. He’ also contributed largely tc -the ‘Century Dictionary> and Bald¬ win’s ‘Dictionary of Psychology and Philos¬ ophy* (1901).

PEIRCE, George James, American botan¬ ist: b. Manila, Philippine Islands, 13 March 1868. In 1890 he was graduated at the Lawrence Scien¬ tific School of Harvard and subsequently studied at the universities of Bonn, Leipzig and Munich. In 1895-97 he was assistant professor of botany at Indiana University, in 1897-1900

assistant professor of botany, in 1900—10 associ¬ ate professor, and since 1910 professor at Le-land Stanford Jr. University. In 1909-10 he was collaborator in the United States Forest Service and in 1910-11 was special agent of the Department of Justice, studying the effects of smoke on vegetation. Peirce is a fellow of the American Association for the Advancement of Science and has published (Textbook of Plant Physiology) (1903).

PEIRCE, James Mills, American mathe¬ matician: b. Cambridge, Mass., 1834; d. 1906. In 1853 he was graduated at Harvard, where he was appointed assistant professor of mathe¬ matics in 1861 and professor in 1869. He be¬ came Perkins professor in 1885. From 1890 to 1895 he served as dean of the graduate school and from 1895 to 1898 of the faculty of arts and sciences. He published (Textbook of Analytic Geometry) (1857) ; (Three and Four Place Tables of Logarithmic and Trigonometric Functions) (1871); (The Elements of Log¬ arithms) (1874) ; (Mathematical Tables, chiefly to Four Figures) (1879).

PEIXOTO, pa-sho'too, Floriano, Brazilian soldier and second President of the Republic of Brazil: .b. Pico, province of Alagoas, Brazil, 30 April 1842; d. Rio Janerio, Brazil, 29 June 1895. He entered the army as a private, rose rapidly, gained high honors in the war with Paraguay in 1865-70, and afterward resigned to oversee his estate. The abolition of slavery greatly affected his fortunes and in 1889 he re¬ joined the army, assisted da Fonseca to over¬ throw the empire, and was elected a senator of the new republic. He acted as first Minister of Finance, was Vice-President in 1891, and succeeded da Fonseca as President in that year. In the civil war which ensued he firmly upheld the constitution and, though unpopular with the army, crushed the navy uprising under Ad¬ mirals De Mello and Da Gama, and the second insurrection (1893) in Rio Grande do Sul, and successfully completed his term. Being de¬ feated in the following election by Dr. Moraes, in 1894 he peacefully resigned the office. Con¬ sult Luiz Tose Pereira da Silva, (Floriano Peixoto) (Rio Janeiro 1894). See Brazil.

PEIXOTO, Ignacio Jose de Alvarenga,

Brazilian jurist and poet: b. Rio Janeiro, 1748; d. Ambaca, Angola, Africa, 22 May 1792. He was graduated from the University of Coimbra, Portugal, as a bachelor of divinity; and re¬ ceived the appointment of judge of Cintra. He returned to Brazil in 1776 and was there ap¬ pointed judge of the district of Rio das Mortes. As a devoted follower of Paula Freire de Andrade he was implicated in a revolutionary uprising, arrested, imprisoned for two years without trial on the island of Cobras, and on 18 April 1792 was condemned to death. The sentence was commuted to transportation for life and he died a few months later in the penal colony at Ambaca, Africa. His poems, which take high rank in Portuguese literature, were collected and published in Paris, (Obras poeticas collegidas annotadas, precedidas de Juizos criticos) (1866).

PEIXOTTO, piks-ot'o, Benjamin Frank¬ lin, American diplomat, lawyer and journalist: b. New York, 13 Nov. 1834; d. there, 18 Sept. 1890. Receiving his earliest training in New

York, he settled in Cleveland after his father's death, in 1847, studying law for a time under Stephen A. Douglas (q.v.). In 1863 he was chosen head of the Order of Benai Berith, the leading Jewish fraternity, whose membership he rapidly trebled. He advocated an American Jewish University which was not favored at the time, but his suggestion to establish an orphan asylum at Cleveland was adopted. In 1867 he removed to San Francisco where he engaged in the practice of law. In June 1870, when the Rumanian persecution of the Jews reached alarming proportions, he was appointed Consul-General to Bucharest by President Grant, where he succeeded in arresting disorder, with the co-operation of Secretary Hamilton Fish and the active sympathy of the European powers whose representatives in Rumania joined with Peixotto in his work of enlightenment. In addition, he did much educational work among the Rumanian Jews. In 1876 he returned to the United States and was tendered by Presi¬ dent Hayes the post of Consul-General at Saint Petersburg, which he declined, accepting, how¬ ever, the consulship at Lyons, France. In 1885 he returned to New York, resumed the practice of law, established a monthly magazine under the title The Menorah, and was prominent in social, educational and charitable work.

PEIXOTTO, Daniel Levy Maduro, Amer¬ ican physician : b. in Amsterdam, Holland, 18 July 1800; d. in New York, 13 May 1843. At

an early age he came to New York with his parents, his father, Moses L. M. Peixotto, be¬ coming minister of a Jewish congregation. He was graduated from Columbia in 1816 and entering the office of Dr. David Hosack received his M.D. degree in 1819. For a few years he occupied himself with travel, returning to New York in 1823, where he entered upon the prac¬ tice of his profession, in which he rose to eminence. He became in 1825-26 one of the editors of the New York Medical and Physical Journal and Gregory's Practice. He was presi¬ dent of the New York County Medical Society 1830-32. In 1836 he was called to the presi¬ dency of the Willoughby Medical College, Cleve¬ land, Ohio, and remained there several years. He was an active participant in public char¬ itable work and especially in forwarding Jewish educational movements.

PEIXOTTO, Ernest Clifford, artist and author: b. San Francisco, Cal., 15 Oct. 1869. He began his art studies at the School of De¬ sign in San Francisco, and in 1888 went to Paris to continue them at the Academie Julian. In 1890 he exhibited a peasant interior at the Salon and in 1891 a church interior, the latter subsequently exhibited at the Society of Ameri¬ can Artists in New York. He returned to San Francisco in 1891. He received honorable men¬ tion for some drawings exhibited at the World's Fair, Chicago, 1893, and in that year he re¬ turned to France for further study. At the Salon of 1895 he was awarded honorable men¬ tion for a picture entitled <(A Woman of Rijsoord,® a study of a Dutch woman's head in the quaint coif of the environs of Rotterdam. Returning to San Francisco again, he painted several portraits and had two successful ex¬ hibitions. He added to his fame at this period by his artistic illustration in Gellett Burgess' (Lark,) an airy San Francisco publication. He

designed most of its covers and made many of its illustrations. In 1897 Mr. Peixotto settled in New York City, and busied himself illus¬ trating for the leading magazines. He illus¬ trated Brun's <Tales of Languedoc, > Henry Cabot Lodge's (History of the Revolution,* Theodore Roosevelt's < Cromwell > and Mrs. Wharton's < Italian

Backgrounds.* As an illus¬ trator his work has taken high rank; its char¬ acteristics are simplicity and directness, pic¬ turesqueness and vividness of detail. He has always had a fondness for architectural studies, and abroad he made many sketches of the cha¬ teaux in the valley of the Loire and of . the French cathedrals, while at home his drawings of the Congressional Library in Washington and Boston Public Library are perhaps the best of that class. In 1899 when he again went to Europe he began writing articles to accom¬ pany his illustrations of the picturesque out-of- the-way places on the Continent, and since 1906 he has confined his illustrations to his own publications. His first book was (By Italian Seas) (1906), dealing with _ Mediterra¬ nean material and containing 80 illustrations by himself, followed by 'Through the French Provinces) (1909), with 85 illustrations. In 1906-07 there were two exhibitions in New York of his paintings of old world garden subjects. By special request his drawings and paintings were exhibited in 1907-08 at the Art Institute, Chicago, the Toledo Museum of Art and the Detroit Museum of Art. In 1909 he was made an associate of the National Acad¬ emy. He then painted a large frieze of panels whose subjects were drawn from the (Morte d'Arthur* for a library near Cleveland. For this work he was made a member of the Na¬ tional Society of Mural Painters, also of the Architectural League. His pictures have found places in notable private and public collections. His later works are (Romantic Calif ornia) (1911) ; 'Pacific Shores from Panama) (1913) ; (Our Hispanic Southwest (1916).

PEIXOTTO, George Da. M., American portrait and mural painter : b. Cleveland, Ohio, February 1859. He was a son of B. F. Peix¬ otto (q.v.) and on his father's apoointment to the Rumanian consulate, he studied at the Dres¬ den Royal Academy of Fine Arts, where he was graduated in 1877, receiving the silver medal. He then went to the Julian Academy in Paris for further study and was also a pupil of Meissonier as well as Munkacsy. His nor-traits of Cardinal Manning and Sir Moses Montefiore began to arouse attention, and were followed by paintings of Father Sylvester Ma¬ lone, Chief Justice M. R. Waite, Bishop Gil-mour, Chancellor Eliot of Saint Louis and many others. Mr. Corcoran purchased the portrait of Montefiore for his art gallery at Washing¬ ton. The New Amsterdam Theatre in New York has some of his mural decorative paint¬ ings. Mr. Peixotto has contributed to the Paris Salons since 1882.

PEKAN. See Fisher.

PEKIN, pe'kin, Ill., city, county-seat of Tazewell County; on the Illinois River and on the Illinois Central, the Chicago, Peoria and Saint Louis,

the Cleveland, Cincinnati, Chicago and Saint Louis, the Atchison, Topeka and Santa Fe, and the Chicago and Alton railroads, about 10 miles south of Peoria. It has

steamboat connection with ports on the Illinois River. It was settled in 1824, became a village in 1829, and in 1849 was incorporated as a city. It is in a productive agricultural section in which wheat and corn are the chief products. In the vicinity are coal, deposits. The chiet manufactures are ammQnia, alcohol, beet sugar, glucose, agricultural implements, wagons, car¬ riages, lumber and lumber, products, foundry products, fertilizers, brick, tile, organs and fur¬ niture. It has an extensive trade in corn and considerable trade in grain, coal and its manu¬ factured goods. There are good public and parish schools, a free library, a beautiful city park, municipal street railway, new $100,000 high school, new $300,000 county courthouse. The city adopted the commission form of gov¬ ernment in 1911. Pop. (1920) 12,086.

PEKIN DUCK, the largest of the white ducks, weighing in some cases 10 to 12 pounds. It was introduced into the United Slates from China in 1873. It is hardy, feathers early and grows rapidly. As a market duck it cannot be excelled. It is also profitable as an egg-layer. The bill and feet are yellow or orange, the body long and meaty, the breast has a deep keel, and the flesh an excellent flavor. Ducklings are ready for market in 10 to 12 weeks from hatching.

PEKING, pe-kmg', or PEKIN, pe-kjn' (Pe, north; King, height),, the capital of the Chinese republic, in the province of Chi-Li, situ¬ ated on the Great Northern Plain of China be¬ tween the rivers Pei-ho and Hoen-ho; lat. 39° 54′ 13″ N. ; long. 116° 28' E. Its population numbers about 700,000. It is about 40 miles from the great wall, 100 miles from the Gulf of Pe-chi-li, and since 1897 has been connected by rail with Tientsin, about 80 miles to the southeast. The entire circuit of the walls and suburbs is reckoned at 21 miles. The wall of the northern section or Tartar City is 50 feet high and 40 feet wide at the top; that of the southern section or Chinese City is 30 feet high and 25 feet thick at the base, diminishing to 12 feet at the top. They are faced nearly throughout with large bricks, laid in a mortar of lime and clay, which, in time, becomes al¬ most as durable as stone. Square towers, pro¬ jecting 50 feet from the outer side of the walls, occur at intervals of about 60 yards, and the whole is surrounded by a ditch. There are six gates leading from the outer world into the northern city and seven gates into the south¬ ern city. Through the wall between the two

cities are three gates.

The northern or Tartar City, called Nui-Ching, was built first and the southern, called Wai-Ching, was added later. The former is built in the shape of a parallelogram, the walls facing the four cardinal points of the compass, and consists of three enclosures, one within the other, each surrounded by its own wall. The innermost enclosure or area is called Kin-Ching (prohibited or forbidden city),, and con¬ tains the imperial palace and buildings con¬ nected with it, in which the emperor and royal family formerly resided. It is about two miles in circumference, is surrounded by a solid wall faced with purplish glazed bricks, and roofed with yellow tiles. _ Within are wonderful gardens, the lakes, the ‘‘Island of Everlasting Flowers,® and the famous marble bridge.

Within the outer entrance, the ((Gate of Celestial Peace,® is the Temple of Imperial Ancestors in a park of fir trees. The inner entrance or ˆNobody’s Gate® opens into the famous Audience Halls. Within the inner enclosure is the Palace of Celestial Beauty. The second enclosure is of an oblong shape, about six miles in circuit, surrounded by a wall about 20 feet high. It was originally intended for the officers of the court, but is now occupied by Chinese merchants and tradesmen. One of the striking features of the second enclosure, or ˆImperial City,® is the terraced artificial mound, 215 feet high, standing close against the northern wall of the <(Forbidden City.® It is known as ((Coal Hill,® and is now covered with trees. This section also includes the gov¬ ernment university and the Northern Cathedral. The third and outermost enclosure comprises the open city, which presents all the evidences of an industrious people intent on the pursuit of gain, mercantile bustle pervading every cor¬ ner of it. Many of the principal streets are spacious, being more than 100 feet wide. They have been much improved in recent years, be¬ ing now well drained by deep gutters and metaled in the centre, and kept sprinkled in dry weather. The side streets, however, are, as formerly, foul-smelling beds of mire in the rainy season, and banks of noisome dust when dry. The

Legation Quarter which lies along the south wall of the Tartar City is quite modern in its appointments. It is surrounded on the north, east and west by a rampart, and within it are the official residences of the Am¬ bassadors of the United States, Austria-Hun¬ gary, Belgium, Great Britain, France, Germany, Holland, Italy, Japan, Russia and Spain. Among the principal public buildings besides those al¬ ready mentioned are the new (1911) Parlia¬ ment Building, the Temple of Eternal Peace, belonging to the Llamas, and said to be the largest and most splendid temple in Peking; the Mohammedan mosque; the observatory; the church of Heaven's Lord, with a convent attached to it, considered one of the finest specimens of architecture in the city, but now going to decay. There are also edifices dedi¬ cated to several other forms of religion ; among these are the Greek and Roman churches, Mos¬ lem mosques, Buddhist temples, besides tem¬ ples dedicated to Confucius and other deified mortals. Among other institutions is the na¬ tional college, Han-lin-yuen, where all Chinese learning and literature are concentrated, also Manchu, Chinese and Russian ; all religions, though some of them are proscribed, share the honor of being sanctioned within its precincts. The chief religions recognized are Confucian¬ ism, Taoism and Buddhism. The other learned and scientific institutions of note are the medical college, astronomical board and the imperial observatory. In the northern part of the Tar¬ tar City is also the Ketteler Memorial ; the Temple of Great Buddha with its wooden statue 78 feet in height; the Temple of Confucius; the Hall of Classics; the Drum Tower; and the Bell Tower with its gigantic bell weighing more than 40 tons. In the Southern City the principal public buildings are the Temple of Heaven and the Temple of Agriculture, both Confucian. In the southwestern section is a noted Buddhist temple. Outside of the walls there are many temples and tombs. Ihe Tem¬

ple of Celestial Peace is one of these. It was built in the 7th century. To the west of the city is the Taoistic Temple of the White Cloud and to the east the Taoistic Temple of the East¬ ern Peak, both notable. The old and new Summer Palaces are several miles to the east. Peking is sustained solely by its being the seat of government, having no trade except that which is produced by. the wants of its vast population. There are no manufactories of any importance, beyond those necessary for making articles of luxury for the resident aristocracy and gentry. The principal part of the provi¬ sions required comes from the southern prov¬ inces or from the flocks reared in the northern part of Chi-Li, the adjacent plain producing but a small amount of the food demanded. A con¬ siderable portion of the taxes

levied upon the productions of the whole empire is paid in kind, and is here stored up; the amount of rice alone in these granaries at one time of the year is enormous; but they are often empty before the new crop is gathered, so that a great many die for want of food.

According to the terms of the Treaty of Tientsin (1858) English and French ministers are allowed to reside at the Chinese capital, and subsequently the same privilege was granted to America and some other nations. Foreigners generally are also allowed to visit the city, but they must be provided with a passport from the ambassador or consul of the nation to which they belong, and on no account is any indi¬ vidual allowed to carry on trade. Previous to the ratification of that treaty, Russia was the only foreign power privileged to have a resi¬ dent embassy. Besides the old established Roman Catholic missions there are six other Christian missions — four British, one American and one Russian. The Pekingese have more of the Tartar element among them than the inhabitants of any of the more southern cities of China; still the Chinese predominate, and they are gradually superseding their fellow-sub¬ jects by their greater industry and wealth. Even the old Tartar Banner corps is being dispersed.

Peking is more healthful than the more southern cities, although the range of tempera¬ ture is much greater. This arises from the comparative dryness of the site, so that, al¬ though the thermometer falls to 4° below zero in the winter, and rises to 104° in the shade in summer, less inconvenience is felt than in Shanghai, where intense humidity prevails at a lesser range. The rainy season is in July and August. In the spring the city is swept by clouds of sand and dust. October is the pleas¬ antest month in the year at Peking. A rude system of drainage intersects the city, but not sufficient to carry off the effluvia of the sewage, which even pervades the dust in sum¬ mer. Attempts at modern sanitation have been made since 1900, but the progress is slow. The water supply is abundant, and a very complete fire brigade uses it to advantage in quenching the frequent conflagrations that take place. These and other matters are under the manage¬ ment of a governor of the city, irrespective of the central administration, which holds its of¬ fices in the imperial quarter of the Tartar section.

Peking is regarded by the Chinese as one of their most ancient qities, dating in Chinese his-

tory from 1121 b.c. In 936 a.d. it was captured by the Tartars of the North who destroyed the old city and built a new one. Part of its north wall still remains. In 1151 the Chinese took the city and greatly enlarged it. It was be¬ sieged in 1215 and taken by the Mongols, led by Genghis Khan, when the inhabitants for want of ammunition, are said to have dis¬ charged ingots of gold and silver on their assail¬ ants. Kublai Khan rebuilt it, and made it his capital in 1260. The Mongol dynasty, founded by Kublai Khan, continued to occupy this city till it was expelled from China, in 1367, by Hung-wu, the tounder of the Ming dynasty. The name Peking was given to the city in 1409 by the second emperor of the Ming dy¬ nasty, who replaced its earth ramparts with brick walls. In 1421, the third emperor of the Chinese dynasty of Ming transferred his resi¬ dence thither from Nankin, since which it has been the capital of the empire. In 1543 the new wall was built to include the southerly section which had grown up outside of the wall of the Tartar City, and which became known as the Chinese City, after 1644, when the Manchus took possession of the northern city ex¬ pelling most of the Chinese to the southern section. It surrendered to the allied armies of France and England in 1860, on which occasion the Yueng-ming, or summer palace of the emperor, situated in the vicinity of the city, was destroyed. It was at this period that the vari¬ ous foreign legations were established. During the “Boxer® uprising of 1900 the foreigners in Peking were besieged in the iegation sec¬ tion. For weeks they were given up as lost, but they managed to hold out till the arrival of the foreign troops. Since the fall of the Manchu dynasty and the establishment of the republic in February 1912, the class distinctions between the several “cities® have largely dis¬ appeared and the people of the several castes intermingle in all parts of the city. Besides the “gateway® smashed through the wall at the time of the siege, another gate has been opened to accommodate traffic, and still another is projected. The; railway which formerly was halted at a distance from the city walls has now been brought into the city and a station built near the Gate of Celestial Peace. Two other railways are making progress from Peking over the Great Plain, opening new sections from which the city which produces none of its own supplies may receive the necessaries of life. The “Purple City,® however, still remains closed to visitors except after much official ceremony. See Boxers-, China; Peking, The Siege In.

PEKING, The Siege in. The siege in Peking in 1900 was the outgrowth of the Boxer uprising. The latter was a secret society formed at first, for the suppression of lawlessness, under the title of the “Society of the Harmoni¬ ous Fists,® which name was Anglicized into “Boxer.® This aim was altered later and the Boxers banded themselves together anew for the extermination of foreigners and the preven¬ tion of foreign intercourse with China. In 1898 the empress dowager, Tse Hi, by a coup d’ etat made herself the ruling power, holding the young reform emperor, Kwang Hsu, a semi¬ prisoner. The Dowager represented the reac¬ tionary forces of the Empire. The rise of the Boxers against foreigners in 1899-1900 received

the encouragement of the Empress Dowager and her coterie who opposed the reforms of Kwang Hsu.

The Boxer movement was not a great anti-religious uprising, nor was it an anti-missionary crusade. It was distinctly anti-foreign, and this, irrespective of race, color, religion or na¬ tionality. The Boxers murdered European merchants, killed foreign engineers, massacred British and American missionaries, one and all, for the same reason, namely, that they were foreigners. Native Christians fell under their ban and were put to death bv thousands because they were representatives of the new forces that had instituted the reforms of the young Em¬ peror. The feeling against anything and every¬ thing foreign ran so high in the city of Peking “that native shops were destroyed for selling American cottons or Japanese lamps.

All this time the rumor was spreading that the Empress was lending her aid to the Boxers in the hope that, instituting a reign of terror, all foreigners might be driven out of China. Many Chinese saw in this only disaster to the government, but even members of the Tsung Li Yamen (Foreign Office) were put to death when they opposed this insane policy of ex¬ terminating foreigners. This fact, together with documents found in Peking, shows be¬ yond question the complicity of the Chinese government in bombarding the legations. In May 1900 seven of the 11 legations, fearing mob violence, secured from their respective navies detachments of sailors and marines as legation guards. This force reached Peking 31 May. It was less than 500, but in addition, there were probably 450 foreigners in Peking. By June the anti-foreign element was in pos¬ session of both the executive and military arms of the Empire. The end of the first week found a critical state of affairs in Peking. The telegraph had been cut, the railroad to the port city of Tientsin had been rendered useless, and all foreigners

in and near Peking had fled from their homes and banded together in several places for self-protection. During this time dangers thickened, foreign property was looted and burned, while thousands of native Chris¬ tians and foreign sympathizers fell by the sword. Matters reached a crisis on the 19th of June when the Chinese government sent word to the legations that all the foreign diplomats and their attaches should leave Peking within 24 hours. This was the beginning of the siege proper. The morning of the 20th, Baron Von Kettler, the German Minister, while on his way to the foreign office to expostulate against this treatment of the representatives of friendly powers, was shot down on the streets of Peking by Imperial soldiers.

Upon the news of the murder of Baron Von Kettler, the-other ministers and their nationals who were preparing to leave the city decided that it would be impossible to make a journey of nearly 100 miles through hostile territory infested by bands of Boxers, bandits and Chi¬ nese troops. Certain massacre would have followed had the foreigners left the walls of Peking and exposed themselves to the attacks of the Chinese in the open country. Rather than take such a perilous journey, fearing the fate of Baron Von Kettler, the foreigners massed together in the British Legation, and

the legations immediately surrounding it, and decided to try to hold out until relief should arrive Fortunately, the legations in Peking, after Oriental style, were surrounded by strong walls. Withdrawing within this enclosure, sup¬ plying themselves with what food they could procure, they fought only on the defensive. Three thousand native Christians went into siege with this handful of foreigners. In round numbers, there were 900 foreigners, in¬ cluding marines, in the legations. Of these, 228 were women and children. In addition, there were the 3,000 native Christians. Besides those in the legations, 41 marines, 13 French fathers, 20 sisters and 3,200 natives were be¬ sieged in the North Cathedral. The foresight of Bishop Favier had laid in food for his refu¬ gees. Sii Claude McDonald, British Minister, was commander-in-chief of the legation forces. This little band for 56 days

held at bay an un¬ known multitude of Chinese soldiers.. Firing was almost continuous upon the legations for 28 days when a semi-truce followed until about four days before the relief forces arrived. The firsl effort of the Chinese was to set fire to the legations. Dangerous conflagrations were fought day and night until the legations them¬ selves stood in the midst of charred ruins. The great Hanlin Library was fired by the Chinese in an effort to burn the British legation. The besieged had only, besides their rifles, one can¬ non throwing a one-pound shell, a Nordenfeldt, a faulty Austrian machine gun, a small one-barrel Colt machine gun, and an old English muzzle-loading cannon of 1860.

As many as 400 shells and solid balls were thrown at the legations in a single day. Forty-three days of the siege were marked with the hail of brllets and the crash of shells The Chi¬ nese soldiers indulged by night in furious at¬ tacks of rifle fire. Major Conger, the Ameri¬ can Minister, said that never had he heard dur¬ ing the Civil War a half hour of such fusillades of firing as these night attacks Only the bad markmanship of the assailants prevented the annihilation of the besieged. Yet every hour witnessed miraculous escapes. From the begin¬ ning the siege was well organized In addition to the military, there were the following com¬ mittees: (1) general management, (2) fortifi¬ cations, (3) food supply, (4) labor, (5) fire, (6) confiscated goods, (7) care of the horses, (8) sanitary and hospital Constant effort was made by native messengers to reach the port with news Out of 20 messengers dispatched, 17 were killed — three reached Tientsin. The besieged subsisted on rice, wheat, horses and mules The truce fortunately gave opportunity for replenishing the food supply, in which labors the Japanese soldiers proved themselves most resourceful The native besieged had by that time become sc reduced in rations that they ate dogs. Fortunately the wells of water held out. The heat was often great. Smallpox, scarlel fever, diphtheria and dysentery espe¬ cially, broke out in the native camp, but were held in check Only one foreign infant out of seven survived Marines and civilians vied with each other in the display of bravery. The mor¬ tality among officers was large. Captain Thomanr (Austrian), Captain Ando (Japan¬ ese), Cantain Strouts (British), Captain La Bruct (French). Lieutenant Henry (French), Lieutenant Paolini (Italian), were killed. Two

British, two American, three Austrian, one Rus¬ sian, one French and two Italian officers were wounded. The Belgian and American captain-surgeons were wounded and the Japanese sur¬ geon was killed.

Among the defenders who took part in the actual fighting more than 50 per cent were killed or wounded. At the cathe¬ dral 400 natives and foreigners were killed. The American marines held a perilous position on the city wall, reinforced by British and Rus¬ sians. Seventeen languages were represented among the besieged.

The Siege of Peking is without a parallel in history. Never before were the representa¬ tives of a friendly power brought to such straits by a nation to whom they had been accredited. Diplomats, missionaries, merchants, business men, teachers in the schools, and even an Eng¬ lishman who was in the capital as a guest of the Chinese government, were penned up in a state of siege and were saved only by the valor of a handful of marines and the personal bravery of some of their own number. Most of the French, the Austrian, Italian, Dutch and Belgian legations were entirely destroyed. All the others, while held, were almost demolished by the terrific bombardment. On 10 June an ef¬ fort had been made at Tientsin by 2,000 inter¬ nationals under Admiral Seymour (British) and Captain McCalla (United States) to reach Peking. After getting half way and enduring terrible hardships this force had to retreat to Tientsin. The latter place itself was shelled for 30 days. On 4 August about 20,000 allies under Generals Gaselee (British), Chaffee (United States), Fukushima (Japanese), Lini-evitch and Vassielevsky (Russian) and Frey (French) left Tientsin and after a terrible march of 10 days reached Peking. Every mile of the way they drove the Chinese forces be¬ fore them.

The allies attacked the city early the morn¬ ing of the 14th and the same afternoon at four o'clock, a detachment of Sikhs and Bengal Raj¬ put Infantry under Gaselee and Americans un¬ der Chaffee reached the Legations. These were soon followed by the other nationals. A thanksgiving service marked the close of the siege. The Te Deum Laudamus was read by the chaplain of the British Legation. At 9 o'clock on the evening of the 14th, the Empress Dowager and the young Emperor with their suites and many of the troops fled by the north¬ ern gate of the Tartar City to the mountain fastnesses, 80 miles away. In the confusion the soldiers of the many nations gathered immense quantities of loot which was afterward ˆsold® at public auctions authorized by the foreign ministers, as the easiest method of settlement.

The siege in Peking adds one more chapter to the conflict between the East and the West. Many of the underlying causes will ever remain obscure. The siege represented what is to be hoped is the final effort of the old China to crush the rising influences of the new. The patience and faith of the women were exempli¬ fied under

circumstances few have ever had to endure. That the foreigners besieged should ever have escaped is one of the miracles of his¬ tory. It shows what a small band of men driven to bay can do with few resources and against overwhelming odds.

B'bliography. — Allen, R., (Thc Siege of the Peking Legations) (London 1901) ; Hooker

M., (Behind the Scenes in Peking) (London 1910) ; Landor, A. H. S., (China and the Allies) (2 vols., New York 1901) ; Martin, W. A. P., (The Siege in Peking* (New York 1900) ; Mor¬ rison, (Letters to the London Times * ; Smith, A. H., (China in Convulsion) (Edinburgh 1902) ; Weale, B. L. P., indiscreet Letters from Peking) (New York 1911).

PELADAN, pa-la-dan, Josephin (((Le Sar®), French romancer and mystical writer: b. Lyons 1858. He became an eccentric and mystic, took the title of <(Sar® (chief), posing as a descendant of the last Babylonian kings, and went about in theatric costume. Among his writings are <Rembrandt) (1881) ; intro¬ duction a l'histoire des peintures) (1884), and a romantic cyclus (Decadence Latine> (1886-91), a mixture of astrology, mysticism and esotericism, which includes (Le vice supreme* (1886); <Curieuse> (1886); (L'initiation senti-mentale) (1887) ; (A cceur perdu* (1888) ; istar) (1888) ; (La victoire du mari* (1889) ; (Cceur en peine) (1890) ; (L' Androgyne* (1890); and (Le Gynandre* (1891). Apart from this cyclus are (Femmes honnetes* (1885) ; and (La decadence esthetique* (1888). He was the founder, in 1892, of the order of La Rose Croix, or Croix du Temple, which, similar to the English pre-Ralphaelite movement several years before, was in reality a reaction against the material side of French art. The cult had great vogue for several years, as the Geste Esthetique salons were held by the Rosicru-cians, which promulgated his views and gave lectures and plays written by the Sar Peladan.

PELAGIANISM, pe-la'ji-an-ism, a doc¬ trine in regard to original sin taught by Pelagius, sometimes called Pelagius Brito, a Welsh monk of

the latter end of the 4th and begin¬ ning of the 5th century, and regarded by the Church after much controversy as a heresy. His name, Morgan, was Latinized into Mari-gena (seaborn), and rendered into Greek as Pelagius (from pelagos, sea). He was in Rome about the year 400. He is thought to have im¬ bibed his opinions from the monk, Rufinus, a follower of Origen. Pelagius was a contempo¬ rary of Augustine, who was influenced by his opposition to Pelagianism in expounding his own views on the subject. According to Pela¬ gius, Adam was created mortal and would have died had he not sinned; and that his sin was not transmitted to his # posterity ; that it was possible for man to live altogether without sin ; and that grace, that is, the divine aid, was not necessary or even possible to the human will. It was held that the will was free only when influenced neither toward good nor toward evil. Sin then becomes an act and has no existence apart from the act. The act does not change the nature of man, but only exposes him to the penalty. The argument was, therefore, that man was endowed with original perfection, not tainted by original sin. The Pelagians generally affirmed that every child was born in the same state of innocence as Adam was, and that his perseverance in virtue depended upon hirnself ; original sin was an impossibility, since sin was the result of a depraved volition, not an in¬ firmity of nature. A peccatum naturale, as they called it, was a confusion of terms, and a con¬ tradiction; infant baptism was administered to sanctify and admit children to the kingdom of

Heaven, not to remove the stain of sin, because infants had none; unbaptized infants dying in infancy have eternal life ; and men may attain Heaven through a righteous life, that is, by keeping the law, as well as through the Gospel, some men having lived without sin while others may. Augustine, opposing these views, main¬ tained that Adam's sin affected the human race, involving all mankind in guilt ; physical death is the penaltv of sin ; infants are baptized for the remission of original or inherited sin, and Jesus Christ was the only sinless man who has appeared upon the earth. Among the Eastern synods the opinions of Pelagius were confirmed as orthodox and Pelagius was advised to anathematize those who opposed him (<not as heretics but as fools.®

- Between 412 and 431 a.d. 24 councils were held to condemn the Pelagian doctrine. In 416 a synod of western bishops presided over by Augustine declared the Pelagian doctrines heretical. In 418 the civil authorities joined the ecclesiastics in denouncing them. . The pope confirmed the sentence of the Third General Council at Ephesus (431)

and anathematized the Pelagians. Pelagius was expelled from Jerusalem (421) and found refuge with Nesto-rius at Constantinople. According to tradition his death occurred in Palestine at the age of about 70 years. Among his writings are works (On the Trinity) ; (On Free WilP ; a Commen¬ tary on Paul's Epistles* (excepting Hebrews), supposed to exist in an expurgated form among Jerome's works; (Eulogise,* a collection of Scriptural extracts for use as an aid to Chris¬ tian living; the creed which he submitted to Bishop Zosimus, a letter to Demetrius on asceti¬ cism; and various fragments. See Original Sin; Augustine, Saint.

PELAGIANS. See Religious Sects. PELAGIC. See Terrigenous.

PELAGIC ANIMALS, animals whose life

is spent in mid-ocean, either near the surface or at various depths. Some, as the pelagic birds (albatrosses, petrels and the like), may come to shore to make their nests; but many forms are to be found nowhere except in the open sea. They comprise many of the lower forms of ani¬ mal life, the radiates and mollusks particularly, many of the Crustacea and large numbers of fish including some of the sharks and dolphins. The mammals also are represented by the whales. See Deep-sea Exploration; Globigerina; Ooze; Plankton, *etc.*

PELAGIC SEALING, a term applied to the taking or capturing of seals in the open sea, that is, beyond the three-mile limit. According to the Paris award of 1893, pelagic sealing within a zone of 60 miles of the Pribyloff Islands was forbidden. In 1911, in response to an invitation of the United States, representa¬ tives of Gx-eat Britain, Russia and Japan met with those of the United States in the Interna¬ tional Fur Seal Conference. An agreement was reached that for 15 years no pelagic sealing in Bering iSea should be permitted. This regula¬ tion went into effect on 15 Dec. 1911. The agreement was made to aoply also to the capture of the sea otter. See Bering Sea Controversy ; Fur Trade, The

PELAGIUS I, pe-la'iT-us, pope: b. Rome; d. there, 3 March 560. He represented Pope

\ igilius at Constantinople, won the favor of the Emperor Justinian, and as the choice of the emperor succeeded Vigilius in the papal chair in 555. Only two bishops and a presbyter as¬ sisted in his consecration, and the refusal of many bishops to accept the decrees of the 5th oecumenical council, which Justinian had con¬ vened in 555 upon the monophysite controversy, made his pontificate a period of trouble and dis¬ sension. The theological tenets concerning which he sustained a controversy with nearly the whole body of the western bishops are known historically as (<The Three Chapters.® He en¬ deavored to reform the clergy; and when Rome was besieged by the Goths, he obtained from Totila, their general, many concessions in favor of the citizens. Sixteen of his Epistles are pre¬ served in the Concilia.

PELAGIUS II, pope: b. Rome; d. Janu¬ ary 590. He succeeded Benedict I, in 579, and was the first independently elected pontiff fol¬ lowing the Byzantine conquest of 536. During his term of office a council at Constantinople roused his ire by bestowing upon the patriarch of that city the exalted title of ((Universal Bishop.® His most trusted counselor was Gregory the Great, who succeeded him. Ten of his Epistles together with six Decrees are to be found in the Concilia.

PELAGIUS, originally ALVAREZ PAEZ,

celebrated Spanish prelate and ecclesiastical jurist: b. about 1280; d. Seville, 1352. After receiving the degree of doctor at Bologna, where he had studied theology and canon law, he went to Paris to continue his studies under the famous Duns Scotus. His talents and the purity of his life recommended him to John XXII of Portugal, who appointed him grand penitentiary to supervise and remedy the abuses and immorality that prevailed among the clergy. In 1332 Pelagius became bishop of Coron and subsequently bishop of Silves and papal nuncio to Portugal. Among several treatises on the¬ ology and canonic law from his pen are Num¬ mary of Theology } ; (De planctu Ecclesiae) (2 vols., 1474), a highly esteemed treatise, in which he argues for the limitless spiritual and tem¬ poral rights of the papacy and vigorously at¬ tacks the disorderly clergy; and also a notable (Apology of John XXII.*

PELAGONIUS, a Greek veterinary sur¬ geon who lived in the 4th century. Numerous fragments of his writings are found in Greek veterinary collections and in the ˆeoponiques.* A Latin work with an Italian translation, pub¬ lished at Florence in 1826, is entitled (Pela-gonii veterinaria ex Richardiano codice ex-cerpta et a mendis

purgataP It contains nu¬ merous formulae for veterinary remedies, which probably form a collection of different veter¬ inary fragments, but chiefly those of Pelagonius.

PELARGONIC ACID, or NONONIC ACID, CHa(CH2)7COOH, one of the nonojc acids. A monobasic acid, belonging to the acetic acid series, present in the leaves of the Pelar¬ gonium roseum and of rue (Ruta graveolens) and in the fusel oil from the beet-root. May be prepared in the laboratory by oxidation of oleic acid or of stearolic acid. It is a viscous oil at ordinary temperatures, becoming solid when cooled; boils with decomposition at 490° F. It has a quince-like odor due probably to ethyl pelargonate. This ester is prepared in vol, 21 — 31

commercial quantities from the oxidation prod¬ ucts of the oil of rue. It is used for improv¬ ing the flavor of cheap wines and liquors.

PELARGONIUM, a genus of shrubs and shrubby perennial herbs of the family Gerania-ccce. About 170 species have been described, mostly natives of South Africa, whence some of them were introduced into European gardens during the latter part of the 17th and early part of the 18th century. Under the popular name geranium some of the species and their innu¬ merable varieties and hybrids have long been popular garden, greenhouse and house plants, because of their fresh green or otherwise colored fragrant leaves, their bright, usually red or white flowers and free blossoming habits and for the ease with which they may be propagated and cultivated. Though the flowers vary little in form, except double varieties, they exhibit great diversity of color, markings and size. And on this account and because of the various markings of the foliage the cultivated species, their hybrids and varieties are arranged for con¬ venience into various groups of which those to be mentioned are the principal. Zonal, horse¬ shoe, bedding, or fish types, popularly known as ˆgeraniums,® which appear to be the progeny of P. inquinans and P zonale, are popular wher¬ ever ornamental plants are grown, but espe¬ cially in the United States, where they thrive admirably in the hot, dry, sunny climate and probably outnumber any other house and home-garden plant in America. A subdivision of this group has double flowers but is less popular than the single-flowered forms because of their unkempt appearance. Ivy-leaved ((geraniums® are derived from P. peltdtum, a species which is said to have appeared in Great Britain in 1701. The plants are rather scraggly, but are popular for window-boxes, hanging-baskets and such things. The thick leaves are conspicuously angled, the flowers usually pink, often double and of pleasing tints. Rose

<(geraniums® are de¬ rived from various species; for instance, P. radula and P. graveolens. These are grown for their scented foliage. P. odoratissimum, the nutmeg geranium, belongs to this group.

The fancy types which gardeners call <(pelar-goniums,® or Lady Washington geraniums, are less grown in America than in Europe, where they have an immense number of varieties and figure prominently not only in flower shows but in home gardens. The hot American summers seem to be against them ; but they are somewhat cultivated in greenhouses. The species from which the group is derived are not definitely de¬ termined but P. cucullatum, P. angulosum and P. grandiflorum are all thought to be blended more or less. There are also several species which are cultivated under their specific names but none are as popular as the above.

As a rule the plants are propagated by means of cuttings rooted under glass during spring and potted in good loam. When the weather has become settled in the spring the plants are removed to the garden where they are allowed to remain until danger of frost when they are dug up, such cuttings taken as are needed and the plants potted for winter bloom or for stock. They may be stored in straw or hung from the ceiling of a dry cellar until \vanted. Some of the kinds must be more carefully managed ; but the common, popular

ones can be ˆmismanaged® more satisfactorily than probably any other plant.

PELASGIAN ARCHITECTURE, an ar¬ bitrary title given by some writers of Cyclopean Works (q.v.).

PELASGIANS, pe-las’ji-anz, a legendary Indo-Germanic race which in prehistoric times was spread over Greece, Asia Minor and Italy. It has been held by some writers that the name does not represent a distinct race, but is merely an epithet, like autochthones or aborigines. Acusilaus (6th century b.c.) included under the title Pelasgia all Greece as far as Larisa and Pharsalia.

The Pelasgi are mentioned by Homer as dwelling in Argos and in Epirus ; by Hesiod with Dodona as their seat. Herodotus says that Greece was anciently called Pelasgia and he includes as Pelasgians the Athenians, Arcadians, Ionians of Asia Minor, the Lemnians, the Samothracians and the inhabitants of Creston. He also speaks of them as worshipping all the gods at Dodona without giving a name to any. It is Arcadian tradition that Pelasgus was the first man to live in Arcadia and that during his time that country was known as Pelasgia. Strabo speaks of the Pelasgians as formerly spread over the whole of Hellas but particularly among the 2Eolians. There are also accounts of their inhabiting Boeotia and Attica. Herod¬ otus mentions their non-migratory habits. Various accounts are given of their expulsion from Athens. Thucydides refers to Pelasgic as a word common among the Greek tribes before the use of the term Hellenic. Herodotus also says it was thus applied among the Athenians. They are mentioned by various writers from Homer downward as occupying islands in the ˆEgean. Herodotus enumerates 17 islands on the coast of Asia as belonging to them. They inhabited in his time the cities of Scylacc and Placie on the Propontis and spoke a language different from Greek. Euripides says that all Greek traditions agree that Peloponnesus in the earliest times was called Pelasgia and that its inhabitants were known as Pelasgians.

Italian accounts of the Pelasgi are vague and difficult to reconcile. The Pelasgi are supposed here to have given to the Latin language the element it had in common with the Greek. Bishop Thirlwall interprets the reference of Herodotus to the language of the Pelasgians as signifying that they spoke a language differing from Greek as a remote but cognate branch of the same stock. Grote holds that Herodotus meant that the language they spoke was not Greek at all.

Niebuhr regarded the migrations of the Pelasgians as mythical, while he held that they inhabited all the countries from the Po to the Bosporus and supplying a common foundation to the Greek and Latin languages. The sup¬ posed Pelasgian migrations are, he believed, only the scattered fragments of this once united people, whose greatness he places in prehistoric times. Other writers, such as Grote, receive the entire tradition of the Pelasgians with skepti¬ cism. Remains attributed to the Pelasgi are found in Italy, Greece and Asia Minor, but their diffusion is held to be at variance with the notion of their being the works of a single people, to such a degree as to form an inde¬ pendent testimony to the otherwise doubtful

existence of a race by whom they might have been executed. These remains belong to the style of architecture called Cyclopean. See Cy¬ clopean Works.

An exhaustive discussion of the traditions and historical references concerning the Pelas¬ gians, with the conclusion that they were not mythical, is to be found in Wm. Ridgeway s (Early Age of Greece^ (Cambridge 1901). Consult also Hall, H. R. H., (The Oldest Civili¬ zation of Greece) (London 1901) and (yEgean Archaeology* (London 1915).

PELAYO, pa-la'yo, a historical personage of the royal line of the Visigoths, who is con¬ sidered the first Christian king of Spain, fol¬ lowing its conquest by the Arabs. He appears to have withstood the Arabs in the mountain districts of Asturias (q.v.) in which the Chris¬ tians of Spain had taken refuge. His death is recorded as occurring in 737. The genealogy of the reigning family of Spain is traced back to Pelayo.

PELECYPODA, pel-e-sip'6-da, or LA-MELLIBRANCHIATA, the class of aquatic

Mollusca known popularly as <(the bivalves® and which are distinguished externally by the pos¬ session of shells in two measurably symmetrical parts or ((valves.® They include the clams, oysters, scallops, cockles, mussels, the pearl oyster, teredos or shipworms, and similar forms. They range in size from the tiniest up to the prodigious Tridacna gigas of the Pacific, with a shell three feet across.

The pelecypoda number about 11,000 species which are classified in five orders. About one-fifth of these are fresh-water forms. Fossil remains of about 15,000 species have been recog¬ nized. See Bivalves ; Mollusca, and the names of various groups and species. Consult Pratt, H. S., (Manual of the Common Invertebrate Animals) (Chicago 1916).

PELEE, Mont, mont pe'le (Fr. mon pa-la), Martinique, West Indies, an active volcano in the northwestern part of the island, noted for its eruptions in 1902, that of 8 May destroying the town of Saint Pierre (q.v.), and nearly 30,000 people, and that of 30 August destroying Morne Rouge, Ajoupa-Bouillon, and other localities, with a loss of about 2,500 persons. Previously recorded eruptions were those of 1762 and 1851. Prior to 1902 the mountain was characterized as a lofty, solitary peak about 4,600 feet high with gradual slopes. Its crater was about one and a half miles in circumference and had a depth of from 1,000 to 2,000 feet below the level of the crater rim. On the south¬ west side the crater rim was breached to the base by a great gash which continued into the gorge of the Riviere Blanche ; over 20 other ravines and waterways indented the mountain slopes. Within the great crater lay L'Etang Sec, a small crater lake. Sinc£ the eruptions of 1902 the crater has increased in width toward the east, south and southwest, the tuff walls on the east and south are almost if not quite vertical, while the V-shaped gash in the southwestern rim is wider and the southern side of it has been cut away and is now filled by volcanic debris. Over 180 feet of the sum¬ mit was blown away, and the crateral basin L'Etang Sec disappeared, but from it an enormous obelisk of polished rock with a basal thickness of 300 to 350 feet extruded to a height

of 1,600 feet or more, towering above the lowest portion of the present crater rim 475 feet, and giving Mont Pelee a varying altitude of from 5,100 to 5,140 feet as the ex¬ trusion continued and fragments broke away from its summit. (See Martinique). Consult Heilprin, (Mont Pelee and the Tragedy of Martinique> (1903).

PELEE (pe'le) ISLAND, an island in Lake Erie lying 10 miles off the southwestern coast of the province of Ontario, Canada, south¬ west of Point Pelee. It is a part of Essex County, Ontario. It is nine miles long, from north to south, and from three to four miles wide. It is the most southerly land of the Dominion of Canada, lying in lat. 42° N., on the same parallel as the city of Boston, and of Rome, in Italy. Its chief

product is grapes and tobacco is grown there successfully. It also has some timber land and the sand on the shores is in special local favor for building.

PELEG ARKWRIGHT, a pseudonym used by David Law Proudfit (q.v.) for a series of newspaper contributions, written partly in dialect. Achieving success with these he began writing under his own name.

PELEIDES, in Greek mythology, a son of Peleus. See Achilles.

PELEU.S, pe'lus or pe'le-us, in Greek legends, the son of ˆEacus king of the Myrmi¬ dons of Thessaly. He is said to have married the sea-nymph Thetis, and thus the father of Achilles (q.v.). Tradition relates that he took part in the expedition of the Argonauts.

PELEW (pe-loo') ISLANDS, a group of 26 small islands in the Pacific between lat. 7° and 8° N. and long. 134° and 135° E. They lie west of the Caroline group, and are some¬ times considered a part of this group; area, 190 square miles. They were discovered in 1543 by Ruy Lopez de Villalobos, who called them the Arrecifos. Six of them are inhabited; the largest island is Babelthuat, in the north¬ ern part of the group, 24 miles long. The islands are hilly, heavily wooded, and com¬ pletely surrounded by coral reefs. The soil is fertile, and sugar, bread-fruit, tobacco, bananas, oranges and other tropical fruits are raised. Tortoise shells and mother of pearl are also obtained. The people are the Micronesian race and are ruled by a king who resides on the island of Korror. They are a primitive people and have a number of interesting social cus¬ toms which make them an important subject of ethnological study. These islands were taken possession of by Spaniards in 1545 and were held by Spain until 1899 when they were sold to Germany with the Caroline and Marianne Islands (except Guam). In October 1914, with the latter mentioned groups of islands, the Pelew Islands were seized by the Japanese fleet, remaining in their control until the end of the war, when the mandatory ad¬ ministration of the islands was assigned to Tapan by the Peace Treaty of May 1919. Pop.

5,500.

PELHAM, pel'am, Peter, English mezzo-tintengraver : b. England about 1684; d. Boston, Mass., December 1751. Data concerning his early life is not obtainable, but he was probably born at Chichester and some authorities fix

the date of his birth about 1694. The earliest date found on any of his plates is 1720. In 1726 he came to Boston, where he established a school in which reading, writing, dancing and needlework were taught, and he gave lessons in drawing and painting, at the same time con¬ tinuing his engraving. He was the earliest artist resident in New England and his por¬ trait of Rev. Cotton Mather (1727) was the first mezzotint engraving produced in America. He was stepfather to John Singleton Copley (q.v.) and his first instructor in art. Among his subjects are George I; Queen Anne, after Kneller; Oliver Cromwell, after Walker; Rev. John Moorehead (1731) and Rev. Mather Byles, after his own originals; Rev. Benjamin Colman (1734); Rev. Wm. Cooper and Rev. Joseph Sewall, after Smibert; Governor Shirley (1747); Rev. Edward Holyoke and Thomas Hollis, after Highmore (1749).

PELHAM, or THE ADVENTURES OF A GENTLEMAN, a novel by Bulwer-Lytton, appeared anonymously in 1828. It was the writer's second published novel, following ˆFalkland,® and the first work of his that gave promise of his extraordinary ability.

PELHAM-HOLLES, Thomas, 1st Duke

of Newcastle. See Newcastle, Thomas Pel¬ ham-Holles, 1st Duke of.

PELIAS, pe'li-as, in Greek mythology, the son of Poseidon (Neptune) and Tyro. He drove his younger stepbrother /Eson, son of Tyro and Crethens, from the throne of Iolcus. He was killed and his body dismembered and boiled, by his own daughters at the instance of Medea who promised them that in this way he could be restored to youth. According to another form of the myth Medea killed him.

PELICAN, a web-footed bird of large size, weighing up to 16 pounds, of the genus Pele-canus, order Steganopodes. The pelicans form a distinct family (Pelecanidce) easily dis¬ tinguished by the great membranous pouch which is attached to the throat and hangs from the rami of the long lower mandible. The upper mandible is straight, 14 to 18 inches long and sharply hooked at the end. Pelicans range in size from four to six feet in length, with a wing expanse of eight to nine feet, the wings bearing numerous quillfeathers, and having great powers of flight. As in some related birds the pneumatic system is wonderfully de¬ veloped, extensions of the anterior air-sacs passing beneath the skin and there developing into an extensive area of subcutaneous air-cells. Ten species of pelicans are known which

inhabit most tropical and temperate parts of the world, and fossil remains of nine other species show their existence as far back as the Lower Mio¬ cene (in France). Of the living species, three are American. Two of these are maritime in¬ habiting the coasts of the Southern States. The other, the white pelican, frequents only fresh water in the summer, nesting far to the north, but in the winter goes to salt water districts in the South. The American white nelican (P. erythrorhynchos) is abundant along the Gulf Coast and, in the interior, in the Mississippi Valley and westward, far into Canada, and is common on the coast of California; elsewhere in temperate North America it is rare. With the exception of the black primary wing-quills

and neighboring parts, the plumage is entirely white, often with straw color on the breast. In the spring the beak of the male develops mid¬ way of its length a rough horny crest which reaches its greatest dimensions (three inches) in the breeding period, and is subsequently molted. This species often lives in great com¬ munities, especially during the breeding season. The only nest is a rude heap of earth and trash, on which a single egg with a thick, chalky, white shell is deposited. The young are hatched naked but are soon covered with a growth of white down, and later with a heavy plumage. The flight is easy, graceful and sus¬ tained; and the bird is fond of rising to great heights and soaring evidently for pleasure. When feeding they skim the surface of the water or dive beneath it, and scoop up small fishes in the net-like pouch, and, after draining the water off, swallow them. The white pelican is often seen in long lines beating the water with their wings and so driving the fish into shoal water where they are easily captured. The young are fed on fish regurgitated from the crop, and not upon living fish carried in the pouch. Unlike the white pelican, which fre¬ quents the shores of lakes and rivers, as well as the sea, the brown pelican (P. occidentalis) is strictly maritime on the Atlantic Coast of tropi¬ cal and subtropical America. The general color is mottled silvery gray and brown, the top of the head being white, and there is no crest on the beak. In feeding this species plunges on its prey from a height of 20 feet above the water, thus differing from

other pelicans. Two or three eggs are laid in a coarse nest of sticks placed on the ground. The general habits resemble those of the white pelican. The California pelican (P . calif ornicus) is the representative on the Pacific Coast of the brown pelican, which it closely resembles. Its head and neck are white, the general color being silvery gray streaked with brown. It is found from the Galapagos Islands as far north as British Columbia. In Europe are found a white pelican (P. onocrotalus) lacking the rostral crest, and a larger and rarer species (P. cris-pus). Other species of similar habits occur in Australia, Asia and Africa.

The pelican is the Hebrew Kaath, and from the fact of its resorting to the most lonely places it is used in the prophecies and psalms as an emblem of solitude and desolation. Popular fancy has ascribed the red tip at the end of its beak to blood drawn from its own breast for the nourishment of its young; hence in ecclesiasti¬ cal symbolism it represents the church feeding her children with her life. Thus the pelican early found a place in Christian art, and like the fish and the peacock has been emblazoned in windows and mosaics, carved in stone and wood, and enameled in crimson and white on chalices and sacred vessels. Its highest symbolic signifi¬ cance was reached when it was used as an em¬ blem of Christ whose blood was poured out for mankind. There are traces of this symbolism in the litanies and hymns of the ancient church, as well as the creations of art. Consult Twin¬ ing, ‘Svmbols and Emblems of Christian Art) (1886) ; also, Bailey, F. M„ ‘Handbook of Birds of the Western United States) (Boston 1914) ; Chapman, F. M.. ‘Birds of Eastern North America5 (New York 1916).

PELICAN, The. See Argus and Peli¬ can.

PELICAN-FISH, a fanciful name given to the deep-sea fishes of the family Eurypha-ryngidee (specifically Eury pharynx pelecanoides) , representing a distinct order Lyomeri, the gul-pers. There are four genera, Sacco pharynx, Eury pharynx , Macro pharynx and Gastrostonius, each represented by a single species. 1 hese rare fishes have an eel-like body, reaching at least six feet in length, four-fifths of which is tail, and an extraordinary structure probably derived from some eel-like ancestor. They are, however, of a distinctly lower physical type, the muscles being feebly and loosely developed and the bones, especially of the head, very soft and elastic. They have an enormous development of -the jaws and the throat and stomach are capable of great distension suggesting the pouch of a pelican. They are believed to feed on the minute animal life in the deep sea, taking in

great mouthfuls of water and straining out the animalculae through their long fringe-like teeth.

It is not uncommon for some of these creatures to swallow a fish as large or larger than itself. The attempts of the saccopharynx to exceed even that limit were for a time our only knowl¬ edge of its family, the few specimens known being those found floating dead with a fish in the pouch too large to be disposed of. Speci¬ mens of all four of the genera named have been secured by dredges at depths varying from 2,350 feet to 8,800 feet. Consult Goode and Beau, 'Oceanic Ichthyology5 (1895). See Deep-sea Exploration.

PELICAN ISLAND, (1) an island, now a bird reserve, off the east coast of Florida, in Indian River, so called because brown pelicans breed there. It has an area at high water of about five and one-half acres. Desiring to pre¬ vent the extinction of the birds, the Audubon Society tried to gain possession of it, but failed to accomplish their purpose on account of the large amount of litigation involved. In 1903 the United States government took possession and the Secretary of Agriculture established a bird reserve there, to guard against the total extinction of the pelicans. The reserve was enlarged in 1909, by order of President Roose¬ velt. The island is very low, and when a storm or very high tide occurs at nesting time, hun¬ dreds of the young birds are drowned. (2) An island in Lake Winnipeg, about latitude 52° 20' N. The principal meridian of Canada passes just to the west of the island. It be¬ longs to the province of Manitoba. (3) An island in Princess Charlotte Bay off the north¬ east coast of Australia, in latitude 13° 50' S.

PELICAN STATE, a popular name for the State of Louisiana.

PELICAN'S FOOT, a Small mollusk, {Aporrhais pes-pelecani) a native of Europe, one of the four living species of the genus Aporrhais. The species A. occidentalis, found off the northern coasts of the United States is the only American representative. This shell gets its name from the arrangement of the spiny protuberances extending from the outer lip, suggesting the webbed foot of the pelican. The characteristic form of the shell is onlv at¬ tained in the adult period, the young shell be¬ ing destitute of spines. Though only about two

inches in length, the pelican's foot is an article of food in Southern Europe.

PELION, pe'li-on, Greece, now Mount Plessidi. See Ossa.

PELISSIER, pa-le-se-a, Jean Jacques Aimable, Duke of Malakoff, marshal of France: b. Maromme, near Rouen, 6 Nov. 1794; d. Al¬ geria, 22 May 1864. Educated at the military school at Saint Cyr, he entered the army in 1815 as sublieutenant of artillery. In 1819 he became a staff officer, subsequently serving in Spain in 1823, in the Morea in 1828-29 and in Algeria in 1830. In this country, being then a colonel, in 1845 he suffocated in a cave a whole tribe, numbering some 600 Arabs, who had taken refuge in it, by lighting a fire at the mouth, an atrocity which aroused great indig¬ nation ; but Bugeaud, commander-in-chief, de¬ clared that Pelissier had only obeyed positive orders. He was made a general of brigade in 1850 and a general of division in 1855, and was placed in command of the forces operating at Sebastopol. On the capture of the Malakoff and the fall of Sebastopol he was appointed marshal of France and made Duke of Malakoff. In 1856 Sir Hugh Gough, the field marshal of Great Britain, was sent to the Crimea to invest Marshal Pelissier with the insignia of the Order of the. Bath. He was afterward vice-president of the senate, a privy-councilor and Ambas¬ sador to England (1858), and in 1859 was made Grand Chancellor of the Legion of Honor. In 1860 he was appointed governor-general of Algeria.

PELL, John, English clergyman and mathe¬ matician : b. Southwick, Sussex, 1 March 1611; d. London, 12 Dec. 1685. Educated at Cam¬ bridge, he became professor of mathematics at Amsterdam in 1643 and in 1646 at Breda, where he was also professor of philosophy. From 1654 to 1658 he was the agent of Cromwell to the Protestant cantons of Switzerland. In 1661 he took orders in the English Church and was rector of Fobbing and vicar of Laindon, Sus¬ sex, till his death, but was more notable for his mathematical attainments than in his clerical labors. Through his publication in 1668 of a solution (not his own) in his algebra of the equation y2~ ax2 + 1, this particular expression received the distinguishing title, ((Pell's equa¬ tion.® To him is frequently attributed the in¬ vention of the symbol of division - r-but the credit of this is in reality due to Rahn, whose work, which Brancher had translated, was edited by Pell in 1668. Among his works are ˆAstronomical History of Observation of Heavenly Motions and

Appearances) (1634) ; (Ecliptica Prognostica) (1634) ; ˆControversy on the Quadrature of the Circle* (1646) ; (An Idea of the Mathematics> (1650) ; (A Table of Ten Thousand Square Numbers. > In addition to these published works he left a great mass of manuscripts and letters, many of them on mathematical subjects, and 40 large folio vol¬ umes, filled with them, are preserved in the British Museum. In his old age he was re¬ duced to extreme poverty, and when he died he received private burial only through the charity of former acquaintances.

PELLA, (1) a city of ancient Macedonia on a marshy lake formed by the river Ludias : a royal city in the 5th century, when it was

Archelaus' capital, it was remodeled by Philip II, who removed his capital here from Edessa. It was the birthplace of Alexander the Great, the site of a splendid castle adorned with paint¬ ings by Zeuxis and of a cenotaph of Aristotle, and in Roman times was the central military station for the province. It is identified with the modern Palatitza, where excavations of importance (described in Hauzey and Daumet,

(Mission archeologique en Macedoine* (1876) have been made. A funeral stele of great artis¬ tic interest belonging to the late 5th century or the early 4th century b.c. is preserved in the Imperial Museum at Constantinople. (2) An ancient and important city of Palestine, east of the Jordan, famous as the refuge of the Chris¬ tians of Jerusalem when that city was taken by the Romans (67 a.d.), and identified with Tabakat Fahil. It was taken by Antiochus the Great in 218 b.c., and was later destroyed by the Jews under Alexander Jannaeus. After being rebuilt it was captured by Pompey, who re¬ stored it to its original inhabitants. Portions of the wall are still standing, and the famous fountain mentioned by ancient writers remains unchanged to identify the locality.

PELLA, Iowa, city in Marion County, on the Chicago, Rock Island and Pacific Railroad, 45 miles southeast of Des Moines. Central Baptist College is located here and there are a public library, canning and pickle factory, feeder works, flouring mills, brick and tile works, wagon works, furniture factory, tank and pipe works, *etc.* The municipality owns the water-supply system and the electric-lighting plant. Pop. 3,338, mostly of Dutch descent.

PELLAGRA, a disease, or complication of diseases, discussed in Italy under this name in the 18th century and which since that time has

been rapidly increasing. It is com¬ mon in northern Italy, in the south of France, in Spain and in countries further east in southern Europe. Within recent years it has been found extensively in the United States, particularly in the Southern States. It more frequently begins with an erysipelatous eruption on the skin, which breaks out in the spring, continues till the autumn and disappears in the winter, chiefly affecting those parts of the surface which are habitually exposed. The dis¬ ease is accompanied or preceded by remarkable lassitude, melancholy, moroseness, hypochon¬ driasis and not seldom by suicidal tendencies. With its progress and duration the disorder be¬ comes more aggravated, with shorter and shorter intervals in the winter. At length the surface ceases to clear itself and becomes permanently enveloped in a thick, livid, leprous crust, some¬ what resembling the dried and black skin of a fish. By this time the physical resistance is reduced to a very low ebb and not seldom the mental functions as well. The victim loses the use of his limbs, especially of the legs, suffers with violent colic, headache, nausea, flatulence and heartburn, the appetite being variable. The countenance becomes void of expression. There is a sense of burning heat in the head and along the spine, where it radiates to other parts, especially to the palms and soles, tormenting the victim day and night. To these severe afflictions are often added strange hallucina¬ tions. The disease, when advanced, takes the

form of many other maladies, such as tetanus, convulsions, epilepsy, dropsy, mania and marasmus, the patient being at last reduced to the appearance of a mummy. It is mainly confined to the poor residing in the country districts and is seldom seen in very young children.

The cause of this disease has been ascribed to the eating of corn, in which a putrefaction occurs during the warm season. Just what food factor is wanting is not yet certainly known. Consult Marie, A.,

<Pellagra> (1910), and Reports, United States Marine Hospital Service.

PELLATT, pel'at, Sir Henry Mill, Cana¬ dian capitalist: b. Toronto, I860. He was edu¬ cated at Upper Canada College and joined the staff of the brokers' firm of Pellatt and Osier at the age of 15; later he was taken into part¬ nership by his father. He is president of the Toronto Electric Light Company, of the Electrical Development Company of Ontario, Ltd., of the British and Colonial Land and Securi¬ ties Company and of the British-Canadian Dock and Shipbuilding Company, and director in very many industrial corporations. In 1901 he received the command of the Queen's Own Rifles and the command of the Canadian con¬ tingent at the coronation of King Edward. In 1910 he took a contingent of the Rifles to Eng¬ land for army manoeuvres. In 1912 he was made brigadier of the 6th Infantry brigade.

PELLEAS (pel-laaz) ET MiCLISANDE

ma'li-san'd'. To understand Maurice Maeter¬ linck's (Pelleas et Melisandeˆ one must have some knowledge of this dramatist's theory of dramatic technique. The style of his early small dramas consisted of iteration of phrase and elision of thought. They dealt with the un¬ seeable forces of destiny and resorted to ex¬ ternal accessories, like storms, meteors, mys¬ terious lights and felt presences — characteristic of certain morbid romances, but going beyond the conventional romance by the added grace of an inner mystic beauty.

Then there befell a change of attitude in Maeterlinck toward the theatre; his dialogue became less shadowy and more representative of definite character. This change was partly due to the fact that he discovered for himself the shortcomings of his theory, and that philo¬ sophically he had advanced out of the murki¬ ness of the "Cymbalist" school into the light of health and a sound will, through the in¬ fluence of Georgette Leblanc, whom he married about this time. This explanation is necessary in order to understand why (Pelleas et Meli¬ sande* is so mystic and "misty." Maeterlinck here used, as a basis for his play, the story of Francesca and Paolo, so appealingly stated by Dante in the famous 14 lines in "The Inferno." It is a simple love story, told in half-uttered phrases, in which impulsive and faintly de¬ veloped youth and wise old age flit across the horizon at moments when Nature announces the descent of destiny on willess characters.

The play was printed in Brussels in 1892 and was first played at the Theatre des Bouffes-Parisiens, with Lugne-Poe as Golaud and *Mme.*

Marie Aubry as Pelleas. It was used as the libretto for an opera by Claude Debussy, an exponent of the “new” school of music in

France, and was produced at the Opera-Comique in Paris 30 April 1902. A storm of protest followed this premiere , for the score was unmelodic and filled with dissonance. There was likewise some ill feeling due to the fact that the composer wished Miss Mary Gar¬ den, father than Madame Maeterlinck, to appear as Melisande. The opera was first heard in America at the New York Manhattan Opera House, under the direction of Oscar Hammer-stein, 19 Feb. 1908, with the original Parisian cast. As a play (Pelleas et Melisande> re¬ ceived notable presentation when, in June 1898, Mrs. Patrick Campbell appeared as Melisande, Forbes Robertson as Golaud and Martin Harvey as Pelleas. Later, in America, Mrs. Campbell appeared with Madame Bernhardt, who played PeLleas. (Pelleas et Melisande* was one of the pieces selected by Madame Maeterlinck for out¬ door performance at the Maeterlinck chateau of Sainte-Wandrille. A sympathetic English translation of this play was made by the late Richard Hovey.

Montrose J. Moses.

PELLEGRIN, pel’ -gran, the pseudonym of the Baron de la Motte-Fouque. See Fouque, Friedrich Heinrich Karl, Baron de la Motte-FouQue.

PELLEGRINI, pel-la-gre’ne, Carlo, Eng¬ lish caricaturist: b. Capua, Italy, March 1839; d. London, England, 22 Jan. 1889. He was de¬ scended from the de Medicis on his mothers side. He received a good education, but soon dissipated the fortune inherited from his father. He entered Garibaldi’s army and fought at Volturno and Capua ; and went to England in 1864, where he began his career as a cari¬ caturist. His humorous drawings of men in public life, beginning with Disraeli and num¬ bering several hundred, were published in Vanity Fair over the. signature of “Ape” from January 1869 until his death, and won for him a national reputation. He also achieved some eminence as a sculptor and painted some portraits which were exhibited at the Royal Academy and the Grosvenor Gal¬ lery. Among his intimates at one time he was affectionately called “Pelican.”

PELLEGRINI, Pellegrino. See Tibaldi

Pellegrino di Bologna.

PELLETIER, pel-te-a, Sir Charles Al¬ phonse Pantaleon, Canadian statesman : b. Riviere Ouelle, province of Quebec, 22 Jan. 1837. He was graduated from Laval University in 1858, studied law and was admitted to the bar in 1860, becoming queen's counsel in 1879. He sat in the Dominion Parliament for Kamouraska, 1867-77, was Minister of Agriculture, 1877-78, was made speaker of the senate in 1896, having been a member of that body from 1877, and was knighted in 1898.

PELLEW, pel'oo, Edward, British admiral. See Exmouth, Viscount.

PELLEW, pel'oo, Henry Edward, Ameri¬ can social reformer : b. Canterbury, England, 26 April 1828. In 1853 he was graduated at Trinity College, Cambridge, and received his M.A. at Oxford in 1870. He was one of the founders of Keble College, Oxford, and was on the executive boards of Feltham Industrial School and other institutions, and identified

with various London hospitals and charities. In 1873 he came to the United States, organ¬ ized the Bureau of Charities in New York in association with the late Theodore Roosevelt, and was active in organizing night refuges, a free circulating library, coffee houses, the first tenement-house reform movement and the erec¬ tion of improved dwellings. Since 1888 he has resided in Washington, D. C., where he is in¬ terested in work among the negroes, in the formation of the Washington Protestant Epis¬ copal diocese and in aiding the building of the Washington cathedral.

PELLICO, pel'le-ko, Silvio, Italian poet and dramatist: b. Saluzzo, Piedmont, 24 June 1788; d. Turin, 1 Feb. 1854. At the age of 16 he went to Lyons, France, where he remained a few years and on his return became a private tutor. In 1810 he became an instructor in the French language in an institution at Milan. In 1818 he joined Romagnosi Manzoni and others in establishing II Conciliatore, a liter¬ ary journal in the patriotic interest, which was suppressed by Austria after a two years' pub¬ lication (1818-20). He was arrested in 1820 as a member of the Carbonari, and on 21 Feb. 1822 was finally

condemned to death. The emperor, however, commuted the sentence to an imprisonment for 15 years in the citadel of Briinn, Moravia. He was released in 1830 and went to live at Turin. His health had been broken by his suffering, however, and his rec¬ ord of his experiences, (Le Mie PrigionP ((My Prisons, > 1832), made him, says Garnett, ((as typical a figure as the Iron Mask or the Pris¬ oner of Chillon.® It was soon translated into many languages ; there is an English version by Roscoe (1833). Pellico's lyric verse is indiffer¬ ent, and but one of his tragedies, (Francesca da Rimini* (1818), has remained famous, although <Laodicea) was highly esteemed in its time. Of this there is a rendering into English by Bingham (1897; Utalian Gem) series). Con¬ sult The Foreign Quarterly Review, April and October, 1833; Longfellow, (The Poets and Poetry of Europe* (1845) ; Giuria, (Silvio Pellico e il Suo Tempo) (1854).

PELLITORY, or SPANISH CAMO¬ MILE, a plant (Anacyclus pyrethrum) closely related to and resembling chamomile (q.v.) of the same order and belonging to an allied genus. The flowers are considerably larger, and are less numerous than those of camomile. It is a native of the Levant and of southern Europe. The root has a hot, pungent taste, derived from a fixed resinous matter, which stimulates the salivary glands, and excites a glowing heat in the mouth. A genus of plants (Parietaria) of the nettle family is known as wall-pellitory. The common wall-pellitory (P. officinalis) is a herbaceous perennial, which contains nitre, and was formerly used as a diuretic.

PELOPIDAS, pe-lop'i-das, Theban gen¬ eral and statesman : d. Cynoscephalae, Thessaly, 364 b.c. He was a son of Hippoclus, inherited great wealth, and was an intimate friend of Epaminondas. In 382 the Spartan leader Leontiades seized the Cadmeia, the Theban citadel, and Pelopidas was driven into exile at Athens. He returned in 379 with a small band, and in a surprise attack at night, which has become clas¬ sic, recovered the Cadmeia, overthrew the Spar¬ tans and with his own hand slew Leontiades.

A democratic government was formed and Pelopidas became its leading general. He won the battle of Tegyra against the Spartans in 375, and aided Epaminondas to defeat the Lacede¬ monians at Leuctra in 371, making Thebes for a time the ruling power of Greece. In 368 Pelopidas headed the expedition against Alex¬ ander of Pherae and was treacherously taken prisoner, but was liberated by Epaminondas and was sent on an embassy to the Persian court, where great success attended him. In 364 he again moved against Alexander

and defeated the latter's forces at Cynoscephalae, but was slain during an impetuous pursuit of his fleeing enemy. Consult Plutarch, (Life of Pelopidas.*

PELOPONNESIAN WAR, the interne¬ cine and intermittent contest, hardly to be dig¬ nified by the term war, between Sparta and Athens for the hegemony of Greece 431-404 b.c. The aristocratic party in Athens, after the sec¬ ond Persian Invasion in 480, had in general under the leadership of Aristides and Cimon aimed to effect a cordial understanding with all the Greek states and especially with Sparta, leaving her leadership unquestioned. But the democratic leaders of Athens' golden age, com¬ ing into power in 460, changed all this, recog¬ nized the natural contrariety of the interests of the two states, built up the city's navy, strengthened the Peiraeus, formed an Ionic league, which soon proved a mere means of money getting for the expenses of the growing navy, and provoked the struggle. In 435 Athens as ally of Corcyra assisted that city when Co¬ rinth undertook to protect Epidamnus, a Doric colony, against Corcyra ; and immediately Corinth summoned the aid of Sparta. In 431 when Thebes, a city of central Greece, but a bitter enemy of Athens, opened the war by at¬ tacking Plataea, Athens was supreme at sea, Sparta on land; Athens had a widely scattered and weakly bound empire. Sparta's was massed in the Peloponnese, with important outposts at Athens' very door, and Athens represented Ionic democracy, Sparta, Doric oligarchy. The result was that the war became not a mere conflict between two leagues, but a manifold civil war, the democratic party in each siding with Athens, the oligarchy with Sparta, and each ready to massacre the other. As for the two principal actors in the struggle — Athens at¬ tempted by sea to devastate the coasts of the Peloponnese, and Sparta striking by land laid waste the state of Attica with the exception of the city of Athens and its long walls reaching down to the sea. In 429 Pericles, the able Athenian leader, died of the plague that ravaged the city, and two years later Athens captured Mytilene, and the Spartans and Thebans took Platsea, the most bloody outrages taking place in each conquered town. In 425 Athens seemed utterly successful ; she fomented a rising in Corcyra which annihilated the pro-Spartan aris¬ tocrats; and she captured an entire Spartan garrison on the island of Corcyra — a terrible blow to an army whose motto was (<Death or victory.® Sparta sued for peace, but Cleon and the other demagogues of Athens refused. The operations in Thrace against Athens' pos¬ sessions there were carried on brilliantly by Brasidas, but at Amphipolis in 422 both he and Cleon were killed. Nicias (q.v.), an aristocrat and a Conservative, took the place of promi-488

nence held by Cleon at Athens and negotiated in March 421 a 50-year truce, which unfortu¬ nately did not bind the Spartan allies, and even in Athens was soon disregarded owing to the growing influence of Alcibiades (q.v.). In 420 he formed a league between Athens, Mantinea, Argos and Elis ; then planned to bring about the defeat of Sparta in the Peloponnese by means of Argos — a scheme crushed by the Spartan victory over the Argives at Mantinea (418). The unfortunate Sicilian expedition (415-13) might have succeeded had not Alci¬ biades been forced out of command and into the enemies' camp. As it was, it struck at Athenian maritime prestige and practically fin¬ ished the war. The eight years before the ac¬ tual end were marked by sudden renewed vigor on the part of Athens due to the recall of Alci¬ biades in 411 ; his victories at Abydus and Cyzi-cus in 408 were the last that Athens won. Then Sparta with the unlimited wealth of Cyrus as backing gained the lucky victory of 2Egospotami (405), Athens was taken, and the long walls were razed (404). The story of the war is told by Thucydides (q.v.), the first great philosophical historian, whose incomplete narra¬ tion is supplemented by Xenophon's (Hellen-icaˆ Consult the authorities under Greece, History.

PELOPONNESUS, pel-6-po-ne'sus, or PELOPONNESE (Greek, «Pelops' Island"), the ancient name for southern Greece, the large peninsula now known as the Morea, because its outline resembles that of a mulberry leaf. It is an individual mountainous system of more than 8,300 square miles, reaching at its apex an ele¬ vation of 7,875 feet. It is attached to the main¬ land by the slender isthmus of Corinth, which has the Corinthian Gulf on the west and the Saronic Gulf on the east. The chief divisions of the country in ancient times were Arcadia, in the centre, Achaia, to the north, Elis, to the west, Messenia, to the southwest, Laconia, to the southeast, and Argolis, to the northeast. There was never much trade in the Pelopon¬ nese; its people were farmers and herdsmen. At one period it was notorious for its roaming bodies of brigands. Patrae (q.v.) was the only port of importance. It contained the cities of Mycenae, Sicyon, Tiryns, Corinth, Argos, Trce-zen, Epidaurus, Sparta. Pylos, Methone, Elis, 2Egium, Tegea, Mantinea and Megalopo¬ lis. Consult Clarke, (Peloponnesus, Notes of Study and TraveP (1858) ; Beule, (Etudes sur le Peloponnese* (1875) ; Curtius, (Peloponne-sos) (Gotha 1851-52) ; Leake, (Travels in the

Morea* (London 1830) ; and <Peloponnesiaca> (ib. 1846) ; and Philippson, {Der Peloponnes* (Berlin 1892) ; Blonet, Expedition scientifique du Moree* (Paris 1838). See Greece.

PELOPS, pe'lops, a legendary personage appearing in Greek mythology, as the son of Tantalus, king of Lydia, and the grandson of Zeus. He1 became a suitor of the beautiful Hippodama, and by defeating her father CEnomaus, king of Pisa, in a chariot race, through the treacherous connivance of Myrtilus, the king's charioteer, obtained the bride with a kingdom. Myrtilus had been won over by an offer of half the kingdom ; but Pelops, being unwilling to keep faith with him, threw him from a cliff into the sea. The drowning man cursed his murderer, and to this curse was at¬

tributed all the misfortunes that fell upon the house of Pelops. Peloponnesus received its name from him. Of his sons, Atreus and Thy-estes are most celebrated. After death Pelops received divine honors, and a temple was built to him in the grove at Olympia, in which was the Pelopium where sacrifices to him were of¬ fered. His memory was further perpetuated in sculptures on the east pediment of Olympia. History records his name as the leader in the Achaean invasion, 1300 b.c. ; and attributes to him the restoration of the Olympian games.

PELORIA, in botany, the appearance of regularity of structure in the flowers of plants which normally bear irregular flowers, instan¬ ces of which occur in the snap-dragon and the toadflax, which being normally irregular, as¬ sume a symmetrical form. It seems to be the result of abnormal conditions, especially as concerns light.

PELOTA, pa-lo'ta, or JAI-ALAI, a Span¬ ish ball game popular in Cuba, South and Cen¬ tral America, and latterly in certain parts of the United States. It is played both indoors and out ; but requires a court or concrete floor, 200 feet long and 65 feet wide, with a front wall 36 feet square at one end and a second or rebounding wall of similar dimensions at the other end of the court. The game is played with a ball, about the size of a lawn tennis-ball and a long, narrow, curved wicker work basket or chistera fastened to the hand by means of a glove. The players number four, six or eight, divided equally into sides or teams. In the professional game there are three players on a side. The ball is bounded from basket to wall and must always be kept in motion. The game is usually of 50 points. What cricket is to England, football and baseball are to the United States, lacrosse and hockey are

to Canada, pelota is to Spain and other Spanish¬ speaking countries. It is claimed for this game that it requires a better eye, more speed, activity and surer control over every muscle of the body than any other sport.

PELOTAS, pa-lo'tas, Brazil, city and most southerly port of the state of Rio Grande do Sul , 25 miles northwest of the city of Rio Grande, on the left bank of the Sao Gongalo River. The bar of the embouching river has been cleared away and Pelotas has become one of the most important of Brazilian ports be¬ cause of its fine harbor. The Sao Gongalo makes commercial relations with Uruguay pos¬ sible. While the commercial section of the city is not always inviting, the residential quarter and the suburbs are attractive. Its chief indus¬ try is drying and powdering meat; there are great abattoirs near the city and 600,000 cattle or more are killed each year. Pop. about 33,000. There are many Europeans, especially Germans aud Italians, in the city. The port serves also a considerable part of Uruguay, and its chief exports are the hides of cattle and horses, and a quantity of mate, or Paraguay tea. The imports are chiefly coal, iron and steel, both raw and manufactured, cotton goods, china, glass and earthenware, flour, paper] machinery and firebrick.

PELOUBET, Francis Nathan, American author: b. New York City, 2 Dec. 1831 ; d. March 1920. In 1853 he was graduated at Williams

College and in 1857 at the Bangor Theological Seminary and in the same year entered the Congregational ministry. From 1857 to 1883 he held various pastorates in Massachu¬ setts, after which he has devoted himself to religious literary work. His published works include (Select Notes on the International Sunday School Lessons* (44 annual vols., 1875— 1918) ; three grades of Sunday School Quarter¬ lies for the Scholars, 1880-1919; ˆSuggestive Illustrations on Matthew, John and Acts) (3 vols., 1898-99); (Loom of Life* (1900); <The Teacher's Commentary on Matthew and on Acts* (1901) ; (Front Line of the Sunday School •Movement1* (1904) ; (Studies in the Book of Job* (1906) ; and various articles on the Sunday School. He edited ˆSelect

Songs for the Sunday iSchool* (Vol. I, 1884; II, 1893) ; (Revision of the Oxford University

Bible Helps* ; (The Cyclopedic Concordance* (1903) ; a second revised edition of Smith's (Bible Dictionary* ; (The International Bible Dictionary* (1912) ; (Treasury of Biblical In¬ formation* (1913) ; (Oriental Light* (1914).

PELTIER EFFECT, a phenomenon of cooling, or the apparent absorption of heat, observed by J. C. A. Peltier at the junction of two rods of metal, when a current is made to pass through both in the same direction as the current which heats them. It is well known (see Thermo-electricity) that heat is trans¬ formed into electricity in a thermo-electric circuit. The electric current in passing through all parts of the circuit tends to heat the con¬ ductors, so that it would seem as if the current merely carried heat from the thermo-electric junction to other parts of the circuit, effecting an equalization of temperature. The heat is transformed into electricity not only at the hot junction, but also, as Lord Kelvin has shown, at portions which have different temperatures of one or both metals. Peltier discovered that a current flowing in a circuit composed of two metallic conductors heated one junction and cooled the other, and it came to be supposed that, as in a thermo-electric circuit, the cur¬ rents hitherto observed had cooled the hot and heated the cold junction in the manner ob¬ served by Peltier, the heat producing the cur¬ rent was wholly absorbed at the hot junction, and given out at the cold junction, diminished by radiation, and by the heat equivalent of the work done in the rest of the circuit. It has been shown by Lord Kelvin that this explanation is incomplete. When the temperature of the junc¬ tion is at the <(neutral point** (see Thermo¬ electricity) the two metals are thermo-elec- trically identical, and no Peltier effect can oc¬ cur, yet a current passes through a circuit when the hot junction is at the neutral point and the other is not, and therefore there must be ab¬ sorption of heat somewhere else in the circuit than at the junctions. It has been proved that in a copper wire a current carries heat with it from a hot place to a cold one; whereas in an iron wire a current carries heat with it from the cold places to the hot ones, thus retarding equalization of temperature throughout the circuit. See Electric Direct Current.

PELUSIUM, pe-lu'shi-um, ancient city of Egypt, situated at the northeastern extremity of the delta of the Nile, and giving its name, which in Greek meant (<mud city,** to the eastern or

Pelusiac mouth of the Nile at Tineh, 40 miles to the north. The city of Pelusium is probably to be identified with Sin of the Bible. It was the scene of several battles, notably the defeat of Sennacherib's besieging forces owing to the fact that the night before the battle a host of field-mice made their way into the Assyrian camp and gnawed through the bowstrings; and the victory of Cambyses in 525 b.c. which put an end to the Egyptian Empire. Pelusium is celebrated as being the birthplace of the geog¬ rapher Ptolemaeus. All that remains of the city at the present day is a few mounds and fragments of broken columns.

PELVIC GIRDLE. See Pelvis.

PELVIS (Latin, <(basin**), the bony basin formed by the haunch-bones and sacrum of ver¬ tebrates, which constitutes the arch giving sup¬ port to the lower or hinder limbs. The pelvis corresponds to the shoulder-girdle of the upper or fore limbs, and forms a cavity in which sev¬ eral of the abdominal viscera, and organs relat¬ ing to reproduction and the urinary functions, are contained and protected. The human pelvis is formed on the sides and in front by two bones, each of which is known as an os innominatum. This, the chief bone of the pelvis, although consisting of but a single bone in the adult, is in the young state composed of three distinct bones, the ilium, ischium and pubes. These bones unite firmly about the 25th year of life to form a deep cup-shaped cavity, the cotyloid cavity or acetabulum, which receives the head of the femur or thigh-bone, and thus forms the hip-joint. To this cup the ischium and ilium each contribute two-fifths of its ex¬ tent, the pubes making up the remaining one-fifth. The acetabulum shows on its lower sur¬ face a depression, to which the interarticular ligament of the hip-joint is fixed. From the acetabulum the ilium rises backward and up¬ ward, and constitutes the haunch, and thus forms the chief upper boundary of the pelvic basin. The ischium passes backward and down¬ ward from the acetabulum, while the pubis proceeds inward and forward, and joins its fellow of the opposite side to form the front wall of the pelvis. Behind, the innominate bones articulate with the sacrum — composed of several vertebrae united together in one bone — which thus forms the posterior part of the pelvis. The sacrum and coccyx belong to the spinal column. The sacrum is an irregu¬ lar pyramid in shape, apex downward and joint¬ ing with the coccyx.

The pelvis is inclined in the erect attitude of man so that the plane of its brim forms with the horizontal plane an angle of from 60 de¬ grees to 65 degrees, raising the base or upper part of the sacrum about four inches above the front. The pelvis of man differs materially from that of woman, the differences having chiefly reference to the greater

capacity re¬ quired for the purposes of gestation. The ilia in woman are more expanded than in man, giving to the female her noticeably greater breadth, on the average about two inches, across the hips. The pelvis of woman, as a whole, is also of lighter weight than that of man. Com¬ plicated muscular attachments exist in con¬ nection with the attachment of the pelvis to the trunk, and with that of the lower limbs to the pelvis. Deformities of the pelvis arise from

various causes, error in development, local disease, injury, new growth, *etc.* There are racial peculiarities in the shape of the pelvic brim. That of the Caucasian is wide trans¬ versely, while that of the negro is relatively constricted in the same sense. . The study of the shape and size of the pelvis is of especial interest to obstetricians.

The pelvis varies greatly in development and perfection even in the Mammalia. It may be extremely rudimentary, as in whales, dugongs and manatees. In the Mammalia generally the pelvis is always more elongated and narrower than in man. It is much elongated in bats and insectivorous mammals ; its halves being con¬ nected at the pubis by ligament only, or being, as in many bats and in moles and shrews, wholly unconnected and separate in front. In no birds, save in the ostriches, are the pelvic halves united at the symphysis pubis. In all birds, and in the porcupine anteater, the acetabulum is perfo¬ rated. The Monotremata and Marsapialia pos¬ sess what are termed marsupial bones, attached to the front of the pelvis brim or pubes. (See Mammals; Marsupialia; Monotremata). These bones are merely the ossified inner ten¬ dons of the external oblique muscles of the abdomen, which in kangaroos, etc., support the marsupium or pouch. The ischia are the most constantly represented elements in the mamma¬ lian pelvis. In turtles and crocodiles the dis¬ position of the pelvis resembles that of man. In some snakes (for example, boas, pythons, etc.) a rudimentary pelvis exists. In all am¬ phibians the ilium is invariably represented in the pelvis, and an ischium in all except Proteus. In fishes many variations exist in the degree of perfection of the pelvic elements. The ilium of fishes is almost

invariably absent.

Pelvic Girdle. — In man this part of the skeleton (imperfect behind, the gap being filled by the sacrum) is formed by the two innomi¬ nate bone — the haunch or hip bones. In the lower forms of animal life its construction is various. See Anatomy; Osteology, and con¬ sult Dorman, Franklin A., < Deformities of the Pelvis) (New York 1916).

PELZ, pelts, Paul Johannes, American architect: b. Seitendorf, Silesia, 18 Nov. 1841; d. 30 March 1918. Educated, College Saint Eliza¬ beth and the College of the Holy Spirit, Bres¬ lau; at 16 removed to America whither his father had come in 1851 for political reasons. In 1859-66 he studied architecture at New York under Detlif Lienau. For many years he was connected with the United States light¬ house board as architect and civil engineer, and designed many lighthouses. He was architect of the Congressional Library building, of Georgetown College Academic Building, Car¬ negie Library and Music Hall Building, Alle¬ gheny, Pa., the United States Government Army' and Navy Hospital at Hot Springs, Ark., the Chamberlain Hotel, Old Point Comfort, Va., Clinic Hospital, University of Virginia, Aula Christi at Chautauqua, N. Y., Machinery Hall at the Saint Louis Exposition, and many others.

PEMBA, a coralline island lying 20 miles due east of the port of Tanga, Tanganyika Ter¬ ritory, and about 28 miles northeast of Zanzi¬ bar. It is a part of British East Africa under the division of the Zanzibar Protectorate. It

is about 38 miles long. 10 miles broad and has an area of about 400 square miles. It is gen¬ erally low with some inland hills and swampy valleys, and is well-wooded and fertile. The northern and eastern parts were until recently covered with primeval forests, which have been partly cut away for clove plantations. ihe Arabs call it (<The Emerald Isle.ˆ The shoie line of the island is deeply indented so that no part of it is far from the sea, and this serves to temper the very hot climate with ˆcontinual breezes. The rainfall is about 75 inches. Malaria of a mild type is prevalent, otherwise the island is salubrious.

Pemba is notable as being the largest clove growing district in the world, haying 38,000 acres under cultivation, and producing an an¬ nual crop of about 9,000,000 pounds — about 70 per cent of the world's supply — valued at nearly $2,000,000. This industry is practically all in the hands of Arabs. There are also some cocoanut

groves, but the soil is too clayey to suit them, and the climate is too moist for dry¬ ing the copra. A few ceara rubber plantations have been set out, and the forests abound in the rubber vine (Landolphia) , but the rubber production is so far insignificant. All sorts of tropical fruits grow in abundance. There were formerly great rice fields, and rice was the chief food of the inhabitants and the chief article of export. Now the principal food is the manioc or cassava (tapioca), and rice is one of the chief imports. The island is governed from Zanzibar, with which it has wireless communi¬ cation, and a weekly steamer service. Chake-chake (pop. 9,000), the principal seaport and town, stands on an inlet on the west coast. Pemba was transferred to the British East Africa Company in 1891 by the Sultan of Zanzibar. The capital is Weti, on the west coast, situated on the islet-fringed Bay of Weti. Pop. about 83,130. Consult Craster, T. E. E., (Pemba, the Spice Island of Zanzibar) (Lon¬ don 1913) ; Lyne, R. N., (Zanzibar in Contem¬ poraneous Times) (London 1905).

PEMBERTON, pem'ber-ton, John Clifford,

American soldier: b. Philadelphia, Pa., 10 Aug. 1818; d. Penllyn, Pa., 13 July 1881. He was graduated from West Point in 1837, served against the Indians in Florida in 1837-39, and took part in the settlement of the Canadian border troubles, 1840-42. He was made first lieutenant in 1842 and served under General Worth in the Mexican War, being breveted captain for conspicuous bravery at Monterey, and major for services at Molino del Rey. He continued in service in the army accompany¬ ing the expedition to Utah in 1858. At the out¬ break of the Civil War he resigned his com¬ mission and entered the Confederate army. He was appointed lieutenant-colonel. and engaged in organizing t]ie artillery and cavalry of the State of Virginia in which task he was eminently successful. He was made a major in 1861, and a few weeks later was promoted to colonel, and then to brigadier-general. In February 1862 he was promoted to the rank of major-general with command of the department of South Carolina, Georgia and Florida; in Oc¬ tober of the same year he was raised to the rank of lieutenant-general; in 1863 succeeded General Van Dorn in the department compris¬ ing Mississippi, Tennessee and eastern Louis-PEMBERTON — PEMMICAN

lana. Here he refused co-operation with General Johnston's plans and his correspond¬ ence with that general fell into the hands of general Grant, who defeated him at Champion's Hill and Big Black Bridge, and later captured Vicksburg after a brave defense by Pemberton. His conduct excited severe criticism and after his exchange he resigned his commission, but m 1864 accepted the rank of lieutenant-colonel with command of the artillery defenses at Richmond and served until the end of the war. 1 he remainder of his life was spent in retire¬ ment in Virginia and later in Pennsylvania.

PEMBERTON, Maˆ, English novelist: b. Birmingham, England, 19 June 1863. He was educated at Cambridge and was one of the staff of Vanity Fair in 1885. He was editor of C hums , a boys' paper, 1892—93, and editor of Cassell's Magazine , 1896-1906. He has pub¬ lished (The Dairy of a Scoundrel' (1891) ; (The Iron Pirate) (1894); (Sea Wolves> (1894), and (The Impregnable City' (1895), stories of adventure; (The Little Huguenot' ; (A Puri¬ tans Wife) (1896); (Gentleman's Gentleman) (1896) ; (Christine of the Hills) (1897), a novel of Dalmatian life; 'The Garden of Swords' (1899); 'The House Under the Sea) (1902); 'Doctor Xavier* (1903); (A daughter of the States> (1904) ; (The Gold Wolf' (1904) ; <The Hundred Days' (1905) ; (Signors of the Night' (1905) ; (Sir Richard Escombe) (1908) ; (White Motley' (1911); (War and the Woman' (1912); 'Behind the Curtain) (1916); (Her Wedding Night' (1917).

PEMBROKE, pem'bruk, Canada, town and county-seat of Renfrew County, Ontario, situated on the Ottawa River and reached by the Canadian Pacific and the Grand Trunk railroads, 100 miles north by west of Ottawa. It has several fine public buildings and contains two hospitals, woolen mills, lumber and saw mills, steel mills, building materials works, tool works, leather and leather goods works, brick yards, *etc.* Pembroke was once the residence of the Rev. Henry Edward Letang, the French-Canadian churchman. Pop. 5,626.

PEMBROKE, N. H., town in Merrimack County, on the Merrimack River, and the Bos¬ ton and Maine Railroad, five miles south of Concord. Pembroke Academy is located here and the town also contains a soldiers' monu¬ ment, monument to Josie Langmaid and a sanitarium. It has extensive interests in farm¬ ing, poultry-culture, and cotton manufacturing. Pop. 3,062.

PEMBROKE, (1) Wales, a western mari¬ time county or shire of South Wales bordered by Saint George's channel on the northwest and the Bristol channel on the south, and bounded northeast by Cardigan and east by Carmarthen. Area, 614 square miles. Capital, Pembroke. The

county is diversified with hill and vale, attaining a height of 1,754 feet in the Precelly Hills; the coast is indented by numer¬ ous bays and fine harbors, chief of which is the celebrated Milford Haven (q.v.). Barley, oats and potatoes are the principal agricultural prod¬ ucts; coal is mined and slate quarried; iron and lead mining have practically ceased. The fish¬ ing industry is important. Pop. about 90,000. (2) The capital of Pembroke County, Wales, on the estuary known as Milford Haven, 40 miles west of Swansea, and 270 miles by rail west of

London. Its principal industries are connected with Pembroke Dock, or Pater, two and one-half miles northwest, a naval dockyard and arsenal, established in 1814. This establish¬ ment comprises an area of 80 acres, and since 1861 has been fortified at a cost of more than $2,500,000. Pembroke's most interesting edifice is its ruined Norman castle dating from 1094, in which it is said Henry VII was born in 1457. Pop. about 15,600. (3) The capital of

Renfrew County, Ontario, Canada, on a south¬ ern point of Allumette Lake, an expansion of the Ottawa River, 74 miles by rail northwest of Ottawa on the Canadian Pacific and Canadian Atlantic railways. It is the see of a Roman Catholic diocese. The Muskrat River, a small affluent of the Ottawa, traverses the town and supplies water-power to the saw, grist, woolen mills, the tannery and other industrial estab¬ lishments. The town has nine churches, six schools, two hospitals and three banks. It is supplied with cheap hydro-electric power from its own works, and manufactures for export mocassins, gloves, steel furniture, *etc.* A con¬ siderable trade in lumber is carried on. Pop. about 8,500. (4) A municipality of Leinster,

Ireland, suburban to Dublin, on the southeast.

PEMBROKE (pem'brok) COLLEGE, Cambridge, England, was founded in 1347, under the name of Valence-Mary, by Mary de Saint Paul, widow of Aylmer de Valence, Earl of Pembroke, who was killed on his wedding-day at a tilting match held in honor of the bride; she thereupon went into conventual re¬ tirement, bequeathing her estate to pious uses. King Henry VI was so liberal a benefactor to the college as to obtain the name of a second founder. There are 29 open scholarships, vary¬ ing in value from $100 to $400 a year, and 13 open fellowships. The buildings were greatly added to and altered between the years 1870 and 1883, many of the original structures being torn down and rebuilt. The chapel, in Corin¬ thian style, was

built by Sir Christopher Wren in 1663. Among many noted alumni are Nicholas Ridley, the martyr, Archbishops Grindal and Whitgift, Spenser and Gray, the poets, and William Pitt (the younger).

PEMBROKE COLLEGE, Oxford, Eng¬ land, originally Broadgates Hall, was founded in the year 1624 by James I, and obtained its name from William Herbert, Earl of Pembroke, then chancellor of the university. It was en¬ dowed by the Rev. Richard Wightwick, rector of Ilsey, Berks, and by Thomas Tesdale of Glympton, Oxfordshire. The present constitu¬ tion of the college, settled by ordinances of the commissioners under the statute of 1877, admits of a master, not less than 10 fellows, and of not less than 12 scholars. Some of the fellow¬ ships are at present suspended There are in all 24 scholarships and exhibitions the value of each being from $300 to $500 a year. Among its distinguished alumni are Beaumont, the dra¬ matist, Camden, the antiquary, Sir William Blackstone, Sir Thomas Browne, Samuel John¬ son, John Pym, Shenstone and George White-field.

PEMMICAN, a food preparation of the American Indians, consisting of buffalo or venison meat, cut into strips and dried in the sun, and, after being pounded into powder mixed with fat to a paste, and pressed into

cakes. It was mixed with shad-berries, cran¬ berries or other wild fruits and compressed in bags of rawhide. It was chiefly used on long journeys and time of war. A similar prepara¬ tion made of beef under the same name is used on long Arctic expeditions, the fruit used be¬ ing raisins or Zante currants. It is regarded as containing the largest possible food value for the space it occupies.

PEMPHIGUS, pem’fi-gus, or POMPHO-LYX, known popularly as ((bladdery fever,® an affection of the skin characterized by an eruption of large vesicles ranging in size from that of a pea to a walnut, filled with serous fluid, blood or pus, and called blebs or bullae. The disease assumes both acute and chronic forms, and appears also as a concomitant with other diseases, as syphilis. In mild acute cases blebs appear in succession, continue for several days, then

break, form a thin scab, and soon heal without fever or inflammation. In severe cases there is often much constitutional disturb¬ ance, the blebs are larger, and the scabs heal with difficulty. The general health shows im¬ pairment, fever develops, and sometimes there is troublesome itching. The chronic form dif¬ fers from the acute mainly by its longer con¬ tinuance. The acute chiefly affects children, and has been ascribed to dentition, errors of diet, *etc.* ; while the chronic chiefly attacks aged persons, and is probably due to debility and im¬ paired nutrition. The acute form usually re¬ quires only cooling medicines and diet, and mild local dressings, such as simple cerate, to pro¬ tect the raw surfaces from exposure to the air. In the chronic form a nutritious diet, with the judicious use of tonics (iron, strychnine, quinine, etc.), is most commonly successful. In obstinate cases arsenic is given. Sedative local applications and continuous baths in warm water are of great importance in the treatment.

PEN, an instrument for writing with a fluid. Pens have been in use from very ancient times, being made and adapted to the material upon which the written characters were to be impressed. In the earliest periods tools of steel served for writing on stone or metallic plates, and such are referred to by Job in speaking of an ((iron pen.® For the waxen tablets of the ancients a metallic stylus was employed, one end of which was sharpened for marking, and the other was flattened for erasing the marks and smoothing the wax, hence the phrase <(often turn the pen,® which was used in careful re¬ vision, with frequent erasure and rewriting. It was also the practice in ancient times, as among the Chinese at the present day, to paint the letters with a fine hair pen¬ cil. Pens of reeds were also made at a very early period for the use of a fluid ink upon papyrus. The reed selected for this pur¬ pose is described as small and hard, and about the size of a swan's quill. It was found in Egypt and Armenia ; and Cairo and Alexandria were famous markets in which it was sold. Along the shores of the Persian Gulf reeds are still collected for this use, and are distributed throughout various parts of the eastern coun¬ tries, being better adapted to the ink and paper employed in these regions than anv other kind of pens. They are prepared by leaving them under dung heaps for several months which causes them to acquire a mixed black and yel¬

low color, and a smooth and hard suiface. The pith is dried up by the heat generated.

Quill Pens.— The introduction of paper ren¬ dered necessary pens of

finer character, and quills of the goose and swan next came into use, and for extremely fine writing those of other birds, as of the crow, were found well adapted. A great trade grew up in these ar¬ ticles, and continued for several centuries. Po¬ land and Russia were largely engaged in it and immense flocks of geese were raised in those countries chiefly for their quills. In a single year Saint Petersburg has furnished to England over 27,000,000 quills. Germany amd the Nether¬ lands were also large producers of goose quills. From each goose the average number of good quills obtained was only 10 or 12, though some¬ times they amounted to 20. As they were plucked from the wing they were soft and tough, and covered within and without with a thin membrane. They were first sorted accord¬ ing to the length and thickness of the barrel into primes, seconds and pinions, and were then buried for a short time in hot sand which dried the outside skin, so that it was easily scraped off, and the inner lining became shriveled and detached. This treatment was called, from hav¬ ing been practised in Holland, (<dutching.® After this the quills were hardened by dipping them into a boiling solution of alum or of diluted nitric acid, which also rendered the barrel yellow. A portion of the barbs was then stripped off, and the quills were tied in bundles for the market.

Steel Pens. — The immense consumption of quills led to the invention of the steel pens, which appeared first in England in 1803. They cost originally $2 to $3 each, although the price was reduced to 12 cents in the course of 10-years. No substantial advance was made in the manufacture until after the adoption of drop presses, in 1825. It was not till after 1830 that steel pens began to come into extensive use, owing to improvements introduced by James Perry, Joseph Gillott, Sir Josiah Mason and other manufacturers. The lowest-priced nens are now made almost entirely by machinery, but the finer qualities require a deal of hand labor in finishing. Up to quite recent years all the steel for the manufacture of pens was im¬ ported from Sheffield, England, and for cer¬ tain makes of pens the steel is still brought from there. But American steel makers have been very successful in supplying a satisfac¬ tory 1 per cent carbon steel which answers every purpose, and the importations are very small. As it comes to the pen manufacturer the steel is in sheets about five feet long, 19 inches wide, and 23/1000 of an inch thick. This is cut into strips 19 inches long and just wide enough to cut a double row of pens, with .their points interlapping alternately. The strips are first annealed for several hours, and then placed in a tumbling barrel containing a <(pickle® of dilute sulphuric acid to remove the scale of oxide. The strip is then cold-rolled by successive reductions to a thickness of 9/1000 of an

inch — requiring about 20 passes through the rolls. For some special pens the thickness required is but 2/1000 of an inch. The sheets are most carefully gauged, the maximum variation permitted being 1/4000 of an inch. The strips are passed into the hands

of a girl, seated at a press, who, by means of a die and punch corresponding, cuts out pieces the shape of the pen, called blanks at the rate of 40,000 per day of eight hours, some 200 dif¬ ferent styles of dies beiner required to produce the variety demanded by the market. The next stage is called piercing, which is cutting out by a punch the central hole in the nib, and at this stage also the lateral slits are cut. The metal has become through the repeated rolling and stamping so hard that it is necessary to anneal it. This is effected by placing the blanks in cast-iron pots, and raising them to a red heat in a muffle-furnace, afterward leaving them to cool slowly. Up to this stage the blank is a flat piece of steel ; it is now stamped with the maker's name and the number, and is then passed to the raising-press, where it is rendered concave by being pressed into a groove by a sinker. The next process is hardening, which is done by heating the pens to a red heat in an iron box or muffle, and then plunging them in oil. The process of tempering follows; and then they are scoured and cleaned by immersion in soda water and dilute sulphuric acid success¬ ively, and by friction in a tumbling barrel with sand and similar solid substances. The outside of the nib is then ground first lengthwise and then crosswise, which is done by different per¬ sons upon separate emery grinding-wheels. Next comes the most delicate operation, cutting the central slit, upon the nicety of which a great part of the value of the pen depends. The pen is placed lengthwise on a chisel fixed in the bed of a shearing machine; the descending lever carries another chisel, which passes down just clearing the other with the minutest ac¬ curacy. The points of the tip are now very sharp and jagged: they are smoothed bv being tumbled in pots for 30 hours with granulated fire-clay bricks. They then eo to the in¬ spectors' tables which are of black glass. Here each pen is scrupulously examined by an ex¬ pert for accuracy of cutting, piercing, marking, raising,

grinding, slittiner. tempering and finish of point. Those which are passed as perfect are then polished in buffing boxes. If they are to remain their natural steel gray color they are at once lacquered. Or they may be plated with gold, silver or bronze. Or they may be colored brown, black or blue, by being heated in a revolving metal cylinder over a charcoal stove, and removing them when the desired tint is attained; they are then varnished by lac dissolved in naphtha.' After being dried by heat they are counted mechanically into small boxes ready for the market. A large propor¬ tion of the cheaper grades of steel pens are now made on automatic machines which turn out the finished pens ready for lacquering. The annual production of steel pens in the United States is about 3,000,000 gross. About one-sixth of the total output is exported.

Gold Pens. — The gold pen is an American product and the world's supply is practically manufactured in New York. In 1823 John Isaac Hawkins, an American, residing in Eng¬ land, imbedded pieces of diamond and ruby in the points of tortoise shell pens, which were softened in water to receive the stones. The same manufacturer, hearing that bits of an ex¬ tremely hard native alloy of iridium and os¬ mium, sent by Dr. Wollaston to a penmaker to

be used for points, had been returned as too hard for working, obtained these for his own experiments and was the first to produce the famous <(diamond points® soldered to gold pens. The manufacture of these pens made but slow progress, great skill, the result of long continued experiments, being necessary to produce the exact shape suited for the required elasticity of the pen and to combine this with the proper size and form of the points. They were more¬ over costly as well on account of the metal employed as the labor expended in the manufac¬ ture. The right to make gold pens was pur¬ chased of Hawkins by Dr. Cleveland, an Ameri¬ can clergyman then in England, who on his return induced Levi Brown, a watchmaker in Detroit, to undertake their manufacture. This was about the year 1835. The experiment was attended with little success. Brown removed in *1840 to New York and there introduced the business, which gradually increased in import¬ ance as the quality of the pens was improved and the price diminished by their more rapid production. At first the pens were cut with scissors into shape from a thin flat strip of gold and a slit being cut in the nib a bit of iridium was soldered to each point separately and the points were then rounded up into shape with a mallet upon a stick. The inferior pens thus made by hand sold for $5 to $10 each. The first machines and

almost the only import¬ ant ones in use applicable to the different branches of this work, were invented by John Rendell, who systematized the process, giving to each workman his peculiar branch and thus a nicety and certainty of g#od work were at¬ tained by each one which was essential to the perfection of the pen. In the process now in use the pure gold as it comes from the United States Assay Office is melted and alloyed with with copper and silver to a 14-carat degree of purity. It is then cast in the form of a bar which is rolled into strips 1.32 of an inch in thickness. The blanks are stamped out on a screw press. A notch is cut in the tip of each blank and a bit of iridium soldered in to form the wearing point. The pen is then ˆmarked® with the maker's name, and curved to proper shape in a suitable press. The tip is then slit at the exact centre by a revolving copper disc coated with emery. The pen is brought to its desired shape and flexibility by grinding on cop¬ per wheels fed with emery and finally polished on buffing wheels coated with rouge. The pen then goes to an expert penman who tests its writing qualities and corrects any defects by regrinding with emery.

Fountain Pens. — From about the middle of the 19th century various attempts were made to construct fountain pens, that is, pens fitted with an ink reservoir from which the point is sup¬ plied by capillary or other action. The fountain pen now in use by the millions was the inven¬ tion of Lewis Edson Waterman in 1883. It is a combination of a rubber barrel and a gold or gilded pen. The completed article as it ap- . pears in the market has passed through 210 distinct operations between the crude materials and the finished product. The making of the gold pen has been described above. The larger fountain pen factories make their own pens, but in some plants only the barrels are made and gold or gold-plated pens are bought from

the pen makers and assembled by the fountain pen manufacturer. In making the barrel the crude rubber "biscuits® are sliced and ground up, the dirt being washed out by jets of water during the process. For 10 or 12 days the rubber is dried and cured in an oven kept at 135° F.,

and is then mixed with about one-third of its weight of sulphur in a mixing mill. From this the mass is passed through the sheet¬ ing rolls and the sheets are then cut into strips of two widths to form the barrel and the cap. These strips are delivered to workmen who sit at heated tables of polished steel and who roll the strips on small cylindrical mandrels and when the rubber is of the proper thickness wind both rubber and mandrel with metal foil. They are then packed in powdered soapstone in steel boxes, which are placed in a vulcanizer and kept at a temperature of 300° F. for 14 or 15 hours. A certain elasticity being required in the finished barrel, the vulcanizing must not be carried too far. After cooling, the cap and barrel are hand turned in a lathe, the barrel being tapered at both ends to fit the cap. Threads are cut for the "spoon® which feeds the ink to the pen ; the ink fissure is routed out ; and the air vent is bored. The parts are then in the rough and have to be polished on a cot¬ ton wheel buff coated with rouge. The chasing of the barrel is done with a diamond. The latest improvement in the fountain pen is an automatic filler, or, to be more exact, a device for filling the pen without removing the part containing the pen from the ink-reservoir, the ink being drawn through the pen, which is dip¬ ped into the well or bottle. Still another im¬ provement is the screw force feed which over¬ comes the drawback experienced in the older models of the clogging of the ink channel through drying. The force feed is reversed to fill the pen. The annual proauction of foun¬ tain pens in the United States alone is between 7,000,000 and 8,000,000.

The Pen Industry. — Pens are now made in almost endless variety as regards shape and size, character of point, etc., as many as 2,000 distinct sizes and styles being offered by makers. The great centre of the manufacture is Bir¬ mingham, England, where more than 20,000,000 pens are turned out every week. France and Germany also manufacture steel pens and New York leads in the gold pen production of the world. Some idea of the growth of the pen in¬ dustry may be obtained, therefore, when it is known that in 1860 nearly all the pens consumed in this country were of foreign manufacture. In 1860, Richard Esterbrook, his son Richard and James Bromgrove founded a pen factory at Camden, N. J. The business was a success from the start and in 1866 the firm was incorpo¬ rated as the Esterbrook Steel Pen Company. In 1880 not more than $10,000 were invested in the pen industry. Besides the Esterbrook com¬ pany, prominent pen manufacturers in the United States are Miller Brothers, Meriden, Conn. ; Turner and Harrison and Malpass and Company, Philadelphia; and the Eagle Pencil Company; A. S. Barnes Company and Jos. Gillott and Sons, New York.

According to the 1914 census of manufac¬ tures there were in the United States in that year, engaged in the manufacture of steel pens, five establishments with an aggregate capital of

$870,601, employing 243,043 hands and with an output for the year valued at $513,498. 1 here

were 12 establishments making gold pens hav¬ ing a combined capital of $408,228, employing 174,209 hands and turning out a product valued at $642,461. There were also 55 establishments making fountain pens and stylographs, with $3,269,809 capital, employing 717,533 hands and a product valued at $6,865,074.

PEN ARGYL, pen ar'jTl (Welsh, Argyl Head), Pa., borough of Northampton County, on the Bangor and Portland and the Lehigh and New England railroads, 20 miles north of Easton. Its industrial activities include shoe factory, planing mill and several slate quarries. Pop. 4,096.

tatt1 TvT OTTHDT 1? T T'runr.o A PH V

~ PENA, pa'na, Carlos Maria de, Uruguayan diplomat: b. 1852. In 1876 he received the degree of doctor of laws and social sciences at the University of Montevideo. From 1885 to 1911 Senor de Pena held the chair of political economy and administrative law at the Lhii-versity of Montevideo, where also he served as dean of the School of Law and Social Sciences. He was mayor of the city of Montevideo in 1889-90. He also was Secretary of the Treas¬ ury and Minister of Public Works, Industry and Public Instruction in the national gov¬ ernment. In 1907 the government despatched him to a confidential mission to Brazil; in 1911 he was delegate to the Pan-American Con¬ ference at Buenos Aires and in the same year was named Uruguayan Minister to the United States. His published works include several volumes on the commerce, education and in¬ dustry of his native land.

PElsfA, Rogue Saenz, Argentine president, son of Don Louis Saenz Pena, also President of Argentina: b. Buenos Aires, 19 March 1851; d. there, 9 Aug. 1914. His education at the law school of the University of Buenos Aires was interrupted by service in the army while a

revolution was being suppressed, after which he completed his course. He was elected to Par¬ liament in 1876 and in the following year be¬ came president of the Chamber, but resigned to offer his services to Peru in the war between that country and Chile in 1879-83. He was wounded and captured, but was released before the end of the war and returned to his own country. He was under-secretary for foreign affairs in 1881 ; and in 1882 was one of the founders of Sud America. He was appointed Minister to Uruguay in 1882; was a delegate to the first International Congress of American States in 1889-90; and was Minister of Foreign Affairs in the Cabinet of Juarez Celman in 1890. In 1906 he was appointed ambassador to Spain, and he was ambassador to Italy in 1907— 10. He was elected President of Argentina in 1910, on a platform of agrarian reform. His administration was marked bv the establishment of cordial relationships between Argentina, Brazil and Chile, resulting in the A. B. C. En¬ tente. His work greatly strengthened the unity of the Latin races in America as well as fos¬ tered good feeling between his country and Spain and Italy. He died in office.

PENALTY, (1) Originally, a punishment inflicted, as for violation of the law ; common in the phrase “death penalty.® (2) A sum of

money agreed to be forfeited in case of non¬ performance or breach of a condition, as in a contract. A penalty, unless damages are un¬ certain or unless agreed upon as liquidated damages, will not be enforced either in a court of law or of equity. The language of the con¬ tract is not conclusive, and if the parties call it a penalty and it appears to be the amount of damages they believe will ensue from a breach, it will be enforced. (3) A sum of money re¬ coverable by virtue of a penal statute for vio¬ lation of its provisions.

PENANCE, a theological term, signifies first, a virtue, or condition of mind; secondly, an outward act or series of acts, expressive of the mental condition; thirdly, — according to the Catholic conception, — a sacrament; all having to do with the forgiveness or atonement of sin. Ihe three various phases are not considered as independent, separate

means for obtaining re¬ mission of sin, but as supplements, one of another : the penitential spirit is the primary necessity; the penitential exercise is the natural and obvious manifestation of the interior state of soul ; and the sacrament is not a substitute for either the virtue or the act, but a comple¬ ment of both. The necessary brevity of this article will allow only a most summary treat¬ ment of the virtue and only such mention of the penitential discipline as may come inci¬ dentally in the treatment of the main subject, the sacrament of penance.

1. “Penance,® the virtue, is synonymous with “repentance,® “contrition,® and such other terms as express sorrow for sin as an offense against the law and the person of God. All Christian theology agrees that without repentance of heart there can be no remission of sin. But as to the precise nature of this sorrow there is dissen¬ sion. According to the Augsburg Confession (Art. XII), “Repentance consists of two parts; one is contrition or terrors stricken into the con¬ science through the acknowledgment of sin ; the other is faith that for Christ’s sake sins be forgiven.® The Council of Trent, teaching the Catholic doctrine, quotes the Lutheran defini¬ tion, condemns it as insufficient and explains that for true repentance there must be not only present “contrition or terrors,® with “faith,® also a look into the past and a provision for the future; there must be “sorrow of mind, a de¬ testation of past sin and a determination of not sinning for the future.® (Sess. 14, ch. 4.) How¬ ever, Trent recognizes a distinction between perfect and imperfect contrition; that contrition is perfect which is motived by love of God, that is imperfect which is begotten of fear of the punishment due to sin. The former, sorrow for sin for God’s sake, of itself immediately remits sin, even without sacramental absolution, provided it be accompanied by at least an im¬ plicit willingness on the part of the penitent to make use of whatever means God may have pro¬ vided for the receiving of formal forgiveness. * Furthermore, even by use of the sacrament, no one can possibly receive forgiveness unless he have at least the sorrow that comes from fear.

2. The Sacrament of Penance. — Any discus¬ sion about the existence of the sacrament may be narrowed down into an attempt to answer the question: did Jesus Christ, as the founder of a new religion, establish an institution for continuing visibly and through human instru¬

mentality one of the chief works of salva¬ tion, the forgiveness of sin

after baptism? Anyone, it would seem, who at all admits the sacramental idea in the Christian religion — who accepts, for example, the fact of baptismal re¬ generation, cannot logically maintain, a priori, the impossibility of the existence of a sacrament for the forgiveness of post-baptismal sins.

And indeed, whether there is or is not such a sacrament, is a question of historical fact rather than of theological theory; and the answer to the question must come from an ex¬ amination of historical evidences.

The scriptural texts, offered as witness of the foundation of a special " ministry of recon¬ ciliation,® are three: St. Matt, xvi, 18, xviii, 18, and St. John xx, 22 and 23. In the two former passages, Christ is represented as bestowing, first upon Saint Peter and then upon all the apostles, the power of "binding® and "loosing,® and as promising that their exercise of that power should be ratified in heaven. The pre¬ cise meaning of these two texts is not immedi¬ ately evident: it may justly enough be main¬ tained that, taken alone, they give no certainty of a delegation of the power of forgiving sins. It has been pointed out that "to bind® and "to loose® are formulae of rabbinical theology mean¬ ing, "to prohibit® and "to permit® ; hence a mere exegesis of these texts may show only that a general legislative and judicial power was granted to the apostles. But the supple¬ mentary passage of the Fourth Gospel ap¬ parently specifies one of the ways in which the general prerogative of binding and loosing is to be exercised. Saint John pictures the Lord solemnly praying over the apostles, breathing upon them in token of the imparting of the Holy Spirit, sending them forth, as He Himself had been sent forth from the Father and trans¬ ferring to them His own divine prerogative of forgiving and retaining sins.

Taking the three texts together, it can scarcely be denied that even in their narrowest significance they witness the imparting of an authority to the Christian church to forgive and to retain sins in Christ's name.

This fact is not generally disputed. Protest¬ ants as well as Catholics maintain that the Church possesses and exercises the power of forgiving sins. The discussions have rather concerned the question, Who are the reposit¬ ories of the pardoning power and what are the means by which it is exercised?

The Protestant party in the controversy de¬ clares that the power was bestowed not upon the apostles alone, — and hence not upon bishops and priests alone, — but upon the whole Christian church in general ;

and that the church exercises its power by conveying the “good tidings® to the world, by preaching and baptizing.

Catholics answer that such theories ignore the details of the incidents recorded in the texts of Saint Matthew and Saint John, which show that only the apostles were present when the Lord gave the commission of binding and loos¬ ing, of forgiving and retaining; that it is ex¬ tremely unlikely that so wonderful a preroga¬ tive should have been conferred indiscriminately upon all ; that to say sins are forgiven only by means of preaching and baptizing is to forget the discretionary and judicial character of the process which permits “binding® as well as

“loosing” “retaining” as well as “forgiving.” Such, in a word, is the status of the controversy concerning the exegesis of the scriptural texts.

But all parties concerned are agreed that a further and perhaps securer interpretation of the Lord’s words is to be sought in an examina¬ tion of the history of the early church ; and, in fact, the vast bulk of modern discussion on the sacrament of penance has dealt with history rather than with exegesis. Ihe adversaries of the Catholic position have, in this case, showed an unusual willingness to appeal from Scrip¬ ture to Tradition. Catholic scholars, in turn, are no less confident of the outcome of a his¬ torical investigation of the origin of penance ; but before undertaking it, they make certain provisos.

They are not loath to admit that the present very exact theology of the sacrament was by no means understood in all its details in the primitive church and that the modern discipline of the administration of penance is the outcome of a long process of — so to say — experimenta¬ tion. For explanation of the divergences be¬ tween the ancient and the modern practice and of the immense advance in certainty of theoretic understanding of the doctrine, they appeal to the principle of theological developments claim¬ ing for the sacrament of penance the same right to legitimate evolution which is acknowledged

for all other Christian institutions. Starting with the essentials once necessarily determined by Christ, namely the forgiveness of sin by men judging in His name and absolving by His au¬ thority they are content if they can show by a recourse to historical documents that the nature of the sacrament was sufficiently clear in its general outlines, from the beginning ; that the forgiveness of sins from earliest Christian times was understood to be consequent upon sorrow of heart, acknowledgment of _ guilt,— either in the church publicly, or to a bishop or a priest privately, or both, — the performance of some penitential discipline and the pronounce¬ ment of reconciliation with the church and with God, by the president of the Christian assembly, the bishop, or his delegated priest. Here, in theological terms, are contrition, confession, satisfaction and absolution, the essentials of the sacrament. All else may vary and be doubtful, conditions and processes of administering and receiving forgiveness may change, the relative value of the constituent parts of the sacra¬ ment may be but obscurely understood, the positive and absolute obligation of confessing may not be universally defined until late in the history of the sacrament, public manifestation of conscience may be found inexpedient and pri¬ vate confession, instead of being an accompani¬ ment or preparation for public confession, may survive alone ; standards of discipline regulat ing the receiving of penitents and the impart¬ ing of absolution may vary from the extreme of severity to the extreme of leniency : along many lines there may be only a gradually increasing certainty of doctrine and a gradually crystal¬ lizing form of discipline, but, say the Catholic apologists, provided it can be shown that in de¬ tails only and not in essentials, doctrine has been clarified and discipline changed, all this involves no incompatibility with the present teaching and practice of the Church.

Such is the viewpoint from which the de¬

fenders of the sacrament look upon the histor¬ ical data, of which a very short summary may here be given.

The first historical evidence of confession in the Early Church is in the Acts of the Apostles (xix 18) The converted Ephesians “came confessing their sins,” evidently not in secret or to God alone, but publicly in the assemb y , and not in general terms only, but in some de¬ tail “declaring their deeds.” And the first clearly recorded instance of the exeicise ot t e absolving power is the “Finding” and the loosing” of the incestuous Corinthian by baint raul (1 Cor. v, 5 and 13; 2 Cor. ii, 10). .

Before the end of the first century, Saint Clement of Rome is recorded as urging penance in this world, because “there can be no confes¬ sion or repentance in the other” (Ep. 2 ana Cor. 8) ; and during the first half of the second century, the Didache twice speaks of public confession in the Church. Any further infor¬ mation concerning the nature of these confes¬ sions, whether they were liturgical or sacra¬ mental, detailed or general, is not vouchsafed by the documents. They cannot, therefore, witness anything further than the fact that there was some kind of public confession in the Church of the 1st and 2d centuries.

Evidently this is meagre evidence, but ex¬ planations are given as to why it could not well be more explicit and satisfactory; first the ex¬ treme paucity of the documents of primitive Christian literature, and second the undoubted predominance in the sub-apostolic Church of s. spirit and tendency which precluded the possi¬ bility of much direct advertence to an institu¬ tion having to do with the forgiveness of sin committed after baptism. The theory was that there should be no such sin. “He who has re¬ ceived remission of his sins” (in baptism) “ought not to sin any more, but live in purity,” says Hermas Pastor (Comm. 4, ch. 3).. The conception of the Chijrch as a community ot saints, the deep-seated expectation of the sec¬ ond coming of the Lord, the intense realization that baptism brought with it an eternal adjura¬ tion of evil, all made the commission of sin after the first regeneration a thing almost un¬ thinkable, and while this idealism reigned, there could be only a kind of subconscious attend¬ ance to the existence of the sacrament of penance, and its use, in consequence, seems to have been almost in abeyance.

To such an extent did this kind of apocalyp¬ tic spirit predominate in the Early Church, that there was an uncertainty as to the method of treating sinners who, in spite of the theoretic impossibility, did actually lapse after baptism. At first they were in some places, and perhaps even at Rome, denied readmission to the Church. A too literal acceptance of the words, “It is impossible for those whd were once en¬ lightened and have tasted of the heavenly gift • … if they shall fall away, to be renewed unto repentance (Heb. vi, 4ff.) led to a gen¬ eral belief that at least some sins were beyond the pardon of the Church (consult Hermas, Jus¬ tin M., Dialogue, 44; Didascalia, ch. 5; Ongen, De Orat. 28). But such a misunderstanding could not last. The Pastor (150 a.d.), after recording that “some teachers maintain that there is no other repentance than that which takes place when we descended into the water

and received remission of our-former sins,® pleads for only one further opportunity for re¬ pentance. (Comm. 4, n. 3). Gradually the plea of the Pastor obtained recognition, its views were adopted by Dionysius of Corinth and Clement of Alexandria, and began to pre¬ vail, though against much opposition and some setbacks.

But alongside the movement toward a milder and saner discipline, there developed a conviction that at least the three capital crimes, murder, apostacy and adultery, were beyond forgiveness in this world. There are indica¬ tions, however, that ultimate pardon from God for such sins -was not despaired of ; the guilty were recommended to do penance and to pray for pardon; but the Church refused to readmit them to her communion. Around this point of discipline the battle was again waged for and against relaxation.

Tertullian, in his tract, De Paenitentia (204 a.d.), affirms as a fact always recognized that the Church forgives sins, but maintains that repentance avails only once after baptism, there is a (<second plank® of salvation after shipwreck but no third ; and he not only accepts but adds to the list of <(irremissible sins.®

Pope Callistus (208-222 a.d.), however, fol¬ lowing the primitive discipline observed by Saint Paul, absolved adulterers, but was roundly blamed for doing so, by Tertullian, now become a Montanist. (De Pudic, ch. 1). Still the milder discipline prevailed not only at Rome but at Carthage and Alexandria. In the latter city, Origen (184-253 a.d.) frequently de¬ clares in most explicit terms the doctrine of confession to the priests, absolution and re¬ newal of repentance.

The Decian persecution (249 a.d.) turned the discussion upon the question of the pardon and readmission of apostates. Saint Cyprian, in the Council of Carthage (251 a.d.) declared the lawfulness of reinstating them, sent the reports of the proceedings to Pope Cornelius, and received his approval. Thereupon the schismatics, Novatian in Rome and Novatus at Carthage, anxious for a casus belli, started a reactionary movement, and maintained that apostacy and other heinous sins were unpar¬ donable; and their followers, in the

two suc¬ ceeding centuries, finally went to the extremity of denying to the Church the power of forgiv¬ ing any mortal sins whatever. They raised the cry — now first heard in Christian history — <(God alone can forgive sins,® and thereby first demanded of the Church a systematic theologi¬ cal defense of the right she had long been ex¬ ercising.

The reply was ready and decisive and came from all quarters. In Spain, Parian (4th cen¬ tury) answers the Novation objection almost in the words of modern theology; God alone has the right to forgive sins, but He has been pleased to delegate His right, not to the Church in general but to the bishops, and the forgive¬ ness of sins in penance is to be compared with that in baptism. In Italy the pseudo-Augustine and Saint Ambrose proclaim the same doctrine and use the same comparison. In Africa, Saint Augustine repeats the objection, and refutes it by an appeal to Matthew xvi, 18, interpreting the power of the keys as a power to forgive sins, granted primarily to Peter and his success¬ ors. In Constantinople, Gregory Nazianzen vol. 21 — 32

affirms the ancient and traditional rights of the bishop to forgive sins ; and the Eastern Church generally was remarkable for its antagonism to the Novatian doctrine.

Thus, when the first real necessity arose, the latent theology of the sacrament came to the light, and the consensus of the Christian world was definitely expressed.

Further than this, the strife against Montanism and Novatianism elucidated not a few of the details of the doctrine; the actual neces¬ sity of the sacrament for the forgiveness of post-baptismal sin now was explicitly stated ; the institution by the Lord himself was directly taught from the exegesis of the texts of Saint Matthew and Saint John, the designation of the bishops and priests as the legitimate possessors of the power of absolution was insisted upon, and in general, under the stimulus of opposi¬ tion, the unfolding of the consciousness of the existence and the nature of a (<ministry of rec¬ onciliation® went on apace.

Two questions of special interest may per¬ haps best be inserted here, before mention is made of the later phases of the theological de¬ velopment :

1st, the origin of private, or auricular con¬ fession: Some scholars,

generally non-Catho- lic, have thought that private confession began in the monasteries, and thence was substituted for the public discipline. Others are inclined to think that auricular confession had its origin under Leo the Great (about 445 a.d.). Neither opinion seems to have the support of the docu¬ ments. The Church historians, Socrates (H. E., 5-9), and Sozomen (H. E., 7-16), narrate the abolition of the office of private confessor at Constantinople, in the year 391, but both say that in their day, private confession was already an ancient custom. Socrates is of the opinion that it dates at least from the year 251, but Sozomen declares its origin is so far back in history that he dares not venture to name a date positively. Saint Cyprian (250) speaks of penitents confessing to the priests and the bishop (Ep. 58, 15), and Tertullian uses words indicating that private confession was in vogue in the beginning of the 3d century (De Poen. x, 7 and 8) ; and even as far back as the first years of the 2d century there is, in Saint Igna¬ tius (ad. Philad. viii) a possible reference to the private recourse of a penitent to his bishop. And in general, indications of the practice of private confession of smaller sins, and even of grievous sins for the purpose of receiving a preliminary judgment upon the necessity of ex¬ posing them publicly, are to be found in almost all the documents that have been cited as con¬ taining information on the ancient use of pen¬ ance.

2d. The question as to the sacramental char¬ acter of the penitential institution is evidently not to be answered by showing that there is no connection of the word sacrament with that of penance until late in the history of the Chris¬ tian Church. This is admitted.. But if without actually using the name, Christians believed and understood that penance was instituted by Christ, and that its purpose was to confer the grace of Christ by use of an outward form, this is sufficient to justify its title to the name sacrament, at least in the mind of the Church which applies the name to it.

To return to the general line of the histor¬ ical description: in spite of the very definite theological teachings evoked by the Novatian

controversy, it must not be imagined that the entire doctrinal theory of the sacrament was everywhere adequately understood. There was still abundant room for the expression of vary¬ ing opinions. Saint Augustine, though in one place he seems to hint at the absolute necessity of absolution for the salvation of sinners, ex¬ claiming, “what ruin will come upon those who depart this life unabsolved® (Ep. 180), does not, however, deny the possibility of their obtaining mercy from God. (Ep. 54). Likewise Cyp¬ rian, refusing absolution to (<deathbed # peni¬ tents,® has no fear that they are by his ac¬ tion excluded from forgiveness forever, and in fact, all through the Middle Ages, and even down to the 13th century, we still find discus¬ sions, for example, in the Decrees of Gratian, and in the “Sentences® of Peter Lombard con¬ cerning the precise purport of absolution, and its relative efficacy compared with the necessary interior contrition. Again, the Council of Cha¬ lons in the 9th century evidently considered the absolute necessity of confession an open ques¬ tion, though the Synod of Liege, in the 8th century, anticipated the fourth Lateran Council of the 15th century by commanding annual confession. In fact the dogma has, like every other, a history full of controversies, doubts, reactions and advances, all looking to precision of theological thought and utterance.

Evidently, then the conclusion to be drawn from any historical examination into the origin and growth of the institution of penance must largely depend upon the acceptance or rejec¬ tion of the principle of development in theol¬ ogy. The investigator who would expect to find at every stage of Christian history the pre¬ cision and fulness of the Tridentine decrees on the sacrament of penance, or not finding them, would condemn the institution as unChristian, will doubtless be compelled to the latter alter¬ native ; but if one is willing to admit that an institution may have been founded by Christ for continuing, in a visible, sacramental way, the forgiveness of sins, and that this institution may have undergone a natural and divinely directed development, eliminating errors, fixing truth and finally settling into definite theological shape — it is quite possible that to such a one the Catholic claim may seem well sustained by historical investigation. Such, at least, is the contention of modern apologists for the sacra¬ ment, who recognize that their task is not so much to show that confession, absolution and penitential satisfaction have always existed in the Church — for this is sufficiently evident-hut that the modern discipline and doctrine are a lawful evolution of the seed planted by Him who said to His apostles, ((As the Father hath sent me, I also send you … whose sins you shall forgive they are forgiven them, whose sins you shall retain, they are retained.® (Saint John xx,

21-23).

The Roman Catholic doctrine of the sacra¬ ment of penance is shared by the schismatical churches : the Greek Church, separate f rom the 11th century, and the Nestorians, Jacobites and Abyssinians, separate from the 5th and 6th centuries, practise penance and hold it a sacra¬ ment.

Luther long wavered before rejecting con¬ fession and priestly absolution, as the Augsburg Confession and the Shorter Catechism testify. Even yet a limited confession is recommended in the Lutheran prayer-book, but the notion of absolution is gone. In general the reformers abolished the idea of the necessity of confession and the efficacy of absolution, though in many cases they recommended a voluntary partial manifestation of conscience. Members of the Anglican Church are coming quite generally to adopt and even to go beyond Dr. Pusey s very nearly Roman views. Some even admit the sac¬ ramental character of penance ; though few, if any, have thus far considered its reception as obligatory and necessary for salvation.

Among Catholics in modern times there has been manifest a growing tendency to a devo¬ tional use of the sacrament. The law of the fourth Lateran Council (1215) prescribing an¬ nual confession for all members of the Church has merely decided the minimum of observ¬ ance. The authoritative approbation of the confession of venial faults by the Council of Trent has immensely promoted the movement for frequent confession , and to-day the confes¬ sional is used to a great extent by the devout as a means of receiving “direction® for the conduct of the spiritual life, and all Catholics generally, whether or not conscious of grievous sin, always seek absolution before receiving the sacrament of the Eucharist.

James M. Gillis, C.S.P.

PENANG, pe-nang’, or PRINCE OF WALES ISLAND, a small island of the Straits Settlements, belonging to Great Britain, lying at the north entrance of the Straits of Malacca, off the west coast of the Malay Peninsula, from which it is separated by a chan¬ nel two to 10 miles across. The length of the island is 14 miles ; breadth, 8 miles ; area, about 106 square miles. The settlement of Penang also includes province, Wellesley, a long strip of the Malay Peninsula opposite the island, 45 miles long by eight and one-half broad; area, about 280 square miles ; and the Dindings, which include the small island of

Pangkor, off the coast of Perak, and a small strip of the main¬ land opposite, area about 13 square miles. The greater part of province Wellesley is fertile plain, and the remainder, about one-eleventh of the whole, consists of low wooded hills, the highest of Which reaches a height of 1,843 feet. Two-fifths of Penang is plain, and the rest hills — for the most part wooded — which rise to a height of 2,734 feet. The climate is hot, but healthful ; bracing sea-breezes blow every day, and rain falls every month during the year except January and February ; temperature from 76° to 90° F. The rocks are granite and mica schist; the soil a rich vegetable mold. The settlement produces sugar, rice and cocoanuts in abundance; together with gambier, coffee, areca-nuts, ginger, pepper, cloves, sweet-potatoes, pineapples, shaddocks, bananas, oranges, lemons, plantains, mangoes, guavas, *etc.* Among tim¬ ber trees are the teak, dammar-pine, caout¬ chouc, cypress, etc., and valuable gums and resins. Tigers, civets, wildcats, monkeys, wild oxen and hogs are natives, as are also pelicans, peafowl, adjutants (a kind of stork) and numerous species of brilliantly plumaged birds. Buffaloes and cattle are extensively raised for

dairy or farm purposes, and hogs in great num¬ bers by the Chinese for food. Goats and sheep are scarce, but poultry is plentiful. The coasts abound with fish, 20 varieties of which, chiefly caught by the Malays, are brought to the market. Tin-ore is abundant, but little wrought. George Town, or Penang, as it is generally called, the capital and port of the settlement, is situated on a tongue of land on the east side of the island. Pop. about 105,000, princi¬ pally Chinese, many of them merchants and shopkeepers. The capital has an iron pier for steamers, and a large drydock. There is a steam ferry to Kuala Prai in province Welles¬ ley whence a railroad extends into the interior. The exports in 1915 were valued at $60,061,280, and the imports at $67,063,065. The Dindings commerce is reported separately and amounted to: Exports, $330,070; imports, $418,130. The population of the whole settlement is esti¬ mated at 294,858. Penang was made over by treaty to the East India Company in 1786 by the Sultan of Kedah, and renamed the Prince of Wales Island. In 1805 it was erected

into a separate presidency. Since 1867, with Singa¬ pore and Malacca, it forms a crown colony with a common governor, Penang and Malacca having each a lieutenant-governor. See Straits Settlements.

PENATES, pe-na'tez, a group of household deities reverenced by the ancient Romans as guardians of the food supply — particularly of the storeroom and kitchen. They were with¬ out distinctive names, but each family was be¬ lieved to have a separate deity belonging to the group, and in honor of which a flame was always kept burning on the kitchen hearth. It was customary also with the devout to make a burnt offering of a part of each meal in recog¬ nition of the protection and supply afforded. The images of these gods were kept in the penetralia, or central part of every house. The Lares were included among the Penates. Since Jupiter and Juno were regarded as the pro¬ tectors of the family, these divinities were wor¬ shipped as Penates ; and each hearth, as the symbol of domestic union, had also its Vesta. There were also higher groups of Penates who guarded the towns, and still higher who were supposed to watch over the prosperity of the state. The chief Penates at Rome were those that protected the empire. See Lares.

PENCIL, a small pointed brush used for painting, drawing and writing. The first draw¬ ing implements used by artists were probably crayons of colored earth or chalk cut into a form convenient for holding in the hand. With such instruments the monochromes, or one-colored pictures, of the Egyptians and Greeks were drawn. On the introduction of wet colors, however, delicate brushes of fine hairs were used. Pencils of this kind, and of various degrees of fineness, are almost solely used by painters for laying on their colors in water-color work, and occasionally for oil painting, but in China and Japan they are employed, in¬ stead of pens, for writing. The cheaper sorts are used in medicine for outward applications. The hairs used for these pencils are obtained from the camel, horse, badger, squirrel, sable, goat and one particular grade is made from the very delicate hairs from the inner ear of the ox. The finest pencils* require very careful

selection and arrangement of the hairs; their naturally fine points must all be in one direc¬ tion; the central one must project the farthest, all the others receding in succession, so as to form a smooth cone terminating in a sharp point. The hairs, being selected, are bound in a little roll by a string tied tightly round their root ends; the points are also temporarily bound together. The roll is then introduced into the large end of a quill tube, which has been softened by moisture,

and pushed through to the smaller end to a snug fit. As the quill dries the increased pressure caused by its contraction holds the hairs securely in their place ; but the pressure should not be so great as to make the points spread apart when they are untied. For larger pencils a socket of tinplate or aluminum is used instead of the quill. Black lead pencils for writing or drawing, are made of graphite or plumbago. See Lead Pencils.

PENCIL-TREE, or GROUNDSEL BUSH, a branching glabrous shrub (Baccharis halimifolia) , of the order Composite e, and be¬ longing to the thistle family. It is found, 3 to 10 feet high, common along the salt marshes and tidal rivers of the Atlantic Coast, from Massachusetts southward, and also along the Gulf Coast of Texas. It is frequently seen along the shores of Cuba and the Bahamas. Its brightly white pappus makes it very con¬ spicuous in autumn.

PENCK, penk, Albrecht, German geologist and geographer: b. Leipzig, 1858. In 1878 he traveled over northern Germany and Scandi¬ navia. He made several careful studies of the Bavarian and Tyrolean mountains in 1880 and later traveled in the Pyrenees and in the moun¬ tains of Scotland. He served as docent at Munich for some time, and in 1885 was ap¬ pointed professor of physical geography at Vienna. He edited the (Geographische Abhand-lungen) in 1886 and contributed extensively to the Geological Journal of Chicago. In 1892 he was made president of the central commis¬ sion for the study of the geography of Ger¬ many. He has written (Die Vergeltscherung der deutschen Alpen) (1882) ; (Die Eiszeit in den Pyrenaen) (1884) ; (Der Flacheninhalt der Osterreichisch-Ungarischen Monarchie) (1889) ; (Morphologie der Erdoberflache) (1894), and he was joint author with Briichner of (Die Alpen in Eiszeitalter) (1901).

PENCO, pan'ko. See Concepcion.

PENCZ, pents, Georg P., German painter and engraver: b. Nuremberg, about 1500; d. 1550. He probably was a pupil of Differ and became a member of the Painters' Guild in 1523, but in 1524 he was tried for heresy and compelled to leave the city, together with his friends, Hans and Barthel Beham. He, how¬ ever, returned in 1525 to the neighborhood, and after a visit to Rome, once more took up his residence in Nuremberg in 1532. Here he was given numerous commissions by the city coun¬ cil. In 1539 he again went to Rome to study Raphael and the Venetian masters and while there studied the art of engraving under Marc Antonio. He ranks next to the Behams among the (Little Masters) and some of his plates equal if not surpass those of his teacher, An¬ tonio. Among them are (The Taking of

Carth¬ age* (1539) ; (The Six Triumphs of Petrarch* ; (Life of Christ* in 26 plates; <Medea) ; (Vergil

and the Courtesan* ; ˆParis,' and several portraits, the best of which is that of John Frederick, elector of Saxony. As an engraver he is considered as second only to Differ. In his time he was called the best portrait painter in Germany. His paintings are mostly portraits and are among the best of those in the Ger¬ manic Museum, Nuremberg. He painted 'Saint Jerome) (1544) ; 'Field Marshal Sebaldus Schirmer* (1545), both in the Germanic Mu¬ seum; 'Young Man* (1534); (The Painter Erhard Schwetzer> (1544), and his 'Wife* (1545); all in the Berlin Museum; the 'Young Man* (1543) in the Vienna Museum, and the masterly portrait of a 'Scholar* in the Karls¬ ruhe Gallery. His 'Adoration of the Magi* is in the Dresden Gallery; his 'Judith with the Head of Holofernes* in the Schleissheim Gal¬ lery, and his 'Crucifixion* in the Worlitz Gallery.

PENDENNIS. This novel by William Makepeace Thackeray was completed in 1850; it is great in virtue of the sincerity and justness of its conception, the variety and truthfulness of its characterization, and its fidel¬ ity to the essentials of that mid-Victorian life and society that will always possess significance. Written in a flexible, easy style that eludes notice by its very adequacy, the book lacks the purple patches of some of Thackeray's novels, but maintains throughout a high level of ex¬ cellence. In plot it is an admirable example of simplicity in outline combined with intricacy in detail. It is a study of the development of Arthur Pendennis, an unheroic, very human hero, who goes to Oxford, is sent from the university in disgrace, returns and retrieves himself to the extent of winning his degree, fares forth into the world of men, makes a career for himself and after various love affairs marries the charming and forgiving Laura Bell. Thus outlined, the story is seen to depend less upon the striking nature of its incidents than upon the variety and vitality of its characters. These give the book its value. Around Arthur Pendennis are men and women as real as any that ever entered into the reader's own life: the

immortal Major Pendennis; the gentle yet thoroughly feminine Helen Pendennis; the crude, sterling Foker ; George Warrington, dis¬ illusioned but sound; the shiftless, fawning Costigan; Blanche Amory, the selfish senti¬ mentalist. Moreover, these characters and their fellows are not mere types, but have the com¬ plexity, the mingled good and evil, of real hu¬ man beings. They convey to the reader Thack¬ eray's unrivaled knowdedge of the men and women of his own day; and of the play of motives and intertwining of traits that persist from age to age. Less outspoken than its proto¬ type, 'Tom Jones, > 'Pendennis* manifests greater range and subtlety, and will always re¬ main one of the greatest of novels presenting the life and character and friends of a young man. Consult Trollope, Anthony, 'Life of Thackeray* (Chap. IV) and Ritchie, Mrs. Anne, 'Introduction to Biographical edition of

Pendennis* (London 1898-99).

George B. Dutton.

PENDENTIVE, in architecture, the name given to the masonry construction built in the angle of two vertical walls as a support for a domed ceiling. The pendentive may start from

a lintel placed across the angle or from a point in the line of intersection of the two walls, and may be plane, curved or carried up corbeled courses. It is usually of the hollow spherical type, but often is conical — with the apex of the cone downward. It is a \ery com mon construction in the spandrels ot large arches. In Gothic architecture the term is used to designate the portion of a groined ceiling springing from one pillar or impost and bounded by the ridges or apices of the longi¬ tudinal and transverse vaults.

PENDER, Harold, American electrical engineer: b. Tarboro, N. C., 13 Jan. 1879. In 1898 he was graduated at Johns Hopkins Uni¬ versity; in 1901-02 was teacher at McDonogh School, Maryland ; in 1902-03 instructor in Syracuse University; in 1903 at the Sorbonne, Paris; in 1904 electrical engineer with the Westinghouse Electric and Manufacturing Com¬ pany; in 1904—05 with the New York Central Railroad. From 1905 to 1909 he was associated with Cary T. Hutchinson, electrical engineer, New York; in 1909-13 professor of electrical engineering at the Massachusetts Institute of Technology, where in 1913-14 he was director of research of the division of the department of electrical engineering. Since 1914 he has been in

charge of the department of electrical engineering at the University of Pennsylvania. He has published 'Principles of Electrical En¬ gineering* (1911); 'Electricity and Magnetism for Engineers* (1918) ; and numerous scientific and technical papers. He was editor of the 'American Electrical Engineering Handbook* for 1914.

PENDER, Sir John, Scottish pioneer in submarine telegraphy: b. Vale of Leven, Dum¬ bartonshire, Scotland, 10 Sept. 1815; d. Kent, England, 7 July 1896. He was educated in the Glasgow high school, entered the counting-house of a Glasgow textile firm and in three years became its manager. He made the busi¬ ness his own under the firm name of J. Pen¬ der and Company, and it became one of the most important in the country, meantime accu¬ mulating for its owner an immense fortune. In 1856 he joined Cyrus W. Field (q.v.) in his projected enterprise of a submarine cable and was one of the original contributors to the fund raised to finance it. He held the office of chair¬ man of the Anglo-American Company, and when, after years of failure and losses, the ven¬ ture was about to be abandoned, he pledged his entire fortune as security for the new cable — which was successfully laid in 1866. Upon its completion he immediately organized companies to connect Great Britain with other parts of the world, and by 1882 66,000 miles of cable had been laid. He was knighted in 1888, sat in Parliament for Totnes in 1862-66, for the Wick Burghs in 1872-85, and 1892-96, at first as a Liberal, -and in his last years as a Liberal Unionist. He was a member of many of the learned societies and held several foreign orders, among them the Legion of Honor and the Grand Cordon of the Medjidie. In 1869 he published 'Statistics of the Trade of the United Kingdom, from 1840.*

PENDER, William Dorsey, soldier: b.

Edgecomb County, N. C., Feb. 6, 1834; d. Staunton, Va., July 18, 1863. In 1854 Pender

was graduated from West Point and entered upon military service in the far West. In 1861 he resigned and entered the Confederate serv¬

ice as captain, and in 1863 had reached the grade of major-general. He fought in the bat¬ tles and campaigns of the Army of Northern Virginia and was wounded many times. His most distinguished service was at Seven Pines, first Cold Harbor, second Manassas, Sharpsburg and Chancellorsville. He was mortally wounded at Gettysburg.

PENDLETON, pen'd'l-ton, Edmund, American statesman and jurist: b. Caroline County, Va., 9 Sept. 1721; d. Richmond, Va., 23 Oct. 1803. He was apprenticed in 1734 to the clerk of Caroline court, three years later became clerk of the vestry of Saint Mary's parish and was licensed in 1741 to practise law, in which profession he soon attained eminence. In 1751 he was made justice of the peace in his native county, an office which he held until 1777, when, by an accident, he was crippled for life. Meanwhile he was developing planting interests on a large scale, grants in his name numbering nearly 10,000 acres being on record. In 1752 he was elected to the House of Bur¬ gesses, and represented his county in that legis¬ lative body without interruption until it became extinct at the outbreak of the Revolution. Though he had been a member of the com¬ mittee of the Virginia legislature, appointed, in 1764, to draw up memorials to the king, lords and Commons of England, protesting against the proposed Stamp Act, Pendleton, the fol¬ lowing May, opposed Patrick Henry's famous resolutions, declaring (<that the General As¬ sembly of this colony have the only, sole and exclusive right and power to lay taxes.® He opposed likewise as premature Henry's resolu¬ tion of 1775, <(that this colony be immediately put into a posture of defence.® Pendleton may be regarded as the leader of the conserva¬ tive party in Virginia, resisting change, but never reactionary after change had once been instituted.

In 1773 Pendleton was made a member of the Committee of Correspondence, which in¬ stantly gave a vigorous impulse to the colonial cause. In 1774 he was elected to the first Vir¬ ginia convention, which met on 1 August, to respond to the call from New England touching the Boston Port Bill. This convention took steps for a general congress, to which Pendle¬ ton was sent as a delegate. Upon the dissolu¬ tion of the royal government in Virginia, by reason of the flight of Lord Dunmore from the capital at Williamsburg, he was made presi¬ dent of the Committee on Public Safety, which piloted the colony during the trying times from 17 Aug. 1775 to 5 July 1776, when Patrick Henry took the oath as governor of the com¬ monwealth. Acting in this capacity, Pendleton was virtually the ruler of Virginia in this transitional period.

Pendleton presided over the conventions which met in December 1775

and May 1776, the latter framing the Virginia constitution and directing the Virginia delegates in Congress to bring forward a motion declaring the inde¬ pendence of the united colonies. 4 he resolution embodying these momentous instructions was drawn by Pendleton, and his words were incor¬ porated almost as written into the Declaration

of Independence. In collaboration with Jeffer¬ son and George Wythe, Pendleton revised the • laws of Virginia in accordance with the changed political situation. As president of the Court of Chancery, he presided from 1779 over the Court of Appeals, and thus for 15 years acted as head of the Virginia judiciary. In 1788 he was elected president of the Virginia conven¬ tion which ratified the Constitution of the United States. Pendleton was a Nationalist even at that early time, and was a staunch sup— porter of peace. When war seemed imminent with France in 1798 he protested against fight¬ ing a sister republic. In his intuitive love of prescription, in his willingness to be pushed along the line of reform only by incontrover¬ tible facts and in his efficiency in carrying out the details of a policy he had strenuously op¬ posed in debate, he is strikingly like Sir Robert Peel. Jefferson said of Pendleton: ((Taken all in all, he was the ablest man in debate I ever met.®

S. C. Mitchell,

President of Delaware College, Newark, Dela¬ ware.

PENDLETON, Ellen Fitz, American edu¬ cator: b. Westerly, R. I., 7 Aug. 1864. In 1886 she was graduated at Wellesley College and subsequently studied at Newnham College, Cambridge, England. In 1886-88 she was tutor in mathematics and from 1888-97 instructor at Wellesley. From 1897-1901 Miss Pendleton was secretary of the college; in 1901-11 dean and associate professor of mathematics, and after 9 June 1911 president of Wellesley. In 1911 Miss Pendleton received the degree of Litt.D. from Brown University and in 1912 that of LL.D. from Mount Holyoke College.

PENDLETON, George Hunt, American legislator : b. Cincinnati, Ohio, 25 July 1825 ; d. Brussels, Belgium, 24 Nov. 1889. He was educated in Cincinnati and Heidelberg, Ger¬ many, studied law and was admitted to the bar.

In 1854-55 he served in the State senate and was a member of the

House of Representatives from his State from 1856-65. Throughout the Civil War he strongly opposed the administra¬ tion, and in 1864 was candidate for the Vice-Presidency on the Democratic ticket with George B. McClellan. He ran for governor of Ohio in 1869, but was defeated. In 1878 he was elected United States senator from Ohio, and in 1882 he introduced the civil service reform bill known by his name and passed in 1883.

In 1885 he was appointed by President Cleve¬ land United States Minister to Germany.

PENDLETON, Louis (Beauregard),

American novelist: b. Tebeauville (now Way-cross), Ga., 21 April 1861. He was educated in Philadelphia and among his published novels and juveniles are (Bewitched) (1888) ; (In the Wire Grass* (1889) ; (King Tom and the Runa¬ ways* (1890) ; (The Wedding Garment* (1894); (The Sons of Ham* (1895); <In the Okefinokee* (1895) ; (Corona of the Nanta-hales) (1895) ; (Carita* (1898) ; (In the Camp of the Creeks) (1903) ; (A Forest Drama* (1904) ; (In Assyrian Tents* (1904) ; and a (Life of Alexander H. Stephens) (in the (American Crisis Biography Series) 1908).

PENDLETON, William Kimbrough,

American educator: b. Yanceyville, Louisa .

County, Va., 8 Sept. 1817; d. Bethany, 1 Sept. 1899 He received his education at the Univer¬ sity of Virginia, and, after graduating from • the law school, was admitted to the bar. He joined Alexander Campbell in 1841 in found¬ ing Bethany College, the first educational insti¬ tution of the ((Disciples of Christ,® also known as the ˆCampbellites,® becoming professor of sacred history and philosophy, belles-lettres and political economy. From 1866 to 1887 he was president of the university. He served in the West Virginia Constitutional Convention. His activity in establishing a free-school

system earned him the appointment as State superin¬ tendent of schools, in which position he served four years. In 1887, because of failing health, he removed to Florida. He died while on a visit to his old home at Bethany.

PENDLETON, William Nelson, Ameri¬ can Episcopal clergyman and soldier : b. Rich¬ mond, Va., 26 Dec. 1809; d. Lexington, Va., 15 Jan. 1883. He was graduated from West Point in i830, served there as assistant instructor in mathematics in 1831-32, resigned from the army in 1833, engaged in teaching mathematics in Bristol College, Pa., and in Delaware College. Resigning from the army he entered the Epis¬ copal ministry, as a deacon, in 1837. The fol¬ lowing year he was made a priest, and in 1839 he established the Episcopal high school in Alexandria, Va., and was its principal until 1853 when he was called to the charge of a church in Lexington, Va. In 1861 he entered the Confederate army as captain of artillery, was promoted to .be chief of artillery in the Army of the Shenandoah and in 1862 received the rank of brigadier-general. He was engaged in all but three of the battles fought by the Army of Northern Virginia, beginning with Bull Run, was one of the commissioners ap¬ pointed by General Lee to arrange terms of surrender in 1865, and then returned to his parish in Lexington, where he remained until his death. He received the honorary degrees of A.M. from Brown University, and D.D. from Kenyon College, and also from the Alexandria Theological Seminary. He published (Science a Witness for the Bible' (1860).

PENDLETON, Ore., city, county-seat of Umatilla County, on the Umatilla River, and on the Oregon-Washington Railroad and Naviga¬ tion Company's Railroad and the Northern Pacific Railroad, 206 miles east of Portland and 35 miles southwest of Walla Walla, Wash. The city was enlarged in 1884 by the addition of 640 acres of the Umatilla Indians' reserva¬ tion. It is built on both sides of the river, which is here crossed by three bridges The river affords good water power for manufactur¬ ing; the chief industrial establishments include flour mills, iron foundries, machine shops, woolen mills, planing mills, a harvester factory and a paper mill. There are also a grain ele¬ vator and a packing-house. The . city has a high school and is the seat of Saint Joseph s Academy, a Roman Catholic school with ele¬ mentary and secondary grades. The State Hos¬ pital for the Insane for Eastern Oregon is located here. The city has recently had an ad¬ dition to its important buildings in the new Federal building ($130,000), and the new Pub¬ lic Library ($40,000). It has a wide celebrity . through its annual exhibition festival, 1 he

Round-Up.® The waterworks are under ˆmunic¬ ipal ownership and control. Pop. (1U0) *,38*.

PENDULUM, a mechanical construction of interest from two widely different points of view : the practical and the mathematical. It consists typically of a comparatively large and concentrated weight called the bob, and some « sort of suspending material, usually of wood or metal, and called the rod. In considering the mechanics of the pendulum, it is customary to think of the suspension as a thread without weight, so that only the weight of the bob comes under discussion. In a state of equili¬ brium it is evident that the weight of the pendulum will hang motionless directly below the point of suspension. Upon moving the weight to one side of this central position and then releasing it, it swings down an arc of which the thread is the radius, toward the point of rest from which it was moved.. The force which urges it down along the arc is not a sim¬ ple force, but the resultant of two forces, one of which is gravity, acting vertically down¬ ward, and the other the pull of the thread, act¬ ing toward the point of suspension. As the weight swings down the arc, it gathers momen¬ tum — that is, weight multiplied by speed. When the bob has reached the lowest point of the arc, its accumulated momentum prevents it from stopping there, and it swings on upward over a similar arc until its momentum is ex¬ pended — that is, until the force of gravity and the pull of the string combined overcome its impulse of motion. Obviously, if there were no exterior force applied the upward swing would be exactly equal to the downward swing, and once started the pendulum would swing on, to and fro, forever. But because of the fric¬ tion of the air upon the bob the motion slows down until it finally ceases, and the bob again hangs at rest vertically below the point of sus¬ pension.

These simple motions of the pendulum are of great interest to the physicist, who sees, in the instrument an engine for the transmutation of potential energy into kinetic energy. For as the bob swings down the arc it stores within itself potential energy to its lowest position in the arc. At this point, however, the potential energy becomes kinetic energy and drives the bob up the opposite arc, against the continuing pull of gravity.

The remarkable regularity with which the pendulum swings early commended it to clockmakers as a governor, to control and space off accurately and evenly the speed with which clock mechanisms ran down after winding. This was accomplished by an escapement wheel geared into the mechanism of the clock, and restrained by a release operated by the pen¬ dulum. In this way the pendulum was left free

to swing, the delicate push ‘of the escape¬ ment wheel being just sufficient to counteract the friction of the air on the bob. With this application to timekeeping, it became of inter¬ est to the clockmakers that the pendulum should be made of such a length as to beat exact seconds; and as the force operating the pendulum was gravity, the problem became somewhat complex, for the force of gravity was known to change with every variation of lati¬ tude, due to the flattening of the earth at the poles. The attraction of gravitation being less

at the equator than at the poles, the seconds-pendulum at the equator would be shorter than at the poles, where the attractive force was greater. Ihe two extremes at which experi¬ ments _ were conducted were Hammerfest, Nor¬ way* in latitude 70° 40’ N., where the value of gravity was found to be 32.2364 feet per second; and Saint Thomas, an island off Portu¬ guese West Africa, in latitude 0° 25’ N., where the value of gravity is 32.0957 feet per second. The length of the seconds-pendulum at Hammerfest is therefore 39.1948 inches, and at Saint Thomas, 39.0207 inches. At New York City, latitude 40° 43’ N., the seconds-pendulum is 39.1012 inches.

The seconds-pendulum was useful only in clocks of large size, like the so-called “grandfather’s clock,® and long wall clocks. The de¬ mand for small shelf clocks led to the ar¬ rangement of the clock train for a pendulum of 9.78 inches, beating half-seconds. For tower clocks the two-second pendulum of 13.04 feet is commonly used. Longer pendulums have been experimented with, but have proved troublesome to manage. The swing of the ordinary clock pendulum is through three de¬ grees of arc, which length has given the most accurate results.

One of the peculiarities of the pendulum in its adaptation to the clock is that it is affected by changes in the pressure of the atmosphere. This is known as the barometric error. As the barometer falls, indicating a decrease of the pressure of the air, the pendulum spontaneously extends its arc of oscillation. This would make no difference in the

time of its beat if the arc of the circle in which it swings were the isochronal arc of the pendulum — that is, the arc all parts of which are passed over by the swinging bob in equal sections of time. This, however, is not the case. The isochronal arc of the pendulum is the cycloid (q.v.), and while a very small arc of a circle does not de¬ part from that of the middle of a cycloid to a practical degree, the longer the arc the greater the difference; and hence, the extension of the circular arc through lessening of the air pres¬ sure becomes a source of error in the precision of beat required for accurate timekeening. In the delicate adjustment of the clock at West¬ minster, the two-seconds pendulum is made to swing over an arc of 5.5 degrees. With this length of arc the barometric error is exactly neutralized by the circular error arising from its extension. Another common source of error in the clock pendulum is that due to the extension of its length by a rise in tempera¬ ture, and vice versa. This variation affects chiefly the length of the rod, but unless the bob is suspended from its centre of gravity, the expansion of the bob also may act to dis¬ arrange the timekeeping qualities of the clock. For ordinary clocks a pendulum constructed with a wooden rod rendered impervious to moisture by soaking in melted paraffin wax, with a hollow cylindrical bob of lead supported at its bottom edge, is self-compensating for the usual range of house temperatures. For clocks of precision, the gridiron or mercury compen¬ sating pendulums, described below, are em¬ ployed.

In the mathematical discussion of the pen¬ dulum it is convenient to begin with the “sim-ple pendulum,® in which the bob is conceived

to be a mere material particle, and the sus¬ pending rod is assumed to be devoid of mass, and the motion is assumed to be confined to some one vertical plane passing through the point of support, and all retarding influences, such as the resistance of the air and the friction at the point of support, are neglected. The “period of oscillation® of any pendulum is de¬ fined as the time occupied by a single oscillation, counting from the instant when the pendulum is at its extreme position on one side of the vei tical, to the instant when it next arrives at its extreme position on the other side of the vertical. It is easy to show that the period of oscillation of the simple pendulum, as defined above, is practically independent of the arc described by the ‘bob, provided that arc is very small ; this fact being expressed, in mathemati¬ cal language, by stating that the vibrations of the simple pendulum are “isochronous,® when the amplitude of the vibration is small. It may be readily shown, in fact, that the period of oscillation of a simple pendulum is given by the

expression 3.1416 B VL/G, where L is the length of the pendulum, G is the intensity of gravity (that is, G is the velocity that a freely-falling body would acquire in one second), and B is a function of the arc, A, through which the pendulum swings, in passing from one of its extreme positions to the other. The func¬ tion B may be expressed in terms of A by means of a series in which A occurs only in

A2

ascending even powers : B = 1 T- — -f- …

When the arc, A, is very small, we may take B equal to unity in all cases, save those in which the highest possible refinement is re¬ quired; and hence, in all ordinary computa¬ tions, we may take the period of oscillation of the simple pendulum to be 3.1416 VL/G, when the amplitude of the oscillation is small. If L is expressed in feet, and G in feet per second, the foregoing formula gives the period of oscillation in seconds. To find the length that a simple pendulum must have, in order that its period of oscillation may be pre¬ cisely one second, we have only to set the fore¬ going formula equal to unity, and solve the resulting equation for L. Thus we have, for

G

this case, L - . The value of G vary-

(3. 1416) 2

ing according to the latitude, we may use G — 32.2 as its average value, and this last formula shows that a simple pendulum, in order to have a period of oscillation of one second, must have a length of' about 3.263 feet, or 39.150 inches.

A pendulum, when once set in vibration in a given vertical plane passing through its point of support, continues to vibrate in this same plane unless forced to depart from it bv the applica¬ tion of some

external force other than gravitv. Foucault took advantage of this fact for experi¬ mentally demonstrating the rotation of the earth. In 1851 he constructed a pendulum which was approximately “simple,® being composed of a heavy sphere of polished metal, suspended by a steel wire about 65 metres long. The experi¬ ment was performed under the dome of the Pantheon, at Paris. A pendulum of this sort, if set in vibration in a vertical plane at the earth’s pole, would continue to vibrate in the same constant plane, while the earth rotated

under it at the rate of 360° every 24 hours, or 15° every hour. The rotation of the earth would therefore become evident to the eye , though, since the observer would be rotating with the earth, it would appear to him as though the earth were stationary, and the plane of the pendulum’s motion were rotating. The phenom¬ ena would be somewhat more complicated in other latitudes, however, because it is only at the poles that the direction in which gravity acts remains constant while the earth rotates. Foucault showed that when allowance is made for the changing direction of gravity, the plane of vibration of a simple pendulum, in the lati¬ tude of Paris, should appear to rotate by 11 17′ 33″, per sidereal hour; and when the ex¬ periment was tried with the giant pendulum that he erected in the Pantheon, the actual apparent rotation was found to agree very closely with this theoretical value. Since 1851 this experi¬ ment has been tried many times; and a pen¬ dulum that is arranged, in accordance with Fou¬ cault’s plan, for the purpose of demonstrating the rotation of the earth, is now known as a “Foucault pendulum.®

Any pendulum whose mass is not wholly con¬ centrated at a single point is said to be “com¬ pound.® The simple pendulum is a convenient mathematical abstraction (such pendulums as Foucault’s being merely close approximations to it) ; but we must, in strictness, regard all actual pendulums as compound. Fig. 1 represents a compound pendulum of generalized form, which is supposed to be vibrating in the plane of the paper (held vertically), about a horizontal axis passing through O, which is called the axis of

suspension.® If G is the centre of gravity of the pendulum the foot of the perpendicular that is let fall from G to the axis of suspension is called the “centre of suspension.® In the same straight line with O and G there is a point C, called the “centre of oscillation® (or, some¬ times, the “centre of percussion) , which has the following properties: (1) The time of

vibration would remain unaffected, lf the tire mass of the pendulum were concentrated at C (2) If the pendulum were inverted, and were taken as the new centre of suspension, the period of oscillation would remain un¬ changed. (3) The period of oscillation of the actual, compound pendulum is the same as t period of oscillation of a simple pendulum hay-ing a length OC ; and hence OC is common y called the “length of the equivalent simple pendulum.® To find the position of C, let rl the distance, OG, from the centre of suspension to the centre of gravity, and let K be the radius of inertia of the pendulum (that is, its moment of inertia divided by its total mass), with re¬ spect to an axis passing through G, and parallel to the axis of suspension. Then the distance,

L ‘from O to C, is given by the expression lL = (H2-|-K2)/H. Evidently L is always

greater than H.

In a piece of apparatus, such as an astro¬ nomical clock, in which it is important to have a pendulum execute its vibrations always in the same time, the temperature must be kept con¬ stant, or else some compensatory device must be employed, which will eliminate the effects due to its variation. Uniformity of tempera¬ ture is important in all cases, because none of the compensation devices are perfect; and clocks of precision should be kept in rooms whose temperatures vary as little as possible.

In such cases it is often sufficient to make the suspending rod of the pendulum of well-seasoned pine or fir since the coefficient of ex¬ pansion of these woods is small, and if the temperature change is also small its effect upon the rate of the clock may become almost indis¬ tinguishable. Wooden pendulum rods are apt to be affected by changes in the hygrometnc state of the air but this can be prevented by a good coat of varnish and the use of a suitable drying medium

within the clock case. In Ger¬ many clock pendulums are commonly made of an alloy of nickel and steel which is known as “invar,® and which has a coefficient of expan¬ sion that is almost negligible.

“Compensation pendulums® are those in which provision is made for the automatic, elimination of the effects of changes of tem¬ perature. Of these the two commonest forms are the “gridiron® pendulum and the mercury compensation pendulum. In the gridiron form the bob is supported by means of a series of parallel bars, somewhat as represented, diagrammatically, in Fig. 2. In the diagram the central bar and the two. outside ones are. of steel, while the intermediate ones are of zinc, or, very commonly, brass. If the zinc bars should expand while the steel ones remained constant in length, the bob of the pendulum would evidently be raised; and if the steel ones should expand while the zinc ones remained constant in length the bob would be lowered. In the actual case, where a rise of temperature causes the zinc and the steel to expand simul¬ taneously the effects of the two metals, in dis¬ placing ‘the bob are therefore opposed. The effective length of the steel rods is about twice that of the zinc ones; but, on the other hand, the coefficient of expansion of zinc is about twice that of steel. On the whole, therefore the position of the bob is not materially affected by a change of temperature.

In the mercury compensation pendulum the supporting rod is a simple bar of steel, but the bob consists of a cylindrical glass vessel con¬ taining mercury. A rise in temperature causes the suspending rod to dilate, and this tends to lengthen the pendulum. The mercury in the bob expands at the same time, however, and the centre of gravitv of the mass of mercury there-

fore rises. The expansion of mercury is con¬ siderably greater than that of steel, and by properly proportioning the apparatus it is possible to make the rise of the centre of grav¬ ity of the bob, due to the expansion of the mercury, sensibly equal to the fall of the bob as a whole, due to the expansion of the support¬ ing rod. The Riefler pendulum used in astro¬ nomical clocks has its tubular rod filled about two-thirds its length with mercurv, thus acting as a compensator for both temperature and barometric changes.

The fact that G, the accelerating effect of .gravity, enters into the expression for the period of oscillation of the pendulum, suggests the use of this instrument for the determination of the value of G; and in fact it has been found that no other method of determining the inten¬ sity of gravity is comparable in accuracy with the pendulum method.

In determining the intensity of gravity by the pendulum, two general methods are fol¬ lowed, according as it is desired to make an "absolute" or a "relative" determination. The absolute determination is much more difficult to execute, because it necessitates the careful measurement of the length of the pendulum, and the determination of certain rather trouble¬

some corrections. In principle it is simple enough, however, for if we knew the length of the pendulum (L), and its period of oscillation (T), we should merely have to substitute their

values in the equation T = 3.1416 VL/G, and solve for G, which would be the only remain¬ ing unknown quantity. In relative determina¬ tions it is not necessary to measure the length of the pendulum (except roughly, for the pur¬ pose of making certain small corrections to the observations), the pendulum being merely vi¬ brated in two different places, at one of which the intensity of gravity is known. If Ti and T2 are the times of oscillation in the two places, and if Gi and G2 are the corresponding inten¬ sities of gravity at these places, we have Ti =

3.1416 VOL/Gi, and T2 = 3.1416 VL/G.. Since L remains the same during such a determination,

we find, by division, Ti/T2 = VG2/Gi ; or G2 = GiTi2/T22. Hence, as Gi is supposed to be known, andTi and T2 have been measured, the value of G2 is also known.

Pendulums that are to be used in determin¬ ing the intensity of gravity are provided with steel knife edges, resting upon agate bearing

plates as the suspension axis; the friction of the supports being reduced, by this device, almost to zero. Those which are to be used in rela¬ tive determinations need not necessarily have more than one set of knife edges ; but when an absolute determination is to be made, it is es¬ sential, in order to secure a high degree of accuracy, that two sets of knife edges should be provided, each being placed, as nearly as possible, at the centre of oscillation of the pendulum, relatively to the other one. If it were mechanically possible to realize this adjustment perfectly, the pendulum would vibrate with pre¬ cisely the same period of oscillation, whether it were supported from one set of knife edges, or from the other one; and the distance from one of these sets to the other one would be pre¬ cisely equal to the "length of the equivalent simple pendulum," which is denoted in the foregoing formulae by L. In practice, however, it is not possible to place the knife edges so that the period of oscillation is not measurably altered by reversing the pendulum ; and this fact makes it necessary to determine the period of oscillation twice, — once before reversal and once afterward. The distance between the knife edges must then receive a small correc¬ tion, in order to deduce the "length of the equivalent simple pendulum" ; but this branch of the subject is too technical for treatment in the present article. (Consult Clarke, (Geodesy ' ; also the various appendices' of the United States Coast and Geodetic Survey, bearing upon pendulum work). The use of the reversible pendulum, which is based upon Huyghens' theorem that the centres of suspen¬ sion and oscillation are reciprocal, is due to Captain Henry Kater, of the British Army, who first employed it in 1818, for determining the length of the seconds-pendulum at London.

The "ballistic pendulum" is an apparatus for determining the velocity of a bullet. It is sus¬ pended in the usual way from a fixed horizon¬ tal axis, and the bob consists of wood or other suitable material, weighted, when necessary, by the addition of iron or lead. The pendulum be¬ ing at rest in a vertical position, the bullet is fired into the bob, and the height to which the

pendulum bob rises in the initial swing is noted. The speed with which the bullet en¬ tered the bob may then be computed, if the masses of the bullet and the bob are known. The ballistic pendulum is not a very accurate instrument, partly because it takes no account of the thermal phenomena that occur when the bullet enters the bob, and partly for other rea¬ sons. It has now been almost entirely dis¬ carded, the velocities of projectiles being meas¬ ured by more direct methods, that are capable of much greater precision.

The so-called conical pendulum, gyroscopic pendulum and torsion pendulum are not pen¬ dulums in the accepted sense of the term, and are not governed by the laws which control the pendulum, but by the laws of centrifugal mo¬ tion. Consult United States Coast and Geo¬ detic Survey, (Special Publications) 10 and 12 (Washington 1912).

A. D. Risteen, Ph.D.

PENEDO, pa-na'do, Brazil, city and port of the state of Alagoas, 70 miles southeast of Maceio, on the left bank of the Sao Francisco and about 26 miles from its mouth. It is located on a rocky bluff at the head of ocean naviga¬ tion and is the transshipping point for the steamboat commerce of the upper river for 150 miles. It is the oldest settlement in the state, having been founded by the Portuguese about 1620; has ruins of a 1 7th century fort; contains several convents and schools; and now does considerable business in foodstuffs with Per¬ nambuco and Bahia, with which it has regular steamer connections. There is fine fishing in the river. Pop. (estimated) 9,000.

PENELOPE, pe-nel'6-pe, in Greek mythol¬ ogy, the daughter of Icarios and Peribcea, also known as Polycaste, of Sparta. When she reached womanhood her extraordinary beauty attracted many suitors, and her father prom¬ ised to give her to the conqueror in a foot race. Odysseus (Ulysses) won the prize, but Icarios tried to persuade his daughter not to accom¬ pany Odysseus to Ithaca. The young victor allowed her to decide for herself, whereupon she covered her face with her veil to hide her blushes, thus intimating her desire to follow her husband. The fruit of the marriage was an only child, Telemachus, who was but an infant when his father was sent by the Greeks against Troy. During the protracted absence of Odysseus, which lasted 20 years, he was generally regarded as dead, and Penelope was surrounded by a host of suitors. Some writers assert that she became the mother of Pan by Hermes, or by all the suitors together; that her husband repudiated her on his return, and that she went to Sparta and thence to Mantinea, where her tomb was shown in after ages. The story generally accepted, however, de¬ scribes in detail the artifices

by which she put off deciding between the suitors, and one of these (Penelope's Web) has become proverbial. She promised a decision when the web she was weaving should be finished. But at night she secretly unraveled what she had woven through the day. Finally being driven to a decision, she agreed to bestow her hand upon the winner in an archery contest. Her husband returned in time to take part in disguise in the contest and was the winner. See Odyssey; Ulysses.

PENEPLAIN, pe'ne-plan' (almost a plain), a plain cut by the erosive activity of running water. A region which has been cut as low as its rivers can plane it is said to be peneplained or base-leveled. Many once mountainous regions have been thus cut away to nearly level plains. The even sky-line of the New England uplands and the Appalachian Moun¬ tains, cutting across the upturned edges of hard and soft rocks, represents such a plain formerly reduced nearly to sea-level, but again uplifted and redissected by its streams. This very ex¬ tensive peneplain was formed in Jurassic (q.v.) and Cretaceous (q.v.) time, and has been called the great Cretaceous Peneplain. It has also been called the Kittatinny or Schooley Peneplain, since it forms the even crest line of the mountains of those names. Any residual elevation not completely planed away and ris¬ ing notably above the general level of a pene¬ plain is called a monadnock, from the mountain of that name overlooking the New England Peneplain in New Hampshire. For an account of the process of peneplanation, see the section on the work of running water in the article on Geology.

PENETANGUISHENE, pen-e'tan-gwish- e'ne, Canada, town in Simcoe County, province of Ontario, on Georgian Bay and on the Grand Trunk Railway. It contains a Carnegie library, insane hospital, leather, lumber and engine works, foundries and machine shops, stove and range factories, boat and canoe works, sash and door factories, fibre board works, brick¬ yards, *etc.* It is acquiring a wide repute as a summer resort. Pop. 3,568.

PENFIELD, Edward, American artist: b. New York, 2 July 1866. He was educated at the Art Students' League, New York, and subsequently studied in England and Holland. From 1891 to 1907 Mr. Penfield was art editor of the Harper magazines. He now devotes his time exclusively to illustrating, designing and painting. Mr. Penfield was the originator of the poster in America, and used numerous ˆtextures® in reproducing his drawings that were not attempted before in relief printing from zinc or other plates. He designed many posters for Harper's Magazine, and posters and designs for various

purposes and illustrated a number of magazine articles in color. He exe¬ cuted decorations for the breakfast room of Randolph Hall, Cambridge, Mass., also deco¬ rations for the Rochester Country Club. He published (Holland Sketches) (1907), and (Spanish Sketches) (1911).

PENFIELD, Frederic Courtland, Amer¬ ican diplomat : b. Connecticut, 23 April 1855. He studied in Germany and England, and then entered journalism and was for five years on the editorial staff of the Hartford Conrant. In 1885 he \yas appointed United States vice-counsul-general at London, and in 1893-97 served as diplomatic agent and consul-general to Egypt, with the rank of minister-resident. In 1913 he was sent as United States Ambassador to Austria-Hungary, where he remained until diplomatic relations between the two countries were severed in 1917. He acted as special rep¬ resentative of President Wilson at the funeral of Emperor Francis Joseph in Austria. He has traveled extensively in India, China and Japan and has been honored by various foreign

societies. He has received decorations of the highest class from governments of France, Turkey, Serbia and Egypt and from the Pope. He has published (Present Day Egypt* (1899) ; (Mahmoud Pasha) (1903); (East of Suez) (1907) ; and numberless articleˆ on interna¬ tional and economic subjects in the leading reviews and periodicals.

PENFIELD, Samuel Lewis, American mineralogist: b. Catskill, N. Y., 16 Jan. 1856; d. South Woodstock, Conn., 12 Aug. 1906. He studied abroad, at Strassburg and Heidelberg. He was graduated from the Sheffield School at Yale in 1877, and became professor of miner¬ alogy there. He was a member of the Na¬ tional Academy of Science, and was from 1877 an extensive contributor on the subjects of mineralogy, crystallography and chemistry in the American Journal of Science and Art. He was a leading authority on mineralogy. He published (Brush-Penfield Determinative Min¬ eralogy and Blow-Pipe Analysis) (1898), and was joint author with L. V. Pirsson of Con¬ tributions to Mineralogy and Petrography from the Sheffield Scientific

School* (1901).

PENFIELD, William Lawrence, Amer¬ ican lawyer : b. Dover, Lenawee County, Mich., 2 April 1846; d. 9 May 1909. He was gradu¬ ated from the University of Michigan in 1870, whence he went to Adrian College as instructor in German and Latin. In 1872 he was admitted to the Michigan bar. He then took up the practice of law in Auburn, Ind., and in 1876 became city attorney. In 1884 he was a mem¬ ber of the Republican State committee; in 1888 presidential elector and electoral messenger and delegate to the National convention in 1892. He was judge of the Fifth Circuit Court of Indiana 1894-97 and in the last-named year was ap¬ pointed Solicitor of the United States Depart¬ ment of State, where he served till 1905. He was counsel for the United States in interna¬ tional arbitration cases of the United States against San Domingo, Peru, Haiti, Nicaragua, Guatemala and Salvador, securing awards for the United States which amounted to over $2,000,000. He was also appointed to represent the United States before The Hague permanent arbitration court in the controversy with Mex¬ ico over the ((Pious Fund Claim of the Californias,** this being the first case to be tried before this tribunal. He was counsel for the United States and for Venezuela in the Vene¬ zuela arbitration case at The Hague in 1903. In 1905 he was sent as a special commissioner to Brazil. In 1907 he acted as diplomatic agent and counsel for the United States in the arbi¬ tration proceedings with Nicaragua.

PENGUIN, a name now restricted to the swimming birds forming the very distinct super¬ order Impennes, and the family Spheniscidce. Their wings are inflexible paddles, destitute of quillfeathers and covered with a scaly integu¬ ment or skin. Although useless as organs of flight, they are very effective aids in diving, and on land may be used after the fashion of fore¬ limbs. Most of the swimming is done below the surface, the bird coming up at frequent in¬ tervals to breathe. The hinder toe is rudimen¬ tary, or wanting in some species, and the front toes are completely webbed. On the body the feathers are scale-like and barbless, and are

distributed uniformly, without naked intervals. These birds exist in immense numbers in the Antarctic seas. They occur on the South African and South American coasts, being found in large flocks at Tierra del Fuego and on the Pacific islands, Australia and New Zea¬ land. ˆThey are gregarious in habits. On shore penguins have the habit of standing in long, regular lines, resembling files of soldiers drawn up in military array. Owing to the very pos¬ terior position of the legs

the attitude on land is erect, often with the bill pointing to the zenith. They stand from 16 to 48 inches tall and weigh up to 75 pounds. The female incu¬ bates the eggs, holding them between the thighs, and they are said to carry off the eggs in the same fashion when disturbed or alarmed. The eggs are white or greenish in color and have a very thick incrusted shell. They are conical in shape, about four inches long and three inches in diameter. The male supplies the female with food during incubation, both parents feed¬ ing the young after they are hatched. The young birds are extremely helpless and many are killed by severe and sudden storms. The nests are formed in the hollows of rocks, and the eggs are deposited on the thick layer of excrement, which, accumulating through long periods of time, constitutes the valued guano of commerce. The eggs, though of rather strong flavor, are highly esteemed by sailors as adding variety to their diet. The birds themselves are also eaten. The usual food consists of fishes, mollusks, *etc.* As a family the penguins repre¬ sent, in the southern seas, the auks of the northern and Arctic regions. There are three principal genera: Aptenodytes with A. pata-gonica, the king penguin, and A. fosteri, the emperor penguin; Eudyptes with Eudyptula minor, the little blue penguin, and Catarractes chrysocome, the crested penguin; and Sphenis-cus, with S. demersus, the well-known Cape or jackass penguin. The penguins are regarded by naturalists as constituting one of the three great classes of birds, the ostriches forming an¬ other class and all other birds a third class. There are six genera, with 20 living species, and 30 fossil species have been recognized. Prominent among the latter is Palceeudyptes antarcticus , found in New Zealand. Some spec¬ imens were seven feet tall. Consult Moseley, (A Naturalist on the Challenged ; Buller, (Birds of New Zealand) ; and the writings of Antarctic explorers.

PENHALLOW, pen-hol'd, Samuel, Amer¬ ican colonist and historian : b. Saint Mabyn, Cornwall, England, 2 July 1665; d. Portsmouth, N. H., 2 Dec. 1726. He came to New England in 1686 and finally settled in Portsmouth where he amassed a considerable property and gained much influence in government affairs. After holding several offices he was appointed a jus¬ tice of the Superior Court of Judicature in 1714, and in 1717 became chief justice, which office he held until his death. His work as a historian is of much value, has been several times republished, and is considered the most authentic history of the period in existence. It was first published under the title (Narrative of the Indian Wars of New England from 1 703— 1726* (1725-26). It now bears the title (A His¬ tory of the Wars of New England with the Eastern Indians.*

PENICK, Charles Clifton, American Prot¬ estant Episcopal bishop : b. Charlotte County, Va., 9 Dec. 1843; d. near Baltimore, Md., 13 April 1914. He was educated at Hampden-Sidney College, studied theology at Fairfax Seminary, Alexandria, Va. He was ordained in the Episcopal Church in 1870 and in 1877 was consecrated missionary bishop of Cape Palma, West Africa. He resigned in 1883 and has since had charge of various parishes. Bishop Penick served four years in the war between the States as sergeant of the 38th Virginia Regiment, Armstead's Brigade, Pick¬ ett's Division. He was at nearly every battle of importance fought in northern Virginia, and also at the battle of Gettysburg, and surren¬ dered with General Lee's army at Appomattox,

9 April 1865. After his return from Africa he was very active and had several charges : Rich¬ mond, Va., Louisville, Ky., Fairmont, W. Va., his last charge being Frankfort, Ky. He was greatly interested in the welfare and upbuilding of the colored people of the South, and gave one year of his life traveling over the States and making reports to the church as to the best means of helping them. Through his influence and principally with his own money he edu¬ cated and put in the ministry 11 or 12 young men.

PENINSULA CAMPAIGN OF 1862, The. A campaign against Richmond having been decided upon as the stroke which would most speedily put an end to the Southern Con¬ federacy, a sharp difference of opinion arose be¬ tween President Lincoln and General McClellan, commanding the Army of the United States, as to the most advisable route by which to make the approach to the capital. The President, sus¬ tained by some of his veteran military advisers, preferred a direct march to Manassas Junction, and thence southward, at all times keeping the army in a position covering Washington. Mc¬ Clellan insisted upon transporting the Army of the Potomac, 110,000 to 140,000 men, to the vicinity of Fortress Monroe and thence up the York Peninsula. The President, 8 March 1862, reluctantly yielded to the plan of campaign urged by McClellan, making the condition that a sufficient force should be left at and near Washington to insure its safety, that not more than 50,000 men should be moved to the new base until the navigation of the Potomac from Washington to Chesapeake Bay should be free from the Confederate batteries, and that the movement should begin as early as 18 March. The day after the issue of this order the Con¬ federates evacuated their positions at

Centreville and Manassas, in front of Washington, and abandoned their batteries on the Potomac. This movement changed completely the conditions under which the President had limited the num¬ ber of men McClellan might take, but no change was made in that restriction. As McClellan proposed to take the field with the Army of the Potomac, he was relieved from command of all other military departments, thus isolating his expedition and leaving the command of other troops in the vicinity to Washington; a division of command which invited disaster, and, indeed, led, with other miscalculations, to the failure of the campaign. The Army of the Potomac, under the President's order, was organized into five corps : the First, General McDowell ; Sec¬

ond, General Sumner; Third, General Heintzelman- Fourth, General Keyes; Fifth, General Banks. McClellan had nothing to say as to the appointment of these commanders. They wcie given their commands by the President. Banks was charged with the care of the Shenandoah Valley, the Upper Potomac, and the positions of Manassas Junction and Centreville, and General Wadsworth had command of the troops garrisoning Washington. The campaign began 17 March by the embarkation of two divisions of the Third corps, which were landed at For¬ tress Monroe and placed in position on the roads leading to Newport News and Yorktown. Other divisions followed, and McClellan in person reached Fortress Monroe on the af¬ ternoon of 2 April. The force actually trans¬ ported was Sumner's, Heintzelman's and Keyes' commands, with a few thousand of regulars — infantry and cavalry — and 2,700 re¬ serve artillery; in all, a total of 109,419 men, 14,502 horses and mules and 44 batteries with 343 guns. The fleet occupied in this transport was upward of 400 vessels. t

On the 4th the movement began, Heintzelman's corps on Yorktown, Keyes' on its left. On the morning of the 6th Heintzelman was stopped by the Confederate works at Yorktown, and on the left Keyes was checked by a small battery on the line of Warwick River. The Confederates, under Gen. J. B. Magruder, held a line across the Peninsula from the mouths of the Warwick River and Deep Creek, on James River, to Yorktown, on York River. The line, about 12 miles in length, was covered a great part of the distance by boggy and difficult swamps, and quite well fortified by redoubts at the road crossings and a series of dams which had been raised to flood the swamps. The entire opposing force was (4 April) 11,000 men, of which about 6,000 were at Yorktown and Gloucester Point on the opposite bank of the York River, leaving but 5,000 to cover the remaining 11 miles. A part

of McClellan's plan was that the navy should reduce Yorktown from the river, but no orders were issued to the navy to co-operate. The existence of this Warwick River line was a surprise to McClel¬ lan, who knew that Yorktown was forti¬ fied, but had no knowledge of the defensive works extending from that place to the James, and his movement on Yorktown was predicated on the belief that he could turn it by his left. Keyes' force of 25,000 men was, there¬ fore, halted in the face of the unknown oppo¬ sition while a movement was made against Yorktown. It was a part of McClellan's plan, also, that McDowell's corps should turn York¬ town by the right, by landing at Gloucester Point on the north bank of York River, but on the 5th he was notified by the adjutant-general of the army that McDowell had been withheld from his control to defend Washington, as it was claimed that McClellan had not complied with the President's condition to make Wash¬ ington secure, and McDowell was necessary to that security. McClellan protested and urged that at least McCall's and Franklin's divisions •of McDowell's corps should be sent him, and a few days later the President ordered Franklin's division to report to him, which it did on the 20th. Meanwhile McClellan had begun a reg¬ ular siege of Yorktown, and apparently gave up all idea of breaking the Warwick line at any

point, though strongly urged by the President to do so. He reconnoitered the line and, 16 April, had an engagement at Lee's Mill (q.v.), which only the more strongly confirmed him in the prosecution of a regular scientific siege. A month was spent in preparation. Batteries were constructed and 90 heavy guns put in position. (See Yorktown, Siege of). But McClellan's plans had leaked into the possession of the enemy, and just as he was about to open fire on the morning of 4 May, it was discovered that during the day and night preceding the Confederates had abandoned the place very deliberately and marched for Williamsburg and Richmond, leaving a booty of 71 guns of vari¬ ous calibres to pay McClellan for a month's arduous toil of a whole army. McClellan started in pursuit, but not until noon did his troops get on the road, McClellan remaining at Yorktown to

superintend the loading of Frank¬ lin's division on transports for the purpose of ascending York River, to land opposite West Point, and attack the Confederates in flank. The Confederate rear-guard was overtaken by the Union advance at Williamsburg, and a severe engagement ensued on the 5th, in which the Confederates' loss was 3,000 killed and wounded and 600 prisoners. The Federal loss was 2,073 killed and wounded and 623 taken prisoners.

Franklin did not get off from Yorktown un¬ til the 6th, reaching Eltham Landing above West Point, at 1 p.m., where he disembarked his troops and awaited orders. The greater part of the Confederate army was already be¬ yond striking distance, but to protect its trains, a division attacked Franklin on the morning of the 7th and engaged him until 3 p.m., when it withdrew. Stoneman's cavalry opened com¬ munication with Franklin at Eltham's Landing, and the Army of the Potomac marched from Williamsburg on the 8th, passing through Barhamsville, Roper's Church and New Kent Court House, headquarters being established at Cumberland, on the south bank of the Pamunkey, on the 15th, and on the 16th at White House, where a permanent depot was organ¬ ized. Gen. Joseph E. Johnston, commanding the Confederate army, since 17 April, had halted but 22 miles from Williamsburg until 15 May, when, hearing that the Merrimac had been destroyed and James River opened to the Union gunboats as far as Drewry's Bluff, he crossed the Chickahominy, and on the 17th encamped his army about three miles from Richmond. At McClellan's request the President ordered an expedition up James River, which was halted at Fort Darling by the Confederate iron¬ clad Virginia , formerly the Merrimac, and the shore batteries, and Commodore Rodgers sug¬ gested to McClellan a land expedition to co¬ operate with the navy in the capture of that work, but McClellan preferred to delay the matter until after he should have crossed the Chickahominy. Meanwhile, by taking from Sumner, Heintzelman and Keyes each a divi¬ sion, McClellan had organized two additional corps and given command of them to Generals Fitz-John Porter and Franklin. On the 21st his army was drawn up along the north bank of the Chickahominy, facing Richmond, which was but 7 to 12 miles distant. Soon after the battle of Williamsburg (q.v.) McClellan's call for reinforcements became earnest and per¬

sistent; he reported that he had not more than 80,000 fighting men, and that the enemy had many more. The President finally consented tc send McDowell overland from Fredericks¬ burg, with 40,000 men and 100 guns, to co-oper¬ ate with McClellan by coming in on his

right, but in no case to uncover Washington. Mc¬ Dowell was to have marched on 26 May, and to clear his way McClellan ordered Gen. Fitz-John Porter, with about 12,000 men, to drive from the vicinity of Hanover Court House, 14 miles north of Richmond, a considerable body of the enemy, under Generals Anderson and Branch, and to destroy the bridges over the South Anna and Pamunkey rivers and cut the railroad connecting Richmond directly with northern Virginia. Porter started from New Bridge on the Chickahominy on the morning of the 27th, with a division of infantry and some regular cavalry and artillery. At the same time Col. G. K. Warren, with a brigade moved from Old Church on a road running parallel to the Pamunkey. Porter engaged and defeated Branch at Hanover Court House (q.v.), destroyed some of the bridges on the railroad and returned to his old camps. But McDowell did not join McClellan. When his head of column had marched but a short dis¬ tance out of Fredericksburg his entire move¬ ment southward was suspended by orders from Washington, and he was sent westward against ˆStonewallˆ Jackson in the Shenandoah Valley (q.v.). Meanwhile the corps of Keyes and Heintzelman had crossed the Chickahominy, Keyes' advance taking position at Seven Pines, on the main road leading to Richmond, about five miles from the city. Heintzelman was in rear, and the three corps of Sumner, Franklin and Porter were on the north bank of the Chickahominy, forming almost a semi-circle concave to the Confederates. On 31 May McClellan reported a strength of 126,089 offi¬ cers and men present, with 280 field guns. At the same time the Confederate army defend¬ ing Richmond numbered about 58,000 men. Johnston, with about 32,000 of these, attacked the 19,000 of the two Union corps south of the Chickahominy on the 31st, driving them back some distance, when he was checked by Sum¬ ner, who had hurriedly crossed the Chicka¬ hominy and struck his left. During the clos¬ ing hours of the engagement Johnston was severely wounded, and Gen. G. W. Smith suc¬ ceeded to his command. On the morning of 1 June the battle was renewed, and it ended with the success of the Union troops, who gained the ground lost the previous day. This battle is known as that of Fair Oaks or Seven Pines (q.v.). The Confederate loss was 4,500 and the Union loss 5,700. During this action Mc¬ Clellan had 50,000 men inactive at Cold Har¬ bor, but feared to move them lest his right flank be turned by a force whose strength he did not know. At noon of 1 Tune Gen. R. E. Lee assumed command of the Confederate army, and at night he ordered its withdrawal to the camps near Richmond, which was done by daybreak next day.

The country was now drenched with tor¬ rential rains and great freshets followed carry¬ ing away all the bridges, which the Union

army was compelled to rebuild. For nearly a month both armies remained inactive, each strengthen¬ ing its position, General Lee bringing up troops

from every possible quarter until late in June, when, including Jackson's command, he had 80,762 men. McClellan had received McCall's division of McDowell's corps as a reinforce¬ ment, and had 92,500 men. On 25 June Porter was on the right of the line, north of the Chickahominy, the four corps of Franklin, Sumner, Heintzelman and Keyes south of it, and on that day, preparatory to a general movement on Richmond, an advance was made in front of Seven Pines, which brought on the battle of Oak Grove (q.v.), with no material result; but it marked the beginning of the "Seven-days' Battles® (q.v.). "Stonewall® Jackson had now been brought from the Shenan¬ doah Valley, and 26 June Lee crossed the Chickahominy with the greater part of his army to turn McClellan's right, cut him off from his base at White House and force him to re¬ treat down the peninsula. Lee attacked McCall's division at Mechanicsville or Beaver Dam Creek (see Mechanicsville, Battle of), and was signally defeated. On the 27th McCall fell back, and Lee, advancing and joined by Jackson, fell upon Porter's corps at Gaines Mill (q.v.), inflicting upon it and Slocum's division of Franklin's corps a bloody defeat. The Federals lost 7.000 killed and wounded and the Confederates many more, but the latter had been victorious. That night McClellan came to a determination, which he had had under consideration, to retreat to James River; his trains were put on the road to cross White Oak Swamp, and move to Haxall's Landing, and Porter's corps recrossed to the south side of the Chickahominy and followed. The bridges across the Chickahominy were de¬ stroyed. Fortunately for McClellan General Lee did not correctly understand his move¬ ment on the 28th, and he withdrew his right, under cover of his left, which remained in the works fronting Richmond, preventing Gen¬ eral Magruder from getting any knowledge of what was going on. Late in the afternoon and night of the 28th Lee came to the con¬ clusion that McClellan was retreating to James River, but gave no order for pursuit until the

morning of the 29th, when Longstreet, A. P. Hill, D. H: Hill and Jackson were ordered to recross to the south side of the Chickahominy, and General Magruder, who discovered by sunrise that the works in his front had been abandoned by Sumner and Heintzelman, was ordered to pursue by the Williamsburg road, and General Huger by the Charles City road. At 9 a.m. Magruder overtook Sumner at Peach Orchard or Allen's Farm (q.v.), and a battle resulted, in which Magruder was checked, and after which Sumner fell back to Savage Station (q.v.), where he was again attacked by Magruder late in the afternoon. He held ground until dark, when he fell back across White Oak Swamp, and with Franklin and Heintzelman prepared to dispute the Confed¬ erate advance. Lee now concentrated for a heavy blow to cut McClellan's army in tyvo and destroy it. He threw his divisions upon Sumner, Franklin and Hqintzelman on the 30th, at Glendale (q.v.), but was unsuccessful. Next morning (1 Tuly) the Army of the Po¬ tomac was in position at Malvern Hill, on the James. Lee followed, and in the afternoon at¬ tacked and was repulsed with great loss. Mc¬ Clellan was urged to retreat no farther, but

he abandoned Malvern Hill during the night and by morning of 2 July his head oi column was at Harrison's Landing. The Con¬ federates did not come up to his position unti. the morning of the 4th. Lee thought it net judicious to make an attack, and on the 8th marched the main body of his army back to the vicinity of Richmond, and the Peninsula Campaign was ended. The Union loss in the campaign was 16,600 killed and wounded ano 7,500 captured or missing. The Contederate loss was 27,000 killed and wounded and 2,000 captured or missing. In both armies the sick-list was very large and many died. Consult < Official Records > (Vol. XI); 'McClellans Own Story* (New York 1887) ; Michie, P. S., (Life of McClellan* (New York 1901) ; Webb, (The Peninsula) ; Swinton, (The Army of the Potomac) ; Barnard, J. E., 'The Peninsula Campaign* (New York 1864) ; Compte de Paris, (History of the Civil War,* Vol. II; Walker, (History of the Second Army Corps* ; Powell, (History of the Fifth Army Corps* ; Fitzhugh Lee, (Life of Gen. Lee) ; Allan, <History of the Army of Northern Virginia* ; (The Century Company's c Battles and Leaders of the Civil War* (Vol. II).

E. A. Carman.

PENINSULAR STATE, a name applied to

Florida on account of its geographical outline.

PENINSULAR WAR, The, sometimes called the War of Spanish (or Portuguese) In¬ dependence, a series of important campaigns 1808-13, against Napoleon in the Iberian penin¬ sula, his opponents being the English, Spanish and Portuguese. Canning was a firm believer in the utilization of aroused national feeling against Napoleon in states invaded by the French. Such a feeling had sprung up in Spain in 1808, when Ferdinand, Prince of Asturias, having received the crown of Spain by the abdication of Charles IV, his father, ceded it to Napoleon, who gave it to Joseph Bonaparte 6 June 1808. In spite of brave op¬ position, the French king entered Madrid 14 July; but six days later three French divisions were forced to surrender, guerrilla warfare in¬ creased in force, and Spain showed J:he first successful national resistance to Napoleon. But before this, by the aid of Charles IV, when he was still king of Spain, a French army un¬ der Junot had entered Portugal, and a Portu¬ guese rising followed that in Spain. The pro¬ visional government of the insurgents asked help from England, so that, at the close of the year 1808, the future Duke of Wellington had defeated the French at Roriqa and at Vimeiro 21 August. Junot by the Convention of Cintra, 30 August, had promised to evacuate Portugal; and, in fine, Canning's policy had proved suc¬ cessful enough to justify itself thoroughly. The campaign in Spain in 1809 was opened by Na¬ poleon hifnself at Madrid, and all looked gloomy for Spain until July, when Wellington, having dislodged from Portugal a fresh French army under Soult, invaded Spain and won the victory of Talavera de la Reina, 28 July, which effected little because of inadequate sup¬ port in the field and at home so that the latter part of the year, like the former, was a monot¬ onous series of French successes over un¬ trained Spanish troops. The third year of the war (1810) was taken up by the attempts

of the French armies to complete their con¬ quest of Spain and to drive Wellington from his fortifications at Torres Vedras; but Massena was forced early in 1811 to retire from Portugal to Spain. He was pursued and de¬ feated by Wellington at Fuentes de Onoro 5 May 1811. On 16 May Portugal was again emptied of French troops by

Beresford's vic¬ tory over Soult at Albuera. In central Spain the French suffered from guerrilla attacks and only in the east, where .Suchet controlled Valen¬ cia and Aragon, were they successful. In 1812, the year that saw the grand army wrecked in Russia, Wellington completely defeated Marmont at Salamanca 22 July, and Joseph Bona¬ parte left Madrid, which was occupied by the English 12 August. However, the French held Burgos, and Suchet was still invincible. But the French armies in Spain were weakened by the demands of the German campaign of 1813. Wellington broke communications with Paris, at Vitoria, 21 June, defeated Jourdan — a vic¬ tory which left Suchet entirely unprotected and forced him to retire — and 31 August stormed San Sebastian, thus breaking the last vestige of French power in Spain and making his way into France itself. There he was equally suc¬ cessful at Saint Palais 15 February, and at Vic-en-Bigorre 19 February, and was still manoeuvring against Suchet when word came of Napoleon's abdication. Consult Napier, W. F. P., (History of the War in the Peninsula> (London 1828ˆ40) ; Arteche y Moro, (Guerra de la independence5 (1868-1901) ; Shand, A. I., <The War in the Peninsula5 (New York 1898) ; and Oman, C. W. C., (History of the Peninsular War5 (Oxford 1902).

PENITENTIAL PSALMS, seven psalms in which repentance is expressed and pardon asked of God. In the Authorized Version they are: 6, 32 (Latin numeration 31), 38 (L. N. 37), 51 (L. N. 50), 102 (L. N. 101), 130 (L. N. 129), and 143 (L. N. 142). In the Roman Catholic Church they are used on solemn oc¬ casions, and Pope Innocent III (1198-1216) ordered their recitation in Lent. Pius V (1566-72) appointed the Fridays in Lent as proper days for this exercise. We are told that Saint Augustine when he was dying caused these Psalms to be written out on the wall fac¬ ing his bed, and their classification and name are of great antiquity. In the Anglican Church they are appointed to be used in the services for" Ash Wednesday, the Prayer Book direction to that effect having been inserted in the re¬ vision of 1662. The most deeply penitential and the most frequently in use is the 5lst Psalm, known also as the Miserere.

PENITENTIARY, a word employed in the early Church to designate the priest or presbyter whose office was to receive the private confessions of the people, and to advise as to whether public or private penance was de¬ manded by the heinousness of the offense. The penitentiary had no power to impose penances. The office was abolished in the East by Nectarius, patriarch of Constantinople, during the reign of Theodosius. It still exists in the Roman Catholic Church where peni¬ tentiaries are of varied rank. The cardinal grand penitentiary presides over tribunal of penitentiaries at Rome, as a sort

of chief jus¬ tice of the ecclesiastical supreme court. Peni¬

tentiary priests are special ecclesiastical officers appointed by the Pope to hear confessions in the three patriarchal churches, of the Vatican, the Lateran and Santa Maria Maggiore. The Council of Trent decreed that every bishop should establish in his cathedral church a peni¬ tentiary priest who must be either a doctor, master or licentiate in theology or canon law and not under 40 years of age. His office is to consider and determine especially cases of ab¬ solution or dispensation referred to him.

PENITENTIARY, a prison. See Pen¬ ology.

PENJAMO, pan'ha-mo, Mexico, town in the state of Guanajuato, 35 miles northeast of the Valle de Santiago, in a fertile and well-watered valley on the right of the Rio de Leon and within four miles of the Queretaro-Gua- dalajara railroads. The birthplace of the Mexi¬ can patriot Miguel Hidalgo y Costilla is in the nearby village of Dolores Hidalgo. Pop. about

9,000.

PENJDEH, pen j 'da, Turkestan, the name of an oasis in lat. 36° 4' north, long. 62° 41' east, the seat of a Turcoman camp, 130 miles north of Herat. It is of irregular form, about 27 miles in extreme length and 20 miles in extreme breadth and has an area of about 300 square miles. It belonged to Afghanistan until 1885. Its importance is derived from its location in the long-disputed boundary region between the English and Russian spheres of influence. Its seizure by the Russians on 30 March 1885 led to elaborate preparations for war; but after various conferences a treaty was arranged in 1887 by which the Russians were allowed to remain in possession. On the breaking up of the Russian Empire in 1917 Penjdeh was lost to Russia. The people keep large flocks, and are expert in the manufacture of cloth and carpets. Pop. about 117,000.

PENN, John, American colonial governor of Pennsylvania, grandson of William Penn (q.v.) : b. London, England, 14 July 1729; d. Philadelphia, Pa., 10 Feb. 1795. He was edu¬ cated in the University at Geneva, came to Philadelphia in 1753, and served in the pro¬ vincial council as its First Member until after Braddock's defeat, when he left the colony, going back to England, where he remained eight

years. He returned as lieutenant-governor in 1763, and his administration was much disturbed by troubles with the Indians, with whom he finally succeeded in forming the treaty of Fort Stanwix in 1768. He was absent in England in 1771-73, but returned with full power as governor, and during the early portion of the Revolutionary period endeavored to steer a middle course, but in 1775 his council was sup¬ planted by the committee of safety. His loyalty being questioned, he was imprisoned for a time in 1777-78, but was released after a few months ; however, with the other members of the Penn family, he was stripped of all his proprietary rights, receiving a share of the £130,000 allowed by the legislature for lands transferred to the possession of the State. He also received one-fourth of the annuity of £4,000 which the British government granted to the family. Consult Pennsylvania Archives5 ; Sheperd, Proprietory Government in Pennsyl¬ vania.5

PENN, John, American statesman: b. Caro¬ line County, Va., 17 May 1741 ; d. North Caro¬ lina, September 1788. He studied law, was ad¬ mitted to the bar in 1762 and became a success¬ ful practitioner, attaining a reputation for elo¬ quence and ability. In 1774 he removed to Greenville County, N. C., and in 1775 was elected to the Continental Congress, where he signed the Declaration of Independence in 1776 He was reelected for the term 1778-80, and upon the invasion of Lord Cornwallis Penn was placed in charge of the affairs of the State with power nearly that of a dictator ; he performed the difficult duties of his trust with much credit, and in 1784 was made receiver of taxes for North Carolina. This office he resigned after a month, and retired to private life.

PENN, Richard, English colonial governor of Pennsylvania, grandson of William Penn: b. England, 1735; d. Richmond, Surrey, England, 27 May 1811. He was educated at Saint John's College, Cambridge, accompanied his brother, John Penn (q.v.), on his return to Pennsyl¬ vania in 1763, and in 1764 became a member of the Provincial Congress. He went back .to England in 1769, but came again to

America to act as deputy-governor in 1771-73, during his brother's absence in England. At the out¬ break of the Revolution he sympathized openly with the colonists, among whom he was very popular, and in 1775 acted as the messenger of Congress to England with a petition for various concessions. He did not return to America for many years and then only for a brief visit in 1808. From 1784-1808 he sat in Parliament, after which he retired to private life. His wife, Mary, whom he married in 1775, was a daughter of William Masters of Philadelphia.

PENN, Thomas, English colonial proprie¬ tor in America, son of William Penn: b. Lon¬ don, England, 8 March 1702; d. at Stoke Poges, 21 March 1775. He was invested with power of attorney by his brothers John and Richard, and came to Pennsylvania In 1732 to look after the interests of their immense estate. He was a member of the provincial council and re¬ mained in the colony until 1741. When the dis¬ putes concerning boundaries and taxation were settled Thomas and his brother Richard (John having bequeathed his interest to the former on his death in 1746), were in possession of a feudal estate of 25,000,000 acres with over 200,000 inhabitants, which was exempt from taxation. This condition led eventually to the commissioning of Benjamin Franklin in 1757 to present to Thomas Penn, then in England, a protest known historically as the (<Heads of Complaint.® In 1760 the long litigation be¬ tween Thomas and his brother Richard on one side and Lord Baltimore on the other was definitely settled. (See Penn v. Baltimore). Upon the seizure of the great estates of the Penn family by the State in 1775 Thomas Penn received three-fourths of the State's award of £130,000 for the lands taken. He is reputed to have been one of the founders and a chief supporter of the College of Philadelphia, which afterward became a part of the Univer¬ sity of Pennsylvania.

PENN, Sir William, English admiral: b. Bristol, England, 1621 ; d. Wanstead, Essex, England, 16 Sept. 1670. He early entered the navy and served with rapid promotion. In

1648 he was made rear-admiral and in 1649 captain and vice-admiral of the Irish fleet. In 1652 he was appointed to the same office in the fleet under Admiral Robert Blake. To him was due, in a great measure, the victory of Portsmouth in February 1653. On 2 Dec. 16:).- he was appointed general of the fleet. At the termination of the war with Holland, Penn determined to desert Cromwell, and accordingly offered his allegiance and his fleet to the Stuarts. Charles could not then

dispose of the fleet and advised him to continue in the service of the Commonwealth until an opportunity favorable to their plans should arise. In 1654 he was appointed general and commander-in¬ chief of the expedition which in 1655 wrested Jamaica from the Spaniards, and on his return was imprisoned in the Tower, ostensibly on the - charge of having absented himself from his duty without leave, but really because his rela¬ tions with Charles had been discovered. Upon his release a few weeks later he retired to his estate in Munster and there remained until the eve of the Restoration. In 1660 he was knighted and made a commissioner in the navy; his pos¬ session of certain Irish estates was confirmed by the king in 1665 and in that year as Great-Captain-Commander under the Duke of York he won the victory over the Dutch off Lowe¬ stoft. He held no further command afloat, but was connected with the naval office until his death.

PENN, William, founder of Pennsyl¬ vania: b. London, 14 Oct. 1644; d. Ruscombe, Berkshire, 30 July 1718. His father was Vice-Admiral Sir William Penn, who had a re¬ markably successful career in the British navy. His mother was Margaret Jasper, the daughter of a wealthy merchant of Rotterdam. While the admiral was off on the seas, his wife and little boy resided on one of his estates at Wanstead in Essex. William Penn went to school at Chigwell, nearby, where he was ap¬ parently under influences largely Puritan. At the age of 11 a strong religious conviction came suddenly upon him. ((He had the strongest con¬ viction of the being of a God and that the soul of man was capable of enjoying communication with him,® an experience which profoundly in¬ fluenced his future life. In 1656 the family re¬ moved to Ireland, and here young Penn was given the best of private instruction.

His boyhood days were lived during the Protectorate. The Admiral, after receiving honors and riches from Cromwell, had so timed his change of loyalty as to gather in a good share of the rewards distributed at the time of the Restoration. He was in a condition to send his son to the most aristocratic of Oxford Colleges, and at the age of nearly 16, in the year 1660, William Penn became a ((Gentleman-Commoner of Christ Church*® The boy was evidently .tinged with puritanism ; the prayer-book and the surplice savored of papacy, and he joined a little company of students in re¬ ligious worship not authorized by the Estab¬ lished Church. An Oxford Quaker, Thomas Loe, spoke with power in the city and Penn came under his influence. The results were not exactly Quakerly, however, for in company with a friend, he forcibly tore from the backs of fellow-students the <(popish rags,® as surplices were called by the zealous puritans of the day.

For this he was, with others, expelled from the college. He went to his home and an¬ nounced himself a Quaker. He was now a manly youth of 18, handsome in appearance, and of unusual intelligence. His father had in¬ tended him for a high career in the state, and no news could have been more unwelcome than this. True to his convictions, he adopted the speech and manners of the sect and attended their meetings. Exile from home followed, but this simply aroused his determination. His father's friends interceded for him, pointing out that one might rather be proud of a son who eschewed the frivolity and immorality of fashionable society of the days of Charles II. He was sent abroad in the company of persons of high degree, first to Paris, where he entered partially into the circle of fashion; thence to Saumur, the Protestant college, where he laid the foundation of that extensive knowledge of patristic literature so much in evidence in his future writings ; thence touring in Italy, where he received a letter from his father calling him home in 1664. The trip had produced its de¬ signed effect and the signs of the Quaker had disappeared.

He was then entered as a student at law at Lincoln's Inn, and was given a place on his father's staff. In 1666 he was sent by his father to manage his large Irish estates. He joined the expedition to put down a mutiny in the garrison at Carrickfergus, and procured for himself a suit of armor, in which seems to have been painted the only picture of him made during his lifetime. The picture shows a hand¬ some youth, with hair parted in the middle and long dark locks. His martial ardor was of short duration. Thomas Loe again crossed his path in Cork and Penn became a Quaker never more to falter. He was soon imprisoned with his fellows on a charge of rioting, and this was but the beginning of many and severe confinements which lasted at intervals through his life. His influence soon secured his release. His father was angered by his <(thee® and ((thou,® which the Quakers had adopted as the language of equality, and his refusal to doff the hat, then a symbol of

reverence of worship, and drove him from his house. In time they were reconciled and the Admiral on his death¬ bed in 1670 endorsed the course of his son.

Penn began immediately to preach and to enter into the theological controversy of his time. His supposed unsoundness on the Calvinistic interpretations of the day got him into the Tower. <(My prison shall be my grave,® he said to the Bishop of London, who asked him to recant as the price of liberty, (<before I will budge a jot. For I owe obedience of the Con¬ science to no mortal man.® He was soon dis¬ charged due to the influence of the Duke of York, afterward James II, with whom he en¬ joyed a strong friendship. <Truth Exalted, > in 1668, was his first important publication; then followed, in the same year, (The Sandy Foundation Shaken,* Hnnocency with her open Face,* and the most noted and valuable of his works, a book breathing the noblest spirit of Christianity, written in prison, (No Cross, No Crown.*

In 1670 he was again arrested under the Conventicle Acts. His trial is noted in the records of English jurisprudence. With a vol. 21—33

friend, William Mead, they were brought be¬ fore the Court, upon an illegal indictment and insufficient evidence. Penn conducted the de¬ fense and the jury brought in a verdict of not guilty. The judge was infuriated and en¬ deavored to browbeat them into another de¬ cision, when Penn appeared as their champion, and so enheartened them by his exhortations to firmness that they stood their ground and set¬ tled for all time the independence of juries within their proper limitations. His next im¬ portant work, (A Seasonable Caveat against Popery) (1670), brought out a principle, fur¬ ther elaborated in (Great Case of Liberty of Conscience) (1671), which now became one of his guiding standards of life, universal tolera¬ tion, which soon developed into perfect religious liberty. The last work was written in prison. On his release he made a trip to Holland and Germany, preaching the gospel.

He took advantage of a little surcease from jails to marry, in his 28th year, Gulielma Maria Springett, daughter of Sir William Springett, a woman of great beauty and sweetness. A declaration of indulgence for dissenters issued by Charles II, in 1672, now made his life easier, and with an estate of £1,500 a year left him by his father, he settled at Rickmansworth, in Hertfordshire. He was active for a few years in preaching his doctrine through Eng¬ land by tongue and pen. The

indulgence was soon revoked and Penn began the work in which we find him engaged largely through life, of securing releases, by his influence at court, for his suffering friends. In 1675 he wrote a (Treatise on Oaths,* explaining why Quakers refused to take them. Another soon followed, England's Present Interests Considered,* a work devoted to showing the history and prog¬ ress of civil liberty in the kingdom.

In 1675 his thoughts were first seriously turned to America. Lord Berkeley and Sir George Carteret, who had received from the Duke of York the promise of New Jersey, sold the western half to two Quakers, John Fenwick and Edward Byllinge. They had some difficulty between themselves in the settlement of their relative claims and asked William Penn to arbi¬ trate the matter. Byllinge afterward becom¬ ing embarrased, transferred to Penn and two otners his interest for the benefit of the cred¬ itors. West New Jersey was opened for sale and the persecuted Quakers found there a haven of rest. Penn wrote to Richard Hartshorne, a settler whom he appointed his agent, ((We lay a foundation for after ages to understand their liberty as men and Christians, that they may not be brought in bondage but by their own consent ; for we put the power in the people.® The colony prospered greatly under the man¬ agement of Penn and his friends. In 1677 he established his family in Worminghurst, in Sussex, on an estate owned by his wife. In company with George Fox, Robert Barclay and others, Penn paid a religious visit to Holland and Germany. Here he made a convert of the Princess Elizabeth Palatine, granddaughter of James I, a woman of great intelligence, learn¬ ing and spirituality, who became a devoted ad¬ herent and correspondent. More important, his¬ torically, however, he began that acquaintance with the Rhine Valley which resulted in a great emigration of its inhabitants to Pennsylvania, in the following century. His journal of the

trip is among his printed works. When he re¬ turned he found persecution breaking out anew, many of his friends in jail and their estates confiscated. The plea was that the Papists were intended to be

the sufferers and the Quakers were drawn in incidentally. Penn published a plea for liberty, even for Papists — a sentiment which, in that day, required no small courage — and gave rise to a report, from which he after¬ ward suffered greatly, that he was a Jesuit in disguise. In 1679 he wrote an ‘Address to Protestants of all Persuasions) to promote general morality, also an address to William, Prince of Orange, on behalf of certain dis¬ senters in Holland. He also became interested in political affairs, identified himself with the Whig party and worked in behalf of the Par¬ liamentaryˆ candidacy of the republican Alger¬ non Sidney. He enjoyed great favor at court. His rank, wealth, courteous manners and strong personality gave him much influence, while his Quaker customs and speech seem to have been regarded with good-natured tolerance. This in¬ fluence he continually exerted for the aid of his suffering brethren and his advocacy of his favorite doctrine of universal toleration. The rest of the life of Penn belongs largely to the history of Pennsylvania. Before entering on this it is well to mention a few of the principal writings of the following years. Examination of Liberty Spiritual) appeared in 1681; /Per¬ suasive to Moderation,* in 1686; (Fruits of Solitude,) in 1692, being a perfect treasury of wise advice, so that it has recently sprung into fresh popularity and many editions in England and in America, having been a favorite of Robert Louis Stevenson; and about the same time a comprehensive Essay towards the Pres¬ ent and Future Peace of Europe,) being a sug¬ gestion for an international parliament which has been the basis of a movement culminating in the Hague tribunal; (Rise and Progress of the People Called Quakers,) in 1695; Enmitive Christianity Revived,) in 1696. His preaching whether in England or America was incessant. His influence ai court, strong under Charles II, was ascendant under James II, suffered an eclipse under William and Mary, and recovered itself under Anne.

He had inherited from his father a claim of £16 000 against Charles II for money loaned and services rendered. In 1680 he asked the pay¬ ment of this claim in lands in America. The king was willing to be so easily released from a troublesome debt and to satisfy an influential friend. Penn saw an opportunity, for which his New Jersey experience had prepared him, to found a Christian commonwealth devoted to liberty, peace and justice, and to secure a place of rest for his persecuted coreligionists. The deed was signed on 4 March 1681. It made Wil¬ liam Penn governor and proprietor of “Pennsil-vania,)) a vast tract, intended to be three de¬ grees in latitude and five in longitude. It was described as bounded on the east by the Dela¬ ware River, on the west by Maryland and to extend as far northward “as plantable.)) He could sell the land on his own terms and to whom he

would. He could fix the government, make the laws — subject to the assent of the freemen — appoint magistrates and judges, levy taxes, control the military forces and grant par¬ dons and reprieves, though in all these powers

the Crown reserved a veto. He now went to work with great energy to settle his colony. A few Dutch and Swedes were already on the banks of the Delaware and some English Quak¬ ers had drifted over from West Jersey while the Indians roamed the woods. He addressed these inhabitants, promising them, “You shall be governed by laws of your own making, and sent out his cousin, William Markham, as his deputy. The impossibility of laying out the province in accordance with the terms ot the royal grant became manifest as soon as a few latitudes were taken and the long controversy between Penn and Lord Baltimore, continued by their heirs, was not settled for nearly a cen¬ tury. It interfered sadly with Penn’s plans for living in his province, - and produced bickerings and hard feeling, at times verging on war

He pushed sales with vigor and immediately the colonists began to arrive. But the subject on which his heart was most set was the ((Frame of Government.)) His first “frame)) was extreme republicanism. He abolished pri¬ mogeniture, gave all the power to the people to initiate the repeal laws, reserving no veto for himself. All taxes were to be collected by law, the courts were to be open to all and no oaths required; penalties were to be light, capital pun¬ ishment abolished except for murder (the more remarkable, as at this time, there were enumer¬ ated 200 capital offenses in the English law) ; prisons were to be workhouses and all children taught a useful trade. All who professed faith in Jesus Christ were to be eligible to office and all who confessed an almighty God were to have free exercise of their worship. This “frame® showed the working of Penn’s mind and probably better expressed his ideas of gov¬ ernment than those which followed. In some respects it was modified, but to the one feature of wide religious liberty he adhered with ten¬ acity in the face of considerable opposition. He had pleaded for it in England when a mem¬ ber of a persecuted sect ; as the ruler of a State he would be true to his ideals. Leaving be¬ hind a beautiful letter to his wife and children, which has been extensively published, he sailed with about 100 others, most of whom were Quakers, for America. On 27 Oct. 1682 he landed at New Castle. This was also his ter¬ ritory, for the Duke of York had transferred to him the land of the present State of Dela¬ ware. Stopping at Chester, he went leisurely up the river to the new city which he had named Philadelphia, then partly laid out, and

the scene of great building activity.

The celebrated treaty with the Indians was probably made in the summer or fall of 1683. Penn was continually meeting tribes, buying land and cementing friendships. His fairness and liberality won their hearts. At various times he bought all of southeastern Pennsyl¬ vania, in sections stretching from “creek® to “creek® and running up into the country a dis¬ tance measured by the length of one or two days’ walk. One of these treaties was held at Shackamaxon (now Kensington) and has been immortalized by West on canvas and Voltaire in print. Penn spent nearly two years in Penn¬ sylvania. He met legislatures and preached in the Quaker meetings, sold land in the country and developed his city, settled disputes and established courts, and hospitably entertained white and red men. The claims of Maryland

were being pressed in London and on 12 Aug. 1684 he embarked for England, expecting to make a brief stay and to bring his family per¬ manently to Pennsylvania.

James II, the great friend of Penn and his father, came to the throne shortjy after his ar¬ rival and Penn strove to use his influence for persecuted dissenters. As this would embrace Roman Catholics, James at first assented and 1,400 imprisoned Quakers were set free; but political measures demanded the re-enactment of the offending measures and Penn became a courtly intercessor for all sorts of favors. This lasted till the revolution of 1688, except for a second visit to Holland and Germany on a dip¬ lomatic mission for James, which Penn turned to religious advantage also, preaching every¬ where. From this trip sprang the great emigra¬ tion of Germans into the Penn province during the early 18th century. Upon the accession of William and Mary, conditions radically changed. All friends of the Stuarts were suspects. Twice Penn was arrested on charges of treasonable correspondence with the banished king and twice acquitted. After each release he began to make preparations to return to Pennsylvania, where his presence was greatly needed to com¬ pose the factional

differences which had arisen. On his return from the funeral of George Fox, in 1600, he heard that he had been accused again by one Fuller, whom the Parliament afterward pronounced ((a cheat,® and that a warrant was out against him. He might have gone to Amer¬ ica, but he would not under suspicion. He allowed the vessel to sail without him and went into hiding in London. This condition lasted about three years. Various treatises issued from his pen. His friends found him to con¬ verse and his opponents to argue theological points, but technically he could not be found by the king's officers. Finally, in 1693, three lords presented his case to King William, giving the assurance that there were no real charges against him. An examination was had and Penn was set at liberty. In the meantime his wife had died. The province and the terri¬ tories, as Pennsylvania and Delaware were respectively called, were demanding separation from each other, and an apostate Quaker named George Keith, was making an ecclesiastical and political turmoil. In 1692, to add to his other troubles, his executive authority was taken away and given to Benjamin Fletcher, governor of New York, who was totally out of sympathy with the people of the province. Upon Penn's release, his powers were returned to him. In 1696 he married Hannah Callowhill of Bristol. This event was followed by three years of un¬ disturbed ministerial labors which drew around him great crowds of all kinds of people. Finally, on 9 Sept. 1699, he fulfilled his long delayed plan and sailed for America with his family, intending to make it his permanent home. He at first took up his residence at Philadelphia; but when in the country before he had built on his estate at Pennsbury, Bucks County, on the banks of the Delaware, a house of some size. This he now furnished with elegance and in 1700 made it his abode. It was, however, so far from Philadelphia that he found it more convenient to spend his time mainly in that citv. He busied himself with affairs of State and Church and the effect of his personal force and wisdom was soon felt in a more wholesome and united feeling in the

little colony. But before two years had ex¬ pired a movement in England to annex all the proprietary governments to the Crown seemed to demand his presence there. Prior to his sailing he gave the colony a new constitution under which it prospered for 75 years, till the Revolution. He chartered the city of Philadel¬ phia and its principal school, he eloquently urged the politicians to stop their petty quar¬ rels and unite for the good of the State, and leaving his interests largely in the hands of James Logan, on the 3d of November 1701 he and his wife sailed for England, never again to see their colony. The following 10 years of Penn's life were years of turmoil and disap¬

pointment, due largely to his own failure to judge character. His appointees to the position of deputy governor, one of whom was his son, were thoroughly unsuited to the task and fomented trouble in the colony, which was fanned by an opposing leader, named David Lloyd. Except in so far as they made Penn's life miserable, they belong rather to the history of the province than to his biography. Still more serious in its personal effects was the financial difficulty incurred by his trust in a tricky steward. Claim after claim was made and allowed without investigation, until finally his whole interest in the province was mort¬ gaged. Finally, rather than pay the fraudulent demand, he allowed himself to be taken to a debtor's prison, where he remained nine months. The matter was compromised by his friends and the claims pared down and discharged.

A little gleam of comfort came over his de¬ clining years. His colony, in 1710, came to its right mind, placed his friends in power, and showed its appreciation of his sacrifices for them. During the colonial days ever afterward his name was held in highest honor. The most serious of his financial difficulties were past, and yet his great fortune was gone. He was seriously contemplating selling his interests in Pennsylvania to the Crown, when, on 4 Oct. 1712, in the midst of a letter to Logan, a paralytic stroke came upon him, depriving him of his memory as well as his power of locomo¬ tion. His wife gave herself energetically and successfully to his business affairs. He lingered with gradually decreasing mental powers, but with a composed mind, till 1718, when on 30 July he died in his 74th year. Penn was a prolific writer and many of his essays were translated into Welsh, Dutch, Danish, French and Ger¬ man. A collection of his works was published in 1726, with a biography by Joseph Besse, con¬ sidered the most authoritative of all. Other collections were published in 1771 and 1782. A collection of (Select Works, J edited (sup¬ posedly) by John Fothergill, in 3 vols., was published in London by Phillips in 1825. Con¬ sult Buell, A. C., (William Penn as the Founder of Two Commonwealths* (New York 1904) ; Clarkson, T., (Memoirs of the Private and Public Life of William Penn* (2 vols., Phila¬ delphia 1813) ; Dixon, W. H., (History of William Penn, Founder of Pennsylvania) (Lon¬ don 1872) ; Fisher, J. F., (The True William Penn) (Philadelphia 1900) ; Hodges, G., (William Penn) (Boston 1901) ; Weems, J. B., (The Life of William Penn) (Philadelphia 1836).

Isaac Sharpless,

Dean of T. JVistar Brown Graduating School , Haverford College, Haverford, Pa,

PENN COLLEGE, a coeducational insti¬ tution, located in a campus of 25 acres in the northern edge of the city of Oskaloosa, Iowa, under the control of the Friends. In 1866 the Society of Friends made an agreement with the Spring Creek Union College Association by which they had a right to conduct the affairs of the college in accordance with the principles of their society, and in 1873 Spring Creek Union College became Penn College. Four collegiate courses are offered, classical, classical-biblical, scientific and philosophical, for the completion of which the degrees of A.B., B.S, and Ph.B. are conferred. There is also a school of music, a school of commerce, a school of domestic economy, and courses in biology, agriculture and manual training, as well as a preparatory department. A summer session has recently been established. The college possesses a fine art collection and a large museum. In 1918 the library contained 10,000 volumes ; the grounds and buildings were valued at over $80,000; the amount of the productive funds was $272,000; the annual income $78,000. The students numbered 555, and the faculty 30.

PENN VS. BALTIMORE, in American history, a case involving the boundaries between Penn's and Lord Baltimore's land grants from the English Crown. Penn obtained a new grant in 1682 from the Duke of York, reaching into Delaware and Maryland; also a letter from the king requesting Baltimore to hasten the adjust¬ ment of the boundary. The dispute was as to the boundary line of Maryland in the peninsula between Delaware and Chesapeake Bays, and descended to the sons of Penn, Thomas and Richard, before it was settled. The case was taken to London and decided in Penn's favor. A compromise was arranged in 1732, and en¬ forced by the Court of Chancery in 1760, in ac¬ cordance with which a line was run by Mason and Dixon, fixing the boundary in 1766.

PENN YAN, pen yan', N. Y., village, coun¬ ty-seat of Yates County; on Keuka Lake at its outlet, and on Pennsylvania and New York Central railroads, 45 miles, southeast of Rochester. It was first settled in 1800, and the village was incorporated in 1833. As some of the settlers were

from Pennsylvania, while others were known as ((New England Yankees,® discussion arose as to the name of the village, but both parties were finally satisfied by the adoption of the present name, Penn Yan, made up from the first syllables of Pennsylvania and Yankee. It has daily steamboat connection with Hammondsport at the head of the lake, and is the trade centre of the largest grape growing region in the nastern States. The lake outlet affords excellent water power for mechnical in¬ dustries; and the manufactures include lumber, flour grape juice, fruit baskets, paper, carriages, machinery and metal manufactures. It is a shipping point for great quantities of excellent ice harvested on the lake. It is the site of the Penn Yan Academy, a public high school, founded in 1859, and free to all residents of the district, and a Roman Catholic parish school. Of recent years it has been a popular summer resort. Pop. (1920) 5,215.

PENNACOOK (pen'a-kuk) INDIANS, a

tribe of North American Indians which in the 17th century occupied both banks of the Merri-

mac River in New Hampshire for some miles above and below where Concord now stands, and which was the site of their principal village. They were the most powerful and influential of the tribes which formed the Pennacook Con¬ federacy, an association of New England tribes of the Algonquian family, who formerly re¬ sided in southern New Hampshire, northeastern Massachusetts and southern Maine. The tribes composing the Confederacy were Agawam, Wamesit, Nashua, Souhegan, Amoskeag, Penna¬ cook proper and Winnepesaukee. The first three named were Massachusetts Indians. Other tribes were so closely affiliated with the Con¬ federacy as to be commonly grouped with them : the Wachuset, Coosuc, Squamscot, Winnecourt, Piscataqua and Newichawanoc tribes, but these were not full members with the first named. They made numerous early treaties with the English, but later their alliances were with the French. At one time they were reported to number upward of 4,000, but by 1630 smallpox and disease had reduced this number to 2,500, and in 1674 they were counted as 1,250. Two of the Pennacook tribes, the Nashua and the Wachuset, joined in the King Philip's War of 1675, but the others remained friendly to the whites until some 200 of their number were treacherously seized by Waldron in 1676. Most of them fled to Canada, but some went west¬ ward and settled at Schaghticoke, N. Y. In 1700 the scattered remnants of the race gathered at Saint Francis in the province of Quebec, and there their descendents reside.

PENNALISM, an ancient system of ty¬ ranny exemplified in torments and impositions to which the elder students (Schoristen) in German Protestant universities used to subject the younger ones, called Pennales (pencases), afterward foxes, Neovisti, cceci (blind), vituli (calves), innocentes (guileless), imp erf ecti, Galli domesticii, dominastri, *etc.* This abuse was carried to a great extent ; and books written 200 years ago depict its real barbarism. What¬ ever the pennals possessed, they had to give up to the schorists, who compelled them to do the most menial services, made laughing-stocks of them, beat and ill-treated them, and all this had to be endured without complaint for one year, when the ceremony of deposition followed. This consisted of a series of symbolical trials (knocking off horns previously put on the pennal's head, combing his hair with a rake, etc.), indicating generally the purgation from impurity and consecration to an intellectual life, after which the former victim became the tyrant of the classman below him. Pennalism was an extreme development of the practice of hazing in the colleges of that day, but degenerated among German students to practices so nearly criminal that in 1661 and 1663 the German em¬ pire enacted laws against pennalism in Jena, Frankfurt, Rostock, Wittenberg, and later in Leipzig and Giessen.

PENNAMITE WARS. The three conflicts known as the Pennamite wars resulted from the very common error in Colonial times of making royal grants in England which overlapped when they came to be worked out on the ground in America. In the drawing of the charter for Connecticut by Charles II in 1662, the grant was made to include <(all the lands lying west of it from sea to sea.® At that time no conception of

the breadth of the continent obtained among the men who were thus laying out grants of land in the new country. In 1681 in the charter

given to William Penn, the tract conveyed overlapped the <(lands west® of Connecticut, by that part of Pennsylvania lying between the parallels of 41° and 42° north — nearly two-fifths of the whole Penn tract.

The people of the Connecticut colony in the prosecution of a colonization scheme sent out explorers in 1750, who traveled as far west as Ohio. The Woyomack, or as it afterward came to be called, the Wyoming Valley, with its broad fertile bottom, 21 miles long and three miles in width, watered by the beautiful Susquehanna River, received the highest commendation in their reports, and the Susquehanna Company of Hartford was formed to settle a colony there. These lands were at that time supposedly the "property® of the Indians of the Six Nations, and a delegation was sent from Connecticut to Albany, the headquarters of these Indians, to purchase their rights in the Wyoming Valley. The bargain was made, and the price of 2,000 English pounds was duly paid to the Indians. When the Susquehanna Company undertook to place a colony on these lands the settlers were attacked by emissaries of the Penn family, who were striving to hold the lands of Pennsylvania in perpetual fee, and issuing leaseholds only to would-be purchasers. This feudalism was re¬ sented by the Pennsylvania settlers, who took sides with the Connecticut settlers and fought the Penn faction. The first battle in which blood was spilled occurred in 1769, and there were several bloody conflicts up to the spring of 1771, when the Penn retainers were thoroughly beaten. This ended the first "war,® and there was peace until 1774, when a force of 700 men was gathered by the Penns and sent against the Wyoming Valley settlers, who then numbered many Pennsylvanians among their landowners. The colonists met the Pennamites with about 350 and administered a decisive defeat, after many had been killed on both sides. And thus ended the second Pennamite War. Following the conclusion of the Revolutionary War and the organization of the several States, Congress was asked to decide whether the Wyoming Val¬ ley section belonged rightly to Connecticut, who claimed it under the original grant. The de¬ cision was in favor of Pennsylvania, and Con¬ necticut was allowed to take a section (after¬ ward known as the Western Reserve) of what is now the State of Ohio, and was then the "Northwest Territory,® by way of recompense. The third war now came on. The new State of Pennsylvania rejected the plea of the Wyom¬ ing Valley colonists that they had bought their holdings in good faith, and sent two companies of the State militia to drive them out. This they did with considerable severity. The people of Pennsylvania resented this action and sent a sheriff's posse to bring back the evicted settlers. A band was hastily gathered, which included

many Pennsylvanians, and the militia were at¬ tacked and many were killed on both sides. For some years these conflicts continued, with much bloodshed, and finally the trouble was ended in 1807 by the confirming of the settlers in their holdings upon payment to the State of Pennsylvania of trifling sums to cover the cost of recording the papers. Consult Chapman,

I. A., ‘A Sketch of the History of Wyoming* (Wilkes-Barre 1830) ; Hayden, H. E., ‘Bibliog¬ raphy of the Wyoming Valley, Pa.* (Wilkes-Barre 1885).

PENNANT, pen’ant, Thomas, English traveler, naturalist and litterateur; b. Downing, Flintshire, Wales, 14 June 1726; d. there, 16 Dec. 1798. He was educated at Oxford, and early made a specialty of the study of minerals and fossils, first attracting attention by an account of an earthquake felt in Flintshire in 1750, which was published in the ‘Philosophical Transactions> in 1856. He served as high-sheriff of Flintshire in 1761. He made scientific tours of the British Isles of which he published de¬ lightfully readable accounts, and in 1767 was elected a member of the Royal Society. Though not a profound scholar he acquired a consider¬ able reputation as a naturalist, and had a very wide circle of readers owing to his attractive style. His literary output was immense and covered many popular subjects outside of his chosen scientific labors. Among his works are ‘British Zoology) (1766) ; ‘Synopsis of Quadrupeds) (1771) ; afterward enlarged to the ‘History of Quadrupeds) (1781) ; ‘Genera of Birds) (1773) ; ‘Indian Zoology) (1781) ; ‘Arctic Zoology) (1784) ; ‘Of London* (1790) ; ‘The Literary Life of the late Thomas Pen¬ nant, Esq. By Himself > (1793) ; ‘History of the Parishes of Whiteford and HolvwelP (1796) ; ‘Outlines of the Globe,* two volumes of which were published before his death, and two afterward (1798-1800).

PENNANT, the name given a small flag or banner, generally used on vessels or nautical stations. Pennants are made of various shapes, and the shape and arrangement indicate the rank of the chief officer on board of the ship which wears them, or the number of the ship, the presence or absence of the officer in command, *etc.* The pennant is usually very long as com¬ pared with its width and tapers to a point. In some instances it is only about twice as long as its width, and the free end is cut into a swallow¬ tail. This form is called the “broad pennant,® and its edges may be parallel to indicate one rank, or taper to the two tips to indicate an¬ other. Again, the pennant may be very short, so as to present an almost equilateral triangle.

“pekan,® “fisher,® or “black cat,® the largest of the martens, 24 to 30 inches long and with a black tail 14 to 18 inches long. The fur is gen¬ erally a brownish shade of black about two inches in length, and is highly esteemed under the commercial title of “American sable.® The animal was formerly found plentifully in the United States but is now limited to Canada. See Marten.

PENNATULIDZE, a family of alcyona-rian coral-polyps: the sea-pens (q.v.).

PENNELL, pen el, Henry Cholmondeley,

English poet and sportsman : b. in London, 1837 ; d. 1915. He entered the public service in 1853. After serving in various departments of the admiralty, he was made Inspector of Sea Fish¬ eries in 1866, where he served until he was se¬ lected in 1875 to carry out commercial reforms for the khedive of Egypt. Upon his return he was appointed director-general of interior com¬ merce. He was an expert marksman winning

the Grand Prix of Monaco and the Universal Championship for his shooting. Among his well-known books of verse are ‘Puck on Pegasus’ (1861); ‘The Crescent’ (1866);

(Modern Babylon’ (1873); (The Muses of Mayfair’ (1874) ; ‘From Grave to Gay’ (1885). On angling and ichthyology he has written among other works ‘The Angler-Naturalist’ (1864) ; ‘The Book of the Pike> (1866) ; ‘Fish¬ ing Gossip’ (1867); ‘The Modern Practical Angler > (1873) ; two volumes in the ‘Badmin¬ ton Library ’ — ‘Salmon and Trout) and ‘Pike and Other Coarse Fish’ (1885) ; ‘The Sporting Fish of Great Britain > (1886), *etc.* He was for some years editor of the Fisherman’s Magazine and Review.

PENNELL, Joseph, American etcher and illustrator: b. Philadelphia, 4

July 1860. He studied in the Pennsylvania School of Indus¬ trial Art and the Pennsylvania Academy of Fine Arts. He began illustrating for the Cen¬ tury Magazine in 1881, and has been a frequent contributor to it and similar magazines ever since. He executed an important series of etchings to accompany the papers on Italian life, by W. D. Howells, and also a long series on English cathedrals published in conjunction with Mrs. Schuyler Van Rensselaer's book on that subject. He has also illustrated several books of travels written by his wife, Elizabeth Robins Pennell, and is himself the author of an im¬ portant work on 'Pen Drawing and Pen Draughtsmen? (1889). He is also the author of an extensive series of works, among them 'A Canterbury Pilgrimage' (1885) ; 'An Italian Pilgrimage' (1886) ; 'The Jew at Home' (1892) ; an introduction on the art of the illus¬ trator to Vierge's 'Pablo de Segovia' M893) ; 'Modern Illustration' (1895); 'The Illustration of Books' (1896); 'The Alhambra' (1896); 'The Work of Charles Keane' (1897) ; 'Lithography and Lithographers' (1900) ; 'Life of James McNeill Whistler' (with Mrs. Pen¬ nell, 1910) ; 'Pictures of the Panama Canal' (1912) ; 'The Wonder of Work' (1916). He has been lecturer on illustration at the Slade School of Art, University College, London, and at the Royal College of Art, South Kensington. He has been the recipient of a very large num¬ ber of awards and prizes and many gold and silver medals. He won the Grand Prize at the Saint Louis Exposition in 1902; the Grand Prix at Milan in 1906; the Grand Prize at Lon¬ don in 1913 and the Grand Prize at Florence in 1915. He has representative works at Luxem¬ bourg; in the citv of Paris collection; in the Uffizi Gallery, Florence; the Modern Gallery, Venice; the Modern Gallery, Rome; the Berlin National Gallery; the British Museum; the South Kensington Museum; the Guildhall Gal¬ lery, London, and also at Dresden, Budapest, Munich, Melbourne, Pearth and Adelaide.

PENNSYLVANIA (the "Keystone State") is the southernmost of the group of the North Atlantic States. The sobriquet, Keystone State, was appropriately given to the commonwealth which occupied the centre of the arch formed by the original 13 States. Its area (land sur¬ face only) is 45,126 square miles. In general outline Pennsylvania is a rectangle, having one irregular side formed by the Delaware River and a triangular projection at its northwestern corner extending northward to the shore of

Lake Erie. The segment of a circle with a radius of 10 miles drawn from the courthouse at New Castle, Del., cuts a small piece from its southeastern corner. Pennsylvania is 158 miles wide between two

parallels of latitude, consti¬ tuting its northern and southern boundaries, and 302 miles long, measured from the Ohio State line to either of two points on the Dela¬ ware, one opposite Port Jervis, N. Y., and the other at Bordentown, N. J., where the river makes its two far eastward bends. Pennsyl¬ vania adjoins New York on the north, New York and New Jersey on the east, Delaware, Maryland and West Virginia on the south and West Virginia and Ohio on the west. Its north¬ west corner lies directly on Lake Erie.

Topography. — The ridge of the Allegha-njes divides the State into two nearly equal parts, popularly known as eastern and western Pennsylvania. About one-fourth of the sur¬ face is a plateau of an average elevation of nearly 2,000 feet above sea-level, comprising the tier of counties abutting on the northwestern slope of the Alleghanies and the northernmost two tiers of counties from the Delaware to Lake Erie. The plateau descends gradually southward and westward into Ohio. Between the Alleghanies and the Blue or North Moun¬ tain range and filling the central part of the State is a complexity of' interlocked ridges and valleys curving in parallel lines from the south¬ ern boundary northeastwardly. At 'the foot of the steep wall of the North Mountain, like a moat before a fortress, lies the "Great Valiev" of the early settlers, which extends from the Hudson River to central Alabama and is known by many names; in Virginia as the Shenandoah, in New Tersey as the Kittatinny and in Penn¬ sylvania as the Lehigh, Lebanon or Cumberland Valley. It is from 10 to 20 miles wide (in this State), and is limited on the southeast by the South Mountain range. Through the break in this range between Harrisburg and Reading the Great Valley merges into the open country of the southeast. All the ridges of the Appalach¬ ian system undergo a considerable lowering be¬ fore entering the State. The Catskills of New York with summits exceeding 4,000 feet be¬ come in Pennsylvania the Pocono Plateau with no elevations greater than 2,000 feet ; the Blue Ridge of Kentucky with peaks reaching an al¬ titude of 7,000 feet enters this State as the South Mountain range, which scarcely anv-where attains the height of 2,000 feet, and dis¬ appears entirely a little to the west of Harris¬ burg. It rises again in a ridge of not over 1,000 feet high at Reading, and, passing into New Jersey, becomes the highlands of the Hudson with summits of 3,000 feet. Only a few knobs of the Alleghanies rise to an altitude of 2,700 to 2,800 feet and the North Mountain range, with its narrow, rocky crest, js of the almost perfectly uniform height of 2,000 feet. While destitute of high mountains the surface, of the State is everywhere more or less hilly. The southeastern quarter of the State, though but little above sea-level, is a rolling country, and the western section is

deeply furrowed by water¬ courses and broken by short ridges. Western Pennsylvania contains two distinct ranges, Laurel Hill and Chestnut Ridge, running paral¬ lel from southwest to northeast about 10 miles apart and enclosing the Ligonier Valley.

Rivers. — The tableland of central and

PENNSYLVANIA. Estimated population, 8,522,017

COUNTIES

jrup.

34,319 Adams . F 7

1,018,463 Allegheny ….. D l

67,880 Armstrong . D 2

78,353 Beaver . D 1

38,879 Bedford . F4

183,222 Berks . E 9

108,858 Blair . E 5

54,526 Bradford . B8

76,530 Bucks … . . E 11

72,689 Butler . D 2

166,131 Cambria . D4

7,644 Cameron . C 5

52,846 Carbon . DIO

43,424 Center . D 6

109,213 Chester . Flo

36,638 Clarion . C3

93.768 Clearfield . C4

31,545 Clinton . CO

48,467 Columbia . C8

61,565 Crawford . B 1

54,470 Cumberland . E 7

136,152 Dauphin . E 8

117,906 Delaware . F ll

35,871 Elk . C 4

115,517 Erie . . B 1

167,449 Fayette . F 2

9,435 Forest . B 3

59,775 Franklin . F 6

9,703 Fulton . F 5

28,882 Greene . FI

38,304 Huntingdon . E 5

66 210 Indiana . D 3

63,090 Jefferson . C 3

15,013 Juniata . -E 6

Pop.

259.570 Lackawanna. .. ,C. 10

167,029 Lancaster . E 9

70,032 Lawrence . D 1

59,565 Lebanon E 8

118,832 Lehigh . D10

343,186 Luzerne . C9

80,813 Lycoming . C7

47.868 McKean . ,B4

77,699 Mercer . Cl

27,785 Mifflin . D 6

22,941 Monroe . C 11

169,590 Montgomery …E ll

14.868 Montour . t 8

127,667 Northampton ,.D 11 111,420 Northumberland . D 8 24,136 Perry . E7

I, 549.008 Philadelphia . ,F 11

8,033 Pike . Oil

29,729 Potter . B 5

207,894 Schuylkill . D 8

16,800 Snyder . D 7

67,717 Somerset . F 3

II, 293 Sullivan . C8

37,746 Susquehanna ,…B 10

42.829 Tioga . ip 7

16,249 Union . D 7

56,359 Venango . C 2

39,573 Warren . B 3

143,680 Washington . E 1

29,236 Wayne . Bll

231,304 Westmoreland …E 2

15,509 Wyoming . B’9

136,405 York . . F 8

Incorporated Cities, Boroughs. *Etc.*

300

675

719

150

1.534 661 432

1,743

63,505

58.659

2,649

5,205

3,006

7,194

383 82

1,818

683

6,855

5.601

384 2,592

546

3,796

514

191

921

2,941

4,317

796

4,634

668

1,262

601

5.369

3.535 1,057

407

221

3.456

13,532

1,530

417

2,235

584

4,145

2,372

6,323

2,277

1,828

355

387

1,922

719

1,336

308

377

332

5,357

130

14.142

1,032

386

2,930

196

326

3,572

5,345

762

(P.

150

7,413

2,303

518

1,878

2,433

3,134

21,685

14,544

3,860

1,983

1,562

459

10,608

478

1,898

3,003

1,300

2,324

539

1,268

142

493

27,632

2,230

Adamsburg . E 2

Adamstown …… E 9

Akron . E 9

Alba . B 8

Albion . B 1

Aldan, Delaware ,F 11

Alexandria . D 5

Aliquippa,

Beaver . D 1

Allentown . D 10

Altoona . D 5

Ambler . Fll

Ambridge . D 1

Apollo . D 2

Archbald . C 1 1

Arendtsville . F 7

Armagh, Indiana . . D 3 Arnold, Westmore¬ land . : . E 3

Arona, Westmore¬ land . E 3

Ashland … D 9

Ashley . CIO

Asbville . . D 4

Aspinwall . D 2

At glen, Chester. . ,F 10

Athens … . . B 8

Attleboro, Bucks. E 11

Atwood . D 3

Auburn . D 9

Austin . B 5

Avalon, Allegheny D 1 (P. O. Pittsburgh)

Avis . C 7

Avoca . CIO

Avondale . F 10

Avonmore . D 3

Baden . D 1

Bangor . D 11

Barnesboro . D 4

Bath . Dll

Beallsville . E 1

Bear Lake . B 3

Beaver . D 1

Beaver Falls . D 1

Beaver Meadow ,D 10 Bechtelsville … .E 10

Bedford . E 4

Beech Creek . C 6

Belief onte . C 6

Belle Vernon . E 2

Bellevue . D 1

(Sta. Allegheny P.O.)

Bellwood . D 5

Ben Avon, Alle¬ gheny . D 1

Bendersville . F 7

Bensoil, Somerset . . F 3

Bentleyville . E 1

Benton . C 8

Berlin . . F 4

Bern vllle . E 9

Berrysburg. ……. D 8

Berwick, Adams.. F 7

Berwick . C 9

Bethany . B 11

Bethlehem . D 10

Big Run . D 3

Biglervllle . F7

Birdsboro . E 10

Birmingham . D 5

Blain . E 6

Blairsville . E 3

Blakely, Lacka¬ wanna ……CIO

(P. O. Peckville)

Bloomfield . E 7

O. New Bloomfield) Blooniing Valley ..B 2

Bloomsburg . C8

Blossburg . B 7

Bolivar . E 3

Boswell . F 3

Boyertown . E 10

Brackenridge. Alle¬ gheny . D 1

Braddock … .E 2

Bradford . B 4

Bridgeport . E 11

Bridgeville . El

Bridgwater . D 1

Brisbin …1 5

Bristol . E 12

Broadtop, Hunt¬ ingdon … . E 5

Brock way vllle . C 4

Brookvillc . C 3

Brownstown, Lan¬ caster ,… E9

Brownsville . F 2

Bruin . C 2

Burgettstown . E 1

Burlington . B 8

Burnside . D4

Butler . D 2

California . E 2

198 Callensburg . C3

335 Callery . D 2

1,514 Cambridge Springs B 1

875 Camp Hill, Cum¬

berland . E 7

3,891 Canonsburg . -E I

1,637 Canton . B 8

19,242 Carbondale . B 11

10,726 Carlisle . E 7

478 Carmichaels . F2

11,692 Carnegie . E 1

6,117 Carrick, Allegheny D 1

1.348 Carroiltown . D 4

306 Cassandra . E4

166 Casselman . F3

1 65 Cassville . E 5

5,250 Catasauqua . D 10

1,930 Catawissa . 08

500 Center Hall . D 6

111 Centerport . E 9

264 Centerville . E 2

1,413 Centerville . E 3

2,429 Centralia . D 8

303 Chalfont . E 11

12,380 Chambersburg ….F6

253 Chapman Quarries,

Northampton. .D 11

11,931 Charleroi . E2

439 CUerrytree . D 4

113 Cherry Valley . E 1

41,396 Chester . Fll

648 Chester HUI,

Somerset . F 3

174 Chest Springs . D4

317 Cheswlck,

Allegheny . D 1

934 Christiana . F 9

3,326 Clairton, Allegheny D 1

933 Clarendon . B 3

2,612 Clarion . C3

208 Clarkesvllle . F 1

216 Clarksville . O 1

(P. O. Clark)

1,045 Claysvilla . E l

6,851 Clearfield . …D5

3,155 Clifton Height®,

Delaware …… F 11

335 Cllntonvllle . C2

1 753 Clymer . D 3

816 Qoal Center . E 2

311 Coaldale. Bedford. F 4

5,154 Coaldale . D 10

228 Coalmont …….. E 5

876 Coalport . D 4

14,455 Coatesville . F 10

695 Cochranton . B 2

1,302 Cokeburg

Washington … . E 1

409 Cokevllle . E 3

1,787 College Hill . D 1

621 Collegeville . E 11

1,361 Collingdale,

Delaware . F 11

11.454 Columbia . E 8

346 Columbus . B 2

1.584 Colwyn,

Delaware . Fll

890 Confluence . F3

725 Conneaut Lake …B 1

867 Conneautville . B 1

15.455 Connellsvillc . E 3

400 Conoquenesslng,

1,483 Conway . D 1

406 Conyngham,

Luzerne . C 9

683 Coopersburg… . ,E 11

181 Cooperstown . C2

2,670 Coplay . ..Dll

5,252 Coraopolis . D 1

5,991 Corry . B2

301 Corsica . C 3

3,100 Coudersport . B 6

548 Courtdale, Luzerne C 9

340 Covington . B 7

4,583 Crafton . E 1

563 Creekslde . D 3

1,470 Cresson . E 4

1,837 Qressona . D 9

158 Cross Roads, York F 8

98 Curllsville, Clarion C 3

2,549 Curwensvtlle . D4

382 Dalsytown,

Cambria . D 4

2,285 Dale. Cambria. .. ,D4

576 Dallas . C 9

1.884 Dallastown . F8

76 7 Dalton. . CIO

7,al7 DauvillO …… .. .D 8

6,305 Darby . F ll

311 Darlington . D 1

545 Dauphin . E 8

848 Dawson . E 2

809 Dayton . D 3

Pop

477 Deemston, Wash¬

ington . El

1,000 Delano D 9

446 Delaware Water—

gap . Dll

881 Delta . F 9

933 Denver . E 9

2,954 Derry … E 3

12,086 Dickson City CIO

853 DUlsburg . F7

147 Donegal . E 3

8,174 Donora . El

1,115 Dormont, Alle¬ gheny . D 1

4,046 Dorranceton….C 10

576 Dover, York . F 8

3,326 Dr wningtown … . K 10

3,304 Doylestown . Ell

1,895 Dravosburg, Alle¬ gheny . I) 1

517 Driftwood . C, 5

14,665 Dubois . C 4

682 Duboistown …. .C 7

440 Dudley . E 5

1,970 Dunbar . F 2

1,474 Duncannon . E7

1,263 Duncansville . E4

150 Dundaff . B 10

20,776 Dunmorc . CIO

19,964 Duquesne . E 2

7,487 Duryea, Luzerne ,.C9

813 Dushore . C 8

184 Eaglesmere . C8

1,186 East Bangor . D 11

672 East Berlin . F 8

1,493 East Brady . D 2

5,046 East Conemaugh,

Cambria . D 4

(P.O. Conemaugh) 1,235 East Greenville . .E 11

2,118 East McKeesport,

Allegheny . D 1

3.45S East Mauch

Chunk . D10

30,530 Easton . Dll

5,615 East Pittsburg,

Allegheny . D 1

316 East Prospect . F 8

718 East Rochester,

Beaver . D 1

220 East Side,

Carbon . D 10

348 East Springfield,

Erie . B 1

3,330 East Stroudsburg C 11 322 Eastvale, Beaver D 1 1,852 East Vandergrift

Westmoreland. . E 2 1,300 East Washington,

Washington ….El (P.O .Washington)

906 East Waynesburg.

Greene . F 1

347 Eau Claire . C2

1,978 Ebensbtfrg . E4

1,167 Eddystone . Fll

616 Edenburg. Clarion C 3 2,596 Edgewood, Alle¬ gheny . D 1

(P. O. Pittsburgh) 1,229 Edgeworth, Alle¬ gheny . D 1

666 Edinboro . B 1

10,443 Edwardsville,

Luzerne . C 9

944 Elco, Washington E 1

285 Elderton . D 2

1,235 Eldred . B 5

148 Elgin . B 2

2,311 Elizabeth . E 2

2,587 Elizabethtown _ E 9

1,039 Elizabethville … .E 8

I. 175 Elkland . ‘ . B 7

2,084 Ellsworth . E 1

3,902 Ellwood City . D 1

379 Elmhurst . C 10

3,501 Emaus . D 11

1,110 Emlenton . C 2

2,916 Emporium . B 5

1,510 Emsworth, Alle¬ gheny . D 1

354 Enon Valley . D 1

3,192 Ephrata . E 9

75,195 Erie … A 1

5,830 Etna . D 2

1,339 Evans City . D 1

1,725 Everett . E 5

1.759 Everson . E 3

3,537 Exeter, Luzerne. .C 9

759 Factory ville . B 10

1.760 Fairchance . F 2

373 Fairfield . F7

167 Fairvlew, Luzerne C 9

349 Fairvlew . A 1

172 Fall Brook . B 7

1,204 Falls Creek . C 4

555 Fallston, Beaver.. D 1

240 Fawn Grove . . F 9

2,005 Fayette City . E 2

241 Felton . F 7

514 Ferndale, Cambria

I D 4

644 Finleyvlile . E 1

1,394 Fleetwood . E 10

1,022 Flemlngton . C 6

4,850 Ford City . D 3

5,749 Forest City . B 10

109 Forksvllle . C 8

2,353 Forty Fort,

Luzerne . C 9

1 ,388 Fountain Hill,

Lehigh . D 10

3,118 Frackville . D 9

144 Frankfort Spring. El 2,102 Franklin, Cambria D 4

II, 307 Franklin . C2

216 Franklintown . F8

443 FredoniaL . C 1

3,060 Freedom …… i … D 1

6,197 Freeland . C 10

* 867 Frcemansburg …D 11

2,248 Freeport . D 2

103 Friendsvllle . B 9

4,027 Galeton. . B 6

3,504 Gallitzin . E 4

848 Garrett . F 4

917 Gaysport, Blair. ,.E 5

236 Geneva . B 1

269 Georgetown,

Beaver …….. D 1

4,030 Gettysburg . F7

5,401 Gilberton . D 9

1,165 Girard . B 1

4,396 Girardville . D 9

203 Glasgow. Beaver. . D 1 5,540 Glassport, Alle¬ gheny . D 1

319 Glenburn . ..CIO

1,099 Glen Camobell … . D 4

Port

823 Glendon . Dll

984 Glenfield . D 1

237 Glen Hope . D 4

1.157 Glen Olden, Dela¬

ware . E 11

1,263 Glen Rock . F8

434 .Goldsboro . E 8

1.185 Gordon . D 9

84 Gouldsboro . C 10

666 Grampian … D 4

290 Grand Valley _ B 2

536 Gratz, Dauphin …E8 788 Great Bend . B 10

1,919 Greencastle . F6

372 Green Lane . E 11

442 Greensboro . F 1

15,483 Greensburg . E3

1,143 Greentree, Alle¬ gheny . D 1

5,909 Greenville …..Cl

3,674 Grove City . Cl

745 Halifax . E 8

472 Hallam . . F 8

1,538 Hallstead . B 10

2,301 Hamburg . E 9

7,057 Hanover . F8

673 Harmony . D 1

72,015 Harrisburg . E 8

352 Harrisville . C2

1 60 Hartleton . D 7

135 Hartstown, Craw¬

ford . B 1

2,125 Hastings . D4

963 Hatboro . Ell

705 Hatfield, Mont¬ gomery . Ell

2,018 Hawley . C 11

569 Hawthorn . C 3

1,888 Hays… . E 2

166 Haysville, Alle¬ gheny . D 1

1,168 Hazeldcll . D 1

2S;491 Hazleton . D9

1,848 Heidelberg, Alle¬ gheny . D 1

915 Hellertown . Dll

620 Herndon . D8

1,669 Highspire,

Dauphin . E 8

3,734 Hollidaysburg …. E 5

985 Homer City . D 3

22,466 Homestead . E2

2,945 Honesdale . Bll

581 Honey Brook… ,E 10

250 Hookstown . D 1

990 Hooversville . E4

364 Hop Bottom … .B 10 590 Hopewell . E 5

136 Hopewell, Chester F 10

793 Houston . El

1,434 Houtzdale . D5

667 Howard . D 6

2,024 Hughestown,

Luzerne . CO

1.650 Hughesville . C8

468 Hulmevllle,

Bucks . E 11

2,128 Hummelstown _ E 8

6,861 Huntingdon . E 6

315 Hyde Park . D 2

413 Hydetown . B 2

1,164 Hyndman . F4

5,749 Indiana. . D3

2,037 Ingram . El

800 Irvona . D 4

2,886 Irwin . E 2

247 Ivyland . Ell

269 Jackson Center… .C 1 87 Jacksonville,

Indiana . D 3

822 Jamestown . Cl

9,468 Jeannette . E 2

3*77 Jeddo, Luzerne …C 9

357 Jefferson . FI

347 Jefferson . F 8

2,968 Jenklntown . E 11

109 Jennertown . E 3

3.158 .Termyn . B 10

5,381 Jersey Shore . C 7

662 Johnetta . D 2

4,334 Johnsonburg . C4

68,529 Johnstown . E 3

603 Jonestown . E 8

5,285 Juniata, Blair … E 5

6,626 Kane . B 4

283 Karns City . C 2

2,049 Kennett Square .. F 10

6,449 Kingston . C 10

4,311 Kittanning . D3

5.651 Knoxville, Alle¬

gheny . D 1

(P. O. Pittsburgh)

840 Knoxville . B 7

2,360 Kutztown . D10

479 Laceyville . B 9

528 Lafiin, Luzerne ,..C9

50,853 Lancaster . F 9

268 Landingville,

. Schuylkill . , . D 9

252 Landisburg . E7

771 Lanesboro . B 5

895 Langhorne . E 12

170 Langhorne Manor

Berks. . » . E 9

3,551 Lansdale . E 11

4,066 Lansdowne, Dela¬ ware . …Fll

10,477 Lansford . D10

258 Laplume . B 10

245 Laporte . C 8

9,288 LarksvlUe,

Luzerne . C 9

lT,393 Latrobe . E 3

790 Laurel Run,

Luzerne . C9

549 Lawrenceville … B 7

20,779 Lebanon . E 9

3,624 Leechburg . D 2

1,904 Leetsdale, Alle¬ gheny . D 1

5,316 Lehighton . D 10

1,393 Lemoyne . E7

153 LenhartsvlUe ,.,.D 10

326 Le Haysville . B 9

233 Lcwisberry . E 8

3,081 Lewisburg.. .. …F8

10,733 Lewistown . D 6

579 LewisvlUte, Potter B 5

253 Liberty . B 7

1,575 Ligonicr . F 3

1,638 Lilly . ; . E-4

833 Llnesvllle . B 1

2,082 Litltz . E 9

156 Little Meadows …B 9

1,347 Littlestown . F7

124 Livermore . . E 3

596 Liverpool . D 7

7,772 Lock Haven . . , . : ,C 6

Pop.

375

208

273

246

363

5,426

2.943

3,389

579

2,543

209

47,521

19,949

813

Logan ton D 7

Loganvllle. York F» Long Branch,

\V ashington … . E 1 Loretto, Cambria . D 4 Lumber City,

Clearfield . C 4

Luzerne . C 10

Lykens . D 8

McAdoo . D 9

McConnellsburg . . ,F 5

McDonald . El

McEvwjUovillc.

Northumberland D 8 McKeesport . E 2

- _ . _E j

McKees Rocks . McMahan, West¬ morland . E 2

1,724 McSherrystown … F 8

5 1 4 McVcy town’ . E 6

772 Macungie, Lehigh D. 10 421 Madison, West¬ moreland . E 2

754 Mahalley . D 4

17,463 Mahanoy City … I) 9

1,125 Malvern . F 10

547 Manchester . E8

2,202 Manhelm . lv 9

341 Manns Choice… . F 4

1,039 Manor . E 2

545 Manorville . D 3

1,645 Mansfield . B 7

752 Mapleton Depot . E 5 1,573 Marcus Hook …Fll

Marianna . E 1

Marietta . E 8

Marion Center … . D 3 Marion Heights. Northumberland D 8

Marklesburg . E 5

Markleysburg . F 3

Mars . D 1

Martinsburg . E 5

Marysville . E 7

Masontown. Fayette

F 2

Matamoras . C 1 2

Mauch Chunk …DIO

Mayfield . B 10

Meadvitle . B 1

Mechantcsburg … . E 7 Mechanicsburg,

Indiana . D 3

Media . Fll

Mercer . C 1

Mercersburg. …. F 5

Meshoppen . B 9

Meyersdale . F 4

Middleboro, Erie. . B 1

Middleburg . D 7

Middleport . D 9

Middletown . E 8

Midland, Beaver. D 1

Midway . El

Mifflinburg . D 7

Mifflintown . D 7

Milesburg . D 6

Milford . C 12

Mil! Creek . E 6

Millbourne,

Philadelphia… F 11

MillersbuTg . E 8

Millerstown,

Butler . . D 2

Millerstown . K 7

Mill Hall . C 6

Millheim . D 6

Miltvale, AlleghenyD 1

Mill Village . B 1

Millville . C 8

Milton . D 8

Miners Mills . CIO

Minersville… D 9

Mohntou, Berks. . ,E 9 Monaca, Beaver… D 1

Monessen . E 2

Monongahela . E 1

Monroeton . B 8

Montgomery . C 8

Montoursville . i … C 8

Montrose . B 9

Moosic . C 10

Morrisville . E 12

Morton . F 11

Moscow ……. CIO

Mt. Carbon . D 9

Mt. Carmel . D 8

Mt. Holly Springs E

Mt. Jewett . B

Mt. Joy . E

Mt. Morris . F

Mt. Oliver. Alle¬ gheny . D

Mt. Penn, Berks . ,E

Mt. Pleasant . E 3

Mt. Union . E 8

M unoy . C 8

Moun’tviUe . E 9

M unhall. AlleghenyD l

Nautlcoke . C 9

Narberth, Mont¬ gomery . E 11

Nazareth . D 11

Nelsou. …… B 7

Nescopcck . C 9

New Albany . 0 8

New Alexandria E 2

1.3G3

2,079 366 1.362

211

227

1,215

920

1,693

890

1,388 3,952

■3.662

13,802 4.4 6,9 159

3,562

2,026

1.410

630

3,741

207

531

1,100

5,374

1,244

941

1,559

954

531

872

308

322

2,394

993

549

1,043

626

7.861

290

611

7,460

3,159

7.240 1,536 3,376

-21,630

7,598

403

1,490

1,904

1,914

3,064

2,002

1,071

650

335

20.26S

1,272

1,771

2.166

382

4.241

785

5,812

3,338

1,904

803

5,185

23,120

1,790

3,978 448 1 .5 <8 413 505 177 527 1,625 9,277 135 274

7 4

8 1

1

9

■;S$

. ,C3 , . D l . E 7

New Baltimore . ,

New Berlin .

New Bethlehem New Brighton . .

New Buffalo . . Newburg,

Clearfield . ,C 4

264 Newburg, Cumber¬ land . E 7

41,133 New Castle . C 1

106 N£w Centerville,

Chester . F 10

175 New Columbus …C9

1,472 New Cumberland,

Cumberland . E 7

717 New Florence . E 3

726 New Freedom . F8

453 New Galilee . D 1

1,106 New Holland . E 9

1,083 New “Hope . E 11

7.707 New Kensington. . D 2

164 New Lebanon . Cl

654 New Milford . B10

838 New Oxford . F 7

194 New Paris . E4

2,512 New Philadelphia,

Schuylkill . D 9

2.009 Newport . . E 7

266 New Ringgold.. . ,D 10

380 Newry . E 4

424 New Salem, „ „

Westmoreland , . E 2

FreeVlUe

Keukajf-Lake))

U;tCHhara

T oMk I N S

Daytoa

C HE jyA N GW

/“ˆNew Berlin Jo. or O 7 E.Ouilford P. 0.

I Kanona,

A room

Caroline

BrootonA \ Prospect Sta.

Wcstflelj

Belfast

Homell

Sidney

(GAN

Belvidere

Beluiont

Little Valley

Chenango

1 Andes

Walton

W. Salamanca’

Friend¬

ship

[orsebeads’

Nineveh

ialumanca Rill Buck \Carrollton

Painted PosC

ˆCHVyEMUN G ‘ — v lEliulra

Owego

WellsvlUe

L’niongrove

■ˆ/vˆSvranv’illlc Sta.

‘v£-Fairview \ |

Wall aoeJoj— k bomson

.Falcone* Jc.

Olean

Addisoi

Riverside Jed

to Limestone

ip Tuna Creek V* Duke Center fl Ic o Dallas City V B Rixford -> ‘

‘Howard Coryville/ hOent.’ (jS

[East Branob

j>7K\Hancock

Autumn UWlm

/SBVUgk* y /

Me.

flifSEiiU^t ^

v N »E Jte

ring0 Galilee o’ irdlando

sK»U.d*l«T„M,|

?Calkina° /((o Bethany VY-,

:%=3 Vendetta/®

^Honwgjfle’y,

Jaw h He Ms. “

t*- i /Girard *-lk c>.\? r°8t[p Jtu p 1 \

jzju\fFlate* Waterford l ltahT//Alblon .Edinboro/^ i-jj /V Lavery }\A

’1OTsb,d(|and”CrpsV’^W“ uVSpringboro — c**/1 L

J \«4 ^ enangoyCatnbrld

: ConneoutTille/0 Woodoot Saegerstowi/L. „

jjA Bear Lak f n Sugargro** , Ch.Ljl.r, V.U., ”e~s«isrmitt BoocSn. Spring Cr. e« / uUn\i > iu»a,M

fgXIncoli/ville w /‘a*7 0 “ ~

tlecooley (jVand

: < fD. v!11^

Wren villa

Aurora o *0 Little Meadow Greatben < N I Silver |0 Laurel Lake* »V en Center 1 Lake o Hallstend

, * „ . L 0 Franklin

1 \ o Fnendsville Forks

0 PolterviUe t Forest Lake 5

Po n t Montro*e < ?o.w* \JA Mace-Herrick’ralle S U S Tw U E lh 1^’^oRummerfield ^Dimoclt _) ^ V]

Camptown-_uf.“ (Brookijn I

itoi^jkvW yalusln^ [Hope Bottom?’-

Fassett

Elklsnt

^Genesee

Honeoye

iSticknсy

K ° Bradford,: ‘Gornplanter •oy’ r; Nusbuum°

Lewis Run-7

ˆBullia

ˆ Mills Eldred iLarabee ‘

;„We«««r wiur»o»‘Y W/gv—

llillerton/ AtheneY/i? w

iaggett PGplett Milan ˆ “

pn Sum/mit « (Jr

[tlandi, *Mt Smffl.«d40 r\, Bom«(

| terl“d» ‘

\ Ellijborg P.O./ Vf C._

M|nporh*rt-_| »

i v\\e ‘ LAjGlyBBes

”| c“° s.bii»viu|

■ort Alleghany ˆ\’ *ˆOand ° 8und - U-~> K nnwltOD*y.l 1 Walton, ˆ3

~i c’ VcV_ J-) Cou do rsport0-ˆ. W. Pike GalneeV

‘ri

>V P O IT T„»t;EˆRM*‘s!‘1*”d?-

o I Keating Summit

Cherry Springer Germania %

o/T *ˆCro8e Fork Jcˆj, Carter Camp,

ˆV\<ˆxer-a\Co6tcll,l uU or Conrad P.O.

l\llc .V o Abbott

*Vhartou’*ˆ Logue ?J.Empˆrtuipc. MoCoys<

■*N Canola, j Berge Run eroao ˆ anˆrT,-“ir/”

e Jr o Sy “ffo

ˆSterling R|ui .\v»Rnn e

.ˆ‘feV_Qlluntle/y

sˆrVDrif ■ ■

>otter [Brook

,w Milford Thom i laokson /

, Little Marsh - (

Holiday ˆynp,,, 77, /Middle bury Cent) & Wellsboro Jc. «

fKinaua

J , Is

uosLudlow ** \Palmerv)i

im _ o Freemn/h w

KaneXˆ .KaneX iQuinnwoodt

“ J 8Pn,,«’ VVVBu.ruws 1 HulJchiM \

.vania Towanda StCViˆˆ;

(Budi = g.o»-Towandaˆ

P

I Granville Summit /-»’

ba /-> ° ˆii Powell VMonri 03 Granville Kel

Center . Y °“ oW. Leroy I / ge Barclay VˆSteTMisoti) c New Albany 4

ˆ-ˆTLaquin _ o OvftB

Vheelerville * Compb dKffle ˆ jSbunk ˆ Rid reds’ 1 lie i

ten c Lincoln Fall* Satterfield,

ˆ.Estella0 Bernice JcˆJ

.A? 0 Forksvillc xˆFy— . -

f YSE.UJfeL L ISV A NOOWf’SSS,

rfoccˆ. - i-ˆR/a glee w Laporte C ‘

ifˆours Mere [Park U TurrellB’

rf/SCEˆ V 7»«?Hrilkw

Is-VHugbesville ˆnityvi/lla Pˆ,,rm°u°l 8. p

0 Lairdgrille jl i 8pr,ng* ˆo,0l

incy Pine Summit’ /-> y*en,\ | at*..

- Odd / ° L Still \ U*A

Y~—r-‘ lol»o 0*W,\V ISh,ck.h,no,ˆ Eiihnuge \ Mill v ill 6q ˆ Vt. 7,nne *_ [_ U\|\T,

\Vhit»Hau\ JRohrspurgˆ.)jcb 0 F i ehTV* g c • il I \X

y *} BodieiSr,* — ‘ ‘/ Mill# ‘dibit BerrnitB,

Dunham V.

Penn line

ffiAK pb

Ana°n ia° >

Sweetbrlar Y .

, ZV Brownlee <

, Vriadaghton zr ‘ rf \ AntrlmS~^

(Gaines Jo. v Leeton\ia Hoytjville

Lun C\/iVoodbouse Bun^- J Oregon1 Hill

;r English Center v Okome «

N, ° Whitepine k° \Ro08 Bro°k8ld.e0 *

feleaflant Mdui ? MJ-niondaler

,,,,,.y B£j»i \ / ® Forest Citi

f Dundaff ° _j :=>’ Rich mondate o-, Fleet- ^NorthweeL ^v.iUex Jc.^ •kO,

Blossbui

Bleedt illo

i 0jc- .

lerinon dun

ˆE*po«itit

VAallonia 0Tˆ / (y Buchanan

A-rnot,

Fall brook

Enterpris] T iTus v inctvrrPi eaaab W lUe j

Niobolsou

sthope i cet colang

MLWhigbilyoˆ ykclletlviUe /[1 4 -ˆs

/ “ *8*ˆ ■ vOIowtown Mills / ffMUlers “Map

„P ‘ o/-R , ESS TV V I, 0 OR,

MnteUt. /O , La.n.idn .1

Ri,i,

Tibeˆr , Rj,; Nb Hailtot

Tˆj. • AriiVxE:

#r 6 > ‘ 1

i j E F/TER’g’O1

i?

lUBhure ,ˆ l.ovelton’-‘ _ L:.1;

> Ri eengrant0 liˆˆˆlWav

v Bernice/ yy Y O M) I N fG

niw»nf

1 8tullvjrNoi®n

‘ZL Ricketts ;T<?£rquh*rt. ˆ C* 1 «

JJollaso, ro,.%

>y

lLackawaxen

_ ˆˆ%j«bohola ‘erie.o! IjW-ˆS,, , Greeley g?>ˆ7rˆ= = Valker Uke *

.-hooper 8- | town o \lj tica

Jrossfork Slate

‘Amaaa 08henkley»ille (Ltdiaono 0

JˆKxemis V

Bodineg/vriensaot Sh-ed, . Cogan v’ljff Brompton House ˆ/ˆTield* St». HilUg /Trout-I Calvert °Bi

Ctcetey

Jlfimmerelcy Fork Leidj . Lucullut’

\ jfˆ*t*»* \

V Hyper \

; Jˆ«sa“®*loˆtRitcbi« “v l-Cpoks Run •jUWhetbam \

fL I i N T fcp N -

[Keatingˆ Glenunipm.peniey j(Minersvillˆ . parrai *\ North Fork cQˆ-0, . „ »o Ort.; \ Queenfl~Run\v_

, / Monument

’—/Stark D.id E»«’:

C’ ˆ‘oˆuieochetd

Howard

> >v y yˆgyiy >-‘vT ,c

.

k/v ElN.AN go |Frbut«

■lo 3-1C5S. 0 Kosr,ufh 8hiˆ«ns-6ˆ

. Clinton -

Emlentonˆ larnsvifle EaiTciair

B»J»™ ° Pnrkeit

bd y Lnodio

-ˆ*eT,n#d Bruinˆ

‘0BoT“rd Hilliard#/ y Baldwin P.0.o *o icT\«F Karnes City* _

DaguBˆ/TPame ˆ JˆDagus Mines s’f V/„,TolKy Mines , fi A Wo-j v LfHydeBˆ*’ [/Brockport x ˆirdir3®ˆ _

WilmeriP

v T Foot

y„..\ f. J *SinnamahonlngSx* > f Plane ‘//Aˆg = ± v’Medixrun | Gr? viyˆTyv I \ t Cal/donia « Round ˆlandˆ\yv

/ˆ3Ty*leTr -] ,lanmorevXi

y — ˆ x.v-v Tenflcld Huntley# Cam?- “k Birch \

JtX, *v. i8ummit Poll*r«i,l\ fiv” -

s ˆKeewaydln® PifieglenK

jNfoRockton \

tSssia * jayp’h-

, yrJˆ#_Sˆ\Voodlaiid»Vi‘a-Sf rgmptan J, \ A n.w TS“JSV~V ˆ

R 1. r otKlty, ‘ M” ‘.M’nut.n f. uta.r

r..lb.rA < VS?b«l_r/ R 3 Summit ˆ£52ˆ

Rosepudˆr—— dtahville —ySS?’? _ /ˆEywle.r T)

‘•“■fcSSnna TlJ Lakt (p ingmansc “Buck mil Fall# \ Ferry >

Mountain home \ r /fc

> 4Cresco Imreatˆai

ˆClifton >, -ˆfobyhanne’ Tboriihurst Bl\keslee

‘oxourc

/”■w ■<&(

,*gSfTBp’

o\ ‘ * . briltooˆ

Trogtownl

knalominko?

W agh idgtoo - o~” -

rfikSSV MONTOUR

kMattf… Bl»“

y/DTSriuSv!

[r Run® SykearillA

ikEleanor/

‘<@ˆ1 :

‘•°vdrˆ‘ *Salona 1 ˆˆrD*y: _vy,ˆ\ / Logantonto °

Cgtfy ‘;Gttt°butr

p„/C> _ oLogan-Millbo M ingbv ber a bu rg ,

m tCvwS’”’”1 cSmullton /Hw ,• v o’ <-« o Aoronsbutˆ

l,‘l”0\

oAlbrlghtBville

_ Fern dale J1

Jjedclo WeatlY

«M#ho»,

FoieSthllL»0 Mootaodm ‘ Lewlsjuuiˆ

A\°1’“5Pv?VWIb9e1’d’

Porters—

o»llle

Sherrett’

riah Ki|.|.iv\

■MMtaalra

W.WjmpunJ

ˆˆD aytonˆ i/a Sagamore o-

‘STRONG j

Maoorvlile oWhll °tv oVunneWillo j ˆBtickchnroh

rTˆY/et ‘WetzJT

RoS8’Vv Cji.l, Creek .

\ -GTˆnj-CampbellQJxL Ip’ — Hooverhurstflfliy t r «■’ A rcadia F/ \’

MUˆˆ5’ Cl\uˆy-ˆ°ˆRau be Mill#

— V

ˆˆK”ˆl/P#itrtar»»iUe OxientaYˆTˆv-v/

s’jft

txT Liverpool

{K®1 y *Old Port%*-fe4ˆ\ Millersburtw— » ana XGrahaˆ”#!| \U >1 , 1

-P -Her nJrJ\r%% #Se ling Vj.Br jaUJ Strove Jc.

-i — m

Herodoilit

M.-Koot JfT’ a”w“

Halt Falls JJvU rban ‘0 Helper

- ‘ RlingerBtownjf-ˆBough Bod

jvˆVˆW il 1 i am s t o

. •“P.Lv’Hoinewtod/

m lor Rscine I’. 0(1 S JBeaver Falls’)

fYlB E A V

BridgswMsr

q) : Jleuvejˆ

ˆ,09 CreVk4 ‘Brainards

ion Gen/ •, -

rg /< >’ ldamar

_L/N DJ I | A N A

<0ilg.in° f1 Dixon ville5t — ■ ˆ XK: ly>irerX->ˆ . i Creokside ‘S. C’ffiEnndi rcˆs°i

1/ Ruoˆ Manver’ˆiWhˆ

1 1 ndiana

tefv3ˆ4 “““if

Bruah ynlley /, rl n) v Luclutboro ibC

…

vj-jSSS1

5«f*j

VTugˆaWa

ICddlgA.

illeˆJyˆˆ

Jastoi

\J -dV/Y’ort Cnrl’oaDvj C

lO0t WfFnlo Alto t

r/ˆsf/a -G’ ji/®?2>«’\x3’>‘3ˆˆˆSkni?Cliotfcoˆ

..Tl ((“av,n«

TpJT7,;5-C, . ˆ,vA\WNBerkS) burg

ˆll.nili.c’J”’ˆˆˆ® [W\,

‘** yi.lonc8town’t Host0B Beriwaieˆ-00” field Bvr A N O N . Mt. Aetna LeinbachBi 5C rOKbW-LebanonpNwˆA W,0tt)(- !‘ T

jQ> — Kobe«hn/ˆ>x

-ˆTiˆYLebanon s.nk;ngs3gˆinˆ«_>ˆ ˆHMidway “Schoeflˆjsmwa |

ˆV>- pv’ˆ.‘cnryn Tark Adnm/stown

f4” B”’»„05‘ */ o6wnr„.Tll.

7’ 3te,eD‘ Mors

i. Lincoln ˆ/Ephrata /v

.. ˆ Akron

ˆ°Jo“lse (3ˆof0°°4/Wˆ,,,Waj MuebsH p

,y>ort 1 ronton r Vp-SˆajV

Sieforavilleˆjy-‘c Uygˆy C.tnMUˆafMˆj

m AUenˆwnˆ

iookstown Gn/i y,!) N. Sheffield o‘ South Heightt

Lucerne

[ington Jc.

’ emtng-‘r ton \

i _ CliOtplfo 4f,

MvdockariltSSk

°Floreoce

n«_, *North Sta*\

n«mor4c.»r5otwtJNn

a

iSoy&imL

SJJ cˆ°GDundul«ˆ »N«w Alexaodrld,’

“‘LvPAik Donohoe\ i

Center Br Newhoi

Lahaeka ,

J) B/u>»rˆsg5 i T’°‘sai>o

Kˆli.den.jlleJoliaˆWWmS”lb

i>„ «Mellon,«rrg Jewmc/JA 4 J »,,CˆT oSpetd/tfl Bot»rlf[t,\1.Arr

i y%„’

DooS g* Laurel Su nix, itj ®U fitoy eelo\ n,

ˆMdUˆAllen?. /J A \ V °iamberl S'.' \ ale sˆ7 ˆ Yiˆˆ Coleman S

BalwrarilleX -/Pfiedens »>faV Somerset yl t-iatie °SˆnˆV

rutbforˆpˆ

lisburg DunCftUD°

'Sb.n».b«d.i.?i",niiI!ˆmW,

. ~i-\ — ˆ \ 1 ❖/(Bin tan"

Gettysbur g Jc- e R»

'W' '\c,.ifhe»d.\ ˆNiddi,,.

i L4A/tQSv9 ;

- - ' ˆVD.A M.Jc,"

le JCT / "Dillsburg

H-x Hunters/ o J. v

Run — \ *Frnnklinlown C j'*.P r|*hy TorksSprings

17 tfytuda Hickorj— <- 'VˆLTHIUs

I'-

f off. M irldloton-NjTˆC a

c| Butfalo0 ˆ/llousl

j Meadow Lands V Eigtily—

3* 'ˆashiiigtonVˆvˆˆl

)waˆfTV\n g t o n

I— — s Bentley *. lie

|B-Claysville /* Ellsworthˆˆo’

I (Cokebury °/yˆ-

I Prosperity VAmity / Coa

1 HnckDeysV-CenyervlliSS

I West Unltfp • Bf“

I 9V ± DbA f Deer lick v～’ /7ˆ LkX . Castile0 T flTj

‘oCrOWB-iy 8 Rice* LwndineilS

| Me ＞RutaV_ileˆ Cr£S oCracken# lAv-ˆiˆ — ˆ(ˆwichaeb’ Woodruff o ” aycnesbitrg

’-‘■■.rl.ty ■■＜

X| ˆ SpiSˆ/Di＞-TTfn a

a,0M#adowg»p Oˆˆton]5＜wi3g“ c I 0Madde(jsrij(ˆ.itoxbury oV

- J Jk/WrllpW HUH o ˆMowe

I — Lurgnn/ \

nf Cabins OJW Sf’onnetUhurg f _ Jt

llougtontowˆ N / LSf＜L

l0»*hu«g

/Browiˆgtor

‘Waltonkilj

Birds boro.

rNˆ\°ttv*

X/

Bunola

•.EmUieˆS)

NlMiraurjV’ y - \

*1/. , \r 0

S?; V

ˆBcUeY’J&Sbo V’>

(Scottdale

Wright*»illo

Dover

Springetl

t-‘Tˆuifro - ijpjrxˆrt reertooe -

S&vili

ˆgSS‘1” ˆMF”rt L”f <

ipeVMill® McConiiellsillurg 8t. Thoims

SfULTON

?Iddoo CV*P -)Sp foi* C’ y\

jjoedmoie 0 oBigCufi l Kauffman ax ■ LocuBtgrove-ˆT«.Aie’iy MercerBburgG / dl

… Gnw«Mtt»£

re.CBTsterTF.™’

lor tonvdle * < Hi| (rf Oaklˆuroe

u/flpkS o M

Scull ton

y-y” Rock wood Casael.ed-’

,.oˆ mant/TT i Huml/R “

••‘W®fcMiM MejerwUIe’

. «u. *

3S Nir»M Boyotonyˆ

/) - — vl5Tf°° _ |

UnarniBˆ < > ~ˆ~A’:‘Li

|t, ˆCkr

bafe ®tr jˆew P tonic v. Harbor cO

- ˆPˆNv V

\A\Smilhvllle ˆfrCoU”

t,W.Tr”’*° r ‘

. Wu I. Kirklwood

lie WUoUwood QV l ‘oˆFulton House’ˆS

ˆ NˆOreeneˆ. A ,

Pwbb Nottu

naroeeS DeltlWb Bwine* _Jp4

7/

T’iiuii.lidf.iiTird

V R\f4aUbt

‘ˆNew F\rnnklini

‘.IS.. fA Ltd, i

Oygjpo Bare Rock/ iBnltj’rii?

ˆ ClonmellV f0 RussellvIlU | Keonett

r l °h “o*ce

‘-/S ° Victoria-ˆ’

0 8e/ ■‘e Conlluenr

(! Thomasdale >ee “Elliotteville i Markleysburg0 %

GtrrelJ.

\sm6&

° Aleppo° Tˆelph <

[Nettle Hill°

INed „ 8rg?Sl

o Garrison h

”* yA- - ˆ/Avqn.

- - ‘A jf,

_4 *Landenberg V*B.

•//Oxford K

/higrove ^^oJUy’lRviH

opium -Run

PtlMarion ■ Hf.

1-) Cooks Mills]

MidviU

limlngton

‘ighfield

‘Kings dale

State Line

Jneboro >

‘Edgemont

Ebbvale **

i?i\ ■

m iHorgsotˆwn

Cumberlai

Octoraro

Kendall

[Berkeley Springy -

West • minster

H a\rtfo

\ Relair

ˆPatterson

PENNSYLVANIA

(HedgesvlUo

Green Spr/ng,

SCALE

Statute Miles, ‘45.7 =1 Inch.

10 20 *30* 40

Fairmont’

Watson *

Berkeley

King wood

Martinsbnrg

BER KEj/l E\V

/ CARROLL

Rand McNally's New 11 x 14 Map of Pennsylvania. Copyright by Rand McNally & Co.

Oakland

Rowlesburg]

Longitude West from Greenwii

Romney

Pod.

218 New Salem. . F S 340 Newton Hamilton E 6

1 ,<575 Newtown . E 11

1 ,449 Newville . E 7

174 New Washington,

Clearfield . C 4

758 New Wilmington .. C 1

852 Nicholson . B 10

31,401 Norristown . Ell

8,729 Northampton …. D 1 1

1,037 Northampton

Heights. North¬ ampton . . D 11

1,522 North Bellevernon.

Westmoreland .E 2 15,148 North Braddock,

Allegheny . D 1

2,030 North CatasauquaD 10 1,008 North Charleroi. ,.E2

2.672

North East .

A 2

646

North Irwin, Westmoreland .

E 2

3.517

Northumberland .

D 8

1.710

North wales . .

F. 1 1

1.902

North York. York

F S

1,608

Norwood Station,

Delaware .

F 11

124

Nuangula, Luzerne C ‘J

1,353

Oakdale .

. E 1

915

Oakland .

B 10

3,436

Oakmont .

D 2

535

Ohioplye .

. F 3

19,297

Oil City .

C 2

1.4,992

Old Forge .

C 10

9,964

Olyphant .

C 10

399

Orangeville .

. ,C «

618

Orbisonia .

. E 6

247

Orrstown .

.E 6

1,801

Orwigsburg .

.D 9

425

Osburn, AUe—

gheny .

D 1

2.437

Osceola Mills … .

. D 5

591

Osceola .

. B 7

381

Oswago .

. B 5

2,390

Oxford .

. F 9

999

Paint, Somerset. .

. F 3

1,873

Palo Alto .

D 9

1,244

Parkers Landing.

. C 2

2.522

Parkesburg .

F 10

2,578

Parnassus .

D 2

590

Parry ville .

D 10

4.338

Parsons. Luzerne

• C 9

885

Patterson .

. D 7

367

Patterson Heights.

Beaver .

D 1

3,907

Patton .

. D 4

3,967

Pen Argyl .

D 11

1.462

Penbrook .

. E 8

1,048

Penns Station …

E 2

1,141

Pennsburg .

E 10

2,779

Perkasle .

.E 11

705

Petersburg .

. D 6

Petrolia, Butler.

D 2

1,709,518 Philadelphia .

.F 12

3.585

Philipsburg .

D 5

1 1.714

Phoenixville ….

.E 10

576

Picture Rocks…

. C 8

1,352

Pine Grove .

.D 9

4,975

Pitcairn .

. . 10 2

579.090 Pittsburgh .

.. E 2

18.599

Pittston .

.C 10

220

Platea .

. B 1

191

Pleasantville,

Bedford ….

..F 4

702

Pleasantville …

. . B 2

414

Plumville .

. D 3

19,100

Plymouth .

.C 10

1,389

Point Marion …

. . F 2

2,066

Polk . .

..02

2,954

Portage .

. . E 4

1,972

Port Allegany . .

. . B 5

2,678

Port Carbon …

D 9

491

Port Clinton .

D 9

170

Portersville ….

..Dl

64 9

Portland .

DU

535

Port Royal .

. . E 6

1.978

Portvue, Allegheny

D 1

16.794

Pottstown .

.E 10

22.372

Pottsville … .

. . D 9

Pop.

283 Prompton . B 1 1

34 0-Prospect . . D 1

1,055 Prospect Park,

Delaware … . F 11 10,043 Punxsutawney , . D 4

3.801 Quakertown . E 11

739 Quarry ville . F9

72 Queenstown,

Armstrong …. D 2

308 Railroad. Yol k … F 8

203 Rainsburg . F8

1,045 Ramey . D 5

0,042 Rankin. Alle¬ gheny . D 1

(P. O. Braddock)

109,381 Reading . E 10

064 Red Hill . E 11

2,092 Red Lion . F 8

4,621 Renovo . C 6

3,189 Reynoldsville … . C3 671 Rices Landing…. F 1 121 Riceville . B 2

722 Richland . E 9

562 Richlandtown… . E 1 1

5,408 Ridgway . C 4

1,761 Ridley Park . F 11

855 Rimersburg . C 2

723 Ringtown . D 9

4 29 Riverside . D 8

1.903 Roaring Spring , . . E 5

5.903 Rochester . D 1

504 Rockhill Furnace E 6 879 Rocltledge,

Montgomery . . E 11

17300 Rockwood . F3

222 Rome . B 9

1,450 Roscoe, Washing¬ ton . El

419 Rosedale, Cambria D 4

648 Rousevillc . C2

1.033 Royalton, Dau¬ phin . E 8

3.073 Royersford . E 10

763 Rural Valley,

Armstrong …. D 2 52.3 Rutledge, Dela¬ ware . Fll

7 1 2 Saegerstown . B 1

885 Salisbury,

Somerset . F 3

280 Salladasburg . C 7

410 Saltillo …… E 5

1.044 Saltsburg . E 3

639 Sandy Lake … Cl 687 Sankertown,

Cambria . . D 1

345 Saxonburg … .D2

1,195 Saxton . . E 5

6.426 Sayre . B 8

1,424 Scalp Level . E 4

314 Scbellsburg . E 4

4 747 Schuylkill Haven .D 9

381 Schwenksvllle,

Montgomery ..Ell

5.456 Scbttdale . E 2

146.811 Scranton . CIO

1,473 Selinsgrove . D7

1,572 Sellersville .V. , .Ell

365 Seven Valleys . F 8

548 Seward . E 4

4,479 Sewickley . E 2

143 Shade Gap . E 6

21,129 Shamokln . D 8

18,618 Sharon . Cl

1,401 Sharon Hill . Fll

8,976 Sharpsburg . D 2

3,634-Sharpsvllle . Cl

126 Sheakleyvllle . Cl

117 Shelocta . D 3

29.2)1 Shenandoah . D 9

1,917 Shickshinny . C 9

1.427 Shilllngton, Berks. E 9

1,598 Shlriglehouse . B 5

3.457 Shtppensourg . 7…F7

378 Shippenville . C 2

545 Shiremanstown … E 7

256 Shirleysburg . E6

598 Shrewsbury . F8

232 Silverdale . Ell

1,646 Siverly, Venango. C 2

Pop

4.454 Slatlngtou . .D10

754 Sligo. . C 2

870 Slippery Rock ….Cl

1,817 Smethport …… B 5

230 Smlcksburg . D 3

749 Smithfteld . F 2

784 Smithtou . E 2

643 Snow Shoe. …… C 6

288 Snydertown. North¬ umberland . D 8

180 Somcrfleld,SomersetF3

2,612 Somerset . F 4

1 ,875 Souderton. …… E 11

1,814 South Allentown,

Lehigh . DIO

439 South Bethlehem. D 3 24,204 South Bethlehem D 11 3,943 South Brownsville,

Fayette . F 2

1,697 South Canonsburg,

Washington . E 1

4,592 South Fork . E 4

1,748 South Greensburg,

Westmoreland . E 2 365 South Heights… .D 1 551 South New Castle

Lawrence . D 1

434 South Philipsburg,

Center … D 6

805 South Renovo,

Clinton . C 6

(P. O. Renovo) 10,190 South Sharon,

Mercer . Cl

1,084 South Waverly,

Bradford . B 8

(P. O. Waverly, N.Y.) 2,127 Southwest Greens¬ burg, Westmore¬ land . E 2

3,734 South Williams¬ port. Lycoming .C 7 2,700 Spangler, Cambla.D 4

460 Spartansburg . B 2

383 Speers, Washington E 1

614 Springboro . B 1

2,880 Spring City . E 10

1,999 Springdale . . D 2

1,100 Spring Garden,

Allegheny . D 1

(P. O. Pittsburgh)

1,152 Spring Grove . F 8

5.640 St.Clair, Allegheny D l

6.455 St. Clair . D 9

101 St. Clairs ville . E5

6.346 St. Marys . C 4

453 St. Petersburg . C 2

381 Starrucca . B 11

1,425 State College . D <’>

15.548 Steelton . E S

674 Stewartstown . F8

179 Stillwater . C 9

761 Stockdale . El

426 Stockertown.

Northampton ..Dll

1.074 Stoneboro . C 1

355 Stoystown . E 4

885 Strasburg . . F 9

376 Strattanville . C3

4,379 Stroudsburg . Dll

459 Sugar Grove . B 3

2.439 Sugar Notch,

Luzerne . C 9

863 Summerhill . E4

609 Summerville . C3

4,209 Summithlll . . Dll

16,260 Sunbdry . D8

3,478 Susquehanna . B10

917 Sutervllle, West¬ moreland . E 2

1,899 Swarthmore, Dela¬ ware . Fll

7.381 Swissvale. Allegheny

D 1

5,396 Swoyersvllle, Luzerne (P. O. Maltby) . C 9

1,756 Sykesville . C 4

217 Sylvanla . B 8

12,077 Tamaqua . D 10

7.414 Tarentum . D2

Pop

512

Tata my .

Dll

11,1 05

Taylor .

871

Teiford .

E 1 1

882

Terre Hill .

. E 9

293

Thompsontown,

Juniata . ‘

. .E 0

322

Thomson .

B 10

230

Thornburg. Allc—

gheny .

D 1

248

Three Springs …

. . E 6

5,133

Throop .

C 10

1.324

Tidloute .

533

Tioga .

. B 7

803

Tionesta .

■ 03

8.713

Titusville .

. B 2

809

Top ton .

4 .‘28 1

Towanda .

. B 8

2,325

Tower City .

1) 8

317

Townville .

B 1

1,959

Trafford .

398 Trappe, Montgomery E 11

2,067 Tremont . D 9

260 Troutvllle. Clearfield

C 4

1,288 Troy … B 8

611 Trumbauersvllle,

Bucks . .E 11

622 Tullytown, Bucks Ell

1,598 Tunkhannock . B_9

661 Tunnelhill.CambriaD 4

365 Turbotville . C8

4 995 Turtle Creek . E 2

468 Twilight, Wash¬ ington . -E 1

7.176 Tyrone … D 5

3,684 Union City . B2

355 Union Dale . B 10

20,780 Uniontown . F2

291 Uniontown, Dau¬ phin . E 8

(P. O. Pillow)

343 Unionvllle . D 5

(P. O. Fleming) 2,221 Upland, Delaware F 1 1

338 Ursina . F 3

265 Utica . ,…C 2

240 Valencia . D 2

1.198 Vanderbilt . E2

3,876 Vandergrift . . D 3

3,438 Vandergrift Heights,

Westmoreland . . E 2

985 Vandllng . B 11

251 Venango . B 1

2,849 Verona . E 2

1,437 Versailles, Alle¬ gheny . D 1

1,410 Vint-oadale …….. E 4

1 85 Volant . Cl

1,962 Wall. Aliegneny… D 1

324 Wallaceton . D5

1,039 Walnutport . D 10

980 Wampum . D1

14,737 Warren . B 3

1,251 Warrior Run,

Luzerne . C 9

21,618 Washington . E 1

560 Washington Boro,

Lancaster . E 9

183 Washlngtonvllle…C 8

724 Waterford. . B 1

1,950 Watsontown . C8

283 Wattsburg . A 2

5J5 Waverly . :.C10

412 Way mart . B 11

7.199 Waynesboro . F6

3.545 Waynesburg . F 1

2,501 Weatherby . D10

638 Weissport . D10

1 93 Wellersburg . F 4

3,183 Wellsboro . B7

308 Wellsville, York. . F 8 426 West Alexander ..El 5,512 West Berwick,

Columbia . C 8

2,036 West Brownsville. ,E 2

13.176 West Chester . F 10

2,202 West Conshohoeken,

Montgomery … E 11 1, 033-West Easton,

Northampton . .D 11

Poo,

841 West Elizabeth - E 2

495 West End, Venango C 2

1,207 Westfield . BO

1,261 Westgrove . F 10

4.715 West Hazelton,

Luzerne . C 9

(P. O. Hazelton) 3.009 West Homestead,

Allegheny . D 1

589 West Kittanning,

Armstrong . D 2

4 36 West Leesport …. E 9

199 West Liberty.

Butler . D 2

1,157 West Middlesex _ Cl

274 West Middletown. . E 1 1,468 Westmont,

Cambria . D 4

2,880 West Newton . E 2

.569 Westover . D4

6,848 West Pittston,

Luzerhe . C 9

(P. O. Pittston) 2,064 West Reading,

Berks … .E 9

933 West Reynoldsville.

Jefferson . C 3

283 West Sunbury, Butler

D 2

664 West Telford,

Montgomery ..Ell

1,626 We6tvlew . . D 2

1,621 West Wyoming,

Luzerne . C 9

2,435 West York, York..F 8

955 Wheatland . Cl

1,547 Whitaker, Alle¬ gheny . ‘….Dl

1,438 White Haven _ CIO

2.775 Wlckboro, Arm¬ strong. . ; . D 2

76,776 Wilkes-Barre . C 10

23,228 Wilkinsburg . ,.E2

(Ind. Sta. Pittsburg P. O.)

1,523 Williamsburg . E 5

33,809 Williamsport . C7

2,904 WUllamstown ,…D8

6,133 Wllmerdlng . E 2

314 Wilmore . E 4

1,108 Wilson. Allegheny . D 1

8,013 Wlndber . E 4

832 Wlndgap ……. D 11

697 Windsor … . . F 8

238 Wlnterstown,

Bucks . E 11

5.280 Winton . C 10

1,301 Womelsdorf . E 9

255 Woodbury . E 5

130 Woodcock . .B 1

1,3 96 Woodlawn . D 1

809 Wormleysburg.

Cumberland … .E 7 436 Worthington.

Armstrong . D 2

121 Worthville. Jeffer¬ son . ,-..C3

2.051 Wrlghtsvllle . F8

580 Wyalusing . B8

3, dlO Wyoming . C 10

985 Wyomissing . E 9

894 Yardley . E 12

573 Yatesville, Luzerne

. C 9

882 Yeadon . Fll

567 Yoe. York . F 8

51,656 York . F8

793 Yorkhaven . E 8

299 York Springs . F 7

323 Youngstown,

Westmoreland . .E 2 1,406 Youngsvllle …… B 3

1,881 Youngwood . E 2

1,388 Zellenople . D 1

northern Pennsylvania forms the water part¬ ing. A small quantity of the rainfall is drained southward through the Potomac, and a still smaller part is carried away northward by the Genesee River into Lake Ontario. The three great drainage systems are those of the Ohio, the Susquehanna and the Delaware. Beginning with the Water Gap in the Pocono Plateau the otherwise unbroken wall of the North Mountain is pierced by five gateways through which flow, in the order named, the Delaware, the Lehigh, the Schuylkill, the Swatara and the Susque¬ hanna. The Delaware drains only three north¬ eastern counties of the State, the Lehigh enters the former river at Easton, after draining parts of Carbon and Monroe counties and passing in its course the conical mountain at Mauch Chunk, one of the most familiar landmarks of the country. The Schuylkill drains the re¬ mainder of the lower anthracite regions and joins the Delaware at Philadelphia. The Brandywine, the lowest of the Delaware's tribu¬ taries, may be here mentioned for its historic interest. It flows through the Chester Valley in Pennsylvania and debouches at Wilmington, Del. The Swatara is an inconsiderable stream, but its water gap is like the others mentioned. The Susquehanna divides at Sunbury into two main branches, which spread their watery ten¬ tacles over the whole country from the Mohawk Valley in New York to Cambria County in western Pennsylvania. Ascending the North Branch 50 miles, one enters the Valley of Wyom¬ ing through another grand mountain gate. Central Pennsylvania is drained mainly by the Juniata, the largest tributary of the Susque¬ hanna and the most picturesque river in the State, winding through this topographical laby¬ rinth, now laughing in the sunlight of a broad valley and then rushing darkly between frown¬ ing and overhanging cliffs. The drainage sys¬ tem of western Pennsylvania is constituted of the Allegheny and the Monongahela and their affluents. The former flows alternately south¬ west and southeast, and at Pittsburgh is joined by the latter, which rises in

Virginia and has a northward course of 80 miles within the State, the united streams forming the Ohio. The Conemaugh, which collects the waters of the highlands west of the Allegheny at Johnstown, and the Youghiogheny, which, like the Monon¬ gahela, rises in Virginia, cut through the Laurel Hill range, and, after crossing the Ligonier Val¬ ley, break in similar fashion through Chestnut Ridge; the four gorges each rising almost vertically 1,200 to 1,300 feet from the river beds to the mountain tops. The Conemaugh and Loyalhanna unite at Saltsburg, forming the Kiskimenetas, which joins the Allegheny at Freeport; the Youghiogheny joins the Monon¬ gahela at McKeesport.

Climate — The climate of southeastern Pennsylvania is comparatively mild; zero weather is of rare occurrence. The Alleghanies act as a wind break and protect the eastern valley from the northwestern cold waves. The lower Delaware is often filled with ice, mostly drift ice from above, and, though navigation is sometimes impeded, it is never closed. Above Philadelphia the river is frozen solid about once in four or five years, ffhe cold spell is usually ‘broken by one or two midwinter thaws. The summer temperature of southeastern Pennsylvania is often above 90° F. in the mid¬

dle of the day and the humidity makes the heat very oppressive. The winters in the cen¬ tral and northern mountain regions are quite rigorous,- but the summer temperature is more moderate than that of the southeastern part of the State, owing to the elevation and compara¬ tive dryness of the atmosphere. The western part of the State has the climate common to the Lower Lake regions. From observations taken at the agricultural experiment station in Centre County for 16 years (1866-1902) the annual rainfall ranged from 30.28 to 43.88 inches. The average monthly temperatures for January ran from 18° to 36.60° F., and the average for July from 65.40° to 76.16°.

Geology. — The geological division of the State coincides with the popular geographical division thereof into eastern and western Pennsylvania; the ridge of the Alleghanies be¬ ing the divisional line. Western Pennsylvania belongs to the geological province of the Mis¬ sissippi Valley, and is one vast field of bitu¬ minous coal, overlaid and underlaid by Car¬ boniferous sandstone and conglomerate. The uppermost and most valuable of the bituminous coal measures is the Pittsburgh ; and from the outlying remnants of the same found on the Broad Top Mountain and in Maryland, and also from the identification of the Pittsburgh with one or two of the deposits of anthracite in

northwestern Pennsylvania, it has been conjec¬ tured that this coal had its origin in a growth of swamp vegetation almost coextensive with the State. The original northern limit of the Pittsburgh bed in the direction of Lake Erie is now undeterminable, for the whole Allegheny Valley and the upper Susquehanna Valley has been denuded of the same by those slow but potent levelers, frost and rain, though the mid¬ dle and lower coal measures in these regions have been preserved. Going northward, the middle and lower beds consecutively disappear, until only patches of the lowest workable de¬ posits maintain a precarious existence on the highest land ; and in the extreme north the old red sandstone of the Catskill (Devonian) for¬ mation, which underlies the Carboniferous sandstone, is exposed in broad bands along all the watercourses. Eastern Pennsylvania be¬ longs to the geological province of the Atlantic seaboard and is partly a region of mountains of Devonian and Silurian age and partly an open country of the still older Cambrian and Ar¬ chaean periods. A broad continuous belt of Jurassic-Triassic brownstone and trap crosses the latter from west to east, and Cretaceous rocks underlie a narrow strip along the Dela¬ ware, below Trenton. A sheet of glacial drift covers the northern part of the State down to a line drawn from Belvidere, N. J., to Olean, N. Y., and curving from the latter place through Warren, Venango and Beaver counties to a point on the western State line, a few miles north of the point of exit of the Ohio River. On the Pocono plateau, in the northeastern sec¬ tion of the State, the old red Catskill sand¬ stone occupies nearly the entire surface. Within a deep trough in the otherwise horizontal out¬ spread of the Catskill formation lie the anthra¬ cite deposits of Luzerne County, the best pre¬ served in the State; for so deep is this trough that not only the lower and middle measures and the measure identified with the Pittsburgh have been saved, but there are still higher coal

beds, and above these remnants of still higher rocks, containing Permian fossils found else¬ where in the State only in its extreme south¬ western corner. The coal beds of the lower anthracite region

lie in a series of parallel folds and rise steeply to the soil at their edges ; the inclination of one bed being opposite to that of the bed in the next pocket. An arch described in the direction of an ascending seam and down again in the direction of descent of the next following would rise thousands of feet in air; and this aerial arch would represent the amount of erosion which the strata underlying the coal and the coal measures themselves have undergone. It is estimated that only one ton in a hundred of the original deposits of anthra¬ cite has been preserved. Another illustration of the stupendous changes wrought in the topography of Pennsylvania by the frosts and rains of ages is found in the region of the Alleghanies. Wherever the Carboniferous for¬ mations (which once covered the entire sur¬ face of the State) have been preserved in geological basins, there are the mountain ridges of to-day; where these formations were arched they have been eroded away and their places taken by the valleys of the present time. The Catskill sandstone crops out beneath the Car¬ boniferous escarpment of the Alleghanies on the western side of the Nittany Valley, for in¬ stance, in a bold bluff. The same formation is recognizable with an opposite dip on the Broad Top, 20 miles to the east. The lower Devonian and Silurian rocks crop out in their regular order on the flanks of both mountains, and in the valley between ; and an arch connecting the old red sandstone bluff with the same forma¬ tion on the Broad Top would reach an altitude of 21,760 feet at its keystone line, if the meas¬ ured thickness of the sandstone itself and of the underlying strata be added together. If to these one should add the thickness of the overlaying Carboniferous strata, up to and in¬ cluding the Pittsburgh coal bed (which has been preserved on the Broad Top), the total height of these primordial mountains, which have been dissolved in the weathering process of millions of years, would appear to have been over five miles.

Mineral Resources. — Pennsylvania far sur¬ passes any other State in the value of its min¬ eral products. It produces nearly half of all the coal mined in the United States and con¬ tains the largest deposits of anthracite to be found anywhere in the world. The production of this variety of coal was about 25,000,000 long tons in 1880; about 50,000,000 long tons in 1900 and now averages about 80,000,000 long tons a year. When mineral fuel was first substituted for charcoal in the blast furnaces only anthra¬ cite was used, and for many years the quantity of bituminous coal so employed was relatively small. Since 1875 this relation has been gradu-allv reversed. In 1880 bituminous coal and coke pig iron constituted 35 per cent of the total production ; in 1890 it was 61 per cent, in 1900 over 76 per cent and now it constitutes practi¬ cally the whole output. In the making of

steam for' motive power in the manufacturing and transporting industries and in the production of illuminating gas, bituminous coal has supplanted anthracite ; and the use of the latter is being more and rpore limited to household purposes.

The most important of the bituminous coal measures of the State is the Pittsburgh in bay-ette, Westmoreland, Allegheny and Indiana counties. The bed varies in thickness between 6 and 12 feet, and in the quantity of fixed car¬ bon from 59 to 64 per cent. The production of bituminous coal in Pennsylvania increased from 18,425,163 tons (2,000 pounds) in 1880 to 42,302,- 173 tons in 1890, and 79,842,326 tons in 1900. Since then the production of bituminous coal in Pennsylvania has increased by leaps and bounds. The output rose to 173,781,217 tons in 1913 and, though production has fluctuated un¬ der influence of the abnormal conditions pre¬ vailing during the last three years, an estimated annual output of 158,000,000 tons, which was the product of Pennsylvania's soft coal mines in 1915, probably, would not be far from correct. This would mean a nearly ninefold increase in the annual production of bituminous coal in the State during the past 35 years. In the produc¬ tion of coke Pennsylvania continues far in the lead. A considerable proportion of the coke produced in the United States is made in ovens or retorts operated by large corporations that not only mine the coal and make the coke but also operate blast furnaces and steel mills which consume their entire coke product. Much coke, moreover, is a by-product of the gas and other industries. Under these circumstances accurate statistical information, either as to out¬ put or values, is difficult to obtain and tabulate. From a collection of the most reliable data it appears, however, that out of a total of from 50,000,000 to 62,000,000 tons of coal consumed per year in the United States in the manufacture of coke 60 per cent is coked in Pennsylvania. Connellsville is the centre of coke production. New installations are rapidly superseding the bee-hive coking ovens and by-products exceed¬ ing in value the coke produced will ultimately be saved. Oil was first struck in the vicinity where Titusville now stands on 29 Aug. 1859. Within the next few years hundreds of wells were drilled in the Oil Creek region. The wildly speculative character of the business in its booming days is reflected in the range of petroleum prices from $19.25 a barrel in Janu¬ ary 1860 to 10 cents a barrel in January 1862. The first oil fields have long since become ex¬ hausted and, though others have been success¬ ively discovered and worked, the State is now outranked as a producer by several States in the Middle Western, Southwestern and Pacific Coast oil fields. In 1915 Pennsylvania's

mar¬ keted output of crude petroleum amounted to 7,838,705 barrels, which was about 2ˆ4 per cent of the total for the United States. In the total value of its product, however, Pennsylvania still ranks fifth among the States. Its 1915 output brought $12,431,353 (about $1.5 7j4 per barrel) whereas the 10 times greater California product for that year brought not quite three times as much. In 1909 Pennsylvania produced natural gas to the value of $20,475,207, which was nearly one-third the value of the total out¬ put of the United States. At the present time Pennsylvania ranks second among the States in the production and consumption of natural gas, its output in 1915 being valued at $21 ,139,605, more than one-fifth the total for the country. This proportion is being maintained. Southwest¬ ern Pennsylvania and the adjoining parts of

PENNSYLVANIA

Horse Shoe Curve, Allegheny Mountains

PENNSYLVANIA

co

o

to

3 —

§

, o *d—

Pcr

•i

re

to

w*

re

-t

to

3

a

»

3

to

o

S*.u>

” §

oS

«■ 3 3*0q

(ti

o «

ˆ to

S> o

o to 3

_ <

Ba

o

a

CO

H

»

►<

B re

jy

J5,ff

c

W rt0) to

p 5*

*8

o

3 -i re o

S.*

to

3* 3

rt> o.

S*. M w ST <-► B »

►?*

P to*

a> o

“3

3*

t/> *o «< S»

*r *-» 2£

2.5

to (W

PENNSYLVANIA

PENNSYLVANIA

PENNSYLVANIA

521

West Virginia between them produce approxi¬ mately one-half the total output and there are no indications of the exhaustion of the stores of this ideal fuel. The extraction of gasoline by compression provides the distributors of nat¬ ural gas with a new source of revenue. Penn¬ sylvania gas is exceptionally rich in carbohy¬ drates, and one distributing company is ex¬ tracting 50,000 gallons of gasoline per day. Since the discovery and development of the Lake Superior and Alabama iron mines Penn¬ sylvania has lost its pre-eminent position as a producer of iron ore. Its output in 1915 was 367,056 tons, about .003 of the total for the United States. The value of stone quarried in this State in 1915 was $9,310,397 (No. 1 in United States) classified as follows: Lime¬ stone, $6,367,116 (No. 1 in United States) ; slate, $2,892,358 (No. 1 in United States), and sandstone, including bluestone, $1,253,994 (No. 2 in United States). Marble, trap-rock and granite make up the rest. Of the total about $2,750,000 in value consisted of crushed stone for ballast, concrete and road material. Port¬ land cement, though in a sense an artificial product — consisting of a mixture of calcifer-ous stone or marl and silicious earths — pul¬ verized and calcined — can be successfully and profitably produced only in localities where minerals containing the required ingredients are found in juxtaposition and in adequate quan¬ tity. The region between Cementon, in Le¬ high, and

Siegfried's Bridge, in Northampton County, Pa., and Phillipsburg, N. J., is the chief centre of cement production in the United States. Nearly the whole output of the coun¬ try in 1882 was produced in this region. In 1915 the output of the entire country was 172,-706,588 barrels, of which number 56,837,391 bar¬ rels, or nearly one-third, came from the Penn¬ sylvania fields. The marls and other earths used in the production of cement nearly all con¬ tain potassium silicates and by slight alterations in the furnaces about 5 per cent of potash is obtained from this material in the process of calcination. Southeastern Pennsylvania pro¬ duces in considerable quantities combined iron and chromium ores, hematite, magnetic iron and corundum. According to the report of the State Secretary of Interior the mineral out¬ put in 1916 had a realized value of $1,357,-

829,836.

Forest Products. — Until 1876, when the supply of white pine in this State had become nearly exhausted by the wasteful methods which marked the decade ended in 1870, the timber of Pennsylvania was accounted one of the most valuable of its natural resources. As early as 1810 there were sawed in the State 73,847,640 feet of lumber. Since 1838 Williamsport has been, as it still is, the centre of the lumber in¬ dustry. Hemlock, once despised, has become the principal variety of timber now cut in this State and constitutes 73 per cent of the entire product of lumber. Hemlock is still found in considerable quantities in northern Pennsylva¬ nia, though its exhaustion would be a matter of only a short time if the measures adopted to prevent and discourage waste should fail. Oak, white pine, poplar and spruce rank next to hem¬ lock in importance in the order named. Prac¬ tically all the chestnut has been killed by the blight and the white pine is menaced by the

blister rust. The State still ranks fourth in the production of lumber, the value of its planing-mill output in 1914 having been $24,862,000 — about 8 per cent of the total for the United States. Of the four sawmills in the United States which produced more than 100,000,000 feet, board measure, this State contained one. Since 1901, when the Forestry Department was created and the Reservation Commission was authorized to purchase land ((that the State ought to possess for forestry preservation, » about 1,000,000 acres of mountain land have been acquired and made into inalienable State reservations. The

protection of forests from fires caused by negligence has been the object of considerable legislation, and timber culture is being encouraged by large rebates from taxes.

Agriculture. — The soil of the State, except in the mountains, is everywhere fertile, and even where least adapted to agriculture is suit¬ able for grazing. The southeastern part is ex¬ cellent for growing cereals. The total farm acreage has not increased greatly since 1850, but the number of farms has grown over 75 per cent. The value of improved farms in the last census year was $1,253,274,862 as compared with $1,051,627,173 in 1900. This represented about 25 per cent of the assessed value of real property in the State. Of the 218,394 farms enumerated 163,587 were cultivated by their owners. The cereal crops raised in 1916 (a short year) were 26,125,000 bushels of wheat; 35,303,000 bushels of oats ; 56,550,000 bushels of corn; 3,780,000 bushels of buckwheat (first in United States) ; 4,420,000 bushels of rye. There were produced also 19,040,000 bushels of pota¬ toes, 5,208,000 tons of hay and 49,096,000 pounds of tobacco. Flour and gristmill prod¬ ucts in 1914 were of the realized value of $43,- 626,000, which was exceeded only by Minne¬ sota and New York. The State excels in dairy and market garden products and in the produc¬ tion of butter ranks second of the United States. The 980,000 milch cows counted in 1917 yielded 575,000,000,000 gallons of milk. There are generally more than 10,500,000 chickens over three months old on the farms of the State and nearly 70,000,000 dozen eggs are produced a year. There were 596,000 horses on farms in 1917 ; 48,000 mules and 664,000 cattle. The stock-raising industry remains stationary. The State department of agriculture is making ef¬ forts to prove the profitableness of raising beef and latterly the raising of sheep for wool has received encouragement from private associa¬ tions and the passage of a stringent Dog Law.

Fisheries. — The most valuable fisheries of Pennsylvania are the shad fisheries of the Dela¬ ware. The Susquehanna, once famous for its shad, has been depleted by the employment of fish baskets, the building of dams and other in¬ jurious and wasteful practices. The annual catch of shad in the Delaware has recently av¬ eraged in value $500,000 ; that of the Susque¬ hanna does not exceed $30,000 in the best years and is generally much lower. Delaware stur¬ geon are verging on extinction ; efforts to give protection to the species by interstate legisla¬ tion and by restocking the streams have not met with much success.

Manufactures. — From a very early period Pennsylvania has held the first rank as an iron

producer in America. According to a publica¬ tion dated 1692 a small quantity of iron had even then been made in the colony; in 1727 it exported 274 tons of pig-iron to England and in 1756 it was spoken of as the most advanced of American colonies in regard to its iron works. Berks County was the earliest seat of the in¬ dustry, where Thomas Rutter, apparently a Ger¬ man, erected a forge on Manatawny Creek, three miles above Pottstown, in 1716. Begin¬ ning with 1788 the industry was developed to a considerable degree in the Juniata Valley and in 1790 a blast furnace was erected in Fayette County, which remained the main source of supply of the Ohio and Mississippi valleys for many years. Not until 1859 was the manufac¬ ture of pig-iron successfully established at Pittsburgh, although that city had produced considerable quantities of steel since 1813. The tremendous growth of the industry, however, dates from 1876. Allegheny County now pro¬ duces 50 per cent of the pig-iron and 65 per cent of the steel manufactured in this State. The pig-iron produced in the State in 1909 amounted to 10,918,824 gross tons, which was about two-fifths of the total output of the United States. This represents an increase of 50 per cent, within the limits of a decade. The annual capacity of the blast furnaces of the en¬ tire country in 1914 was 44,405,000 gross tons ; the capacity of the furnaces of Pennsylvania in that year was 17,858,000 gross tons — rather more* than two-fifths of the total — and in obedience to an abnormal demand they have been recently run as nearly as possible to capac¬ ity. The production of rolled iron and steel in Pennsylvania (excluding that of the tinplate works) was approximately 3,300,000 tons in 1890, 5,500,000 tons in 1900 and 9,000,000 tons in 1910, showing an increase of 173 per cent in a period of 20 years. From these data some idea may be obtained of the growth of the steel and iron industry in Pennsylvania within less than a generation. The production of tin and terne plates, a new industry in 1890, was val¬ ued at $35,283,360 in 1905. In 1914 the value of this product for the entire country was $68,- 343,000, of which the State produced $36,796,- 000. The foundry and machine-shop products of the State were valued in 1900 at $127,292,440, which was nearly twice the value of the output for 1890. In 1910 their value was

$210,746,257, more than thrice that of 20 years previously. More than one-half the total number of locomo¬ tives built in the United States come from the shops of this State and the Delaware River at Philadelphia has become by far the greatest shipbuilding centre the world has ever seen. The second in importance of the industries of the State is the manufacture of textile fabrics, its output of silk, woolen, worsted and cotton goods of all kinds (clothing excluded) amounting in value in 1890 to $134,001,269, in 1900 to $158,- 782,087, and in 1914 to $221,645,000. Pennsyl¬ vania ranks second in the production of carpets, with 33 per cent of the entire product of the country; first in the production of thrown silk and pile fabrics of that material, with 35 per cent of the total; second in the manufacture of knit goods (especially hosiery, in respect to which it stands first) with 23 per cent of the total ; second in the production of woolen and worsted goods, in which it is exceeded only by Massachusetts, whose output is approximately

one-third as against Pennsylvania's one-sixth, of the total for the country. The German col¬ onists of 1683 are credited with having intro¬ duced the manufacture of hosiery in this coun¬ try; in 1810 there were manufactured in the State 107,508 pairs of stockings; in 1858 there were 700 hand frames in operation, and, indeed, the making of hosiery and other knit goods was a household industry in Germantown and vicin¬ ity down to quite recent times. The exhaustion of the hemlock forests of southeastern New York some years after the Civil War caused the tanners to turn their attention to central and northern Pennsylvania, and a great devel¬ opment of the leather industry followed; in 1900 the State ranked first in the tanning and finishing of leather, with products valued at $55,615,000 or 27.3 per cent of the whole prod¬ uct of the country. In 1914 the State was still far in the lead in this industry, with products of the value of $85,253,000, nearly 25 per cent of the product of the entire country. This State has also long led all others in the manu¬ facture of glass, having produced 51.8 per cent of the total in 1870 and $22,011,130 worth or 38.9 per cent of the vastly larger total in 1900. In 1914 the State's output was valued at $39,- 798,000, nearly one-third the total for the coun¬ try. The industry is carried on chiefly in the region of Pittsburgh, stimulated by the abun¬ dant supply of coal and natural gas, of fire¬ clay suitable for furnaces and the glass sand of unexcelled quality found in Fayette and Juniata counties. The first glass house west of the Alleghanies was built in 1797 by Albert Gallatin at New Geneva on the Monongahela River.

The following statistical tabulation of all manufacturing industries of Pennsylvania shows the growth thereof during a recent and comparatively normal period of five years.

	1904	1909
Persons engaged .	855,392	763,282
Wage workers .	$1,995,837,000	441,230,000
Capital .	73,269,000	367,961,000
Services .	1,142,943,000	
Salaries .		
Wages .		
Cost of material . .		
Value of product .		
Value added by mana factures .		

1,955,551,000

812,608,000

1,002,171

877,543

$2,749,006,000

566,524,000

110,897,000

455,627,000

1,582,560,000

2,626,742,000

1,044,182,000

The value of the product in 1914 was $2,832,349,437.

Commerce and Navigation. — The Alle¬ gheny and the Monongahela are both navigable about 60 miles from their junction at Pittsburgh, the latter by the aid of locks and slackwater basins. The Ohio from the earliest times and down to the beginning of the railroad era was the highroad of immigration from the East to the Mississippi Valley and continues to be a busy thoroughfare of steamboat traffic. The Delaware is navigable from the sea to Trenton and has great depth along the water front of Philadelphia. The shoals in its lower course have been removed, a channel 25 feet deep at mean low water has been dredged to the sea and a further deepening of the same to 35 feet is projected. The Schuylkill is navigable for large vessels about six miles from its mouth at Girard Point, Philadelphia, and for steam¬ boats (with the aid of dams and locks) as far as Reading. The water of the Delaware does not become brackish until some distance below Wilmington, Del.; Philadelphia, therefore, is

unique in the possession of a deep fresh water harbor within easy reach of the ocean. In 1916 the imports at the port of Philadelphia were valued at $95,801,175 and the exports at $193,- 495,296. Most of the canals of the State have i alien into disuse, though the Lehigh and Dela¬ ware Canal carries stone, bricks, cement and coal in limited quantities. The inland water¬ borne commerce of the State is conducted mainly on the Delaware and Ohio rivers, while the frontage on Lake Erie gives access to the commerce of the Great Lakes. The Delaware and Raritan and the Chesapeake and Delaware canals now afford, though inadequately, in¬ terior water communication with New York, Buffalo and Boston, on the one hand, and Bal¬ timore and the South on the other — and the im¬ provements projected and partly carried out open up incalculable possibilities. There are 148 steam railway companies operating lines in Pennsylvania;' the greater part of the carrying businesses conducted, however, by 12 railways; the Baltimore and Ohio, the Buffalo, Rochester and Pittsburgh, the Central Railroad of New Jersey, the Delaware, Lackawanna and West¬ ern, the Erie, the Lake Shore and Michigan Southern, the Lehigh Valley, the New York Central and Hudson River, the Northern Cen¬ tral, the Pennsylvania, the Pennsylvania Com¬ pany, the Philadelphia and Reading, and the Pittsburgh, Cincinnati, Chicago and Saint Louis. Of the foregoing the Northern Central, the Pennsylvania Company and the Pittsburgh, Cincinnati, Chicago and Saint Louis form part of the Pennsylvania system. The Central of New Jersey, the Delaware, Lackawanna and Western, the Erie, the Lehigh Valley and the Philadelphia and Reading carry practically all the product of the anthracite mines to market. The railway mileage of the State, according to the report of the Secretary of the Interior for 1916, con¬ sisted of 9,187 miles of main line and 7,931 miles of branches and spurs, a total of 17,118 miles. In 1860 the total was 2,598 miles. There were on 16 Dec. 1916, according to the same report, 4,384 miles of electric railways in opera¬ tion within the State. Continuous or connect¬ ing lines afford means of communication north¬ ward from Chester and Philadelphia to Bethle¬ hem, Scranton, Easton and the Water Gap, and connections can be made via Trenton to New York and the Eastern States.

Banking. — The segregation of the banks of western Pennsylvania with those of the Fed¬ eral Reserve District of Cleveland has made the consideration of the national banking resources by States unprofitable. The transactions at all the clearing houses within the State for the year ended 30 Sept. 1916 amounted to $15,895,- 707,000. The combined clearings at Philadel¬ phia, Pittsburgh and Scranton for the year ended 30 Sept. 1910 amounted to $10,470,000,000, approximately. The transactions at Philadel¬ phia increased from $7,760,336,900 in 1910 to $12,018, 127,000 in 1916, about 70 per cent. The increase at Scranton was nearly 60 per cent, and at Pittsburgh about 30 per cent. The an¬ nual report of the State commissioner of bank¬ ing of date 30 Nov. 1916 indicates:

Number Aggregate assets

State banks . 192 $243,000,791 92

Trust companies . 300 1,034,508,056 78

Savings institutions . 11 270,614,648 40

The par assets of the banks of discount and trust companies — commercial paper and call loans against collateral — amounted at that date to approximately $478,000,000 and this capital stock and surplus to $316,882,886. There were on the same date 1,940 building and loan asso¬ ciations with 625,000 shareholders, with aggre¬ gate receipts for which they are accountable to members to the amount of $157,328,274.

State Finances and Government. — The revenues of the State are derived mainly from the following sources, yielding for the year 1916 approximately the following amounts:

T axes on corporate stock . $16,500, 000

Taxes on net earnings of corporations . 4,500,000

Taxes on collateral inheritances . 2,600,000

Licenses for motor vehicles . 2,500,000

Receipts from licenses, official fees and mis¬ cellaneous special taxes made up the rest of the State's income, which amounted to $36,228,096. Real estate is not taxed for State purposes. The total disbursements were $34,962,445. There is practically no State debt. At the date of the latest available financial report there were outstanding overdue debentures, which had not been presented for redemption and on which interest has ceased to run, of the amount . of $20,505. There are $500,000 of agricultural script bonds bearing 6 per cent. These sums are entirely covered, principal and interest, by cash in the sinking funds.

Pennsylvania's delegation in the Congress of the United States is composed of two Senators and 36 Representatives. The administration of the State's business and the execution of the laws is distributed between the executive de¬ partment and numerous boards and commis¬ sions. The executive department consists of the governor, lieutenant-governor, secretary of state, attorney-general, auditor-general, State treasurer, secretary of internal affairs and superintendent of public instruction. The gov¬ ernor, lieutenant-governor, auditor-general treasurer and secretary of internal affairs are elected; the secretary of state, attorney-general and heads of other departments and commis¬ sions are appointed. The governor, whose term is four years, and who is not eligible for re-election, is invested with the veto and par¬ doning power. The former may be exercised with respect to single items of appropriation bills. No pardon can be granted by the gov¬ ernor except on recommendation of the lieu¬ tenant-governor, secretary of state, attorney-general and secretary of internal affairs, or any three of them; these officials constituting the board of pardons. The governor may refuse a pardon notwithstanding the recommendation of the board. The general assembly consists of two branches, the senate and house of rep¬ resentatives, and meets biennially in the odd numbered years at Harrisburg, which since 1810 has been the capital. The senators, 50 in num¬ ber, are elected for four years in such manner that the terms of one-half the number expire every second year. The house contains 204 members elected for a term of two years. The compensation to members of the general assem¬ bly is $1,500 and 20 cents mileage for the regu¬ lar biennial session and $500, besides mileage, for any extraordinary or special session. The judiciary is composed of the Supreme Court, the Superior Court, an Intermediate Court of

Appeals and the County courts. The Supreme Court has original jurisdiction in cases of in¬ junction when a corporation is a defendant, and the judges thereof are ex officio justices of Oyer and Terminer; ordinarily, however, courts of Oyer and Terminer and Quarter Ses¬ sions are held by county judges, who also pre¬ side over Orphans' courts, and as judges of Common Pleas have jurisdiction in the first instance over all civil actions.

Population. — Pennsylvania has (United States Census Bureau returns, 1920) a popu¬ lation of 8,720,017. No detailed information in respect to increase, race, nativity, sex dis¬ tribution or status later than that given in ' the census of 1910 is available, however. The growth of population by decennial periods is indicated below:

1790 .	434,373	1850	
1800 .	602,265	1860	
1810 .	810,091	1870	
1820 .	1,049,458	1880	
1830 .	1,348,233	1890	
1840 .	1,724,033	1900	
			2,311,786
			2,906,215
			3,521,951
			4,282,891
			5,258,014
			6,302,115

The population in 1910 was 7,665,111, of which number 193,919 were negroes and 3,479 were of Indian, Mongolian and other non-European races. The native-born numbered 6,223,392, of whom 5,638,052, or 90 per cent, were born in the State. There were 4,418,277 of native parentage, 1,806,267 of foreign or mixed (foreign and native) parentage, and 1,442,374 foreign born. The rural population was 39.6 per cent of the total, which compares with 24.8 per cent for New Jersey, 21.2 per cent for New York, 10.3 per cent for Connecti¬ cut, 7.2 per cent for Massachusetts and 3.3 per cent for Rhode Island. Of the total popula¬ tion 3,942,206 were male and 3,722,905 female. There were 1,560,397 married men and 117,- 728 widowers, and 1,473,465 married women and 259,641 widows. The males 21 years of age and over numbered 2,309,026, of whom 741,610 were foreign-born whites, and of the latter 248,827 were naturalized, giving a voting population of approximately 1,812,000. The total vote cast in the State in the presidential election of 1916 was 1,297,097. The density of the population of Pennsylvania in 1910 was 171 to the square mile. The figures above given can, generally speaking, be brought down to date by increasing them 2 per cent for each elapsed year, which is the method adopted by the Census Bureau in making its estimates. The number of persons in Pennsylvania who were engaged in gainful occupations in the last two census years is shown below:

year	Total number	Males	Females
1900 .	2,448.589	2,017,052	431,537
1910 ” . .	3,130,681	2,525,245	605,436
Increase .	28 per cent	25 per cent	40 per cent

Political Divisions. — The State is divided into 67 counties. The present constitution for¬ bids special legislation, but the act of 25 June 1895 divides cities into three classes and, under the guise of general laws for each class, Phil¬ adelphia is legislated for by itself,

being the only municipality answering the description of a city of the first class. The second class. of cities includes those containing a population of 100,000 and less than 1,000,000 and covers Pittsburgh and Scranton. Cities of less than 100,000 population constitute the third class.

government has been in this class by a general act. the third class with their in 1920 follow :

The commission form of made mandatory The principal cities of population

Allentown . 73,502

Altoona . 60 , 33 1

Beaver Falls . 12,802

Bethlehem . 50 , 358

Bradford . 15,525

Butler . 23,778

Carbondaie . 18 , 640

Chester . 58,030

Coatesville . 14,515

Connellsvilie . 13 , 804

Corry . 7,228

Du Bois . 13,681

Duquesne . 19,011

Easton . 33,813

Erie . 93,372

Franklin . 9,970

Harrisburg . 75,917

Hazleton . 32,2 77

Johnstown . 67,327

Lancaster . 53,150

Lebanon . 24 , 643

Lock Haven . 8,557

McKeesport . 46,781

Meadeville . 14,568

M onongahela . 8,688

New Castle . 44,938

Oil City . 21,274

Pittston . 18,497

Pottsville . 21,876

Titusville . 8,432

U niontown . 15,692

Wilkes-Barre . 73,833

Williamsport . 36,198

York . 47,512

The principal boroughs of Pennsylvania, some of which are more populous and other¬ wise more important than many of the incor¬ porated cities, are given below, with counties where located and population at the last census :

Braddock (see North Braddock), Allegheny

Bristol, Bucks .

Carlisle, Cumberland .

Carnegie, Allegheny… .

Chambersburg, Franklin . .

Columbia, Lancaster. .

Conshohocken, Montgomery .

Darby, Delaware .

Dunmore, Lackawanna .

Farrell (South Sharon), Mercer .

Greensburg, Westmoreland .

Homestead, Allegheny.. .

Mahonoy City, Schuylkill .

Monessen, Westmoreland .

Mount Carmel, Northumberland .

Nanticoke, Lucerne .

Norristown, Montgomery .

North Braddock, Allegheny .

Old Forge, Lackawanna .

Phoenixville, Chester .

Plymouth, Lucerne .

Pottstown, Montgomery .

Punxsutawney, Jefferson .

Shamokin, Northumberland .

Sharon (see Farrell), Mercer .

Shenandoah, Schuylkill .

Steelton, Dauphin .

Sunbury, Northumberland .

Warren, Warren .

Washington, Washington .

West Chester, Chester .

20,879

10,273

10,916

11,516

13,171

10,833

8,481

7,922

20,250

15,586

15,033

20,452

15,599

18,179

17,469

22,614

32,319

14,928

12,237

10,484

16,500

17,431

10,311

21,204

21,747

24,726

13,428

15,721

14,272

21,480

11,717

Charities and Correction. — Provision is made for the care of the criminal, indigent, insane and other defective and dependent per¬ sons in numerous State institutions, under the general supervision of the board of public charities. The correctional institutions, aside from the county jails, are the Eastern and Western penitentiaries, the former at Philadel¬ phia and the latter at Pittsburgh ; the State Industrial Reformatory at Huntington and the Reform School at Morganza. The Philadel¬ phia House of Refuge, the male department whereof is at Glen Mills, Delaware County, though a ibcal institution, receives State aid and accepts commitments from all counties. The contract system was abolished by law in 1881, and the inmates of prisons and reforma¬ tories are required to be employed ((in behalf of the State® or ((in behalf of such institutions.® The penitentiaries are supported in part by appropriations from the State treasury. The other needed revenues are derived from the labor of convicts, profits of

manufacturing, payments by the United States for the support

of Federal prisoners and by the counties to make good any deficiency of support by labor of their convicts. The convict inmates of all correctional institutions, workhouses, county jails, the Industrial Reformatory, the Eastern and the Western penitentiary, at the date of the latest officially published reports were 9,923. The House of Refuge at Glen Mills had 1,186 and the Reform School at Morganza 500 in¬ mates. The population of the almshouses was 17,802. The State hospitals for the insane, five in number, and located at Harrisburg, Dan¬ ville, Norristown, Warren and Dixmont; the State asylum for chronic insane at Werners-ville; the Homeopathic State Hospital at Rit-tersville and the State Hospital for the Crimi¬ nal Insane at Fairview at the date of the latest published official report held 10,876 patients. The county-care hospitals held 7,919 insane patients; there were 832 in private hospitals and sanatoria and about 150 in almshouses and jails. The number of insane persons cared for in these various institutions was 19,800, of whom 10,530 were males and 9,270 females. Institutions for the feeble-minded at Polk, Spring City and Elwyn care for 3,435 defect¬ ives ; four institutions for the deaf and dumb give instruction in oral speech and other train¬ ing to 970; there are 336 inmates of institu¬ tions for the blind, 19,145 in home for children and the aged and friendless, 10,910 in State and private hospitals and 525 in sanatoria. The total population of the correctional and char¬ itable institutions of Pennsylvania at date of the latest official report was 64,732. It is the policy of the State to give liberal aid to private charities and the money grants considerably exceed $2,000,000 a year. The unsystematic, haphazard manner in which the appropriations are distributed and the multiplication of ap¬ plicants for State bounty lay open the present method to just criticism. There remain to be mentioned as State institutions the five hos¬ pitals for injured miners — one in the anthra¬ cite region, one in the middle field and three in the bituminous coal fields — and, finally, the Soldiers' and Sailors' Home at Erie.

Education. — The system of public instruc¬ tion of the State dates from 1834, when the Common School Law was passed. The sys¬ tem is under the direction of the State super¬ intendent. There are 2,582 school districts, each district generally comprising a township. The directors of the district assess the local rates. The supervision of instruction is by county superintendents and their assistants. The more important of the third-class cities have their own superintendents and the great cities have autonomous systems under local boards of edu¬ cation. The total number of public schools in the States is 40,655. Of these 331 are first-grade high schools, 275 second-grade high schools and 368 are third-grade high schools. There are 66 county superintendents, 79 as¬ sistant county superintendents and 123 district superintendents. There are 42,727 teachers, 9,163 males with salaries averaging $68.63 per month, and 33,564 females, whose monthly stipends average $50.55. The whole number of pupils for the school year ended 3 July 1916, was 1,504,794. Attendance at school between the ages of 6 and 14 years is compulsory. The constitution of 1873 requires the general assem¬ bly to appropriate not less than $1,000,000 a

year to the common schools; the sum regu¬ larly appropriated is over $7,000,000, besides $300,000 for free tuition of students at the State Normal School and $250,000 for other purposes. The total expenditure for the entire system in 1916 was $61,670,951. Manual and vocational training have become features of prime importance in public instruction in Penn¬ sylvania. Boys and girls between the ages of 14 and 16 who leave school to go to work are required to attend school not less than eight hours a week. For these, continuation classes are provided, which are located when feasible at the industrial plants where the pupils are employed. More than 30,000 pupils attend private schools and academies ; there are more than 3,000 on the average in attend¬ ance in manual training and trade schools ; more than 7,000 attend business colleges and more than 5,000 receive instruction at collegiate and other institutions for orphans. There are in the State 16 theological seminaries, seven medical colleges, four colleges of pharmacy, five dental colleges and four law schools. The Penn¬ sylvania State College is one of the <(land grant® colleges founded under the act of Congress of 1862. The names of the private collegiate in¬ stitutions in the State, with their religious de¬ nominations, if any, are given in the following table :

name of institution Denomination

Allegheny College, co-ed . Methodist-Episcopal.

Bryn Mawr, female .

Bucknell University, co-ed . Baptist.

Dickinson College, co-ed . Methodist-Episcopal.

Franklin and Marshall College . Reformed Ch. in U. S.

Geneva College, co-ed . Reformed Pres.

Grove City College, co-ed .

Haverford College . Friends.

Lafayette College . . Presbyterian.

Lebanon Valley College, co-ed . United Brethren.

Lehigh University . .

Moravian College and Theological

Seminary . Moravian.

Muhlenberg College . Lutheran. J

Pennsylvania College, co-ed . Lutheran.

Pennsylvania Military College .

Saint Vincent College and Seminary. Roman Catholic.

Susquehanna University, co-ed . Lutheran.

Swarthmore College, co-ed . Friends.

Thiel College, co-ed … Evangelical-Lutheran.

University of Pennsylvania, co-ed…

Ursinus College, co-ed . Reformed Church.

Villanova College . Roman Catholic.

Washington and Jefferson College… Presbyterian.

Waynesburg College, co-ed . Cumberland Pres.

Western University of Pennsylvania,

co-ed .

Westminster College, co-ed . United Presbyterian.

Wilson Female College . Presbyterian.

Newspapers and Other Publications. — In

1900 there were in Pennsylvania 1,795 estab¬ lishments engaged in printing and publishing with 16,991 wage-earners and products valued at $36,455,629. In 1914 the number of estab¬ lishments was 2,352, the wage-earners em¬ ployed numbered 23,012, and the products had increased in value to $77,889,000. The first printing press in the State was erected at Phil¬ adelphia in 1686, the first paper mill in the United States was established at Germantown in 1693. Franklin in 1787 stated that he was in¬ terested in the establishment of 18 and that there were then in operation 48 such mills in the State. In the middle of the 18th century there were some lively political wars of words car¬ ried on in the province and pamphlets were as numerous here as sermons in New England. In 1810 it was estimated that half a million volumes were printed annually at Philadelphia

and for half a century after the Revolution as it had been for half a century before, this city was undoubtedly first in the printing in¬ dustry. The first daily paper in the United States was established here in 1784. By 18 1U the number of newspapers had increased to 73, of which eight were dailies — a larger number than published in any other city of the country at that time. The output of the periodical press in 1914 was valued at more than $52,- 000,000 (2d in United States) and the aggre¬ gate circulation per issue of all publications, according to the most recent information ob¬ tainable, was

19,674,336 copies, classified as

follows :

PUBLICATIONS

Number

. 1,520

Aggregate circulation per issue

2,924,306

223

1,481,282

847

5,319,021

253

6,107,571

97

3,516,933

Semi-and tri-weekly .

All others .

. 52

21

243,089

History.

The Swedes Colony.— The earliest settle¬ ments of white men on the western shore of the Delaware River were those of the Swedes. Though Henry Hudson, in the service of the Dutch East India Company, had turned the prow of the Half Moon into Delaware Bay in 1609 ; though Cornelius May, a Dutch navi¬ gator, in 1616 explored the bay and river, giv¬ ing his own name to one and the name of a Frisian town (Hindlopen) to the other of the outer capes; though the Dutch West India Company in 1623 formally took possession of South River, now the Delaware, built Fort Nassau on the present site of Gloucester, N. J., and later on, Fort Beversrede on the Schuyl¬ kill— the Dutch came merely as traders. The Swedes were real colonists, Gustavus Adolphus, the Swedish champion of Protestantism in Ger¬ many, is believed to have entertained a rather large scheme of colonization in America; but the king's preoccupation by his contest with the German emperor hindered the development of the plan, and his death at Liitzen ended it. In a more modest form the project was taken up by Chancellor Oxenstierna and in December 1637 two small vessels filled with Swedes and Finns set sail for America. The expedition was led by Peter Minuit, who had been di¬ rector-general in the plantation of New Am¬ sterdam. Heedless of the protests of either the English in Virginia or the Dutch in New Netherlands, the doughty Peter proceeded to build a fort on the present site of Wilmington and buy from the Indians all the west shore of the South River from Bombay Hook to the Schuylkill. He was drowned in the West In¬ dies in the following year and was succeeded by one Hollander, who brought another ship load of colonists and enlarged the boundaries by purchasing the west bank up to Trenton Falls. In 1642 came John Printz, with two warships and an armed transport and fortified with a commission to administer justice, maintain the Lutheran religion and defend New Sweden against all comers. Printz, who was a native of Holstein, appears to have been a person of distinction. He had been a lieutenant-colonel in the Swedish service and lived to become a

general He was accompanied by 54 Gcr man families, mainly from Pommerania. He strengthened Fort Christina (Wilmington) and established another, armed with cannon on Tinicum Island ; where he

also erected for him¬ self a mansion and pleasure house and built a yacht. The settlers cultivated tobacco wheat, rye and barley ; they raised cattle and had a flourishing mill on Cobb's Creek. Fort Casimer, which Peter Stuyvesant had established in the locality where New Castle, Del., now stands (in order to overawe the Swedes), was captured by Printz and enlarged. At last, in 1655 while Governor Printz was absent from the colony, the Dutch sent an overwhelming force of 750 men down from New Amsterdam and the Swedes capitulated. The colony hence¬ forward shared the vicissitudes of New Nether¬ lands ; it was captured by the British in 1664, recaptured by the Dutch 10 years later, and finally ceded to Great Britain by the treaty o peace signed February 1675, when it was an¬ nexed to the domains of the Duke of York in America. The colony included about 200 families and, a few years before the arrival of Penn, received some accessions from the English Quakers who had begun to settle in West Jersey in 1675. <(The Three Lower Coun¬ ties on the Delaware® were transferred to Wil¬ liam Penn by the Duke of York in 1681 and were attached to Pennsylvania until 1701, when Penn consented to a separate assembly for the "Territory,® by which name the counties # be¬ came known. The social and political relations between "Territory® and "Province,® however, continued most intimate, even after the separa¬ tion* it was not unusual for the residents of one colony to sit in the legislature of and to occupy high official positions in the other down to Revolutionary times, when the "Territory became the State of Delaware.

Penn's Experiment in Government. — "This day my country was confirmed to me under the great seal of England, by the name of Pennsylvania,® wrote Penn, in a letter of date 5 March 1681 (the charter bears date March 11th). He had proposed to name it New Wales, "being as this a pretty, hilly country®; and when this was objected to, he suggested Sylvania. "They added Penn to it.® he con¬ tinued, "and though I much opposed it and went to the King to have it struck out, he said it was past, and would take it upon him; nor could twenty guineas move the under Secre¬ tary to vary the name ; for I feared lest it should be looked on as a vanity in me and not as respect in the king, as it truly was, to my father.® The charter, which was granted partly in extinguishment of a debt due from the King (Charles II) to Admiral Penn, the father of the first proprietor, conveyed a tract lying between the 40th and 43d parallels of north latitude and extending from the Delaware River westward five degrees of longitude. Be¬ side making Penn the sole and absolute pro¬ prietor of the land it invested him with power to frame the laws, subject to the consent of the freemen, to appoint judges and other offi¬ cers, impose

taxes, suppress piracy and levy troops. To the British Parliament was reserved the right to lay imposts and to the Privy Coun¬ cil Committee on Trade and Plantations the right to annual provincial laws, which were

required to be submitted to that body within five years after enactment. The Proprietor thus had an absolutely free hand for half a decade, at least, to conduct his ((holy experi¬ ment.® To the men of the tail end of the 17th century, still in the throes of a sanguinary re¬ ligious conflict which had devastated Europe for more than 150 years, the idea of founding a state without an established church, and wherein all creeds were to be placed on a foot¬ ing of complete equality, must have appeared as hare-brained as do the tenets of scientific nihilism to the average citizen of our times. The notion of establishing in a howling wilder¬ ness an unarmed community, conscientiously obedient to the doctrine of non-resistance, must have seemed a manifestation of insanity. What could be expected of such a community but that it would be annihilated by its savage neighbors or be wrecked hy internal anarchy? But, nothing daunted, Penn proceeded with framing a constitution for his colony. His magnetic personality had enabled him to smooth out dif¬ ferences and preserve harmony in the intensely individualistic sect to which he belonged and he doubtless, imagined he could sway a Quaker assembly with like success. His expectations to permanently reside in and to personally su¬ perintend the upbuilding of his model State were doomed to be disappointed, however. He arrived at New Castle in the ship Welcome on 27 Oct. 1682, and in less than two years he was called back to England by the state of the con¬ troversy over the Maryland boundary. Political and financial complications detained him there until 1699. His departure was the signal for the outbreak of dissensions. Penn's first <(Frame of Government® was a compound of feudal, monarchial, aristocratic and democratic elements. The proprietor was the lord para¬ mount of the soil and all the colonists were his tenants ; he claimed the right not only to ap¬ point the judges, but of organizing the courts; the assembly had the power to

assent or to re¬ ject proposed laws, but the initiative in legis¬ lation as well as supreme judicial and adminis¬ trative authority was vested in the council, which was thus a copy in miniature of the British House of Lords and Privy Council rolled into one. The assembly chafed under the restrictions placed upon its action. It could not inaugurate but it could frustrate legislation. It impeached its speaker for no apparent reason than that he was more reasonable than <(the witless zealots® who made (<a monkey-house of Mr. Penn's Assembly® — the quotations are from a letter of Penn's deputy, Governor Blackwell. A clerical adventurer named Keith about this time was threatening to cause a schism in the Quaker 'brotherhood and the colony re¬ sounded with shrill invectives from the ortho¬ dox — for Keith, though a man of no princi¬ ples, was eloquent and had no equal in this respect in the province. Penn's friend, James II, the former Duke of York, had been de¬ posed and William of Orange had succeeded to the throne. William well understood for what purpose his enemy Louis XIV had sent Frontenac hack to Canada in 1691 invested with vice-regal powers ; he determined to put the colonies in a condition to effectively defend themselves. Colonel Blackwell, an old Crom¬ wellian soldier, whom Penn had appointed his deputy, perhaps with such a contingency in

view, was unable to extract a penny of money from the assembly for military purposes. Two commissioners sent to Pennsylvania from New York at King William's command reported that the colony was prepared neither against an In¬ dian attack from the west nor against the French privateers who infested the estuary of the Delaware. To the foremost warrior of that warlike age this seemed a trifling with fate. The Proprietary charter was revoked in 1692 and Governor Fletcher of New York instructed to take over the direction of affairs in Penn¬ sylvania. On giving his promise to the Privy Council to ((provide for the safety and security® of the colony, to transmit to the assembly the king's orders, and on expressing his assurance that the colony would (<supply such quotas of men and defray such part of the charges as his majesty might deem necessary to preserve his dominions in North America,® Penn was re¬ instated in his proprietorship in 1694. During his second brief term of residence in the col¬ ony, from 1699 to 1701, Penn urged and secured the passage of laws to suppress piracy and con¬ traband trade, a subtle distinction between police and military measures enabling him to reconcile his conscience to these enactments. He could not, however, prevail over himself to advocate the warlike policy imposed upon him by royal command; and his promise remained unfulfilled. A second, and probably final, rev¬

ocation of his charter being impending Penn hurried back to England, as the event proved, never to return. By the sudden death of King William the charter was saved; but the as¬ sembly had been made to dimly comprehend that it represented a polity and not a denomination and, on the renewal of war with France in Queen Anne's time, voted money to the use of her gracious majesty — to be sure, with an art¬ less effort to conceal the purpose for which it was granted. Less consideration was shown for the founder. ((0, Pennsylvania, what hast thou cost me?® wrote Penn in 1705. <(About £30,000 more than I ever got, two hazardous and fatiguing voyages and my son's soul.® The reference is to William Penn, Jr., a scapegrace, whose escapades had scandalized sober Phila¬ delphia and who died shortly after a brief and boisterous career as member of the Pennsyl¬ vania council. Though pecuniary profit was the last thing considered by Penn, it certainly was not an unreasonable expectation that the colony would afford him an income commensurate with the sacrifices he had made. He had expended over £50,000, the greater part of his patrimony, in establishing the same. The quitrent de¬ manded for land was low, but the payments were spasmodic; the receivers were derided and occasionally maltreated. The sales of land up to 1710 amounted to 91,000 acres, bringing a total of £10,640. But the assembly exhibited supreme indifference to Penn in his financial distress. When reminded by the proprietor that he had received no support from the colony for 20 years an excise tax was ordered in 1700 for his benefit; but in the following year the income therefrom was directed to be paid into the public treasury. Disillusioned, and harassed by the fear that he would leave his family ruined, Penn entered into negotiations with the Crown to surrender his proprietary rights. A stroke of paralysis prevented the consummation of the agreement.

A Quaker Republic — But the experiment in Quaker government was not wholly a failure. The last act of Penn before leaving the colony in 1701 was the promulgation of a new con¬ stitution. The assembly became the sole law¬ making power, the council an appointive ad¬ visory and executive body ; the proprietor re¬ sumed the right of veto,

which he had in the beginning and of his own free will renounced. David Lloyd, a Welsh Quaker, the best lawyer in the province, assumed the leadership of the popular party. He was an unscrupulous poli¬ tician, a lover of power and a persistent per¬ sonal enemy of William Penn; but in him the assembly found its master. Whatever else may be said to the discredit of David Lloyd it can¬ not be denied that he was an uncompromising democrat and made the assembly a workable political machine. Governor Evans (1704-09) spoke truly when he said that (<the proceedings of the Assembly from the beginning of the century indicated a purpose to reverse the methods of government according to the Eng¬ lish Constitution and to establish one more nearly resembling a republic in its stead.® When the House assumed the right to prorogue itself at will it became practically the most in¬ dependent legislative body in the British Em¬ pire. Although the veto of the proprietor or his deputy governor was absolute, the assembly, holding the purse-strings of the province, was in the end able to get anything it seriouslv de¬ sired. As for the right of the Privy Council or their lordships of the Board of Trade to annul provincial laws, the assembly could, if it would, re-enact them; when they would stand good until again repealed — and this expedient the House did not hesitate to employ on occa¬ sions. After a struggle of nearly a quarter century between the assembly on the one side and the proprietaries and the British Privy Council on the other, over the organization of the colonial judiciary, the courts were finally organized (in 1722) substantially as first pro¬ posed by the House. The county courts, or courts of common pleas, were made the main depositories of judicial power; all cases, civil and criminal, were triable in the first instance by tribunals of the vicinity in which the cause of action arose. No provincial imitation of the English King's Bench could send forth a Jeff¬ reys to hold bloody assizes, the local courts were not to be dominated by certiorari, man¬ damus and quo warranto, and their proceedings were reviewable, generally speaking, only on appeal of one of the parties to an action. To this day the judiciary system of Pennsylvania retains practically the organization thus pro¬ vided under Lloyd's influence. The attempt to undermine the Quaker democracy by requiring all public functionaries to take oaths of office, and by compelling jurors and witnesses in ju¬ dicial proceedings to be sworn, ended in failure, although the victory in this case involved a sacrifice of Penn's mild penal code. The scruples of the Quaker juries, however, con¬ tinued to give assurance against the taking of human 'life as a penalty for petty crimes. «It is our great happiness,® said Andrew Hamilton, speaker of the assembly in 1739, (<that instead of triennial assemblies, a privilege which sev¬ eral other colonies have in vain endeavored to obtain, ours are annual and

for that reason less

liable -to be practised upon or corrupted. W e sit upon our own adjournments when we please and as long as we think necessarv and are not to be sent a-packing in the middle of a debate and disabled from representing our just griev¬ ances to our gracious sovereign. … We have no officers but what are necessary • . .

and those generally elected by the people or ap¬ pointed by their representatives. Other colonies swarm with unnecessary officers nominaied by the governors, who make it a main part of their care to support them notwithstanding their op¬ pressions… . Our foreign trade and ship¬

ping are free from all imposts except those small duties payable by the law of Great Britain. The taxes we pay for carrying on the public service are inconsiderable, for the sole power of raising and disposing money is lodged in the Assembly, who appoint their own treasurer and to them alone is he accountable. Such is our happy state as to civil rights.® In the constitu¬ tion of 1701, as in all the previous "Frames of Government,® Penn had given the foremost place to the proviso for the unconditional equal¬ ity of all religious creeds. The proviso was esteemed rather lightly by the assembly; they had "liberty enough for Englishmen,® and some would have preferred to disqualify all but Quakers. Even Penn's secretary, Thomas Logan, wrote to him 'that "most of us do not value it at so many pence.® Penn was ahead of his times, but liberty of conscience, was doubtless one of his most beneficent legacies to the colony. Another, of the utmost advantage, was his Indian policy. Firmly convinced that the natives could be won by justice, he would permit no land to be opened to settlement with¬ out consent of the aboriginal occupants. In several instances the claims of five or six tribes asserting title to territory acquired by the pro¬ prietary from one of them were successively satisfied. The famous Treaty of Shackamaxon, however, involved more than a mere land pur¬ chase. In Penn's description of Pennsylvania he says: ((We have agreed that in all differ¬ ences between us, six of each side shall end the matter® ; and from this and the Indian tradi¬ tions it may be inferred that the compact was an arbitration treaty. Governor Byrd of Vir¬ ginia, who certainly could be suspected of no predilections in favor of Quakers, in 1734 put his testimony on this subject in writing thus: "The truth is they have observed exact Justice with all the natives bordering on them …

which has saved them from many wars and massacres, wherein the other colonies have been indiscreetly involved.® In this manner Penn and the Quakers contributed much to the secu¬ rity of the American frontier; as for Penn¬ sylvania, down to Braddock's defeat, "she scarcely knew an alarm.® Peace, abundance and religious and civil liberty, were blessings which few if any other communities of that era enjoyed. Small wonder that the colony grew with unparalleled rapidity; it would have been strange if it had not. Within 20 years of the first settlement the province contained nearly 25,000 white settlers, besides 6,000 Indians and nearly as many negroes. By 1750 its capital city was the market centre for a population of probably 150,000. In 1723 about 85 vessels en¬ tered the port ; its imports amounted in value to £16,000 and its exports to £90,000. By 1752 the

ships, annually visiting the port numbered 453,

rrˆnnon ˆore*8n *rade had grown in value to zoZUjLHJU.

German and Other Foreign Accessions. —

From the first the Quaker community received non-English accessions. A company of Friends of Welsh nationality bought large tracts of land west of the Schuylkill. Such names as Merion, Bryn Mawr, Radnor and Cynwyd still proclaim the Welsh origin of these townships. The sale of land within their "Barony® to others than Welshmen evoked orotests from these particu-larists and their "meetings® performed nearly all the functions of government, even ordering such matters as the establishment of ferries and the erection of line fences. But the purpose, if it ever existed, of maintaining a Welsh im-pirium in imperio was not long sustained. Their leading men soon took active parts in the political life of the province. The same vessel which brought over the Welsh in 1683 carried Francis Daniel Pastorius, the founder of Ger¬ mantown and a signer, perhaps the originator, of the first American petition for the abolition of slavery. Pastorius and his company were German Quakers. The Mennonites had been hounded up and down the country from Lake Geneva to the North Sea for a

century, when, falling in with Penn's missionaries and en¬ couraged by letters from Pastorius, a party of them, headed by William Rittinghuysen, set out for Pennsylvania in 1688, joined the Ger¬ mantown colony and were followed in time by nearly the whole 'body of the sect. To the Dunkers, who came to Germantown in 1719, belonged Christopher Sauer, the printer of the first Bible in America in a European language. The Moravians, adherents of the pre-Lutheran reformer John Huss, had become almost anni¬ hilated in the religious wars of the 17th cen¬ tury. A remnant of the sect was given asylum on the estate of Count Zinzendorf in Silesia. This refuge was called Herrenhut (Shelter of the Lord), an almost literal translation into German of the name Bethlehem. Their noble protector found the means of transporting the Moravians to America. Georgia, their first stopping place, was abandoned for the more congenial surroundings of Pennsylvania; and here they were joined by Count Zinzendorf in 1734, who publicly renounced1 his title of nobil¬ ity and led his little band to a new Bethlehem on the Lehigh. The Moravians, who were men of deep learning and refined manners, attained considerable success in their effort to civilize their Indian neighbors and to instil into their more backward kinsmen higher ideals of living.

All told the Germans in Pennsylvania in 1710 did not exceed 3,000 in number. Begin¬ ning with that year a tide of immigration set in which was to impress upon a large section of the Commonwealth characteristics that have persisted to the present day. The Palatines, as they have been called without sufficient regard for historical accuracy, were not the victims of religious bigotry; they belonged to regu¬ larly established churches, the Reformed and the Lutheran — wherefore they were called "church people® to distinguish them from the "Sects.® The cause of their emigration en masse is obscure. The devastation of their homes during a century of conflict, first, in the Thirty Years' War, by Swedes and Imperial¬ ists, and later by the armies of Louis XIV

and his German, English and Dutch foes who made their country a common battleground ; the hard winter of 1708-09 and inducements believed to have been held forth by the govern¬ ment of Queen Anne — all these probably con¬ tributed to the result. In 1709 from 12,000 to 15,000 of these wretched and half-famished people were gathered in London, sustained by public and private charity. Many died, a few returned to Germany, others were scattered to various parts of

England; about 3,000 became settled in Ireland and a nearly equal number were given passage to America. The uncouth and destitute wanderers were looked upon with disfavor by the authorities at Philadelohia ; they did not long trouble the latter with their presence, however, but pressing beyond the tracts occupied by the Quakers they took up lands mostly in Berks and Lancaster counties and in the. Lebanon and Lehigh valleys, where their skill in husbandry soon made them fairly prosperous and contented. The German immi¬ gration into Pennsylvania exceeded in number all others in colonial times; in the vear 1749 alone 12,000 landed at Philadelphia. “I remem¬ ber,® wrote Franklin in 1753, “when they mod¬ estly declined intermeddling in our elections, but now they come in droves and carry all before them. Of the six printing houses in the province two are entirely German, two half German half English and but two entirely Eng¬ lish. They have one German newspaper and one half-German. Advertisements intended to be general a’re now printed in Dutch and Eng¬ lish. The signs in our streets have inscriptions in both languages and in some places only German. They begin of late to make all their bonds and other legal instruments in their own language, which are allowed good by our courts.

… and I suppose in a few years inter¬ preters will be needed in the Assembly to tell the one half of our legislators what the other half say.® At the outbreak of the Revolution the population of the State was about 300,000, and Franklin’s remark that it consisted one-third of Quakers, one-third of Germans and one-third of miscellaneous and refractory ele¬ ments was substantially correct. By this time the Swedes and Welsh had been merged with the English-speaking population; but the so-called Palatines constituted a seemingly im¬ permeable. mass. In the Revolutionary period they, conjointly with the Scotch-Irish Presby¬ terians, dominated the government. During the first quarter of the 19th century, and even later, the Germans held the balance of power in Pennsylvania politics, a fact to which the succession of early State governors with Ger¬ man names bears witness. Even at the present day many of the inhabitants of the German belt can speak no other tongue than “Penn¬ sylvania Dutch® ; and in a recent sensational criminal trial, when some of the witnesses were unable to give their testimony in any other language, neither judge nor jury nor the prose¬ cutor nor counsel for defense required the serv¬ ices of an interpreter.

The Era of Franklin. — The sons of Penn by his second marriage were in almost every respect the opposites of their father. They had abjured Quakerism and entered the Church of England ; they possessed none of his intellectual gifts and were parsimonious and grasping. Thomas

Penn, who succeeded to the proprietor-

ship by right of primogeniture, inaugurated his career by cheating the friendly Delawares. The latter had ceded a tract of land to the west of the Delaware River, extending from the latitude of Trenton northward as far as a man could walk in a day and a half; the new proprietor caused the distance to be measured off in a 36-hour relay race by two trained athletes. This transaction became known in history as the "Walking Purchase.® The quarrel was further embittered when the Delawares, who had threatened to defend their homes, were ordered off the land by their suzerains — the Six Na¬ tions of the Iroquois Confederacy — to whom the proprietors appealed. The colony now for the first time had a vindictive and savage foe on its frontier. Pennsylvania was but little affected by the third of the wars between France and Great Britain, in which the Ameri¬ can colonies were more or less involved and which broke out in 1744. There was some ap¬ prehension from privateers in Philadelphia, and Franklin's appeal in his pamphlet, (Plain Truths,* roused the people who were not Quakers to organize a volunteer force and to build and equip a fort on the river just below the city; there was some desultory fighting in the Indian borderland; Thomas Penn's deputy proclaimed the Delawares and Shawnees public enemies and magnanimously offered rewards for Indian scalps. The intelligence of the New England militia's expedition to _ Louisburg seemed like news from another continent The assembly remained unmoved by Franklin s terrible description of a defenseless community, ((subject to the wanton and unbridled rage, rapine and lust of negroes, mulattoes and others, the vilest of mankind,® such as consti¬ tuted the crews of privateering vessels in those times. Many Quakers resigned their seats, however, and surrendered other official posi¬ tions, being unwilling to serve under a govern¬ ment which had committed the sin of declaring war. The peace of 1748 endured only for a short time. The decisive conflict between France and England for colonial empire in America was drawing near. The Seven Years' War, in which Frederick of Prussia earned his title ' of "the Great,® and in which England under Pitt gained Canada and India, began in Europe

in 1755; in America the gravity of the situation was recognized two years earlier. At the Congress of Albany in 1754 the Pennsyl¬ vania assembly was represented by Samuel Norris and Benjamin Franklin; the proprie¬ tary by John Penn. One of the main objects of the Congress was to deter the Six Nations, hitherto the strongest bulwark against the sav¬ age allies of France, from casting their lot with the enemies of the English settlers. That at such a time, when the American colonies were preparing to defend their very existence, . the proprietors should have imperiled all for private gain seems incredible, but such was the fact. In the "Western Purchase,® which was consum¬ mated at the Albany conference, the Indians were deceived 'into conceding their favorite and jealously guarded hunting grounds, the bounda¬ ries being described by the compass, which they did not understand. Part of the Iroquois openly espoused the French cause; the re¬ mainder became lukewarm and unreliable friends. The disaster of Braddock threw the undefended colony open to the murderous onset

of its now numerous native enemies. In the fall of 1755 the savages, after overrunning the outlying settlements, pressed through the passes of the Blue Mountains on the heels of the flee¬ ing British regulars. Every post brought to the council at Philadelphia heartrending appeals for help; the assembly and the governor, acting under instructions from the proprietary, were deadlocked ; no money bills could be passed. Troops of frontiersmen rode through the city threateningly brandishing their weapons ; a party of Germans laid the corpses of their countrymen, scalped within 65 miles of the capital, at the door, of the State House. The Quaker peace policy was denounced in un¬ measured terms from the backwoods pulpits. On this occasion, however, the assembly did what it could. It had voted money to aid Mas¬ sachusetts in the expedition to Cape Breton and, the grant having been vetoed, it had adopted the suggestion of Franklin to draw upon the Loan Office, as it had a right to do without the consent of the executive. _ There was not a stiver in the treasury of that institu¬ tion, but an issue of interest-bearing bills of credit payable in a year served the purpose. The assembly was prepared to levy a tax to provide for the defense of the province, but the governor's instructions from the proprie¬ tary were to sign no supply bills unless the estates of the latter should be expressly ex¬ empted from taxation. ((He who would purchase present securitv at the cost of essential liberty,® insisted Franklin on the other side, (<deserved neither security nor liberty® ; and so the dead¬ lock continued until late in the fall of 1755. Intimidated at last by the indignation aroused in England by the

reports of their meanness, the proprietors agreed to (<donate® £5,000, ap¬ proximately their share of the proposed levy. Under the pressure of necessity the assembly yielded the point, voted the money and left the proprietary estates untaxed. A volunteer regi¬ ment was speedily recruited by Franklin, who proceeded to the frontier with part of his force to supervise the construction of a line of forts. Blackened ruins everywhere told their fearful tale. The savages had not even spared their own kin ; Gnadenhut, a settlement of Indians who had been civilized and Christianized by the Moravians, had been wiped out. The Mo¬ ravians, themselves, though relieved from mili¬ tary service by special act of Parliament, were found by Franklin to be (<in good posture for defense.® The trouble subsided gradually dur¬ ing 1756; the voluntary organization of the Scotch-Irish frontiersmen into companies of rangers had a good effect; the destruction of Kittanning in January 1757 by the Pennsyl¬ vania levies compelled the hostile Indians to retire behind the guns of Fort Du Quesne. A treaty of amity was concluded later in the year with . the Delawares and Iroquois at Easton, and the Ohio Indians were persuaded by Moravian missionaries to give up the war. The French dismantled and abandoned their stronghold; when rebuilt it became Fort Pitt. So far as Pennsylvania was concerned the con¬ flict was ended. There was to be a tragic epilogue to the French wars, however. Peace had scarcely been concluded between France and Great Britain in 1762 when the American fron¬ tier was again ablaze and the scalping parties of Pontiac ravaged all Pennsylvania west of

the Susquehanna. Eight fortified outposts fell m a sˆgle day, though Fort Pitt was saved by Colonel Bouquet, who proved a better soldier ˆ49 Braddock. Maddened by fear and by their sufferings a body of Scotch-Irish rangers, the

i axton Boys," so named for the principal set¬ tlement of their vicinity, fell upon the remnant of the Conestoga tribe — some 20 harmless peo¬ ple, who eked out a miserable existence by weaving baskets and binding brooms. Every man, woman and child of them was butchered.

The expressions of horror in Philadelphia over the deed of blood evoked recrimination from the backwoods; treating with the heathen in¬ stead of exterminating them was pronounced ungodly, and the calamities which had come upon the province were declared to have been visitations in punishment of a sinful and irre¬ ligious policy. Here was a contrast, indeed, with the Quaker point of view. When the Moravian Indians, for better security, had been removed to Philadelphia the ((Paxton Boys," swollen by rumor to an army, swooped down on the city, vowing to annihilate the red-skinned Ishmaelites as well as anybody who dared de¬ fend them. In the excitement several hundred young Quakers joined the defenders, musket in hand. The affair fizzled out. It was Franklin again who relieved the situation. He inter¬ viewed the rioters, received their petition and induced them to disperse. But the backwoods¬ men were able to point out the inconsistency of those who would fly to arms to protect In¬ dian "heathen" and leave Christian white men exposed to the rapine of wolfish savages. With the return of peace the quarrel with the pro¬ prietary once more came to the fore. It was discovered that the "donation" of £5,000 was to be paid in driblets, as money could be ex¬ tracted from tenants whose quitrents were in arrears. The proprietors at last shut off all remonstrances by announcing that they would receive none. This filled the measure. They had reserved the best land for speculative purposes, yet required property thus held for private gain to be relieved of all burdens, as though it were public domain. They would con¬ tribute nothing to the defense of the province, including their own possessions ; yet they would not consent to a law to establish a militia unless they should have the appointing of the officers and thus control the force. They had consti¬ tuted themselves as a non-resident and irrespon¬ sible cabal, whose secret instructions their deputy, the governor, was under bonds to carry out, and now they denied the right of petition, one of the most valued privileges secured to freeborn Englishmen by the Bill of Rights. The question submitted to the electors by the assembly in 1764, whether the king should not be requested to take over the government of Pennsylvania as a Crown colony, was answered affirmatively after the hottest political cam¬ paign the province had ever known. Franklin was defeated of re-election, but he was com¬ missioned to present a petition of the assembly to the above effect to the king's council in Lon¬ don. The petition was duly presented, but was not pressed, other and graver issues having meanwhile arisen; but the revolt against the proprietary was a premonition of the coming revolution.

Boundary Controversies. — Colonel Mark¬

ham, Penn's first deputy, had scarcely arrived at New Castle in 1681 when he became involved in a boundary dispute with Lord Baltimore. The 40th parallel, named in the royal charter as the southern boundary of Pennsylvania, was sup¬ posed to be the latitude of New Castle but to the consternation of Markham and the gratifi¬ cation of Baltimore it was found that the 40th degree ran to the north of the site of Phila¬ delphia. The proprietor of Maryland also claimed title to all the western bank of the Delaware River up to his northern line. But a reservation in the Maryland charter, which excluded lands "previously settled," saved the three southern counties for Penn — the Swedes' colony being held to constitute a previous settle¬ ment within the meaning of the grant. On other points the position of Lord Baltimore was apparently impregnable. He sent an armed force into the peninsula and established a fort on the Susquehanna near Columbia. At this point his proceedings were stayed by the Privy Council, but not until 1763, when it had been located and surveyed by two English surveyors, Mason and Dixon, was the divisional line between Mary¬ land and Pennsylvania definitely fixed. It fol¬ lows lat. 39° 43′ 26.3″ N. The Virginia claim, founded in part on the vaguely worded charter of that colony, had a more substantial basis in the grant by George II in 1749 to the Ohio Company of 500,000 acres on the "Forks of the Ohio" for the purpose of establishing a settle¬ ment as a barrier to the French. The company and the proprietors arranged a modus vivendi, however, and the action of Lord Dunmore, gov¬ ernor of Virginia, who assumed control of nearly the whole of Westmoreland County, caused Fort Pitt to be rebuilt, and on 25 April 1774 issued a proclamation commanding the militia to <(repel the insults of Pennsylvania" and the inhabitants to decline payment of quitrents for land (<freely given" by Virginia, was evidently intended to provoke dissensions be¬ tween the colonies then falling into line in united opposition to the British Crown. In 1779 the differences between Pennsylvania and Virginia were amicably settled by a joint commission. The determination of the northern boundary was begun when David Rittenhouse, who was commissioned by Gov. John Penn to locate the line in 1775, fixed a mark on the Dela¬ ware River in lat. 42° N. for its starting point. The line was surveyed to Lake Erie in 1786 and 1787 pursuant to acts of the legislatures of both States and confirmed in 1789. The "Erie Tri¬ angle" formed part of the claims of both Massa¬ chusetts and New York in the Northwest Terri¬ tory, which they ceded to the United States in 1781 and 1785, respectively. The triangle was thereupon purchased from Congress by Pennsyl¬ vania and the transaction was confirmed in a deed or warrant signed by President Washing¬ ton in 1792. The Connecticut claim had for its basis Yankee cheek and the Connecticut charter of 1662, which

purported to grant to the gov¬ ernor and company the territory bounded on the east by Narragansett Bay, on the north by Mas¬ sachusetts and “with this breadth stretching westward to the South Sea,” that is, the Pacific Ocean. A settlement of boundaries had been arranged with the authorities of New York be¬ fore 1683; but the intervention of a few thousand square miles of neutral territory was

not enough, in the opinion of the calculating New Englanders, to prevent their territory tak¬ ing up its march across the continent on the further side of New York. Certain citizens of Windham County, Conn., in 1753 petitioned the General Court to organize them as the Sus¬ quehanna Company and give them a quitclaim of 16 square miles of land on both sides of the Susquehanna River. The plan was approved and an inflow of settlers from Connecticut to the new country in the Wyoming Valley almost immediately began. The company was joined by the most prominent people in Connecticut ; it bolstered up its title with purchases from t e Indians, 10,000 square miles of which were laid out into shares, townships were surveyed and mills and cabins built. The War of Pontiac caused the suspension of operations for a time, but in 1769 when ((Forty Fort® was built, five townships created, each five miles square, and each offered to 40 settlers who would de¬ fend the same, the proprietors of Pennsylvania took notice of the proceedings. They in turn leased lands to settlers who would agree to defend them and the manors of Stoke and Sunbury were established. Now began what is known as (<the Pennamite and Yankee War. The Pennsylvania garrison at Wilkesbarre was besieged by the Yankees. «Forty Fort® was stormed by the Pennamites. Alternately the latter were imprisoned in the New England forts and the New Englanders, taken by sheriffs posses, locked up in Philadelphia. The Pennsyl¬ vania assembly refused to interfere because the disturbances did not affect the general govern¬ ment and the inhabitants of Wyoming continued to extend their settlement, passing laws, col¬ lecting taxes and even establishing a militia. The Connecticut legislature in 1773 resolved to support the colony. The proprietary, so stingy when the protection of settlers from Indian war

parties was required, readily enough found means to defend is land titles. But when Gov¬ ernor Penn, in December 1775, sent an armed force of 500 men to dispossess the trespassers, and the latter had repulsed the invaders at Nanticoke with loss of life on both sides, the Continental Congress was moved to interfere. The combatants were directed to desist from hos¬ tilities until a legal determination of the dispute could be had. On petition of the supreme executive council of Pennsylvania, Congress in 1782, nominated commissioners who decided that' Connecticut had no claim to the territory. Connecticut acquiesced in 1800.

The New Commonwealth. — At the out¬ break of the Revolution there was not any¬ where in America a legislative body more demo¬ cratic and more firmly opposed to the tyrannic exercise of royal prerogatives than was the Pennsylvania assembly. It promptly elected delegates to the Continental Congress, and voted money to aid Massachusetts in the conflict with the royal army. It went as far in resistance as Quaker scruples against war and violence would permit and had, rather reluctantly, consented to the appointment of a Committee of Safety (of which Franklin became president), empowered to call the people to arms. Government by Quaker meeting, however, would no longer serve. When Congress early in 1776 passed a resolu¬ tion advising the colonies to organize govern¬ ments fitted to meet present exigencies the Com-

mitte of Safety prescribed qualifications for electors, whereby all ((enemies of liberty were disfranchised and ordered a Constitutional Con¬ vention. The convention met on 15 July, de¬ clared the existing government unfit, adopted a ((Bill of Rights and Constitution for the Com¬ monwealth of Pennsylvania® and delivered the same to the assembly, which, uttering a feeble protest, adjourned on 16 September, never to meet again. The convention as a council ot safety assumed the whole political power ot the province. The Quakers as a body withdrew from public affairs. They were, rather un¬ justly, however, included with the Tories, lhey would not surrender their conscientious scruples against shedding blood, but they bore without complaint the heavy burdens imposed by the revolutionary council of safety on non-com¬ batants and many of the younger men, un¬ deterred by the fear of being "disowned® by the disciplinary meetings, joined the Revolutionary army. From 1776 to the end of the war Penn¬ sylvania was Washington's base of operations, from hence he executed his raids into New Jer¬ sey and marched down to victory at Yorktown. Except during the occupation of the city by the British,

under General Howe, from the fall of 1777 to the summer of 1778, the Continental Congress sat in Philadelphia. The Paoli massacre, the bivouac of the Continental army under Washington at Valley Forge and the reign ot the mob following the withdrawal of General Howe, were the most stirring military and polit¬ ical events of the Revolution in Pennsylvania save one — the tragedy of Wyoming. The an¬ nihilation of the Connecticut settlement in 17/8, while the able-bodied men were absent serving in the ranks of the Continental army, was the crowning infamy of British rule in America. The outrage was terribly avenged in 1779 when 3,000 men under' General Sullivan marched into the country of the Six Nations, who with some English soldiers had committed the atrocity, and broke their power for mischief for all time. The constitution of 1776 created a legislature, the general assembly, consisting, like the provincial assembly, of a single cham¬ ber. The prejudices of the time against con¬ centrated power were reflected in the institu¬ tion of a plural executive, the supreme execu¬ tive council. A council of censors to be elected once in seven years, and empowered to order impeachments, to rectify injustice in the levy of taxes and to direct the repeal of im¬ proper laws, was to act as a curb on possible legislative, executive and judicial tyranny. The general assembly thus tied could accomplish little. It secured from the proprietors in 1779, for a consideration of £130,000, a transfer of their property, exclusive of their manors and private estates, some of which belong to the Penn family to this day; in 1780 a law was passed giving freedom to all children born of slaves after that date; it procured the ratifica¬ tion by Pennsylvania of the Federal Constitu¬ tion on 12 Dec. 1787, within three months after its submission to the States, and by this prompt action probably saved it from defeat. The frame of government of 1776, however, proved unworkable and on 2 Sept. 1790 a new State constitution, modeled on the recently adopted Constitution of the United States, was formally proclaimed. Thomas Mifflin, a ((fighting Quaker®

and a Democrat, became the first governor of the State. He was twice reelected serving until De¬ cember 1799. During his term occurred

the : Whisky Rebellion® (q.v.) and the «Hot Water War.® The latter, a mere tumult in the Ger¬ man counties, was caused by a misunderstanding of the nature of the house tax ordered by Con¬ gress in 1798 and by the harangues of John Fries, an itinerant auctioneer with a stentorian voice and a gift of repartee, which nearly cost him his neck. The <(traitor® was pardoned by Washington. The discovery of the utility of anthracite as fuel led to the canalization of the Lehigh River in 1818, and this and the improve¬ ment of the navigation of the Schuylkill in 1825, with a view to bringing the product of the lower coal fields to market, gave the impetus to the construction of State works on a scale which, for those times, was colossal. The ridge of the Alleghanies seemed to have been created for the purpose of thwarting the people, but they would not be balked. The rivers which could not be made navigable were to be paralleled by canals and were to be connected one with the other so that continuous water communication should be established between eastern Pennsylvania, cen¬ tral New York and the Mississippi Valley. The main lines to the West was to run by way of the Juniata, the Conemaugh and a portage railway, whereby boats were to be lifted over the inter¬ vening mountain. Before 1829 the State owned 450 miles of canals and had expended $6,000,000 in construction. The works undoubtedly had a beneficent effect ; they increased traffic and thus promoted the public welfare. But they exer¬ cised a corrupting influence in politics and nearly bankrupted the State. By 1840 the Com¬ monwealth owned 726 miles of railways and canals, which had cost $26,500,000, and 200 miles were under construction; the entire income from them was required or had been pledged to pay interest on the debt incurred, and State stocks had become (<an unsalable drug in the market.® The State had been made the victim of gross frauds by contractors; the principle of short tenures and rotation in office applied to sur¬ veyors, engineers, etc., was not conducive to efficient and economical management ; the most profitable branch of the business, the carriage of passengers, was farmed out to private cor¬ porations especially created for that purpose by pliant legislators. The total receipts from the public works from 1830 to 1859 amounted to $32,270,712.55 ; the expenditures were $30,400,- 433.07. The debt of the State, before rock bottom was reached, amounted to nearly $41,000,000. The works were finally sold, the main line to the Pennsylvania Railroad in 1856, nearly all the rest in 1857 — the State realizing about $11,000,000 from the sale. The deliberate verdict of the people on State owner¬ ship was expressed in the Constitutional Amendment of 1857, forbidding partnerships between the Commonwealth and transportation, banking and other companies, and limiting the borrowing powers of the legislature to $750,000. Down to

1860 Pennsylvania was normally a Democratic State, though by a small majority; and the Whigs occasionally controlled the gov¬ ernment — sometimes through coalitions, as with the Anti-Masons in 1835 and the ((Know-Nothings,® in 1854. ((As goes Pennsylvania so goes the Union,® had been a maxim in American

politics for two generations, and when Andrew J. Curtin, the first Republican governor, was elected in October 1860 by a majority of 30,000, the supporters of Lincoln were justified in their hope, to be realized a month later, that they would carry the country. Six days after the bombardment of Fort Sumpter, two regiments of Pennsylvania troops marched into Washing¬ ton — the first to arrive in defense of the national capital. The first call for volunteers in the Civil War was responded to by nearly twice the 75,000 required, and Governor Curtin was enabled to organize a reserve of 11 regiments besides the 14 which consti¬ tuted the quota of the State. Altogether Pennsylvania contributed 362,284 men to the Union armies, exclusive of militia. The State was trice invaded; the invasions of 1862 and 1864 were mere raids, but it was ((the high tide of the Confederacy® which rolled into Cumber¬ land Valley in July 1863 and was forced back at Gettysburg. Among the generals who com¬ manded in that three days' battle Geary, Han¬ cock, Meade and Reynolds were natives of the State.

Since the Civil War the history of the Com¬ monwealth has been mainly the history of its industries and commerce. A new constitution was adopted in 1873, which effected many im¬ portant changes, chiefly in the restriction of the powers of the legislature and of common car¬ riers. The abuses which had grown out of spe¬ cial legislation and the passage of ((omnibus® bills were enjoined with searching minuteness; municipal and other corporations were there¬ after to be organized only under general laws, and a whole article, containing 33 sections and many sub-sections, was devoted to an enumera¬ tion of the things which the general assembly should not be permitted to do. Railroads and canal companies were forbidden to make any "undue or unreasonable® discrimination in rates or in the furnishing of cars or motive power; to own, lease or control competing and parallel lines or to engage in manufacturing, mining or other business except that of transportation — the convention anticipated the Interstate Com¬ merce Law by more than 10 years. The finan¬ cial panic of 1873 and the succeeding years of industrial stagnation were attended, as are all crises in human history, by serious social dis¬ turbance. The story of the reign of terror insti¬ tuted in the

anthracite regions by the “Molly Maguires® (q.v.) in 1873 pertains to the history of crime rather than of industry, and the “Mollies® were a sprout from foreign soil. The rail¬ way riots of July 1877, which centred in Pitts¬ burgh, cannot be dismissed, however, as having been manifestations of imported lawlessness. The local authorities displayed lamentable weak¬ ness in permitting the mob to grow to dangerous dimensions ; they were guilty of something worse than negligence if the testimony that the militia were fired on from a police station be credible. In 1892 again forcible methods to prevent a re¬ duction of wages plunged a part of the Com¬ monwealth into a state bordering on civil war when the military and the striking steel workers confronted one another at Homestead. But contempt for the law may be shown in other manner than by the commission of crimes of violence. The secret traffic agreement, which was a most potent factor in the upbuilding of

the oil monopoly, was in direct conflict with the constitutional provision against unfair prefer¬ ences by carriers; the combination of the an¬ thracite mining and carrying companies circum¬ vents, if it does riot violate, the letter and spirit of the constitution of 1873. The great strike of the anthracite miners in 1902 disclosed the

progressive perfection attained in the organiza¬ tion of the labor unions. The consent of the parties to arbitration, though reluctantly given, was an acknowledgment of the superior rights of the general community, which monopolistic combinations, whether of laborers or capitalists, must be made to respect. One outcome of the

List of Governors or Executives of the Dutch and Swedish Colonies on the Delaware and of the Province and Commonwealth of Pennsylvania.

COLONIAL GOVERNMENTS.

Peter Minuit, Governor of New Sweden .

Peter Hollender, Governor of New Sweden .

John Printz, Governor of New Sweden . .

John Pappegoya, Governor of New Sweden .

John Claude Rysinghe, Governor of New Sweden .

Peter Stuyvesant, Governor of New Netherlands . .

Col. Richard Nicholls, Governor of New York .

Col. Francis Lovelace, Governor of New York . .’ .

Anthony Colve, Governor of New Netherlands .

Sir Edmund Andross, Governor of New York . .

PROVINCIAL GOVERNMENT.

William Penn, Proprietor .

William Markham, Deputy Governor . .

William Penn, Governor in person… . .

Thomas Lloyd, President of the Council . .

Capt. John Blackwell, Deputy Governor .

Thomas Lloyd, President of the Council . .

Thomas Lloyd, Deputy Governor for Province . .

William Markham, Deputy Governor for Lower Counties .

William Markham, Deputy Governor under the Crown .

William Markham, Deputy Governor under the Proprietor .

William Penn, Proprietor and Governor …

Andrew Hamilton, Lieutenant-Governor… . .

Edward Shippen, President of the Council .

John Evans, Lieutenant-Governor .

Charles Gookin, Lieutenant-Governor … .

Sir William Keith, Lieutenant-Governor .

John, Richard and Thomas Penn, Proprietors .

Sir William Keith, Lieutenant-Governor …

Patrick Gordon, Lieutenant-Governor .

James Logan, President of the Council .

George Thomas, Lieutenant-Governor .

Thomas Penn and John, son of Richard, Proprietors .

George Thomas, Lieutenant-Governor .

Anthony Palmer, President of the Council .

James Hamilton, Lieutenant-Governor . .

Robert Hunter Morris, Lieutenant-Governor .

William Denny, Lieutenant-Governor . .

James Hamilton, Lieutenant-Governor .

John Penn, Lieutenant-Governor …

James Hamilton, President of the Council .

Richard Penn (brother of John), Lieutenant-Governor .

John Penn, Lieutenant-Governor .

1638-1641

1641-1643

1643-1653

1653-1654

1654-1655

1655-1664 1664-1667 1667-1673

1673-1674

1674-1681

. . 1681-1718

. . June 1681-June 1682 . . Oct. 1682-June 1684 . . Aug. 1684-Dec. 1686 . . Dec. 1686-Jan. 1690 Jan. 1690-Mar. 1691

| Mar. 1691-April 1693

. . April 1693-Mar. 1695 . . Mar. 1695-Dec. 1699 . . Dec. 1699-Nov. 1701 . . Nov. 1701-April 1703 . . April 1703-Feb. 1704 . . Feb. 1704-Feb. 1709 . . Feb. 1709-July 1717 . . May 1717-July 1718

. . 1718-1746

. . July 1718-July 1726 . . July 1726-Aug. 1736 . Aug. 1736-Aug. 1738 . . Aug. 1738-May 1746

. 1746-1776

. . May 1746-May 1747 . May 1746-Nov. 1748 . . Nov. 1748-Oct. 1754 . . Oct. 1754-Aug. 1756 , . Aug. 1756-Oct. 1759 . Oct. 1759-Nov. 1763 . Nov. 1763-April 1771 . April 1771-Oct. 1771 . Oct. 1771-Aug. 1773 . Aug. 17 73-July 1776

Benjamin Franklin, Chairman Committee of Safety Thomas Wharton, Jr., President Executive Council George Bryan, acting, vice Wharton, deceased Joseph Reed, President Executive Council William Moore, President Executive Council John Dickinson, President Executive Council Benjamin Franklin, President Executive Council Thomas Mifflin, President Executive Council Thomas Mifflin, Governor

Thomas McKean, Governor .

Simon Snyder, Governor .

William Findlay, Governor .

Joseph Hiester, Governor .

John Andrew Shulze, Governor .

George Wolfe, Governor .

Joseph Ritner, Governor .

David Rittenhouse Porter, Governor

Francis Rawn Shunk, Governor .

William Freame Johnston, Governor

William Bigler, Governor .

James Pollock, Governor .

William Fisher Packer, Governor -

Andrew Gregg Curtin, Governor ....

John White Geary, Governor .

John Frederick Hartranft, Governor

Henry Martyn Hoyt, Governor .

Robert Emory Pattison, Governor . .

James Addams Beaver, Governor ...

Robert Emory Pattison, Governor. .

Daniel H. Hastings, Governor .

William A. Stone, Governor .

Samuel W. Pennypacker, Governor. .

Edwin S. Stewart, Governor .

John K. Tener, Governor .

Martin G. Brumbaugh, Governor…

William C. Sproul .

17 Sept. 1776-4 Mar. 1777 5 Mar. 1778-23 May 1778 23 May 1778-1 Dec. 1778 1 Dec. 1778-8 Oct. 1781 14 Nov. 1781-8 Oct. 1782 7 Nov. 1782-18 Oct. 1785

18 Oct. 1785-14 Oct. 1788 5 Nov. 1788-20 Dec. 1790 21 Dec. 1790-17 Dec. 1799

Democrat . 17 Dec. 1799-20 Dec. 1808

Democrat . 20 Dec. 1808-16 Dec. 1817

Democrat . 16 Dec. 1817-19 Dec. 1820

Independent Democrat… 19 Dec. 1820-16 Dec. 1823

Democrat . 16 Dec. 1823-15 Dec. 1829

Democrat . 15 Dec. 1829-15 Dec. 1835

Anti-masonic . 15 Dec. 1835-15 Jan. 1839

Democrat . 15 Jan. 1839-21 Jan. 1845

Democrat . 21 Jan. 1845-9 July 1848

Whig . 26 July 1848-20 Jan. 1852

Democrat . 20 Jan. 1852-16 Jan. 1855

Democrat, . 16 Jan. 1855-19 Jan. 1858

Democrat . 19 Jan. 1858-15 Jan.. 1861

Republican . 15 Jan. 1861-15 Jan. 1867

Republican . 15 Jan. 1867-21 Jan. 1873

Republican . 21 Jan. 1873-21 Jan. 1879

Republican . 21 Jan. 1879-16 Jan. 1883

Democrat . 16 Jan. 1883-18 Jan. 1887

Republican . 18 Jan. 1887-20 Jan. 1891

Democrat . 20 Jan. 1891-15 Jan. 1895

Republican . 15 Jan. 1895-17 Jan. 1899

Republican . 17 Jan. 1899-15 Jan. 1903

Republican . 20 Jan. 1903-15 Jan. 1907

Republican . 15 Jan. 1907-17 Jan. 1911

Republican . 17 Jan. 1911-19 Jan. 1915

Republican . 19 Jan. 1915-Jan. 1919

Republican . . Jan. 1919-

GOVERNMENT OF THE COMMONWEALTH.

PENNSYLVANIA, UNIVERSITY OF

535

arbitration was the judicial recognition of the principle of collective bargaining. Since 1860 Pennsylvania has been overwhelmingly Repub¬ lican. The late Governor Pennypacker became official authority for the statement that the Com¬ monwealth “has no ills worth mentioning.® There were political evils, plenty of them, in the good old times, and such as exist are, per¬ haps, no greater and no more incurable than those which have been grappled with and rem¬ edied in other days. While not marching in the forefront, Pennsylvania’s legislators have kept step with those of the more progressive sister States. A public service commission with adequate powers has been created. Child and woman labor laws according to the best models have been passed and a system of work¬ ingman’s compensation and State insurance against the accidents of industry

has been estab¬ lished, which has many points of excellence. The election laws have been radically reformed, but the ballot law remains one of the worst in the country. The long continuance in power of one party, whose managers feel secure against effective criticism through their com¬ mand over majorities counted by the hundred thousand, is no doubt an evil in itself. Under such conditions a really healthy political life is impossible. Broadly speaking, the community has advanced steadily, ethically as well as ma¬ terially; the course of human progress has ed¬ dies and cross-currents here as elsewhere. Ex¬ perience, as Franklin remarked, keeps a dear school, but the lessons of this hard task-mis¬ tress, once they have been thoroughly mastered, are as likely to be heeded in the future as they have been in the past.

Bibliography. — Buell, Aug. C., (William Penn, Founder of Two Commonwealths) (New York 1904) ; Dixon, Wm. Hepworth, 'William Penn, an Historical Biography* (Philadelphia 1851) ; Egle, Wm. H., illustrated History of the Commonwealth of Pennsylvania* (Harris¬ burg 1876) ; Fisher, Sydney Geo., 'The Making of Pennsylvania* (Philadelphia 1896) ; Fiske, John, 'The Dutch and Quaker Colonies in America* (Boston 1899) ; Gordon, Thos. F., 'History of Pennsylvania from its Discovery to 1776* (Philadelphia 1829) ; Hazard, Sam'l, 'Annals of Pennsylvania 1609-1682* (Philadel¬ phia 1850); Heckewelder, John, 'Manners and Customs of the Indian Nations* (Transactions American Philosophical Society, Philadelphia 1819; republished by Historical Society of Pennsylvania, Philadelphia 1876) ; Janney, Samuel M., 'Life of William Penn* (6th ed., Philadelphia 1882) ; Jenkins, Howard M., editor, 'Pennsylvania, Colonial and Federal, 1608-1903* (Philadelphia 1903) ; Kuhns, Oscar, 'The German and Swiss Settlements of Colonial Pennsylvania* (New York 1901) ; Miner, Chas., 'History of Wyoming* (Philadelphia 1845) ; McMaster, John Bach, and Stone, Fred D., 'Pennsylvania and the Federal Constitution* (Philadelphia 1888) ; Parton, James, 'Life and Times of Benjamin Franklin* (New York 1865) ; Peck, Geo., 'Wyoming, Its History and Stirring Incidents* (3d ed., New York 1868) ; Pennypacker, Sam'l W., 'Pennsylvania in American History* (Philadelphia 1910) ; Proud, Robt., 'History of Pennsylvania, 1681—1 770 > (Philadelphia 1797-98) ; Rupp, I. Daniel, 'Early History of Western Pennsylvania, 1754-1833** (Pittsburgh 1846) ; Sharpless, Isaac, 'A Quaker

Experiment in Government* (Philadelphia 1898) ; id., 'Quakers in the Revolution (Phila¬ delphia 1899) ; id., 'Two Centuries of Pennsyl¬

vania History* (Philadelphia 1900) ; Shepherd, Wm. Robert, ‘Proprietory Government in Pennsylvania* (New York 1896) ; Walton, Joseph S., ‘Conrad Weiser and the Indian Policy of Colonial Pennsylvania* (Philadelphia 1900) ; Wickersham, Jas. Pyle, ‘History of Ed¬ ucation in Pennsylvania* (Lancaster 1886) ; Winsor, Justin, editor, ‘Narrative and Critical History of America* (Vol. Ill, Boston 1889).

Stephen Pfeil,

Formerly Editor of the Philadelphia Press.

PENNSYLVANIA, University of, located at Philadelphia. In 1749 Benjamin Franklin pub¬ lished a pamphlet entitled ‘Proposals Relating to the Education of Youth in Pennsylvania,* and shortly afterward 24 citizens of Philadelphia associated themselves for the establishing of an “academy.** They joined with the new institu¬ tion a charitable school which had been in ex¬ istence since 1741 and the building occupied by this school became the home of the two schools so combined. The academy classes were first opened in 1751 and the free charitable part of the institution was maintained until well into the 18th century, when the charitable feature was merged into free scholarships in the college. In 1753 the treasurer obtained a charter from the proprietors of the colony of Pennsylvania in which the institution was designated as a “college and academy.** In 1761 the college was in need of funds, and Dr. Smith, the provost, was sent to England to raise money for an en¬ dowment. There he met the commissioner from King’s College (now Columbia) who had come on a similar errand, and they agreed to aid each other; through the influence of the archbishop of Canterbury, they obtained a circular letter from the king to all the churches, and succeeded in raising a considerable amount of money for each college. During the Revolution the col¬ lege did not prosper; the attention of students was diverted by the stirring events of the time and the city was for a time occupied by British troops ; hence the college was closed for over a year and a half and the buildings used for other purposes, being the meeting place of the Congress for several days in July 1778. In 1779 the legislature, on a pretext that the original plan of the college was not being carried out, seized its rights and properties and transferred them to a new organization, called the “Trus¬ tees of the University of the State of Pennsyl¬ vania** ; in 1789 the property was restored, and in 1791 the old college and the university united under the corporate name of the University of Pennsylvania. For several years (1802-29) the university occupied the house which was built for the residence of the President of the United States, when it was expected that

Philadelphia would become the national capital ; and later new buildings were erected on the same site. In 1872 the university was moved to its present site in West Philadelphia and the original group of four buildings erected. The most marked growth has taken place since that time; the work of the old departments extended and many new buildings added.

The first professional department established was that of medicine, founded in 1765, being the first medical school in the United States. Lee-

tures in law were given in the university as early as 1790, but the law department did not receive its present organization till 1850. The university was among the earliest to undertake systematic instruction in science, technology and engineering. In 1852 it was resolved to estab¬ lish a department of mines, arts and manu¬ factures, and professorships in geology and mineralogy, civil engineering and mining ; also two regular courses in science were offered. In 1874 John Henry Towne, a trustee, made the university the residuary legatee of his estate ; whatever sum might accrue from this bequest to form a portion of the endowment fund of the university, and the income from it to be devoted exclusively to the payment of the sal¬ aries of professors and instructors in the de¬ partment of science. In recognition of this gift the department was named the (<Towne Scien¬ tific School of the University of Pennsylvania." The present organization of the university in¬ cludes : the College, the Graduate School, the Law School, the School of Medicine, the Uni¬ versity Hospital, the Wistar Institute of An¬ atomy and Biology, the Laboratory of Hygiene, the School of Dentistry, the School of Veter¬ inary Medicine, the Veterinary Hospital, the University Library, the University Museum, the Flower Astronomical Observatory, the Depart¬ ment of Physical Education, the Wharton School, the Towne Scientific School, the School of Education, the Henry Phipps Institute, the Graduate School of Medicine, the Evans In¬ stitute. The School of Arts confers the de¬ gree of A.B. Electives were first introduced to a

slight extent in 1867 ; and the number of elective studies for the junior and senior years were increased in 1887. In 1893 the group system was established, by which privilege of election in certain subjects was carried into the first two years.

The Wharton School of Finance and Com¬ merce is intended to give special training to students who expect to enter banking, insurance, railway service, manufacturing, law and public service, social work or accounting. Graduate courses are also offered to advanced students in the same general fields. The object of the Wistar Institute of Anatomy and Biology is to afford facilities to postgraduates and advanced students ; it is a distinctive corporation with separate funds, but organically united with the university so as to constitute one of its de¬ partments. The library is one of the original departments of the university, and contains many interesting historical documents; it in¬ cludes several special libraries, and contained (1919) nearly 500,000 volumes. The University Museum (organized 1889) was made a depart¬ ment of the university in 1891; in 1902 E. W. and C. H. Clark founded, in this depart¬ ment, the Clark Research Chair of Assyri-ology. Women are admitted to a number of the courses. The present site of the university is on rising ground, half a mile west of the Schuylkill River; the buildings number 33; among them are Houston Hall, the centre of the student social life, College Hall, the library, the University Museum and the gymnasium. Among the notable new buildings are the laboratories for engineering and medicine, which together have cost $1,500,000. Much at¬ tention is paid to systematic physical culture and to general athletics. There is an athletic

field (Franklin field) which is equipped with a gymnasium and a stadium which accommo¬ dates nearly 25,000 persons. The final control of athletic sports is vested in the Council on Athletics.

The students have a number of large debat¬ ing societies, dramatic societies and musical clubs. The Greek letter fraternities are well established, 43 having chapters, many of which have attractive fraternity houses. ConsuF Lippincott, H. M., (The University of Pennsylvania) (1919).

PENNSYLVANIA, Western University

of. See Western University of Pennsyl¬ vania.

PENNSYLVANIA COLLEGE, a non¬ sectarian institution of learning at

Pittsburgh, Pa., founded in 1870. Its faculty numbers 19; the average annual enrolment of students is 185; tuition fees are $120; living expenses, board, etc., $250 to $350; the productive funds amount to $420,000; total income, including tuition and incidental charges, $83,840. The college colors are orange-blue. The library contains over 5,000 volumes. The graduates since enrolment number 1,242.

PENNSYLVANIA COLLEGE OF GETTYSBURG, located at Gettysburg, Pa. It was chartered in 1832 under the auspices of the Lutheran Synod of Pennsylvania. In 1850 the charter was modified to incorporate Frank¬ lin and Marshall College, and the Franklin professorship was endowed by the funds thus obtained. When in 1863 Pennsylvania was threatened with invasion a company formed mainly of students of the college was the first to respond to the call for volunteers and be¬ came Company A of the 26th Emergency Regi¬ ment. Though this took away the majority of the students the college remained in session until the day of the battle of Gettysburg. The college buildings were used for hospital pur¬ poses, and it is estimated that they sheltered at least 500 wounded Confederates. The col¬ lege offers two regular courses, classical and scientific, leading respectively to the degrees of A.B. and B.S. ; and provision is made for special work for those who are not candidates for a degree, and for graduate work leading to the degrees of A.M., M.S. and Ph.D. There is also a preparatory department. The work of the junior and senior years is partially elec¬ tive. In 1888 all departments of the college were opened to women, the preparatory depart¬ ment being already open to them; there is no women's dormitory, however, and the number entering is small. The buildings include (1916) four dormitories, recitation hall (containing the library), the chapel, the chemical laboratory, the astronomical observatory, the gymnasium and the academy. The library contains over 37,500 volumes, including the regular college library and the libraries of the two literary societies. In 1916 the annual income was $60,000; the students numbered 447, and the faculty 28. The courses of study are ar¬ ranged in 10 groups as follows: Greek and Latin; Latin and Modern Languages; History and Political Science; Chemistry and Physics; Biology, Chemistry and Physics ; Commerce and Finance ; Civil Engineering ; Municipal Engi¬ neering; Mechanical Engineering; and Electri¬ cal Engineering. The first three courses lead

UNIVERSITY OF PENNSYLVANIA

rrr» ■ r

timi

… jfl ‘ A. .

w

1 Dormitory Terrace

2 Campus — Library and College Hall Tower

\

to the degree of A.B. while the last seven lead to the degree of B.S.

PENNSYLVANIA COLLEGE FOR WOMEN, located at Pittsburgh, Pa. It was founded in 1869 under the auspices of the Presbyterian Church. The collegiate depart¬ ment offers a classical and a literary course and confers the degree of A.B. Instruction is given in music and art, and there is also a prepara¬ tory department. A department of social serv¬ ice gives special training in that sphere of ef¬ fort, and practical work in the field is arranged for in connection with the widely diversified philanthropies and charities of the city of Pitts¬ burgh. In 1918 the grounds and buildings were valued at over $180,000; the annual income was $55,000. The library contained 5,000 volumes ; the students numbered 185 and the faculty 19.

PENNSYLVANIA DUTCH, a dialect, partly English and partly German (often cor¬ rupt), spoken by the descendants of the orig¬ inal German settlers of parts of Pennsylvania.

PENNSYLVANIA-GERMAN SOCI¬ ETY, a patriotic-historical association organ¬ ized 15 April 1891, at Lancaster, Pa., to col¬ lect, preserve and publish letters, papers and documents relating to the biography, genealogy, history and folklore of the Pennsylvania-Ger-

mans in America, and to gather into a per¬ manent library all books pertaining thereto. The members must be direct descendants of early German or Swiss emigrants to the colony of Pennsylvania. There are about 400 members, embraced in three classes : regular, associate and honorary. Meetings are held annually. The Society has published 25 volumes of their pro¬ ceedings, together with much historical ma¬ terial, and of late years has reprinted many of its earlier volumes.

PENNSYLVANIA HISTORICAL SO¬ CIETY, organized in Philadelphia, 2 Dec. 1824, and incorporated 2 June 1826, is famous for its valuable collection of material, historical and genealogical, relating to the State, its founders and prominent families. Notable are the records and papers of the Penn family, the Charlemagne Tower collection of American colonial laws, first editions of Bradford. Frank¬ lin and Christopher Saur books, early American printed handbills, pamphlets, portraits and relics. The subscribed publication fund of the society amounts to $40,000. Since 1877 the Pennsylvania Magazine of History and Biog¬ raphy has been issued quarterly and now com¬ prises over 40 volumes; besides 14 volumes of Memoirs of the Society ; one of Bulletins; one of Collections ; one on Pennsylvania and the Federal Constitution) and an historical map of the State. In the library are over 5,000 volumes of manuscripts, about 260,000 special pamphlets and over 152,000 bound books.

PENNSYLVANIA RAILROAD COM¬ PANY, The. The incorporate name of one of the great transportation systems of the United States. It controls and operates the network of railroads east of Pittsburgh and having its centre in the State of Pennsylvania. A second corporation organized in 1871, with a present capitalization of $80,000,000, is called the Pennsylvania Company and controls and operates the railroads of the system west of Pittsburgh. The railway, ferry, canal and other

transportation lines, owned, operated or con¬ trolled by, or affiliated in 1915 with, the Penn¬ sylvania Railroad system have an aggregate mileage as follows: East of Pittsburgh, 6,519.- 02 miles ; west of Pittsburgh, 5,303.99 ; making a total of 11,823.01 miles. The company owns and operates directly, east of Pittsburgh, a total mileage of 4,541.04, in five divisions, as follows :

Eastern Pennsylvania Division . 1,339.55 miles

Western Pennsylvania Division . 741.69 miles

New Jersey Division . 541 . 08 miles

Central Division . 1,112.62 miles

Northern Division . 806. 10 miles

Total . 4,541 . 04 miles

The first-named division is composed of the original parent lines of railroad, several of which had their beginning in the early half of the 19th century. On 7 April 1826, the Pennsylvania legislature granted a charter to the Columbia, Lancaster and Philadelphia Rail¬ road Company. In 1832 among other roads incorporated were the Harrisburg, Portsmouth, Mount Joy and Lancaster and the Philadelphia and Trenton. In 1833 the Columbia Railroad was built.

Early History. — On 13 April 1846 an act to incorporate the Pennsylvania Railroad Com¬ pany was passed by the State legislature. The capital of the company was fixed at $7,500,000. The company was authorized to build a road to connect with the Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad, and to con¬ struct a line to Pittsburgh or any other place in the county of Allegheny, or to the town of Erie. On 25 Feb. 1847 Governor Shunk granted a charter to the company. The grading of the first 20 miles of road west of Harrisburg was under contract 16 July 1847 and 40 miles additional on 26 November. On 1 Sept. 1849 the first division, extending from Harrisburg to Lewistown, a distance of 61 miles, was opened to travel On 15 Feb. 1854 cars run through from Philadelphia to Pittsburgh. On 31 July 1857 (pursuant to provisions of an act of the Commonwealth of Pennsylvania of 16 May 1857) the Commonwealth of Pennsylvania sold and conveyed to The Pennsylvania Railroad Company, inter alia, a line of railroad and facilities between Philadelphia and Columbia, Pa., known as the Philadelphia and Columbia Railroad, with power to operate and extend the same. In 1861 the Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad was leased by the Pennsylvania Company for 999 years, which gave the corporation the ownership of the through line from Philadelphia to Pitts¬ burgh.

Civil War Period. — J. Edgar Thomson, the chief engineer of the company, under whose direction the road was built, was elected presi¬ dent of the company 2 Feb. 1852. In 1858 Col. Thos. A. Scott was appointed general superin¬ tendent of the road; he became vice-president in March 1860. It was Colonel Scott who, at the outbreak of

the Civil War. was appointed to take charge of government railroads and telegraphs. He was instructed by Simon Came¬ ron, Secretary of War, after the destruction of the Northern Central Railway, to open a line of communication from Washington to Philadelphia and the North and East. The

Pennsylvania Railroad Company at once placed all its resources at the disposal of Colonel Scott, and a route via Annapolis and Perryville was placed at the disposal of the government in a few months.

In 1862 the Philadelphia and Erie Railroad passed to the control of the Pennsylvania Com¬ pany under a lease for 999 years. Meanwhile the road had improved its main lines and branches, and in 1864 began the use of steel rails and the development of their manufacture.

Western Lines. — The next important un¬ dertaking was to aid the construction of lines west of Pittsburgh. The Pittsburgh, Fort Wayne and Chicago Railroad was the first of these to be built, work on which commenced 4 July 1849, extending 468 miles from Pitts¬ burgh to Chicago, and being the essential link in the chain which was to bind the Atlantic Seaboard and the Mississippi Valley. On 7 June 1869 this road was leased by the Pennsyl¬ vania Railroad Company for 999 years ; as was also Newcastle and Beaver Valley Railroad, the Massillon and Cleveland Railroad, the Akron Branch Railroad and the Lawrence Railroad, all in Ohio. On 6 Nov. 1867 the Pittsburgh and Steubenville Railroad was sold at auction and was purchased by the Pennsylvania. In 1869 the leases were signed for the control of the Pittsburgh, Cincinnati and Saint Louis Rail¬ road and its numerous branches. In 1869 the Cincinnati and Muskingum Valley and the Saint Louis, Vandalia and Terre Haute, and the Terre Haute and Indianapolis roads were added, thus extending the line to the Mississippi River at Saint Louis. In March 1870 the Erie and Pittsburgh was leased and in October 1871 the Cleveland and Pittsburgh was also leased for 999 years. In the same year the Pennsylvania purchased a controlling interest in the Jeffersonville, Madison and Indianapolis, extending from Indianapolis, Ind., to Louisville, Ky. Other roads, large

and small, were added to the system from time to time, embracing important direct and connecting lines in Ohio, Indiana, Illinois, Michigan, Kentucky, West Virginia, Missouri and other States.

Eastern Development. — After the Civil War the Pennsylvania made rapid progress east of Pittsburgh. Between 1868 and 1872 the company leased the Philadelphia and Trenton Railroad; Camden and Amboy Railroad and the United New Jersey Railroad and Canal Company; and in 1873 completed the Baltimore and Potomac Railroad, and built the Baltimore Tunnel. Further acquisitions of connecting lines have since been made from time to time, including the Allegheny Valley Railway, the Western New York and Pennsylvania Railway, Cambria and Clearfield Railway and the North¬ ern Central Railway. Numerous branch lines were built in the mining and lumber districts, the principal of which was the Schuylkill Val¬ ley Railroad, from Philadelphia to Pottsville, Pa., and Wilkesbarre, which brought the anthra¬ cite coal region in touch with the main line. The company has a four-tracked line from New York to Pittsburgh, a double-tracked line from Pittsburgh to Chicago. A tunnel under the Hudson River, with a terminal in New York City, and an extension to Long Island, opened 8 Sept. 1910, is one of the more recent improve¬ ments instituted by this company, affording great transportation facilities to all points men¬

tioned. The tunneling of the two rivers and Manhattan Island was the most notable piece of underground engineering ever undertaken. See New York City—

The company has water lines on Chesapeake Bay and Long Island Sound, covering a dis¬ tance of 2,000 miles of water transportation.

Finances. — The general income account of the Pennsylvania Railroad for the year ending 31 Dec. 1915 shows total operating revenues of $196,628,170.10; total operating expenses, $142,- 736,560.83; net operating revenue, $53,891,609.27. The operating revenues are from lines directly operated and include freight, passenger, mail, express, other transportation and incidental maintenance of equipment, traffic, transporta¬ tion, general and miscellaneous. After deduct¬ ing taxes and uncollectible railway revenues, the railway operating income was $46,250,924.68. Income from securities and other sources brings this up to $66,626,245.34 ; deducting fixed charges from this leaves a net income of

$42,425,322.32.

Traffic Statistics. — The traffic statistics for all lines owned, operated or controlled by, or affiliated in interest with, the Pennsylvania Rail¬ road system, both east and west of Pittsburgh, for 1915 were as follows:

PASSENGER

Number of passengers

Lines east of Pittsburgh and Erie. Lines west of Pittsburgh and Erie.

1915

140,879,300

31,111,793

i *

Comparison with 1914, decrease ‘

9,073,329 2,090,871

Total .

171,991,093

11,164,200

FREIGHT

Number of tons

Lines east of Pittsburgh and Erie. Lines west of Pittsburgh and Erie.

1915

182,187,383

157,740,337

Comparison with 1914, increase

8,553,398 17,256,957

Total …

339,927,720

25,810,355

Equipment. — The following figures show the equipment available for service on lines of the Pennsylvania system east and west in 1910:

Locomotives of all kinds . 7,373

Passenger, express and mail cars… 6,706

Freight cars . 276,619

Maintenance of way, car equipment . 4,536

Floating equipment, ferry boats, tugs, barges, etc 448

Total . 295,682

The number of employees 31 Dec. 1910 in the service east of Pittsburgh was about 150,- 000; west of Pittsburgh about 60,000; making a total of 210,000. Applying the statistics of the last census that there is an average of five persons dependent upon the head of each family, it would seem that there are more than a million of people who depend directly upon the opera¬ tions of the road for their means of subsistence. In addition, there are the employees of many industries supplying rails, cars, locomotives, etc., besides merchants of all classes in the cities and towns located along the roadway, whose pros¬ perity is largely dependent thereon. The com¬ pany asks and insists upon faithful service from

its employees. It administers a fund which takes care of them in cases of sickness or acci¬ dent, and when their days of usefulness are over it provides them with a pension which cares for them in their declining years. The company also maintains an Employees Saving Fund, so that employees may leave on deposit with the company such portion of their wages as they may desire, upon which a stipulated rate of interest is allowed.

PENNSYLVANIA STATE COLLEGE, The, located at State College, Pa., is one of the chain of ((land-grant® colleges established in 1863 by the State and Federal governments under the Act of 1862. It was first chartered in 1855 as a Farmer's High School and in 1861 it graduated a class of 11, probably the first graduates in a purely agricultural course in the United States. It is beautifully situated on a plateau of the eastern slope of the Alleghany Mountains, 1,200 feet above sea-level. The total valuation of property under college con¬ trol is $3,306,422.66. About 1,400 acres of land are used for campus, farm and experimental purposes. The buildings number 35, harmoniz¬ ing

in location, architecture and building ma¬ terials according to the school groups. There are six schools — • Agriculture, Engineering, Home Economics, Liberal Arts, Mining and Natural Science — offering a total of 42 four-year courses of study. Courses in the Liberal Arts lead to the bachelor of arts and in other schools to the bachelor of science. Engineer¬ ing and master's degrees are conferred on graduates after one year of study. The doctorate degree is not given. Short courses are offered in agriculture, industrial engineering, milling engineering and home economics. A summer session in which only teachers of Pennsylvania are permitted to register is a novel feature. A winter course of one week during the holidays for 'farmers and home-makers attracts over 1,000 students annually.

The experimental work of the college is conducted in an agricultural, an engineering and a mining experiment station, under Federal and State appropriations. The agricultural ex¬ tension division maintains county agricultural agents in nearly every county of the State, offers correspondence courses, organizes boys' and girls' clubs, holds institutes and sends ex¬ perts to help solve farming problems. The en¬ gineering extension division organizes and con¬ ducts apprentice schools in manufacturing plants and industrial centres. The liberal arts ex¬ tension supplies lecturers, topics and material for clubs, and organizes public school debating leagues. Military drill and gymnasium prac¬ tice are required of all students during the first two years in college, under instruction of offi¬ cers detailed from the United States army. All forms of college sports are fostered; 40 acres of the campus are set aside for play-and drill-grounds. The trustees number 31, being di¬ vided into four classes : Ex-officio State offi¬ cials ; appointed by the governor ; chosen by the alumni ; and elected by delegates representing the learned societies of the State.

The following statistics are given for the college year ending 31 June 1916: Total in¬ structors, 255; experimental and extension staff, 84. Total enrolment of college men, 2,388; women, 147; summer session, 1,024; grand total,

2,535. Total in engineering apprentice schools, 3,516; in correspondence courses, 4,510. Num¬ ber of volumes in library, 58,200. Total income of college from United States, $126,893; from State appropriation, $472,245; from other sources, $232,152; total budget. $831,290.

PENNSYLVANIAN SERIES, in geology, one of the three principal

subdivisions of Car¬ boniferous time having the Permian above and Mississippian below. It occupies extensive areas in many parts of the United States, including the great coal measures of Pennsylvania, and the Central-Eastern and Southeastern States as far west as eastern Nebraska and Oklahoma. Farther west it consists mainly of limestone deposited in moderately deep water, a condi¬ tion unfavorable for coal accumulation. Some geologists class the Pennsylvanian as upper¬ most Carboniferous, others regard it as a sepa¬ rate system or period.

PENNY, a British coin and money of ac¬ count, in value the 12th part of a shilling. It was at first a silver coin weighing about 22ˆ2 grains troy, or the 240th part of a Saxon pound. Till the time of Edward I the penny was so deeply indented by a cross mark that it could be broken into halves (thence called half-pen¬ nies) or quarters (fourthings or farthings). A ((gold penny® was coined in 1257 during the reign of Henry III. It had the value of 20 silver pennies of that time. Edward I in 1300 reduced the weight of the penny to a standard, ordering that it should weigh' the 20th part of an ounce, that is, 22 grains. Ed¬ vard III reduced its weight three times, leaving it at 18 grains. Edward IV reduced it in 1464 to 12 grains and Henry VIII, in 1527, to \0y2 grains. It was still further reduced to 8 grains under Edward VI in 1552, and at last, in the reign of Elizabeth, it was fixed at 7 ff grains, or the 62d part of an ounce of silver. This proportion was observed up till the introduction of the bronze coinage in 1860. George III coined a copper penny in 1797. It weighed one ounce and did not come into favor because of its clumsiness. The in¬ trinsic value of the bronze penny is about half of that of the old copper coin. The bronze of which the present British penny is coined is composed of copper, 95 per cent ; tin, 4 per cent; and zinc, 1 per cent. Copper pennies were coined by the American colonies prior to 1780. See Numismatics.

PENNYPACKER, Samuel Whitaker,

American jurist and author: b. Phoenixville, Pa., 9 April 1843; d. Schwencksville, Pa., 2 Sept. 1917. He received his education at the Grovemont Seminary at Phoenixville and at the West Philadelphia Institute. As a member of the 26th Emergency Pennsylvania regi¬ ment he participated in the first engagement at Gettysburg (1863). He then studied law at the University of Pennsylvania and after admis¬ sion to the bar was elected in 1868 president of the Law Academy of Philadelphia. His legal productions include four volumes of Su¬ preme Court Reports,) a volume of (Colonial Cases, } a (Digest of the English Common Law Reports> and he also assisted in the publication of 45 volumes of the (Weekly Notes ot Cases. > In 1889 he was appointed judge of the Court of Common Pleas No. 2 and was

elected for two terms of 10 years each, acting for five

years as president judge of that court. In 1902 he became governor of Pennsylvania and in that capacity instituted several notable re¬ forms. During his administration a law was passed requiring newspapers to print the names of their owners and editors and making them responsible for negligence; the State constab¬ ulary, the health department and the highway department were created and a new capitol building was erected. Governor Pennypacker s session was particularly stormy. He repudi¬ ated his party, which opened his administration to violent criticism, and led a war on the easy divorce system of Pennsylvania. Economy and vigor marked his term. He was later president of the Historical Society of Penn¬ sylvania, a trustee of the University of Penn¬ sylvania and held positions of honor in vari¬ ous German and Netherlandish societies. He was author of (Pennslyvania in American History) ;

< Pennsylvania, the Keystone } ; Settlement, of Germantown* ; (Historical and Biographical Sketches* ; (Annals of Phcenixville) and nu-. merous other historical documents. In 1915 he was appointed chairman of the Public Serv¬ ice Commission of Pennsylvania, which office he held until his death.

PENOBSCOT BAY, pe-nob'skot, a bay on the southern coast of Maine. It is about 35 miles long and nearly 28 miles wide at its mouth. It is really an estuary, the current of the Penobscot River which flows into it being submerged. The tide waters extend beyond the head of the bay up the river for 20 miles. There are a number of small inlet harbors along the shores and it contains a number of islands, the largest being North Haven, Vinal Haven and Deer Isle.

PENOBSCOT EXPEDITION, in Ameri¬ can colonial history the attempt of the Mas¬ sachusetts Bay colonists in 1779 to dislodge a party of British from the peninsula of Maja-bagaduce, where the city of Castine, Me., now stands. A British force of 700 soldiers had come down from Nova Scotia, seized the peninsula and started to build a

fort. It had already become evident that the American colo¬ nies were likely to obtain their independence and the fort in Penobscot Bay was intended to establish a northern limit to their territory. A force of 1,500 Americans were sent out from Boston in 19 ships, 13 of which were armed privateers, and three warships of the colony. A combined land and naval attack was planned. The land force debarked and gallantly as¬ saulted the fort, which had been completed on only three sides. Three small British vessels closed the entrance to the harbor and made such a strenuous defense that the commander of the fleet, Captain Saltonstall, refused to attack. Af¬ ter a few days of fruitless action a British fleet appeared on the scene and forced the expedi¬ tionary ships to flee up the Penobscot. Three of the ships were captured and nine ships and seven brigs were burned to prevent their fall¬ ing into the hands of the British. The Ameri¬ cans lost 474 in killed, wounded and prisoners. The losses of the British were 70 in killed, wounded and missing. The remainder of the expedition, including the commanders, made their way across the country to Boston where Captain Saltonstall and General Wadsworth

were publicly censured. General Lovell was acquitted of blame.

PENOBSCOT INDIANS, a North Amer¬ ican tribe of the Algonquian family, formerly residing along the both sides of the Penobscot Bay and the Penobscot River, in Maine. They were the most numerous and most influential tribe in the Abnaki Confederation. On the site of the present city of Bangor a chief vil¬ lage was established where the French founded a mission in 1688. The Penobscots took an active part on the side of the French in all the American colonial wars until 1749 when they made a peace treaty with the English. About 250 of these Indians remain, residing at Old-town, a few miles above Bangor.

PENOBSCOT RIVER, a river in Maine, ‘the headquarters of its western branch being on the northwest boundary of the State, in Somerset County, near the Canada line. It flows eastward into Piscataquis County and passes through Lake Chesuncook, then southeast through Lake Pamedumcook and the Twin Lakes, after which it receives the eastern branch, also known as the Seboois River, then east to the southwest corner of Aroostook County, where it turns and flows south by west to Penobscot Bay. It receives as its most im¬ portant tributaries the Mattawaumkeag from the east and the Piscataquis from the west. It is about 350 miles long, the largest river in Maine, and navigable for large steamers for 26 miles from its mouth and for small river steamers for many miles higher up. The river is a swift-flowing

stream along its upper and middle course and furnishes water power for many mills. In times past it was a noted sal¬ mon stream. The headwaters are in the pine forests and the rough timber is brought down to the mills by floating or rafting. The output of the winter's work in the lumber camps is thus brought to the lumber mills in the spring when the waters, ice-locked for several months, be¬ come free. It drains an area of 8,500 square miles. Bangor, at the head of tidal water, is the most important city on its banks. Other towns are Castine, Orrington, Bucksport, Bel¬ fast, Frankfort and Prospect.

PENOKEE RANGE, same as Gogebic Range. See Iron Ore Districts.

PENOLOGY. Penology (from Greek,

7 toivtj, penalty or expiation, and hoyog, theory or science), is the study of punishment for wrongdoing or for crime, both from its de¬ terrent and reformatory aspects. It is often confounded with criminology, the study of crime, and is frequently used as synonymous with it. From a scientific viewpoint the study of penology is the study of the aims for which punishment may be inflicted. Punishment may be deterrent, preventive, retributive or re¬ parative.

Under certain circumstances where the danger to the community is great and the temptation to commit the offense is strong, it is often believed to be necessary to impose punishment which is severe. The offender may, in such cases, be punished without serious consideration being given to his moral guilt or his responsibility. In such a case the culprit suffers for the sake of the community in order that his punishment may deter others from

wrongdoing through the awakening of fear within them.

Punishment may be made preventative by the taking of the culprit's life or by shut¬ ting him up within prison walls permanently. The habitual criminal is frequently committed to prison for life. Strictly speaking, if the purpose of society in imposing such sen¬ tence is

preventive, the word ˆpunishment® is wrongly applied. In such cases society is usually attempting to protect itself and not to make the offender pay for his offense. The third purpose for which punishment is inflicted is to reform the offender himself. This aspect of punishment has been emphasized during this century. This form of punishment demands a radical change in many obsolete methods, in¬ cluding those of the old-fashioned prison with its antiquated administrative practices, equip¬ ment and administration. This form of punish¬ ment recognizes that the offender must be pre¬ pared to return to society through the building up of his physical well-being and of his moral life.

Punishment may be retributive in that it may be made to gratify the feelings of the per¬ son injured. Where the victim realizes that the law will swiftly and adequately punish the offender, he is slow to take action contrary to society's law. When on the other hand the victim feels the law will give him no redress, he may take things into his own hands and inflict punishment himself, or take part in its exercise, in accordance with the prompting of the mob mind, as in the case of lynching.

Finally, punishment is reparative when the wrongdoer is detected and punished in such a way as to gratify the disinterested feelings of moral indignation of the public.

In recent years the reformatory aspects of punishment have been emphasized almost to the exclusion of the other aspects because it is now believed that reformatory punishment in¬ cludes deterrence, prevention, retribution and reparation either as inherent or incidental fea¬ tures. It is the only satisfactory and thorough¬ going form of punishment. In recent years, therefore, penology has been concerned more about the criminal than with his crime. Its aim is chiefly to make the punishment fit the criminal rather than the crime. Penology usu¬ ally treats of methods of studying the indi¬ vidual offender in order to study his character. It assumes that he is abnormal ; it emphasizes the necessity of discovering all the points of difference between him and the so-called nor¬ mal man. Penology treats of the methods which may be used to determine the proper classifi¬ cation of the offender so that treatment of him may be based upon careful inquiry. It empha¬ sizes all the different methods or systems of treatment which are calculated if possible to make him normal, that is, to render him capable of associating in free society with ˆnormal® men. In a word, it aims to effect his rehabili¬ tation. Penology also emphasizes and treats of the studies of the offender wLich should be undertaken in order to discover the causes of delinquency, so that society and

government may be taught how to prevent the development of abnormal persons whom we call offenders or criminals. From this point of view penology concerns itself chiefly with preventive meas¬

ures and only in a secondary sense with the rehabilitation of the offender.

The study of the individual offender has produced different classes of thinkers. Among the most interesting of these were the so-called ((criminologists® led by Lombroso, the great Italian savant, who claimed that they had dis¬ covered a criminal type of (<instinctive® or <(born® criminal, a creature who had come into the world predestined to evil deeds, and who surely could be recognized by certain stigmata — certain physical, even moral birthmarks, the possession of which presumably ineradicable, foredoomed him to the commission of crime. The traits were defined as follows: <(Various brain and cerebral anomalies ; receding fore¬ heads; massive jaws; prognathous chins; skulls without symmetry; ears long, large and projecting (the ear ad ansa) ; noses rectilinear; wrinkles strongly marked, even in the young and in both sexes ; hair abundant on the head, scanty on the cheeks and chin ; eyes feline, fixed, cold, glassy, ferocious ; bad, repellant faces. Much stress is laid upon the physiog¬ nomy; and it is said that it is independent of nationality; two natives of the same country do not so nearly resemble each other as two criminals of different countries. Other peculi¬ arities are : Great width of the extended arms (I'envergure of the French) ; extraordinary ape-like agility; left-handedness as well as ambidexterism ; obtuse sense of smell, taste and sometimes of hearing, although the eye¬ sight is superior to that of normal people. (In general,) to quote Lombroso, (the born crimi¬ nal has projecting ears, thick hair and thin beard, projecting frontal eminences, enormous jaws, a square, protruding chin, large cheek¬ bones and frequent gesticulation. > So much for the anatomical and physiological or mental characteristics, so far as they have been ob¬ served. Moral insensibility is attributed to him, a dull conscience that never pricks, and a gen¬ eral freedom from remorse. He is said to be generally lacking in intelligence, hence his stu¬ pidity, the want of proper precautions both before and after an offense, which leads so often to his detection and capture. His vanity is strongly marked and shown in the pride taken in infamous achievements rather than personal appearance.®

Out of this study of the physique and ap¬ pearance of ˆ the individual grew a celebrated system of identification called the Bertillon method,

an invention of Alphonse Bertillon, who was born in Paris in 1853, which was adopted by penologists. Later, Sir E. R. Henry adopted the finger print system as a basis for the detection of crime by the identification of the criminal. Measurements of the skull, the cranium, the shape of the forehead, the face, the slant of the eye and the length of the fore¬ arm, were for a long time considered funda¬ mental in studies of this sort. Such studies of externals probably reached their climax in the monumental work of Dr. Charles Goring, published in 1913, entitled (The English Con¬ vict, } in which he presents an intensive statis¬ tical study of 4,000 male convicts. Dr. Goring gave 12 years to the study of this data. His published work marks the close of an epoch in which penologists placed reliance upon ex¬ ternal measurements to discover the character

of the individual offender and the proper clas¬ sification of the offenders.

The inadequacy of the system was estab¬ lished by Dr. William White in his review of Dr. Goring's book. He said: ˆTaking the more limited concept of (thief, > one man may steal under the influence of the prodromal stage of paresis, who has been previously of high moral character ; another man may steal under the excitement of a hypodermic attack ; an¬ other may steal as a result of moral delin¬ quency; another as a result of a high-grade mental defect; and another under the influence of alcoholic intoxication, etc., and so on ; and how by any possibility a grouping of these men together can give us any light upon the general concept of <thief) is beyond my power to com¬ prehend.®

In more recent years penology has been profoundly influenced by the development of modern scientific studies in the fields of botany, anthropology, physiology, psychiatry, neurology, pathology and bacteriology. Penology is not a science but is rapidly assuming many of the aspects of science. It has leaned heavily upon all of the sciences and has utilized the meth¬ ods developed in such diverse fields as are rep¬ resented by such subjects as education, public health work,

sanitation, engineering and archi¬ tecture.

At the present time the methods for study¬ ing the individual adopted by hospitals for the insane have been adopted by penologists not only in studying but also in treating the of¬ fender. The monumental study of offenders which is the product of the use of such meth¬ ods of study is Dr. William Healy's (The In¬ dividual Delinquent,* which strangely enough was published in 1913, the same year that Dr. Goring brought out his monumental work. The adoption of these methods was brought about naturally in a course of years and for several years the penal codes of some of the American States have recognized different degrees of accountability in determining the punishment for crime. Many of them provide that the criminal who is insane is not responsible for his actions, but only very recently has the idea been extended to other forms of insanity such as feeble-mindedness and epilepsy. This broad¬ ening of the field of investigation to determine responsibility has led penologists to give atten¬ tion to hereditary and to environmental factors in determining the criminal's responsibility un¬ der the statutory and moral law.

As a preliminary to the study of crime, penology insists upon a study of the individual offender to ascertain: (1) His exact identity; (2) the salient facts concerning his family history; (3) his environment; (4) his crimi¬ nal record; (5) his mental and physical condi¬ tion; (6) his attitude toward society; (7) any circumstances which call for leniency or severity in his case.

When these facts have been determined, then the study of penology emphasizes the necessity for classification of the offender so that he may be dealt with intelligently. His case is studied to ascertain: (1) His physical and mental status; (2) his physical and mental age; (3) his character and conduct; (4) the nature and cause of his delinquency; (5) the training he requires to fit him for his return to society.

There are those who are handicapped men¬ tally or physically, or both; there are the in¬ ebriates, the habitually idle, the unskilled, the youthful and the aged; there are those who are old in body but children in mind, brom the viewpoint of character and conduct, there are the capable and the hopeful, the capable and wilfully delinquent, and the incapable and the unfit. From the standpoint of the nature and cause of the delinquency, there are the casual and environmental and social offenders, the constitutional or habitual offenders and the symptomatic offenders. These latter are in¬ teresting cases. They are

usually the assassins of our Presidents, the poor derelicts who imag¬ ine themselves as rich as Croesus, the perverts, the degenerates and the parasites.

For the public welfare, and in order that the proper methods and places of treatment may be provided for offenders, penology treats of prisons and institutions and of methods of conducting them so that society may be pro¬ tected adequately and safeguarded thoroughly, and, further, so that the individual offender may be reformed. Great diversity of treatment is required, which calls for wide differentiation in prison architecture, prison location, prison equipment and prison administration, including discipline.

Institutional government or discipline has imitated but has lagged behind the develop¬ ment of government in the outside world. The different forms of government or discipline may be divided as follows: (1) The autocratic; (2) the benevolent despotic; (3) the mixed autocratic and benevolent despotic; (4) the mixed benevolent and Hamiltonian republican ; (5) the Jeffersonian democratic.

In reviewing carefully the development of government and discipline of correctional in¬ stitutions, more or less pure examples of each of the foregoing types of government are in evidence. In the case of the autocratic form of discipline, which is distinctly a repressive sys¬ tem, the individual is subordinate entirely to the will of the superior government. In this way it is a pure autocracy, modeled after the severest examples of the autocratic state. The benevolent despotic system was carried out by Sir Walter Crofton, director of Irish prisons, from whom it gained its name. Under this system, the superintendent of a prison is a benevolent despot, but his despotism is tempered with both benevolence of purpose and expedi¬ ency of action. Another development of disci¬ pline which has characterized some of our older reformatories and better State prisons was partly autocratic and partly despotic. While to outward appearances the discipline is con¬ ducted according to the autocratic system, kind¬ ness and cheerfulness so permeate the plan as to provide work and activities which are develop¬ mental and reformative in character. In the case of the so-called mixed benevolent and Hamiltonian republican system, classification and promotion are based on individual effort and self-government is granted as far as pos¬ sible to that group which is deemed deserving and capable of exercising such control. The Jeffersonian democratic system is the self-gov¬ ernment plan of control. It is a system which may be applied in special institutions where the best prisoners are collected, that is, institutions from which the incorrigible, the low grade,

feeble-minded, the degenerate, the seriously ab¬ normal, the insane, the old rounders and the feeble inebriates have been removed.

The best type of prison government is that which is best synchronized with the stage of development with the group of offenders to which it is applied. The aim of penology is to determine the form of government which is best suited to meet the needs of the particular individual under consideration. It emphasizes the necessity for the proper equipment to meet the needs of the particular kind of government which is instituted.

Under the stimulus of the idea of probation, judges were lead to regard institutional treat¬ ment as a last resort, as a hopeless refuge of the hopeless offender. More recent studies have demonstrated the inadequacy of such treatment, so that modern penologists insist that the of¬ fender shall be carefully studied and his treat¬ ment determined in the light of such a study. If his condition demands and warrants release instead of commitment to an institution, then he is recommended for release. If he is in need of hospital treatment or of training, then he is sent to an institution equipped properly to furnish treatment or education, or both.

The penalty as exacted by society in accord¬ ance with the teachings of modern penologists is claimed by them to be not less but more se¬ vere than the penalty exacted in accordance with the so-called old penology, which attempted to mete out the exact amount of punishment to balance the offense. Under that system, the culprit ((paid the penalty® and then was free. Under the more modern system, he is to be deprived of his right to direct himself until such time as he is able and willing to conduct himself normally in accordance with the will of society as it is expressed through govern¬ ment. According to the teachings of this branch of penology, the mere surrender of free¬ dom acts as a more powerful deterrent to the individual than any of the old forms of pun¬ ishment. Retribution is made to the satisfaction of the victim and of society under a system of treatment through a period of time in such a way as not to offend the

better impulses and instincts of any. Under this branch of penology the study of a person being thus punished may also yield results of great value in correcting environmental conditions which are found to be productive of crime.

Bibliography. — Brockway, Z. R., (Fifty Years of Prison Service) (New York 1906) ; Dickens, Charles, ˆAmerican Notes) (Chicago 1885) ; Ellis, Havelock, (The CriminaP (New York 1890) ; Fosdick, Raymond B., (European Police Systems) (New York 1916) ; George, W. R., (The Junior Republic) (New York 1911) ; Goring, Dr. Charles, (The English Convict) (London 1913) ; Hall, Capt. Basil, trav¬ els in North America from 1827-28) (Edin¬ burgh 1829) ; Griffiths, Arthur, (Fifty Years of Public Service) (London 1914) ; Healy, Wil¬ liam, (The Individual Delinquent (Boston 1915) ; Ives, George, (A History of Penal Methods) (London 1914) ; Pollock, Frederic, and Maitland, Frederick William, (The History of English Law) (Cambridge 1895) ; Kenny, C. S., (Outlines of Criminal Law) (Cambridge 1902) ; Lewis, B. G., <The Offender* (New York 1917) ; Lombroso, Caesare, (L'Homme

CrimineP (Paris 1887-88, trails, by bis daugh¬ ter, New York 1911), and (Crime — Its Causes and Remedies) (New York 1911, trans. by Henry P. Horton) ; Osborne, Thomas Mott, (Society and Prisons) (New Haven 1916) ; Parmelee, Maurice, (Criminology) (New York 1918) ; Pound, Roscoe, (The Administration of Justice in a Modern City* (Harvard Law Re¬ view, Cambridge Mass., 1913) ; Riddell, W. R., (Jury System in Ontario* (Publication New York City Bar Association, New York 1914) ; Ross, E. A., (Social ControP (New York 1901) ; Stephen, Sir fames, (A General View of the Criminal Law of England* (London 1863) ; Wigmore, John H., (Modern Penal Methods in Our Army, * Journal Criminal Law and Crimi¬ nology (Chicago 1918) ; Wines, F. A., Punish¬ ment and Reclamation) (New York 1910) ; and (American Prison Association Pro"ceedings) (Indianapolis 1870-1918).

Burdette G. Lewis,

Commissioner of Department of Institutions and Agencies, State of New Jersey.

PENON DE CORdN, pa-non' da ko-ron', or (<CROWN PEAK,® now known as CORON ISLAND, an island of the Calamianes group of the Philippines, -lying south of the eastern extremity of Busuanga Island and northeast of Palawan; area, 42 square miles. It is a rocky and

precipitous peak 1,200 feet in height, W/2 miles from north to south and six miles across its northern end. The southern end terminates in a sharp, steep point called Calis. The soil is sterile and unfitted for agriculture, and the chief employment of the inhabitants is the gathering of edible birds' nests, composed of the salivary secretions of the swift (q.v.). The birds' nests of Pehon de Coron are of the fin¬ est quality and are unrivaled in the market, the Chinese paying double their weight in silver for them. The nests from Coron are nearly always entirely free from foreign substances. On the neighboring islands, also frequented by the swifts, the birds add grass and bits of moss to their nests, which consequently bring much lower prices.

PENROSE, Boies, American lawyer and politician: b. in Philadelphia, 1 Nov. 1860. He was graduated from Harvard College in 1881 ; read law with Wayne MacVeagh and George Tucker Bispham, and was admitted to the bar in 1883. He then practised his profession in Philadelphia for several years ; was elected to the Pennsylvania House of Representatives from the eighth Philadelphia district in 1884; to the Pennsylvania State senate from the sixth Philadelphia district in 1886, reelected in 1890 and again in 1894; was elected president pro tempore of the senate in 1889, and re¬ elected in 1891. He was a delegate to the Re¬ publican National Conventions of 1900, 1904 and 1908; was chairman of the Republican State Committee in 1903-05 ; was elected a member of the Republican National Committee from Pennsylvania in 1904 and reelected in 1908; was elected to the United States Senate, to succeed J. Donald Cameron, for the term be¬ ginning 4 March 1897 ; reelected in 1903, 1909 1914 and 1920. His term of service will expire 3 March 1927.

PENSACOLA, pen-sa-kola, Fla., city and county-seat of Escambia County, on the

west shore of Pensacola Bay, 10 miles north of the Gulf of Mexico, 48 miles east of Mobile and 204 miles west of Tallahassee. It is on the line of the Louisville and Nashville and the Pensacola, Mobile and New Orleans rail¬ roads. The city has an excellent landlocked harbor

with from 30 to 33 feet of water on the bar. The climate here is mild and very healthful, the sanitary and quarantine regu¬ lations precluding any danger from yellow-fever. The city has gas, electric-light, water and street railway plants. There is a United States navy yard at Warrington seven miles nearer the Gulf and two forts, Pickens and McRee, at the entrance to the harbor, and Fort Barrancas within. The remains still exist of the old Spanish forts of San Bernardo and San Miguel. There is a State armory, Federal gov¬ ernment building, opera-house, courthouse and 11 public school buildings. Pensacda is a con¬ siderable commercial centre, having a large domestic trade in lumber, fish, naval stores, hides, tallow, cotton, wool, iron, phosphate and coal. There are a commercial fertilizer fac¬ tory, several cotton presses, sawmills and plan¬ ing mills. The city has three national and several private banks. Since 1910 extensive de¬ velopments have been in progress, many large and handsome buildings erected, among them some great hotels ; and a series of beautiful parks laid out.

Pensacola Bay was visited in 1528 by the Spanish explorer, Panfilo de Narvaez. The first settlement there was in 1559. The city was first permanently settled in 1696, by a colony of Spaniards from Vera Cruz, Mexico. In 1719 it was captured by the French, but was restored to Spain in 1723. The British secured possession of the town in 1763, but in 1781 it was again captured by the Spanish. In the War of 1812 (q.v.) it was taken by General Jackson. The United States took permanent possession of the city in 1821, in accordance with the treaty of 1819. The navy yard was soon afterward established. Pensacola had a population in 1890 of 11,750 and in 1900 of 17,750. The population in 1910 was 22,982. . In 1920, the population according to the United States Census Bureau, was 31,035.

PENSACOLA BAY, an inlet of the Gulf of Mexico in the western part of Florida, ex¬ tending 25 miles inland and covering # about 200 square miles. The northern extension of the bay divides into two parts, West Bay ex¬ tending up the valley of the Escambia River, and East Bay with two branches extending up the Blackwater and Yellow rivers. It is only one mile wide at the entrance between Santa Rosa Island on the east and the main¬ land on the west; the bar has 30 to 33 feet of water. Pensacola Bay proper is about 10 miles wide ; it is landlocked and affords an excellent harbor. On the western shore, 10 miles from the entrance, is the city of Pensa¬ cola. A United States navy yard and naval hospital are at Warrington, also on the west shore and about three miles from the en¬ trance. The bay is defended by Fort Pickens on the Santa Rosa Island and Fort McRee on the outer bar attached to the mainland, and Fort Barrancas on the inner shore of the bay.

PENSACOLA BAY IN THE CIVIL WAR. After the secession ordinance of 10

Jan. 1861, the State authorities seized Fort McRee, Fort Barrancas, north of it, and the navy yard on the west shore, and demanded the surrender of Fort Pickens, located on Santa Rosa Island to the east of the entrance to the bay. But it was resolutely held by Lieut. A. J. Slemmer and a small body of United States regulars, which soon were reinforced by a detachment of Wilson's Zouaves of New York and a small blockading squadron. The' garrison and marines made night raids on the navy yard, on 2 September burning the dry dock, and ori the 13th burning a vessel fitting out as a pri¬ vateer. The Confederates in turn attempted to surprise and capture Wilson's troops. For this purpose an expedition of 1,000 men under Gen. R. H. Anderson crossed over to Santa Rosa Island and landed several miles east of Fort Pickens. It was the early morning of 9 Octo¬ ber. Anderson divided his force into three battalions, one 260 strong under Col. John K. Jackson, the rest about evenly divided under Cols. James Chalmers and J. Patton Anderson respectively.

After a march of three or four miles, the shooting of a sentinel by some one of Chalmers' command gave the alarm to the Federal camp. Jackson's battalion of Georgians then pushed through thickets to the middle of the island, driving the Federal outposts before them and stormed the camp, which they found deserted. Here they burned the storehouses and sheds. As daylight came before arrangements could be made for further concerted action, General An¬ derson ordered all back to the boats. During the withdrawal a sharp skirmish occurred with two companies of Federals that attempted to intercept the retreat. While the troops were embarking, an unavoidable delay enabled the Federals to come up and open fire, by which several Confederates were killed or wounded. The total Confederate loss in this affair was officially stated as 18 killed, 39 wounded and 30 captured. The total Union loss reported was 64.

PENSILES. Pascal's (Pensees,> or (Thoughts, > have been called the greatest mas¬ terpiece in French prose. Yet the work is in¬ complete, even fragmentary, and it is impos¬ sible to say what was in detail the author's proposed argument. Pascal had long planned a great work on religion which should express from his point of view its defense or justifi¬ cation. The period was one of great religious turmoil, characterized not only by the disputes of the Jesuits and the Jansenists, but also by what was considered the subtly corroding

influ¬ ence of the wordly indifferentists or unbelievers, known as ˆlibertines.® It was to a considerable degree against these last that Pascal's projected work was directed. He also wished to refute the scientists who. in his opinion, allowed too much power to the freedom of lay and inde¬ pendent lationalism. He had all the ardor of the new convert, and only illness and early death prevented him from completing this great apology of his faith.

There were many difficulties in the way of posthumous publication. Pascal's nephew brought out the first edition in 1670, in which the material was somewhat arbitrarily arranged. For over a century this remained the standard version, but now it is possible to read the <Pensees> both in reprints of the disorderly

primitive manuscripts and in new systematic classifications more suited to modern readers.

Pascal was influenced in the composition of the <Pensees) by such works as the Bible and the writings of Jansenius, as well as by lay authors like the sceptical moralists, Epictetus and Montaigne, whose arguments Pascal used to justify his own progress from scepticism to faith.

The underlying concept of Pascal in the <Pensees) is that man stands in the midst of nature apparently a helpless victim of cruel and ruthless forces. Yet he has an inward con¬ viction that there must be some motive for this state of things. We get consolation and even comfort if we are willing to believe that our suffering expiates the sin of our first parents' wrongdoing. This conviction is reached, not merely by cold reasoning but by an inner feel¬ ing or intuition, and it throws us headlong and lovingly into the arms of faith.

To-day so many of Pascal's thoughts have become familiar by frequent repetition and have so entered into the commonplaces of literature that we find it difficult to realize their pro¬ fundity and novelty in his own day. Some pas¬ sages extend over several pages, some are mere

unfinished scraps, some, indeed, occur in dupli¬ cate or triple form, but they are full of personal and religious feeling expressed in lyric prose. Therefore, however little some persons may sympathize with what they consider the morbid and neurotic sensitiveness of Pascal, none the less he has an irresistible appeal to many. At no time has he been more studied than now when the reaction against the scientific, ma¬ terialistic rationalism of the 19th century has led many philosophers to draw parallels be¬ tween their religious position and that of Pascal.

Important modern editions of the <Pensees) are those of L. Brunschvig (two editions, 1897 and 1904, small and large), with a reclassifica¬ tion of the text; Michaut, G. (1896), a reprint of the manuscript; Gazier, A. (1907), reprint of the text of the first edition. Consult also other editions by Havet and Fougere.

Charles H. C. Wright.

PENSIONS. A pension is in its essence a gratuity, and as such is to be sharply distin¬ guished from any form of insurance, to which the beneficiary contributes. The idea has been advanced that a pension is to be considered a deferred payment of salary — on the under¬ standing that the salary had been an inequitable compensation. 4 he courts have not sustained this view but have ruled that there is no . in¬ herent right of the pensioner to the pension, but that it is charity pure and simple. In its specific form, however, it is generally recog¬ nized as being a-reward for continuity of serv¬ ice — a protection extended to a faithful em¬ ployee when he is no longer able to remain effectively at his post as in the case of civil service and police pensions ; or as a tangible recognition of a valuable service rendered to the state, as in the case of maternity pensions

and military pensions. . , . , .

The several systems of pensions which have been developed from charitable and socialistic investigations may be grouped largely into two classes: public and private. The former in¬ cludes (1) old age pensions; (2) invalid or disability pensions; (3) maternity pensions;

(4) widows' or mothers' pensions; (5) civil service pensions; (6) municipal pensions; (7) military pensions ; (8) teachers' pensions. The latter includes various systems of pensioning retired clergymen and

college professors, and the industrial or employees' pensions of pri¬ vate concerns. All systems which are based in whole or in part, directly or indirectly, upon voluntary or compulsory contributions by the beneficiaries belong properly to the domain of insurance (q.v.).

Old Age Pensions. — The idea of the old age pension system is to do away with the wholly unsatisfactory almshouse as the ultimate refuge of the dependent aged by providing them with means of retaining their own individual homes. The basic principle of such pensions is well set forth in the preamble to the New Zealand Pension Act, thus : <(It is equitable that deserving persons who, during the prime of life, have helped to bear the public -burdens of the Colony by payment of taxes, and to open up its resources by their labor and skill should receive from the Colony a pension in their old age.® The pension under the New Zealand law, which may be instanced as typical, and the most generous of all, is up to a maximum of $2.50 per week, or $130 a year. It is payable to all persons except Chinese and other Asi¬ atics, and civil service employees (otherwise provided for) reaching 65 years of age and who have been residents of the colony for 25 years, and who have for the five years immediately preceding application lived a sober and reputable life ; whose income does not exceed $250 a year, and whose accumulated property does not exceed $1,300. Under these conditions about one-third of the persons of 65 years of age and over in the colony are recipients of pensions.

In Australia similar laws are in force for men of 65 and women of 60, if of 20 years' residence. In Victoria, however, there is a con¬ dition that no pension shall -be given to such persons as are physically able to earn their living. In New South Wales a graduated pen¬ sion is paid, the maximum of $130 per annum to a pensioner whose income does not exceed $130 per annum, and decreasing as the private income increases, so that those who receive privately $260 per annum are not entitled to any pension. The pension is also reduced by another scale based on the value of personal property owned by the applicant. Any one own¬ ing $1,950 in property, although without a stated income, is not entitled to draw a pension.

By the revised (1908) Pension Act of Great Britain a pensioner must be at least 70 years old, and have been a British, subject for at least 20 years. His yearly income must not exceed $156. The pension is scaled according to the private income -and; ranges from a mini¬ mum of 24 cents up to a maximum of $1.20 a week, the aggregate of the income and pension not to exceed $3.12 per week.

In the United States two unproductive at¬ tempts have been made

within recent years to establish an old age pension system. The Wil¬ son bill (61st Cong. 2d sess., H. R. No. 14494) introduced 14 Dec. 1909, proposed the organiza¬ tion of all persons of 65 years upward into the ((01d Age Home Guard of the United States Army® ; enlisting both men and women who had been residents of the United States

for 25 years, and citizens for 15ˆ years, and who were possessed of less than $1,500 of prop¬ erty, and with an income of less than $240 per annum. The “pay® of “privates® in this army was to be $120 per annum, subject to certain deductions in case of a private income larger than $300 per year. The Berger bill (62d Cong. 1st sess. H. R. No. 13144) introduced 31 July 1911, aimed to provide a pension for all persons reaching 60 years of age, and having been citizens of the United States for 16 years; and whose average income for the previous year had not been more than $6 a week The pension in such case was to be $4 a week. In case of a larger private income the pension should be reduced accordingly, so that the ag¬ gregate of income and pension should not ex¬ ceed $10 per week. In the case of a married couple not legally separated, and both of pen¬ sion age and circumstances, the pension of each should be three-fourths of the standard pension for a single person.

In Canada a government annuity system takes the place of an old age pension. _ In France and Germany the pensioner is required to contribute during his productive years, the government and the employer each contribut¬ ing also to the pension fund. This is actually old age insurance.

Invalid Pensions. — A disability or invalid

pension is one granted to a person permanently disabled by disease or injury. The invalid pen¬ sion system of Australia is typical, and is the best purely gratuitous system so far developed. The applicant must have attained the age of 16 years, and have been continuously a resident for at least five years. He (or she) must be permanently incapacitated for work and have been incapacitated while in Australia.

The rate of the pension is fixed by the commissioner or one of his deputies, and must not exceed $130 per annum ; and the aggregate income of the pensioner, including the pension, must not be over $260 per annum. Australia began to pay invalid pensions 15 Dec. 1910. On 30 June 1917 there were 26,781 of these pensions current, 157 of these being paid to persons of 16 years of age, of whom 76 were males and 81 females. Of the whole number, 93.6 per cent received the maximum pension of $6.25 every fortnight. During the year 5,142 pen¬ sions had been granted, 2,729 to males and 2,413 to females. The fortnightly expenditure amounted to $164,475.

In Great Britain the old age pensions are made to apply to persons incapacitated at an age below the standard age at which applica¬ tions may be made. There is also a similar provisioin in the Civil Service Pension Law.

In the United States “invalid pensions® are paid to men in the military service who are disabled by wounds or by disease contracted while in the service. These pensions are dis- ‘ tinguished only in classification from the regu¬ lar military “service pension.®

Maternity Pensions. — The maternity pen¬ sion is one given to a woman at and’ for a time following the birth of her child. It is considered a better provision than the medical and surgical advice given gratuitously in some countries. It may be given as a lump sum, or in a series of weekly payments continuing from 2 to 12 weeks, and in some cases begin¬

ning two weeks before the birth. In Great Britain and Australia it is paid in one specified sum. In Switzerland and France it is a serial payment running from 4 to 12 weeks, or during the “nursing® period. By the Netherlands law of 1913 and the German law of 1915 the aid is given for three months after the birth. In some other countries, as Rumania and Den¬ mark, the mother is required to contribute the whole fund from her wages, to be paid back to her when her child is born. In most coun¬ tries a provision for aid at maternity is a part of the scheme of health insurance, and hence not a pension.

Widow’s Pensions, called in some localities “mothers’ pensions,® are intended to provide a -widowed mother, or one divorced or deserted, with the means necessary to keep her family together, and to bring up her children at least to the age of 16 years. In some States the “mothers’ pension® is granted to the mother when the father is

incapacitated for work. The term is doubtless a misnomer, the expressed intent being care of the children, and “chil¬ dren’s pension® would more accurately describe the gratuity. The usual requirements are that the child shall live with the mother; that the mother is a proper person physically and men¬ tally to bring up the child; and that except for the pension the child would have to be sent for support to a public institution. The first widows’ pension law in the United States was passed by the Missouri legislature in 1911. It was general in character, but by its limitations as to population, it applied only to Kansas City. In the same year Illinois passed a broader law. The idea has spread rapidly and at the close of 1917 31 States had adopted it, and a provi¬ sion of some kind for widows with dependent children had been incorporated into their stat¬ utes. These States are Arizona, California, Colorado, Florida, Idaho, Illinois, Iowa, Kan¬ sas, Maine, Massachusetts, Michigan, Minne¬ sota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oklahoma, Oregon, Penn¬ sylvania, South Dakota, Tennessee, Texas. Utah, Washington, Wisconsin and Wyoming. A comprehensive digest of these various State laws may be found in the editions of (The World Almanack

Civil Service Pensions are those granted to employees of the State upon their superannua¬ tion, or, in some cases, on the abolition of an office which had been adequately and faithfully administered by the displaced official. It is commonly graduated upon a basis of continu¬ ous service for a certain minimum period. In the English law the pensioner must have served at least 10 years and be over 60 years when re¬ tired, or, if under 60 he must be certified as permanently incapable of discharging his official duties. The pension is figured on a basis of 1/80 of his former salary for each year of service, not to exceed in all 40/80. There is also a provision for a graduated bonus in ad¬ dition, based on the length of service, but this forms no part of the pension.

In the United States the only civil service pensions are those granted to Federal judges, who may retire after 70 years of age. The pension is equal to the salary where the length of service has been 10 years or more. Eight

of the States similarly pension their retired judges.

Municipal Pensions. — In the United States the only municipal pension systems are for the police and firemen, the principle in¬ volved being that the men constituting these forces are often called upon to risk their lives or their health for the benefit of the com¬ munity which they serve. The city of Rochester, N. Y., also pensions the widows and children of policemen or firemen who lose their lives in the discharge of their duty, and of those who are incapacitated while on duty. Some 300 American cities have municipal pen¬ sion systems, but in some of them the fund is in part contributed by the members of the force on a fraternal insurance plan. In the principal European cities the pension is wholly gratuitous, and is equal to the former salary. In the United States the retirement pension is generally half the former salary.

Military Pensions are those granted to sol¬ diers and sailors of the army and navy, for serv¬ ice of the State under hazard. In the United States, pension legislation was first enacted by the different States, for the relief of those who were wounded or disabled in service during the War of the Revolution, but in 1789 by an act of Congress the general government assumed the payment of such pensions as had been granted by the States, and this provision was continued by subsequent legislation. Later on, pensions were granted to the widows of Revolutionary soldiers, and in 1861 the pension rolls contained the names of 63 survivors of that war and 2,728 widows of Revolutionary soldiers. The last survivor was Daniel F. Bakeman, of Freedom, Cattaraugus County, N. Y., who died 5 April 1869, aged 109 years six months and eight days. On 30 June 1910 the rolls still contained the name of one daughter of a Revolutionary soldier, the daughters having been pensioned by special acts of Congress. The amount dis¬ bursed to Revolutionary pensioners up to 30 June 1916 was approximately $70,000,000.

War of 1812. — On 14 Feb. 1871 an act was passed by Congress granting a pension of $8 per month to the survivors of the War of 1812 who rendered a service of 60 days, and to their widows provided they were married to such soldiers or sailors prior to the treaty of peace 17 Feb. 1815. The act of 9 March 1878 reduced the period of service to 14 days, and made no limitation as to date of marriage in case of widows. By subsequent legislation the pension to widows was

increased to $12 per month. On 30 June 1916 the pensioners of the War of 1812 were 115 widows. The amount disbursed under said acts up to 30 June 1916 was $45,991,744.

Indian Wars. — On 27 July 1892 Congress enacted a law granting pensions to those who served 30 days in the Black Hawk, Creek, Cherokee and Florida War with Seminole In¬ dians from 1832 to 1842 and to their widows. On 27 June 1902 the benefits of this act were extended to the survivors of the Florida and Georgia Seminole Indian War of 1817-18; the Fevre River Indian War of Illinois of 1827,; the Sac and Fox Indian War of 1831 : the Sa¬ bine Indian disturbances of 1836 and 1837 ; the Cayuse Indian War of 1847-48 on the Pacific Coast; the Florida wars with the Seminole In¬

dians from 1842 to 1858; the Texas and New Mexico Indian War of 1849-56; the California Indian disturbances of 1851-52; the Utah In¬ dian disturbances of 1850-53, and the Oregon and Washington Territory Indian wars from 1851 to 1856, and to their surviving widows. The pension is fixed at $8 ner month. The number of pensioners on the rolls under these acts on 30 June 1916 was 2,578, consisting of 676 survivors and 1,902 widows; the amount disbursed thereunder up to said date was $13,-

790,299.

Mexican War. — By an act of 29 Jan. 1887 Congress granted a pension of $8 per month to the surviving soldiers and sailors of the war with Mexico, provided that they actually served 60 days with the army or navy of the United States in Mexico, or on the coasts or frontier thereof, or en route thereto, in the war with that nation, or were actually engaged in a battle in that war, and were honorably discharged; and to such officers and soldiers and sailors as may have been personally named in any resolution of Congress for any specific service in the war ; and to the surviv¬ ing widows of such officers and enlisted men. The conditions under which title is granted under the act are that the soldier or sailor must be 62 years of age, or if under that age he must be disabled from causes not incurred while in any manner voluntarily engaged in or aiding or abetting the late rebellion against the authority of the United States. The provisions of this act were subsequently extended to Powell's Battalion of Missouri Mounted Volun¬ teers and to Gray's Battalion of Arkansas Volunteers, and by

the act of 3 March 1903 the pension to survivors was fixed at $12 per month. Widows of officers and enlisted men who served as above stated are entitled to pension on the same conditions as to age, disability or de¬ pendence, as apply to such officer or soldier, but their pension is not subject to increase, nor are the descendants of survivors entitled to pension under those acts. The number of Mexican War pensioners on 30 June 1916 was 4,298, consisting of 513 survivors and 3,785 widows, and the total payments to them on that date had amounted to $50,422,229.

Civil War. — There are two distinct sys¬ tems of pensioning on account of service in the Civil War. Under the acts of 14 July 1862 and 3 March 1873 any officer, soldier, sailor or ma¬ rine, disabled by reason of wound or injury received or disease contracted in the service of the United States, and in the line of duty, may be pensioned for such disability during its con¬ tinuance. In case of his death from causes originating as above set forth, his widow or his child or children under 16 years of age become entitled to pension. If he left no widow, or child under 16, his dependent mother, father, or orphan sisters and brothers are entitled in the order named.

Under the acts of 27 June 1890 and 9 May 1900 any officer, soldier, sailor or marine who served 90 days or more in the military or naval service of the United States during the war of the Rebellion, who had been honorably discharged therefrom, and who was suffering from disability of a permanent character, not the result of his own vicious habits, which incapacitated him from the performance of man¬ ual labor in such a degree as to render him

unable to earn a support, was entitled to pension under these acts of not less than $6 per month nor more than $12 per month.

In case of the death of any person named above, his widow becomes entitled to pension, provided she married him prior to 27 June 1890, and that she is without other means of support than her daily labor. If she remarries or dies, the child or children of such soldier or sailor

under the age of 16 years become entitled. The act of 9 May 1900, which is an amendment of the act of 27 June 1890, provided that in de¬ termining inability to earn a support each and every infirmity shall be duly considered, and the aggregate of the disabilities shown be rated. It is also provided that a widow may have title to pension if she is left without means of support other than her daily labor and an actual net income not exceeding $250 per year. On 30 June 1916 there were 362,277 invalid pensioners of the Civil War and 286,080 widows, minor children and dependent rela¬ tives. The amount of money paid to pension¬ ers of the Civil War up to 30 June 1916 was $4,765,075,021. The rates of pensions to inva¬ lids under the general law range from $6 per month to $100 per month, there being various intermediate rates for different degrees of disa¬ bility. The rates of pensions to widows and dependents range from $8 per month to $30 per month and are governed by the rank held by the husband on the date his fatal disease was incurred in the service. In 1918 an amendment was made to the General Pension Act of 11 May 1912, reading: “From and after th-e passage of this act the rate of pension for any person who served ninety days or more in the military or naval service of the United States during the Civil War, now on the roll or hereafter to be placed on the pension roll and entitled to re¬ ceive a less rate than hereinafter provided, shall be $30 per month. In case such a person has reached the age of seventy-two years and served six months, the rate shall be $32 per month; one year, $35 per month; one and a half years, $38 per month; two years or over, $40 per month : Provided ((That this act shall not be so construed as to reduce any pension under any act, public or private.®

The Supreme Court of the United States has decided that ((no pensioner has a vested legal right to his pension. Pensions are the bounties of the government, which Congress has the right to give, distribute, or recall at its discretion.®

An act of Congress, approved 21 Dec. 1893, provides, however, that a pension shall be deemed and held by all officers of the United States to be a vested right in the grantee to that extent that payment thereof shall not be withheld or suspended until after due notice to the grantee of not less than 30 days, the Commissioner of Pensions shall decide to annul, vacate, modify and set aside the decision upon which such pension was granted.

Laws have been enacted from time to time for the purpose of protecting pensioners from any diversion of their pensions either by their own acts or by the acts of others. Any pledge, mortgage, sale, assignment or transfer of any right, claim or interest in any pension

shall be void and of no effect. The holding of a pen¬ sion certificate as collateral security for any

debt or promise, or the retention of a certificate and refusal to surrender it upon proper demand, are misdemeanors, and punishable by heavy fine, upon conviction.

War with Spain and Insurrection in the Philippine Islands.— The provisions of the acts of 14 July 1862 and 3 March 1873 apply to those who served in the war with Spain and the insurrection in the Philippine Islands, and up to 30 June 1916, 28,472, including invalids, widows and dependents, had been pensioned on account of such service, and 1,164 special pensions had been granted. The amount disbursed to them was $53,744,668. An act of 1918 provides for widows and minor children of officers and en¬ listed men who served 90 days or more in the War with Spain, the Philippine insurrection, or in China. The law grants a widow without means of support other than her daily labor and an actual net income not exceeding $250 per year, $12 per month during widowhood, and $2 per month for each child under 16, until 16 unless insane, idiotic or otherwise perma¬ nently incapable. For the comprehensive scheme of insurance, allotments, pensions, etc., in the War of 1914-18 see War Risk Insurance.

Regular Establishment. — The acts of 14 July 1862 and 3 March 1873 also apply to those who have served in the army and navy in time of peace since 4 March 1861, and to those who are now in the military or naval service. The number of pensioners on the roll of the regular establishment on 30 June 1916 were distributed as follows: invalids, 15,553; widows, 2,937; minor children, 221; dependent mothers, 1,208; dependent fathers, 169; brothers, sisters, sons and daughters, 6; helpless children, 8; a total of 20,102. The total amount disbursed to 30 June 1916 in this classification was $39,098,319.

Army Nurses. — Under the act of 5 Aug. 1892 all women employed by the surgeon-gen¬ eral of the army as nurses, under contract or otherwise, during the late War of the Rebellion for a period of six months or more, and who were honorably relieved from such service, are granted a pension of $12 per month, provided they are unable to earn a support. On 30 June 1916 the pension rolls bore the names of 252 pensioners under this act.

Total Disbursements for Pensions. — From 1 July 1790 to 30 June

1865, a period of 75 years, the disbursement for pensions amounted to $96,445,444.23. From 1 July 1865 to 30 June 1916 the disbursements for the payment of pen¬ sions were $4,993,114,894, making the actual total disbursements in pensions since the be¬ ginning of the government $5,089,560,338. Adding to this amount the cost of maintenance, namely, $131,375,055, it will be seen that the pension system since the foundation of the gov¬ ernment has cost $5,220,935,393, which sum is exclusive of the establishment of soldiers' homes.

Number of Soldiers and Sailors of the Various Wars. — Revolutionary War, 184,038; War of 1812, 286,730; Mexican War, 78,718; Indian wars, 83,993; Civil War, 2,213,363; Spanish War, 312,000; Philippines and China, 146,151 ; total 3,304,993. The average pension paid to each enlistment has been $919.

Pension Agencies. — Pensions are paid quarterly through the 18 pension agencies lo¬ cated in different parts of the country. The President is authorized by law to establish agencies for the payment of pensions, wherever,

in his judgment, the public interests and the convenience of the pensioners require. Pen¬ sion agents are appointed by the President by and with the advice and consent of the Senate, and they are required to give bond, with good and sufficient sureties, for such amount and in such form as the Secretary of the Interior may approve.

Teachers' Pensions. — In the United States only five States have granted State-wide gratui¬ tous pensions to teachers. They are Arizona (1912) ; Maine (1913) ; Maryland (1902) ; New Hampshire (1915) ; and Rhode Island (1907). In Maryland, the pension begins after 25 years of service, and the amount is $200 a year ; in Rhode Island the pension begins after 35 years of service and the amount is half of the average annual salary for the five years next preceding; but must not exceed $500 per year. New Jer¬ sey has two pension laws ; the one in force pre¬ vious to January 1908, and applicable only to

teachers in service previous to that date is in terms the same as that of Rhode Island. The other law provides for teachers' compulsory contributions. Virginia makes annual contribu¬ tions of State funds to the pension fund, but requires a contribution from teachers of 1 per cent of their salaries. Massachusetts per¬ mits all cities except Boston to pension their teachers if the people so decide at the polls. Boston has a small private fund of its own. Alabama in 1915 passed a pension law permit¬ ting the pensioning of teachers in communities of more than 80,000 and less than 82,000 popula¬ tion. These figures limited the application of the law to Mobile County.

In Europe nearly all countries have teachers' pension laws in operation. Russia's law dates from 1819; England's from 1848; France's from 1858. Other countries in which such laws are in force are Australia, Austria, Belgium, Fin¬ land, Ireland, Japan, Norway, Serbia, Spain, Sweden and Switzerland. In South America, the Argentine Republic and Chile have most generous teachers' pension laws. In Canada the provinces of Ontario and Quebec must be included in the list. In Mexico, also there is a non-contributary provision for retired teachers.

Among the private pension systems are many for retired teachers from famous schools, not¬ ably in England. The other classes of private pensions as noted above are as follows:

Clergymen's Pensions. — These are paid from the private funds of the church organiza¬ tions in which the pensioner has been active. In England where the Church is a state insti¬ tution the pension is called ˆEcclesiastical,® and under the peculiar conditions is a public pen¬ sion.

Collegiate Pensions. — The principal pro¬ vision for the pensioning of college professors is (<The Carnegie Foundation for the Advance¬ ment of Teaching.® This organization was incorporated by an act of Congress and ap¬ proved by the President 10 March 1906, with the avowed purpose of providing retiring pen¬ sions <(for the teachers of universities, colleges, and technical schools in the United States, Can¬ ada and Newfoundland, who are in need of the aid, and who have not served in sectarian insti¬ tutions.® It is a duty of the administrators to approve the institution from which the appli¬ cant comes as one of college grade. There is

an age limit of 65 years, and 15 years of service, but the rules are not

rigid, each case being judged on its merits. Provision is also made for the widows of pensioners. The (<retiring allowance® as the pension is termed is not to exceed 80 per cent of the salary previously re¬ ceived and in any case cannot exceed $4,000. The average pension has been about $1,600. The number of pensioners is about 350 and the annual expenditure about $550,000.

Industrial Pensions. — The effect of the pensions granted to the employees of the larger industrial concerns has been to ensure the con¬ tinuance of experienced men in their service. It is thus a benefit to the employer as well as the employee, and experience has shown that the system can be carried at an expense of only 1 per cent of the wage scale. In some of the establishments where the system has been in¬ troduced, the employees have been asked to con¬ tribute half of the expense, but in the large ma¬ jority of cases the pehsion is wholly gratui¬ tous. The American Express Company's plan is typical. It is in amount half of the average salary for the preceding 10 years, and is paid to an employee for not less than 20 years' serv¬ ice when he becomes incapacitated through age or injury while in the company's service. Other industrial concerns who provide pensions for their aged employees are the E. I. du Pont de Nemours Powder Company, the Gorham Man¬ ufacturing Company, the International Harves¬ ter Company, the Philadelphia Electric Com¬ pany, the Public Service Corporation of New Jersey, the Standard Oil Company, the United States Steel Corporation, Wells, Fargo and Company, and the Westinghouse Air Brake Company. The Armour Company and Morris and Company are conspicuously in opposition to the gratuitous pension. They require a 3 per cent contribution to the pension fund from all their employees except unmarried women.

Nearly all the transportation companies re¬ tire their long-service employees with pensions, at 60 years if they ask it, and at 65 years under compulsion. The system adopted by most rail¬ roads is on a basis of 1 per cent of the aver¬ age monthly pay received for the preceding 10 years, multiplied by the number of years in the company's service. The pensions are granted also to men permanently incapacitated while in the company's service without regard to age. (See Annuities; Pauperism). Consult Squier, L. W., (01d Age Dependency in the United States) (New York 1912) ; and annual reports of the Bureau of Labor and of the Commis¬ sioner of Pensions.

PENTACLE. See Pentageron.

PENTACRINUS. See Crinoid.

PENTATEUCH, pen’ta-tuk\ The He¬ brew Old Testament consists of three parts, Law, Prophets and Writings. The first of these, containing five books sometimes called the Five Books of Moses, is called Torah or Law, because it embodies practically the entire legal system of the Hebrews. The five-fold division goes back to very early times, for the early rabbis speak of the five fifths of the Law, while the Early Church fathers, beginning with Tertullian, employ the term Pentateuch, which is still in common use among Christians. Pen-tateuchos means <(five-roll,® that is, the five-roll book. Primarily, the word teuchos denotes

the box or chest in which the roll was kept, but in the course of time it came to be used of the roll itself. The five-fold division coincides with the contents. Genesis clearly forms a book by itself, and so does Deuteronomy; Leviticus has characteristics of its own, which separates it from the books on either side. This leaves Exodus and Numbers, the opening words of the former (Ex. i, 1-7) and the closing words of the latter (Num. xxxvi, 13), showing that each is considered complete in itself. In this article only subjects dealing with the Pentateuch as a whole are considered. See articles Gene¬ sis; Exodus; Leviticus; Numbers; Deuter¬ onomy.

2. The Hexateuch. — Modern scholars add to the first five books the book of Joshua, which results in a six-roll book, or a Hexa¬ teuch. Joshua is joined to the others because ((its contents, and still more, its literary struc¬ ture, show that it is intimately connected with the Pentateuch and describes the final stage in the history of the Origines of the Hebrew na¬ tion.® The reason for separating Joshua from the Torah appears to be twofold: (1) Moses could not be connected with the Joshua material as its author, and (2) the contents prevented its setting apart with the books of the Penta¬ teuch as an authoritative guide of life. (Much of what is said in this article, though referring primarily to the Pentateuch, applies also to the Hexateuch).

3. General Contents. — Though there is

great variety of contents, all the material may be arranged under two

heads: (1) History : The historical portions of the Hexateuch cover the period beginning with the creation of the world and ending with the settlement of the Israelite tribes in Canaan. This period may be divided into three epochs: (a) The beginning of all things (Gen. i, 1-xi, 9) ; (b) The Hebrew Patriarchs (Gen. xi, 10-1, 26) ; (c) The organ¬ ization of Israel into a more or less compact national unit and its settlement in Canaan (the historical sections of Exodus, Leviticus, Num¬ bers, Deuteronomy and Joshua). No attempt is made to furnish a complete history, for many important details are treated very briefly or passed over entirely; nevertheless, the stream of narrative is never wholly interrupted, and though at times it is almost lost sight of, it always reappears and flows on to the end. (2) Law : The legal sections of the Pentateuch are so extensive that, as has been stated, the whole group is known as the Torah, which means law. The book of Leviticus consists entirely of legal material; two others, Exodus and Numbers, are a mixture of law and history; Deuteronomy is made up largely of addresses embodying laws ; and even Genesis, which is almost entirely narrative, mentions the laws of marriage and of the Sabbath as given in primaeval times, intro¬ duces regulations concerning food said to have been given in the days of Noah, and relates the Institution of circumcision in the days of Abraham.

4. History of the Pentateuchal Criticism.

— In the latest portions of the Old Testament it seems to be assumed that the Law or Torah is the work of Moses (2 Chron. xxxiv, 14; Ezra iii, 2; vii, 6) but it may well be that these passages refer only to the legal system of the Hebrews embodied in the Pentateuch, and not

to the book as a whole. However, whatever the significance of these Old Testament refer¬ ences may be, Philo of Alexandria (Vita Mosis, iii, 39) and Josephus (Contra Ap., i, 18; Ant. iv, 8-48) proceed on the assumption that Moses wrote the entire Pentateuch and the same seems to be true of some of the New Testament writers. The Babylonian Talmud (Baba bathra, 14b) states definitely : ((Moses wrote his own book, the section about Balaam and Job.® Only the last eight verses of Deuteronomy are ascribed to Joshua, on the reasonable assump¬ tion that Moses could hardly have written in his lifetime an account of his own death in the words: ((And he died there® (Deut. xxxiv, 5). Nevertheless, according to the Gemara exposi¬ tion of this passage at least one rabbi insisted that even the closing verses were written by Moses <(with weeping.®

The view that Moses wrote the entire Pen¬ tateuch maintained itself without very serious opposition until the time of the Reformation. The objectors were few, and they exerted little influence (for instance, Isaac ben Jason in the 10th or 11th century, and Ibn Ezra in the 12th). The Renaissance and the Reformation mark a new epoch in Biblical criticism; and some of the men prominent in the Reformation move¬ ment, like Karlstadt and Luther, anticipated some of the conclusions of modern scholars. The learned Catholic Masius also suggested that the Pentateuch may have received its final form from Ezra or some other man of God.

The general church, both Protestant and Catholic, did not adopt the liberal attitude of these leaders, but continued to regard belief in the Mosaic authorship of the Pentateuch an essential article of faith. But there continued to be protests against this view. Among the objectors the outstanding men were Spinoza, Hobbes, Peynerius, Simon, Clericus; but they were vigorously opposed by numerous represen¬ tatives of the Church. The permanent value of the discussions published during the 17th and the early years of the 18th century lies not in the theories proposed but in their insistence upon the facts and the demand for an adequate explanation of the facts.

Jean Astruc, physician of Louis XIV, and professor of medicine in Paris, gave new direc¬ tion to critical theories ((Conjectures sur les memoires originau x dont it paroit que Moyse s'est servi pour composer le livre de la Genese,* Brussels 1753). Following out suggestions made by earlier writers Astruc maintained that in the composition of Genesis, Moses used sev¬ eral sources which he incorporated in his work practically without alterations. Noticing further that in some sections of Genesis the divine name Elohim was used, and in others Y ahweh he proceeded, on the basis of this peculiarity, to analyze the book into two principal sources, the Elohistic and the Yahwistic or Jehovistic — admitting, however, the presence of 9 or 10 additional minor sources, of which only frag¬ ments were preserved. Astruc did not deny the Mosaic authorship of Genesis or of the rest of the Pentateuch ; his view was that Moses compiled Genesis from the older sources, and then wrote the remaining four books.

During the latter part of the 18th and during the 19th century Eichhorn, Ugen, De Wette, Bleek, Ewald, Hupfeld, Graf, Kuenen, Well-

hausen and others labored diligently on the problem, until Pentateuchal criticism became established upon a firm, scientific basis. In the course of these investigations various theories have been proposed to account for the complicated facts discovered in the Penta¬ teuch : (1) The Fragment Theory, which re¬ garded the Pentateuch as (<an agglomeration of longer and shorter fragments, between which no threads of continuous connection could be traced.® The arguments in support of the theory were drawn chiefly from the middle books of the Pentateuch, where the transitions are frequently very abrupt. (2) The Supple¬ ment Theory, originated in the better apprecia¬ tion of the common plan and purpose running throughout the Pentateuch. According to that theory in its simplest form, the Elohistic part was the oldest portion and served as ground¬ work for the whole. It was revised by a later editor, the Yahwist or Jehovist, who annotated the older work throughout and added to it a considerable number of new and independent sections. Deuteronomy was thought to be the latest addition. (3) The Document Theory. The discovery by Hupfeld in 1853 of a second Elohim source necessitated a modification of the Supplement Theory. Moreover, a closer study of the interrelation of the different layers in the Pentateuch showed that theory to be in¬ adequate. Its place was taken by what is gen¬ erally known as the Document Theory, because it considers the Pentateuch in its present form to be the result of the compilation of material coming from at least four documents, each of which is thought to have had originally an independent existence. The earlier advocates of the Document Theory used a variety of symbols to designate the different sources, but at present the four documents are generally known as J — the Jehovistic document, that is, the document characterized by the use of the divine name ((Jehovah® or ((Yahweh® in the sections narrating events preceding the call of Moses; E — the Elohistic document, that is, the document using the divine name <(Elohim® in the corresponding sections ; D — the Deuteronomic Code, furnishing the heart of the book of Deuteronomy; P — the Priestly Code, a document combining history and law, written from a distinctively priestly standpoint. All four documents are thought to embody older sources which had an independent existence either in written or oral form.

The Document Theory is the prevailing theory at the present time; but

in the course of its history it has passed through various modifications. The form in which it is most widely accepted among scholars to-day is known as the Graf-W ellhausen Theory, or the De¬ velopment Theory. The earliest exponent of this view was E. Reuss, who as early as 1833 or 1834, in his lectures at the University of Strassburg, called attention to the. fact that the history of Israel as outlined in Judges, Samuel and Kings contained much that seemed to conflict with the theory that the laws of the Pentateuch were in force among the people dur¬ ing the centuries described in those books. He further maintained that the Pentateuchal legal system was utterly unknown to the prophets of the 8th and 7th centuries, that Jeremiah was the first prophet who shows acquaintance with a written law and that his quotations are ex¬

clusively from Deuteronomy. This book, or at least its central portion (iv, 45-xxviii, 68), he thought to have been the book found in the temple in the days of Josiah, and he looked upon that code as the most ancient part of the codified legislation contained in the Penta¬ teuch. Ezekiel he believed to have lived prior to the redaction of the ritual code and of the laws which were formulated by the hierarchy. The views of Reuss were not published until 1879. Meanwhile a former pupil of Reuss, K. H. Graf, had published similar views, which were further developed by A. Kayser, A. Kuenen and most brilliantly of all, by Julius Wellhausen. According to these scholars the four documents originated in the order J, E, D, P and their dates, not counting later addi¬ tions, were approximately: J, 850; E, 750; D, 650; P, 500-450. It should be noted, however, that there are a few scholars (Koenig, Sellin, etc.), who, while accepting the Document Theory in some form, assign the documents to earlier dates, and a few who consider E earlier than J.

The efforts to determine the dates of the completed documents were followed by attempts to fix the age of the material embodied in these documents. The earlier adherents of the Graf-Wellhausen School were inclined to assign not only the completed documents, but practically all the material embodied in them to relatively late dates. Later investigations have clearly shown that much of the material, both histori¬ cal and legal, must have been handed down, orally or in written form, from very early times.

It would be erroneous to think that no voices were raised against the modern views in gen¬ eral, and against the prevailing Document Theory in particular. Hengstenberg, Haever-nick, Keil, Green and

others did their best to uphold or re-establish the traditional views. Others, while admitting some truth m the newer views, proposed rival theories which, their authors believed, would explain all the facts without departing so far from traditional views. To this latter group belong A. Klostermann, James Orr, B. D. Erdmans, J. Dahse, A. Troelstra, H. M. Wiener and others. In general it may be said that these more recent theories are a combination of the Supplement Theory and a modified Document Theory. Unfortunately, the textual-critical foundations so necessary for the newer views are rather insecure. Con¬ sequently, though it may be admitted that many questions of Pentateuchal criticism are still unsettled and that some of the opinions now held may have to be modified, the Document Theory as presented in its main outlines by the Graf-Wellhausen School has still the better of the argument.

5. Mosaic Authorship. — The arguments in favor of the Mosaic authorship of the Penta¬ teuch or Hexateuch have been skilfully wrought out by those who still favor the tra¬ ditional view. (For a detailed discussion, con¬ sult F. C. Eiselen — (The Books of the Pen¬ tateuchˆ chapters IV-VII). But the most that the facts presented by the defenders of the traditional view prove is that the Pentateuch contains elements going back to Mosaic times ; which is far different from saying that the entire Pentateuch, with the exception of a few later interpolations or additions, was written

by Moses. They cannot even prove that these Mosaic elements were preserved in writing; oral tradition, faithfully preserved, would satisfy all the facts in the case. Nor is it possible to point out any of the Mosaic ele¬ ments, for they may have undergone altera¬ tions, either accidentally in the course of oral transmission, or intentionally, at the hands of later editors or revisers. Putting the case briefly, the facts presented may be said to war¬ rant the following conclusion and nothing more : Whatever the time of the final compo¬ sition or compilation of the Pentateuch, it con¬ tains elements, both historical and legal, that may have originated in the days of Moses. These

elements were later modified and ex¬ panded in the spirit of the first great leader, and the result of this development, continuing throughout several centuries, is embodied in the Pentateuch in its present form.

6. The Pentateuch a Compilation.— The modern view of the origin of the Pentateuch insists that the Pentateuch is a relatively late compilation of material taken from at least four distinct written sources, J, E, D, P, all of which reached their final form subsequently to the time of Moses. In support of this theory at¬ tention is called to facts like these: (1) The peculiar use in the book of Genesis of the divine names Yahweh and Eloliim. There are large sections of Genesis and of the opening chap¬ ters of Exodus which systematically use the divine name Yahweh, while others use Elohim (For instance in Gen. i, 1-ii, 4a, the account of creation, Elohim is used 35 times and Yahweh not at all, while in ii, 4b-25, also dealing with creation, Yahweh-Elohim is used exclusively; in Gen. xii-xvi, Yahweh is used 27 times and Elohim not at all; in Gen. xxˆiii-1, Yahweh occurs but once, El or Elohim, 67 times). Vari¬ ous explanations of the peculiarity have been at¬ tempted, but it receives a natural and satis¬ factory explanation only on the assumption that the sections were taken from productions of at least two different authors, one believing that the name Yahweh was known from the begin¬ ning, the other that it was revealed to Moses (Exod. iii, 13-16; vi, 2, 3; for a detailed dis¬ cussion consult Eiselen, F. C., (Books of the Pentateuch,* chap. VIII).

(2) The presence of repetitions and dis¬ crepancies, both in the historical and the legal portions of the Pentateuch, supports the theory of compilation. In the narrative sections these repetitions and discrepancies appear sometimes in narratives appearing side by side (compare, for instance, the stories of creation in Gen. i, 1-ii, 4a and ii, 4b-25), sometimes in narratives which, on first sight, appear to be continuous accounts of a single incident (for instance, the story of the flood in Gen. vi-ix), at other times in narratives found in different parts of the Pentateuch (compare, for instance, the dupli¬ cate accounts of the origin of names like Beer-Sheeba, Gen. xxi, 31 and xxvi, 32, 33; Bethel, xxviii, 18, 19 and xxxv, 15, or Israel, xxxii, 28 and xxxv, 10, etc). Similar repetitions and dis¬ crepancies are found in the legal sections. Mention may be made of the several laws re¬ garding the place of sacrifice (compare Exod. xx, 24, 25 with Deut. xii, 2-7 with Exod. xxvii, Iff), the laws regarding the priesthood (for instance, compare Deut. xvii, 9, 18; xviii, 1;

xxi, 5, with Exod. xxviii, 1 ; Num. iii, 5-10 and xviii, 1-7) and the laws regarding slavery (compare Exod. xxi, 2-6 with Deut. xv, 12-17, with Lev. xxv, 39ˆ12).

(3) The differences in theological concep¬ tion, in style and vocabulary, serve as additional supports of the compilation theory. One need not go beyond the stories of creation to dis¬ cover these differences (compare Gen. i, 1-ii, 4a and ii, 4b-25) ; but when we remember that the differences are equally marked in other parts of the Pentateuch, the strength of the cumulative argument can hardly be overestimated.

7. Characteristics of the Documents. — Some of the outstanding peculiarities of each of the four documents may be noted :

(1) Peculiarities of Style. — The stylistic dif¬ ferences between J and E are not as great as those between JE on the one hand and D or P on the other; which is due to the fact that J and E come from approximately the same age, the creative age, of prophetic narration. How¬ ever, a few differences between J and E may be noted : J is the best narrator in the Bible. (<His touch,® says Driver, ((is singularly light. With a few strokes he paints a scene which before he has finished is impressed indelibly upon the reader's memory.® E is perhaps a little more terse in style, but his narratives are on the whole so well told that it is not easy to see wherein they fall short of J, except that at times they lack the spontaneous charm and strength of the other. P is stereotyped, measured and prosaic. The author shows a preference for standing formulae and expres¬ sions. D can be compared only with the legal sections of P. While P is cold, legal, formal and precise, D is rhetorical and hortatory. In style the latter closely resembles the great prophets.

(2) Peculiarities of Language. — All that may

be done here is to enumerate a few of the characteristic expressions of each document. The following words are characteristic of J : — <(Yahweh is the name of the God of Israel even in pre-Mosaic times ; Sinai , not Horeb, is the name of the mountain on which the law was given; Israel, not Jacob, is the name of the third patriarch from the birth of Benjamin on. The inhabitants of Palestine are called Canaanites; the regular name of Mesopotamia is Aram Naharaim; Egypt is used as equivalent to Egyptian. The longer form of the pronoun of the first person anoklii is used, not ani. Char¬ acteristic phrases are : T o find favor or grace in the sight of … ; to call on the name of

… ; to run to meet … ; took him a

wife … ; to preserve seed alive . . ;

to dwell in the midst of … ; the particle

na with the imperative, *etc.*

As characteristic of* E may be noted : The use of the divine name Elohim in Genesis ; the pre-Israelitish inhabitants of Palestine are called Amorites, not Canaanites ; the mountain of God is called Horeh, not Sinai; from Gen. xxxii, 32 on Jacob is used in preference to Israel ; the name of Moses's father-in-law is Jethro. Char¬ acteristic expressions are also: the man Moses, and to bring up from the land of Egypt, where J uses to bring out.

The linguistic peculiarities of P are very numerous. Driver enumerates 50 expressions characteristic of the narrative-portions of

P, many of which occur never or rarely in other books, some of them only again in Eze¬ kiel. Of these may be mentioned: The use of the divine name Elohim in Genesis ; Paddan Aram is the regular name for Mesopotamia ; the mountain of God is called Sinai, as in J, never Horeb. The shorter form of the pro¬ noun of the first person singular ani is used 130 times, the longer form anokhi only once. The Hebrew ammim, meaning peoples, is used in the sense of kinsfolk, especially in the two phrases ((that soul shall be cut off from his kinsfolk® and ((to be gathered unto one's kins¬ folk.® Other peculiar expressions are: To be fruitful and multiply … ; this selfsame day

(literally <(the bone of this day®) . . after

their families … ; soul (nephesh) in the

sense of <(person® … ; throughout their

generations … ; congregation of the Israel¬ ites …; according to the mouth (com¬

mand) of … ; *etc.*

D also has its characteristic words and phrases: Horeb is used, not Sinai, as the name of the mountain on which the law was given; that your days may be long … ; a mighty hand and a stretched out arm … ; the stran¬ ger, the fatherless, and the widow … ; and

remember that thou wast a bondman in Egypt …; to do what is right (or evil) in the

eyes of Yahweh …; with all the heart and

with all the soul … ; to observe to do

… ; *etc.*

(3) Peculiarities of Thought. — J reflects a very primitive and pronounced anthropomorphic conception of deity. Yahweh is represented not only as forming human resolutions and as swayed by human emotions which is common also in later books, but as performing his acts in a human way. The J narrative shows less tendency than is seen in other parts of the Pentateuch to explain significant events by an appeal to the extraordinary, miraculous or supernatural. There is a more general recogni¬ tion of the play of

natural forces. (See, for example, the J story of the plagues of Egypt. Exod. viii, 1ˆ4, 20-32; ix, 1-7, etc., and com¬ pare these with viii, 5-7 ; ix, 8-12, etc., and also the J story of the crossing of the Red Sea, Exod. xiv, 21). E reveals different and more elaborate theological ideas. The God of E ap¬ pears not in bodily form but in dreams, and he carries out his plans through the ministry of angels. Closely connected with this high view of Divine manifestations is the representation of Abraham as a prophet and Moses, though not called a prophet, is represented as entrusted with a prophet's mission. Both J and E have much to say about the sacred sites of Pales¬ tine. The theological conceptions of P are strikingly different. The author scrupulously avoids anthropomorphisms and there are no angels or dreams as means of communication. In the legal sections of P religion is defined in terms of ritual and form which is at variance with the spirit of J and E.

D, like the other documents, has its own peculiar theological conceptions. Its funda¬ mental theological thought is expressed in Deut. vi, 4. and its fundamental law, reiter¬ ated again and again, in Deut. vi, 5. While J and E make mention of the old sacred places D will have nothing to do with them. While J and E seem to consider the pillar a perfectly

legitimate symbol of Hebrew religion, D pro¬ hibits the setting up of the pillar. While J and E permit the bringing of sacrifice in different places, D recognizes but one legitimate place of public worship.

These and other peculiarities clearly and convincingly point to diversity of authorship.

8. Post-Mosaic Elements. — If only the book of Genesis were a compilation Moses might, perhaps, be regarded as its compiler and the author of the remaining books (this was the view of Astruc). But if the entire Pentateuch is a compilation, this fact in itself makes belief in the Mosaic authorship practically impossible. There are, however, some additional specific considerations that have convinced scholars that Moses cannot be the author and that at least some portions come from post-Mosaic times. There are, for instance, certain literary con¬ siderations, such as the use of the third per¬ son, when speaking of Moses (Num. xxxiii, 2 or Exod. vi, 26, 27), or the account of Mbses' death (Deut. xxxiv, 1-8). Again in the narra¬ tive portions (Deut. i, 5; iv, 41, 46, 47, 49, Num. xxii) the territory east of the Jordan is spoken of as (<beyond Jordan,® implying that the author lived west of the

Jordan, which is not true of Moses. Residence in western Palestine is im¬ plied also in the use of the geographical term neghebh, i.e., the southern portion of Judah with the general meaning <(south,® and of ((sea,® with the general meaning ((west.® The name Hebron, used in Gen. xiii, 18; xxiii, 2; xxxvii, 14, and Num. xiii, 22, was of post-Mosaic origin (Josh, xiv, 15; xv, 13); the same is true of the name Dan (cp. Gen. xiv, 14; Deut. xxxiv, with Jdg. xviii, 29). In the same direction point passages like Deut. iii, 14 (cp. Jdg. x, 3, 4) and Gen. xl, 15.

There are also certain historical statements which point to a post-Mosaic date. Thus Gen. xxxvi, 31 presupposes the establishment of the monarchy in Israel; the expression, ((the Canaanite was then in the land® (Gen. xii, 6; xiii, 7), has meaning only if written at a time when the Canaanites had disappeared at least as an independent people. Deut. ii, 12 and Num. xxi, 14, 15 look back to the conquest as an accomplished fact. Exod. xv, 13, 17, pre¬ suppose the establishment of Yahweh's sanctu¬ ary on Mount Zion. If Moses wrote the entire Pentateuch, is it not strange that he was in doubt regarding the name of his own father-in-law (cp. Exod. ii, 18; Num. x, 29, with Exod. iii, 1; xviii, 1). Moreover, the char¬ acterization of Moses in certain passages reads as if it came from some one other than Moses (for example, Exod. xi, 3; Num. xii, 3; Deut. xxxiv, 10). There are also some legislative enactments which presuppose a background other than that of the desert (for instance, Exod. xxiii, 19; Deut. xix, 14), and some archaeological references which seem to have originated at a relatively late date (for in¬ stance, Exod. xxx, 13, 34; xxxviii, 24-26; and Deut. iii, 11).

Now, while it is true that Moses might, perhaps, have written some of the passages enumerated, others cannot possibly come from him; and in every case the only natural inter¬ pretation is that which ascribes the passage to another and later author. Again, while some of the passages might, perhaps, be thrown out

as interpolations, others are so closely bound Up with their context

that they would carry with them large sections of the Pentateuch, and the resulting breaking up of continuity in narration would increase rather than diminish the difficulties. On the other hand, all the diffi¬ culties disappear if it is admitted that the nar¬ rative in which the alleged post-Mosaic elements are found were written in the period to which modern scholarship assigns them.

9. Chronological Order of the Pentateuchal Documents.— If the Pentateuch is a compilation, and if the documents used by the compiler were written subsequently to Moses, is it possible to arrange them in chronological order? In an attempt to solve the problem scholars have studied the documents along several lines, so as to determine: (1) The historical situation reflected in the documents;

(2) the theological standpoint expressed or implied; (3) the relation of the Pentateuchal documents to other Old Testament writings,

(4) peculiarities of vocabulary and style, and

(5) the mutual relation of the documents. The conclusions reached may be summed up in these words: 1. J and E reflect the historical situation of the period of the judges and of the early kings ; D that of the later kings, especially conditions presupposed in the account of Josiah's reforms and Jeremiah's prophecies; P that of the exilic and postexilic period, espe¬ cially the age of Ezra-Nehemiah. 2. The theo¬ logical standpoint of each document agrees with what is known of Hebrew theological thinking during the period to which the document is assigned by the historical background reflected in it. 3. J and E have points of contact with Old Testament writings known to have orig¬ inated before b.c. 650 (for instance, the 8th century prophets) ; D with literature that can be dated between 650 and the exile (Jer., Kings) ; P with that of the exilic and postexilic period (Malachi, Ezra, Neh., Chronicles). D appears to have been unknown during the period of the early monarchy, P before the exile. 4. The vocabulary and style of each document are just what they might be expected to be if the documents were written during the periods to which the historical background points. 5. In their legal as in their historical sections JE, D and P represent three successive stages of development; P implies the prior ex¬ istence of D, D the prior existence of J and E. 6. All the available evidence points to the fol¬ lowing approximate dates for the documents: J belongs to the early centuries of the mon¬ archy, perhaps to the 9th century ; E was writ¬ ten somewhat later, but still during the period of the early monarchy, perhaps a generation or two preceding the appearance of the 8th cen¬ tury prophets. D presupposes the activity of the 8th century prophets and was written

dur¬ ing the reactionary reign of Manasseh, not far from 650 b.c. (See Deuteronomy). P orig¬ inated among the descendants of the exiles in Babylonia about 500 or 450 b.c.

10. Growth of the Pentateuch.— In conclu¬ sion, a brief survey may be given of the several stages in the development of the Pentateuch.

(1) The earliest literary period in Israel, as among other peoples, was preceded by aq age of song and story. The songs, dealing with sig¬ nificant incidents and events in the history of

the clan, tribe or nation, and with the heroic deeds of individuals, were highly prized and re¬ peated both by the common people and by pro¬ fessional singers. Alongside of these songs existed stories and legends centring around important persons and events. Some of this material goes back to pre-Mosaic times.

(2) In the course of time collections of the songs were made, two of which are referred to in the Old Testament (The Book of the Wars of Yahweh, Num. xxi, 14 and The Book of Yashar, Josh, x, 13). Similarly, the individual stories were combined into cycles, centr¬ ing around prominent persons who distinguished themselves in battle or in connection with other epoch-making events (cp. The Patriarchal

Stories). .

(3) After the occupation of Palestine the Hebrews assimilated in large part the native population and rededicated to Yahweh many of the local shrines and sanctuaries. With the sanctuaries some of the traditions that had grown up around the sacred places were taken over by the invaders.

(4) In time the new religion introduced by Moses permeated the early pre-Mosaic material and caused various other modifications that brought them into line with the newer and higher religious conceptions.

(5) The entrance into Palestine produced far-reaching social changes which necessitated the adaptation of older laws to the new condi¬ tions and to the formulation of new laws. At the sanctuaries, codes of such laws may have been made (cp. The Book of the Covenant), and in the same places efforts may have been made to preserve in more permanent form the songs and stories of the past.

(6) During the period of the United Mon¬ archy traces of connected prose writing appear for the first time. The new literary interest continued to flourish, even after the division of the kingdom, and manifested itself among the prophets in the collection of ancient songs and stories, and their compilation, after im¬ pressing upon them the religious ideas of the collectors into extensive narrative works, which endeavored to trace history back to the begin¬ ning of man's life upon earth. Several compila¬ tions of this kind may have been undertaken, but only two of them, <(The Yahwist," written in Judah, and ((The Elohist,® written in Israel, exerted marked influence on later literary developments affecting the growth of the Pentateuch.

(7) The next significant step was a com¬ bination of these two documents, <(The Yahwistic}) and <(The Elohistic,® into one continuous history. This was done probably during the reactionary reign of Manasseh, when the les¬ sons taught in and by these histories needed to be impressed upon the people. As might be expected, the Yahwist, which originated in Judah, where the combination was made — the northern kingdom having disappeared — was made the basis of the compilation.

(8) During the same general period the Deuteronomic Code, or D, assumed literary form. In a sense D marks a compromise be¬ tween the prophets and the priests. The author or authors sought to make the prophetic teach¬ ing more effective by putting the lofty, pro¬ phetic principles into concrete form. Hence,

they adopted, as far as possible, previously existing forms, usages and traditions, and eliminating the lower elements they poured into them a deeper and more spiritual significance.

(9) After the acceptance of D as the law of the land during the reign of Josiah, the desira¬ bility of combining the new law code with the earlier documents was soon felt. This feeling received a new impetus after the dissolution of the national life, when the few remains of national literature came to be highly prized. Thus, at some time

during the 6th century D was united with JE, the compiler, or compilers, introducing into the older work such modifi¬ cations as were necessary to maintain or estab¬ lish a logical arrangement.

(10) The publication of D with its prophetic note caused the priests to feel that their own interests and the interests of the phase of re¬ ligion they represented demanded the collection into a short code of the more fundamental laws dealing with the priests' interests and ideals. The result was the so-called (<Law of Holiness® (Levit. xvii-xxvi. See article Leviticus), which was compiled shortly before the exile of b.c. 586.

(11) The Babylonian exile was of the great¬ est significance in the development of Israel's literature and religion. Religion became spirit¬ ualized, especially through the activity of Jere¬ miah and Ezekiel. But while the spiritualizing process was going on the question seems to have arisen in the minds of some: Having reached the higher stages of religion, how may the lapses of the past be avoided? The answer was : By insisting upon obedience to definite rules and regulations. With the promulgation of D the reign of written law had its beginning; the Law of Holiness and the laws of Ezekiel mark further steps in the same direction, but the highest development of the legalistic tend¬ ency may be seen in the Priestly Code, which originated among the exiles in Babylon.

(12) The new law, having behind it the authority of the name of Moses, soon came to be accepted and revered as final authority. In other words, the seat of authority was trans¬ ferred from the present experience of com¬ munion with God to laws thought to have been given when God seemed much nearer to his people. This new interest in the past impelled some priest or priests who were under the influence of the new point of view to rewrite the early history of Israel, tracing it back to creation, perhaps for the sole purpose of pro¬ viding a fitting historical setting for the laws of the Priestly Code.

(13) The necessity of amalgamating the two parallel histories of the Mosaic and the pre-Mosaic ages JED and P must have been felt soon after the compilation of the Priestly Code. As long as the two existed side by side as separate works, they would appear to compete for recognition as the authoritative work of Moses or of Yahweh. Such controversy could be avoided only by uniting the two into one continuous work. The task of fusing JED with P may have been undertaken by Ezra the scribe, or, if not by him, by some one else who was in hearty sympathy with the ideals of P.

(14) Thus, aside from minor alterations made at a later period, the Pentateuch reached its complete form before b.c. 400. The finished

production received the designation Tdrah or Law. Subsequently it was divided at natural dividing points into five parts or books, so that the whole came to be known as the “Five-Fifths of the Law.® From this title came the name “Pentateuch,® meaning “Five-Roll Trea¬ tise,® which was coined by Greek writers, from whom it passed into Latin and other Western languages.

Bibliography. — 1. Old Testament Introduc¬ tions by Bennett, W. H. (New York 1899) ; Creelman, H. (New York 1917) ; Driver, S. R. (New York 1891 ; new ed., 1910) ; Gray, G. B. (New York 1913) ; McFadyen, J. E. (New York 1905) ; Keil, C. F. (Edinburgh 1869) ; Raven, J. H. (New York 1906). The last two represent the traditional point of view.

2. Books on the Pentateuch: Addis, W. E., (The Documents of the Hexateuch) (Vol. I, 1893; Vol. II, 1898); Bacon, W. B., <Genesis of Genesis* (Hartford 1892) ; (The Triple Tra¬ dition of the Exodus *(Hartford 1894) ; Bissell, E. C., (The Pentateuch) (New York 1885, traditional) ; Briggs, C. A., (The Higher Criti¬ cism of the Hexateuch) (New York 1893) ; Brightman, E. S., (The Sources of the Hexateuch* (New York 1918) ; Carpenter, J. E., and Harford-Battersby, G., (The Hexateuch) (2 vols., London 1900; Vol. I is published separately under the title, (The Composition of the Hexateuch*); Chapman, A. T., introduc¬ tion to the Pentateuch* (Cambridge 1911); Eiselen, F. C., (The Books of the Pentateuch* (New York 1916) ; Finn, A. H., (The Unity of the Pentateuch) (London, no date, traditional) ; Green, W. H., (The Higher Criticism of the Pentateuch* and (The Unity of the Book of Genesis) (New York 1895, traditional) ; Orr, James, (The Problem of the Old Testament (New York 1906) ; Simpson, D. C., (Pentateuchal Criticism* (London 1914) ; Skinner, J., (The Divine Names in Genesis) (London 1914) ; Troelstra, A., (The Name’ of God in the Pentateuch) (London 1912) ; Wiener, H. M., (Essays in Pentateuchal Criticism* (Lon¬ don 1910) ; (The Origin of the Pentateuch) (Oberlin 1910) ; (Pentateuchal Studies) (Oberlin 1912, against the Document Theory).

Frederick Carl Eiselen, Professor of Old Testament Interpretation,

Garrett Biblical Institute.

PENTAUR (Egyptian, Pen-ta-were), an Egyptian scribe who died

about the 10th year of the reign of Menephtah. He is famed as the copyist of the papyrus (Sallier 3) in which is recorded the poem celebrating the victory of Rameses II over the Hittites at Kadesh. Pentaur was long considered the author of the poem. In Egypt another person of this name was tried and convicted of treason in the reign of Rameses III. Consult Breasted, J. H., (A History of the Ancient Egyptians* (New York 1908).

PENTECOST, George Frederick, Ameri¬ can clergyman : b. Albion, Ill., 23 Sept. 1841 ; d. 7 Aug. 1920. He was private secretary to the governor of Kansas Territory in 1858 and later entered Georgetown University which he left to join the Union army, where he was chaplain of the 8th Kentucky Cavalry volunteers in 1862-64. After the war he held several Baptist pas¬ torates, was pastor of Tompkins Avenue Con¬ gregational Church in Brooklyn 1880-87; en-

gaged in evangelical work with Moody in Scot¬ land and England in 1887-88; and in 1889-91 conducted a mission to the English-speaking Brahmans in India. He was pastor of Mary-lebone Presbyterian Church, London, 1891-97, and of the First Presbyterian Church, Yonkers, N. Y., 1897-1902; and after that was sent by the joint boards of the Presbyterian and Congrega¬ tional churches as special commissioner to the Philippine Islands, China and Japan. From 1914 he was the pastor of the Bethany Presbyterian Church in Philadelphia. He wrote (The Angel in the Marble) (1876) ; (Bible Studies1 (10 vols., 1880-89) ; (Birth and Boyhood of Christ1 (1896); (Precious Truths1 (1898), and others.

PENTECOST (from the Greek pente-koste, the fiftieth), a Jewish festival, held on the fiftieth day after Passover (the 16th of Nisan), in celebration of the ingathering and in thanksgiving for the harvest. It may fall on the 5th, 6th or 7th of Sivan. Its establishment is related in Levit. xxiii, 15, 16 and Deut. xvi, 9—12. It was called the Feast of Weeks (Exod. xxxiv, 22) because it occurred at the end of a week of weeks, or seven weeks; the Feast of the Harvest (Exod. xxiii, 16) ; or the Day of First-Fruits Numb, xxviii, 26). It is cele¬ brated by Jews of

the present day on the 6th and 7th of Sivan — that is, between the second half of May and the first half of Tune. It is also a festival of the Christian Church, occur¬ ring 50 days afer Easter, and is celebrated in commemoration of the descent of the Holy Ghost upon the disciples gathered together to celebrate the ancient feast (Acts ii, 1-4). It is called Pentecost in the Roman Catholic Church ; but Whitsunday ‘by Anglicans.

PENTECOSTAL CHURCH OF THE NAZARENE, also called the HOLINESS CHURCH, an American church body formed in 1908. Its most particular tenet is sanctifi¬ cation by faith after justification has been ef¬ fected through the medium of divine grace. The Church maintains a collegiate institute at North Scituate, R. I., and maintains theological schools at Los Angeles, Cal., and at Pilot Point, Tex. It is also connected with Texas Holi¬ ness University at Peniel, Tex., and Arkansas Holiness University at Vilonia, Ark. The offi¬ cial publications are the Beulah Christian , Providence, R. I., Holiness Evangel, Pilot Point, Tex., and The Nazar ene Messenger, Los Angeles, Cal. In 1919 ‘the Church had 780 min¬ isters, 941 churches and 33,419 communicants.

PENTELICON, the modern mountain range known as Mendeli. It is situated in Attica. The marble quarries on its slopes fur¬ nished material for the great public buildings of Athens. Consult Gardner, E. A., (Ancient Athens1 (London 1902).

PENTHESILEA, according to Greek legend the daughter of Ares and queen of the Amazons. She aided the Trojans in their struggle with Greece and was slain by Achilles, who was about to erect a tomb for her when Thersites reproached him so that Achilles slew the latter and the body of Penthesilea was thrown into the Scamander by Diomedes.

PENTLAND FIRTH, pent’land ferth, a channel connecting the Atlantic Ocean with the North Sea, lying between the mainland of

Scotland and the Orkney Islands. It is about 14 miles long, east to west, six to eight miles broad and is regularly traversed by a steam-ferry. A current, setting from west to east at each tide, flows through it with a velocity of 6 to 12 miles per hour, meeting another tidal wave speeding from east and causing many eddies and whirlpools, rendering navigation ex¬ ceedingly dangerous for sailing vessels. At its eastern extremity are the Pentland Skerries, a group of small islands and rocks, the scene of numerous shipwrecks. On the Muckle

Skerry, about four and a half miles north by east of Duncansbay Head, are twin lighthouses, 100 feet apart, with two fixed lights — the one 170 feet, visible 19 miles, and the other 140 feet high, visible 18 miles. Previous to the war more than 5,000 vessels a year navigated this -passage.

PENTLAND HILLS, a mountain range of Scotland, of porphyry and greenstone for¬ mation, in the counties of Edinburgh, Peebles and Lanark, commencing three and a half miles south by west of Edinburgh, and extending southwest for about 16 miles. The highest summits are Scald Law, 1,898 feet, and Carne-thy, 1,890 feet above sea-level. The water sup¬ ply of Edinburgh is obtained from springs on these hills.

PENTLANDITE, a sulphide of iron and nickel worked for nickel in Gap mine, Lancas¬ ter County, Pa.

PENTONVILLE, London, England, a populous district in the parish of Saint James, Clerkenwell, first settled in 1773. It gives its name to the Pentonville Model Prison, built in 1840-42 in Caledonian road, in the adjacent parish of Islington. The prison is constructed on the radiating principle, so as to admit of thorough inspection, and contains accommoda¬ tion for 520 prisoners. The treatment is to <(enforce strict individual separation, with in¬ dustrial employment and moral training.11 The advantages of this type of prison quickly brought it into prominence, and within a very short time a large number of such prisons were erected not only in England, but all over the civilized world.

PENTSTEMON, in systematic botany, a genus of chiefly American perennial herbs of the figwort family (or Scrophulariacece) hav¬ ing opposite or veriticillate leaves and bright blue, purple, red or white flowers. The name of this genus is from two Greek words, nevre, five, and oTrgujv, or warp (the latter word akin to the Latin stamina, a warp, a fibre), — two words conjoined, and thus expressing the idea of “five-stamened11 plants, a notion that re¬ fers to the presence of a fifth stamen in plants of the genus. It is to be noted, however, that the stamen in question, unlike its four com¬ panion st?mens, is imperfect, having no anther. The vast majority of the many species of this genus are natives of western United States. Two, perhaps three, species occur in the eastern half of the Union; while a few occur wild in Mexico. Many, cultivated under the name ˆBeard-tongue,11 are to he found in Amer¬ ican gardens. A sterile filament, usually densely bearded, is characteristic of the plant. This perennial has prettv flowers which in the late spring and during the summer abound in

dry, rocky regions, giving at a distance a hyacinth-like effect to the landscape. In parts of the United States they are said to be very beautiful, especially somewhat to the southward.

Pentstemon pubecens of Solander is a com¬ mon species, and its stem is found to range be¬ tween one and three feet in length. Its leaves are oblong or lance-shaped, and its dull purple or partly whitish, nodding flowers open in a slender cluster. Its calyx is five-parted ; its corolla tubular and slightly dilate, the throat being nearly closed by a bearded palate.. It has four stamens perfect, and the fifth is a densely yellow-bearded sterile filament ; and there is a single pistil. It occurs especially in dry soiled regions. P. digitalis of Gray, the white beard-tongue of more western localities and especially of Pennsylvania, is a very effective plant, which at times attains the height of five feet. It is perhaps the tallest member of the genus. An abruptly inflated corolla in¬ clines toward a pure white flower in this species. Other species of the genus are (1) P. Iceviga-tus of Solander, growing from two to four feet tall, with a white corolla sometimes purple-tinged; (2) P. Cobcea of Nuttall found on the plains from Kansas southward. It grows from one to two feet tall; has o.vate,. even denticulate leaves, and a few-flowered panicle or raceme, a pale purplish corolla, abruptly inflated above a narrow base. Its sterile filament is bearded. Pentstemon Cobaea is often found cultivated;

(3) P. ovatus of Douglas, found in Oregon, is an early blue-flowered species, puberulent or pubescent, with ovate or lance-ovate serrate leaves, and an open panicle of small flowers ;

(4) P. confertus of Douglas, which grows from one to two feet tall, has lance-oblong, oblong, even linear, quite entire leaves. Its inflorescence is spike-like, interrupted and naked. Its corolla is small, cream or sulphur-colored. Yet in one variety of this species, P. caeruleo-purpureus of Gray, it is blue-purple and violet colored. This variety occurs in the Rocky Mountain area and in other parts of the West; (5) P. cam-panuldtus, of Willdenow, is a plant with lanceolate leaves, the base clasping. It flowers in a raceme-like, onesided panicle. Its corolla

is reddish-purple or rose-colored; and its sterile filament is bearded. Common in gardens, this Mexican species varies greatly under cultivation; (6) P. barbatus of Nuttal, another species found in Mexico and in the United States as far north as Colorado, has been long under cultivation in gardens. Its slender, wand-like stems attain from three to four feet in height. Its leaves are pale, and it has a long, loose, raceme or panicle of droop¬ ing flowers. The corolla is narrowly tubular and of a scarlet hue. Some beard appears in its throat but its sterile filament is naked; (7)

P. grandiflorus of Nuttall, is pale and graucus, with thick ovate leaves, closely sessile and en¬ tire ; the upper ones are rounded. Its short-pediceled flowers are lilac-purple ; its oblong, bell-shaped corolla is almost equally five-lobed; and its sterile filament is nearly smooth. Its home is in Wisconsin and to the west and south- , ward of that State; (8) P. glaber of Pursh, found on the great plains from Dakota, south and west. Its ascending stems are from one to two feet long. Its leaves are lanceolate or lance-ovate, and it bears a narrow panicle of very handsome flowers ; the tubular-inflated

corolla being of a bright purple-blue hue, with spreading lobes. Its sterile filaments are found either slightly hairy or else entirelv naked; (9) P. Hartwegi of Bentham (or P. gentianoides) , with lanceolate leaves, elongated peduncles, three-flowered and a corolla of a deep red or red-purple, is found wild in Mexico ; and has also passed under cultivation.

Plants formerly called Chelone or Turtle-Head (q.v.) (Chelone barbata and Chelone

campanulata) are now classed among pent-stemons.

PENUMBRA. See Eclipse.

PENZA, pen’za, Russia, (1) the capital of a government of the same name, beautifully sit¬ uated on an eminence at the junction of the Penza and Sura, 492 miles by rail southeast of Moscow. It is the see of a Greek Catholic bishop. It was founded in 1666 by Michael as one of four fortified defenses against Tartar incursions, and consists of an old town with wooden houses, and a new town with many fine mansions and residences, and handsome churches standing in the centres of large open squares. In the upper end of the town is Cathedral square in which are located the Greek cathedral, the courthouse and the

gover¬ nor's residence. In the town are several beauti¬ ful gardens, a large park, and numerous good educational institutions, including a horticultural school connected with the Imperial Botanical Gardens located here. It possesses paper mills, lumber and flour mills, cloth factories, iron works, tanneries, soap-boiling and candle-mak¬ ing establishments, *etc.* Penza is the market place for certain characteristic textile manufac¬ tures of goats' wool, made in the government. Here also are held two fairs in each year for sales of the horses and cattle bred in the neigh¬ borhood. Pop. 83,100 (1917). (2) A govern¬

ment of central Russia, bounded north by Nipni-Novgorod, west by Tamboy, south by Saratov, and east by Simbirsk, has an area of 14,997 square miles. Its surface is undulating and intersected by low hills separating the basins of the Oka, Don and Volga, the last of which receives the far largest share of the drainage indirectly. The Moksha and Sura rivers are navigable and support a large and active traffic. The climate is rather severe; the average yearly temperature being 40°, with extremes of 12° in January and 68° in July. The soil is a fertile black loam. The forests are extensive, especially in the north. Agricul¬ ture is the chief industry, and the region has large areas devoted to the sugar beet which flourishes here. Cattle and horses are raised in quantity, and much grain is grown. Bee-keep¬ ing is widely followed. Mill-stones are quar¬ ried. The chief exports are corn, flour, spirits, leather, soap, wax, honey, potash, wool and timber. Manufactures are steadily progressing in the government. Pop. 1,940,500.

PENZANCE, pen-zans', England, a sea¬ port town of Cornwall, picturesquely situated on the northwest margin of Mount's Bay, on a finely curved shore, bordered by rocky heights, 26 miles southwest of Truro. It is the terminus of the Great Western Railway. Besides three fine parish churches, it has various Dissenting chapels, a handsome townhall, market-house and customhouse; a grammar school, and science and art schools; a geological society

with a valuable collection, a public library, and other scientific or

literary institutions. The harbor is small, about 25 acres, and is formed by a breakwater, with a lighthouse at the ex¬ tremity. The climate is extremely mild, though moist, and it is highly esteemed as a health re¬ sort. It is a large gardening section raising early vegetables for the London market. The principal industries, however, are fishing and shipping. There is a large export of tin and copper, china-clay, mackerel and pilchards to Italy. The town was burned by a band of Spanish marauders in 1595, and was sacked by Fairfax in 1646. Pop. about 15,000.

PEONS AND PEONAGE. Peon is a Spanish word signifying a day laborer, and in South America is applied especially to Indians. By the word peonage is meant compulsory serv¬ ice based on the indebtedness of the peon to the employer. By the civil law under the Span¬ ish colonial system, and by special statute in some countries, as for instance by the law reg¬ ulating contracts between masters and servants in Mexico, peons are compelled to continue to work for their employers, if they are in debt to the latter, until the debt is paid. They re¬ ceive wages, amounting in Mexico to $5 a month. The condition which arises is that no effort is made by the peon to keep out of debt; on the contrary, the larger his debt the more secure he feels, and if the employer insists on scaling down the indebtedness, it is not only regarded as an insulting lack of confidence, but also as notice of a coming discharge. On his side, however, the peon may demand a state¬ ment of his account at certain intervals, and be allowed 17 days freedom to look for a new em¬ ployer willing to buy his account — that is, pay the debt to the former employer, and take over the peon worker and his indebtedness. In Co¬ lombia peonage is at its worst. The peon is obliged to work for the employer whom he owes four days in every week. For this service he receives five cents per day if on the uplands, 10 cents if on the lowlands. He has the use of an acre or more of land upon which to raise food for his family, and except for the pre¬ scribed four days (eight hours each) his time is his own. As a rule “trading® is done at the store of his employer, and the peon is at his mercy if disposed to demand extortionate prices. It is alleged that many proprietors, by enticing the peons in their employment into needless expenditures, and by selling them goods and advancing them money, contrive to keep them hopelessly in debt and in a conse¬ quent state of bondage. The creditor, however, has no power over the wife and children of the peon, nor can the latter be sold like a slave. Peonage was abolished in the Argentine Repub¬ lic in 1886.

In the United States peonage has always ex¬ isted to a greater or lesser extent, especially in the Southern States. When Arizona and New Mexico came under the jurisdiction of Congress it was found that

the local laws and customs recognized the peonage system, and it continued until 1867, when Congress abol¬ ished peonage in the United States and the ter¬ ritories thereof. This condition of qualified servitude is still more or less prevalent in the South, and in some places the brutalities perpe¬ trated have led to the indictment and prosecu¬

tion of offenders for violations of the statutes. Since 1890 the prosperity of the Southern States has rivaled that of the North, and the demand for labor has been phenomenal, and employers, especially in the naval stores indus¬ try and on the plantations, have had great dif¬ ficulty in securing workmen. As a result of these conditions there has been a great demand for convict labor (q.v.). In many instances persons, white as well as black, apparently without money or friends, have been arrested by the local constable and arraigned before the police or justice of the peace court. At this point it has been customary for an employer or agent of a large employer of labor to appear on the scene and induce the prisoner to plead guilty to a trivial offense, with the understand¬ ing that the employer (who is quite often in conspiracy with the court officials) would pay the fine and prevent an imprisonment. A writ¬ ten acknowledgment of debt is secured from the victim, in which he agrees to work for the person paying the fine, either on his plantation or in his labor camp. The victim is then taken to the place of labor, and finds that he is guarded there like a convict. If he turns to and works diligently so as to pay off the debt due his employer, he is charged with all kinds of goods at high prices, and the debt is held over him for an indefinite period. If, on the other hand, he revolts and escapes, he is run down, arrested without process, returned to the private prison and perhaps beaten brutally.

Another way of securing victims is for the employer or his agent to proceed to some town or city and to hire a lot of laborers, agreeing to pay them certain wages and their railroad fare to the place of labor, and to advance them pro¬ visions from the company store, or, as it is commonly called, the commissary. The labor¬ ers arrive, and at the outset are indebted to the employer, who sees that they trade out their wages at the commissary, and in many instan¬ ces, by a system of deductions and false entries, manages to keep the laborer perpetually in debt. If the laborer has a family, so much the better for the employer ; they must live out of the commissary, and if the laborer runs away his family is detained at the camp. The writer has known of an employer withholding young chil¬ dren from both father and mother for the pur¬ pose of forcing the payment of a debt. If the

laborer escapes, the machinery of the local criminal law is put in motion to arrest and re¬ turn him under the charge of false pretenses, cheating and swindling; or, in the State of Florida, under the law relating to false prom¬ ises. If the runaway is arrested he is seldom tried before the courts. The arresting officer, often in the pay of the employer, induces the victim to return to work rather than go to jail, and so he returns to bondage with a heavier load of debt to carry, for the cost of pursuit and arrest is charged to him. Often no process is issued for arrest, but the employer arrests without process, returns the prisoner to his labor camps and inflicts severe chastisement. Many of the labor contracts contain provisions to the effect that the laborer consents to allow himself to be locked in a stockade at night and at any other time when the employer sees fit to do this.

On 2 March 1908 the House of Representa-

tives passed a resolution requesting the Immi¬ gration Commissioner to investigate the treat¬ ment and conditions of labor of the immigrants on the cotton plantations of the Mississippi Delta, in Mississippi and Arkansas, and also on the turpentine farms, and in the lumber and railway camps of Florida, • Mississippi, Louisi¬ ana and other States. The commission made an exhaustive inquiry, and developed the fact that cases of peonage existed in every State in the Union excepting Oklahoma and Connec¬ ticut. Most of those in a condition of peonage in the South had been sent there from New York City, their fare thither constituting the first link in the chain of debt which ever grew heavier. It was found that the root of the sys¬ tem was in the terms of the contract-labor laws, which made the flight of a man in debt for money or goods or transportation advanced, prima facie evidence of intent to defraud; and thus it was easy to bring about their arrest and sentence to jail, unless the employer paid a fine to be charged up on the peon's account. The courts in Virginia, West Virginia, North Caro¬ lina, Georgia, Florida, Alabama, Mississippi, Arkansas and Missouri found methods of safe¬ guarding the rights of the peons, and have done much toward ending the condition ; and the

Supreme Court in the historic Clyatt case ruled that while there is no law against peonage, it was unlawful to arrest and confine a man for debt, and that damages might be recovered therefor. The condition of peonage is still in uninterrupted sway in some of the New Eng¬ land lumber camps, and to some extent in every cosmopolitan city.

In New York and San Francisco thousands of Chinese coolies, mostly employed in laun¬ dries, exist under a system of peonage not un¬ like that in vogue in the South; while the Italian padrone system, which has always held sway in the Italian quarter of New York City, has held hundreds of immigrants in slavery. These two evils of metropolitan life have le-ceived scant if any attention from the Federal, State or municipal authorities.

PEONY, a genus (Pceonia) of the family Rammculacece. With one exception (P. biownii) ‘the species are natives of Europe and Asia. They are practically all in cultivation in gardens, being valued for their hardiness, easy cultivation and large, attractive fioweis. They are mostly herbaceous perennials with tuberous rootstocks, large pinnate leaves and flowers ranging through all shades of red to white and yellow. Many garden varieties and hybrids have been produced, including numerous double forms. The plants will grow in almost any soil but thrive best in rich, rather moist deep loam The crowns should be buried two inches below the surface and the ground, especially close to the plant, kept free from weeds. When once established annual dressings of stable manure should be given and the plants left un¬ disturbed. Properly treated peonies will often prove satisfactory for 25 years without removal or renewal. The most popular species is P. officinalis, a native of southern Europe, which produces large flowers abundantly during late spring. The next most popular is probably P. albiHora, a native of Siberia, blossoming about a month later than the preceding species and having fragrant flowers. A large number ot the cultivated forms are derived from these

two species. The roots of the latter are used by the Tartars for food.. Several species are known as Chinese peonies but this term is more widely applied to hybrids and varieties of a more extended list than the native Chinese kinds. They are often fragrant and double-flowered. The tree-peony (P. moutan) often grows five feet tall, is much branched, and pro¬ lific of bloom. It is somewhat less hardy than the common peony and in the North is often grown as a greenhouse plant. It is a native of China, where it has long been cultivated and where there are hundreds of varieties. In America it is less known than the

first two spe¬ cies. When grown out of doors the tree-peonies should be mulched. with litter or leaves if in exposed places, especially north of Phila¬ delphia.

PEOPLE'S INSTITUTES. The people's institute purposes to promote broader co-opera¬ tion between different classes of society, to in¬ crease the spirit of tolerance between different religious and racial groups, to create, a social consciousness and civic pride. Two significant movements are to be recorded for the last two decades. The People's Institute of New York City was organized in 1897 in Cooper Union ; the Rochester Social Center was organized in the autumn of 1907 as part of the extension activities of the Rochester public schools. The undertaking is a large one. Religious , predi¬ lections are deeply rooted; political theories and party allegiances give rise to intemperate dis¬ cussions, racial and political customs among immigrants constitute serious social barriers. But to name the difficulties confronting this socializing effort is to emphasize its importance. The plan has commended itself to many, com¬ munities but few have been able to avoid the pitfalls of politics and prejudice. .The people's institute may become the nerve centre of democracy but it must be built on very gener¬ ous lines.

Activities. — The activities of a people's in¬ stitute are both intellectual or cultural and social. Anything that promotes sociability and stimulates the intellectual and moral life is a legitimate part of the work. Lectures, concerts, debates, study-groups, folk-dramatics, games, dances — such is the program.

Community interests focus, the community attention. Social welfare, civic improvements, public sanitation, are used to awaken a social consciousness and social solidarity is an in¬ evitable consequence as soon as a common interest has been found to intensify and fix community thought. It is reasonable to expect free discussion of political doctrines in a people's institute. But campaign speakers may not be safely included on the program until a community has been educated to a large measure of intellectual self-control. The people's institute is another form, of educa¬ tional extension and should be considered with Parent-Teacher Associations, Education, Im¬ migrants, Continuation Schools, Mother's Clubs and the Lyceum Movement (qq.v.).

A. R. Brubacher.

PEOPLE'S PALACE, a building in the East End of London, situated in Mile-end Road, opened by Queen Victoria, May 1887. It pro¬ vides for

the population of the East End a hall for concerts and other entertainments, a library

and reading-rooms, gymnasia, swimming-baths, social-meeting rooms, rooms for games, refresh¬ ment-rooms, a winter-garden, technical schools, *etc.* The first year the membership was 4,200. The nucleus of the palace was the Beaumont Philosophical Institute, founded by J. T. B. Beaumont (died 1840), who left $60,000 to establish an institution for the moral and intel¬ lectual improvement of the working-class in the East End of London. A movement set on foot by a novel by Sir Walter Besant All Sorts and Conditions of Men5— in which a (<Palace of Delight55 was described, resulted in raising the fund to $375,000, and with this largely increased fund the People's Palace was constructed. It is supported mainly by the annual contribution of $35,000 made by the Drapers Company of London. The technical schools, organized under the title of ((The East London Technical College,55 now rank as a school of the University of London with the title of ((The East London College,55 and as such receives a grant of $17,500 annually.

PEOPLE'S PARTY, The, or POPU¬ LIST PARTY, an American political party with national and State organizations, originally formed at a national convention held at Cin¬ cinnati, Ohio, 19 May 1891. The People's party was the outgrowth of various smaller organiza¬ tions like the Greenback party, the National Farmers' Alliance, the Grangers and other bodies composed of workingmen and the agri¬ cultural classes. It became the third political party in size and strength, next to the Republi¬ can and Democratic parties, and. for over a decade was an important factor in American politics. The original convention platform demanded :

The free and unlimited coinage of silver; the abolition of the national banking system; the issue of fiat money in suffi¬ cient quantity to transact the business of the country on a cash basis, and the loan of

such currency to the people at not more than 2 per cent per annum on non-perishable agricul¬ tural products; national ownership of all means of public communication and transportation; a graduated income tax; popular election of United States senators; the adoption ot the initiative and referendum in legislation; and the proi'iibi-tion of alien ownership of land.

In 1892 the second National Convention of the People's party met at Omaha, Neb., on 2 July, to nominate candidates for President and Vice-President, and adopted substantially the same platform as that promulgated at Cincin¬ nati. The nominees were James B. Weaver of Iowa, for President, and James B. Field of Virginia, for Vice-President. At the subse¬ quent election in November the ticket received 22 electoral votes and a popular vote . of 1,055,424. In the next Presidential campaign, that ' of 1896, the party nominated William Jennings Bryan, for President, and Thomas E. Watson of Georgia, for Vice-President. The platform adopted at the National Convention was as follows:

1. We demand a National money, safe and s<pund, issued bv the General Government only, without the intervention of banks of issue, to be a full legal tender for all debts, public and private; a just and equitable, and efficient means of distribution, direct to the people, and through the lawful

disbursements of the Government. . , .,

2. We demand the free and unrestricted coinage of silver and gold at the present legal ratio of 16 to 1, without waiting

for the consent of foreign nations.

3. We demand that the volume of circulating medium be speedily increased to an amount sufficient to meet the demands of the business and population., and to restore the just level of prices of labor and production.

4. We denounce the sale of bonds and the increase of the public interest-bearing debt made by the present Adminis¬ tration as unnecessary and without authority of law and demand that no more

bonds be issued, except by specific act

°f ˆ?nWeSdemand such legislation as will prevent the demon¬ etization of the lawful money of the United States by private

contractˆ demand that the Government, in payment of its

obligations, shall use its option as to the kind of lawful money in which they are to be paid, and we denounce the present and preceding Administrations for surrendering this option to the holders of Government obligations.

7. We demand a graduated income tax, to the end that aggregated wealth shall bear its just proportion of taxation and we regard the recent decision of the Supreme Court relative to the income tax law as a misinterpretation o .the Constitution and an invasion of the rightful powers of Uon-crrp > cQ nvpr the. subiect of taxation.

In this campaign of 1896 Bryan also received the nomination of the Derrtocratic party, and a majority of the People's party also voted for the Democratic Vice-Presidential candidate, W. J. Sewall of Maine. Those who remained steadfast to the Bryan and Watson ticket were popularly known as <(Middle-of-the-Road Populists.55 Bryan received 176 electoral votes, Sewall 149 and Watson 17. Various State con¬ ventions of the People's party in 1898 adopted substantially the same declarations of principles, the salient points of which were: The free and unrestricted coinage of silver and gold at the ratio of 16 to 1, without waiting for the con¬ sent of other nations; the speedy increase of the circulating medium to an amount sufficient to meet the demands of a growing business, and no further issue of United States interest-bearing bonds. Other demands of these conven¬ tions were for postal savings banks, the gov¬ ernment ownership of railroads, telegraph, tele¬ phones and lighting plants; the construction and ownership of the Nicaragua Canal by the United States; the election of United States senators by the direct vote of the people and the adoption of the initiative and referendum. ˆGovernment by injunction55 was denounced; also all funding bills calculated to extend the time for the payment of the Pacific Railroad debt. All conventions commended the action of the United States in making war upon Spain and promised the support of their party to the government in its efforts to carry it to a suc¬ cessful issue. The North Carolina convention opposed <(the domination of gold and monopoly55 and favored the (<overthrow of national banks and railroad influence in

controlling legislation.55 The Nebraska convention demanded ((more money and less misery for the people55 and pro¬ tested against the retirement of the greenback.

At the close of the campaign of 1896 much opposition arose among Southern Populists against a further alliance with the Democratic party and spread northward. On 14 Feb. 1897 the first open rupture occurred at Grand Rapids, Mich., in a State convention, and resulted in two State organizations. On 22 Feb. 1897, at a meeting of* the Populist Reform Press Associa¬ tion at Memphis, Tenn., a committee was ap¬ pointed to endeavor to heal the differences, and call a conference, if deemed necessary. The Nashville Conference, held 3, 4 and 5 July 1897, was the outcome, but turned out to be a mjd-road convention. A National Organization Committee, similar to the National Committee, was appointed with power to call a National Convention if deemed necessary. This commit¬ tee called a convention, which was lightly at¬ tended, at Cincinnati, Ohio, on 5 Sept. 1898.

In February 1900 a meeting of the regular National Convention was held at Omaha, Neb., resulting in a complete separation of the fac¬ tions and a call for a national convention from each — the fusion at Sioux Falls, Iowa, and the anti-fusion at Cincinnati, Ohio, both for 9 May. The Sioux Falls Convention, in addition to the platform of previous conventions, vigorously denounced the imperialistic policy of the gov¬ ernment, expressed sympathy with the Boers in their struggle with Great Britain, advocated public ownership of public utilities . and con¬ demned the practice of the courts in issuing in¬ junctions in labor disputes between employees and employers. William J. Bryan was nomi¬ nated for President and later by the Democratic Convention. Charles A. Towne of Duluth, Minn., was nominated for Vice-President after a lively contest to leave the second place vacant until action by the Democratic National Con¬ vention, and to accept the nominee. After the Kansas City Convention Mr. Towne declined the Populist nomination and the Populist Na¬ tional Executive

Committee substituted Mr. Stevenson, the Democratic nominee. The Cin¬ cinnati Convention nominated Wharton Barker of Philadelphia, Pa., for President, and Igna¬ tius Donnelly of Saint Paul, Minn., for Vice-President, and adopted as its platform :

(1) Initiative and referendum; (2) public ownership and operation of those means of communication, transportation and production which the people may elect; (3) land for actual occupation only and alien ownership prohibited; (4) a scientific, or absolute paper money, based upon the entire wealth and population of the nation, not redeemable in any specific commodity, but a full legal tender for debts, taxes and public dues, issued by the government only m sufficient quantity to meet the demands of commerce, and free coinage of silver and gold at 16 to 1 until such currency system could be established; (5) graduated tax on incomes and inheritances; (6) election of president, vice-president, senators and Federal judges by direct vote of the people; (7) direct nominations.

Both wings of the People's party main¬ tained national committees in 1903-04 with a representative from every State in the Union, and in the summer of 1903, through the initia¬ tive of the fusion wing, a joint meeting of the two National conventions was held at Denver, Colo., resulting in harmony, and in a united call for a meeting of both committees at Saint Louis, Mo., on 22 Feb. 1904 when plans for the approaching National campaign were discussed and it was positively decided to nominate inde¬ pendent candidates for the offices of President and Vice-President. At the National Conven¬ tion, held later in the year, therefore, Thomas E. Watson of Georgia and Thomas H. Tibbies were selected to represent the party in the forthcoming election, at which they received a popular vote of 120,903. On 27 Dec. 1906 the Populist party in Kansas was officially dis¬ banded. In 1908 the Populists polled only 28,131 votes for their candidates, Thomas E. Watson and Samuel W. Williams. The decline of the party appears to be jointly due to the increased rural prosperity since 1900, to its alliance with the Democrats, and to the fact that most of its demands have been enacted into law by the older parties. Consult McKee, (National Con¬ ventions and Platforms) (1900) ; Reynolds, (National Platforms and Political History* (1898); Peck, H. T., 'Twenty Years of the Republic (New York 1907) ; Woodburn, J. A c Political Parties and Party Problems in the United States> (2d ed,, ib. 1914).

PEORIA, pe-or'Ia, Ill., the second largest city in the State and county-seat of Peoria County, situated on an expansion of the Illi¬ nois River called Peoria Lake, 155 miles south¬ west of Chicago. It is the centre of an ex¬ tensive railroad system consisting of the Min¬ neapolis and Saint Louis, the Toledo, Peoria and Western, the Lake Erie and Western, the Chicago, Burlington and Quincy, the Chicago, Peoria and Saint Louis, the Chicago and Alton, the Chicago, Rock Island and Pacific, the Chi¬ cago and Northwestern, the Sante Fe, Illinois Central, the Big Four, Vandalia, Rock Island and Peoria, Illinois Traction System and various other roads with interurban lines in course of construction. Many of these lines connect with the belt system of the Peoria and Pekin Union and with the Peoria Railway Ter¬ minal. The city is also connected with Chicago by the Illinois and Michigan Canal — five-foot channel, and the Illinois River is continuously navigable, eight feet from LaSalle, Ill., to the Mississippi River, giving an extensive trade by water. Peoria is built on a plateau 40 feet above the river extending back over the bluffs for two miles and completely surrounded with rolling prairies. It covers an area of about 10 square miles. Eighty-two miles of its streets are paved; it has a complete sewage system with all modern improvements and is noted for its beautiful parks, which are connected by boule¬ vards. Bradley and Glen Oak parks are the largest and finest.

Industries. — Situated as it is, in the heart of an unrivaled agricultural region, a large portion of which is devoted to corn, the city possesses a great wholesale and retail trade in groceries, farm implements, hardware, dry goods, boots and shoes, drugs, paper, china and accessories. Nearby are large bituminous coal fields. The city is also the centre for a tremendous trade in fish, of which hundreds of thousands of pounds are caught in the Illinois River and shipped alive to Eastern cities. Peoria is undermined by a vast basin of water, percolating through gravel and affording to the manufactories an endless supply of abso¬ lutely pure water. This water maintains a temperature of 53 at all seasons of the year and this fact enables the manufacturer of corn products to secure 'the largest amount of starch from every bushel of corn, and has made the city a favorite place for the manufacture of glucose and alcohol. It is also the seat of sev¬ eral meat packing-houses, two large strawboard factories and other paper mills. Peoria is first in the manufacture of diversified agricultural implements and third in aggregate output ; roofing, paper mills, wire fence works, paper bag mills, steel mills, agricultural implement factories, automobile works, foundries and other industries. It has been proven that Peoria possesses an advantage of 6 per cent in the manufacture of distillery products over any other point in the world.

The city ranks first in the products of distilleries among the cities of the Union. The distilleries, of which there were seven until the manufacture of whisky was stopped by the government con¬ sumed over 100,000 bushels of corn daily, and paid into the United States treasury in internal revenue tax, on the manufacture of alcohol and high wines, $35,000,000 per year, a larger sum than any other revenue district in the United

States. Peoria has long been the centre of an enormous grain trade.

In 1918 Peoria ranked second in the receipts of corn, Chicago being first and Omaha third. Alcohol now produced is for the government. The remaining distillery plants have been con¬ verted to flour and syrup mills.

Peoria has 10 banks and savings institutions, one of which is the largest bank in the State outside of Chicago.

Public Buildings, Charitable Institutions, *etc.* — They are the city hall, court house, United States post office, numerous libraries, churches and public schools. The charitable institutions include the Proctor, Guyer and Bradley homes for the aged ; the Proctor, the Peoria State, the Methodist and Saint Francis hospitals; Saint Joseph's Home, Home of the Good Shepherd and the Home for the Friendless.

Educational Institutions. — Besides an ex¬ cellent public school and high school system consisting of two high and 22 grammar schools, there are — Bradley Polytechnic Institute, al¬ lied with the Chicago University (q.v.), en¬ dowed with $3,000,000 through the liberality of Mrs. Lydia Bradley, Spalding Institute en¬ dowed by the late Archbishop, John Lancaster Spalding (q.v.) ; the Academy of Our Lady of the Sacred Fleart, several parish elementary schools and several conservatories of music. There are also the Peoria Law Library and a fine public library and branch libraries contain¬ ing 100,000 volumes.

Government. — The city is governed by a mayor and city council,

elected every two years. The mayor appoints, subject to the approval of the council, ‘all administrative city officials, except the city attorney, treasurer, police magistrate and city clerk, who are chosen by popular vote. The expenditures for the year 1918, for municipal maintenance and operation amounted to $1,565,431.31, the princi¬ pal items of which are as follows : Schools, $819,736.91 ; police department, $107,041.96; fire department, $112,320.56; public works, $124,- 608.55 and street lighting, $67,138.78. > The balance is made up of miscellaneous items. Peoria has a magnificent park system, embrac¬ ing some 500 acres. Bradley, Glen Oak and Madison Parks are the largest. A scenic drive¬ way two miles long runs along the brow of the bluffs, 400 feet above Peoria Lake and the val¬ ley of the Illinois and affords a view of un¬ rivalled beauty and extent. The park system has to date cost nearly $3,000,000. The annual expenditure is approximately $125,000.

Population. — In 1900 there were in the city as residents 8,900 people of foreign birth and 1,400 colored persons. Since the Federal census of 1900 was taken, North Peoria has been an¬ nexed, increasing the population nearly 3,000. Population (1900) 56,100; (1910) 66,950. Fed¬ eral census report 1920, 76,121) within city limits. Population, Greater Peoria, the three-mile district, 100,000. Directory census, 1918,

105,000.

History. — The site on which Peoria stands was originally a small Indian village and was visited by missionaries who were trying to con¬ vert the savages. LaSalle stopped here in 1680 for the winter and built a fort called Fort Creve Cceur which was abandoned the next year. The place afterward became a seat for considerable traffic in furs. In the last half

of the 18th century French traders made a set¬ tlement here, but they were regarded with sus¬ picion by the American, who looked upon the French as allies of the Indians. In 1783 Col. George Rogers Clarke conquered the settlement and shortly afterward erected a fort called Fort Clark which was in existence to 1818 when it was destroyed by fire. In 1812 Gen¬ eral Craig with a small force of United States soldiers drove the French away altogether from the Illinois River. Congress afterward settled the claims of the French for damages

caused by these depredations, by granting a tract of land to the original occupants of the soil, and these claims known as ((The French Claims® were clouds on much of the property where the present city stands and have only been settled in recent years. In 1819 a new colony took possession of land, at first cultivating the land and giving attention only to farming, but gradually a village community was formed and in 1835' Peoria was incorporated. It was chartered as a city in 1845.

S. A. Oaklev, Editor Peoria Star.

PEORIA INDIANS, a North American tribe of the Illinois Confederacy, who formerly resided on the shores of Peoria Lake in central Illinois. In 1673 they were located on the west side of the Mississippi near the mouth of a river now believed to be the Des Moines. In 1688 they were found on the Upper Iowa River. After the war of the northern tribes against the Illinois Confederacy, the Peorias crossed over into Missouri. The main body, however, re¬ mained on the east bank of the Illinois River until 1832. In that year the tribe, very much reduced in numbers, sold to the United States all their claims in Illinois and Missouri and removed with the Kaskaskias (q.v.) to a reser¬ vation on the Osage River, Kansas. In 1861 with the Wea and Piankashaw tribes they took up their residence on a reservation in Indian Territory, now Oklahoma. In 1914 they num¬ bered less than 150, the majority being of mixed blood, very few, if any, remaining of the origi¬ nal tribal stock.

PEPE, pa'pa, Guglielmo, Italian general and revolutionist: b. Squillace, Calabria, 15 Feb. 1783; d. at Turin, 9 Aug. 1855. When but 16 years old he joined the French party in Italy against Cardinal Ruffo and was captured and condemned to death, a sentence afterward commuted to exile. In 1802 he organized a conspiracy against Ferdinand IV, but was ar¬ rested and imprisoned. He was rescued by Joseph Bonaparte with whom he served for some time in the Parthenopean army, then fought with the French against Spain and later served under Murat, gradually working up in the service until he attained the rank of lieuten¬ ant-general in 1815. In 1820 he joined the Lib¬ eral party of Naples, known as the Carbonari, and in that year commanded the military revolt against the king. He entered Naples in tri¬ umph, 6 July 1820, and forced the king to accept his new constitution, but on 7 March 1821 was defeated at Rieti by the Austrians. He was again exiled and fled to London. The Austrian government with the sanction of the Holy Alli¬ ance then replaced the Bourbons on the throne. He returned in 1848, however, and was made commander-in-chief of the Neapolitan forces in

the war with Austria and regained his lost favor by his gallant but ineffectual defense of Venice in 1849. He then abandoned his military career and retired to Paris ; but returned to Italy in 1851, where he died four years later. At his request his remains were removed to Naples for burial. Among his works are de¬ lation des Evenements Politiques et Militaires de Naples en 1820 et 1821 > (Paris . 1822) ; ‘Memoires Historiques, Politiques et Militaires sur la Revolution de Naples* (London 1823) ; (Memoires du General Guillaume Pepe* (2 vols., Paris 1847) ; (Histoire des Revolutions et des Guerres d’ltalie en 1847ˆf9 > (1850).

PEPI I, or PHIOPS, the third Egyptian monarch of the 6th dynasty, called also Meri-ra. His reign began in 2795 b.c. and was pros¬ perous and of some length. He is the first warlike Egyptian king of whom any record ex¬ ists. He made an expedition against the Asiatic Mentu, who had gained possession of the Sinai Peninsula, and with large levies, against the Herusha and the Amu, people inhabiting the desert region east of the Delta. The latter enemies again assembled farther northward and again were defeated. He also sent a naval expedition against the ((Terehbah,® believed to have been the Syrians. The negro races of the south appear in Pepi’s time as subjects to Egypt and furnish a contingent for the wars. He executed several public works and left more monuments and records than any other Egyptian ruler previous to the 12th dynasty. He is credited with having built the Sakkarah pyra¬ mid. His son, Pepi II, also called Meren-Ra, is remarkable for having reigned 90 years. How¬ ever, the kingdom was in a sadly deteriorated condition at his death.

PEPIN, pep’in (Fr. pa-pan), or PIPPIN

II, known as Pepin le Gros or Pepin of Heristal, Duke of the Franks: d. Jupille, 16 Dec. 714. He became mayor of the palace in Austrasia, under Dagobert II., fought successfully against the Germans and by the victory of Testry (687) gained control of Neustria and Burgundy and was recognized as mayor of the palace in the three kingdoms, becoming thus the actual ruler of France for 27 years, though

appearing to serve under four nominal kings. His power was royal and generally despotic, though he per¬ mitted the defeated king of Neustria, Thierry

III, to retain the title, the latter being the first of the so-called <(do-nothing® kings (rois faine¬ ants).- A side light is thrown on his character by the commissioning of Willibrord as a Chris¬ tian missionary to Friesland and his establishing a see for him at Utrecht. At his death Pepin left his power undiminished to his son, Charles Martel (q.v.).

PEPIN THE YOUNGER (called also ((The Short®), king of the Franks and the first of the Carlovingians ; b. about 715; d. 24 Sept. 768. He was the second son of Charles Martel, who succeeded his father, Pepin of Heristal. Martel was not only able to maintain, but so to extend his power that his two sons, Karlo-man and Pepin the younger, were able to share the kingdom between them, Pepin receiving Neustria and Burgundy. After his brother en¬ tered a monastery in 747, Pepin became sole ruler and having secured the deposition of the nominal king, Childeric III, in 751, by agreement

with Pope Zachery, he was proclaimed king of the Franks. Shortly after, Pope Stephen III, pressed by the Langobards under Aistulf, applied to France for aid and by a visit paid to Pepin induced him to march to Italy, where he signally defeated the Langobards, or Lombards, as they were commonly called and made the Pope a present of the lands which he had conquered from them. These lands, known historically as the (<donation of Pepin,® formed the nucleus of the papal states. After a second expedition to Italy, to which he was compelled by the treach¬ ery of the Langobards, he defeated the Bavari¬ ans and warred successfully with the Saxons (753-57). He was succeeded at his death in 768 by his son, Charles the Great, usually called Charlemagne (q.v.).

PEPIN LAKE, an expansion of the Missis¬ sippi River between Goodhue and Wabasha counties, Minn., and Pierce and Pepin counties, Wis., 60 miles below Saint Anthony's Falls, covering an area of 38ˆ4 square miles. It is nearly 22 miles long and two and one-half miles across at its greatest width. Its greatest depth is 56 feet, but the usual depths are from 25 to 30 feet. The lake was undoubtedly formed by a natural dam or delta deposited by the Chip¬ pewa River, flowing in from the east. The swifter current of the latter river enabled it to bring down material too heavy for the slower stream to remove. The

gorge of the Mississippi at this point must have been over 50 feet in depth. Along the shores are vertical cliffs of limestone reaching 400 feet in height and weathered into picturesque spires and turrets, and castellated battlements, and is surrounded by cliffs. On its shores are the city of Red Wing, Minn., at the head of the lake, Lake City, Minn., Wabasha, Wis., and Point au Sable, once the site of a French fortress.

PEPITA JIMENEZ. The ˆpublication in 1874 of Juan Valer's (Pepita Jimenez* marks an important date in modern Spanish literature. The literary reputations of Fernan Caballero and Avellaneda were always more or less local, but Valera, poet and critic as well as novelist, was known throughout Europe and the Americas as a diplomat as well as a man of letters. (Pepita Jimenez* was the first of a long series of novels by Valera himself, Pardo Bazan, Galdos, Pereda, and Blasco Ibanez, which showed the world that Spain possessed a great modern novel. (Pepita Jimenez * has met favor not only in Spain and in Spanish America, it has been translated into English, French, Ger¬ man, Italian, Portuguese, Bohemian and Polish. This popularity is due to the fact that it is a love story, a literary love story with a philo¬ sophical and mystical flavor to it that has en¬ deared it to the mature reader. Valera who had been accused of attacking the Church in his treatment of his hero, Luis, maintains that he was not concerned with the fact as to whether he was more pious or less pious. He had writ¬ ten a work for the entertainment of his readers, and if the public has taken delight in reading his novel he has attained his goal. As a fact if Luis had not been a youth about to take orders who succumbs to the feminine charms of Pepita and gives up the Church, the author would not have had the opportunity to develop his delicate psychological study of a (<cas de conscience.® The whole charm of the novel lies in its religio-564

•

mystical touch which Valera had imbibed from Luis de Leon and Santa Teresa, the two great mystics of Spanish literature. Valera acknowl¬ edges with graceful modesty that if there is any charm in (Pepita Jimenez5 it has come from these favorites of his whom he has de¬ spoiled to embellish his own work. Others of Valera's novels may be technically more per¬ fect and more psychological in their character drawing, but (Pepita Jimenez5 has been the most popular both in and out of Spain. It is an exquisite example of Spanish literary art which

Coventry Patmore has described as pos¬ sessing ((that complete synthesis of gravity of matter and gaiety of manner.55 In addition to the Appleton edition there is an abridged edi¬ tion with notes and vocabulary by G. L. Lincoln (published by D. C. Heath and Co.) in which there is an excellent bibliography.

Samuel M. Waxman.

PEPOLI, pa'pd-le, Gioacchino Napoleone,

Marquis, Italian statesman: b. Bologna, 6 Nov. 1825; d. Rome, 26 March 1881. He was a grandson of Murat, and in 1848 in the war with Austria, being in command of the national guards, defended his native city for some time against the Austrian troops, but upon the capitu¬ lation of the garrison was forced to flee into Tuscany. After the restoration of the Ponti¬ fical government he returned and devoted him¬ self to the study of finance, publishing in 1856 a work on that subject. Later, in 1859, he became chief of the provincial government in Bologna. Upon the annexation of Ro¬ magna he became a member of the Left Cen¬ tre of the Italian Parliament, and in 1862 was appointed Minister of Commerce, and later of the interior. From 1863-64 he was Ambassador to Saint Petersburg; from 1868-70 was Ambas¬ sador at Vienna; and from 1868 until his death in the year 1881 he was a senator in the Italian Parliament.

PEPPER, George Dana Boardman, Amer¬ ican educator and theologian : b. Ware, Mass., 5 Feb. 1833; d. 30 Jan. 1913. He graduated from Williston Seminary, Easthampton, Mass., in 1853; from Amherst in 1857, receiving the degree of D.D. in 1882; from Newton Theolog¬ ical Institution in 1860, which conferred upon him the degrees of D.D. in 1866 and LL.D. in 1890. Colby University in 1867 and Amherst in 1882 gave him the degree D.D., Lewisburg Uni¬ versity in 1882 and Colby University in 1890 also gave him LL.D. After completing his studies, he became pastor of the First Baptist Church of Waterville, Me., where he remained for five years, from there going to Newton Theological Institution as professor of ecclesiastical history, oc¬ cupying that position until 1867. In 1868 he became professor of systematic theology in Crozer Theological Seminary at Upland, Pa., and served in that capacity until 1882, in which year he received a call to the presidency of Colby University. Ill health caused him to re¬ sign from his duties as president in 1889, and for three years he traveled. Upon his return in 1892 he was appointed to the chair of Biblical literature in Colby University, a position he held until 1900. He has published 'Outlines of Theology5 and written numerous articles for theological reviews.

PEPPER, George Wharton, American lawyer and author: b. Philadelphia, Pa., 16 March 1867. After graduating from the Uni¬ versity of Pennsylvania in 1887, he took a two years' course in law there and was admitted to the bar in 1889. He practised law until 1893, when he was appointed Algernon Sydney Bid¬ dle professor of law in the University of Penn¬ sylvania, where he remained until 1910. In 1915 he was Lyman Beecher lecturer in law at Yale University. He has written 'The Borderland of Federal and State Decisions5 (1889);

(Pleading at Common Law and Under the Codes5 (1891); (Digest of the Laws of Penn¬ sylvania, 1700-1901, 5 and 'Digest of Decisions and Encyclopaedia of Pennsylvania Law, 1754-1898 5 (with W. D. Lewis, 1902) ; 'The Way5 (1909) ; 'A Voice from the Crowd5 0915).

PEPPER, John Henry, English chemist and mechanical inventor: b. Westminster, Eng¬ land, 17 June 1821 ; d. Leytonstone, Essex, Eng¬ land, 29 March 1900. He was appointed analytical chemist at the Royal Polytechnic in 1848 and in 1852 was made a salaried director of the institution, a position which he held for 20 years. He was very popular as a lecturer with the stereopticon and introduced a number of clever optical illusions. He is best known as the exhibitor of ((Pepper's Ghost,55 the invention of Henry Dircks, but made a practical success by the ingenious stage adaptations of Professor Pepper. He succeeded in presenting on the same stage living persons and phantoms as act¬ ing simultaneously. Pepper traveled with this invention in the United States and Australia, and in the latter country accepted the position of public analyst in Brisbane, Queensland, where he remained for some years. He returned to England in 1890 and essayed a revival of the "Pepper's Ghost55 exhibitions, but public interest was centred on other amusements, and Profes¬ sor Pepper retired to his home in Essex. He published (The Boys' Playbook of Science5 (1860) ; (The Playbook of Metals5 (1861) ; Scientific Amusements for Young People5 (1861) ; (Cyclopaedic Science Simplified5 (1869) ; (The True History of Pepper's Ghost5 (1890),

etc.

PEPPER, William, American physician: b. Philadelphia, Pa., 21 Aug. 1843; d. Pleas¬ anton, Cal., 28 July 1898. He was the son of Dr. William Pepper, a Philadelphia physician of great repute, and

professor of the theory and practice of medicine in the University of Penn¬ sylvania at the time his more eminent son ma¬ triculated there. He was graduated from the University of Pennsylvania in 1862, and from its medical department in 1864. Beginning prac¬ tice in Philadelphia, he speedily attained dis¬ tinction. In 1868-70 he was lecturer there on morbid anatomy ; on clinical medicine in 1870— 76; and was professor of clinical medicine in 1876-87, when he was appointed professor of the theory and practice of medicine. From 1881-94, when he resigned, he was provost of the university, and under his administration the institution made phenomenal progress, the num¬ ber of instructors increased from 88 to 268, the material equipment and endowment rose from $1,600,000 to more than $5,000,000, many new departments were added and through his efforts the university hospital was established. He founded the Philadelphia Medical Times and

edited it in 1870-71 ; was one of the founders of the Pennsylvania Museum and School of Industrial Art ; through his efforts the course of study in medicine was extended to four years ; and an endowment fund for the medical department was established and received a gift of $50,000 from him on his resignation. He was medical director of the Centennial Exhibi¬ tion of 1876, and for his services was made Knight Commander of Saint Olaf by the king of Sweden. He was prominently connected with the leading medical organizations of the coun¬ try. He published (Trephining in Cerebral Disease5 (1871) ; c Local Treatment in Pulmon¬ ary Cavities5 (1874) ; (Higher Medical Educa¬ tion5 (1877) ; (Phthisis in Pennsylvania5 (1886) ; A Textbook on the Theory and Prac¬ tice of Medicine5 (1893), and several others; besides uncounted contributions to medical periodicals. He also edited the (System of Medicine by American Authors,5 regarded as the American authority on medical auestions. Consult the biography by F. N. Thorpe (1904).

PEPPER, a popular name for several plants and their products. The best known is com¬ mon or black pepper (Piper nigrum) of the

family Piperacecc , a native of the East Indies, whence it has been introduced into many trop¬ ical countries (especially the West Indies and northern South America, where it is an import¬ ant commercial crop). The plant is a climb¬ ing shrub often more than 15 feet tall, with smooth soft stems which bear pointed, heart-shaped, leathery leaves, opposite which are spikes of mostly perfect flowers, followed by little red fruits. The plants are propagated by cuttings, which when well rooted are set near small trees over which they can spread, or in fields where poles are provided as supports. In about four years the plants commence to bear and continue to yield two crops annually for 10 years or more. As soon as 'the earliest berries commence to color, the whole crop is harvested to prevent loss by dropping and to retain the pungency. After drying the product is ready for market. White pepper is derived from dried black pepper by soaking in water and rub¬ bing off the dried fleshy covering. The pun¬ gent qualities of black pepper are dependent mainly upon an acid volatile and an acrid resin. Meleguetta or Guinea pepper is derived from species of the families Anonacece and Zingibe-raceoe ; and Jamaica pepper or pimento from the family Myrtacecc.

The red peppers of the temperate zones are various species of Capsicuni, particularly C. an-nuum and C. frutescens, the former an annual herb, the latter a shrubby perennial. The for¬ mer is the parent of the peppers, of Northern gardens; the latter, being slower in its growth, is found only in the South. The species are all natives of tropical America, where they were cultivated for condimental uses prior to the landing of Columbus, who took specimens back with him to Europe. It seems, however, to have been introduced into European gardens by way of Africa. In 'the South the fruits, green oi ripe, are very popularly used as a condiment and for mixing with pickles. Some varieties are used for special purposes ; for example, the little-fruited sorts, which are ground to make Cayenne or red pepper, and the Tabasco vari¬ ety, which forms the basis of Tabasco sauce.

The green peppers of Northern markets are merely immature red peppers. They are used for salads and for making ((mangoes,55 the con¬ tents being removed and chowchow pickles put in their place. Olives are often stuffed with minced pepper which has been steeped in olive oil. The plants are grown from seed started under glass and transplanted to the field after all danger of frost has passed. They require a fairly light, rich soil, plenty of sun and a warm season. Their insect enemies are the same that attack the egg-plant.

PEPPER GRASS, See Cress.

PEPPER-POT, a prepared food common in the West Indies, of which cessareep (q.v.) is the principal ingredient, together with fresh or dried fish and vegetables.

PEPPER-ROOT. See Dentaria.

PEPPER-TREE, PERUVIAN MASTIC-TREE, or PEA-TREE, several species of the genus Schinus of the family Anacardiacecz. Only two of the 20 species are cultivated. In California they are popular as far north as San Francisco. Schinus molle is the commoner species. It is an evergreen tree 20 or more feet high with rounded top, pendulous branches and yellowish-white flowers in conical panicles fol¬ lowed by fruits about the size of peppercorns. The narrow leaves are rich in a resinous fluid which they discharge into the air especially after a rain when the tissues become turgid. Next to the blue gum tree (Eucalyptus globu¬ lus) this has been the most popular ornamental tree, but owing to its acting as a harbor for scale insects, etc., it has suffered in orange¬ growing districts, thousands , of trees having been cut down because of this.

PEPPER-WOOD, a popular name for Xmthoxylum clava-Hercules, also known as <(Hercules Club,55 and Toothache tree. It is a very spiny tree of shrubby size and growth, growing in coast lands from Virginia to Florida, and westward to Texas and Arkansas. It has been called erroneously southern prickly ash, and under this title its bark is found in commerce for medicinal use. See Xanthoxy-lum.

PEPPERELL, pep'er-el,ˆ Sir William,

American colonial general: b. Kittery Point, Me., 27 June 1696; d. there, 6 July 1759. He joined his father in business as a merchant and the firm was for many years the largest mercantile house in New England. He ultimately became sole owner of most of the towns of Saco and Scanboro, and held large properties in Ports¬ mouth, Hampton and other places. In 1722 he was elected colonel of the Maine militia; and in 1727 was elected one of his majesty's council for the province of Massachusetts, and was regularly reelected for 32 years in suc¬ cession. Living on an exposed frontier, where the inhabitants were constantly engaged in warfare with the savages, a large portion of his life was spent in the camp. When the ex¬ pedition against Louisburg was undertaken, the governors of New England gave him the com¬ mand of the troops. Beginning the siege in May 1745, he compelled the city to surrender on 16 June, and in reward

for his services was made a baronet. In 1755 he was commissioned a major-general in the British army, and given command of forces protecting the frontier of

Maine and New Hampshire. From 1756 to 1758 he was acting governor of Massachusetts. In 1759 he was appointed lieutenant-general. His grandson was created a baronet in 1774, and embraced the royal cause during the Revolu¬ tionary War, in consequence of which his estates were confiscated. Consult Parsons, U., <Life of Sir William PepperelP (Boston 1885) ; Parkman, F., (A Half Century of Conflict (Boston 1892) ; Brooks, C., (Sir William Pep¬ perelP (Boston 1903).

PEPPERELL, Mass., town in Middlesex County, 35 miles northwest of Boston, on the Nashua River, and on the Boston and Maine Railroad. The Lawrence Library and the Wol¬ cott monument are located here. The town has manufactures of paper and cards and owns the water-supply system. Pop. 2,953.

PEPPERIDGE, a popular name in some localities for Nyssa sylvutica, which is known also as tupelo, black gum and sour gum. See Tupelo.

PEPPERMINT. <(Mint® was among the plants first recognized as of value by the an¬ cients, and many interesting references to it are found in the earliest known literature. Its ex¬ treme antiquity is evidenced by the fact that it was known in Greek mythology, where it was given a birth both romantic and divine in connection with the loves of the gods. ((Min-tha® (M ivOjj), a beautiful girl, had won the affections of Hades, and in, a fit of jealousy was transformed by Ceres into the plant which was then given her name, from which followed the Latin <(Mintha ,® <(Mentha ,® and <(Mcnta .® There still exists under this name in Pylos, Greece, Mount Mintha, upon which the transformation occurred. At the base of the mountain was in ancient times a grove dedicated to Ceres and a temple to Hades. This romantic tradition is recorded by Strabo (Geographia, liber VIII), Julius Pollux, and others.

Hippocrates, the most celebrated physician of antiquity, b. about 460 B.c., mentions the virtues of mint, and also says <(It excites to love.® Aristotle, b. 384 b.c., describes its well-known beneficial effects upon the human system, and Theophrastus, his successor, in his his¬ tory of Plants,* also mentions its various virtues in a most interesting way under the newer name which had been given it of 'Hdvoc/iov (fragrant, or sweet-scented). This name is also used in both the Greek gospels, which record the well-known utterance of Jesus, from which we learn that taxes were annually paid in this plant, indi¬ cating that it had already become an article of regular commerce.

A very interesting account of mint is given by Pliny (23-79 a.d.) in his (Historia Plantarum* (liber XIX, cap. 8), where he mentions the methods of propagation, its use in banquets, etc., and its various medical virtues. Ovid also speaks, of its having ((magical power.® Much prominence is given to its virtues in the writings of the great physicians of antiquity, including Galenus, Avicenna, Celsus, *etc.*

Commercial History. — There are many species of the genus Mentha noted by various writers, but by far the most important and the only one cultivated or distilled in a large com¬ mercial way in Europe or America is the true peppermint plant, Mentha piperita. The regu¬ lar cultivation of this plant in a commercial

way began in Surrey, England, about 1750, where at that time only a few acres were de¬ voted to medicinal plants. Fifty years later about 100 acres were under cultivation. The growers, having no distilleries of their own, sold their plants to London chemists who were engaged in distilling other products as well ; but afterward distilleries were built at the sources of production to save transportation expenses. The industry in England reached its maximum about 1850, the area under cultiva¬ tion being about 500 acres, after which it began rapidly to decline owing to the growth of the American industry.

The inception of the industry in America occurred in 1816, in Wayne County, N. Y., which for a number of years was the chief pro¬ ducing centre of the world, but in the year 1835 it was inaugurated in Michigan, a region, with soil of extreme fertility, under climate conditions especially favorable, which soon be¬ came the chief producing centre of the world, a position it has since maintained. It is accord¬ ingly of interest to note that over three-fourths of all the true peppermint of the world is pro¬ duced within a radius of 75 miles of the city of Kalamazoo. Besides the climatic advantages and fertile soil

of Michigan, radical improve¬ ments were effected here in the apparatus for distillation, implements of cultivation, etc., en¬ abling the process to be conducted with far greater rapidity, and materially enhancing the quality. The business, which had hitherto been in a crude state, now began to assume a more systematic form.

Peppermint, as is well known, is cultivated chiefly for its (<essential oil,® in which are se¬ creted the aroma and virtues of the entire plant. This exists in minute cells in the leaves and blossoms. Distillation is effected by placing the plants, which have been harvested and dried, in large vats, thoroughly packed and closed with air-tight covers, steam being ad¬ mitted to the bottom of these vats by means of pipes and valves. The oil cells are ruptured by the heat, the oil escaping upward with the cur¬ rent of steam. The steam thus impregnated with oil flows through condensers where it is converted into' oil and water, from thence flow¬ ing into the ((receiver,® where the oil, which is lighter, floats upon the top, while the water set¬ tles below and is again forced into the boiler to be reconverted into steam for successive charges.

The product thus obtained is the crude or ((natural®. oil ; but this although (<pure® contains some resin extracted from the stems, and some approximate hydrocarbons. The quality is con¬ sequently greatly improved by an intelligent (<fractional distillation® by which the objection¬ able properties may be separated, the refined product being the ˆquintessence® of the plant, with a rich and mellow aroma.

The soil now mostly used for mint culture is formed by the deposit during many centuries of the decay from acquatic plants, forests and other vegetation growth in the beds of ancient lakes. Being soft and porous, it is necessary to provide the horses with <(mud shoes,® which are fastened to their hoofs to prevent sinking.

The essential parts of a distillery are a boiler for generating steam, a series of vats for con¬ taining the plants and a condensing apparatus, these all being connected by a system of pipes,

valves, *etc.* Auxiliary to these in the larger “stills® are engines, steam cranes, etc., for econ¬ omizing labor. While the first distilleries had a capacity of only five pounds per day of oil, the distilleries of the most modern type and in¬ stallation have a daily capacity each of 400,-000 pounds of plants, yielding about 1,500 pounds of oil. Much of the labor formerly done by hand is now accomplished by steam and other forms of power.

The production in America of peppermint during the past 10 years has averaged annually about 60,000,000 pounds of plants, yielding be¬ tween 150,000 and 400,000 pounds essential oil. About half of the entire production is used in America, the other half being exported to for¬ eign countries. An oil sold as “Peppermint® is distilled largely in Japan, which, however, is not produced from the true peppermint plant, but from Mentha arvensis, and is inferior in flavor, *etc.*

Peppermint in the pure state is highly agree¬ able and beneficial and its consumption is rap¬ idly increasing, owing to the new uses which have been found and an increased demand for those purposes to which it has long been ap¬ plied ; its chief use being in medicine, confec¬ tionery, chewing gums, toilet articles and fine pharmaceuticals.

PEPSIN, a group proteolytic enzyme or a ferment believed by some to be secreted by the mucous lining of the stomach. By other in¬ vestigators it is held to be a product of an antecedent substance called pepsinogen with hydrochloric acid. It has never been prepared in the pure state, but it is believed to be of a proteid nature. When present in a feebly acid solution, at a temperature approximately ° the same as that of the human body, from 98° to 105° F., pepsin possesses the power of splitting proteins into metaproteins, proteoses and sol¬ uble peptones, and thus rendering them capable of absorption in the alimentary canal. This action is greatly enhanced by the presence of one-twentieth of 1 per cent of hydrochloric acid. Owing to this remarkable power, pepsin is a highly important agent in the chemistry of diges¬ tion, and it is very commonly administered, in medicine, when the quantity secreted by the stomach is deficient. It is rendered inert by al¬ kalis and recovers very slowly. A moist heat of 200° F. destroys its power. The commercial sup¬ ply of pepsin is obtained from the stomachs of hogs, sheep or calves, and its digestive power varies considerably. When extracted with gly¬ cerine for 12 to 24 hours, the product is pepsinogen. A solution containing two grainsof pepsin in one ounce of water, and acidified by the addition of five minims of-hydrochloric acid of specific gravity 1.16, should dissolve at least 100 grains of the white of hard-boiled egg in 30 minutes, if

the egg is finely divided, and the mixture is kept at 125° F., and constantly stirred. The total solvent power of pepsin is much greater than this, however, and in nor¬ mal digestion one grain of pepsin probably dis¬ solves as much as 3,000 grains of coagulated albumin. Specimens of pepsin have been [pre¬ pared which have dissolved as much as 25,000 times their own weight of coagulated proteid, and some authorities are of the opinion that pepsin is theoretically capable of exerting its peculiar powers indefinitely, without being itself destroyed in the process. There is evidence

that pepsin is reabsorbed by the alimentary canal to a considerable extent, and returned to the secreting glands of the stomach for re¬ peated use; and it has also been detected in the muscles and in the urine. The pepsin of com¬ merce is an amorphous powder, of a yellow¬ ish-white color ; but the substance is also ad¬ ministered in the form of elixirs and in many other ways. When kept dry and at a tempera¬ ture not above 100° it retains its properties in¬ definitely. It is used, not only as a digestive corrective, but also for effecting the solution of various superficial necrotic tissues, such as diphtheritic membranes. Its existence was first recognized by Schwann (1836) and Wasmann (1840). Consult Hawk, P. B., (Practical Phy¬ siological Chemistry) (Philadelphia 1913) ; Mathews, A. P., Physiological Chemistry) (New York 1915).

PEPYS, pep'is, peps, or pips, Samuel, Eng¬ lish diarist: b. at Bampton, 23 Feb. 1633; d. London, 26 May 1703. He was educated at Saint Paul's School and Magdalen College, Cambridge, and early acquired the patronage of Sir Edward Montague, afterward Earl of Sandwich, who employed him as secre¬ tary in the expedition for bringing Charles II from Holland. On his return he was appointed one of the principal officers of the navy, in which, through his high

favor with the king, he introduced many re¬ forms. In 1673, when the king took the Admiralty into his own hands, he appointed Pepys secretary to that office. He was employed under Lord Dartmouth in the expedition against Tangier, and often accompanied the Duke of York in his naval visits to Scotland and coasting cruises. During the excitement of the Popish plot he was, at the instigation of the Earl of Shaftesbury, committed to the Tower on an unfounded charge of aiding in the design to dethrone the king and extirpate the Protestant religion, but was presently dis¬ charged without a trial, and reinstated in his office at the Admiralty, which he held until the abdication of James II. On the accession of William and Mary he resigned his office

and devoted himself to publishing his <Memoirs) (1690), relating to the navy for 10 years pre¬ ceding, and led a retired life from this time till his death. Besides being a recognized authority on naval affairs, he was well versed in history, architecture, painting and sculpture. He was president of the Royal Society in 1684-86. He left a large collection of manuscripts to Mag¬ dalen College, Oxford, known as the Pepysian Library, and consisting of naval memoirs, prints and five large folio volumes of ancient English poetry, begun by Selden, and carried down to 1700, from which Bishop Percy made numerous selections for his (Reliques of Ancient Eng¬ lish Poetry.) His unique (Diary) (begun 1 Jan. 1660 and ending 31 May 1669, on account of defective eyesight) affords a curious picture of past manners and particulars of the Stuart court. It was written from day to day in a sort of shorthand which was deciphered by the Rev. J. Smith, and first published under the editorship of Lord Braybrooke in 1825. Fuller editions have since been published, the fullest being that of H. B. Wheatley (1893). Consult Wheatley, (Samuel Pepys and the World he Lived In) (1880) ; Stevenson in (Familiar Studies> (1892).

PEPYS' DIARY. Samuel Pepys' diary is a minute daily chronicle for about 10 years (1659-69) of the life of a young man in his 20's and 30's engaged in important public office during the momentous period of the restoration of the Stuarts to the throne in England. It reveals with complete frankness the most inti¬ mate details in the personal, family and official life of the author; his relations with his wife, relatives, friends, patrons and servants; the shifts by winch he acquired over £6,000 in six years of government service, the back-stairs gossip and political wire-pulling of Whitehall, and his own manoeuvres in the Navy Depart¬ ment ; his weakness for drink, fine clothes and playhouses, his resolutions to abstain therefrom, his backslidings and consequent regrets; his salacious interest in ladies of easy virtue at court and elsewhere, all the life of London as it came under his shrewd eyes in the public places of the time. It was with keen regret that, owing to growing weakness of sight, he desisted from keeping his record. Its charm rests partly upon the concreteness with

which he sets down his experiences and impressions, but also on his point of view. His morals, decent enough for a thriving middle class offi¬ cial of the time, differ somewhat from ours, but not so much as to put us out of sympathy with him. He writes out the minutest motions of his own nature, all the petty feelings, vani¬ ties and virtues that most men feel but seldom acknowledge and never mention even to them¬ selves. Consequently to read Pepy's diary is to undergo a series of those pleasurable little shocks which make the charm and zest of racy gossip about people we ourselves know. Much of this amusement is at Pepys' expense, a fact likely to make us forget that he was really a person of consequence in his day. Beginning as a kind of clerk, he became the most useful man in the Navy office, capable, industrious, determined and for the age not unusually cor¬ rupt. He suffered from some political vicissi¬ tudes, was ousted from his position, but gained others, and sat in Parliament. He figures in later years as rather more than an acquaintance of artists and writers like Kneller and Dryden and as a collector of books. The manuscript of his diary, written in cipher, was left ulti¬ mately with his library to Magdalen College. It was not published, and then but in part, until 1825. A full edition appeared in 1895.

William Haller.

PEQUOT, pe'kwot, Conn., the name of a former Indian fort on Pequot Hill, an eleva¬ tion 180 feet above sea-level in the eastern part of the town of Groton, and eight miles north¬ east of New London, Conn. (q.v.).

»

PEQUOT INDIANS, a tribe of North American Indians at one time an integral part of the Mohegan tribe and of the Algonquian family. In the early part of the 17th century they occupied a narrow strip of the coast of New London County from the Niantic River to the boundary line of Rhode Island, where London, Groton and Stonington now 'stand. At their zenith they numbered upward of 3,000, were warlike and powerful in the country round the Thames River when Connecticut was first settled, and made treaties with the Dutch and English. Hostilities broke out with, the whites in 1637, and the tribe was cut to pieces

and scattered. Some fled to Long Island, where a few remained, but most of these with the larger part of the tribe were distributed among

the Mohegan, Narragansett and Niantic tribes, where they had their own villages but were forbidden to use their tribal name. A few descendants may be found at Green Bay, Wis., and a few may still be found in the old Groton tract.

PEQUOT WAR. See Colonial Wars in America.

PERAK, pa-rak', one of the federated Malay states, under British protection, lying be¬ tween 3° 37' and 6° 5' N., and between 100° 3' and 101° 51' E. on the west coast of the Malay Peninsula, north of Selangor, south of Siam and Kedah and west of Pahang, Kelentan and Petani. Extreme length, 172 miles; extreme breadith, 100 miles ; coast line, 90 miles ; area, 7,800 square miles, including the 1,000 square miles recently conveyed to Perak by Siam. The region is crossed by two parallel ranges. Between them lies the Perak River, the only navigable stream in the country; steamers go up it 40 miles, and trading boats 200 miles. The climate is very damp, the annual rainfall being 223 inches. The climate is hot on the coast and the river plains, and much cooler in the mountains ; the mean temperature along the coast is 87° F. by day and 78° by night. The total area of land occupied is (1913) 850,824 acres — 142,649 in rubber ; 90,644 in cocoanuts ; and 85,513 in general agriculture. Sugar, to¬ bacco and rice grow in the plains ; tea, coffee and vanilla in the uplands. Opium is exten¬ sively grown and the rubber plantations in 1913 covered 60,000 acres in the Kiuta district alone, and 19,500 trees were tapped. The exports of copra are large, amounting to a value of $800,- 000 annually. The forests are under the con¬ trol of the government and systematic refores¬ tation with valuable cabinet woods is carried on. The forest reserves in 1913 covered 288,- 451 acres — about 6 per cent of the whole area of the State. Irrigation is practised increas¬ ingly, the government appropriation in 1913 being $130,600. The principal acreage watered is the 70,000 acres of rice fields. The irrigation canals also carry the water supply for the dis¬ tricts traversed. Deer, snakes, leopards and elephants are found in the hills, and there are crocodiles in the rivers. The mineral resources are great. Tin is the metal of largest value. It is found everywhere throughout the State, on the tops of the highest mountains and in the soil of the river swamps. The centre of the tin-mining industry is the Kiuta Valley, 30 miles long and .12 miles broad. For the year 1913 (the latest records published since the outbreak of the war) the exports of tin amounted to a value of $27,866,186. Tungsten ore (wolfram) and gold were also exported in small quantities. Silver, lead, iron, copper, zinc, arsenic and titanium are also found. A railroad connects the centre of the mining dis¬ trict, Kiuta, with Kuala Kangsar, and this road is being extended to Wellesley. There are also 776 miles of metaled roads in the State and

19 permanent road bridges. There are 204 gov¬ ernment schools and 18 others under governmen inspection. . The enrolment is 13,563, and the average daily attendance, 81.32 per cent. The exports for 1913 totaled $40,542,615 and

consisted of principally tin, rubber, copra and rice. The imports were valued at $19,468,032 and were chiefly opium, tobacco and cigars, iron ware, machinery, petroleum, cotton goods and cattle. The population by the 1911 census was 494,057 ; more than two-thirds being males, owing to the preponderance of Chinese miners. There is continual immigration from China and India, so that the Chinese far outnumber the Malays.

Perak was long ago settled by the Malays. The Dutch made a settlement by treaty in 1650, but were repeatedly driven out by the natives and in 1795 by the English, who in 1824 made a treaty with Siam by which Perak's indepen¬ dence was recognized in spite of Siamese con¬ quest in 1818. In 1874 British intervention was asked by one of the native sultans ; a year later the British resident was murdered; the result¬ ing punitive expedition brought the country under British protective control, though Perak was still nominally independent. Perak joined the Federation of the Malay States in 1895-96.

PERCEFORET, pars'fo-ra, French legend giving the history of Britain before the days of King Arthur.' It was first printed in 1528 in Paris and is supposed to have been com¬ posed about the 13th century. According to the work King Perceforet visited Britain with Alexander the Great and was made king. . The work is unlike the later romances of chivalry in that it deals with enchantments, visions and

superstitions rather than doughty deeds in bat¬ tle. It was very popular in the Middle Ages and is valuable to-day for the insight it gives us of life as it was lived in mediaeval times.

PERCEPTION. In its psychological mean¬ ing, perception is the direct conscious apprehen¬ sion of physical objects and events through the medium of the senses. Thus one perceives trees, animate objects, one's own body, rhythms, harmonies, progressive movements, *etc.* By some psychologists the term percep¬ tion has been rigidly interpreted as simply the sensation or sense testimony, and all thought activity aroused by the excitement of the senses as being a distinct mental process termed ideation. By the larger number, however, perception is regarded as including cogni¬ tion. Thus, one sees a tree, but also recog¬ nizes it as an oak tree, and perhaps, still fur¬ ther, as a white-oak tree. The perception is evidently inclusive of the cognition that the tree is of the family of the oaks, and of the variety white-oak. In another more complex phase, one may look down a long stretch oi railroad track and "see" a minute 'blackish dot capped with a tiny white cloud. That is the sense testimony; but it is obvious that the perception is that a train is approaching. We perceive not the dot and the cloud, but the train. Hence it is held that perception in¬ cludes recognition. Perception is frequently-contrasted with ideation in which the object is "thought® or "imagined,® but not seen or heard or handled. Although the objects o perception are innumerable, and the sensoiy materials involved of great variety, the forms of perception, that is, the wavs in which sen¬ sations are interwoven and compounded, aie reducible to three primary types; one form or pattern underlying spatial perception, a sec ond underlying the perception of temporal

sequence and order, and a third furnishing a basis for the apprehension of the qualitative nature of things. The perceptual consciousness is constantly undergoing, both in the individual and in the race, elaboration and refinement. For, in the individual, experience is continually investing the apprehension of objects with new shades of meaning and, in the animal series at large, evolutionary processes have modified and are still modifying both the structures and functions of the nervous system and the external organs of sense.

Inasmuch as perceptual knowledge comes by way of the senses, the most obvious mode of classification is by reference to the various

sense-departments. This plan of classification would yield one large group of visual percep¬ tions, another of auditory, a third of tactual, and so on through the senses. It would in¬ clude, also, perceptions in which more than one sense-department is involved. Sight mediates the largest number of perceptions. The primary function of vision is the appre¬ hension of objects; the primary function, of audition, the apprehension of events . Vision, in conjunction with tactual and kinaesthetic sensations, gives us our spatial world — objects which are of various sizes, colors and shapes, which occupy various positions and offer, to each other and to the experiencing individual, varying degrees of resistance. The ear is less well equipped than the eye for spatial per¬ ception. It is only by aid of the eye and of the skin, tendons and muscles that sounds acquire definite spatial characteristics. But hearing is rich in qualities, the normal ear distinguishing several thousand tones and noises ; and it is also quick to detect rapid-and complicated changes in the environment. The three chief functions of the ear are the perceptions of human speech, of music and of the sounds of nature. Tactual perceptions, that is, perceptions mediated by nervous organs lying within the skin, inform us — though not so accurately or so minutely as visual perceptions do — of the spatial characteristics of objects; their size, position, form, *etc.* They also acquaint us with the texture (roughness, smoothness, bluntness) and the temperature of objects, and with the condition of the skin itself (whether wet or dry, irritated or bruised). When reinforced by sensation-elements from muscles (muscular pressure), tendons (tendinous strain) and joints (articular pressure), tactual sensation-complexes furnish knowledge of the. weight, resistance, extent and movement of objects and of the position and movement of the observer's own body. The perception of bodily orienta¬ tion is aided by a specific quality of sensation set up within the* semi-circular canals of the ear. Finally, tactual factors, pressure, tem¬ perature and pain, in co-operation with sen¬ sations of taste and smell, bear information regarding the nature of food and other sub¬ stances placed in the mouth. Olfactory sensa¬ tions serve, by themselves, to acquaint the in¬ dividual with the nature of odorous substances. The perception of the state of the large organs within the body is mediated, for the most part, by sensations set up in these organs them¬ selves ; for example, the stomach, heart and

lungs. , . , . , ,

Perceptual knowledge is by no means intal-

lible. Its ambiguities and inaccuracies are termed illusions. They may arise when an ob¬ ject is perceived under varying conditions (for example, a stick looks longer in a vertical than in a horizontal position) or when a perception falls into conflict with the results of objective measurement or of some other standard of knowledge (for instance, a filled right angle seems to contain more than 90°). Certain illu¬ sions are ineradicable factor's of normal ex¬ perience; others — as illusions of insanity — rest upon derangement of mental function. Hallucination is generally considered to be a more serious derangement of perception than illusion. The hallucinatory object either does not exist at all — as in certain deliriums — or it exists in quite a different form from the actual object; for example, the mistaken ap¬ prehension of subjective noises as human speech. The perceptions of the dream-con¬ sciousness may be considered as hallucinations of a normal type. Consult Angell, J. R., (Psychology) (New York, 1904) ; James, W., (The Principles of Psychology) (New York 1913) ; Titchener, E. B., (A TextBook of Psychology) (2 vols., 1909-10).

PERCEVAL, per'si-val, Spencer, Rt. Hon.,

English politician: b. London, England, 1 Nov. 1762; d. there, 11 May 1812. He received his early education at Harrow and was graduated from Trinity College, Cambridge, in 1781. He studied law, was admitted to the bar and rose rapidly in his profession, attaining a high repu¬ tation as a constitutional lawyer. In 1794 Lord Chatham made him counsel to the Board of Admiralty. In 1795, Pitt offered him the Chief Secretaryship for Ireland but he candidly de¬ clined it. In 1796 with the aid of Pitt he was returned to Parliament for Northampton and there proved himself an eloquent speaker and a quick and keen debater. In 1801 he was solici¬ tor-general, in 1802 attorney-general. On the decease of Cox in 1807, he was appointed chan¬ cellor of the exchequer, in which office he con¬ tinued until 1809 when? upon the death of the Duke of Portland, he succeeded him as First Lord of the Treasury and became Premier. This office he held until his assassination at the door of the House of Commons by a man named Bellingham, who declared that he had slain him by mistake for Lord

Leverich Gower, with whom he had a grievance. Consult Williams, (Life and Administration of the Right Honor¬ able Spencer PercevaP (1856) ; Walpole, (Life of Spencer PercevaP (1874).

PERCH, a popular name, used with some specific qualifying word for a variety of spiny-rayed fishes; but generally and properly applied to species of the genus Perea of which about 90 species are known, most of them American. The name <(white perch® is erroneously but com¬ monly given to Morone interrupta described be¬ low. These fishes belong to the families Pcr-cidce and Serranidce respectively. The yellow perch (Perea flavescens) , known in many lo¬ calities as ((yellow Ned,® ringed perch, etc., is very closely related to the Perea fluviatilis of Europe, with which many zoologists consider it to be identical. It may be recognized by the possession of two spines before the anal fin, the well developed pseudo-branchiae, the absence of canine teeth on the vomer and jaws and the

distinctive colors, which are olivaceous above, golden yellow with six or eight dark vertical bands on the sides and the pectoral and ventral fins orange or red. It reaches a length of one foot and a weight of two pounds, but generally does not exceed one pound. This well-known and deservedly popular fish abounds in the fresh waters of the eastern United States, descending coastwise streams to the brackish waters of bays and inlets, in which it attains a large size and excellent quality. It is especially abundant in the Great Lakes and is common in the lakes and streams of the upper Mississippi Valley; but is not found in the lower Mississippi and its tribu¬ taries, nor on the Atlantic Coast south of North Carolina. Recently it has been introduced, through the United States Fish Commission, in .western lakes and streams from which it was formerly absent. The yellow perch prefers slow-running streams, ponds or lakes with sandy or gravelly bottoms ; and is to be sought in the deeper holes under shaded banks, about mill-dams, bridge-piers, sunken timbers and in ed¬ dies. It is gregarious and a noteworthy cir¬ cumstance is that each school is composed of fish all of one size — be they large or small. Like several other fresh-water fishes they be¬ come inactive in very cold weather and conceal themselves in holes. In the spring they assume brighter hues, the reddish parts becoming deeper in tint as the spawning season approaches. The eggs are about 1/12 inch in diameter, and are remarkable for their adhesive quality and the manner of deposition in strings or bands which sometimes reach a length of seven feet, and a width of three or four inches. They are laid from February to May, according to locality. The favorite food of this fish consists of min¬ nows and other small fishes, which they

pursue with relentless vigor ; but they also eat many kinds of worms, insects and their larvae, *etc.* Though not of superior quality yellow perch is esteemed as a panfish and is shipped to the principal markets to an annual value of several hundred thousand dollars. The principal fish¬ eries are on several of the eastern rivers, and especially the Great Lakes, where they are taken in large numbers in various kinds of traps and set-nets.

The white perch (Morone americana) be¬ longs to the family of the sea-basses and rock-fish (Serranidce) . It has three spines before the anal fin, and the two dorsal fins are united, with very strong spines in the anterior. The color is olivaceous above, silvery white on the sides and belly, marked with faint longitudinal streaks. In length it is usually about nine inches and its weight is about half a pound. A few specimens weighing up to two pounds have been caught in Connecticut waters. This species is exceedingly abundant along the coast from Nova Scotia to South Carolina, in the brackish and fresh waters of estuaries and rivers,, and is found landlocked or introduced in many fresh¬ water ponds. It appears to be somewhat migra¬ tory, the schools remaining in brackish water during the winter and ascending the rivers in the spring. They usually spawn about May — about 40,000 small, clear, semi-buoyant and separate eggs being deposited by each female on regular spawning grounds. Their food re¬ sembles that of the yellow perch, but they show a preference for shrimps and other crustaceans.

Both of these perches are favorites with anglers and may be caught with live bait and the sim¬ plest of tackle ; but the finest sport is afforded by the use of a trout rig with either bait or artificial fly. (See also Pike-Perch). Consult Goode, (American Fishes) (New York 1888) ; Henshall, (Bass, Pike, Perch and Others) (New York 1903).

PERCH, POLE, or ROD, a measure of length used in surveying land, equal to 5*4 yards or 16ˆ4 feet. Surveyor’s chains are usually four perches or 66 feet in length. A square perch is 30*4 square yards, and 160 square perches make an acre. In masonry a perch is a cubic

measure, signifying a form 16ˆ4 feet long, 1*4 feet high, and 1 foot thick. It contains 24ˆ4 cubic feet.

PERCHED BOWLDERS. See Rocking Stones.

PERCHERON (per-she-ron) HORSE, a breed of heavy horses perfected in the province of La Perche, in northcentral France, a long time ago. They were first brought to America in 1839. It has Arabian characteristics imparted to a large, bony frame, giving a very strong and durable draught-horse, rarely less than 15, and often 16 hands high, and weighing from 1,500 to 2,000 pounds. Many stallions of this breed have been imported into the United States, and have influenced favorably the work-horses of the country. As the heavier type was desired to mate with the light-weight mares of this country a heavy draught horse has been the develop¬ ment here whereas in Europe a heavy coach horse was developed. The Percherons in America make excellent farm horses of quick, alert action and great strength. They are stocky and easy keepers, and of great endurance. There are said to be over 30,000 registered Percherons in the United States.

PERCHLORIC ACID and PERCHLO¬ RATES. Perchloric acid, HCICh, is prepared by the careful distillation of a mixture of pow¬ dered potassium perchlorate and four times its weight of concentrated sulphuric acid; the prod¬ uct being purified by repeated distillation in a vacuum. The water-free acid is. a heavy, color¬ less, syrupy liquid, specific gravity 1.8 soluble in water with evolution of heat, can be distilled without decomposition at 102° F. under dimin¬ ished pressure. At a temperature of 230° white fumes are evolved and pure perchloric acid comes over. By continuing the distillation the liquid gradually becomes a white crystalline mass. It unites with the moisture of the air emitting dense white fumes of the hydrate, HCICL.H2O. This hydrate when heated decom¬ poses into pure acid which distils over, and an aqueous acid which boils at 203° and is left behind in the retort. It is a strong monobasic acid resembling sulphuric acid in many of its physical and chemical properties. Iodine dis¬ solves in it, producing a yellow crystalline sub¬ stance, with the formula HI7O3. If distilled at a low pressure perchloric acid assumes a brown¬ ish color, similar to bromine, and explodes. < It is also very apt to decompose with explosive violence when brought in contact with anything of an organic nature as paper, wood, charcoal, *etc.* Burns on skin produce wounds which do not heal for months. It forms a number of salts, the most important being potassium perchlorate and sodium perchlorate. Potas¬

sium perchlorate is made by the careful ap¬ plication of heat to potassium chlorate which decomposes, giving off oxygen and a mixture of potassium perchlorate and potassium chloride. It is then dried, powdered, well washed and heated gently with hydrochloric acid as long as chlorine and chlorine peroxide are evolved ; and again washed. It is a color¬ less crystalline body, rather difficultly soluble in water, and differs markedly from the free acid in being very stable, decomposing only at a high temperature to oxygen and potassium chloride. Perchlorate of soda is found in small quantities in Chili-nitrate.

PERCIER, par-se-a, Charles, French archi¬ tect: b. Paris, 22 Aug. 1764; d. there, 5 Sept. 1838. He was a pupil of A. F. Peyre, in 1786, won the premier grand prix de Rome, during the Revolution designed furniture and decora¬ tions and by the antique motifs which he intro¬ duced from Pompeii and Rome, may be said to have begun the <(Empire style0 so wide¬ spread in Europe in the early 19th century. From 1794 to 1814 he worked in collaboration with Pierre Fontaine (q.v.), with whom he continued the decoration of the Paris Opera, restored the Louvre colonnade and completed the upper story of the buildings about the court, built the theatre and chapel of the Tuileries, and designed the Arc de Triomphe du Carrousel, and the grand staircase of the Mu¬ seum. Napoleon made him a chevalier of the empire. Among his writings are (Restauration de la Colonne Trajane* (1788), and (Choix des Plus Celebres Maisons de Plaisance de Rome et de ses Environs* (1809-13).

PERCIN, Alexandre, French general: b. Nancy, 1846. He served in the Franco-Prus- sian War 1870-71, and attained the rank of captain. He became brigadier-general in 1900 and major-general in 1903. In 1893 he was ap¬ pointed director of the Saint-Etiemie arms fac¬ tory and was made a member of the Superior Council of War in 1908. In the first weeks of the European War General Percin held a prom¬ inent command, but was retired by General Joffre for reasons which were not made public. He was a frequent contributor to periodical literature on military subjects.

PERCIVAL, James Gates, American poet and geologist: b. Kensington, Conn., 15 Sept. 1795; d. Hazel Green, Wis., 2 May 1856. He was the second of three sons of Dr. Tames Percival. At the age of 16 he entered Yale College ; when 20 he stood at the head of his class, which included the poet John G. Brainard, statesmen John M. Clayton and Thomas A. Marshall, and author Rev. Wm. Buel Sprague, and was graduated as bachelor of arts June 1815. He early showed a strong predilec¬ tion for the writing of verse, but devoted him¬ self to the

study of medicine also. At the age of 25 he published his first volume of poems. Then, having received the degree M.D., and be¬ ing in feeble health, he went to Charleston, S. C., where he began to publish a periodical entitled Clio, which failed after two issues. He gave this name later to one of his books of verse. In the year 1824 he was appointed pro¬ fessor of chemistry at West Point and was also appointed United States physician there. He resigned after a few months. He never again attempted to follow the practice of medicine,

but continued to write verse and studied assidu¬ ously in geology and the allied physical sciences. During the year 1825 he published a second volume of poems, which was republished in London. After leaving West Point he drifted about and soon became assistant of Noah Web¬ ster in publishing (Webster's Dictionary, > in which his knowledge of many languages proved invaluable. Having 'been appointed assistant State geologist of Connecticut, in 1836, he con¬ tinued in that capacity until the year 1842, when he issued an elaborate report on the work of his department. The next 10 years of his life were passed in poverty and ill health. In 1853 he was employed by the American Mining Com¬ pany to examine into and report upon its mines in Wisconsin. After he had finished that work in 1854 he was appointed by Governor Barstow State geologist for Wisconsin, which place he filled until his death, having made one report, and died during the time he was preparing his second. Percival was a linguist and scholar and wrote poems in Danish, German, Italian, Latin and Greek. As a geologist he ranked with Hitchcock and Comstock as the foremost of their time. He translated from the French, Malta Brun's Geography, published in 1843. In religion he was a Universalist ; in politics, an Abolitionist. All 'his poems show an artistic finish, and several of them are entitled to a high place among the classic literature of the English language. His (The Deserted Wife) has run through school-readers and has been recited upon many a rostrum. <Prometheus> was his greatest effort, and, no doubt, one of the best of all his works.

PERCUSSION, in medical technics, that method of investigation which consists in tap¬ ping on the surface of the body, to ascertain from the sound produced the condition of the parts lying beneath. It forms a principal branch of modern medical diagnosis. Anatomy teaches how the organs enclosed in the cavities of the body are normally formed, whether they are firm or spongy in texture, whether they are full or empty of air, whether they are tense or lax, *etc.* ; and, according to these distinctions, a slight blow upon the surface over them will evoke variations of sound, dull where the underlying substance is solid; resonant where it is more or less hollow. Thence by a comparison of the sounds emitted on percussion with the in¬ formation furnished by physiology as to the position and structure of any particular organ, and by pathology as to the morbid changes to which it is liable, an idea more or less distinct is obtained of the actual condition of the organ and of the nature and extent of any disease which may be acting upon it. In a technical point of view percussion is either immediate or mediate. In the former a stroke is given with the ends of the fingers on the part of the body, either bare or slightly covered, which is to be examined; in the latter an intermediate sub¬ stance, as a firm elastic plate or body of ivory, wood, gutta-percha, etc., called a pleximeter, is placed on the part in question, and the stroke is given on it either with the fingers or with a percussion-hammer. As ordinarily practised, one or two fingers of the left hand are laid firmly against the part, and sharp raps are made with the end of the middle finger of the right hand. Much depends on the way in which the

stroke is given, as its force and elasticity, as well as its direction, have much influence on the sound. It was introduced in 1761 by the Vienna physician, Auenbrugger (q.v.). Ignored by the profession in Austria, it was brought again into notice by its advocacy by Corvisart in 1808. The practice of it has extended throughout the medical world. Mediate percussion was in¬ vented by Piorry in 1828, and it has been car¬ ried to the highest perfection by Skoda and his pupils. See Auscultation.

PERCY, an ancient and noble English fam¬ ily, of Norman or Danish extraction, tracing their descent from Manfred, who settled, be¬ fore Rollo came to France, at Perci, near Ville-dieu. Its founder in England was William de Percy, called ˆAlsgernons® or <(Algernon,® (<the - mustachioed, w who came over with William I in 1066 (or 1067) and received lands in York¬ shire, where he resided, and in Lincolnshire, Essex and Hampshire. His son Alan succeeded him in 1116, as 2d Baron Percy. Alan’s son William became 3d Baron Percy in 1168, and

died without male issue, but Joscelin of Louvain, upon his marriage with William's sister, Agnes de Percy, took the family name and the title of ,4th Baron. His son Richard (about 1170-1244) signed the Magna Charta. Their direct descend¬ ant in the 6th generation was Henry Percy (1342-1408), 1st Earl of Northumberland, who rebelled against Richard II, and then, with Henry IV, was defeated at Shrewsbury (1403), where his son Henry Percy, called ˆHotspur,® was killed, 21 July 1403, and at Bramham Moor, where he was slain (1408). Hotspur's son Henry (3 Feb. 1394-23 May 1455), 2d Earl of North¬ umberland, served often as special ambassador and at length became lord high constable, and fell on the Lancastrian side at Saint Albans. Six years later the 3d earl, again named Henry Percy (25 July 1421-29 March 1461), died in battle at Towton, where he was defeated by the Yorkists. The 4th Earl Henry (1446-28 April 1489) was killed in a popular uprising directed against him. His son Henry Alger¬ non (13 Jan. 1478-19 May 1527), 5th Earl of Northumberland, served under Henry VII and Henry VIII, holding important offices and es¬ caping from the jealousy of Wolsey. His son of the same name, the 6th earl (1502-29 June 1537), had no children, made the king his heir. The title went to his nephew Thomas, 7th Earl of Northumberland (1528-72), a Catholic, whose religion made him distasteful to Eliza¬ beth. He joined Westmoreland in behalf of Mary Queen of Scots, rebelled openly in 1570, and was beheaded at York 22 Aug. 1572. He was succeeded in the title by his brother Henry (1532-21 June 1585), was devoted to Elizabeth, assisted in suppressing the Catholic rising led by his brother, but after his execution followed his example, declared for Mary, was seized, tried for treason, fined and released, only to be arrested a second and a third time, being sent to the Tower in 1584. There he was mysteriously shot through the heart, probably by his own hand. His son Henry (1564-5 Nov. 1632) was accused of complicity in the Gunpowder Plot and was imprisoned for nearly 16 years (1605— 21) in the Tower, where he devoted himself to the sciences. His kinsman Thomas Percy, the actual organizer of the Gunpowder Plot, b. 1560; d. Holbeach, 10 Nov. 1605, was educated

a Protestant, but became an ardent Catholic, hired a house adjoining the Parliament house in his own name, put Guy Fawkes in charge and stored gunpowder in the adjoining cellar, in¬ tending to destroy the members at the next ses¬ sion. His plot was discovered and he escaped from London, but was pursued by government troops and in the ensuing fight was mortally wounded. The 10th Earl of Northumberland, Algernon Percy (October 1602-13 Oct. 1668), was the third great earl. He was appointed 23 March 1636, admiral of the fleet, in which posi¬ tion he attempted in vain to reform the navy under Charles I ; sided with the opposition in the Long Parliament, but was in favor of peace throughout the civil war and took no part in public affairs during the Commonwealth ; and advanced the cause of the Restoration. His son Josceline (4 July 1644—21 May 1670) was sur¬ vived by a daughter, later the Duchess of Som¬ erset, whose son became Duke of Northumber¬ land. Consult De Fonblanque, E. B., (Annals of the House of Percy) (London 1887).

PERCY, Florence, the pen name of Eliza¬ beth Akers Allen (q.v.).

PERCY, George, English colonial gov¬ ernor: b. Northumberland, England, 4 Sept. 1580; d. England, March 1632. He entered the army, served in the Netherland wars and in 1600 came to America where in 1609 he suc¬ ceeded Capt. John Smith as governor of Vir¬ ginia, retaining the office until Sir Thomas Gates arrived from England in 1610, when he became a member of the governor's council. From March 1611 to May 1612 he acted as dep¬ uty governor and in 1612 returned to England where he again served in the wars in the Low Countries in 1625, becoming captain in 1627. He was a man of much courage as a soldier and showed ability in administering the affairs of the colony when in his charge. He wrote dis¬ course of the Plantations of the Southerne Colonie in Virginia) (1606) ; and (A Trewe Re-laycion of the Proceedings and Occurentes of momente … in Virginia … 1609-1612> (1625).

PERCY, Thomas, English prelate and anti¬ quary: b. Bridgenorth, Shropshire, 13 April 1729; d. Dromore, Ireland, 30 Sept. 1811. He was graduated at Oxford in 1750, taking his M.A. in 1753, and after taking orders in the English Church was vicar of Easton Maudit, Northamptonshire, 1753-78. He proceeded to the degree of D.D. in 1770 from Emmanuel College, Cambridge. In 1778 he became dean of Carlisle, which he resigned in 1782 for the Irish bishopric of Dromore. The last five years of his life he was blind. He is best re¬ membered by his (Reliques of Ancient English Poetry } ; and a poem, the < Hermit of Wark-worthP Many of. the pieces in the <Reliques) were retouched, recast and, when fragmentary, completed, almost always

with great taste. The work was published in 1765 and materially helped to give a more natural and vigorous tone to English literature. The manuscript source of Percy's <Reliques) was edited and published by J. W. Hales and F. J. Furnivall in 1867-68. Percy was well skilled in the Ice¬ landic and several other languages and he made some translations from Portuguese versions of Chinese works. He also published a curious domestic record, long extant in the Percy fam¬

ily of Northumberland, with which he claimed a dubious kinship, and known as the North¬ umberland Household Book) — a document val¬ uable for the light it throws on the manners of a bygone age. (See Reliques of Ancient Eng¬ lish Poetry). Consult Gaussen, A. C. C., (Percy: Prelate and Poet> (1908).

PERCY ANECDOTES, a collection of popular anecdotes published in monthly parts (1821-23). They were assumed to be from the pens of <(Sholto and Reuben Percy, Broth¬ ers of the Benedictine Monastery of Mount Benger.® The real names of the authors were Thomas Byerley (d. 1826), first editor of the (Mirror of Literature, > and Joseph Clinton Robertson (d. 1852), editor of the Mechanics' Magazine. The Percy coffee-house in Rath-bone place, London, was the customary place of meeting of Byerley and Timbs, and the se¬ ries derived its name from this circumstance. A new edition of the (Percy Anecdotes,* edited by Timbs in four volumes appeared at London in 1887.

PERDICCAS, per-dik'as, Macedonian gen¬ eral : d. near Memphis, Egypt, 321 b.c. He was descended from the royal house of Orestis, a Macedonian province, attached himself to the court of Philip and was a member of that ru¬ ler's bodyguard at the time of his assassination. He fought in all the important campaigns of Alexander, and for his services at Susa re¬ ceived a crown of gold and the daughter of a satrap of Media for his wife. At Alexander's death Perdiccas received from him his sig¬ net ring, the symbol of royal power, and was placed in command of the military forces by the new sovereign Arrhidseus, the natural son of Philip, over whom he soon gained a para¬ mount influence, practically controlling the government. War was at length declared against him by Antipater, Craterus and Ptolemy. Perdiccas thereupon marched into Egypt to meet Ptolemy and was slain by his own sol¬ diers.

PERDIDO, per-di'do (Sp. per-fhe-fho), a river and bay which form the

western boundary of Florida, separating it from Alabama. The river rises in southwestern Alabama and flows south into the bay. The bay is entirely land¬ locked and its outlet into the Gulf of Mexico is so small, and enters at so acute an angle with the line of coast, as to be almost undistinguishable from sea, from which circumstance the river and bay probably derived their Spanish word name perdido, or ((lost.® There are gener¬ ally but four or five feet of water on the bar at its mouth. The river and bay were from an early period the boundary between the French colony of Louisiana and the Spanish colony of Florida, and were claimed as the eastern boundary of the territory acquired by the United States by the Louisiana purchase in 1803. The question was not settled till the cession of West Florida to the United States in 1819.

Pi£RE GORIOT, par go're-o. (Pere Goriot* (1834), probably best of the "Parisian Scenes® in the (Comedie humaine* by Honore de Balzac, is the counterfoil of (Eugenie GrandetP There avarice crushed paternal affec¬ tion; here the too-loving father — a bourgeois Lear — is made the victim of his daughters' folly and insatitate social ambition. The story,

like many even of the best of Balzac s, lacks unity. Interest is divided between the tragedy of Goriot's unrequited paternal devotion, the so¬ cial climbing of Rastignac, and the personality of the super-criminal Vautrin, both of whom play leading parts in other scenes of the Comedie Humaine. So far as it concerns Goriot the story is in outline this : He had amassed a con¬ siderable fortune as a speculator in food and as a politician in Revolutionary days, had di¬ vided it between his daughters, spoiled children, who had married beyond their station, Anastasie the Count de Restaud, Delphine the Alsatian Nucingen, a wealthy banker, of whom they neither had the love nor deserved the respect. Their follies for worthless lovers brought both into repeated financial crises from which they were partly extricated by the father's unreckon¬ ing sacrifice. Seeking to secure their happiness by the gratification of their desires, he com¬ pletes his own ruin without

averting theirs. Already fatally compromised, they shine at a ball while their father is dying, and are con¬ strained to leave him to the barest of funerals at the charge of a medical student and Rastignac. A fierce quarrel of the daughters over the fainting Goriot, and his death, follow¬ ing hard upon it, are described with great power. Notable, too, are the pages in which the ex-convict and satanic philosopher of cynical self-will Jacques Collin, alias Vautrin, beguiles Rastignac to crime. The progressive corruption of this brilliant youth, under Vautrin s promptings and the exigencies of his relations with Delphine, is admirably exhibited. Much of the action takes place in a Parisian boarding¬ house, precisely located in the Rue Neuve-Sainte Genevieve, <(between the Latin Quarter and the Faubourg-Saint-Marcel,55 the famous Pension Vauquer, described with really marvel¬ ous minuteness of vision in the opening pages. Here lived and died Pere Goriot, in a room as minutely depicted. Every boarder is made a portrait-study, notably the young and beautiful Victorine Taillefer. The landlady, the porter, the maid are no less individualized. In and above the social circle of Anastasie and Del¬ phine, the Vicomtesse de Beauseant and the Duchess de Langleais are engaging figures. In¬ deed few novels count so many life-like char¬ acter studies, though all of them pale before the picture of the tortured heart of Goriot, drawn as it were in blood, and of Rastignac, with high breeding and slender purse, cast to sink or swim in an unfamiliar world. Vautrin, though less real, lives, like his fellow-super¬ man and convict, Hugo's Jean Valjean, by the sheer creative power of genius. How society dominates at last even the giants who con¬ travene its laws remained to be shown in (Lost Illusions,5 <The Splendors and Miseries of Courtesans5 and (The Last Incarnation of Vautrin.5 The later fortunes of Anastasie may be followed in (Gobseck> and (The Beauvisage Family) ; of Delphine in many stories notably (The Deputy from Arris.5 Rastignac has a subordinate part in many novels, among them <Lost Illusions, > (The House of Nucingen > and (Cousine Betted It is enough for (Pere Goriot5 to have given senile oaternal devotion and self-centred filial ingratitude probably their strong¬ est expression in all fiction. There is a good translation in (Everyman's Library.5

Benjamin W. Wells.

PˆRE LACHAISE, par-la'shaz', a ceme¬ tery on the northeast side of Paris and one of the most remarkable burial grounds in the vyorld. Its site was the garden of the country villa bestowed on Frangois d'Aix de Lachaise, confessor of Louis XIV, by that monarch. It was converted to its present use in 1804 and now contains over 20,000 monuments and

nearly 800,000 graves. Some of the great figures in French modern history repose within its pre¬ cincts. Here, too, is the celebrated monument to Oscar Wilde.

PEREDA, pa-ra'tha, Jose Maria de, Span¬ ish novelist: b. Polanco (Santander), 6 Feb. 1833; d. there, 1 March 1906. He received a good education, was graduated as an engineer, but soon found that his talents and inclinations . lay in the direction of literature. As he pos¬ sessed independent means, he determined to satisfy his preference in this respect. His early work brought him little recognition because it confined itself to the description of local scenes and characters until then practically unknown beyond their local domain. Yet his (Escenas Montanesas5 (1864) and other like works are clever in presentation, excellent in diction and original in form and presentation. Among his other publications worthy of special notice are (Bocetos al Temple) (1876) ; (Tipos5 (1877) ; (E1 buey suelto) (1877) ; (Don Gonzalo Gon¬ zalez de la Gonzalera) (1878) ; (Pedro Sanchez5 (1883) ; (Sotileza5 (1884) ; (La Montalvez5 (1888) ; (La Puchera5 (1889) ; cNubes de Estio5 (1891) ; (A1 primer vuelto5 (1891) ;

(Penas arrrba5 (1895) ; (Pachin Gonzalez5 (1895). Pereda, though not a very cosmopoli¬ tan writer, shows a great deal of originality in the handling of his subjects, plots and char¬ acters. His personages are for the most part local, but instinct with life and truth. An ex¬ ception must be made in the case of his villians which are invariably over-drawn, often to such an extent that they appear caricatures. His language is strong and good and has great skill in the depicting of nature. See Pedro Sanchez.

PEREGRINUS, Petrus, otherwise Pierre de Maricourt, writer of the earliest treatise on the magnet, a.d. 1269. He owes his surname to the village of Maricourt in Picardy and the appellation Peregrinus, or Pilgrim, to his having visited the Holy Land. Little is known of his life save that he was a man of academic cul¬ ture and a leader in experimental philosophy, that he was greatly admired by his contem¬ porary, Friar Bacon, and that he served in the engineering corps of the French army which laid siege to Lucera in southern Italy in 1269. It was in the midst of his warlike duties at Lucera that Peregrinus sought to construct a motor which would keep the orrery of Archi¬ medes in continuous rotation for a definite time ; and in the course of this work, he was led to the consideration of perpetual motion itself with the result that he showed diagrammatically and to his own satisfaction how a wheel might be kept in movement forever by magnetic at¬ traction.

To explain this magnetic motor, the first of its kind the world had ever heard of, Pere¬ grinus wrote a letter of 3,500 words — the (Epistola ad Sigerum5 — from the trenches at Lucera to one Sigerus, a friend of his at home, in which he expounds clearly and methodically the prop-

erties of the magnet, many of which he himself had discovered. The letter is one of great interest in physics, geodesy and navigation. In it Peregrinus assigns a definite position to the poles (he uses the term) of a lodestone, and shows how to determine which is north and which south ; proves that unlike poles attract and similar ones repel each other ; breaks a magnet into pieces and finds that each fragment, however small, is a complete magnet ; recognizes that a pole of a magnet may neutralize a weaker one of the same kind and even reverse its polar¬ ity; and crowns his work by supporting his magnets on a pivoted axis instead of floating them on corks or in glass vessels, as previously done, and by surrounding them with graduated circles; all this 50 years before Flavio Gioia of Amalfi invented his form of the mariner's compass which brought him fame.

Of manuscript copies of the <Epistola,) the Bodleian library has six; the Vatican two; Trin¬ ity College, Dublin, one; the Bibliotheque Na¬ tional, Paris, one ; Leyden, Geneva and Turin, one each.

The first printed edition came from the presses of Augsburg in 1558, having been pre¬ pared by Achilles Gasser, a physician of Lindau who was well versed in mathematics, astronomy, history and philosophy. Libri published another in his (Histoire des Sciences Mathematiques en Italie, } (1838), as did Bertelli in the (Bulletind di Bibliografia e di Storia delle Scienze Math-cmatiche et Fisiche) (1868) and Hellmann in his (Rara Magnetica) (1898).

Bertelli not only gives the Latin text, but collates and compares the readings of the Vati¬ can codices with other manuscripts, adding co¬ pious references, critical remarks, *etc.*

Of translations, we have one by Prof. Silvanus P. Thompson (London

1902), and an¬ other by Brother Arnold of Manhattan College (New York 1904).

PEREIRA DA SILVA, da selva, Joao Manuel, Brazilian historian: b. Rio de Janeiro, Brazil, 30 Aug. 1817; d. 1898. He was educated in Brazil and in Paris, admitted to the bar of Rio Janeiro in 1814 and practised law suc¬ cessfully. In 1844 he was elected to Congress, where his course was conservative. As a his¬ torian he gained a wide reputation ; among his works are (Historia da fundagao do imperio BrazileinP (1864-68) ; (Plutarcho Brazileiro) (1866); (Obras politicas e literarias) (1868), *etc.*

PEREIRE, pa-rar, Jacques Emile (b. Bor¬ deaux, 3 Dec. 1800; d. Paris, 6 Jan. 1875); Isaac (b. Bordeaux, 25 Nov. 1806; d. 12 July 1880), French bankers. They gained an im¬ mense fortune through the organization of the Paris and Saint Germain Railroad and after¬ ward engaged in vast speculations. They founded the Societe du Credit Mobilier in 1852 (see Credit Mobilier), and upon its becoming bankrupt contributed $16,000,000 to aid its re¬ organization. They greatly built up trade be¬ tween France and America and through their efforts lines were established to South America, Mexico and the West Indies. They were the founders of a maritime company in 1855 which subsequently became the Campagnie Generate Transatlantique.

PEREIRA, Jonathan, English pharmacol¬ ogist: b. Shoreditch, London, 22 May 1804; d.

20 Jan. 1853. He studied medicine and in 1823 was appointed resident medical officer of the general dispensary in Aldersgate street; after ward becoming lecturer on chemistry. In 1824 he published a translation of the (London Phar¬ macopoeia, > followed by (A Manual for the Use of Students) ; (A General Table of Atomic Numbers, with an Introduction to the Atomic Theory,* and other textbooks. In 1832 he resigned the office of lecturer for that of pro¬ fessor of materia medica in the New Medical School in Aldersgate street, and succeeded Dr. Gordon as lecturer on chemistry at the London Hospital. His great work, (Elements of Materia Medica,* appeared as a separate work in 1839-40, and at once established his reputa¬ tion. The treatise is remarkable for research, variety of scientific, commercial and practical information, and scrupulous exactness. In 1841 he procured the license to practice in London from the College of Physicians and in 1845 was elected a fellow of that body, and on the establishment of London University he was

appointed examiner in materia medica and pharmacy. Among his contributions to science, his excellent treatises on <Diet) and on Polar¬ ized Light) (1843) are best known. His death was the result of a fall.

PlˆREZ, Antonio, Spanish writer: b. Monreal de Ariza (Aragon), 1539; d. Paris, 3 Nov. 1611. He was at once a statesman of note in his day and he held a high place among the best letter writers of his age. A natural son of Gonzalo Perez, Minister to Charles V and Philip II, he early obtained through his family connection and his own intelligence and talent strong influence at court, where he be¬ came secretary to the latter sovereign. He was peculiarly fitted for this position, having re¬ ceived the best education possible in his day at Madrid, Venice and Louvain. As the trusted agent of the king in almost every important political move, Perez played a very prominent part in the politics of Europe, in their relation to those of Spain, for several years. In this connection he was mixed up in several unsavory acts, among them the murder of Juan de Esco¬ bedo, the special ambassador at the Spanish court of Don Juan of Austria (1578). In all of these moves he undoubtedly acted with the consent, if not at the solicitation, of the king. These acts raised up for him many enemies, among the bitterest and most persistent of whom were the relatives of Escobedo. At first the king loyally backed his secretary and agent ; but Perez made the mistake of playing false to his master; and the latter became his unrelent¬ ing enemy. Perez fled from the Spanish Court to Aragon and, on the fall of the latter, he went to Paris and, later on, from there to London, then back again to Paris. Perez had the ability to present his thoughts in a novel and interesing form. His ˆrevelations® are to-day among the most unblushing confessions of an unblushing age. They are, therefore, of great interest in that they present a picture of the intrigues, corruptions, vices and love affairs of the court of Philip II and depict the sovereign himself and those surrounding him. His two most in¬ teresting remains are his (Relaciones) and his (Memorial del hecho de su causal The former which recounts at length his experiences was published in London in 1594. Consult Froude, J. A., (Spanish Story of the Armada)

(New York 1892) ; Hume, M. A. S., < Antonio Perez in Exile) ((Transactions,5 Royal His¬ torical Society, London 1894) ; (Espanoles e lngleses5 (Madrid 1903) ; Miguel, A. M., An¬ tonio Perez et Philippe IIP (Paris 1845); Muro, (Vida de la Princesa de Eboli) (Madrid 1877) ; consult also Fitzmaurice-Kelley/ Spanish Literature) (New York 1908) ; Ford, J. D. M. A., <A Spanish Anthology) (New York 1901) ; Ticknor, M., (History of Spanish Literature> (New York 1854).

PEREZ, pa'rets, Isaac Loebush, Jewish writer : b. Zamosc, Poland, 1851 ; d. 1915. He received the traditional Jewish training, after which he prosecuted secular studies. For many years he was a practising lawyer, but the re¬ strictions imposed on members of his race obliged him to forego a legal career. He be¬ came secretary to the Jewish community at Warsaw and there he remained until his death. His first literary efforts were in Hebrew, but he soon abandoned this tongue in order to reach a larger audience through the Yiddish. His works are (Stories in Verse and Miscel¬ laneous Poems) (1877) ; (Love Poems) (1894) ;

(Collected Writings5 (1899-1901), in Hebrew. In Yiddish there appeared <Schriften5 (1906) ; <FolkTales> (1909); <Dramas> (1910); <Adam and Eve) (1910) ; <Chasidisch) (1911) ; (Sketches and Pictures5 (1911) ; (For Young and Old5 (1911); (The Old and the New5 (1912). For an appreciation of Perez's in¬ fluence on his audience consult Pines, <Histoire de la litterature judeo-allemande5 (Paris 1910).

PlˆREZ, pa'rath, Pedros Ildefonso, Mexi¬ can minor poet: b. Merida, Yucatan, 23 Jan. 1826; d. there, 21 Feb. 1869. He was self-edu¬ cated, entered the employ of the government when very young, meanwhile continuing his study of literature, particularly the works of the Spanish poet Zorrilla. In 1849 he was one of the founders of the Academy of Science, and at his death was a member of the govern¬ ment council and comptroller of the treasury of his native state. His work was Jong in gain¬ ing recognition and the best of it was pub¬ lished in the literary journals Mosaico and Pensamiento. A collection of his poems was published in 1885. Among his works are (La Ida del Sol5; (A Tunkas5 ; (E1 Prisma de la Vida,5 *etc.*

PˆREZ GALDOS, Benito, Spanish nov¬ elist and dramatist: b. Las Palmas, Canary Islands, 10 May 1845; d. 3 Jan. 1920. He was graduated in law at Madrid but finally gave it up to devote his energies to painting, for which he displayed considerable talent. But

the revolu¬ tion found him contributing political, critical and literary articles to El Parlamento ‘ La Nation, El Contemporaneo , La Revista de Espana and other Madrid papers. In 1871 he published his first historical romance, (E1 Audaz,5 which was so favorably received by the public that he was enabled to find a publisher for (La Fontana de Oro,5 which had been writ¬ ten four years earlier. He* found a mine of wealth in the stories, tales and incidents con¬ nected with the political and national struggles of Spain from the beginning of the 19th cen¬ tury on to his own time, and in 1873 he began the publication of (Episodios Nacionales,5 which resulted in 10 volumes covering the war for independence and the events that led up to

it. These romances include Trafalgar,’ (La corte de Carlos IV,5 (E1 19 de Marzo y el 2 de Mayo,5 (Bailen,5 (Napoleon en Chamartlin,5 (La Batalla de los Arapiles,5 (Zaragoza,5 (Gerona,5 (Cadiz,5 (Juan Martin el Empeci-nado5 (1873-75). They became very popular and placed Perez Galdos among the foremost Spanish literary men of his day. A second series of national romances followed in 10 volumes and became as popular as their pre¬ decessors. This latter series shows more ma¬ turity, better literary form and more centaintv in the presenting of the artistic coupled with a broad sympathy for and a deep insight into human nature. It _ includes (E1 equipaje del Rey Jose,5 (Memorias de un cortesano de 1815, 5 (La segunda casaca,5 (E1 Grande Oriente,5 <Siete de Julio,5 (Los cien mil hijos de San Luis,5 (E1 terror de 1824, 5 (Un voluntario realista,5 <Los apostolicos,5 (Un faccioso mas y algunos frailes menos.5 Slowly but surely Perez Galdos was developing a mastery over his characters, his literary material and himself that was to place him in the very fore rank among the Spanish romantic writers of the 19th century. His studies of the history of the political and social struggles of Spain during the first half of the past century had shown him the bigotry and religious intolerance then characteristic of Spanish life, especially in the rural ‘ districts ; and his own naturally liberal attitude toward political and religious questions had displayed itself frequently in the two series of ˆpisodios nacionales.5 So when he began, in 1876, the publication of the (Novelas espanolas contemporaneas,5 he had insensibly drifted into a field where his genius found itself more at home than it had ever previously been. With a skill and enthusiasm surpassing the best displayed in his previous work, he set himself to depict national customs, habits, prejudices and modes of thought. He was the valiant knight of the crusading days going out after the bigotry of his own age. His pictures of Spanish society are instinct with life, virility and the compelling sense of their truthfulness. An

earnestness and a power of describing feelings and passions pervade this whole series of (Novelas espanoles contemporaneas5; so .these new novels got closer to the heart of the Span¬ ish people than any of his previous ones had done; and having a much broader and more general human interest, they soon made the author popular outside his own country. This popularity called for translations of practically all of the series of (Novelas contemporaneas5 into the various languages of Europe. Perez Galdos thus soon found himself at the head of a school of his own, composed of uncompro¬ mising adherents and admirers among the younger literary set of Spain, behind whom stood the greater part of the novel reading class of the nation, who were captivated with his power of depicting most convincingly so many striking and interesting phases of the national life, and of drawing female characters with a skill surpassed by few, if any, Spanish writers. All Spain loves a good love story and Perez Galdos presented it with love stories, the heroines of which seemed almost at once, after their appearance, a part of the national life. The peculiarly national yet realistic types thus presented in the midst of the bitterest satire on

the narrowness of rural life, its self-compla¬ cency and its intolerable bigotry, tended to fix the national attention on his female characters which are generally the storm centre of a stormy plot and of intrigues which have made them the subjects of much and bitter discussion and the recipients of strange , sympathy from the followers and friends of Perez Galdos, who were legion in Republican and revolutionary Spain. His attacks on the bigotry of the Church and his ridicule of the priests brought the Catholic organizations about his ears ; and this made the author himself a storm centre, the result of which was that the echo of the local conflict resounded in foreign countries ; and the comparatively young author woke to find his works being studied by foreign literary societies and clubs and placed as school texts on the curriculums of colleges and universities wher¬ ever the language of Cervantes was studied. <Gloria) and ‘Dona Perfecta) became almost as well known abroad as in Spain. To the novels of this class, which may be called the third period of his literary activity, belong

‘Marianela,5 ‘Dona Perfecta,5 (La familia de Leon Roch) (1878); ‘Gloria5 (1879); ‘El amigo Manso) (1882); ‘El doctor Centeno) (1883) ; (La de Bringas5 (1884) ; ‘Tormento5 ; ‘La prohibido) ; (Fortunata y Jacinta) ; <Miau> ; (La Incognita5 ; (Torquemada en la hoguera5 ; (Realidad 5 ; (La desheredada5 ;

‘Angel Guerra5 ; ‘La Sombra5 ; ‘Tristana.5 In various other novels not here mentioned he continued to work the veins of national cus¬ toms, characters and incidents to the satisfac¬ tion of the Spanish reading public by whom he was more or less idolized.

While Spain has, since the beginning of the present century, been fairly unanimous in ac¬ cording Perez Galdos the first place among Spanish novelists of the latter quarter of the 19th century, there still exists a very decided difference of opinion as to his merits as a dramatist. His dramas show much less marks of originality than his novels. Most of them in fact being dramatizations of his novels inter¬ spersed with an occasional original drama. Perez Galdos began his dramatic career in 1892 with a dramatization of his successful novel (Realidad. 5 This was followed by (La Loca de la Casa5 in 1893, and (Gerona.5 These all had a certain success which the fame of the author lent them, but nothing more. (La de San Quintin5 presented in 1894, was enthusiastically received because its dramatic construction is much better than the dramas that preceded it and because it is socialistic in the extreme in its denunciation of inherited wealth and position and oppression of the poor and the laboring classes. Among the other dramas of Perez Galdos, several of which have been, very suc¬ cessful, are (Los Condenados5 ; (Voluntad5 ; (La fiere5; ‘Electra5 ; Mariucha5 ; ‘Barbara5; ‘Amor y ciencia5 ; ‘Pedro Minio* ; ‘Casandra5 ; ‘El abuelo5 ; and ‘Dona Perfecta.5 The Spanish critics have complained that Perez Galdos’ Spanish is by no means classical, and that even in his own finest descriptive passages, dialectic forms and grammatical improprieties are constantly creeping in. Yet in spite of these acknowledged shortcomings, he was head and shoulders above any other Spanish novelist of his own time. He had the wonderful power of observation of Scott, Dickens and Manzoni , VOL. 21—37

and his voice was nearly always pitched in a true key. He made breathe again for us the people of an age but recently past, an age like our own in that it was one of wonderful new ideas about which the passions of mankind fought and for which many bled and died; yet very different from our own in its attitude toward most of the questions that vitally affect human life. This great difference Perez

Galdos paints always with the truth and sympathy of a master hand. In his later novels and dramas he presents contemporary society, taking up in each some great national problem. New and modern ideas and the wall of prejudice and bigotry opposed to them form the great underground structure of most of his mod¬ ern novels and dramas. He seems to be ever actuated by some impelling purpose, which never lets the interest of the story lag. His plots are well developed ; he has a real genius for the creation of types, characters and cos¬ tumes. In the first two series of the 'Episodios5 there are over 500 well-defined char¬ acters ; and in the other two series published at a much later date, the power of creation is still with him. This power he owed in part at least to years spent in investigation in archives, libraries and among papers, documents, letters, biographies likely in any way to illus¬ trate the history of Spain in the first half of the 19th century and, more especially, that of the French invasion. In pursuit of his work he studied the clothing, customs, advertisements, proclamations and laws of the period he wished to introduce into his stono His fascinating style, his brilliant descriptive power and his ability to group his scenes and characters with artistic effect around great national ques¬ tions enabled Perez Galdos to make for himself a permanent place in Spanish literature. (See Electra). Consult Alas (Clarin), 'Benito Perez Galdos (Madrid 1889); Anthon del Olmet, 'Galdos5 (Madrid 1912) ; Altamira, 'El Teatro de Perez Galdos5 (Madrid 1898) ; Menendez y Pelayo, 'Discursos Academicos5 (1898) ; 'Benito Perez Galdos5 (in preface to 'Episodios5) ; Pardo Bazan, 'Polemicos y estudios literarios5 (Madrid 1892).

John Hubert Cornyn.

PEREZ DE HITA, Gines, Spanish poet : b. Murcia, and flourished in the second half of the 16th century. He took part in the war against the uprising of the Moor, which began in 1560. This much is known of his life from his 'Guerros Civiles de Granada,5 which en¬ joyed a great reputation during the life of the author and for many years afterward, and which is still a valuable authority on the events of which it treats and the relations between Moors and Christians in Southern Spain down to the end of the 16th century. This work consists of two parts, one of which was pub¬ lished in Zarayoza in 1595, and the other in Barcelona in 1619. Both parts have been printed many times and generally issued in one volume. One of the best editions is that pub¬ lished in the 'Bibliotica de Autores Espanoles5 (Rivadeneira). This edition contains a valu¬ able preface by Buenaventura Carlos Aribau (Vol. III). As poet Perez de Hita does not stand very high; but as a simple, direct and effective historian his work is of great value. It has the added merit of seeing the troubles

of Spain from the point of view of both contending factions; and he not infrequently lashes with unsparing hand the savagery and injustice of the Spaniards upon whom he blames much of the trouble. The two volumes of <Guerras) are in reality distinct works since they treat of totally different events and per¬ sonages in no way directly connected with one another. They are, moreover, distinct in sub¬ ject and manner of treatment. The first vol¬ ume is little else than a historical novel ; while the second is history told very much in the form of a novel. Both are interesting and their stories are well presented from the point of view of the author; who is ever as ready to use his imagination as his labors and investi¬ gations in the realms of true history. The author writes like a soldier, and especially in - the second volume the events that come under his attention either directly or indirectly through stories heard in camp, interest him more than direct and formal history adjusted to dates and official documents and developed in detail. These defects, in reality, at this dis¬ tant date, make the <Guerras) the more inter¬ esting and, in a sense, valuable, since they breathe the spirit and paint the customs of the age in which they were written. As the author unfolds his story we see the life of the camp and feel, in his tale, the breath that animated society when man's chief business was war and his greatest glory was gained from feats of arms. The (Guerras } is filled with singular com¬ bats told in a spirited way that proclaims that the heart of the author was in his task; and the language of the text is singularly modern.

PlSREZ DE ZAMBRANA, da sam-bra'na, Luisa, Cuban poet and novelist: b. El Cobre, Cuba, 1837. She came of a very poor family, and spent her early days in the country, where she received a very meagre education. She read widely the Spanish poets, and early began to write poems which displayed depth of feel¬ ing and a fine sense of the rhythm of language. At the age of 14 she published, in the local press, < Armor Materno) (Maternal Love), which attracted attention. This she followed with frequent contributions to the press, prin¬ cipally to El Or den of Santiago de Cuba, the following year. One of her poems, (A Cuba,' became so popular that it was learned by the school

children, and recited in public, in salon, school and theatre. At the age of 19 she pub¬ lished a volume of poems <Poesias) which at once gained for her a national reputation. In 1858 “Miss Perez married Dr. Zambrana of Havana, a writer also of considerable reputa¬ tion. Three years later Zambrana began the publication of El Kaleidoscopio; and for this his wife did some of her best work. Her poems were welcomed by the press of the capi¬ tal and she contributed to the Aguinaldo Habanero, La Havana, the Album de lo Bueno y lo Bello, Cuba Literaria, Revista Habanera, Brisas de Cuba, Ofrenda al Bezar, La Guirnalda and Noches Literarias. In 1860 another volume of <Poems) appeared with a critical yet lauda¬ tory preface, by Avellaneda, then at the height of popularity. This so increased her reputa¬ tion that her poems were copied extensively in Spain and many of them were translated into Italian and French by eminent poets, all of whom found in the work of the young Cuban poet

a new and compelling note of frankness, simplic¬ ity and wealth of poetic feeling. Among her admirers was the Italian poet Mantici who translated her <A1 campo,> (Noches de luna,> <E1 sabio en su patria,> and other poems into Italian ; and Alexandre Aveline, who translated <La caridad) into French. Among her novels and numerous other prose writings are (Mujeres celebres,) < Dolor, > (A las estrellas,’ <Angelica,) (Estrella) and (Hija del verdugoP To these must be added another book of poems issued in 1880, which still further increased her reputation at home and abroad. A vast amount of her writings is still buried in the files of the Liceo Habanero, El Ateneo; El Siglo; Rcvista de Cuba, Album de las Darnas, and other periodicals to which she contributed in later years.

PERFECT NUMBER. See Arithmetic. PERFECTABILISTS. See Religious

Sects.

PERFECTIONISTS. See Noyes, John Humphrey; Oneida Community; Religious Sects.

PERFUMES (per’fumz or per-fumz’) and PERFUMERY. Perfumes are substances of pleasing odor, prepared for use by combining them with inodorous materials, as grease, spirits, starch, soaps, snuffs. They are used in the extract form and in cosmetics, dentifrices, pastes, tinctures, incense, pastils, pomades, hair-oils, hair-washes and dyes, depilatories and other toilet accessories. They are classified as natural or artificial: the former being derived from animal and vegetable

substances found in nature; the latter being produced synthetically by combining chemical substances.

Animal Perfumes. — There are four odors of animal origin used in perfumery — namely, musk, ambergris, civet and castor. The aroma of musk freely imparts odor to every body with which it is in contact. Its power is such that polished steel will become fragrant of it if the metal be shut in a box where there is musk, contact not being necessary. In perfumery manufacture tincture of musk is mixed with other odorous bodies to give permanence to the more evanescent perfumes or bouquets, the musk acting to them almost as a mordant does to a dyestuff. The usual statement as to the length of time that musk continues to give out odor is exaggerated. If fine musk be spread in thin layers upon any surface and fully ex¬ posed to a changing current of air, all fra¬ grance, it is said, will be gone in from 6 to 12 months. The finest musk, that which in¬ deed is the only kind really useful in per¬ fumery, is distinguished as Tonquin musk, the average price of which is about $25 per ounce. Civet is exceedingly potent as an odor, and when pure, and smelled at in the bulk of an ounce or so, is utterly insupportable from its nauseousness; in this respect it exceeds musk. When, however, civet is highly diluted so as to afford but minute quantities to the olfactories, its sweet perfume is generally admitted; the fragrant principle is the same as that emitted by the beautiful narcissus, which also is too powerful for a great many persons. Civet is extensively used, when duly attenuated, in per¬ fumery. Its powerful and lasting odor makes it very useful in soaps, and especially in sachets.

It is one of the perfumes of <(Spanish leather,)J or Peau d'Espagne; the first gloves used in England were scented with it. Several thou¬ sand ounces are annually imported, the aver¬ age price of which is about S3 per ounce. Castor, although it cannot be largely used in any given perfume on account of the very dark color of its tincture, when properly di¬ luted is extensively employed. Its perfume, when old especially, is exceedingly pleasant, and its fixing power is at least

equal to that of musk. Its market price is about $12 a pound.

Vegetable Perfumes. — The simplest per¬ fumes and doubtless the most primitive are those exhaled by flowers dried for domestic use — rose petals, violets, lavender flowers, *etc.* — and combinations of these with fragrant spices and odorous woods and herbs. The fragrant gum-resins, in use from the most ancient times, exude naturally from the trees which yield them, or from wounds accidental or purposely inflicted to increase the yield. These may be regarded as perfumes in a solid form. The most important are benzoin, myrrh, opoponax, tolu, Peru and storax. A second group which are procured by distillation and are mostly fluid bodies are termed volatile oils, essential oils or ottos — formerly quintes¬ sences. Odor-bearing plants contain the fra¬ grant principle in minute glands or sacs ; these are found sometimes in the rind of the fruit, as the lemon and orange ; in others it is in the leaves, as sage, mint and thyme ; in wood, as rosewood and sandahvood ; in the bark, as cassia and cinnamon ; in seeds, as caraway and nutmeg; in yet others in the petals, as in rose, lavender or ylang-ylang. The odor principle of orris is a solid resembling cocoa-butter, and is contained in what is really the rhizome of Iris florentina, though techincally called orris-root. These glands or sacs of perfume may be plainly seen in a thin-cut stratum of orange-peel ; so also in a bay leaf, if it be held up to the sunlight, all the oil-cells may be seen in¬ dividually. All the fragrance-bearing sub¬ stances yield by distillation an essential oil peculiar to each ; thus is procured oil of patchouli from the leaves of the patchouli plant (Pogostemon patchouli), a native of Burma; oil of caraway, from the caraway-seed ; oil of geranium, from the leaves of the Pelargonium roseum; oil of lemon, from lemon-peel, Citrus limonis; and a hundred others of infinite variety.

The celebrated perfumer Eugene Rimmel groups the scents mostly used in perfumery under 18 kinds, represented by the following types: rose, jasmine, orange-flower, tuberose, violet, balsam, spice, clove, camphor, sandal, citrine, lavender, mint, aniseed, almond, musk, ambergris and vanilla. The first five men¬ tioned, with acacia, are those most largely used in compounding the popular perfumes of the present day.

Manufacture of Natural Perfumes.— By

the improvements introduced during the first half of the 19th century by Darcet, Leblanc, Robiquet and Chevreul, the perfume industry has developed rapidly and extensively. > The reduction of the chemistry of essential oils to an exact science and the simplification of the

machinery employed have done much for the industry, particularly in France. The prepara¬

tion of all natural perfumes requires the exer¬ cise of the most delicate care. If, for example, the essence is contained in the flower, the per¬ fume finally obtained will vary considerably with the age of the flower, with the at¬ mospheric conditions at the time it was plucked and with the process of extraction employed. It may happen, therefore, that instead of the exquisite aroma which is exhaled by the grow¬ ing plant, an odor is obtained totally lacking in delicacy. No little skill, experience and knowledge are required in the art of making perfumes. Nevertheless, certain general methods are employed which may here be briefly outlined. The process of infusion is employed for iris, musk, civet, benzoin and the like. The odorous substances are macerated with alcohol, thus forming tinctures. The proc¬ ess of expression is employed to a certain ex¬ tent in the making of citron, orange and berga¬ mot perfumes. The best essential oil is ob¬ tained simply by squeezing the peel with the hand. In Calabria, Italy, the expressed residue is afterward distilled with steam; but the es¬ sential oil thus extracted is of an inferior quality. The process most widely employed is that of distillation, which is resorted to for the extraction of essences that neither a high tem¬ perature nor aqueous vapor can appreciably decompose. Rosemary, thyme, ylang-ylang, roses, patchouli, lavender, cedarwood and sandalwood are thus treated. Long experience has shown that there are certain theoretical conditions which should obtain in practice. Among these conditions may be mentioned the picking apart of the flower to facilitate the diffusion of the essential oil; the treatment of proper quantities to obtain stronger products; distillation gradually increased in intensity by increasing the heat at the end of the process ; the evacuation of the vapors with the utmost expedition; and quick condensation. The ap¬ paratus used for the purpose of attaining these objects varies in form almost infinitely. The use of fixed solvents depends upon the prop¬ erty which fatty substances have of absorbing perfumes when in contact with fragrant bodies. The cold process, absorption or enfleurage, as it is called by the French, is chiefly made use of for procuring the odoriferous principle of very delicate flowers, such as the jasmine and tuberose. Lard is the fat usually employed, although a mixture of beef fat with the lard is preferred for some perfumes. In the most approved apparatus the fat is laid out in ˆstrings® on glass plates, with a fine syringe, and these plates are stacked in a tall case so that an air space is left alternately at front and back so that a current of air passing through the stack has to flow across every plate.

The flowers are placed in bulk in a tall container and an air current forced through them passing thence through the stack with its larded plates. By careful adjustment of the size of the con¬ tainer and the stack, almost every bit of fra¬ grance imparted to the air current is caught and held in the lard. The delicate perfumery oils are dissolved out of the fat with alcohol, chloroform, benzine, bisulphide of carbon, ether or petroleum spirit, according to the volatility of the oil obtained. The solvent is then evaporated by manipulation of the tempera¬ ture with cold or heat. If the hot . process is employed the flowers are encased in small

bags of fine linen and hung in jars of fat which is kept melted by being immersed in warm baths or by hot-water jackets, into which the pots are fitted. The temperature is kept at from 100° to 120° F., for from 12 to 48 hours, according to the particular flowers being treated. In the larger establishments this op¬ eration is conducted in a continuous apparatus, formed of a series of fat-pots each containing a network basket filled with the flowers. A continuous current of melted lard flows through the apparatus in at the bottom of the pot and out of the top and thence into the bottom of the next in the series, and so on. New baskets of flowers are continually being fed into the apparatus, the newly-filled basket going into the last pot — that holding the lard which has the largest absorption of perfume. As each new basket is placed, all the others are moved up one place in a direction contrary to the flow of the lard. The flowers after passing through the series of pots are put into a hy¬ draulic press and subjected to great pressure. This apparatus has been proved thoroughly ef¬ fective. The fragrant oils are dissolved out of the lard by appropriate solvents, as already described, and the lard is ready to be used over again. Instead of fat, either glycerine or, as is usually the case, vaseline can be em¬ ployed. In the manufacture of extracts the flowers are treated with alcohol until the es¬ sence is entirely removed. Rose water and similar perfumes are made by simply heating the fresh flowers in water: for rose water the proportion is five pints of water to each pound of rose petals. The heat is applied by steam pipes surrounding the bath and

after the perfume is absorbed by the water, the whole is gently distilled, only the first half (two and one-half pints) being saved. Sufficient alcohol is added to keep it from molding. Oils of the citrus fruits — orange, lemon, bergamot, etc.— are se¬ cured by hand. The rinds of these fruits are cut into strips and removed from the fruit, being placed in water to soak for a short period. They are then squeezed against small sponges which take up the oil. These are afterward pressed out or dissolved out, according to the process used. As the quality of these oils is adversely affected by heat, they are distilled at a low temperature in a vacuum. Although most of the fragrant flowers which form the basis of natural perfumes are grown in the vicinity of Grasse, Cannes and Nice, never¬ theless almost every quarter of the globe pays its floral tribute to the perfume makers of France. The distilleries of essential oils in the department of Alpes-Maritimes use annually 5.500,000 pounds of orange blossoms; 4,400,000 pounds of roses; 440,000 pounds of jasmine; .530,000 pounds of violets, and an eaual quantity of cassia and tuberoses. In Basse-Alpes, Gard, Drome, Herault and Var 220,000 pounds of

lavender essence ; 88,000 pounds of thyme es¬ sence; 55,000 pounds of rosemary essence and the same quantity of aspic essence are annually manufactured. Furthermore, the environs of Algiers, Staoueli, the plain of Mitidja and Boufarik (Algeria), annually send to France a contingent of 13,300,000 pounds of rose

geraniums and rosemary. Malaga supplies

lavender, rosemary and thyme ; Corsica,

geranium; Dalmatia, lavender oil; Cyprus, the oils of myrtle and origanum- .Mexico, the oil

of linaloe; China, the oils of cassia and anise-, Calabria, the oil of bergamot; Zanzibar, oil of cloves and other spice oils; Rumania, oil of fennel; Holland, oil of carraway; Tuscany, oil of orris; France, Spain and North Africa, oil of thyme; Burma, oil of lemon-grass; Asia Minor, oil of origanum and, since the war began, otto of roses, formerly supplied chiefly from Bulgaria, Uganga, oil of backhousia ; Saint Thomas, West Indies, oil of bay; Para¬ guay, petitgrain oil; French Guiana, bois de rose femelle oil; Malay Archipelago, Java and the Philippines, ylang-ylang, patchouli and citronella; Mysore and Madras, oil of sandal¬ wood. Natural perfumery oils are classified according to their chemical constitution, as follows :

- Geraniol Group. — Otto of roses, theˆ ge¬ ranium oils of Turkey, France, Algeria, Spain and Italy (presenting minor differences) ; palmarosa oil, and the citronella oil of Ceylon.

Linalol Group. — Bois de rose femelle, linaloe, neroli, petitgrain, French lavender, English lavender, spike lavender, bergamot.

Eugenol Group. — Clove, cinnamon leaf, pimento, bay.

Anethol Group. — Star anise, fennel.

Saffrol Group. — Sassafras, camphor.

Thymol Group. — Origanum, thyme.

Aldehyde Group. — Java citronella, cinna¬ mon (bark), cassia, lemon, orange, lime, cit¬ ron, lemon-grass, backhousia, bitter almonds.

Ketone Group. — Carraway, dill, spearmint, pennyroyal.

Menthol Group. — Peppermint of Japan, pep¬ permint of America, black peppermint of Eng¬ land, Italian peppermint.

Borneol Group. — Rosemary, pinus pumilio, pinus Sibirica.

Cineol Group. — Eucalyptus globulus, eu¬ calyptus dumosa, cajaput.

Sesquiterpene Group. — Cubebs, juniper, patchouli, vetivert.

Unclassified. — Orris, wintergreen, sandal¬ wood, ylang-ylang.

Manufacture of Artificial Perfumes. — The

first synthetic perfumes were discovered by Cahours, Grimaux and Lauth in 1851 ; but the industry of artificial aromatic products hardly developed until the discovery of coumarin in 1868. The industry took its sudden rise after the remarkable synthesis of vanillin by Tiemann and Haarman in 1885, followed by heliotropin in the same year. By artificial perfumes French and German chemists usually mean compounds formed entirety from artificial substances and aromatic products obtained by the manipula¬ tion of natural essences. The methods of pre¬ paring artificial perfumes are of great theoreti¬ cal simplicity; but in practice they are exceed¬ ingly difficult of application. Indeed, the prin¬ ciples underlying the preparation of artificial perfumes r.re by no means well understood. For alcohols, Haller has shown that succinct anhydrides are to be preferred. In the case of ether, the resultant alcohol is saponified and then re-etherized

by means of an acid com¬ bined with the essential oil. The alkaline bisul¬ phites are used in the treatment of aldehydes and ketones, which are separated from the compound formed by means of an acid or alkali. For the phenols, potassium is used and the salt obtained is decomposed by means of an acid.

Among the more important nitrated deriva¬ tives, the first place should be given to the artificial musk invented by Albert Baur in 1888. This ingenious German chemist prepares his substitute for the costly natural musk by heating a mixture of isobutyl chloride and tolune with aluminum chloride. Water is ad¬ ded to the product of this reaction ; the com¬ pound is subjected to distillation; and the dis¬ tillates which pass over at a temperature be¬ tween 107° and 200° C. are collected. These distillates are then treated with nitric and sul¬ phuric acid; the product is washed with water, and when treated with alcohol yields crystals having a marked odor of musk. This same characteristic odor has been encountered in many of the benzenes. The compound most widely used in commerce is the compound in¬ vented by Baur, and the ketone musk which Mallemann obtained by nitrating ketones with butyltoluene. More recently trinitro-butylxy-lence has been used as a substitute for natural musk. In the series of alcohols and ethers, terpilene should be mentioned. This compound is prepared by hydrating terpenes. Terpilene is much used by perfumers, by reason of its strong odor of syringa. It is often mixed with heliotropine, the two blending well. Cin¬ namic alcohol has the odor of hyacinth with a touch of rose ; octyl alcohol has an odor closely resembling opoponax ; nonyl alcohol, a mixture of orange and rose; ethyl butyrate, of pine¬ apple; methyl salicylate, of wintergreen ; amyl acetate, of pears; geranyl acetate, of rose ge¬ ranium; benzyl acetate, of jasmine and ylang-ylang ; lynalyl acetate of bergamot; benzalde-hyde, of bitter almonds. Among the phenols, thymol, discovered by Doveri in the essence of thyme, but also extracted from other es¬ sential oils, is of extreme importance. In ob¬ taining this aromatic compound, the essential oil of Ajoivan ptychocis is agitated with soda lye. The mixture is allowed to settle, and the liquor is then decanted.

Employed as an anti¬ septic, thymol finds its chief value as an in¬ gredient of medicinal soaps. In this connec¬ tion its antiseptic power is 30 times that of carbolic acid. Vanillin is both an aldehyde and a phenol. Many ways have been devised for its preparation; ‘but they are all more or less modifications of two methods — synthesis of benzene derivatives which are of slight scienti¬ fic interest and the oxidation of natural com¬ pounds, which is of more importance from an industrial point of view. Vanillin is employed not only by perfumers, but also by bakers and cooks, as a substitute for the vanilla of nature. Up to the present time it must be confessed that artificial perfumes have not curtailed the production of natural oils and pomades. At first it seemed that synthetic perfumes would result in cutting down the price of the natural product. But experience has shown that ar¬ tificial essences, by reason of their coarseness, have not been able to dethrone natural per¬ fumes in popular favor. Scientists, ingenious though they may be, have not as yet com¬ pletely succeeded in reproducing the delicacy of nature.

History.— Perfumes of various sorts have been held in high estimation from the most an¬ cient times. The Egyptians prepared them for various purposes ; for embalming the dead, as

offerings to the gods and for domestic uses. They anointed their bodies with sweet-scented oils, which they also poured upon the heads of newly-arrived guests. In the Bible frequent reference is made to the use of perfumes by the Hebrews. The Phoenicians, Assyrians and Per¬ sians are known to have made great use of them ; Tyre was a famous mart where they were exported by sea, as Babylon was for the supply of the interior. The art was practised to an extraordinary extent by the Greeks and Romans. The odor of perfumes was an offering to the gods; after bathing and in their athletic exercises the Greeks applied them liberally to their persons. Their wines were perfumed by infusing in them roses, violets and hyacinths. Pliny gives a full account of the great variety of perfumes used by the Romans under the emperors. The use of perfumes was introduced by the Arabs into Spain. In the Middle Ages, France and Italy were most conspicuous for the use and manufacture of perfumes. Incense and fragrant tapers were consumed in the Church even as far back as the baptism of Clovis, 496. Charlemagne used perfumes and Philip Augus¬ tus granted a charter to the master perfumers in 1190. Alcoholic perfumes are supposed to have been first made in the 14th century; the first of these of which we have an account is Hungary water, distilled from rosemary in 1370, by Queen Elizabeth of Hungary, who re¬ ceived the receipt

from a hermit, and by the use of it is said to have preserved her beauty to old age. When Catherine de' Medici went to France she was accompanied by a famous Flor¬ entine perfumer named Rene, and ever since that time the French have made great progress in the art. In Europe at the present time the manufacture of perfumes is carried on in Paris and London, and in various towns near the Mediterranean, especially in the south of France. Certain districts are. famous for their peculiar productions; as Cannes for its perfumes of the rose, tuberose, cassia, jasmine and the neroli extracted from the leaves of the bitter orange; Nimes for thyme, rosemary, as¬ pic and lavender; Nice for the violet and mign¬ onette; and Sicily for the lemon, bergamot and orange. England claims the superiority for her lavender and peppermint; these, herbs being cultivated upon a large scale at Mitcham in Surrey and at Hitchin in Hertford.

United States. — The growing of flowers and plants for perfumes in the United States has made very slow progress. A start has been made in Florida by one or two flower-growers, and experiments with perfume grasses have been made by the government. In Michigan, Indiana and New York large areas are de¬ voted to peppermint, spearmint and erigeron. Michigan, Wisconsin and Nebraska produce wormwood oil. Sassafras oil is made in many localities along the Atlantic seaboard, from Pennsylvania southward. The oils of wintergreen, black birch, spruce and cedar are made in some quantity in the North Atlantic States and also in Tennessee and Kentucky. Oil of pennyroyal is made in Ohio and North Caro¬ lina. Most of these, however, are for use as flavoring extracts rather than for perfumes.

Production. — According to the special cen¬ sus of manufactures taken for the year 1914, there were then in the United States 496 estab-

lishments making perfumes and cosmetics. They employed an aggregate capital of $9,646,- 613 and 3,748,414 persons were engaged in the industry. Their product for the year reached a value of $16,899,101, of which sum $9,434,315 represented the value added by the manufac¬ turing processes. Practically all of the raw materials were imported.

Imports. — Since the war began nearly all of the materials used in making perfumery have come from France. For the year ended 30 June 1917 there were brought in a value of $406,136 in floral essences and $418,774 in other odor-bearing substances. From the Philippines came a value of $2,800. In addition to these raw materials there were brought in of ready¬ made perfumes, cosmetics, pastes, etc., a value of $2,772,539. The duty laid upon such goods is extremely high, ranging from 60 per cent to 78.68 per cent, the total duty collected on the imported perfumes for that year totaling $1,808,736. Including the essences, the value imported from France was $3,357,235 ; from England, $199,589; and from Switzerland, $144,484. Those from other countries were in¬ significant.

Consult Askinson, G. W., (Perfumes and Cosmetics) (New York 1915) ; Charabot, E., Industrie des Parfums Naturels) (Paris 1912) ; Gattefosse, R. M., (Technique de la Fabrication des Parfums Naturels et Artifi-ciels) (Lyons 1913) ; Otto, M., (L'Industrie des Parfums d'apres les Theories de la Chimie Moderne) (Paris 1909) ; Parry, E. J., (The Chemistry of Essential Oils and Artificial Perfumes) (London 1908) ; Rimmel, E., (The Book of Perfumes) (London 1867).

PERGAMUS, per'ga-mus, or PERGA-MUM, Asia Minor, an ancient city of Mysia, the modern Bergama, on the north bank of the navigable Cai'cus, about 15 miles from the sea. Behind the town, on a conical hill, rose the acropolis, which was the original nucleus of the place. It was founded by emigrants from Greece and was selected by Lysimachus as a safe depository for his great wealth ; he placed here 9,000 talents of gold in charge of his lieu¬ tenant, Philetserus. The city first rose to im¬ portance about the commencement of the 3d century b.c., when it became the capital of an independent state of the same name, founded by Philetserus, who had revolted against Lysima¬ chus. A succession of monarchs reigned over the city and territory till 133 b.c., when Attalus III bequeathed on his deathbed his kingdom to the Romans, and it subsequently became a Roman province. Under the Byzantine em¬ perors the prosperity of the city rapidly de¬ clined. Pergamus was one of the most mag¬ nificent cities of antiquity and was principally indebted for its architectural splendors to Eu-menes II, who likewise founded the celebrated library

of Pergamus, containing 200,000 vol¬ umes; inferior in extent and value only to that of Alexandria. The city was famed for its manufacture of tapestries, pottery and precious ointments. It was also famous for its manu¬ facture of parchment, which derives its name (Pergamena charta) from this place. In ec¬ clesiastical history it is memorable as one of the seven churches of Asia referred to by Saint John (Rev. 2:12). Excavations carried out on the site in 1878-86 resulted in the dis¬

covery of splendid architectural and sculptural treasures. The great library was removed by Antony and presented by him to Cleopatra.

The modern city of Bergama on the plain at the foot of the acropolis has a population of about 20,000 inhabitants. Consult Conze, A. C. L. (and others), (Stadt und Landschaft von Pergamon) (Koenigliche Museum zu Ber¬ lin, 3 vols., 1912-13) ; Dorpfeld, W., (Die Ruinen von Pergamon) (Athens 1902) ; Pon-tremoli, E., and Colignon, M., <Pergame) (Paris 1900).

PERGOLESI, Giovanni Battista, jo-van'-

ne bat-tes'ta per-go-la'se, Italian musical com¬ poser: b. Jesi, near Ancona, 3 Jan. 1710; d. Naples, 16 March 1736. In the Conservatory of the Poveri di Gesu Cristo at Naples he was in¬ itiated by Gaetano Greco in the mysteries of his art, and while a pupil there composed his sacred drama (San Guglielmo d'Aquitania,5 produced in 1731. About this time he wrote in addition to several operas, a famous intermezzo, or op¬ eretta, (La Serva Padrona,5 whose original in¬ different reception was Pergolesi's greatest pop¬ ular success, but which later became the basis of all Italian comic opera up to Rossini's time. In 1734 he was appointed chapel-master of the church of Loretto. In 1735 he was invited to Rome to compose the opera (d'01impiade) for the theatre Tordinone. It met with no apˆ plause, while Duni's opera of (Nerone,5 per¬ formed at the same time, and far inferior to il, was lauded to the skies. Ill-health compelled him afterward to take up his residence at Poz-zuoli, where he finished his celebrated (Stabat Mater.5 In addition to the above works he composed masses, a (Kyrie cum Gloria,5 a (Salve Regina5 and other church music; 30 trios for two violins and violoncello; and (Or-feo et Eurydice,5 a cantata. His posthumous recognition was somewhat exaggerated ; but his achievement, despite his general lack of sci¬ ence, was considerable. Consult the study by Schletterer (1880).

PERI, in Persian mythology, the descend¬ ants of fallen spirits excluded from paradise until their penance is accomplished. They be¬ long to the family of the genii or jinn, and are constantly at war with the dsevas (the evil jinn). In earlier times they were themselves considered evil. They are immortal and spend their time in all imaginable delights. They are male and female, the latter being of surpassing beauty. The legends of the peris and the daevas are Avestan in origin.

PERIAGUA, per-i-a'gwa. See Pirogue.

PERIANDER, per-i-an'der, Corinthian tyrant : d. about 585 b.c. He was a son of Cypselus, whom he succeeded about 625. His reign w-as at first mild but he soon developed into a tyrannous and oppressive ruler, though he was a patron of the arts and was reputed to be one of the Seven Wise Men of Greece. He prohibited the ownership of large numbers of slaves and luxurious habits and forbade the people from the country to live in the city. He put to death his wife Melissa, daughter of Procles, the tyrant of Epidarus, which circum¬ stance when afterward related to her younger son Lycophron thoroughly alienated him from his father. Periander knowing Procles to have told his son of the mother's fate, thereupon

made war upon Epidarus, reduced it, and took Procles prisoner. He then endeavored to make peace with his son, who resided at Corcyra, and proposed to visit him, whereupon the Cor-cyreans put Lycophron to death in order to avert the visit. His rule extended over Corcyra, Ambracia, Leucas and Anactorium, beside his kingdom of Corinth. He was said to have died of a broken heart over his son's death.

PERIANTH, in botany, the floral envel¬ opes, the calyx and corolla, or either, especially when the calyx and corolla are combined so that they cannot be satisfactorily distinguished from each other, as in the tulip, orchis, *etc.* See Flower.

PERIBONKA RIVER, Canada, an af¬ fluent of Lake Saint John, in the

province of Quebec, over 400 miles long. It flows from about lat. 52° N., southward through a forest and lake region, Manonan being the chief lake along its course.

PERICARDITIS, inflammation of the peri¬ cardium, the membrane enveloping the heart, essentially the same as inflammation of other serous membranes. It is either acute or chronic. In acute pericarditis the membrane is usually bright red with sometimes spots of ecchymoses and is covered with layers of soft or firm fibrinous exudation (false membrane) of varying thickness. Generally there is an ef¬ fusion of flaky serum varying from a few ounces to a pint or more, which sometimes is sanguinolent. Rarely is pus present. If the serum is small in amount, or is absorbed, the sides of the pericardial sac adhere to each other in portions or entirely. Serum may dis¬ tend the sac pulling apart adhesions into thread¬ like bands (hairy heart). Both serum and the exudate impede the action of the heart, especially if they are present in considerable amount. The principal causes of acute pericar¬ ditis are acute rheumatism and Bright's disease. It may also accompany pleurisy, pneumonia, erysipelas and the continued and eruptive fevers. Sometimes it results from penetrating wounds or contusions. An instance is recorded where a set of false teeth swallowed by an in¬ toxicated man, causing ulceration of the oesoph¬ agus, was forced into the pericardial sac, peri¬ carditis resulting. It occurs most often before the 25th year, rarely after the 45th, and in about one-sixth of the cases of acute rheuma¬ tism, is not, as popularly supposed, a transfer¬ ence (metastasis) of that affection, but a mani¬ festation of it, due to the same condition of blood. When it appears in acute articular rheumatism, it occurs about the sixth day. The symptoms of acute pericarditis vary, de¬ pending on the amount of exudation and ef¬ fused serum, and may be considered in con¬ nection with the three stages of the disease . (1) From the attack to the effusion, rarely be¬ yond two days; (2) the stage of effusion; (3) stage of absorption. In the first stage there is more or less pain over the heart, increased by respiration ; a shortened inspiration ; generally a dry irritable cough and some tenderness , sometimes there is distress rather than pain. The action of the heart is increased; there is fever, anorexia and debility. When effusion occurs, pain and soreness are less. If there is much serum, symptoms of pressure upon the heart and irregular action of that organ appear,

with a feeling of weight, faintness on exertion, a feeble and irregular pulse, dyspnoea, a feeble voice, sometimes vomiting, dysphagia and men¬ tal disturbances. The detection of acute peri¬ carditis is

sometimes difficult, especially if asso¬ ciated with pleurisy or pneumonia. To the physician it is revealed by the precordial or cardiac friction-murmur, by an increased area of normal dullness, and by the exclusion of the symptoms of other affections. The prognosis varies with the extent and character of the in¬ flammation and its products and also with the resisting powers of the patient. Sometimes the disease is mild and recovery occurs ; often it is dangerous, death occurring in a day or two from paralysis of the heart, or within a week or two from impaired and, it may be, poisoned blood. Even if recovery takes place from a moderately severe attack, the action of the heart is usually impeded more or less for a variable time by the contracting fibrinous ex¬ udation. It must be borne in mind that very frequently endocarditis is associated with peri¬ carditis. The treatment demands rest, sooth¬ ing applications, freedom from excitement, and the relief of pain by remedies that do not dis¬ turb the heart's action or lower the strength of the body. Extensive serous effusion may have to be removed surgically.

Chronic pericarditis is usually one of the results of an acute inflammation following it after two or three weeks, but it may exist in¬ dependently as a subacute affection from the outset. Generally there is little or no effused serum, but there are several layers of fibrinous exudation. Sometimes liquid distends the sac. Pus is rare. Usually there is little pain; but the heart is feeble; circulation is poor; dyspnoea is common, especially on exertion. If the lung is compressed, blood-tinged mucus may be expectorated. The prognosis is unfa¬ vorable because of the probability-of repeated attacks, the likelihood that adhesions will form, and the presence of myocarditis. Suppurative pericarditis is nearly always fatal if associated with a general septicemia. The treatment of chronic pericarditis requires tonics, saline laxa¬ tives, and attention to hygienic measures.

PERICARDIUM, the investing fibro-se- rous sac or bag of the heart in man and other animals. In man it contains the heart and the origin of the great vessels. It lies behind the breast-bone, between the pleurae and from the third to the seventh ribs. Its apex or smaller extremity is directed upward, and at this point it encloses the great blood-vessels about two inches above their origin from the heart. The base of the pericardium is fixed to the central tendon of the diaphragm or midriff. It rests upon the bronchi, the gullet and the descending aorta, behind ; while the margins of the lungs overlap it in front. The sac consists of two lay¬ ers, an outer or fibrous and an inner or serous layer. The fibrous layer is continued upward on the great blood-vessels, and gradually merges into their outer coats. Its inner or serous layer, which directly invests the heart, is reflected over the inner surface of

the fibrous layer, and it therefore consists in reality of two layers or portions — a visceral portion, surrounding the heart, and a parietal portion., reflected on the fibrous layer. A single fold of the serous layer of the pericardium encloses the aorta and pul-584

monary artery. The inner surface of the mem¬ brane secretes a serous fluid, which in health is present only in sufficient quantity to lubricate the heart, and so to facilitate its movements within the sac. Galen was familiar with peri¬ cardial effusion in animals and suspected it in man. In 1824 Collin discovered the pericardial friction rub from which the dry form of peri-cordites is easily recognized. The pericardium of an adult man with a healthy heart is capable of holding from 14 to 22 ounces of fluid. The pericardium is liable to various serious forms of diseased action. Of these pericarditis (q.v.) is the most common. Others are hydroperi¬ cardium, hemopericardium, pneumopericar¬ dium and newr growths in the pericardium. See Heart.

PERICLES, per'I-klez (Greek, Ilepwcˆ O, Greek statesman, whose age was the most flourishing period of Grecian art and science : b. Athens, about 498b.c. ; d. there, 429 b.c. He was the son of Xanthippus and Agarista, both members of the best families of Athens, and the youth grew up in this choice environment. Damon, Anaxagoras and Zeno of Elea were his instructors. It was thought that from Anaxa¬ goras Pericles derived the elevation and in¬ dependence of mind and the remarkable elo¬ quence which characterized him in his public life. In 469 he entered upon his career as a statesman. Up to this time only the nobler and more influential citizens had held control of the important offices. Pericles accomplished the absolute democratization of the state. At once he proclaimed himself champion of the people's party, in opposition to his friend Cimon, the aristocratic leader, and won favor by the legis¬ lation which he effected. Thus, he brought about the enactments that citizens serving as soldiers or as judges in the courts of the Heliaea should be paid, and that the public treasury should provide the two oboli charged for ad¬ mission to the theatre at the Dionysia for such citizen as could not afford them. In 462-461,

through Ephialtes, he introduced the measure by which the court of Areopagus was deprived of all those valuable political powers which made it antagonistic to his own success. Cimon was disposed of by being exiled, and conserva¬ tive resistance was slight. Subsequently Pericles himself obtained the return of his opponent, who died at the siege of Citium in 449. For 30 years Pericles was undisputedly the fore¬ most personage of Athens. Popular allegiance was strengthened by further changes. A salary was attached to the archonship, and in course of time the office was made accessible to all citi¬ zens. All officials were eventually salaried. Poorer citizens were established in holdings in the Athenian colonies. The foreign policy of Pericles was based on the purpose of making Athens supreme in Greece. In 445 he conquered the revolted island of Euboea; in 441—440 he subdued Samos, Sophocles being among the generals of the expedition. During the 10 years' interim preceding the Peloponnesian War, Pericles devoted his attention to increasing the maritime strength of Athens and to de¬ veloping those plans of art which made Athens the wonder not alone of Greece but of the world. The funds obtained through the tribute of allies were applied to these designs. Among the temples and public buildings erected under

his administration were the Odeum, the Propy-lsea and that unapproached marvel of the archi¬ tectural skill of Ictinus, the Parthenon. 4 be im¬ petus thus afforded to the fine arts was notable. Phidias directed the general work upon the edifices. But while his personal achievement was very great, it is evident that that age must have been well supplied with architects, plastic workers and decorators of admirable powers. The Parthenon sculpture, 50 colossal statues and 4,000 square feet of frieze and metope could not all have been done by Phidias, yet all is of about equal merit. These works diffused at Athens every Sort of activity, and the con¬ sequent prosperity confirmed the influence of Pericles. The Peloponnesian War (q.v.) has been incorrectly ascribed to his ambition. In¬ correctly, because, while he did urge resistance ~to Lacedaemonian demands, he did so because he saw that war was inevitable, and was con¬ vinced that as long as Athens retained the influence then possessed Sparta would never be content. At the commencement of the war (431 b.c.) Pericles recommended to the Athe¬ nians to turn all their attention to the defense of the city and to naval armaments rather than to the protection of their territories. Accord¬ ingly, as commander-in-chief, he allowed the superior forces of the Spartans and their allies to advance to Acharnae, in Attica, without re¬ sistance, and at the same time sent a fleet to the shores of

Peloponnesus, to Locris and 2Egina, which took twofold vengeance for the ravages in Attica. After the Peloponnesians retired he invaded the territory of Megaris, which had been the cause of the war. At the end of this campaign he delivered a eulogy over those who had fallen in their country's service. The next year a plague broke out at Athens which wrought such dreadful havoc that Pericles was obliged to summon all his fortitude to sustain his countrymen and him¬ self. To occupy their attention he fitted out a large fleet and sailed to Epidaurus ; but the mortality among his troops prevented him from effecting anything important. He returned with a small force; but the Athenians no longer put confidence in him. He was deprived of command and obliged to pay a heavy fine, though no particular crime was charged against him. The people, however, soon recalled him and gave him more power than before. He died of the pestilence after being 40 years the' ruler of Athens — 25 years with others and 1$ years alone. Pericles maintained a reserve quite unwonted among Athenian statesmen. Such was his dignity, according to Plutarch, that (<the epithet Olympian — attached to his name by a rash and thoughtless crowd — ® was ((a worthy and becoming title.® His oratory was very highly esteemed, and as a military com¬ mander he was able, though he did not particu¬ larly seek distinction in that field. His exalted position m&y be the more truly appreciated when it is remembered that he was the central figure of a group including such eminent per¬ sonages as Sophocles, Euripides, HIschylus, Soc¬ rates, Anaxagoras and Zeno, and numbered also Herodotus, Hippocrates, Democritus, Pindar and Empedocles among his fellow countrymen. There is little doubt that his policy of personal government had for Athens injurious results. He had been the greatest man in the state, but had not encouraged a second; and at his death

democracy was helpless and a prey to dema¬ gogues. His lofty ideals, however, and their influence, became a permanent part of civiliza¬ tion. There are accounts of him by Plutarch and .Thucydides. Consult also Abbott, Evelyn, (Pericles, and the Golden Age of Athens) in (Heroes of the Nations) (New York 1891) ; Lloyd, W. W., (The Age of

Pericles) (2 vols., London 1875).

PERICLES, Prince of Tyre. <Pericles) is the only play now in the Shakespeare canon, which was not included in the 1623 Folio. It was, however, printed in quarto with Shakes¬ peare's name on the title-page twice in 1609 and four times thereafter. There is no ques¬ tion that at least two authors, possibly three, collaborated in this drama, and modern criticism is agreed that one of these is Shakespeare, w'hose hand reveals itself distinctly at the opening of Act III, scene 1, if not earlier. Evidently Shakespeare created the poetical Marina scenes of the last three acts in the same spirit in which he created the Perdita scenes of (The Winter's Tale) and the Miranda scenes of <The Tempest. } Whether he wrote the coarse prose scenes of Act IV is more doubtful, but Fleay's effort to father them upon William Rowley rests on thin evidence. That they are utterly unlike Shakespeare or injudi¬ ciously introduced into the play cannot safely be asserted. -Practically all the first two acts and the Gower speeches as a whole are now most usually ascribed (on Delius's suggestion, 1868) to George Wilkins, who in 1608 published a prose version of the story, frankly based upon the play. D. L. Thomas, however, who recognizes Shakespeare's touch largely in the first two acts and almost exclusively in the last three, argues interestingly for Thomas Hey wood as the collaborator. Engl. Studdien (XXXIX, 210-239, 1908). The story of (Pericles) is one of the most popular and most ancient in mediaeval literature. It is the subject of the last tale in Gower's 14th century <Confessio Amantis) where it fills nearly 2,000 lines. The drama seems to be indebted to Gower and particularly to a more recent prose version in Lawrence Twine's (Pattern of Painful Adventures) (licensed 1576). The hero is in most forms of the story called Apollonius of Tyre, the name Pericles in the play being possibly a reminiscence of Pyrocles, one of the chief figures in Sidney's (Arcadia. > The exclusion from the first and second folios of a play of which six quarto editions between 1609 and 1635 claimed Shakespeare as author may be taken to prove that the poet repudiated the vitiated text we possess. There is no doubt, however, that <Pericles) was an enormously popular work both on the stage and in printed form ; and it is equally certain that it contains much fine Shakespearean poetry, quite typical of the author's latest style. In subject and dramatic method the play most resembles The Winter's Tale,1' which likewise leaps over long times and distances and likewise deals with a king's ultimate recovery of his lost and sup¬ posedly dead wife and daughter. As it stands, (Pericles,1* with its long prologues and elabˆate dumb-shows, its spectacular plot and continual shifting of scene through the entire Mediter¬ ranean world, reminds one, probably moie than any other Elizabethan play, of the

modern

moving-picture show. In a recent article (<On the Date and Significance of Pericles" (Modern Philology, XIII, 1916), T. S. Graves has shown that the Venetian ambassador in London prob¬ ably sought to make diplomatic use of a per¬ formance of the play as early as the close of 1606, with the idea that the representation of the scene (I, 4) in which Pericles brings ships of grain to the relief of famine-stricken Tarsus would increase popular and royal favor for the project of securing English wheat for the use of Venice.

Tucker Brooke.

PERICLES AND ASPASIA, by Walter Savage Landor, was first published in two volumes in 1836; with numerous additions, in the Collected Works of 1846. It is a repre¬ sentation of Athenian society in the great age by means of a series of imaginary letters, in which are included several imaginary speeches by Pericles and abundant specimens of verse attributed to a great variety of Greek poets. Pericles, Alcibiades and Anaxagoras partici¬ pate in the correspondence, but the bulk of it is carried on by Aspasia and her bosom friend, Cleone of Miletus. The two women are alike interested in literature and politics, and their relations are made piquant by the fact that Cleone loves Xeniades, who follows Aspasia to Athens, and dies there of unrequited passion. To Cleone, Aspasia relates with sweet effusion her first glimpse of her hero, Pericles, at the the¬ atre, whither she has gone in disguise to see the Prometheus of yEschylus acted; comments on current literature, art, morals, foreign affairs, wTar ; describes a call from Sophocles, a reading by Thucydides, the marriage of Socrates ; and exchanges with her friend bits of original verse. It would require a sensitive ear always to distinguish these fine bluestockings from one another or either from Pericles; for all the Greeks show a marked bias-toward the terse, thoughtful, critical, sententious style of Landor. He apparently thought of his work as a kind of 'concentrated extract of the Periclean Age — its history and poetry redis¬ tilled by an independent English imagination m love with the glory that was Greece. It is one of the longest, most ambitious and, according to the judgment of his devoted admirers, one of the most successful of his efforts in prose — <(perhaps the richest mine,® says Sidney Colvin, <(which English prose literature contains of noble and unused quotations.® Consult Forster, John,

(Walter Savage Landor1* (1869) ; Colvin, Sid¬ ney, (<Landor® in (

English Men of Letters.)

Stuart P. Sherman.

PERIDINIUM ; PERUT1NID2E, respec¬ tively, a genus and a family oi Dinoflagellate Protozoa at times coloring parts of the sea red. See Red Water.

PERIDOT, a pale, yellowish-green or pis¬ tachio-colored variety of chrysolite (q.v.). It: is used as a gem, but is soft and difficult to pol¬ ish. In New Mexico and Arizona it is found abundantly in small grains or pebbles in the sands. From their form they are commonly known as ((Job's tears.® It is obtained also in Brazil and Egypt, and on an island in the Red Sea.

PERIDOTITE, per'i-do-tit, a rock of which the essential constituent is olivine. It is

of ultra-basic composition, is free from quartz and feldspar, and is of igneous origin. With the olivine are associated more or less of the minerals augite, enstatite, magnetite, diallage, hornblende, chromite, and sometimes biotite. According to the kind of accessory mineral and its amount relative to the amount of olivine, the following varieties have been distinguished : dunite, saxonite, lherzolite, buchnerite, eulysite and picrite. Of these the first four appear in meteorites, as well as in terrestrial rocks, while the others have been discovered only in the latter. From the abundance of magnesia in the peridotites they are sometimes known as mag¬ nesian rocks. Their component minerals readily change by taking up water as the result of weathering into serpentine.

PERIER, pa-re-a, Casimir Pierre, French politician: b. Grenoble, 11 Oct. 1777; d. Paris, 16 May 1832. He studied at the Oratorian col¬ lege in Lyons, and then in Paris ; fought in Italy in 1795; became a partner in his brother's bank; and was very successful in his varied business ventures, soon becoming a director of the Banque de France.

He was elected to the House of Deputies in 1817, and made his mark there as a financier, but especially as a con¬ servative. He wrote against the means by which the due de Richelieu attempted to obtain funds for the indemnity due the Allies. He sharply opposed the domestic policy of Polignac in 1829 and signed the (Address of the 22\? He did not approve of the revolution of 1830 but acquiesced in it ; served as minister in Lafitte's cabinet, but soon retired; in 1831 be¬ came Prime Minister, taking the portfolio of the interior; and in this office carried out what he called the ((policy of the right mean® in do¬ mestic affairs, showing himself severe toward the republican opposition but insisting on his independence of the king — for instance in the matter of the meeting place of the cabinet, which he arranged should be at his home and not at the Tuileries. He regarded the stand of the king toward the mob as weak and too conciliatory. His 'foreign policy was <(non-intervention® ; but in 1832, in spite of the united opposition of the majority of his colleagues and the king, he sent an armed force to Ancona as a check on Austria's influence on the papacy. A naval demonstration at Lisbon was also carried out after the Portuguese government had re¬ fused -compensation for certain injuries to French subjects. The awful cholera plague in Paris was met by strict sanitary measures de¬ vised by Perier and carried out under his per¬ sonal supervision. In this work he was attacked by the plague, to which he fell a speedy victim, worn out as he was with overwork and anxiety. Consult Castille, (Casimir Perier > (1859) ; and Nicoullaud, (Casimir Perier, Depute de l'Opposition) (1894).

PˆRIERS, pa-re-a, Jean Bonaventure des,

French poet: b. Arnay-le-Duc, Bourgogne, about 1500; d. 1544. He collaborated in the first French translation of the Bible which ap¬ peared in 1534, he collaborated with Dolet in (Commentaires de la langue latine5 in 1536. He received favor from Marguerite of Navarre in 1536-37 but his ridicule of human institutions in (Cymbalum MundP lost him all court favor. This work was publicly burned and Periers found himself a social outcast. It is said that

he committed suicide. An edition of his works was issued in Paris in 1866 and the year 1874 saw a special edition of the (Cymbalum MundiP

PERIGEE, per'i-je, that point in the orbit of the moon which is at the shortest distance from the earth. See Moon.

PˆRIGORD, pa-re-gor, France, an ancient province forming part of the military govern¬ ment of Guienne and Gascony now represented by Dordogne and part of Lot-et-Garonne. See France.

PERIGUEUX, pa-re-ge, France, capital of the department of Dordogne on the right bank of the Isle, 68 miles east-northeast of Bor¬ deaux. The chief buildings are the 10th century church of Saint Etienne de la Cite, a Bvzantine Cathedral with a lofty tower and five small cupolas, built in 984—1047 and restored in 1865, a handsome modern prefecture, a courthouse, hospital, museum, library, barracks and theatre. The manufactures are bombazine, serge, hosiery, cutlery, nails, pottery, liqueurs, spirits, leather; many hands are employed in cutting and polish¬ ing marble. One article of trade is the famous partridge and truffles {fates de Perigueux). Perigueux is the Vesuna of Caesar, and near the town are the remains of a vast amphithea¬ ter, of ancient aqueducts, baths and temples. The completely destroyed Vesuna of the Petro-coriani, who first inhabited this' district, was somewhat further south than the present town ; the Vesuna of the Romans is that part of the town now known as la Cite. The Tour de Vesonne is a remarkable Roman structure, 67 feet high and 200 feet in circumference, with neither door or window. Perigueux was one of the eight towns ceded to the Protestants in 1576.

PERIHELION, in astronomy, that part of the orbit of the earth or any other planet in which it is at the point nearest to the sun. The ((perihelion distance® of a heavenly body is its distance from the sun at its nearest approach.

PERIM, pa-rem', British island in the Strait of Bab-el-Mandeb, 12° 40' N. and 43° 23' E., two miles from the Arabian coast and 12 miles from Africa. It has neither water nor vegetation and the entire island (about six square miles) is merely the remains of a great volcano. It was seized for the second time by the British in 1857, in spite of the protest of nearly all the Powers ; has a fortress and light¬ house, built in 1861, and a small garrison; and is a key to the Suez Canal. The harbor is excellent.

PERINEUM, or PERINEUM, the out¬ let or floor of the pelvis, comprising muscles, blood-vessels, nerves, the lymphatic glands, the anus and a portion of the vagina in females and the genital apparatus in males. It is. some¬ what triangular in shape and is bounded by the rami of the pubes and ischia, the tuberosities of the ischia, the sacro-ischiatic ligaments and the apex of the coccyx. The portion between the pudendum and the anus is sometimes called the anterior perinaeum, or triangle, and that between the anus and coccyx the

posterior or triangle. The perinaeum is sometimes ruptured or torn during the birth of a child, especially in primiparae, and is sometimes the seat of

operation for the removal of a stone from the bladder (perinaeal lithotomy). Stone in the bladder in children can often be diagnosed through the rectum and, if the whole hand is introduced, the entire pelvis may be explored. Consult Shepherd, Francis J., ‘Anatomy of the Perin3eum) (in ‘Reference Handbook of the Medical Sciences,) New York 1916).

PERIOD, in geologic chronology, a time interval the value of which has been variously interpreted. The special committee of the Inter¬ national Congress of Geologists at the Bologna meeting in 1881 recommended the use of the term period for the time division of second mag¬ nitude, that for the first being era. The rocks formed during this time period were to be grouped as a system. According to this usage we should have Cambrian, Ordovician, Silurian, Devonian, etc., periods. In this sense the term is used by the United States Geological Survey. Dana on the other hand uses era for this time division, giving period a subordinate rank — as Niagara period, Onondaga period, Lower Hel-derberg period. The New York State Survey uses the term in nearly this sense but empha¬ sizes more especially the threefold division of each era, that is, early, middle and later De¬ vonian periods, or early, middle and later Cam¬ brian periods. The dual nomenclature of geo¬ logic classification, that is, the separate grouping of the time divisions and of the corresponding rock divisions was first strongly urged in this country by Prof. Henry S. Williams of Cornell (late of Yale). He also proposed the use of the prefixes eo, meso and neo for the periods. Thus he uses Eo sihirian, Mesosilurian and Neosilurian periods. The New York State Survey has adopted these terms with the substitution of palceo for eo. Consult Williams, ‘The Making of the Geological Time S. CalP (Journ . of Geol. I, 180-197) ; ‘Dual Nomenclature in Geological Classification > (ib., II, 145-160) ; (Geologic

Biology } (1895) ; Clarke and Schuchert, ‘The Nomenclature of the New York Series of Geo¬ logic Formations) (Science , 8 Dec. 1899), and American Geologist (February 1900). See Age; Cenozoic; Era; Formation; Mezozoic; Paleozoic ; Quaternary ; Secondary ; Series ; System ; Tertiary.

PERIODIC LAW, in chemistry, the law which teaches that the properties of the elements are periodic functions of the atomic weights ; so that when the elements are arranged in the order of increasing atomic weights, similar properties recur periodically, as we proceed from one end of the array to the other. It had long been known that certain approximate numerical relations exist among the atomic weights of ele¬ ments that have strikingly similar properties. For example, if we consider the three closely re¬ lated elements lithium, sodium and potassium, we find that the atomic weight of sodium is al¬ most exactly the arithemetic mean between the other two. Thus Li = 6.94 and K 39.10, the mean of which is 23.02 ; and the atomic weight of sodium is 23.00. Again, in the triad calcium, strontium and barium, we have Ca = 40.07 and Ba — 137.37, the mean of which is 88.72 ; and the atomic weight of strontium is 87.63, 1 he triad

chlorine, bromine and iodine affords still another familiar example, for we have Cl 35.46 and 1 = 126.92, giving a mean of 81.19; and the

atomic weight of bromine is 79.92. These rela¬ tions, of whose precise significance we are still ignorant, forcibly suggest a relationship among the elements, similar (for example) to that pre¬ vailing among the paraffins in organic chemistry ; for the paraffins all have analogous properties, and their molecular weights form an arithmetic series. In 1862 De Chancourtois conceived the idea of arranging all of the known elements along a helix, each element being represented by a point, whose distance from some fixed point, as measured along the helix, was numerically equal to the atomic weight of the element. He chose the unit of measurement, to be used in lay¬ ing off the positions of the various points, so that a difference of 16 in the atomic weights of two elements corresponded to a complete turn of the helix. He then endeavored to show that similarity in properties in any group of elements corresponds to some simple geometric relation among the representative points. Chlorine, bromine and iodine, for example, are repre¬ sented by points that lie sensibly upon a straight line parallel to the axis of the helix. De Chan¬ courtois was primarily a mathematician and geologist, and his contribution to chemical science

did not receive the attention that it merited until many years had elapsed. In 1864 and 1865, Newlands published two papers in which he exhibited the elements in a tabular array, following the order of increasing atomic weights approximately, but not without some slight transpositions. He pointed out that the elements in his scheme fall into groups, and he likened the members of each group to the notes composing one octave in music, calling the regularities which he pointed out the ((law of octaves.® In March 1869, Mendeleeff read a paper before the Russian Chemical Society, in which he examined the whple subject with great thoroughness, investigating the way in which various properties of the elements change with the atomic weights. His general conclusion was, that the measureable properties of the elements do not, as a rule, increase or decrease con¬ tinuously as the atomic weights increase, but that they exhibit a species of periodicity, in¬ creasing and decreasing alternately, though ap¬ parently not with sufficient regularity to admit of representation by a definite mathematical expression. In 1870 Lothar Meyer, inde¬ pendently of Mendeleeff, published an important paper on the same subject, in which he showed that the periodicity of the "atomic volumes® of the elements is especially marked ; "atomic vol¬ ume® being defined as the quotient obtained by dividing the atomic weight of an element by the specific gravity of the element in the solid state. Meyer's diagram, with some changes and additions to bring it down to date, is presented in the accompanying engraving. The atomic weights of the elements are here laid off along a horizontal line, or "axis,® and the corresponding atomic volumes are laid off verti¬ cally, according to the scale given at the left. In this way a series of points is obtained, cor¬ responding to the respective . elements ; and through these points a broken line has been drawn, so that as we proceed along the line from left to right we pass the different ele¬ ments in the order of ascending atomic weights. The specific gravities of some of the elements, in a solid state, are not known, and those of

others (such as nitrogen) are more or less un¬ certain, owing to the great experimental diffi¬ culties involved in their determination.

With¬ out doubt, therefore, Meyer's diagram will be still further modified, as our knowledge of the physical properties of the elements increases. There are five regions in the diagram, for which we possess no acceptable data concerning the specific gravities in the solid state, and for which, therefore, we do not know the atomic volumes. These regions are indicated by the dotted lines. In two places, also, the line pass¬ ing through the representative points does not strictly follow the order of increasing atomic weights. Argon (A), for example, appears to have an atomic weight slightly greater than that of potassium (K), and yet there seems to be no doubt but that argon should precede potassium as we pass along the broken line to the right. Argon forms no compounds, and its atomic weight is known only by inference from its density; so that this trifling irregularity can hardly be considered serious. Again, tellurium (Te) precedes iodine (I) on the diagram, al¬ though the diagram shows the atomic weight of tellurium to be the greater by a trifling amount. The atomic weight of tellurium, how¬ ever, is still more or less uncertain. According to some authorities, it is actually less than that of iodine, so that the slight discrepancy here shown disappears altogether.

It will be seen that the broken line exhibits a marked tendency to vary in height in a periodic manner, now rising to a strongly ac¬ centuated maximum height, and again sinking to a minimum that is less distinctly emphasized. The irregularities are doubtless due in part to the imperfection of our data; but many of them,

to are those corresponding to magnesium (Mg), calcium (Ca), strontium (Sr) and barium (Ba), which also form a group with markedly similar properties. If we pass downward to the left from the highest points, we first come to the group neon (Ne), argon (A), krypton (Kr) and xenon (X) which are distinguished by their singular chemical inertness. Beyond these, on the left, comes the group fluorine (F), chlorine (Cl), bromine (Br) and iodine (I) ; and next beyond these come oxygen (O), sulphur (S), selenium (Se) and tellurium (Te). Many other singular correspondences may be observed on the diagram ; and as it is highly improbable that these are merely accidental, we must conclude that some fundamental unity, either of structure, material or internal motion, pervades the substances that we call ˆelements.® Mendeleeff (and Meyer also) arranged the elements in tabular form, in such a way as to bring out their correspondences quite clearly. Mendeleeff's arrangement (with some modifica¬ tions and additions) is presented herewith. The elements, it will be seen, are divided into nine groups, each of which is entered in a separate

column. They are also divided into 12 ˆseries® each of which is entered upon one horizontal line. The atomic weights increase across the table from left to right. The elements in any one column are similar to one another in many ways, the resemblance being sometimes very striking. Hydrogen does not properly fit into the table at all. Copper, silver and gold, it will be seen, are entered both in the first group and in the eighth one. This is because their true positions are doubtful, some considerations indi¬ cating the first group, while others point equally well to the eighth. The eighth group is an

without doubt, are real and due to causes that we cannot yet understand. At the highest points of the diagram we find the metals of the alkalis — sodium (Na), potassium (K), rubid¬ ium (Rb) and caesium (Cs) — whose physical and chemical properties are strikingly similar. Passing down the line to the right of these several elements, the first points that we come

anomalous one at best, for the metals that com¬ pose it are so similar that it appears necessary to arrange them in threes (or fours), each little group of this kind being considered as lying upon one and the same horizontal line of the table. Between cerium and ytterbium in atomic weight there are a number of closely-allied metals, the metals of the rare earths, which do

not fit into the periodic system in anv natural manner, and are omitted from the table. In any given group, the elements of the even series (2, 4, 6, 8, 10 and 12) resemble one an¬ other, as a general rule, more closely than they resemble those in the odd series of the same group; this fact (which is not true in all parts of the table) is indicated by indenting the odd and even series differently.

The full significance of Mendeleeff's table cannot be understood

without an exhaustive study of the chemical deportment of the ele¬ ments classified. At the top of the table, and immediately under the group number, formulae are given which indicate the character of the compounds that the elements of the correspond¬ ing group form when combining directly with hydrogen. Thus, in combining with hydrogen alone, carbon yields - the saturated compound CHU; nitrogen yields NH3; oxygen yields OH2; and fluorine yields FH. The elements of groups I. II and III, either do not combine directly with hydrogen, or they, form compounds which are unstable ; and the elements in grouo IX do not form any compound at all. Most of the elements combine with oxygen in more than one proportion ; but there is usually one oxide which may be regarded as characteristic, of the ele¬ ment. The formulae of these oxides for the different groups are given in the second line under the group number. In some cases the general formula for the oxide does not corre¬ spond to the particular oxide that is commonly regarded as typical of the element in question. The oxides of manganese, for example, are analogous to those of lead in many respects; and yet manganese appears in the seventh group and lead in the fourth. But it should be observed that manganese has an oxide of the form MmO?, while lead has not so far as is known ; and in this sense, at least, the oxi.de R2Ot may be said to be characteristic of manganese. The oxides of group VIII do not, in general, correspond to the typical for¬ mula RO4 ; though osmium and ruthenium have oxides of this form. It must be remembered, throughout, that the “periodic law® is more or less elastic, and that in classifying the elements in groups we have to consider their properties as a whole, and not simply some one of them, nor some few. In Mendeleeff’s arrangement, for example, attention has been paid to the melting points, boiling points, spectra and mag¬ netic properties of the elements, as well as to the colors and heats of formation of their salts. Other physical and chemical properties have likewise been examined in the light of the “periodic law,® and the arrangement here sug¬ gested is that which appears, to best represent the entire mass of relationships.

It is evident that if an erroneous atomic weight were assigned to any element whose place in the periodic scheme is definitely fixed by its general physical and chemical properties, the error would be detected if. it were great enough to transfer the element in question to a position already occupied by another element, or to a group in which it manifestly did not belong. Several instances could be given in which a dis¬ agreement of this kind has led to further re¬ search, followed by the improvement of the atomic weight of an element in the direction indicated by the periodic law. The atomic

£

<L>

X

W

£

cG

<v

t£

‘S

o

m

H

£

w

S

w

W

w

X

H

to

O

u

>4

ffl

<

H

w

to

w

w

t4

w

Q

X

w

X

o

c

!> „

£ft

o

a

O

fN

o

d C

B O

W (1ˆ

■Mz

0)

W

ft

ft

fO

c

o

bo

u

<

ft!

o

gftft

u

O

SffiO

oft!ft

u.

C

T cl

Ci

O

CL,

£

O

o

£

O

a

O

O

(4

00

G

o

•*->

ft

H

x

o

g

o

C

<L>

X

.

ft 00 O’ —

■ 10*0 II

3 II II !

II’ -33 g

O -r-4 Or’)

11 2° •

all Is

|| 111 G G “d vh •G’C rt >

ftftft Q

lO

.

!ft

to II

ft ;

ft

. .

: ||

on ;

vO

CN

• •

! <u

II §

II :

; ;

. c

• T-H

« 5?

<i> !

||

• •

• U

• O

.S 3

G .

0)

• •

■ G

E :

_c

. .

3

O . u .

‘^3

0

. ,

0

m ■

• •

■ O

. G

. <0

. M : > > . X

• o

CN

IO

cs g ˆ G

1*°

*3

c n

ft

to

ft

™ll £ B

II |

.3 > >

p.o

OlH (U ˆ

in

to

. + *1 . 00

• G . <u

. -t- >

to

• bo ’ G . G

•H

CO •

•

ft •

to

* iH

• y—i

• 00

• tH

0 to

＜0

O •

’ tH

PO

Ov

ill

: B

! 13

ill

• G

• a)

• bfl

II II

cS

3-2

II

III

tH

II i >. • g :

* O

•

• 4*

is

ft 5

c n C

O ctJ

■i!

C Vy-r

O .

fi ;

+-> |

. 4-*

. a

■H

ft

C .

＜1 ■

▼H

IO

.

•

CO

＜N O

＜0

!

* 04

ill

Th

II

8 2

Os

II II

|B

d

-rH ˆ

ft 1!

. G . O

.42

. t-i

. rt

ii-I

C G

0 + 2

.2.2

B G

2 0

B B

J g

II -B

•o

•2H

＜v £

■ So

w

: E

• G

• G

• • ^4

. o ■ J3

■

C4 ©

fs

II

＜8’o

c bo,

UUr X

vO

00

7B

to 2

in

o ＋* GW

S3

tN i~»

— 1 ro

E E

G G

■§‘S

•s«

o

O

ft

G 6

&2 042

tw

o

ro

<T> r-*

04 g

• GO

“Cft

o 1 n

>0

00

- B

II -I

t— < ’ ^

ft*G

o

00

C4

ON

o II

TJ1 6

11.2

fe 8

c/5

00

CN

6

.3

‘3

a!

00

o

(N

3

s

C/5

s

r4

ro

(N

S|

111

•ft 43 ct3 V hJ

to

4

00*

. ^

ft ft

▼H

l-H

1— < t— 1

P.

G

O

(G

«o

q

ft

T-H

Ml

. a

. 0

N II

II 6

6.2

3^

C ci

. 00

-II

II |

S-c

i\

7, B

G ” G

B S3

Ml

: S

. G

• H

• u

O

04

II

S

G

O

. u

. 0

• CQ

B c

C O

GC/2

<

.2^

O

.2- *3 2

£3

. <u

. 4-P

4->

>

“2

43

H

‘O

™ II

II l

t.a

G t2 p aj

oGf2

fO

ft

2

o

O

saiiag -h (N

to ‘O

weight of titanium, for example, was formerly taken as 52, this being the result indicated by actual analysis of its compounds. But with this atomic weight it did not fit into the general classification, which called for an atomic weight of about 48. Thorpe, by a new investigation, showed that 48 is correct. The order in the

table, however, of tellurium and iodine, and of argon and potassium, is not the order of their atomic weights.

Mendeleeff found it impossible to construct his table without leaving many of the spaces in it vacant. He considered these vacancies to correspond to elements which were not then known, but which would probably be discovered in the future. In 1871 he wrote a paper upon this subject, in which he essayed to predict the general properties that three of these unknown elements must have, in order to fit well into the periodic scheme. It is gratifying to record that he has lived to see all three of them discovered, and to know that his predictions have been veri¬ fied with extraordinary accuracy. The metals so predicted are now called <(gallium,55 ((scan-dium55 and ˆgermanium,55 respectively, for the three countries (Gallia, Scandinavia and Ger¬ many), in which the rare earths containing them were discovered. His predictions for scandium (which he provisionally called (<eka-boron55 from its position in the table, and denoted by the symbol Eb), may be compared with the actual properties of that metal in the following manner :

Eka-Boron (hypothetical) .

1. Atomic weight about 44.

2. Oxide will have formula

Eb203; will be soluble in acids, but insoluble in alkalis; specific gravity of oxide about 3.5; anal¬ ogous to AI2O3, but more basic; less basic than MgO.

3. Salts of Eb will be colorless,

and will yield gelatinous precipitates with KOH, K2CO3, Na2HP04 *etc.*

4. Sulphate will have the

formula Eb2(SC > 4),3 and will form, with K2SO4, a double salt which will probably not be isomorphous with the alums.

Scandium (actual).

1. Atomic weight 44.

2. Oxide has formula SC2O3;

is soluble in strong acids, but insoluble in alkalis; specific gravity of oxide = 3.8; analogous to AkCb, but more de¬ cidedly basic.

3. Solutions of Sc salts are

colorless, and yield gel¬ atinous precipitates with KOH, K2CO3, and Na2HP04.

4. Sulphate has the formula

Sc2(S02)3, and forms, with K2SO4, the double salt Sc2(S04)3, 3K2SO4, which is not an alum.

Of the discovery of the periodic law, whose antecedents are briefly mentioned above, Men¬ deleeff says : ((Neither De Chancourtois, to whom the French ascribe the discovery of the periodic law, nor Newlands, who is put forward by the English, nor L. Meyer, who is now cited by many as its founder, ventured to foretell the properties of undiscovered elements, nor to alter the Accepted atomic weights,5 nor, in general, to regard the periodic law as a new, strictly-established law of nature, as I did from the beginning (1869). 55 He claims the discovery of the law for himself, on the ground that it was he who first established it in such a way that it can lie used to correct the results of direct ob¬ servation, to predict new elements and their properties, and (in his own words) to ((permit the invisible to be seen, and the unknown known.®

One of the most interesting things about the periodic law is that it appears to indicate a finite limit to the number of elements existing. Thus if all the vacant spaces in the table were filled, the number of elements would still be less than 120. It does not appear probable that other ele¬

ments will be discovered whose atomic weights are less than that of hydrogen. On the other hand, it appears from considerations entirely foreign to the periodic law that elements having atomic weights materially greater than that of uranium would not be stable. Modern research indicates that radium, thorium and uranium are all on the verge of instability, and perhaps just over the verge.

The modern explanation for the phenomena summed up by the periodic law is that the atom is a system of very small negative electrons (q.v.) in a relatively large sphere of positive electrification, that the atomic weight is propor¬ tional to the number of electrons in the atom and that the stable arrangements of electrons are in a general way periodic functions of the . number of electrons to be arranged.

For detailed information regarding the pe¬ riodic law, consult Garrett, (The Periodic Law5 (London 1909) ; Huth, (Das periodische gesetz der atomgewichte) (Frankfurt 1884) ; Meyer, Lothar, (Modern Theories of Chemistry) ; Men¬ deleeff, Principles of Chemistry) (3d English ed., London 1905) ; Newlands, (On the Dis¬ covery of the Periodic Law5 (London 1884) ; Ramsay, Sir W., (Modern Chemistry5 (New York 1901) ; Richardson, (The Electron Theory of Matter5 (Cambridge, England, 1914) ; Ven¬ able, (A Bibliography of the Periodic Law5 (Easton, Pa., 1896).

PERIODICAL LITERATURE. In the

general acceptance of the term a periodical is any publication other than a book or a daily newspaper. Usually the term comprises those serial publications the orincipal object of which is the circulation of interesting essays, tales, poems and useful information of a literary, scientific or artistic character. Periodicals are, furthermore, generally distinguished from news¬ papers by the greater care and reflection com¬ monly bestowed upon their articles, and by their shape, which is always such that the numbers may be easily and conveniently bound and preserved in the form of books. Periodical literature embraces various classes of publica¬ tions, those devoted to literature or criticism, and others to the sciences, the arts, or to special branches of knowledge or politics. Periodicals exclusively devoted to criticism are generally called reviews, and those whose contents are of a miscellaneous and entertaining kind maga¬ zines ; but there is no great strictness in the use of the terms. The spread of knowledge during the 18th and 19th centuries, and the multiplication of books rendered it impossible for the scholar to inform himself of the progress of learning in various countries, or to purchase and read more than a small portion of the works published ; hence the necessitv for criti¬ cal serials, magazines and other productions in the field of periodical literature. In the United States and in Great Britain most periodicals are issued weekly, monthly or quarterly. In France, Italy and Beleium the fortnightly is re¬ garded as the natural form of the high-class periodical. Outside these countries the fort¬ nightly is practically unknown. In Russia, Ger¬ many, Scandinavia and in Spain and Portugal the periodicals are generally monthly. The periodical had its genesis in France in 1665, and Italy and Great Britain followed soon afterward. But rather than deal with the sub-PERIODICAL LITERATURE

ject chronologically, it would seem better for the sake of convenience to tell the life history of the periodical by an arrangement into the principal countries.

American periodical literature dates from 1741, the year when Franklin issued the Gen¬ eral Magazine and Historical Chronicle at Philadelphia; but it existed only six months, while the American Magazine, begun a few days earlier by Andrew Bradford and John Web'be, was still less successful, running no further than two monthly numbers, i he Bos¬ ton News-Letter (1704), the first newspaper in America, was a weekly until 1776. The other issues of the kind nrior to the Revolution were the Boston American Magazine and Historical Chronicle (1743-47), the Boston Weekly Maga¬ zine (1743), the Independent Reflector (New York 1752-54), the New England ' Magazine (Boston 1758), which ceased after a few issues, the American Magazine (Philadelphia 1757-58), the North American Magazine (Weodbridge, N. J., 1758), the American Magazine (Phila¬ delphia 1769), the Royal American Magazine (Boston 1774), and the Pennsylvania Magazine (Philadelphia 1775). Before the end of the century came the Columbian Magazine (Phila¬ delphia 1786), the American Museum (1787), the Massachusetts Magazine (Boston 1789), the New York Magazine (1790), the Farmers Weekly Museum (Walpole, N. H. 1793), the United States Magazine (Philadelphia 1796), the American Universal Magazine (lb. 179/), and the Monthly Magazine and American Re¬ view (New York 1799-1800), founded by the novelist Brown, but carried on afterward as the American Review and Literary Journal (1801-02) Early in the 19th century came the Port Folio (Philadelphia 1801-27), founded by Toseph Dennie; the Literary Magazine and American Register (ib. 1803-08) ; the Anthology and Boston Review (1803-11), the forerunner of the North American Review; the Monthly Register of Charleston (1805) was the first periodical produced in the South. . Altogether there were 27 periodicals appearing in the United States during 1810. The Analectic Magazine (Philadelphia 1813-20) was for a time edited by Washington Irving; the N ew York Weekly Museum appeared In 1814, 'but it was not till 1824 that the first periodical worthy of the city was founded in the Atlantic Maga¬ zine, which soon became the New York Monthly Review. The New York Mirror (1823-42) counted N. P. Willis among its editors ; Gra¬ ham's Magazine (1840-50) enjoyed a large circle of readers; the Knickerbocker (New York 1833-60) rose to great influence and prosperity. The Southern Literary Messenger (Richmond 1834) was a vehicle for some of Poe's finest criticism. The Dial (Boston 1840-44), the mouthpiece of the Transcendentalists was

edited successively by Margaret Fuller and Emerson; the Illinois Monthly Magazine (Vandalia 1830-32) was the first Western periodical, principally the work of one man, James Hall, who later for three years conducted the Western Monthly Magazine. The inde¬ pendent started in 1848 and absorbed Harper s Weekly in 1916. Putnam's Monthly Magazine ran with great popularity in New York from 1853 to 1870, when it merged into Scribner's Monthly, which later became the Century

Magazine. Putnam's was revived in 1906, com¬ bining with the Critic and Literary World as Putnam's Monthly, which was merged into the Atlantic Monthly in 1910. The last-named dates from 1857 (Boston) ; in 1878 it absorbed the famous Galaxy, which was founded in 1866 and had numbered Whittier, Longfellow, Lowell and Howells among its contributors and editors.

The review literature of the United States begins with the American Revieiv of History and Politics founded by Robert Walsh (q.v.) in Philadelphia in 1811, a quarterly which ex¬ isted two years ; but one of the ablest and most permanent publications of this type has been the North American Review (1815), which has constantly maintained a high character both in style and critical excellence. The General Repository and Review (Cambridgeˆ 1812-13) had a very brief career, while Niles's Weekly Register (Baltimore 1811) ran till 1849. The American Quarterly Review (Philadelphia 1827-37) was another enterprise of Robert Walsh; the Southern Quarterly Review, an organ of Southern politics, ran from 1828 to 1832; revived in 1842, it existed till 1857 at Charleston, S. C. Other periodicals were the Democratic Review (1837-51), which absorbed the Boston Quarterly Review in 1842; the American Review (1845-49), which became the American Whig Review in 1850 and ended in 1852 ; the Massachusetts Quarterly Re¬ view (Boston 1847—50) ; Lippincott's Maga¬ zine of Literature, Science and Education (1868-71) underwent a slight alteration in title in 1871 and 1886 and was absorbed by Scrib¬ ner's Magazine in 1916. The last-named peri¬ odical dates from 1887, and must not be con¬ fused with the former Scribner's Monthly, since 1881 known as the Century Magazine. A remarkable publication was Browns on's Quar¬ terly Revieiv (Boston 1844-56 and New York 1856— 75) , founded and conducted throughout its career by the late Orestes A. Brownson (q.v.) after severing his connection with the Boston Quarterly Review. The Catholic World, de¬ voted to general literature and science, has ap¬ peared in New York since 1865, in which year the important weekly Nation also was first issued.

The National Quarterly Review (New York 1860-80) and the New York International Review (1874-83) were popular in their day. A successful career was that of De Bow's Com¬ mercial Review, established in New Orleans in 1846, which under different sub-titles and after several breaks in continuity of issue ended in 1870. Still later appeared the Arena (Boston 1889-1909) ; Cosmopolitan (New York 1886) ; Forum (ib. 1886) ; McClure's Magazine (ib. 1893) ; New England Magazine (the third of that name, Boston 1884) ; Overland Monthly (San Francisco 1868) ; Munsey's Magazine (1884-85); Everybody's (New York 1899); Metropolitan ; Review of Reviews (American edition, 1890); Collier's Weekly (1888); Har¬ per's Monthly (1850) and Harpe/s Weekly (1857-1916); Leslie's Weekly (1855) and Les¬ lie's Monthly (1876), now the American Illus¬ trated Magazine; The Outlook (formerly Chris¬ tian Union from 1870-93) ; Saint Nicholas (1873); Youth's Companion; Country Life m America (1901); Woman's Home Companion (1873) ; Ladies' Home Journal (1883) ; Pictorial Revieiv and a host of other popular periodicals.

Increased revenue from advertisements enabled publishers to improve style and quality by en¬ listing highly-paid literary and artistic skili. The excellence of the illustrations to be found in American magazines is unsurpassed, while the stories and articles are with rare exceptions of a high order. The resuscitated Munsey's Maga¬ zine (as a weekly publication, in 1889) led the way in popularizing this form of literature. In not a few cases the intrusion of commer¬ cialism has led to a chaotic system of "make¬ up,® by which connected articles and stories are split up and scattered with columns and even pages of advertisement intervening.

The serious reviews cover almost every branch of topical and intellectual interest- — art, science, engineering, history, commerce, indus¬ trialism, law, theology and medicine. Practi¬ cally all the learned societies and educational in¬ stitutions have their <(journals® or (<reviews.® Within recent years a number of new and original periodicals have appeared. The Un¬ popular Review (1914), a

high-class publica¬ tion of extraordinary merit, represents an ac¬ cessible asylum for unpleasant truths and opinions; World's Work , Review of Reviews and Literary Digest are indispensable for the student of contemporary events. The publica¬ tion by the New York Times of the monthly Current-History (1914), dealing with the Euro¬ pean War, struck a new note in periodical litera¬ ture by reproducing only authentic records with¬ out any comment. Among the latest periodicals may be mentioned The Reviezv (New York 1919), a weekly devoted to political and general discussion; Reconstruction: A Herald of the New Time (New York 1919) ; Harvey's Weekly (1918) and The Journal of Industrial Hygiene (New York 1919), the first periodical devoted to the various phases of social and in¬ dividual welfare included under that head.

Australia. — The British periodicals circulate largely in Australia. Chief among the native products are the quarterly Imperial Review (Melbourne), another of the same name pub¬ lished in Sydney; the Australian Reviezv of Re¬ viezv s ; and the Monthly Reviezv of New Zea¬ land. In the large cities appear several illus¬ trated topical weeklies, sporting journals and religious magazines.

Belgium. — From 1772 to 1818, the Esprit des Journaux, a literary miscellany of consider¬ able value, was published in Belgium, but it was not until the separation from Holland (1829-31) that a distinctive periodical literature appeared. In early years of the 19th cen¬ tury the Messages des Sciences was edited by Saint Genois, while the Nederdeutsche Letter-oeffningen appeared in 1836. Willems (q.v.) edited the Belgisch Museum from 1836 to 1846. The modern reviews cover the usual spheres of literature, science, history, politics, *etc.* See Belgium, Newspapers and Literature.

Canada. — To a large extent Canada depends upon the mother country and the United States for her periodical literature. Among the prin¬ cipal native publications are the Canadian Maga¬ zine of Politics , Science , Art and Literature (Toronto 1893) ; Canadian Institute Trans¬ actions (1852) and a large number of agri¬ cultural, engineering, mining and industrial pub¬ lications. Several religious journals are pub¬ lished in Toronto and Montreal. The By¬

stander, a unique magazine edited, written and owned by the late Goldwin Smith, and Once-a-Week were shortlived Toronto publications.

England. — With the possible exception of the Philosophical Transactions of the Royal Society, which first appeared in 1665, the earli¬ est English periodical seems to have been the Weekly Memorials for the Ingenious , the first number of which is dated January 1681. It was followed by several other periodicals, the most noteworthy being the History of the Works of the Learned (1699-1711); the Memoirs of Literature (1709, continued under different titles till 1743). The famous Gentleman's Magazine was founded in -1730. In the same century the nearest approach to the review, as differing from the magazine proper, was made -by the Monthly Review (1749-1844), which was followed by the Critical Review (1756-1817), to which Smollett largely contributed ; the British Critic (1793-1843) ; the Anti-Jacobin Review and Magazine (1798-1821). In 1809 appeared the Quarterly Review, successively edited by Gifford, Coleridge and Lockhart, who were assisted by the contributions of Scott, Southey, Croker, Heber, etc., who wrote in the Tory interest. In 1824 the Westminster Reviezv was started by Bentham as the organ of utili¬ tarianism and radicalism in politics, and has numbered among its contributors Bowring, Grote, Carlyle, John Sterling, Mill, Bain, etc To provide critical literature at shorter inter¬ vals there was started in 1865 the Fortnightly Review, which for a short time appeared twice a month, since then only once. It was followed by the Contemporary Review (1866) and the Nineteenth Century (1877 — since 1901 the Nineteenth Century and After). Among the more recent periodicals of this class are the National Review (1883), a Conservative organ; the Review of Reviews (1890), giving analyses of the current periodicals generally; the Neve Century Review (1897) ; and the Monthly Re¬ view (1900). The Athenaeum (1828) and the Academy (1869) are weekly journals devoted to the criticism of new books, paintings and sculpture, music and dramatic works and per¬ formances, with information on matters con¬ nected with literature, science and art. The Saturday Review, Spectator and Speaker (all weekly) combine the character of the review proper with more or less of that of the news¬ paper. The first English magazine, properly speaking, may be said to be the Gentleman's Journal, or Monthly Miscellany, commenced in 1692. The well-known Tatler (1709-10), Spectator (1711-12, revived 1714) and Guard¬ ian, as well as Johnson's Rambler (1750-51), were periodicals of a special kind. In 1731 ap¬ peared the Gentleman's Magazine, published by Cave, and contributed to by Johnson and other eminent writers. It brought a fortune to the lucky publisher, at whose death it was con¬ tinued by Henry and Nichols. The success of Cave's venture brought out a host of imitators. The London Magazine (1732-84), the European Magazine (1782-1826) and the Monthly Maga¬ zine (1796-1829) were among

the chief of this class which were originated in the 18th century. In 1832 Chamber's Journal made its appearance, marking the commencement of a new and more popular era. It was published

weekly, but was also issued in monthly parts. Cassell's Family Paper (now known as Cas¬ sell's Family Magazine) was started in 1853. The old Penny Magazine (1832), published by the Society for the Diffusion of Useful Knowl¬ edge, deserves honorable mention. It was suc¬ ceeded by the Leisure Hour in 1852, still one of the best illustrated sixpennies, published by the Religious Tract Society. Charles Dickens founded Household Words in 1850, and All the Year Round in 1859. A new era in this kind of literature was inaugurated by the shilling monthlies, some of them with excellent illus¬ trations, the first being Macmillan s Magazine (1859) ; Cornhill Magazine (1860) ; Temple Bar (1860) ; closely followed by a number of others. Another step in the direction of cheap¬ ness was shortly afterward made by the pub¬ lication of monthly magazines at sixpence, in¬ cluding The Argosy, Good Words, the Sunday Magazine, etc., followed at a long interval by Longman's Magazine, Murray's Magazine, Eng¬ lish Illustrated Magazine (1883) ; Strand Maga¬ zine (1891) ; Idler (1892) ; Woman at Home (1893); Windsor (1895); Englishwoman (1895) ; Lady's Realm (1896) ; Pearson's Maga¬ zine (1896) ; Temple Magazine (1896) ; Girl's Realm (1898) ; and Wide World Magazine (1898). Threepenny and fourpenny monthly magazines have become prominent in recent years. Cosmopolis (1896) has sections in French and Italian. There are innumerable religious magazines. The Jewish Quarterly is read by many who are not Jews. The Em¬ pire Review (1901) deals entirely with Imperial affairs. The United Service Magazine is a monthly, the Navy and Army a weekly. The Badminton is devoted to sport.

The European War was responsible for a number of new periodicals, such as the Land¬ mark (1919), the monthly magazine of the Eng¬ lish-Speaking Union ; the Balkan Review (1919); the New Europe (1916), a valuable weekly; the Anglo-French Review (1919) represents

life and letters in the two langauges ; the New Poland (1919); the New World (1919) aims to strengthen the bonds of permanent friendship among all the allied and associated peoples; the Reveille (1918), devoted to the disabled soldier and sailor; and the Anglo-Italian Review. The other prominent periodicals include the Round Table , a quarterly review of the politics of the British Empire; Science Progress; Journal of the Royal Asiatic Society, the foremost authority on Orientalia; the Hibbert Journal, a quarterly review of re¬ ligion, theology and philosophy; The East and the West (missionary problem) ; Economic Journal; Modern Language Review; the Quest, embracing a wide range of philosophic psychol¬ ogy; and journals issued by the Geographical, Statistical and numerous other learned societies. The Edinburgh Review, like the Quarterly, presents the mature reflections of serious thinkers on problems of the day.

France — As already stated, the periodical originated in France in 1665, but the idea dates back to 1631, when Theophraste Renaudot, doctor, journalist and philanthropist, started the Gazette de France, a weekly political and literary review, which lived till 1792. In 1633—42 he published the Bureau d'adresses, a series of reports of the scientific conferences held at vol 21 — 38

his home every Monday. In January 1665, Denis de Sallo, assuming the name of the Sieur de Hedouville, issued at Paris the first number of the Journal des Savants, generally regarded as the parent of critical reviews and the first periodical in France if not in the world. J. Doneau de Vise founded in 1672 the second literary periodical in France, the Mercure Galant, which gave reviews of poetry and the drama. Its title was changed in 1717 to the Mercure de France, and it was conducted with ability by Marmontel and others until 1818. The Journal du Palais, a legal periodical, made its appearance in 1672, and the first medical journal, Nouvelles decouvertes dans toutes les parties de la medicine, was started in 1679. In 1701 a society of Jesuits at Trevoux began the Memoires pour servir a I'FIistoire des Sciences et des Beaux-Arts, more commonly known as the Memoires de Trevoux. It was characterized by the excellence of its critical judgments and by the zeal with which it combated anti-Jesuiti¬ cal opinions; it lasted until 1767. The other noteworthy literary journals of France m the 18th century were the Annee Litteraire of Freron (1754-91) ; the Magasin Encyclopedique , begun in 1795, the second series of which was called the Annales Encyclopedique s, and the third the Revue Encyclopedique — it was sus¬ pended in 1832, and a last attempt was made to re-establish it by Didot in 1846, but failed. In the

19th century the Revue Frangaise, the Revue de Paris, the Revue Independante and many more have appeared and been discontinued. But the Revue des Deux Mondes, begun in 1829, and from 1831 issued fortnightly, was marked by an ability which rendered it permanent, and placed it in the front rank of the critical jour¬ nals of the world. In 1852 appeared the Revue Germanique, devoted to German literature; the Revue des Races Latines (1857), appropriated to the arts and letters of those nations having a Latin origin ; and the Revue Europeenne (1859). Other important French periodicals in¬ clude the Nouvelle Revue, Revue Politique et Litteraire, Grande Revue, Revue de Famille, Revue Illustree, L'lllustration, Revue des Lettres et des Arts, Figaro, *etc.* To the admission of poetry and tales into the reviews, and to the publication by almost every newspaper of a literary feuilleton or serial, must be ascribed the comparative paucity in France of serials exactly corresponding to the English and American magazines.

Germany. — The first periodicals in the Ger¬ man language were written in the form of dia¬ logues; they were the Monatsgesprdclie (1688— 89) and the Monatliche Unterredungen (1689-98). Under the title of Gelehrte Zeitung al¬ most every large town had at some period of the 18th century its literary journal, such, for instance, as those published at Frankfort (1736-86), Halle (1766-92), Gotha (1774-1804) and others. But of more importance than all these was the Gottinger Gelehrte Anzeigen,, begun in 1739. In 1766 Nicolai founded the Allgemeine Deutsche Bibliothck, which lived over 49 years ; the more valuable Brief e, die neueste Literatur Betreffend, supported by Les¬ sing, Mendelssohn and others, had an existence of only six years (1759-65). Among the other notable periodicals established in the 18th cen¬ tury and in the beginning of the 19th were the

Allgemeine Literatur-Zeitung (1785-1848) ; the Jenaische Allgemeine Literatur-Zeitung (1804-48) ; to which the great literary circle of Weimar, of which Goethe was the centre, con¬ tributed. The Leipziger Literatur-Zeitung (1800) , the Wiener Jahrbiicher der Literatur

(1818), Hermes (1819), and the Jahrbiicher filr Wis- , senschaftliche Critik (1827). The leading critical authorities are the Heidelberger Jahrbiicher der Literatur (1808), the Deutsche Vierteljahrsschrift (1838), modeled upon the English review, and the Gelehrte Anzeigen. Of a more popular tone are the Blatter filr Literarische Unterhaltung (1833), the Deutsche Museum (1852), the Grenzboten (1841), Westermanns Monatshefte (1855), and many more of the magazine kind. . The Illustrirtes Familien-Journal of Leipzig is of the Penny Magazine school, and enjoys a very large cir¬ culation. Of more recent date are Die Gegenwart (1872), the Literaturzeitung (1874), the Deutsche Rundschau (1874), Die Neue Zeit (1872) ; Nord und Siid (1878), Die Nation (1888), Die Zukunft (1892) and Preussische Jahrbiicher.

Holland. — In 1684 appeared the Mercure Savant at Amsterdam, and in the same year the Nouvelles de la Republique des Lettres, which was continued with great success until 1718. Then came the Boekzal van Europa (1692-1708), which was excelled by the Republijk der Geleerden (1710). J. van Effen produced his Hollandsche Spectator (1731) with marked suc¬ cess ; but a new era in criticism was introduced in 1761 by the V aderlandsche Letter oefningen. The Allgemcene Konstcn Letterbode (1788) maintained for many years a high rank. The Recensent (1803), superseded by the Nieuwe Recensent, proved itself a powerful rival to the • Letteroefningen. Other periodicals are the N ederlandsche Museum (1835), the Tijdstrom (1859) and the Navorscher.

India. — The best known of early periodicals in India were the Calcutta Monthly Register (1798) ; the Oriental Magazine and Indian Hurkaru, which bˆgan at Madras in 1819 ; the Madras Miscellany ; the Calcutta Review (1844), a valuable existing quarterly; and the Bombay Quarterly Revieiv, which dated from 1855. At Singapore the Journal of the Indian Archipelago began in 1847, while the Chinese Repository, begun by Morrison at Canton, was from 1832 to 1851 filled with valuable articles relating chiefly to literature and history. The New China Review (Hongkong 1919) is a suc¬ cessor to the long defunct China Review. To¬ day India has the Calcutta Review (quarterly) and the monthlies, the National Magazine, the Indian Magazine and Review and Allahabad Review.

Ireland. — The Literary Journal was pub¬ lished in Dublin in 1744, the first periodical in Ireland. In 1836 the Dublin Review was estab¬ lished by O'Connell and his friends as the organ of the Roman Catholic party. The New Ire¬ land Review appeared in 1894. Studies is a quarterly review of letters, philosophy, science and Irish questions.

The Irish Monthly is a religious publication of considerable literary merit. The Leader (weekly) is perhaps the most spirited publication of the new Ireland. An Claidlieamh Soluis (The Sword of Light) is the official organ of the Gaelic League.

There are many lesser periodicals in Cork and Dublin.

Italy.— In 1668 the Giornale de letterati was commenced at Rome by Nazzari, and pub¬ lished until 1679. Under the same title literary periodicals were afterward issued at Parma (1686), at Venice (1719), at Florence (1742), and finally at Pisa in 1771. The Biblioteca volante (1676) was of a less solid character, but the Novelle letterarie, published for several years subsequent to 1740. was marked by much erudition. Distinguished at a later period were the Biblioteca Italiana (1816) of Milan; the Antologia (1821) of Florence; the Giornale Arcadico (1819) of Rome; the Giornale Enci-clopcdico (1806) of Naples, which was followed in that city by the Progresso delle Scienze X 1833) , the Museo di Scienze e Letteratura, and several minor ones, like the Poligrafo (1811), Magazzino Pittoresco, and the popular Album (1824) of Rome. The chief critical serials are the Rivista Contemporanca (1852) of Turin; the Politecnico (1839) of Milan, which was sup¬ pressed in 1844, and revived in 1859 ; the Gior¬ nale degli Eruditi (T883) ; the Nuova Revista Internazionale (1879) and the Revista Internazionale (1883).

Russia. — In point of size the Russian peri¬ odicals excel all others. Among the earlv pub¬ lications were the Y ezhemyesyatchniiya Sotchi-neniya (Monthly Works), edited by Muller from 1755 to 1764. Soon afterward commenced Sumarakoff's Industrious Bee (1759) and Keraskoff's Leisure Hours (1762). Superior to these, however, was the Vyestnik Yevropi (European Messenger), founded in 1802 by Karamzin the historian and subsequently (1808) edited by the poet Zhukovsky. This was fol¬ lowed by the Russkoi Vyestnik (Russian Mes¬ senger), conducted 1808-20 by Glinka, Gretch and Polevoy; after having been suspended for some years it was revived 1856 in Moscow by Katkov. One of the ablest publications was the Synn Otechestva (Son of the Fatherland), founded in "1812, with which was united in 1825 the Severniii Arkhiv (1822) or Northern Archives. This combined publication came to an end in 1840; the newspaper Synn Otechestva of Petrograd is of more recent origin. Other periodicals past and present include the Biblioteka dlya Chteniya (1834) or Circulating Library; the Moscow Russkaya Miissl (Rus¬ sian Thought) ; Zhurnal Ministerstva Narod-nava Prosveshtclieniya, a monthly

Journal of Public Instruction; Vyestnik V ospitaniya (Edu¬ cational Messenger) ; Mir Iskussiva (Art World) ; Russkoye Bogatstvo (Russian Wealth), a literary monthly; Mir Bozhi (God's World) ; Russki Arkhiv ; Russkaya Starind (Russian Antiquity), an archaeological review; Baltische Monatsschrift (Baltic Monthly) in the German language, and the historical jour¬ nal, Istoricheski Vyestnik. The former Russian Imperial Historical Society issued a periodical or Zbornik (magazine).

Scotland. — The long defunct Scots Maga¬ zine first appeared in 1739, and in 1755 there was started in the capital an Edinburgh Review which lived only a year, its second number be¬ ing, also the last. Since then there had been no critical journal in Scotland at all till the ap¬ pearance, on 10 Oct. 1802, of the well-known Edinburgh Review or Critical Journal (q.v.) —

((to be continued quarterly.® It is now pub¬ lished by Longmans in London. William Black¬ wood founded the famous Blackwood's Edin¬ burgh Magazine in 1817, which soon took rank as the first serial of the kind in the United Kingdom. Among its contributors were Prof. John Wilson ("Christopher North®), James Hogg, Lockhart, Wordsworth, Coleridge, Lamb, Maginn, De Quincy, Landor and other prominent literary masters while in later years Professor Aytoun, Jerrold, Lord Lytton, George Eliot, etc., have enriched its pages. In 1830 came Fraser's Magazine which, after many vicissi¬ tudes under numerous editors, is now extinct, while Blackwood's still flourishes. It was in Fraser's that Carlyle's (Sartor Resartus) was first published (1833-34).

Spain and Portugal. — The earliest period¬ icals in Spain were the Diario de los Literatos (1737), the Pensador (1762), the Seminario Erudito (1755), the Memorial Literario (1784— 1807) and the Variedades, which acquired a considerable reputation. The Cronica Cientifica y Literaria (1834) subsequently became a political sheet. The Censor (1820) was for some years the best Spanish periodical ; it was finally superseded by the Revista Espahola (1831), which successively changed its title to Revista Europea and Revista de

Madrid. It was not till after the revolt against Espartero (1841-43) that periodical literature began to flourish in Spain. For a time there existed a journal devoted to bull-fighting. Later came the Cartas Espaholas, Antologia Espahola (1848), the Revista de Espaha, the Seminario Pintoresco and the Revista de Ambos Mundos. The Journal da Coimbra in the early part of the 19th century was the first and for a long time the only literary organ of which Portugal could boast. In 1837, however, the Panorama was founded, and in 1842 the Revista universal Lisbonense was established. Other publications of the literary class are the Journal da socie-dade dos amigos das letteras and the Biblio-philo.

Sweden. — The Svenska Argus (1732) was the earliest notable addition made by Sweden to learned periodical literature. In 1742 Celsius founded the Tidningar om den lardes Arbeten; but the first comprehensive critical journal was the Svenska Mercurius (1755), the Phosphorus (1810), and the Iduna (1811). Both wielded a powerful influence in the literary circles of Sweden, and originated two different schools of poetry and criticism. Among other periodicals were Poly fern (1810), Svea (1818), Journal for Literaturen (1809), Skandia (1833), Literatur-Foreningens Tidning (1833), and the Literatur-blad (1838). The best of a later date are the Tidskrift for Literatur and Nor disk Tidskrift.

Switzerland. — In Switzerland the Bibliotheque Britannique 0796-1815) and its suc¬ cessor, the Bibliothiaue Universelle (1816), which was published in two parallel series, one scientific and the other literary, were widely cir¬ culated both at home and abroad. The Revue Suisse has been conducted with much success at Neuchatel since 1837.

See Catholic Press of America ; De Bow ; Medical Journalism ; Newspapers, American.

Bibliography. — (Annual Index of Period¬ ical (London 1890-) ; (Annual Library

Index) (New York 1894-) ; ˆCumulative

Index to Periodical (Cleveland, Ohio, 1896-) ;

(Bibliographic der Fremdsprachigen Zeitschrif-ten-Literatur) (Leipzig 191 1-) ; Ames, Mrs. E. M., Periodicals That Pay Contributor (Brooklyn 1895) ; Ayers, N. W., (American Newspaper Annual and Directory) ;

Bolton, H. C, (Catalogue of Scientific and Technical Periodicals 1665 —1895 J ; Bowker, R. R., Publi¬ cations of Societies) (1899) ; Carnegie Institu¬ tion of Washington, (Handbookof Learned So¬ cieties and Institutions) (1908) ; Chandler, K., (List of California Periodicals Issued Previous to the Completion of the Transcontinental Tele¬ graphy, 1846-61 > (San Francisco 1905) ; Clark, A. W., (Checklist of Indexed Periodicals)

(New York 1917); Faxon, F. W., < Checklist of American and English Periodical (Boston 1908) ; Fletcher and Bowker, (The Annual Literary Index, including Periodical (New York); Ford, P. L., . (Checklist of American Magazines Printed in the 18th Century* (Brooklyn 1889) ; Hatin, E., (Bibliographic Historique et Critique de la Presse Periodique Francaise, avec un essai historique et statis-tique sur la naissance et les progres de la presse periodique dans les deux mondes) (Paris 1866) ; Poole, W. F., (Index to Periodical Lit¬ erature: Chronological Conspectus 1802-1906* (New York) ; Peaders' Guide to Periodical Literature* (Monthly, New York) ; Sell's dic¬ tionary of the World's Press> (London, an¬ nual) ; Severance, H. O., (A Guide to the Cur¬ rent Periodicals and Serials of the United States and Canada* (3d ed., Ann Arbor, Mich., 1914) ; Smyth, A. H., (The Philadelphia Maga¬ zines and their Contributors 1741— 1850 J (Phil¬ adelphia 1892) ; Stead's (Index to Periodicals) (London) ; Steiger, E., (The Periodical Liter¬ ature of the United States) (New York 1873) ; Stevens, H., (Catalogue of American Books in the British Museum* (1866) and (American Books with Tails to 'em) (1873) ; Tassin, A. de V., <The Magazine in America) (New York 1916) ; Willing's Press Guide* (London) ; Wilson's "Guide to Periodical (New York).

Henri Klein,

Editorial Staff of the Americana.

PERICECI, pe-ri'6-kl, the term used in La¬ conia and other ancient Dorian lands to desig¬ nate the descendants of the ancient inhabitants of those countries. The Periceci were freemen, and strictly speaking not vassals, much less serfs, like the Helots, but they were considered in¬ ferior to the Spartans in regard to social rank and political rights. They were only allowed to occupy the inferior lands, and were employed as artisans, merchants and sailors, and had at times a minor share in the government. At some periods they were allowed to intermarry with the Dorians, and they served in war even as hoplites, though they were compelled to form corps of their own, not being allowed to serve in the same corps with the Dorians.

PERIOPTHALMUS. See Mud-skipper.

PERIOSTEUM, the fibrous membrane in¬ vesting the bones, and serving as a medium for the transmission of the nutritive blood vessels of the bone. It firmly adheres to the surface of bones, save at their gristly or cartilaginous extremities, and it becomes continuous with the tendons or ligaments inserted into bones. In young bones the periosteum is loosely

attached to the shaft, and between the growing bone and the periosteum a layer of soft blastema or formative matter is interposed, this layer contributing to the formation of new bone on the outer surface of the structure. As the bone advances in development, and in adult life, the periosteum grows much thinner, and it becomes in time more or less firmly adherent to the bone. When the periosteum, through disease or injury, becomes affected, the blood-supply and nutrition of the bone suffer, and in consequence the bone-tissue dies or becomes necrosed, and is exfoli¬ ated or thrown off in the form of a sequestrum. The alveoli or sockets of the teeth are lined by periosteum, and this membrane is reflected on to the tooth, and invests it as far as the neck. The periosteum at the neck of the tooth merges with the fibrous structures of the gums. When a bone is fractured the periosteum plays an im¬ portant part in the repair of the injury, new osseous material being deposited by the mem¬ brane. It is liable to certain diseases, such as actinomycosis, tumor, tuberculosis, *etc.* See Periostitis.

PERIOSTITIS, per-i'os-ti'tiz, inflamma¬ tion of the membrane encasing a living bone, or the periosteum (q.v.), a painful ailment fre¬ quently developed by sudden exposure to cold after being heated. It is exhibited in two forms, acute and chronic. In the acute form suppura¬ tion commonly occurs, with the result of sepa¬ rating the membrane

from the bone structure, in which case it is liable to suffer necrosis. This condition calls for prompt removal of the pus. Various constitutional diseases, such as scrofula, syphilis, tuberculosis or gout, may produce chronic periostitis. The chronic form usually excites a thickening of the bone at the point beneath the affected membrane. The diagnosis that detects the originating disease will also lead to the indicated treatment, which is to be applied chiefly to that cause of the periostitis.

PERIPATETIC PHILOSOPHY, the

philosophy of Aristotle, which received this name from the shady avenues (Greek peripatoi) in which that philosopher was accustomed to walk with his disciples, while expounding to them his doctrines. See Aristotelianism.

PERIPATUS, a genus of animal, some¬ what resembling the cylindrical myriapods, first described as mollusks, then transferred to the annelids, and now regarded as arthropods, since Moseley discovered that they respired by tracheae, resembling those of the insects. The animals have a wide but discontinuous distribu¬ tion, being found in South and Central America, the West Indies, Cape of Good Hope, the Kongo, Australia, New Zealand, Melanesia and Malaya, living in decaying wood and feeding upon the insects found there. This distribution is indicative of great antiquity, but we cannot hope to find fossils of the group since all hard parts are lacking. The animals have cylin¬ drical, worm-like bodies, without external seg¬ mentation, supported on numerous fleshy feet, the number varying with the species. The head has a pair of primitive eyes, a pair of ringed antennae and a pair of jaws, while on either side of the mouth are the openings of a pair of slimeglands, the secretion of which is exceed¬ ingly sticky. The nervous system is very primi¬ tive. The respiratory organs, as mentioned

above, are air-tubes or tracheae which, un¬ branched, arise in scattered bunches from the skin. The excretory system is much like that of the annelids and consists of a pair of nephridia in each segment. The sexes are separate ; the reproductive organs opening below just in front of the terminal anus. The young are born alive. The different species show great differences in their development. There is great uncertainty as to the position of these forms, which are usually regarded as a class variously called Malacopoda, Onychophora or Protracheata. By some they are regarded as the stock from which the

insects have sprung, by others the resemblances between the Mala¬ copoda and Insecta are regarded as homoplastic. The distinctly arthropod features of Peripatus are limbs modified as jaws, openings from the heart into the pericardium, the absence of a true body-cavity around the viscera and blood-sinuses surrounding the viscera. The nephridia and the presence of cilia in the generative organs are annelid characteristics. Other fea¬ tures in which Peripatus is unique among ar¬ thropods are the distribution of the tracheae, the absence of a second pair of jaws, the repro¬ ductive system, the texture of the skin and the similarity of the body-segments behind the head. The original genus Peripatus has recently been divided by some authorities into several genera. Consult Sedgwick, A., article on Peri¬ patus in <The Cambridge Natural History) (London 1895).

PERISCOPE, a term first applied to spec¬ tacles with concavo-convex glasses, constructed to increase the distinctness of objects when viewed obliquely. It now designates an appa¬ ratus with reflecting prisms at opposite ends of a tube so that an observer beneath the sur¬ face of water or otherwise concealed may make observations. It was much used in the trenches during the European War of 1914—18, but its employment on land was eclipsed by its develop¬ ment and use as the eye of the submarine. Here it was developed into a strong rigid ma¬ chine enabling the submarine commander to scan the seas round about while retaining his vessel submerged. The magnification in the larger types reached as high as six diameters. See Submarine.

PERISSODACTYLA. See Ungulata.

PERISTALSIS, vermicular or peristaltic motion or contraction of the stomach and intes¬ tines ; a kind of undulation or worm-like move¬ ment beginning at some point in the wall of a tubular viscus and extending from above down¬ ward toward or to the end of the hollow organ. Its object is to propel forward the contents of the viscus. The movement is a series of gentle but strong contractions, associated and alter¬ nating more or less with contractions of the longitudinal fibres. Peristalsis in the stomach and intestines pushes the food along so that it can come in contact with the digestive juices, and its waste be cast out of the body. In very thin persons peristalsis of the small intestine is sometimes so conspicuous that the ignorant have inferred the presence of a live snake within the abdomen. Pood, after it leaves the grasp of the constrictor muscles of the pharynx, is pushed through the oesophagus or gullet and into the stomach by the peristaltic movements of the oesophagus. Urine and sometimes calculi

are propelled from the kidneys into the bladder bv the peristalsis of the walls of the ureters. Sometimes there is an inverse action of .the muscular fibres of a hollow viscus, producing anti-peristalsis. Peristalsis is involuntary, and mainly under the control of the ganglionic di¬ vision of the nervous system, and may continue for a time after death. The presence of irri¬ tating substances cause abnormal peristaltic mo¬ tion, which may then be painful, spasmodic or violent. See Digestion.

PERISTEROPODES, a division or sub¬ order of the Gallince, including the curassows and mound-builders, distinguished by having the hind toe long and on a level with the others as in pigeons. It is contrasted with Alectoro-podes, or true fowls, which have the hind toe short and elevated.

PERISTYLE, in architecture, a name given to a range of columns surrounding anything, as the cells of a temple, or any place, as a court or cloister. It is frequently but incorrectly limited in signification to a range of columns round the interior of a place. In the Roman house the peristyle was a room somewhat like the atrium, but larger, containing an open space surrounded by pillars.

PERIT, Pelatiah, American merchant : b. Norwich, Conn., 23 June 1785; d. New Haven, Conn., 8 March 1864. He was graduated from Yale in 1802, taught for a year, entered busi¬ ness in Philadelphia and in 1809 settled in New York where he engaged with a firm of shipping merchants. He was a member of the firm in 1817-63 and in 1853-63 was president of the Chamber of Commerce. In that posi¬ tion he rendered important service to the gov¬ ernment by leading in the movement which put the United States treasury onˆa basis to meet the heavy expenses of the Civil War. In 1857 he served as a police commissioner and did much to restore the security of New York City, which was endangered by the contest between the ˆMunicipal” and the <(Metropolitan}) police. He was a benefactor of many edu¬ cational and charitable institutions and was deeply interested in Christian missions.

PERITONEUM, the most extensive serous membrane in the body. It

lines the abdominal cavity in mammals, and in general the body-cavity of other vertebrates. In man it forms a closed sac; in the female it communicates with the interior of the uterus through its Fallopian tubes. It partially invests all the viscera in the abdominal and pelvic cavities, forming the visceral layer of the peritoneum; the portion reflected upon the internal surface of the walls of the abdominal and pelvic cavi¬ ties is the parietal layer. The cavity enclosed by these two layers is the peritoneal cavity, which in health contains just sufficient serous fluid to moisten its surfaces. The free or inner surface of the peritoneum is moist, smooth and glistening and covered by a layer of flattened endothelial cells; its attached or outer surface is rough, being connected to the viscera and the walls of the abdominal and pelvic cayities, by means of the subperitonaeal alveolar tissue. Various reflections of the peritoneum, such as the broad folds known as the mesenteries (the mesentery proper, the mesocolon, etc.) and the narrow ones forming ligaments (of the liver,

spleen, bladder and uterus), hold the viscera in position and enclose vessels and nerves, while admitting free movement of certain of the viscera.

The pancreas, kidneys and suprarenal cap¬ sules lie behind the peritoneum; the liver, stomach, spleen, a large part of the small and large intestine and the uterus and ovaries are almost entirely invested by it; the remaining viscera are partially invested. Duplicatures of the peritoneum extending from the stomach to adjacent organs are called omenta. The largest peritoneal fold is the great omentum, enfolding the transverse colon and reaching in front of the small intestine as low down as the pelvis, forming a sort of apron. A fold of peritoneum between the rectum and vagina forms a pouch or cul-de-sac known as the rectovaginal pouch. In the male foetus a lengthened pouch of peri¬ toneum accompanies the testicle at the time of its descent, the upper part of the pouch becom¬ ing obliterated just before birth; in the female there is a similar pouch, sometimes persistent.

The peritoneum may become inflamed from various causes, constituting the disease known as peritonitis. It may be injured by contusions and wounds of various kinds, or it may be the seat of morbid formations, such as deposits of fat in the great omentum, or of new growths, tuberculous and cancerous. Peritonitis is al¬ ways serious and in its acute form, especially if extensive and associated with rupture of the in¬ testine or other viscera, frequently proves fatal. An injury to the peritoneum from without may not prove

dangerous unless it induces hemor¬ rhage or severe inflammation. But the intro¬ duction of foreign material, such as food, faeces, calculi, pus and bile, into the peritoneal cavity by perforation and rupture is a grave complica¬ tion. Chronic inflammations of the peritoneum and some acute forms sometimes produce false membranes which bind some of the abdominal and pelvic viscera, restraining their necessary movements and inducing chronic and trouble¬ some disorders.

Surgeons formerly did not consider it a legit¬ imate operation to open the abdomen for the removal of diseased organs, etc., so great was the dread of establishing a severe inflammation. At the present time many lives are saved by such operations. With antiseptic precautions, the opening of the peritoneal cavity is now con¬ sidered a reliable mode of procedure in many cases. Consult Reference Handbook of the Medical Sciences) (Vol. VII, New York 1916).

PERITONITIS, inflammation of the peri¬ toneum. It is either acute or chronic. The acute form is always serious and often quickly fatal; the chronic is sometimes of little consequence, sometimes grave, but may end in great improve¬ ment or practical recovery. The symptoms and prognosis of this disease depend upon the extent and degree of the inflammation, whether it is general or local, circumscribed and partial, and also upon the cause, predisposing or exciting. The diagnosis, except in typical cases, is some¬ times obscure ; the disease may be latent, or subacute at the outset and for a considerable period. The principal dangers of the disease are great depreciation of the vital forces, with im¬ pairment of the blood in extensive inflamma¬ tion ; shock to the nervous system from perfor¬ ations ; and impairment of the necessary move-

merits of abdominal organs from fibrinous ex¬ udations. Perforation is the result of an ulcer¬ ation and may occur from ulceration of the small intestine in typhoid fever, chronic ulcers of the stomach, ulceration in dysentery and in appendicitis, ulceration of softened solid ab¬ dominal organs, of cysts, of aneurismal sacs, of pulmonary abscesses through the diaphragm, *etc.* Sometimes the localized

thickening of the peritoneum resulting from the inflammation of a threatening ulceration prevents a perfora¬ tion and the already existing peritonitis becomes less dangerous. Urine and unhealthy pus are especially dangerous, if introduced into the peritoneal cavity. Idiopathic or spontaneous peritonitis, resulting from such causes as cold, or excessive eating or drinking, is rare, though it sometimes occurs. Acute peritonitis is more common among women than among men, as the result of extra-uterine pregnancy, or ovaritis, or the extension of gonorrhaeal or other forms of inflammation from the uterine cavity, *etc.* It is usually due either to wounds, perforation from ulceration or severe injury, or to obstruction or irritation, the result of the presence of morbid products. While the peritoneum is frequently cut or aspinated by the surgeon with safety, sometimes a slight penetrating wound, especially if air and septic material accompany it, proves fatal. Violent blows upon the abdomen may not only excite peritonitis, but may rupture solid or hollow viscera, causing blood and other for¬ eign material to escape into the peritoneal cav¬ ity, usually with fatal results. Distention of the peritoneal sac in ascites, morbid deposits, such as cancer and tubercle, mechanical pressure or friction, extension of a local inflammation of the uterus, liver, etc., or from a pleurisy, a pericarditis or a strangulated hernia, are among the causes of peritonitis. The internal marks or characteristics of acute peritonitis are hyperaemia and infiltration, more or less marked, of the peritoneum; sometimes small extravasations of blood ; serous effusion containing flakes of fibrin ; sometimes pus in considerable quantity, especially in the pelvic cavity, occasionally dan¬ gerously infectious ; and thin layers of soft fibrinous material coating one or more of the viscera; or firm fibrinous exudations. The first symptom usually noticed by the patient is pain in one spot, which pain gradually spreads and becomes intense and is aggravated by move¬ ments either of the bowels or the body. The pain may be preceded by shivering. The patient lies for the most part upon the back with the knees drawn up to relieve tension. The ab¬ domen gradually becomes distended with gas and is tympanitic; soreness and tenderness are more or less marked ; the pulse reaches to 120 or more and is small ; the tongue is very red and is covered in part with fur; thirst and vom¬ iting are not infrequent; bowels are usually constipated, but sometimes there is diarrhoea ; there is more or less difficulty in urinating; fever is high ; the face wears an anxious ex¬ pression ; and perspiration is sometimes profuse. A chill in the course of the disease indicates either a perforation or other serious complica¬ tion. In latent acute peritonitis pain may be slight and there may be no tympanites.

While acute peritonitis is a very dangerous disease, especially if

perforation occurs, its treatment is now much more successful than it was before 1842, when Alonzo Clark, in the

United States, demonstrated the power of opium to relieve pain and calm nervous and muscular irritability. Absolute rest in bed, hot applica¬ tions, easily digested food, attention to the tongue, bowels and bladder and quiet surround¬ ings are additional remedies.

Chronic peritonitis may be the result of an acute peritonitis, but in the majority of cases is due to the deposit of tubercular material, mostly in the mesenteric and intestinal mucous glands, of cancerous material in abdominal organs, or to chronic ulcerations of the stomach, to renal disease, *etc.* The history is obscure; the symp¬ toms are a feeling of tightness or of dragging; a dull pain, aggravated by movement ; a poor appetite; more or less diarrhoea and constipa¬ tion ; dryness of the skin and its earthy hue ; gradual emaciation, bed-sores, *etc.* The prin- ‘ cipal evidence of chronic peritonitis is fibrinous exudation. The prognosis is, as a rule, un¬ favorable if the inflammatory products are ex¬ tensive. The disease may last a long time.

Bright’s disease, low forms of fever, ery¬ sipelas and a tuberculous tendency are predis¬ posing causes of peritonitis. Tuberculous peri¬ tonitis is often cured by opening and exposing the tuberculous masses to the air and washing out with a saline solution. Puerperal peritoni¬ tis is especially to be dreded because of the great mortality attendant upon it.

PERITYPHLITIS, inflammation of the connective tissue behind and around the caecum. The most frequent cause is an extension of in¬ flammation from the caecum (typhlitis) or the vermiform appendix, but it may result from the extension of inflammation from more dis¬ tant parts of the body. External injury, such as blows, kicks or severe compression of the lower part of the body, are some of the exciting causes. Prognosis depends upon the severity of the inflammation and the local lesions resulting. If an abscess forms and discharges into the peri¬ toneal cavity, death results. The diagnosis of perityphlitis is more or less difficult. See Caecum ; Colon ; Appendicitis.

PERIWINKLE, a genus (Vinca) of the family Apocynacece. The species, of which 10 have been described, are erect or trailing herbs or sub-shrubs with opposite leaves, and rather large axillary, solitary, salver-shaped flowers. Four species are cultivated in gardens and greenhouses. The common periwinkle, run¬ ning, blue, or trailing

myrtle (V . minor) is a hardy, evergreen, trailing herb common in shady cemeteries, gardens, *etc.* It is typically blue-flowered, but some of its varieties have white, others pink flowers. Some have varie¬ gated foliage. The larger periwinkle (V. major) is larger in stem, leaf, flower, etc., than the preceding species, but is less hardy in the north. Some of its variegated varieties are exceedingly popular for window-boxes, hang¬ ing baskets and vases, being able to withstand untoward conditions with respect to heat and drought. The Madagascar, Cape or rose peri¬ winkle (V . rosea), is a tender, ever-blooming species cultivated in greenhouses. It is also popularly called old maid. The herbaceous periwinkle (V . herbacea) is a hardy species which sheds its leaves in winter. The flower¬ ing shoots which appear in spring are followed by leafy stems that root at the tips. It is val¬ ued for its free-flowering qualities. All these

species are readily propagated from cuttings or seeds and will thrive in almost any kind of soil.

PERJURY, in law, is an offense defined as intentionally false testimony given under oath on a point material to the question by one re¬ quired by law to state the truth in any judicial proceedings. In a number of jurisdictions statutes are in effect which provide that sworn testimony or declarations in other specified conditions shall be considered perjury. Whether or not one testifies voluntarily or un¬ der compulsion does not affect the status of perjury. Under a Federal statute one is guilty of perjury who falsely states, certifies to or declares before a tribunal, or a person author¬ ized under a law of the United States, relative to any material matter which he does not be¬ lieve to be true. Generally perjury is a mis¬ demeanor and punishable as such, but in some States it has been made a felony; the offense takes place immediately upon completing the false testimony before a court, person or offi¬ cer, lawfully authorized to take same; and one is not liable for perjury where an oath is not required by law, or upon a false statement made under mistake, or unusual circumstances such as excitement, or fear, or without knowledge of the falsity of the

statement. Whether in¬ jury results from the false oath, or the same is credited or not, is not material to the of¬ fense. Perjury must be proven beyond all rea¬ sonable doubt and cannot be established by the proof of a single witness. The punishment therefor must be only as provided by law, and is usually prescribed by statute. Damages can¬ not be recovered in a civil action on account of the commission of perjury, or procuring an¬ other to commit perjury. A person procuring another to commit perjury is guilty, if the per¬ jury is actually committed, of subornation of perjury; this may be proven by one witness, and the person so found guilty may be con¬ victed. If one attempts to procure another to commit perjury, but perjury is not actually committed, he is guilty of incitement to commit perjury and may, under some statutes, be in¬ dicted and punished.

PERKASIE, per'ka-si, Pa., borough of Bucks County, situated on the Philadelphia and Reading and the Lehigh Valley Traction Com¬ pany railroads, 35 miles north of Philadelphia. It is a thriving industrial centre, with brick¬ yards, tile works, silk mills, cigar factories, wire, tag and label works, *etc.* The borough owns and operates the electric-lighting plant. Pop. 3,150.

PERKIN, Sir William Henry, famous English chemist: b. London, 12 March 1838; d. there, 14 July 1907. His title to fame is mainly based on his greatest and earliest achievement, the discovery of the first aniline color, in 1858. Educated at the City of London College, he entered the Royal College of Chemistry in 1853. Two years later he was assistant to Dr. Hof¬ mann in his research laboratory. _ His aniline discovery was made whilst conducting some ex¬ periments at home dring the Easter vacations. The object he had in view was the artificial for¬ mation of quinine ; what he found, however, was the aniline purple or mauve color, which was destined to lay the foundations of the great coal-tar color industry. He made numer¬

ous experiments at Pullar's dye works at Perth, and finally left his college to devote himself entirely to the development of his discovery, which he patented when he was 18 years old. With the assistance of his father and his brother he started the firm of Perkin and Sons and erected some works near London, where the new dye was successfully produced in 1857 and supplied to silk dyers and calico printers. He also discovered several other coal-tar coloring matters, and when Liebermann and Graebe dis¬ covered the formation of alizarine from an¬ thracene in 1868, Perkin devised two processes to put that discovery to practical uses. He was the first, in 1869, to manufacture

alizarine com¬ mercially, and also found that with this arti¬ ficial product another coloring matter was as¬ sociated, namely, anthrapurpurine, a valuable ingredient in varying the shades of pure aliza¬ rine. In 1873 he retired from technical work to continue his researches in pure chemistry, on which branch he published numerous papers, e.g., the artificial formation of glycocine, a de¬ rivative of gelatine (1859), and tartaric acid (1861). His first papers on salicylic aldehyde appeared in 1867, in which he proved that his substance was also a phenol, a discovery that led to the artificial formation of coumarin and other odoriferous substances, an event that marked the beginning of the artificial perfume industry. By the process known as <(Perkin's Reaction® it became possible to produce cin¬ namic acid technically for the artificial pro¬ duction of indigo by the method of Bayer. Perkin's valuable services were universally recognized. The jubilee of his aniline discovery was celebrated in 1906, on which occasion he was knighted by King Edward and likewise received honorary degrees from the universities of Oxford, Columbia (N. Y.), Johns Hopkins, Heidelberg, *etc.* He was presented with the Hofmann medal by the German Chemical So¬ ciety and the Lavoisier medal by the French Chemical Society. A sum of $13,500 was sub¬ scribed by chemists and handed to the Chemi¬ cal Society (London) to found a ((Perkin Me¬ morial Fund® to be applied to the encourage¬ ment of research in the coal-tar and allied industries. The English Society of Dyers and Colourists instituted the ((Perkin medal® for distinguished services to chemical industry, and the American memorial committee founded a Perkin medal for American chemists. The three sons of Sir William Perkin followed in their father's footsteps, and each enjoys an international reputation for achievements in the domain of science.

PERKINS, Charles Callahan, American art critic : b. Boston, Mass., 1 March 1823 ; d. Windsor, Vt., 25 Aug. 1866. He was graduated from Harvard in 1843, studied music and art in Europe and became widely known as an art critic and writer and was one of the first to practise the art of etching in this country. He was elected to the French Legion of Honor in 1867, corresponding member of the French In¬ stitute in 1868, was president of the Boston Art Club in 1869-79, one of the founders of the Boston Museum of Fine Arts, and occasionally he conducted the performances of the Handel and Haydn Society of which he was president in 1875-86. He was critical editor of Champlin's Cyclopaedia of Painters and Paintings* (1886-

87) and wrote (Tuscan Sculptors) (1864) ; (Art in Education (1870); ˆRaphael and Michelangelo5 (1878) ; (Ghiberti et son Ecole) (1886), *etc.*

PERKINS, Elisha, American physician: b. Norwich, 16 June 1741 ; d. 6 Sept. 1799. He began the practice of medicine with his father at Plainfield, Conn. He invented, about 1796, some instruments which he named metallic trac¬ tors, for the cure of local pains, inflammations and rheumatism. The tractors, he claimed, were of peculiar and secret composition, but it is asserted that one was of iron, the other brass ; they were three inches long and pointed. In use they were drawn downward over the af¬ fected part of the patient for 20 minutes. The wonder is that many learned men in the United States and abroad approved the process. It was known as ˆPerkinism,55 and 12 physicians in Copenhagen (probably the ancestors of those who a century later received Dr. Cook!) tested it, and published a volume in its favor, giving details of its effects. Dr. Perkins' son published a book, in London, introducing the method ; and there it inspired so much faith that a Perkinsian institution was opened, of which Lord Rivers was president. Recommendations were signed by many physicians and clergymen, and thousands of cures published. Heated dis¬ cussions arose, and a satire, (Terrible Tractora-tion,5 was put forth by Thomas G. Fessenden, in defense of the tractors. The history of this supposed remedy belongs doubtless among the many illustrations of the power of the mental state over the physical. Dr. Perkins invented also an antiseptic, and visited New York in 1799 when he undertook to prove its efficacy during a yellow fever epidemic, but he himself fell a victim to the fever.

PERKINS, George Clement, American senator: b. Kennebunkpor't, Me., 23 Aug. 1839. He was reared on a farm; went to sea at 13, and was cabin boy and sailor until 1855, when he shipped before the mast on a sailing vessel bound for San Francisco, and on arrival there went to Oroville, where he engaged in mining. Subsequently he carried on a successful mer¬ cantile business in San Francisco and became interested in banking, milling, mining and the steamship business. He operated numerous ships on Pacific Ocean from Alaska to Mexico. In 1869-76 he was a member of the California senate and in 1879 to 1883 was governor of California. On 24 July 1893 he was appointed

United States senator to fill the vacancy caused by the death of Leland Stanford and on 8 Aug. 1893 was elected for remainder of term. Mr. Perkins was reelected in 1895, 1903, 1909, but was not a candidate in 1915.

PERKINS, George Walbridge, American financier: b. Chicago, 31 Jan. 1862; d. 18 June 1920. He was educated in the public schools of Chicago; began work in the Chicago office of the New York Life Insurance Company in 1877, becoming successively bookkeeper, cashier, inspector of agencies, superintendent of Western department, third vice-president 1892 ; in charge of agency force with headquarters in home office and second vice-president in 1898. In 1900 he became chairman of the finance com¬ mittee of the New York Life and in 1903 was made vice-president. From 1901 to 1910 he was a partner in the banking firm of J.. P.

Morgan and Company. He was a director of the International Harvester Company and presi¬ dent of the New York Palisades Interstate Park Commission, and director in several industrial corporations. In 1912 Perkins supported Roose¬ velt and the Progressive party and in 1915 opposed the return of the Progressives to the Republican fold.

PERKINS, Jacob, American inventor : b. Newburyport, Mass., 9 July 1766; d. London, England, 30 July 1849. He was early appren¬ ticed to a goldsmith and at 15 invented a method of plating shoe-buckles, which he manu¬ factured successfully. At 21 he was engaged in making dies for the copper coinage of Massa¬ chusetts, shortly after inventing a machine which cut and headed nails at one operation. He gained no pecuniary advantage from this invention owing to the mismanagement of his partners, but soon afterward originated the idea of substituting steel for copper plates in bank¬ note engraving, thereby greatly lessening the expense of the operation, and later invented a method of transferring the costly engraving from one plate to another by means of pressure. He removed to Philadelphia where he was as¬ sociated with a firm of banknote engravers and in 1818 went to London and obtained the con¬ tract for supplying the Bank of Ireland with plates. Later he became interested in steam artillery and constructed a gun in which steam was used for /the propelling power in place of powder. He also invented an instrument for measuring the depth of water, called the bath¬ ometer, and the pelometer for measuring the speed at which a ship is moving. Science also owes to him its knowledge of the fact that water is compressible.

PERKINS, Justin, American Congrega¬ tional clergyman and missionary: b. West Springfield, Mass., 12 March 1805 ; d. Chicopee, Mass., 31 Dec. 1869. He was graduated from Amherst in 1829 and later studied at the An¬ dover Theological Seminary. In 1833 he was ordained to the ministry and sailed for Persia where he established a mission among the Nestorians. He translated the Bible into modern Syriac and wrote a commentary on Genesis and Daniel, meanwhile aiding in the establishment of missionary schools and directing general mis¬ sionary work. He wrote (A Residence of Eight Years in Persia5 (1843); Missionary Life in Persia5 (1861), *etc.*

PERKINS, Thomas Handasyd, American merchant: b. Boston, Mass., 15 Dec. 1764; d. Brookline, Mass., 11 Jan. 1854. He entered a counting-house in Boston when very young and later joined his brother in mercantile business in Santo Domingo. He returned to the United States and then went to China and East India in order to attain a thorough knowledge of the trade, finally settling in Boston where he amassed a large fortune. In 1805 he was elected to the legislature of Massachusetts where he served for many years. He was deeply inter¬ ested. in philanthropic enterprises, founded the Perkins Institute for the Blind at Boston, con¬ tributed generously to various public institu¬ tions, among them the Massachusetts General Hospital and the Boston Athenaeum. He was a •projector of the Quincy Railroad, the first rail¬ road built in the United States.

PERKINS, William Oscar, American com¬ poser: b. Stockbridge, Vt., 23 May 1831; d. Boston, Mass., 13 Jan. 1902. He engaged in teaching in Boston, became known as a musical conductor and organized the Mendelssohn Vo¬ cal Quartet, believed to be the first male quartet for concert singing organized in the United States. In 1858 he was conductor of the Bos¬ ton Music Hall, conducted different musical fes¬ tivals and was a member of the governing board of the Handel and Haydn Society. He lectured and wrote on musical subjects, com¬ posed many songs and hymns, and compiled and edited 60 volumes of vocal music. His last composition was (The War in South Africa, or

Boer and Briton) (1900).

PERKS, Sir Robert William, English en¬ gineer : b. Kensington, 24 April 1849. He was educated at New Kingwood School, Bath, and at King's College, London. In 1878ˆ92 he was a railway lawyer; was associated with the late T. A. Walker in building the Barry Docks, Preston Docks, the Manchester Ship Canal, the Inner Circle Railway and other works. He also built the Rio de Janeiro quays and harbor works for the Brazilian government, the port extension at Buenos Aires for the Argentine government and the Transandine Railway be¬ tween Chile and Argentina. He retired from the firm of Walker and Company in 1912 and is now member of the firm of McArthur, Perks and Company, Ltd., of Ottawa and New York. He is interested in the Georgian Bay Canal and sat in Parliament in 1892-1910 as Liberal mem¬ ber for the South division of Lincolnshire. In 1908 he was made a baronet.

PERLES, per'les, Joseph, Jewish rabbi: b. Baja, South Hungary, 1835; d. 1894. He was educated at Breslau and in 1859 received the degree of doctor there. His doctor's thesis was entitled (Meletemata Peschitthoniana) and pro¬ pounded a new theory in regard to the origin of the Peshitto version. Dr. Perles was ap¬ pointed rabbi at Posen in 1862 and removed to Munich in 1871. His later writings dealt mainly with Hebrew philology and the history of the Jews in the Middle Ages.

PERLEY, Sir George Halsey, Canadian statesman : b. Lebanon, N. H., 12 Sept. 1857. He was educated at Ottawa Grammar School and at Harvard University; entered commercial life in Canada and soon had acquired extensive lumber manufacturing, railroad and banking in¬ terests. He was elected to the Dominion House of Commons in 1904; was chief Conservative whip in 1911 and a violent opponent of reci¬ procity with the United States. When < the Borden Cabinet was formed he became minister without portfolio. In 1913 Perley became High Commissioner for Canada in London. He was knighted in 1915.

PERLEY, Moses Henry, Canadian scien¬ tist: b. Maugerville, New Brunswick, 1804; d. 1862. He received his education at Saint John and in 1830 became a member of the bar but did not practise. He acquired large lumbering and manufacturing interests and becoming in¬ terested in exploration soon became an expert on the physical resources of the Canadian prov¬ inces. In 1840 Mr. Perley was made Indian commissioner and emigration agent for the province of New Brunswick. During the years

1848-51 Perley made exhaustive reports on the fisheries of Canadian eastern waters and in 1854-66 prepared much of the data for the Canadian side in the discussion of a reciprocity treaty with the United States. The Natural History Society of New Brunswick was founded by Mr. Perley who was also a frequent con¬ tributor to literary and scientific journals. He published (Report on the Forest Trees of New Brunswick (1847) ; (Catalogue of Fishes of New Brunswick and Nova Scotia) (1851) ; Observations on the Geology and Physical Characteristics of Newfoundland) (1862).

PERM, perm, Russia, (1) the capital of an eastern government, on the high left bank of the Kama, at the confluence of the Chusovaya, about 250 miles due north of Ufa, with which it is connected by rail via Ekaterinburg and Cheliabinsk. It was founded in 1781, has straight and spacious streets, a well-kept park and a number of handsome public buildings, among them the cathedral and 18 other churches. There are also a gymnasium, a theo¬ logical seminary, several other educational and scientific institutions and a civil and military hospital. A permanent exhibit of the city's products is maintained in the Zemstvo building. The chief employment is in connection with the iron smelting and refining works. There is a considerable trade with the inland districts, and an increasing river traffic. The great highway connecting Moscow with Siberia passes by way of Perm. Pop. 105,410. (2) A government of

eastern Russia, politically attached to European Russia, but topographically Asiatic and almost enclosed by the Ural Mountains. Area, 127,500 square miles. While lumbering, agriculture , and stock raising are considerable industries, Perm's commercial importance is due to its vast mineral wealth, consisting of iron, coal, salt, zinc, copper, nickel, platinum, silver and gold. Pop. 4,083,200. See Russia.

PERMANENT WAY, a term used in Great Britain to designate the finished roadbed and track of a railway, including bridges, via¬ ducts, crossings and switches. The term is used in contradistinction to a temporary way, such, as is made in construction, for removing the soil and making fillings.

PERMANENT WHITE, a white pigment consisting of sulphate of barium precipitated from the chloride by adding dilute sulphuric acid. It is used as an adulterant of, and as a substitute for, white-lead.

PERMANGANATE. See Manganese.

PERMIAN, in geology, the name given to the last of the smallest time divisions of the Paleeozoic, which are of worldwide recognition. The rocks of this age were first studied by Murchison, Dr. Verneuil and Keyserling, in the Russian province of Perm, whence the name. In Germany they are also known by the term ˆDyas,® proposed by Geinitz on account of their well-marked division into two groups • — the Rothliegende and Zeckstein. In Europe these rocks overlie the Carbonic for the most part un-conformably, but in North America there is no sharp line of demarkation between them. This has led to a difference in grouping of the time division in question, and the formations belong¬ ing to it. English and Continental geologists consider the Permian a distinct division, equiv-

alent to Siluric, Devonic or Carbonic (Carbonif¬ erous), while in America it was formerly made the terminal subdivision of the Carbonic era. The present textbooks, however, conform gen¬ erally to the European mode of classification. Its best development in this country is in the Middle West. According to the latest studies of Puner, the Permian of Kansas consists of a lower marine series — ((Big Blue series,® and an upper non-marine series, <(Cimarron series.® In Pennsylvania, Ohio and West Virginia the de¬ posits of this age are known as the Upper Bar¬ ren Measures or Dunkard Creek series. They are non-marine beds of sandstones, shales and calcareous layers, with some thin seams of coal. The greatest thickness is not much over 1,000 feet. Palaeontologicallv the Permian deposits are especially interesting from the presence of amphibians and of primitive reptiles. See Car¬ boniferous.

PERMUTATIONS. See Combinations.

PERNAMBUCO, per-nam-boo'ko (Port, per-nan-boo'koo) , a maritime state of Brazil and its capital city. (1) The state of Pernam¬ buco is bounded on the north by the states of Parahyba, Rio Grande do Norte and Ceara, on the east by the Atlantic, on the south by Alagoas and Bahia and on the west by Piauhy; lies between 7° and 10° 40' S. and 'between 34° 45' and 42° 10' W. ; has an area of 49,573 square miles,

with a coast line of about 140 miles. Next the sea there is a low coastal plain reaching 30 or 40 miles inland, and back of that the Matta or fertile forest belt and farther inland the treeless plateaus and moun¬ tains. The Sierra dois Irmaos on the western frontier is the watershed of the Paranhyba and Sao Francisco, and into the latter river the inland waters of Pernambuco flow. The Sao Francisco (q.v.) is navigable for nearly its whole extent. The climate varies greatly in the two diverse zones, being moist in the Matta, which follows the sea coast, whereas the Sertao, or ((desert® up-country, is dry, arid and almost uninhabited. The alluvial plain grows sugar¬ cane, cotton, tobacco, vanilla, cacao, coffee, red¬ wood, cocoanuts and, among many important drugs, ipecacuanha. There is a little gold and a great deal of excellent marble. Little develop¬ ment of the mineral wealth of Pernambuco has been attempted, but it is known that coal, iron, manganese, Chile nitrate and a superior grade of kaolin have been found, in paying quantities. Cattle raising flourishes in the interior, and dairying is increasingly important. Rum and hides rank next to cotton and sugar as the most valuable staples. Pernambuco is the chief sugar and cotton state of Brazil. Its annual yield of cotton is valued at $5,000,000, and its 60 sugar mills turn out 180,000 tons of sugar per year. Along with the latter industry is the distillation of rum as a by-product. Recife or Pernambuco (see below) is the most import¬ ant port; there are good harbors at Taman-dare, Porto de Gallinhas and Porto do Rio Formosa. The principal cities are Victoria (30,000) ; Goyana (28,000) ; Garanhuns (25,- 000) ; Cabo (25,000) ; Escada (22,000) ; Li-moeiro (20,000); and Rio Formoso (20,000). They are all connected with, the capital by rail. There are 560 miles of railroad in the state. Its annual exports amount to nearly $15,500,000; the imports to about $13,700,000. Pop. (1912)

1,650,000. The region was first settled at Iguar-assu and Olinda by the Portuguese in 1534. The Dutch held it 1630-54, and founded Moritz-stadt, now the capital. The island of Fernando de Noronha, in lat. 30° 50’ S. and 34° 47’ west of Rio de Janeiro, belongs to Pernambuco, and so does the island of Itamaraca lying along the coast 18 miles from the city of Re¬ cife. (2) The city of Pernambuco, called by the Brazilians Ciudade do Recife, that is, Reef City, the third city of the republic, excelled, in population and wealth only by Rio de Janeiro and Bahia. It is an Atlantic port, distant, 3,982 marine miles from New York and 4,065 from Liverpool. The city is cut into three parts by the Rio Capiberibe and the Rio Beberibe, Recife occupying the northeast part parallel to the coast reef, and Sao Antonio being an island south¬ west of it and southeast of the mainland, on which is the third section, Boa

Vista. Two bridges join Recife and Sao Antonio, and three connect Sao Antonio and Boa Vista. Recife is the old city, is poorly built and contains the great business houses. Sao An¬ tonio has the theatres, government buildings, customs house and Parliament ; is well built ; and has many traces of Dutch occupation. Boa Vista is largely residential with tropical one-story houses and beautiful gardens; it contains the archiepiscopal palace. The harbor is pro¬ tected from the sea by a long reef, and to this has been added at a cost of $28,000,000 a break¬ water and a stone jetty; with docks affording 28 feet to 33 feet of water, and equipped with elec¬ tric cranes and capacious storage houses, and plans are on foot to improve the port by ex¬ cavation. The city is now a regular port for 10 steamship lines, and some 900 steamers ag¬ gregating 1,700,000 tons enter and clear an¬ nually. The annual imports amount to about $15,000,000 and the exports to $5,000,000. The imports are mainly foodstuffs — codfish, flour and dried beef — and manufactures of cotton and of iron and steel. The principal exports are sugar, cotton, carnauba wax and goat skins. Four railroads connect the city with various parts of the state. There are cotton factories, oil mills, machine shops, shipyards, cigar manufactories, sugar refineries and manufac¬ tures of glassware and shoes. Pop. 268,000.

PERNAMBUCO WOOD. See Brazil

Wood.

PERNICIOUS AN2EMIA (also called Progressive Pernicious Anaemia, Malignant Anemia, Idiopathic An.emia, Essental An¬ emia, etc.), a severe blood-disease, a progres¬ sive and usually fatal form of anaemia. It was first described in 1855, by Addison, as an idio¬ pathic or self-originated anaemia, hence the term idiopathic or Addison's anaemia. In 1868 it was more closely studied by Biermer, espe¬ cially as to the post-mortem appearances; and when these are distinctive the disease is some¬ times spoken of as Biermer's anaemia. The dis¬ ease is characterized by a great destruction of the red corpuscles of the blood and lesions of the blood-making organs. The red corpuscles are mixed with megalocytes microcytes and poikilocytes. There is no increase of leucocy¬ tes. Post-mortem examination shows that the skin is pale lemon-colored; fat is yellowish pale; there is little loss of subcutaneous fat, but fatty degeneration of organs is common ;

heart-muscles are light-colored, flabby and, fatty ; other muscles may be red ; the cavities of the heart contain a little light-colored blood. There is fatty degeneration in the liver, kidneys, gastric and intestinal walls; extravasation of blood in the retinae, serous and mucous mem¬ branes and skin ; swelling and redness of lym¬ phatic glands ; and commonly sclerosis of the posterior and to some extent of the lateral columns of the spinal cord. Deposits of iron, probably due to the great destruction of the red corpuscles, are found in the liver, spleen, pan¬ creas, kidneys, *etc.* The bone-marrow is fre¬ quently very red.

The etiology is obscure. There is undoubt¬ edly haemolysis or disintegration and degenera¬ tion of the blood. This may be caused by long-continued loss of blood, by splenic, miasmatic, glandular, strumous or malignant disease, by intestinal parasites, *etc.* Bad hygienic condi¬ tions, especially impure air and poor and insuffi¬ cient food, are predisposing causes. The dis¬ ease most often appears in middle life, and is sometimes almost endemic. The symptoms, which develop slowly, are pallor, shortness of breath, palpitation, muscular weakness, oedema about the ankles, colorless lips and gums, gas¬ trointestinal disturbance — diarrhoea, dyspepsia, nausea and vomiting or constipation, with loss of appetite — aneurosis, dark urine of low spe¬ cific gravity, slight fever, though at night the temperature may be 102° F., rapid pulse (100 to 120), soft or full, and sometimes ecchymoses. Death usually occurs in from two months to a year. The treatment is only palliative — rest in bed, nourishing and easily digested food, gentle massage, *etc.* Transfusion of milk and blood seems to be of little avail. See Blood, Diseases of THE.

PEROFSKITE. A mineral consisting of calcium titanite (CaTi03). Occurs in ore in Gunnison County, Colo.

PEROSI, pa-ro'ze, Don Lorenzo, Italian composer: b. Tortona, Piedmont, Italy, 20 Dec. 1872. He was educated at the Milan Conserva¬ tory, studied for the priesthood and was or¬ dained at 23. His compositions are exclusively confined to religious subjects in a style appeal¬ ing peculiarly to the Italian people, crowding the churches with devout listeners. They have thus gained for him much fame throughout Italy, though they are less acceptable to English and German critics on the score of artistic form. He was appointed

honorary maestro of the Papal Choir in 1898. He has composed many masses and among his other compositions are the oratorios, (La passione de Cristo) (1897) ; (La risurrezione di Lazora-* (1898) ; (I1 natale del Redentore> (1899), *etc.*

PEROWNE, pe-rown', John James Stew¬ art, English Anglican prelate, the son of a mis¬ sionary: b. Burdwan, Bengal, 13 March 1823; d. 6 Nov. 1904. He was educated at Norwich Grammar School and Corpus Christi College, Cambridge, ordained in 1847 and appointed curate at Tunsted the same year. He was as¬ sistant master in King Edward's School, Birm¬ ingham, in 1849, for a time a lecturer in divinity at King's College, London, and from 1862 to 1872 vice-principal of Saint David's College, Lampeter. As an authority on Old Hebrew he was one of the Old Testament Revision Com¬ mittee (1870-84), and in 1875—78 was Hulsean

professor of divinity at Cambridge. From 1878 till 1891 he was dean of Peterborough and in the last-named year was consecrated bishop of Worcester. He resigned his see in 1901 and was succeeded by Charles Gore (q.v.). His published works include (The Book of Psalms,) a new translation, with commentary (1864) ;

(Immortality, J Hulsean lectures (1868) ; (Sermons) (1873) ; (Life and Remains of Bishop ThirlwalP (1878) ; (The Church, the Ministry, and the Sacraments) ; and an Arabic grammar. He edited the (Cambridge Bible for Schools) and the Cambridge Greek Testament for schools.

PEROXIDES, binary compounds of oxy¬ gen containing the greatest amount of that element; thus of the two oxides of hydrogen, H20 and H2O2, the latter is the peroxide; of the two oxides of sulphur, S02 and S03, S03 is the peroxide; and so on. Some of the metallic peroxides, such as those of barium and lead, appear to be skits of hydrogen peroxide. See Hydrogen.

PERPENDICULAR, in geometry, a line falling directly on another line so as to make equal angles on each side ; called also a normal line. Two perpendicular lines form a right angle with one another. As the angle of two intersecting curves is defined to be that of the tangents at the point of intersection, it is pos¬ sible to define perpendicularity or normality be¬ tween curves. A plane is perpendicular to another plane if a line drawn on one of them, perpendicular to the line of intersection, is at right angles to a line on the other plane per¬ pendicular to the line of intersection. A line is perpendicular to a

plane if it is perpendicular to two distinct lines in the plane through its foot. Two non-intersecting lines may be said to be perpendicular if one lies in a plane per¬ pendicular to the other.

PERPENDICULAR STYLE, a variety of pointed or Gothic architecture, the latest to be introduced. It was first noticed in Gloucester in 1337 but did not acquire distinction until 1370. From that time on it prevailed in Eng¬ land until the middle of the 16th century, the period during which the Flamboyant Style pre¬ vailed in France, and is to be regarded as a reaction from the too profuse exuberance of flowing curves in the French practice. It is characterized chiefly by the predominance of upright straight lines in its tracery. The mullions of the windows are vertical, rising gen¬ erally to the main arches, and are often crossed by horizontal bars or transoms. The mechani¬ cal simplicity of this kind of tracery enabled the architects of the period to increase the size of the windows without difficulty or danger, and large windows are accordingly another dis¬ tinctive feature of this style. The roof of such buildings is often their most striking feature, being either vaulted or supported by open tim¬ ber work. Another characteristic of the per¬ pendicular style is its extensive use of paneline, suggested obviously by the intersections of the vertical and horizontal construction lines. Nearly all the colleges of Oxford and Cam¬ bridge are in this style, and it is also exempli¬ fied more or less in many of the English cathe¬ drals, notably York and Canterbury, and in several of the principal churches. The example usually cited as perhaps the most exquisite is

Saint Michael’s Church at Wrexham, in Coven¬ try.

PERPETUAL MOTION, literally, a de¬ vice or mechanism capable of maintaining its own state of internal motion forever, without depending upon a supply of energy from exter¬ nal sources. In this sense, the heavenly bodies constitute a system which approximates very closely to perpetual motion, since their move¬ ments would probably continue forever if it were not for the dissipation of energy due to their slight tidal influences upon one another, and to the

possible existence of some unrecog¬ nized resisting medium in space. The phrase <(perpetual motion® is not commonly used in this sense, however; for a (<perpetual motion® is technically and almost universally un¬ derstood to be a device or apparatus which is capable of performing an indefinite quantity of mechanical work, without absorbing an equiva¬ lent quantity of energy from external sources. (See Energy; Mechanics). The search for a device of this sort was begun many centuries ago, and although educated physicists have now pronounced perpetual motion (in the more limited technical sense) to be impossible, there are still many persons who are hopefully en¬ gaged in the search for it. When the funda¬ mental principles of mechanics were unknown, and it was believed (for example) that heavy bodies, even in a vacuum, fall faster than light ones, there was nothing unreasonable in the hope that a machine might be devised which should furnish energy enough, not only to keep itself going forever, but also to run other machines, and thus do useful work. Further study of the behavior of bodies and forces led to the discovery of certain laws of motion which clearly indicated the impossibility of solv¬ ing the problem of perpetual motion by any combination of cranks and levers and gears, or by any arrangement of water wheels and pumps, or other simple mechanical devices. It is true that these laws of motion are based upon ex¬ perimental evidence, and hence their truth may be legitimately questioned ; but it must be re¬ membered that all of the great advances in ap¬ plied mechanics have been based upon the assumption that they rigorously exact, and it is suggestive to note that whenever a machine is constructed so that it demonstrably violates one of these laws, it does not work. Many of those who still persevere in the search for perpetual motion are ignorant of the laws of mechanics, or fail to appreciate the vastness of the experimental evidence upon which they are based. Others take refuge in the more recon¬ dite forces of nature. Driven from the field of simple mechanics, they seek, in the less explored fields of physics and chemistry, for principles that may conceivably accomplish what they per¬ ceive it is hopeless to search for in better. ex¬ plored regions. Electrical and magnetic devices, in particular, have been exploited in great num¬ bers, and a favorite object of search is some sort of a shield which will be impermeable to magnetism. As time has gone on, and the in¬ vestigation has been prosecuted in. every imagi¬ nable field, it has become increasingly evident that the problem of perpetual motion has no solution. It will still appeal to many minds as a logical possibility; but thoughtful men, who are educated in physics and mechanics, have

come ,to the conclusion, almost without ex¬ ception, that there is something about perpetual motion which is incompatible with the general principles that underlie the universe as it is actually constituted. It is certainly safe to say that perpetual motion can never be attained by the haphazard methods that its seekers have usually adopted. If attained at all, it must be by mastering all the known principles of physics and mechanics that now indicate its impossi¬ bility, and then analyzing these and discovering some flaw in the vast mass of experimental evidence upon which they are based. (See Energy; Endless Screw.) Consult De Morgan, A., CA Budget of Paradoxes) (London 1872) ; Balfour Stewart, (The Conservation of Energy* (New York 1874); Papin, Denis, (Philosophical Transactions > (1895); Dircks, Henry, (Per—

petuum Mobile) (2 vols., 1861 and 1870).

PERPETUITY, <(Any limitation tending to take property out of commerce for a longer period than a life or lives in being, and 21 years beyond, and in case of a posthumous child, a few months more, allowing for. the term of gestation® (Randall on Perpetuities, p. 48). A perpetuity need not be strictly for an unending period. Perpetuities in both real and personal estates are forbidden by the com¬ mon law of England, and accumulations are restricted to a period still more brief than a life and 21 years. In most of the United States this prohibition of perpetuties is enforced unchanged or with slight modifications by the constitution of the State or by statute. New York and some other States have limited the permissible number of the Hives in being® in the definition of a perpetuity to two, and have eliminated the extra period of 21 years. See Entail.

PERPIGNAN, per-pen-yon, France, capi¬ tal city of the department of Pyrenees Orientales, on the right bank of the Tet, seven miles from where that river empties into the Medi¬ terranean. It was united to France in 1659. It is a fortified city of the first class, with walls dating back to the days of Charles V. The city itself is supposed to have been founded as early as the 10th century ; a charter was granted it by Peter II of Aragon in 1197; and in 1408 the Council of Perpignan met here at the summons of the Antipope Benedict XIII and attempted to bring the great schism to an end. The university founded in 1349 by Peter IV of Aragon, the cathedral of Saint John, begun in 1324, and Le Castillet, a chateau in the Moorish style, built in 1319 and now a military prison, are among the interesting public edifices. The present city is a garrison town, and manufactures woolens, silks, playing cards, cigarette paper, chocolate, leather goods and corks, besides trading in wines,' olive oil, honey and many Mediterranean products.

Pop. about 33,000, and with the rest of the arrondissement of Perpignan about 40,000.

PERRAULT, par'ro, Charles, French

poet: b. Paris, 12 Jan. 1628; d. there, 16 May 1703. He was a man of erudition, but of little taste, whose verses have not outlived his day. Colbert availed himself of his assistance and made him comptroller-general of the king's buildings. Colbert's influence also procured him an election to the Academy. His mediocre

poem, Re Siecle de Louis le Grand,* which he read before the Academy in 1687, gave rise to the famous controversy on the comparative merits of the ancients and moderns. In his (Parallele des Anciens et Modernes* (1688-91), in the form of a dialogue, he maintains that the moderns have carried art and science, which were in a state of infancy among the ancients, to the highest perfection, and have excelled them in their works. This opinion was answered by Boileau in the Reflections on Longinus.) Perrault was also author of Res hommes illustres qui ont paru en France pend¬ ant ce siecle* (1696-1701). His (Contes de ma Mere l'Oye* (1897) (Rales of Mother Goose)) have procured for him the title of <(inventor of the French Fairy Tales,® and have secured for him a more enduring reputation than any of his other works. See Fairy Tales.

PERRAULT, Claude, French architect: b. Paris, 1613; d. 1688. At first a doctor of medicine he soon abandoned this field and took up architecture in which he soon became prominent. His chief works are the eastern facade of the Louvre quadrangle, also the southern, the Paris Observatory, and a trium¬ phal arch at the gate of Saint-Antoine ; the last-named work was demolished in 1716. Perrault's works include (Dix livres d'architecture de Vitruve, corriges et traduits

norwellement en Franˆais* (1673); (Ordonnance des cinq especes de colonnes selon la methode des anciens) (1683; translated into English by John James as (A Treatise of the Five Orders of Columns in Architecture,* 1708).

PERRET, par'ra, Frank Alvord, Ameri¬ can volcanologist: b. Hartford, Conn., 2 Aug. 1867. He was educated at the Brooklyn Poly¬ technic Institute and began as assistant in Edison's East Side Laboratory in 1886. He in¬ vented the Perret electric motor and assisted in organizing the Elektron Manufacturing Com¬ pany of Brooklyn; subsequently was engaged in the manufacture of Perret electric motors at Springfield, Mass. He took up volcanology in 1904 and became honorary assistant to Pro¬ fessor Mattencci in the Royal Observatory, Mount Vesuvius, Italy. He investigated by direct research the Mount Vesuvius eruption of 1906, Stromboli in 1907, 1912 and 1915, Messina 1908, Teneriffe 1909, Sakurashina 1914 and yEtna in 1910. Mr. Perret was director of the Hawaiian expedition of the Massachusetts In¬ stitute of Technology and lived at the crater of Kilanea through the summer of 1911. He is the author of scientific papers in professional

journals.

PERRIER, par'rya', (Jean Octave) Ed¬ mond, French zoologist: b. near Tulle, Cor-reze, 1844; d. 1 Aug. 1921. Appointed pro¬ fessor at the Lycee d'Agen in 186/, m 1872 became master of conferences at the.Ecole Normale de Paris. In 1876 he was appointed to the chair of zoology in the Museum of Natural His¬ tory, of which he was afterward director. # Per¬ rier became a member of the Academie oi Sciences in 1892. His works include Res colonies animales et la formation des organismes) (1881 ; 2d ed., 1898) ; Res principaux types des etres vivants, etc.* (1882); Ra philosophic zool-oeioue avant Darwin> (1884); Rlements de zoologie* (1886; 8th ed., 1899); (Traite de zoologie) (1892-1903); Ra vie des ammaux

illustree* (1903-06) ; Ra femme dans la nature et revolution du sexe feminin> (1908).

PERRIN, par'ran, Bernadotte, American educator: b. Goshen, Conn., 15 Sept. 1847. He was graduated from Yale in 1869, studied in the universities of Leipzig, Tubingen and Berlin and in 1881-93 was

professor of Greek in West¬ ern Reserve University, since when he has oc¬ cupied that chair at Yale. He has written ex¬ tensively on Greek and Roman history and has edited many textbooks, among them are (Caesar's Civil War> (1882) ; (School Odyssey,*

8 vols. and vocab. (1897); (Plutarch's Greek Lives) (1901) ; *etc.* He is associate editor of the Rwentieth Century Series of TextBooks. *

PERRIN, Ernest L., French-Canadian clergyman and educator : b. province of Que¬ bec, about 1876. He was educated at the Col¬ lege de Montreal, the Seminaire de Philosophic and the Grand Seminaire of Montreal and in 1899 was ordained to the priesthood. Subse¬ quently he entered the Order of Saint Sulpice and made postgraduate studies at Issy, near Paris and at Rome. In 1902-06 he was pro¬ fessor of philosophy at the Seminaire de Philos¬ ophic, Montreal, and subsequently became pro¬ fessor of church history at the Grand Semi¬ naire, Montreal. His success as professor led to Dr. Perrin's promotion to the rectorship of the Collegio Canadese, Rome, an administra¬ tive post of great responsibility and difficulty. His administration was most successful despite the difficulties brought about by the participa¬ tion of Italy in the Great War. In 1917, Dr. Perrin returned to Canada and was appointed to a chair in the Grand Seminaire, the theo¬ logical department of Laval University at Mon¬ treal. He has been highly successful as a pro¬ fessor and his individual efforts have been largely responsible for a general improvement of the standards of education of .the Roman Catholic clergy in Canada and the United States.

PERRONE, par-ro'na, Giovanni, Italian theologian: b. Chieri, Piedmont, 1794; d. 26 Aug. 1876. He was educated in the University of Turin, where he received the degree of doc¬ tor of theology about 1814. In the following year he entered the Society of Jesus and in 1816 was appointed professor of theology at Orvieto, removing in a similar capacity to the Collegium Romanum in 1823. For a short time he was rector of the Jesuit College at Ferrara. During the troubled years of 1848, he took refuge in England but returned to his old col¬ lege in Rome in 1850 and became its rector in 1853. Perrone was one of the greatest theo¬ logians of his time and took a prominent part in the discussions relative to the dogma of the Immaculate Conception and that of Papal In¬ fallibility. He wrote (Praelectiones Theologi-cae* (9 vols., 1835^42; compendium in 2 vols., 47 editions) ; (I1 protestantismo e la regola di fede) (1853) ; (De Domini Nostri Jesu Christi Divini-tate) (1870) ; (De Romani Pontificis Infallibili-tate* (1874).

PERRONET, Vincent, English clergyman : b. London, 1693; d. 1785. He received his edu¬ cation at Christ College, Oxford, entered holy orders and was named curate of Stindridge, Kent. After -nine years there he became vicar of Shoreham, where he remained for over 50

jrears. His interest in the Methodist movement was so active that he was called ((the archbishop of Methodism® by Charles Wesley. He was the author of two works in defense of John Locke and of several in defense of Methodism.

PERROT, par'ro, Georges, French archae¬ ologist: b. Villeneuve-Saint-Georges, Seine-et- Oise, 1832; d. 1914. He received his education at the Ecole Normale, Paris, and at the French school at Athens. He was member of an ar¬ chaeological expedition to Asia Minor in 1861 and was appointed to the chair of archaeology at the Sorbonne in 1875. Perrot was made direc¬ tor of the Ecole Normale Superieure in 1889 and subsequently became permanent secretary of the Academy of Inscriptions. He recon¬ structed the text of the Monumentum Ancyra-num and published (Exploration archeologique de la Galatie et de la Bithynie5 (1 862-72) ; (Histoire de l'art dans l'antiquite,5 with Chipiez (1882-) ; (Essai sur le droit public et prive de

la republique athenienne5 (1867) ; (Les peintures du Palatin5 (1872) ; (Memoires d'archeologie, d'epigraphie et d'histoire> (1875) ; (Lettres de Grece5 (1908).

PERRY, Arthur Latham, American politi¬ cal economist: b. Lyme, N. H., 27 Feb. 1830; d. Williamstown, Mass., 9 July 1905. He was graduated from Williams College in 1852 and became professor of history and political econ¬ omy there in 1853, which position he held till 1891, when he was made professor emeritus. He published (The Elements of Political Econ¬ omy > (1865), a work which passed

through 20 editions; (Introduction to Political Economy) (1877) ; Principles of Political Economy5 (1891) ; (Williamstown and Williams College5

(1900).

PERRY, Bliss, American educator and edi¬ tor : b. Williamstown, Mass., 25 Nov. 1860. He is a son of Arthur L. Perry (q.v.) ; was grad¬ uated from Williams College in 1881 and then studied at the universities of Berlin and Strassburg; received the degrees of L.H.D. from Princeton and Williams, of Litt. D. from Bowdoin and of LL. D. from Lake Forest. He was professor of English at Williams (1886-93) ; of oratory and aesthetic criticism at Princeton Uni¬ versity, 1893-1900; editor, Atlantic Monthly, 1899-1900, and' professor of English litera¬ ture at Harvard after 1907. He is a mem¬ ber of the National Institute of Arts and Letters ; was the Harvard lecturer at the Uni¬ versity of Paris 1909-10. He has edited many selections from literature and a series of < Little Masterpieces.5 Among his books are (The Broughton House5 (1890) ; (Salem Kittredge and Other Stories5 (1894); (The Plated City5 (1895); (The Powers at Play5 (1899); (A Study of Prose Fiction5 (1902) ; (The Amateur Spirit5 (1904); (Walt Whitman5 (1906); (Whittier5 (1907) ; Park Street Papers5 (1909). (The American Mind5 (1912) ; (Car-lyle5 (1915).

PERRY, Edward Delavan, university pro¬ fessor: b. Troy, N. Y., 20 Dec. 1854. He gradu¬ ated from Columbia in 1875; received the de¬ gree of Ph.D. from University of Tubingen in 1879 and of LL.D. from Columbia in 1904. He has been connected with Columbia since 1880 as instructor in Greek and Sanskrit (until 1891) ; professor of Sanskrit (1891-95) ; professor of

Greek (since 1895) ; dean of faculty of phi¬ losophy (1902-09). Prominent in management of American School of Classical Studies in Athens since 1897.

PERRY, John, British physicist : b. Ulster, Ireland, 14 Feb. 1850; d. 4 Aug. 1920. He was educated at Queen's College, Belfast, was as¬ sistant master at Clifton College 1870-74; pro¬ fessor of engineering in Japan 1875-79 and in London Technical College, Finsbury 1S81-96. He was professor emeritus of mechanics and mathematics at the Royal College of Science, South Kensington. He published (The Steam

Engine5 (1874) ; Practical Mechanics5 (1883) ;

(Spinning Tops5 (1890) ; (Cantor Lectures,

Hydraulics5 (1882) ; <Calculus) (1897) ; Png-land's Neglect of Science5 (1901), *etc.*

‘ PERRY, Matthew Calbraith, American naval officer: b. Newport, R. I., 10 April 1794; d. New York city, 4 March 1858. He was a brother of Oliver Hazard Perry (q.v.). He entered the navy in 1809,. served in the War of 1812 and in 1813 was promoted to the rank of lieutenant. In 1819 he was executive officer of the Cyane, which convoyed the first colonists to Liberia, and in 1821 .and 1822 was active in protecting commerce from the West Indian pirates. He was then with the Mediterranean squadron for a time ; in 1826 was promoted to the rank of commander and in 1832 was again on duty in the Mediterranean in command of the Concord. He was next stationed at the Brooklyn Navy Yard (1833-43), and took an important part in the organization of the steam naval service. The Fulton, the first steam ves¬ sel of the navy, was built under his direction ; and when in 1837 he was promoted to the rank of captain, he handled her with such skill that he fully proved the utility of steam vessels for naval purposes. In 1838 he was sent on special duty to England and France to investigate the steam vessels of their navies. In 1841 he was promoted commodore and later assigned to com¬ mand the squadron on the African Coast for suppressing the slave trade. In 1846 he was ap¬ pointed second in command of the squadron in the Gulf of Mexico, and in 1847 succeeded Commodore Conner in command. In 1852 he was entrusted by President Fillmore with a let¬ ter to the ruler of Japan for the purpose of establishing diplomatic and trade relations, and was given command of a squadron which reached Japan in July 1853. He delivered Pres¬ ident Fillmore's letter at Kurihama and return¬ ing to Japan early in 1854 concluded, at Yoko¬ hama, the treaty which inaugurated a new era in the history of Japan. He gave the Japanese an industrial exposition of American products and manufactures, including an illustration of the railway and telegraph at work. On 14 July 1901, saluted by the guns of thre.e American war vessels under Commodore Frederick Rodgers, grandson of Perry, and of a fleet of Japanese vessels, graded from gunboat to battleship, a superb monolith of Sendai granite, inscribed in letters of gold, written by the Marquis Ito, and to which the emperor himself had subscribed a thousand yen, was unveiled in Perry Park at Kurihama, where the President's letter had first been delivered. Beside many brief biographies in Japanese, consult (Matthew Calbraith Perry, a Typical American Officer,5 by William Elliot Griffis (1887).

PERRY, Oliver Hazard, American naval officer: b. South Kingston, R. I., 23 Aug. 1785; d. Trinidad, 23 Aug. 1819. He entered the navy as a midshipman in 1799, cruised among the West Indies, served in the war against Tripoli and in 1807 was commissioned lieuten¬ ant, and in 1809 given command of the schooner Revenge, which in 1811 was wrecked on Watch Hill Reef near Stonington, Conn. An official court, of inquiry acquitted him of all blame. At the outbreak of the War of 1812 he was in command of a division of gunboats at Newport, R. I., but in February 1813 was transferred, at his own request, to Lake Erie under the com¬ mand of Commodore Chauncey. He was then ordered to Presque Isle (now Erie) to super¬ intend the construction and equipment of a fleet ; and by August had built and manned nine vessels. Taking advantage of the temporary absence of the British squadron which had been watching him, he succeeded in getting his fleet out of port, and brought the British to an en¬ gagement on 10 September, which resulted in a complete victory for the Americans. (See Erie, Lake, Battle of). Perry immediately sent to General Harrison the dispatch which has be¬ come famous in American history, “We have met the enemy and they are ours.® This battle was most important as giving the Americans the control of Lake Erie and enabling Perry to co-operate with General Harrison and the land forces in the operations which resulted in the English evacuating Detroit and the victory at the Thames River. Perry became in the esti¬ mation of the people one of the chief heroes of the war, and high honors were paid him wherever he went. Congress gave him a gold medal in recognition of his services, and he was promoted captain. A controversy later arose between Perry and Elliott, the commander of the Niagara, as to the part employed by the latter in the battle. In 1814 he was appointed to command the Java, then being equipped at Baltimore ; and as the Chesapeake was closely blockaded, he found it impossible to get to sea, but was actively engaged in the defense of Baltimore. After the war he cruised in the Java on the United States Coast and in the Mediterranean with Decatur’s squadron. # He was appointed commodore, and in 1819 given command of a squadron for the West Indies and South America. In July of that year he ascended

the Orinoco River to Angostura, and on leaving the river was seized with yellow fever, which caused his death on the day that his ship reached Port Spain, Trinidad. He was buried there, but in 1826 his remains were trans¬ ferred in the Lexington to Newport, R. I. Statues of him have been erected at Newport and at Cleveland, Ohio. Consult the 'Life* by Mackenzie, A. S. (Akron, Ohio, 1910), and that by Lyman (New York 1905) ; Barnes, 'The Hero of Erie* (New York 1898) ; Cooper, 'Lives of Distinguished Naval Officers* (New York 1846).

PERRY, Peter, Canadian statesman: b. Lennox County, Ontario, 1793; d. 1851. For many years he pursued successfully the career of a farmer after which he became a merchant. Taking an active interest in politics he was one of the founders of the Reform party in Ontario in 1824, and from 1824 to 1836 sat in the Upper Canada legislature as Liberal mem¬

ber for Lennox and Addington counties. In 1841 he was elected to the Canadian legislative assembly. Perry was an advanced Liberal and was undoubtedly ahead of his time in political thought. As a result he was dissatisfied with the program of the Reform party and organ¬ ized the Clear Grit, or Advanced Reform party.

PERRY, Ralph Barton, American philoso¬ pher:' b. Poultney, Vt., 3 July 1876. He took his baccalaureate at Princeton in 1896 and his master's and doctor's degree at Harvard in 1897 and 1899, respectively. After teaching at Williams and Smith colleges he came to Har¬ vard in 1902 as instructor, and in 1913 he be¬ came professor there. He is especially known as an exponent of the New Realism. He has edited Williams James' 'Essays in Radical Empiricism* (1912), and has published 'The Approach to Philosophy* (1905) ; 'The Moral Economy* (1909) ; 'Present Philosophical Ten¬ dencies* (1912); 'The New Realism* (as co¬ author, 1912) ; 'The Free Man and the Soldier*

(1916).

PERRY, Roland Hinton, American painter and sculptor: b. New York, N. Y., 25 Jan. 1870. He was educated at a private school in New York, entered the Lcole des Beaux Arts in 1890 and studied at the Academie Julien and Academie Delacleuse, Paris, in 1890-94. His principal works are the bas-reliefs of Sibyls and the 'Fountain of Neptune* in the Library of Congress (1895) ; 'Cain* (1892) and 'Death of Sigurd*

(1898), paintings in the Detroit Museum of Art; 'The Valkyrie,* painting (1899) ; 'The Lion in Love,* sculpture (1899) ; spandrels on Dewey Arch, New York (1899, since razed) ; 'Statute of Circe* (1900) ; the Langdon doors of the Buffalo Historical Society (1901) ; frieze for the New Amsterdam Theatre, New York (1903); statue of Dr. Benjamin Rush, Washington (1904).; figure of 'Pennsylvania* atop the capitol at Harrisburg, Pa. (1904) ; statue of Gen. George S. Greene, Gettysburg (1906) ; group for New York State monument for Lookout Mountain, Tenn. (1907) ; lions for Connecticut Avenue Bridge, Washing¬ ton (1908) ; New York State memorial at Andersonville, Ga. (1910) ; equestrian statue of Gen. John B. Castleman, of Louisville, Ky. ; statues of General Curtis for Ogdensburg, N. Y., and of General Wadsworth at Gettys¬ burg. Since 1916 Mr. Perry has devoted him¬ self to portrait painting.

PERRY, Thomas Sergeant, American

educator and critic: b. Newport, R. I., 23 Tan. 1845. He was graduated at Harvard in 1866; was tutor in German there, 1868-72; and in¬ structor in English, 1877-81 ; professor of Eng¬ lish in Keiogijiku University, Tokio, 1898-1901. He has spent much time abroad, and his writ¬ ings, which are mainly critical and historical, include 'Life and Letters of Francis Lieber* (1882) ; 'The Evolution of the Snob* (1887) ; 'English Literature in the 18th Century* (1883); 'From Opitz to Lessing* (1884); 'History of Greek Literature* (1890) ; 'Life of John Fiske* (1905).

PERRY, William Stevens, American Prot¬ estant Episcopal bishop: b. Providence, R. I., 22 Jan. 1832; d. Dubuque, Iowa, 13 May 1898. He was educated at Harvard College, where he was graduated in 1854; prepared for the min-

istry at the Virginia Theological Seminary, was ordained deacon in 1857 and priest in 1858. After holding various charges in New England and for a time editing the Church Monthly, published in Boston, he became rector of Trinity Church, Geneva, N. Y., in 1869.

Here he remained for the next seven years, during the last six months of which time he was also president of Hobart College. He had already acted as professor of history there 1871-73, and had been in 1868 appointed, in succession to Dr. Hawks, historiographer of the Episcopal Church, a position which he held until his death. In three successive general conven¬ tions, beginning with the year of this appoint¬ ment, he was secretary of the House of Clerical and Lay Deputies. In 1876 he entered the upper house by his consecration as bishop of Iowa. In addition to his ordinary episcopal labors, he was in general demand as a preacher, and continued during the rest of his life his historical studies. The fruits of these remain especially in the valuable (Historical Collec¬ tions* illustrating the history of the Episcopal Church in various States, and the publication of the journals of the General Convention, with notes and appendices, at first in collaboration with Dr. Hawks and afterward independently. He published also a connected (History of the American Episcopal Church, 1587 to 1883 } (1885) and other works.

PERRY, Iowa, city, of Dallas Co'inty, on the Chicago, Milwaukee and Saint Paul and the Minneapolis and Saint Louis railroads, 35 miles northwest of Des Moines. It has ex¬ tensive agricultural interests and manufactures cement blocks, tile spades, washing machines, *etc.* It contains a public library and is the seat of Jones College. The city owns the water-supply system. Pop. (1920) 5,642.

PERRY, N. Y., village in Wyoming County, on the Buffalo, Rochester and Pittsburgh Rail¬ way, 55 miles southwest of Rochester. The vil¬ lage has a public library, a masonic temple and modern school buildings, knitting mills, cutlery factory, machine shops, *etc.* The water-supply system is the property of the village. Pop.

(1920) 4,717.

PERRY, Okla., city, county-seat of Noble County; on the Atchison, Topeka and Santa Fe Railroad, about 30 miles northeast of Guth¬ rie. It is in an agricultural region, in which stock-raising is an important industry. The chief manufactures are flour, feed, machine repair-shops and cigars. It has an extensive trade in grain and livestock. Perry was set¬ tled in 1889 and a United States landoffice is stationed here. It has a Carnegie library, pub¬ lic parks and operates municioal waterworks and electric-lighting plant. Pop. 3,200.

PERRY, a fermented beverage made from the juice of pears.

PERRYVILLE, Battle of, and the Ken¬ tucky Campaign of 1862. After the expulsion of the Confederate army from Corinth, Miss, (q.v.), 29 May 1862, General Halleck's large army of 137,000 men was unfortunately and, as it afterward proved, mistakenly divided, and the army of the Ohio, under Gen. D. C. Buell, 10 June, upon a peremptory demand from the authorities at Washington, was ordered to move on Chattanooga, the movement beginning

next day along the line of the Memphis and Charleston railroad. This railroad had to be rebuilt as the army moved forward, and from its location it was constantly under attack and destruction by enemy raiders. The Union arms had opened the Mississippi to Memphis and Vicksburg, and all the country north of the line of the Memphis and Charleston Railroad and Tennessee River, as far east as Bridge¬ port, Ala., and following the Cumberland Mountains northward, to the Ohio River, had come into Union possession. The two great States, Kentucky and Tennessee, except the eastern part of the latter, and the key to the railroad system of the South were held by Union troops. The advance of the Union armies on Chattanooga and Knoxville, in June and July, led to prompt reinforcement of Chattanooga and Knoxville by the Confeder¬ ates, and Gen. Braxton Bragg was authorized to make a counter movement into Middle Ten¬ nessee and Kentucky. The idea obtained in the South that the people of Kentucky would rise and swell the Confederate ranks, and at Richmond it was thought that Bragg could march through Tennessee and Kentucky to the banks of the Ohio and beyond. Bragg was then at Tupelo, Miss., and Gen. E. Kirby Smith was in command of the department em¬ bracing Chattanooga and Knoxville with a force of 15,000 men. Information led both to believe that, if properly armed, at least 25,000 in Kentucky and Tennessee would join their armies. At the same time Generals Earl Van Dorn and Sterling Price were to move from Mississippi into West Tennessee and Bragg thought that all his forces would unite in Ohio. On 21 July he ordered his own army of 45,000 from Tupelo to secure Chattanooga against Buell's advance, and to prepare for movement to the Ohio. Bragg divided his army into two wings, the right commanded by Gen. L. Polk, the left by General Hardee. He crossed the • Tennessee at and above Chattanooga on 21-24 August, and his column of 30,000 men took up the march over Walden's Ridge and the Cum¬ berland Mountains. Turning Buell's left, whose advance was at McMinnville and Alta-mont, it threatened Nashville; whereupon Buell ordered a concentration of his army at Murfreesboro, where they arrived 3-5 Septem¬ ber. Hearing there of Nelson's defeat at Richmond, Ky. (q.v.) on 30 August he fell back to

cover Nashville and his connections with Louisville. Bragg now turned northward for Louisville and the Ohio. He entered Ken¬ tucky 5 September, about 45 miles above Nash¬ ville, and halted at Glasgow on the 12th. On the 13th he found that Buell was ahead of him on the railroad from Nashville to Bowling Green. Bragg, however, marching from Glas¬ gow across the country, with a force of 25,000, captured Munfordsville, with over 4,000 men, 17 September, and took up a strong position on the south side of Green River, in¬ tending to give Buell battle, but owing to want of supplies he changed his mind. He released his prisoners on parole and on the night of the 19th abandoned his position, which Buell, marching from Bowling Green, was about to attack, and marched for Bardstown, thus leav¬ ing the road to Louisville open to Buell, who entered the city on the 25th. Bragg seems to

have given up all idea of fighting and devoted all his energies to foraging for supplies and endeavoring to raise recruits for his army. He was eminently successful in the first, gath¬ ering huge droves of cattle and trains of pro¬ visions, and some recruits joined him. Though he had been at first headed for Ohio, lie was now traveling away from it. Meanwhile E. Kirby Smith had occupied Lexington, Paris, Frankfort and Cynthiana, and sent General Heth to threaten Covington and Cincinnati. On 18 September Smith was in motion to join Bragg at Shelbyville, but hearing of Gen. Geo. W. Morgan's evacuation of Cumberland Gap (q.v.) and retreat northward, he suspended his movement westward and marched his entire army east toward Mount Sterling, to intercept Morgan. In this he failed, and as Bragg re¬ ports: ((The delay caused by the necessity of Smith's going prevented his forming junction with my forces at Shelbyville, and enabled General Buell to reach Louisville before an assault could be made by the combined force.® Smith next marched back to the vicinity of Frankfort, Bragg in person joining him from an inspection tour, with the information that Buell was moving out of Louisville.

On reaching Louisville Buell found thou¬ sands of volunteers pouring

in from the West, and Grant sent him a detachment, increasing the army of the Ohio to nearly 100,000. The army was ready to march against Bragg at Bardstown, where only Polk's corps remained, when on the 29th Buell was handed an order from Washington relieving him from com¬ mand and assigning Gen. Geo. H. Thomas to succeed him. Thomas protested against the change of command, and the order was sus¬ pended, Thomas being announced, in orders as second in command, but the straightening out process cost a delay of 24 hours. The three corps of the army were commanded by Gens. A. McD. McCook, T. L. Crittenden and C. C Gilbert. On 1 October Buell's army of 68,000 fighting men moved out of Louisville in three columns against Polk at Bardstown. General Sill with his own division and Dumont s marched direct to Frankfort to threaten . E. Kirby Smith. Bragg, at Frankfort, believing that Sill was but the advance of Buell s main body marching for that place, ordered General Polk to move the entire army from Bardstown toward Frankfort and to strike Sill and Buell in flank, while E. Kirby Smith, advancing from Frankfort, met the Union column m front. But Polk, finding that he had Buell s whole army before him, disregarded Braggs order and retired slowly by way of Perryville toward Harrodsburg, where he thought that the entire Confederate army in Kentucky would be con¬ centrated. When Bragg heard of this 4 Octo¬ ber, he, Smith and others were formally inaug¬ urating a secession governor of Kentucky at Frankfort, a ceremony that was cut short upon the announcement that Sill was rapidly ap¬ proaching. Smith, accompanied by the newly inaugurated governor, retreated in haste o-ward Lexington. Dumont's division occupied the city, and Sill slipped away on the 8th to join Buell. Smith took position near Ver¬ sailles, to cover Lexington and watch an ad¬ vance from Frankfort. Polk, with two divi¬ sions, was ordered to join Smith. Hardee, with his two infantry divisions and Wheelers

cavalry, was left to hold Perryville and cover the depot of supplies at Camp Dick Robinson.

Meanwhile Buell's three columns were ap¬ proaching Perryville. Gilbert, with the centre, preceded by a brigade of cavalry, drove back "Wheeler, and on the night of the 7th went into camp four miles from Perryville, about 40 miles south of Frankfort. Crittenden, with the right, was to have encamped at Hayesville, but finding no water, he marched three miles to the west. McCook, with the left, after some re¬ sistance, reached Mackville, 10 miles from Perryville, the same

distance from Harrods¬ burg, and six miles in rear and to the left of Gilbert. Late in the afternoon Bragg, at Har¬ rodsburg, heard from Hardee that he was being pressed by Gilbert, whom the Confeder¬ ates supposed to be isolated from the rest of Buell's army and ordered Polk to join Hardee with Cheatham's division and attack Gilbert. Hardee and Polk urged a union of Bragg's and Smith's armies before giving battle. Early in the morning of the 8th, when it was seen that the Union forces were advancing, Polk, cor¬ rectly informed that the greater part of Buell's army was in his front, determined to disregard Bragg's order to attack, and after consultation with Hardee and other officers, he concluded ((to adopt the defensive-offensive.® The battle began in an effort of the Federals to get water, through gaining possession of the springs at Perryville, in quest of which Col. Dan Mc¬ Cook's brigade advanced at 3 am. of the 8th and took position in advance , of Chaplin's Creek. After daylight it was joined by the remainder of Sheridan's division, followed by Mitchell's and a brigade of Schoepf's. Sheri¬ dan moved up the road, driving back strong skirmish-lines, and nearly a mile in advance with Mitchell on his right, he formed line of battle on ground overlooking a branch of Doc¬ tor's Creek. It was nearlv 11 a.m. when Rous¬ seau's division, the advance of McCook's corps, came up on the left of Sheridan, about 400 yards from him. Lytle's and Harris' brigades were put on the right. Terrill's brigade of Jackson's division on the left, Webster's brigade of Jackson's division in rear of Rousseau, and Starkweather's brigade of Rousseau's division, with two batteries on high ground, to the left and rear of Terrill's brigade. Soon infantry and artillery on both sides were engaged. The battle was mainly fought on McCook's line. Buell's army numbered about 58,000 men, and was confronted by 16,000. But this inequality was not suspected 'by either side. Buell thought the whole of Bragg's command was before him and made careful plans for an attack on the following day. The Confederates be¬ lieving they faced only a single corps attacked courageously.

General Bragg came upon the field from Har¬ rodsburg about 10 a.m., and was surprised and angered when informed by Polk that be had as¬ sumed the defensive-offensive. Cheatham's division of 7,000 arriving, Bragg made some changes in the disposition of the troops, mov¬ ing Cheatham's division to the right, and ordered Polk to open the attack. Polk was dila¬ tory, and Bragg led the entire line forward, his left striking Sheridan, and the centre and right falling furiously upon McCook at 2 p.m., im¬ mediately involving his entire line in a desperate struggle. Terrill's brigade, on the left, but

partially formed, received a heavy blow from Cheatham's division and Wharton's cavalrv; General Jackson, the division commander, was killed at almost the first fire, while directing the fire of Parson's battery; and the brigade, composed of raw troops, after inflicting severe loss on Maney's brigade, was routed, abandon¬ ing seven of Parson's eight guns. The Con¬ federates, advancing, struck Starkweather to the rear and left of Terrill, and were checked and repulsed by the fire of his two batteries and unyielding infantry, the attacking brigades of Maney and Stewart losing nearly half their men. Later in the action Starkweather was obliged to yield some ground, and General Ter¬ rill, in a vain effort to rally a part of his brigade on him, was mortally wounded. From the attack upon Terrill the battle rolled down the line upon the brigades of Lytle and Harris, of Rousseau's division, the greater part of Buck¬ ner's division attacking them with fury and, taking advantage of an interval of 400 yards be¬ tween the right of Rousseau and the left of Sheridan, pressing their attack at this point. Colonel Webster sprung to Rousseau's support and was killed ; his brigade, with those of Lytle and Harris, were soon overpowered and forced back nearly a mile ; Lytle was seriously wounded and taken prisoner; and the three brigades, ter¬ ribly thinned, were about to dissolve in frag¬ ments, when Colonel Gooding's brigade, of Mitchell's division, came up from the right, made a gallant charge, and after nearly an hour's contest, in which it lost 499 killed and wounded, one-third of its strength, checked the Confederate advance and then threw it back beyond Chaplin's Creek. Steedman's brigade arrived about sunset and Lieut. F. G. Smith's battery, supported by the 18th United States Infantry, was pushed forward and opened with canister; but it soon grew dark and the firing ceased on both sides. On McCook's right Sher¬ idan was attacked by a part of Buckner's divi¬ sion and that of Anderson. He had a good position and, beside checking the assault on his own front, helped McCook by turning his artil¬ lery upon the flank of the troops opposing him; but unfortunately Gilbert, his corps commander, ordered him and Mitchell to fall back, thus un¬ covering McCook's right. However, he soon advanced, held his ground, though severely pressed, and as his right was strongly threat¬ ened, Mitchell sent General Carlin's brigade to his assistance. Carlin formed on his right

and, making an impetuous charge, broke the Con¬ federate lines and drove them back through Perryville, capturing in the town 15 to 20 cais¬ sons and wagons, loaded with ammunition, and a guard of 140 officers and men. This was about nightfall and ended the battle on that part of the field. Crittenden's corps, on the right, was not engaged and had but two men wounded. Of Buell's 58,000 men on. the field less than half were engaged. The noise of the action had been muffled by the surrounding woods and Buell was unaware of the battle till 4 p.m. The Union loss was 845 killed, 2,851 wounded and 515 missing, an aggregate of 4.211. The Confederate loss was 510 killed, 2,635 wounded and 251 missing, an aggregate of 3,396. Considering the number of men en¬ gaged and the brief duration of the battle, it is regarded as the bloodiest engagement of the Civil War.

During the night Bragg, abandoning his dead and many wounded, and 13 of the 15 guns he had captured, withdrew from the field, and at daylight he retreated to Harrodsburg, where he was joined by E. Kirby Smith, raising his com¬ mand to over 60,000 men. Buell awaited the arrival of Sill's division, which arrived on the 11th, and next day advanced and maneuvered to turn Bragg's left. Bragg fell back to Brvants-ville, and on the 13th he began his retreat from Kentucky by way of Cumberland Gap. Buell pursued, the bulk of his army stopping at Crab Orchard, the advance going as far as London, where pursuit ended, and Buell moved back to the line of the Louisville and Nashville Rail¬ road. Bragg continued his retreat, passing through Cumberland Gap 19-26 October.

The Confederate campaign into. Kentucky •was a failure and a sore disappointment to General Bragg and his government. In his re¬ port Bragg says : ((The campaign was predicated on a belief and the most positive assurance that the people of this country would rise in mass to assert their independence. No people ever had so favorable an opportunity, but I am distressed to add there is little or no disposition to avail of it. Willing perhaps to accept their inde¬ pendence, they are neither disposed nor willing to risk their lives or their property in its achievement. With ample means to arm 20,000 men and a force with that to fully redeem the State, we have not yet issued half the arms left up by casualties incident to the campaign.® Consult (Official Records) (Vol. XVI) ; Fry, <The Army under Buell) ; the Century Com¬ pany's (Battles and Leaders of the Civil War) (Vol. III).

E. A. Carman.

PERSEPHONE, per seph‘6-ne (Greek UepcscpbvT/; Lat. Proserpina ; other Greek forms appear), in Greek myth, according to some the daughter of Zeus and Styx, or, according to the more usual tradition, the daughter of Zeus and Demeter (Ceres). Pluto carried her off, with the consent of Zeus, and made her his wife. This fable has been treated by several poets and adorned in different ways. In Homer, where she bears the name of Perse-phoneia, no mention is made of her having been carried off by Pluto against her will. She is simply represented as the majestic and awful wife of Pluto and queen of the lower world. According to the later story Persephone was once dancing in the choir of nymphs led by Athena and Artemis in a grassy meadow. Leav¬ ing the dancers she went with some of her com¬ panions to gather flowers. At the prayer of Pluto, and with the consent of Zeus, the earth produced 100 blooming narcissuses from one root, and gods and men were astonished at their beauty and delighted by their odor. The maid eagerly gathered them, and, beguiled by their magic power, wandered from her companions. Suddenly the earth opened, and Pluto, rising from the chasm with his immortal steeds, seized Persephone, and carried her in a golden chariot to the lower world. She called loudly on her father for protection, but in vain; no one heard her cries except Hecate and the Sun.

In vain did Zeus attempt to obtain her mother’s consent to her marriage with Pluto and he at length granted her permission to re¬ turn to the upper world provided she had not

tasted any of the food of the gods. But while walking through the lovely fields of Elysium she had eaten a pomegranate, and all that Zeus could grant to the prayers of her afflicted mother was that she should spend the spring and summer of each year in the upper world. See Demeter.

The chief seats of the worship of Perse¬ phone were Attica and Sicily, although her wor¬ ship was not wholly neglected in any part of Greece or in any of the Greek colonies. Some¬ times she shared the honors paid to her hus¬ band, sometimes those paid to her mother,

and sometimes particular celebrations were dedi¬ cated to her alone. In Attica she bore the name of Kore, that is, the daughter, namely, of Demeter, who is sometimes called He Meter, the mother; and the Eleusinian mysteries (q.v.) held in September, were sacred to both. The story of Persephone in the simple form in which it is given by the Greek poets is univer¬ sally held to be a mythical account of the changes of the seasons, and this interpretation is so obvious that the ancients themselves saw in the abduction of Persephone a symbol of autumn when the fruits of nature disappear ; and in her return a symbol of spring. This idea of the myth is beautifully worked out in Schiller's ballad, (Klage des Ceres. >

PERSEPOLIS, per-sep'6-lis, in ancient geography a capital of the Persian empire, near the junction of the Araxes River (now the Kur) and the Medus (now Polvar), and 35 miles northeast of the modern city of Shiraz. 'Persepolis is Greek for ((Persian City" ; the form of the Persian name is unknown, but as the earlier notices in Greek authors call it Persae, and as it succeeded Pasargadse (q.v.), whose name possibly means <(the city of the Persians," it may be conjectured that the Greek name is a translation of the Persian and not a new appellation. The city, probably already a great one, became the Persian capital under Darius I. Both Darius and Xerxes did much to build up and beautify the city, which was strongly fortified with a tripl? wall about the citadel, on which were the royal palace and treasury. This part of the city was destroyed by Alexander the Great (about 330 b.c.) ; but the northern part, the real city, was unharmed and retained some importance down to the 1st century b.c. About 200 a.d. Istakhr arose here and became a royal city of the Sassanids down to 632 a.d. The ruins of Persepolis are among the most important of the remains of ancient Persia. They lie in the desert plain of Mer-dasht nearly hemmed in by mountains, which are sufficiently described in the native name of Seh Gumbeddan, that is, «the three cupolas" ; the natives call the ruins Takhti Jemshed («Jemshed's Throne"), Tchil Minar ("Forty Pillars"), and Nakshi Rustem ("Rustem's Pic¬ ture"). The first two names are variants and are applied to the buildings topping three ter¬ races, up which lead a double staircase, broad enough for 10 men to pass abreast, with a slope so gentle that it is easy to ride up on horse¬ back over the 106 steps. The second terrace, 35 feet high and 550 feet long, has at the en¬ trance of a great propylaea, attributed to Xerxes, portals with four figures of winged bulls, two of them with men s heads, closely re¬ sembling the Assyrian statues in Nineveh.

Southeast of the propylaea is Xerxes' throne room with 13 great columns 64 feet high and 29}4 feet apart, still standing; it seems to have been open to the air. At one side is the en¬ closed pavilion of Darius, 250 feet square, which had 100 columns. North of Takhti Jemshed are the tetragonal pyramidal remains of an ancient fire temple. Consult Curzon, (Persia) (1892) ; Dieulafoy, (L'Art antique de la Perse) (1884-89) and *Mme.* Dieulafoy, (La Perse, la Susiane et la Chaldee; Fergusson, (The Palaces of Nineveh and Persepolis Restored) (1851) ; Stolze and Andreas, (Die achamenidischen und sassanidischen Denkmaler und Inschriften von Persepolis) (1882) ; and Stolze, <Persepolis)

(1892).

PERSEUS, per'sus, last king of the Mace¬ donians, son of Philip V : b. about 212 b.c. ; d. Alba, Italy, about 163 b.c. He succeeded to the throne in 179 b.c., renewed the treaty with Rome which his father had been preparing to break, but continued the preparations for war in which hd had been engaged. In 168 b.c. the Romans sent Lucius ZEmilius Paulus against him, and after a campaign of 13 days the Macedonian army was routed. Perseus escaped to Samo-thrace, but was captured by the Romans and died in honorable captivity at Alba some years later. Consult Droysen, (Geschichte des Hellenismus) (2 ed., 1877-78) ; Mahaffy, Alexander's Empire } (1888).

PERSEUS, fabulous Greek hero, son of Danae and Zeus, and grandson of Acrisius. In consequence of an oracle which had foretold that Acrisius would die by the hands of a son of Danae (See Danae) he was sent to sea on his birth, in a chest with his mother. But the chest reached the Island of Seriphos, and on being opened both mother and son were found to be alive. Dictys, a fisherman who found them, conveyed them to his brother, Polydectes, king of the island, at whose court Perseus was brought up. Polydectes at first treated Perseus with kindness but when he was grown up be¬ came anxious to get rid of him, as he thought he would prove an obstacle in the way of his gratifying a passion which he had conceived for his mother Danae. Under pretense, therefore, of suing for the daughter of CEnomaus, he re¬ quested from his friends presents of rarities to make his wedding feast more splendid; and when Perseus professed willingness to bring him anything that he desired, even the head of the Gorgon Medusa, bade him bring what he had mentioned. Conducted by Hermes and Athena, he first went on to the western coast of the ocean, to the three Graiae, who had but one eye and one tooth in common. Perseus got

pos¬ session of these, and promised to restore them on condition that they would bring him to the nymphs, who kept the instruments which he needed in this enterprise — the talaria, or winged shoes, the bag, and the helmet of Pluto, which made its wearer invisible. Led by Hermes and Athena, he reached the slumbering Gorgons. With his face averted he approached the monsters whose look transformed the spec¬ tator into stone, saw the head of Medusa by reflection in his brazen shield, and cut it off. Upon his return, he transformed Polydectes, with all his associates, into stone; and having placed Dictys upon the throne of Seriphos, re¬ turned to Hermes the talaria, bag and helmet,

and gave to Athena the Gorgon's head which she fixed in the centre of her shield, or, accord¬ ing to some, on her breastplate. Perseus then went to Argos to visit his grandfather, Acrisius. To avoid the predictions of an oracle Acrisius had fled to Thessaly, but could not escape his destiny, for Perseus followed him there and killed him accidentally with the discus, of which he was the inventor. In consequence of this event he refused to ascend the throne of Argos, which had thus fallen to him, and exchanged it for Tiryns, the kingdom of Megapenthes. Here he founded Mycenae.

In astronomy, a northern constellation of Ptolemy, exceedingly rich in objects of inter¬ est. In a good telescope the double cluster in the Sword-handle appears wonderfully rich in stars. Persues contains the variable star Algol (q.v.).

PERSEVERANCE, or FINAL PERSE¬ VERANCE, generally referring to the doctrine that the salvation of any individual has been absolutely fixed from eternity, and that after the work of salvation has actually been begun, it will be carried forward without fail to a suc¬ cessful termination. (Consult Romans viii, 28-30). The Westminster Assembly's Confession of Faith declares: "This perseverance of the saints depends not upon their own free-will, but upon the immutability of the decree of election flowing from the free and unchanging love of God the Father ; upon the efficacy of the merit and

intercession of Jesus Christ; the abiding of the Spirit, and of the seed of God within them ; and the nature of the covenant of grace — from all which ariseth also the cer¬ tainty and infallibility thereof.®

In the Arminian theology the possibility and even danger of the falling away of saints is admitted, and it is declared that free-will gov¬ erns in the adherence to Christ, and does not cease to govern in the abandonment of him. The Calvinist, in argument, does not deny such conditions, but insists that the absence of perse¬ verance in itself proves that actual salvation was never begun for those who afterward became backsliders.

In the Roman Catholic theology the term Final Perseverance signifies the preservation of the state of grace till the end of life on earth; that is, from the last conversion until death — regardless of previous lapses. It is viewed both as a power, and as a fact: In the first sense the combination of spiritual means whereby it becomes possible for the human will to persevere; in the second, an accom¬ plishment by the constant aid of divine over¬ sight and care, and in its eventuality a divine gift, beyond any merit achieved by the human devotee. Consult Hodge, C., ‘Systematic The¬ ology J (New York 1877) ; Newman, Cardinal, ‘Tracts Theological and Ecclesiastical 5 (London

1874).

PERSHING, Cyrus L., American jurist: b. Youngstown, Westmoreland County, Pa., 3 Feb. 1825; d. Pottsville, Pa., 29 June 1903. He sustained himself as a clerk and teacher at Jefferson College, Pa., where he was graduated in 1848, and was admitted to the bar in 1850. He practised his profession in Johnstown, Pa., and was elected to the legislature in 1861, 1862, 1863, 1864 and 1865. In October 1872 he was elected president judge of Schuylkill County,

presiding during the trial of the members of the “Molly Maguire® association, and was nominated for the governorship of his State by the Democrats in 1875. He was a frequent contributor to the law journals of Pennsylvania.

PERSHING, John Joseph, American gen¬ eral: b’. Linn County, Mo., 13 Sept. 1860. He was graduated at the United States Military Academy at West Point in 1886 as senior cadet captain, when he received his commission of second lieutenant in the Sixth United

States Cavalry, and saw his first active service in the same year in the Apache Indian campaigns in Arizona and New Mexico. In 1890-91 he took part in the Sioux campaign in South Dakota, commanding for a time the Sioux Indian scouts. Appointed military instructor in the University of Nebraska in 1891 (where he took his LL.B. degree), and transferred to the 10th Cavalry as first lieutenant in 1892, Pershing continued his lectures at the university till 1895, and two years later became instructor in tactics at West Point. He won special commendation in the Cree cam¬ paign of 1896, and in 1898 was made chief ord¬ nance officer in the volunteers with the rank of major, served in Cuba and organized the Bureau of Insular Affairs there, acting as chief of that department till August 1899, when he left the volunteers and was sent to the Philippines. For four years he was engaged there as adjutant-general in the department of Mindanao and in command of the military operations against the Moros, a “fierce, proud and restive® tribe of Mohammedans that had defied Spanish author¬ ity for centuries. Pershing’s unqualified success in subjugating the Moros and even winning their confidence and friendship was a skilful exhibition of military and diplomatic talents that did not fail to attract the attention of the authorities at Washington. In his message to Congress on 7 Dec. 1903 President Roosevelt paid a handsome tribute to Captain Pershing’s achievements. Criticizing the inadequate system of promotion and reward for meritorious serv¬ ice, the President wrote, “The only people who are contented with a system of promotion by mere seniority are those who are contented with the triumph of mediocrity over excellence… . Moreover, when a man renders such service as Captain Pershing rendered last spring in the Moro campaign, it ought to be possible to re¬ ward him without at once jumping him to the grade of brigadier-general.® The President’s words aroused considerable opposition both in Congress and in army circles. The matter was held up for nearly three years, but on 20 Sept. 1906 it was officially announced that Captain Pershing was promoted to brigadier-general over the heads of 862 officers who ranked him in the service. Meanwhile, during 1905-06, Pershing served as military attache at Tokio and spent a year with General Kuroki’s army in the Manchurian campaign against Russia, thus gaining valuable experience of modern warfare and large-scale operations. The next years were spent in departmental and routine duties till the Mexican imbroglio of 1915, when Pershing was placed in command of a punitive expedition against the bandit Francisco Villa. While engaged on this service, stationed at El Paso, Tex., a sad domestic tragedy befel him. In 1905 Captain Pershing had married Miss Francis Warren, daughter of Senator Warren

GENERAL JOHN JOSEPH PERSHING

Commander-in-Chief of the American Expeditionary Force in France (1917-1919)

*

V

%

r •

*

t-#

- i ■

f

*6?

&1’ <

>

‘ = *

*4

?’•’

? *r > .

■ .V

■. ‘ •

of Wyoming. Four children were born to them. On 27 Aug. 1915 Mrs. Pershing and her three little daughters lost their lives by a fire in the Presidio at San Francisco. The son, a boy of five, alone was rescued.

On the entrance of the United States into the European War, Pershing was chosen (18 May 1917) to command the American Expedi¬ tionary Force to be sent to Europe. He pre¬ ceded the troops with his staff of 53 officers and 146 men and arrived in England 8 June 1917. After studying military conditions and conferring with the king, ministers and officials, Major-General Pershing proceeded to France, arriving at Boulogne on 13 June. On 6 Oct

1917 the United States Senate revived the ranks of general and lieutenant-general, and Pershing was elevated to full general, being the fourth American soldier to hold that rank since Wash¬ ington. The object of the change was to place the American commanders in Europe on a level with those of the Allies. The great German offensive which opened 21 March 1918 and al¬ most brought disaster upon the Allies led to the appointment of General Foch (q.v.) as generalissimo on the Western front and brought about that unity of action already long over¬ due. At a critical moment General Pershing placed the whole of his forces at the disposal of General Foch in the name of the President and people of the United States. On 3 Aug.

1918 the French government conferred the Grand Cross of the Legion of Honor upon Gen¬ eral Pershing in recognition of the great serv¬ ices he rendered to the Allied cause. On that occasion Premier Clemenceau telegraphed to the general: <(France shall never forget that it was at a moment when the struggle was most bitter that your splendid troops came to add their efforts to ours. This cross shall be

the symbol of our gratitude.® At the close of the war General Pershing received the American Distinguished Service Medal. He was also decorated with the Grand Cross of the Order of the Bath (British), Grand Cordon of the Paulownia (Japan), Grand Cross of Saints Maurice and Lazarus (Italy), the Order of Leopold (Belgium) and the Cross of the Mili¬ tary Order of Michael the Brave (Rumania). The British decoration carries with it the title of <(Sir®. On 4 Sept. 1919 General Pershing was confirmed by the United States Senate <(General of the Armies of the United States.® On 1 July 1921 he became Chief of Staff of the United States Army; for his preliminary report on the part played in the war by the American army. See War European.

PERSIA (Persian Iran), a kingdom of western Asia situated between lat. 25° and 39° 45' N. and between long. 44° and 63° E. ; area, about 628,000 square miles; population, about 9,500,000. According to various treaties with Russia and Turkey, and the Seistan-Afghan Boundary Commissions of 1870 and. 1905, Persia is bounded on the north by Armenia and Azer-bayan along the river Aras (Araxes) to the plain of Mogan and the Lenkoran district (both Russian) on the Caspian; by the coast of the Caspian, and the former Tekke .Turkoman country, now known as the Russian Trans¬ caspian territory. This last-mentioned frontier is not definitely fixed. On the west, Persia borders on Mesopotamia, though here, again,

the frontier line is still in dispute. On the southwest and south the Persian Gulf and the Arabian Sea form natural frontiers. On the east, toward Afghanistan and Baluchistanˆ the boundary was fixed by the Perso-Seistan Boundary Commission of 1903-05 ; here the dividing line runs from Sarakhs on the Russo-Persian frontier (southeast of Merv) down to Gwattar on the Arabian Sea. Persia thus forms an irregular triangular mass with a base running from below Mount Ararat for about 1,000 miles southeast to the Gulf of Oman, and with nearly equal sides of 700 miles north and east from Ararat to Sarakhs, and thence south¬ ward to Gwattar, in long. 61° 30' E. The en¬ tire coast line on the south and west is over 900 miles.

Topography. — The centre of Persia is a vast plateau with a mean altitude of from 3,000 to 5.000 feet above sea-level, but it is by no means a flat tableland, for the country is almost everywhere traversed by lofty ranges to such an extent that the strictly highland really prevails considerably over the plateau formation. With few exceptions the ranges run diagonally from northwest to southeast. Some of the

ridges run for over 100 miles at mean altitudes of from 8,000 to 10,000 feet, rising in some places to 16,000 or 17,000 feet. So far as it is yet known, the most extensive and loftiest range is the Koh-Dinar, traversing the western province of Fars at an elevation of perhaps 17,000 to 18,000 feet. Although still unexplored it is plainly visible from the Perisan Gulf 130 miles away over intervening coast ranges known to be 1,000 feet high. The mountain range of southern Persia presents a succession of parallel ridges and valleys so that it is possible to drive between the ranges for some hundreds of miles. In the Elburz chain running over 500 miles from west to east and fringing the south coast of the Caspian, stands the giant Damavand, a volcanic mountain of about 19,000 feet high. This range continues on the eastern flank where it is known as the Ala-Dagh, and varies from 8,000 to 10,000 feet above sea-level, with numerous valleys inter¬ spersed, joining the Paropamesan range in Afghanistan. The separate ranges in the north¬ west merge in the general highland systems of Luristan, Kurdistan and Armenia, where sev¬ eral peaks rise to 15,000 feet. The parallel ranges in the northwest running southeast to¬ ward Baluchistan reach their greatest heights in the province of Fars and in the Bakhtiari district. The valleys between them are ex¬ tremely fertile. The Kuruh-Koh range, running southeastward to Yezd, maintains a height of 10,000 feet for a long distance and is continued toward the Koh-i-Basman (10,000 to 12,000 feet) by the snow-topped Koh-Banan and other lofty ridges, culminating with the Koh-Hazar (14,500 feet). In Sarhad, southeast of this point, the volcano Koh-i-Naushada rises to nearly 15,000 feet. In recent years it has been determined that the northern scarp of Khorasan is an eastern continuation of the Caucasus, and not of the Elburz Range. As the edges of the great Iranian Plateau are all higher than the earth level of its interior, hardly any of the rivers and streams find their way to the sea, but lose themselves in marsh and desert, e.g., the river Nendeh Rud, on the banks of which Isfahan is built, ends abruptly in a

broad shallow lake on the wide plain below. The general tendency of the plateau is to rise toward all the seaboards and the western and

northern frontiers. The traveler from Europe desiring to reach Teheran via the Caspian Sea must cross the Elburz Range; to penetrate the interior from the Persian Gulf, he must first overcome formidable mountain barriers and lofty passes. Between the coast ranges and the sea there is but little arable soil excepting, on the Caspian, the delta of the Safi-Rud, and a few strips along the Persian Gulf. This geo¬ graphical inaccessibility has no doubt con¬ tributed largely to the backward state of the country in regard to civilization and prosperity. Once inside the natural ramparts of Persia, however, the traveler may find large tracts of fertile plains and valleys and still larger regions of dreary desert, waste and salt marshes, totally unfit for human existence or cultivation. Be¬ sides the rich plain of the Urmia Basin in the extreme northwest, extensive level tracts occur everywhere between the mountain ranges. A great portion of eastern Persia is occupied by the Great Salt Desert of Khorasan (Dasht-i- Kavir) and the Desert of Lut further south. These salt marshes, named Kavir in the north and Kafeh in the south, collect the rainfall and all the water from surrounding streams and form dangerous quagmires through which noth¬ ing can pass. There are several of such forma¬ tions of considerable extent north of Kum, west of Yezd and south of Khaf. All the lakes are salt water, the greatest, in the northwest is Lake Urumieh; south of Teheran lies the Darya-i-Namak (Sea of Salt), while about 30 others are scattered through the country. -The lakes have a curious habit of shifting their beds and moving from place to place. A ˆnew® one made its appearance in 1883 which, accord¬ ing to the late Shah Muzaffar-ed-Din, was a lake that had dried up 1,300 years ago. Steril¬ ity and poverty are the predominant features of Persia. Great barren plains and equally bare mountains are the rule; for many miles not a tree, a shrub or a blade of grass is to be seen, and only camel-thorn and veitch are sparsely dotted about on the arid ground. At intervals the monotony is relieved in the spring by the green of the young crops around towns or villages. The only islands on the Persian Coast are the Kishm group in the Strait of Hormuz, claimed by the sultan of Oman, and the adjoining islands of Larak and Hormuz, belonging to Persia.

Hydrography. — The Karun is the only navigable river in Persia. Situated in the west, it rises in the Bakhtiari Mountains, flows by Shushter and Ahwaz into the Shatt-el-Arab above Mohammerah through an artificial chan¬ nel, 45 miles from the Gulf, though a portion of its waters continues through its natural bed, the Bahmanshir, east of the Shatt-el-Arab, to the head of the Gulf, though on Persian terri¬ tory. The Karkha and Jarahi, the next largest rivers, also flow from the Luristan and Kurdis¬ tan highlands into the Shatt-

el-Arab. South of the Karun flows the Tab, a sluggish waterway that helped to form the Arabistan delta, one of the richest alluvial plains of Persia. Still further south, the Minab drains all the wide plains across the hills of Bandar Abbas and flows by the town of Minab into the Strait of Hormuz. The largest river flowing into the

Caspian (east of Rasht) is the Safid-Rud (White River), which drains an area of 25,000 square miles south and east of Lake Urumieh. The Gurgan and Atrak (the latter perhaps event¬ ually becoming the Russian frontier) reach the Caspian-on the southeast coast below Chikishliar. The Keshef-Rud rises near Kabushan, joins with the Hari-Rud and forms the Tajand, which ex¬ pands to a swamp short of reaching the Caspian. There are numerous inland rivers which lose themselves in lakes or deserts, the principal be¬ ing the Aji-Chai and Jaghatu, flowing to Lake Urumieh ; the Hamadan-Rud and Shurab, dis¬ appearing in the Great Kavir; the Zainda-Rud, watering the Isfahan district and running dry in the salt marsh of Gavkhana; the Kur (Bend-amir), chief feeder of the salt lake Bakhtegan (Niriz) ; and the Mashkel, which filters along the Baluchistan frontier northward to the Hamun-i-Mashkel in the Karan desert.*

Climate. — There is a great diversity of tem¬ perature and rainfall, ranging between excess¬ ive heat and extreme cold. The moist, sultry and unhealthy climate round the Caspian and the Persian Gulf is entirely the opposite of the usually fine climate of the plateau, where the air is dry and exhilarating, enabling the vision to travel almost incredible distances. Yet ex¬ tremes of heat and cold alternate in the interior ; heavy snow falls during the winter in the north¬ ern parts from November till the middle of March. Though the sun may shine fiercely by day, the temperature falls as low as 15° or 20° at night. The summer heat is so intense that many escape to the hills to avoid it. North¬ west and southeast winds prevail throughout the year with considerable uniformity, their di¬ rection being largely determined by the Black and Arabian seas and the parallelism of the intervening mountain ranges. These currents often meet on the southwest coast with the result that while a northwest gale is raging at Bushire on the Gulf, Bandar Abbas further south is exposed to the blazing fury of a south¬ easter. Violent sandstorms are frequent in the spring in the desert provinces, and hailstorms in which the stones are as large as marbles occur at the same season in the north. In one day's march a traveler may start from a frost-bound region and descend into a tropical zone of luxuriant palms and overwhelming heat. In Arabistan the dry heat in summer reaches over 120° indoors. To the extreme

east, again, the climate is very unhealthy and excessively hot. Rainfall is scanty; about 50 inches fall annually at Resht on the Caspian and only five or six inches in central and southeast Persia. But for the mountains storing moisture in shape of snow, nine-tenths of Persia would be the arid desert that half of it is now. The rivers being few and small and the lakes all salt, most of the cultivation has to be carried o* > by means of irrigation, mountain-streams being conveyed to the towns by subter¬ ranean aqueducts requiring incessant labor to keep them open. Artificial canals and a system of wells connected by underground channels are also employed through the greater part of the country.

Flora and Fauna. — The deficiency of water

* The inland drainage of Persia amounts to nearly two-thirds of that for the whole Iranian plateau (of which Persia is the western section), covering an area of about 1,000,000 square miles.

from Greenwich,

(ARARAT

WJIakuVf

crˆ‘iAoor

… ‘4b‘ > -»ba < < 5 I

oflJJakar* Ui

,Samˆpkw

iUKHARA

Y j»rn»r]X. .

j — ■i,aiSllU‘““V’ J Bar Baojali TafuU rMT tab guff** t
,4UA_»FAlJ»BAa

Sunchi

Ft.Duzlu Olum

Kurgan

rumi«

MISENO MT. V° Kerei 2

[ahinehabad *

‘v°Snev»l<

mm**”

Yunkak lEddi-Auyu o

‘TchikishliarJ

Ivhoirv Sajleh

TalAifihhano N’^rN”\

‘ loAndkhui 0Yakdan \

v joˆfceAa

LsblWergan Balkh fASi

iftobat Abdullah j)eroguB

1 Shliioˆˆv-— ˆ 3H£ikh IVˆVm

Xar/iametaf.ad*

° Souch

’dlozrat

Imam

f* RESHT

Lutfabajd

trans

badahars

TUahmudahad 1 . eChadc

XiKbe$\

(JrneidJb.

j

itilalan

lard in

| Abda,nˆ

KURGAN

£c,huinigikl

STRABAD -ˆ“Tal»«r

Awa*,** y »►’ • ‘

mlsQpsPn. JurttipsQs;

°Meana

l*tanˆyffCˆj [amber Kokassj [Jtfuhkia

! ˆTU0:iiaˆˆS

•Kav’«‘S”R” “-‘

F a3fehmando«fc °T)arnghan /Valt;

Sbamjrabad 1DEorRT ‘

° Semnan ‘?AV,R/ “’-Rasulgar c-Abdaldbacl

-TahruU,, ˆRishin

Kar«t,ar_V1.i14r . f5IS’£!!£_^_.T’ul6inl … KelekoTTˆJSrjjBr;

I Jm TS3”’

(_y A88ASBE, MT.

UyBaldt

% ˆ ˆ

ˆvllbSabad

nrifam’id‘0

Chacha

JPuhl

＞Bagalan

Gul3ula

Beibai

JDunmat

“‘‘ Abbasabatft . ®Maiamai jRagh-i-ijod

”” ■■!■• r’\‘

£hf.e4

＞ar iasts

ˆ-AliabactN

“＞faimana

Tilagai lndarab

;-CbuTNdˆi

d»* \ DcvJ .‘Sbamtf. \ /

TiˆraaiA Vjfo

Takhta-bazar

7 CˆMarucbak

Camp;

a«3 Sang-gird.

JVIagra JXala-i • Mai d aoMlf oMf;

0 Zabunabad ＝＝ ££**

oKulan Chah r/t&JfLt _jtmarbet° MvfllH T£ahlilab«Kl,1“ˆ3 Tirozabad* BulUpabj c～f＞ Kaizalt

ˆZanglChah® . Tunsiˆ Cuapa i0

Abid° Rimeho

jirdun0 8hjrBubad

lanak Zahariy ©Bam

Tarij ‘0Toon

o 6’iriano -gidri

BmW® jDo3,aDadd

farii ZameTi

,-KotaTLo jg>»f«n /

-iidooshk »°*bJ J Katnard0

XuNOAN 6HIKAN

**!« I-ˆ5 ˆAkr.)

r>cmavead

oˆNarkhanˆ’

Afladabad

Zurabad, “Sbo ˆ ‘ idarabaa

mzaf)

TAiLAl

, .w;—. : A’tuiuvci

,abad-Teheran V-. oKinaragird ˆ

VˆN-v 0Al > arik ,

Dhair «N. v\|

pSadrabadˆNˆ.

$T~Su o Salamabad f r;‘J’c«Jat ’Skikuh •

1 A.OQJ or*

Sunbado o Sinaia j _ pJf m > habai ©

al °lCasfin»i ■ — 4

iflg&xtfj “Biizabad

ˆ(UH-QARG’SHtlChaleˆabad ˆ

jBoh ■Anˆn ˆrokhar fuaima* J ©Ardistan 0 Dehlur o | c,ahan0 Sbiraghian,

X alo-bMaur o/ˆ-

\ Baamijan’

ˆ |5Iamuai o

o Fount, onamirr.n

Kara

- All < A, | Q j

te?®**1 i,

Ararik(

, anyar

hiW/w’^ianl /

n Jam

Rala Kalsang’

‘■f — ■ • f-Pcmez

.rk.rmanAh, b,

/ o HAninab

MT. ELV Kherdu ,

(NO ©Kamedan Rastf \ .. I SaUano

>\Otsnnjai °I>udch

f ^KJgird,

‘ e ‘ r

y-oultanabad t

^PfAmS,r^Tri«*f»

^V;k .) Gkj

ym • j 0 Kumaln {$

{ ‘Mohsinabad ° fbf v,.Yaxei q

i aim an

,ABUV

7“Sitnlkbagbc

ˆS’barˆssˆ*’

Kbvnabad Turbatsf-ˆp?,

Naudpishan-ˆ- Satami i

°Ro6hanawan KbL., < V/, oSiab KiilaVˆPˆaJ ® oKakhk Behdadxmo 15111 Btiznabad,;, Robat-S Shan Baluch’ 75 ~Fundukht\

iirilhvai

ˆrˆivarv

Tukaghi

V e ˆ Gura’KhanaJ!i

-o BautLSarai — - p®

o Our-i-Sufaid

/adrASHKAN Narbcpd j |,

l PASS , 08cah &tiP*a\ ‘j

SsSahxnWnr SebzarV 0 KblrevWt

BulilaaMˆ

* oBujalii

OUCHAt

t-KAV > B ˆ ancfgff

PASHT-

2Tarbas-ab°

ShirgbiBt,

Oasis 12 Villages

Shukur

Shorak, Hclend 0

JCbur

iCbasma

ChardchP teru o

ar$o fKaril ©Chabar Gumbat 3tum°

■> Chasma Shutaran I Sehdeh0

ojiilcab Gazar*

kadan Arababa3* jch'aro. Ohink° Purwadeh" | Suayan0 Bakt

khan" ˆ P-A.bi Garih iiirjand 0 Mucl Q

-? | K alula bad 0

o QShanc Ali Reaah oXhamlr "Di-t — < >Naiband | ISalimkasr 0 e

©Dig-i-Rustan -c ®lhU

ALh>..rfei;b"',cb

igawan

Holwan

1 Yazdur.

' ZTraj

Wajlabado

, 3foa~ SafeS o Auarak ..

'V'% V aZartn gPusht-i-R: "K: -Allahabad©

©Ja(Kala Husen Th

la ; . .ItizAb" 0 Sukfcnd a A rack an

i«1ttaibˆSteKUH TURUNA y, Gustan

Char aka

Searut

! ShuTab0 Durukhs Cha Shirmak * ©Gaak Burj Gulyerdaj

\ J Bazar Ovfrukjit

J *Sukl* Bisbllng y If Brim an iˆBupni

oDuria jDurmao,

■und ycbbbsungy

＞Pe/i-Baba JJurmab oChlna

) r’lllunilt_

L GunnawukQ

K[u\lgo°rum

oh’nin

KundiaJ

-Ispahan

/ % Hunzari

Shehti Moorcboh

Kalnkatn.

rGoWˆS

ilT7\ ”(3utaaS5[ttjy«

D)-> . gdfereifflj

vaˆknaneHˆ-ˆyˆ

b“ ˆUyn,Sirih ©h-umban \Pakan_ T~ /•IKovmlihd,

ˆlahomadabad / Sllanrudˆ ˆ -,1 ‘•Huftfdrum ‘ 1

ah A

MAh-iKAE”

/vˆ J’Fnrah

[ijiflˆau Gelanj

:rebist4n\ˆ

Tavisl

Darak,

r<l ‘K

pKala-Nuvi

Asparjan Vy l, Aliabad ‘

ˆTlazdikhaat J)$h.Shiya Ok ’SaidabadShamaabad0-3lˆz*rao ‘Sˆv tfa® oAbadeh oAbarguh ˆ ˆ 1

ˆM|ˆrˆiˆklid °Jsihnderabad

-.ˆSeA. 1 T \ . 1-1 * A

ˆ4’*’ 1’ Hairing — ˆ Natali e

\ C Q Tulkhab \ \

r 1. Kftˆh Kurkl Tajris!

cCbaudrl Turm Sbamaltftio/

-*Tbakan.arst’ˆ MurI* \ rt. NadalL ttta KEW

irgcsanj

Ba/t;

Girdkn

fotai ui

God-i-Namek 0 Deh--Sul an

Bazar ‘/’V) Juft Zurral Kila Sirdar Kha

> KUa Jhan

Svjfuh

[iaVl3ughut

TTadhta,

vTabas Kuchak 0 I

iP’fe b

kama Burg L,

pw ;r

Saif

y ,,vv,-; b Khcthi

»Babaˆhmad Jalˆn Soda? * Ilabalian

JlasirabadL

Hudahi

•-vew Chaman

sM“

C* \L’ 0 Best»nJ

GIra‘

Sefidab’

ar© Murdy?ri

aval o ˆ athLibid0 ‘t

Zqrand *

°e . 0 Kushkub’- °ˆ‘JPaj .-NiL.likilU A*1(“0Bahrimabaf ‘ oKurum 1 Kerman * oBhiM-BaJl, ˆEia“ ,

iohut Husanjfljac

Salam

ˆ!Bardi ‘Ghazi&n KEL ˆnnrghab Siryan0

oLira*

tNasvarabad,

•Dchbid.

chappaR

mbezan

Kala Fath’

- tTEH MT.

TekoXgalur _ *Band Ali tiiaaor -

Zaidia

1 0 Taspoaha

j • Khlalit r-

Ghora,

“Wubai

oMahun IT. JUPAR G

Godar-i-

Wasnu

.otutar

Tarizo f

- — _ Zaidabad 1

•IS ;ol > aaht-l kak ©^asht ° :

LAKE .Dchehah cTarabad

v Btshna

oJilrlsc^^ Abbasabado

run! -aatru

“sajˆParakan Jfonic

j>i

.Deb Khair ˆ.ˆsAAi.&j.,, Q

Jfasratabado

: °Banaka aiun0

:KUH~I-HA2AR

3tani d „ , *y

\ _ — - •£[/Nua

JJamun M /

Chagai G

{Sjk) Koui

— Kharan f

i Goosh fe/ Soormasi

‘Shapup -\Zirgan1

MALIK OOKHArNˆ

ˆfˆQod-l-Zirreh i’

sRobkt

Kahooi

ˆ 1 -3 fa\ai

V. iJcreh

-©Ahmadi qHuaainabi

Kalimcb

. Abram s) I

Khvrkuwair \

’■ Baa hi V

. barakiˆVjSond

Darband

Kalat’

?ara|hbˆud

ˆFiˆozabi

qIjndavaˆ

Haw’bhˆ

■Mashkei

Gheddej

lakura

IKiiku©

)o giranrig

«? Kodzar

“Vashakio

JamV I Rais

‘＞^‘arda＜raˆ Hafrawan

～’^8ZTi‘itu\

-x-j Shevar Jv

J\ -Ahmadi 3 0 Gord

Tin0 lfl＞ru

.Churanl

„Wudd

aToorkubi

7»6fca*-»

Tallin

Shqhkir “I Jdlrai yrˆnˆMuarVut Sj< ˆAliabad) Gau, & Balan °l

Riristnn0

JKichal

Rbamirtf<i

WShami

mkht

jiabad.

Kobuk

Xudabt ndˆtt.

fhashur

0 Manujai

Jaxmorlanfl

‘arvar.

• ’©Muiab

I” Baluchan Chalˆ

‘ij)frtybcnL’Ma*kotu c

” r Rai/ntcn!1’*ˆ1 j i

f [,v Fanochy (

lA liutv/”5’ /i

i Dat.tr, A?

ill ihrjMˆirdato

©Telling y Anquhran* -Kar 2ˆ

‘ anajee 2>

Sbehri Ibrahim

, v” /“AT %

Ipajab’

- ˆ * Shiˆian ˆar baa Sarhi CˆTangˆpij.khuˆ ! /® Kasrkand S 1

lab jllait RoeanlVA-

■ape’Bostana’ ‘ QSsw*. “

Gustunj

Chirak

K*HYDtRABAD

Sarkun o

Vˆueiar© Ta,a? ˆ /Sircˆi ˆ oazdan ■ e ˆ e ‘r

[0drj2＞e＜

60° 1

Xongitude East

B

B T

TT AJJ

. A

til

\

\?

PERSIA I \

AFGHANISTAN , ˆ and BALUCHISTAN

\/N > ’ ˆ{J

SCALES)\

Statute Miles, 180 = 1 Inch.

0 10 20 20 40 &0 100 150 200

JKllowetres, 208 — J Inch.

0 _ 50 100 150 200 250 300 J

3*od, McNkU, *Co.’» N«w 11* 14 Map of Ponia. Afgham«taa and BaiochlaUfl.

Oopjright l»y Rand McNally & Co.

is naturally reflected in the poverty of vegeta¬ tion. Except on the outer slopes of the coast ranges hardly any trees or large shrubs are to be found. Along the Persian Gulf and the Arabian Sea the date-palm flourishes, the staple food and chief product of the country. The trees of the Bakhtiari and other inner ranges are mostly stunted in growth. Only on the northern slopes of the Elburz range are the true forests of the country — dense, large tracts of oak, elm, cedar, beech, box and walnut. The eastern plains of Khorasan and Karman are almost destitute of vegetation — a region of sands and salt. In some parts flowers are abundant, roses flourishing so profusely that they are cultivated for perfume. The Caspian provinces have also an exuberant vegetation and innumerable streams. The eastern prov¬ ince of

Seistan is very fertile, but abounds in malaria and insect pests that breed in the great lagoon of Hamun. Along the Caspian seaboard wild animals are plentiful; hyaena, leopard, tiger cheetah, wild ass, jackal, lynx, porcupine and smaller beasts of prey. Lions exist in Farsis-tan. Wild goats, bustards and pheasants are hunted. The bulbul or Persian nightingale is celebrated in oriental poetry. The Gulf and the Caspian are rich in fish, the sturgeon fisheries in the rivers flowing in¬ to the latter are highly productive, but are exclusively operated by Russians. Fresh-water fish are rare, the numerous lakes being nearly destitute of animal life. The domestic animals are generally of inferior stock, though the Mazandarart black cattle are highly prized. Camels and mules are employed as carriers for the plains and highland regions respectively; a useful breed of small horses of mixed Arab blood is noted for speed. The famous <(Persian cat® is well known in the West. Persia is infested with numerous weird types of reptiles, spiders and insects.

Minerals. — Though Persia possesses great mineral wealth, very little has been done to develop mining industries owing to the lack of communications. Lead and copper mines have been worked from time immemorial. Coal is mined about Tabriz in the north and Laristan in the southwest ; iron, lead and copper occur in the Khamesh region and in Khorasan ; coal and zinc are found near Teheran and tin in Azerbaijan ; manganese ore, coal, lead and cop¬ per in Kerman; The famous turquoise mines near Naishapur have been known for ages. Be¬ tween the Salt Sea and Isfahan the country is rich in iron and copper pyrites and mercury. There is also a quarry of Yezd marble, Yezd and Kerman, where Tabriz marble is also found. The pearl fisheries on the Gulf are very valuable, but are mainly worked by foreigners.

Population. — As already stated, the popula¬ tion of Persia is estimated at about 9,500,000. Under this estimate the inhabitants are distrib¬ uted approximately — town residents, 2,500,- 000 ; peasants, 5,000,000 ; nomad tribes, 2;000,000. The nomad tribes are mainly Turks, Kurds and Leks, Arabs, Lurs, Baluchis and gipsies. The town residents in the principal cities are — Teheran, the capital, 280,000; Tabriz, 200,000; Isfahan, 80,000; Meshed and Kerman, each 60,- 000; Barfurush and Shiraz, each 50,000; Yezd, 45,000; Resht, Kum, Hamadan, Kermanshah, Kashan and Kazvin. each 30,000 to 40,000.

Smaller towns are Dizful, 25,000; Nenjan, 24,- 000; Shushter Bandar Abbas and Burnjird, each 20,000; Sari and Mohammerah, each 15,-

000; Naishapur, 12,000; Astrabad and Bushire, each 11,000. By far the bulk of the people (over 6,000,000) belong to the indigent Iranian stock, Aryans, like the whites of Europe and America. The true Irani resembles the Span¬ iard or Italian in appearance. The frequent in¬ vasions of Persia by Central Asiann tribes have left a strong element of the Mongols' — Tartar type, while from the north and west were in¬ troduced into Persia the Arabs, Chaldeans, Jews and Armenians. The Persians proper, or west¬ ern Iranians, are called Tajiks or Tats. There is little spiritual affinity between the Persians and the Turk; the latter is more serious and speaks little, while the former rather approxi¬ mates to the French type — nervous, artistic, voluble, witty and polite. The moral and mental temperament of the Persians is not highly ad¬ vanced. Ages of despotism have left the stamp of cruelty upon the Persian, which is exempli¬ fied in the savage sentences imposed by justice and the cold-blooded manner in which they are carried out under the indifferent gaze of the public. The natives of Kharasan show traces of Mongol and Usbeg blood in their broad, flat faces, high cheek-bones and brusque man¬ ner. The Persian Gulf is bordered by Arab tribes and throughout the whole country a shift¬ ing, nomad population, the Iliats, drive their cattle and carry their homes up into the hills in spring and summer and seek the warmer plains in winter. Their women are not veiled, like those of the towns and villages ; adorned with valuable jewelry, they look not only healthy but happy, which latter is far from being the lot of the average Persian woman. There are about 1,200 Europeans, half of whom are British.

Religion and Education. — The Persians be¬ long almost exclusively to the Shiah sect of Islam; like the Turks, many of the Arab and Turki tribes as well as the Kurds belong to the rival faction, the Sunnites. The Lurs of the Bakhtiari region are nominally followers of the prophet, yet they possess neither mosques nor priests. Babiism (q.v.) counts many ad¬ herents, while there are about 10,000 Parsis or Guebres, some 50,000 Armenians and 30,000 Nestorians (both Christian), and about 43,000 Jews. Other religions are represented by Catho¬ lics, Greek Orthodox, Protestants and Zoroastrians. The chief priest of the Shiites resides in the holy city of Kerbela, near Bagdad.

Until recent years education was in a very backward state, being limited to reading the Koran in Arabic, which few were able to un¬ derstand. There are now numerous schools on European lines to the number of about 200, with some 15,000 pupils of both sexes. A ministry of education and. an educational coun¬ cil have been created to supervise and co-ordi¬ nate public instruction. The government main¬ tains numerous colleges where some scientific knowledge may be gained besides Persian and Arabic literature. Since 1849 there has

been a polytechnic school in Teheran equipped with European instructors, to which four French professors were added a few years ago. Military colleges exist in the capital and Tabriz, and a German school, partially subsidized by

German funds, was opened in 1907. The Alliance Frangaise supports a French school. A political college or civil service institution trains pupils for diplomatic and foreign office service.

Political Divisions. — Persia is divided into 33 provinces of very unequal size, the principal ones being, in the north, Astrabad, 10,000 square miles, pop. 250,000; Mazandaran, 8,000 square miles, pop. 500,000; Ghilan, 6,000 square miles, pop. 600,000; Azairbijan, 35,000 square miles, pop. 1 ,700,000 ; in the west, Irak-Ajemi, 115,000 square miles, pop. 1 ,800,000 ; Ardelan, 6,000 square miles, pop. 200,000 ; Khuzistan, 30,000 square miles, pop. 800,000; Luristan, 30,000 square miles, pop. 400,000; Farristan, 60,000 square miles, pop. 1,500,000; in the south, Kar-man, with Kohistan, Makran and Seistan, 150,- 000 square miles, pop. 820,000 ; and in the east, Khorasan, 140,000 square miles, pop. 960,000; Kermanshah, pop. 425,000. Though three times the size of France, where the population is 190 to the square mile, that of Persia is slightly less than 15 to the square mile.

Government. — Until 5 Aug. 1906 the Shah was an absolute autocrat. On that day the then reigning Shah, Muzaffar-ed-Din, issued a decree convoking a Mejliss or national assembly, and a constitution, dated 1 Jan. 1907, was con¬ firmed on 11 Feb. 1907 by his successor, Mo¬ hammed Ali. In October of the same year a new constitution limited the ruler's preroga¬ tives and ecclesiastical authority, granted liberty of conscience, of the person, education, speech, press and associations and defined the respon¬ sibility of ministers and the duties of Parlia¬ ment. The Shah violated and abolished the constitution in November 1908. Yielding to diplomatic pressure by Great Britain and Russia, he granted another constitution and electoral law in June 1909. By this law, under which the elections were held shortly after the Shah's

deposal in July, the Mejliss consists of 120 deputies, 40 forming a quorum. The Mejliss was dissolved in December 1911, and did not meet again until 1915. (See History). The provinces are governed by governors-general directly responsible to the central government, with power to nominate their subordinate lieutenant-governors. The towns have mayors or chief magistrates, while every parish of a town has its local chief. The nomad tribes also have their chieftains, who are responsible for the collection of taxes among their people. Practically all male subjects are entitled to vote in municipal elections.

Justice. — • The administration of justice is vested in the provincial governors, the Sheikhs-ul-Islam and the Mohammedan priesthood, which produces a conflicting code based upon a mixture of unwritten common law and divine law according to the Koran. Bribery, corrup¬ tion and perjury are the rule rather than the exception in legal procedure, while the criminal code is somewhat barbaric. Appeal does not exist.

Army. — The army is Oriental in character and, consequently, extremely loose in organiza¬ tion and defective in equipment. Various European officers — principally Russian — have attempted to instil Western discipline into the army, with but poor results. Troops are re¬ cruited from districts according to certain pre¬ scribed quota. Christians and Jews are exempt

on payment of a tax. The regular and irregu¬ lar troops are probably about 110,000 in num¬ ber. A Cossack brigade, composed of Persians drilled by Russian officers, is stationed at Teheran, while the Russian government until recently maintained a similar body at Tabriz. In September 1915, owing to lack of payment, a Gendarmerie force of 7,000 men officered by Swedes was disbanded. In several of the large cities the police are commanded by Swedish officers. The navy is insignificant; the half-dozen small vessels composing it being engaged by the customs department.

Agriculture and Industry. — Though the Persian is by nature more adapted to trade than agriculture, the bulk of the people are perforce engaged in cultivating the soil. From the fertile regions come rice, wheat, barley, fruit, dates, drugs, gums, silk, wool and cotton. Persian carpets and rugs, made by the peasantry in wretched hovels, are celebrated throughout the world, attracting fancy prices enormously in excess of their cost of production. Opium, pearls, precious stones and skins are exported. The lack of internal transit and manufactories

compels the Persians to import many items which, under more favorable conditions, their own country could produce. The greatest trade before the war was with Russia; the British Empire came second, Turkey third and Ger¬ many fourth. The principal ports are Bushire, Bandar Abbas, Mohammerah and Lingah. In the year before the war broke out, German shipping entered amounted to nearly 2,000,000 tons and little over 1,500,000 tons of British shipping.

Internal Communications. — Persia has only six miles of railroad, running from Teheran to Shah Abdul Azim, run by a Belgian com¬ pany. The British government subsidizes a British firm of Bagdad to run a fortnightly steamer up the Karun River. The only high¬ ways that existed in Persia at the beginning of this century were two roads with a total length of about 300 miles. A number of new roads have been opened since then and others are under construction. The two methods of travel and transport are still the primitive cart — drawn by mules or oxen — and the camel. A regular postal system has been in operation since 1877. There is a weekly service to India via Bushire and another twice a week to and from Europe via Resht or Tabriz and Tiflis. Since 1902 the post office has been united with the customs department and is mainly operated by Belgians. A ministry of posts and tele¬ graphs was created in 1909. About half the telegraph wires in Persia are operated by an English staff, while the Persian government operates its private system by its own staff. Direct telegraphic communication with India was established in 1904.

History t— When one regards modern Per¬ sia, steeped in poverty, torn by factions, de¬ luded by political visionaries, infested with brigands, squeezed between foreign powers, even partitioned into spheres of influence, and at the most a big desert surrounded by rocky mountains, (<a land where no water is,® one is apt to forget that it once meant an empire which stretched from the Indus to the Danube, from the Oxus to the Nile, and that on the shore of the Narrows in the Dardanelles a ((Great King® once sat on a marble throne at

Abydos and poured a libation from a gold cup into the Hellespont as

the Persian “Immortals® led the way across the bridge of boats to the conquest of Athens. Though the beginnings of Persian history are wrapped in legendary mist, we know that the ancient Persians were Aryans or Indo-Iranians, but at what period they migrated from the East to the plains of Iran cannot be determined, though existing records at least prove that it was prior to 1400 b.c. Some authorities hold that the migration extended over thousands of years, beginning from about 2000 or 2500 b.c. Tradition relates that the Iranians were compelled to forsake their home country, Aryanem-Vaejo, on account of its cold climate. Where that country was located is uncertain. It is generally accepted that the Medes entered Persia from the north¬ west and settled along the western side of the plateau. The Iranians came from the north¬ east through Bactria, now known as Balkh, in northern Afghanistan, penetrated somewhere into the northern part of Khorasan, and wan¬ dered southward through Kerman to the Per¬ sian Gulf. Other migrations followed: Some turned southeast and crossed the Hindu Kush; the Hyrcanians settled on the Caspian coast about Astrabad; the Carmanians (whence the name Kerman) settled in western Persia, while other invaders poured into Afghanistan and Baluchistan, where they made their homes. The Iranians appear to have been the first branch of the Aryan group to adopt civiliza¬ tion and to practise monotheism. They also introduced the horse into western Asia, where it was previously unknown. Before Persia proper came into being there were two Iranian empires side by side on the plateau — those of the Medes and the Persians. We read of Shal¬ maneser II, king of Assyria, battling with the Medes in 836 b.c., and Sargon exacting tribute from Median princes bearing unmistakably Persian names. About the 7th or 6th century b.c. Zoroaster, a native of Media, developed the religion of fire-worship which still bears his name. In the region which is now included in the Persian provinces of Arabistan, Luristan, Pusht-i-Koh and the Bakhtiari Mountains, due east of Babylon, Basrah and Bagdad, there lay the kingdom of Elam bordering on ancient Sumer and Akkad, more ancient by far than the Median or Persian communities, and over which King Chedorlaomer, mentioned in Genesis (xiv, 9), ruled in Susa — the Shushan of the Bible. “Elam® is the biblical name for Persia. The earliest example of a letter re¬ covered from the ruins of Babylon relates to Elam, and the date ascribed to this document is about 2850 b.c. The aborigines of Elam supposedly were negritos of non-African type, bv whom the whole plateau was perhaps at one time inhabited. The influx of Turanian and later of Semitic elements in time absorbed the native stock and modified the language. Various other tribes, Mesopotamian and Iranian, made up the population of Elam. For centuries Elam led a predatory existence, raiding Baby¬ lon and Assyria until the latter,

under Assur-banipal (668-626 b.c.), entirely destroyed the kingdom in 645 b.c. (Ezekiel, xxxii, 24). Its territory included or adjoined the principality of Anshan or Anzan, over which reigned the first great Aryan recorded in history — Cyrus. In 550 b.c. Cyrus defeated Astyages the Median

king, to whom he was related, captured the royal city of Ecbatana and united the two Iranian states under the name of Persia. About 100 years earlier the Medes had thrown off the yoke of Assyria, hence their independ¬ ence had lasted approximately a century. Cyrus now led his armies into Asia Minor, conquered and captured Croesus, the king of Lydia, and annexed all the Greek colonies in those regions. The Phrygians, Mysians and other Asiatic tribes submitted to him. For the next five or six years Cyrus was engaged on his eastern borders, either warring against unruly neighbors or preparing his army for the great task he had in view — the capture of Babylon. He certainly subdued greater part of what is now Afghanistan in the meantime. Babylon under Nabonidus was in turmoil; the captive Jews and many other exiles had been encouraged by their prophets and leaders to expect the fall of the city. Cyrus advanced with his host, easily defeated the Babylonian army and entered the city without opposition ; mighty Babylon surrendered without a blow to the Persians in 538 b.c.

Until the discovery, within recent years, of the Nabonidus and the Cyrus cylinders, our knowledge of the fall of Babylon was based upon the dramatic story of Herodotus and the book of Daniel. The former is proved to be merely a legend and the latter devoid of his¬ torical value. There was no siege of Babylon by Cyrus; the Belshazzar (q.v.) who was killed by Gobryas (the father-in-law of Darius) at the surrender of Babylon was neither the son of Nebuchadnezzar nor king of Babylon.

Cyrus displayed remarkable generosity to¬ ward the Jews; he permitted them to return to Jerusalem and restored the gold and silver ves¬ sels of the sanctuary. His dominions now in¬ cluded Elam, and, outside of Persia, the Greek colonies Lydia, Babylon and Phoenicia; there yet remained Egypt. He began preparations for the conquest of that country, but died before he could carry out his plans. During his reign of nearly 20 years Cyrus raised Persia to the chief position in Asia by his victories, diplo¬ matic skill and magnanimous character. He fell in battle against Turanians, Tartars or Parthians (accounts differ on this point) in 529 b.c. The circumstantial story of Herodotus

connecting the death of Cyrus with the Massa-getse is a legend. Cyrus was succeeded by his son Cambyses, who accomplished the conquest of Egypt in 525 b.c., thereby adding a great province to the Persian Empire. A cruel tyrant, Cambyses had not the ability of his father; he caused his brother Smerdis (Bardiya) to be murdered secretly, and when he himself died by suicide in 522 there was no heir to the throne. A revolt fomented by the Median tribe of Magians resulted in one of their number, Gomates, impersonating Smerdis and seizing the royal crown. He ruled for a year before the imposture was discovered, when Darius, son of Hystaspes, a descendant of the second or Persian line of the Achaemenian princes (Cyrus belonged to the Anshan line), with six other Persian nobles, killed the usurper and all his followers. Darius became king in 521 b.c. and proved himself a born leader of men, a great general and a skilful ruler. He extended his dominions eastward to the Indus and attempted to force a way into Russia, but here the climate

defeated him as it did Napoleon over 2,000 years later. The spirit of revolt was abroad in the land. The Greek cities of Cyrene and Barca had submitted to Cambyses. Greek patriotism became inflamed; revolutions broke out in Babylonia and Elam; the governors of other provinces saw opportunities of creating kingdoms for themselves. Darius led his army against Babylon and reduced the city after a two years' siege in 519 b.c., after which he turned against the individual rebels. He quickly overcame all opposition and peace reigned throughout the empire in 518. He di¬ vided his realms into satrapies and appointed inspectors with plenary powers to investigate the conduct of administrators. He coined the first Persian money; revenue was raised on a system of assessments and collected in money or kind according to the products of the various districts. Roads were constructed and a great army of levies and regulars was maintained. In 512 b.c. Darius led an expedition into southern Russia against the Scythians, who kept out of his way. On his return journey he reduced the rebellion in Thrace and received the submission of Macedonia. One of his generals, Otanes, compelled the surrender of Byzantium

(Constantinople) and burnt it down. A later expedition to India brought the Panjab and Sind (Scinde) under Persian dominion. Per¬ sia had reached the zenith of her glory; tran¬ quility and order were enforced by ((the law of the Medes and Persians which altereth not.® In 499 b.c. the Ionic revolt ‘broke out and led to the Persian invasion of Hellas. Darius sup¬ pressed the Ionian Greeks and dispatched a punitive expedition against Athens and Eretria. It failed in its purpose; a second expedition was more successful. It totally destroyed Eretria and sailed for Marathon, 24 miles northeast of Athens, where some 9,000 Greeks charged into a host of 40,000 to 50,000 Persians and routed them, 490 b.c. Darius I died in 485 b.c. and was succeeded by Xerxes, supposed to be the Ahasuerus ®which reigned from India even unto Ethiopia, over an hundred and seven and twenty provinces® (Esther i, 1). His first task was to crush the Egyptian revolt which had broken out in 486. Three years later Babylon rose in arms. Xerxes besieged the city, took it in a few months and delivered it over to be plundered. From this blow Babylon never recovered — her glory faded and the wonder of the Old World sank slowly into oblivion. To redeem the disgrace of Marathon preparations on a vast scale had long been in the making for the conquest of Hellas. Troops were collected from every part of the empire — Persians, Medes, Hyrcanians, Cissians, Assyrians, Arians, Bactrians, Parthians, Sakae, Indians and Ethiopians; infantry, cavalry, archers and spearmen, chariots and Arabs mounted on camels. The Phoenicians supplied 1,200 war¬ ships with crews ; 3,000 transports were ready to convey the greatest and most picturesque ag¬ glomeration the world had hitherto witnessed. Herodotus relates that there were 1,700,000 in¬ fantry, 100,000 mounted men, and 510,000 sailors and marines, a total of 2,310,000, though this is considered to be an exaggeration. In the spring of 480 b.c. this huge machine was set in motion. While it moved across two pontoons bridging the Hellespont near the modern Chanak Kalessi, Xerxes poured a libation into the water praying

that he might conquer Europe. The Greeks feverishly prepared to meet the approaching avalanche advancing unopposed through Thes¬ saly and Macedonia. With the honorable ex¬ ceptions of Plataea and Thespiae, most of the Greek states of northern and central Hellas submitted without resistance before the first battle was fought. The fate of that expedition is known to every schoolboy: the heroic de¬ fense of the pass of Thermopylae by I eonidas and his immortal Three Hundred; the naval battles off Artemisium • the evacuation of Athens to be ravaged by the invaders and the last stand of the Greeks at Salamis, risking all upon a single battle with the result that the

Persians suffered a crushing defeat. The Greek victory at Plataea (479) settled for cen¬ turies the question as to whether Asia should conquer Europe. Famine and disease com¬ pleted the work of the Greeks upon the Persian host ; King Xerxes fled back to the safe shores of Asia; and Athens began to tgke her posi¬ tion as the intellectual and artistic leader of the world. The Lacedaemonians under Pausanias took Byzantium from the Persians. Xerxes was murdered by two of his courtiers in 466 b.c. and Persia fell into the hands of in¬ competent rulers. Despite the magnitude of defeat and loss of prestige, the empire con¬ tinued to play the leading role on the world's stage for another century and a half.

Artaxerxes I (third son of Xerxes) suc¬ ceeded to the throne as a mere boy. He ruled for 40 years and proved utterly incapable. A second revolt broke out in Egypt (460 b.c.) and the Athenians joined in the struggle against Persia. They sent a fleet to Egypt and defeated the Persians under Achaemenes at Papremis in the Nile Delta and captured Memphis all but the fortress. A Persian army of 300,000 men supported by 300 Phoenician ships appeared on the scene in 456 b.c. and relieved the garrison ; the Egyptians and Greeks were defeated and the rebellion collapsed. In 449 b.c. the Greeks came to an agreement with Persia bv the Peace of Callias and years of comparative peace fol¬ lowed. Artaxerxes died in 425 b.c. His son, Xerxes II, was quickly murdered when drunk by his brother Secudianus, and another brother, Ochus, became king under the title of Darius II. He was an inhumanly cruel brute; his wife, Parysatis, is said to have surpassed him in bloodthristy temperament. He reigned about 20 years, a period of anarchy, insurrection and degrading villainy at the royal court. Persian military efficiency began to weaken, sapped by excessive prosperity and the king's evil ex¬ ample. Large numbers of Greek mercenaries were enrolled into the army and navy and en¬ trusted with high commands. What had been conquered by the sword was maintained by in¬ trigue and bribery; wealth and luxury began to undermine national strength and spirit. Darius II died in 404 b.c. and was succeeded by his son, Artaxerxes II (Mnemon), despite the efforts of Parysatis to substitute her younger son, Cyrus, who was to become the hero of one of the most remarkable adventures in history. This Cyrus the Younger, described by Xenophon as <(a man, of all the Persians who existed after the ancient Cyrus, the most kingly and worthy to command,® left his satrapy in Asia Minor and marched against his brother the king with a composite force of

13,000 Greeks (commanded by Greek officers) and 10,000 Asiatics. The expedition en¬ countered the Persians under Artaxerxes at Cunaxa near Babylon. In the ensuing battle (401 b.c.) the Greeks were victors although their cause was lost ; but Cyrus was defeated and slain. The event is vividly related with some exaggeration by Xenophon the Greek his¬ torian (q.v.), who accompanied the expedition. After Cunaxa a league was formed between Persia, Athens, Thebes, Corinth and Argos against Sparta, whose fleet was defeated at Cnidus in 394. The long walls of Athens were rebuilt with Persian money, and Sparta was compelled to sign the humiliating Peace of Antalcidas (387 b.c.), so named after the Spartan ambassador. By this peace Persia recovered her lost possessions in Asia Minor. Eˆpt again rose in defiance under Nectanebo, and Artax¬ erxes dispatched a powerful expedition in 374 b.c., which had to retire from the Nile without accomplishing its object. After an eventful reign of 46 years Artaxerxes died at the age of 94 in 358. A weak and benevolent ruler, he revived the worship of Mithras. He was suc¬ ceeded by his son Ochus as Artaxerxes III, in whom exceptional ability was disfigured by an incredible ferocity. He began his reign by murdering nearly all the members — male and female — of his family. He almost succeeded in restoring Persia to her former greatness by crushing every revolt with the utmost brutality. In his campaign against Tennes, king of Sidon, he ordered the massacre of 500 representatives of the people, whereupon the townsmen set fire to their own city and immolated themselves with their families. Ochus crushed the revolt in Egypt, killed the sacred bull Apis and had it served at a banquet ; he destroyed cities, murdered thousands of citizens and despoiled their temples. Ochus was in his turn mur¬ dered by his capable minister, the eunuch Bagoas, as a means of self-preservation. Most of the king’s sons were also put out of the way, and Bagoas placed the youngest, Arses, on the throne (338 b.c.). The eunuch soon found it advisable to murder Arses and selected in 336 b.c. a certain Codomannus as King Darius III, believed to have been a scion of the Achaemenian line, which died out with him. As a safe¬ guard against sharing the fate of his two im¬ mediate predecessors, Darius took the precau¬ tion of killing Bagoas.

In the same year that Darius III ascended the throne of Persia, the

poor and compara¬ tively small kingdom of Macedon in Europe crowned its new king, the great Alexander, a pupil of Aristotle and a military commander at the age of 16. Up to this time Persian armies had carried war into Europe; the turn of the tide was at hand. In 334 b.c. Alexander, then 22 years old, set out to realize the great scheme originated by his father — the conquest of Asia. He led his army of 30,000 infantry and 5,000 cavalry across the Hellespont, defeated the Persians on the Granicus, captured Sardes, Ephesus, Miletus, Halicarnassus and several cities of Lycia and Pamphylia. Turning inland, he crossed through Asia Minor and met the Persian armies of over 500,000 on a plain near the city of Issus. Here, in November 333 b.c., was fought one of the great decisive bat¬ tles in history. The Persians were put to flight with terrific slaughter. King Darius fled,

leaving his camp and his family in the hands of the victors. During 332-331 b.c. Alexander captured Tyre and annexed Egypt. Crossing the Euphrates and the Tigris he found Darius awaiting him with an army about 1,000,000 strong at Gaugamela, near the ruins of Nineveh, about 70 miles northwest of Arbela. With only 40,000 infantry and 7,000 cavalry Alexander bore down upon the enemy, broke through his ranks and scattered all before. Darius fled early during the battle, pursued by the Mace¬ donians. After the battle of Arbela (331 b.c.) Alexander was received in triumph in Babylon, whose people welcomed him as their savior. Three weeks later he entered Susa, the capital of Elam; Persepolis, Pasargadae and Ecbatana fell into his hands. A party sent in pursuit of Darius found his body in a wagon, murdered by order of Bessus, viceroy of Bactria (330 b.c.) . Bessus was crucified two years later. The death of Darius ended the Achaemenian dynasty after an existence of 320 years, and Persia became a part of the Macedonian Empire, the annexation being completed by the capture of Balkh in 328 b.c.

Alexander the Great took steps to pacify and consolidate the empire he had won; he mixed Persian soldiers with his own troops and ordered his men and officers to marry the women of the country. He himself married Roxana, the beautiful daughter of the Bactrian chief, Oxyartes, and also, later, Statira, a daughter of Darius. He then began the in¬ vasion of India in 327 b.c., a task he did not live to accomplish ; a spirit of mutiny and war¬ weariness among his soldiers ended the Indian campaign in 326 b.c. The sudden death of Alexander at Babylon in 323 b.c. gave the signal for a fierce strife among >the generals and satraps for the possession of the empire. Out of the turmoil of civil war one of Alexander's generals, Seleucus Nicator,

seized Babylon and founded the Seleucid dynasty. He conquered Susiana, Media and the eastern provinces of Alexander's empire to the Oxus and Indus. Some nomad tribes from north of the river Atrek settled in Parthia (q.v.), the modern Khorasan where Arsaces I founded the dynasty of the Arsacidae. Of this family, Mithridates the Great (171-138 b.c.), overthrew the Seleu-cidae and extended his dominions from the Indus to the Euphrates. His successors ruled over Persia till the revolt of 226 a.d., which brought about the downfall of Parthia and the rise of a new Persian dynasty.

The Sasanian Period. — For over 500 years after the death of Alexander Persia was in¬ volved in an ever-changing kaleidoscope of wars, conquests, alliances and revolts, embrac¬ ing Mesopotamia, India, Rome, Greece, Armenia and the Alani. Under Artaxerxes I (known as Ardeshir) the independent kingdom of Per¬ sia was restored after the battle of Hormuz in 226 a.d. and a new brilliant dawned for Iran. From this period, also, dates the beginnings of reliable Persian chronicles unencumbered with legendary embroidery. Ardeshir conquered Armenia, Kerman, Susiana, Media and the greater part of the Iranian highlands. He also revived the neglected religion of Zoroaster and ruled with justice and wisdom. He was suc¬ ceeded by his son Shapur I in 240 or 241, who led an expedition into Roman territory and cap¬ tured the Emperor Valerian. B.ut he was later

defeated by Odcenathus, husband of the famous Zenobia of Palmyra (q.v.). Shapur founded the city of Nishapur, the birthplace of Omar Khayyam. It was in his reign that the sect known as Manichaeans arose, whose leader, Mani, preached a kind of ˆChristianized Zoroastrian¬ ism.® Hormisdas, son of Shapur, reigned only a year and was followed by Bahram I, who, according to Alberuni, (<killed Mani, stripped off his skin, filled it with grass and hung it up at the gate of Gundisapur.® Bahram ruled from 272 to 275 a.d. Bahram II (275-282) began as a tyrant, but reformed when threatened with murder; the third Bahram reigned four months and was followed by Narses, who provoked a quarrel with Rome by invading Mesopotamia.

At first successful, he was finally defeated by the Romans who captured his wives and chil¬ dren and compelled him to cede much of his territory. He abdicated in 301 and was suc¬ ceeded by Hormisdas II, who died in 309. The natural heir of the latter was refused the throne and a posthumous son was elected king even before he was born. The expected heir arrived a few months after his father's death and became the famous Shapur the Great. As he died in 379 he was actually king for 70 years, though he did not assume power till he attained his 16th year. He began war against Rome in 337 to regain the lost territory, and in 338 invaded Mesopotamia. With varying de¬ feats and victories the war dragged on for 15 years, to about 352 and was recommenced in 359, ending in 361. Rome and Persia came to grips again in 363. The Emperor Julian fell in battle and his successor Jovian returned to Persia the five provinces ceded by Narses. Un¬ der Constantine Christianity had become the official religion of the Roman Empire, a cir¬ cumstance which led to the barbarous persecu¬ tion of Christians in Persia under Shapur. That monarch, however, left his country at the height of her glory and power. His successors call for little notice. Ardeshir II (379-383), weak, old and benevolent, was deposed; Shapur III (383-388) made peace with Rome and received! a large portion of Armenia. As¬ sassination ended his career, and Bahram IV (388-399) became king. He was killed by his own soldiers. Yezdigird the Wicked (399-420) distinguished himself by his barbarity toward the Christians; Bahram V (420-440), the ((great hunter® of Omar Khayyam, is the hero of Persian fable. He continued the Chris¬ tian persecution ; after a short war with Rome, in which he suffered defeat, a mutual agree¬ ment was made by which religious liberty was granted to Zoroastrians under Rome and Christians in Persia. In his reign the Eastern Church declared its independence of the West¬ ern Church (424). About this time a Chinese tribe known in history as the White Huns crossed the Oxus and ravaged Persian terri¬ tory. Bahram fell upon these invaders and in¬ flicted a crushing defeat. Yezdigird II (440-457) waged war against Rome and attempted to reconvert the Christians of Armenia by mas¬ sacre. He persecuted both Christians and Jews, married his own daughter and then murdered her. Hormisdas III (457^159) was overthrown by his brother Perozes (Firuz) with the assist¬ ance of the White Huns, against whom he had to fight for the rest of his life. He fell in battle in 483 and Persia became tributary to

the White Huns. His successor, Volagases (Balas), was blinded and died in 487. The next ruler, Kobad or Kavadh, was converted to a communistic creed propounded by Mazdak of Persepolis; the king was

put in prison by the nobles and replaced by his brother Zamasp. He escaped in 1501, fled to the White Huns and re¬ gained his throne. He broke the 60 years peace with Rome, ravaged Armenia and captured the fortress of Amida. For the next 10 years he fought against the White Huns and broke their power for ever. Roman aggression led to an¬ other war in 524, resulting in defeat for the Persians at the hands of Belisarius (q.v.). Kobad was succeeeded in 531 by his son Khosru I (Chosroes) the Just, the most distinguished member of the Sasanian dynasty. He caused the execution of Mazdak and many thousands of his followers. He made a treaty of per¬ petual alliance with Rome in 533 which he broke in 540, when he led an invasion of Syria, cap¬ turing and plundering the rich cities and razing Antioch to the ground. Khosru forced Justin¬ ian to pay tribute; he expelled the Abyssinians from Yemen, invaded the White Hun country and thereby recovered Balkh, and attacked the wild Khazars, whom he slew in thousands. In addition to his military ability Khosru pos¬ sessed the virtues of toleration, generosity and a strong sense of justice. A patron of art, literature, education and science, he organized the state to a high degree of efficiency. Under his reign the so-called <(Nestorian® church flourished in Persia. Hormisdas IV (579-590), son of Khosru by a Turkish princess, continued the war with Rome and defeated the Turks. His tyranny and offensive conduct led to his assassination. Khosru II, Parvis (590-629) was immediately attacked by Bahram Chubin, a de¬ moted general, who seized the throne. But the nobles opposed the usurper; with the aid of a Roman army the allies of the legitimate heir crushed Bahram in 591 and restored Khosru to power. The latter declared war on Byzantium in 603 to avenge the murder of his friend, the Emperor Maurice. Persian arms achieved a long series of victories in Mesopotamia and Asia Minor; cities and fortresses fell before them: Dara (605), Edessa, Harran, Hieropolis and Aleppo. Aided by 26,000 Jews the Persians captured and sacked Jerusalem in 614; three years later they took Chalcedon and stood in sight of Constantinople. Alexandria fell in 616 and the Nile Valley, after an interval of nearly 1,000 years, was again in Persian hands. The Emperor Heraclius stemmed the tide at Issus in 622, reconquered all the lost territory and carried the war into Persia. Khosru II was deposed and murdered in 628. Kobad II followed (628) ; he made peace with Heraclius and returned the True Cross to Jerusalem which his father had carried away. In the following year he miydered his brothers and died of the plague. His son, a boy of eight, was mur¬ dered in 630 and a period of anarchy ensued. Eleven rulers — among them two queens — fol¬ lowed in rapid sequence until the accession of Yezdigird III in 634. The last king of the Sasanian dynasty, he was murdered in 652. During his reign the Arabs, galvanized by the new

faith of Islam, overran Persia and battered down a desperate resistance that lasted 10 years. Except in Yezd and Kerman the creed of Zoroaster was stamped; Islam was forced

upon the vanquished and Persia ‘became a part of the caliphate. The star of Persia had set. After the fall of the Sasanians the country was ruled by despots who were celebrated only for cruelty and incompetence. From the disastrous battle of Nahavand in 642, at which over 100,000 Persians and allies were slain, there followed eight centuries of alien rule, civil wars and invasions. In the 9th century Persia was broken up into petty states; the Turkish Seljuk dynasty later dominated several provinces ; the terrible Mongol hordes of Chengiz Khan desolated the country in the 13th century ; the grandson of this distinguished savage. Hulagu Khan, killed the last caliph and made himself king. He and his successors governed wisely and tolerated all religions until the arrival of Timur the Lame (Tamerlane) in 1387 with his Tartar hordes. Timur conquered Persia and filled Asia with terror. After his death in 1405 the Mongol dominion collapsed to be super¬ seded by that of the Turkomans for the next 100 years. The Sufi dynasty (1501-1736) brought about that division of Mohammedan¬ ism which was vitally momentous to the Islamic world. The new sect (Shia) rejected the infallibility of human wisdom and discarded the Sunni doctrine hitherto the standard of Mohammedan countries. To this day the Shah must belong to the Shia faith. The Sufi dynasty was a national one, descended from the Sasanians. In 1722 the Afghans under Mah¬ mud invaded Persia, settled themselves in Ispahan and captured the Shah.

Taking advantage of the situation, Russia and Turkey deprived Persia of her richest and most important northern provinces. Mahmud, meanwhile, was drenching Ispahan with the blood of her people; at one time 300 Persian nobles were invited to a banquet and mur¬ dered; Mahmud had his 3,000 Persian guards butchered, after which an indiscriminate mas¬ sacre lasting 15 days almost depopulated the royal city. The tyrant himself took a hand in exterminating 39

members of the Sufi dynasty. He died in 1725 and was succeeded by the Af¬ ghan Ashraf. Two years later the fugitive Shah, Husayn, was joined by Nadir Kuli, a famous brigand who was destined to become the great¬ est conqueror of his age. He not only drove the Afghans out but killed the old Shah and his heirs and became Shah himself in 1736. (See Nadir Shah). After his assassination in 1747 there was a period of over 40 years largely filled with anarchy and the struggles of rival princes. But for 19 years Karim Khan ruled with the title of wakil or regent over the whole of Persia except Khorasan.

Modern Persia. — The Kajar Dynasty, of Turkish origin, was founded by Agha Mo¬ hammed, a eunuch, one of the most cruel and vindictive monarchs that ever disgraced a throne. Upon his conquest of the greater part of Persia in 1794, he ordered a general massa¬ cre; 20,000 women and children were sold into slavery and numberless other atrocities fol¬ lowed. He ordered 70,000 eyes of the inhabit¬ ants of Kerman brought to him on a platter, and on receiving them he counted them, touch¬ ing each with the point of his dagger, then turning to his minister he said: <(If one had been wanting I would have made up the num¬ ber with your own eyes.® After a reign of 18 years he was fortunately murdered by his own

attendants in 1797. He was succeeded by his nephew, Fath Ali Shah, under whose sanction many acts of cruelty and injustice were com¬ mitted. He was followed on the throne by ‘his son in 1834. The reign of Mohammed Shah was marked by difficulties with the British gov¬ ernment ; by the rebellion of Agha Khan Mahlati — (<The Chief of Assassins® ; by a new rupture with Turkey and the rise of the sect of the Babis, who afterward led an in¬ surrection. Mohammed died in 1848 and was succeeded by his son Nasir-u-Din Mirza. It was during the reign of Fath Ali Shah that „ official relations began with England and Brit¬ ish India. Mahdi Ali Khan was entrusted by the governor of Bombay with a letter to the Shah. He was soon followed by an English envoy from the governor-general, Captain Malcolm of the Madras army. The results were a political and commercial treaty and a return mission to India from Fath Ali Shah. In 1887 Sir Henry Drummond Wolff was ap¬ pointed as the British Minister to Persia, Nasir-u-Din seemed to lend a willing ear to his ad¬ vocacy of the development of commerce, the construction of roads and the abolition of various restrictions upon Persian merchants. In 1888 the Shah issued a proclamation assur¬ ing safety of life and property to all his sub¬ jects, and soon afterward declared the Karun River open to international navigation up to Ahwaz. In the same year the first

railway in Persia was opened. In 1873 Baron Julius de Reuter had become the owner of a concession for the organization of a Persian state bank, with exclusive rights for the issuing of bank¬ notes and also for the working of Persian mines. Russia then demanded what she con¬ sidered a corresponding advantage but it was not until February of 1898 that Prince Dolgo-rouki, the Russian Minister, obtained from the Shah a document which gave to Russia the re¬ fusal of any railway concession in the country for five years.

The Persian state bank was established by the British royal charter of 1889 as the Impe¬ rial Bank of Persia. The Banque d'Escompte dc Perse is — or was — a Russian government institution. Nasir-u-Din was assassinated in 1896 after nearly 50 years reign. His son Muzaffar-u-Din issued a decree on 5 Aug. 1906 convoking for the first time in Persian history a national assembly called the Mejliss. A constitution, dated 1 Tan. 1907, was con¬ firmed on 11 February by Mohammed Ali Shah after his accession. The latter signed a new constitution in October limiting the sovereign's prerogatives and ecclesiastical authority, and granting freedom of speech, press, conscience, of the person, *etc.* The duties of Parliament and responsibility of ministers were defined. This constitution was violated and abolished by the Shah in November 1908. Under British and Russian pressure he granted another con¬ stitution and signed a new electoral law in June 1909. He was deposed by the National¬ ists in July and his son Ahmed Mirza, then 11 years old, was appointed Shah. The Mejliss was dissolved in Deaember 1911 and did not meet again till 1915.

Anglo-Russian Intervention. — For a num¬ ber of years Great Britain and Russia endeav¬ ored, unsuccessfully, to formulate a Persian policy which would make the most of those

sporadic elements of progress still to be found in that ill-starred country and leave the nation to lead a quiet but independent life of its own. Though in apparent agreement as to intentions and aims, the British and Russian governments differed fundamentally about the

means of achieving them, with the result that they were unable to accomplish anything useful. Each held considerable trade interests in Persia, while the chronic financial embarrassments of successive Persian governments made it neces¬ sary to raise foreign loans by mortgaging the customs receipts. Thus, in 1892, Persia con¬ tracted a 6 per cent loan of $2,500,000 from London; in 1897 various attempts were made to raise another foreign loan with the sole re¬ sult of discrediting the Persian government in Europe. In 1900 Russia permitted the issue of a loan of $12,000,000 at 5 per cent, guaran¬ teed by all the customs receipts of Persia ex¬ cepting those of Fars and the Gulf ports. Russia gradually gained control of Persian finance and of the commerce of the northern portion of the country. British interests in Persia may be summed up in one word — India. The preservation of the Indian Empire had influenced the Asiatic policy of Great. Britain since the Crimean War. That policy involved the maintenance of independent “buffer states,® e.g., Turkey, Persia and Afghanistan against the encroachments of Russia. Persian men¬ aces against Afghanistan repeatedly caused strained relations with England in the first half of the 19th century. In 1856 the British invaded southern Persia as a protest against the Persian capture of Herat. The campaign was brief and the British troops never crossed the Southern Mountains. Persia sued for peace and evacuated Afghanistan. From this campaign dates the introduction of “khaki® (q.v.). In the Persian Gulf Great Britain has acted as “policeman® for over 300 years ; in January 1622 British and Persians united in expelling the Portuguese from Hormuz, since when no foreign power has ever obtained a footing upon the Persian coast.

Under the Anglo-Russian treaty of 1907 the whole of northern Persia, to points as far south as Yezd and Ispahan, was declared to be within the Russian sphere of influence. The British sphere was defined as a triangle of southeastern Persia, the line being drawn from Bander Abbas through Kerman to Birjand and the Afghan frontier. The remainder of cen¬ tral and southern Persia, including the whole Persian coast of the Gulf, was declared to be a neutral sphere. Both governments engaged to respect the integrity and independence of Persia and to institute a control over the sources of revenue (within their respective spheres) in case of irregularities arising in the redemption or payment of interest on Persian loans. Persia became a party to this conven¬ tion in 1912. After the fall of Mohammed Ali (1909) a regency was appointed and the Mejliss reassembled. Reform was a difficult task; the reformers were inexperienced and the treasury was empty. There was no or¬ ganic bond between people and Parliament; many of the deputies were appointed by the government

and the Mejliss itself nominated others. In 1911 Mr. W. Morgan Shuster, an American financial administrator selected by President Taft, was invited to Persia to take

control of the finances. Mr. Shuster made a tactical mistake in refusing to recognize the Anglo-Russian agreement, by which he drew upon himself the inevitable hostility of Russia. A series of Russian interventions in questions of administration proved that that government interpreted its rights in a manner not conso¬ nant with the agreement. When Mr. Shuster chose Major Stokes, a British officer who spoke Persian, as commander of the gendar¬ merie to secure the collection of the taxes, the appointment was vetoed from Saint Petersburg on the ground that no Englishman could exer¬ cise authority in the Russian sphere. After eight months of uphill but fruitful effort, continu¬ ally interrupted by friction with Russia, Mr. Shuster was dismissed by a Russian ultimatum, which was approved bv Sir Edward Grey. With regard to Great Britain, support of Rus¬ sian claims in Persia was the price of the treaty of 1907, as support of French claims in Morocco was the price of the treaty in 1904. If those claims went further than was expected or approved by the British government, the European situation in 1912 rendered it difficult — if not impossible — to challenge them. After the departure of Mr. Shuster in January 1912 the country relapsed into hopeless anarchy. Russian troops were stationed in the north in various large towns for the maintenance of order and the protection of Russian interests. In the south, where disorder was more rife, Great Britain took very limited steps of a like character. Bands of brigands roamed the country attacking travelers and their escorts.

Persia and the War. — Though Persia re¬ mained neutral her territory was invaded near Mount Ararat where the frontiers of Russia, Turkey and Persia meet. (See War, European). In 1914 the British government advanced £50,- 000 ($250,000) and subscribed $11,000,000 to the share capital of the Anglo-Persian Oil Company. During 1915 German influences di¬ rected against Great Britain and Russia fo¬ mented disorders which led to the Persian gen¬ darmerie revolting against the government and the murder of a British and a Russian vice-consul. A Russian force advanced upon Tehe¬ ran to protect the legations. The gendarmerie was disbanded in 1916 and the Persian govern¬ ment accepted a British offer to place at their disposal a number of British officers to organ¬ ize a new force. Within eight months Brig.- Gen. Sir Percy Sykes with three Indian officers had recruited an efficient force of 5,000 men and marched over 1,000 miles restoring order and

suppressing bands of marauders. In January 1918 Persia asked Russia to with¬ draw her troops. Trotzky, the Bolshevist Foreign Minister, denounced the Anglo-Rus¬ sian agreement. In May 1918 Persia in¬ formed Holland that she regarded that agree¬ ment and all other treaties imposed on Persia in recent ‘years as null and void. To relieye distress and famine in Persia the American Committee for Armenian and Syrian Relief es¬ tablished a centre at Teheran and ‘spent $2,000,-000 during the famine in 1917-18. The young Shah expressed his gratification by subscrib¬ ing $100,000 to the Fourth Liberty Loan, 3 Dec.

See Babylon; Ctesiphon; Cyrus the Great; Darius; Karun River; Manichajans; Media; Nestorianism ; Persepolis; Susa; Tab-

riz; Teheran; Tigranes; Zoroaster. Consult the works of Arrianus, Herodotus, Plutarch and Xenophon.

Bibliography. — Adams, I., E.ersia by a Persian) (London 1906) ; Babelon, E. C. F.,

(Manual of Oriental Antiquities) (London 1889); Barbier, A. C., (Dictionnaire geo-graphique, historique et litteraire de la Perse** (Paris 1861) ; Bassett, J., (The Land of the Imams* (New York 1886) ; Benjamin, S. G. W., (Persia and the Persians) (Boston 1887) and Persia* (Story of the Nation Series) ; Bevan, (The House of Seleucus* (1903) ; Birt, F. B., (Through Persia from the Gulf to the Caspian* (New York 1909) ; Bishop, Mrs., (Journeys in Persia and Kurdistan* (London

1893) ; British Blue Books : Affairs of Persia (London, annually, 1908-14) ; Brown, E. G., (A Year Among the Persians* (London 1893) and (The Persian Revolution of 1905-09* (ib. 1910); Brydges, Sir H. J. (translator), (The Dynasty of the Kajars* (London 1838) ; Chirol, Sir V., (The Middle Eastern Question* (London 1904) ; Collins, E. T., (In the King¬ dom of the Shah* (ib. 1896) ; Cresson, W. P., Eersia* (ib. 1906) ; Curzon, G. N. (Lord), Eersia and the Persian Question* (London 1892) ; Dieulafoy, *Mme.* J. P., (La Perse, la Chaldee, et la Susiane* (Paris 1886) ; Durand Sir H. M., (Nadir Shah* (London 1908) ; Ferrier, J. P., (Caravan Journeys in Persia* (London 1856) ; Feuvrier, Dr., (Trois ans a la Cour de Perse* (Paris 1899) ; Fraser, D., Eersia and Turkey in Revolt* (London 1910) ; Gordon, Sir T. E., Eersia Revisited* (ib. 1896) ; Grothe, H., <Wanderungen in Persien* (Berlin 1910) ; Grundy, G. B., (The Great Persian War* (New York 1902) ;

Gutschmied, A. von, (Geschichte Irans und seiner Nachbar-lander* (Tubingen 1888) ; Hedin, Seven. Over¬ land to India* (London 1910) ; Hogarth, <The Near East* (New York 1902) ; Houssay, Ees peuples actuels de la Perse* (Lyons 1888) ; Jackson, A. V. W., (Zoroaster* (New York 1899), (Persia Past and Present* (London 1906) and Erom Constantinople to the Home of Omar Khayyam* (1914) ; Jung, K., (Die Wirtshaftlichen Verhaltnisse Persiens* (Ber¬ lin 1910) ; Justi, F., (Geschichte des alten Persiens* (ib. 1879) ; Kander, E.. Eeisebilder aus Persien, Turkestan und der Tiirkei* (Bres¬ lau 1900) ; Kennion, Lieut.-Col. R. L., (By Mountain, Lake and Plain: Sport in Eastern Persia* (London 1911); Kershasp, P., Studies in Ancient Persian History* (ib. 1905) ; Khani-koff, N. de, (Memoires sur l'ethnographie de la Perse* (Paris 1866) ; Landor, H. S., < Across Coveted Lands* (London _ 1902) ; Lane-Poole, S., (Mohammedan Dynasties* (ib.

1894) ; Layard, Sir H. A., Early Adventures

in Persia* (new ed., London 1894) ; Loti, Pierre, Ee Desert* (1895) and (Vers Ispa¬ han* (1911); Malcolm, Sir John, ˆHistory of Persia* (2d ed., London 1829) ; Malcolm, N., <Five Years in a Persian Town: Yezd* (ib. 1905); Markham, C. R., (General Sketch of the History of Persia* (London 1874) and Eastern Persia: An Account of the Journeys of the Persian Boundary Commission 1870-72* (1876); Maspero, G., Eassing of the

Empire: 850-330 b.c.* (London 1910); Moore, A., <The Orient Express* (ib. 1914) ; Nojdeke, T ' <Aufsatze zur persischen Geschichte> (Leipzig 1887), and <Geschichte der Perser

und Araber zur Zeit der Sasaniden* (1879) ; Oppert, J., (Le peuple et les langues des Medes* (1879); Piggot, J., (Persia, Ancient and Modern* (London 1874) ; Polak, J. E.,

< Persien, das Land und Seine Bewohner* (Leipzig 1865) ; Pumpelly, R., Explorations in Turkestan 1903-04* (with eastern Persia and Seistan), Carnegie Institution (Washing¬ ton 1905) ; Ranking, G. S. A., (ed.), (History of Minor Dynasties of Persia* (Oxford 1910) ; Rawlinson, G., 'History of Ancient Persia* (Vol. IV of the 'History of Ancient Monarchies of the East,* London 1868), also (The Seventh Great Oriental Monarchy: the Sassanian or New Persian Empire* (1876), and (The Sixth Great Oriental Monarchy: Parthia* (1873); Schiaparelli, 'Sul etno-grafia della Persia antica anteriore alle in-vasioni ariane* (Turin 1888) ; Shuster, W. Morgan, (The Strangling of

Persia* (New York 1912) ; Spiegel, F., (Eran, des Land zwischen Indus und Tigris* (Berlin 1863), and Eranische Altertumskundei (Leipzig 1871-78) ; Stillman, C. H., (The Subjects of the Shah* (London 1902) ; Strange, G. Le, <The Lands of the Eastern Caliphate* (Cam¬ bridge, England, 1905) ; Stuart, D., (The Strug¬ gle for Persia* (London 1902) ; Sykes, Ella C., Eersia and its People* (New York 1910), and (Through Persia on a Side-Saddle* (Lon¬ don 1898) ; Sykes, Gen. Sir Percy M., (Ten Thousand Miles in Persia* ˆLondon 1902) ; <The Glory of the Shia World* (ib. 1910). and (A History of Persia* (2 vols., ib. 1915) ; Warzee, Dorothy de, (Peeps into Persia* (London 1913) ; Watson, R. G., (A History of Persia from the Beginning of the 19th Cen¬ tury* (continues Sir J. Malcolm's History; London 1873) ; Weeks, E. L., Erom the Black Sea Through Persia and India* (London 1896) ; Whigham, H. J., 'The Persian Prob¬ lem* (London 1903) ; Williams, E.- C., 'Across Persia* (ib. 1907) ; Wills, Dr. C. J., 'The Land of the Lion and the Sun* (London 1883), and Eersia As It Is* (ib. 1886) ; Wilson, S. G.,

(Handbook for Asia Minor, Persia, etc.* (London 1895), and Eersian Life and Cus¬ toms* (ib. 1896) ; Yate, C. E., 'Khurasan and Sistan* (ib. 1900); Yule, Sir H. (tr. and ed.), (The Book of Marco Polo* (ib. 1903).

Henri F. Klein,

Editorial Staff of The Americana.

PERSIA, ORDERS AND DECORA¬ TIONS. See Orders, Royal, and Decorations of Honor.

PERSIAN ART. One may assume, for the purpose of easier classification, two main sub¬ divisions of Persian art, viz., the early period ending with the Mohammedan conquest of the country, and the period beginning with the latter point and ending with the present. And in the term ((art** it is well to include not only architecture and sculpture, but all forms of painting and artcraft which exemplify and illustrate so large a portion of the Persian artistic genius as well. Doubtless Persian art received its first stimulus from Babylonian sources, filtering in by way of Sogdiana (Susiana). But very little is known about this for certain. There are, to be sure, a few references, or which seemingly purport to be such, to such a process in the early Sacred Scriptures of the Persians, but those are not

plain in their meaning, cite no details and give no dates at all. So much, however, has been ascertained that no vestige of any prehistoric or very early Iranian art has survived. This indeed is no - wonder when we keep in mind what has of late years been established irrefragably, namely, that the very beginnings of Persia do not go back farther than the immigration era, lasting probably for many centuries, when hordes of adventurous tribes (the forefathers of the Persians), many of them nomads and on a low plane of development, crossed oyer into the Iranian Plateau from India, coming in shoals large and small and settling on their new-found lands. This process of gradual immigration must have antedated, of course, an autochthonous civilization of their own. The so-called Median period (b.c. 700-550) is the most ancient we can deal with definitely as to a Persian art life. But the records are rather meagre. It is true we read of the architectural wonder of the royal palace at Ecbatana, the Hamadan of our day, but Herodotus, our au¬ thority, tells only of what he has heard and not of what he has himself seen. And his descriptions are rather vague. Polybius later on speaks glowingly of the (<gold-plated edifices® at Anatis, the city named after the Persian river goddess, and furnishes some details, such as the (<silver roof tiles.® These Greek accounts all refer to several centuries before Alexander the Great overthrew and trampled under foot the Persian Empire, and Ecbatana was the capital of the Median state. When Persia fell and crumbled at Issus and Granicus, un¬ told artistic treasures in precious metals were carried off by the plundering soldiery, spoil from the outside and inside of the royal palaces and temples. But that the style of architecture exhibited by the early Medians and Persians was stiff and somewhat conventional, consisting mainly in foundations of enormous platforms or terraces, upon which were reared the build¬ ings themselves, seems certain. Not only that, but the Medians and after them still more the Persian architects borrowed all around from their neighbors to produce effects, from the Egyptians most, from the Assyrians, the Lydians and others. Most prominent of the remains of Persian art that have come down to us are the tombs of the kings belonging to the great Achaemenid dynasty. The tomb of Cyrus in Pasargadae reveals Hellenistic influences, but the others are different. Cubic masses of rock are surmounted by a flattened pyramid, with little of ornamentation. Egyptian models evidently inspired the forms of these tombs. The tomb of Darius in Persepolis is, however, carved

into the living rock itself. Egyptian motifs , too, governed in the erection of the palace of Darius — the same doors and gates, the same archi¬ traves and cornices as in the pharaonic ruins of Memphis. In front of the wide entrance ascends a terrace of 1,100 steps, leading direct to the throne hall, and further on is the hall of Darius with its 100 pillars. The palaces of Susa and Ecbatana are built on the same gen¬ eral plan. And the architectural skill displayed by the Arsacids, as shown by the remains of the great palace of Servistan, leaned still more on Egyptian models. What is left of the Sassanide palace at Ctesiphon, erected by Chosroes I, exhibits Coptic influences. The ruin shows a nave 80 feet long and 150 feet deep, covered

by an elliptic cupola 110 feet high. It is every¬ where observable that the Persians, while bor¬ rowing freely in spirit and form of architec¬ tural plans from foreign nations, made the highly original interior decorations chiefly their own concern. The columns supporting the audience hall of Darius, for instance, are irre¬ proachable with their elegant shape and just proportions, the capitals showing bullsheads of fine design, and exquisite enameled brick and wonderful bas-reliefs everywhere apparent. However, the open-air lofty structures of the Persians, the large and well-lit halls, such as we see in the ruins of Persepolis and Pasar¬ gadae, are admirably adapted to the climate and to their uses, and one feature especially, the delicately tinted and very durable tiles, is noted thus early. Sculpture, both in bronze and hard ‘stone, is massive, somewhat uncouth, though possessing rugged strength. But it is rather monotonous ; the groups of combat showing the slayer of lions and bulls as a victor, — nearly always typifying a ruler or a god, — recur too frequently. When Persia was at its zenith, the time of Darius, enameled bricks of cement, with relief pictures in brilliant colors, pillars (some of them graceful and slender, suggested by the palm tree, such as the one left in a ruined temple near Kermanshah) with voluted capitals in three rising sections, were much used in the palaces and sacrificial buildings. Then there was a rapid and steady decline, all through the Parthian and Sassanide period, with occasional Hellenistic or Arabic influences apparent. No specific style of art is seen till after the Mos¬ lem conquest. And the bastard Greek art flour¬ ishing along the shores of the Black Sea is often noticeable during these first centuries of the Christian era. So, too, in the specimens of the coiner’s, the gold and silversmith’s skill that have survived. Sculpture died with the Arab invasion of the 7th century, in consonance with the Koranic injunction. Not so, however, the art of painting in all its branches. On the whole, architecture in Persia has made no strides forward during the last 1,000 years. On the contrary,

nothing of equal value has taken the place of the stately piles of ancient times. Private buildings while generally of rather graceful outlines are made of cheap and flimsy material, even the Shah's palaces, villas and shooting boxes being no exception. For the style of the mosques and medressehs the Arabs stood sponsor, although there is an occasional exception, such as the famous mosque at Koum, with its bronze cupola. On the other hand, despite Mohammed's prohibi¬ tion of representing the human figure, painting has progressed greatly in Persia since the adop¬ tion of Islam. Her artists for many centuries past have excelled particularly in the field of miniature painting, in all its, branches. Some really good specimens of portraiture may still be seen iln the Shah's extensive palaces and pavilions in Teheran and in some of the houses of wealthy Persians. But as battle painters, as painters of harem and family life, as decorat¬ ors of costly furniture, and above all as illu¬ minators of manuscripts the Persians have ac¬ complished considerable. Much of this work is covered with a thin lacquer coating to with¬ stand wear, and the mingling of colors is nearly always highly harmonious and yet original. Illuminating manuscripts, outdoing the achieve-PERSIAN GULF— PERSIAN LANGUAGE

ments of our own mediaeval monks, are still being produced in every art centre of Persia, such as Ispahan, Tabriz, Teheran, Shiraz, Hamadan, etc., that vie with the best. But this style of art is of relatively recent growth, for scarcely anything remarkable exists much ante¬ dating 1400. Bihzad (who flourished at the Saffanide court, 1460-1525) was the greatest of these painters. One very peculiar feature of this style of art is its minute faithfulness to life, its realism, the microscope being often re¬ quired to discern its details. Mikrak, some time later, who did most of his work in Bok¬ hara, was pastmaster with a peculiarly florid brush. Under Shah Abbas the Great and Nadir Shah, two conquering rulers with open purses, there was a whole school of highly efficient artists of this type. Many illuminated manu¬ scripts brought rewards of between $2,000 and $10,000 from the royal treasury. Of battle paintings, done in the miniature manner, there are still some veritable masterpieces extant and in good condition. The greatest battle painter of Persia, Ali Kuli Begh, thus glorified the reign and the victorious campaigns of his patron, Abbas the Great, who about 1600 in¬ vaded India. From the time of Nadir

Shah, 150 years later, there is yet in existence a fine battle picture, less than a foot square, but on which not less than 1,200 human figures are dis¬ tinctly portrayed, some of them plainly show¬ ing, though in microscopic dimensions, the passions that tore the combatants. The king himself, on a white charger, is seen with his viziers and a group of warriors surrounding him, while in the distance the fight still rages.

Included must be also artcraft, such as ceramics, rug weaving, decorations of arms, etc., in all of which Persia has achieved much for ages. The silken rugs of Persia still lead. The choicest of these dainty rugs come from Feraghan, Kerman, Shiraz and Khorassan. Their soft colors blend marvelously. One priceless prayer rug in Shah Nasr ed-Deen's treasury is said to be 650 years old and of in¬ describable charm. A brief sura of the Koran was woven into the texture in thin gold thread, and Allah's throne above it, with tur¬ quoise and rare rubies encrusting it. Besides these art rugs, serving for ornament or wall decoration mostly, the woolen and felt rugs of Persia, some of them heavy and very dur¬ able, and often of wondrous design, must be mentioned. Finely tempered steel weapons and artistic metal work of every kind, hammered ware, scimitars, bucklers, scale armor and net cuirasses, etc., are also a Persian specialty. Threaded and inlaid work, often showing floral designs of rare beauty, wrought in bullion, and set in precious stones, the whole embellishing mirror frames, wall cupboards, tiny tallies, etc., and carved and grilled work in sandal,, teak, cedar, camphor wood, likewise bear testimony to the innate art spirit of Persia. Though with the invasion, in 1722, of the Afghans under Ameer Mahmoud, the secret of the man¬ ufacture of the peculiar Persian tinted and glazed pottery and "fayences,® even of the marvelous tilings, made up to that period, seems to have been lost forever, there is a good deal of this artistic ware still in the country. Some of the mosques in Persia are coated on the outside with these wondrous tiles, the lat¬ ter being of a delicate blue, brilliant black or

soft pink hue. The making of fine glazed pot¬ tery and chinaware was learned directly from the Chinese, and from the 13th to the 18th century the industry flourished in Persia. A delicate apple green found on many of the old Persian pieces can only be duplicated by the rarest of old china pieces.

Bibliography. — Coste, A., (Monuments

modernes de la Perse) (Paris 1867) ; Dieulafoy, *Mme.* Jeanne, (La Perse, la Chaldee et la Susianeˆ (ib. 1887) ; L'Art antique de la Perse> (ib. 5 vols., 1884-89) ; Gayet, Al¬ bert, (L'art persan> (ib. 1895) ; Huart, C. J. (Les calligraphes et les miniaturistes de l'Ori-ent musulman) (ib. 1908) ; Jackson and Yohanon, (A Catalogue of Persian MSS. in the Metropolitan Museum of Art) (New York 1914) ; Martin, F. R., (The Miniature Paintings of Persia, India and Turkey) (2 vols., London 1913) ; Mohl, J., (Le Livre des Rois) (tr., Paris 1833-78) ; Noldeke, Th.,. (Geschichte der Perser und Araber zur Zeit der SassanideiP (Leyden 1879) ; Sarre, F., (Denkmaler persischer BaukunsF (Berlin 1901).

Wolf von Schierbrand, Author of (America, Asia and, the Pacificˆ ; formerly Secretary to American Minister to Teheran, Persia.

PERSIAN GULF, sometimes called an arm of the Indian Ocean, 520 miles long, 150 to 200 miles wide, with an area of 95,000 square miles, and a depth rarely exceeding 170 feet, and varying so slightly as to make navigation remarkably safe. The Strait of Ormuz, 30 to 60 miles wide connects it with the Gulf of Oman, which opens directly from the Arabian Sea. The entire gulf is the product of the same geological force which traced the course of the Tigris and of the Euphrates. The coasts are calcareous, flat and sandy on the Arabian side and high and sheer on the Persian side. Among the islands of the Gulf are Ormaza, Kishm and the Bahrien group, the last being an early home of Chaldsean civilization, one of the traditional sources of the Phoenicians and the source of important pearl fisheries. The fauna contains some peculiar specimens; tiny sea-animals give the water not only a phosphorescent hue, but so green a tinge that the Arabs called it the Green Sea. Its economic importance is due to the excellent fishing, nota¬ bly for pearl-oysters, which are annually worth about $2,500,000 and employ 70,000 fishermen and 6,000 barks. Great Britain practically con¬ trols the Gulf. Russian influence in Persia is often reckoned as aiming at the concession of a port there to be reached by a railroad line from the Trans-Caspian province.

PERSIAN LANGUAGE. Just as Persian literature, in the narrower and stricter sense, so also the Persian language is only about a thousand years old, although it must be ad¬ mitted that the difference between the modern tongue and that spoken say some 2,000 years ago by the ancient Persians is scarcely as great as is, for instance, that between the French, German or English of the earlier Middle Ages and that of to-dav. (See also Iranian Languages). Essentially modern Persian is the slow outgrowth of the stately and sonorous idiom of the Avesta or the Gathas, the Zend, but in the sloughing process has lost much of its

one-time majesty and beauty, though on

the other hand it has enormously enriched itself by adopting throngs of foreign words (mostly Arabic and Turkish), until it is more fit to express every mood and even the most delicate shade of an idea than is any other Oriental language. During the more than three centuries that Persia dumbly had lain under the heel of the Arab conqueror every vestige almost of national Persian thought had been stamped out, the very vernacular of the humbled people tabooed, and when finally Persia once more arose, a new idiom rose with it from the womb of obscurity. The mentality, too, of the nation had been changed. Islam with its wholly differ¬ ent code had powerfully impressed itself on mind and morals of the new Persians, and the new speech faithfully mirrored these marked alterations. The present cultivated form of Persian is called deri by the Persians them¬ selves ; it is a ((court language,® in distinction from the popular dialects, which latter have withstood, throughout all the political vicis¬ situdes, the insidious influence of court favor much better. Each province of Persia has a dialect of its own, those of Shiraz and Ispahan approximating most nearly with deri, while those spoken on the shores of the Caspian, in the provinces of Masanderan and Ghilan re¬ semble most of the ancient speech. East of them, in Khorassan, Persian is spoken in the towns, a mixture of Tartar and Turkish out¬ side of them by the nomads of the steppe and the agricultural population. Elsewhere the mat¬ ter is treated with some more detail.

With the new religion the Persians also adopted the Arabic aphabet (talik), at least in the main. The cuneiform system of writing being wholly discarded and buried, the new one was a syllabic system, marking out the consonants, at least in most cases, possessing no special characters for the vowels. To the 28 Arabic consonantal signs were added four specific Persian ones, the p, tch, zh and g, while nine of the Arabic characters were dropped as useless. Thus, then, we find five vowels in modern Persian: a, e, i, o, u. But the manner of enunciating them differs greatly, not only as to provinces but as to

individuals. These vowels when written at all are written in the queer Semitic fashion, sharing among them only three characters, and are mostly omitted in the writing when short. Of consonants there are the gutturals q, g, gh, k, kh, the latter almost identical with the Welsh sign and all of them rather harsh. Then there are the palatals, tch and j ; the dentals, t, d, n; the labials, p, f, b, m; the semi-vowels, y, r, l, v; the sibilants, s, sh, z, zh; and the aspirated h. The sounds thus produced tally in the main with those of the Huzvaresh, but have lost several aspirates and have added the /. As to the inflection of nouns and adjectives the modern Persian has been entirely deprived of it, whereas in Zend and in Old Persian these forms were rich and expressive. The whole grammar, in fact, has become greatly simplified and reduced almost beyond reasonable bounds. Having absolutely no gender in its extremely bald grammar, Persian cannot give the equivalent of “he,® “she,® < <it, >) but helps itself by employing separate words conveying the meaning of sex. There are two endings for the plural, ha and an, the latter being restricted to animate objects. The suffix

rd is used in lieu of the accusative, originally meaning “through,® “by means of.® The vowel i, the so-called izafet, is made to do the duty for a variety of purposes. It is really the remnant of the relative pronoun ya. Standing between the noun and its qualifiers, it indicates possession, relation, means. The long vowel e is employed, attached to a noun, to indicate aloofness, rarity, singularity, oneness; as merd- < ?, a single, lonely man. This e is what is left of the Zend aeva, meaning “one.® There is neither definite nor indefinite article in modern Per¬ sian. The pronouns are of pure Iranian stock. In the latter idioms we see an abundance of suffix pronouns, singular and plural : em, et, esh, eman, etdn, eshdn, and these are added mostly to verbs and nouns, serving the purpose of marking the otherwise lacking cases. The passive voice of the verb is constructed by the use of the auxiliary shudan (to go). The future is formed by prefixing to the shortened infinitive the present tense of gahen kerd: to wish, to will, to be about ; and the imperative of this verb is kun. As regards the irregular verbs, which are both abundant and of most frequent and necessary use, they . vary both from the regular form of the infinitive and im¬ perative. The tenses of -the indicative are the preterit, the imperfect (by giving the preterit the prefix mi or hami), the indefinite present or aorist, the true present (made by giving the prefix mi or hami to the aorist), and the future, marked by the prefix bi. The comparison of the adjective is made by adding tar for the comparative and tarin for the superlative. The manner of stating a fact or conveying an idea in Persia differs as a

rule somewhat from the Western fashion, in fact from the mode in vogue in all European tongues. Thus, to say “my father,® the Persian puts it ccpidar hya mana ,® i.e., literally, “father that of me.® In his whole speech as in his thinking he, too, abhors a naked fact. One can never pin him down to exact figures, for instance ; his way is then to use some such phrase as “more than man can count,® “like the sand by the seashore.® But here we touch on psychology. Persian has developed away from the original mother tongue or root, the Sanskrit, by substituting the letter h for the Sanskrit s, as shown in the word sindhu (Indian and Indus) to hindu (Zend) ; hindu (Old Persian), and hind (Mod¬ ern Persian), and in many others. The original aspirates gh, dh, bh, became g, d, b; as in Sanskrit bhumi (earth) to bumi (Zend), bumi (Old Persian) and bum (Modern Persian). Again the letters k, t, p change into kh, th, f before consonants, and the hard sibilant .? of the Sanskrit becomes the soft sibilant z in Persian; as in Asurd Medhds, to AJiuro Maz-deo, Aura Mazda, Ormuzd. There was a lapse of fully five centuries, the time when Alex¬ ander the ,Great destroyed the Persian Em¬ pire until the rebirth of the country under the national Sassanide dynasty, a.d. 220, when there reigned, a complete dearth of literary production. Not a line, not a word has come down to us from this long Arsacide period, and even the Persian coins preserved were Greek in workmanship and in imprint. But Persia after this long lapse was still Persia. And when Persia awoke once again from its second dreamless slumber of

three centuries’ duration, a sleep in which it had been prostrate under the heel of its Arab and Moslem lords the same uncanny fact strikes ns once more. The tongue of Persia has sur¬ vived. What the great Firdusi uses as the vehicle of expression in the ((Shah Nameh® is again veritable Persian with an astonishingly small infusion of Arabic, circumstances con¬ sidered. It is nearly a pure Iranian dialect he employs ; so does the Persian translation of Tabari’s ˆChronicles.® But from the death of Firdusi (a.d. 1020) on without any tyrannical pressure whatever from above the Persian writers became more and more negligent in this respect. The number of Arabic first and of

Turkish words next which are paraded by them in the guise of acquisitions to the Persian language grows steadily. Scientific works not alone are composed in Arabic then and after, but literary works teem with Semitic or Turan¬ ian vocables. It would seem that Persian writers for a long time took a pride in turning out works in such bastard Persian, and not writers alone — courtiers, officials, rulers, even priests, out of sheer pedantry and affectedness employed it, so that half the words used were often of foreign origin. And this tendency, sad to say, has continued uninterruptedly for nearly a thousand years ; it is deplorable from a philological point of view, since Persian is by rights one of the richest and most flexible, sonorous and elegant idioms in existence, one which could afford to stand altogether on its own bottom. The ease with which Persian lends itself to composition of every type is very great, owing to the latitude given the writer in forming new compounds, often very bold ex¬ periments, such as epithets made up of com¬ pound adjectives and nouns, of two nouns, of nouns and verbs, of verbal phrases, of nouns and prepositions. Quite characteristic, too, is the manner in which a compound or derivative verb is combined with an adjective or noun, or else with one of the large number of semi¬ auxiliaries, such as «to do,® ((to make,® «to bring,® ((to have,® <(to show, <(to come,® ((to take,® *etc.* But Persia, though politically it has declined for the space of several centuries, has in its language a treasure which will not stay buried. The opulence and inexhaustible re¬ sources of it await merely the hand of another genius, like one of the past, to give the language a second golden age.

Bibliography — Barb, Am ˆTranscript Grammar of Persian, } in Latin (Vienna 1886) ; Berezin, F. A., ˆ Grammar, in Russian, of P. (ICasan 1853) ; Berge, Adolphe, <Dictionnaire persan-frangais) (Leipzig 1869) ; Chodzko, Alex., (Grammaire de la Langue persane) (Paris 1883); Horn, P., (Grundriss der neupers Ety¬ mology (Strassburg 1893) ; Huart, C. J., <Grarnmaire elementaire de la langue persane> (Paris 1889); Palmer, Wm, 'Dictionary* (2d ed., London 1883) ; Pizzi, G., 'Chrestomathie* (Turin 1888) ; Rosen, G., <Pers. Grammatik) (Berlin 1843) ; Tolman, H. C., 'Ancient Persian Lexicon and the texts of the Archse-menidan Inscriptions) (New York 1908) ; Vul-lers Aug., (A Historical Grammar* (2d ed., Giessen 1870) ; same, 'Chrestomathie* (Bonn 1833) ; Wahrmund, Adolf, (Prakt. Handbuch der neupers. Sprache* (Giessen 1875) '• Wd-laston, A. N., (Diclionary) (London 1904) ;

Zenker, Albert, 'Diet. turc-arab-pers.* (2 vols., Leipzig 1866 and

1876).

Wolf von Schierbrand, Author of (America, Asia and the Pacific *; formerly Secretary to American Minister to T eheran, Persia.

PERSIAN LITERATURE. Of ancient Persian literature only fragments of a reli¬ gious character are left. Persian literature in the stricter sense takes its rise shortly after the settlement of the Arab conquerors, after the utter downfall of the Sassanides and the forci¬ ble conversion of the Persians to Moham¬ medanism ; that means, therefore, since the growth of the modern Persian language. To judge correctly the importance of Persian liter¬ ature proper it must be borne in mind that it was very largely instrumental in building up once again the entire Persian race; that its spread was more than commensurate with the spread of the Persian language itself to far beyond its proper boundaries, all over India, in fact, where for a number of centuries it was one of its chief centres and attained to great lustre; that of all modern Oriental literature it is by far the most comprehensive and varied, the most elegant and refined and that — just to cite but one case of its pervasive influence — the thoughtful, gracious verse of the "tentmaker,® Omar Khayyam, in Fitzgerald's translation (un¬ doubtedly an improvement on the original) has become almost a sort of literary vademecum with the intellectual elect of every western nation. The subtle charm of Persian literature even drew the Tartar and Mongolian hordes into its net. Only in drama it is weak and negli¬ gible. The passion play, or tazieh, as regularly performed in the Persia of our days in each Muharrem, the month of mourning for the slaughter of Hussein, is more like our mediaeval mystery plays ; it glorifies the rise of the Shiah split within Islam and is scarcely to be ac¬ counted a literary factor. Of late years, though, there has been noticed a widening of the scope in drama. But with that exception, albeit a telling one, Persian literature is singu¬ larly copious, all-embracing and vivid,_ cultivat¬ ing every branch and every style of writing, from the most courtly, grave and dignified to the most debonnair, scurrilous or spirited. One other peculiarity must be noted. Persian liter¬ ature is also the fountain head of Soofeeism — that deep-tinged scepticism which even to-day pervades the mind of the educated classes of Persia. The sketch 'here 'given cannot, of course, make pretension to completeness. It can merely outline the vast field. Persian liter¬ ature excels in poetry, the graceful idiom and its vast vocabulary adapting itself admirably to it. A tradition more or less leaning on fact relates how as early as the time of Bahrain Gor (a.d. 42CF438), that prince invented the art of versification. Aufi, in his work on literary history, about 1180, even quotes a few rhymed lines of this crowned poet, who is answered in kind, on the spur of the

moment, by his be¬ loved slave, Dilaram, she employing the same metre and syllabification. During the reign of another Sassanide, Chosroes Pahrwis, there cer¬ tainly lived a poet, Barbed. And it seems quite certain that even during the dark days of Arab Moslem rule that followed the total destruction of the Sassanides and of Persian national life

and institutions there lingered on in the soul of the Persian people the love of poetry, of legend¬ ary and national epic lore. But only after the dissension growing out of the warring claims to the caliphate and the rise of Sheeism in Persia and thus of a rebirth of nationalism, modern Persian poetry sprang into full light. The Tahiridas, Saffarides and Samanides, short¬ lived reigning houses, a.d. 819-999, assisted and cherished this movement. Next, the Ghaznavis (from 976 on) and the Seldjuks (after 1037) as well as even the rude and untutored Tartar and Mongolian chieftains under Genghis Khan and his successors, who overran and ruled all the Iranian plateau, did much in the same line. In fact, Persian literature for the space of four centuries, i.e., during the period of its greatest splendor, owed much to the favor of rulers and courts. This favor, too, was responsible for an entire school of Persian poets — the panegyr¬ ists one might call them. The first period, however, that of about 900-1100, gave fruition to the purest and most characteristic Persian heroic poetry. There is first, the great Rudaki (d. about 950), the author of 100 volumes of poems, of which, though, but little has come down to us. Some 50 of his lays only have been printed in their original text and a transla¬ tion. Kabous, a ruler of Ghilan, with his book in 44 chapters, the (Kabous Nam eh, > gave a standard work on princely manners and virtues still acknowledged throughout the Orient as a model. At the court of the great Mahmoud Ghaznavi (998-1030) poets and savants were assembled and flourished in the sunlight of his favor. It was due to his inspiration and en¬ couragement that a cycle of epics arose, based on ancient Persian traditions and myths. His poet laureate, Unszuri, wrote the heroic tale of (Wamik i AsraP His pupils, Farrukhi and Dakiki, wrote in a similar strain. But out¬ shining them all is Firdusi,

the (Homer of the Orient,* the author of the (Shah Nameh) (Book of Kings), in which breathes the pure national spirit of ancient, proud Persia. Indeed, in the (Shah Nameh,* legend and historic truth are mingled in such masterly fashion that these elements become welded into a splendid homo¬ geneous whole and to the Persian mind at least leave no doubts. Following in the same path, other legendary epics were written by Firdusi's imitators, such as the (Djehan Gir Nameh,* the (Barzu Nameh,* the (Gershasp Nameh,* *etc.* Sheikh Abu Said (968-1049) wrote spirited quatrains, and Nasr-i-Chosroes (1004-1088) didactic poems showing both depth of thought and high moral aspirations. Tabari's work was issued in the revised and embellished chronicles of Bal'ami, and Meno-Chehri likewise belongs to this category. During this entire period the ferment of national enthusiasm never flags. But with the next, the 12th century, there is a dis¬ tinct change in all this. Both panegyrists and fiction writers monopolize the stage. Enveri (d. 1191) was the ablest and subtlest of those court scribes who glorified the barbarian despots or for that matter, any rulers pos¬ sessed of fat purses, as in their writings they themselves shamelessly admitted. But though Iinveri led the list, there were many like him during the period of about 1100-1300, such as Zenayi, Reshid ed-Deen (1247), Wassaf, Shereef ed-Deen, the historian and apologist of Tamer¬

lane and Chakani Hak&iki. Again, always an important branch of Persian literature, the entertaining or amusing stories, anecdotes, legendary and supernatural tales crowded the pages of the Persian writers of those days. Some of these, like a Persian paraphrase of the fables of Bidpay, Turami's <Nigaristan) (Pic¬ ture Gallery), the (Bakhtyar Nameh,* (Tuti Nameh,* etc., enjoy wide popularity even to¬ day. Among the earliest Soofees turning up at this time, Sanai (d. 1131) is noticeable, with his mystical (Garden of Truth.* The antithesis to him is Omar Khayyam, the satiric freethinker and charming cynic. Reshid Watwat (d. 1182) writes a compendium of poetical rules. The greatest name, though, during this period is that of Nisami, the Boccaccio of Persia, whose love stories are so true to nature and their plots so plausible and well-constructed that they charm the reader even to-day, notwithstanding that the Persian <(ishk** and the English (<love** are by no means convertible terms. The next, the third period of Persian literature, a period synchroniz¬ ing with the frightful devastation wrought in the whole land by Genghis Khan and his Mongo¬ lians, is, nevertheless, the golden age of Persian letters. The three great stars shining in her literary firmament were Sa'adi, Djelal ed-Deen Rumi, and Ferid ed-

Deen Attar. The last-named as the guiding spirit of Persian mysti¬ cism. His chief writing, (Esrar Nameh) (Book of Mysteries), (Pend Nameh* (Book of Coun¬ sel), and (Djevahu Nameh) (Essence of Sub¬ stance) are deeply tinged with Oriental mysti¬ cism and not to be appraised at their value with¬ out possessing the key, being replete with allu¬ sions incomprehensible to the uninitiated. He lived to over 100 and then was slain by the conquering. Mongolians during the sack of the city in which he dwelt. Djelal ed-Deen Rumi was the great founder and the intellectual cen¬ tre of that Moslem pantheism which even to-day runs through the whole Orient, often side by side with occasional flashes of fierce fanaticism and narrow bigotry, and his writings breathe the spirit of Soofeeism throughout. But to the Western world Sa'adi has always seemed greater and closer and more rational as a thinker. In his (Gulistan* and (Bostan,* his two chief books, there is a pleasant simplicity of fable and diction, coupled with a sound sapiency that are touching. Sa'adi, too, passed the ordinary span of life allotted to man, and is said to have died at the more than venerable age of 120. His Persian biographers usually divide his life into periods of 30 years, he devoting himself to philosophic travel from 60 to 90, and the last space of equal length to writing down his mani¬ fold experience. This, however, is probably one of those flowery inaccuracies of the Oriental mind with which we are constantly struck when sounding it. It is true, however, that Sa'adi's life was long and full of vicissitudes, he. being, among other things, a prisoner of the Crusaders for years ; that he wandered far and wide and often knew hunger and thirst, and that he did ' his writing in his very old age.

The period of 130(M400 was, in one respect at least, the most brilliant for Persian letters. It is curious to note that it was precisely during this time, the time when the whole Iranian world was groaning under the Mongolian yoke and politically in the very depths of abasement,

that Persia reached her literary zenith, certainly in the field of lyrics. Her greatest poet, one who as yet is quite insufficiently appreciated in

the West (owing, doubtless, in part to inadequate translation), Hafiz, that is, sang his sweetest and gayest. Tuneful and multicolored they are, his lyrics, covering an immense range of human emotions, though with Hove, roses and wineM predominating. Hafiz by common consent figures among the few greatest lyrical poets of all ages and climes. His finished, smooth and easy verse, attuned to every known measure and mood, has since served the whole Orientˆ as an unapproached model. Wassaf and Kasim-i- Anwar are likewise to be mentioned. The suc¬ ceeding century showed the poetical genius of the Persian people at a standstill. It is alto¬ gether dominated by the surpassing gifts of Djami, the last of Persian poets of the first order. His achievements were assuredly most comprehensive, since they partook of epical, lyrical and mystical literature. He ex¬ ceeded his immediate forerunners in all these, and he brought the form at least to abso¬ lute perfection, his style being throughout most brilliant. But Djami was as certainly de¬ ficient in creative powers And after his death, from 1500 on, begins the slow decline of Persian letters. Djami's imitators, his son-in-law Hatifi, Hilali, Ali of Shiraz, Feisi and Fettahi, did some clever work, although lacking in initiative. Since 1600 of the men of letters writing in the Persian vernacular, either in Persia or India, who stand out above the average may be cited, among the lyric poets : Talib, Saib, the Emperor Shah-Alam and Aftab, the latter's teacher. One leading feature of this later period is the extraordinary wealth in prose fiction, especially collections of fables, fairy and mythical tales, novels and short stories. Most of these had their first home in India and traveled thence, first to the Persians and next to the Arabs, Turks and Ivoords, whence they finally reached the Occident in versions more or less garbled or emasculated. The collection of fables, published by Hussein Wais Kashifi under the name of (Enwar-i- Suheilip belongs in this category. So do the bright fairy stories of Nakhshebi, as well as ˆehar-i-Danishp by Inayet Oullah ; the novels of Hatim Ta'i, and the great cycle of novels, (Bostan-i-Khayal, in 15 huge tomes. During the 18th century again Ferid Ghafr Khan trans¬ cribed the fanciful folklore tales of Hatim ben Oba'id. Another sphere in which Persian litera¬ ture excels is history. These writings deal in part with the Mohammedan states in general, but likewise with biography, special history and monographs. The habit of using Arabic ex¬ clusively as the vehicle of expression when deal¬ ing with scientific topics, a habit adopted since the first coming of the Moslem Arab con¬ querors of Persia, hampered Persian historians for a long time, for many centuries in fact. The first break with this iron-clad custom was made at the instance of Mansur ben Nuh, in causing a translation of Tabari's great Arabic work to be made by Bal'ami, in 963.ˆ An excel¬ lent work by the famous vizier, Nisam-ul-Mulk, the

(Siyaset Namehp dates from about 1092. Minhadj ben Siradj wrote a huge general his¬ tory, embracing the time up to 1259, and en¬ titled ‘Tabakat-i-Nassiri,* while Hamdullah

Mustafi wrote one in 1329 under the title of ˆarish-i-GuzideP Reshid ed-Deen of Hamadan published a history of the Mongolian con¬ querors, the (Djami UttawarishP The chronicles of Wassaf also deserve mention, notably because of their florid and highly polished diction. The <Zafar Nameh/ being a history of Tamerlane; the (Rauset Ussefa,* a universal history couched in rhetorical phrase; the (Habib UssiyaD by Khondemir and (Lubbuttawarish) by the Ameer Yahia may be named. By the official adoption of the Persian idiom at the courts of the new-established Moslem dynasties in India and of the entire ruling class there, it came about that up to the very conquest of that vast country by the British most, in fact nearly all, historical writ¬ ing was done there in Persian. Elliott’s famous (History of India as ‘told by its own His¬ torianˆ continued by Dawson, gives in a faith¬ ful English translation a very good summary of all this. And it is but proper to add here that all these so-called historical works in the Per¬ sian tongue are properly classed with literature. For while as a rule they plainly show the de¬ fect of the Oriental mind, its horror almost of absolute, bald truth, they give free reign to Oriental imagination and generally welter in poetical description, beautiful pageantry and in admirable strokes of fancy.

Bibliography. — Bland, N., Papers in Jour¬ nal Asiatic Society, VII, 345 seq. and IX, 122 seq. ; Browne, E. G., (Literary History of Persia) (London 1902), and (Memoirs of the Poets of Dawlatshak) (ibid., 1900) ; Chezy, A. L. de , French translation of (Laila u Majn’inV (Paris 1805) ; Ethe, H., in Vol. II of Geiger and Kuhn’s (Grundriss der iran. Philologie) (Strassburg 1906) ; (H6fische u. romant. Poesie der P.} (ibid., 1887) ; (Mvs-tische, didaktische u. lyrische Poesie der P.} (ibid., 1888) ; (Rudagi’s Vorlaufer u. Zeit-genossen) in Morgenland Forschungen (Leipzig 1875) ; Fliigel, G. L., in Ersch u. Gruber’s (Allgemeine Encyclopadie) (Leipzig 1842) ; Graf, C. H., (Jurjani’s Wis u Ramin ‘ (trans. into German in Zeitschrift der morgenl. Gesellschaft, XXIII, 375 seq., Leipzig 1864) ; Harlez, C. J. de, (Introduction a l’etude de l’Avesta) (Brussels 1881) ; (Des Origines du Zoroas-trisme) (Paris 1879) ; Horn, P., <Geschichte der pers. Litteratur> (Berlin 1901) ; Kasimirsky, A. de B., (Specimen du Diwan de MenoutschehrP (Versailles 1876) ; Rieu, C., /Catalogue of the Persian Manuscripts in British MuseunP (3 vols., London 1879-83) ; Rosenzweig, Von. Ger¬ man trans. of (Djami’s Poems) ; Schlechta-Wssehrd, O. von,

(Bruchstucke aus Ibn Yamin) (Vienna 1852); Sprenger, A., Catalogue of Oriental Manuscripts in Library of King of Oudh) (Vol. I, Calcutta 1854) ; Zotenberg, H., (Chronique de Tabari* (Paris 1867-74).

Wolf von Schierbrand, Author of < America, Asia and the Pacific' ; for¬ merly Secretary to American Minister to Teheran ,* Persia.

PERSIAN MYTHOLOGY. A large num¬ ber of the Persian myths agree with the earlier and earliest Indian ones and are doubtless drawn from the same prehistoric sources, dat¬ ing back probably to the days before b.c. 4000. We find in this list the tale of a great ceaseless battle between the Sun God (Trita , Indra, Iran. Thraetona) and a colossal, evil

serpent (Ind. Alii, Ir. Azhi) , a myth em¬ bodied and reclothed by Zoroaster in his self-evolved creed. There is also the legend of Yama, the first man, now ruler of the dark regions after death ; of the (<Glorious OneM (Iran., Huzrava, Chosrau, Chosroes) , the per¬ former of great and useful deeds of valor, a sort of Persian Herakles; of the highest god, the All-Ruler, Asura; of Mithras, of the Dragon-Slayer, Verethraghna. These earliest mystic and symbolical tales were common to both branches of the Aryan stock, the Indians and Iranians, and have survived all religious and political changes that have occurred in Iran; and so have, up to the Moslem con¬ quest, the fire cult, the veneration of the sacrificial flame, the belief in soma, that lifts up man to the gods and fills him with divine strength and fevor; the command to con¬ ceive pure thoughts and do good deeds ; the faith in the efficacy of prayer, incantations, magical power with certain secret formulas, the manthra of the early Persians ; the sub¬ mission to fate by gods and men ; the service of the athravan, priests, mediators, nursers of the flame. All these things have come down from primeval days. But there are unexplained feature's in all this. No written records tell us of it, but there must have been a long and bitter strife between the two branches — the Iranians and Indians. Only thus can be understood the fact that the old and mutually recognized gods, the daeva, became in later days in Iranian eyes ˆdemons® and

((evilwork-ers,® while the Indians retained them as benefi¬ cent superhuman beings, and that the Iranians called their own gods instead hhaga. And that, on the other hand, the Indians dethroned the highest god of the Iranians, Asura, and his subservient helpers, and degraded them to the level of evil spirits and devils. There is, too, at a very early date, plainly perceptible a schism between the two subdivisions north and south of the Indus. Persians, though fanciful yet deep thinkers, were throughout a virile people, bent on practical purposes and enjoying the good things of this earth, while the Indians even in prehistoric times, even be¬ fore the appearance of their oldest holy books, lapsed into dreamers ; their pantheism became negative, even denied the use and purpose of sublunar life itself. Probably climate had much to do with this. In any case this striking contrast must have separated the two races very early and accounts in large measure for the phenomenon of their respective historical development. However, the cycle of myths above referred to, the joint parent possession of the Aryan race, remained firmly fixed in the Persian soul. Zoroaster in molding anew the Persian creed into a purer and more ra¬ tional one, was a skilful adapter. He retained in somewhat altered shape the ancient sagas and heroes. So did Firdusi in his # legendary history ((Shah Nameh® even adding to the list some names that had acquired fame as purely Persian doers of great things, such as Rustem particularly. And the Persians of to¬ day still bear these early seeds of faith, this pristine philosophy, in every fibre. Their early mythology breathes in their wonder and fairy tales and in their outlook on spiritual life. Firdusi's stories of the beginnings of the Per¬

sian state, though presented with a naive ap¬ pearance of truth, are wholly unwarranted, however. He tells of the overthrow of a mythical personage, King Afrasiab, by the national hero, Rustem. As a matter of fact, though, history in Persia started with their migration from India.

Consult Geiger, L., (Ostiranische Kultur) (Erlangen 1882) ; Hubschmann, J. H., (Iranische Studien) (in Kuhn's Zeitschrift fur vergl. S prachfors chung, XXIV, pp. 323-415, Berlin 1879) ; Spiegel, F., (Eranische Altar-tumskunde) (3 vols., Leipzig 1871-78).

Wolf von Schierbrand, Author of (America, Asia and The Pacificˆ ; formerly Secretary to American Minister to Teheran, Persia.

- PERSIAN POWDER. See Insecticides.

PERSIAN WHEEL. See Noria.

PERSIGNY, per -sen-ye, Jean Gilbert Vic¬ tor Fialin, Due de, French statesman: b. Saint-Germain-l'Espina&se, department of the Loire, 11 Jan. 1808; d. Nice, 13 Jan. 1872. Having entered the cavalry division of the army he took part in a movement among a section of the troops in favor of the revolution of July (1830) and was expelled from the service on the charge of insubordination. He then went to Paris and took up journalism, became an intimate friend of Louis Napoleon, and an active disseminator of Bonapartist propaganda. He was the instigator of the military rising at Strassburg in 1836, was arrested, but managed to escape ; and in 1840 shared in the expedi¬ tion to Boulogne, when he was again captured ; and on this occasion condemned to 20 years' confinement, but his captivity ultimately re¬ sulted in little more than restriction to the town of Versailles. During this period he wrote and published (Memoire de l'Utilite des Pyramides de l'Egypte) (1845). On the out¬ break of the revolution of February 1848 he hastened to Paris, brought about an agreement between the members of the Napoleon family, collected their adherents, traveled over France on their behalf and in various other ways largely contributed to determine the vote by which Louis Napoleon was elected President of the republic, on 10 Dec. 1849. He was also one of the most prominent actors in the coup d'etat of 2 Dec. 1851. In January 1852 he was nominated Minister of the Interior, and in this capacity signed the decrees relative to the con¬ fiscation of the Orleans estates, and directing the first elections to the corps legislatif. In 1855 he went as Ambassador to London. In 1860 he was again made Minister of the In¬ terior, but in 1863 was compelled to resign be¬ cause of his attempted arbitrary control of the press. He was elevated to the rank of duke iri 1863, and thereafter held the position of Senator until* the fall of the empire. Consult d'Espagny, Count, (Memoires du Due de Persigny) (Paris 1896) ; Delarva, (Le Due de Persigny et les Doctrines de l'Empire) (1865).

PERSIMMON, or DATE-PLUM. These names are given to each of several trees and shrubs of the family Ebenacecc. Like other members of their genus (Diospyros) , of which there are about 200 mostly tropical species, these have deciduous or persistent entire leaves,

dioecious or polygamous, whitish or yellowish flowers in axillary cymes, followed by large juicy fruits (berries) containing from one to 10 flat seeds. The best known species in America is the common or American persim¬ mon (D . virginiana), which often reaches 50 feet in height and sometimes 100 feet, with a spreading, round-topped head and frequently drooping branches. It is found from Con¬ necticut to Indiana and southward to the Gulf States. The plum-like fruits, to which the calyx is adherent, are. usually about an inch in diameter, yellow with a pink cheek on the sunny side, and of variable flavor. Contrary to popular belief, they are not always astrin¬ gent until frozen, nor does freezing make all persimmons edible. There are wild varieties which ripen in early autumn before frost, and others which continue unpalatable in spite of frost and sun. The tree will thrive as far north as southern Michigan and western New York. Though there are numerous native seed¬ lings which bear good fruit, yet even in its most favored districts the tree has attracted little horticultural attention. Like other mem¬ bers of the genus, notably D. ebeniim, which yields ebony, this species furnishes a hardwood useful for interior finish of houses, but ill adapted to resist moisture. Propagation is readily effected by means of seeds stratified out of doors during the winter and planted like peach-pits in the spring. Since they are exceedingly variable, they are usually grafted or ‘budded when two years old, in early spring, with desirable varieties. Unless transplanted when very small, they are likely to fail be¬ cause of their long tap-roots. Autumn trans¬ planting is preferred, the top being cut back severely, but the roots retained 3.s much 3.S possible. The trees succeed best upon well-drained, rich, loamy soil well exposed to the

The Japanese persimmon or kaki (D . kaki) is a smaller species than the American, rarely exceeding 40 feet in height, some varieties be¬ ing under 10 feet. It is a native of Japan, China and Korea, where it is one of the lead¬ ing cultivated fruits. During the closing quar¬ ter of the 19th century it was successfully cultivated in the Southern States, .and is mak¬ ing its way as a dessert fruit in Northern markets. The fruits, which often resemble tomatoes in appearance, are several times larger than the native species. Some of them resemble apricots in flavor They have been successfully cultivated in the Atlantic States as far north as Virginia; in the Gulf States and in California. Usually they are Propa¬ gated by budding or grafting upon seedling stocks of the American species, like which they

are cultivated… , …

Two other species are cultivated tor their small black fruits: D. lotus, an Asiatic species, in China, Japan and Korea, and D. texana, in Texas and Mexico, where it is indigenous.

The persimmon is fairly free from insects, few of which are troublesome. The chewing species, such as caterpillars, can be controlled by arsenites ; the sucking species, such as plant-lice and flea-lice, by kerosene emulsion. (See Insecticide). Consult Watts, Persimmons/ Tennessee Agricultural Experiment Station Bulletin XI, No. 1 ; Hadley and Troop, (The American Persimmon/ Indiana Agricultural

Experiment Station Bulletin, No. 60; Bailey,

(Standard Cyclopedia of Horticulture. >

PERSIUS FLACCUS, per'shi-us, flak'us, Aulus, Roman satirist : b. Volaterrae, Etruria, 34 a.d. ; d. Rome, 62 a.d. He was a pupil of the grammarian Virginius Flavius, probably also of Remmius Palaemon, but more important than all of the Stoic Cornutus, whom he celebrated in his verse, and whose teachings he pro¬ claimed and expounded. In Psetus Thrasea, the famous senator and lofty Stoic, he found a patron and close companion. His earlier poetic ventures he burned. But he left six. satires, containing only between 600 and 700 lines, which, retouched by Cornutus, were pub¬ lished in a booklet by Caesius Bassus, a fellow poet. These works won immediate and high reputation. Apparently the obscurity which had become felt as far back as Jerome, and made him <(the paradise of commentators/ was not sufficient to disturb contemporaries. This un¬ intelligibility seems to be the result of an effort to condense into phrases more meaning than they may clearly bear. Whether or not this is a literary trick has been debated; but such cer¬ tainly is its effect. Within a limited field Per-sius evinces keen insight, descriptive gift, and dramatic power. At times he gives interesting glimpses of his studious life, and his devotion to the noble interests of his philosophy. He was a persistent, though none too successful, imitator of Horace, playing generally unsatis¬ factory changes upon some 100 various lines of the earlier poet. He was seriously in earnest and practically devoid of humor. _ Many of his pointed expressions have passed into the store of literary quotation. There are editions by Orelli (1833); Hauthol (1837); Jahn (1843; rev. by Biicheler 1886) ; and, with excellent notes, by

Gildersleeve (1875). Conington made a prose rendering into English (1874). Con¬ sult also Knickenberg, F. A., (De Ratione Stoica in Persic/ (Marburg 1869).

PERSONAL EQUATION. See Equa¬

tion, Personal.

PERSONAL LIBERTY LAWS, in

American history, a general name applied to those statutes passed by the Northern States to protect the negroes within their borders, who had escaped from slavery in the South. They were passed by the States as a protest against the Federal support of the capture of fugitive negroes in the free country of the North. The first acts were passed about 1840, though In¬ diana and Connecticut had previously provided that fugitives might have a trial by jury. The Fugitive Slave Law (q.v.) of 1850 aroused the most violent opposition in the North, and be¬ fore 1856 many of the States had passed per¬ sonal liberty acts. Beside prohibiting the use of State jails these laws forbade State judges and officers to assist claimants or issue writs. Trial was to be given all alleged fugitives. Heavy penalties were provided for the viola¬ tion of these laws. Such acts were passed in Vermont, Connecticut, Rhode Island, Massa¬ chusetts, Michigan, Maine, Wisconsin, Kansas, Ohio and Pennsylvania. Several of the other Northern States, while refraining from passing laws which virtually were in direct opposition to the Federal laws, imposed such restrictions in the administration that all attemots to en¬ force its provisions were seriously hampered.

Among these obstructionist States were Illinois, Indiana, Iowa and New Hampshere. Of the Northern States, New Tersey and California alone sanctioned the rendition of fugitives. See Slavery.

PERSONAL PROPERTY. See Prop¬ erty.

PERSONALITY, Disorders of. There are certain interesting pathological states of the mind in which the unity of the individual is lost or disordered. In many forms of insanity the whole nature of the patient is altered, and he may have the hallucination that he has be¬ come some inanimate object, or that he has lost his soul, or that he has undergone some other profound change of personality. This is due to the fact that the unity and character of consciousness are largely determined by the organic 'background which underlies all experi¬ ences, so that when this changes the continuity with the former self is likely to be lost. How¬ ever, in these pathological states the continuity of consciousness does not suffer the 'brusque disruption characteristic of certain mental anomalies which are more definitely disorders of personality. In extreme cases we may find what to all appearances are two or more selves alternating in one body. These may differ in character, in tastes and in their entire stock of experiences; each may feel the rest as in¬ truders in the common body. On the other hand, there may be a greater or less degree of community between the different selves; one may have a partial memory of the experiences of another. Furthermore, the separate selves may coexist, as in the case where an anaesthetic hand exhibits a power of writing things un¬ known to its possessor. The selves coexisting with the normal self may or may not also have an independent existence and may or may not pos¬ sess a considerable measure of unification into clean-cut personalities. The "automatism phe¬ nomena, w as such manifestations as the writing of an anaesthetic hand are called, may be evoked in normal individuals by means of various modes of suggestion. Alternation of personal¬ ity is always pathological in nature and is usually due to some shock, mental or physical, in nature, which shatters the personality and causes some of the resulting fragmentary groups of ideas to assume an existence on their own account. According to Freud this shock is generally of a sexual nature, which causes certain experiences to be suppressed, and to as¬ sume a consequent individuality of their own. Consult Binet, A., Alterations of Personality) (New York 1910) ; Prince, M., (The Dissocia¬ tion of a Personality > (New York 1910) ; Ribot, T., (The Diseases of Personality) (tr., Chicago 1906) ; Sidis and Goodhart, (Mutiple Personality) (New York 1905).

PERSONATION. See Corrupt Practices Acts.

PERSONIFICATION, the representation of things inanimate or of abstract ideas as living things or persons. This is a familiar practice in all the arts; thus we have the statue of liberty and the familiar (My Country Tis of Thee,* both of them implying the personification of an idea which has no real human attributes. Fine examples of

personification in paetry are the <Passions) of Collins and the odes of Gray. Michelangelo's statues of <Night) and (Morn¬

ing* ; Guido Reni's <Dawn) ; Titian's (Beauty, Sacred and Profane* are noble examples of personification in art.

PERSONS TO BE INCORPORATED.

See Corporations, Legal.

PERSPECTIVE, Linear. Most people have observed that objects diminish in size as they recede farther and farther from the eye; that parallel lines appear to converge; that in general the appearance of objects differs from the reality. But if we are asked why the ap¬ pearance differs from the truth, or what the precise appearance must be when the true di¬ mensions and position of the object are known we cannot answer offhand. These must be de¬ termined by the principles of Perspective.

Perspective Defined.— Perspective is the science and art of representing on a plane sur¬ face the appearance of objects according to optical and mathematical principles. In order that the representation of an object may be complete we must represent its correct outline, its proper light and shade and the apparent color. These requirements give rise to two branches of the subject, namely, Aerial Per¬ spective and Linear Perspective.

Aerial Perspective deals with the appearance of objects as affected by the air, light and shade and color. But as its principles are not yet fully established, we shall devote our attention in this article mainly to Linear Perspective, the exact science, which deals with outline alone. It will teach us the laws governing the apparent position, direction and length of the edges or outlines of objects. We shall first review the principles of the subject and then take up a few practical problems.

1. The Basic Theory of Perspective.

Theory of Perspective Illustrated. — If

while standing before a closed window you traced on the glass the outline of an object beyond, seen through it, you drew on the glass a true picture or perspective view of that ob¬ ject. What took place in this process of trac¬ ing? From every visible point of the object there emanated a ray of light termed a visual ray, which pierced the glass

and entered the eye. The outline you marked was the aggre¬ gate of points through which the rays of light from the object pierced the glass. This is graphically illustrated in Fig. 1.

Let Y. P. in Fig. 1 be the eye of the specta¬ tor, B A P L a pane of glass standing on its edge P L, and T, a triangle behind the glass. From a b and c draw lines to Y. P ; on the plane B A P L mark the points a , b' , c', *and connect ; then T', drawn on the glass, will be a

perspective view of the triangle as seen by the eye at 6". P. It is evident then that the whole problem of perspective is, — given a pyramid of light, its base at the various points of the ob¬ ject and its apex at the eye; required to deter¬ mine the section on a plane cutting the pyramid somewhere between the base and the apex.

The Problem of Perspective Formulated. — The vast majority of objects have their prototypes in the geometric solids — the cube, prism, pyramid, cylinder, *etc.* Hence in all demonstrations on the theory of perspective, these are used as models. Again, all solids are bounded by plane surfaces ; all surfaces are limited by lines ; and a line is a consecutive series of points. It is obvious, therefore, that before we can successfully construct the per¬ spective of any solid we must know how to determine the perspective of a given point. Let us then assume a point and try to find its per¬ spective. Our problem will read: Given a ray of light emanating from a point on one side of the vertical plane, and traveling to the eye on the other side of the plane ; required to find the point at which that ray will pierce the plane. Before solving the problem we must get a clear idea of the terms, conventions and basic prin¬ ciples of the science. .

Terms and Conventions used in Perspec¬ tive.— In this subject four planes are employed: (1) The Picture Plane (P.P., Fig. 2), an im¬ aginary plane placed in front of the spectator, on which the objects are drawn; (2) The Ground Plane (G.P.), a horizontal plane on which

the spectator and the objects viewed are supposed to stand. The intersection of the first and second plane is called the Ground Line (G.L.), or Base of the Picture; (3) The Horizontal Plane (H.P.), a plane passing horizontally through the eye of the observer, and cutting the Picture Plane at right angles in the line H. L., called the Horizon Line . or sim¬ ply the Horizon; (4) The Central Plane (C.P.), a plane passing vertically through the eye of the observer, and cutting each of the other planes in a right angle. .

The position of the eye is fixed by its dis¬ tance from the ground plane, its distance m front of and from the left-hand or right-hand limit of the picture plane.

The height of the eye is the distance of the

eye above the ground. .

‘ The Centre of Vision (C.V .) is the point on the picture plane which is directly opposite the observer’s eye. (Fig. 3). .

The Station Point (S.P .) is the point in

space at which the eye is held.

The Distance of the Eye is the distance from the station point to the centre of vision.

The Prime Vertical is a vertical line on the picture plane passing from the centre of vision to the ground line. It is of course directly opposite the spectator.

The Distance Points (DR and pL) are the distance of the eye (S.P. — C.V.) laid off on the horizon, to the right (pR), and to the left (DL) of the centre of vision.

The Perspective of a Line is the sum of the perspectives of all its points.

The Vanishing Point of an indefinitely long line is the perspective of that one of its points which is farthest from the picture plane.

The Fundamental Rules of Perspective.— The basic rules upon which the whole science of perspective rests are : .

Rule I. — When a line is parallel to the pic¬ ture plane, its perspective

will be parallel to the line itself. This may be proved as follows:

Given the line X Y in space, parallel to the picture plane P.P. (Fig. 4), and S.P., the eye. Through X Y pass a plane R R parallel to the Picture Plane. Connect A Y with S. P. The plane of the triangle X.S.P.Y. is cut by two planes P.P. and R.R., parallel to each other.

Fig. 2.

Fig. 3.

Hence the lines of intersection on these planes X Y and X' Y' are parallel to each other, that is, the perspective of the line is parallel to the line itself. From Rule I we also deduce: (1) That when a horizontal line is parallel to the picture plane, its perspective is parallel to the horizontal line. (2) That a vertical line appears vertical in perspective. (3) That any surface parallel to the picture plane is represented in perspective by a surface, similar but smaller.

Rule II. — When a line is inclined to the picture plane, its vanishing point may be found by drawing from the eye a visual ray,, parallel to the line, and noting where this ray pierces the picture plane. This may be proved as fol¬ lows :

Given the line O T (Fig. 5), inclined to the P.P., and extending from its intersection with the picture plane at O, to infinity. The per¬ spective of any point of this line is found by drawing a ray from the eye to tha- t point and noting where that ray cuts the picture plane. Assume the points 1, 2, 3, 4, on the given line, receding successively from the

picture plane. It will be seen that the farther the point as¬ sumed is from the picture plane, the more

From Rule II we deduce: (1) That all parallel lines with the exception of lines parallel to the picture plane, converge to, or vanish in, the same point. (2) That horizontal parallel lines with the exception of lines parallel to the picture plane vanish in a point on the horizon line. (3) That lines perpendicular to the pic¬ ture plane vanish in the centre of vision. (4) That horizontal lines 45° to the picture plane vanish either in DR or Z)L.

Problem I. — To determine the perspective of a line perpendicular to the picture plane and re¬ ceding from the picture plane to infinity.

To find the perspective of any line, wo need but find the perspective of two of its points, say the beginning and the end of the line, and connect. Let O T be the line (Fig. 6), O being the initial point in P.P., and T , a point at in¬ finity. O being in the P.P., is its own perspec¬ tive ; T being the infinitely distant end of a line perpendicular to P.P. has its perspective at C.V. (Rule II, Deduction 3). Connecting these two points in the picture plane, we get O-C.V ., the perspective sought.

In Fig 6 we assume the ground plane per- ‘ pendicular to the picture plane. If we are to represent all this on a flat surface, we must turn the planes in such a manner that they form one continuous surface. This is accomplished by turning both front and rear parts of the ground plane downward, till they lie on the same plane as the picture plane; and viewed from the front, . or simply as a picture plane, the work in Fig. 6 assumes the appearance ‘shown in Fig. 7.

Problem II. — T o determine the perspective of a horizontal line 45° to the picture plane and receding to infinity.

Let M N (Fig. 8) be the line lying on the ground, M the initial point in P.P., and N, a point at infinity. M is its own perspective. T will vanish in DL if the line makes an angle of 45° toward the left, with the P.P. (Rule II, Deduction 4). Connecting M with DL, we ob¬ tain the line M-DL, the perspective sought. Re¬ volving the planes as in Problem I, we get Fig. 9.

nearly does the visual ray to that point become parallel to the given line. And if the point T be assumed at an infinite distance from the

picture plane, the ray to that point will be parallel to the line O T. Hence the vanishing point of the line O T is found by drawing from the eye a ray parallel to the given line, and noting where it pierces the picture plane.

We can now proceed to find the perspective of a given point, which we set out to do at the beginning.

Problem III. — To determine the perspective of a point.

Let A be the point (Fig. 10). Pass through it a line 0 T, perpendicular to the picture plane. Its perspective will be O-C.V. (Prob. I).

Somewhere on this line will be the perspective of X. Through the same point X pass another line M N , horizontal and at 45° to the picture plane, left or right called a diagonal. If the angle is toward the left, its perspective will be M-Dl. The perspective of X will be some¬ where on this line too. Being both on O-C.V. and on M-C L, the perspective of X must be at the intersection of the two, namely at X' . Re¬ volving the ground plane downwards we obtain Fig. 11.

prism. Removing the prism and revolving the G.P. downward, we obtain Fig 13. Frequently the plan and elevation of an object have to be drawn before the perspective of that object can be determined.

Drawing to Scale. — Objects to be rendered in perspective are generally so large that their real dimensions cannot be shown in a drawing; hence in such cases, the drawing is made a certain number of times smaller than the real object. The relative proportion between the

Fig. 8.

Fig. 9.

Rule III. — Hence, to find the perspective of any point, pass through that point a perpendicu¬ lar and a diagonal to the P.P.; at the intersec¬ tion of their perspectives will he the perspec¬ tive of the point.

II. The Practice of Perspective.

Before taking up the solution of practical problems, it would be well to know how to find the plan and elevation of an object, and to un¬ derstand drawing to scale.

The Plan and Elevation of Objects. — Let

drawing and the real size of the object to be represented is called a scale. For example, if an object is 12 feet high, and the drawing is made three inches high, the scale is one-forty- eighth, or one-quarter inch to the foot. But to avoid confusion, we shall in the following demonstrations designate and render the size and position of objects in terms of units of measure. A unit of measure may stand for a foot, an inch, or any part of an inch, according to the scale used.

Fig. 10.

us take a square prism for illustration. In Fig. 12, in which both planes are assumed trans¬ parent, let the square prism be placed so as to rest on one of its square bases on the G.P., some distance back of the P.P. If lines be drawn around the edges of the prism where it touches to G.P., we shall obtain what is called the horizontal projection or plan of the prism. And if we draw perpendiculars from every point of the prism to the P.P., and connect points ac-bd-AC-BD, we shall get on the picture plane the vertical projection or elevation of the

Fig. 11.

Divisions of Perspective. — For convenience, linear perspective is divided into three parts, namely, parallel [angular and oblique perspec¬ tive, depending on the position of the object with reference to the P.P. and the G.P.

Parallel Perspective or One-Point. Perspec¬ tive refers to that position of the object which makes use of only one vanishing point (C.V.), and the two distance points (DL and Dn) . Hence it is applied to the drawing of all rectan¬ gular objects when so situated that all their faces are either parallel with or at right angles

to the P.P. A few problems in Parallel Per¬ spective will now be solved. The instruments and materials necessary are : a drawing board, a T square, two triangles (30° and 60°), a pro¬ tractor, paper, a 2H leadpencil, a compass, a

of the line. Through point 3 draw a diagonal to G.L., touching the G.L. at 4. Draw 4 -DL. Point 5, where 4-DL crosses 2-C.V. will be the perspective of the lower end of the line (Rule III). At 5, erect a vertical line until it touches

Problem IV. — Put into perspective a vertical straight line 3 units high , when the -lower end rests on the G.P., 3 units to L. of S. (left of Spectator) , and 1 unit within.

Assume the H.L. 2 units above the G.L. ; and the distance of the eye 4ˆ2 units (Plate I).

spective of the given line.

Problem V. — Draw a horizontal square plane of 2 units edge, lying

on the G.P. with 2 of its edges parallel with the P.P. and its right front corner *4 unit to R. of S., and unit within.

fffgjw'

ProbJZZ

ProbUI

From S mark off on the G.L. the point 1, three units to the left, and draw 1-2, the verti¬ cal projection or elevation of the line. Draw 1-C.V. and 2-C.V. One unit below the G.L, mark point 3, the horizontal projection or plan

Mark off on the G.L. point 7, one-half unit to the right of S, and point 8. 1ˆ2 units to the left of S. Line 7-8 will be the vertical projection of the square. Draw 1-C.V. and 8-C.V. One-half unit below the G.L., draw the square 9-10-

11-12, the horizontal projection. Through points 9-12, draw a diagonal, touching the G.L. at 13. Draw 13-DL, cutting the line 7-C.V. at 14, and the line 8 -C.V. at 16. Construct lines 16—17 and 14—15, parallel to G.L. The figure 14-15-16-17 will be the desired perspective of the square. In many problems we can dispense with the plan entirely. In the last problem, for instance, knowing that the square is one-half unit behind the P.P., we might have measured off directly on the G.L. the point 13, one-half unit to the right of point 7, without the

aid of the plan and diagonal 12-9. The method of finding the perspectives in Problems VI and VII is evident, and requires no explanation.

Problem VIII. — Draw the perspective of a pavement of squares of 1 unit edge, two of the sides of the squares heing parallel to the Ground Line.

Assume the H.L. 2ˆ4 units above the G.L. ; and the distance of the eye 4*4 units (Plate II).

The squares having two of their sides par-

perpendiculars cutting the lines 3 -C.V. and 4-C.V., at points 10, 11, J2 and 13. Connect 10 with 11, and 12 with 13. Make line 7—8, 8-9 and 8-12 dotted. The figure 6-7-8-9-10-11 is the perspective of the given cube.

Problem X. — Draw the perspective of a wooden cross, 1 unit in section, the long beam being 4 units long, and the short one 3 units. The distance from the lower end of the long beam to the under side of the cross beam is 2 units. The cross is standing on the lower end of the long beam with the square end of the cross beam in the P.P. The extreme right corner of the square end is 3% units to R. of S.

Draw the elevation 1 -2-3-4. From points 1, 2, 3, 4, 5, 6, 7 and 8 draw lines to C.V. The square end 5-6-7-8, being in the P.P. is its own perspective. To the left of 1, mark off points a, b, c one unit apart; connect these with DR. At points 9, 10, 11, 12, 19 erect perpendiculars, limited by the lines running to C.V. Accent the visible lines.

Plate II

G /

Prob. VIII

allel to the G.L. their other two sides will be perpendicular to the P.P.

and will therefore vanish in C.V. DL and £>K will be the vanish¬ ing points of the diagonals. Mark off on the GL at 1, 2, 3, 4, etc., distances of one unit each. Through these draw to C.V., lines which are the perspectives of the sides of the squares, perpendicular to the picture, intersect these by a diagonal drawn from any point, as 8,. to £)U; and through the points of intersection, draw lines parallel to the G.L.

Problem IX — Put into perspective a cube of 1 Ya units edge, standing on the G.P. with the front face parallel to the P.P. and its right lower corner 1% units to the left of S., and one-half unit within.

Construct the elevation, 1-2-3-4 (Plate III, Prob. IX), and draw the lines 1 -C.V., 2-LV., 3-C V and 4 -C.V. on the G.L. mark off point 5 1/ unit to the left of point 1. Draw the line 5_Z)L, cutting, 1 -C.V. and 2-C.V. in points 6 and 8, respectively. Through points 6 and 8 diaw the lines 6-7 and 8-9, parallel to the G.L. The resulting figures, 6-7-S-9, will be the base ol the cube. On points 6, 7, 8 and 9 erect

In the perspective of the bridge (Prob. XI) one new element enters which requires ex¬ planation — the rendering of the semi-circular arch. The method of construction is as shown on Plate IV.

To the left of line 1-2, and at a distance from the G.P. equal to that of the arch, con¬ struct the square 3-4-5-6 of 1ˆ4 units edge; in this inscribe the quadrant 3-4-5. Draw the diagonal 3-6, cutting the quadrant at point 7 ; through this point draw a line parallel to 5-6. Connect points 6, 8 and 4 with C.V. In the proper place construct the half square 9—10—1 1— 12; and from point 13 draw the lines 10-13, 11-13, cutting the line 8-C.V., at points 15 and 16. The curve connecting points 9, 15, 14, 16 and 12, will be the required perspective of the arch.

We are now ready to consider the second division of perspective, namely,

Angular Perspective. — This branch of per¬ spective is applied to the drawing of all rec¬ tangular objects that make angles other than right angles with the picture plane. Hence it makes use of two vanishing points, both on

the horizontal line. For this reason it is some¬ times called Tzvo-Point Perspective.

Problem XII. — Making a perspective draw¬ ing of a cube of 1*4 units edge, resting on the G.P., with its horizontal edges vanishing to the right at 60°, and to the left at 30° with the P.P.

lett, at S.P., make an angle of 30°, and con¬ tinue the line until it touches the H.L. at V.P. 30°. All lines in the model inclined 30° to the P.P. will vanish at this point.

Every vanishing point must have a measur¬ ing point (M.P .) for all lines that vanish r.t

ProbJ

Prob.

JX

Plate III. *

7 ne nearest corner on the ground being 1 unit to R. of S., and *4 unit within. See Plate V.

Assume the H.L., G.L. and S.P. (station point). At S.P. to the right, make an angle of 60° with the line D.L. (directing line), and continue the line forming the angle until it touches H.L. at V.P. 60°. All lines in the cube 60° to the P.P. will vanish at this point. To the

it. To find the M.P. for V.P. 60°, lav-off on the H.L. the distance from V.P. 60° to S.P. Sim¬ ilarly find the M.P. for V.P.3 0°.

On the G.L. mark off point 1, 1 unit to R. of S'. and 2, ˆ4 unit to the right of 1. Draw 1 -C.V., and 2 PL, intersecting at 3, the nearest point of the cube on the ground. Draw 3-V.P. 30° and 3-V.P. 60°. From M.P. 3 0° draw a line

Prob XI

Plate IV.

PERSPECTIVE

639

through 3, touching G.L. at 7. Mark off \lA units to the left of 7, giving us point 8, and draw 8-M.P.300, cutting 3-V.P.300 at 9. From M.P. 60° draw a line through 3, touching the G.L. at 4. From 4 mark off on G.L. I1/* units to the right at 5, and draw S-M.P. 60°, cutting 3-V.P. 60° at 6. Draw 9-V.P600 and 6-F.P.300, intersecting at 10, the rear corner of the cube. Prolong 3-V.P. 60°, touching the G.L. at 11. On 11 erect a perpendicular 11-12, 1}4 units high, and connect 12 and V.P. 60°. On 3 erect a per¬ pendicular, touching 12-F.P.600 at 14, and one on 9, touching 13-F.P.300 at 15. Draw 15-V.P.600 and 14-F'.P.30o, intersecting at 16. Construct the perpendicular 10-16, completing the cube. Make lines 9-10, 10-16 and 10— 6f dotted, and accent the others.

The third division of perspective known as Oblique Perspective or Three-Point Perspective refers to that position of rectangular objects in which there are three systems of vanishing lines. It is applied to the representation of

dering of architectural subjects as dwelling-houses, mansions, public libraries, churches, railway stations and theatres in linear perspec¬ tive. It is customary for an architect to ex¬ press his ideas for a proposed building in two distinct ways. At first he produces a series of working-drawings, consisting of plans, eleva¬ tions and sections of the structure, drawn to a proper scale, and conveying precisely the in¬ formation necessary for the builders. But the plans and elevations represent in each case only two dimensions and do not exhibit the natural aspect of the structure from a given point of view. Hence, to supply the deficiency, he also renders his designs in linear perspective.

History of Perspective. — A thorough study of the plastic and graphic arts of the ancient Egyptians and Assyrians reveals the fact that they were absolutely ignorant of all the branches of perspective. The Greeks under¬ stood sculptural perspective, but knew nothing of the linear and aerial phases of <the subject.

lines that make angles other than right angles with the G.P. and the P.P.; for example, in gable edges of house roofs. The work is too complicated and advanced to be taken up here.

Perspective, Sculptural. — Owing to the ac¬ tion of aerial and linear perspective, statues and reliefs designed for positions high above the eye-level naturally appear changed in size, form and degree of distinctness, when viewed from below. For instance, a figure, which looks tall and graceful at the eye-level will appear short and squat above the eye, and a subject, modeled in very low relief, will be vague and indistinct in an elevated position. Therefore, when the sculptor models a statue for a posi¬ tion on the fagade or spire of a church, he deliberately exaggerates the proportions and forms of his subject in such a manner that they will appear natural when viewed from the ground. This forms a special study, known as sculptural perspective. The ancient Greeks un¬ derstood it and used it to advantage in the pediments and metopes of their temples. The works of Donatello, Michelangelo and Rodin also show mastery of this form of perspective.

Architectural Perspective refers to the ren-

It is in the Roman age that artists first became aware of the phenomenon of foreshortening. Thus in some of the frescoes at Pompeii we find positive attempts at rendering buildings in

perspective, although with little success.

The honor of having been the first to solve the problem of linear perspective rests with the Florentine realistic painter, Paolo Ucello (1397— 1475). Its application in his fresco (The Flood) in the church of Saint Maria Novella at Flor¬ ence is quite successful. Following his ex¬ ample, the subject was attacked with enthusi¬ asm by his contemporaries, especially by the architects Filippo Brunelleschi and Leo Bat¬ tista degli Alberti who formulated and wrote down the principles of the science. Alberti's treatise, (De Pictura Libri tres,* formed the textbook on the subject for generations of artists, and is even to-day quite readable.

It was the Dutch and Flemish schools of painting that first introduced aerial perspective in their pictures, as may be seen in the interiors of Pieter de Hooghe, in the architectural paint¬ ings of Van der Heyden, in the landscapes of Hobbema and in the figure pieces of Rem¬ brandt. Later it was adopted by the Italian,

Spanish, English and French schools. The artists of modern times who have especially distinguished themselves as masters of aerial perspective are Corot, Daubigny, Mauve, Israels, Maris and Monet.

Bibliography. — There are very many ex¬ cellent treatises on perspective by American, English, French and German authorities. The most important are Maillard de la Gournerie, J. A. R., (Traite de perspective lineaire) (Paris 1898) ; Lawrence, W. H., Principles of Archi¬ tectural Perspective) (2d ed., Boston 1904) ; Pratt, Robert, Perspective Including the Pro¬ jection of Shadows and Reflections* (New York 1901) ; Seeberger, Gustav, Principien der Perspektive) (7th ed., Munich 1900) ; Spanton, J. H., (Complete Perspective Course) (London 1900) ; Storey, G. A., <The Theory and Prac¬ tice of Perspective) (Oxford 1910) ; Ware, W. R., (Modern Perspective) (rev. ed., New York 1905).

A. G. SCHULMAN,

Department of Art, College of the City of New York.

PERSPIRATION, or SWEAT, the fluid

secretion of the sudoriferous glands (sweat-glands) of the skin. The term perspiration is, however, sometimes used to include all the secretions of the skin, such as those of the sebaceous glands or follicles, *etc.* The sweat consists of part of the watery constituents of the blood, separated therefrom by the sweat-glands and eliminated on the surface of the skin in drops of fluid. The sweat-secretion, in ordinary circumstances, is evaporated from off the skin as fast as it appears. But after violent exercise, when the body is exposed to a great heat, or in certain diseases, the perspiration may collect in greater quantity and appear in the form of visible drops of fluid. The sweat-glands are situated in the subcutaneous adipose or fat-tissue of the skin. Each consists of a coiled-up tube, forming a glandular structure, which is invested by a capillary network of blood-vessels. The tube is continued in a some¬ what wavy course upward through the cutis or true skin. When it enters 'the epidermis it be¬ comes spiral and it continues to ascend through this superficial layer of the skin in a tortuous course till it opens on the surface in an oblique aperture. The duct is lined by epithelial cells, continuous with those of the epidermis itself. The openings of the sweat-ducts are the pores of the skin. The largest and most numerous ducts are situated in the armpit. The palm of the hand is also well supplied. Their number in this situation has been estimated by different authorities at from 2,736 to 3,528 to the square inch. The sole of the foot is also abundantly supplied; and these ducts and glands occur, in less numbers and of smaller size, over the en¬ tire body surface. In the neck and back they number only about 417 to the square inch and the entire number in the body is estimated at 2,381,428. If placed together the openings of the entire sweat-glands would form, it is cal¬ culated, an evaporating surface of about eight square inches ; that is, reckoning each orifice or sweat-pore to present a diameter of one fifty-sixth of a line. The line, as Krause estimates it, is equal to one-tenth of an inch.

The insensible perspiration of the skin is a term used by physiologists to denote the mat¬

ters evaporated from the skin, and which are thus continually being got rid of without being noticed. When the sweat collects in drops on the skin-surface it is termed sensible perspira¬ tion. The primary factor determining the amount of sweat excreted is nervous dilata¬

tion of the blood-vessels ; heat, etc., are only secondary factors. In this respect the skin is unlike the kidneys.

The analysis of sweat has always formed a matter of dispute, chiefly from the difficulty of obtaining the secretion in sufficient quantity to make an exact estimate of its compounds. In ordinary sweat, water, carbonic acid and seba¬ ceous matter may be assumed to be the chief constituents. Thenard, analyzing the. sweat ob¬ tained from a flannel shirt washed in distilled water, found chloride of sodium, acetic acid, ■phosphate of soda, phosphate of lime, traces of oxide of iron and an animal substance. Ber¬ zelius obtained chloride of sodium, chloride of ammonium and lactic acid in sweat from the forehead. Anselmino, in the sweat collected from his own arm placed in a glass cylinder, found water, carbonic acid and acetate of am¬ monia; and from the dried residue or ashes of sweat he obtained soda, in the form of the sul¬ phate, phosphate, and carbonate, potash, chloride of sodium; phosphate and carbonate of lime; and oxide of iron (traces). A certain amount of urea is generally regarded as a normal con¬ stituent of sweat-fluid. Gorup-Besanez says that the general and ordinary composition of perspiration is included under the list of water, fat, urea, acetic, butyric and formic acid and salts — the latter being chlorides of sodium and potassium, earthly phosphates and sulphates, to¬ gether with oxide of iron.

The quantity of sweat evolved from the skin varies according to temperature and exertion from a small value to more than two pounds an hour. The carbonic acid got rid of by . the skin is calculated to amount to about one-fiftieth of that exhaled by the lungs, this calculation ap¬ plying to warm-blooded animals only. In amphibians (frogs, etc.), in which the skin plays a more important part in respiration, the amount of carbonic acid exhaled is much greater than that above stated to occur in warm¬ blooded animals. A frog, the lungs of which had been cut out, generated by its skin one-quarter cubic inch of carbonic acid in eight hours. The amount of watery vapor secreted by the skin has been roughly calculated to amount to double of that exhaled by the lungs in the same or during any given time. The entire subject of transpiration by the skin shows how very closely connected is that func¬ tion with respiration and excretion by the kid¬ neys. The skin of man eliminates about as much water as the kidneys, but much less solid matter. Perspiration is essentially not an ex¬ cretory, but a heat-regulating function. See Respiration ; Skin.

PERTH, Canada, county-seat of Lanark County, Ontario, situated on the Tay, and the Canadian Pacific Railway, 50 miles southwest of Ottawa. It contains a public library, col¬ legiate institute and fine

municipal buildings. There are also foundries, machine shops, sash and door factories, mineral water works, felt and carpet factories, knitting mills, boot and shoe factories, *etc.* Pop. 3,588.

PERTH, Scotland, city, capital of the county of the same name, and a great railway junction on the right bank of the Tay, here ciossed by an elegant bridge of nine arches, a steel girder bridge (1900) and a railway bridge, 43 miles north-northwest of Edinburgh.

The town is laid out with considerable regu¬ larity, and contains several spacious streets, handsome terraces and crescents. The public buildings include the municipal building, a handsome edifice in the Tudor style; the county building, an elegant Grecian structure facing the Tay ; the penitentiary or general prison, the .city and county infirmary, the Royal Lunatic Asylum, finely situated on the north side of Kinnoull Hill; the public hall, in the Scottish baronial style; the handsome new post office; the Academy; Sharp's Educational Institution and various other schools ; the attractive build¬ ing of the Antiquarian Society, called Marshall's Monument, which contains a public library in addition to the museum of the So¬ ciety; the Sandeman Public Library; the rail¬ way station, one of the finest in Scotland, *etc.* Among ecclesiastical buildings are Saint John's Church, an ancient structure in the pointed style, with a massive square tower, terminat¬ ing in a spire, originally forming only one church, but now converted into three parish churches; Saint Paul's, also a parish church, of modern erection, with a lofty steeple; a handsome Episcopal cathedral and other churches.

Of industrial establishments the chief are large dye works, iron-founding and engineering industries, textile works, rope and twine (the great staple industry). There are also bleachfields. The shipping trade is small. There are extensive auction sales of cattle and other stock. The North and South Inches form beautiful public parks.

Perth was formerly known as Saint Johns-toun. It was created a royal burgh in 1210 by William the Lion, and the Scottish Parlia¬ ment

repeatedly assembled here. Among the most remarkable events connected with it are its capture and the carrying off of its records by Edward I of England in 1298; the bloody conflict on the North Inch between Clan Chattan and Clan Kay (1396); the murder of James I in 1437; the various events connected with the progress of the Reformation; the Gowrie conspiracy or Raid of Ruthven in 1600; the capture of the town by Montrose in 1644, after his victory of Tippermuir ; its capitula¬ tion to Cromwell in 1651, and . its occupa¬ tion, first by Viscount Dundee in 1689 and afterward by the Highlanders in 1715 and 1745. Scone the ancient place of coronation of the Scottish kings, is in the immediate neighbor¬ hood. Pop. 35,854.

PERTH, Western Australia, the capital of the state, on the Swan River, 12 miles above the port of Fremantle, which is situated at the mouth of the river. A macadamized road, con¬ structed by convict labor, connects Perth with Fremantle, and there is also regular communi¬ cation by water and rail. The city is built on a slope, washed at its base by a lake-like ex¬ panse known as Melville Water. The stieets are regular and moderately wide. The prin¬ cipal public buildings are the city hall, the chambers of the legislative council of the state, VOi. 21 — 41

an assembly room and offices, two cathedrals, one Protestant and one Roman Catholic, a hos¬ pital, government offices, pensioners' barracks, a handsome mint, a fine new music hall, a mechanics' institute containing a museum, the Victoria public library, art gallery, government house, the high school, government and Roman Catholic schools and some handsome hotels and private residences. The waterworks are municipally owned and there is a good tram¬ way system. A university was established in 1912. Pop. about 55,000.

PERTH, The Five Articles of, a measure, passed in a general assembly of the Church of Scotland, convened 25 Aug. 1618 at Perth by the order of James VI. The first required communicants to receive the elements kneeling; the second permitted the celebration of the Holy Communion privately in case of sickness; the third allowed private baptism on sufficient cause; the fourth required that children of eight years should be confirmed; and the fifth enjoined the religious observance of Christmas Day, Good Friday, Easter Day, Ascension and Whitsunday or Pentecost. These articles were accepted by the Estates in 1621, but were op¬ posed by the Presbyterians of Scotland as an undue interference with the very constitution of the assembly. These

articles became the source of much serious dissension between king and people, and in the general assembly held at Glasgow in 1638 the assembly of Perth was declared to be unlawful and null, and the Five Articles were formally condemned.

PERTH AMBOY, am-boi', N. J., city, port of entry, in Middlesex County; on Raritan Bay, at the mouth of the Raritan River, and on the Central Railroad of New Jersey, the Staten Island Rapid Transit, the Lehigh Val¬ ley, the New York and Long Branch and the Pennsylvania railroads, about 15 miles south of Newark and 21 miles in direct line south by west of Battery Park, New York City. It has extensive shipping interests on account of its good harbor. In the vicinity are valuable de¬ posits of fire-clay. The first white settlement was made about 1683 at the site of an Indian village called "Amboy.® The settlers were from Scotland and they named the place Perth, in honor of James, Earl of Perth. Soon after the Indian name "Amboy® was added. It was the capital of the province nearly all the time it was held as a colony of Great Britain. In 1776, William Franklin, the last British gov¬ ernor of the province, was captured here. It is a commercial and industrial centre of im¬ portance. The latest industrial census re¬ ported $61,814,000 invested in industries; the cost of materials used was reported as $135,- 745,000, and the value of products $148,960,000. There were 128 industrial establishments em¬ ploying 10,556 persons, of whom 9,202 were wage-earners, who received $4,906,000 in wages, an average of $533 per wage-earner per year. The sum of $1,849,000 was paid in salaries to 1,252 salaried employees, a total of $6,755,000 for all services, while $13,215,000 was the amount added by manufacture to the raw ma¬ terials. The war stimulated the city's indus¬ tries very greatly, the above figures being dwarfed during the years 1917 and 1918. The chief manufacturing establishments are large lead and copper smelting and refining plants,

shipbuilding and repairing yards with dry docks, emery mills, brick, terra cotta, fire brick, white ware, drain pipes, handkerchiefs and un¬

derwear, corks, cables, iron and steel works, chemical works, cartridges and munitions fac¬ tories, copper works, and railroad shops and yards. There are about 9,000 employees in the manufactories. The city has a high school, public and parish schools, a public library, one daily and three weekly newspapers. The three banks have a combined capital of $500,000. The city owns and operates the waterworks and an electric-light and power plant. Pop. 41,707.

PERTHES, per'tes, Friedrich Christoph,

German publisher and patriot : b. Rudolstadt, 21 April 1772; d. Gotha, 18 May 1843. After an apprenticeship of six years with a bookseller in Leipzig, he went to Hamburg in 1793, and in 1796 established himself ther'* in the same business. In 1810 he initiated the patriotic publication known as The ISlational Museum , to which men of eminent intellectuality were contributors, in an effort to arouse the patriot¬ ism of the People. On account of this ardent opposition to Napoleon's extension of power he was obliged to leave the city when it be¬ came a part of the French empire, and he remained in virtual exile until 1814. In 1821 he sold his interest in the business to his part¬ ner and moved to Gotha and founded there a prosperous publishing business, chiefly of his¬ torical and theological literature. In his ex¬ tensive correspondence with men of note he accumulated a most valuable collection of auto¬ graph letters. An uncle of his, J. G. Justus Perthes, was the founder of the firm Justus Perthes of Gotha, celebrated later as the pub¬ lishers of the famous geographical work (Petermann's MitteilungenP and of the (A1-manach de Gotha. }

PERTINAX, per'ti-naks, Publius Hel—

vius, Roman emperor : b. Alba Pompeia, in Liguria, 126 a.d.; d. Rome, Italy, 28 March 193 a.d. He was well educated, entered the army and distinguished himself in the service, at¬ tracted the attention of Marcus Aurelius who elevated him to the consulate in 179. He was in command of the legions which crushed the revolt in Syria, was governor in turn of Moesia, Dacia and Syria, and under Emperor Corn-modus was placed in command in Britain. Later he became pro-consul of Africa and finally prefect of Rome. He was banished with others on suspicion of having been con¬ cerned in a conspiracy against Commodus; but on the death of the latter he was pro¬ claimed emperor by his soldiers, 31 Dec. 192 and immediately, set about forming a govern¬ ment which was to reform the abuses counte¬ nanced by his predecessor. He was well re¬ ceived by the senate and the people, but owing to the treachery of Laetus, prefect of the Prae¬ torian Guard, who feared the loss of his own supremacy, Pertinax

failed to retain the con¬ fidence of the Guard and was assassinated by that body three months after his accession.

PERTURBATIONS, in astronomy, devia¬ tions in motion of planets or comets from their fixed orbits or from the regular velocity in those orbits. They are regarded not as draw¬ ing the planets out of their orbits, but more in the light of change in elements of the orbits themselves.

PERU, Ill., city in Lasalle County; on the Illinois River and the Illinois and Michigan Canal, and on the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy and the Chicago, Ottawa and Peoria interurban railroads, about 100 miles southwest of Chi¬ cago and 55 miles northeast of Peoria, five miles from Starved Rock and five miles from Deer Park, and at the head of navigation on the Illinois River. It was settled in 1827 and founded as a village in 1834. It was granted a city charter in 1852. In the vicinity are relics of the Mound Builders. Peru is in a locality favorable for manufacturing; large bituminous coal fields are near, and deposits of white-sand rock and cement rock. The chief manufacturing establishments are foundry and machine shops, planing mill, fer¬ tilizer works, grain elevators, clock factory, nickeloid works, zinc-rolling mills, scale works, plow and wheel works, furniture factory, shirt factories, acid factories, zinc smelters, nail and glazier paint factories, novelty works, weather-strip factories, implement factories, cigar and tobacco factories and furnaces. There are several wholesale houses. The city is the seat of Saint Bede College, opened in 1891 by the Benedictine Fathers, and it has public and parish schools and a free library, non-sectarian hospital and one of the very best hotels along the whole valley and large parks. The city owns and operates the electric-light plant and the waterworks. Pop. 8,869.

PERU, Ind., city, county-seat of Miami County; on the Wabash River, and on the Chesapeake and Ohio of Indiana, the Wabash, the Lake Erie and Western railroads, about 74 miles north of Indianapolis. Electric lines run to Warsaw, Indianapolis and elsewhere. It was settled in 1827, in 1834 was laid out as a town, and chartered as a city in 1852. There is a municipal park on the river and an amusement park nine miles away. It is in an agricultural section of the State, and is the commercial centre for a large extent of country. The chief manufacturing establish¬ ments are confectionery factories, glass works, steel works, wagon and carriage factories, woolen mills, carbon works, bagging and basket factories and railroad shops. It has a large

trade in its own manufactures and in farm products. The city owns and operates the elec¬ tric-light plant and the waterworks. Some petroleum is found near by. Pop. 12,561.

PERU, Balsam of. See Balsams.

PERU, pe-roo' (Sp. pa-roo'), Republic of, a country occupying a part of the western side of South America. Its boundaries touch on the north, Ecuador and Colombia; on the east, Brazil and Bolivia; on the south, Chile; on the southwest and west .lies the Pacific Ocean, with a coast line of 1,350 miles. The location of" these boundaries has been the source of many and serious disputes, which have in recent years been gradually settled through peaceful arbitration — with Colombia in 1909; with Brazil in 1910, and with Chile in 1912. The controversy with Ecuador, involv¬ ing an area of about 100,000 square miles lying about the headwaters of the Amazon, was in a fair way of being settled when the European war broke out, but has been indefinitely post¬ poned. No thoroughly reliable surveys of the

eastern district have ever been made. Esti¬ mates of the total area are, therefore, naturally far apart, but the total area claimed officially (1919) is 679,600 square miles.

Political Divisions. — In 1917 the country was divided into 19 departments and three provinces. The accompanying table shows their areas, and population figures as officially esti¬ mated in 1896; since which there has been no attempt at enumeration. The British foreign office in 1908 estimated the total population at 4,500,000, and this corresponds very closely with the figures in the table and bears out the opinion of travelers that the population of Peru is stationary. In the Peruvian census of 1876 — the latest taken — -the population was made up of 13 per cent white persons; 1.9 per cent negroes; 57.6 per cent Indians (South American) ; 24.8 per cent mestizos (Cholos and Zambos), and 1.9 per cent Chinese and other Asiatics. These figures are considered approximately correct at the present day. The 18 departments in turn are subdivided into 102 provinces.

and eastern ranges show through their whole extent peaks of great height (16,000 to 22,000 feet), the crowning summit, Coropuna, reach¬ ing 22,900 feet, and the twin-peaked Huascaran, 22,240 feet The heart of the. sierra, where Inca semi-civilization arose, is in a compara¬ tively limited section, extending about 380 miles from south to north, between the great transverse ridge of Vilcanota and that of Cerro de Pasco. The main natural features of the Montana are the rivers Maranon, Huallaga and Ucayali, each of these being navigable, and all uniting to form the stream which here is called the Solimoes, but on its lower reaches, the Amazon. The sources of the first two are in the interior of the Sierra. On the other hand the southern portion of the Montana forms its rivers on the eastern slope of the Andes, and sends them as affluents to the Madeira system. The most important of these are the Purus, Madre de Dios and Beni rivers. The absence of rain on a large part of the Pacific Coast is due to the fact, mentioned in the article South America (q.v.), that the

DEPARTMENTS

Area

(square miles)

Population

Capital

Population

13,943

16,562

8,187

21,947

18,185

12,538

156,270

70,676

428,703

177,387

229,007

302,469

442,412

Chacapoyas .

4,000

Hararaz .

17,000

Abancay .

3,000

Arequipa .

35,000

Ayacucho .

14,346

Cajamarca .

12,000

438,646

Cuzco .

15,000

9,251

223,796

Huancavelica .

4,000

14,024

8,718

23,347

145,309

90,962

394,393

Huanuco .

7,500

Ica .

10,000

Cerro de Pasco .

15,000

4,614

124,091

Chiclavo .

13,000

10,206

250,931

Trujillo .

15,000

13,310

298,106

Lima .

143,500

288,456

100,596

Iquitos .

12,000

24,747

16,825

16,000

Maldonado .

3,500

213,909

Piura .

14,000

41,198

537,345

Puno .

6,000

NATIONAL PROVINCES

14

48,118

Callao .

34,346

5,549

1,980

709,871

42 , 694

Moquegua .

5,000

8,602

4,574,608

Tumbes .

Total .

Topography and Hydrography.— The Mari¬ time Cordillera, rising about 20 miles from the coast, and the great ranges of the Andes farther inland, divide Peru into three principal regions: (1) The central, called the tierra, in¬ cluding the parallel chains of mountains — the Maritime Cordillera, Central Cordillera and the Andes — together with transverse ridges, table¬ lands, deep gorges and intermediate valleys; (2) the Montana, all that territory lying be¬ tween the eastern Andean slope and the Bra¬ zilian and Bolivian frontiers; (3) the coast region, a practically arid belt about 30 miles in width along the Pacific, with oases along the 46-river courses crossing it. In the Sierra the mountains of the western section are vol¬ canic, while those of the east have an en¬ tirely different geologic history. To the former are ascribed the violent earthquakes which have so often afflicted the country; the latter are famous for their past and present pioduction of gold and silver. Both western

prevailing winds from the east lose all their moisture in passing over the Andes. Fogs and mists, however, are the source of very heavy dews, which are sufficient in many places to sustain a growth of grass. Forty-six rivers rising in the central or western Cordilleras, make their way to the ocean across this desert, their waters in some cases being utilized to irrigate the great sugar plantations in this coastal plain. The principal lakes are Titicaca, 12,545 feet above sea-level, now about 130 miles in length, but formerly much longer, and from 40 to 60 miles in breadth, its southern por¬ tion extending into Bolivian territory; Arapa; Umayo; Chinchaycocha, 36 miles long and 7 miles wide, and Parinacocha, 12 by 6 miles.

Climate. — The line of perpetual snow is usually about 16,400 feet, though in some situa¬ tions only 15.400 feet, above sea-level. The elevated plains stretching between the moun¬ tain peaks are often exceedingly cold; the climate of the numerous deep valleys, however,

is tropical, and that of the intermediate slopes temperate. The rarefied atmosphere of the cooler uplands is healthful in certain respects only. Tropical conditions prevail on the lower altitudes of the Montana and in the coast region, but with a marked difference: the former is exceedingly rainy, and the latter, from November to April, has no rainfall what¬ ever, although the humidity is high — 72° to 84°. By a law of 22 Dec. 1916 the govern¬ ment made provision for a vigorous campaign against malarial conditions throughout the country. The work involves the treatment of patients, the protection of people in regions where the disease is endemic, the destruction of insects transmitting germs and the drainage or special treatment of swampy lands. In con¬ nection with the campaign quinine is admitted free of all duties.

Flora and Fauna. — The coast region is treeless except for the mesquite and the Aus¬ tralian eucalyptus, which have been success¬ fully introduced in some sections. The great forests which cover two-thirds of the entire area of Peru lie in the Montana division. They contain an untold wealth of tropical timber trees of the most valuable woods : ebony, ma¬ hogany, cedar and other cabinet woods, besides dyewoods, innumerable rubber trees in several varieties and many wild olive trees. The cin¬ chona tree, from which quinine is obtained; the sarsaparilla, vanilla and host of medicinal plants are characteristic of the Montana. Fibrous plants abound and there is the greatest profusion of flowers, among them orchids, begonias and calceolarias, which are native here. In fact the Peruvian Montana can show specimens of every tree and plant known to South American -botany. The Sierra is. said to be the original home of the potato, which is still found here in a wild state, but too bitter to be edible. The Sierra section is very rich, in fodder grasses and has many of the familiar trees and plants of the temperate zones of other countries. The fauna of the Montana includes the puma or cougar, the jaguar, the armadillo, the tapir, the peccary, the anteater and the manatee or sea-cow, and 30 species of monkeys, besides a great variety of small ani¬ mals. Snakes, boas and vipers abound, and so do alligators and turtles. Parrots, flamin¬ goes and a multitude of smaller tropical birds, butterflies, moths, beetles, flies and mosquitoes inhabit the forest. In the Sierra are found the characteristic group of wool-bearing ani¬ mals: the llama, alpaca, guanaco and vicuna. The two former are

domesticated; the other two roam wild, the guanaco in herds of .500 or more. The vicuna has been diminishing so rapidly that it is now protected by law. The fur-bearing chinchilla and several other rodents are denizens of the Sierra. The birds of this section are the familiar robins, flycatchers, finches and phcebes of the temperate zones, with partridges, ducks and geese, and the great condor of the Andes. In the coastal region there are lizards, scorpions and tarantulas. Seals visit the coast in large numbers and cod, haddock, mackerel, sole, plaice, flounder, smelt, lobsters and shrimp, are plentiful in the coast waters. Among birds are the alcatras and gaviotas ; and the gulls, terns and other marine species, in great numbers, frequent the small islands near the coast.

Agriculture. — Sugar is the most important crop grown and is cultivated mainly in the river valleys of the coastal section, chiefly in Lam-bayegue, Libertad and Lima. The largest sugar estates are in the Chicama and Canete valleys. In 1916 the plantations covered 100,650 acres and gave employment to 23,456 persons, and the total production was 304,229 tons, of which 263,480 tons were exported. Cotton is cultivated on a large scale, the area in 1916 having been 139,087 acres. Several varieties are grown, but the main crop is of the Peruvian and the long staple Egyptian cotton. The former grows into a tree-like shrub, from 10 to 16 feet in height, begins to bear when eight months old and con¬ tinues production for six years. The cotton area lies in Piura, lea and Lima. Coffee is -grown principallv in central Peru, in the Chanchamayo and Perene districts of Junin and the Paucartambo district of Cuzco ; the Huanaco district, and the Choguisongo and Carabay districts of Puno. Indian corn, which is indigenous to South America, thrives in all parts of Peru below the frigid tablelands. The district of Chancay alone produces annually 10,000 tons. Cacao grows wild in the Montana and large plantations have been set out in Cuzco and Junin. The great native groves of rubber are on the eastern slopes of the Andes and in the region bordering the large rivers of the department of Loreto. The supply is so abundant that only one-hundredth part of the trees can be used. The rubber production amounts to more than 6,000,000 pounds an¬ nually. Coca is found wild in the forests, but there are also cultivated plantations, the largest in the Otuzco district. Cocaine is manufac¬ tured there and in Lima. Wheat, oats and barley are grown in perfection in the higher levels — between 5,000 and 11,500 feet eleva¬ tion. Rice succeeds along the coast, principally in Lambay and the Pacasmayo valley in La Libertad. The annual production (1917) is over 46,000 tons. Grapes thrive in the coastal val¬ leys, and there are

several extensive vineyards where excellent wine is made. Olives also are of the finest quality and yield 30 per cent of oil, but are not largely grown. Other agricul¬ tural products are : Manioc, yams, tobacco, wax, honey, ramie., *etc.* Stock-raising, both of cattle and sheep, is carried, on through the entire length of the country in the Sierra sections up to an elevation of 13,000 feet. Swine breeding is. a considerable industry in the Chancay dis¬ trict. The wools of the alpaca, sheep and llama are grown for export as well as domestic use, the value of the exported wool reaching $2,500,- 000 a year. Other products of the stock-raising industry which add to the exports of the coun¬ try are hides, goat skins, horns, parchment, tallow, lard and horsehair.

Mineral Resources. — A late report of the Department of Fomento (Development) of the Peruvian government contains the following in¬ teresting statement : <(The chronicles of the dis¬ covery and exploitation of Peru's chief mining zones during the colonial epoch make the most important chapters in the history of that period. The development of this industry was stopped, first, by the abolition of compulsory Indian labor, and, secondly, by the revolt of the In¬ dians and the prolonged war for national inde¬ pendence… . Later, the easy and sure ex-

Pta.Mt

80°

Carua 'Sta. Anna Marabitanas\

ipe$ I * s/ Marcellino

f. Lake La Cucha

IAHYABYS

Atacai Pta. Galera

Muisrit

jJauarit <

‘Guiˆ, Felippe |

Zapotal

Guames

‘Juquira

Panoret-2.

Sta. Anna

Pedernale

EQUATQR

Isabel

Equator

Castanˆgiro

Concepcion’

Bahia Carat ;

Tl omar

[‘p Ant IsanaCˆol CotopaxiCV.ol .pld.-SSuA »0-VK-Vr,,„. «A

ENCABELLADOS

iCoca

Napo Ahuano ˆˆZAPAROSˆ

Canelos

Taboca

NvTflolmmba ＞)oT -§Hs«ngajtV＜l

AwSiOa /

S. Antonio de.M irapi

Sapp

lti Parana

Fortaleza

Peguaa

Andoas

Thermopylae i. Pass I

Lake

nana

Andrea3

Ambrasio

■Jˆonaptjns oanto Aˆntonio

Arabella

iPiuches

f Lake A C\ tpeia

\ Caicaracfc . Nogneira

Oran

Best acamen\yo Iquitos- -\

Maraua

Roearlo

Matura.

JZorritpJ Punta d© Bap#’

Mancorjˆ*5

Cape;£ˆ

Blanco]

.Cabalfo’Qocha

Joannico

Mancallacta

NanaV

ˆazron

Nazareth/

i\ TUCALES \S Rimct\h tima

ij A-

Catauixi

Nauta.

[oirVf o] a serichf

Parinari

c

SanˆIgnacloVj f-s

Sullana

:ntonio’

rarinaS

ˆPajjayatQ ; Jeyeroa

‘*T La Laguna* Sta. Ci-U2Acu

Pampas

-Pucacura ->

Lake yfarimari.

Catacaos

PAM MARYS

Combos

iSguos

.# >Woyobambj

■ y \ % ATChabhapoyti*

*P° llualgiy vc0＝J^$^SJb

aCaJSu lorcft^

\, Sta. j Catalina

Louo* oe Tier in

Cigano

Co»»in

MAMORYS

£?© ^Tarapoto- % s -A N

M’-A R T l£r.N fi #5＞ ^chlras s,otP^\ \ . PizanaV^.

MorropesI

MoaS®.

{Choauta

Aguas terijfal.es

Puerto Chandles# o

Labrea

JAMAMADYS

Pauynim

’Roaboya.

Quicia t

,0tOWBˆˆ

Chucnriam

HYPU.RiNAS /

‘Huanchac

Tooach’tj

»ilak«ˆˆPv -Tayatob* /U

JSacram

■ h.** v2p£Uw’‘vN* H“aS™ch u co h

Huanape

Maparai

/y\Falls

Chim bolew Samanc6?w Casuia’

‘Q Puerto Gibbon

‘ CARIF

Madeira

Huaraz\

Recuay’

Cuinaria 1

f I R 0 S

AbMna

RUPURUCURUS

Cachoeira J Esperauza

Culebravl

Huarnieyj

uanucoˆJ Poziizo ,

y%uhiii\up ‘2 S =’ j 1 Chlqui^^feˆ

Xrˆ>c

k Vuelta / pdcl>I)iablo’

:>-Palcar.a’ Pto. Tuokeiˆ

[Villa Bella

l MAT

Gua-j dj’a-Mirim.

t

R -Abra ‘

Paraisoˆ

‘CAM PAS

Pativ ilclCvˆgpCer r S u S A J on

Huuai aVjaL>— >o_. H uaclitjtV sbjId’** Pta. Baja^^N. /

Ht AURA I A LA >

Chancaw(p Puerto AncoiK\

r Orton, Monteeristo

mAP

u Jam feoncewlon

r 1 • 1

irenzo ˆ Can taro

Chandlej

r*～&c”

Riberalta

l*rovldcnol» lga-v:-”’ t***-Jg-

“HuayUip

PuertooRico A 1 •Costa Rica -S°r’

Xrˆhwujj*™ 1

\ Cai-men r

Puertodhaudlesj

ABARIS

‘Tpnquini

vˆfeˆ.Jaujaisp \/ˆV. latueaga … ‘■ ’ˆConoepcluaMˆ

Filadelfia

Sax Lorenzo IhlanDˆT’ˆ j Barrabcoot

ChorrUVvyT’

Pachaca

Ctalf

l™P*%R6sa}in*<}>%

\ / ; Lake

! (Roguaguada \

Natividad

u an caj 0 h A r«

‘l3\l 0 Tireo*’

“ A. PampagN ‘ ‘ ‘ isv |

jˆ‘jˆAcobambiˆ iancavT-liea

fnchura

Vasques

Cerro Azm

Cane’ˆSˆcˆ

Chlnchaˆ Ua Tain bo de Molw1 Chinch a iBLAsi’SˆyAyjry;

PiKCO WlL

San Gau.an Irlam > ©(ˆ/\ p Pa RAC AS l > ENIX8 0CWP.-j-4JS

V iejas

Jndepetrdentia BSftuLj

/Ajaeuefiˆ V

U’aras

Exaltacipn’

‘TJruoambR

Paucartamboi

SJRamonj

Lake Rogagua

‘ Andah ui v la Ab»ncay\0 \ q Tambobamba

fAPURIˆAc

ˆMQjJCliO y C hallhuan5»y M wnart

Dolorel

(AComayo’

Tumut>/sa gta\

O <

,»*■«” SˆReyes .

Concei

dcIBauraa

e- ‘JlˆMapusani ˆSˆndlaˆ ˆ

qtflpr C r uoero %\ <#* ˆ a.

ˆVilcanota Cololo PeeJii-a pel« ˆ.590/ I 17,6140Vt \ Axangiro ˆ

? uv n \ 0 /yh?

: PUOarai(<ˆ jlluancun;-ˆ

kffir*a7ˆU _ 1;ˆ

Trinidad

\0 S.Javier

JL 0 Loreto

Pta. Dona Mar

Sto-Tj rnaa l gt

\ Caporaqne0/

Am-mW^umts,

Apolobamba

8. jlgnacioo

)s“Jp“IW

t j Cotab liasi Coricor. ˆ (pˆ V:

f ‘ ‘P«n|\ai:ulca

A7 vPi ea

Kytirivelt’, T＝7oWjCha＜;ˆ-

55/) Chuqu.ˆmb. TV /Jha”

ˆi/npci cfe’

Mapiri

” Tliu°«W /

‘ Strata n ” J . ˆ.Mt. Sorata((lli

■omaSˆy -A

. /%＜

Antiquipa:

lluachi

OS ISLANDS

d?uno

Cbuouito

UADOR)

/Corojcb

[Huaini Rotosi _) VJif 21), 500 TChulumi

janaZˆ

Scbllll i

►con;

Camana!

Abingoo:

QuiloaxJ.lay

Molleiid-okˆ

Mejiaˆ; Cocotea de Jest

%:;wT’y

JToweb

ˆ */ ’oV Marochata jChimore 1 iLJbˆtileibl \ © ‘ SAfoe _ l

WgwW Cerro tunari 1„1SP»rA»

lapadarlrf ? > Kr °clj“ Tofoii’

’ii.tupaca Vol. < lanjaraie 18, 95ˆ’

GS»! !•’,

NaruoiIgcui £lizcfoet/r ALBEJ Pf. (ffr

ChllWOJlll’BIˆ

rt. ˆ

\Bibosbo s / \ ˆ ˆdVtacbueldi a

j* o }s_

Ita. Cruz oj

0 R ‘& JZ

ˆajnaypbtaˆ

Pacochttˆ-‘ , de C°WS%. Buenavista’

ChAcanlla1

ˆAjTIGABLˆ

Tacorj

‘•wL Shn Pedro e e j

PWi C < Jqu.oh,c.ˆZ“ > » <

of Ik-. Q

CˆYocallA

-? ; coUˆ.,7ˆ4ˆ7

barring:

UI CO j

Jqrquˆ

ib&u&jr ■ 0 vTi

‘A～.

‘Caˆza t >)

Cl»A*LC < ˆˆv j (FLOREAxV)SGardner (M

jidainarcav

&&a

Padilla

‘in a (fa de

\Cqipasa~

ˆLRgunillas

iauces

TticS”

{fPampa |

Pampas

de

p Toropalca’T7

“■rj7 pppip.

E Tumusla

SaladaUy uni

r:\ l>ˆX Sta. Elenas. 7(fii I* LomaVˆ

[mpeza

ˆCama\po

Atocba ” “ /

S*iet«0 Cotagaita i’ˆsˆSan Tinwnte \T 5fc ˆˆˆˆTupiza/ Antonio ˆv1

ˆamataqui, P l<

Crist ovaL

icdpcion

Cerro

/ Licarfcaurˆ oL y ol‘9;:500ˆMˆlff

.ˆMt. Incahuai

C.

S. Lorenzos - ..

Plata L « 6 v / ftj’

Jipijapaˆ * J

Salanoo Valdivil

Punta/^^y ˆ U A

Sta.Eleu5vSta.Elena>’

yaqu.

Canal del Morri

Puna

Gulf of Guay aqu)

ON THE SAME SCALE

ECUADOR, PERU and BOLIVIA

AND

WESTERN PART OF BRAZIL

SCALES

Statute Miles, 140 = 1 Inch.

0

25

50

100 150

200

800

0

50

100

Kilometre*, *225

200

= 1 Inch.

300

400

500

FOR EASTERN PART OF BOLIVIA SEE MAP OF BRAZIL

Rand-MoNall/‘o 11 x 14 Map of Ecuador, Peru and Bolivia.

Copyright by Rand-McNally & Co.

ploitation of the fabulously rich guano deposits rendered it unnecessary to risk capital and spend energies in the hazardous and difficult mining industry. When the guano deposits be¬ gan to be exhausted, the men who had been en¬ gaged in that industry turned

their eyes toward the rich mineral deposits of Peru and resolved to encourage their exploitation. The founding of the School of Mines in 1876 and the passage of the Mining Law of January 1877, which made the holding of mining property perpetual and irrevocable (contrary to the practice under the old Spanish codes), caused a renewal of this great national industry. Even with the meagre development of the present, the mineral resources of Peru have been shown to be of remarkable variety and prodigious extent. The minerals which have 'begun to figure substan¬ tially in the export trade of the country are few in number. In 1916 the list included the following: Copper, 96,968,000 pounds; value, $24,000,000. Petroleum, 400,794 tons; value, $7,500,000. Silver, 11,835,168 fine ounces; value, $6,661,000. Vanadium ore, 3,801 tons; value, $1,380,000. Gold, 67,264 fine ounces; value, $1,239,000. Tungsten ore, 576 tons; value, $1,- 089,000. Coal, 320,000 long tons ; value, $793,000. Lead, 2,246 tons; value, $156,000. There were also reported small values in antimony, molyb¬ denum, zinc, quicksilver, borax and salt. Other minerals known to exist in considerable quanti¬ ties are nickel, bismuth, cobalt, iron manganese, magnesium, graphite and sulphur. Besides these there are large deposits of marble, por¬ phyry, jasper, jade, alabaster, gypsum and kao¬ lin. Copper is found chiefly in the region from Cajamarca to Cuzco. The predominant ores are grey copper and iron pyrites, carrying per¬ centages of both gold and silver. The largest smelter in the country is at Cerro de Pasco. It has a capacity of 500 tons of ore per day. Petroleum is found in quantity over a large area along the coast, in the province of Tumbes, and the department of Piura and Lambayeque. The most prolific districts at present are those of Talara and Lobitos. Silver is extremely abundant on the eastern slopes of the Andes throughout the whole Peruvian section. The most famous silver district is that of Cerro de Pasco, in Junin, which has produced since 1630, when the Spaniards took possession, about 50,000 tons of silver. The principal ores are oxides, sulphides, and argentiferous galena. The largest lode known in the country is that of Carahuaca. Vanadium is found abundantly near Cerro de Pasco. Gold is found chiefly in veins of ferruginous quartz, accompanied by silver and copper. It is also found in the form of nuggets, and scattered through alluvial de¬ posits, particularly in the provinces of Sandia v and Carabaya in Puno, and Quispicanchi in Cuzco. The lode mines have been practically neglected. Coal exists in Peru in vast quanti¬ ties in all sections, and in all forms — anthra¬ cite, bituminous, lignite and peat. The fields being worked are in Anca[chs, Huaigavoc and Cajamarca, but the total output is relatively insignificant. Lead is found plentifully in all the silver-bearing sections. Nickel exists in San Miguel and La Mar; bismuth in Junin;

molybdenum in Jauja; cinabar in Huancavelica ; borax in Arequipa, Moquegua, Tacna and Puno* and sulphur both in the coast region and in the Sierra. The guano diggings have

diminished from the former prodigious output of 300,000 tons to about 60,000 tons per annum. The mining possibilities of the country are still practically undeveloped. While upwards of 10,- 000 mining claims are on record, only about 1,200 are being worked at all, and very few of these with any show of energy. The most serious obstacles to mining in Peru are the great altitudes at which the ores are found — 8,000 to 12,000 feet — and their inaccessibility owing to lack of railroad facilities.

Commerce and Manufactures. — The value of exports from Peru, as shown in the report of the department of finance, has increased steadily with slight fluctuations since 1897. For the year 1916 the exports were valued at $82,- 705,315 and the imports at $43,415,750. Before the War Great Britain's trade with Peru was much greater than that of any other country and in some years even greater than that of the United States, Germany and France com¬ bined. But these conditions are changed, and in 1916 the United States bought more than 60 per cent of the total of Peru's exports; and supplied nearly 60 per cent of her imports — about four times as much in both cases as any other country. The imports from the United States for the year ending 30 June 1916, were valued at $25,500,000 ; and exports to the United States at $52,000,000. The chief imports and their values in 1916 were : textiles of wool and cotton, $4,250,000; wheat, $3,350,000; lumber, $2,000,000; coal, $1,850,000; industrial oils, $1,- 500,000. The chief exports and their values were: copper, $28,915,685 (more than double the value for 1915); sugar, $19,362,725; cotton, $8,320,605; alpaca wool, $2,710,985; petroleum, $1,773,115. The largest manufacturing indus¬ tries in the country are those of sugar and cocaine. High speed mills of the most ap¬ proved type are replacing the older machinery in the sugar mills, with the result that 90 per cent of the sucrose of the cane is secured as compared with the old record of 75 per cent. The 30 cocaine factories of Peru supply the whole world's demand for the drug. Textiles are woven in five cotton mills in Lima, and in several other cotton and woolen mills in other sections. The annual output of the wine presses amounts to 2,500,000 gallons; considerable beer is made; and there is a large quantity of alcohol distilled. There are 20 rice mills throughout the country, and 20 mills where cottonseed oil and oilcake are produced. The manufacture and sale of tobacco was made a

government monopoly in 1909, and the industry is conducted for the government by an organization with headquarters in Lima. The production in 1915 was 359,300,000 cigarettes, and 152,900 cigars; in which was consumed 1,340,000 pounds of domestic grown tobacco, and 178,000 pounds im¬ ported from Ecuador and Colombia. Other industries are the making of flour, macaroni and vermicelli; chocolate; paper; leather; boots and shoes and saddlery; ˆPanama" hats; fur¬ niture and chemicals.

Navigation and Railways. — The chief port of Peru is Callao; Paita and Mollendo are also important as ports of foreign trade. There are a score of other Pacific towns which enjoy a coastwise steamship service. The Peruvian ports on the Maranon and Huallaga rivers in the east are connected by steamers with those of Brazil. In 1916 a total of 495 steamships

aggregating 1,037,404 tons entered the ports of Peru. Of these 135 were Chilean; 117 British; 78 Peruvian ; and 47 of the United States. The railways in 1916 totaled 1,724 miles; of which 1,117 miles were under control of the Peruvian Corporation (see the section Finance). The table below shows the proposed railways, many of which are already completed or under con¬ struction :

Pascamayo to Eten . 65.160

Chocope to San Pedro de Lloc . 52.306

Trujillo to Rio Santo . 113.360

Menocucho to Queruvilca . 80.600

Lima to Huacho . 253.391

Lima to Pisco . 246.040

Oroya to Yucayali . 528.

Ayacucho to Cuzco… 500.

Vitor to Siguao & Camani . . 198.

llo to La Joya . 158.365

Cuzco to Santa Ana… . 185.

Total (kilometers) . 2,380.12

Post Office and Telegraph. — In 1916 there were 646 post offices in Peru, and in that year they handled a total of 26,688,754 letters and packets. There were 252 telegraph offices, with 7,849 miles of line, and handling 1,707,000 tele¬ grams in the year. Wireless stations were es¬ tablished at Iquitos, Masisca and Puerto Ber¬ mudez in 1908; at Callao, Pisco, Chala, llo, and Lima in 1913 ; and at Leticia, El Encanto and Orellana in 1916. In 1917 a high-power station was erected at Cachendo, near Arequipa. There are 182,900 miles of telephone wire. Iquitos, department of Loreto, has the advantage of regular service by direct freight and passenger steamers from New York and Europe. Other river ports are Yurimaguas on the Huallaga, and Contamana on the Ucayali. The chief Pacific ports are visited by vessels of the Chilean and Pacific Steam Navigation companies. The railroads, 1,718 miles in extent (1,300 miles standard gauge, including 30 miles of interurban electric lines, and the rest narrow gauge) are in large part owned by the government, and 65 per cent (1,120 miles) are operated, under arrangements of long standing, by the Peru¬ vian Corporation (Ltd.), which owns and oper¬ ates a line of steamers on Lake Titicaca, the railroad connecting that lake with La Paz, *etc.* The Central Railway climbs from sea-level at Callao to the altitude 15,666 feet on its way to Oroya, over 140 miles of track, and on a short branch line attains 15,865 feet. Its Huancayo extension has 78 miles of track. From Oroya a railway extends to Cerro de Pasco (see sec¬ tion Mineral Resources) . The Southern Rail¬ way climbs from Mollendo on the Pacific Coast to Arequipa (altitude about 7,600 feet) and thence up to 14,666 feet at Crucero Alto and so to Puno on Lake Titicaca and, by the Juliaca and Sicuani branch, to Cuzco. The Pan-American Union handbook Chile contains the statement that, besi'de the Central and Southern, the Pe¬ ruvian Corporation also operates six other rail¬ roads in Peru, as follows : Paita to Piura Rail¬ way; the

Trujillo Railway; the Pascamayo and Guadalupe Railway ; the Chimbote, the Pisco to lea, and the Ho to Moquegua railways. These, and other short lines, serve portions of the littoral. In 1917 the government authorized the departmental board of Ancachs to construct an automobile road between the port of Casma and the city of Huaraz. The Department is authorized to contract a loan of 40,000 Peru¬ vian pounds (pound —$4.8665), with interest

and amortization not to exceed 10 per cent annually. The loan will be guaranteed by a small tax on freight transported over the road and by a yearly appropriation of $2,000 in the departmental budget. The government has adopted recently a scheme of road building to apply to all parts of the republic. Roads are classified in four groups — national, depart¬ mental, provincial and district, according to the authority in charge of construction. For the national roads a staff of road engineers is or¬ ganized and provided for in the annual budget. Roads from Andamayo to Ayo, San Miguel to Mount Pucamarca, and from La Mergerada to Luricocha are already under construction.

Weights and Measures. — The Peruvian libra— 1,0143 pounds; quintal— 101.44 pounds; arroba = ˆ).7 gallons ; vara = 0.927 yard ; the

square vara— 0.835 square yard. The metric system was formally adopted many years ago but was not put into operation until September 1916, and then only in Lima and Callao. It is of¬ ficial in all tariff applications. Congress passed a law 14 Dec. 1901, providing for the adoption of the gold standard on 1 March 1903. The Peruvian gold pound, or libra (equivalent to the British pound sterling), is the basis of the coinage. Silver is legal tender for all sums up to 100 soles (3o/ = $0.487). The statement was officially made in August 1903 that <(Ten silver soles are accepted and paid by the banks as the equivalent of the Peruvian or British pound sterling.® The silver coins are the sol, half-sol, 1-5 sol, 1-10 sol and 1-20 sol. There are one-centavo and two-centavo bronze coins — 100 centavos = one sol. Paper money is issued in one-sol, five-sol, one-libra, five-libra and 10-libra notes.

Government. — While in its main features the government resembles that of the United States, the differences are important. Thus, Congress consists of a Senate and House of Representatives, but Senators as well as depu¬ ties are chosen by direct popular vote, and the number of Senators representing each depart¬ ment in the national legislature is not invariably two, but from one to four, the

larger number being conceded to departments which contain more than eight provinces. In 1918 the Senate had 52 members and the House 116 members. Every second year one-third of the members of each chamber are retired, the selection being made by drawing lots. The President is chosen by direct popular vote for four years, but he cannot serve for two successive terms ; and, to provide for such contingencies as the death or disability of the chief executive, two vice-presidents are elected in the same manner. The executive appoints a cabinet of six ministers, removable at his pleasure. Official acts of the President require for their validity the signa¬ ture of a member of his cabinet (compare Par¬ aguay), the cabinet ministers being severally in charge of the departments of Foreign Affairs, War and Marine, Interior, Finance and Public Works, Justice and Worship and Instruction. The departments are divided into provinces (102 in all), each of which is administered by a pre¬ fect. The provinces are subdivided into districts (850 in all), each governed by a sub-prefect. The Supreme Court sits at Lima, and is composed of 11 judges. The country is divided into 10 judicial districts for which superior and minor courts are provided. The choice of Supreme

PERU

%

* ‘|rw.

San Francisco Church and Convent, Lima

PERU

Copyright Newman Traveltalks and Brown A Dawson, N. Y.

2 Bridge over Rimac River at Lima

1 The University at Cuzco

Court judges depends upon Congress and the executive; the latter selects judges of the lower courts from lists of candidates proposed by the higher tribunals.

Finance. — The improvement in the financial policy of the country during recent years has been marked. A syndicate for the collection of taxes began operation in April 1913, advancing as a loan the sum of $6,225,000. The chief sources of revenue are customs, taxes, the salt and tobacco monopolies, posts and telegraphs, alcohol, opium, stamped paper, legacy and prop¬ erty transfers, *etc.* The expenditures are chiefly for the Bureau of War, Bureau of Finance, the Home Office, the Bureau of Jus¬ tice and Instruction and the Bureau of Fomento. The revenues for the year ending 31 May 1916 were $19,711,915, and the expendi¬ tures were $15,968,045, showing a surplus of $3,743,870. The estimated revenue for 1918 amounted to $19,878,050. The foreign debt, con¬ sisting of loans contracted in England and large arrears of interest at the beginning of 1890 amounted to £54,577,731. Railways, and certain rights over mines and lands, were ceded to the Peruvian Corporation, a foreign company rep¬ resenting the bondholders, for a period of 66 years, as the only feasible method of obtaining relief. As neither party to this contract fulfilled the obligations, the agreement was nullified, and in 1907 the Peruvian government began under a new contract to pay 80,000 libras per year for 30 years to the corporation. The latter com¬ pleted certain railroad construction from which the government receives half the net receipts, and the lease of the corporation was. extended 17 years — to 1921. Peru's total public debt in 1916 amounted to 6,983,010 libras ($31,423,545).

Revenue and Banking System. — The delegation of Peru to the First Pan-American Financial Conference called attention to the in¬ crease in national revenue during the 17 years from 1896 (when the amount was $5,643,570) to 1913 (when the amount was $17,089,870) ; somewhat more, therefore, than 300 per cent. As chief sources of revenue we mention the Pacific Coast customhouses, tobacco monopoly, tax on spirits and salt monopoly. There was a marked falling off in the public revenues after the exporting and importing

nations of Europe became involved in war; and this, in so far as it had not been met by a proportional reduction in the government's expenses, led directly to a situation fairly obliging the government to adopt plans for the protection of banks and private debtors (this includes the moratorium) and for a budget of reasonable proportions; it led also to that substitution of paper for metal¬ lic currency mentioned in the foregoing para¬ graph. The collection of taxes, with a single exception to be noted, is delegated to a joint-stock company called the National Tax Collect¬ ing Company (capital $1,500,000) which charges 1 per cent on the revenue from general taxes, 6 per cent for collecting license fees in the capital and at Callao and 10 per cent for the administration of the piers at Tumbes, Supe and Chala. The exceptional collecting agency just referred to is the National Salt Company, another joint-stock and fiscal organization : to it the government delegates control of all the salt mines and deposits of salt in Peru. The distinguished authors of the memorandum we cite said that the national debt was $28,932,286,

which shows, according to the accepted esti¬ mate of the number of inhabitants, a per capita debt of only $6.42 or $6.43. Tim banks men¬ tioned were the Banco del Peru y Londres (paid-up capital $2,500,000 and reserve fund $1,500,000) ; Banco Internacional (authorized capital $2,500,000, paid-up capital $500,000, and reserve fund $125,000) ; Banco Popular (au¬ thorized capital $1,000,000, paid-up capital $750,- 000, cash reserve fund $310,000) ; Banco Itali-ano (paid-up capital $1,000,000, reserve fund $446,650, sinking fund $75,000) ; Banco Aleman Transatlantic© (a branch for transactions in Peru, $1,000,000). The Commercial Code of Peru prescribes for foreign associations wishing to establish banks in this country (paragraph 11, article 21 and article 185) that they c(shall produce and enter in the register a certificate issued by the Peruvian consul that they are constituted and authorized in accordance with the laws of the respective countries, in addi¬ tion to their constitution and the documents required for Peruvian associations… . All

banks must have in their vaults at least one-fourth in sterling of the amount of their indebt¬ edness to the public.® Banks must pay, ((for inscription,® or as initiation-fee, from one-fourth to one-half per thousand, calculated on the amount of the declared capital, and 5 per cent on the net earnings. The banking insti¬ tutions of special and distinctive characteristics, to be added to the foregoing list, are the Peru¬ vian clearing house (Banco de Depositos y Consignaciones, capital $500,000 subscribed by Peruvian banks), W. R. Grace and

Company, and the Lima Savings Bank (Caia de Ahorros, capital $100,000 and over $1,000,000 in deposits).

Army and Navy. — Military service is uni¬ versal and compulsory : three years in the active army, and 27 years in the three reserves. The peace army consists of 6,500 officers and men. There is also a semi-military state police, a body of 5,074 men, of whom 1,886 are mounted. The navy numbers seven vessels : an armored cruiser of 6,400 tons ; two cruisers of 3,200 tons, and one of 1,700 tons; two submarines; and one torpedo-boat destroyer. There is also a fleet of seven small government boats on the Amazon.

Population. — Though the Quichua language is still spoken by a majority of the people of Peru (of whom 57.6 per cent are classed as In¬ dians and 24.8 per cent mestizos), this linguistic unity by no means implies uniform characteris¬ tics ; on the contrary, it is necessary to regard the present Indian population as descendants of many different native races of varying degrees of natural intelligence and physical vigor, the common tongue having been imposed by the conquering Inca tribe. Some of the Indians of to-day are found to be progressive — at least sufficiently so to encourage the hope that they may, little by little, become useful citizens in a civilized country; but other descendants of the aborigines seem utterly incapable and irrespon¬ sible. The negro and Asiatic elements are small; the white element 13 per cent.

Education and Religion. — The most an¬ cient university in the New World, that of San Marcos at Lima, was founded in 1551 ; the uni¬ versity at Cuzco in 1598; the college at Arequipa in 1616. There are also a university at Trujillo, a school of mines and engineering at Lima, a school of arts and trades, a military

school, a naval school, and a school of agricul¬ ture. Like the neighboring republic of Ecua¬ dor (q.v.), Peru has been honored by the achievements of her historians and geographers, the Paz Soldans and others; writers on consti¬ tutional and legal subjects; poets and

dramatists (comedies by Segura, etc.) ; and such natural¬ ists as Rivero and Pinerola. Elementary educa¬ tion is compulsory for both sexes, but the law has never been enforced. Instruction is free in the public schools. In the government high schools, one of which is maintained at each of the capital cities of the departments, a small fee is required. The number of primary schools in 1916 was 2,296, with 3,304 teachers and 166,- 002 pupils. There were also 277 students in the normal schools ; 5,202 in the high schools ; and 1,791 at the universities. The Roman Catholic bishopric of Cuzco was founded in 1537, and the see of Lima in 1541. > The provisions of the constitution and laws in regard to worship recognize only Roman Catholicism as the reli¬ gion of the state, although other religions are tolerated as a social custom. All churches and convents belong to the state, and the govern¬ ment appropriates annually about $80,000 for the maintenance of public worship.

History. — Before the coming of the Span¬ iards, the Sierra was held by Indians of the Inca tribe whose chief town was Cuzco. Chiefs of that tribe, <(Incas® par excellence, had ex¬ tended their conquests along the heights of the Andes, northward somewhat beyond Quito and southward into the Titicaca Basin. Unquestion¬ ably, also, they held in subjection tribes of the Pacific Littoral and Montana regions ; their com¬ manding position, relatively efficient military organization, and use of the llama on long marches, enabling them to levy, even in remote communities, a tribute of <(sun virgins® (female captives, who were assigned to the service of the national god), and of the precious metals, which were largely used, never as money, but for the interior decoration of temples and for domestic utensils. As for the social organization of the Incas, and the impressive accounts of the so-called dynasty which have been commonly ac¬ cepted hitherto, it must be admitted that recent scientific researches conducted in the Sierra have put the whole subject in doubt. It is quite cer¬ tain, for example, that the <(empire® was ruled, not by a succession of enlightened administra¬ tors, but by war-chiefs, whose office was not hereditary; that extravagant notions have pre¬ vailed in regard to the defenses of the capital, the system of roads and the irrigation works; and that a reliable chronology begins with the Spanish conquest. On 14 Nov. 1524 Pizarro first sailed from Panama. About three years later the Inca Huayna Coapac died, and a civil war broke out between north and south, Atahualpa commanding in the former section, Huascar in the latter. This disruption proved to be the Spaniards' opportunity. In January 1530 Pizarro again sailed from Panama, and, after long delays, reached the Sierra. On 16 Nov. 1532 the Spanish force seized and im¬ prisoned Atahualpa. Xeres, Pizarro's

secretary, writes: <(Atabaliba (Atahualpa) feared that the Spaniards would kill him, so he told the governor that he would give his captors a great quantity of gold and silver. The governor asked him : (How much can you give, and in

what time?) Atabaliba said: (<I will give gold enough to fill a room 22 feet long and 17 wide, up to a white line which is half way up the wall.® The height would be that of a man's stature and a half. He said that, up to that mark, he would fill the room with different kinds of golden vessels, such as jars, pots, vases, besides lumps and other pieces. As for silver, he said he would fill the whole chamber with it twice over. He undertook to do this in two months.® February 1533 Almagro arrived; 3 May 1533 the gold and silver were melted; 29 Aug. 1533 Atahualpa was garroted. On 6 Jan. 1535 the site of Lima was chosen ; the city founded 12 days later. On 8 April 1537 Almagro seized Cuzco; 8 July 1538 he was condemned to death. Two years afterward, _ Gonzalo Pizarro started to explore the Mon¬ tana; Sunday, 26 June 1541, Francisco Pizarro was assassinated. June 1542 Gonzalo Pizarro returned to Quito. From 28 Oct. 1745 to Febru¬ ary 1746, earthquakes occurred destroying Cal¬ lao; 1780 to July 1783, Tupac Amaru, descendant of the Incas, rebelled; 3 Aug. 1814 the cry of independence was raised at Cuzco ; September 1820, the Argentine general, San Martin, landed on the coast of Peru, Lord Cochrane and Eng¬ lish officers accompanying him from Chile (q.v.) ; 28 July 1821, independence was pro¬ claimed at Lima, after San Martin's entrance; 20 Sept. 1822, San Martin resigned protectorate; 1 Sept. 1823, Bolivar arrived at Lima ; 6 Aug. and 9 Dec. 1824 the Spanish forces were de¬ feated at battles of Junin and Ayacucho; 24 Aug. 1827, General Lamar elected to the presi¬ dency; 16 Oct. 1856 the existing constitution was framed, and 25 Nov. 1860 revised; 2 May 1866 a Spanish fleet, sent to enforce alleged claims, was repulsed at Callao ; 13 Aug. 1868 and 9 May-1877 destructive earthquakes occurred; 5 April 1879 Chile declared war against Peru ; 8 Oct. 1879 the Huascar was captured by Chilean iron¬ clads; 17 Nov. 1879 battle of Tarapaca, the Peruvian province of that name falling into the hands of the Chileans ; 26 May 1880, battle of Tacna; 7 June 1880, Chileans captured the port of Arica; the Peruvian army was nearly an¬ nihilated ; Chilean ships desolated the whole coast; 13 and 15 Tan. 1881, Chilean invading force defeated Peruvians at Chorrillos and Miraflores; 17 Jan 1881, Chileans entered Lima; 20 Oct. 1883, a treaty was signed, ceding Tara¬ paca to Chile, and providing for the occupation of Tacna and Arica by the Chileans for 10 years, at the end of which period the inhabit¬ ants should determine by vote whether they would belong to

Chile or Peru. But it was also provided that the nation preferred by the voters should pay $10,000,000 to the other nation ; and when the time arrived for holding the plebiscite, Peru was unablq to give attention to the matter and unprepared to pay the stipu¬ lated sum, *in the event of a favorable decision. On 25 Nov. 1901 an agreement was made with Bolivia for the settlement of the boundary dis¬ putes by arbitration. In September 1903 Manuel Candamo was inaugurated President but he died in May 1904 and was succeeded temporarily by Senor Calderon, the Second Vice-President, as the First Vice-President had also died. Elections were immediately held and Jose Pardo was chosen President and installed in September 1904. On 24 Sept. 1908 Augusto B. Leguia was

inaugurated President. On 29 May 1909 Presi¬ dent Leguia and several members of the Cabinet were captured by a band of desperate men in an attempt to overthrow the government. After being paraded through the streets of Lima and threatened with death if he did not resign, Leguia was rescued by the loyal troops and the conspirators captured or put to flight.

In 1912 the Chilean occupation or tenancy of Tacna and Arica was confirmed, in perpetuity, by agreement between the two countries. On 6 Dec. 1914 a severe earthquake in the depart¬ ment of Ayacucho killed a number of people and destroyed many buildings. In 1915 im¬ portant archaeological studies were made by an expedition under the auspices of Yale Univer¬ sity and the National Geographic Society (of Washington) ; the excavation of the large ruins of Patallacta at Qquente was carried on with care, although seriously hampered by unfriendly action on the part of the Historical Institute of Cuzco ; and, before the reconnaissance work was stopped by the government, addition was made to the new learning in regard to the region of the Machu Picehu ruins. In February 1914 Colonel Benavides led a military uprising against President Billinghurst who was accused of autocratic methods of government. The movement resulted in the exile of Billinghurst and a provisional government was set up with

Benavides at the head. During that year Pro¬ visional President Benavides, ((as a reply to the charges that he desired to establish a dictator¬ ship, w issued a call for an election ; his candidate was defeated; Dr. Jose Pardo, coalition candidate, was elected; and Benavides was accused, in charges presented to Congress, ((of abuse of power, the assassination of General Varela, treason, rebellion against the govern¬ ment of Billinghurst, securing loans without previous consent of Congress and amassing wealth while in office.55 Congress ordered an investigation. The same body approved, in October, a constitutional amendment guaran¬ teeing religious liberty; but President Pardo re¬ fused to sanction or to veto that progressive measure (see Education and Religion), and unon its promulgation by Congress a demon¬ stration of hostility was made in the streets of the capital.

Bibliography. — Bingham, H., ‘In the Wonderland of Peru5 (Washington 1913), and (Ruins of Espiritu Pampa5 (Lancaster 1914) ; Eaton, G. F., (The Collection of Osteo-logical Material from Machu Picchu5 (New Haven 1916) ; Enock, C. R., ‘The Andes and the Amazon5 (London 1907) ; id., (Peru5 Ob., 1908) ; Franck, H., (Vagabonding down the Andes5 (New York 1914) ; Hardenburg, W. E., (The Putumayo5 (with extracts from the re¬ port of Sir Roger Casement, London 1912) ; Helps, A., ‘The Life of Pizarro5 (London 1869) ; Joyce, T. A., ‘South American Archaeology, with special reference to the Early History of Peru5 (London 1912) ; Mark¬ ham,” C. R., (A History of Peru5 (Chicago 1892) ; ‘Contributions Towards a Grammar and Dictionary of the Quichua5 (London 1864) ; ‘The Incas of Peru5 (London 1910) ; ‘Narra¬ tives of the Rites and Laws, Etc., translated from original Spanish manuscripts5 (London, Hakluyt Societv 1873) ; ‘Ollanta,5 translated from original Quichua (London 1871); Re¬

ports on the Discovery of Peru,5 translated and edited (London, Hakluyt Society 1872) ; ‘Vocabularies of the General Language of the Incas of Peru5 (London 1908) ; and ‘The War Between Peru and Chile5 (New York 1883) ; Martin, P. F., ‘Peru of the Twentieth Century5 (London 1911) ; Moore, J. B., ‘Brazil and Peru Boundary Question5 (New York 1904) ; ‘Pan American Union, Peru5 (Washington 1915) ; Peixotto, E., ‘Pacific Shores5 (New York 1913) ; Prescott, W. H., ‘History of the Con¬ quest of Peru5 (New York 1847) ; Rutter, F. R., ‘Tariff Systems of South American Coun¬ tries5 (Department of Commerce, Tariff Series No. 34, Washington 1916) ; Spruce, R., ‘Notes of a Botanist5 (ed. A. R. Wallace, London 1908) ;

Squier, E. G., ‘Peru5 (New York 1877) ; Todd, M., ‘Peru: a Land of Contrasts5 (Bos¬ ton 1914) ; Vega, Garcilasso de la, ‘First Part of the Royal Commentaries,5 translated and edited by Clements R. Markham (London, Hak¬ luyt Society 1869-71); Vivian, E. C., ‘Peru: Physical Features, etc.5 (London 1914) ; Walle, P., ‘Le Perou £conomique> (Paris 1908) ; Xeres, F. de, ‘Verdadera Relacion de la Con-quista del Peru, segun la primera edicion im-presa en Sevilla en 15345 (Madrid 1891).

Marrion Wilcox.

PERUGIA, pa-roo’ja, Italy, (1) a city, capital of the province of the same name, on the side and summit of a lofty eminence washed by the Tiber, 84 miles north of Rome. It is surrounded by lofty walls, and defended by a citadel; has irregular but spacious streets, and many remarkably handsome buildings. Among its edifices are the unfinished cathedral, a bold Gothic edifice of the 15th century, possessed of a valuable library rich in works and manu¬ scripts connected with biblical literature ; the church of Saint Agnese, adorned with frescoes by Perugino and his pupils ; the oratory of San Bernardino, with a magnificent faga’de in which colored marble and terra-cotta are employed; the convent of San Severo, now a college, con¬ taining the first fresco painted by Raphael ; the church of San Pietro de Cassinensi, dating from the 10th century, with a roof supported by marble and granite pillars taken from a heathen temple, and so rich in pictures as al¬ most of itself to form a gallery; the 13th cen¬ tury church of San Domenico, with some fine monuments; the Palazza Pubblico or townhall, a majestic edifice of the 13th century, contain¬ ing the valuable Vannucci picture-gallery and a library of 77,000 volumes; the Collegio del Cambio or Exchange, no longer required for that purpose but interesting from the number of fine frescoes with which Perugino has cov¬ ered its walls; the prefecture, a handsome mod¬ ern building; a fine public fountain; the arch of Augustus, a fine ancient gate, built of mass¬ ive blocks of travertine without cement. Peru¬ gia possesses a free university, founded in 1320, with about 270 students, a library of some 54,000 volumes, a museum of antiquities, a botanical garden, *etc.* The manufactures, com¬ paratively unimportant, consist of velvet, silk stuffs, brandy, *etc.* The trade is in grain, oil, wool, spun silk and cattle. Perugia (then known as Perugia) under the Romans and in pre-Roman times was one of the 12 principal cities of Etruria, and remains of the ancient necropolis with the tomb of the Volumnii, dis-650

covered in 1480, are to be seen three miles southeast of the city. Having taken the part of Mark Anthony in the war between him and Augustus, Perugia was sacked. In the 6th cen¬ tury, Totilla, one of the northern barbarians, took it after a siege of seven years, and put many of its inhabitants to the sword. Pepin le Bref, king of France, took Perugia in the 8th century, and made a present of it to the Pope. It suffered much during the contests between the Guelfs and Ghibellines, and both in the 14th and 15th centuries was fearfully ravaged by the plague. It was joined to the papal states in the middle of the 16th century. The Sardinians annexed it to what is now the kingdom of Italy in 1860. The celebrated painter, Pietro Vannucci or Perugino (q.v.), though born in Citta della Pieve, long made Perugia his adopted home, and died in it a victim of the plague in 1524. Pop. about 66,000. (2) The province of Perugia or Umbria has an area of 3,748 square miles. It is traversed in all directions by offsets of the Apennines. The principal stream is the Tiber. The soil is fertile, producing in abundance corn, wine, fruits, oil and silk. Pop. about 686,000. (See Umbria). (3) The Lago di Perugia, is about 10 miles long, by eight in breadth, and sur¬ rounded with olive plantations. It contains three islands — Isola Maggiore, Isola Minore and Isola Polvese; and abounds in fish. It appears to have no natural outlet, and its shores used to be often overflowed, but this was reme¬ died by an artificial outlet opened in 1896. Hannibal gained a signal victory over the Ro¬ mans near this lake in 217 b.c., as related by Livy (XXII, 3-6). (See Hannibal). Consult Cruikshank, (The Umbrian Towns) (1901) ; Heywood, W., (History of Perugia5 (New

York 1910) ; Symonds and Duff-Gordon, (The Story of Perugia5 (London 1900).

PERUGINO, pa-roo-je'no, easel name of Pietro Cristoforo Vannucci, Italian painter : b. Citta della Pieve, near Perugia, 1446; d. Castello di Fontignano, near Perugia, 1524. It is quite probable from indications in his early painting that Fiorenzo di Lorenzo was his teacher, while according to Vasari he com¬ pleted his studies under Verrocchio at Florence, was a fellow-pupil of Leonardo da Vinci (1475) and gained much skill in tempera painting, though he was subsequently among the first Italians to use oil as a vehicle. In 1475 he painted frescoes in the townhall of Perugia. He worked for Sixtus IV in the decoration of the Sistine Chapel, where his /Christ Delivering the Keys to Peter5 and (Baptism of Christ5 are still admired (1483-86) . At Perugia to which

city he finally returned and where he took up his resi¬ dence, Raphael, then a boy of 12, became his pupil. His first easel pictures, two Madonnas, are now one in the Louvre, the other in the English National Gallery, and exhibit that ten¬ derness and grace, yet strength of expression, which belong to all his works. While his earlier pictures belong to the Quattro-cento style his latter productions show the influence of Michelangelo and Leonardo, exponents of the Cinque-cento style. Among his best pic¬ tures, which he executed in the latter manner (1490-1505), is <The Marriage of the Virgin,5 now in the museum at Caen, and widely known through the Arundel print reproduction. This

work, however, has recently been attributed to Lo Spagna. To the same period belong <rlhe Ascension of Christ5 in the museum at Lyons, which is one of his masterpieces, combining strength of composition with intense _ religious feeling; and (The Assumption of Saint Mary the Virgin5 for the Church of Santa Maria Maddalena de Pazzi at Florence. Among his last works were the (Martyrdom of Saint Sebastian5 ; (The Baptism of Christ5 ; (The Transfiguration5 ; and (The Birth of Christ5 in the church at Fontignano. It was after com¬ pleting this picture that he was struck with the plague from which he never recovered. He was a prolific and industrious artist, and even during his lifetime foreign merchants carried his pic¬ tures into every country of Europe, where they -are to be found in all the great public and many private collections. He made a really original departure in Italian art, and molded the style of Raphael in its early stages, though the latter quickly developed a manner and spirit pre¬ eminently his own.

PERUVIAN ANTIQUITIES. See Peru¬

vian Archaeology.

PERUVIAN ARCHAEOLOGY. During

the pre-Incaic and Incaic periods ancestor-worship, hero-worship and sun-worship all exerted a remarkable degree of influence in the Andean highlands. We may appreciate the effect of ancestor-worship in the remote past if we give attention to the fact that even to¬ day the most important article of the simple faith of one of the native races is that human beings are transformed into Achachilas after death. Now, these Achachilas are, according to the belief of the natives, powerful spirits or demons living in every mountain, every

lake, meadow and stream, and exerting most active influence in control of the lives and for¬ tunes of men — to such an extent, indeed, that no important undertaking is begun until the Achachilas of the neighborhood have been propitiated by symbolic offer¬ ings. With similar motives, so far as we may judge, in prehistoric times every effort was made to express by means of burial customs the belief in what may be roughly described as immortality on earth. Thus, for example, offerings of the products of industry and of art were placed near the mummified body in its burial cave to express firm assurance that the ancestor still continued his conscious par¬ ticipation in the activities of his descendants ; and it is obvious that such objects as these supply the archaeologist with trustworthy data.

Again, we may at least begin to appreciate the driving force of hero-worship and sun-worship if we give attention for a moment to a tradition that deals not only with one of the most heroic of Inca rulers but also with the extremely interesting Temple of the Sun at Cuzco, that famous mountain-built city which was the capital of the Inca tribe and nation before the Spanish conquest of Peru.

The descriptions one may still hear if one talks with educated Cuzquenos about the egre¬ gious symbolism of the interior decoration of the principal temple are certainly fancy-stirring. In pre-Columbian times the high altar, which faced the east, held the <(effigy55 of the sun,

which was made of gold encrusted with precious stones.* The walls also were covered with gold wrought in various shapes. Seated in a semi-circle on their thrones, right and left from the image of the god, were the mummies of the (<children of the sun,® the Inca chiefs, ranged in the order of their succession, from Manco Ccapac to Huayna Ccapac. Light was admitted through a single aperture, in the east¬ ern wall, so situated that when the sun rose to a certain height its rays pierced the obscurity and fell upon its own image, which then sud¬ denly, with glow of gold and gleam of emeralds, illuminated this chamber ((long to quiet vow'd.® It is said that the face of every other

enthroned Inca was averted reverently from the god, but the corpse of Huayna Ccapac had been placed in the attitude of fearless scrutiny; and this for the reason that in his lifetime he claimed that his own power was absolute, while even the freedom of action of the god was limited. One day (so the story goes) when a religious ceremony was being performed in the great square of Cuzco, Huayna Ccapac looked up at the sun in the zenith, staring at it so fixedly that the high priest remonstrated: <(Do you forget, son of the sun though you are, that the law of our religion forbids even you to gaze on him impiously?® ((You are right about the law,® replied the chief, (<but consider the facts. Do you believe anyone could oblige me to do a thing contrary to my free choice?® (<Impossible !® the high priest exclaimed. ((Now listen,® continued the Inca. ((This sun does the same thing day after day, always rising in one quarter, always going down in another, and holding one course unalterably. Why? Be¬ cause he is not his own master. He is com¬ manded to do it. Therefore he is not and cannot be god.® It seems probable that the superstitious and patient native laborers of an earlier day accomplished the most difficult tasks (the ancient faith being then unshaken) under twofold inspiration; that when they built a great stone fortress, palace or temple they did the work as servants of the life-giving god of all the people and as subjects of some scarcely less revered ruling family, conspicuous mem¬ bers of which were regarded as intermediate in nature between gods and men. This seems to be true especially when we study architectural remains of the pre-Incaic or megalithic period.

These megalithic, pre-Incaic monuments are found in many parts of the Peruvian and adjacent Bolivian highlands, and are generally regarded as works of a superior native race which, after being from earliest times the domi¬ nant factor in the population of the best por¬ tions of that whole region, had the misfortune to be overcome, and ultimately to a large ex¬ tent exterminated, by savage invaders about the time of Christ. Professor Bingham (see Bibliography) writes in Harper's Magazine: «Sir Clements Markham in his book on the Incas of Peru devotes a chapter to a myth which was told to all the Spanish chroniclers by their native informants, which he believes is the fabulous version of a distant historical event.® The gist of the native informants' ac¬ counts was that people of the early megal¬ ithic period were conquered by a great incursion

* According to early Spanish accounts, a conventionalized

discoidal representation.

from the south. The whole country broke up into anarchy, and savagery returned, ushering in a period of mediaeval barbarism. Remnants of the megalithic folk took refuge in a district called Tamputocco (or Tampu Tocco) where they were protected from the invaders by the inaccessible character of the country. Here the fugitives multiplied. Their descendants, more progressive and powerful than their neighbors, <(in time became crowded, and started out to acquire a better and more extensive territory. The legend relates that out of a hill with three openings or windows there came three tribes. These tribes eventually settled at Cuzco and founded the Inca empire.®

At Tiahuanaco the groups of megalithic ruins are called by local scholars simply the (<monumentos prehistoricos® and the city which occupied this site is commonly assigned to a remote period antedating changes traditionally reported (compare second part of Cieza de Leon's Cronica del Peru) -to have occurred in the topography and climate of the high plain of Peru and Bolivia at this point. Thus, a South American author says that the construc¬ tion of an edifice which he calls the (<palace® shows clearly that the climate at the time when this building was erected must have been posi¬ tively warm; that it was <(benignant® then be¬ cause this Andean plain had not attained its present altitude, and the inhabitants vyere able to devote themselves to such gigantic works as these which excite our wonder at Tiahuanaco because climatological conditions in those days favored the development of a large agricultural and industrial community; that Lake Titicaca occupied a larger part of the high plain, and Tiahuanaco was an island. The view he has expressed, to the effect that the region in ques¬ tion was much lower and less bleak when Tiahuanaco was built, is one that is commonly shared by travelers who study the ruined city at all carefully. Sir Clements Markham, in an address published in the Geographical Journal, says: ((Some miles from the southern shores of Lake Titicaca, once actually on the shore, there are the ruins of a great city, now called Tiahuanacu. (There is good authority for spell¬ ing the name either Tiahuanaco or Tiahuanacu). In the time of the Incas it was the same ruin as it is now, its origin and history absolutely unknown, and myths were invented to account for the numerous stone statues. The ruins show very advanced proficiency in the masonic art, and there are monoliths which have been conveyed from great distances. The size of these cut and carved stones is unequaled in any other part of the world except Egypt. There must necessarily have been a very large population and an immense food supply. But at the present time we observe that corn will not ripen in this neighborhood, because the

climate is too rigorous. The question how a region where corn will not ripen can have been selected as a site for a great city is a problem which seems well worthy of study.® A dis¬ cussion which arose after the reading of that address related chiefly to the rather startling suggestion that the Andes have risen 1,000 feet in height since certain stone remains were de¬ posited at Tiahuanaco by man, as the president of the Royal Geographical Society, Maj. Leon¬ ard Darwin, expressed it. Continuing, the

president said: <(In considering this question, what we should like to know in the first place is, what is the age of these ancient ruins? … Judging by the age now generally assigned to the pyramids of Egypt, it would not be an out¬ rageous supposition to suggest that these megalithic remains may be 4,000 years old.® Sir Martin Conway said that observations he him¬ self had made in the same upper region led him to conclusions not at variance with those expressed by the other members.

One consideration which was not mentioned during that discussion at the Royal Geographical Society has, we think, direct bearing upon the problem. When the writer walked over the fields near the famous ((artificial hill,® noticing how great the distances are between vestiges of old Tiahuanaco on the north and south sides of the valley, and paying attention to the evi¬ dences of vast and exceedingly laborious under¬ takings, it seemed obvious that we must take into account the rarefaction of the air which, at an altitude of 12,500-12,600 feet occasions a more or less clearly marked aversion to long-sustained physical effort. If we forget all we have ever read about the place, and simply let the monuments tell their own story, we are quite certain to receive an impression predis¬ posing us to favor the view that blocks of stone of such enormous size (and one brown-red slab that we measured in the Puma-Puncu district of Tiahuanaco was more than 27 feet long, 18 feet wide and from three to six feet thick) were quarried at Andamarca de Quim-zachata or still more remote places and brought to this point before the plain had

been uplifted above the present level of Cuzco.

Recent discoveries made by the Yale Pe¬ ruvian expedition supply a connecting link be¬ tween the builders of Tiahuanaco and the Incas. The leader of that expedition believes the place now called Machu Picchu <(to have been the original Tampu Tocco, from which the Incas came when they started on that migration which led them to conquer Cuzco and to establish the Inca empire® ; and it seems almost certain that the investigations carried on at Machu Picchu since 1911 shed light on the pre-Incaic as well as the Incaic periods. Professor Bingham claims for Machu Picchu a superiority in ex¬ tent and interest over previously discovered In¬ caic ruins, saying that those in the city of Cuz¬ co and on the islands of Lake Titicaca, the town and fortress of Ollantaytambo, Pisac, Ancon (near Callao), Pachacamac, Nazca, Trujillo, Vitcos and the country of the grand Chimu, <(where the chief interest lies in the extensive findings of mummies, pottery, tex¬ tiles and metal ornaments, including gold, silver, bronze, etc.,® were known to the Spanish con¬ querors and have been despoiled by treasure-hunters. On the other hand, Machu Picchu, which is larger and contains more edifices than any other ruin discovered in Peru (except Cuzco), was not known to the early Spaniards, was not occupied by their descendants, and, not having been the treasure-hunter's prey, survives to-day in a remarkably good state of preserva¬ tion. It is found that the ancient inhabitants of Machu Picchu were, like the citizens of Tia¬ huanaco, masters of the art of cutting and handling great blocks of stone. Thus, a single piece of granite in the east wall of the chief

temple on the sacred plaza at Machu Picchu measures 13ˆ2 feet in length and nearly eight feet in height. The builders of Machu Picchu knew how to make bronze; their pottery is varied in form ; they understood how to plan and accomplish great architectural and engi¬ neering works; they utilized for intensive agri¬ culture (on the patiently constructed andenes, or terraces) every square yard of available land within a radius of several miles; ignorant of writing, they employed small stone discs which (<seem to be pre-Inca and may have been used to keep the records of Tampu Tocco before the discovery of the quipu, or knotted string® ; and they divided their city into wards or clan groups, each ward having but one entrance, a gateway that could be securely closed. Dr. Eaton, the osteologist of the Peruvian expedi¬ tion of 1912 under the auspices of Yale Uni¬ versity and the National Geographic Societv. writes in regard to Machu Picchu burial cus¬ toms : (<In only a few instances were the re¬

mains actually inhumed, that is, entirely covered with earth. The large majority of burials were made in caves, where the remains would be well protected from moisture and sunlight. When skeletal material was obtained from such sheltered places there were usually indications that the greater part of each mummy or body had been originally left above ground. I think that whenever there was sufficient head-room, the mummies were placed sitting in the con¬ tracted position.® See also the article Inca Semi-Civilization.

Bibliography. — Bandelier, A. F. A., (The Islands of Titicaca and KoatP (New York 1910) ; Bingham, H., (Across South America) (Boston and New York 1911) ; also (The Dis¬ covery of Machu Picchu by the Yale Peruvian Expedition of 191 P (Harper's Magazine, April 1913) ; (In the Wonderland of Peru) (National Geographic Magazine, April 1913) ; (The Inca Peoples and Their Culture> (PanAmer. Sci¬ entific Congress, 2d, Washington 1915-16 Proc., Washington 1917) ; (Vitcos, the Last Inca Cap-itaP (Worcester Amer. Antiquarian Society 1912) ; and (The Story of Machu Picchu) (National Geographic Magazine, February 1915) ; Eaton, G. F., (The Collection of Oste-ological Material from Machu Picchu) (New Haven 1916) ; Reiss and Stuebel, (The Necrop¬ olis of Ancon in Peru) (Berlin 1880-87) ; Rich-man, I. B., (The Spanish Conquerors* (New Haven 1919) ; Vega, Garcilasso de la, (First Part of the Royal Commentaries) (London

1869-71).

Marrion Wilcox.

PERUVIAN BARK. See Bark, Per¬ uvian; Cinchona.

PERUZZI, pa -root'se, Baldassare, Italian painter and architect: b. Accajano, near Siena, 1481 ; d. Rome, 6 Jan. 1536. He settled in 1503 in Rome, where he began a study of the antique. He painted in the church of Santa Croce in Gerusalemme and designed the Villa Farnesina (1509-16). In 1520 he succeeded Raphael in the construction of Saint Peter's, changing Bramante's plan from a Latin into a Greek cross. This design, however, was not carried out. From 1527, when he was made architect to the city of Siena, he built many palaces there. He was again busy with Saint Peter's and Roman palaces from 1530. Of his

paintings special mention should be given to his fresco of the (Sibyl Proclaiming to the Em¬ peror Augustus the Coming of Christ, } in the Fontegiusta Church of Siena. Consult the study by Redtenbacher (1877).

PERVIGILIUM VENERIS, the Vigil of Venus, a short Latin poem of 93 lines, of which the author, date and place of composition are unknown. It is, however, of the 2d or 3d cen¬ tury a.d. ; was written professedly in spring on the eve of a festival in honor of Venus. It is the ((spring poem® par excellence. The re¬ frain is <(Cras amet qui nunquam amavit ; quique amavit eras amet® which may be freely trans¬ lated :

“Who hath never loved.

Shall he love to-morrow?

From to-morrow who hath loved Shall he again love borrow? “

In the Classical Review (May 1905) an article assigned the poem to Sidonius Apollinaris.

PESADO, Jose Joaquin de, ho’sa ho-a- ken’ da pa-sa’do, Mexican poet : b. San Augustin del Palmar, Mexico, 9 Feb. 1801 ; d. City of Mexico, 3 March 1861. He was self-educated, acquired an extensive knowledge of languages, science and history and in 1833 entered public life as a member of the legislature of Vera Cruz. In 1834 he was elected governor of that state and in that year founded and conducted La Oposicion, also writing a short novel. He was appointed Minister of the Interior in 1838, Minister of Foreign Affairs in 1846, resigning in 1854 to accept the chair of belles-lettres at the University of Mexico. His poetry was of the neo-Catholic school established in France by Lamartine, but though excelling in biblical sub¬ jects his descriptions of nature are quite as de¬ serving of attention. He published (Poesias originales y traducidas) (1839) ; (La Revelacion) (1856) ; <Gerusalemme Liberata,* a partial translation of Tasso (1860). Consult Barcena, Jose M. Roa, (Biografia) (Madrid 1878).

PESARO, pa-sa’ro, Italy, capital and port of the province of Pesaro e Urbino, situated at the mouth of the Foglia (which, like the town, was

known in ancient times as Pisaurum) in a fertile plain backed by the Ardizi Hills, on the railroad between Bologna and Ancona. The castle and part of the mediaeval walls are still standing; a bridge dating from Roman times crosses the Foglia > and the most . important buildings are the ducal palace, built by the Sforza in 1455; the Palazzo Almerici, connected with which is the Ateneo Pesarese, containing a remarkable collection of majolica ware, a gal¬ lery of paintings and the rich Olivieri Library with 40,000 volumes and 3,000 manuscripts, in¬ cluding some of Tasso and Poliziano, the ca¬ thedral of S. Francesco, with a Gothic portal and a (Madonna* by Bellini; and excellent schools, a theatre and an insane asylum, as well as a musical lyceum founded by Rossini, a native of the town. The grave of the Roman tragedian Accius (b. here 170 b.c.) is reputed to be about two miles from the city on Monte Santo Bartolo. Terra-cotta wares, silk, hemp and woolen textiles, sealing-wax, cream of tartar, ships, machinery, etc., are among the citys manufac¬ tures. It exports the product of the surround¬ ing country, its figs, olives and truffles being particularly prized.

Settled by the Sicilians in early times, and then held by the Umbrians, Etruscans and Senonian Gauls, successively, in 184 b.c. it be¬ came the Roman colony of Pisaurum; was de¬ stroyed by Totila, the Ostrogoth; was given by Pepin to the Pope; and in 1631 again became a papal state, after being a possession of the Malatesta (1285) the Sforza (1445) and the Rovere (1512). Under the latter the city be¬ came a centre of art and literature through the patronage of Lucrezia d'Este ; Bernardo Tasso wrote <Amadis> here and the city was also the home of his son Torquato Tasso.

PESCADORES, pes-ka-do'res, PENG¬ HU, or HOKO-TO, a group of 48 small islands in the Fu-kien Strait between China and Formosa, forming an administrative dependency of the latter. Area, 85ˆ square miles. With Formosa they were ceded by China to Japan in April 1895 after the Chino-Japanese War. They are dangerous to ships passing through the strait, and are subject to stormy weather, on an average during 230 days of the year. Fish¬ ing is practically the only industry. Safe an¬ chorage is obtainable at Makung on Hoko-to, the principal island. Pop. about 60,000, mostly Chinese.

PESETA, pe-sa ta, the chief Spanish mone¬ tary unit, equal to about 20 cents.

PESHAWAR, pe-show'ur, or PESHAW—

UR, India, (1) a city, capital of the Northwest Frontier Province, and of the division and dis¬ trict of Peshawar, in a small plain near the Kabul River, about 12 miles east of the eastern extremity of the Khyber Pass (q.v.). It is sur¬ rounded by a mud wall and entered by 16 gates. The Kabul gate has been rebuilt as a memorial to Sir Herbert Edwardes. Just outside the wall on the northwest is the Bala Hissar, a fort built of sun-dried bricks surmounting a small eminence, and completely commanding the town. The houses generally are built of brick and mud with wooden frameworks. The chief build¬ ings and institutions comprise some handsome mosques, a clock-tower, English church mission, collegiate school, the Egerton Hospital, Martin lecture hall and institute, *etc.* The town is well drained and has an ample supply of well and canal water. Outside the wall are gardens and pleasure-grounds, and two miles to the west are the extensive military cantonments, where most of the civil offices are situated. Peshawar is traversed by the great route from Khorasan and Kabul to India through the Khyber Pass; and has a good trade. It has direct railway com¬ munication with Lahore through Attock and Rawal Pindi. Pop. about 100,000, including about 20,000 in the cantonments. (2) The dis¬ trict is the central one of the division. Area, 2,611 square miles; pop. about 800,000.

PESHITTO, pe-she'to, the standard Syriac version of the Holy Scriptures. See Bible, Versions of.

PE.SHWAS, the Brahman ministers of the great Mahratta dynasty in India, who in 1718 rose to such power that they ruled the Mogul Empire for a century. See India, History.

PESO, pa'so, a Spanish coin; a unit in many South and Central American countries, varying in value from $1.03 in Uruguay to 36ˆ cents in Chile.

PESSIMISM, an attitude towards the world, or a theory expressive of an attitude, which finds evil in general preponderant over good, unlike optimism (q.v.), which finds good dominant. Pessimism need not be articulate, and even if articulate, need not be reasoned. The book of Ecclesiastes is an example of pes¬ simism of this naive type. Theories may be designated pessimistic either from an internal or an external standpoint, according as the moral value they assign the universe as a whole fails to fulfil the norms of the proponents of the theory or of external critics, respectively. As European ethics in the past has been predomi¬ natingly Christian, setting a high worth on a personal God, on personal immortality and on order it has treated pantheistic, atheistic, agnos¬ tic or materialistic theories as pessimisms, and has likewise given a pessimistic interpretation to Oriental speculations which find the goal of all conduct in the abolition of the individual and his identification with the universe. These theo¬ ries may be optimisms from the standpoint of their advocates, and as a matter of fact many of them are thus regarded. True philosophical pessimism, recognizing itself as such, is much less prevalent, though views which regard the world of appearances as essentially evil, and the sphere of the good as that of reason or worship or of some other higher activity, have been common ever since Parmenides. The first noteworthy example of true pessimism is to be found among the Epicureans, who consid¬ ered pleasure as the mere absence of pain, yet regarded it as the greatest good. Scepticism led to a similar conclusion. In modern times, the chief exponent of pessimism is Schopen¬ hauer (q.v.), who finds the true nature of the world in blind, purposeless, unhappy Will, which is <(the living principle of reason® itself. Like the Buddhist, he finds the highest good in the annihilation of consciousness by suffer¬ ing and sacrifice and artistic contemplation ; but unlike the Buddhist he tends to regard this, not as a positive good, but rather as a mere respite from evil. Schopenhauer's pessimism is the result of the compounding of an Oriental natural history of values with Occidental norms. A similar view was held by von Hartmann, who attempted to mediate between Will and Reason by the essentially voluntaristic Uncon¬ scious. The philosophy of Nietzsche, notwith¬ standing the belief in the ultimate appearance of the Superman, contains a strong pessimistic trend in its condemnation of morality as it now exists.

Pessimism and optimism are not necessary alternatives, for they consist in an evaluation of the world as a whole, and the world, as a completed, conceivable whole may not exist, or if it exists, may not be subject to an evalu¬ ation. For example, it is quite possible that good and bad are terms which have no intrin¬ sic meanings, but merely

signify ((better than some given standard® or (<worse than that standard.® In such a case, it is quite reasonable to suppose that the world as a whole or human life as a whole furnishes the norm by which good and bad are judged, and the problem whether the world is good or bad loses all significance. The question might still remain open as to whether the general tendency of the world is to improve morally or to deterio¬

rate. The theory that there is a general trend toward better things is called meliorism; the theory which finds the opposite tendency has no generally accepted name, but has been called pejorism by Max Muller. Pejorism is much rarer than pessimism; meliorism is the preva¬ lent ethical opinion of the present time and has probably always occupied that position. That the world has any definite moral trend, however, whether for better or for worse, is not evident a priori. See Optimism ; Prog¬ ress ; Schopenhauer.

Bibliography. — Caro, (Le pessimisme au XIX siecle> (Paris 1878); Duhring, (Der Werth des Lebens> (Leipzig 1865) ; Gass, (Optimismus und Pessimismus) (Berlin 1876) ; Huber, (Der Pessimismus) (Munich 1876) ; James, W., (The Will to Believe) (New York 1897) ; Kowalewski, (Studien zur Psychologie des Pessimismus) (Wiesbaden 1904) ; Lub¬ bock, Sir John, (Is Life Worth Living?) (Lon¬ don 1879) ; Paulsen, (Schopenhauer, Hamlet, Mephistopheles) (Berlin 1900) ; Pfleiderer, E., (Der moderne Pessimismus> (Berlin 1875) ; Rehmke, (Die Philosophic des Weltschmerzes5 (Saint Gall 1876) ; Royce, J., (Studies of Good and EviP (New York 1898) ; Saltus, (The Anatomy of Negation) (1886); Smith, Goldwin, (Pessimism } (Atlantic Monthly, 1880) ;

Sully, .J., <Pessimism) (London 1877) ; Tau-bert, A., (Der Pessimism und seine Gegner) (Berlin 1873) ; Tulloch, (Modern Theories on Philosophy and Religion } (Edinburgh 1884).

Norbert Wiener, Editorial Staff of The Americana.

PESTALOZZI, pes -ta-lot'se, Johann Hein¬ rich, Swiss educational reformer: b. Zurich, 12 Jan. 1746; d. Brugg, Aargau, 17 Feb. 1827. He was educated at the University of Zurich, and became a follower of Lavater (q.v.), to whose <Memorial> he contributed. At the death of Bluntschli who was a friend of his, he became interested in educational matters. At the age of 23 he married. The perusal of Rousseau's (Emile) filling him with dislike for the habits of a learned

life, and for the general system of education in Europe, he turned his attention to farming. He studied agriculture, and then in 1767 bought a piece of land near Birr, in Aargau, built a house, which he called Neuhof. He became acquainted with the moral wretched¬ ness of the lowest classes, and in 1775 began his career of instruction by the admission of the children of paupers into his house, turning his farm into a kind of asylum or industrial home. But his philanthropic and noble self-denial was derided, his confidence was abused, his own affairs declined, he was generally con¬ sidered as a well-meaning enthusiast and his enterprise failed in 1780. Nevertheless, amid straitened circumstances he collected that knowledge of the state of the lower classes so admirably sef forth in his novel (Lienhard und Gertrud) (1781-85), a work which exerted a remarkable influence. This book details the influence for good of a high-minded woman at home and in the village. Other writings of his are alike numerous and important, and contain further elucidations of his principles. In 1798 he established a school at Stanz for refugees from the French invasion, but circumstances obliged him to abandon it, and he then took charge of a school at Burgdorf, where he also

received pupils who paid for their instruction, so that he was enabled to employ able assistants. In 1802 he went to Paris as a deputy, and un¬ successfully tried to interest Napoleon in a plan for national education ; in 1805 he removed his school to Yverdum, in the Pays de Vaud, where he occupied the castle given to him by the government. The grand principle of Pestalozzi's method was that of communicating all instruction by direct appeal to the senses and understanding, and forming the child by constantly calling all his powers into exercise, instead of making him a mere passive recipient, selecting the subjects of study in such a way that each step should best aid the further prog¬ ress of the pupil. The principles of his method are clearly developed in his (Wochenschrif t fur Menschenbildung.5 The value of these prin¬ ciples, as well as the esteem in which they are now held, may be gathered from the fact that they are substantially at the basis of the normal school system of Europe. Pestalozzi was a poor organizer,

manager and teacher ; but he originated and gave the impetus to the ideas of social reform by education so prominent in the 19th century. Among his works were (The Evening Hours of a Hermit) (1780) ; (How Gertrude Teaches her Children5 (1801) ; (The Swan's Song5 (1826). The best known of his many disciples is Frobel. Consult (Life and Works5 by De Guimps (1880), and (Life5 by Pinloche (1901).

PESTH. See Budapest.

PESTILENCE, general term for diseases of epidemic character in which a large pro¬ portion of the population of a district or country is affected and in which there is a high rate of mortality. Within historic times the term has been used to designate successively smallpox, erysipelas, syphilis, the bubonic plague, yellow fever, etc., which at different times have devastated whole countries and continents, e.g., the Black Death, now known to have been the bubonic plague. See Plague.

PETAIN, pa'tan, Henry Philippe, French general : b. April 1856. Educated at Saint Cyr and the Lcole Superieure de Guerre, he rose to general staff rank and in 1901 was ap¬ pointed a professor at the latter school. At the outbreak of the European War he was a colonel on the retired list, but was immediately placed in command of a brigade. During the fighting and retreat at Charleroi he beat off some furious attacks by overwhelmingly su¬ perior enemy forces. His skilful withdrawal of the brigade from an untenable position led to his being placed at the head of a division, which he commanded at the first battle of the Marne. Like General Foch, who had also been a mili¬ tary professor, Petain found the occasion to put his classroom theories to a practical test that proved a decided success. Within a few weeks, while still wearing his colonel's uniform, Petain was a general in command of an army corps, and during the first offensive in May 1915, in the Artois sector, he took some 10,000 prisoners and numerous guns from the enemy In the Champagne battles of September he com¬ manded the Army of Reserve and greatly dis¬ tinguished himself in the capture of the Hand of Massiges. In Februarv 1916, when the great German attack on Verdun opened, General Petain was placed in command of the armies

defending the historic fortress, in succession to General Balfourier. He arrived at Verdun on the fourth day of the battle; four miles of ground had been lost, and with it gun posi¬ tions which made the task of the defense al¬ most impossible. The crisis came the same evening; the

German assault on the two miles of the Douaumont front reached a pitch of unprecedented violence. It was the culmina¬ tion of the German effort, the last blow before which the fortress was to crumble. The Kaiser was watching through his glasses and victory was already taken for granted. That same night tidings were flashed to Berlin that Douaumont, the key of the last defense line of Verdun, was in German hands. The next morning, 26 Feb. 1916, Petain launched the counter-attack and drove the invaders back. In April he was ap¬ pointed to one of the three group commands, the central Secteur, from Soissons to Verdun, while General Nivelle continued the defense of Verdun. In December 1916 Petain was raised to the dignity of a marshal of France; in April 1917 he became chief of the staff, and on 15 May 1917 was appointed commander-in¬ chief of all the French armies on the western front. His tenure of that responsible post was remarkably free from those <(regrettable incidents55 that at times marked the disunited efforts of the Allies. On the unification of all the commands under General Foch in April 1918, Marshal Petain received a staff appoint¬ ment. See War, European — Military Opera¬ tions on the Western Front.

PETAL, one of the leaf-like parts of the corolla of a flower. See Corolla; Flower.

PETALESHARO, pet-4' lesh-a-ro, Paw¬ nee chief of the Skidi band. He made himself famous by rescuing from sacrifice a young girl captive from the Sioux tribe with which the Pawnees were at war. As she was being led to the place of sacrifice Petalesharo 'seized her, flung her upon a horse and springing upon another eluded pursuit and carried her near enough to her own people for her to be safe from pursuit. He then daringly returned to his tribe and faced their anger with such intrepidity that his conduct went unpunished. Later he succeeded in abolishing the practice of human sacrifice and upon his visit to Washington in 1821, acting as a delegate from the Pawnees, he was the recipient of much attention and was presented with a medal in recognition of his service to humanity.

PETALUMA, pet'a-loo'ma, Cal., city of Sonoma County, on the Petaluma River and on the Northwestern Pacific and the Petaluma and Santa Rosa railroads, 35 miles north of San Francisco. It contains a fine plaza and park, a public library, flour and silk mills, foundries, machine shops, engine works, cheese factories, tanneries, planing mills, *etc.* Pop. 6,226.

PETARD, pe-tard, in ancient warfare, a bell-shaped engine, made of gun-metal, loaded with from 9 to 20 pounds of powder and then

exploded. It was employed to break down gates, bridges, barriers, etc., to which it was hung by means of a wooden plank attached to it. It was also used in countermines to break through the enemy's galleries.

PETAVIUS, pe-ta'vi-us, Dionysius or Denys Petau, pa to, French theologian : b. Or-

leans, France, 21 Aug. 1583; d. Paris, France, 11 Dec. 1652. He was educated at Orleans and at Paris pursuing with avidity the studies of mathematics, belles-lettres and philosophy in particular. In Paris he became an intimate friend of Isaac Casaubon (q.v.). In 1602, when but 19 years of age, he was appointed to the chair of philosophy at the University of Bourges. He resigned in 1605 to enter the order of the Jesuits. He instructed in rhetoric at Rheims in 1609 ; at La Fleche in 1613 ; and at the College of Paris in 1618. Subsequently he studied theology at the College of Pont-a-Mous-son and in 1621 accepted the position of profes¬ sor of theology at the University of Paris, which he occupied 22 years. After 1646 he gave up teaching and devoted himself entirely to literature, completing 49 books dealing with philosophy, history and theology, which give him rank as one of the greatest scholars of the Jesuit order. It has been claimed for him that he was the restorer of dogmatic theology. His chief work, (Opus de Theologicis Dogmatibus) (5 vols., 1644-50), was uncompleted at his death. He published annotated editions of (Synesius) (1612) ; <Themistius) (1613) ; <Jtdian) (1614) ; <Nicephorus) (1616) ; ˆpiphanius* (1622) ; etc., besides his historical and theological works, among which are (Opus de Doctrina Tem-porum) (1627) ; <Uranologion) (1630) ; (Ra-tionarium TemporunV (1633).

PECHORA or PETCHORA, pech-o'ra, a river of European Russia, which rises in the north of the government of Perm, on the west¬ ern slope of the North Ural Mountains; flows almost due west, then turns

north across the eastern part of the government of Vologda, enters the government of Archangel and on reaching lat. 66° N. makes a long curve south¬ west to long. 52° E., when it turns abruptly due north and enters Pechora Bay by a great number of channels through a broad delta. Its total course is about 980 miles, of which 730 miles are navigable. Its upper reaches are frozen for six months in the year and the lower stretches for nearly five months. Its principal affluents are the Izhma from the south and the Ussa from the east.

PETECHIiE, pe-tek'i-e, small, purplish or crimson spots which appear on the skin in cer¬ tain diseases. They are caused by hemorrhage into the subcutaneous tissues. These spots are well defined and of variable size. They are not raised above the surface of the skin and do not fade on pressing. They may be symptoms of purpura or scurvy and are sometimes seen in scarlet fever, measles and in that form of smallpox called varioloid. When large, these spots are sometimes called ecchymoses.

PETER, Saint. See Saint Peter.

PETER I (the Great), Alexelevitch, em¬ peror of Russia: b. near Moscow, 9 June 1672; d. Saint Petersburg, 8 Feb. 1724. He was the son of the Tsar Alexei or Alexis Mikhailovitch. His elder brothers, Fedor and Ivan, were feeble in constitution. Fedor succeeded to the throne as Fedor III in 1676, and died in 1682. An attempt was then made to have Peter assume the imperial dignity with his mother, . the Tsarina Natalia Kirillovna, as regent. This ar¬ rangement did not please Sophia, the third daughter of Alexis, who had hoped to reign in

the name of her feeble brother. She roused the Strelitz, or bodyguard, and had Ivan pro¬ claimed tsar jointly with Peter, and herself regent. Peter gave early proof o£ capacity, and under the guidance of the Genevese Lefort took enthusiastically to the study of military science. In 1689 he married Eudoxia Fedor¬ ovna, who belonged to a powerful family, the Lapuchin. This alliance enabled him openly to oppose his sister, and in the course of this year he succeeded after a brief struggle in wresting the power from her. She was confined in a convent, where she died in 1704. Peter was now virtually sole emperor, though, till the death of his brother in 1696, he associated the latter's name with his own in the ukases of the empire. With the assistance of Lefort and Patrick Gordon he began to organize his army; but his great ambition was to form a navy. He went himself to Archangel, and cruised on board Dutch and English ships. He brought Dutch and Venetian

shipbuilders to Russia, and sent Russians to Venice, Holland and Leg¬ horn to learn shipbuilding. At length a fleet, which he had constructed, enabled him to con¬ quer Azof from the Turks. His reforms ex¬ cited great opposition among the old Russian party of the nobility. A few years after his marriage he repudiated his wife for the encour¬ agement she gave the reactionary party. In 1697 he suppressed with great barbarity a re¬ volt of the Strelitz. Leaving his capital under the military command of Gordon, he then pro¬ ceeded on that remarkable tour through Europe, in which his vast designs for the improvement of his people first began to appear. He formed an extraordinary embassy to Holland, which he accompanied incognito. After working some weeks in flan Amsterdam shipyard he took up his residence in August at Saardam, a famous shipbuilding port, and for several months worked for wages as a ship-carpenter under the name of Peter Michaeloff. Here for a time he lived alone in a little hut, meanwhile keeping up a correspondence with his ministers of state at Saint Petersburg. In 1698 he spent about three months in a similar manner in England, where he worked in a Deptford dockyard; and here also, as in Holland, he procured a great num¬ ber of sailors and artificers, as well as engi¬ neers, for a great canal which he projected be¬ tween the Don and the Volga. He afterward visited Vienna, where he particularly acquainted himself with the organization of the army. He was about to proceed into Italy, when he re¬ ceived intelligence of another revolt of the Strelitz, upon which he returned home, qnd through Gordon repressed the revolt, savage vengeance being taken on the insurgents. Peter organized his army on the German model ; served himself in it as a private soldier, and worked his way up through all the subordinate grades before he received a commission, an example which he compelled the young nobles to imitate. He obliged his subjects to adopt European costume by taxing their long Tartar robes ; emancipated the women from Asiatic seclusion; reformed the calendar; committed the charge of the public revenue to a regular administration ; and made himself virtually the head of the Church. He founded schools of navigation and mathematics, brought cattle and herds from Silesia, called into his dominions

foreign artisans of all kinds, established manu¬ factories of arms, tools and fabrics, and dis¬ tributed metallurgists through the mining dis¬ tricts of Russia. Such were the peaceful oc¬ cupations of his whole reign ; but he was not satisfied till he had given Russia a seaboard, and this could only be done at the expense of Sweden. Accordingly in 1700, when he thought his army was ready, he joined Denmark and Poland in a league against Charles XII (q.v.). His defeat at Narva, 30 Nov. 1700, and other early reverses, did not discourage him. In two following campaigns he gained some advan¬ tages over the Swedish generals, and 27 May 1703 his conquests enabled him to accomplish his great object by laying the foundation of Saint Petersburg on the Neva. The decisive victory of Poltava, 8 July 1709, confirmed and extended his conquests ; but the war dragged on until 1713, and Turkey becoming involved in it he nearly threw away all his successes by allowing himself to be hemmed in by the Turk¬ ish army on the Pruth. The empress Catharine I (q.v.), whom he had married secretly in 1706, and publicly in 1710, opened negotiations with the grand vizier, and procured a peace, with the relief of the Russian army, for the surrender of Azof and some small forts on the. Black Sea. Not satisfied, however with all his temporal power, Peter had suppressed the patriarchate and declared himself head also of the church. In 1713 Peter transferred the senate from Mos¬ cow to Saint Petersburg. His eldest son, Alexis, was in open sympathy with the reaction¬ ary party. Peter had him tried for conspiracy and condemned to death, 5 July 1718. He died in prison 7 July. The Peace of Nystadt with Sweden was signed in 1721. By its terms the tsar retained nearly all his conquests, including Livonia and Esthonia. He relinquished Fin¬ land, and paid to Sweden about $2,000,000. The senate after this peace conferred on him the title of emperor of all the Russias, to which were added the epithets of the Great and Father of His Country. In 1724 Peter founded at Saint Petersburg the Academy of Sciences, which was not, however, opened until 1726. In spite of the great material services Peter ren¬ dered to his country he remained to the last a man of coarse tastes and brutal propensities, addicted to the lowest vices and ferocious cruel¬ ties. His death followed a period of the severest suffering. The empress was declared his successor. The so-called Testament . of Peter the Great, defining his political policy, was probably written at the order of Napoleon I. Consult Motley, J. L., <Peter the GreaC in Harper's Half-hour Series (New York 1877) ; Bruckner, A., (Peter der Grosse) ('Berlin 1880) ; Minzloff, R. J., (Pierre le Grand dans la Litterature Etrangere) (Saint Petersburg 1872) ; Schuyler, E., (Peter the Great, Emperor, of Russia* (2 vols., New York 1884) ; Browning, R., (Peter the Great) (London 1898).

PETER II, Alexeievitch, Russian emperor, grandson of Peter the Great: b. Saint Peters¬ burg, Russia, 22 Oct. 1715; d. there, 9 Feb. 1730. Orphaned in his childhood, he was sequestered by those in authority, and was rescued by a coterie of the nobility who pre¬ vailed upon his grandmother, Catharine I, to will him the throne. There is much doubt as to whether the will later produced was legal, but

on the strength of it Peter was proclaimed em¬ peror, 18 May 1727. During his brief reign he was controlled by Mentchikof, who endeavored to marry the 13-year-old emperor to one of his daughters. In this he was frustrated by his rival, Dolgoruki, who also wished to ally his family with the imperial one. Dolgoruki took him to Moscow, and there he was crowned 25 Feb. 1728. The intrigues of the several factions came suddenly to naught upon the death of the emperor from smallpox in 1730. Anna Ivanova succeeded to the throne.

PETER III, Feodorovitch, emperor of Russia, grandson of Peter the Great, son of Anna Petrovna and Duke Karl Friedrich: b. Kiel, 21 Feb. 1728; d. Ropscha, 17 July 1762. Succeeding his father as Duke of Holstein, he bore the name Karl Peter Ulrich. In 1742 he was appointed grand-duke and heir-apparent by his aunt, the Empress Elizabeth, the direct male line having failed with Peter II. Three years afterward he married Sophia Augusta, Princess of Anhalt-Zerbst, later the Empress Catharine II (q.v.). He succeeded Elizabeth 5 Jan. 1762; immediately concluded a peace with Frederick II of Prussia, restoring the parts of Prussia conquered by Russia and sending 15,000 Russian troops to join Frederick's army; and in general showed himself so devoted to German ways of living, and so enamored of Frederick of Prussia, that the nobles soon rose against him. His wife, Catharine, already accused of adultery, joined the conspiracy, in which her lover Orloff and his brother (see Orloff) also took part, and 8 July 1762 was proclaimed em¬ press. Peter offered to retire to Holstein, but he was forced to abdicate and then was assassinated by the conspirators. Consult Bain, R. N., (Peter III, Emperor of Russia) (West¬ minster 1902).

PETER I, called Karageorgevitch as grand¬ son of Karageorge or Czerny George, king of Serbia: b. Belgrade, 29 June 1844; d. there, 16 June 1921. His father, Alexander Kara-georgevich, ousted Michael Obrenovitch in 1842, but in 1858 was exiled by the returning Obrenovitch dynasty. Peter was educated in Russian military schools

and at Saint Cyr; fought in the Franco-Prussian War, being thnce cap¬ tured; furthered the Herzegovinian rising in 1875 ; married Zorka, princess of Montenegro, in 1883 and lived at Cettinje until her death in 1890. He then resided quietly in Geneva until June 1903, when he was proclaimed king of Serbia by the army officers who had killed King Alexander Obrenovitch and Queen Draga. His elevation to the throne was received coldly by most of the nations. His reign was signal-lized by the shaking off by Serbia of Austrian influence; by Austria's attack on the kingdom on 28 July 1914, which resulted in the general European War, and, in 1918, by the union of the Austro-Serbian, Croatian and Slovenian parts of the former Austro-Hun¬ garian monarchy with Serbia to form the Serb, Croat and Slovene state (Jugo-Slavia), to which on 1 March 1921 Montenegro was added.

PETER, Epistles of. First Peter, His¬ torical Attestation.— Two letters appear in the New Testament with the name of Peter as 'author. The early testimony that the first of these Epistles was written by him is unusu¬ ally early and strong. It has often been re-

peated that except 1 John no other of the Catho¬ lic Epistles is so strongly attested in early Christian literature.

Objections to Petrine Authorship. — Many critics have, however, doubted for various reasons that Peter was the author of 1 Peter.

(1) It is objected that there exists a dependence on the Epistles of Paul which cannot be at¬ tributed to Peter. Certainly, as is now gen¬ erally recognized, this Epistle shows acquaint¬ ance with and use of both Romans and Ephe¬ sians, but it is not so generally admitted that this fact precludes Petrine authorship. On the other hand, it may fairly be said that nothing which we know of Peter justifies us in holding that he was an original thinker, and there seems to be no decisive reason why he might not have made such use of Paul's writings as is here made. The same may be said as to the more indefinite assertion that the theological conceptions may be denominated Pauline. It is easy to exaggerate the difference between the preaching of Paul and of the

earlier Apostles ; indeed, there is no reason to suppose that any fundamental differences existed between the two. In fact it is simpler to explain the relations to Pauline language and thought on the basis of the genuineness of the letter than otherwise.

(2) Further objection is made to Peter's au¬ thorship on the ground of the lack of personal reminiscences of the life of Jesus. In answer, it is argued that it is unfair to set up any standard as to what material a man shall use in writing, and that the story of the ministry of Jesus which we find in the Gospels is not to be regarded as the substance of Apostolic preaching. In fact there are a number of slight expressions, too subtle to be the work of a forger, which show the familiarity of an eyewitness with the ministry of Jesus, and there are a much greater number of parallels with his teaching. (3) It is also urged that the con¬ ditions of the Christians addressed, especially in regard to persecution, require a date later than must be set for the death of Peter. But, in answer, it is said that Peter might have lived to a time later than the Neronian persecution, and by others that the conditions implied may reasonably be held to have already existed in the time of Nero. (4) Another difficulty is made out of the fact that the language and style of the Epistle is better than can reasonably be attributed to the Galilean Apostle. It is answered that as Greek was commonly spoken in Galilee in the time of Christ, Peter may have used it familiarly from his boyhood and have improved in his use of the language during the years of his Apostolic travels. But it is not necessary to credit Peter alone with this Epistle, since the connection of Silvanus with it (v, 12) is consistent with the view that he aided in putting the letter in shape, if, indeed, the phrase does not require this supposition. In view of these and similar considerations the great majority of scholars hold strongly to the traditional Petrine authorship.

Persons Addressed. — Those to whom the letter was sent were addressed (i, 1) as mem¬ bers of the ˆDispersion,® the Jewish name at that time for those Jews who lived outside of Palestine, but various statements in the body of the letter so clearly imply that the readers wrere of Gentile origin that it is agreed that the

word ˆDispersion® is used figuratively, not literally. These readers are said in the same address to live in Pontus, Galatia, Cappadocia, Asia and Bithynia, the Roman provinces which covered practically the whole of Asia Minor.

Date and Place of Composition — The date of the Epistle, if genuine, is, as has al¬ ready been suggested, dependent on the con¬ ditions of the readers in regard to persecution and the date to be set for the death of Peter. While the argument of Ramsay for 80 a.d. is in many ways plausible, the majority of scholars still hold that it was written between 64 and 67. The majority also hold that (<Babylon® given in v. 13 as the place of composition is used figuratively for Rome, in harmony with what is held to have been already Jewish usage, as it is shown by the Revelation to have later b'een Christian usage.

Contents. — While the plan of the letter is not very sharply defined, the contents may be briefly summarized as follows : i, 1-12, Intro¬ ductory ; I, a series of exhortations relating to the individual lives of the readers, to hope, holiness, reverential fear, love and desire for truth, i, 13-ii, 10; II, a second series of ex¬ hortations with regard to relations to others, the civil power, submission of slaves to their masters, husbands and wives, and duties in view of persecution, ii, 11-iv, 6; III, another series of varied exhortations touching the individual life, iv, 7-v, 9; the conclusion being a few personal words presumably in Peter's own hand¬ writing and two brief prayers.

Character. — This letter is often called an ((Epistle of hope.® Its primary object seems to have been a message of encouragement to the persecuted Christians of the time. Von Sodem characterizes it thus: (<This simplicity of thought joined with intimacy of appeal, this lofty moral earnestness joined with joyous, indeed jubilant, hope — amid a prevailing at¬ mosphere of trial and affliction … — all

combine to make this short, impressive letter one of the most precious monuments of primi¬ tive Christianity, a jewel of the New Testa¬ ment worthy to be inscribed with the name of the great Apostle.®

Second Peter, Historical Attestation. — The

second Epistle ascribed to Peter was not till late given an undisputed place in the Canon, and the authorship which it claims is more widely set aside than in the case of any other book of the New Testament. Eusebius reckons it among the ((disputed® books, though this must not be taken to mean that he did not him¬ self accept it. It is found in the Sinaitic and Vatican, our oldest manuscripts. In the 3d cen¬ tury it had found considerable acceptance, but the traces of its influence in the 2d century are comparatively scanty and uncertain.

Objections to Petrine Authorship. — Against its claim to be written by the Apostle Peter (i, 1), it is urged (1) that the author makes

conspicuous endeavors to have it appear thus. Not only does the claim stand in the address of the letter, but also it is argued that the references to the first letter, to the Trans¬ figuration, to the prediction by Jesus of Peter's death, all are introduced to substantiate this claim. In answer, it is argued that Peter cer¬ tainly might have said all that is attributed to him. Attention is also called to the fact that

in many points there are somewhat striking differences between 1 Peter and 2 Peter, which an imitator would have been expected to avoid, as, for example, that in the opening address the very name of Peter appears in a form quite different from that in the first letter. (2) The unlikeness between the two letters in vocabulary and style is also urged against Petrine author¬ ship. This should certainly be recognized to the full, but its significance is greatly lessened if the first letter is largely due, as many hold, to the aid of Silvanus. A difference in assist¬ ants might practically explain the whole differ¬ ence in the letters, and at the same time it should be noted that certain subtle resemblances exist which need to be taken into account. (3) The unlikeness in the thoughts advanced is used as an argument that the two Epistles can¬ not be due to the same author. To this it has been answered that while the encouragements of 1 Peter are lacking, or, rather, are replaced by warnings, and while instead of ((hope,55 which is the keynote of 1 Peter, ˆknowledge55 is emphasized in 2 Peter, this may fairly be explained by the different conditions and needs of those addressed. (4) It is also urged that the errorists attacked must have belonged to the 2d century. But while doubtless there were such errorists in the 2d century, it can scarcely be demonstrated that such did not exist in the 1st century as well. To very many minds the Epistle of Jude, to which 2 Peter is according to general consent largely indebted, would demonstrate the early date of the evils combated. (See article Jude, Epistle of). (5) It has sometimes been insisted that an Apostle could not have used the material of Jude as did the author of 2 Peter. But such assertions are unsafe. It is at least conceivable that Peter, recognizing the importance of the warnings of Jude, might have given them the weight of his authority. (6) It is

further held that some phrases, as <(your Apostles,55 the ref¬ erence to Paul's Epistles as «Scripture,55 and the fact that some were disappointed at the delay of the expected end, all imply a later date than would be consistent with Peter's authorship. But many thoughtful scholars do not feel that this is a necessary inference. (7) It is also urged that the Epistle as a whole is unworthy of the Apostle Peter. But there seems to be of late an increasing recognition that, even though not a great creative work, it yet de¬ serves what Calvin said of it: ((Since the majesty of the Spirit of Christ exhibits itself in every part of the Epistle, I feel a scruple in rejecting it wholly.® Many scholars of the first rank still accept the Petrine authorship, and many who do not accept it would also not characterize the book as a forgery. On the contrary, they would insist that for the author to give the name of Peter to his work was not dishonestly intended, but was instead a literary device not uncommon at the time nor to be regarded as discreditable when judged as it should be by the standards not of our age but of his own.

Circumstances of Composition.— If genu¬ ine, it cannot be later than 80 in any case, or than 66 i-f Peter perished in the Neronian per¬ secution, and the place of composition would naturally be Rome if the earlier date is ac¬ cepted, but would be wholly uncertain with

the later date. If not genuine, the date might fall almost anywhere between 80 and 130, but the language of the Fathers would seem to show that it was composed not later than the first quarter of the 2d century, and it might well have been before 100. The place would then be wholly a matter of conjecture, as would the special evils which it was its purpose to correct.

Contents. — After a brief address, i, 1, 2, the author exhorts to growth in the Christian life to full knowledge of Christ, i, 3-11; then jus¬ tifies his reminders by the Divine testimony at the time of the Transfiguration, i, 12-20; denounces the false teachers and warns of doom, ii, 1-22 ; and makes a final appeal to his readers based on the coming destruction of the world, iii, 1-18.

Bibliography. — Bigg, Ch., Commentary on the Epistle of Saint Peter5 (International Criti¬ cal Commentary 1901) ; Mayor, J. B., (The Epistle of Jude and the Second Epistle of Saint Peter) (1907); Moffatt, Jas., introduc¬ tion to the Literature of the New Testament (1911) ; Salmon, Geo., (Historical Introduction to the Books of the New Testament5 (1885) ; Zahn, Theodor, introduction to the New Tes¬

tament5 (Eng. trans., Vol. II, 1909).

David Foster Estes,

Professor of New Testament Interpretation, Colgate University.

PETER, Order of. See Orders, Royal.

PETER OF BLOIS, blwa, English prel¬ ate: b. Blois, 1135; d. about 1208. He received his education at Paris and Bologna; became tutor to William II of Sicily and keeper of the royal seal. In 1173 he entered the service of Henry II of England, by whom he was dis¬ patched on missions to Paris and Rome. In 1176 Peter became secretary to the archbishop of Canterbury. From 1191 to 1195 he was sec¬ retary to Queen Eleanor. He was one of the most learned men of his time. He wrote sev¬ eral works of which the (Epilstles5 (Brussels 1480) is the most important.

PETER CLAVER, Saint, Spanish Jesuit missionary: b. at Verdu in Catalonia 1580; d. Cartagena, New Granada, South America, 8 Sept. 1654. He entered upon his novitiate in the Society of Jesus at Tarragona in 1602, and upon the establishment of a province of his order in New Granada he was sent to Carta¬ gena as missionary to the negroes in 1610. After two years of further study in the College of Santa Fe de Bogota, he was ordained priest; and from that time labored heroically for 44 years in behalf of the blacks. Bearing food and medicines he visited the slavers imme¬ diately upon their arrival in Cartagena harbor, and when the negroes had been landed, in¬ structed them, organizing a band of catechists for the purpose; directed their care in the hos¬ pitals; obtained for them humane treatment by their owners ; regularly conducted for such as remained in Cartagena services in the Jesuit Church; and extended his labors widely among the mines and plantations of the province. Un¬ able to suppress the slave trade, he labored ceaselessly to mitigate its cruelties through a noble ministrv to its victims. He was beati¬ fied by Pius IX 16 July 1850 and canonized by Leo XIII 15 Jan. 1888. Consult the lives by

Schelkle (1833; a translation, into German of the work by the Jesuit Fleurian)-; and Hover (1888). Also de Andrada, F., (Lives of the Saints* (Madrid 1657).

PETER THE CRUEL, king of Castile and

Leon. See Pedro the Cruel.

PETER THE HERMIT, preacher of the

first crusade: b. diocese of Amiens about 1050; d Neufmoutier, near Huy, 8 July 1115. Many fictitious stories, have been given of his early life. It is generally believed that he had been a French military officer, and that he made a pilgrimage to Palestine about 1093 but did not actually reach the Holy City, owing to the dan¬ gers encountered. He is reported to have made a journey to Rome and by some is cred¬ ited with having proposed the Crusades to Pope Urban II, who is generally regarded as their author. After the Council of Clermont (see Crusades), he preached the crusade in central and northern France, everywhere arousing un¬ precedented enthusiasm. He journeyed about on mule-back, clad in a hermit's robe, and bear¬ ing in his hand a crucifix. Wherever oppor¬ tunity offered he urged the cause. The success of his enthusiastic harangues was proportionate to the boldness of his scheme and the ignorance of his auditors. Peter himself led the way through Hungary at the head of the first undis¬ ciplined multitude of more than 30,000 men, a comparatively small number of whom survived to reach the city. He preached on the Mount of Olives 8 July 1099, took part in the capture of Jerusalem (15 July) ; and, having witnessed the accomplishment of his undertaking, re¬ turned to his native country, where he founded the abbey of Neufmoutier and died its prior. Consult Donnet, F., (Pierre l'Hermite et la Famille L'hermite d' Anvers* (Antwerp 1893).

PETER IBBETSON. The novel which first brought to George Du Maurier fame as a writer of fiction. Its success led to the writing of the two other novels, <Trilby) and (The Martian,* which complete the author's major literary achievement. It is important to re¬ member that these works were produced as a venture, by one who was not a professional writer. Du Maurier was an artist, and first became famous as an illustrator of Punch. In 1859, at the age of 25, he suddenly lost the sight of one eye as a result of detached retina. When the sight of the other eye became uncer¬ tain, he lived under the fear of becoming un¬ able to earn his living by the prosecution of his regular work. He

therefore turned to writing. About 1891, encouraged by Henry James, Du Maurier wrote (Peter Ibbetson* for Harper and Brothers. The story was published seri¬ ally in Harper's Magazine in 1891 (June to November numbers inclusive), and was later issued in book form. Three factors contrib¬ uted to the success of the work. First, the scenes of the story are those of Du Maurier's own early life, and over the whole narrative, particularly over the early chapters, there hangs a truly delightful atmosphere of reminiscence. Certainly, few readers can resist the appeal of Du Maurier's narrative of young Peter's jour¬ ney from London to Paris — from <(a dingy house in the heart of London in a long street of desolating straightness that led to a dreary square and back again,** to Passy, the suburb of

Paris, where he awoke to find himiself (<on a beautiful June morning in a charming French garden, where the warm, sweet atmosphere was laden with the scent of lilac and syringa, and gay with butterflies and dragon-flies and humblebees.** Second, the supernatural element attracted many readers. The action of the story centers about the ability of Peter Ibbetson and Mary, Duchess of Towers, to live in the world of dreams a life entirely apart from their actual life. Lastly, Du Maurier illustrated his own story with the skill which only a gifted artist can summon. The least artistic feature of the novel is the handling of the supernatural element. The delicate feeling evidenced in the autobiographical portion constitutes the chief charm of the story, and will keep the work alive for a long time. (Peter Ibbetson,* like (Trilby,* has been successfully dramatized.

Waldo H. Dunn.

PETER LOMBARD, or PETER THE LOMBARD, Italian theologian : b. at Lumello, Lombardy, about 1100; d. 1164. He was edu¬ cated at Bologna, Rheims and under Abelard at Paris. He became professor of theology in the Notre Dame School and was made bishop of Paris in 1159. After a year in charge of the see he resigned. He compiled (Sententiarum Libri IV,) collected from the works of Saint Augustine and other doctors of the Church Consult Harnack, A., (History of Doctrine * (Eng. trans., Boston 1899) ; De Ghellinck, (The Book of Sentences) (in Dublin Review, 1910) ; Protois, (Pierre Lombard, son epoque, sa vie, ses ecrits, son influence) (Paris 1881).

PETER MARTYR, Protestant divine: b. Florence, 1500; d. Zurich, 1562. As Pietro Martire Vermigli, son of Stefano Vermigli, he entered at 16 the order of the regular canons of Saint Augustine, at the

monastery of Fie-sole. In 1519 he removed to Padua, where he studied Greek and philosophy. In 1526 he commenced to preach, and attracted great ap¬ plause in several cities of Italy. For a time he was prior of Saint Fridian's at Lucca. After receiving numerous important offices in his order his religious opinions were considered as savoring too much of the doctrine of the re¬ formers, Luther and Zwinglius. At length he renounced Roman Catholicism, and it became necessary for him to quit Italy. At Zurich, in Switzerland, he was received in a friendly man¬ ner by the Protestant clergy (1542). Soon after he became professor of divinity at Strassburg, and in 1547 accompanied Bucer, Fagius and other learned reformers, on the invitation of Archbishop Cranmer, to England, where he was made professor of divinity at Oxford and canon of Christchurch. Martyr had followed the example of Luther in marrying a nun who had renounced her vows. He was appointed to the theological chair at Oxford in 1549, and be¬ came a very efficient assistant to the English reformed clergy in carrying on their plans of innovation in the Church. On the accession of Queen Mary, being commanded to quit the country, he returned to Strassburg and resumed his former situation. In 1556 he removed to Zurich to occupy the office of professor of theology. In 1561 he assisted at the? famous conference between the Catholics and Protest¬ ants held at Poissy, in France. He was the author of many works on theology and comPETER PAN —PETERBOROUGH

mentaries on the books of both the Old and the New Testament.

PETER PAN, a play for children written by Sir James M. Barrie in 1904. In 1905 it was produced in New York, Miss Maude Adams assuming the principal role.

PETER PARLEY. See Goodrich, Samuel Griswold.

PETER-PENNY, or PETER-PENCE.

See Peter's Pence.

PETER SCHLEMIHLS WUNDERSAME GESCHICHTE. (The. Wonderful History of Peter SchlemihP by Adalbert von Chamisso — first published in Germany in 1814, in the United States in English translation in 1825 — is one of the most famous fairy-tales of German

Romanticism. The fundamental idea, that a man can lose his shadow, Chamisso probably took from folklore and he made it a fascinating means of putting the reader in an atmosphere hovering between the real and the fantastic. The meaning which Chamisso gave to the shadow seems to be social repute, which men imperatively demand of each other with¬ out testing it for its true value. Schlemihl, a Hebrew name, originally meaning friend of God, Theophilus, was also used euphemistically by the Jews for a man who is denied all success in the world. Our Peter Schlemihl exchanges his shadow for the gold sack of Fortunatus, but only to fall a victim to unhappiness very soon, since men withdraw from him on account of his defect and he himself becomes involved in guilt. Yet when the devil wants to return his shadow to him in exchange for his soul, Schlemihl, as the friend of God, rejects the proposal and throws away the magic gold sack besides. He seeks refuge in nature and travels about the world in seven-league boots. When overtaken with sickness he is reconciled with his fellow-men who take care of him and in his sickness do not look for his shadow. Fi¬ nally, however, he returns to his. studies of nature and find's his deepest satisfaction in communion with her and his own better self.

Undoubtedly <The Wonderful History of Peter SchlemihP contains features and expe¬ riences of Chamisso's own,, but the poet him¬ self protested against carrying the comparison between him and the hero of his story too far. Consult edition in c Deutsche National-Litera-tur> (1882-98, Vol. 148, with excellent introduc¬ tion and references) ; English translation in

(German Classics 5 (Vol. V).

Ewald Eiserhardt.

PETER SIMPLE, a tale of life on the sea, told in his best vein by Captain Marryat and first published in 1834.

PETER THE VENERABLE, Abbot of Cluny: b. Montboissier, about 1092; d. Cluny, 25 Dec. 1156. He was educated in a monastery of the Cistercians, and entered the monastery of Cluny in 1111. In 1122 he became abbot there and for 35 years exerted a powerful in¬ fluence for good in the West. In 1134 he at¬ tended the Council of Pisa and brought about a recognition of Innocent II as the legitimate Pontiff. To Abelard, Peter gave a. refuge in the closing years of the former's life. Peter was a scholar of great ability. He caused a translation of the Koran to be. made, which for many years was the only one in existence, and

wrote several treatises including those (Against the Jews' ; Two Books of Miracles,' and (Against the Saracens. ' For these and his other works consult Migne, (Patrologia Latina' (Vol. CLXXXIX). Consult also Demimcied, Pierre le Venerable' (new ed., Paris 1895) ; d'Avenel, J., (Vie de Pierre le Venerable' (ib. 1874) ; Wilkens, C. A., Petrus der Ehrwur-dige' (Leipzig 1857).

PETERBORO, N. H., town in Hills¬ borough County, on the Boston and Maine Railroad, 40 miles southwest of Manchester, lit has a public library, a historical society, bas¬ ket factories, cotton mills, *etc.* In recent years groups of artcraft workers, art and music stu¬ dents have established colonies in Peterboro. The town owns the water-supply system. Pop.

2,615.

PETERBOROUGH, pe'ter-bur-o, Charles Mordaunt, 3d Earl of, English soldier : b. about 1658; d. Lisbon, Portugal, 25 Oct. 1735. He succeeded to his title and estate in 1675, went to Holland in the reign of James II, and, entering into the scheme of his dethronement, returned to England with William III, by whom he was created Earl of Monmouth. He succeeded to the earldom of Peterborough in 1697, and in 1705 was employed as joint-com¬ mander with Sir Cloudesley Shovel of the Eng¬ lish army in Spain, in the War of the Spanish Succession. In 1710—1 1 he was appointed am¬ bassador to Turin and other Italian courts, and in 1712 governor of Minorca. In 1722 he was made general of the marine forces of Great Britain. Lord Peterborough was intimate with his literary contemporaries, and was himself . a writer of verse. He figures as Lord Ormont in George Meredith's novel, (Lord Ormont and His Aminta.' Consult Warburton, (Memoirs of Charles Mordaunt' (1853); Russell, Me¬ moir of Charles Mordaunt' (1887.) ; Stebbmg, Peterborough' (1890).

PETERBOROUGH, Canada, a port of entry and county-seat of Peterborough County, Ontario, on the Outonabee River and Trent Valley Canal, and on the Grand Trunk and Canadian Pacific railways, 75 miles northeast of Toronto. The city is well laid out with wide and regular streets, and has a city hall, post office, customs and inland revenue buildings, mechanics' institute, normal school, collegiate institute, 11 other schools, 13 churches, a Young Men's Christian Association building, Young Women's Christian Association building, a

pub¬ lic library, hospitals, banks and daily and weekly newspapers. A United States consular agent is resident here. Peterborough is the centre of a rich agricultural region. It exports lumber, peas, oats, barley, wheat, flour, leather, furs, cheese, wool and pork. The manufactures include steam-engines, agricultural implements, mill machinery, foundry products, furniture, fur garments, harness, boats, electrical ma¬ chinery, mining machinery, laundry machinery, bricks and tiles, aerated water, silk labels, pianos, lockfi,1' canoes, flour, quaker oats, cream separators, dairy supplies, steel window sashes, marble, yarn, carpets, women's and childrens dresses, and mattresses. There are saw and planing mills, electrical and carbon works. A hvdraulic lift-lock, the largest of its kind in the world, designed to lift vessels 140 feet long

to a height of 65 feet in one movement, was completed at Peterborough in 1904. (See Can¬ adian Canals). There are now 50 miles of water mains, 40 miles of concrete sidewalk, five miles of asphaltic concrete pavement, and 30 miles of sewers in the city. The waterworks system, electric distribution system, garbage disposal plant and sewerage system are owned and controlled by the city. The city is the headquarters for Canadian General Electric Company, De Haval Dairy Supply Company, Vermont Marble Company for Canada, Quaker Oats Company for Canada. Pop. about 25,000.

PETERBOROUGH, England, an episcopal

city, in the county and 43 miles north by east of the town of Northampton, mainly on the left bank of the Nen. It is the railway centre of a large agricultural district; its corn and stock markets and its manufactures of agricul¬ tural implements are of great importance. The principal building is its cathedral, founded by Peada, son of Penda, fourth king of Mercia, in 655, and destroyed by the Danes in 870. Re¬ built in 966, in 1116 a great part of the edifice was destroyed by fire; in the following year its restoration was commenced; but not till the opening of the 16th century did the structure assume its present aspect. The prevailing char¬ acter of the

building is Norman, but it exhibits examples of transition, early English, decorated English and perpendicular styles. The most commanding feature is the west front, consist¬ ing of three magnificent pointed arches 80 feet high, surmounted by pediments and pinnacles, and flanked by turrets with spires and pinnacles. The whole front forms a square of 150 feet in height and breadth. Catharine of Aragon, wife of Henry VIII, was interred in this cathedral. The building has recently undergone extensive repairs and restorations. The minster precincts show the remains of a cloister, a fine perpendic¬ ular gateway leading to the deanery, a massive tower and gateway conducting to the bishop's palace, and an old chapel, now used as a mu¬ seum. Other public buildings are seven churches, a number of Nonconformist chapels, the townhall, corn exchange, county court of¬ fices, several banks and a post-office. There is a training college for Church of England school¬ masters, grammar-school, middle-class school, *etc.* There are also an infirmary and dispen¬ sary and monastic almshouse. Pop. 33,574.

PETERHEAD, pe-ter-hed', Scotland, a sea¬ port town in the county and 32 miles by road north-northeast of Aberdeen, on a peninsula, the most easterly point of Scotland, with a har¬ bor on either side of it, communicating by a cut across the isthumus. A great harbor of refuge is being constructed by convict labor. The town has several churches, a townhall with a spire 110 feet high, free library and museum, a market-cross, a customhouse, excel¬ lent schools, a convict prison, public baths, mu¬ nicipal lodging-house, etc.. There are a woolen factory and granite-polishing works. The town has a considerable trade. The Greenland whale and seal fisheries, once of impor^nce, have all but ceased ; but the town is still an important centre of the herring-fishery. Some miles from the town are the ruins of the castles of Ravens-craig and Inverugie, the latter once the seat of the Keiths, earls-marischal of Scotland. There is at Peterhead a statue (presented to the town

by William I, emperor of Germany) of James Keith, field-marshal in the Prussian service, who was killed at the battle of Hochkirch in 1758. Pop. 13,559.

PETERHOF, pa'ter-hof, Russia, a town on the Gulf of Finland, 18 miles west of Petrograd and noted for an imperial summer palace built by Peter the Great in 1711. It contains a fine collection of paintings and is surrounded by beautiful parks and gardens laid out on the model of those at Versailles, with cascades, terraces and summer houses.

Population esti¬ mated at 15,000.

PETERKIN, George William, American bishop : b. Clearspring, Md., 21 March 1841 ; d. 22 Sept. 1916. He was educated at the Univer¬ sity of Virginia and at the theological seminary -of Virginia. From 1861-65 he served in the Confederate Army, becoming first-lieutenant and adjutant to Gen. W. A. Pendleton of the Army of Northern Virginia. He then assisted his father in his duties at Saint James Church, Richmond, Va. (1868) ; was rector of Saint Stephen's Church, Culpeper, Va. (1869); Memorial Church, Md. (1873). In 1893 he or¬ ganized a mission in Brazil, and in 1901 organ¬ ized another in Porto Rico. He founded the Sheltering Arms Hospital in 1886. He was first bishop of West Virginia after 1878. Among his. publications are (Records of Protestant Episcopal Church in Western Virginia and West Virginia* ; 'Handbook for the use of Members and Friends of the Protestant Epis¬ copal Church,* and various other articles.

PETERMANN, pa'ter-man, August Hein¬ rich, German geographer : b. Bleicherode, Prus¬ sian Saxony, 18 April 1822; d. Gotha, 25 Sept. 1878. He; learned his art at the Potsdam School of Geography. His first important work in cartography was a map for Humboldt's Cen¬ tral Asia.* In 1845 he went to Edinburgh and assisted Keith Johnston in the preparation of his (Physical Atlas,* and in 1847 went to Lon¬ don, where he became a member of the Royal Geographical Society and contributed to the Encyclopaedia Britannica,* *etc.* Queen Vic¬ toria appointed him "Physical Geographer Royal.® In 1854 he became professor of ge¬ ography at Gotha and superintendent of Justus Perthes' geographical establishment, editing for 14 years .'Petermann's Mitteilungen,* which he founded in 1855, the foremost among the geo¬ graphical magazines. He traveled extensively in the Orient and wrote of his travels. He was associated with Hiibner in important discoveries in chemistry and provings of the atomic theory.

PETERS, pe'terz, or PETER, Hugh, Eng¬ lish Puritan Clergyman: b. Fowey, Cornwall, June 1598; d. London, 16 Oct. 1660. He was educated at Cambridge, took orders and preached with much acceptance at Saint Sepul¬ chre, London, for a time but was presently im¬ prisoned for non-conformity by Archbishop Laud. On being released he went to Rotterdam and from about 1632 was minister of an inde¬ pendent congregation, there. In 1635 he came to New England and in December 1636 was or¬ dained pastor of. the First Church in Salem, Mass., in succession to Roger Williams, whose followers he excommunicated. In *63 7 he was made an overseer of the newly established Har¬ vard College. He proved himself to be a public-

spirited citizen, was active in civil and commer¬ cial affairs and in March 1638 was appointed to assist in collecting and revising the laws of the Massachusetts Bay Colony. He was sent to England in August 1641, with two others, to ob¬ tain revision of the laws of trade and excise, in which commission they were successful. Peters then joined the Parliamentarians, became a chap¬ lain in the army, is said to have held a colonel's commission and was a valuable asset to the popular cause. He had intended to return to America, but various matters prevented and during the Protectorate he was a zealous sup¬ porter of Cromwell, on whose death he preached a sermon from the text "My Servant Moses is Dead.® At the Restoration he was exempted from the Act of Indemnity, sent to the Tower and indicted for high treason as having been concerned in the death of Charles I. He was able to prove false the rumor of his having been present on the scaffold at the king's execution, but was found guilty of treason and was be¬ headed at Charing Cross. His private char¬ acter, as was the fashion of the time, was the subject of much attack and the grossest im¬ morality was charged against him, without any solid basis. He appears to have been honest and high-minded, but given to violent denuncia¬ tions of his opponents and wanting in judg¬ ment. His writings are mainly political pamph¬ lets and sermons. Consult Peters, Samuel, (His¬ tory of Hugh Peters) (1807) ; Felt, (Memoir and Defense of Hugh Peters) (1851); and 'Dictionary of National Biography. }

PETERS, John Punnett, American Episco¬ pal clergyman and archaeologist: b. New York, 16 Dec. 1852. He was graduated from Yale in 1873. He took his doctorate in 1876 and was in¬ structor until 1879. He entered the ministry of the Episcopal Church in 1876, studied in Berlin and Leipzig (1879-83), was in charge of Saint John's Church, Dresden, Germany (1881-83). He be¬ came professor of Old Testament languages and literature in the Episcopal Divinity School, Philadelphia, in 1884; of Hebrew, University of Pennsylvania in 1885 and was in charge of the expedition of that university which conducted excavations at Nippur (1888-91) unearthing the great temple of En-lil and discovering the oldest cuneiform inscriptions

known up to that time, carrying back the records of civilization a millennium or more. In 1891 and again in 1901, he traveled and explored in Palestine. Since 1893 he has been rector of Saint Michael's Church, New York, was canon residentiary, Cathedral of Saint John the Divine (1904-10) and has been very active in civic and social work in New York City. He received the honorary degree of D.D. from Yale in 1895 and of Sc.D. from the University of Pennsylvania in the same year. He is the author of 'Political His¬ tory of Recent Times) (1883) ; 'Scriptures He¬ brew and Christian) (English edition) ; 'The Bible for Home and SchooP (1886—89) , 'The Bible as Literature) (1896) ; Nip¬ pur, or Explorations and Adventures on the Fuohrates) (1897) ; 'Diary of David MTClurc (1899) ; 'Archeological History of Hither Asia > (1899) ; 'The Old Testament and the New Scholarship) (1901) ; (Labor and Capital) (1902); 'Early Hebrew Story) (1904); 'Some Tombs in the Necropolis of Marissa) (1905) ; <- Annals of Saint Michael's) (1907); 'Modern

Christianity) (1909) ; 'Jesus Christ and the Old Commandments) (1914) ; 'The Religion of the Hebrews) (1914).

PETERS, pa'ters, Karl, German explorer: b. Neuhaus, Hanover, Germany, 27 Sept. 1856; d. 17 Oct. 1918. He was educated in Gottingen, Tubingen, London, and Berlin. For a few years he devoted himself to teaching. In 1884 he founded the German Colonization Society and led an expedition to Central Africa, where he raised the German flag in Usagara, Ukarni, Nguru and Useguha. He was granted the first Imperial Charter in German history ; founded German East Africa in 1885 ; and continued his management of the colonial possessions until 1888, meanwhile annexing more territory in East Africa. In 1889-90 he led the German re¬ lief expedition in search of Emin Pasha and in 1890 reached Victoria Nyanza, after crossing which he met Emin Pasha with Stanley. In 1891-93 ho was imperial high commissioner for East Africa and succeeded in establishing the boundary line between English and German possessions. He was attached to the colonial office of Berlin in 1893-95 and in 1896 was ac¬ cused of cruelty in his treatment of the natives of Africa and recalled. The subsequent in¬ vestigations resulted in his dismissal. He went to London, founded an exploration company, and in 1899-1901 explored the region between Zambosi and Sabi, where he made important discoveries of ruins which throw much light on ancient African history, and also found gold and copper mines. He has written extensively concerning his travels, his 'New Light on Dark Africa) has been published in nine lan¬ guages and amung his other publications

are ‘Willenswelt und Weltwille) (1883) ; ‘Deutsch-nationaP (1887); ‘Die deutsche. Emin Pascha Expedition) (1891); ‘^Equatorial und Sud-afrika nach einer Darstellung von 1719) (1895) : ‘Im Goldlande des Altertums) (1902) ; ‘Forschungen swichen Sambes; und Sabi) (1902); ‘England und die Englander) (1905) ; ‘Die Grandung von Deutsch-Ostafrika) (1906) ; ‘Zur Weltpolitik) (1912); ‘Afrikanische Kopfe) (1915).

PETERS, Madison Clinton, American Baptist clergyman : b. Lehigh County, Pa., 6 Nov. 1859; d. 12 Oct. 1918. He worked his way through school and college. At 16 he was a teacher, preaching on Sundays and lecturing through the week. For a year he attended Muhlenberg College, at Allentown, Pa., and then went to Franklin and Marshall College, Lancaster, Pa., and Heidelberg Theological Seminary, Tiffin, Ohio; entered the ministry of the Reformed Church in 1880, his first charge being in Indiana. He went from there to Ottawa, Ill., where he achieved a great reputa¬ tion as a popular preacher. In 1884, when but 24 years of age, he was called to the Old First Presbyterian Church of Philadelphia. Here he increased his reputation, building up a regular congregation of 1,500. During the five years of his service there he lectured continually not only in Philadelphia but also in many distant cities. In 1889 he went to New York to become pastor of the Bloomingdale Church, Broadway, New York, where he remained for 11 years. He then adopted the Baptist faith and became pastor of the Sumner Avenue Baptist Church, Brooklyn, resigning in 1906. For two years

following he was pastor of the Church of the Epiphany in New York. Besides being a prolific contributor to newspaper syndicates he has published (Justice to the Jew) (1899) ; (Wit and Wisdom of the Talmud5 (1900) ; Sancti¬ fied Spice5 (1895) ; (Why I Became a Baptist5 (1901) ; (The Man Who Wins5 (1905) ; (After Death — What?5 (1908); (The Mission of Masonry5 (1913) ; (Seven Secrets of Success5 (1916) ; (America for Americans5 (1916) ; (The Masons as Makers of America5 (1917) ; (All for America5 (1917), and others.

PETERS, Richard, American jurist: b. near Philadelphia, 22 Aug. 1744; d. there, 21 Aug. 1828. He was educated in Philadelphia studied law and was admitted to the bar in 1763. In 1771 he became register of the admiralty but left this post at the breaking out of the Revolu¬ tion and was appointed captain of a company of volunteers. In June 1776 he was appointed by Congress secretary of the board of war. On resigning this office in 1781 he was elected a Member of Congress for the term 1782-83. In 1787 he was member of the State assembly, and was its speaker from 1788 to 1790. In 1791 he was speaker of the State senate, and after the organization of the government he accepted in 1792 the office of judge of the United States District Court for Pennsylvania, a position which he retained for the rest of his life. The admiralty law of the United States may be said to owe to him its foundation. He was also eminent as an agriculturist, and was president of the Philadelphia Agricultural Society. His great estate of 200 acres, known as ((Belmont,55 is now a part of Fairmount Park in Philadel¬ phia.

PETERS, Samuel, American clergyman : b. Hebron, Conn., 12 Dec. 1735; d. New York, 19 April 1826. In 1757 he was graduated at Yale and traveled in Europe the following year. In 1759 he took orders in the Church of England in London and in 1762 took charge of churches in Hartford and Hebron. He imitated the style of an English nobleman in his house, kept a coach, and looked with scorn upon Re¬ publicans. ((In his domestic and private re¬ lations he was all that could be desired.55 The Whigs accused him of communicating with England, and a committee, accompanied by an assemblage of 300 persons, visited him in August 1774, and obtained from him a written declara¬ tion that he had not ((sent any letter to the bishop of London, or the venerable society for the propagation of the gospel, relative to the Boston port bill, or the tea affair, or the con¬ troversy between Great Britain and the colonies, and design not to, during my natural life, as these controversies are out of my business as a clergyman.55 He gave them also a copy of the <(Thirteen Resolves55 which he confessed that he had written for the press. He was again visited by the people in September and com¬ pelled to sign another declaration. Soon after¬ ward he fled to Boston with the intention of sailing for England to make a representation there of his treatment. It was feared that he would procure a withdrawal of the charter of Connecticut, and his letters were intercepted. One dated 1 Oct. 1774, and addressed to Rev. Samuel Auchmuty, of New York, proposed that Connecticut should be divided between New York and Massachusetts. Dr. Peters obtained

a pension and a grant for his property that was later confiscated by the Americans, but, owing to a quarrel with William Pitt, he lost this about 1803. In 1794 he was chosen bishop of Vermont by a convention of that diocese, but the archbishop of Canterbury refused his con¬ secration on the ground that the number of bishops for America was limited. In 1805 he returned to the United States and traveled to the Falls of Saint Anthony (Minneapolis, Minn.), where he obtained from a Captain Carver a grant of a tract of land 100 miles square. He spent several years in Washington petitioning Congress for a confirmation of this grant. In 1818 he settled in New York City, where he lived in obscurity and on charity. He wrote a (General History of Connecticut, by a Gentleman of the Province5 (London 1781 ; 3x1 ed., New Haven 1829). This contains numerous anecdotes and is a satire on the colony, written during Peters' stay in England during the Revolution. In this book he in¬ cludes the story of the ((Blue Laws55 of the New Haven colony, which until recently were branded as pure fabrications. It is now known that of the 45 laws included only two cr three are pure inventions, the others having existed in one form or other in the colonies although the most extreme were never enforced. Con¬ sult Prince, Examination of Peters' Blue Laws5 (in (Report of the American Historical Association5 1898), and Trumbull, (The Rev. Samuel Peters: His Defenders and Apologists5 (Hartford 1877).

PETERS, William John, American ex¬ plorer: b. Oakland, Cal., 5 Fob. 1863. He was educated at Oakland High School and from 1885 to 1897 was engaged in various surveys for the United States government. In 1898-1902 Mr. Peters had charge of the Alaskan ex¬ plorations made by the United States Geologi¬ cal Survey, accounts of which appear in the publications of that bureau. He was appointed official representative of the National Geo¬ graphic Society on the Ziegler Polar expedition to Franz Joseph Land in 1903-05 and in 1907-13 was in command of the magnetic survey ships Galilee and Carnegie. His published works deal with the results of his exploration work.

PETER'S PENCE (Romescot, Rom-ges- ceot, Rom-feoh, Denarius S. Petri, The King's Alms, Hearth-money). Anciently, an annual tribute of one penny for every household, col¬ lected in England and other countries of Chris¬ tendom, and paid to the Holy See ; in modern times, a yearly voluntary contribution made by Catholics, through their bishops, for the main¬ tenance of the Sovereign Pontiff. Several theories are advanced as to its origin. It appears, however, to be beyond reasonable doubt that the tax was inaugurated by Ina, King of Wessex, about the year 727. Writes Roger of Wendover (1237) : <(In

the year of grace 727, the fortunate and powerful King Ina left his kingdom to his kinsman, Athel-hard, and went to Rome that he might ex¬ change a temporal for an eternal kingdom. On his arrival, with the consent and appro¬ bation of. Pope Gregory, he built a house in the city which he called the English School to the end that when the kings of England, and the royal family and the bishops,

presbyters, and clergy came hither to be in¬ structed in the Catholic faith and doctrine, nothing heterodox or contrary to Catholic doctrine might be taught ip the English church, and that they might return home confirmed in the faith… . He built more¬ over, nigh to the aforesaid house, a church in honor of the Blessed Virgin Mary, wherein the divine mysteries might be celebrated for the English who came to Rome, and in which they might be buried if any of them chanced to die in Rome. And to give strength and perpetuity to all this, it was ordered by a general decree, throughout the entire kingdom of the West Saxons, in which the aforesaid Ina reigned, that, every year, one penny, which in English is called Romescot, should be sent by every family for the blessed Peter and the Roman Church, that the English who sojourned there might be furnished with the necessary subsistence.® ('Flowers of Hist.,* tr. Giles, 1849, Vol. 1, p. 137. Comp. 'Cronica Ranulphi Cestrensis Monachi, lib. v., c. 24, Caxton, 1482). Offa, king of Mercia, according to the same chronicler, augmented this revenue (793) by granting ((the blessed Peter's penny … . . which the English call Romescot,® to be paid, each year, throughout the 23 shires subject to him, by each family that had possessions in lands yielding rental annually to the value of 30 pence (ib. pp. 163, 164). In the 9th century, Ethelwulf (<offered to God and to Saint Peter an annual tax of a silver penny to be paid by each house in England ; this tax is now known under the name of Peter's Pence.® (William of Malmesbury, Gesta Regum, ii, 2). At the request of Alfred the Great, son of the former, the Pope freed the English school from all tribute and tax, and the Romescot was con¬ tributed by both the king and the people for a new and twofold object, part for the Pope's personal use, and part to keep up the light in the churches of Saint

Peter and Saint Paul. (‘Monumenta Historise Britannicseˆed. Petrie and Sharpe, p. 472. Comp, ib., p. 552, p. 5-7, C.). In 1027 King Knut wrote from Rome tc the English clergy and laity, and in his letter mentioned ((the pennies which we owe at Saint Peter’s, Rome,® as among the things ((we owe to God, according to ancient law.® (Monumenta Historise Britannicse, p. 597). Consider¬ able irregularity arose, from time to time, in the levying of the Peter’s Pence. At times, it was interrupted through misunderstandings and quarrels with the Holy See ; sometimes, portions of it were withheld or the sum total forwarded only after several years. No regular payments were made after 1343. King John, in 1199, when he swore fealty to the Pope, ex¬ pressly promised that in addition to the pay¬ ment of the sum of 1,000 marks a year the payment of the Peter’s Pence should be continued. Edward II in 1307 undertook to collect the arrearages and pay them in instal¬ ments Some English monarchs, however, notably Edward III, in his address to Parlia¬ ment, 21 Jan. 1365, objected to the collection of the Romescot. Finally in 1366 it was abolished by law. (Lingard, ‘History of England, > Vol. Ill p 41, note). Suppressed by statute 25th Henry VIII, ch. 21, in 1534, it was revived by Mary, and finally abolished in England under Elizabeth.

The Peter’s Pence tribute is said to have

been introduced into Denmark and Norway by Knut, into Sweden by Olaf, into France by Charlemagne, and into Poland under Casimir I. It was extended to Ireland in 1154, through the much-discussed bull of Adrian IV.

It was paid in Scotland, Bohemia and Spain. That toward the end of the 11th century the payment of this tribute implied, in Continental countries, the acknowledgment by the various sovereigns of a kind of suzerainty or temporal protectorate on the part of the Apostolic See, is certain. (Fabre, ‘Etude sur le Liber Censuum de l’Eglise Romaine*)- And there can be little doubt that after the original object of the Romescot — the support of the English School — had no longer to be met, the same condition obtained also in England. (Riving-ton, ‘Rome and England,) p. 47). When Henry VIII broke with the Holy See, and the Peter’s Pence was prohibited by act of Parliament, this latter took place “on the grounds,® writes Gairdner, “that the realm was not subject to any power outside of it®. (‘History of the Eng¬ lish Church, > p. 145).

The Peter’s Pence tribute, was collected in midsummer on the days

which intervene be¬ tween the feast of Saints Peter and Paul and the feast of Saint Peter's Chains. The value of the penny varied considerably. In the time of Henry II it amounted to one dollar or a little more of our money. (Malone, 'Church His¬ tory of Ireland,) 1880, p. 26, note). The annual sum forwarded in the time of King John was £199 8s., according to Lingard, who took the figures, with the amount for each of the 15 dioceses which paid it, from the 'Authentic Register of Innocent III, > in the Vatican Library. ('History of England, > Vol. Ill, p. 41, note). Some of the coins are still in existence. The English penny was of fine silver, 240 to the pound weight. In the latter days of the tax, the tokens appear to have been manufactured in every cathedral town. On the one side they have the inscription Sci. Petri M. (Sancti Petri Moneta) ; on the other the name of the place of minting. The Poles, who kept up the impost for about three cen¬ turies, paying within that period not far from half a million florins, used a coin for the pur¬ pose which was a base mixture of copper and silver. On one side was stamped the image of the Polish eagle; on the other, that of Saint Peter with a key.

The modern Peter's Pence is used by the Pope for the current expenses of his admin¬ istration. A voluntary offering, inaugurated through the efforts of M. de Coux and Louis Veuillot, editors-in-chief of the L'Univers, in September, 1847, its purpose was to relieve a condition of embarrassment then prevailing in the papal finances, as well as, in a practical way, to demonstrate the devotion of Catholics to the Holy Father. One hundred francs for the Pope, deposited at the office of the paper by an anonymous benefactor, was made the occasion of a movement which almost immedi¬ ately received the indorsement of Cardinal de Bonald, many bishops and the whole Catholic press. In a short time the subscription became general throughout France. (Veuillot, Eugene, 'Louis Veuillot,* Paris, 1901, t. II, pp. 195-198). From France it spread into other countries, especially on the seizure of the papal provinces, at which time the contributions

reached the sum of $4,000,000 in the year — the highest figure on

record ; it is now observed by Catholics everywhere. In 1868 the second plenary council of Baltimore decreed that col¬ lections for the Pope be taken up annually in all churches of the United States on the Sun¬ day within the octave of Saints Peter and Paul, or at any other opportune time, that the total sum collected be sent, either directly by the bishops themselves or through the metropolitan of each province, to the Sovereign Pontiff. (Cl. P. B. II, n. 48). The pastoral letter of the archbishops and bishops of the third plenary council in 1884 praises the liberality of the people in the collection for the Holy Father ((which will continue to be made annually throughout all the dioceses of the country.ˆ (Cl. P. B. Ill, p. 77).

Bibliography. — Fabre, (Etude sur le Liber Censuum de l'Eglise Romaine) (Paris 1892) ; Cancellieri, <La visita de' sacri limini ed il danaro di S. Pietro) (Roma 1821) ; Riving-ton, 'Rome and England* (London 1896) ; Addis and Arnold, (Catholic Dictionary *(1884) ; Veuillot, Eugene, (Louis Veuillot,* (tome II, Paris 1901);. Chamber's Journal, Vol. XXXVI, pp. 298-301 ; Historical and Political Papers, Vols. XLV, XLVI, <The Peter Pence of the 19th Century) ; Wetzel and Welte, dictionary Encyclopedia) ; Lingard, (History of England* (Rev. ed., 10 vols., 1854-55) ; Jensen, O. (in transactions of the Royal His¬ torical Society,* New Series, Vols. XV, XIX, London 1901, 1905) ; id., (Die Englische Peterspfennig* (Heidelberg 1903) ; Ranke, Leopold von, (History of the Popes) (Eng. trans. (by Foster, London 1908) ; Steinle, A. M., von, die Peterspfennig) (Frankfort 1893).

PETERSBURG, Alaska, town on the island of Mitkof. Fishing and lumbering are the chief industries. The town has been incor¬ porated and numbers 1,000 souls.

PETERSBURG, Ill., city and county-seat of Menard County, on the Sangamon River, and on the Chicago and Alton and the Chicago, Peoria and Saint Louis railroads, 20 miles northwest of Springfield. It contains a public library, high school, a monument to Stephenson, founder of the G. A. R., flour mills, canning establishments, brick yards, *etc.* The water-supply system is municipally owned. Pop. 2,587.

PETERSBURG, Ind., town and county-seat of Pike County, on the Chicago and Eastern Illinois Railroad, 40 miles northeast of Evansville. Here are located Old Indian Fort and the Thornton Home for Orphan Children. There are coal mines, gas and oil wells nearby and there is a large trade in these commodities. The town has flour mills, brick and tile yards, lumber yards, *etc.* Agriculture and stock raising give employment to great numbers. The town owns the water-supply system. Pop. 2,367.

PETERSBURG, Va., city, port of entry, in Dinwiddie County, on the south bank of the Appomattox River, the upper Appomattox Canal, and on the Atlantic Coast Line, the Sea¬ board Air Line, and the Norfolk and Western railroads, 22 miles south of Richmond. It is located in an agricultural region in which tobacco is the chief product, and at the northern end of the great peanut belt, and is the con¬ trolling peanut market of the country.

Where Petersburg now stands was once the site of an Indian village, which was destroyed by Nathaniel Bacon in 1676. Petersburg was founded by Peter Jones in 1733, incorporated as a town in 1784, and in 1850 was chartered as a city. It was the scene of several engagements during the Revolutionary War, and twice it was occupied by British troops under General Philips. In the War of 1812, and in the war with Mexico, Petersburg sent her full quota to the front. During the Civil War, it was the scene of many of the engagements of the famous Virginia Campaign. East of the city, on Griffith's farm, is a small museum, contain¬ ing many relics of the war, principally from the old crater which is on this farm. See Petersburg, Military Operations Against.

Petersburg, although an important manu¬ facturing centre, is a residential city of peculiar charm, with many stately mansions in spacious grounds. It has two well-kept parks ; supports three prosperous banks; and has 10 miles of street railway. In 1916 the real estate of the city was valued at $11,428,865, and the personal property at $8,820,465. The prominent public structures are the Y. M. C. A. building, Ma¬ sonic Temple, Odd Fellows' and Red Men's buildings and the municipal buildings. It is the site of the State Central Hospital for the Colored Insane, with 1,000 patients, a Home for the Sick and the Benevolent Mechanics' Association. The educational institutions are the Virginia Normal and Collegiate Institute, for colored students ; the Petersburg Academy for young men, the Southern Female College; Saint Joseph's School; 11 private academic schools of high grade ; public and parish schools and the library and .museum of the Mechanics' asso¬ ciation.

Owing in part to its excellent water power, besides its unusual transportation facilities, and the abundance of raw materials, Petersburg's manufacturing interests are many and various. In 1916 the city had 290 factory establishments, employing over 6,000 hands, who received $1,750,000 in the year's wages. The output was valued at $11,000,000. The five cotton mills consume annually 10,000 bales

of cotton and produce 11,000,000 yards of cloth and upward of 100,000 pounds of thread and yarn ; much of which is exported direct to China and Cen¬ tral America. One of the flour mills has a yearly output of 40,000 barrels, and the four corn mills grind a million bushels of corn annually. The yearly lumber export is 50,- 000,000 feet, cut in the surrounding forests. The trunk factories turn out daily 1,200 trunks and 1,500 handbags. The tanbark mills grind between 5,000 and 6,000 tons of bark, and 3,000 tons of sumac leaves. Other industries include the making of fruit baskets and crates in enormous quantities, veneer and wheels ; ship¬ yards, which build not only the hulls, but the engines also; foundries and machine shops; a silk factory; brick works, *etc.* The govern¬ ment is administered under a charter of 1875 which provides for a mayor, who holds office four years, and a council. The voting popula¬ tion numbered, in 1916, 3,582 whites and 2,187 colored. The annual water commerce of the port aggregates 200,000 tons. The city owns and operates the waterworks. Pop. 31,002.

PETERSBURG, Military Operations Against. When General McClellan, in the

summer of 1862, was forced to abandon his ad¬ vance upon Richmond by way of the Peninsula and fall back to Harrison's Landing, he pro¬ posed to cross to the south side of James River and operate against Richmond by that side, seizing Petersburg and the railroads leading to that city and Richmond from the south, and for this purpose asked that his army be largely reinforced. General Halleck, commander-in¬ chief of the army, disapproved the movement and withdrew the Army of the Potomac from the Peninsula. No further effort was made for a serious advance south of the James until early in May 1864, when, in co-operation with the campaign beginning in the Wilderness, Gen¬ eral Grant ordered General Butler, command¬ ing the Army of the James, to cross to the south side of the river and, moving close along its bank, press for Richmond. Butler was stopped at Drewry's Bluff (q.v.), and held to his

intrenchment at Bermuda Hundred. On 9 June Butler ordered General Gillmore and Gen¬ eral Kautz to capture Petersburg and destroy the railroad bridge across the Appomattox. On the morning of the 10th Gillmore, with 1,800 men arrived before the Confederate works on the City Point road, General Hinks, with 1,200 men coming up a mile to his left. Both thought the works too strong to be carried, and with¬ drew. Kautz, with 1,500 cavalry, planning to strike the city from the south, moved up by a circuit over the Jersualem plank-road, four or five miles to Gillmore's left and, near noon, made three unsuccessful attacks, then turned the Confederates in his front, and advanced close to the city waterworks, on Reservoir Hill, where he found infantry and artillery in¬ trenched, and, believing that he could not cap¬ ture the city, withdrew, followed by Dearing's Confederate cavalry brigade. At this time Petersburg was held by about 2,400 infantry under General Wise, Dearing's cavalry, and some local militia.

After the loss of 53,400 men in his campaign from the Wilderness to Cold Harbor, in an ef¬ fort to reach Richmond from the north, Gen¬ eral Grant concluded to transfer his army to the south of James River and conduct oper¬ ations against Petersburg and Richmond simi¬ lar to those proposed by McClellan two years before. General Halleck objected, advocating an investment of Richmond from the north, but Grant adhered to his own plan, sent Sheridan to destroy the railroad north and west (see Trevilian Raid and Battle of Trevilian Sta¬ tion), and began preparations to withdraw from before Lee at Cold Harbor and cross to the south of the James. The general movement began on the 12th and was skilfully conducted , and crossing the Chickahominy and then the James, at and near Wilcox's Landing, the en¬ tire Army of the Potomac was south of the river, in 'rear of Bermuda Hundred, at mid¬ night of the 16th.

First Assault. — Before all the Army of the Potomac had crossed the James, Grant or¬ dered an advance on Petersburg for 15 June. The Petersburg intrenchments ran from the Appomattox River east a mile to the City Point Railroad; then south three miles to Norfolk Railroad; then west four miles to a point a mile west of the Weldon Railroad , then north two miles to the Appomattox. The length of

the intrenchments from the Norfolk Railroad west to the Jerusalem plank-road was one and one-half miles. These works 15 June were held by General Wise's infantry brigade of 2,400 men, General Dearing's cavalry brigade of 3,500, and a small body of local militia. Gen. W. F. Smith, who had rejoined the Army of the James at

Bermuda Hundred on the night of the 14th and next morning with his infantry division increased to 13,700 officers and men, and Ivautz's division of 2,400 cavalry, marched along the City P.oint Railroad and wagon-road, General Hinks'. negro brigade capturing two guns and a line of rifle pits. When he came under Are of artillery, he reconnoitered and formed his troops for assault. Ignorant of the comparatively slender force behind the works, his reconnoissance was delib¬ erate and prolonged, and it was 5 p. m. when he concluded not to assault in column under a heavy artillery fire that had been opened upon him, but to use his own artillery against one of the Confederate redoubts and to attack the Confederate works with a strong skirmish-line. When he was ready for the movement it was found that all the artillery had gone to the rear to water the horses, and there was a delay of an hour or more. About seven o'clock the guns opened, the skirmishers advanced, by nine o'clock one and one-half miles of the Confed¬ erate intrenchments had been taken, and with them 16 guns and nearly 400 prisoners. These captures laid the city open to an unobstructed advance, as no other works then existed and no reinforcements had yet been sent. General Hancock, commanding the Second corps, had been ordered to march on Petersburg on the morning of the 15th after rationing his men; but neither he nor General Meade was in¬ formed of Smith's movement; there was delay in furnishing the rations ; he started late in the morning without them ; the position he was to occupy was incorrectly laid down on the maps, and it was not until 5 p.m. that he was notified to hasten to Smith's assistance. In fact this was the first inkling that Hancock had that there was any intention to attack Petersburg on that day. It was night, though bright moon¬ light, when he came to Smith's position, and, at Smith's request, relieved his troops. Had there been a proper understanding that day between Meade, Hancock and Smith, Peters¬ burg would have been taken 'before night,, and a weary, wasting 10 months' siege avoided.

• During the night nearly the whole of Lee's army was poured in from every quarter be¬ tween Petersburg and the sleeping Federals. Hoke's division was sent by Beauregard to form on Wise's left and extend to the Appomattox. B. R. Johnson's division was withdrawn from the Bermuda Hundred line and early on . the 16th took position on Hoke's right. Wise's right was still half a mile from the Jerusalem plank-road. From Wise's right to Hoke's left, a distance of five miles, the Confederates had, on the 16th, besides artillery, about 14,000 men. When daylight came the attacking force found a 'new line of earthworks before the city,

' manned by the best of Lee's veterans. On the morning of that day

Egan's brigade of Han¬ cock's corps attacked and carried a Confederate redoubt. Burnside's Ninth corps came up at 10 a.m. and formed on Hancock's left. The

Union troops now fronting Beauregard's 14,000 numbered 53,000 men. At 6 p.m. Hancock as¬ saulted with the Second corps, supported by two brigades of the Eighteenth on the right and two of the Ninth on the left. Three re¬ doubts and their connecting works were car¬ ried. The Union loss was severe. B. R. John¬ son's withdrawal from the front of Butler's right had been discovered during the night of the 1 5th, and early next morning General Terry advanced, captured some pickets and, after sharp resistance, occupied the main line of Beauregard's intrenchments, taking many prisoners. Meade had been ordered to attack with artillery at 6 p.m. At the same hour Pick¬ ett's division, sent by General Lee from Drew-ry's Bluff, drove in Terry's skirmishers, and Terry abandoned the captured works, which were reoccupied by Pickett, who, advancing from them, attacked Terry and was repulsed. On the 16th General Ledlie, sent to relieve Potter's troops, advanced to within one and one-half miles of the city into which he threw shells. On the morning of the 1 7 th the Second and Ninth corps under General Potter again assaulted the Confederate works, carrying portions of them and taking four guns and 400 prisoners. Mean¬ while Warren's Fifth corps had come up and formed on the left of the Ninth. Another as¬ sault was made in the afternoon by the Second, Ninth and Fifth corps, and continued until after dark, with heavy losses on both sides, but the advantage remained with the Union troops, who had gained several important positions. During the night Beauregard withdrew across a ravine, formed a new line from 500 to 1,000 yards in rear of the one he had been occupying, and immediately intrenched it. General Meade ordered a general assault for the 18th, which was made by piecemeal and repulsed, but the ground gained, close up to the Confederate works, was intrenched, and on this part of the field the two opposing lines remained substan¬ tially the same in position to 'the close of the war. In these attempts to carry Petersburg by assault 10,000 men had been lost ; it was now

known that Lee's entire army was being thrown into the place; Meade said there was ((nothing further to be gained by direct attacks® ; and Grant ordered that no more assaults be made and determined to invest the place partially by extending his left across the Weldon Railroad and to the South Side Railroad.

Petersburg. — General Grant having de¬ cided that a siege was necessary to reduce Petersburg, ordered strong works to be thrown up close to those of the Confederates; close connection was made with the Army of the James on the right; and the first offensive movements were to destroy communication with Petersburg on the south. On 22 June General Wilson, with 5,500 cavallry and 16 guns, marched to destroy the Petersburg and Weldon Railroad and the South Side Railroad (see Weldon and South Side Railroad, Wilson's Raid on), and on the same day the Second and Sixth corps made an effort to seize the Weldon Railroad near Globe Tavern, but were severely checked by A. P. Hill's Confederate corps when about a mile from the road. (See Jeru¬ salem Plank-Road, Engagement near). Be¬ ing reinforced by Meade at sundown, both corps advanced, retaking the lost ground. Hill

was obliged to withdraw with his 2,500 prison¬ ers, and the cutting of the Welldon-Railroad was accomplished. Meanwhile, Kautz and Wil¬ son, with 8,000 cavalry, cut the railways south of Petersburg over an area of 22 miles, and then pushed on, against strong opposition to Burke's Station at the junction of the South-side and Danville railroads. Both of these roads were thoroughly torn up ; and then these commanders attempted a circuit to strike the Weldon Railroad. They were met by Hamp¬ ton's cavalry and supporting infantry, and re¬ pulsed with heavy losses; and were compelled to retreat to the position before Petersburg. Both armies remained comparatively quiet for more than a month, intrenching and throwing up redoubts, but there was incessant skirmish¬ ing all along the lines, with severe losses. On 25 July Grant ordered a movement north of the James to threaten Richmond and thus draw from Petersburg a part of Lee's army to give more likelihood of success in a proposed ex¬ plosion of a mine in front of his army on the Petersburg line and a subsequent assault. This movement resulted in the battle of Deep Bot¬ tom (q.v.), and the transfer by Lee of five in¬ fantry and two cavalry divisions to die north side of the James, thus reducing the force south of it to three divisions of infantry and one of cavalry.

Petersburg Mine. — In the latter part of June Lieutenant-Colonel

Pleasants, 48th Penn¬ sylvania, suggested to General Potter, his di¬ vision commander, the mining of a Confederate redan in his front, and agreed to conduct the operation. General Burnside authorized it to be done, and General Meade, though not having much faith in it, assented. The redan was held by Elliott's brigade of B. R. Johnson's division, and was opposite the centre of the Ninth corps, where the opposing lines were not more than 120 yards apart. Pleasants had many difficulties to overcome, but the work was finished ready for charging by 23 July. The main gallerv was 511 feet long, with two lateral galleries of 37 and 38 feet, in which were eight magazines, each charged with 1,000 pounds of powder. It was intended that, upon the ex¬ plosion of the mine, the artillery on the right and left should open a furious fire, and that two brigades of General Ferrero's colored di¬ vision should lead in the assault upon the wrecked work; but as these troops had never been under close fire of the enemy, Generals Meade and Grant objected, and Burnside sub¬ stituted General Ledlie's division. The whole army was held in readiness to advance and take any advantage gained by the confusion antici¬ pated in the Confederate lines. The order for the attack was issued by General Meade on the 29th, and was full and precise as to what was to be done by each commander. Burnside was to spring the mine at 3.30 in the morning of the 30th ; his guns were to begin at once a bombard¬ ment of the whole line, and of Cemetery Hill, 400 yards in the rear of the mined works ; his assaulting columns were to rush forward, seize a crest of ground 150 yards beyond the breach in the line caused by the explosion, reform and push on, closely followed by General Ord's corps on the right and by General Warren's on the left. The fuses failed, however, and had to be relighted after half an hour's delay and it

was 4.40 when the explosion occurred, carrying men, guns, carriages, dirt and timbers high into the air and leaving a crater 170 feet long, 60 feet wide and 25 to 30 deep. Burnside had failed to carry out the precise orders given him, the guns did their part accurately and with effect, but there was delay and confusion in getting the charging

columns over his own works. Ledlie's division, without its com¬ mander, moved into the crater and halted, fill¬ ing it with a confused mass. A corps of negro troops had been selected for this movement but General Grant objected and Ledlie's force was substituted. Anticipating a storm of artillery fire from the works beyond, it did not go for¬ ward; was not promptly supported; other troops rushed into the crater and added to the confusion. The Confederates were silent for a full half hour, and then, recovering from their first surprise, reoccupied the intrenchments they had abandoned on the right and left; swept the crater with canister; and shortly after noon the Union troops were ordered to fall back either during the day or under cover of night. Those in the crater were driven out or captured early in the afternoon, losing many in killed and wounded, though they had not much more than 100 yards to go to reach the intrenchments from which they had charged. General Grant says : (<The effort was a stupendous failure …

due to inefficiency on the part of the corps com¬ mander and the incompetency of the division commander who was sent to lead the assault. M The Union loss was 504 killed, 1,881 wounded and 1,413 captured or missing; an aggregate of 3,798, of whom 3,475 were of the Ninth corps. The Confederate loss was not over one-third of that sustained by the Union troops.

Siege of Petersburg and Richmond. — On 30 July 1864 the armies of the Potomac and the James, investing Petersburg and Richmond, numbered about 59,000 effective infantry and 12,000 cavalry. General Lee had about 38,000 effective infantry and 8,300 cavalry'. The Army of the Potomac undertook the investment of Petersburg, while the Army of the James held Bermuda Hundred and all the ground possessed north of James River. The Ninth corps was on the right of the Army of the Potomac at Petersburg, the Fifth in the centre, and the Second on the left. The Sixth corps had been sent to Washington to oppose General Early. To prevent General Lee from sending rein¬ forcements to Early, Grant 12 August, ordered another movement north of the James to threaten Richmond, which resulted in the sec¬ ond battle of Deep Bottom (q.v.), in which the Union loss was over 2,700 men. Under cover of this movement Warren's Fifth corps, with a brigade of cavalry, moved to the left on the morning of the 18th and, after some hard fight¬ ing for four days, with heavy losses on both sides, succeeded in gaining and holding the Weldon Railroad at Globe Tavern, about four miles south of Petersburg. Thus clinching. for Lee the loss of one of his most important lines of communication. (See Globe Tavern, Bat¬ tle of). On the 22d General Hancock, with about 8,500 infantry and cavalry, moved to destroy the railroad south of

Globe Tavern. By the 25th he had destroyed it as far down as Ream's Station and three miles beyond, 12 miles south of Petersburg when he was at¬

tacked by A. P. Hill and driven back with a loss of 2,700 men, 12 colors and 5 guns. Hill's losses were equally severe and he withdrew, having accomplished nothing, as Warren still held the railroad. (See Ream's Station, Bat¬ tle of). For a full month quiet continued along the lines. On 28 September, to retain Lee in his position, Grant having heard that only a few men were left to hold the Confederate lines north of the James, ordered Butler, who was at Bermuda Hundred, to send the Tenth (Birney) and the Eighteenth (Ord) corps, with Kautz's cavalry across the river and attempt to gain Richmond by a sudden attack before troops could be brought in to prevent it. The cross¬ ing was made at night on pontoon bridges muffled with straw. Birney crossed at Deep Bottom, and Ord at Aiken's Landing, eight miles above. Birney attacked the works on Spring Hill with colored troops. They took the position in a fierce engagement, losing one-third of their number. Ord's division attacked Battery Harrison, the strongest defensive works around Richmond. It was carried, though with desperate losses. (See Fort Harrison, Battle of). Further advance was prevented by the most obstinate resistance, and the Confederates made repeated efforts to regain the lost posi¬ tions, but without success. Kautz's cavalry meanwhile had succeeded in reaching a point within three or four miles of Richmond, at the inner lines of defense, but was attacked and driven back. The affair was redeemed by the Tenth corps, and the Confederates retreated to Richmond after losing heavily. The two oppos¬ ing lines north of the James maintained their relative positions to the close of the siege. In co-operation with this movement north of the James, Generals Warren and Parke, with two divisions each of the Fifth and Ninth corps and Gregg's cavalry division, moved 30 Septem¬ ber .to extend the intrenched line - beyond the Weldon Railroad in the direction of the South Side Railroad. There was sharp fighting on 1 and 2 October, but the movement was checked after reaching the Weldon Railroad south of Globe Tavern, the Union loss being about 2,800, the Confederate loss about 1,000 (See Poplar Spring Church, Battle of). On 7 October Kautz's cavalry division of 1,700 men, holding the right of the Union line north of the James, was attacked by the Confederate infantry di¬ visions of Field and Hoke and Gary's cavalry brigade, and driven back under cover of the in¬ fantry, losing 274 men and eight guns. Field's division followed in an attempt to turn the right of the line attacking the Tenth corps pn the New Market road, and was repulsed with the

loss of three brigade commanders and 700 men. On the 13th General Butler made a reconnoissance of the Confederate works on the Darbytown road, north of the James; one brigade made an assault upon them and was repulsed. On 27 October parts of the Ninth, Fifth and Second corps, together with Gregg's cavalry division, in all about 38,000 men, moved to the left to seize the bridge over Hatcher's Run and capture the Confederate works, which at that point Grant thought were not strongly held, the chief objective being the seizure of the South Side Railroad. The movement failed, and the troops were withdrawn with a loss of over 1,700, the Confederate loss being about the same. (See Hatcher's Run (Boydton Road),

Battle of). On the 27th and 28th General Butler made another movement on Richmond north of the James, by the Williamsburg, Charles City, and Darby roads. A severe en¬ gagement took place on the old battlefield of Fair Oaks or Seven Pines, in which Butler's forces were repulsed by Longstreet, and fell back to their camps near Fort Harrison, with a loss of about 1,100 men. On 6 December Gen¬ eral Warren, with his own corps (Fifth), Mott's division of the Second, and Greggs cavalry, started on a raid against the Weldon Railroad, which was destroyed as far as Hicks-ford, on the Meherrin River, about 40 miles south of Petersburg. A. P. Hill was sent to intercept him, but failed to do so ; and having completed his work, Warren returned to his camps.

Winter had now set in, and was of unusual severity, entailing much suffering upon both armies, but especially upon the Confederates, who were poorly fed and clothed. Lee strength¬ ened his works and extended them up the south side of Hatcher's Run and where the Boydton plank-road crosses the run. A. P. Hill held the right from Hatcher's Run to Fort Gregg; Gordon and R. H. Anderson held from Hill's left to the Appomattox, and Longstreet from the Appomattox to the Confederate left, north of the James, at White Oak swamp. The length of the line was about 37 miles, eight of which were north of the James. To cover those 37 miles Lee had, 30 December, about 59,000

officers and men. At the same date Grant had about 110,000 men. With these he held Lee tightly to his works while armies elsewhere were carrying out his own comprehensive plans. On 5 February 1865 Grant put the greater part of his army in motion to the left to destroy Lee's communications, resulting in the battle of Hatcher's Run, Dabney's Mill, and Armstrong's Mill, and the extension of his intrenched -line to the Run. The loss was about 1,000 to the Confederates and nearly 2,000 to the Union forces. The ford at Hatcher's Run was now securely in the hands of the Nationals and the City Point Railroad was promptly extended to that position.

General Lee had foreseen that the evacuation of Petersburg and Richmond would be forced uoon him when Sherman approached from. the south, and it was determined early in March that, as soon as the roads would admit of movement, the two places should he abandoned and his army moved to Danville to unite with Gen. J. E. Johnston and attack Sherman, and preparations were made accordingly. Mean¬ while Lee proposed to make a sortie in order to gain some of the works on the right of the line held by the Army of the Potomac, near the Appomattox, and the ridge in their rear, with the expectation that this would oblige Grant to concentrate there by drawing in his left, and thus postpone the necessity for abandoning Richmond and Petersburg until the weather was favorable for falling back to Danville. To this President Davis gave his assent. General Gordon with about one-half of the army, was given charge of the movement, which was directed against Fort Stedman, on the Ninth corps line, where the opposing lines were only 150 yards apart, the pickets 50 yards apart. The chance was a hazardous one, but if successful

the movement would have cut the National army in two and opened a gap for the escape of Lee's army. The assault was made at half-past four in the morning of 25 March, and was at first successful, the Confederates carrying the fort and works on either side of it; but after a hard fight of four hours they were driven back, with an estimated loss of 4,000 men and many colors. The Union loss was about 2,200. (See Fort Stedman, Assault on). Before this as¬ sault Grant had ordered a movement for the 29th to destroy the railroads leading into Peters¬ burg from the south, force Lee to come out of his intrenchments and fight on open ground, or so far attenuate his line as to give chance for a successful assault. He had been joined by Sheridan and his cavalry from the Shenandoah Valley, and had under his command 101,000 in¬ fantry, 14,700 cavalry, and 9,000 field

artillery, with 369 guns, an aggregate of 124,700 men. The Confederate army under General Lee num¬ bered about 46,000 infantry, 6,000 cavalry and 5,000 field artillery, with about 190 guns, an aggregate of 57,000 men, or less than half of Grant's force.

The movement, which was the beginning of the end, began on the day fixed by Grant. Its object was to turn Lee's right with an over¬ whelming force. The greater part of the Army of the James was marched secretly on the night of the 27th from the right to the left of the Army of the Potomac, 36 miles, and on the morning of the 29th Sheridan's cavalry, with the Fifth and Second corps, moved to the left attacking the intrenchments at the junction of several roads from the north and south with the White Oak Road. The result was the battles of Dinwiddie CourtHouse and White Oak Road, on the 30th and 31st, followed by the decisive battle of Five Forks (q.v.) on 1 April.

Final Assault Upon Petersburg. — General Grant heard of the victory of Five Forks at 9 o'clock that night and ordered General Humphreys, commanding the Second corps, on the left of the general intrenched line, to ((feel for a vulnerable point in the enemv's intrench¬ ments, and, if one was found, to assault im¬ mediately.® Humphreys assaulted before mid¬ night, carried the picket-line, but was repulsed when he approached the main line. A general bombardment of the Confederate lines was kept up throughout the night and, under Grant's orders, at 4 a.m. of 2 April Ord's, Wright's and Parke's corps, about 63,000 men, assaulted the lines before which they had been held for 10 months, and which were now defended by less than 20,000 men. On many parts of the line there was desperate resistance, but the exterior lines were finally captured, Humphreys fol¬ lowing up their successes by a new attack on his front, , taking the redoubt which foiled him in the night attack. Lee thereupon sent word to President Davis that his lines were broken in three places, and that Richmond must be evacu¬ ated, and that he would hold on to his interior line until night, and then endeavor to reach Danville. At 3 p.m. Lee ordered a retreat, which began at 8 o'clock, the point of as¬ semblage of his various columns being Amelia CourtHouse. Grant ordered a general assault for the morning of the 3d, but at 3 a.m. it was discovered that Lee had abandoned all his works. Petersburg was taken possession of by

Willcox's division of the Ninth corps, and at 8.15 a.m. Richmond was formally surrendered to General Weitzel, who had entered it from north of the James.

The Union loss in the final assault on Peters¬ burg, 2 April, was 625 killed, 3,189 wounded and 326 missing. There is no record of Con¬ federate losses. From 15 June 1864 to 9 April 1865 the campaign for Petersburg and Rich¬ mond cost the Union armies under General Grant 6,883 killed, 35,414 wounded and 20,859 captured or missing; an aggregate of 63,156 officers and men. The Confederate loss for the same period is not known.

Bibliography. — (Official Records1 (Vols. XXXVI, XL, XLIII, XLVI) ; Humphreys, H. H., (The Virginia Campaigns of 1864-651 ; Walker, F. A., (History of the Second Army Corps1 (New York 1891) ; Powell, W. H., (History of the Fifth Army Corps1 (New York 1896) ; Grant, U. S., '■Personal Memoirs1 (Vol. II, New York 1885-86) ; Sheridan, P. H., Per¬ sonal Memoirs1 (Vol. II, New York 1888) : Pennypacker, I. R., (Life of General Meade1 (New York 1901) ; Lee, Fitzhugh, (General Lee1 (New York 1894) ; The Century Com¬ pany's Patties and Leaders of the Civil War1 (Vol. IV).

E. A. Carman.

PETERSEN, pater-sen, Niels Matthias,

Danish historian and philologist: b. Sanderup, island of Funen,, Denmark, 24 Oct. 1791 ; d. Copenhagen, Denmark, 11 May 1862. He studied philology and history, and in 1845 was appointed to the chair of Norse languages in the University of Copenhagen. He was an au¬ thority on mythology, geography and history, his specialty being the history of literature, and though some of his works have been superseded his (History of Danish Literature1 n853-64) is still a standard. Among his books are (Det Danske, Norske og Svenske Sprogs Histone1 (1829) ; (01dnordiske Sagaer1 (12 vols., 1826-36) ; (Danmarks Histone i Hedenold1 (1834) ; <Den Nordiske Mythologi1 (1849); Pemserk-ninger om Modersmaalet1 (1853) ; Pidrag til den Danske Literaturs Historic1 (5 vols., 1853— 61); Pidrag til den old Nordiske Literaturs Historie1 (1866), etc., all published in Copen¬ hagen.

PETERSON, Frederick, American neurol¬ ogist: b. Faribault, Minn., 1 March 1859. He was graduated from the medical department of the University of Buffalo, studied abroad and in 1882-83 was professor of general pathology and laboratory director in the University of Buffalo. In the latter year he removed to New York, . where he practised as a nerve and brain specialist, and in 1893-94 was professor of neurology at the University of Vermont. He has been at¬ tending physician at various hospitals, was pro¬ fessor of neurology at the Woman s Medical College of the New York Infirmary, pathologist in the New York City Insane Asylum, presi¬ dent of the board of managers for the Craig Colony of Epileptics, chief of the clinic in the department of nervous diseases at Columbia, and in 1900 was made president of the New York State Commission in Lunacy. He was professor of psychiatry in Columbia Univer¬ sity 1903-14. He has for several years been associate editor of the New York Medical

Journal and the Journal of Nervous and Mental Disease. His publications include Poems and Swedish Translations1 (1883) ; (In the Shade of Ygdrasil1 (1893) ; (Nervous and Mental Diseases1 (1901-11) ; (American Textbook of Legal Medicine and Toxicology1 (1903); (A Song of the Latter Day1 (1904).

PETERSSEN, (Hjalmar) Eilif, Norwegian painter : b. Christiania, 1852. He was educated at Carlsruhe and under Lindenschmit at Mu¬ nich. His early efforts were confined to histori¬ cal episodes of which his (Christian II, signing a Death Warrant1 (1876) is a good example. It is now in the Museum of Breslau. He next turned to religious subjects, of which (The Ascension,1 at Ulleven, is perhaps his greatest work. His next field was landscape and genre painting in which he was also successful. His best works in this style are Piazza Montanara1 (1882) ; (The Laundresses1 (1889); * Woodland Lake1 (1891) ; (Summer Night,1 in the Munich Pinakothek and (Gajamars Song' (1907).

PETERWARDEIN, pa'ter-var-dm, Jugo¬ slavia, a town in Croatia-Slavonia, on the right bank of the Danube, 45 miles by rail northwest of Belgrade. It is the site of the castle of Peter the Hermit (q.v.). It stands partly on a steep rock and partly on a marshy flat below and is the strongest fortress on the Danube. It communicates by a bridge of boats and a rail¬ way bridge with the town of Neusatz on the opposite bank. The fortifications are exten¬ sive and contain barracks for a garrison of 10,- 000 men; but the town itself is small. It has, however,

four churches, a military hospital, an arsenal, a high school and a trade in wine and fruit. A great victory was gained here (5 Aug. 1716) over the Turks by Prince Eugene. Peter-war dein was occupied by the Hungarians in the civil war of 1848-49. It was surrendered to the Austrians, 6 Sept. 1849. Pop. 6,000. -

PETIGRU, pet'i-groo, James Louis, Amer¬ ican lawyer : b. Abbeville District, S. C., 10 March 1789; d. Charleston, S. C., 3 March 1863. He was graduated at the South Carolina Col¬ lege, now the University of South Carolina, in 1809 and in 1812 was admitted to the bar. Hav¬ ing attained professional eminence in the rural districts, he removed to Charleston, where he rapidly rose to distinction. In 1822 he became attorney-general of the State, which office he held for eight years. During the Nullification troubles of 1830-32 he opposed the doctrine of the State veto and was the most notable of the leaders of the ((Union and State Rights11 party. Upon the defeat of his party, he became in his political capacity an object of much popu¬ lar dislike, but his talents and virtues neverthe¬ less secured him the respect of the community m which he lived, and he continued to maintain his position as a leader at the bar with scarcely a rival. He subsequently served in the State legislature and despite general condemnation of his political opinions he was entrusted with the codification of the laws and statutes of South Carolina. Although stoutly opposed to the se¬ cession movement of 1860-61, he followed the fortunes of his State. Consult Grayson, W. J., (James Louis Petigru1 (New York 1866) ; and a memorial volume published by the Charleston bar in 1867.

PETIOLE, in botany, the stalk of a leaf. When the petiole is wanting, the leaf is said to be sessile. In general, however, it is distinctly marked and is usually either round, or half-cylindrical and channeled on the upper side. In the poplar it is strongly flattened at right angles to the blade and hence the remarkable move¬ ment observable on the least breath of wind, especially in the aspen. Sometimes, as in the garden sweet-pea, the petiole is furnished with a kind of border or wing. In many umbellifer¬ ous plants its base is dilated into a broad

mem¬ branous inflated sheath. In grasses and various other plants it consists of a sheath embracing the stem ; in the pea tribe the apex of the petiole is often changed into a tendril. In one section of the genus Astragalus (tragacanth) it hardens into a spine after the leaflet drops. The petiole in some Australian species of acacia and euca¬ lyptus is flattened into a leak-like expansion, occupying the place of the true leaf ; such pet¬ ioles have received the name phyllodia. See Leaves.

PETION, pa-te-oii, Alexandre Sabes,

Haitian soldier and politician : b. Port-au-Prince, Haiti, 2 April 1770; d. there, 29 March 1818. He was educated in the military school of Paris, entered the French army in Haiti and in 1791 joined the forces of Toussaint l'Ouverture (q.v.), serving as commander of artillery. In 1799 he entered the service of General Riguad and upon the latter's defeat by l'Ouverture was obliged to leave the island. He went to France and returned in 1802 with the rank of colonel under General Leclerc, who was to subdue the island but in the same year Petion joined the revolt under Henry Christophe and later served under Dessalines. The latter was murdered in 1806 and Christophe assumed the Presidency in 1807. The south and west provinces, however, declared for Petion and chose him president of that portion of the island, which resulted in almost continual warfare. Petion's administra¬ tion was in marked contrast to that of Christo¬ phe. He opened his ports, granted protection to commerce, paid the debts of the country and introduced measures which gave great com¬ mercial and agricultural prosperity to the coun¬ try. In 1815 he was elected President for life with power to nominate his successor, but in the latter part of his administration the financial affairs of the government became depressed, and Petion fell a victim to hypochondria in which state he starved himself to death. Consult Saint John, Sir S. B., (Hayti; or, the Black Republic) (London 1889).

POTION DE VILLENEUVE, de vel-nev, Jerome, French revolutionist: b. Chartres, France, 1753; d. near Saint Emilion, France, 1794. He was an advocate in his native city when chosen a deputy to the States-General in 1789, and in 1790 was president of the National Assembly. He later became a member of the Jacobin Club and a supporter of Robespierre. He was elected mayor of Paris in 1791, and president of the Convention in 1792 and voted for the execution of the king. Although he had exhibited unnecessary cruelty in forcing the re¬ turn of the royal family from Varennes, he was nevertheless suspected of being a royalist, and the jealousy of Robespierre being aroused he was arrested with the Girondists in 1793. He

escaped, but perished in a field near Saint Emi¬ lion, either by suicide or starvation. His works were published in four volumes in 1793. Con¬ sult Dauban, C. A., (Memoires inedites) (Paris

1866).

PETIT, pe-te, Louis, French clergyman and author: b. Viuz-la-Chiesaz, Haute-Savoie,

France, 21 Feb. 1868. He was educated at Notre Dame des Chateaux, Pas-de-Calais, France, the Assumption Scholasticate, Osma, Spain, and at Rome. He entered the order of the Augustinians of the Assumption in 1880 and was ordained in 1891. He was professor at Notre Dame des Chateaux, and at the Oriental Seminary, Phanaraki, Constantinople, in 1893— 94. Thereafter he was superior of the houses of his order at Toulouse in 1894-95, at Kadi- ‘ Keui, Constantinople, in 1895-1908, and superior of Assumptionist missionaries in the Orient 1903 and from 1906 to 1912 was member of the gen¬ eral chapter of his order. From 1908 to 1911 he was engaged in research work in the Propa¬ ganda and Vatican Archives, Rome. In 1912 Dr. Petit was made archbishop of Athens and apostolic delegate to Greece He originated the plan of recasting and publishing in separate monographs Le Quien’s (Oriens Christianas } ; made two trips of scientific exploration to Mount Athos in 1901 and 1905 and in 1911 was theologian and consultor of the Council of Armenian Catholics, Rome. His published works include (Les confreries musulmanes> (1899) ; (Typicon de Gregoire Pacouranos pour le monastere de Bachkovo (1904) ; <Serborum per Hungarian constitutorum ordinationes ecclesiasticae* (1906) ; (Acta dissidii ecclesiastici graeco-bulgaricP (1911) ; (Recueil des inscriptions chretiennes de l’Athos) (1904). With Martin he edited and contributed to Mansi, (Amplissima collectio conciliorunP ; and is a frequent contributor to religious reviews and periodicals.

PETIT DE JULLEVILLE, de zhiil-vel, Louis, French historian of literature: b. Paris, 18 July 1841 ; d. Paris, 1900. He was graduated from the Lcole Normale in 1863, receiving their degree of doctor of letters in 1868, and after teaching in the College Stanislas of Paris and the faculty of letters at Dijon, became pro¬ fessor of French literature in the Paris faculty of letters in 1886. His principal work is his¬ tory of the Theatre in France) (1880-86) ; very complete with regard to the

old French theatre. He gives in (The Theatre in France) (1889) an account of the evolution of the French drama down to the present time. In 1896 he com¬ menced the publication of a (History of the French Language and Literature,* but died be¬ fore its completion.

PETITION, Right of, in public law, the right of the citizen to present a formal sup¬ plication to the government for the granting of some favor, usually the redress of a grievance, in which the established courts were not au¬ thorized to act. The ‘better opinion is that it also includes the right of the petitioner to have his petition heard, otherwise the right of peti¬ tion is worthless. Like many of the great con¬ stitutional safeguards it is the result of a long struggle against tyranny. It was implied in the guarantees of Magna Charta and was so fre¬ quently exercised in the time of Edward II that

it became necessary to formulate rules by which the task of hearing petitions could be facilitated. During this period petitions were usually made to the king, but later when Parliament had suc¬ ceeded in establishing its supremacy over the royal power petitions came to be preferred to that body instead. The Stuarts looked with dis¬ favor upon the growing practice of presenting petitions, and during the reign of Charles II Parliament passed an act forbidding the presen¬ tation of petitions signed by more than 10 per¬ sons and placing other restrictions upon the right of petition. The refusal of James II to hear the petition of the seven bishops, who re¬ fused to publish his declaration of independ¬ ence, created a great sensation throughout Eng¬ land, and in the Declaration of Right drawn up by Parliament after the Revolution of 1688 it was declared to be the right of English sub¬ jects to petition the king and all commitments and prosecutions for such petitioning were de¬ clared to be illegal. This right was confirmed by the Act of Settlement of 1700. Petitions to Parliament now became very numerous and the exercise of the right may be said to have cul¬ minated in the Chartist movement of 1848, when a petition bearing its signatures of more than 1,000,000 persons was presented to Parliament praying for annual parliaments, universal

suf¬ frage and other reforms. In early times it be¬ came the custom of Parliament at the opening session to appoint “receivers® and “triers® of petitions, who examined them and referred them to the courts or to Parliament for con¬ sideration. In order to receive attention from Parliament petitions must be in a prescribed form, respectful in language and, with a few specified exceptions, must be presented by a member. The member, however, is not com¬ pelled by law to present it to the Parliament, and this omission has occasionally been the cause of complaint.

The first amendment of the Constitution of the United States prohibits Congress from mak¬ ing any law to abridge “the right of the people to peacefully assemble and to petition the gov¬ ernment for a redress of grievances.® 1 1 ˆ will be seen from the language of this provision that its purpose is not to create the right of petition, its existence being assumed, but to secure it. In spite of this provision the Na¬ tional House of Representatives in the course of the controversy over slavery encroached seri¬ ously upon this right. Beginning as early as 1790 petitions for the abolition of the slave trade and the prohibition of slavery in the Dis¬ trict of Columbia were presented to Congress. The latter were referred to the Committee on the District of Columbia and reported unfavor¬ ably. As the petitions increased the committee ceased to make reports. In 1836 the. House adopted a rule providing that all petitions re¬ lating to slavery should be laid on the table without action and without being printed or re¬ ferred to a committee. This was the first of the so-called “gag® rules and was stout y op¬ posed by John Quincy Adams, who had pre¬ sented most of the petitions relating to slavery. Finally in January 1840 the House adopted a rule declaring that no petition praying for the abolition of slavery or of the interstate slave trade should be received or entertained in any manner whatever. For the repeal ol this il¬ liberal rule Adams labored incessantly until his

efforts were crowned with success in 1844. After this the right of petition was never again abridged by Congress.

By the present rule petitions are delivered to the clerk, endorsed with the name of the member presenting them and of the. committee to which they are referred, and by him they are transferred to the appropriate committee. All of the States with one or two exceptions have constitutional provisions guaranteeing the right of petition.

James Wilford Garner, Professor of Political Science , University of

Illinois.

PETITION OF RIGHT, in English poli¬ tics, a celebrated statute of Parliament passed in 1628 declaratory of certain of the ancient rights and privileges of Englishmen. It had its origin in the controversy between Charles I and the Parliament concerning the prerogatives of the king and the privileges of the Commons. Charles had violated the privileges of Com¬ mons and the rights of the people by evasions of the Constitution. Accordingly it was re¬ solved to demand from him a formal conces¬ sion of those rights and privileges, in particular, which he had violated and to refuse a grant of supplies until his consent had been given. These rights were embodied in a statute, but the docu¬ ment is popularly known as the Petition of Right from the fact that the grievances of the Commons were presented in the form of a petition. When the petition was presented to the king for his approval he quibbled and hesi¬ tated and finally answered in a general way “that right should be done according to the laws and customs of the realm and that the statutes should be executed that his subjects may have no cause to complain of any wrong or opposi¬ tion to their rights and liberties.® But the Commons refused to be satisfied with an an¬ swer so vague and indeterminate and prepared a remonstrance. Finally the king yielded and gave his assent in a manner acceptable to the Commons on 7 June 1628. The petition, after reciting various statutes recognizing the rights contended for, declared that taxes, forced loans, benevolences, mfts, etc., should no longer be demanded by the king without the mnsent of Parliament; that soldiers should not be billeted upon the citizens without payment; that no freeman should be imprisoned except by the law of the land; and that martial law should not be proclaimed in time of peace.

The Petition of Right Act of 1860 assures the petitioner the privilege of proceeding against the Crown at common law, or he may file his petition with the Secretary of State, upon which the king’s fiat that right be done may be issued on the merits of the petition, the Crown thus accepting the defense. This orivi-lege was extended to Ireland in 1873, but has never been bestowed upon Scotland.

PETOFI, or PETON, pe’te-fi, Sandor (Alexander), Hungarian poet: b. Kis-Koros, comitat of Pesth, 1823; d. neat Schassburg, 31 July 1849. He was a common soldier for some two years and for a time a subordinate member of a troop of strolling players. His first oub-lished collection of verse (1844) established his national fame as a poet. He was less fortunate as a novelist. In March 1848 he came forward as a patriotic leader of the youth of Pesth with

the celebrated 12 national requisitions and made the revolutionary cause triumphant for the time. His spirited lyric (Talpra, Magyar ((Up, Magyar5) was everywhere sung, and was the first of a series of patriotic verses. In 1848 he joined the Honved, and served with dis¬ tinction under Bern. He is believed to have perished in the battle of Schassburg, though his body was never found, and doubts were long entertained as to his being really dead. He banished false rhetoric from Hungarian poetry, and much of his own work attained a true folk-character. He was a very prolific writer, and in the six years 1844-49 he published 10 vol¬ umes of poems, besides producing a countless number of minor writings. There are render¬ ings into English by Sir John Bowring (London (1866) ; Loew, W. H., (Gems from Petofi and other Hungarian Poets5 (New York 1881), and Phillips, Henry J. (Philadelphia 1885). There are also numerous translations in German and other languages. The best critical edition of his work is that by Haras (1894). Consult bi¬ ographies in Magyar by Zilahy (1864) and Vut-kovics (1883) ; Bubenik, (A Petofi, eine Skizze seines Lebens und Dichtens5 (1882) ; Fischer, (Petofis Leben und Werke5 (1889) ; Ferenczi, Z., (Petofi: Poete de la Liberte5 (Budapest

1912).

PETOSKEY, pe-tos'ki, Mich., city, county-seat of Emmet County, at the mouth of Bear River, on the south shore of Little Traverse Bay, an inlet of Lake Michigan, and on the Pere Marquette and the Grand Rapids and Indiana railroads, about 191 miles north of Grand Rapids and 35 miles south of Mackinac. It has steamer connections with the lake ports. Itˆ was settled in 1874 by white traders and missionaries; incorporated in 1879 and char¬ tered as a city in 1895. It is in a

lumber region, but the surrounding cleared land has been converted into productive farms. The chief manufacturing establishments are lumber works; leather works, which employ about 150 persons; fibre and paper mills, 125 persons; woodenware works, 75; lime works, 110; other industries about 200 more. The delight¬ ful summer climate attracts thousands of vis¬ itors which necessitates extensive hotel accom¬ modations and the employment of many per¬ sons during the season. It has the Lockwood Hospital, 11 churches, public and parish schools and a public library. The two banks have a combined capital of $160,000, and the annual amount of business is over $1,000,000. The county offices are housed in the new $30,000 city hall. The government is vested in a mayor and a board of public works, a council of eight members, who hold office two years. The population is composed of a majority American born, a number of Germans, a few Armenians, Indians, Hungarians and Poles. Pop. (1920) 5,064.

PETRA, pe'tra, in Aramaic, called Rekem, and in Hebrew Sela, a ruined Nabataean city of the land of Edom, northern Arabia, in the eastern part of Arabia Petraea, to which it gave that name. Its great importance was as a trad¬ ing place and station on the caravan route between Syria and Arabia up to the 4th century a.d. A century later it had disappeared from the annals of human history and even its site was unknown until 1812 when Burckhardt dis¬

covered it in the Wadi Musa. The ruined city lies in a narrow valley which is surrounded on all sides by lofty mountains, embracing an area about one mile in length and half a mile in width. One of the striking characteristics of the place is the carving upon the perpen¬ dicular faces of the cliffs of ornate fronts of temples and tombs. The interiors of these ex¬ cavated rooms, however, are scarcely more than caves, bare of any attempt at ornament or even finish. A great "treasure house,55 an amphithea¬ tre, convent, citadel and palace have been found, mostly of late Greek architecture, but with evidence of Egyptian and Oriental influences, also in the older remains. The city was cap¬ tured by Amaziah of Judah in the 9th century b.c. ; became the property of the Nabataeans in the 3d (or 2d) century b.c., was made tributary -to Rome in the 1st century b.c., and in the 2d century a.d. became capital of a Roman prov¬ ince, Arabia Petraea. It was a Christian bishop¬ ric during its last years. Consult Buhl, H., ˆeschichte der Edomiter5 (Heidelberg 1893) ; Burckhardt, J. L., (Travels in Syria and the Holy Land> (London 1822) ; Dalman, G. H., (Petra und seine Felsheiligtiimer (Leipzig 1905) ; Due de Luynes, (Voyage

d'Exploration a la Mer Morte, a Petree5 (Paris 1875) ; Hornby, E., (Sinai and Petra5 (London 1901) ; Palmer, E. H., (The Desert of the Exodus5 (Cambridge 1871).

PETRARCH, pe'trark (Italian, Petrarca, pa-trar'ka), Francesco, Italian lyric poet and scholar: b. Arezzo, 20 July 1304; d. Arqua, near Padua, 18 July 1374. Soon after his birth the family moved to Avignon, France, and here the lad received his early education, going later to institutions at Montpellier (1319-23), and thence to Bologna, where he studied law dur¬ ing the period 1323-25. Though he pursued his profession with success, his own inclinations led him to devote much time to the Latin and Pro¬ vencal poets. He returned to Avignon, where he came into a small inheritance which gave him freedom to pursue his favorite studies. His talent for Latin poetry commended him to the court of Pope John XXII, and he took minor orders in the Church. It was at this time that he first saw in the church of Saint Claire (1327) the Laura who exercised so great an influence on his future life, and was his inspiration in his most famous works. The identity of this personage, and whether she was a real or ideal one, has been much disputed, but she is generally believed to have been the 19-year old wife of Hugues de Sade, and the story is that she was so embarrassed by the passion of Petrarch that she rebuked him in public. Pope Benedict XII conferred on Pe¬ trarch a cannonry at Lombez (1335). In 1336 he embarked at Marseilles for Rome, the antiqui¬ ties of which he visited with an enthusiasm which he has recorded in his poems. In 1337 he returned to Avignon and bought a small estate at Vaucluse. He remained here for three years and wrote numerous sonnets which acquired popularity even before the earlier and longer work of Dante (still in manuscript), and served to fix the Italian language. These were, however, only his recreation. He rested his hopes of fame on his Latin scholarship. Virgil, Cicero and Livy were his favorite authors, but he was a diligent explorer of the monasteries

PETRARCH'S SONNETS

for old manuscripts of all the Latin classics (he did not learn Greek till comparatively late in life), which he transcribed with his own hand, and diffused as much as possible, while he formed a precious collection of his own. In his search he traveled widely through France, Ger¬ many, Italy and Spain, making many discov¬ eries, which have placed his name high among the restorers of letters, and preserving through his copies invaluable manuscripts which other¬ wise would have been lost to the world of let¬ ters. He had advanced views for his age of history and science, despising legends and as¬ trology, and recommending true research. In politics his views were equally advanced. In religious matters he had no sympathv with the skepticism common among the scholars of his day. His Latin works, both in prose and verse, were highly esteemed, and in 1341 he was called to Rome to receive on Easter-day (8 April), the crown of laureate of the civilized world, awarded him for his Latin epic, 'Africa,* a work of real eloquence. He was subsequently charged with various diplomatic missions, and in 1342 appointed joint ambassador with Rienzi to Clement VI to solicit his return to Rome. He praised the enterprise of Rienzi (1347) in a Latin epistle, and went to Rome, though too late, to support him. At one time he thought of shutting himself up in a monastery, and de¬ termined to live more in accordance with his ecclesiastical profession. In 1353 he returned to Italy, where his repute led to his employmentjn many important diplomatic negotiations. He was consulted by the Pope and the emperor. In 1354 he negotiated a peace between the republics of Genoa and Venice in the name of Giovanni Vis¬ conti of Milan. From this time, with the ex¬ ception of embassies to France and Germany, he lived entirely in Italy, and until 1366 chiefly at Milan, Padua and Venice, to the last of which he presented his library. In 1370 he took up his residence at Arqua, near Padua, where he passed his remaining years in religious exer-. cises. He had two natural children by an Avignon lady — a son who died before his father, and a daughter who married Francesco de Brossano, a Milanese gentleman, who became his executor. Petrarca left no works in Italian prose. Among his Latin works are three books of 'Epistles* ('Epistolse Familiares*) and 12 'Eclogues,* his epic poem 'Africa,* various philosophical, religious, political and historical treatises, as 'De Officio et Virtutibus Imperatoris* ; 'De Remediis utriusque Fortunae* ; 'De Vita Solitaria* ; 'De Vera Sapientia* ; 'De Contemptu Mundi* ; 'Itinerarium Syriacum* (a geographical work), and 'Epitome Vitarum Viror Illustrium.* His Italian poems consist of 'Sonetti* and 'Canzoni in Vita e in Morte di Laura,* and of 'Trionfi.* The first edition is dated Venice, 1470. The

subsequent editions are innumerable. They may be found trans¬ lated into English by various hands. The ‘Trionfi* are in terza rima. Despite their re¬ finement and delicacy of sentiment and purity of language, the sonnets of Petrarch are some¬ what dull and monotonous. They are also filled, according to the taste of the age, with conceits, artificial refinements of sentiment and plays upon words. Petrarch’s learning was very great, and, for his time, critical. He despised the vulgar tongue of Italy, but as the champion

of national unity wrote in that tongue such celebrated patriotic poems as the canzone ‘Spirito Gentil.* As a writer of Latin he ranks among the best of modern times and shares with Boccaccio the credit of having restored classical scholarship. He is placed by suffrage of the Italians as among their poeis second to Dante only. (See Petrarch’s Sonnets). Con¬ sult Lord Woodhouselee, ‘An Historical and Critical Essay on the Life of Petrarch’ (1810) ; Campbell, T., ‘Life and Times of Petrarch* (London 1843) ; Cayley, C. B., ‘The Sonnets and Stanzas of Petrarch* (London 1879) ; Koerting, G. C. O., ‘Petrarca’s Leben und Werke* (Leipzig 1878) ; Longfellow, H. W., ‘Poets and Poetry of Europe* (New York 1855) ; Mezieres, A. J. F., ‘Petrarque* (Paris 1896) ; Robinson and Rolfe, ‘Petrarch, the First Modern Scholar* (New York 1898).

PETRARCH’S SONNETS. The Sonnets of Petrarch, written and often revised during the years between 1327 and 1374, cannot be properly understood without reference to Petrarch the scholar, whose earnest study of classic authors then known by little more than their names gave him philosophic breadth and humanistic sympathy far in advance of the narrow and dogmatic teaching of mediaeval scholastics and dowered him with a delicacy of diction and a wealth of mythological imagery that gained him the delighted appreciation of his own generation and helped establish him as a master for several generations of romantic lyr¬ ists. Nor can we enter fully into the spirit of these centuries-old love poems without a sympa¬ thetic knowledge of the man himself, a scholar of genuine and, for his generation, surprising intellectual attainment, yet a singularly winning, affectionate human being, with a lively interest in all that concerned those near him, and an admirable capacity for loyal and enduring friendship. The constancy to a. relation so entirely onesided as Petrarch’s passion for Laura, the lady of his verse, seems not un¬ characteristic of the man who said, “After you have once decided upon a friend, there must be no doubt concerning the friendship… .

There must be no mistrust, no fear.**

The term “Sonnets,** in the case of Petrarch, has been loosely applied to that verse which is the expression of the poet’s love passion. As a matter of fact, Petrarch employed as his in¬ strument not only about 300 sonnets, but a number of poems in looser verse form, vari¬ ously styled, and six long poems entitled the ‘Trionfi* or ‘Triumphs,* celebrating the suc¬ cessive victories over each other of love, chas¬ tity, death, fame, time and eternity. To the en¬ tire collection he himself gave the name, ‘Can-zoniere* or ‘Song Book.* As everyone knows, this volume of verse is, with the exception of a few occasional poems, inspired by the lady whom Petrarch names Laura. Whether Laura, under either this or another name, really existed is a matter of dispute among scholars. Beyond sus¬ picion of forgery are the records made by Petrarch of his meeting with her, and of her death 21 years later. Yet no indisputable evi¬ dence confirming her identity exists, and Petrarch’s constant play on the name Laura, likening it to Laus (renown) and Laurel, the meed of the successful poet, gave rise, even among his own contemporaries, to the accusa-676

tion that the lady of his aspiration was merely the personification of the poet’s literary ambi¬ tions. However, it would seem impossible for anyone reading the Sonnets with sympathetic attention to give such an impersonal interpreta¬ tion to them. They certainly lack definite in¬ formation concerning Laura. Other than that she is lovely to look upon, with golden hair, and lashes and eyebrows of jet, that her bear¬ ing is modest and dignified, and that she is endowed with a spiritual grace that is at once the inspiration and despair of the poet, she is without attribute. But that this is so by no means disproves the actuality of her existence, and it most assuredly does not disprove the reality and poignancy of the emotion aroused through her in the soul of Petrarch. The quality of this emotion and the mood and philos¬ ophy to which it gave rise can be more clearly understood after an examination of the poems themselves to discover the poet’s method and the scope of his artistic range.

Exclusive of those which deal with other matters, the Sonnets begin with chronicling his first encounter with Laura at the age of 23, and his helplessness, as a naked youth, against love’s dart, which found

entrance through his eyes and transfixed his heart. From that moment, he is love's captive, borne on, as by a steed heedless to bridle or spur, to that laurel whose flower aggravates the pain that it should heal. This comparison of Laura to the laurel is one of many figures employed. Now she is a sun, shedding the light of her eyes on him to waken him into new life; she is a flame and he the fated moth; she is the enchantress who transforms Petrarch himself into a laurel whose constant green defies the changing wintry blasts. She is dire winter, on her eyes hang the cloud, in her heart is unyielding ice. Again, such fire burns in her eyes that he melts as snow and would fain assuage his pain by death. Some¬ times she is not Love but Love's opponent. Because his ((two loved lights (Laura's eyes) their wonted aid restrain,® Love rides the poet's ship, desire mans every oar, and, while <(Reason and Art lie dead amid the storm,® he himself is borne by the wet wind of his own sighs and tears through the fog of disdain to destruction. The figure of his lady's eyes acting as beacons of safety and a guide to higher things is often employed, and with the passage of years and the deepening of the poet's passion takes its place as a symbol of that spiritualizing influence exerted by her to which he so often and espe¬ cially after her death pays tribute. In her pres¬ ence lust died, in her regard was a heavenly grace worn only by the blest in realms on high.

The above, translated almost literally from passages throughout the poems, indicates how entirely subjective is their content. They cele¬ brate not the lady but the moods, the thought, the reflections aroused in the poet by the sight and memory of her. Her presence causes him unspeakable joy, while at the same time it creates unendurable desires. She unfits him for serious work, even as she inspires him to nobler ends. The lover and poet would rejoice in this manifestation of human loveliness did not thwarted passion demand toll, while monastic tradition frowned in angry reproof. Entirely sincere are Petrarch's pleas that heavenly aid

deliver him from the "mortal loveliness® that (<seized and soiled® his soul. Yet quite as sincere is the expression of his grief and loneli¬ ness after the death of Laura, his longing for her presence, and the comfort that dreams and visions of her bring.

This dualism or antagonism of thought and utterance became the keynote of the horde of Petrarchan imitators that followed in Italy, France, England and Spain. With them it was almost entirely a matter of form, the contrast¬ ing moods of the poet or lover being simply

material out of which to fashion what are known as (<conceits,® highly elaborated and in crude hands highly absurd figures of speech. With Petrarch, however, sophisticated as he is, and in style polished almost to the point -of preciosity, there is a profound basis of feeling and an irreconcilable spiritual paradox. It is not enough to recall that, whatever the impedi¬ ment, Petrarch's love was not returned. Mere possession of the loved one might have brought passing joy to Petrarch the man. But there would still remain unsatisfied Petrarch the idealist, the mortal conscious of his dross, of his eternal inability to remain at One with the divine. From this arose the restlessness, the self-conflict, the recurrent stand against that love which now inflamed him with holy zeal, now fanned desire and the pur¬ suit of self-gratification. A disciple of Augus¬ tine, he could not but believe such imaginings and affections were unholy things, even as his intellect, founded on the calm philosophy of the Stoics, resented the beauty that "spoiled his mind of judgment and from freedom's lofty path so drew him.® Yet the very nobility of the object of his desire was to him both as idealist and lover sufficient justification 'for its con¬ tinued pursuit.

The type of imagery employed by Petrarch has been indicated. To this factor in artistic effect may be added his many charming de¬ scriptions of nature. In this there is nothing of marked originality or intimacy. Fresh¬ leaved woods, fountains, sweet air, are usually but a background, sympathetic or the reverse, to the mood of the poet. The attitude of the writer is again subjective, his range of observa¬ tion distinctly limited. But read in the light of Petrarch's many-times avowed preference for the peace and beauty of the country, and his actual choice of it as a residence, these expres¬ sions of appreciation are added confirmation of the sincerity of his feeling and its utterance.

A complete critical edition of Petrarch's verse was made in 1896 by Giovanni Mestica. His lyrics were edited by Carducci and Ferrari in 1899, and by Salvo-Cozzo in 1904. The <Trionfi) were edited in 1901 by Carl Appel. A number of English poets have translated in¬ dividual poems. These translations have been collected into a convenient volume issued by George Beli'and Sons of London in their Bohn library.

Clara deLissa Berg.

PETREL, any of the smaller species of a group of oceanic birds allied to the albatrosses, characterized by webbed feet and tubular nos¬ trils. In the albatrosses the tubular nostrils of the two sides are quite distinct, while the ful¬ mars, shearwaters and petrels proper have them united to each other and to the base of the bill

and are, therefore, placed in a distinct family the Procellariidce. Most of them also have the hallux much better developed than have the al¬ batrosses. The wings are long and pointed, the tail short but of various shapes, and usually with 14 or 16 quillfeathers. Owing to its com¬ pactness and oiliness the plumage is extremely resistant to water. The feet are small and com¬ pletely webbed in front. The fulmars and shearwaters are relatively large birds, the petrels proper of small size and distinguished by the prominence of the ‘nasal tube and the more or less hooked beak. Except during the breeding season the petrels never voluntarily come on land, and s-eldom even approach the shores, but remain out at sea even during the most severe storms. Sailors call the smaller ones, indis¬ criminately as to species, Mother Carey’s chick¬ ens. Probably 75 species are known, many of which have a wide range. They feed on small marine animals and on almost any kind of food-refuse cast overboard from ships, and appear exceedingly fond of fat or grease, for which, and for other edibles, they will follow in the wake of vessels for great distances, and for many days continuously, and often collect in great numbers where food is plentiful. When irritated they vomit an oily fluid of highly offensive odor.

These birds breed in large communities in localities adjoining the sea, forming their nests in holes, usually in the face of a cliff, but often in burrows or cavities which they dig for them¬ selves or appropriate from rabbits and other burrowing animals. Where the earth is hard and digging difficult several females will lay in the same burrow. The female lays one egg. They are not often seen near shore in the day¬ time, remaining hidden in the nest and going abroad for food at night. They fly rapidly, and generally close to the water; and when in pursuit of food they suspend themselves by ex¬ tending their wings, and appear to run on the surface of the water. It is from this circum¬ stance that they are called petrels (<(little Peters®), after the apostle Peter, who walked on the water. The appearance of these birds is considered by seamen to presage a storm — hence the common name of a familiar species (P pelagica) known as the <(stormy petrel®—

and it is thought peculiarly unlucky to kill one of them. The largest representative of the group is the Giant Fulmar of the southern seas. This bird has a wing spread of six to seven feet. In northern waters the largest is the fulmar petrel, a bird about 20 inches in length. Owing to their wandering habits most of the species are likely to be seen occasionally in North American waters, where fully 15 species of true petrels, besides as many more shearwaters and fulmars, have been actually recorded. The best-known on the North Atlantic Coast is Leach s petrel (Cymochorea leucorrhoa), a pretty little bird in black with a white rump, which skims the waves with the most marvelous skill and seems never to tire. It is barely six inches |ohg and one of the smallest of water birds. Wil¬ son's stormy petrel (Oceanites oceamcus) is one of several petrels characterized by their long plover-like legs. It is one of the most widely dispersed and commonest species on the high seas. The diving petrels are a distinct group, belonging to the family Pelecanoididce. These

birds are eight to nine inches in length, and they are numerous in the waters about Aus¬ tralia and New Zealand. They have become famous from their habit of diving at full speed through the crests of waves. Consult Baird, Brewer and Ridgway, (North American Water Birds> (Boston 1884) ; Knowlton, F. H., (Birds of the World* (New York 1909); Salvin, Chal¬ lenger Reports) (Vols. II and IV, London

1881-82).

PETRIE, pe'tre, William Matthew Flin¬ ders, English Egyptologist, grandson of Mat¬ thew Flinders (q.v.), the Australian explorer: b. Charlton, 3 June 1853. He received a private education, and in 1875-80 devoted his attention to British archaeology, the results appearing in the works, (Inductive Metrology, or the Re¬ covery of Ancient Measures from the Monuments> (1877), and (Stonehenge: Plans, De¬ scription, and Theories* (1880). He then went to Egypt, making a careful survey of the pyramids of Gizeh, of which he published an account in (The Pyramids and Temples of Gizeh) (1883).* He continued his work in Egypt under the auspices of the Egypt Ex¬ ploration Fund Committee (1884-86) ; exca¬ vated the site of Tanis, and discovered and excavated Naukratis, Aan and Daphnae, his results being published in (Tanis* (1885-87), (Naukratis* (1886). In 1894 he founded the Egyptian Research Account and was instru¬ mental in enlarging the British School of Archaeology in Egypt in

1905. He has con¬ tinued his explorations of ancient sites, his excavations forming the theme of the works <Hawara) (1889); (Tell el Amarna) (1895); <Koptos> (1896); <Denderah) (1900); (Diospolis) (1901), and (Royal Tombs of the Earliest Dynasties* (1901), *etc.* Among other publi¬ cations are (A Season in Egypt* (1888); fa¬ cial Portraits) (1888); historical Scarabs) (1889) ; (Ten Years' Digging in Egypt* (1893) ;

< A History of Egypt* (2 vols., 1895-97) ;

(Egyptian Tales> (2 vols., 1895-99) ; (Egyp¬ tian Decorative Art* (18951; Religion and Conscience in Ancient Egypt* (1898) ; (Syria and Egypt > (1898); (Diospolis* (1901);

<Abydos) (1902-03) ; (Ehnasya) (1904) ; Re¬ searches in Sinai) (1906); (Hyksos and Israelite Cities* (1906); (Gizdh and Rifeh) (1907);

(Athribis) (1908); 'Personal Religion in Egypt* (1908); 'Memphis* (1909); 'Qurneh* (1909); (Arts and Crafts in Egypt) (1909); 'Egypt and IsraeP (1911); 'Tarkhan* (1912-13); 'Amulets* (1914); 'Heliopolis* (1914); <Scarabs) (1917) ; (Tools and Weapons* (1917). Since 1892 he has been professor of Egyptology in University College, London.

PETRIFACTION, literally to make into a stone, specifically the replacement of organic substance by mineral matter in such a way that the minute details of structure are pre¬ served. The petrifaction of wood with the preservation of the grain is a familiar ex¬ ample. The common statement that petrifac¬ tion and fossilization are the # same is not strictly true, since some fossils are merely the imprint of the organism, such as the tracery of fern leaves in coal beds. Silica and calcium carbonate are the most common substances to replace organisms. See Fossils.

PETRIFIED FORESTS. See Forests, Petrified.

PETROBRU.SIANS, followers of Pierre de Bruys, who in Languedoc, during the 12th century, founded a sect of religious extremists. His tenets included the rejection of infant baptism, the abolition of church music, the destruction of church buildings, the disuse of the cross as an object of veneration and a denial of the Real Presence in the Eucharist, whose elements were, he said, mere symbols; and strenuously opposed all prayers and serv¬ ices offered in behalf of the dead. For 20 years his doctrines were propagated with fiery zeal, and the number of his followers in south¬ ern France rapidly increased. Peter, abbot of Cluny, wrote a treatise to refute him, and he incurred the anger of the people by the demo¬ lition of altars and churches, and in 1124 was burnt to death by the mob at Saint Gilles, near Nimes. The Petrobrusians as a sect disap¬ peared in the closing years of the 13th century.

PETROGRAD, a government of Russia, formerly (till 1 Sept. 1914) called Saint Peters¬ burg. Situated in the northwest of Russia, Petrograd is bounded on the north by Finland and the gulf of that name; area, 17,226 square miles of land and 3,534 square miles of water surface; population in 1914, 3,136,500, of which number 2,133,100 were at that time located in the city of Petrograd. On the west lie the republics of Esthonia and Livonia; south and southeast those of Pskov and Novgorod, re¬ spectively. Petrograd includes Lake Ladoga (the largest in Europe, nearly 7,000 square miles), Lake Peipus and the Neva and Narova rivers. The flat and generally marshy surface is nearly half covered with forests and almost a quarter with waste lands, unsuitable for till¬ age. Little effort has been made to render the ground available for cultivation; potatoes, flax, rye, barley and oats are grown, mainly for local consumption. The waters — including the gulf — supply an abundance of fish. Cotton weaving is an important industry, while the other in¬ dustries and manufactures are the same as those carried on in the city of Petrograd. Much trade is transacted at the numerous fairs which are periodically held in almost every town and village. Its early history is almost parallel with that of the city, though the whole terri¬ tory did not become Russian till 1721, or 19 years after Peter the Great had conquered the site on which the capital stands. Two com¬ munes belonging to the province of Viborg (Finland) were detached in 1911 and added to Petrograd, which was thus enlarged by about 600 square miles.

PETROGRAD, formerly Saint Petersburg, the capital of the former Russian Empire, in the government of Petrograd, situated on the delta of the Neva, at the head of the Gulf of Finland, in 59° 57’ N. lat. and 30° 20’ E. long., 400 miles northwest of Moscow, the ancient capital, and 1,400 miles from Odessa. The city covers an extensive area

embracing the banks of the river bordering the mainland as well as numerous islands formed by the many branches of the Neva, about 30 feet above sea-level. The principal portion is on the right bank; the other parts are built on the islands, which are connected with each other and the mainland by numerous bridges. The Neva, which flows from Lake Ladoga near Schlussel¬ burg, empties itself into the Gulf of Finland

after a course of 43 miles. It enters Petrograd near the convent of Saint Alexander-Nevsky, describing a great arc about 10 miles long and dividing into several branches — Great or Bolshaya Neva, Little or Malaya Neva and the Great and Little Nevka. The principal navigation is on the Great Neva, but there are numerous sand-banks where only vessels of low draught can pass. Inundations not in¬ frequently occur; the strong southwest winds at times raise the Neva considerably and causes it to overflow its banks. On such occasions cannon-shots from the citadel warn the people of the coming flood. Between the Great Neva and the Little Neva lies Basil Island (Vassili Ostrov), a part of which (Golodai Ostrov) is again cut off by the narrow Smolenskaya River. The next largest island is what was formerly called the Peterburgsky Ostrov, on which the Alexander Park and Zoological Garden are situated, separated by a canal, Kronversky, from the fortress of Saint Peter and Saint Paul, which stands on an island connected with the mainland by the Troitsky Bridge. The other islands are Aptekarsky Ostrov (Apothecarie's Island), Kamenny Ostrov (Stone Is¬ land), Yelaghine Ostrov, Krestovsky Ostrov, Volny Ostrov, Petrovsky Ostrov, Gutuijevsky Ostrov, Krugly Ostrov and several smaller ones. Of the bridges only three are permanent; others are built on boats (pontoons) and removed periodically, especially when the ice descends from Lake Ladoga. Some 200 canals have been constructed to receive the overflow of the river and the melting ice and snow in the spring. The canals are spanned by granite and iron bridges, with a draw-bridge in the mid¬ dle. Lying on low, marshy ground, the climate is extremely variable, cold and damp ; rain and snow fall for over 150 days in the year. Spring commences late; snow often lies till May, and about the middle of that month the first green begins to appear. June, July and part of August there is agreeable weather. During September and the first half of October the temperature is fairly regular. Altogether, Petrograd enjoys barely three and a half months of pleasant weather. The average tem¬ perature in July is 64° F. and in January 15° F., when all the waterways are frozen over. The time in Petrograd is seven hours ahead of New York. The banks of the principal canals are protected by solid walls of granite, and the quays

of the Neva are necessarily more substantial than those of any other European city. Great forests extend to the very con¬ fines of the city in one direction, while marshy bogs are characteristic everywhere. Petrograd comprises 12 districts or quarters (chasti), sub¬ divided into 38 arrondissements or police pre¬ cincts. The most important section of the city is that south of the Admiralty, from which the principal streets radiate. With few ex¬ ceptions the streets are wide and commodious ; the sidewalks are narrow and most of the roads are roughly paved. The streets are di¬ vided into three classes: ((prospect,® equivalent to the New York ((avenue® ; ulitza, cross-street, and ˆpereulok,® or third-class thoroughfare. Of the <(prospecty® the most famous is the (<Nevsky Prospect,® which shares with Princes street in Edinburgh (Scotland) the distinction of being the two finest streets in the world.

PETROGRAD, RUSSIA

1 The Cathedral of Saint Isaac

2 The Column Alexander and the Admiralty

PETROGRAD

679

Many travelers, indeed, award the palm to the Nevsky Prospect. Other prominent thorough¬ fares are the Voznessensky Prospect, Liteiny Prospect, the Vladimirsky Prospect, Gorok-hovaya Ulitza, Morskaya, Millionnaya, Sado¬ vaya, Kazanskaya and Koniuchennaya. These streets contain the palaces of the court and nobility and of the better classes. Owing to the swampy nature of the ground the main buildings are generally erected on wooden piles in large plots. This part of the resi¬ dential district on the south bank of the Neva occupies the peninsula or the Bolshaya or Great Side ; that on the north bank,

including the islands, Petrograd (formerly Peterburgskaya). Across the Alexander Bridge lies the district of Viborg. The Peterburgskaya sec¬ tion contains the commercial and business dis¬ trict and also the important docks and ware¬ houses, the stock exchange (birzha), scientific institutions and numerous schools and colleges. The old fortress of Saint Peter and Saint Paul on Peterburgsky Island faces the Winter Palace, and contains the Mint (Monety Dvor) and the ancient cathedral (sobor) where all the Russian sovereigns except the last one are buried with their families. Here are political prisons — generally crow'ded — behind which ■stands the arsenal, and in the wide streets are the houses where the minor government offi¬ cials dwelt .before the revolution cut off their functions. Many of the islands contain at¬ tractive parks and summer houses of the wealthy. The old Admiralty, founded by Peter the Great in 1705, stands in the midst of a spacious square enclosed by trees on three sides. Near it are grouped the principal buildings of the capi¬ tal, Which include the ((Glavny Shtabˆ (head¬ quarter staff), containing the Foreign Office and Customs Department ; the War Department (Voyennoye Ministerstvo) the cathedral, the Senate and the Synod, and nearby the equestrian statue of Peter the Great, erected by Catherine II. On the right is the huge Winter Palace, an immense quadrilateral block erected in the middle of the 18th century. It was rebuilt after having been destroyed by fire in 1837. It is the largest palace in the world and was a city in itself when formerly occupied by the im¬ perial family, accommodating 6,000 people. Its fine halls are rich in statuary, paintings and gems of art, including the tables of rare maluchite. The great court ceremonials were held in 'this palace, and in its treasury were pieserved the costly crown jewels. The Her¬ mitage, a classical edifice built by Catherine II, but reconstructed in 1840-50, contains one of the richest artistic and archaeological col¬ lections in the world, including sculptures and masterpieces from all the famous schools of painters. In Petrovsky square stands the cathedral of Saint Isaac, built of granite and manble, whose five gilded domes are conspicuous from all parts of the city. It is of almost cubic form and void of any artistic beauty, though its peristyles of colossal red granite monoliths create a striking impression. Rich in interior decorations, its paintings represent Russian art for over a century. On a large square south of the cathedral stands a monument to Nicholas I, a rather stiff Doric column ; there are other monuments to Catherine II, one commemorat¬ ing the Russo-Turkish War 1877-78, *etc.* The

arsenal contains a museum of artillery; the Academy of Sciences has an extensive museum and art collection and a library of 350,000

volumes. The ˆImperial® Library is one of the most valuable in the world, containing con¬ siderably over 1,000,000 volumes and many priceless manuscripts, besides some 100,000 en¬ gravings. Catherine II purchased the library of Voltaire and added it to the collection. Besides other theatres, there are four in which plays and operas are rendered in different languages. Scattered all over the city are lofty watch-towers used for signaling danger by fire or water. The general style of architecture — apart from the purely Russian — is nondescript and lacks the picturesque element — masses of architecture in endless lines, often gorgeous, but frequently tasteless. There are about 400 churches ; besides those mentioned are the cathedral of Our Lady of Kazan, celebrated for its Napoleonic trophies; the church of Saint Alexander Nevski, the church of the Smolnoi, convent and the church of the Preobrazhen¬ skaya, rich in military trophies. The chief scientific and educational institutions, of which there is a vast number and variety, include the University, the Ladies' University, the Mining Institute, The Imperial Academy of Medicine, the Technological Institute of Nicholas I, Medi¬ cal College for Women, Polytechnic College for Women, besides a great number of art, music, literary, mining, military and scientific institutions which make Petrograd one of the great intellectual centres of the world. Despite this, the percentage of illiteracy for European Russia is as high as 70. . About 150 newspapers were published in Petrograd before the revolu¬ tion. The palaces not already referred to are the Marble, Taurida (where the Duma met), Annitchkov — a favorite residence of the late Tsar, and the new Michaelov Palace, one of the most elegant buildings in the city. The government buildings are remarkable for their enormous size. There are numerous hospitals, dispensaries, convalescent homes and charitable institutions. Among the more important of the manufactures are those of Gobelin tapestry, glass, porcelain, military surgical instruments, articles of malachite and precious stones, ma¬ chinery, embroidery, *etc.* There are great iron¬ works, shipbuilding yards, breweries, distilleries, sugar refineries, textile mills, factories for the preparation of tobacco, silk, cotton, leather, paper mills, clock, watch and jewelry works, and various other industries. The commerce of the city is enormous; six railroads converge there; nearly half of the entire shipping trade of the country passes through the ports of Petrograd and Kronstadt, the latter 16 miles distant (connected by canal), where, the large vessels unload. Increased railway facilities have developed internal traffic and trade to a re¬ markable extent. A great grain-producing country, Russia exports thousands of shiploads through Petrograd to northern Europe. The war and the subsequent revolution in 1917 have so disorganized the trade of Petrograd that all former statistics are now obsolete and meaningless.

Tsarskoe-Selo (Tsar Village), 22 versts (16 miles) south-southeast of Petrograd, is a sum¬ mer resort of society. It contains two castles eight churches, several barracks, hospitals, etc.,

and has a population of 24,000. Peter the Great had a residence here, and since his time it has been the favorite summer residence of Russian sovereigns. The Old Palace (Stary Dvorets) is an immense building in rococco style erected under Elizabeth and Catherine II, and internally decorated with extraordinary magnificence. The New Palace (Novy Dvorets) was built by Catherine for her grand¬ son, Alexander I, and contains a valuable li¬ brary and a military museum. A fine theatre in Chinese style stands in the Alexander Gar¬ den. Several German communities are scattered around the environs. Peterhof, also a former imperial residence, is situated on the southern coast of the gulf about 20 miles from the city and contains a magnificent palace begun by Peter the Great in imitation of the palace at Versailles.

The population of Petrograd in 1914 was 2,133,100, and in 1915, it was 2,318,- 645, of which number about 75 per cent was Russian ; the remainder was made up of Poles, Finns, Germans, Jews and other nationalities. After Moscow was made the capital of Russia, Petrograd lost a large per¬ centage of its population. By far the bulk of the population — over 80 per cent — professed the Orthodox faith; less than 10 per cent was Protestant, and about 4 per cent Roman Catholic. In 1800 the population was 220,000; in 1864 it was 539,120; it rose to 1,870,000 in 1908 and in 1913 it was 2,318,645.

History. — The territory between the Gulf of Finland and Lake Ladoga was inhabited by Finns and Slavs during the 9th century. Swedes settled at the mouth of the Neva in 1300, and during the next four centuries the land changed hands several times, but remained most of the period in possession of the Swedes, from whom it was reconquered by Peter the Great in 1702. He laid the foundation of the city in May 1703; the first brick house was built in 1710, and in 1712 the seat of empire was transferred hither from Moscow, by which move Peter trans¬ formed Russia (Muscovy) from an Oriental into an

Occidental power. He forced Western civilization upon his subjects by relentless methods, compelled them to help in the build¬ ing and development of the capital by residing there, and obliged every vessel arriving to carry stones in her cargo to build the walls and pave the streets. All the stone had to be transported to the site, which was at the time a desolate, unhealthy Finnish marsh. A great fire in 1736 destroyed 2,000 houses; another in 1780 de¬ stroyed over 11,000 houses, and in 1796 a con¬ flagration devoured government magazines, naval stores and many vessels. The last great fire was in 1862. The railroad to Moscow was completed in 1851 ; to Berlin in 1862. Apart from local disturbances, such as revolutionary riots, Petrograd has no stirring history like the other and older European capitals. In 1901 and 1902 revolutionary demonstrations were rigorously suppressed, and the Putiloff iron¬ works strike in January 1905 led to the events of (<Bloody Sunday® (22 January), when thou¬ sands of workmen approached the Winter Palace headed by the notorious Father Gapon to petition the Tsar for redress of their grievances. The troops fired on the crowd and hundreds were killed. On 1 Sept. 1914 the old

name of Saint Petersburg was abolished by imperial ukase on account of its German deriva¬ tion, and that of Petrograd substituted, a name that had already been used for many years by non-Russian Slavs, and which was conse¬ quently not new. The wildest scenes ever wit¬ nessed in Petrograd broke out early in 1917 and developed into the great revolution which swept away the Romanov family, broke the mili¬ tary power of Russia and eliminated her from the war as a belligerent. For nearly four years anarchy and wholesale murder prevailed in the city under the Kerensky and Bolshevik regimes, and in the Spring of 1921 there was no indica¬ tion that the city was likely to settle down in the near future to normal life under a stable government. See Kerensky ; Lenine ; Raspu¬ tin ; Russia; Russian Revolution; Trotsky; War, European.

Consult Buchanan, (Miss) M., (Petrograd: The City of Trouble) (London 1918) ; Dobson, G.. (Saint Petersburg) (New York 1910) ;

Elaroff, (Saint Petersburg et ses environs5 (Saint Petersburg 1892) ; Stevens, W. B., (Petrograd, Past and Present5 (London 1915; Philadelphia 1916).

Henri F. Klein,

Editorial Staff of The Americana.

PETROGRAPHY, the science which deals with the description of individual rock forma¬ tions. In modern methods the microscope and chemical analyses play a conspicuous part. Strictly considered, petrography confines itself to the study of the rock specimen per se , while the study of the field relations and of the origin of the rock falls more properly under the science of petrology. The two are, however, often used synonymously, and often inter¬ changeably with lithology. The latter term, however, is preferably limited to the discussion of rock material as distinguished from other natural substances.

PETROLEUM, the general name applied to one of the three great classes of natural oily liquids, the other two being the essential oils and the fixed oils. (See Oil). It is obtained ready formed from the earth and from various localities. It belongs to a great series of bodies grouped under the name (<Bitumens55 which to¬ gether comprise a range of materials of the highest importance to the well-being of the human family. The familiar bitumens are the gaseous natural gas, the liquid, petroleum, ♦the semi-liquids, maltha and asphalt pitch, and the solids, natural asphalt and ozokerit. The word is derived from the Latin, petra, rock, and oleum, oil, and literally means rock oil. It is also known in some parts of the world in its crude state as naphtha, derived from the Per¬ sian <(nafata.55 As used in the United States the term <(naphtha55 is applied only to one of the lighter products which is given off in the process of distillation. In Germany it is known as (<erdoel55 or earth oil and ((steinoel55 — stone oil; the French and Italian equivalent is ((petrol.55 Crude petroleum varies in specific gravity over a wide range. This characteristic of petroleum and its products is usually expressed in degrees Baume, a type of hydrometer which found favor in the early days of the industry. Its readings are directly reducible to specific gravity through

use of the formula j^^B0 = Sp. Gr. Water is

PETROLEUM

Copyright, Underwood & Underwood, N. Y.

1 A general view of the great oil field at Eldorado, Kansas

2 A battery of stills (right) and condensing plant (left) in a big oil refinery near Cushing, Oklahoma

Muskogee (Oklahoma) Refinery — Stills and Stock Tanks

10° Baume. One of the heavy crudes from Wyoming approaches this gravity, while the amber varieties from Pennsylvania are as light as 46° to 48° Baume. Most of the paraffin crudes (see classification below) take fire on application of a flame, at ordinary temperatures, due to the gasoline content. Others, like the natural West Virginia black oils, must be heated to 180° F. or above before they will give off inflammable vapors rapidly enough to produce a flash. Certain crudes are not frozen at 0° F., while others containing, larger per¬ centages of paraffin solidify at temperatures only slightly below normal. In color petroleum ranges all the way from a light straw through amber, red and brown to jet black. The trans¬ parent oils also exhibit a variety of color by re¬ flected light.

Crude oils have been variously classified, preference now being given to naming them from the group of hydrocarbons representing the largest proportion of the crude. Nearly all contain percentages of the paraffins, of the ole¬ fins or ethylenes, of the naphthenes, and of various other bodies in smaller proportions, but because of the variable proportions of these groups, certain ones having strongly marked characteristics have been chosen as types and the two generally recognized are differentiated by Holde as: (1) the

naphthenes, and (2) the paraffins. The first are those that are rich in naphthenes, low in paraffin (from 0 to V/2 per cent), containing little naphtha as well as very little kerosene but much lubricating oil, and frequently asphaltic bodies: Most of the Cali¬ fornia crude and that from the Gulf Coastal fields of Texas and Louisiana are properly naphthenes. They have been also called asphalt base crudes. Asphaltic or asphalt-bearing crudes would be a better designation. The paraffins or paraffin base crudes contain smaller quantities of naphthenes, larger proportions of paraffin, ranging from 3 per cent to 8 per cent, considerable amounts of naphtha and illuminat¬ ing oils, and both light and heavy lubricating oils, the relative yields of the latter depending somewhat on the method of distillation. The Pennsylvania crudes are the best of this type. There are various grades between these two as well as those containing sulphur or pitch-like bodies or both. Some of the more recent writers are confining the term “asphalt* to the naturally existing body and the names “mineral* or “artificial pitch* to the semi-fluid product of petroleum used as an adulterant of the natural asphalt.

Geographical Distribution of Types. —

The former divisions of the petroleum pro¬ ducing areas into rather definite sections in the United States are being disregarded because of the widening areas of such fields, and the separation has come to be based more and more on fundamental differences in the type of oil produced and its adaptability to refining needs. Thus the oils of the Appalachian fields are in the main paraffins free from objectionable sul¬ phur and asphalt and they yield by ordinary refining methods high percentages of gasoline and. illuminating oils. Contrasted with them is the petroleum of the Lima-Indiana fields which contains some asphalt though consisting chiefly of paraffin hydrocarbons, and is contaminated with sulphur compounds which necessitate

special treatment for their elimination. Illinois oils contain varying proportions of both asphalt and paraffin and differ considerably as to specific gravity and distillation products. Sulphur is generally present but rarely in such form as to necessitate special treatment for its removal. Mid-continent oils vary in composition within wid :• limits, ranging from the naphthenes con¬ taining asphalt to the paraffins in which the asphalt content is negligible and which yield correspondingly high percentages of the lighter products of distillation. Sulphur is present in varying quantities in the lower grade oils, in certain of which, Healdton, for example, it exists in the form

requiring special treatment for its elimination. Oils from the Gulf field exhibit a considerable variety, but many of the naphthenes are characterized by relatively high percentages of asphalt. Considerable sulphur is present, much of which, however, is in the form of sulphureted hydrogen and is easily re¬ moved by steaming before refining or utilizing the oil as fuel. Oils from Wyoming and Colorado are in the main paraffin hydrocarbons suitable for refining by ordinary methods. Cer¬ tain of the naphthenes containing large per¬ centages of asphalt and suitable only for use as a fuel are also obtained in the Wyoming fields. The California oils exhibit a variety of com¬ positions, none of them containing hydrocar¬ bons of the paraffin series and all of them con¬ taining more or less dense, asphaltic hydrocar¬ bons. The phenols are a common constituent of the denser oils; many of them also contain sulphur. The chief products are fuel oils, illuminating oils, lubricants and artificial asphalt, though low percentages of naphthas may be de¬ rived from certain of the lighter oils, notably those of the Santa Maria, Sespe and Santa Paula fields in the southern part of the State. Canadian petroleum, like that from the Appalachian field, is classed as a paraffin.

Chemistry. — Much work has been done in determining the actual chemical formulae of the various hydrocarbons found in crude petroleum and its distillates, and many in the series of cer¬ tain types have been identified. CH4 is marsh gas or methane, the first of the series of the paraffins which have the general formula of Cn Hm + 2. Pentane, C5H12, is one of the lowest boiling point paraffins of commercial import¬ ance. It also has a low freezing point for which reason it is used instead of alcohol in ther¬ mometers for measuring very low temperatures. A “straight run* kerosene of this series con¬ tains a large percentage of tridecane, CisHw. One of the paraffin waxes having the unusual melting point of 167° F. is chemically CasH™. The members of this series are said to be saturated because the chemical bonds — linkages — are all satisfied. The olefins or ethylenes which have two unsatisfied linkages are unsaturated, and are soluble in sulphuric acid. This char¬ acteristic is made use of commercially in sweet¬ ening and deodorizing kerosene by treating with that acid. The olefins, named from olephiant gas, C2H4, the first member of the series, have the general formula CnHm, and with the para¬ ffins are known as open chain hydrocarbons. The naphthenes or cycloparafinns have the same chemical composition as the olefins but differ widely from them in physical characteristics, the theory being that the naphthenes are closed

chains or closed ring hydrocarbons, in which the grouping of the elements in the molecule is not the same as that in the chain.

Mabery, whose studies of the petroleums have been of great scientific value, has iden¬ tified members of the groups CnH2n— 2, and CnHm-i in oil from the Trenton limestone in Ohio. The next series CnH2ra— « is represented by the aromatic hydrocarbons, benzol, toluol and xylol. They are found only in small per¬ centages in Pennsylvania crude but certain of the petroleums from the Far East yield such appreciable quantities that they are being worked as a substantial source of supply of the aromat¬ ics. The aromatics are chiefly collected in the distillation of bituminous coal for the manu¬ facture of gas for domestic purposes, but because of the adaptability of some of them to use in high explosives, such as picric acid and trinitro¬ toluol, <(T.N.T,® it has become necessary to secure them from every available source.

Origin. — The question of the formation of petroleum is of great chemical as well as geologi¬ cal interest. The older hypothesis that petrol¬ eum was formed entirely from inorganic re¬ actions has been modified during recent years through continued studies of the optical rotatory power of the crude oil (See Polarization of Light) and for geological reasons. ˆ Such hypotheses were suggested by Mendeleeff and by Sabatier and Senderens. According to Mendeleeff petroleum resulted from the action of steam on carbides in the interior of the earth ; according to Sabatier and Sen¬ derens hydrogen and acetylene (resulting from the action of water on alkali and alkaline earth metals and carbides) by contact with metallic bodies, acting as catalyzers, formed aliphatic and cyclic derivations according to con¬ ditions. The hypotheses proposed more re¬ cently favor in general the formation from organic material. This view is supported by the work of Biot in 1835 on the optical rotatory power of crude oil to which attention was again drawn by Walden and by Tschugajef and has recently been carefully studied and confirmed by Rakusin, by C. Engler and others. Differences of opinion exist as to whether the petroleum is derived from animal or from vegetable material, or from both. C. Engler first showed by ex¬ periment, after Hofer had concluded from geological

evidences that petroleum was derived from marine deposits, that an artificial petro¬ leum could be obtained by the distillation of fats. He carried out his experiments with the fat of marine animals. According to the theory of Engler, petroleum is formed from the fatty remains of all kinds of life after decomposition under pressure, and after the other accompany¬ ing matter (protein substances) has changed by putrefaction into water, soluble nitrogen and sulphur derivatives. The lighter hydrocarbons resulting from vigorous treatment ot fatty acids (adipocere) containing paraffins, ethylenes and naphthenes are supposed to have polymerized to those of higher boiling points in the course of long geological period. Marcusson, thinks that the higher boiling point fractions of petroleum could not have formed from the same volatile portions, because the former have a greater optical rotatory power than the latter. The opposite view would seem to him the more rea¬ sonable one. Many of the bituminous deposits

in nature, however, seem to point to a gradual transition from natural gas through the petro¬ leums to the semi-liquid or more solid bodies. All the great pools of petroleum have been found immediately below impervious strata of the earth's crust. Where this crust has faulted, pressures from below, either gaseous, aqueous or from sheer weight of the earthy material, have forced the more plastic bodies to the sur¬ face where the transition has taken place. It cannot be stated that any one theory has found universal acceptance and it seems quite plausible that different kinds of petroleum may have been produced from different materials.

Geological Distribution — In the Appa¬ lachian field the petroleum yielding strata be¬ long to the Carboniferous and Devonian sys¬ tems, the most productive including the Mahoning sandstone and the Bradford ((thjrd oil sand® immediately underlying the Devonian shale. However, every well-defined and per¬ sistent sandstone, discovered below the Pottsville conglomerate, has produced oil or gas in paying quantities. In Kansas and Oklahoma they are generally found in Carboniferous sand¬ stones. The principal oil horizon of Canada is confined to the Corniferous limestone, still older than the Devonian shales ; in Indiana and Ohio, the Trenton limestone is the chief source of oil and gas; in Colorado, northern Texas and Louisiana it is found in the Cretaceous ; in California chiefly in the Miocene Tertiary; in southern Texas and southern Louisiana, in association with salt domes which also carry limestone and gypsum, while in Europe it is found in the Tertiary.

Early Uses of Petroleum. — The use of

petroleum, in its semi-liquid and solid forms, was common among the ancient nations of the East. The (<slime® noted in the Old Testament, as employed in the construction of the Tower of Babel, was, without doubt, partially evaporated petroleum. The ruins of Nineveh and Babylon reveal its use as a bond in cementing structures of brick at least 2000 b.c. Herodotus, the Greek historian, mentions the oil springs on the island of Zante and the asphaltic deposits, which were carried down by the river Is and collected by the early Babylonians. Bitumen was an article of commerce in the region of the Dead Sea and was transported into Egypt and sold for em¬ balming purposes centuries before the time of Christ. ((Sicilian Oil® obtained from natural springs near Agrigentum, on the island of Sicily, was burned in the lamps of the temple of Jupiter about the beginning of the Christian era. This is the earliest record of petroleum being used for illuminating purposes. A Roman general built a bridge across the Danube about the year 100 a.d., near the city of Severance. The piers were of brick, cemented with bitumen. Two of these ancient piers remain to this day on the banks of the Danube, in which the outer layers of brick have crumbled away, leaving the black pitchy matter protruding. Historical ref¬ erences to the early knowledge and use of petroleum in Galicia, Persia, India, China and Japan are very numerous. The ((holy fire® from the naphtha and natural gas springs- of the Apsheron Peninsula, on the borders of the Caspian Sea, has been known and worshipped by certain sects among the Persians for from 2,500 to 3,000 years.

. On the western continent this important mineral product was known to the aborigines centuries before the discovery by Columbus. The presence of pits, excavated for the purpose of collecting oil, along the waters of Oil Creek and French Creek, bear witness to this fact. Many of these were from six to eight feet square and varied in depth from 4 to 12 feet. They were lined with heavy timbers and were always to be found in the valleys and along streams where natural seeps of

petroleum existed. They were not constructed by the Senecas or other Indian tribes that occupied the territory, when the first white man appeared in America. They were, doubtless, the work of the same race of people who developed the copper deposits of Lake Superior, the lead ores of Lexington, Ky., and built the great mounds in Ohio and other of our Western States.

The earliest mention of petroleum in the United States was in 1627 by a French mis¬ sionary, who described the famous petroleum spring near Cuba, in western New York State. The first mention of petroleum in Pennsyl¬ vania was by a Moravian missionary who visited the region in 1767 and described the petroleum bubbling up in springs and from the beds of creeks, accompanied by natural gas. Many subsequent travelers, who penetrated the almost unbroken wilderness in after years in southwestern New York, northwestern Pennsyl¬ vania and southeastern Ohio, mention the ex¬ istence of petroleum and natural gas. These explorers were guided to these localities by the Indians, who usually collected sufficient petro¬ leum from the surface of the streams for a fire. This phenomenon was regarded by them with religious awe and superstition.

The artesian well driller, in search of salt brine in subsequent years, demonstrated the existence of petroleum in greater or less quanti¬ ties, accompanied by natural gas, both of which wTere considered a source of annoyance and danger, over a large area in the Ohio Valley reaching from Freeport, on the Allegheny River in Pennsylvania, to Burkesville, in southeastern Kentucky, and from the waters of Duck Creek, in Washington County, Ohio, to a few miles above Charleston, on the Big Kanawha in West Virginia. The last-named locality has the dis¬ tinction of containing the pioneer salt brine well of the United States, which was drilled by the Ruffner . Brothers in 1808. They em¬ ployed the most primitive appliances, but suc¬ cessfully cased off the weaker salt brine, adopt¬ ing methods that are now employed in sinking deep artesian wells o.f every kind. About the year 1810 the first salt wells were drilled at Tarentum, Pa., followed by those on the Big Sandy, on the borders of Kentucky, which also produced considerable petroleum and natural gas associated with the salt brine. About the year 1829 a well was drilled for salt near Burkesville, in Cumberland County, Ky., which struck a great reservoir of petroleum; the oil flowed into the Cumberland River nearby, caught fire and produced a conflagra¬ tion on the surface of the river for nearly 50 miles. For a number of years after, this well continued to flow, and a portion of the product was bottled up and marketed under the title of <(American Medical Oil. Burkesville, Ky.»

From the year 1848 to 1856 Mr. Samuel Kier, of Pittsburgh, Pa., bottled the petroleum

produced from the salt wells at Tarentum and sold quantities of it for medicine under the name of Seneca Oil, which name has ‘been given it from the oil produced by the cele¬ brated spring near Cuba, N. Y., whose product was also sold for medicinal purposes.

A portion of the petroleum from these wells was used in its crude state for illumination, but, because of the smoke and offensive odor, it was unfit for burning indoors. Mr. Kier of Pittsburgh, Pa., also made a number of experi¬ ments and succeeded in manufacturing an il¬ luminating oil, but, owing to the crude and imperfect methods emnloved and the faulty character of the lamps, it did not become popu¬ lar as a source of artificial light. In the mean¬ time other minds were at work on the problem of supplying the world with a cheap, safe and efficient illuminant, to take the place of the beeswax and tallow candle and the greasy whale oil lamp, which were then the common sources of artificial light in general use. The decline in the whale-oil industry, owing to the grow¬ ing scarcity of the animals in the high seas, threatened the total extinction of the supply of sperm and whale oil.

The Shale Oil Industry.— To meet the emergency, manufacturers turned their atten¬ tion to the shale-oil industry, which had already made considerable progress in Scotland and some other parts of Europe. By distillation it was found possible to extract a rich paraffin oil from the bituminous coal shales and out of this was manufactured a very fair grade of illumi¬ nating oil. The first patent for refining coal oil (as it was called) was granted to James Young of Manchester, England, in 1850.

The same process was patented in the United States in 1852. Dr. Abraham Gessner patented his illuminating oil, which he called ˆkerosene,® and was obtained from the same sources in 1854. By 1859 the shale-oil industry had made considerable progress and there were nearly 60 establishments engaged in its manu¬ facture. It was the progress made by this industry that paved the way for the almost instant success of refining crude petroleum. But the discovery of the latter in commercial quantities at Colonel Drake’s experimental well in 1859 rendered the laborious process of ob¬ taining a crude distillate from the shale rocks no longer necessary and speedily brought about the abandonment of the shale refineries. A number of them

immediately took up the new discovery and adapted their works to the manu¬ facture of illuminating oil from the crude prod¬ uct that they secured from the Pennsylvania oil regions. ‘Between 1853 and 1860 four large distilling plants for the manufacture of shale oil were erected on the Allegheny River, near Freeport, Pa., eight miles above Tarentum. A number of factories were established along the New England coast, which used the boghead coal, obtained in Scotland, for distilling pur¬ poses. Albertite, from Nova Scotia, was em¬ ployed in some Maine establishments, and several manufactories were erected in the. in¬ terior for distilling oil from the Breckenridge cannel coal obtained in Kentucky and from the Grahamite deposits of West Virginia. The principal points of manufacture were at Can-field, Ohio; Ritchie Mines and Peytonia, W. Va„ and Cloversport and Maysville in Ken¬ tucky.

PETROLEUM

Distribution of Petroleum. — The United States leads the world in the production of petroleum as well as in the manufacture of refined oil. For several years it was surpassed by Russia, but recent discoveries of enormous supplies in the Mid-Continent region together with the rapid development of the California oil fields have placed the United States once more in the first rank of oil-producing coun¬ tries. Outside the United States, petroleum is obtained in commercial quantities in other countries ranking in production in the follow¬ ing order: Russia, Mexico, Dutch East Indies, Rumania, India, Japan and Formosa, Peru, Germany, Trinidad, Argentina, Egypt, Canada and Italy.

Petroleum in the United States. — For

years the world was almost dependent upon the oil fields of Pennsylvania for its supply of illuminating oil and the American product dom¬ inated the markets of the world. Develop¬ ments gradually extended to the Northeast and Southwest, taking in several counties in the lower part of western New York and covering large areas of territory in West Virginia and southeastern Ohio. Then followed the discov¬ ery of oil in the Trenton limestone formations of northwestern Ohio and Indiana. Up to the year 1901 almost the entire

production of the United States came from five States east of the Mississippi, namely — New York, Pennsylvania, West Virginia, Ohio and Indiana. In 1901 the wonderful petroleum fields in Texas were opened up and California and Kansas came into prominence as producing sections. At the pres¬ ent time (1918) the production of the Western States surpasses that of the Eastern, and while the original territory producing paraffin base oil appears to be on the decline there are immense fields opening up west of the Mississippi. In 1907 Oklahoma advanced at once to the first rank as a producing territory, going beyond California, notwithstanding the fact that during that year she increased her production nearly 20 per cent. Oklahoma still holds first position, while Texas, Louisiana and Illinois have shown marked developments. The latter State reached its largest yield in 1908.

A table prepared under the direction of the Secretary of the Interior, published in February 1916, estimates that the oil fields of the country are exhausted to an average of 32 per cent, based on the present method of production, but that the fields already being worked can rea¬ sonably be looked to for the production of an additional 7,629,000,000 barrels of crude petro¬ leum. A competent authority stated in July 1917 that, ((this country is producing oil at the rate of about 300,000,000 barrels a year, but it is using it at the rate of about 335,000,000 bar¬ rels per year. The amount of crude oil in storage (all grades) 1 May 1917 was 165,688,- 797 barrels.®

<(In 1910 there were 400,000 automobiles in use in the United States. In 1916 the number was 2.250,000. To-day there are more than 4.000,000 cars, demanding more than 2,000,000,- 000 gallons of gasoline a year and other uses of gasoline and oil are expanding upon an enor¬ mous scale.®

Casing-head Gasoline. — While the enor¬ mous quantities of natural gas gasoline being recovered from the great natural gas fields will go far to make up the shortage, it is apparent

that the gasoline situation is becoming acute. At the present rate of consumption all the sur¬ plus stocks of crude oil above ground will have become exhausted within five years unless pro¬ duction is increased in a substantial percentage, or methods are discovered under which more of the petroleum can be obtained from the oil sand. In 12 States in 1916 there were 596 plants which produced 103,492,689 gallons of raw gas¬ oline from natural gas. Much of it

was ob¬ tained from casing-head, oil-well or <(wet® natural gas, and both by the compression and condensation and the absorption methods. The former is the familiar one applied to liquifying gases. The absorption method is carried out in two ways. In one the gas is bubbled through an oil of higher boiling point than gasoline like _ a 300° F. fire test burning oil, until it will no longer absorb all the suspended gasoline. The oil is transferred to a still, where it is heated and the gasoline recovered by ordinary frac¬ tional distillation. In the other the gas is. ab¬ sorbed directly into a naphtha of higher boiling point until the mixture is brought down to or below the boiling point of commercial gasoline. This grade is then steam stilled or weathered to remove the excess of light ends boiling below 140° F. (<Gravity® is no longer a safe guide in choosing a gasoline for automobile use, because a mixture of a casing-head gas and kerosene in the proportions to make a 70° gas¬ oline might contain so much low boiling material as to interfere with carburation and make it unsuitable for engine fuel. The ideal fuel contains enough low boiling point fractions for easy starting and not so much (<heavy end® as to interfere with instantaneous com¬ bustion of the atomized mixture.

It is easily understood that this casing-head gasoline is, therefore, becoming of commercial importance not only as a conservancy of fuel but because it makes possible the use of naph¬ thas too heavy for service alone as an engine fuel, by raising the boiling point of the mixture to a satisfactory degree. It adds to the avail¬ able supply besides its volume the quantity of heavy naphtha not otherwise usable for the pur¬ pose. It is estimated that the increased quan¬ tity of commercial gasoline represented by the output of casing-head gasoline for 1916 amounted to approximately 200,000,000 gallons. Natural gas containing as low as one pint of gasoline per 1,000 cubic feet is now profitably treated. Casing-head gas contains as high as 3.6 gallons per thousand cubic feet.

The Drake Discovery. — Previous to 1858 nothing had been accomplished toward estab¬ lishing the fact that petroleum existed in al¬ most inexhaustible quantities and that large supplies could be obtained by simply drilling wells into the rocky structure of the earth. The natural petroleum had been analyzed by eminent chemists, its properties as an illuminant had been pretty well established and in a small way it had become an article of commercial exchange. Its production, however, was con¬ fined to collecting it by various crude and im¬ perfect methods from the oil springs and streams that bore petroleum on their waters, in various parts of the country. It was ob¬ tained in considerable quantities from the salt wells of Tarentum, Pa., and the lower Allegheny Valley, and it was gradually finding a market

in Pittsburgh and New York for various pur-PETROLEUM

poses. On 4 March 1858 nine barrels of oil from Tarentum were shipped to the Kerosene Oil Company at New York City and sold for $275.19. From such small beginnings rose an industry that was to revolutionize the methods of artificial lighting in general use and add millions of dollars to the combined wealth of the United States.

The Pennsylvania Rock Oil Company, the first of its kind, was organized in New York in December 1854 by George H. Bissell and Jonathan D. Eveleth. They were prosperous New York attorneys, who had become inter¬ ested in petroleum, and had secured some land on Oil Creek from Brewer, Watson and Com¬ pany, a firm of lumbermen operating a lumber mill below Titusville, Pa. Their first idea was to collect the oil from the surface springs and they hoped by systematic work to secure it in sufficient quantities to market it in the East. Professor Benjamin Silliman, Jr., of New Haven, Conn., had made an exhaustive analysis of the samples of oil submitted to him by Messrs. Eveleth and Bissell, and his report confirmed their highest expectations as to the value of the product. The efforts of the com¬ pany to obtain petroleum by such primitive methods proved far from successful, and an¬ other company was formed in Connecticut for the same purposes. It took over the property of the New York concern and later on was suc¬ ceeded by the Seneca Oil Company, in which Col. E. L. Drake of New Haven became in¬ terested. Drake was sent to Titusville, Pa., in 1858, and shortly after commenced prepara¬ tion for drilling an artesian well in order to tap the hidden sources of the oil supply in the underlying rocks. He encountered many trials and difficulties, his partners lost faith in the enterprise and he was compelled to strain his own resources to the utmost in order to con¬ tinue the project. His persistency was rewarded and on 28 Aug. 1859 the first oil well in the United States began producing at a depth of 69ˆ2 feet. The oil rose to within 10 feet of the surface and when the well was equipped for pumping it produced for a short time about 40 barrels a day. The product sold readily at 50 cents a gallon or about $20 a barrel. The news of the wonderful discovery spread over the country and created the greatest excitement. The production of the Drake well during the last four months of 1859 and the first four months of its existence is estimated at 2,000 barrels. Another well was

completed near Rouseville, farther down Oil Creek, in De¬ cember 1859, which pumped about eight bar¬ rels a day… ,

Hundreds of wells were then started in the Oil Creek Valley and up and down the Alle¬ gheny River, and the rush to engage in the new industry resembled greatly the excitement that followed the discovery of gold in California in 1849. Oil was found the following year at Tidioute, Henry's Bend, Franklin and Smith's Ferry, Pa., and the production of the year I860 amounted to over 500,000 barrels. Most of these wells were drilled only to the first sand, as the upper producing formation of the Venango group is commonly termed, and dry holes were numerous in territory that in after years proved highly productive from the deeper

sands. . „ ,

In 1861 the first flowing well was struck

on the Funk farm, near Rouseville, Pa. It was 400 feet in depth and the oil was obtained in the third sand. This well was followed by oth¬ ers that spouted from 2,000 to 3,000 barrels a day. The market was overstocked and prices went down to the lowest point known in the history of the oil industry. The estimated pro¬ duction for 1861 was 2,113,609 barrels, but thou¬ sands of barrels flowed upon the ground and were carried away by the waters of the Oil Creek and the Allegheny River.

The oil developments, which were at first confined to the lowlands along the valleys of Oil Creek, French Creek and the Allegheny River were rapidly extended in all directions and test wells in search of the hitherto little-known product were drilled miles away from the original strike. An era of oil stock com¬ panies ensued, which came to an end in 1866-67 after causing heavy losses to the people of this country, amounting to many millions of dol¬ lars. The rise and fall of Pithole occurred dur¬ ing this period, which was almost duplicated a few years later in the history of Petroleum Centre. Both were flourishing towns in Ve¬ nango County, Pa., but the exhaustion of their big wells and the removal of their population to fresh centres of oil development caused their whole or partial abandonment. At present Pithole is nothing but a memory, while the name of Petroleum Centre is still preserved by a flag-station on the Pennsylvania Railroad, between Oil City and Titusville, Pa.

From Venango-County the oil developments were extended southward into Clarion, Butler and Armstrong counties, and within 15 years after the Drake strike production had risen to nearly 30,000 barrels a day. In December 1874 the initial well of the great Bradford oil field in Pennsylvania was opened up, but it was not until 1878 that the exodus of lower country op¬ erations to the prolific districts of -the North¬ east began in real earnest. For three years this new district, which covered over 100,000 acres, extending from Cattaraugus County, in New York State, through the central portion of Mc¬ Kean County, Pa., was the centre of an un¬ paralleled activity. New wells were drilled and production increased at a rapid rate, beyond the ability of the pipe-line companies to take care of the oil. In July 1880 the production of the Bradford field reached 100,000 barrels a day, but not more than 80,000 barrels were run into the storage tanks of the transportation com¬ panies. The remainder ran to waste. The same year the developments in Allegany County, in New York State, began to attract attention, and it likewise proved a very rich and prolific source of oil production. Stocks were steadily increasing during this time, and prices going down, but there was no cessation of drilling operations. Bradford and Allegany were followed by the discovery of the Cherry Grove district in Warren County, Pa., which came into prominence during the summer of 1882. It furnished a number of spouting wells, such as the oil country had not known since the development of the fourth sand belt in Butler County, about 10 years previous. The pool, however, was quickly drilled over and the ˆgushers® declined to pumping-wells of small calibre. Cherry Grove was followed by Cooper and Balltown, both of which produced a large amount of petroleum and helped swell the con-686

stantly increasing stocks in the custody of the pipe-lines. These three last-named pools ob¬ tained their oil from white sand formations, similar to those of Venango and Butler coun¬ ties, but they were found at a greater depth and of a different geological horizon. The Brad¬ ford and Allegany oil is found in a dark, choc¬ olate-colored formation commonly known as the ((black sand® to distinguish it from the white. These sands are all found below the regular Venango group, which was the first and only oil formation known to the early drillers and operators. With the advent of the Cherry Grove field in 1882, oil declined to less than 50 cents a barrel, and the steady

accumulation of the stocks made the outlook very discouraging for the oil producers. By August 1884 the gross stocks had reached over 40,000,000 bar¬ rels and its depressing influence upon prices of crude petroleum was freely admitted by every¬ one. In 1884 another big white sand develop¬ ment was opened up in Washington County, Pa., and the attention of oilmen was again at¬ tracted toward the Southwest. These develop¬ ments were extended into West Virginia and southeastern Ohio, and for many years have proved the sources of a great supply of high-grade petroleum. In 1891 the phenomenal oil¬ field at McDonald, in Allegheny and Washing¬ ton counties, Pa., was opened up and ran the production for that year up to the largest amount that had ever been recorded. Mannington and Sisterville, in West Virginia, were the next pools of importance, and they were fol¬ lowed by others in succession, all of which helped to maintain the supply.

For years the production of Pennsylvania oil had steadily exceeded the demand, stocks continued to accumulate and the price ruled very low. In 1887 the market declined from an average of 71 cents in January to 59j4 cents in July. A movement among the oil producers was then started which resulted in the forma¬ tion of the Producers' Protective Association, and an agreement was entered into to stop drilling new wells and shut in a third of the daily production. The object was to get rid of some of the surplus stocks and increase the price of oil at the wells. The movement proved a remarkable success. The net pipe-line stocks which at the close of July 1887 amounted to over 32,000,000 barrels, by the close of De¬ cember 1888 had become reduced to 18,604,474 barrels. The production for the year 1888 showed a decline of over 5,000,000 barrels from that of the previous year. At the same time it was over 9,000,000 barrels less than the consump¬ tion and the market value of the oil, which av¬ eraged 66ˆ4 cents per barrel in 1887, increased to 87 cents in 1888 and 94J6 cents in 1889.

Trenton Rock Oil Fields. — For nearly 30 years Pennsylvania had maintained her posi¬ tion as the leading oil-producing State of the country, and during the first 10 years after Drake's discovery had been the source of the world's principal supply of illuminating oil. In 1885 oil was discovered in the Trenton rock at a well drilled for natural gas, near Lima, Ohio, which proved the beginning of the de¬ velopments in northwestern Ohio and Indiana. This oil was of different quality from that pro¬ duced in Pennsylvania and was impregnated with sulphur. It, however, had a paraffin base, but its value for illuminating purposes was not

at once established. For many years it was marketed as a fuel oil, the supply being very much below the demand. When a process was found for converting it into an acceptable illuminant its market value was considerably en¬ hanced. The production of northwestern Ohio, which amounted to 1,079,025 barrels in 1885, in 11 years increased to 20,575,138 barrels, and at the close of 1896 there was a surplus stock of over 25,000,000 barrels. Indiana came into prominence as an oil-producing State in 1891 and grew in importance until it reached its highest production in 1904 with a yield of 11,339,124 barrels. The production has gradu¬ ally diminished, and in 1916 it was only 769,036 barrels. The Indiana oil is of the same gen¬ eral character as that of northwestern Ohio and comes from the same Trenton Rock for¬ mation. The yields from Kentucky and Tennes¬ see are usually grouped because the quantity from the latter State has been so small. The oil from both States is of paraffin base though heavier in specific gravity than the usual run from the Appalachian field. This district pro¬ duced in 916 1,203,246 barrels and gives prom¬ ise of even greater yields for the future.

West of the Mississippi. — Oil has been produced in California since 1876, but not until 1895 did it reach the million barrel mark. In 1903 California advanced to first place as a pro¬ ducing State, which position it held, except the years 1907 and 1908, continuously until 1915 when its production of 86,591,535 barrels was surpassed by the 97,915,243 barrels produced by Oklahoma. It is still far ahead of every other competing State. The product is marketed largely for fuel purposes for the railroads of the Southwest, for steamships, including those of the navy, and for manufacturing purposes. The production is chiefly asphaltic, in some re¬ spects similar to that from the Gulf Coastal field, all of which are now classified as naph¬ thene base oils. The percentage of illuminating oils and gasoline is small, but the lubricating oil manufactured from these crudes is of good quality.

For commercial purposes it is customary to group under the title Mid-Continent field, the areas of oil production in Kansas, Oklahoma, northern and central Texas and northern Louisiana. For many years the oil territory in Kansas was confined to a small area around a refinery at Neodesha, in Wilson County, where a small refinery was erected and connected with the wells by pipe-lines. The developments were gradually extended, but no great volume was produced until 1903 when the yield was 932,214 barrels. The next year the record was 4,250,779 barrels, and Oklahoma also became a million-barrel State. The production in the latter State increased so enormously that its yield of 43,524,128 barrels in 1907 exceeded the Califor¬ nia yield by more than 4,000,000 barrels. Its productiofi for 1915 was

97,915,243 barrels, again exceeding California, but the banner year was 1916 when the yield was 107,071,715 bar¬ rels. The first refinery in this field was built in 1892; the second one in 1904, and since that year, with the increased production, many re¬ fineries have been erected. In 1916 there were 71 independent and three Standard Oil Com¬ pany refineries in operation, with an approxi¬ mate investment of $107,000,000 and consuming upward of 208,000 barrels of crude per day.

One of the results of the enormous production in this field was the laying of pipe-lines so that the crude oil could be delivered to the large refineries of the Standard Oil Company at Whiting, Ind.

Texas. — Oil was discovered in Texas in 1867, the first development having been located about 15 miles south of Nacogdoches. About 100 wells were drilled and a pipe-line built to the nearest railroad. This oil was of fair lu¬ bricating quality, but the yield was very small and the field quickly lapsed into disuse. In June 1894 in the process of drilling an artesian well for water near Corsicana, a good flow of oil was struck at a depth of 1,027 feet. The oil was cased off and the well continued down to 2,470 feet where a good flow of warm water was encountered, but no more petroleum re¬ vealed itself. This was the beginning of the first successful oil development of any commer¬ cial importance in Texas. It was over two years later before outside capital was attracted to this district which in 1897 was credited with a production of 65,975 barrels. This was in¬ creased until it reached the maximum of 28,- 136,189 barrels in 1905. The yield fell off for the several succeeding years but started upward in 1911, and in 1916 became the third in order of quantity produced with 27,644,605 barrels. The great oil field in southeastern Texas was opened up in January 1901, when a well drilled on Spindletop, near Beaumont, in Jefferson County, started to flow at 70,000 barrels a day and proved the forerunner of developments that soon placed the Lone Star State in the front rank of oil-producing sections of the world. Oil is obtained from two formations in this State, in the northern and central portions

from strata, in the former from sandstone be¬ longing to the upper Carboniferous, and in the central from sandstones or other porous rocks of the Cretaceous and Tertiary, and in the Coastal plain from domes associated with rock-salt and gypsum. Here the reservoir rock is generally either porous dolomitic limestone or sandstone ranging from the Cretaceous to the Quaternary.

Louisiana. — Oil was discovered at Jen¬ nings shortly after the opening of the prolific field in southeastern Texas. In 1911 the State produced more crude than the combined pro¬ duction of Pennsylvania and New York. Some of the largest wells in the country were found in Louisiana, and to the close of 1915 its yield was on the increase, that year amounting to 18,191,539 barrels. For 1916 the quantity pro¬ duced was 15,248,138 barrels. The oil in the northern part of the State is from the same strata as found in central Texas; that from the southern part from domes similar to those of the Gulf Coastal Plain of Texas.

Rocky Mountain Field. — For convenience, all areas of production of petroleum in Colo¬ rado, Wyoming and Montana, as well as a num¬ ber of areas of prospective production in Utah and New Mexico, are classified as the ((Rocky Mountain Fields Various grades of petro¬ leum are found both in the strata of the Car¬ boniferous and the Cretaceous. The oils from the former range in gravity from 18° to 24° Baume are asphaltic and are utilized chiefly for fuel. Those from the Cretaceous rocks range from 32° to 48° Baume, are of paraffin base and in wide demand for refining.

Colorado. — The oil production of Colorado is confined to a small pool in the vicinity of Florence, and another of still more limited di¬ mensions at Boulder. It is of dark-green color and generally of paraffin base and above 31° Baume. It is all refined at Florence and mar¬ keted in the Rocky Mountain stations. In 1904 the production amounted to a half-million bar¬ rels, but it has almost continuously declined since that year, the production in 1916 amount¬ ing to only 197,235 barrels.

Wyoming. — ‘The description of an expedi¬ tion to Great Salt Lake written in 1894 refers to a spring of petroleum or mineral tar in the valley of Sulphur Creek. The emigrants col¬ lected it for medicinal purposes and for greas¬ ing their wagon wheels. The Carter Spring, six miles to the west, was discovered about the same time. Various other discoveries were made, but the first production marketed from

drilled wells was from the Carter well in Uinta County. The first gusher wells were drilled in the Dallas field in 1883 and the first wells at Shannon on the north end of the Salt Creek field in 1880. The earlier discovered wells yielded heavy dark products chiefly valuable for lubricating purposes. Up to 1910 the production was nominal when it began to increase and passed the million-barrel mark in 1912. In 1916 Wyoming produced 6,234,137 barrels, and is be¬ coming recognized as the dominant factor in the situation with respect to high-grade petro¬ leum in western North America. The fact that the greater part of this yield consists of high-grade refining oil, capable of furnishing 15 to 25 per cent of gasoline by modern refining methods, indicates well for the local industry.

Montana. — In 1916 this State marketed 44,917 barrels of petroleum from the only dis¬ trict that had been developed commercially.

Utah. — The few wells developed in this State yielded in 1916 15,200 barrels. Plans were also made by two companies in 1917 for the erection of experimental plants for the dis¬ tillation of oil shale which promises to become an important industry.

The quantities above given are in barrels of 42 gallons each and represent marketed produc¬ tion taken from government reports. In prac¬ tically every State at the time these figures were compiled the actual production from the wells was greater, the difference going into storage tanks and not being available for publication. In some States this storage is now being drawn on, and as stated in another section of this ar¬ ticle, at the present rate all the accumulated sur¬ plus will be used up within five years.

Production. — In the older fields where the oil wells are drilled through stratified rock, the ordinary method of procedure, after locating the well, is to sink a shaft, the same as for a water well, or to drive down a wooden or iron ˆconductor® through the soil nearly or quite to the bed rock. When the rock has been reached, the real drilling is begun with a string of tools consisting of rope socket, drilling jars, drill stem and bit. Various sizes of the lattbr are at hand and the one selected to start the hole with may be anywhere from 8 inches to 12 inches in diameter, depending on the known rock formation. The drill is raised by mechan¬ ical means and allowed to fall of its own weight, thus crushing its way through the strata until water is reached. An iron pipe or casing

is then placed in the drill hole in such a man¬ ner as to exclude the water and below this point a drill of smaller size is used until water is again encountered. A pipe of smaller size is fitted within the first casing and this pro¬ cedure repeated until the oil sand is reached. Usually it is unnecessary to case the lower part of the drill hole. Just before the produc¬ ing oil sand is reached is a layer of impervious shale. Unless the oil starts flowing imme¬ diately, it is customary in some sections to continue the drilling for several feet into the oil-bearing sand, and after due preparation explode a charge of nitroglycerine at the bot¬ tom of the drill hole, which shatters the sur¬ rounding rock, forming a cavity in which the oil can accumulate. This cavity is then cleared of debris, and the pump, with all its appli¬ ances, placed in the well which is started on its career as an oil producer.

In several sections of the United States, particularly in Texas, the nature of the soil is such that cave-ins occur and the drill hole has to be carried down by other means. The rotating pipe method has been very useful for this work. The lower end of the drive pipe is supplied with a cutting tool on the plan of saw teeth and as the pipe is rotated it quickly cuts its way through the soft soil. These cuttings are removed from the drill hole or well by forcing downward through the inside of the drill pipe a stream of water. This passes out below the bottom of the cutting edge and floats the cuttings to the surface. When the line of rotating pipe is sunk to its length in the ground, another run is screwed into its upper end and this plan carried on until the well reaches either the oil sand or some obstruction requiring a different tool. With the use of different cutting edges, the rotating pipe can be forced through rock that is reasonably hard, and in the hardest strata the drilling is carried out by lowering steel shot into the bottom of the well and grinding this into the rock by means of the rotating pipe. The cone of rock within the tube is broken off frequently and brought to the surface.

In the Mid-Continent fields where gas is met at varying depths when in search of oil, a modification of the rotary method has come into use which has proven of great utility both in conserving the natural gas as

well as in overcoming the troubles incident to the bubbling of the gas through the water or mud-laden fluid used in putting down the well. This modification consists in mixing in a seoarate tank from 5 to 15 per cent of clay with water and pumping this mixture down through the drill and catching it again when it comes up outside the casing, allowing it to pass through a separate tank where the drill cuttings drop out and the mud-laden fluid again returns to the tank from which it is circulated. The clay deposits as a thin layer of mud over the loose strata from which the gas flows into the well and eventually so fills the openings as to ef¬ fectively shut out the gas. The pressure neces¬ sary to force this fluid down is estimated to be from 500 to 600 pounds per square inch in a well 1,000 feet deep and increasingly greater in deeper wells. The depth of oil wells natu¬ rally varies in different fields, but it is note¬ worthy that the Drake well, the first one drilled, was but 69]/2 feet deep and may be con¬

sidered remarkable in many ways. Some of the West Virginia wells, drilled into the fifth sand, approach 3,400 feet in depth.

Transportation. — The crude petroleum from the Oil Creek Valley was first transported down Oil Creek and Allegheny River in bar¬ rels on barges to Pittsburgh, where it found a ready market. The barrels were of oak with iron hoops holding about 42 gallons each, which doubtless is the origin of the unit of capacity still in use in tabulations of petroleum and its products. It was also hauled overland in wagons to Union City and Garland, where the barrels were loaded on cars for shipment by rail, to points East and West. The boats loaded with empty barrels were towed up the creek by horses or mules wading in the stream, there being no towpath. After filling, the barrels were again loaded on the boats which were re¬ leased at the next freshet. As a matter of economy, two upright wooden tanks or cisterns, holding 2,000 gallons each, replaced the barrels on barges and platform cars, and later boats having a number of water-tight compartments took the place of barrel barges. In 1871 the wooden tanks began to disappear, their place being supplied by the horizontal, cylindrical tanks now in general use.

The first pipe-line was three miles long and was laid in 1862. It was of ordinary four-inch gas pipe with caulked joints. The leakage was so great that but little oil was delivered at des¬ tination and the line was soon abandoned. However, it existed long enough to arouse the opposition of the teamsters who had been haul¬ ing the oil out of the district and who saw, in its successful operation, the ruin of their oc¬

cupation, and much rioting followed. In 1865 the first successful line was constructed and was the forerunner of this most useful method of transportation. It connected the Shaffer Farm with Benninghoff Run, was of four-inch pipe and four miles long. Now the entire pro¬ duction of the Eastern oil fields is handled by pipe-line systems which cover the oil country with a network of gathering lines that con¬ nect the small receiving tanks of the producers with the large storage tanks of the pipe-line companies. The first seaboard pipe-line was completed about 1879 and its route was from Olean, N. Y., through the southern part of New York State to Saddle River, N. J. At this point is was divided, one branch going to the Standard Oil Company's refineries at Hun¬ ter's Point, L. I., and another to Bayonne, N. J. The growth of the pipe-line has been one of the most remarkable developments in connec¬ tion with the growth of the oil industry. The Transit line to New York conveyed the petro¬ leum of the great Bradford oil field to the Eastern seaboard and supplied the markets of the world with American illunjinating oil. The Tide Water pipe-line which antedated the New York Trafisit, did not succeed in reaching the Eastern coast until many years later. Its route was through Pennsylvania, from Brad¬ ford to Williamsport, where it halted and shipped the oil of the Bradford field in .tank cars to New York and Philadelphia.

At the present trunk lines convey the prod¬ uct of the Pennsylvania, West Virginia, New York, Ohio, Indiana, Kentucky and Tennes¬ see oil fields to New York, Philadelphia, Balti¬ more, Cleveland, Pittsburgh and Chicago. With

the line now completed from Kansas City to Whiting, Ind., it is possible to pump oil through iron pipes from the remotest sections of the Kansas and Oklahoma oil fields to the Atlantic seaboard. Of the great trunk lines now in operation, the New York Transit ex¬ tends from Olean to New York, the Southern Pipe Line from West Virginia to Philadelphia, while the Buckeye Pipe Line cares for the production of the Ohio and Indiana fields. The Tide Water Pipe Line Company transports oil from the Allegany, N. Y., and Bradford, Pa., oil fields to

the refineries at Bayonne and Philadelphia. The United States Pipe Line Company was the first to undertake the trans¬ portation of refined oil through pipe-lines. It has a double line, one for conveying crude and the other refined oil. It receives its supply of crude oil from the Producers and Refiners Oil Company, a gathering line, which extends through northern Pennsylvania into the oil

fields of eastern Ohio and West Virginia. Its refined oil, which it ships to New York, is ob¬ tained from the refiners of Oil City, Titusville, Warren and Bradford, Pa. There are a num¬ ber of minor companies with lines that penetrate various sections of the Pennsylvania and Ohio oil regions. Pipe-lines form an important part of the transportation system in Texas and Cali¬ fornia.

These lines are of pipes of various sizes from four inches to eight inches in diameter. From Kansas City to New York, much of the way the lines are in pairs, so that the total length approaches 3,000 miles, holding approxi¬ mately 760,000 barrels. This is dead capital. At the price at which Mid-Continent oil was quoted during May 1917 this had a total value of $1,500,000.

The pipe-line is of special construction of wrought iron, lap-welded and tested to 1,200 pounds pressure. At distances of approxi-

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months.

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

February .

Total, 12 months

Pipe-Line Statistics.

BUCKEYE PIPE LINE (LIMA)

Runs from Wells Other receipts, barrels, 1918 barrels, 1918

117,444 1,936,738

1,832,297 26.595,259

BUCKEYE PIPE LINE (MACKS)

_ 260,683

3,474,468

1,778

39,506

EUREKA PIPE LINE

515,959 1,090,463

6,968,028 13,705,838

NATIONAL TRANSIT

176,415

2,456,955

1,302,108

17,971,908

SOUTHWEST PENNSYLVANIA

100,477

1,447,475

PIPE LINES

917,150

11,908,053

INDIANA PIPE LINE

13,434

189,351

2,274,967

32,262,102

CUMBERLAND PIPE LINE

284,995 927

3,276,591 12,192

SOUTHERN PIPE LINE

1,383,355 . 16, 638,804

CRESCENT PIPE LINE

84,125

1,786,471

NEW YORK TRANSIT

11,678 163,486

1,027,547

14,720,206

NORTHERN PIPE LINE

. 1,193,155

. 17,738,772

TIDE WATER PIPE LINE (EASTERN DIVISION)

100,840 .

LW.‘L.. 1,365,706 .

PRODUCERS’ AND REFINERS’ OIL COMPANY

218,421 .

‘LL 2,185,472 .

EMERY PIPE LINE COMPANY

23,079 .

WLW… 318,051 .

Illinois Field

Deliveries, barrels, 1918

2,088,141 29,035,722

212,529

3,576,706

1,710,128

20,946,559

1,405,591

20,363,213

995,081

13,401,598

2,384,029

32,320,159

242,970

3,214,343

1,321,847

16,575,885

112,659

1,758,567

1,286,387

15,393,692

1,213,316

18,266,273

78,712

1,723,865

153,409

2,181,470

19,835

311,318

Gross stocks, barrels, 1918

1,627,210

400,004

1,322,343

772,292

464,195

741,910

138,966

624,030

138,766

852,769

536,311

348,804

21 ,065

February .

Total, 12 months

February .

Total, 12 months

ILLINOIS PIPE LINE

721,234

10,514,716

3,926

2,224,963

TIDE WATER PIPE LINE COMPANY (WESTERN DIVISION)

36,537 .

w 537,670 .

787,840

13,794,080

120,549

1,620,977

1,928,769

mately 25 miles pumping stations are located. Besides the two or more large tanks for holding the crude discharged from the line is a power¬ house in which are located the great pumps for forcing the oil through the line, auxiliary pumps for various purposes, as well as steam boilers in which to generate steam for operating the plant. The triplex double-acting pump is the type quite generally used. These are sup¬ plied with a liberal number of valves, which condition together with the action of the three pistons results in forcing forward a nearly constant stream. At the next station the crude is received in one of the large tanks from which it is again pumped forward. In 1907 the rifled pipe was introduced in California for the pur¬ pose of handling the heavy viscous crudes. The rifling is about one-eighth inch in depth and makes one complete revolution in every 10 linear feet. In operation water is pumped into the line at the same time as the oil, and it follows the pipe itself, acting as a lubricant. As an indication of the capacity of these lines, the following statements are interesting: The Gulf Pipe Line Company has an eight-inch

trunk line from Watkins Station to Glenn

Pool, Sour Lake, a distance of 419 miles. It

has a capacity of 14,000 barrels per day. The

Texas Company has a trunk line eight inches in diameter from Lefebre Station, Tulsa, to Humble, Tex., the length of which is 470 miles. The delivery capacity of this line is 15,000 barrels daily.

The statistics given in the preceding table taken from a current periodical show the vast quantities of crude petroleum being transported by the principal pipe-line companies.

Production of the United States. — The amount of marketed production in the United States during the last 10 years has suffered no setback, reaching in 1915 a total of 281,104,104 barrels, valued at $179,462,890. Of this quan¬ tity 83.49 per cent was produced in the

newer fields west of the Mississippi. The actual gal-lonage in tfle Eastern fields is somewhat smaller than formerly but the great change in percentage of yield between the sections is due to the enormously increased production in the West. The following table shows the produc¬ tion of crude petroleum and the value by years since the beginning in 1859 to 1917 inclusive:

Quantity and Value of Production of Crude Petroleum, 1859-1917.

Barrels,

Total

YEAR

42 gallons

value

1859 .

. 2,000

$32,000

1860 .

. 500,000

4,800,000

1861 .

. 2,113,609

1 ,035,668

1862 .

. 3,056,690

3,209,525

1863 .

8,225,663

1864 .

. 2,116,109

20,896,576

1865 .

. 2,497,700

16,459,853

1866 .

. 3,597,700

13,455,398

. 1867 .

. 3,347,300

8,066,993

1868 .

13,217,174

1869 .

. 4,215,000

23,730,450

1870 .

20,503,754

1871 .

. 5,205,234

22,591,180

1872 .

. 6,293,194

21,440,503

1873 .

18,100,464

1874 .

. 10,926,945

12,647,527

1875 .

. 8,787,514

7,368,133

1876 .

22,982,822

1877 .

. 13,350,363

31,788,566

1878 .

18,044,520

1879 .

17,210,708

1880 .

24,600,638

1881 .

25,448,339

YEAR

Barrels Total

42 gallons value

1882 . 30,349,897 123,631,165

1883 . 23,449,633 25,790,252

1884.. . 24,218,438 20,595,966

1885 . 21,858,785 19,198,243

1886 . 28,064,841 19,996,313

1887 . 28,283,483 18,877,094

1888 . 27,612,025 17,947.620

1889 . 35,163,513 26,963,340

1890 . 45,823,517 35,365,105

1891 . 54,292,655 30,526,553

1892 . 50,514,657 25,906,463

1893 . 48,431,066 28,950,326

1894 . 49,344,516 35,522,095

1895 . 52,892,276 57,632,296

1896 . 60,960,361 58,518,709

1897 . 60,475,516 40,874,072

1898 . 55,364,233 ‘ 44,193,359

1899 . 57,070,850 64,603,904

1900 . 63,620,529 75,989,313

1901 . ‘69,389,194 66,417,335

1902 . 88,766,916 71,178,910

1903 . 100,461,337 94,694,050

1904 . 117,080,960 101,175,455

1905 . 134,717,580 84,157,399

1906 . 126,493,936 92,444,735

1907 . 166,095,335 120,106,749

1908 . 178,527,355 129,079,184

1909 . 183,170,874 128,328,487

1910 . 209,557,248 127,899,688

1911 . 220,449,391 134,044,752

1912 . 222,935,044 164,213,247

1913 . 248,446,230 237,121,388

1914 . 265,762,535 214,125,215

1915 . 281,104,104 179,462,890

1916 . 300,767,158 330,899,868

1917 . 335,315,601 522,635,213

The following table gives the quantity of crude petroleum produced by each State for the years 1914, 1915 and 1916:

state Years

California . 1914

1915

1916

Oklahoma . 1914

1915

1916

Illinois . 1914

1915

1916

Texas . 1914

1915

1916

Louisiana . 1914

1915

1916

West Virginia . 1914

1915

1916

Ohio . 1914

1915

1916

Pennsylvania . 1914

1915

1916

Wyoming . 1914

1915

1916

Kansas . 1914

1915

Indiana . 1914

1915

1916

New York . 1914

1915

1916

Kentucky . 1914

1915 , 1916

Colorado . 1914

1915

1916

Alaska . 1914

Michigan . 1915

Missouri . 1916

Montana . 1916

Quantity Per-

(bbls.)

centage

Rank

99,775,327

37.54

1

86,591,535

30.81

2

90,951,936

30.24

2

73,631,724

27.71

2

97,915,243

34.83

1

107,071,715

35.60

1

21,919,749

8.25

3

19,041,695

6.77

4

17,714,235

5.89

4

20,068,184

7.55

4

24,942,701

8.87

3

27,644,605

9. 19

3

14,309,435

5.39

5

18,191,539

6.47

5

15,248,138

5.07

5

9,680,033

3.64

6

9,264,798

3.30

6

8,731,184

2.90

7

8,536,352

3.21

6

7,825,326

2.78

8

7,744,511

2.57

8

8,170,335

3.07

7

7,838,705

2.79

7

7,592,394

2.52

9

3,560,375

1.34

8

4,245,525

1.51

9

6,234,137

2.07

10

3,103,585

1.17

9

2,823,487

1.00

10

1,335,456

.50

10

875,758

.31

12

769,036

.26

13

938,974

.35

11

887,778

.32

11

874,087

.29

12

502441

.19

12

437,274

.16

13

1,203,246

.40

11

222,773

.09

13

208,475

.08

14

197,235

.07

14

7,792

16

14,265

18

7,705

.02

17

44,917

15

Total . 1914 265,762,535 100.00

1915 281,104,104 100.00

1916 300,767,158 100.00

PETROLEUM

691

World’s Production of Crude Petroleum in 1916 and Since 1857, by Countries.

Production, 1916

Total production, 1857-1916

COUNTRY

Barrels of 42 gallons

Metric tons

Percent¬ age of total

Barrels of 42 gallons

Metric tons

Percent¬ age of total

United States a .

300,767,158

672,801,110

39,817,402

13,174,399

610,298,208

40,102,288

9,933,387

5,308,987

1,820,247

65.26

a3 ,917 ,328,402

1,763,583,017 163,087,779 162,174,312

a522,310,554

60.46

Russia .

15.80

232,917,643

27.22

Mexico .

8.64

21,728,995

2.52

Dutch East Indies c .

2.86

21,849,705

2.50

Rumania .

1 ,432,296

2.23

140,310,595

18,910,174

2.16

India .

8,491,137

1,132,152

1.84

90,083,522

12,011,136

1.39

Galicia .

6,461,706 2,997,178 2,550,645

dl, 000, 000

898,670

1.40

142,494,206

19,817,034

2.20

Japan and Formosa .

399,624

.65

33,166,800

4,422,230

.51

Peru .

340,086

.55

19,344,868

2,579,315

.30

Trinidad .

139,082

.22

3,819,430

531,214

.06

Germany .

995,764

dAO , 000

.22

14,957,097

2,015,974

.23

Argentina .

870,000

116,000

. 19

1,903,121

267,693

.03

Egypt .

411,000

54,800

.09

1,759,936

234,658

.03

Canada .

198,123

26,416

.04

23,907,197

3,187,626

.37

Italy .

43,143

d6 , 000

t 01

(889,513

125,884

.02

Other countries .

d25 , 000

3,333

) 397,000

52,953

.02

Totals .

460,901,973

61,853,368

100.00

6,479,206,795

862,962,768

100.00

o Marketed production. b Estimated in part. c Includes British Borneo. d Estimated.

Distillation and Refining. — The separation of petroleum into its various usable components is based upon the principle of fractional distil¬ lation. This is carried so far as to result in the actual decomposition of some of the con¬ stituent hydrocarbons when running: crude spe¬ cially for the production of gasoline and il¬ luminating oil. In the early days of the distil¬ lation of crude petroleum the main purpose was to make illuminating oils. At that period the gasolines were worse than useless and when the stocks had accumulated to the capacity of storage, not infrequently the water-cock in the bottom of the tank would be “accidentally” left open and the naphtha, as it was then called, allowed to flow out until the tank was empty. Many disastrous fires resulted in the oil region from this practice.

Destructive or Cracking Process. — The

stills utilized in distilling for illuminating oils by the destructive process are usually horizontal cylinders mounted in brickwork, much the same as steam boilers, except that the upper half of the still is left uncovered. Heat is applied by burning coal in a furnace the same as under boilers. From the top of the still a large vapor pipe, or pipes, lead to coils of pipe submerged in water held in large, shallow iron tanks called condensers ; these coils end in a pipe leading to the running-room where it terminates in a boiler iron “look-box” fitted with plate-glass for purposes of observation. Leading from this “look-box” is a pipe with side outlets con¬ necting with various tanks.

After charging the still with crude petro¬ leum the fires are started and the lighter prod¬ ucts known as the naphthas pass over through the vapor pipes and condenser into the running-house. Samples are taken from the ulook-boxes” and weighed and when the degree Baume is heavy enough to indicate that all the naphtha is off, the stream of distillate is conducted into another tank and allowed to run until the next lower “cut” is indicated by the Baume degree of the sample. In this way, roughly, the naphthas of various grades and the illuminating oils are taken off. The heavier residual oil is usually then transferred

to another still — “tar still” — in which distillation is similarly con¬

ducted until nothing but coke remains. The heavier distillates, as the process proceeds, do not easily pass out through the vapor pipe but condense on the cooler upper surface of the still and finally fall back in drops into the hotter oil below. This results in the decomposition or “cracking” of the original hydrocarbon and the formation of additional quantities of illumi¬ nating oil distillates. When necessary the fires are increased until all of the oil has been de¬ composed and the carbon which was set free by the operation has collected as coke, which must be removed by picks. Formerly this coke was largely used in the production of carbons for arc lamps used in street lighting. One of its uses at present is in dry cells employed for battery ignition in motor cars.

The heavy distillates from the second stage of this process are treated with sulphuric acid in a lead-lined agitator, followed by a soda solution, and finally washed with water, are chilled and pressed for paraffin wax, which is subjected to various treatments, and is finally marketed as a white refined scale wax. The distillates from which the waxes have been re¬ moved are used in making the pale and red paraffin oils for lubricating purposes.

The naphthas from this process are treated with sulphuric acid, washed and neutralized with caustic soda and redistilled for separation into the various grades of gasoline. From Pennsylvanian petroleum 88° Baume gasoline is separated for use in carburetting air in gas machines to be used both for domestic heating and lighting. Following this is cut a grade known as 76° Baume gasoline’ and then follow the heavier grades used as fuel for automobiles and other internal combustion engines. Because of the great demand for the latter purposes very small amounts of the higher grades are now separated. This demand has also resulted in a multiplication of “cracking processes,” so that stills or other devices in which some of the high-boiling residuals may be cracked and recombined under pressure are now being erected in large numbers.

Burton Process. — One of them is the Bur¬ ton process which has been developed com¬ mercially to such an extent that the production

of <(motor spirits® by this method alone was stated in April 1916 to amount to over 3,000,000 barrels per year. The apparatus used by Burton consists of a still mounted over a furnace and equipped with a safety-valve, pressure gauge and thermometer. A pipe leads from the top of the still to the usual condenser, consisting of a pipe-coil immersed in the usual cooling tank. From near the lower end of this coil, a small pipe leads up to a relief valve, and lower, connected to a receiver for the condensates, is a shut-off valve. This valve is normally closed. The relief valve allows any excess gas pressure to escape. The pressure with the shut-off valve closed runs up to four or five atmospheres, rais¬ ing the boiling point from 500° F. to 750° F. or 800° F. After charging a Burton still with the special cut of distillate oil that has been found to yield the most satisfactory products, the fires are started and distillation begins. Similarly to the way steam pressure is built up by the evaporation or distillation of water in a steam boiler, so the oil vapors build up the pressure in the still, condenser and receiver, oil and vapor — two phase system — being under the same pressure. The heavier distillates are ((cracked® under this treatment and recombined to form good yields of gasoline, the residual being purified and utilized as a lubricant. The shut-off valve is opened at intervals to allow withdrawal of the gasoline formed. As stated, in this process both vapor and liquid are sub¬ jected to the same pressure, differing in this respect from the Rittman process in which the vapor only — one phase system — is under pres¬ sure. Another difference is that the Burton process is operated chiefly for the production of gasoline, while the Rittman process can be operated either to produce gasoline or the aromatic hydrocarbons, benzol, toluol and xylol.

Rittman Process.— In the process of Wal¬ ter F. Rittman, vaporized petroleum is passed into a hot tube at 840° F., the pressure in the tube being held variously from 90 to 500 pounds per square inch, adjusted for the product de¬ sired. The cracked vapors are condensed un¬ der pressure and the condensate transferred to a still where it is distilled for its gasoline con¬ tent. It is claimed for this process that by cracking the oil in the form of vapor any com¬ bination of temperature and pressure may be applied; and any oil from kerosene to much heavier fractions may be used. It is interesting that Rittman concludes as the result of experi¬ ments that the formation of

aromatic hydro¬ carbons (benzol, toluol, etc.) occurs best at moderate to high temperatures and under high pressure. The formation of gasoline is favored by moderate to low temperatures and by high pressure.

McAfee Process. — For the increased pro¬ duction of gasoline, this is an interesting method depending on the reactive or catalyzing power of aluminum chloride and proper temper¬ ature control. There is no need of employing extra pressure, or vacuum or special apparatus ; any still with a stirrer in it suffices. The opera¬ tion is so controlled that the vapor is kept at a temperature not to exceed 356° F. The distillate obtained will be a mixture of gasoline, solvent oil and kerosene which is afterward separated by fractional distillation. These products are all water-white, sweet-smelling, saturated and

need no refining with sulphuric acid. In prac¬ tice no treatment is given them except a wash¬ ing with alkali followed with water to remove hydrogen sulphide. With proper back-trapping of high-boiling oils into the still from the air¬ cooled condenser of 320° F. in the vapor line, the distillate obtained will be gasoline alone which is ready for the market when washed with an alkaline solution.

Fractional Distillation. — The other method of distilling crude petroleum is by fractional distillation throughout the process and with the least possible cracking or decomposition. Stills for this purpose are horizontal cylindrical tanks from approximately 30 to 40 feet in length by 10 to 12 feet in diameter, some of them holding as much as 1,000 barrels. These stills are mounted similarly to those for destructive dis¬ tillation except that the tops are bricked over and insulated, with even greater care than with steam boilers, to prevent any possible condensa¬ tion within the still. They are also supplied internally with perforated iron pipes at the bottom to allow the admission of steam to keep the oil in agitation during distillation, as well as to assist in carrying over the oil vapors as fast as formed. These stills are fitted with vapor pipes, condensers, look-boxes, etc., much the same as the stills for destructive distillation above described.

During the early part of the process the naphthas and burning oils come off practically the same as in the cracking process. Below the fraction from which the kerosene can be made is a heavier distillate utilized in making a burning oil of 300° F., fire test, which is used in signal oils required for lighting on steam¬ boats or other means of transporting passengers where electricity is not available. Then follow

heavier distillates containing the paraffin wax. The residual is a heavy viscous oil which may be used just as produced for the lubrication of the cylinders of steam engines or may be first filtered through filtering clay to decolorize it and brought on the market as a transparent oil. From this filtered cylinder stock petrolatum is also manufactured.

The wax distillate is chilled and pressed for the removal of the paraffin wax. The wax is submitted to various operations, being washed with sulphuric acid to decolorize and sweeten it by dissolving out unsaturated bodies that bear both color and odor; by being neutralized with a soda solution which also dissolves out bodies not removed by the acid, by being washed with water to remove all traces of chemical treat¬ ment; and finally filtered and put on the market as refined wax of different melting points. One grade has become an important article of do¬ mestic consumption because of its adaptability as a <(cover)> for jelly jars. The*wax is chemi¬ cally pure and heating for the purpose of melt¬ ing so sterilizes it that jelly covered with the melted wax' always <(keeps.® The wax-free dis¬ tillate is fractioned by further distillation into various grades which are given the added preparation needed for each special service and the whole series from this process brought to the market as ((neutral oils.® While all pe¬ troleums are practically neutral in reaction, the term (<neutral oil® has always been applied to the lighter colored distillate oils made by the process of (<fractional distillation.®

One of the most notable variations of the

process of fractional distillation is the use of diminished pressure by means of which the dis¬ tillation proceeds at lower temperatures and reduces possible cracking to the minimum. The inventor of the vacuum process, patented in 1866, expected to convert the entire body of the crude petroleum into illuminating oil, the hope of all refiners at that period. However, though the results obtained in working this patent were disappointing, they did furnish products of such excellence that they became the foundation of what has grown to be the largest industry of its kind in the world. They were the first

unburned residual oils offered for sale and were sold direct to consumers, a policy always followed. The Gargoyle Brands, or, as they were earlier known, the Vacuum Brands, of lubricating oils, have literally carried the name of the Vacuum Oil Company of Roch¬ ester, N. Y., around the world.

Wells Process. — Another modification for fractional distillation was patented by Willet C. and Frank E. Wells, in 1908. The essential apparatus consists of a separating vessel to con¬ tain the petroleum to be refined and frac¬ tionated; a condenser in which to cool the dis¬ tilled fractions; receiving tanks for holding the condensates ; a pump for circulating gas, and a steam boiler for generating steam with which to heat the petroleum, there being no furnace under the separating vessel. The heating coil in the latter has an upper and a lower connec¬ tion with the steam boiler, both above the water level to ensure circulation. Instead of the usual blowing of steam into the petroleum to assist in the distillation, the Wells process is based on the theory that a permanent gas preheated to a definite temperature injected into the pe¬ troleum heated to a corresponding temperature will absorb fractions having boiling points cor¬ responding to these temperatures. By raising the temperature of the petroleum as well as the gas all of the desired fractions can be suc¬ cessively distilled, leaving the heavy residual in the separating vessel. The gas laden with the distillates from the petroleum is conducted through the condenser and thence to the receiv¬ ing tanks. Here the separation is completed, the condensed fraction remaining in the tank, the gas being exhausted by means of the pump and returned to the separating vessel through heated pipes, to again perform its function of extracting fractions of consecutively higher boiling points. If it be desirable to decolorize any fraction, this is done by passing it, while still dissolved in the gas, through filters charged with fullers earth.

In no other country has the manufacture of lubricating oils reached such a high degree of excellence as in the United States. No other crude affords such a wide range of lubricating oils as the paraffin base oil from the Appalach¬ ian field. These facts are substantiated by the practically exclusive use in this country of mineral lubricating oils of domestic manufac¬ ture for all purposes, and by the greater and constantly increasing quantities exported.

Export. — For many years the production of crude oil was in excess of the home demand and over one-half of the entire yield had been compelled to seek a market in foreign lands. This condition has changed considerably as shown by the figures available for 1915. Dur¬ ing that year there was produced in the United

States 11,806,372,368 gallons of crude petroleum of which only 158,263,069 gallons were exported. Prior to the development of the Russian oil industry on the Caspian Sea, on a large scale, American refined oil held almost undisputed sway in the markets of the world. Latterly the Java petroleum has become an active com¬ petitor.

Nearly all the oil shipped abroad is trans¬ ported in bulk in tank steamers specially con¬ structed for the purpose. Beginning about 1900 large fleets of these vessels have come into existence, and the ocean carrying trade of oil in bulk has assumed vast proportions. These vessels are built of steel and many of them use oil for fuel to furnish their steam power. The largest motor-driven ship built in America to date is equipped with three Bolinder internal combustion engines and is owned and used ex¬ clusively by the Vacuum Oil Company for the transportation of petroleum and its products. While sailing vessels are sometimes used for cargoes of lubricating oils in barrels, their em¬ ployment for this purpose has nearly ceased. By the old method, the sailing vessel carrying from 5,000 to 8,000 barrels of oil would make but three or four trips a year. The modern type of tank steamer has been increasing in size from the 6,000 to 10,000 tons carrying capacity, capable of making 8 to 10 trips per year, to the tanker Standard which holds enough oil to fill 108,000 barrels of the cus¬ tomary 50-gallon size.

The first of the very large tankers for ex¬ port shipments was the Narragansett, completed for the Anglo-American Oil Company in 1903. She is built of steel, and has a gross tonnage of 9,169 tons.

The oil tanks proper, of which there are eight, are situated four forward and four aft of the machinery space and are divided by a longitudinal bulkhead running fore and aft through all the tanks.

The steamship Paulsboro, completed for the Vacuum Oil Company in September 1916, is a typical vessel of the modern tanker type; built of steel — 435 feet long, 56 feet beam, depth of 33 feet 6 inches. She has a capacity for 11,529 tons of cargo, the equivalent of 78,835 42-gallon barrels. Besides this, she has a ca¬ pacity for fuel oil, for the use of her boilers, of 1,708 barrels. She has 8 main oil tanks besides 10 wing or summer tanks and 2 fuel tanks. She is propelled by triple expansion engines and has a speed of 12*4 knots under fully loaded condition in good weather. She is equipped with two National Transit cargo pumps size 18” x 14” x 24”. Pipe-lines are 12-inch.

The record of petroleum and its products exported since 1862, together with its value, is as follows, as reported by the United States Bureau of Statistics ;

Petroleum Exports and Value for Years

1862 to 1916.

YEAR	Gallons	Value
1862 .	2,664,280	$1,598,568
1863 .	4,680,174	2,340,087
1864 .	23,210,369	10,782,689
1865 .	25,496,849	16,563,413
1866 .	50,987,341	24,830,887
1867 .	70,255,481	24,407,642
1868	79,456,888	21,810,676
1869 .	100,636,684	31,127,433

YEAR	Gallons
1870 .	

113,735,294

1871 .

152,195,617

1872 .

144,318,707

1873 .

240,369,908

1874 .

235,108,168

1875 .

237,526,312

1876 .

263,449,455

1877 .

361,883,225

1878 .

349,346,253

1879 .

1880 .

421,719,782

346,779,443

1881 .

514,561,719

1882 .

503,492,462

1883 .

533,145,429

1884 .

544,495,608

1885 .

560,784,459

1886 .

591,884,302

1887 .

601,846,317

1888 .

572,457,975

1889 .

680,705,456

1890 .

693 , 829 , 848

1891 .

673,905,577

1892 .

744,638,463

1893 .

804,221,230

1894 .

908,252,314

1895 .

884,502,082

1896 .

890,458,994

1897 .

994,297,757

1898 ....

986,480,610

1899 .

951,024,441

1900 .

975,123,476

1901 .

1,079,074,519

1902 .

1,064,233,601

1903 .

936,697,255

1904 .

1,022,116,276

1905 .

1,220,513,587

1906 .

1,269,777,645

1907 .

1,294,659,979

1908 .

1,547,402,601

1909 .

1,569,103,378

1910 .

1,502,491,933

1911 .

1,768,731,699

1912 .

1,883,479,897

1913 .

2,136,465,721

1914 .

2,240,033,652

1915 .

2,328,725,749

1916 .

2,607,482,366

PETROLEUM

Value

$32 ,668,960 36,663,825 33,761,685 45,924,880

of lubricating (heavy paraffin, etc.) their values since 1887 given below:

year Gallons

1RR7 . 20,582,613

oils with

Value

$3,559,280

33,042,276

1888 .

. 24,510,437

4,215,449

31,734,861

1889 .

. 27,903,267

4,638,724

49,545,219

1890 .

. 32,090,537

4,766,850

57,539,873

1891 .

33,310,264

4,099,978

41,022,007

1892 .

34,026,855

5,130,643

37,235,467

1893 .

. 32,432,857

4,738,892

34,505,645

1894 .

. 40,190,577

5,449,000

48,556,103

1895 .

. 43,418,942

5,867,477

44,623,074

1896 .

_ 50,525,530

6,556,775

47,763,079

1897 .

51,228,284

6,478,479

49,457,116

1898 .

. 63,968,341

7,385,054

49,671,743

1899 .

. 69,329,188

8,344,735

48,145,204

1900 .

. 68,997,715

9,542,618

46,898,842

1901 .

. 75,305,938

10,260,125

48 , 105 , 703

1902 .

. 82,200,503

10,872,154

53,293,299

1903 .

. 95,621,941

12,690,065

52,270,953

1904 .

. 89,688,123

12,393,382

46,174,835

1905 .

. 113,730,205

14,312,383

42,729,157

1906 .

. 151,268,522

18,689,622

42,142,058

1907 .

152,028,855

19,210,353

41,499,806

1908 .

. 147,769,024

18,971,436

46,660,082

1909 .

. 161,639,609

20,016,107

62,383,403

1910 .

. 163,832,544

20,921,103

59,057,547

1911 .

. 183,319,645

23,337,126

52,551,048

1912 .

. 216,393,206

28,297,467

64,982,249

1913 .

. 207,639,092

29,608,549

73,276,282

72,784.912

68,597,143

1914 .

1915 .

1916 .

. 191,647,570

239,678,725

260,805,939

26,316,313

32,459,641

43,027,371

72,628,539

80,624,207

79,640,929

Total .

. 3,125,084,848

$423,057,151

85,738,866 91,383,064 108,815,455 103,838,590 94,107,022 105,922,848 124,210,382 149,316,409 139,900,587 142,941,669 201,721,291

$3,309,510,589

This table includes all crude as well as manufactured oils shipped abroad during the

past 55 years. . ,

The following table gives the annual exports of illuminating oils only from July 1863 to 30 June 1916:

YEAR ENDING JUNE 30

1864 .

1865 .

1866 .

1867 .

1868 .

1869. . -

1870 .

1871 .

1872 .

1873 .

1874 .

1875 .

1876 .

1877 .

1878 .

1879 .

1880 .

1881 .

1882 .

1883 .

1884 .

1885 .

1886 .	
1887 .	
1888 .	
1889 .	
1890 .	
	Gallons
	12,791,518
	12,722,005
	34,255,921
	62,686,657
	67,909,961
	84,403,492
	97,902,505
	132,608,955
	122,539,575
	158,102,414
	217,220,504
	191,551,933
	204,814,673
	262,441,844
	289,214,541
	331,586,442

367,325,823

332,283,045

488,213,033

419,821,081

415,615,693

458,243,192

469,471,451

480,845,811

456,487,221

502,257,455

523,295,090

YEAR ENDING JUNE 30

1891 .

1892 .

1893 .

1894 .

1895 .

1896 .

1897 .

1898 .

1899 .

1900 .

1901 .

1902 .

1903 .

1904 .

1905 .

1906 .

1907 .

1908 .

1909 .

1910 .

1911 .

1912 .

1913 .

1914 .

1915 .

1916 .

Gallons

571,119,805

564,896,658

642,239,816

730,368,626

714,859,144

697,346,150

761,367,900

806,096,250

713,353,600

710,002,700

769,487,250

842,829,070

699,807,201

741,567,086

881,450,388

878,274,104

905,924,296

1,129,004,833

1,046,401,072

940,247,039

1,112,295,006

1,026,138,239

1,119,441,243

1,010,449,253

836,958,665

854,688,404

As stated, the manufacture of lubricating oil in the United States has reached a high degree of perfection. The recognition of this fact abroad is attested by the record of our exports

Petroleum as Fuel — With the largely in¬ creased supply of crude oil in 1913, its use as a fuel oil was considerably extended, particularly in the West and Southwest section of this country where the difficulty of obtaining coal as fuel has been greatest. Both locomotives and steamboats have been fitted for burning fuel oil. This is in some cases the crude itself, in others the residual after taking off the kerosene and lighter products — and in still others, the distillates too light for lubrication and too heavy for illuminating oils. The American merchant ships especially in the Pacific, depend almost entirely on petroleum as a fuel, and its popularity in the Atlantic coast¬ wise trade is making its use general there. However, in the States near the great bitu¬ minous coal mines where the solid fuel is ob¬ tained at relatively lower prices, oil is more expensive to burn for the generation of steam power than coal, though there are many uses to which the liquid fuel is adapted where it would not be possible to use coal. One-half the tonnage of the ocean-going steamers now being built in America are constructed with tanks for oil for fuel, an indication of the line of future development of American trade.

Some figures were published early in 1917 as to the needs of the United States navy for fuel oil, including 1923. For 1917 it was ex¬ pected that 1,475,000 barrels would be required and this quantity necessarily increased from year to year, so that in 1923 the volume to be provided would amount to 6,721,000 barrels. To take care of this supply the government has set aside certain claims in the West; some of it is proven territory which, it is believed, will take care of the needs of the navy. One of these fields is known as Reserve No. 2 and prob¬ ably contains above 400,000,000 barrels of oil.

Complete statistics of the consumption of petroleum as fuel in the United States are not available. Data compiled from reports by pipe¬ line companies show 48,868,000 barrels of do-

mestic crude petroleum were delivered for fuel purposes in 1915. In

addition more than 16,- 000,000 barrels of crude oil, much of which was used as fuel, were imported from Mexico; and indeterminate quantities of refinery prod¬ ucts of domestic oil found the same use. In the oil fields of the United States, no less than 3,191,000 barrels of crude oil, not recorded any¬ where, were consumed in drilling and pumping.

During 1916, 85 railroads, operating in 21 States and Territories, used fuel oil in whole or in part. The following table shows consump¬ tion for several years :

Statistics of Oil-Burning Raii.roads.

Length of line operated by use made of fuel oil	Total mileage No. of fuel oil-burning engines,	Average miles per bbl. oil consumed,
year barrels miles miles miles		
1906 . 15,577,655 . .		
1907 . 18,849,803 13,573 74,079,726 3.93		
1908 . 16,870,882 15,474 64,279,509 3.81		
1909 . 19,905,335 17,676 72,918,118 3.66		
1910 . 23,817,346 22,709 89,107,883 3.74		
1911 . 29,748,845 30,039 109,680,976 3.69		
1912 . 33,605,598 28,451 121,393,228 3.61		
1913 . 33,004,815 29,145 118,672,162 3.60		
1914 . 31,093,266 29,595 118,737,469 3.82		
1915 . 36,648,466 30,776 125,255,525 3.39		

1916 . 42,126,417 31,980 140,434,566 3.33

The following table shows the relative evap¬ orative values of various coals in comparison with petroleum. In addition, however, the labor item enters in deciding which is the more economical steam producer for the individual plant.

in the endeavor to determine the character of its effects. These experiments have seemed to prove that the deleterious effects noted have been caused only by the heavy oils and the residuum after distillation, the light oils being entirely harmless. The chief symptoms re¬ corded were an irritation and inflammation of the stomach with a few lacerations and blood clots on the lining membrane of the stomach and intestines in extreme cases. On the other hand the widespread use of refined heavy oil by multitudes of persons for the relief of sluggish action of the bowels indicates that ex¬ cept in large quantities the poisoning effects do not supervene. In excessive doses petroleum has been known to cause faintness with vertigo, headache and palpitation of the heart.

PETROLIA, Canada, town of Lambton County, Ontario, on the Michigan Central and the Grand Trunk railroads, 20 miles southeast of Port Huron. It is an important oil-pro¬ ducing centre, has numerous oil wells, refineries, etc., and manufactures of oil-well machinery, boilers, automobiles, wagons, machine-shop products, bricks, *etc.* It has also a hospital, pub¬ lic library, two parks and a business college. Pop. 3,518.

PETROLOGY, that branch of geology that treats of the origin, composition, texture, classi¬ fication and occurrence of rocks. Petrography is narrower, dealing only with composition, texture and classification, largely as revealed by the petrographic microscope. Lithology has been used as a svnonym for petrology, but is coming to be applied to a study of rocks with¬ out the microscope, but otherwise in the more

ONE POUND OF COMBUSTIBLE

Pounds of water evaporated at 212° F. per pound of combustible

Barrels of petroleum required to do the same amount of evaporation as tons of coal

Cost of coal per ton to equal petro¬ leum at $1 per barrel

Less 10 per cent, owing to the greater economy in handling petroleum

Petroleum, 18° to 40° …

16.0

Pittsburgh lump and nut, Pennsylvania .

10.3

4. 1

$4.10

$3.69

Pittsburgh nut. and slack, Pennsvlvania .

8.0

3.2

3.20

2.88

Anthracite, Pennsylvania .

9.8

3.9

3.90

3.51

Indiana block .

9.5

3.8

3.80

3.42

Georges Creek lump, Maryland .

10.0

4.0

4.00

3.60

New River, West Virginia .

9.7

3.8

3.80

3.42

Pocahontas lump, Virginia .

10.5

4.2

4.20

3.78

Cardiff lump, Wales .

10.0

4.0

4.00

3.60

Cape Rret.on, Canada .

9.2

3.7

3.70

3.33

Nanaimo, Rrit.ish Columbia .

7.3

2.9

2.90

2.61

Cooperative, Rritish Columbia .

8.9

3.6

3.60

3.24

Gret.a, Washington .

7.6

3.0

3.00

2.70

Carbon Hill, Washington .

7.6

3.0

3.00

2.70

One pound petroleum = 16 pounds of water evaporated from and at 212° F. One pound coal = 10 pounds of water evaporated from and at 212° F.

One pound petroleum = 1.6 pounds good coal.

(2,000) = 1,250 pounds petroleum = 2,000 pounds coal.

16 312 pounds petroleum = 1 barrel of petroleum.

(1,250) = 4 barrels petroleum = 2,000 pounds coal.

312

As these figures are based on equivalent weights, it follows that the fuel oils of low degree Baume or high specific gravity offer advantages both as to heat units per barrel and as to storage capacity required.

Florus R. Baxter,

Chief Chemist, Vacuum Oil Company.

PETROLEUM POISONING. Not a

few instances of poisoning by petroleum have been recorded in medical annals, and numerous experiments have been performed upon animals

restricted sense of petrography. See Optical Mineralogy ; Rocks and Geology.

PETRONIUS, pe-tro’nl-us, Arbiter, Ro¬ man author, identified as the man of unsavory reputation, known to be the favorite of Nero, at whose court he was arbiter elecjantiarum. The influence thus gained by Petronius made him an object of dislike to the all-powerful

Tigellinus. Accused of treason, he forestalled what he thought inevitable death by an eccen¬ tric suicide, opening his veins, but prolonging

life for some time by the application of bandages (66 a.d.). Such is a brief resume of the account by Tacitus in the/AnnalesP To this Petronius is generally assigned the book known as <Satira> or <Satiricon,) an incom¬ plete work of picaresque fiction in prose and verse, published in Paris in 1601 and in Amster¬ dam in 1663. The longest portion is the *Ban¬ quet of Trimalchio> ((Cena Trimalchioms), a satirical account of a dinner given by Trimalchio, a good-humored freedman and nouveau riche . The work is of interest from the fact that in the speech of many of the characters is preserved the sermo plebeius , or dialect of the lower classes, of which little remains. The best text is that of Biicheler (1862; smaller ed., 1895). There is an edition of the (Cena* with commentary, by Waters (1901) ; and an Eng¬ lish translation of it, with introduction by Harry Thurston Peck (New York 1898). Con¬ sult also Collignon, A., (Etude sur Petrone) (Paris 1892); Whibley. C., (Studies in Frankness> (New York 1912).

PETROPOLIS, pat-ro'po-les, Brazil, city of the state of Rio de Janeiro, 30 miles by rail from the city of that name. Virtually a health resort, it lies in the Serra d'Estrdla, was built in 1845 and settled by a German colony who named it in honor of Dom Pedro. It is a thriving and picturesque mountain city, with broad, clean streets, down some of which run little brooks. The buildings are of tasteful architecture, and hotels and sanitariums abound. The city is connected with Rio de Janeiro by two railway lines, and it is the favorite summer resort for the government officials and diplo¬ mats of the capital and for the elite of the en¬ tire country. Several attempts have been made to have Petropolis declared the capital of its state, but that distinction is firmly held by its commercial rival. Nichtheroy, on the coast. The city has varied manufactures and a population estimated at about 12,000.

PETROTOME. The petrotome is a ma¬ chine for cutting sections of rocks or fossils and is used both by mineralogists and biologists. Its

essential feature is a circular saw of some rather soft metal, like tin, without any teeth, but with the edge impregnated with diamond dust. The saw is run at such a tremendous speed that the centrifugal force keeps it rigid. A stream of cold water keeps the saw and the object from becoming too hot. In botany, it is used for cutting sections of petrified plants. Many fossils are mere impressions, or “casts/ which show only the form without internal structure; but some, designated as petrifactions, show both external form and internal struc¬ ture. The method of cutting thin sections of petrifactions is the same as for cutting granite or any other hard rock.

Let us suppose that a transverse section of a petrified stem a couple of inches in diameter is to be cut. First the stem is fastened in a rigid damp and a piece is sawed off so as to leave a fairly smooth surface. This surface is then polished by holding it on a revolving disc covered with polishing powder and water. The polished surface is now cemented to a glass slide. Dry white shellac, heated until it melts, is a good cement. The polished surface is pressed firmly into the cement. When it has become cool the object is again fastened in the

clamp and sawed off as close as possible to the glass slide. The section firmly cemented to the slide is now ground thinner and polished on the revolving disc until it is thin enough for microscopic observation. Any powder and dirt is carefully washed away. When the slide is perfectly dry a few drops of Canada balsam and a thin cover glass are added, and the mount is ready for use. Not only cell walls, but even the nuclei and other cell contents are easily shown in sections cut from Paleozoic rocks. Consult Chamberlain, C. J., (Methods in Plant Histology) ; Wieland, G. R., American Fossil Cycads) (Vol. I).

Charles J. Chamberlain.

PETRUCCI, pa-troo’che, Ottaviano de

-(“Petrutius Forosempronensis®), Italian printer: b. Fossombrone, near Urbino, Italy, 1466; d. 1539. He invented the art of printing music by means of movable types, each note being cast complete with a staff line. He estab¬ lished himself in Venice in 1491, and in 1498 was granted sole right to the use of his dis¬ covery for 20 years by the council of Venice. From 1498-1511 he prospered, but then at¬ tempted further experiments which proved so expensive that he was forced to sell his rights. He then removed to his native city, and from Pope Leo X secured rights for the papal states for 15 years, but never

achieved any consider¬ able success there. His process involved double printing, the staff lines being first laid on and then the notes in their proper position requiring the utmost nicety in execution. The specimens remaining of his work are exceedingly neat and exact and are both rare and valuable. His first work was (Harmonice Musices Odhecaton A/ It was printed in Venice in 1501. It com¬ prised a collection of 96 pieces arranged for three or four voices by eminent musicians of the time. He was very prolific, his publications following one another in rapid succession. A fine collection of his works is treasured at the British Museum.

PETRUCHIO, pe-troo'cho or -ki-6, in Shakespeare's (Taming of the Shrew, 5 a gentle¬ man of Verona, who becomes the husband of Katherine, Baptista's high-tempered daughter, known to her friends and neighbors as "the shrew/ Petruchio treats her with a mad turbulence even exceeding hers, in order "to kill her in her own humor/ Under all his roughness he preserves his own good nature, and in the end the "taming® of Katherine is complete. #

PETTENKOFER, pet'ten-ko-fer, Max Joseph von, German chemist: b. near Neuburg, 3 Dec. 1818; d. 10 Feb. 1901. He was gradu¬ ated from the University of Munich with the degree of M.D. in 1843. Following his gradua¬ tion he was associated with Liebig in his prepa¬ ration of meat extracts. In 1847 became pro¬ fessor of chemistry there, a post which he held until 1894. He was the earliest in Germany to give practical instruction in hygiene, which he began to do in 1866, and his name has since been associated with advances in that direction. He made many valuable contributions to science on subjects as various as gold-refining: gas-making, the manufacture of glass, ventilation, clothing, the influence of soils on health, epidemics, — his researches in regard to ventilation and cholera being of especial value. He also established the

connection of the rise and fall of subsoil water with the prevalence of typhoid. He was the first to demonstrate that cholera is propagated by a germ and that local conditions are largely responsible for the spread

of the disease. He published (Untersuchungen fiber die Verbreitungsart der Choilera) (1885) ; (Ueber den Luft-wechsel in Wohngebauden) (1858) ; (Populare Vortrage) ; (Beziehungen der Luft zu Kleidung, Wohnung und Boden) ; (Handbuch der Hy-gieneJ (1882), *etc.*

PETTIE, pet'i, John, Scottish genre pain¬ ter: b. Edinburgh, 17 March 1839: d. Hast¬ ings, 21 Feb. 1893. He exhibited for the first time in the Royal Scottish Academy (The Prison Pet> (1859); removed to London in

1862 and was elected associate to the Royal Academy in 1867 and Royal Academician 1875. His work as a historical painter was much ad¬ mired and his pictures sold well. Of the very large number which he produced only a few of the more prominent ones may be mentioned,

(Disgrace of Wolsey> (1869) ; 'Juliet and Friar Laurence) (1874) ; (Flag of Truce (1873) ; 'Duke of Monmouth before James II> (1882).

PETTIGREW, pet'i-groo, James John¬ ston, American soldier: b. Tyrrell County, N. G, 4 July 1828; d. Bunker Hill, Va., 17 July

1863 He was graduated from the University of North Carolina in 1847, was professor in the Naval Observatory at Washington for a year when he resigned to study law in Charleston,

S C. He was admitted to the bar in 1849. Early in 1850 he went to Germanv where he spent about two years in the study of law, and afterward traveled extensively. For a tew months he acted as secretary of legation at Madrid, returning in 1852 to Charleston where he practised law with much success. In 18oo he was elected to the legislature, where he vigorously opposed the slave trade. Foreseeing the Civil War he went in 1859 to Italy in order to acquire knowledge of arms in the Sardinian army, but they had been withdrawn from active service He then returned to South Carolina and engaged in drilling a regiment of riflemen. With this regiment he took possession of Castle Pinkney in December 1860, immediatelv upon the secession of his State. After ˆ opening of the Civil War he proved himself an able engineer in the construction of batteries and was appointed brigadier-general in the Confederate army in 1862. He defended Richmond against General Stoneman in 1863 and aline battle of Gettysburg led his brigade in Hills corps against the Iron brigade. He »as m command of Heth's division on the third day and participated in the famous charge on Cemetery Ridge. In the retreat which followed the -battle he

was fatally wounded. His book, Spain and the Spaniards,) was published in 1861.

PETTIGREW, Richard Franklin, Amer¬ ican lawyer and political leader: b. Ludlow, Vt., 23 Tuly 1848. He was educated at Beloit Col¬ lege, Wisconsin, and at the law school of the University of Wisconsin. In 1869 he went to Dakota as surveyor in the United States service, and located at Sioux Falls, where he en¬ gaged in surveying and real estate business. It was not until 1872 that the population of that section had increased to the degree that h could enter upon the practice of law. He be came prominent also in public life; was a mem¬

ber of the legislative council of Dakota 1877-81 : represented the Territory in Congress in 1881-83; was a member of the Constitutional Convention in 1883, and of the Territorial Coun¬ cil in 1884-85. After the admission of South Dakota as a State he was elected to the United States Senate on the Republican ticket, where he served two terms, from 1889 to 1901. In 1896 he left the Republican party on account of its opposition to the free coinage of silver and its attitude toward the trusts, and in the elec¬ tions of that year and of 1900 supported Bryan for the Presidency. After the Spanish War he led the opposition in the Senate against the annexation of the Philippines and the imperial¬ istic policy. Besides his political activities he took a leading part in civic and industrial enter¬ prises, building the Sioux Falls street railways and the Sioux Falls Terminal Railway, and organizing the Sioux Falls Stock Yards and the Midland Pacific Railroad, extending from Sioux Falls through Wyoming and Idaho to Puget Sound.

PETTITS, Edmund Winston, American legislator: b. Limestone County, Ala., 6 July 1821 ; d. Selma, Ala., 27 July 1907. Pettus was educated at Clinton College, Tennessee. In 1842 he was admitted to the bar and began the practice of law at Gainesville, Ala. From 1842 to 1855, except for a short time when in Cali¬ fornia, Pettus was district solicitor. From 1855 58 he was circuit judge. In the Mexican War he served as a lieutenant. When Alabama se¬ ceded in 1861 Pettus was sent as commissioner to Mississippi, of which State his brother was governor. He entered the Confederate army as major and rose to be brigadier-general in the Western army. After the war he devoted him¬ self to his profession until 1897 when he was elected to the United States Senate. He was reelected in 1903 without opposition.

PETTY, pet'i, Sir William, English politi¬ cal economist : -b. Romsey, Hampshire, 26 May 1623; d. London, 16 Dec. 1687. He showed great

precocity in carpentry and other mechan¬ ical trades, and went to sea in his early teens. Suffering a broken leg on ship board he was left by the sailors on a sparsely settled section of the coast of France, where he devoted him¬ self to teaching until he had acquired funds to enter the Jesuit College at Caen. Heˆ later studied at the universities of Utrecht and Am¬ sterdam and then took a course in medicine at Leyden and at Paris. Returning to England he entered the Royal navy, but during the Civil War lived on the Continent. In 1648 he was instructor in anatomy and chemistry at Ox¬ ford* in 1651 filled the chair of anatomy there, at the same time holding a professorship m music at Gresham College, London, and in 1652 he was appointed physician to the army in Ireland, a post in which he achieved renown in his skilful reorganization of the medical serv¬ ice He was secretary to Henry Cromwell when the latter was lord-lieutenant of Ireland but upon the Restoration soon gained the confidence of Charles II, who appointed him surveyor-general of Ireland and knighted him. lie was thus the founder of the Lansdowne family He was a founder of the Royal Society and one of the leading political economists of the dav receiving the title of ((The Father of Eng¬ lish' Economics." He published Political Anat-698

omy oi ' Ireland } (1672) ; 'Observations upon the Cities of London and Rome) (1687); 'Political Arithmetic* (London 1683-89). His 'Economic and Statistical Writings) were gathered and published by Charles H. Hull in 1894; and another ˆedition by the University Press, Cambridge, England, in two volumes in 1899. His history of the survey of Ireland, 'The Down Survey, *was published by the Irish Archaeological Society in 1851, at Dublin. Consult Bevan, W. L., 'Sir William Petty) (Baltimore 1894) ; Carroll, W. G., 'The Lansdowne Irish Estate and Sir William Petty* (Dublin 1881) ; Fitzmaurice, E. C. P., 'Life of Sir William Petty * (London 1895).

PETTY OFFICER, a rank among the en¬ listed men of the navy analogous to the non¬ commissioned officers of the army. Such officers are comparatively more numerous in the navy and receive a higher rate of pay than the army non-commissioned officers. They are also eligible to promotion to warrant rank, and un¬ der certain conditions are commissioned as ensigns.

PETTY SESSIONS, Court of. See

Court.

PETUNIA, pe’tu-ny’a, one of the most pop¬ ular of garden flowers on ‘account of its pro¬ fusion of bloom under almost all conditions of soil and culture. A defect in the habit of the plant is its tendency to sag down on the ground after reaching a modest height, and sprawl about, with, however, many upright flowering branches. This feature is not objectionable where the plants are massed, and in the dwarf varieties, like the little Countess of Ellesmere group, is practically absent. In other uses the plants may be potted and trained to stakes, the pots being sunk in the ground.

From the 16 known natural species the florists have, through hybridizing, obtained re¬ markably beautiful and rich shades of crimson and rose in which lingers hardly a trace of the objectionable magenta of earlier days. There are also to be found among them magnificent shades of purple, and one group is decorated with a distinct yellow throat. A profusion of blotched, striped, penciled and spotted varieties have been produced, and these are peculiarly effective when massed, as well as interesting individually. Another section has its ample corollas deeply ruffled and fringed, as well as variegated. The grandiflora or large-flowered type bears great ruffled flowers five inches or more across, the throats often veined and stained with a characteristic blackish purple. Double varieties, produced in the first instance as sports, have been multiplied by fertilizing the single and semi-double flowers with the pollen of the best doubles. The seed thus ob¬ tained will produce from 25 to 40 per cent of fine double-flowering plants, and the remainder of the seedlings are apt to be the choicest of the single blooms-. Double petunias of fine form and habit are propagated by cuttings, and thus an endless succession of the best types pre¬ served.

Petunias thrive best in deep rich soil and abundance of sunshine. In the ORen ground they bloom continuously from June to Septem¬ ber. For early flowering the seeds are sown in a hotbed and transplanted into the borders when the weather has become settled warm.

They are quite tender and are stunted by low temperatures. The seeds may be sown directly in the open border when the ground has be¬ come warm. For winter blooming in pots it is customary to strike cuttings from the bedded plants in early September and bring them

along under glass protection.

The wild species are mostly natives of Brazil, Argentina and southern South America, al¬ though one is Mexican and one, P. parviflora, has become naturalized in the southern States. They are perennial herbs belonging to the order Solanacecz, with opposite leaves and axillary blossoms. The species which have been most used in the production of the modern garden petunias are P. yiolacea, which is probably not now in cultivation as a pure species, and P. nyctagina flora , which may be found in some old gardens. The former has purplish-violet blossoms; the latter, white.

PETZITE, a telluride of silver and gold (AgAu)2Te. Carrying from 18 to 25.6 per cent of gold and 40.7 to 46.8 per cent of silver. An important ore in San Juan and other districts, Colorado, and in several mines in California.

FtLUEKBACH (PURBACH or PEUR-BACH), Georg von, Austrian astronomer and mathematician: b. Peurbach, 30 May 1423; d. 8 April 1461. He studied at Vienna and de¬ livered astronomical lectures in the principal cities throughout Europe, later becoming pro¬ fessor of astronomy at the University of Vienna. He prepared a table of sines, which probably were the basis for the modern decimal fraction, but he died before it was done, and his pupil, Regiomontanus, completed it. He was also astronomer to the king of Hungary, and prepared for him a list of planets and the fixed stars. His chief works, published after his death, were 'Theoricae novae Planetarum* (1472); 'Tabulae Ecclipsium* (1514).

PEUTINGER'S (poi'ting-erz) TABLE (Tabula Peutingeriana) , a popular name for a Roman chart showing the military roads of the world, drawn, it was formerly believed for Theodosius the Great in the 3d century. In the original it was in 12 sheets. It is so called after Conrad Peutinger, a German scholar (1465-1547). Among his papers was this famous ˆP> evidently a copy by a monk at Colmar in 1265. Conrad Celtes, who found it in the Bene¬ dictine monastery of Tegernsee, borrowed and did not return it. Such a mappa mundi in rotulo was extant in that convent in 1502 Celtes bequeathed this map to Peutinger, who intended to publish it, but his death intervened. After his death it disappeared for many years until Mark Welser published fragments of it* The manuscript of the map is at present in the imperial library at Vienna, where an additional leaf of it was some time ago discovered. The chaiacters and figures show that the map is

not the original. Docen thinks that it belongs to the 12th century. Impressions have been published by Mannert (Leipzig 1824), Desjardins u ans 1ˆ69-70) and Miller (Ravensburg 1888), the last on a reduced scale.

PEVERIL OF THE PEAK, a novel by Sir Walter Scott, published in 1823. The time of the story is the reign of Charles II, and the action takes place in the Peak region of Derbyshire and on the Isle of Man. The story

is built around Sir Geoffrey Peveril, of the Peak, as the principal character.

PEWEE, a popular name given to several species of American flycatchers of the subfamily Tyrannina ?, the typical Tyrant-birds or king¬ birds. The common pewee or Phcebe-bird (Sayornis fuscus), is seven inches long and nine and one-half inches in wingspread. The general color is dull olive brown above, darkest on the head and yellowish white below with a brownish hue on the breast ; quills brown, most of the wing feathers edged with dull white; tail forked, the outer edge of the lateral feather dull white; bill and feet black. This lively species is found throughout eastern North America, from Newfoundland to Florida, and as far west as eastern Wyoming and Colo¬ rado. The pewees winter generally in the Southern States, but some go to Mexico, Central America and the West Indies. In the Middle States it arrives from the south early in April and gets out a first brood by the middle of May; it leaves again for the south in October, migrating by night. Though the pewees mate for life they do not migrate together, the one first returning waiting near the old nest till its mate arrives. The nest resembles that of the barn swallow, being made of mud, grasses and moss, lined with softer materials and at¬ tached to a rock, wall or rafter. The rough stone piers of a country-bridge are so often chosen that a widespread name for the bird is “bridge-pewee® The owners sometimes re¬ pair the same nest

year after year; the eggs, four to six, are white, with a few reddish spots at the larger end; the young are hatched out on the 13th day, and leave the nest in 16 more; the parents show great affection for them, snapping the bill and darting boldly toward all intruders. The flight of this bird is rapid, with frequent sailings; it is fond of vibrating the tail, erecting the crest and mak¬ ing a tremulous motion with the wings, feeds on insects, which it takes with great dexterity and rapidity on the wing, swallowing them whole, and, after digestion, ejecting the hard parts. The pewee though offish with human beings is fearless of them, and becomes in a measure sociable upon extended acquaintance , ,

The wood pewee (C onto pus virens) is six

and one-half inches long and 10*4 in extent of wings, the wings extending beyond the tip ot the tail; the general color above is brownish olive ‘ brownish black on the head ; two pale grayish bands across the wings ; a narrow white circle around the eyes; greenish yellow below, with a grayish tinge on the throat and breast. Its range is about the same as that of the phcebe-bird. It is fond of forests and shady orchards. The flight is swift, with sudden sweeps in pursuit of its insect prey. Its notes are low, mellow and sweetly melancholy when in its favorite haunts; its common name, like that of others of the subfamily, is derived from its utterance of the syllables ((pe-wee or often in three notes, as <(pe-a-wee, plaintively prolonged. The nest of this fly¬ catcher is a tiny cup of soft materials covered by lichens, and so apparently a part of the branch upon which it sits as to be seen with difficulty; the eggs are four or five, light yel¬ lowish. with reddish spots at the larger end ,

in the Middle States two broods are raised in a season; it boldly attacks man, beast or bird approaching its nest.

Several other dark-colored flycatchers of this group are called ((pewee)) in various parts of the country, and most of them resemble the examples given above in general habits.

PEWS (Old French, pui, from Latin, po¬ dium, a balcony), enclosed stalls, or, also, open seats in a church devoted to the sole occupancy of a person or family. In the early part of the 14th century worshippers in churches were accustomed to stand or to sit on the floor. A little later they were provided with short three-legged stools. But from 1450 onward mention is found in church records of “pues.® The title of <(

reading Pue® was given in those days to the elevated stall which held the reading desk. Pews were in use before the Reforma¬ tion in England and are held by their occu¬ pants in the Established Church, by two tenures : first, by prescriptive right, when they descend as an heirloom ; second, all pews not so held are at the disposal of the bishop of the diocese for use and benefit of the parish, and are un¬ der him assigned by the church wardens to the parishioners according to their rank. The bishop may grant the right to sit in a par¬ ticular pew. In the disposal of the pews or seats in the area of parish churches in Scot¬ land parishioners have a preferable claim ac¬ cording to the valued amount of their rent. The disposal of pews or seats in churches of other denominations is a matter of private ar¬ rangement. They are common)ˆ rented to .de¬ fray the congregational expenses. In the United States pews are the property of the church corporation, who can sell or lease them. Whether property in pews is real or personal depends upon the provision made in the statutes of the different States. A purchaser or lessee of a pew may maintain an action at law for trespass or disturbance in the enjoyment of his right. The usual church practice under its rules is to reserve owned and leased pews only for a limited period after the commencement of a regular service. If they are not then occupied by the owner or lessee, they are at the disposal of the ushers for seating other attendants at the service.

PEWTER, a generic term for a variety of alloys, of which tin forms the predominating component. The ordinary pewter is tin alloyed with lead, in the proportion of four parts to one. Specimens of the old Roman pewter left in England at the time of the Roman occupa¬ tion of that country show a variance in com¬ position ranging from 99 per cent tin to. 1 per cent lead, for the richest, to 46 per cent tin and 53 per cent lead, with a little copper. Generally, however, the proportions were either 71.5 per cent tin to 27.8 per cent lead or 78.2 per cent tin to 21.7 per cent lead.

Specimens of early English pewter show a composition of 112 parts tin to 26 parts cop¬ per, with no lead, for what is called . fine pewter.ˆ Another formula is 84 parts tin, 7 parts antimony and 4 parts copper. A lower quality has 56 parts tin, 8 parts lead, 6 parts copper and 2 parts zinc. The harder alloys were used for articles subject to the greatest strains in their use, as in bowls and dishes. For mugs and tankards a somewhat softer

alloy was prepared ; that is one containing more lead in proportion to the tin.

As early as 1348 the guild of pewterers in Great Britain were allowed to make a set of rules by which all pewterers were governed, and these rules were enforced on the trade by law; the intent being to prevent a debasement of the metal by so large a proportion of lead as to render it liable to poison any acid food standing in it.

In the manufacture of pewter three processes were employed. The metal was cast, spun on a lathe, or hammered. Molds were generally of gun metal or brass, and on account of the large expense of making them were passed about from shop to shop, each paying a proportion for their use. The decline of pewter followed upon the cheap production of pottery and china ware on the one hand, and of the activity of the silversmiths on the other. The pewterers for a time imitated the designs of the silver¬ smiths, but the metal was not suited to this work, and lost a large part of its artistic value in consequence.

A revival of interest in pewter had begun by several English societies just before the War broke out in Europe. There is so much of historical and artistic value in the old pewter that it offers a fair field for collectors, and with the return of peace a renewal of the pur¬ suit is to be anticipated.

Bibliography. — Bell, Malcom, (01d Pewter5 (London 1906) ; Markham, C. A., (Pewter Marks and Old Pewter Ware5 (London 1909) ; Masse, R. J. L., (Chats on Old Pewter5 (Lon¬ don 1911) ; Moore, N. H., (The Pewter Col¬ lector's Manual5 (London 1907) ; Welch, C., (History of the Worshipful Company of Pew¬ terers of the City of London5 (2 vols., Lon¬ don 1902) ; Wood, L. I., (Scottish Pewter Ware and Pewterers5 (Edinburgh 1904).

PEWTER-MUGGERS, in American his¬ tory, a popular name given to a New York fac¬ tion of the Democratic party which was opposed to the Tammany candidates in 1828. Their meetings being held in a Frankfort Street re¬ sort, where liquors were served in pewter-mugs the name was affixed by their opponents.

PEYER'S (pi'erz) PATCHES or GLANDS (also called Peyerian Glands), in anatomy, aggregate oval patches on the surface of the mucous membrane lining the bowels, and surrounded by simple follicles, with flattened villi occupying the interspace. They are situ¬ ated near the lower end of the small intestine (ileum), and their ulceration is the pathogno¬ monic characteristic of enteric or typhoid fever. In health they are indistinct, groups about four inches in length and half an inch across. They were discovered and described in 1677, by Johann Konrad Peyer, a Swiss anatomist.

PEYOTE, pa-yo'ta, a small cactus (Lopho - phora wiUiamsii) abundant in the southwestern United States and northern Mexico, formerly used by all the native redmen of that region as an exhilarant in connection with certain cere¬ monies, and as a remedy for various ailments ; and is still so used among the remaining In¬ dians and Mexicans. The effect is to produce a delightful and apparently non-injurious languor accompanied by a stimulated imagination. Some tribes look upon the plant as of divine origin and treat it with veneration. The name is de¬

rived from the Aztec word peyotl, and was originally applied to a composite plant of south¬ ern Mexico.

PEYTON, pa'ton, Jesse Enlows, Ameri¬ can patriot and promoter : b. Maysville, Ky., 10 Nov. 1815; d. Haddonfield, N. J., 28 April 1897. He first came into prominence in 1843-44 through his secret and successful effort to raise $40,000 to relieve Henry Clay from the seizure of his estate by creditors. He was one of the founders of the Constitutional Union Party in 1860 and was sent by President Lincoln on a mission to Kentucky to dissuade that State from seceding. The first regiment in the Civil War to reach Washington was a cavalry force that Mr. Peyton had raised in New Jersey, and of which he was quartermaster. He also organized two other regiments for the Union army, the 3d and 11th Pennsylvania cavalry. He was instrumental in promoting the centennial of Independence Day (Philadelphia 1876) ; Bunker Hill Day (1875) ; Yorktown Day (1881) ; and of the inauguration ot American constitutional government. He was also the prime mover in the World's Columbian Exposition, held at Chi¬ cago, Ill., in 1893. At the time of his death he was attempting to organize an international celebration of the birth of Christ, to be held in Jerusalem in 1900. He was the author of (Reminiscences of Philadelphia during the Past Half Century5 (Philadelphia 1888).

PEZET, pa’that’, Federico Alfonso, Peru¬ vian diplomat: b. London, 1859. He received his education in England and at the Lima Mili¬ tary Academy ; entered the army, and saw serv¬ ice in the war with Chile, in which he was taken prisoner. In 1884-86 Pezet was Spanish editor of the Panama Star and Herald, and in the latter year entered the diplomatic service of his country, becoming consul at Panama. Sub¬ sequently he served as consul successively at Liverpool, London and New York. In 1902-09 he was charge d’affaires and consul general at Panama, was Minister to Panama in 1909, and in 1909—12 was envoy extraordinary to Central America and Panama. Pezet was appointed Peruvian Minister to the United States in 1912. He has published (Peru: Its Commerce and Resources5 (1893); (The Question of the Pacific5 (1901) ; (What the Panama Canal Means to Peru5 (1911) ; ‘Handbook of Peru for Investors and Immigrants.5

PFAFERS, pfa’fers, or PFEFFERS, pfef’- fers, Switzerland, a small health-resort in the canton of Saint Gall and 31 miles east of the village of that name. It is famous for its warm baths, situated in the vale of the Tamina, in one of the most extraordinary gorges in Switzerland. Its permanent population is about 600. The baths are built on a narrow ledge of rock a few Jeet above a rushing mountain tor¬ rent, the buildings which form them consisting of two structures connected by a chapel so deeply sunk between the rocks that the sun in the longest summer day is visible above them only from 10 to 4 o’clock. The spring is heavily impregnated with chlorides, and has a tempera¬ ture of nearly 100° F. Since 1840 the water has been conveyed by pipes to the village of Ragatz (q.v.) below the gorge, a distance of about two and one-half miles, without losing its warmth. Near the village is situated the

ancient Benedictine abbey of Pfeffers, a vast edifice, built in 1665, and now used as a lunatic asylum under the name of Saint Pirminsberg. The abbot of this institution in the 10th century enjoyed independence of the civil government of the duchy. Up to 1838 the baths were con¬ trolled by the abbey.

PFAFF, pfaf, Christian Heinrich, German phyiscian and physicist : b. Stuttgart, 2 March 1772; d. Kiel, Holstein, 24 April 1852. His interest in electricity was first awakened by the celebrated experimenter Gross. He was graduated as a physician at Stuttgart in 1793 and then went to Gottingen, where he published the results of his galvanic inquiries in (Ueber thierlsche Electricitat und Reizbarkeit.* In 1797 he became an extraordinary professor at Kiel and in 1801 was made professor of chem¬ istry, physics and medicine there with rank at the same time as a member of the medical faculty. He then directed his attention partic¬ ularly to pharmaceutical chemistry, and was thus led to the composition of his most impor¬ tant work, (System der Materia Medica nach chemischen Principien) (1808-24). Among other writings of his are (Handbuch der analy-tischen Chemie) (1824ˆ25) ; (Ueber und gegen den thierischen Magnetismus) (1807) ; (Der Electromagnetismus) (1824) ; (Parallele der chemischen Theorie und der voltaischen Con-tacttheorie der galvanischen Kette) (1845).

PFEIFFER, pfif'er, Ida Laura Reyer,

Austrian traveler: b. Vienna, 14 Oct. 1797 ; d. there, 27 Oct. 1858. She received the education usually given a boy and was married in 1820 to Dr. Pfeiffer, a lawyer connected with the Austrian government. Her first long journey was a trip to Palestine and Egypt when she was but five years old. The influence of this experience remained with her, and upon the death of her husband in 1842 she determined to travel. In that year she made a tour which included the Holy Land, Constantinople, Cairo, Arabia and the Red Sea, the Mediterranean and Rome, and later she again visited the Holy Land. In 1845 she visited Scandinavia and Ice¬ land, and in 1846-48 made a tour of the world traveling in Brazil, Chile, China, India, Persia, Armenia, Caucasus and Turkey, and in 1851-55 made a tour which included England, South Africa, the Malay Archipelago, Australia and North and South America. Her last long jour¬ ney was to Madagascar in 1856 and after many hardships and a narrow escape from death fol¬ lowing imprisonment at the hands of Queen Ranavalona I, she returned to Vienna. Her travels covered 160,000 miles of sea routes and over 21,000 miles on land; a record which had never been approached by any woman traveler up to the time of her death. Among her works which have been translated into English are (Journey of a Viennese to the Holy Land) (1843); (Journey to the Scandinavian North and Iceland> (1846); (A Woman's Journev Round the World) (1852) ; <A Lady's Second Journey Round the WorlcP (2 vols., 1855); (Last Travels: Inclusive of a Visit to Mada¬ gascar (posthumously 1861).

PFENNIG, a German monetary unit, equal to one-hundredth part of a

mark. There are bronze coins of the value of one pfennig and two pfennige, or about one-fourth cent and one-half cent respectively. Nickel coins valued

at five and 10 pfennige are also in use, anti in silver a coin of 50 pfennige, or about 11 cents.

PFEUFER, pfoi'fer, Karl von, German physician: b. Bamberg 1806; d. 1869. He se¬ cured his professional education at the univer¬ sities of Erlangen and Wurzburg; practised eight years in Munich, from 1840 to 1844 was professor at Zurich, from 1844 to 1852 at Heidel¬ berg, and from 1852 to 1869 at Munich. Pfeu-fer acquired an international reputation for his rational system of explanation of pathological and other conditions. He published (Ueber die Cholera Epidemie in Mittenwalde) (1837) ; (Zum Schutz wider die Cholera) (1849; 3d ed., 1854) and important contributions to the Zcit-schrift fur rationelle Medizin5 (1844 et seq.).

PFISTER, pfis'ter, Albrecht, German printer : b. Bamberg, Germany, about 1420 ; d. there about 1470. He was engaged in card¬ painting in Bamberg and about 1455 began printing with movable type. It has been claimed for him by some writers that he is the real inventor of the art of printing, but whether he invented his process or learned it as an assist¬ ant of Gutenberg has been a matter of doubt. His types, though similar to Gutenberg's, have some peculiarities. Lie printed prayer and school books, some of which are still in exist¬ ence, as are also (Indulgences) printed with metal types in the years 1454-55, an almanac of 1457 and a (Biblia Pauperum) (1462). His crowning achievement was his Latin 36-line Bible in three volumes and comprising 881 leaves. These were printed in part with worn type which, it is claimed, was formerly in use bv Gutenberg. In Pfister's books published about 1461 appear the first known printed illus¬ trations, in the form of crude woodcuts. Con¬ sult Dziatzko, (Gutenbergs friiheste Drucker-praxis) (1890).

PFLEIDERER, pfli'der-er, Otto, German Protestant theologian : b. Stetten, Wiirtemberg, Germany, 1 Sept. 1839; d. Berlin, 20 July 1908. He was educated at Tubingen, and later in England and Scotland, and entered the minis¬ try, serving at Tubingen and Heilbronn. In 1870 he became chief pastor and superintendent at Jena, and later was made professor of the¬ ology there. In 1875 he became professor of systematic theology at the University of Ber¬ lin, a post which he held till his death. He be¬ came widely known as a writer and lecturer, his

inclinations being toward a liberal theology. His lectures in London in 1858 and in Edin¬ burgh in 1894 were published in English. Among his works are (Die Religion, ihr Wesen und ihre Geschichte) (2 vols., 1869-78) ; (Re-ligionsphilosophie auf geschichtlicher Grund-lage) (1878—93) ; (Geschichte der Religionsphil-osonhie von Spinoza bis auf die Gegenwart> (1893); (Evolution and Theology) (English, 1900) ; (The Early Christian Conception of Christ* (1905) ; (Religion und Religionem) (1906) ; (Christian Origins) (Huebach's trans¬ lation, appeared in 1906) ; and (The Develop¬ ment of Christianity* (by the same translator, in 1910).

PFLUGK-HARTTUNG, pfloog' har'toong, Julius Albert G. von, German historian : b. Warnikow, Germany, 8 Nov. 18ˆ8. He was educated at Bonn, Berlin and Gottingen, ac¬ cepted the chair of history in the University of Basel in 1883 which he held until 1893 when

he was made head of the Secret State Archives at Berlin. He is an authority on mediaeval and papal history and has published (Studien zur Geschichte Konrads IP (1876-77) ; 'Norwegen und die deutschen Seestadte) (1887) ; (Krieg und Sieg 1870-7P (1895); (Die Bullen der Papste bis zum Ende des zwolften Jahrhun-derts5 (1901) ; (Weltgeschichte) (6 vols., 1907— 10) ; (Das Befreiungsjahr 1813 > (1913) ; cBelle-Alliance-verbiindetes Heer) (1915). A num¬ ber of his important works have been translated into English, among them The Great Migration and (The Early Middle Ages — by Wright* (Philadelphia 1902) ; and (The Franco-Ger¬ man Warp by General Maurice (London 1900).

PFORZHEIM, pforts'him, Germany, the fourth largest (1914) city of Baden, 15 miles southeast of Carlsruhe, on the northern edge of the Black Forest, at the junction of the Wurm, the Nagold and the Enz. Among its buildings are the remains of an ancient castle, formerly the

residence of the margraves of Baden-Durlach ; the castle church, dating from the 12th century, containing the tombs of many of the margraves; the townhouse, a handsome building, rebuilt in 1892-95 ; the post office ; a fine museum, a gymnasium, and many other educational institutions. The chief industry of the place is the manufacture of cheap jewelry, which employs over 22,000 hands. There are also chemical works, machine-works, forges, tanneries, copper-works, bleachfields, paper-mills, oil-mills, sawmills, *etc.* The trade in wood is important, the timber being floated by the Enz and Neckar to the Rhine. There is also a considerable trade in oil, fruit, wine and cattle. The inhabitants distinguished them¬ selves in the Thirty Years' War. Reuchlin, one of the most distinguished precursors of the Reformation, was born here. Pop. 73,786.

PFUHL, pfool, Johannes, German sculp¬ tor : b. Lowenberg, Silesia, 1846. He was edu¬ cated at the Academy of Fine Arts in Berlin and later became an assistant of Schievelbein, under whom he had studied, and after his mas¬ ter's death in 1867 completed his designs for the bronze memorial in the Donhoffsplatz, Ber¬ lin. His work includes several portrait busts, but his best work is seen in his colossal groups in relief. He has executed a frieze in rilievo in commemoration of the Franco-Prussian War, in the Military School of Lichterfelde (1876); an equestrian statue of William I, with Bis¬ marck and Von Moltke, in Gorlitz (1893) ; the Laube monument at Sprottau (1895); the Goethe monument (1902) ; the standing group of William I and Frederick (1902); the Wil¬ liam I, of the Reichstag building (1905) ; and many others.

PHiEDO, fe'do, or PHiEDON (Gr. <pai6uv), philosopher : b. Elis. Having been captured in his youth, he was sold as a slave, and was brought to Athens by his owner b.c. 400. Freed through the influence of Socrates, he became one of his favorite students. After the death of Socrates, Phaedo remained for a time at Athens and then returned to Elis, and there founded a school of philosophy of which no definite knowledge remains. The dialogue of Plato on the immortality of the soul, which con¬ tains the last conversation of Socrates with his scholars while he was in prison, bears his name; but no inference can be drawn from it as to

his teaching. None of Phaedo's writings, which were in the form of dialogues, have come down to us; but Seneca, in his (Epistolae ad Lucilium,) has a translation of an extract from one of his works. Mendemenus, who founded the Eretrian branch of the Eleatic school,

was in¬ directly a disciple of Phaedo, but to what ex¬ tent he expressed the views of his teacher has not been determined. (See Socrates). Consult <Life) by Mendelssohn (Leipzig 1871).

PHZEDRA, fe'dra, in Greek mythology, daughter of Minos, king of Crete and of Pasi-phae, was the sister of Ariadne and wife of Theseus. Happening to meet Hippolytus, her step-son, whom she had never before seen, and whom she did not know to be the son of The¬ seus, she was inflamed with an ardent passion for the youth. He would not reciprocate, and ' to satisfy her revenge she accused him to her husband of a criminal attempt upon her honor. The father cursed his son, and Neptune soon carried his execrations into effect by bringing upon Hippolytus a violent death. When this event was known in Athens, Phaedra repented of her crime and hanged herself. Seneca in his <Phaedra) and Euripides in (Hippolytus) have taken Phaedra as the subject of their tragedies, now lost.

PHAEDRUS, fe'drus, Roman author. Lit¬ tle is known of him but from his own writings. He was a slave brought from the Pierian district of Macedonia to Rome, and manumitted by Augustus. By the publication of the first two books of his (Fables) he drew upon himself the ill-will of Tiberius' minister, the all-powerful Sejanus, who imagined that he saw in the fables reflections upon himself and Tiberius. The re¬ maining books did not appear until after the death of Tiberius in b.c. 37. Phaedrus intro¬ duced the fable into Latin literature, and a prose version of his work, prepared by one Romulus, was the basis of the mediaeval fable. He was less a translator than an imitator — not always skilful — of 2Esop, from whom only a small proportion of his material is taken. The five books remain in an imperfect state. They are written with more or less fluency in the iambic senarius, and exhibit great purity of style. It seems from contemporary records that Phaedrus was not appreciated in his own period. The best editions of the fables of Phaedrus are those of Bentley (1726), Orelli (1832), Koch (1846), Lucien Muller (1877), Riese (1885) and Havet (1895). Besides the above fables some have ascribed to Phaedrus another group of 32, the ˆEpitome Fabularum* or (Fabulae Novae, > published from a manuscript of N. Perotti, arch¬ bishop of Manfredonia in the 15th century. The genuineness of these is doubtful. It is at least certain that among the genuine are many writ¬ ten by others. Consult Hervieux, <Les Fabu-listes Latins * (1893-96).

PH.7EQPHYCE.7E, fe'5-fi-se'e, a division of Algce (q.v.) containing the brown seaweeds, whose color is due to the pigment phycophaein. The group is almost wholly marine, and mainly inhabits the cold seas, flourishing especially in the polar regions. The group includes the

great kelps (q.v.) and other large-leaved forms, many of which have commercial value, or do an important service in protecting shores against excessive erosion. The various <(rock-weeds® and ((gulf-weeds® also belong here. The sim-

plest Phceophycece, however, consist of single filaments. Reproduction takes place in a very variable manner. A sexual reproduction is the only means known in some forms, such as the kelps. It takes place by motile ciliated spores. Elsewhere sexual and asexual reproduction ex¬ ist concomitantly. The sexual reproduction may vary between the fusion of equal free-swimming gametes and the fertilization of a non-motile egg by motile sperms. This latter mode of reproduction may form a stage in a definite alternation of sexual and asexual gentrations, or as in the case of Fucus, it may be the only mode of reproduction.

PHAER, or PHAYER, fa'er, Thomas, English author: b. Kilgerran, Wales, about 1510; d. there, 1560. He had a legal training and studied medicine at Oxford. He settled at Kilgerran in Pembrokeshire where he prac¬ tised both professions ; publishing two popular handbooks of law, and a number of booklets on medical subjects. From 1544 onward he wrote considerable poetry which was published locally. He translated in heroic ballad metre the first nine books of the ZEneid, publishing seven books in 1558, but died before the com¬ pletion of the other two. Oxford gave him the degree of M.D. a year before his death.

PHAETHON, fa'e-thon, in Greek mythol¬ ogy, according to the myth most generally ac¬ cepted, the offspring of Helios and Clymene, and brother of the Heliades. To please his un¬ fortunate mother, and to satisfy those who doubted whether the Sun were his father, he desired the latter to grant him a favor. Helios imprudently promised it unconditionally. Phaethon asked permission to take his father's place as driver in the chariot of the Sun, and would not be denied. But he had scarcely mounted the flaming car and taken the reins, when the celestial horses, despising the weakness of their mortal charioteer,

turned out of the path, and set everything on fire. The Ethiopians, on the left, were blackened by the near approach of the sun ; and when the chariot careened danger¬ ously over the earth to the right, Zeus with his bolts plunged the helpless driver into the river Eridanus or Po. His sisters found him there lifeless, and lamented him. They were changed into poplars, and their tears into amber. The god of the sun was also called Phaethon (the enlightener).

PHAETON, the tropic-bird (q.v.).

PHAGOCYTOSIS, a process of destruc¬ tion of foreign bodies by living cells. The term was originated by Metchnikoff, the Russian scientist, who founded upon the process a theory of immunity to disease. He observed that in many infectious diseases there was an increase in the number of leucocytes or white blood-cells in the body. These were observed to be greatly increased in the neighborhood of an infected area, and he further noted that these leucocytes were capable of enveloping or swal¬ lowing as it were the invading bacteria, and de¬ stroying them by a process of intercellular diges¬ tion. The enveloped substance might, however, resist digestion, in which case it would be dis¬ gorged after an interval; or the organism swallowed might be the stronger and destroy the cell which engulfed it, and multiply at its expense. The white blood-cells were early termed by Metchnikoff the protecting army of

the interior, which always stood ready to annihilate the bacterial foe. He explained in-flammatic as a phagocytic reaction of the animal organism against an irritant, the phagocytes swarming to the affected locality, settling about the noxious bacteria and swallowing them. The injection of protective serums has been sup¬ posed by some to act through arousing the phagocytes to unusual activity. While this early theory rested upon a mechanical basis, and is now accepted only as to that view, it has never¬ theless stimulated an immense amount of re¬ search along this line, and the general theories of phagocytosis are broader now than formerly, including distinct chemical reactions. It is now known that not all leucocytes are phagocytes; the lymphocytes are not ; the eosinophiles are never phagocytic, although they are elements in the struggle of the body against infecting foreign bodies. The polynuclear and hyaline leucocytes are the chief agents in phagocytosis. It is further recognized that some of the fixed cells of the body have some phagocytic power. The endothelium that lines the blood-vessels can take up and destroy bacteria. Many epi¬ thelial elements, as in the mammary glands, and in the respiratory mucous

membranes, can de¬ stroy bacteria ; otherwise infections would be much more frequent than they are. The phe¬ nomenon of phagocytosis has been shown to be a much more complicated one than Metchnikoff at first supposed, but he has been able to defend and develop his theory with much skill in view of the many recent studies on immunity. It is certain that phagocytosis is an important mechancial process in the struggle with disease, but it is only one of the many biological agencies utilized by the body in this conflict. See Blood; Immunity; Inflammation.

PHALANGERS, fa-lan'jers, a group of small polyprotodont marsupials, which owe their name to the fact that the slender fourth and fifth toes of the hind feet are united in a com¬ mon integument. They have thick wooly coats of such density as to repel a charge of shot from an ordinary gun. The great toes are opposable, and are destitute of nails, the other digits being provided with curved nails. Some varieties have prehensile tails. The phalangers are about the size of the house cat, and are adapted for an arboreal life. They inhabit the trees of the forests of Australia and the Pa¬ puan Archipelago. They are nocturnal in. habits, and feed upon fruits and leaves, but some varieties also devour grubs and young birds. In confinement they are found to prefer flesh as an article of diet. They are eaten by the natives of the countries in which they occur, although the flesh is said to emit a strong and offensive odor.

These animals are grouped in a family (PhalangeridcB) which is composed of several subfamilies. The Tarsipedina contains the genus Tarsipes alone. In the Phalangerince are included 10 or 12 genera and numerous species, among them the typical phalangers, the flying-phalangers and the flying-mouse. The largest of them is the ˆvulpine® or true phalanger, exampled by Trichosurus vulpecula, the size of a small fox. The flying phalangers are provided with a parachute-like expansion of the skin be¬ tween the fore and hind limbs ; by which they can make long skimming leaps from tree to tree as do the flying-squirrels of northern

countries. The foremost genus is Petaurus, and the best known species is P. breviceps, which bears a remarkable resemblance to an American flying squirrel, but is somewhat larger. The flying-mouse is the minute Acro-bates pygmceus, which is not more than six inches long, including the plume-like tail. The koala and wombat (qq.v.) are also phalangers.

PHALANGES. See Anatomy ; Osteology.

PHALANGIID7E, fal-an'jid-e, a family of arachnidans, the daddy-longlegs (q.v.) or har¬ vestmen, one of six families of the order Pha-langida, or with scorpions and false scorpions constituting the order Arthrogastra of Packard. The distinguishing feature is the fact that the abdomen is distinctly six-segmented, instead of the usual nine, but the cephalo thorax is unseg¬ mented. The legs are very long in most species though relatively short in others, and are many-jointed. The pedipalps are short and leg-like, the last segment with a claw at the end, and the chel